



USB & ETHERNET CONTROLLED

Mechanical Switch

RC-2SPDT-A40

50Ω DC to 40 GHz 2 x SPDT 2.92 mm Female

THE BIG DEAL

- 2 x mechanical SPDT absorptive switches
- High reliability, millimetre wave switching
- Ethernet & USB control
- Fail-safe / redundancy switching
- LED switch state indicators

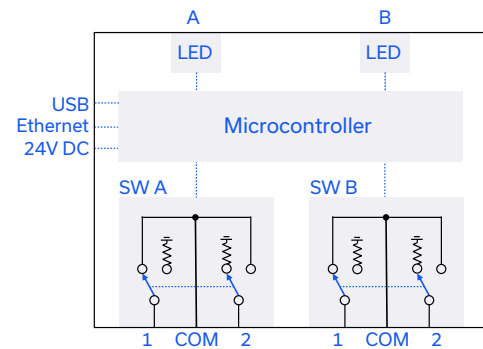


Generic photo used for illustration purposes only

APPLICATIONS

- Automated test & measurement systems
- 5G node / device testing
- Harmonic testing
- Switch matrices

FUNCTIONAL BLOCK DIAGRAM



PRODUCT OVERVIEW

Mini-Circuits' RC-2SPDT-A40 houses 2 independently controlled electro-mechanical SPDT switches. Each switch operates over an extremely wide bandwidth, from DC to 40 GHz with high isolation and low insertion loss. The absorptive switches are failsafe, with a break before make configuration, and lifetime of 2 million switching cycles typically when used within the noted specifications.

The switch box is constructed in a compact, rugged metal case with 2.92mm (f) connectors and LED position indicators on the front panel to enable easy access on a test bench. 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.

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 |
| Operation from DC to 40 GHz | Supports a wide range of RF test and signal routing applications, including 2G, 3G, 4G and 5G, with a single device |
| 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 |
| USB & Ethernet control | USB HID and Ethernet (HTTP / Telnet) interfaces provide easy compatibility with a wide range of software setups and programming environments |

REV. A
ECO-018308
RC-2SPDT-A40
MCL NY
240325





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ELECTRICAL SPECIFICATIONS AT +25°C (EACH SWITCH)

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|-----------------------------------|------|------|------|----------------|
| Frequency Range | | DC | | 40 | GHz |
| Insertion Loss | DC - 12 GHz | | 0.2 | 0.5 | dB |
| | 12 - 26 GHz | | 0.3 | 0.7 | |
| | 26 - 40 GHz | | 0.6 | 1.1 | |
| Isolation | DC - 12 GHz | 60 | 80 | | dB |
| | 12 - 26 GHz | 55 | 75 | | |
| | 26 - 40 GHz | 50 | 65 | | |
| Return Loss | DC - 12 GHz | | 19 | | dB |
| | 12 - 26 GHz | | 17 | | |
| | 26 - 40 GHz | | 14 | | |
| Switching Time | - | | 25 | | ms |
| RF Input Power (Cold Switching) ¹ | DC - 12 GHz | | | 20 | W |
| | 12 - 26 GHz | | | 10 | |
| | 26 - 40 GHz | | | 5 | |
| RF Input Power (Internal Terminations) ² | DC - 40 GHz | | | 1 | W |
| Switch Lifetime | 100 mW hot switching ³ | 2 | | | million cycles |
| | 1W hot switching | | 1 | | |

1. Input power for any connected through path

2. Input power for each internal termination

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



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CONTROL INTERFACES

| | | |
|------------------|-------------------------------------|---|
| Ethernet Control | Supported Protocols | TCP / IP, HTTP, Telnet, DHCP, UDP (limited) |
| | Max Data Rate | 10 Mbps (10 Base-T Half Duplex) |
| USB Control | Supported Protocols | HID - Full Speed |
| | Min Communication Time ¹ | 3 ms typ |

1. Based on the polling interval of the USB HID protocol (1 ms 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

| | 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"> • [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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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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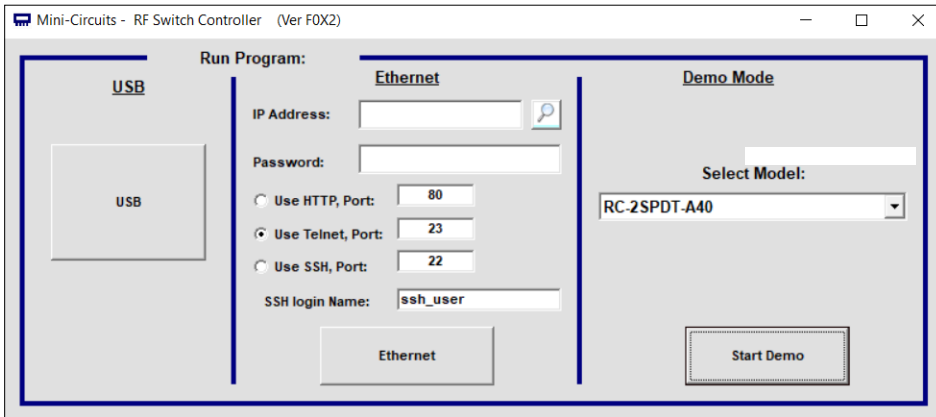
Mechanical Switch

RC-2SPDT-A40

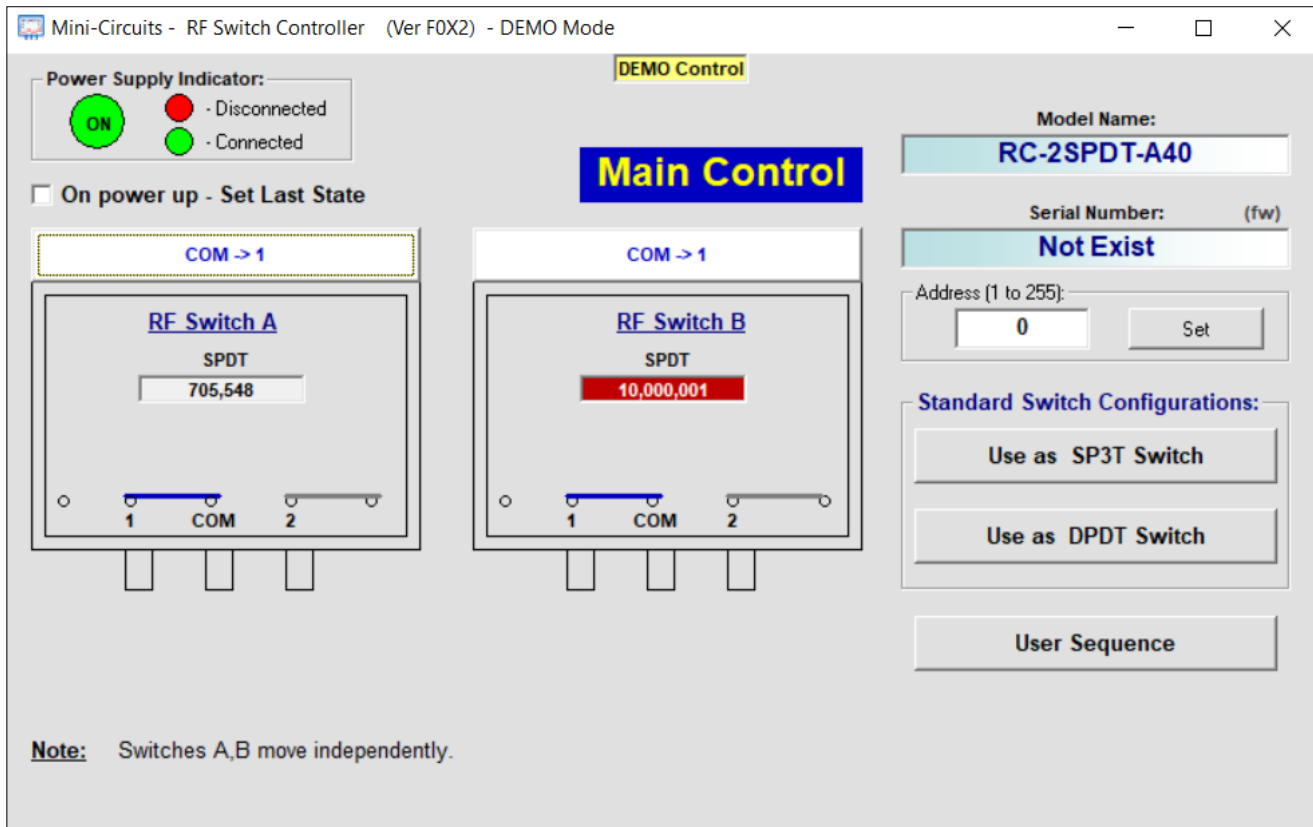
50Ω DC to 40 GHz 2 x SPDT 2.92 mm Female

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
- Configure Ethernet settings
- Update firmware





USB & ETHERNET CONTROLLED

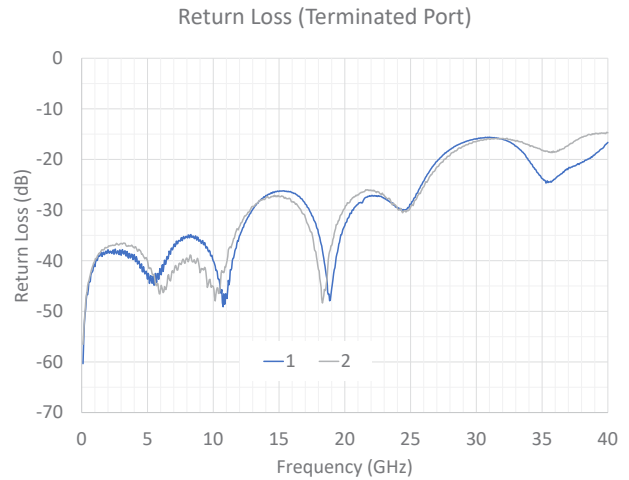
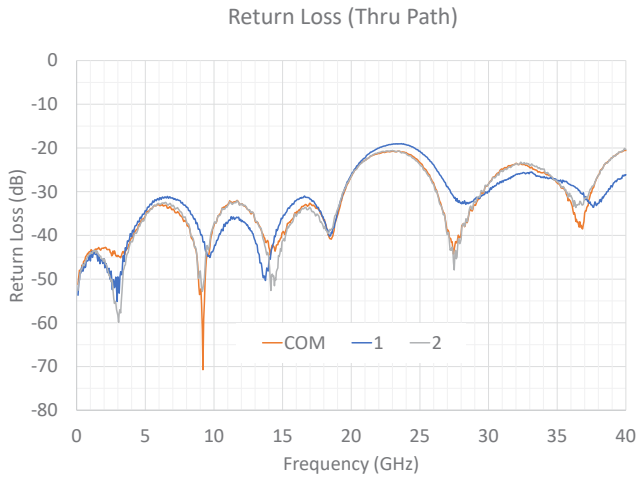
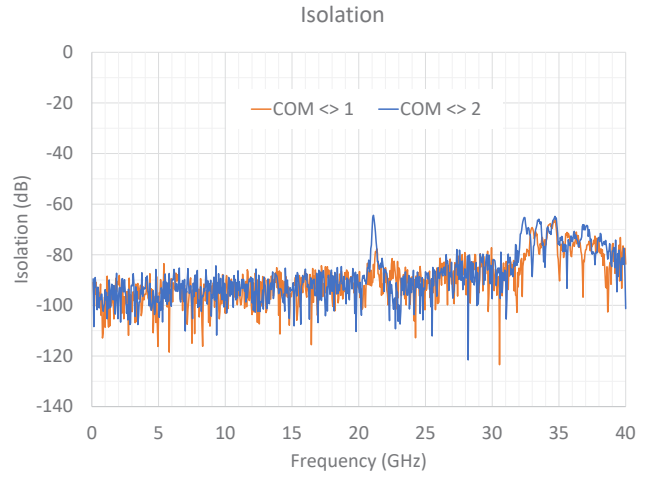
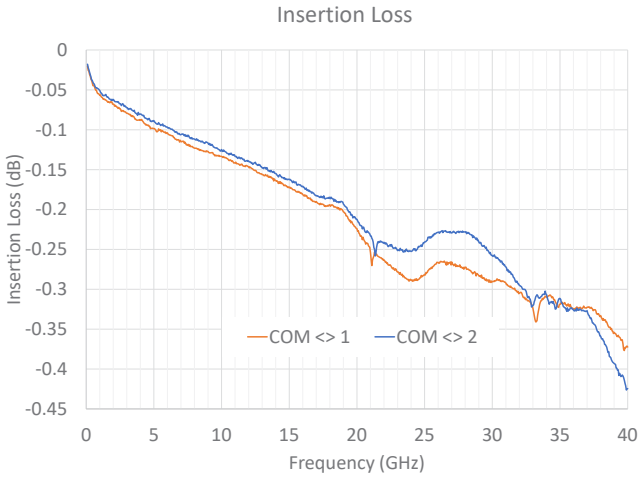
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Mini-Circuits

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TYPICAL PERFORMANCE DATA





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ABSOLUTE MAXIMUM RATINGS

| Parameter | Conditions | Limits | Units |
|-------------------------|---------------------------|------------|-------|
| Temperature | Operating | 0 to +40 | °C |
| | Storage | -15 to +85 | |
| DC Supply Voltage | | 26 | V |
| Input Power (No Damage) | Cold switching: | | W |
| | DC - 12 GHz | 20 | |
| | 12 - 26 GHz | 10 | |
| | 26 - 40 GHz | 5 | |
| | Hot switching | 1 | |
| | Into internal termination | 1 | |

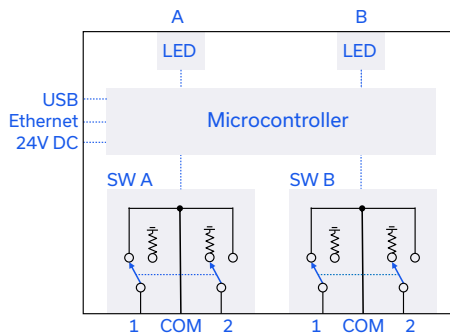
Permanent damage may occur if any of these limits are exceeded. Operating in the range between operating power limits and absolute maximum ratings for extended periods of time may result in reduced life and reliability.

POWER SUPPLY

| Parameter | Typ | Max | Units |
|-----------------------|-----|-----|-------|
| DC Voltage | 24 | 26 | V |
| Current Consumption: | | | mA |
| All switches COM to 1 | 90 | - | |
| All switches COM to 2 | 500 | 700 | |

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

FUNCTIONAL BLOCK DIAGRAM



CONNECTIONS

| Port | Connector |
|--------------------------------|----------------------------------|
| SW A-B (COM, 1 & 2 per switch) | 2.92 mm female |
| USB | USB type B |
| Ethernet / LAN | RJ45 |
| 24V DC Input | 2.1 mm center positive DC socket |

COM = Common port
1 & 2 = Input / output ports

SWITCH CONTROL LOGIC

| Switch Command | Switch State | | Front Panel LED Color | |
|----------------|--------------|----------|-----------------------|-------|
| | A | B | A | B |
| SETA=0 | COM to 1 | x | Green | x |
| SETA=1 | COM to 2 | x | Red | x |
| SETB=0 | x | COM to 1 | x | Green |
| SETB=1 | x | COM to 2 | x | Red |

x = Switch / LED state not affected by this switch command



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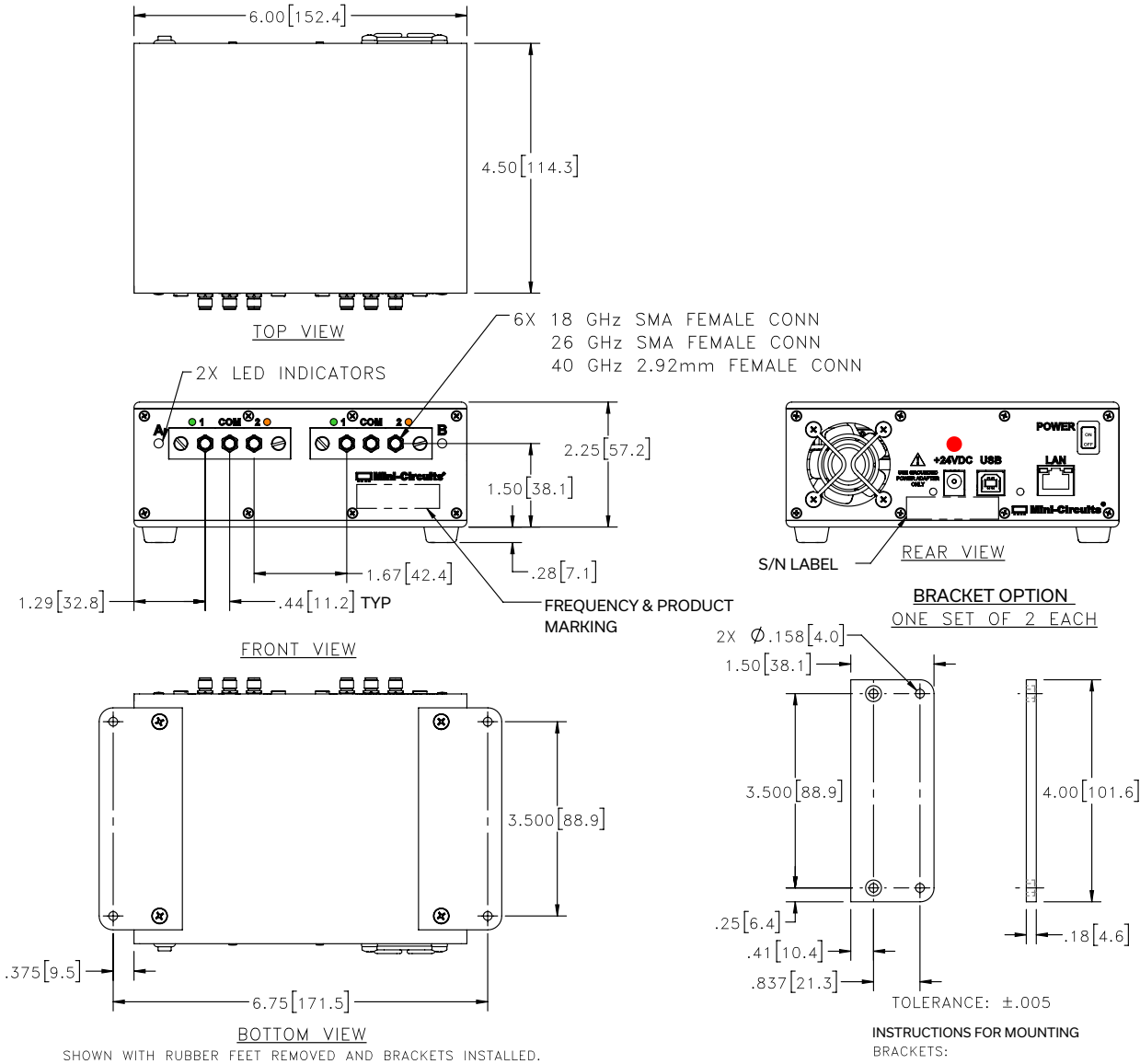
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CASE STYLE DRAWING



Weight: 960 grams.

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

PRODUCT MARKING*

RC-2SPDT-A40

DC-40 GHz

Serial Number

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

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.



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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 | <p>Refer to our website for compliance methodologies and qualifications</p>  <p>www.minicircuits.com/quality/environmental_introduction.html</p> |

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) |

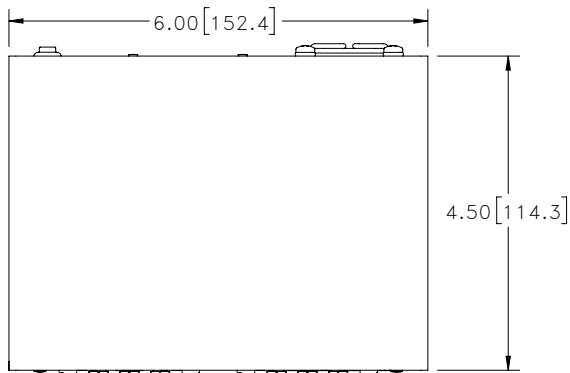
| AC Power Cord Options | Part Number | Description |
|---|-------------|--|
|  | CBL-3W1-US | USA NEMA 5-15 plug (type B) to IEC C5 connector |
|  | CBL-3W1-EU | Europe CEE 7/7 plug (type E/F) to IEC C5 connector |
|  | CBL-3W1-UK | UK BS-1363 plug (type G) to IEC C5 connector |
|  | CBL-3W1-AU | Australia & 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

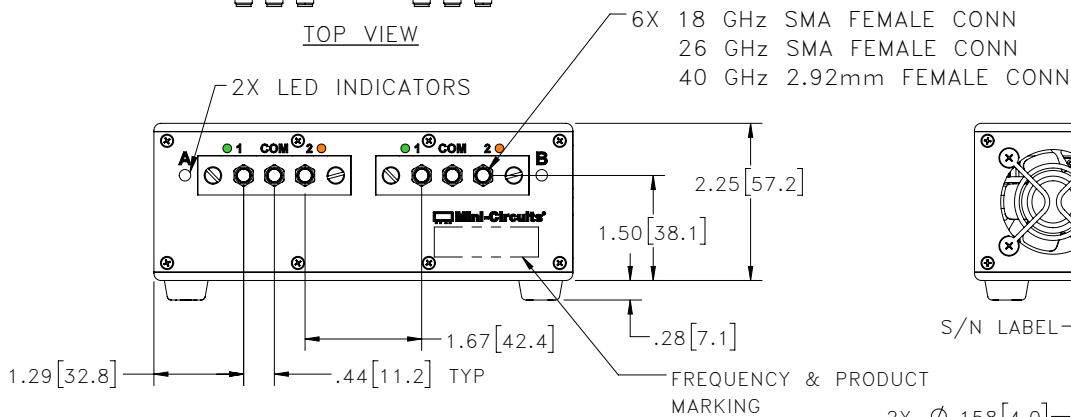


Outline Dimensions

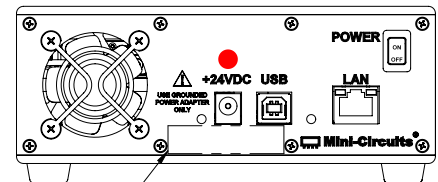
LM1849



TOP VIEW



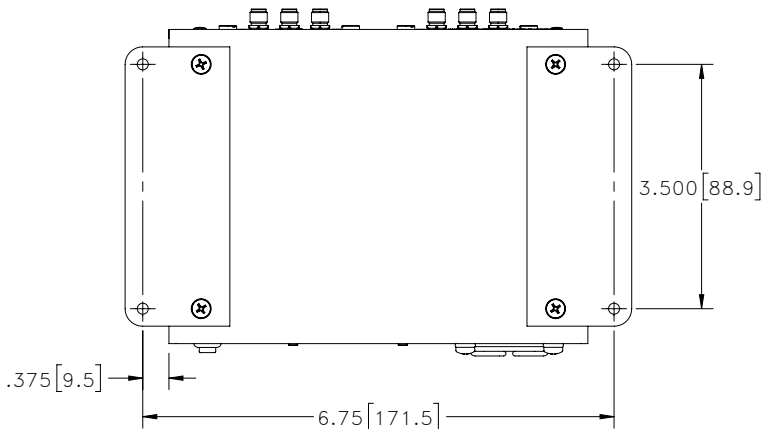
FRONT VIEW



REAR VIEW

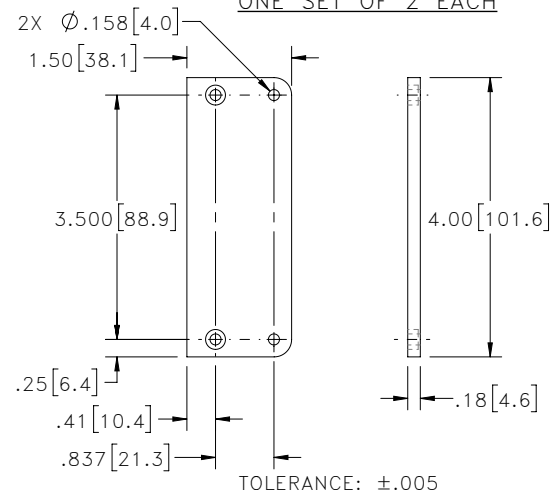
S/N LABEL

BRACKET OPTION
ONE SET OF 2 EACH



BOTTOM VIEW

SHOWN WITH RUBBER FEET REMOVED AND BRACKETS INSTALLED.



TOLERANCE: ±.005

Notes:

1. Case material: Aluminum (with protective coating to prevent corrosion).
2. Dimensions are in inches [mm]. Tolerances: 2 Pl. ±.03 inch; 3 Pl. ±.015 inch.
3. Weight: 960 grams.
4. Marking may contain other features or characters for internal lot control.

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.



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



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: 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 Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -15° to 85°C 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 |