

B1500A

Semiconductor Device Analyzer

Introduction

Keysight B1500A Semiconductor Device Analyzer of Precision Current-Voltage Analyzer Series is an all in one analyzer supporting IV, CV, pulse/dynamic IV and more, which is designed for all-round characterization from basic to cutting-edge applications. It provides a wide range of measurement capabilities to cover the electrical characterization and evaluation of devices, materials, semiconductors, active/passive components, or virtually any other type of electronic device with uncompromised measurement reliability and efficiency. In addition, the B1500A's modular architecture with ten available slots allows you to add or upgrade measurement modules if your measurement needs change over time.

Keysight EasyEXPERT group+ GUI based characterization software is available either on the B1500A's embedded Windows 10 platform with 15-inch touch screen or on your PC to accelerate the characterization tasks. It supports efficient and repeatable device characterization in the entire characterization process from measurement setup and execution to analysis and data management either interactive manual operation or automation across a wafer in conjunction with a semiautomatic wafer prober. EasyEXPERT group+ makes it easy to perform complex device characterization immediately with hundreds of ready-to-use measurements (application tests) furnished and allows you the option of storing test condition and measurement data automatically after each measurement in a unique built-in database (workspace), ensuring that valuable information is not lost and that measurements can be repeated at a later date. Keysight B1500A provides the complete solution for device characterization with these versatile capabilities.

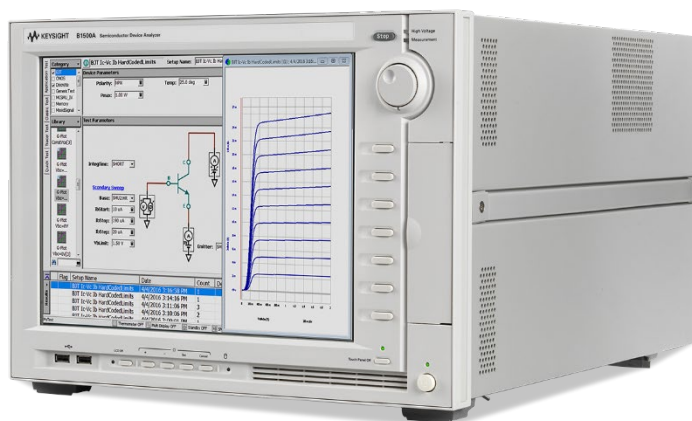


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Supported Plug-in Modules

The B1500A supports ten slots for plug-in modules.

Module Name	Slots Occupied	Key Features
B1510A High power source/monitor unit (HPSMU)	2	- Range up to 200 V/1 A with 4-quadrant operation - Minimum measurement resolution 10 fA/2 μV
B1511B Medium power source/monitor unit (MPSMU)	1	- Range up to 100 V/0.1 A with 4-quadrant operation - Minimum measurement resolution 10 fA/0.5 μV - Optional ASU (atto-sense and switch unit) for 100 aA resolution and IV/CV switching capability
B1517A High resolution source/monitor unit (HRSMU)	1	- Range up to 100 V/0.1 A with 4-quadrant operation - Minimum measurement resolution 1 fA/0.5 μV - Optional ASU (atto-sense and switch unit) for 100 aA resolution and IV/CV switching capability
B1514A 50 μ s Pulse medium current source/monitor unit (50 μ s Pulse MCSMU)	1	- Range up to 30 V/1 A pulsed (0.1 A DC) with 4-quadrant operation - Pulse measurement from 50 μs pulse width with 2 μs resolution - Oscilloscope view (voltage/current waveform viewer) is supported - Minimum measurement resolution 10 pA/0.2 μV
B1520A Multi-frequency capacitance measurement unit (MFCMU)	1	- AC impedance measurement (C-V, C-f, C-t) 1 kHz to 5 MHz frequency range with minimum 1 mHz frequency resolution 25 V built-in DC bias and 100 V DC bias with SMU and SCUU (SMU CMU Unify Unit) - Easy and fast yet accurate IV and CV automated connection change by SCUU
B1525A High voltage semiconductor pulse generator unit (HV-SPGU)	1	- High voltage output up to ± 40 V applicable for non-volatile memory testing - Two-level and three-level pulse capability by single channel - Flexible arbitrary waveform generation with 10 ns resolution (arbitrary linear waveform generation function) - Two channels per module
B1530A Waveform generator/fast measurement unit (WGFMU)	1	- Ultra-fast IV measurement capability for the pulsed IV and transient IV such as NBTI/PBTI, RTN, etc. - Waveform generation with 10 ns programmable resolution - Simultaneous high-speed IV measurement capability (200 MSa/s, 5 ns sampling rate) 10 V peak-to-peak output - No load line effect accurate pulsed IV measurement by dynamic SMU technology

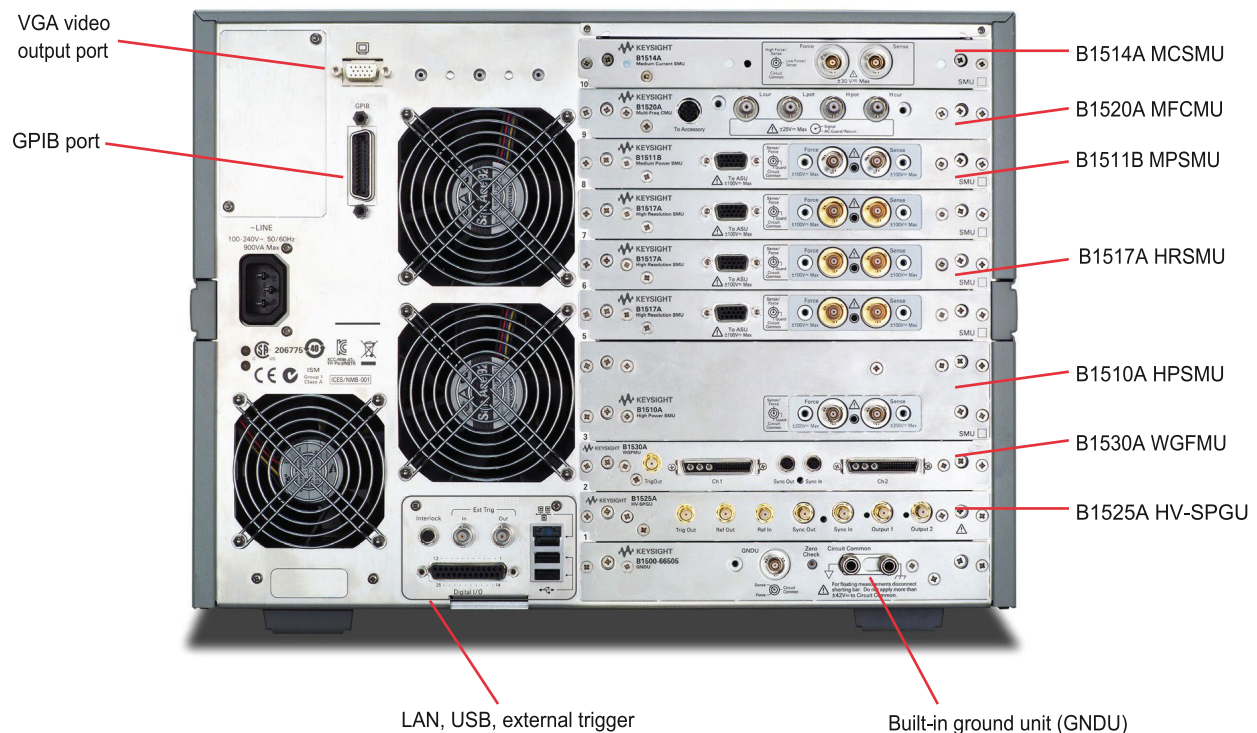
Maximum Module Configuration

The total power consumption of all SMU modules cannot exceed 84 W. Under this rule, the B1500A can contain any combination of the following SMUs:

- Up to 10 MPSMUs
- Up to 10 HRSMUs
- Up to 4 HPSMUs
- Up to 4 MCSMUs

Only one single-slot MFCMU can be installed per B1500A mainframe. Up to five single-slot HV-SPGUs can be installed per mainframe. Up to five single-slot WGFMUs can be installed per mainframe. When one or more WGFMU modules are installed in the B1500A mainframe, the following table applies. Multiply the values given below by the number of installed modules of that type and add the products together. The sum of the products must be less than or equal to 59 for the configuration to be permissible.

MPSMU	2
HRSMU	2
HPSMU	14
MCSMU	5
MFCMU	7
HV-SPGU	12
WGFMU	10

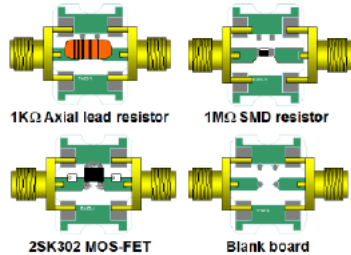


B1500A Configuration Options and Contents

Model/Option	Description	Contents	Qty	Additional Information
B1500A	Semiconductor device analyzer mainframe	B1500A mainframe ¹	1	
		USB keyboard and mouse	1	
		Stylus pen	1	
		Interlock cable	1	
		Triaxial cable	2	Triaxial cable x 1, GNDU cable x 1
		GNDU kelvin adapter	1	
		Miscellaneous	1	Power cable, software license entitlement document, etc.
Select the Cable Length (Mandatory)				
B1500A-015	1.5 m cable length	-	-	Length of cable bundled in the mainframe and package options is specified by option 015 (1.5 m) or 030 (3.0 m)
B1500A-030	3 m cable length	-	-	
Select the Power Line Frequency (Mandatory)				
B1500A-050	50 Hz power line frequency	-	-	Power line frequency is specified by option 050 (50 Hz) or 060 (60 Hz).
B1500A-060	60 Hz power line frequency	-	-	
Select Package Options (Mandatory and Mutually Exclusive)				
B1500A-A00	Standard Pack 0 - Empty package for custom solution (No modules)	-	-	-
B1500A-A01	Standard Pack 1 -Standard package (Mid PWR unit 4ea, cables)	MPSMU	4	Installed MPSMU module
		Triaxial cable	8	Cable length is 1.5 m or 3.0 m
B1500A-A02	Standard Pack 2 -High-resolution Package (High-resolution unit 4ea, cables)	HRSMU	4	Installed HRSMU module
		Triaxial cable	8	Cable length is 1.5 m or 3.0 m
B1500A-A03	Standard Pack 3 -High power package (High PWR unit 2ea, Mid PWR unit 2ea, cables)	HPSMU	2	Installed HPSMU module
		MPSMU	2	Installed MPSMU module
		Triaxial cable	8	Cable length is 1.5 m or 3.0 m
B1500A-A04	Standard Pack 4 - Flash Pack (Mid PWR unit 2ea, Hi-Res unit 2ea, PG, accessories)	MPSMU	2	Installed MPSMU module
		HRSMU	2	Installed HRSMU module
		HV-SPGU	1	Installed HV-SPGU module
		SPGU cable	2	SPGU Cable (SMA to Coaxial)
		SPGU synchronous cable	2	SPGU synchronous cable (16493Q, SMA to SMA, 8 cm).
		16440A	1	16440A SMU/PGU pulse generator selector
		Control cable	1	Control cable (40 cm) between 16445A and 16440A (16440A-003)
		16445A	1	16445A Selector adapter for 16440A
		Control cable	1	Digital I/O cable, 1.5 m, between B1500A and 16445A (16445A-001)
		Triaxial cable	2	Triaxial cable (1.5 m) bundled in 16440A
		Triaxial cable	8	Cable length is 1.5 m or 3.0 m
Select Add-On Packages (Optional)				
B1500A-A10	Add-on package - High power source monitor unit (B1510A) 1ea, cables	HPSMU	1	Installed HPSMU module
		Triaxial cable	2	Cable length is 1.5 m or 3.0 m
B1500A-A11	Add-on package - Mid power source monitor unit (B1511B) 1ea, cables	MPSMU	1	Installed MPSMU module
		Triaxial cable	2	Cable length is 1.5 m or 3.0 m
B1500A-A17	Add-on package - High-resolution source monitor unit (B1517A) 1ea, cables	HRSMU	1	Installed HRSMU module
		Triaxial cable	2	Cable length is 1.5 m or 3.0 m
B1500A-A1A	Add-on package - B1514A medium current source/monitor unit 1ea w/ connection box	MCSMU	1	Installed MCSMU module
		Triaxial cable	2	Cable length is 1.5 m or 3.0 m
		N1255A	1	N1255A Connection box for B1514A MCSMU

1. Mainframe with serial number MY64320101 or later is not equipped with DVD drive.

Model/Option	Description	Contents	Qty	Additional Information
B1500A-A1B	Add-on package - B1514A medium current source/monitor unit 2ea w/ connection box	MCSMU	2	Installed MCSMU module
		Triaxial cable	4	Cable length is 1.5 m or 3.0 m
		N1255A	1	N1255A Connection box for B1514A MCSMU
B1500A-A20	Add-on package - Capacitance measurement unit (B1520A) 1ea, cable 1ea	MFCMU	1	Installed MFCMU module
		CMU cable	1	CMU cable. Cable length is 1.5 m or 3.0 m Two coaxial BNC Tee Adapters (male - female - female) are included.
B1500A-A25	Add-on package - Pulse generator unit (B1525A) 1ea, cables	HV-SPGU	1	Installed HV-SPGU module
		SPGU cable	2	SPGU Cable (SMA to Coaxial)
		SPGU synchronous cable	2	SPGU synchronous cable (16493Q, SMA to SMA, 8 cm)
B1500A-A28	Add-on package - Atto Sense Unit 1ea for High Resolution Source Monitor Unit	ASU	1	Atto sense switch unit (E5288A ASU), 1 ea.
		Triaxial and D-sub cable for ASU	1	A set of triaxial D-sub Cable for ASU (16493M) Cable length is 1.5 m or 3.0 m
B1500A-A29	Add-on Package - Atto sense unit 1ea, for mid power source monitor unit (only for B1511B)	ASU	1	Atto sense switch unit (E5288A ASU), 1 ea.
		Triaxial and D-sub cable	1	A set of triaxial D-sub Cable for ASU (16493M) Cable length is 1.5 m or 3.0 m
B1500A-A30	Add-on package - B1530A 1ea, remote sense unit 2ea, cables	WGFMU	1	Installed WGFMU module
		RSU	2	Remote-sense and switch unit (RSU)
		RSU cable	2	RSU cable between WGFMU and RSU. Cable length is 1.5 m or 3.0 m
B1500A-A31	Add-on package - B1530A 1ea, connector adaptor, remote sense unit 2ea, cables	WGFMU	1	Installed WGFMU module
		RSU	2	Remote-sense and switch unit (RSU)
		RSU cable (2.4 m)	2	RSU cables between WGFMU and connector adapter (2.4 m), and connector adapter and RSU (0.6 m). Cable length can't be selected by Option 015/030.
		RSU cable (0.6 m)	2	
		Connector adapter	2	Connector adapter for RSU cable, female-female (16493R-801). This can be used for a shield box to hook up the RSU cable.
B1500A-A3P	Add-on Package - Probe cable kit for B1530A(8 probe cables. B1530A not included)	SSMC cable, 50 mm	2	SSMC short-open cable for current return path, 50 mm (16493R-101)
		SSMC cable, 75 mm	2	SSMC short-open cable for current return path, 75 mm (16493R-102)
		SMA-SSMC cable, 200 mm	2	SMA-SSMC cable between RSU and DC probe, 200 mm (16493R-202)
		SMA cable, 200 mm	2	SMA-SMA cable between RSU and RF probe, 200 mm (16493R-302)
B1500A-A5F	Add-on pack - Test fixture for packaged device (16442B 1ea)	Test Fixture	1	Test fixture for packaged device (16442B)

Model/Option	Description	Contents	Qty	Additional Information
		Accessory case	1	Accessory case for furnished accessories
		Blank PTFE board	1	Blank PTFE board for DUT stage
		28-pin socket module	1	28-pin DIP (dual-in-line) package socket module
		Universal socket module	1	Universal socket module, 0.075 inch pitch
		Universal socket module	1	Universal socket module, 0.05 inch pitch
		Connection pin	10	Connection pin set for universal socket module
		Mini-banana to pin-plug	12	4ea per each color (black, red, blue)
		Pin-plug to pin-plug	9	3ea per each color (black, red, blue)
		Mini-banana to clip	9	3ea per each color (black, red, blue)
		Mini-banana to mini-banana	9	3ea per each color (black, red, blue)
Select Calibration Options (Optional)				
B1500A-A6J	ANSI Z540-1-1994 calibration	-	-	ANSI Z540 compliant calibration
B1500A-UK6	Commercial calibration certificate with test data	-	-	Test Data for ISO 9001/2 Commercial Calibration. This option provides measurement test data for the standard commercial calibration and test equipment trace information.
Rack Mount Kit (Optional)				
B1500A-1CM	Rack Mount Kit for B1500A	Rack mount flange kit	1	Rack mount flange kit 310.4mm H (7U) - two flange brackets (1CM033A). A rail kit (E3663AC) is not included.
WGFMU Learning Kit (Optional)				
B1530A-0KN	Self-paced sample program learning kit for B1530A WGFMU	Sample devices	4	Sample device is the assembly made from two SMA (female) connectors, a printed circuit board, and a discrete device. (1kΩ, 1MΩ, N-MOS FET and blank board) 
		SMA cable	2	SMA (m) – SMA (m) cable (20 cm) for connecting to the sample device
		Printed manual	1	Sample Program Learning Kit User’s Guide
Startup Assistance				
PS-S20-01	Recommended startup assistance	-	-	Startup assistance & product training

B1500A Upgrade Options and Contents

The B1500AU allows the upgrade of the B1500A mainframe and/or installed modules. Upgrade and installation must be performed at the service center. The serial number and the configured module information are needed to order the upgrade. In addition to the selected upgrade options, a few mainframe components can be required to be replaced as a prerequisite to the upgrade. Contact Keysight for the quote for the upgrade, including the service charge.

B1500A Upgrade Options

Model/Option	Description	Contents	Qty	Additional Information
B1500AU	Upgrade kit for B1500A	-	-	Various upgrade option can be ordered as the option of B1500AU.
Module Upgrade Options (Optional)				
B1500AU-010	Addition of B1510A High power source/monitor unit module	HPSMU	1	HPSMU module. No cable is included. Order B1500AU-T01/T02 or 16494A triaxial cable if necessary.
B1500AU-11B	Addition of B1511B Medium power source/monitor unit module	MPSMU	1	MPSMU module. No cable is included. Order B1500AU-T01/T02 or 16494A triaxial cable if necessary.
B1500AU-141	Addition of B1514A Medium current source/monitor unit 1ea w/ connection box	MCSMU	1	MCSMU module. No cable is included. Order B1500AU-T01/T02 or 16494A triaxial cable if necessary.
		N1255A	1	N1255A Connection box for B1514A MCSMU
B1500AU-142	Addition of B1514A Medium current source/monitor unit 1ea w/o connection box	MCSMU	1	MCSMU module. No cable is included. Order B1500AU-T01/T02 or 16494A triaxial cable if necessary.
B1500AU-017	Addition of B1517A High-resolution source/monitor unit module	HRSMU	1	HRSMU module. No cable is included. Order B1500AU-T01/T02 or 16494A triaxial cable if necessary.
B1500AU-088	Addition of E5288A Atto sense and switch unit (ASU. HRSMU is required.)	ASU	1	Atto sense switch unit (E5288A ASU). ASU will be tied with HRSMU. No cable is included. Order B1500AU-A01/A02 or 16493M.
B1500AU-089	Addition of E5288A Atto sense and switch unit (B1511B MPSMU is required.)	ASU	1	Atto sense switch unit (E5288A ASU). ASU will be tied with MPSMU. No cable is included. Order B1500AU-A01/A02 or 16493M.
B1500AU-020	Addition of B1520A Multi frequency capacitance measurement unit module	MFCMU	1	MFCMU module. No cable is included. Order B1500AU-C01/C02 or N1300A cable and accessories.
B1500AU-025	Addition of B1525A High voltage semiconductor pulse generator unit module	HV-SPGU	1	HV-SPGU module. No cable is included. Order B1500AU-S01/S02, or 16493P SMA-BNC cable and 16493Q if necessary.
B1500AU-030	Addition of B1530A Waveform generator/fast measurement unit module with two RSUs	WGFMU	1	WGFMU module. No cable is included. Order B1500AU-W01, W02, W03, W04 or W05 for WGFMU-RSU cable.
		RSU	2	Remote-sense and switch unit (RSU)
WGFMU and RSU Cable Options (Mandatory for B1500AU-030)				
B1500AU-W01	0.6m/2.4m cable set between WGFMU and RSU(2ea). Require prober I/F with adapter	RSU cable	2	0.6 m (2ea) and 2.4m (2ea) RSU cables
B1500AU-W02	3m Cable between WGFMU and RSU (2ea)	RSU cable	2	3 m RSU cable
B1500AU-W03	5m Cable between WGFMU and RSU (2ea)	RSU cable	2	5 m RSU cable
B1500AU-W04	0.6m/4.4m Cable set between WGFMU and RSU(2ea). Require prober I/F with adapter	RSU cable	2	0.6 m (2ea) and 4.4m (2ea) RSU cables
B1500AU-W05	1.5m Cable between WGFMU and RSU (2ea)	RSU cable	2	1.5 m RSU cable

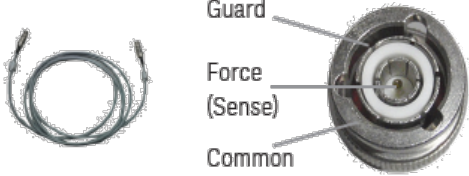
Cable Options (Optional)				
B1500AU-A01	Triax and Dsub cable for ASU (1.5 m)	Triaxial	1	Triaxial cable (16494A-001, 1.5 m)
		D-sub cable	1	D-sub cable for ASU (16493M-001, 1.5 m)
B1500AU-A02	Triax and Dsub cable for ASU (3 m)	Triaxial	1	Triaxial cable (16494A-002, 3 m)
		D-sub cable	1	D-sub cable for ASU (16493M-002, 3 m)
B1500AU-T01	Addition of 16494A-001 Triaxial cable (1.5 m)	Triaxial cable	1	Triaxial cable (16494A-001, 1.5 m)
B1500AU-T02	Addition of 16494A-002 Triaxial cable (3 m)	Triaxial cable	1	Triaxial cable (16494A-002, 3 m)
B1500AU-C01	Addition of N1300A-001 CMU cable for B1520A (1.5 m)	CMU cable	1	CMU cable (N1300A-001, 1.5 m) Two coaxial BNC Tee Adapters (male - female - female) are included.
B1500AU-C02	Addition of N1300A-002 CMU cable for B1520A (3 m)	CMU cable	1	CMU cable (N1300A-002, 3 m) Two coaxial BNC Tee Adapters (male - female - female) are included.
B1500AU-S01	Addition of two 16493P-001 SPGU cables (1.5 m)	SPGU cable	1	SMA-BNC cable (16493P-001, 1.5 m)
B1500AU-S02	Addition of two 16493P-002 SPGU cables (3 m)	SPGU cable	1	SMA-BNC cable (16493P-002, 3 m)
EasyEXPERT Extension Support				
B1500AU-SWS	EasyEXPERT upgrade, extension support and subscription	Software entitlement document	1	This provides the software entitlement document for the license for EasyEXPERT software revision 5.5 or later. If you do not have it, it is required to order option SWS when you upgrade software revision 5.5 or later.
B1500A Mainframe Upgrade/Modification - It Is Required to Upgrade/Modify the Mainframe at the Service Center				
B1500AU-PC2	Mainframe upgrade (available for S/N starts with JP or less than MY53440000)	Embedded OS and a set of PC hardware of the mainframe	1	Upgrade the embedded OS from Windows XP/7 to Windows 10 with PC hardware upgrade. According to the mainframe configuration, it can be required to upgrade other hardware parts.
B1500AU-PC3	Mainframe upgrade (available for S/N MY53440101 or later)	Embedded OS and a set of PC hardware of the mainframe	1	Upgrade the embedded OS from Windows XP/7 to Windows 10 with PC hardware upgrade. According to the mainframe configuration, it can be required to upgrade other hardware parts.
B1500AU-DR1	Replace DVD-R drive with read-only drive ²	DVD drive	1	Replace the DVD-R drive with DVD drive (read-only) Available only for S/N JP49090101 or later.
Installation				
R-51U-501	Service center	-	-	Installation
Calibration				
R-50G-711	Calibration for hardware upgrade	-	-	Calibration
R-50G-721	Z540 Calibration for hardware upgrade	-	-	
Startup Assistance				
PS-S20-01	Recommended startup assistance	-	-	Startup assistance and product training

2. Mainframe with serial number MY64320101 or later is not equipped with DVD drive.

Accessories

SMU Accessories

Triaxial cable: Triaxial cable has three leads, a central conductor for the signal, an encapsulating conductor that shields the center signal by employing the same voltage thus decreasing a possible leakage current, and an outer conductor that serves as common.

Model/Option	Description	Contents	Qty	Additional Information
16494A	Triaxial cable	-	-	Order with the option.
Select Cable Length Option				
16494A-001	Triaxial cable (1.5 m)	Triaxial cable	1	
16494A-002	Triaxial cable (3 m)	Triaxial cable	1	
16494A-003	Triaxial cable (80 cm)	Triaxial cable	1	
16494A-004	Triaxial cable (40 cm)	Triaxial cable	1	
16494A-005	Triaxial cable (4 m)	Triaxial cable	1	

Kelvin Triaxial cable: Kelvin Triaxial cable consists of two central twisted parallel leads that are connected to the Force and Sense terminals of an SMU. A common guard and an outer conductor that is connected to Common further shield the two leads. By using the Kelvin connection, it is possible to limit the influence of the connection leads to a lower resistive measurement to a minimum. Kelvin Triaxial cables should be employed when performing very sophisticated measurements.

Model/Option	Description	Contents	Qty	Additional Information
16493K	Kelvin triaxial cable	-	-	For B1500/E5260/E5270. Order with the option.
Select Cable Length Option				
16493K-001	Kelvin triaxial cable (1.5 m)	Kelvin Triaxial cable	1	
16493K-002	Kelvin triaxial cable (3 m)	Kelvin Triaxial cable	1	

Model/Option	Description	Contents	Qty	Additional Information
16494B	Kelvin triaxial cable	-	-	For E5250A input port. Order with the option.
Select Cable Length Option				
16494B-001	Kelvin triaxial cable (1.5 m)	Kelvin triaxial cable	1	
16494B-002	Kelvin triaxial cable (3 m)	Kelvin triaxial cable	1	
16494B-003	Kelvin triaxial cable (80 cm)	Kelvin triaxial cable	1	

ASU cable and accessory

Model/Option	Description	Contents	Qty	Additional Information
16493M	Triax and Dsub cable for ASU	-	-	Order with the option
Select Cable Length Option				
16493M-001	Triax and Dsub cable for ASU (1.5 m)	A set of triaxial D-sub Cable	1	
16493M-002	Triax and Dsub cable for ASU (3 m)	A set of triaxial D-sub Cable	1	

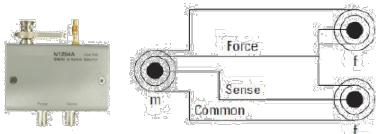
Model/Option	Description	Contents	Qty	Additional Information
N1254A	Accessories for instruments and fixtures	-	-	Order with the option.
Select Cable Length Option				
N1254A-108	ASU magnetic stand	Magnetic stand	1	

Ground Unit Cable and Accessory

GNDU has a triaxial type connector as well as SMU. However, the terminal assignment is different from SMU. Force and sense are integrated into a single terminal. A central conductor is Sense, the inner shield is Force, and the outer shield is Common. The 16493L GND unit cable is designed for the GNDU and can sink the current up to 4.2 A. The GNDU to Kelvin adapter separates the Force and Sense for cabling like SMU.

Model/Option	Description	Contents	Qty	Additional Information
16493L	GNDU Cable	-	-	Order with the option
Select Cable Length Option				
16493L-001	GNDU cable (1.5 m)	GNDU cable	1	
16493L-002	GNDU cable (3 m)	GNDU cable	1	
16493L-003	GNDU cable (5 m)	GNDU cable	1	

Model/Option	Description	Contents	Qty	Additional Information
16493N	Ground unit cable for B2200/B2201 Input (Kelvin triaxial)	-	-	Order with the option
Select Cable Length Option				
16493N-001	Ground unit cable for B2200/B2201 Input (Kelvin triaxial, 2 m)	GNDU cable	1	GNDU cable for B2200A/B2201A switching matrix input port, 2 m 

Model/Option	Description	Contents	Qty	Additional Information
N1254A	Accessories for instruments and fixtures	-	-	Order with the option
Select Cable Length Option				
N1254A-100	GNDU to Kelvin adapter	GNDU to Kelvin adapter	1	Furnished with B1500A mainframe. 

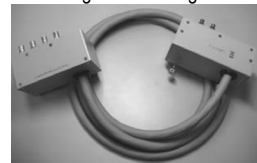
CMU Accessories

CMU Cable and Accessories

SMU CMU Unify Unit (SCUU): The SCUU multiplexes the output from two SMUs (MPSMUs and/or HRSMUs) and the CMU. The SCUU outputs are two sets of Kelvin triaxial ports for IV measurement, and a pair of CMU-H and CMU-L of the shielded two terminal pair configuration for CV measurement. The SCUU also allows the SMUs to act as DC bias source in conjunction with the CMU. The GSWU contains a relay that automatically opens for IV measurements and closes for CV measurements, forming a guard return path to improve CV measurement accuracy.

Model/Option	Description	Contents	Qty	Additional Information
N1300A	CMU cable	-	-	Order with the option
Select Cable Length Option				
N1300A-001	CMU cable (1.5 m)	CMU cable	1	Two coaxial BNC Tee Adapters (male - female - female) are included.
N1300A-002	CMU cable (3 m)	CMU cable	1	



Model/Option	Description	Contents	Qty	Additional Information
N1301A	CMU Accessories	-	-	Order with the option
SCUU Options				
N1301A-100	SMU CMU Unify Unit (SCUU)	SCUU	1	SCUU is attached to the rear panel of B1500A. One CMU and two SMUs are required. 
N1301A-102	SMU CMU Unify Unit Cable (3 m)	SCUU cable	1	SCUU cable is attached to the rear panel of B1500A. One CMU, two SMUs and N1301A-100 SCUU are required. The SCUU cable enables to place the SCUU 3 m away from the rear panel. N1301A-110 magnet stand is recommended to hold the SCUU. Since 1.5 m or 3 m triaxial cable is attached beyond the SCUU, note the total cable length will be longer than 3 m. 
N1301A-110	SCUU magnet stand	Magnet stand	1	
N1301A-200	Guard Switch Unit (GSWU)	GSWU	1	SCUU is required to use the GSWU. Select the same cable length as triaxial cable from the SCUU. 
		Pin cable	2	
N1301A-201	GSWU cable (1.5 m)	GSWU cable	1	
N1301A-202	GSWU cable (3 m)	GSWU cable	1	

HV-SPGU Accessories

SPGU Cable

Model/Option	Description	Contents	Qty	Additional Information
16493P	SPGU cable (SMA-to-Coaxial)	-	-	Order with the option
Select Cable Length Option				
16493P-001	SPGU cable (1.5 m)	SPGU cable	1	
16493P-002	SPGU cable (3 m)	SPGU cable	1	

SPGU Synchronous Cable

SPGU synchronous cable is semirigid SMA cable. It is used to connect between sync-in and out to synchronize the timing between SPGU modules.

Model/Option	Description	Contents	Qty	Additional Information
16493Q	SPGU Synchronous cable	-	-	Order with the option
Select Cable Length Option				
16493Q-001	SPGU Synchronous cable (8 cm)	SPGU Synchronous cable	1	 SPGU synchronous cable (SMA to SMA, 8 cm).

SMU/PGU selector: 16440A SMU/PGU selector is used to switch the measurement resource connected to the device. The measurement resource can be SPGU or SMU. A selector provides two switching channels. 16445A selector adapter is required to control the 16440A SMU/PGU selector.

Model/Option	Description	Contents	Qty	Additional Information
16440A	SMU/Pulse generator selector	16440A	1	 16440A SMU/PGU pulse generator selector. Order with the option.
Select Cable Length Option				
16440A-003	Control cable (40 cm)	Control cable	1	

Model/Option	Description	Contents	Qty	Additional Information
16445A	SMU/PGU selector connection Adapter	16445A	1	 16445A Selector adapter for 16440A. Order with the option.
16445A-001	Control cable for B1500A to 16445A (1.5 m)	Control cable	1	 Digital I/O cable from B1500A to 16445A
16445A-002	Control cable for B1500A to 16445A (3 m)	Control cable	1	

WGFMU Accessories

Model/Option	Description	Contents	Qty	Additional Information
16493R		-	-	Order with the option
WGFMU to RSU Cable Length Option				
16493R-001	WGFMU to RSU cable (0.6 m)	WGFMU to RSU cable	1	
16493R-002	WGFMU to RSU cable (2.4 m)			
16493R-003	WGFMU to RSU cable (3 m)			
16493R-004	WGFMU to RSU cable (5 m)			
16493R-005	WGFMU to RSU cable (4.4 m)			
16493R-006	WGFMU to RSU cable (1.5 m)			
Cable Option for Connection with DC Probe				
16493R-101	SSMC short-open cable for current return path (50 mm)	SSMC short-open cable	1	
16493R-102	SSMC short-open cable for current return path (75 mm)			
16493R-103	SMA-SSMC cable between RSU and DC probe (200 mm)	SMA-SSMC cable	1	
Cable Option for Connection with RF Probe				
16493R-302	SMA-SMA cable between RSU and RF probe (200 mm)	SMA-SMA cable	1	
Other WGFMU Accessories				
16493R-801	WGFMU connection adapter (female-female)	connection adapter	1	 This can be used for a shield box to hook up the RSU cable
16493R-802	Magnet stand for RSU (1 ea)	Magnet stand	1	 Two stands are required for one WGFMU module
16493R-803	Sync terminal connection cable	Sync cable	1	

Other Accessories

Test fixture: Keysight 16442B test fixture is designed for testing packaged devices and electronic components. You can mount the suitable socket module on the 16442B, which allows you to easily connect various devices to measurement units. The 16442B has 6 triaxial, 6 BNC, 1 GNDU input ports and interlock connector.

Model/Option	Description	Contents	Qty	Additional Information
16442B	Test fixture for semiconductor devices	Test fixture	1	Test fixture for packaged device (16442B)
		Accessory case	1	Accessory case for furnished accessories.
		Blank PTFE board	1	Blank PTFE board for DUT stage
		28-pin socket module	1	28-pin DIP (dual-in-line) package socket module
		Universal socket module	1	Universal socket module, 0.075 inch pitch
		Universal socket module	1	Universal socket module, 0.05 inch pitch
		Connection pin	10	Connection pin set for universal socket module
		Mini-banana to pin-plug	12	4ea per each color (black, red, blue)
		Pin-plug to pin-plug	9	3ea per each color (black, red, blue)
		Mini-banana to clip	9	3ea per each color (black, red, blue)
		Mini-banana to mini-banana	9	3ea per each color (black, red, blue)
Accessory Case				
16442B-890	Extra accessories case	Accessories case	1	

Test Fixture Accessories

Model/Option	Description	Contents	Qty	Additional Information
N1254A	Accessories for instruments and fixtures	-	-	Order with the options.
Extra Module Options				
N1254A-200	Socket module for 4-pin TO package	socket module	1	
N1254A-201	Socket module (28-pin DIP)	socket module	1	
N1254A-202	Socket module (18-pin DIP)	socket module	1	
N1254A-204	Universal socket module 0.1 inch pitch	Universal socket module	1	
N1254A-205	Universal socket module 0.075 inch pitch	Universal socket module	1	
N1254A-206	Universal socket module 0.05 inch pitch	Universal socket module	1	
N1254A-207	Blank PTFE board	Blank PTFE board	1	
Extra Pin/Wire Options				
N1254A-300	Connection pins set	Connection pin	10	Connection pin set for universal socket module.
N1254A-301	Mini banana - pin plug (black)	Mini-banana to pin-plug	1	
N1254A-302	Mini banana - pin plug (red)	Mini-banana to pin-plug	1	
N1254A-303	Mini banana - pin plug (blue)	Mini-banana to pin-plug	1	
N1254A-304	Pin plug - pin plug (black)	Pin plug to pin plug	1	
N1254A-305	Pin plug - pin plug (red)	Pin plug to pin plug	1	
N1254A-306	Pin plug - pin plug (blue)	Pin plug to pin plug	1	
N1254A-307	Mini banana - mini clip (black)	Mini banana to mini clip	1	
N1254A-308	Mini banana - mini clip (red)	Mini banana to mini clip	1	
N1254A-309	Mini banana - mini clip (blue)	Mini banana to mini clip	1	
N1254A-310	Mini banana - mini banana (black)	Mini banana to mini banan	1	
N1254A-311	Mini banana - mini banana (red)	Mini banana to mini banan	1	
N1254A-312	Mini banana - mini banana (blue)	Mini banana to mini banan	1	

B1500A Mainframe Furnished Accessories

Model/Option	Description	Contents	Qty	Additional Information
16444A	B1500 accessories	-	-	Order with the option.
Extra Accessory Options				
16444A-001	USB keyboard	USB keyboard	1	
16444A-002	USB mouse	USB mouse	1	
16444A-003	Stylus pen	Stylus pen	1	

Interlock Cable and Accessories

Model/Option	Description	Contents	Qty	Additional Information
16493J	Interlock cable	-	-	Order with the options.
Select the Cable Length Option				
16493J-001	Interlock cable (1.5 m)	Interlock cable	1	
16493J-002	Interlock cable (3 m)	Interlock cable	1	
16493J-003	Interlock cable (5 m)	Interlock cable	1	

Model/Option	Description	Contents	Qty	Additional Information
N1254A	Accessories for instruments and fixtures	-	-	Order with the options.
Select the Cable Length Option				
N1254A-402	Interlock micro switch	Switch	1	Interlock microswitch (3101-4439)

Digital I/O Cable and Accessories

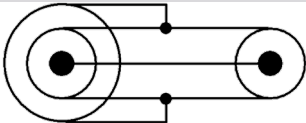
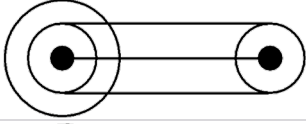
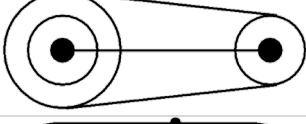
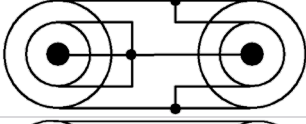
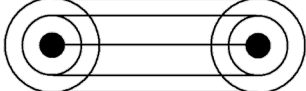
Model/Option	Description	Contents	Qty	Additional Information
16493G	Digital I/O control cable	-	-	Order with the option.
Select Cable Length Option				
16493G-001	Digital I/O control cable, (1.5 m)	Control cable	1	
16493G-002	Digital I/O control cable, (3 m)	Control cable	1	

Model/Option	Description	Contents	Qty	Additional Information
N1253A	Digital I/O accessories	-	-	Order with the option.
Select the Cable Length Option				
N1253A-100	Digital I/O T-cable	Digital I/O T-cable	1	Digital I/O T-cable has 2 male and 1 female connector in order to connect more than two units. In order to connect three units, order one N1253A-100 and one 16493G cable.
N1253A-200	Digital I/O BNC box	Digital I/O BNC box	1	Adapter for connecting Digital I/O port with BNC trigger port of other instruments. The box which has 8 BNC connectors for connecting with the BNC trigger port of other instruments and 25 pin D-sub connector for connecting this box to B1500A. In order to use this box for the connection, you need a D-sub 25-pin straight cable (16493G) and a BNC cable. 

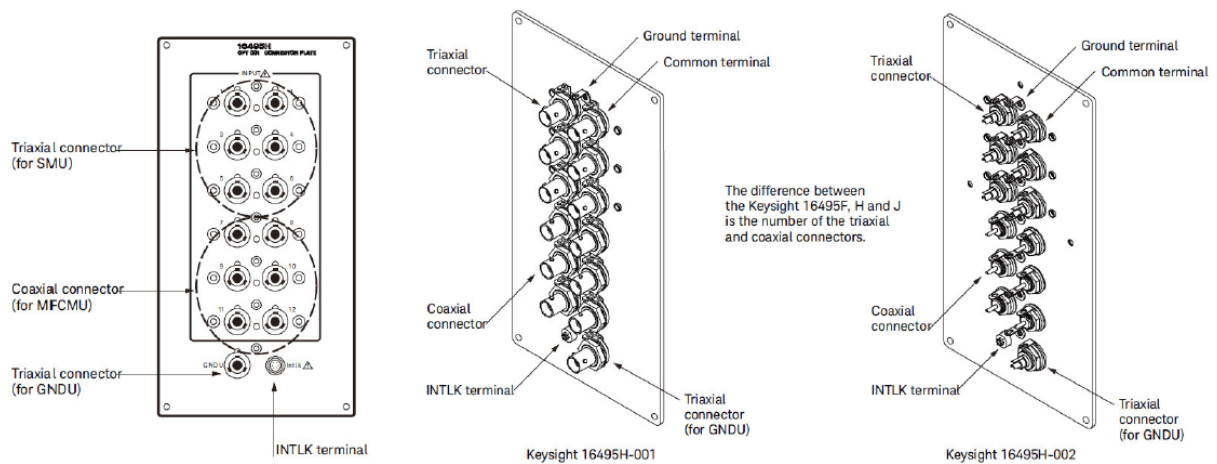
BNC cable: The maximum voltage is 40 V, and Maximum current is 200 mA.

Model/Option	Description	Contents	Qty	Additional Information
16493B	Coaxial cable	-	-	Order with the option.
Select Cable Length Option				
16493B-001	Coaxial cable (1.5 m)	Coaxial cable	1	
16493B-002	Coaxial cable (3 m)	Coaxial cable	1	

Adapters

Model/Option	Description	Contents	Qty	Additional Information
N1254A	Accessories for instruments and fixtures	-	-	Order with the options.
Select Cable Length Option				
N1254A-101	Triax(m) to BNC (f) adaptor	1250-2648	1	
N1254A-102	Triaxial (f) to Coaxial (m) adapter	1250-2649	1	
N1254A-103	Triaxial (m) to Coaxial (f) adapter	1250-2650	1	
N1254A-104	Triaxial (f) to Coaxial (m) adapter	1250-2651	1	
N1254A-105	Triaxial (f) to Coaxial (m) adapter	1250-2652	1	
N1254A-106	Triaxial (m) to Coaxial (f) adapter	1250-2653	1	
N1254A-107	Triaxial (m) to Triaxial (f) adapter	1250-2654	1	
N/A (1250-2618)	Triaxial (f) to Triaxial (f) adapter	1250-2618	1	

Connector Plate: Connector plate can be used to feed the cable through a shielding box.



Model/Option	Description	Contents	Qty	Additional Information
16495F	Connector plate with 12 triaxial, interlock and GNDU connectors	-	-	Order with the option
Select Connector Type Option				
16495F-001	Bulkhead feedthru connectors	Connector plate	1	
16495F-002	Connectors to contacts for soldering	Connector plate	1	

Model/Option	Description	Contents	Qty	Additional Information
16495G	Connector plate with 24 triaxial, interlock and GNDU connectors	-	-	Order with the option
Select Connector Type Option				
16495G-001	Bulkhead feedthru connectors	Connector plate	1	
16495G-002	Connectors to contacts for soldering	Connector plate	1	

Model/Option	Description	Contents	Qty	Additional Information
16495H	Connector Plate with 6 triaxial., 6 BNC, interlock and GNDU connectors	-	-	Order with the option
Select Connector Type Option				
16495H-001	Bulkhead feedthru connectors	Connector plate	1	
16495H-002	Connectors to contacts for soldering	Connector plate	1	

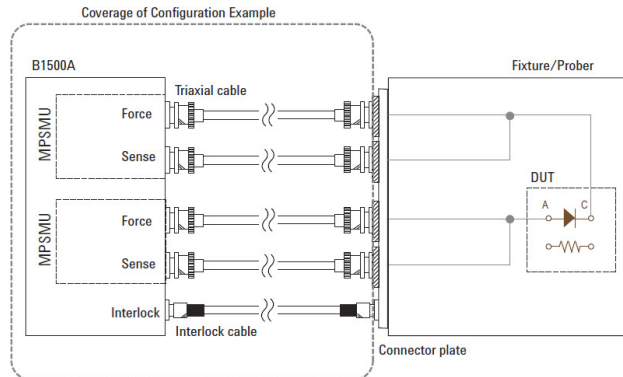
Model/Option	Description	Contents	Qty	Additional Information
16495J	Connector plate with 8 triaxial., 4 BNC, interlock, and GNDU connectors	-	-	Order with the option
Select Connector Type Option				
16495J-001	Bulkhead feedthru connectors	Connector plate	1	
16495J-002	Connectors to contacts for soldering	Connector plate	1	

Model/Option	Description	Contents	Qty	Additional Information
16495K	Connector plate with universal cable holder	-	-	Order with the option
Select Connector Type Option				
16495K-001	Bulkhead feedthru connectors	Connector plate	1	16495K does not have any connections. This plate provides the cable hole and the cover with rubber used to block the light from the cable hole. This can be used to feed the E5288A ASU or the N1301A-200 GSWU through the shielding box. 

B1500A Configuration

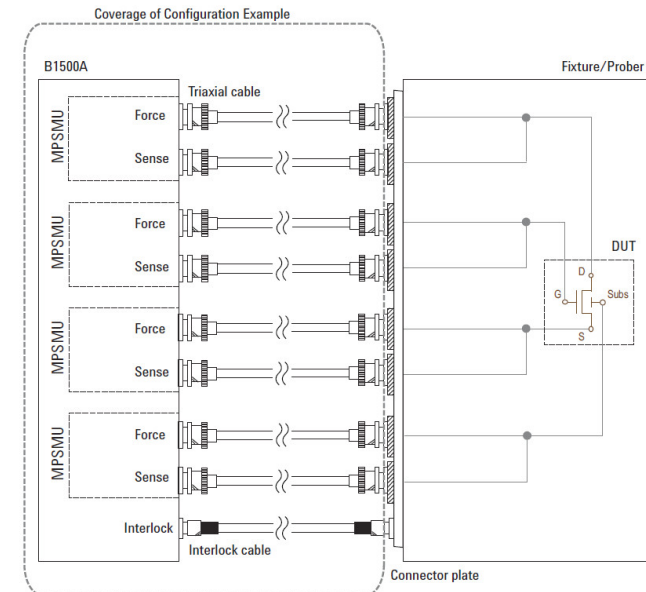
Example-1. For IV characterization of 2-terminal device

Model/Option	Description	Qty
B1500A	Semiconductor device analyzer mainframe	1
B1500A-015/030	1.5 m or 3 m length of bundled cables	1
B1500A-A00	Empty package for custom solution, contains no measurement module	1
B1500A-A11 (or A17)	Adds one MPSMU (or HRSMU) and two triaxial cables	2
B1500A-A5F	Test fixture for packaged device measurement, adds one 16442B (Optional)	1



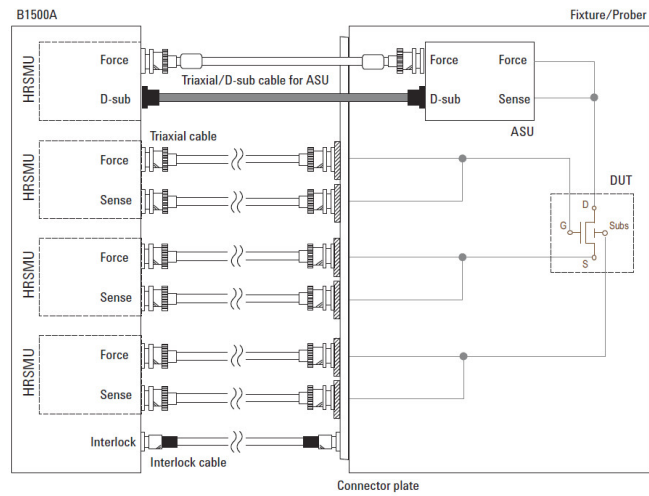
Example-2. For IV characterization of 4-terminal device

Model/Option	Description	Qty
B1500A	Semiconductor device analyzer mainframe	1
B1500A-015/030	1.5 m or 3 m length of bundled cables	1
B1500A-A01 (or A02)	Four MPSMU (or HRSMU) and eight triaxial cables	1
B1500A-A5F	Test fixture for packaged device measurement, adds one 16442B (Optional)	1



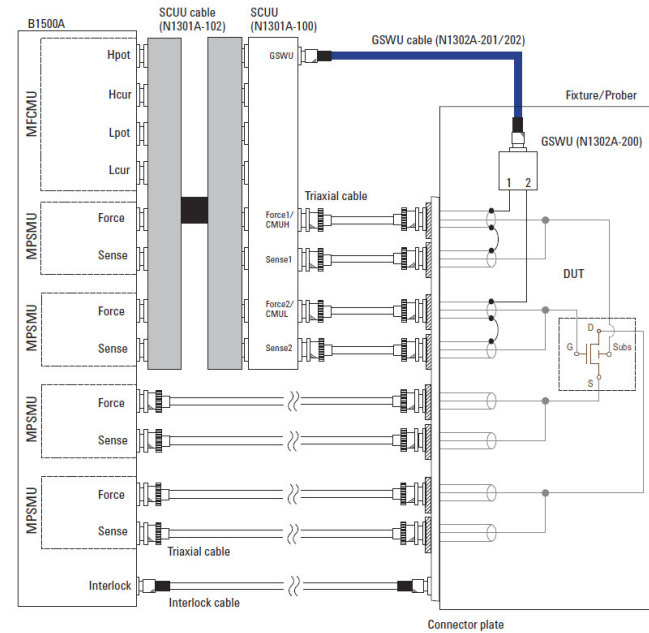
Example-3. For IV characterization of a 4-terminal device with ASU

Model/Option	Description	Qty
B1500A	Semiconductor device analyzer mainframe	1
B1500A-015/030	1.5 m or 3 m length of bundled cables	1
B1500A-A01 (or A02)	Four MPSMU (or HRSMU) and eight triaxial cables	1
B1500A-A29 (or A28)	Adds one ASU, one D-sub cable, and one triaxial cable	1
B1500A-A5F	Test fixture for packaged device measurement, adds one 16442B (Optional)	1



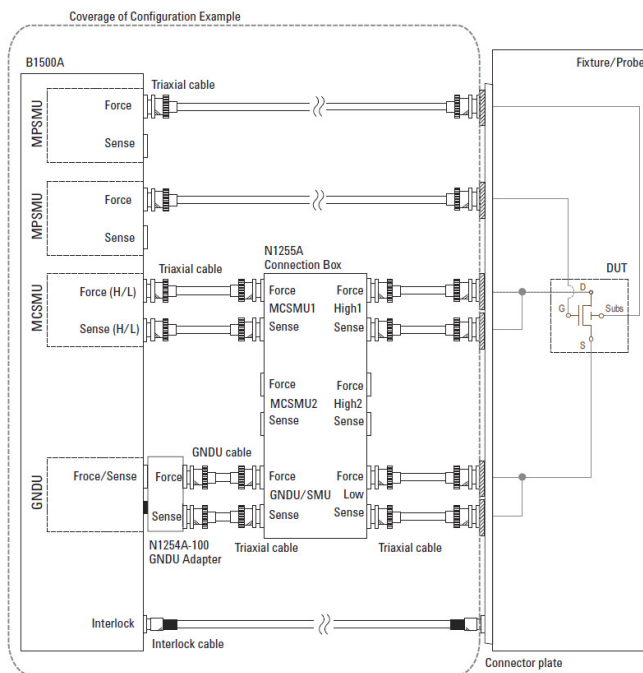
Example-4. For IV/CV characterization of a 4-terminal device

Model/Option	Description	Qty
B1500A	Semiconductor device analyzer mainframe	1
B1500A-015/030	1.5 m or 3 m length of bundled cables	1
B1500A-A01 (or A02)	Four MPSMU (or HRSMU) and eight triaxial cables	1
B1500A-A20	Capacitance measurement add-on package, adds the MFCMU and one CMU cable	1
N1301A	Accessories for CMU	1
N1301A-100	SMU CMU unify unit (SCUU)	1
N1301A-102	SCUU cable, 3 m (Optional) * Note the total cable length.	1
N1301A-110	SCUU magnetic stand (Optional)	1
N1301A-200	Guard switch unit (GSWU) (Optional)	1
N1301A-201/202	GSWU cable, 1.5 m or 3 m (Optional. Required if GSWU is ordered.)	1
B1500A-A5F	Test fixture for packaged device measurement, adds one 16442B (Optional)	1



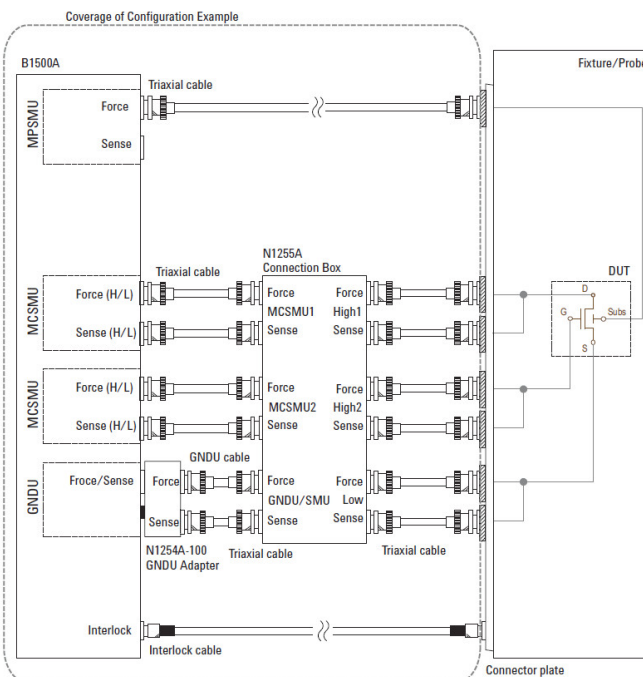
Example-5. For 50μs pulse using one MCSMU for a 4-terminal device

Model/Option	Description	Qty
B1500A	Semiconductor device analyzer mainframe	1
B1500A-015/030	1.5 m or 3 m length of bundled cables	1
B1500A-A00	Empty package for a custom solution, contains no measurement module	1
B1500A-A11 (or A17)	Adds one MPSMU (or HRSMU) and two triaxial cables	2
B1500A-A1A	Adds one MCSMU, connection box (N1255A), and two triaxial cables	1
B1500A-A5F	Test fixture for packaged device measurement, adds one 16442B (Optional)	1
16494A	Triaxial cable (Select cable length option)	4



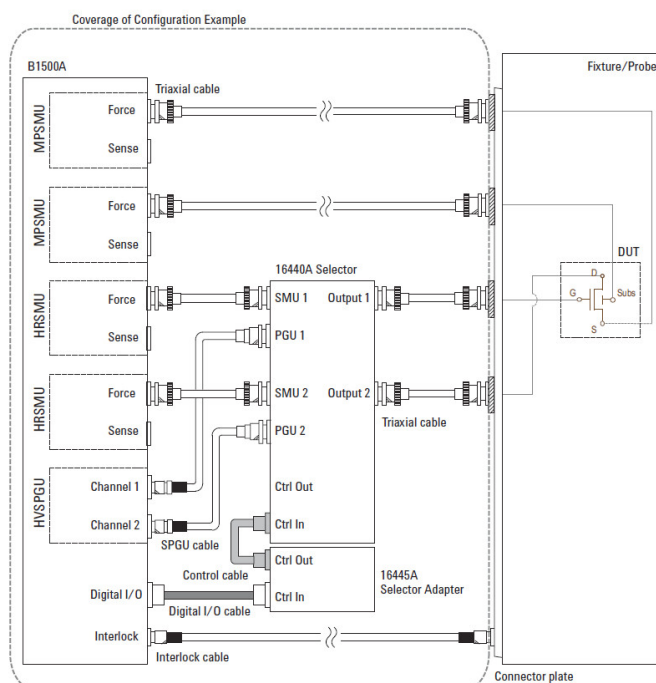
Example-6. For 50μs pulse using two MCSMU for 4-terminal device

Model/Option	Description	Qty
B1500A	Semiconductor device analyzer mainframe	1
B1500A-015/030	1.5 m or 3 m length of bundled cables	1
B1500A-A00	Empty package for a custom solution contains no measurement module	1
B1500A-A11 (or A17)	Adds one MPSMU (or HRSMU) and two triaxial cables	1
B1500A-A1B	Adds two MCSMU, connection box (N1255A), and four triaxial cables	1
B1500A-A5F	Test fixture for packaged device measurement, adds one 16442B (Optional)	1
16494A	Triaxial cable (Select cable length option)	6



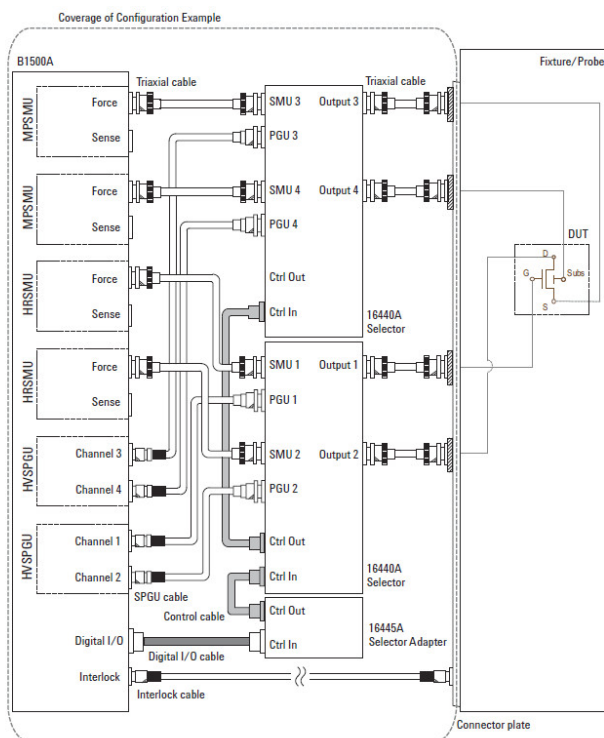
Example-7. For flash memory cell characterization (2 pulse channels)

Model/Option	Description	Qty
B1500A	Semiconductor device analyzer mainframe	1
B1500A-015/030	1.5 m or 3 m length of bundled cables	1
B1500A-A04	Flash memory cell measurement package	1
B1500A-A5F	Test fixture for packaged device measurement, adds one 16442B (Optional)	1



Example-8. For flash memory cell characterization (3 or 4 pulse channels)

Model/Option	Description	Qty
B1500A	Semiconductor device analyzer mainframe	1
B1500A-015/030	1.5 m or 3 m length of bundled cables	1
B1500A-A04	Flash memory cell measurement package	1
B1500A-A25	Adds one HVSPGU and two SPGU cables	1
16440A	SMU/PGU pulse generator selector	1
16440A-003	Control cable, 40 cm for second selector	1
B1500A-A5F	Test fixture for packaged device measurement, adds one 16442B (Optional)	1



The diagram illustrates the B1500A probe system setup and its dimensions. On the left, the B1500A unit is shown with three main sections: MPSMU (Monopulse Signal Measurement Unit) for Force and Sense signals, WGFMU (Wideband Frequency Measurement Unit) for Channel 1, Channel 2, and Interlock signals, and a WGFMU Connector Adapter (16493R-801). These are connected to a Connector plate. The Connector plate is connected to two SMU (Signal Measurement Unit) units, SMU 1 and SMU 2, each with an Output 1 and Output 2. SMU 1 is connected to WGFMU 1, and SMU 2 is connected to WGFMU 2. The SMU units are connected to a Prober. The Prober is connected to a DC Probe Connection Example, which shows a 16493R-101 probe connected to a 16493R-202 probe. The DC Probe Connection Example is connected to a Pad Layout, which shows a Gate, Drain, Signal, Gnd, Well, Source, and Gnd connection. The dimensions of the B1500A-A31 and B1500A-A30 units are shown: B1500A-A31 has a length of 2.4m and a width of 0.6m, and B1500A-A30 has a length of 3.0m. A note indicates to check with a prober vendor which connection is suitable.

Model/Option	Description	Qty
B1500A	Semiconductor device analyzer mainframe	1
B1500A-015/ 030	1.5 m or 3 m length of bundled cables	1
B1500A-A00	Empty package for custom solution, contains no measurement module	1
B1500A-A11 (or A17)	Adds one MPSPMU (or HRSMU) and two triaxial cables	2
B1500A-A30 (or A31)	WGFMU, RSU and cables	1
(If the Connection Adapter is Required)		
B1500A-A3P	WGFMU probe cable kit	1



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