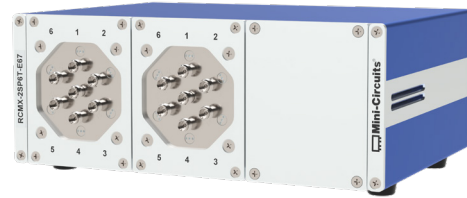


**THE BIG DEAL**

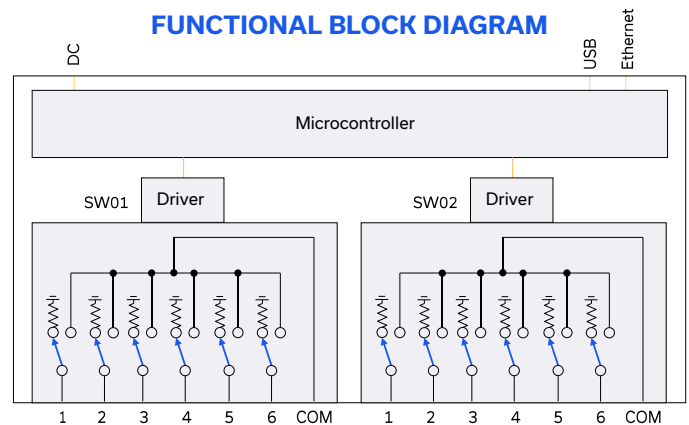
- Mechanical SP6T Absorptive Switches
- Latching Switches with Excellent Performance to 67 GHz
- High Reliability, Millions of Cycles
- Compact Benchtop Package with Power Supply
- Software Control & Automation



Generic photo used for illustration purposes only

**APPLICATIONS**

- Benchtop & Rack-Mounted Automated Test Systems
- 6G, RF Over Fiber & Millimeter Wave Radio Infrastructure
- High Data-Rate Digital Communication
- Satellite Communications & Radio-Astronomy
- Military Radio, Radar & Electronic Warfare

**FUNCTIONAL BLOCK DIAGRAM****PRODUCT OVERVIEW**

Mini-Circuits' RCMX-2SP6T-E67 contains a pair of latching electro-mechanical SP6T switches operating over a wide bandwidth from DC to 67 GHz with high isolation and low insertion loss. Each switch is absorptive / internally terminated with a break before make configuration and typical lifetime of 2 million switching cycles when used within the noted specifications.

The switches are housed in a compact benchtop package with all RF connectors on the front. The switch assembly can be controlled via USB or Ethernet (supporting SSH, 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.

The modular design of the RCMX series supports easy maintenance in the field without needing to return to a Mini-Circuits facility.

**KEY FEATURES**

| Feature                                       | Advantages                                                                                                                                                                                           |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mechanical Switches                           | Mechanical absorptive switches provide low loss, high isolation, high reliability, repeatable performance and internal termination of input signals on the disconnected paths                        |
| Latching Switch Action                        | Latching switches maintain the active state even with the DC power supply removed, ensuring reliable signal connections in safety critical applications and minimizing DC power consumption.         |
| 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. |
| Compact Package with Flexible Control Options | Easy to use on the lab bench or integrate into larger automated test systems without the need to develop custom control systems.                                                                     |



## ELECTRICAL SPECIFICATIONS AT +25 °C

| Parameter                                  | Conditions (GHz)                       | Min. | Typ. | Max. | Units          |
|--------------------------------------------|----------------------------------------|------|------|------|----------------|
| Frequency Range                            | -                                      | DC   | -    | 67   | GHz            |
| Insertion Loss                             | DC – 8 GHz                             | -    | 0.30 | 0.45 | dB             |
|                                            | 8 – 18 GHz                             | -    | 0.45 | 0.60 |                |
|                                            | 18 – 26.5 GHz                          | -    | 0.50 | 0.70 |                |
|                                            | 26.5 – 40 GHz                          | -    | 0.70 | 0.90 |                |
|                                            | 40 – 50 GHz                            | -    | 0.85 | 1.20 |                |
|                                            | 50 – 67 GHz                            | -    | 1.50 | 1.70 |                |
| Isolation <sup>1</sup><br>(Inactive Paths) | DC – 8 GHz                             | 60   | 85   | -    | dB             |
|                                            | 8 – 18 GHz                             | 60   | 85   | -    |                |
|                                            | 18 – 26.5 GHz                          | 55   | 80   | -    |                |
|                                            | 26.5 – 40 GHz                          | 50   | 75   | -    |                |
|                                            | 40 – 50 GHz                            | 50   | 75   | -    |                |
|                                            | 50 – 67 GHz                            | 50   | 70   | -    |                |
| Return Loss <sup>2</sup>                   | DC – 8 GHz                             | -    | 17   | -    | dB             |
|                                            | 8 – 18 GHz                             | -    | 15   | -    |                |
|                                            | 18 – 26.5 GHz                          | -    | 11   | -    |                |
|                                            | 26.5 – 40 GHz                          | -    | 10   | -    |                |
|                                            | 40 – 50 GHz                            | -    | 9    | -    |                |
|                                            | 50 – 67 GHz                            | -    | 9    | -    |                |
| Switching Time                             | -                                      | 70   | -    | -    | ms             |
| RF Input Power                             | Cold Switching                         | -    | -    | 1.0  | W              |
|                                            | Hot Switching <sup>3</sup>             | -    | -    | 0.1  |                |
|                                            | Into Internal Termination <sup>4</sup> | -    | -    | 0.5  |                |
| Switch Lifetime                            | -                                      | -    | 2    | -    | 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 COM when active or ports 1-6 in any state; COM is reflective when disconnected

3. Hot switching power above this level will degrade the switch lifetime

4. Maximum power into any internal termination is 0.5 W per port, 1.5 W total per switch



USB & ETHERNET

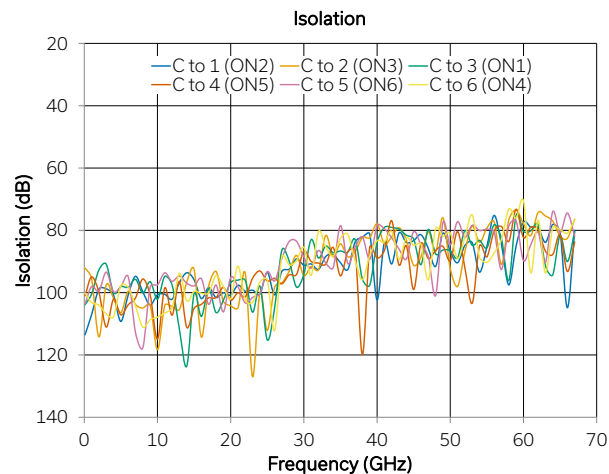
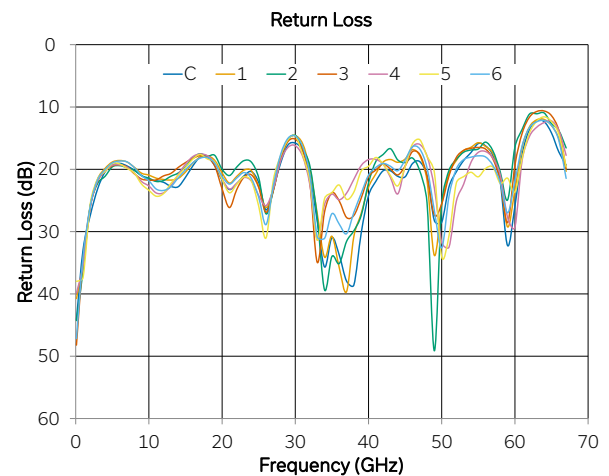
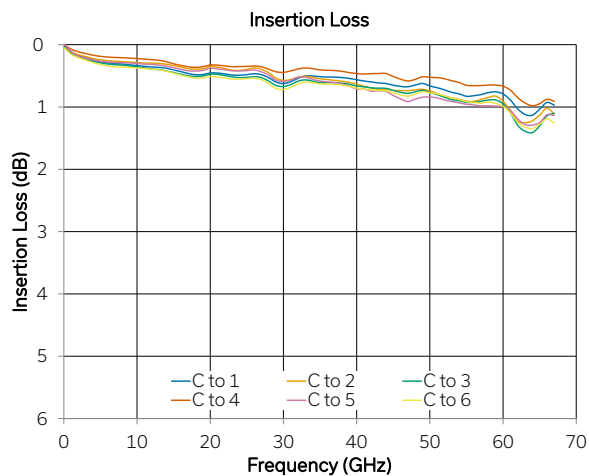
# Mechanical Switch Assembly

RCMX-2SP6T-E67

Mini-Circuits

50Ω DC to 67 GHz 2 x SP6T 1.85 mm Female

## TYPICAL PERFORMANCE GRAPHS





## ABSOLUTE MAXIMUM RATINGS

| Parameter                  | Conditions                | Limits     | Units |
|----------------------------|---------------------------|------------|-------|
| Temperature                | Operating                 | 0 to +50   | °C    |
|                            | Storage                   | -20 to +60 |       |
| DC Supply Voltage          |                           | 26         | V     |
| Input Power<br>(No Damage) | Cold Switching            | 1.0        | W     |
|                            | Hot Switching             | 0.1        |       |
|                            | Into Internal Termination | 0.5        |       |

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     |

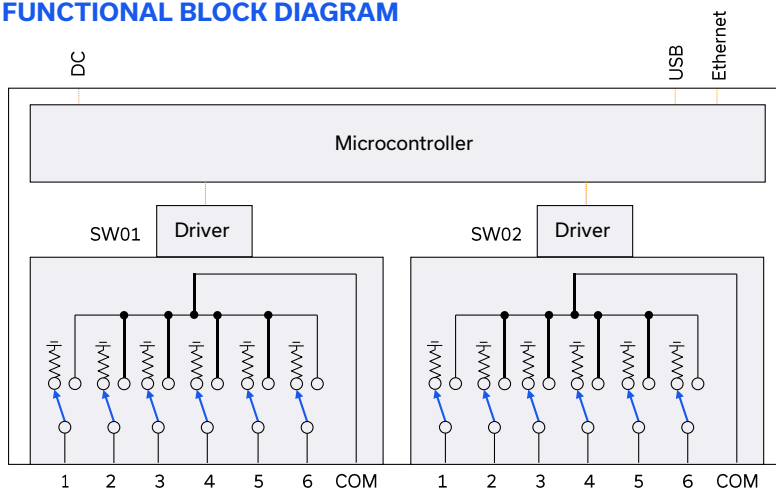
Using included AC/DC-24-3W1 power supply adapter (110 / 240 V AC input)

## CONNECTIONS

| Port                | Connector                        |
|---------------------|----------------------------------|
| SW1 & SW2 - C & 1-6 | 1.85 mm mm female                |
| USB                 | USB type B                       |
| Ethernet / LAN      | RJ45                             |
| 24V DC Input        | 2.1 mm center positive DC socket |

C = Common port  
1-6 = Input / output ports

## FUNCTIONAL BLOCK DIAGRAM



## SWITCH STATE TABLE (EACH SWITCH)

| Switch Command    | Switch x State                                     |
|-------------------|----------------------------------------------------|
| :SP6T:[x]:STATE:0 | All ports disconnected<br>(C open; 1-6 terminated) |
| :SP6T:[x]:STATE:1 | C to 1                                             |
| :SP6T:[x]:STATE:2 | C to 2                                             |
| :SP6T:[x]:STATE:3 | C to 3                                             |
| :SP6T:[x]:STATE:4 | C to 4                                             |
| :SP6T:[x]:STATE:5 | C to 5                                             |
| :SP6T:[x]:STATE:6 | C to 6                                             |

x = switch number

## POWER-UP OPTIONS

| Mode        | Initial Switch Paths                                                      |
|-------------|---------------------------------------------------------------------------|
| Default     | Switches revert to the default state on power-up (all ports disconnected) |
| Last States | Switches maintain the active state                                        |

Switches maintain the active state when the power supply is turned off or disconnected



## 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 Time <sup>5</sup> | 400 μs typ                                       |

5. Based on the polling interval of the USB HID protocol 1 ms with 64 bytes per packet / 125 μs with 1024 bytes per packet and no other significant CPU or USB activity

## SOFTWARE &amp; 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](mailto: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                                                                                                                                           |
| :SP6T:[sw_label]:STATE:[port] | Set a single switch state: <ul style="list-style-type: none"> <li>• [sw_label] = 1 to 2</li> <li>• [port] = 0 (all ports disconnected) to 6 (C to 6)</li> </ul> |
| :SP6T:[sw_label]:STATE?       | Get a single switch state: <ul style="list-style-type: none"> <li>• [sw_label] = 1 to 2</li> </ul>                                                              |

**GRAPHICAL USER INTERFACE (GUI) FOR WINDOWS**

- Connect via USB or Ethernet
- Run GUI in "demo mode" to evaluate software without a hardware connection
- View and set all switch states at the click of a button
- Configure automated / timed switching sequences
- Set switch power-up states
- Configure Ethernet settings
- Update firmware

Mini-Circuits RCMX (version 1.0.0)

**Available Devices**

RCMX-2SP6T-E67 596111

**Add LAN Device** **Add USB Device**

**Model Name** RCMX-2SP6T-E67

**User Defined Name** My\_Device

**Serial Number** 596111

**Firmware** 9.5.32

**Connection** Ethernet

**IP Address** 192.168.20.88

**TCP Port** 23

**Network Protocol** TELNET

**Switch Control** **Programming** **Automation** **Configuration**

| Switch | Switch Name | Active Path  |
|--------|-------------|--------------|
| 1      | SP6T        | Disconnected |
| 2      | SP6T        | Disconnected |

Contact: ztmgroup@minicircuits.com



USB & ETHERNET

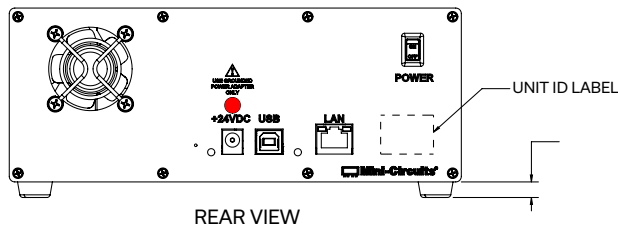
# Mechanical Switch Assembly

RCMX-2SP6T-E67

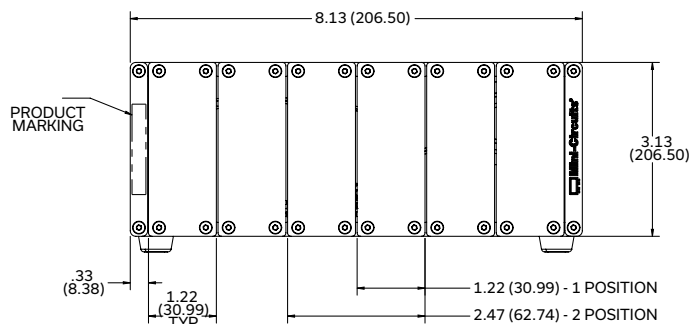
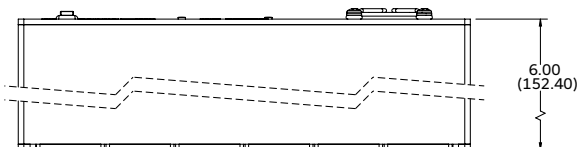
Mini-Circuits

50Ω DC to 67 GHz 2 x SP6T 1.85 mm Female

## CASE STYLE DRAWING

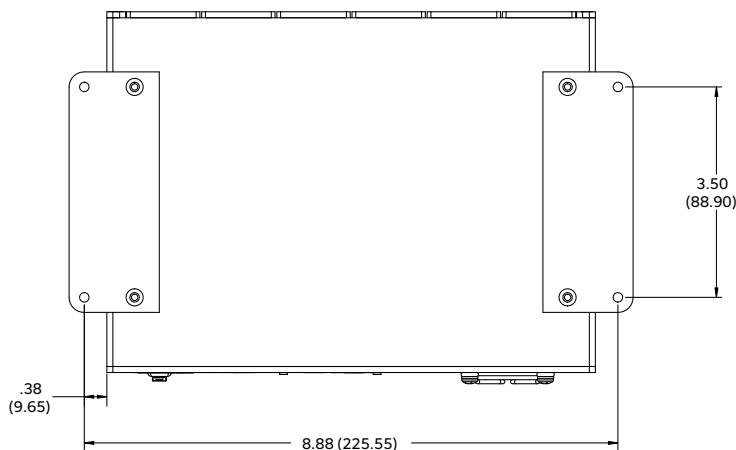


REAR VIEW



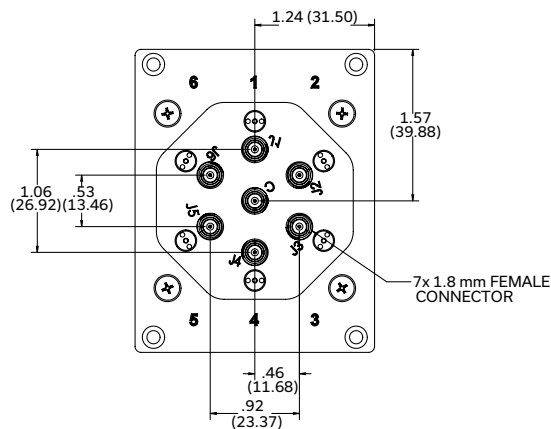
FRONT VIEW

BRACKET OPTION  
ONE SET OF 2 EACH

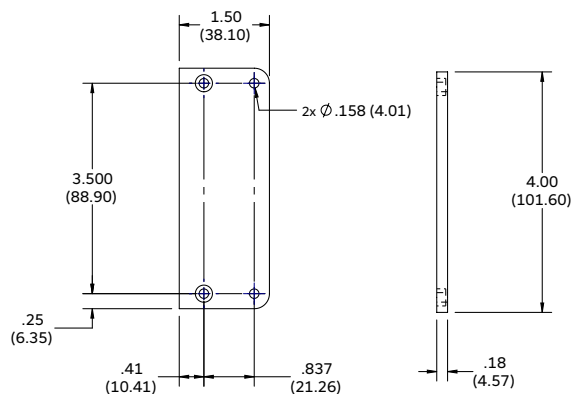


BOTTOM VIEW

SHOWN WITH RUBBER FEET REMOVED AND BRACKETS INSTALLED



SP6TA-67GHz



INSTRUCTION FOR MOUNTING BRACKETS:  
TOOL REQUIRED: PHILLIPS HEAD SCREW DRIVER  
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.

## PRODUCT MARKING\*

RCMX-2SP6T-E67

\*Marking may contain other features or characters for internal lot control

Mini-Circuits



## USB & ETHERNET

# Mechanical Switch Assembly

## RCMX-2SP6T-E67

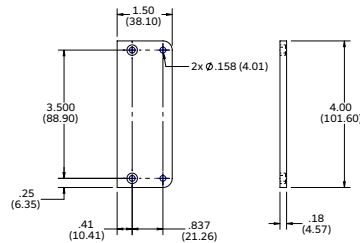
50Ω DC to 67 GHz 2 x SP6T 1.85 mm Female

DETAILED MODEL INFORMATION IS AVAILABLE ON OUR WEBSITE [CLICK HERE](#)

|                                           |                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Case Style                                | BBY3749                                                                                                                                                                                                                                                                                                      |
| Software, User Guide & Programming Manual | <a href="http://www.minicircuits.com/softwaredownload/rcmx.html">www.minicircuits.com/softwaredownload/rcmx.html</a>                                                                                                                                                                                         |
| Environmental Rating                      | ENV55                                                                                                                                                                                                                                                                                                        |
| Regulatory Compliance                     | <p>Refer to our website for compliance methodologies and qualifications</p>  <a href="http://www.minicircuits.com/quality/environmental_introduction.html">www.minicircuits.com/quality/environmental_introduction.html</a> |

Contact Us: [testsolutions@minicircuits.com](mailto: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)<br>Select one option from the list below.<br>Please contact <a href="mailto:testsolutions@minicircuits.com">testsolutions@minicircuits.com</a> if your regions is not listed. |
|   | USB-CBL-AB-3+  | USB cable (2.7ft) type A to type B                                                                                                                                                                                           |
|  | CBL-RJ45-MM-5+ | Ethernet cable (5 ft)                                                                                                                                                                                                        |

| Optional Accessories                                                                                                                                                                                                 | Part Number | Description                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------|
|  <p>Dimensions: 1.50 (38.10), 3.500 (88.90), 2x Ø.158 (4.01), 4.00 (101.60), .25 (6.35), .41 (10.41), .837 (21.26), .18 (4.57)</p> | BKT-272-08+ | Pair of base mounting brackets |

| AC Power Cord Options                                                               | Part Number | Description                                                        |
|-------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------|
|  | CBL-3W1-US  | USA<br>NEMA 5-15 plug (type B) to IEC C5 connector                 |
|  | CBL-3W1-EU  | Europe<br>CEE 7/7 plug (type E/F) to IEC C5 connector              |
|  | CBL-3W1-UK  | UK<br>BS-1363 plug (type G) to IEC C5 connector                    |
|  | CBL-3W1-AU  | Australia & China<br>AS/NZS 3112 plug (type I) to IEC C5 connector |
|  | CBL-3W1-IL  | Israel<br>SI-32 plug (type H) to IEC C13 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-Circuits' 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](http://www.minicircuits.com/MCLStore/terms.jsp)

