

**Agilent B1505A
Power Device Analyzer/
Curve Tracer**

**Configuration and Connection
Guide**



Agilent Technologies

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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

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In This Document

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

- Chapter 1, "Configuration Guide."
Describes how to configure the B1505A.
- Chapter 2, "N1259A Connection Guide."
Describes how to connect the B1505A, the N1259A Test Fixture, and a device under test (DUT).
- Chapter 3, "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.
- Chapter 4, "Connection and Ordering Examples."
Provides the connection examples and the ordering examples.

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1 Configuration Guide



Agilent B1505A Power Device Analyzer/Curve Tracer is a modular instrument which has ten slots for plug-in modules and four types of supported module. So you need to specify the module configuration and accessories you desire properly.

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

- “Furnished Accessories”
- “Modules and Mainframe Options”
- “Accessories for N1259A Test Fixture”
- “Accessories for Wafer Prober and Your Own Test Fixture”
- “Options and Accessories”
- “Retrofit Products for B1505A”
- “Upgrade Product from B1500A to B1505A”
- “Upgrade Kit for N1259AU Test Fixture”
- “Note for 4142B Users”

To make configuration of your B1505A

Follow the next steps. You can make the configuration of your B1505A as shown below.

Step	Action								
1	Make decision on the number of SMU modules to install. Two, three, or four?								
2	Make decision on the type of module to install, high voltage, high current, high power, or all?								
3	See “Modules and Mainframe Options” on page 1-6 and select the modules and the required options. To confirm the furnished accessories, see “Furnished Accessories” on page 1-3.								
4	For packaged device measurement: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px;"></td> <td>Use the N1259A test fixture and the required accessories. See “Accessories for N1259A Test Fixture” on page 1-9 and select the required accessories.</td> </tr> <tr> <td></td> <td>If you use your own test fixture, see “Accessories for Wafer Prober and Your Own Test Fixture” on page 1-12 and select the accessories required and available for your measurement environment. Be careful about the connector type. The connector of accessories should be the same as or convertible to the connector of your own test fixture.</td> </tr> <tr> <td></td> <td>If you use a handler for production tests or others, consult a third party or a system integrator to make your measurement environment.</td> </tr> </table> For on-wafer measurement: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px;"></td> <td>Use a wafer prober. See “Accessories for Wafer Prober and Your Own Test Fixture” on page 1-12 and select the accessories required and available for the wafer prober. Be careful about the connector type. The connector of accessories should be the same as or convertible to the connector of the wafer prober. If you need, consult the wafer prober vendor.</td> </tr> </table>		Use the N1259A test fixture and the required accessories. See “Accessories for N1259A Test Fixture” on page 1-9 and select the required accessories.		If you use your own test fixture, see “Accessories for Wafer Prober and Your Own Test Fixture” on page 1-12 and select the accessories required and available for your measurement environment. Be careful about the connector type. The connector of accessories should be the same as or convertible to the connector of your own test fixture.		If you use a handler for production tests or others, consult a third party or a system integrator to make your measurement environment.		Use a wafer prober. See “Accessories for Wafer Prober and Your Own Test Fixture” on page 1-12 and select the accessories required and available for the wafer prober. Be careful about the connector type. The connector of accessories should be the same as or convertible to the connector of the wafer prober. If you need, consult the wafer prober vendor.
	Use the N1259A test fixture and the required accessories. See “Accessories for N1259A Test Fixture” on page 1-9 and select the required accessories.								
	If you use your own test fixture, see “Accessories for Wafer Prober and Your Own Test Fixture” on page 1-12 and select the accessories required and available for your measurement environment. Be careful about the connector type. The connector of accessories should be the same as or convertible to the connector of your own test fixture.								
	If you use a handler for production tests or others, consult a third party or a system integrator to make your measurement environment.								
	Use a wafer prober. See “Accessories for Wafer Prober and Your Own Test Fixture” on page 1-12 and select the accessories required and available for the wafer prober. Be careful about the connector type. The connector of accessories should be the same as or convertible to the connector of the wafer prober. If you need, consult the wafer prober vendor.								

Furnished Accessories

The B1505A is furnished with the accessories listed in the following tables. Table 1-1 lists the accessories for the B1505A mainframe. And Table 1-2 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 1-1 **Furnished Accessories**

Description	Qty.		Description	Qty.	
16493J Interlock cable	1		16493L GNDU cable	1	
16444A-001 USB keyboard	1		16444A-002 USB mouse	1	
16444A-003 Stylus pen	1				
Description	Qty.	Note			
Manual CD	1	Stores electronic files of user manuals, literatures, and programming examples			
Software CD	1	Desktop EasyEXPERT software CD-ROM			
License sheet	1	License-to-use for Desktop EasyEXPERT Standard edition			
Disk set	1	Disk set for Agilent 4155B/4155C/4156B/4156C firmware update			
Label	1	Used to specify the SMU number. Only for the B1505A installed with SMU.			
Power cable	1				

Table 1-2 Measurement Cable Furnished with Modules






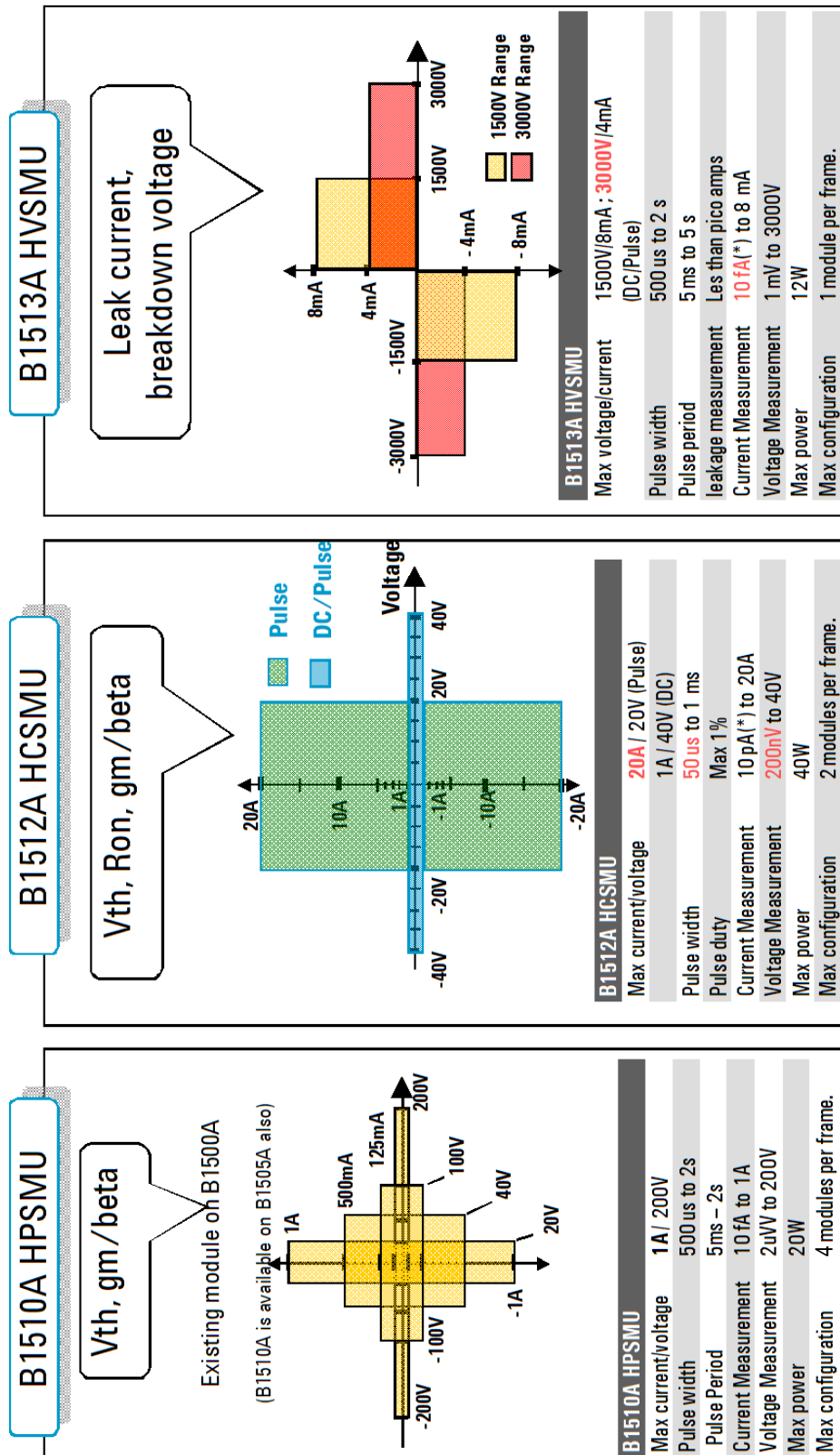
	Description	Quantity
	16494A Triaxial cable, for HPSMU	2 ea./ module
	16493T HVSMU cable, for HVSMU	1 ea./ module
	16493S HCSMU cable, for HCSMU	1 ea./ module
	16493S-010 HCSMU Kelvin adapter, for HCSMU Do not connect or put any conductor on the HCSMU Low Force and Low Sense terminals, outer conductor of the coaxial connectors. Connecting or putting conductor of circuit common, chassis ground, or any potential on causes the measurement error.	1 ea./ module
	N1300A CMU cable, for MFCMU	1 ea./ module

Figure 1-1 SMU Current and Voltage Coverage



Modules and Mainframe Options

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

- Select the modules to be installed in the B1505A mainframe
 See Table 1-3 for the plug-in modules supported by the B1505A. See figures 1-1 and 1-2 for the key features of the modules.
- Specify cable length, 1.5 m or 3 m
 See Table 1-4 for the options available for the B1505A.
- Select power line frequency, paper manual, rack mount kit, service options, and so on
 See Table 1-4 for the options available for the B1505A.

Table 1-3 Plug-in Modules Supported by B1505A

Module type	Description	Slots occupied	Maximum number of modules installed in B1505A ¹
HPSMU ²	High voltage source/monitor unit	2	4
HCSMU ^{2, 3}	High current source/monitor unit	2	2
HVSMU	High power source/monitor unit	2	1
MFCMU	Multi frequency capacitance measurement unit	1	1
GNDU ⁴	Ground unit	-	-

1. Total power consumption of all modules cannot exceed 84 W.
2. 4-HPSMU plus 1-HCSMU configuration and 3-HPSMU plus 2-HCSMU configuration are not supported.
3. 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).
4. GNDU has been installed in the mainframe. You do not need to count for the number of slots occupied.

NOTE

Module Position

The installation order of the modules is: HPSMU, MFCMU, HCSMU, and HVSMU starting from the bottom of the mainframe.

Figure 1-2 High Voltage Capacitance Measurement (MFCMU + HVSMU)

- 3000V DC biased capacitance measurement
- Spot & Sweep measurement
- 1 kHz - 5 MHz freq. range
- 1pF-10nF with 1% accuracy (10 kHz – 1 MHz) with HV Bias Tr
- Leak measurement when capacitance is measured. (uA level)

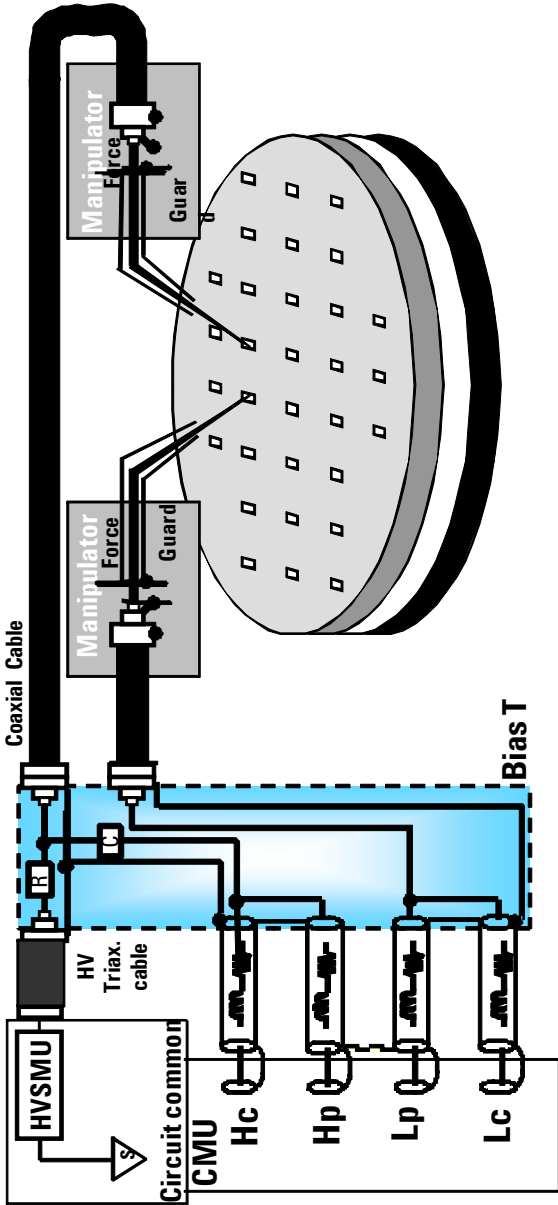


Table 1-4 Mainframe Options

Description	Model/ Option	Note
Mainframe		
Power Device Analyzer/Curve Tracer	B1505A	See Table 1-1 on page 1-3 for furnished accessories.
Select modules (optional)		
High Power Source/Monitor Unit module (HPSMU), 200V/1A	B1510A-FG	Furnished with triaxial cable (16494A), 2 each. Four modules can be installed.
High Current Source/Monitor Unit module (HCSMU), 20A at 20V	B1512A-FG	Furnished with HCSMU cable (16493S) and Kelvin adapter. Two modules can be installed.
High Voltage Source/Monitor Unit module (HVSMU), 3000V at 4mA	B1513A-FG	Furnished with HVSMU cable (16493T). One module can be installed.
Multi Frequency Capacitance Measurement Unit module (MFCMU)	B1520A-FG	Furnished with CMU cable (N1300A). One module can be installed.
Specify the cable length (mandatory)		
1.5m cable	015	Same cable length for all furnished cables
3.0m cable	030	
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	
Specify the language of the paper manuals if you need		
Paper manual set, English	ABA	Printed manuals are optional. Order this option to get the paper manuals. Contains B1505A user guide, quick start guide, and self-paced training manual, EasyEXPERT user guide and self-paced training manual, and B1500 series programming guide.
Paper manual set, Japanese	ABJ	
Select rack mount kit (optional)		
Rack mount kit	1CM	

Accessories for N1259A Test Fixture


The following table lists the accessories available for the N1259A test fixture. Select the required accessories. If you want to add options later, please refer to “Upgrade Kit for N1259AU Test Fixture” on page 1-25

Table 1-5 Accessories for N1259A Test Fixture

Description	Model/Option	Additional Information
<p>Test Fixture, furnished with Kelvin socket module for inline package device (N1259A-010), four black connection wire (N1259A-509), six red connection wire (N1259A-508), built-in GNDU protection adapter, and built-in HPSMU protection adapter. Mandatory option.</p>	<p>N1259A-001</p>	
<p>Kelvin socket module for inline package device (3pin)</p>	<p>N1259A-010</p>	
<p>Universal socket module for power device</p>	<p>N1259A-011</p>	

Configuration Guide
 Accessories for N1259A Test Fixture

Description	Model/Option	Additional Information
Blank teflon board	N1259A-012	
Curve tracer test adapter socket module	N1259A-013	
High voltage bias-T, furnished with two SHV-SHV test leads (N1254A-512) and two SHV-banana adapters (N1254A-513)	N1259A-020	Installed in the N1259A-001. Retrofit is available. See NOTE below.
1 M Ω R-box	N1259A-021	
100 k Ω R-box	N1259A-022	
1 k Ω R-box	N1259A-030	
Module selector, furnished with digital I/O control cable (16493G-001), maximum 35 VA	N1259A-300	Installed in the N1259A-001. Retrofit is available. See NOTE below.
Connection wire, red 1 ea.	N1254A-508	
Connection wire, black 1 ea.	N1254A-509	
Dolphin clip adapter, black 1 ea. and red 1ea.	N1254A-510	
Cable lag adapter, black 1 ea. and red 1ea.	N1254A-511	

Description	Model/Option	Additional Information
<p>SHV to SHV test lead, 1 ea.</p> <p>Two test leads are furnished with the high voltage bias-T (N1259A-020).</p> <p>The N1253A-513 adapter is required to connect the banana plug.</p>	N1254A-512	
<p>SHV to banana adapter, 1 ea.</p> <p>Two adapters are furnished with the high voltage bias-T (N1259A-020).</p> <p>The N1253A-513 adapter is used with the N1253A-512 test lead to connect the banana plug.</p>	N1254A-513	
<p>Digital I/O control cable</p> <p>The 16493G-001 cable is furnished with the module selector (N1259A-300).</p>	16493G	
<p>Dual HCSMU combination adapter, for 40 A measurement</p> <p>Output connectors are compatible with HCSMU.</p> <p>This adapter is furnished with the dedicated cable, 30 cm for output connection.</p> <p>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.</p>	16493S-021	

NOTE




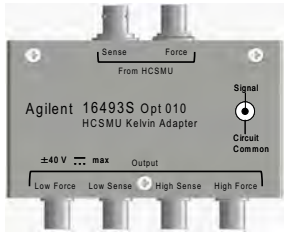
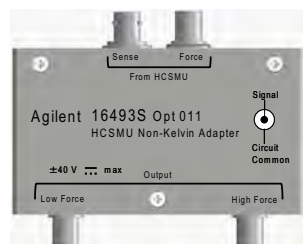
The N1259A-020 high voltage bias-T and/or the N1259A-300 module selector can be installed in the N1259A-001 test fixture later. Contact Agilent Technologies to get an estimation and order the retrofit. Agilent Technologies service center is responsible for the retrofit.



Accessories for Wafer Prober and Your Own Test Fixture

The following table lists the accessories available for the wafer prober or the test fixture other than N1259A. Select the required accessories.

Table 1-6 Accessories for Wafer Prober or Test Fixture other than N1259A

Description	Model/Option	
<p>Module selector, furnished with digital I/O control cable (16493G-001), built-in GNDU protection adapter, built-in HPSMU protection adapter, and built-in HCSMU Kelvin adapter, maximum 65 VA</p> <p>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.</p>	N1258A	
High voltage bias-T	N1260A	
Protection Adapter		
HPSMU protection adapter, Triax(f)	N1261A-001	
GNDU protection adapter, BNC(f)	N1261A-002	
HPSMU protection adapter, HV jack	N1261A-003	
GNDU protection adapter, SHV	N1261A-004	

Description	Model/Option	
High Voltage R-box		
1 M Ω R-box	N1262A-001	
100 k Ω R-box	N1262A-002	
1 k Ω R-box, Triax(f)	N1262A-010	
1 k Ω R-box, SHV	N1262A-011	
HCSMU Adapter		
<p>HCSMU Kelvin adapter</p> <p>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.</p>	16493S-010	
<p>HCSMU non-Kelvin adapter</p> <p>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.</p>	16493S-011	






Description	Model/Option	
Dual HCSMU Adapter		
<p>Dual HCSMU Kelvin combination adapter, for 40 A measurement, for connecting wafer prober directly</p> <p>Output connectors are compatible with N1258A module selector.</p> <p>This adapter has built-in GNDU protection adapter and built-in HCSMU Kelvin adapter.</p> <p>This adapter cannot be used with N1258A module selector and N1259A test fixture.</p> <p>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.</p>	16493S-020	
<p>Dual HCSMU combination adapter, for 40 A measurement, used with N1259A test fixture, N1258A module selector, or 16493S-010/011 HCSMU adapter</p> <p>Output connectors are compatible with HCSMU.</p> <p>This adapter is furnished with the dedicated cable, 30 cm for output connection.</p> <p>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.</p>	16493S-021	









Options and Accessories


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














Table 1-7 Options and Accessories

Model/Option	Description	Additional Information
Agilent EasyEXPERT software		
B1540A-001	Standard edition	
B1540A-002	Plus edition, adds support instrument (E5250A/E5252A switching matrix is supported)	
Agilent Desktop EasyEXPERT software		
B1541A-001	Standard edition	
B1541A-002	Plus edition, adds support instrument and function (E5250A/E5252A switching matrix is supported, and 4155/4156 support function is expanded)	
Accessories for B1500 series		
16444A-001	USB keyboard	
16444A-002	USB mouse	
16444A-003	Stylus pen	
Interlock cable		
16493J-001	1.5 m length	
16493J-002	3 m length	
16493J-003	5 m length	





Model/Option	Description	Additional Information
GNDU cable		
16493L-001	1.5 m length	
16493L-002	3 m length	
16493L-003	5 m length	
Triaxial cable for HPSMU		
16494A-001	1.5 m length	
16494A-002	3 m length	
16494A-003	80 cm length	
16494A-004	40 cm length	
16494A-005	4 m length	
Kelvin triaxial cable for HPSMU		
16493K-001	1.5 m length	
16493K-002	3 m length	
HVSMU cable, HV plug to HV plug triaxial cable		
16493T-001	1.5 m length	
16493T-002	3 m length	
Protection Adapter		
N1261A-001	HPSMU protection adapter, Input: Triax(f) × 2, Output: Triax(f) × 2	
N1261A-002	GNDU protection adapter, BNC(f)	

Model/Option	Description	Additional Information
N1261A-003	HPSMU protection adapter, HV jack	
N1261A-004	GNDU protection adapter, SHV	
High Voltage R-box		
N1262A-001	1 M Ω R-box	
N1262A-002	100 k Ω R-box	
N1262A-010	1 k Ω R-box, Triax(f)	
N1262A-011	1 k Ω R-box, SHV	
HCSMU cable and adapter		
16493S-001	1.5 m length	
16493S-002	3 m length	
16493S-010 ¹	HCSMU Kelvin adapter	
16493S-011 ¹	HCSMU non-Kelvin adapter	

Model/Option	Description	Additional Information
16493S-020 ¹	<p>Dual HCSMU Kelvin combination adapter, for 40 A measurement, for connecting wafer prober directly</p> <p>Output connectors are compatible with N1258A module selector.</p> <p>This adapter has built-in GNDU protection adapter and built-in HCSMU Kelvin adapter.</p> <p>This adapter cannot be used with N1258A module selector and N1259A test fixture.</p>	
16493S-021 ¹	<p>Dual HCSMU combination adapter, for 40 A measurement, used with N1259A test fixture, N1258A module selector, or 16493S-010/011 HCSMU adapter</p> <p>Output connectors are compatible with HCSMU.</p> <p>This adapter is furnished with the dedicated cable, 30 cm for output connection.</p>	 
16493U-001	High current coaxial cable, BNC(m) to BNC(m), 1.5 m	
16493U-002	High current coaxial cable, BNC(m) to BNC(m), 3 m	
MFCMU cable and high voltage bias-T		
N1300A-001	CMU cable, 1.5 m	
N1300A-002	CMU cable, 3 m	
N1260A	High voltage bias-T	
Accessories		
N1254A-500	HV jack connector, panel mount, for soldering, 1 ea.	

Model/Option	Description	Additional Information
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	BNC(m) to no connector coaxial cable, 1.5 m, 1 ea.	
N1254A-505	HV plug to no connector triaxial cable, 1.5 m, 1 ea.	
N1254A-506	HV plug to no connector coaxial cable, 1.5 m, 1 ea.	
N1254A-507	HV plug to HV plug coaxial cable, 1.5 m, 1 ea.	
N1254A-508	Connection wire, red 1 ea.	
N1254A-509	Connection wire, black 1 ea.	
N1254A-510	Dolphin clip adapter, black 1 ea. and red 1ea.	
N1254A-511	Cable lag adapter, black 1 ea. and red 1ea.	
N1254A-512	SHV to SHV test lead, 1 ea.	
N1254A-513	SHV to banana adapter, 1 ea.	
N1254A-514	BNC(m) to BNC(m) adapter, 1 ea.	

Model/Option	Description	Additional Information
N1254A-515	BNC(f)-BNC(m)-BNC(f) adapter, 1 ea.	
N1254A-516	BNC(f)-BNC(f)-BNC(f) adapter, 1 ea.	
1250-2405	BNC-T Plug(m)-BNC(f)-BNC(f) adapter, 1ea	
1252-1419	Interlock receptacle connector	
N1258A ¹	Module selector, furnished with digital I/O control cable (16493G-001), built-in GNDU protection adapter, built-in HPSMU protection adapter, and built-in HCSMU Kelvin adapter, maximum 65 VA	
Test Fixture		
N1259A-001	Test Fixture, furnished with Kelvin socket module for inline package device (N1259A-010), four black connection wire (N1259A-509), six red connection wire (N1259A-508), built-in GNDU protection adapter, and built-in HPSMU protection adapter	
N1259A-010	Kelvin socket module for inline package device	

Model/Option	Description	Additional Information
N1259A-011	Universal socket module for power device	
N1259A-012	Blank teflon board	
N1259A-013	Curve Tracer test adapter socket module	
N1259A-020	High voltage bias-T, furnished with two SHV-SHV test leads (N1254A-512) and two SHV-banana adapters (N1254A-513)	Installed in the N1259A-001. Retrofit is available. See NOTE below.
N1259A-021	1 M Ω R-box	
N1259A-022	100 k Ω R-box	
N1259A-030	1 k Ω R-box	
N1259A-300	Module selector, furnished with digital I/O control cable (16493G-001), maximum 35 VA	Installed in the N1259A-001. Retrofit is available. See NOTE below.

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

The N1259A-020 high voltage bias-T and/or the N1259A-300 module selector can be installed in the N1259A-001 test fixture later. Contact Agilent Technologies to get an estimation and order the retrofit. Agilent Technologies service center is responsible for the retrofit.

Retrofit Products for B1505A

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

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

Table 1-8 **Module products and available accessories**

Model/ Option	Description	Note
Measurement module		
B1510A	High power source/monitor unit module (HPSMU), 200 V/1 A	Modules are NOT furnished with any cables. Order the required cables and accessories separately.
B1512A	High current source/monitor unit module (HCSMU), 20 A at 20 V	
B1513A	High voltage source/monitor unit module (HVSMU), 3000 V at 4 mA	
B1520A	Multi frequency capacitance measurement unit module (MFCMU)	
B1510A HPSMU 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 Kelvin combination adapter, for 40 A measurement, for connecting wafer prober directly	
16493S-021 ¹	Dual HCSMU combination adapter, for 40 A measurement, used with N1259A test fixture, N1258A module selector, or 16493S-010/011 HCSMU adapter	Furnished with the dedicated cable, 30 cm for output connection.

Model/ Option	Description	Note
B1513A 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 Agilent Technologies service center is responsible for module installation. Contact Agilent Technologies to get an estimation and order. Module products doesn't include installation cost.

NOTE MPSMU (medium power SMU) and HRSMU (high resolution SMU) are not supported by the B1505A.

NOTE Under the total power consumption limit, there is configuration limitation. Please refer to Table 1-3 on page 1-6.

Upgrade Product from B1500A to B1505A

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

Table 1-9 Required and Available Accessories for Remodelling B1500A to B1505A

Model/ Option	Description	Note
B1505AU	Conversion kit from B1500A to B1505A	Mainframe doesn't include anything.
B1505AU-001	Conversion kit from B1500A to B1505A	Furnished with interlock cable and GNDU cable only. Mandatory option. It doesn't include modules, other cables. Select modules or accessories separately. Please refer to "Retrofit Products for B1505A" on page 1-22.

NOTE Agilent Technologies service center is responsible for remodelling and module installation. Contact Agilent Technologies to get an estimation and order remodelling. B1505AU doesn't include installation cost.

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 HDD by yourself before sending the instrument to the service center.





NOTE The 16442A/16442B test fixture cannot cover 3000 V / 40 A. So use the N1259A designed for supporting the B1505A. See "Accessories for N1259A Test Fixture".

NOTE MPSMU (medium power SMU), HRSMU (high resolution SMU), WGFMU (Waveform Generator / Fast Measurement Unit), and 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 1-10 Available options for upgrading N1259A

Model/ Option	Description	Note
N1259AU	Upgrade Kit for N1259A Test Fixture	This product is only available for N1259A owner. No furnished items in main product. Please select the following options.
N1259AU-010	Inline Package Socket Module (3 pin)	
N1259AU-011	Universal Socket Module	
N1259AU-012	Blank Teflon Board	
N1259AU-013	Curve Tracer Test Adapter Socket Module	

Configuration Guide
 Upgrade Kit for N1259AU Test Fixture

Model/ Option	Description	Note
N1259AU-020	High Voltage Bias-Tee	furnished with two SHV-SHV test leads (N1254A-512) and two SHV-banana adapters (N1254A-513). Upgrade Info: Installation is performed at Agilent service center. Installation cost is not included in the price.
N1259AU-021	1Mohm R-box	
N1259AU-022	100 kohm R-box	
N1259AU-030	1 kohm R-box for gate	
N1259AU-300	Module Selector	furnished with digital I/O control cable (16493G-001), maximum 35 VA. Upgrade Info: Installation is performed at Agilent service center. Installation cost is not included in the price
N1254A-508	Connection wire, red 1 ea.	
N1254A-509	Connection wire, black 1 ea.	
N1254A-510	Dolphin clip adapter, black 1 ea. and red 1ea.	
N1254A-511	Cable lag adapter, black 1 ea. and red 1ea.	

Model/ Option	Description	Note
N1254A-512	<p>SHV to SHV test lead, 1 ea.</p> <p>Two test leads are furnished with the high voltage bias-T (N1259A-020).</p> <p>The N1253A-513 adapter is required to connect the banana plug.</p>	
N1254A-513	<p>SHV to banana adapter, 1 ea.</p> <p>Two adapters are furnished with the high voltage bias-T (N1259A-020).</p> <p>The N1253A-513 adapter is used with the N1253A-512 test lead to connect the banana plug.</p>	
16493G	<p>Digital I/O control cable</p> <p>The 16493G-001 cable is furnished with the module selector (N1259A-300).</p>	

NOTE Agilent Technologies service center is responsible for **option 020 and 300** installation. Contact Agilent Technologies to get an estimation and order remodelling. B1505AU doesn't include installation cost.

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 HDD by yourself before sending the instrument to the service center.

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 Agilent 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 1-11 Considering Connector Types

Connector Plate Part Number 04142-60032
 Interlock receptacle: Agilent 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



2

N1259A Connection Guide



This chapter describes the required information for connecting Agilent 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, HPSMU, HVSMU, and HCSMU or dual HCSMU (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 prevent electrical shock during use, connect the Interlock cable (see “To Connect Interlock Circuit” on page 2-6).

WARNING

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

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

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 3-11 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.

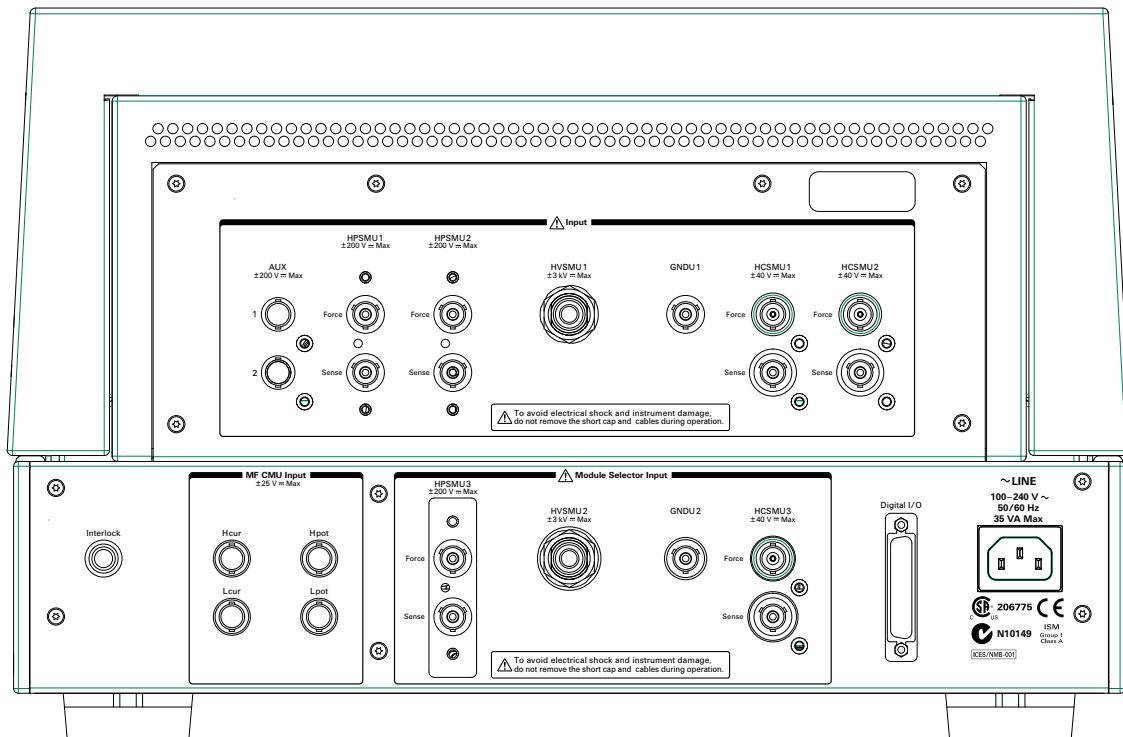
Input Connection

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. And Table 2-2 shows the connections for using Module Selector (N1259A-300).

Module selector is used to switch the measurement resource connected to the DUT automatically. The measurement resource will be GNDU, HPSMU, HVSMU, HCSMU, or DHCSMU. One selector provides one switching channel.

Tables 2-1 and 2-2 support the B1505A installed with one HVSMU, one HCSMU, one HPSMU, and one MFCMU. If your B1505A installs additional HCSMU and/or HPSMU, use extra N1259A terminal HCSMU1 or HCSMU2, and/or HPSMU1 or HPSMU2 for connection.

Figure 2-1 N1259A Rear View



WARNING

To avoid electrical shock and instrument damage, do not connect or disconnect measurement cable or connector cap during operation.

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

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.

Table 2-1 To Connect between B1505A and N1259A, without 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.	GNDU1	
HVSMU	Force	16493T HVSMU cable, 3 m or 1.5 m, 1 ea.	HVSMU1	
HCSMU or DHCSMU	Force	16493S HCSMU cable, 3 m or 1.5 m, 1 ea. for HCSMU	HCSMU1 or HCSMU2	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	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.	AUX 1	
	Lpot/ Lcur	It is not needed to connect the ground wire extended from the CMU cable.	AUX 2	
MFCMU	Hpot	N1300A CMU cable, 3 m or 1.5 m, 1 ea.	MFCMU Only for N1259A- 020	Hpot
	Hcur	It is not needed to connect the ground wire extended from the CMU cable.		Hcur
	Lcur			Lcur
	Lpot			Lpot
N.A		BNC cable, for connecting instruments other than the B1505A	AUX 1 or 2	

NOTE

For connecting HPSMU, use either 16494A or 16493K.
For connecting MFCMU, use either AUX or MFCMU only for N1259A-020.
Turn the B1505A off before connecting the CMU cable.

CAUTION

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

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

Table 2-2 To Connect between B1505A and N1259A, using Module Selector (N1259-300)

B1505A terminals		Required cables	N1259A terminals	
Digital I/O		16493G Digital I/O connection cable, 3 m or 1.5 m, 1 ea.	Digital I/O	
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.	GNDU2	
HVSMU	Force	16493T HVSMU cable, 3 m or 1.5 m, 1 ea.	HVSMU2	
HCSMU or DHCSMU	Force	16493S HCSMU cable, 3 m or 1.5 m, 1 ea. for HCSMU	HCSMU3	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	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
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.	AUX 1	
	Lpot/ Lcur	It is not needed to connect the ground wire extended from the CMU cable.	AUX 2	
MFCMU	Hpot	N1300A CMU cable, 3 m or 1.5 m, 1 ea.	MFCMU Only for N1259A- 020	Hpot
	Hcur	It is not needed to connect the ground wire extended from the CMU cable.		Hcur
	Lcur			Lcur
	Lpot			Lpot
N.A		BNC cable, for connecting instruments other than the B1505A	AUX 1 or 2	
N.A		Power cable, 1 ea., for connecting to power line	LINE, 35 VA Max.	

NOTE Turn the B1505A off before connecting the cables between the B1505A and the N1259A Test Fixture.

For connecting HPSMU, 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 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.

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.

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 2-16
- “N1259A-011 Universal Socket Module” on page 2-17
- “N1259A-012 Blank Teflon Board” on page 2-18

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

Table 2-3

Required Parts

Model/Option	Description
N1254A-508	Connection wire, red, for using socket module 
N1254A-509	Connection wire, black, for using socket module 
N1254A-510	Dolphin clip adapter, red and black, for using blank board 
N1254A-511	Cable lag adapter, red and black, for using blank board 
N1254A-512	SHV(plug)-SHV(plug) test lead, for using high voltage bias-T 
N1254A-513	SHV(jack)-banana adapter, attached to SHV test lead 

NOTE

Note that you must set the module output off when connecting or disconnecting DUT. If not, the DUT may be damaged.

To set the module output off, press the **Stop** key.

WARNING

To avoid electrical shock and instrument damage, do not connect or disconnect measurement cable during operation. Hazardous voltage, SMU maximum output voltage may appear at the Force, Guard, and Sense terminals if the fixture cover is closed.

To Connect DUT

1. Press the **Stop** key to set the module output off.
2. Open the fixture cover.
3. Set a socket module on the test fixture.

For using the blank teflon board, see “N1259A-012 Blank Teflon Board” on page 2-18.

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 2-16.

For using the universal socket module, also see “N1259A-011 Universal Socket Module” on page 2-17.

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.

CAUTION

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

CAUTION

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

CAUTION

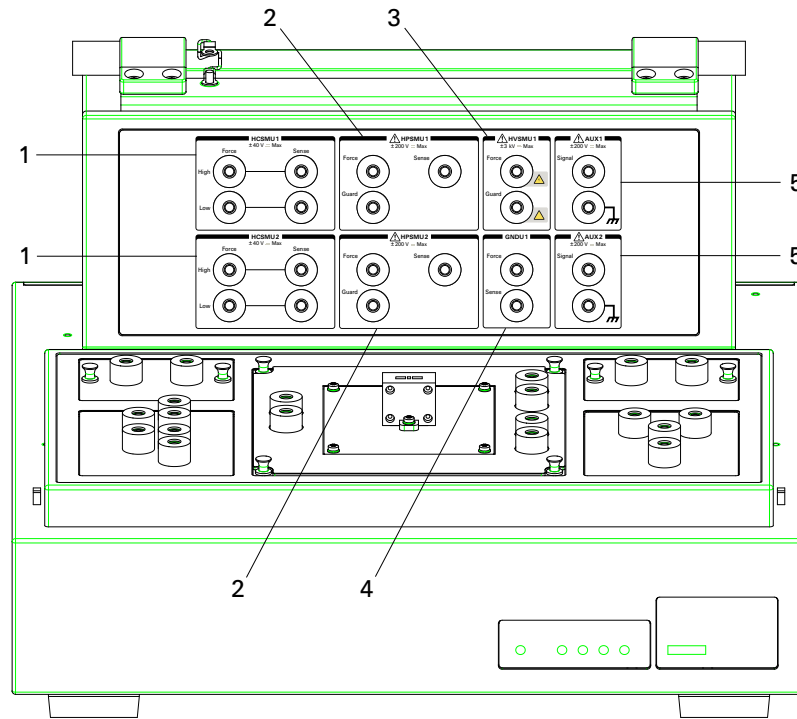
Never connect the HVSMU Force and Guard terminals to any output, including circuit common, chassis ground, or any other module terminal. Connecting other module may damage the connected module.

NOTE

HPSMU/HVSMU Guard terminal

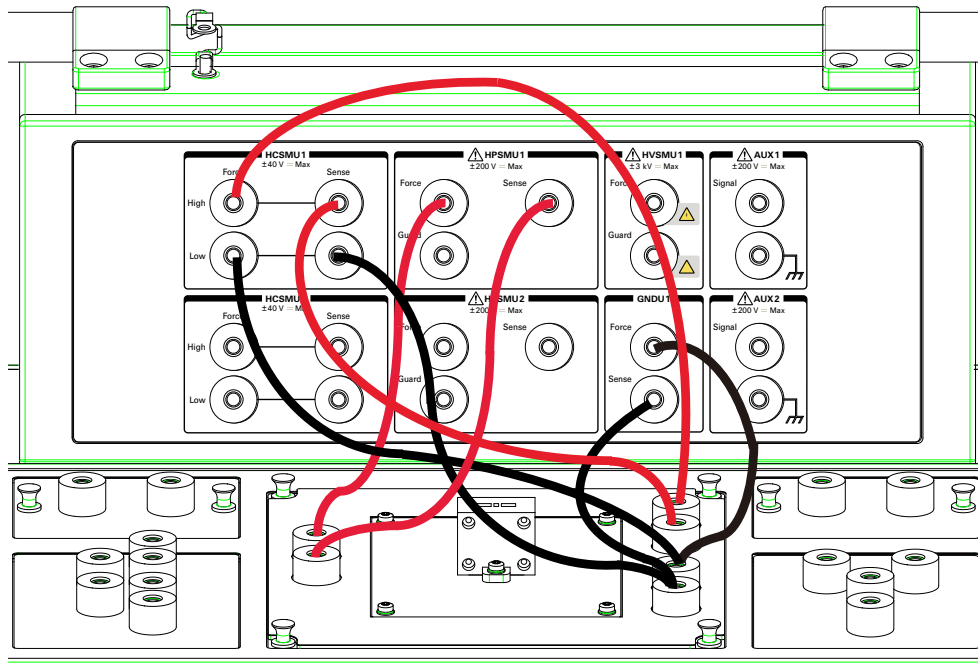
Guard must be opened. You may extend it as close as possible to a DUT terminal for reducing the leakage current of the extension cable.

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.

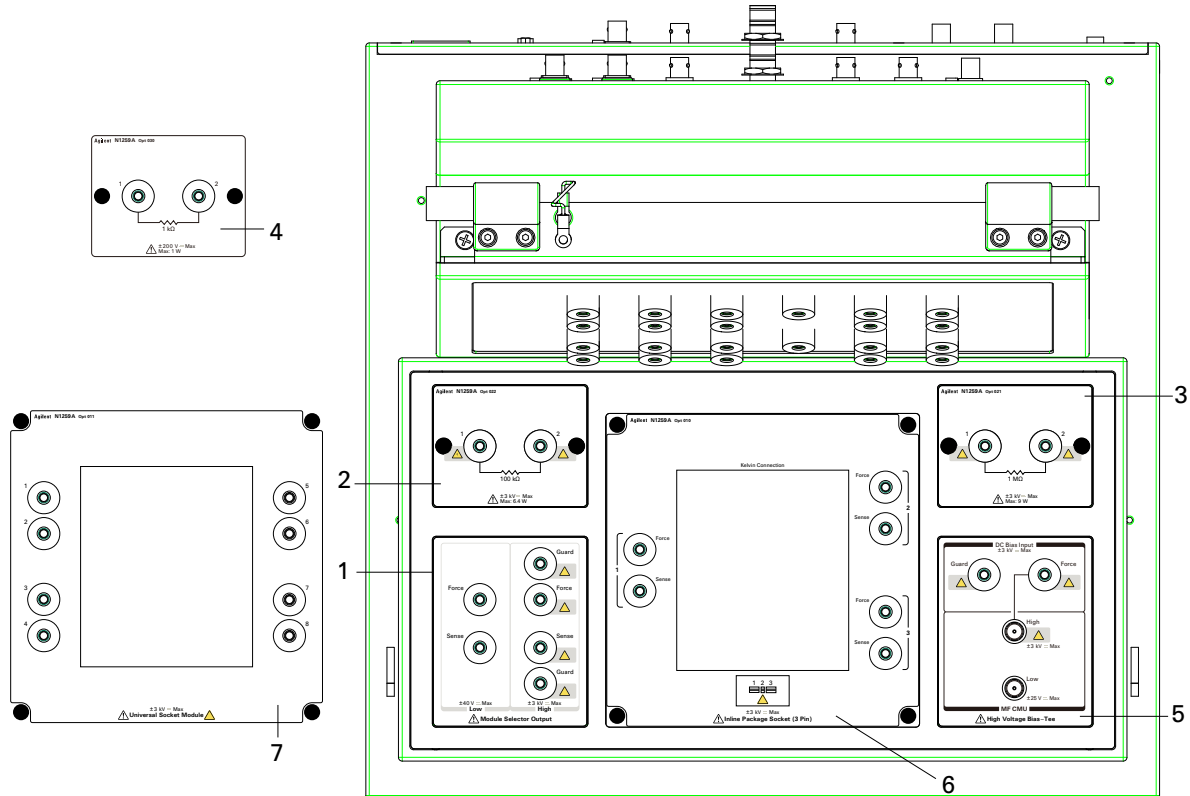
If you perform the low resistance measurement or the high current measurement, use the Kelvin connection which can reduce the residual resistance effects of the cables and contacts by connecting the Force and Sense lines together as close as possible to the DUT terminal. The Kelvin connection can be 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 HVSMU, HCSMU, and HPSMU connected to DUT automatically.
2. N1259A-022 Series resistor, 100 k Ω , \pm 3000 V max
For reducing damage of DUT or preventing SMU from oscillation.
3. N1259A-021 Series resistor, 1 M Ω , \pm 3000 V max
For reducing damage of DUT or preventing SMU from oscillation.
4. N1259A-023 Series resistor, 1 k Ω , \pm 200 V max
For reducing damage of DUT or preventing SMU from oscillation.
5. N1259A-020 High voltage bias-T
For performing capacitance or impedance measurements using DC bias up to \pm 3000 V.
6. N1259A-010 Inline package socket module
For mounting DUT. See “N1259A-010 Inline Package Socket module” on page 2-16.
7. N1259A-011 Universal socket module
For mounting DUT. See “N1259A-011 Universal Socket Module” on page 2-17.

Figure 2-4 N1259A Available Options



To Use Module Selector

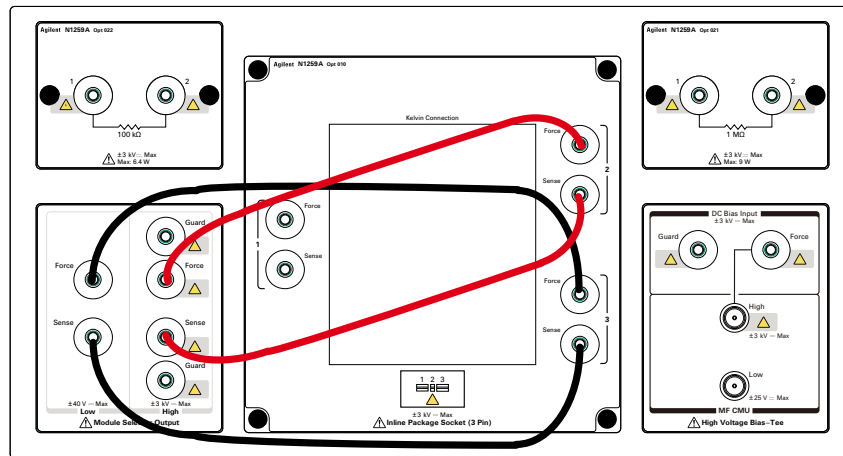
The module selector is used to switch the measurement resource connected to a terminal of DUT. The measurement resource will be GNDU, HPSMU, HVSMU, HCSMU, or dual HCSMU (DHCSMU) connected to the Module Selector Input terminals (GNDU2, HPSMU3, HVSMU2, and HCSMU3 connectors, see Figure 2-1). The measurement 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 Table 2-4 on page 2-13.

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.

Table 2-4 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			
		High Sense	High Force	Low Sense	Low Force
HPSMU	HPSMU	HPSMU3 Sense	HPSMU3 Force	HCSMU3 Low Sense + GNDU2 Force + GNDU2 Sense	HCSMU3 Low Force
HCSMU or DHCSMU	HCSMU	HCSMU3 High Sense	HCSMU3 High Force		
HVSMU	HVSMU	HVSMU2 Force	Open		
HVSMU and built-in series resistor		HVSMU2 Force + series resistor			
2	Open	Open	Open		

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.

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 Table 2-4 for the indication and the connection path.

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.

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

- Connection:

See Figure 2-6.

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 2-6. For the Kelvin connections, add the following connection, dotted line shown in Figure 2-6.

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

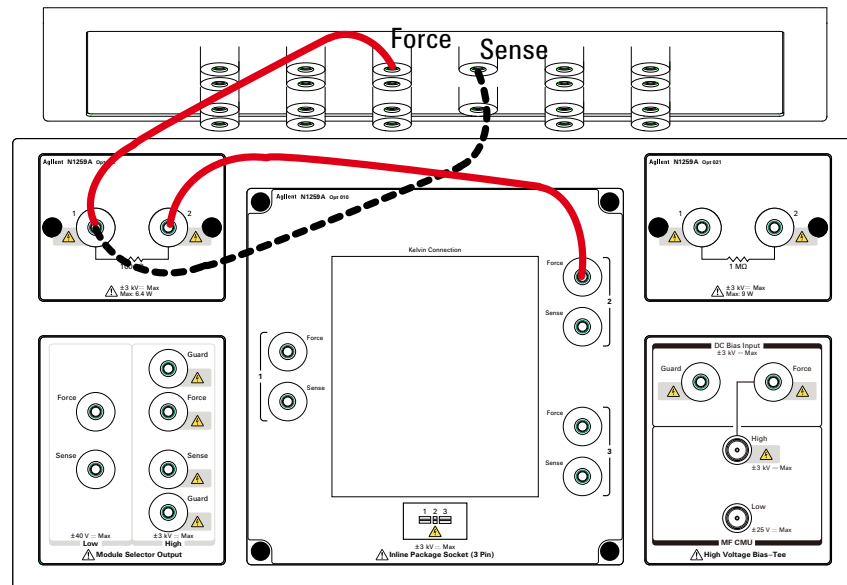
V_{out} : Source output voltage

R_s : Resistance of the series resistor

I_{meas} : Measurement current

Figure 2-6

Series Resistor Connection Example



To Use High Voltage Bias-T

The high voltage bias-T is used to perform capacitance or impedance measurements using DC bias 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.

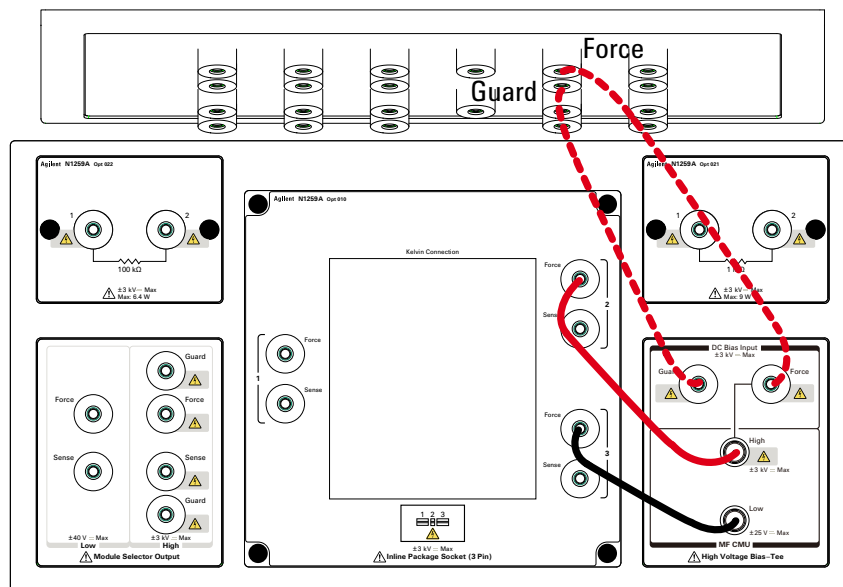
- Required parts:
 - N1254A-512 SHV(plug)-SHV(plug) test lead, 2 ea.
 - N1254A-513 SHV(jack)-banana adapter, 2 ea.
 - N1254A-508 or N1254A-509 connection wire, 2 ea.
- Connection:

See Figure 2-7.

 1. Attach the SHV-banana adapter to the SHV test lead, 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 HPSMU for DC bias up to ± 200 V, or HVSMU for DC bias up to ± 3000 V.
 5. Connect a wire (dotted line) between the SMU Guard output terminal and the DC Bias Input Guard terminal.

Figure 2-7

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. Terminals 1, 2, and 3 of the socket are internally connected to the associated couple of the Force and Sense terminals.

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. For the component locations and dimensions, see Figure 2-8.

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

To make the connection easy, connect Force only.

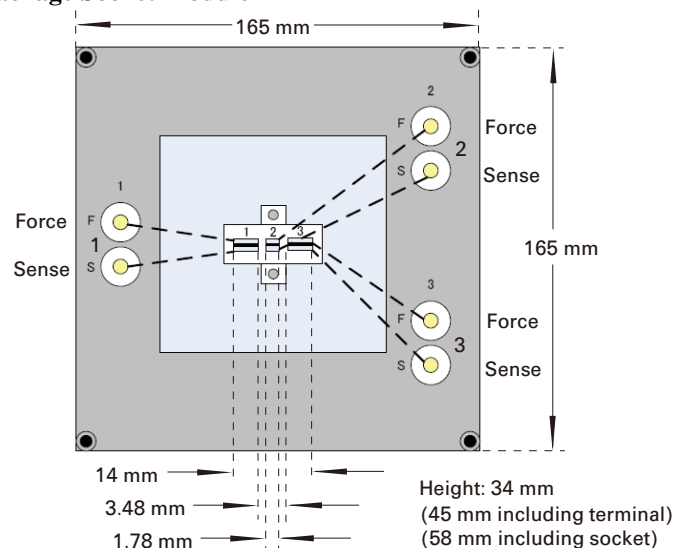
For making the Kelvin connection, Force and Sense must be connected to Force and Sense of the socket module respectively.

If HCSCMU or DHSCMU 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.

Figure 2-8

Inline Package Socket Module



N1259A-011 Universal Socket Module

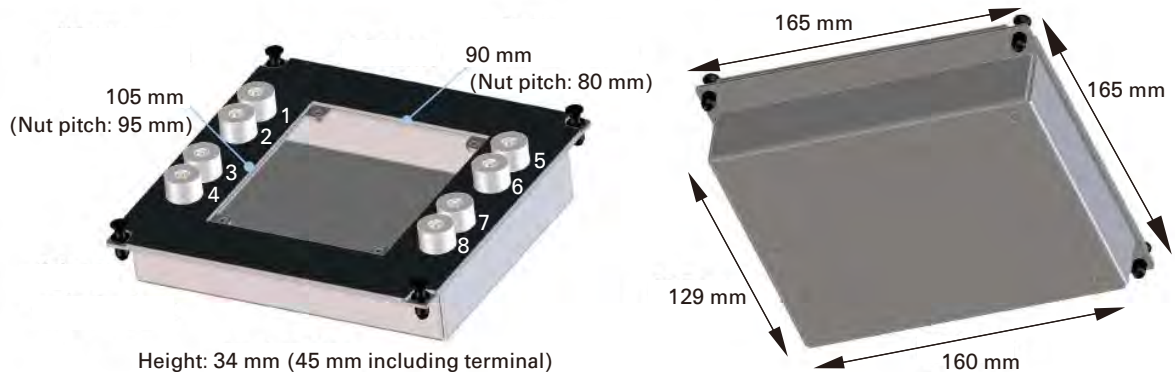
This is a blank module, kind of a do-it-yourself kit for supporting variety of packaged devices. This module can be used by mounting your desired socket or packaged device and making connections same as the N1259A-010 Inline Package Socket Module.

To use this module, see the following simple instruction. For the component locations and dimensions, see Figure 2-9. Also see “N1259A-010 Inline Package Socket module” on page 2-16 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
 - socket, if you use
 - device under test (DUT)
- Instruction:
 1. Cut the blank board in 105 mm × 90 mm square.
 2. Make four screw holes on the board. The holes should be 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.
 6. Replace the cover.

Figure 2-9

Universal Socket Module



N1259A-012 Blank Teflon 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 lag adapter, 1 ea. for one connection. Select one suitable for your DUT. See Table 2-3.
 - device under test (DUT)

- Instruction:
 1. Attach the blank teflon board to the test fixture.
 2. Connect adapters directly to the DUT and put it on the blank Teflon board.
 3. Connect wires between the adapters and the fixture output terminals.

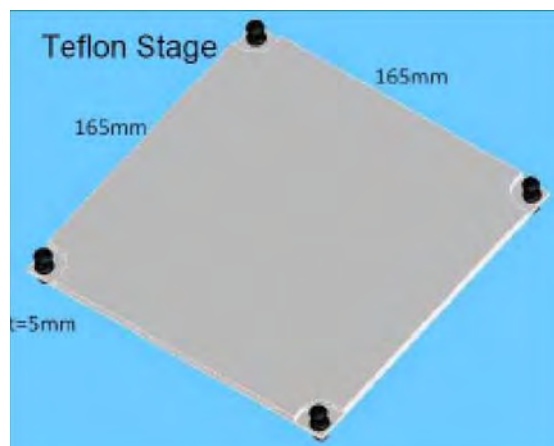
To make the connection easy, connect Force only.

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

If HCSPMU or DHCSMU is used, High Force and Sense must be connected to the high terminal of a device under test (DUT). Low Force and GNDU Force must be connected to the same terminal, and Low Sense and GNDU Sense must be connected to the same terminal. And they 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 Teflon board properly.
5. Close the fixture cover and perform measurement.

Figure 2-10 Blank Teflon Board



N1259A-013 Curve Tracer Test Adapter Socket Module

This module provides a socket available for connecting a test adapter designed for Tektronix 370 series curve tracers and three couples of the Force and Sense terminals, Collector/Drain, Emitter/Source, and Base/Gate. Terminals 1 to 6 of the socket are internally connected to the Force and Sense terminals as shown in Figure 2-11.

To use this module, see the following simple instruction.

- Required parts:
N1254A-508 or N1254A-509 connection wire, 1 ea. for one connection device under test (DUT)
- 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.

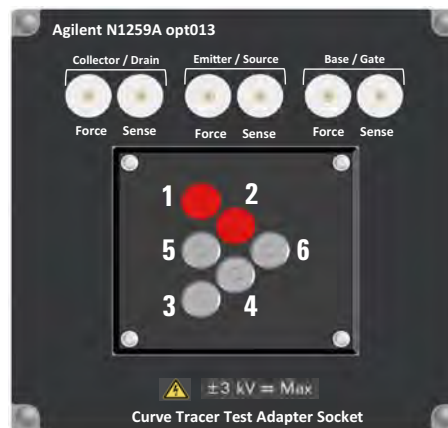
To make the connection easy, connect Force only.

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

If 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.

Figure 2-11 Curve Tracer Test Adapter Socket Module



Internal connection

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



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



This chapter describes how to make the measurement environment without using Agilent N1259A 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 Install an Interlock Circuit”
- “About Cable Connections”
- “Accessory Dimensions”

WARNING

To prevent electrical shock during use, install an interlock circuit (see p. 3-23) and connect the Interlock cable (see p. 3-25).

WARNING

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

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

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

Note that you must set the module output off when connecting or disconnecting DUT. If not, the DUT may be damaged.

To set the module output off, press the **Stop** key.

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.

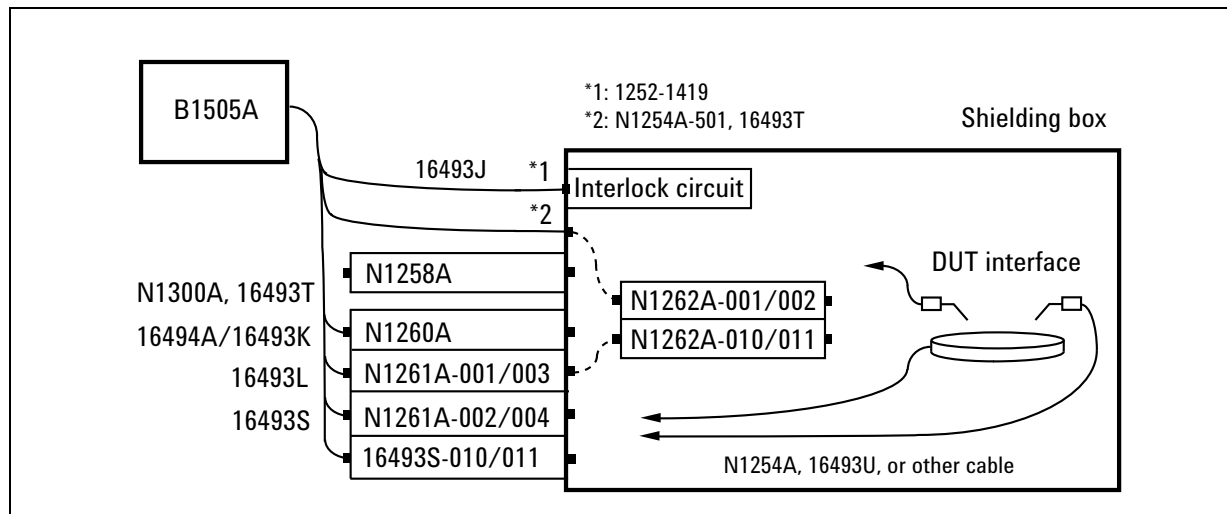
Connection Overview

Connection image and requirements are shown in Table 3-1. Find and prepare required accessories and cables, and install and connect them to make the measurement environment. All available accessories are listed in Table 3-3.

Table 3-1 supports the B1505A installed with one HVSMU, one HCSMU, one HPSMU, and one MFCMU. If your B1505A installs additional HCSMU and/or HPSMU, prepare additional cables and accessories.

Table 3-1 Connection Image and Requirements

B1505A terminals		Required accessories and cables	Connection inside of the shielding box
HVSMU	Force	N1254A-501 HV(jack)-HV(jack) adapter, 1 ea. 16493T HVSMU cable, 3 m or 1.5 m, 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
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.	
HPSMU	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	



B1505A terminals		Required accessories and cables	Connection inside of the shielding box	
GNDU		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	
Interlock		1252-1419 Interlock connector, 1 ea. 16493J Interlock cable, 3 m or 1.5 m, 1 ea.	Interlock circuit	
MFCMU	Hpot	N1260A High voltage bias-T, 1ea. N1300A CMU cable, 3 m or 1.5 m, 1 ea. 16493T HVSMU cable, 3 m or 1.5 m, 1 ea.	SHV(plug) cable, 3 ea.	High
	Hcur			Low
	Lcur			AC Guard
	Lpot			
HVSMU	Force			

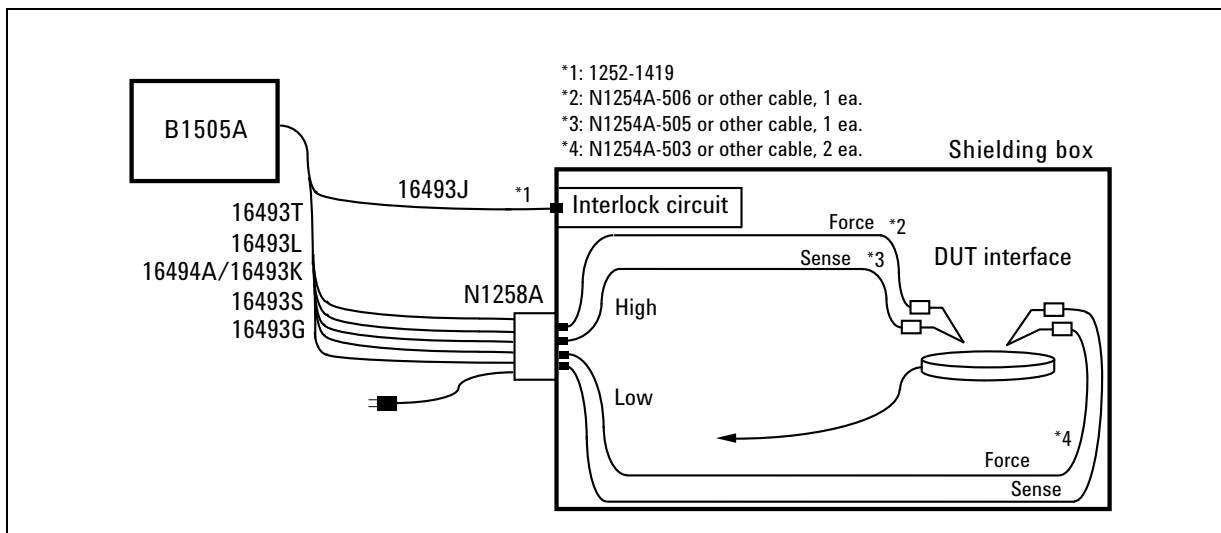
NOTE To install the accessories, see “Accessory Dimensions” on page 3-30 and prepare the appropriate space in the shielding box of your DUT interface or make the openings for the accessories.

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 3-2.

NOTE Turn the B1505A off before connecting CMU cable. The B1505A needs to automatically detect and register the 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 the N1261A-002/004. Do *not* use normal triaxial cable (16494A) because the maximum current rating of the cable is 1 A.

Table 3-2 To Connect N1258A Module Selector



B1505A terminals		Required cables	N1258A terminals	
HVSMU	Force	Agilent 16493T HVSMU cable, 3 m or 1.5 m	HVSMU	
GNDU		Agilent 16493L GNDU cable, 3 m or 1.5 m	GNDU	
HPSMU	Force	Agilent 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
Digital I/O		Agilent 16493G Digital I/O connection cable, 3 m or 1.5 m	Digital I/O	
N.A		Power cable, for connecting to power line	LINE	
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.		

1. Non-Kelvin connection is not allowed. GNDU Force and Sense are internally connected to Low Sense.
See Table 3-18 on page 3-22.

Table 3-3 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 dual HCSMU (DHCSMU).
16493S-021	Dual HCSMU combination adapter with cable	
N1258A	Module selector	For switching HVSMU, HCSMU, and HPSMU connected to DUT automatically.
N1260A	High voltage bias-T	For performing capacitance or impedance measurements using DC bias up to ± 3000 V.
N1261A-001	HPSMU protection adapter, Triaxial(f)	For protecting HPSMU from high voltage.
N1261A-003	HPSMU protection adapter, HV(jack)	
N1261A-002	GNDU protection adapter, BNC(f)	For protecting GNDU from high voltage.
N1261A-004	GNDU protection adapter, SHV(jack)	
N1262A-001	1 M Ω (± 3000 Vdc) R-box, SHV(jack)	For reducing damage of DUT or preventing SMU from oscillation.
N1262A-002	100 k Ω (± 3000 Vdc) R-box, SHV(jack)	
N1262A-010	1 k Ω (± 200 Vdc) R-box, Triaxial(f)	
N1262A-011	1 k Ω (± 3000 Vdc) R-box, SHV(jack)	
N1254A-106	BNC(f)-Triaxial(m) adapter	
N1254A-402	Interlock micro switch	For making interlock circuit. See “To Install an Interlock Circuit” on page 3-23.
1252-1419	Interlock connector (6 pin, female)	
1450-0641	LED ($V_F \cong 2.1$ V @ $I_F = 10$ 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	
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	
8120-1838 or 8120-1839	BNC(m)-BNC(m) coaxial cable, 12 inch or 24 inch	

To Connect High Voltage R-Box

Agilent 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 3-1 on page 3-3.

N1262A-001: 1 M Ω (\pm 3000 Vdc) resistor with SHV(jack) output connector

N1262A-002: 100 k Ω (\pm 3000 Vdc) resistor with SHV(jack) output connector

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

N1262A-011: 1 k Ω (\pm 3000 Vdc) resistor with SHV(jack) output connector

WARNING



To avoid electrical shock and instrument damage, do not connect or disconnect measurement cable during operation.

Table 3-4 To Connect N1262A Input

Connect from		Required cables	N1262A terminals
HVSMU	Force	Agilent 16493T-001 HVSMU cable, 1.5 m	From HVSMU
N1261A-001	Force	Agilent 16494A-001 Triaxial cable, 1.5 m, for N1262A-010	From SMU Force
N1261A-003	Force	Agilent 16493T-001 HVSMU cable, 1.5 m	

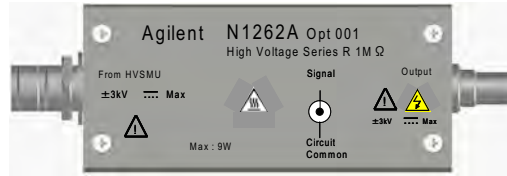


Table 3-5 To Connect N1262A Output

N1262A 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.	

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 Connect HCSMU Adapter

Agilent 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 3-1 on page 3-3.

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 3-1 for the Kelvin connection and in Figure 3-4 for the non-Kelvin connection. Also a connection example for using two HCSMU modules is shown in Figure 3-5.

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.

WARNING



To avoid electrical shock and instrument damage, do not connect or disconnect measurement cable during operation.

Table 3-6

To Connect 16493S-010/011 Input

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

Table 3-7

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 3-2. 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 3-2. This connection can save one manipulator.

Figure 3-1 Typical Connection to Use One HCSMU, Kelvin connection

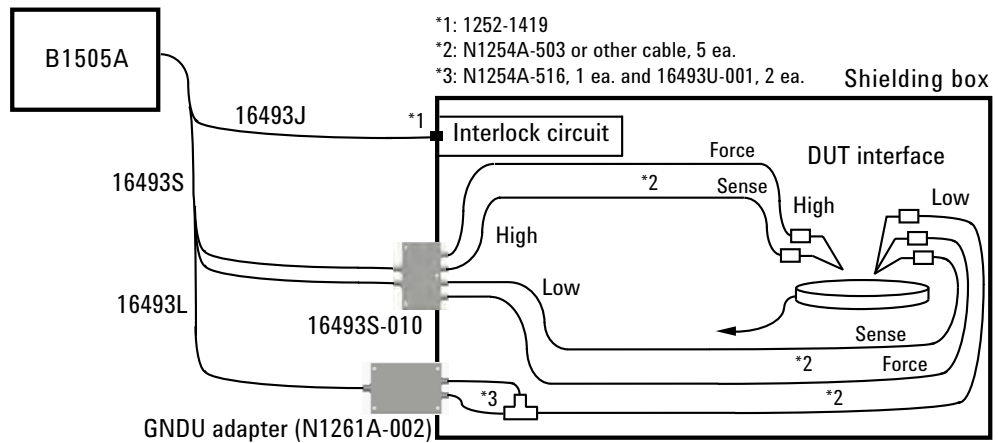


Figure 3-2 To Simplify GNDU Connection, Kelvin connection

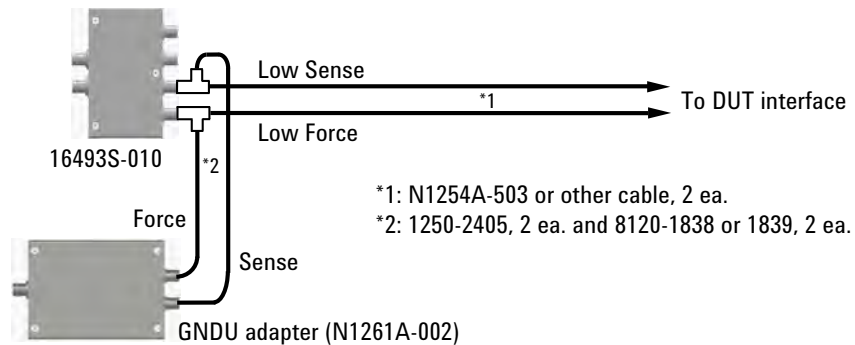
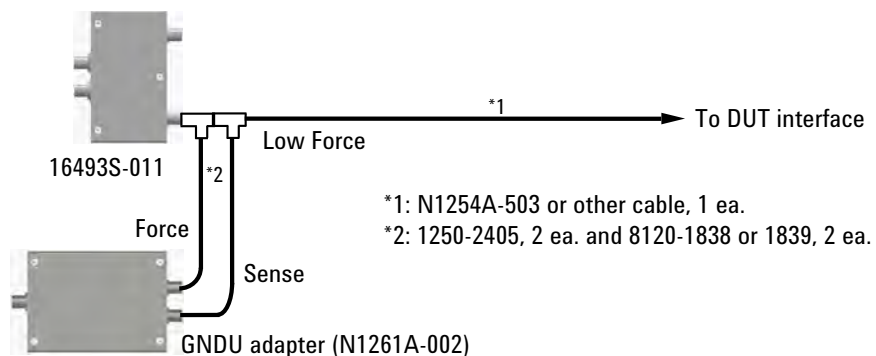


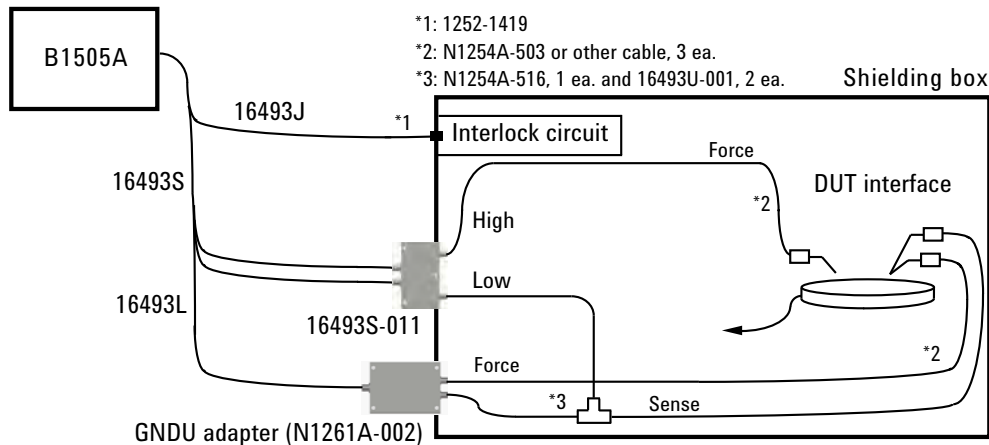
Figure 3-3 To Simplify GNDU Connection, non-Kelvin connection



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 3-3. This connection can save one manipulator. Also the GNDU connection can be replaced with the connection shown in Figure 3-1 if an extra manipulator is available.

Figure 3-4

Typical Connection to Use One HCSMU, non-Kelvin connection

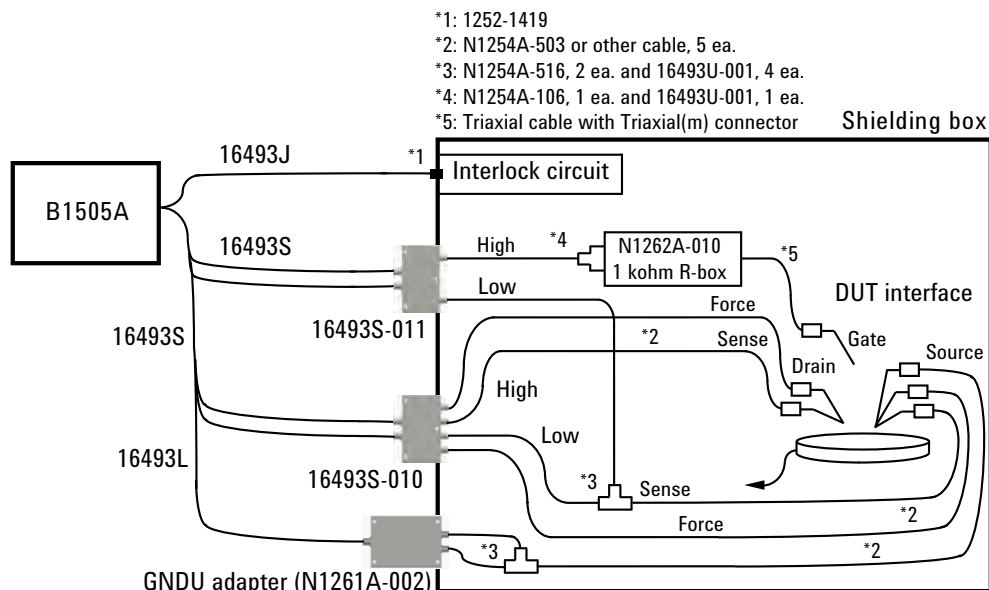


The following connection example uses two HCSMU modules. One is connected to the MOSFET Drain by the Kelvin connection. And another one is connected to the Gate by the non-Kelvin connection through the 1 kΩ R-box. The non-Kelvin connection is effective for not-so-high current path such as the Gate. For 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 3-2 is also effective.

Figure 3-5

Connection Example to Use Two HCSMU Modules



To Connect Dual HCSMU Adapter

Agilent 16493S-020/021 Dual HCSMU adapter is used to configure the dual HCSMU (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 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.

WARNING



To avoid electrical shock and instrument damage, do not connect or disconnect measurement cable during operation.

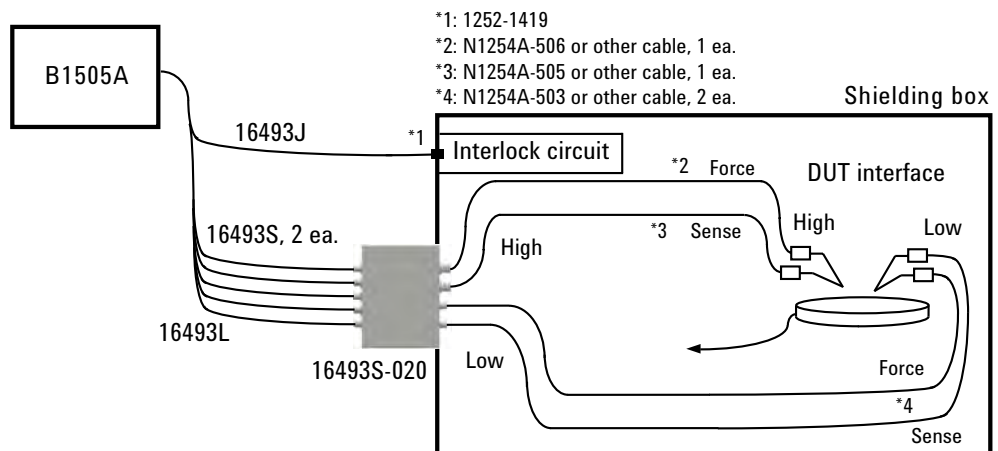
To Connect 16493S-020

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 3-6. 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.

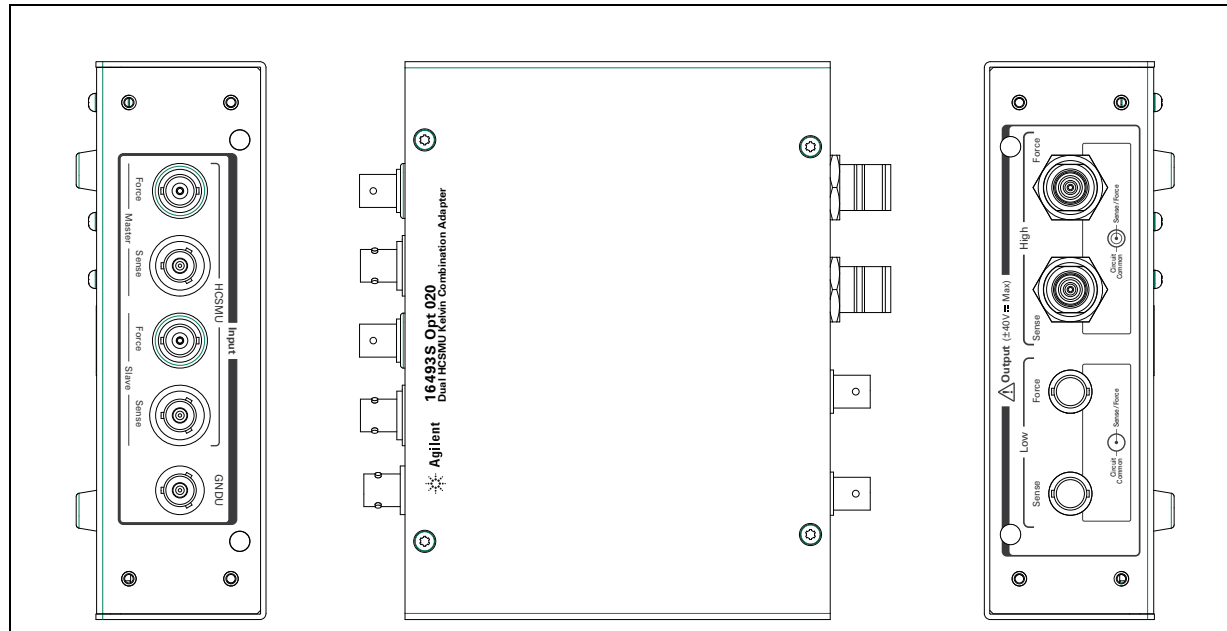
Figure 3-6

Typical Connection of Dual HCSMU Kelvin Combination Adapter



Connection Guide for Wafer Prober and Your Own Test Fixture
To Connect Dual HCSMU Adapter

Table 3-8 To Connect 16493S-020 Input



B1505A terminals		Required cables	Input terminals	
HCSMU used for master	Force	Agilent 16493S HCSMU cable, 3 m or 1.5 m	HCSMU Master	Force
	Sense			Sense
HCSMU used for slave	Force	Agilent 16493S HCSMU cable, 3 m or 1.5 m	HCSMU Slave	Force
	Sense			Sense
GNDU		Agilent 16493L GNDU cable, 3 m or 1.5 m	GNDU	

Table 3-9 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, N1259A test fixture, N1258A module selector, or 16493S-010/011 HCSMU adapter. The adapter should be installed near the accessory which should be installed near your DUT interface as shown in Table 3-1 on page 3-3. And the adapter must be connected between the B1505A and the accessory.

Table 3-10 To Connect 16493S-021 Input

B1505A terminals		Required cables		Input terminals	
HCSMU used for master	Force	Agilent 16493S HCSMU cable, 3 m or 1.5 m		Master	Force
	Sense				Sense
HCSMU used for slave	Force	Agilent 16493S HCSMU cable, 3 m or 1.5 m		Slave	Force
	Sense				Sense

Table 3-11 To Connect 16493S-021 Output

Output terminals ¹		Required cables/Description	Connect to
Output	Force	dedicated cable, 300 mm, furnished with 16493S-021	N1259A, N1258A, or 16493S-010/011 HCSMU input connectors
	Sense		

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

CAUTION

If dual HCSMU (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

Agilent N1261A protection adapter is used to protect GNDU or HPSMU module from high voltage. The N1261A should be installed near your DUT interface as shown in Table 3-1 on page 3-3.

N1261A-001: HPSMU protection adapter with Triaxial(f) output connectors

N1261A-002: GNDU protection adapter with BNC(f) output connectors

N1261A-003: HPSMU protection adapter with HV(jack) output connectors

N1261A-004: GNDU protection adapter with SHV(jack) output connectors

WARNING



To avoid electrical shock and instrument damage, do not connect or disconnect measurement cable during operation.

Table 3-12

To Connect N1261A Input

B1505A terminals		Required cables	N1261A terminals	
HPSMU	Force	Agilent 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		Agilent 16493L GNDU cable, 3 m or 1.5 m	From GNDU	

NOTE

For connecting HPSMU, use either 16494A or 16493K.

Table 3-13 To Connect N1261A Output

N1261A 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 3-8.

To Connect High Voltage Bias Tee

Agilent N1260A high voltage bias-T is used to perform the high voltage C-V measurement. The C-V measurement up to 3000 Vdc can be realized by using the bias-T, MFCMU, and HVSMU. The N1260A should be installed near your DUT interface as shown in Table 3-1 on page 3-3. Also see Figure 3-7 for connection example.

Table 3-14 To Connect N1260A Input

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

NOTE

Turn the B1505A off before connecting the CMU cable.

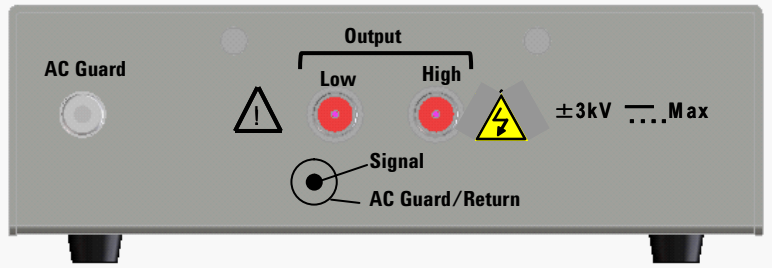
Connect HVSMU to obtain DC bias input. Because the bias-T cannot pass the MFCMU internal DC bias.

WARNING



To avoid electrical shock and instrument damage, do not connect or disconnect measurement cable during operation.

Table 3-15 To Connect N1260A Output



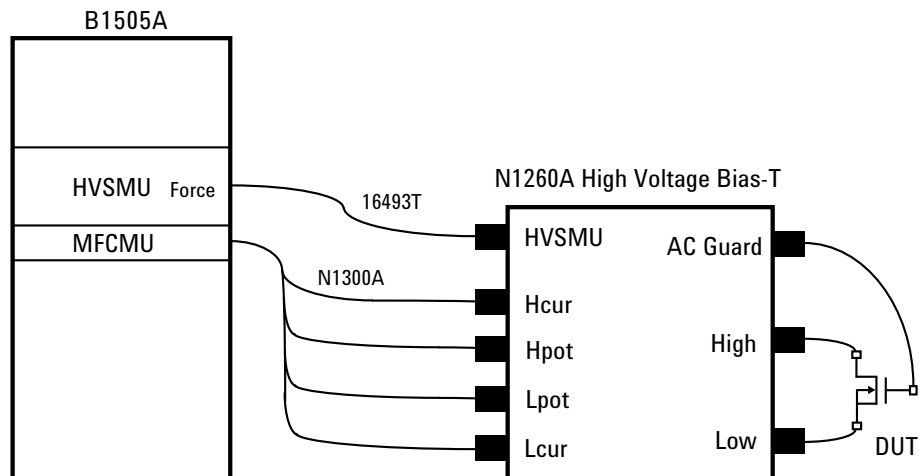
N1260A terminals		Required cables/Description	Connect to
Output	Low	Coaxial cable with SHV(plug) connector.	DUT low terminal (ex: source)
	High	Coaxial cable with SHV(plug) connector.	DUT high terminal (ex: drain)
AC Guard		Coaxial cable with SHV(plug) connector. This terminal provides the AC guard (circuit 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)

WARNING



To avoid electrical shock and instrument damage, do not connect or disconnect measurement cable during operation.

Figure 3-7 To Connect N1260A High Voltage Bias-T



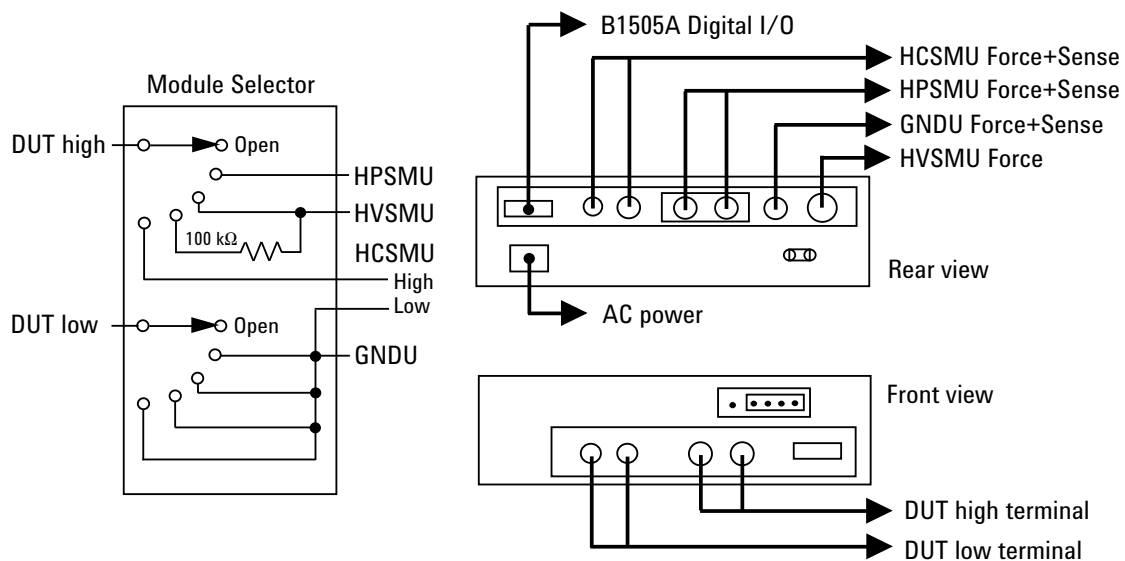
To Connect Module Selector

Agilent N1258A module selector is used to switch the measurement resource connected to the device under test (DUT) automatically. The measurement resource will be GNDU, HPSMU, HVSMU, HCSMU, or dual HCSMU (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 3-2 on page 3-5. Also see figures 3-9 and 3-10.

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 3-18 on page 3-22.

Figure 3-8 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 3-9 To Connect N1258A Module Selector

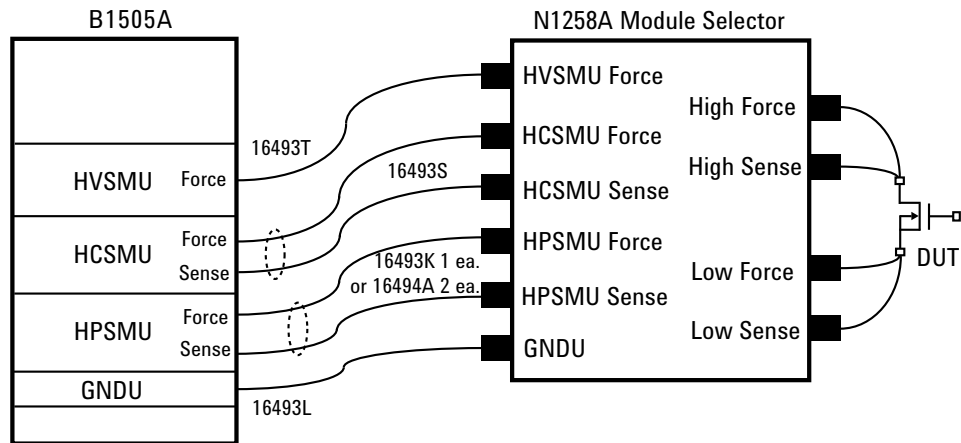
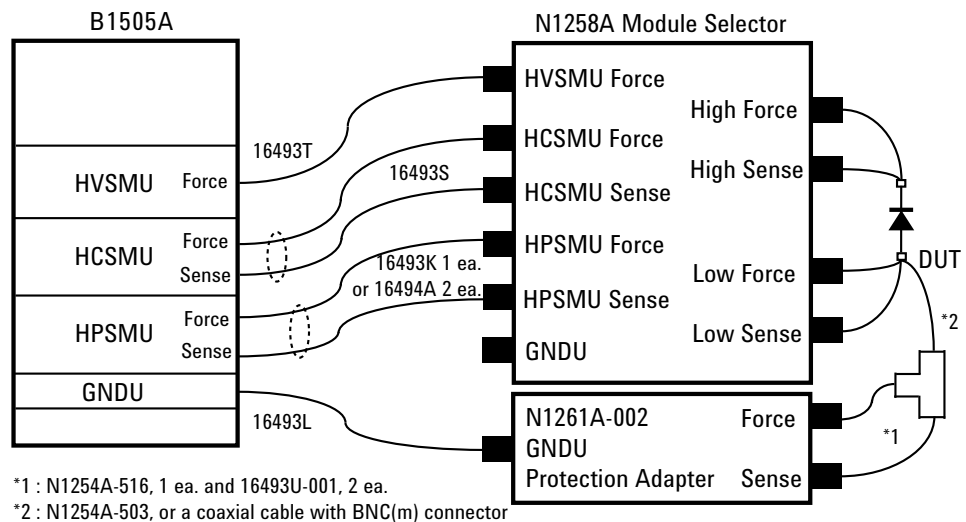


Figure 3-10 To Connect N1258A Module Selector, with N1261A-002 GNDU Adapter



NOTE Using GNDU Adapter

Generally, the connection of Figure 3-9 is used for the measurement using the module selector. And the connection of Figure 3-10 is effective for the accurate measurement over 10 mA using the HPSMU or HVSMU.

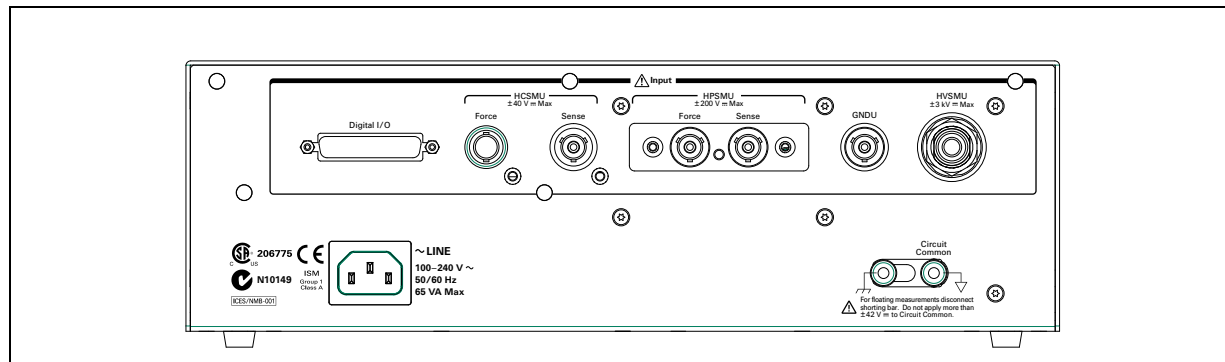
CAUTION

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

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 3-16 To Connect N1258A Input



B1505A terminals		Required cables	N1258A terminals	
Digital I/O		Agilent 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	Force	Agilent 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
GNDU		Agilent 16493L GNDU cable, 3 m or 1.5 m	GNDU	
HVSMU	Force	Agilent 16493T HVSMU cable, 3 m or 1.5 m	HVSMU	
N.A		Power cable, for connecting to power line	LINE, 65 VA Max.	

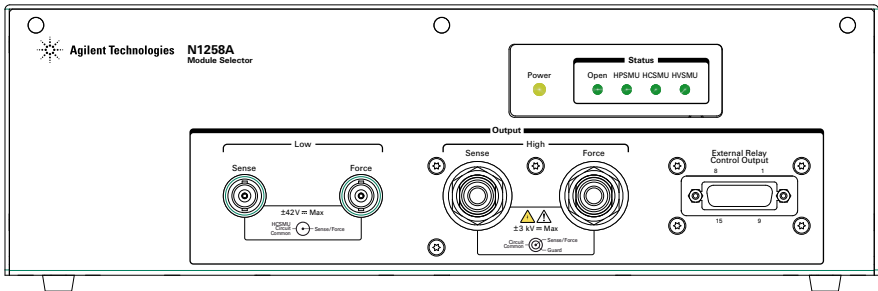
NOTE Turn the B1505A off before connecting the cables between the B1505A and the N1258A.
For connecting HPSMU, use either 16494A or 16493K.

WARNING To avoid electrical shock and instrument damage, do not connect or disconnect measurement cable or connector cap during operation.
The connector cap must be connected to the unused input connectors.

WARNING 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.

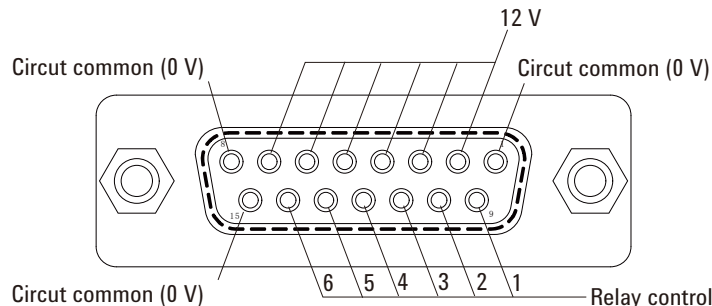
Table 3-17 To Connect N1258A Output



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 3-11 for pin assignment. Relay control 1 to 6 are used to control an external relay and controlled by using the Agilent 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 3-18 on page 3-22.

Figure 3-11 External Relay Control Output Connector



WARNING

To avoid electrical shock and instrument damage, do not connect or disconnect measurement cable during operation. Hazardous voltage, SMU maximum output voltage may appear at the Force, Guard, and Sense terminals.

Table 3-18 **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			
		High Sense	High Force	Low Sense	Low Force
HPSMU	HPSMU	HPSMU Sense	HPSMU Force	HCSMU Low Sense + GNDU Force + GNDU Sense	HCSMU Low Force
HCSMU or DHCSMU	HCSMU	HCSMU High Sense	HCSMU High Force		
HVSMU	HVSMU	HVSMU Force	Open		
HVSMU and built-in series resistor		HVSMU Force + series resistor			
2	Open	Open	Open		

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.

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 Table 3-18 for the indication and the connection path.

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 3-12 shows the pin assignments of the interlock connector that should be mounted on your DUT interface. And Table 3-19 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 3-12 Interlock Connector Pin Assignments

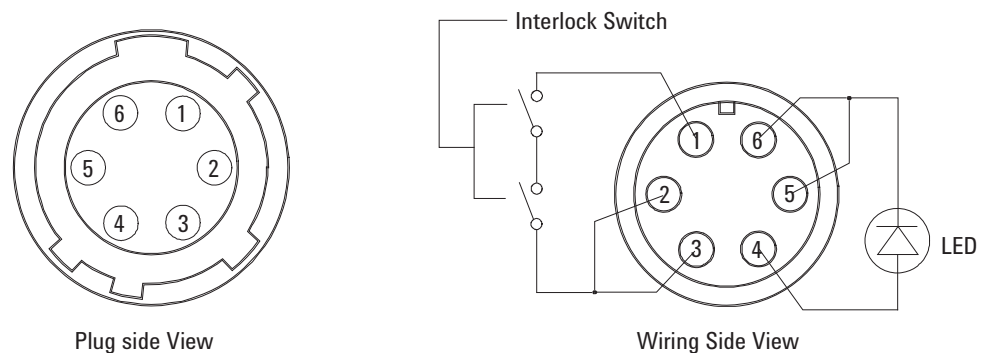


Table 3-19

Recommended Parts

Agilent 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 3-19. And install the interlock circuit as shown below.

1. Make mounting hole for the interlock connector. See Figure 3-14 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 3-15 below.
3. Mount an LED on your shielding box. For the dimensions of the LED, see Figure 3-13.
4. Use wire to connect the two switches in series between pin number 1 and 2 (or 3) of the interlock connector. See Figure 3-12.
5. Use wire to connect the LED between pin number 4 and 5 (or 6) of the interlock connector. See Figure 3-12.
6. Attach the interlock connector to the mounting hole.

If Agilent B1505A Interlock connector is connected to the interlock circuit, Agilent 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 3-13 Dimensions of the LED (Agilent part number 1450-0641)

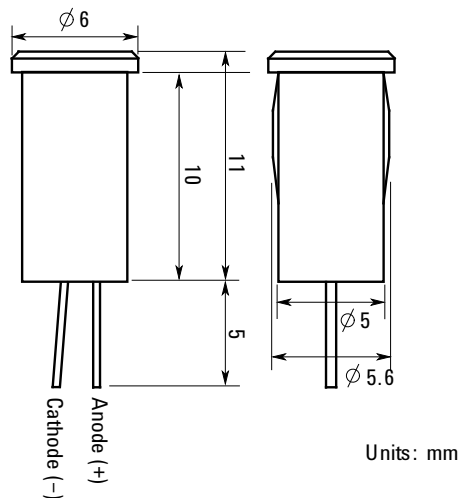
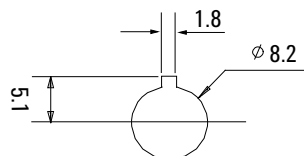


Figure 3-14 Dimensions of Mounting Hole for the Interlock Connector








About Cable Connections

Prepare the open end cable assemblies listed in Table 3-20 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”

Table 3-20

Open End Cable Assemblies for Connecting Your DUT Interface

Cable assemblies	Connect to	Remarks
Coaxial cable with BNC(m) connector 	N1258A Low Force	N1254A-503
	N1258A Low Sense	
	N1261A-002 Output Force	
	N1261A-002 Output Sense	
Triaxial cable with HV(plug) connector 	N1261A-003 Output Force	N1254A-505
	N1261A-003 Output Sense	
	N1258A High Sense	
Coaxial cable with HV(plug) connector 	N1258A High Force	N1254A-506
Triaxial cable with Triaxial(m) connector 	N1261A-001 Output Force	N.A
	N1261A-001 Output Sense	
	N1262A-010 Output	
Coaxial cable with SHV(plug) connector 	N1260A Output Low	N.A
	N1260A Output High	
	N1260A AC Guard	
	N1261A-004 Output Force	
	N1261A-004 Output Sense	
	N1262A-001 Output	
	N1262A-002 Output	
N1262A-011 Output		

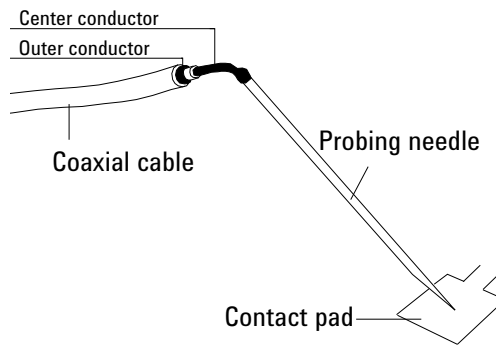
To Make Connection to Reduce Leakage Current

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.

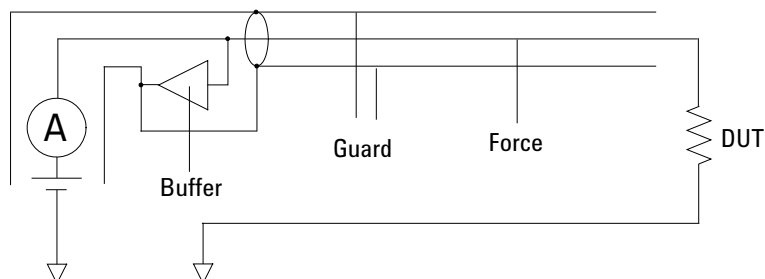
CAUTION

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

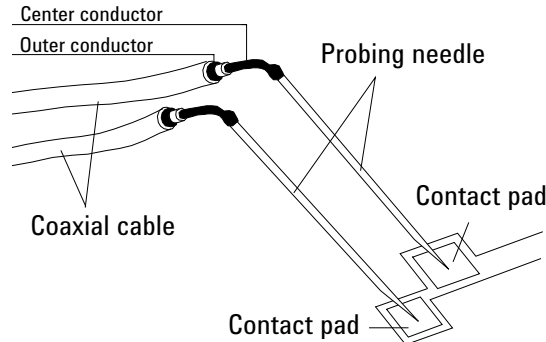
When you measure a low resistance, high current flows through the DUT. This high current increases the measurement error caused by the residual resistance of cables. To cancel the effect of this resistance, you can use *Kelvin connections* (4-wire), which means the Force and Sense lines are extended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

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

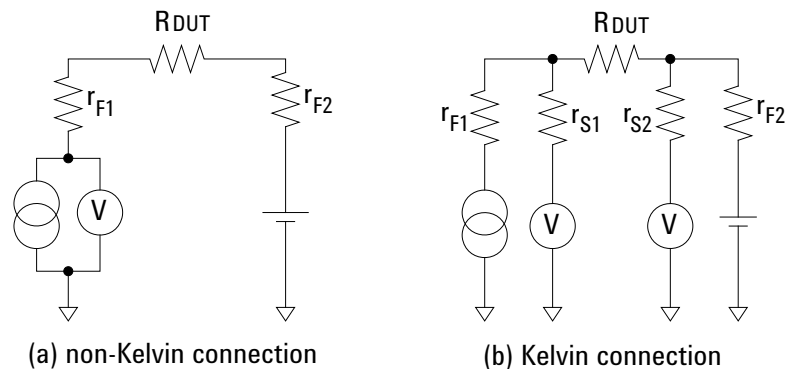
1. Cut and trim end of the coaxial cable such as N1254A-503 and N1254A-506, so that the center conductor does not touch the outer conductor (connected to the guard terminal).
2. Connect the center conductor to tail of the probing needle. Never connect the outer conductor to the probing needle. However 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 test leads 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 Ω 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.

Accessory Dimensions

Dimensions and weight of accessories are listed in Table 3-21. Also you can find the dimensions of mounting hole and screw hole needed to fix the accessories in the following figures.

- “N1254A-500/502 HV Connector for Soldering, mounting hole, in mm”
- “N1254A-501 HV jack - HV jack Adapter, mounting hole, in mm”
- “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”
- “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 High Voltage R-Box, HV Output, in mm”
- “N1262A-010 R-Box, Triaxial Output, in mm”

Figure 3-16

N1254A-500/502 HV Connector for Soldering, mounting hole, in mm

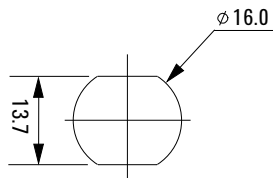


Figure 3-17

N1254A-501 HV jack - HV jack Adapter, mounting hole, in mm

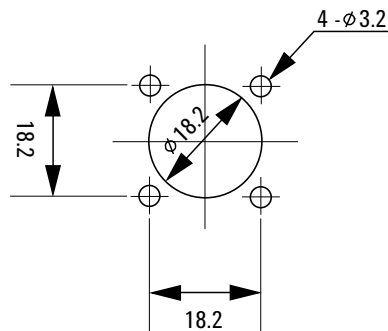


Figure 3-18 16493S-010 HCSMU Kelvin Adapter, in mm

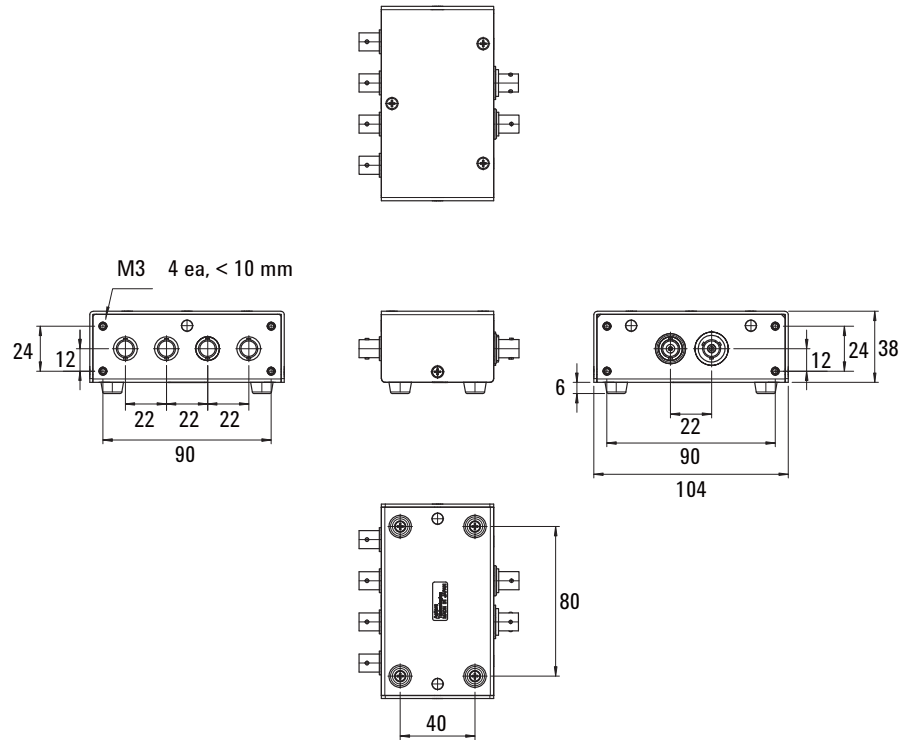


Figure 3-19 16493S-011 HCSMU non-Kelvin Adapter, in mm

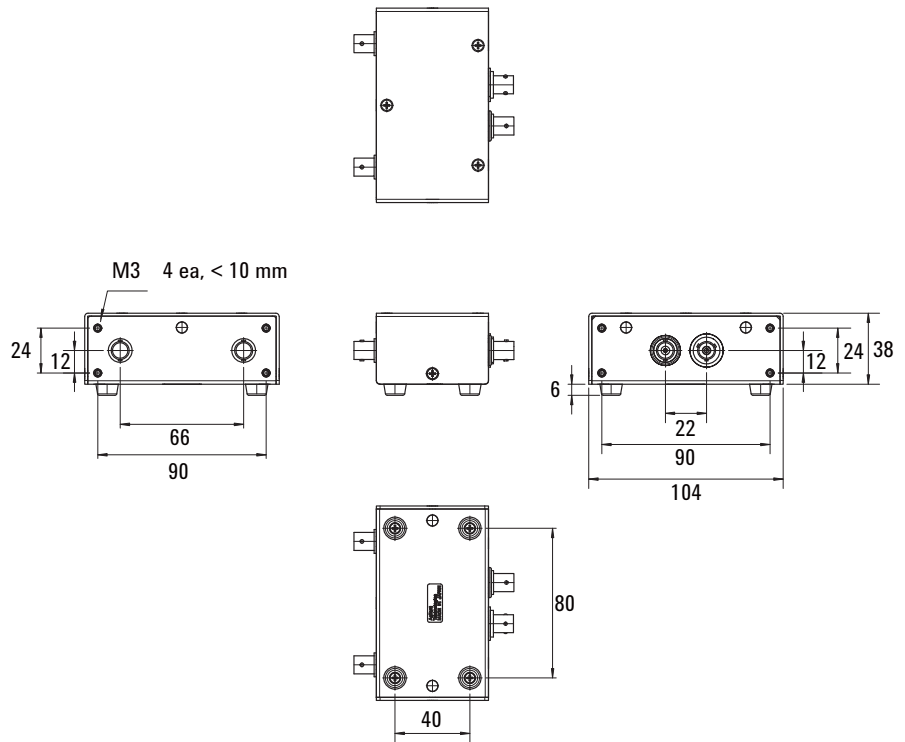


Figure 3-20 16493S-020 Dual HCSMU Kelvin Combination Adapter, in mm

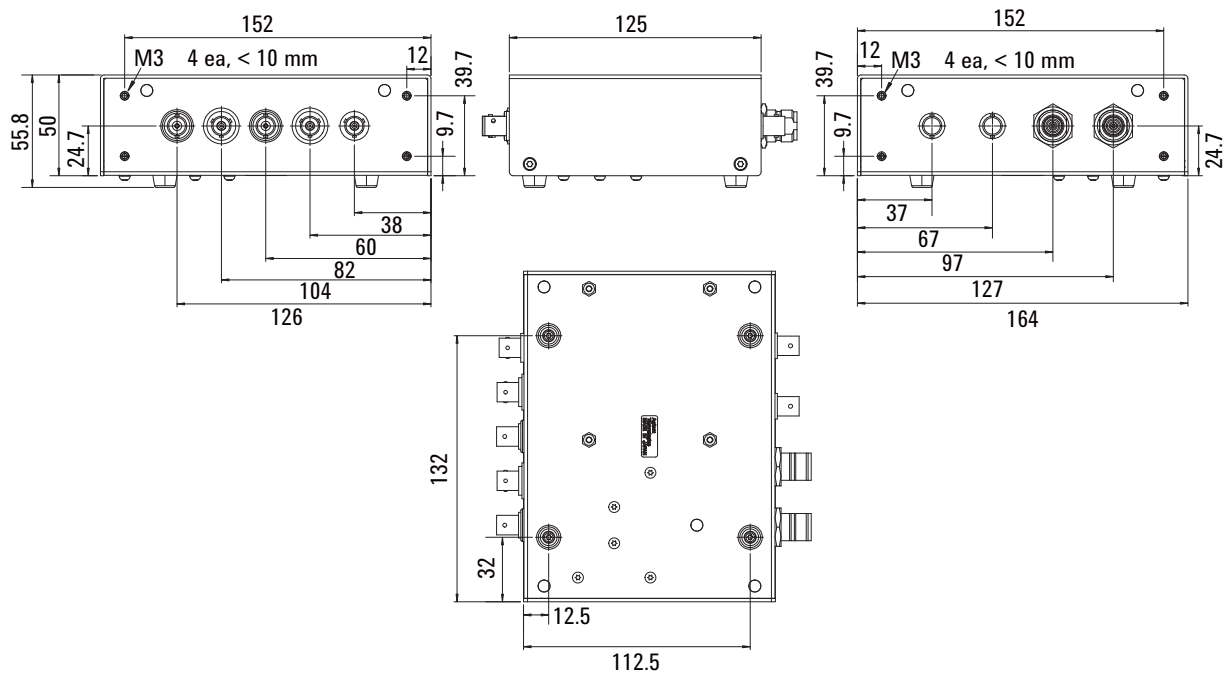


Figure 3-21 16493S-021 Dual HCSMU Combination Adapter, in mm

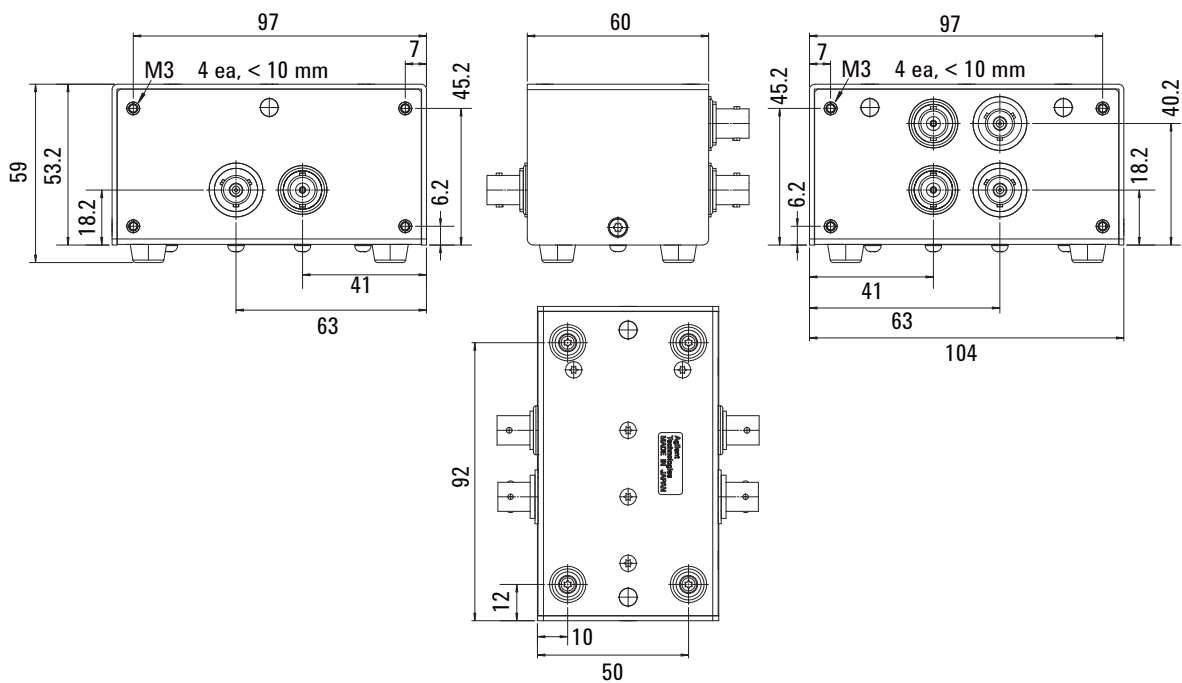
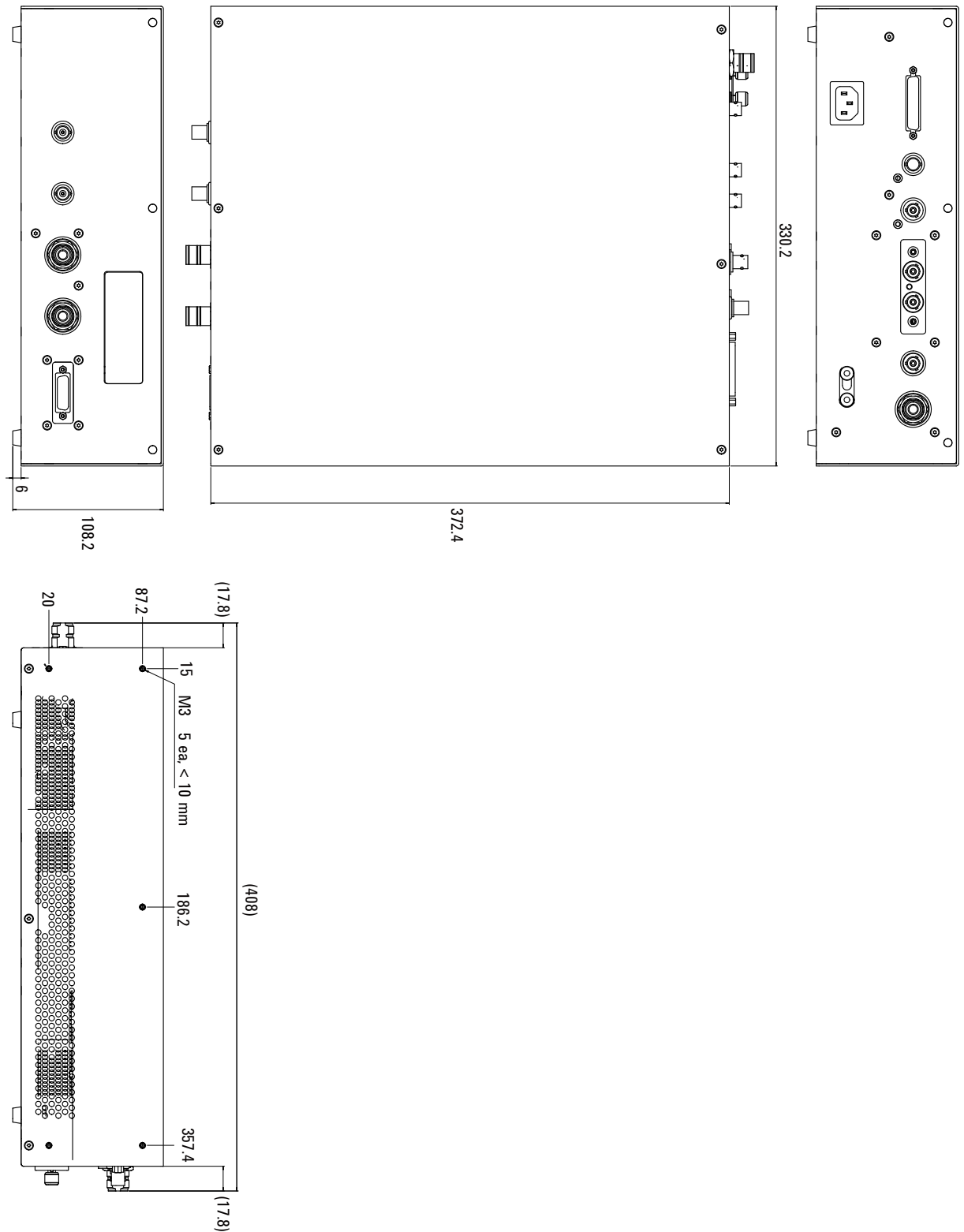


Figure 3-22 N1258A Module Selector, in mm



Connection Guide for Wafer Prober and Your Own Test Fixture
Accessory Dimensions

Figure 3-23 N1260A High Voltage Bias-T, in mm

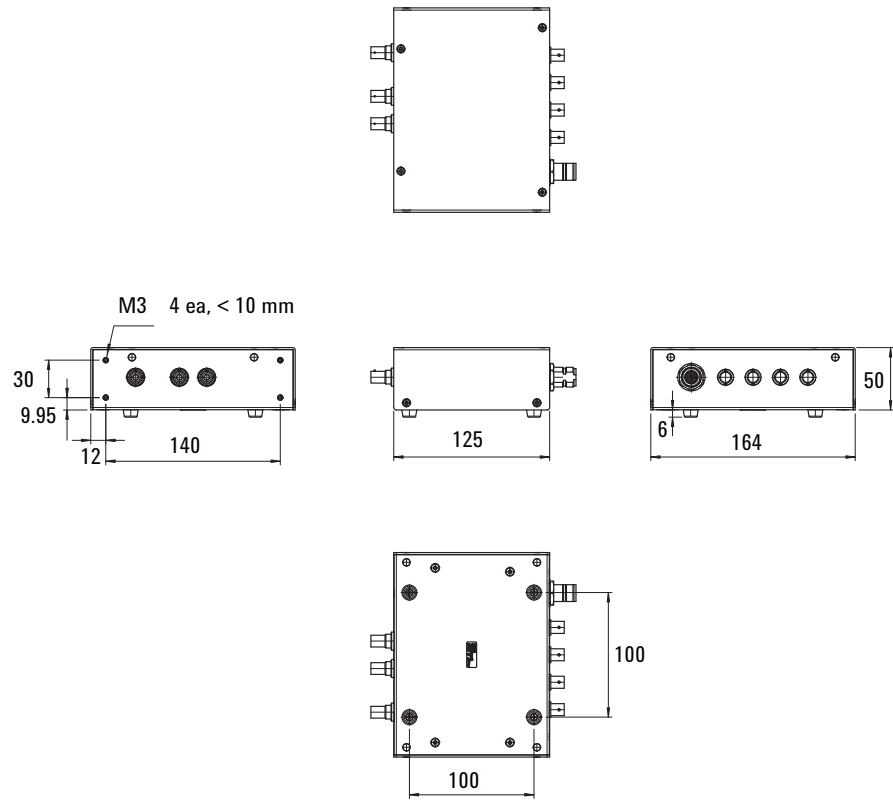


Figure 3-24 N1261A-001 HPSMU Protection Adapter, in mm

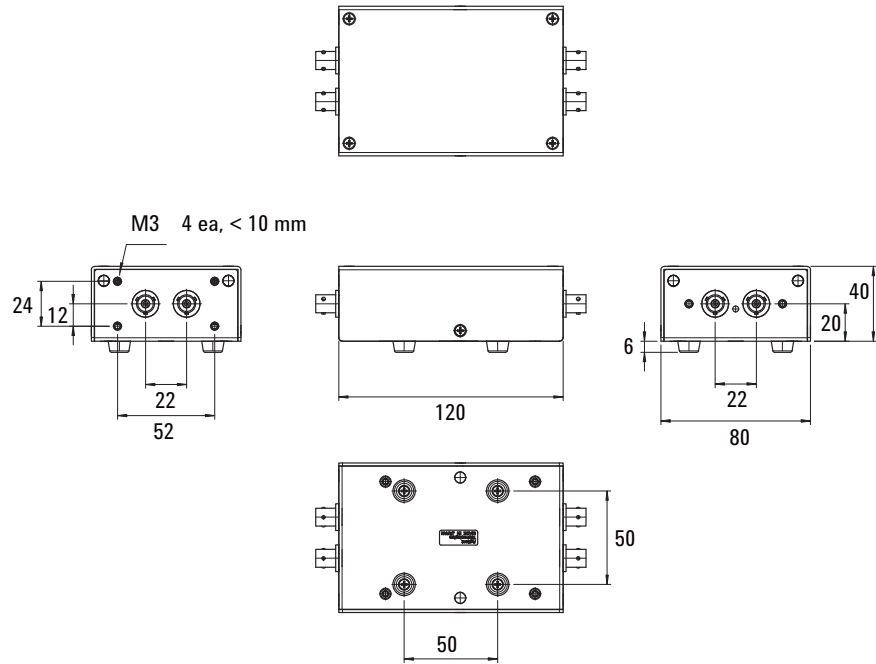


Figure 3-25 N1261A-002 GNDU Protection Adapter, in mm

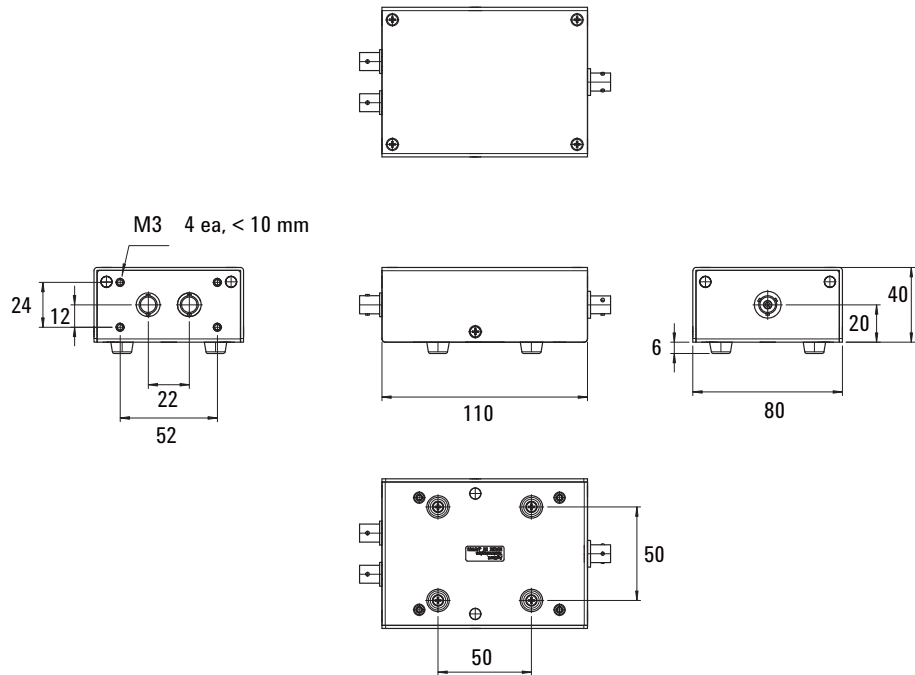


Figure 3-26 N1261A-003 HPSMU Protection Adapter, HV Output, in mm

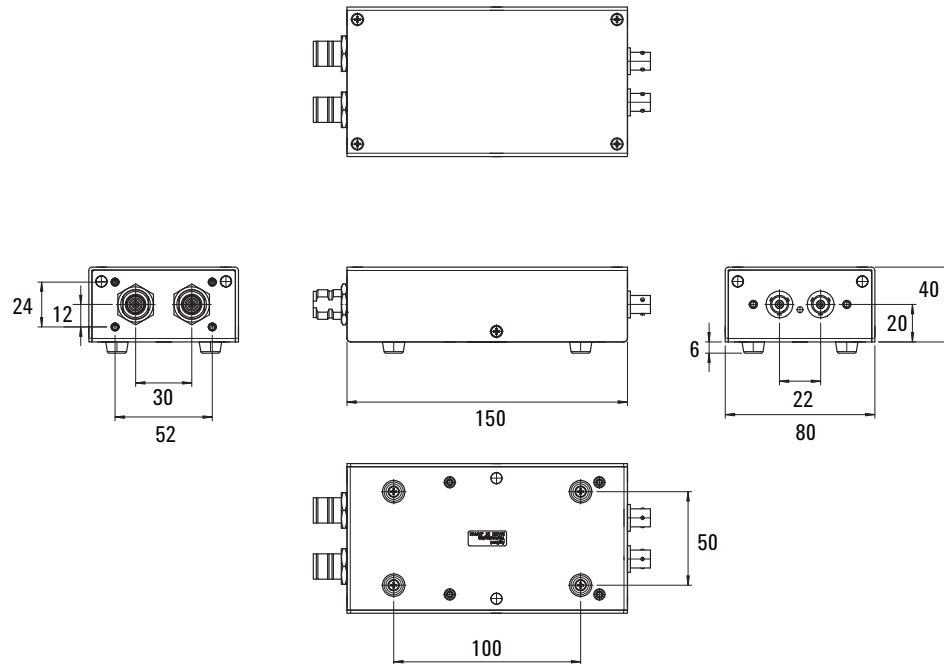


Figure 3-27 N1261A-004 GNDU Protection Adapter, SHV Output, in mm

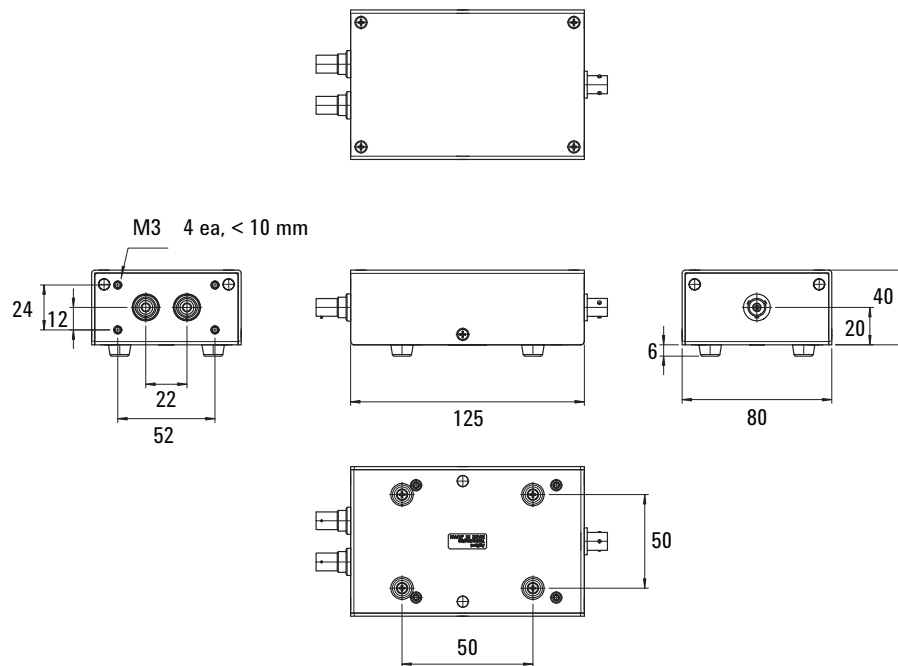


Figure 3-28 N1262A-001/002/011 High Voltage R-Box, HV Output, in mm

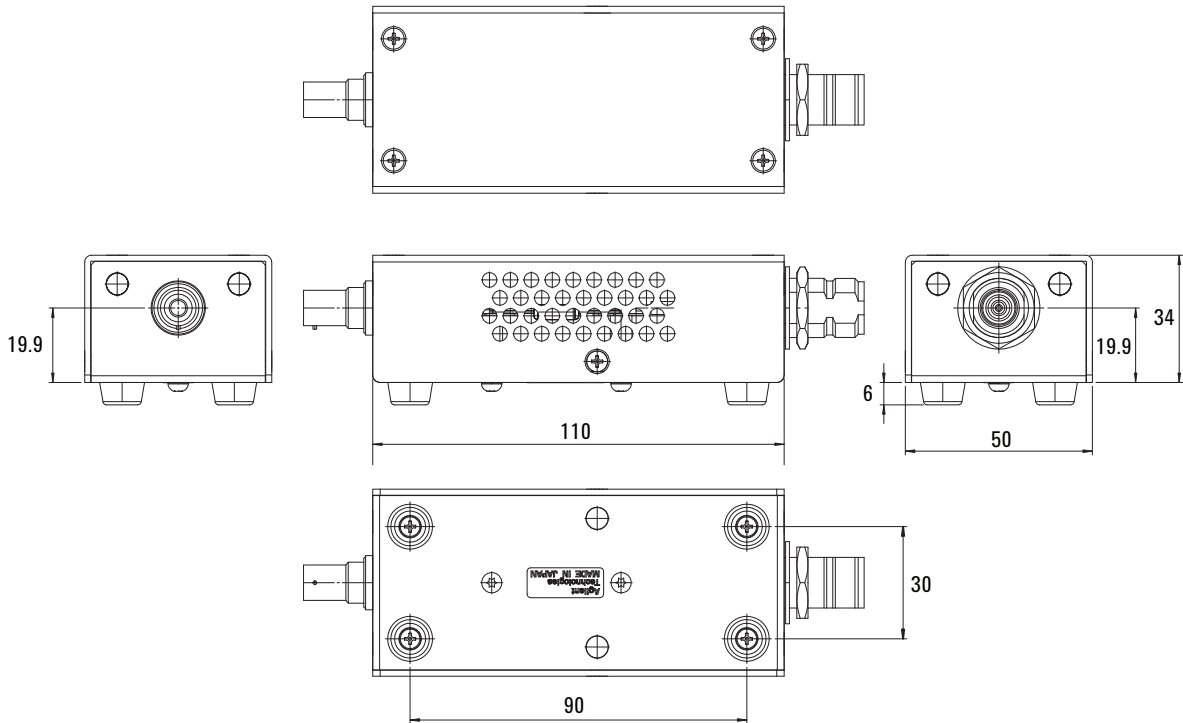


Figure 3-29 N1262A-010 R-Box, Triaxial Output, in mm

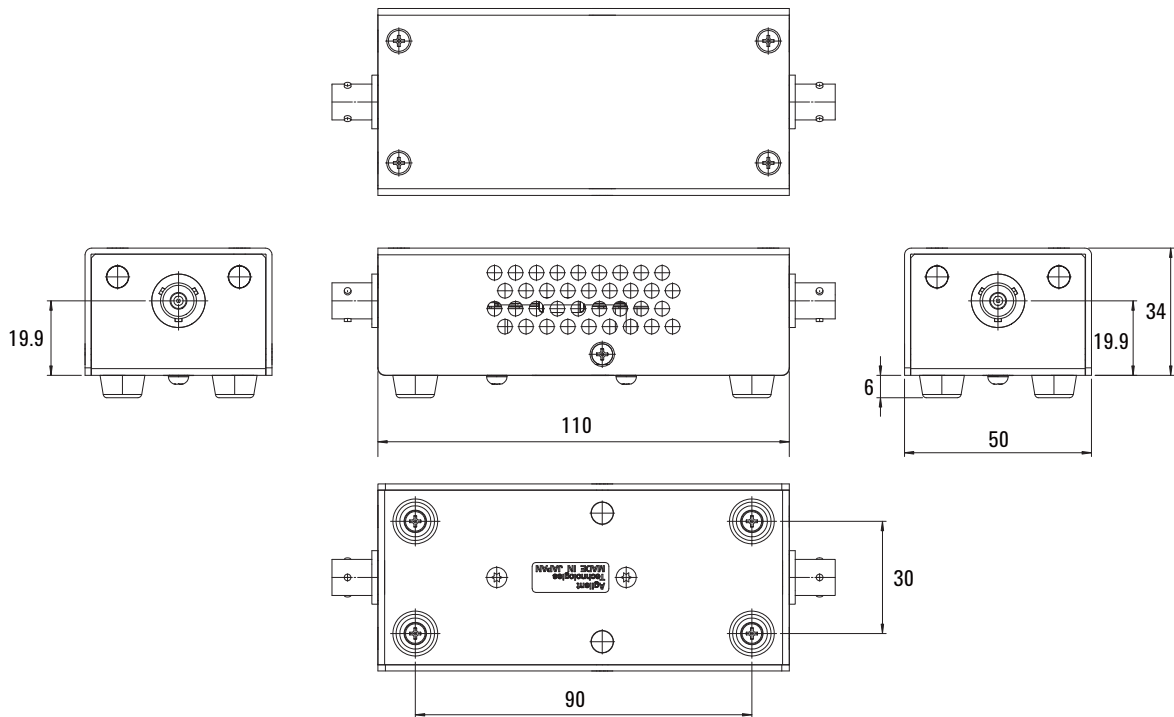


Table 3-21 **Dimensions and Weight of Accessories**

Model/Option	Description	Dimensions¹ 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

1. Body size. Excluding connectors and rubber foot.



4

Connection and Ordering Examples

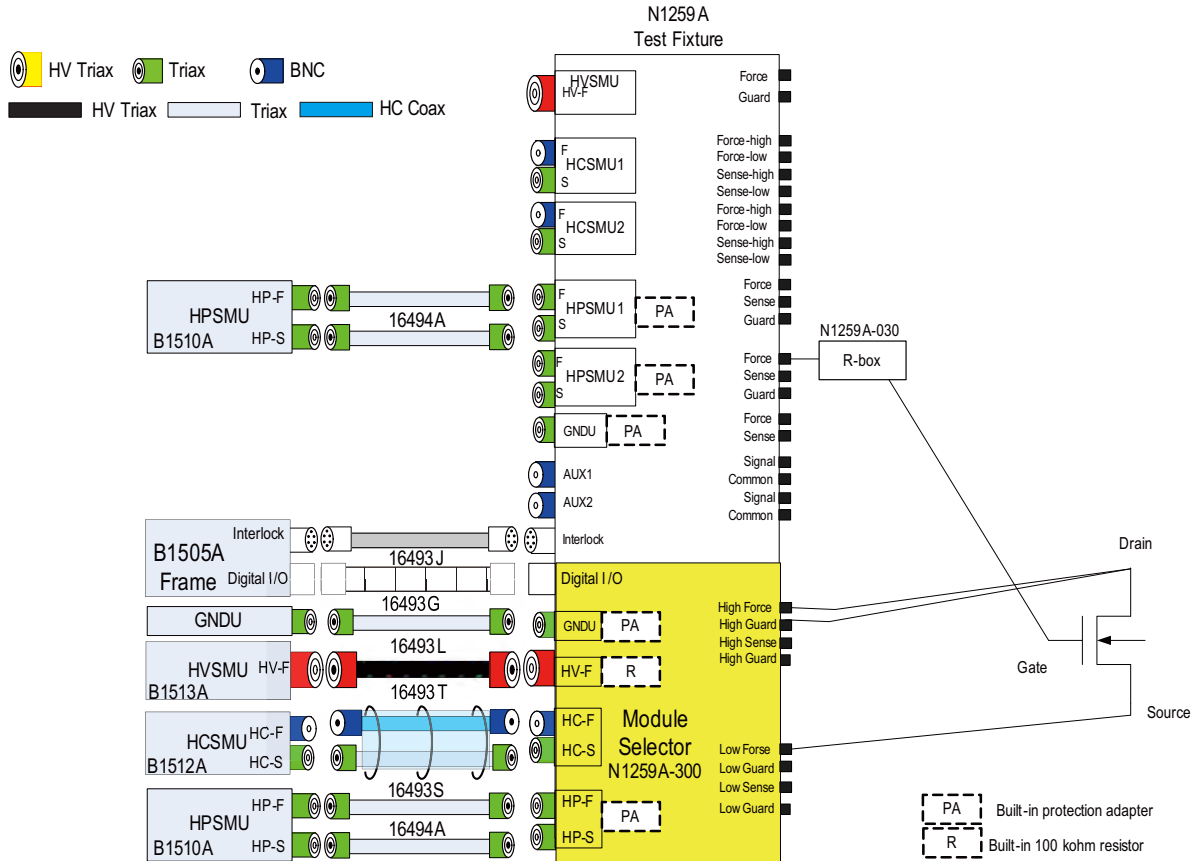


This chapter describes prober connection and ordering examples of Agilent B1505A Power Device Analyzer/Curve Tracer, and consists of the following sections.

- “Package Device Configuration Example”
- “Lateral Device Measurement with HV Connectors Only”
- “Lateral Device Measurement with General Triaxial or BNC Connectors”
- “Vertical Device Measurement with HV Connectors Only”
- “Vertical Device Measurement with General Triaxial or BNC Connectors”
- “Two-Terminal Device Measurement by Kelvin Connections”
- “Using Three HPSMU Modules”

Package Device Configuration Example

Figure 4-1 General Configuration



NOTE Protection adapter of HPSMU and GND are built in test fixture.

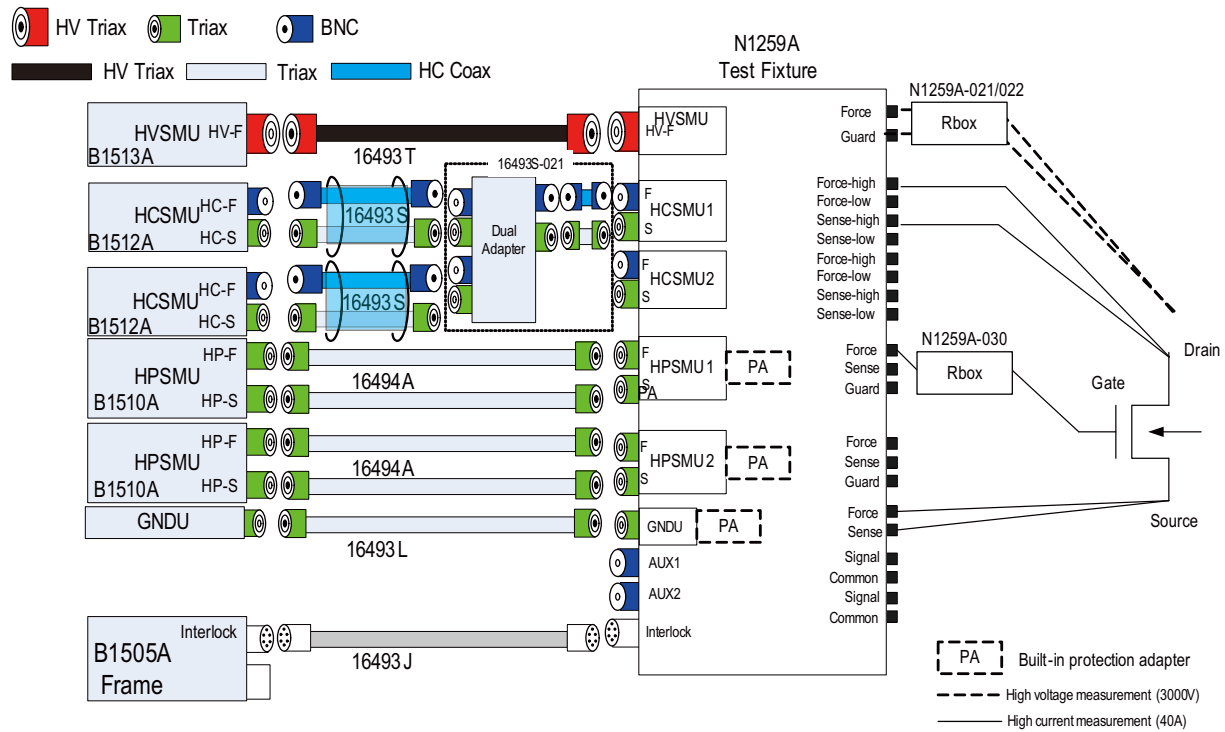
NOTE Built-in 100 kΩ resistor of the module selector is for device protection.

Table 4-1 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	2	High Power Source/Monitor Unit module
B1512A-FG	1	High Current Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1259A-001	1	Test Fixture including Inline Package Socket Module and Cables
N1259A-030	1	1 kΩ R-box for gate
N1259A-300	1	Module Selector

Connection and Ordering Examples
 Package Device Configuration Example

Figure 4-2 40 A Configuration



NOTE Module selector is available up to 30 A. If 40 A capability is required, please dual HCSMU combination adapter to device directly (without module selector).

Table 4-2 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	2	High Power Source/Monitor Unit module
B1512A-FG	2	High Current Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
16493S-021	1	Dual HCSMU Combination Adapter
N1259A-001	1	Test Fixture including Inline Package Socket Module and Cables
N1259A-021	1	1 MΩ R-box
N1259A-022	1	100 kΩ R-box
N1259A-030	1	1 kΩ R-box for gate

Lateral Device Measurement with HV Connectors Only

Figure 4-3 Lateral Device: Breakdown measurement, only HV connectors

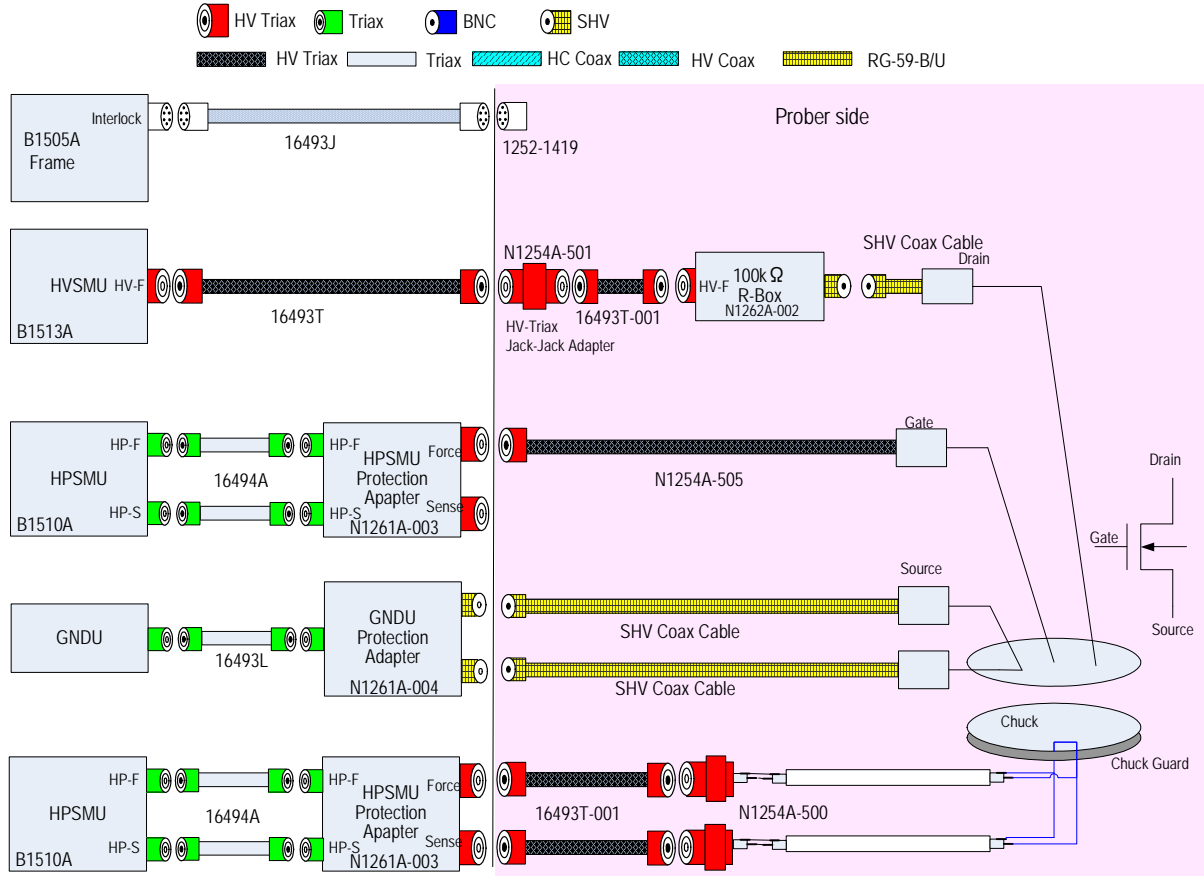


Table 4-3 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	2	High Power Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1261A-003	2	Protection adapter for HPSMU, HV output
N1261A-004	1	Protection adapter for GNDU, SHV output
N1262A-002	1	100 kΩ R-box
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-501	1	HV jack to jack adapter
N1254A-505	1	Triaxial cable assembly 1.5 m, HV plug to open-end
16493T-001	3	HVSMU cable 1.5 m
1252-1419	1	Interlock receptacle connectors

Figure 4-4 Lateral Device: I-leakage measurement, only HV connectors

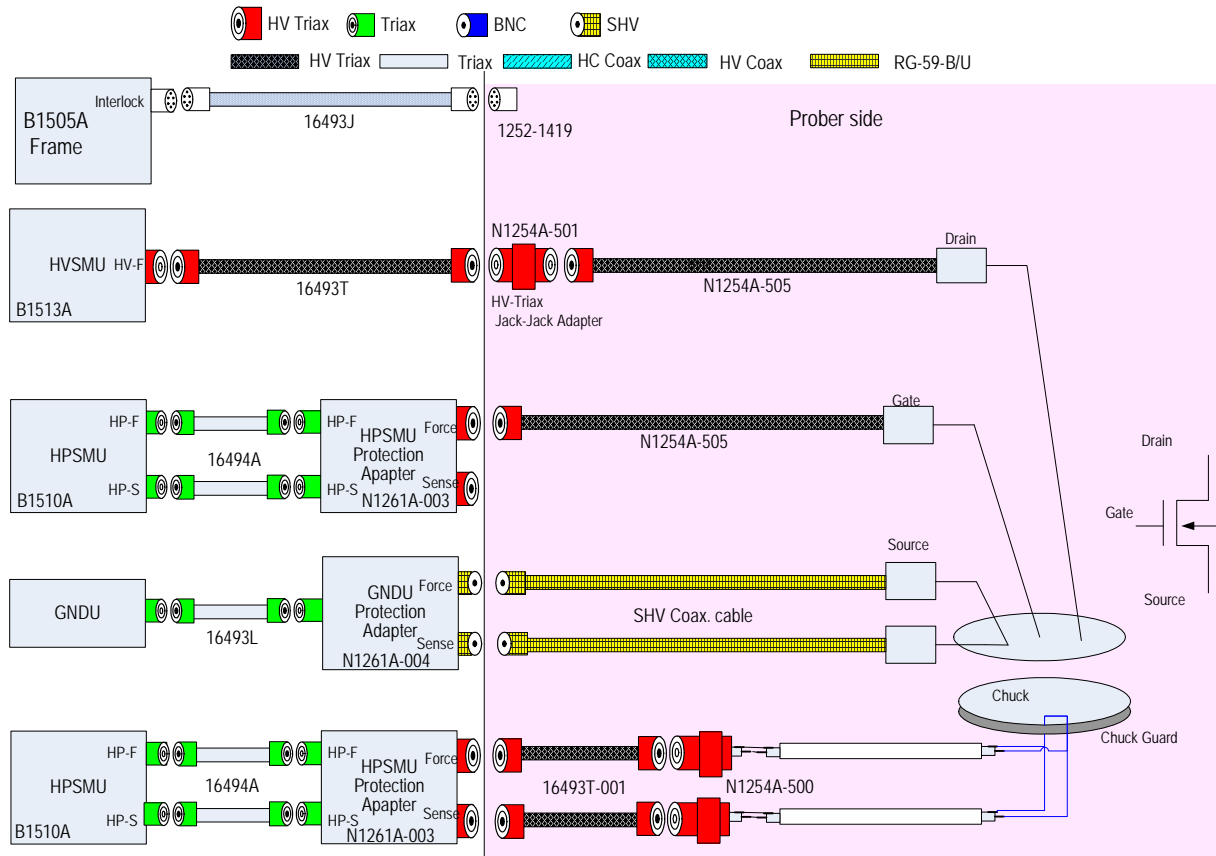


Table 4-4 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	2	High Power Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1261A-003	2	Protection adapter for HPSMU, triaxial output
N1261A-004	1	Protection adapter for GNDU, BNC output
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-501	1	HV jack to jack adapter
N1254A-505	2	Triaxial cable assembly 1.5 m, HV plug to open-end
16493T-001	2	HVSMU cable 1.5 m
1252-1419	1	Interlock receptacle connectors

Figure 4-5 Lateral Device: I-V measurement with selector, SHV cable connection for gate

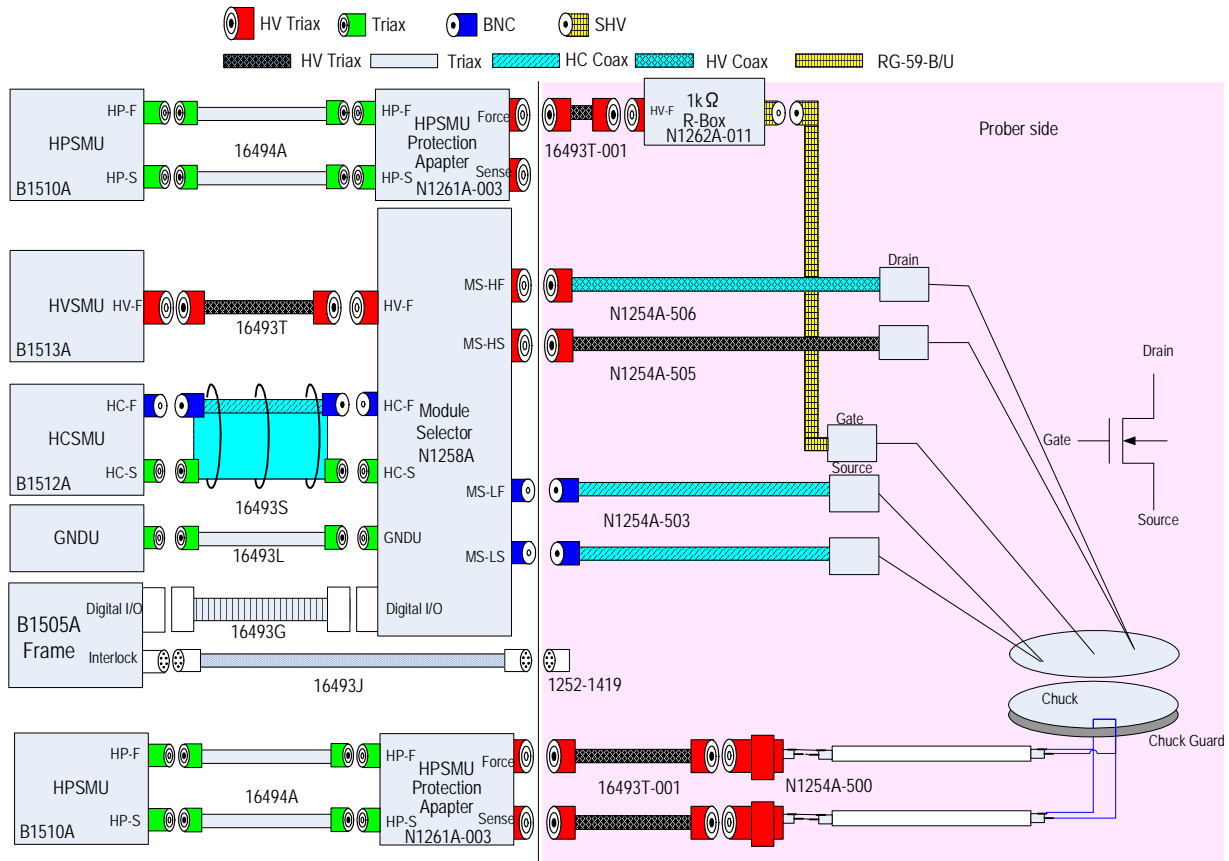


Table 4-5 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	2	High Power Source/Monitor Unit module
B1512A-FG	1	High Current Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1258A	1	Module selector
N1261A-003	2	Protection adapter for HPSMU, HV output
N1262A-011	1	1 kΩ R-box for gate, SHV output
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-503	2	Coaxial cable assembly 1.5 m, BNC to open-end
N1254A-505	1	Triaxial cable assembly 1.5 m, HV plug to open-end
N1254A-506	1	Coaxial cable assembly 1.5 m, HV plug to open-end
16493T-001	3	HVSMU cable 1.5 m
1252-1419	1	Interlock receptacle connectors

Connection and Ordering Examples
Lateral Device Measurement with HV Connectors Only

Figure 4-6 Lateral Device: C-V measurement (Cds), only HV connectors

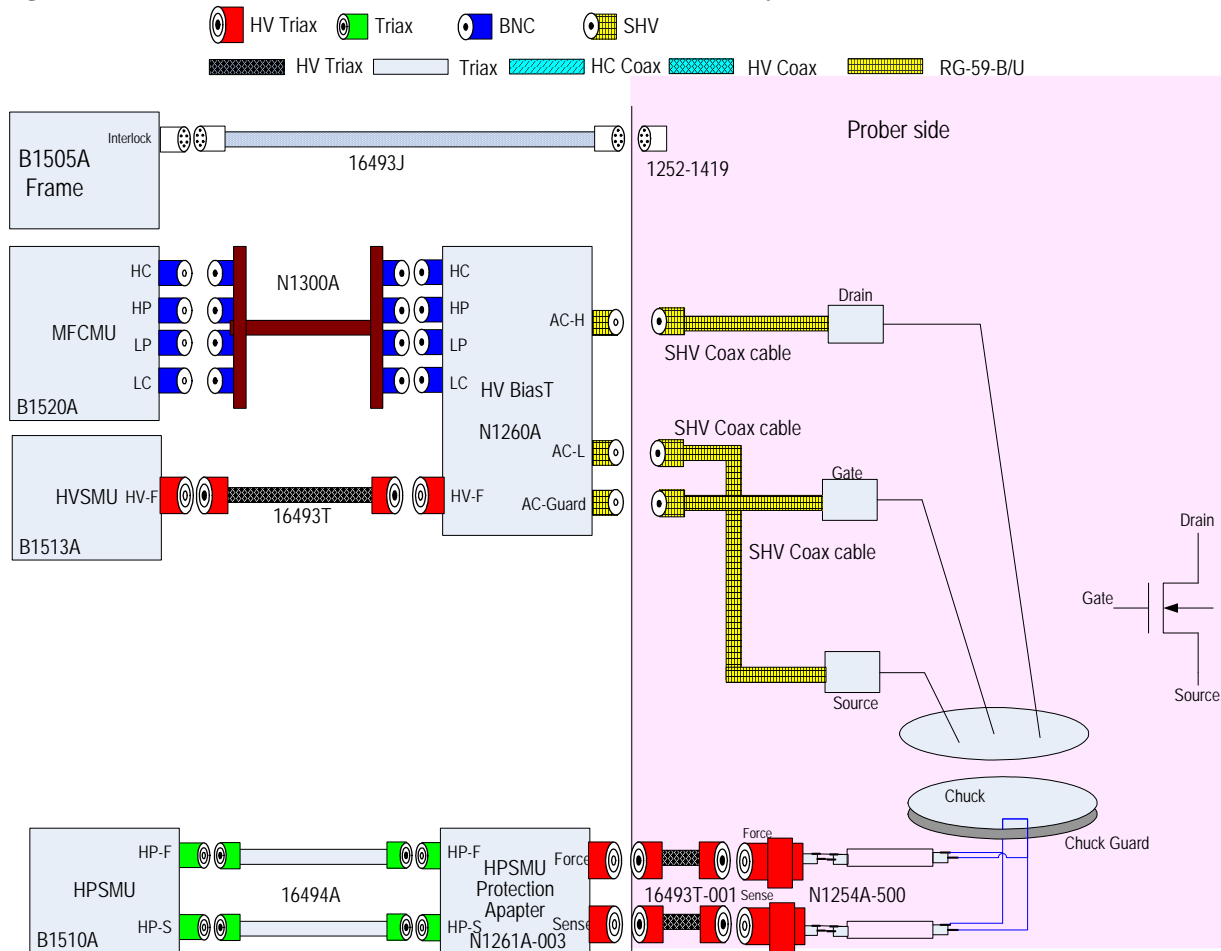


Table 4-6 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	1	High Power Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
B1520A-FG	1	Multi Frequency Capacitance Measurement Unit module
N1260A	1	High Voltage Bias Tee
N1261A-003	1	Protection adapter for HPSMU, HV output
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
16493T-001	2	HVSMU cable 1.5 m
1252-1419	1	Interlock receptacle connector

Figure 4-7

Lateral Device: C-V measurement (Cgd), only HV connectors

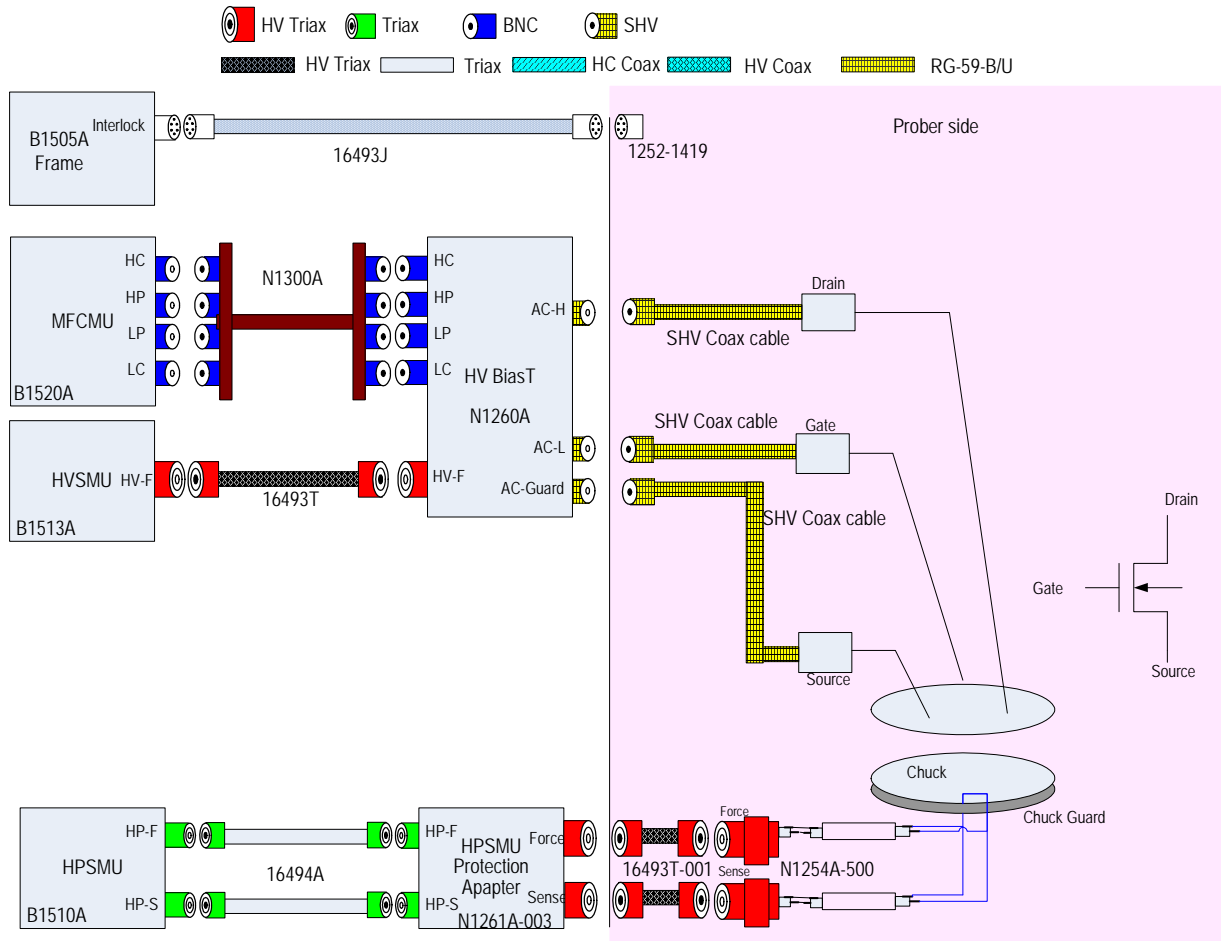


Table 4-7 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	1	High Power Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
B1520A-FG	1	Multi Frequency Capacitance Measurement Unit module
N1260A	1	High Voltage Bias Tee
N1261A-003	1	Protection adapter for HPSMU, HV output
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
16493T-001	2	HVSMU cable 1.5 m
1252-1419	1	Interlock receptacle connector

Lateral Device Measurement with General Triaxial or BNC Connectors

Figure 4-8 Lateral Device: Breakdown measurement, general triaxial or BNC connectors for gate/source

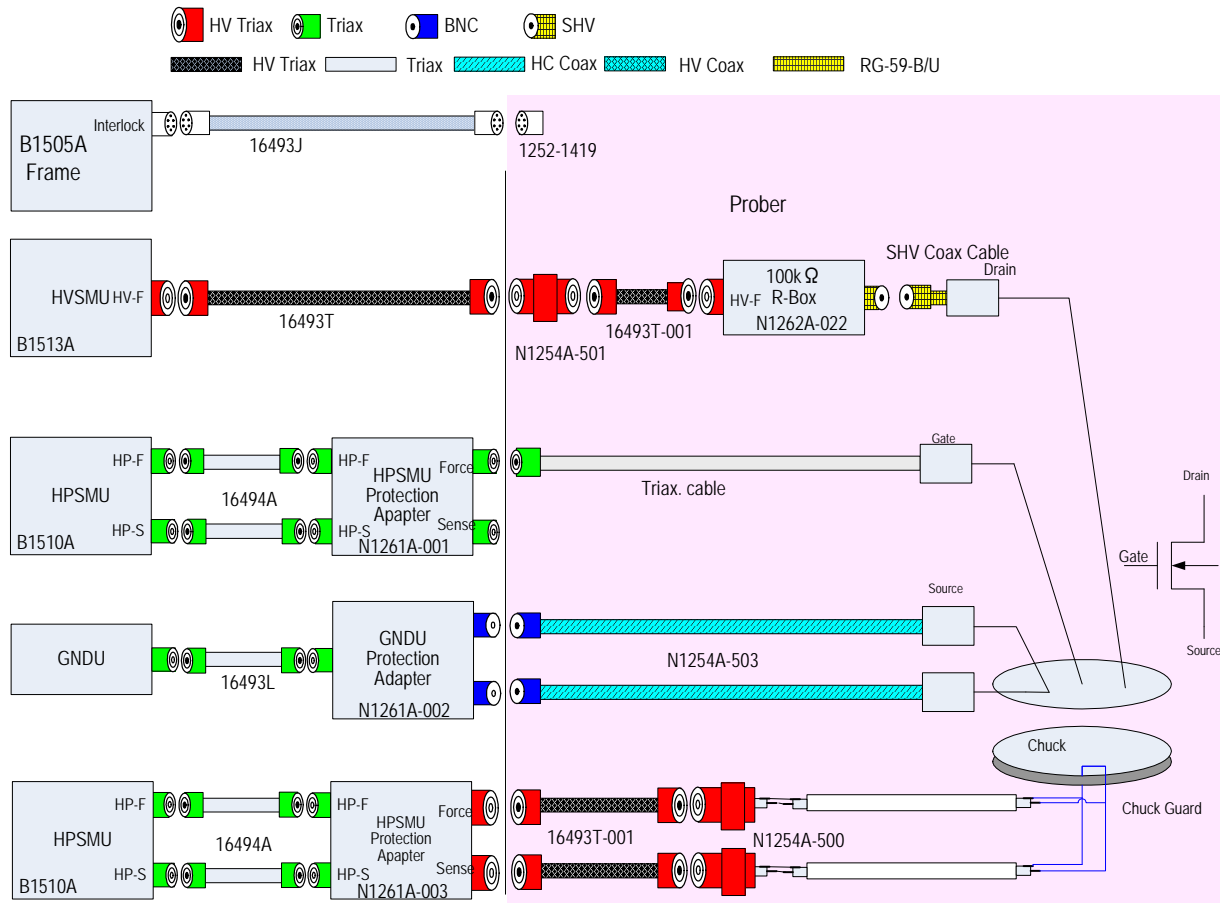


Table 4-8 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	2	High Power Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1261A-001	1	Protection adapter for HPSMU, triaxial output
N1261A-002	1	Protection adapter for GNDU, BNC output
N1261A-003	1	Protection adapter for HPSMU, HV output
N1262A-022	1	100 kΩ R-box
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-501	1	HV jack to jack adapter
N1254A-503	2	Coaxial cable assembly 1.5 m, BNC to open-end
16493T-001	3	HVSMU cable 1.5 m
1252-1419	1	Interlock receptacle connectors

Figure 4-9 Lateral Device: I-leakage measurement, general triaxial or BNC connectors for gate/source

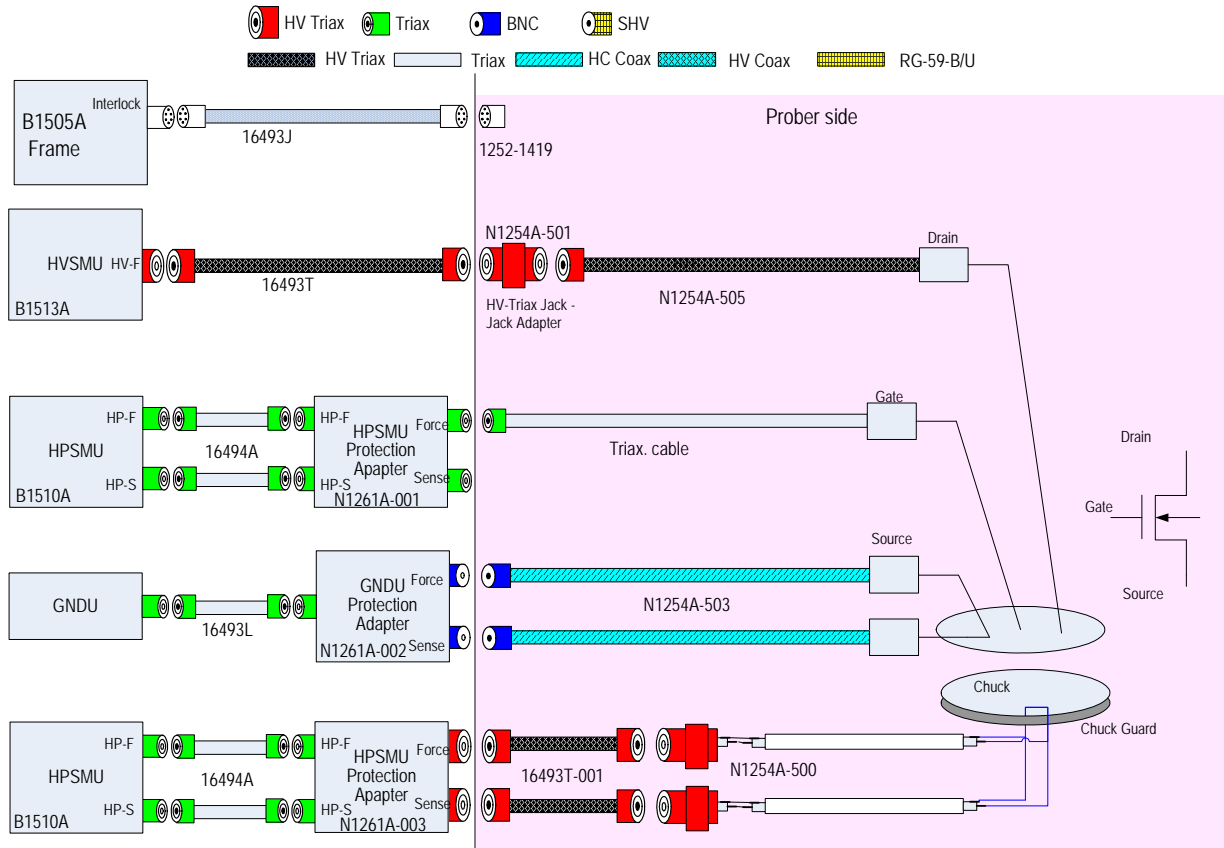


Table 4-9 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	2	High Power Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1261A-001	1	Protection adapter for HPSMU, triaxial output
N1261A-002	1	Protection adapter for GNDU, BNC output
N1261A-003	1	Protection adapter for HPSMU, HV output
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-501	1	HV jack to jack adapter
N1254A-503	2	Coaxial cable assembly 1.5 m, BNC to open-end
N1254A-505	1	Triaxial cable assembly 1.5 m, HV plug to open-end
16493T-001	2	HVSMU cable 1.5 m
1252-1419	1	Interlock receptacle connectors

Connection and Ordering Examples
Lateral Device Measurement with General Triaxial or BNC Connectors

Figure 4-10 Lateral Device: I-V measurement with selector, general triaxial or BNC connectors for gate/source

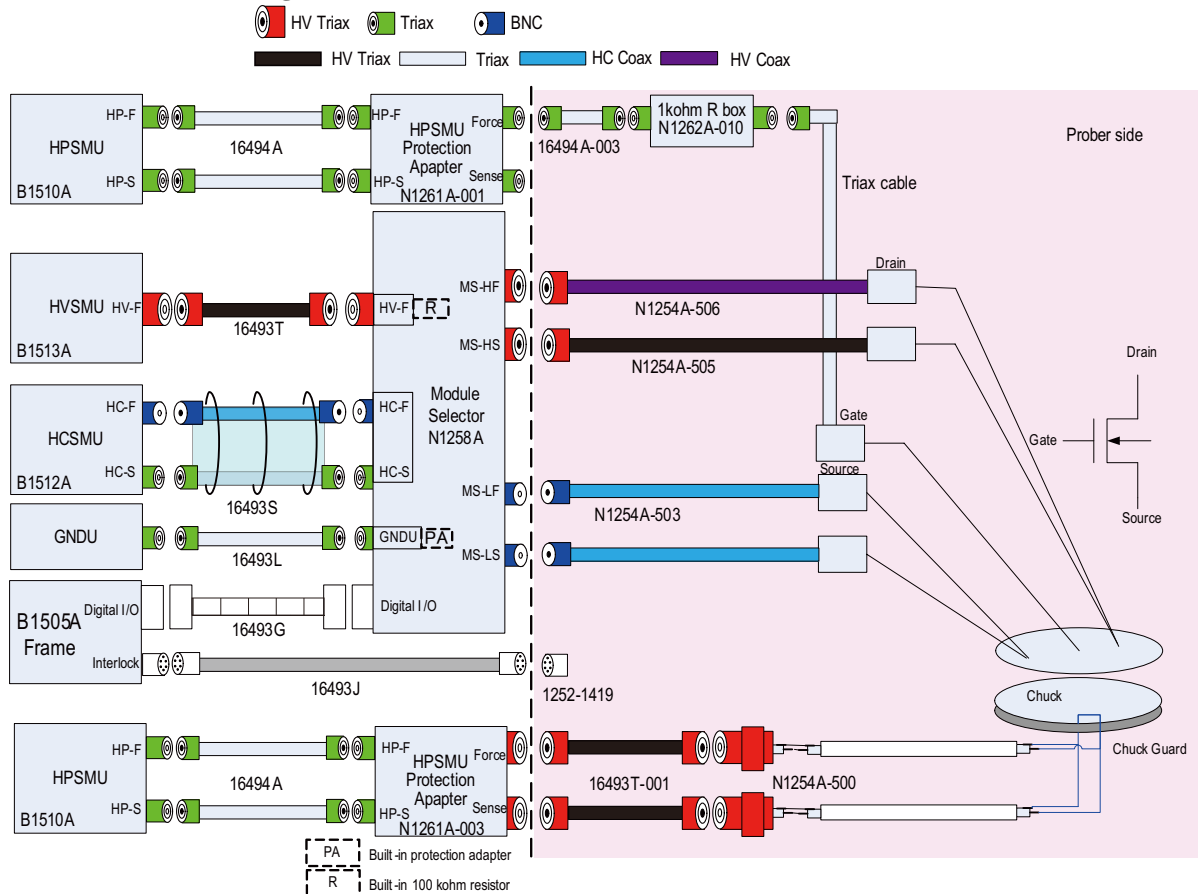


Table 4-10 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	2	High Power Source/Monitor Unit module
B1512A-FG	1	High Current Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1261A-001	1	Protection adapter for HPSMU, triaxial output
N1261A-003	1	Protection adapter for HPSMU, HV output
N1262A-010	1	1 kΩ R-box for gate, triaxial output
N1258A	1	Module selector
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-503	2	Coaxial cable assembly 1.5 m, BNC to open-end
N1254A-505	1	Triaxial cable assembly 1.5 m, HV plug to open-end
N1254A-506	1	Coaxial cable assembly 1.5 m, HV plug to open-end
16493T-001	2	HVSMU cable 1.5 m
16494A-003	1	Triaxial cable 80 cm
1252-1419	1	Interlock receptacle connectors

Figure 4-11 Lateral Device: I-V measurement by Kelvin connections

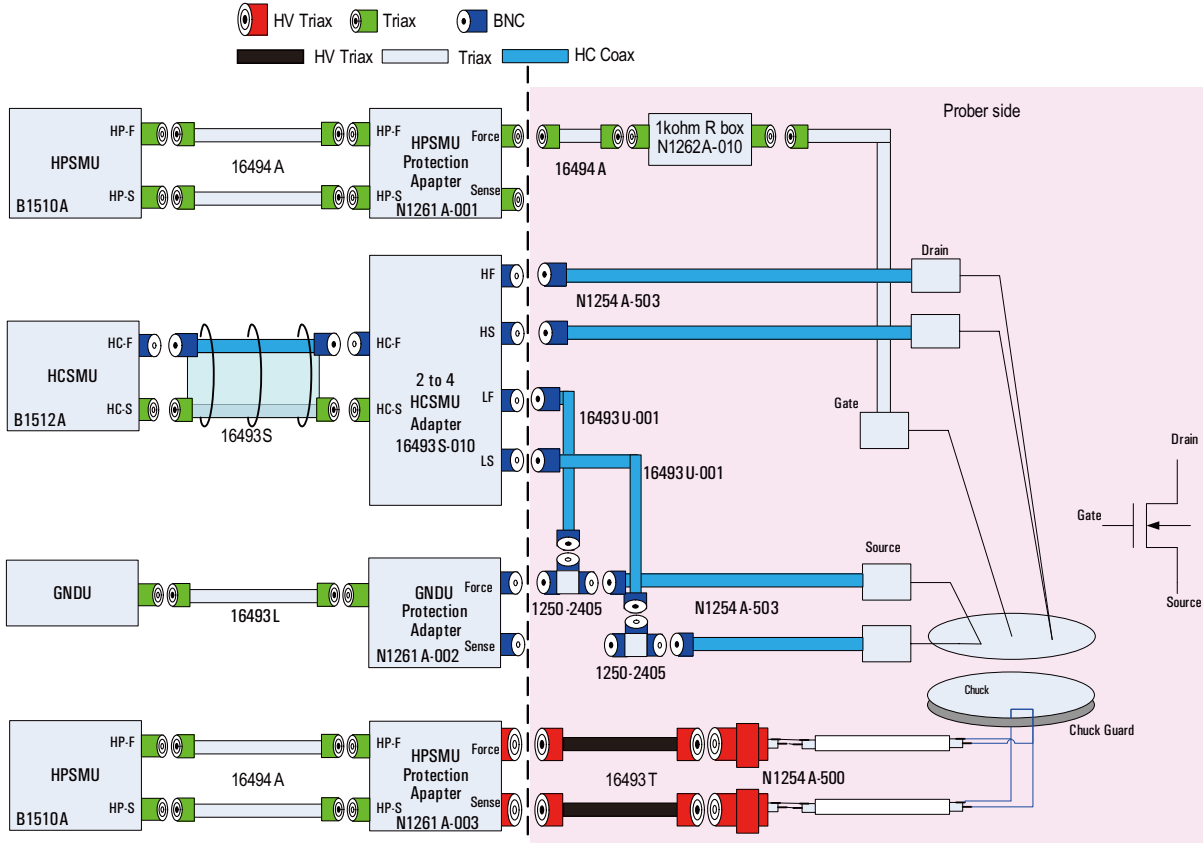


Table 4-11 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	2	High Power Source/Monitor Unit module
B1512A-FG	1	High Current Source/Monitor Unit module
N1261A-001	1	Protection adapter for HPSMU, triaxial output
N1261A-002	1	Protection adapter for GNDU, BNC output
N1261A-003	1	Protection adapter for HPSMU, HV output
N1262A-010	1	1 kΩ R-box for gate, triaxial output
16493S-010	1	HCSMU Kelvin adapter, Force/Sense to HighF/HighS/LowF/LowS, BNC
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-503	4	Coaxial cable assembly 1.5 m, BNC to open-end
16493U-001	2	High current coaxial cable 1.5 m, BNC to BNC
16493T-001	2	HVSMU cable 1.5 m
16494A-003	1	Triaxial cable 80 cm
1252-2405	2	BNC(m)-(f)-(f) adapter

Figure 4-12 Lateral Device: I-V measurement by Kelvin connections, HCSMU for gate

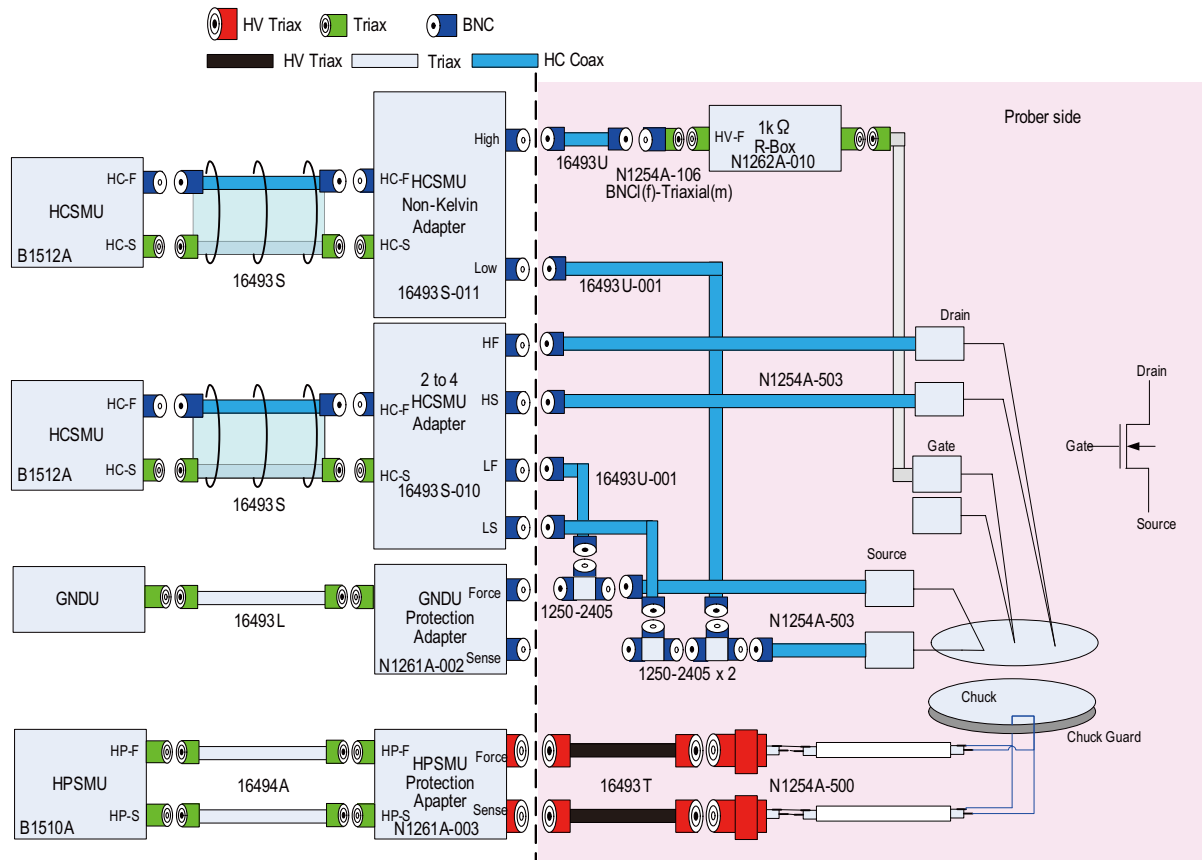


Table 4-12 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	1	High Power Source/Monitor Unit module
B1512A-FG	2	High Current Source/Monitor Unit module
16493S-010	1	HCSMU Kelvin adapter, Force/Sense to HighF/HighS/LowF/LowS, BNC
16493S-011	1	HCSMU non-Kelvin adapter, Force/Sense to High/Low, BNC output
N1261A-002	1	Protection adapter for GNDU, BNC output
N1261A-003	1	Protection adapter for HPSMU, HV output
N1262A-010	1	1 kΩ R-box for gate, triaxial output
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-503	4	Coaxial cable assembly 1.5 m, BNC to open-end
16493U-001	4	High current coaxial cable 1.5 m, BNC to BNC
16493T-001	2	HVSMU cable 1.5 m
N1254A-106	1	BNC(f)-triaxial(m) adapter
1252-2405	3	BNC(m)-(f)-(f) adapter

Figure 4-13 Lateral Device: I-V measurement by full Kelvin connections, HCSMU for gate

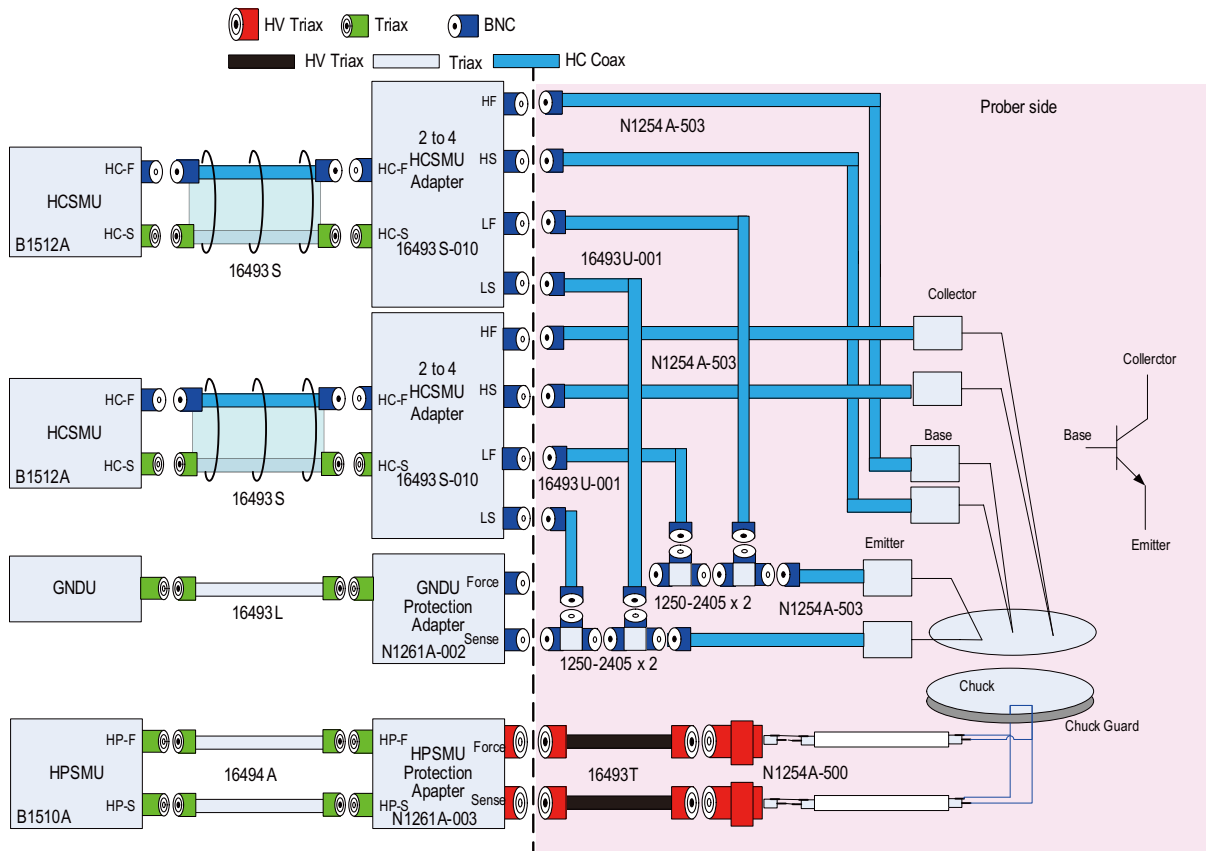


Table 4-13 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	1	High Power Source/Monitor Unit module
B1512A-FG	2	High Current Source/Monitor Unit module
N1261A-002	1	Protection adapter for GNDU, BNC output
N1261A-003	1	Protection adapter for HPSMU, HV output
16493S-010	2	HCSMU Kelvin adapter, Force/Sense to HighF/HighS/LowF/LowS, BNC
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-503	6	Coaxial cable assembly 1.5 m, BNC to open-end
16493U-001	4	High current coaxial cable 1.5 m, BNC to BNC
16493T-001	2	HVSMU cable 1.5 m
1252-2405	4	BNC(m)-(f)-(f) adapter

Connection and Ordering Examples
Lateral Device Measurement with General Triaxial or BNC Connectors

Figure 4-14 Up to 40 A measurement by using two HCSMU modules

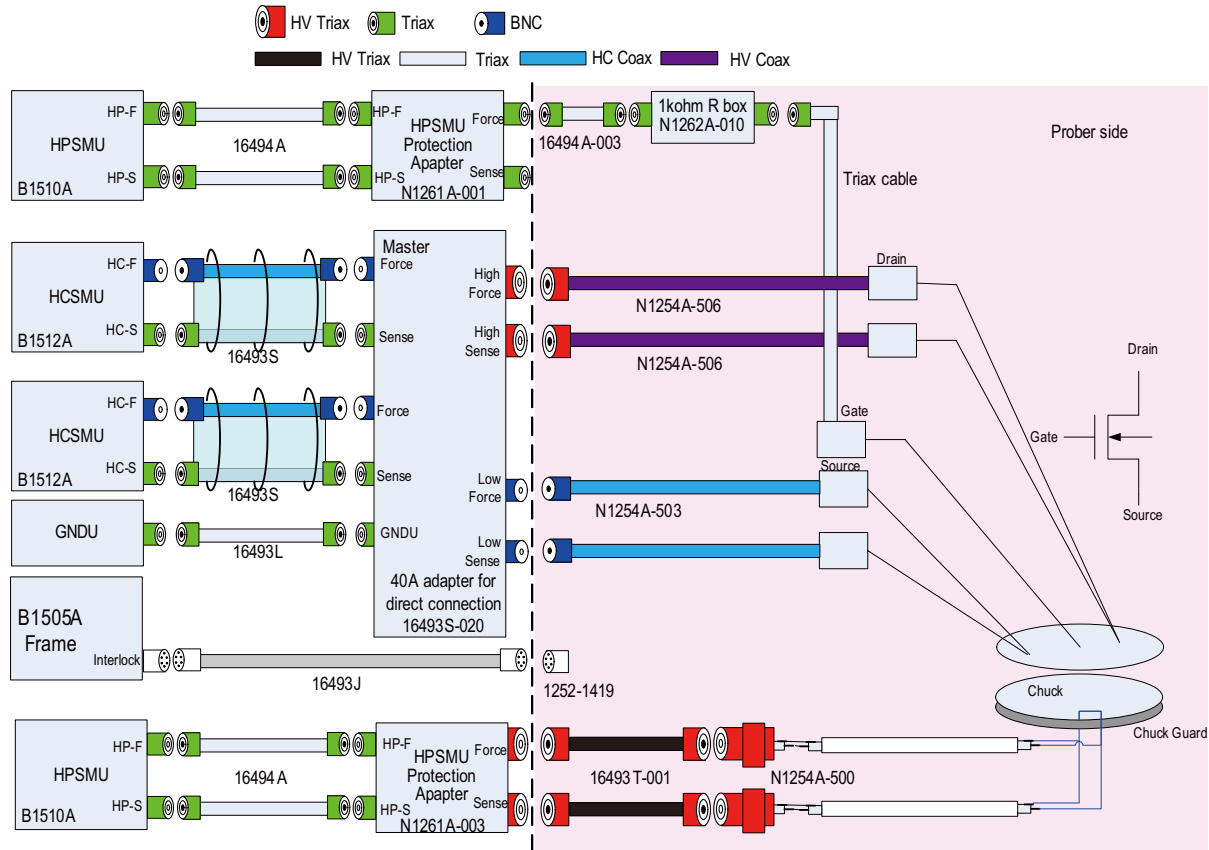


Table 4-14 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	2	High Power Source/Monitor Unit module
B1512A-FG	2	High Current Source/Monitor Unit module
N1261A-001	1	Protection adapter for HPSMU, triaxial output
N1261A-003	1	Protection adapter for HPSMU, HV output
N1262A-010	1	1 kΩ R-box
16493S-020	1	Adapter, 40 A, when connecting to wafer prober directly without N1258A selector
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-503	2	Coaxial cable assembly 1.5 m, BNC to open-end
N1254A-506	2	Coaxial cable assembly 1.5 m, HV plug to open-end
16493T-001	2	HVSMU cable 1.5 m
16494A-003	1	Triaxial cable 80 cm
1252-1419	1	Interlock receptacle connector

Figure 4-15 Up to 30 A measurement by using two HCSMU modules and selector

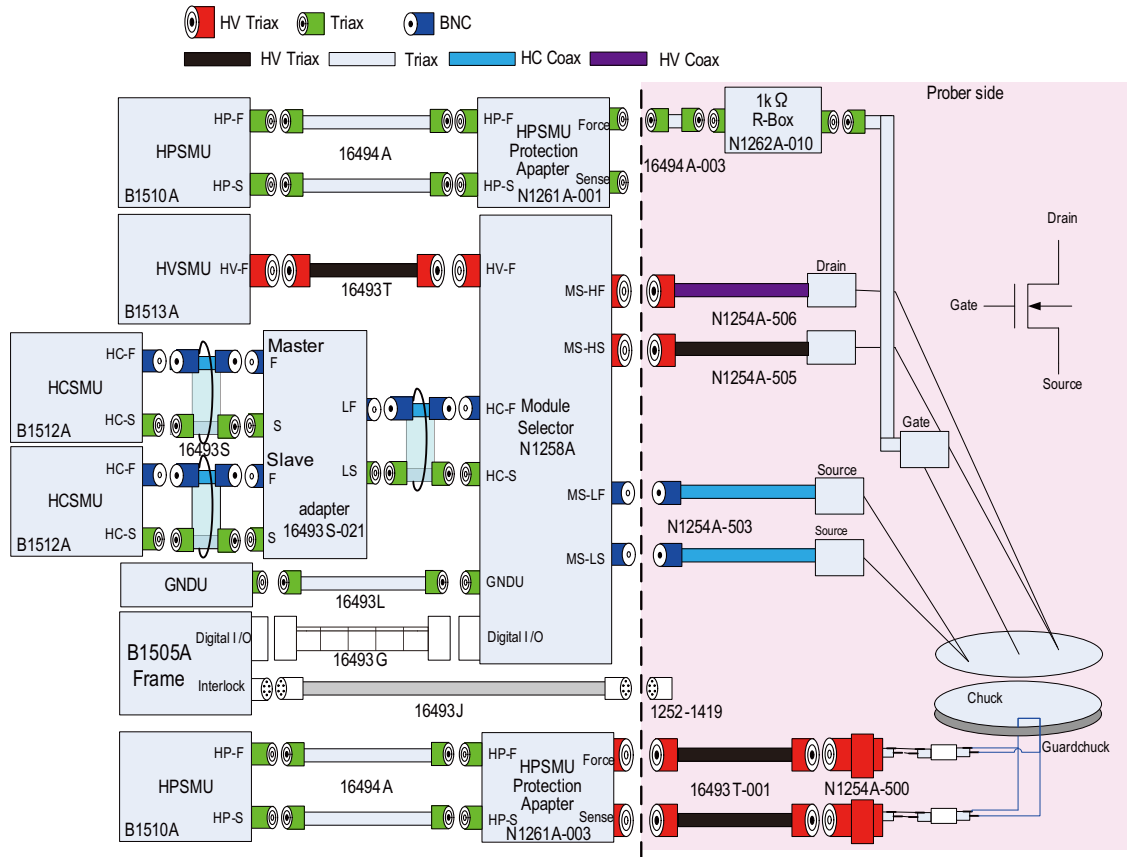


Table 4-15 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	2	High Power Source/Monitor Unit module
B1512A-FG	2	High Current Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1261A-001	1	Protection adapter for HPSMU, triaxial output
N1261A-003	1	Protection adapter for HPSMU, HV output
N1262A-010	1	1 kΩ R-box
N1258A	1	Module selector
16493S-021	1	Adapter, 40 A, select this if 16493S-020 is not used
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-503	2	Coaxial cable assembly 1.5 m, BNC to open-end
N1254A-505	2	Triaxial cable assembly 1.5 m, HV plug to open-end
N1254A-506	2	Coaxial cable assembly 1.5 m, HV plug to open-end
16493T-001	2	HVSMU cable 1.5 m
16494A-003	1	Triaxial cable 80 cm
1252-1419	1	Interlock receptacle connector

Vertical Device Measurement with HV Connectors Only

Figure 4-16 Vertical Device: I-Leakage measurement, only HV connectors

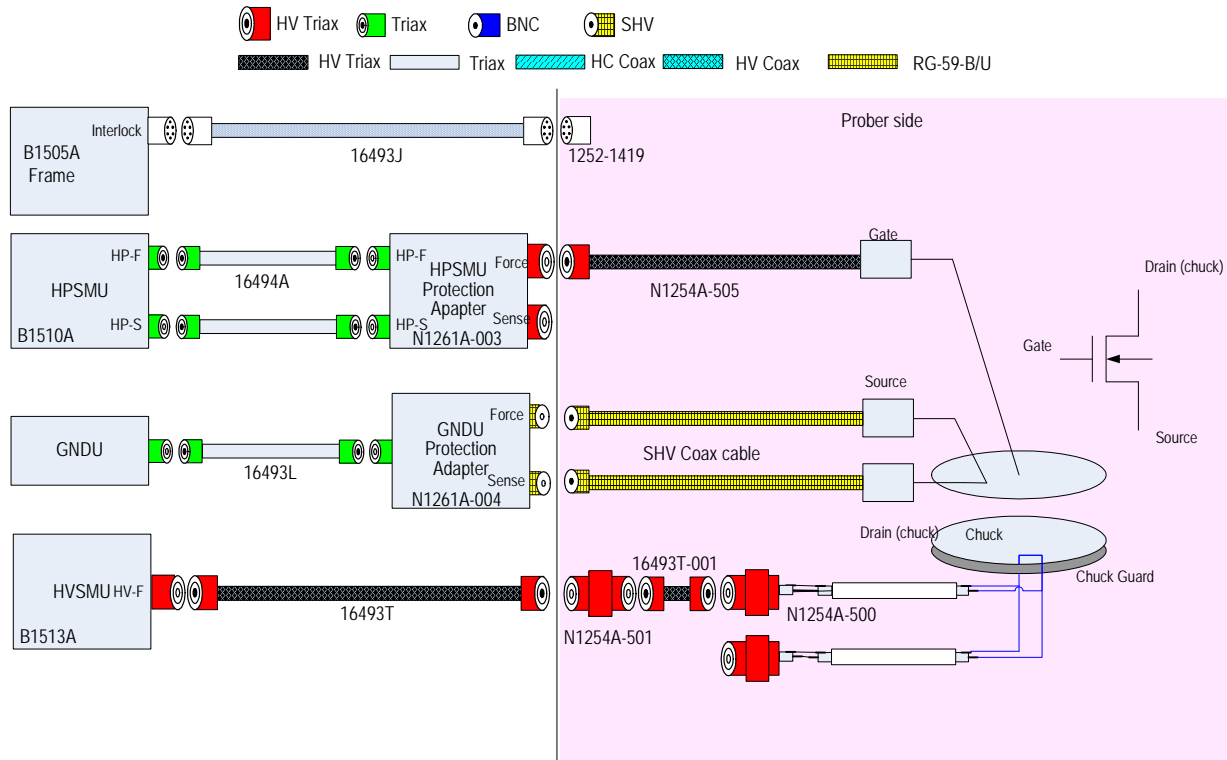


Table 4-16 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	1	High Power Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1261A-003	1	Protection adapter for HPSMU, HV output
N1261A-004	1	Protection adapter for GNDU, SHV output
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-501	1	HV jack to jack adapter
N1254A-505	1	Triaxial cable assembly 1.5 m, HV plug to open-end
16493T-001	1	HVSMU cable 1.5 m
1252-1419	1	Interlock receptacle connector

Figure 4-17 Vertical Device: I-V measurement with selector, HV connector for gate

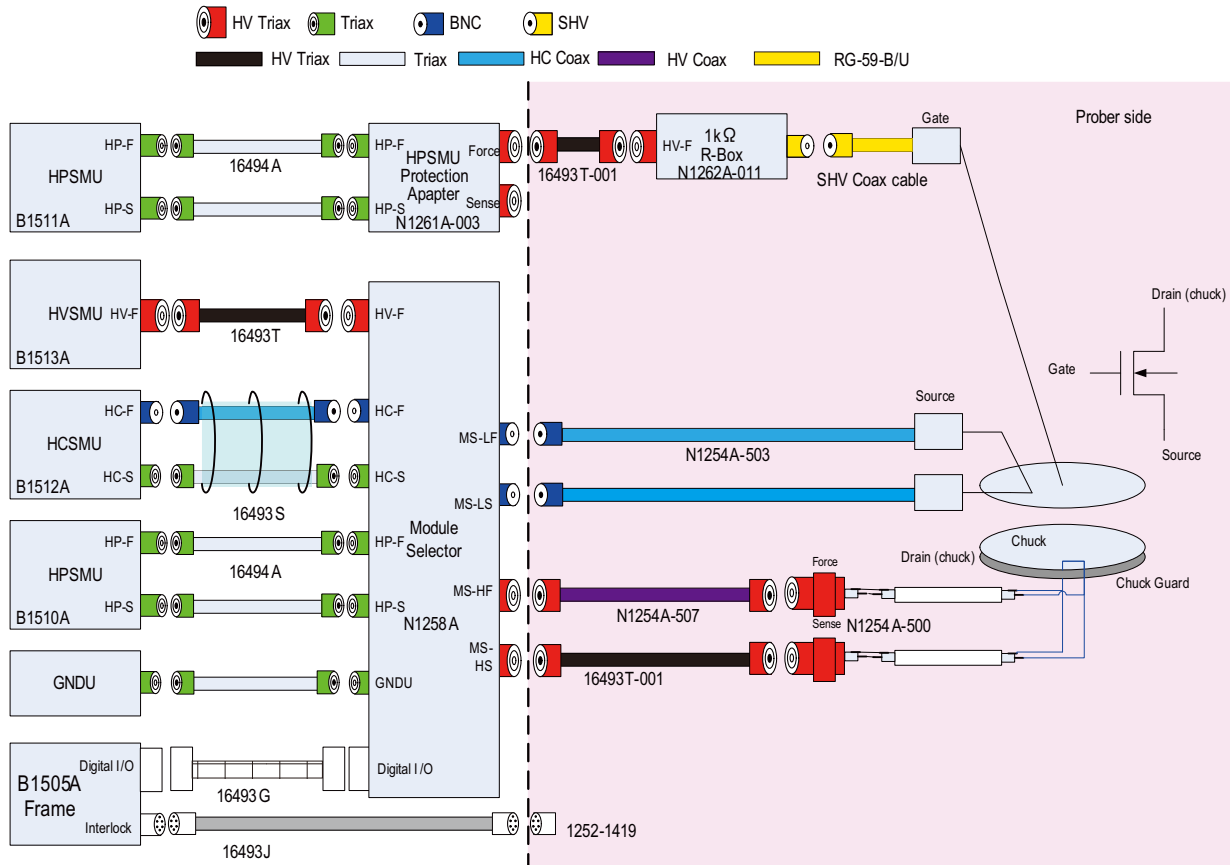


Table 4-17 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	1	High Power Source/Monitor Unit module
B1512A-FG	1	High Current Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1258A	1	Module selector
N1261A-003	1	Protection adapter for HPSMU, HV output
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1262A-011	1	1 kΩ R-box for gate, SHV output
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-507	1	Coaxial cable assembly 1.5 m, HV plug to HV plug
16493T-001	2	HVSMU cable 1.5 m
1252-1419	1	Interlock receptacle connector

Connection and Ordering Examples
Vertical Device Measurement with HV Connectors Only

Figure 4-18 Vertical Device: C-V measurement (Cds), only HV connectors

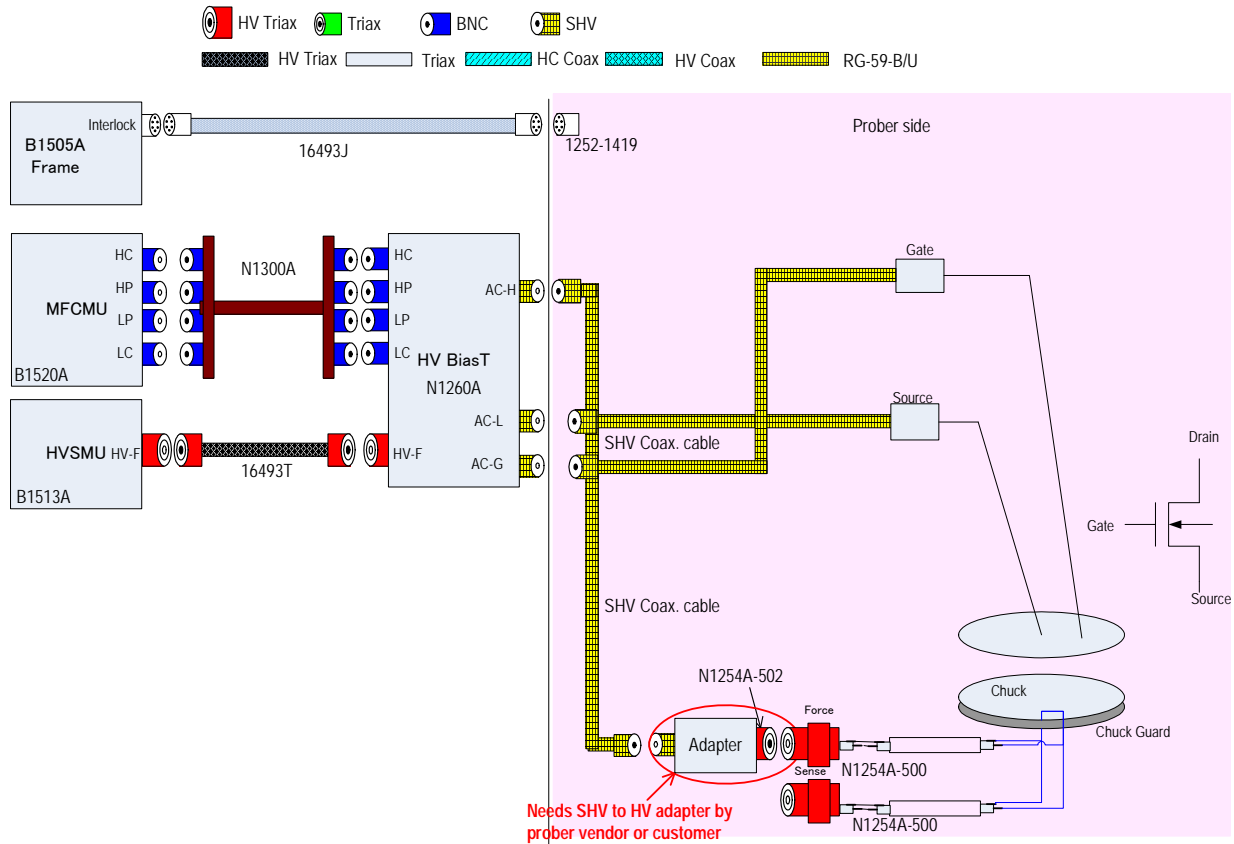


Table 4-18 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1513A-FG	1	High Voltage Source/Monitor Unit module
B1520A-FG	1	Multi Frequency Capacitance Measurement Unit module
N1260A	1	High Voltage Bias Tee
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
1252-1419	1	Interlock receptacle connector

NOTE

SHV to HV plug adapter

In this example, the HV jack connector is used to connect the wafer chuck. Then you need the adapter which connects the HV plug connector to the SHV connector. Assemble it by using the N1254A-502 connector. Or consult prober vendor.

Figure 4-19

Vertical Device: C-V measurement (Cgd), only HV connectors

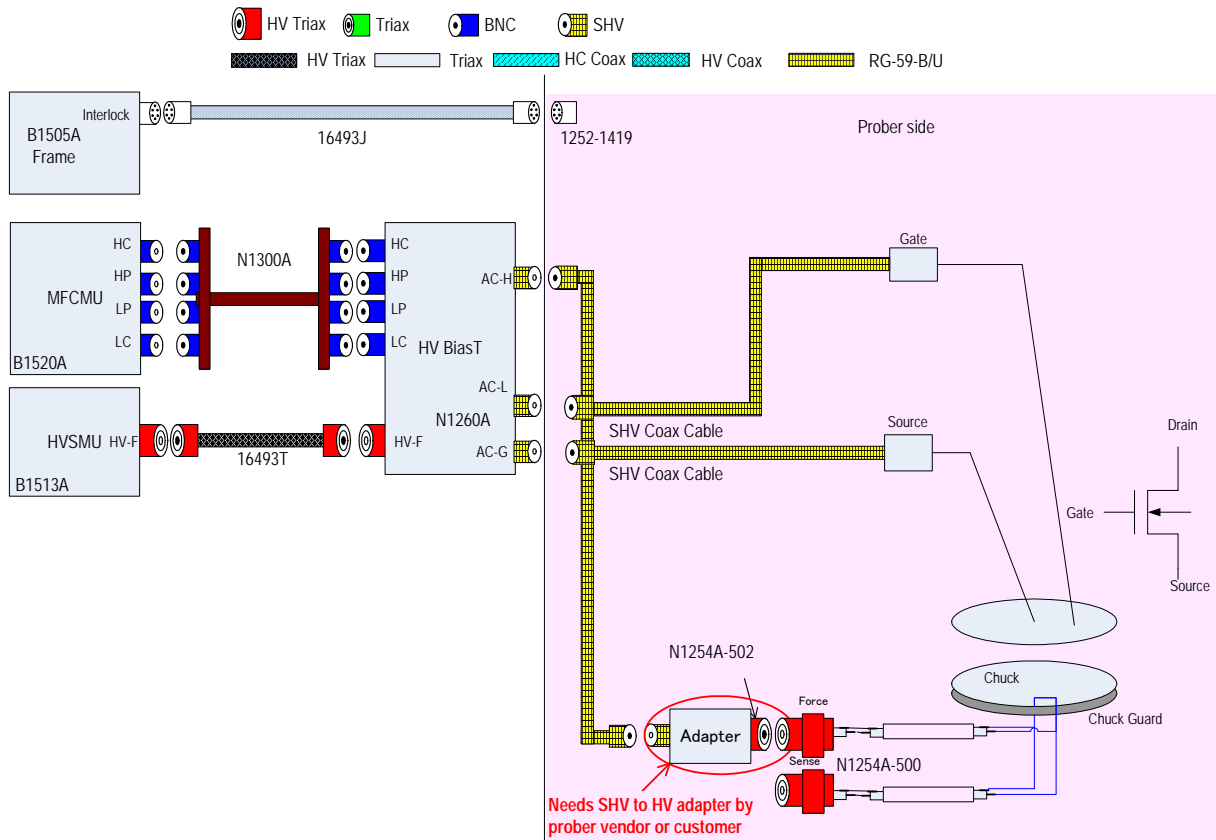


Table 4-19

Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1513A-FG	1	High Voltage Source/Monitor Unit module
B1520A-FG	1	Multi Frequency Capacitance Measurement Unit module
N1260A	1	High Voltage Bias Tee
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
1252-1419	1	Interlock receptacle connector

NOTE

SHV to HV plug adapter

In this example, the HV jack connector is used to connect the wafer chuck. Then you need the adapter which connects the HV plug connector to the SHV connector. Assemble it by using the N1254A-502 connector. Or consult prober vendor.

Vertical Device Measurement with General Triaxial or BNC Connectors

Figure 4-20 Vertical Device: I-Leakage measurement, general triaxial or BNC connectors for gate/source

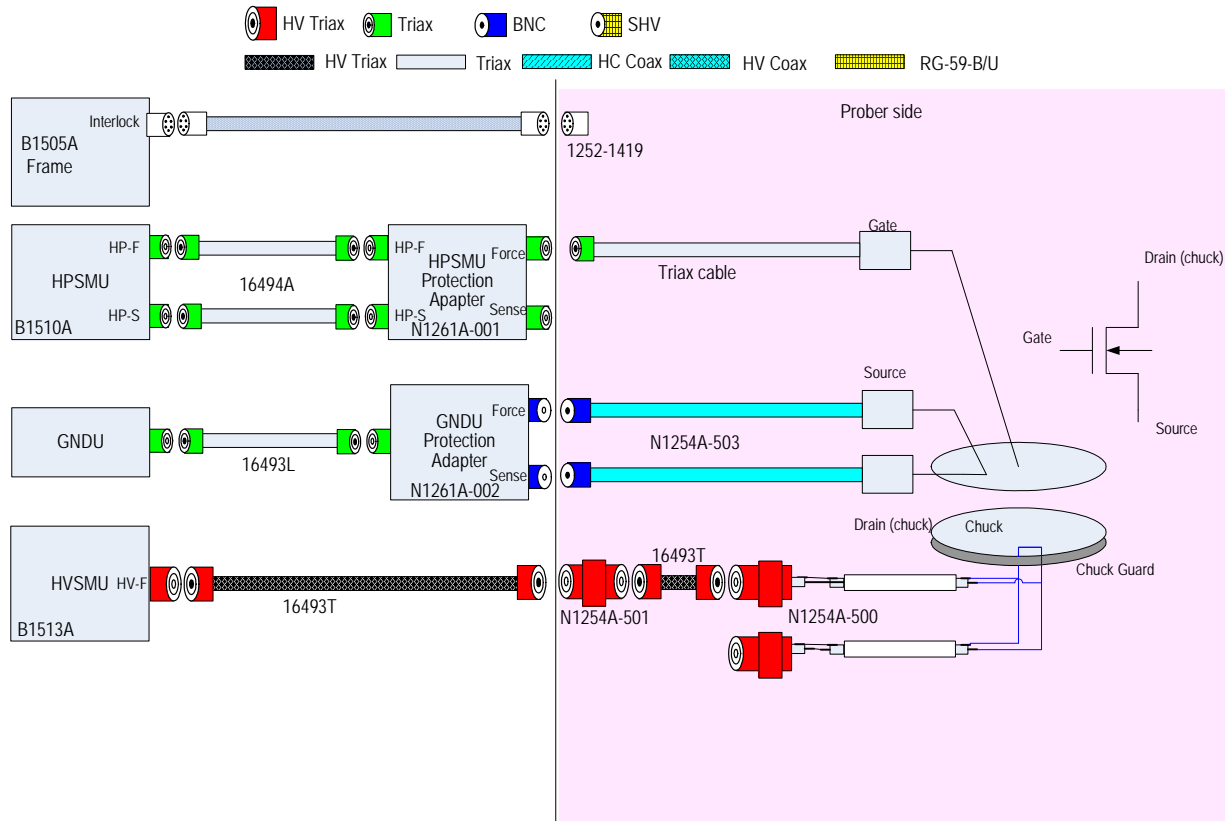


Table 4-20 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	1	High Power Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1261A-001	1	Protection adapter for HPSMU, triaxial output
N1261A-002	1	Protection adapter for GNDU, BNC output
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-501	1	HV jack to jack adapter
N1254A-503	2	Coaxial cable assembly 1.5 m, BNC to open-end
16493T-001	1	HVSMU cable 1.5 m
1252-1419	1	Interlock receptacle connector

Figure 4-21 Vertical Device: I-V measurement by Kelvin connections

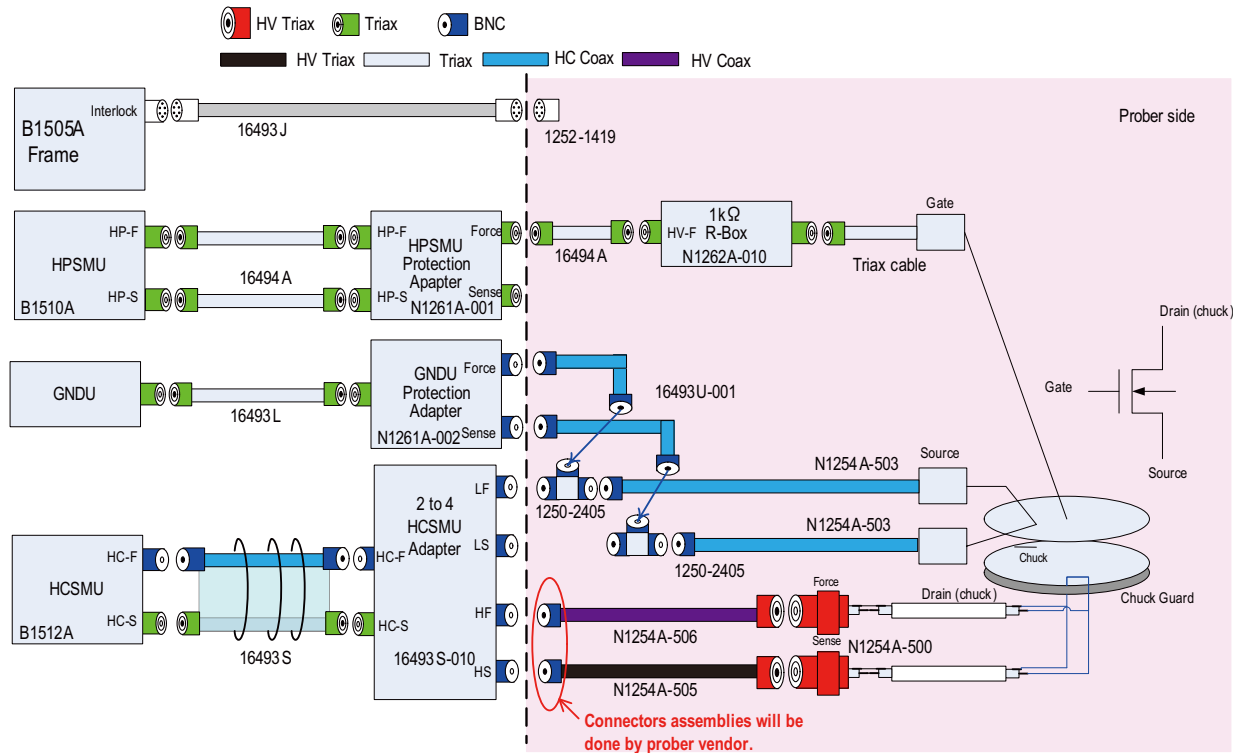


Table 4-21 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	1	High Power Source/Monitor Unit module
B1512A-FG	1	High Current Source/Monitor Unit module
N1261A-001	1	Protection adapter for HPSMU, triaxial output
N1261A-002	1	Protection adapter for GNDU, BNC output
16493S-010	1	HCSMU Kelvin adapter, Force/Sense to HighF/HighS/LowF/LowS, BNC
N1262A-010	1	1 kΩ R-box for gate, triaxial output
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-503	2	Coaxial cable assembly 1.5 m, BNC to open-end
N1254A-505	1	Triaxial cable assembly 1.5 m, HV plug to open-end
N1254A-506	1	Coaxial cable assembly 1.5 m, HV plug to open-end
16493U-001	2	High current coaxial cable 1.5 m, BNC to BNC
16494A-001	1	Triaxial cable 1.5 m
1250-2405	2	BNC(m)-(f)-(f) adapter
1252-1419	1	Interlock receptacle connector

Connection and Ordering Examples
 Vertical Device Measurement with General Triaxial or BNC Connectors

Figure 4-22 Vertical Device: I-V measurement with selector, triaxial connector for gate

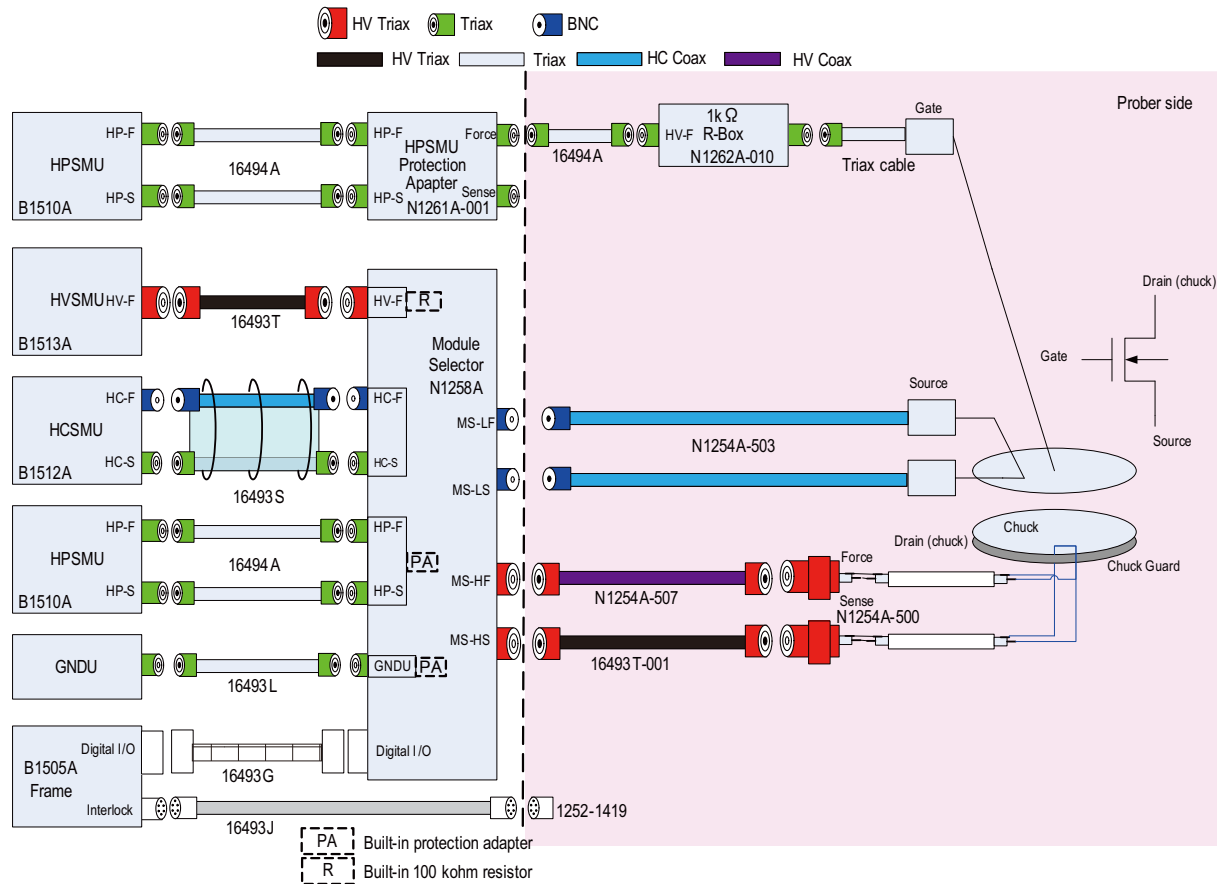


Table 4-22 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	1	High Power Source/Monitor Unit module
B1512A-FG	1	High Current Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1258A	1	Module selector
N1261A-001	1	Protection adapter for HPSMU, triaxial output
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1262A-010	1	1 kΩ R-box for gate, triaxial output
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-503	2	Coaxial cable assembly 1.5 m, BNC to open-end
N1254A-507	1	Coaxial cable assembly 1.5 m, HV plug to HV plug
16493T-001	1	HVSMU cable 1.5 m
16494A-001	1	Triaxial cable 1.5 m
1252-1419	1	Interlock receptacle connector

Figure 4-23 Up to 40 A measurement by using two HCSMU modules

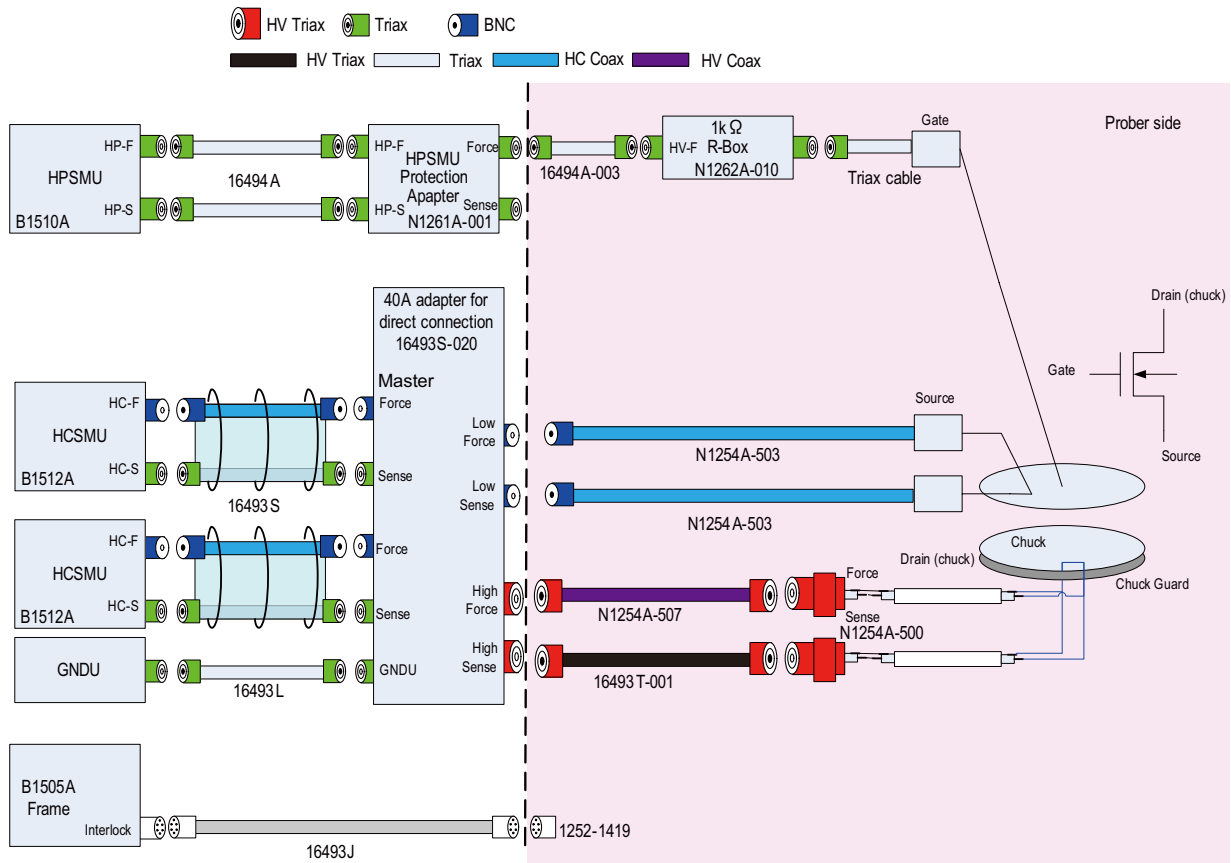


Table 4-23 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	1	High Power Source/Monitor Unit module
B1512A-FG	2	High Current Source/Monitor Unit module
N1261A-001	1	Protection adapter for HPSMU, triaxial output
N1262A-010	1	1 kΩ R-box
16493S-020	1	Adapter, 40 A, when connecting to wafer prober directly without N1258A selector
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-503	2	Coaxial cable assembly 1.5 m, BNC to open-end
N1254A-507	1	Coaxial cable assembly 1.5 m, HV plug to HV plug
16493T-001	1	HVSMU cable 1.5 m
16494A-003	1	Triaxial cable 80 cm
1252-1419	1	Interlock receptacle connector

Connection and Ordering Examples
Vertical Device Measurement with General Triaxial or BNC Connectors

Figure 4-24 Up to 30 A measurement by using two HCSMU modules and selector

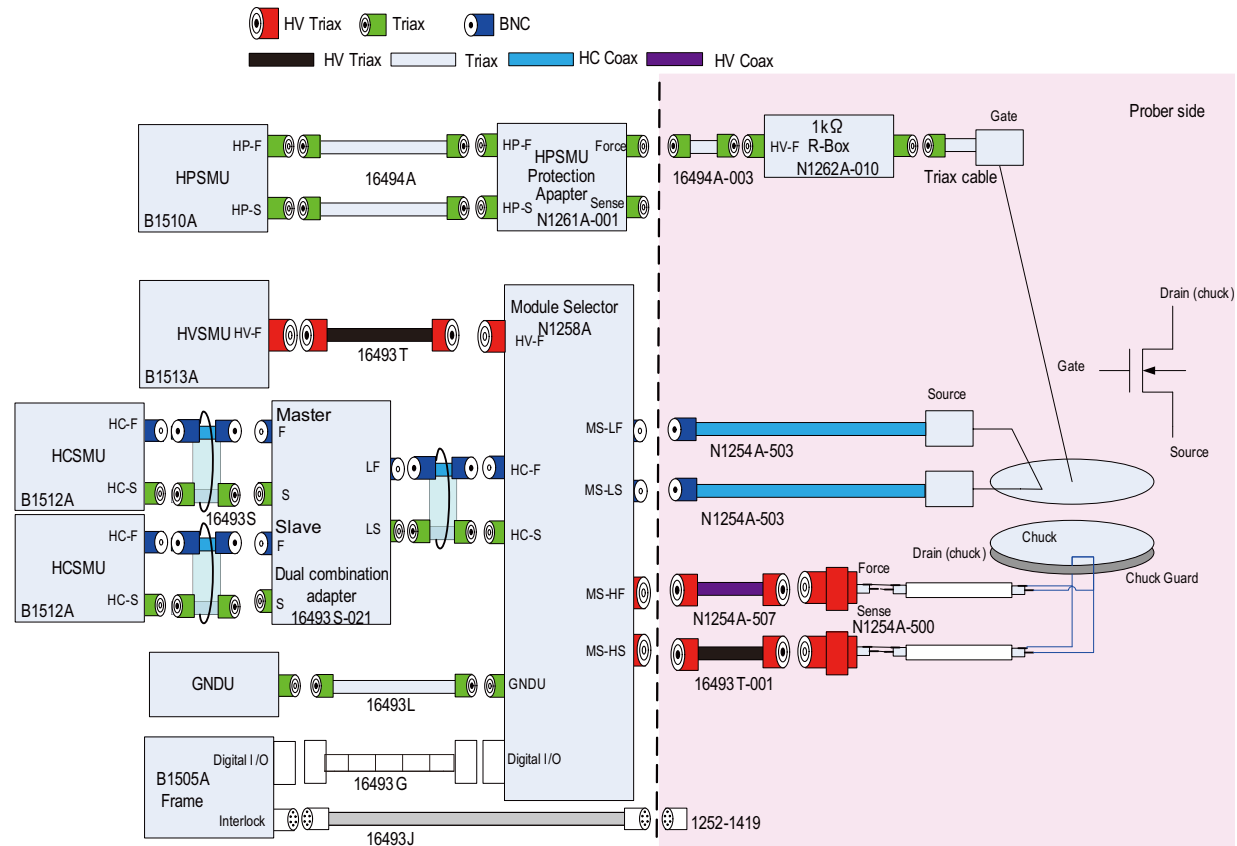


Table 4-24 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	1	High Power Source/Monitor Unit module
B1512A-FG	2	High Current Source/Monitor Unit module
N1261A-001	1	Protection adapter for HPSMU, triaxial output
N1262A-010	1	1 kΩ R-box
N1258A	1	Module selector
16493S-021	1	Adapter, 40 A, select this if 16493S-020 is not used
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-503	2	Coaxial cable assembly 1.5 m, BNC to open-end
N1254A-507	1	Coaxial cable assembly 1.5 m, HV plug to HV plug
16493T-001	1	HVSMU cable 1.5 m
16494A-003	1	Triaxial cable 80 cm
1252-1419	1	Interlock receptacle connector

Two-Terminal Device Measurement by Kelvin Connections

Figure 4-25

Two-terminal device or material evaluation like SiC with selector, Kelvin connection

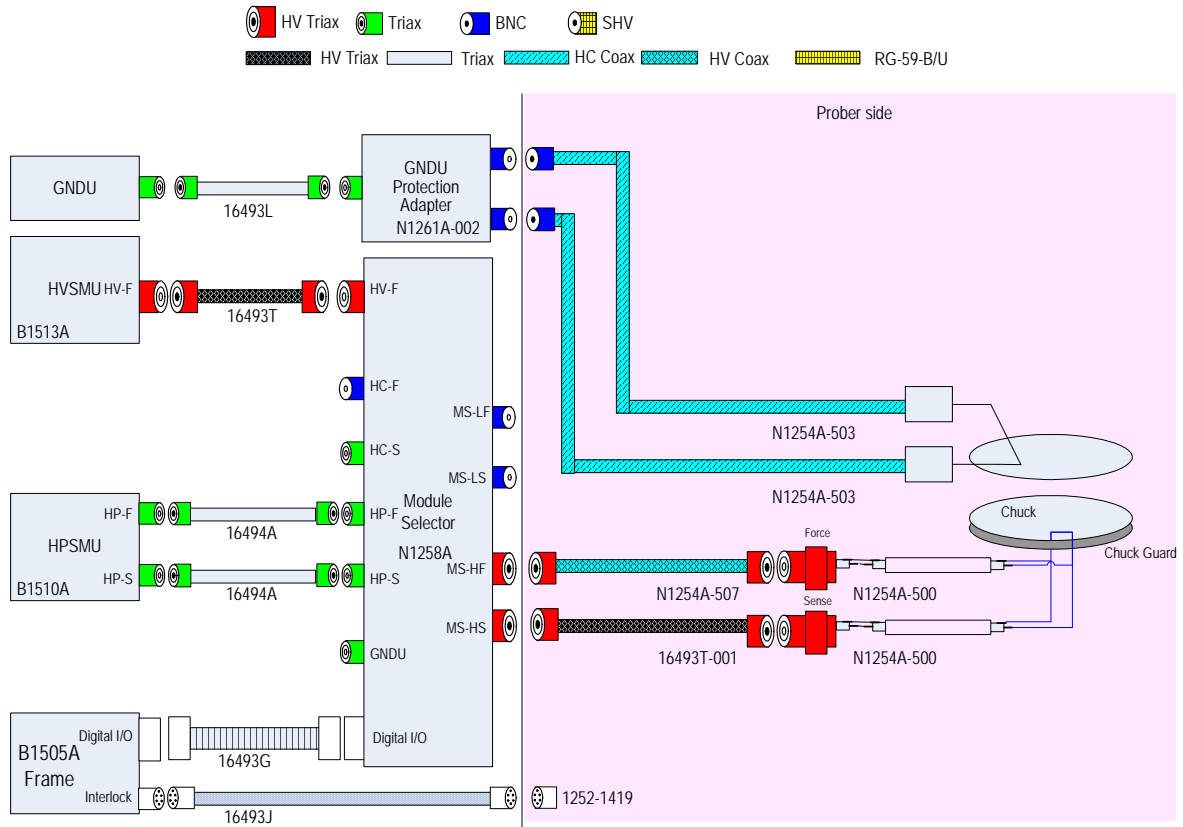


Table 4-25

Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	1	High Power Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1258A	1	Module selector
N1261A-002	1	Protection adapter for GNDU, BNC output
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-503	2	Coaxial cable assembly 1.5 m, BNC to open-end
N1254A-507	1	Coaxial cable assembly 1.5 m, HV plug to HV plug
16493T-001	1	HVSMU cable 1.5 m
1252-1419	1	Interlock receptacle connector

Connection and Ordering Examples
Two-Terminal Device Measurement by Kelvin Connections

Figure 4-26 Two-terminal device like solar cell etc. with selector, Kelvin connection

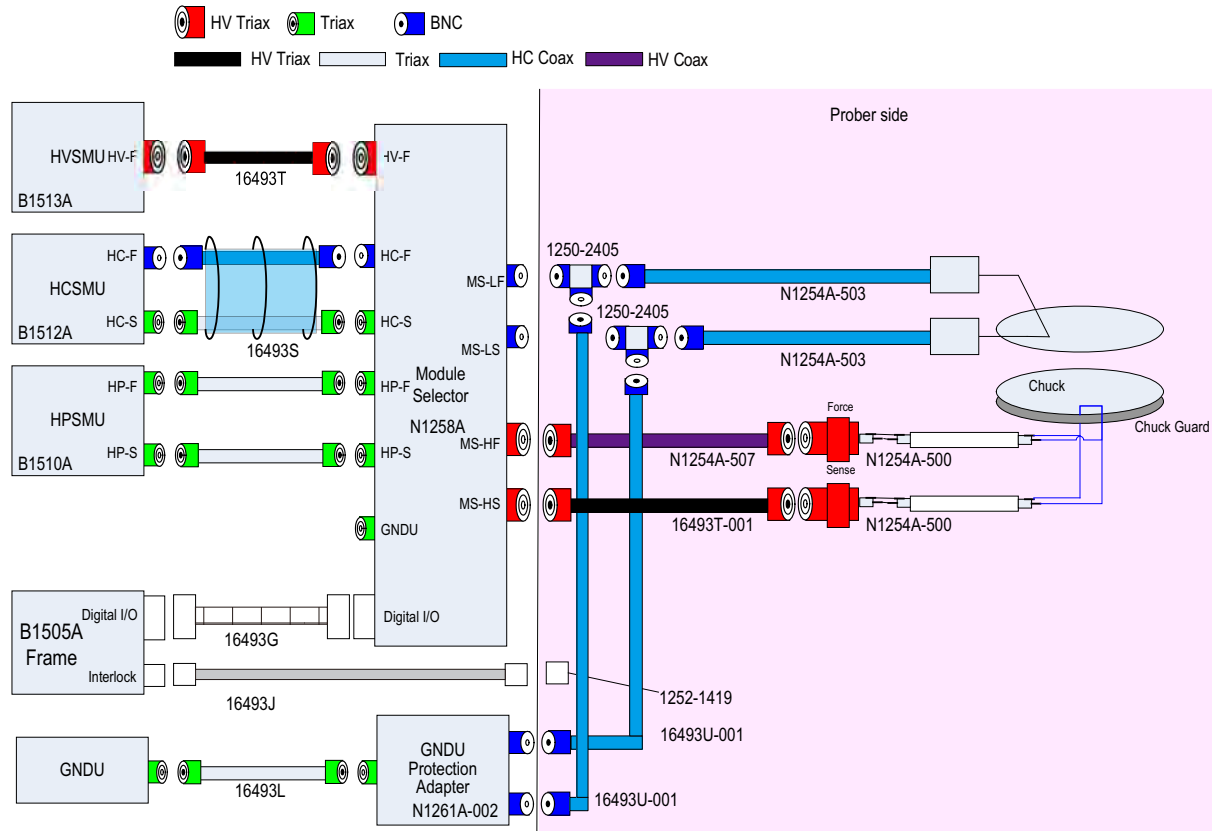


Table 4-26 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	1	High Power Source/Monitor Unit module
B1512A-FG	1	High Current Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1258A	1	Module selector
N1261A-002	1	Protection adapter for GNDU, BNC output
Prober vendor is responsible for cabling inside shielding box. The following parts can be used for cabling.		
N1254A-500	2	HV jack connector panel mount, soldering type
N1254A-503	2	Coaxial cable assembly 1.5 m, BNC to open-end
N1254A-507	1	Coaxial cable assembly 1.5 m, HV plug to HV plug
16493U-001	2	High current coaxial cable 1.5 m, BNC to BNC
16493T-001	1	HVSMU cable 1.5 m
1250-2405	2	BNC(m)-(f)-(f) adapter
1252-1419	1	Interlock receptacle connector

Using Three HPSMU Modules

This section introduces the configuration using three HPSMU modules and a HCSMU and/or a HVSMU. This configuration is effective for the breakdown voltage measurement with voltage or current measurement of other terminals.

- Using the N1259A test fixture for packaged devices. See Figure 4-27.

The N1259A must be equipped with the option N1259A-300 built-in module selector to connect three HPSMU modules.

- Using a wafer prober. See Figure 4-28.

Connection cables depend on kind of wafer prober. Please contact prober vendor for details.

NOTE

When the drain current measurement is performed by the HCSMU, the HCSMU and GNDU must be connected to the drain and source terminals through the module selector. Then the source terminal must be connected to the module selector Low Force and Low Sense instead of the HPSMU Force and Sense.

Connection and Ordering Examples
Using Three HPSMU Modules

Figure 4-27 Using three HPSMU modules and N1259A, for packaged devices

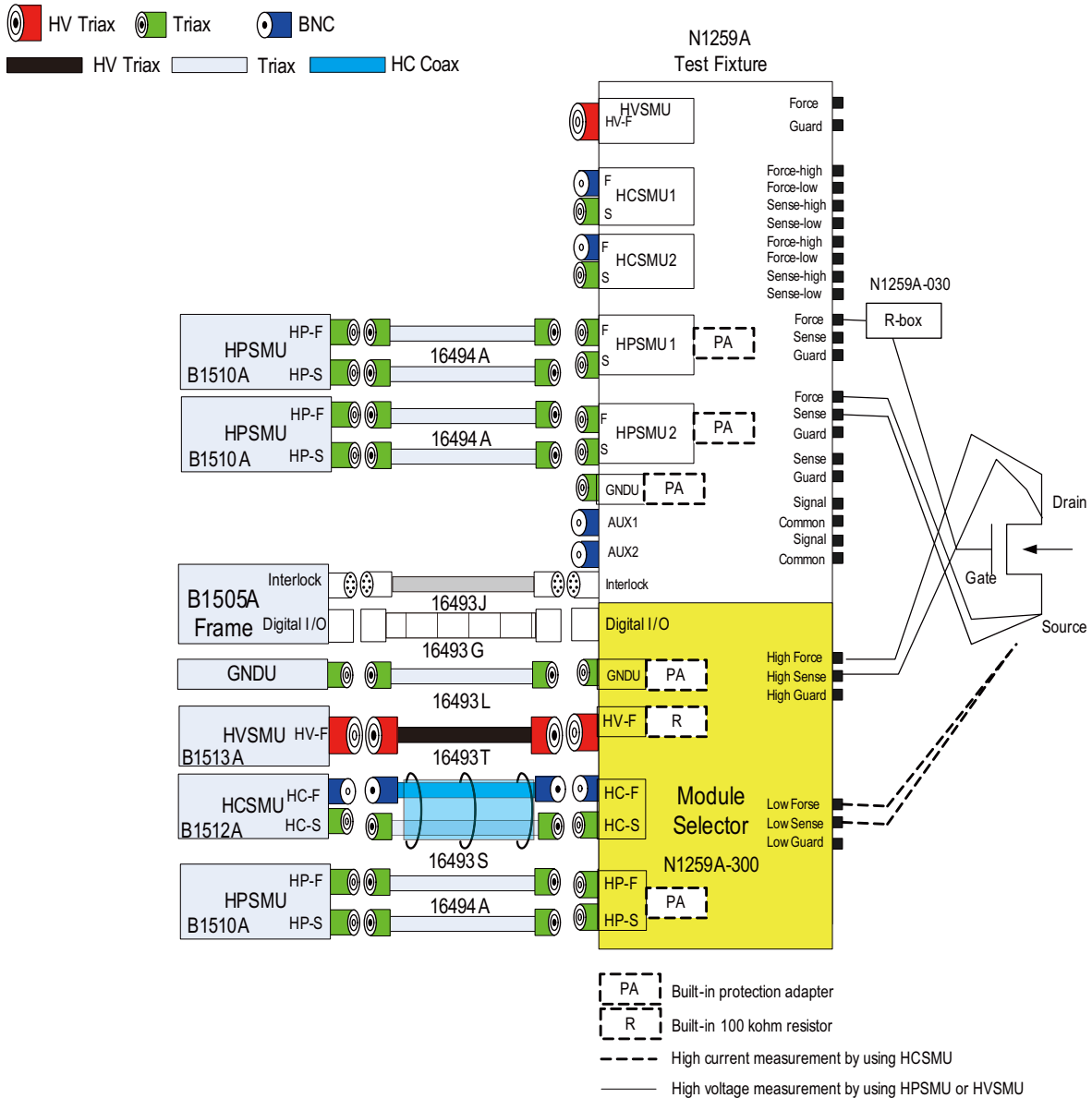


Table 4-27 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	3	High Power Source/Monitor Unit module
B1512A-FG	1	High Power Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1259A-001	1	Test Fixture
N1259A-030	1	R-box for gate
N1259A-300	1	Module Selector

Figure 4-28 Using three HPSMU modules and wafer prober

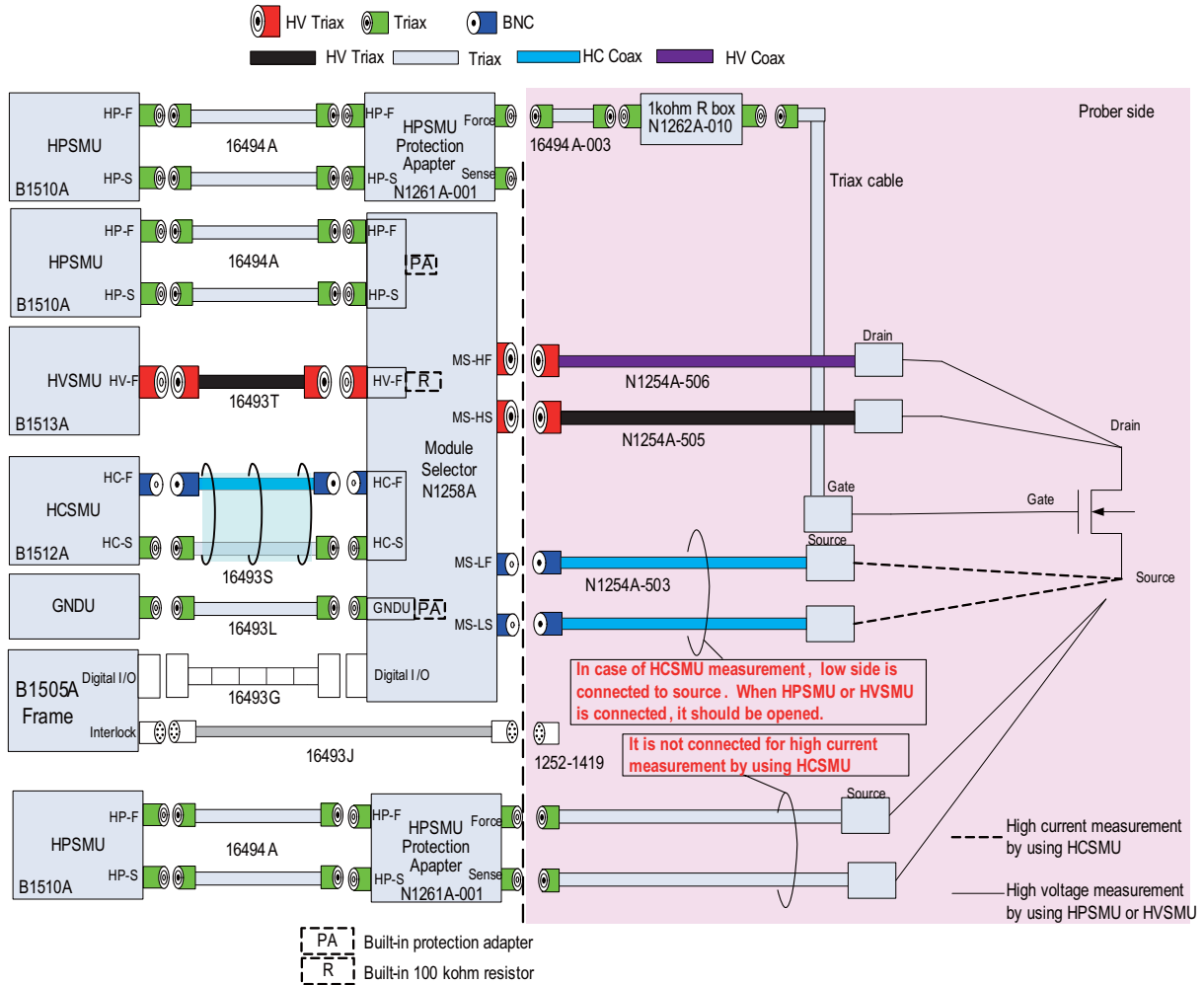


Table 4-28 Required equipment, accessories, and cables

Model/Option	Quantity	Description
B1505A	1	Power Device Analyzer/Curve Tracer mainframe
B1510A-FG	3	High Power Source/Monitor Unit module
B1512A-FG	1	High Power Source/Monitor Unit module
B1513A-FG	1	High Voltage Source/Monitor Unit module
N1258A	1	Module selector
N1261A	1	Protection adapter for HPSMU
N1262A	1	R-box for gate
Prober vendor is responsible for cabling inside shielding box. Also it depends on device types.		
N1254A-503	2	Coaxial cable assembly 1.5 m, BNC to open-end
N1254A-505	1	Triaxial cable assembly 1.5 m, HV plug to open-end
N1254A-506	1	Coaxial cable assembly 1.5 m, HV plug to open-end
16494A-003	1	Triaxial cable
1252-1419	1	Interlock receptacle connectors

Connection and Ordering Examples
Using Three HPSMU Modules