USB & ETHERNET

Mechanical Switch Assembly RC-2SPDT-A18

50Ω DC to 18 GHz 2 x SPDT SMA-Female

THE BIG DEAL

- 2 x mechanical SPDT absorptive switches
- Software control & automation
- High reliability, millions of cycles
- SSH secure Ethernet communication
- LED switch state indicators

CASE STYLE: LM1849

DOWNLOAD SOFTWARE PACKAGE

RoHS Compliant
See our website for RoHS Compliance methodologies and qualifications

APPLICATIONS

- Benchtop and rack-mounted automated test systems
- 5G FR1 & FR3, WiFi 6E MIMO, UWB, Bluetooth
- Quantum computing
- Military radio, radar & electronic warfare
- Switch matrices

PRODUCT OVERVIEW

Mini-Circuits' RC-2SPDT-A18 houses 2 independently controlled electro-mechanical SPDT switches. Each switch operates over an extremely wide bandwidth, from DC to 18 GHz with high isolation and low insertion loss. The absorptive switches are fail safe and break before make configuration, with a lifetime of 5 million switching cycles per switch when used within the noted specifications.

The switch box is constructed in a compact, rugged metal case (4.5 x 6.0 x 2.25") with all SMA (f) RF connectors on the front panel. The switches are controlled via USB or Ethernet, allowing control directly from a PC, or remotely over a network. 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).

KEY FEATURES

Feature	Advantages
Mechanical switches	Mechanical absorptive switches provide high reliability, repeatable high performance and internal termination of input signals on the disconnected paths
Fail-safe design	The switches revert to a known default state when the DC supply is removed, allowing their use in systems that must continue to operate safely in the event of power failure.
Break-before make configuration	Prevents a momentary connection of the old and new signal paths, reducing the inconsistent transient effects that could otherwise be observed during switching
Secure Ethernet communication	Support for SSH (Secure Shell protocol) provides a means for secure communication over Ethernet networks with strict security policies. HTTP & Telnet communication via Ethernet are also supported.
Full software support	User friendly Windows GUI (graphical user interface) allows manual control straight out of the box, while the comprehensive API (application programming interface) with examples and instructions allows easy automation in most programming environments

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ECO-024239
EDR-10927/10F4
RC-2SPDT-A18
RAV/MCL NY
250103

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ELECTRICAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Units
Frequency Range		DC		18	GHz
Insertion Loss	DC – 8 GHz 8 – 12 GHz 12 – 18 GHz		0.15 0.25 0.30	0.30 0.40 0.50	dB
Isolation (Inactive Paths)[1]	DC – 8 GHz 8 – 12 GHz 12 – 18 GHz	75 70 60	90 80 66		dB
Return Loss[2]	DC – 8 GHz 8 – 12 GHz 12 – 18 GHz		20 20 19		dB
Switching Time			25		ms
RF Input Power (Cold Switching)	DC-18 GHz Into internal termination			40 1	W
Switch Lifetime	100 mW hot switching[3] 1W hot switching		5 1		million cycles

1. Isolation measured between Com and any disconnected port. Example: Isolation for Com to 1 is the leakage measured at port 1 from a signal input at Com when the active switch path is set to Com to 2.
2. Return loss into all ports in all states
3. Hot switching power above this level will degrade the switch lifetime

ABSOLUTE MAXIMUM RATINGS

Parameters	Ratings	Limits	Units
Temperature	Operating Storage	0 to +40 -15 to +85	°C
DC Supply Voltage		+26	V
Input Power (No Damage)	Cold switching Hot switching Into internal termination	40 1 1	W

Permanent damage may occur if any of these limits are exceeded. Operating in the range between operating power limits and absolute maximum ratings for extended periods of time may result in reduced life and reliability.

POWER SUPPLY

Parameter	Conditions	Typ	Max	Units
DC Voltage		+24	+26	V
DC Current Consumption	All switches COM to 1	100		mA
	All switches COM to 2	500		

Using included AC/DC-24-3W1 power supply adapter (110 / 240 V AC input)

SWITCH CONTROL LOGIC

Switch Command	Switch State		Front Panel LED Color	
	A	B	A	B
SETA = 0	Com-1	N/A	Green	N/A
SETA = 1	Com-2	N/A	Red	N/A
SETB = 0	N/A	Com-1	N/A	Green
SETB = 1	N/A	Com-2	N/A	Red

POWER-UP OPTIONS

Mode	Initial Switch Paths
Default	Switches power up in the default state (COM to 1)
Last State	Switches resume the previous state from the point of last power supply disconnection

Switches revert to the default state when the power supply is turned off or disconnected

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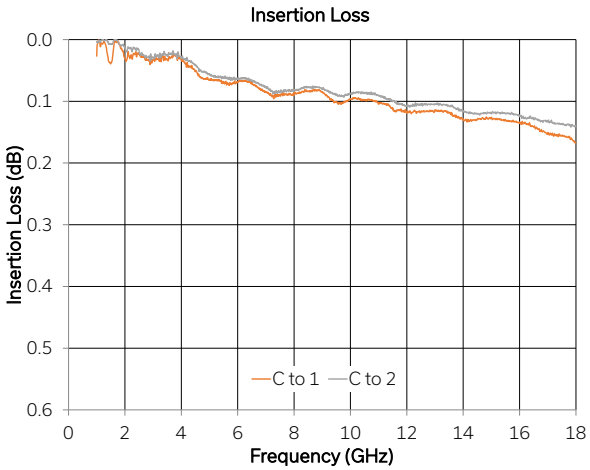
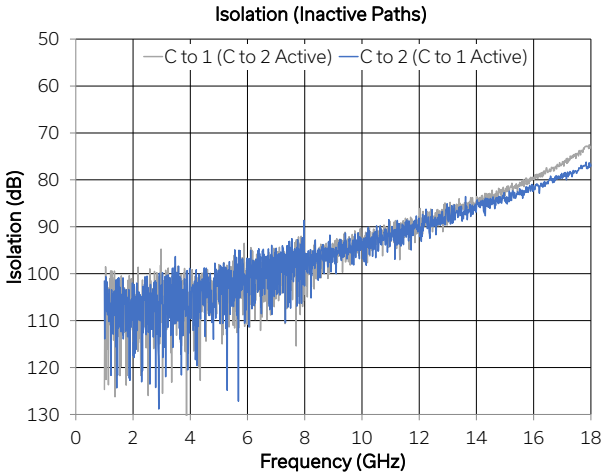
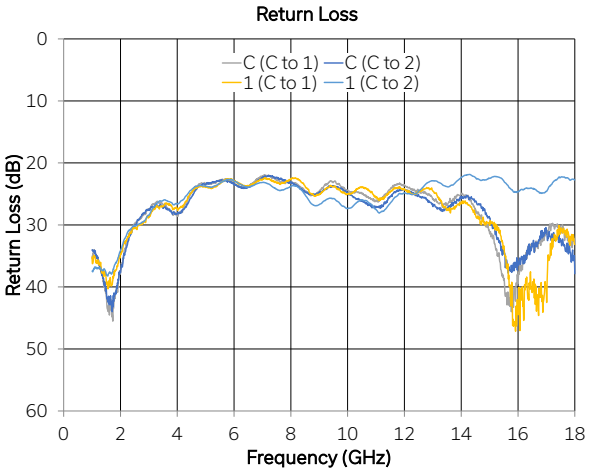
TYPICAL PERFORMANCE GRAPHS







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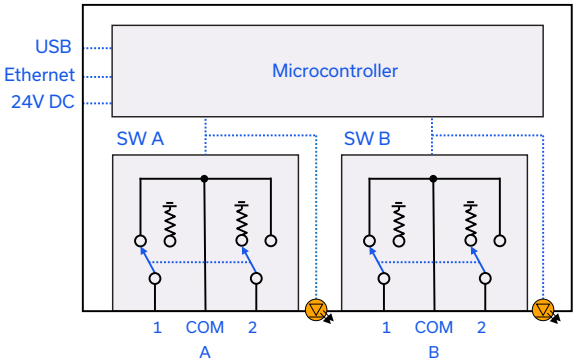
CONNECTIONS

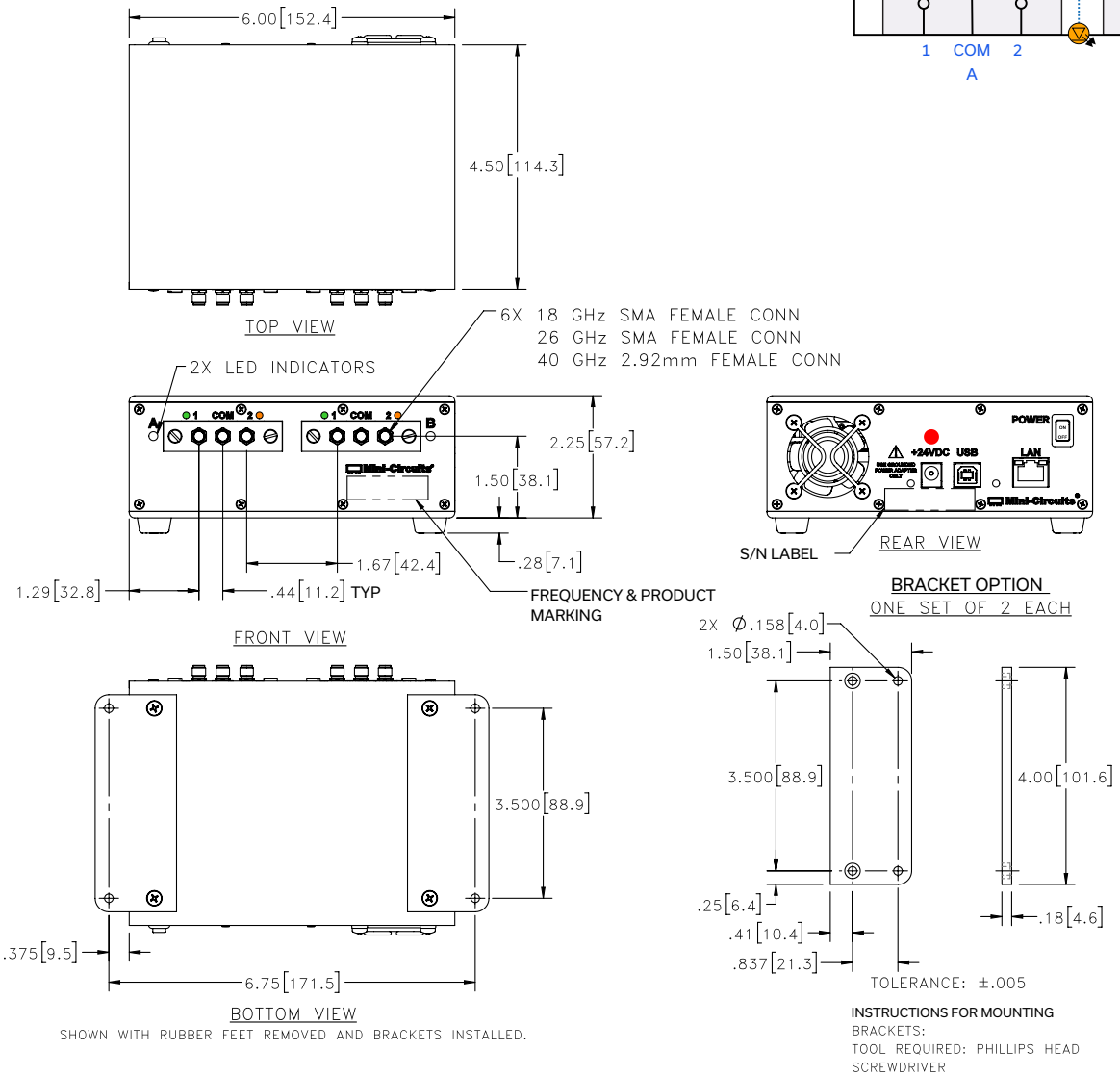
Port Name	Connector Type
$24V_{DC}$ IN	(2.1 mm center positive DC Socket)
Switch A-B (Com & 1-2)	(SMA female)
USB	(USB type B receptacle)
Network (Ethernet/LAN)	(RJ45 socket)

SWITCHING CONFIGURATION (PER SWITCH):

- Fail-Safe
- Absorptive (Internal terminations on ports J1-J2)



OUTLINE DRAWING (LM1849)



INSTRUCTIONS FOR MOUNTING BRACKETS:
TOOL REQUIRED: PHILLIPS HEAD SCREWDRIVER
STEP 1: REMOVE RUBBER FEET FROM THE BOTTOM OF THE UNIT, DO NOT DISCARD THE FASTENERS.
STEP 2: MOUNT THE BRACKETS WITH THE FASTENERS REMOVED IN STEP 1, USING THE COUNTER BORE HOLES IN THE BRACKET.

Weight: 960 grams.
Dimensions are in inches [mm]. Tolerances: 2 Pl.±.03 inch; 3 Pl.±.015 inch

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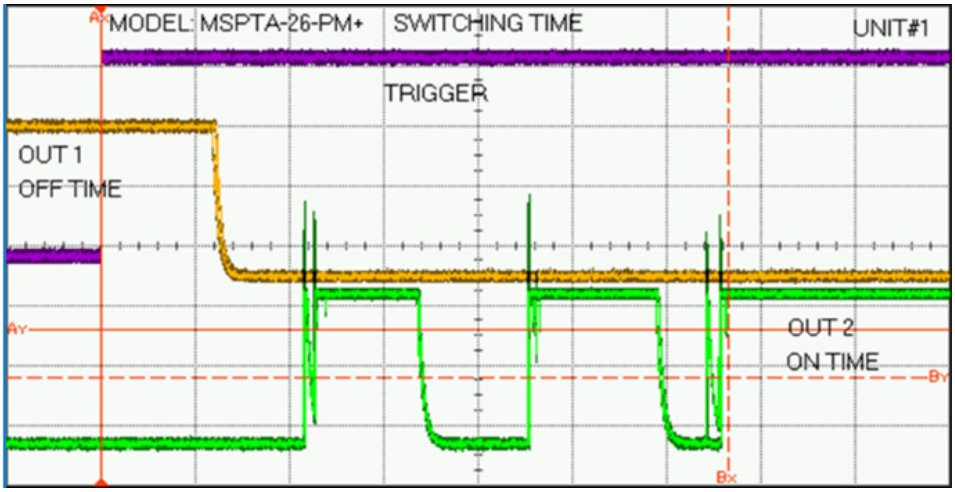
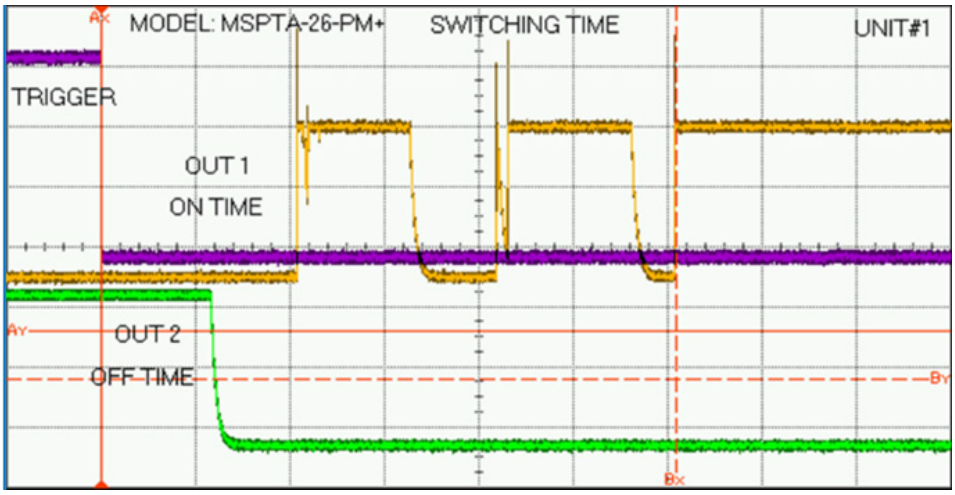
TYPICAL SWITCHING PERFORMANCE

The graphs below present the typical mechanical switching characteristic from the point of applying the internal DC voltage to the switch actuator (identified by the purple "trigger" trace). USB / Ethernet communication delays are excluded (in the order of several ms , depending on PC / network performance). The break before make process is visible in the sequence of events (the active switch path is disconnected, prior to connecting the final switch path).

Switching from COM <> 1 to COM <>2 state: 13.30 ms



Switching from COM <> 2 to COM <> 1 State: 12.17 ms



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CONTROL INTERFACES

Ethernet Control	Supported Protocols	TCP / IP, SSH, HTTP, Telnet, DHCP, UDP (limited)
	Max Data Rate	100 Mbps (100 Base-T Full Duplex)
USB Control	Supported Protocols	HID – High Speed
	Min Communication Time5	400 µs typ

5. Based on the polling interval of the USB HID protocol (125 µs with 64 bytes per packet) and no other significant CPU or USB activity

SOFTWARE & DOCUMENTATION

Mini-Circuits' full software and support package including user guide, Windows GUI, API, programming manual and examples can be downloaded free of charge (refer to the last page for the download path).
A comprehensive set of software control options is provided:

- GUI for Windows – Simple software interface for control via Ethernet and USB
- Programming / automation via Ethernet
  - Complete set of control commands which can be sent via any supported protocol – simple to implement in the majority of modern programming environments

- Programming / automation via USB
  - DLL files provide a full API for Windows with a set of intuitive functions which can be implemented in any programming environment supporting .Net Framework or ActiveX
  - Direct USB programming is possible in any other environment (not supporting .Net or ActiveX)
  -

Please contact testsolutions@minicircuits.com for support

MINIMUM SYSTEM REQUIREMENTS

Hardware	Intel i3 (or equivalent) or later
GUI (USB or Ethernet Control)	Windows 7 or later
USB API DLL	Windows 7 or later with support for Microsoft .Net Framework or ActiveX
USB Direct Programming	Windows 7 or later; Linux
Ethernet	Windows, Linux or macOS with Ethernet TCP / IP support

PROGRAMMING COMMANDS

The key ASCII / SCPI commands for control of the system for control via the Ethernet or USB API are summarized below (refer to the programming manual for full details):

Command / Query	Description
:MN?	Read model name
:SN?	Read serial number
:FIRMWARE?	Read firmware version
SET[sw_label]=[port]	Set a single switch state: • [sw_label] = A to B • [port] = 0 (Com to 1) or 1 (Com to 2) • Example: SETA=1 (set SPDT A with Com to 2)
SWPORT?	Get the state of all switches: • Returns a byte value, with the 2 least significant bits each representing the state of an individual SPDT (switch A is the least significant bit). The value for each switch will be: • 0 = COM to 1 • 1 = COM to 2 • Example: A returned value of 2 is represented as 00000010 indicating SW B = 1 (Com to 2) & SW A = 0 (Com to 1)

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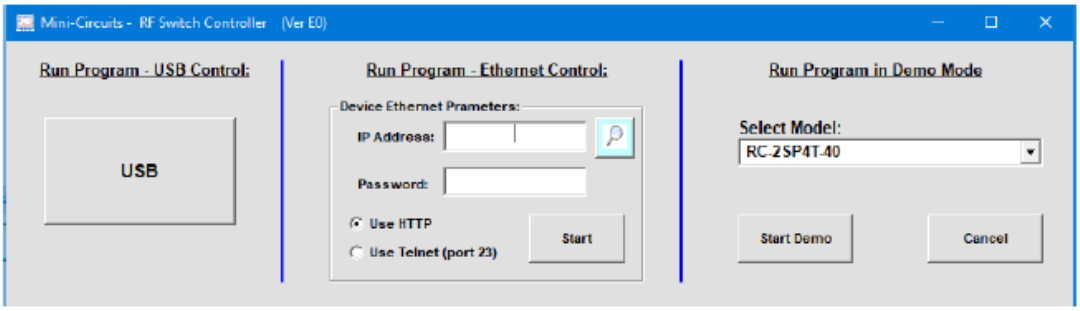
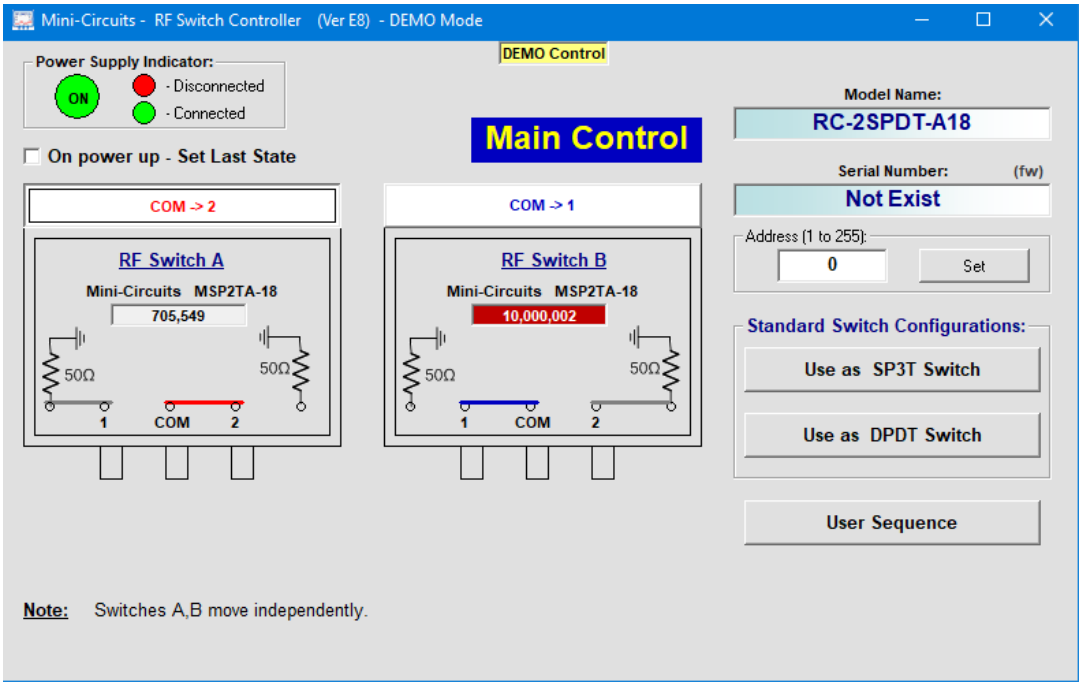
GRAPHICAL USER INTERFACE (GUI) FOR WINDOWS - KEY FEATURES

- Connect via USB or Ethernet
- Run GUI in "demo mode" to evaluate software without a hardware connection



- View and set switch states at the click of a button
- Configure and run timed switching sequences
- Set start-up switch state
- Configure Ethernet IP Settings



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DETAILED MODEL INFORMATION IS AVAILABLE ON OUR WEBSITE CLICK HERE

Case Style	LM1849
Software, User Guide & Programming Manual	www.minicircuits.com/softwaredownload/rfswitchcontroller.html
Environmental Rating	ENV104
Regulatory Compliance	Refer to our website for compliance methodologies and qualifications CE UKCA www.minicircuits.com/quality/environmental_introduction.html

Contact Us: testsolutions@minicircuits.com

Included Accessories	Part Number	Description
	AC/DC-24-3W1	AC/DC 24V DC grounded power adaptor. Operating temperature 0 to +40˚C, max current 2.5A, IEC C6 AC inlet.
	CBL-3W1-xx	AC power cord (IEC C5 connector to local plug) Select one option from the list below. Please contact testsolutions@minicircuits.com if your regions is not listed.
	USB-CBL-AB-3+	USB cable (2.7 ft) type A to type B
	CBL-RJ45-MM-5+	Ethernet cable (5 ft)

AC Power Cord Options	Part Number	Description
	CBL-3W1-US	USA NEMA 5-15 plug (type B) to IEC C5 connector
	CBL-3W1-EU	Europe CEE 7/7 plug (type E/F) to IEC C5 connector
	CBL-3W1-UK	UK BS-1363 plug (type G) to IEC C5 connector
	CBL-3W1-AU	Australia & China AS/NZS 3112 plug (type I) to IEC C5 connector
	CBL-3W1-IL	Israel SI-32 plug (type H) to IEC C5 connector

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/terms/viewterm.html