



PART NUMBER	DESCRIPTION
	The MMC Series is an ideal solution that consists of multi-throw, electromechanical coaxial switches designed to switch a microwave signal from a common input to any of 3, 4, 5, 6, 7 or 8 outputs. The characteristic impedance is 50 Ohms. With the normally open actuator, all paths are open when the switch is de-energized.
	The MMC Series is designed to allow the remote operation of 1 to 2 Single Pole Multi Throw switches. Remote operation is accomplished via TCP/IP commands to the Matrix's Ethernet interface. Switch control is also accessible via the USB virtual serial port, using the provided command set. Through these interfaces the Coax Switch can be switched to the desired position and its position can be read for verification. The default switch position at power up can be set by the user. The MMC will feature a graphical user interface (GUI), which will enable user to control switches through graphical icons and visuals.



ENVIRONMENTAL AND PHYSICAL CHARACTERISTICS	
Operating Temperature	-40°C to 65°C
Standard Actuator Life	5,000,000 cycles
Connector Type	SMA, 2.9mm
Weight Non-Terminated	
1 Switch	26 oz. (737 g) (max.)
2 Switches	32 oz. (907 g) (max.)
Weight Terminated	
1 Switch	54 oz. (1531 g) (max.)
2 Switches	60 oz. (1701 g) (max.)

ELECTRICAL CHARACTERISTICS (SWITCHES ONLY)	
Form Factor	Multi-Throw, break before make
Frequency Range	Up to DC-40 GHz
Characteristic Impedance	50 Ohms
Operate Time	15 ms (max.)
Release Time	15 ms (max.)
Actuation Voltage Available	24 Vdc
Actuation Current, max. @ ambient	170mA/switch

TYPICAL RF CHARACTERISTICS						
Frequency	DC-6 GHz	6-12 GHz	12-18 GHz	18-26.5 GHz	26.5-34 GHz* (40 Option)	34-40 GHz* (40 Option)
Insertion Loss, dB, typ.	0.20	0.40	0.50	0.90	1.00	1.50
Isolation, dB, typ..	70	60	60	50	50	50
VSWR , typ.	1.25:1	1.40:1	1.50:1	1.80:1	1.90:1	2.00:1

For specific RF performance data please refer to Coax Switch Part number list in Glossary (page 5)

ADDITIONAL INFORMATION	
Interface	USB or TCP/IP
Host Operating System	Windows, MAC, Linux
Operating System	Embedded

INCLUDED ITEMS	
• AC/DC Power Adapter	• USB Cable
• Power Cord	• Installation CD
• Ethernet Cable	

## BUILD YOUR BOX

### Number of Switches (Select One):

Non-Terminated (Enclosure A)		Terminated (Enclosure B)	
1 (Enclosure A)		1 (Enclosure B)	
2 (Enclosure A)		2 (Enclosure B)	

### Number of Throws (Select One):

SP3T	SP5T
SP4T	SP6T
SP7T*	SP8T*

### Frequency Range (Select One):

DC-18GHz	DC-26.5GHz
DC-40GHz	

### Remote Control (Select One):

USB Only	USB & Ethernet
----------	----------------

### Actuation Type (Select One):

Normally Open	Latching**
---------------	------------

\* Only available in Normally Open Models, up to 18GHz  
See Page 5, for Part Number List for switches used

\*\* Only available in Enclosure B

For additional options, please contact factory.

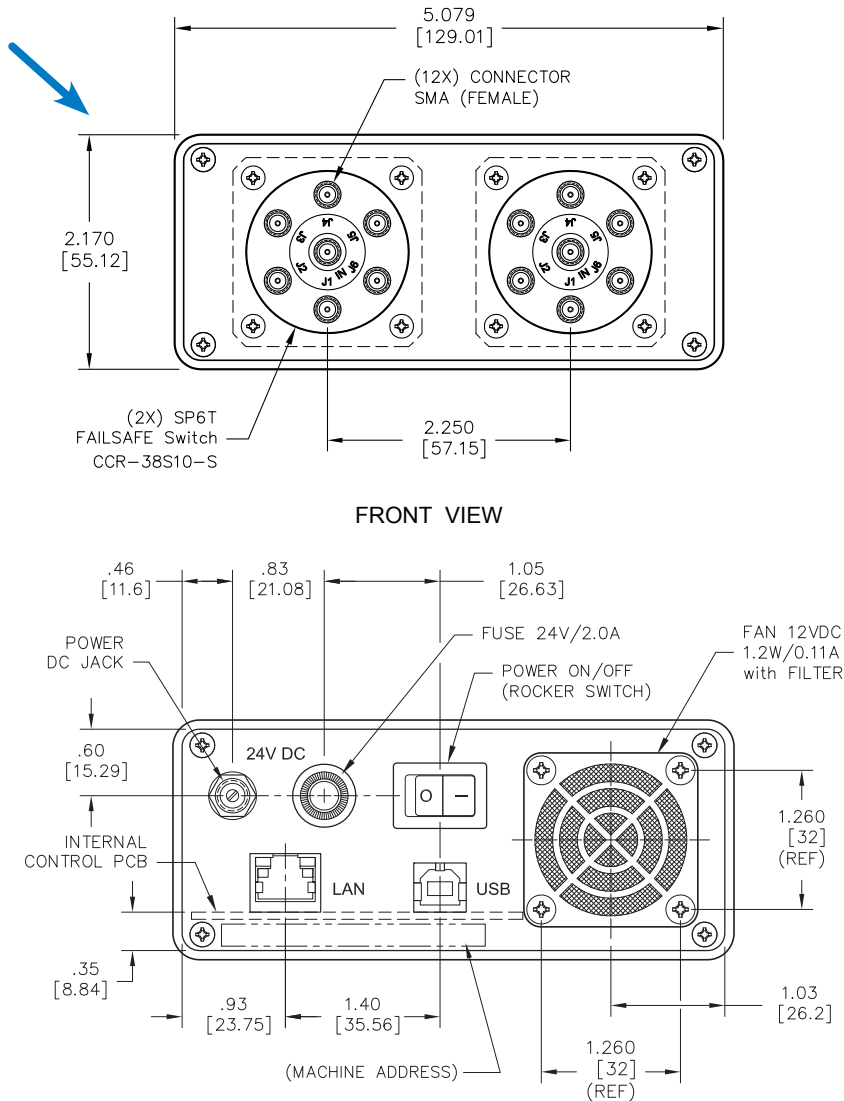
# Miniature Matrix: MMC Series Controlled with USB or Ethernet



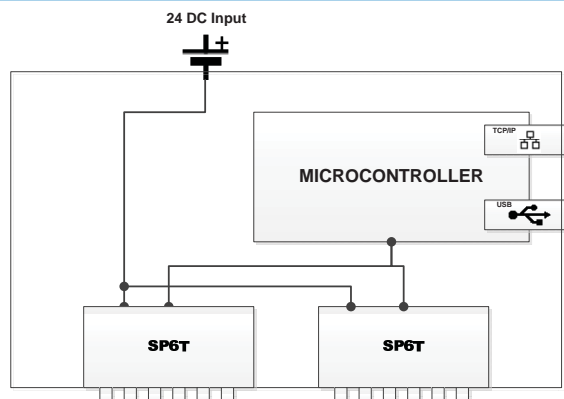
## MECHANICAL OUTLINE FOR ENCLUSE A

Max. Length with Switches= 7.75 (196.85)

Enclosure A: UP TO 2 NON-TERMINATED SPMT SWITCHES

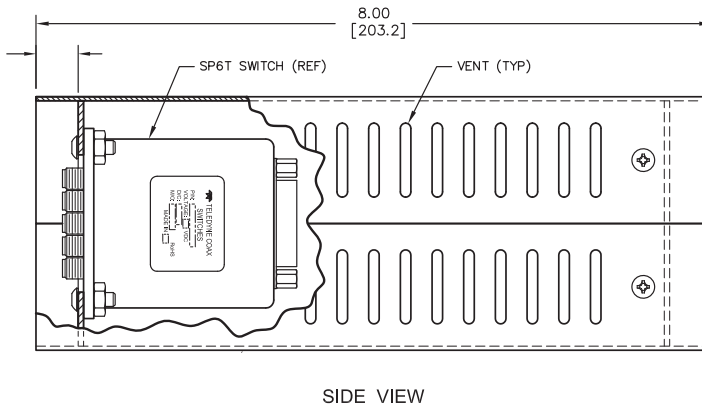
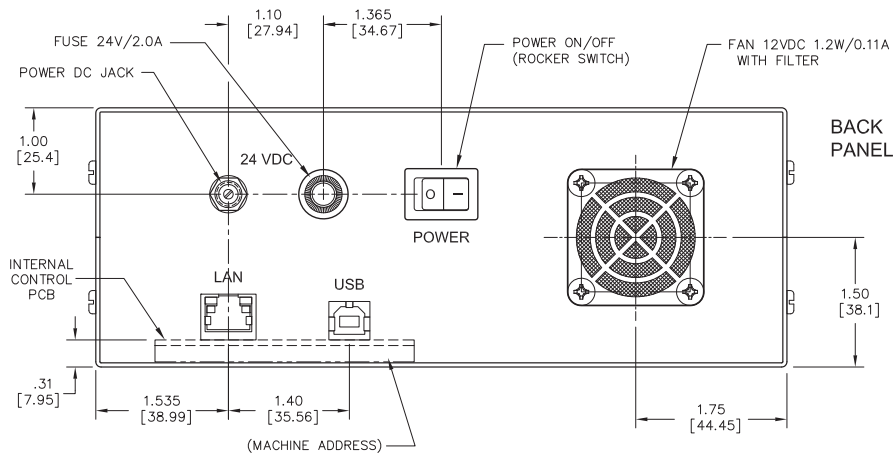
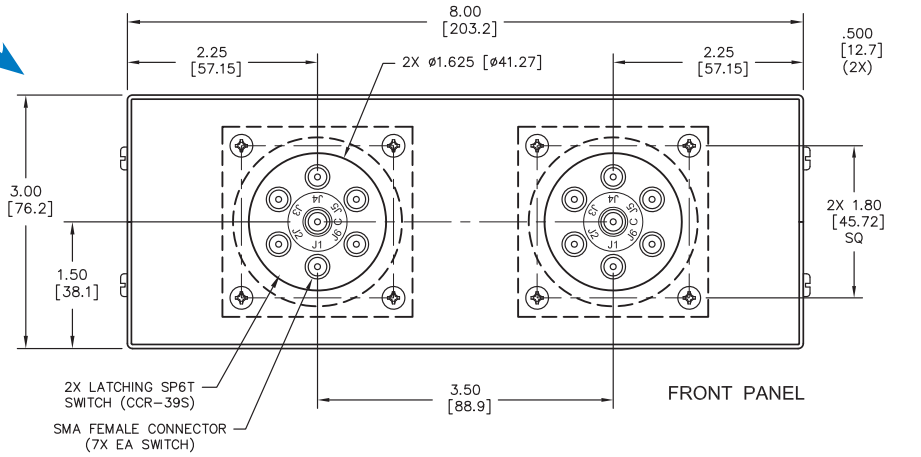


## BLOCK DIAGRAM EXAMPLE



**MECHANICAL OUTLINE FOR ENCLUSE B**

**Enclosure B: UP TO 2 TERMINATED SP3T to SP6T SWITCHES**

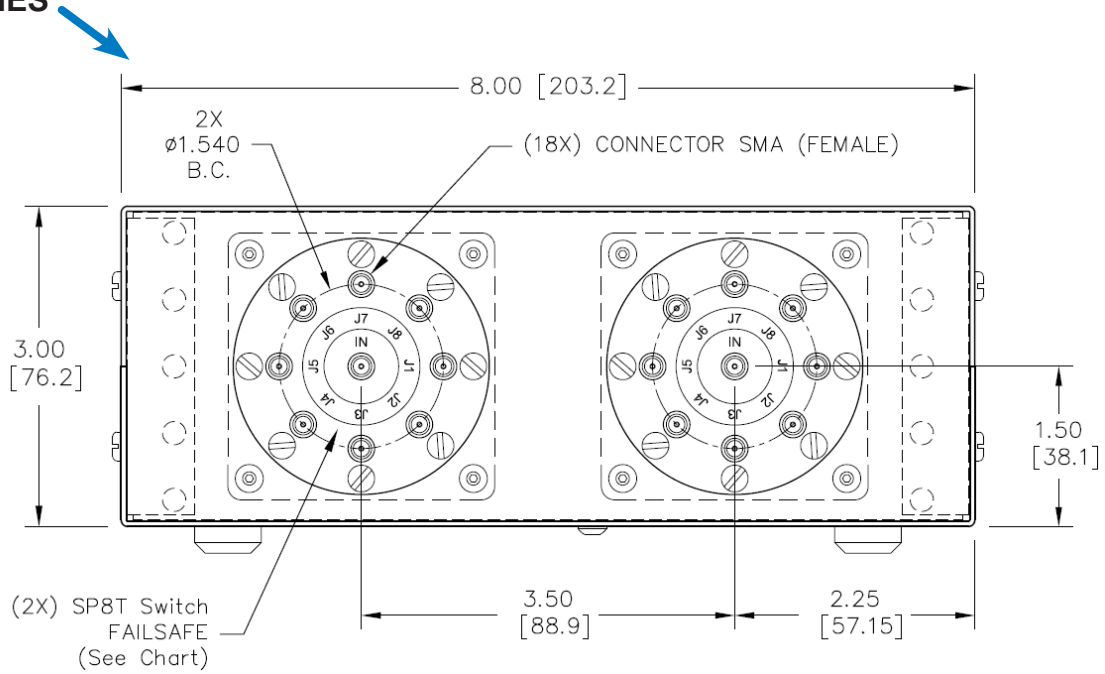


# Miniature Matrix: MMC Series Controlled with USB or Ethernet



## MECHANICAL OUTLINE FOR ENCLUSE B

### Enclosure B: UP TO 2 TERMINATED SP7T to SP8T SWITCHES



## GLOSSARY

### Actuator

An actuator is the electromechanical mechanism that transfers the RF contacts from one position to another upon DC command.

### Ethernet

A high-speed interface used in local area networks (LAN). Ethernet is also known as IEEE 802.3 standard. DHCP or Static IP can be configured through a web interface.

### Isolation

Isolation is the measure of the power level at the output connector of an unconnected RF channel as referenced to the power at the input connector. It is specified in dB below the input power level.

### Magnetic Sensitivity

An electro-mechanical switch can be sensitive to ferrous materials and external magnetic fields. Neighboring ferrous materials should be permitted no closer than 0.5 inches and adjacent external magnetic fields should be limited to a flux density of less than 5 Gauss.

### Multi-Throw Switch

A multi-throw switch is a switch with one input and three or more output ports. The SPMT can switch a microwave signal to any of 2, 3, 4, 5, 6, 7 or 8 outputs from a single common input.

### Performance Parameters vs Frequency

Generally speaking, the RF performance of coaxial switches is frequency dependent. With increasing frequency, VSWR and insertion loss increase while isolation decreases. All data sheets specify these three parameters as “worst case” at the highest operating frequency. If the switch is to be used over a narrow frequency band, better performance can be achieved.

### Switching Time

Switching time is the total interval beginning with the arrival of the leading edge of the command pulse at the switch DC input and ending with the completion of the switch transfer, including contact bounce. It consists of three parts: (1) inductive delay in the coil, (2) transfer time of the physical movement of the contacts, and (3) the bounce time of the RF contacts. **This does not include time added by the communication interface, application or operating system.**

### Universal Serial Bus (USB)

An industry standard that defines the cables, connectors and communication protocols used in a bus for connection, communication and power supply between computers and electronic devices. VCP Driver available for Windows OS, Mac OS, and Linux.

### Termination

When not connected to the common port, RF ports are shunted to ground via a 50Ω path, rated for 1W.

### Part Number List (Non-Terminated) SP3T to SP6T

Frequency	Series	Link
DC-18GHz	CCR-38S	<a href="http://www.teledynecoax.com/Datasheets/CCR-38S%20NORMALLY%20OPEN.pdf">http://www.teledynecoax.com/Datasheets/CCR-38S%20NORMALLY%20OPEN.pdf</a>
DC-26.5GHz	CCR-58S	<a href="http://www.teledynecoax.com/Datasheets/CCR-58S%20NORMALLY%20OPEN.pdf">http://www.teledynecoax.com/Datasheets/CCR-58S%20NORMALLY%20OPEN.pdf</a>
DC-40GHz	CCR-48K	<a href="http://www.teledynecoax.com/Datasheets/CCR-48K_NORMALLY_OPEN.pdf">http://www.teledynecoax.com/Datasheets/CCR-48K_NORMALLY_OPEN.pdf</a>

### Part Number List (Non-Terminated) SP7T to SP8T

Frequency	Series	Link
DC-18GHz	CCR-58S	<a href="http://www.teledynecoax.com/Datasheets/CCR-58S%20SP8T%20NORMALLY%20OPEN.pdf">http://www.teledynecoax.com/Datasheets/CCR-58S%20SP8T%20NORMALLY%20OPEN.pdf</a>

### Part Number List (Terminated) SP3T to SP6T

Frequency	Series	Link
DC-18GHz	CCT-38S	<a href="http://www.teledynecoax.com/Datasheets/CCT-38S%20NORMALLY%20OPEN.pdf">http://www.teledynecoax.com/Datasheets/CCT-38S%20NORMALLY%20OPEN.pdf</a>
DC-26.5GHz	CCT-58S	<a href="http://www.teledynecoax.com/Datasheets/CCT-58S%20NORMALLY%20OPEN.pdf">http://www.teledynecoax.com/Datasheets/CCT-58S%20NORMALLY%20OPEN.pdf</a>
DC-40GHz	CCT-49K	<a href="http://www.teledynecoax.com/Datasheets/CCT-49K_LATCHING.pdf">http://www.teledynecoax.com/Datasheets/CCT-49K_LATCHING.pdf</a>

### Part Number List (Terminated) SP7T to SP8T

Frequency	Series	Link
DC-18GHz	CCT-58S	<a href="http://www.teledynecoax.com/Datasheets/CCT-58S%20SP8T.pdf">http://www.teledynecoax.com/Datasheets/CCT-58S%20SP8T.pdf</a>