

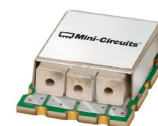
# Surface Mount Bandpass Filter

## CBP-1538J+

50Ω 1518 to 1559 MHz

### The Big Deal

- Good Insertion Loss
- Low VSWR
- Miniature shielded package



Generic photo used for illustration purposes only  
CASE STYLE: MQ1770

### Product Overview

CBP-1538J+ is a ceramic coaxial resonator based bandpass filter in a shielded package fabricated using SMT technology. This filter has narrow passband and offers low insertion loss , low VSWR and high power handling for use in satellite communication.

### Key Features

| Feature             | Advantages                                                                                                                                                                 |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High Quality        | The CBP-1538J+ filter incorporates High-Q ceramic resonators that enables low insertion loss.                                                                              |
| Low VSWR            | This filter maintains typical VSWR over passband frequency range making this filter easier to integrate between other components.                                          |
| Rugged construction | The CBP-1538J+ has been qualified over wide range of thermal, mechanical and environmental conditions including withstanding the stress of extensive solder reflow cycles. |

#### Notes

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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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## CBP-1538J+



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CASE STYLE: MQ1770

### Features

- Good Insertion loss
- Low VSWR
- Miniature shielded package

### Applications

- Satellite communication
- Test and measurement

### Electrical Specifications at 25°C

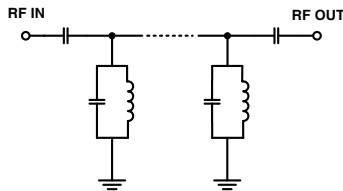
| Parameter        |                  | F#    | Frequency (MHz) | Min. | Typ. | Max. | Unit |
|------------------|------------------|-------|-----------------|------|------|------|------|
| Pass Band        | Center Frequency | —     | —               | —    | 1538 | —    | MHz  |
|                  | Insertion Loss   | F1-F2 | 1518-1559       | —    | 1.1  | 1.7  | dB   |
|                  | VSWR             | F1-F2 | 1518-1559       | —    | 1.6  | 2.32 | :1   |
| Stop Band, Lower | Insertion Loss   | DC-F3 | DC-1390         | 20   | 27.4 | —    | dB   |
|                  | VSWR             | DC-F3 | DC-1390         | —    | 20   | —    | :1   |
| Stop Band, Upper | Insertion Loss   | F4-F5 | 1750-3000       | 20   | 25.9 | —    | dB   |
|                  | VSWR             | F4-F5 | 1750-3000       | —    | 20   | —    | :1   |

### Maximum Ratings

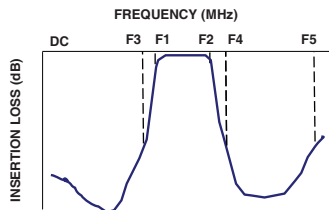
|                       |                |
|-----------------------|----------------|
| Operating Temperature | -40°C to 85°C  |
| Storage Temperature   | -55°C to 100°C |
| RF Power Input        | 8 W            |

Permanent damage may occur if any of these limits are exceeded.

### Functional Schematic



### Typical Frequency Response

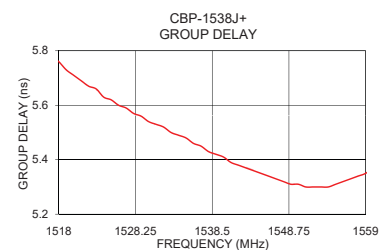
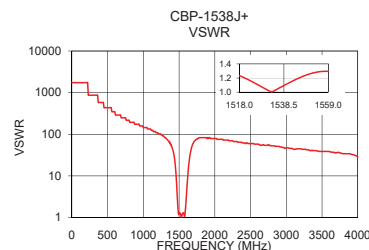
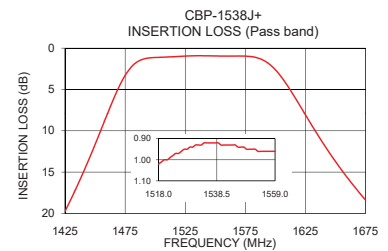
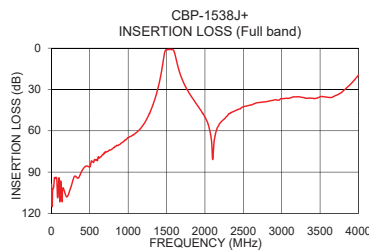


### Typical Performance Data at 25°C

| Frequency (MHz) | Insertion Loss (dB) | VSWR (:1) | Frequency (MHz) | Group Delay (nsec) |
|-----------------|---------------------|-----------|-----------------|--------------------|
| 1               | 98.71               | 1737.18   | 1518            | 5.76               |
| 100             | 94.35               | 1737.18   | 1520            | 5.71               |
| 800             | 72.86               | 217.15    | 1522            | 5.67               |
| 1150            | 59.03               | 115.81    | 1524            | 5.63               |
| 1384            | 30.08               | 57.91     | 1526            | 5.60               |
| 1390            | 28.64               | 54.29     | 1528            | 5.57               |
| 1421            | 20.88               | 36.97     | 1530            | 5.54               |
| 1475            | 3.30                | 3.08      | 1534            | 5.49               |
| 1500            | 1.13                | 1.23      | 1538            | 5.43               |
| 1518            | 1.02                | 1.23      | 1540            | 5.41               |
| 1538            | 0.92                | 1.09      | 1542            | 5.38               |
| 1559            | 0.96                | 1.29      | 1544            | 5.36               |
| 1605            | 3.50                | 3.92      | 1546            | 5.34               |
| 1686            | 20.14               | 54.98     | 1548            | 5.32               |
| 1750            | 28.30               | 75.53     | 1550            | 5.31               |
| 1770            | 30.34               | 78.97     | 1552            | 5.30               |
| 1800            | 33.12               | 82.73     | 1554            | 5.30               |
| 2500            | 42.61               | 57.91     | 1556            | 5.32               |
| 3000            | 36.56               | 46.96     | 1558            | 5.34               |
| 4000            | 19.60               | 28.49     | 1559            | 5.35               |

### +RoHS Compliant

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



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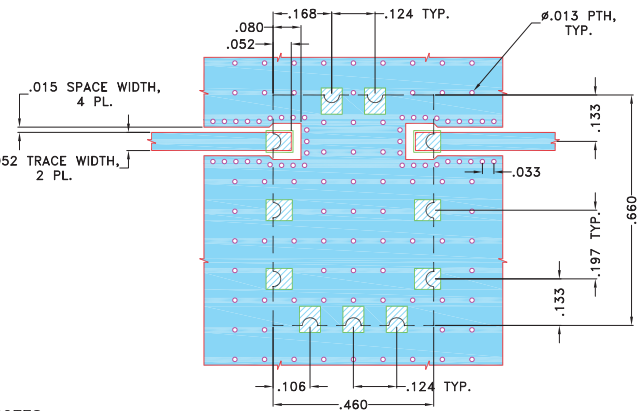
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M174392  
CBP-1538J+  
EDU1736/1  
URJ  
200813  
Page 2 of 3

Pad Connections

|        |                     |
|--------|---------------------|
| INPUT  | 1                   |
| OUTPUT | 9                   |
| GROUND | 2,3,4,5,6,7,8,10,11 |

Demo Board MCL P/N: TB-692+  
Suggested PCB Layout (PL-375)

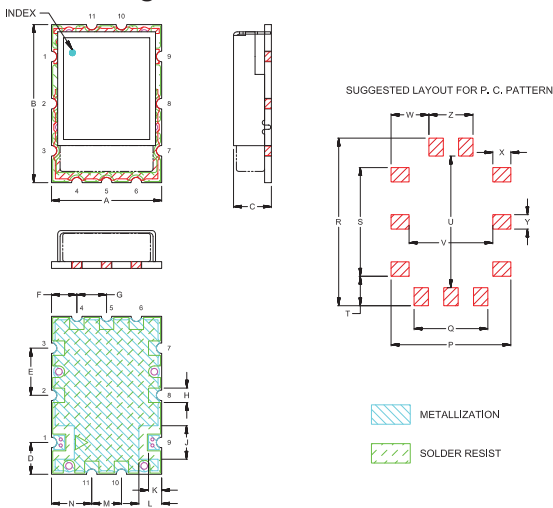


- NOTES:
- 1. TRACE WIDTH IS SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .030"±.002". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
  - 2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

Outline Drawing



Outline Dimensions ( inch mm )

|       |       |       |       |      |       |      |      |      |      |      |          |      |
|-------|-------|-------|-------|------|-------|------|------|------|------|------|----------|------|
| A     | B     | C     | D     | E    | F     | G    | H    | J    | K    | L    | M        | N    |
| .460  | .660  | .175  | .133  | .197 | .106  | .124 | .060 | .140 | .055 | .095 | .124     | .168 |
| 11.68 | 16.76 | 4.45  | 3.38  | 5.00 | 2.69  | 3.15 | 1.52 | 3.56 | 1.40 | 2.41 | 3.15     | 4.27 |
| P     | Q     | R     | S     | T    | U     | V    | W    | X    | Y    | Z    | WT.GRAMS |      |
| .500  | .308  | .700  | .454  | .123 | .550  | .350 | .158 | .075 | .060 | .184 | 1.8      |      |
| 12.70 | 7.82  | 17.78 | 11.53 | 3.12 | 13.97 | 8.89 | 4.01 | 1.91 | 1.52 | 4.67 |          |      |

Note: Please refer to case style drawing for details.

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# Band Pass Filter

**CBP-1538J+**

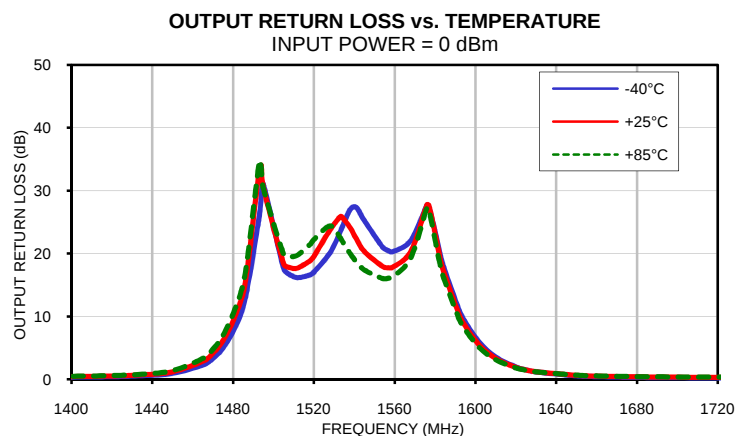
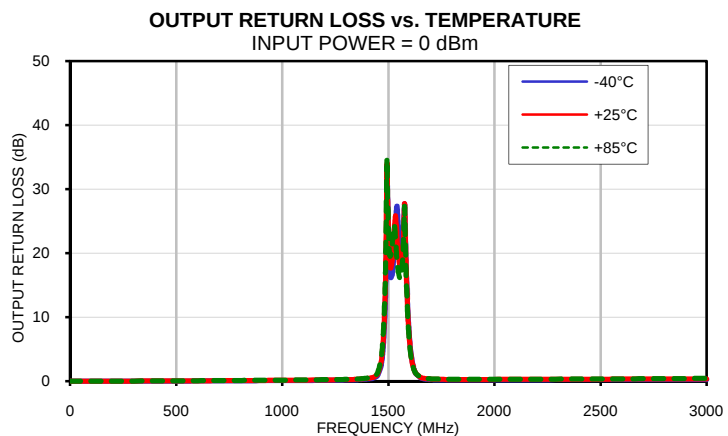
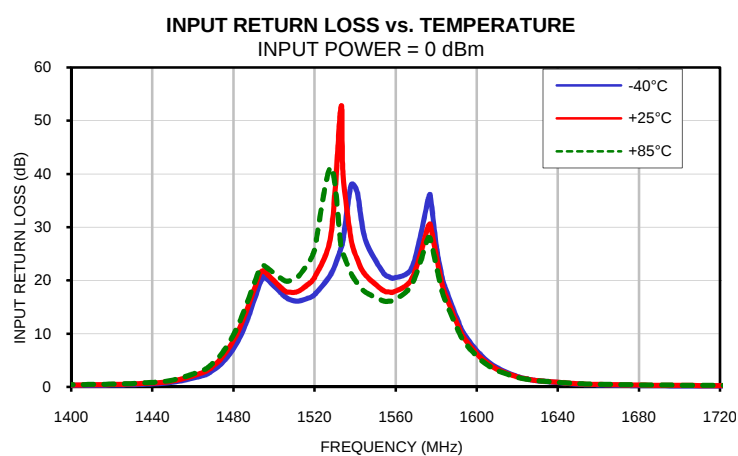
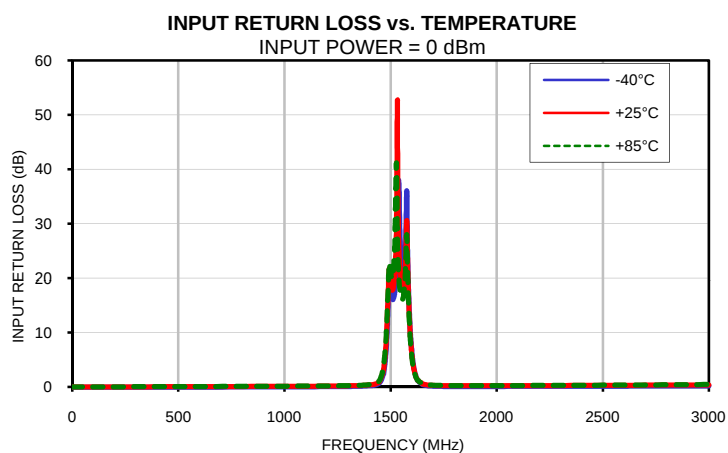
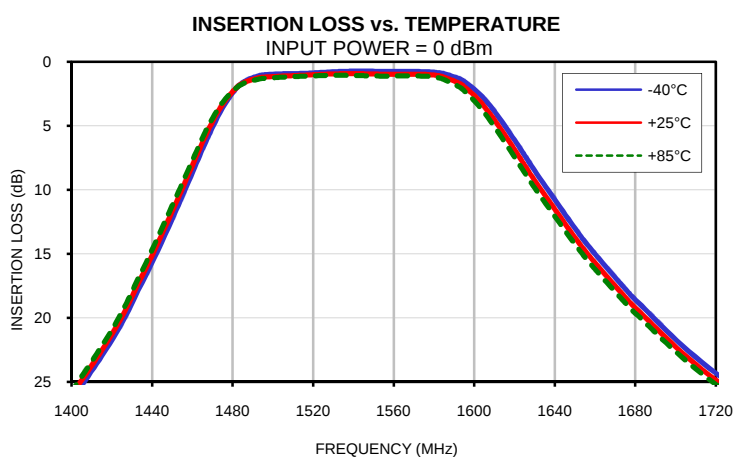
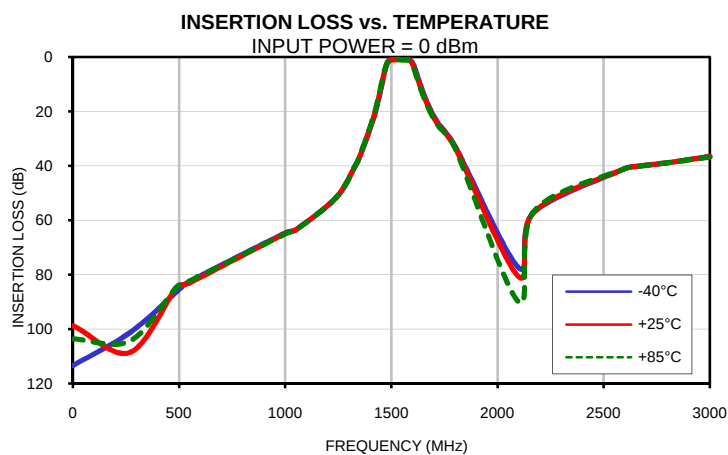
## Typical Performance Data

| FREQ. | INSERTION LOSS |        |        | INPUT RETURN LOSS |        |        | OUTPUT RETURN LOSS |        |        |
|-------|----------------|--------|--------|-------------------|--------|--------|--------------------|--------|--------|
| (MHz) | (dB)           |        |        | (dB)              |        |        | (dB)               |        |        |
|       | @-40°C         | @+25°C | @+85°C | @-40°C            | @+25°C | @+85°C | @-40°C             | @+25°C | @+85°C |
| 1     | 113.36         | 98.71  | 103.52 | 0.00              | 0.00   | 0.00   | 0.00               | 0.00   | 0.00   |
| 270   | 101.25         | 108.53 | 104.27 | 0.00              | 0.02   | 0.03   | 0.00               | 0.02   | 0.02   |
| 490   | 86.22          | 84.51  | 84.48  | 0.01              | 0.04   | 0.05   | 0.01               | 0.04   | 0.05   |
| 550   | 82.51          | 82.98  | 82.25  | 0.01              | 0.04   | 0.06   | 0.02               | 0.05   | 0.06   |
| 1000  | 64.66          | 64.85  | 65.03  | 0.06              | 0.12   | 0.14   | 0.09               | 0.14   | 0.17   |
| 1050  | 63.54          | 63.51  | 63.52  | 0.06              | 0.12   | 0.15   | 0.10               | 0.15   | 0.18   |
| 1240  | 51.78          | 51.61  | 51.70  | 0.11              | 0.17   | 0.20   | 0.15               | 0.22   | 0.25   |
| 1330  | 40.16          | 39.97  | 39.86  | 0.15              | 0.23   | 0.26   | 0.20               | 0.27   | 0.31   |
| 1360  | 35.02          | 34.78  | 34.60  | 0.19              | 0.26   | 0.30   | 0.23               | 0.31   | 0.35   |
| 1415  | 22.96          | 22.53  | 22.19  | 0.32              | 0.43   | 0.49   | 0.38               | 0.49   | 0.55   |
| 1435  | 17.23          | 16.71  | 16.29  | 0.50              | 0.64   | 0.74   | 0.56               | 0.71   | 0.81   |
| 1450  | 12.25          | 11.66  | 11.21  | 0.87              | 1.11   | 1.29   | 0.94               | 1.19   | 1.37   |
| 1465  | 6.81           | 6.28   | 5.93   | 2.14              | 2.72   | 3.15   | 2.26               | 2.85   | 3.30   |
| 1470  | 5.09           | 4.66   | 4.40   | 3.15              | 3.95   | 4.55   | 3.31               | 4.14   | 4.76   |
| 1475  | 3.58           | 3.30   | 3.15   | 4.74              | 5.86   | 6.66   | 4.98               | 6.15   | 6.99   |
| 1481  | 2.21           | 2.15   | 2.13   | 7.84              | 9.46   | 10.51  | 8.29               | 10.05  | 11.20  |
| 1486  | 1.51           | 1.58   | 1.64   | 11.81             | 13.91  | 15.12  | 12.80              | 15.36  | 16.83  |
| 1493  | 1.07           | 1.23   | 1.34   | 19.41             | 21.29  | 22.32  | 26.00              | 33.36  | 34.71  |
| 1494  | 1.04           | 1.21   | 1.31   | 20.23             | 21.71  | 22.70  | 29.22              | 34.07  | 33.59  |
| 1495  | 1.01           | 1.19   | 1.29   | 20.72             | 21.77  | 22.77  | 31.01              | 30.61  | 30.40  |
| 1505  | 0.93           | 1.10   | 1.19   | 17.05             | 18.09  | 19.98  | 17.66              | 18.40  | 19.91  |
| 1508  | 0.93           | 1.09   | 1.17   | 16.38             | 17.76  | 19.97  | 16.67              | 17.78  | 19.52  |
| 1512  | 0.91           | 1.06   | 1.14   | 16.11             | 17.96  | 20.74  | 16.16              | 17.70  | 19.76  |
| 1518  | 0.88           | 1.02   | 1.10   | 16.81             | 19.60  | 23.92  | 16.59              | 18.82  | 21.41  |
| 1519  | 0.87           | 1.01   | 1.10   | 17.04             | 20.05  | 24.78  | 16.78              | 19.14  | 21.80  |
| 1520  | 0.86           | 1.00   | 1.09   | 17.32             | 20.55  | 25.79  | 17.02              | 19.52  | 22.22  |
| 1528  | 0.79           | 0.95   | 1.05   | 21.12             | 28.88  | 41.25  | 20.11              | 23.75  | 24.39  |
| 1533  | 0.75           | 0.93   | 1.05   | 26.01             | 52.54  | 26.33  | 23.40              | 25.85  | 22.56  |
| 1534  | 0.75           | 0.92   | 1.05   | 27.46             | 40.07  | 25.04  | 24.17              | 25.79  | 22.02  |
| 1538  | 0.73           | 0.92   | 1.06   | 37.87             | 27.72  | 21.33  | 27.01              | 24.10  | 19.98  |
| 1541  | 0.73           | 0.93   | 1.07   | 36.57             | 24.02  | 19.50  | 27.34              | 22.34  | 18.69  |
| 1545  | 0.72           | 0.93   | 1.08   | 27.69             | 21.06  | 17.81  | 25.26              | 20.34  | 17.39  |
| 1554  | 0.74           | 0.96   | 1.11   | 21.35             | 18.07  | 16.13  | 21.05              | 17.95  | 16.04  |
| 1557  | 0.74           | 0.96   | 1.11   | 20.63             | 17.81  | 16.12  | 20.45              | 17.75  | 16.08  |
| 1559  | 0.74           | 0.96   | 1.11   | 20.42             | 17.83  | 16.28  | 20.29              | 17.81  | 16.27  |
| 1568  | 0.75           | 0.96   | 1.09   | 22.39             | 20.35  | 19.25  | 22.07              | 20.34  | 19.33  |
| 1576  | 0.76           | 0.98   | 1.12   | 35.13             | 30.11  | 28.01  | 27.68              | 27.75  | 27.29  |
| 1577  | 0.77           | 0.99   | 1.13   | 36.05             | 30.56  | 27.93  | 27.39              | 27.66  | 26.97  |
| 1580  | 0.80           | 1.03   | 1.18   | 26.64             | 24.70  | 22.81  | 23.61              | 23.31  | 22.19  |
| 1582  | 0.84           | 1.07   | 1.24   | 22.30             | 20.87  | 19.40  | 20.71              | 20.11  | 19.02  |
| 1584  | 0.88           | 1.14   | 1.32   | 19.13             | 17.91  | 16.67  | 18.16              | 17.43  | 16.41  |
| 1592  | 1.28           | 1.63   | 1.91   | 11.22             | 10.39  | 9.62   | 10.97              | 10.26  | 9.54   |
| 1595  | 1.54           | 1.94   | 2.27   | 9.28              | 8.55   | 7.90   | 9.10               | 8.47   | 7.85   |
| 1602  | 2.41           | 2.95   | 3.39   | 5.95              | 5.46   | 5.05   | 5.86               | 5.43   | 5.02   |
| 1610  | 3.86           | 4.53   | 5.06   | 3.59              | 3.33   | 3.11   | 3.55               | 3.32   | 3.10   |
| 1620  | 6.11           | 6.86   | 7.44   | 1.97              | 1.89   | 1.81   | 1.96               | 1.90   | 1.82   |
| 1625  | 7.30           | 8.07   | 8.66   | 1.49              | 1.48   | 1.43   | 1.50               | 1.49   | 1.45   |
| 1630  | 8.50           | 9.27   | 9.85   | 1.16              | 1.18   | 1.16   | 1.17               | 1.20   | 1.18   |
| 1650  | 13.00          | 13.72  | 14.24  | 0.51              | 0.59   | 0.62   | 0.54               | 0.63   | 0.66   |
| 1660  | 15.01          | 15.70  | 16.19  | 0.38              | 0.47   | 0.51   | 0.42               | 0.51   | 0.54   |
| 1675  | 17.73          | 18.38  | 18.82  | 0.27              | 0.36   | 0.41   | 0.31               | 0.40   | 0.44   |
| 1680  | 18.57          | 19.20  | 19.63  | 0.25              | 0.34   | 0.38   | 0.29               | 0.39   | 0.42   |
| 1720  | 24.31          | 24.85  | 25.19  | 0.16              | 0.25   | 0.29   | 0.21               | 0.30   | 0.34   |
| 1800  | 32.69          | 33.12  | 33.38  | 0.13              | 0.21   | 0.25   | 0.19               | 0.27   | 0.30   |
| 2100  | 77.44          | 80.75  | 90.00  | 0.15              | 0.23   | 0.26   | 0.21               | 0.28   | 0.31   |
| 2170  | 57.17          | 57.08  | 56.80  | 0.16              | 0.24   | 0.27   | 0.22               | 0.29   | 0.31   |
| 2590  | 41.35          | 41.28  | 41.25  | 0.20              | 0.30   | 0.34   | 0.23               | 0.33   | 0.36   |
| 2650  | 40.25          | 40.20  | 40.30  | 0.21              | 0.32   | 0.36   | 0.24               | 0.34   | 0.37   |
| 2800  | 38.89          | 38.86  | 38.82  | 0.22              | 0.33   | 0.39   | 0.24               | 0.35   | 0.40   |
| 3000  | 36.50          | 36.56  | 36.82  | 0.24              | 0.37   | 0.45   | 0.24               | 0.37   | 0.44   |

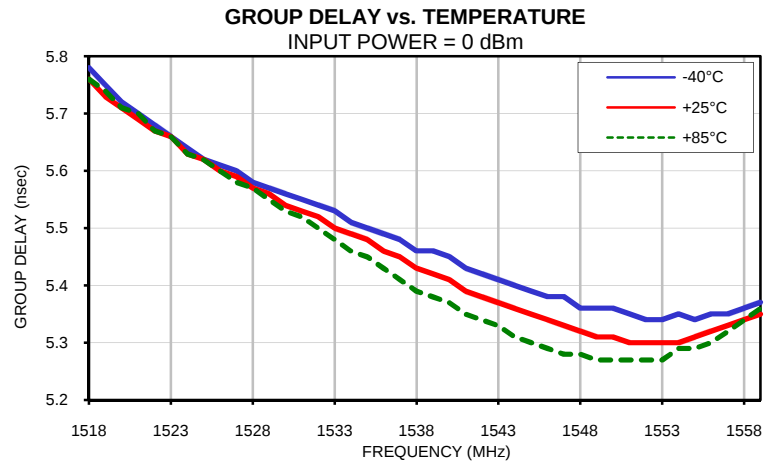
**Band Pass Filter****CBP-1538J+***Typical Performance Data*

| FREQ. | GROUP DELAY |        |        |
|-------|-------------|--------|--------|
| (MHz) | (nsec)      |        |        |
|       | @-40°C      | @+25°C | @+85°C |
| 1518  | 5.78        | 5.76   | 5.76   |
| 1519  | 5.75        | 5.73   | 5.74   |
| 1520  | 5.72        | 5.71   | 5.71   |
| 1521  | 5.70        | 5.69   | 5.70   |
| 1522  | 5.68        | 5.67   | 5.67   |
| 1523  | 5.66        | 5.66   | 5.66   |
| 1524  | 5.64        | 5.63   | 5.63   |
| 1525  | 5.62        | 5.62   | 5.62   |
| 1526  | 5.61        | 5.60   | 5.60   |
| 1527  | 5.60        | 5.59   | 5.58   |
| 1528  | 5.58        | 5.57   | 5.57   |
| 1529  | 5.57        | 5.56   | 5.55   |
| 1530  | 5.56        | 5.54   | 5.53   |
| 1531  | 5.55        | 5.53   | 5.52   |
| 1532  | 5.54        | 5.52   | 5.50   |
| 1533  | 5.53        | 5.50   | 5.48   |
| 1534  | 5.51        | 5.49   | 5.46   |
| 1535  | 5.50        | 5.48   | 5.45   |
| 1536  | 5.49        | 5.46   | 5.43   |
| 1537  | 5.48        | 5.45   | 5.41   |
| 1538  | 5.46        | 5.43   | 5.39   |
| 1539  | 5.46        | 5.42   | 5.38   |
| 1540  | 5.45        | 5.41   | 5.37   |
| 1541  | 5.43        | 5.39   | 5.35   |
| 1542  | 5.42        | 5.38   | 5.34   |
| 1543  | 5.41        | 5.37   | 5.33   |
| 1544  | 5.40        | 5.36   | 5.31   |
| 1545  | 5.39        | 5.35   | 5.30   |
| 1546  | 5.38        | 5.34   | 5.29   |
| 1547  | 5.38        | 5.33   | 5.28   |
| 1548  | 5.36        | 5.32   | 5.28   |
| 1549  | 5.36        | 5.31   | 5.27   |
| 1550  | 5.36        | 5.31   | 5.27   |
| 1551  | 5.35        | 5.30   | 5.27   |
| 1552  | 5.34        | 5.30   | 5.27   |
| 1553  | 5.34        | 5.30   | 5.27   |
| 1554  | 5.35        | 5.30   | 5.29   |
| 1555  | 5.34        | 5.31   | 5.29   |
| 1556  | 5.35        | 5.32   | 5.30   |
| 1557  | 5.35        | 5.33   | 5.32   |
| 1558  | 5.36        | 5.34   | 5.34   |
| 1559  | 5.37        | 5.35   | 5.36   |

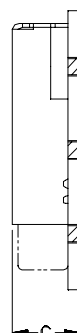
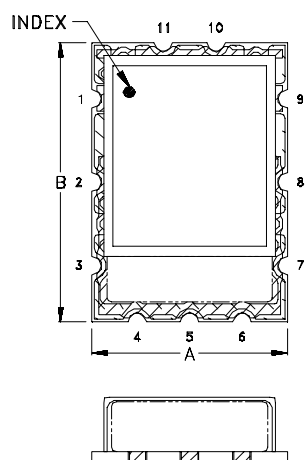
## Typical Performance Curves



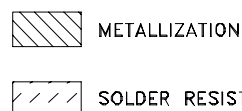
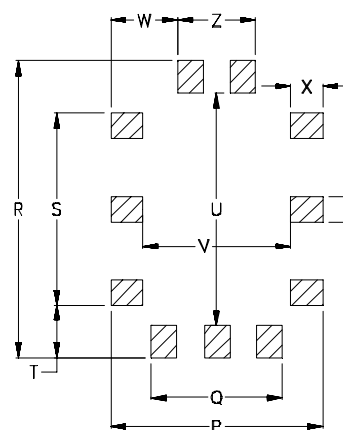
## Typical Performance Curves



### Outline Dimensions



### PCB Land Pattern



| CASE#  | A               | B               | C              | D              | E              | F              | G              | H              | J              | K              | L              | M              | N              |
|--------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| MQ1770 | .460<br>(11.68) | .660<br>(16.76) | .175<br>(4.45) | .133<br>(3.38) | .197<br>(5.00) | .106<br>(2.69) | .124<br>(3.15) | .060<br>(1.52) | .140<br>(3.56) | .055<br>(1.40) | .095<br>(2.41) | .124<br>(3.15) | .168<br>(4.27) |

| CASE#  | P               | Q              | R               | S               | T              | U               | V              | W              | X              | Y              | Z              | WT,GRAMS |
|--------|-----------------|----------------|-----------------|-----------------|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------|
| MQ1770 | .500<br>(12.70) | .308<br>(7.82) | .700<br>(17.78) | .454<br>(11.53) | .123<br>(3.12) | .550<br>(13.97) | .350<br>(8.89) | .158<br>(4.01) | .075<br>(1.91) | .060<br>(1.52) | .184<br>(4.67) | 1.8      |

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

#### Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:

For RoHS Case Styles: 2-5  $\mu$  inch (.05-.13 microns) Gold over 120-240  $\mu$  inch (3.05-6.10 microns) Nickel plate.  
All models, (+) suffix.



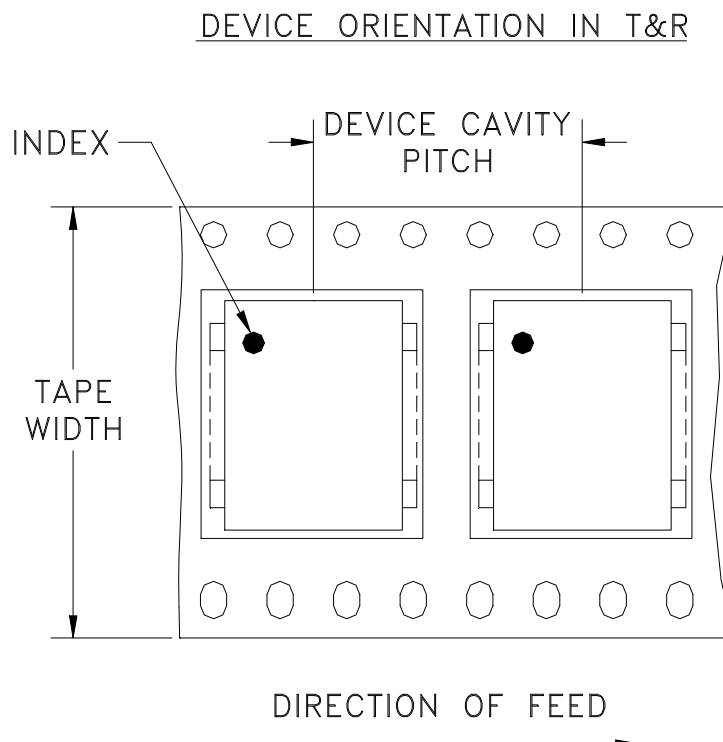
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# Tape & Reel Packaging TR-F5



| Tape Width,<br>mm | Device Cavity<br>Pitch, mm | Reel Size,<br>inches | Devices per Reel |
|-------------------|----------------------------|----------------------|------------------|
| 32                | 16                         | 13                   | 500              |

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)

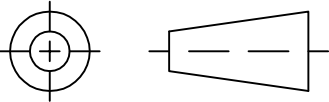


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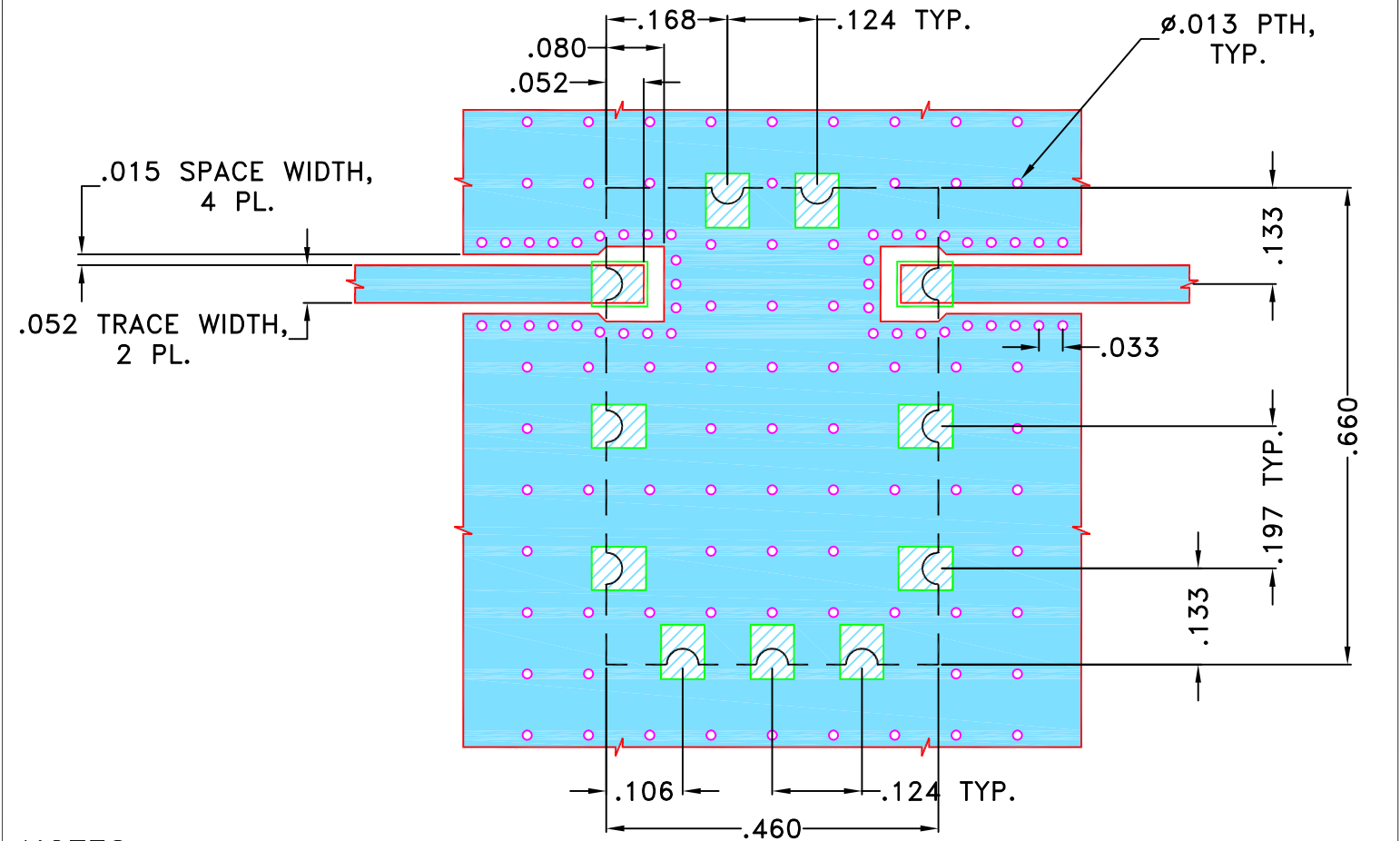
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|                                                                                   |  |           |         |             |        |     |      |
|-----------------------------------------------------------------------------------|--|-----------|---------|-------------|--------|-----|------|
| THIRD ANGLE PROJECTION                                                            |  | REVISIONS |         |             |        |     |      |
|  |  | REV       | ECN No. | DESCRIPTION | DATE   | DR  | AUTH |
|                                                                                   |  | OR        | M137891 | NEW RELEASE | JUL 12 | DDR | KG   |
|                                                                                   |  |           |         |             |        |     |      |
|                                                                                   |  |           |         |             |        |     |      |
|                                                                                   |  |           |         |             |        |     |      |

SUGGESTED MOUNTING CONFIGURATION FOR  
MQ1770 CASE STYLE "11FL01" PIN CODE



NOTES:

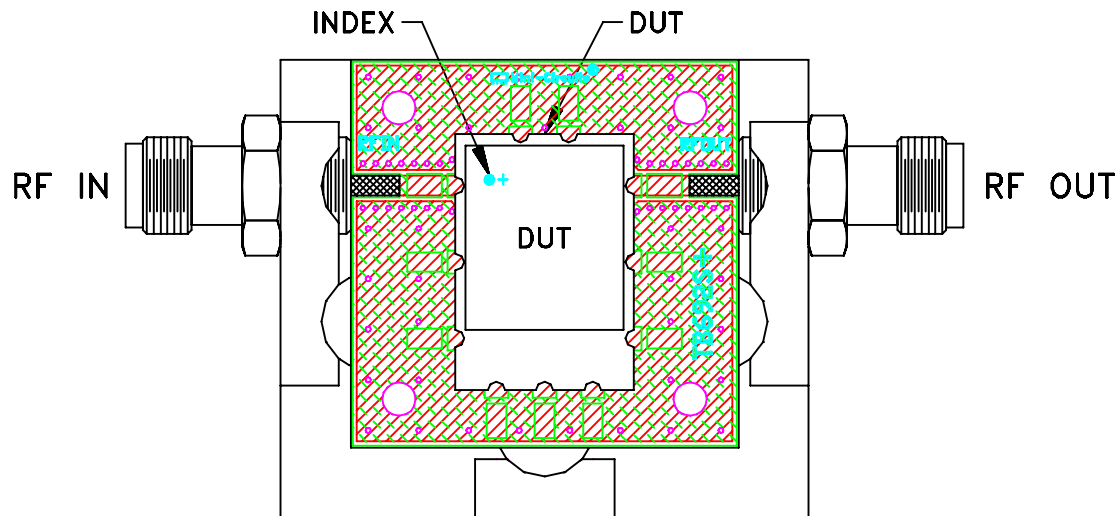
- TRACE WIDTH IS SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS .030"±.002". COPPER: 1/2 OZ. EACH SIDE.  
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

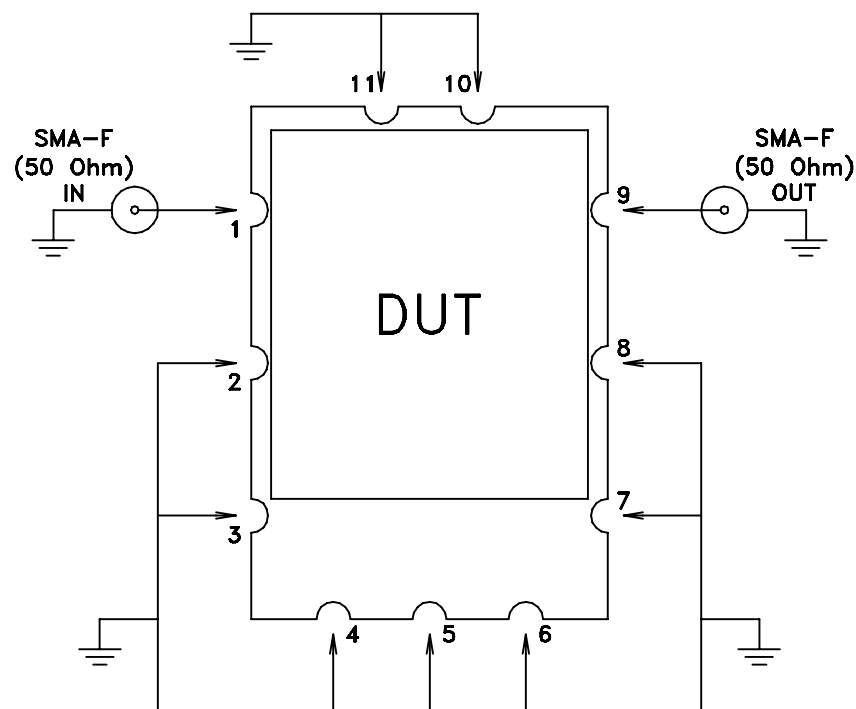
 DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |          |     |           |  |                                                                                                   |  |            |               |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------|-----|-----------|--|---------------------------------------------------------------------------------------------------|--|------------|---------------|--|
| UNLESS OTHERWISE SPECIFIED                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  | INITIALS |     | DATE      |  | <div><div></div><div>Mini-Circuits®</div><div>13 Neptune Avenue<br/>Brooklyn NY 11235</div></div> |  |            |               |  |
| DIMENSIONS ARE IN INCHES                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  | DRAWN    | DDR | 06 JUL 12 |  | PL,11FL01, MQ1770, BPF,<br>TB-692+, 50 Ohm                                                        |  |            |               |  |
| TOLERANCES ON:                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  | CHECKED  | MD  | 06 JUL 12 |  |                                                                                                   |  |            |               |  |
| 2 PL DECIMALS ±                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  | APPROVED | KR  | 06 JUL 12 |  |                                                                                                   |  |            |               |  |
| 3 PL DECIMALS ± .005                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |          |     |           |  |                                                                                                   |  |            |               |  |
| ANGLES ±                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |          |     |           |  | SIZE A CODE IDENT 15542 DRAWING NO: 98-PL-375 REV: OR                                             |  |            |               |  |
| FRACTIONS ±                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |          |     |           |  |                                                                                                   |  |            |               |  |
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| ASHEETA1.DWG REV:A DATE:01/12/95                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |          |     |           |  |                                                                                                   |  |            |               |  |

# Evaluation Board and Circuit



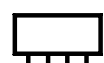
TB-692+



Schematic Diagram

## Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: ROGERS (R04350B) OR Equivalent  
Dielectric Constant= $3.48 \pm .05$ , Thickness=.030 inch.

 Mini-Circuits®



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                           |
| Humidity                   | 90 to 95% RH, 96 hours, 40°C                                      | MIL-STD-202, Method 103B, Condition B, Except 50°C    |
| Thermal Shock              | -55° to 100°C, 100 cycles                                         | MIL-STD-202, Method 107, Condition A-3, except +100°C |
| Solder Reflow Heat         | Sn-Pb Eutectic Process: 225°C peak<br>Pb-Free Process, 245°C peak | J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1         |
| Solderability              | 10X Magnification                                                 | J-STD-002, Para 4.2.5, Test S, 95% Coverage           |
| Vibration (High Frequency) | 20g peak, 10-2000 Hz, 4 times in each of three axes (total 12)    | MIL-STD-202, Method 204, Condition D                  |
| Mechanical Shock           | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes | MIL-STD-202, Method 213, Condition A                  |