

# Surface Mount Switch

50Ω SPDT, Reflective DC<sup>4</sup> to 2.0 GHz

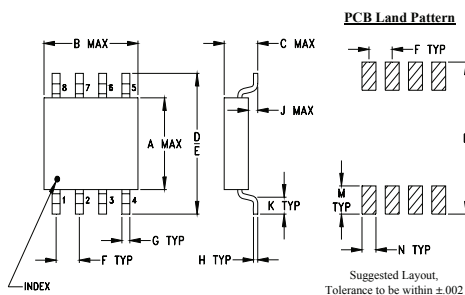
## Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| Operating Temperature                                           | -40°C to 85°C  |
| Storage Temperature                                             | -55°C to 100°C |
| Input Power                                                     | see Note 1     |
| Control Current                                                 | see Note 2     |
| Permanent damage may occur if any of these limits are exceeded. |                |

## Pin Connections

|           |       |
|-----------|-------|
| RF IN     | 1     |
| RF OUT 1  | 6     |
| RF OUT 2  | 3     |
| CONTROL 1 | 5     |
| CONTROL 2 | 4     |
| GROUND    | 2,7,8 |

## Outline Drawing



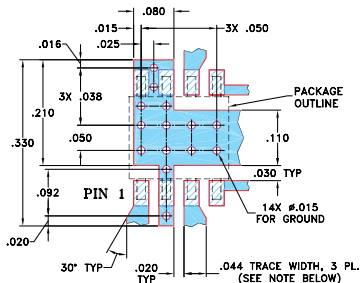
## Outline Dimensions (inch/mm)

| A    | B    | C    | D    | E    | F    | G    |
|------|------|------|------|------|------|------|
| .163 | .210 | .077 | .250 | .220 | .050 | .017 |
| 4.14 | 5.33 | 1.96 | 6.35 | 5.59 | 1.27 | 0.43 |

| H    | J    | K    | M    | N    | P    | wt    |
|------|------|------|------|------|------|-------|
| .009 | .025 | .030 | .050 | .030 | .270 | grams |
| 0.23 | 0.64 | 0.76 | 1.27 | 0.76 | 6.86 | 0.10  |

## Demo Board MCL P/N: TB-203 Suggested PCB Layout (PL-108)



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
3. DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
4. DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

## Features

- wideband, DC to 2.0 GHz
- very fast switching, 4ns typ.
- low insertion loss, 0.5 dB typ.
- low video leakage, 15 mVp-p typ.

## Applications

- cellular
- PCN
- 2-way radio
- receiver antenna switching



Generic photo used for illustration purposes only

CASE STYLE: XX211

## +RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications



Available Tape and Reel at no extra cost

| Reel Size | Devices/Reel                |
|-----------|-----------------------------|
| 7"        | 20, 50, 100, 200, 500, 1000 |
| 13"       | 2000                        |

## Electrical Specifications

| FREQ. <sup>4</sup><br>(GHz)   | INSERTION LOSS<br>(dB) |             |              |               |            |             |              |               | 1dB COMPR.<br>(dBm) |             |              |               | IN-OUT ISOLATION<br>(dB) |             |              |               |            |             |              |               |
|-------------------------------|------------------------|-------------|--------------|---------------|------------|-------------|--------------|---------------|---------------------|-------------|--------------|---------------|--------------------------|-------------|--------------|---------------|------------|-------------|--------------|---------------|
|                               | DC-100 MHz             | 100-500 MHz | 500-1000 MHz | 1000-2000 MHz | DC-100 MHz | 100-500 MHz | 500-1000 MHz | 1000-2000 MHz | DC-100 MHz          | 100-500 MHz | 500-1000 MHz | 1000-2000 MHz | DC-100 MHz               | 100-500 MHz | 500-1000 MHz | 1000-2000 MHz | DC-100 MHz | 100-500 MHz | 500-1000 MHz | 1000-2000 MHz |
| f <sub>L</sub> f <sub>U</sub> | Typ. Max.              | Typ. Max.   | Typ. Max.    | Typ. Max.     | Typ. Max.  | Typ. Max.   | Typ. Max.    | Typ. Max.     | Typ. Max.           | Typ. Max.   | Typ. Max.    | Typ. Max.     | Typ. Min.                | Typ. Min.   | Typ. Min.    | Typ. Min.     | Typ. Min.  | Typ. Min.   | Typ. Min.    | Typ. Min.     |
| DC 2.0                        | 0.30 0.8               | 0.4 0.9     | 0.50 1.0     | 0.75 1.3      | 22         | 23          | 24           | 25            | 55                  | 50          | 43           | 36            | 34                       | 28          | 24           | 20            |            |             |              |               |

## Additional Specifications

|                                                       |                                                           |                    |
|-------------------------------------------------------|-----------------------------------------------------------|--------------------|
| Control Voltage                                       | -8/0 for compression spec, -8 to -5/0 for all other specs |                    |
| Control Current, mA                                   | 0.2 max to -8V, 0.02 max at 0 to -0.2V                    |                    |
| VSWR(:1)                                              | DC-1GHz<br>1.2 typ.                                       | 1-2GHz<br>1.4 typ. |
| Rise/Fall time (10%-90%), ns                          | 4 typ.                                                    |                    |
| Switching time, 50% of Control to 90% RF(Turn-on), ns | 10 typ                                                    |                    |
| 10% RF(Turn-off), ns                                  | 4 typ                                                     |                    |
| **Video Leakage, mVp-p 0/-5V Control                  | 19 typ.                                                   |                    |

\*\* Video leakage or break through is defined as leakage of switching signal to RF output ports.

1. RF Power Input(dBm), Max.DC-100MHz100-500MHz500-2000MHz

\* Steady State Control 0/-8V 23 27 31

\* As a Modulator 11 17 21

2. Control Current, 500μA (occurs at -9V to -12V typ)

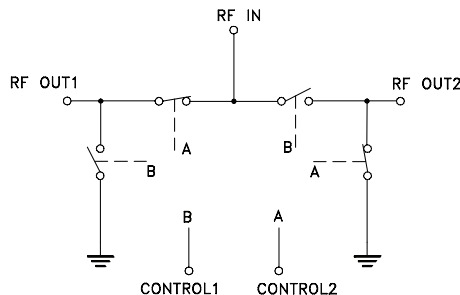
3. OFF state of RF output is low impedance

4. All RF connections must be DC blocked or held at 0V DC.

## CONTROL LOGIC

| Control Ports |    | RF outputs |     |
|---------------|----|------------|-----|
| 1             | 2  | 1          | 2   |
| 0             | -V | Off        | On  |
| -V            | 0  | On         | Off |

## Electrical Schematic



## 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](http://www.minicircuits.com/MCLStore/terms.jsp)

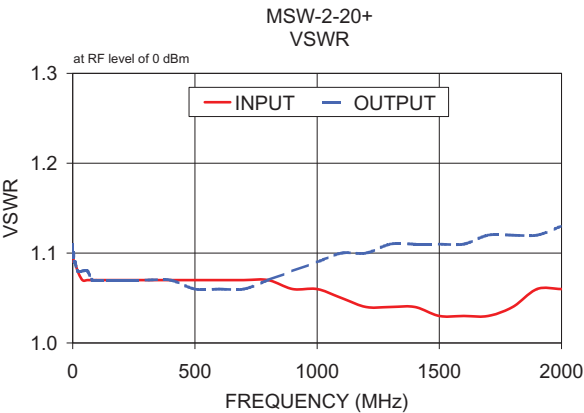
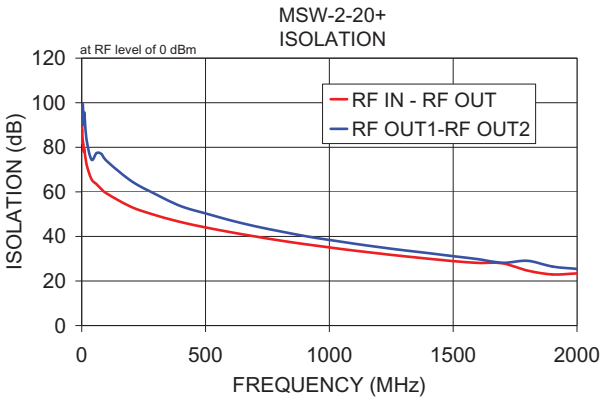
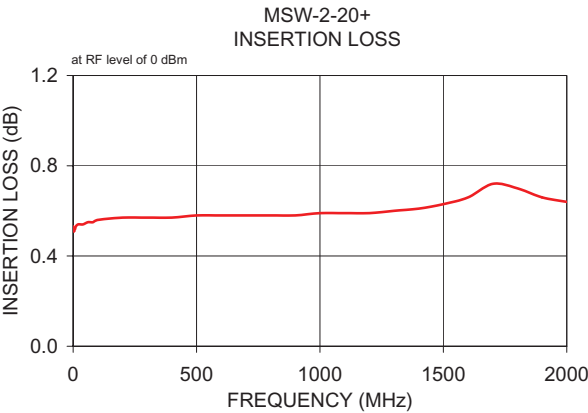


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M151107  
MSW-2-20+  
WP/CP/AM  
200810  
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Typical Performance Data

| FREQ.<br>(MHz) | ON INSERTION LOSS (dB)<br>Control @ 0V/-5V | OFF ISOLATION (dB)<br>Control @ 0V/-5V |                 | VSWR      |        |
|----------------|--------------------------------------------|----------------------------------------|-----------------|-----------|--------|
|                |                                            | IN-OUT                                 |                 | RF IN     | RF OUT |
|                | RF IN-RF OUT                               | RF IN-RF OUT                           | RF OUT1-RF OUT2 | (ON PORT) |        |
| 0.3            | 0.52                                       | 81.93                                  | 93.30           | 1.10      | 1.11   |
| 1.0            | 0.52                                       | 97.26                                  | 97.90           | 1.10      | 1.10   |
| 100.0          | 0.56                                       | 59.31                                  | 73.94           | 1.07      | 1.07   |
| 200.0          | 0.57                                       | 53.23                                  | 64.89           | 1.07      | 1.07   |
| 300.0          | 0.57                                       | 49.47                                  | 58.85           | 1.07      | 1.07   |
| 400.0          | 0.57                                       | 46.44                                  | 53.61           | 1.07      | 1.07   |
| 500.0          | 0.58                                       | 44.05                                  | 50.36           | 1.07      | 1.06   |
| 600.0          | 0.58                                       | 41.90                                  | 47.22           | 1.07      | 1.06   |
| 700.0          | 0.58                                       | 39.98                                  | 44.58           | 1.07      | 1.06   |
| 800.0          | 0.58                                       | 38.20                                  | 42.30           | 1.07      | 1.07   |
| 900.0          | 0.58                                       | 36.54                                  | 40.21           | 1.06      | 1.08   |
| 1000.0         | 0.59                                       | 35.06                                  | 38.40           | 1.06      | 1.09   |
| 1100.0         | 0.59                                       | 33.66                                  | 36.75           | 1.05      | 1.10   |
| 1200.0         | 0.59                                       | 32.36                                  | 35.21           | 1.04      | 1.10   |
| 1400.0         | 0.61                                       | 29.98                                  | 32.49           | 1.04      | 1.11   |
| 1500.0         | 0.63                                       | 28.91                                  | 31.14           | 1.03      | 1.11   |
| 1600.0         | 0.66                                       | 28.12                                  | 29.80           | 1.03      | 1.11   |
| 1800.0         | 0.70                                       | 24.70                                  | 29.05           | 1.04      | 1.12   |
| 1900.0         | 0.66                                       | 22.96                                  | 26.48           | 1.06      | 1.12   |
| 2000.0         | 0.64                                       | 23.40                                  | 25.43           | 1.06      | 1.13   |



Notes

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## Typical Performance Data

| Control Voltage: 0V/-5V |                 |               |               |               |                |                |            |            |            |            |
|-------------------------|-----------------|---------------|---------------|---------------|----------------|----------------|------------|------------|------------|------------|
| RF FREQ<br>(MHz)        | INSERTION LOSS* |               | ISOLATION*    |               |                |                | VSWR*      |            |            |            |
|                         | (dB)            |               | (dB)          |               |                |                | (:1)       |            |            |            |
|                         | RF IN-RF OUT1   | RF IN-RF OUT2 | RF IN-RF OUT1 | RF IN-RF OUT2 | RF OUT1-RFOUT2 | RF OUT1-RFOUT2 | RF IN      | RF IN      | RF OUT1    | RF OUT2    |
|                         | RF OUT1 ON      | RF OUT2 ON    | RF OUT2 ON    | RF OUT1 ON    | RF OUT1 ON     | RF OUT2 ON     | RF OUT1 ON | RF OUT2 ON | RF OUT1 ON | RF OUT2 ON |
| 0.3                     | 0.52            | 0.52          | 95.48         | 81.93         | 86.02          | 93.30          | 1.10       | 1.11       | 1.11       | 1.11       |
| 0.5                     | 0.53            | 0.53          | 93.50         | 96.98         | 96.30          | 91.99          | 1.10       | 1.11       | 1.10       | 1.10       |
| 1.0                     | 0.52            | 0.53          | 105.84        | 97.26         | 96.68          | 97.90          | 1.10       | 1.10       | 1.10       | 1.10       |
| 2.0                     | 0.51            | 0.52          | 101.67        | 87.07         | 90.87          | 90.04          | 1.10       | 1.10       | 1.10       | 1.10       |
| 4.0                     | 0.51            | 0.52          | 97.05         | 83.22         | 85.19          | 99.29          | 1.09       | 1.10       | 1.10       | 1.10       |
| 6.0                     | 0.52            | 0.53          | 94.91         | 81.38         | 81.93          | 95.21          | 1.09       | 1.09       | 1.10       | 1.09       |
| 8.0                     | 0.52            | 0.53          | 96.45         | 78.15         | 80.53          | 90.19          | 1.09       | 1.09       | 1.09       | 1.09       |
| 10.0                    | 0.53            | 0.54          | 93.59         | 79.27         | 79.61          | 95.56          | 1.09       | 1.09       | 1.09       | 1.09       |
| 20.0                    | 0.54            | 0.55          | 97.15         | 72.12         | 73.11          | 83.11          | 1.08       | 1.08       | 1.08       | 1.08       |
| 40.0                    | 0.54            | 0.55          | 86.74         | 65.62         | 68.68          | 74.42          | 1.07       | 1.08       | 1.08       | 1.08       |
| 60.0                    | 0.55            | 0.56          | 76.78         | 63.45         | 63.80          | 77.41          | 1.07       | 1.07       | 1.08       | 1.08       |
| 80.0                    | 0.55            | 0.57          | 73.08         | 61.19         | 61.30          | 77.00          | 1.07       | 1.07       | 1.08       | 1.07       |
| 100.0                   | 0.56            | 0.57          | 71.49         | 59.31         | 59.31          | 73.94          | 1.07       | 1.07       | 1.08       | 1.07       |
| 200.0                   | 0.57            | 0.57          | 63.48         | 53.23         | 53.10          | 64.89          | 1.07       | 1.07       | 1.07       | 1.07       |
| 300.0                   | 0.57            | 0.57          | 57.82         | 49.47         | 49.25          | 58.85          | 1.07       | 1.06       | 1.07       | 1.07       |
| 400.0                   | 0.57            | 0.57          | 53.43         | 46.44         | 46.44          | 53.61          | 1.07       | 1.06       | 1.07       | 1.07       |
| 500.0                   | 0.58            | 0.58          | 49.82         | 44.05         | 43.87          | 50.36          | 1.07       | 1.06       | 1.07       | 1.06       |
| 600.0                   | 0.58            | 0.57          | 46.77         | 41.90         | 41.82          | 47.22          | 1.07       | 1.06       | 1.07       | 1.06       |
| 700.0                   | 0.58            | 0.57          | 44.21         | 39.98         | 39.93          | 44.58          | 1.07       | 1.05       | 1.07       | 1.06       |
| 800.0                   | 0.58            | 0.58          | 41.94         | 38.20         | 38.18          | 42.30          | 1.07       | 1.05       | 1.07       | 1.07       |
| 900.0                   | 0.58            | 0.58          | 39.92         | 36.54         | 36.60          | 40.21          | 1.06       | 1.05       | 1.07       | 1.08       |
| 1000.0                  | 0.59            | 0.59          | 38.14         | 35.06         | 35.13          | 38.40          | 1.06       | 1.04       | 1.08       | 1.09       |
| 1100.0                  | 0.59            | 0.59          | 36.48         | 33.66         | 33.71          | 36.75          | 1.05       | 1.04       | 1.08       | 1.10       |
| 1200.0                  | 0.59            | 0.60          | 34.98         | 32.36         | 32.37          | 35.21          | 1.04       | 1.05       | 1.09       | 1.10       |
| 1300.0                  | 0.60            | 0.61          | 33.58         | 31.14         | 31.11          | 33.81          | 1.04       | 1.05       | 1.09       | 1.11       |
| 1400.0                  | 0.61            | 0.62          | 32.26         | 29.98         | 29.93          | 32.49          | 1.04       | 1.05       | 1.09       | 1.11       |
| 1500.0                  | 0.63            | 0.64          | 31.10         | 28.91         | 28.59          | 31.14          | 1.03       | 1.05       | 1.09       | 1.11       |
| 1600.0                  | 0.66            | 0.65          | 30.09         | 28.12         | 27.78          | 29.80          | 1.03       | 1.06       | 1.08       | 1.11       |
| 1700.0                  | 0.72            | 0.69          | 29.12         | 27.92         | 27.10          | 28.17          | 1.03       | 1.06       | 1.08       | 1.12       |
| 1800.0                  | 0.70            | 0.72          | 25.49         | 24.70         | 26.69          | 29.05          | 1.04       | 1.06       | 1.07       | 1.12       |
| 1900.0                  | 0.66            | 0.67          | 24.59         | 22.96         | 24.52          | 26.48          | 1.06       | 1.10       | 1.06       | 1.12       |
| 2000.0                  | 0.64            | 0.65          | 25.38         | 23.40         | 24.07          | 25.43          | 1.06       | 1.12       | 1.07       | 1.13       |

\*Note:

| CONTROL LOGIC |     |            |     |
|---------------|-----|------------|-----|
| Control Ports |     | RF Outputs |     |
| 1             | 2   | 1          | 2   |
| 0             | -5V | Off        | On  |
| -5V           | 0   | On         | Off |



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IF/RF MICROWAVE COMPONENTS

## Typical Performance Data

| Control Voltage: 0V/-8V |                 |               |               |               |                |                |            |            |            |            |
|-------------------------|-----------------|---------------|---------------|---------------|----------------|----------------|------------|------------|------------|------------|
| RF FREQ<br>(MHz)        | INSERTION LOSS* |               | ISOLATION*    |               |                |                | VSWR*      |            |            |            |
|                         | (dB)            |               | (dB)          |               |                |                | (:1)       |            |            |            |
|                         | RF IN-RF OUT1   | RF IN-RF OUT2 | RF IN-RF OUT1 | RF IN-RF OUT2 | RF OUT1-RFOUT2 | RF OUT1-RFOUT2 | RF IN      | RF IN      | RF OUT1    | RF OUT2    |
|                         | RF OUT1 ON      | RF OUT2 ON    | RF OUT2 ON    | RF OUT1 ON    | RF OUT1 ON     | RF OUT2 ON     | RF OUT1 ON | RF OUT2 ON | RF OUT1 ON | RF OUT2 ON |
| 0.3                     | 0.51            | 0.51          | 95.40         | 105.54        | 89.64          | 89.08          | 1.10       | 1.10       | 1.10       | 1.10       |
| 0.5                     | 0.52            | 0.52          | 94.63         | 103.91        | 97.58          | 97.84          | 1.10       | 1.10       | 1.10       | 1.10       |
| 1.0                     | 0.51            | 0.52          | 102.70        | 92.24         | 90.34          | 99.32          | 1.09       | 1.10       | 1.10       | 1.09       |
| 2.0                     | 0.51            | 0.51          | 104.71        | 87.07         | 87.58          | 103.27         | 1.09       | 1.09       | 1.10       | 1.09       |
| 4.0                     | 0.51            | 0.51          | 94.84         | 81.94         | 83.44          | 97.72          | 1.09       | 1.09       | 1.09       | 1.09       |
| 6.0                     | 0.51            | 0.52          | 94.84         | 80.61         | 80.79          | 93.61          | 1.08       | 1.09       | 1.09       | 1.09       |
| 8.0                     | 0.51            | 0.52          | 94.08         | 77.54         | 79.83          | 88.22          | 1.08       | 1.08       | 1.09       | 1.09       |
| 10.0                    | 0.52            | 0.53          | 89.72         | 76.32         | 78.21          | 101.29         | 1.08       | 1.08       | 1.09       | 1.09       |
| 20.0                    | 0.53            | 0.54          | 94.25         | 71.90         | 72.61          | 82.50          | 1.08       | 1.08       | 1.08       | 1.08       |
| 40.0                    | 0.53            | 0.54          | 87.03         | 65.49         | 68.56          | 74.53          | 1.07       | 1.08       | 1.08       | 1.08       |
| 60.0                    | 0.54            | 0.55          | 76.80         | 63.29         | 63.67          | 76.71          | 1.07       | 1.07       | 1.08       | 1.07       |
| 80.0                    | 0.54            | 0.56          | 73.40         | 61.03         | 61.09          | 77.25          | 1.07       | 1.07       | 1.08       | 1.07       |
| 100.0                   | 0.55            | 0.56          | 71.10         | 59.20         | 59.18          | 74.62          | 1.07       | 1.07       | 1.08       | 1.07       |
| 200.0                   | 0.56            | 0.56          | 63.57         | 53.14         | 52.93          | 65.45          | 1.07       | 1.07       | 1.07       | 1.07       |
| 300.0                   | 0.56            | 0.57          | 57.98         | 49.41         | 49.16          | 59.34          | 1.07       | 1.06       | 1.07       | 1.07       |
| 400.0                   | 0.56            | 0.56          | 53.69         | 46.41         | 46.35          | 53.93          | 1.07       | 1.06       | 1.07       | 1.07       |
| 500.0                   | 0.57            | 0.57          | 50.06         | 44.07         | 43.85          | 50.72          | 1.07       | 1.06       | 1.07       | 1.06       |
| 600.0                   | 0.57            | 0.56          | 47.02         | 41.97         | 41.79          | 47.57          | 1.07       | 1.06       | 1.07       | 1.06       |
| 700.0                   | 0.57            | 0.56          | 44.46         | 40.08         | 39.94          | 44.94          | 1.07       | 1.05       | 1.07       | 1.06       |
| 800.0                   | 0.57            | 0.57          | 42.21         | 38.34         | 38.22          | 42.64          | 1.07       | 1.05       | 1.07       | 1.07       |
| 900.0                   | 0.57            | 0.57          | 40.19         | 36.71         | 36.67          | 40.56          | 1.06       | 1.05       | 1.08       | 1.08       |
| 1000.0                  | 0.58            | 0.58          | 38.42         | 35.25         | 35.23          | 38.75          | 1.06       | 1.04       | 1.08       | 1.08       |
| 1100.0                  | 0.58            | 0.58          | 36.76         | 33.86         | 33.83          | 37.09          | 1.05       | 1.04       | 1.09       | 1.09       |
| 1200.0                  | 0.58            | 0.59          | 35.25         | 32.58         | 32.51          | 35.56          | 1.05       | 1.04       | 1.09       | 1.10       |
| 1300.0                  | 0.59            | 0.60          | 33.85         | 31.37         | 31.26          | 34.15          | 1.04       | 1.03       | 1.09       | 1.10       |
| 1400.0                  | 0.60            | 0.61          | 32.53         | 30.21         | 30.04          | 32.83          | 1.04       | 1.04       | 1.09       | 1.10       |
| 1500.0                  | 0.61            | 0.63          | 31.39         | 29.16         | 28.75          | 31.49          | 1.03       | 1.03       | 1.09       | 1.10       |
| 1600.0                  | 0.64            | 0.64          | 30.35         | 28.37         | 27.91          | 30.09          | 1.03       | 1.04       | 1.09       | 1.10       |
| 1700.0                  | 0.71            | 0.67          | 29.40         | 28.30         | 27.30          | 28.54          | 1.04       | 1.04       | 1.08       | 1.10       |
| 1800.0                  | 0.69            | 0.70          | 25.66         | 24.95         | 26.88          | 29.31          | 1.04       | 1.04       | 1.06       | 1.10       |
| 1900.0                  | 0.64            | 0.65          | 24.81         | 23.19         | 24.66          | 26.77          | 1.04       | 1.07       | 1.06       | 1.09       |
| 2000.0                  | 0.63            | 0.63          | 25.59         | 23.61         | 24.24          | 25.69          | 1.04       | 1.09       | 1.07       | 1.10       |

\*Note:

| CONTROL LOGIC |     |            |     |
|---------------|-----|------------|-----|
| Control Ports |     | RF Outputs |     |
| 1             | 2   | 1          | 2   |
| 0             | -8V | Off        | On  |
| -8V           | 0   | On         | Off |

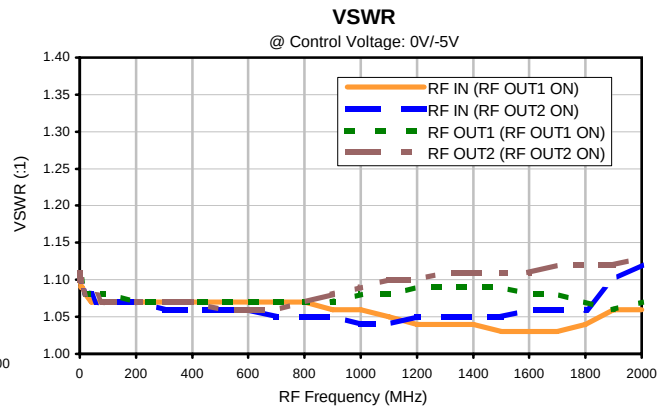
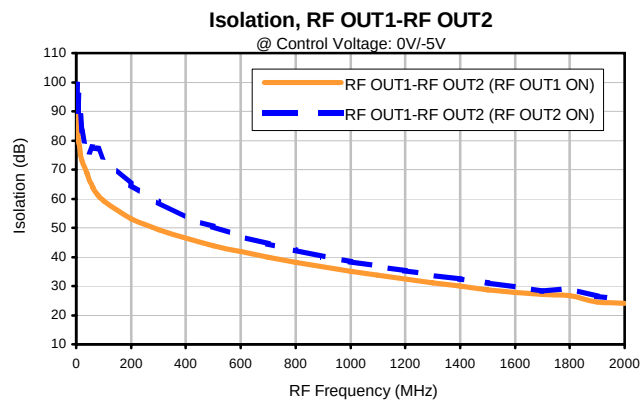
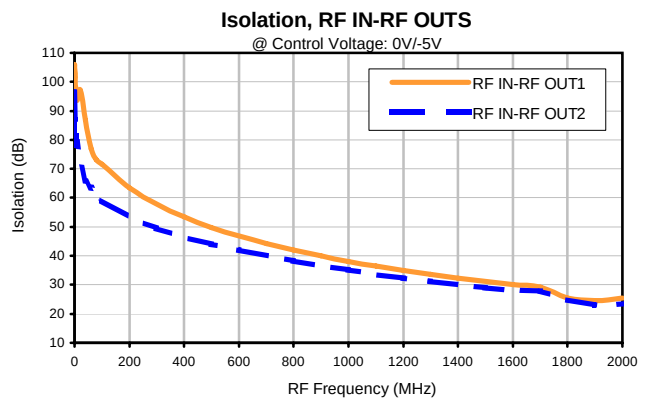
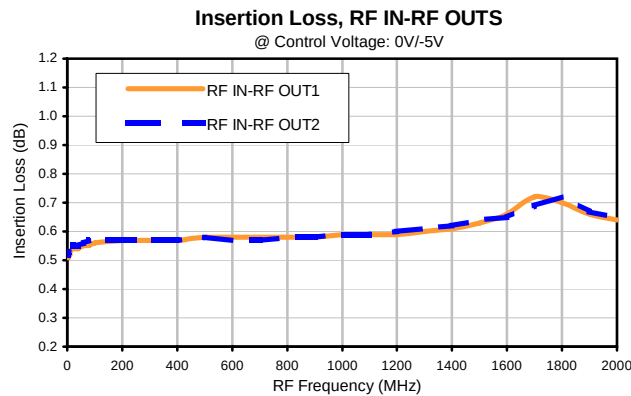


P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 • Fax (718) 332-4661 For detailed performance specs &amp; shopping online see Mini-Circuits web site

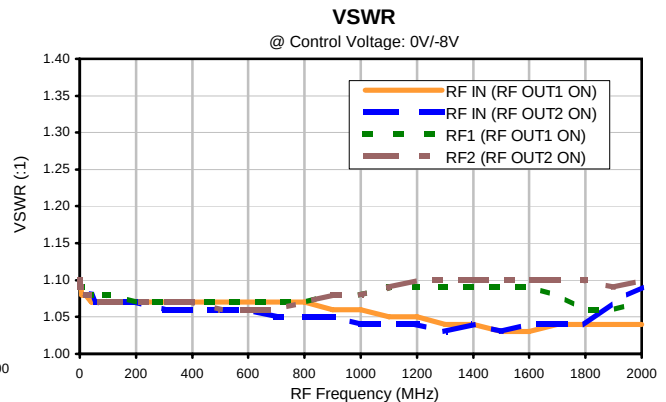
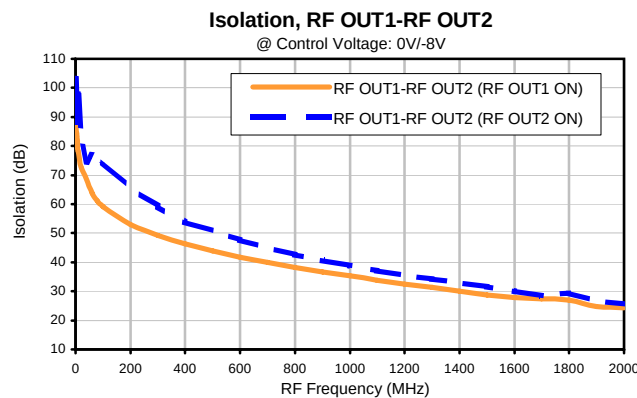
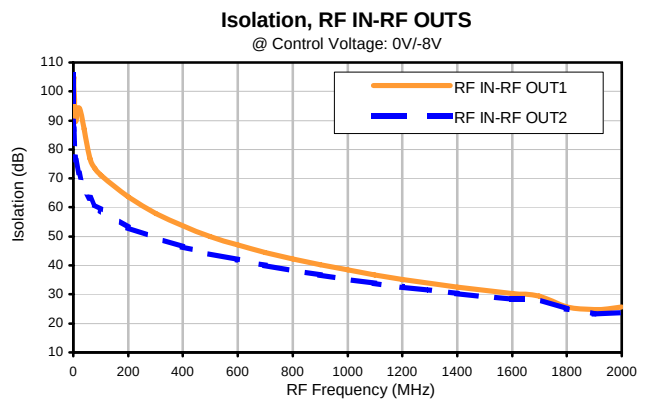
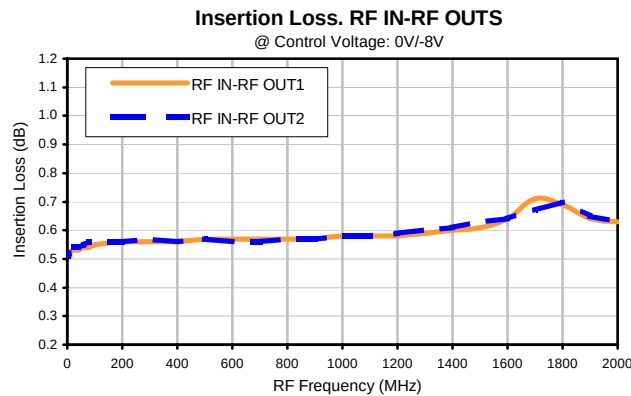
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IF/RF MICROWAVE COMPONENTS

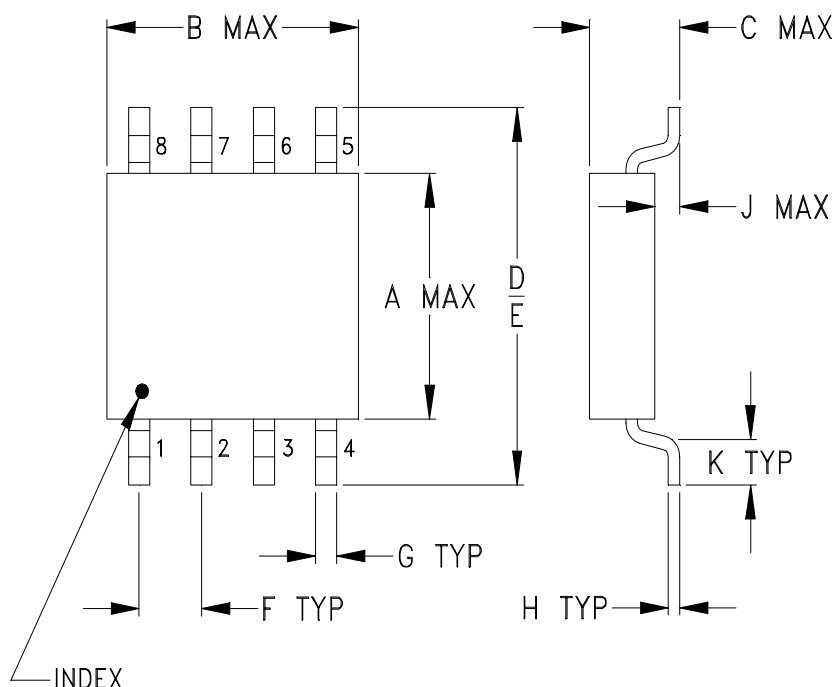
## Typical Performance Curves



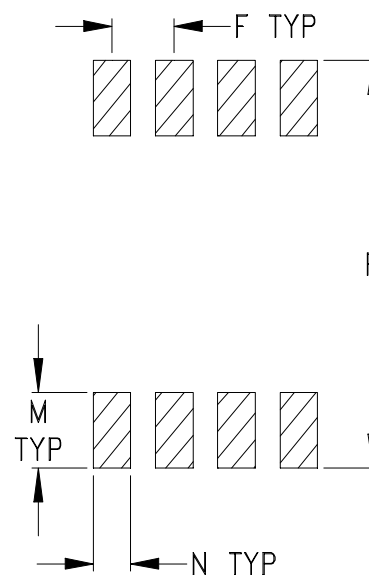
## Typical Performance Curves



### Outline Dimensions



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm .002$

| CASE # | A              | B              | C              | D              | E              | F              | G              | H              | J              | K              | L        | M              | N              | P              |
|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------|----------------|----------------|----------------|
| XX211  | .163<br>(4.14) | .210<br>(5.33) | .077<br>(1.96) | .250<br>(6.35) | .220<br>(5.59) | .050<br>(1.27) | .017<br>(0.43) | .009<br>(0.23) | .025<br>(0.64) | .030<br>(0.76) | --<br>-- | .050<br>(1.27) | .030<br>(0.76) | .270<br>(6.86) |

| CASE # | Q        | R        | S        | WT. GRAM |
|--------|----------|----------|----------|----------|
| XX211  | --<br>-- | --<br>-- | --<br>-- | .10      |

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

#### Notes:

- Case material: Plastic.
  - Termination finish:  
For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier. All models, (+) suffix. ☉  
For RoHS-5 Case Styles: Tin-Lead plate. All models, No (+) suffix.
  - Special Tolerances: Termination width  $\pm .005$  inch, termination thickness  $\pm .003$  inch.
- ☉ Model BP4C+ will be supplied with either Tin finish or Tin-Silver-Nickel finish until Tin finish inventory is depleted.



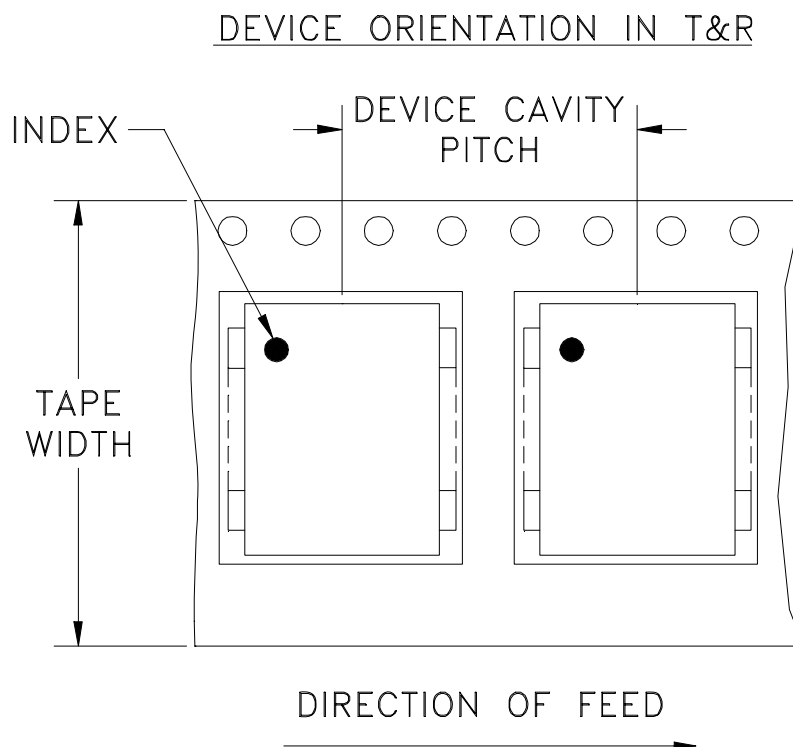
INTERNET <http://www.minicircuits.com>

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# Tape & Reel Packaging TR-F16



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel                    |        |
|----------------|-------------------------|-------------------|-------------------------------------|--------|
| 12             | 8                       | 7                 | Small quantity standards (see note) | 20     |
|                |                         |                   |                                     | 50     |
|                |                         |                   |                                     | 100    |
|                |                         |                   |                                     | 200    |
|                |                         |                   |                                     | 500    |
|                |                         |                   | Standard                            | 1000*  |
|                |                         | 13                | Standard                            | 2000** |

Note : Please Consult individual model data sheet to determine device per reel availability

\* BP models only

\*\* MSW and MSWA models

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: [www.minicircuits.com/pages/pdfs/tape.pdf](http://www.minicircuits.com/pages/pdfs/tape.pdf)



INTERNET <http://www.minicircuits.com>

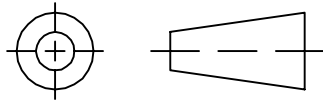
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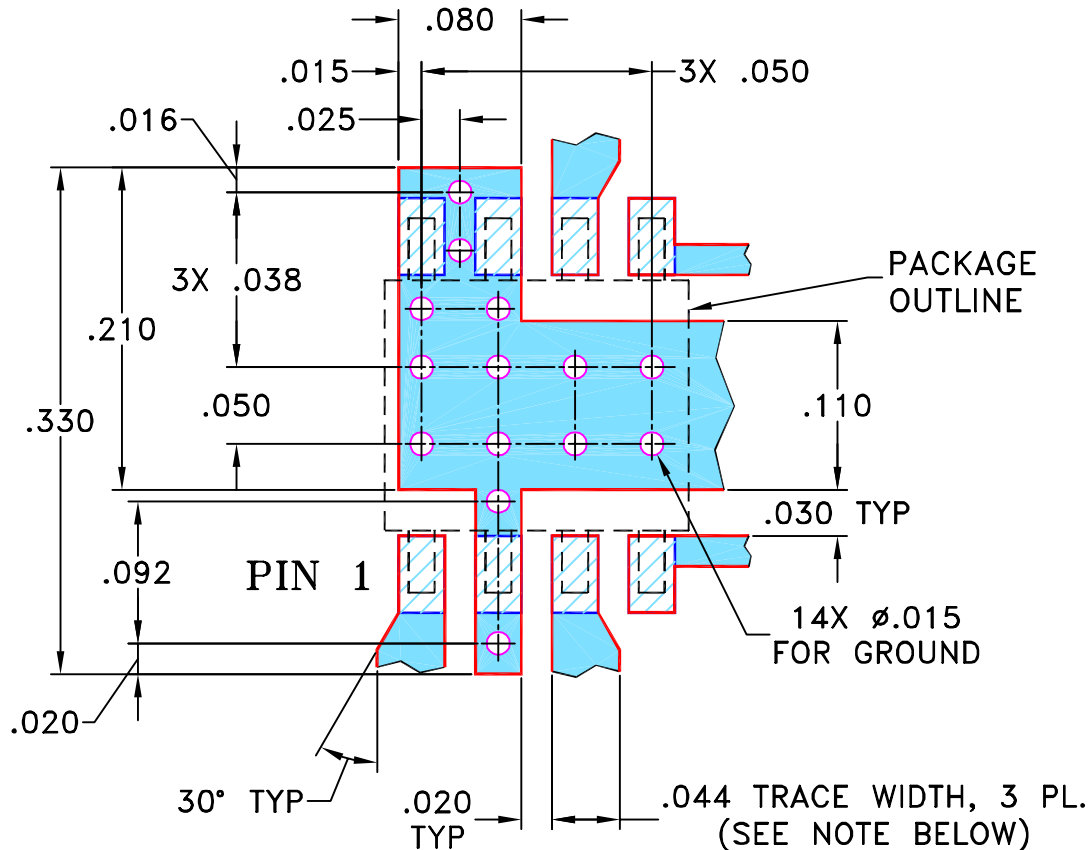
## THIRD ANGLE PROJECTION



## REVISIONS

| REV | ECN No. | DESCRIPTION           | DATE     | DR  | AUTH |
|-----|---------|-----------------------|----------|-----|------|
| OR  | M82408  | NEW RELEASE           | 09/12/02 | MMG | WP   |
| A   | M102713 | ADDED "...WITH SMOBC" | 01/14/06 | GF  | IL   |
|     |         |                       |          |     |      |
|     |         |                       |          |     |      |

### SUGGESTED MOUNTING CONFIGURATION FOR XX211 CASE STYLE, "et" PIN CONNECTION



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS  $0.020'' \pm 0.0015''$ ; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.



DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)



DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE

DIMENSIONS ARE IN INCHES

DRAWN

MMG

09/03/02

TOLERANCES ON:  
2 PL DECIMALS  $\pm$   
3 PL DECIMALS  $\pm$  .005

CHECKED

AV

09/12/02

APPROVED

WP

09/12/02

ANGLES  $\pm$   
FRACTIONS  $\pm$

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ASHEETA1.DWG REV:A DATE:01/12/95



Mini-Circuits®

13 Neptune Avenue  
Brooklyn NY 11235

PL, et, XX211, MSW, TB-203

SIZE  
A

CODE IDENT  
15542

DRAWING NO:  
98-PL-108

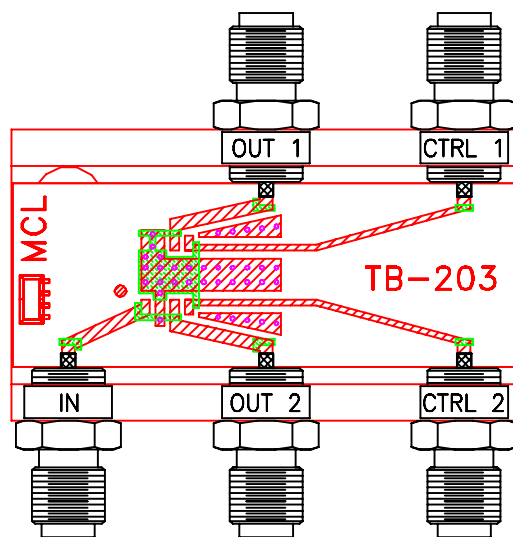
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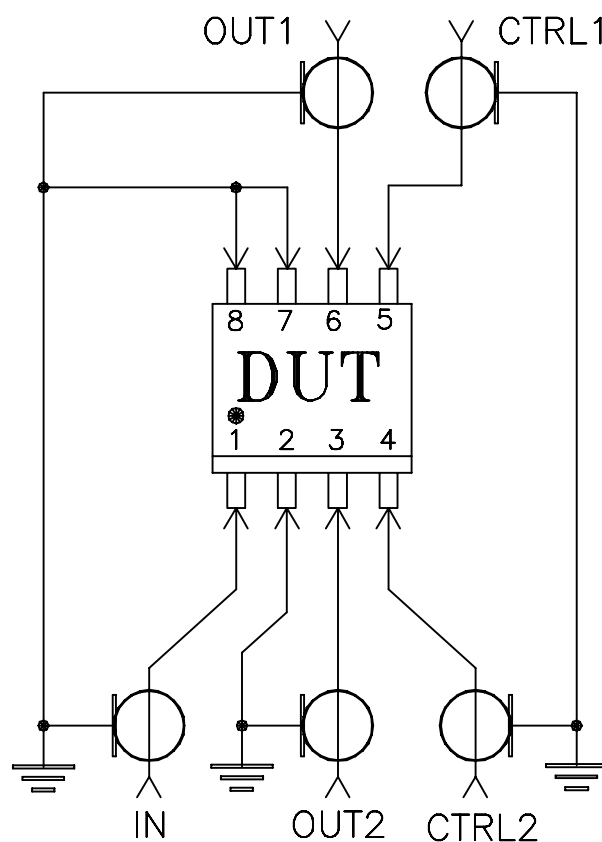
SCALE: 8:1

SHEET: 1 OF 1

# Evaluation Board and Circuit



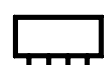
TB-203



Schematic Diagram

## Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.020 inch.

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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          | -40° to 85° C<br>Ambient Environment                                                                                                                            | Individual Model Data Sheet                                          |
| Storage Temperature            | -55° to 100° C<br>Ambient Environment                                                                                                                           | Individual Model Data Sheet                                          |
| Temperature Cycling            | -55° to 100°C, 100 cycles                                                                                                                                       | MIL-STD-883, Method 1010, Condition B, except 100°C                  |
| Autoclave                      | 15 psig, 100% RH, 121°C, 96 hours                                                                                                                               | JESD22-A102-C, Condition C                                           |
| HAST                           | 130°C, 85% RH, 96 hours                                                                                                                                         | JESD22-A110                                                          |
| Solder Reflow Heat             | Sn-Pb Eutetic Process: 240°C peak<br>Pb-Free Process: 260°C peak                                                                                                | J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1                        |
| Vibration (High Frequency)     | 20g peak, 20-2000 Hz, 2 times in each of three perpendicular directions (total 6)                                                                               | MIL-STD-883, Method 2007. 3, Condition A, Except 2X number of cycles |
| Mechanical Shock               | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes                                                                                               | MIL-STD-202, Method 213, Condition A                                 |
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C;<br>distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215                                              |