



Mini-Circuits

USB & ETHERNET

# Mechanical Switch Assembly **RC-1SP4T-A18**

50Ω DC to 18 GHz 1 x SP4T SMA-Female

## THE BIG DEAL

- Mechanical SP4T absorptive switch
- Software control & automation
- High reliability, millions of cycles
- SSH secure Ethernet communication
- LED switch state indicators



CASE STYLE: MR1853

[DOWNLOAD](#)

SOFTWARE PACKAGE

## 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

## RoHS Compliant

See our website for RoHS Compliance methodologies and qualifications

## PRODUCT OVERVIEW

Mini-Circuits' RC-1SP4T-A18 is an electro-mechanical SP4T switch operating 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 switching lifetime of 10 million cycles when used within the noted specifications.

The switch box is constructed in a compact, rugged metal case (5.5 x 6.0 x 2.75") 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.

## KEY FEATURES

Feature	Advantages
Mechanical SP4T switch	Mechanical absorptive switches provide high reliability, repeatable high performance and internal terminations of input signals on the disconnected paths
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.
Fail-safe / normally open design	The switches revert to a known default state when the DC supply is removed, allowing their use in systems that must continue to operate safely in the event of power failure.
Break-before-make configuration	Prevents a momentary connection of the old and new signal paths, reducing the inconsistent transient effects that could otherwise be observed during switching

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RC-1SP4T-A18  
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## ELECTRICAL SPECIFICATIONS

Parameter	Conditions (GHz)	Min.	Typ.	Max.	Units
Frequency	-	DC	-	18	GHz
Insertion Loss	DC – 8 GHz	-	0.15	0.30	dB
	8 – 12 GHz	-	0.25	0.40	
	12 – 18 GHz	-	0.50	0.80	
Isolation (Inactive Paths) <sup>1</sup>	DC – 8 GHz	80	100	-	dB
	8 – 12 GHz	75	95	-	
	12 – 18 GHz	60	80	-	
Return Loss <sup>2</sup>	DC – 8 GHz	-	20	-	dB
	8 – 12 GHz	-	20	-	
	12 – 18 GHz	-	17	-	
Switching Time	-	-	25	-	ms
RF Input Power	Cold switching	-	-	20	W
	Hot switching <sup>3</sup>	-	-	0.1	
	Into internal termination <sup>4</sup>	-	-	1	
Switch Lifetime	-	-	10	-	million switching cycles

1. Isolation measured between Com and any disconnected port. Example: Isolation for Com to 1 is the leakage measured at port 1 from a signal input at Com when the active switch path is set to Com to 2

2. Return loss into Com when active or ports 1-4 in any state; Com is reflective when disconnected

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

4. Maximum power into any internal termination is 1W per port, 3W total per switch

## 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	20	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.

## SWITCH CONTROL LOGIC

Command	Switch Path
:SP4TA:STATE:0	All ports disconnected
:SP4TA:STATE:1	COM to 1
:SP4TA:STATE:2	COM to 2
:SP4TA:STATE:3	COM to 3
:SP4TA:STATE:4	COM to 4

## POWER SUPPLY

Parameter	Conditions	Typ	Max	Units
DC Voltage		+24	+26	V
DC Current Consumption	Com disconnected	100		mA
	Com to any port (1-4)	200		

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

## POWER-UP OPTIONS

Mode	Initial Switch Paths
Default	Switches power up in the default state (all ports disconnected)
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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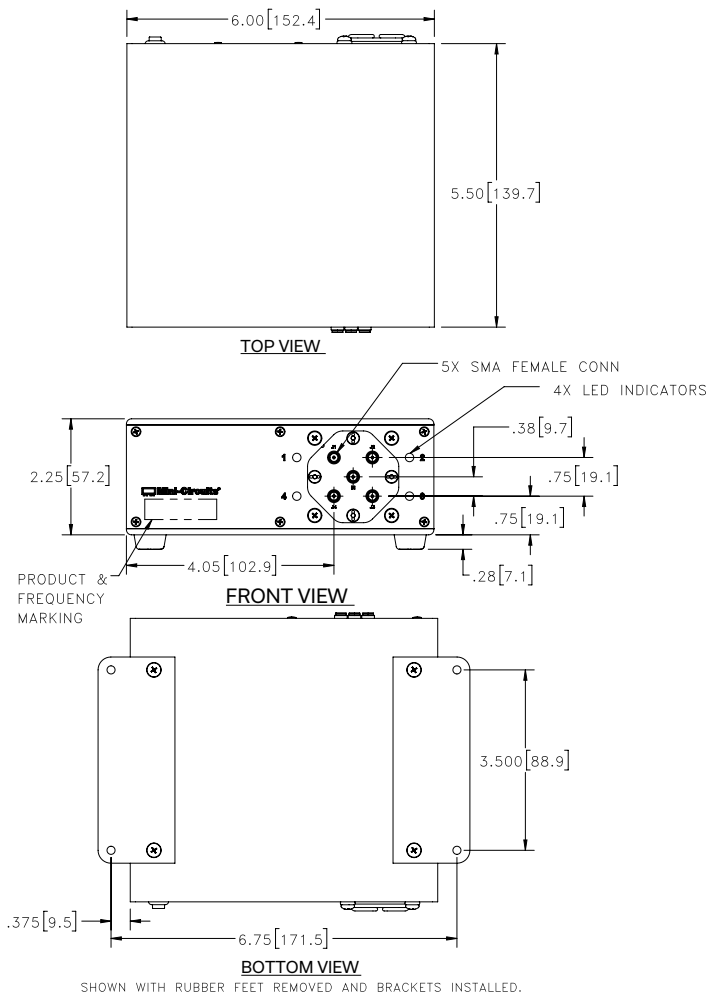
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## CONNECTIONS

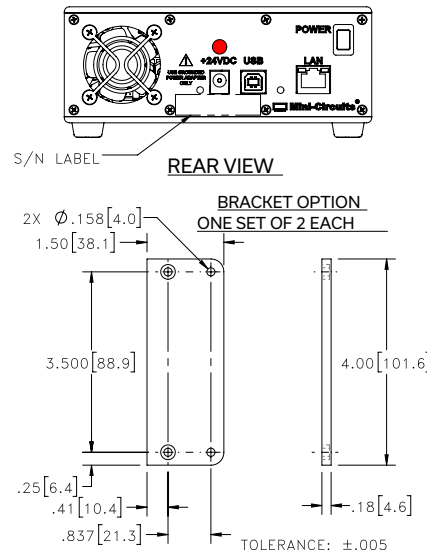
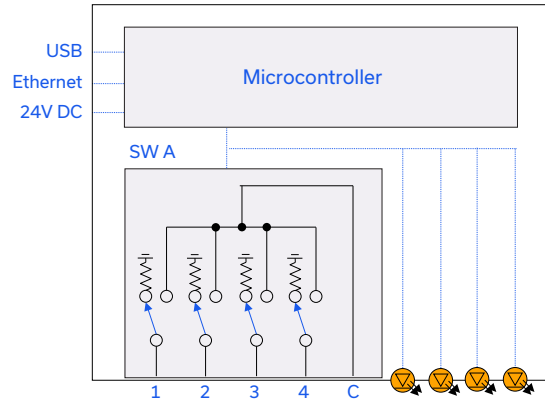
24V <sub>DC</sub> IN	(2.1 mm center positive DC Socket)
COM, 1, 2, 3 & 4	(SMA female)
USB	(USB type B receptacle)
Network (Ethernet/LAN)	(RJ45 socket)

## OUTLINE DRAWING (MR1853)



Weight: 830 grams.  
Dimensions are in inches [mm]. Tolerances: 2 Pl. ±.01 inch; 3 Pl. ±.005 inch

## BLOCK DIAGRAM



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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**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
:SP4TA:STATE:[port]	Set the switch state: <ul style="list-style-type: none"> <li>• [port] = 0 to 4</li> </ul>
:SP4TA:STATE?	Return the switch state



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

Case Style	MR1853
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) Select one option from the list below. 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 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

- 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)

