WINSOURCE ELECTRONICS

THE DATASHEET OF

RC-2SP4T-A18

USB & ETHERNET CONTROLLED

RF SP4T Switch Matrix RC-2SP4T-A18

50Ω DC to 18 GHz SMA-Female

THE BIG DEAL

- Dual mechanical SP4T switch box
- High reliability, 10 million switch cycles
- 20W power rating (cold switching)
- High isolation, 85 dB typ



CASE STYLE: MR1937

DOWNLOAD SOFTWARE PACKAGE

RoHS Compliant
See our website for RoHS Compliance methodologies and qualifications

APPLICATIONS

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

PRODUCT OVERVIEW

Mini-Circuits' RC-2SP4T-A18 is a general purpose RF switch matrix controlled via either USB or Ethernet-TCP/IP (supports HTTP and Telnet protocols). The model contains two electromechanical SP4T, absorptive fail-safe RF switches constructed in break-before-make configuration and powered by +24VDC, with switching time of 25 ms typical. The RF switches operate over a wide frequency band from DC to 18 GHz, have low insertion loss (0.2 dB typical) and high isolation (85 dB typical), making the switch matrix perfectly suitable for a wide variety of RF applications.

The RC-2SP4T-A18 is constructed in a compact, rugged metal case (5.5" x 6.0" x 2.25") with 10 SMA (F) connectors (COM and ports 1 to 4, for each switch), 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 adapter. 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-2SP4T-A18 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 SP4T absorptive electromechanical switch	Wideband (DC to 18 GHz) with low insertion loss (0.2 dB typ.), very high isolation (85 dB typ.), and high power rating (20W cold switching).
Switch Cycle Counters	Allows user to monitor the exact usage and plan test requirements accordingly.
Break-before-make configuration	Prevents the momentary connection of the old and new signal paths and reduces transient phenomena.

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Patents: Protected by US Patents 5,272,458; 6,414,577; 6,650,210; 7,633,361 and 7,843,289

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RC-2SP4T-A18
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251010

RF SP4T Switch Matrix RC-2SP4T-A18

50Ω DC to 18 GHz SMA-Female

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)[1]	DC – 8 GHz	80	100	-	dB
	8 – 12 GHz	75	95	-	
	12 – 18 GHz	60	80	-	
Return Loss[2]	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[3]	-	-	0.1	
	Into internal termination[4]	-	-	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[5]

Parameters	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

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

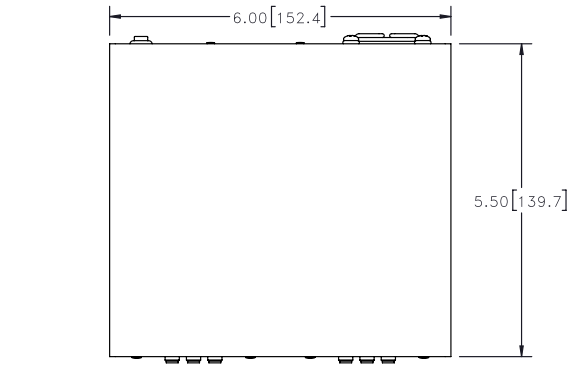
CONNECTIONS

Port Name	Connector Type
$24V_{DC}$ IN	(2.1 mm center positive DC Socket)
RF Switch A (1, 2, 3, 4, COM)	(SMA female)
RF Switch B (1, 2, 3, 4, COM)	(SMA female)
USB	(USB type B receptacle)
Network (Ethernet/LAN)	(RJ45 socket)

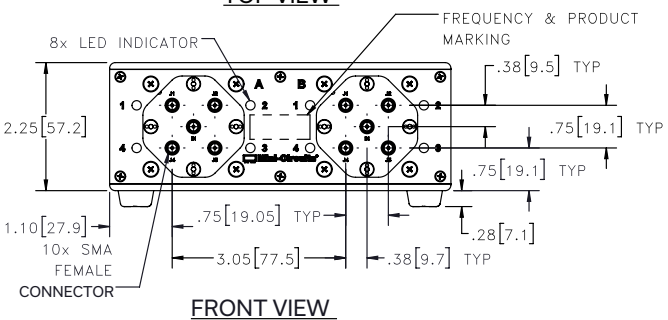
RF SP4T Switch Matrix RC-2SP4T-A18

50Ω DC to 18 GHz SMA-Female

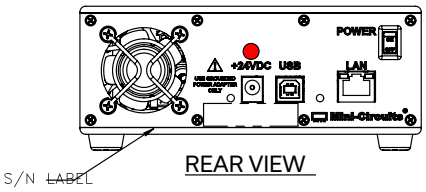
OUTLINE DRAWING (MR1937)



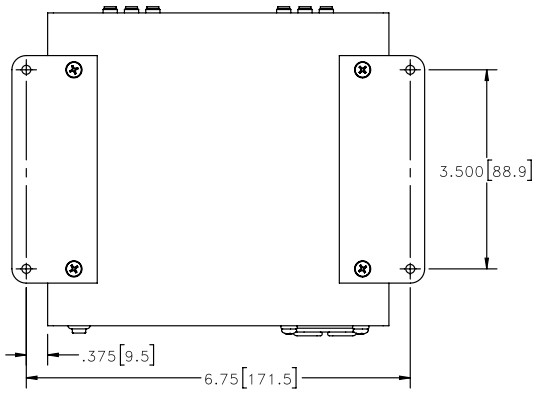
TOP VIEW



FRONT VIEW



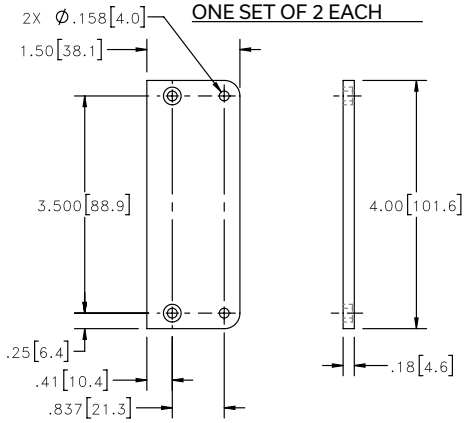
REAR VIEW



BOTTOM VIEW

SHOWN WITH RUBBER FEET REMOVED AND BRACKETS INSTALLED.

BRACKET OPTION
ONE SET OF 2 EACH



TOLERANCE: ±.005

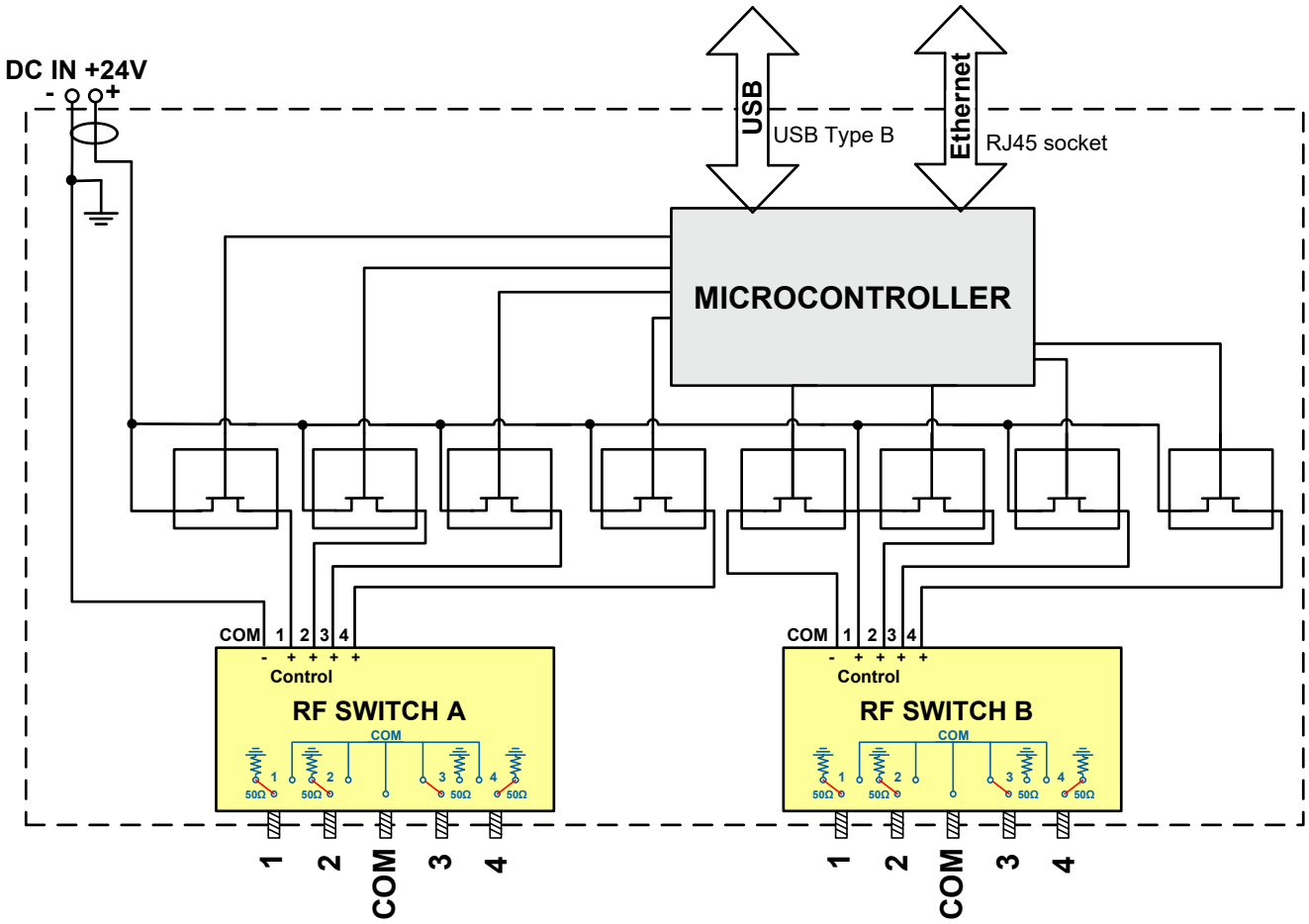
INSTRUCTIONS FOR MOUNTING BRACKETS:
TOOL REQUIRED: PHILLIPS HEAD SCREWDRIVER
STEP 1: REMOVE RUBBER FEET FROM THE BOTTOM OF THE UNIT, DO NOT DISCARD THE FASTENERS.
STEP 2: MOUNT THE BRACKETS WITH THE FASTENERS REMOVED IN STEP 1, USING THE COUNTER BORE HOLES IN THE BRACKET.

Weight: 1180 grams.
Dimensions are in inches [mm]. Tolerances: 2 Pl. ±.03 inch; 3 Pl.± .015 inch.

RF SP4T Switch Matrix RC-2SP4T-A18

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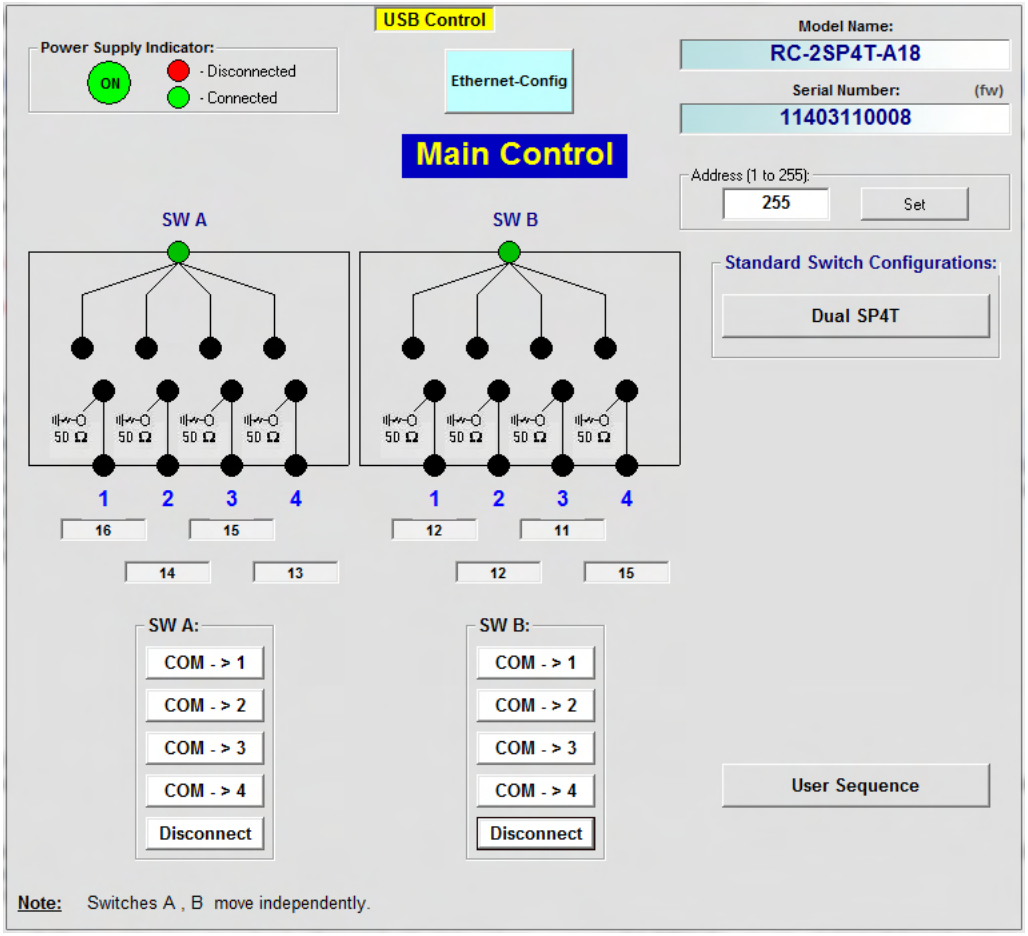
BLOCK DIAGRAM



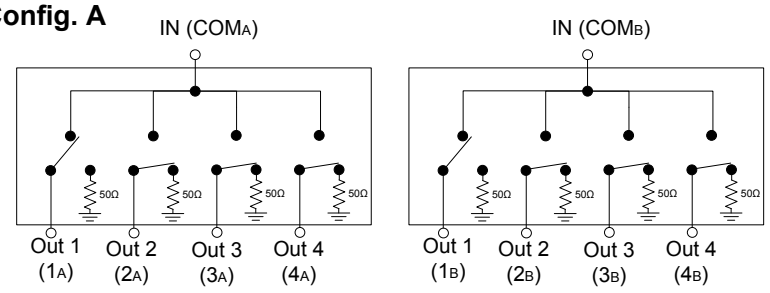
RF SP4T Switch Matrix RC-2SP4T-A18

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CONFIGURATION A: TWO SP4T SWITCHES



Config. A

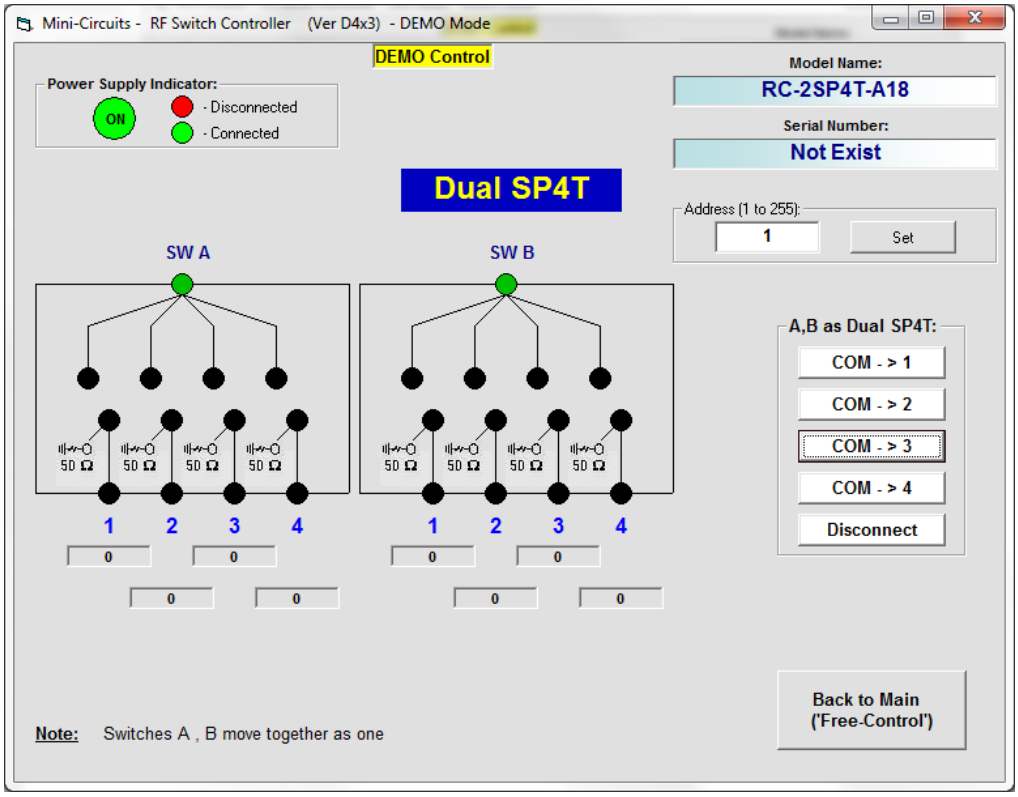


SP4T: Switch A or B Logic:
Disconnected : 0000
IN ⟷Out1 : 0001
IN ⟷Out2 : 0010
IN ⟷Out3 : 0100
IN ⟷Out4 : 1000
Switches move independently.

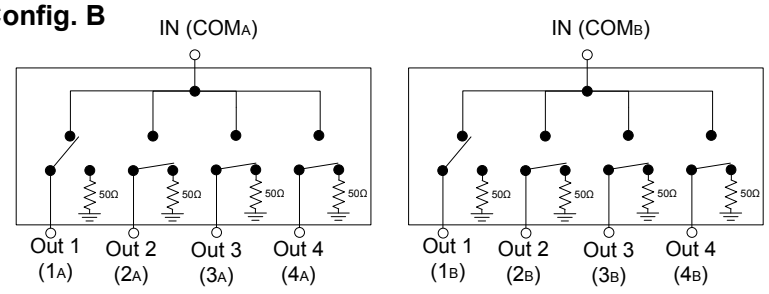
RF SP4T Switch Matrix RC-2SP4T-A18

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CONFIGURATION B: DUAL SP4T SWITCHES



Config. B



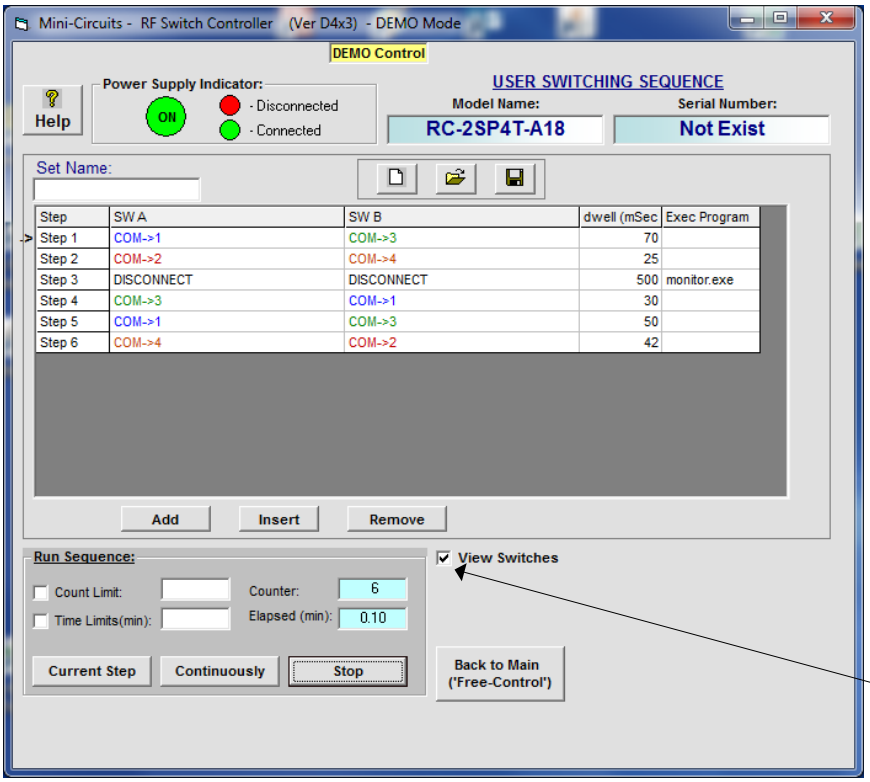
DP4T: Switch A & B Logic:

Disconnected : 0000, 0000
IN ⟷Out1 : 0001, 0001
IN ⟷Out2 : 0010, 0010
IN ⟷Out3 : 0100, 0100
IN ⟷Out4 : 1000, 1000

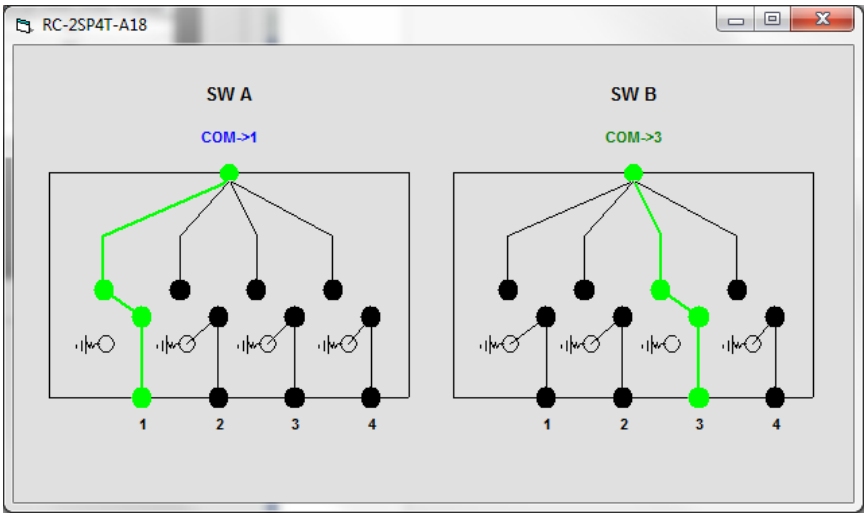
Both switches move together as one.

USER SWITCHING SEQUENCE - FOR SETTING ANY CONFIGURATION OR SEQUENCE NEEDED

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



Check this box to show graphical presentation of current switch state(shown below)



- For instructions on using the GUI See the user guide on Mini-Circuits' website
- For programming instructions of the switch matrix see the programming guide and AN-49-001 on Mini-Circuits' website

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: https://www.minicircuits.com/softwaredownload/rfswitchcontroller.html
- Please contact testsolutions@minicircuits.com for support

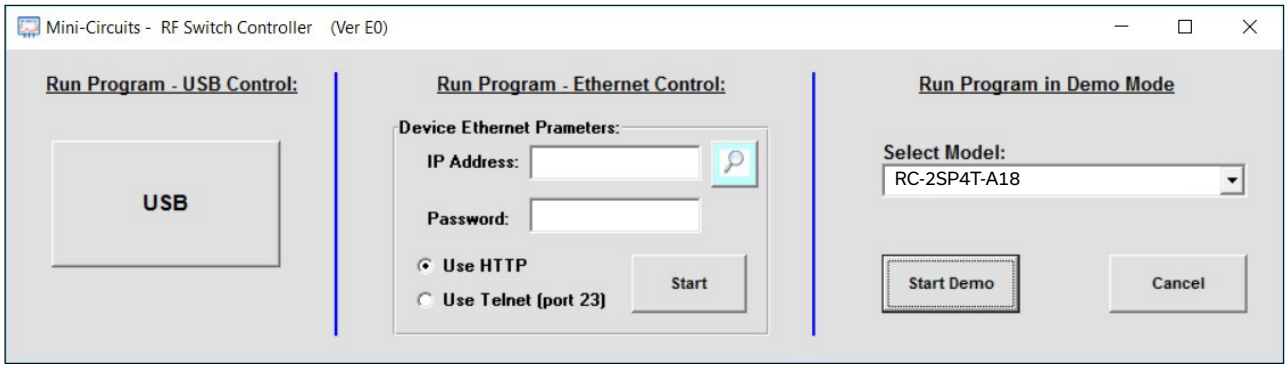
MINIMUM SYSTEM REQUIREMENTS

Parameter	Requirements	
Interface	USB HID or HTTP Get/Post or Telnet protocols	
System requirements	GUI:	Windows 32 & 64 bit systems from Windows 98 up to Windows 10
	API DLL (USB)	Windows 32 & 64 bit systems with ActiveX or .Net support from Windows 98 up to Windows 10
	USB interrupt API	Linux, Windows systems from Windows 98 up to Windows 10
	Telnet & HTTP	Any Windows, Mac, or Linux computer with a network port and Ethernet-TCP/IP (HTTP or Telnet protocols) support
Hardware	Pentium ® II or higher	

GRAPHICAL USER INTERFACE (GUI) FOR WINDOWS

KEY FEATURES:

- Set each switch manually
- Set timed sequence of switching states
- Configure switch address and upgrade Firmware



STEPS TO START RC-2SP4T-A18 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-2SP4T-A18 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.

APPLICATION PROGRAMMING INTERFACE (API) WINDOWS SUPPORT:

- API DLL files exposing the full switch matrix functionality.
  ActiveX COM DLL file for creation of 32-bit programs
  Net library DLL file for creation of 32 / 64-bit programs
- HTTP Get/Post and Telnet protocols use SCPI commands to provide full control.

Supported by most common programming environments (refer to application note AN-49-001 for summary of tested environments)

LINUX SUPPORT:

- Full switch matrix control in a Linux environment is achieved by way of USB interrupt commands. See programming manual at https://www.minicircuits.com/softwaredownload/Prog_Manual-2-Switch.pdf for details

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ORDERING INFORMATION

Please contact Mini-Circuits' Test Solutions department for price and availability: testsolutions@minicircuits.com

Model	Description
RC-2SP4T-A18	USB/Ethernet RF SP4T 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
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[6]	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

6. If you need a Power cord for a country not listed please contact 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

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

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- Mini-Circuits Information

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- Obsolete Management
- Cost Control Management
- Shortage Management
- Alternative Solution
- Excess Inventory Management