



Mini-Circuits

USB & ETHERNET

# Mechanical Switch Assembly **RC-1SPDT-A18**

50Ω DC to 18 GHz SPDT SMA-Female

## THE BIG DEAL

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

## 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



CASE STYLE: LM1848

DOWNLOAD

SOFTWARE PACKAGE

**RoHS Compliant**

See our website for RoHS Compliance methodologies and qualifications

## PRODUCT OVERVIEW

Mini-Circuits' RC-1SPDT-A18 is an independently controlled, electro mechanical SPDT switch. It operates over an extremely wide bandwidth, from DC to 18 GHz with high isolation and low insertion loss. The absorptive switch is of a failsafe 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 switch               | Mechanical absorptive switches provide high reliability, repeatable high performance and internal termination of input signals on the disconnected paths                                                                                                   |
| Fail-safe design                | The switch reverts 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 |

**Mini-Circuits**

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RC-1SPDT-A18  
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Mechanical Switch Assembly **RC-1SPDT-A18**

50Ω DC to 18 GHz SPDT SMA-Female

**ELECTRICAL SPECIFICATIONS**

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

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                 | 0 to +40   | °C    |
|                            | Storage                   | -15 to +85 |       |
| DC Supply Voltage          |                           | +26        | V     |
| Input Power<br>(No Damage) | Cold switching            | 40         | W     |
|                            | Hot switching             | 1          |       |
|                            | Into internal termination | 1          |       |

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 | COM to 1   | 100 |     | mA    |
|                        | COM to 2   | 280 |     |       |

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 |
|----------------|--------------|-----------------------|
| SETA = 0       | Com-1        | Green                 |
| SETA = 1       | Com-2        | 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

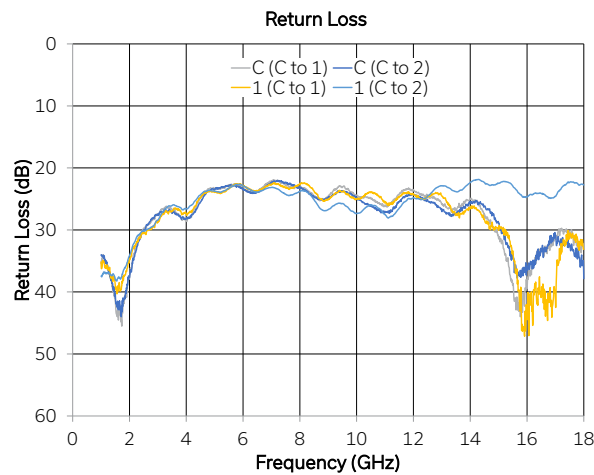
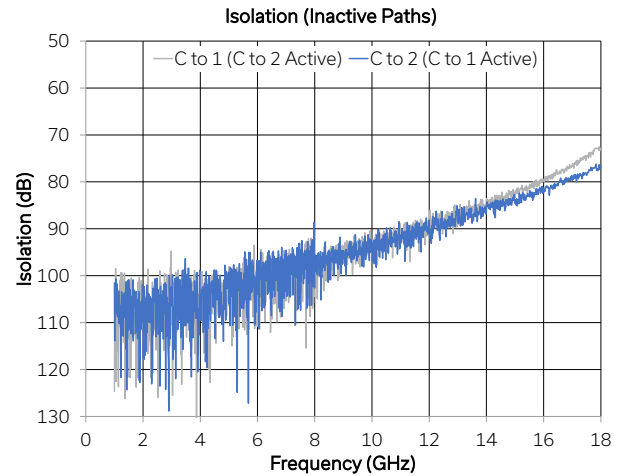
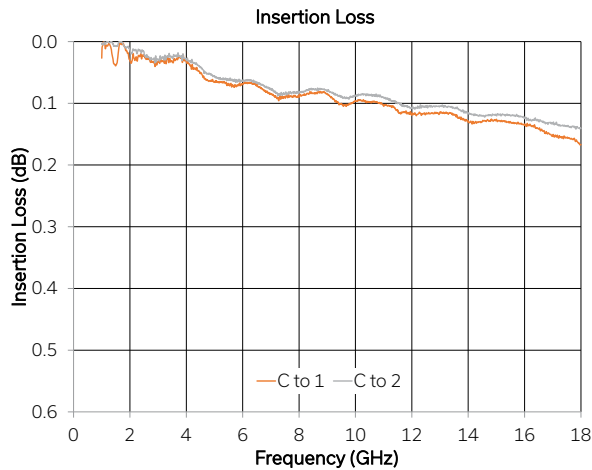


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# Mechanical Switch Assembly **RC-1SPDT-A18**

50Ω DC to 18 GHz SPDT SMA-Female

## TYPICAL PERFORMANCE GRAPHS



Mechanical Switch Assembly **RC-1SPDT-A18**

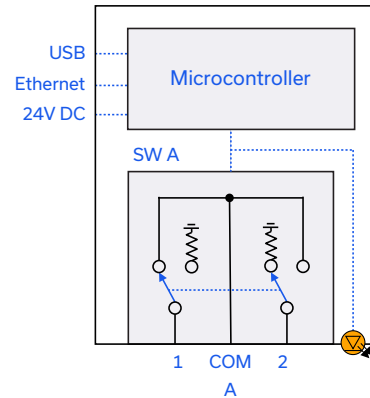
50Ω DC to 18 GHz SPDT SMA-Female

## CONNECTIONS

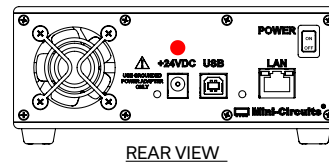
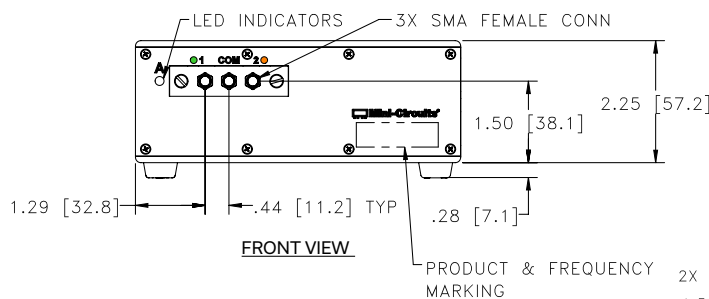
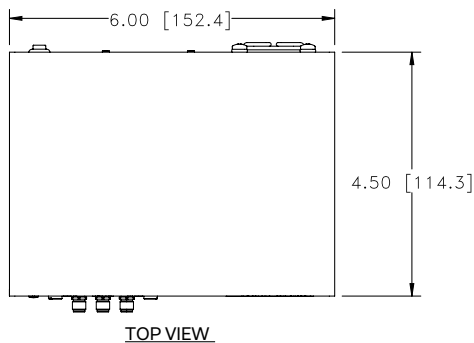
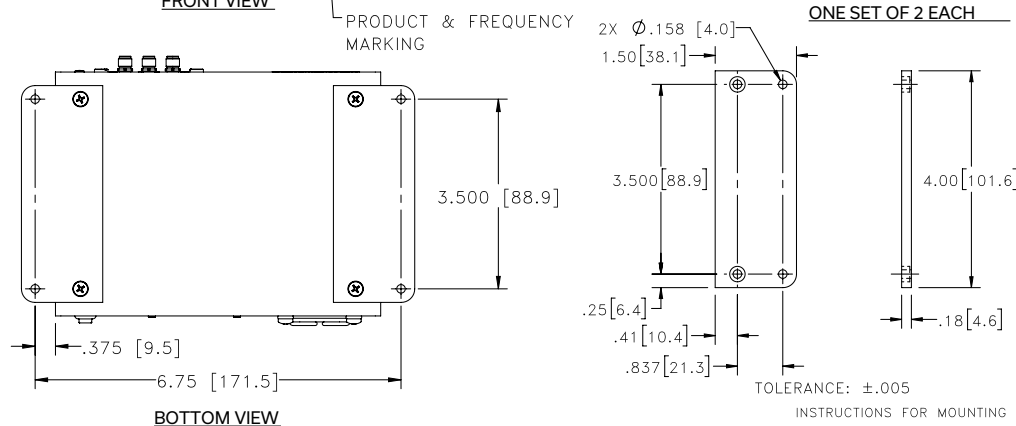
| Port Name              | Connector Type                     |
|------------------------|------------------------------------|
| 24V <sub>DC</sub> IN   | (2.1 mm center positive DC Socket) |
| COM & 1-2              | (SMA female)                       |
| USB                    | (USB type B receptacle)            |
| Network (Ethernet/LAN) | (RJ45 socket)                      |

## SWITCHING CONFIGURATION:

- Fail-safe
- Absorptive (internal terminations on ports J1-J2)



## OUTLINE DRAWING (LM1848)

BRACKET OPTION  
ONE SET OF 2 EACH

SHOWN WITH RUBBER FEET REMOVED AND BRACKETS INSTALLED.

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: 857 grams.

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

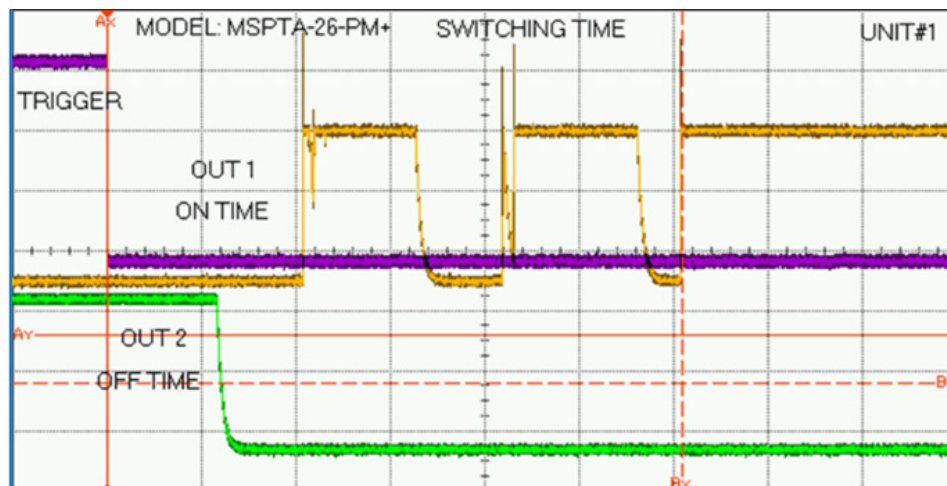
Mechanical Switch Assembly **RC-1SPDT-A18****TYPICAL SWITCHING PERFORMANCE**

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



Mechanical Switch Assembly **RC-1SPDT-A18**

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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 Time <sup>5</sup> | 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](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                                                                                                                                                                                                                                                                                                    |
| SET[sw_label]=[port] | Set a single switch state: <ul style="list-style-type: none"> <li>• [sw_label] = A</li> <li>• [port] = 0 (Com to 1) or 1 (Com to 2)</li> <li>• Example: SETA=1 (set SPDT A with Com to 2)</li> </ul>                                                                                                                     |
| SWPORT?              | Get the state of all switches: <ul style="list-style-type: none"> <li>• 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:</li> <li>• 0 = COM to 1</li> <li>• 1 = COM to 2</li> </ul> |

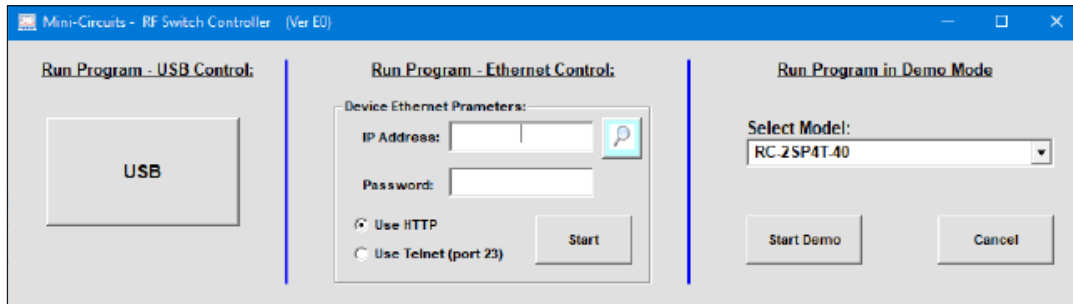


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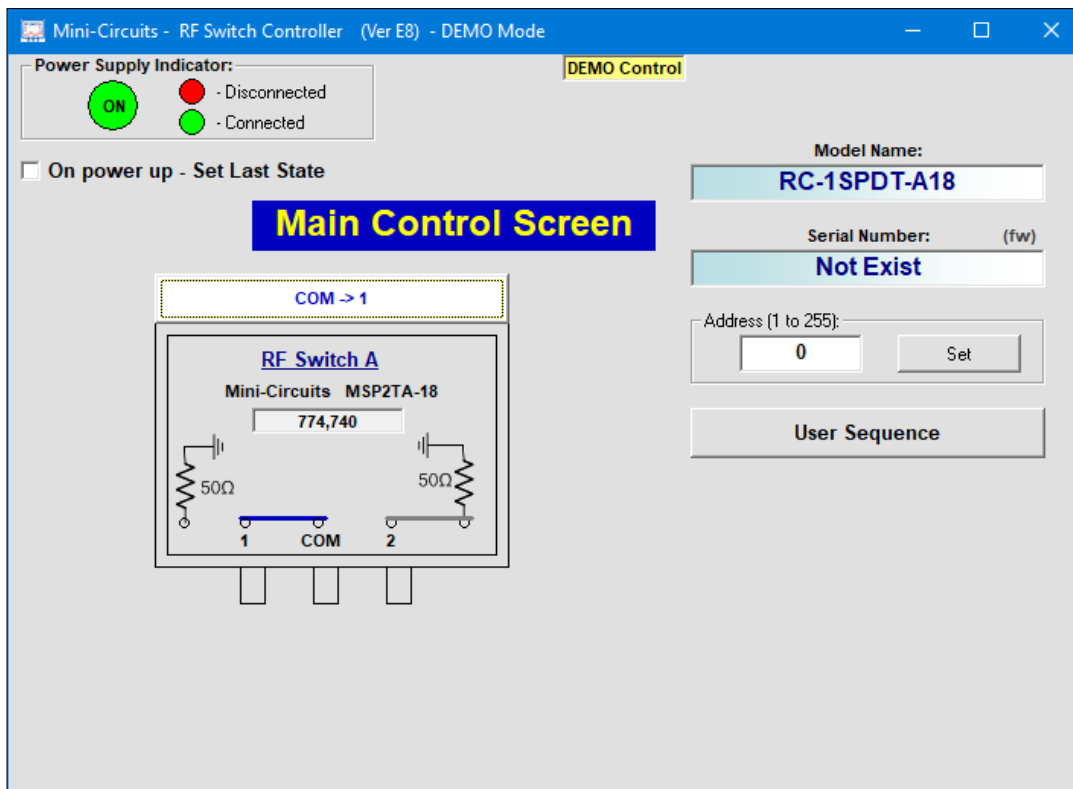
50Ω DC to 18 GHz SPDT SMA-Female

## 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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# Mechanical Switch Assembly **RC-1SPDT-A18**

50Ω DC to 18 GHz SPDT SMA-Female

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

|                                           |                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Case Style                                | LM1848                                                                                                                                                                                                                                                                                                       |
| Software, User Guide & Programming Manual | <a href="http://www.minicircuits.com/softwaredownload/rfswitchcontroller.html">www.minicircuits.com/softwaredownload/rfswitchcontroller.html</a>                                                                                                                                                             |
| Environmental Rating                      | ENV104                                                                                                                                                                                                                                                                                                       |
| 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 (2.7 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<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 C5 connector                  |

## NOTES

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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](http://www.minicircuits.com/terms/viewterm.html)





# Xtra Long Life USB/Ethernet RF SPDT

## RC-1SPDT-A18

### Typical Performance Data

TEST CONDITIONS: @Temperature = 0degC

| FREQUENCY<br>(MHz) | INSERTION LOSS<br>ON<br>(dB) |       | ISOLATION<br>OFF<br>(dB) |        | VSWR COM<br>(:1) |      | VSWR<br>COM->2<br>(:1) |      | VSWR<br>COM->1<br>(:1) |      |
|--------------------|------------------------------|-------|--------------------------|--------|------------------|------|------------------------|------|------------------------|------|
|                    |                              |       |                          |        |                  |      |                        |      |                        |      |
|                    | COM-1                        | COM-2 | COM-1                    | COM-2  | ON               | OFF  | 1                      | 2    | 1                      | 2    |
| 10                 | 0.02                         | 0.02  | 92.69                    | 86.49  | 1.01             | 1.01 | 1.00                   | 1.00 | 1.01                   | 1.01 |
| 20                 | 0.02                         | 0.01  | 86.06                    | 87.87  | 1.01             | 1.01 | 1.00                   | 1.00 | 1.01                   | 1.01 |
| 30                 | 0.03                         | 0.02  | 78.50                    | 89.42  | 1.01             | 1.00 | 1.00                   | 1.01 | 1.00                   | 1.01 |
| 40                 | 0.03                         | 0.02  | 87.99                    | 86.57  | 1.01             | 1.01 | 1.00                   | 1.01 | 1.01                   | 1.01 |
| 50                 | 0.00                         | 0.00  | 85.58                    | 86.20  | 1.01             | 1.01 | 1.00                   | 1.01 | 1.01                   | 1.01 |
| 60                 | 0.01                         | 0.01  | 88.17                    | 88.75  | 1.01             | 1.01 | 1.00                   | 1.01 | 1.01                   | 1.01 |
| 70                 | 0.01                         | 0.01  | 111.04                   | 86.47  | 1.01             | 1.01 | 1.00                   | 1.01 | 1.01                   | 1.01 |
| 80                 | 0.01                         | 0.00  | 93.25                    | 86.40  | 1.01             | 1.01 | 1.01                   | 1.01 | 1.01                   | 1.01 |
| 90                 | 0.01                         | 0.00  | 84.68                    | 86.35  | 1.01             | 1.01 | 1.01                   | 1.01 | 1.01                   | 1.02 |
| 100                | 0.01                         | 0.00  | 91.27                    | 91.27  | 1.01             | 1.01 | 1.01                   | 1.01 | 1.01                   | 1.02 |
| 200                | 0.01                         | 0.00  | 91.56                    | 97.21  | 1.01             | 1.01 | 1.02                   | 1.01 | 1.01                   | 1.03 |
| 300                | 0.00                         | 0.00  | 94.03                    | 104.54 | 1.01             | 1.01 | 1.02                   | 1.02 | 1.01                   | 1.03 |
| 400                | 0.01                         | 0.01  | 95.48                    | 99.11  | 1.02             | 1.02 | 1.02                   | 1.02 | 1.02                   | 1.03 |
| 500                | 0.01                         | 0.01  | 103.50                   | 102.97 | 1.01             | 1.01 | 1.02                   | 1.01 | 1.01                   | 1.02 |
| 600                | 0.01                         | 0.02  | 96.73                    | 98.55  | 1.01             | 1.01 | 1.01                   | 1.01 | 1.01                   | 1.02 |
| 700                | 0.02                         | 0.02  | 99.74                    | 102.52 | 1.01             | 1.01 | 1.02                   | 1.01 | 1.01                   | 1.02 |
| 800                | 0.02                         | 0.02  | 105.65                   | 100.78 | 1.01             | 1.01 | 1.02                   | 1.01 | 1.01                   | 1.02 |
| 900                | 0.02                         | 0.02  | 99.56                    | 102.99 | 1.01             | 1.02 | 1.02                   | 1.02 | 1.02                   | 1.03 |
| 1000               | 0.02                         | 0.03  | 105.33                   | 97.50  | 1.01             | 1.01 | 1.02                   | 1.02 | 1.02                   | 1.03 |
| 1200               | 0.02                         | 0.03  | 95.06                    | 104.12 | 1.01             | 1.01 | 1.03                   | 1.01 | 1.01                   | 1.03 |
| 1400               | 0.02                         | 0.03  | 104.83                   | 110.41 | 1.02             | 1.01 | 1.03                   | 1.01 | 1.01                   | 1.03 |
| 1600               | 0.03                         | 0.03  | 94.89                    | 99.77  | 1.02             | 1.02 | 1.03                   | 1.02 | 1.02                   | 1.03 |
| 1800               | 0.03                         | 0.03  | 103.10                   | 103.23 | 1.02             | 1.03 | 1.04                   | 1.02 | 1.02                   | 1.03 |
| 2000               | 0.03                         | 0.04  | 103.84                   | 103.70 | 1.02             | 1.03 | 1.04                   | 1.02 | 1.02                   | 1.04 |
| 2200               | 0.03                         | 0.04  | 93.08                    | 102.31 | 1.02             | 1.02 | 1.05                   | 1.02 | 1.02                   | 1.04 |
| 2400               | 0.04                         | 0.05  | 102.45                   | 104.45 | 1.03             | 1.04 | 1.05                   | 1.03 | 1.03                   | 1.05 |
| 2600               | 0.04                         | 0.05  | 111.34                   | 96.36  | 1.03             | 1.05 | 1.06                   | 1.04 | 1.04                   | 1.06 |
| 2800               | 0.04                         | 0.05  | 105.47                   | 103.64 | 1.03             | 1.04 | 1.07                   | 1.04 | 1.04                   | 1.06 |
| 3000               | 0.05                         | 0.05  | 101.65                   | 98.86  | 1.03             | 1.04 | 1.08                   | 1.04 | 1.04                   | 1.07 |
| 3200               | 0.05                         | 0.06  | 97.59                    | 105.83 | 1.04             | 1.06 | 1.08                   | 1.06 | 1.06                   | 1.08 |
| 3400               | 0.06                         | 0.07  | 99.40                    | 102.61 | 1.06             | 1.09 | 1.10                   | 1.08 | 1.09                   | 1.10 |
| 3600               | 0.06                         | 0.06  | 105.16                   | 112.37 | 1.07             | 1.08 | 1.10                   | 1.08 | 1.08                   | 1.11 |
| 4000               | 0.07                         | 0.07  | 100.12                   | 102.42 | 1.10             | 1.13 | 1.12                   | 1.12 | 1.12                   | 1.13 |
| 4500               | 0.08                         | 0.09  | 110.61                   | 104.60 | 1.14             | 1.14 | 1.13                   | 1.15 | 1.15                   | 1.14 |
| 5000               | 0.10                         | 0.12  | 101.66                   | 99.14  | 1.19             | 1.22 | 1.14                   | 1.23 | 1.21                   | 1.17 |
| 5500               | 0.12                         | 0.13  | 104.68                   | 106.94 | 1.24             | 1.21 | 1.13                   | 1.23 | 1.21                   | 1.15 |
| 6000               | 0.12                         | 0.14  | 102.68                   | 99.55  | 1.26             | 1.23 | 1.13                   | 1.27 | 1.23                   | 1.17 |
| 6500               | 0.12                         | 0.14  | 101.00                   | 95.07  | 1.26             | 1.19 | 1.10                   | 1.24 | 1.19                   | 1.15 |
| 7000               | 0.12                         | 0.13  | 97.32                    | 97.36  | 1.23             | 1.14 | 1.08                   | 1.20 | 1.16                   | 1.13 |
| 7500               | 0.12                         | 0.13  | 92.52                    | 93.66  | 1.19             | 1.13 | 1.06                   | 1.16 | 1.12                   | 1.11 |
| 8000               | 0.12                         | 0.13  | 100.57                   | 96.16  | 1.17             | 1.08 | 1.06                   | 1.13 | 1.09                   | 1.11 |
| 8500               | 0.15                         | 0.14  | 95.34                    | 93.74  | 1.12             | 1.08 | 1.07                   | 1.11 | 1.08                   | 1.11 |
| 9000               | 0.15                         | 0.14  | 94.67                    | 91.78  | 1.08             | 1.06 | 1.05                   | 1.05 | 1.04                   | 1.10 |
| 9500               | 0.16                         | 0.15  | 92.17                    | 93.77  | 1.06             | 1.02 | 1.07                   | 1.10 | 1.04                   | 1.11 |
| 10000              | 0.17                         | 0.17  | 92.10                    | 91.45  | 1.07             | 1.05 | 1.08                   | 1.06 | 1.02                   | 1.11 |
| 12000              | 0.21                         | 0.18  | 91.26                    | 86.33  | 1.03             | 1.06 | 1.12                   | 1.04 | 1.07                   | 1.05 |
| 13000              | 0.26                         | 0.20  | 87.46                    | 84.59  | 1.06             | 1.08 | 1.21                   | 1.06 | 1.10                   | 1.14 |
| 14000              | 0.29                         | 0.22  | 87.80                    | 81.01  | 1.12             | 1.11 | 1.27                   | 1.14 | 1.15                   | 1.25 |
| 15000              | 0.36                         | 0.28  | 83.73                    | 78.00  | 1.27             | 1.25 | 1.31                   | 1.25 | 1.25                   | 1.32 |
| 16000              | 0.46                         | 0.34  | 82.49                    | 75.43  | 1.19             | 1.31 | 1.27                   | 1.23 | 1.27                   | 1.26 |
| 17000              | 0.38                         | 0.28  | 81.40                    | 72.40  | 1.09             | 1.11 | 1.22                   | 1.04 | 1.10                   | 1.12 |
| 18000              | 0.43                         | 0.33  | 80.97                    | 69.69  | 1.27             | 1.08 | 1.26                   | 1.20 | 1.05                   | 1.18 |

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REV. OR

RC-1SPDT-A18

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Page 1 of 3

# Xtra Long Life USB/Ethernet RF SPDT

## RC-1SPDT-A18

### Typical Performance Data

TEST CONDITIONS: @Temperature = +25degC

| FREQUENCY<br>(MHz) | INSERTION LOSS<br>ON<br>(dB) |       | ISOLATION<br>OFF<br>(dB) |        | VSWR COM<br>(:1) |      | VSWR<br>COM->2<br>(:1) |      | VSWR<br>COM->1<br>(:1) |      |
|--------------------|------------------------------|-------|--------------------------|--------|------------------|------|------------------------|------|------------------------|------|
|                    | COM-1                        | COM-2 | COM-1                    | COM-2  | ON               | OFF  | 1                      | 2    | 1                      | 2    |
|                    |                              |       |                          |        |                  |      |                        |      |                        |      |
| 10                 | 0.00                         | 0.00  | 86.43                    | 93.17  | 1.00             | 1.00 | 1.00                   | 1.02 | 1.02                   | 1.01 |
| 20                 | 0.02                         | 0.02  | 87.42                    | 90.43  | 1.00             | 1.00 | 1.00                   | 1.01 | 1.01                   | 1.01 |
| 30                 | 0.02                         | 0.02  | 89.26                    | 93.81  | 1.00             | 1.00 | 1.00                   | 1.00 | 1.00                   | 1.01 |
| 40                 | 0.03                         | 0.03  | 91.18                    | 87.61  | 1.00             | 1.01 | 1.00                   | 1.00 | 1.00                   | 1.01 |
| 50                 | 0.00                         | 0.00  | 91.95                    | 88.50  | 1.00             | 1.00 | 1.00                   | 1.00 | 1.00                   | 1.01 |
| 60                 | 0.00                         | 0.00  | 92.97                    | 88.43  | 1.00             | 1.00 | 1.00                   | 1.00 | 1.00                   | 1.01 |
| 70                 | 0.01                         | 0.01  | 88.69                    | 88.95  | 1.00             | 1.00 | 1.00                   | 1.00 | 1.00                   | 1.01 |
| 80                 | 0.01                         | 0.01  | 106.34                   | 86.65  | 1.00             | 1.00 | 1.00                   | 1.00 | 1.00                   | 1.01 |
| 90                 | 0.01                         | 0.00  | 89.91                    | 98.42  | 1.00             | 1.00 | 1.00                   | 1.00 | 1.00                   | 1.01 |
| 100                | 0.00                         | 0.01  | 92.71                    | 86.88  | 1.00             | 1.00 | 1.00                   | 1.00 | 1.00                   | 1.01 |
| 200                | 0.01                         | 0.01  | 94.79                    | 97.05  | 1.00             | 1.00 | 1.01                   | 1.01 | 1.01                   | 1.01 |
| 300                | 0.02                         | 0.02  | 109.88                   | 90.43  | 1.00             | 1.00 | 1.01                   | 1.01 | 1.01                   | 1.01 |
| 400                | 0.02                         | 0.02  | 102.23                   | 99.10  | 1.01             | 1.01 | 1.01                   | 1.01 | 1.01                   | 1.01 |
| 500                | 0.02                         | 0.02  | 97.52                    | 101.30 | 1.01             | 1.00 | 1.01                   | 1.01 | 1.01                   | 1.01 |
| 600                | 0.03                         | 0.03  | 100.41                   | 100.25 | 1.01             | 1.00 | 1.01                   | 1.01 | 1.01                   | 1.01 |
| 700                | 0.03                         | 0.03  | 98.46                    | 100.26 | 1.01             | 1.01 | 1.01                   | 1.01 | 1.01                   | 1.01 |
| 800                | 0.03                         | 0.03  | 107.02                   | 108.08 | 1.01             | 1.01 | 1.01                   | 1.01 | 1.01                   | 1.01 |
| 900                | 0.03                         | 0.03  | 98.13                    | 102.59 | 1.01             | 1.01 | 1.02                   | 1.01 | 1.01                   | 1.01 |
| 1000               | 0.03                         | 0.04  | 106.26                   | 108.06 | 1.01             | 1.01 | 1.02                   | 1.01 | 1.01                   | 1.02 |
| 1200               | 0.04                         | 0.04  | 105.64                   | 118.05 | 1.01             | 1.01 | 1.02                   | 1.00 | 1.01                   | 1.02 |
| 1400               | 0.04                         | 0.04  | 113.89                   | 108.14 | 1.01             | 1.01 | 1.03                   | 1.00 | 1.01                   | 1.02 |
| 1600               | 0.05                         | 0.05  | 109.89                   | 113.36 | 1.01             | 1.01 | 1.03                   | 1.01 | 1.01                   | 1.02 |
| 1800               | 0.04                         | 0.05  | 101.11                   | 105.12 | 1.02             | 1.02 | 1.04                   | 1.01 | 1.01                   | 1.03 |
| 2000               | 0.05                         | 0.06  | 98.50                    | 108.08 | 1.03             | 1.02 | 1.04                   | 1.01 | 1.01                   | 1.03 |
| 2200               | 0.05                         | 0.06  | 109.01                   | 102.61 | 1.04             | 1.02 | 1.05                   | 1.02 | 1.02                   | 1.04 |
| 2400               | 0.06                         | 0.06  | 97.17                    | 103.88 | 1.05             | 1.03 | 1.05                   | 1.02 | 1.02                   | 1.04 |
| 2600               | 0.06                         | 0.07  | 102.67                   | 99.87  | 1.06             | 1.03 | 1.06                   | 1.03 | 1.03                   | 1.05 |
| 2800               | 0.06                         | 0.07  | 102.17                   | 101.90 | 1.07             | 1.04 | 1.07                   | 1.03 | 1.04                   | 1.06 |
| 3000               | 0.06                         | 0.07  | 102.72                   | 102.95 | 1.08             | 1.04 | 1.08                   | 1.04 | 1.04                   | 1.06 |
| 3200               | 0.06                         | 0.07  | 108.07                   | 100.45 | 1.08             | 1.06 | 1.09                   | 1.05 | 1.06                   | 1.07 |
| 3400               | 0.07                         | 0.08  | 101.22                   | 103.70 | 1.09             | 1.07 | 1.09                   | 1.06 | 1.07                   | 1.08 |
| 3600               | 0.08                         | 0.08  | 106.01                   | 102.58 | 1.09             | 1.09 | 1.10                   | 1.08 | 1.08                   | 1.09 |
| 4000               | 0.09                         | 0.09  | 105.56                   | 107.81 | 1.10             | 1.11 | 1.11                   | 1.11 | 1.11                   | 1.10 |
| 4500               | 0.10                         | 0.11  | 96.22                    | 96.80  | 1.11             | 1.15 | 1.13                   | 1.15 | 1.15                   | 1.12 |
| 5000               | 0.12                         | 0.13  | 98.62                    | 100.46 | 1.15             | 1.18 | 1.13                   | 1.18 | 1.18                   | 1.14 |
| 5500               | 0.13                         | 0.14  | 105.56                   | 102.08 | 1.21             | 1.20 | 1.13                   | 1.22 | 1.20                   | 1.15 |
| 6000               | 0.14                         | 0.16  | 96.57                    | 94.10  | 1.26             | 1.20 | 1.12                   | 1.23 | 1.21                   | 1.15 |
| 6500               | 0.14                         | 0.16  | 96.21                    | 107.68 | 1.27             | 1.19 | 1.11                   | 1.23 | 1.19                   | 1.15 |
| 7000               | 0.13                         | 0.16  | 99.56                    | 100.96 | 1.24             | 1.16 | 1.10                   | 1.21 | 1.17                   | 1.14 |
| 7500               | 0.15                         | 0.17  | 94.50                    | 101.70 | 1.18             | 1.14 | 1.08                   | 1.20 | 1.15                   | 1.13 |
| 8000               | 0.14                         | 0.16  | 93.06                    | 95.68  | 1.12             | 1.13 | 1.07                   | 1.17 | 1.13                   | 1.12 |
| 8500               | 0.15                         | 0.16  | 92.44                    | 95.29  | 1.06             | 1.09 | 1.07                   | 1.13 | 1.09                   | 1.12 |
| 9000               | 0.14                         | 0.16  | 92.53                    | 92.00  | 1.06             | 1.06 | 1.06                   | 1.09 | 1.06                   | 1.10 |
| 9500               | 0.14                         | 0.16  | 90.69                    | 98.64  | 1.09             | 1.04 | 1.06                   | 1.07 | 1.03                   | 1.10 |
| 10000              | 0.14                         | 0.16  | 90.46                    | 93.90  | 1.10             | 1.02 | 1.07                   | 1.06 | 1.03                   | 1.10 |
| 12000              | 0.16                         | 0.17  | 86.14                    | 90.83  | 1.12             | 1.10 | 1.14                   | 1.04 | 1.10                   | 1.08 |
| 13000              | 0.17                         | 0.19  | 82.24                    | 89.32  | 1.10             | 1.13 | 1.19                   | 1.07 | 1.15                   | 1.14 |
| 14000              | 0.18                         | 0.20  | 77.92                    | 83.48  | 1.22             | 1.15 | 1.25                   | 1.10 | 1.18                   | 1.24 |
| 15000              | 0.21                         | 0.22  | 74.68                    | 81.86  | 1.33             | 1.19 | 1.27                   | 1.14 | 1.19                   | 1.30 |
| 16000              | 0.22                         | 0.24  | 71.05                    | 79.37  | 1.20             | 1.19 | 1.25                   | 1.13 | 1.19                   | 1.28 |
| 17000              | 0.19                         | 0.21  | 67.00                    | 78.15  | 1.18             | 1.11 | 1.23                   | 1.09 | 1.14                   | 1.17 |
| 18000              | 0.17                         | 0.21  | 64.13                    | 77.52  | 1.20             | 1.13 | 1.27                   | 1.06 | 1.14                   | 1.17 |

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# Xtra Long Life USB/Ethernet RF SPDT

## RC-1SPDT-A18

### Typical Performance Data

TEST CONDITIONS: @Temperature = +45degC

| FREQUENCY<br>(MHz) | INSERTION LOSS<br>ON<br>(dB) |       | ISOLATION<br>OFF<br>(dB) |        | VSWR COM<br>(:1) |      | VSWR<br>COM->2<br>(:1) |      | VSWR<br>COM->1<br>(:1) |      |
|--------------------|------------------------------|-------|--------------------------|--------|------------------|------|------------------------|------|------------------------|------|
|                    | COM-1                        | COM-2 | COM-1                    | COM-2  | ON               | OFF  | 1                      | 2    | 1                      | 2    |
|                    |                              |       |                          |        |                  |      |                        |      |                        |      |
| 10                 | 0.01                         | 0.01  | 93.16                    | 86.04  | 1.00             | 1.01 | 1.00                   | 1.03 | 1.03                   | 1.01 |
| 20                 | 0.02                         | 0.01  | 86.95                    | 87.71  | 1.00             | 1.01 | 1.00                   | 1.01 | 1.01                   | 1.01 |
| 30                 | 0.01                         | 0.01  | 87.55                    | 86.33  | 1.00             | 1.00 | 1.00                   | 1.01 | 1.01                   | 1.01 |
| 40                 | 0.01                         | 0.02  | 86.27                    | 85.48  | 1.01             | 1.01 | 1.00                   | 1.01 | 1.01                   | 1.01 |
| 50                 | 0.04                         | 0.04  | 99.67                    | 97.07  | 1.00             | 1.01 | 1.00                   | 1.01 | 1.01                   | 1.01 |
| 60                 | 0.04                         | 0.04  | 90.09                    | 91.49  | 1.00             | 1.00 | 1.00                   | 1.00 | 1.00                   | 1.01 |
| 70                 | 0.03                         | 0.03  | 96.24                    | 90.53  | 1.01             | 1.00 | 1.00                   | 1.00 | 1.00                   | 1.01 |
| 80                 | 0.03                         | 0.03  | 89.09                    | 87.33  | 1.01             | 1.00 | 1.00                   | 1.00 | 1.00                   | 1.01 |
| 90                 | 0.04                         | 0.03  | 87.46                    | 90.96  | 1.01             | 1.01 | 1.00                   | 1.01 | 1.00                   | 1.01 |
| 100                | 0.04                         | 0.03  | 108.00                   | 93.23  | 1.01             | 1.01 | 1.00                   | 1.01 | 1.01                   | 1.01 |
| 200                | 0.04                         | 0.03  | 91.04                    | 110.98 | 1.00             | 1.00 | 1.00                   | 1.01 | 1.00                   | 1.01 |
| 300                | 0.02                         | 0.02  | 112.96                   | 96.74  | 1.01             | 1.00 | 1.00                   | 1.00 | 1.01                   | 1.01 |
| 400                | 0.02                         | 0.01  | 93.21                    | 101.96 | 1.01             | 1.01 | 1.00                   | 1.01 | 1.01                   | 1.01 |
| 500                | 0.02                         | 0.01  | 101.11                   | 107.60 | 1.01             | 1.01 | 1.01                   | 1.01 | 1.01                   | 1.01 |
| 600                | 0.01                         | 0.00  | 98.77                    | 102.27 | 1.01             | 1.01 | 1.01                   | 1.01 | 1.01                   | 1.01 |
| 700                | 0.00                         | 0.00  | 100.18                   | 99.09  | 1.01             | 1.01 | 1.01                   | 1.01 | 1.01                   | 1.01 |
| 800                | 0.00                         | 0.00  | 106.15                   | 102.47 | 1.01             | 1.01 | 1.01                   | 1.00 | 1.01                   | 1.01 |
| 900                | 0.00                         | 0.00  | 99.25                    | 102.98 | 1.01             | 1.01 | 1.01                   | 1.00 | 1.01                   | 1.01 |
| 1000               | 0.00                         | 0.01  | 99.90                    | 105.39 | 1.01             | 1.01 | 1.02                   | 1.01 | 1.01                   | 1.02 |
| 1200               | 0.01                         | 0.01  | 100.12                   | 107.89 | 1.01             | 1.00 | 1.02                   | 1.01 | 1.01                   | 1.02 |
| 1400               | 0.01                         | 0.02  | 100.50                   | 102.06 | 1.01             | 1.01 | 1.02                   | 1.00 | 1.01                   | 1.02 |
| 1600               | 0.01                         | 0.02  | 99.87                    | 117.53 | 1.01             | 1.01 | 1.03                   | 1.01 | 1.00                   | 1.03 |
| 1800               | 0.01                         | 0.02  | 102.17                   | 97.27  | 1.01             | 1.01 | 1.04                   | 1.01 | 1.01                   | 1.04 |
| 2000               | 0.02                         | 0.02  | 96.89                    | 109.32 | 1.02             | 1.02 | 1.05                   | 1.01 | 1.02                   | 1.04 |
| 2200               | 0.02                         | 0.03  | 102.64                   | 101.47 | 1.02             | 1.02 | 1.05                   | 1.01 | 1.01                   | 1.04 |
| 2400               | 0.03                         | 0.04  | 101.33                   | 93.50  | 1.03             | 1.03 | 1.05                   | 1.03 | 1.03                   | 1.04 |
| 2600               | 0.03                         | 0.04  | 106.77                   | 100.51 | 1.03             | 1.04 | 1.07                   | 1.04 | 1.04                   | 1.06 |
| 2800               | 0.03                         | 0.04  | 112.14                   | 102.63 | 1.03             | 1.05 | 1.08                   | 1.05 | 1.05                   | 1.07 |
| 3000               | 0.03                         | 0.04  | 113.00                   | 99.01  | 1.04             | 1.06 | 1.08                   | 1.05 | 1.05                   | 1.07 |
| 3200               | 0.04                         | 0.04  | 107.61                   | 105.71 | 1.05             | 1.07 | 1.08                   | 1.06 | 1.07                   | 1.07 |
| 3400               | 0.05                         | 0.06  | 107.98                   | 114.40 | 1.07             | 1.09 | 1.09                   | 1.08 | 1.09                   | 1.08 |
| 3600               | 0.05                         | 0.06  | 114.87                   | 100.87 | 1.08             | 1.11 | 1.10                   | 1.10 | 1.11                   | 1.10 |
| 4000               | 0.06                         | 0.07  | 98.83                    | 101.56 | 1.11             | 1.13 | 1.11                   | 1.11 | 1.13                   | 1.10 |
| 4500               | 0.08                         | 0.09  | 104.39                   | 112.46 | 1.15             | 1.18 | 1.13                   | 1.17 | 1.18                   | 1.13 |
| 5000               | 0.09                         | 0.10  | 97.43                    | 101.23 | 1.19             | 1.19 | 1.12                   | 1.18 | 1.18                   | 1.13 |
| 5500               | 0.10                         | 0.12  | 105.16                   | 97.84  | 1.22             | 1.20 | 1.13                   | 1.21 | 1.20                   | 1.16 |
| 6000               | 0.10                         | 0.12  | 99.05                    | 98.10  | 1.24             | 1.19 | 1.12                   | 1.21 | 1.19                   | 1.15 |
| 6500               | 0.10                         | 0.13  | 101.27                   | 95.61  | 1.23             | 1.17 | 1.11                   | 1.21 | 1.17                   | 1.16 |
| 7000               | 0.10                         | 0.14  | 95.68                    | 94.61  | 1.22             | 1.15 | 1.11                   | 1.20 | 1.15                   | 1.16 |
| 7500               | 0.12                         | 0.15  | 95.39                    | 101.97 | 1.19             | 1.14 | 1.07                   | 1.19 | 1.13                   | 1.13 |
| 8000               | 0.12                         | 0.15  | 93.75                    | 92.47  | 1.16             | 1.14 | 1.08                   | 1.20 | 1.14                   | 1.15 |
| 8500               | 0.12                         | 0.15  | 93.50                    | 94.53  | 1.13             | 1.09 | 1.06                   | 1.13 | 1.09                   | 1.11 |
| 9000               | 0.12                         | 0.15  | 95.48                    | 90.98  | 1.08             | 1.08 | 1.05                   | 1.11 | 1.08                   | 1.11 |
| 9500               | 0.12                         | 0.14  | 93.48                    | 91.28  | 1.04             | 1.06 | 1.06                   | 1.06 | 1.03                   | 1.11 |
| 10000              | 0.13                         | 0.15  | 93.06                    | 92.02  | 1.03             | 1.06 | 1.05                   | 1.03 | 1.05                   | 1.09 |
| 12000              | 0.15                         | 0.17  | 87.31                    | 85.88  | 1.08             | 1.13 | 1.14                   | 1.06 | 1.13                   | 1.06 |
| 13000              | 0.18                         | 0.21  | 86.93                    | 83.67  | 1.12             | 1.18 | 1.21                   | 1.10 | 1.19                   | 1.11 |
| 14000              | 0.18                         | 0.22  | 85.23                    | 79.47  | 1.12             | 1.16 | 1.26                   | 1.12 | 1.15                   | 1.19 |
| 15000              | 0.17                         | 0.22  | 81.58                    | 75.73  | 1.11             | 1.07 | 1.24                   | 1.07 | 1.06                   | 1.24 |
| 16000              | 0.17                         | 0.25  | 80.35                    | 72.22  | 1.06             | 1.06 | 1.22                   | 1.11 | 1.10                   | 1.22 |
| 17000              | 0.16                         | 0.24  | 78.82                    | 68.49  | 1.04             | 1.09 | 1.30                   | 1.14 | 1.15                   | 1.19 |
| 18000              | 0.23                         | 0.24  | 76.92                    | 66.23  | 1.06             | 1.35 | 1.38                   | 1.17 | 1.37                   | 1.22 |

#### Notes

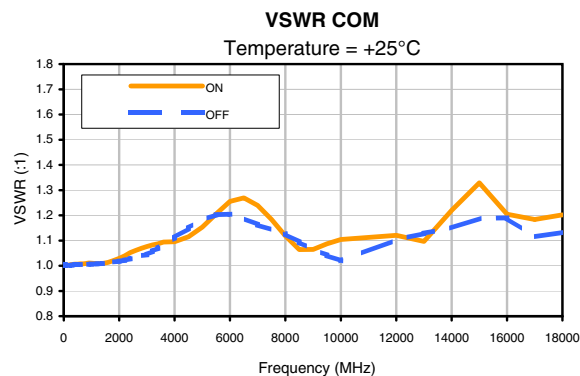
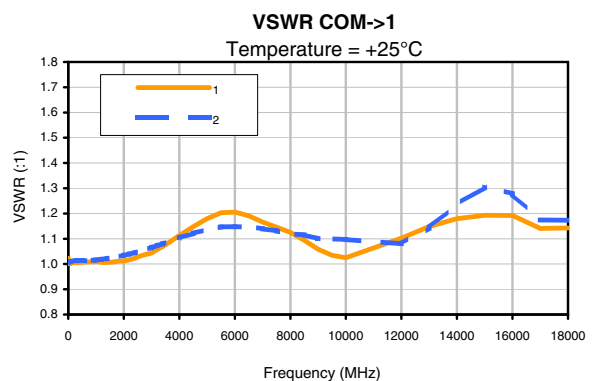
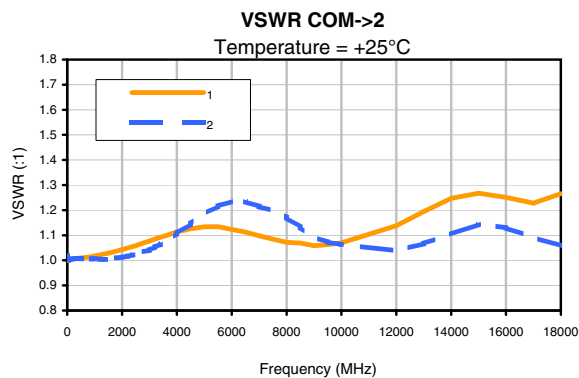
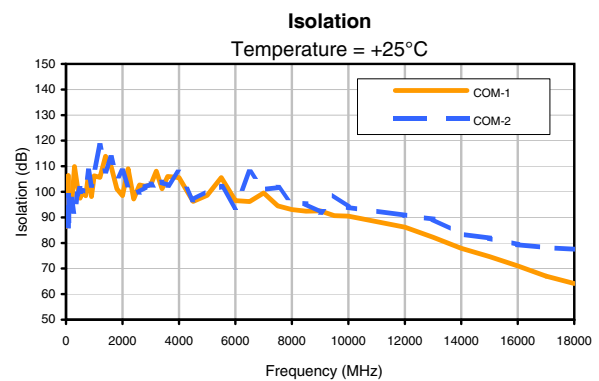
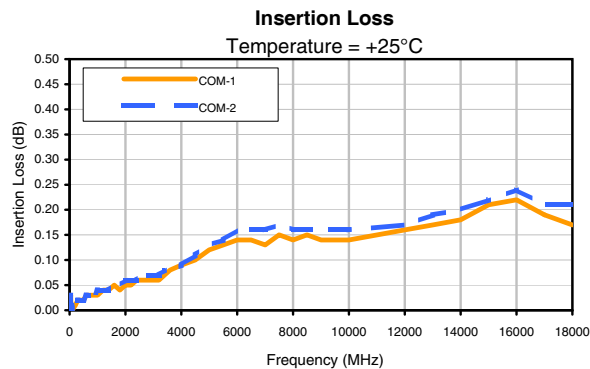
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# Xtra Long Life USB/Ethernet RF SPDT Switch

RC-1SPDT-A18

## Typical Performance Curves



### Notes

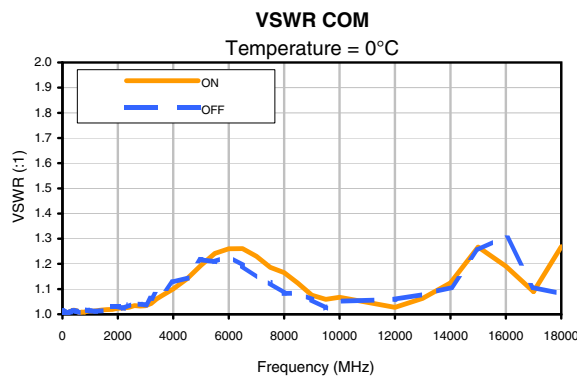
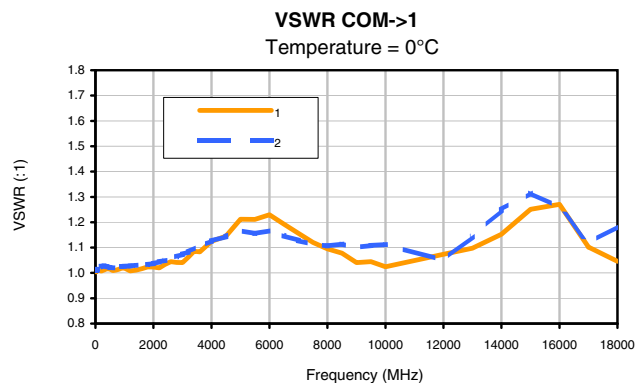
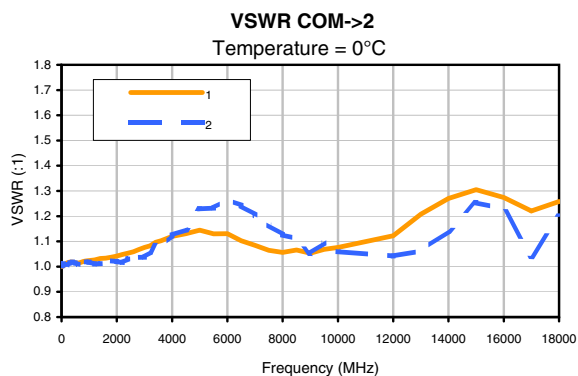
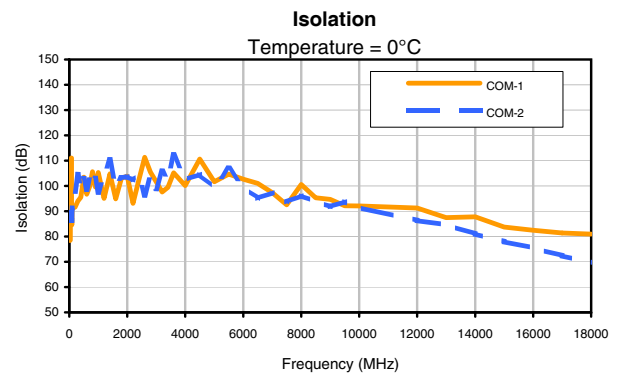
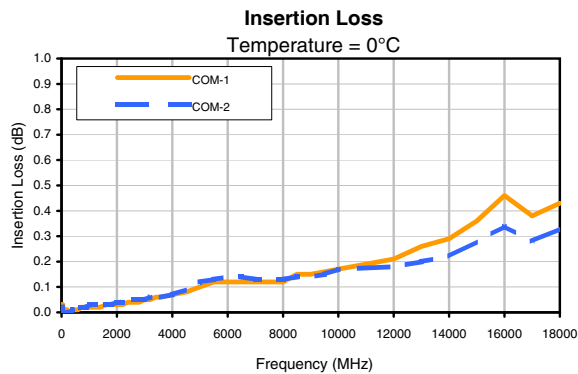
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RC-1SPDT-A18

## Typical Performance Curves



### Notes

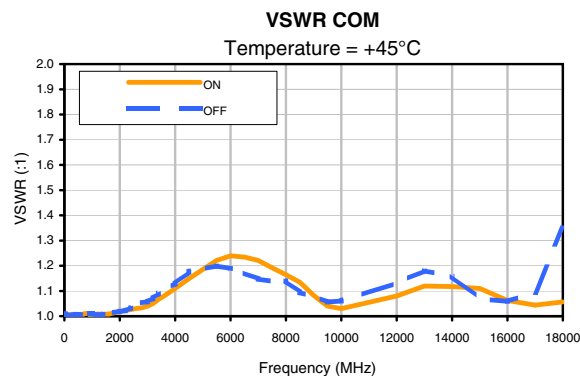
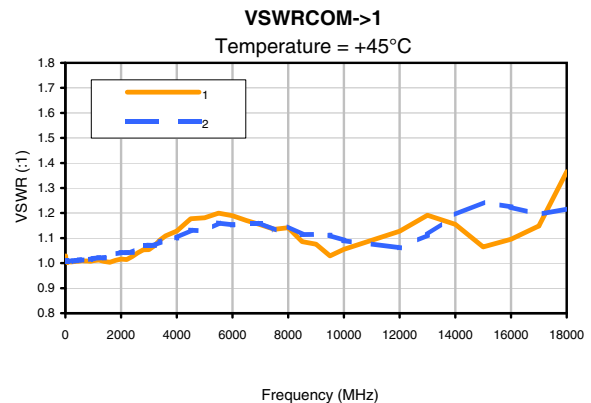
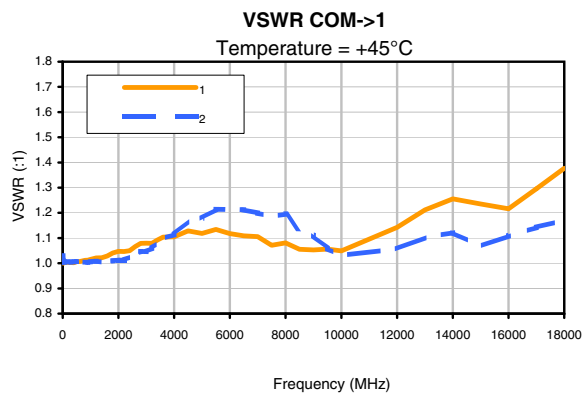
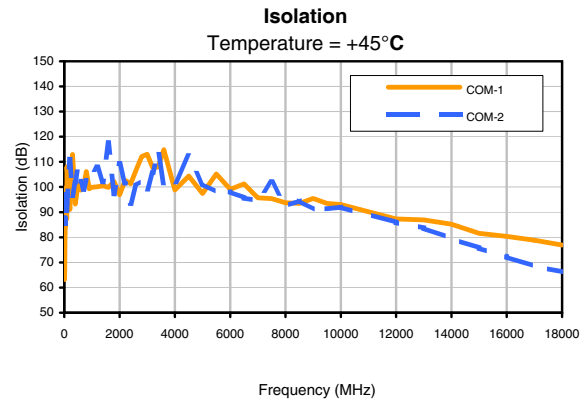
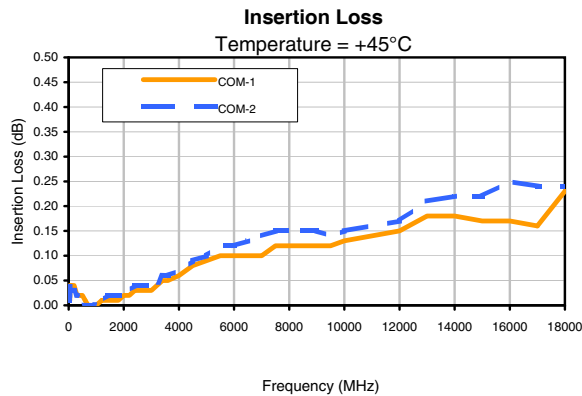
- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuits' applicable established test performance criteria and measurement instructions.
- 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/MCStore/terms.jsp](http://www.minicircuits.com/MCStore/terms.jsp)



# Xtra Long Life USB/Ethernet RF SPDT Switch

RC-1SPDT-A18

## Typical Performance Curves



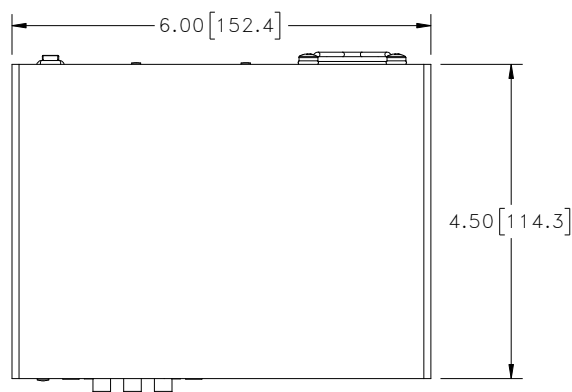
### Notes

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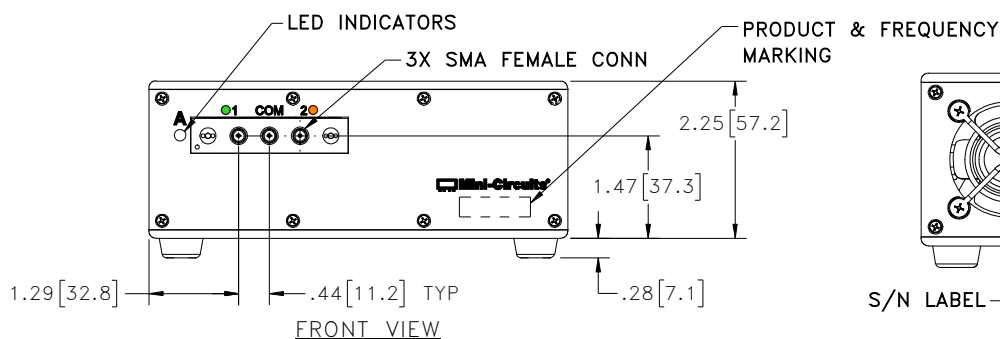


## Outline Dimensions

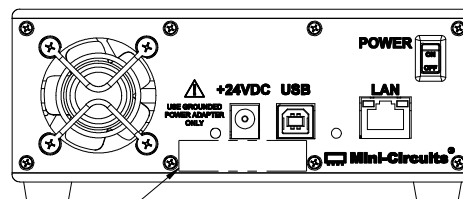
LM1848



TOP VIEW



FRONT VIEW



REAR VIEW

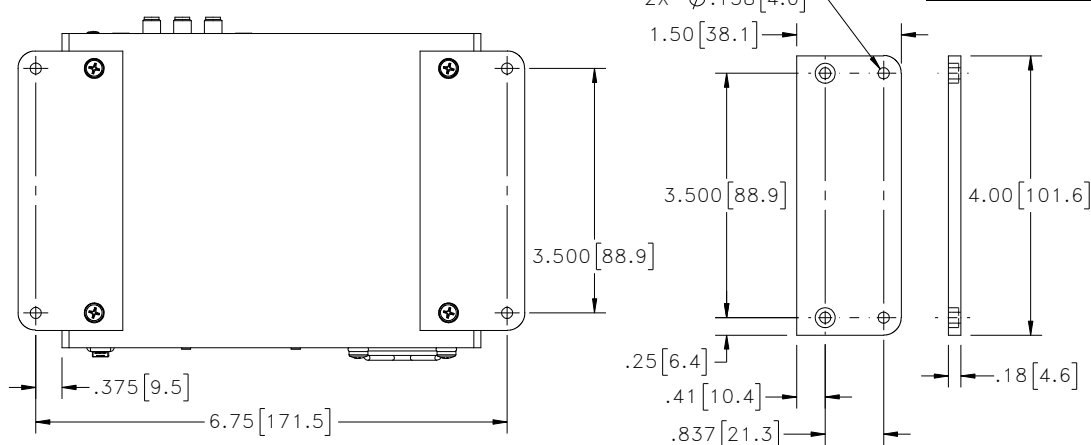
S/N LABEL

BRACKET OPTION  
ONE SET OF 2 EACH

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.



BOTTOM VIEW

SHOWN WITH RUBBER FEET REMOVED AND BRACKETS INSTALLED.

### Notes:

1. Case material: Aluminum (with protective coating to prevent corrosion).
2. Dimensions are in inches [mm]. Tolerances: 2 Pl.  $\pm .03$  inch; 3 Pl.  $\pm .015$  inch.
3. Weight: 875 grams.
4. Marking may contain other features or characters for internal lot control.



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| Specification                  | Test/Inspection Condition           | Reference/Spec              |
|--------------------------------|-------------------------------------|-----------------------------|
| Operating Temperature          | 0° to 40° C<br>Ambient Environment  | Individual Model Data Sheet |
| Storage Temperature            | -15° to 85°C<br>Ambient Environment | Individual Model Data Sheet |
| Operating and Storage Humidity | 5% to 85% RH (non-condensing)       | Ambient                     |
| Bench Handling Test            | Bench Top Tip 45° & Drop            | MIL-PRF-28800F              |
| Transit Drop Test              | Free Fall Drop, 20 cm (7.9 inches)  | MIL-PRF-28800F class 3      |