USB & ETHERNET CONTROLLED

RF SP8T Switch Matrix RCM-2SP8T-26

50Ω DC to 26.5 GHz

THE BIG DEAL

- Dual mechanical SP8T switch
- Excellent performance to 26.5 GHz
- High reliability
- 5W power rating (cold switching)

CASE STYLE: UV2068

DOWNLOAD SOFTWARE PACKAGE

RoHS Compliant

See our website for RoHS Compliance methodologies and qualifications

APPLICATIONS

- 5G node / device testing
- Automated test equipment
- Fail-safe / redundancy switching

PRODUCT OVERVIEW

Mini-Circuits' RCM-2SP8T-26 comprises a pair of independently controlled, electro-mechanical SP8T switches. Each switch operates over an extremely wide bandwidth, from DC to 26.5 GHz with high isolation and low insertion loss. The absorptive switches are of a failsafe and break-before-make-configuration, with a lifetime of 2 million switching cycles, when used within the noted specifications.

The switch box is constructed in a compact, rugged metal case (8.25 x 8.25 x 4.25") with all SMA (f) RF connectors on the front panel. 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).

KEY FEATURES

Feature	Advantages
Dual Mechanical SP8T switches	Mechanical absorptive switches provide high reliability, repeatable high performance and internal terminations of input signals on the disconnected paths
Operation from DC to 26.5 GHz	Supports a wide range of RF test and signal routing applications, including 2G, 3G, 4G, 5G, C / S / X / Ku bands with a single device.
Break-before-make configuration	Prevents a momentary connection of the old and new signal paths, reducing the inconsistent transient effects that could otherwise be observed during switching
USB & Ethernet control	USB HID and Ethernet (HTTP / Telnet) interfaces provide easy compatibility with a wide range of software setups and programming environments
Full software support	User friendly Windows GUI (graphical user interface) allows manual control straight out of the box, while the comprehensive API (application programming interface) with examples and instructions allows easy automation in most programming environments

REV. D
ECO-028242
RCM-2SP8T-26
MCL NY
260122

RF SP8T Switch Matrix RCM-2SP8T-26

ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Conditions	Min.	Typ.	Max.	Units
Frequency Range	-	DC	-	26.5	GHz
Insertion Loss	DC – 8 GHz	-	0.15	0.30	dB
	8 – 18 GHz	-	0.30	0.50	
	18 – 26.5 GHz	-	0.45	0.70	
Isolation[1] (Inactive Paths)	DC – 8 GHz	70	90	-	:1
	8 – 18 GHz	60	80	-	
	18 – 26.5 GHz	55	70	-	
Return Loss[2]	DC – 8 GHz	-	20	-	W
	8 – 18 GHz	-	16	-	
	18 – 26.5 GHz	-	14	-	
Switching Time	-	-	25	-	ms
RF Input Power	Cold switching, DC – 8 GHz	-	-	20	W
	Cold switching, 8 – 18 GHz	-	-	10	
	Cold switching, 18 – 26.5 GHz	-	-	5	
	Hot switching[3]	-	-	0.1	
	Into internal termination[4]	-	-	1	
Switch Lifetime	-	-	2	-	million 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 1-6 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

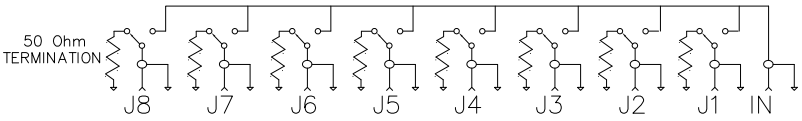
MAXIMUM RATINGS

Parameters	Ratings
Operating Temperature	0°C to 40°C
Storage Temperature	-15°C to 85°C
Supply Voltage	26V

RF SP8T Switch Matrix RCM-2SP8T-26

SWITCHING CONFIGURATION:

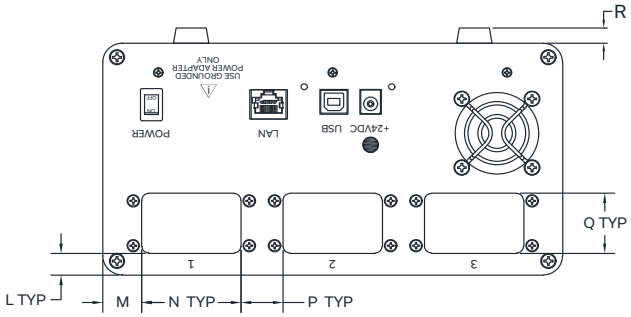
- Normally open (all port disconnected)
- Absorptive (internal terminations on ports J1-J8)

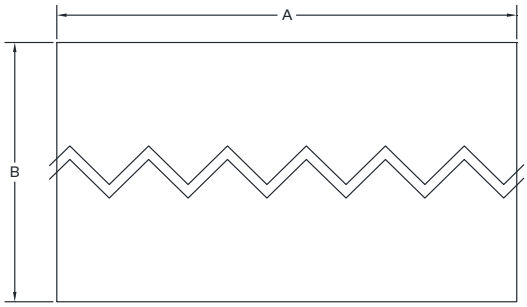


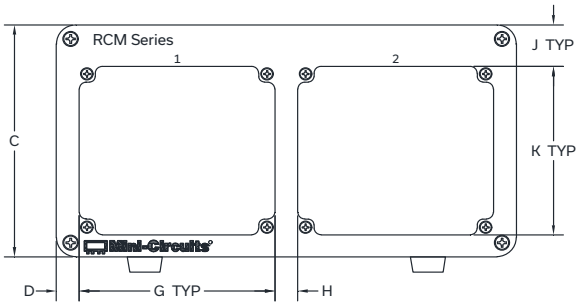
CONNECTIONS

Port Name	Connector Type
RF Switch 1 (Com & 1-8)	SMA female
RF Switch 2 (Com & 1-8)	SMA female
USB	USB type-B
Ethernet / LAN	RJ45
24V $_{DC}$ Input	2.1mm center positive DC socket

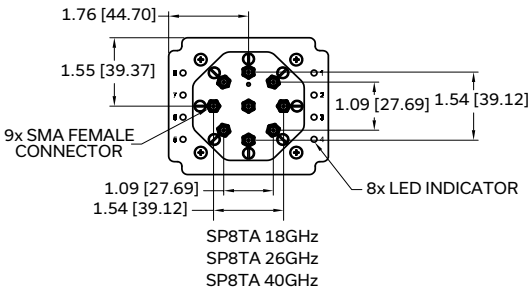
OUTLINE DRAWING (UV2068)







FRONT PANEL FOR RCM WITH SP8T SWITCHES



OUTLINE DIMENSIONS (Inches / mm)

A	B	C	D	E	F	J	K	L	M	N	P	Q	R	wt
8.25	8.25	4.25	.41	2.36	.18	.76	3.09	.40	.70	1.78	.76	1.10	.28	grms
209.55	209.55	107.95	10.41	59.94	4.57	19.30	78.49	10.16	17.78	45.21	19.30	27.94	7.1	2350

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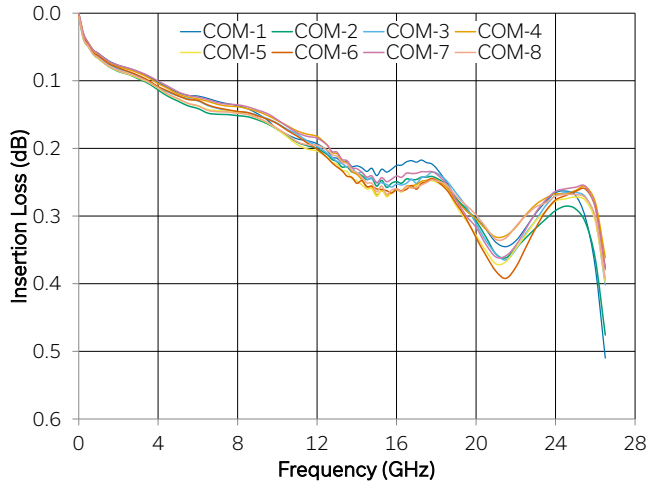
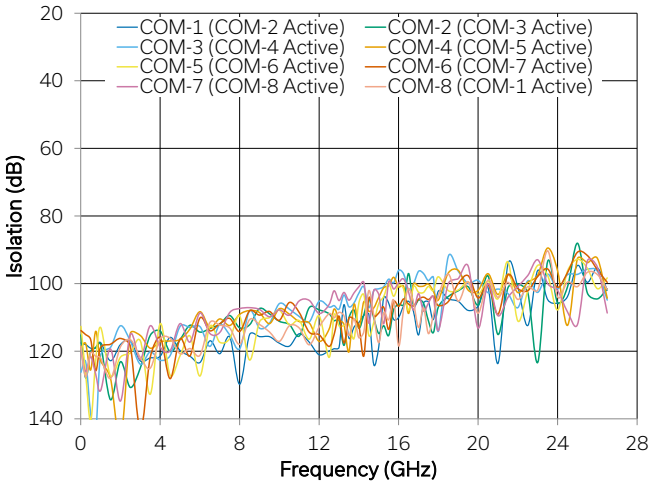
TYPICAL PERFORMANCE DATA (PER SWITCH)

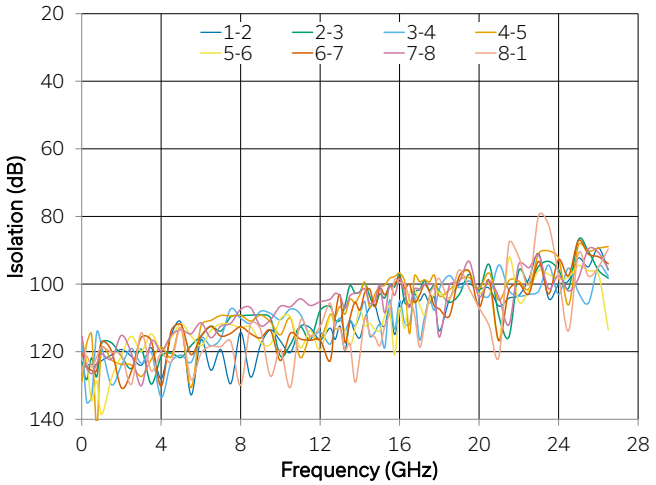
Insertion Loss



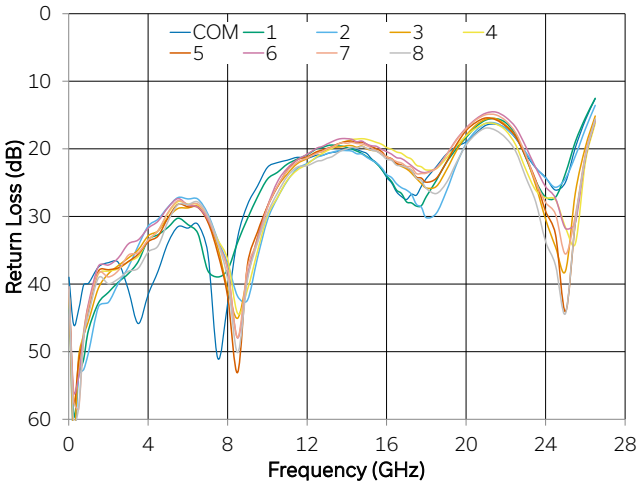
Isolation (Inactive Paths)



Isolation (Between Output Ports)



Return Loss



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

MINIMUM SYSTEM REQUIREMENTS:

Parameter	Requirements	
Interface	USB HID & Ethernet (HTTP & Telnet)	
System Requirements	GUI	Windows 98 or later
	USB API DLL	Windows 98 or later and programming environment with ActiveX or .NET support
	USB Direct Programming	Linux, Windows 98 or later
	Ethernet	Windows, Linux or Mac computer with a network port and Ethernet TCP/IP support
Hardware	Pentium II or later with 256 MB RAM	

APPLICATION PROGRAMMING INTERFACE (API)

ETHERNET SUPPORT:

- Simple ASCII / SCPI command set for attenuator control
- Communication via HTTP or Telnet
- Supported by most common programming environments

USB SUPPORT (WINDOWS):

- ActiveX COM DLL file for creation of 32-bit programs
- .NET library DLL file for creation of 32 / 64-bit programs
- Supported by most common programming environments (refer to application note AN-49-001 for summary of suported environments)

USB SUPPORT (LINUX):

- Direct USB programming using a series of USB interrupt codes

Full programming instructions and examples available for a wide range of programming environments / languages.

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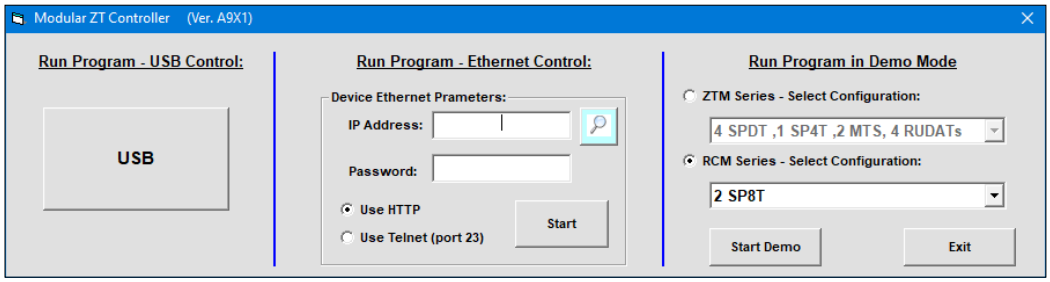
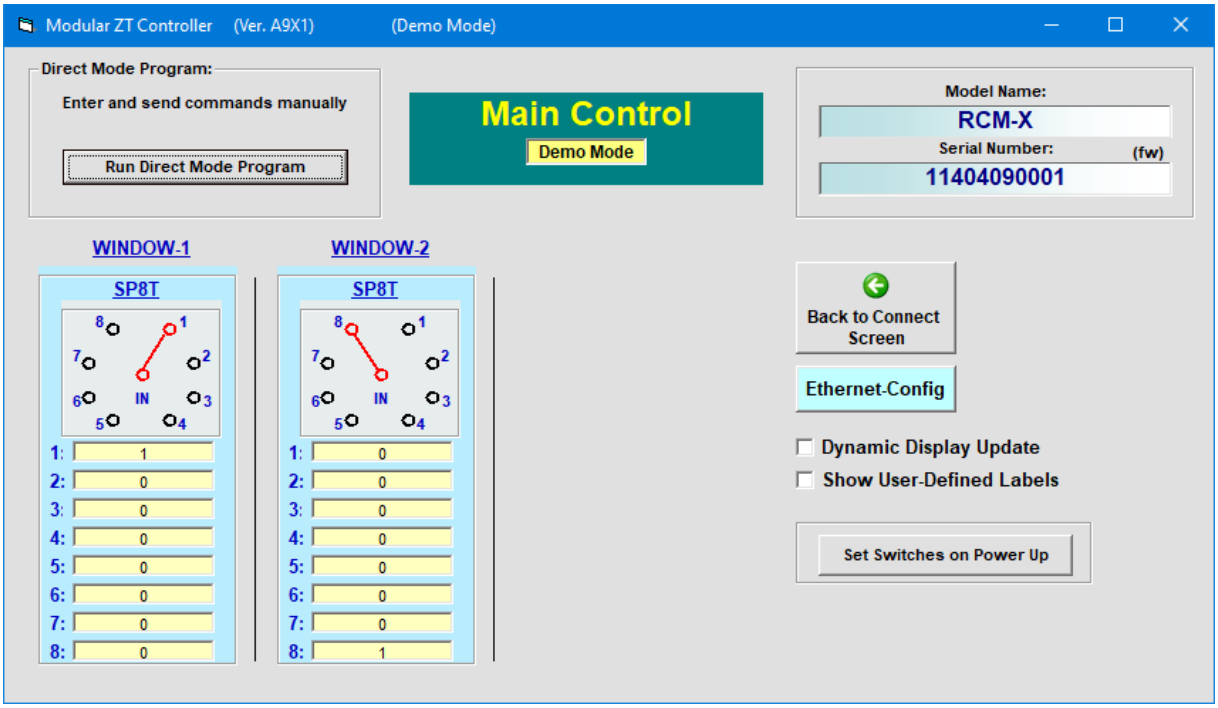
GRAPHICAL USER INTERFACE (GUI) FOR WINDOWS - KEY FEATURES

- Connect via USB or Ethernet
- 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
- Set start-up switch state
- Configure Ethernet IP settings



RF SP8T Switch Matrix RCM-2SP8T-26

ORDERING INFORMATION

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

Model	Description
RCM-2SP8T-26	USB & Ethernet controlled SP8T 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[5]	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

5. 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

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

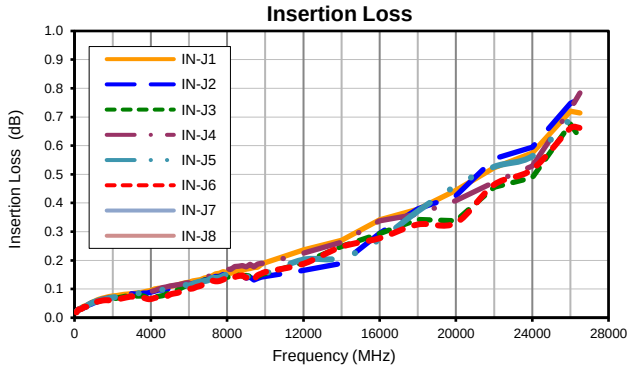
USB & Ethernet Controlled RF SP8T Switch Matrix

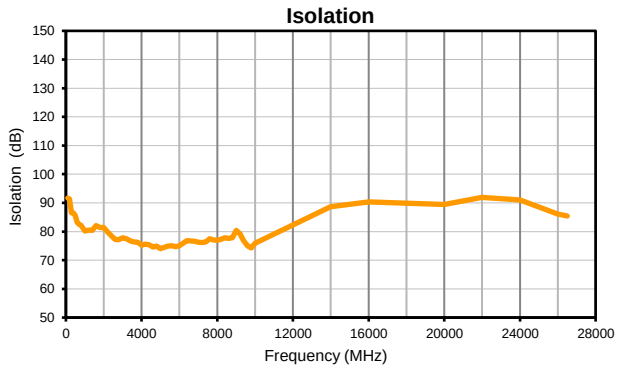
RCM-2SP8T-26

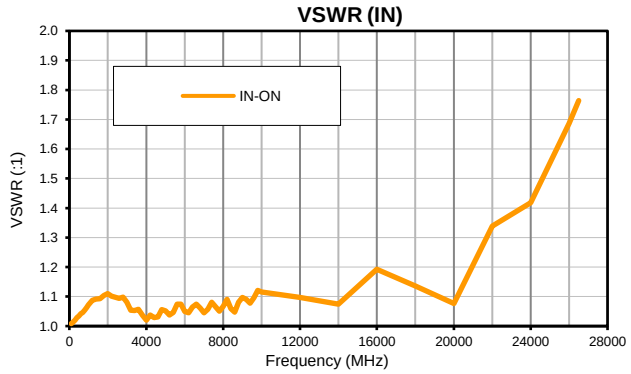
Typical Performance Data per Switch

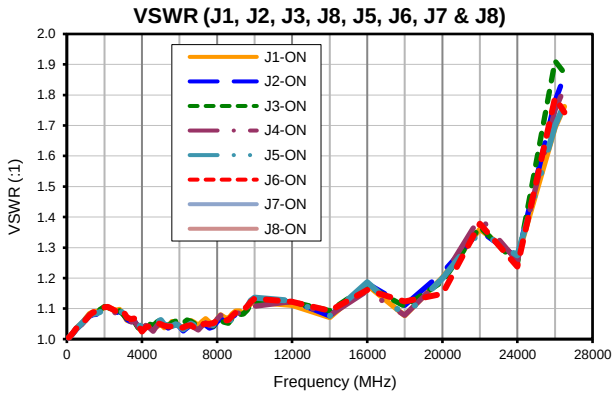
FREQUENCY	INSERTION LOSS (dB)								ISOLATON	VSWR (:1)								
(MHz)	IN-J1	IN-J2	IN-J3	IN-J4	IN-J5	IN-J6	IN-J7	IN-J8	(dB)	IN	J1-ON	J2-ON	J3-ON	J4-ON	J5-ON	J6-ON	J7-ON	J8-ON
100	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	91.73	1.01	1.00	1.00	1.00	1.00	1.00	1.01	1.04	1.04
200	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	91.39	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.04	1.04
300	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	86.60	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.04	1.04
400	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	86.57	1.03	1.03	1.02	1.03	1.02	1.03	1.03	1.03	1.04
500	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.04	85.58	1.03	1.04	1.03	1.03	1.03	1.03	1.04	1.03	1.04
600	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	83.18	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
700	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	82.54	1.05	1.05	1.04	1.05	1.04	1.05	1.05	1.04	1.05
800	0.05	0.05	0.04	0.05	0.05	0.04	0.05	0.05	82.15	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
900	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	81.14	1.06	1.06	1.06	1.06	1.05	1.06	1.06	1.05	1.06
1000	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	80.14	1.07	1.07	1.06	1.06	1.06	1.06	1.06	1.06	1.07
1200	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	80.48	1.09	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
1400	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	80.39	1.09	1.09	1.08	1.09	1.08	1.08	1.09	1.08	1.08
1600	0.07	0.06	0.07	0.07	0.06	0.06	0.07	0.06	82.13	1.09	1.09	1.08	1.09	1.08	1.08	1.09	1.08	1.08
1800	0.07	0.07	0.07	0.07	0.07	0.06	0.07	0.07	81.44	1.10	1.10	1.09	1.10	1.09	1.09	1.09	1.09	1.09
2000	0.08	0.07	0.07	0.07	0.07	0.06	0.07	0.07	81.37	1.11	1.11	1.09	1.11	1.10	1.10	1.10	1.10	1.10
2200	0.08	0.07	0.07	0.07	0.07	0.06	0.08	0.07	79.90	1.10	1.10	1.09	1.10	1.10	1.10	1.11	1.10	1.09
2600	0.08	0.08	0.07	0.08	0.08	0.07	0.08	0.08	77.23	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.08
2800	0.08	0.08	0.08	0.08	0.08	0.07	0.08	0.08	77.17	1.10	1.10	1.09	1.09	1.09	1.10	1.10	1.10	1.09
3000	0.08	0.08	0.08	0.08	0.09	0.07	0.08	0.08	77.84	1.08	1.08	1.08	1.08	1.08	1.08	1.09	1.08	1.08
3200	0.09	0.08	0.08	0.08	0.09	0.07	0.08	0.08	77.55	1.05	1.06	1.06	1.07	1.06	1.07	1.07	1.07	1.06
3400	0.09	0.08	0.08	0.08	0.09	0.07	0.08	0.08	76.68	1.05	1.06	1.06	1.06	1.06	1.07	1.07	1.07	1.06
3600	0.09	0.09	0.08	0.08	0.09	0.07	0.08	0.08	76.37	1.06	1.06	1.06	1.06	1.06	1.06	1.07	1.07	1.05
3800	0.09	0.09	0.07	0.09	0.09	0.07	0.08	0.09	76.24	1.04	1.04	1.04	1.04	1.04	1.05	1.05	1.05	1.04
4000	0.09	0.09	0.07	0.09	0.09	0.07	0.08	0.09	75.23	1.02	1.03	1.03	1.03	1.03	1.04	1.02	1.05	1.03
4200	0.10	0.09	0.07	0.10	0.10	0.07	0.09	0.09	75.63	1.04	1.04	1.05	1.05	1.04	1.05	1.04	1.05	1.04
4400	0.10	0.10	0.07	0.10	0.10	0.07	0.09	0.10	75.36	1.03	1.04	1.04	1.05	1.04	1.05	1.04	1.05	1.04
4600	0.10	0.10	0.08	0.11	0.10	0.07	0.09	0.09	74.60	1.03	1.03	1.03	1.04	1.03	1.04	1.05	1.03	1.03
4800	0.10	0.10	0.08	0.11	0.10	0.07	0.09	0.09	74.90	1.06	1.04	1.05	1.06	1.04	1.06	1.05	1.04	1.05
5000	0.11	0.10	0.09	0.11	0.10	0.08	0.10	0.10	74.04	1.05	1.05	1.06	1.06	1.05	1.06	1.05	1.05	1.06
5200	0.11	0.10	0.09	0.11	0.10	0.08	0.10	0.10	74.49	1.04	1.04	1.05	1.05	1.04	1.05	1.04	1.03	1.04
5400	0.11	0.11	0.10	0.12	0.10	0.09	0.10	0.10	74.95	1.05	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
5600	0.12	0.11	0.10	0.12	0.11	0.09	0.11	0.11	75.02	1.07	1.06	1.05	1.05	1.04	1.04	1.04	1.04	1.05
5800	0.12	0.11	0.11	0.12	0.11	0.09	0.12	0.11	74.69	1.07	1.05	1.05	1.06	1.05	1.05	1.04	1.04	1.05
6000	0.12	0.11	0.11	0.12	0.11	0.10	0.12	0.11	75.07	1.05	1.04	1.04	1.05	1.04	1.04	1.04	1.04	1.04
6200	0.13	0.12	0.11	0.13	0.12	0.10	0.12	0.12	75.90	1.05	1.04	1.03	1.05	1.03	1.03	1.04	1.04	1.04
6400	0.13	0.12	0.12	0.13	0.12	0.11	0.13	0.12	76.79	1.06	1.05	1.04	1.06	1.04	1.04	1.04	1.05	1.05
6600	0.13	0.13	0.12	0.14	0.13	0.11	0.13	0.12	76.76	1.07	1.06	1.05	1.06	1.05	1.05	1.05	1.05	1.05
6800	0.14	0.13	0.13	0.14	0.13	0.12	0.14	0.13	76.56	1.06	1.05	1.04	1.05	1.04	1.04	1.04	1.05	1.05
7000	0.14	0.13	0.13	0.14	0.13	0.12	0.14	0.13	76.32	1.05	1.04	1.03	1.04	1.03	1.03	1.04	1.06	1.06
7200	0.15	0.14	0.14	0.15	0.14	0.13	0.14	0.14	76.16	1.06	1.06	1.04	1.05	1.04	1.04	1.05	1.06	1.06
7400	0.15	0.14	0.14	0.16	0.14	0.13	0.15	0.14	76.40	1.08	1.07	1.05	1.05	1.05	1.06	1.05	1.07	1.06
7600	0.15	0.14	0.14	0.16	0.14	0.13	0.15	0.14	77.54	1.07	1.05	1.04	1.05	1.04	1.05	1.05	1.07	1.07
7800	0.16	0.15	0.15	0.17	0.15	0.13	0.15	0.15	77.01	1.05	1.05	1.04	1.04	1.05	1.05	1.05	1.07	1.07
8000	0.16	0.15	0.14	0.17	0.15	0.14	0.15	0.15	76.97	1.07	1.07	1.06	1.05	1.07	1.06	1.06	1.08	1.08
8200	0.16	0.15	0.14	0.17	0.15	0.13	0.15	0.15	77.28	1.09	1.08	1.07	1.06	1.08	1.07	1.06	1.08	1.08
8400	0.16	0.15	0.15	0.18	0.15	0.14	0.16	0.15	77.88	1.06	1.07	1.06	1.06	1.07	1.06	1.06	1.08	1.08
8600	0.17	0.15	0.15	0.18	0.15	0.15	0.16	0.16	77.62	1.05	1.07	1.06	1.05	1.07	1.05	1.06	1.08	1.09
8800	0.16	0.15	0.15	0.18	0.15	0.15	0.16	0.15	77.83	1.08	1.08	1.07	1.07	1.08	1.07	1.08	1.09	1.09
9000	0.17	0.14	0.15	0.18	0.14	0.14	0.17	0.15	80.46	1.10	1.09	1.08	1.08	1.09	1.08	1.09	1.09	1.09
9200	0.17	0.14	0.15	0.19	0.15	0.15	0.17	0.15	79.14	1.09	1.09	1.08	1.08	1.08	1.08	1.09	1.09	1.10
9400	0.18	0.13	0.15	0.18	0.14	0.14	0.17	0.15	76.83	1.08	1.08	1.08	1.08	1.08	1.08	1.10	1.09	1.10
9600	0.18	0.14	0.14	0.19	0.15	0.15	0.17	0.15	75.02	1.10	1.10	1.10	1.10	1.09	1.11	1.11	1.09	1.10
9800	0.19	0.14	0.15	0.19	0.15	0.15	0.18	0.16	74.31	1.12	1.12	1.12	1.11	1.10	1.13	1.12	1.09	1.10
10000	0.19	0.14	0.15	0.19	0.15	0.16	0.18	0.16	75.90	1.12	1.12	1.13	1.12	1.11	1.14	1.13	1.10	1.11
12000	0.24	0.16	0.19	0.23	0.20	0.19	0.22	0.19	82.32	1.10	1.11	1.13	1.12	1.12	1.13	1.12	1.12	1.11
14000	0.27	0.19	0.25	0.26	0.21	0.25	0.27	0.21	88.68	1.07	1.07	1.08	1.09	1.08	1.08	1.09	1.07	1.08
16000	0.34	0.30	0.29	0.34	0.27	0.28	0.32	0.33	90.33	1.19	1.18	1.18	1.18	1.16	1.19	1.16	1.19	1.15
18000	0.38	0.38	0.34	0.36	0.37	0.33	0.34	0.48	89.89	1.14	1.08	1.11	1.11	1.08	1.08	1.12	1.13	1.13
20000	0.44	0.42	0.34	0.41	0.46	0.33	0.39	0.44	89.43	1.08	1.20	1.22	1.19	1.20	1.20	1.15	1.18	1.19
22000	0.52	0.55	0.46	0.47	0.53	0.46	0.47	0.46	91.92	1.34	1.36	1.36	1.37	1.40	1.35	1.38	1.34	1.33
24000	0.58	0.60	0.49	0.53	0.56	0.52	0.48	0.49	91.06	1.42	1.26	1.27	1.25	1.26	1.27	1.24	1.25	1.24
26000	0.72	0.75	0.68	0.73	0.69	0.66	0.62	0.53	86.09	1.69	1.69	1.78	1.91	1.75	1.70	1.79	1.71	1.84
26500	0.71	0.76	0.63	0.78	0.72	0.66	0.63	0.54	85.48	1.76	1.76	1.86	1.87	1.82	1.77	1.74	1.79	1.93

Typical Performance Data per Switch





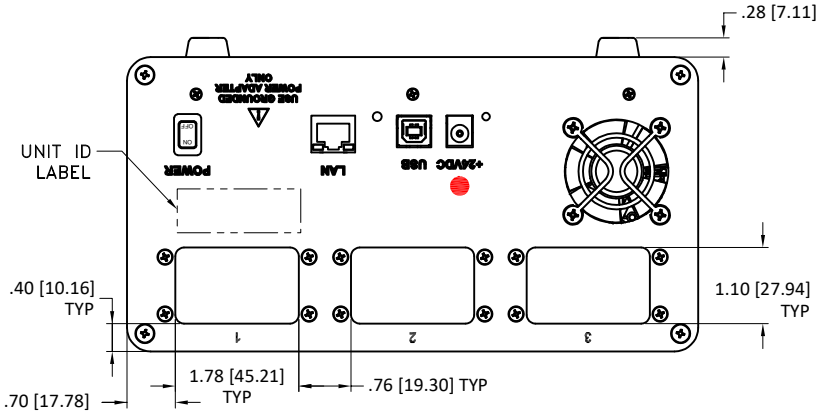


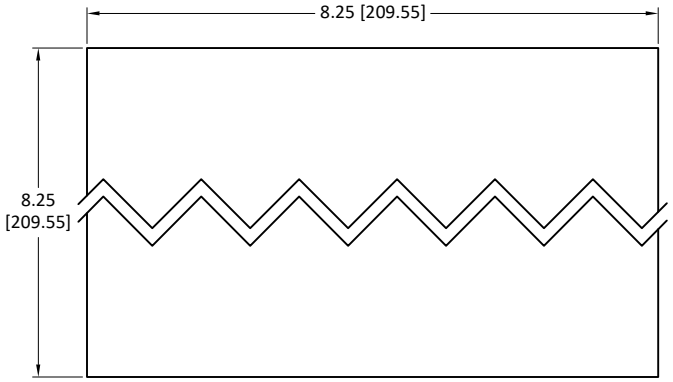


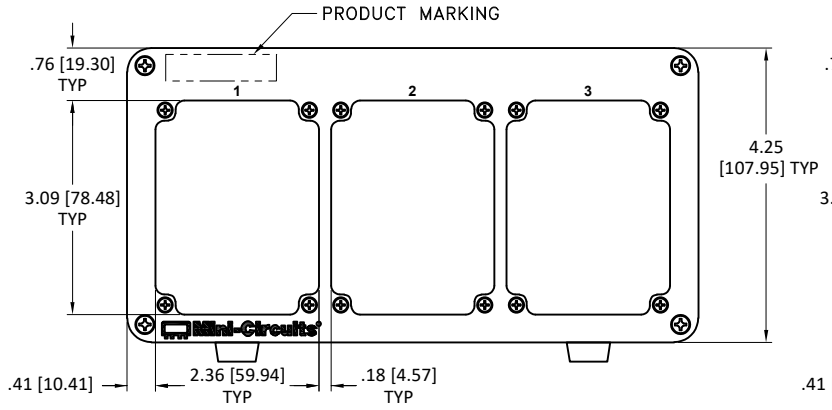
Case Style UV

Outline Dimensions

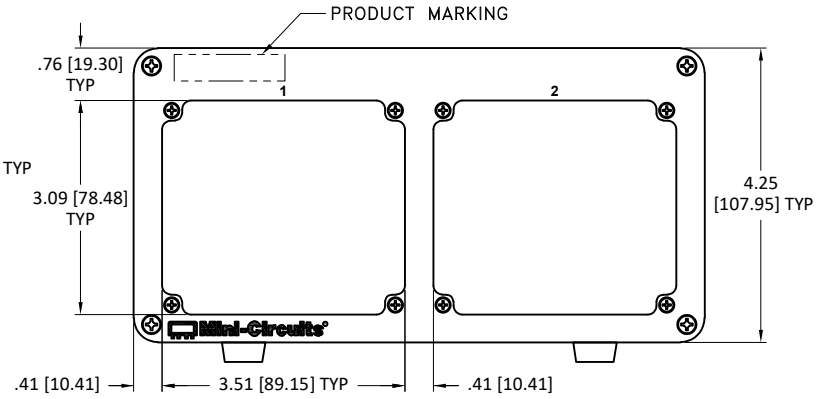
UV2068







FRONT PANEL FOR RCM WITH RUDAT, SPDT, SP4T, SP6T & MTS SWITCHES



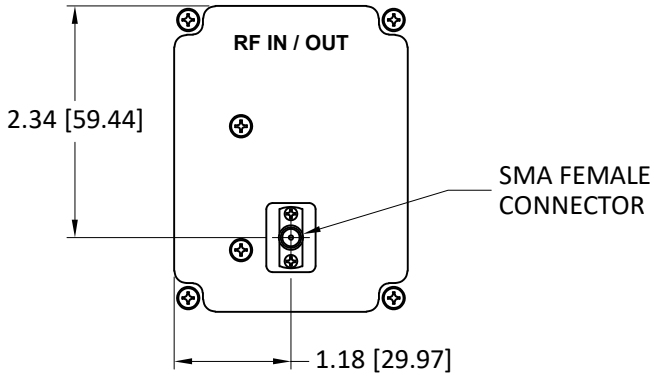
FRONT PANEL FOR RCM WITH SP8T SWITCHES

Notes:

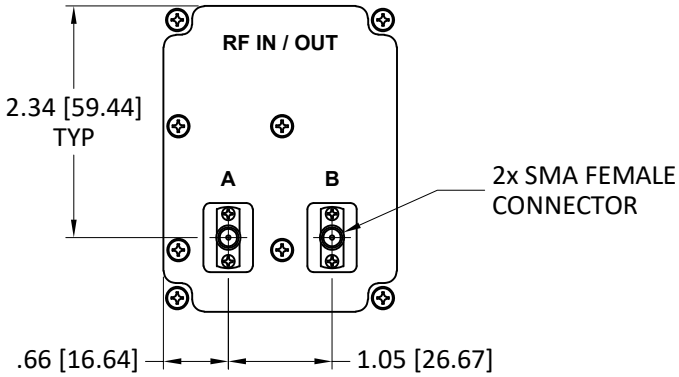
1. Case material: Aluminum alloy.
2. Finish: Clear chemical conversion coating
3. Dimensions are in inches [mm]. Tolerances: 2 Pl. ±.03 inch; 3 Pl. ±.015 inch
4. Weight: 2350 grams.
5. Marking may contain other features or characters for internal lot control.

Outline Dimensions

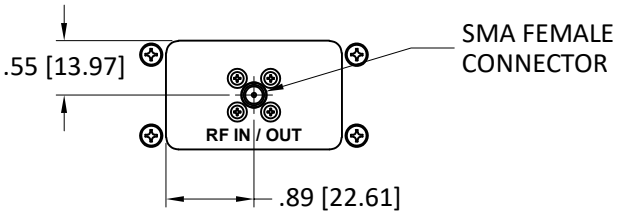
UV2068



FRONT PANEL

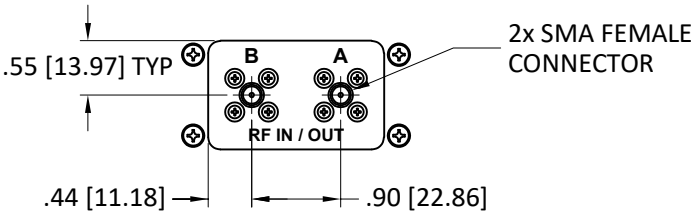


FRONT PANEL



REAR PANEL

SINGLE RUDAT

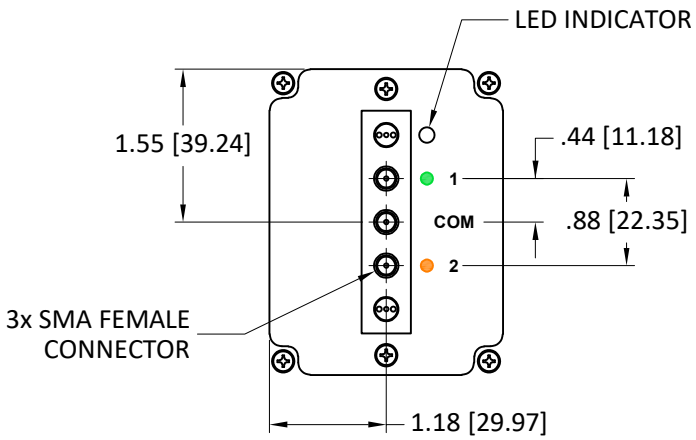


REAR PANEL

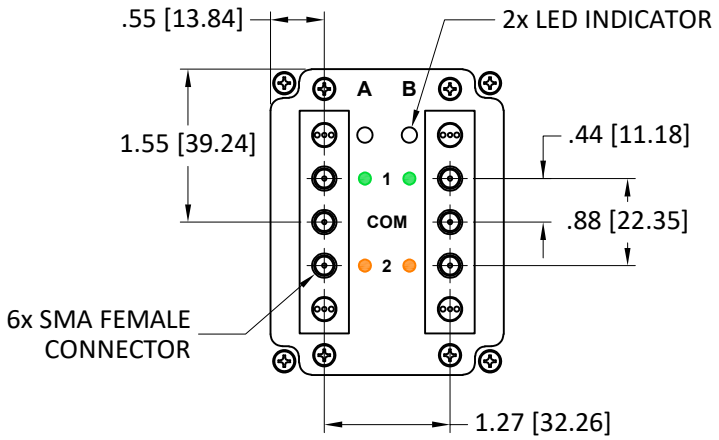
DUAL RUDAT

Outline Dimensions

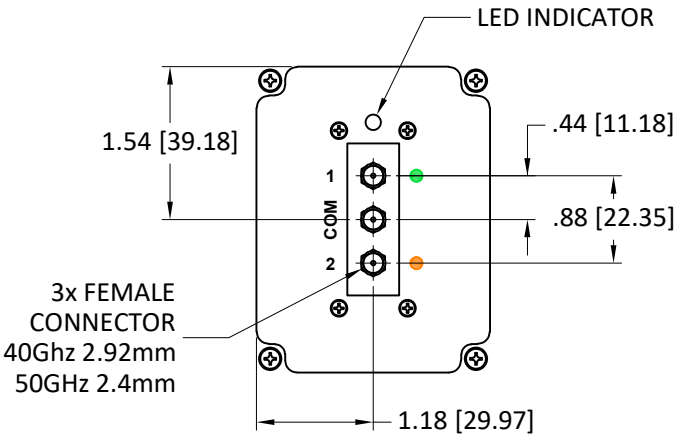
UV2068



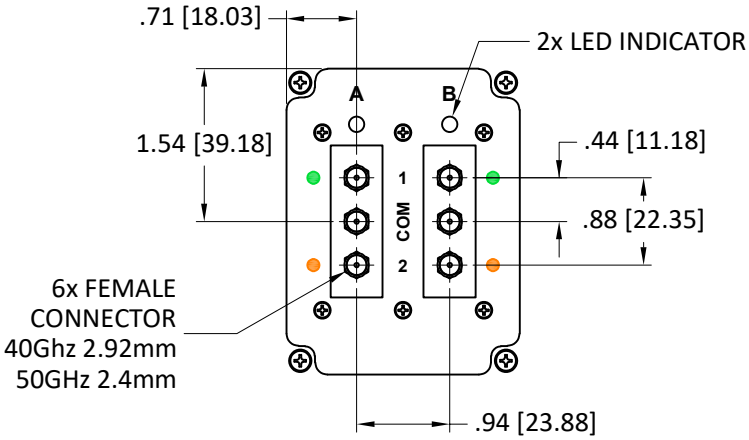
SPDTA 18GHz
SPDTA 26GHz



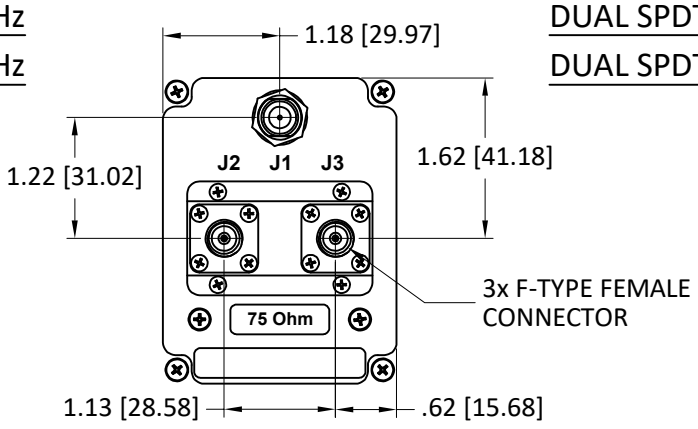
DUAL SPDTA 18GHz
DUAL SPDTA 26GHz



SPDT 40GHz
SPDT 50GHz



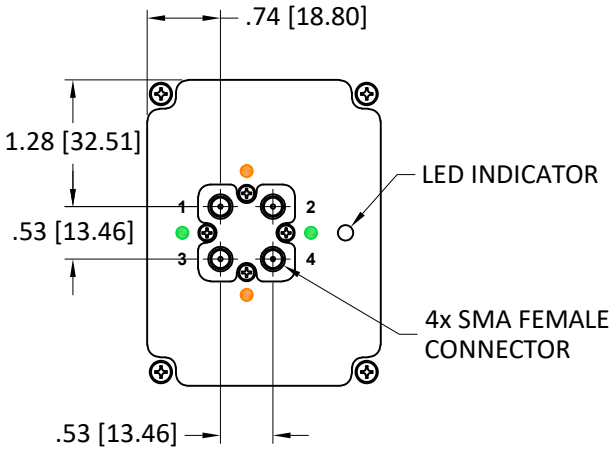
DUAL SPDT 40GHz
DUAL SPDT 50GHz



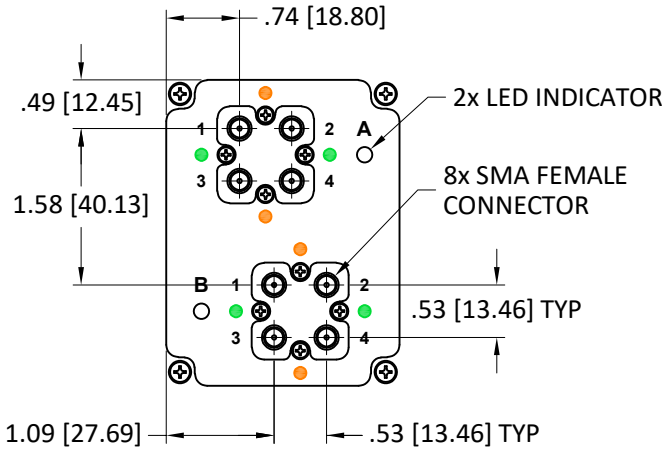
SPDT 2.15GHz

Outline Dimensions

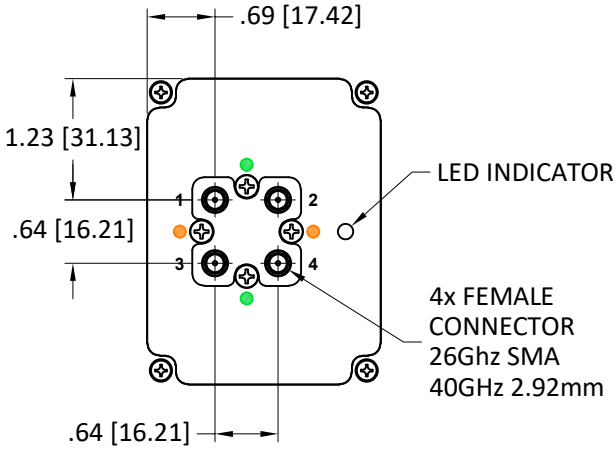
UV2068



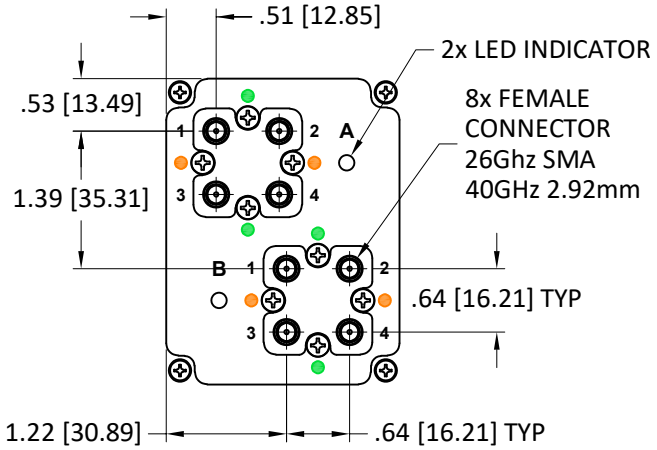
MTS 18GHz



DUAL MTS 18GHz



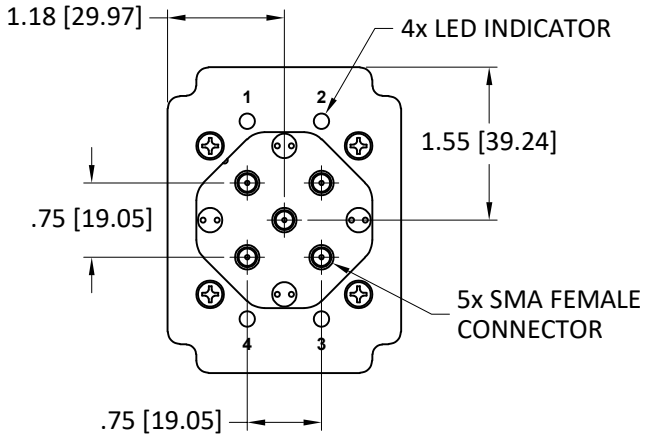
MTS 26GHz
MTS 40GHz



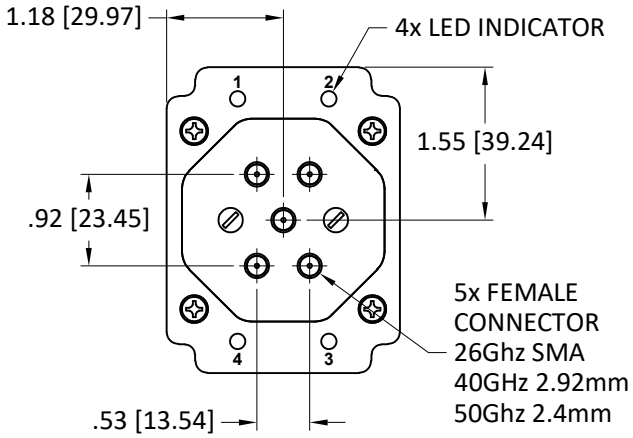
DUAL MTS 26GHz
DUAL MTS 40GHz

Outline Dimensions

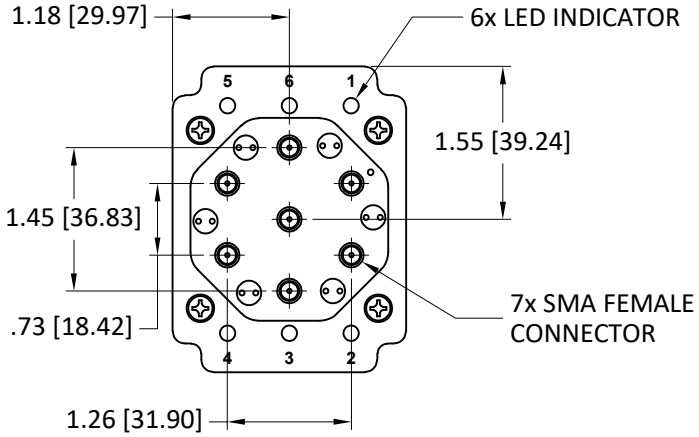
UV2068



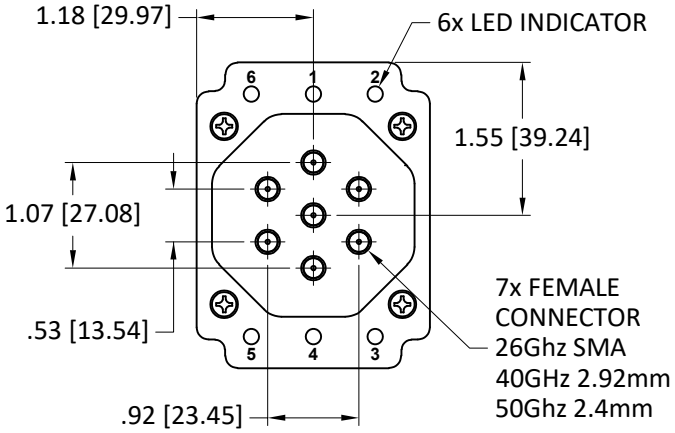
SP4TA 18GHz



SP4TA 26GHz
SP4TA 40GHz
SP4TA 50GHz



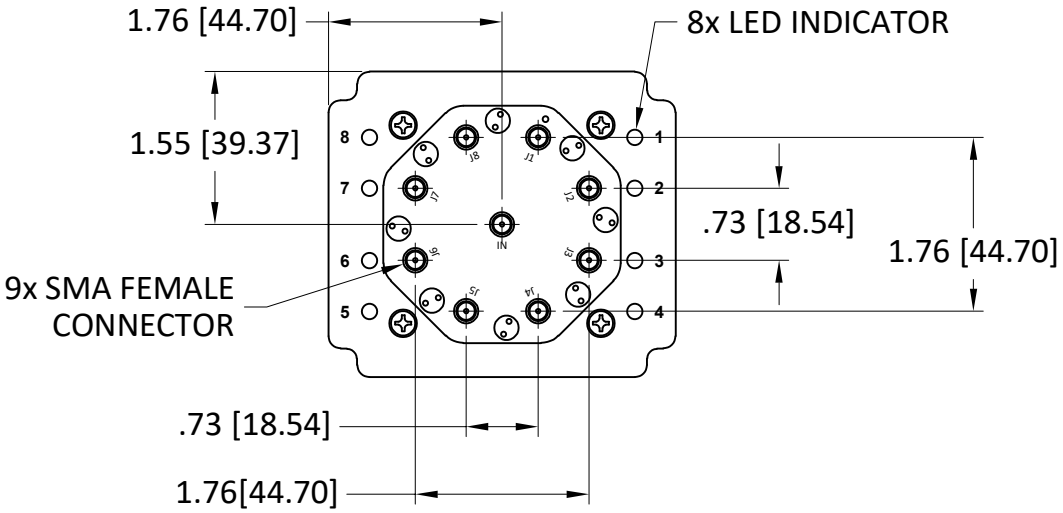
SP6TA 12GHz
SP6TA 18GHz



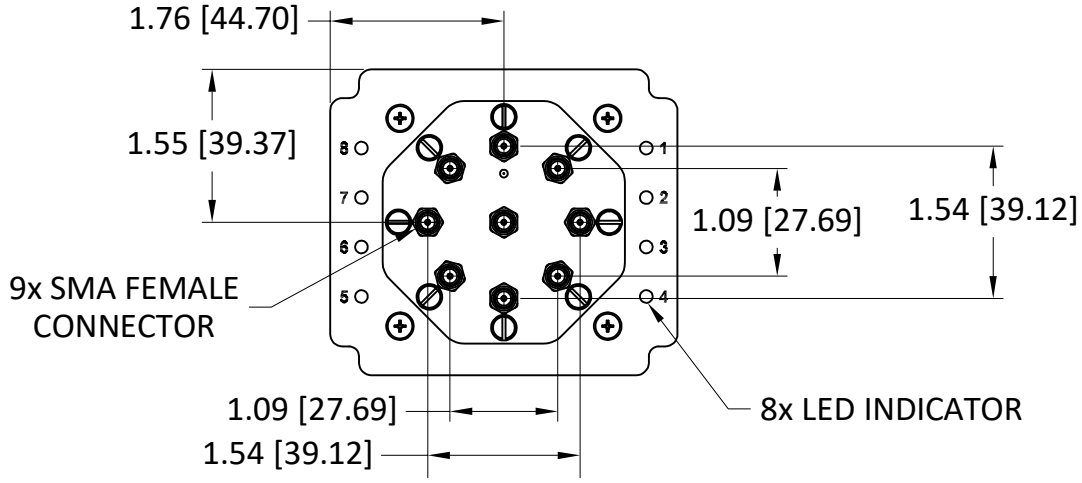
SP6TA 26GHz
SP6TA 40GHz
SP6TA 50GHz

Outline Dimensions

UV2068



SP8TA 12GHz



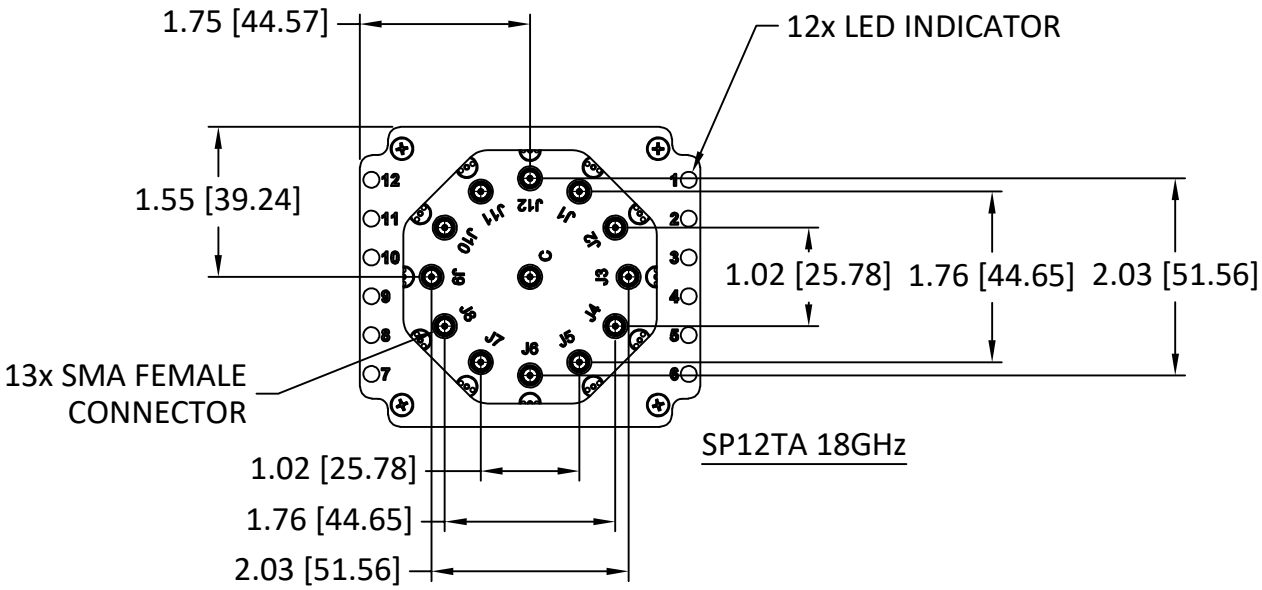
SP8TA 18GHz

SP8TA 26GHz

SP8TA 40GHz

Outline Dimensions

UV2068



Mini-Circuits

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