Rack-Mounted | USB & Ethernet Control

Solid-State 16 x SP4T Switch ZTS-16SP4T-63H

50Ω 10-6000 MHz

Product Overview

Mini-Circuits' ZTS series platform allows multiple solid-state switch types to be combined and integrated into a single rack-mount package with software control via USB and Ethernet.

ZTS-16SP4T-63H houses 16 independent SP4T switches, each operating from 10 MHz to 6 GHz with fast switching and high isolation. All RF connections (SMA) are accessible on the front panel of the 19-inch 2U height rack chassis.

The system can be controlled via USB or Ethernet (supporting both HTTP and Telnet network protocols). Full software support is provided, including our user-friendly GUI application for Windows and a full API with programming instructions for Windows and Linux environments (both 32-bit and 64-bit systems).

Mini-Circuits' novel daisy-chaining interface allows multiple switch racks to be cascaded together into a Master / Slave chain. The full chain effectively becomes one system with every switch controlled through a single USB or Ethernet connection and software interface.

Key Features

Feature	Advantages
High performance switches	Multiple high isolation switches, integrated in a single chassis, well suited to automated test setups with large numbers of devices or channels under test.
Rack-mount chassis	Compact, 2U height 19" rack-chassis with all RF connections on the front, suits integration in automated production test environments
USB & Ethernet control	USB HID and Ethernet (HTTP / Telnet / SSH) interfaces provide easy compatibility with a wide range of software setups and programming environments

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Mechanical Specifications

Dimensions	19” (W) x 2U (H) x 15” (D)			
Case Drawing	99-01-3070			
Case Material	Aluminum (with protective coating to prevent corrosion), black finish			
RF Connectors	**Panel**	**Connector**	**Quantity**	**Port Labels**
	Front	SMA female	80	Switch 1A, 1B to 8A, 8B Ports COM and J1-J4 (per switch)
Panel Items	**Front Panel**			**Rear Panel**
Panel Marking	• ZTS-16SP4T-63H • 16 x Solid-State SP4T • 10-6000 MHz			• CE / EAC / UKCA • Serial number / date code / model name
Panel Items				• AC mains power input (IEC C14 inlet) • USB type B socket • RJ45 (LAN) socket • 2 x D-Sub 9-pin (SPI In & Out) • Power on / off switch with LED
Power Supply	AC mains power input (90-260 V, 47-63 Hz)			
Fuse	2A, 250V rating			
Temperature	Operating: 0 to +50 ºC			

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Electrical Specifications at 25°C

Parameter	Port	Conditions	Min.	Typ.	Max.	Units
Operating Frequency			10		6000	MHz
Insertion Loss	COM to any active port	10 to 700 MHz	–	2.1	3.5	dB
		700 to 2500 MHz	–	2.5	4.0	
		2500 to 5000 MHz	–	2.9	4.3	
		5000 to 6000 MHz	–	3.3	4.7	
Isolation	Between ports 1 to 4 of a given switch	10 to 700 MHz	78	105	–	dB
		700 to 2500 MHz	74	105	–	
		2500 to 5000 MHz	63	90	–	
		5000 to 6000 MHz	58	80	–	
	COM to any terminated port of a given switch	10 to 700 MHz	77	105	–	
		700 to 2500 MHz	73	100	–	
		2500 to 5000 MHz	60	79	–	
		5000 to 6000 MHz	58	70	–	
	COM to port 1, 2, or 4 of a given switch (Disconnected state) [1]	10 to 700 MHz	77	105	–	
		700 to 2500 MHz	73	100	–	
		2500 to 5000 MHz	60	79	–	
		5000 to 6000 MHz	58	70	–	
	COM to port 3 of a given switch (Disconnected state) [1]	10 to 700 MHz	55	70	–	
		700 to 2500 MHz	37	48	–	
		2500 to 5000 MHz	30	39	–	
		5000 to 6000 MHz	28	36	–	
	Crosstalk between switches	10 to 6000 MHz	85	100	–	
VSWR	COM port at all active states	10 to 700 MHz	–	1.25	–	:1
		700 to 2500 MHz	–	1.25	–	
		2500 to 5000 MHz	–	1.45	–	
		5000 to 6000 MHz	–	1.40	–	
	Any port connected to COM	10 to 700 MHz	–	1.25	–	
		700 to 2500 MHz	–	1.25	–	
		2500 to 5000 MHz	–	1.25	–	
		5000 to 6000 MHz	–	1.30	–	
	Any terminated port	10 to 700 MHz	–	1.20	–	
		700 to 2500 MHz	–	1.20	–	
		2500 to 5000 MHz	–	1.25	–	
		5000 to 6000 MHz	–	1.40	–	
Power Input @1 dB Compression	COM to any active port	100 to 6000 MHz	–	33	–	dBm
IP3 [2]	COM to any active port	100 to 6000 MHz	–	50	–	dBm
Transition Time [3]	–	–	–	5	8	µs
Minimum dwell time [4]	High Speed Mode	–	–	15	–	µs
Switching Time (USB) [5]	–	–	–	2	–	ms
Operating RF Input Power	Any active port to COM port	Hot Switching	–	–	+23	dBm
	Any terminated port	–	–	–	+23	
	Through path	10 to 50 MHz	Max power at through path derates linearly from +30 dBm @ 50 MHz to +23 dBm @10 MHz			
		50 to 6000 MHz	–	–	+30	

[1] In disconnected state COM port is reflective and ports 1-4 are absorptive, isolation COM to 1,2,4 is significantly better than COM to 3. See block diagram on page 3 for details.

[2] IP3 is tested with 1 MHz span between signals, +5 dBm per tone.

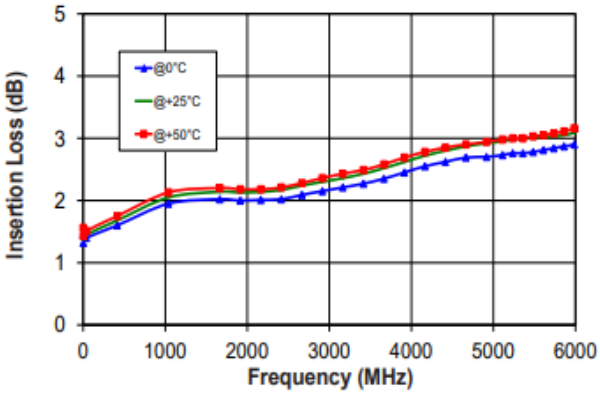
[3] Transition time spec represents the time that the RF signal paths are interrupted during switching and thus is specified without communication delays.

[4] Minimum dwell time is the shortest time that can be achieved between 2 switch transitions when programming an automated switch sequence.

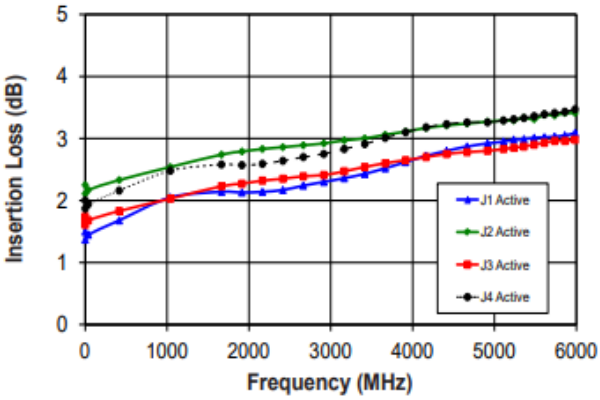
[5] Switching time(USB) is the time from issuing a single software command via USB to the switch state changing. The most significant factor is the host PC, influenced by CPU load and USB protocol. The time shown is an estimate for a medium CPU load and USB 2.0 connection.

Typical Performance Data

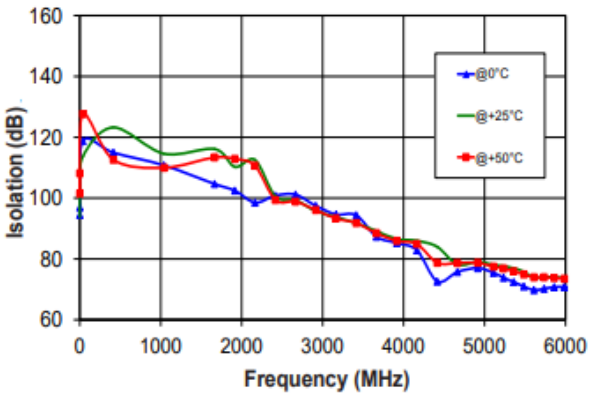
Insertion Loss J1 Active (over Temp.)



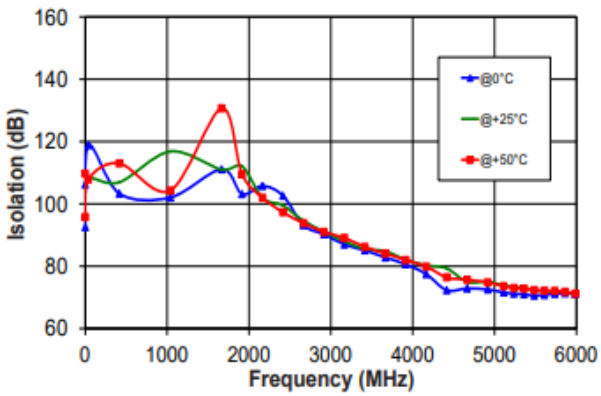
Insertion Loss J1/2/3/4 Active



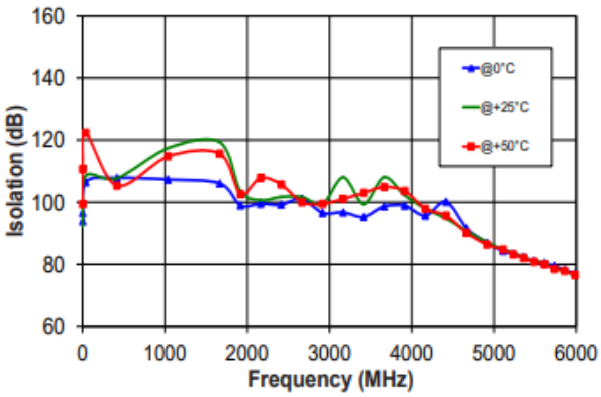
Isolation COM to J1 (J2 Active)



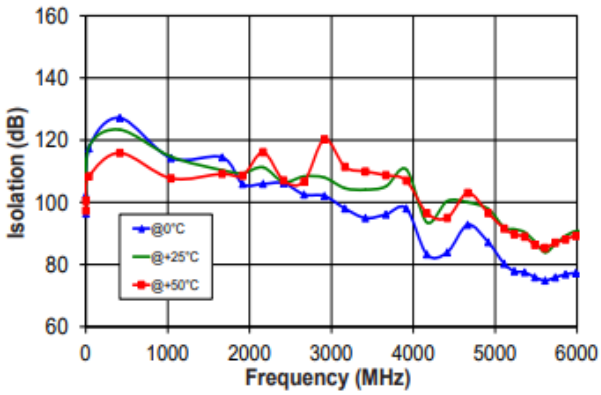
Isolation COM to J1 (J3 Active)



Isolation J2 to J3 (J3 Active)

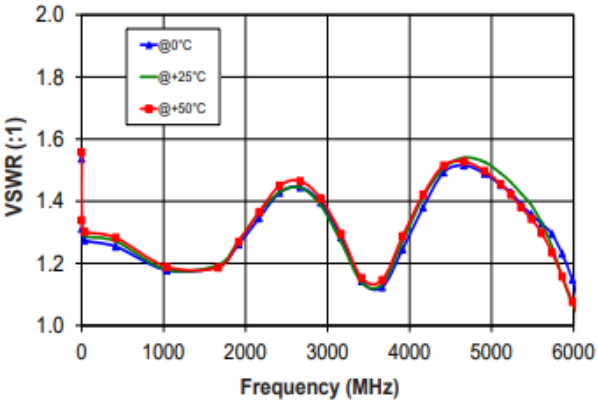


Isolation J1 to J3 (J2 Active)

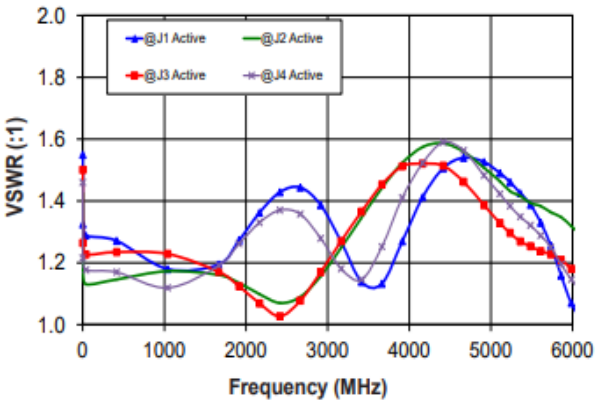


Typical Performance Data

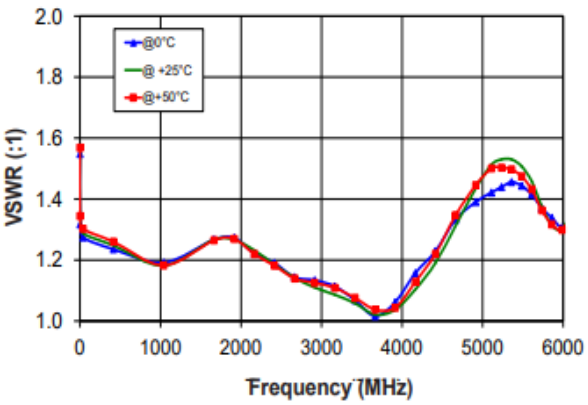
VSWR @ COM over Temp. (J1 Active)



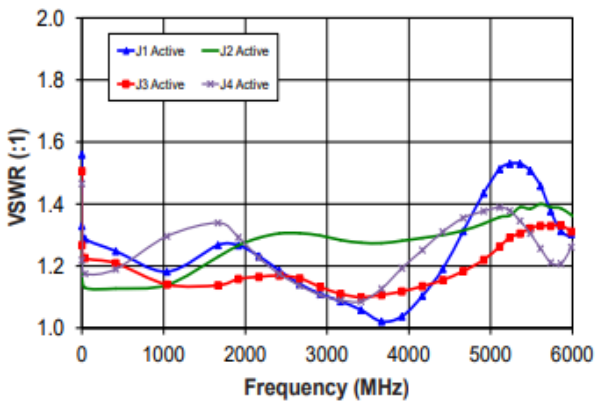
VSWR @ COM (J1/2/3/4 Active)



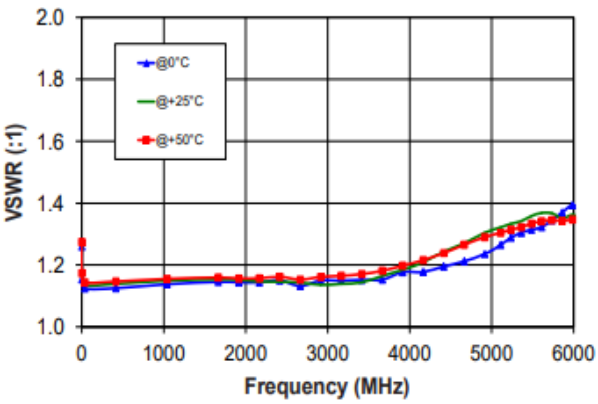
VSWR @ J1 Active Port over Temp.



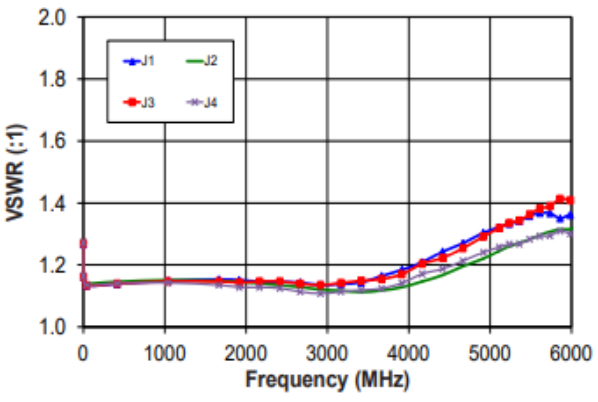
VSWR @ Active Ports J1/2/3/4



VSWR @ J1 Terminated over Temp.



VSWR J1/2/3/4 Terminated Ports



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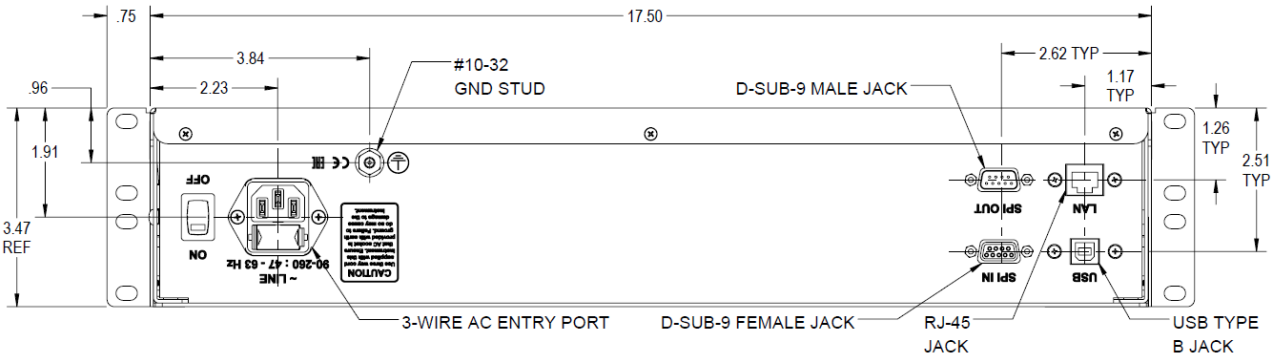
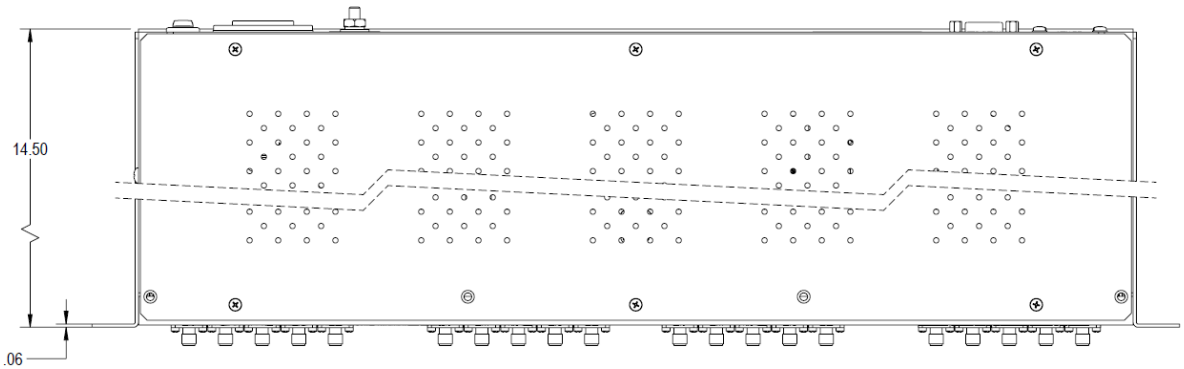
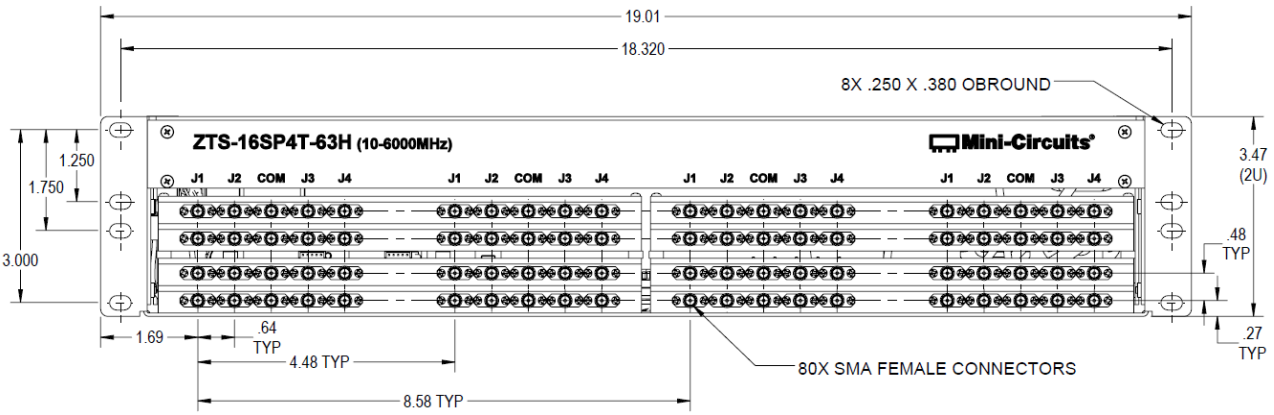
Outline Drawing







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Software Specifications

• Please contact testsolutions@minicircuits.com for support

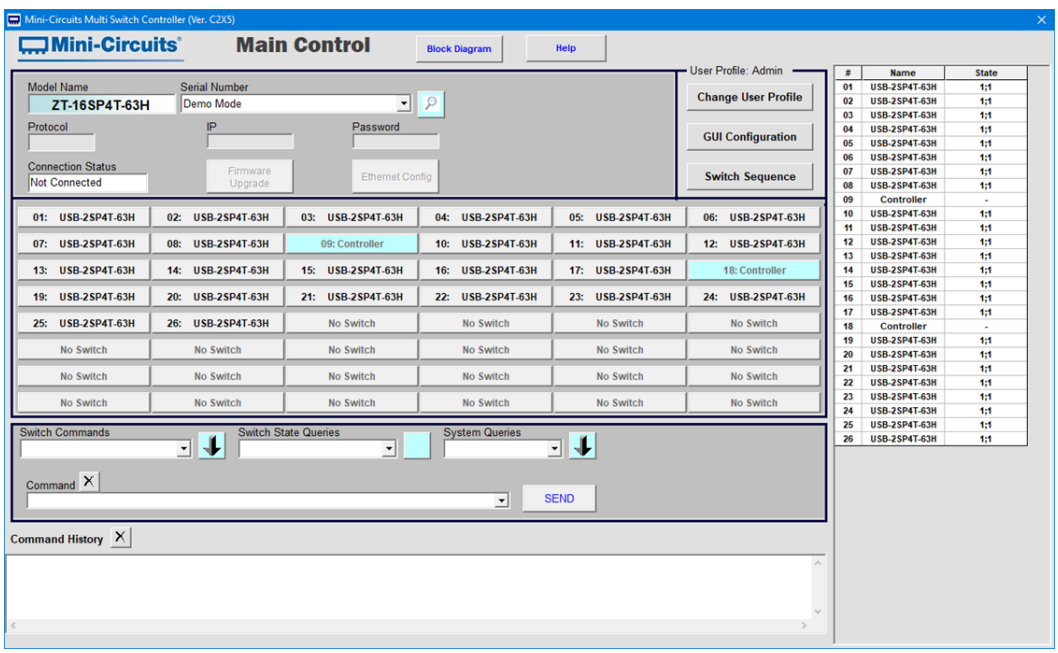
Ethernet Control	**Supported Protocols**	TCP / IP, SSH, HTTP, Telnet, DHCP, UDP
	Max Data Rate	100 Mbps (100Base-T Full Duplex)
USB Control	**Supported Protocols**	HID - High Speed
	Min Communication Time	400 µs typ
Software Support	• Mini-Circuits' Universal GUI for USB & LAN control (Windows only) • ASCII / SCPI command syntax for LAN programming (all OS) • ActiveX / .Net DLL APIs for USB programming (Windows only) • Interrupt codes for direct USB programming (all OS) • Full programming instructions and examples for a wide range of languages	
Downloads	**Software & Documentation**	https://www.minicircuits.com/softwaredownload/multissw.html

Programming Commands

• The key ASCII / SCPI commands for control of the system are summarized below
• These can be sent via the USB or Ethernet API
• Please refer to the programming manual for full details

Command / Query	Description
:MN?	Read model name
:SN?	Read serial number
:FIRMWARE?	Read firmware version
:SP4T:sw_number:STATE:port	Set a single switch state: • sw_number = 1A to 8B • port = the switch state to set • Example: :SP4T:1A:STATE:4 (set SP4T switch 1A to state 4)
:SP4T:sw_number:STATE?	Get the state of a single switch

Graphical User Interface (GUI)



Ordering Information

Please contact Mini-Circuits' Test Solutions department for price and availability:
testsolutions@minicircuits.com

Included Accessories

Model Name	Quantity	Description
CBL-3W-xx*	1	AC power cord (IEC C13 connector to local plug)
USB-CBL-AB-7+	1	USB cable (6.8 ft)
CBL-RJ45-MM-5+	1	Ethernet cable (5 ft)
HT-4-SMA	1	SMA Cable Wrench (4 in)

*Please specify one option on the purchase order, at no charge

Cable Model	Region
CBL-3W-US	USA
CBL-3W-EU	Europe
CBL-3W-IL	Israel
CBL-3W-UK	UK
CBL-3W-AU	Australia / China

Additional Notes

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp