



Mini-Circuits

USB & ETHERNET CONTROLLED

# Millimeter Wave Switch Matrix

RC-4SPDT-A40

50Ω DC to 40 GHz SMA-Female

## THE BIG DEAL

- Millimetre wave switching (up to 40 GHz)
- 4 x mechanical terminated SPDT switches
- High reliability, 2 million switch cycles
- 5W power rating (cold switching)

## APPLICATIONS

- 5G node / device testing
- Automated test equipment
- Fail-safe / redundancy switching

## PRODUCT OVERVIEW

Mini-Circuits' RC-4SPDT-A40 houses 4 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 of a failsafe and break-before-make-configuration, with a minimum lifetime of 2 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 2.92mm (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).



CASE STYLE: LM1851

DOWNLOAD

SOFTWARE PACKAGE

RoHS Compliant

See our website for RoHS Compliance methodologies and qualifications

## KEY FEATURES

| Feature                         | Advantages   |
|---------------------------------|--|
| Mechanical SPDT switches        | Mechanical absorptive switches provide high reliability, repeatable performance and internal terminations 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  |
| 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   |
| USB & Ethernet control          | USB HID and Ethernet (HTTP / Telnet) interfaces provide easy compatibility with a wide range of software setups and programming environments   |
| 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 |

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# Millimeter Wave Switch Matrix **RC-4SPDT-A40**

50Ω DC to 40 GHz SMA-Female

## ELECTRICAL SPECIFICATIONS AT 25°C

| Parameter                                    | Conditions (GHz)                 | Min. | Typ. | Max. | Units          |
|--|----------------------------------|------|------|------|----------------|
| Frequency Range                              |                                  | DC   |      | 40   | GHz            |
| Insertion Loss                               | DC - 12                          | —    | 0.2  | 0.5  | dB             |
|  | 12 - 26                          | —    | 0.3  | 0.7  |                |
|  | 26 - 40                          | —    | 0.6  | 1.1  |                |
| Isolation                                    | DC - 12                          | 60   | 80   | —    | dB             |
|  | 12 - 26                          | 55   | 75   | —    |                |
|  | 26 - 40                          | 50   | 65   | —    |                |
| VSWR   | DC - 12                          | —    | 1.25 | —    | :1             |
|  | 12 - 26                          | —    | 1.30 | —    |                |
|  | 26 - 40                          | —    | 1.50 | —    |                |
| Switching Time                               | —                                | —    | 25   | —    | ms             |
| RF Input Power (Cold Switching) <sup>1</sup> | DC - 12                          | —    | —    | 20   | W              |
|  | 12 - 26                          | —    | —    | 10   |                |
|  | 26 - 40                          | —    | —    | 5    |                |
| Switch Lifetime (per switch)                 | 100mW hot switching <sup>2</sup> | 2    | —    | —    | million cycles |
|  | 1W hot switching                 | —    | 1    | —    |                |
| Rated Current (24V DC Input)                 | All switches in state 2          | —    | 950  | —    | mA             |
|  | All switches in state 1          | —    | 90   | —    |                |
| Rated Current (USB)                          |                                  | —    | 10   | 20   | mA             |

1. Maximum power into internal termination is 1W

2. Hot switching powers above this level will degrade the switch lifetime

## ABSOLUTE MAXIMUM RATINGS

| Parameters            | Ratings       |
|-----------------------|---------------|
| Operating Temperature | 0°C to 40°C   |
| Storage Temperature   | -15°C to 85°C |
| Supply Voltage        | 26V           |





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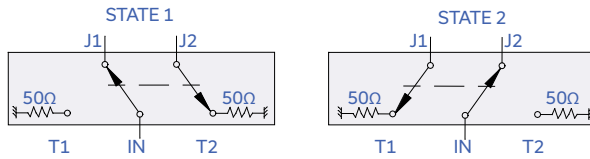
# Millimeter Wave Switch Matrix

**RC-4SPDT-A40**

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## SWITCHING CONFIGURATION (PER SWITCH):

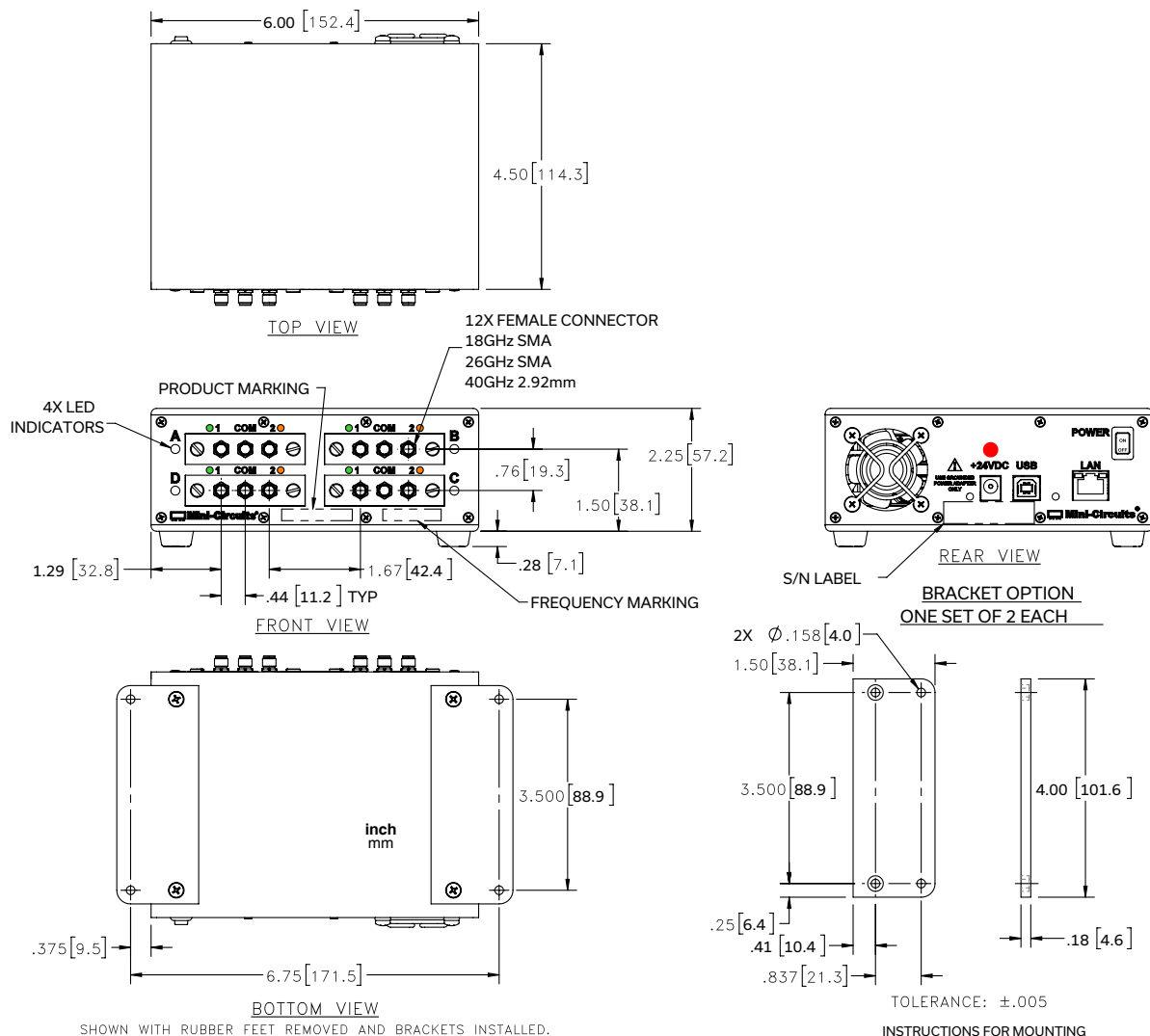
- Fail-safe
- Terminated / Absorptive



## CONNECTIONS

| Port Name                  | Connector Type                  |
|----------------------------|---------------------------------|
| RF Switch A-D (Com, 1 & 2) | 2.92mm female                   |
| USB                        | USB type-B                      |
| Ethernet / LAN             | RJ45                            |
| 24V <sub>DC</sub> Input    | 2.1mm center positive DC socket |

## OUTLINE DRAWING (LM1851)



Weight: 1160 grams.

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

**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.





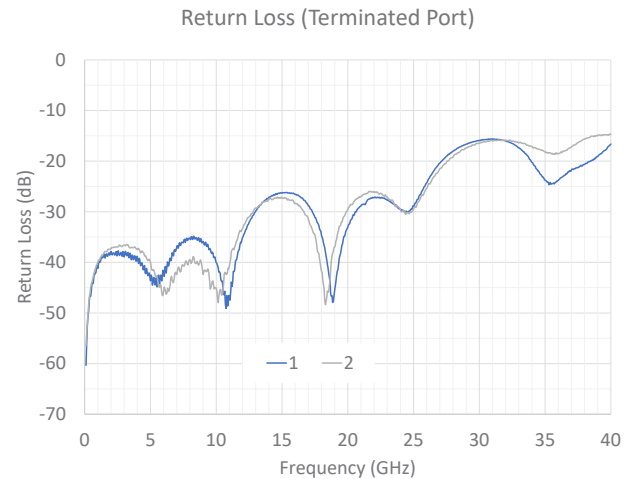
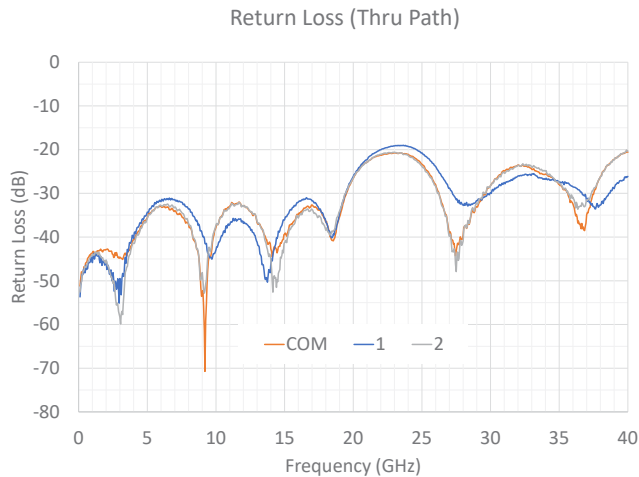
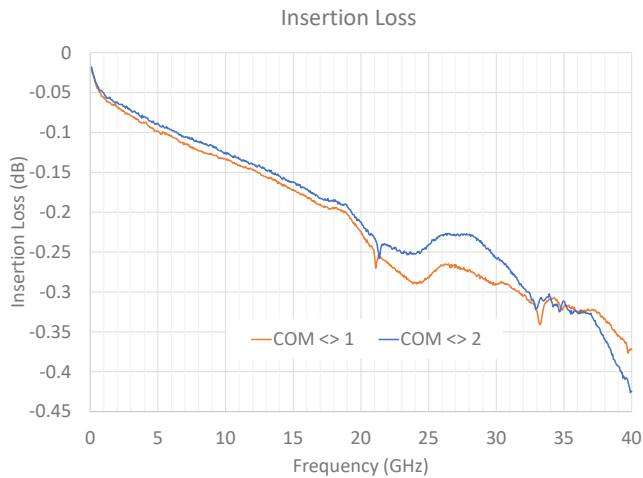
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## TYPICAL PERFORMANCE DATA



**SOFTWARE SPECIFICATIONS****SOFTWARE & DOCUMENTATION DOWNLOAD:**

- Mini-Circuits' full software and support package including user guide, Windows GUI, DLL files, programming manual and examples can be downloaded free of charge from: [www.minicircuits.com/softwaredownload/rfswitchcontroller.html](http://www.minicircuits.com/softwaredownload/rfswitchcontroller.html)
- Please contact [testsolutions@minicircuits.com](mailto:testsolutions@minicircuits.com) for support

**MINIMUM SYSTEM REQUIREMENTS:**

| Parameter           | Requirements                        |  |
|---------------------|-------------------------------------|--|
| Interface           | USB HID & Ethernet (HTTP & Telnet)  |  |
| System Requirements | GUI                                 | Windows 98 or later  |
|                     | USB API DLL                         | Windows 98 or later and programming environment with ActiveX or .NET support   |
|                     | USB Direct Programming              | Linux, Windows 98 or later   |
|                     | Ethernet                            | Windows, Linux or Mac computer with a network port and Ethernet TCP/IP support |
| Hardware            | Pentium II or later with 256 MB RAM |  |

**APPLICATION PROGRAMMING INTERFACE (API)****ETHERNET SUPPORT:**

- Simple ASCII / SCPI command set for attenuator control
- Communication via HTTP or Telnet
- Supported by most common programming environments

**USB SUPPORT (WINDOWS):**

- ActiveX COM DLL file for creation of 32-bit programs
- .NET library DLL file for creation of 32 / 64-bit programs
- Supported by most common programming environments (refer to application note AN-49-001 for summary of supported environments)

**USB SUPPORT (LINUX):**

- Direct USB programming using a series of USB interrupt codes

Full programming instructions and examples available for a wide range of programming environments / languages.



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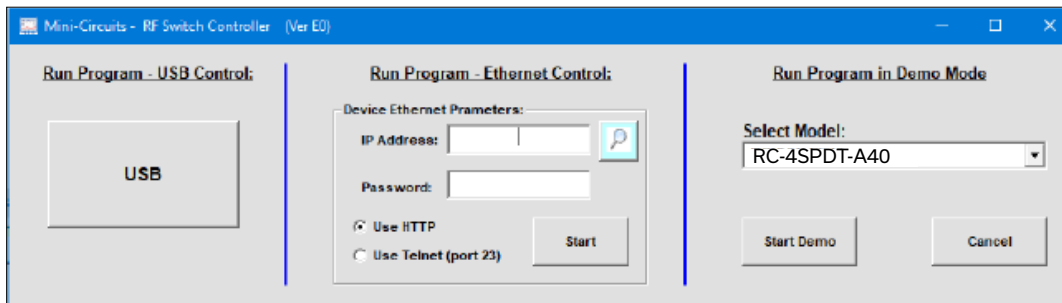
# Millimeter Wave Switch Matrix

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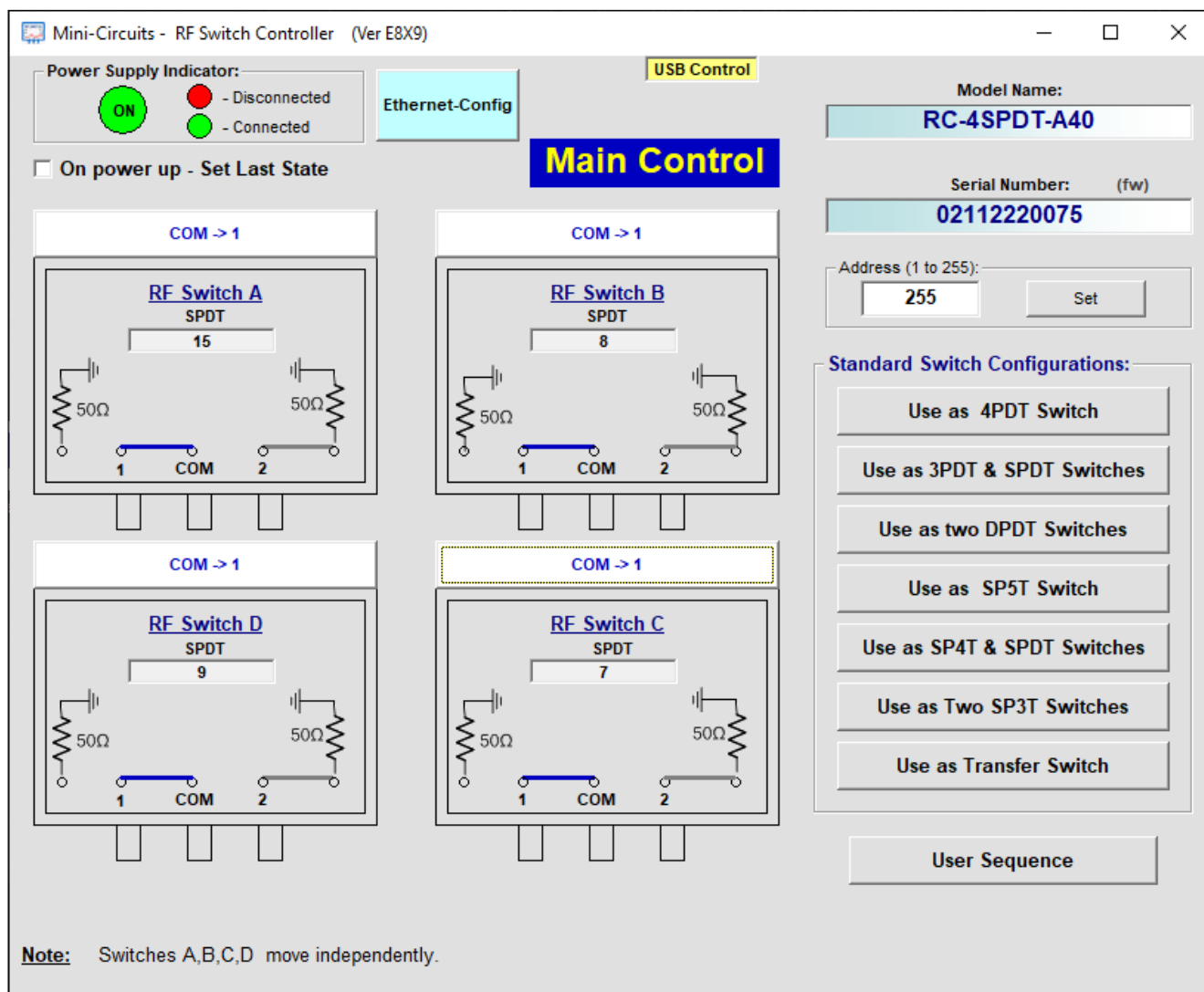
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## GRAPHICAL USER INTERFACE (GUI) FOR WINDOWS - KEY FEATURES

- 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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## ORDERING INFORMATION

Please contact Mini-Circuits' Test Solutions department for price and availability: [testsolutions@minicircuits.com](mailto:testsolutions@minicircuits.com)

| Model        | Description                                  |
|--------------|--|
| RC-4SPDT-A40 | USB & Ethernet controlled SPDT switch matrix |

| Included Accessories  | Part No.      | Description  |
|---|---------------|--|
|  | AC/DC-24-3W1  | AC/DC 24V <sub>DC</sub> Grounded Power Adaptor.<br>Operating temperature: 0°C to +40°C, I <sub>Max</sub> =2.5A |
| See Below   | CBL-3W1-XX    | AC Power Cord (Select one power cord from below with each Switch Matrix box)                                   |
|  | USB-CBL-AB-3+ | 2.7 ft (0.8 m) USB Cable: USB type A(Male) to USB type B(Male)   |

| AC Power Cords <sup>5</sup>   | Part No.   | Description                        |
|---|------------|------------------------------------|
|  | CBL-3W1-US | Power Cord for United States       |
|  | CBL-3W1-EU | Power Cord for Europe              |
|  | CBL-3W1-UK | Power Cord for United Kingdom      |
|  | CBL-3W1-AU | Power Cord for Australia and China |
|  | CBL-3W1-IL | Power Cord for Israel              |

5. If you need a Power cord for a country not listed please contact [testsolutions@minicircuits.com](mailto:testsolutions@minicircuits.com)

## OPTIONAL ACCESSORIES

|                |  |
|----------------|--|
| USB-CBL-AB-3+  | 2.7 ft (0.8 m) USB Cable: USB type A(Male) to USB type B(Male)     |
| USB-CBL-AB-7+  | 6.8 ft (2.1 m) USB Cable: USB type A(Male) to USB type B(Male)     |
| USB-CBL-AB-11+ | 11 ft (3.4 m) USB Cable: USB type A(Male) to USB type B(Male)      |
| CBL-RJ45-MM-5+ | 5 ft (1.5 m) Ethernet cable: RJ45(Male) to RJ45(Male) Cat 5E cable |
| BKT-272-08+    | Bracket (One set of 2 each)  |

## 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)



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