

Keysight Technologies B1505A Power Device Analyzer/Curve Tracer



Configuration and
Connection Guide

Notices

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Manual Part Number

B1505-90090

Edition

Edition 1, June 2009
Edition 2, November 2009
Edition 3, May 2010
Edition 4, August 2010
Edition 5, February 2011
Edition 6, September 2012
Edition 7, April 2013
Edition 8, September 2015
Edition 9, November 2015
Edition 10, December 2015
Edition 11, July 2019
Edition 12, November 2020
Edition 13, September 2022

Published by:

Keysight Technologies Japan K.K.
9-1, Takakura-cho, Hachioji-shi, Tokyo
192-8550 Japan

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In This Document

This document provides the following information about Keysight B1505A Power Device Analyzer/Curve Tracer.

1. [Configuration Guide](#)

Describes how to configure the B1505A.

2. [N1259A Connection Guide](#)

Describes how to connect the B1505A, the N1259A Test Fixture, and a device under test (DUT).

3. [N1265A Connection Guide](#)

Describes how to connect the B1505A, the N1265A Test Fixture, and a device under test (DUT).

4. [N1272A and N1273A Connection Guide](#)

Describes how to connect the B1505A, the N1273A Capacitance Test Fixture, and a device under test (DUT).

5. [Connection Guide for Wafer Prober and Your Own Test Fixture](#)

Describes how to connect the B1505A, accessories, and a DUT interface such as wafer prober and your own test fixture.

6. [Accessory Dimensions](#)

Describes dimensions and weight of accessories.

7. [Connection and Ordering Examples](#)

Describes prober connection and ordering examples.

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1 Configuration Guide

Keysight B1505A Power Device Analyzer/Curve Tracer can meet the requirements of modern power devices evaluations. You can configure a B1505A system from a wide variety of measurement resources that best meets your needs today and also permits expansion in future. Please specify the B1505A's module configuration and accessories you desire properly.

This chapter is a guide for configuring your B1505A system, and consists of the following sections.

- "Measurement Resources"
- "B1505A Mainframe Furnished Accessories"
- "B1505A Modules and Mainframe Options"
- "N1259A Test Fixture for Power Device"
- "N1265A Ultra High Current Expander/Fixture"
- "N1266A High Voltage Source Monitor Unit Current Expander"
- "N1267A High Voltage Source Monitor Unit / High Current Source Monitor Unit Fast Switch"
- "N1268A Ultra High Voltage Expander"
- "N1271A Thermal Test Enclosure and Related Accessories"
- "Pre-configured Power Device Analyzer/Curve Tracer (B1505A with Modules/Fixture)"
- "Accessories for Wafer Prober and Your Own Test Fixture"
- "Other Accessories"
- "Retrofit Products for B1505A"
- "Conversion Kit from B1500A to B1505A"
- "Upgrade Kit for N1259AU Test Fixture"
- "Upgrade Kit for N1265AU Test Fixture"
- "Note for 4142B Users"

Measurement Resources

Keysight B1505A can be equipped with the following measurement resources.

- “HPSMU - High Power SMU”
- “HCSMU - High Current SMU”
- “HVSMU - High Voltage SMU”
- “MPSMU - Medium Power SMU”
- “MCSMU - Medium Current SMU”
- “UHCU - Ultra High Current Unit”
- “HVMCU - High Voltage Medium Current Unit”
- “UHVU - Ultra High Voltage Unit”
- “MFCMU - Multi Frequency CMU”

Figure 1-1 B1505A Measurement Resources

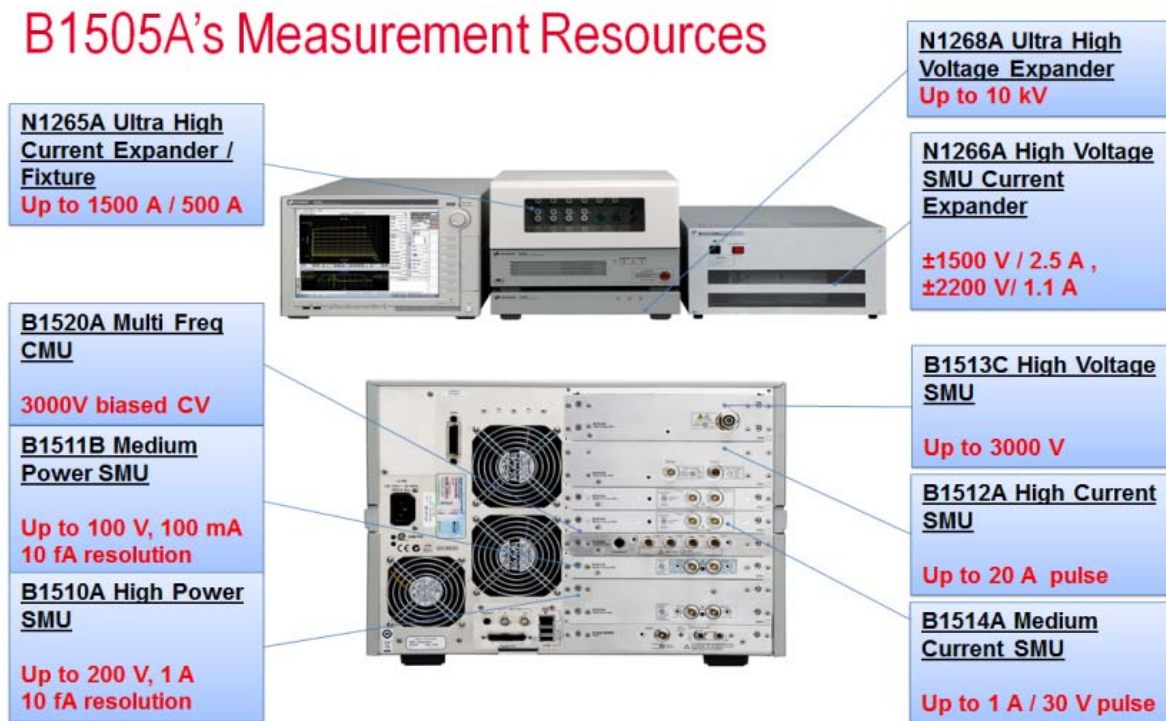







Table 1-1 B1505A Measurement Resource Selection Guide

Measurement Resource	Required Module/Expander	Main Specification
High Power SMU	B1510A HPSMU	<ul style="list-style-type: none"> Up to 200 V, 1A force 10 fA current resolution
Medium Power SMU	B1511B MPSMU	<ul style="list-style-type: none"> Up to 100 V, 100 mA force 10 fA current resolution
High Current SMU	B1512A HCSMU	<ul style="list-style-type: none"> 20 A/20 V (Pulsed); 1A/40 V (DC)
High Voltage SMU	B1513C HVSMU	<ul style="list-style-type: none"> 1500 V/8 mA;3000 V/4 mA (Pulsed & DC)
Medium Current SMU	B1514A MCSMU	<ul style="list-style-type: none"> 1 A/30 V (Pulsed); 100 mA/30 V (DC)
Ultra High Current Unit	N1265A Ultra High Current Expander/Fixture and two units of B1514A MCSMU/B1512A HCSMU	<ul style="list-style-type: none"> 1500 A/60 V (Pulsed), 22.5 kW peak power 500 A/60 V (Pulsed), 7.5 kW peak power
High Voltage Medium Current Unit	N1266A HVSMU Current Expander, B1513C HVSMU and two units of B1514A MCSMU/B1512A HCSMU	<ul style="list-style-type: none"> 1500 V / 2.5 A (Pulsed), 2200 V/ 1.1 A (Pulsed)
Ultra High Voltage Unit	N1268A Ultra High Voltage Expander and two units of B1514A MCSMU or a combination of a B1512A HCSMU and a B1514A MCSMU	<ul style="list-style-type: none"> 10 kV/20 mA (Pulsed);10 kV/10 mA (DC)
Multi Frequency CMU	B1520A MFCMU	<ul style="list-style-type: none"> 1 kHz to 5 MHz 0 to ± 25 V using internal DC bias 0 to ± 3000 V using HVSMU and High Voltage Bias-Tee

B1505A Mainframe Furnished Accessories

The B1505A is furnished with the accessories listed in the following tables. **Table 1-2** lists the accessories for the B1505A mainframe. And **Table 1-3** lists the measurement cables available for and furnished with the plug-in modules. Number of the furnished cables depends on the number of modules installed in the mainframe.

Table 1-2 **Furnished Accessories**

Description	Qty.		Description	Qty.	
16493J Interlock cable ¹	1		16493L GNDU cable ¹	1	
16444A-001 USB keyboard	1		16444A-002 USB mouse	1	
16444A-003 Stylus pen	1				
Description	Qty.	Note			
License sheet	1	License-to-use for Desktop EasyEXPERT Standard edition			
Label	1	The label is used to specify the SMU number. Only for the B1505A installed with SMU.			
Power cable	1				

1. Cable length 1.5 m or 3.0 m is specified by B1505A cable length option (B1505A-015 or -030).

Table 1-3 Measurement Cable Furnished with Modules

	Description	Quantity
	16494A Triaxial cable, for MPSMU, HPSMU and MCSMU	2 ea./ module
	16493T HVSMU cable, for HVSMU	1 ea./ module
	16493S HCSMU cable, for HCSMU	1 ea./ module
	16493S-010 HCSMU Kelvin adapter, for HCSMU	1 ea./ module
	N1300A CMU cable, for MFCMU	1 ea./ module

B1505A Modules and Mainframe Options

The B1505A can contain several combinations of modules; up to four dual-slot HPSMU modules, up to ten MPSMU, up to two dual-slot HCSMU modules, up to five dual-slot HVSMU, up to six MCSMU and one single-slot MFCMU.

- Select the modules to be installed in the B1505A mainframe
See [Table 1-4](#) for the plug-in modules supported by the B1505A.
- Specify cable length, 1.5 m or 3 m
See [Table 1-5](#) for the options available for the B1505A.
- Select power line frequency, paper manual, rack mount kit, service options, and so on
See [Table 1-5](#) for the options available for the B1505A.

Table 1-4 Plug-in Modules Supported by B1505A

Module type	Description	Slots occupied	Maximum number of modules installed in B1505A
HPSMU ¹	High Power Source/Monitor Unit module	2	4
MPSMU	Medium Power Source/Monitor Unit module	1	10
HCSMU ^{1, 2}	High Current Source/Monitor Unit module	2	2
HVSMU ³	High Voltage Source/Monitor Unit module	2	5
MCSMU	Medium Current Source Monitor Unit module	1	6
MFCMU	Multi Frequency Capacitance Measurement Unit module	1	1
GNDU ⁴	Ground Unit	-	-

1. Total number of installed HPSMU and HCSMU modules cannot exceed 4.
2. Dual HCSMU (DHCSMU) configuration is available if two HCSMU modules are installed in one mainframe and connected to the 16493S-020 Dual HCSMU Kelvin adapter or the 16493S-021 Dual HCSMU adapter. This configuration expands the maximum current up to ± 40 A (pulse), ± 2 A (DC).
3. For B1513C only. Multiple B1513A/B1513B HVSMU modules cannot be installed in one mainframe.
4. GNDU has been installed in the mainframe. You do not need to count for the number of slots occupied.

Table 1-5 Mainframe Options

Description	Model/ Option	Note
Mainframe		
Power Device Analyzer/Curve Tracer	B1505A	<ul style="list-style-type: none"> See Table 1-3 on page 1-6 for furnished accessories
Select modules (optional)		
High Power Source/Monitor Unit module (HPSMU), 200 V/1 A	B1510A-FG	<ul style="list-style-type: none"> Furnished with two triaxial cables (16494A). Cable length 1.5 m or 3.0 m is specified by 015 or 030. Up to four modules can be installed. The total number of installed HPSMU and HCSMU modules cannot exceed 4.
Medium Power Source/Monitor Unit module (MPSMU) , 100 V/100 mA	B1511B-FG	<ul style="list-style-type: none"> Furnished with two triaxial cables (16494A). Cable length 1.5 m or 3.0 m is specified by 015 or 030. Up to ten modules can be installed.
High Current Source/Monitor Unit module (HCSMU), 20 A at 20 V	B1512A-FG	<ul style="list-style-type: none"> Furnished with one pair of high current cables (16493S) and Kelvin adapter (16493S-010). Cable length 1.5 m or 3.0 m is specified by 015 or 030. Up to two modules can be installed. The total number of installed HPSMU and HCSMU modules cannot exceed 4.
High Voltage Source/Monitor Unit module (HVSMU), 3000 V at 4 mA	B1513C-FG	<ul style="list-style-type: none"> Furnished with one HVSMU cable (16493T). Cable length 1.5 m or 3.0 m is specified by option 015 or 030. Up to five modules can be installed.
Medium Current Source Monitor Unit module (MCSMU), 1 A at 30 V	B1514A-FG	<ul style="list-style-type: none"> Furnished with two triaxial cables (16494A). Cable length 1.5 m or 3.0 m is specified by 015 or 030. Up to six modules can be installed.
Multi Frequency Capacitance Measurement Unit module (MFCMU)	B1520A-FG	<ul style="list-style-type: none"> Furnished with one CMU cable (N1300A). Cable length 1.5 m or 3.0 m is specified by option 015 or 030. Up to one modules can be installed.
Specify the cable length (mandatory)		
1.5m cable	015	<ul style="list-style-type: none"> Same cable length is applied to all furnished cables.
3.0m cable	030	

Description	Model/ Option	Note
Specify the power line frequency (mandatory)		
50Hz line frequency	050	
60Hz line frequency	060	
Select calibration options (optional)		
ANSI Z540 compliant calibration	A6J	
Commercial calibration certificate with test data	UK6	
Select rack mount kit (optional)		
Rack mount kit	1CM	

Module type and locations

Module locations when the B1505A is shipped from the factory are shown in [Table 1-6 on page 1-10](#). This table shows the relative locations by the module types.

If HPSMUs are installed, the HPSMUs must be installed in the slots from the slot number 1. And if HPSMU and MPSMU and MFCMU are not installed and MCSMUs are installed, the MCSMUs must be installed in the slot number 1. Then the same type of modules must be installed in the contiguous slots.

For example, if the module configuration is one MFCMU, three MCSMUs, one HCSMU and one HVSMU, the B1505A will be shipped with the MFCMU of the slot 1, the MCSMUs of the slot 2 to 4, the HCSMU of the slot 5 to 6, the HVSMU of the slot 7 to 8, and the blank panels of the slot 9 to 10.

Table 1-6 **Module Installation Rule in the Factory**


Slot Number and Location		SMU type and port number
10	top	B1513A/B/C High Voltage SMU (HVSMU)
:	:	B1512A High Current SMU (HCSMU)
:	:	B1514A Medium Current SMU (MCSMU)
:	:	B1520A Multi Frequency CMU (MFCMU)
:	:	B1511A/B Medium Power SMU (MPSMU)
1	:	B1510A High Power SMU (HPSMU)
0	bottom	GNDU/ADC (Always installed)





NOTE After module installation at Keysight Service Center, the B1505A will be returned with the module configuration defined by the rule shown in the **Table 1-6**. If you want to change the module locations, consult the service personnel before servicing.

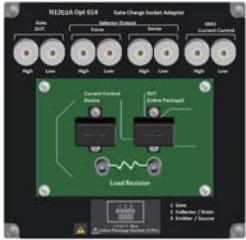


N1259A Test Fixture for Power Device





The N1259A is a test fixture used for package device measurements. It supports up to 3 kV and 40 A. The following table lists the accessories available for the N1259A test fixture. Select the required accessories. If you add options later, please refer to "[Upgrade Kit for N1259AU Test Fixture](#)" on page 1-65.



Table 1-7 N1259A Test Fixture options and accessories


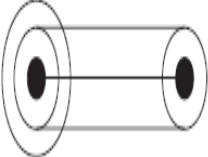
Model/Option	Description	Additional Information
N1259A	Test Fixture for Power Device	<ul style="list-style-type: none"> N1259A-001 is a mandatory option. Please select options that meet your needs.
N1259A-001	Test Fixture for Power Device	<ul style="list-style-type: none"> Mandatory option The N1259A-001 is furnished with Kelvin socket module for inline package device (N1259A-010), four black connection wires (N1259A-509) and six red connection wires (N1259A-508). The N1259A-001 has a built-in GNDU protection adapter and a built-in HPSMU protection adapter inside. 

Model/Option	Description	Additional Information
N1259A-010	Inline Package Socket Module (3 pin)	<ul style="list-style-type: none"> The N1259A-001 Test Fixture for Power Device is furnished with a N1259A-010 socket module. The N1259A-010 cannot be used with the N1265A Ultra High Current Expander / Fixture. Max voltage and current are 3 kV and 40 A. 
N1259A-011	Universal socket module for power device	<ul style="list-style-type: none"> Maximum voltage is 3 kV. 
N1259A-012	Blank PTFE board	
N1259A-013	Curve tracer test adapter socket module	<ul style="list-style-type: none"> The N1259A-013 is the same as the N1265A-013 Curve Tracer Test Adapter Socket Module. Maximum voltage and current is 3 kV and 500 A. 

Model/Option	Description	Additional Information
N1259A-014	Gate charge socket module	<ul style="list-style-type: none"> The N1259A-014 is the same as the N1265A-014 Gate Charge Socket Module. The N1259A-014 option is furnished with the following wires: <ul style="list-style-type: none"> - Four red long wires (N1254A-508) - Four black long wires (N1254A-509) - Two red short wires (N1265-61751) - Two black long wires (N1265-61752) Maximum voltage and current is 3 kV and 20 A. 
N1259A-020	High Voltage Bias-Tee	<ul style="list-style-type: none"> The N1259A-020 option is furnished with two SHV-SHV cables (N1254A-512) and two SHV-banana adapters (N1254A-513). The N1259A-020 is a built-in factory-installed accessory of the N1259A-001. 
N1259A-021	1 M Ω R-box	<ul style="list-style-type: none"> R-box can be replaced with other R-box easily by N1259A users. 
N1259A-022	100 k Ω R-box	
N1259A-030	1 k Ω R-box	
N1259A-035	Universal R-box	
N1259A-300	Module Selector	<ul style="list-style-type: none"> Furnished with a 1.5 m digital I/O control cable (16493G-001), maximum 35VA The N1259A-300 is a built-in and factory-installed option for the N1259A-001.

Model/Option	Description	Additional Information
N1254A-508	Connection wire, red 1 ea.	<ul style="list-style-type: none"> The N1254A-508/509 Connection Wire supports 40A current, but does not support 500 A/1500 A current flow on the N1265A Ultra High Current Expander/Fixture. Maximum voltage and current is 3 kV and 40 A. The cable length is 250 mm. 
N1254A-509	Connection wire, black 1 ea.	
N1254A-510	Dolphin clip adapter, black 1 ea. and red 1ea.	
N1254A-511	Cable lug adapter, black 1 ea. and red 1ea.	
N1254A-512	SHV to SHV cable 350 mm, 1 ea.	<ul style="list-style-type: none"> The N1259A-020 High Voltage Bias-tee is furnished with two N1254A-512 cables. The N1254A-513 adapter is required to connect the banana plug. 

Model/Option	Description	Additional Information
N1254A-513	SHV to banana adapter, 1 ea.	<ul style="list-style-type: none"> The N1259A-020 High Voltage Bias-tee is furnished with two N1254A-513 adapters. An N1254A-513 adapter is used with an N1254A-512 cable to connect a banana plug. 
16493G-001	Digital I/O control cable (1.5 m)	<ul style="list-style-type: none"> The N1259A-300 Module Selector option is furnished with a 16493G-001 cable. Cable length 1.5 m or 3.0 m can be specified by option 001 or 002. 
16493G-002	Digital I/O control cable (3.0 m)	


Model/Option	Description	Additional Information
16493S-021	Dual HCSMU combination adapter, for 40 A measurement	<ul style="list-style-type: none"> • Output connectors are compatible with B1512A HCSMU. • The 16493S-021 is furnished with one 30cm Triaxial cable and one 30 cm High current coaxial cable for output connection. • Do not connect or put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. Connecting or locating conductor of circuit common, chassis ground, or any potential on causes the measurement error. 
N1254A-104	Triax (f) to BNC (m) adapter	<ul style="list-style-type: none"> • This adapter is required when a B1514A MCSMU is connected to the HCSMU ports of the N1259A Fixture. This adapter is used for Force terminal. 




NOTE The N1259A-020 high voltage bias-T and/or the N1259A-300 module selector can be installed in the N1259A-001 test fixture later. For upgrade kit, please refer to "[Upgrade Kit for N1259AU Test Fixture](#)" on page 1-65. Keysight Technologies service center is responsible for N1259AU-020 and N1259AU-300 installation.

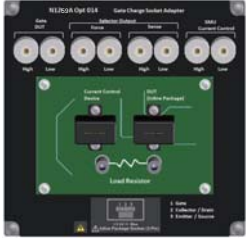

N1265A Ultra High Current Expander/Fixture




The N1265A expands the B1505A's current capability up to 1500 A. Current expansion is made using the Ultra High Current Unit (UHCU), which is comprised of a current expander in the N1265A and two MCSMU's which are connected to I/V control ports of the N1265A. The MCSMU used for the I/V controller can be substituted by the HCSMU. The following table lists the accessories available for the N1265A Ultra High Current Expander/Fixture. Select the required accessories. If you add options later, please refer to "[Upgrade Kit for N1265AU Test Fixture](#)" on page 1-69.






Table 1-8 Options and accessories for N1265A Ultra High Current Expander/Fixture





Model/Option	Description	Additional Information
N1265A	Ultra High Current Expander/Fixture	<ul style="list-style-type: none"> The N1265A-001 is a mandatory option for the N1265A. Please select options that meet your needs. The N1265A UHC Expander/Fixture does NOT have a built-in Bias-Tee option like the N1259A Test Fixture. The N1260A High Voltage Bias-Tee is necessary for capacitance measurement.
N1265A-001	Ultra High Current Expander/Fixture	<ul style="list-style-type: none"> Mandatory option A 500A current amplifier and a built-in module selector are included mandatorily. The N1265A-001 is furnished with a 1.5 m Digital I/O control cable (16493G-001), a Blank Silicon Plate and a power code. <div style="text-align: center;">  </div>



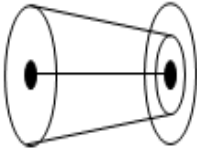
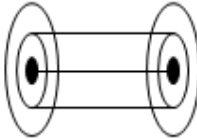
Model/Option	Description	Additional Information
N1265A-010	500 A Ultra High Current 3-pin Inline Package Socket Module	<ul style="list-style-type: none"> The N1265A-010 is furnished with total six cable shown below N1252A-522 1500A Ultra High Current Banana to Banana Cables (Yellow, 2ea) for Collector/Drain and Emitter/Source force lines N1265-61751 Test Lead (Banana), 180mm (Red, 1ea) and N1265-61752 Test Lead (Banana), 180mm (Black, 1ea.) for Collector/Drain and Emitter/Source sense lines N1254A-508 Banana to Banana cable, 250mm (Red, 1ea), N1254A-509 Banana to Banana cable, 250mm (Black, 1ea) for Base/Gate force/sense lines Maximum voltage and current is 3 kV and 500 A. 
N1265A-011	Universal socket module for power device	<ul style="list-style-type: none"> Maximum voltage is 3 kV. 
N1265A-013	Curve tracer test adapter socket module	<ul style="list-style-type: none"> The N1265A-013 is the same as the N1259A-013 Curve Tracer Test Adapter Socket Module. Maximum voltage and current is 3 kV and 500 A. 


Model/Option	Description	Additional Information
N1265A-014	Gate charge socket module	<ul style="list-style-type: none"> The N1265A-014 is the same as the N1259A-014 Gate Charge Socket Module. The N1265A-014 option is furnished with: <ul style="list-style-type: none"> - Four red long wires (N1254A-508) - Four black long wires (N1254A-509) - Two red short wires (N1265-61751) - Two black long wires (N1265-61752) - Two yellow high current banana-banana cable (N1254A-522) Maximum voltage and current is 3 kV and 500 A. 
N1265A-015	1500 A Current Option	<ul style="list-style-type: none"> 1500 A upgrade can be made later by ordering a B1505AU-015 1500 A upgrade kit.
N1265A-035	Universal R-Box	<ul style="list-style-type: none"> A desired register can be installed by soldering. 

Model/Option	Description	Additional Information
N1265A-040	10 kV Ultra High Voltage Gate Protection Adapter	<ul style="list-style-type: none"> This adapter is used to protect a B1514A MCSMU module used for a Gate driver from device breakdown when making ultra high voltage measurement with the N1268A UHV Expander The B1514A MCSMU module has to be connected to a passthrough port of the N1265A UHC Expander/Fixture, not a module selector port. 
N1265A-041	Thermocouple, Type K, 2ea	<ul style="list-style-type: none"> Include two Type-K thermocouples 
N1265A-045	Container for Protection Adapter and Bias Tee	<ul style="list-style-type: none"> An N1260A High Voltage Bias-tee and N1261A Protection Adapters can be placed in this container to avoid messy cabling. 
Calibration options		
N1265A-A6J	ANSI Z540 compliant calibration	
N1265A-UK6	Commercial cal. Certificate with test data	
Connection accessories inside the N1265A		

Model/Option	Description	Additional Information
N1254A-508	Connection wire, red 1 ea.	<ul style="list-style-type: none"> • Max voltage and current are 3 kV and 40 A. • The N1254A-508/509 Connection wire does not support 500A/1500A current flow on the N1265A Ultra High Current Expander/Fixture. Use the N1254A-522 1500A Ultra High Current Banana to Banana cable. • Cable length is 250 mm. 
N1254A-509	Connection wire, black 1 ea.	
N1254A-510	Dolphin clip adapter, black 1 ea. and red 1ea.	
N1254A-511	Cable lug adapter, black 1 ea. and red 1ea.	
N1254A-520	10 kV Ultra High Voltage Open End Cable, 1 m.	<ul style="list-style-type: none"> • One-side 10kV UHV/SHV and the other-side open end 
N1254A-522	1500 A Ultra High Current Banana to Banana Cable, 2 ea.	<ul style="list-style-type: none"> • Max voltage and current are 3 kV and 1500 A. • The N1265A-010 500 A Ultra High Current 3-pin Inline Package Socket Module is furnished with these cables. 

Model/Option	Description	Additional Information
N1254A-523	1500 A Ultra High Current Banana to Open End Cable, 1 m, 2 ea	<ul style="list-style-type: none"> Max voltage and current are 3 kV and 1500 A. 
16493G-001	Digital I/O control cable (1.5 m)	<ul style="list-style-type: none"> The N1265A-001 is furnished with a 16493G-001 cable. Cable length 1.5 m or 3.0 m can be specified by option 001 or 002. 
16493G-002	Digital I/O control cable (3.0 m)	
For capacitance measurement		
N1260A	High Voltage Bias-Tee	<ul style="list-style-type: none"> The N1265A does not have a built-in high voltage bias-tee option like the N1259A. The N1260A is required to make capacitance measurement with the N1265A. The N1260A-STD is a mandatory option. The N1260A High Voltage Bias-Tee is not furnished with any cables. 
N1254A-512	SHV to SHV cable 350mm, 1 ea.	<ul style="list-style-type: none"> The N1254A-513 SHV Jack to Banana Adapter is required to connect a banana plug. 

Model/Option	Description	Additional Information
N1254A-513	SHV to banana adapter, 1 ea.	<ul style="list-style-type: none"> The N1254A-513 adapter is used with the N1254A-512 cable to connect the banana plug. 
N1254A-518	SHV Cable 1.5 m, 1 ea	
Adapters		
N1254A-103	Triaxial (m) to BNC (f) adapter	<ul style="list-style-type: none"> This adapter is needed when a B1512A HCSMU is connected to a voltage/current controller SMU port or Gate port or SMU ports of the N1265A. This adapter is used for Force terminal. 
N1254A-517	Adapter, Triax Jack to Triaxial Plug	<ul style="list-style-type: none"> This adapter is needed when a B1512A HCSMU is connected to a voltage/current controller SMU port or Gate port or SMU ports of the N1265A. This adapter is used for Sense terminal. 



Model/Option	Description	Additional Information
For on-wafer measurement		
N1254A-524	500 A Ultra High Current Prober System Cable	<ul style="list-style-type: none"> • The N1254A-524 cable is furnished with one transparent shield with a slit. • Maximum current range is about 800 A or more. • Cable length is 1.8 m. 

NOTE The N1259A-010 Inline Package Module (3 pin) and N1259A-011 Universal Socket Module cannot be used with the N1265A Ultra High Current Expander/Fixture.

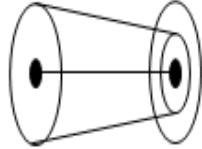
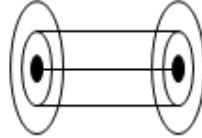
N1266A High Voltage Source Monitor Unit Current Expander

The N1266A expands HVSMU current up to 2.5 A. Current expansion is made using the High Voltage Medium Current Unit (HVMCU), which is comprised of N1266A, HVSMU (B1513A, B, or C) and two MCSMUs which are connected to I/V control ports of the N1266A. The MCSMU used for the I/V controller can be substituted by the HCSMU. The following table lists the accessories available for the N1266A High Voltage Source Monitor Unit Current Expander. Select the required accessories.

Table 1-9 Accessories for N1266A Ultra High Current Expander/Fixture

Model/Option	Description	Additional Information
N1266A	High Voltage Source Monitor Unit Current Expander	<ul style="list-style-type: none"> The N1266A is furnished with 1.5 m Digital I/O control cable (16493G-001) and a power code. The N1266A does not include a 16493T High Voltage Source Monitor Unit Cable and a 16493L GNDU Cable. Order a 16493T-001/002 and a 16493L-001/002 separately. <div style="text-align: center;">   </div>
Calibration options		
N1266A-A6J	ANSI Z540 compliant calibration	
N1266A-UK6	Commercial cal. Certificate with test data	

Model/Option	Description	Additional Information
Related cables		
16493G-001	Digital I/O control cable (1.5 m)	<ul style="list-style-type: none"> The N1266A is furnished with a 16493G-001 cable. Cable length 1.5 m or 3.0 m can be specified by option 001 or 002. 
16493G-002	Digital I/O control cable (3.0 m)	
16493L-001	Ground Unit Cable (Triaxial, 1.5 m)	<ul style="list-style-type: none"> Cable length 1.5 m or 3.0 m can be specified by option 001 or 002. 
16493L-002	Ground Unit Cable (Triaxial, 3.0 m)	
16493T-001	High Voltage Source Monitor Unit Cable (1.5 m)	<ul style="list-style-type: none"> The 16493T-001/002 supports up to 3000V. Cable length 1.5 m or 3.0 m can be specified by option 001 or 002. 
16493T-002	High Voltage Source Monitor Unit Cable (3.0 m)	

Model/Option	Description	Additional Information
Adapters		
N1254A-103	Triaxial (m) to BNC (f) adapter	<ul style="list-style-type: none"> This adapter is needed when a B1512A HCSMU is used as a voltage/current controller of the N1266A instead of MCSMU. This adapter is used for Force terminal. 
N1254A-517	Adapter, Triax Jack to Triaxial Plug	<ul style="list-style-type: none"> This adapter is needed to use a B1512A HCSMU as a voltage/current controller of the N1266A instead of MCSMU. This adapter is used for Sense terminal. 

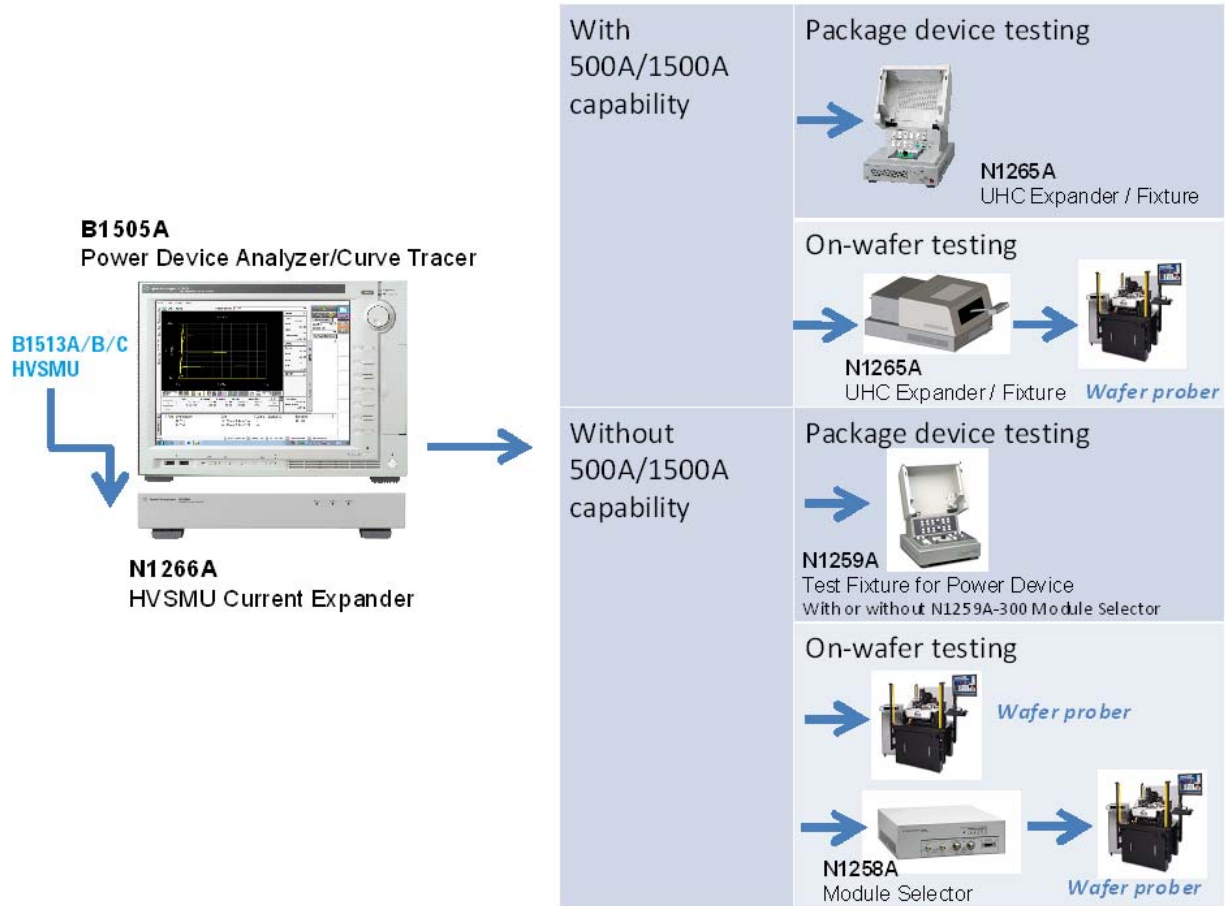
N1266A Compatibility with Fixture and Module Selector

The N1266A can be used with the N1265A Ultra High Current Test Fixture, N1259A Test Fixture for Power Device and N1258A Module Selector for B1505A. **Table 1-10** shows the equipment list which is compatible with the N1266A for package device testing and on-wafer device testing environment.

Table 1-10 **N1266A Compatibility with Fixture and Module Selector**

Test Environment	Supported Fixture and Module Selector
Package device testing	<ul style="list-style-type: none"> N1259A Test Fixture for Power Device with or without N1259A-300 Module Selector Option N1265A Ultra High Current Expander/Fixture
On-wafer device testing	<ul style="list-style-type: none"> N1265A Ultra High Current Expander/Fixture with a N1254A-524 Ultra High Current Prober System Cable M1258A Module Selector

Figure 1-2 N1266A Compatibility with Fixture and Module Selector



N1267A High Voltage Source Monitor Unit / High Current Source Monitor Unit Fast Switch

The N1267A supports fast switching between the HVSMU and HCSMU to enable the measurement of the GaN current collapse phenomena. The N1267A switch requires one MCSMU in the B1505A mainframe for control. Please refer to Chapter 4 Connection and Ordering Examples for connection examples for GaN current collapse measurement system using the N1267A.

Table 1-11 Accessories for the N1267A HVSMU/HCSMU Fast Switch


Model/Option	Description	Additional Information
N1267A	High Voltage Source Monitor Unit / High Current Source Monitor Unit Fast Switch	<ul style="list-style-type: none"> • The N1267A is NOT furnished with any cable. <div style="text-align: center;">  </div>

Table 1-12 Supported B1505A modules for the N1267A HVSMU/HCSMU Fast Switch

	Supported B1505A modules
Drain stress bias SMU at device OFF state	<ul style="list-style-type: none"> • B1513B/C HVSMU (B1513A HVSMU is NOT supported)
Drain current measurement SMU at device ON state	<ul style="list-style-type: none"> • B1512A HCSMU
N1267A control SMU	<ul style="list-style-type: none"> • B1514A MCSMU
Gate control SMU	<ul style="list-style-type: none"> • B1514A MCSMU • B1512A HCSMU • B1510A HPSMU and B1511A/B MPSMU are NOT supported as a gate control SMU.
Substrate bias SMU	<ul style="list-style-type: none"> • B1510A HPSMU • B1511A/B MPSMU • B1512A HCSMU • B1514A MCSMU

Table 1-13 Supported Environment for the N1267A HVSMU/HCSMU Fast Switch

Supported Environment	Supported instruments
On-wafer measurement	
Package device measurement	<ul style="list-style-type: none"> • N1259A Test Fixture (N1259A-300 Module Selector option is required for Kelvin connection measurement)




NOTE The N1267A does not support the two HCSMU 40A configuration.



N1268A Ultra High Voltage Expander




The N1268A expands the B1505A's voltage capability up to 10 kV. Voltage expansion is made using the Ultra High Voltage Unit (UHVU), which is comprised of N1268A and two MCSMUs which are connected to I/V control ports of the N1268A. The MCSMU used for the V controller can be substituted by the HCSMU.



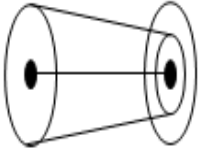
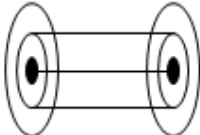
The following table lists the accessories available for the N1268A Ultra High Voltage Expander. Select the required accessories.

Table 1-14 Options and accessories for N1268A Ultra High Voltage Expander

Model/Option	Description	Additional Information
N1268A	Ultra High Voltage Expander	<ul style="list-style-type: none"> The N1268A-STD is a mandatory option.
N1268A-STD	Ultra High Voltage Expander	<ul style="list-style-type: none"> Mandatory option The N1268A-STD is furnished with a 16493G-001 Digital I/O control cable (1.5m), a 16493J-001 Interlock cable (1.5m) and a power code. The N1268A-STD is NOT furnished with a 16493V 10kV Ultra High Voltage Cable. Order a 16493V-001/002 separately. <div style="text-align: center;">    </div>
Calibration options		
N1268A-A6J	ANSI Z540 compliant calibration	

Model/Option	Description	Additional Information
N1268A-UK6	Commercial cal. Certificate with test data	
Related accessories for package device testing		
N1265A-040	10 kV Ultra High Voltage Gate Protection Adapter	<ul style="list-style-type: none"> The N1265A-040 adapter is used with the N1265A UHC Expander/Fixture for package device testing. This adapter is used to protect a B1514A MCSMU module used as a Gate driver SMU from device breakdown when making ultra high voltage measurement with the N1268A. 
Related accessories for on-wafer device testing		
N1269A	Ultra High Voltage Connection Adapter	<ul style="list-style-type: none"> The N1269A adapter is used to protect measurement resources from unexpected surge when connecting the N1268A Ultra High Voltage Expander to a wafer prober. Protection adapter for the B1514A MCSMU is included in the N1269A adapter. This adapter supports the B1514A MCSMU only. 

Model/Option	Description	Additional Information
N1262A-023	Universal R-Box for Ultra High Voltage	
N1254A-521	10 kV Ultra High Voltage Jack to Jack Adapter	<ul style="list-style-type: none"> • Feed through adapter set of UHV and SHV connectors
Related cables		
16493G-001	Digital I/O control cable (1.5 m)	<ul style="list-style-type: none"> • The N1268A is furnished with a 16493G-001 cable. • Cable length 1.5 m or 3.0 m can be specified by option 001 or 002. 
16493G-002	Digital I/O control cable (3.0 m)	
16493J-001	Interlock cable (1.5 m)	<ul style="list-style-type: none"> • The N1268A is furnished with a 16493J-001 cable. • Cable length 1.5 m or 3.0 m can be specified by option 001 or 002. 
16493J-002	Interlock cable (3.0 m)	

Model/Option	Description	Additional Information
16493V-001	10 kV Ultra High Voltage Cable, 1.5 m	<ul style="list-style-type: none"> One UHV cable (Red) and one SHV cable (Black) are included in the 16493V-001/002. These cables are used to connect between the N1268A UHV Expander and the N1265A Ultra High Current Expander/Fixture or a prober. Cable length 1.5 m or 3.0 m can be specified by option 001 or 002. 
16493V-002	10 kV Ultra High Voltage Cable, 3 m	
N1254A-520	10 kV Ultra High Voltage Open End Cable, 1 m.	<ul style="list-style-type: none"> One-side 10kV UHV/SHV and the other-side open end These cables are used to connect between the N1268A UHV output and a device under test (DUT) placed inside the N1265A. 
Adapters		
N1254A-103	Triaxial (m) to BNC (f) adapter	<ul style="list-style-type: none"> This adapter is needed when a B1512A HCSMU is used as a voltage controller of the N1268A. This adapter is used for Force. 
N1254A-517	Adapter, Triax Jack to Triaxial Plug	<ul style="list-style-type: none"> This adapter is needed when a B1512A HCSMU is used as a voltage controller of the N1268A. This adapter is used for Sense. 

NOTE The HPSMU and MPSMU modules cannot be used with the Ultra High Voltage Unit (UHVU) even when protection adapters are used.

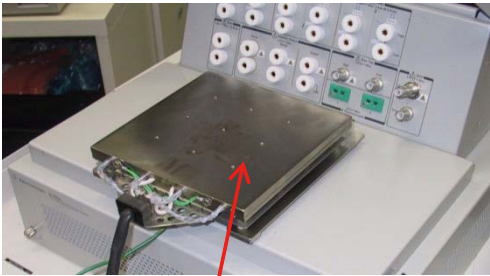
N1271A Thermal Test Enclosure and Related Accessories

The N1271A is an accessory for the N1259A/N1265A fixture and is necessary for performing the thermal test. The N1271A has three options 001, 002, and 005.

The N1271A-001 is required for using the inTEST thermal plate and can be used with the N1259A or the N1265A.

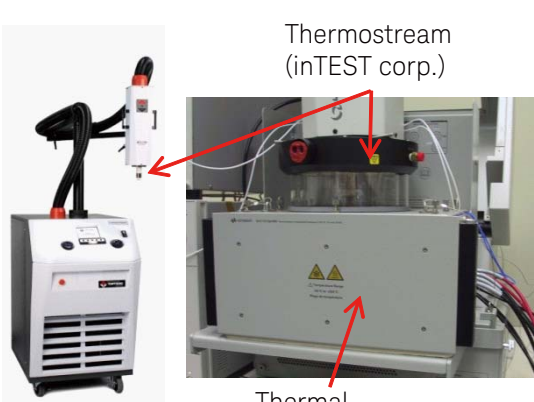
The N1271A-002 or 005 is required for using the inTEST Thermostream and can be used with the N1265A. The N1271A-002 supports the IV measurement up to 3 kV. The N1271A-005 supports the IV measurement up to 10 kV and the CV measurement up to 3 kV.

Figure 1-3 Thermal Test



Thermal Plate
(inTEST corp.)

(a) Using Thermal Plate


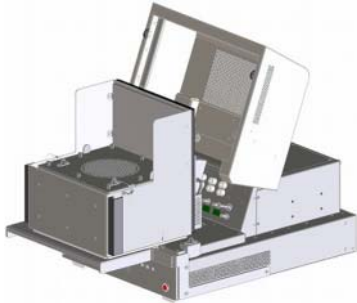


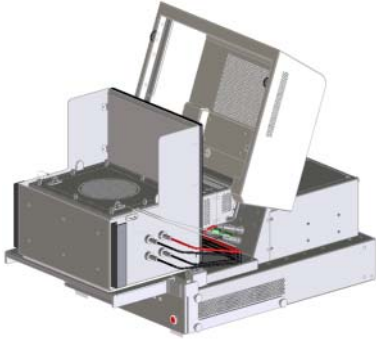

Thermostream
(inTEST corp.)



Thermal
Enclosure

(b) Using Thermostream

Table 1-15 N1271A Thermal Test Enclosure Options and Related Accessories

Model/Option	Description	Additional Information
N1271A	Thermal Test Enclosure	
N1271A-001	Thermal Plate Compatible Enclosure for N1259A/N1265A	<ul style="list-style-type: none"> • Accessory for the N1259A/N1265A test fixture for using the inTEST Thermal Plate to enable temperature dependency measurements up to +250 °C. • Contains the N1254A-557 connection kit. • Inner dimension is 284 mm W, 340 mm H, 195 mm D. 
N1271A-002	Thermostream Compatible Enclosure for N1265A (3 kV IV)	<ul style="list-style-type: none"> • Interface between the N1265A and the inTEST Thermostream. The enclosure supports fully automated IV measurements up to 3 kV at temperature range from -50 °C to +220 °C. • Contains the N1254A-557 connection kit. • Inner dimension is 284 mm W, 150 mm H, 195 mm D. 

Model/Option	Description	Additional Information
N1271A-005	Thermostream Compatible Enclosure for N1265A (3 kV IV, CV and 10 kV)	<ul style="list-style-type: none"> • Interface between the N1265A and the inTEST Thermostream. The enclosure supports CV measurements up to 3 kV and IV measurements up to 10 kV at temperature range from -50 °C to +220 °C. • Contains the N1254A-557 connection kit. • Inner dimension is 275 mm W, 150 mm H, 195 mm D. <div style="text-align: center;">  </div>
N1254A	Accessories for instruments and fixtures	
N1254A-550	Test Leads and Connection Kit for Thermal Test, 20 cm	<p>Connection kit, thermal resistance up to +250 °C</p> <p>This kit contains the following items.</p> <ul style="list-style-type: none"> • 200 mm high current cable, 2 ea. • 200 mm normal cable, 8 ea. • Banana pin adapter, 10 ea. • Mini alligator clip, 8 ea. • Large clip, 2 ea. <div style="text-align: center;">  </div>

Model/Option	Description	Additional Information
N1254A-551	Test Leads and Connection Kit for Thermal Test, 30 cm	<p>Connection kit, thermal resistance up to +250 °C</p> <p>This kit contains the following items.</p> <ul style="list-style-type: none"> • 300 mm high current cable, 2 ea. • 300 mm normal cable, 6 ea. • Banana pin adapter, 8 ea. • Mini alligator clip, 6 ea. • Large clip, 2 ea. 
N1254A-554	Thermal resistance thermocouple, 75 cm, 2 ea.	<p>Thermocouple, 2 ea., thermal resistance up to +250 °C</p> 
N1254A-557	Test Leads and Connection Kit for Thermal Test with N1271A	<p>Connection kit, thermal resistance up to +250 °C</p> <p>This kit contains the following items.</p> <ul style="list-style-type: none"> • 200 mm high current cable, 2 ea. • 300 mm high current cable, 2 ea. • 200 mm normal cable, 6 ea. • 300 mm normal cable, 4 ea. • Banana pin adapter, 14 ea. • Mini alligator clip, 10 ea. • Large clip, 4 ea.

Measurement Capability on Thermal Test

The B1505A measurement capabilities supported on the thermal test are summarized in [Table 1-16](#). Qg tests are not supported on the thermal test.

Table 1-16 Measurement Capability and Requirements

Capability	Fixture	Thermal Plate Solution	Thermostream Solution
• IV test up to 20 A, 3 kV	N1259A	Yes (with N1271A-001)	No
• IV test up to 1500 A, 3 kV	N1265A	Yes (with N1271A-001)	Yes (with N1271A-002)
• IV test up to 1500 A, 10 kV • CV test	N1265A	Yes (with N1271A-001)	Yes (with N1271A-005)
• Qg test up to 20 A, 3 kV	N1259A	No	No
• Qg test up to 1100 A, 3 kV	N1265A	No	No

Information of inTEST Thermal Plate and Thermostream

The B1505A with the N1271A supports the Thermal Plate and the Thermostream of inTEST corporation. Supported models are listed below but contact inTEST for more information, sales@inTESTthermal.com.

ThermoStream

Model#:	ATS-545 (*1)
Temperature Range:	- 80 °C ~ +225 °C
Transition Rate:	18°C/s
Max Airflow Output:	8.5 l/s
Remote Interface:	GPIO. RS232C
Dimension:	W610 × D710 × H1080mm
Weight:	236 kg
Air Supply Pressure:	6.3 kg/cm ² ~ 7.7 kg/cm ²
Air Flow Rate Required:	7.2 l/s ~ 14.3 l/s
Power Supply:	AC220V ± 10%, 30A, 1φ
Operational Environment:	20 ~ 28°C
Operational Humidity:	0 ~ 60%

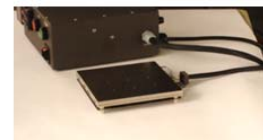


(*1)
inTEST has some Themostream models depend on temperature range

Thermal Plate

Model#:	HP289-PM-1.000.928 (with GPIO I/F)
Plate Dimension: (w/o controller)	17cm x 17cm x 3cm
Controller Dimension (*2):	25.7cm x 24.6cm x 11.9cm
Worksurface Finish:	Electroless Nickel Plating
Temperature Range:	Room temperature ~ +250°C
Power Supply:	AC100V(10%) or 200V(+10%), 10A, 1φ, 50/60Hz (w/o Plug)
Operational Environment:	5 ~ 35°C
Operational Humidity:	70% maximum
Operational Altitude:	2000mm maximum

(*2)
inTEST can accept custom size order for thermal plate.
(ex. 190mm x 140mm)



Contact Information: sales@inTESTthermal.com
Website: www.inTESTthermal.com

Pre-configured Power Device Analyzer/Curve Tracer (B1505A with Modules/Fixture)

The Keysight B1505AP Pre-configured packages include all necessary modules, cables and accessories.

Table 1-17 B1505AP Pre-configured package

Product Number	Description
B1505AP	Pre-configured Power Device Analyzer/Curve Tracer (B1505A w/ modules/fixture)

Option	Max V	Max I	C-V	Note
H20	3 kV	20 A		3 kV / 20 A / Fixture Pack
H21	3 kV	20 A	Yes	3 kV / 20 A / C-V / Fixture Pack
H50	3 kV	500 A		3 kV / 500 A / Fixture Pack
H51	3 kV	500 A	Yes	3 kV / 500 A / C-V / Fixture Pack
H70	3 kV	1500 A		3 kV / 1500 A / Fixture Pack
H71	3 kV	1500 A	Yes	3 kV / 1500 A / C-V / Fixture Pack
U50	10 kV	500 A		10 kV / 500 A / Fixture Pack
U70	10 kV	1500 A		10 kV / 1500 A / Fixture Pack

Table 1-18 B1505AP-H20 3 kV / 20 A / Fixture Package

Description	Qty	Note
B1505A	1	Power Device Analyzer / Curve Tracer Mainframe <ul style="list-style-type: none"> • Include 16493J-001 Interlock cable (1.5 m), 16493L-001 GNDU cable (1.5 m), 16444A-001 Keyboard, 16444A-002 Mouse, 16444A-003 Stylus pen.
B1512A-FG	1	High Current Source Monitor Unit Module <ul style="list-style-type: none"> • Include 16493S-001 HCSMU cable (1.5 m) 1ea and 16493S-010 Kelvin adapter.
B1513C-FG	1	High Voltage Source Monitor Unit <ul style="list-style-type: none"> • Include 16493T-001 HVSMU cable (1.5 m).
B1514A-FG	1	Medium Current Source Monitor Unit <ul style="list-style-type: none"> • Include 16494A-001 Triaxial cable (1.5 m) 2ea.
N1259A	1	Test Fixture for Power Device

Description	Qty	Note
N1259A-001	1	Test Fixture including Inline Package Socket Module and Cables <ul style="list-style-type: none"> • Include N1259A-010 Inline package socket module (3 pin), N1254A-508 Banana to banana cable black 4ea and N1254A-509 Banana to banana cable red 6ea.
N1259A-300	1	Module Selector <ul style="list-style-type: none"> • Include 16493G-001 Digital I/O control cable.
N1259A-022	1	100 kohm R-box
N1259A-030	1	1 kohm R-box for gate
N1254A	1	Accessories for instruments and fixtures
N1254A-104	1	Triax (f) to BNC (m) adaptor

Table 1-19 B1505AP-H21 3 kV / 20 A / C-V / Fixture Package

Description	Qty	Note
B1505A	1	Power Device Analyzer / Curve Tracer Mainframe <ul style="list-style-type: none"> • Include 16493J-001 Interlock cable (1.5 m), 16493L-001 GNDU cable (1.5 m), 16444A-001 Keyboard, 16444A-002 Mouse, 16444A-003 Stylus pen.
B1512A-FG	1	High Current Source Monitor Unit Module <ul style="list-style-type: none"> • Include 16493S-001 HCSMU cable (1.5 m) 1ea and 16493S-010 Kelvin adapter.
B1513C-FG	1	High Voltage Source Monitor Unit <ul style="list-style-type: none"> • Include 16493T-001 HVSMU cable (1.5 m).
B1514A-FG	1	Medium Current Source Monitor Unit <ul style="list-style-type: none"> • Include 16494A-001 Triaxial cable (1.5 m) 2ea.
B1520A-FG	1	Multi Frequency Capacitance Measurement Unit Module <ul style="list-style-type: none"> • Include N1300A-001 CMU cable (1.5 m)
N1259A	1	Test Fixture for Power Device
N1259A-001	1	Test Fixture including Inline Package Socket Module and Cables <ul style="list-style-type: none"> • Include N1259A-010 Inline package socket module (3 pin), N1254A-508 Banana to banana cable black 4ea and N1254A-509 Banana to banana cable red 6ea.
N1259A-300	1	Module Selector <ul style="list-style-type: none"> • Include 16493G-001 Digital I/O control cable.
N1259A-020	1	High Voltage Bias-Tee <ul style="list-style-type: none"> • Include N1254A-512 SHV Cable 250 mm, 2ea and N1254A-513 SHV Jack to Banana Adapter, 2ea.
N1259A-022	1	100 kohm R-box

Description	Qty	Note
N1259A-030	1	1 kohm R-box for gate
N1254A	1	Accessories for instruments and fixtures
N1254A-104	1	Triax (f) to BNC (m) adaptor

Table 1-20 B1505AP-H50 3 kV / 500 A / Fixture Package

Description	Qty	Note
B1505A	1	Power Device Analyzer / Curve Tracer Mainframe <ul style="list-style-type: none"> • Include 16493J-001 Interlock cable (1.5 m), 16493L-001 GNDU cable (1.5 m), 16444A-001 Keyboard, 16444A-002 Mouse, 16444A-003 Stylus pen.
B1513C-FG	1	High Voltage Source Monitor Unit <ul style="list-style-type: none"> • Include 16493T-001 HVSMU cable (1.5 m).
B1514A-FG	3	Medium Current Source Monitor Unit <ul style="list-style-type: none"> • Include 16494A-001 Triaxial cable (1.5 m) 2ea.
N1265A	1	Ultra High Current Expander / Fixture
N1265A-001	1	Ultra High Current Expander / Fixture <ul style="list-style-type: none"> • Include 16493G-001 Control cable (1.5 m) and a Blanck silicon plate.
N1265A-010	1	500 A Ultra High Current 3-pin Inline Package Socket Module <ul style="list-style-type: none"> • Include N1254A-522 1500 A Ultra High Current Banana to Banana Cable (yellow, 2ea), N1254A-508 Banana to Banana Cable, 250 mm (red, 1ea), N1254A-509 Banana to Banana Cable, 250 mm (black, 1ea), N1265-61751 Test Lead 180mm (red, 1ea) and N1265A-61752 Test Lead 180mm (black, 1ea).
N1254A	1	Accessories for instruments and fixtures
N1254A-508	4	Banana to Banana Cable 250 mm (red, 1ea)
N1254A-509	4	Banana to Banana Cable 250 mm (black, 1ea)
N1254A-510	3	Dolphin Clip 2 ea. (red and black)

Table 1-21 B1505AP-H51 3 kV / 500 A / C-V / Fixture Package

Description	Qty	Note
B1505A	1	Power Device Analyzer / Curve Tracer Mainframe <ul style="list-style-type: none"> • Include 16493J-001 Interlock cable (1.5 m), 16493L-001 GNDU cable (1.5 m), 16444A-001 Keyboard, 16444A-002 Mouse, 16444A-003 Stylus pen.
B1513C-FG	1	High Voltage Source Monitor Unit <ul style="list-style-type: none"> • Include 16493T-001 HVSMU cable (1.5 m).
B1514A-FG	3	Medium Current Source Monitor Unit <ul style="list-style-type: none"> • Include 16494A-001 Triaxial cable (1.5 m) 2ea.

Description	Qty	Note
B1520A-FG	1	Multi Frequency Capacitance Measurement Unit Module • Include N1300A-001 CMU cable (1.5 m)
N1260A	1	High Voltage Bias-Tee
N1260A-STD	1	High Voltage Bias-Tee
N1265A	1	Ultra High Current Expander / Fixture
N1265A-001	1	Ultra High Current Expander / Fixture • Include 16493G-001 Control cable (1.5 m) and a Blanck silicon plate.
N1265A-010	1	500 A Ultra High Current 3-pin Inline Package Socket Module • Include N1254A-522 1500 A Ultra High Current Banana to Banana Cable (yellow, 2ea), N1254A-508 Banana to Banana Cable, 250 mm (red, 1ea), N1254A-509 Banana to Banana Cable, 250 mm (black, 1ea), N1265-61751 Test Lead 180mm (red, 1ea) and N1265A-61752 Test Lead 180mm (black, 1ea).
N1254A	1	Accessories for instruments and fixtures
N1254A-508	4	Banana to Banana Cable 250 mm (red, 1ea)
N1254A-509	4	Banana to Banana Cable 250 mm (black, 1ea)
N1254A-510	3	Dolphin Clip 2 ea. (red and black)
N1254A-512	2	SHV Cable 250 mm
N1254A-513	2	SHV Jack to Banana Adapter
N1254A-518	2	SHV Cable 1.5 m

Table 1-22 B1505AP-H70 3 kV / 1500 A / Fixture Package

Description	Qty	Note
B1505A	1	Power Device Analyzer / Curve Tracer Mainframe • Include 16493J-001 Interlock cable (1.5 m), 16493L-001 GNDU cable (1.5 m), 16444A-001 Keyboard, 16444A-002 Mouse, 16444A-003 Stylus pen.
B1513C-FG	1	High Voltage Source Monitor Unit • Include 16493T-001 HVSMU cable (1.5 m).
B1514A-FG	3	Medium Current Source Monitor Unit • Include 16494A-001 Triaxial cable (1.5 m) 2ea.
N1265A	1	Ultra High Current Expander / Fixture
N1265A-001	1	Ultra High Current Expander / Fixture • Include 16493G-001 Control cable (1.5 m) and a Blanck silicon plate.

Description	Qty	Note
N1265A-010	1	500 A Ultra High Current 3-pin Inline Package Socket Module <ul style="list-style-type: none"> • Include N1254A-522 1500 A Ultra High Current Banana to Banana Cable (yellow, 2ea), N1254A-508 Banana to Banana Cable, 250 mm (red, 1ea), N1254A-509 Banana to Banana Cable, 250 mm (black, 1ea), N1265-61751 Test Lead 180mm (red, 1ea) and N1265A-61752 Test Lead 180mm (black, 1ea).
N1265A-015	1	1500 A Current Option
N1254A	1	Accessories for instruments and fixtures
N1254A-508	4	Banana to Banana Cable 250 mm (red, 1ea)
N1254A-509	4	Banana to Banana Cable 250 mm (black, 1ea)
N1254A-510	3	Dolphin Clip 2 ea. (red and black)
N1254A-522	1	1500 A Ultra High Current Banana to Banana Cable, 2 ea.

Table 1-23 B1505AP-H71 3 kV / 1500 A / C-V / Fixture Package

Description	Qty	Note
B1505A	1	Power Device Analyzer / Curve Tracer Mainframe <ul style="list-style-type: none"> • Include 16493J-001 Interlock cable (1.5 m), 16493L-001 GNDU cable (1.5 m), 16444A-001 Keyboard, 16444A-002 Mouse, 16444A-003 Stylus pen.
B1513C-FG	1	High Voltage Source Monitor Unit <ul style="list-style-type: none"> • Include 16493T-001 HVSMU cable (1.5 m).
B1514A-FG	3	Medium Current Source Monitor Unit <ul style="list-style-type: none"> • Include 16494A-001 Triaxial cable (1.5 m) 2ea.
B1520A-FG	1	Multi Frequency Capacitance Measurement Unit Module <ul style="list-style-type: none"> • Include N1300A-001 CMU cable (1.5 m)
N1260A	1	High Voltage Bias-Tee
N1260A-STD	1	High Voltage Bias-Tee
N1265A	1	Ultra High Current Expander / Fixture
N1265A-001	1	Ultra High Current Expander / Fixture <ul style="list-style-type: none"> • Include a 16493G-001 Control cable (1.5 m) and a Blanck silicon plate.
N1265A-010	1	500 A Ultra High Current 3-pin Inline Package Socket Module <ul style="list-style-type: none"> • Include N1254A-522 1500 A Ultra High Current Banana to Banana Cable (yellow, 2ea), N1254A-508 Banana to Banana Cable, 250 mm (red, 1ea), N1254A-509 Banana to Banana Cable, 250 mm (black, 1ea), N1265-61751 Test Lead 180mm (red, 1ea) and N1265A-61752 Test Lead 180mm (black, 1ea).
N1265A-015	1	1500 A Current Option
N1254A	1	Accessories for instruments and fixtures

Description	Qty	Note
N1254A-508	4	Banana to Banana Cable 250 mm (red, 1ea)
N1254A-509	4	Banana to Banana Cable 250 mm (black, 1ea)
N1254A-510	3	Dolphin Clip 2 ea. (red and black)
N1254A-512	2	SHV Cable 250 mm
N1254A-513	2	SHV Jack to Banana Adapter
N1254A-518	2	SHV Cable 1.5 m
N1254A-522	1	1500 A Ultra High Current Banana to Banana Cable, 2 ea.

Table 1-24 B1505AP-U50 10 kV / 500 A / Fixture Package

Description	Qty	Note
B1505A	1	Power Device Analyzer / Curve Tracer Mainframe <ul style="list-style-type: none"> • Include 16493J-001 Interlock cable (1.5 m), 16493L-001 GNDU cable (1.5 m), 16444A-001 Keyboard, 16444A-002 Mouse, 16444A-003 Stylus pen.
B1514A-FG	5	Medium Current Source Monitor Unit <ul style="list-style-type: none"> • Include 16494A-001 Triaxial cable (1.5 m) 2ea.
N1265A	1	Ultra High Current Expander / Fixture
N1265A-001	1	Ultra High Current Expander / Fixture <ul style="list-style-type: none"> • Include 16493G-001 Control cable (1.5 m) and a Blanck silicon plate.
N1265A-010	1	500 A Ultra High Current 3-pin Inline Package Socket Module <ul style="list-style-type: none"> • Include N1254A-522 1500 A Ultra High Current Banana to Banana Cable (yellow, 2ea), N1254A-508 Banana to Banana Cable, 250 mm (red, 1ea), N1254A-509 Banana to Banana Cable, 250 mm (black, 1ea), N1265-61751 Test Lead 180mm (red, 1ea) and N1265A-61752 Test Lead 180mm (black, 1ea).
N1265A-040	1	10 kV Ultra High Voltage Gate Protection Adapter
N1268A	1	Ultra High Voltage Expander
N1268A-STD	1	Ultra High Voltage Expander <ul style="list-style-type: none"> • Include 16493G-001 Control cable (1.5 m), 16493J-001 Interlock cable (1.5m).
16493V-001	1	10 kV Ultra High Voltage Cable, 1.5 m <ul style="list-style-type: none"> • Include one UHV cable (red) and one SHV cable (black).
N1254A	1	Accessories for instruments and fixtures
N1254A-508	4	Banana to Banana Cable 250 mm (red, 1ea)
N1254A-509	4	Banana to Banana Cable 250 mm (black, 1ea)

Description	Qty	Note
N1254A-510	3	Dolphin Clip 2 ea. (red and black)
N1254A-520	1	10 kV Ultra High Voltage Open End Cable, 1m (pair)
N1254A-522	1	1500 A Ultra High Current Banana to Banana Cable, 2 ea

Table 1-25 B1505AP-U70 10 kV / 500 A / Fixture Package

Description	Qty	Note
B1505A	1	Power Device Analyzer / Curve Tracer Mainframe <ul style="list-style-type: none"> • Include 16493J-001 Interlock cable (1.5 m), 16493L-001 GNDU cable (1.5 m), 16444A-001 Keyboard, 16444A-002 Mouse, 16444A-003 Stylus pen.
B1514A-FG	5	Medium Current Source Monitor Unit <ul style="list-style-type: none"> • Include 16494A-001 Triaxial cable (1.5 m) 2ea.
N1265A	1	Ultra High Current Expander / Fixture
N1265A-001	1	Ultra High Current Expander / Fixture <ul style="list-style-type: none"> • Include 16493G-001 Control cable (1.5 m) and a Blanck silicon plate.
N1265A-010	1	500 A Ultra High Current 3-pin Inline Package Socket Module <ul style="list-style-type: none"> • Include N1254A-522 1500 A Ultra High Current Banana to Banana Cable (yellow, 2ea), N1254A-508 Banana to Banana Cable, 250 mm (red, 1ea), N1254A-509 Banana to Banana Cable, 250 mm (black, 1ea), N1265-61751 Test Lead 180mm (red, 1ea) and N1265A-61752 Test Lead 180mm (black, 1ea).
N1265A-015	1	1500 A Current Option
N1265A-040	1	10 kV Ultra High Voltage Gate Protection Adapter
N1268A	1	Ultra High Voltage Expander
N1268A-STD	1	Ultra High Voltage Expander <ul style="list-style-type: none"> • Include 16493G-001 Control cable (1.5 m), 16493J-001 Interlock cable (1.5m).
16493V-001	1	10 kV Ultra High Voltage Cable, 1.5 m <ul style="list-style-type: none"> • Include one UHV cable (red) and one SHV cable (black).
N1254A	1	Accessories for instruments and fixtures
N1254A-508	4	Banana to Banana Cable 250 mm (red, 1ea)
N1254A-509	4	Banana to Banana Cable 250 mm (black, 1ea)
N1254A-510	3	Dolphin Clip 2 ea. (red and black)
N1254A-520	1	10 kV Ultra High Voltage Open End Cable, 1m (pair)
N1254A-522	1	1500 A Ultra High Current Banana to Banana Cable, 2 ea

NOTE Cable length is 1.5 m only (No cable length option).

NOTE To add additional modules such as a B1511B MPSMU into the B1505AP package, the B1505AU with corresponding module option has to be ordered and users have to send their B1505A mainframe to Keysight Service Center for installing modules. So, building a B1505A configuration from scratch is recommended.

NOTE To add additional accessories of the N1259A or N1265A, please order them separately using the N1259AU or N1265AU with corresponding options.

Accessories for Wafer Prober and Your Own Test Fixture

Table 1-26 lists the accessories available for wafer probers or your own test fixtures. Select the required accessories.

Figure 1-4 Connection to probers

Condition	Gate	Drain	Source	Other bias
500 A	N1265A UHC Expander / Fixture + N1254A-524 Ultra High Current Prober System Cable			MCSMU*
<=30A with Module Selector	MCSMU* + R-box	N1258A Module Selector		
<=40A without Module Selector		Direct	Direct	

+

Condition	Gate	Drain	Source	Other bias
10 kV**	N1269A	UHV direct	N1269A	MCSMU + N1269A

* We recommend B1514A MCSMU for a Gate SMU and other bias SMUs.

** We should manually change cabling for a 10 kV measurement

Figure 1-5 Connection between the N1265A Ultra High Current Expander / Fixture and Prober with the N1254A-524 Ultra High Current Prober System

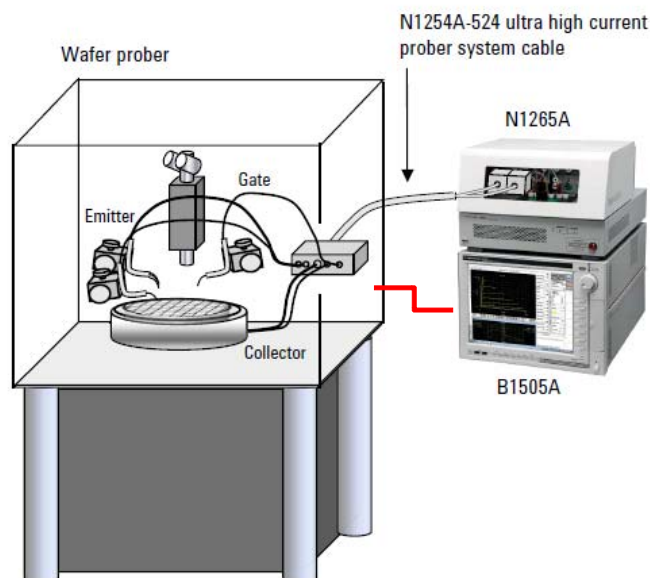








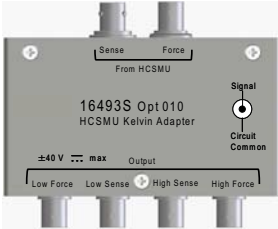
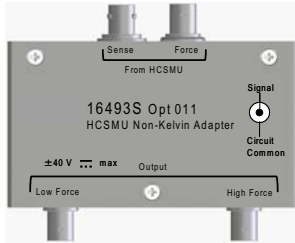



Table 1-26 Accessories for Wafer Prober or Your Own Fixture



Model/Option	Description	Additional Information
Module Selector		
N1258A	Module Selector for B1505A	<ul style="list-style-type: none"> • The N1258A is furnished with 3 m digital I/O control cable (16493G-002). Maximum 65 VA • The N1258A has a built-in GNDU protection adapter, a built-in HPSMU protection adapter and a built-in HCSMU Kelvin adapter. • Do not connect or put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. Connecting or putting conductor of circuit common, chassis ground, or any potential on causes the measurement error. 
For High Voltage Capacitance Measurement		
N1260A	High Voltage Bias-Tee	<ul style="list-style-type: none"> • The N1260A-STD is a mandatory option. • The N1260A High Voltage Bias-Tee is not furnished with any cables. 



Model/Option	Description	Additional Information
Protection Adapter		
N1261A-001	Protection adapter for High Power Source Monitor Unit (Triaxial output)	<ul style="list-style-type: none"> Two Triaxial inputs (Force/Sense) and two Triaxial outputs (Force/Sense). This adapter is used to protect not only B1510A HPSMU but also B1511A/B MPSMU. 
N1261A-002	Protection Adapter Ground Unit (BNC output)	<ul style="list-style-type: none"> One Triaxial input for GNDU and two BNC outputs (Force/Sense). 
N1261A-003	Protection adapter for High Power Source Monitor Unit (HV-Triaxial output)	<ul style="list-style-type: none"> Two Triaxial inputs (Force/Sense) and two High Voltage Triaxial outputs. This adapter is used to protect not only B1510A HPSMU but also B1511A/B MPSMU. 
N1261A-004	Protection Adapter Ground Unit (SHV output)	<ul style="list-style-type: none"> One Triaxial input for GNDU and two SHV outputs (Force/Sense). 
High Voltage R-box		
N1262A-001	1Mohm R-box	<ul style="list-style-type: none"> One High Voltage Triaxial input and one SHV output. 
N1262A-002	100 kohm R-box	<ul style="list-style-type: none"> One High Voltage Triaxial input and one SHV output. 



Model/Option	Description	Additional Information
N1262A-010	1 kohm R-box for gate (Triaxial output)	<ul style="list-style-type: none"> One Triaxial input and one Triaxial output. 
N1262A-011	1 kohm R-box for gate (SHV output)	<ul style="list-style-type: none"> One High Voltage Triaxial input and one SHV output. 
N1262A-020	Universal R-Box, Triaxial	<ul style="list-style-type: none"> One Triaxial input and one Triaxial output. 
N1262A-021	Universal R-Box, HV Triaxial to SHV	<ul style="list-style-type: none"> One High Voltage Triaxial input and one SHV output. 
N1262A-036	50 Ohm Termination Adapter	<ul style="list-style-type: none"> The N1262A-036 is used to avoid device oscillation by inserting it to the gate cabling. 

Model/Option	Description	Additional Information
HCSMU Adapter		
16493S-010	High Current Source Monitor Unit Kelvin Adapter	<ul style="list-style-type: none"> • One Triaxial input and one BNC input for HCSMU and four BNC outputs (High Force/Sense, Low Force/Sense) • Do not connect or put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. • Connecting or putting conductor of circuit common, chassis ground, or any potential on causes the measurement error. 
16493S-011	High Current Source Monitor Unit non-Kelvin Adapter	<ul style="list-style-type: none"> • One Triaxial input and one BNC input for HCSMU and two BNC outputs (High Force/Low Force). • Do not connect or put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. • Connecting or putting conductor of circuit common, chassis ground, or any potential on causes the measurement error. 

Model/Option	Description	Additional Information
Dual HCSMU Adapter		
16493S-020	Adapter, 40A, when connecting to wafer prober directly without N1258A selector	<ul style="list-style-type: none"> • Output connectors are compatible with N1258A module selector. • This adapter has a built-in GNDU protection adapter and a built-in HCSMU Kelvin adapter. • This adapter cannot be used with N1258A module selector and N1259A test fixture. • Do not connect or put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. • Connecting or putting conductor of circuit common, chassis ground, or any potential on causes the measurement error. 

Model/Option	Description	Additional Information
16493S-021	Adapter, 40A, select this if 16493S-020 is not used	<ul style="list-style-type: none"> • This adapter is used with the N1259A Test Fixture, N1258A Module Selector, or 16493S-010/011 HCSMU Adapter • If a N1258A Module Selector is used with this adapter, the maximum current is limited to 30 A. If 40 A capability is needed, please connect this adapter to device directly. • Output connectors are compatible with B1512A HCSMU. • The 16493S-021 is furnished with one 30cm Triaxial cable and one 30 cm High current coaxial cable for output connection. • Do not connect or put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. • Connecting or putting conductor of circuit common, chassis ground, or any potential on causes the measurement error. 
For Ultra High Current Measurement		
N1254A-524	Ultra High Current Prober System Cable	<ul style="list-style-type: none"> • The N1254A-524 cable is furnished with one transparent shield with a slit. • Maximum current range is about 800 A or more. • Cable length is 1.8 m. 





Model/Option	Description	Additional Information
For Ultra High Voltage Measurement		
N1269A	Ultra High Voltage Connection Adapter	<ul style="list-style-type: none"> The N1269A adapter is used to protect measurement resources from unexpected surge when connecting the N1268A Ultra High Voltage Expander to a wafer prober. Protection adapter for the B1514A MCSMU is included in the N1269A adapter. This adapter supports the B1514A MCSMU only. 
N1254A-521	10 kV Ultra High Voltage Jack to Jack Adapter	<ul style="list-style-type: none"> Feed through adapter set of UHV and SHV connectors
N1262A-023	Universal R-Box for Ultra High Voltage	<ul style="list-style-type: none"> Two Ultra High Voltage ports. 



Model/Option	Description	Additional Information
For Gate Charge Measurement		
N1274A	On-Wafer Gate Charge Measurement Adapter/Selector for 20 A/3 kV	<ul style="list-style-type: none"> • The N1274A is an adapter to enable on-wafer gate charge measurements using the HCSMU (max. 20 A) and HVSMU (max. 3 kV). • This equips an internal selector to automatically switch signal paths of I-V measurement and gate charge measurement. • The selector relays in the N1274A are controlled by the N1258A module selector. • You can also mount a current control device or load resistor on the N1274 by opening a small panel on the top of this adapter. 
N1275A	On-Wafer Gate Charge Measurement Adapter for N1265A Ultra High Voltage Connection Adapter	<ul style="list-style-type: none"> • The N1275A is an adapter to enable on-wafer gate charge measurements with the UHCU (max. 500 A) and HVSMU (max. 3 kV). • The adapter output can be extended to your prober station by using the N1254A-524 prober system cable. • You can also mount current control device or load resistor for the gate charge measurement on the top of this adapter. 


Other Accessories




The following table lists the options and accessories available for the B1505A.

Table 1-27 Options and Accessories

Model/Option	Description	Additional Information
Accessories for B1500 series		
16444A-001	USB keyboard	
16444A-002	USB mouse	
16444A-003	Stylus pen	
Cables, adapters, interlock		
16493K-001	Kelvin Triaxial Cable, 1.5 m length	<ul style="list-style-type: none"> • Cable length 1.5 m or 3.0 m can be specified by option 001 or 002. • These cables are NOT supported by the N1265A, N1266A, N1267A and N1268A. 
16493K-002	Kelvin Triaxial Cable. 3.0 m length	

Model/Option	Description	Additional Information
16493U-001	High current coaxial cable, BNC(m) to BNC(m), 1.5 m	<ul style="list-style-type: none"> Cable length 1.5 m or 3.0 m can be specified by option 001 or 002. 
16493U-002	High current coaxial cable, BNC(m) to BNC(m), 3 m	
8120-1838	BNC cable, 30 cm (12 inch)	
8120-1839	BNC cable, 60 cm (24 inch)	
N1254A-500	HV jack connector, panel mount, for soldering, 1 ea.	
N1254A-501	HV jack to HV jack adapter, panel mount, 1 ea.	
N1254A-502	HV plug connector, panel mount, for soldering, 1 ea.	
N1254A-503	HCSMU Coaxial Cable Assy 1.5 m - BNC to Open-End, 1 ea.	
N1254A-505	HVSMU Triaxial Cable Assy 1.5 m - HV Plug to Open-End, 1 ea.	
N1254A-506	HVSMU Coaxial Cable Assy 1.5 m - HV Plug to Open-End, 1 ea.	
N1254A-507	HVSMU Coaxial Cable Assy 1.5 m, 1 ea.	
N1254A-514	BNC(m) to BNC(m) adapter, 1 ea.	
N1254A-515	BNC(f)-BNC(m)-BNC(f) adapter, 1 ea.	

Model/Option	Description	Additional Information
N1254A-516	BNC(f)-BNC(f)-BNC(f) adapter, 1 ea.	
N1254A-517	Triax(f)-Triax(m) adapter, shield separated, 1 ea.	
N1254A-518	SHV(plug)-SHV(plug) coaxial cable, 1.5 m, 1 ea.	
N1254A-520	UHV(plug) to no connector cable, 1 m, 1 ea. and SHV(plug) to no connector cable, 1 m, 1 ea.	
N1254A-521	UHV(jack)-UHV(jack) adapter, 1 ea. and SHV(jack)-SHV(jack) adapter, 1 ea.	
N1254A-522	Connection wire, banana-to-banana, maximum 1500 A, 2 ea.	
N1254A-523	Banana to no connector wire, maximum 1500 A, 1 m, 2 ea.	
N1254A-524	System cable for prober, 1.8 m, 1 ea.	
N1254A-525	SHV Cable Assy 1.5m - SHV Plug To Open-end, 1 ea.	
N1254A-526	Ultra High Current Cable, 2m, No Connectors At Either End, 1 ea.	
N1254A-527	PTFE Standoff, Jack, 4 ea.	
N1254A-528	PTFE Standoff With Banana Plug, 4 ea.	
N1254A-554	Thermocouple, Type K, 75 cm, 2 ea.	
N1254A-556	Test Leads and Connection Kit for Capacitance Test, four 20 cm alligator clip - lug cables, four banana plugs, four nuts, and four spare clips	

Model/Option	Description	Additional Information
1250-2405	BNC-T Plug(m)-BNC(f)-BNC(f) adapter, 1ea	
1251-2277	Banana to BNC adapter	
1252-1419	Interlock receptacle connector	

Retrofit Products for B1505A

The Keysight B1505A has 10 slots so that users can install appropriate modules into B1505A mainframe. The retrofit module product is available to add more modules into existing B1505A mainframe. These modules have to be installed in Keysight Technologies service center to meet the specifications.

The following table lists the module products and the available accessories.

Table 1-28 **Module products and available accessories**

Model/ Option	Description	Note
B1505AU	Upgrade kit for B1505A	
Software license to use advanced functions		
B1505AU-SWS	EasyEXPERT Extension support and subscription	<ul style="list-style-type: none"> B1505A users who have not purchased a B1505A-SWS have to update EasyEXPERT software to version 5.5 or later. The B1505AU-SWS includes 15 licenses which can be used for both EasyEXPERT and Desktop EasyEXPERT.
B1505A mainframe upgrade		
B1500AU-PC2	Mainframe upgrade (available for S/N starts with JP or less than MY53440000)	Including OS (from Windows XP/7 to Windows 10), CPU, mother board, storage (from HDD to SSD), VGA output. Contact Keysight Technologies to upgrade the B1500A.
B1500AU-PC3	Mainframe upgrade (available for S/N MY53440101 or later)	
Measurement module		
B1505AU-010	High Power Source/Monitor Unit Module (B1510A)	Modules are NOT furnished with any cables. Order the required cables and accessories separately.
B1505AU-011	Medium Power Source/Monitor Unit Module (B1511B)	
B1505AU-012	High Current Source Monitor Unit Module (B1512A)	
B1505AU-013	High Voltage Source Monitor Unit (B1513C)	
B1505AU-014	Medium Current Source Monitor Unit (B1514A)	
B1505AU-020	Multi Frequency Capacitance Measurement Unit Module (B1520A)	

Model/ Option	Description	Note
B1510A HPSMU, B1511A/B MPSMU and B1514A MCSMU cables		
16494A-001	1.5m length triaxial cable	
16494A-002	3 m length triaxial cable	
16494A-003	80 cm length triaxial cable	
16494A-004	40 cm length triaxial cable	
16494A-005	4 m length triaxial cable	
16493K-001	1.5 m length Kelvin triaxial cable	
16493K-002	3 m length Kelvin triaxial cable	
B1512A HCSMU cables and adapters		
16493S-001	1.5 m length	
16493S-002	3 m length	
16493S-010 ¹	HCSMU Kelvin adapter	
16493S-011 ¹	HCSMU non-Kelvin adapter	
16493S-020 ¹	Dual HCSMU combination adapter, for 40 A measurement, when connecting to wafer prober directly without N1258A selector	
16493S-021 ¹	Dual HCSMU combination adapter, for 40 A measurement, when being used with N1259A test fixture, N1258A module selector, or 16493S-010/011 HCSMU adapter	The 16493S-021 is furnished with one 30cm Triaxial cable and one 30 cm High current coaxial cable for output connection.
B1513A/B/C HVSMU cables		
16493T-001	1.5 m length	
16493T-002	3 m length	
B1520A CMU cables		
N1300A-001	1.5 m length	
N1300A-002	3 m length	

1. Do not connect or put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. Connecting or putting conductor of circuit common, chassis ground, or any potential on causes the measurement error.

NOTE

For customers, module upgrades to existing B1505A systems must be carried out at an Keysight Technologies service center. In order to ensure system specifications the new modules need to be installed and the complete unit calibrated. Contact your nearest Keysight Technologies office to arrange the installation and calibration of new B1505A modules.

NOTE For Keysight field team, installation fee (R-51U-501 or R1286A-HU) will be automatically added to the B1505AU when making a quotation with Keysight order configuration tool.

NOTE E5288A ASU (Atto Sense and Switch Unit) is not supported by the B1505A.

NOTE Under the total power consumption limit, there is configuration limitation. Please refer to [Table 1-4 on page 1-7](#).

Conversion Kit from B1500A to B1505A

The following table lists the requirements and the available accessories for remodelling the B1500A to the B1505A.

Table 1-29 Required and Available Accessories for Remodelling B1500A to B1505A

Model/ Option	Description	Note
B1505AU-001	Conversion kit from B1500A to B1505A	The B1505AU-001 is NOT furnished with any cables. It doesn't include any modules. Select modules or accessories separately. Please refer to " Retrofit Products for B1505A " on page 1-61.

NOTE For customers, Keysight Technologies service center is responsible for remodelling and module installation. Contact Keysight Technologies to get a quotation.

NOTE For Keysight field team, installation fee (R-51U-501 or R1286A-HU) will be automatically added to the B1505AU when making a quotation with Keysight order configuration tool.

NOTE The instrument firmware and software will be updated to the latest version at the service center. So make a back up of data saved in the built-in SSD by yourself before sending the instrument to the service center.




NOTE The 16442A/16442B test fixture supports up to 200 V / 1A. So use the N1259A or the N1265A, which are designed for supporting the B1505A. See "[N1259A Test Fixture for Power Device](#)" or "[N1265A Ultra High Current Expander/Fixture](#)".


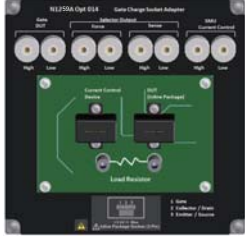
NOTE B1517A HRSMU (high resolution SMU), E5288A ASU (Atto Sense and Switch Unit), B1530A WGFMU (Waveform Generator / Fast Measurement Unit), and B1525A SPGU (High Voltage Semiconductor Pulse Generator Unit) are not supported by the B1505A.






Upgrade Kit for N1259AU Test Fixture



The following table lists upgrade kit options to expand own N1259A capability.

Table 1-30 Available options for upgrading N1259A

Model/ Option	Description	Note
N1259AU	Upgrade Kit for N1259A Test Fixture	This product is only available for N1259A owners. No furnished items in main product. Please select the following options.
N1259AU-010	Inline Package Socket Module (3 pin)	<ul style="list-style-type: none"> The N1259AU-010 cannot be used with the N1265A Ultra High Current Expander. Max voltage and current are 3 kV and 40A. 
N1259AU-011	Universal Socket Module	<ul style="list-style-type: none"> Maximum voltage is 3 kV. 
N1259AU-012	Blank PTFE Board	

Model/ Option	Description	Note
N1259AU-013	Curve Tracer Test Adapter Socket Module	<ul style="list-style-type: none"> The N1259AU-013 is the same as the N1265AU-013 Curve Tracer Test Adapter Socket Module. Maximum voltage and current is 3 kV and 500 A. 
N1259AU-014	Gate Charge Socket Module	<ul style="list-style-type: none"> The N1259AU-014 is the same as the N1265AU-014 Gate Charge Socket Module. The N1259AU-014 option is furnished with the following wires: <ul style="list-style-type: none"> - Four red long wires (N1254A-508) - Four black long wires (N1254A-509) - Two red short wires (N1265-61751) - Two black long wires (N1265-61752) Maximum voltage and current is 3 kV and 20 A. 
N1259AU-020	High Voltage Bias-Tee	<ul style="list-style-type: none"> The N1259AU-020 High Voltage Bias-Tee is furnished with two SHV-SHV cables (N1254A-512) and two SHV-banana adapters (N1254A-513). Installation must be done at Keysight Service Center. 

Model/ Option	Description	Note
N1259AU-021	1Mohm R-box	<ul style="list-style-type: none"> R-box can be replaced with other R-box easily by users. 
N1259AU-022	100 kohm R-box	
N1259AU-030	1 kohm R-box for gate	
N1259AU-035	Universal R-Box	
N1259AU-300	Module Selector	<ul style="list-style-type: none"> Furnished with a Digital I/O control cable (16493G-001), maximum 35VA. Installation must be done at Keysight Service Center.
N1254A-508	Connection wire, red 1 ea.	<ul style="list-style-type: none"> The N1254A-508/509 Connection Wire supports 40A current, but does not support 500 A/1500 A current flow on the N1265A Ultra High Current Expander/Fixture. Max voltage and current are 3 kV and 40 A. The cable length is 250 mm. 
N1254A-509	Connection wire, black 1 ea.	
N1254A-510	Dolphin clip adapter, black 1 ea. and red 1ea.	
N1254A-511	Cable lug adapter, black 1 ea. and red 1ea.	
N1254A-512	SHV Cable 250 mm, 1ea	<ul style="list-style-type: none"> The N1259AU-020 High Voltage Bias-tee is furnished with two N1254A-512 cables. The N1254A-513 adapter is required to connect a banana plug. 

Model/ Option	Description	Note
N1254A-513	SHV Jack to Banana Adapter, 1ea	<ul style="list-style-type: none"> The N1259AU-020 High Voltage Bias-tee is furnished with two N1254A-513 adapters. The N1254A-513 adapter is used with the N1254A-512 cable to connect a banana plug. 
16493G-001	Digital I/O control cable (1.5 m)	<ul style="list-style-type: none"> The N1259AU-300 is furnished with a 16493G-001 cable. Cable length 1.5 m or 3.0 m can be specified by option 001 or 002. 
16493G-002	Digital I/O control cable (3.0 m)	



NOTE Keysight Technologies service center is responsible for **N1259AU-020** and **N1259AU-300** installation.

NOTE For Keysight field team, installation fee (R-51U-501 or R1286A-HU) will be automatically added to the N1259AU when making a quotation with Keysight order configuration tool.




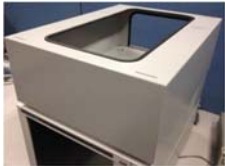
Upgrade Kit for N1265AU Test Fixture







The following table lists upgrade kit options to expand own N1265A capability.




Table 1-31 Available options for upgrading N1265A

Model/ Option	Description	Note
N1265AU	Upgrade kit for N1265A	This product is only available for N1265A owners. No furnished items in main product. Please select the following options.
N1265AU-002	Blank Silicon Plate	
N1265AU-010	Inline Package Socket Module (3 pin)	<ul style="list-style-type: none"> • The N1265A-010 is furnished with total six cable shown below <ul style="list-style-type: none"> • N1252A-522 1500A Ultra High Current Banana to Banana Cables (Yellow, 2ea) for Collector/Drain and Emitter/Source force lines • N1265-61751 Test Lead (Banana), 180mm (Red, 1ea) and N1265-61752 Test Lead (Banana), 180mm (Black, 1ea.) for Collector/Drain and Emitter/Source sense lines • N1254A-508 Banana to Banana cable, 250mm (Red, 1ea), N1254A-509 Banana to Banana cable, 250mm (Black, 1ea) for Base/Gate force/sense lines • Maximum voltage and current is 3 kV and 500 A. 

Model/ Option	Description	Note
N1265AU-011	Universal Socket Module	<ul style="list-style-type: none"> Maximum voltage is 3 kV. 
N1265AU-013	Curve Tracer Test Adapter Socket Module	<ul style="list-style-type: none"> The N1265AU-013 is the same as the N1259AU-013 Curve Tracer Test Adapter Socket Module. Maximum voltage and current is 3 kV and 500 A. 
N1265AU-014	Gate Charge Socket Module	<ul style="list-style-type: none"> The N1265AU-014 is the same as the N1259AU-014 Gate Charge Socket Module. The N1265AU-014 option is furnished with: <ul style="list-style-type: none"> - Four red long wires (N1254A-508) - Four black long wires (N1254A-509) - Two red short wires (N1265-61751) - Two black long wires (N1265-61752) - Two yellow high current banana-banana cable (N1254A-522) Maximum voltage and current is 3 kV and 500 A. 
N1265AU-015	1500 A Current Option	<ul style="list-style-type: none"> 1500 A upgrade must be done at Keysight Service Center.

Model/ Option	Description	Note
N1265AU-035	Universal R-Box	<ul style="list-style-type: none"> A desired register can be installed by soldering. 
N1265AU-040	10 kV Ultra High Voltage Gate Protection Adapter	<ul style="list-style-type: none"> This adapter is used to protect a B1514A MCSMU module used for Gate driver from device breakdown when making ultra high voltage measurement with the N1268A UHV Expander, The B1514A MCSMU module has to be connected to a passthrough port of the N1265A UHC Expander/Fixture, not a module selector port. 
N1265AU-041	Thermocouple, Type K, 2ea	<ul style="list-style-type: none"> Include two Type-K thermocouples. 
N1265AU-045	Container for Protection Adapter and Bias Tee	<ul style="list-style-type: none"> N1260A High Voltage Bias tee and N1261A Protection Adapters can be placed in this container to avoid messy cabling. 

Model/ Option	Description	Note
Related accessories		
N1254A-508	Connection wire, red 1 ea.	<ul style="list-style-type: none"> The N1265AU-010 500 A Ultra High Current 3-pin Inline Package Socket Module is furnished with one N1254A-508 cable and one N1254A-509 cable. Maximum voltage and current is 3 kV and 40 A. 
N1254A-509	Connection wire, black 1 ea.	
N1254A-510	Dolphin clip adapter, black 1 ea. and red 1ea.	
N1254A-511	Cable lug adapter, black 1 ea. and red 1ea.	
N1254A-512	SHV Cable 250 mm, 1ea	<ul style="list-style-type: none"> The N1259AU-020 High Voltage Bias-tee is furnished with two N1254A-512 cables. The N1254A-513 adapter is required to connect a banana plug. 
N1254A-513	SHV Jack to Banana Adapter, 1ea	<ul style="list-style-type: none"> The N1259AU-020 High Voltage Bias-tee is furnished with two N1254A-513 adapters. The N1254A-513 adapter is used with the N1254A-512 cable to connect a banana plug. 
N1254A-520	10 kV Ultra High Voltage Open End Cable, 1 m.	<ul style="list-style-type: none"> One-side 10kV UHV/SHV and the other-side open end 

Model/ Option	Description	Note
N1254A-522	1500 A Ultra High Current Banana to Banana Cable, 2 ea.	<ul style="list-style-type: none"> Maximum voltage and current is 3 kV and 1500 A. The N1265AU-010 500 A Ultra High Current 3-pin Inline Package Socket Module is furnished with N1254A-522 cables. 
N1254A-523	1500 A Ultra High Current Banana to Open End Cable, 1 m, 2 ea	<ul style="list-style-type: none"> Maximum voltage and current is 3 kV and 1500 A. 
16493G-001	Digital I/O control cable (1.5 m)	<ul style="list-style-type: none"> The N1266A is furnished with a 16493G-001 cable. Cable length 1.5 m or 3.0 m can be specified by option 001 or 002. 
16493G-002	Digital I/O control cable (3.0 m)	

NOTE Keysight Technologies service center is responsible for **N1265AU-015** installation.

NOTE For Keysight field team, installation fee (R-51U-501 or R1286A-HU) will be automatically added to the N1265AU when making a quotation with Keysight order configuration tool.

Note for 4142B Users

The B1505A expands the maximum measurement range up to 40 A/3000 V from the range 10 A/1000 V covered by Keysight 4142B Modular DC Source/Monitor.

Because of the following reasons, the measurement setup and environments for the 4142B cannot be used with the B1505A. The test fixture and the connection path from connector plate to wafer prober must be designed, changed, or remade for the B1505A.

- Test fixture 16088A/B designed for the 4142B, cannot be used for the measurements over 10 A/1000 V.
- The connection path, connectors, cabling, and wiring will not support up to 40 A/3000 V.
- Connector types are different from the 4142B.

Table 1-32 Considering Connector Types

Connector Plate Part Number 04142-60032

Interlock receptacle: Keysight P/N:1252-1419 or Hirose, HR10A-7R-6S

	4142B	B1505A
High current connector	Dual triaxial	BNC and triaxial
High voltage connector	BNC and screwed-triaxial	HV triaxial
Interlock connector	BNC	6-pin

This chapter describes the required information for connecting Keysight B1505A, N1259A, and a device under test (DUT).

- "Input Connection"
- "Output Connection"

The N1259A is a test fixture used for measurements of packaged devices. The fixture can be connected to GNDU, MFCMU, HP/MPSMU, HVSMU/HVMCU, and HC/MC/DHCSMU. And the fixture has built-in GNDU protection adapter and built-in HPSMU protection adapter. Also the fixture can install the module selector for switching the measurement resource connected to the DUT, the high voltage R-box for reducing the risk of device breakdown, and the high voltage bias-T for performing the high voltage capacitance measurement. General specifications of the N1259A are listed below.

- Dimensions: 420 mm (W) × 272 mm (H) × 410 mm (D)
- Weight: 12.0 kg
- Maximum volt-amps, only for N1259A-300 module selector: 35 VA

WARNING To avoid electrical shock and instrument damage, turn the all instruments off before connecting or disconnecting measurement cable.

WARNING There are potentially hazardous voltages of up to ± 3000 V (HVSMU), ± 2200 V (HVMCU), ± 200 V (HPSMU), or ± 100 V (MPSMU) at the Force, Guard, and Sense terminals. To prevent electrical shock, do *not* expose these lines.

WARNING To prevent electrical shock during use, connect the Interlock cable (see "To Connect Interlock Circuit" on page 2-4).

WARNING The B1505A is heavy and requires a two person lift.

CAUTION Do not grab the fixture cover when lifting the N1259A.

CAUTION Never connect the Guard terminal to any output, including circuit common, chassis ground, or any other guard terminal. Connecting anything may damage the module.

CAUTION Never connect the HVSMU Force and Guard terminals to any output, including circuit common, chassis ground, or any other module terminal. Connecting other module may damage the connected module.

NOTE **Using Universal R-box and Universal Socket Module**

The universal R-box and the universal socket module are the do-it-yourself kit for installing a resistor you want or mounting a socket you want.

You need to prepare the hexlobe (torx type) screwdriver T-10 to remove the cover.

After installing a resistor or mounting a socket, reattach the cover. Do not use the universal R-box and the universal socket module under the condition that the cover is removed.

Input Connection

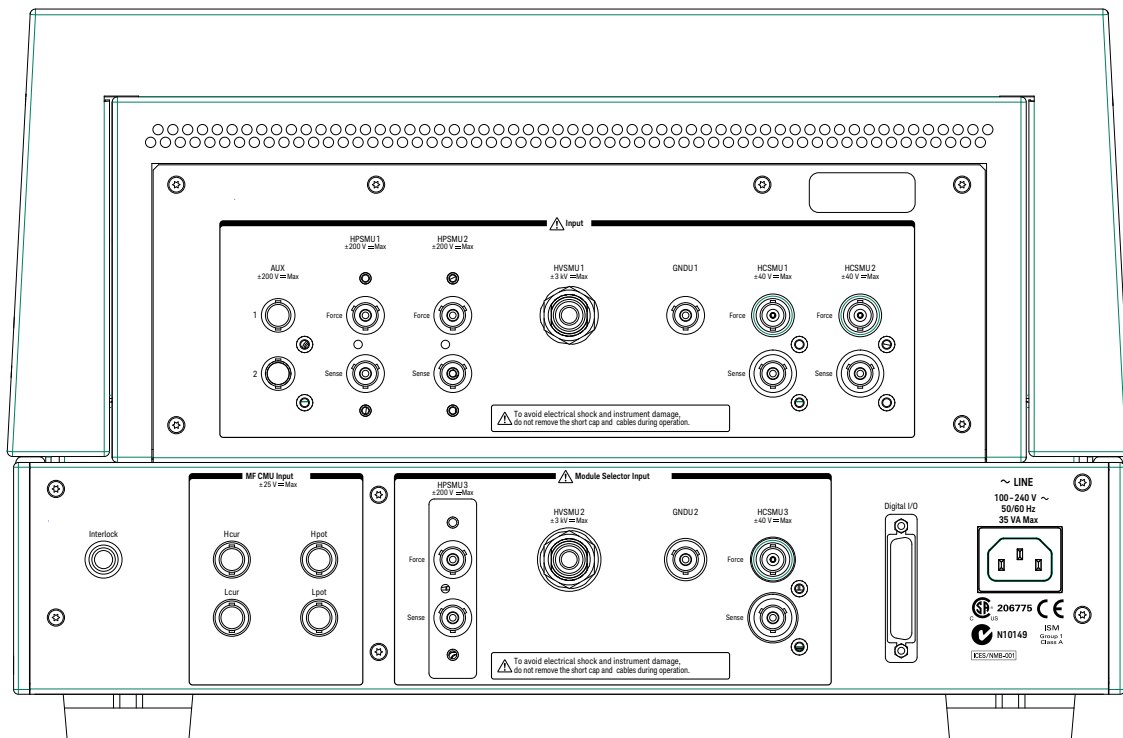
Prepare the required cables listed in the following tables and connect them between the B1505A terminals and the relative N1259A terminals. **Table 2-1** shows the connections without module selector, fast switch, and HVMCU.

Table 2-2 shows the additional connections for using module selector (N1259A-300).

Table 2-3 shows the additional connections for using HVSMU/HCSMU fast switch (N1267A). For the additional information on the fast switch, see "**To Connect HVSMU/HCSMU Fast Switch**" on page 5-32.

Table 2-4 shows the additional connections for using HVMCU. For the additional information on the HVMCU, see "**To Connect HVSMU Current Expander**" on page 5-34.

Figure 2-1 N1259A Rear View



WARNING

The connector cap must be connected to the unused input connectors.

NOTE

For connecting HP/MPSMU, use either 16494A or 16493K.

For connecting MFCMU, use either AUX or MFCMU only for N1259A-020.

CAUTION

The GNDU can sink current of up to 4.2 A.

Use 16493L GNDU cable to connect the GNDU to an adapter, a test fixture, or a connector plate.

Do *not* use normal triaxial cable (16494A) because the maximum current rating of the cable is 1 A.

NOTE

Do not put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. Putting conductor of circuit common, chassis ground, or any potential on causes the measurement error.

NOTE**Dual HCSMU (DHCSMU)**

DHCSMU can be configured by two HCSMU modules installed in one B1505A and connected to the 16493S-021 Dual HCSMU combination adapter. See "[To Connect Dual HCSMU Adapter](#)" on page 5-20 for connection. The adapter output connectors are compatible with HCSMU.

CAUTION

If the DHCSMU is used with the built-in module selector, the maximum current must be ± 30 A to prevent the module selector from performance degradation and failure.

NOTE

The B1505A needs to automatically detect and register the CMU cable type during boot process.

To Connect Interlock Circuit

The B1505A provides the Interlock connector to prevent you from receiving an electrical shock from high voltage (more than ± 42 V). If the interlock circuit is open, the B1505A *cannot* apply high voltage more than ± 42 V.

When using the N1259A test fixture, connect the 16493J interlock cable between the Interlock connectors of the B1505A and the N1259A.

Table 2-1 To Connect between B1505A and N1259A, without HVMCU and Module Selector

B1505A terminals		Required cables	N1259A terminals	
Interlock		16493J Interlock cable, 3 m or 1.5 m, 1 ea.	Interlock	
GNDU		16493L GNDU cable, 3 m or 1.5 m, 1 ea.	GNDU ¹	
HVSMU	Force	16493T HVSMU cable, 3 m or 1.5 m, 1 ea.	HVSMU ²	
HCSMU or DHCSMU	Force	For HCSMU, 16493S HCSMU cable, 3 m or 1.5 m, 1 ea.	HCSMU1 or HCSMU2	Force
	Sense	For DHCSMU, 16493S HCSMU cable, 3 m or 1.5 m, 1 ea., and 16493S-021 Dual HCSMU adapter. See "To Connect 16493S-021" on page 5-22 for Dual HCSMU adapter.		Sense
MCSMU	Force	16494A Triaxial cable, 3 m or 1.5 m, 1 ea. and N1254A-104 Triaxial(f)-BNC(m) adapter, 1 ea.	HCSMU1 or HCSMU2	Force
	Sense	16494A Triaxial cable, 3 m or 1.5 m, 1 ea.		Sense
HPSMU or MPSMU	Force	16494A Triaxial cable, 3 m or 1.5 m, 1 ea., for the non-Kelvin connection, connect it between the Force connectors.	HPSMU1 or HPSMU2	Force
	Sense	For the Kelvin connection, prepare additional one more cable and connect it between the Sense connectors. Or use 16493K Kelvin triaxial cable instead of 16494A.		Sense
MFCMU	Hpot/ Hcur	N1300A CMU cable, 3 m or 1.5 m, 1 ea. BNC(m)-(f)-(f) adapter, total 2 ea., 1 ea. for connecting Hpot, Hcur, and AUX1, and 1 ea. for connecting Lpot, Lcur, and AUX2. It is not needed to connect the ground wire extended from the CMU cable.	AUX 1	
	Lpot/ Lcur		AUX 2	
MFCMU	Hpot	N1300A CMU cable, 3 m or 1.5 m, 1 ea. It is not needed to connect the ground wire extended from the CMU cable.	MFCMU Only for N1259A- 020	Hpot
	Hcur			Hcur
	Lcur			Lcur
	Lpot			Lpot
—		BNC cable, for connecting instruments other than the B1505A	AUX 1 or 2	

1. If the N1266A expander is used, connect the 16493L-001 cable from the N1266A Output Low.
2. If the N1266A expander is used, connect the 16493T-001 cable from the N1266A Output High.

Table 2-2 To Connect between B1505A and N1259A for using Module Selector (N1259A-300)

B1505A terminals		Required cables	N1259A terminals	
GNDU		16493L GNDU cable, 3 m or 1.5 m, 1 ea.	GNDU ¹	
HVSMU	Force	16493T HVSMU cable, 3 m or 1.5 m, 1 ea.	HVSMU ²	
HCSMU or DHCSMU	Force	For HCSMU, 16493S HCSMU cable, 3 m or 1.5 m, 1 ea.	HCSMU3	Force
	Sense	For DHCSMU, 16493S HCSMU cable, 3 m or 1.5 m, 1 ea., and 16493S-021 Dual HCSMU adapter. See "To Connect 16493S-021" on page 5-22 for Dual HCSMU adapter.		Sense
HPSMU or MPSMU	Force	16494A Triaxial cable, 3 m or 1.5 m, 1 ea., for the non-Kelvin connection, connect it between the Force connectors.	HPSMU3	Force
	Sense	For the Kelvin connection, prepare additional one more cable and connect it between the Sense connectors. Or use 16493K Kelvin triaxial cable instead of 16494A.		Sense
Digital I/O		16493G Digital I/O connection cable, 3 m or 1.5 m, 1 ea.	Digital I/O ³	
—		Power cable, 1 ea., for connecting to power line	LINE	

1. If the N1266A expander is used, connect the 16493L-001 cable from the N1266A Output Low.
2. If the N1266A expander is used, connect the 16493T-001 cable from the N1266A Output High.
3. If the N1266A expander is used, connect the 16493G-001 cable from the N1266A Digital I/O Output.

Table 2-3 To Connect between B1505A and N1259A for using Fast Switch (N1267A)

B1505A terminals		Required cables	N1267A terminals	
MCSMU	Force	16494A Triaxial cable, 3 m or 1.5 m, 1 ea.	MCSMU	Force
	Sense	16494A Triaxial cable, 3 m or 1.5 m, 1 ea.		Sense
HCSMU	Force	16493S HCSMU cable, 3 m or 1.5 m, 1 ea. for HCSMU	HCSMU	Force
	Sense			Sense
HVSMU	Force	16493T HVSMU cable, 3 m or 1.5 m, 1 ea.	HVSMU	
GNDU		16493L GNDU cable, 3 m or 1.5 m, 1 ea.	GNDU	
N1267A terminals		Required cables/Description	N1259A terminals	
High	Force	16493T-001 HVSMU cable, 1.5 m, 1 ea.	HVSMU1	
Low	Force	16493U-001 HVSMU cable, 1.5 m, 1 ea.	AUX 1 or 2	

Table 2-4 To Connect between B1505A and N1259A for using HVMCU (N1266A)

B1505A terminals		Required cables	N1266A terminals¹	
GNDU		16493L-001 GNDU cable, 1.5 m, 1 ea.	GNDU	
HVSMU	Force	16493T-001 HVSMU cable, 1.5 m, 1 ea.	HVSMU	
MCSMU ²	Force	16494A-001 Triaxial cable, 1.5 m, 1 ea.	I Control	Force
	Sense	16494A-001 Triaxial cable, 1.5 m, 1 ea.		Sense
MCSMU ²	Force	16494A-001 Triaxial cable, 1.5 m, 1 ea.	V Control	Force
	Sense	16494A-001 Triaxial cable, 1.5 m, 1 ea.		Sense
Digital I/O		16493G-001 Digital I/O connection cable, 1.5 m, 1 ea.	Digital I/O Input	

1. To configure HVMCU, the N1266A current expander is required.
2. HCSMU is substitutable. Then use 16493S HCSMU cable, N1254A-103 adapter for Force, and N1254A-517 adapter for Sense.

N1266A terminals		Required cables	N1259A terminals
Output	High	16493T-001 HVSMU cable, 1.5 m, 1 ea.	HVSMU1 or 2
	Low	16493L-001 GNDU cable, 1.5 m, 1 ea.	GNDU1 or 2
Digital I/O Output		16493G-001 Digital I/O connection cable, 1.5 m, 1 ea.	Digital I/O ¹
LINE		Power cable, 1 ea., for connecting to power line	—

1. This connection is required if the module selector (N1259A-300) is used.

Output Connection






The following parts are available for mounting a device under test (DUT) on the test fixture. Prepare the part suitable for your DUT and attach it to the test fixture. For details, see the following sections.

- "N1259A-010 Inline Package Socket module" on page 2-19
- "N1259A-011 Universal Socket Module" on page 2-20
- "N1259A-012 Blank PTFE Board" on page 2-21
- "N1259A-013 Curve Tracer Test Adapter Socket Module" on page 2-22

Required parts for making the output connections are listed in the following table.

Table 2-5

Required Parts

Model/Option	Description
N1254A-508	Connection wire, red 
N1254A-509	Connection wire, black 
N1254A-512 and N1254A-513	SHV(plug)-SHV(plug) cable and SHV(jack)-banana adapter, for high voltage capacitance measurement 
N1254A-510	Dolphin clip adapter, red and black, for using blank board 
N1254A-511	Cable lug adapter, red and black, for using blank board 

To Connect DUT

WARNING

Set the instrument output off before connecting or disconnecting connection wire. Press the B1505A front panel Stop key to set the output off. And confirm that the B1505A front panel High Voltage indicator is not lit.

WARNING

Do not connect or disconnect your DUT while the B1505A is applying voltage or current. Otherwise, the DUT may be damaged. Do not touch the DUT soon after measurement. Have enough time for discharge and radiation.

CAUTION

Do not touch the terminals of the cable and wire. Oil, perspiration, and dirt prevent good electrical contact, deteriorate insulation, and degrade measurement accuracy.

CAUTION

Never connect the HVSMU Force and Guard terminals to any output, including circuit common, chassis ground, or any other module terminal. Connecting other module may damage the connected module.

NOTE

HP/MP/HVSMU and HVMCU Guard terminal

Guard must be opened. You may extend it as close as possible to a DUT terminal for reducing the leakage current of the extension cable.

1. Set the instrument output off.
2. Open the fixture cover.
3. Set a socket module on the test fixture.
For using the blank PTFE board, see "[N1259A-012 Blank PTFE Board](#)" on page 2-21.
4. Connect a wire to an output terminal. And repeat this for all terminals connected to the measurement resources to be used. See [Figure 2-2](#) for the output terminals.
5. Connect the wire to the socket module input terminal.

Confirm the DUT pin assignment and the measurement resource to be used and complete the connections of all measurement terminals without making misconnection.

For using the inline package socket module, also see "[N1259A-010 Inline Package Socket module](#)" on page 2-19.

For using the universal socket module, also see "[N1259A-011 Universal Socket Module](#)" on page 2-20.

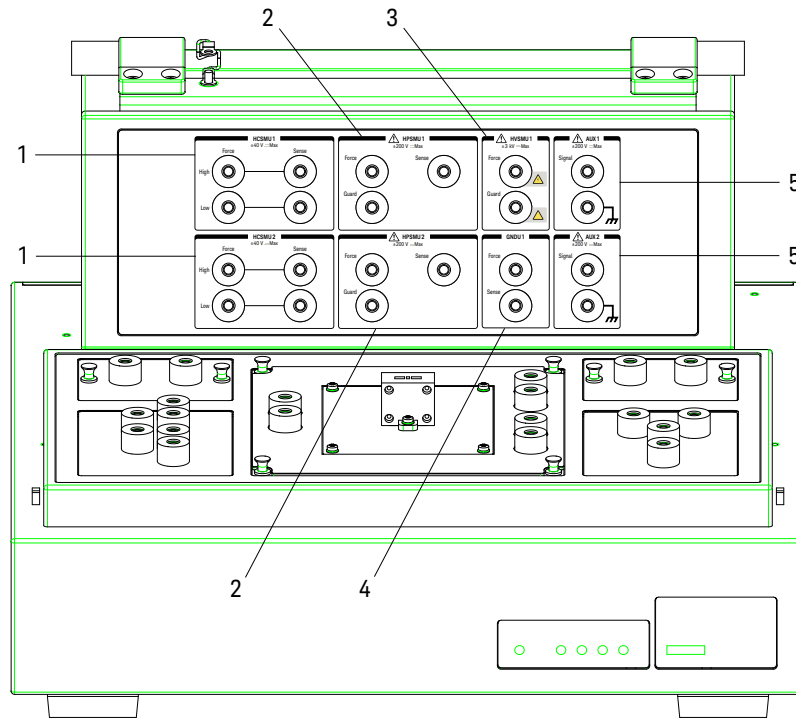
6. Set the DUT on the socket.
7. Close the fixture cover.

To apply more than ± 42 V, close the fixture cover. Otherwise, the interlock function will stop the B1505A output over ± 42 V.

WARNING

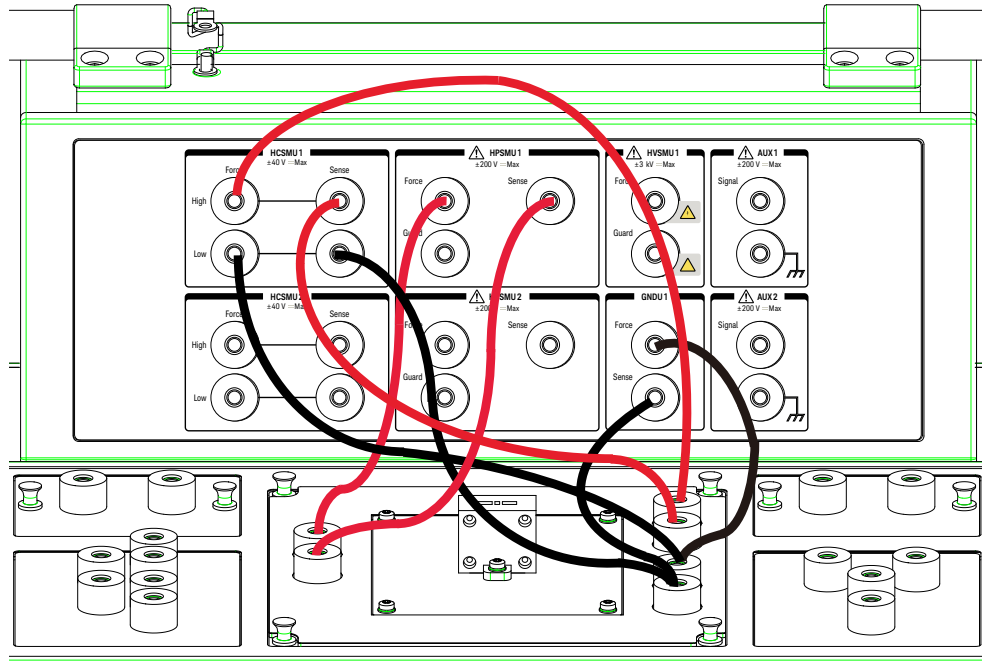
Make sure that the cover is closed properly before starting measurement. Do not perform the measurement when a wire is protruding from the fixture cover.

Figure 2-2 N1259A Output Terminals



1. HCSMU
2. HPSMU
3. HVSMU
4. GNDU
5. AUX

Figure 2-3 Kelvin Connection Example



NOTE

Kelvin connection and non-Kelvin connection

If you want to simplify the connections, open the Sense terminals and use the Force terminals only. This is the non-Kelvin connection. The Force terminals can be used to apply and measure dc voltage or current. Note that the non-Kelvin connection is not available for GNDU and HCSMU.

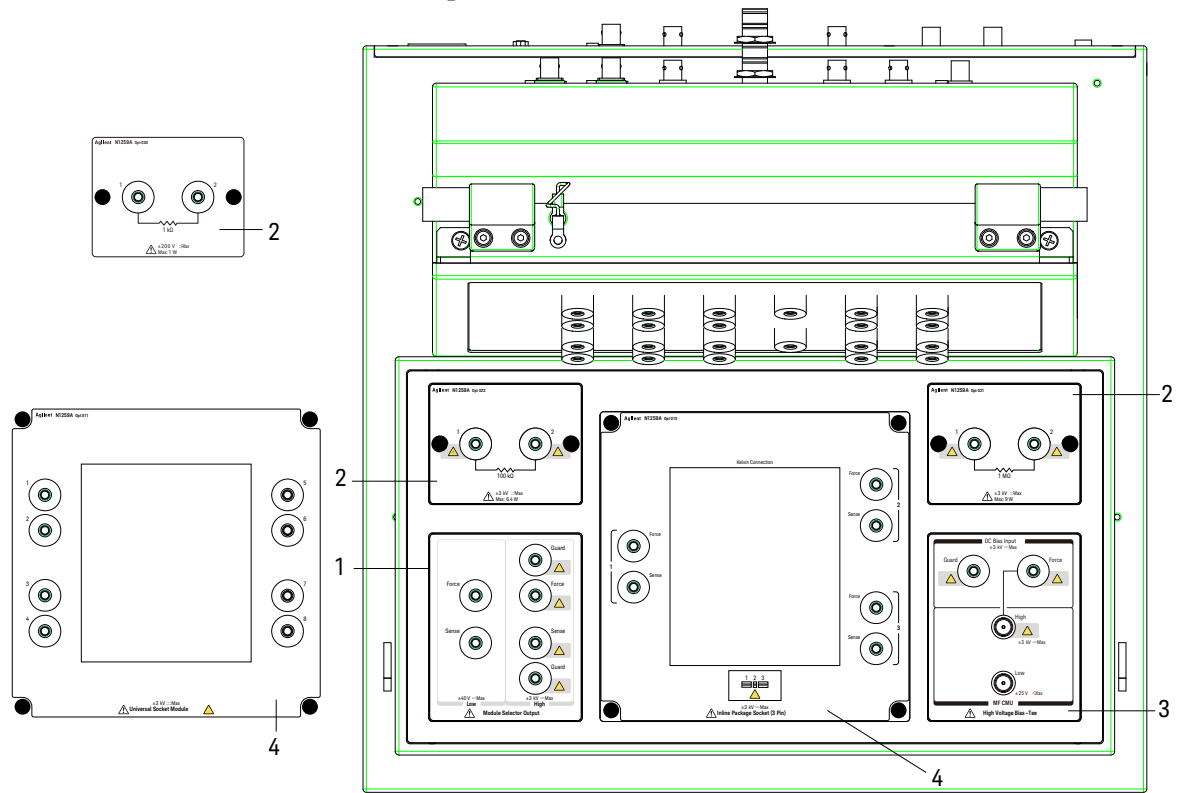
If you perform the low resistance measurement or the high current measurement, use the Kelvin connection which can reduce the residual resistance effects of the cables and contacts by connecting the Force and Sense lines together as close as possible to the DUT terminal. The Kelvin connection can be made on the test fixture as shown in [Figure 2-3](#).

To Use Options

The following options are available for the N1259A. See [Figure 2-4](#).

1. N1259A-300 Module selector
For switching measurement resource connected to DUT automatically.
2. N1259A-021 Series resistor, 1 M Ω , \pm 3000 V max, for drain/collector
N1259A-022 Series resistor, 100 k Ω , \pm 3000 V max, for drain/collector
N1259A-030 Series resistor, 1 k Ω , \pm 200 V max, for gate/base
N1259A-035 Universal R-box, for installing your desired resistor
For reducing damage of DUT or preventing SMU from oscillation.
3. N1259A-020 High voltage bias-T
For capacitance or impedance measurements using DC bias of up to \pm 3000 V.
4. Socket module and blank board
For mounting DUT. See the following sections.
 - ["N1259A-010 Inline Package Socket module" on page 2-19.](#)
 - ["N1259A-011 Universal Socket Module" on page 2-20.](#)
 - ["N1259A-012 Blank PTFE Board" on page 2-21.](#)
 - ["N1259A-013 Curve Tracer Test Adapter Socket Module" on page 2-22.](#)
 - ["N1259A-014 Gate Charge Socket Module" on page 2-23.](#)

Figure 2-4 N1259A Available Options



To Use Module Selector

The module selector is used to switch the measurement resource connected to a terminal of DUT. The measurement resource will be HP/MPSMU, HVSMU/HVMCU, or HC/DHCSMU connected to the Module Selector Input terminals (GNDU2, HPSMU3, HVSMU2, and HCSMU3 connectors, see [Figure 2-1](#)). The measurement resources must be connected to the Input terminals as shown in [Table 2-2](#).

- Required parts:
N1254A-508 or N1254A-509 connection wire, 4 ea.

- Connection:

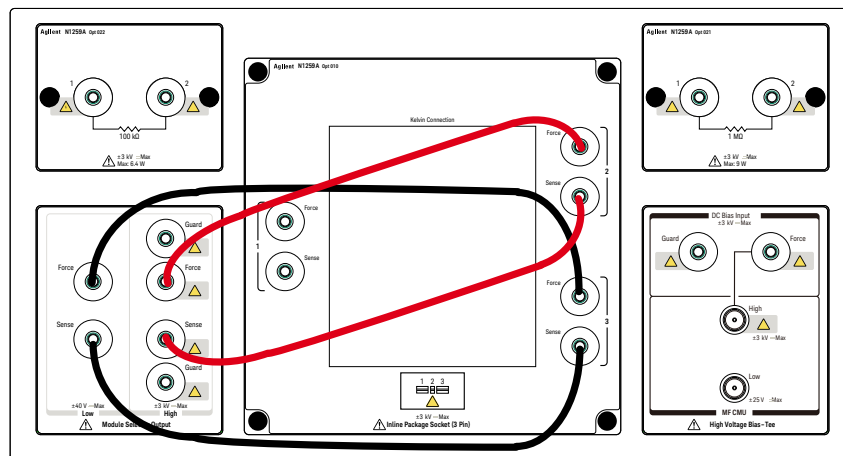
See [Figure 2-5](#).

1. Connect a wire between the Low Force terminal and the low terminal of DUT.
2. Connect a wire between the Low Sense terminal and the low terminal of DUT.
3. Connect a wire between the High Force terminal and the high terminal of DUT.
4. Connect a wire between the High Sense terminal and the high terminal of DUT.

This connection is effective for all measurement performed by the modules connected to the module selector Input terminals. Connection change is not required. The module selector switching status is indicated by the Status indicator mounted on the front panel. See [Figure 2-6](#) and [Table 2-6](#) on [page 2-15](#).

The Guard terminals must be opened. You may extend it as close as possible to a DUT terminal for reducing the leakage current of the extension cable.

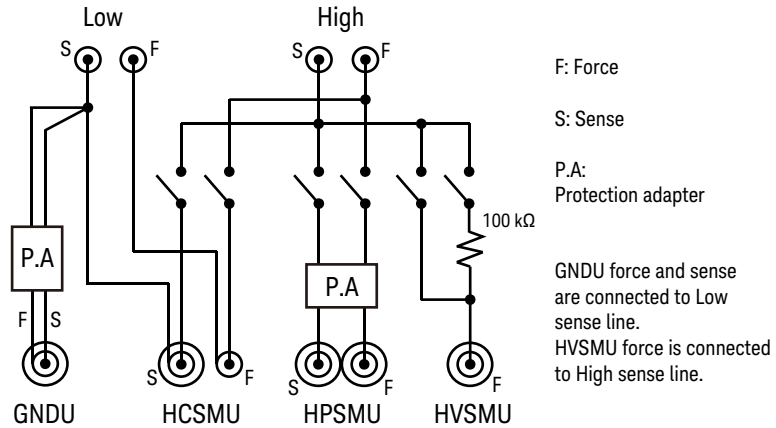
Figure 2-5 Module Selector Connection Example



CAUTION

Maximum current must be ± 30 A to prevent the module selector from performance degradation and failure.

Figure 2-6 **Module Selector Simplified Internal Connections**



NOTE

Controlling module selector input-to-output path

The configuration and the default I/O path of the module selector are set by using the Module Selector tab screen of the Configuration window of the EasyEXPERT software. The connection path from the input port to the output port is controlled by each test setup. And the module selector switching status is indicated by the status indicator mounted on the front panel. See [Figure 2-6](#) and [Table 2-6](#) for the indication and the connection path.

Table 2-6 **Module Selector Status Indicator and Input-to-Output Connection Path**

Module used for the test	Status indicator	Input-to-output connection ¹ of output terminals			
		Low Sense	Low Force	High Sense	High Force
2	Open	HCSMU3 Low Sense	HCSMU3 Low Force	Open	Open
HPSMU or MPSMU	HPSMU	GNDU2 Force + GNDU2 Sense		HPSMU3 Sense	HPSMU3 Force
HCSMU or DHCSMU	HCSMU			HCSMU3 High Sense	HCSMU3 High Force
HVSMU or HVMCU	HVSMU			HVSMU2 Force	Open
HVSMU/HVMCU and built-in series resistor				HVSMU2 Force + Series resistor	

1. In the normal state, the module selector makes the path to the output port from the input port specified by the Default field. When a measurement is performed, the module selector performs automatic switching in every test. The selector makes the path to the output port from the module used for the test.
2. This condition is when all Input fields HVSMU, HCSMU, and HPSMU are blank.

To Use Series Resistor

The series resistor is used to reduce damage of DUT or prevent SMU from oscillation. The resistor is internally connected between the terminals 1 and 2.

NOTE

To install your desired resistor in the universal R-box, see "[To Use Universal R-Box](#)".

- Required parts:
N1254A-508 or N1254A-509 connection wire, 2 ea., or 3 ea. for Kelvin connection

- Connection:

See [Figure 2-7](#).

1. Connect a wire between a SMU Force output terminal and the 1 terminal.
2. Connect a wire between the 2 terminal and a Force terminal on the socket module.

This is the non-Kelvin connection, solid lines shown in [Figure 2-7](#). For the Kelvin connections, add the following connection, dotted line shown in [Figure 2-7](#).

1. Connect a wire between the SMU Sense output terminal and the 1 terminal.

The Kelvin connection is effective up to the series resistor input. So the voltage drop caused by the series resistor must be subtracted from the measurement result as following.

$$V_{dut} = V_{out} - R_s \times I_{meas}$$

where,

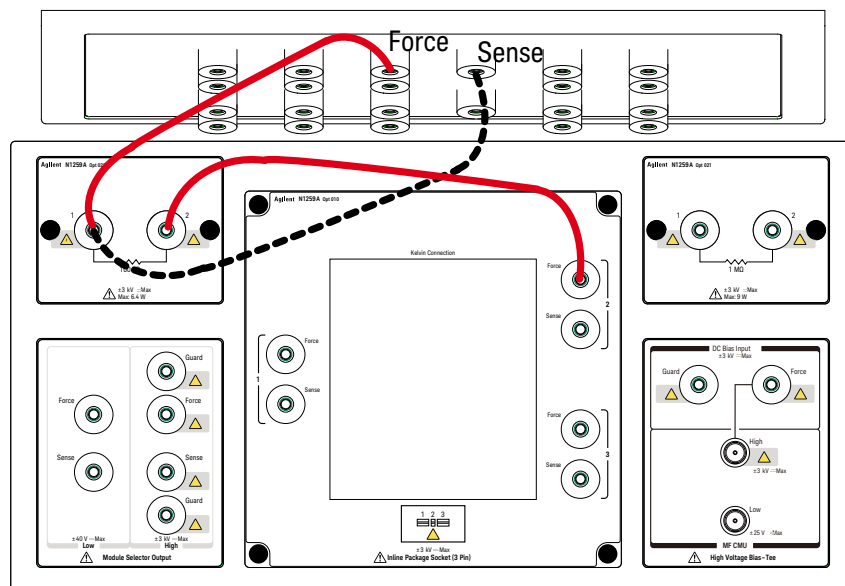
V_{dut} : Voltage after correction

V_{out} : Source output voltage

R_s : Resistance of the series resistor

I_{meas} : Measurement current

Figure 2-7 Series Resistor Connection Example



To Use Universal R-Box

The universal R-box is a blank box, kind of a do-it-yourself kit for installing your desired resistor.

To install the resistor, see the following simple instruction.

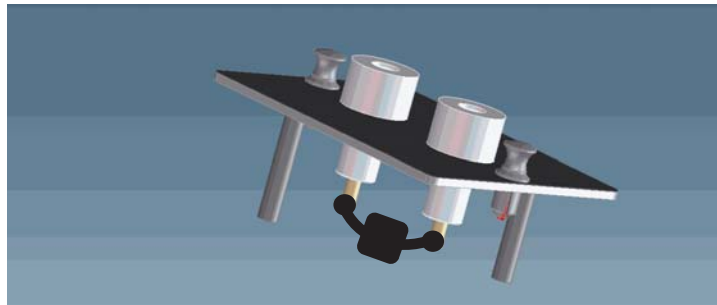
- Required parts:
 - your desired resistor, adequate rating
 - hexlobe (torx type) screwdriver T-10
 - label, for noting the resistance value
- Instruction:
 1. Remove the cover bottom of the blank box.
 2. Solder the resistor between the terminals 1 and 2.

To prevent discharge and any accident, make enough space between the resistor leads and the shield or chassis. For example, make space of about 6 mm from the leads for maximum 3000 V output.
 3. Reattach the cover.

Make enough space between the resistor leads and the cover.
 4. Write the resistance value in the label.
 5. Affix the label to the top cover.

Figure 2-8

To Install Resistor in the N1259A-035 Universal R-Box



To Use High Voltage Bias-T

The high voltage bias-T is used to perform capacitance or impedance measurements using DC bias of up to ± 3000 V. The bias-T High terminal is internally connected to the MF CMU Hpot and Hcur input connectors. And the bias-T Low terminal is internally connected to the MF CMU Lpot and Lcur input connectors.

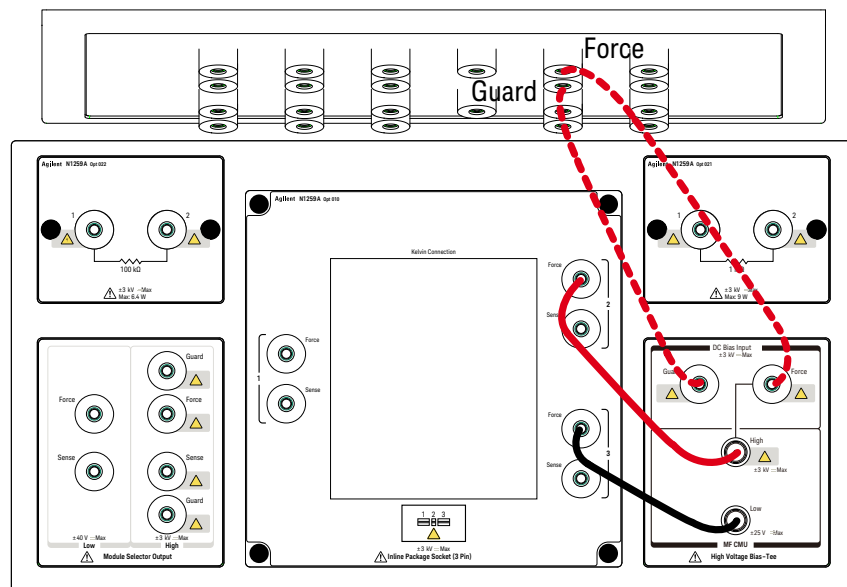
- Required parts:
 - N1254A-512 SHV(plug)-SHV(plug) cable, 2 ea.
 - N1254A-513 SHV(jack)-banana adapter, 2 ea.
 - N1254A-508 or N1254A-509 connection wire, 2 ea.
- Connection:

See [Figure 2-9](#).

 1. Attach the SHV-banana adapter to the SHV cable, and make two cables.
 2. Connect a cable (solid line) between the bias-T Low terminal and the low terminal of DUT.
 3. Connect a cable (solid line) between the bias-T High terminal and the high terminal of DUT.
 4. Connect a wire (dotted line) between a SMU Force output terminal and the DC Bias Input High terminal. Use MPSMU for DC bias of up to ± 100 V, HPSMU for ± 200 V, or HVSMU for ± 3000 V.
 5. Connect a wire (dotted line) between the SMU Guard output terminal and the DC Bias Input Guard terminal.

Figure 2-9

High Voltage Bias-T Connection Example



N1259A-010 Inline Package Socket module

This module provides a socket used for connecting three-terminal inline packaged device and three couples of the Force and Sense terminals. Socket module internal connection is shown in [Figure 2-10](#).

Short bar is furnished with the module. It is used for performing the short correction before the impedance measurement. Set the short bar before the short correction and remove it after the correction.

To use this module, see the following simple instruction.

- Required parts:
N1254A-508 or N1254A-509 connection wire, 1 ea. for one connection
- Instruction:
 1. Attach the socket module to the test fixture.
 2. Connect wires between the socket module terminals and the fixture output terminals.

For making the Kelvin connection, Force and Sense must be connected to Force and Sense of the socket module respectively.

If MCSMU, HCSMU, or DHCSMU is used, High Force and Sense must be connected to Force and Sense used for the high terminal of a device under test (DUT), respectively. Low Force and GNDU Force must be connected to Force used for the low terminal of the DUT, and Low Sense and GNDU Sense must be connected to Sense used for the low terminal of the DUT. See [Figure 2-3](#) for example.

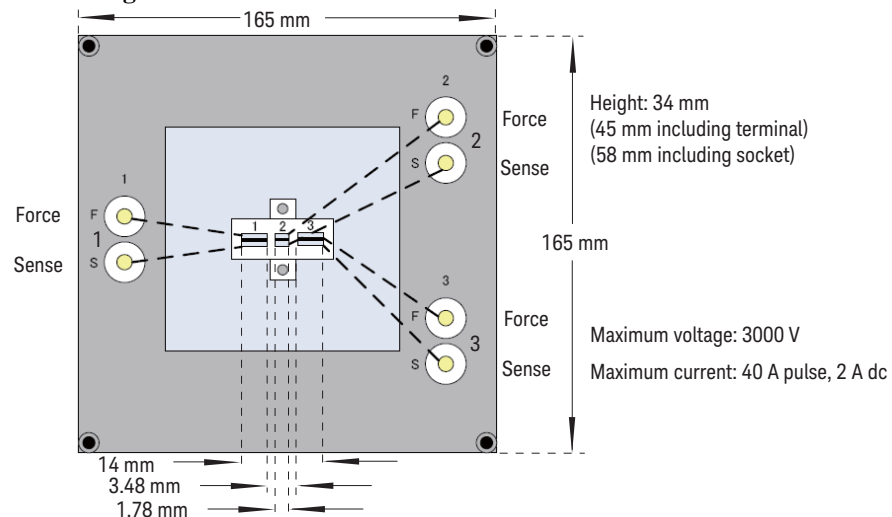
3. Set the DUT on the socket.
4. Close the fixture cover and perform measurement.

CAUTION

Do not apply voltage/current over the maximum limit of the socket module.

Figure 2-10

Inline Package Socket Module



N1259A-011 Universal Socket Module

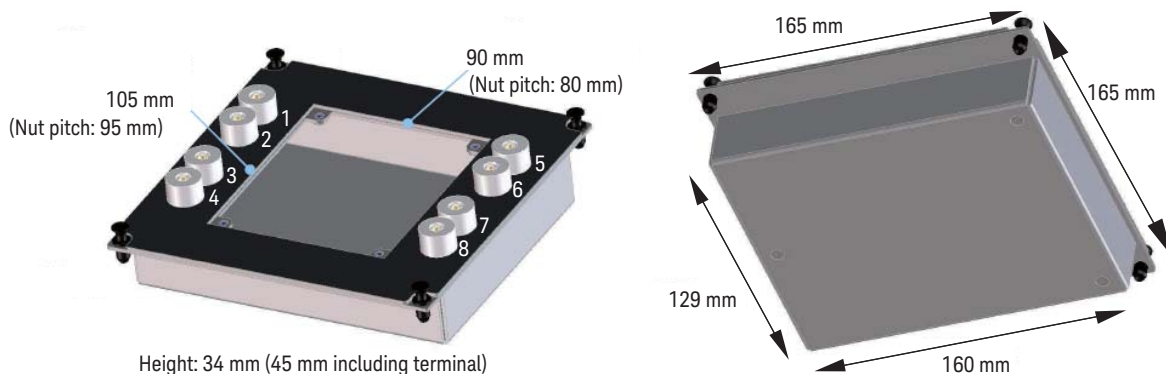
This is a blank module, kind of a do-it-yourself kit for supporting variety of packaged devices. This module can be used by mounting your desired socket or packaged device and making connections same as the N1259A-010 Inline Package Socket Module.

To use this module, see the following simple instruction. For the component locations and dimensions, see [Figure 2-11](#). Also see "[N1259A-010 Inline Package Socket module](#)" on [page 2-19](#) to perform measurement.

- Required parts:
 - blank board suitable for mounting the socket or packaged device
 - screw M3, 4 ea., for fixing the blank board on the socket module
 - wire, adequate length and quantity, for making connections
 - hexlobe (torx type) screwdriver T-10
 - socket, if you use, and packaged device under test (DUT)
- Instruction:
 1. Cut the blank board in 104 mm × 89 mm square.
 2. Make four screw holes on the board. The holes should be 4.5 mm inside from the edge.
 3. Fix the board to the blank module.
 4. Remove the cover bottom of the blank module.
 5. Mount the socket or DUT on the board and solder wire between its terminals and the blank module terminals 1 to 8.

Make enough space between the socket/DUT terminal and the shield/chassis, for example, about 1 mm for maximum 200 V output and 6 mm for 3000 V, to prevent discharge and any accident.
 6. Reattach the cover.

Figure 2-11 Universal Socket Module



N1259A-012 Blank PTFE Board

This is an insulation board used for placing a DUT.

To use this board, see the following simple instruction.

- Required parts:

N1254A-508 or N1254A-509 connection wire, 1 ea. for one connection

N1254A-510 dolphin clip adapter or N1254A-511 cable lug adapter, 1 ea. for one connection. Select one suitable for your DUT. See [Table 2-5](#).

- Instruction:

1. Attach the blank PTFE board to the test fixture.
2. Connect adapters directly to the DUT and put it on the blank PTFE board.
3. Connect wires between the adapters and the fixture output terminals.

For making the Kelvin connection, Force and Sense must be connected together at the device terminal.

If MCSMU, HCSMU, or DHCSMU is used, High Force and Sense must be connected to the high terminal of a device under test (DUT). Low Force, Low Sense, GNDU Force, and GNDU Sense must be connected to the low terminal of the DUT. See [Figure 2-3](#) for reference.

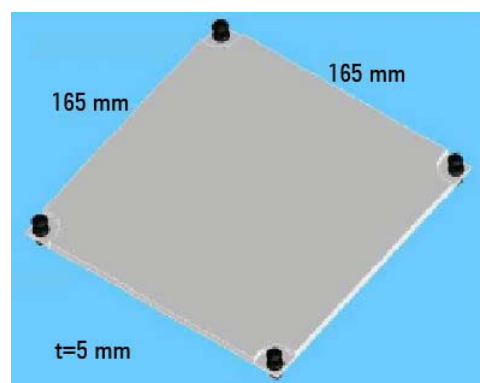
4. Make sure the DUT location. The DUT must be placed on the blank PTFE board properly.

Make enough space between the adapters, also between the adapter of high side and the shield/chassis, for example, about 1 mm for maximum 200 V output and 6 mm for 3000 V, to prevent discharge and any accident.

5. Close the fixture cover and perform measurement.

Figure 2-12

Blank PTFE Board



N1259A-013 Curve Tracer Test Adapter Socket Module

This module provides a socket available for connecting a test adapter designed for connecting to Tektronix 370 series curve tracers. Socket module internal connection is shown in [Figure 2-13](#).

To use this module, see the following simple instruction.

- Required parts:
 - N1254A-508 or N1254A-509 connection wire, 1 ea. for one connection
- Instruction:
 1. Attach the socket module to the test fixture.
 2. Connect your test adapter to the socket.
 3. Connect wires between the socket module terminals and the fixture output terminals.

For making the Kelvin connection, Force and Sense must be connected to Force and Sense of the socket module respectively.

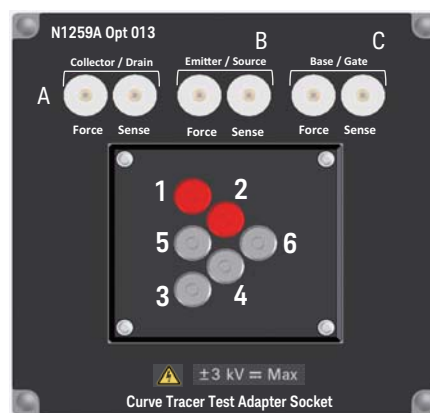
If MCSMU, HCSMU, or DHCSMU is used, High Force and Sense must be connected to Force and Sense used for the high terminal of a device under test (DUT), respectively. Low Force and GNDU Force must be connected to Force used for the low terminal of the DUT, and Low Sense and GNDU Sense must be connected to Sense used for the low terminal of the DUT. See [Figure 2-3](#) for example.

4. Set the DUT on your test adapter.
5. Close the fixture cover and perform measurement.

CAUTION

Do not apply voltage/current over the maximum limit of the socket module.

Figure 2-13 Curve Tracer Test Adapter Socket Module



Internal connection

- 1: Collector/Drain Force
- 2: Collector/Drain Sense
- 3: Emitter/Source Force
- 4: Emitter/Source Sense
- 5: Base/Gate Force
- 6: Base/Gate Sense

Maximum voltage: 3000 V

Maximum current:

- A-Force: 500 A pulse, 39 A dc
- A-Sense: 40 A pulse, 2 A dc
- B-Force: 500 A pulse, 39 A dc
- B-Sense: 40 A pulse, 2 A dc
- C-Force: 40 A pulse, 2 A dc
- C-Sense: 40 A pulse, 2 A dc

N1259A-014 Gate Charge Socket Module

This socket adapter is designed for performing the gate charge measurement.

Note that the B1513A HVSMU cannot be used for the gate charge measurement and must be upgraded to B1513B or later version.

To use this module, see the following simple instruction.

1. Attach the socket module to the test fixture.
2. Connect wires between the socket module terminals and the fixture output terminals.
You can use the following wires supplied with the socket module.
 - N1254A-508: long wire (red), 4 ea.
 - N1254A-509: long wire (black), 4 ea.
 - N1265-61751: short wire (red), 2 ea.
 - N1265-61752: short wire (black), 2 ea.

For making the Kelvin connection, Force and Sense must be connected together at the device terminal.

Figure 2-15 and Figure 2-16 show connection examples.

3. Set the current control device on the left socket or connect the load resistor between the studs for the resistor.

The current control device must be an extra 3-pin inline package device which is expected to have the same characteristics as DUT. If the device is not available, use a load resistor. The resistor must satisfy the following specifications.

Resistance = V_r / I_r (V_r : rated voltage, I_r : rated current)

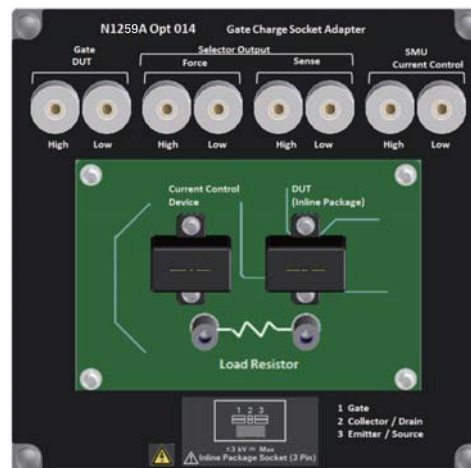
Peak power $\geq V_r \times I_r \times 1 \text{ ms}$

4. Set your DUT on the right socket.
5. Close the fixture cover and perform measurement.

CAUTION

Do not apply voltage/current over the maximum limit of the socket module.

Figure 2-14 Gate Charge Socket Module



Gate DUT

High: Max. 30 V / 1 A

Low: Max. 10 V / 1 A

Selector Out Force

High: Max. 3000 V / 500 A

Low: Max. 10 V / 500 A

Selector Out Sense

High: Max. 3000 V / 20 mA

Low: Max. 10 V / 20 mA

SMU Current Control

High: Max. 30 V / 1A floating 3000 V

Low: Max. 10 V / 1A floating 3000 V

Figure 2-15 Connection Example for High Voltage Gate Charge Measurement

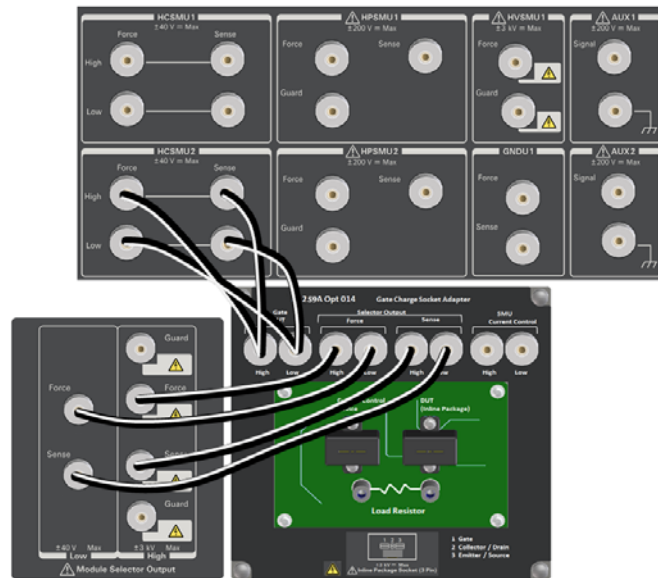
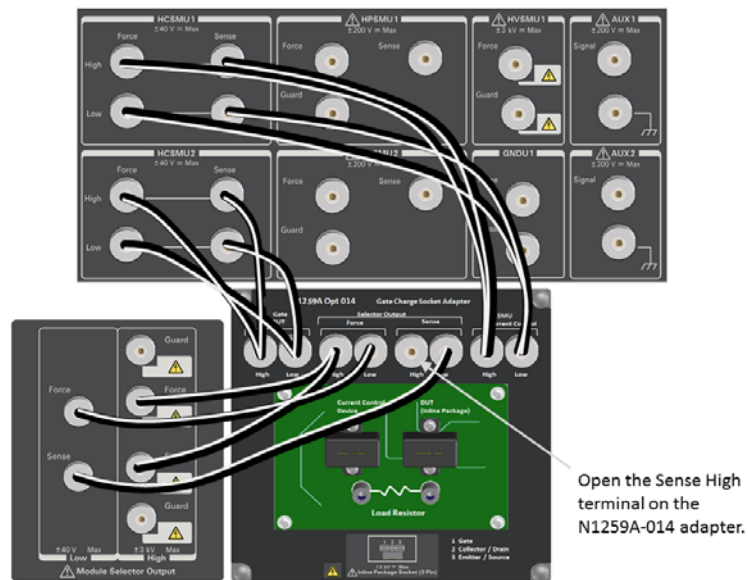


Figure 2-16 Connection Example for High Current Gate Charge Measurement



NOTE

For the high current gate charge measurement, connect the Selector Output Sense High terminal on the fixture to the Selector Output Force High terminal on the N1259A-014 adapter. Measurement may fail depending on the device characteristics if it is connected to the Selector Output Sense High terminal.

3

N1265A Connection Guide

This chapter describes the required information for connecting Keysight B1505A, N1265A, and a device under test (DUT).

- "Input Connection"
- "Output Connection"

The N1265A is a test fixture which contains the current expander to enable 500 A or 1500 A (option N1265A-015) output and measurement, and contains the selector to switch the measurement resource connected to the DUT.

The current expander is used to configure ultra high current unit (UHCU).

The selector is used to switch the measurement resource connected to the DUT. The measurement resource will be the UHCU, HVSMU/HVMCU, or HP/MPSMU. The selector output can be extended to your prober station by using the N1254A-524 ultra high current prober system cable.

The N1265A also provides the connection paths for UHVU, MFCMU via bias-tee, and HP/MP/HC/MC/DHCSMU.

- Dimensions: 420 mm (W) × 285 mm (H) × 575 mm (D)
- Weight: 30.0 kg
- Maximum volt-amps: 400 VA

WARNING

To avoid electrical shock and instrument damage, turn the all instruments off before connecting or disconnecting measurement cable.

WARNING

There are potentially hazardous voltages of up to ± 10 kV (UHVU), ± 3000 V (HVSMU), ± 2200 V (HVMCU), ± 200 V (HPSMU), or ± 100 V (MPSMU) at the High, Force, Guard, and Sense terminals. To prevent electrical shock, do *not* expose these lines.

WARNING

To prevent electrical shock during use, connect the Interlock cable (see "**To Connect Interlock Circuit**" on page 3-5).

WARNING

The B1505A, the N1265A ultra high current expander/fixture, and the N1268A ultra high voltage expander are heavy and require a two person lift.

CAUTION

Do not grab the fixture cover when lifting the N1265A.

CAUTION

Never connect the Guard terminal to any output, including circuit common, chassis ground, or any other guard terminal. Connecting anything may damage the instrument.

CAUTION

Never connect the UHVU High, HVMCU High, and HVSMU Force and Guard terminals to any output, including circuit common, chassis ground, or any other measurement resource such as SMU. Connecting other measurement resource may damage the connected one.

CAUTION

Never connect the UHVU Low terminal to any other measurement resource except for the N1269A or N1265A-040 adapter. Connecting other measurement resource may damage the connected one.

NOTE

Using Universal R-box and Universal Socket Module

The universal R-box and the universal socket module are the do-it-yourself kit for installing a resistor you want or mounting a socket you want.

You need to prepare the hexlobe (torx type) screwdriver T-10 to remove the cover.

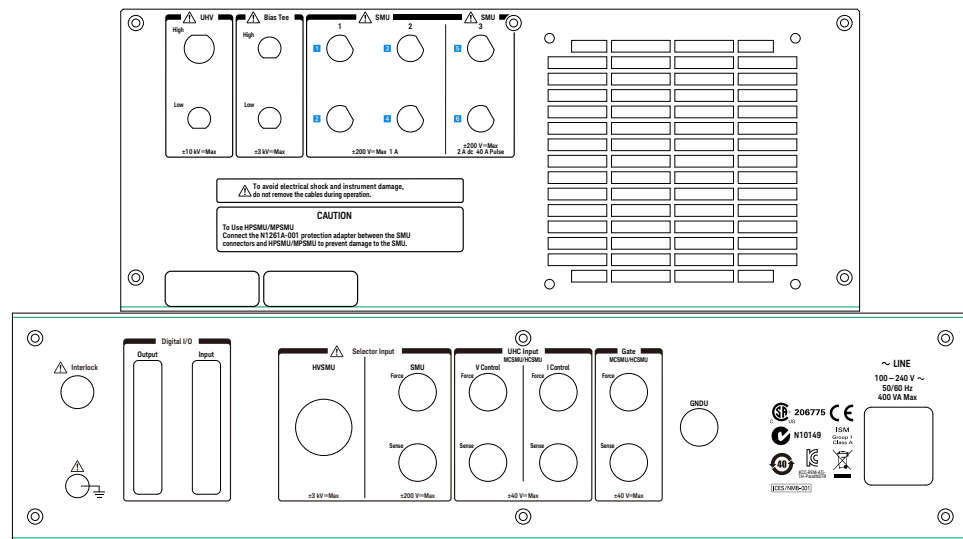
After installing a resistor or mounting a socket, reattach the cover. Do not use the universal R-box and the universal socket module under the condition that the cover is removed.

Input Connection

Prepare the required cables listed in the following tables and connect them between the B1505A terminals and the relative N1265A terminals. [Table 3-2](#) shows the connections without HVMCU and UHVU. [Table 3-3](#) shows the additional connections for using HVMCU. And [Table 3-4](#) shows the additional connections for using UHVU. For the additional information on the HVMCU, see "[To Connect HVSMU Current Expander](#)" on page 5-34. For the additional information on the UHVU, see "[To Connect Ultra High Voltage Expander](#)" on page 5-38.

Figure 3-1

N1265A Input Connectors on Rear Panel



SMU 1 ([1], [2]), 2 ([3], [4]), and 3 ([5], [6]) connectors are used for connecting the MPSMU, HPSMU, or MCSMU. Also SMU 3 ([5], [6]) connectors can be used for connecting HCSMU or DHCSMU. See [Table 3-1](#) for the SMU signal assigned to the SMU input connector by the type of the connected SMU.

The connectors [1], [3], and [5] are for connecting Force, and the connectors [2], [4], and [6] are for connecting Sense of the measurement resource connected to the connectors [1], [3], and [5] respectively.

For connecting HP/MPSMU, the connectors [2], [4], and [6] can be also used to connect Force of other SMU for non-Kelvin connection.

NOTE

For connecting MFCMU, use N1300A-001 CMU cable, N1260A high voltage bias-tee, and N1254A-518 SHV(plug)-SHV(plug) cable.

CAUTION The GNDU can sink current of up to 4.2 A.
Use 16493L GNDU cable to connect the GNDU to an adapter, a test fixture, or a connector plate.
Do *not* use normal triaxial cable (16494A) because the maximum current rating of the cable is 1 A.

NOTE Do not put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. Putting conductor of circuit common, chassis ground, or any potential on causes the measurement error.

NOTE **Dual HCSMU (DHCSMU)**
DHCSMU can be configured by two HCSMU modules installed in one B1505A and connected to the 16493S-021 Dual HCSMU combination adapter. See "[To Connect Dual HCSMU Adapter](#)" on page 5-20 for connection. The adapter output connectors are compatible with HCSMU.

NOTE The B1505A needs to automatically detect and register the CMU cable type during boot process.

Table 3-1 SMU Input Connectors and Signals by SMU Type

Connected SMU	Connection method	1		2		3	
		[1]	[2]	[3]	[4]	[5]	[6]
MPSMU	Kelvin	Force	Sense	Force	Sense	Force	Sense
	non-Kelvin	Force	Force	Force	Force	Force	Force
HPSMU	Kelvin	Force	Sense	Force	Sense	Force	Sense
	non-Kelvin	Force	Force	Force	Force	Force	Force
MCSMU	Kelvin	Force	Sense	Force	Sense	Force	Sense
HCSMU	Kelvin	NA		NA		Force	Sense
DHCSMU	Kelvin	NA		NA		Force	Sense


To Connect Interlock Circuit

The B1505A provides the Interlock connector to prevent you from receiving an electrical shock from high voltage (more than ± 42 V). If the interlock circuit is open, the B1505A *cannot* apply high voltage more than ± 42 V.

When using the N1265A test fixture, connect the 16493J interlock cable between the Interlock connectors of the B1505A and the N1265A. If the N1268A expander is used, connect the cables between the B1505A and the N1268A, and between the N1268A and the N1265A.

Table 3-2 To Connect between B1505A and N1265A, without HVMCU and UHVU

B1505A terminals		Required cables	N1265A terminals	
Interlock		16493J Interlock cable, 3 m or 1.5 m, 1 ea.	Interlock ¹	
GNDU		16493L GNDU cable, 3 m or 1.5 m, 1 ea.	GNDU ²	
HVSMU	Force	16493T HVSMU cable, 3 m or 1.5 m, 1 ea.	Selector Input HVSMU ³	
HPSMU or MPSMU	Force	16494A Triaxial cable, 3 m or 1.5 m, 1 ea., for the non-Kelvin connection, connect it between the Force connectors. For the Kelvin connection, prepare additional one more cable and connect it between the Sense connectors.	Selector Input SMU	Force
	Sense			Sense
MCSMU ⁴	Force	16494A Triaxial cable, 3 m or 1.5 m, 1 ea.	UHC Input V Control	Force
	Sense	16494A Triaxial cable, 3 m or 1.5 m, 1 ea.		Sense
MCSMU ⁴	Force	16494A Triaxial cable, 3 m or 1.5 m, 1 ea.	UHC Input I Control	Force
	Sense	16494A Triaxial cable, 3 m or 1.5 m, 1 ea.		Sense
MCSMU ⁴	Force	16494A Triaxial cable, 3 m or 1.5 m, 1 ea.	Gate	Force
	Sense	16494A Triaxial cable, 3 m or 1.5 m, 1 ea.		Sense
MCSMU or HPSMU or MPSMU	Force	To connect MCSMU, use two 16494A cables, 3 m or 1.5 m. To connect HP/MPSMU, use N1261A-001 protection adapter and four 16494A triaxial cables for Kelvin connection or two 16494A cables for non-Kelvin connection. Recommended cable length is 1.5 m. See "To Connect Protection Adapter" on page 5-23 for protection adapter.	SMU 1/2/3 See Table 3-1 .	[1]/[3] /[5]
	Sense			[2]/[4] /[6]
HCSMU or DHCSMU	Force	For HCSMU, 16493S HCSMU cable, 3 m or 1.5 m, 1 ea., N1254A-103 adapter for Force, and N1254A-517 adapter for Sense For DHCSMU, 16493S HCSMU cable, 3 m or 1.5 m, 1 ea., 16493S-021 Dual HCSMU adapter, N1254A-103 adapter for Force, and N1254A-517 adapter for Sense. See "To Connect 16493S-021" on page 5-22 for Dual HCSMU adapter.	SMU 3	[5]
	Sense			[6]
MFCMU	Hpot	N1300A-001 CMU cable 1 ea., N1260A high voltage bias-tee 1 ea., and N1254A-518 SHV(plug)-SHV(plug) cable 2 ea. See "To Connect High Voltage Bias Tee" on page 5-25 for bias-tee. It is not needed to connect the ground wire extended from the CMU cable.	Bias Tee	High
	Hcur			Low
	Lcur			
	Lpot			

B1505A terminals	Required cables	N1265A terminals
Digital I/O	16493G Digital I/O connection cable, 3 m or 1.5 m, 1 ea.	Digital I/O Input
—	Power cable, 1 ea., for connecting to power line	LINE
—	Wire, 1 ea., for earthing	(earth) 

1. If the N1268A expander is used, connect the 16493J-001 cable from the N1268A Interlock Output.
2. If the N1266A expander is used, connect the 16493L-001 cable from the N1266A Output Low.
3. If the N1266A expander is used, connect the 16493T-001 cable from the N1266A Output High.
4. HCSMU is substitutable. Then use 16493S HCSMU cable, N1254A-103 adapter for Force, and N1254A-517 adapter for Sense.

WARNING Connect a wire from an electrical ground (safety ground) to the earth terminal.

Table 3-3 To Connect between B1505A and N1265A for using HVMCU (N1266A)

B1505A terminals		Required cables	N1266A terminals ¹	
GNDU		16493L-001 GNDU cable, 1.5 m, 1 ea.	GNDU	
HVSMU	Force	16493T-001 HVSMU cable, 1.5 m, 1 ea.	HVSMU	
MCSMU ²	Force	16494A-001 Triaxial cable, 1.5 m, 1 ea.	I Control	Force
	Sense	16494A-001 Triaxial cable, 1.5 m, 1 ea.		Sense
MCSMU ²	Force	16494A-001 Triaxial cable, 1.5 m, 1 ea.	V Control	Force
	Sense	16494A-001 Triaxial cable, 1.5 m, 1 ea.		Sense


1. To configure HVMCU, the N1266A current expander is required.
2. HCSMU is substitutable. Then use 16493S HCSMU cable, N1254A-103 adapter for Force, and N1254A-517 adapter for Sense.

N1266A terminals		Required cables	N1265A terminals
Output	High	16493T-001 HVSMU cable, 1.5 m, 1 ea.	Selector Input HVSMU
	Low	16493L-001 GNDU cable, 1.5 m, 1 ea.	GNDU
Digital I/O Input		16493G-001 Digital I/O connection cable, 1.5 m, 1 ea.	Digital I/O Output
LINE		Power cable, 1 ea., for connecting to power line	—

Table 3-4 To Connect between B1505A and N1265A for using UHVU (N1268A)

B1505A terminals		Required cables	N1268A terminals ¹	
Interlock		16493J-001 Interlock cable, 1.5 m, 1 ea.	Interlock Input	
MCSMU	Force	16494A-001 Triaxial cable, 1.5 m, 1 ea.	I Control	Force
	Sense	16494A-001 Triaxial cable, 1.5 m, 1 ea.		Sense
MCSMU ²	Force	16494A-001 Triaxial cable, 1.5 m, 1 ea.	V Control	Force
	Sense	16494A-001 Triaxial cable, 1.5 m, 1 ea.		Sense

1. To configure UHVU, the N1268A ultra high voltage expander is required.
2. HCSMU is substitutable. Then use 16493S HCSMU cable, N1254A-103 adapter for Force, and N1254A-517 adapter for Sense.

N1268A terminals		Required cables	N1265A terminals	
Interlock Output		16493J-001 Interlock cable, 1.5 m, 1 ea.	Interlock	
Output	High	UHV(plug)-UHV(plug) cable, 1.5 m, 1 ea. (part of 16493V-001)	UHV	High
	Low	SHV(plug)-SHV(plug) cable, 1.5 m, 1 ea. (part of 16493V-001)		Low
Digital I/O ¹		16493G-001 Digital I/O connection cable, 1.5 m, 1 ea.	Digital I/O Output	
LINE		Power cable, 1 ea., for connecting to power line	—	
(earth) 		Wire, 1 ea., for earthing	—	

1. If the N1266A expander is used, connect the 16493G-001 cable from the N1266A Digital I/O Output.

WARNING **Connect a wire from an electrical ground (safety ground) to the earth terminal.**

Output Connection









The following parts are available for mounting a device under test (DUT) on the test fixture. Prepare the part suitable for your DUT and attach it to the test fixture. For details, see the following sections.

- "Inline Package Socket module (N1265A-010)" on page 3-17
- "Universal Socket Module (N1265A-011)" on page 3-18
- "Curve Tracer Test Adapter Socket Module (N1265A-013)" on page 3-19
- "Blank Silicon Plate (N1265A-002)" on page 3-22

Required parts for making the output connections are listed in the following table.

Table 3-5

Required Parts

Model/Option	Description
N1254A-508	Connection wire, red, do not use with UHCU/UHVU 
N1254A-509	Connection wire, black, do not use with UHCU/UHVU 
N1254A-522	Connection wire, 2 ea., for using UHCU 
N1254A-512 and N1254A-513	SHV(plug)-SHV(plug) cable and SHV(jack)-banana adapter, for high voltage capacitance measurement 
N1254A-510	Dolphin clip adapter, red and black, for using blank plate 
N1254A-511	Cable lug adapter, red and black, for using blank plate 
N1254A-520	UHV(plug)/SHV(plug) to no connector cables, 1 m, for using UHVU and blank plate 
N1254A-523	Banana to no connector wire, 1 m, 2 ea., for using UHCU and blank plate 

To Connect DUT

WARNING

Set the instrument output off before connecting or disconnecting connection wire.

Press the B1505A front panel Stop key to set the module output off. And confirm that the B1505A front panel High Voltage indicator is not lit.

If the N1268A is used, press the High Voltage Enable switch to disable the high voltage output. And confirm that this red switch is not lit.

CAUTION

Do not connect or disconnect your DUT while the B1505A is applying voltage or current. Otherwise, your DUT may be damaged.

CAUTION

Do not touch the terminals of the cable and wire. Oil, perspiration, and dirt prevent good electrical contact, deteriorate insulation, and degrade measurement accuracy.

CAUTION

Never connect the Selector Output High Force, High Sense, and Guard terminals, Bias Tee High connector, and UHV High connector to any output, including circuit common, chassis ground, or any other measurement resource such as SMU. Connecting other measurement resource may damage the connected one.

NOTE

SMU Guard terminals and Selector Output Guard terminal

Guard must be opened. You may extend it as close as possible to a DUT terminal for reducing the leakage current of the extension cable.

1. Set the instrument output off.
2. Open the fixture cover.
3. Set a socket module on the test fixture.

For using the blank silicon plate, see "[Blank Silicon Plate \(N1265A-002\)](#)" on page 3-22.

4. Connect a wire to an output terminal. And repeat this for all terminals connected to the measurement resources to be used. See [Figure 3-2](#) for the output terminals.
5. Connect the wire to the socket module input terminal.

Confirm the DUT pin assignment and the measurement resource to be used and complete the connections of all measurement terminals without making misconnection.

For using the inline package socket module, also see "[Inline Package Socket module \(N1265A-010\)](#)" on page 3-17.

For using the universal socket module, also see "[Universal Socket Module \(N1265A-011\)](#)" on page 3-18.

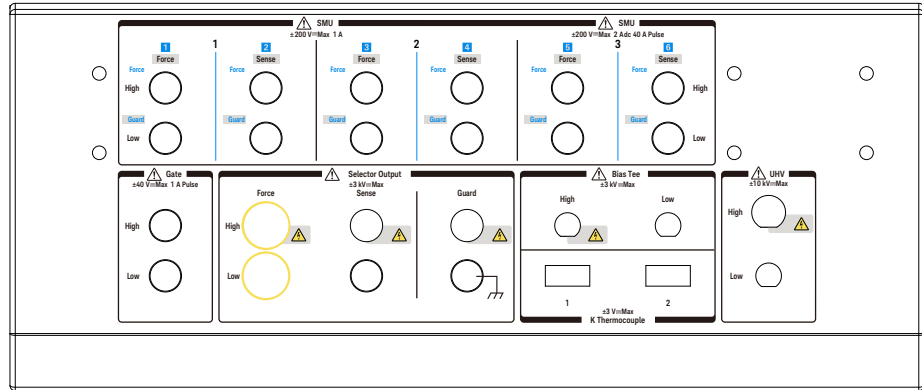
6. Set the DUT on the socket.
7. Close the fixture cover.

To apply more than ± 42 V, close the fixture cover. Otherwise, the interlock function will stop the B1505A output over ± 42 V.

WARNING

Make sure that the cover is closed properly before starting measurement. Do not perform the measurement when a wire is protruding from the fixture cover.

Figure 3-2 N1265A Output Terminals



SMU Terminals

Output terminals internally connected to the SMU input connectors on the rear panel. Force, Sense, and Guard terminals for HP/MPSMU. High Force, Low Force, High Sense, and Low Sense for HC/MC/DHCSMU. See [Table 3-6](#).

For using HP/MPSMU, Force must be connected to a terminal of a DUT. And Guard must be opened. You may extend it as close as possible to the DUT terminal for reducing the leakage current of the extension cable. Also, Force and Sense should be connected together at the device end for making the Kelvin connection effective for low resistance and high current measurements.

For using HC/MC/DHCSMU, High Force and High Sense must be connected together at the high terminal of a DUT. And Low Force and Low Sense must be connected together at the low terminal of the DUT. Also, Selector Output Low Force and Sense must be connected to the low terminal for connecting GNDU.

Use a MCSMU for the gate or base terminal of active device measurement using UHVU. Then attach the N1265A-040 protection adapter on the SMU terminals used for the MCSMU. This adapter is designed for protecting the MCSMU from ultra high voltage. Also see "[Protection Adapter \(N1265A-040\)](#)" on [page 3-25](#).

NOTE

Kelvin connection and non-Kelvin connection

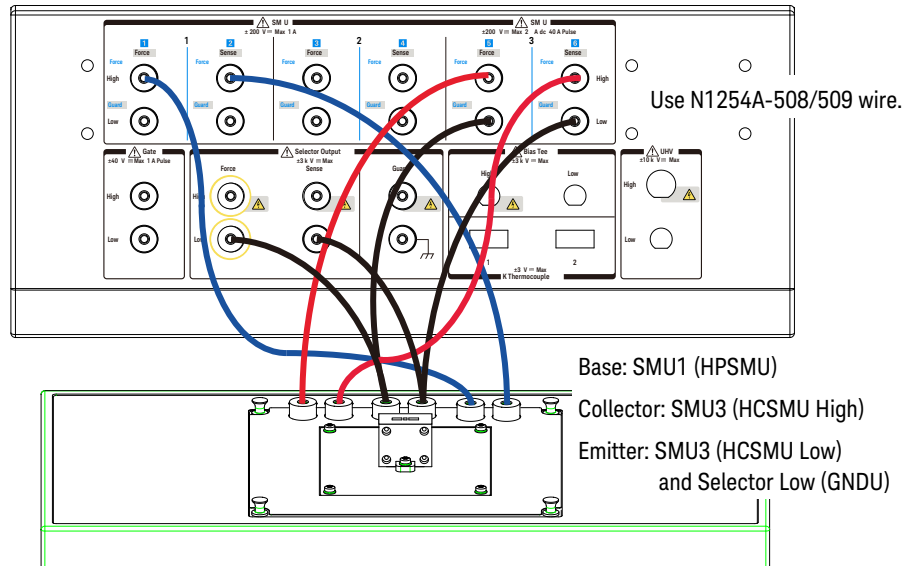
If you want to simplify the connections, open the Sense terminals and use the Force terminals only. This is the non-Kelvin connection. The Force terminals can be used to apply and measure dc voltage or current. Note that the non-Kelvin connection is not available for GNDU and MCSMU/HCSMU/DHCSMU.

If you perform the low resistance measurement or the high current measurement, use the Kelvin connection which can reduce the residual resistance effects of the cables and contacts by connecting the Force and Sense lines together as close as possible to the DUT terminal. The Kelvin connection can be made on the test fixture as shown in [Figure 3-3](#).

Table 3-6 SMU Terminals and Signals by SMU Type

Connected SMU	1		2		3		Designation on panel
	[1]	[2]	[3]	[4]	[5]	[6]	
HP/MPSMU (non-Kelvin)	Force	Force	Force	Force	Force	Force	Blue letters
	Guard	Guard	Guard	Guard	Guard	Guard	
HP/MPSMU (Kelvin)	Force	Sense	Force	Sense	Force	Sense	Letters in white square
	Guard	Guard	Guard	Guard	Guard	Guard	
MCSMU	High Force	High Sense	High Force	High Sense	High Force	High Sense	Black letters
	Low Force	Low Sense	Low Force	Low Sense	Low Force	Low Sense	
HCSMU or DHCSMU	NA		NA		High Force	High Sense	
					Low Force	Low Sense	

Figure 3-3 Kelvin Connection Example



Gate Terminals

Output terminals internally connected to the Gate input connectors on the rear panel. High and Low terminals used for the gate drive.

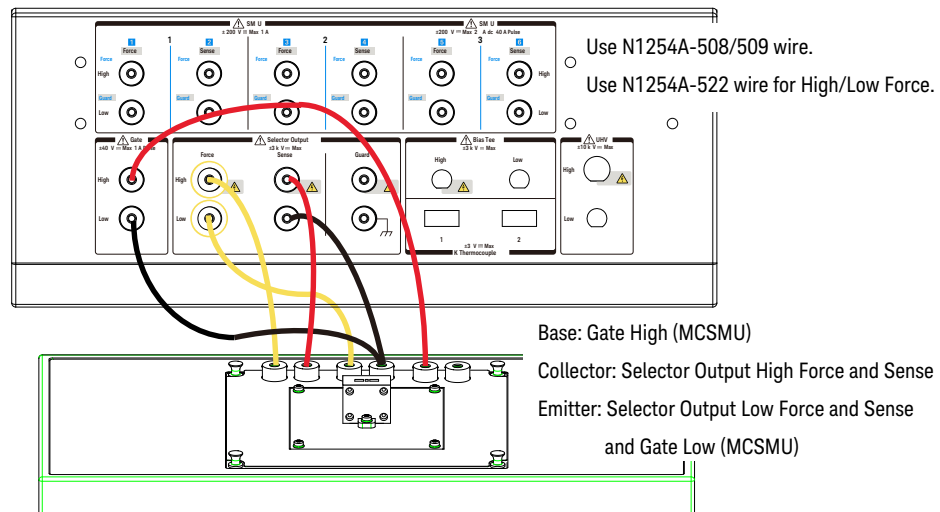
Gate terminals are designed for using with the Selector Output terminals. See [Figure 3-5](#). High should be connected to the gate or base terminal of a DUT. Low should be connected to the source or emitter terminal of the DUT. See [Figure 3-4](#) for connection example.

CAUTION

Open the Gate terminals for the ultra high voltage measurement using UHVU.

Figure 3-4

Gate and Selector Output Connection Example



Selector Output Terminals

Selector is used to switch the measurement resource connected to the DUT. See [Figure 3-5](#) and [Table 3-7](#) for the connection path. Also see [Figure 3-4](#) for connection example.

CAUTION

Open the terminals for the ultra high voltage measurement using UHVU.

1. Low Force and Low Sense output terminals

Force and Sense must be connected together at the low terminal of a DUT. Use the banana-banana wire (N1254A-522) to connect the Low Force terminal for performing the ultra high current measurement using UHCU.

2. High Force and High Sense output terminals

Force and Sense must be connected together at the high terminal of a DUT. Use the banana-banana wire (N1254A-522) to connect the High Force terminal for performing the ultra high current measurement using UHCU.

3. Guard terminal

Guard (high level) must be opened. You may extend it as close as possible to a DUT terminal for reducing the leakage current of the extension cable.

4. Chassis common terminal

Use for grounding or shielding.

NOTE Controlling selector input-to-output path

The configuration and the default I/O path of the selector are set by using the UHC Expander/Fixture tab screen of the Configuration window of the EasyEXPERT software. The connection path from the input port to the output port is controlled by each test setup. And the selector switching status is indicated by the status indicator mounted on the front panel. See [Figure 3-5](#) and [Table 3-7](#) for the indication and the connection path.

Figure 3-5 Built-in Selector Simplified Internal Connections

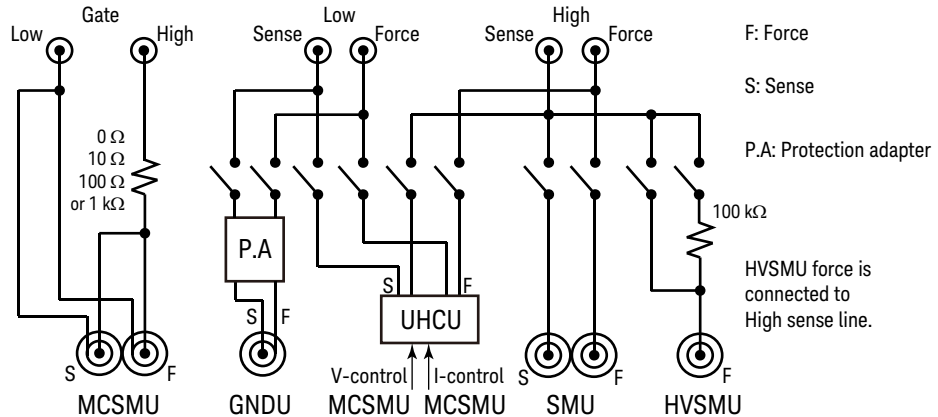


Table 3-7 Built-in Selector Status Indicator and Input-to-Output Connection Path

Measurement resource used for the test	Status indicator	Input-to-output connection ¹ of output terminals			
		Low Sense	Low Force	High Sense	High Force
2	(off)	Open	Open	Open	Open
GNDU		GNDU Sense	GNDU Force	Open	Open
HPSMU or MPSMU	SMU	GNDU Sense	GNDU Force	SMU Sense	SMU Force
UHCU	UHC	UHCU Low Sense	UHCU Low Force	UHCU High Sense	UHCU High Force
HVSMU or HVMCU	HVSMU	GNDU Sense	GNDU Force	HVSMU Force	Open
HVSMU/HVMCU and built-in series resistor		GNDU Sense	GNDU Force	HVSMU Force + Series resistor	Open

1. In the normal state, the selector makes the path to the output port from the input port specified by the Default field. When a measurement is performed, the selector performs automatic switching in every test. The selector makes the path to the output port from the measurement resource used for the test.
2. This condition is when the Default field is blank.

NOTE Selector may emit a noise sound during operation. However it is not abnormal status.

Bias Tee Terminals

Output terminals internally connected to the Bias Tee High and Low input connectors on the rear panel. The terminals should be connected to a DUT for performing the high voltage C-V measurement.

High and Low must be connected to the high and low terminals of a DUT respectively.

Use SHV(plug)-SHV(plug) cable (N1254A-512), 2 ea. and SHV(jack)-banana adapter (N1254A-513), 2 ea. for connection.

CAUTION

Open the Bias Tee terminals for the ultra high voltage measurement using UHVU.

K Thermocouple Terminals

For connecting the thermocouple to monitor temperature around a DUT.

The N1265A-041 thermocouple supports maximum of +180 °C.

The N1254A-554 thermocouple supports maximum of +250 °C.

UHV Terminals

Output terminals internally connected to the UHV High and Low input connectors on the rear panel.

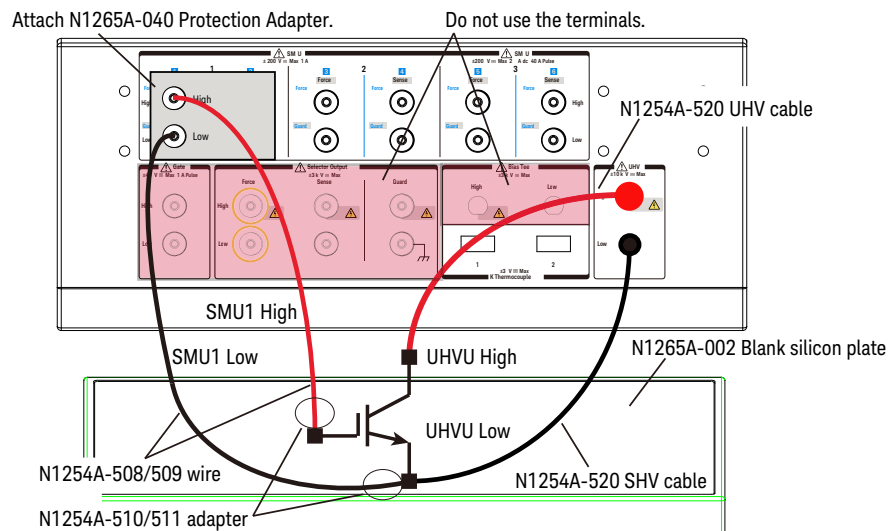
High and Low must be connected to the high and low terminals of a DUT respectively. Use the blank silicon plate and the UHV/SHV to no connector cables (N1254A-520) for connection. Figure 3-6 shows a connection example.

The ending of cables must be converted for connecting a DUT terminal. You may attach any adapter or solder a DUT terminal directly. See "Blank Silicon Plate (N1265A-002)" on page 3-22 and Figure 3-13 on page 23 for more information.

For the gate or base terminal of active device measurement using UHVU, use a MCSMU. Then attach the N1265A-040 protection adapter on the SMU terminals used for the MCSMU. This adapter is designed for protecting the MCSMU from ultra high voltage. Also see "Protection Adapter (N1265A-040)" on page 3-25 for the protection adapter.

Figure 3-6

UHV Connection Example



CAUTION

Open the Gate terminals, the Selector Output terminals, and the Bias Tee terminals for the ultra high voltage measurement using the UHVU.

CAUTION

Never connect the UHVU High terminal to any output, including circuit common, chassis ground, or any other measurement resource such as SMU. Connecting other measurement resource may damage the connected one.

Inline Package Socket module (N1265A-010)

This module provides a socket used for connecting three-terminal inline packaged device and three couples of the Force and Sense terminals. Socket module internal connection is shown in [Figure 3-7](#).

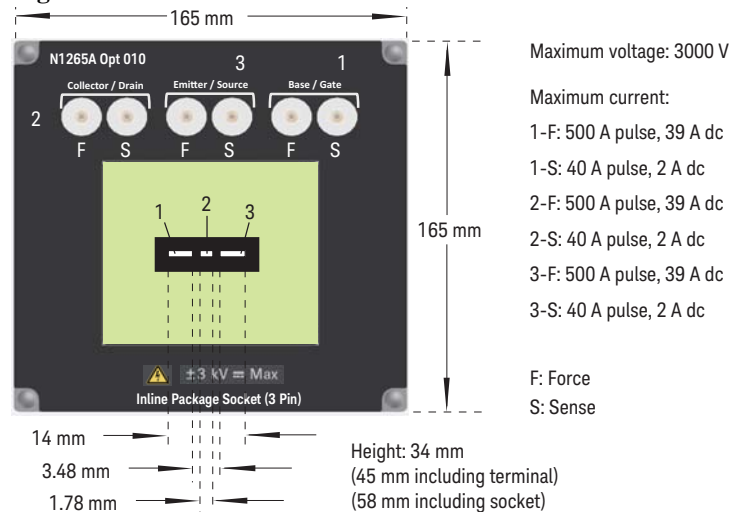
Short bar is furnished with the module. It is used for performing the short correction before the impedance measurement. Set the short bar before the short correction and remove it after the correction.

CAUTION

Do not apply voltage/current over the maximum limit of the socket module.

Figure 3-7

Inline Package Socket Module



To use this module, see the following simple instruction.

1. Attach the socket module to the test fixture.
2. Connect wires between the socket module terminals and the fixture output terminals. Then use the following wire (furnished with the N1265A-010).
 - 180 mm length wire (yellow) for Selector Output High/Low Force
 - 180 mm length wire for Selector Output High/Low Sense
 - 250 mm length wire for Gate, SMU, or chassis

For making the Kelvin connection, Force and Sense must be connected to Force and Sense of the socket module respectively.

For the high voltage capacitance measurement, use SHV(plug)-SHV(plug) cable (N1254A-512) and SHV(jack)-banana adapter (N1254A-513) for connection.

Selector Output and Gate should be connected as follows.

- Selector Output High to DUT high (ex. Collector/Drain)
- Selector Output Low to DUT low (ex. Emitter/Source)
- Gate High to DUT drive (ex. Base/Gate Force)
- Gate Low to DUT low (ex. Emitter/Source Force)

HC/MC/DHCSMU via SMU 3 terminals should be connected as follows.

- SMU 3 High Force and Sense to DUT high
- SMU 3 Low Force and Sense to DUT low
- GNDU Force and Sense to DUT low

The GNDU signals will appear at the Selector Output Low terminals as shown in [Table 3-7](#).

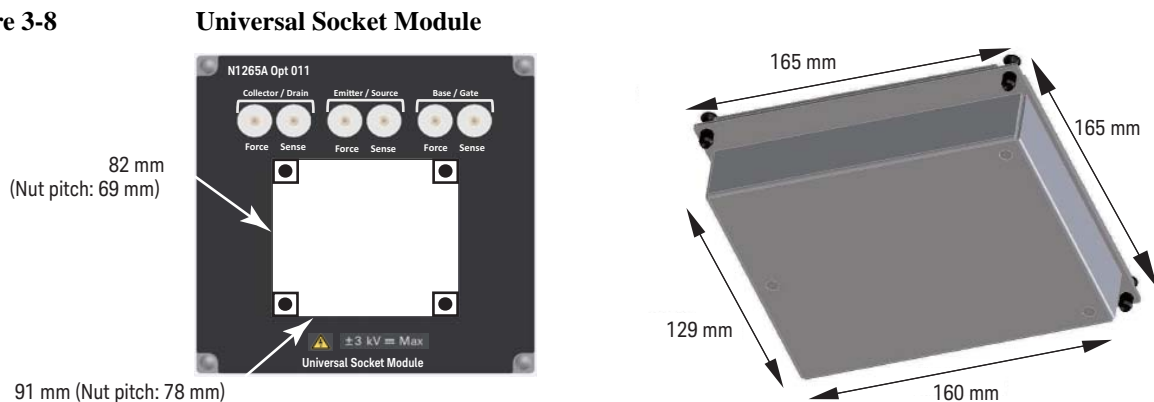
3. Set the DUT on the socket.
4. Close the fixture cover and perform measurement.

Universal Socket Module (N1265A-011)

This is a blank module, kind of a do-it-yourself kit for supporting variety of packaged devices. This module can be used by mounting your desired socket or packaged device and making connections same as the N1265A-010 Inline Package Socket Module.

To use this module, see the following simple instruction. For the component locations and dimensions, see [Figure 3-8](#). Also see "[Inline Package Socket module \(N1265A-010\)](#)" on [page 3-17](#) to perform measurement.

Figure 3-8



1. Prepare the following parts.
 - blank board suitable for mounting the socket or packaged device
 - screw M3, 4 ea., for fixing the blank board on the socket module
 - wire, adequate length and quantity, for making connections
 - hexlobe (torx type) screwdriver T-10
 - socket, if you use, and packaged device under test (DUT)
2. Cut the blank board in 90 mm × 81 mm square.
3. Make four screw holes on the board. The holes should be 6 mm inside from the edge.
4. Fix the board to the blank module.
5. Remove the cover bottom of the blank module.

- Mount the socket or DUT on the board and solder wire between its terminals and the blank module terminals.

Make enough space between the socket/DUT terminal and the shield/chassis, for example, about 1 mm for maximum 200 V output and 6 mm for 3000 V, to prevent discharge and any accident.

- Reattach the cover.

Curve Tracer Test Adapter Socket Module (N1265A-013)

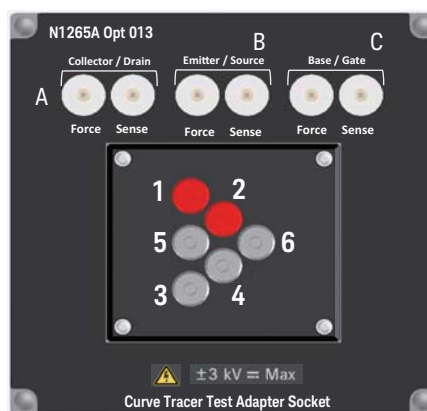
This module provides a socket available for connecting a test adapter designed for connecting to Tektronix 370B/371B curve tracers. Socket module internal connection is shown in [Figure 3-9](#).

CAUTION

Do not apply voltage/current over the maximum limit of the socket module.

Figure 3-9

Curve Tracer Test Adapter Socket Module



Internal connection

- Collector/Drain Force
- Collector/Drain Sense
- Emitter/Source Force
- Emitter/Source Sense
- Base/Gate Force
- Base/Gate Sense

Maximum voltage: 3000 V

Maximum current:

- A-Force: 500 A pulse, 39 A dc
- A-Sense: 40 A pulse, 2 A dc
- B-Force: 500 A pulse, 39 A dc
- B-Sense: 40 A pulse, 2 A dc
- C-Force: 40 A pulse, 2 A dc
- C-Sense: 40 A pulse, 2 A dc

To use this module, see the following simple instruction.

- Attach the socket module to the test fixture.
- Connect your test adapter to the socket.
- Connect wires between the socket module terminals and the fixture output terminals. Then use the following wire.
 - N1254A-522 wire (yellow) for Selector Output High/Low Force
 - N1254A-508 or 509 wire for Selector Output High/Low Sense, Gate, SMU, or chassis

For making the Kelvin connection, Force and Sense must be connected to Force and Sense of the socket module respectively.

For the high voltage capacitance measurement, use SHV(plug)-SHV(plug) cable (N1254A-512) and SHV(jack)-banana adapter (N1254A-513) for connection.

Selector Output and Gate should be connected as follows.

- Selector Output High to DUT high (ex. Collector/Drain)
- Selector Output Low to DUT low (ex. Emitter/Source)

- Gate High to DUT drive (ex. Base/Gate Force)
- Gate Low to DUT low (ex. Emitter/Source Force)

HC/MC/DHCSMU via SMU 3 terminals should be connected as follows.

- SMU 3 High Force and Sense to DUT high
- SMU 3 Low Force and Sense to DUT low
- GNDU Force and Sense to DUT low

The GNDU signals will appear at the Selector Output Low terminals as shown in [Table 3-7](#).

4. Set the DUT on your test adapter.
5. Close the fixture cover and perform measurement.

Gate Charge Socket Module (N1265A-014)

This socket adapter is designed for performing the gate charge measurement.

The B1513A HVSMU cannot be used for the gate charge measurement and must be upgraded to the B1513B or later version.

To use this module, see the following simple instruction.

1. Attach the socket module to the test fixture.
2. Connect wires between the socket module terminals and the fixture output terminals. You can use the following wires supplied with the socket module.
 - N1254A-522: high current wire (yellow), 2 ea.
 - N1254A-508: long wire (red), 2 ea.
 - N1254A-509: long wire (black), 2 ea.
 - N1265-61751: short wire (red), 2 ea.
 - N1265-61752: short wire (black), 2 ea.

For making the Kelvin connection, Force and Sense must be connected together at the device terminal.

[Figure 3-11](#) and [Figure 3-12](#) show connection examples.

3. Set the current control device on the left socket or connect the load resistor between the studs for the resistor.

The current control device must be an extra 3-pin inline package device which is expected to have the same characteristics as DUT. If the device is not available, use a load resistor. The resistor must satisfy the following specifications.

Resistance = V_r/I_r (V_r : rated voltage, I_r : rated current)

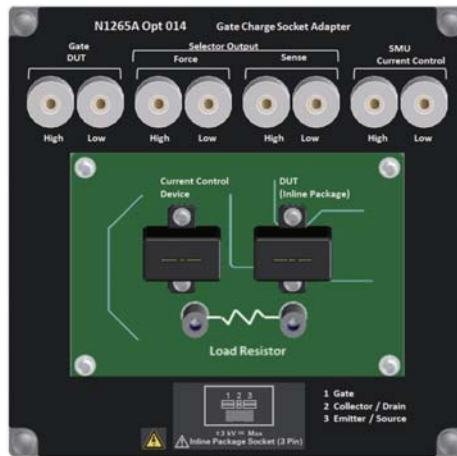
Peak power $\geq V_r \times I_r \times 1 \text{ ms}$

4. Set your DUT on the right socket.
5. Close the fixture cover and perform measurement.

CAUTION

Do not apply voltage/current over the maximum limit of the socket module.

Figure 3-10 Gate Charge Socket Module



Gate DUT
 High: Max. 30 V / 1 A
 Low: Max. 10 V / 1 A
 Selector Out Force
 High: Max. 3000 V / 500 A
 Low: Max. 10 V / 500 A
 Selector Out Sense
 High: Max. 3000 V / 20 mA
 Low: Max. 10 V / 20 mA
 SMU Current Control
 High: Max. 30 V / 1A floating 3000 V
 Low: Max. 10 V / 1A floating 3000 V

Figure 3-11 Connection Example for High Current Gate Charge Measurement

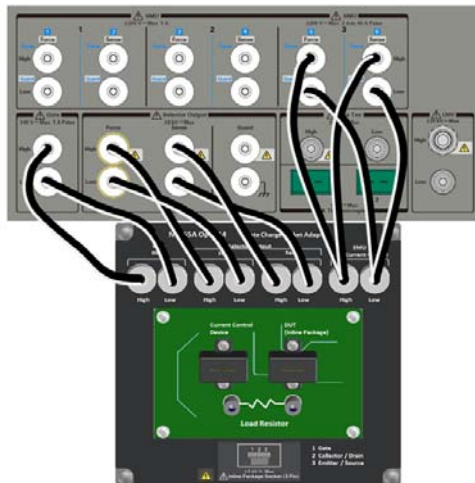
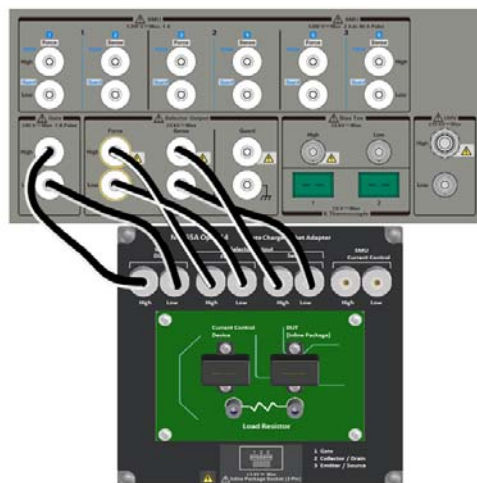


Figure 3-12 Connection Example for High Voltage Gate Charge Measurement



Blank Silicon Plate (N1265A-002)

This is an insulation board used for placing a DUT. To use this board, see the following simple instruction.

1. Prepare a DUT and cable or wire, adequate length and quantity, for making connections. The following accessories are available.
 - N1254A-520 UHV/SHV to no connector cables for UHV High/Low, see [Figure 3-13](#) for connection. The cables need adapters or soldering to connect DUT.
 - N1254A-522 banana-banana wire (yellow) or N1254A-523 banana to no connector wire (yellow) for Selector Output High/Low Force
 - N1254A-508 or 509 connection wire for Selector Output High/Low Sense, Gate, SMU, and chassis
 - N1254A-512 SHV cable and N1254A-513 adapter for capacitance measurement (Bias Tee terminals)
 - N1254A-510 dolphin clip adapter or N1254A-511 cable lug adapter
2. Attach the blank silicon plate to the test fixture.
3. Connect cable/wire between the DUT and the fixture output terminals.

For making the Kelvin connection, Force and Sense must be connected to Force and Sense of the socket module respectively.

Selector Output and Gate should be connected as follows.

- Selector Output High to DUT high (ex. Collector/Drain)
- Selector Output Low to DUT low (ex. Emitter/Source)
- Gate High to DUT drive (ex. Base/Gate Force)
- Gate Low to DUT low (ex. Emitter/Source Force)

HC/MC/DHCSMU via SMU 3 terminals should be connected as follows.

- SMU 3 High Force and Sense to DUT high
- SMU 3 Low Force and Sense to DUT low
- GNDU Force and Sense to DUT low

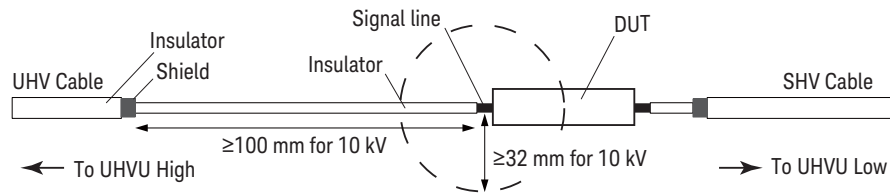
The GNDU signals will appear at the Selector Output Low terminals as shown in [Table 3-7](#).

4. Make sure the DUT location. The DUT must be placed on the blank silicon plate properly.

Make enough space between the cable ends, also between the high side cable end and the shield/chassis, for example, about 1 mm for maximum 200 V output, 6 mm for 3000 V, and 32 mm for 10 kV, to prevent discharge and any accident. Also the creepage distance must be more than 100 mm for 10 kV.

5. Close the fixture cover before starting measurement.

Figure 3-13 Space around Cable End



Universal R-Box (N1265A-035)

This is a blank box, kind of a do-it-yourself kit for installing a resistor you want. Generally, inserting a resistor between SMU and DUT is effective for preventing SMU from oscillation. You can insert your desired resistor by using this box. This box is designed for using the MCSMU. See [Figure 3-14](#) for connection example.

NOTE To install your desired resistor in the universal R-box, see "[To Use Universal R-Box](#)".

The Kelvin connection is effective up to the R-box input. So the voltage drop caused by the series resistor must be subtracted from the measurement result as following.

$$V_{dut} = V_{out} - R_s \times I_{meas}$$

where,

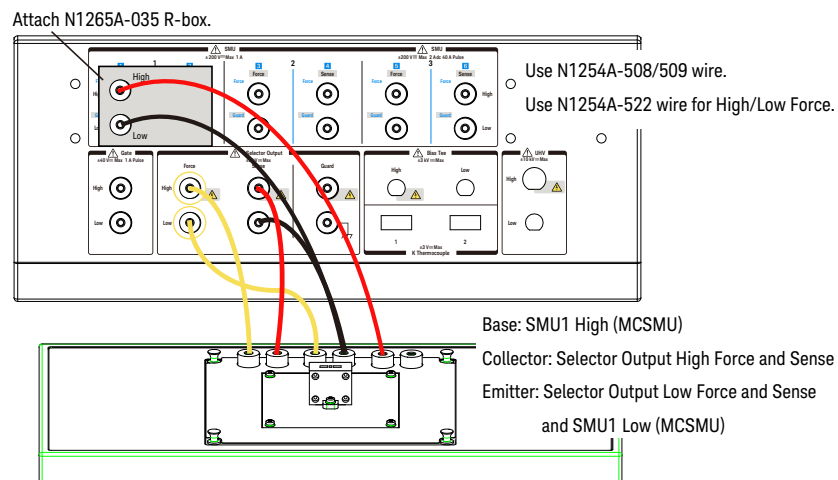
V_{dut} : Voltage after correction

V_{out} : Source output voltage

R_s : Resistance of the series resistor

I_{meas} : Measurement current

Figure 3-14 Series Resistor Connection Example



To Use Universal R-Box

To install your desired resistor, see the following simple instruction.

- Required parts:

wire, adequate rating, length, and quantity

your desired resistor, adequate rating

hexlobe (torx type) screwdriver T-10

label, for noting resistance value

- Instruction:

1. Remove the cover of the universal R-box.

2. Solder the resistor and wire as shown below.

To prevent discharge and any accident, make enough space between the resistor leads and the shield or chassis. For example, make space of about 1 mm from the leads for maximum 200 V output.

Case 1: installing a series resistor on High, see [Figure 3-15 on page 25](#).

- Connect a wire between Low Force and Low.
- Connect the resistor between High Force and High.

Case 2: installing a parallel resistor between High and Low

- Connect a wire between Low Force and Low.
- Connect a wire between High Force and High.
- Connect the resistor between High Force and Low Force.

Case 3: installing a series resistor on High and a parallel resistor between High and Low

- Connect a wire between Low Force and Low.
- Connect the parallel resistor between High and Low.
- Connect the series resistor between High Force and High.

Case 4: installing a series resistor on High and a parallel resistor between High Force and Low Force

- Connect a wire between Low Force and Low.
- Connect the parallel resistor between High Force and Low Force.
- Connect the series resistor between High Force and High.

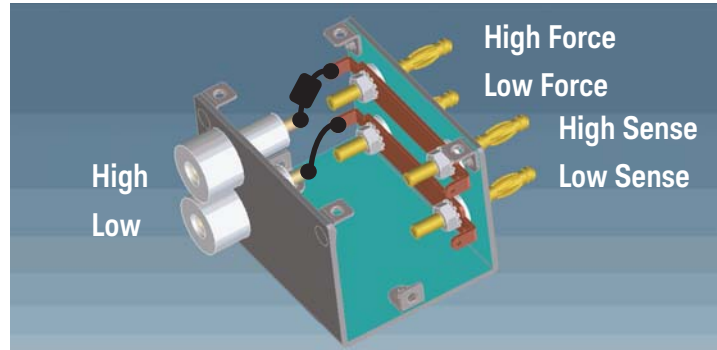
3. Reattach the cover.

Make enough space between the resistor leads and the cover.

4. Write the resistance value in the label.

5. Affix the label to the top cover.

Figure 3-15 To Install Resistor in the N1265A-035 Universal R-Box, Connection for Case 1



Protection Adapter (N1265A-040)

This is the adapter for protecting SMU from ultra high voltage.

If a SMU is used for the gate drive when performing the ultra high voltage measurement using UHVU, this adapter must be connected to the SMU terminals for preventing SMU from damage. See [Figure 3-6](#) for connection example.

This adapter is designed for using the MCSMU.

Container (N1265A-045)

This container can accommodate protection adapters and bias-tee which are used with the N1265A to make the measurement environment clean and safe.

Maximum superimposed load is 50 kg. The N1265A and the N1266A can be put on the top of the container.

Prober System Cable (N1254A-524)

This is the cable for extending the N1265A's Selector Output and Gate terminals to a prober station. See "[To Connect Ultra High Current Expander](#)" on page 5-36 for more information.

CAUTION

Do not apply voltage/current over the maximum limit of the cable. See [Table 5-28](#).

This chapter describes the required information for connecting Keysight B1505A, N1272A, N1273A, and a device under test (DUT).

- "Input Connection"
- "Output Connection"

The N1273A capacitance test fixture is a test fixture used for capacitance measurements of packaged devices. The fixture can be connected to GNDU, MFCMU, HVSMU, and MPSMU via the N1272A device capacitance selector.

The N1272A selector is connected between the mainframe and the test fixture. And it is used for switching the IV measurement and the CV measurement, and has a built-in GNDU protection adapter and a built-in MFCMU protection adapter.

General specifications of the N1272A/N1273A are listed below.

N1272A selector:

- Dimensions: 420 mm (W) × 75 mm (H) × 575 mm (D)
- Weight: 9.4 kg

N1273A fixture:

- Dimensions: 340 mm (W) × 200 mm (H) × 345 mm (D)
- Weight: 4.9 kg

WARNING

To avoid electrical shock and instrument damage, turn the all instruments off before connecting or disconnecting measurement cable.

WARNING

There are potentially hazardous voltages of up to ± 3000 V (HVSMU) or ± 100 V (MPSMU) at the Force, Guard, and Sense terminals. To prevent electrical shock, do *not* expose these lines.

WARNING

To prevent electrical shock during use, connect the Interlock cable (see "**To Connect Interlock Circuit**" on page 4-3).

WARNING

The B1505A is heavy and requires a two person lift.

CAUTION

Do not grab the fixture cover when lifting the N1273A.

CAUTION

Never connect the Guard terminal to any output, including circuit common, chassis ground, or any other guard terminal. Connecting anything may damage the module.

CAUTION

Never connect the HVSMU Force and Guard terminals to any output, including circuit common, chassis ground, or any other module terminal. Connecting other module may damage the connected module.

Input Connection

Prepare the required cables listed in [Table 4-1](#) and connect them between the B1505A terminals and the relative N1273A terminals through the N1272A selector.

Figure 4-1

N1273A Rear View



To Connect Interlock Circuit

The B1505A provides the Interlock connector to prevent you from receiving an electrical shock from high voltage (over ± 42 V). If the interlock circuit is open, the B1505A *cannot* apply high voltage over ± 42 V. When using the N1273A test fixture, connect the 16493J interlock cable between the Interlock connectors of the B1505A and the N1272A selector, and the composite cable between the N1272A and the N1273A. The composite cable is furnished with the N1273A.

N1272A Device Capacitance Selector

The N1272A is used to switch the measurement resource connected to the device under test (DUT), for capacitance testing (input/output capacitance, feedback capacitance, and gate resistance). The measurement resource will be HVSMU, MPSMU and MFCMU.

NOTE

Controlling selector input-to-output path

The configuration and the default I/O path of the selector are set by using the Device Capacitance Selector tab screen of the Configuration window of the EasyEXPERT software. The connection path from the input port to the output port is controlled by each test setup. And the selector switching status is indicated by the status indicator mounted on the front panel.

Figure 4-2 Selector Simplified Internal Connections

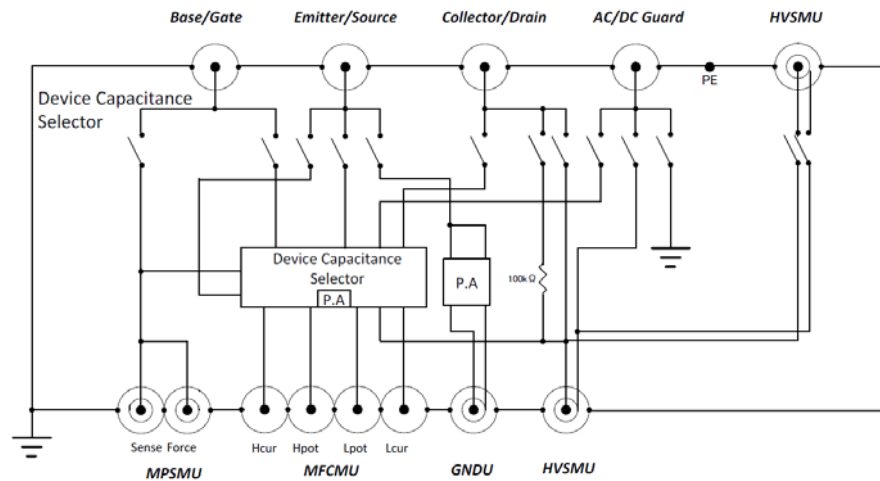
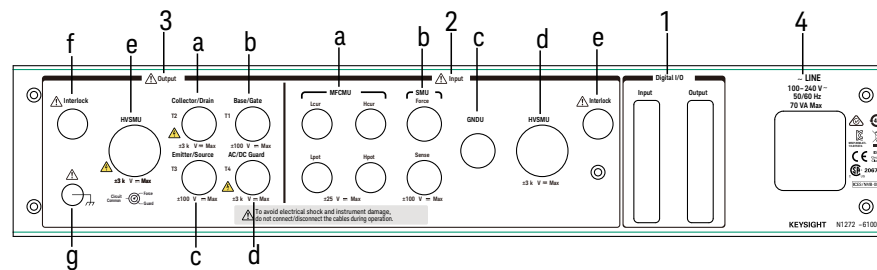


Figure 4-3 N1272A Rear View



1. Digital I/O connectors
2. Input
 - a. MFCMU input connectors Hcur, Hpot, Lpot, and Lcur
 - b. SMU input connectors
 - c. GNDU input connector
 - d. HVSMU input connector
 - e. Interlock input connector
3. Output
 - a. Collector/Drain output connector
 - b. Base/Gate output connector
 - c. Emitter/Source output connector
 - d. AC/DC Guard output connector
 - e. HVSMU output connector
 - f. Interlock output connector
 - g. Frame ground terminal
4. LINE input receptacle and power switch

Table 4-1 To Connect between B1505A and N1273A via N1272A

B1505A terminals		Required cables	N1272A input terminals	
Interlock		16493J Interlock cable, 3 m or 1.5 m, 1 ea.	Interlock	
GNDU		16493L GNDU cable, 3 m or 1.5 m, 1 ea.	GNDU	
HVSMU	Force	16493T HVSMU cable, 3 m or 1.5 m, 1 ea.	HVSMU	
MPSMU	Sense		16494A Triaxial cable, 3 m or 1.5 m, 1 ea., for the non-Kelvin connection, connect it between the Force connectors. For the Kelvin connection, prepare additional one more cable and connect it between the Sense connectors.	SMU
	MFCMU	Hpot	N1300A CMU cable, 1.5 m, 1 ea. It is not needed to connect the ground wire extended from the CMU cable.	MFCMU
Hcur		Hcur		
Lcur		Lcur		
Lpot		Lpot		
Digital I/O		B1506-61780 Digital I/O connection cable, 1 ea. This cable is supplied with the N1272A.	Digital I/O Input	
—		Power cable, 1 ea., for connecting to power line	LINE	

N1272A output terminals	Required cables	N1273A terminals
Interlock	Composite cable assembly, 0.4 m, 1 ea. This cable is supplied with the N1273A.	Interlock
Collector/Drain		Collector/Drain
Base/Gate		Base/Gate
Emitter/Source		Emitter/Source
AC/DC Guard		AC/DC Guard
Chassis Common		Chassis Common
HVSMU	16493T HVSMU cable, 3 m or 1.5 m, 1 ea. ¹	—
Digital I/O Output	16493G-001 Digital I/O connection cable, 1.5 m, 1 ea. ²	—

1. If the N1258A module selector, N1259A test fixture, or N1265A expander/fixture is used, connect to the HVSMU Input of the equipment.
2. If the N1258A module selector, N1259A test fixture, or N1265A expander/fixture is used, connect to the Digital I/O Input of the equipment.

NOTE The B1505A needs to automatically detect and register the CMU cable type during boot process.

CAUTION

The GNDU can sink current of up to 4.2 A.

Use 16493L GNDU cable to connect the GNDU to an adapter, a test fixture, or a connector plate.

Do *not* use normal triaxial cable (16494A) because the maximum current rating of the cable is 1 A.

The following figures show two connection examples with using the N1272A selector and the N1273A fixture. For the color-codes of cables and connectors in the figures, see [Figure 7-1 on page 2](#).

[Figure 4-4](#) shows the connection example effective for minimizing the connection changes between the I-V measurement using the N1259A fixture and the capacitance measurement using the N1273A fixture.

[Figure 4-5](#) shows the connection example effective for minimizing the connection changes between the I-V measurement using the N1265A fixture and the capacitance measurement using the N1273A fixture.

WARNING

If the N1273A is used with the N1259A/N1265A fixture, you need to change the connection of the interlock and GNDU cables each time you change the fixture.

Figure 4-4 Connection Example using N1272A, N1259A, and N1273A

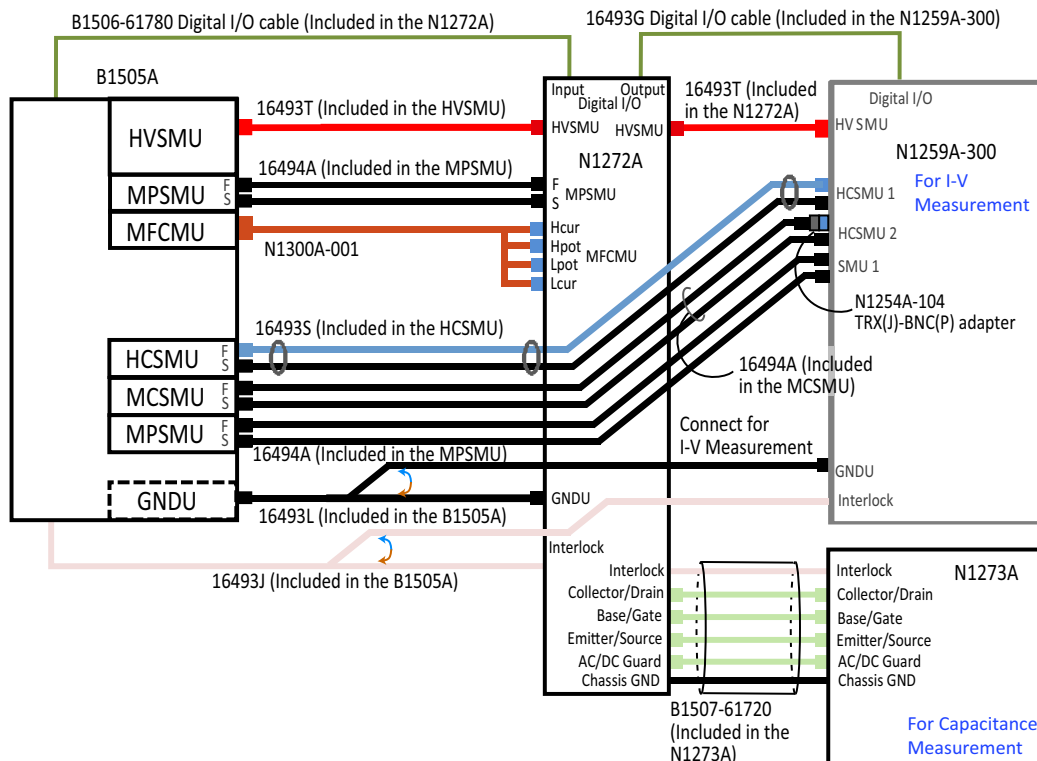
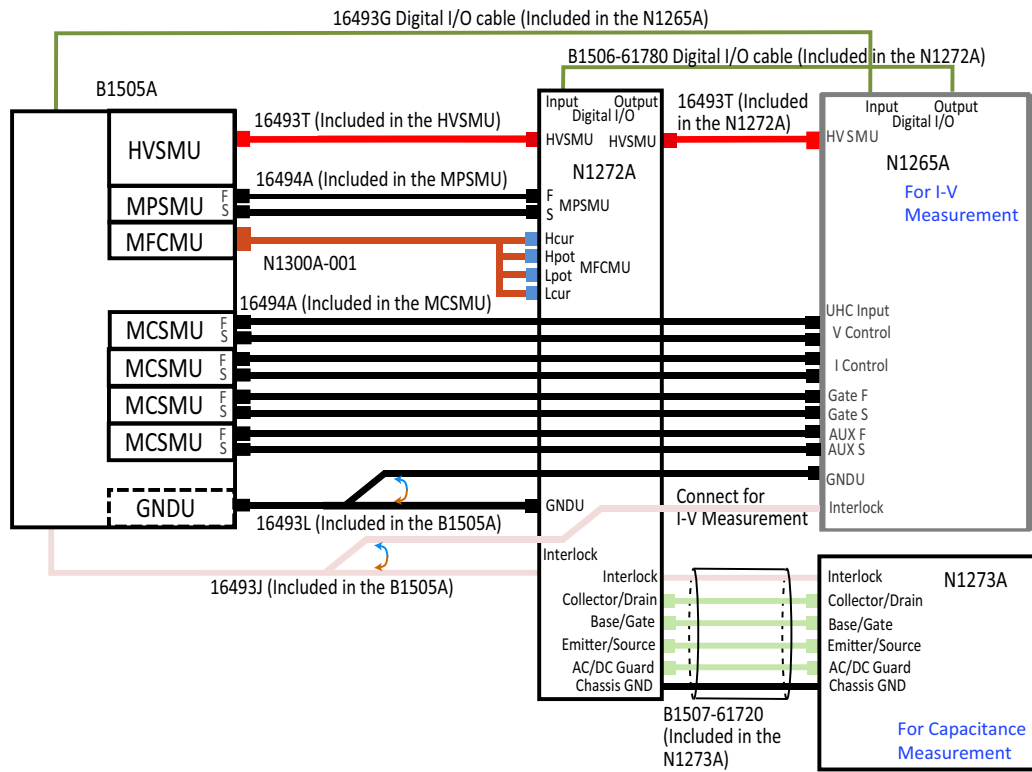


Figure 4-5 Connection Example using N1272A, N1265A, and N1273A



Output Connection

The following parts are available for mounting a device under test (DUT) on the test fixture. Prepare the part suitable for your DUT and attach it to the test fixture. For details, see the following sections.

- ["3-pin Inline Package Socket Module" on page 4-9](#)
- ["N1273A-011 Universal Socket Module" on page 4-11](#)
- ["N1273A-013 Curve Tracer Test Adapter Socket Module" on page 4-14](#)

To Connect DUT

WARNING

Set the instrument output off before connecting or disconnecting connection wire.

Press the B1505A front panel Stop key to set the output off. And confirm that the B1505A front panel High Voltage indicator is not lit.

WARNING

Do not connect or disconnect your DUT while the B1505A is applying voltage or current. Otherwise, the DUT may be damaged.

Do not touch the DUT soon after measurement. Have enough time for discharge and radiation.

CAUTION

Do not touch the terminals of the cable and wire. Oil, perspiration, and dirt prevent good electrical contact, deteriorate insulation, and degrade measurement accuracy.

CAUTION

Never connect the HVSMU Force and Guard terminals to any output, including circuit common, chassis ground, or any other module terminal. Connecting other module may damage the connected module.

1. Set the instrument output off.
2. Open the fixture cover.
3. Set a socket module on the test fixture.

For using the 3-pin inline package socket module, also see ["3-pin Inline Package Socket Module" on page 4-9](#).

For using the universal socket module, also see ["N1273A-011 Universal Socket Module" on page 4-11](#).

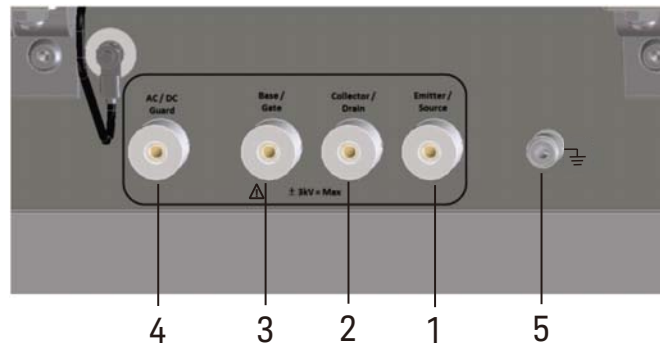
For using the curve tracer test adapter socket module, also see ["N1273A-013 Curve Tracer Test Adapter Socket Module" on page 4-14](#).

4. Set the DUT on the socket.
5. Close the fixture cover.

To apply more than ± 42 V, close the fixture cover. Otherwise, the interlock function will stop the B1505A output over ± 42 V.

Figure 4-6

N1273A Output Terminals



1. Emitter/Source
2. Collector/Drain
3. Base/Gate
4. AC/DC Guard
5. Chassis Common

3-pin Inline Package Socket Module

This module is furnished with the N1273A and provides a socket used for connecting three-terminal inline packaged device.

To use this module, see the following simple instruction.

- Requirements:
 - 3-pin inline package socket module
 - DUT
- Instruction:
 1. If the earthing wire is not connected to the socket module, connect it.
 2. Attach the socket module directly to the Base/Gate, Collector/Drain, and Emitter/Source terminals of the test fixture.
 3. Connect the earthing wire of the socket module to the chassis common terminal.
 4. Set your DUT on the socket.

5. Close the fixture cover and perform measurement.



WARNING Hazardous voltage, instrument maximum output voltage may appear at the measurement terminals if the fixture cover is closed.

WARNING Open the Guard terminal of the test fixture. Do not connect anything to it.

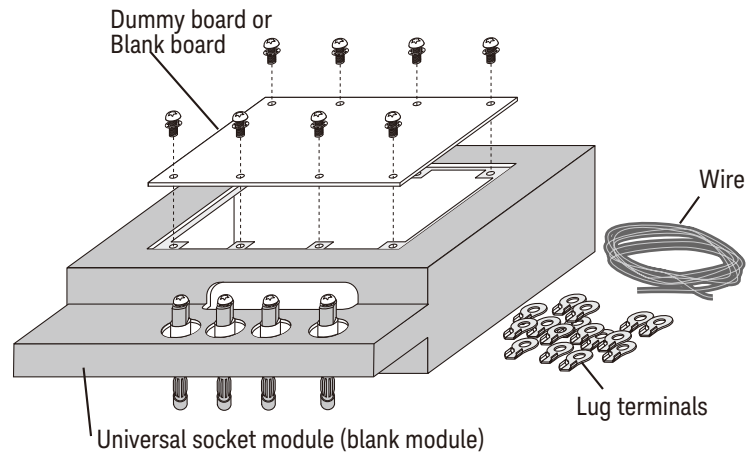
NOTE A short plate is furnished with the socket module. It is used for performing the short correction before the capacitance measurement. Set it on the socket before the short correction and remove it after the correction is completed.

N1273A-011 Universal Socket Module

This is a blank module, kind of a do-it-yourself kit for supporting variety of packaged devices. This module can be used by mounting your desired socket or packaged device.

Figure 4-7

Universal Socket Module

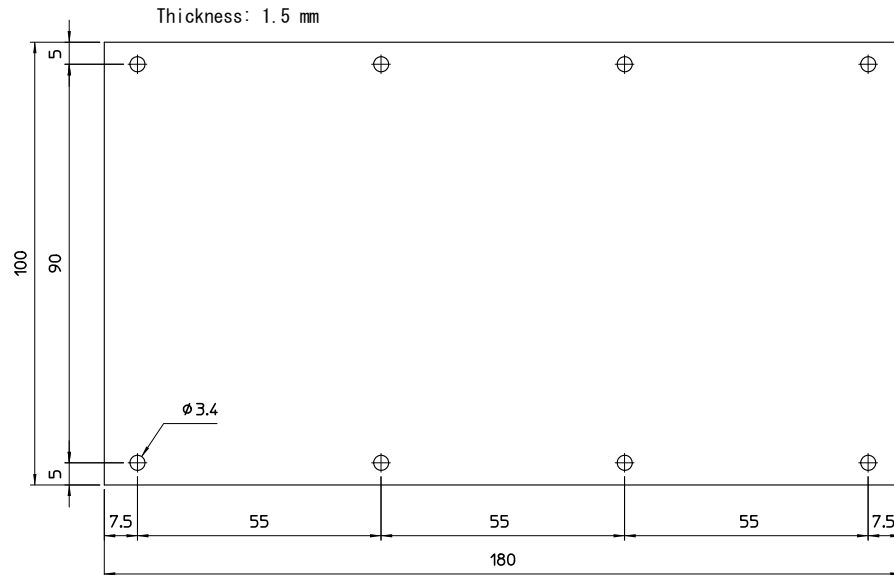


To use this module, see the following simple instruction. For the dimensions and screw holes of a blank board, see [Figure 4-8](#). You can use their handmade socket modules with the same manner as the 3-pin Inline Package Socket Module. See "[3-pin Inline Package Socket Module](#)" on page 4-9.

- Requirements:
 - Blank board suitable for mounting the socket or packaged device
 - Screws for fixing the blank board, supplied with the socket module
 - Wire (2 m, 1 ea.) supplied with the socket module
 - Lug terminals (14 ea.) supplied with the socket module
 - Socket, if you use, and packaged device under test (DUT)
 - T-10 and T-15 Torx screwdrivers
 - 9 mm wrench
 - Caulking tool for lug terminals, 2.0sq

Prepare a socket for your test devices, a blank board, tools for mounting the socket, screws and nut for socket terminals, and so on separately.

Figure 4-8 **Dimensions and Screw Holes of Blank Board**



- Instruction:
 1. Remove the dummy board from the blank module using a T15 Torx screwdriver.
 2. Make a socket board by processing a blank board or the dummy board and mount your device socket onto the board.

WARNING

Make enough space between the socket terminal and the shield/chassis, for example, about 1 mm for maximum 200 V output and 6 mm for 3000 V, to prevent discharge and any accident.

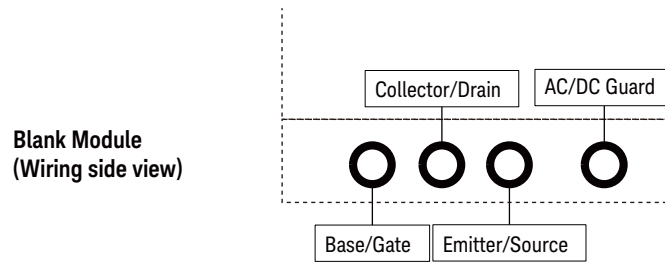
3. Fix the socket board to the blank module using the screws and tooth washers.
4. Remove the bottom cover of the blank module using a T10 Torx screwdriver.
5. Assemble cables using the wire and lug terminals.

Cut the appropriate length of the wire, tear off the coating of wire ends, and then secure the lug terminals to the wire ends using a caulking tool.

6. Connect one end of all cables to the upside terminals on the blank module.

Remove screws and tooth washers from the terminals, and fix the lug terminal of the cable end in order of a washer, a lug terminal, a tooth washer, and a screw. When fixing the lug terminal, secure a screw by a T15 Torx screwdriver with fixing the bottom nut by a 9 mm wrench. And, pass the cables through the opening of the blank module.

The following shows the positions of the upside terminals in the blank module.



7. Connect the other end of the cables to the terminals on the back side of the socket board.

If a socket terminal does not have a screw or nut for securing a lug terminal of the cable, prepare it. Ensure the terminal position of the blank module and the socket board, and connect the cables correctly.

8. Fix the bottom cover to the blank module using a T10 Torx screwdriver.

CAUTION

Do not apply voltage/current over the maximum limit of the socket module.
Terminal rated voltage: 3000 Vd c
Terminal rated current: 120 mA

N1273A-013 Curve Tracer Test Adapter Socket Module

This module provides a socket available for connecting a test adapter designed for connecting to Tektronix 370B/371B curve tracers. The socket module internal connection is shown in [Figure 4-9](#).

To use this module, see the following simple instruction.

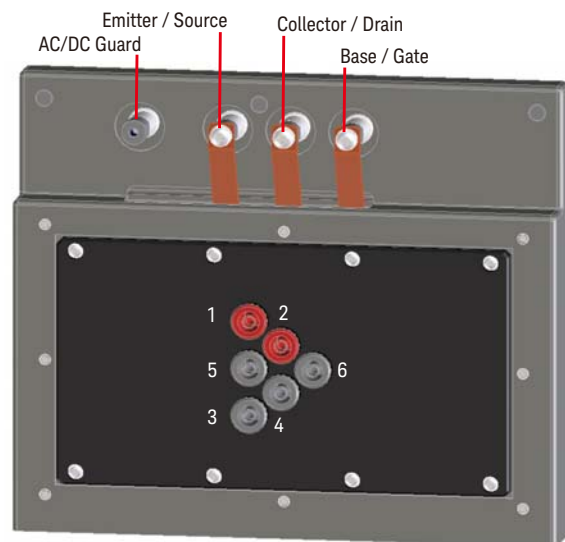
- Instruction:
 1. Attach the socket module to the test fixture.
 2. Connect your test adapter to the socket.
Socket terminal: $\phi 4$ mm pin receptacle
 3. Set the DUT on your test adapter.
 4. Close the fixture cover and perform measurement.

CAUTION

Do not apply voltage/current over the maximum limit of the socket module.
Maximum voltage: 3000 V
Maximum current: 100 mA

Figure 4-9

Curve Tracer Test Adapter Socket Module



Internal connections

Socket Terminal	N1273A Output
1: Collector/Drain Force	Collector/Drain
2: Collector/Drain Sense	No Connection
3: Emitter/Source Force	Emitter/Source
4: Emitter/Source Sense	No Connection
5: Base/Gate Force	Base/Gate
6: Base/Gate Sense	No Connection

Accessories for Connecting a DUT

Use the test lead kit furnished with the N1273A to connect a device that cannot be connected to any socket module.

See the following simple instruction.

- Requirements:
 - Test Leads and Connection Kit for Capacitance Test (N1254A-556), four 20 cm alligator clip - lug cables, four banana plugs, four nuts, and four spare clips
 - DUT
- Instruction:
 1. Put your DUT on the blank silicon plate.
 2. Connect your DUT to the measurement terminals of the test fixture by using the test leads.
 3. Close the fixture cover and perform measurement.

WARNING

Hazardous voltage, instrument maximum output voltage may appear at the measurement terminals if the fixture cover is closed.

WARNING

Open the AC/DC Guard terminal to avoid electrical shock, instrument damage, or DUT damage. Do not connect anything to this terminal which may have the same potential as the Collector/Drain terminal.

WARNING

Make sure that the cover is closed properly before starting measurement. Do not perform the measurement when a wire is protruding from the fixture cover.

5

**Connection Guide for Wafer Prober and
Your Own Test Fixture**

This chapter describes how to make the measurement environment without using Keysight N1259A or N1265A test fixture.

For extending the measurement terminals to a device under test (DUT), you need to prepare connection cables, accessories, and your DUT interface such as wafer prober and your own test fixture. Also you need to install the interlock circuit and make the openings for the accessories on the shielding box of your DUT interface.

- "Connection Overview"
- "To Connect High Voltage R-Box"
- "To Connect HCSMU Adapter"
- "To Connect Dual HCSMU Adapter"
- "To Connect Protection Adapter"
- "To Connect High Voltage Bias Tee"
- "To Connect Module Selector"
- "To Connect HVSMU/HCSMU Fast Switch"
- "To Connect HVSMU Current Expander"
- "To Connect Ultra High Current Expander"
- "To Connect Ultra High Voltage Expander"
- "To Connect Device Capacitance Selector"
- "To Connect Gate Charge Adapter"
- "To Install an Interlock Circuit"
- "About Cable Connections"

For the dimensions of accessories, see [Chapter 6, "Accessory Dimensions"](#).

WARNING

To avoid electrical shock and instrument damage, turn the all instruments off before connecting or disconnecting measurement cable.

WARNING

There are potentially hazardous voltages of up to ± 10 kV (UHVU), ± 3000 V (HVSMU), ± 2200 V (HVMCU), ± 200 V (HPSMU), or ± 100 V (MPSMU) at the High, Force, Guard, and Sense terminals. To prevent electrical shock, do *not* expose these lines.

WARNING

To prevent electrical shock during use, install an interlock circuit (see [p. 5-47](#)) and connect the Interlock cable (see [p. 5-49](#)).

WARNING

The B1505A, the N1265A ultra high current expander/fixture, and the N1268A ultra high voltage expander are heavy and require a two person lift.

CAUTION

Never connect the Guard terminal to any output, including circuit common, chassis ground, or any other guard terminal. Connecting anything may damage the instrument.

NOTE To install the accessories, see **Chapter 6, "Accessory Dimensions"** and prepare the appropriate space in the shielding box of your DUT interface or make the openings for the accessories.

NOTE **Connecting the 16493G Digital I/O Connection Cable**

If multiple accessories are used, the accessories must be connected together by using the Digital I/O cable. Then the cables must be connected from the B1505A to the accessories in the following sequence.

N1265A Ultra High Current Expander / Fixture, if used

N1266A HVSMU Current Expander, if used

N1268A Ultra High Current Expander, N1258A Module Selector, or N1259A test fixture

NOTE **Using Universal R-box**

The universal R-box is a blank box, kind of a do-it-yourself kit for installing a resistor you want.

You need to prepare the hexlobe (torx type) screwdriver T-10 to remove the cover.

After installing a resistor, reattach the cover. Do not use the universal R-box under the condition that the cover is removed.

NOTE **Connecting or disconnecting the N1254A-524 Prober System Cable**

The prober system cable is used to extend the UHCU (ultra high current unit) output to a probe station.

You need to prepare the box wrench (M5 hex) to connect or disconnect the system cable.

If the system cable is used, the 16493J interlock cable from the B1505A or the N1268A must be connected to the interlock circuit installed in the shielding box of the probe station. Do not connect the interlock cable to the N1265A.

Connection Overview

Connection image and requirements are shown in [Table 5-1](#). Find and prepare required accessories and cables, and install and connect them to make the measurement environment. All available accessories are listed in [Table 5-7](#).

CAUTION

The GNDU can sink current of up to 4.2 A. Use 16493L GNDU cable to connect the GNDU to the N1261A-002/004.

Do *not* use normal triaxial cable (16494A) because the maximum current rating of the cable is 1 A.

NOTE

Do not put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. Putting conductor of circuit common, chassis ground, or any potential on causes the measurement error.

NOTE

Using Dual HCSMU (DHCSMU)

DHCSMU can be configured by two HCSMU modules installed in one B1505A and connected to the 16493S-020 Dual HCSMU Kelvin combination adapter or the 16493S-021 Dual HCSMU combination adapter. See "[To Connect Dual HCSMU Adapter](#)" for connection.

NOTE

The B1505A needs to automatically detect and register the CMU cable type during boot process.

NOTE

The N1258A module selector has built-in GNDU protection adapter, built-in HPSMU protection adapter, and built-in HCSMU Kelvin adapter. If you use the selector, you do not need the N1261A and 16493S-010/011 for the modules connected to it. See [Table 5-3](#).

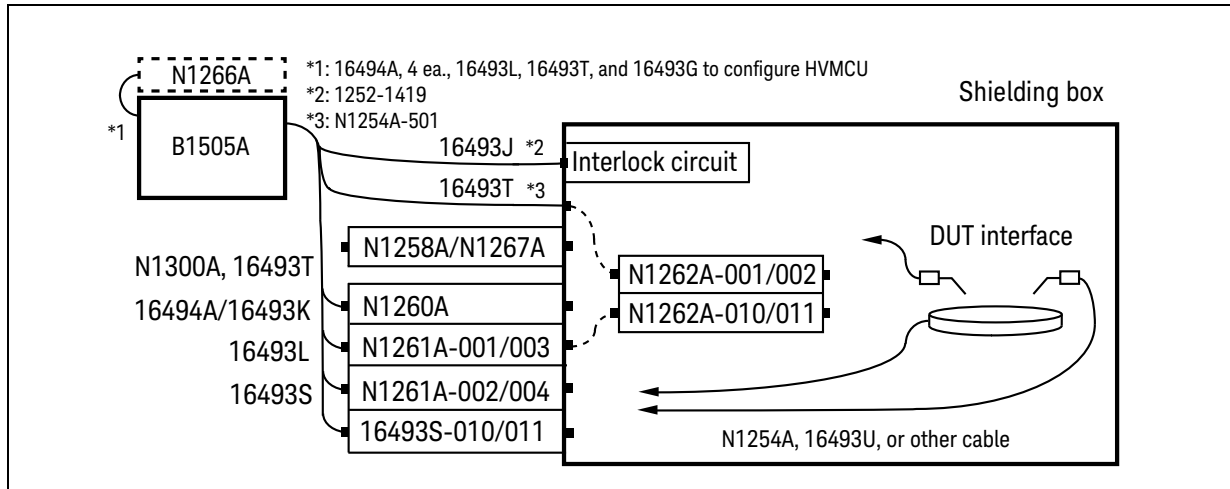
CAUTION

Never connect the UHVU High, HVMCU High, and HVSMU Force and Guard terminals to any output, including circuit common, chassis ground, or any other measurement resource such as SMU. Connecting other measurement resource may damage the connected one.

CAUTION

Never connect the UHVU Low terminal to any other measurement resource except for the N1269A or N1265A-040 adapter. Connecting other measurement resource may damage the connected one.

Table 5-1 Connection Image and Requirements



B1505A terminals		Required accessories and cables	Connection inside of the shielding box	
Interlock		16493J Interlock cable, 3 m or 1.5 m, 1 ea. 1252-1419 Interlock connector, 1 ea.	Interlock circuit	
HVSMU Also see Table 5-2 for HVMCU.		16493T HVSMU cable, 3 m or 1.5 m, 1 ea. N1254A-501 HV(jack)-HV(jack) adapter, 1 ea. N1262A-001/002 R-box and 16493T cable, optional	HV(plug) cable, 1 ea. or SHV(plug) cable, 1 ea. for N1262A-001/002	
MFCMU	Hpot	N1260A High voltage bias-T, 1ea.	SHV(plug) cable, 3 ea.	High
	Hcur	N1300A CMU cable, 3 m or 1.5 m, 1 ea.		Low
	Lcur	16493T HVSMU cable, 3 m or 1.5 m, 1 ea.		AC Guard
	Lpot			
HVSMU	Force			
HPSMU or MPSMU	Force	N1261A-001/003 HPSMU protection adapter, 1 ea.	Triaxial(m) cable, 2 ea. for N1261A-001 or HV(plug) cable, 2 ea. for N1261A-003 or Triaxial(m) cable, 1 ea. for N1262A-010 or SHV(plug) cable, 1 ea. for N1262A-011	
	Sense	16494A Triaxial cable, 3 m or 1.5 m, 2 ea. or 16493K Kelvin triaxial cable, 3 m or 1.5 m, 1 ea. N1262A-010/011 R-box and 16494A/16493T cable, optional for non-Kelvin connection		
GNDU Also see Table 5-2 for HVMCU.		N1261A-002/004 GNDU protection adapter, 1 ea. 16493L GNDU cable, 3 m or 1.5 m, 1 ea.	BNC(m) cable, 2 ea. for N1261A-002 or SHV(plug) cable, 2 ea. for N1261A-004	
HCSMU	Force	16493S-010 HCSMU Kelvin adapter, 1 ea. or 16493S-011 HCSMU non-Kelvin adapter, 1 ea.	BNC(m) cable, 4 ea. for 16493S-010 or BNC(m) cable, 2 ea. for 16493S-011	
	Sense	16493S HCSMU cable, 3 m or 1.5 m, 1 ea.		

Also see the following tables.

- [Table 5-2, "To Configure HVMCU by Using N1266A."](#)
- [Table 5-3, "To Connect N1258A Module Selector."](#)
- [Table 5-4, "To Connect N1267A Fast Switch."](#)
- [Table 5-5, "To Make UHC Measurement Path."](#)
- [Table 5-6, "To Make UHV Measurement Path."](#)

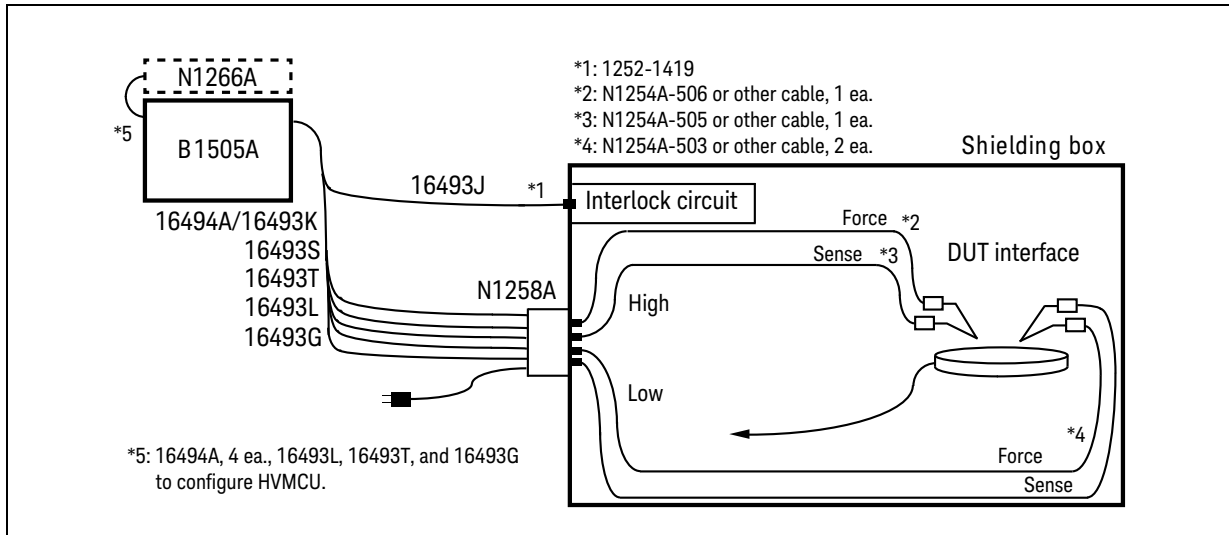
Table 5-2 To Configure HVMCU by Using N1266A

B1505A terminals		Required cables	N1266A terminals	
MCSMU ¹	Force	16494A-001 Triaxial cable, 1.5 m, 1 ea.	I Control	Force
	Sense	16494A-001 Triaxial cable, 1.5 m, 1 ea.		Sense
MCSMU ¹	Force	16494A-001 Triaxial cable, 1.5 m, 1 ea.	V Control	Force
	Sense	16494A-001 Triaxial cable, 1.5 m, 1 ea.		Sense
HVSMU	Force	16493T-001 HVSMU cable, 1.5 m, 1 ea.	HVSMU	
GNDU		16493L-001 GNDU cable, 1.5 m, 1 ea.	GNDU	
Digital I/O		16493G-001 Digital I/O connection cable, 1.5 m, 1 ea.	Digital I/O Input	

1. HCSMU is substitutable. Then use 16493S HCSMU cable, N1254A-103 adapter for Force, and N1254A-517 adapter for Sense.

N1266A terminals		Required accessories and cables	Connection inside of the shielding box
Output	High	16493T HVSMU cable, 3 m or 1.5 m, 1 ea. N1254A-501 HV(jack)-HV(jack) adapter, 1 ea. N1262A-001/002 R-box and 16493T cable, optional	HV(plug) cable, 1 ea. or SHV(plug) cable, 1 ea. for N1262A-001/002
	Low	N1261A-002/004 GNDU protection adapter, 1 ea. 16493L GNDU cable, 3 m or 1.5 m, 1 ea.	BNC(m) cable, 2 ea. for N1261A-002 or SHV(plug) cable, 2 ea. for N1261A-004
LINE		Power cable, 1 ea., for connecting to power line	—

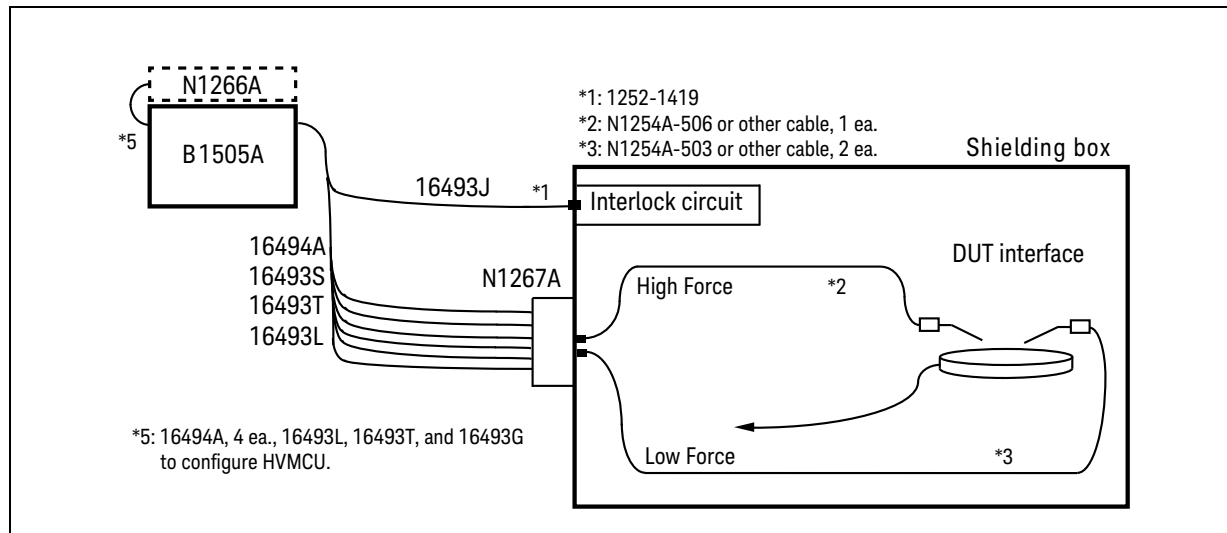
Table 5-3 To Connect N1258A Module Selector



B1505A terminals		Required cables	N1258A terminals	
HPSMU or MPSMU	Force	16494A Triaxial cable, 3 m or 1.5 m, 1 ea., for the non-Kelvin connection, connect it between the Force connectors. For the Kelvin connection, prepare additional one more cable and connect it between the Sense connectors. Or use 16493K Kelvin triaxial cable instead of 16494A. Use 16493K cable if the High output terminals are connected to the prober chuck.	HPSMU	Force
	Sense			Sense
HCSMU or DHCSMU	Force	16493S HCSMU cable, 3 m or 1.5 m, 1 ea. for HCSMU	HCSMU	Force
	Sense	16493S HCSMU cable, 3 m or 1.5 m, 2 ea. and 16493S-021 Dual HCSMU adapter, 1 ea. for DHCSMU		Sense
HVSMU	Force	16493T HVSMU cable, 3 m or 1.5 m, 1 ea. HVMCU can be used instead of HVSMU. See Table 5-2 .	HVSMU	
GNDU		16493L GNDU cable, 3 m or 1.5 m, 1 ea. Also see Table 5-2 .	GNDU	
Digital I/O		16493G Digital I/O connection cable, 3 m or 1.5 m, 1 ea.	Digital I/O	
N1258A terminals		Required cables/Description	Connect to	
Low	Force	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	DUT low terminal (ex: source) ¹	
	Sense	Coaxial cable with BNC(m) connector. N1254A-503 can be used.		
High	Force	Coaxial cable with HV(plug) connector. N1254A-506 can be used. Use coaxial cable to minimize affect of inductance.	DUT high terminal (ex: drain) ¹	
	Sense	Triaxial cable with HV(plug) connector. N1254A-505 can be used.		
LINE		Power cable, 1 ea., for connecting to power line	site AC power	

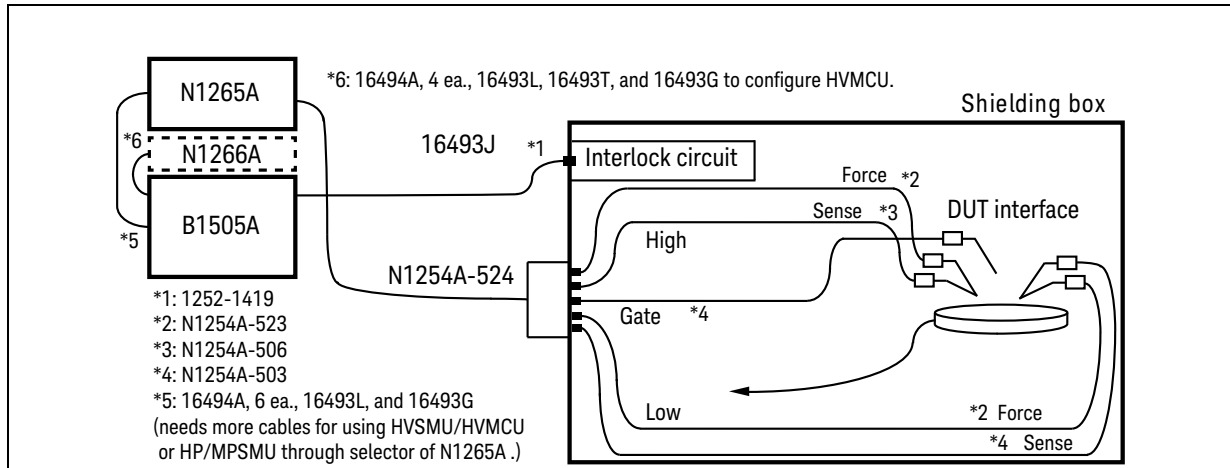
1. Non-Kelvin connection is not allowed. GNDU Force and Sense are internally connected to Low Sense. See [Table 5-22 on page 5-31](#).

Table 5-4 To Connect N1267A Fast Switch



B1505A terminals		Required cables	N1267A terminals	
MCSMU	Force	16494A Triaxial cable, 3 m or 1.5 m, 1 ea.	MCSMU	Force
	Sense	16494A Triaxial cable, 3 m or 1.5 m, 1 ea.		Sense
HCSMU	Force	16493S HCSMU cable, 3 m or 1.5 m, 1 ea. for HCSMU	HCSMU	Force
	Sense			Sense
HVSMU	Force	16493T HVSMU cable, 3 m or 1.5 m, 1 ea.	HVSMU	
GNDU		16493L GNDU cable, 3 m or 1.5 m, 1 ea.	GNDU	
N1267A terminals		Required cables/Description	Connect to	
Low	Force	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	DUT low terminal (ex: source)	
High	Force	Coaxial cable with HV(plug) connector. N1254A-506 can be used. Use coaxial cable to minimize affect of inductance.	DUT high terminal (ex: drain)	

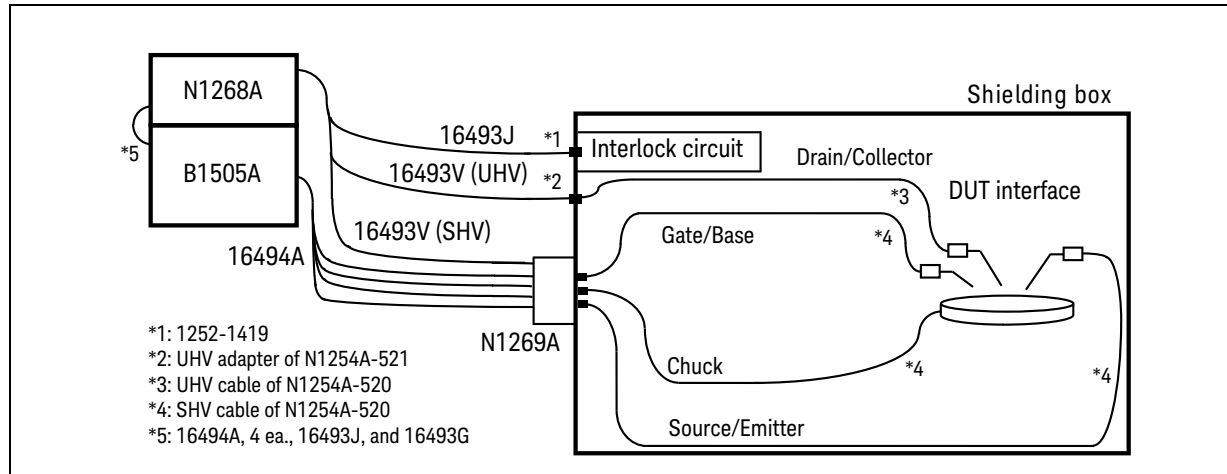
Table 5-5 To Make UHC Measurement Path



B1505A terminals		Required cables	N1265A terminals	
MCSMU ¹	Force	16494A Triaxial cable, 1.5 m, 1 ea.	UHC Input I Control	Force
	Sense	16494A Triaxial cable, 1.5 m, 1 ea.		Sense
MCSMU ¹	Force	16494A Triaxial cable, 1.5 m, 1 ea.	UHC Input V Control	Force
	Sense	16494A Triaxial cable, 1.5 m, 1 ea.		Sense
MCSMU ¹	Force	16494A Triaxial cable, 1.5 m, 1 ea.	Gate	Force
	Sense	16494A Triaxial cable, 1.5 m, 1 ea.		Sense
GNDU		16493L GNDU cable, 1.5 m, 1 ea. Also see Table 5-2 .	GNDU	
Digital I/O		16493G Digital I/O cable, 1.5 m, 1 ea. Also see Table 5-2 .	Digital I/O Input	
Terminals	Required cables/Description		Connect to	
Low Force	Cable with banana connector. N1254A-523 can be used.		DUT low terminal (ex: source) ²	
Low Sense	Coaxial cable with BNC(m) connector. N1254A-503 can be used.			
High Force	Cable with banana connector. N1254A-523 can be used.		DUT high terminal (ex: drain) ²	
High Sense	Triaxial cable with HV(plug) connector. N1254A-505 can be used.			
Gate	Coaxial cable with BNC(m) connector. N1254A-503 can be used.		DUT gate or base	
LINE	Power cable, 1 ea., for connecting to power line		site AC power	
Earth	Wire, 1 ea., for earthing		site ground	
B1505A Interlock	16493J Interlock cable, 3 m or 1.5 m, 1 ea., and 1252-1419 Interlock connector, 1 ea.		Interlock circuit	

1. HCSMU is substitutable. Then use 16493S HCSMU cable, N1254A-103 adapter for Force, and N1254A-517 adapter for Sense.
2. Non-Kelvin connection is not allowed. GNDU Sense is internally connected to Low Sense.

Table 5-6 To Make UHV Measurement Path



B1505A terminals		Required cables	N1268A/N1269A terminals	
Interlock		16493J Interlock cable, 1.5 m, 1 ea.	Interlock Input	
MCSMU	Force	16494A Triaxial cable, 1.5 m, 1 ea.	I Control	Force
	Sense	16494A Triaxial cable, 1.5 m, 1 ea.		Sense
MCSMU ¹	Force	16494A Triaxial cable, 1.5 m, 1 ea.	V Control	Force
	Sense	16494A Triaxial cable, 1.5 m, 1 ea.		Sense
Digital I/O		16493G Digital I/O connection cable, 1.5 m, 1 ea.	Digital I/O	
MCSMU	Force	16494A Triaxial cable, 1.5 m, 1 ea.	N1269A Gate	Force
	Sense	16494A Triaxial cable, 1.5 m, 1 ea.		Sense
MCSMU	Force	16494A Triaxial cable, 1.5 m, 1 ea.	N1269A Chuck	Force
	Sense	16494A Triaxial cable, 1.5 m, 1 ea.		Sense
Terminals	Required cables/Description		Connect to	
Interlock Output	16493J Interlock cable, 3 m or 1.5 m, 1 ea., and 1252-1419 Interlock connector, 1 ea.		Interlock circuit	
Output Low	SHV cable of 16494V, 3 m or 1.5 m, 1 ea.		N1269A UHV Low	
Output High	UHV cable of 16494V, 3 m or 1.5 m, 1 ea., UHV adapter of N1254A-521, 1 ea., and UHV cable of N1254A-520		DUT high terminal (ex: drain)	
LINE	Power cable, 1 ea., for connecting to power line		site AC power	
Earth	Wire, 1 ea., for earthing		site ground	
N1269A Source	SHV cable of N1254A-520		DUT low terminal (ex: source)	
N1269A Gate	Coaxial cable with SHV connector or SHV cable of N1254A-520		DUT gate or base	
N1269A Chuck	Coaxial cable with SHV connector or SHV cable of N1254A-520		DUT chuck	

1. HCSMU is substitutable. Then use 16493S HCSMU cable, N1254A-103 adapter for Force, and N1254A-517 adapter for Sense.

Table 5-7 Available Accessories

Model/Option	Description	Remarks	
16493S-010	HCSMU Kelvin adapter	For converting HCSMU connectors to BNC(f) connectors.	
16493S-011	HCSMU non-Kelvin adapter		
16493S-020	Dual HCSMU Kelvin combination adapter	For configuring DHCSMU.	
16493S-021	Dual HCSMU combination adapter with cable		
N1258A	Module selector	For switching HVSMU, HCSMU, and HP/MPSMU connected to DUT automatically.	
N1260A	High voltage bias-T	For performing capacitance or impedance measurements using DC bias of up to ± 3000 V.	
N1261A-001	HPSMU protection adapter, Triaxial(f)-Triaxial(f)	For protecting HP/MPSMU from high voltage.	
N1261A-003	HPSMU protection adapter, Triaxial(f)-HV(jack)		
N1261A-002	GNDU protection adapter, Triaxial(f)-BNC(f)	For protecting GNDU from high voltage.	
N1261A-004	GNDU protection adapter, Triaxial(f)-SHV(jack)		
N1262A-001	1 M Ω (± 3000 V) R-box, HV(jack)-SHV(jack)	For reducing damage of DUT or preventing SMU from oscillation.	
N1262A-002	100 k Ω (± 3000 V) R-box, HV(jack)-SHV(jack)		
N1262A-010	1 k Ω (± 200 V) R-box, Triaxial(f)-Triaxial(f)		
N1262A-011	1 k Ω (± 3000 V) R-box, HV(jack)-SHV(jack)		
N1262A-020	Universal R-box, Triaxial(f)-Triaxial(f)		
N1262A-021	Universal R-box, HV(jack)-SHV(jack)		
N1262A-023	Universal R-box, UHV(jack)-UHV(jack), with UHV(plug)-UHV(plug) cable, 1.5 m		
N1262A-036	50 Ω termination adapter		
N1265A	Ultra high current expander/fixture		For supporting 500 A
N1265A-015	Built-in 1500 A ultra high current expander		For supporting 1500 A
N1266A	HVSMU current expander	For expanding HVSMU current to 2.5 A	
N1267A	HVSMU/HCSMU fast switch	For switching HVSMU and HCSMU	
N1268A	Ultra high voltage expander	For supporting 10 kV	
N1269A	Ultra high voltage connection adapter	For connecting UHVU Low	
N1272A	Device capacitance selector	For switching the I-V measurement path and capacitance measurement path automatically.	

Model/Option	Description	Remarks
N1274A	On-wafer gate charge measurement adapter/selector for 20 A/3 kV	For on-wafer gate charge measurements using the HCSMU (max. 20 A) and HVSMU (max. 3 kV).
N1275A	On-Wafer gate charge measurement adapter for N1265A	For on-wafer gate charge measurements with the UHCU (max. 500 A) and HVSMU (max. 3 kV).
N1254A-103	BNC(f)-Triaxial(m) adapter, triaxial shield open	For using HCSMU instead of MCSMU
N1254A-517	Triax(f)-Triax(m) adapter, shield separated	
N1254A-104	BNC(m)-Triaxial(f) adapter, triaxial shield open	For using MCSMU instead of HCSMU
N1254A-106	BNC(f)-Triaxial(m) adapter, triaxial guard open	For changing N1262A-010 triax to BNC
N1254A-402	Interlock micro switch	For making interlock circuit. See "To Install an Interlock Circuit" on page 5-47.
1252-1419	Interlock connector (6 pin, female)	
1450-0641	LED ($V_F \cong 2.1 \text{ V} @ I_F = 10 \text{ mA}$)	
N1254A-500	HV(jack) connector, panel mount, for soldering	For connecting HVSMU or accessory to your DUT interface.
N1254A-501	HV(jack)-HV(jack) adapter, panel mount	
N1254A-502	HV(plug) connector, panel mount, for soldering	
N1254A-503	BNC(m) to no connector coaxial cable, 1.5 m	For connecting accessory to your DUT interface.
N1254A-504	HV(jack) to no connector coaxial cable, 1.5 m	
N1254A-505	HV(plug) to no connector triaxial cable, 1.5 m	
N1254A-506	HV(plug) to no connector coaxial cable, 1.5 m	
N1254A-507	HV(plug)-HV(plug) coaxial cable, 1.5 m	
N1254A-516	BNC(f)-(f)-(f) adapter	
N1254A-518	SHV(plug)-SHV(plug) coaxial cable, 1.5 m	For connecting N1260A to N1265A.
N1254A-520	UHV(plug) to no connector cable, 1 m and SHV(plug) to no connector cable, 1 m	For connecting UHVU to your DUT interface.
N1254A-521	UHV(jack)-UHV(jack) adapter and SHV(jack)-SHV(jack) adapter	
N1254A-523	Banana to no connector wire, 1 m, 2 ea.	For connecting UHCU to probe station.
N1254A-524	System cable for prober, 1.8 m	

Model/Option	Description	Remarks
N1254A-525	SHV Cable Assy 1.5m - SHV Plug To Open-end, 1 ea.	For connecting accessory to your DUT interface.
N1254A-526	Ultra High Current Cable, 2m, No Connectors At Either End, 1 ea.	
N1254A-527	PTFE Standoff, Jack, 4 ea.	
N1254A-528	PTFE Standoff With Banana Plug, 4 ea.	
N1254A-554	Thermocouple, Type K, 75 cm, 2 ea.	For measuring temperature with N1265A.
N1254A-558	SHV cable, 3 m, 1 ea.	For connecting accessory to your DUT interface.
16493U-001	BNC(m)-BNC(m) coaxial cable, 1.5 m	
16493U-002	BNC(m)-BNC(m) coaxial cable, 3 m	
1250-2405	BNC(m)-(f)-(f) adapter	For connecting HCSMU adapter output and GNDU protection adapter output.
8120-1838 or 8120-1839	BNC(m)-BNC(m) coaxial cable, 12 inch or 24 inch	

To Connect High Voltage R-Box

Keysight N1262A resistor box is used to reduce the risk of device breakdown or prevent SMU from oscillation. The N1262A should be installed in your DUT interface as shown in [Table 5-1 on page 5-5](#).

N1262A-001: 1 M Ω (\pm 3000 Vdc) resistor, HV(jack)-SHV(jack)

N1262A-002: 100 k Ω (\pm 3000 Vdc) resistor, HV(jack)-SHV(jack)

N1262A-010: 1 k Ω (\pm 200 Vdc) resistor, Triaxial(f)-Triaxial(f)

N1262A-011: 1 k Ω (\pm 3000 Vdc) resistor, HV(jack)-SHV(jack)

N1262A-020: Universal R-box, Triaxial(f)-Triaxial(f)

N1262A-021: Universal R-box, HV(jack)-SHV(jack)

N1262A-023: Universal R-box, UHV(jack)-UHV(jack)

N1262A-036: 50 Ω termination adapter

Universal R-box is kind of a do-it-yourself kit for installing a resistor you want. To install the resistor, see ["To Use Universal R-Box" on page 5-15](#).

N1262A-036 termination adapter is a BNC(f)-BNC(m) adapter which contains 50 Ω resistor between signal line and shield. If a SMU is used as the gate drive for the measurement using HVMCU, UHVU, or UHCU, the SMU may cause oscillation. Then this adapter should be connected between the gate drive output and a DUT terminal. This will be effective for preventing oscillation.

Table 5-8 To Connect N1262A Input

Connect from		Required cables	N1262A terminals
HVSMU	Force	16493T-001 HVSMU cable, 1.5 m	From HVSMU
N1261A-001	Force	16494A-001 Triaxial cable, 1.5 m, for N1262A-010 or N1262A-020	From SMU Force
N1261A-003	Force	16493T-001 HVSMU cable, 1.5 m	
UHVU	High	UHV cable of 16493V-001 UHVU cable, 1.5 m	From UHV

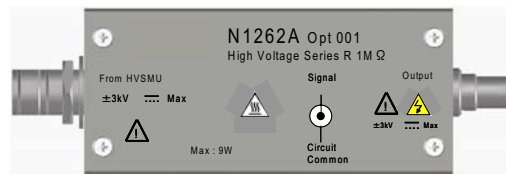


Table 5-9 To Connect N1262A Output

Options	Required cables/Description	Connect to
N1262A-001	Coaxial cable with SHV(plug) connector.	DUT terminal (ex: drain)
N1262A-002	Coaxial cable with SHV(plug) connector.	
N1262A-010	Triaxial cable with Triaxial(m) connector.	DUT terminal (ex: gate)
N1262A-011	Coaxial cable with SHV(plug) connector.	
N1262A-020	Triaxial cable with Triaxial(m) connector.	
N1262A-021	Coaxial cable with SHV(plug) connector.	
N1262A-023	Coaxial cable with UHV(plug) connector.	

Voltage drop caused by the R-box must be subtracted from the measurement result as following.

$$V_{dut} = V_{out} - R_s \times I_{meas}$$

where, V_{dut} : Voltage after correction, V_{out} : Source output voltage, R_s : Resistance of the series resistor, and I_{meas} : Measurement current

To Use Universal R-Box

To install your desired resistor, see the following simple instruction.

•Required parts:

- wire, adequate rating, length, and quantity
- your desired resistor, adequate rating
- hexlobe (torx type) screwdriver T-10
- label, for noting resistance value

• Instruction:

1. Remove the cover of the universal R-box.
2. Solder the resistor and wire as shown below.

To prevent discharge and any accident, make enough space between the resistor leads and the shield or chassis. For example, make space of about 1 mm from the leads for maximum 200 V output, 6 mm for 3000 V, and 32 mm for 10 kV.

Case 1: N1262A-020/021, see [Figure 5-1](#).

- Connect a wire between a terminal and the center conductor of its near connector.
- Connect a wire between the other terminal and the center conductor of the other connector.
- Connect the resistor between the terminals.

Case 2: N1262A-023, see [Figure 5-2](#).

- Connect the resistor between the terminals.
3. Reattach the cover.
Make enough space between the resistor leads and the cover.
 4. Write the resistance value in the label.
 5. Affix the label to the top cover.

Figure 5-1

To Install Resistor in the N1262A-020 Universal R-Box

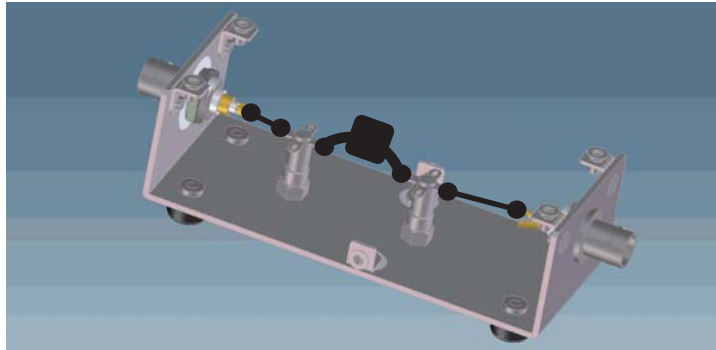
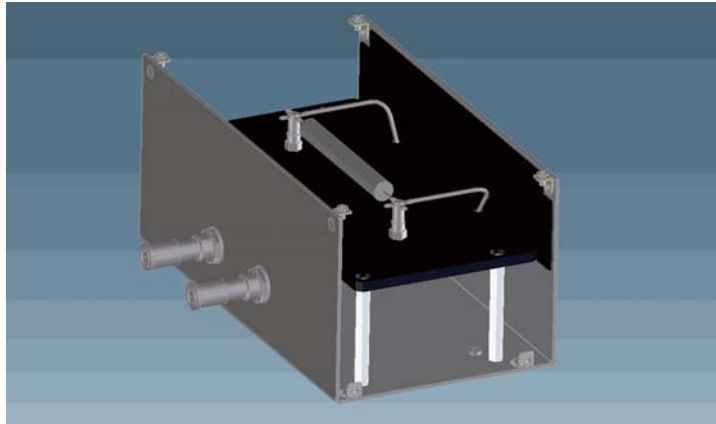


Figure 5-2

To Install Resistor in the N1262A-023 Universal R-Box



To Connect HCSMU Adapter

Keysight 16493S-010/011 HCSMU adapter is used to convert HCSMU connectors to BNC(f) connectors. The 16493S-010/011 should be installed near your DUT interface as shown in [Table 5-1 on page 5-5](#).

16493S-010: Adapter for making the Kelvin connection of HCSMU path

16493S-011: Adapter for making the non-Kelvin connection of HCSMU path, available for the low current path such as the MOSFET gate terminal

Connection examples for using one HCSMU module are shown in [Figure 5-3](#) for the Kelvin connection and in [Figure 5-6](#) for the non-Kelvin connection. Also a connection example for using two HCSMU modules is shown in [Figure 5-7](#).

NOTE

Do not connect or put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. Connecting or putting conductor of circuit common, chassis ground, or any potential on causes the measurement error.

Table 5-10 To Connect 16493S-010/011 Input

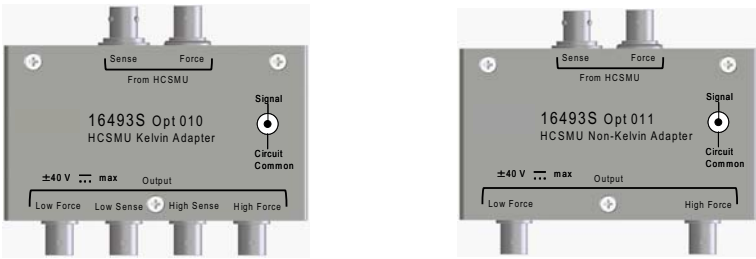
					
B1505A terminals		Required cables		Input terminals	
HCSMU	Force	16493S HCSMU cable, 3 m or 1.5 m		From HCSMU	Force
	Sense			Signal	Sense

Table 5-11 To Connect 16493S-010/011 Output

Output terminals	Required cables/Description	Connect to
Low Force	Coaxial cable with BNC(m) connector. 16493U-001/002 or N1254A-503 can be used.	DUT low terminal (ex: source)
Low Sense		
High Force	Low terminals must be grounded by using the GNDU. If you want to simplify the connection, connect the HCSMU adapter and the GNDU adapter as shown in Figure 5-4 . It can remove the path from the GNDU adapter to the DUT interface.	DUT high terminal (ex: drain)
High Sense		

The following connection example uses one HCSMU module and the 16493S-010 adapter for making the Kelvin connection. In this example, the GNDU path is prepared as a separate path. This GNDU connection is also effective for the connection using the 16493S-011 non-Kelvin adapter.

To simplify the GNDU connection, change the connection as shown in **Figure 5-4**. This connection can save one manipulator.

Figure 5-3 Typical Connection to Use One HCSMU, Kelvin connection

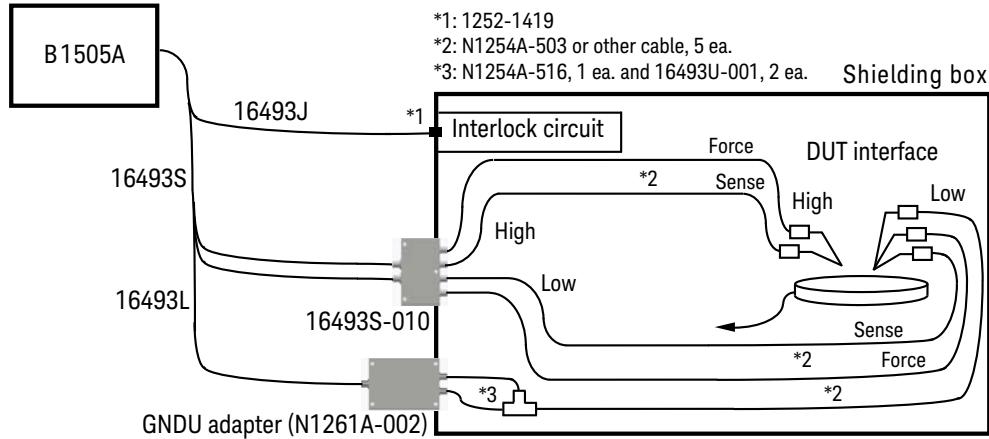


Figure 5-4 To Simplify GNDU Connection, Kelvin connection

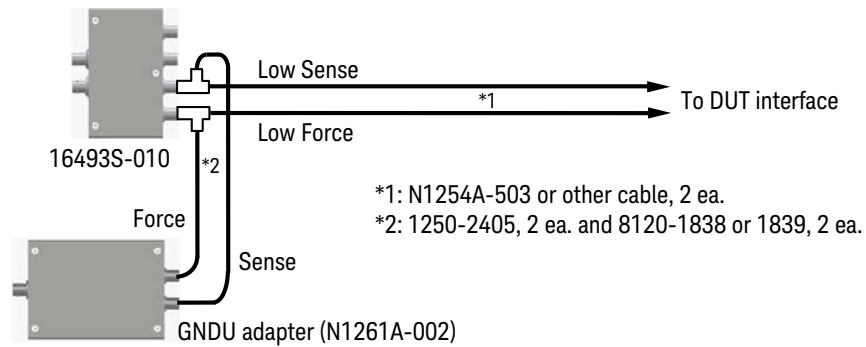
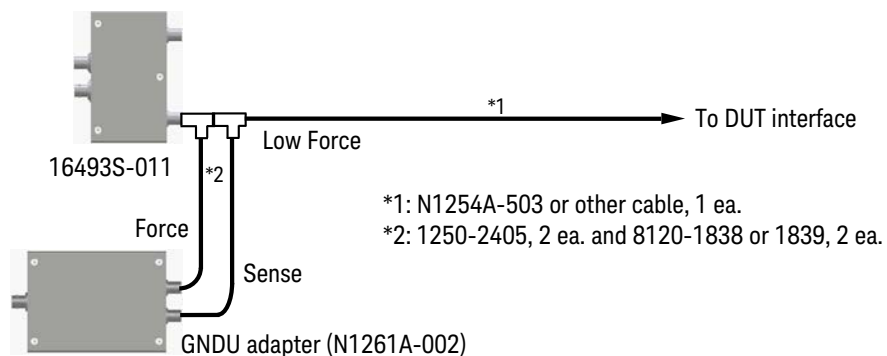


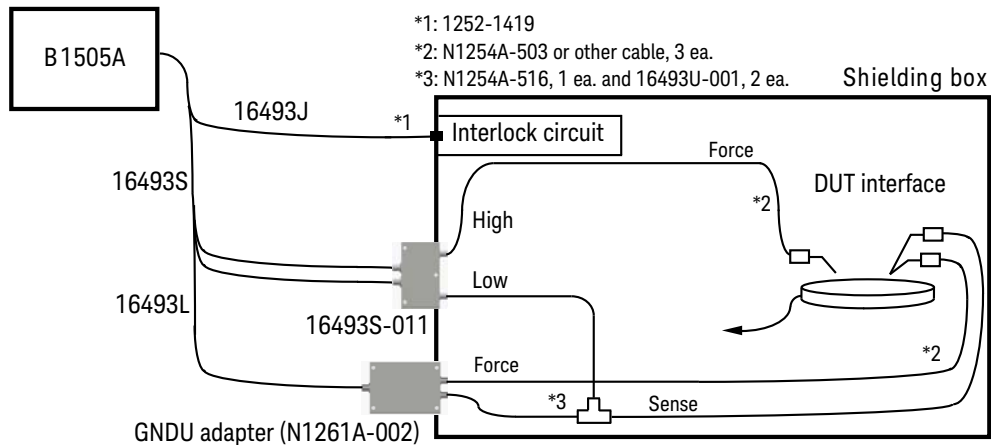
Figure 5-5 To Simplify GNDU Connection, non-Kelvin connection



The following connection example uses one HCSMU module and the 16493S-011 adapter for making the non-Kelvin connection. In this example, the HCSMU Low is connected to the GNDU Sense to simplify the connection. For more simplified non-Kelvin connection of the GNDU, see [Figure 5-5](#). This connection can save one manipulator. Also the GNDU connection can be replaced with the connection shown in [Figure 5-3](#) if an extra manipulator is available.

Figure 5-6

Typical Connection to Use One HCSMU, non-Kelvin connection

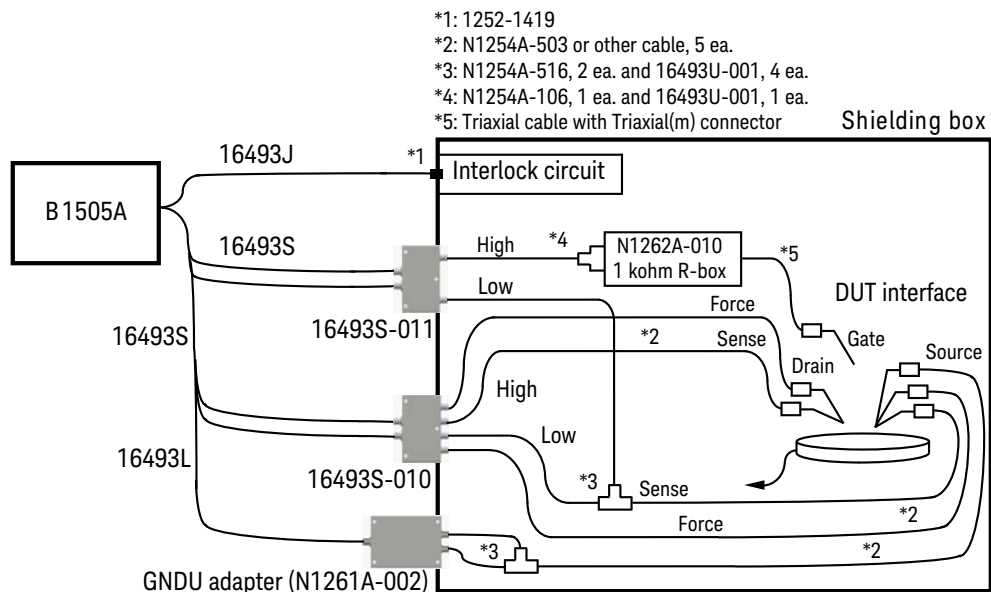


The following connection example uses two HCSMU modules. One is connected to the MOSFET Drain by the Kelvin connection. And another one is connected to the Gate by the non-Kelvin connection through the 1 kΩ R-box. The non-Kelvin connection is effective for not-so-high current path such as the Gate. For the bipolar devices, the Kelvin connection should be used for all terminals. For the measurements using both Kelvin and non-Kelvin connections, the HCSMU Low Sense must be connected together. So the 16493S-011 Low is connected to the 16493S-010 Low Sense in this example.

The simplified GNDU connection shown in [Figure 5-4](#) is also effective.

Figure 5-7

Connection Example to Use Two HCSMU Modules



To Connect Dual HCSMU Adapter

Keysight 16493S-020/021 Dual HCSMU adapter is used to configure the DHCSMU channel by connecting two HCSMU modules installed in one B1505A. Using two modules can expand the B1505A maximum current up to ± 40 A (pulse), ± 2 A (DC).

16493S-020: Dual HCSMU Kelvin combination adapter, for connecting a DUT interface such as your own test fixture and wafer prober, not the N1259A test fixture

16493S-021: Dual HCSMU combination adapter, for connecting the N1259A/N1265A test fixture, the N1258A module selector, or the 16493S-010/011 HCSMU adapter

NOTE

Do not connect or put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. Connecting or putting conductor of circuit common, chassis ground, or any potential on causes the measurement error.

To Connect 16493S-020

The 16493S-020 adapter is used to connect a DUT interface such as your own test fixture and wafer prober. This adapter cannot be used with the N1258A module selector.

The adapter should be installed near your DUT interface and connected between the B1505A and your DUT interface as shown in [Figure 5-8](#). This adapter has built-in GNDU protection adapter and built-in HCSMU Kelvin adapter. So the 16493S-010/011 and N1261A-002/004 adapters are not required.

Figure 5-8

Typical Connection of Dual HCSMU Kelvin Combination Adapter

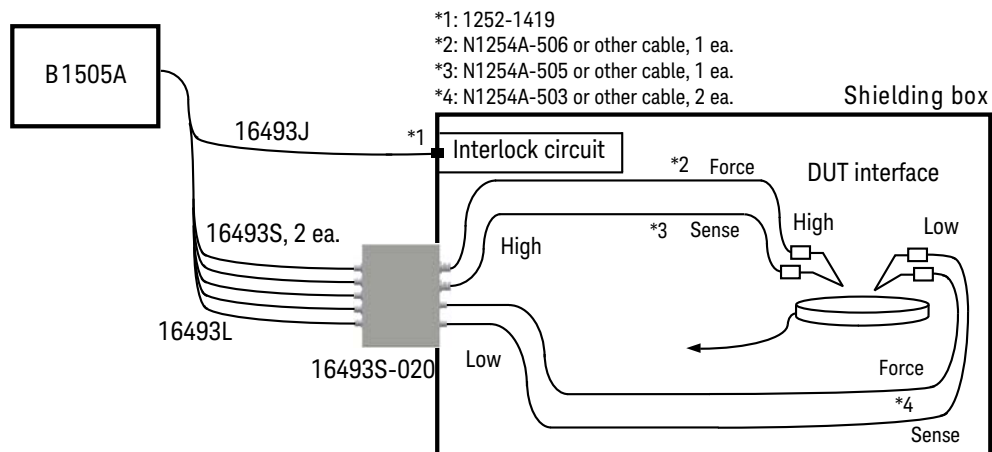


Table 5-12 To Connect 16493S-020 Input

B1505A terminals		Required cables	Input terminals	
HCSMU used for primary	Force	16493S HCSMU cable, 3 m or 1.5 m	HCSMU Primary	Force
	Sense			Sense
HCSMU used for Secondary	Force	16493S HCSMU cable, 3 m or 1.5 m	HCSMU Secondary	Force
	Sense			Sense
GNDU		16493L GNDU cable, 3 m or 1.5 m	GNDU	

Table 5-13 To Connect 16493S-020 Output

Output terminals ¹		Required cables/Description	Connect to
Low	Force	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	DUT low terminal (ex: source) ²
	Sense	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	
High	Force	Coaxial cable with HV(plug) connector. N1254A-506 can be used. Use coaxial cable to minimize affect of inductance.	DUT high terminal (ex: drain) ²
	Sense	Triaxial cable with HV(plug) connector. N1254A-505 can be used.	

1. This is the DHCSMU channel. The connectors are compatible with the N1258A module selector output connectors.
2. Non-Kelvin connection is not allowed. GNDU Force and Sense are internally connected to Low Sense.

To Connect 16493S-021

The 16493S-021 adapter is used with an accessory, 16493S-010/011 HCSMU adapter, N1258A module selector, or N1259A/N1265A test fixture. The adapter should be installed near the accessory.

Table 5-14 To Connect 16493S-021 Input

B1505A terminals		Required cables	Input terminals	
HCSMU used for primary	Force	16493S HCSMU cable, 3 m or 1.5 m	Primary	Force
	Sense			Sense
HCSMU used for secondary	Force	16493S HCSMU cable, 3 m or 1.5 m	Secondary	Force
	Sense			Sense

Table 5-15 To Connect 16493S-021 Output

Output terminals ¹		Required cables/Description	Connect to
Output	Force	dedicated cable, 300 mm, furnished with 16493S-021	HCSMU input connectors of 16493S-010/011, N1258A, N1259A, or N1265A
	Sense	To connect N1265A, adapters N1254A-103 for Force and N1254A-517 for Sense are required.	

1. This is the DHCSMU channel. The connectors are compatible with HCSMU.

CAUTION

If DHCSMU is used with the N1258A or N1259A-300 module selector, the maximum current must be ± 30 A to prevent the module selector from performance degradation and failure.

To Connect Protection Adapter

Keysight N1261A protection adapter is used to protect GNDU or HP/MPSMU module from high voltage. The N1261A should be installed near your DUT interface as shown in [Table 5-1 on page 5-5](#).

The N1261A-001 is also used for the measurement using the N1265A test fixture. It must be connected between the HP/MPSMU and the N1265A SMU input. Then use four 16494A triaxial cables for Kelvin connection or two 16494A cables for non-Kelvin connection. Recommended cable length is 1.5 m. Ignore [Table 5-17](#).

N1261A-001: HPSMU protection adapter, Triaxial(f)-Triaxial(f)

N1261A-002: GNDU protection adapter, Triaxial(f)-BNC(f)

N1261A-003: HPSMU protection adapter, Triaxial(f)-HV(jack)

N1261A-004: GNDU protection adapter, Triaxial(f)-SHV(jack)

Table 5-16 To Connect N1261A Input

B1505A terminals		Required cables	N1261A terminals	
HPSMU or MPSMU	Force	16494A Triaxial cable, 3 m or 1.5 m, 1 ea., for the non-Kelvin connection, connect it between the Force connectors. For the Kelvin connection, prepare additional one more cable and connect it between the Sense connectors. Or use 16493K Kelvin triaxial cable instead of 16494A.	From HPSMU	Force
	Sense			Sense
GNDU		16493L GNDU cable, 3 m or 1.5 m	From GNDU	

NOTE

For connecting HP/MPSMU, use either 16494A or 16493K. But the 16493K cannot be used for connecting the N1265A.

Table 5-17 To Connect N1261A Output

Options		Required cables/Description	Connect to
N1261A-001	Force	Triaxial cable with Triaxial(m) connector.	DUT terminal (ex: gate) or Prober chuck
	Sense	Triaxial cable with Triaxial(m) connector.	
N1261A-003	Force	Triaxial cable with HV(plug) connector. N1254A-505 can be used. Also 16493T-001 and N1254A-500 can be used.	DUT terminal (ex: source) Non-Kelvin connection is not allowed.
	Sense	Triaxial cable with HV(plug) connector. N1254A-505 can be used. Also 16493T-001 and N1254A-500 can be used.	
N1261A-002 1	Force	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	DUT terminal (ex: source) Non-Kelvin connection is not allowed.
	Sense	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	
N1261A-004	Force	Coaxial cable with SHV(plug) connector.	DUT terminal (ex: source) Non-Kelvin connection is not allowed.
	Sense	Coaxial cable with SHV(plug) connector.	

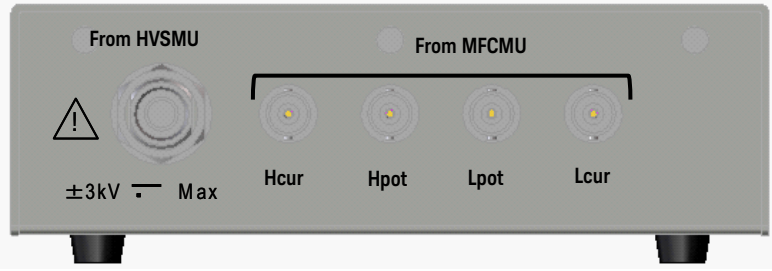
1. For connecting HCSMU adapter, see "[To Connect HCSMU Adapter](#)" on page 5-17.

To Connect High Voltage Bias Tee

Keysight N1260A high voltage bias-tee is used to perform the high voltage C-V measurement. The C-V measurement of up to 3000 Vdc can be realized by using the bias-tee, MFCMU, and HVSMU. The N1260A should be installed near your DUT interface as shown in [Table 5-1 on page 5-5](#). Also see [Figure 5-9](#) for connection example.

The N1260A is also used for the high voltage C-V measurement using the N1265A test fixture. It must be connected between the MFCMU and the N1265A. Then use two N1254A-518 SHV cables to connect the N1260A output to the N1265A Bias Tee input. The N1260A input connection is same as [Table 5-18](#). Ignore [Table 5-19](#).

Table 5-18 To Connect N1260A Input

					
B1505A terminals		Required cables		N1260A terminals	
HVSMU	Force	16493T HVSMU cable, 3 m or 1.5 m		From HVSMU	
MFCMU	Hcur	N1300A CMU cable, 3 m or 1.5 m		From MFCMU	
	Hpot	It is not needed to connect the ground wire extended from the CMU cable.			Hpot
	Lpot				Lpot
	Lcur				Lcur

NOTE Turn the B1505A off before connecting the CMU cable.
Connect HVSMU to obtain DC bias input. Because the bias-tee cannot pass the MFCMU internal DC bias.

Table 5-19 To Connect N1260A Output

N1260A terminals		Required cables/Description	Connect to
Output	Low	Coaxial cable with SHV(plug) connector.	DUT low terminal (ex: source)
	High	Coaxial cable with SHV(plug) connector.	DUT high terminal (ex: drain)
AC Guard		Coaxial cable with SHV(plug) connector. This terminal provides the AC guard (circuit common) signal of MFCMU. For the 3-terminal device measurement, the AC Guard must be extended to the device terminal which is not connected to Low or High.	DUT terminal (ex: gate)

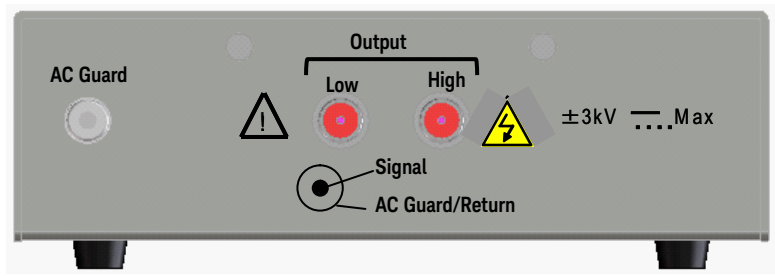
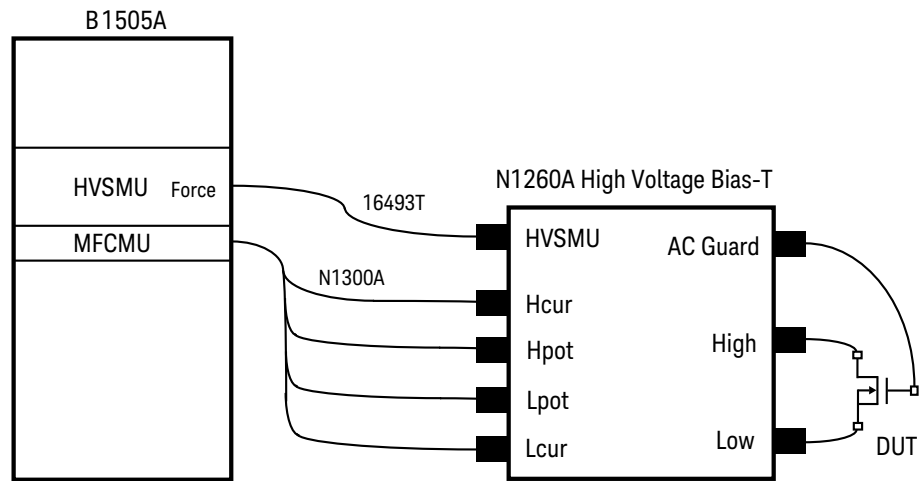


Figure 5-9 To Connect N1260A High Voltage Bias-Tee



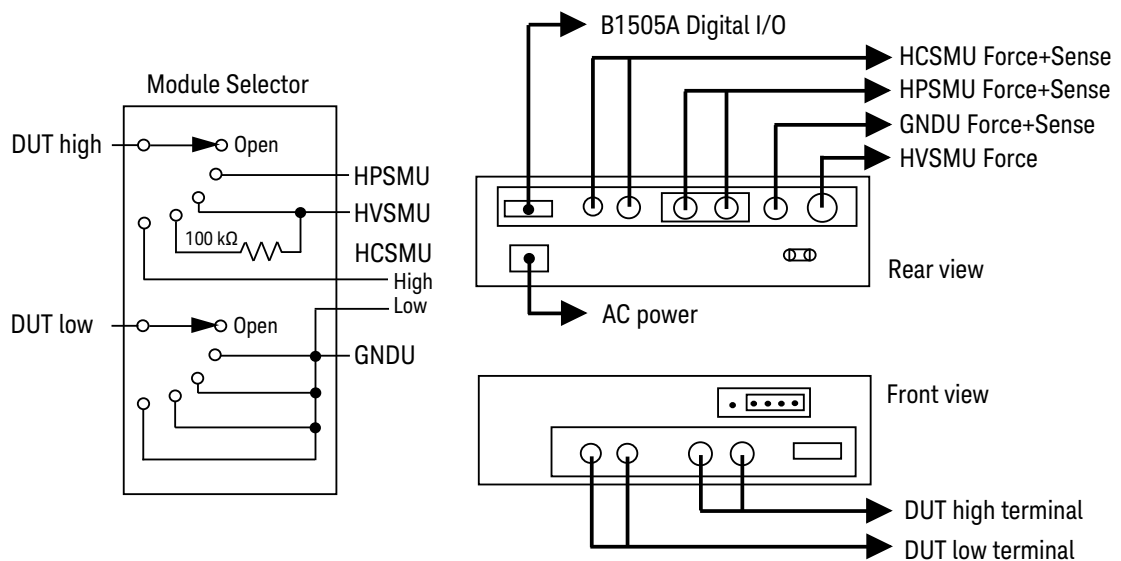
To Connect Module Selector

Keysight N1258A module selector is used to switch the measurement resource connected to the device under test (DUT) automatically. The measurement resource will be HP/MPSMU, HVSMU/HVMCU, or HC/DHCSMU. One selector provides one switching channel. Also the selector has built-in GNDU protection adapter, built-in HPSMU protection adapter, and built-in HCSMU Kelvin adapter.

The N1258A should be installed near your DUT interface as shown in [Table 5-3 on page 5-7](#). Also see figures [5-11](#) and [5-12](#).

The output cable connection is effective for all measurement performed by the modules connected to the Input terminals. Connection change is not required. The module selector switching status is indicated by the Status indicator mounted on the front panel. See [Table 5-22 on page 5-31](#).

Figure 5-10 Module Selector Circuit Diagram and Connections



CAUTION

The GNDU can sink current of up to 4.2 A. Use 16493L GNDU cable to connect the GNDU to the N1258A.

Do *not* use normal triaxial cable (16494A) because the maximum current rating of the cable is 1 A.

CAUTION

Maximum current must be ± 30 A to prevent the module selector from performance degradation and failure.

NOTE

Using Dual HCSMU (DHCSMU)

DHCSMU can be configured by two HCSMU modules installed in one B1505A and connected to the 16493S-021 Dual HCSMU combination adapter. See ["To Connect Dual HCSMU Adapter"](#) for connection. The output connectors are compatible with HCSMU.

Figure 5-11 To Connect N1258A Module Selector

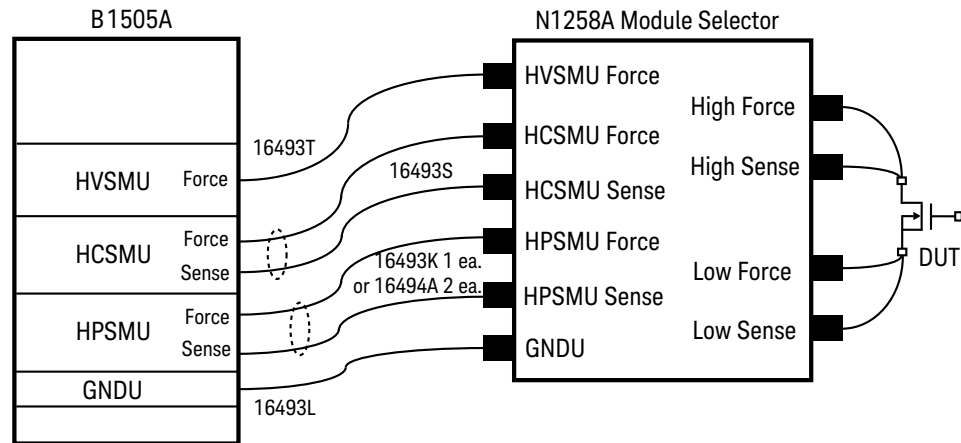
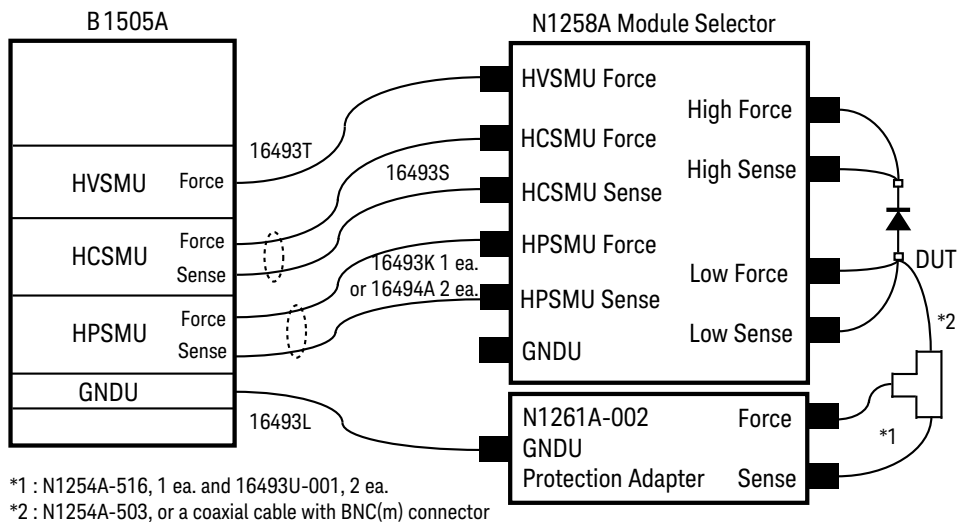


Figure 5-12 To Connect N1258A Module Selector, with N1261A-002 GNDU Adapter



NOTE Using GNDU Adapter

Generally, the connection of [Figure 5-11](#) is used for the measurement using the module selector. And the connection of [Figure 5-12](#) is effective for the accurate measurement over 10 mA using the HP/MPSMU or HVSMU.

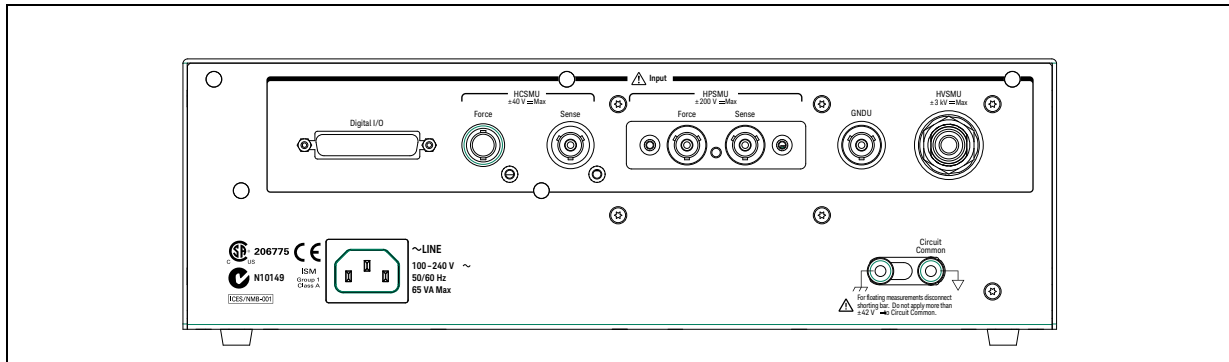
CAUTION

Never connect the HVSMU Force and Guard terminals and the HVMCU High terminal to any output, including circuit common, chassis ground, or any other measurement resource such as SMU. Connecting other measurement resource may damage the connected one.

NOTE

Do not connect or put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. Connecting or putting conductor of circuit common, chassis ground, or any potential on causes the measurement error.

Table 5-20 To Connect N1258A Input



B1505A terminals		Required cables	N1258A terminals	
Digital I/O		16493G Digital I/O connection cable, 3 m or 1.5 m	Digital I/O	
HCSMU or DHCSMU	Force	16493S HCSMU cable, 3 m or 1.5 m, 1 ea. for HCSMU	HCSMU	Force
	Sense	16493S HCSMU cable, 3 m or 1.5 m, 2 ea. and 16493S-021 Dual HCSMU adapter, 1 ea. for DHCSMU		Sense
HPSMU or MPSMU	Force	16494A Triaxial cable, 3 m or 1.5 m, 1 ea., for the non-Kelvin connection, connect it between the Force connectors. For the Kelvin connection, prepare additional one more cable and connect it between the Sense connectors. Or use 16493K Kelvin triaxial cable instead of 16494A. Use 16493K cable if the High output terminals are connected to the prober chuck.	HPSMU	Force
	Sense			Sense
HVSMU	Force	16493T HVSMU cable, 3 m or 1.5 m	HVSMU	
HVMCU ¹	High	16493L GNDU cable, 3 m or 1.5 m	GNDU	
	Low			
GNDU				
—		Power cable, for connecting to power line	LINE, 65 VA Max.	

1. HVMCU is configured by using the N1266A, HVSMU, GNDU, and two MCSMU. See **"To Connect HVSMU Current Expander"** on page 5-34.

WARNING

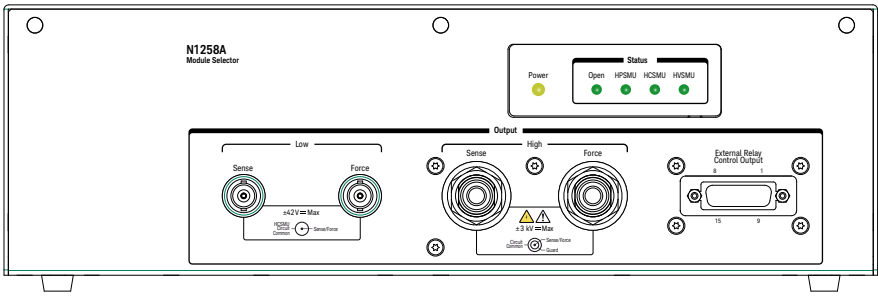
The connector cap must be connected to the unused input connectors.

If the Circuit Common terminal is *not* connected to the frame ground terminal (for floating measurement), a potential shock hazard may present. Do not touch any of measurement circuit at any time while a floating measurement is in progress.

CAUTION

For floating measurement, do not apply voltage more than ± 42 V to the Circuit Common terminal. Failure to heed this caution may result in damage to the N1258A.

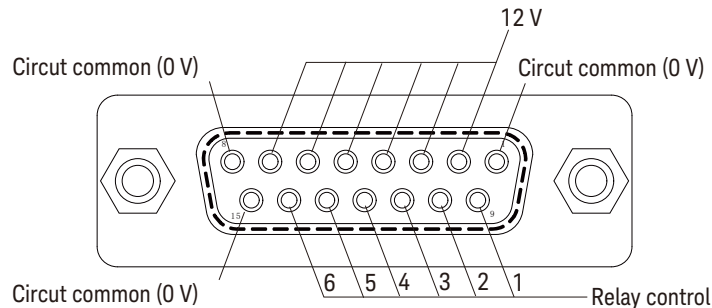
Table 5-21 To Connect N1258A Output



N1258A terminals ¹		Required cables/Description	Connect to
Low	Force	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	DUT low terminal (ex: source) ²
	Sense	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	
High	Force	Coaxial cable with HV(plug) connector. N1254A-506 can be used. Use coaxial cable to minimize affect of inductance.	DUT high terminal (ex: drain) ²
	Sense	Triaxial cable with HV(plug) connector. N1254A-505 can be used.	
External Relay Control Output		Cable with D-sub 15 pin connector. See Figure 5-13 for pin assignment. Relay control 1 to 6 are used to control an external relay and controlled by using the Keysight FLEX command. See <i>Programming Guide</i> for the FLEX command. Relay control signal level: 0 V or 12 V, normally 0 V (circuit common)	Input connector of your own switch box like a module selector

1. The connectors are compatible with the 16493S-020 adapter output connectors.
2. Non-Kelvin connection is not allowed. GNDU Force and Sense are internally connected to Low Sense. See [Table 5-22](#) on page 5-31.

Figure 5-13 External Relay Control Output Connector



NOTE **Controlling N1258A input-to-output path**

The configuration and the default I/O path of the N1258A are set by using the Module Selector tab screen of the Configuration window of the EasyEXPERT software. The connection path from the input port to the output port is controlled by each test setup. And the N1258A switching status is indicated by the Status indicator mounted on the front panel. See Figure 5-14 and Table 5-22 for the indication and the connection path.

Figure 5-14 **Module Selector Simplified Internal Connections**

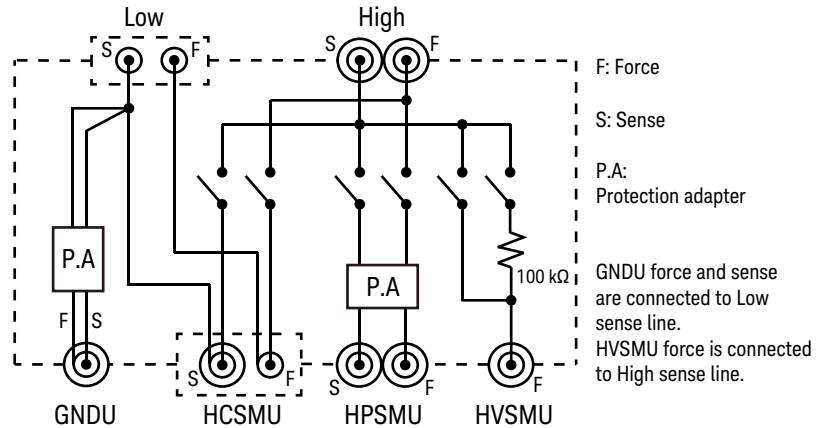


Table 5-22 **Module Selector Status Indicator and Input-to-Output Connection Path**

Measurement resource used for the test	Status indicator	Input-to-output connection ¹ of output terminals			
		Low Sense	Low Force	High Sense	High Force
2	Open	HCSMU Low Sense + GNDU Force + GNDU Sense	HCSMU Low Force	Open	Open
HPSMU or MPSMU	HPSMU			HPSMU Sense	HPSMU Force
HCSMU or DHCSMU	HCSMU			HCSMU High Sense	HCSMU High Force
HVSMU or HVMCU	HVSMU			HVSMU Force	Open
HVSMU/HVMCU and built-in series resistor				HVSMU Force + Series resistor	

1. In the normal state, the N1258A makes the path to the output port from the input port specified by the Default field. When a measurement is performed, the N1258A performs automatic switching in every test. The N1258A makes the path to the output port from the measurement resource used for the test.
2. This condition is when all Input fields HVSMU, HCSMU, and HPSMU are blank.

To Connect HVSMU/HCSMU Fast Switch

Keysight N1267A HVSMU/HCSMU fast switch is used to switch quickly and automatically the measurement resource, HVSMU or HCSMU, connected to the device under test (DUT). This is effective for the current collapse measurement of GaN power devices.

The N1267A can be used with the N1259A test fixture, but not with the N1265A test fixture. See [Table 2-3](#) for the input output cable connections.

If you use your DUT interface, see [Table 5-4](#) and [Figure 5-15](#) for the connection image.

The output cable connection is effective for all measurement performed by the measurement resources connected to the Input terminals. Connection change is not required. See [Figure 5-16](#) for the internal connection.

Figure 5-15

To Connect HVSMU/HCSMU Fast Switch

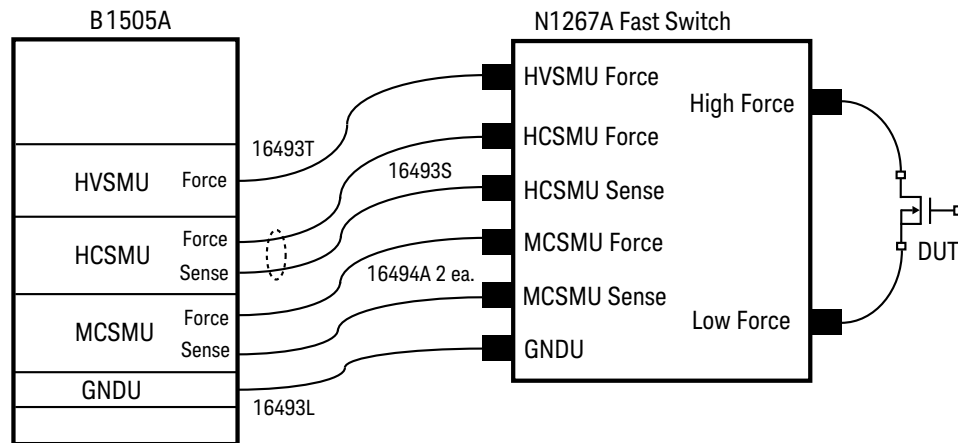


Figure 5-16

N1267A Simplified Internal Connections

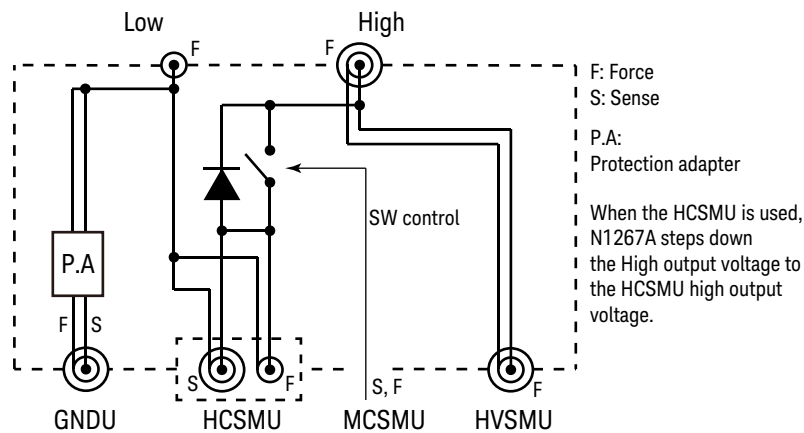


Table 5-23 To Connect N1267A Input

B1505A terminals		Required cables	N1267A terminals	
HCSMU	Force	16493S HCSMU cable, 3 m or 1.5 m, 1 ea.	HCSMU	Force
	Sense			Sense
HVSMU	Force	16493T HVSMU cable, 3 m or 1.5 m	HVSMU	
GNDU		16493L GNDU cable, 3 m or 1.5 m	GNDU	
MCSMU	Force	16494A Triaxial cable, 3 m or 1.5 m	MCSMU	Force
	Sense	16494A Triaxial cable, 3 m or 1.5 m		Sense

Table 5-24 To Connect N1267A Output

N1267A terminals		Required cables/Description	Connect to
Low	Force	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	DUT low terminal (ex: source)
High	Force	Coaxial cable with HV(plug) connector. N1254A-506 can be used. Use coaxial cable to minimize affect of inductance.	DUT high terminal (ex: drain)

CAUTION

The GNDU can sink current of up to 4.2 A. Use 16493L GNDU cable to connect the GNDU to the N1267A.

Do *not* use normal triaxial cable (16494A) because the maximum current rating of the cable is 1 A.

CAUTION

Never connect the HVSMU Force and Guard terminals to any output, including circuit common, chassis ground, or any other measurement resource such as SMU. Connecting other measurement resource may damage the connected one.

NOTE

Do not connect or put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. Connecting or putting conductor of circuit common, chassis ground, or any potential on causes the measurement error.

To Connect HVSMU Current Expander

The N1266A HVSMU current expander is used to configure the high voltage medium current unit (HVMCU) by using the HVSMU module and the MCSMU modules as shown in [Figure 5-17](#). The N1266A should be installed near the B1505A.

The N1266A output can be selected from the HVSMU or HVMCU. The switching status is indicated by the Status indicator mounted on the front panel. See [Table 5-25](#) for the internal connection.

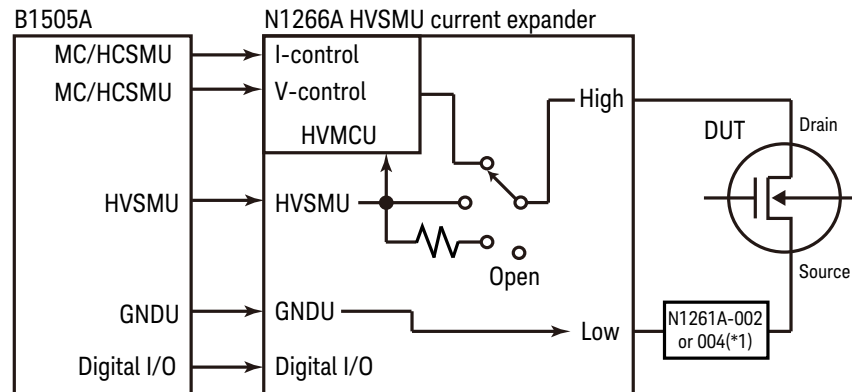
NOTE

To switch measurement resource

The configuration of the HVMCU is set by using the HVSMU Current Expander tab screen of the Configuration window of the EasyEXPERT software. The measurement resource HVMCU or HVSMU is controlled by each test setup. And the switching status is indicated by the Status indicator mounted on the front panel. See [Table 5-25](#) for the indication and the connection path.

Figure 5-17

To Configure HVMCU



*1: N1261A-002/004 protection adapter is required for connecting prober.

Table 5-25

N1266A Status Indicator and Input-to-Output Connection Path

Measurement resource used for the test	Status indicator	Input-to-output connection ¹ of output terminals	
		Low	High
GNDU only	(off)	GNDU Force + Sense	Open
HVMCU	HVMC		HVMCU High
HVSMU	HVSMU		HVSMU Force
HVSMU and built-in series resistor			HVSMU Force + Series resistor

1. When a measurement is performed, the N1266A performs automatic switching in every test. The N1266A makes the path to the output port from the measurement resource used for the test.

Table 5-26 To Connect N1266A Input

B1505A terminals		Required cables	N1266A terminals	
HVSMU	Force	16493T-001 HVSMU cable, 1.5 m	HVSMU	
GNDU		16493L-001 GNDU cable, 1.5 m	GNDU	
MCSMU ¹	Force	16494A-001 Triaxial cable, 1.5 m	I Control	Force
	Sense	16494A-001 Triaxial cable, 1.5 m		Sense
MCSMU ¹	Force	16494A-001 Triaxial cable, 1.5 m	V Control	Force
	Sense	16494A-001 Triaxial cable, 1.5 m		Sense
Digital I/O		16493G-001 Digital I/O connection cable, 1.5 m	Digital I/O Input	
—		Power cable, for connecting to power line	LINE	

1. HCSMU is substitutable. Then use 16493S HCSMU cable, N1254A-103 adapter for Force, and N1254A-517 adapter for Sense.

CAUTION

The GNDU can sink current of up to 4.2 A. Use 16493L GNDU cable to connect the GNDU to the N1267A.

Do *not* use normal triaxial cable (16494A) because the maximum current rating of the cable is 1 A.

Table 5-27 To Connect N1266A Output

N1266A terminals	Required cables/Description	Connect to
Low	16493L GNDU cable, N1261A-002 protection adapter and two BNC(m) coaxial cables (N1254A-503 can be used), or N1261A-004 protection adapter and two SHV(plug) coaxial cables Protection adapter is not required to connect to the N1258A, N1259A, N1259A-300, or N1265A.	DUT low terminal (ex: source)
High	HV(plug) triaxial cable (N1254A-505 can be used).	DUT high terminal (ex: drain)

CAUTION

Never connect the HVSMU Force and Guard terminals and the HVMCU High terminal to any output, including circuit common, chassis ground, or any other measurement resource such as SMU. Connecting other measurement resource may damage the connected one.

To Connect Ultra High Current Expander

The ultra high current expander is built into the N1265A test fixture, and is used to configure the ultra high current unit (UHCU) with the MCSMU modules. The UHCU output can be applied from the Selector Output terminals of the N1265A, and extended by using the N1254A-524 Prober System Cable, 1.8 m. See "Selector Output Terminals" on page 3-13 for the selector itself and the output terminals.

The N1254A-524 system cable is used to extend the Selector Output and Gate terminals of the N1265A, and can be connected to these terminals directly. See "Connecting System Cable to N1265A" on page 5-37.

The other side, prober side, of the system cable is a connector box which provides the five connectors for connecting cables from manipulators. The connector box should be installed near your DUT interface. See Figure 5-18 for the connection image.

The prober side connector type, maximum voltage, and maximum current of the N1254A-524 are shown in Table 5-28. See Table 5-29 for the output connection cables.

CAUTION

Do not grab the fixture cover when lifting the N1265A.

Do not apply voltage/current over the maximum limit of the cable. See Table 5-28.

Figure 5-18 To Extend Selector Output by using N1254A-524 Prober System Cable

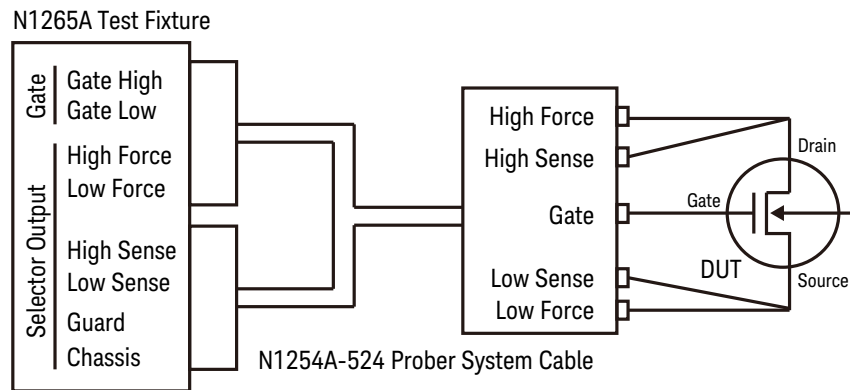


Table 5-28 Prober Side Connectors and Maximum Voltage/Current of N1254A-524

Connector label	Connector type	N1265A output terminals to extend	Maximum voltage	Maximum current
High Force	Banana(jack)	Selector Output High Force	3000 V	39 A dc, 500 A pulse ¹
Low Force	Banana(jack)	Selector Output Low Force	200 V	
High Sense	HV(jack)	Selector Output High Sense	3000 V	1 A dc, 20 A pulse
Low Sense	BNC(f)	Selector Output Low Sense	200 V	
		Gate Low		
Gate	BNC(f)	Gate High	200 V	

1. Pulse of 1 ms pulse width and 0.4 % duty cycle

Table 5-29 Cables for connecting Prober Side of N1254A-524 System Cable

N1254A-524 connectors	Required cables/Description	Connect to
Low Force	Ultra high current cable with banana(plug). N1254A-523 can be used.	DUT low terminal (ex: source)
Low Sense	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	
High Force	Ultra high current cable with banana(plug). N1254A-523 can be used.	DUT high terminal (ex: drain)
High Sense	Triaxial cable with HV(plug) connector. N1254A-505 can be used.	
Gate	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	DUT drive terminal (ex: gate)

CAUTION

Never connect the High Force and High Sense terminals to any output, including circuit common, chassis ground, or any other measurement resource such as SMU. Connecting other measurement resource may damage the connected one.

Connecting System Cable to N1265A

Requirements

- Box wrench, M5 hex
- Clear plastic plate, 2 ea. (furnished with the N1254A-524 system cable)

Procedure

1. Turn the all instruments off.
2. Remove power cable from the all instruments.
3. Open the fixture cover of the N1265A.
4. Remove connection wire from the Selector Output and Gate terminals if the wire is connected.
5. Remove the clear plastic plate from the fixture cover. This makes opening for passing the cable through. Use the box wrench and unscrew six hex nuts to remove the plate.

Treature the removed plate. It must be replaced in the normal use conditions without the N1254A-524 system cable.
6. Connect two connector boxes of the system cable to the Selector Output and Gate terminals properly. See [Figure 5-18](#).
7. Pull out the prober side connector box and some long of extension cable (approximately 1.5 m) from the opening.
8. Set and fix two clear plastic plates to the fixture cover by using the hex nuts removed in the step 5. The plates close the excess opening and make the opening enough to pass the cable through.
9. Close the fixture cover.
10. Connect the 16493J interlock cable from the B1505A or the N1268A to the interlock circuit installed in the probe station.

WARNING

For using the prober system cable safely

Never connect the interlock cable to the N1265A.

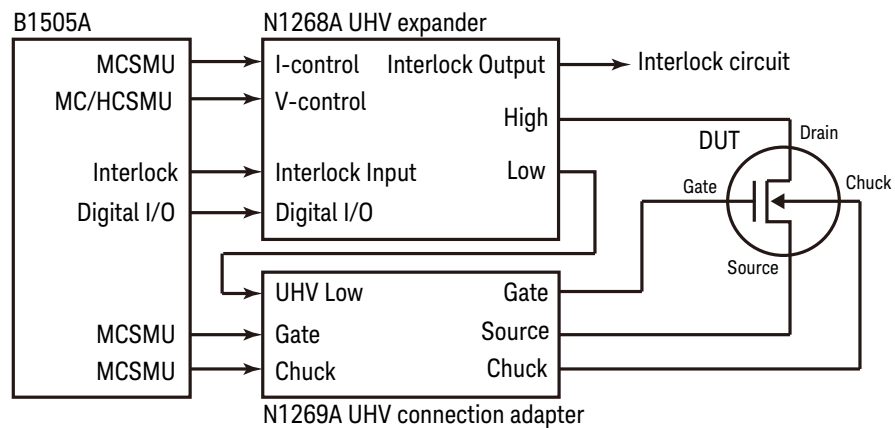
Never remove the clear plastic plates from the fixture cover.

To Connect Ultra High Voltage Expander

The N1268A ultra high voltage expander is used to configure the ultra high voltage unit (UHVU) with the MCSMU modules. And the UHVU can be connected to prober as shown in [Figure 5-19](#), by using the N1269A connection adapter. The N1268A should be installed near the B1505A. And the N1269A should be installed near prober as shown in ["Connection Overview"](#).

Figure 5-19

To Configure UHVU



WARNING

Connect a wire from an electrical ground (safety ground) to the earth terminal of the N1268A.

Table 5-30

To Connect N1268A/N1269A Input

B1505A terminals		Required cables	N1268A input	
MCSMU	Force	16494A-001 Triaxial cable, 1.5 m	I Control	Force
	Sense	16494A-001 Triaxial cable, 1.5 m		Sense
MCSMU ¹	Force	16494A-001 Triaxial cable, 1.5 m	V Control	Force
	Sense	16494A-001 Triaxial cable, 1.5 m		Sense
Interlock		16493J-001 Interlock cable, 1.5 m	Interlock Input	
Digital I/O		16493G-001 Digital I/O connection cable, 1.5 m	Digital I/O Input	
—		Power cable, for connecting to power line	LINE	
—		Wire, 1 ea., for earthing	(earth) ⏏	

1. HCSMU is substitutable. Then use 16493S HCSMU cable, N1254A-103 adapter for Force, and N1254A-517 adapter for Sense.

B1505A/N1268A terminals		Required cables/Description	N1269A input	
MCSMU	Force	16494A Triaxial cable, 1.5 m or 3 m	Gate	Force
	Sense	16494A Triaxial cable, 1.5 m or 3 m		Sense
MCSMU	Force	16494A Triaxial cable, 1.5 m or 3 m	Chuck	Force
	Sense	16494A Triaxial cable, 1.5 m or 3 m		Sense
N1268A Output Low		SHV(jack)-SHV(jack) cable, 1.5 m or 3 m, of 16493V	Low	

Table 5-31 To Connect N1268A/N1269A Output

N1268A output	Required cables/Description	Connect to
Interlock Output	16493J Interlock cable, 1.5 m or 3 m	Interlock circuit
High	Ultra high voltage coaxial cable with UHV(plug) connector. UHV cable of N1254A-520 can be used.	DUT high terminal (ex: drain)

N1269A output	Required cables/Description	Connect to
Gate	Coaxial cable with SHV(plug) connector. SHV cable of N1254A-520 can be used.	DUT drive terminal (ex: gate)
Source	Coaxial cable with SHV(plug) connector. SHV cable of N1254A-520 can be used.	DUT low terminal (ex: source)
Chuck	Coaxial cable with SHV(plug) connector. SHV cable of N1254A-520 can be used.	DUT chuck terminal

CAUTION

Never connect the High terminal to any output, including circuit common, chassis ground, or any other measurement resource such as SMU. Connecting other measurement resource may damage the connected one.

CAUTION

Never connect the UHVU Low terminal to any other measurement resource except for the N1269A or N1265A-040 adapter. Connecting other measurement resource may damage the connected one.

To Connect Device Capacitance Selector

Keysight N1272A device capacitance selector is used to switch the measurement resource connected to the device under test (DUT), for capacitance testing (input/output capacitance, feedback capacitance, and gate resistance). The measurement resource will be HVSMU, MPSMU and MFCMU.

The N1272A should be installed near your DUT interface. Connection examples are shown below. For the color-codes of cables and connectors in the figures, see [Figure 7-1 on page 7-2](#).

[Figure 5-20](#) shows the connection example for the ultra high current configuration using the N1265A.

[Figure 5-21](#) shows the connection example for the high current configuration using the HCSMU and the N1258A module selector.

Table 5-32 To Connect N1272A Input

B1505A terminals		Required cables	Input terminals	
HVSMU		16493T-001 HVSMU cable, 1.5 m, 1 ea.	HVSMU	
MPSMU	Force	16494A Triaxial cable, 1.5 m, 1 ea.	SMU	Force
	Sense	16494A Triaxial cable, 1.5 m, 1 ea.		Sense
MFCMU	Hcur	N1300A-001 CMU cable, 1.5 m, 1 ea.	MFCMU	Hcur
	Hpot	It is not needed to connect the ground wire extended from the CMU cable.		Hpot
	Lpot			Lpot
	Lcur			Lcur
GNDU			16493L-001 GNDU cable, 1.5 m	GNDU
Interlock		16493J-001 Interlock cable, 1.5 m	Interlock Input	
Digital I/O		16493G-001 Digital I/O connection cable, 1.5 m If the N1272A selector is used with other fixture or selector, you can also connect the output from it to this input connector.	Digital I/O Input	
—		Power cable, for connecting to power line	LINE	

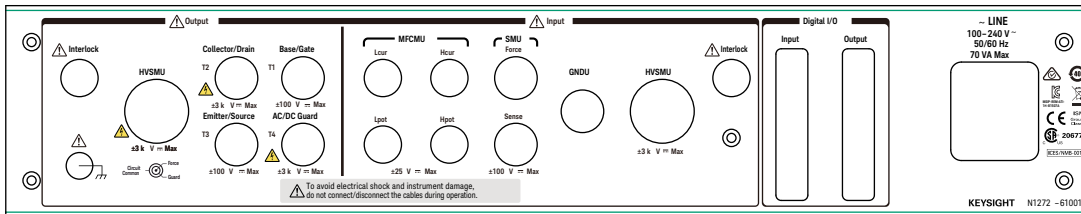


Table 5-33 To Connect N1272A Output

Output terminals	Required cables/Description	Connect to
Collector/Drain	N1254A-558 or 518 SHV(plug)-SHV(plug) coaxial cable	DUT high terminal (ex: drain)
Base/Gate	N1254A-558 or 518 SHV(plug)-SHV(plug) coaxial cable	DUT terminal (ex: gate)
Emitter/Source	N1254A-558 or 518 SHV(plug)-SHV(plug) coaxial cable	DUT low terminal (ex: source)
DC/AC Guard	N1254A-558 or 518 SHV(plug)-SHV(plug) coaxial cable	
HVSMU	16493T-001 HVSMU cable, 1.5 m (furnished in the N1272A)	N1258A or N1265A HVSMU input terminal
Interlock output	16493J-001 Interlock cable, 1.5 m	Interlock circuit
Digital I/O Output	16493G-001 Digital I/O connection cable, 1.5 m If the N1272A selector is used with the N1258A or N1265A, you can connect this terminal to the input of it.	Digital I/O Input of N1258A or N1265A

Figure 5-20 Typical Connection of N1272A Device Capacitance Selector with N1265A

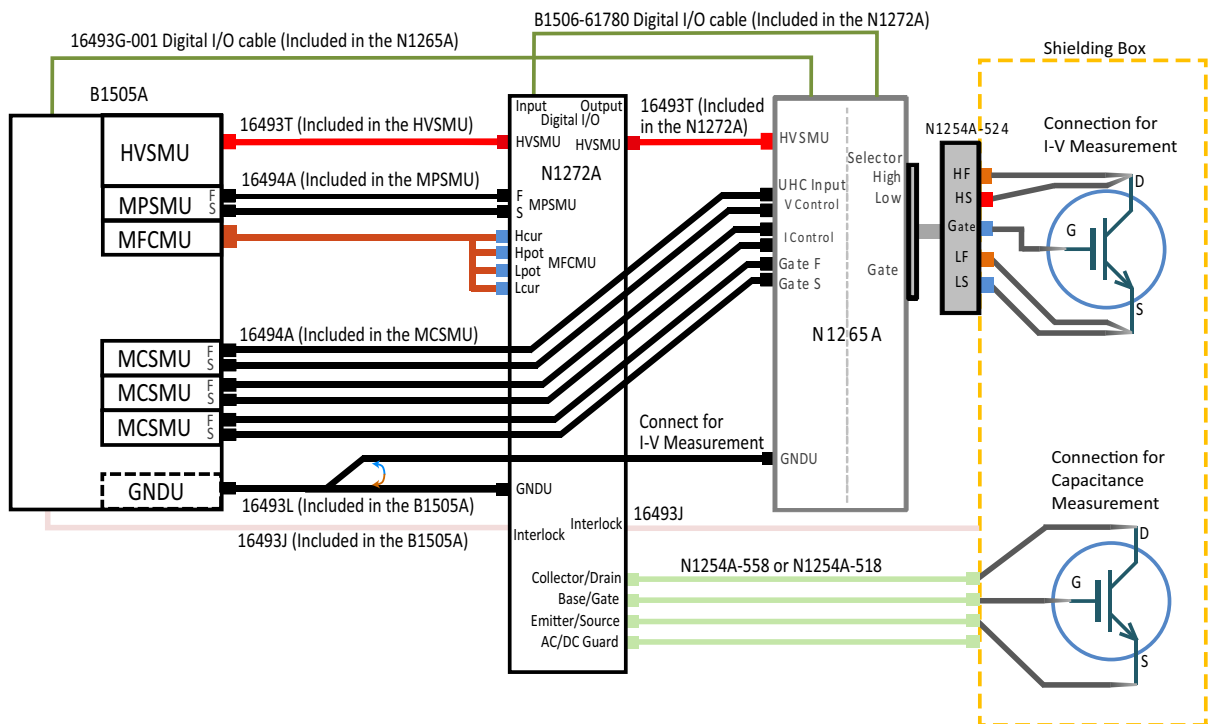
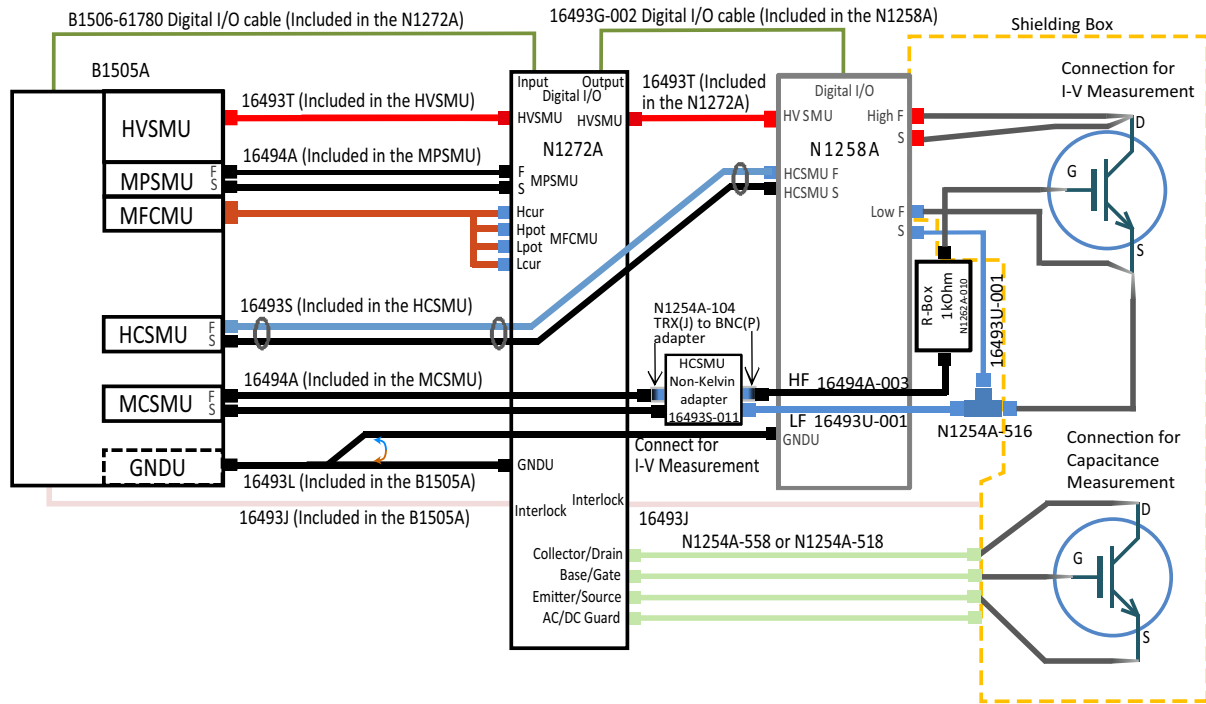


Figure 5-21 Typical Connection of N1272A Device Capacitance Selector with N1258A

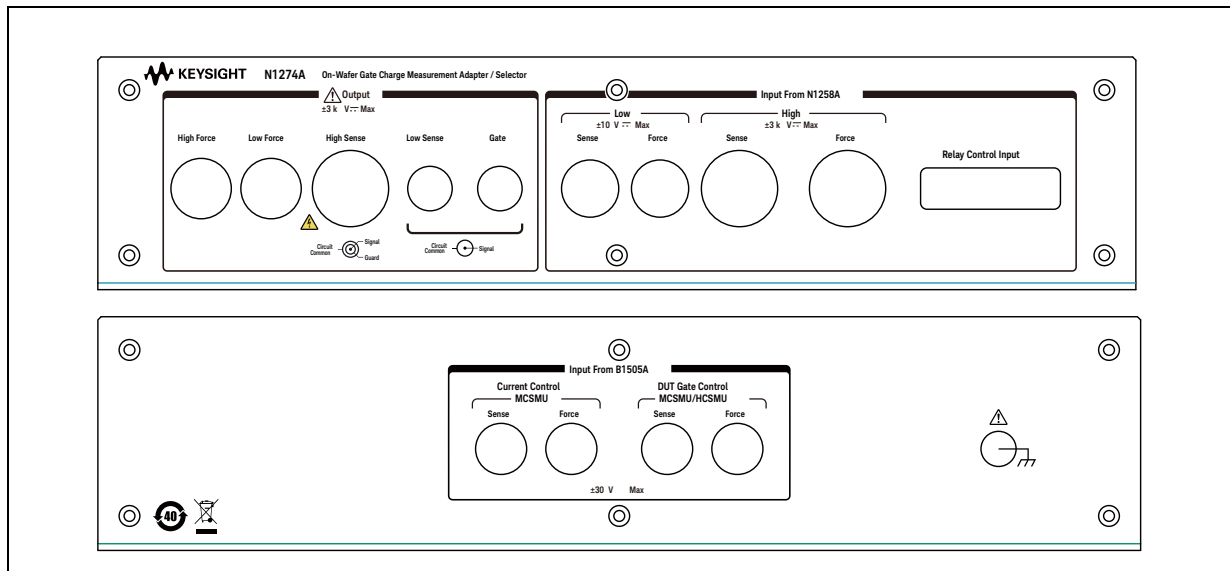


To Connect Gate Charge Adapter

Keysight B1505A supports the following two adapters for on-wafer gate charge measurement.

- N1274A On-Wafer Gate Charge Measurement Adapter/Selector for 20 A/3 kV
- N1275A On-Wafer Gate Charge Measurement Adapter for N1265A

Table 5-34 To Connect N1274A Input



N1258A terminals		Required cables		Input terminals	
High	Force	N1274-61721 HV coaxial cable, 35 cm (furnished in the N1274A)		High	Force
	Sense	N1274-61720 HV triaxial cable, 35 cm (furnished in the N1274A)			Sense
Low	Force	B1512-61741 BNC cable, 30 cm (furnished in the N1274A)		Low	Force
	Sense	B1512-61741 BNC cable, 30 cm (furnished in the N1274A)			Sense
External Relay Control Output		N1274-61722 D-sub 15 pin cable (furnished in the N1274A)		Relay Control Input	
B1505A terminals		Required cables		Input terminals	
MCSMU	Force	16494A Triaxial cable, 1.5 m, 1 ea.		Current Control	Force
	Sense	16494A Triaxial cable, 1.5 m, 1 ea.			Sense
MCSMU or HC SMU	Force	16494A Triaxial cable, 1.5 m, 1 ea.		DUT Gate Control	Force
	Sense	16494A Triaxial cable, 1.5 m, 1 ea.			Sense

Table 5-35 To Connect N1274A Output

Output terminals		Required cables/Description	Connect to
High	Force	Ultra high current cable with banana(plug). N1254A-523 can be used.	DUT high terminal (ex: drain)
	Sense	Triaxial cable with HV(plug) connector. N1254A-505 can be used.	
Low	Force	Ultra high current cable with banana(plug). N1254A-523 can be used.	DUT low terminal (ex: source)
	Sense	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	
Gate		Coaxial cable with BNC(m) connector. N1254A-503 can be used.	DUT terminal (ex: gate)

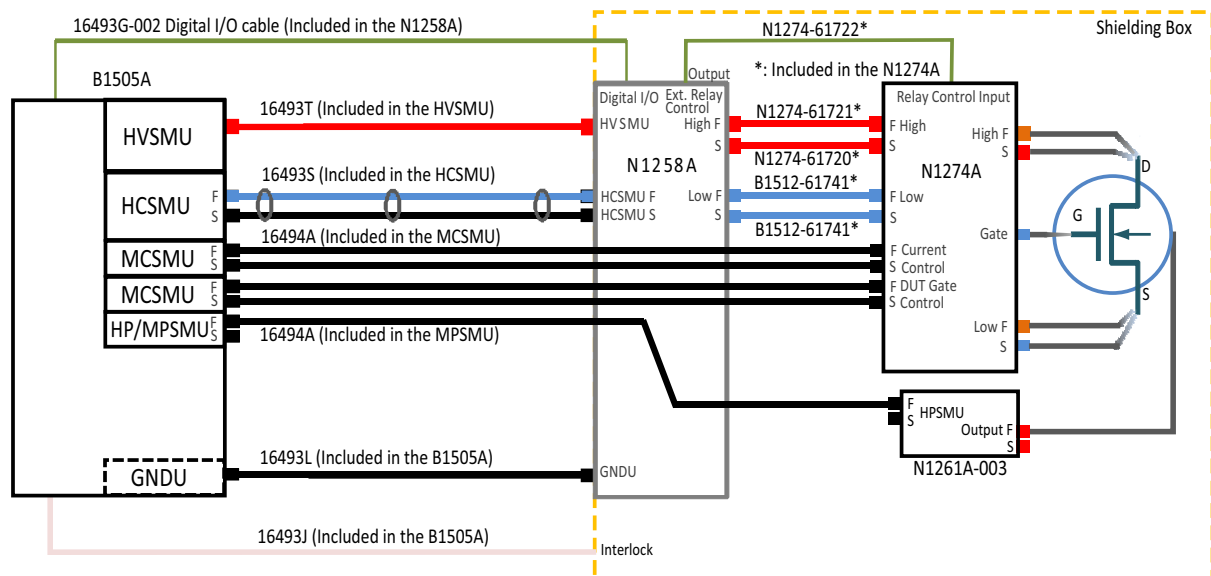
To Connect N1274A

The N1274A is used to enable on-wafer gate charge measurements using the HCSMU (max. 20 A) and the B1513B/C HVSMU (max. 3 kV). This equips an internal selector to automatically switch signal paths of I-V measurement and gate charge measurement. The N1274A is used with the N1258A module selector. (Note that the B1513A cannot be used for gate charge measurement.)

You can also mount a current control device or load resistor on the N1274 by opening a small panel on the top of this adapter.

The N1274A should be installed in the shielding box with your DUT interface. Connection example is shown in **Figure 5-22**. For the color-codes of cables and connectors in this figure, see **Figure 7-1** on page 7-2.

Figure 5-22 Typical Connection of N1274A Gate Charge Measurement Adapter



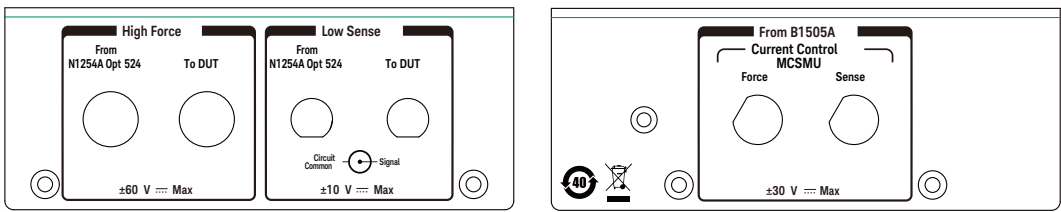
To Connect N1275A

The N1275A is used to enable on-wafer gate charge measurements with the UHCU (max. 500 A) and the B1513B/C HVSMU (max. 3 kV). You need to switch signal paths of IV measurement and gate charge measurement manually. And also, you need manual switching between high voltage and high current gate charge measurements. The adapter output can be extended to your probe station by using the N1254A-524 prober system cable. (Note that the B1513A cannot be used for the gate charge measurement.)

You can also mount current control device or load resistor for the gate charge measurement on the top of this adapter.

The N1275A should be installed in the shielding box with your DUT interface. Connection example is shown in [Figure 5-23](#). For the color-codes of cables and connectors in this figure, see [Figure 7-1 on page 7-2](#).

Table 5-36 To Connect N1275A Input

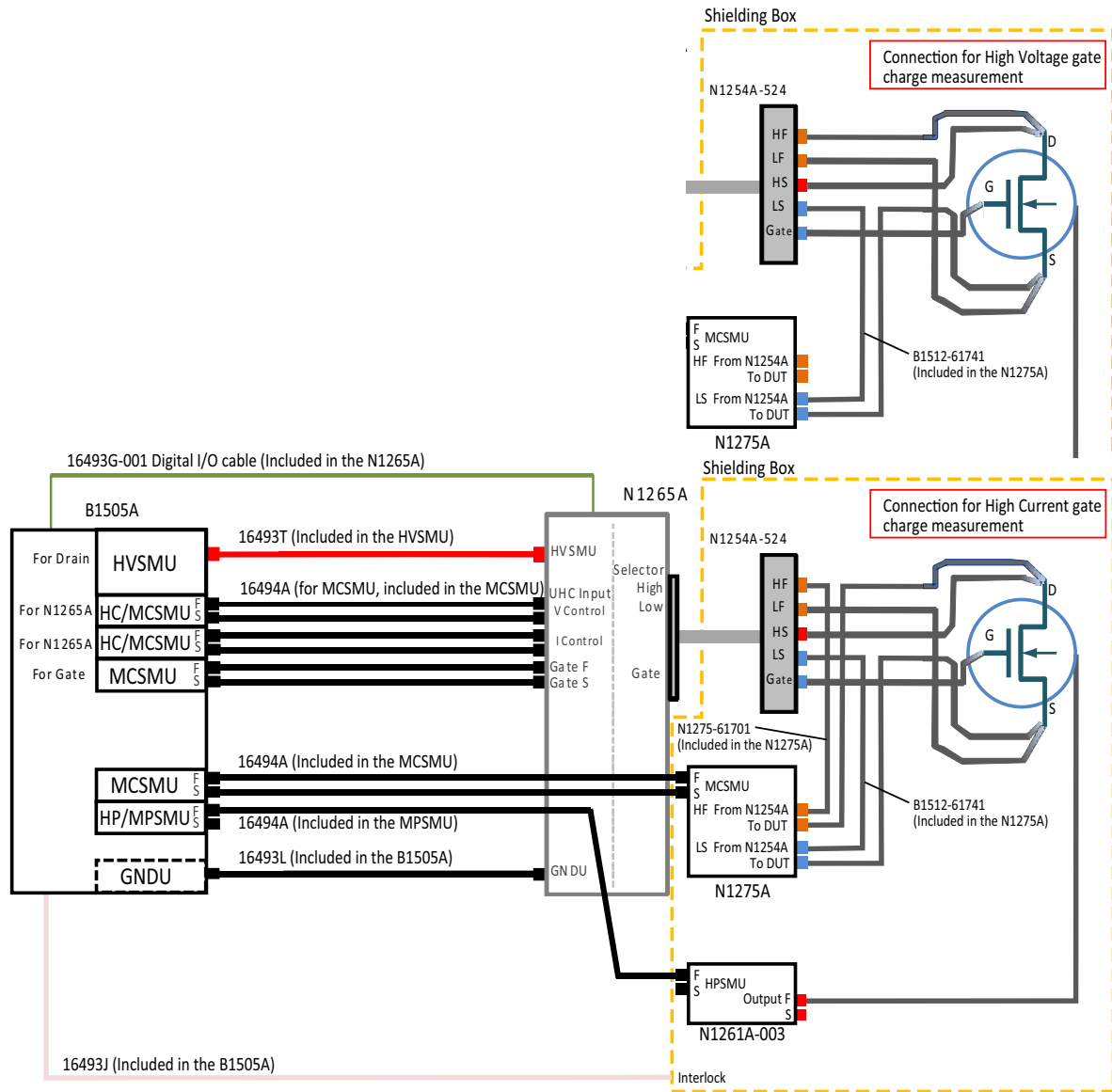


N1254A terminals		Required cables	Input terminals	
High	Force	N1275-61701 Ultra high current banana cable, 30 cm (furnished in the N1275A)	High Force	From N1254A
Low	Sense	B1512-61741 BNC cable, 30 cm (furnished in the N1275A)	Low Sense	From N1254A
B1505A terminals		Required cables	Input terminals	
MCSMU	Force	16494A Triaxial cable, 1.5 m, 1 ea.	Current Control MCSMU	Force
	Sense	16494A Triaxial cable, 1.5 m, 1 ea.		Sense

Table 5-37 To Connect N1275A Output

Output terminals		Required cables/Description	Connect to
High Force	To DUT	Ultra high current cable with banana(plug). N1254A-523 can be used.	DUT high terminal (ex: drain)
Low Sense	To DUT	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	DUT low terminal (ex: source)

Figure 5-23 Typical Connection of N1275A Gate Charge Measurement Adapter



To Install an Interlock Circuit

The interlock circuit is designed to prevent electrical shock when a user touches the measurement terminals.

You must install an interlock circuit on a shielding box to prevent hazardous voltages when the door of the shielding box is open.

Figure 5-24 shows the pin assignments of the interlock connector that should be mounted on your DUT interface. And Table 5-38 lists the required parts to make the interlock circuit.

WARNING

Potentially hazardous voltages may be present at the Force, Guard, and Sense terminals when the interlock terminals are shorted.

Figure 5-24 Interlock Connector Pin Assignments

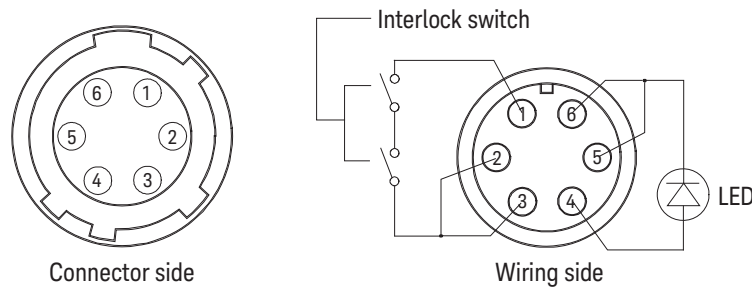


Table 5-38

Recommended Parts

Keysight Part No.	Description	Quantity
N1254A-402	Interlock micro switch	2
1252-1419	Interlock connector (6 pin, female)	1
1450-0641	LED ($V_F \cong 2.1 \text{ V}$ @ $I_F = 10 \text{ mA}$)	1
—	Wire 24AWG, 600 V, 150 degree C or equivalent	

Procedure

Prepare the required parts listed in [Table 5-38](#). And install the interlock circuit as shown below.

1. Make mounting hole for the interlock connector. See [Figure 5-26](#) for dimensions.
2. Mount two mechanical switches on your shielding box, so that the switches close when the door of the shielding box is closed, and open when the door is opened. For the dimensions of the switch, see [Figure 5-27](#) below.
3. Mount an LED on your shielding box. For the dimensions of the LED, see [Figure 5-25](#).
4. Use wire to connect the two switches in series between pin number 1 and 2 (or 3) of the interlock connector. See [Figure 5-24](#).
5. Use wire to connect the LED between pin number 4 and 5 (or 6) of the interlock connector. See [Figure 5-24](#).
6. Attach the interlock connector to the mounting hole.

If Keysight B1505A Interlock connector is connected to the interlock circuit, Keysight B1505A SMU *cannot* force more than ± 42 V when the door is open. When the door is closed, it can force more than ± 42 V.

When more than ± 42 V is forced from an SMU, the LED lights to indicate *high voltage output*.

Figure 5-25 Dimensions of the LED (Keysight part number 1450-0641)

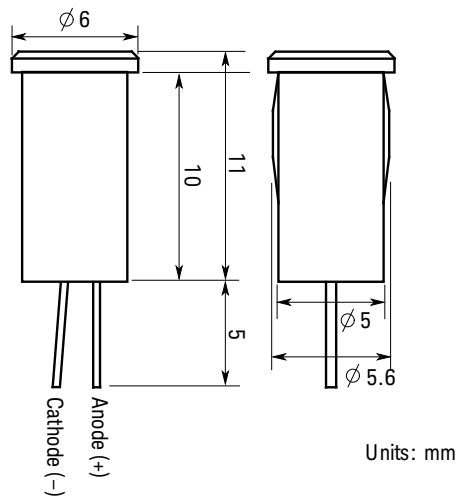


Figure 5-26 Dimensions of Mounting Hole for the Interlock Connector

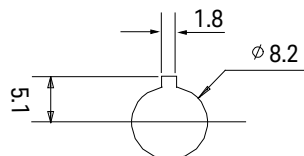
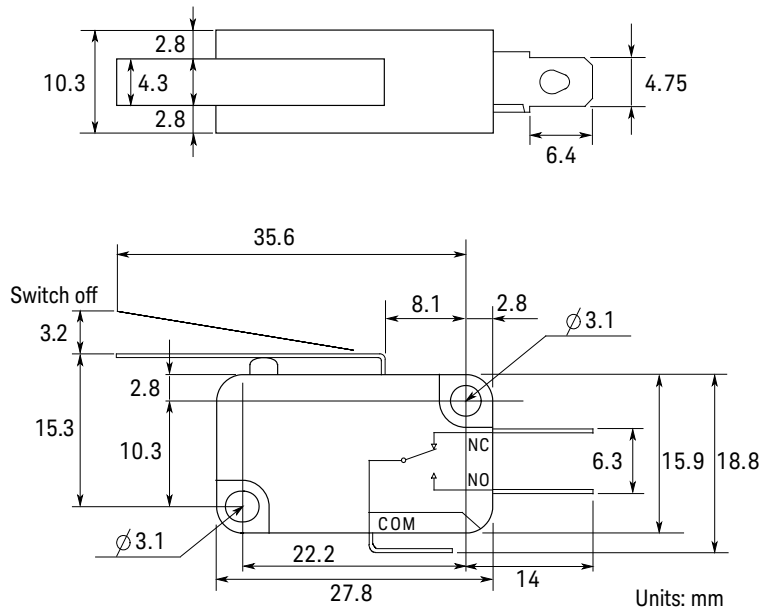


Figure 5-27 **Dimensions of the Interlock Switch (Keysight N1254A-402)**



To Connect Interlock Circuit

The B1505A provides the Interlock connector to prevent you from receiving an electrical shock from high voltage (more than ± 42 V). If the interlock circuit is open, the B1505A *cannot* apply high voltage more than ± 42 V.







Before performing measurement, connect the 16493J interlock cable between the B1505A Interlock connector and the interlock connector which is a part of the interlock circuit installed in your DUT interface as described in **"Procedure"** on page 5-48.

About Cable Connections

Prepare the open end cable assemblies listed in [Table 5-39](#) which contain the connector suitable for connecting the accessory, and connect it to your DUT interface.

- "To Make Connection to Reduce Leakage Current"
- "To Make Connection to Measure Low Resistance"
- "To Connect UHVU/HVSMU/HVMCU Output"

Table 5-39 Open End Cable Assemblies for Connecting Your DUT Interface

Cable assemblies	Connect to	Remarks
Coaxial cable with one BNC(m) 	N1258A Low Force/Sense	N1254A-503
	N1261A-002 Output Force/Sense	
	N1267A Low Force	
	N1254A-524 Low Sense and Gate	
Triaxial cable with one HV(plug) 	N1261A-003 Output Force/Sense	N1254A-505
	N1258A High Sense	
	N1266A High	
	N1268A High Sense	
Coaxial cable with one HV(plug) 	N1258A High Force	N1254A-506
	N1267A High Force	
Triaxial cable with one Triaxial(m) 	N1261A-001 Output Force/Sense	—
	N1262A-010/020 Output	
Coaxial cable with one SHV(plug) 	N1260A Output Low/High/AC Guard	N1254A-520
	N1261A-004 Output Force/Sense	
	N1262A-001/002/011/021 Output	
	N1268A Low	
Ultra high voltage cable with one UHV(plug) 	N1269A Output Gate/Source/Chuck	N1254A-520
	N1268A High	
Ultra high current cable with one banana	N1254A-524 High Force and Low Force	N1254A-523

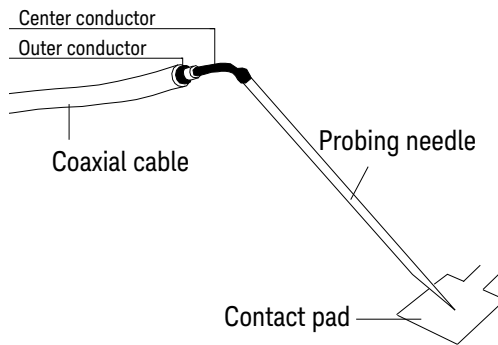
To Make Connection to Reduce Leakage Current

To reduce the leakage current caused by connection cables, the guard technique is effective. Connect the probing needles to the coaxial cables as shown below:

1. Cut and trim end of the coaxial cable such as N1254A-503 and N1254A-506, so that the center conductor does not touch the outer conductor (connected to the guard terminal).
2. Connect the center conductor to tail of the probing needle. Never connect the outer conductor to the probing needle. However the outer conductor should be extended as close as possible to the probing needle.
3. Connect the outer conductor to the outer conductor of the probing needle if it is a coaxial probing needle.

Example

The following example connection can be used to reduce the leakage current. Extend the outer conductor as close as possible to the probing needle. This also reduces the induced noise.



WARNING

Do not touch the guard terminal with bare hands because you may be shocked by high voltage. The potential of the guard terminal is equal to the output voltage.

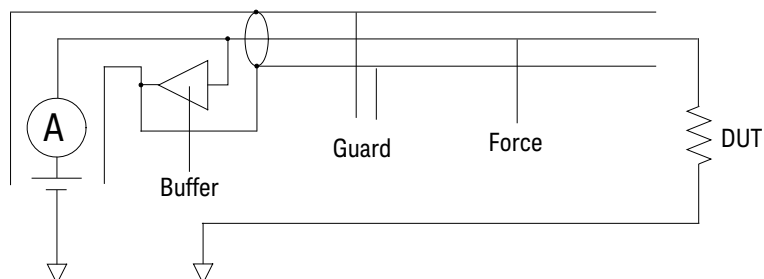
CAUTION

Never connect the guard terminal to any other output, including circuit common, frame ground, or the terminals of any other unit.

Guarding

Guarding reduces the leakage current between the measurement points and instrument. This is important when you measure low current.

The following figure shows the theory of guarding. The buffer amplifier ($\times 1$) keeps the potential of the guard conductor at the same potential as the force conductor, so current does not flow between the force and guard conductors. Therefore, the current measured by SMU is same as current at measurement point because no current is leaked.



To Make Connection to Measure Low Resistance

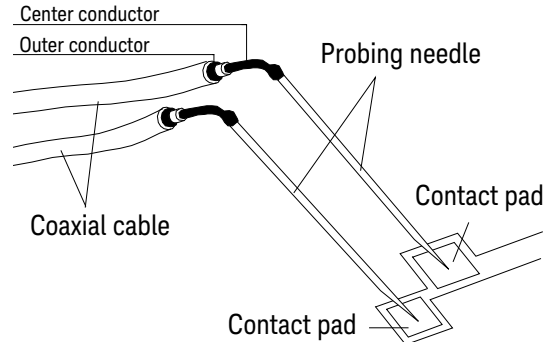
When you measure a low resistance, high current flows through the DUT. This high current increases the measurement error caused by the residual resistance of cables. To cancel the effect of this resistance, you can use *Kelvin connections* (4-wire), which means the Force and Sense lines are extended separately to the DUT.

Connect the probing needles to the coaxial cables as shown below:

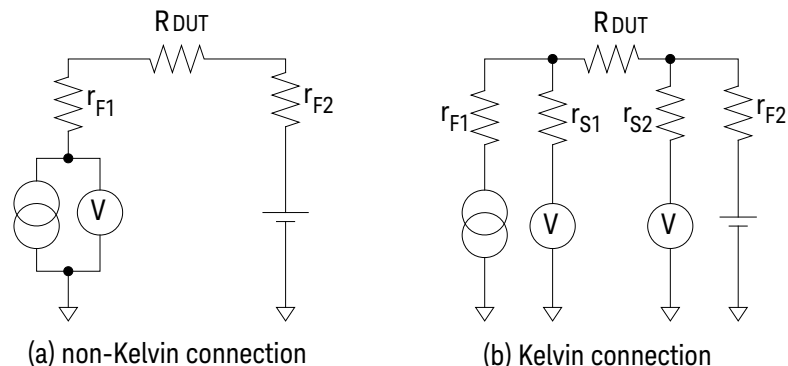
1. Cut and trim end of the coaxial cable such as N1254A-503 and N1254A-506, so that the center conductor does not touch the outer conductor (connected to the guard terminal).
2. Connect the center conductor to tail of the probing needle. Never connect the outer conductor to the probing needle. However the outer conductor should be extended as close as possible to the probing needle.
3. Connect the outer conductor to the outer conductor of the probing needle if it is a coaxial probing needle.
4. Perform 1 to 3 for both Force and Sense lines.
5. Contact the probing needles for the Force and Sense lines as close as possible to the DUT.

Example

The following example connection can be used to measure low resistance. The Sense line is extended to the probing pad, and contacts the Force line through the pad, so the voltage drop due to the residual resistance caused by cables and wires is canceled.



Kelvin Connection Kelvin connections give good measurement results when you force high-current. The following figure shows the equivalent circuits for Kelvin and non-Kelvin connections.



- For the non-Kelvin connection, the voltmeter measures the voltage drop of resistances r_{F1} , R_{DUT} , and r_{F2} .
- For the Kelvin connection, the voltmeter measures the voltage drop of resistance R_{DUT} only. The impedance of the voltmeter is very high, so the voltage drop of resistances r_{S1} and r_{S2} can be ignored.

The Kelvin connection is effective even when forcing voltage. The voltage drop due to the residual resistance of the Force line wiring is fed back to the voltage source via a comparator in the Sense line. The input impedance of comparator is high, and current flow into the Sense line is very low. So output error is not significant if the Sense line wiring has a residual resistance of $10\ \Omega$ or less. Therefore, the specified voltage appears at the sense point (point where Sense line contacts Force line)

NOTE

Kelvin connection and non-Kelvin connection

To make the Kelvin connection, use both Force and Sense terminals. Connecting the Force and Sense lines together at the terminal of the DUT (device under test) minimizes the measurement error caused by the residual resistance of the connection cables. The Kelvin connection is effective for the low resistance measurement and the high current measurement.

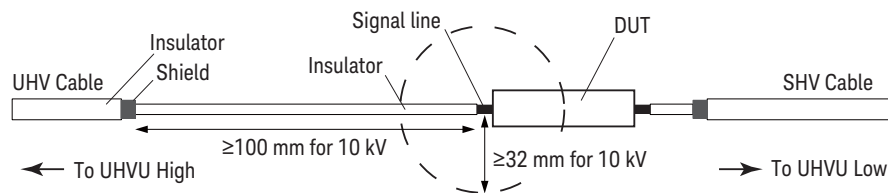
If you want to simplify the cable connections, open the Sense terminals and use the Force terminals only. This is the non-Kelvin connection. The Force terminals can be used to force and measure dc voltage or current.

To Connect UHVU/HVSMU/HVMCU Output

To prevent discharge and any accident, make enough space between the cable ends, also between the high side cable end and the shield or chassis. For example, make space of about 32 mm from the high side cable end for maximum 10 kV output. Also the creepage distance must be more than 100 mm for 10 kV.

Figure 5-28

Space around Cable End



Connection Guide for Wafer Prober and Your Own Test Fixture
About Cable Connections

6 Accessory Dimensions

This chapter describes the dimensions of accessories.

Dimensions and weight of accessories are listed in [Table 6-1](#). Also you can find the dimensions of mounting hole and screw hole needed to fix the accessories in the following figures.

- "16493S-010 HCSMU Kelvin Adapter, in mm"
- "16493S-011 HCSMU non-Kelvin Adapter, in mm"
- "16493S-020 Dual HCSMU Kelvin Combination Adapter, in mm"
- "16493S-021 Dual HCSMU Combination Adapter, in mm"
- "N1254A-500/502 HV Connector for Soldering, mounting hole, in mm"
- "N1254A-501 HV jack - HV jack Adapter, mounting hole, in mm"
- "N1254A-521 UHV jack Adapter and SHV jack Adapter, mounting hole, in mm"
- "N1254A-524 Prober System Cable, Prober side, in mm"
- "N1258A Module Selector, in mm"
- "N1260A High Voltage Bias-T, in mm"
- "N1261A-001 HPSMU Protection Adapter, in mm"
- "N1261A-002 GNDU Protection Adapter, in mm"
- "N1261A-003 HPSMU Protection Adapter, HV Output, in mm"
- "N1261A-004 GNDU Protection Adapter, SHV Output, in mm"
- "N1262A-001/002/011/021 R-Box, HV-SHV, in mm"
- "N1262A-010/020 R-Box, Triaxial-Triax, in mm"
- "N1262A-023 R-Box, UHV-UHV, in mm"
- "N1267A HVSMU/HCSMU Fast Switch, in mm"
- "N1269A Ultra High Voltage Connection Adapter, in mm"
- "N1272A Device Capacitance Selector, in mm"
- "N1274A On-Wafer Gate Charge Measurement Adapter/Selector for 20 A/3 kV, in mm"
- "N1275A On-Wafer Gate Charge Measurement Adapter for N1265A, in mm"

Table 6-1 Dimensions and Weight of Accessories

Model/Option	Description	Dimensions ¹ in mm	Weight in kg
16493S-010	HCSMU Kelvin adapter	104 (W) × 38 (H) × 60 (D)	0.3
16493S-011	HCSMU non-Kelvin adapter	104 (W) × 38 (H) × 60 (D)	0.3
16493S-020	Dual HCSMU Kelvin combination adapter	164 (W) × 50 (H) × 125 (D)	0.3
16493S-021	Dual HCSMU combination adapter	104 (W) × 53 (H) × 60 (D)	0.3
N1258A	Module selector	330 (W) × 102 (H) × 372 (D)	5.0
N1260A	High voltage bias-T	164 (W) × 50 (H) × 125 (D)	0.6
N1261A-001	HPSMU protection adapter, Triaxial(f)	80 (W) × 40 (H) × 120 (D)	0.3
N1261A-002	GNDU protection adapter, BNC(f)	80 (W) × 40 (H) × 120 (D)	0.3
N1261A-003	HPSMU protection adapter, HV(jack)	80 (W) × 40 (H) × 150 (D)	0.3
N1261A-004	GNDU protection adapter, SHV(jack)	80 (W) × 40 (H) × 125 (D)	0.3
N1262A-001	High voltage R-box, 1 MΩ, SHV(jack)	50 (W) × 40 (H) × 125 (D)	0.3
N1262A-002	High voltage R-box, 100 kΩ, SHV(jack)	50 (W) × 40 (H) × 125 (D)	0.3
N1262A-010	R-box, 1 kΩ, Triaxial(f)	50 (W) × 40 (H) × 125 (D)	0.3
N1262A-011	High voltage R-box, 1 kΩ, SHV(jack)	50 (W) × 40 (H) × 125 (D)	0.3
N1262A-020	Universal R-box, Triaxial(f)	50 (W) × 40 (H) × 125 (D)	0.3
N1262A-021	Universal R-box, SHV(jack)	50 (W) × 40 (H) × 125 (D)	0.3
N1262A-023	Universal R-box, UHV(jack)	214 (W) × 103 (H) × 125 (D)	0.3
N1265A	Ultra high current expander/test fixture	420 (W) × 285 (H) × 575 (D)	30
N1266A	HVSMU current expander	420 (W) × 75 (H) × 575 (D)	10
N1267A	HVSMU/HCSMU fast switch	202 (W) × 56 (H) × 175 (D)	0.8
N1268A	Ultra high voltage expander	420 (W) × 222 (H) × 482 (D)	18
N1269A	Ultra high voltage connection adapter	134 (W) × 56 (H) × 150 (D)	0.4
N1272A	Device capacitance selector	420 (W) × 75 (H) × 575 (D)	9.4
N1274A	On-wafer gate charge measurement adapter/selector for 20 A/3 kV	330 (W) × 90 (H) × 410 (D)	3.2
N1275A	On-wafer gate charge measurement adapter for N1265A	116 (W) × 78 (H) × 125 (D)	0.4

1. Body size. Excluding connectors.

Figure 6-1 16493S-010 HCSMU Kelvin Adapter, in mm

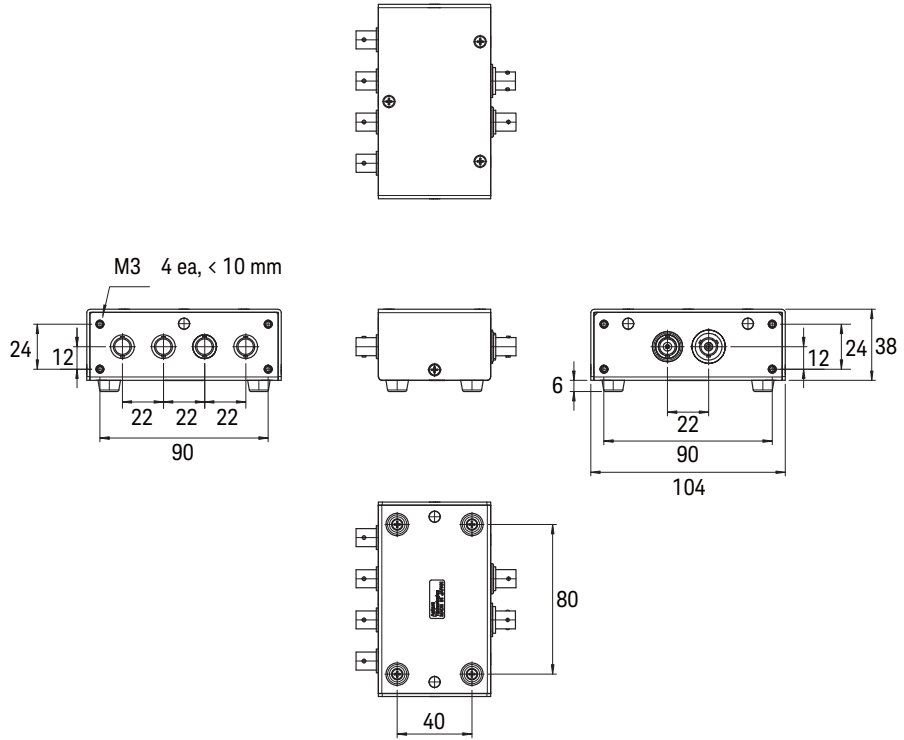


Figure 6-2 16493S-011 HCSMU non-Kelvin Adapter, in mm

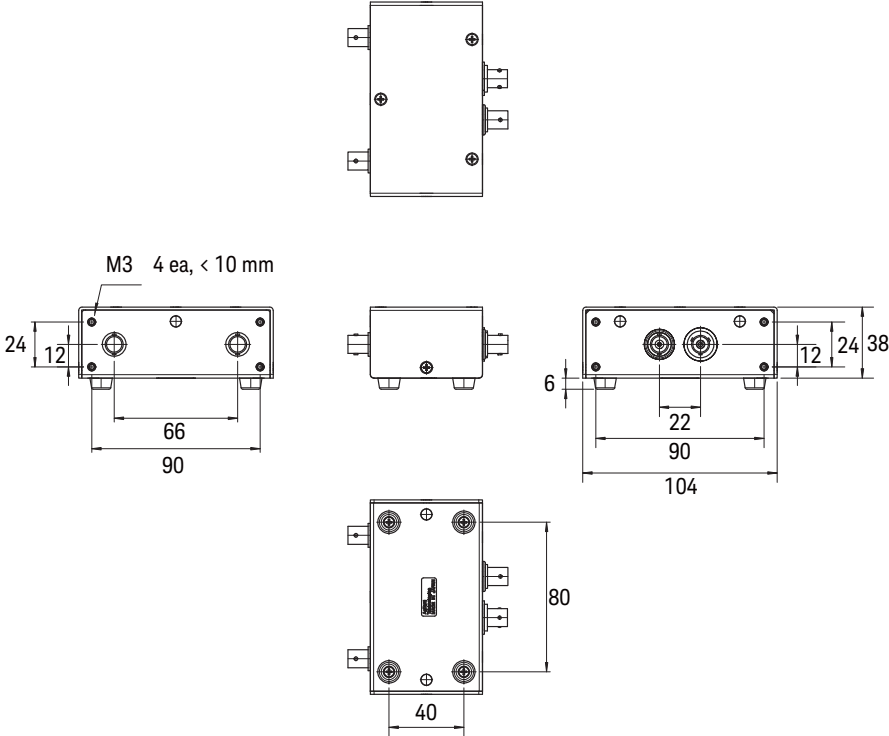


Figure 6-3 16493S-020 Dual HCSMU Kelvin Combination Adapter, in mm

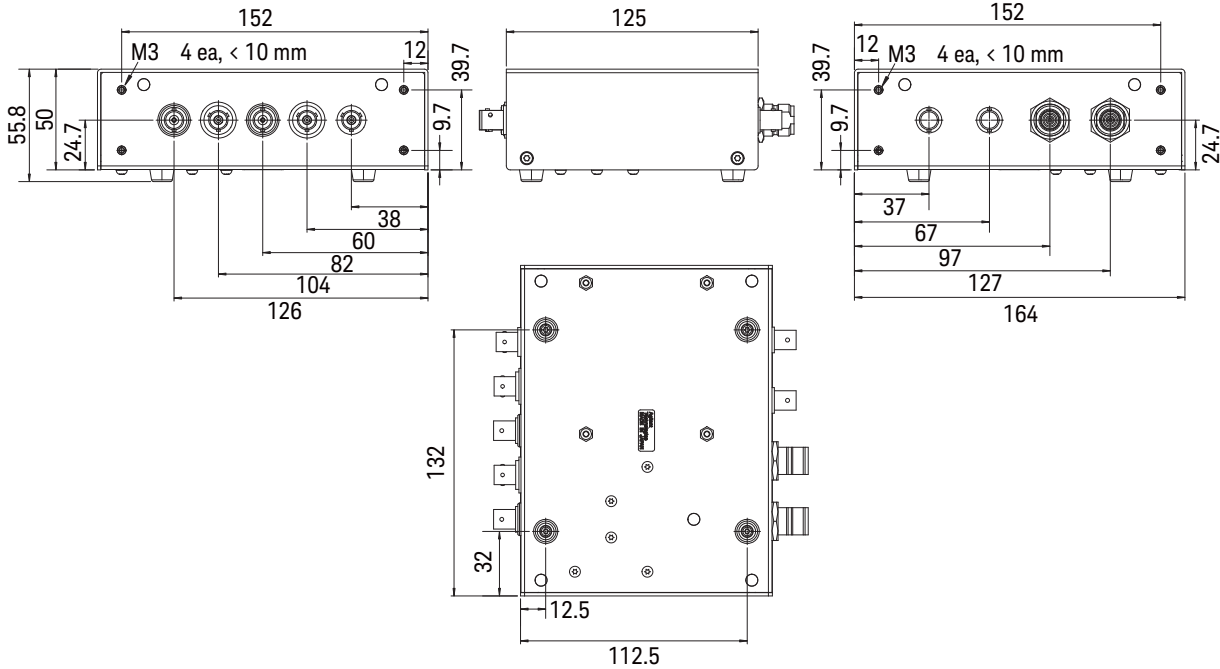


Figure 6-4 16493S-021 Dual HCSMU Combination Adapter, in mm

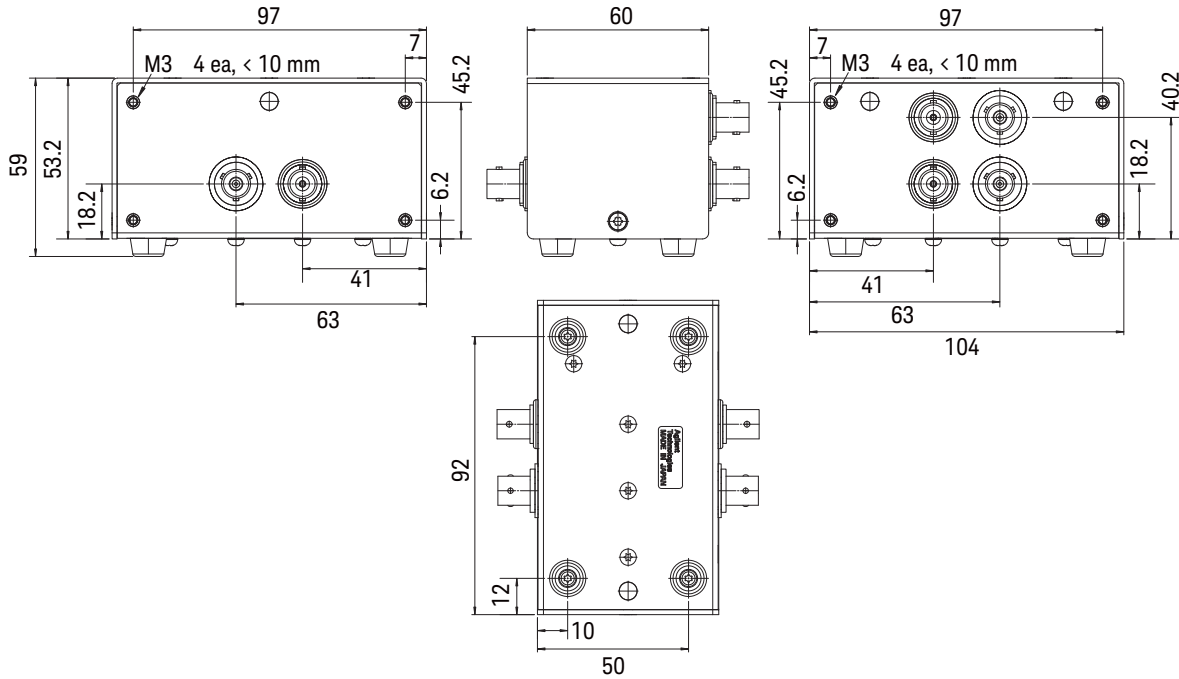


Figure 6-5 N1254A-500/502 HV Connector for Soldering, mounting hole, in mm

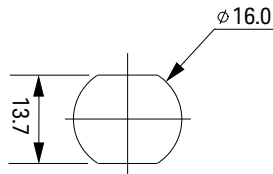


Figure 6-6 N1254A-501 HV jack - HV jack Adapter, mounting hole, in mm

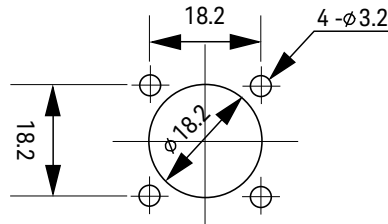


Figure 6-7 N1254A-521 UHV jack Adapter and SHV jack Adapter, mounting hole, in mm

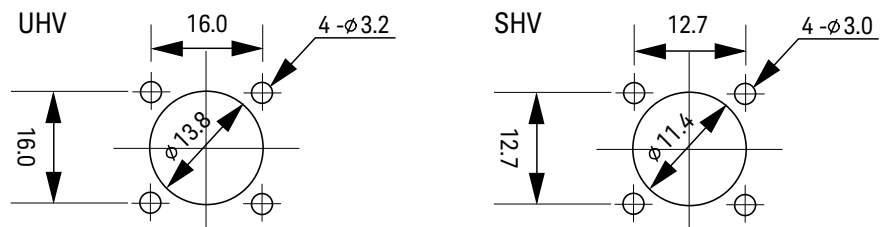


Figure 6-8 N1254A-524 Prober System Cable, Prober side, in mm

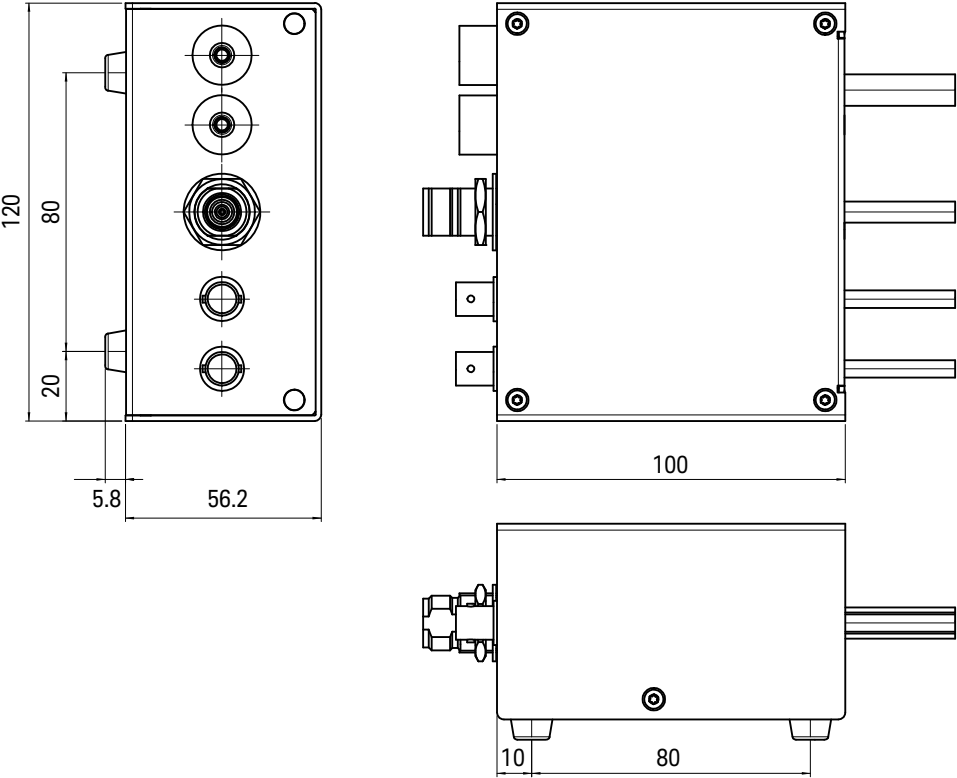


Figure 6-9 N1258A Module Selector, in mm

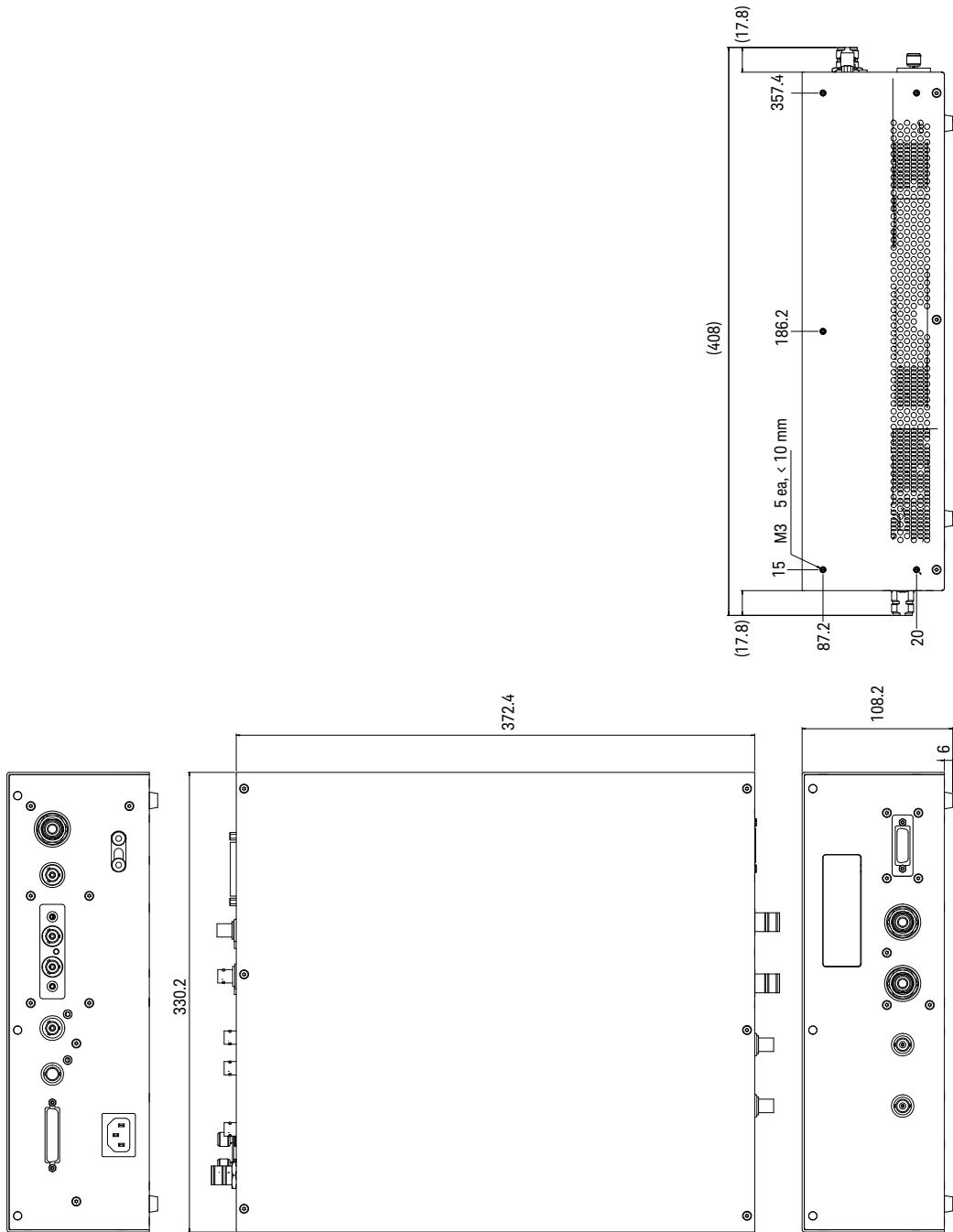


Figure 6-10 N1261A-001 HPSMU Protection Adapter, in mm

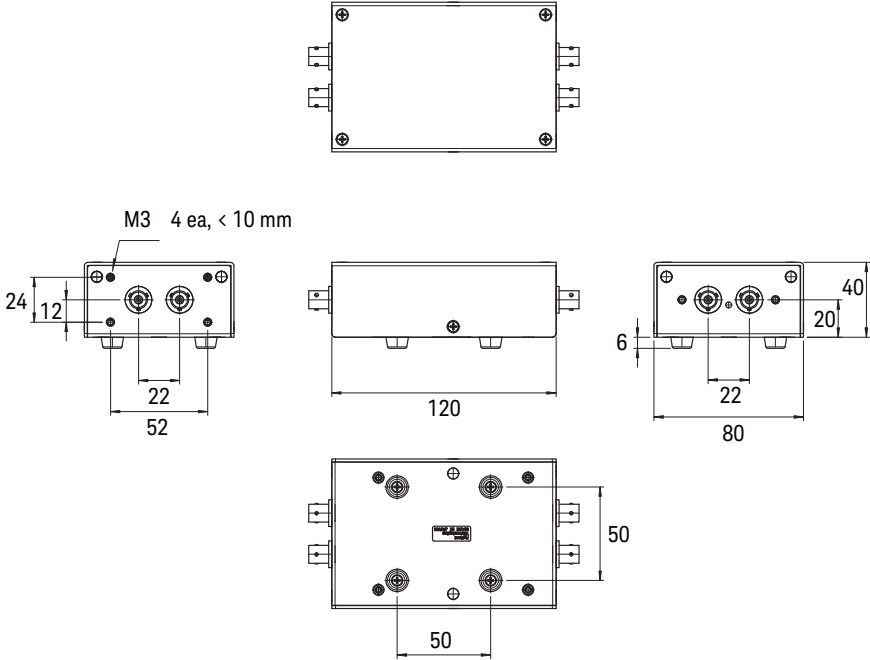


Figure 6-11 N1261A-002 GNDU Protection Adapter, in mm

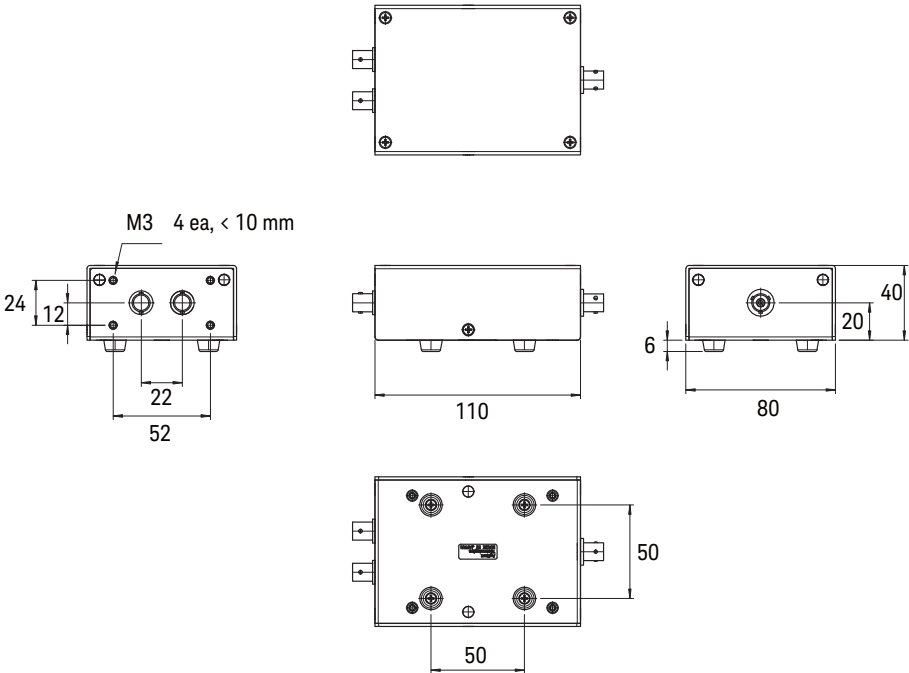


Figure 6-12 N1261A-003 HPSMU Protection Adapter, HV Output, in mm

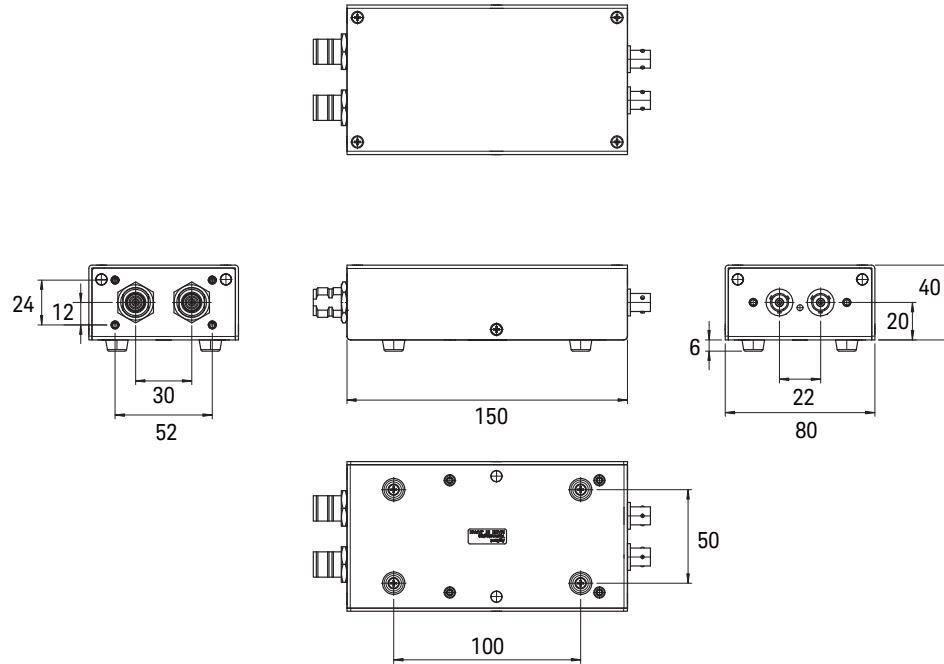


Figure 6-13 N1261A-004 GNDU Protection Adapter, SHV Output, in mm

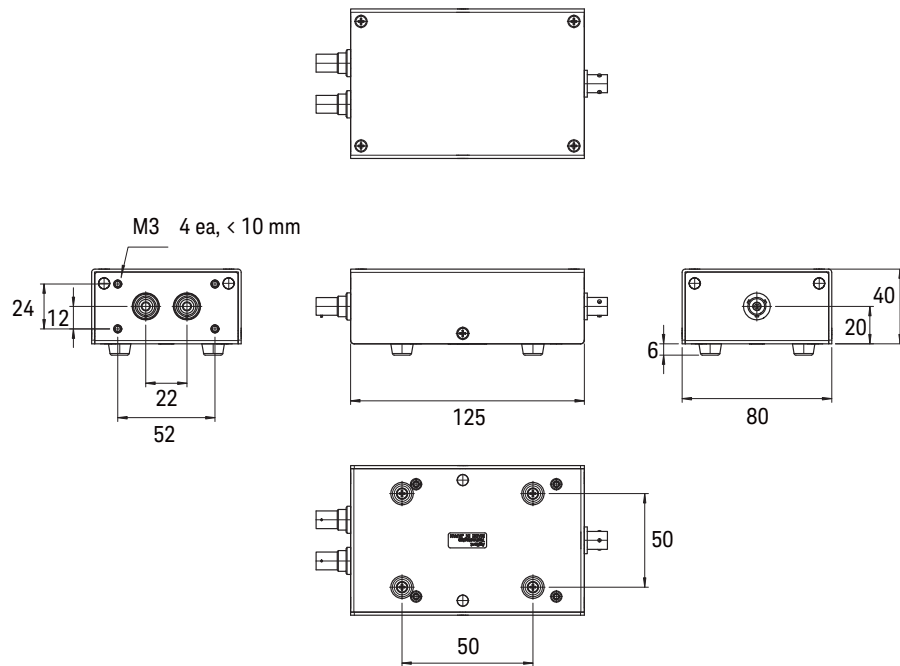


Figure 6-14 N1260A High Voltage Bias-T, in mm

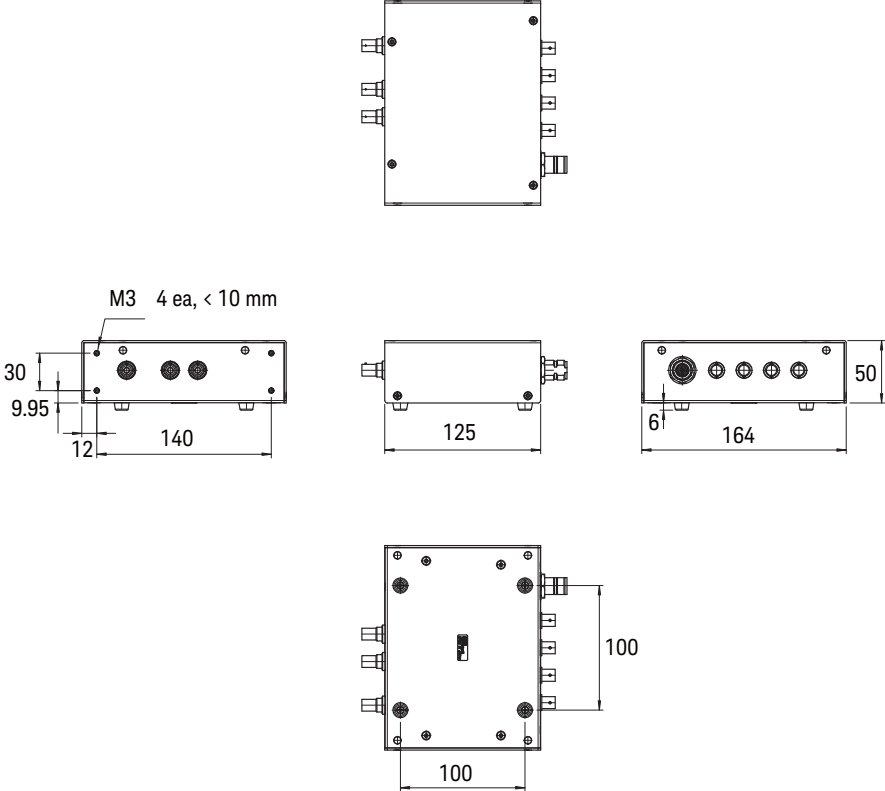


Figure 6-15 N1262A-001/002/011/021 R-Box, HV-SHV, in mm

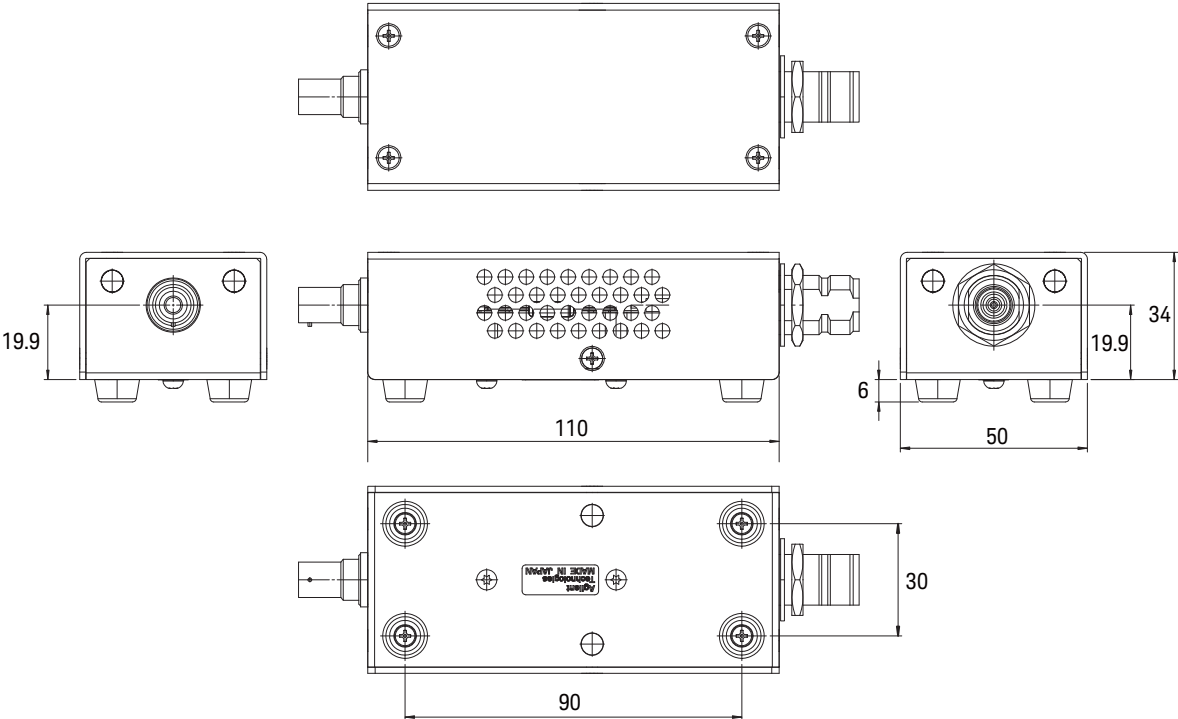


Figure 6-16 N1262A-010/020 R-Box, Triaxial-Triax, in mm

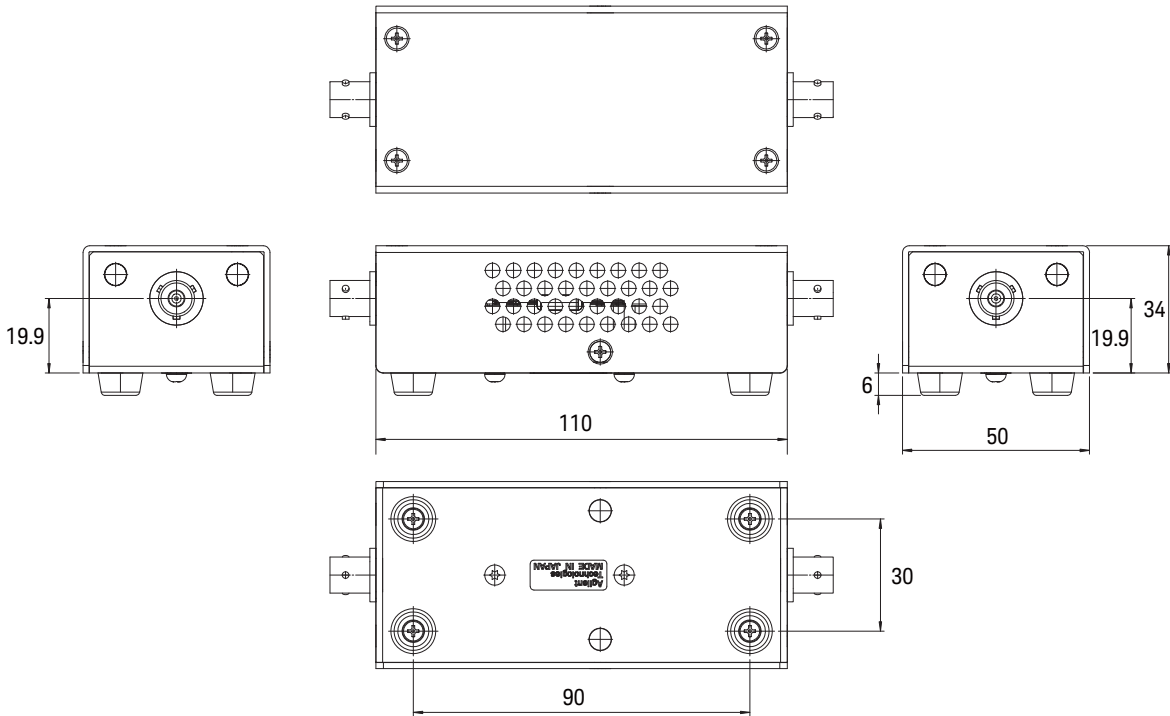


Figure 6-17 N1262A-023 R-Box, UHV-UHV, in mm

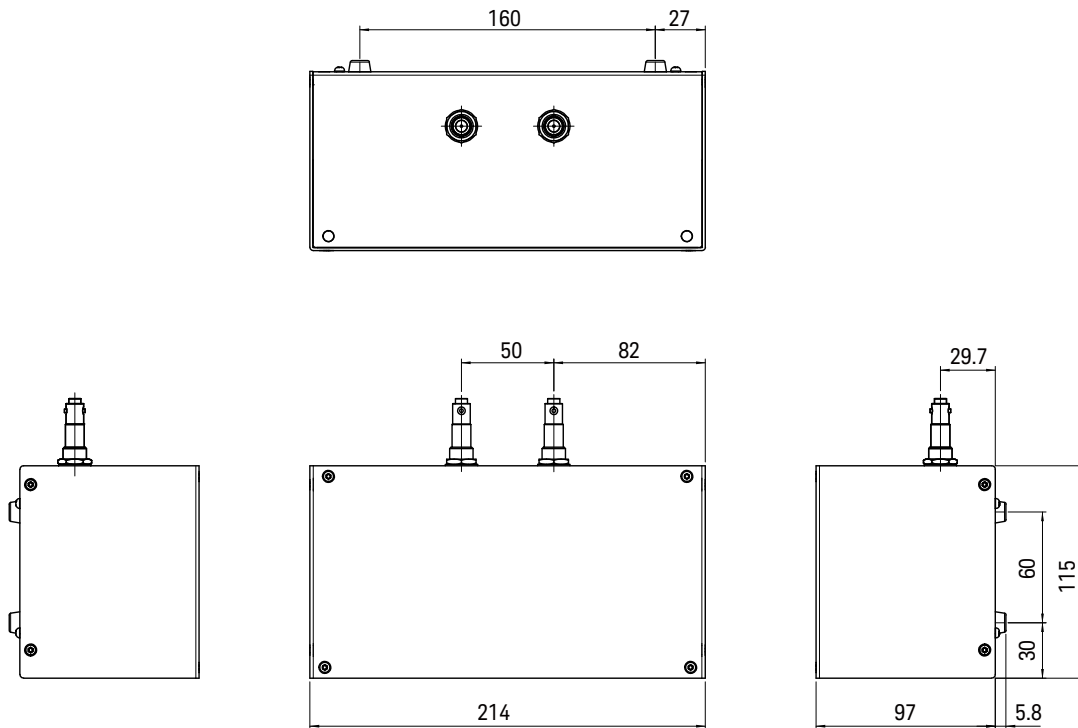


Figure 6-18 N1267A HVSMU/HCSMU Fast Switch, in mm

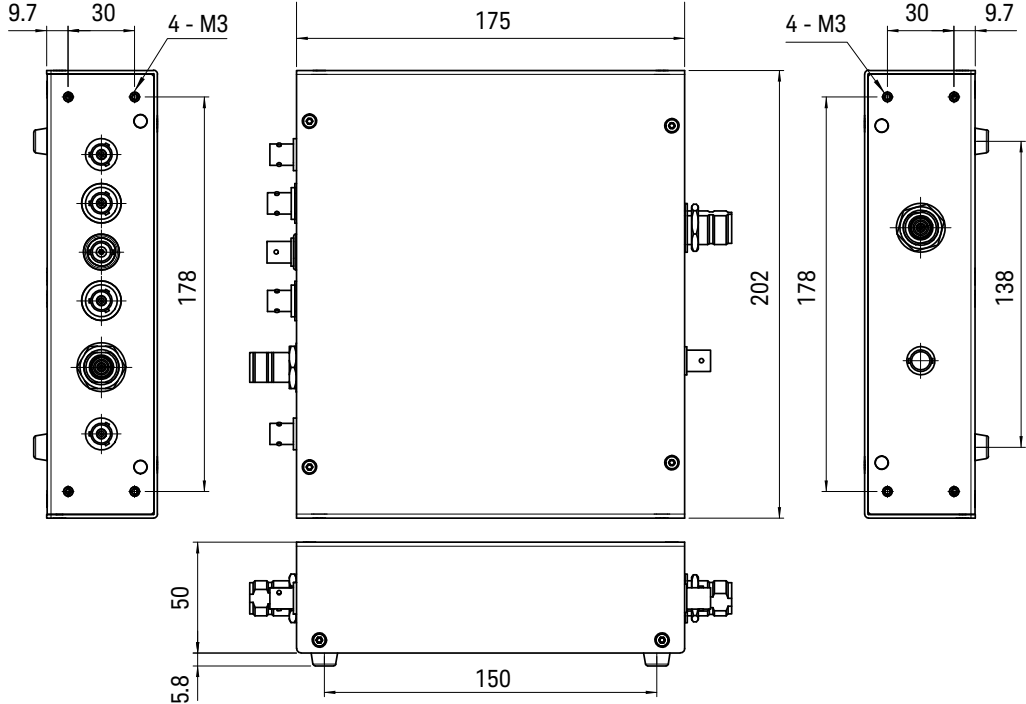


Figure 6-19 N1269A Ultra High Voltage Connection Adapter, in mm

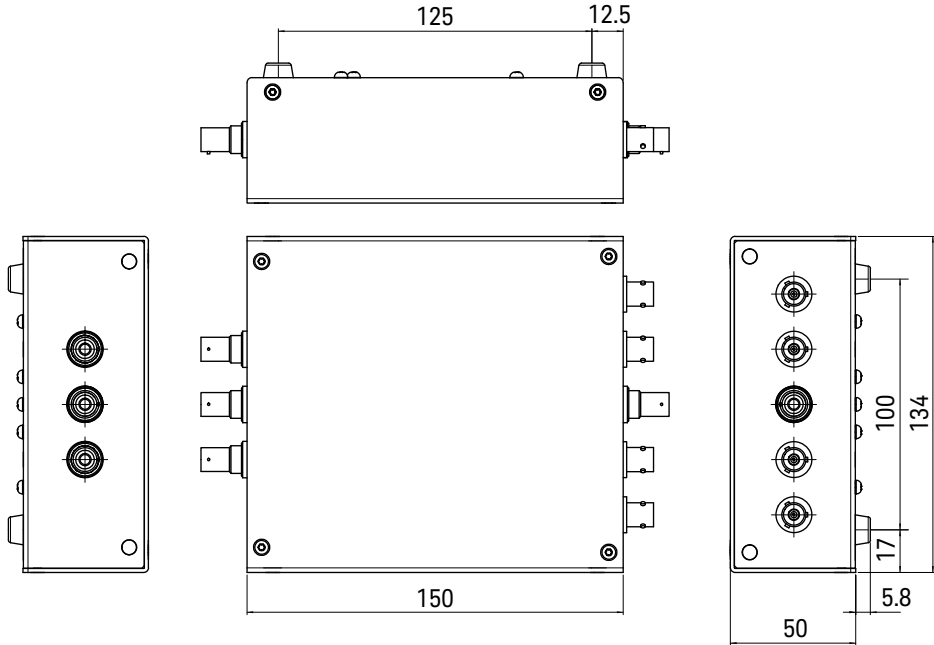


Figure 6-20 N1272A Device Capacitance Selector, in mm

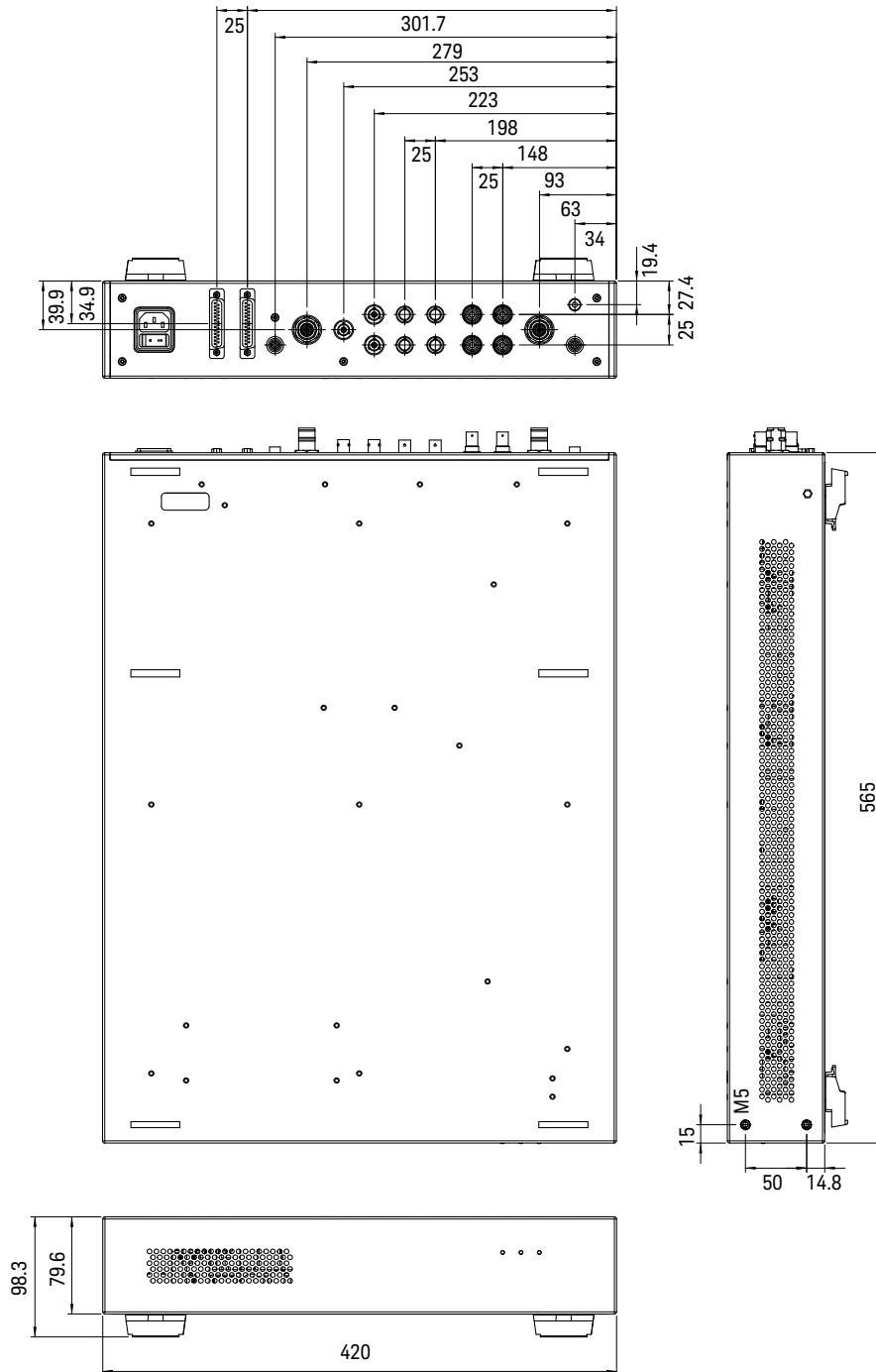


Figure 6-21 N1274A On-Wafer Gate Charge Measurement Adapter/Selector for 20 A/3 kV, in mm

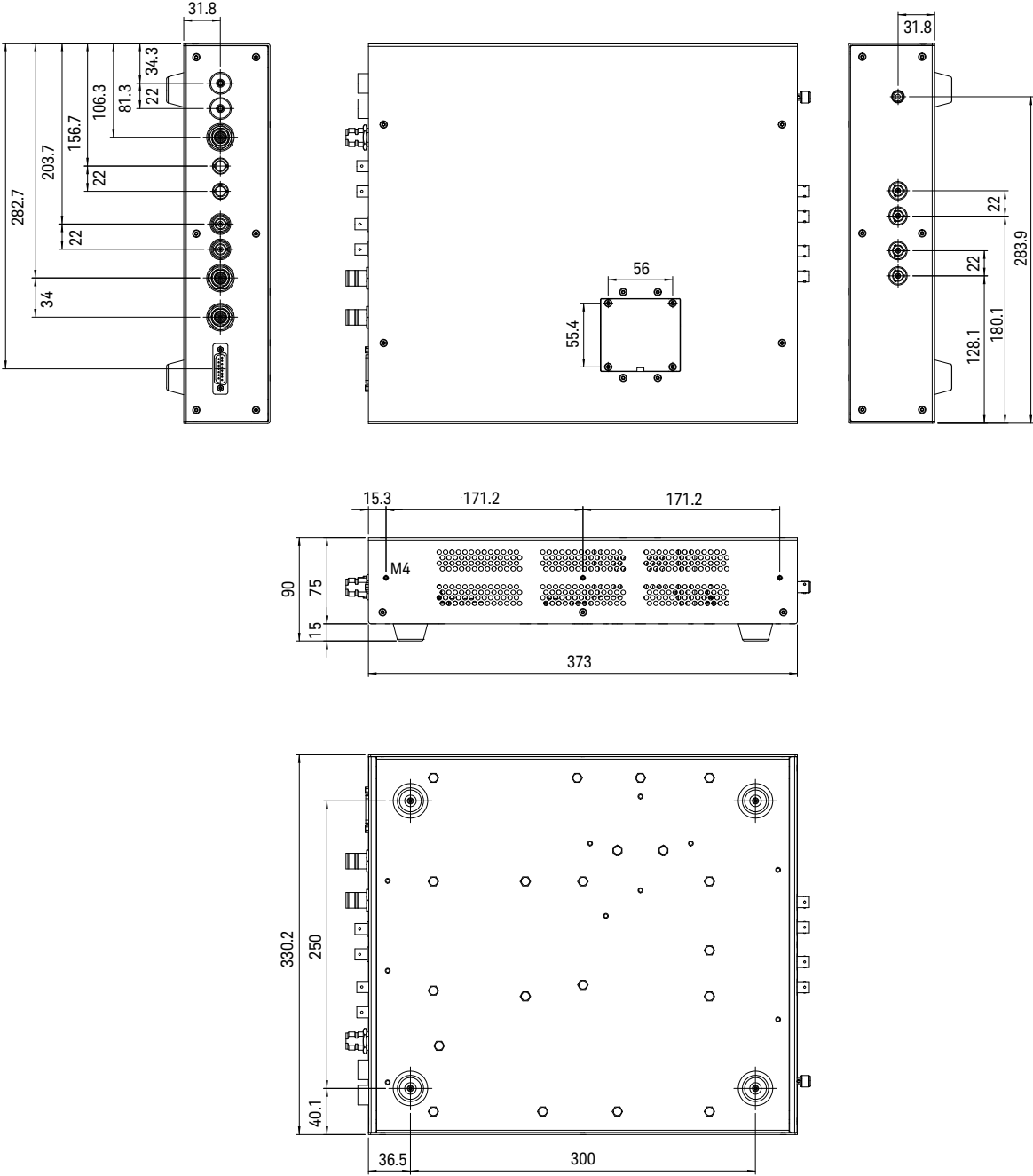
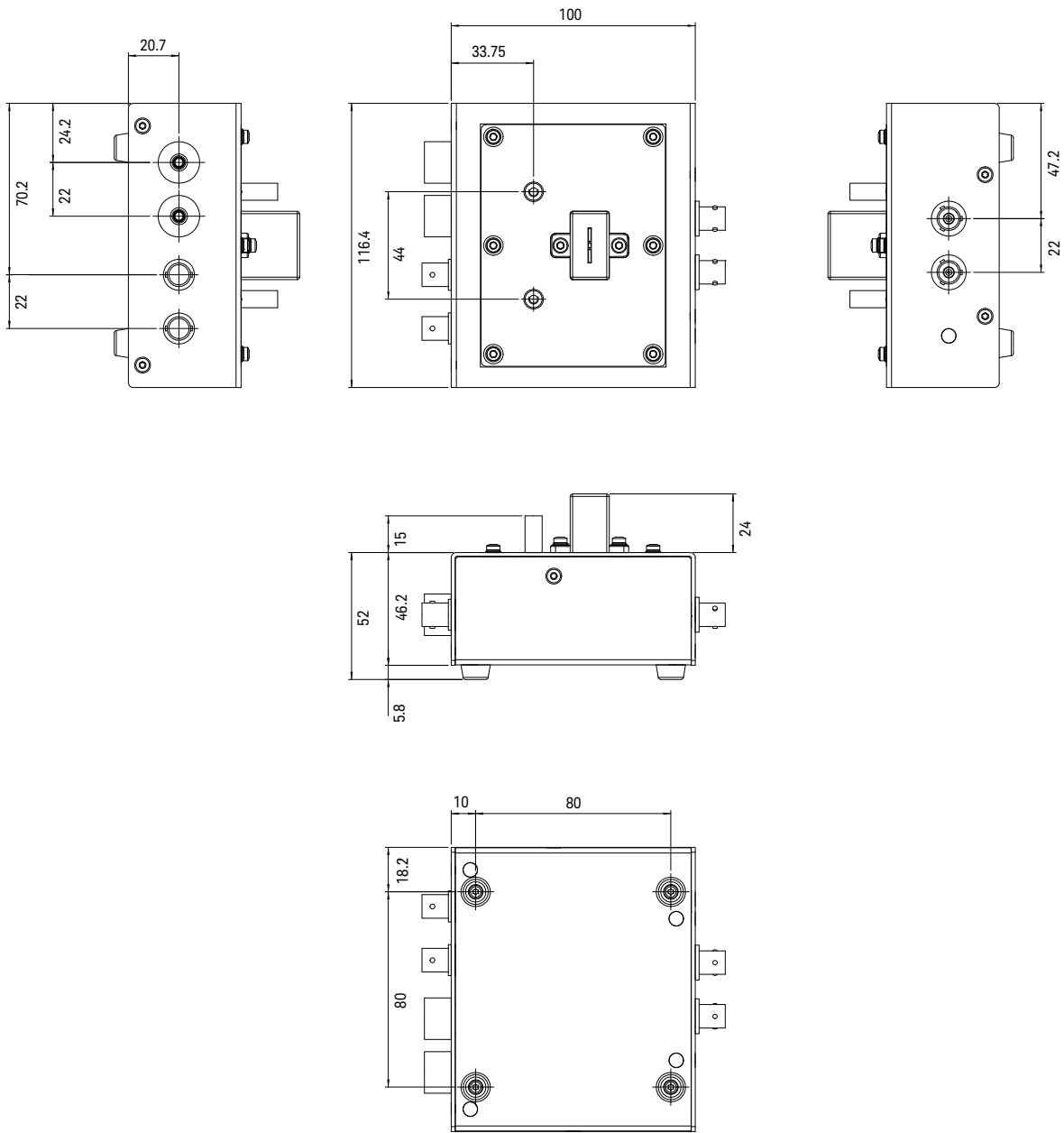


Figure 6-22 N1275A On-Wafer Gate Charge Measurement Adapter for N1265A, in mm



7

Connection and Ordering Examples
















This chapter describes prober connection and ordering examples of Keysight B1505A Power Device Analyzer/Curve Tracer, and consists of the following sections.




- "Package Device Measurement Configuration Examples"
- "Configuration Examples for Lateral Device Measurement with Wafer Prober"
- "Configuration Examples for Vertical Device Measurement with Wafer Prober"
- "GaN Current Collapse / Dynamic On-Resistance Measurement System using the N1267A"
- "Upgrading from existing B1505A"


NOTE

Please view connection diagrams included in this Chapter in color because cables and connectors are color-coded according to their types.

Figure 7-1 Legend

Mark	Description
	UHV connector
	HVTRX connector
	TRX connector
	BNC connector
	SHV connector
	Banana connector
	UHV cable
	HVTRX cable
	TRX cable
	BNC cable
	SHV cable
	Banana cable
	1500 A UHC Banana cable
	Digital I/O cable
	Interlock cable

Mark	Description
	CMU Cable
	To change connection manually
	N1254A-524 500 A Ultra High Current Prober System Cable



Prober vender provides items surrounded by the dotted yellow line.

Package Device Measurement Configuration Examples

This section introduces typical configuration examples shown in [Table 7-1](#).

Table 7-1 Configuration examples

Device	Max V	Max I	HVMC	C-V	Add MPSMU	Note
Discrete 3 terminal devices	3 kV	20 A				"3kV, 20A Configuration (B1505AP-H20 equivalent)" on page 7-4
	3 kV	20 A		YES		"3kV, 20A with Capacitance Measurement Configuration (B1505AP-H21 equivalent)" on page 7-6
	3 kV	500 A or 1500 A				"3 kV, 500 A or 1500 A Configuration (B1505AP-H50 or B1505AP-H70 equivalent)" on page 7-8
	3 kV	500 A or 1500 A		YES		"3 kV, 500 A or 1500 A with Capacitance Measurement Configuration (B1505AP-H51 or B1505AP-H71 equivalent)" on page 7-10
	10 kV	500 A or 1500 A				"10 kV, 500 A or 1500 A Configuration (B1505AP-U50 or B1505AP-U70 equivalent)" on page 7-12
	3 kV	20 A			YES	"Add High Resolution Measurement (10 fA resolution with MPSMU or HPSMU) Capability to 3 kV, 20 A Configuration" on page 7-14
	3 kV	20 A	YES			"3 kV, 20A, High Voltage Medium Current Configuration" on page 7-16
	3 kV	40 A				"3 kV, 40 A Configuration" on page 7-18
	10 kV	500 A	YES			"10 kV, 500 A, High Voltage Medium Current Configuration" on page 7-23
Discrete 4 terminal device	3 kV	500 A			YES	"Add High Resolution Measurement Capability (10 fA resolution with MPSMU or HPSMU) to 3 kV, 500A Configuration" on page 7-21

3kV, 20A Configuration (B1505AP-H20 equivalent)

- Device Type: Discrete MOSFET (3 terminals)
- Key Specification
 - Max voltage/current: 3 kV/20 A
 - Module Selector for multi-parameter automated measurement function

Figure 7-2 Connection example

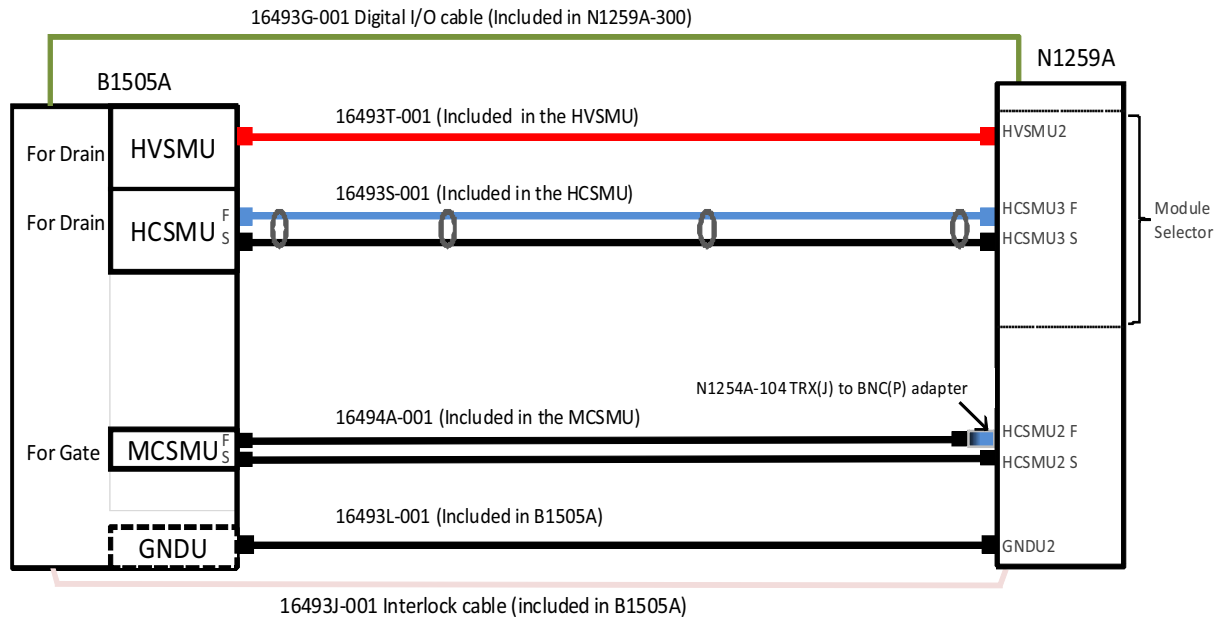


Table 7-2 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1505A-015	1	1.5 m cable
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	1	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
N1254A	1	Accessories for instruments and fixtures
N1254A-104	1	Triax (f) to BNC (m) adapter
N1259A	1	Test Fixture for Power Device
N1259A-001	1	Test Fixture including Inline Package Socket Module and Cables
N1259A-022	1	100 kohm R-box for gate
N1259A-030	1	1 kohm R-box
N1259A-300	1	Module Selector

Model/Option	Quantity	Description
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter
1251-2277	1	Banana to BNC Adapter

NOTE This configuration is equivalent to the B1505AP-H20 3 kV / 20 A / Fixture Pack configuration.

3kV, 20A with Capacitance Measurement Configuration (B1505AP-H21 equivalent)

- Device Type: Discrete MOSFET (3 terminals)
- Key Specification
 - Max voltage/current: 3 kV/20 A
 - Capacitance measurement with up to 3 kV DC bias
 - Module Selector for multi-parameter automated measurement function

Figure 7-3 Connection example



Table 7-3 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1505A-015	1	1.5 m cable
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	1	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
B1520A-FG	1	Multi Frequency Capacitance Measurement Unit Module
N1254A	1	Accessories for instruments and fixtures
N1254A-104	1	Triax (f) to BNC (m) adapter
N1259A	1	Test Fixture for Power Device
N1259A-001	1	Test Fixture including Inline Package Socket Module and Cables
N1259A-020	1	High Voltage Bias-Tee
N1259A-022	1	100 kohm R-box for gate
N1259A-030	1	1 kohm R-box

Model/Option	Quantity	Description
N1259A-300	1	Module Selector
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter
1251-2277	1	Banana to BNC Adapter

NOTE

This configuration is equivalent to the B1505AP-H21 3 kV / 20 A / C-V / Fixture Pack configuration.

3 kV, 500 A or 1500 A Configuration (B1505AP-H50 or B1505AP-H70 equivalent)

- Device Type: Discrete MOSFET (3 terminals)
- Key Specification
 - Max voltage/current: 3 kV/500 A or 1500 A
 - Module Selector for multi-parameter automated measurement function

Figure 7-4 Connection example

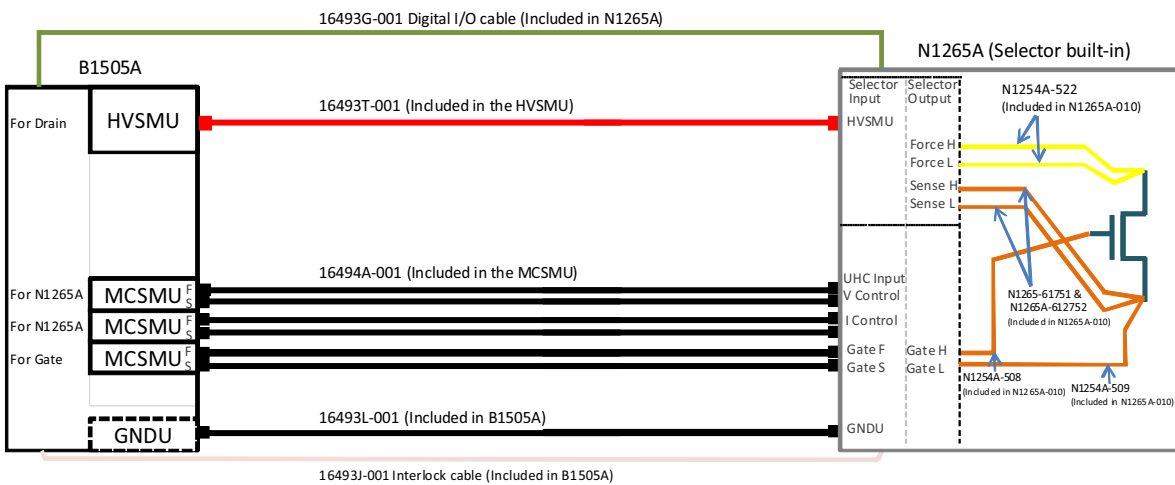


Table 7-4 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1505A-015	1	1.5 m cable
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	3	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
N1265A	1	Ultra High Current Expander / Fixture
N1265A-001	1	Ultra High Current Expander / Fixture
N1265A-010	1	500 A Ultra High Current 3-pin Inline Package Socket Module
N1265A-015	1	1500 A Current Option (This option needs to be ordered only when 1500 A capability is required)
N1254A	1	Accessories for instruments and fixtures
N1254A-508	4	Banana to Banana Cable 250 mm (red, 1ea)
N1254A-509	4	Banana to Banana Cable 250 mm (black, 1ea)
N1254A-510	3	Dolphin Clip 2 ea. (red and black)

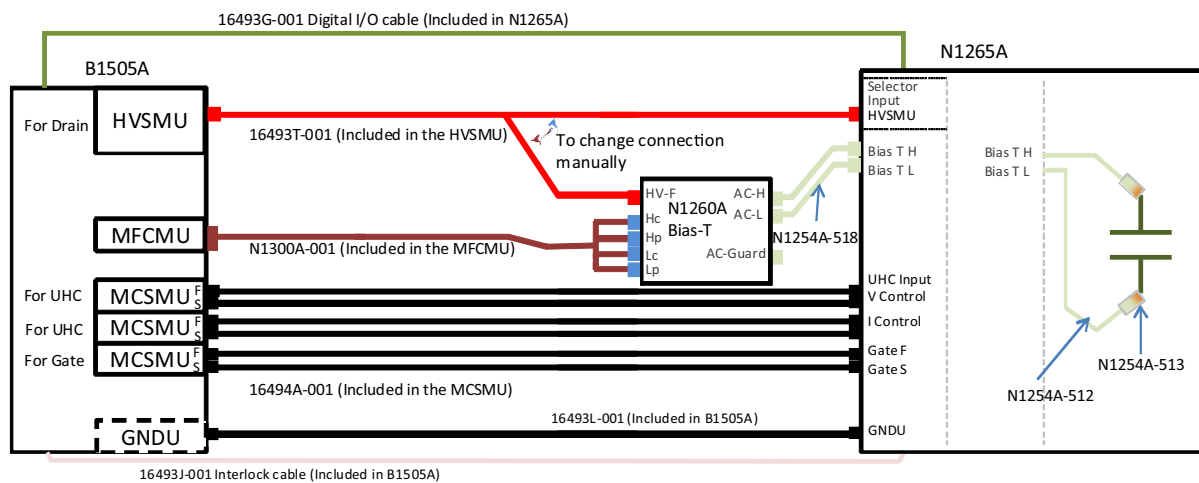
Model/Option	Quantity	Description
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter
1251-2277	1	Banana to BNC Adapter

NOTE This configuration is equivalent to the B1505AP-H50 3 kV / 500 A / Fixture Pack or B1505AP-H70 3 kV / 1500 A / Fixture Pack configuration.

3 kV, 500 A or 1500 A with Capacitance Measurement Configuration (B1505AP-H51 or B1505AP-H71 equivalent)

- Device Type: Discrete MOSFET (3 terminals)
- Key Specification
 - Max voltage/current: 3 kV/500 A
 - Capacitance measurement up to 3 kV DC bias
 - Module Selector for multi-parameter automated measurement function

Figure 7-5 Connection example for CV measurement



NOTE For IV measurement connection diagram, please refer to [Figure 7-4](#).

Table 7-5 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1505A-015	1	1.5 m cable
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	3	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
B1520A-FG	1	Multi Frequency Capacitance Measurement Unit Module
N1260A	1	High Voltage Bias-Tee
N1260A-STD	1	High Voltage Bias-Tee
N1265A	1	Ultra High Current Expander / Fixture
N1265A-001	1	Ultra High Current Expander / Fixture
N1265A-010	1	500 A Ultra High Current 3-pin Inline Package Socket Module

Model/Option	Quantity	Description
N1265A-015	1	1500 A Current Option (This option needs to be ordered only when 1500 A capability is required)
N1254A	1	Accessories for instruments and fixtures
N1254A-508	4	Banana to Banana Cable 250 mm (red, 1ea)
N1254A-509	4	Banana to Banana Cable 250 mm (black, 1ea)
N1254A-510	3	Dolphin Clip 2ea (red and black)
N1254A-512	2	SHV Cable 250 mm
N1254A-513	2	SHV Jack to Banana Adapter
N1254A-518	2	SHV Cable 1.5 m
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter
1251-2277	1	Banana to BNC Adapter

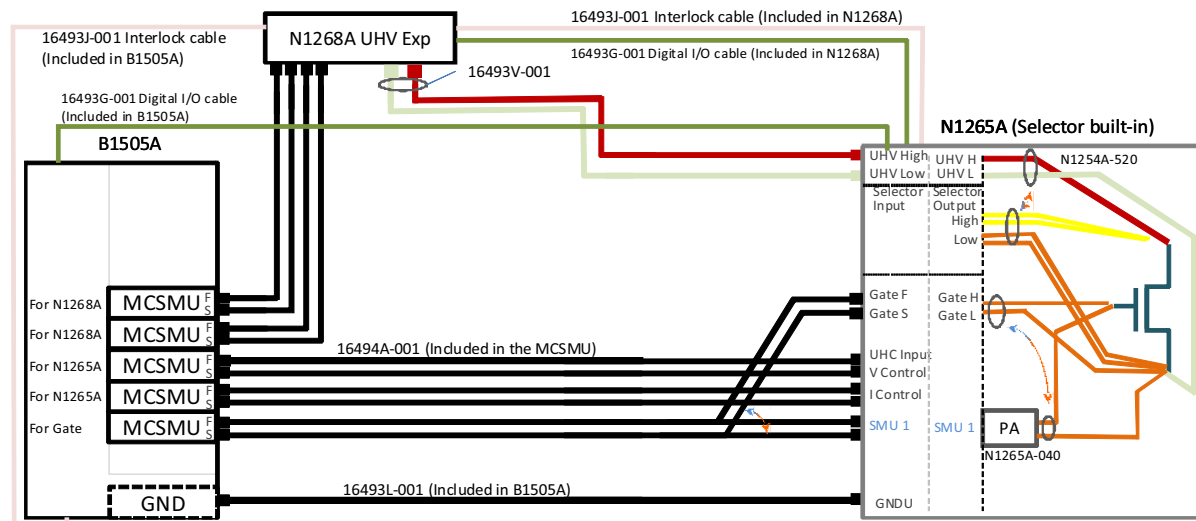
NOTE

This configuration is equivalent to the B1505AP-H51 3 kV / 500 A / C-V / Fixture Pack or B1505AP-H71 3 kV / 1500 A / C-V / Fixture Pack configuration.

10 kV, 500 A or 1500 A Configuration (B1505AP-U50 or B1505AP-U70 equivalent)

- Device Type: Discrete MOSFET (3 terminals)
- Key Specification
 - Max voltage/current: 10 kV/500 A or 1500 A

Figure 7-6 Connection example



NOTE

When using a N1268A, Gate input ports of the N1265A Ultra High Current Expander/Fixture cannot be used due to potential damage to these terminals. Instead, device gate terminal should be connected to SMU 1, 2 ports of the N1265A through the N1265A-040 10 kV Ultra High Voltage Gate Protection Adapter.

Table 7-6 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1505A-015	1	1.5 m cable
B1514A-FG	5	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
N1265A	1	Ultra High Current Expander / Fixture
N1265A-001	1	Ultra High Current Expander / Fixture
N1265A-010	1	500 A Ultra High Current 3-pin Inline Package Socket Module
N1265A-015	1	1500 A Current Option (This option needs to be ordered only when 1500 A capability is required)
N1265A-040	1	10 kV Ultra High Voltage Gate Protection Adapter
N1268A	1	Ultra High Voltage Expander
N1268-STD	1	Ultra High Voltage Expander

Model/Option	Quantity	Description
16493V	1	10 kV Ultra High Voltage Cable
16493V-001	1	10 kV Ultra High Voltage Cable (1.5 m)
N1254A	1	Accessories for instruments and fixtures
N1254A-508	4	Banana to Banana Cable 250 mm (red, 1ea)
N1254A-509	4	Banana to Banana Cable 250 mm (black, 1ea)
N1254A-510	3	Dolphin Clip 2ea (red and black)
N1254A-520	1	10 kV Ultra High Voltage Open End Cable, 1 m (pair)
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter
1251-2277	1	Banana to BNC Adapter

NOTE

This configuration is equivalent to the B1505AP-U50 10 kV / 500 A / Fixture Pack or B1505AP-U70 10kV / 1500 A / Fixture Pack configuration.

Add High Resolution Measurement (10 fA resolution with MPSMU or HPSMU) Capability to 3 kV, 20 A Configuration

- Device Type: Discrete MOSFET (3 terminals)
- Key Specification
 - Max Drain voltage/current: 3 kV/20 A
 - Minimum current measurement resolution for Drain and Gate terminals: 10 fA
 - Module Selector for multi-parameter automated measurement function

Figure 7-7 Connection example

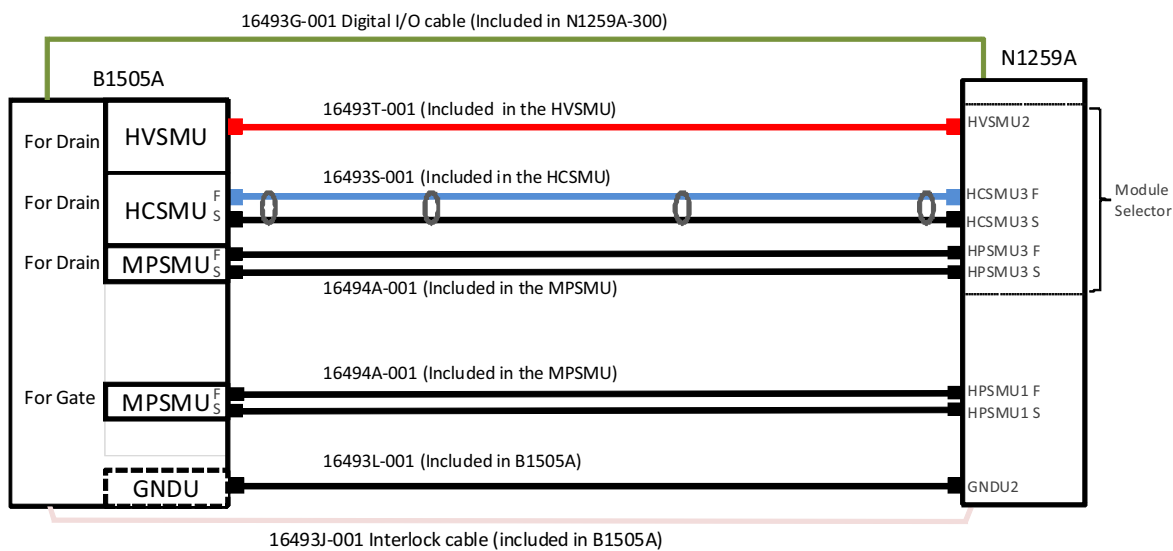


Table 7-7 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1505A-015	1	1.5 m cable
B1510A-FG or B1511B-FG	2	High Power Source/Monitor Unit module (200 V/ 1A) or Medium Power Source/Monitor Unit module (100 V/ 100 mA)
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
N1259A	1	Test Fixture for Power Device
N1259A-001	1	Test Fixture including Inline Package Socket Module and Cables
N1259A-022	1	100 kohm R-box for gate
N1259A-030	1	1 kohm R-box
N1259A-300	1	Module Selector
N1254A	1	Accessories for instruments and fixtures

Model/Option	Quantity	Description
N1254A-508	4	Banana to Banana Cable 250 mm (red, 1ea)
N1254A-509	4	Banana to Banana Cable 250 mm (black, 1ea)
N1254A-510	3	Dolphin Clip 2ea (red and black)
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter
1251-2277	1	Banana to BNC Adapter

3 kV, 20A, High Voltage Medium Current Configuration

- Device Type: Discrete MOSFET (3 terminals)
- Key Specification
 - Max voltage/current: 3 kV/20A
 - High Voltage Medium Current capability: 2200 V/1.1 A, 1500 V/2.5 A
 - Module Selector for multi-parameter automated measurement function

Figure 7-8 Connection example

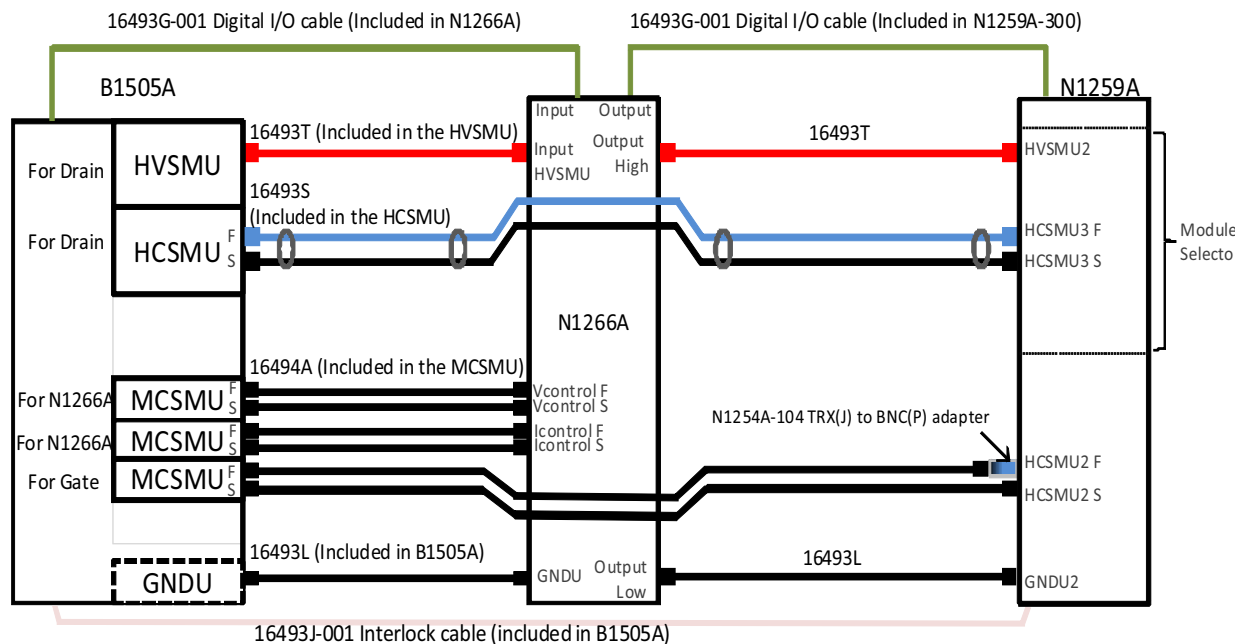


Table 7-8 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	3	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
16493L	1	Ground Unit Cable (Triaxial)
16493L-001 or 002	1	Ground Unit Cable (Triaxial, 1.5m or 3.0m)
16493T	1	High Voltage Source Monitor Unit Cable
16493T-001 or 002	1	High Voltage Source Monitor Unit Cable (1.5m or 3.0m)
N1254A	1	Accessories for instruments and fixtures

Model/Option	Quantity	Description
N1254A-104	1	Triax (f) to BNC (m) adapter
N1259A	1	Test Fixture for Power Device
N1259A-001	1	Test Fixture including Inline Package Socket Module and Cables
N1259A-022	1	100 kohm R-box for gate
N1259A-030	1	1 kohm R-box
N1259A-300	1	Module Selector
N1266A	1	High Voltage Source Monitor Unit Current Expander
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter
1251-2277	1	Banana to BNC Adapter

3 kV, 40 A Configuration

- Device Type: Discrete MOSFET (3 terminals)
- Key Specification
 - Max voltage/current: 3 kV/40 A without N1259A-300 Module Selector, 3 kV/30 A with N1259A-300 Module Selector
 - Module Selector for multi-parameter automated measurement function

Figure 7-9 Connection example for 3 kV, 30A automated measurement with Module Selector

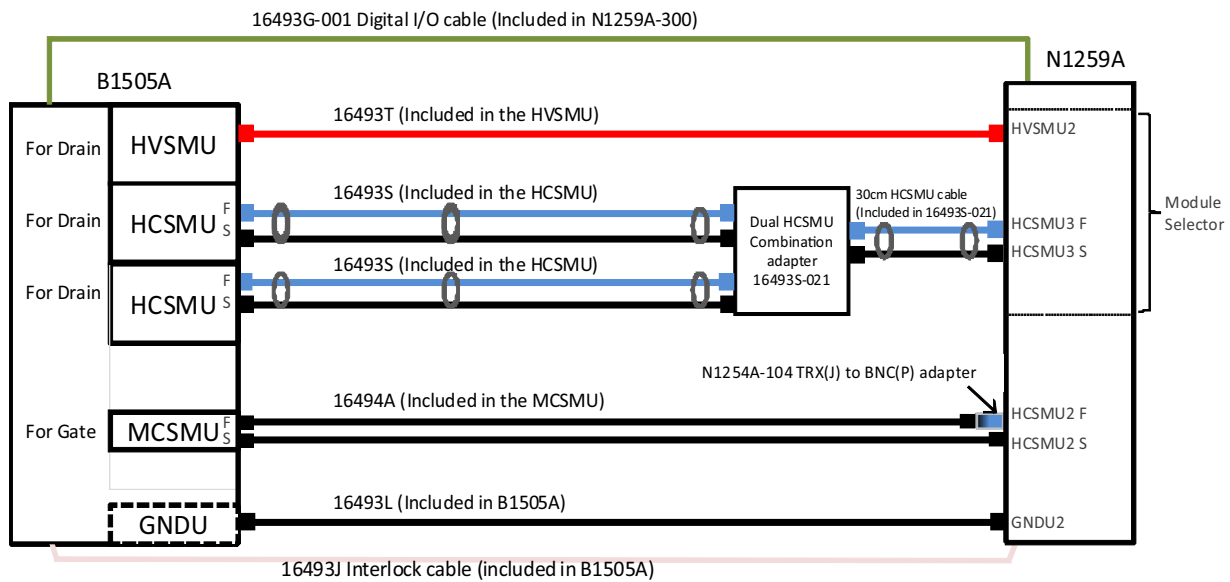
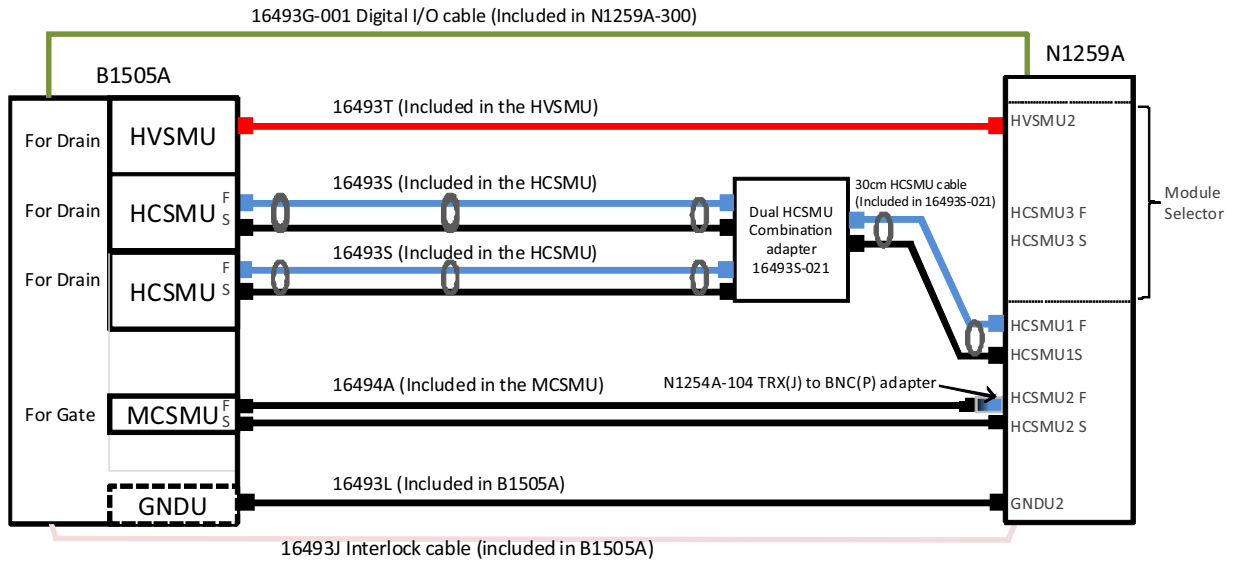


Figure 7-10 Connection example for 3kV, 40A measurement without Module Selector



NOTE N1259A-300 Module selector is available up to 30 A. If 40 A capability is required, please connect HCSMU 1 or HCSMU 2 ports of the N1259A instead of HCSMU 3 ports (Module Selector ports). Please see the connection in [Figure 7-10](#).

Table 7-9 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1512A-FG	2	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	1	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
16493S	1	High Current Source Monitor Unit Cable
16493S-021	1	Dual HCSMU Combination Adapter
N1254A	1	Accessories for instruments and fixtures
N1254A-104	1	Triax (f) to BNC (m) adapter
N1259A	1	Test Fixture for Power Device
N1259A-001	1	Test Fixture including Inline Package Socket Module and Cables
N1259A-022	1	100 kΩ R-box
N1259A-030	1	1 kΩ R-box for gate
N1259A-300	1	Module Selector

Connection and Ordering Examples
Package Device Measurement Configuration Examples

Model/Option	Quantity	Description
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter
1251-2277	1	Banana to BNC Adapter

Add High Resolution Measurement Capability (10 fA resolution with MPSMU or HPSMU) to 3 kV, 500A Configuration

- Device Type: Discrete MOSFET (4 terminals)
- Key Specification
 - Max voltage/current: 3 kV/500 A
 - Minimum current measurement resolution for Drain and Gate terminals: 10 fA
 - Module Selector for multi-parameter automated measurement function

Figure 7-11 Connection example

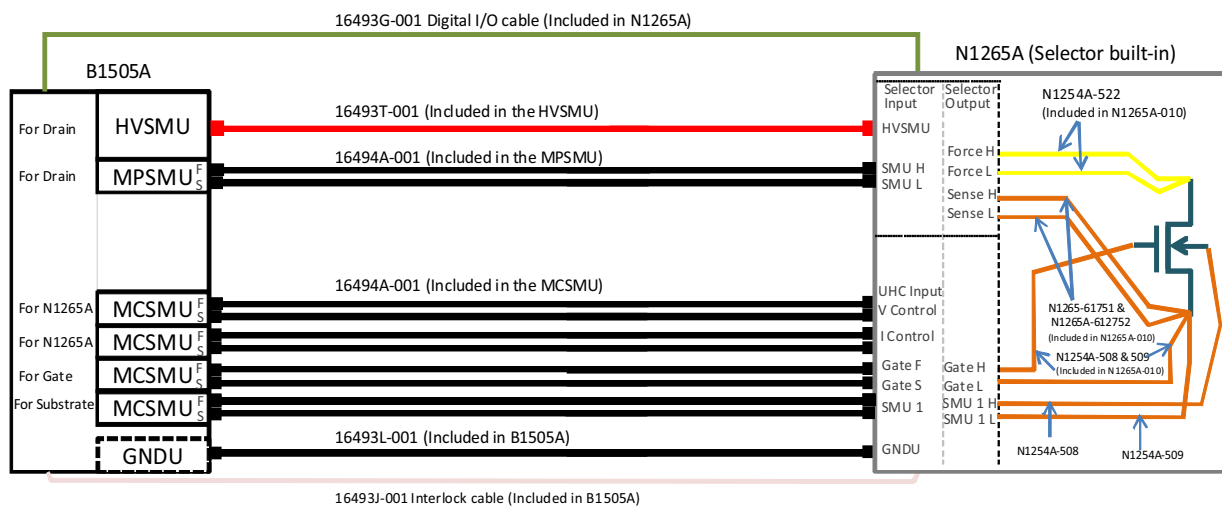


Table 7-10 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1505A-015	1	1.5 m cable
B1510A-FG or B1511B-FG	2	High Power Source/Monitor Unit module (200 V/ 1A) or Medium Power Source/Monitor Unit module (100 V/ 100 mA)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	4	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
N1265A	1	Ultra High Current Expander/Fixture
N1265A-001	1	Ultra High Current Expander/Fixture
N1265A-010	1	500 A Ultra High Current 3-pin Inline Package Socket Module
N1254A	1	Accessories for instruments and fixtures
N1254A-508	4	Banana to Banana Cable 250 mm (red, 1ea)

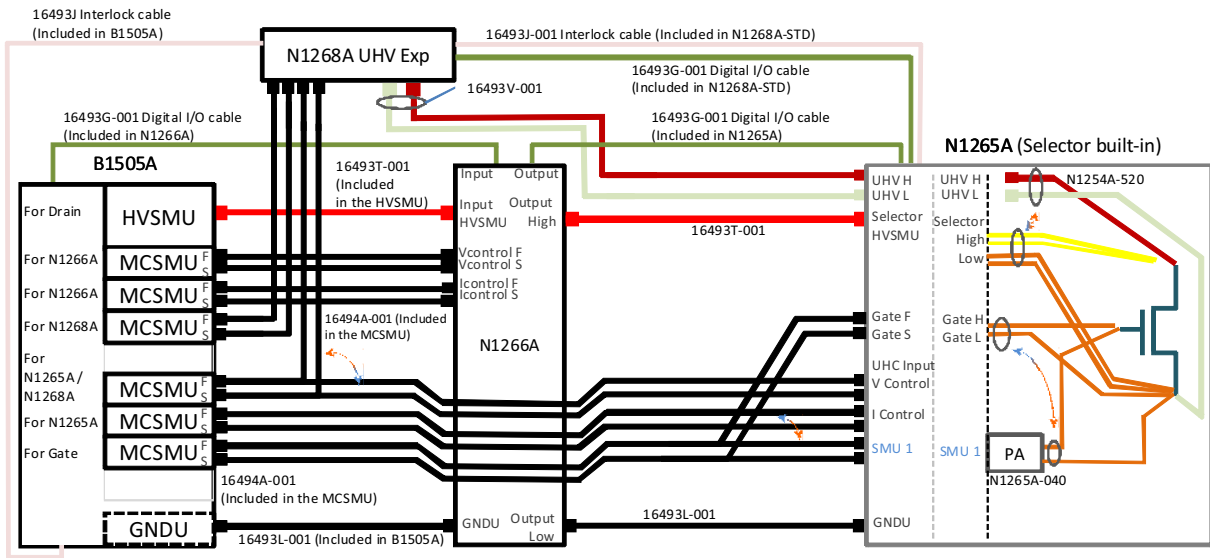
Connection and Ordering Examples
Package Device Measurement Configuration Examples

Model/Option	Quantity	Description
N1254A-509	4	Banana to Banana Cable 250 mm (black, 1ea)
N1254A-510	4	Dolphin Clip 2 ea. (red and black)
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter
1251-2277	1	Banana to BNC Adapter

10 kV, 500 A, High Voltage Medium Current Configuration

- Device Type: Discrete MOSFET (3 terminals)
- Key Specification
 - Max voltage/current: 10 kV/500 A
 - High Voltage Medium Current capability: 2200 V/1.1 A, 1500 V/2.5 A
 - Module Selector for multi-parameter automated measurement function

Figure 7-12 Connection example



NOTE

When using a N1268A, Gate input ports of the N1265A Ultra High Current Expander/Fixture cannot be used due to potential damage to these terminals. Instead, device gate terminal should be connected to SMU 1, 2 ports of the N1265A through the N1265A-040 10 kV Ultra High Voltage Gate Protection Adapter.

Table 7-11 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1505A-015	1	1.5 m cable
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	6	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
16493T	1	High Voltage Source Monitor Unit Cable
16493T-001	1	High Voltage Source Monitor Unit Cable (1.5 m)
16493L	1	Ground Unit Cable

Connection and Ordering Examples
 Package Device Measurement Configuration Examples

Model/Option	Quantity	Description
16493L-001	1	Ground Unit Cable (Triaxial, 1.5 m)
16493V	1	10 kV Ultra High Voltage Cable
16493V-001	1	10 kV Ultra High Voltage Cable (1.5 m)
N1265A	1	Ultra High Current Expander/Fixture
N1265A-001	1	Ultra High Current Expander/Fixture
N1265A-010	1	500 A Ultra High Current 3-pin Inline Package Socket Module
N1264A-040	1	10 kV Ultra High Voltage Gate Protection Adapter
N1266A	1	High Voltage Source Monitor Unit Current Expander
N1268A	1	Ultra High Voltage Expander
N1268-STD	1	Ultra High Voltage Expander
N1254A	1	Accessories for instruments and fixtures
N1254A-508	4	Banana to Banana Cable 250 mm (red, 1ea)
N1254A-509	4	Banana to Banana Cable 250 mm (black, 1ea)
N1254A-510	3	Dolphin clip adapter, black 1 ea. and red 1 ea.
N1254A-520	1	10 kV Ultra High Voltage Open End Cable, 1 m
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter
1251-2277	1	Banana to BNC Adapter

Configuration Examples for Lateral Device Measurement with Wafer Prober

This section introduces typical configuration examples for lateral device measurement with wafer prober shown in [Table 7-12](#).

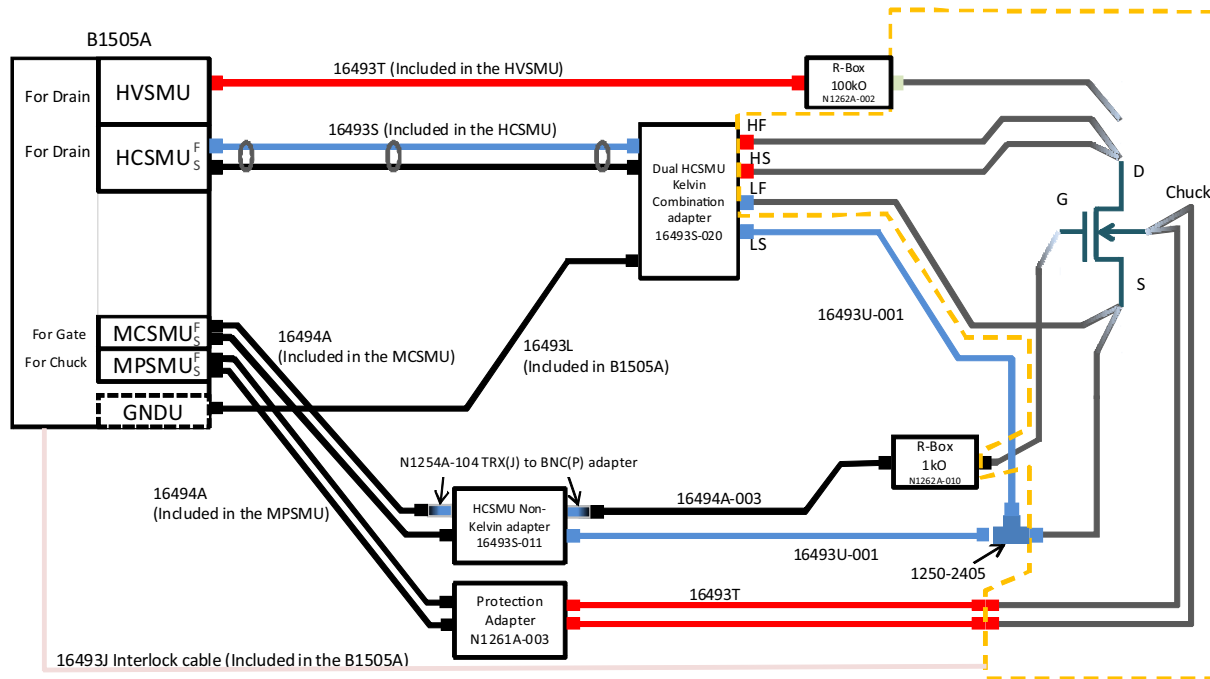
Table 7-12 Configuration examples

Device	Max V	Max I	HVMC	C-V	Add MPSMU	Note
Lateral 4 terminal on-wafer device	3 kV	20 A				"3 kV, 20 A Measurement for On-Wafer Lateral Device" on page 7-26
	3 kV	20 A		YES		"3 kV, 20 A, Capacitance Measurement for On-Wafer Lateral Device" on page 7-30
	3 kV	20 A			YES	"Add High Resolution Measurement (10 fA resolution with MPSMU or HPSMU) Capability to 3 kV, 20 A, Capacitance Measurement for On-Wafer Lateral Device" on page 7-33
	3 kV	40 A				"3 kV, 40 A Measurement for On-Wafer Lateral Device" on page 7-35
	3 kV	500 A				"3 kV, 500 A Measurement for On-Wafer Lateral Device" on page 7-38
	3 kV	500 A		YES		"3 kV, 500 A, Capacitance Measurement for On-Wafer Lateral Device" on page 7-40
	3 kV	500 A	YES			"3 kV, 500 A, High Voltage Medium Current Measurement for On-Wafer Lateral Device" on page 7-42
	10 kV	500 A				"10 kV, 500 A Measurement for On-Wafer Lateral Device" on page 7-44

3 kV, 20 A Measurement for On-Wafer Lateral Device

- Device Type: Lateral MOSFET (4 terminals)
- Key Specification
 - Max voltage/current: 3 kV/20 A

Figure 7-13 Connection example for 3 kV/20A measurement without N1258A Module Selector



NOTE Prober vendor is responsible for cabling inside the shielding box.

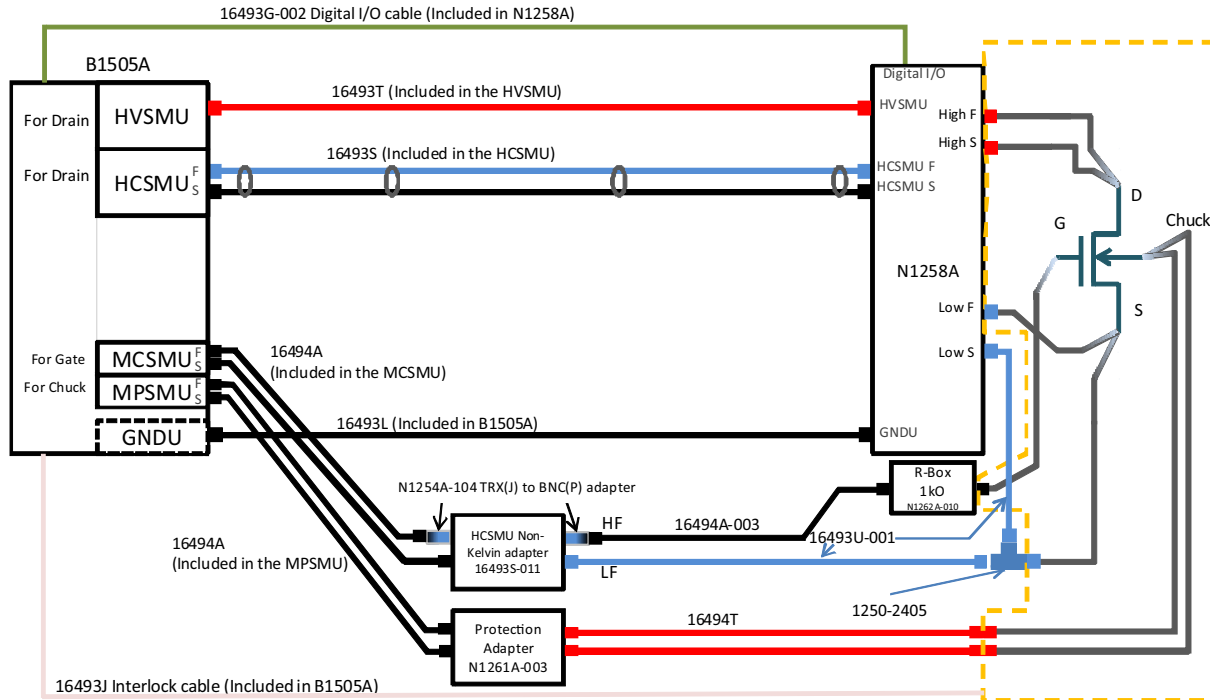
Table 7-13 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1511B-FG	1	Medium Power Source/Monitor Unit module (100 V/ 100 mA)
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	1	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
16493T	1	High Voltage Source Monitor Unit Cable
16493T-001 or 002	2	High Voltage Source Monitor Unit Cable (1.5 m)
16493U	1	High Current BNC Coaxial Cable
16493U-001	2	High Current BNC Coaxial Cable (1.5 m)
16494A	1	Triaxial Cable

Model/Option	Quantity	Description
16494A-003	1	Triaxial Cable (80 cm)
1250-2405	1	BNC-T Plug (m)-BNC (f)-BNC (f) adapter, 1ea
16493S	1	High Current Source Monitor Unit Cable
16493S-011	1	High Current Source Monitor Unit non-Kelvin Adapter
16493S-020	1	Dual HCSMU Combination Adapter
N1261A	1	Protection Adapter
N1261A-003	1	Protection Adapter for High Power Source Monitor Unit (HV-Triaxial output)
N1262A	1	R-box for B1505A
N1262A-002	1	100 kohm R-box
N1262A-010	1	1 kohm R-box for gate (Triaxial output)
N1262A-036	1	50 Ohm Termination Adapter
N1254A	1	Accessories for instruments and fixtures
N1254A-104	2	Triax (f) to BNC (m) adapter

- Device Type: Lateral MOSFET (4 terminals)
- Key Specification
 - Max voltage/current: 3 kV/20 A
 - Module Selector for multi-parameter automated measurement function

Figure 7-14 Connection example for 3 kV/20 A automated measurement with N1258A Module Selector



NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-14 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1511B-FG	1	Medium Power Source/Monitor Unit module (100 V/ 100 mA)
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	1	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
16493T	1	High Voltage Source Monitor Unit Cable
16493T-001 or 002	2	High Voltage Source Monitor Unit Cable (1.5 m)
16493U	1	High Current BNC Coaxial Cable
16493U-001	2	High Current BNC Coaxial Cable (1.5 m)

Model/Option	Quantity	Description
16494A	1	Triaxial Cable
16494A-003	1	Triaxial Cable (80 cm)
1250-2405	1	BNC-T Plug (m)-BNC (f)-BNC (f) adapter, 1ea
N1258A	1	Module Selector for B1505A
16493S	1	High Current Source Monitor Unit Cable
16493S-011	1	High Current Source Monitor Unit non-Kelvin Adapter
N1261A	1	Protection Adapter
N1261A-003	1	Protection Adapter for High Power Source Monitor Unit (HV-Triaxial output)
N1262A	1	R-box for B1505A
N1262A-010	1	1 kohm R-box for gate (Triaxial output)
N1262A-036	1	50 Ohm Termination Adapter
N1254A	1	Accessories for instruments and fixtures
N1254A-104	2	Triax (f) to BNC (m) adapter

3 kV, 20 A, Capacitance Measurement for On-Wafer Lateral Device

- Device Type: Lateral MOSFET (4 terminals)
- Key Specification
 - Max Voltage/Current: 3 kV/30 A with Module Selector, 3 kV/40 A without Module Selector
 - Capacitance measurement up to 3 kV DC bias
 - Module Selector for multi-parameter automated measurement function

Figure 7-15 Connection example for IV measurement

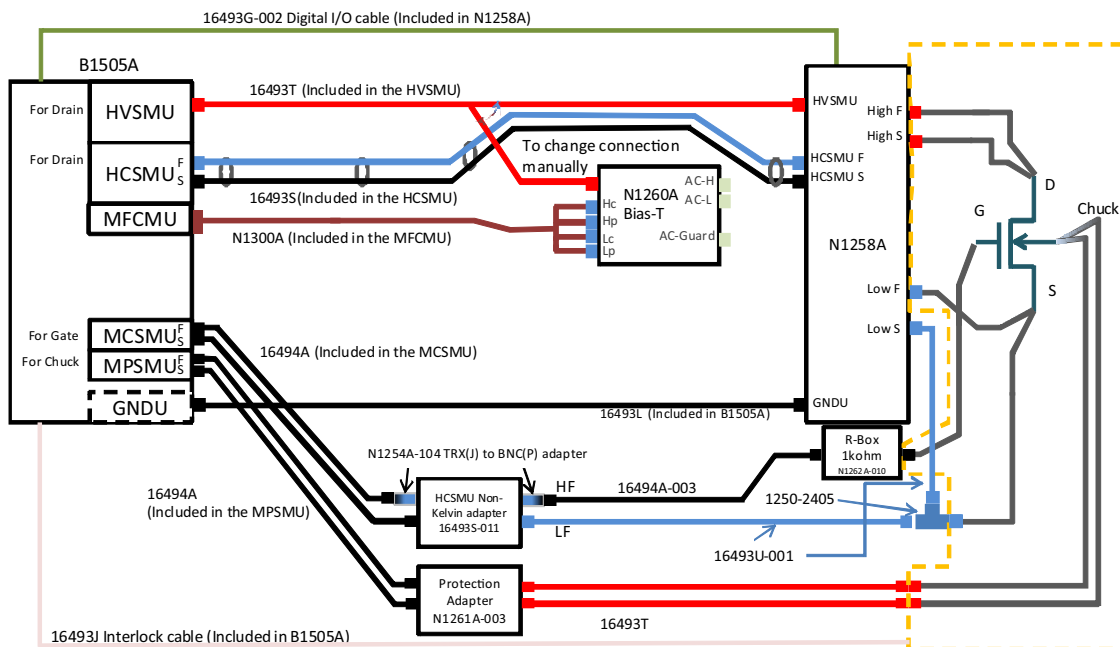
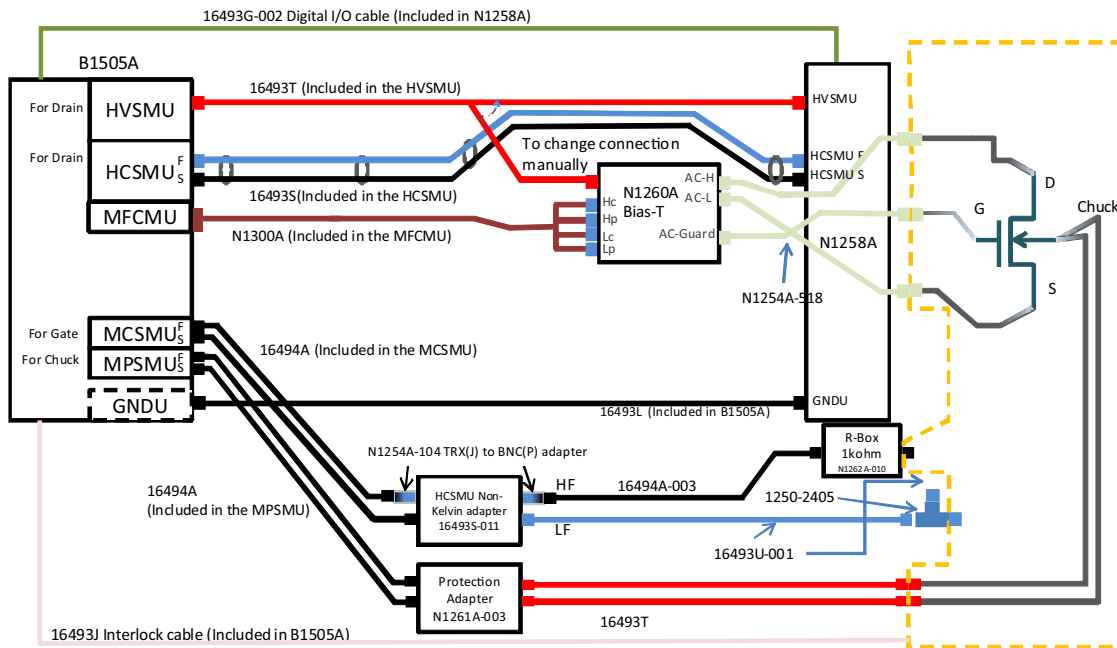


Figure 7-16 Connection example for CV measurement



NOTE The connection diagram in Figure 7-16 shows Cds measurement.

NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-15 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1511B-FG	1	Medium Power Source/Monitor Unit module (100 V/ 100 mA)
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	1	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
B1520A-FG	1	Multi Frequency Capacitance Measurement Unit Module
16493T	1	High Voltage Source Monitor Unit Cable
16493T-001 or 002	2	High Voltage Source Monitor Unit Cable (1.5 m)
16493U	1	High Current BNC Coaxial Cable
16493U-001	2	High Current BNC Coaxial Cable (1.5 m)
16494A	1	Triaxial Cable
16494A-003	1	Triaxial Cable (80 cm)
1250-2405	1	BNC-T Plug (m)-BNC (f)-BNC (f) adapter, 1ea
N1258A	1	Module Selector for B1505A
N1260A	1	High Voltage Bias-Tee

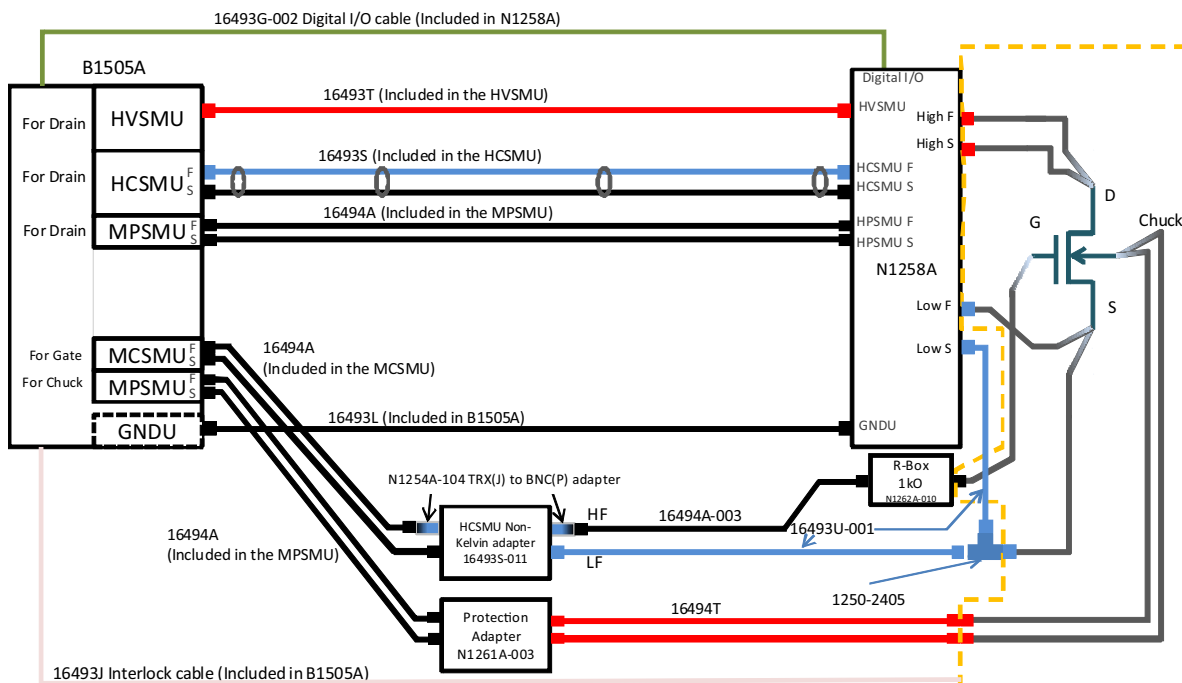
Connection and Ordering Examples
 Configuration Examples for Lateral Device Measurement with Wafer Prober

Model/Option	Quantity	Description
N1260A-STD	1	High Voltage Bias-Tee
16493S	1	High Current Source Monitor Unit Cable
16493S-011	1	High Current Source Monitor Unit non-Kelvin Adapter
N1261A	1	Protection Adapter
N1261A-003	1	Protection Adapter for High Power Source Monitor Unit (HV-Triaxial output)
N1262A	1	R-box for B1505A
N1262A-010	1	1 kohm R-box for gate (Triaxial output)
N1262A-036	1	50 Ohm Termination Adapter
N1254A	1	Accessories for instruments and fixtures
N1254A-104	2	Triax (f) to BNC (m) adapter
N1256A-518	3	SHV Cable 1.5 m

Add High Resolution Measurement (10 fA resolution with MPSMU or HPSMU) Capability to 3 kV, 20 A, Capacitance Measurement for On-Wafer Lateral Device

- Device Type: Lateral MOSFET (4 terminals)
- Key Specification
 - Max voltage/current: 3 kV/20 A
 - Drain leakage current down to 10 fA
 - Module Selector for multi-parameter automated measurement function

Figure 7-17 Connection example



NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-16 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1511B-FG	2	Medium Power Source/Monitor Unit module (100 V/ 100 mA)
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	1	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed); 100 mA/30 V(DC)
16493T	1	High Voltage Source Monitor Unit Cable

Connection and Ordering Examples

Configuration Examples for Lateral Device Measurement with Wafer Prober

Model/Option	Quantity	Description
16493T-001 or 002	2	High Voltage Source Monitor Unit Cable (1.5 m)
16493U	1	High Current BNC Coaxial Cable
16493U-001	2	High Current BNC Coaxial Cable (1.5 m)
16494A	1	Triaxial Cable
16494A-003	1	Triaxial Cable (80 cm)
1250-2405	1	BNC-T Plug (m)-BNC (f)-BNC (f) adapter, 1ea
N1258A	1	Module Selector for B1505A
16493S	1	High Current Source Monitor Unit Cable
16493S-011	1	High Current Source Monitor Unit non-Kelvin Adapter
N1261A	1	Protection Adapter
N1261A-003	1	Protection Adapter for High Power Source Monitor Unit (HV-Triaxial output)
N1262A	1	R-box for B1505A
N1262A-010	1	1 kohm R-box for gate (Triaxial output)
N1262A-036	1	50 Ohm Termination Adapter
N1254A	1	Accessories for instruments and fixtures
N1254A-104	2	Triax (f) to BNC (m) adapter

3 kV, 40 A Measurement for On-Wafer Lateral Device

- Device Type: Lateral MOSFET (4 terminals)
- Key Specification
 - Max Voltage/Current: 3 kV/30 A with Module Selector, 3 kV/40 A without Module Selector
 - Module Selector for multi-parameter automated measurement function

Figure 7-18 Connection example for 3kV, 30A measurement with N1258A Module Selector

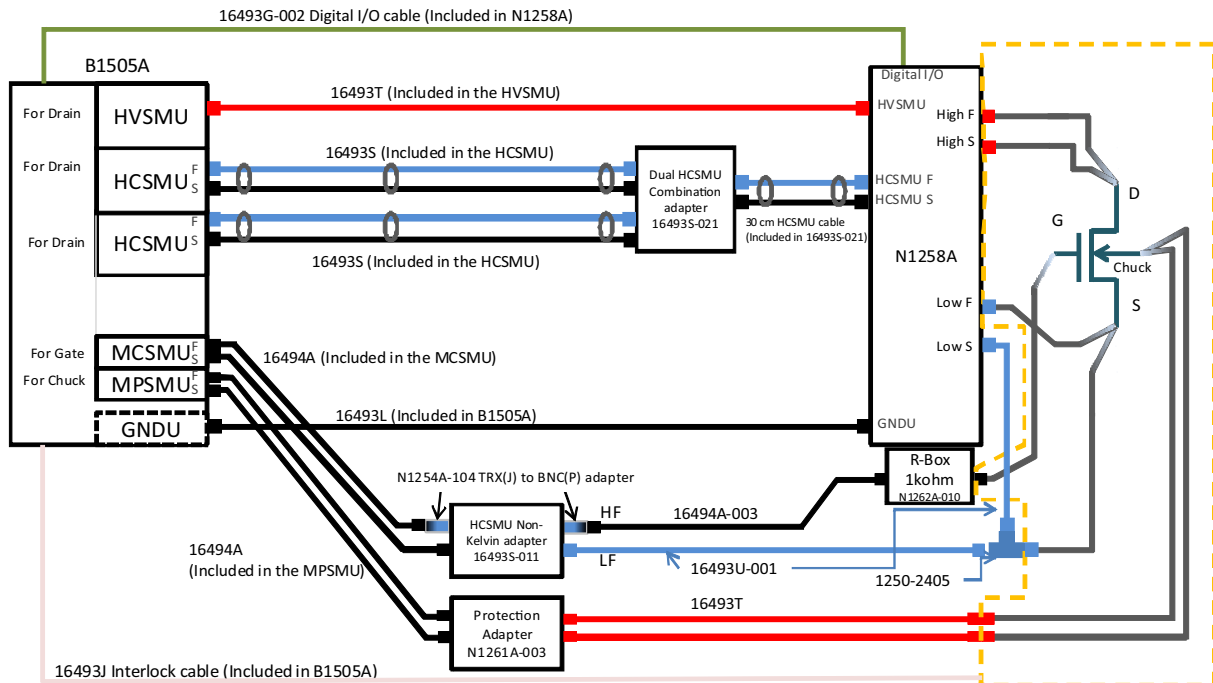
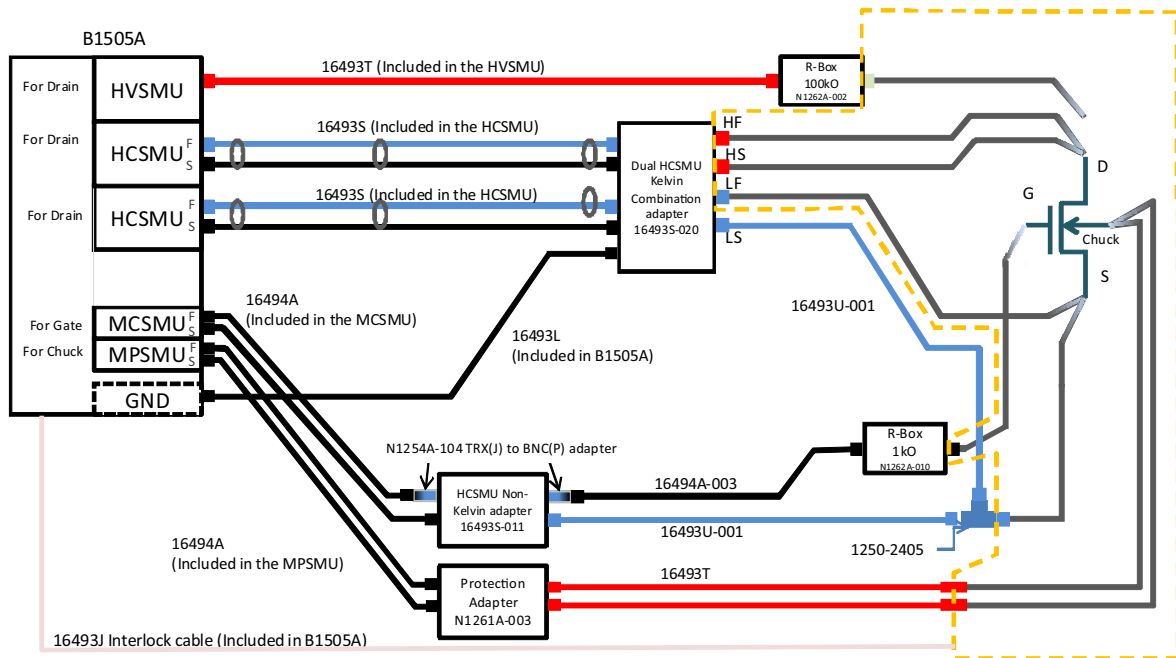


Figure 7-19 Connection example for 3kV, 40A measurement without N1258A Module Selector



NOTE Module selector is available up to 30 A. If 40 A capability is required, please connect 16493S-020 Dual HCSMU Kelvin Connection Adapter without a N1258A Module Selector (See [Figure 7-19](#)).

NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-17 Required equipment, accessories, and cables

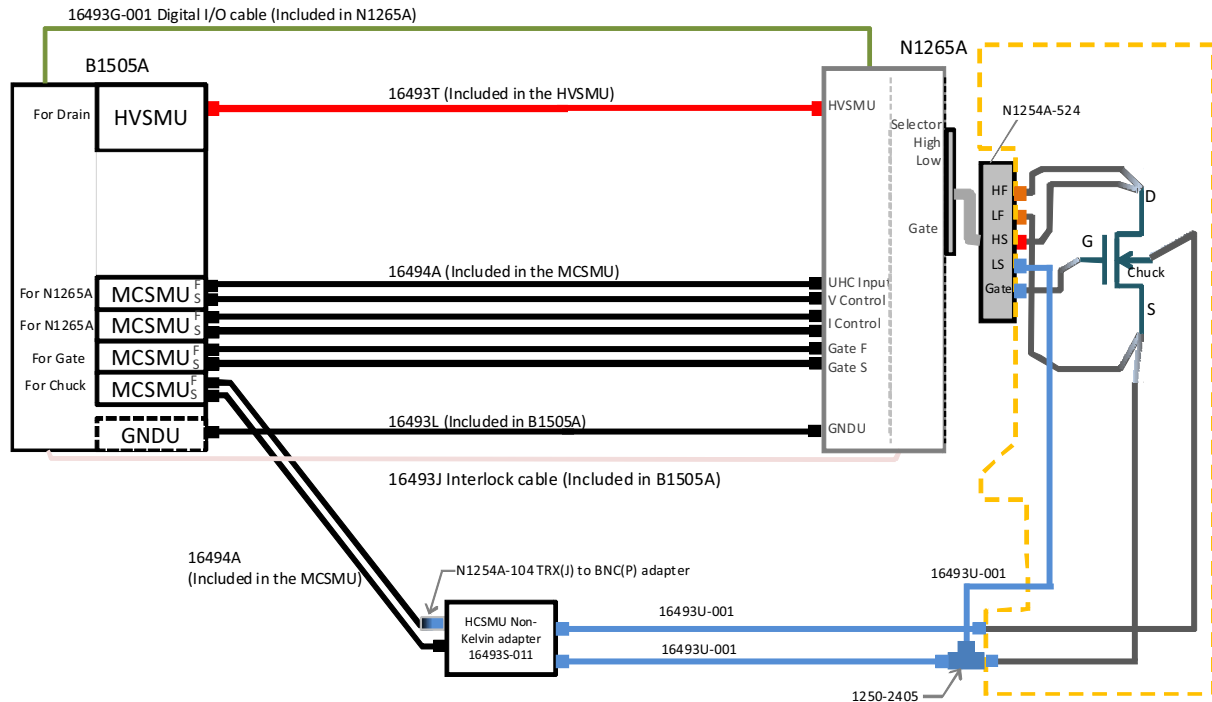
Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1511B-FG	1	Medium Power Source/Monitor Unit module (100 V/ 100 mA)
B1512A-FG	2	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	1	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
16493S	1	High Current Source Monitor Unit Cable
16493S-020	1	Dual HCSMU Combination Adapter (This adapter is used when a N1258A Module Selector is not used)
16493S-021	1	Dual HCSMU Combination Adapter (This adapter is used with a N1258A Module Selector)
16493S-011	1	High Current Source Monitor Unit non-Kelvin Adapter
16493T	1	High Voltage Source Monitor Unit Cable
16493T-001 or 002	2	High Voltage Source Monitor Unit Cable (1.5 m)
16493U	1	High Current BNC Coaxial Cable

Model/Option	Quantity	Description
16493U-001	2	High Current BNC Coaxial Cable (1.5 m)
16494A	1	Triaxial Cable
16494A-003	1	Triaxial Cable (80 cm)
1250-2405	1	BNC-T Plug (m)-BNC (f)-BNC (f) adapter, 1ea
N1258A	1	Module Selector for B1505A
N1261A	1	Protection Adapter
N1261A-003	1	Protection Adapter for High Power Source Monitor Unit (HV-Triaxial output)
N1262A	1	R-box for B1505A
N1262A-010	1	1 kohm R-box for gate (Triaxial output)
N1262A-002	1	100 kohm R-box
N1262A-036	1	50 Ohm Termination Adapter
N1254A	1	Accessories for instruments and fixtures
N1254A-104	2	Triax (f) to BNC (m) adapter

3 kV, 500 A Measurement for On-Wafer Lateral Device

- Device Type: Lateral MOSFET (4 terminals)
- Key Specification
 - Max voltage/current: 3 kV/500 A
 - Module Selector for multi-parameter automated measurement function

Figure 7-20 Connection example



NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-18 Ordering example

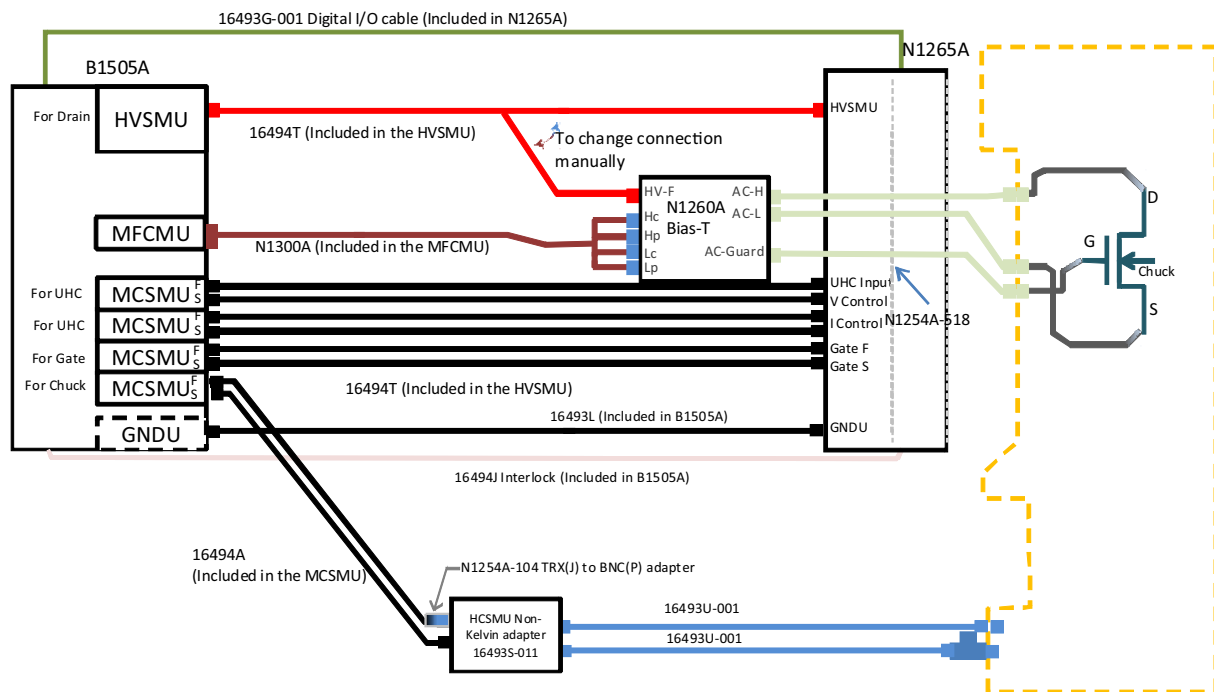
Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	4	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
N1265A	1	Ultra High Current Expander/Fixture
N1265A-001	1	Ultra High Current Expander/Fixture
16493S	1	High Current Source Monitor Unit Cable
16493S-011	1	High Current Source Monitor Unit non-Kelvin Adapter
16493U	1	High Current BNC Coaxial Cable
16493U-001	3	High Current BNC Coaxial Cable (1.5 m)
1250-2405	1	BNC-T plug (m)-BNC (f)-BNC (f) adapter, 1ea

Model/Option	Quantity	Description
N1254A	1	Accessories for instruments and fixtures
N1254A-524	1	Ultra High Current Prober System Cable
N1254A-104	1	Triax (f) to BNC (m) adapter
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter

3 kV, 500 A, Capacitance Measurement for On-Wafer Lateral Device

- Device Type: Lateral MOSFET (4 terminals)
- Key Specification
 - Max voltage/current: 3 kV/500 A
 - Capacitance measurement up to 3 kV DC bias
 - Module Selector for multi-parameter automated measurement function

Figure 7-21 Connection example for CV measurement



NOTE The connection diagram in [Figure 7-16](#) shows Cds measurement.

NOTE For IV measurement connection diagram, please refer to [Figure 7-20](#).

NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-19 Ordering example

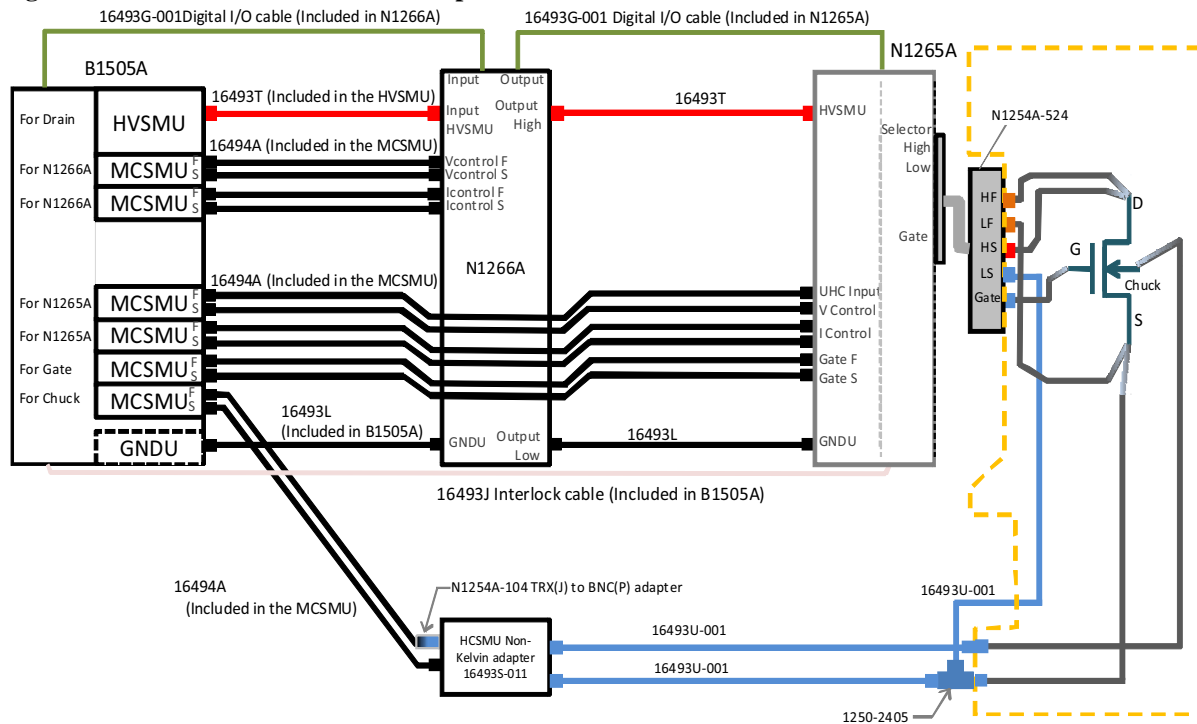
Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	4	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
B1520A-FG	1	Multi Frequency Capacitance Measurement Unit Module

Model/Option	Quantity	Description
N1265A	1	Ultra High Current Expander/Fixture
N1265A-001	1	Ultra High Current Expander/Fixture
16493S	1	High Current Source Monitor Unit Cable
16493S-011	1	High Current Source Monitor Unit non-Kelvin Adapter
16493U	1	High Current BNC Coaxial Cable
16493U-001	3	High Current BNC Coaxial Cable (1.5 m)
1250-2405	1	BNC-T plug (m)-BNC (f)-BNC (f) adapter, 1ea
N1260A	1	High Voltage Bias-Tee
N1260A-STD	1	High Voltage Bias-Tee
N1254A	1	Accessories for instruments and fixtures
N1254A-524	1	Ultra High Current Prober System Cable
N1254A-104	1	Triax (f) to BNC (m) adapter
N1254A-518	3	SHV Cable 1.5 m
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter

3 kV, 500 A, High Voltage Medium Current Measurement for On-Wafer Lateral Device

- Device Type: Lateral MOSFET (4 terminals)
- Key Specification
 - Max voltage/current: 3 kV/500 A
 - High Voltage Medium Current capability: 2200 V/1.1 A, 1500 V/2.5 A
 - Module Selector for multi-parameter automated measurement function

Figure 7-22 Connection example



NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-20 Ordering example

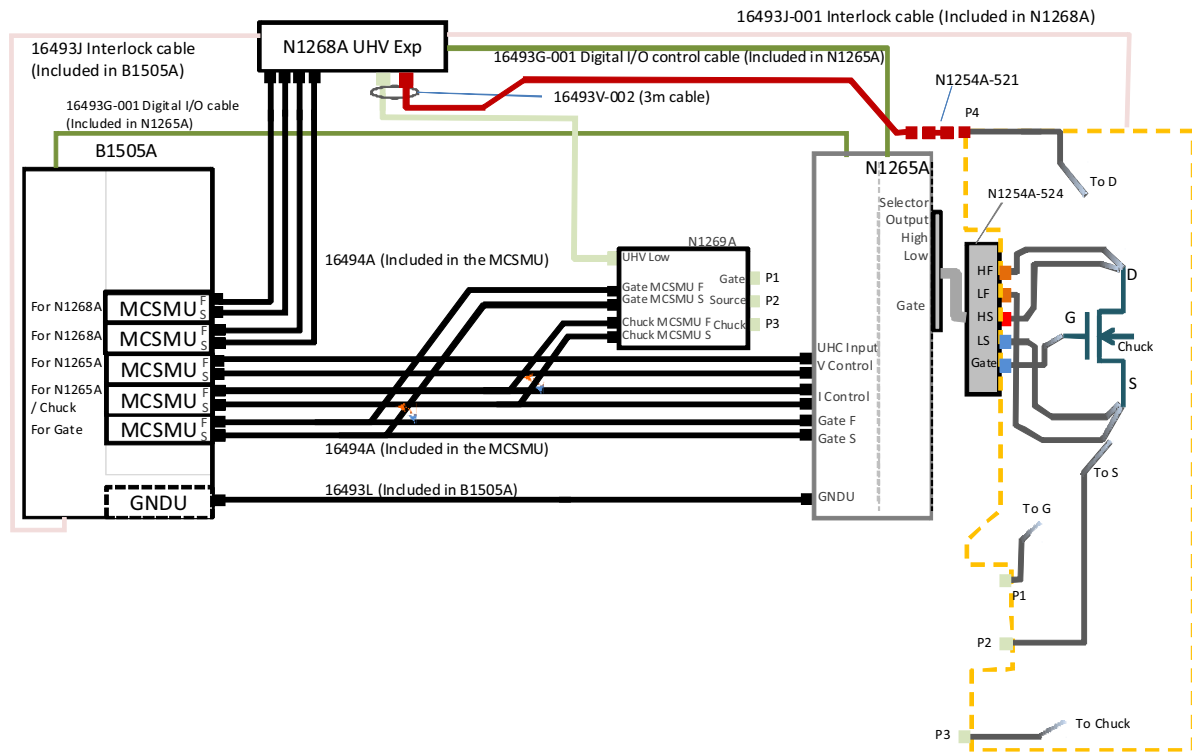
Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	6	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
16493T	1	High Voltage Source Monitor Unit Cable
16493T-001 or 002	1	High Voltage Source Monitor Unit Cable (1.5 m or 3.0 m)
16493L	1	Ground Unit Cable

Model/Option	Quantity	Description
16493L-001 or 002	1	Ground Unit Cable (Triaxial, 1.5 m or 3.0 m)
N1265A	1	Ultra High Current Expander/Fixture
N1265A-001	1	Ultra High Current Expander/Fixture
N1266A	1	High Voltage Source Monitor Unit Current Expander
16493S	1	High Current Source Monitor Unit Cable
16493S-011	1	High Current Source Monitor Unit non-Kelvin Adapter
16493U	1	High Current BNC Coaxial Cable
16493U-001	3	High Current BNC Coaxial Cable (1.5 m)
1250-2405	1	BNC-T plug (m)-BNC (f)-BNC (f) adapter, 1ea
N1254A	1	Accessories for instruments and fixtures
N1254A-524	1	Ultra High Current Prober System Cable
N1254A-104	1	Triax (f) to BNC (m) adapter
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter

10 kV, 500 A Measurement for On-Wafer Lateral Device

- Device Type: Lateral MOSFET (4 terminals)
- Key Specification
 - Max voltage/current: 10 kV/500 A

Figure 7-23 Connection example



NOTE When using the N1268A, P1 to P4 terminals need to be connected to Gate, Source, Chuck and Drain respectively, instead of the connection shown in [Figure 7-23](#).

NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-21 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1514A-FG	5	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
16493V	1	10 kV Ultra High Voltage Cable
16493V-002	1	10 kV Ultra High Voltage Cable (3.0 m)
N1265A	1	Ultra High Current Expander/Fixture
N1265A-001	1	Ultra High Current Expander/Fixture
N1268A	1	Ultra High Voltage Expander

Model/Option	Quantity	Description
N1268A-STD	1	Ultra High Voltage Expander
N1269A	1	Ultra High Voltage Connection Adapter
N1254A	1	Accessories for instruments and fixtures
N1254A-521	1	10 kV Ultra High Voltage Jack to Jack Adapter
N1254A-524	1	Ultra High Current Prober System Cable
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter

Configuration Examples for Vertical Device Measurement with Wafer Prober

This section introduces typical configuration examples for vertical device measurement with wafer prober shown in [Table 7-22](#)

Table 7-22 Configuration examples

Device	Max V	Max I	HVMC	C-V	Add MPSMU	Note
Vertical 3terminal on-wafer device	3 kV	20 A				"3 kV, 20 A Measurement for On-Wafer Vertical Device" on page 7-47
	3 kV	20 A		YES		"3 kV, 20 A, Capacitance Measurement for On-Wafer Vertical Device" on page 7-51
	3 kV	20 A			YES	"Add High Resolution Measurement (10 fA resolution with MPSMU or HPSMU) Capability to 3 kV, 20 A, Capacitance Measurement for On-Wafer Vertical Device" on page 7-54
	3 kV	40 A				"3 kV, 40 A Measurement for On-Wafer Vertical Device" on page 7-56
	3 kV	500 A				"3 kV, 500 A Measurement for On-Wafer Vertical Device" on page 7-59
	3 kV	500 A		YES		"3 kV, 500 A, Capacitance Measurement for On-Wafer Vertical Device" on page 7-60
	3 kV	500 A	YES			"3 kV, 500 A, High Voltage Medium Current Measurement for On-Wafer Vertical Device" on page 7-62
	10 kV	500 A				"10 kV, 500 A Measurement for On-Wafer Vertical Device" on page 7-64

3 kV, 20 A Measurement for On-Wafer Vertical Device

- Device Type: Vertical MOSFET (3 terminals)
- Key Specification
 - Max Voltage/Current: 3 kV/20 A

Figure 7-24 Connection example for 3 kV/20A measurement without N1258A Module Selector

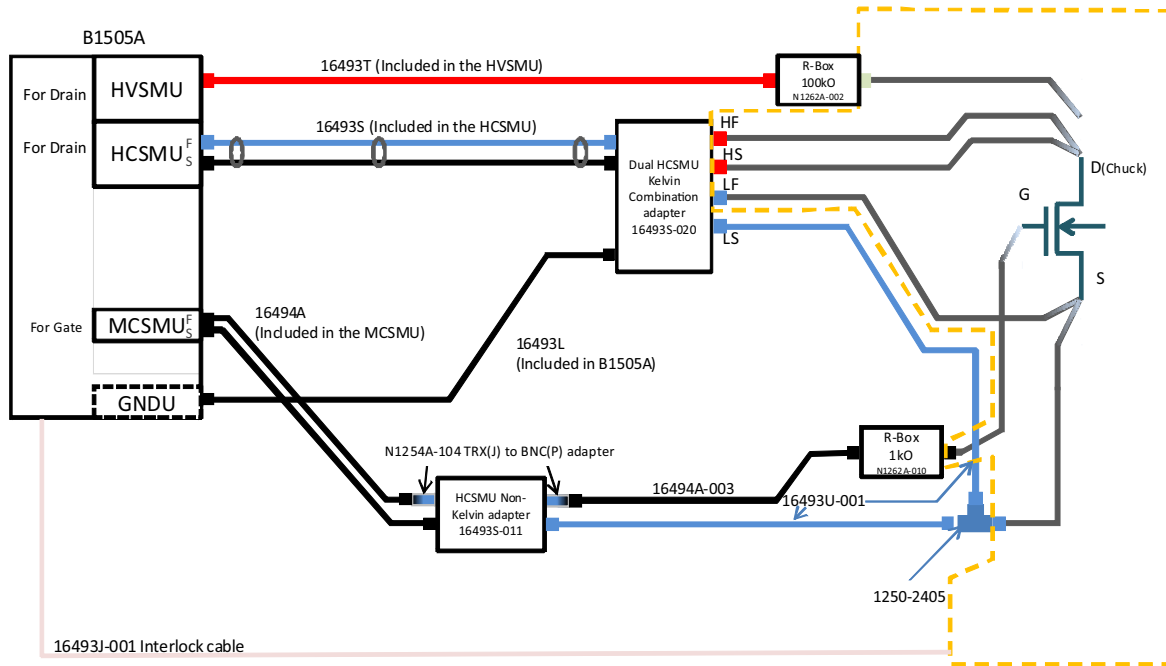


Table 7-23 Required equipment, accessories, and cables

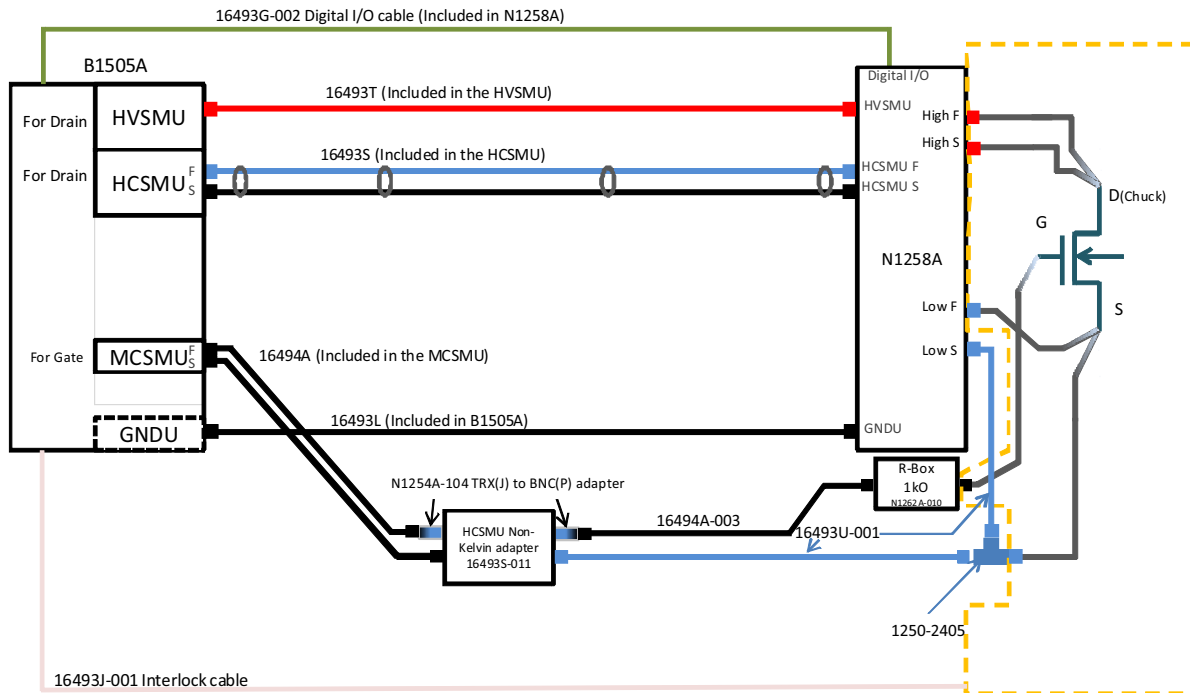
Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	1	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
16493U	1	High Current BNC Coaxial Cable
16493U-001	2	High Current BNC Coaxial Cable (1.5 m)
16494A	1	Triaxial Cable
16494A-003	1	Triaxial Cable (80 cm)
1250-2405	1	BNC-T Plug (m)-BNC (f)-BNC (f) adapter, 1ea
16493S	1	High Current Source Monitor Unit Cable
16493S-011	1	High Current Source Monitor Unit non-Kelvin Adapter
16493S-020	1	Dual HCSMU Combination Adapter

Connection and Ordering Examples

Configuration Examples for Vertical Device Measurement with Wafer Prober

Model/Option	Quantity	Description
N1262A	1	R-box for B1505A
N1262A-002	1	100 kohm R-box
N1262A-010	1	1 kohm R-box for gate (Triaxial output)
N1262A-036	1	50 Ohm Termination Adapter
N1254A	1	Accessories for instruments and fixtures
N1254A-104	2	Triax (f) to BNC (m) adapter

Figure 7-25 Connection example for 3 kV/20 A automated measurement with N1258A Module Selector



NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-24 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	1	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
16493U	1	High Current BNC Coaxial Cable
16493U-001	2	High Current BNC Coaxial Cable (1.5 m)
16494A	1	Triaxial Cable
16494A-003	1	Triaxial Cable (80 cm)
1250-2405	1	BNC-T Plug (m)-BNC (f)-BNC (f) adapter, 1ea
N1258A	1	Module Selector for B1505A
16493S	1	High Current Source Monitor Unit Cable
16493S-011	1	High Current Source Monitor Unit non-Kelvin Adapter
N1262A	1	R-box for B1505A
N1262A-010	1	1 kohm R-box for gate (Triaxial output)

Connection and Ordering Examples

Configuration Examples for Vertical Device Measurement with Wafer Prober

Model/Option	Quantity	Description
N1262A-036	1	50 Ohm Termination Adapter
N1254A	1	Accessories for instruments and fixtures
N1254A-104	2	Triax (f) to BNC (m) adapter

3 kV, 20 A, Capacitance Measurement for On-Wafer Vertical Device

- Device Type: Vertical MOSFET (4 terminals)
- Key Specification
 - Max voltage/current: 3 kV/20 A
 - Capacitance measurement up to 3 kV DC bias
 - Module Selector for multi-parameter automated measurement function

Figure 7-26 Connection example for IV measurement

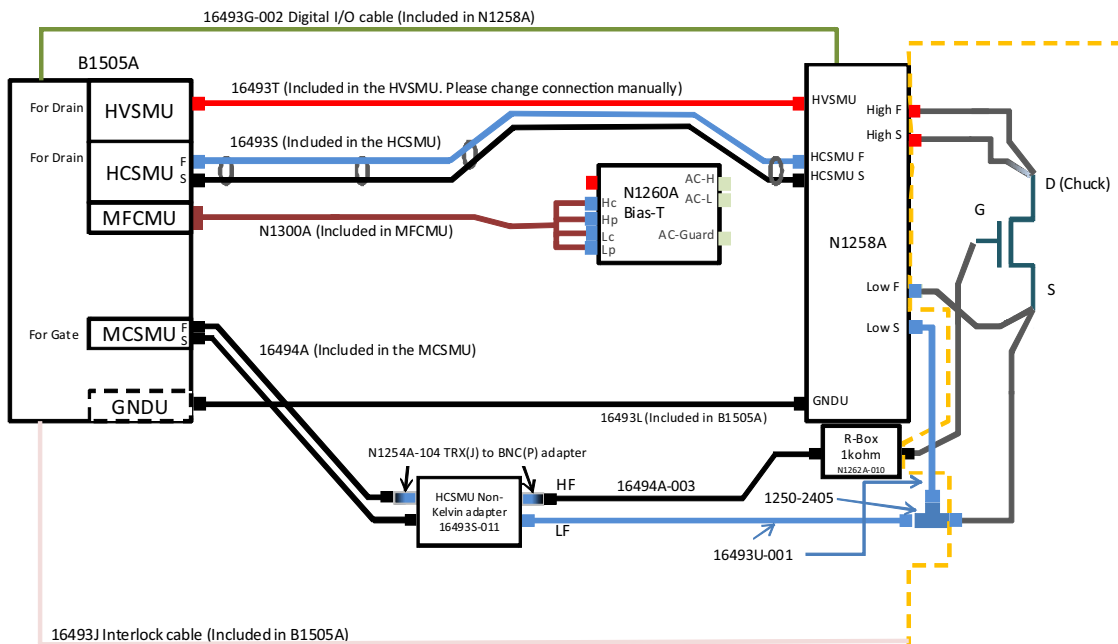
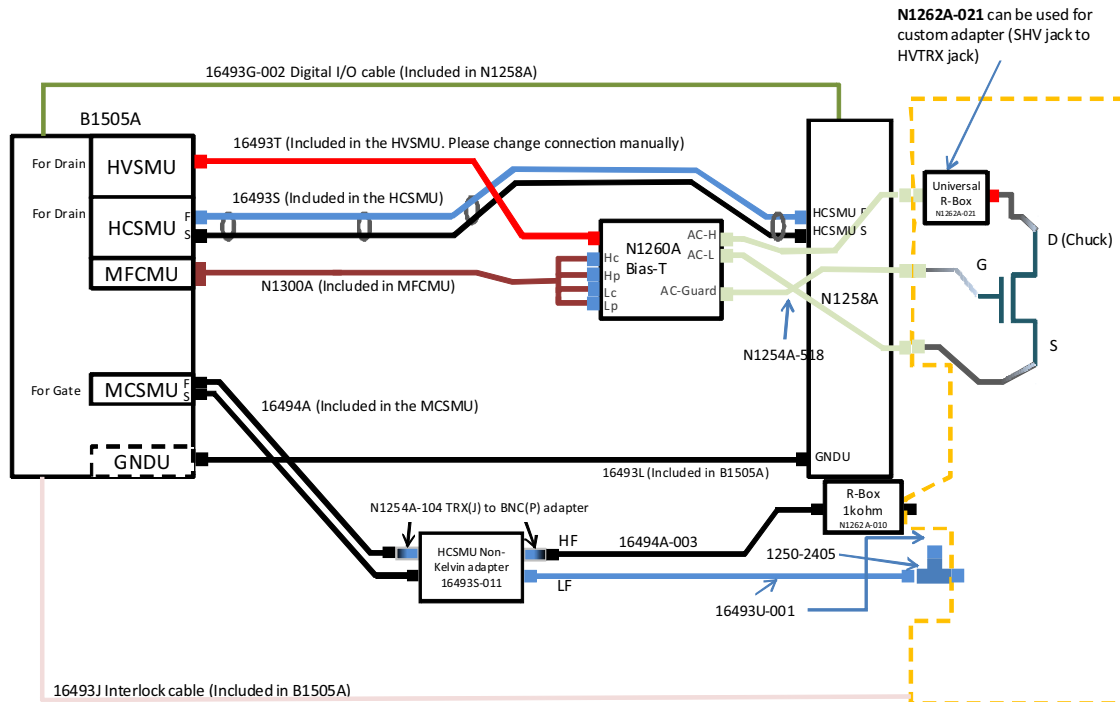


Figure 7-27 Connection example for CV measurement



NOTE The connection diagram in [Figure 7-27](#) shows Cds measurement.

NOTE Prober vendor is responsible for cabling inside the shielding box.

NOTE In the connection diagram in [Figure 7-27](#), a High Voltage Triaxial jack connector is used to connect the wafer chuck. Then you need an adapter to connect the High Voltage Triaxial plug connector to the SHV connector. Assemble it by using the N1262A-021 or consult your prober vendor.

Table 7-25 Ordering example

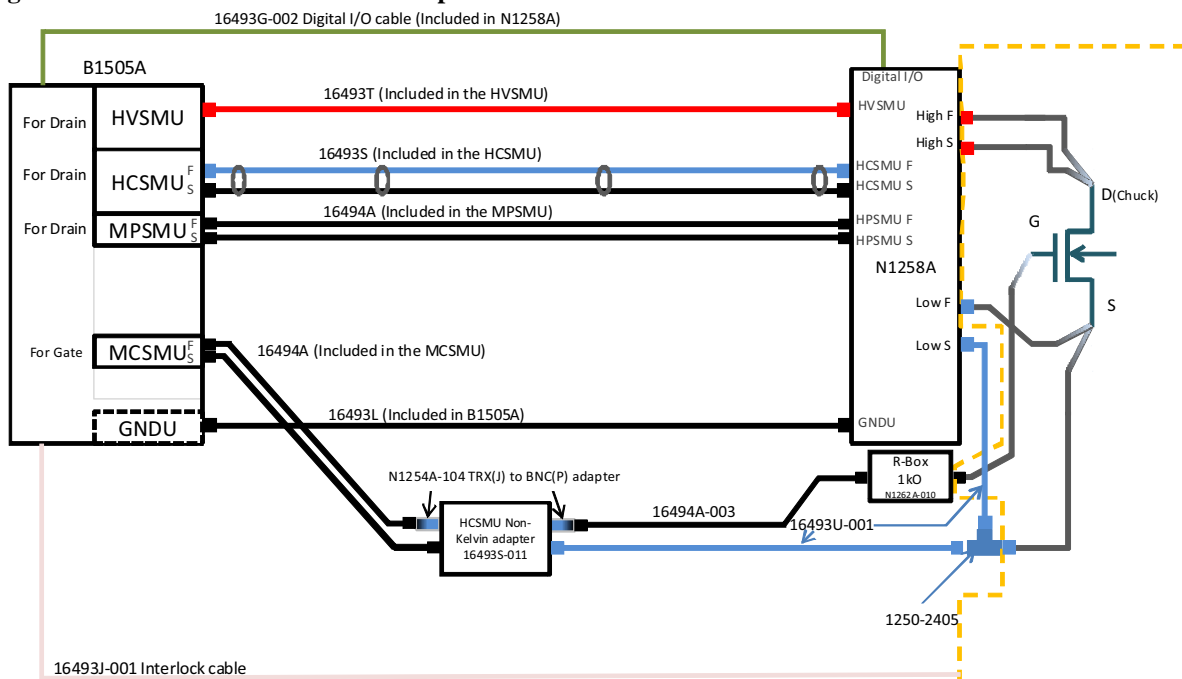
Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	1	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
B1520A-FG	1	Multi Frequency Capacitance Measurement Unit Module
16493U	1	High Current BNC Coaxial Cable
16493U-001	2	High Current BNC Coaxial Cable (1.5 m)
16494A	1	Triaxial Cable
16494A-003	1	Triaxial Cable (80 cm)
1250-2405	1	BNC-T Plug (m)-BNC (f)-BNC (f) adapter, 1ea
N1258A	1	Module Selector for B1505A

Model/Option	Quantity	Description
N1260A	1	High Voltage Bias-Tee
N1260A-STD	1	High Voltage Bias-Tee
16493S	1	High Current Source Monitor Unit Cable
16493S-011	1	High Current Source Monitor Unit non-Kelvin Adapter
N1262A	1	R-box for B1505A
N1262A-010	1	1 kohm R-box for gate (Triaxial output)
N1262A-021	1	Universal R-Box, HV Triaxial to SHV
N1262A-036	1	50 Ohm Termination Adapter
N1254A	1	Accessories for instruments and fixtures
N1254A-104	2	Triax (f) to BNC (m) adapter
N1254A-518	3	SHV Cable 1.5 m

Add High Resolution Measurement (10 fA resolution with MPSMU or HPSMU) Capability to 3 kV, 20 A, Capacitance Measurement for On-Wafer Vertical Device

- Device Type: Vertical MOSFET (3 terminals)
- Key Specification
 - Max voltage/current: 3 kV/20 A
 - Drain leakage current down to 10 fA
 - Module Selector for multi-parameter automated measurement function

Figure 7-28 Connection example



NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-26 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1511B-FG	1	Medium Power Source/Monitor Unit module (100 V/ 100 mA)
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	1	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
16493U	1	High Current BNC Coaxial Cable
16493U-001	2	High Current BNC Coaxial Cable (1.5 m)
16494A	1	Triaxial Cable
16494A-003	1	Triaxial Cable (80 cm)
1250-2405	1	BNC-T Plug (m)-BNC (f)-BNC (f) adapter, 1ea
N1258A	1	Module Selector for B1505A
16493S	1	High Current Source Monitor Unit Cable
16493S-011	1	High Current Source Monitor Unit non-Kelvin Adapter
N1262A	1	R-box for B1505A
N1262A-010	1	1 kohm R-box for gate (Triaxial output)
N1262A-036	1	50 Ohm Termination Adapter
N1254A	1	Accessories for instruments and fixtures
N1254A-104	2	Triax (f) to BNC (m) adapter

3 kV, 40 A Measurement for On-Wafer Vertical Device

- Device Type: Vertical MOSFET (3 terminals)
- Key Specification
 - Max voltage/current: 3 kV/30 A with Module Selector, 3 kV/40 A without Module Selector
 - Module Selector for multi-parameter automated measurement function

Figure 7-29 Connection example for 3kV, 30A measurement with a N1258A Module Selector

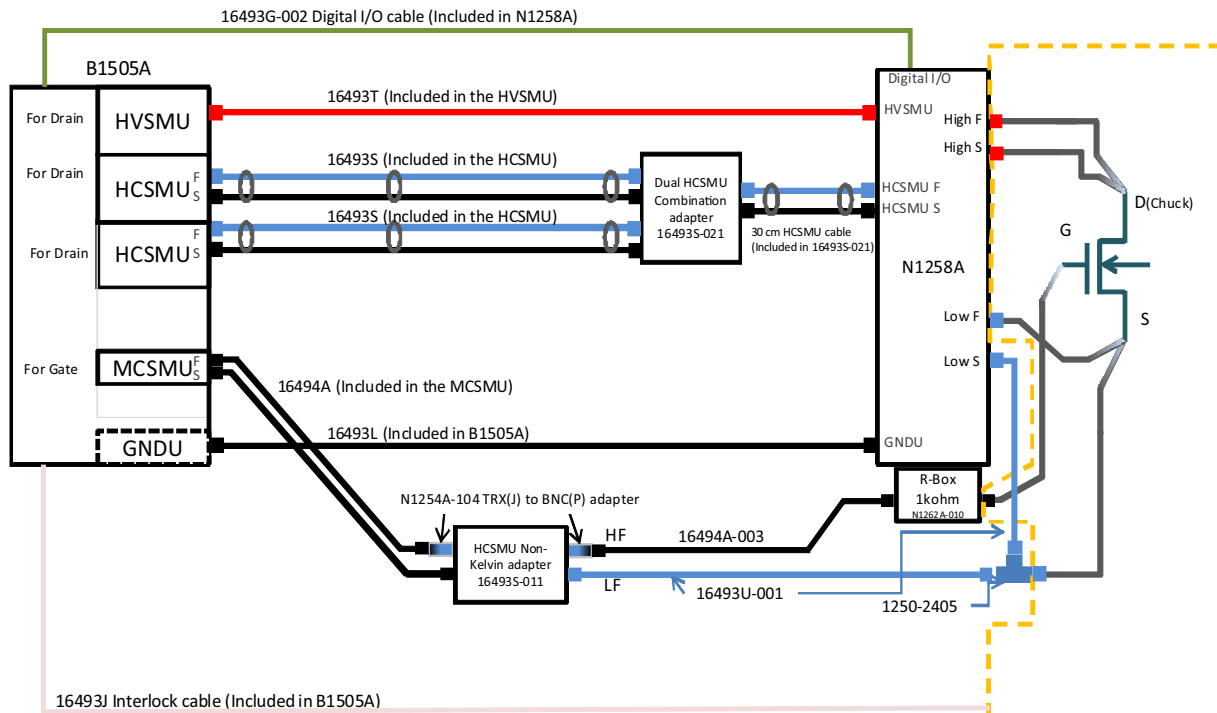
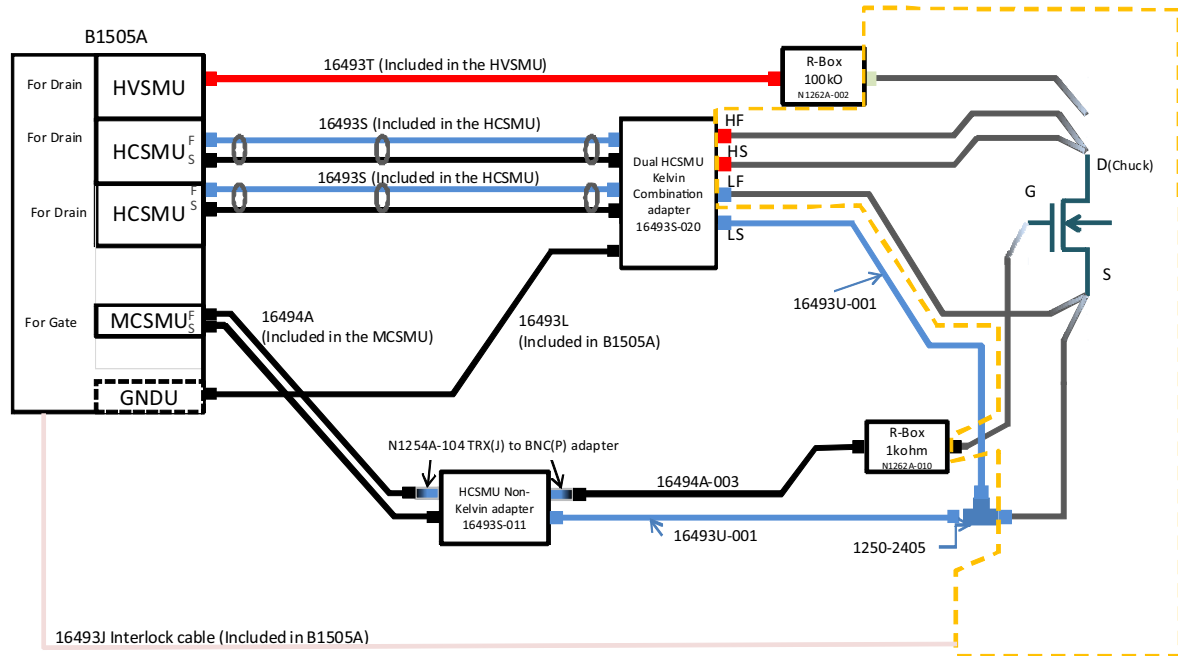


Figure 7-30 Connection example for 3kV, 40A measurement without a N1258A Module Selector



NOTE Module selector is available up to 30 A. If 40 A capability is required, please connect 16493S-020 Dual HCSMU Kelvin Connection Adapter without using a N1258A Module Selector (See [Figure 7-30](#)).

NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-27 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1512A-FG	2	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	1	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
16493S	1	High Current Source Monitor Unit Cable
16493S-020	1	Dual HCSMU Combination Adapter (This adapter is used when a N1258A Module Selector is not used).
16493S-021	1	Dual HCSMU Combination Adapter (This adapter is used with a N1258A Module Selector)
16493S-011	1	High Current Source Monitor Unit non-Kelvin Adapter
16493U	1	High Current BNC Coaxial Cable
16493U-001	2	High Current BNC Coaxial Cable (1.5 m)
16494A	1	Triaxial Cable
16494A-003	1	Triaxial Cable (80 cm)

Connection and Ordering Examples

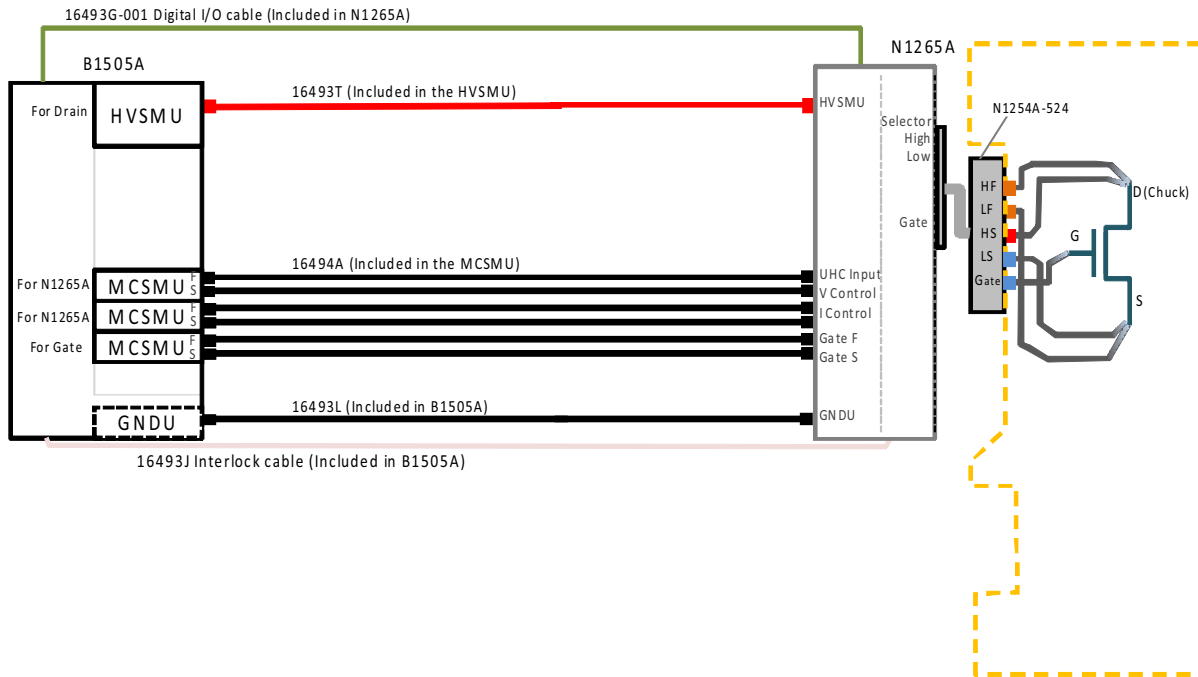
Configuration Examples for Vertical Device Measurement with Wafer Prober

Model/Option	Quantity	Description
1250-2405	1	BNC-T Plug (m)-BNC (f)-BNC (f) adapter, 1ea
N1258A	1	Module Selector for B1505A
N1262A	1	R-box for B1505A
N1262A-010	1	1 kohm R-box for gate (Triaxial output)
N1262A-002	1	100 kohm R-box
N1262A-036	1	50 Ohm Termination Adapter
N1254A	1	Accessories for instruments and fixtures
N1254A-104	2	Triax (f) to BNC (m) adapter

3 kV, 500 A Measurement for On-Wafer Vertical Device

- Device Type: Vertical MOSFET (3 terminals)
- Key Specification
 - Max voltage/current: 3 kV/500 A
 - Module Selector for multi-parameter automated measurement function

Figure 7-31 Connection example



NOTE Prober vendor is responsible for cabling inside the shielding box.

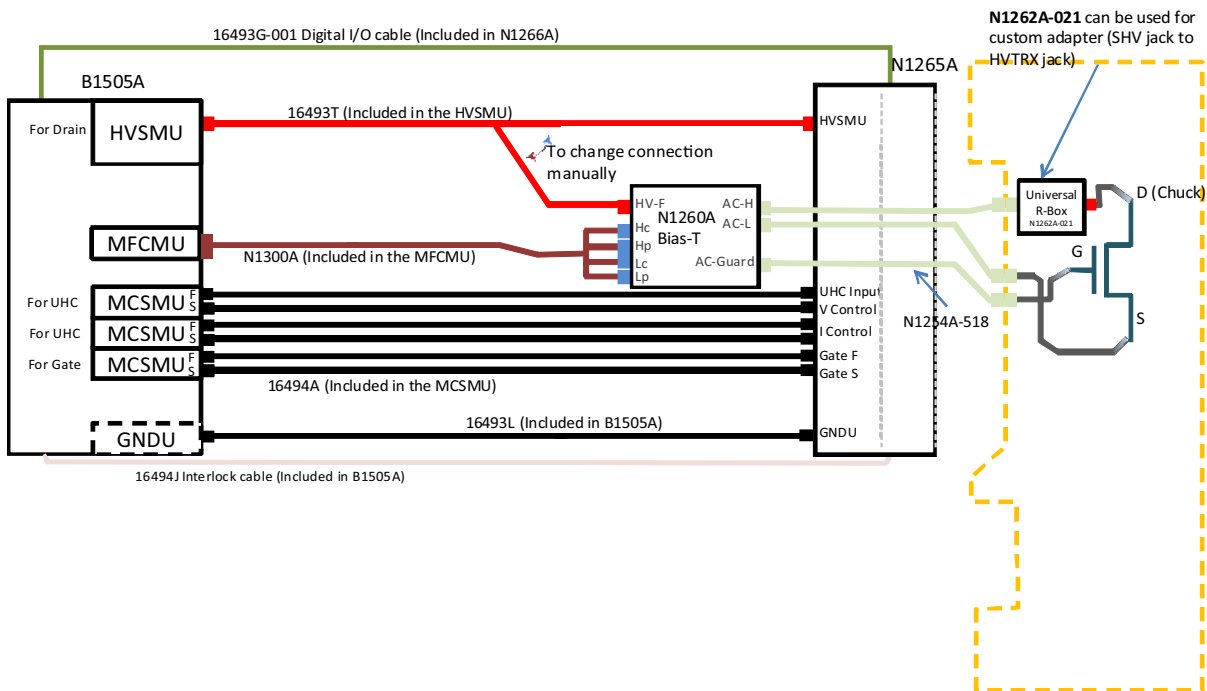
Table 7-28 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	3	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
N1265A	1	Ultra High Current Expander/Fixture
N1265A-001	1	Ultra High Current Expander/Fixture
N1254A	1	Accessories for instruments and fixtures
N1254A-524	1	Ultra High Current Prober System Cable
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter

3 kV, 500 A, Capacitance Measurement for On-Wafer Vertical Device

- Device Type: Vertical Device (3 terminals)
- Key Specification
 - Max voltage/current: 3 kV/500 A
 - Capacitance measurement up to 3 kV DC bias
 - Module Selector for multi-parameter automated measurement function

Figure 7-32 Connection example for CV measurement



NOTE Prober vendor is responsible for cabling inside the shielding box.

NOTE Please refer to [Figure 7-31](#) for IV measurement connection example.

NOTE In this configuration example, a High Voltage Triaxial jack connector is used to connect the wafer chuck. Then you need a adapter to connect the High Voltage Triaxial plug connector to the SHV connector. Assemble it by using the N1262A-021 connector or consult your prober vendor.

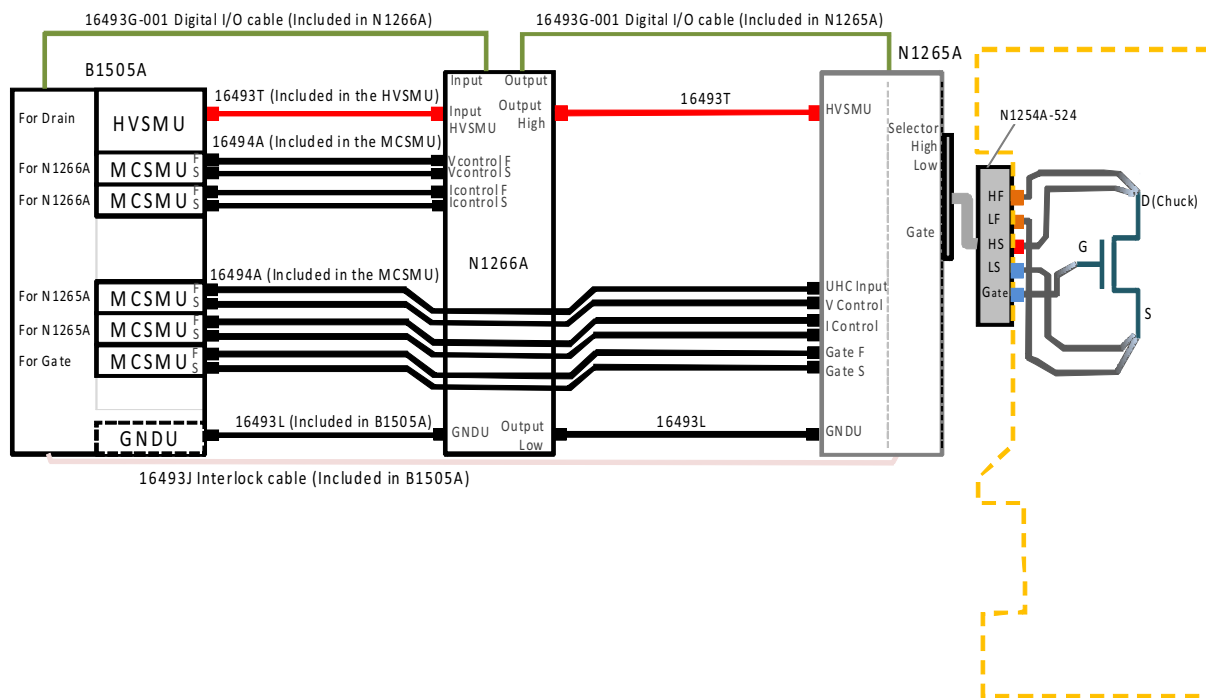
Table 7-29 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	3	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
B1520A-FG	1	Multi Frequency Capacitance Measurement Unit Module
N1265A	1	Ultra High Current Expander/Fixture
N1265A-001	1	Ultra High Current Expander/Fixture
N1260A	1	High Voltage Bias-Tee
N1260A-STD	1	High Voltage Bias-Tee
N1254A	1	Accessories for instruments and fixtures
N1254A-518	3	SHV Cable 1.5 m
N1254A-524	1	Ultra High Current Prober System Cable
N1262A	1	R-box for B1505A
N1262A-021	1	Universal R-Box, HV Triaxial to SHV
N1262A-036	1	50 Ohm Termination Adapter

3 kV, 500 A, High Voltage Medium Current Measurement for On-Wafer Vertical Device

- Device Type: Vertical MOSFET (3 terminals)
- Key Specification
 - Max voltage/current: 3 kV/500 A
 - High Voltage Medium Current capability: 2200 V/1.1 A, 1500 V/2.5 A
 - Module Selector for multi-parameter automated measurement function

Figure 7-33 3 kV, 500 A, High Voltage Medium Current Measurement for On-wafer Vertical Device



NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-30 Required equipment, accessories, and cables

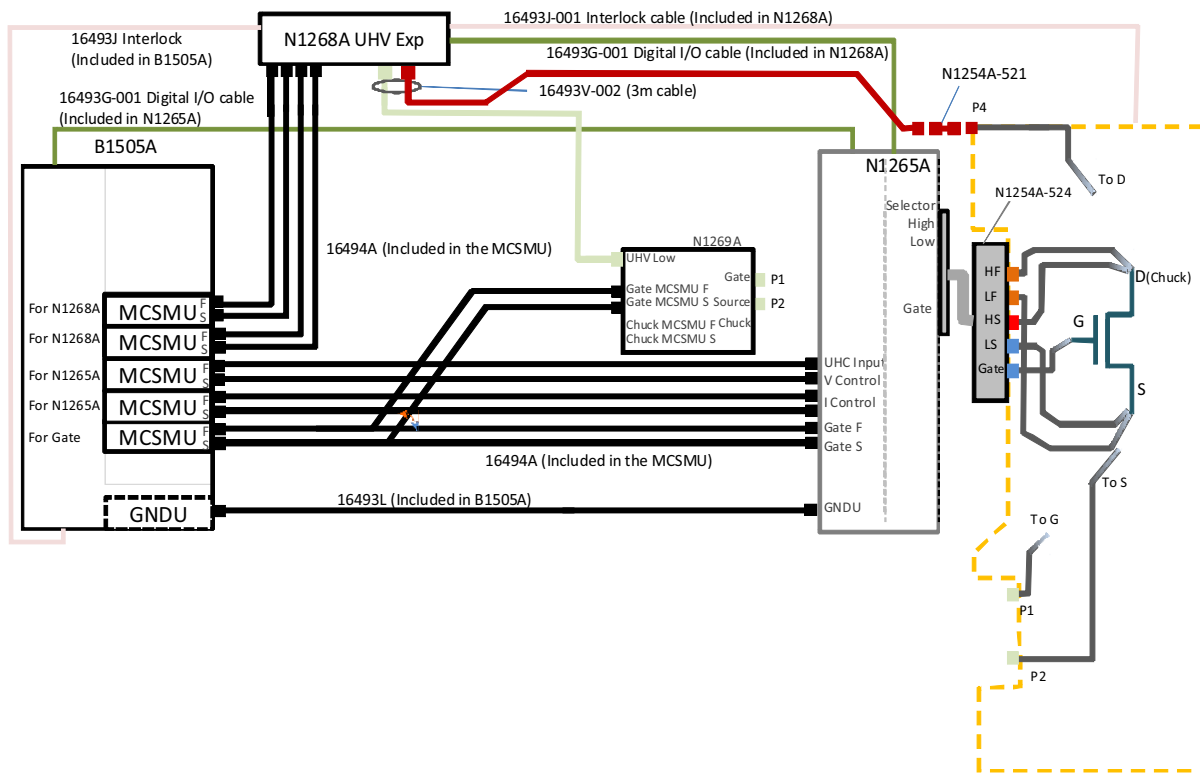
Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	5	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
16493T	1	High Voltage Source Monitor Unit Cable
16493T-001 or 002	1	High Voltage Source Monitor Unit Cable (1.5 m or 3.0 m)
16493L	1	Ground Unit Cable

Model/Option	Quantity	Description
16493L-001 or 002	1	Ground Unit Cable (Triaxial, 1.5 m or 3.0 m)
N1265A	1	Ultra High Current Expander/Fixture
N1265A-001	1	Ultra High Current Expander/Fixture
N1266A	1	High Voltage Source Monitor Unit Current Expander
N1254A	1	Accessories for instruments and fixtures
N1254A-524	1	Ultra High Current Prober System Cable
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter

10 kV, 500 A Measurement for On-Wafer Vertical Device

- Device Type: Vertical MOSFET (3 terminals)
- Key Specification
 - Max voltage/current: 10 kV/500 A

Figure 7-34 Connection example



NOTE When using the N1268A, P1, P2 and P4 terminals need to be connected to Gate, Source and Drain respectively, instead of the connection shown in Figure 7-34.

NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-31 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1514A-FG	5	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
16493V	1	10 kV Ultra High Voltage Cable
16493V-002	1	10 kV Ultra High Voltage Cable (3.0 m)
N1265A	1	Ultra High Current Expander/Fixture
N1265A-001	1	Ultra High Current Expander/Fixture
N1268A	1	Ultra High Voltage Expander

Model/Option	Quantity	Description
N1268A-STD	1	Ultra High Voltage Expander
N1269A	1	Ultra High Voltage Connection Adapter
N1254A	1	Accessories for instruments and fixtures
N1254A-521	1	10 kV Ultra High Voltage Jack to Jack Adapter
N1254A-524	1	Ultra High Current Prober System Cable
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter

GaN Current Collapse / Dynamic On-Resistance Measurement System using the N1267A

Non-Kelvin Connection with the N1259A Test Fixture for Package Device

- Device Type: Lateral MOSFET (3 terminals)
- Key Specification
 - Max Voltage/Current: 3 kV/20 A

Figure 7-35 Connection example

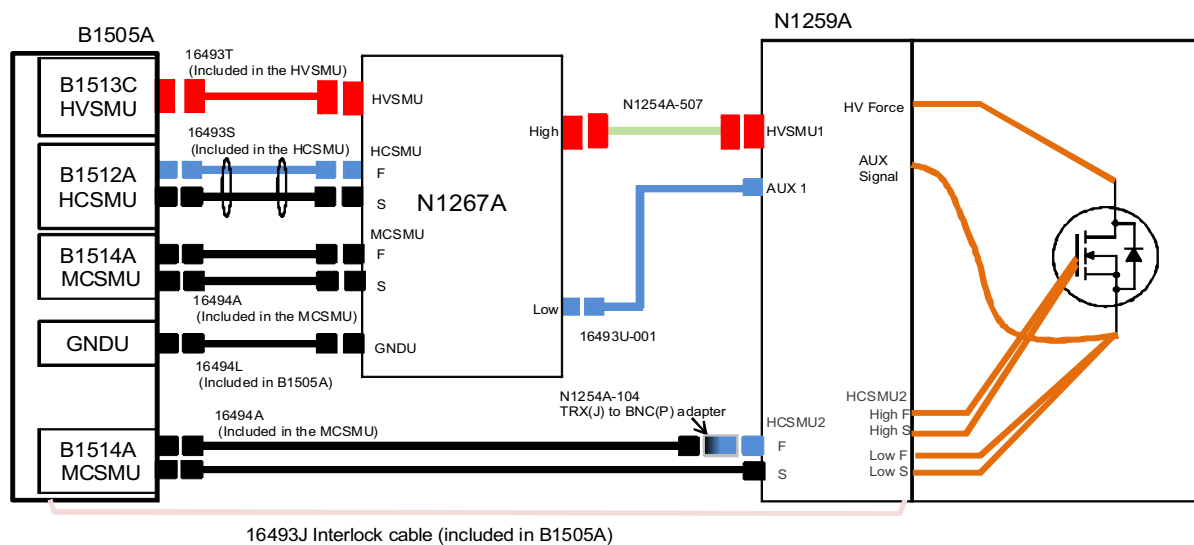


Table 7-32 Ordering example

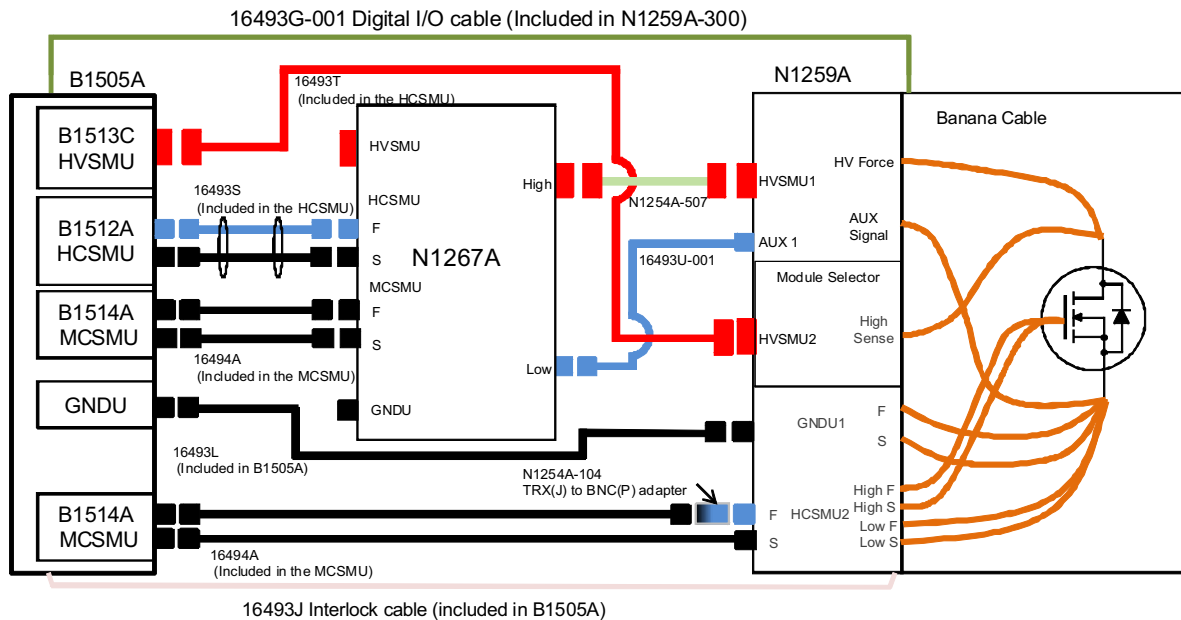
Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	2	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
N1267A	1	High Voltage Source Monitor Unit / High Current Source Monitor Unit Fast Switch
N1259A	1	Test Fixture for Power Device
N1259A-001	1	Test Fixture including Inline Package Socket Module and Cables
N1259A-022	1	100 kohm R-box
N1259A-030	1	1 kohm R-box for gate
N1259A-035	1	Universal R-Box

Model/Option	Quantity	Description
N1254A	1	Accessories for instruments and fixtures
N1254A-507	1	HVSMU Coaxial Cable Assy 1.5 m
N1254A-104	1	Triax (m) to BNC (f) adapter
16493U	1	High Current BNC Coaxial Cable
16493U-001	1	High Current BNC Coaxial Cable (1.5 m)
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter
1251-2277	1	Adapter-BNA BNC Jack Black

Kelvin Connection with the N1259A Test Fixture for Package Device

- Device Type: Lateral MOSFET (3 terminals)
- Key Specification
 - Max Voltage/Current: 3 kV/20 A

Figure 7-36 Connection example



NOTE The N1259A-300 Module Selector option for the N1259A Test Fixture is required for making Kelvin connection.

Table 7-33 Ordering example

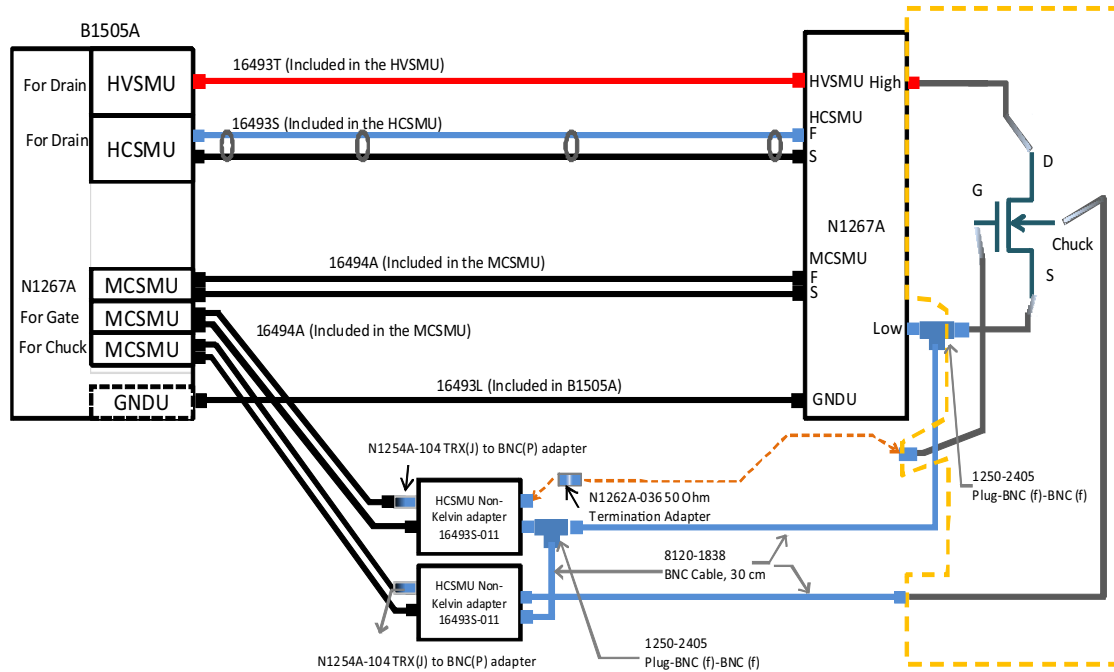
Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	2	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
N1267A	1	High Voltage Source Monitor Unit / High Current Source Monitor Unit Fast Switch
N1259A	1	Test Fixture for Power Device
N1259A-001	1	Test Fixture including Inline Package Socket Module and Cables
N1259A-022	1	100 kohm R-box
N1259A-030	1	1 kohm R-box for gate
N1259A-035	1	Universal R-Box
N1259A-300	1	Module Selector

Model/Option	Quantity	Description
N1254A	1	Accessories for instruments and fixtures
N1254A-507	1	HVSMU Coaxial Cable Assy 1.5 m
N1254A-104	1	Triax (m) to BNC (f) adapter
16493U	1	High Current BNC Coaxial Cable
16493U-001	1	High Current BNC Coaxial Cable (1.5 m)
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter
1251-2277	1	Adapter-BNA BNC Jack Black

Non-Kelvin Connection with Prober for On-Wafer Lateral Device

- Device Type: Lateral MOSFET (3 terminals)
- Key Specification
 - Max Voltage/Current: 3 kV/20 A

Figure 7-37 Connection example



NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-34 Ordering example

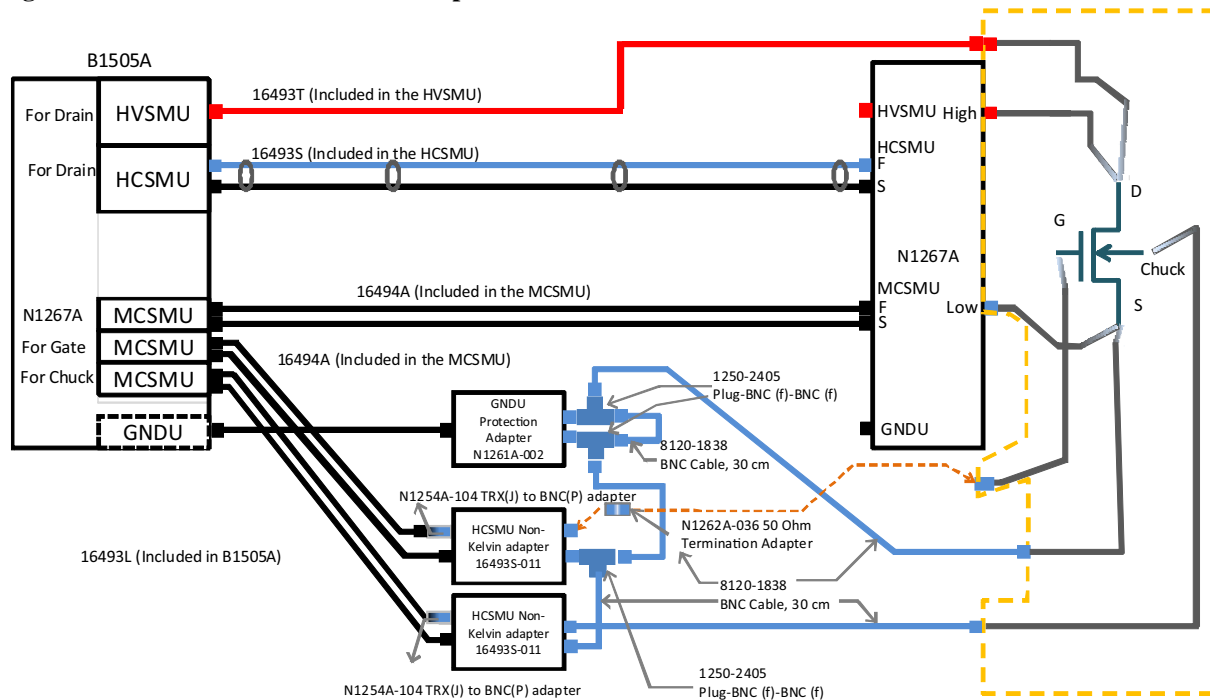
Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	3	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
N1267A	1	High Voltage Source Monitor Unit / High Current Source Monitor Unit Fast Switch
16493S	1	High Current Source Monitor Unit Cable
16493S-011	2	High Current Source Monitor Unit non-Kelvin Adapter
8120-1838	3	BNC Cable, 30 cm
1250-2405	2	BNC-T Plug (m)-BNC (f)-BNC (f) adapter, 1ea
N1254A	1	Accessories for instruments and fixtures

Model/Option	Quantity	Description
N1254A-104	2	Triax (f) to BNC (m) adapter
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter

Kelvin Connection with Prober for On-Wafer Lateral Device

- Device Type: Lateral MOSFET (3 terminals)
- Key Specification
 - Max Voltage/Current: 3 kV/20 A

Figure 7-38 Connection example



NOTE Prober vendor is responsible for cabling inside the shielding box.

Table 7-35 Ordering example

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1512A-FG	1	High Current Source Monitor Unit, 20 A/20 V(Pulsed); 1 A/40 V(DC)
B1513C-FG	1	High Voltage Source Monitor Unit, 3000 V/4 mA (Pulsed & DC)
B1514A-FG	3	Medium Current Source Monitor Unit, 1 A/30 V(Pulsed), 100 mA/30 V(DC)
N1267A	1	High Voltage Source Monitor Unit / High Current Source Monitor Unit Fast Switch
16493S	1	High Current Source Monitor Unit Cable
16493S-011	2	High Current Source Monitor Unit non-Kelvin Adapter
8120-1838	5	BNC Cable, 30 cm
1250-2405	3	BNC-T Plug (m)-BNC (f)-BNC (f) adapter, 1ea
N1254A	1	Accessories for instruments and fixtures
N1254A-104	2	Triax (f) to BNC (m) adapter

Model/Option	Quantity	Description
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter
N1261A	1	Protection Adapter
N1261A-002	1	Protection Adapter Ground Unit (BNC output)

Upgrading from existing B1505A

B1505A owners can upgrade their own B1505A to expand voltage and current range or add capacitance measurement capability.

Please refer to the following step by step instructions on how to upgrade your existing B1505A.

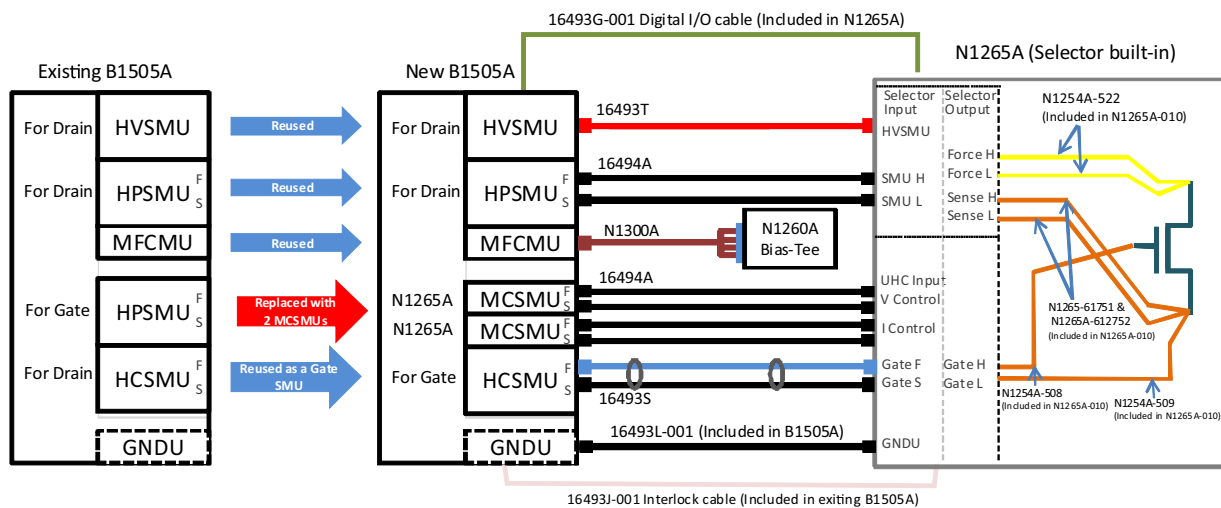
- Step 1: Create a full configuration based on your measurement requirement
- Step 2: Check if existing modules are re-usable in the new configuration
 - B1510A HPSMU
 - B1510A HPSMU used for module selector input can be re-used for the same purpose.
 - B1510A HPSMU used for a Gate SMU should be replaced with a B1514A MCSMU
 - B1512A HCSMU
 - B1512A HCSMU can be re-used as a controller SMU for a N1265A Ultra High Current Expander/Fixture, N1266A HVSMU Current Expander and N1268A Ultra High Voltage Expander (V control SMU only). In this case, one N1254A-103 Triaxial (m) to BNC (f) adapter and N1254A-517 Triaxial (f) to Triaxial (m) adapter are required.
 - B1513A/B HVSMU
 - B1513A HVSMU cannot be used with N1267A HVSMU/HCSMU Fast Switch unit. It must be replaced to the B1513B or later
 - B1513A HVSMU cannot be used for gate charge measurement. (N1259A/N1265A-014, N1274A or N1275A). It must be replaced to the B1513B or later.
 - B1513A HVSMU needs to be replaced with a B1513B/C HVSMU when you make GaN current collapse measurement using a N1267A HVSMU/HCSMU Fast Switch
 - B1513A/B HVSMU needs to be replaced with a B1513C HVSMU when you install more than one HVSMU. (Only B1513C supports multiple HVSMU configuration)
- Step 3: Check total number of consumed slots. If the total number of consumed slots exceeds 10, replace dual-slot modules with single-slot modules.
 - B1510A HPSMU
 - B1510A HPSMU may be replaced with a B1511B MPSMU
 - B1512A HCSMU
 - B1512A HCSMU may be replaced with a B1514A MCSMU
- Step 4: Check if existing cables are re-usable or not and add cables if necessary

- Cables are re-usable in the case listed below
 - B1513A HVSMU to B1513C HVSMU
 - B1510A HPSMU to B1511B MPSMU
 - B1510A HPSMU to B1514A MCSMU
- Step 4: Add a N1260A High Voltage Bias-Tee for capacitance measurement up to 3 kV if necessary
 - The N1265A Ultra High Current Expander/Fixture does not have a Bias-Tee option like the N1259A. The N1260A High Voltage Bias-Tee is necessary when making capacitance measurement up to 3 kV using a N1265A.

Example of how to upgrade existing B1505A

- Existing B1505A system configuration
 - B1505A with one unit of B1512A HCSMU, one unit of B1513A HVSMU, two units of B1510A HPSMU and one unit of B1520A MFCMU
 - N1259A Test Fixture with N1259A-010 3-line inline socket module option, N1259A-020 High Voltage Bias-Tee option and N1259A-300 Module Selector option.
- Conditions and required specification
 - Device Type: Three terminal discrete MOSFET
 - Max voltage/current: 3 kV/1500 A
 - Capacitance measurement up to 3 kV DC bias
 - Drain leakage current measurement down to 10 fA

Figure 7-39 Connection example of upgraded B1505A



NOTE The N1259A-010 Inline Package Socket Module (3 pin) cannot be used with the N1265A Ultra High Current Expander/Fixture due to its current limitation (maximum current is 40 A).

NOTE The N1259A-020 High Voltage Bias-Tee option cannot be re-used.

Table 7-36 Ordering example

Model/Option	Quantity	Description
B1505AU	1	Power Device Analyzer/Curve Tracer mainframe
B1505AU-014	2	Medium Current Source Monitor Unit (B1514A)
16494A	1	Triaxial Cable

Model/Option	Quantity	Description
16494A-001 or 002	2	Triaxial Cable (1.5 m or 3.0 m) (Two Triaxial cables which existing B1510A is furnished with can be re-used)
N1265A	1	Ultra High Current Expander / Fixture
N1265A-001	1	Ultra High Current Expander / Fixture
N1265A-010	1	500 A Ultra High Current 3-pin Inline Package Socket Module
N1265A-015	1	1500 A Current Option
N1260A	1	High Voltage Bias-Tee
N1260A-STD	1	High Voltage Bias-Tee
N1254A	1	Accessories for instruments and fixtures
N1254A-512	2	SHV Cable 250 mm
N1254A-513	2	SHV Jack to Banana Adapter
N1254A-518	2	SHV Cable 1.5 m
N1262A	1	R-box for B1505A
N1262A-036	1	50 Ohm Termination Adapter
1251-2277	1	Adapter-BNA BNC Jack Black

Connection and Ordering Examples
Upgrading from existing B1505A

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Edition 13, September 2022



B1505-90090
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