



**PART NUMBER DESCRIPTION**

The MMA Series is an ideal solution that consists of SPDT, electromechanical coaxial switches designed to switch a microwave signal from a common input to either of two outputs. The characteristic impedance is 50 Ohms. The terminated option provides an impedance match for the unselected port.

The MMA Series is designed to allow the remote operation of 1 to 4 Single Pole Double 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 MMA 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, 2.92mm            |
| Weight Non-Terminated  |                        |
| 1 Switch               | 18 oz. (510 g) (max.)  |
| 2 Switches             | 20 oz. (567 g) (max.)  |
| 4 Switches             | 23 oz. (652 g) (max.)  |
| Weight Terminated      |                        |
| 1 Switch               | 60 oz. (1701 g) (max.) |
| 2 Switches             | 62 oz. (1758 g) (max.) |
| 4 Switches             | 64 oz. (1814 g) (max.) |

**ELECTRICAL CHARACTERISTICS (SWITCHES ONLY)**

|                                   |                            |
|-----------------------------------|----------------------------|
| Form Factor                       | SPDT,<br>break before make |
| Frequency Range                   | 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 | 110mA/switch               |

**TYPICAL RF CHARACTERISTICS**

| Frequency                | DC-6 GHz | 6-12 GHz | 12-18 GHz | 18-26.5 GHz*<br><small>(26.5 Option)</small> | 26.5-34 GHz**<br><small>(40 Option)</small> | 34-40 GHz**<br><small>(40 Option)</small> |
|--------------------------|----------|----------|-----------|--|---|---|
| Insertion Loss, dB, typ. | 0.20     | 0.40     | 0.50      | 0.960  | 0.70  | 0.80                                      |
| Isolation, dB, typ..     | 70       | 60       | 60        | 50   | 50  | 50  |
| VSWR , typ.              | 1.25:1   | 1.40:1   | 1.50:1    | 1.60:1                                       | 1.80:1                                      | 1.80:1                                    |

For additional RF performance data please refer to Coax Switch Part number list in Glossary (page 4)

**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  | Terminated      |
|-----------------|-----------------|
| 1 (Enclosure A) | 1 (Enclosure A) |
| 2 (Enclosure A) | 2 (Enclosure A) |
| 4 (Enclosure A) | 4 (Enclosure B) |

**Actuation Type (Select One):**

|          |          |
|----------|----------|
| Failsafe | Latching |
|----------|----------|

**Frequency Range (Select One):**

|           |            |
|-----------|------------|
| DC-18GHz  | DC-26.5GHz |
| DC-40GHz* |            |

**Remote Control (Select One):**

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

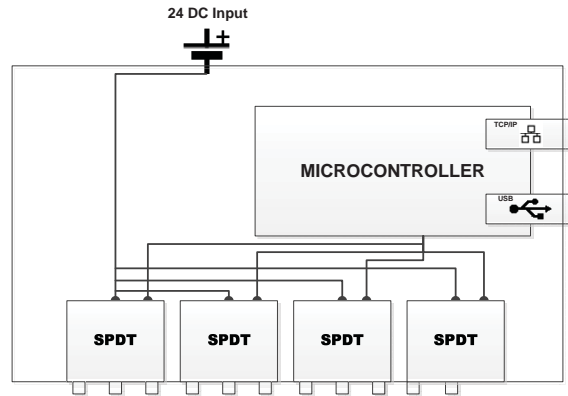
For additional options, please contact factory.

\* Only available in Non-Terminated Models  
See Page 4, for Part Number List for switches used

# Miniature Matrix: MMA Series Controlled with USB or Ethernet

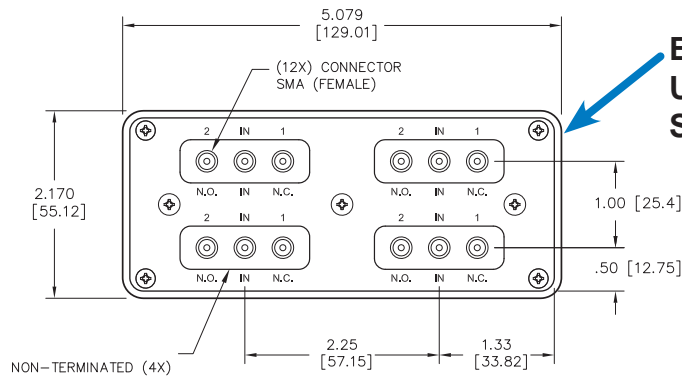
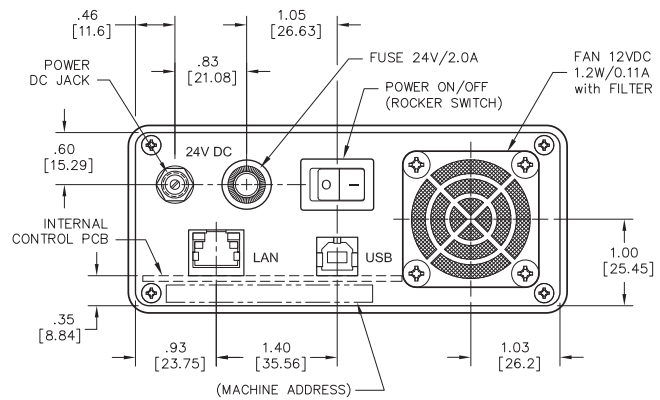


## BLOCK DIAGRAM EXAMPLE



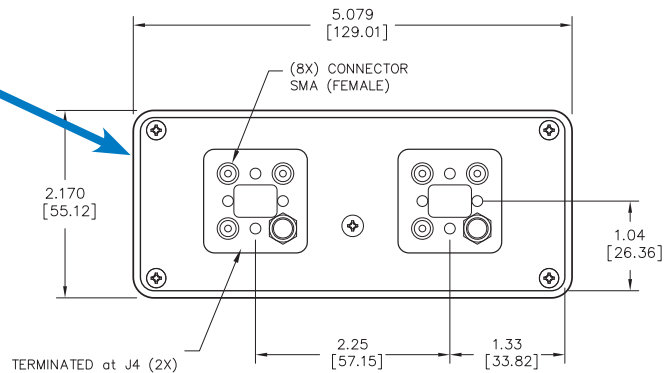
## MECHANICAL OUTLINE FOR ENCLOSURE A

Max. Length with Switches= 7.75 (196.85)



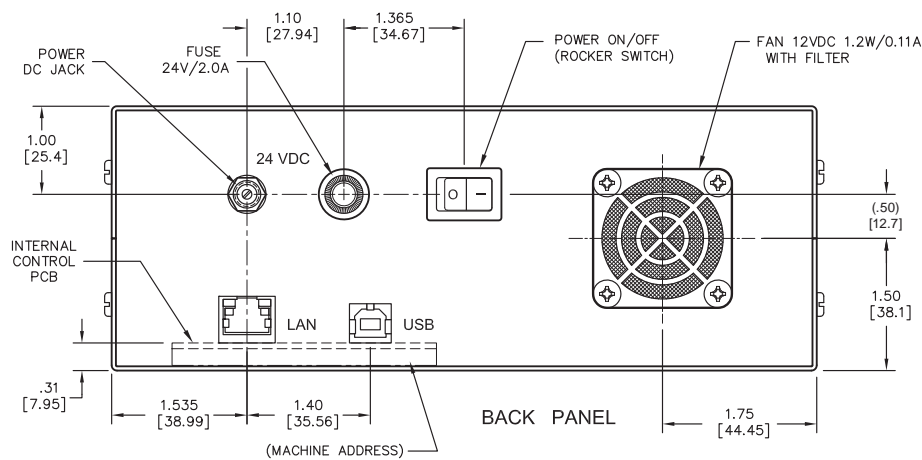
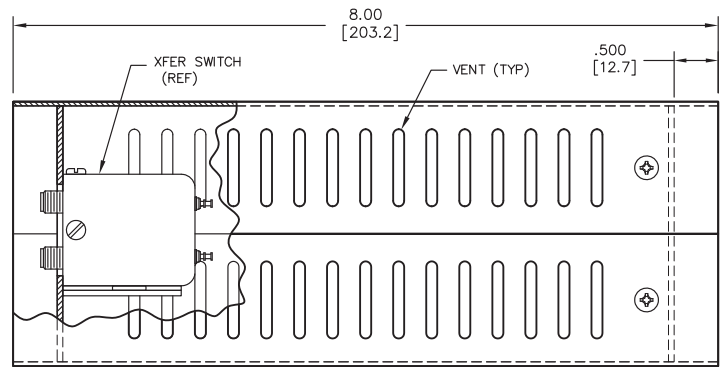
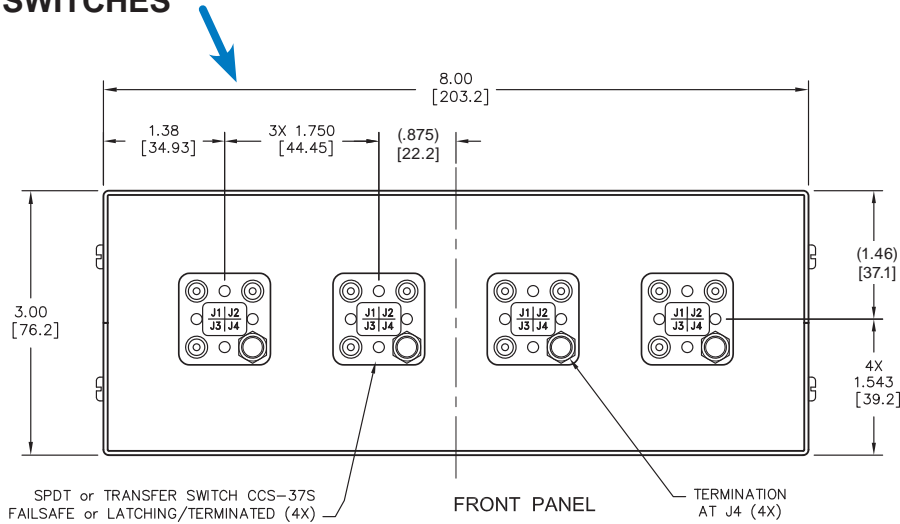
**Enclosure A :  
UP TO 4 NON-TERMINATED SPDT  
SWITCHES**

**Enclosure A :  
UP TO 2 TERMINATED SPDT SWITCHES**



**MECHANICAL OUTLINE FOR ENCLOSURE B**

**Enclosure B: UP TO 4 TERMINATED SPDT 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.

### 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.

### 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.

### SPDT Switch

A single-pole double-throw, bi-directional switch that can be used as having one input and two outputs or two inputs and one output.

### 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.

## Part Number List

| Frequency  | Series  | Link  |
|------------|---------|---|
| DC-18GHz   | CCR-33S | <a href="http://www.teledynecoax.com/pdf/coaxialswitches/CCR-53S_CR-53S%20FAILSAFE.pdf">http://www.teledynecoax.com/pdf/coaxialswitches/CCR-53S_CR-53S%20FAILSAFE.pdf</a> |
| DC-26.5GHz | CCR-53S | <a href="http://www.teledynecoax.com/pdf/coaxialswitches/CCR-33S_CR-33S%20FAILSAFE.pdf">http://www.teledynecoax.com/pdf/coaxialswitches/CCR-33S_CR-33S%20FAILSAFE.pdf</a> |
| DC-40GHz   | CCR-40K | <a href="http://www.teledynecoax.com/pdf/coaxialswitches/CCR-40K%20FAILSAFE.pdf">http://www.teledynecoax.com/pdf/coaxialswitches/CCR-40K%20FAILSAFE.pdf</a>               |