

Solid state

USB RF SP4T Switch

USB-SP4T-63

50Ω 1 to 6000 MHz

The Big Deal

- USB power & control
- High speed switching (3 μsec typ)
- High power handling (+27 dBm max)
- Small case (2.25" x 1.50" x 0.475")



Product Overview

Mini-Circuits' USB-SP4T-63 is a low cost, high speed solid state RF SP4T absorptive switch, controlled and powered via USB port. The model contains an electronic, high speed (3 μsec typ switching time), high linearity (IP3 54 dBm typ), SP4T. The RF switch can be operated remotely using the supplied GUI software or programmed by the user with the included API objects or the supplied command codes for Linux systems. The RF switch operates over a wide frequency band from 1 to 6000 MHz, has low insertion loss (1.6 dB typ) and high isolation (50 dB typical) making the switch perfectly suitable for a wide variety of RF applications.

The USB-SP4T-63 is constructed in a compact, rugged metal case (2.25" x 1.50" x 0.475") with 5 SMA(F) connectors (COM, J1, J2, J3, and J4), and a USB type Mini-B port. The model is supplied with our easy-to-install, easy-to-use GUI software, API objects for Windows environments with complete programming instructions for 32 and 64 bit Windows®, and Linux® operating systems. Also included is a 2.6 ft. USB cable. Longer USB cables are available as optional accessories.

Key Features

Feature	Advantages
USB HID (Human Interface Device)	USB control. Plug-and-Play, no driver required. Compatible with Windows® or Linux® operating systems using 32 and 64 bit architecture.
RF SP4T absorptive switch	Wideband (1 to 6000 MHz) with low insertion loss (1.25 dB typ.), high isolation (50 dB typ.), and high power rating (+27 dBm through path).
High Linearity (IP3 54 dBm typ.)	Results in little or negligible inter-modulation generation, meeting requirements for digital communications signals
DC Blocking	No need for external DC blocking circuitry
Programmable switching sequence	The USB-SP4T-63 allows the user to set up a sequence of up to 100 switching settings (from 5μsec to 10 seconds) to run automatically without waiting for commands from the PC.
GUI Software CD, programming instructions, and USB cable included	The USB-SP4T-63 comes ready to use out of the box with all software, accessories, and instructions needed for immediate operation.

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USB-SP4T-63

50Ω 1 to 6000 MHz

Features

- High speed switching (3 μsec typ)
- 1 to 6000 MHz SP4T absorptive RF switch
- High power handling, +27 dBm
- High linearity (IP3 54 dBm)
- USB power and control
- Easy installation and operation
- Programmable switching sequence
- Supports a wide range of programming environments (See application note [AN-49-001](#) for details)



Case Style: NR1982



Installation CD

Included Accessories

Model No.	Description	Qty.
MUSB-CBL-3+	2.6 ft USB cable	1
ESW-CD	Installation CD	1

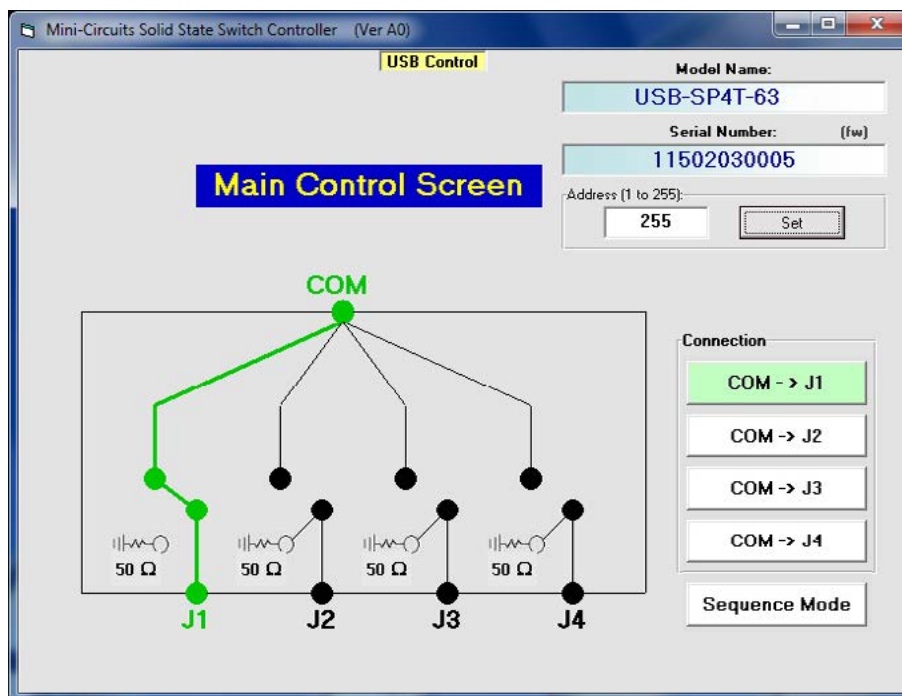
Applications

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

RoHS Compliant

See our web site for RoHS Compliance methodologies and qualifications

Mini-Circuits RF Switch Control Program for USB Solid State RF Switch



- See [user guide](#) for details on installing GUI or using the RF switch.
- For programming instructions of the switch matrix see [programming guide](#) and [AN-49-001](#) on Mini-Circuits' website



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Rev. B
M155200
EDR-11214/2
USB-SP4T-63
RAV
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Electrical Specifications

Parameter	Port	Conditions	Min.	Typ.	Max.	Units
Operating Frequency			1		6000	MHz
Insertion Loss	COM to any active port	1 to 3000 MHz	–	1.0	2.0	dB
		3000 to 6000 MHz	–	1.6	3.0	
Isolation	Between ports J1,J2,J3, and J4	1 to 500 MHz	50	85	–	dB
		500 to 5000 MHz	35	60		
		5000 to 6000 MHz	33	55	–	
	COM to any terminated port	1 to 500 MHz	55	85		
		500 to 5000 MHz	30	50		
		5000 to 6000 MHz	25	40	–	
VSWR	COM port	1 to 3000 MHz	–	1.10	1.40	:1
		3000 to 6000 MHz	–	1.15	1.60	
	Any port connected to COM	1 to 3000 MHz	–	1.20	1.50	
		3000 to 6000 MHz	–	1.20	1.55	
	Any terminated port	1 to 3000 MHz	–	1.10	1.60	
		3000 to 6000 MHz	–	1.25	2.00	
Power Input @ 1 dB Compression ^{1,2}	COM to any active port	10 to 6000 MHz	30	–	–	dBm
IP3 ³	COM to any active port	10 to 6000 MHz	–	54	–	dBm
Switching Time	–	Note 4	–	3	–	µsec
Minimum dwell time	–	Using switching sequence function	–	5	–	µsec
Rated voltage	USB port	–	4.75	5	5.25	V
Rated Current		–	–	30	80	mA
Operating RF Input Power	COM to any active port	Hot Switching	–	–	+17	dBm
	Any terminated port	–	–	–	+17	
	COM to any active port	Through path ¹	–	–	+27	

¹ Max operating power degrades linearly below 10 MHz to +22 dBm at 1 MHz.

² Note absolute maximum ratings in table below

³ Tested with 1 MHz span between signals.

⁴ Specified without communication delays. Switching time spec represents the time that the RF signal paths are interrupted during switching.

Minimum System Requirements

Interface	USB HID
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
Hardware	Pentium® II or better

Connections

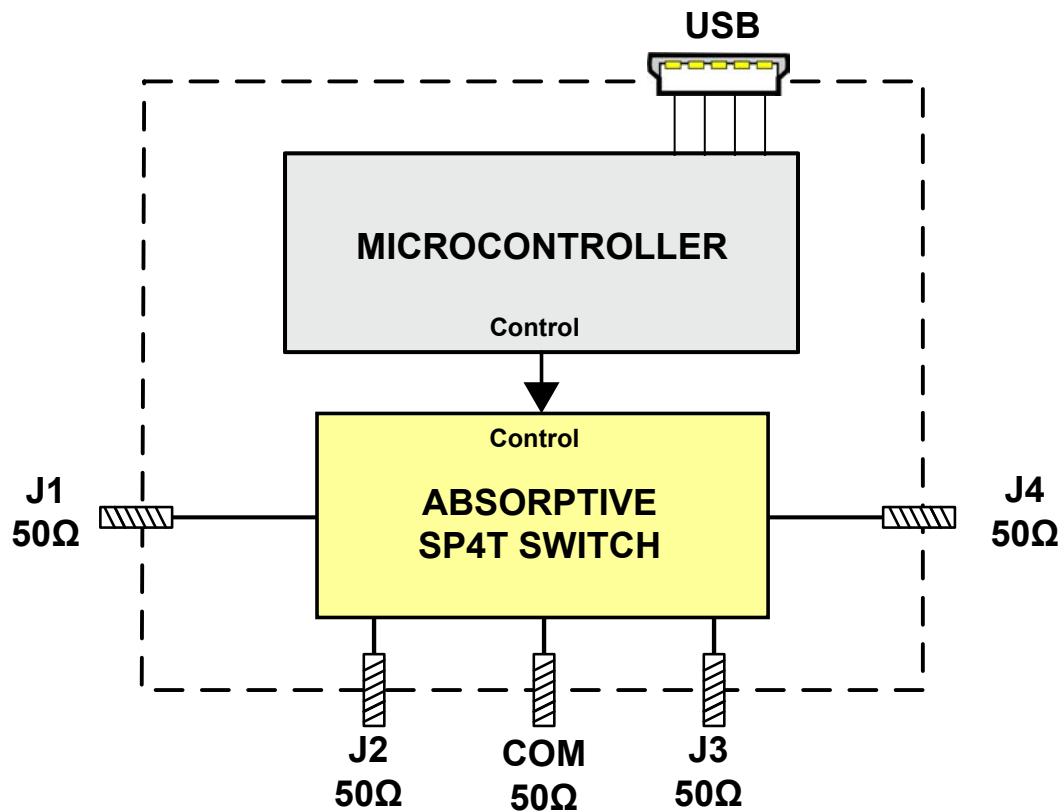
RF Switch (J1, J2, J3, J4, COM)	(SMA female)
USB	(USB type Mini-B receptacle)

Absolute Maximum Ratings

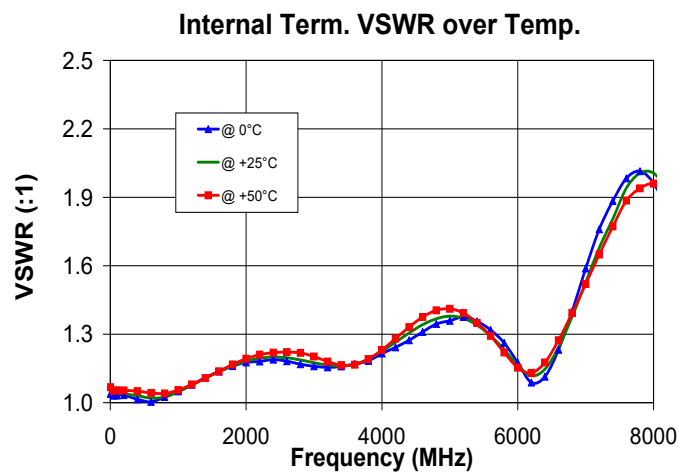
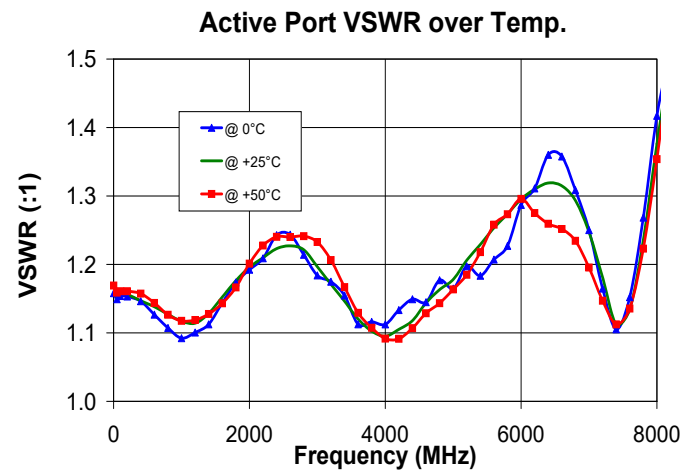
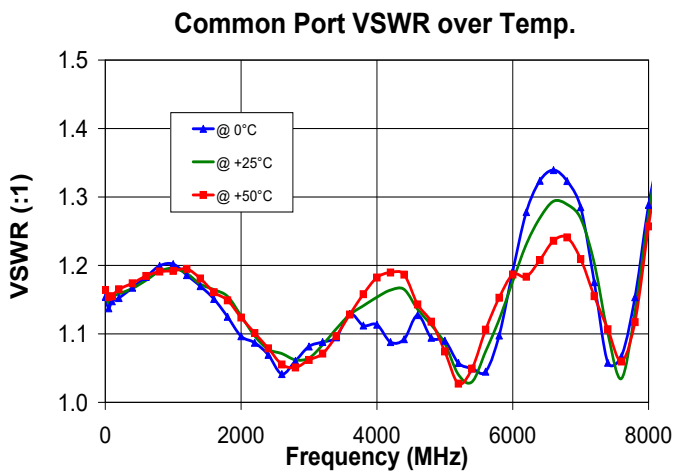
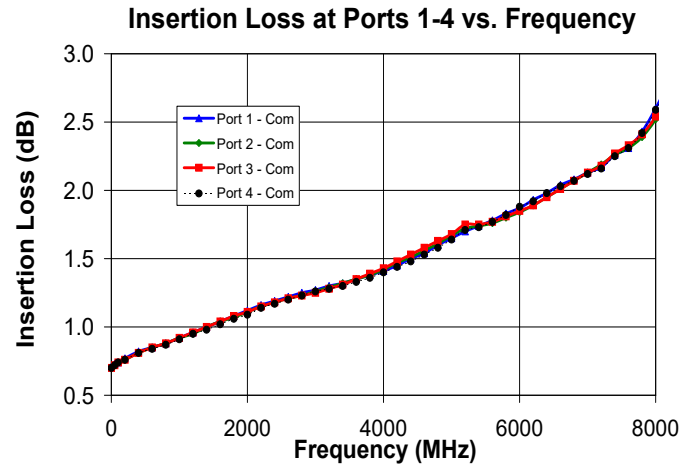
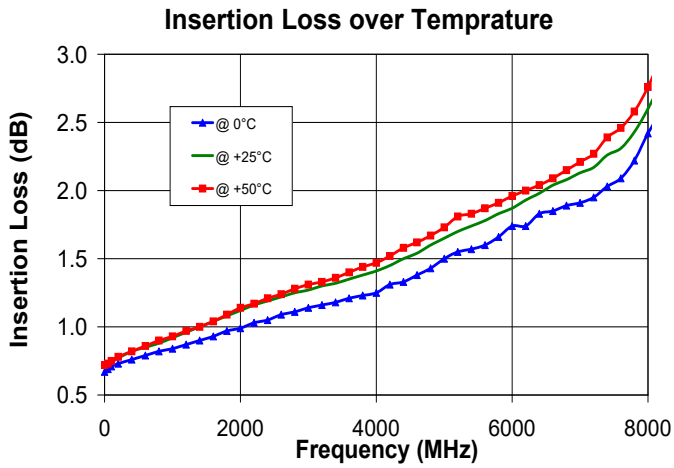
Operating Temperature	0°C to 50°C
Storage Temperature	-20°C to 60°C
DC supply voltage max.	6V
RF power @ 1 -6000 MHz into termination	+20 dBm
RF power @ 10 -6000 MHz into COM or active port	+30 dBm
RF power @ 1 -10 MHz into COM or active port	+25 dBm
DC voltage @ RF Ports	16V

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.

Block Diagram

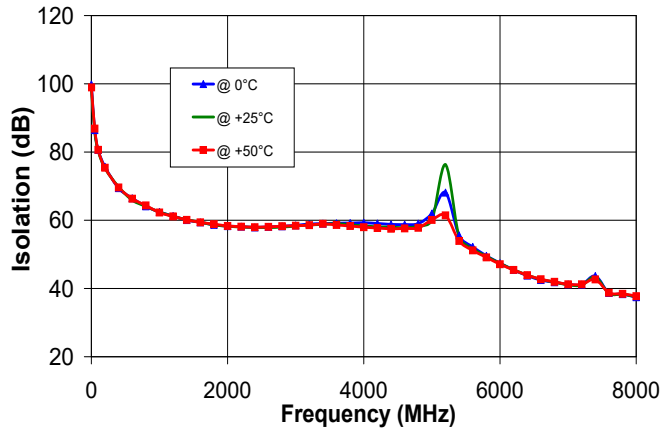


Typical Performance Curves

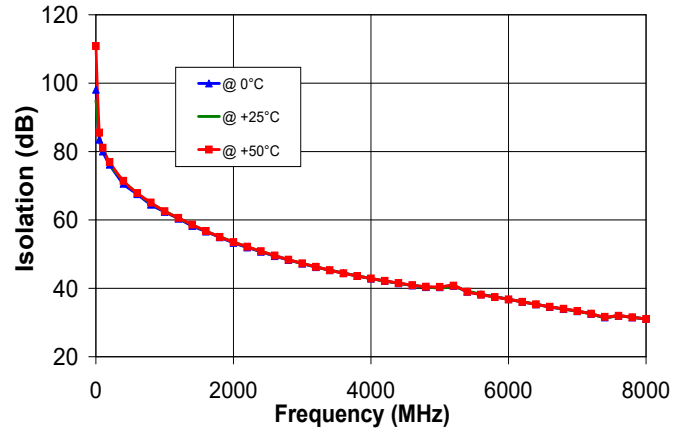


Typical Performance Curves (Continued)

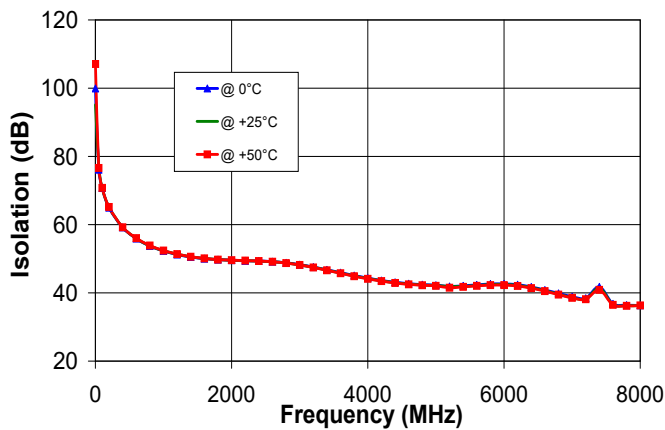
Com to Port 1 Isolation with Port 4 active



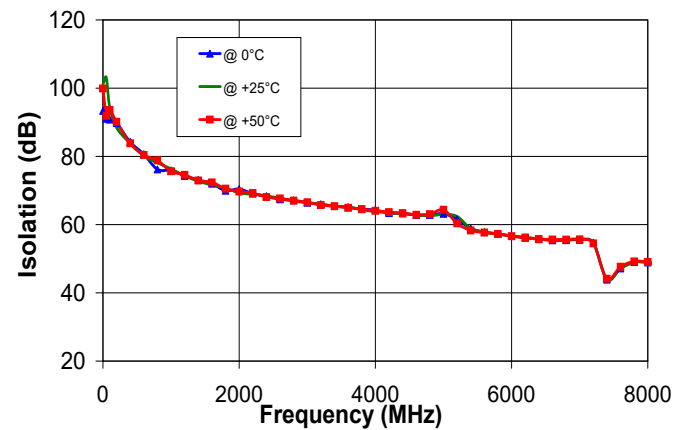
Com to Port 1 Isolation with Port 2 active



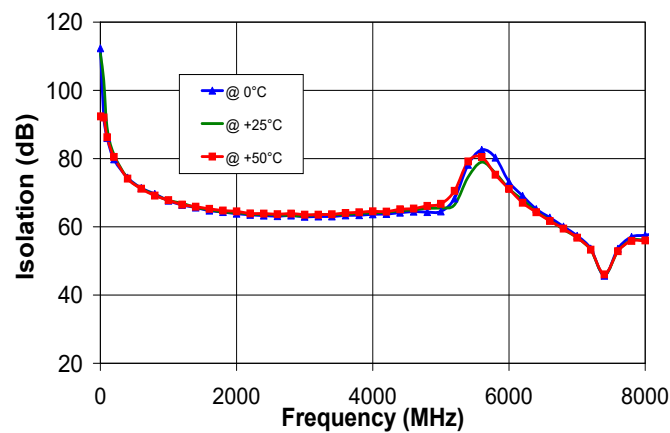
Port 1 to Port 2 Isolation with Port 4 active



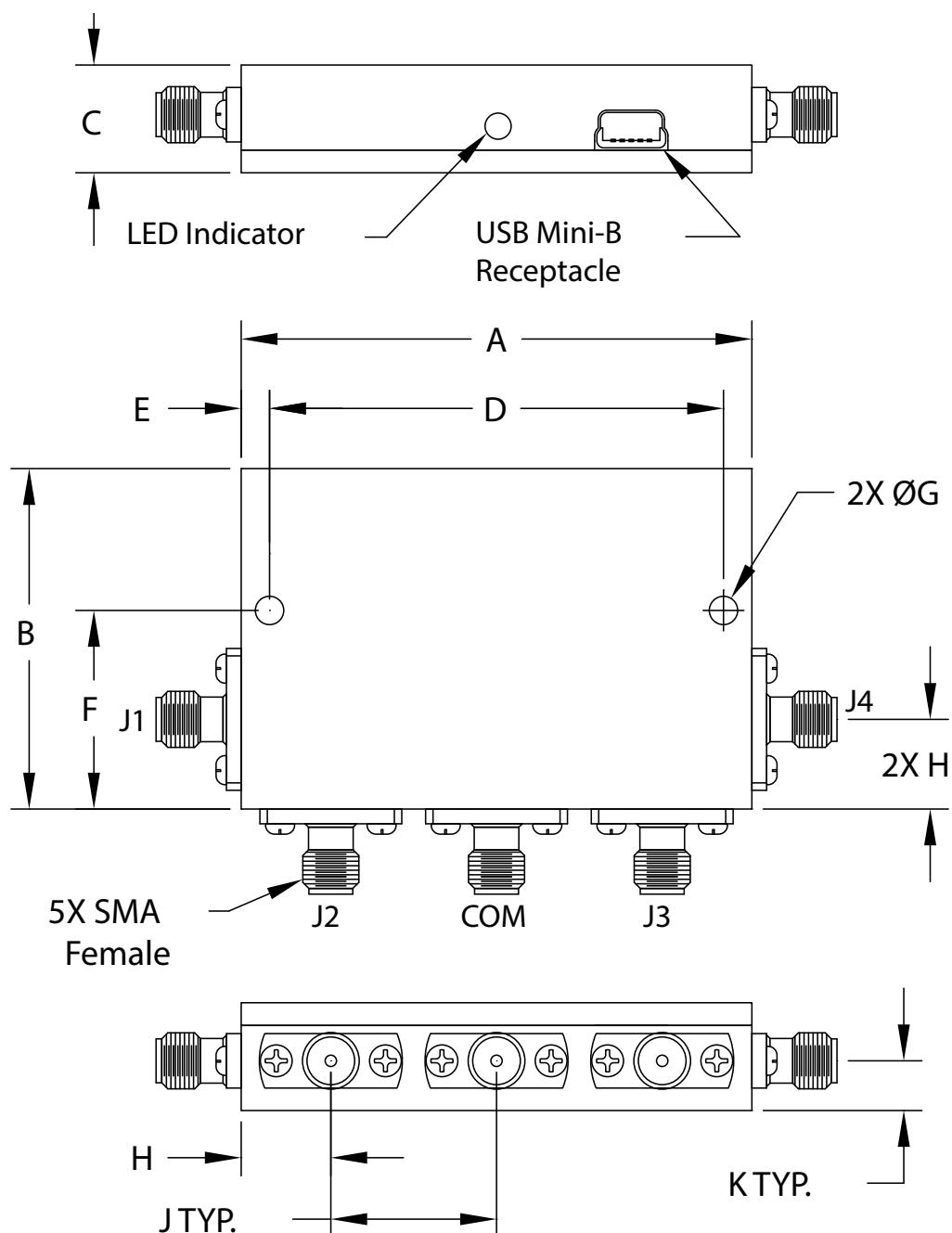
Port 1 to Port 3 Isolation with Port 4 active



Port 2 to Port 3 Isolation with Port 4 active



Outline Drawing (NR1982)





Outline Dimensions ($\frac{\text{inch}}{\text{mm}}$)

A	B	C	D	E	F	G	H	J	K	WT. GRAMS
2.25	1.50	0.475	2.000	0.125	0.875	0.125	0.395	.730	0.219	85
57.2	38.1	12.07	50.80	3.18	22.23	3.18	10.03	18.54	5.56	

Ordering, Pricing & Availability Information see our web site

Model	Description
USB-SP4T-63	USB RF SP4T Switch

Included Accessories	Part No.	Description
	ESW-CD	Software CD
	MUSB-CBL-3+	2.6 ft (0.8 m) USB Cable: USB type A(Male) to USB type Mini-B(Male)

Optional Accessories	Description
MUSB-CBL-3+ (spare)	2.6 ft (0.8 m) USB Cable: USB type A(Male) to USB type Mini-B(Male)
MUSB-CBL-7+	6.6 ft (2.0 m) USB Cable: USB type A(Male) to USB type Mini-B(Male)

Additional 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/MCLStore/terms.jsp