USB & ETHERNET CONTROLLED

# 3x SP2T Mechanical Switch Assembly RCM-3SPDT-75F

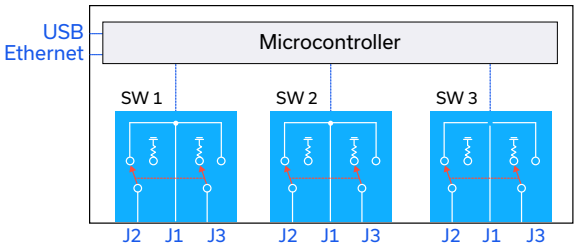
75Ω DC to 2150 MHz F-Type Female

## THE BIG DEAL

- 3 x mechanical SPDT absorptive switches
- Ethernet & USB control
- High isolation, 70 dB typ
- Fail-safe / redundancy switching
- 75Ω F-type connectors




## FUNCTIONAL BLOCK DIAGRAM




## APPLICATIONS

- Automated test & measurement systems
- L-band satellite communications infrastructure
- CATV / MoCA test systems
- DOCSIS 4.0
- Switch matrices

## PRODUCT OVERVIEW

Mini-Circuits' RCM-3SPDT-75F houses 3 independently controlled electro-mechanical SPDT switches. Each switch operates over a wide bandwidth, from DC to 2150 MHz with high isolation and low insertion loss. The absorptive switches are fail-safe, with a break before make configuration, and excellent 75Ω impedance match.

The switch box is constructed in a compact, rugged metal case with all F-type (female) RF connectors on the front panel to enable easy access on a test bench. The switch box can be controlled via USB or Ethernet (supporting both HTTP and Telnet network protocols). 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.

## KEY FEATURES

| Feature | Advantages |
|---|---|
| Mechanical switches | Mechanical absorptive switches provide low loss, high isolation, high reliability, repeatable performance and internal termination of input signals on the disconnected paths |
| 75Ω characteristic impedance | Route or test 75Ω signals in their characteristic impedance for optimal performance, rather than working with 50Ω equipment and impedance matching |
| Fail-safe design | The switches revert to a known default state when the DC supply is removed, allowing their use in systems that must continue to operate safely in the event of power failure |
| Compact benchtop chassis | Compact chassis allows for flexible operation, both in lab and 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-017289
RCM-3SPDT-75F
MCL NY
230330

# 3x SP2T Mechanical Switch Assembly RCM-3SPDT-75F

75Ω DC to 2150 MHz F-Type Female

## ELECTRICAL SPECIFICATIONS @ +25°C (EACH SWITCH)

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Frequency Range | | DC | | 2150 | MHz |
| Insertion Loss | DC – 950 MHz<br>950 – 1850 MHz<br>1850 – 2150 MHz | | 0.25<br>0.60<br>0.75 | 1.25<br>1.50<br>1.50 | dB |
| Isolation | DC – 950 MHz<br>950 – 1850 MHz<br>1850 – 2150 MHz | 50<br>45<br>45 | 77<br>71<br>62 | | dB |
| Return Loss | DC – 950 MHz<br>950 – 1850 MHz<br>1850 – 2150 MHz | | 17<br>12<br>12 | | dB |
| Switching Time | | | 25 | | ms |
| RF Input Power | Hot & cold switching<br>Into internal termination | | | +20<br>+20 | dBm |

## CONTROL INTERFACES

| | | |
|---|---|---|
| **Ethernet Control** | Supported Protocols | TCP / IP, HTTP, Telnet, DHCP, UDP (limited) |
| | Max Data Rate | 10 Mbps (10Base-T Half Duplex) |
| **USB Control** | Supported Protocols | HID – Full Speed |
| | Min Communication Time[1] | 3 ms typ |

1. Based on the polling interval of the USB HID protocol (1 ms with 64 bytes per packet) and no other significant CPU or USB activity

## 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

| | Requirements |
|---|---|
| **Hardware** | Intel i3 (or equivalent) or later |
| **GUI (USB or Ethernet Control)** | Windows 7 or later |
| **USB API DLL** | Windows 7 or later with support for Microsoft .Net Framework or ActiveX |
| **USB Direct Programming** | Windows 7 or later; Linux |
| **Ethernet** | Windows, Linux or macOS with Ethernet TCP / IP support |

## PROGRAMMING COMMANDS

The key ASCII / SCPI commands for control of the system for control via the Ethernet or USB API are summarized below (refer to the programming manual for full details):

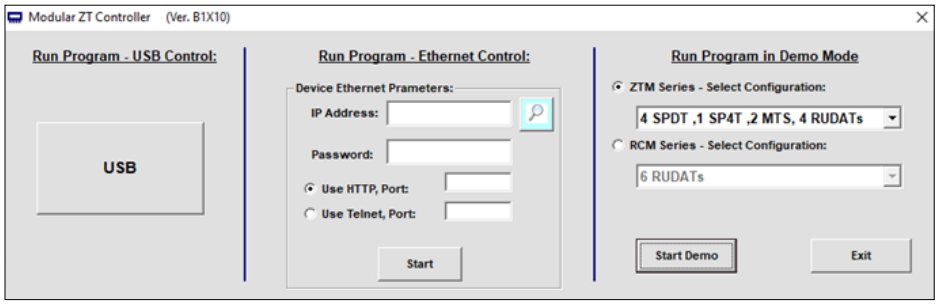
| Command / Query | Description |
|---|---|
| :MN? | Read model name |
| :SN? | Read serial number |
| :FIRMWARE? | Read firmware version |
| :SPDT:[sw_number]:STATE:[port] | Set a single switch state:<br>• [sw_number] = 1 to 3<br>• [port] = 1 (J1 to J2) or 2 (J1 to J3)<br>• Example :SPDT:1:STATE:2 (set SPDT 1 with J1 to J3) |
| :SPDT:[sw_number]:STATE? | Return a single switch state:<br>• [sw_number] = 1 to 3<br>• Example :SPDT:1:STATE? (return the state of SPDT 1) |

# 3x SP2T Mechanical Switch Assembly RCM-3SPDT-75F

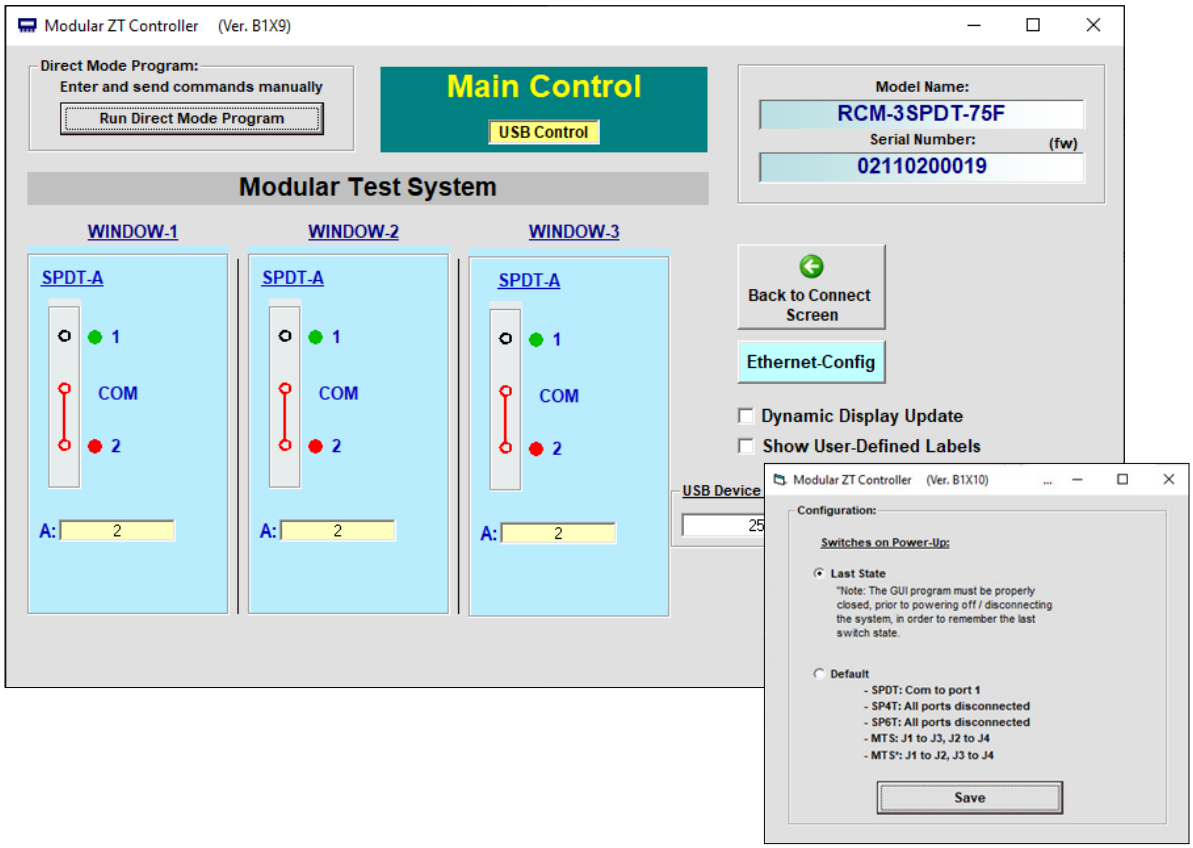
75Ω DC to 2150 MHz F-Type Female

## GRAPHICAL USER INTERFACE (GUI) FOR WINDOWS

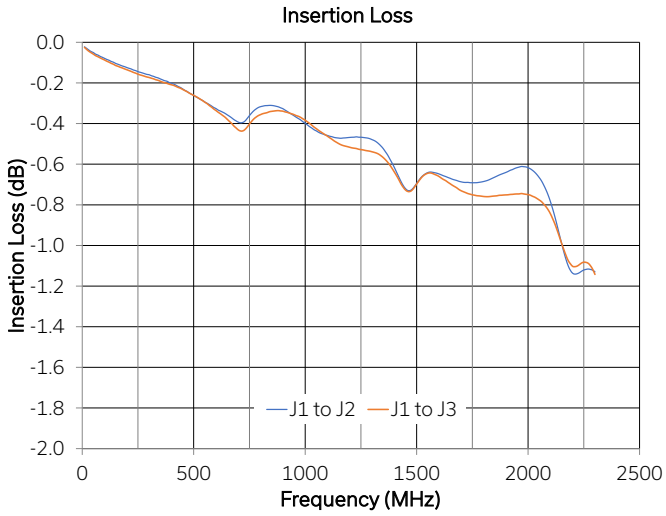
- Connect via USB or Ethernet
- Run GUI in “demo mode” to evaluate software without a hardware connection

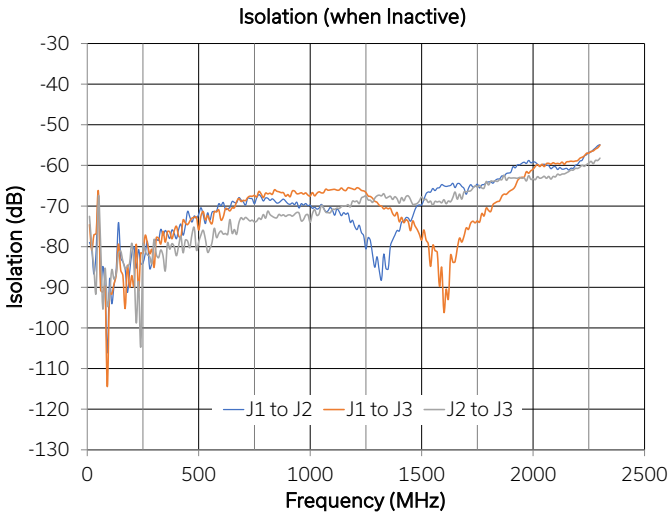


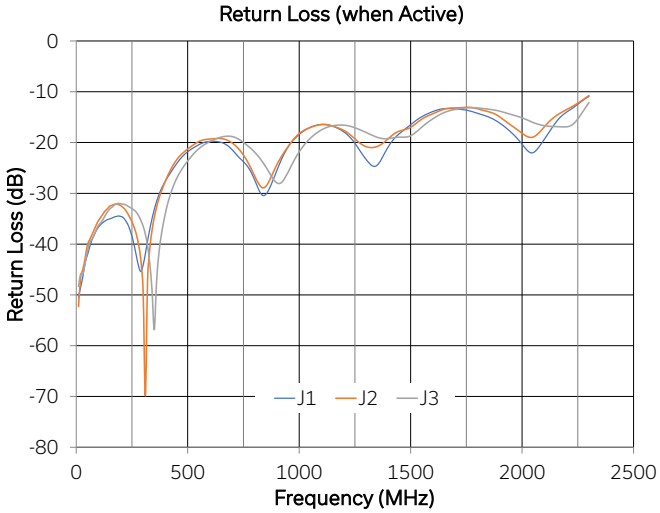

- View and set all switch states at the click of a button
- Update firmware



## TYPICAL PERFORMANCE GRAPHS



# 3x SP2T Mechanical Switch Assembly RCM-3SPDT-75F

75Ω DC to 2150 MHz F-Type Female

## ABSOLUTE MAXIMUM RATINGS[2]

| Parameter | Conditions | Limits | Units |
|---|---|---|---|
| Temperature | Operating | 0 to +40 | °C |
| | Storage | -15 to +85 | |
| DC Supply Voltage | | 26 | V |
| Input Power (No Damage) | Cold switching | +20 | dBm |
| | Hot switching | +20 | |
| | Into internal termination | +20 | |

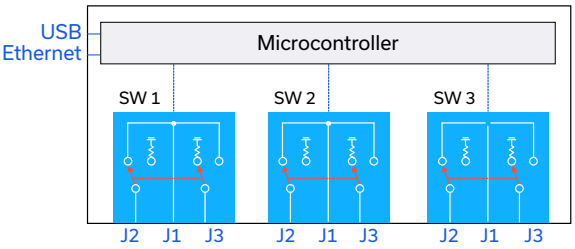
2. Permanent damage may occur if any of these limits are exceeded. Operating in the range between operating power limits and absolute maximum ratings for extended periods of time may result in reduced life and reliability.

## POWER SUPPLY

| | |
|---|---|
| DC Voltage Input[3] | +24V DC |

3. Using included AC/DC-24-3W1 power supply adapter (110 / 240 V AC input)

## FUNCTIONAL BLOCK DIAGRAM




## CONNECTIONS

| Port | Connector |
|---|---|
| SW 1 – J1, J2 & J3 | F-type female |
| SW 2 – J1, J2 & J3 | F-type female |
| SW 3 – J1, J2 & J3 | F-type female |
| USB | USB type B |
| Ethernet / LAN | RJ45 |
| 24V DC Input | 2.1mm center positive DC socket |

J1 = Common port
J2, J3 = Input / output ports

## SWITCH CONTROL LOGIC

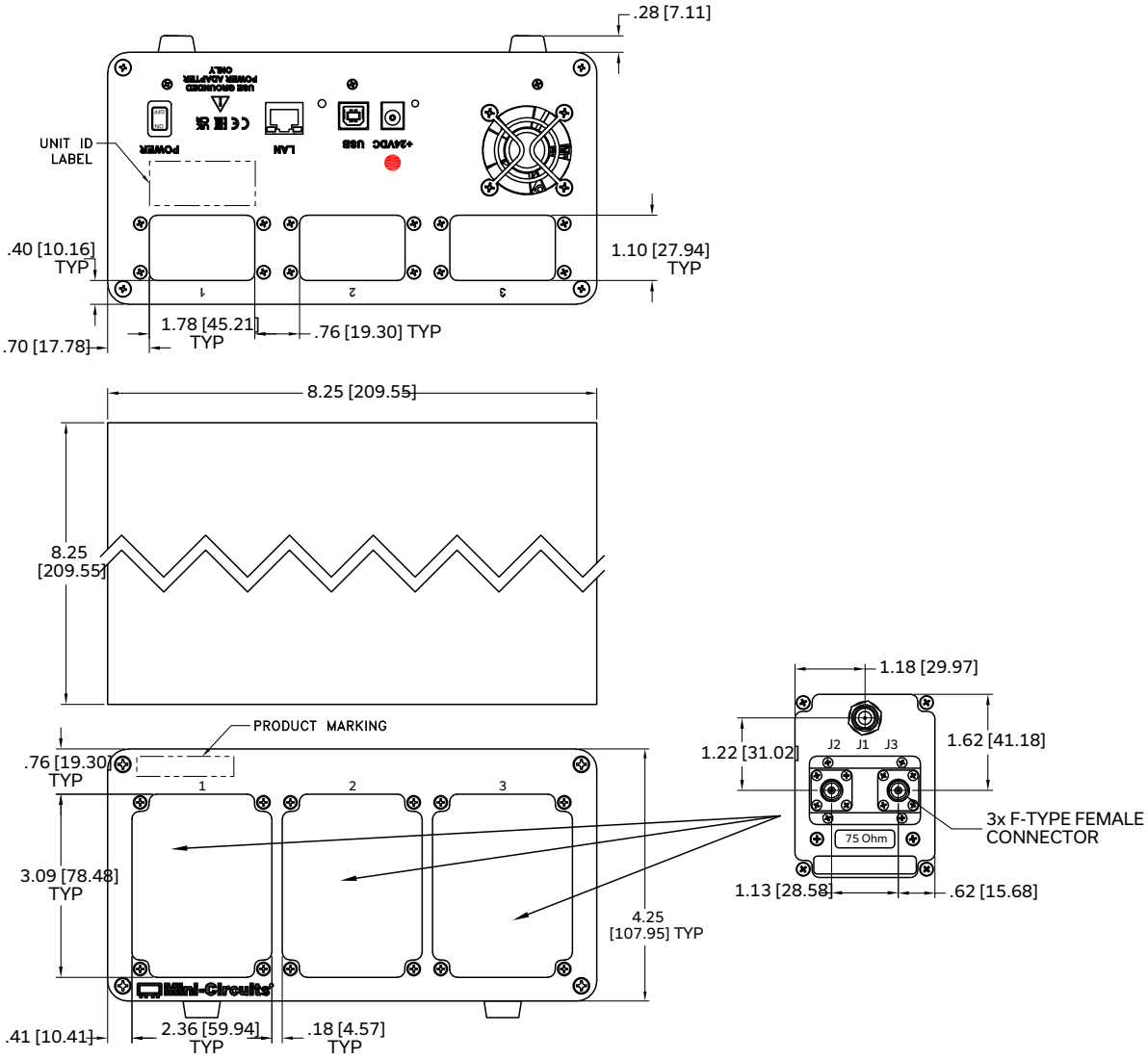
| Switch Command | 1 | 2 | 3 |
|---|---|---|---|
| :SPDT:1:STATE:1 | J1 to J2 | x | x |
| :SPDT:1:STATE:2 | J1 to J3 | x | x |
| :SPDT:2:STATE:1 | x | J1 to J2 | x |
| :SPDT:2:STATE:2 | x | J1 to J3 | x |
| :SPDT:3:STATE:1 | x | x | J1 to J2 |
| :SPDT:3:STATE:2 | x | x | J1 to J3 |

x = Switch state not affected by this switch command

# 3x SP2T Mechanical Switch Assembly RCM-3SPDT-75F

75Ω DC to 2150 MHz F-Type Female

## CASE STYLE DRAWING




Weight: 2350 grams.

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

## PRODUCT MARKING

Product Marking: RCM-3SPDT-75F
Product Frequency: DC – 2150 MHz
Product ID: Contains product marking, regulatory compliance, bar code and serial number
Marking may contain other features or characters for internal lot control

## USB & ETHERNET CONTROLLED

# 3x SP2T Mechanical Switch Assembly RCM-3SPDT-75F

75Ω DC to 2150 MHz F-Type Female

**DETAILED MODEL INFORMATION IS AVAILABLE ON OUR WEBSITE** CLICK HERE

| | |
|---|---|
| **Case Style** | UV2068 |
| **Software, User Guide & Programming Manual** | www.minicircuits.com/softwaredownload/ztm_rcm.html |
| **Environmental Rating** | ENV56 |
| **Regulatory Compliance** | Refer to our website for compliance methodologies and qualifications CE FC UKCA www.minicircuits.com/quality/environmental_introduction.html |

Contact Us: testsolutions@minicircuits.com

| Included Accessories | Part Number | Description |
|---|---|---|
|  | AC/DC-24-3W1 | AC/DC 24V DC grounded power adaptor. Operating temperature 0 to +40˚C, max current 2.5A, IEC C6 AC inlet. |
| | CBL-3W1-xx | AC power cord (IEC C5 connector to local plug)<br>Select one option from the list below.<br>Please contact testsolutions@minicircuits.com if your regions is not listed. |
|  | USB-CBL-AB-7+ | USB cable (6.8ft) type A to type B |
|  | CBL-RJ45-MM-5+ | Ethernet cable (5 ft) |

| AC Power Cord Options | Part Number | Description |
|---|---|---|
|  | CBL-3W1-US | USA<br>NEMA 5-15 plug (type B) to IEC C5 connector |
|  | CBL-3W1-EU | Europe<br>CEE 7/7 plug (type E/F) to IEC C5 connector |
|  | CBL-3W1-UK | UK<br>BS-1363 plug (type G) to IEC C5 connector |
|  | CBL-3W1-AU | Australia & China<br>AS/NZS 3112 plug (type I) to IEC C5 connector |
|  | CBL-3W1-IL | Israel<br>SI-32 plug (type H) to IEC C13 connector |

**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.

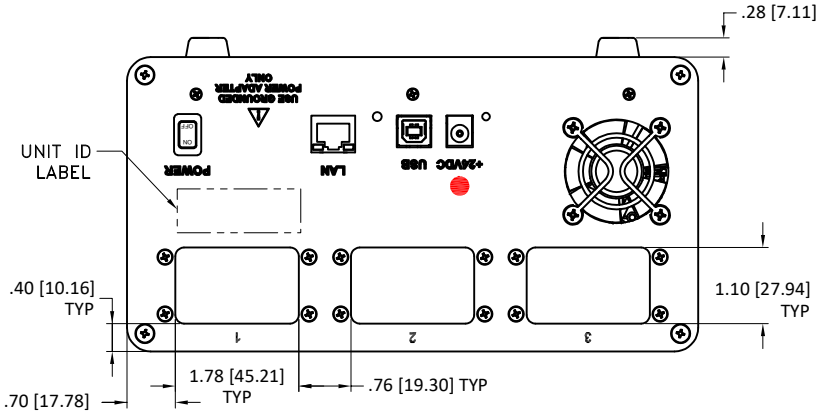
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

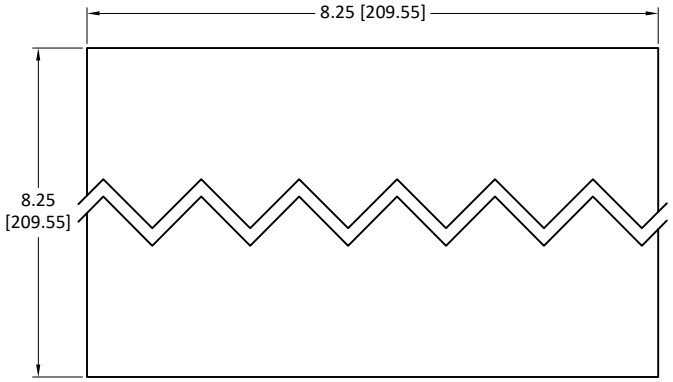
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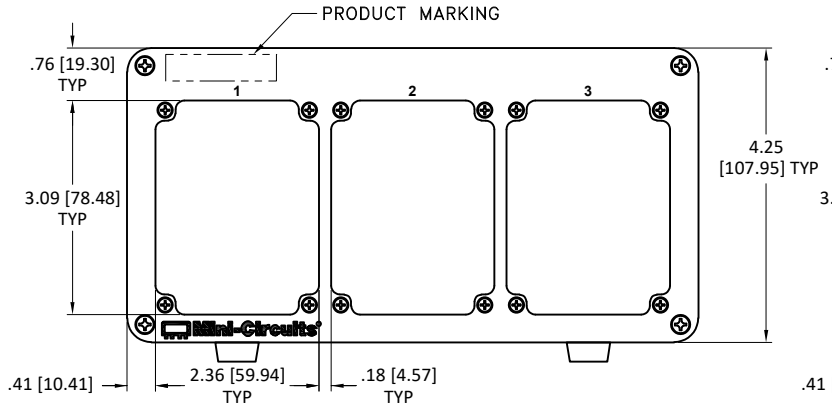
# Case Style UV

## Outline Dimensions

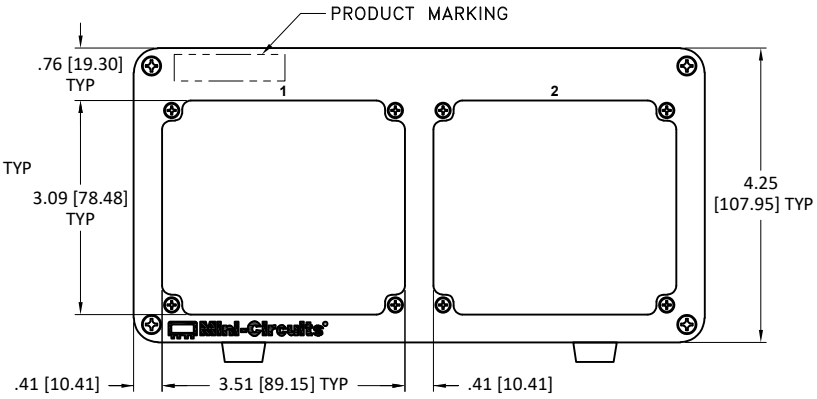
## UV2068




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




FRONT PANEL FOR RCM WITH SP8T SWITCHES

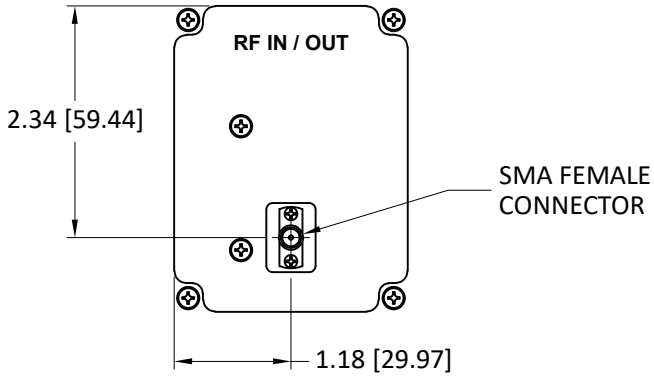
**Notes:**

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.

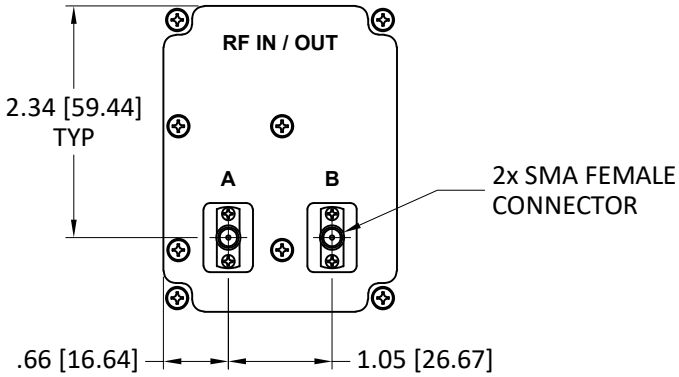

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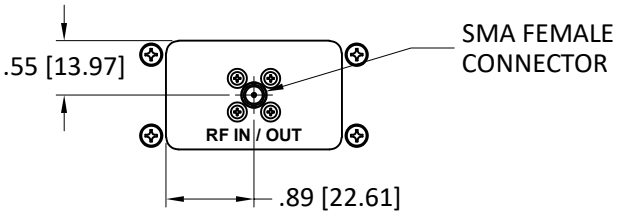
## UV2068




FRONT PANEL

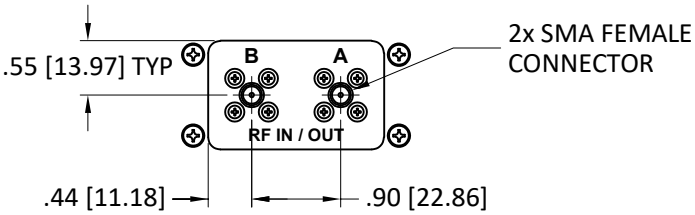



FRONT PANEL




REAR PANEL

SINGLE RUDAT



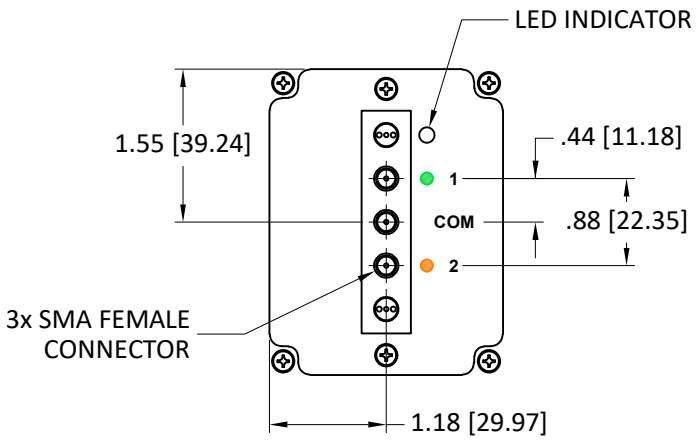

REAR PANEL

DUAL RUDAT

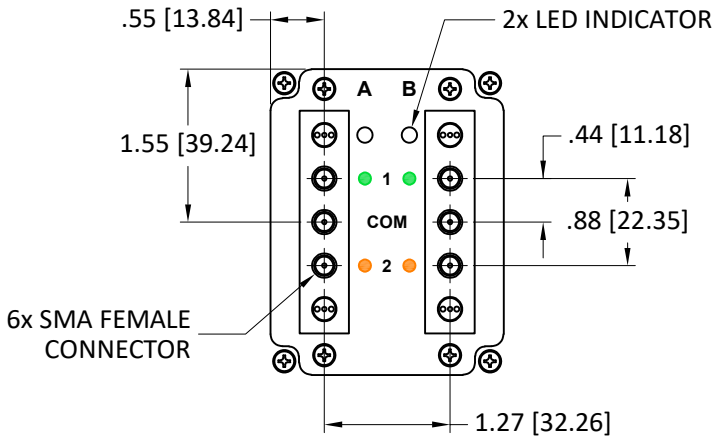
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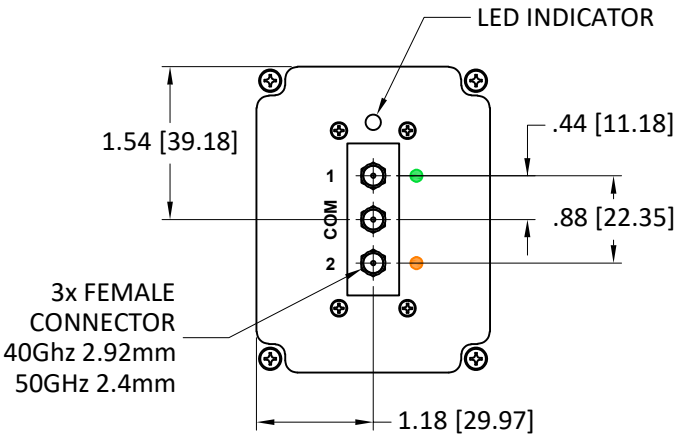
## UV2068



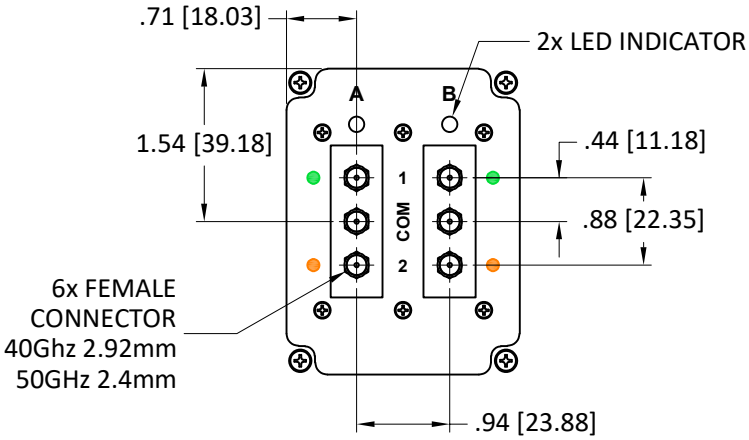

SPDTA 18GHz
SPDTA 26GHz



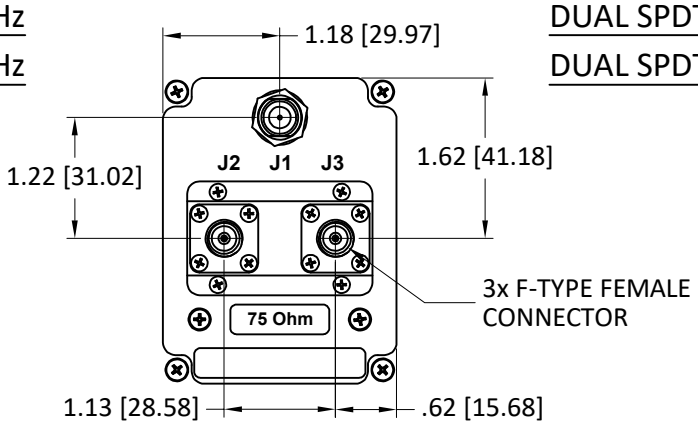

DUAL SPDTA 18GHz
DUAL SPDTA 26GHz




SPDT 40GHz
SPDT 50GHz




DUAL SPDT 40GHz
DUAL SPDT 50GHz

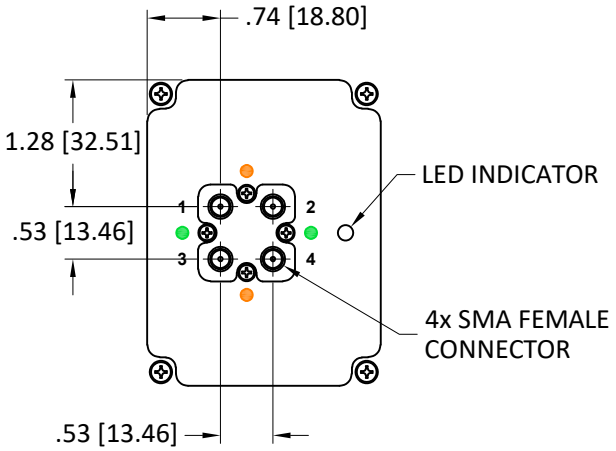



SPDT 2.15GHz

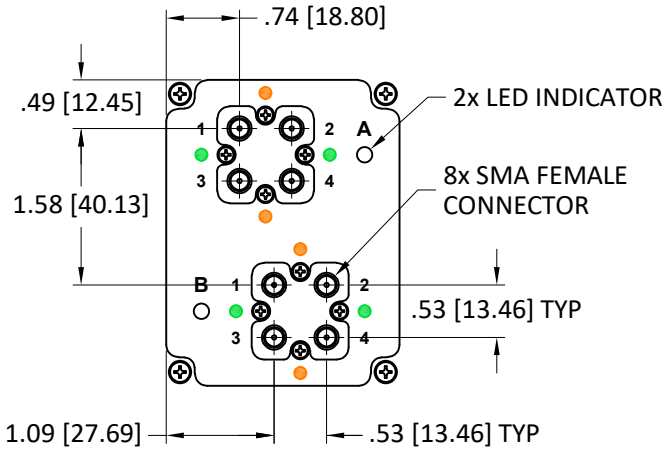
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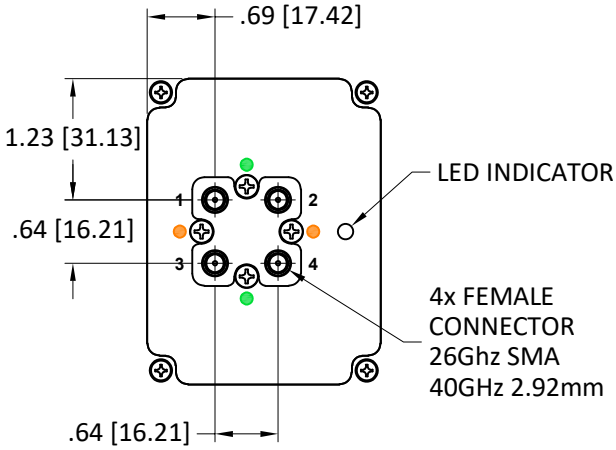
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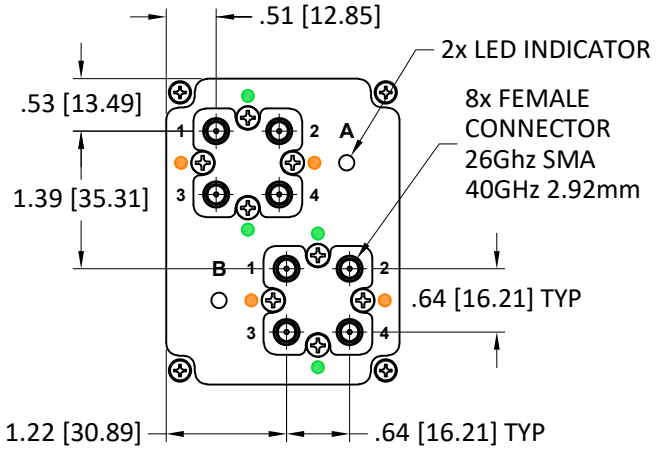

MTS 18GHz




DUAL MTS 18GHz




MTS 26GHz
MTS 40GHz

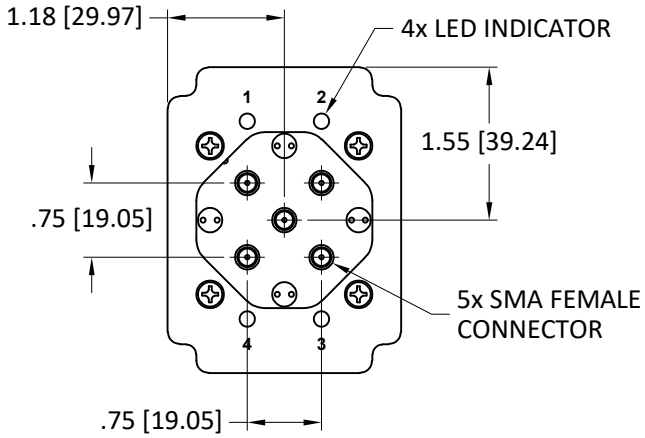



DUAL MTS 26GHz
DUAL MTS 40GHz

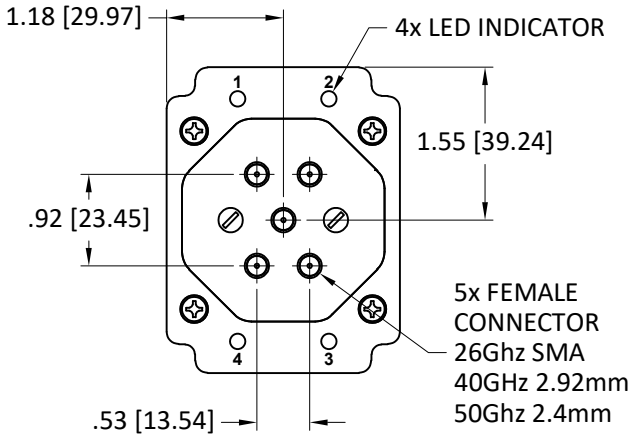

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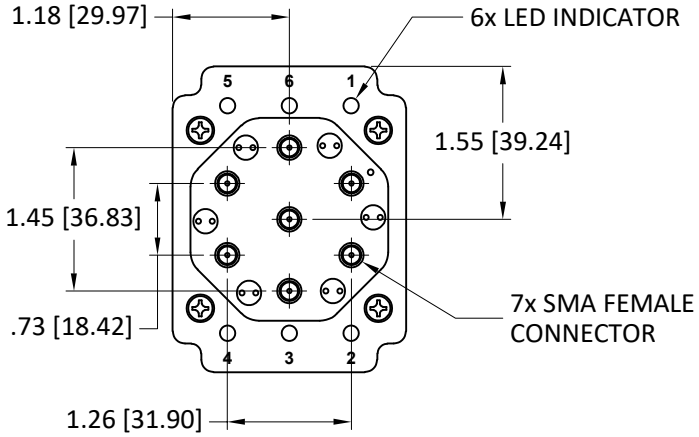
## UV2068



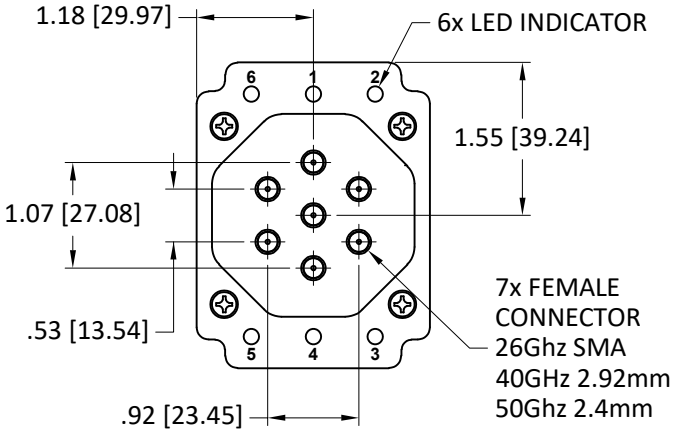

SP4TA 18GHz




SP4TA 26GHz
SP4TA 40GHz
SP4TA 50GHz




SP6TA 12GHz
SP6TA 18GHz

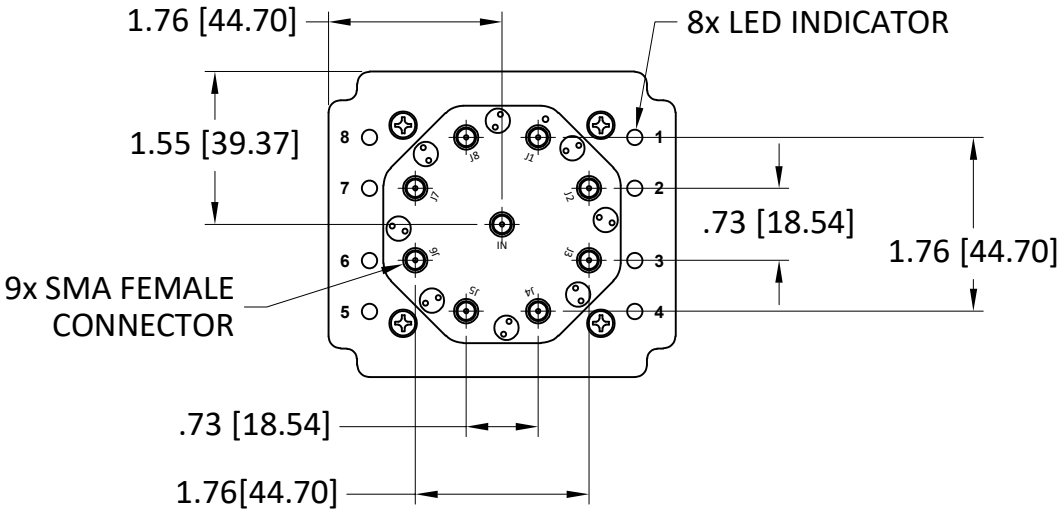



SP6TA 26GHz
SP6TA 40GHz
SP6TA 50GHz

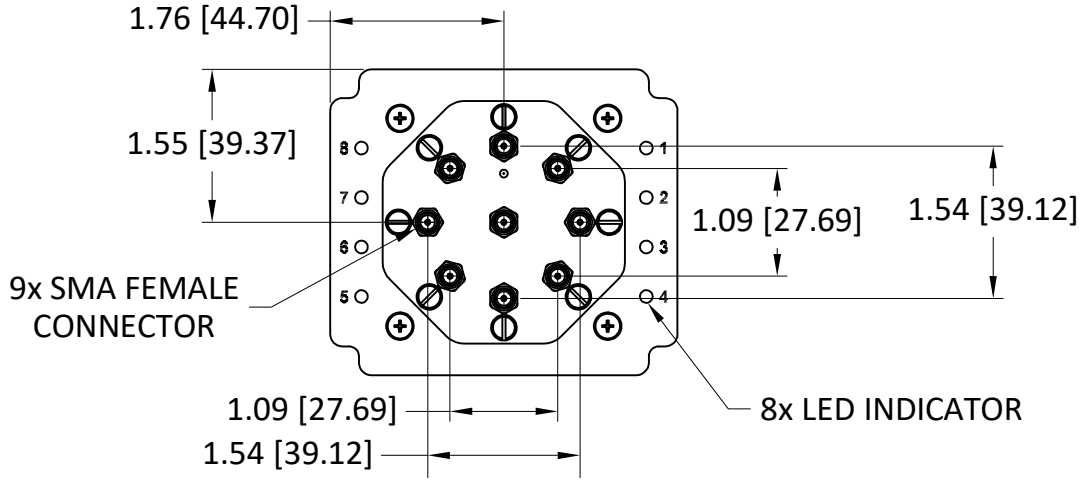

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## Outline Dimensions

**UV2068**




SP8TA 12GHz




SP8TA 18GHz

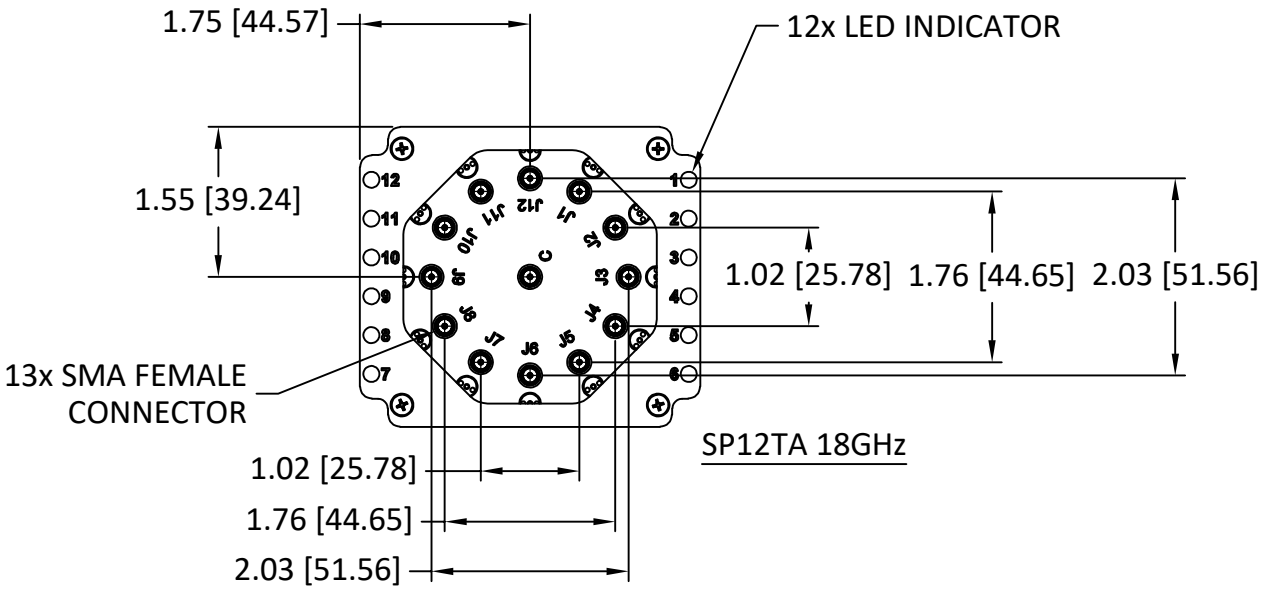
SP8TA 26GHz

SP8TA 40GHz

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## Outline Dimensions

## UV2068





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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<br>Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -15° to 85° C<br>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 |



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