



RACK MOUNTED | USB & ETHERNET CONTROL

# RF SP6T Switch Matrix

## ZTM-15

Mini-Circuits

50Ω DC to 12 GHz 20W

### THE BIG DEAL

- 6 x mechanical terminated SP6T switches
- Ethernet & USB controlled
- High reliability, 10 million switch cycles
- 20W power rating (cold switching)

### APPLICATIONS

- 5G FR1, WiFi 6E, UWB, Bluetooth
- Automated test equipment
- Fail-safe / redundancy switching

### PRODUCT OVERVIEW

Mini-Circuits' ZTM-15 comprises 6 independently controlled, electro-mechanical SP6T switches. Each switch operates over a wide bandwidth, from DC to 12 GHz, with high isolation and low insertion loss. The absorptive switches are of a failsafe / normally open and break-before-make-configuration with a lifetime of 10 million switching cycles when used within the noted specifications.

The switch system is housed in a rugged 19" rack chassis, 3U height, with all SMA (f) RF connectors and LED switch position indicators on the front panel. The modular design of the ZTM series switch rack supports easy maintenance and re-configuration in the field, without the need to return the whole system to a Mini-Circuits facility.

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).

Custom switch configurations can be configured to fit any requirement, using Mini-Circuits' online configurator tool at [www.minicircuits.com/WebStore/ztm.html](http://www.minicircuits.com/WebStore/ztm.html).



CASE STYLE: YD2861

DOWNLOAD

SOFTWARE PACKAGE

**RoHS Compliant**  
See our website for RoHS Compliance methodologies and qualifications

### KEY FEATURES

Feature	Advantages
High performance switches	Mechanical absorptive switches provide high reliability, repeatable high performance, and internal terminations of input signals on the disconnected paths.
Rack-mount chassis	Compact 3U height, 19" rack-mountable chassis with RF connections on the front, suits integration in automated production test environments.
Ethernet & USB control	USB HID and Ethernet (HTTP / Telnet ) interfaces ensure compatibility with most software environments and connection requirements.

REV. A  
ECO-013880  
ZTM-15  
MCL NY  
220623





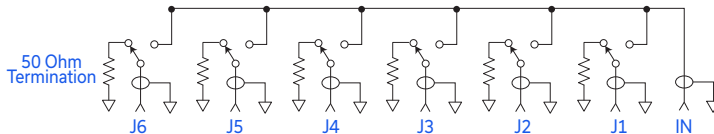
### ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Conditions (GHz)	Min.	Typ.	Max.	Unit
Frequency Range	-	DC	-	12	GHz
Insertion Loss	DC - 6	-	0.15	0.25	dB
	6 - 8	-	0.20	0.30	
	8 - 12	-	0.25	0.45	
Isolation	DC - 6	80	95	-	dB
	6 - 8	80	90	-	
	8 - 12	80	90	-	
VSWR	DC - 6	-	1.20	-	:1
	6 - 8	-	1.20	-	
	8 - 12	-	1.20	-	
Switching Time	-	-	25	-	ms
RF Input Power <sup>1</sup>	Cold switching	-	-	20	W
Switch Lifetime (per Switch)	100 mW hot switching 2	10	-	-	million cycles
	1W hot switching	-	1	-	

1 Maximum power for any connected through path as stated; maximum power into any internal termination is 1W per port  
 2 Hot switching power above this level will degrade the switch lifetime

### SWITCHING CONFIGURATION:

- Normally open (all port disconnected)
- Absorptive (internal terminations on ports J1-J6)



### MECHANICAL & ENVIRONMENTAL SPECIFICATIONS

Dimensions	19" (W) x 3U (H) x 13" (D)			
Case Style	YD2681			
Case Material	Aluminum (with protective coating to prevent corrosion)			
RF Connectors	Panel	Connector	Quantity	Port Labels
	Front	SMA female	42	COM & 1-6 per switch
Panel Marking	Front Panel		Rear Panel	
	<ul style="list-style-type: none"> <li>• ZTM-15</li> <li>• Modular Test System</li> </ul>		<ul style="list-style-type: none"> <li>• CE / EAC / UKCA</li> <li>• Serial number / date code / model name</li> </ul>	
Panel Items	<ul style="list-style-type: none"> <li>• Power on / off switch with LED</li> <li>• LED switch position indicators</li> <li>• Carry handles</li> </ul>		<ul style="list-style-type: none"> <li>• AC mains power input (IEC C14 inlet)</li> <li>• USB type B socket</li> <li>• RJ45 (LAN) socket</li> </ul>	
Power Supply	AC mains power input (90-260 V, 47-63 Hz)			
Fuse	2A, 250V rating			
Power Consumption	150 W max			
Temperature	Operating: 0 to +50 °C			

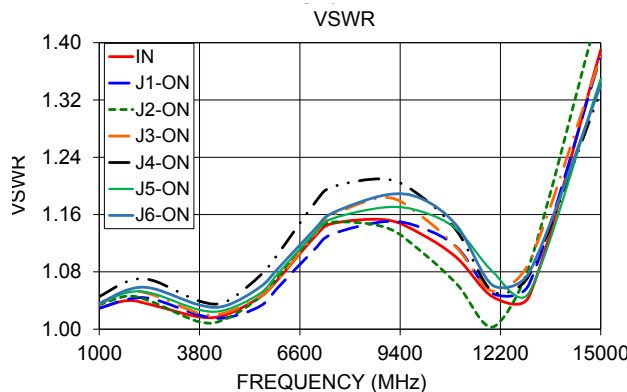
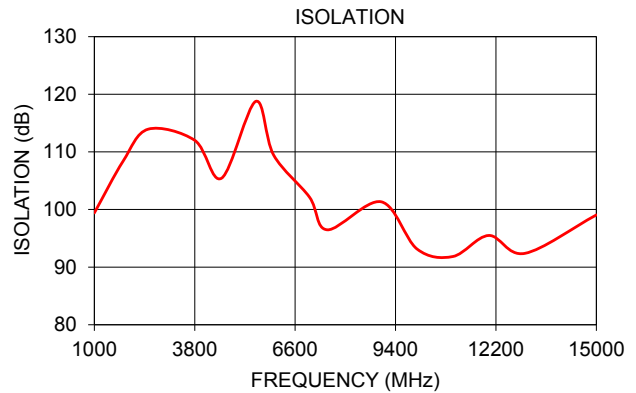
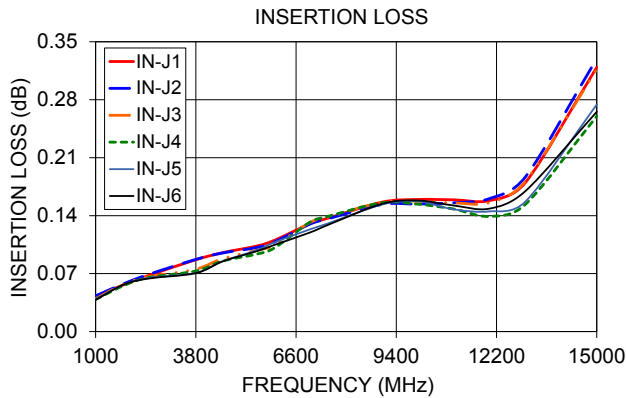


# RF SP6T Switch Matrix

## ZTM-15

### TYPICAL PERFORMANCE DATA

FREQ. (MHz)	ON INSERTION LOSS (dB)						ISOLA- TION (dB)	VSWR (:1)						
	IN-J1	IN-J2	IN-J3	IN-J4	IN-J5	IN-J6		IN	J1-ON	J2-ON	J3-ON	J4-ON	J5-ON	J6-ON
1000	0.04	0.04	0.04	0.04	0.04	0.04	99.41	1.03	1.03	1.03	1.04	1.05	1.04	1.04
1800	0.06	0.06	0.06	0.06	0.06	0.06	108.37	1.04	1.04	1.05	1.05	1.07	1.05	1.05
2500	0.07	0.07	0.07	0.07	0.06	0.06	113.94	1.03	1.04	1.04	1.05	1.07	1.05	1.06
3800	0.09	0.09	0.08	0.07	0.07	0.07	112.01	1.02	1.02	1.01	1.02	1.04	1.03	1.03
4550	0.10	0.09	0.09	0.09	0.08	0.08	105.44	1.02	1.02	1.01	1.02	1.04	1.03	1.03
5500	0.10	0.10	0.10	0.09	0.10	0.10	118.76	1.05	1.03	1.05	1.05	1.08	1.05	1.06
6000	0.11	0.11	0.10	0.10	0.11	0.10	109.45	1.07	1.06	1.07	1.07	1.11	1.08	1.09
7000	0.13	0.13	0.13	0.13	0.12	0.12	102.15	1.13	1.11	1.13	1.13	1.18	1.13	1.14
7500	0.14	0.14	0.14	0.14	0.13	0.13	96.47	1.15	1.13	1.15	1.16	1.20	1.15	1.16
9000	0.16	0.15	0.16	0.16	0.15	0.15	101.34	1.15	1.15	1.14	1.18	1.21	1.17	1.19
10000	0.16	0.15	0.16	0.15	0.16	0.16	93.14	1.13	1.14	1.11	1.16	1.18	1.16	1.18
11000	0.16	0.16	0.16	0.15	0.15	0.15	91.84	1.10	1.11	1.06	1.11	1.14	1.14	1.14
12000	0.16	0.16	0.16	0.14	0.15	0.15	95.49	1.04	1.05	1.00	1.05	1.05	1.08	1.06
13005	0.18	0.19	0.18	0.15	0.16	0.17	92.38	1.05	1.06	1.09	1.09	1.08	1.05	1.08
15000	0.32	0.33	0.32	0.26	0.27	0.27	99.05	1.39	1.38	1.46	1.38	1.33	1.35	1.34

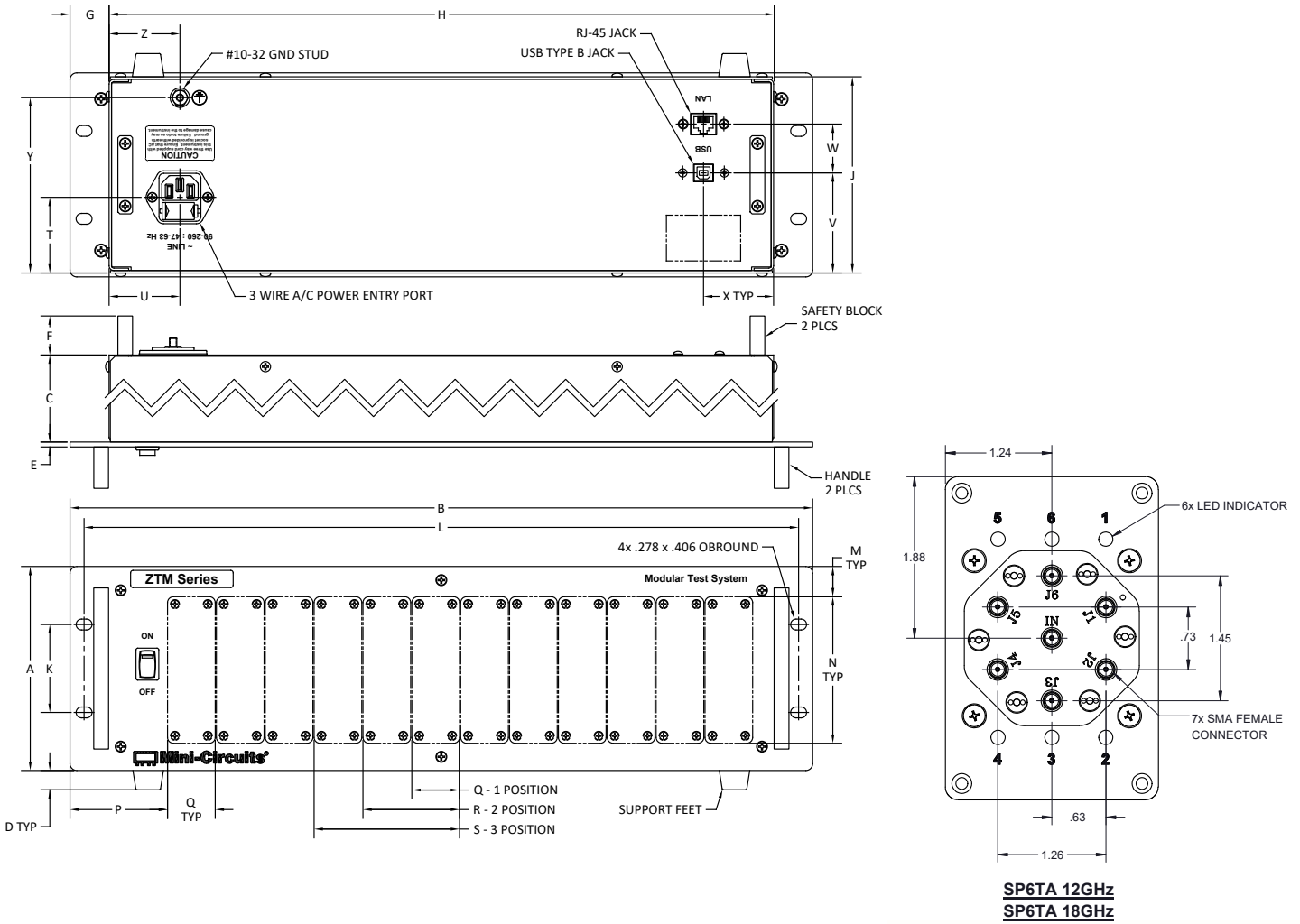




# RF SP6T Switch Matrix

## ZTM-15

### OUTLINE DRAWING



### OUTLINE DIMENSIONS (Inch/mm)

A	B	C	D	E	F	G	H	J	K	L	M	N
5.22	19.00	13.00	0.49	0.13	1.00	1.000	0.95	17.00	5.02	2.25	18.28	3.75
132.6	482.6	330.2	12.45	3.30	25.4	25.4	24.13	431.8	127.5	57.2	464.3	95.3
P	Q	R	S	T	U	V	W	X	Y	Z	wt	
2.50	1.22	2.47	3.72	1.94	1.81	2.56	1.25	1.79	4.49	1.81	grams	
63.5	31.0	62.7	94.49	49.28	46.0	65.0	31.75	45.5	114.0	46.0	4535	



### SOFTWARE & CONTROL SPECIFICATIONS

- 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/ztm\\_rcm.html](http://www.minicircuits.com/softwaredownload/ztm_rcm.html)
- Please contact [testsolutions@minicircuits.com](mailto:testsolutions@minicircuits.com) for support

Ethernet Control	Supported Protocols	TCP / IP, HTTP, Telnet, DHCP, UDP
	Max Data Rate	10 Mbps (10Base-T Half Duplex)
USB Control	Supported Protocols	HID - Full Speed
	Min Communication Time	3 ms typ
Software Support	<ul style="list-style-type: none"> <li>• Mini-Circuits' Universal GUI for USB &amp; LAN control (Windows only)</li> <li>• ASCII / SCPI command syntax for LAN programming (all OS)</li> <li>• ActiveX / .Net DLL APIs for USB programming (Windows only)</li> <li>• Interrupt codes for direct USB programming (all OS)</li> <li>• Full programming instructions and examples for a wide range of languages</li> </ul>	

### PROGRAMMING COMMANDS

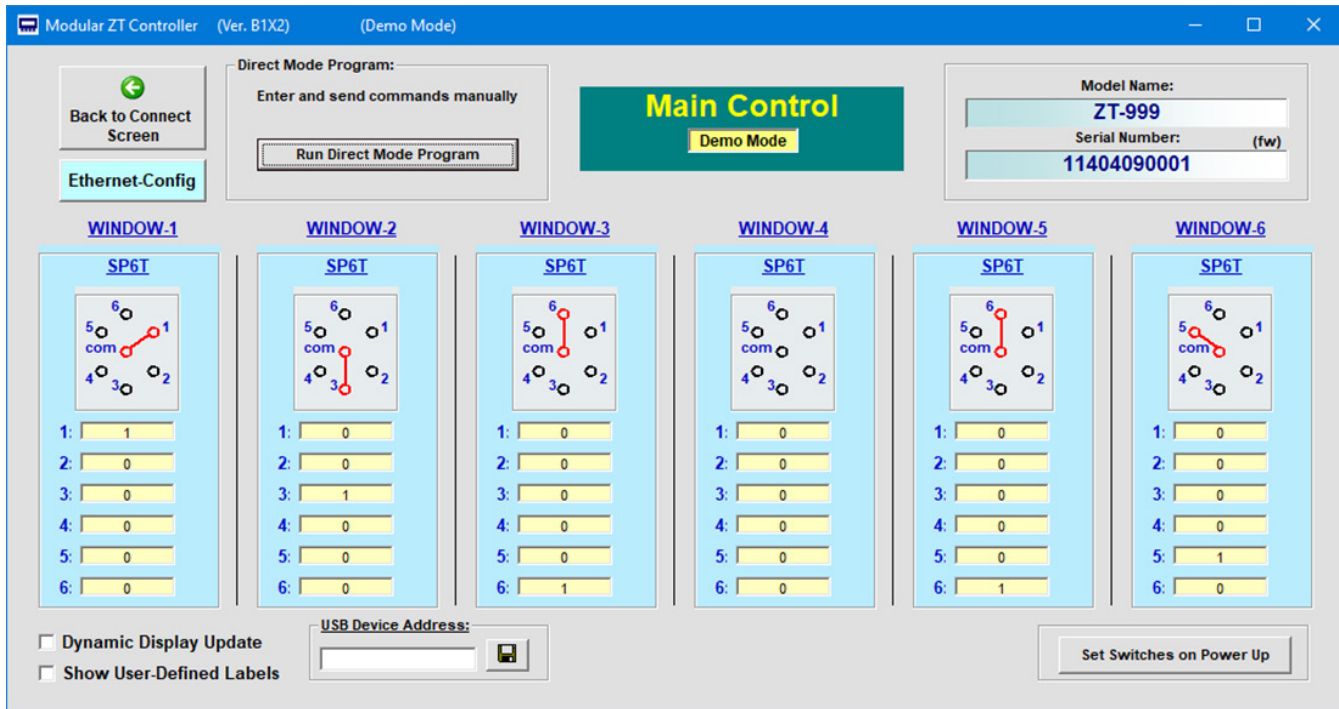
- The key ASCII / SCPI commands for control of the system are summarized below
- These can be sent via the USB or Ethernet API
- Please refer to the programming manual for full details

Command / Query	Description
:MN?	Read model name
:SN?	Read serial number
:FIRMWARE?	Read firmware version
:SP6T:sw_number:STATE:port	Set a single switch state: <ul style="list-style-type: none"> <li>• sw_number = 1 to 6</li> <li>• port = the switch state to set</li> <li>• :SP6T:1:STATE:2 (set switch 1 to state 2)</li> </ul>
:Csw_number=port	Short-hand to set a single switch state: <ul style="list-style-type: none"> <li>• sw_number = 1 to 6</li> <li>• port = the switch state to set</li> <li>• C1=2 (set switch 1 to state 2)</li> </ul>
:SP6T:sw_number:STATE?	Get the state of a single switch: <ul style="list-style-type: none"> <li>• sw_number = 1 to n</li> <li>• :SP6T:1:STATE? (get the state of switch 1)</li> </ul>



### GRAPHICAL USER INTERFACE (GUI) FOR WINDOWS

- Connect via USB or Ethernet
- Run GUI in "demo mode" to evaluate software without a hardware connection
- View and set all switch states
- Configure Ethernet settings
- Upgrade firmware
- Send SCPI commands



**ORDERING INFORMATION**

Please contact Mini-Circuits' Test Solutions department for price and availability:

[www.minicircuits.com/WebStore/dashboard.html?model=ZTM-15](http://www.minicircuits.com/WebStore/dashboard.html?model=ZTM-15)

Model	Description
ZTM-15	RF SP6T Switch Matrix

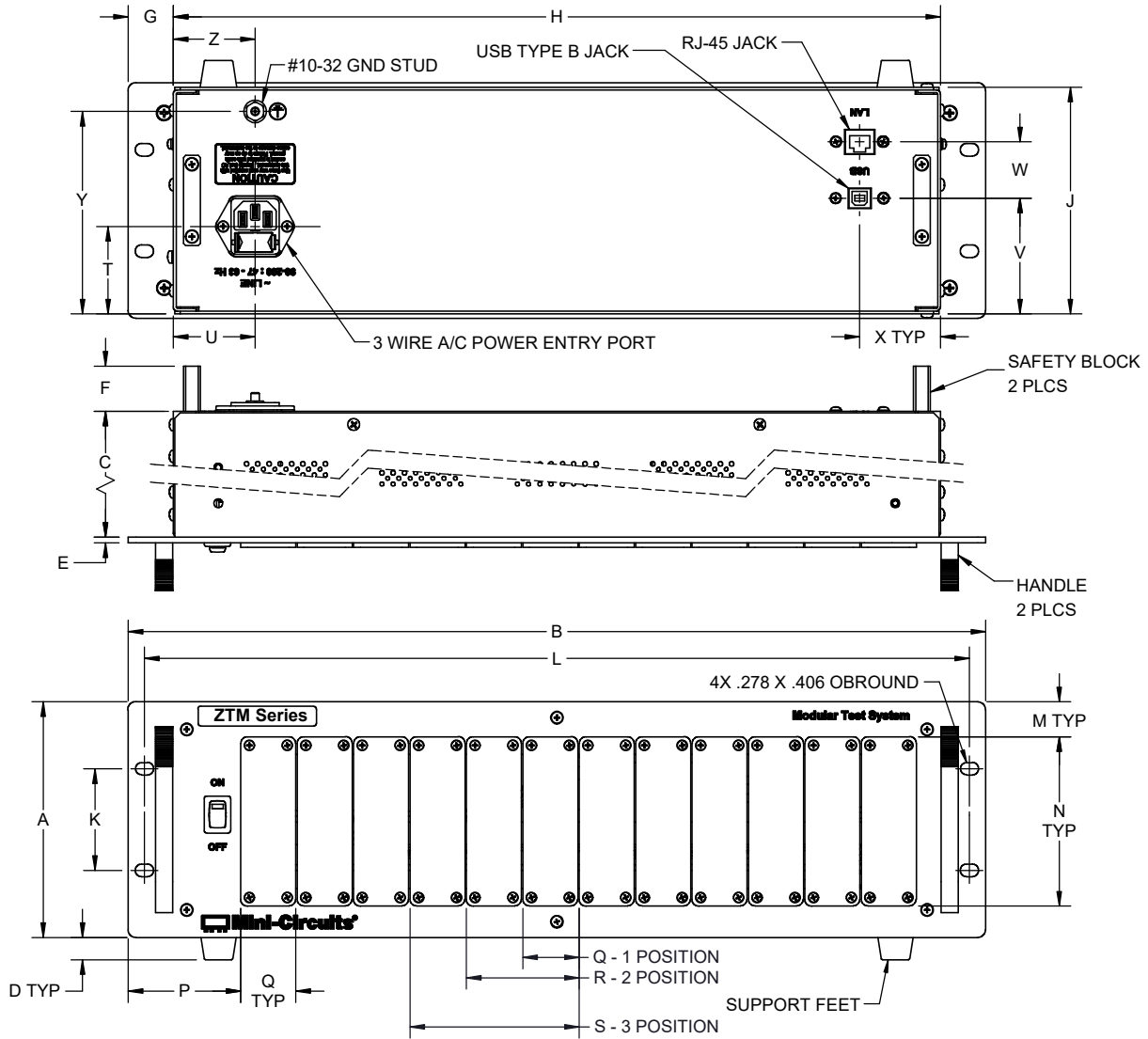
Included Accessories	Part No.	Description
CBL-3W-xx*	1	AC power cord (IEC C13 connector to local plug)
USB-CBL-AB-7+	1	USB cable (6.8 ft)
CBL-RJ45-MM-5+	1	Ethernet cable (5 ft)
HT-4-SMA	1	SMA Cable Wrench (4 in)

Cable Model	Region
CBL-3W-US	USA
CBL-3W-EU	Europe
CBL-3W-IL	Israel
CBL-3W-UK	UK
CBL-3W-AU	Australia / China

- 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)

## Outline Dimensions

YD2861



CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N
YD2861	5.22 (132.6)	19.00 (482.6)	13.00 (330.2)	.49 (12.4)	.13 (3.3)	1.00 (25.4)	1.00 (25.4)	17.00 (431.8)	5.02 (127.5)	2.250 (57.15)	18.280 (464.31)	.78 (19.8)	3.75 (95.3)

CASE #	P	Q	R	S	T	U	V	W	X	Y	Z	WT, GRAMS
YD2861	2.50 (63.5)	1.22 (31.0)	2.47 (62.7)	3.72 (94.5)	1.94 (49.3)	1.81 (46.0)	2.56 (65.0)	1.25 (31.8)	1.79 (45.5)	4.49 (114.0)	1.81 (46.0)	4535

Dimensions are in inches ( mm ) . Tolerances: 2 Pl.  $\pm$ .03; 3 Pl.  $\pm$ .015

**Notes:**

1. Case material: Aluminum alloy.
2. Finish: Clear chemical conversion coating



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



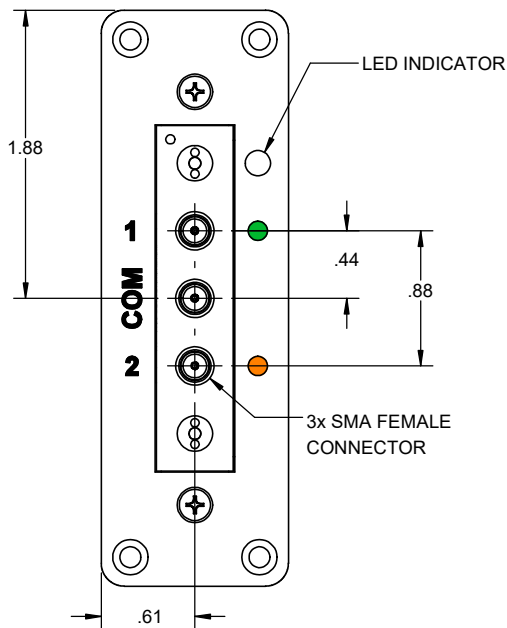
The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

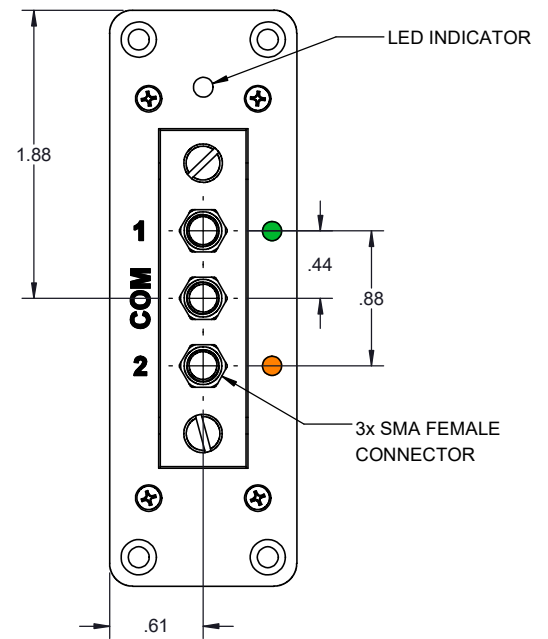


## SPDT Switch Options:

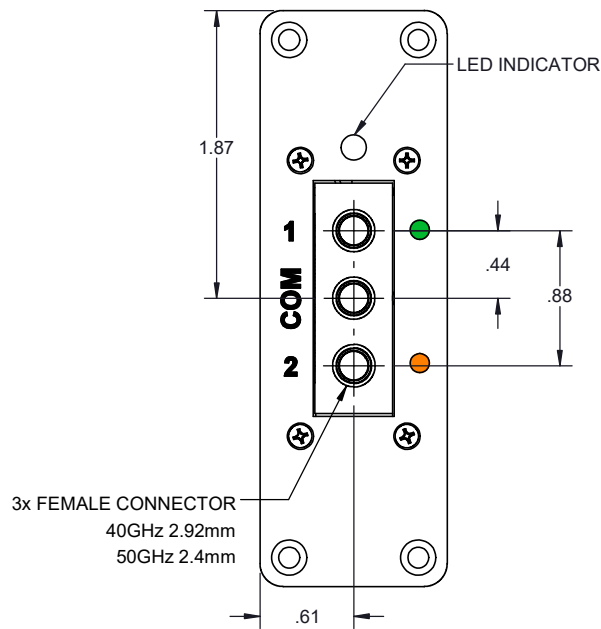
YD2861



**SPDTA 18GHz**



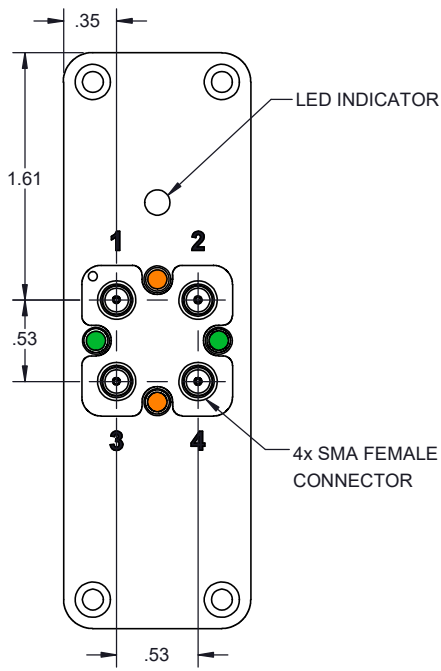
**SPDTA 26GHz**



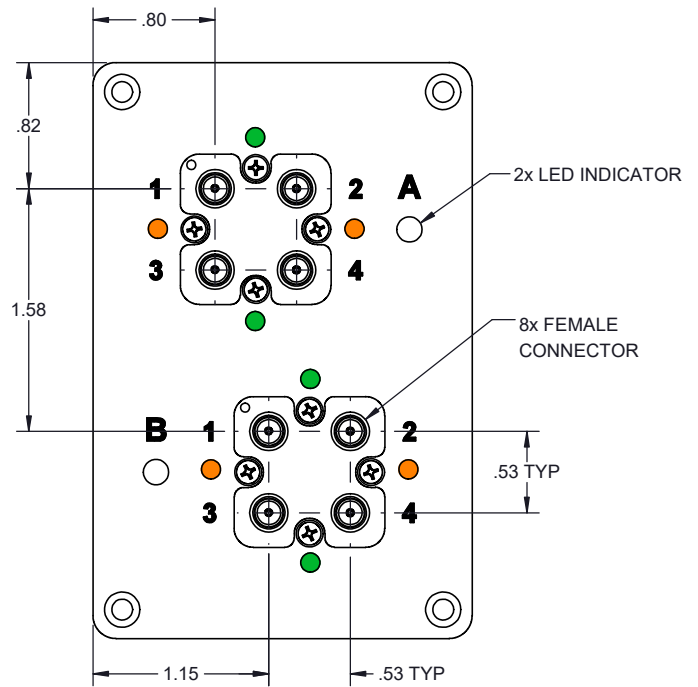
**SPDT 40GHz**  
**SPDT 50GHz**

## MTS (Transfer) Switch Options:

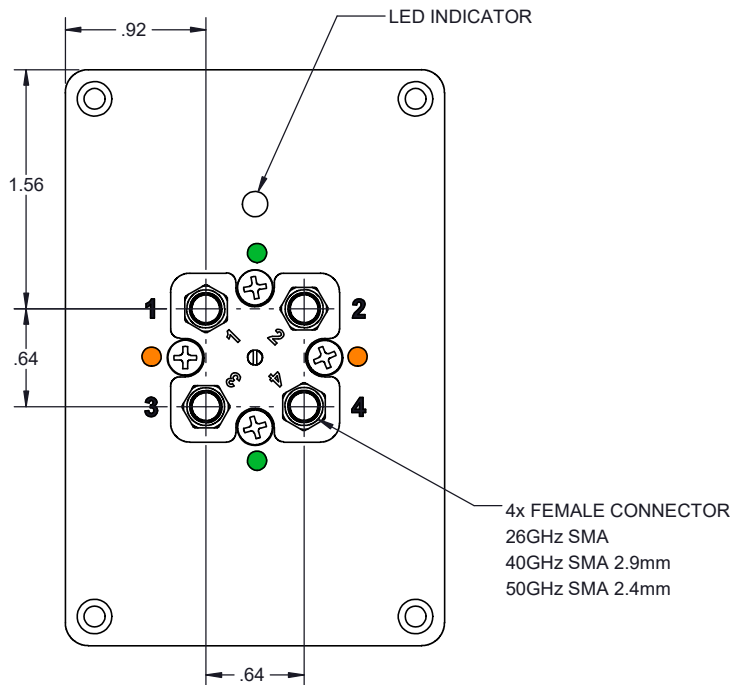
YD2861



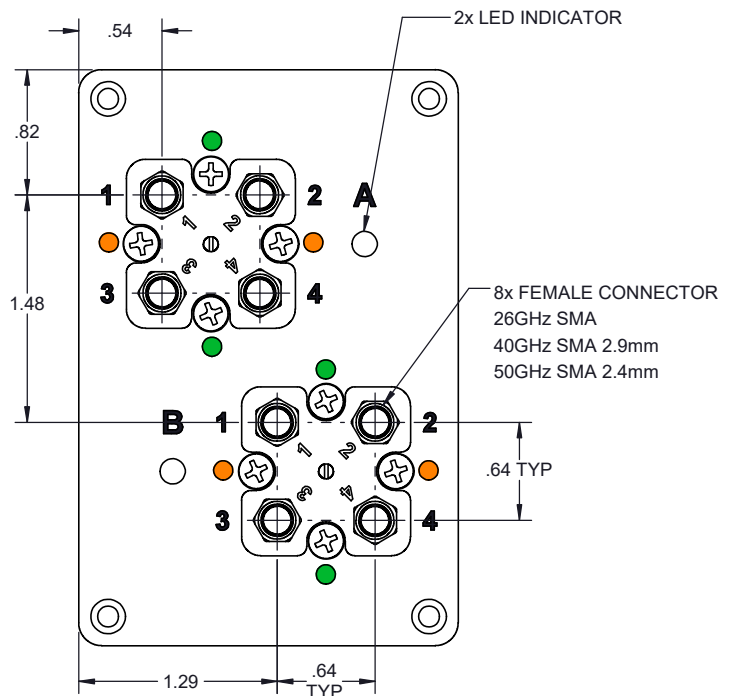
**MTS 18GHz**



**MTS 18GHz**



**MTS 26GHz**  
**MTS 40GHz**  
**MTS 50GHz**



**MTS 26GHz**  
**MTS 40GHz**  
**MTS 50GHz**

**Mini-Circuits®**  
ISO 9001 ISO 14001 CERTIFIED

ALL NEW  
[minicircuits.com](http://minicircuits.com)

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

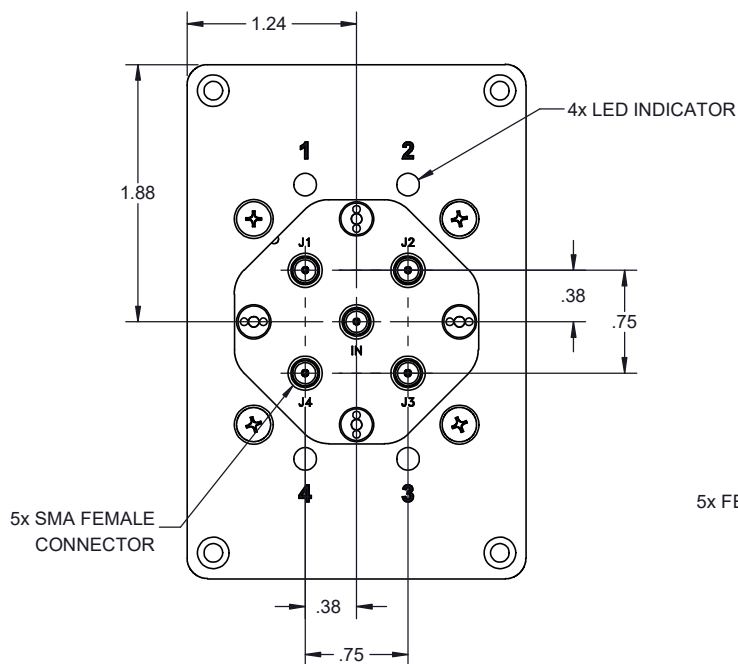


The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

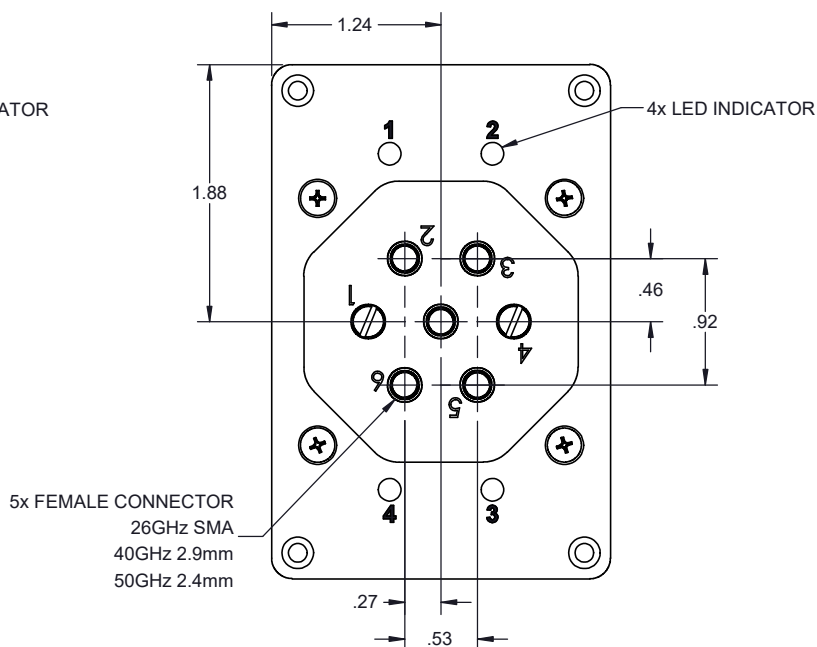
RF/IF MICROWAVE COMPONENTS

## SP4T and SP6T Switch Options:

YD2861

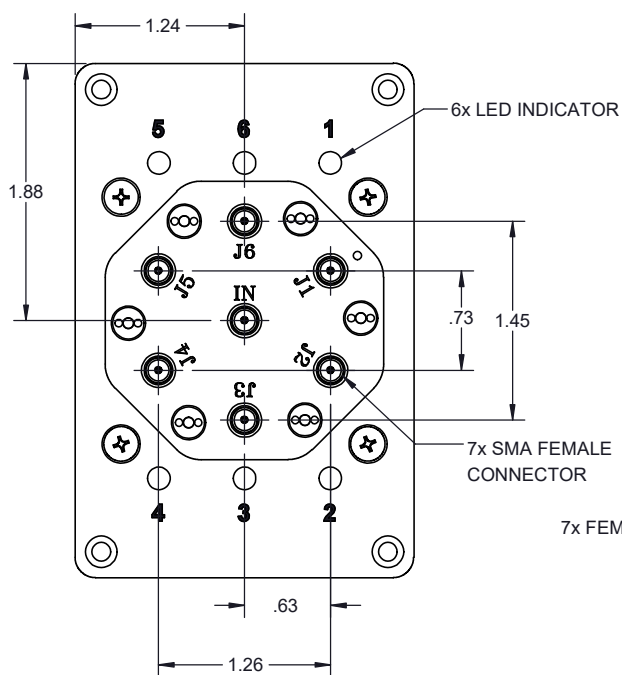


**SP4TA 18GHz**



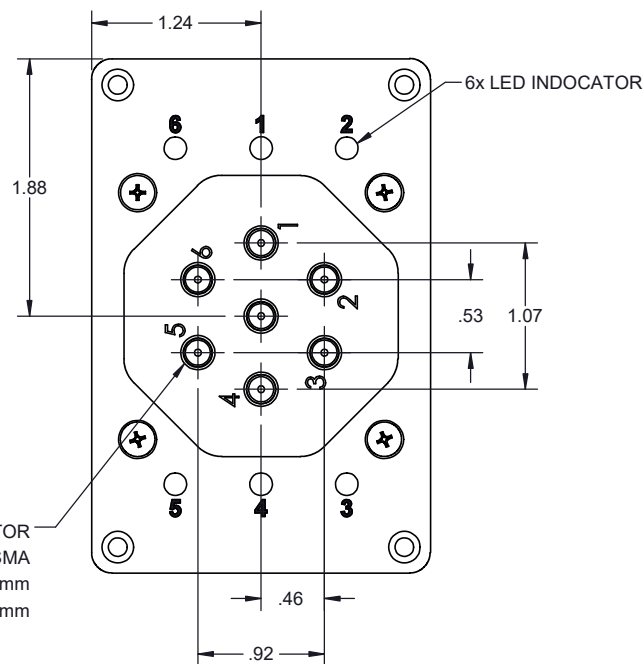
5x FEMALE CONNECTOR  
26GHz SMA  
40GHz 2.9mm  
50GHz 2.4mm

**SP4TA 26GHz**  
**SP4TA 40GHz**  
**SP4TA 50GHz**



**SP6TA 12GHz**  
**SP6TA 18GHz**

7x FEMALE CONNECTOR  
26GHz SMA  
40GHz 2.9mm  
50GHz 2.4mm



**SP6TA 26GHz**  
**SP6TA 40GHz**  
**SP6TA 50GHz**



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

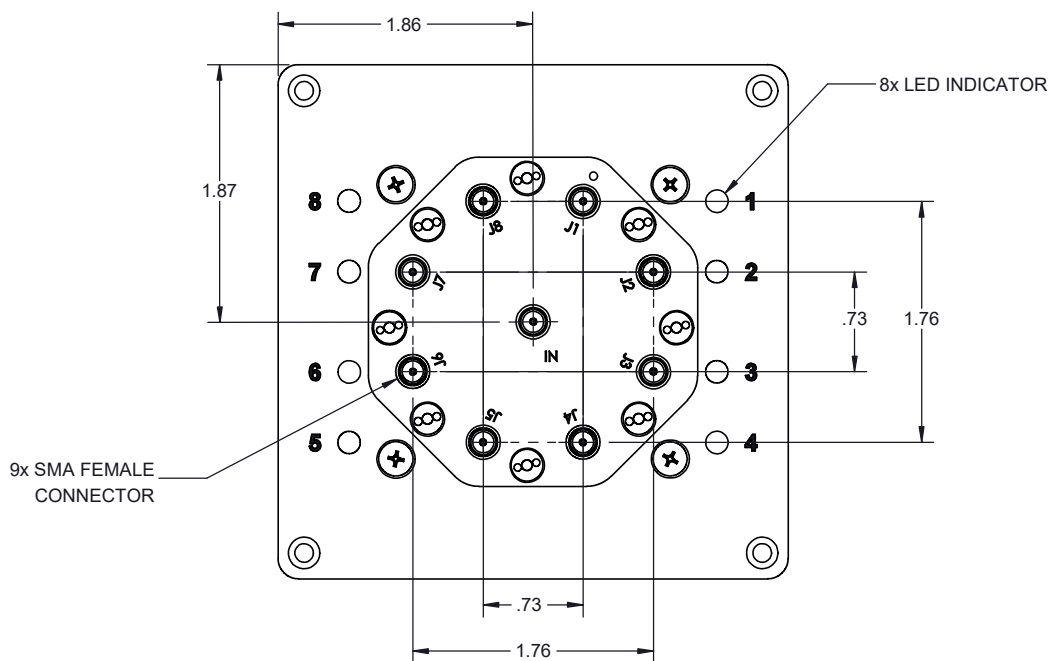


The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

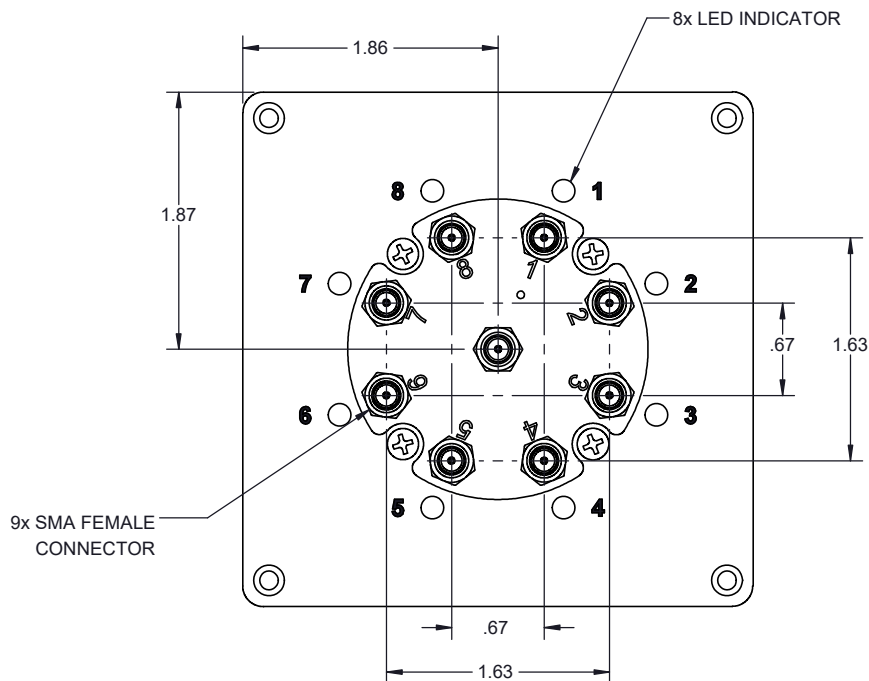
RF/IF MICROWAVE COMPONENTS

## SP8T Switch Options:

YD2861



**SP8TA 12GHz**



**SP8TA 18GHz**  
**SP8TA 26GHz**

**Mini-Circuits**  
ISO 9001 ISO 14001 CERTIFIED

ALL NEW  
minicircuits.com

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS



Environmental Specifications **ENV56**

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	-0° to 40° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-15° 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