USB

MEMS Switch

MEM-SP4T-A18

50Ω DC to 18 GHz SP4T 2.92 mm Female

THE BIG DEAL

- DC passing & wide bandwidth, DC to 18 GHz
- Extremely high reliability, 30 Billion switch cycles (@1GHz, +30dBm)[Note 1]
- 25W CW power rating (Cold switching @ 1GHz) [Note 1]
- High-speed switch transition, 15µs
- Excellent Linearity, 90 dB IP3

Generic photo used for illustration purposes only

APPLICATIONS

- Antenna linefeed
- Redundancy switching for microwave radio
- Satcom / GNSS antenna switching (RF & DC paths)
- Signal routing / switch matrices
- High volume production testing / ATE

PRODUCT OVERVIEW

Mini-Circuits' MEMS-SP4T-A18 uses the unique Micro ElectroMechanical System technology to provide an absorptive SP4T switch with the high speed of a solid state switch and the power handling and isolation of a mechanical one with extremely high reliability and good isolation.

The daisy-chain control interface with "dynamic addressing" simplifies control integration, allowing multiple switches to be combined into a Master / Slave chain. Simply connect, then power on and the whole chain of up to 25 compatible switches can be controlled independently through a single USB and software interface. The switch is supplied in a compact package with precision 2.92 mm RF connectors

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).

KEY FEATURES

Feature	Advantages
High Power DC Passing	Passing DC power (up to 9V, 500mA, cold switching) allows the switch to be used in Antenna feeds and high power amplifiers without the need for separate DC Feeds
Fast switching sequences	Program automated switching sequences to run with extremely fast transitions and no external control.
High Performance	The MEMS design provides high speed switching, with high power handling and good Isolation and insertion loss over DC to 18 GHz range.
Dynamic daisy-chain control	Control up to 25 switches through a single USB interface.
Power and control via USB	Simplifies control integration relative to traditional mechanical switches, with significantly lower DC power consumption and eliminate the need for external power supplies

1. See Max power vs Life section for details.

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ELECTRICAL SPECIFICATIONS, -10 TO +60°C

Parameter	Ports	Condition (GHz)	Min.	Typ.	Max.	Unit
Frequency Range	–	–	0.1	–	18	GHz
Insertion Loss	COM to any active port	0.1 - 6	–	0.7	1.7	dB
		6 - 10	–	1.3	2.1	
		10 - 15	–	1.7	2.8	
		15 - 18	–	2.1	3.5	
Isolation	Between ports 1 to 4	0.1 - 6	45	65	–	dB
		6 - 10	35	55	–	
		10 - 15	35	50	–	
		15 - 18	33	45	–	
	COM to any terminated port (including disconnected state)	0.1 - 6	40	70	–	
		6 - 10	37	55	–	
		10 - 15	30	50	–	
		15 - 18	28	40	–	
Return Loss	COM port (in all active states)	0.1 - 6	–	16	–	dB
		6 - 10	–	12	–	
		10 - 15	–	12	–	
		15 - 18	–	10	–	
	Any port connected to COM	0.1 - 6	–	16	–	
		6 - 10	–	14	–	
		10 - 15	–	13	–	
		15 - 18	–	11	–	
	Any terminated port	0.1 - 6	–	18	–	
		6 - 10	–	14	–	
		10 - 15	–	12	–	
		15 - 18	–	11	–	
IP3	COM to any active port	0.1 - 18	–	90	–	dBm
Transition Time [2]	–	–	–	15	20	µs
Minimum Dwell Time [3]	High-speed mode	–	–	100	–	µs
Switching Time (USB) [4]	–	–	–	2	–	ms

2. Transition time spec represents the time that the RF signal paths are interrupted during switching and thus is specified without communication delays.
3. Minimum dwell time is the shortest time that can be achieved between 2 switch transitions when programming an automated switch sequence.
4. Switching time (USB) is the time from issuing a single software command via USB to the switch state changing. The most significant factor is the host PC, influenced by CPU load and USB protocol. The time shown is an estimate for a medium CPU load and USB 2.0 connection.

ELECTRICAL SPECIFICATIONS, -10 TO +60°C (CONTINUED)

Parameter		Ports	Condition (GHz)	Min.	Typ.	Max.	Unit
Supply Voltage (V_{USB})		USB port	–	4.75	5	5.25	V_{DC}
Supply Current (I_{USB}) [5]			–	–	112	140	mA
Supply Current Pass-through [6]		–	–	–	–	500	mA
Signal path DC pass (V)		Thru path	–	–	±10	–	V_{DC}
Signal path DC pass (I)			–	–	500	–	mA
Life @ 25°C [7,8]		Cold switching	1 GHz, +30 dBm	3,000	30,000	–	10^6 cycles
			1 GHz, +41.5 dBm	–	1,000	–	
			1 GHz, +42.5 dBm	–	100	–	
		Hot switching	0.1 - 18, +10 dBm	3,000	30,000	–	
Operating RF Input Power [7]	Cold Switching	CW signal (thru path)	DC - 0.005	–	–	1	W
			0.005 - 1	–	–	25	
		CW signal (into termination)	DC - 18	–	–	1	
		Peak Power (thru path) [9]	0.005 - 6	–	–	75	
	Hot Switching	CW signal (at any port)	0.1 - 18	–	–	0.01	

5. USB current draw for a single unit with no slave units.
6. Pass through current is the maximum supply current handling of a unit with slave modules attached. If controlling a large number of slave modules additional power supplies should be included to ensure this limit is not exceeded. See Daisy Chain section for details.
7. Max power derates for frequencies above 1GHz according to the power derating curve shown below.
8. Signal with duty cycle over 99%. Longer RF off time will produce improved life.
9. Signal with duty cycle 10%, pulse width 100µs.

ABSOLUTE MAXIMUM RATINGS [10]

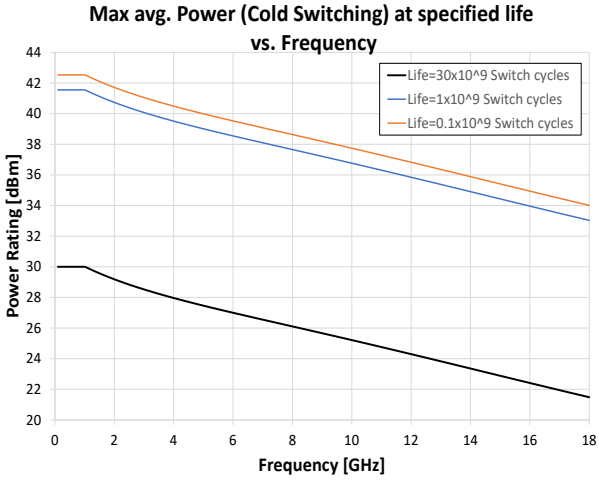
Operating Temperature		-10°C to +60°C
Storage Temperature		-20°C to +85°C
DC supply voltage max.		6V
DC voltage @ RF Ports	**Cold Switching**	9 V
	Hot Switching	0.5V

10. 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.

MAX POWER VS LIFE

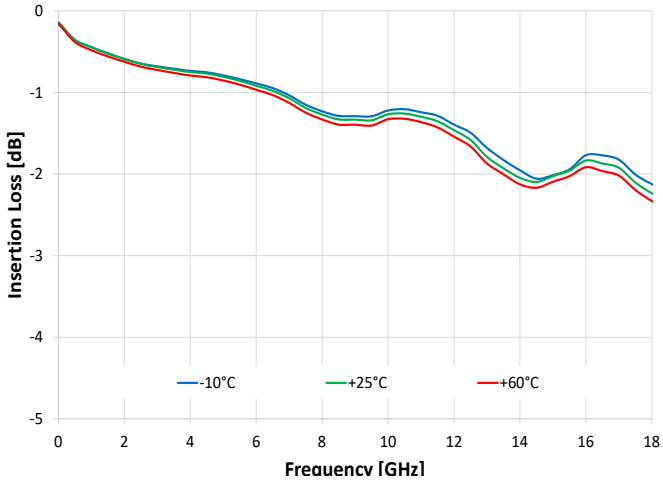
When cold switching, the max power vs. Frequency of the model (for a given life) derates above 1GHz according to the graph to the right. Thus at 6GHz the power is down to 50% of the power at 1GHz, and at 18 GHz 14%.

For a life of 100 Million cycles max power at 1GHz is 42.5 dBm, since max power at 18 GHz is 14% of power at 1GHz the power at 18 GHz needs to be below +34 dBm for a life of 100 million cycles.

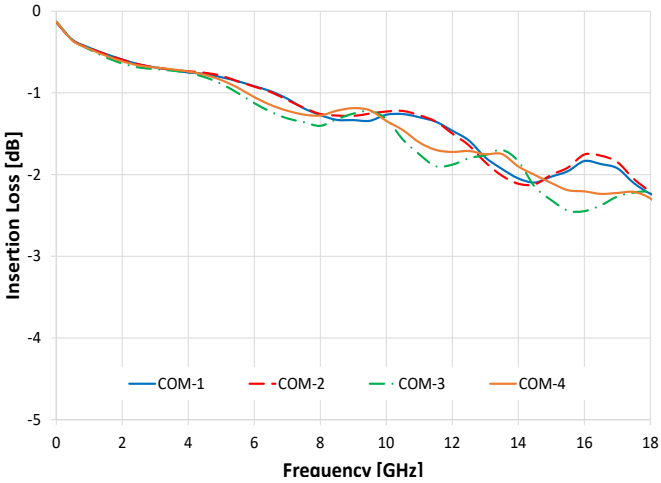


TYPICAL PERFORMANCE GRAPHS

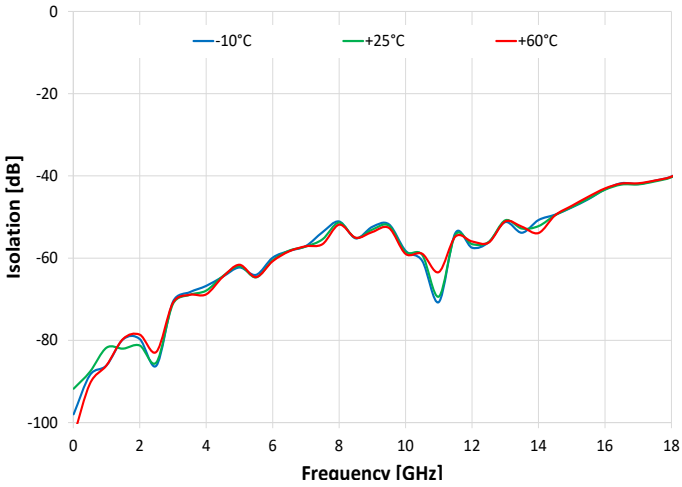
Insertion Loss over Temperature (1 Active)



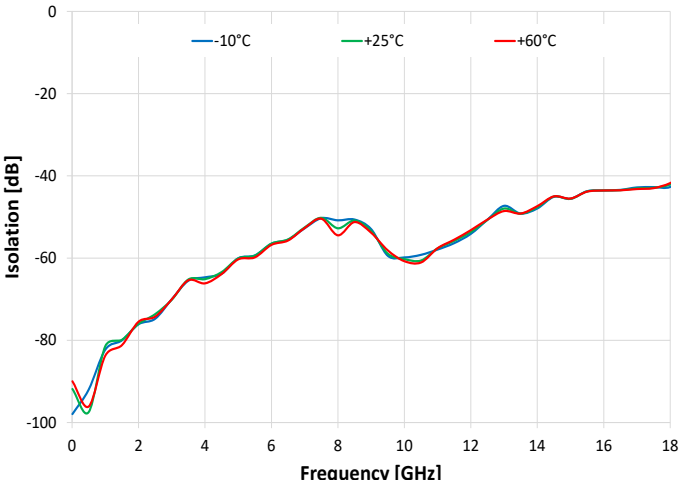
Insertion Loss 1 - 4 Active



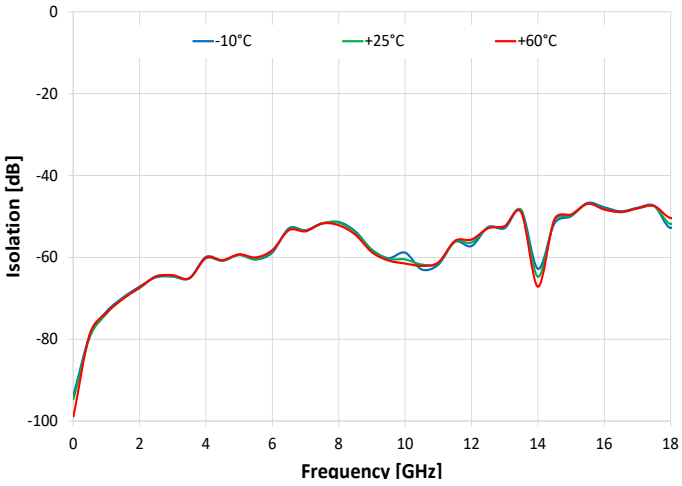
Isolation Com to 1 (2 Active)



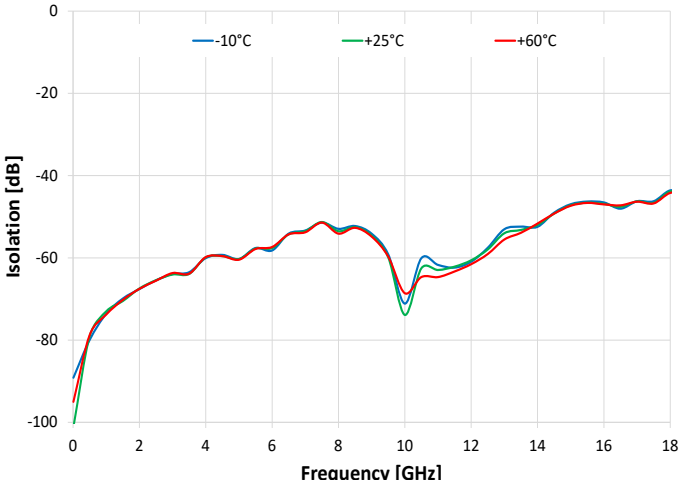
Isolation Com to 3 (4 Active)



Isolation 2 to 3 (2 Active)

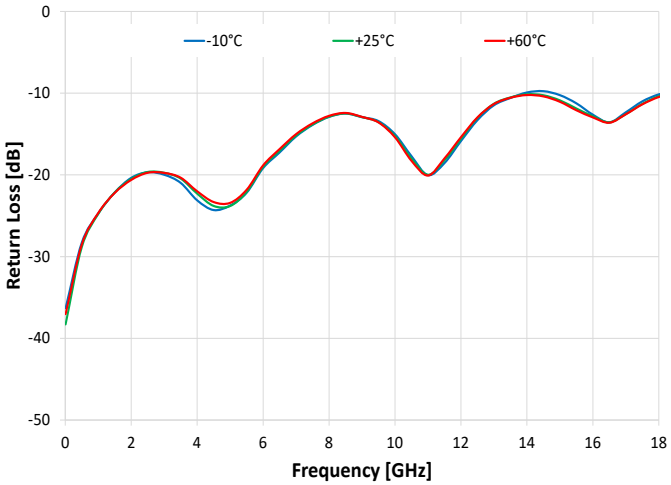


Isolation 3 to 4 (3 Active)

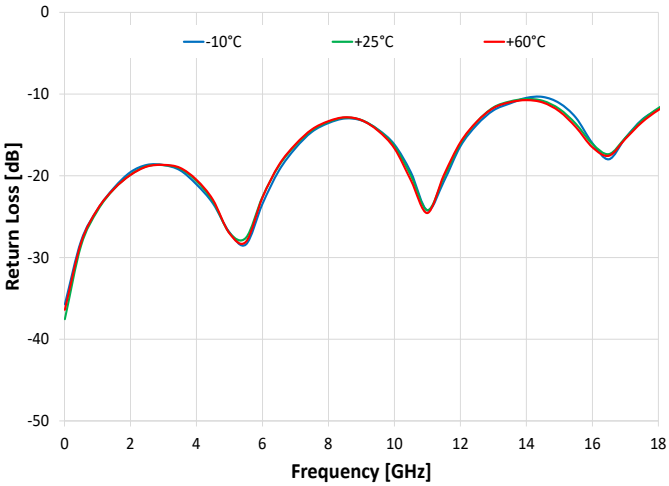


TYPICAL PERFORMANCE GRAPHS (CONTINUED)

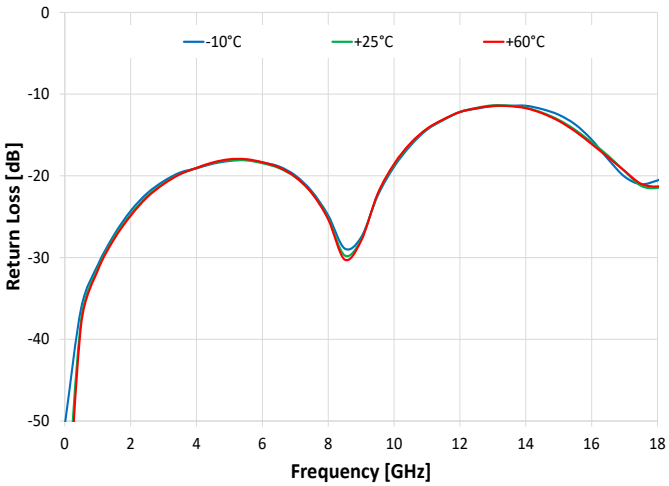
Return Loss @ COM over Temperature (1 Active)



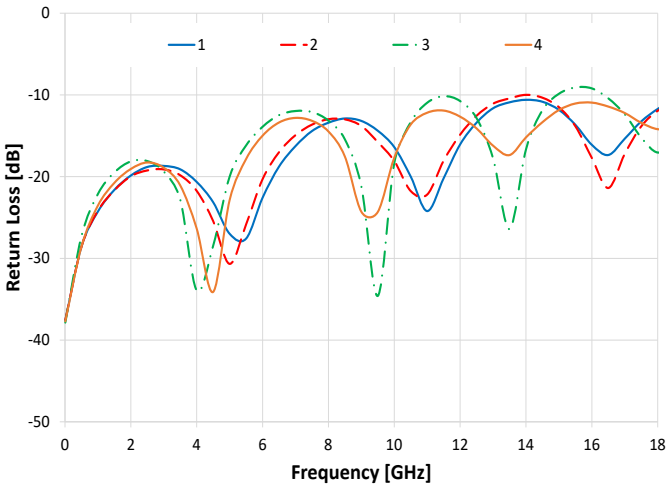
Return Loss @ 1 over Temperature (1 Active)



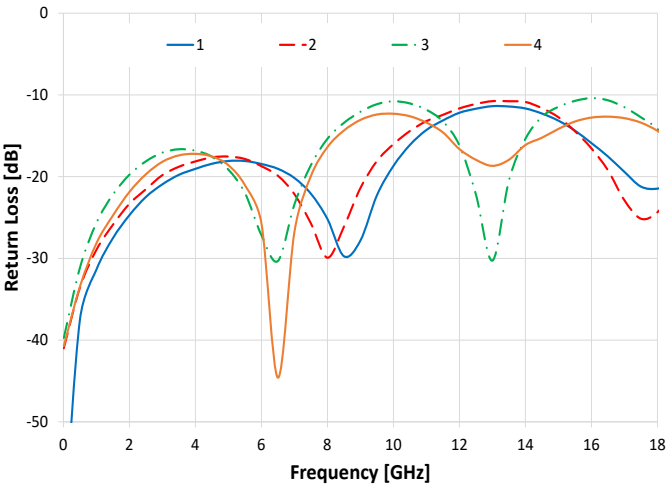
Return Loss @ 1 over Temperature (1 Terminated)



Return Loss @ Active ports (1 - 4 Active)



Return Loss @ Terminated ports (1 - 4 Terminated)



CONTROL INTERFACES

USB Control	Supported Protocols	HID (Human Interface Device) - Full-speed
	Min Communication Time [11]	3 ms typ (full transmit/receive cycle)

11. USB Min Communication Time is based on the polling interval of the USB HID protocol (1 ms polling interval, 64 bytes per packet), medium CPU load and no other high speed USB devices using the USB bus.

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).

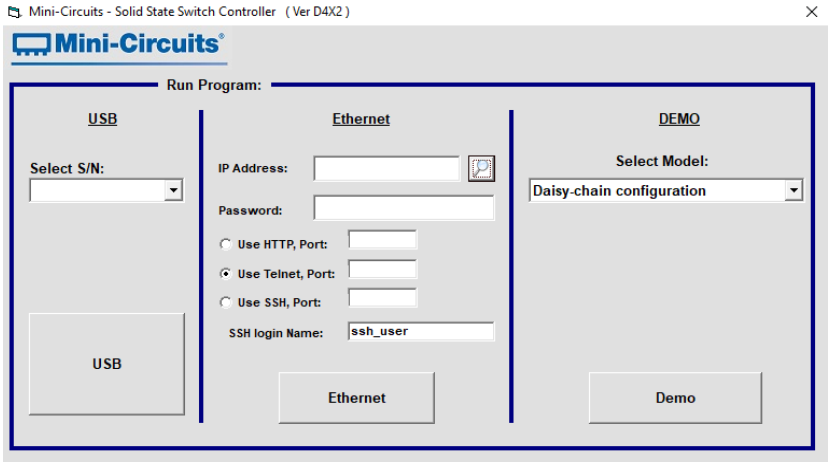
Please contact testsolutions@minicircuits.com for support.

MINIMUM SYSTEM REQUIREMENTS

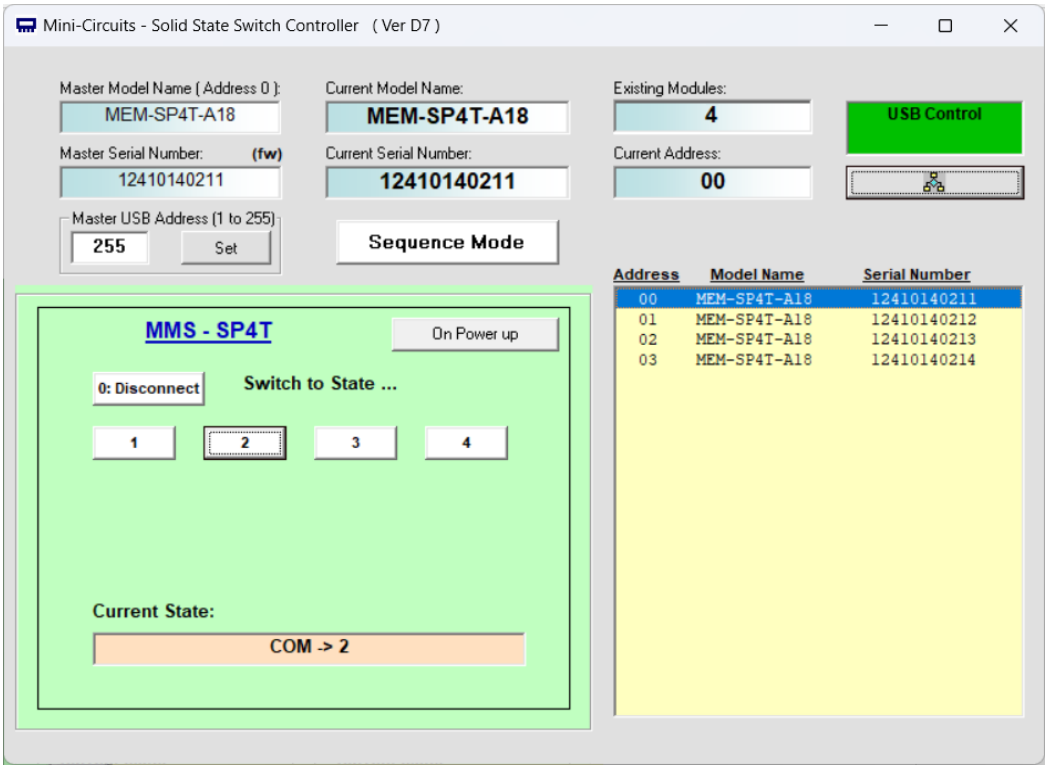
GUI	Windows 7 or later
USB API DLL	Windows 7 or later and programming environment with ActiveX or .NET support
USB Direct Programming	Linux, Windows 7 or later
Daisy-Chain Dynamic Addressing	An additional Mini-Circuits unit supporting dynamic addressing
Hardware	Intel i3 (or equivalent) or later

GRAPHICAL USER INTERFACE (GUI) FOR WINDOWS - KEY FEATURES

- Connect via USB to control the module. (Ethernet control is not available for this model)
- Run GUI in "demo mode" to evaluate software without a hardware connection.

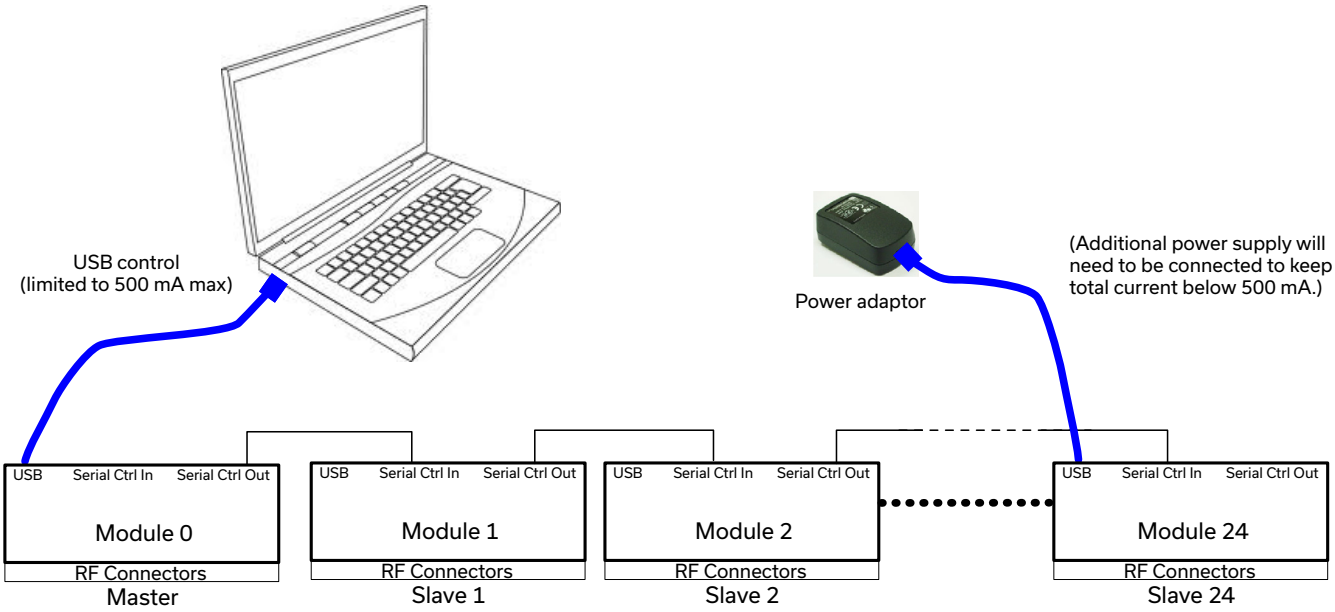


- View and set switch states at the click of a button.
- Configure and run timed switching sequences.



CONNECTING MULTIPLE MODULES (DAISY CHAIN)

The model is designed to connect up to 25 modules in series (daisy chain) using dynamic addressing, meaning there is no need to specifically set the address of the modules. The addresses will be set automatically as part of establishing the communications with the computer. The module connected to the computer's USB port will be assigned address 0 (master), the first module connected to it will get address 1 (slave) and subsequent modules incrementing up to address 24 (slave).



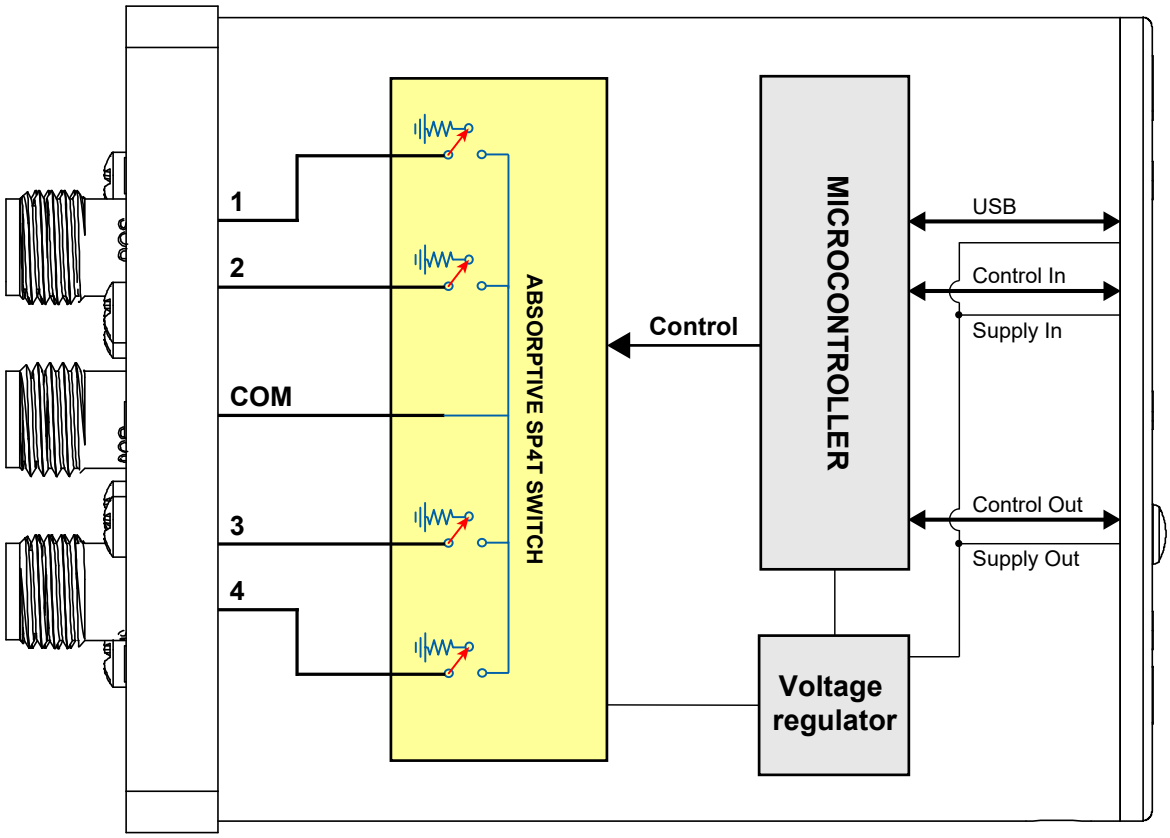
Connections between modules will be made using the serial in/out ports with the module connected to the PC act as a master and all other as slave modules. All control will be through the master module (address 0) which is the only one communicating with the PC. Serial control out port of each module should be connected to the serial control in port of the next module.

Power will be supplied from the PC via the master module up to a maximum of 500 mA. Generally, additional power supply will be needed to keep total current below 500 mA. All power supplies should be connected to the module via the module's USB port. Connecting an additional power supply will automatically cut off power draw from the serial control in port for that module.

The serial master/slave bus allows connecting modules of different types to the same daisy chain as long as all support Mini-Circuits Dynamic addressing setup. To add a new module to the setup, simply connect the module and refresh the address listing, no need to reset any of the existing modules or assign addresses manually.

Note: Different module types may have different current consumption which will change the number of units which can be connected before an additional power supply is needed. For example ,if connecting units with a current consumption of 100 mA each, additional power supply is recommended every sixth module. If using units with current consumption of 50 mA additional power supply is recommended every eleventh module.

BLOCK DIAGRAM



SWITCH STATE TABLE

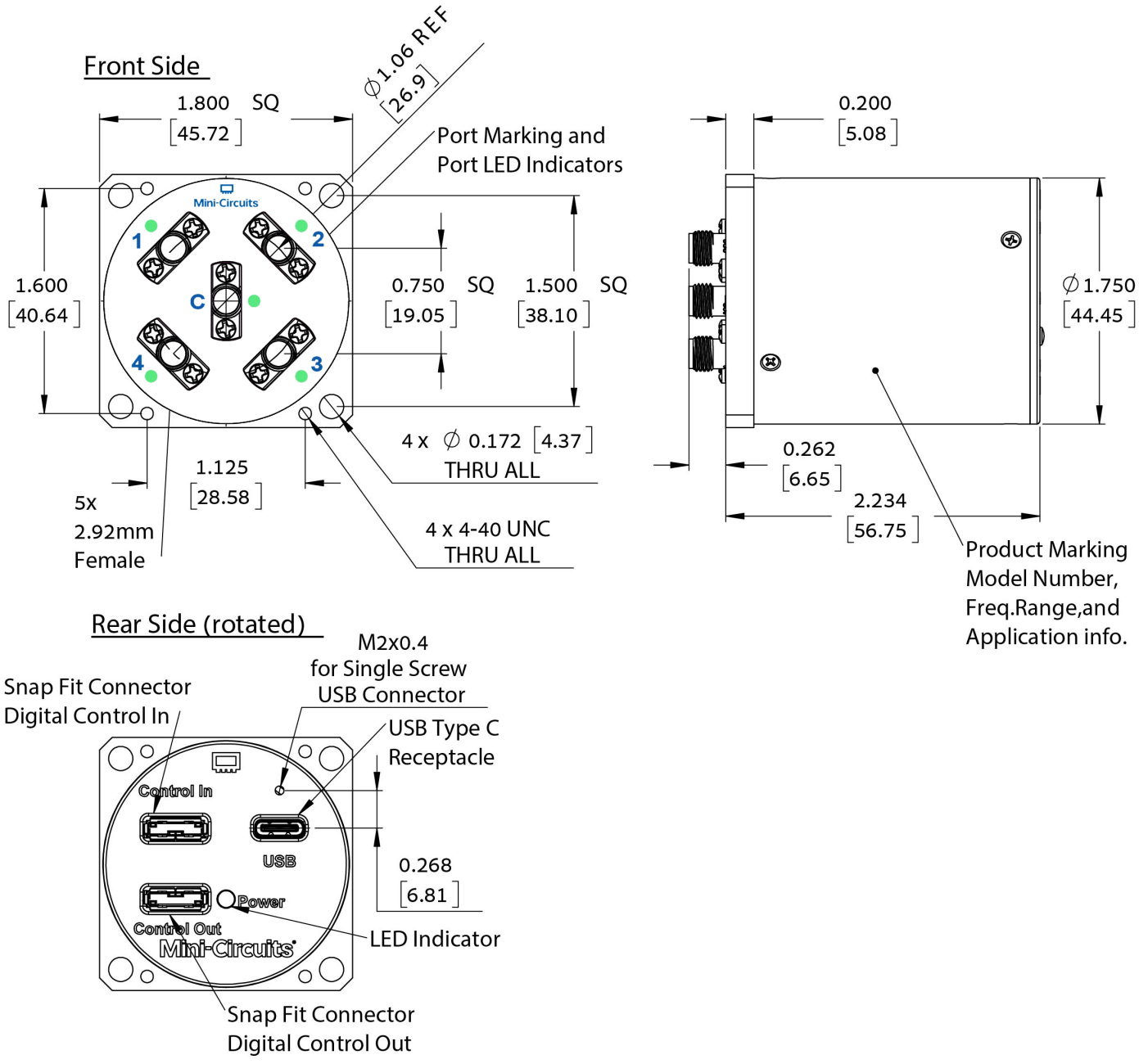
State	Switch Path
0	All ports disconnected (COM Open, 1 - 4 Terminated)
1	Com to 1
2	Com to 2
3	Com to 3
4	Com to 4

CONNECTIONS

Port Name	Connector Type
RF Ports (COM, 1 to 4)	2.92 mm Female
USB	USB Type C Receptacle
Serial In (digital control 2 port)	Digital Snap-Fit Connector [11]
Serial Out (digital control 1 port)	Digital Snap-Fit Connector [11]

11. Mating connector is Hirose ST40X-10S-CV(30).

CASE STYLE DRAWING (HJ3609)



NOTES:

1. Case material: Aluminum alloy.
2. Case Finish: Nickel Plate. Cover: Stainless Steel
3. Dimensions are in inches [mm]. Tolerances 2 Pl. ±.03 inch; 3 Pl. ±.015 inch.
4. Weight: 175 grams
5. Marking may contain other features or characters for internal lot control.

USB

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DETAILED MODEL INFORMATION IS AVAILABLE ON OUR WEBSITE CLICK HERE

Performance Data & Graphs	Data Graphs
Case Style	HJ3609
Environmental Rating	ENV55T2
Software, User Guide & Programming Manual	https://www.minicircuits.com/softwaredownload/solidstate.html
Regulatory Compliance	Refer to user guide for compliance information CE UKCA https://www.minicircuits.com/app/AN49-012.pdf
Support	testsolutions@minicircuits.com

INCLUDED ACCESSORIES [13]

	Part No.	Description	Qty.
	USB-CBL-AC-3+	3.3 ft (1.0 m) USB cable: USB type A (Male) to USB type C (Male)	1

13. Additional quantities are available for purchase as optional accessories.

OPTIONAL ACCESSORIES

	Part No.	Description
	CBL-1.5FT-MMD+	1.5 ft (0.45 m) cable assembly for serial control Daisy Chain with snap fit connectors
	USB-AC/DC-5	AC/DC +5V power adaptor with USB connector [14, 15]

14. The power adaptor may be used to provide additional power via USB port when connecting several units in daisy chain control.
15. Includes power plugs for US, UK, EU, IL, AU & China. Plugs for other countries are also available. If you need a power cord for a country not listed, please contact testsolutions@minicircuits.com

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 https://www.minicircuits.com/terms/viewterm.html

SP4T Switch

MEM-SP4T-A18

Typical Performance Data

Test Conditions: @ Temperature = -10°C, Pin = 0 dBm.

Freq. (GHz)	Insertion Loss (dB)			
	COM-1	COM-2	COM-3	COM-4
0.01	-0.16	-0.15	-0.16	-0.19
0.50	-0.36	-0.36	-0.36	-0.40
1.00	-0.44	-0.44	-0.47	-0.49
1.50	-0.52	-0.51	-0.56	-0.58
2.00	-0.59	-0.58	-0.64	-0.65
2.50	-0.65	-0.64	-0.69	-0.70
3.00	-0.68	-0.67	-0.70	-0.72
3.50	-0.71	-0.69	-0.72	-0.74
4.00	-0.74	-0.71	-0.75	-0.77
4.50	-0.75	-0.73	-0.79	-0.81
5.00	-0.79	-0.76	-0.87	-0.86
5.50	-0.84	-0.83	-0.97	-0.95
6.00	-0.89	-0.88	-1.08	-1.05
6.50	-0.95	-0.94	-1.19	-1.15
7.00	-1.04	-1.04	-1.27	-1.22
7.50	-1.15	-1.13	-1.32	-1.27
8.00	-1.23	-1.20	-1.37	-1.29
8.50	-1.29	-1.22	-1.29	-1.23
9.00	-1.29	-1.23	-1.22	-1.19
9.50	-1.29	-1.20	-1.17	-1.21
10.00	-1.22	-1.17	-1.26	-1.32
10.50	-1.21	-1.16	-1.50	-1.43
11.00	-1.24	-1.20	-1.68	-1.58
11.50	-1.29	-1.27	-1.82	-1.66
12.00	-1.39	-1.41	-1.81	-1.69
12.50	-1.49	-1.53	-1.74	-1.68
13.00	-1.68	-1.73	-1.70	-1.73
13.50	-1.83	-1.91	-1.62	-1.72
14.00	-1.95	-2.02	-1.74	-1.85
14.50	-2.06	-2.08	-2.05	-1.97
15.00	-2.02	-1.98	-2.24	-2.09
15.50	-1.94	-1.87	-2.42	-2.20
16.00	-1.77	-1.68	-2.41	-2.21
16.50	-1.77	-1.67	-2.31	-2.20
17.00	-1.82	-1.73	-2.15	-2.14
17.50	-2.01	-1.93	-2.07	-2.11
18.00	-2.12	-2.07	-2.08	-2.19
18.50	-2.21	-2.24	-2.30	-2.42
19.00	-2.28	-2.40	-2.44	-2.37
19.50	-2.39	-2.55	-2.56	-2.53
20.00	-2.57	-2.82	-2.83	-2.77

SP4T Switch

MEM-SP4T-A18

Typical Performance Data

Test Conditions: @ Temperature = -10°C, Pin = 0 dBm.

Freq. (GHz)	Return Loss, Active ports (dB)					R. Loss, Internally terminated ports (dB)			
	COM	1	2	3	4	1	2	3	4
0.01	-36.30	-35.73	-36.14	-36.06	-34.25	-50.21	-40.08	-38.76	-38.20
0.50	-28.30	-28.00	-28.14	-26.85	-27.41	-36.13	-33.07	-30.74	-32.23
1.00	-24.72	-24.12	-24.04	-22.00	-23.20	-30.93	-28.83	-25.56	-27.78
1.50	-22.15	-21.47	-21.52	-19.31	-20.52	-27.20	-25.76	-22.05	-24.51
2.00	-20.37	-19.55	-19.65	-17.84	-18.68	-24.30	-23.12	-19.58	-21.58
2.50	-19.68	-18.67	-19.02	-17.91	-18.03	-22.14	-21.28	-17.97	-19.46
3.00	-19.98	-18.69	-19.08	-19.35	-18.80	-20.66	-19.63	-16.99	-18.04
3.50	-20.98	-19.31	-20.03	-23.07	-21.04	-19.60	-18.70	-16.63	-17.31
4.00	-23.11	-21.05	-22.17	-34.69	-26.34	-19.08	-18.16	-16.91	-17.17
4.50	-24.30	-23.39	-25.79	-28.78	-35.89	-18.51	-17.74	-17.75	-17.52
5.00	-23.75	-26.92	-30.83	-20.39	-23.83	-18.18	-17.66	-19.42	-18.59
5.50	-22.19	-28.40	-26.39	-16.64	-18.67	-18.07	-17.97	-22.20	-20.88
6.00	-19.17	-23.43	-20.84	-14.33	-15.57	-18.37	-18.83	-27.34	-25.19
6.50	-17.26	-19.36	-17.48	-12.77	-13.74	-18.85	-19.84	-32.08	-41.55
7.00	-15.30	-16.62	-15.25	-12.14	-13.09	-19.95	-21.95	-23.83	-27.40
7.50	-13.88	-14.62	-13.86	-12.14	-13.33	-21.89	-25.22	-18.81	-20.22
8.00	-12.90	-13.54	-13.11	-13.16	-14.50	-24.84	-28.91	-15.59	-16.54
8.50	-12.49	-12.98	-13.02	-15.29	-17.32	-28.89	-26.04	-13.52	-14.46
9.00	-12.94	-13.22	-13.81	-20.57	-23.80	-27.51	-21.45	-12.07	-13.06
9.50	-13.42	-14.33	-15.70	-41.69	-25.68	-22.46	-18.21	-11.18	-12.32
10.00	-15.03	-16.18	-17.81	-19.08	-18.04	-18.90	-16.11	-10.82	-12.20
10.50	-17.70	-19.58	-21.54	-13.51	-13.86	-16.30	-14.46	-10.95	-12.59
11.00	-20.03	-24.23	-22.48	-11.10	-12.42	-14.36	-13.20	-11.63	-13.34
11.50	-18.56	-20.67	-18.34	-10.28	-12.15	-13.16	-12.50	-13.09	-14.42
12.00	-15.86	-16.38	-15.28	-10.75	-12.86	-12.18	-11.76	-15.91	-16.23
12.50	-13.30	-13.75	-12.93	-12.61	-14.01	-11.77	-11.17	-21.28	-17.14
13.00	-11.48	-11.99	-11.31	-16.86	-15.72	-11.47	-10.73	-28.82	-18.01
13.50	-10.59	-11.15	-10.56	-25.72	-17.37	-11.43	-10.69	-21.06	-18.04
14.00	-9.92	-10.46	-9.81	-17.68	-15.91	-11.43	-10.58	-15.78	-16.68
14.50	-9.76	-10.35	-9.83	-12.31	-13.76	-11.84	-11.13	-13.06	-15.57
15.00	-10.24	-11.11	-10.86	-9.89	-11.84	-12.53	-12.17	-11.61	-14.17
15.50	-11.24	-12.89	-13.10	-8.77	-10.68	-13.71	-13.89	-10.55	-12.94
16.00	-12.63	-16.01	-17.18	-8.69	-10.64	-15.56	-16.10	-10.00	-12.44
16.50	-13.57	-17.98	-21.96	-10.10	-11.38	-17.96	-19.27	-10.33	-12.39
17.00	-12.34	-15.36	-17.30	-12.44	-12.60	-20.10	-23.43	-11.15	-12.64
17.50	-11.00	-13.14	-13.88	-15.95	-14.29	-21.03	-25.10	-12.37	-13.34
18.00	-10.15	-11.84	-12.06	-17.86	-14.76	-20.56	-23.81	-13.95	-14.38
18.50	-9.72	-10.82	-11.15	-15.49	-14.06	-19.88	-21.19	-16.92	-15.48
19.00	-9.18	-10.51	-10.70	-13.71	-13.85	-20.41	-20.88	-19.16	-16.73
19.50	-8.26	-9.93	-10.15	-12.92	-12.57	-20.35	-20.00	-18.98	-18.13
20.00	-8.02	-9.45	-9.75	-11.65	-11.00	-19.00	-18.76	-19.98	-19.76

SP4T Switch

MEM-SP4T-A18

Typical Performance Data

Test Conditions: @ Temperature = -10°C, Pin = 0 dBm.

Freq. (GHz)	Isolation, Active states (dB)				Isolation, Disconnected states (dB)			
	COM-1	COM-3	2-3	3-4	COM-1	COM-2	2-3	3-4
0.01	-97.99	-97.95	-93.59	-89.15	-98.53	-103.83	-96.07	-88.69
0.50	-88.46	-91.99	-79.09	-79.96	-85.28	-82.01	-81.36	-98.80
1.00	-86.09	-82.28	-73.25	-73.57	-78.41	-77.07	-77.69	-90.72
1.50	-79.74	-80.01	-69.78	-69.90	-73.18	-72.81	-72.95	-90.36
2.00	-79.69	-76.10	-67.14	-67.59	-70.69	-69.87	-69.08	-84.08
2.50	-86.16	-74.76	-64.86	-65.47	-70.70	-71.07	-66.52	-81.72
3.00	-70.59	-70.01	-64.69	-63.93	-70.24	-68.86	-65.62	-79.76
3.50	-68.30	-65.50	-65.09	-63.49	-66.16	-65.90	-66.03	-78.37
4.00	-66.76	-64.68	-59.90	-60.06	-64.85	-64.50	-61.14	-71.07
4.50	-64.51	-63.82	-60.74	-59.28	-69.10	-67.02	-60.76	-69.37
5.00	-62.28	-60.05	-59.42	-60.28	-69.70	-66.13	-60.01	-70.92
5.50	-64.08	-59.36	-60.51	-57.61	-64.78	-63.60	-60.72	-70.00
6.00	-59.89	-56.51	-58.80	-58.20	-65.21	-64.12	-58.84	-68.05
6.50	-58.24	-55.53	-52.88	-54.10	-69.81	-68.89	-54.00	-63.31
7.00	-57.05	-52.75	-53.39	-53.35	-68.40	-69.84	-54.00	-58.57
7.50	-53.69	-50.30	-51.78	-51.40	-58.51	-66.45	-53.50	-56.43
8.00	-51.09	-50.82	-51.37	-52.95	-52.36	-56.71	-55.90	-55.66
8.50	-55.19	-50.63	-53.65	-52.26	-50.11	-53.97	-54.97	-52.89
9.00	-52.39	-52.96	-58.16	-54.13	-46.07	-51.69	-56.72	-52.54
9.50	-51.78	-59.44	-60.18	-59.15	-47.59	-51.06	-56.37	-53.38
10.00	-58.22	-59.84	-58.85	-71.12	-47.42	-50.78	-68.93	-51.89
10.50	-60.67	-59.21	-62.96	-60.06	-48.07	-50.34	-58.64	-50.44
11.00	-70.69	-57.93	-61.77	-61.72	-49.23	-51.75	-60.28	-50.63
11.50	-53.86	-56.36	-56.20	-62.37	-46.21	-48.62	-55.06	-50.67
12.00	-57.47	-54.11	-57.23	-60.93	-48.16	-50.32	-58.30	-50.46
12.50	-56.15	-50.67	-52.58	-57.54	-48.11	-49.62	-53.53	-50.14
13.00	-51.23	-47.29	-52.86	-53.03	-47.28	-48.61	-57.86	-49.62
13.50	-53.83	-49.17	-48.47	-52.41	-47.39	-48.24	-51.99	-49.54
14.00	-50.74	-47.93	-62.80	-52.45	-46.95	-48.63	-58.21	-52.27
14.50	-49.43	-45.10	-51.70	-49.01	-47.43	-47.75	-58.64	-48.15
15.00	-47.68	-45.57	-49.95	-46.96	-47.62	-47.99	-59.14	-50.60
15.50	-45.67	-43.74	-46.70	-46.31	-45.96	-46.80	-52.62	-52.47
16.00	-43.29	-43.54	-47.77	-46.52	-43.95	-44.75	-57.97	-53.35
16.50	-41.78	-43.42	-48.76	-48.04	-42.34	-42.74	-57.22	-51.66
17.00	-41.98	-42.82	-47.89	-46.23	-42.20	-42.46	-53.96	-51.44
17.50	-41.17	-42.73	-47.40	-46.23	-41.80	-41.17	-51.98	-50.33
18.00	-40.16	-42.70	-52.79	-43.59	-39.91	-39.38	-52.53	-52.34
18.50	-37.74	-39.52	-47.77	-44.34	-38.05	-37.95	-51.72	-47.13
19.00	-36.13	-37.21	-43.81	-40.82	-35.96	-35.77	-47.29	-47.36
19.50	-33.73	-35.25	-40.50	-36.51	-33.77	-33.39	-46.82	-44.79
20.00	-31.32	-33.24	-38.02	-35.97	-30.84	-30.63	-44.97	-47.82

SP4T Switch

MEM-SP4T-A18

Typical Performance Data

Test Conditions: @ Temperature = +25°C, Pin = 0 dBm.

Freq. (GHz)	Insertion Loss (dB)			
	COM-1	COM-2	COM-3	COM-4
0.01	-0.14	-0.14	-0.13	-0.13
0.50	-0.35	-0.36	-0.35	-0.36
1.00	-0.45	-0.45	-0.47	-0.46
1.50	-0.52	-0.53	-0.56	-0.54
2.00	-0.59	-0.59	-0.64	-0.61
2.50	-0.65	-0.65	-0.69	-0.66
3.00	-0.69	-0.69	-0.71	-0.69
3.50	-0.72	-0.72	-0.73	-0.71
4.00	-0.75	-0.74	-0.76	-0.74
4.50	-0.77	-0.75	-0.81	-0.78
5.00	-0.81	-0.79	-0.89	-0.84
5.50	-0.86	-0.86	-1.00	-0.94
6.00	-0.92	-0.92	-1.13	-1.05
6.50	-0.98	-0.99	-1.23	-1.15
7.00	-1.07	-1.09	-1.31	-1.22
7.50	-1.19	-1.18	-1.36	-1.27
8.00	-1.27	-1.26	-1.40	-1.28
8.50	-1.33	-1.28	-1.32	-1.22
9.00	-1.33	-1.28	-1.25	-1.19
9.50	-1.34	-1.25	-1.22	-1.21
10.00	-1.27	-1.23	-1.32	-1.34
10.50	-1.26	-1.22	-1.57	-1.46
11.00	-1.30	-1.27	-1.75	-1.61
11.50	-1.35	-1.35	-1.90	-1.70
12.00	-1.46	-1.50	-1.88	-1.72
12.50	-1.58	-1.64	-1.80	-1.71
13.00	-1.79	-1.85	-1.76	-1.75
13.50	-1.93	-2.01	-1.70	-1.75
14.00	-2.05	-2.11	-1.84	-1.90
14.50	-2.10	-2.12	-2.15	-2.01
15.00	-2.03	-2.00	-2.31	-2.10
15.50	-1.96	-1.91	-2.44	-2.19
16.00	-1.83	-1.75	-2.45	-2.21
16.50	-1.87	-1.77	-2.38	-2.24
17.00	-1.92	-1.85	-2.27	-2.23
17.50	-2.10	-2.05	-2.22	-2.21
18.00	-2.24	-2.21	-2.22	-2.29
18.50	-2.31	-2.38	-2.40	-2.46
19.00	-2.37	-2.51	-2.53	-2.42
19.50	-2.44	-2.63	-2.66	-2.58
20.00	-2.63	-2.89	-2.97	-2.84

SP4T Switch

MEM-SP4T-A18

Typical Performance Data

Test Conditions: @ Temperature = +25°C, Pin = 0 dBm.

Freq. (GHz)	Return Loss, Active ports (dB)					R. Loss, Internally terminated ports (dB)			
	COM	1	2	3	4	1	2	3	4
0.01	-38.29	-37.55	-37.53	-37.86	-37.70	-63.25	-41.00	-39.74	-40.76
0.50	-28.86	-28.57	-28.59	-27.28	-28.57	-37.49	-33.58	-31.14	-33.45
1.00	-24.78	-24.27	-24.17	-22.12	-23.53	-31.36	-28.95	-25.65	-28.14
1.50	-22.15	-21.62	-21.67	-19.49	-20.76	-27.52	-25.88	-22.19	-24.75
2.00	-20.50	-19.86	-19.96	-18.14	-19.06	-24.71	-23.32	-19.76	-21.87
2.50	-19.65	-18.81	-19.24	-18.10	-18.27	-22.48	-21.53	-18.12	-19.70
3.00	-19.74	-18.69	-19.11	-19.37	-18.91	-20.93	-19.81	-17.06	-18.18
3.50	-20.45	-19.10	-19.83	-22.81	-21.07	-19.78	-18.79	-16.65	-17.39
4.00	-22.29	-20.65	-21.74	-33.92	-26.36	-19.04	-18.14	-16.83	-17.21
4.50	-23.80	-23.13	-25.44	-28.45	-34.10	-18.42	-17.64	-17.56	-17.53
5.00	-23.81	-26.99	-30.67	-20.00	-22.86	-18.08	-17.54	-19.15	-18.60
5.50	-22.09	-27.58	-25.84	-16.18	-17.84	-18.09	-17.84	-22.00	-21.05
6.00	-19.02	-22.58	-20.31	-13.90	-14.99	-18.45	-18.72	-27.16	-25.71
6.50	-17.05	-18.77	-17.01	-12.47	-13.37	-19.04	-19.89	-30.31	-44.60
7.00	-15.19	-16.26	-14.92	-11.97	-12.81	-20.17	-22.15	-23.38	-26.74
7.50	-13.83	-14.42	-13.64	-12.10	-13.17	-22.10	-25.73	-18.58	-19.92
8.00	-12.88	-13.40	-12.97	-13.15	-14.47	-25.18	-29.92	-15.36	-16.39
8.50	-12.48	-12.88	-12.99	-15.44	-17.54	-29.74	-26.11	-13.42	-14.35
9.00	-12.93	-13.18	-13.79	-21.20	-24.30	-27.81	-21.39	-12.06	-13.06
9.50	-13.55	-14.39	-15.78	-34.59	-24.32	-22.27	-18.09	-11.13	-12.40
10.00	-15.24	-16.39	-18.08	-18.35	-17.67	-18.69	-16.02	-10.78	-12.30
10.50	-18.00	-19.99	-21.77	-13.33	-13.62	-16.11	-14.42	-11.04	-12.61
11.00	-19.99	-24.21	-22.19	-10.95	-12.18	-14.29	-13.21	-11.82	-13.39
11.50	-18.21	-20.19	-18.04	-10.15	-11.91	-13.12	-12.44	-13.25	-14.59
12.00	-15.59	-16.05	-14.86	-10.75	-12.66	-12.18	-11.65	-16.20	-16.63
12.50	-13.03	-13.39	-12.55	-12.85	-14.10	-11.69	-11.10	-22.20	-17.94
13.00	-11.30	-11.63	-11.07	-17.76	-16.21	-11.37	-10.76	-30.28	-18.68
13.50	-10.52	-10.90	-10.42	-26.41	-17.36	-11.42	-10.77	-20.46	-17.93
14.00	-10.14	-10.60	-9.99	-16.67	-15.19	-11.66	-10.86	-15.37	-16.13
14.50	-10.26	-10.83	-10.34	-11.86	-13.33	-12.28	-11.62	-12.67	-15.24
15.00	-10.88	-11.83	-11.50	-9.86	-11.85	-13.15	-12.73	-11.45	-14.16
15.50	-11.88	-13.65	-13.84	-9.09	-11.05	-14.37	-14.44	-10.73	-13.25
16.00	-12.82	-16.11	-17.71	-9.20	-10.94	-15.90	-16.54	-10.39	-12.77
16.50	-13.57	-17.35	-21.39	-10.42	-11.42	-17.53	-19.22	-10.66	-12.66
17.00	-12.56	-15.35	-17.21	-12.37	-12.22	-19.42	-22.90	-11.50	-12.85
17.50	-11.31	-13.24	-13.84	-15.22	-13.41	-21.22	-25.15	-12.74	-13.39
18.00	-10.37	-11.72	-11.94	-17.05	-14.19	-21.47	-24.36	-14.17	-14.39
18.50	-9.87	-10.64	-11.08	-15.75	-13.99	-20.69	-21.57	-16.78	-15.85
19.00	-9.36	-10.47	-10.72	-13.97	-13.64	-20.42	-20.67	-19.48	-17.38
19.50	-8.59	-10.31	-10.38	-12.69	-12.50	-19.69	-19.50	-20.61	-19.07
20.00	-8.41	-9.94	-10.09	-11.41	-10.91	-18.47	-18.54	-21.46	-20.67

SP4T Switch

MEM-SP4T-A18

Typical Performance Data

Test Conditions: @ Temperature = +25°C, Pin = 0 dBm.

Freq. (GHz)	Isolation, Active states (dB)				Isolation, Disconnected states (dB)			
	COM-1	COM-3	2-3	3-4	COM-1	COM-2	2-3	3-4
0.01	-91.77	-91.85	-94.64	-101.17	-96.96	-92.36	-97.70	-89.92
0.50	-87.66	-97.47	-79.55	-79.08	-82.02	-81.14	-80.10	-90.66
1.00	-81.79	-81.41	-73.79	-73.01	-78.22	-76.63	-76.81	-89.09
1.50	-82.02	-79.88	-69.92	-70.50	-73.48	-73.12	-71.72	-88.00
2.00	-81.26	-76.00	-67.51	-67.45	-70.80	-70.63	-68.81	-84.83
2.50	-85.37	-73.65	-64.58	-65.44	-71.02	-70.73	-66.51	-80.80
3.00	-71.15	-70.14	-64.64	-64.04	-70.33	-68.79	-65.58	-79.64
3.50	-68.95	-65.20	-65.12	-63.90	-66.10	-66.24	-65.93	-79.27
4.00	-67.91	-65.12	-60.21	-59.87	-65.34	-64.77	-61.45	-70.92
4.50	-64.39	-63.41	-60.85	-59.56	-68.55	-66.75	-60.91	-70.22
5.00	-61.94	-60.09	-59.38	-60.30	-70.70	-66.22	-59.86	-70.41
5.50	-64.68	-59.40	-60.42	-57.72	-64.78	-63.45	-60.49	-70.34
6.00	-60.54	-56.48	-58.45	-57.62	-64.80	-65.57	-58.53	-68.22
6.50	-58.18	-55.46	-53.13	-54.28	-70.44	-68.50	-54.23	-63.53
7.00	-57.18	-52.54	-53.40	-53.50	-67.85	-70.08	-54.04	-58.95
7.50	-55.43	-50.21	-51.67	-51.29	-59.23	-66.29	-53.44	-56.40
8.00	-51.35	-52.76	-51.53	-53.52	-52.69	-56.64	-55.27	-56.50
8.50	-55.09	-50.87	-53.91	-52.55	-50.02	-53.80	-55.06	-53.24
9.00	-53.06	-53.40	-58.15	-54.58	-46.58	-51.22	-57.04	-52.82
9.50	-52.10	-58.93	-60.35	-59.90	-48.19	-51.78	-56.19	-53.59
10.00	-58.51	-60.25	-60.50	-73.88	-47.74	-50.79	-68.57	-52.26
10.50	-59.21	-60.60	-61.75	-62.52	-48.27	-50.52	-58.78	-51.36
11.00	-69.36	-57.63	-61.43	-62.95	-49.34	-51.90	-61.55	-50.98
11.50	-54.31	-55.81	-56.19	-62.14	-46.46	-48.89	-55.19	-51.00
12.00	-56.60	-53.65	-56.36	-60.59	-48.21	-50.39	-57.60	-50.74
12.50	-56.07	-50.71	-52.75	-57.95	-48.40	-49.90	-53.31	-50.52
13.00	-50.80	-47.95	-52.44	-54.01	-46.88	-48.60	-60.10	-50.15
13.50	-52.80	-49.19	-48.69	-53.21	-47.73	-48.41	-52.43	-49.95
14.00	-52.22	-47.63	-64.73	-51.99	-47.41	-48.66	-58.74	-51.47
14.50	-49.56	-45.02	-51.05	-49.22	-47.63	-47.86	-58.37	-49.17
15.00	-47.59	-45.59	-49.80	-47.19	-47.56	-48.10	-58.69	-50.89
15.50	-45.54	-43.78	-46.88	-46.58	-45.91	-46.61	-52.97	-52.53
16.00	-43.36	-43.55	-48.12	-46.85	-43.90	-44.72	-58.35	-53.70
16.50	-42.10	-43.49	-48.96	-47.59	-42.54	-42.93	-57.97	-52.00
17.00	-42.07	-43.03	-48.04	-46.25	-42.29	-42.65	-54.22	-51.83
17.50	-41.34	-42.89	-47.48	-46.61	-41.94	-41.36	-52.13	-50.68
18.00	-40.32	-42.09	-51.83	-43.84	-40.09	-39.77	-51.79	-55.19
18.50	-37.97	-39.47	-48.61	-44.29	-38.12	-38.05	-51.22	-47.82
19.00	-36.23	-37.28	-43.93	-41.17	-35.93	-35.78	-47.28	-47.46
19.50	-33.76	-35.25	-41.17	-36.64	-33.63	-33.23	-47.44	-45.44
20.00	-31.32	-33.19	-38.03	-36.01	-30.73	-30.49	-44.95	-48.47

SP4T Switch

MEM-SP4T-A18

Typical Performance Data

Test Conditions: @ Temperature = +60°C, Pin = 0 dBm.

Freq. (GHz)	Insertion Loss (dB)			
	COM-1	COM-2	COM-3	COM-4
0.01	-0.16	-0.15	-0.15	-0.15
0.50	-0.38	-0.38	-0.38	-0.39
1.00	-0.48	-0.48	-0.50	-0.50
1.50	-0.56	-0.56	-0.60	-0.58
2.00	-0.62	-0.63	-0.67	-0.65
2.50	-0.68	-0.68	-0.72	-0.70
3.00	-0.72	-0.72	-0.75	-0.73
3.50	-0.76	-0.75	-0.77	-0.75
4.00	-0.79	-0.78	-0.80	-0.78
4.50	-0.81	-0.79	-0.85	-0.82
5.00	-0.85	-0.83	-0.94	-0.89
5.50	-0.90	-0.90	-1.05	-0.98
6.00	-0.97	-0.97	-1.18	-1.10
6.50	-1.03	-1.04	-1.29	-1.20
7.00	-1.13	-1.14	-1.37	-1.28
7.50	-1.25	-1.24	-1.42	-1.33
8.00	-1.33	-1.32	-1.46	-1.34
8.50	-1.39	-1.34	-1.38	-1.28
9.00	-1.40	-1.34	-1.32	-1.25
9.50	-1.41	-1.32	-1.30	-1.28
10.00	-1.33	-1.29	-1.40	-1.42
10.50	-1.32	-1.29	-1.66	-1.54
11.00	-1.36	-1.34	-1.84	-1.68
11.50	-1.43	-1.43	-1.98	-1.77
12.00	-1.54	-1.57	-1.95	-1.79
12.50	-1.66	-1.72	-1.87	-1.79
13.00	-1.87	-1.93	-1.84	-1.83
13.50	-2.00	-2.09	-1.79	-1.83
14.00	-2.13	-2.19	-1.94	-2.00
14.50	-2.17	-2.19	-2.26	-2.10
15.00	-2.09	-2.07	-2.41	-2.20
15.50	-2.03	-1.99	-2.53	-2.28
16.00	-1.92	-1.85	-2.53	-2.28
16.50	-1.96	-1.87	-2.45	-2.32
17.00	-2.02	-1.95	-2.35	-2.31
17.50	-2.20	-2.15	-2.31	-2.31
18.00	-2.33	-2.31	-2.33	-2.39
18.50	-2.41	-2.47	-2.51	-2.56
19.00	-2.47	-2.61	-2.65	-2.52
19.50	-2.56	-2.73	-2.78	-2.69
20.00	-2.73	-2.99	-3.09	-2.95

SP4T Switch

MEM-SP4T-A18

Typical Performance Data

Test Conditions: @ Temperature = +60°C, Pin = 0 dBm.

Freq. (GHz)	Return Loss, Active ports (dB)					R. Loss, Internally terminated ports (dB)			
	COM	1	2	3	4	1	2	3	4
0.01	-37.03	-36.40	-36.61	-36.77	-36.46	-67.47	-40.74	-39.41	-39.75
0.50	-28.54	-28.22	-28.31	-27.03	-28.23	-38.12	-33.65	-31.21	-33.32
1.00	-24.67	-24.09	-24.05	-22.00	-23.38	-31.61	-28.93	-25.71	-28.07
1.50	-22.21	-21.60	-21.69	-19.48	-20.77	-27.74	-25.88	-22.25	-24.76
2.00	-20.62	-19.90	-20.04	-18.17	-19.10	-24.89	-23.35	-19.84	-21.90
2.50	-19.74	-18.86	-19.31	-18.10	-18.29	-22.63	-21.57	-18.17	-19.71
3.00	-19.76	-18.67	-19.10	-19.24	-18.85	-21.02	-19.82	-17.05	-18.15
3.50	-20.34	-19.02	-19.71	-22.42	-20.86	-19.80	-18.78	-16.60	-17.32
4.00	-22.01	-20.49	-21.49	-32.35	-25.96	-19.03	-18.12	-16.74	-17.08
4.50	-23.32	-22.94	-25.11	-29.08	-35.94	-18.36	-17.62	-17.40	-17.38
5.00	-23.42	-27.05	-31.15	-20.10	-23.05	-17.97	-17.55	-18.92	-18.46
5.50	-21.82	-28.07	-26.09	-16.16	-17.83	-17.96	-17.95	-21.75	-20.90
6.00	-18.83	-22.66	-20.31	-13.83	-14.95	-18.33	-18.95	-26.78	-25.53
6.50	-16.84	-18.67	-16.93	-12.38	-13.32	-18.96	-20.31	-29.55	-42.87
7.00	-15.01	-16.15	-14.83	-11.93	-12.78	-20.14	-22.87	-23.28	-26.70
7.50	-13.69	-14.32	-13.54	-12.10	-13.16	-22.12	-27.13	-18.50	-19.88
8.00	-12.78	-13.32	-12.89	-13.15	-14.51	-25.34	-31.51	-15.27	-16.33
8.50	-12.42	-12.84	-12.93	-15.55	-17.73	-30.25	-25.67	-13.34	-14.30
9.00	-12.90	-13.19	-13.77	-21.73	-24.92	-27.96	-20.89	-12.00	-13.00
9.50	-13.58	-14.48	-15.87	-31.37	-23.87	-22.21	-17.70	-11.08	-12.36
10.00	-15.41	-16.65	-18.40	-17.75	-17.32	-18.54	-15.74	-10.75	-12.30
10.50	-18.28	-20.56	-22.41	-13.09	-13.45	-16.00	-14.25	-11.06	-12.66
11.00	-20.08	-24.55	-22.28	-10.88	-12.15	-14.22	-13.17	-11.91	-13.49
11.50	-17.98	-19.89	-17.90	-10.19	-11.98	-13.08	-12.53	-13.40	-14.74
12.00	-15.38	-15.90	-14.82	-10.86	-12.81	-12.19	-11.86	-16.41	-16.86
12.50	-12.96	-13.36	-12.55	-13.09	-14.34	-11.73	-11.39	-22.67	-18.15
13.00	-11.32	-11.70	-11.14	-18.41	-16.54	-11.44	-11.12	-30.09	-18.83
13.50	-10.56	-11.00	-10.52	-27.05	-17.62	-11.47	-11.21	-20.22	-17.99
14.00	-10.23	-10.74	-10.15	-16.52	-15.27	-11.72	-11.39	-15.27	-16.02
14.50	-10.39	-11.03	-10.56	-11.79	-13.34	-12.35	-12.29	-12.57	-15.13
15.00	-11.05	-12.11	-11.83	-9.87	-11.92	-13.28	-13.62	-11.38	-14.09
15.50	-12.09	-14.05	-14.33	-9.21	-11.18	-14.56	-15.65	-10.74	-13.24
16.00	-12.97	-16.51	-18.28	-9.39	-11.20	-16.11	-18.17	-10.47	-12.88
16.50	-13.62	-17.54	-21.79	-10.69	-11.77	-17.73	-21.37	-10.75	-12.86
17.00	-12.58	-15.48	-17.39	-12.73	-12.51	-19.39	-26.22	-11.64	-13.03
17.50	-11.37	-13.45	-14.09	-15.63	-13.70	-20.97	-29.63	-12.94	-13.57
18.00	-10.47	-11.95	-12.17	-17.37	-14.43	-21.30	-28.18	-14.43	-14.62
18.50	-9.98	-10.84	-11.25	-15.94	-14.18	-20.78	-24.27	-17.05	-16.02
19.00	-9.44	-10.65	-10.93	-14.06	-13.88	-20.55	-23.33	-19.73	-17.57
19.50	-8.68	-10.48	-10.63	-12.78	-12.63	-19.75	-22.01	-20.77	-19.36
20.00	-8.49	-10.12	-10.30	-11.48	-11.06	-18.48	-20.89	-21.64	-20.81

SP4T Switch

MEM-SP4T-A18

Typical Performance Data

Test Conditions: @ Temperature = +60°C, Pin = 0 dBm.

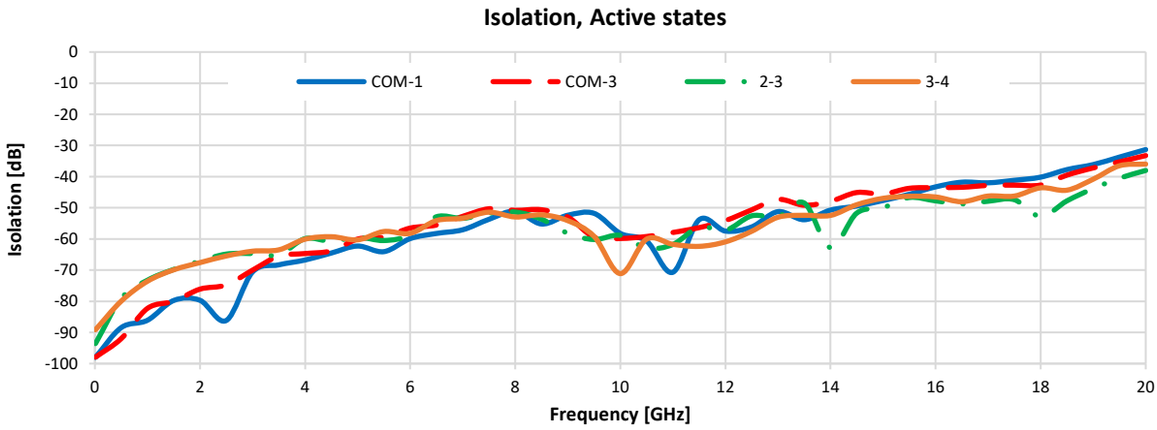
Freq. (GHz)	Isolation, Active states (dB)				Isolation, Disconnected states (dB)			
	COM-1	COM-3	2-3	3-4	COM-1	COM-2	2-3	3-4
0.01	-103.31	-89.98	-98.83	-95.01	-94.39	-100.74	-93.56	-91.72
0.50	-90.56	-96.11	-78.66	-78.77	-82.50	-81.43	-78.63	-91.56
1.00	-86.08	-83.74	-73.55	-73.78	-78.82	-76.94	-75.10	-94.11
1.50	-79.65	-81.18	-70.16	-70.21	-73.31	-72.55	-71.21	-87.18
2.00	-78.62	-75.48	-67.36	-67.53	-70.02	-70.00	-68.11	-83.16
2.50	-82.80	-74.26	-64.68	-65.55	-71.36	-70.10	-66.00	-81.29
3.00	-70.85	-70.04	-64.36	-63.69	-69.78	-68.40	-64.93	-80.18
3.50	-68.92	-65.40	-65.10	-63.84	-66.06	-65.54	-65.01	-80.62
4.00	-68.81	-66.15	-60.12	-59.82	-65.91	-64.96	-60.91	-71.07
4.50	-64.56	-63.89	-60.68	-59.57	-68.49	-66.36	-60.53	-70.22
5.00	-61.62	-60.31	-59.26	-60.45	-69.77	-65.82	-59.25	-71.27
5.50	-64.61	-59.83	-60.01	-57.84	-65.06	-62.89	-59.85	-71.02
6.00	-60.75	-56.79	-58.21	-57.36	-65.61	-67.59	-58.02	-68.89
6.50	-58.34	-55.72	-53.36	-54.28	-70.58	-68.88	-54.12	-64.21
7.00	-57.11	-52.68	-53.62	-53.78	-68.78	-71.79	-53.98	-59.72
7.50	-56.60	-50.42	-51.71	-51.43	-60.03	-69.42	-53.26	-56.67
8.00	-51.86	-54.46	-52.16	-54.11	-53.02	-57.61	-54.89	-57.81
8.50	-55.04	-51.24	-54.47	-52.70	-50.10	-54.35	-54.98	-53.58
9.00	-53.65	-53.83	-58.74	-54.84	-46.83	-51.29	-56.83	-53.22
9.50	-52.67	-58.12	-60.77	-59.70	-48.54	-52.11	-55.75	-53.53
10.00	-58.98	-60.76	-61.50	-68.60	-47.86	-51.02	-66.58	-52.63
10.50	-58.94	-61.07	-62.07	-64.66	-48.37	-50.64	-57.95	-51.77
11.00	-63.40	-57.60	-61.23	-64.68	-49.10	-52.05	-60.37	-51.31
11.50	-54.74	-55.52	-55.96	-63.31	-46.56	-49.13	-55.04	-51.32
12.00	-55.94	-53.21	-55.64	-61.54	-48.17	-50.49	-56.74	-51.13
12.50	-56.22	-50.63	-52.89	-59.07	-48.46	-50.08	-53.47	-51.03
13.00	-51.07	-48.56	-52.35	-55.54	-46.65	-48.87	-62.52	-50.53
13.50	-52.36	-49.16	-49.08	-53.90	-47.78	-48.67	-53.02	-50.12
14.00	-53.90	-47.37	-67.15	-51.66	-47.66	-48.84	-60.18	-51.03
14.50	-49.58	-44.99	-50.64	-49.24	-47.68	-48.09	-57.38	-49.70
15.00	-47.29	-45.51	-49.52	-47.33	-47.50	-48.33	-57.15	-51.11
15.50	-45.06	-43.83	-46.90	-46.64	-45.86	-46.75	-52.36	-52.62
16.00	-43.05	-43.56	-48.32	-47.00	-43.87	-44.95	-57.34	-54.01
16.50	-41.86	-43.51	-48.89	-47.23	-42.63	-43.17	-56.29	-52.26
17.00	-41.80	-43.20	-48.03	-46.34	-42.30	-42.98	-52.84	-52.21
17.50	-41.13	-42.99	-47.44	-46.76	-41.89	-41.47	-50.73	-50.67
18.00	-40.19	-41.76	-50.38	-44.20	-40.12	-39.96	-49.89	-58.35
18.50	-37.93	-39.38	-48.90	-44.33	-38.11	-38.12	-49.42	-48.08
19.00	-36.21	-37.34	-43.83	-41.24	-35.97	-35.80	-46.28	-47.52
19.50	-33.78	-35.32	-41.21	-36.75	-33.64	-33.20	-46.41	-45.97
20.00	-31.35	-33.24	-37.89	-36.06	-30.75	-30.37	-44.37	-48.95

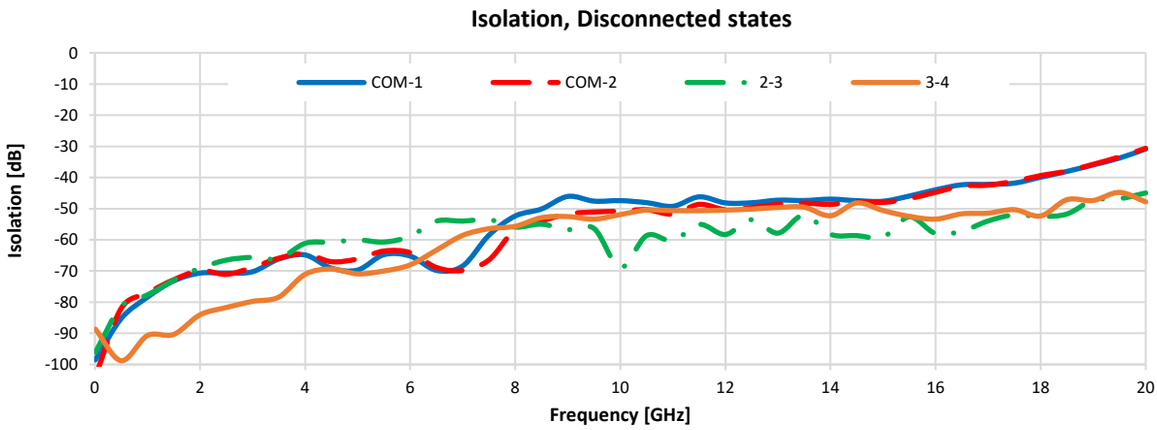
SP4T Switch

MEM-SP4T-A18

Typical Performance Graphs

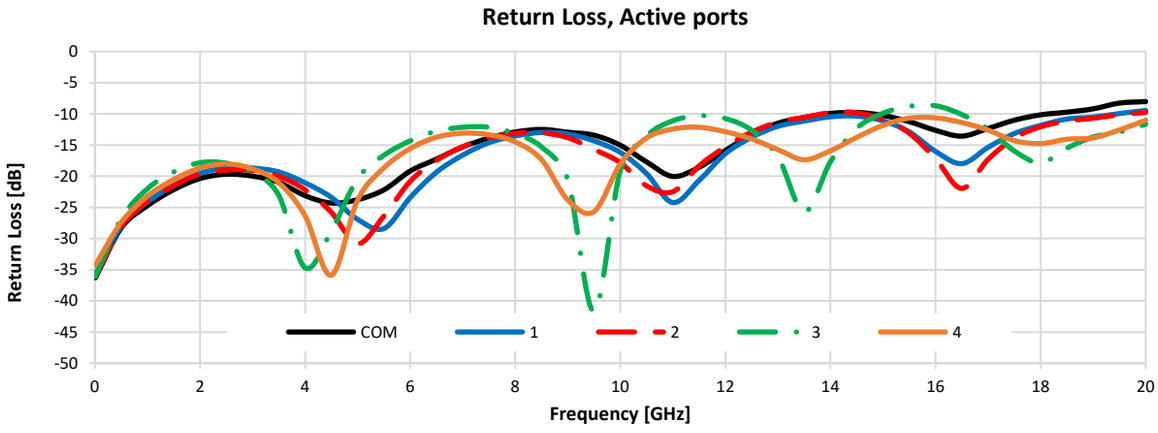
Test Conditions: @ Temperature = -10°C, Pin = 0 dBm.

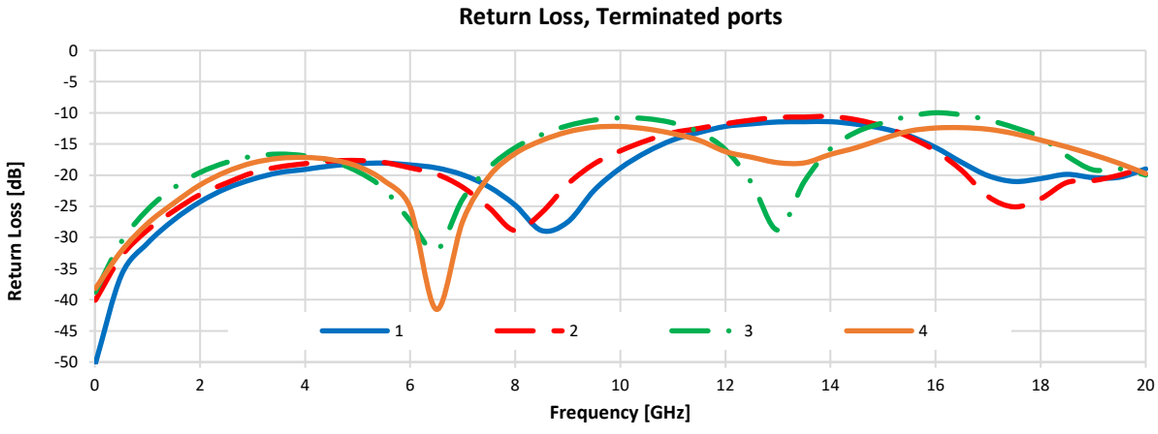




Typical Performance Graphs

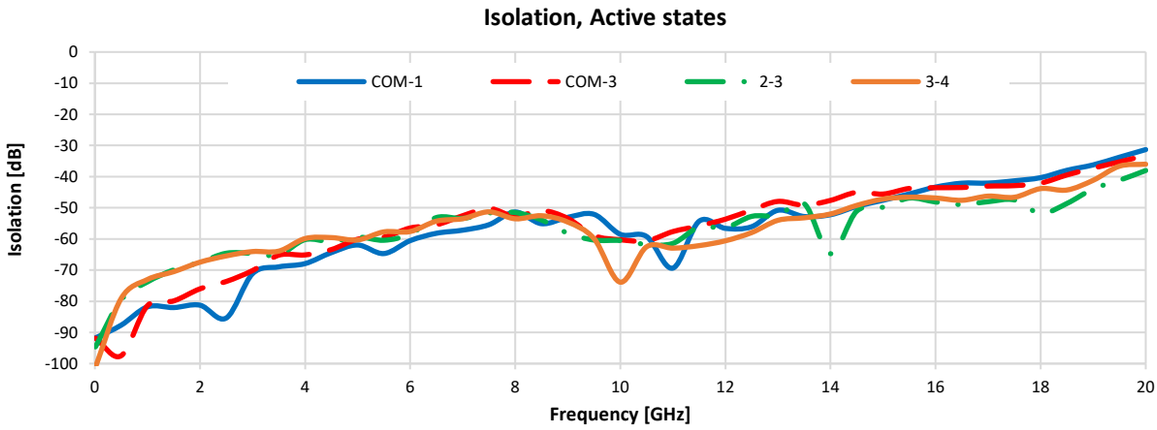
Test Conditions: @ Temperature = -10°C, Pin = 0 dBm.

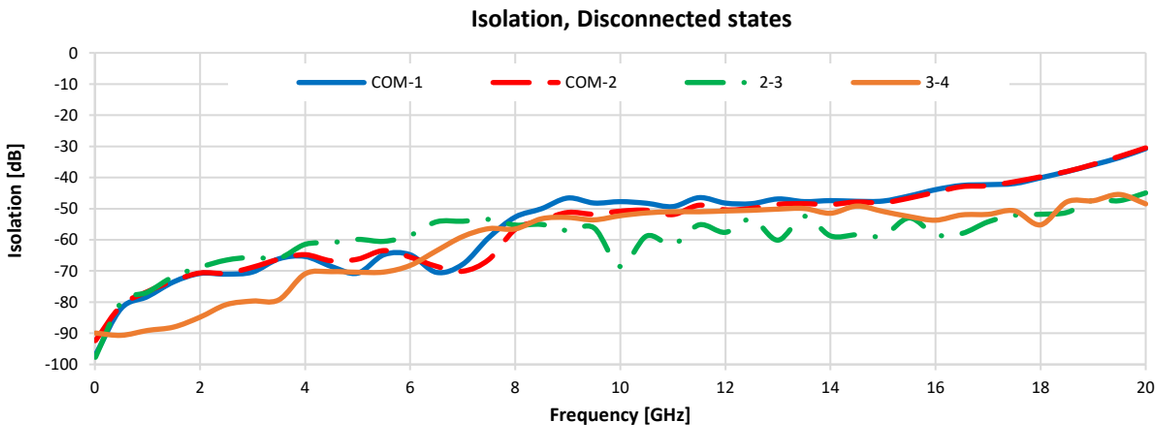




Typical Performance Graphs

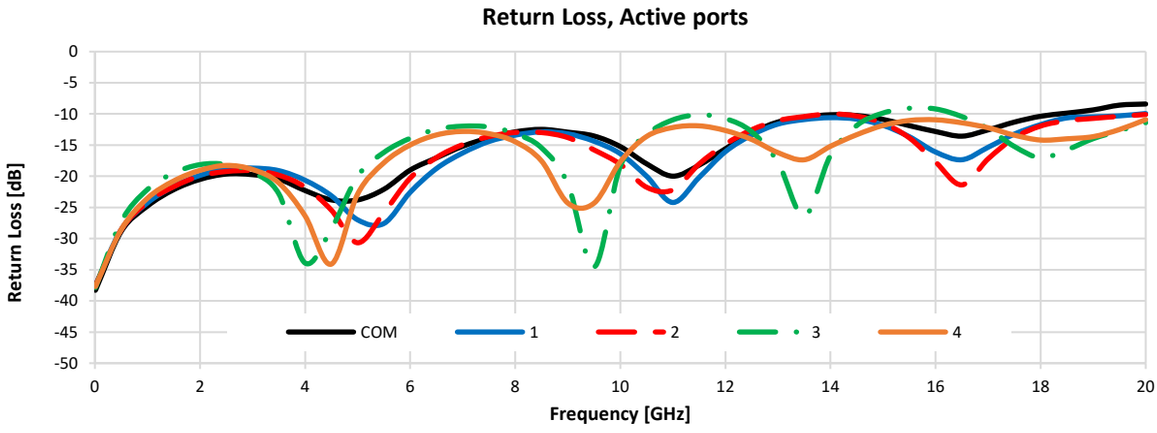
Test Conditions: @ Temperature = +25°C, Pin = 0 dBm.

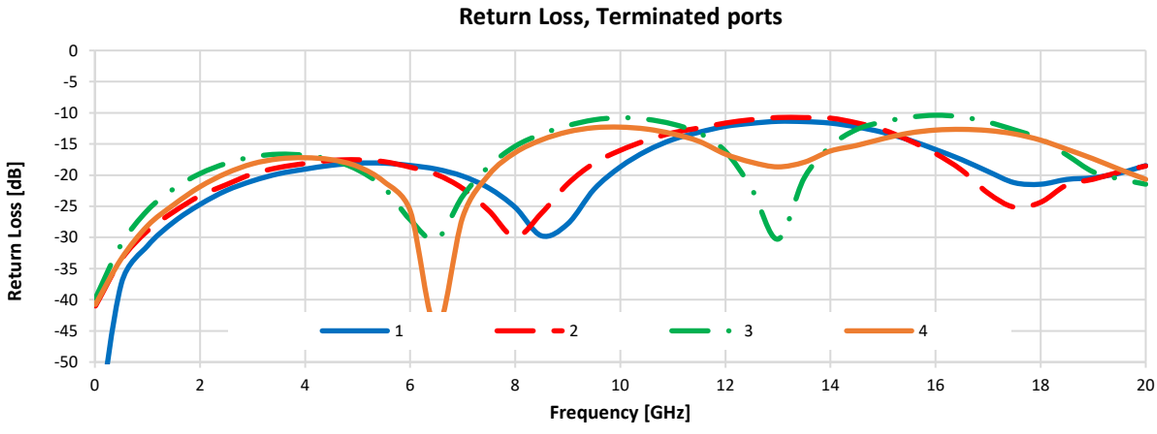




Typical Performance Graphs

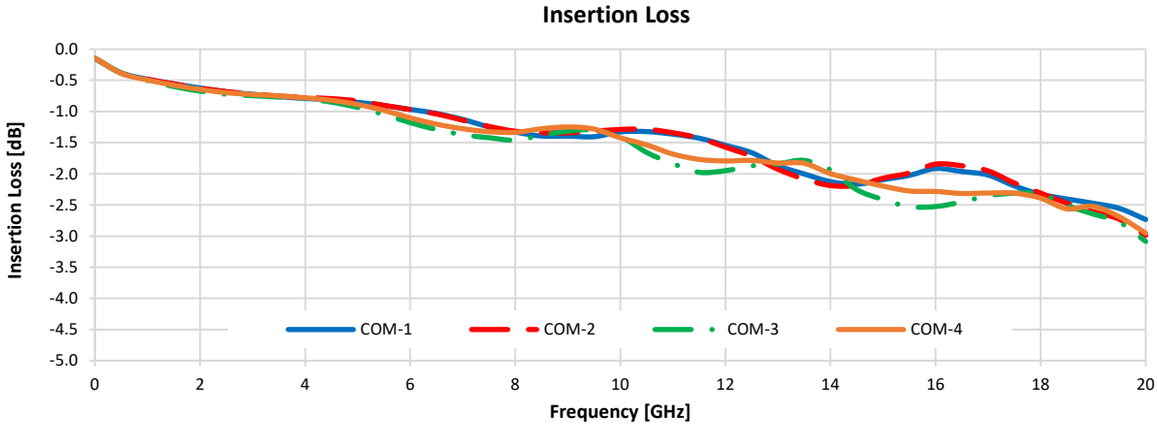
Test Conditions: @ Temperature = +25°C, Pin = 0 dBm.

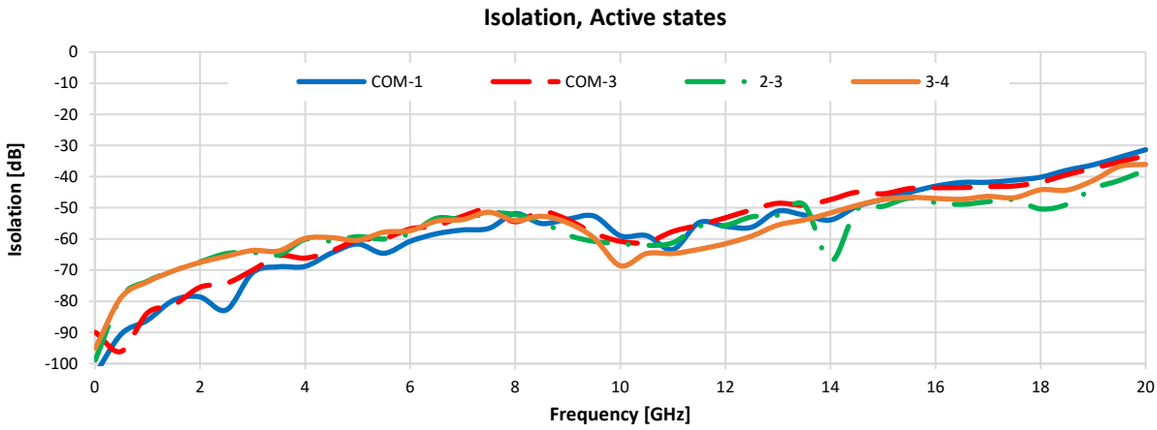


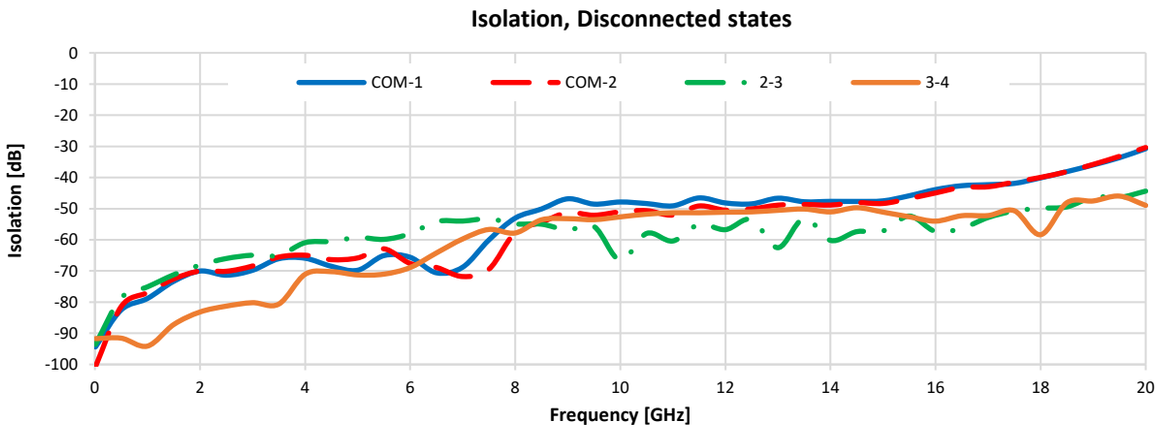


Typical Performance Graphs

Test Conditions: @ Temperature = +60°C, Pin = 0 dBm.





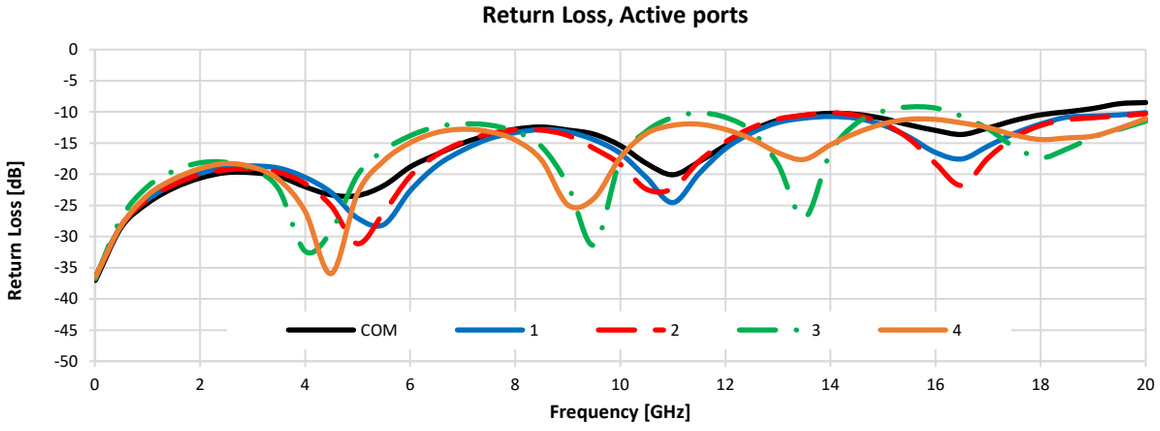


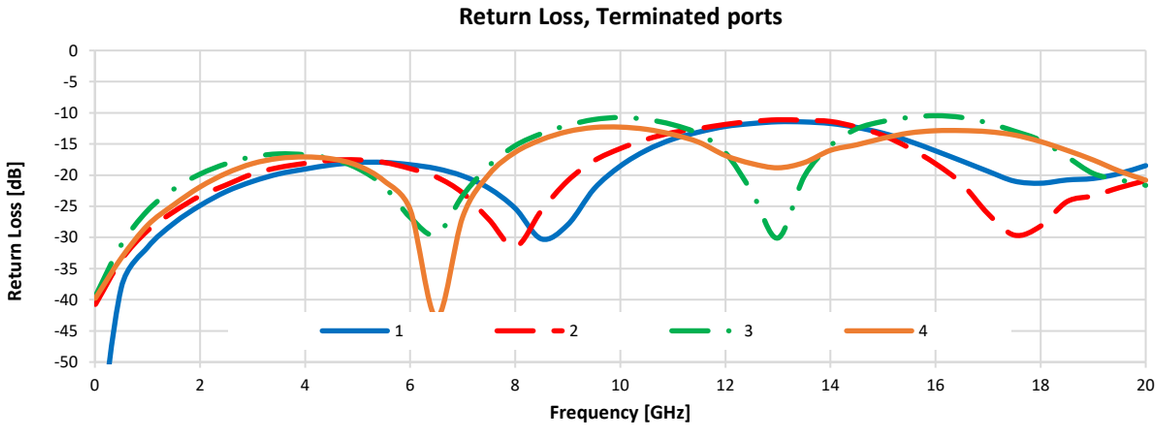
SP4T Switch

MEM-SP4T-A18

Typical Performance Graphs

Test Conditions: @ Temperature = +60°C, Pin = 0 dBm.

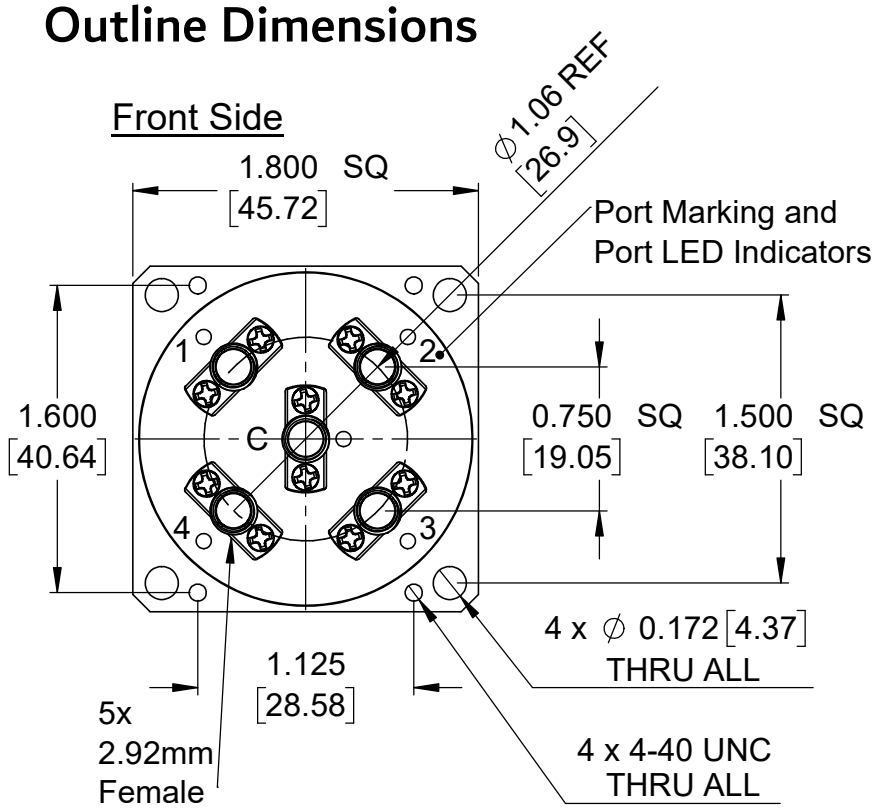


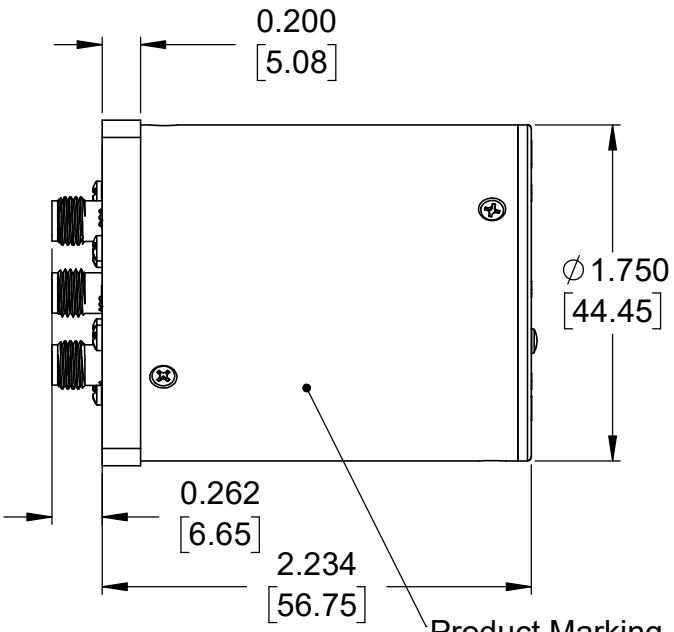


Case Style HJ

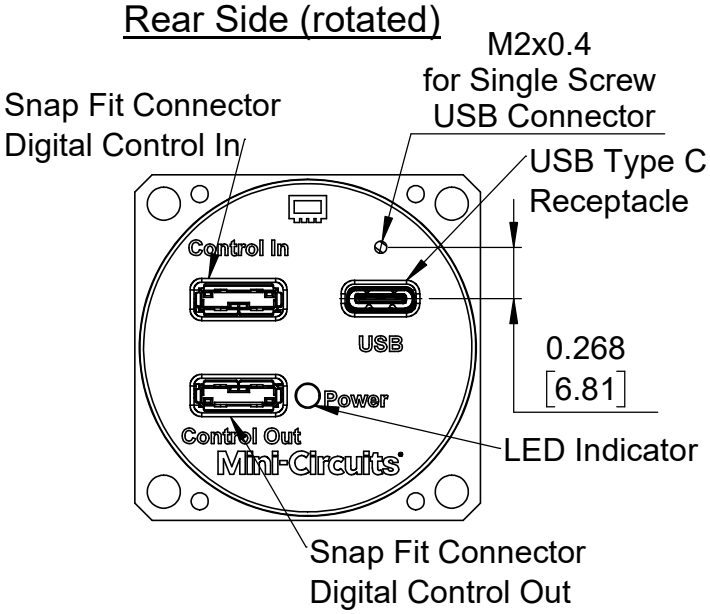
Outline Dimensions HJ3609

Front Side





Rear Side (rotated)



NOTES:

1. Case material: Aluminum alloy.
2. Case Finish: Nickel Plate. Cover: Stainless Steel
3. Dimensions are in inches [mm]. Tolerances 2 Pl. ±.03 inch; 3 Pl. ±.015 inch.
4. Weight: 175 grams
5. Marking may contain other features or characters for internal lot control.

Mini-Circuits®

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Environmental Specifications **ENV55T2**

Mini-Circuits

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-10° to 60° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-20° to 85° C Ambient Environment	Individual Model Data Sheet
Operating and Storage Humidity	5% to 85% RH (non-condensing)	Ambient
Bench Handling Test	Bench Top Tip 45° & Drop	MIL-PRF-28800F
Transit Drop Test	Free Fall Drop, 20 cm (7.9 inches)	MIL-PRF-28800F Class 3