

Xtra Long Life 10 million cycles

USB/Ethernet RF Switch Matrix

RC-1SP6T-A12

50Ω DC to 12 GHz

The Big Deal

- **USB or Ethernet-TCP/IP** (HTTP and Telnet protocols) control
- **SP6T** electromechanical, absorptive RF switch (90 dB typ. isolation)
- **Plug-and-Play** usable with Windows®, Mac®, and Linux® computers



Case Style: PF2320



Software Package

Product Overview

Mini-Circuits' RC-1SP6T-A12 is a general purpose RF switch matrix controlled via either USB or Ethernet-TCP/IP (supports HTTP and Telnet protocols). The model contains an electromechanical SP6T, absorptive fail-safe RF switch constructed in break-before-make configuration and powered by +24VDC with switching time of 25 ms typical. The RF switch operates over a wide frequency band from DC to 12 GHz, has low insertion loss (0.2 dB typical) and high isolation (90 dB typical) making the switch matrix perfectly suitable for a wide variety of RF applications.

The RC-1SP6T-A12 is constructed in a compact, rugged metal case (5.5" x 6.0" x 2.75") with 7 SMA (f) connectors (COM and ports 1 to 6), USB type B port, standard RJ45 network socket and DC power input. Full software support is provided and can be downloaded from our website any time at <https://www.minicircuits.com/softwaredownload/rfswitchcontroller.html>. The package includes 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). Also included is a 2.7 ft USB cable and AC/DC power adaptor. Longer USB cables, Ethernet cables and a mounting bracket are available as optional accessories.

Key Features

| Feature | Advantages |
|--|--|
| Ethernet-TCP/IP- HTTP and Telnet Protocols (Supports DHCP and Static IP) | The RC-1SP6T-A12 switch matrix can be controlled from any Windows®, Mac®, or Linux® computer, or even a mobile device with a network connection and Ethernet-TCP/IP (HTTP or Telnet protocols) support. Using a VPN would allow remote control from anywhere in the world. |
| USB HID (Human Interface Device) | User may also control the switch matrix via USB connection. Plug-and-Play, no driver required. Compatible with Windows® or Linux® operating systems using 32 and 64 bit architecture. |
| RF SP6T absorptive electromechanical switch | Wideband (DC to 12 GHz) with low insertion loss (0.2 dB typ.), very high isolation (90 dB typ.), and high power rating (20W cold switching). |
| 24VDC operating voltage | The RC-1SP6T-A12 requires 24V / 230 mA to power the RF switch, supplied from the power adaptor (included). |
| Switch Cycle Counters | Allows user to monitor exact switch path usage and plan test requirements accordingly. |

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50Ω DC to 12 GHz

Features

- DC to 12 GHz SP6T absorptive fail-safe RF switch in break-before-make configuration
- Electromechanical switching (Isolation 90 dB typ.)
- High power handling, 20W
- USB or Ethernet-TCP/IP (HTTP and Telnet) control
- Switch Cycle Counters
- Easy installation and operation
- Supports a wide range of programming environments (See [AN-49-001](#) for details)
- Mounting bracket (Optional)
- Protected by US Patents 5,272,458; 6,414,577; 6,650,210; 7,633,361 and 7,843,289

Applications

- R&D
- Automated Test equipment
- Controlling RF signal paths



Case Style: PF2320



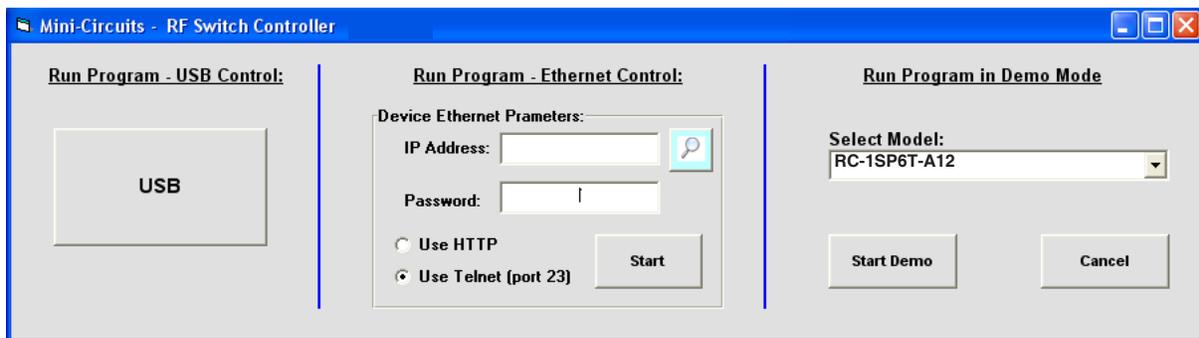
Software Package

| Model No. | Description | Qty. |
|-----------------------------|--|------|
| RC-1SP6T-A12 | USB/Ethernet RF Switch | 1 |
| Included Accessories | | |
| AC/DC-24-3W1 | AC/DC 24V Adapter (see Ordering Information) | 1 |
| CBL-3W1-XX | AC Power Cord (see Ordering Information) | 1 |
| USB-CBL-AB-3+ | 2.7 ft USB cable | 1 |

RoHS Compliant

See our web site for RoHS Compliance methodologies and qualifications

Mini-Circuits RF Switch Control Program for **USB/Ethernet** RF Switch Matrix



Steps to start RC-1SP6T-A12 GUI via USB

- Click on USB button.
- If more than one unit is connected select S/N from list and click OK.
- Start working.

Steps to start RC-1SP6T-A12 GUI via Ethernet

- Click on search icon.
- Select unit from list of IP addresses and click select
- The selected IP will appear in the IP Address field.
- Select communication protocol (Telnet or HTTP)
- Click on Start and begin working.

- For Demo mode of any Switch Matrix model select the model name from the drop box and click 'Start Demo' (See [user guide](#) for details)
- For programming instructions of the switch matrix see [programming guide](#) and [AN-49-001](#) on Mini-Circuits' website

Electrical Specifications

| Parameter | Port | Conditions | Min. | Typ. | Max. | Units |
|---|----------------------|---------------------------------------|------|------|------|--------------------------|
| Rated Voltage | 24V _{DC} IN | provided via external power adapter | 23 | 24 | 25 | V |
| | USB Port | - | - | 5 | - | |
| Power On Sequence: Connect the 24V power, followed by the USB control and/or Ethernet cable before turning on the Switch Matrix. | | | | | | |
| Rated Current | 24V _{DC} IN | COM -> 1,2,3,4,5 or 6 state | - | 160 | 230 | mA |
| | | RF Switch @ Disconnect state | - | 60 | 90 | |
| | USB Port | COM -> 1,2,3,4,5 or 6 state | - | 10 | 20 | |
| | | RF Switch @ Disconnect state | - | 10 | 20 | |
| Switching Time | | - | - | 25 | - | ms |
| Life (per switch) | | @ 100 mW (hot switching) ¹ | 10 | - | - | million switching cycles |
| | | @ 1 W (hot switching) ¹ | - | 1 | - | |
| RF Power (cold switching) ² | | | - | - | 20 | W |
| RF VSWR ³ | | DC to 1 GHz | - | 1.05 | 1.10 | :1 |
| | | 1 GHz to 6 GHz | - | 1.10 | 1.25 | |
| | | 6 GHz to 8 GHz | - | 1.20 | 1.35 | |
| | | 8 GHz to 12 GHz | - | 1.20 | 1.35 | |
| RF Insertion Loss (per switch) | | DC to 1 GHz | - | 0.10 | 0.15 | dB |
| | | 1 GHz to 6 GHz | - | 0.15 | 0.25 | |
| | | 6 GHz to 8 GHz | - | 0.20 | 0.30 | |
| | | 8 GHz to 12 GHz | - | 0.25 | 0.35 | |
| RF Isolation (per switch) | | DC to 1 GHz | 85 | 100 | - | dB |
| | | 1 GHz to 6 GHz | 80 | 95 | - | |
| | | 6 GHz to 8 GHz | 80 | 90 | - | |
| | | 8 GHz to 12 GHz | 80 | 90 | - | |

¹ Exceeding these limits will result in reduced life.

² Power handling is specified with RF applied to the COM port and output load connected to 1,2,3, 4, 5 or 6 ports.

³ For COM port only when connected to port 1,2,3,4,5 or 6. For ports 1,2,3, 4, 5 or 6 only when connected to COM port.

Minimum System Requirements

| | |
|--|--|
| Interface | USB HID or HTTP Get/Post or Telnet protocols |
| Host operating system - USB Control | Windows 32/64 Bit operating system: Windows 98®, Windows XP®, Windows Vista®, Windows 7®, Windows 8® Linux® support: 32/64 Bit operating system |
| Host operating system - Ethernet Control | Any Windows®, Mac®, or Linux® computer with a network port and Ethernet-TCP/IP (HTTP or Telnet protocols) support |
| Hardware | Pentium® II or better |

Connections

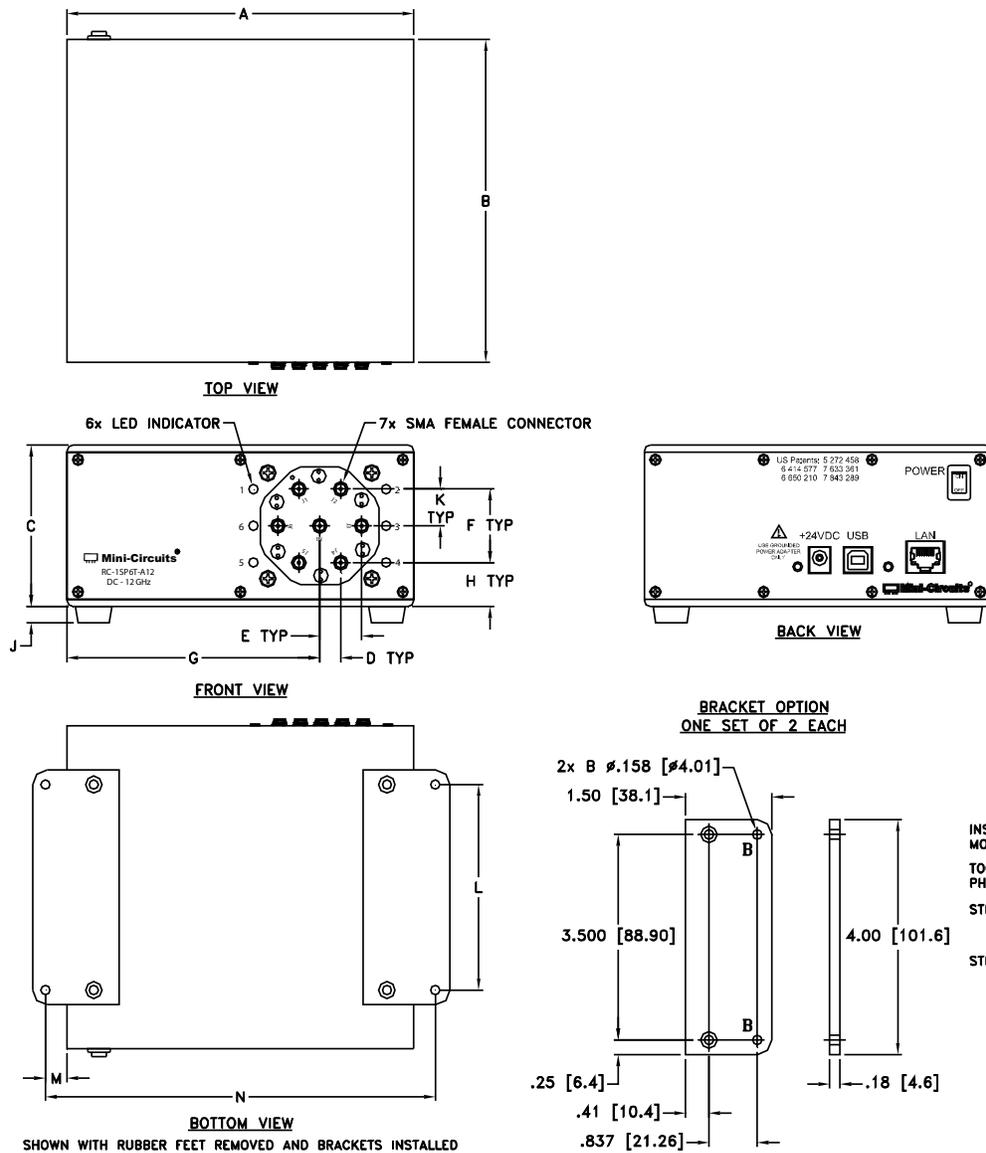
| | |
|------------------------|----------------------------------|
| 24V _{DC} IN | 2.1 mm center positive DC Socket |
| RF Ports | SMA female |
| USB | USB type B receptacle |
| Network (Ethernet/LAN) | RJ45 socket |

Absolute Maximum Ratings

| | |
|--------------------------------------|---------------|
| Operating Temperature | 0°C to 40°C |
| Storage Temperature | -15°C to 85°C |
| DC Voltage max. | 26V |
| RF power (through path) | 20W |
| RF power (into internal termination) | 1W |

Permanent damage may occur if any of these limits are exceeded.

Outline Drawing (PF2320)



Outline Dimensions (inch mm)

| A | B | C | D | E | F | G | H | J | K | L | M | N | P | wt |
|--------|--------|-------|------|-------|-------|-------|-------|------|-------|-------|------|--------|----|-------|
| 6.00 | 5.50 | 2.75 | 0.36 | 0.73 | 1.26 | 2.75 | 0.75 | 0.28 | 0.63 | 3.50 | 0.38 | 6.720 | -- | grams |
| 152.40 | 139.70 | 69.85 | 9.14 | 18.54 | 32.00 | 69.85 | 19.05 | 7.11 | 16.00 | 88.90 | 9.53 | 170.69 | -- | 1150 |

Main Software Control Screen: Independent control of one SP6T switch

- Power handling is specified with RF applied to the COM port and output load connected to either 1,2,3,4,5 or 6 of the respective switch.
- When connecting a coaxial semi flex cable, tighten connectors alternately using an 8in/lb torque wrench to insure proper contact at each end.

| Step | SW A | dwel Time | Units | Exec Program |
|--------|--------|-----------|-------|--------------|
| Step 1 | COM->1 | 500 | mSec | |
| Step 2 | COM->2 | 600 | mSec | |
| Step 3 | COM->3 | 670 | mSec | |
| Step 4 | COM->4 | 1020 | mSec | |
| Step 5 | COM->5 | 1400 | mSec | |
| Step 6 | COM->6 | 804 | mSec | |
| Step 7 | COM->2 | 1200 | mSec | |
| Step 8 | COM->3 | 1500 | mSec | |

Ordering, Pricing & Availability Information see our web site

| Model | Description |
|--------------|------------------------------------|
| RC-1SP6T-A12 | USB/Ethernet RF SP6T Switch Matrix |

| Included Accessories | Part No. | Description |
|---|---------------|---|
|  | AC/DC-24-3W1 | AC/DC 24V _{DC} Grounded Power Adaptor. Operating temperature: 0°C to +40°C, I _{Max} =2.5A |
|  | 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 ⁴ | 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 |

⁴ If you need a Power cord for a country not listed please contact testsolutions@minicircuits.com

| Optional Accessories | Description |
|----------------------|--|
| USB-CBL-3+ (spare) | 2.7 ft (0.8 m) USB Cable: USB type A(Male) to USB type B(Male) |
| USB-CBL-7+ | 6.8 ft (2.1 m) USB Cable: USB type A(Male) to USB type B(Male) |
| USB-CBL-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) |
| RFSW-CD ⁵ | Software CD |

⁵ To receive the CD at no extra cost, request when placing order. CD contents can also be downloaded from Mini-Circuits website at: <https://www.minicircuits.com/softwaredownload/rfswitchcontroller.html>

Additional 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/MCLStore/terms.jsp