USB & ETHERNET CONTROLLED

Mechanical Switch

RC-2SPDT-A40

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

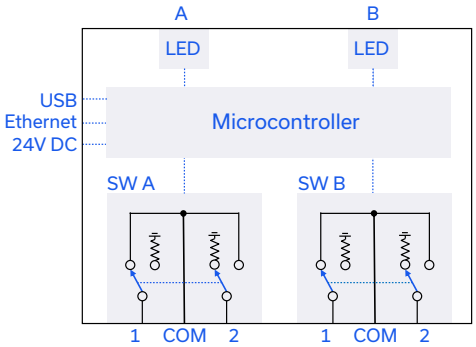
THE BIG DEAL

- 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

FUNCTIONAL BLOCK DIAGRAM



APPLICATIONS

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

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. B
ECO-028391
RC-2SPDT-A40
MCL NY
260202

Mechanical Switch RC-2SPDT-A40

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

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[1] (Inactive Paths)	DC – 12 GHz	60	80		dB
	12 – 26 GHz	55	75		
	26 – 40 GHz	50	65		
Return Loss[2]	DC – 12 GHz		19		dB
	12 – 26 GHz		17		
	26 – 40 GHz		14		
Switching Time			25		ms
RF Input Power	Cold switching, DC – 12 GHz			20	W
	Cold switching, 12 – 26 GHz			10	
	Cold switching, 26 – 40 GHz			5	
	Hot switching[3]			0.1	
	Into internal termination[4]			1	
Switching Lifetime			2		million cycles

1. Isolation measured between Com and the 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

Mechanical Switch RC-2SPDT-A40

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

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: • [sw_label] = A to B • [port] = 0 (Com to 1) or 1 (Com to 2) • Example: SETA=1 (set SPDT A with Com to 2)

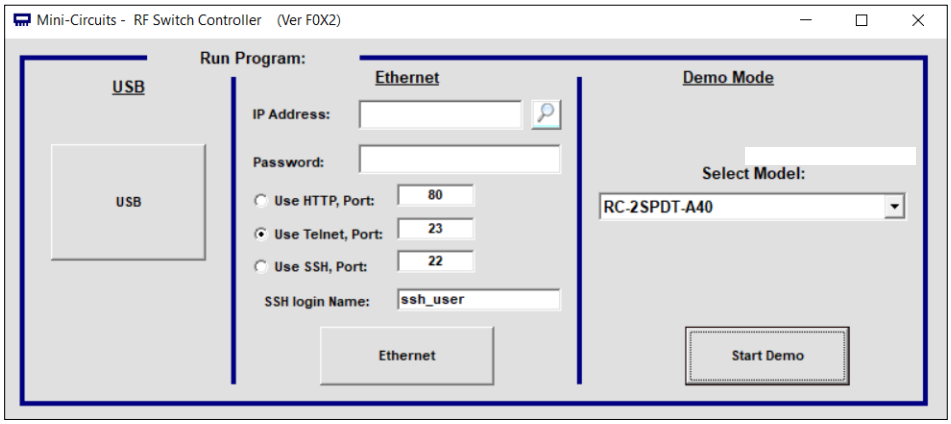
SWPORT?	Get the state of all switches:
	• Returns a byte value, with the 2 least significant bits each representing the state of an individual SPDT (switch A is the least significant bit). The value for each switch will be:
	  • 0 = COM to 1
	  • 1 = COM to 2
	• Example: A returned value of 2 is represented as 00000010 indicating SW B = 1 (Com to 2) & SW A = 0 (Com to 1)

Mechanical Switch RC-2SPDT-A40

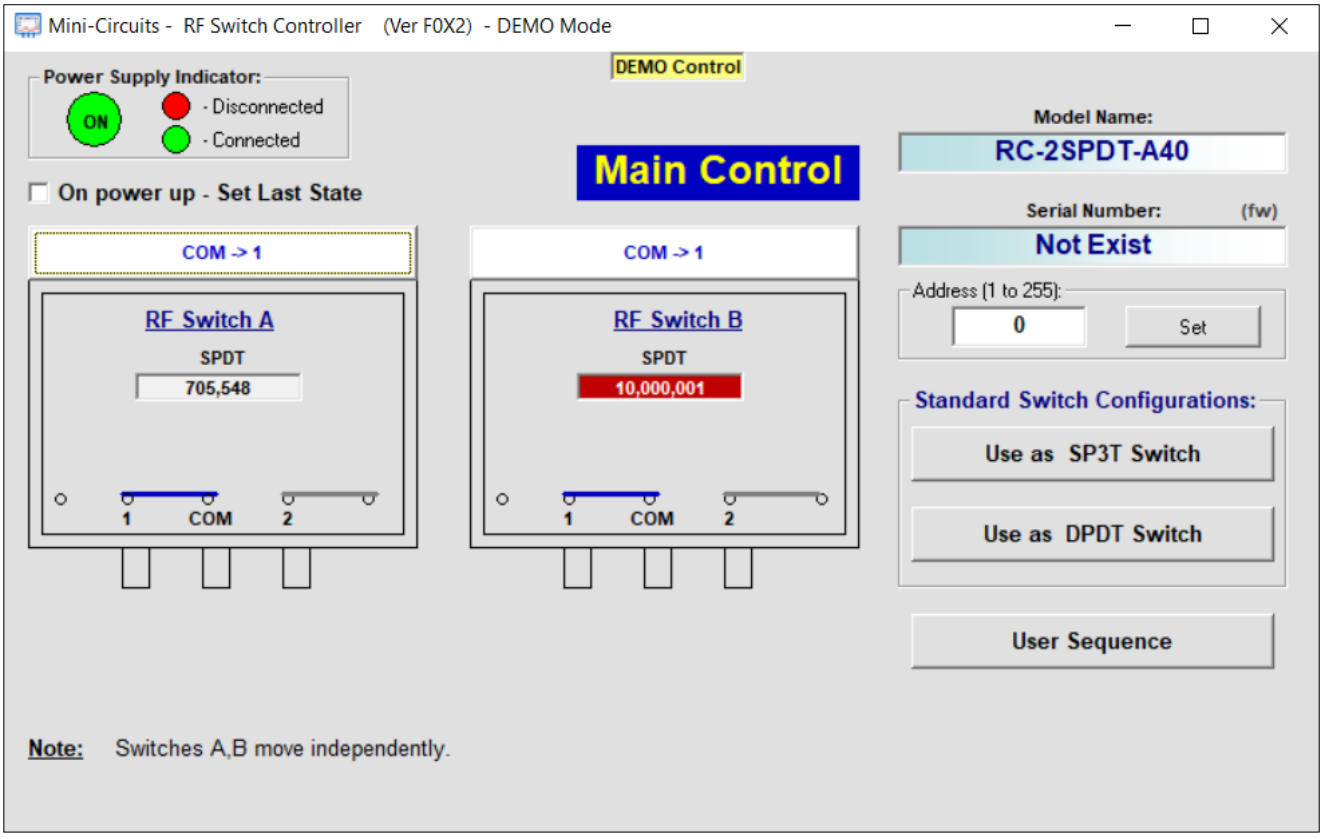
50Ω DC to 40 GHz 2 x SPDT 2.92 mm Female

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

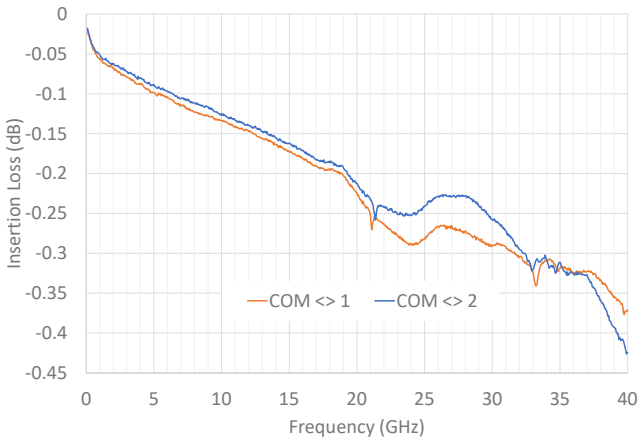


Mechanical Switch RC-2SPDT-A40

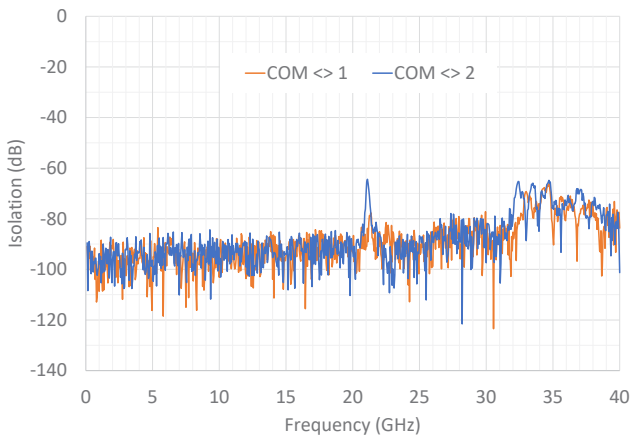
50Ω DC to 40 GHz 2 x SPDT 2.92 mm Female

TYPICAL PERFORMANCE GRAPHS

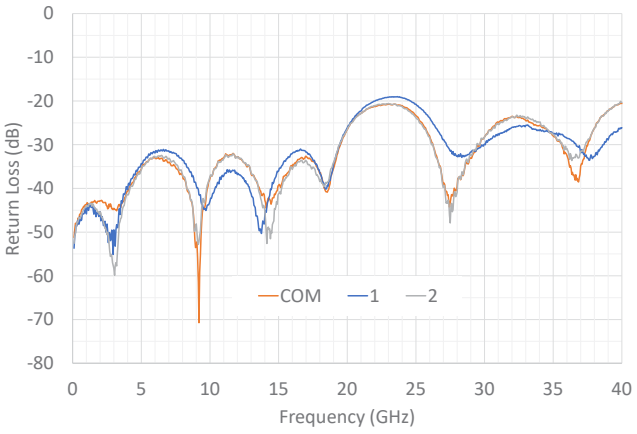
Insertion Loss



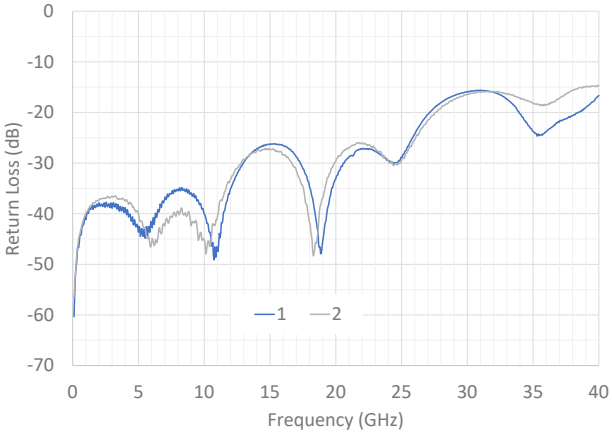
Isolation



Return Loss (Thru Path)



Return Loss (Terminated Port)



Mechanical Switch RC-2SPDT-A40

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

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	

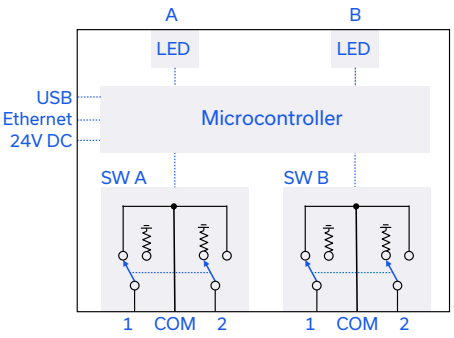
Permanent damage may occur if any of these limits are exceeded. Operating in the range between operating power limits and absolute maximum ratings for extended periods of time may result in reduced life and reliability.

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

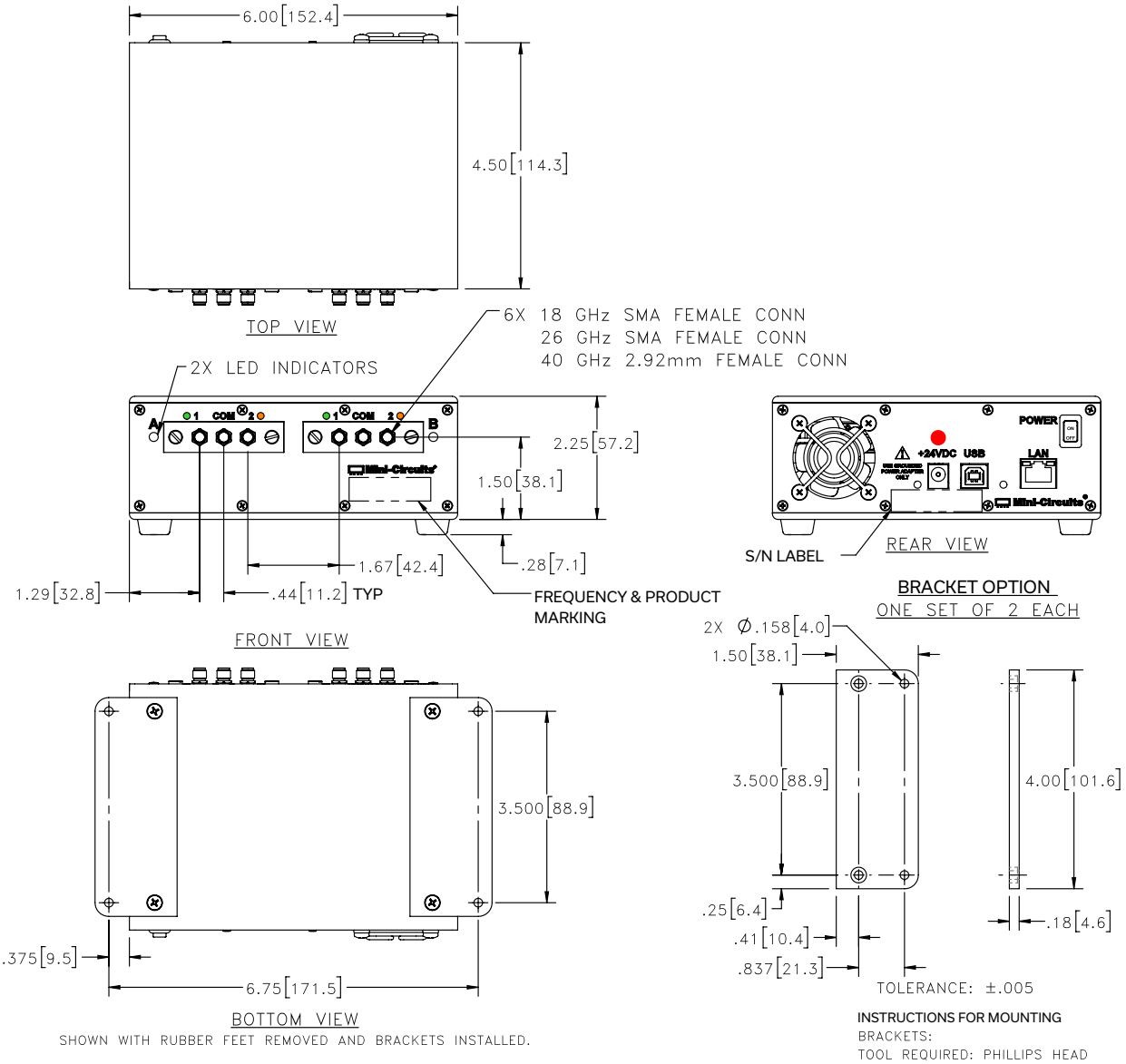
Switch Command	Switch State		Front Panel LED Color	
	A	B	A	B
SETA=0	COM to 1	x	Green	x
SETA=1	COM to 2	x	Red	x
SETB=0	x	COM to 1	x	Green
SETB=1	x	COM to 2	x	Red

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

Mechanical Switch RC-2SPDT-A40

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

CASE STYLE DRAWING



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

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

PRODUCT MARKING*

RC-2SPDT-A40
DC-40 GHz
Serial Number
*Marking may contain other features or characters for internal lot control

USB & ETHERNET CONTROLLED

Mechanical Switch RC-2SPDT-A40

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

DETAILED MODEL INFORMATION IS AVAILABLE ON OUR WEBSITE CLICK HERE

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

Contact Us: testsolutions@minicircuits.com

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

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

NOTES

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

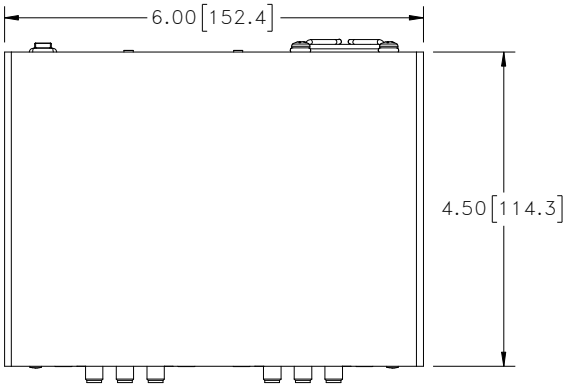
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

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

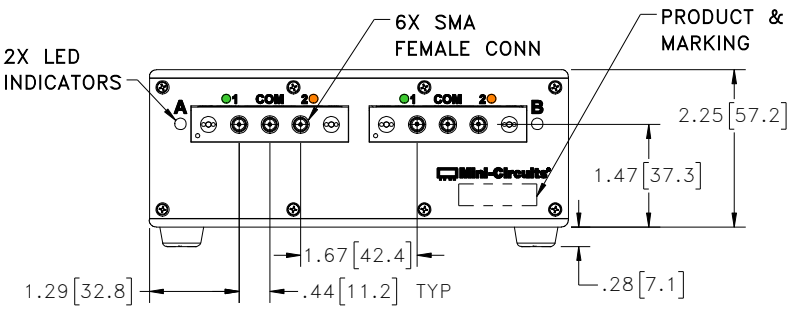
Case Style LM

Outline Dimensions

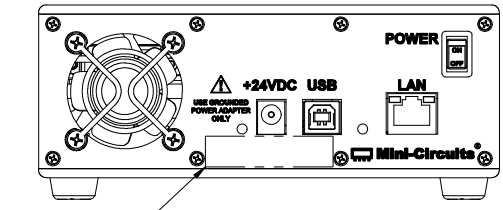
LM1849



TOP VIEW

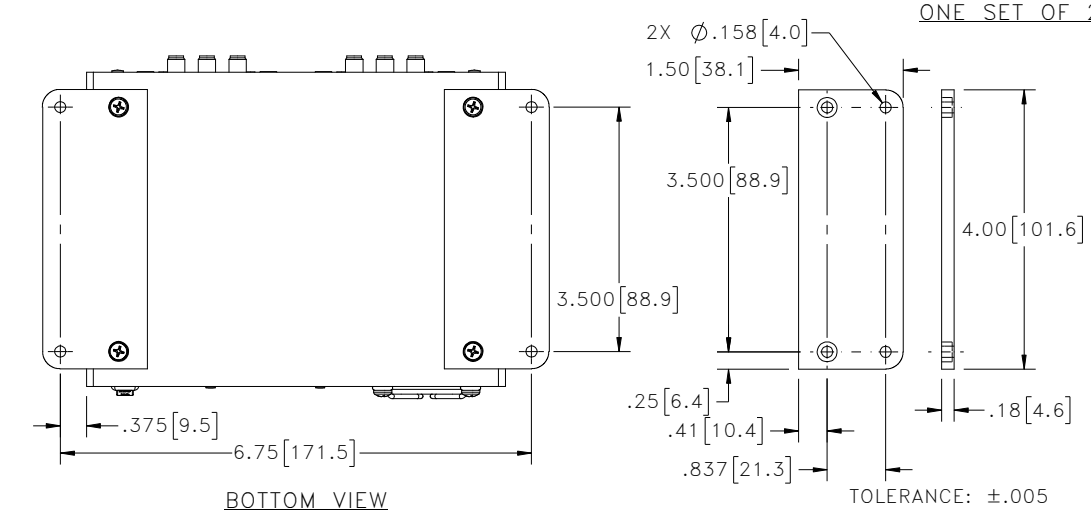


FRONT VIEW



REAR VIEW

BRACKET OPTION
ONE SET OF 2 EACH



BOTTOM VIEW

SHOWN WITH RUBBER FEET REMOVED AND BRACKETS INSTALLED.

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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: 980 grams.
4. Marking may contain other features or characters for internal lot control.

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Mini-Circuits

Environmental Specifications **ENV104**

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

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