

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

**Configuration and Connection
Guide**



Agilent Technologies

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Agilent Technologies, Inc.
5301 Stevens Creek Blvd
Santa Clara, CA 95051 USA

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In This Document

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

- Chapter 1, "Configuration Guide."
Describes how to configure the Agilent 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 Other DUT Interface."
Describes how to connect the B1505A, accessories, and a DUT interface such as your own test fixture and prober station.
- Chapter 4, "Connection and Order Examples."
Provides the connection examples and the ordering examples.

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1 Configuration Guide



The following steps will guide you through configuring B1505A. This chapter includes the following sections.

- “Before configuring B1505A”
- “Step 1: Configure Mainframe”
- “Step 2: Configure N1259A Test Fixture for Package Device Evaluation”
- “Step 3: Configure Accessories for Wafer Prober or Customer’s Test Fixture”
- “Options and Accessories”
- “Conversion from B1500A”
- “Configuration for 4142B HCU/HVU users”

Before configuring B1505A

Consider and decide the following points before configuring B1505A.

1. The type of device (package device or on-wafer?)
 - Package device: Type of fixture?
 - N1259A test fixture and accessories options
 - Handler configuration for production tests. (It had better to ask for third party or system integrator)
 - On-wafer: Type of connector? HV triaxial and SHV only or others?
 - Select accessories options for each wafer prober
2. The number of device terminals (two terminals, three terminals or four terminals?)
 - Define number of SMU modules
3. High voltage, high current, or both?
 - Define type of SMU modules

Step 1: Configure Mainframe

- Select modules
- Select cable length (1.5m or 3m)
- Select power line frequency, paper document, rack mount kit, and service options

The B1505A installs a ground unit (GNDU) and provides 10 empty slots for installing the modules. The following modules are available for the B1505A.

Module	Description	Slots occupied	Allowable number of modules in one mainframe
HVSMU	High voltage source/monitor unit	2	1
HCSMU	High current source/monitor unit	2	2
HPSMU	High power source/monitor unit	2	2
MFCMU	Multi frequency capacitance measurement unit	1	1

See Figure 1-1 and Figure 1-2 for the key features of the modules.

See Table 1-1 for the accessories furnished with the B1505A.

See Table 1-2 for the options available for the B1505A.

Figure 1-1 Key Specification of SMUs

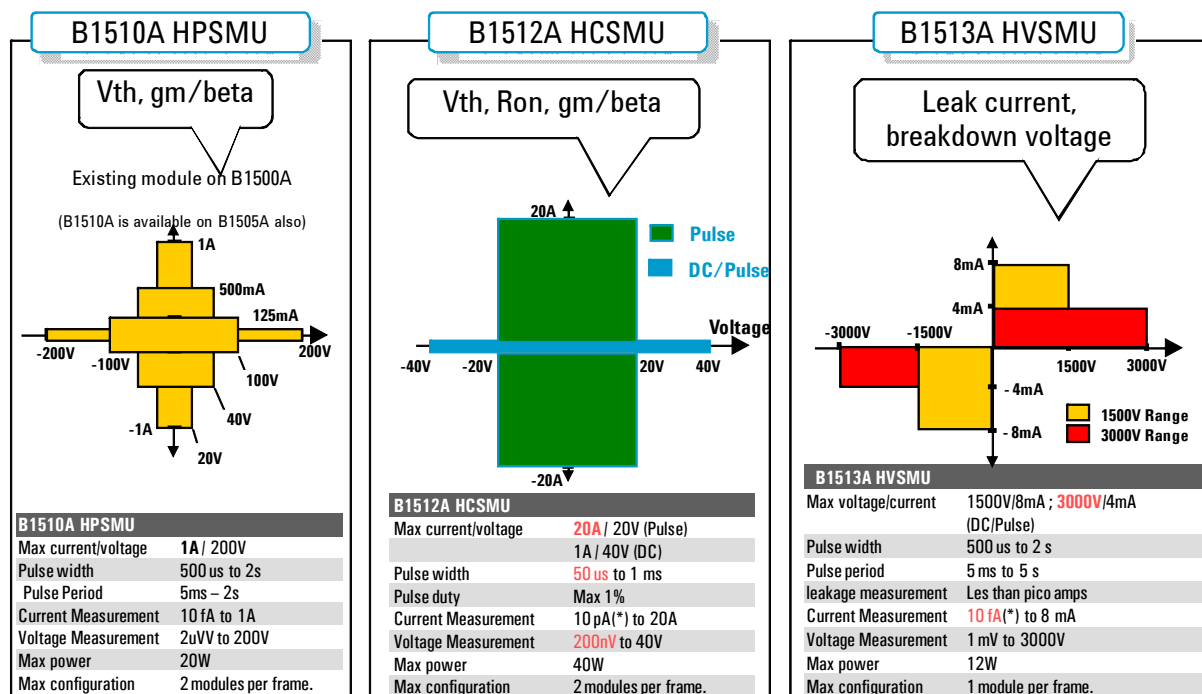


Figure 1-2 High Voltage Capacitance Measurement Capability (MFCMU + HVSMU)



- 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 Tee
- Leak measurement when capacitance is measured. (uA level)

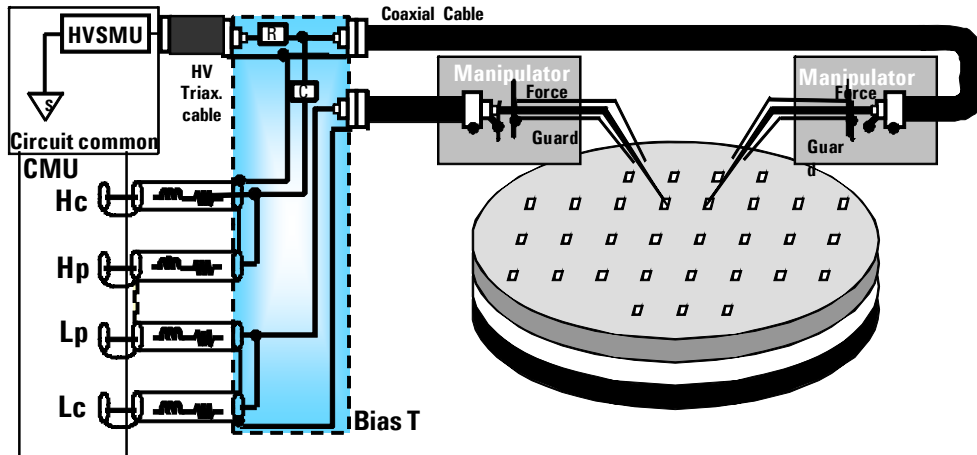




Table 1-1 Furnished Accessories

Description	Photo or remarks	Q'ty	Description	Photo or remarks	Q'ty
Power cable		1	License-to-use for Desktop EasyEXPERT Standard edition		1
Manual CD	Contains user guide, programming guide, EasyEXPERT user guide, and etc.	1	Disk set for Agilent 4155B/4155C/4156B/4156C firmware update		1
Desktop EasyEXPERT CD		1	SMU number label, for the B1505A installed with SMU		1
16444A-001 USB keyboard		1	16444A-002 USB mouse		1

Configuration Guide
 Step 1: Configure Mainframe













Description	Photo or remarks	Q'ty	Description	Photo or remarks	Q'ty
16444A-003 Stylus pen		1	16493J Interlock cable		1
16493L GNDU cable		1	16494A Triaxial cable, for the B1505A installed with HPSMU		2/module
16493S HCSMU cable, for the B1505A installed with HCSMU		1/module	16493S-010 HCSMU Kelvin adapter, for the B1505A installed with HCSMU		1/module
16493T HVSMU cable, for the B1505A installed with HVSMU		1/module	N1300A CMU cable, for the B1505A installed with MFCMU		1/module

Table 1-2 Mainframe Options





Description	Model No. or Option Item	Remarks
Mainframe		
Power Device Analyzer/Curve Tracer	B1505A	See Table 1-1 for the furnished accessories.
Select module (Optional)		
High Power Source/Monitor Unit module (HPSMU), 200V/1A	B1510A	Furnished 2 ea. of the triaxial cable (16494A) per module. Maximum 2 modules can be installed in one mainframe.
High Current Source/Monitor Unit module (HCSMU), 20A@20V	B1512A	Furnished HCSMU cable (16493S) and Kelvin adapter per module. Maximum 2 modules can be installed in one mainframe.
High Voltage Source/Monitor Unit module (HVSMU), 3000V@4mA	B1513A	Furnished HVSMU cable (16493T). Only 1 module can be installed in one mainframe.
Multi Frequency Capacitance Measurement Unit module (MFCMU)	B1520A	Furnished HCSMU cable (N1300A) Only 1 module can be installed in one mainframe.
Select furnished cable length (Mandatory)		
1.5m cable	B1505A-015	All furnished cable will be same length.
3.0m cable	B1505A-030	
Select power line frequency (Mandatory)		
50Hz line frequency	B1505A-050	
60Hz line frequency	B1505A-060	
Select calibration option (Optional)		
ANSI Z540 compliant calibration	B1505A-A6J	
Commercial calibration certificate with test data	B1505A-UK6	
Select paper manual (Optional)		
Paper manual set, English	B1505A-ABA	Printed manuals are not furnished. Order paper manual option if required. Contains the user's guide, programming guide, and EasyEXPERT user's guide.
Paper manual set, Japanese	B1505A-ABJ	
Select rack mount kit (Optional)		
Rack mount kit	B1505A-1CM	

Step 2: Configure N1259A Test Fixture for Package Device Evaluation

Table 1-3 Options and Accessories of Test Fixture




Description	Option No.	Photo or remarks
<p>Test Fixture (furnished Kelvin socket module for inline package device(N1259A-010), four black connection wire(N1259A-509), and six red connection wire(M1259A-508)) Protection adapter for HPSMU and GNDU are installed.</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>	
<p>Blank teflon board</p>	<p>N1259A-012</p>	

Step 2: Configure N1259A Test Fixture for Package Device Evaluation

Description	Option No.	Photo or remarks
High voltage bias-T (furnished with two SHV-SHV test leads(N1254A-512) and two SHV-banana adapters(N1254A-513))	N1259A-020	Installed in N1259A-001 test fixture. If you would like to add one later, it is installed in service center.
1 M Ω R-box	N1259A-021	
100 k Ω R-box	N1259A-022	
1 k Ω R-box	N1259A-030	
Module selector (furnished digital I/O control cable (16493G-001))	N1259A-300	Installed in N1259A-001 test fixture. If you would like to add one later, it is installed in service center.
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	


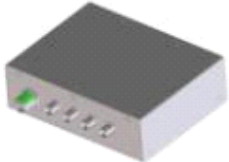




Configuration Guide




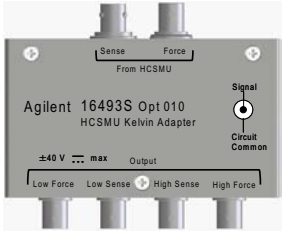
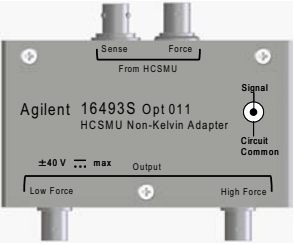
Step 2: Configure N1259A Test Fixture for Package Device Evaluation

Description	Option No.	Photo or remarks
SHV to SHV test lead, 1 ea. (N1253A-512 is connected to N1253A-513)	N1254A-512	 A black, flexible test lead with two SHV connectors at each end, shown against a dark background.
SHV to banana adapter, 1 ea. (N1253A-513 is connected to N1253A-512)	N1254A-513	 A black, cylindrical adapter with an SHV connector on one end and a banana plug on the other, shown against a dark background.
Digital I/O control cable	16493G	 A coiled, braided metal control cable with two large, silver-colored multi-pin connectors at each end, shown against a light background.

Step 3: Configure Accessories for Wafer Prober or Customer's Test Fixture

Table 1-4 Options and Accessories of Wafer Prober







Description	Option Item	Photo or remarks
Module Selector (furnished digital I/O control cable (16493G-001))	N1258A	
High voltage bias-T	N1260A	
Protection Adapter		
HPSMU protection adapter Input: Triax.(f) x 2, Output:Triax(f) x 2	N1261A-001	
GNDU protection adapter Input:Triax.(f), Output:BNC(f) x 2	N1261A-002	
HPSMU protection adapter Input: Triax.(f) x 2, Output: HV Triax.(f) x 2	N1261A-003	
GNDU protection adapter Input:Triax.(f), Output: SHV(f) x 2	N1261A-004	

Description	Option Item	Photo or remarks
High Voltage R-box		
1 M Ω R-box Input: HV Triax.(f), Output:SHV(f)	N1262A-001	
100 k Ω R-box Input:HV Triax.(f), Output:SHV(f)	N1262A-002	
1 k Ω R-box, Triax(f) Input:Triax.(f), Output:Triax.(f)	N1262A-010	
1 k Ω R-box, SHV Input:Triax.(f), Output:SHV	N1262A-011	
HCSMU Adapter		
HCSMU Kelvin adapter Input:BNC(f), Triax.(f), Output: BNC(f) x 4	16493S-010	
HCSMU non-Kelvin adapter Input:BNC(f), Triax.(f), Output: BNC(f) x 2	16493S-011	

Options and Accessories



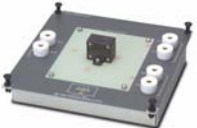



Furnished accessories and the available options and accessories for Agilent B1505A are listed in Table 1-5.








Table 1-5 Options and Accessories

Option Item	Description	Photo or remarks
Agilent EasyEXPERT software		
B1540A-001	Standard edition	
B1540A-002	Adds support instrument (E5250A/E5252A switching matrix is supported)	
Agilent Desktop EasyEXPERT software		
B1541A-001	Standard edition	
B1541A-002	Adds support instrument and function (E5250A/E5252A switching matrix is supported, and 4155/4156 support function is expanded)	
Accessories		
N1254A-500	HV jack connector, panel mount, for soldering, 1 ea.	
N1254A-501	HV jack to HV jack adapter, panel mount, 1 ea.	
N1254A-502	HV plug connector, panel mount, for soldering, 1 ea.	
N1254A-503	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.	

Configuration Guide
Options and Accessories





Option Item	Description	Photo or remarks
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.	
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	

Option Item	Description	Photo or remarks
1252-1419	Interlock receptacle connector	
Test Fixture		
N1259A-001	Test Fixture (furnished with the built-in HPSMU protection adapter, the built-in GNDU protection adapter, a Kelvin socket module for inline package device, four black connection wire, and six red connection wire)	
N1259A-010	Kelvin socket module for inline package device	
N1259A-011	Universal socket module for power device	
N1259A-012	Blank teflon board	
N1259A-020	High voltage bias-T (furnished with two SHV-SHV test leads and two SHV-banana adapters)	
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	

Option Item	Description	Photo or remarks
Module Selector		
N1258A	Module selector	
High Voltage Bias-T		
N1260A	High voltage bias-T	
Protection Adapter		
N1261A-001	HPSMU protection adapter Input:Triax(f) x 2, Output:Triax(f) x 2	
N1261A-002	GNDU protection adapter Input:Triax.(f), Output:BNC(f) x 2	
N1261A-003	HPSMU protection adapter Input: Triax.(f) x 2, Output: HV Triax.(f) x 2	
N1261A-004	GNDU protection adapter Input:Triax.(f), Output: SHV(f) x 2	
High Voltage R-box		
N1262A-001	1 M Ω R-box Input: HVTriax.(f), Output:SHV(f)	
N1262A-002	100 k Ω R-box Input:HV Triax.(f), Output:SHV(f)	
N1262A-010	1 k Ω R-box, Triax(f) Input:Triax.(f), Output:Triax.(f)	
N1262A-011	1 k Ω R-box, SHV Input:Triax.(f), Output:SHV	

Option Item	Description	Photo or remarks
HCSMU Adapter		
16493S-010	HCSMU Kelvin adapter Input: BNC(f), Triax.(f), Output: BNC(f) x 4	
16493S-011	HCSMU non-Kelvin adapter Input: BNC(f), Triax.(f), Output: BNC(f) x 2	
Accessories for B1500 series		
16444A-001	USB keyboard	
16444A-002	USB mouse	
16444A-003	Stylus pen	
Digital I/O connection cable		
16493G-001	1.5 m length	
16493G-002	3 m length	

Option Item	Description	Photo or remarks
Interlock cable		
16493J-001	1.5 m length	
16493J-002	3 m length	
16493J-003	5 m length	
HPSMU Kelvin triaxial cable		
16493K-001	1.5 m length	
16493K-002	3 m length	
GNDU cable		
16493L-001	1.5 m length	
16493L-002	3 m length	
16493L-003	5 m length	
HCSMU cable		
16493S-001	1.5 m length	
16493S-002	3 m length	

Option Item	Description	Photo or remarks
HVSMU cable, HV plug to HV plug triaxial cable		
16493T-001	1.5 m length	
16493T-002	3 m length	
High current coaxial cable, BNC(m) to BNC(m)		
16493U-001	1.5 m length	
16493U-002	3 m length	
Triaxial cable		
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	
CMU cable		
N1300A-001	1.5 m length	
N1300A-002	3 m length	

Conversion from B1500A

Table 1-6 Conversion kit from B1500A

Model No. or Option Item	Description	Remarks
B1505AU	Conversion kit from B1500A to B1505A Furnished with the interlock cable and the GNDU cable.	
Select module (Optional)		
B1510A	High Power Source/Monitor Unit module (HPSMU), 200V/1A	No cable is furnished. Need to order cables and required accessories separately.
B1512A	High Current Source/Monitor Unit module (HCSMU), 20A@20V	
B1513A	High Voltage Source/Monitor Unit module (HVSMU), 3000V@4mA	
B1520A	Multi Frequency Capacitance Measurement Unit module (MFCMU)	
Cables for HPSMU module (Optional)		
16494A-001	1.5m length Triax cable	
16494A-002	3 m length Triax cable	
16494A-003	80 cm length Triax cable	
16494A-004	40 cm length Triax cable	
16494A-005	4 m length Triax cable	
16493K-001	1.5 m length Kelvin triaxial cable	
16493K-002	3 m length Kelvin triaxial cable	
Cables and accessories for HCSMU module (Optional)		
16493S-001	1.5 m length	
16493S-002	3 m length	
16493S-010	HCSMU Kelvin adapter	
16493S-011	HCSMU non-Kelvin adapter	
Cables for HVSMU module (Optional)		
16493T-001	1.5 m length	
16493T-002	3 m length	
Cables for MFCMU module (Optional)		
N1300A-001	1.5 m length	
N1300A-002	3 m length	

NOTE The module is installed in service center. The installation cost is not included.in.

NOTE Only HPSMU and MFCMU is supported in B1505A. Other modules can not be installed.

NOTE New version software will be installed in service center. Please back up the data before sending B1500A to service center.

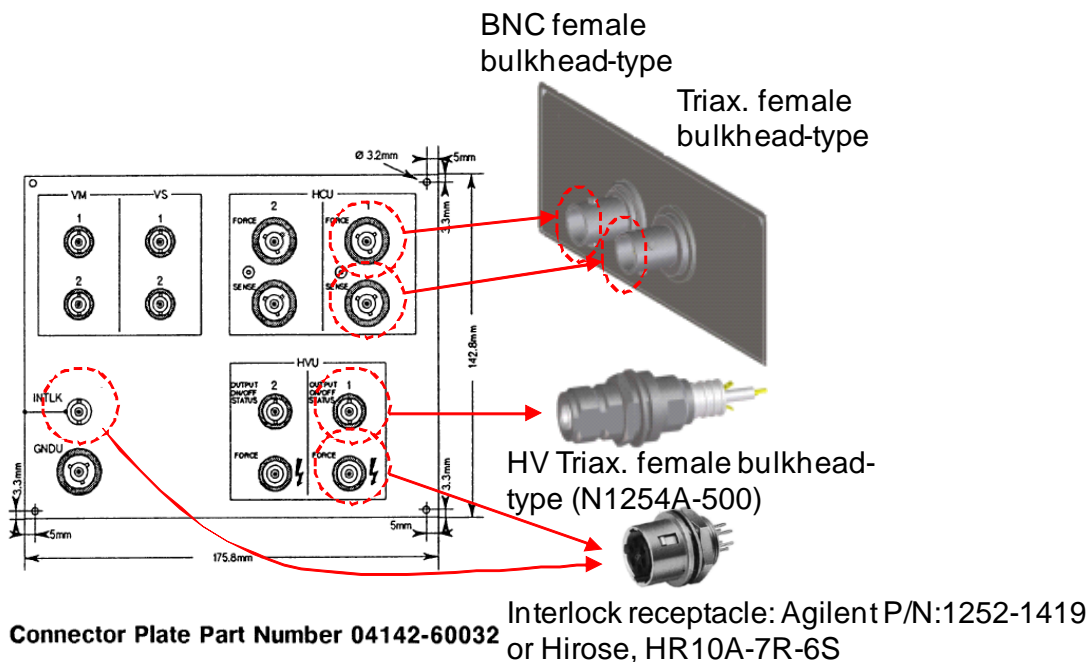
Configuration for 4142B HCU/HVU users

B1505A expands capability from 4142B's 10A/1000V to 20A/3000V.

The previous test fixture or prober is not supported.

- Test fixture 16088A/B which was used with 4142B, is not supported by B1505A. B1505A supports N1259A test fixture.
- For prober or handler etc., it is not compatible because connectors are different from 4142B to give safe and sure test environment.

Figure 1-3 Connectors are not compatible with 4142B



4142B	B1505A
HCU (dual triaxial)	HCSMU (BNC and Triaxial)
HVU (BNC and Screwed-Triax)	HVSMU (HV Triax.)
4142B Interlock (BNC)	Interlock connector (6-pin)

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, HVSMU, HCSMU, HPSMU, and MFCMU. And the fixture initially installs the GNDU and HPSMU protection adapters. 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. Dimensions and weight of the N1259A are as follows.

- Dimensions: 420 mm (W) × 272 mm (H) × 410 mm (D)
- Weight: 12.0 kg

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.

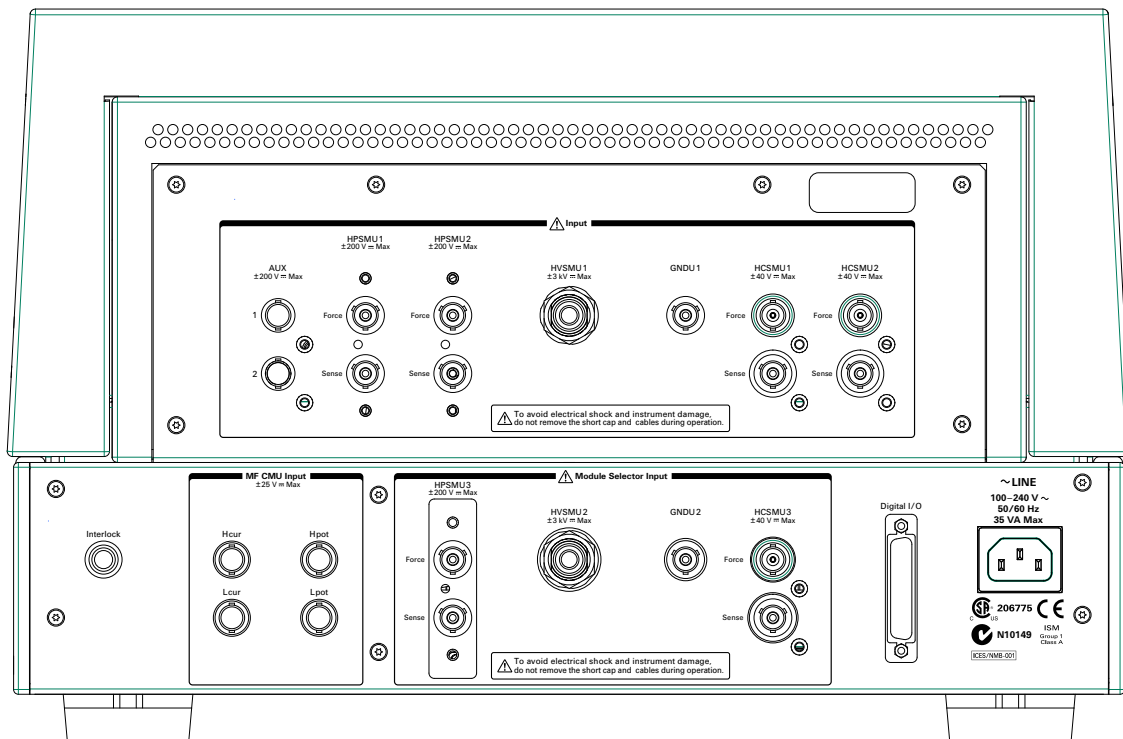
Input Connection

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 HVSMU, HCSMU, or HPSMU. One selector provides one switching channel.

The following tables support the B1505A installed with one HVSMU, one HCSMU, one HPSMU, and one MFCMU. If your B1505A installs the additional HCSMU and/or HPSMU, use the 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.

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	Force	16493S HCSMU cable, 3 m or 1.5 m, 1 ea.	HCSMU1	Force
	Sense		or HCSMU2	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. 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.	HPSMU1	Force
	Sense		or HPSMU2	Sense
MFCMU	Hpot/ Hcur	N1300A CMU cable, 3 m or 1.5 m, 1 ea. BNC(m)-(f)-(f) adapter, total 2 ea., 1 ea. for connecting Hpot, Hcur, and AUX1, and 1 ea. for connecting Lpot, Lcur, and AUX2. It is not needed to connect the ground wire extended from the CMU cable.	AUX 1	
	Lpot/ Lcur		AUX 2	
MFCMU	Hpot	N1300A CMU cable, 3 m or 1.5 m, 1 ea. It is not needed to connect the ground wire extended from the CMU cable.	MFCMU	Hpot
	Hcur		Only for N1259A- 020.	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.

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	Force	16493S HCSMU cable, 3 m or 1.5 m, 1 ea.	HCSMU3	Force
	Sense			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. 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.	HPSMU3	Force
	Sense			Sense
MFCMU	Hpot/ Hcur	N1300A CMU cable, 3 m or 1.5 m, 1 ea. BNC(m)-(f)-(f) adapter, total 2 ea., 1 ea. for connecting Hpot, Hcur, and AUX1, and 1 ea. for connecting Lpot, Lcur, and AUX2. It is not needed to connect the ground wire extended from the CMU cable.	AUX 1	
	Lpot/ Lcur		AUX 2	
MFCMU	Hpot	N1300A CMU cable, 3 m or 1.5 m, 1 ea. It is not needed to connect the ground wire extended from the CMU cable.	MFCMU Only for N1259A- 020.	Hpot
	Hcur			Hcur
	Lcur			Lcur
	Lpot			Lpot
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	

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 DUTs and attach it to the test fixture. For details, see the following sections.

- “N1259A-010 Inline Package Socket module” on page 2-14
- “N1259A-011 Universal Socket Module” on page 2-15
- “N1259A-012 Blank Teflon Board” on page 2-16

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

Table 2-3

Required Parts

Model number	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 DUTs. If not, the DUTs 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 2-16.

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 2-14.

For using the universal socket module, also see “N1259A-011 Universal Socket Module” on page 2-15.

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.

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.

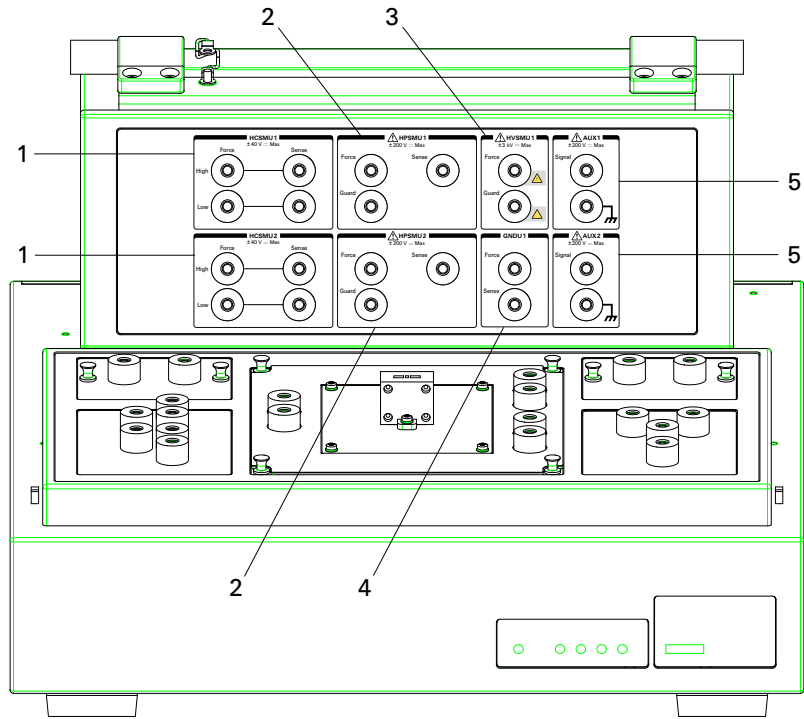
NOTE

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

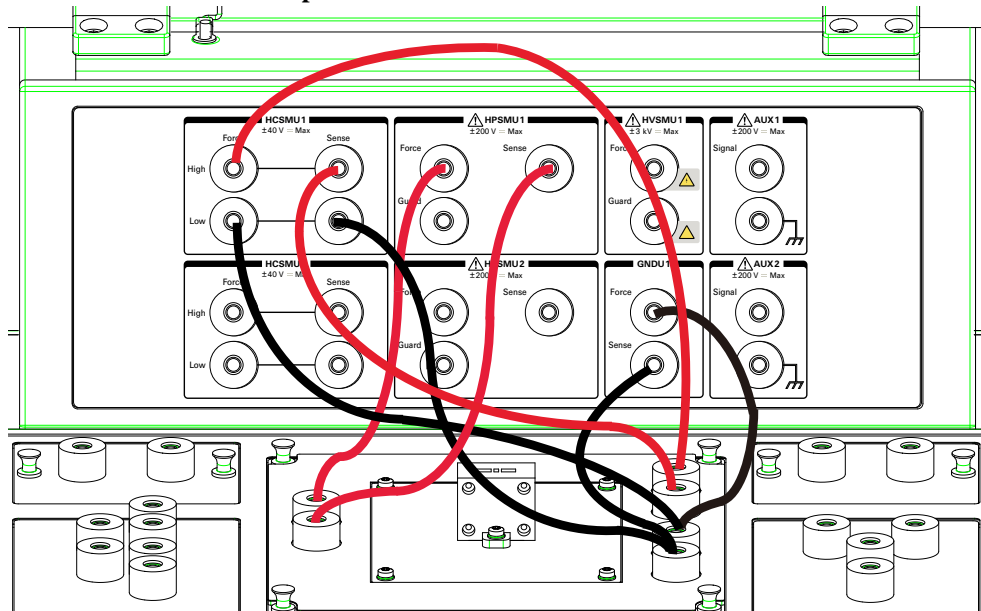
N1259A Output Terminals



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

Figure 2-3

Kelvin Connection Example

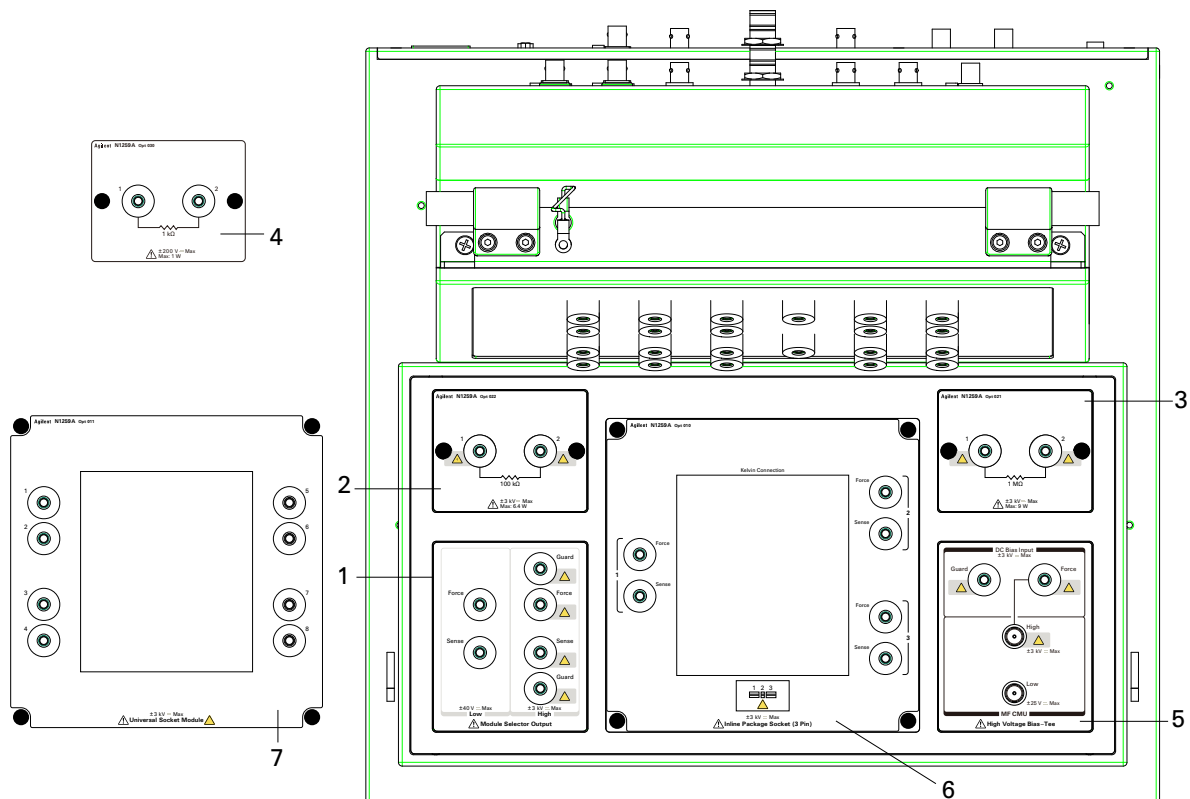


To Use Options

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 2-14.
7. N1259A-011 Universal socket module
For mounting DUT. See “N1259A-011 Universal Socket Module” on page 2-15.

Figure 2-4 N1259A Available Options



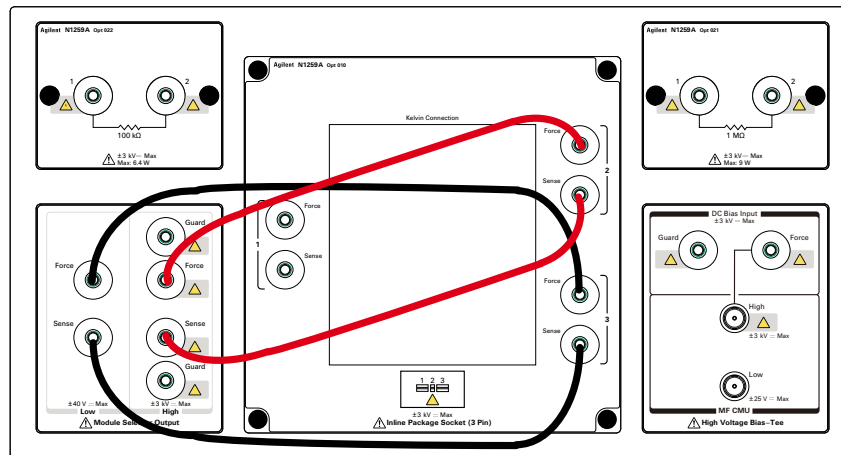
To Use Module Selector

The module selector is used to switch the measurement resource connected to a terminal of DUT. The measurement resource will be HVSMU, HCSMU, HPSMU, and GNDU connected to the Module Selector Input terminals (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.

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



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

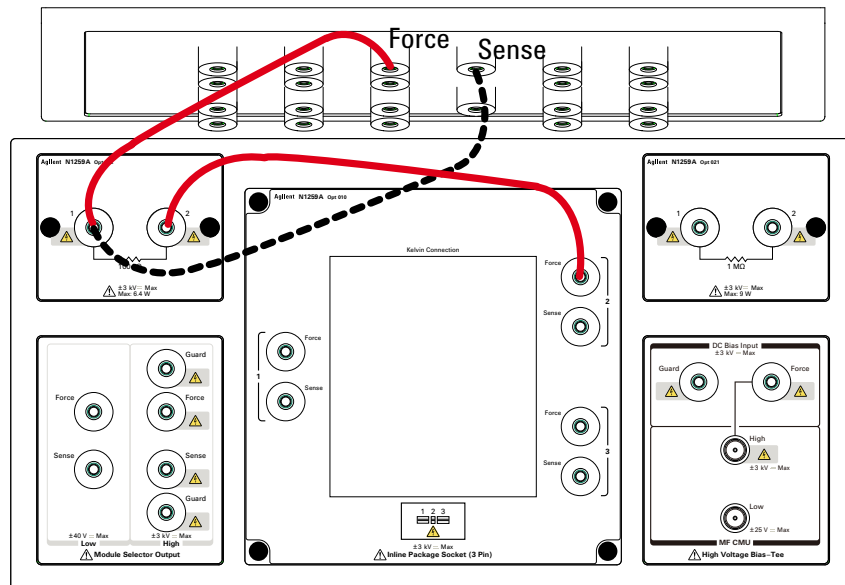
V_{out} : Source output voltage

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.

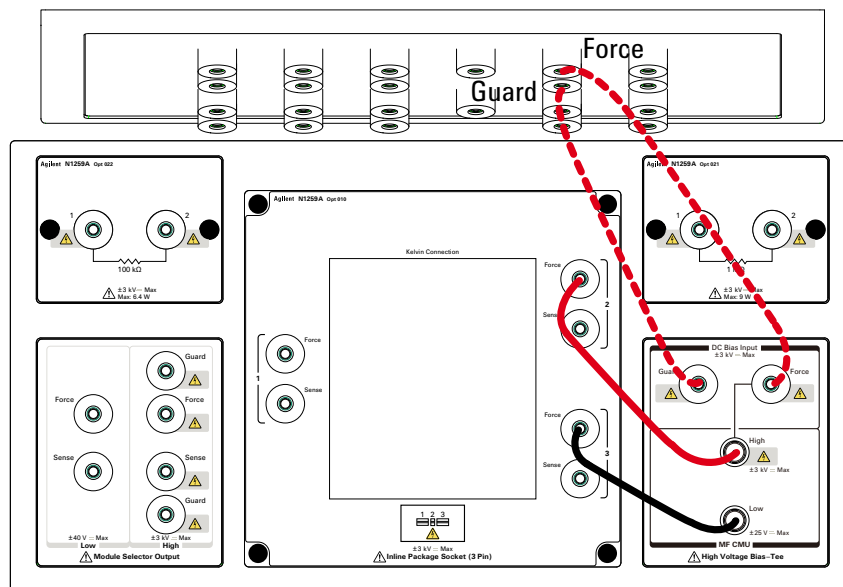
- Connection:

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

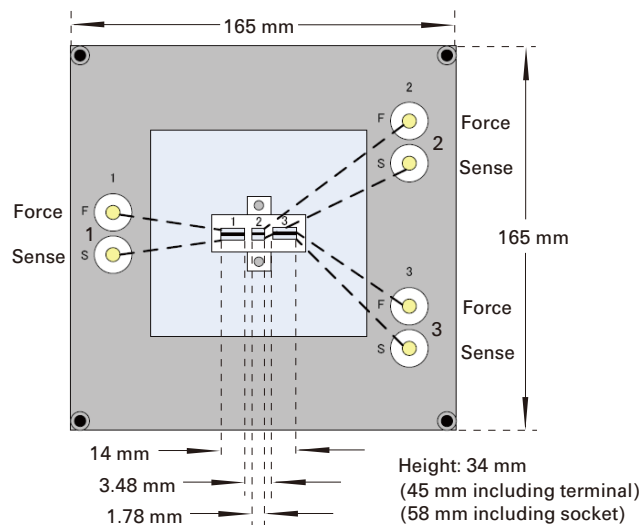
This module has a socket for three-terminal inline packaged device and three couples of the Force and Sense terminals. Terminals 1, 2, and 3 of the socket are internally connected to the associated couple for supporting the Kelvin connection.

This module is furnished with a short bar. Set the short bar before performing MFCMU short correction and remove it before performing the open 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
 - DUT
- Instruction:
 1. Attach the socket module to the test fixture.
 2. Connect a wire between the output terminal and the terminal on the socket module.
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 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 the measurement.

Figure 2-8 Inline Package Socket Module



N1259A-011 Universal Socket Module

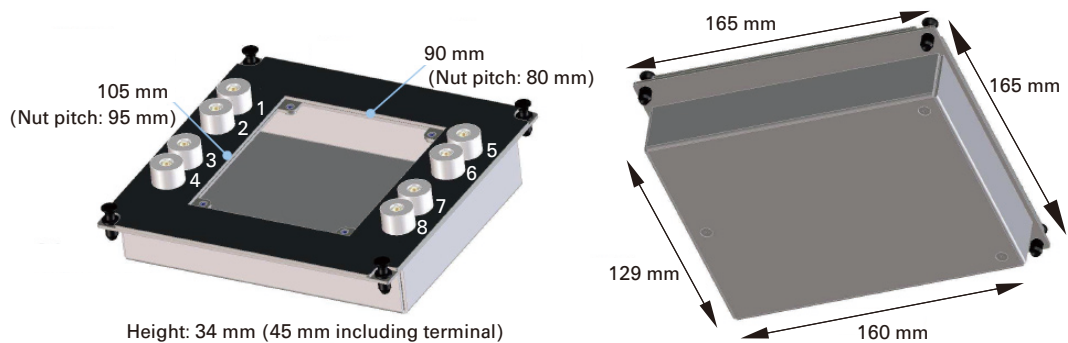
This is blank module for supporting variety of packaged devices. You can measure a packaged device mounted on a board by using this blank module.

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 2-14 to perform measurement.

- Required parts:
 - Blank board suitable for mounting a packaged device under test, 1 ea.
 - Screw (M3), 4 ea.
 - Connection wire for soldering, 1 ea. for one connection
 - DUT
- Instruction:
 1. Cut the blank board in 105 mm × 90 mm square.
 2. Make four screw holes. The holes should be 5 mm inside from the edge.
 3. Fix the blank board to the blank module.
 4. Remove the cover bottom of the blank module.
 5. Mount the device under test (DUT) and solder it on the board.
 6. Solder wire between the terminal 1 to 8 and the terminals of DUT.
 7. Replace the cover.

Figure 2-9

Universal Socket Module



N1259A-012 Blank Teflon Board

This is the insulation board used to place 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.

DUT

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

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 HCSMU 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.

4. Make sure the DUT location. The DUT must be placed on the blank Teflon board properly.
5. Close the fixture cover and perform the measurement.

Figure 2-10 Blank Teflon Board





3 Connection Guide for Other DUT Interface



This chapter describes the information required to make the measurement setup for Agilent B1505A. For connecting the B1505A to a device under test (DUT), you need to prepare the connection cables, accessories, and your DUT interface such as prober station 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 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. 3-17) and connect the Interlock cable (see p. 3-19).

NOTE

To install the accessories, see “Accessory Dimensions” on page 3-24 and prepare the appropriate space in the shielding box of your DUT interface or make the openings for the accessories.

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

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

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

Connection Overview

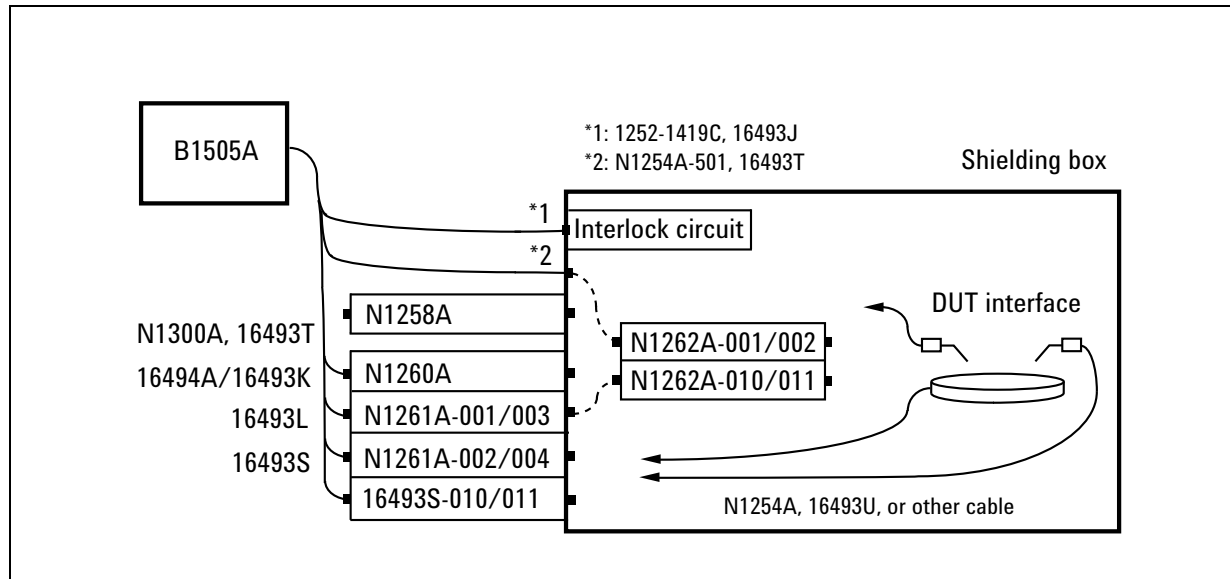
Connection image and requirements are shown in Table 3-1. Prepare the accessories and the required cables, and connect them to make the measurement setup. For the available accessories, see Table 3-3.

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

Connection Guide for Other DUT Interface
 Connection Overview



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		1252-1419C 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.	SHV(plug) cable, 3 ea.	High
	Hcur	N1300A CMU cable, 3 m or 1.5 m, 1 ea.		Low
	Lcur	16493T HVSMU cable, 3 m or 1.5 m, 1 ea.		AC Guard
	Lpot			
HVSMU	Force			

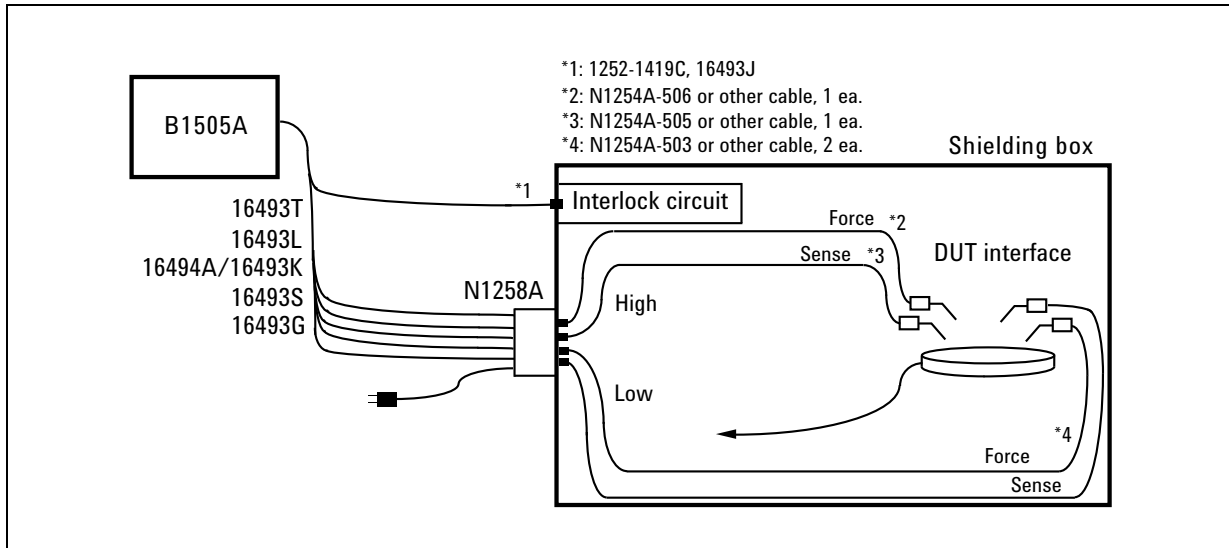
NOTE Turn the B1505A off before connecting the CMU cable.

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

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

NOTE If you use the N1258A module selector, you do not need the N1261A and 16493S-010/011 adapters for the modules connected to the module selector. For connecting the module selector, see Table 3-2.

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	Force	Agilent 16493S HCSMU cable, 3 m or 1.5 m	HCSMU	Force
	Sense			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	Sense	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	DUT low terminal (ex: source) ¹	
	Force	Coaxial cable with BNC(m) connector. N1254A-503 can be used.		
High	Sense	Triaxial cable with HV(plug) connector. N1254A-505 can be used.	DUT high terminal (ex: drain) ¹	
	Force	Coaxial cable with HV(plug) connector. N1254A-506 can be used.		

1. Non-Kelvin connection is not allowed.

Table 3-3 Available Accessories

Model No.	Description	Remarks
16493S-010	HCSMU Kelvin adapter	For converting HCSMU connectors to BNC(f) connectors.
16493S-011	HCSMU non-Kelvin adapter	
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-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-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	

To Connect High Voltage R-Box

Agilent N1262A resistor box is used to reduce the risk of device breakdown or prevent SMU from oscillation. There is four options. The N1262A should be installed in your DUT interface as shown in Table 3-1.

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. There is two options. The 16493S-010/011 should be installed near your DUT interface as shown in Table 3-1.

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

16493S-011: Adapter for making the non-Kelvin connection of HCSMU path

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	Agilent 16493U-001 BNC(m)-BNC(m) coaxial cable, 1.5 m, 2 ea. N1254A-516 BNC(f)-(m)-(f) adapter, 1 ea. Coaxial cable with BNC(m) connector, 1 ea. N1254A-503 can be used.	N1261A-002 Output Force and DUT low terminal (ex: source) ¹
Low Sense	Agilent 16493U-001 BNC(m)-BNC(m) coaxial cable, 1.5 m, 2 ea. N1254A-516 BNC(f)-(f)-(f) adapter, 1 ea. Coaxial cable with BNC(m) connector, 1 ea. N1254A-503 can be used.	N1261A-002 Output Sense and DUT low terminal (ex: source) ¹
High Force	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	DUT high terminal (ex: drain) ¹
High Sense	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	

1. Non-Kelvin connection is not allowed.

Figure 3-1 To Connect 16493S-010 HCSMU Kelvin Adapter

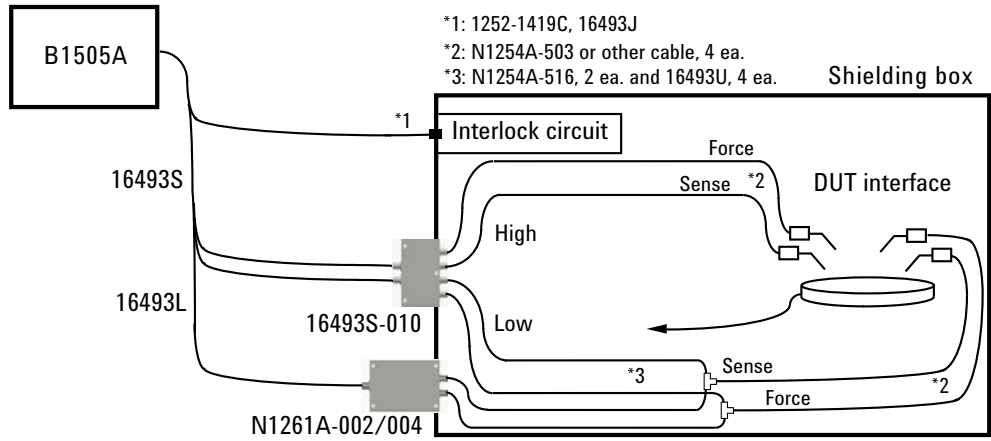
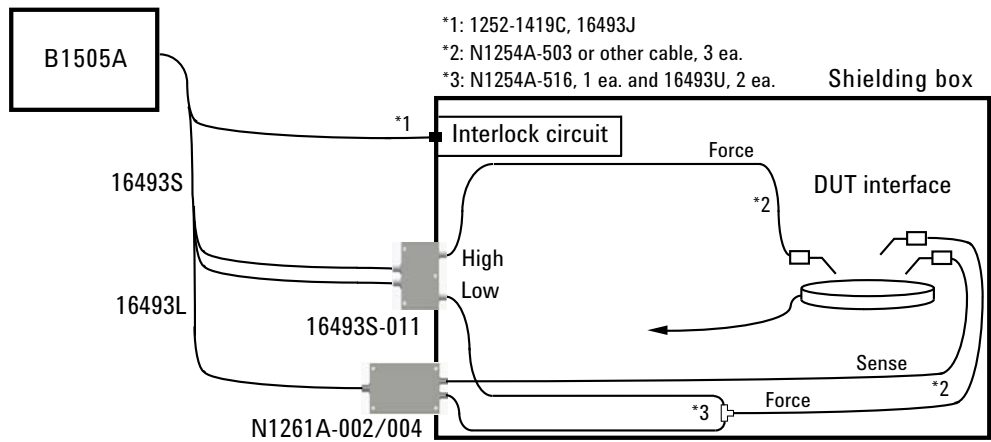


Figure 3-2 To Connect 16493S-011 HCSMU non-Kelvin Adapter



To Connect Protection Adapter

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

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 3-8

To Connect N1261A Input

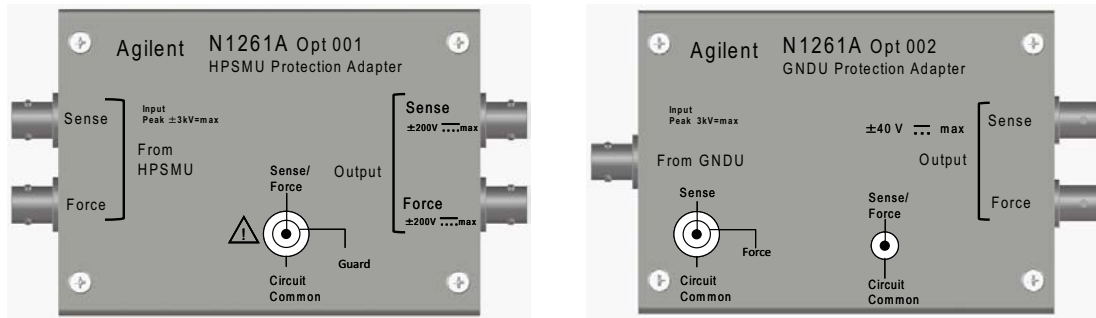
B1505A terminals		Required cables	N1261A terminals	
HPSMU	Force	Agilent 16494A Triaxial cable, 3 m or 1.5 m, 1 ea., for the non-Kelvin connection, connect it between the Force connectors. For the Kelvin connection, prepare additional one more cable and connect it between the Sense connectors. Or use 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 3-9 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	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.	



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. Also see Figure 3-3 for connection example.

Table 3-10 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.

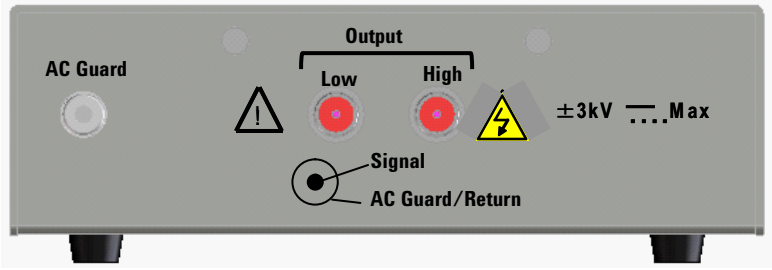
Connect HVSMU to obtain DC bias input. Because the bias-T cannot pass the MFCMU internal DC bias.

WARNING



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

Table 3-11 To Connect N1260A Output



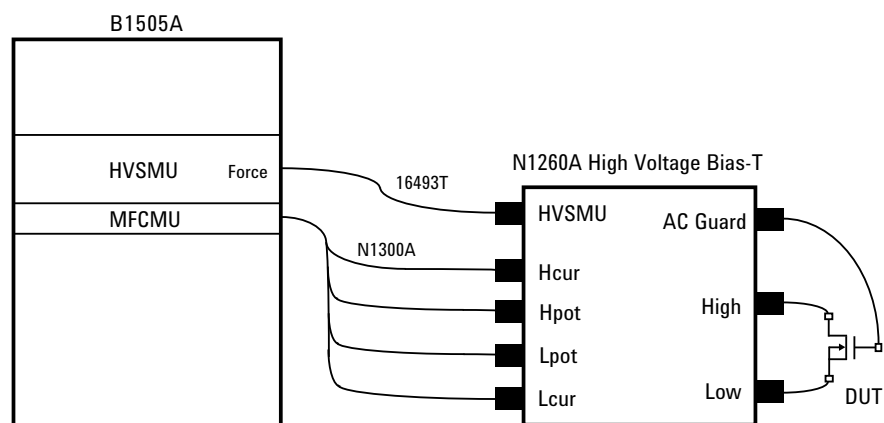
N1260A terminals		Required cables/Description	Connect to
Output	Low	Coaxial cable with SHV(plug) connector.	DUT low terminal (ex: source)
	High	Coaxial cable with SHV(plug) connector.	DUT high terminal (ex: drain)
AC Guard		Coaxial cable with SHV(plug) connector. This terminal provides the AC guard (circuit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

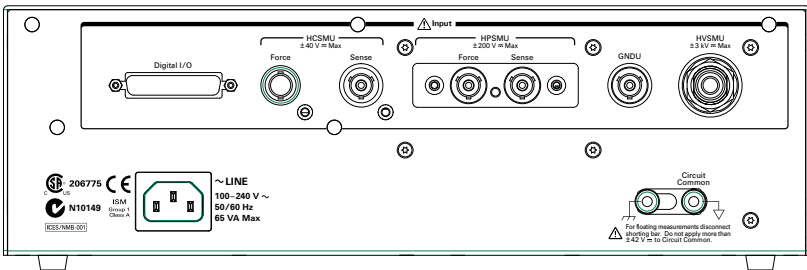
Figure 3-3 To Connect N1260A High Voltage Bias-T



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 HPSMU, HVSMU, or HCSMU. One selector provides one switching channel. The N1258A should be installed near your DUT interface as shown in Table 3-1. Also see Figure 3-4.

Table 3-12 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	Force	Agilent 16493S HCSMU cable, 3 m or 1.5 m	HCSMU	Force
	Sense		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	

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

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.

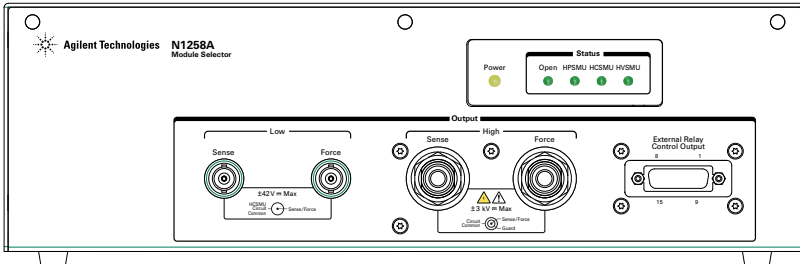
WARNING To avoid electrical shock and instrument damage, do not connect or disconnect measurement cable or connector cap during operation.

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 3-13 To Connect N1258A Output



N1258A terminals		Required cables/Description	Connect to
Low	Sense	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	DUT low terminal (ex: source) ¹
	Force	Coaxial cable with BNC(m) connector. N1254A-503 can be used.	
High	Sense	Triaxial cable with HV(plug) connector. N1254A-505 can be used.	DUT high terminal (ex: drain) ¹
	Force	Coaxial cable with HV(plug) connector. N1254A-506 can be used.	
External Relay Control Output		Cable with D-sub 15 pin connector. See Figure 3-5 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. Non-Kelvin connection is not allowed.

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.

Figure 3-4 To Connect N1258A Module Selector

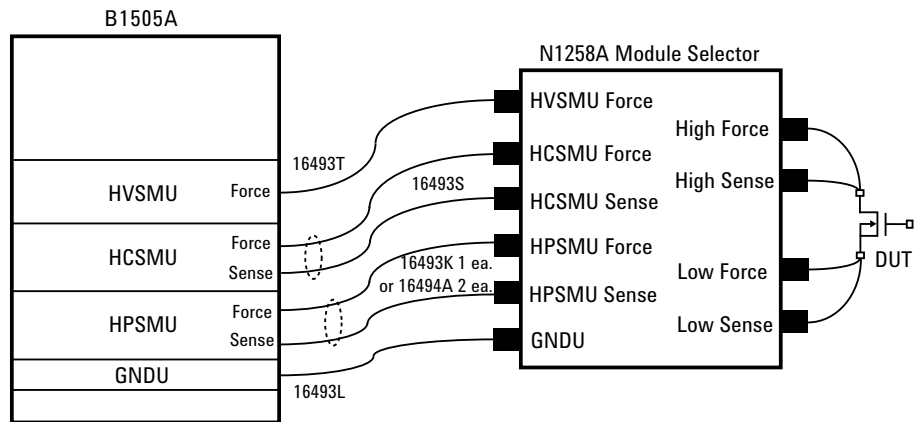
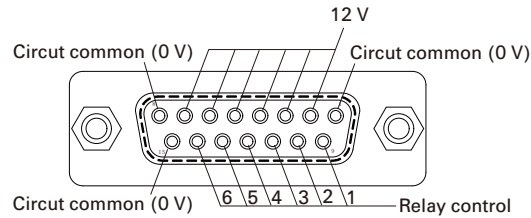


Figure 3-5 External Relay Control Output Connector



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 3-6 shows the pin assignments of the interlock connector that should be mounted on your DUT interface. And Table 3-14 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 3-6

Interlock Connector Pin Assignments

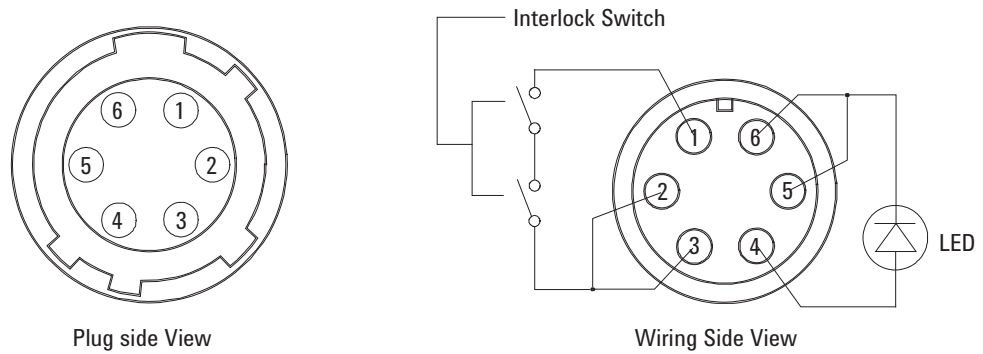


Table 3-14

Recommended Parts

Agilent Part No.	Description	Quantity
1252-1419C	Interlock Connector (6 pin, female)	1
3101-0302 or 3101-3241	Switch	2
1450-0641	LED ($V_F \cong 2.1 \text{ V} @ I_F = 10 \text{ mA}$)	1
8150-5680	Wire	

Procedure

Prepare the required parts listed in Table 3-14. And install the interlock circuit as shown below.

1. Make mounting hole for the interlock connector. See Figure 3-8 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 3-9 and Figure 3-10 below.
3. Mount an LED on your shielding box. For the dimensions of the LED, see Figure 3-7.
4. Use wire to connect the two switches in series between pin number 1 and 2 (or 3) of the interlock connector. See Figure 3-6.
5. Use wire to connect the LED between pin number 4 and 5 (or 6) of the interlock connector. See Figure 3-6.
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 3-7

Dimensions of the LED (Agilent part number 1450-0641)

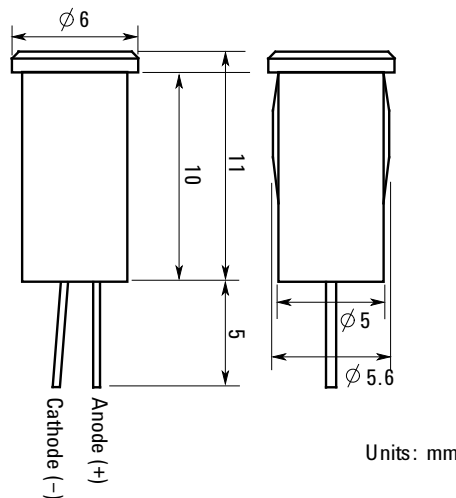
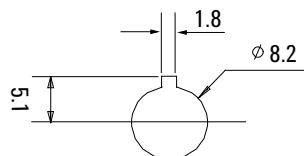


Figure 3-8

Dimensions of Mounting Hole for the Interlock Connector






About Cable Connections

Prepare the open end cable assemblies listed in Table 3-15 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 3-15

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		

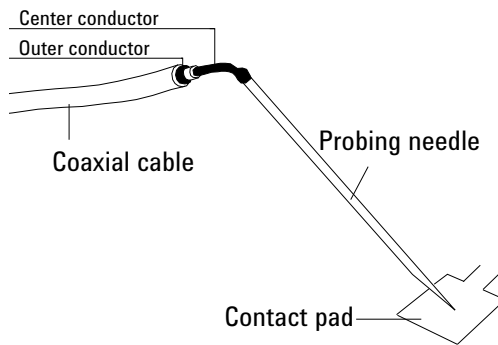
To Make Connection to Reduce Leakage Current

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.

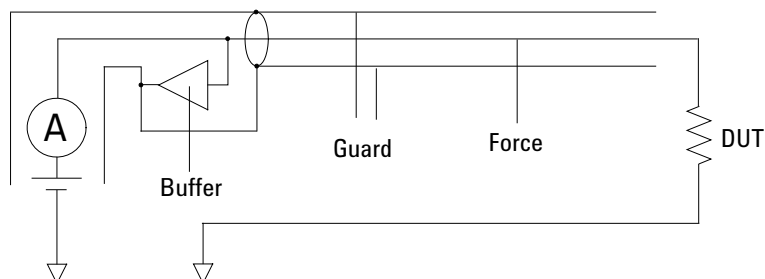
CAUTION

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

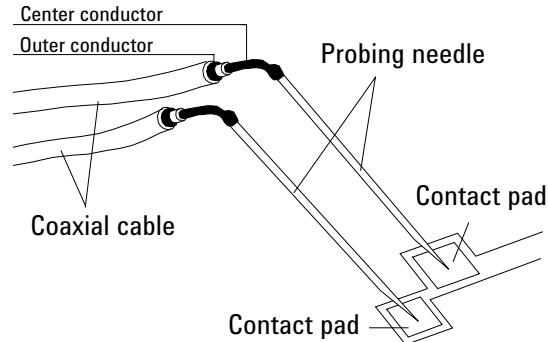
When you measure a low resistance, high current flows through the DUT. This high current increases the measurement error caused by the residual resistance of cables. To cancel the effect of this resistance, you can use *Kelvin connections* (4-wire), which means the Force and Sense lines are extended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

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

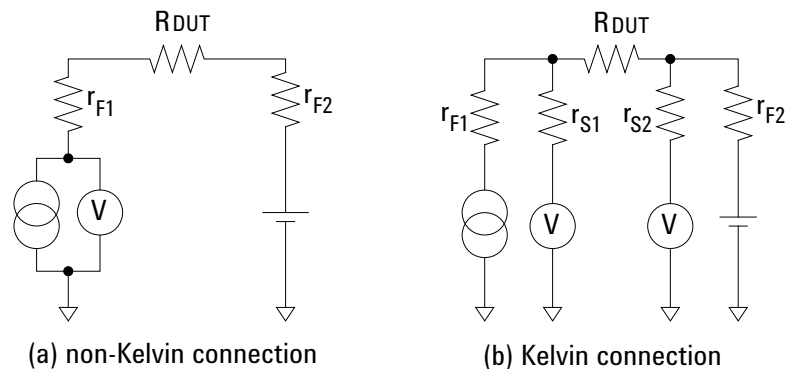
1. Cut and trim end of the coaxial cable such as N1254A-503 and N1254A-506, so that the center conductor does not touch the outer conductor (connected to the guard terminal).
2. Connect the center conductor to tail of the probing needle. Never connect the outer conductor to the probing needle. However 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 3-16. 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”
- “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 3-11 N1254A-500/502 HV Connector for Soldering, mounting hole, in mm

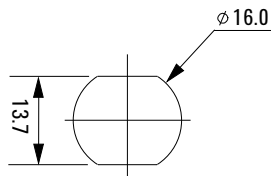


Figure 3-12 N1254A-501 HV jack - HV jack Adapter, mounting hole, in mm

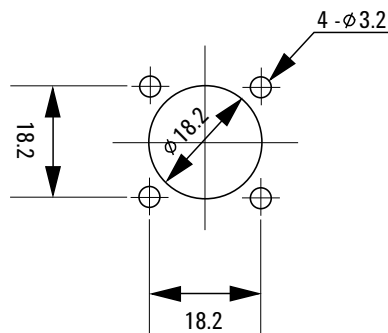


Figure 3-13 16493S-010 HCSMU Kelvin Adapter, in mm

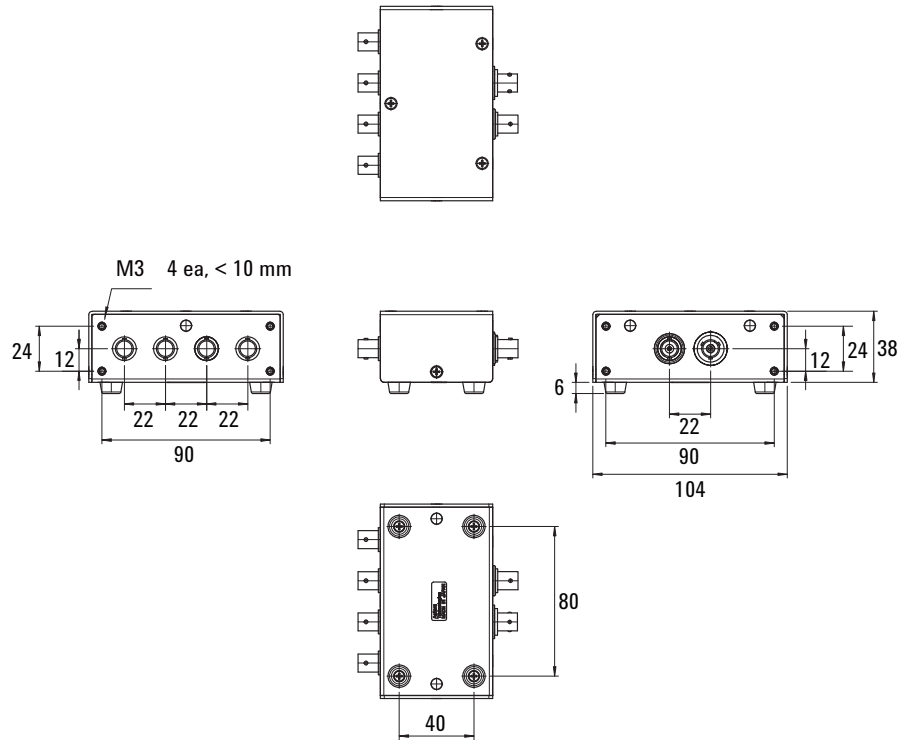
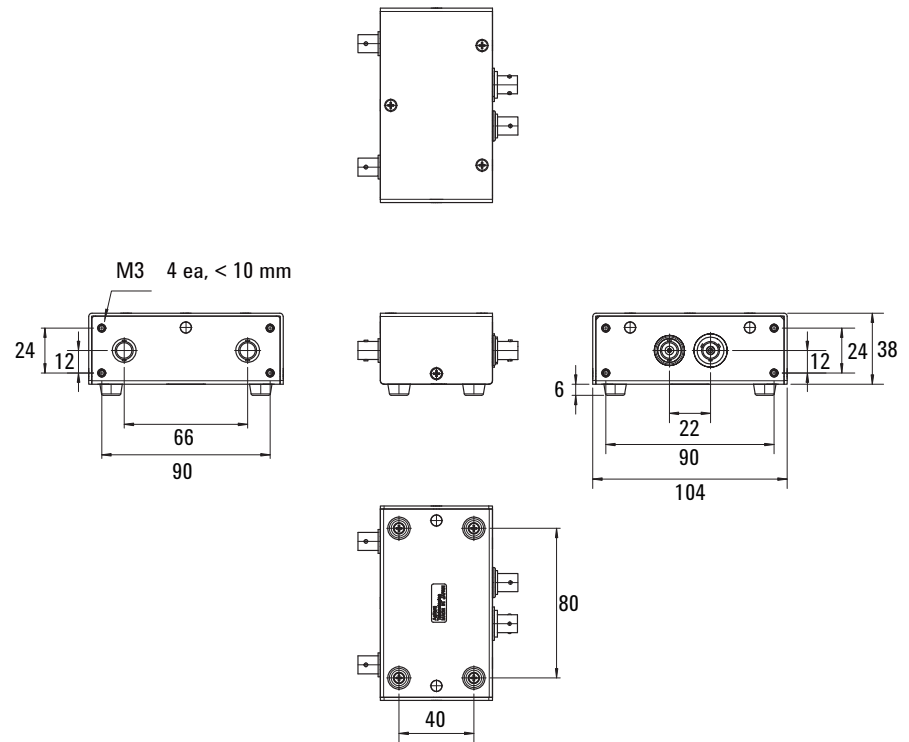


Figure 3-14 16493S-011 HCSMU non-Kelvin Adapter, in mm



Connection Guide for Other DUT Interface
 Accessory Dimensions

Figure 3-15 N1258A Module Selector, in mm

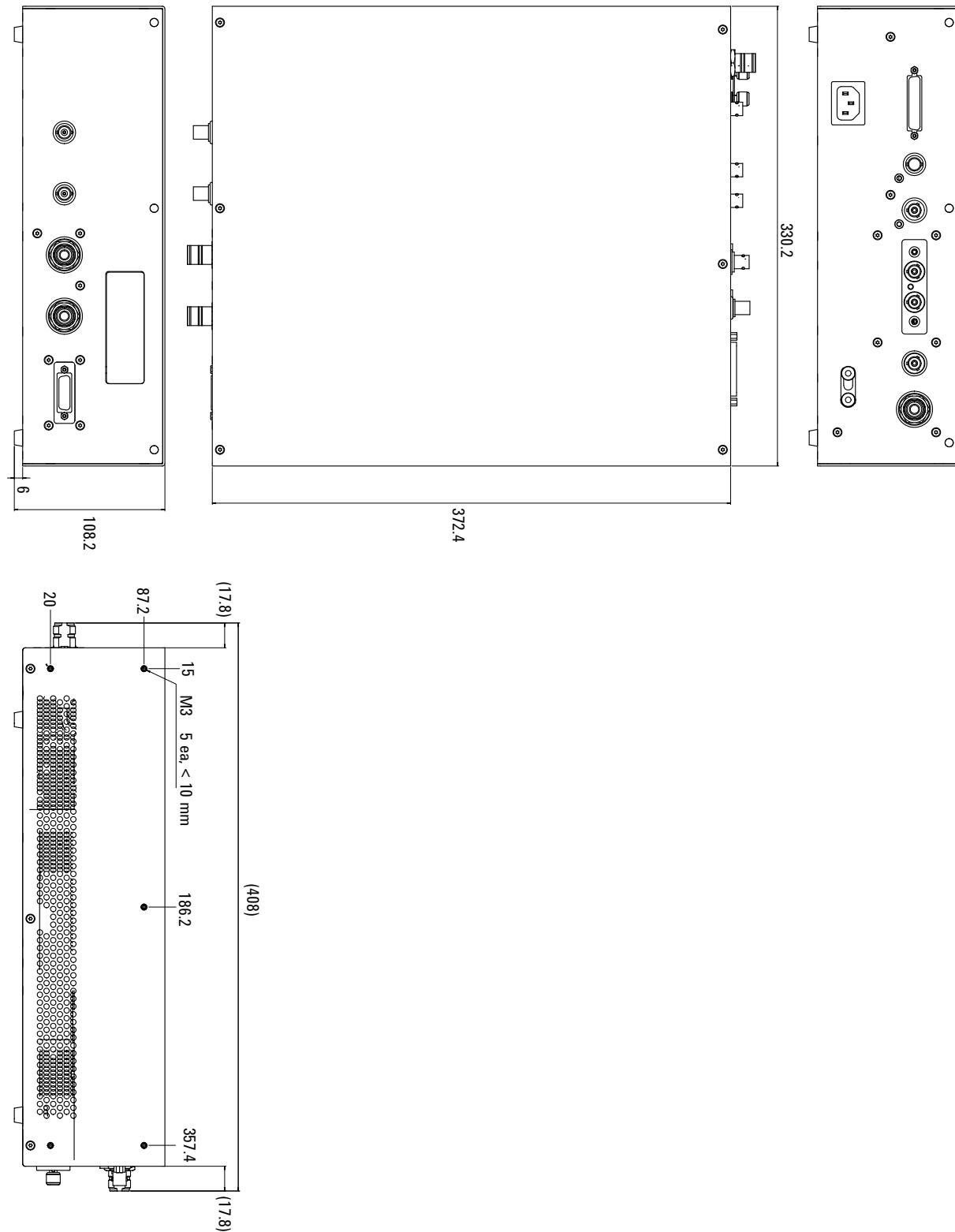


Figure 3-16 N1260A High Voltage Bias-T, in mm

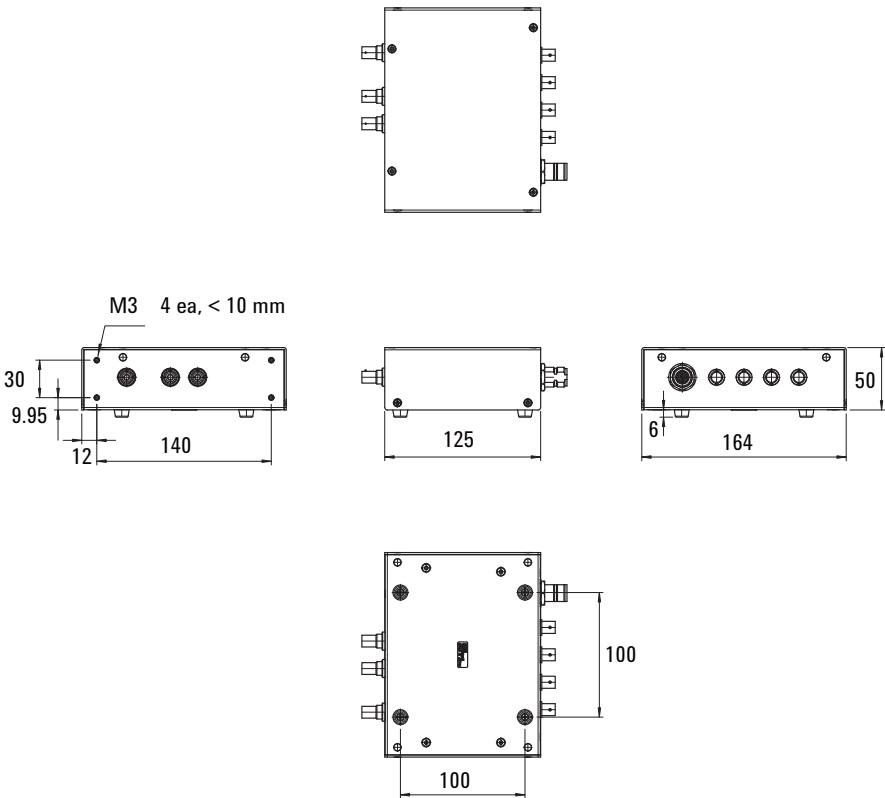


Figure 3-17 N1261A-001 HPSMU Protection Adapter, in mm

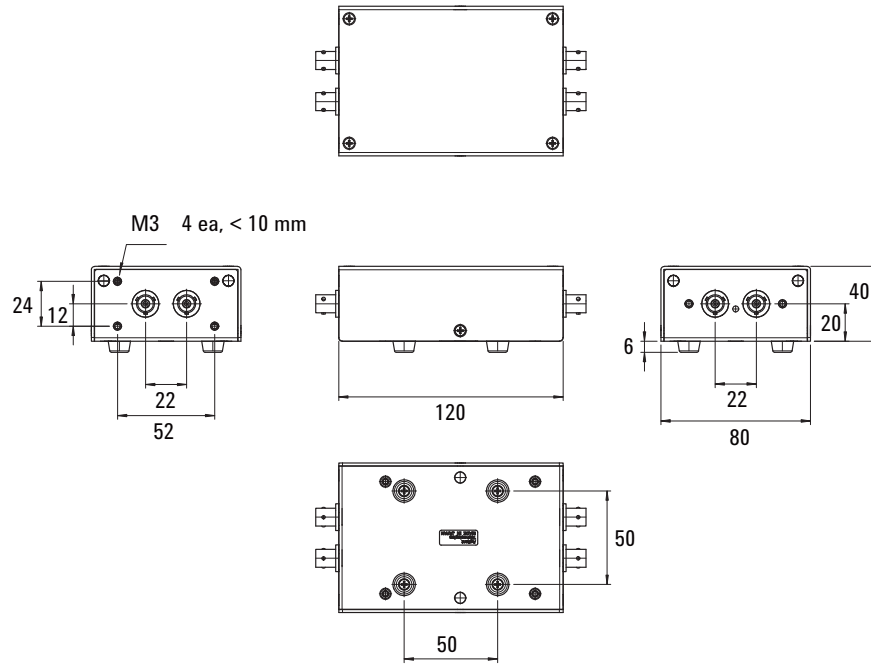


Figure 3-18 N1261A-002 GNDU Protection Adapter, in mm

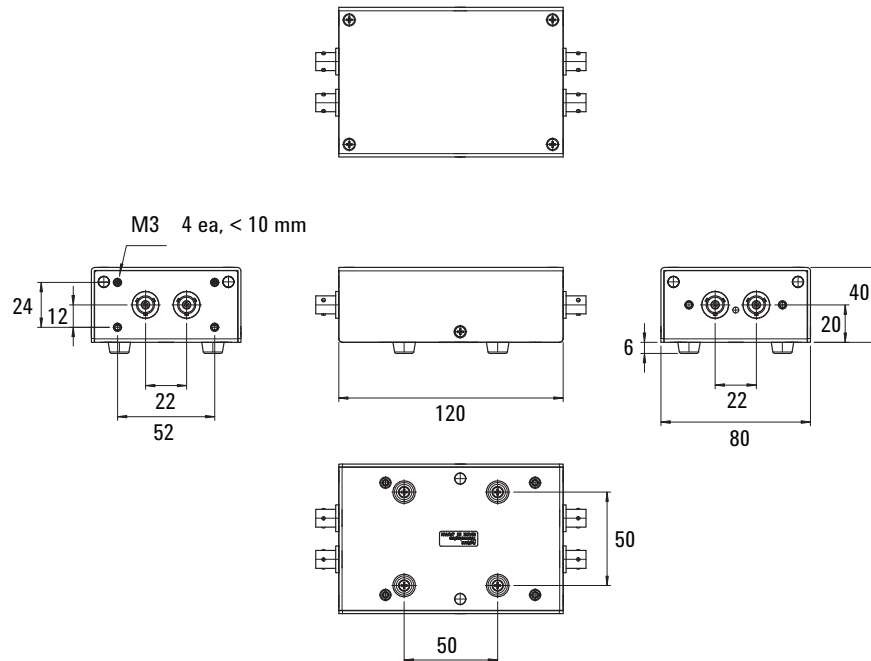


Figure 3-19 N1261A-003 HPSMU Protection Adapter, HV Output, in mm

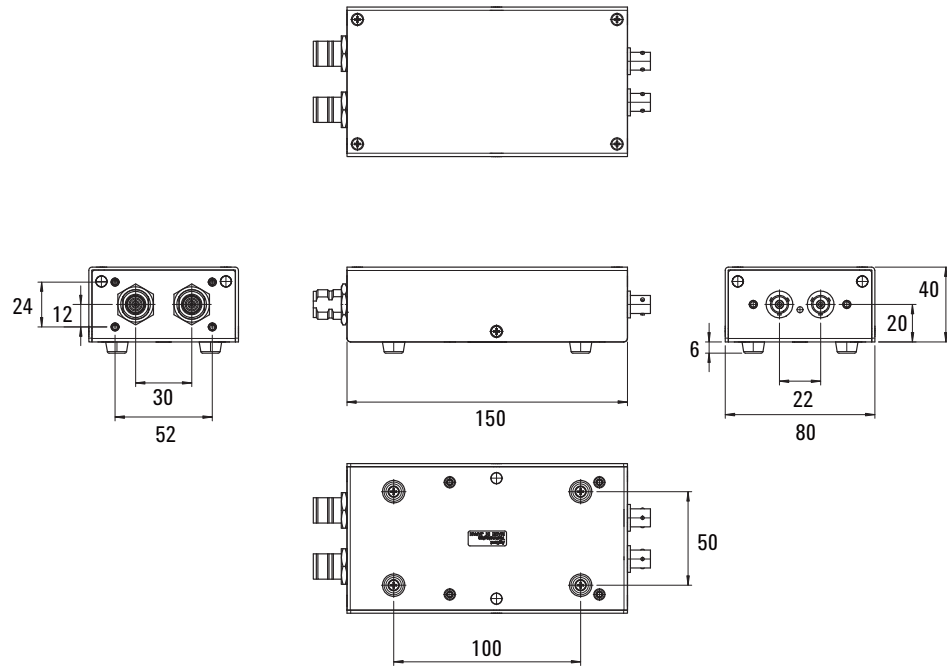


Figure 3-20 N1261A-004 GNDU Protection Adapter, SHV Output, in mm

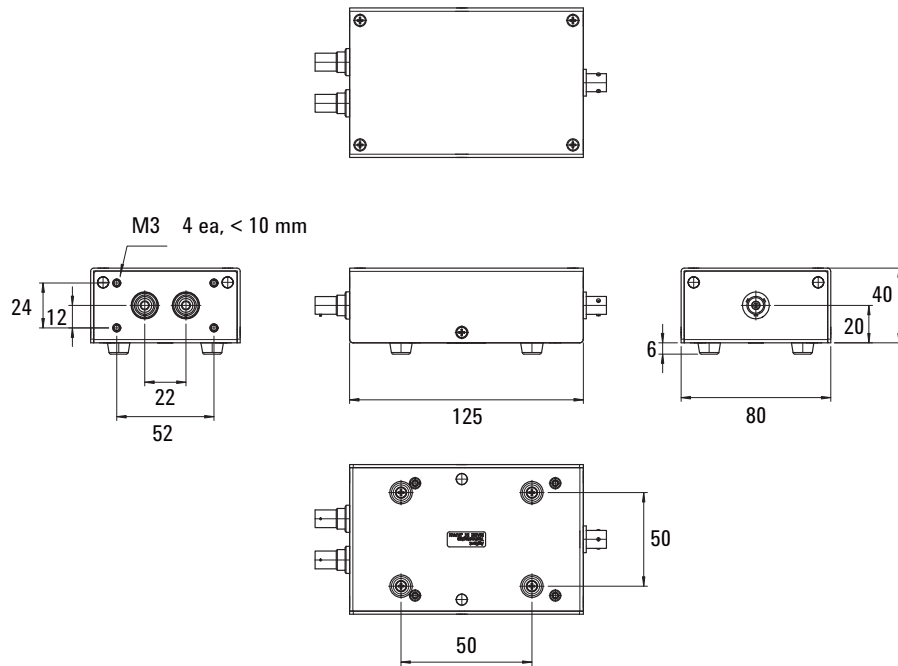


Figure 3-21 N1262A-001/002/011 High Voltage R-Box, HV Output, in mm

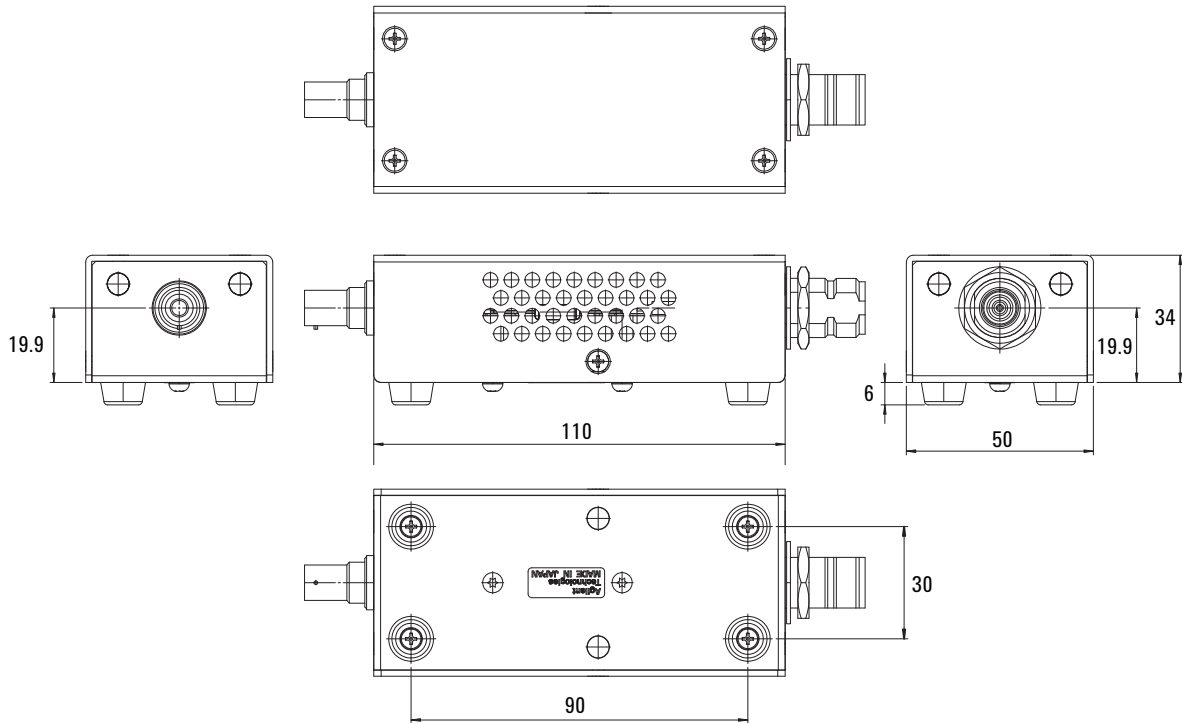


Figure 3-22 N1262A-010 R-Box, Triaxial Output, in mm

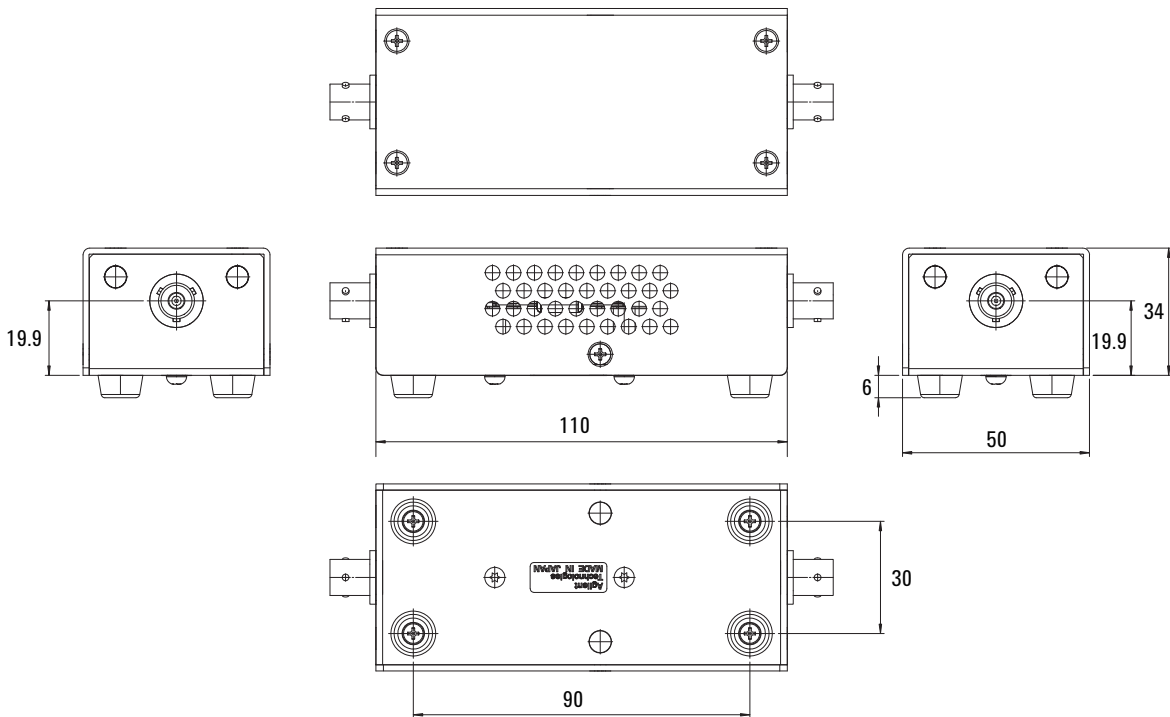


Table 3-16 Dimensions and Weight of Accessories

Model	Description	Dimensions in mm	Weight in kg
16393S-010	HCSMU Kelvin adapter	90 (W) × 30 (H) × 60 (D)	0.3
16393S-011	HCSMU non-Kelvin adapter	90 (W) × 30 (H) × 60 (D)	0.3
N1258A	Module selector	330 (W) × 120 (H) × 410 (D)	5.0
N1260A	High voltage bias-T	164 (W) × 53 (H) × 125 (D)	0.6
N1261A-001	HPSMU protection adapter, Triaxial(f)	80 (W) × 40 (H) × 110 (D)	0.3
N1261A-002	GNDU protection adapter, BNC(f)	80 (W) × 40 (H) × 110 (D)	0.3
N1261A-003	HPSMU protection adapter, HV(jack)	90 (W) × 40 (H) × 140 (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 M Ω , SHV(jack)	50 (W) × 40 (H) × 125 (D)	0.3
N1262A-002	High voltage R-box, 100 k Ω , SHV(jack)	50 (W) × 40 (H) × 125 (D)	0.3
N1262A-010	R-box, 1 k Ω , Triaxial(f)	50 (W) × 40 (H) × 125 (D)	0.3
N1262A-011	High voltage R-box, 1 k Ω , SHV(jack)	50 (W) × 40 (H) × 125 (D)	0.3

Connection Guide for Other DUT Interface
Accessory Dimensions



4

Connection and Order Examples



Connection and Order Examples

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

- “Lateral Device Measurement with HV Connectors Only”
- “Lateral Device Measurement with General Triax or BNC Connectors”
- “Vertical Device Measurement with HV Connectors Only”
- “Vertical Device Measurement with General Triax or BNC Connectors”
- “Two-Terminal Device Measurement by Kelvin Connections”

Lateral Device Measurement with HV Connectors Only

Figure 4-1 Lateral device: breakdown measurement – only HV connectors

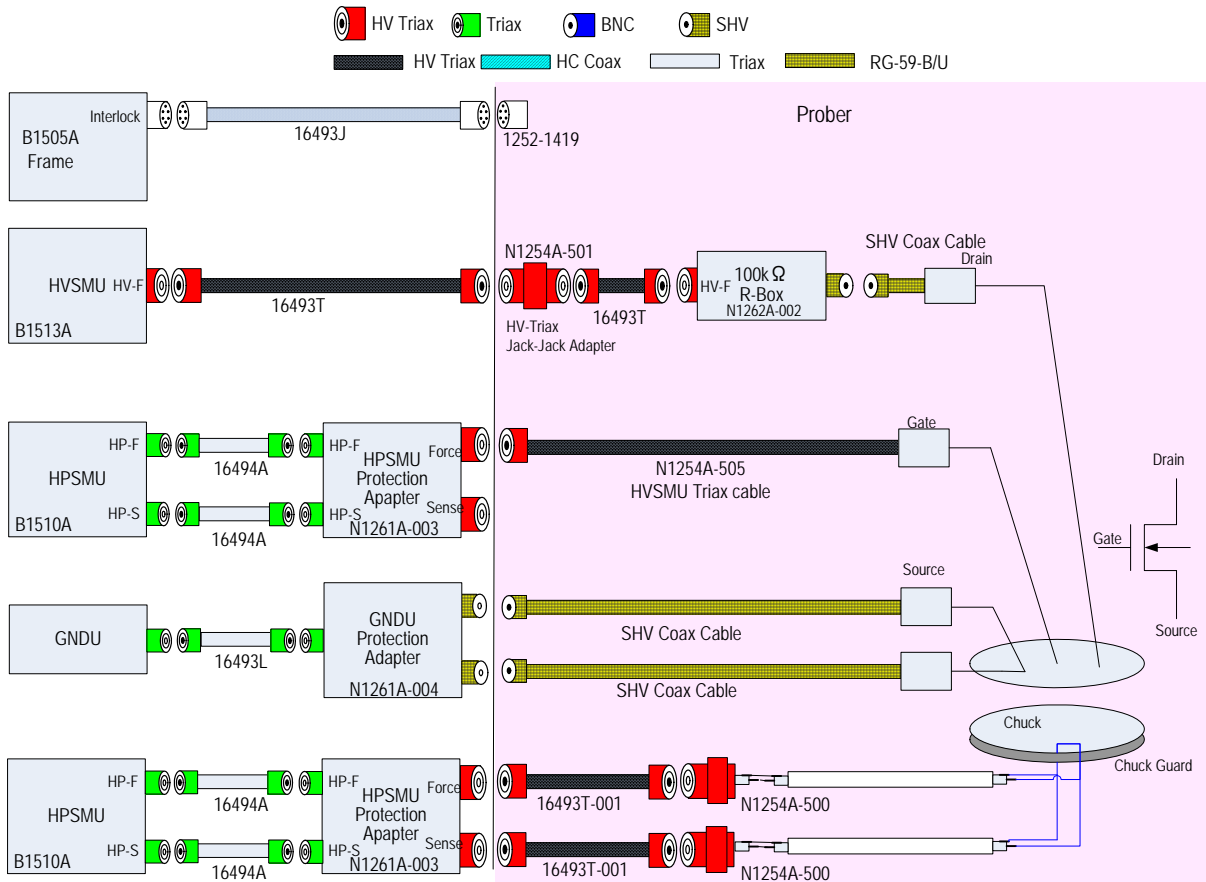


Table 4-1 Order example of breakdown measurement - only HV connectors

Product/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-Triaxial output)
N1261A-004	1	Protection Adapter Ground Unit (SHV output)
For prober		
N1262A-002	1	100k ohm R-box
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-501	1	HV Jack to Jack Adapter
N1254A-505	1	HVSMU Triaxial Cable Assy 1.5m - HV Plug to Open-End
16493T-001	3	High Voltage Source Monitor Unit Cable (1.5m)
1252-1419	1	Interlock receptacle connectors

Connection and Order Examples
Lateral Device Measurement with HV Connectors Only

Figure 4-2 Lateral device: I-leakage measurement - only HV connectors

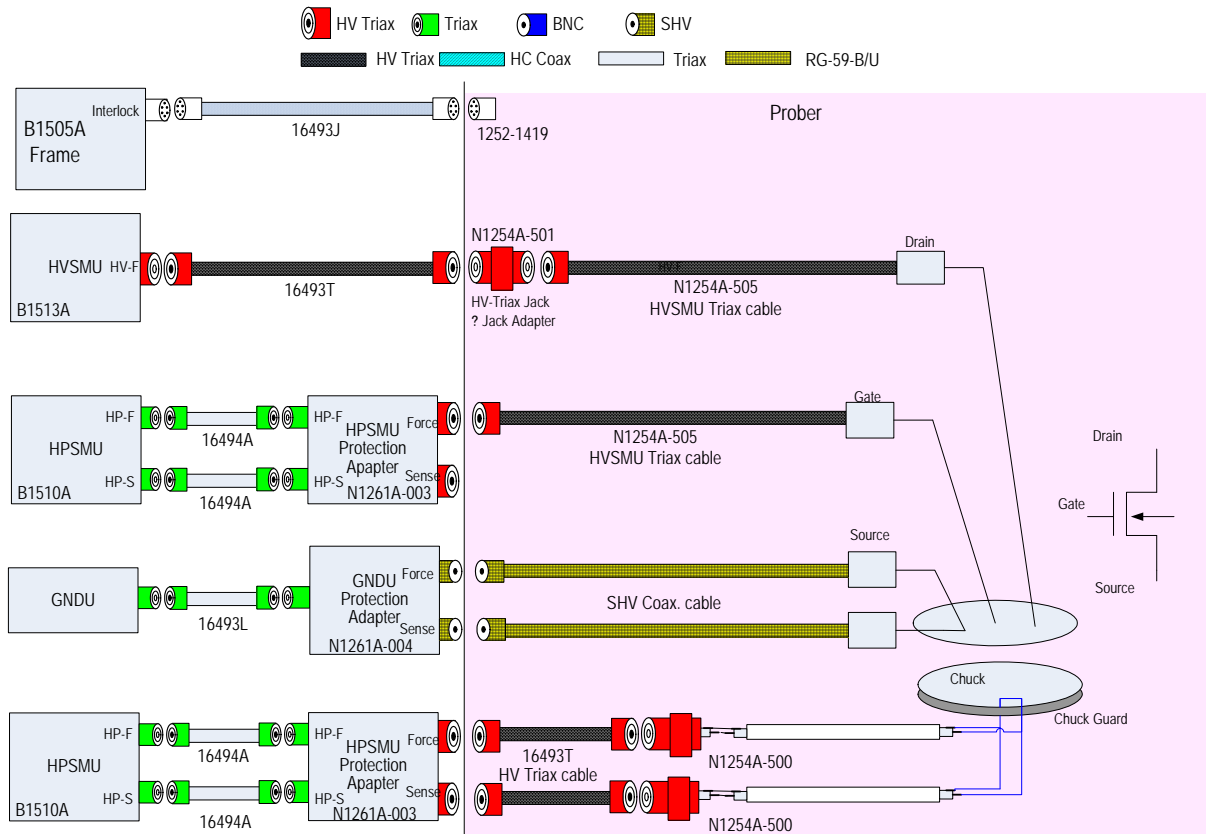


Table 4-2 Order example of I-leak measurement - only HV connectors

Product/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)
For prober		
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-501	1	HV Jack to Jack Adapter
N1254A-505	2	HVSMU Triax Cable Assy 1.5m - HV Plug to Open-End
16493T-001	2	High Voltage Source Monitor Unit Cable (1.5m)
1252-1419	1	Interlock receptacle connectors

Connection and Order Examples
Lateral Device Measurement with HV Connectors Only

Figure 4-4 Lateral device: C-V measurement (Cds) - only HV connectors

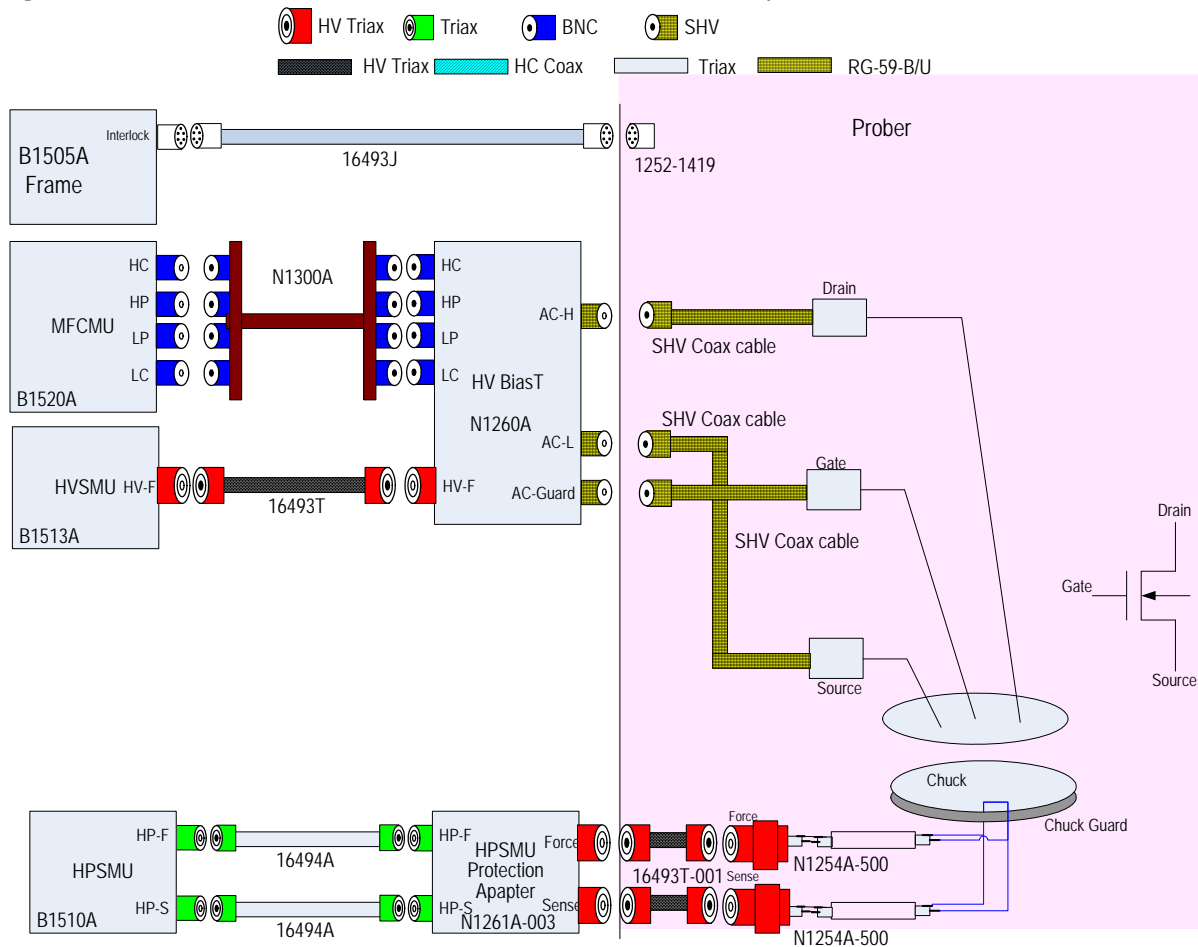


Table 4-4 Order example of C-V measurement (Cds) -only HV connectors

Product/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-Triaxial output)
For prober		
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
16493T-001	2	High Voltage Source Monitor Unit Cable (1.5m)
1252-1419	1	Interlock receptacle connector

Figure 4-5

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

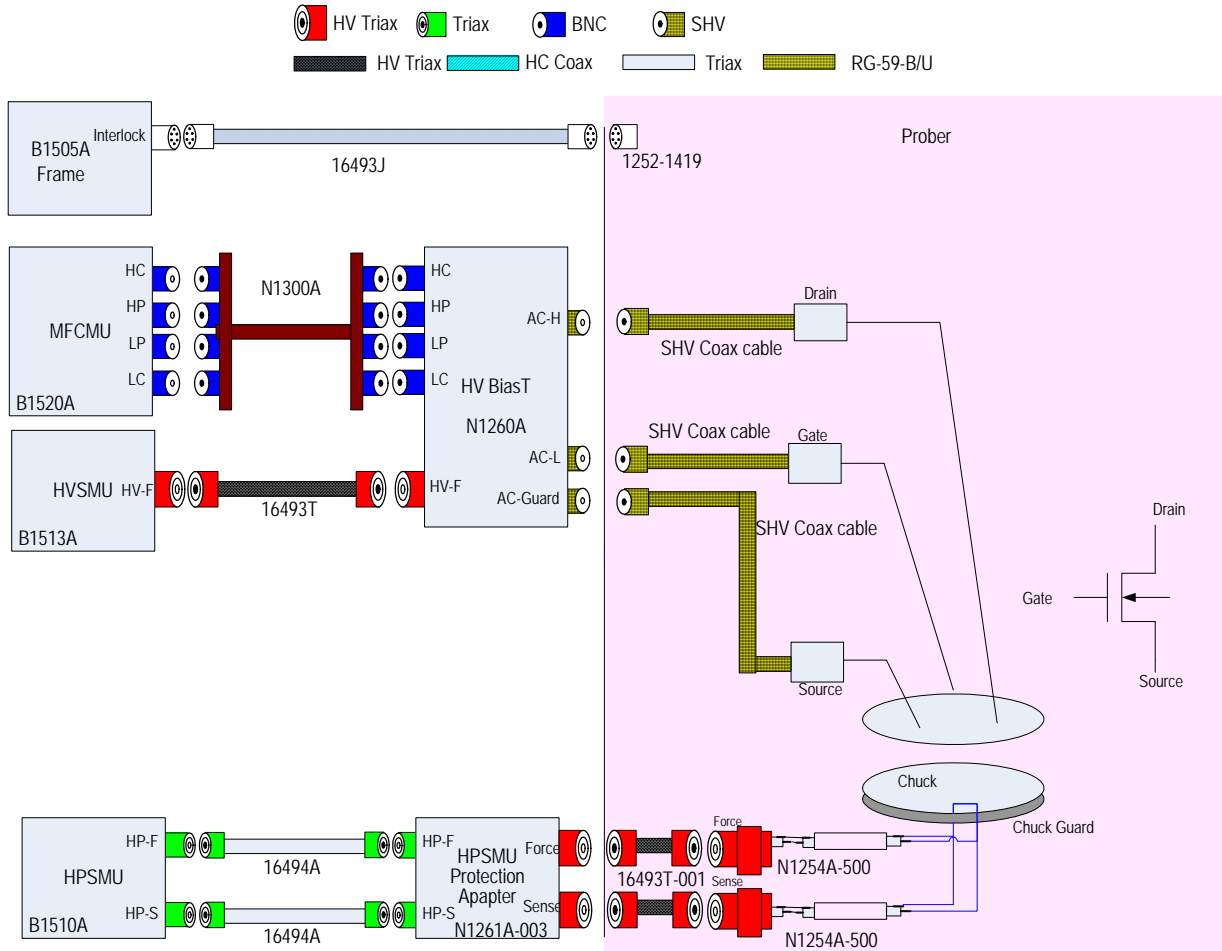


Table 4-5

Order example of C-V measurement (Cgd) -only HV connectors

Product/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-Triaxial output)
For prober		
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
16493T-001	2	High Voltage Source Monitor Unit Cable (1.5m)
1252-1419	1	Interlock receptacle connector

Lateral Device Measurement with General Triax or BNC Connectors

Figure 4-6 Lateral device: breakdown measurement - general Triax. or BNC connectors for gate/source

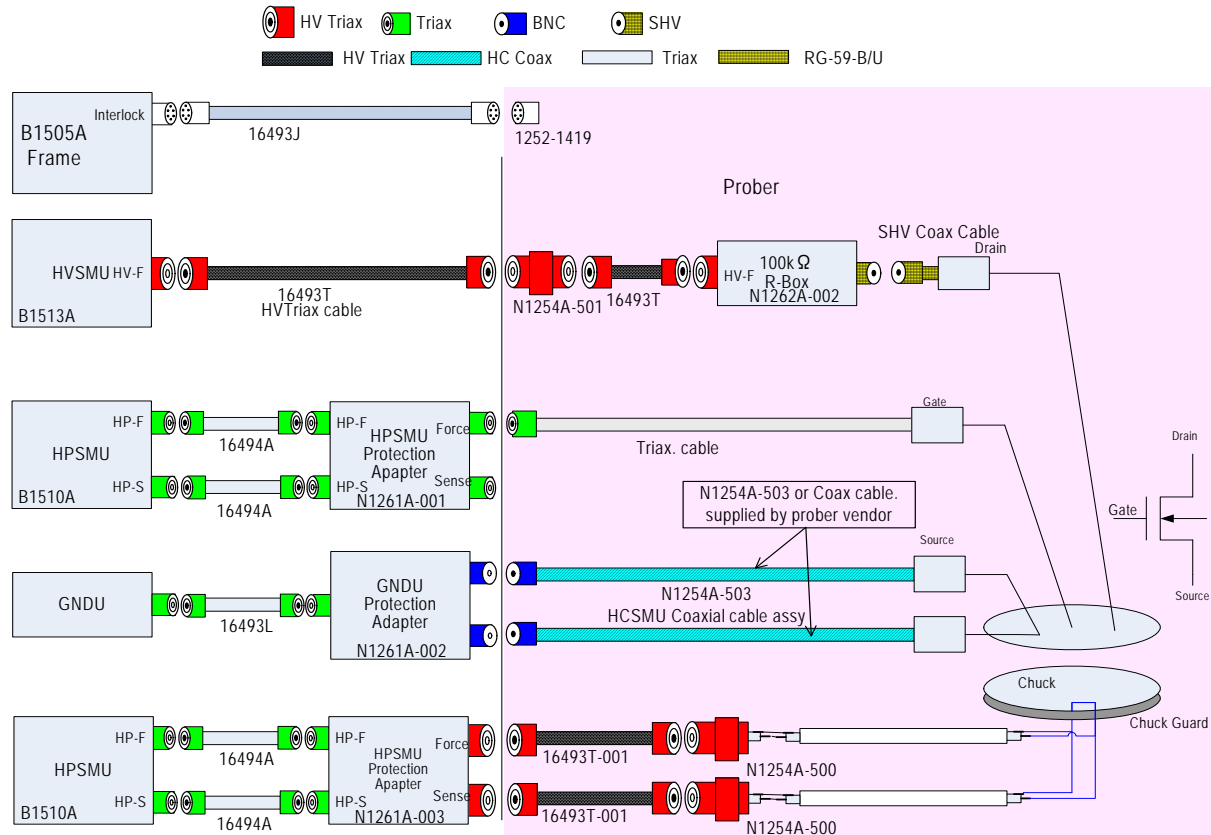


Table 4-6 Order example of breakdown measurement

Product/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	2	Protection adapter for HPSMU (Triaxial output)
N1261A-002	1	Protection adapter for GNDU (BNC output)
N1261A-003	2	Protection adapter for HPSMU (HV-Triaxial output)
For prober		
N1262A-002	1	100k ohm R-box
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-501	1	HV Jack to Jack Adapter
N1254A-503	2	HCSMU Coax Cable Assy 1.5m - BNC to Open-End
16493T-001	3	High Voltage Source Monitor Unit Cable (1.5m)
1252-1419	1	Interlock receptacle connectors

Figure 4-7 Lateral device: I-leakage measurement - general triax. or BNC connectors for gate/source

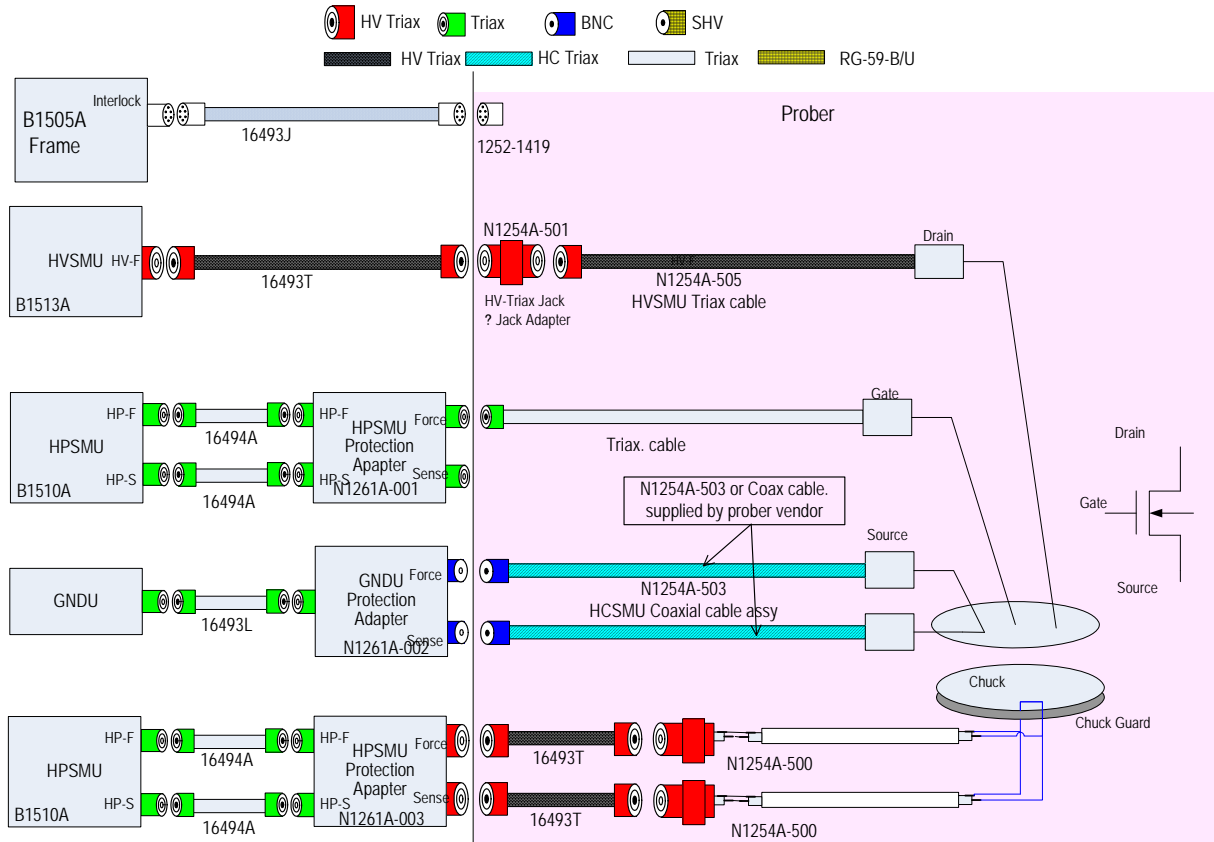


Table 4-7 Order example of I-leakage measurement

Product/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-Triaxial output)
For prober		
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-501	1	HV Jack to Jack Adapter
N1254A-503	2	HCSMU Coax Cable Assy 1.5m - BNC to Open-End
N1254A-505	1	HVSMU Triax Cable Assy 1.5m - HV Plug to Open-End
16493T-001	2	High Voltage Source Monitor Unit Cable (1.5m)
1252-1419	1	Interlock receptacle connectors

Connection and Order Examples
Lateral Device Measurement with General Triax or BNC Connectors

Figure 4-8 Lateral device: I-V measurement with selector

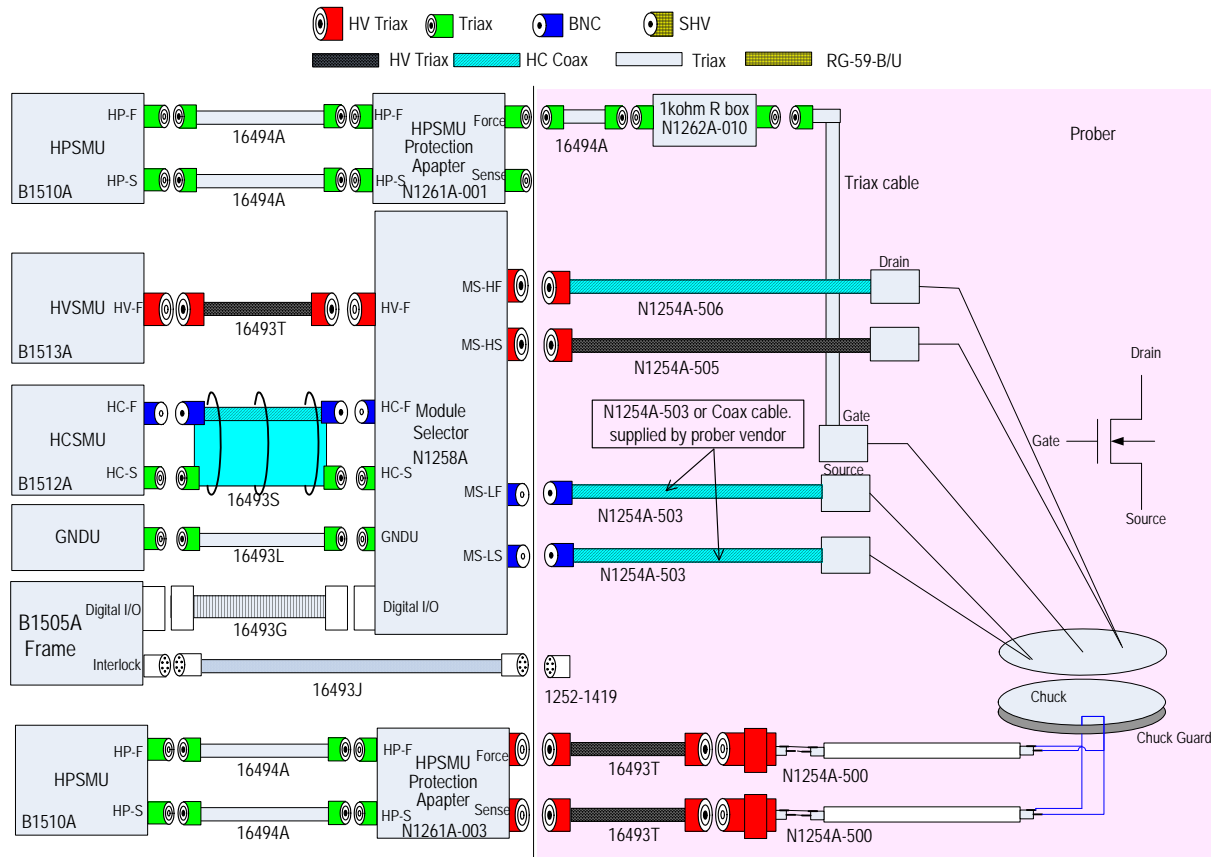


Table 4-8 Order example of I-V measurement with selector

Product/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-Triaxial output)
N1258A	1	Module Selector
For prober		
N1262A-010	1	1kohm R-box for gate (Triax. output)
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-503	2	HCSMU Coax Cable Assy 1.5m - BNC to Open-End
N1254A-505	1	HVSMU Triax Cable Assy 1.5m - HV Plug to Open-End
N1254A-506	1	HVSMU Coax. Cable Assy 1.5m - HV Plug to Open-End
16493T-001	3	High Voltage Source Monitor Unit Cable (1.5m)
16494A-001	1	Triax. cable
1252-1419	1	Interlock receptacle connectors

Figure 4-9 Lateral device: I-V measurement with HCSMU - Kelvin connections

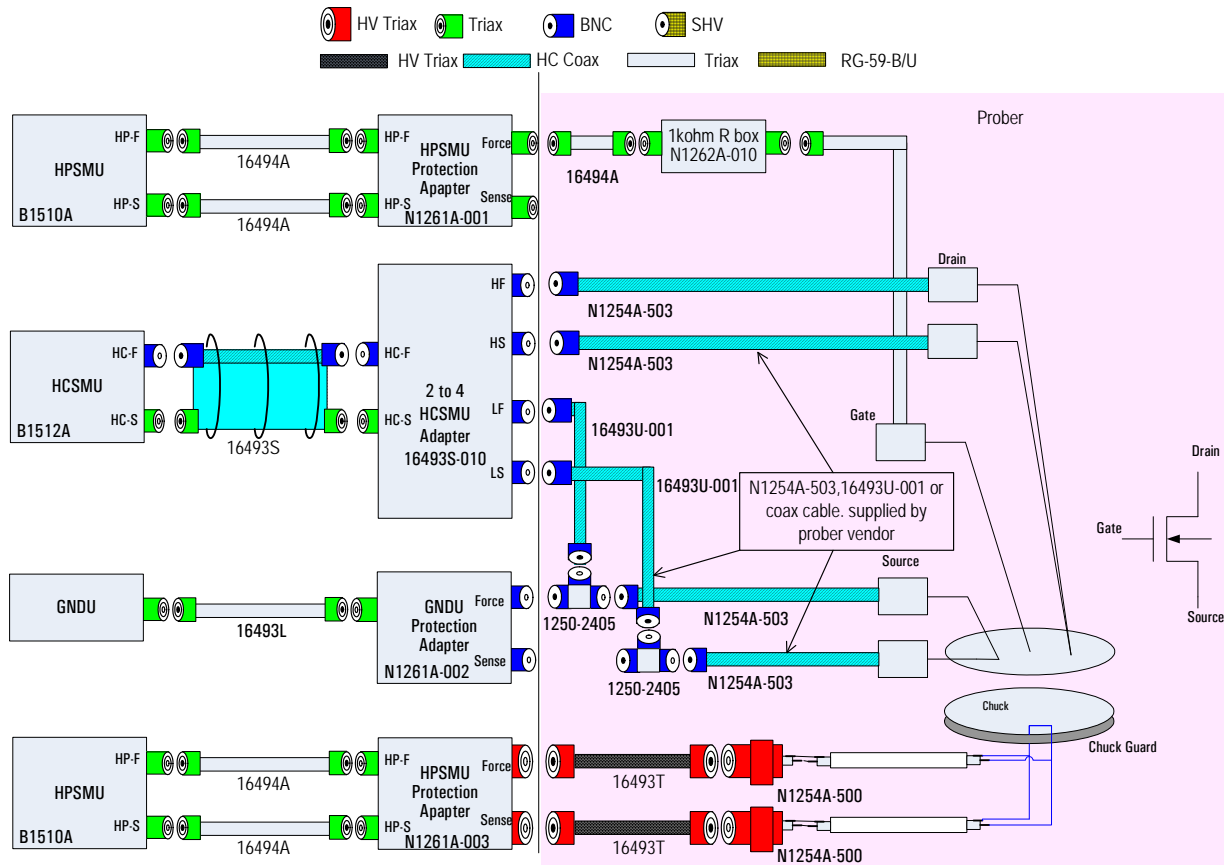


Table 4-9 Order example of I-V measurement with HCSMU -Kelvin connections

Product/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-Triaxial output)
For prober		
N1262A-010	1	1kohm R-box for gate (Triax. output)
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-503	4	HCSMU Coax Cable Assy 1.5m - BNC to Open-End
16493U-001	2	High Current BNC Coaxial Cable (1.5m)
16493T-001	2	High Voltage Source Monitor Unit Cable (1.5m)
16494A-001	1	Triax. cable
1252-2405	2	BNC - T Plug(m)-BNC(f)-BNC(f) adapter

Connection and Order Examples
Lateral Device Measurement with General Triax or BNC Connectors

Figure 4-10 Lateral device: I-V measurement with 2 x HCSMUs - Kelvin connections

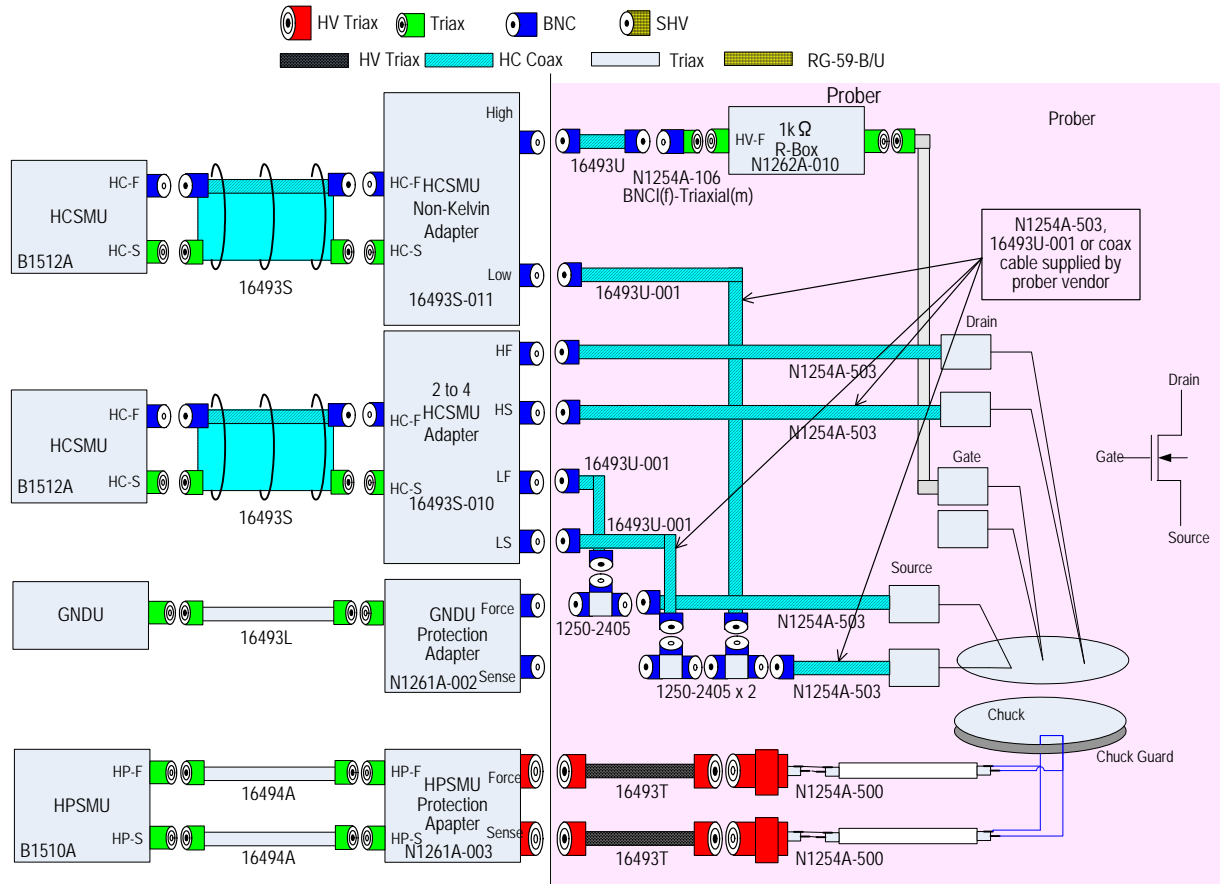


Table 4-10 Order example of I-V measurement with 2 x HCSMUs - Kelvin connections

Product/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-011	1	High Current Source Monitor Unit non-Kevin adapter
N1261A-002	1	Protection adapter for GNDU (BNC output)
N1261A-003	1	Protection adapter for HPSMU (HV-Triaxial output)
For prober		
N1262A-010	1	1kohm R-box for gate (Triax. output)
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-503	4	HCSMU Coax Cable Assy 1.5m - BNC to Open-End
16493U-001	4	High Current BNC Coaxial Cable (1.5m)
16493T-001	2	High Voltage Source Monitor Unit Cable (1.5m)
N1254A-106	1	BNC(f)-Trax(m) adapter
1252-2405	2	BNC - T Plug(m)-BNC(f)-BNC(f) adapter

Figure 4-11 Lateral device: I-V measurement with 2 x HCSMUs - Kelvin Connections

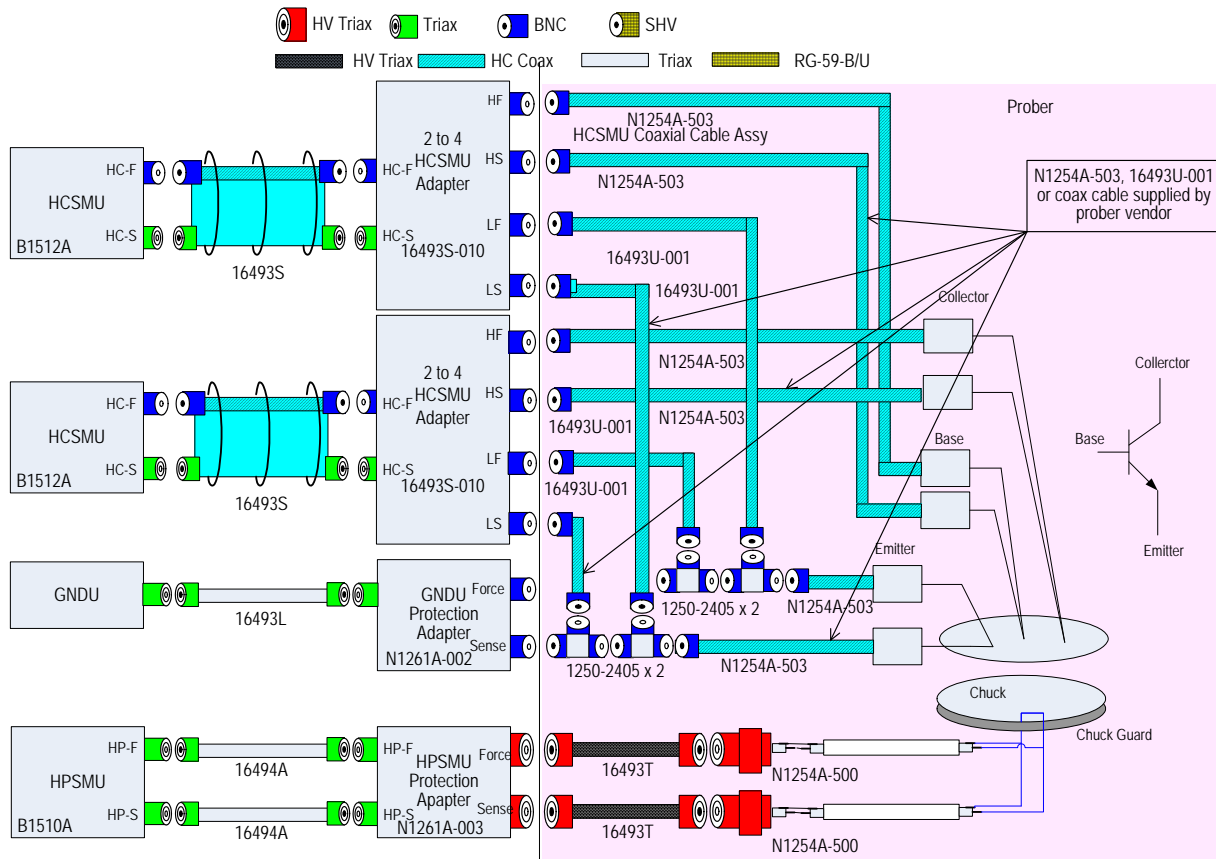


Table 4-11 Order example of I-V measurement with 2 x HCSMUs - Kelvin connections

Product/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-Triaxial output)
For prober		
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-503	6	HCSMU Coax Cable Assy 1.5m - BNC to Open-End
16493U-001	4	High Current BNC Coaxial Cable (1.5m)
16493T-001	2	High Voltage Source Monitor Unit Cable (1.5m)
1252-2405	4	BNC - T Plug(m)-BNC(f)-BNC(f) adapter

Vertical Device Measurement with HV Connectors Only

Figure 4-12

Vertical device: I-leakage measurement - only HV connectors

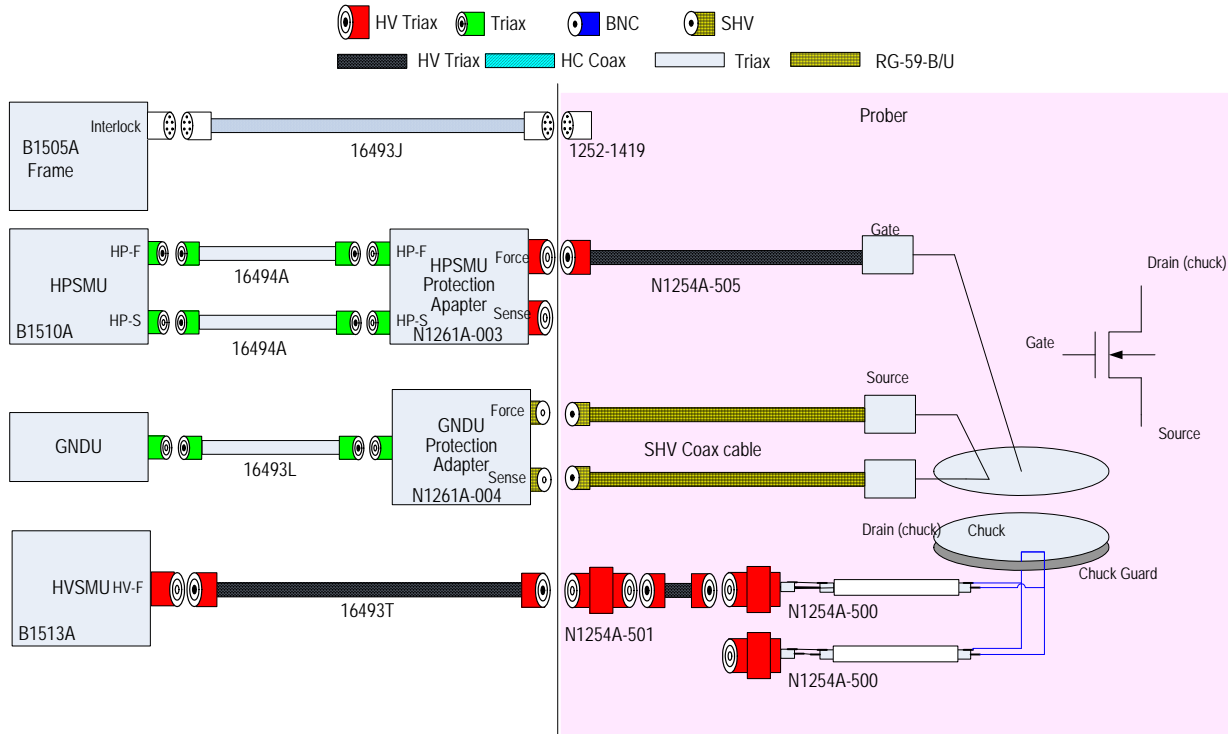


Table 4-12

Order example of I-leakage measurement - only HV connectors

Product/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-Triaxial output)
N1261A-004	1	Protection Adapter Ground Unit (SHV output)
For prober		
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-501	1	HV Jack to Jack adapter
N1254A-505	1	HVSMU Triax. cable assy 1.5m -HV plug to open-end
16493T-001	1	High Voltage Source Monitor Unit Cable (1.5m)
1252-1419	1	Interlock receptacle connector

Figure 4-13

Vertical device: I-V measurement w/selector - HV connectors for gate

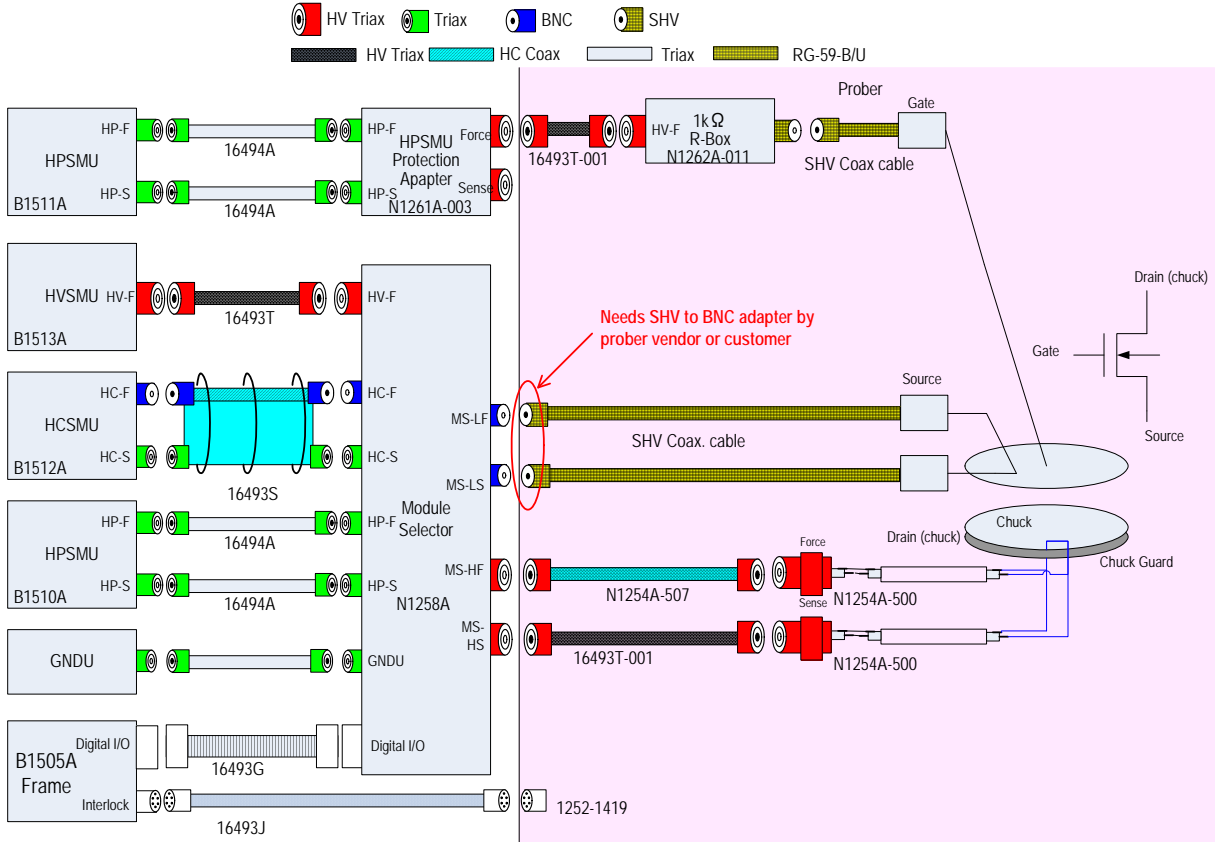


Table 4-13

Order example of I-V measurement with selector

Product/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-Triaxial output)
For prober		
N1262A-011	1	1kohm R-box for gate (SHV output)
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-507	1	HVSMU Coaxial cable assy 1.5m
16493T-001	2	High Voltage Source Monitor Unit Cable (1.5m)
1252-1419	1	Interlock receptacle connector

Connection and Order Examples
Vertical Device Measurement with HV Connectors Only

Figure 4-14 Vertical device: C-V measurement (Cds) - only HV connectors

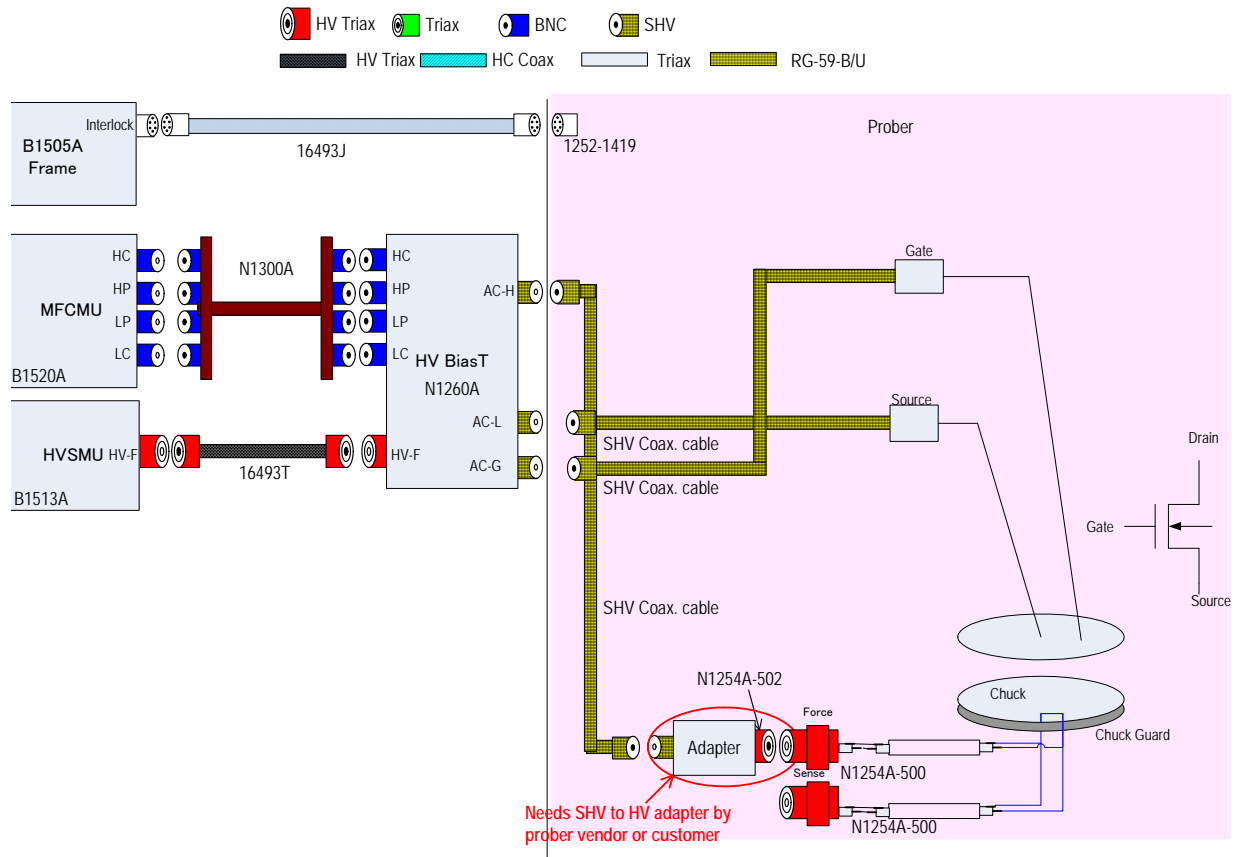


Table 4-14 Order example of C-V measurement (Cds)

Product/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
For prober		
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
1252-1419	1	Interlock receptacle connector

Figure 4-15

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

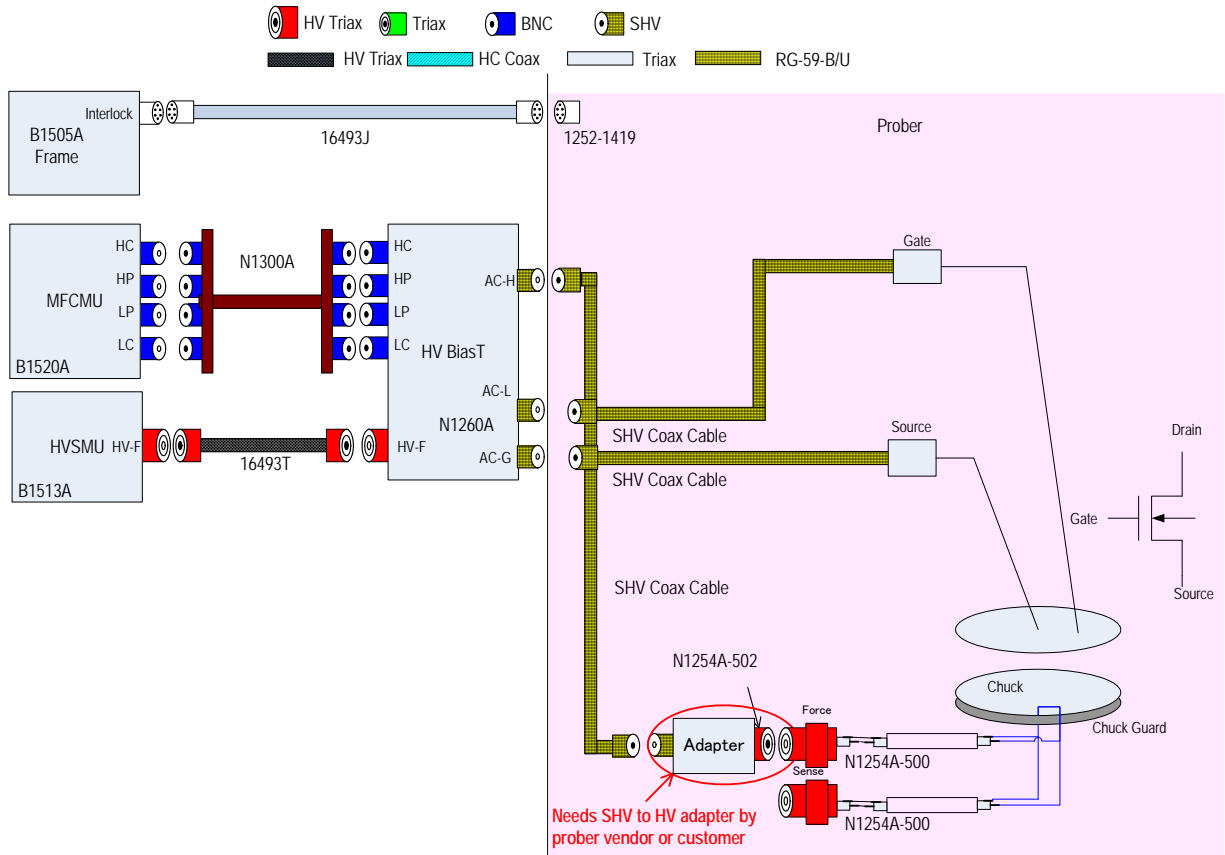


Table 4-15

Order example of C-V measurement (Cgd)

Product/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
For prober		
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
1252-1419	1	Interlock receptacle connector

Vertical Device Measurement with General Triax or BNC Connectors

Figure 4-16 Vertical device: I-leakage measurement - general Triax. or BNC connectors for gate/source

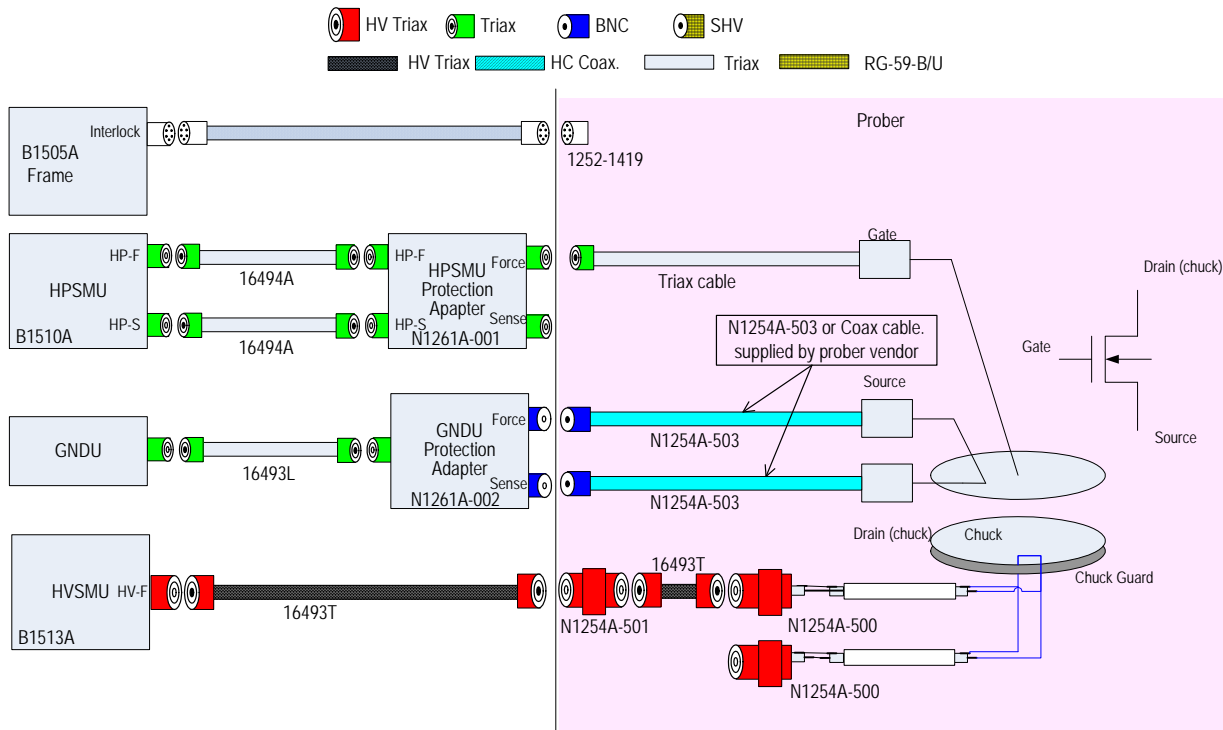


Table 4-16 Order example of I-leakage measurement

Product/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 Ground Unit (BNC output)
For prober		
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-501	1	HV Jack to Jack adapter
N1254A-503	2	HCSMU Coax. cable assy 1.5m -BNC to open-end
16493T-001	1	High Voltage Source Monitor Unit Cable (1.5m)
1252-1419	1	Interlock receptacle connector

Figure 4-17 Vertical device: I-leakage measurement - general Triax. or BNC connectors for gate/source

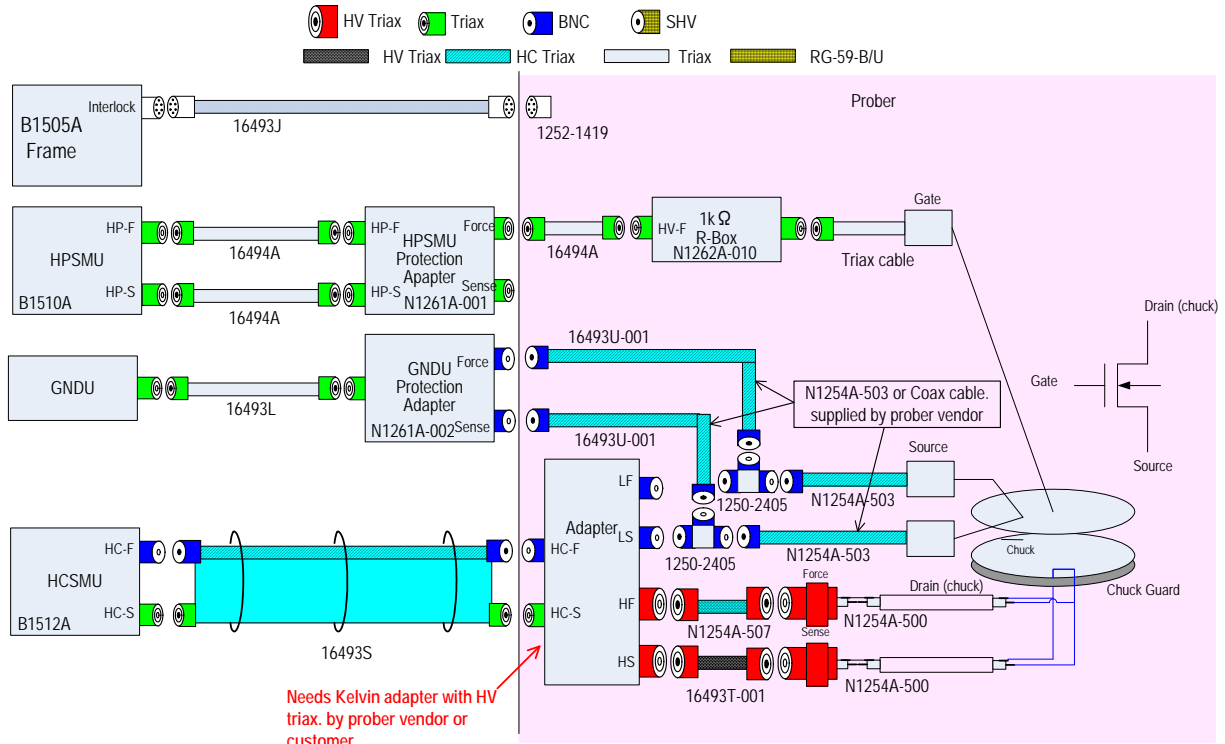


Table 4-17 Order example of I-leakage measurement

Product/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 Ground Unit (BNC output)
For prober		
N1262A-010	1	1kohm R-box for gate (Triax. output)
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-503	2	HCSMU Coax. cable assy 1.5m -BNC to open-end
N1254A-507	1	HVSMU Coax. cable assy 1.5m
16493U-001	2	High Current BNC Coaxial Cable (1.5m)
16493T-001	1	High Voltage Source Monitor Unit Cable (1.5m)
16494A-001	1	Triax. cable (1.5m)
1250-2450	2	BNC-T Plug(m)-BNC(f)-BNC(f) adapter
1252-1419	1	Interlock receptacle connector

Kelvin adapter is provided by prober vendor if HV output is required.

Connection and Order Examples
Vertical Device Measurement with General Triax or BNC Connectors

Figure 4-18 Kelvin adapter

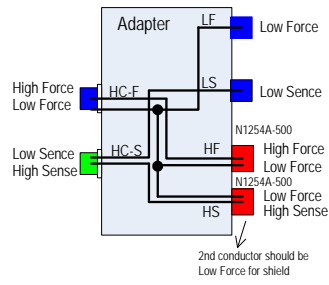


Figure 4-19 Vertical device: I-V measurement w/selector - general Triax. or BNC connectors for gate/source

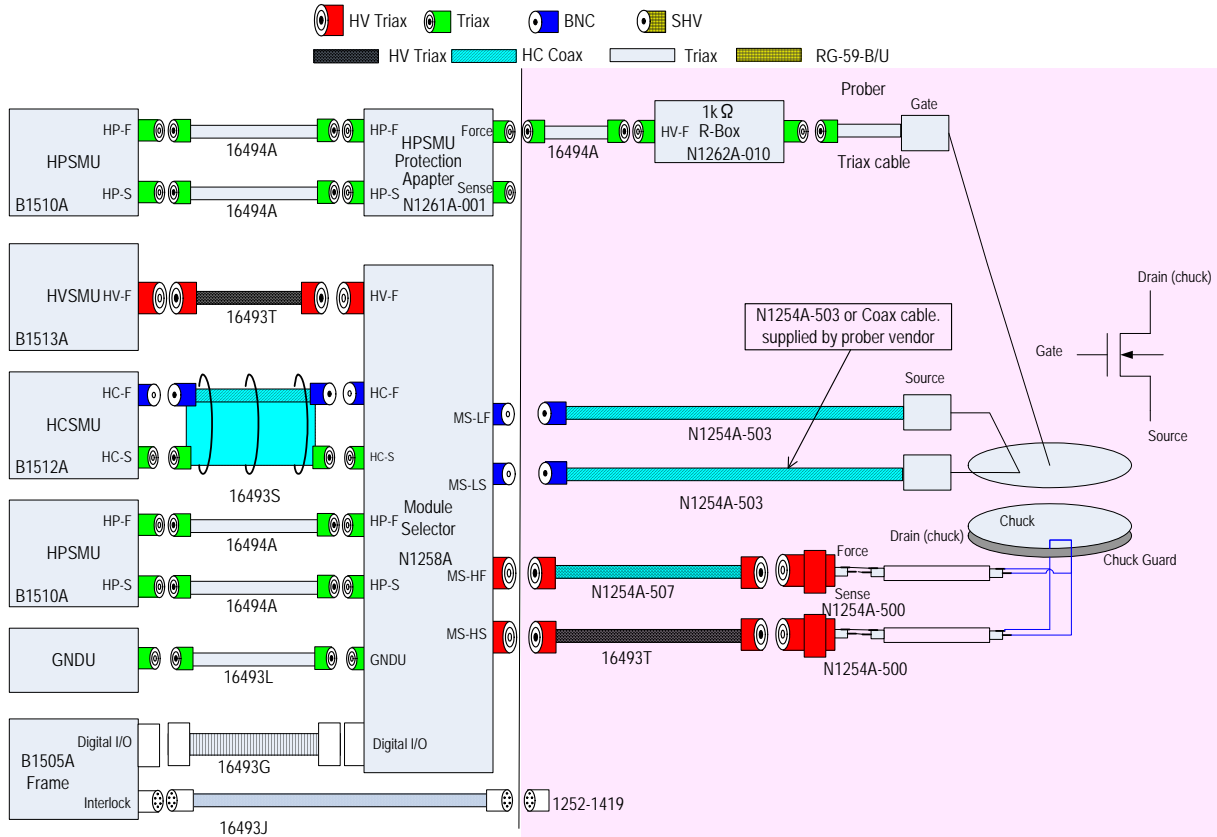


Table 4-18 Order example of I-V measurement with selector

Product/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)
For prober		
N1262A-010	1	1kohm R-box for gate (Triax output)
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-503	2	HCSMU Coaxial cable assy 1.5m -BNC to open-end
N1254A-507	1	HVSMU Coaxial cable assy 1.5m
16493T-001	1	High Voltage Source Monitor Unit Cable (1.5m)
16494A-001	1	Triax Cable (1.5m)
1252-1419	1	Interlock receptacle connector

Two-Terminal Device Measurement by Kelvin Connections

Figure 4-20 Two-terminal device or material evaluation like SiC w/selector -Kelvin connections

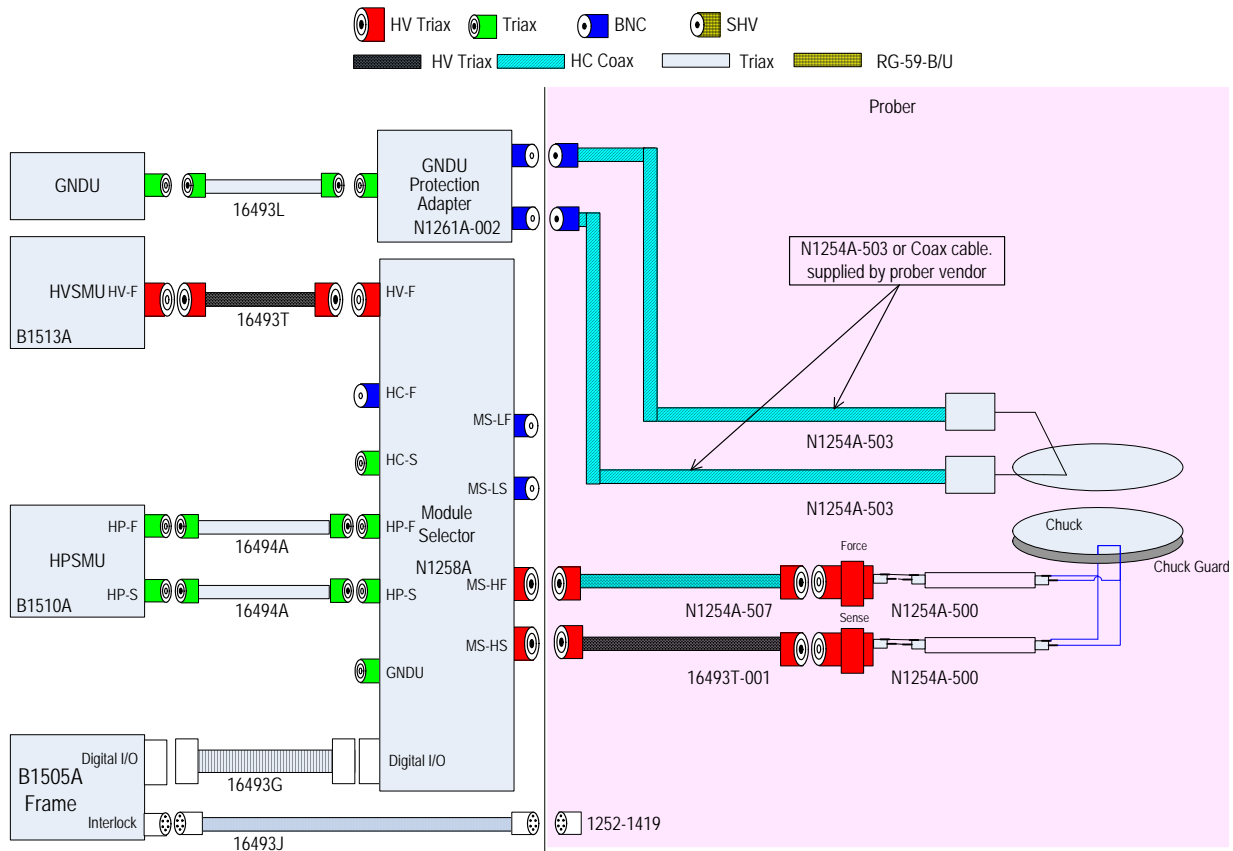


Table 4-19 Order example of two terminal device like SiC - Kelvin connections

Product/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)
For prober		
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-503	2	HCSMU Coaxial cable assy 1.5m -BNC to open-end
N1254A-507	1	HVSMU Coaxial cable assy 1.5m
16493T-001	1	High Voltage Source Monitor Unit Cable (1.5m)
1252-1419	1	Interlock receptacle connector

Figure 4-21

Two-terminal device like solar cell etc. w/selector -Kelvin connections

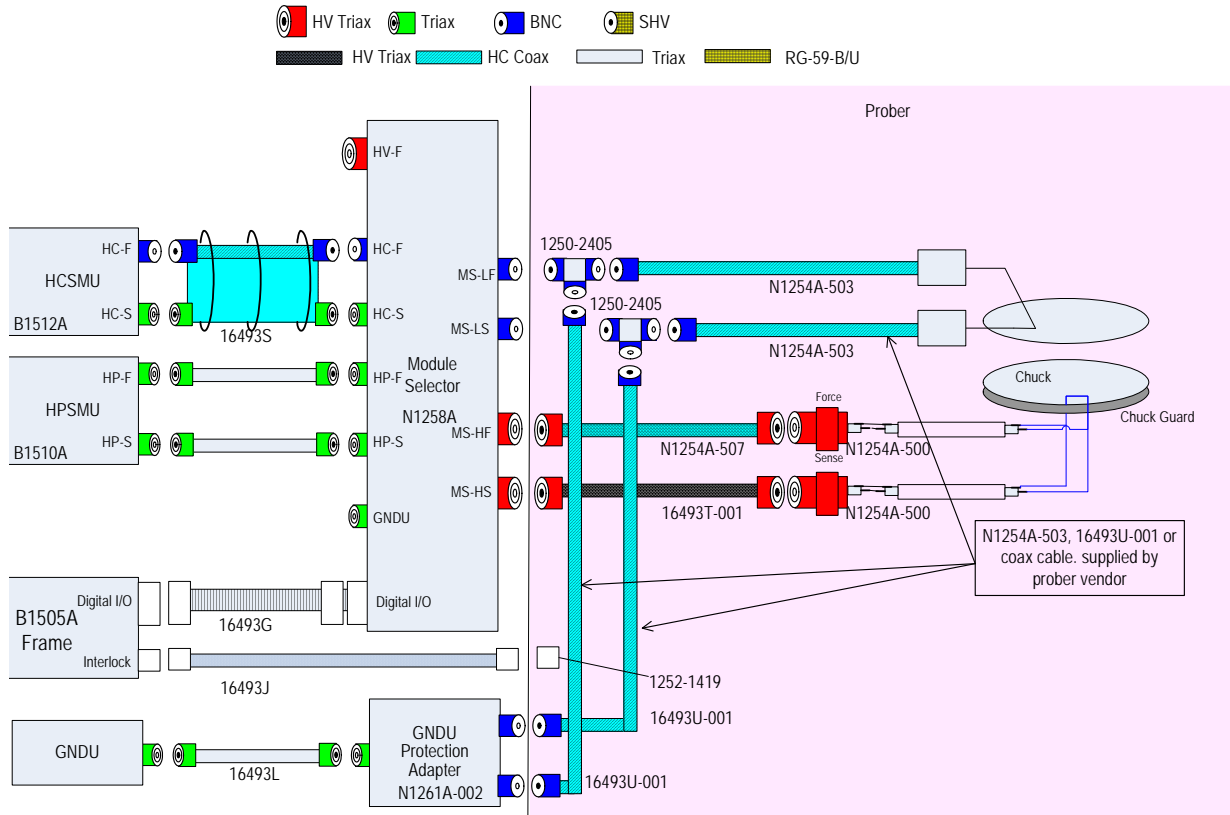


Table 4-20

Order example of two terminal device like solar cell

Product/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
N1258A	1	Module Selector
N1261A-002	1	Protection adapter for GNDU (BNC output)
For prober		
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-503	2	HCSMU Coaxial cable assy 1.5m -BNC to open-end
N1254A-507	1	HVSMU Coaxial cable assy 1.5m
16493U-001	2	High Current BNC Coaxial Cable (1.5m)
16493T-001	1	High Voltage Source Monitor Unit Cable (1.5m)
1250-2450	2	BNC - T Plug (m)-BNC(f)-BNC(f) Adapter
1252-1419	1	Interlock receptacle connector

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

Figure 4-22 Two-terminal device or material evaluation with selector - Kelvin connections

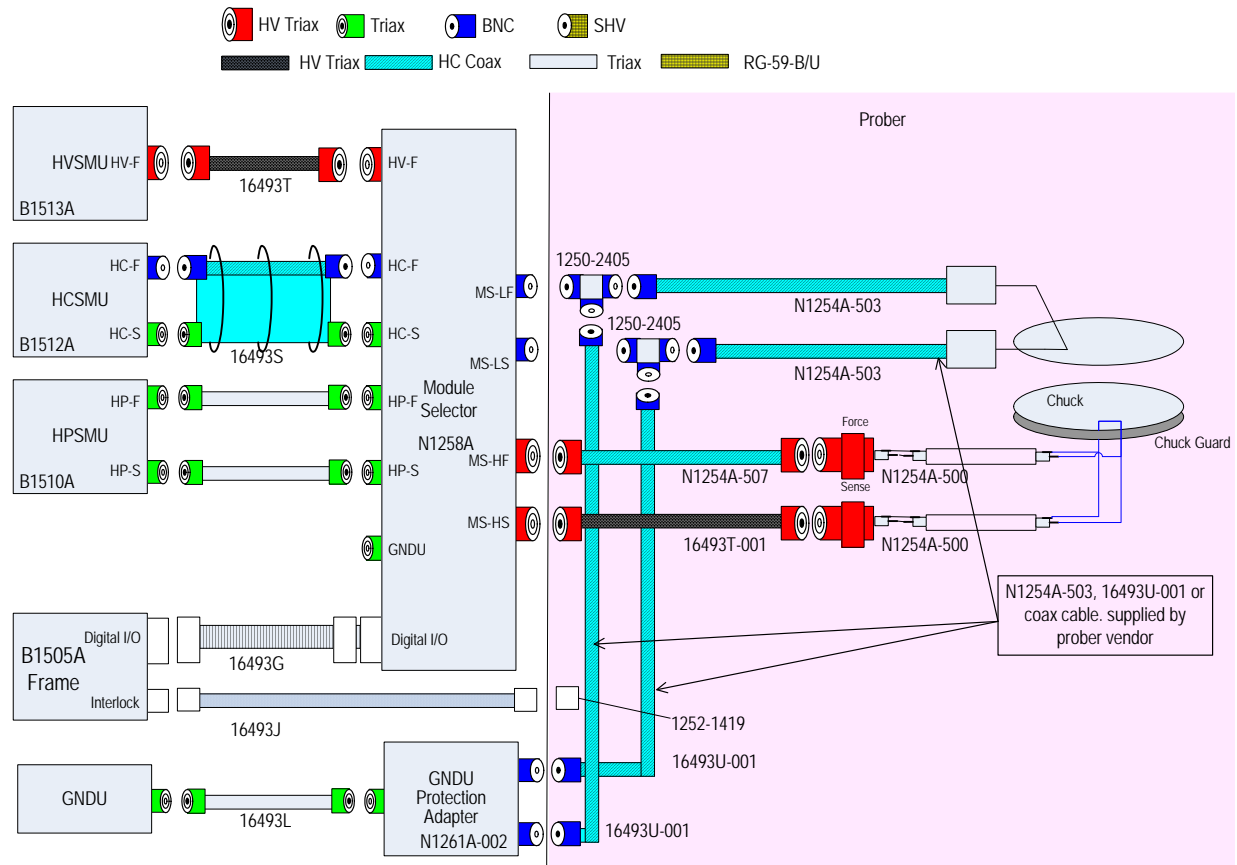


Table 4-21 Order example of two-terminal device with selector

Product/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)
For prober		
N1254A-500	2	HV Jack Connector Panel Mount - Solder Type
N1254A-503	2	HCSMU Coaxial cable assy 1.5m -BNC to open-end
N1254A-507	1	HVSMU Coaxial cable assy 1.5m
16493U-001	2	High Current BNC Coaxial Cable (1.5m)
16493T-001	1	High Voltage Source Monitor Unit Cable (1.5m)
1250-2450	2	BNC - T Plug (m)-BNC(f)-BNC(f) Adapter
1252-1419	1	Interlock receptacle connector