

Surface Mount Bandpass Filter

CBP-770C+

50Ω 760 to 780 MHz

The Big Deal

- Narrow bandwidth
- Excellent Rejection
- High power handling
- Miniature shielded package



Generic photo used for illustration purposes only
CASE STYLE: MP1766

Product Overview

CBP-770C+ is a ceramic-coaxial-resonator based bandpass filter in a shielded package fabricated using SMT technology. This filter offers outstanding close in rejection, low insertion loss and high power handling for use in wireless control systems.

Key Features

| Feature | Advantages |
|---------------------|--|
| High Selectivity | The CBP-770C+ filter incorporates High-Q ceramic resonators that enables sharp rejection near passband. |
| Low Passband VSWR | This filter maintains typical VSWR over passband frequency range making this filter easier to integrate into receiver and transmitter RF chains with less concerns for in band frequency ripple. |
| Rugged construction | The CBP-770C+ has been qualified over wide range of thermal, mechanical and environmental conditions including withstanding the stress of extensive solder reflow cycles. |

Notes

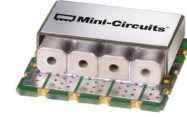
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Features

- Narrow bandwidth
- Excellent rejection
- High selectivity
- High power handling
- Miniature shielded package

Applications

- Wireless control system (WCS)
- Amateur radio bands
- Mobile test system
- Public safety services

Electrical Specifications at 25°C

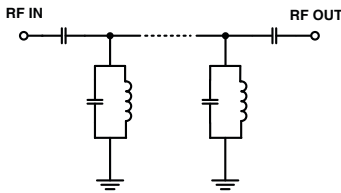
| Parameter | F# | Frequency (MHz) | Min. | Typ. | Max. | Unit | |
|------------------|------------------|-----------------|----------|------|------|------|----|
| Pass Band | Center Frequency | — | — | 770 | — | MHz | |
| | Insertion Loss | F1-F2 | 760-780 | — | 1.0 | 2.0 | dB |
| | VSWR | F1-F2 | 760-780 | — | 1.24 | 2.1 | :1 |
| Stop Band, Lower | Insertion Loss | DC-F3 | DC-705 | 20 | 29 | — | dB |
| | VSWR | DC-F3 | DC-705 | — | 20 | — | :1 |
| Stop Band, Upper | Insertion Loss | F4-F5 | 840-1650 | 20 | 27 | — | dB |
| | VSWR | F4-F5 | 840-1650 | — | 20 | — | :1 |

Maximum Ratings

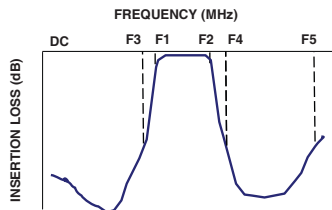
| | |
|-----------------------|----------------|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature | -55°C to 100°C |
| RF Power Input | 10W |

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

Functional Schematic



Typical Frequency Response

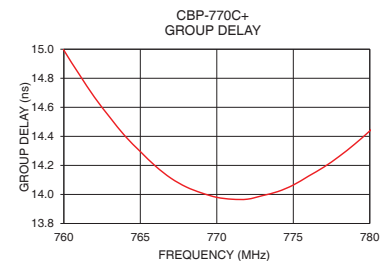
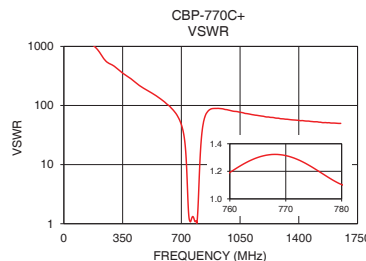
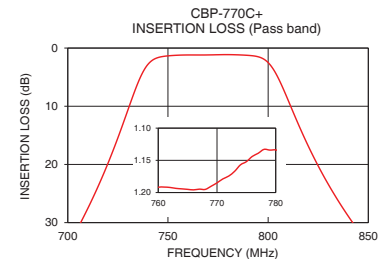
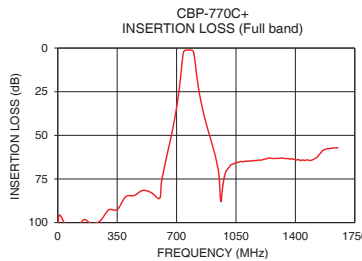


Typical Performance Data at 25°C

| Frequency (MHz) | Insertion Loss (dB) | VSWR (:1) | Frequency (MHz) | Group Delay (nsec) |
|-----------------|---------------------|-----------|-----------------|--------------------|
| 1 | 102.23 | 29634.56 | 760 | 14.99 |
| 500 | 81.57 | 178.11 | 762 | 14.67 |
| 650 | 58.48 | 84.53 | 763 | 14.53 |
| 705 | 30.93 | 42.72 | 764 | 14.40 |
| 719 | 20.69 | 26.55 | 765 | 14.30 |
| 730 | 10.65 | 10.80 | 766 | 14.19 |
| 739 | 3.27 | 2.60 | 767 | 14.11 |
| 745 | 1.64 | 1.31 | 768 | 14.05 |
| 760 | 1.19 | 1.19 | 769 | 14.01 |
| 770 | 1.18 | 1.31 | 770 | 13.98 |
| 780 | 1.13 | 1.10 | 771 | 13.97 |
| 795 | 1.50 | 1.18 | 772 | 13.97 |
| 802 | 3.34 | 2.82 | 773 | 13.99 |
| 810 | 8.98 | 10.18 | 774 | 14.02 |
| 825 | 20.27 | 39.30 | 775 | 14.06 |
| 840 | 28.90 | 63.63 | 776 | 14.13 |
| 843 | 30.40 | 67.60 | 777 | 14.19 |
| 1000 | 69.42 | 81.18 | 778 | 14.26 |
| 1400 | 64.00 | 56.00 | 779 | 14.35 |
| 1650 | 57.04 | 49.83 | 780 | 14.44 |

+RoHS Compliant

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



Notes

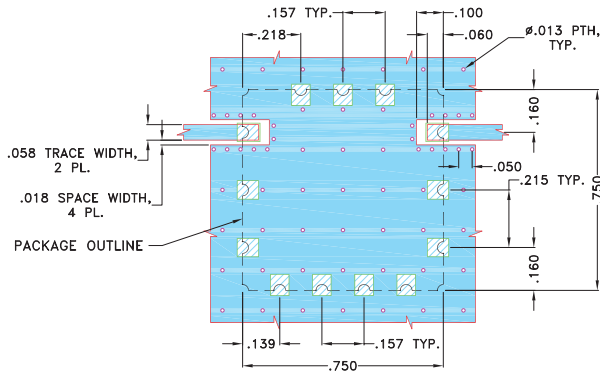
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Pad Connections

| | |
|--------|--------------------------|
| INPUT | 1 |
| OUTPUT | 10 |
| GROUND | 2,3,4,5,6,7,8,9,11,12,13 |

Demo Board MCL P/N: TB-684+
Suggested PCB Layout (PL-373)

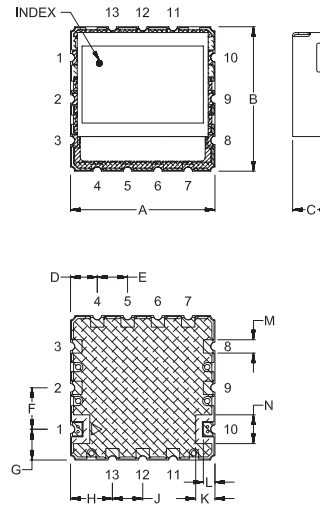


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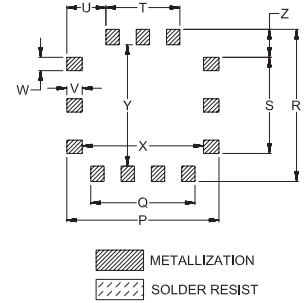
- TRACE WIDTH IS SHOWN FOR OAK (OAK-602) WITH DIELECTRIC THICKNESS .022"±.0015". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
- DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

Outline Drawing



PCB Land Pattern



Outline Dimensions (inch)

| A | B | C | D | E | F | G | H | J | K | L | M | N |
|-------|-------|-------|-------|------|------|------|------|-------|-------|------|-------|------|
| .750 | .750 | .210 | .139 | .157 | .215 | .160 | .218 | .157 | .100 | .060 | .069 | .149 |
| 19.05 | 19.05 | 5.33 | 3.53 | 3.99 | 5.46 | 4.06 | 5.54 | 3.99 | 2.54 | 1.52 | 1.75 | 3.78 |
| P | Q | R | S | T | U | V | W | X | Y | Z | wt. | |
| .790 | .541 | .790 | .499 | .384 | .203 | .080 | .069 | .630 | .630 | .145 | grams | |
| 20.07 | 13.74 | 20.07 | 12.67 | 9.75 | 5.16 | 2.03 | 1.75 | 16.00 | 16.00 | 3.68 | 4.6 | |

Note: Please refer to case style drawing for details

Notes

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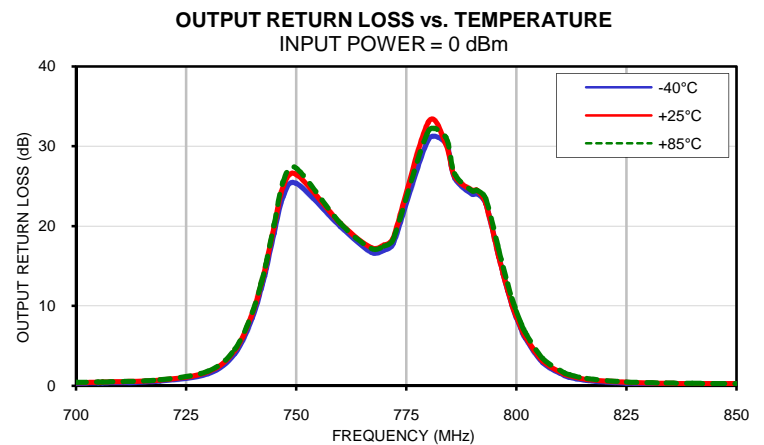
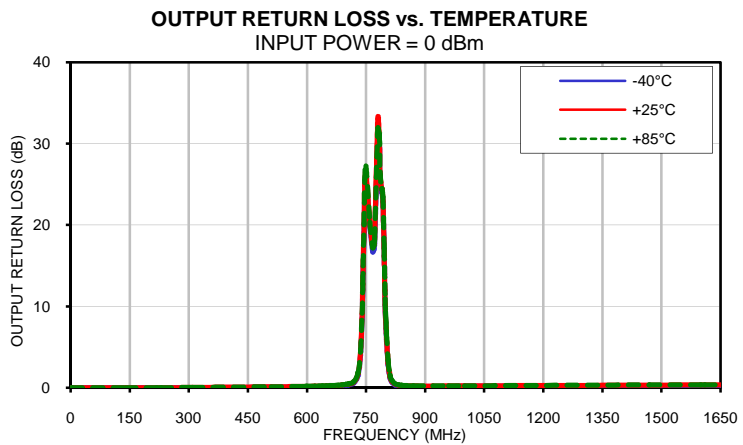
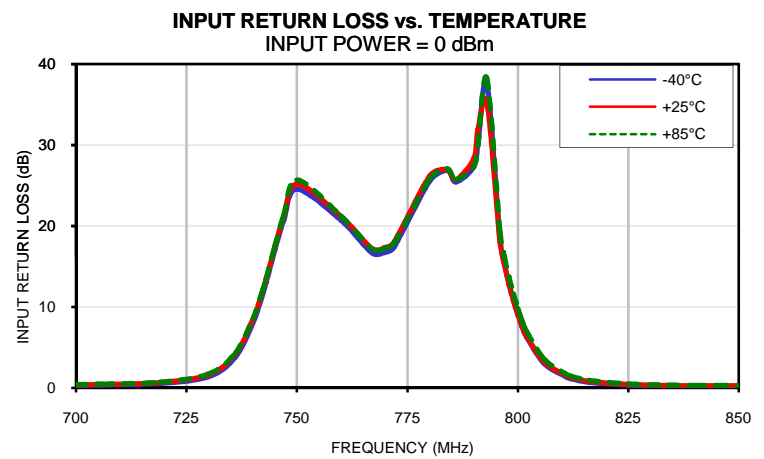
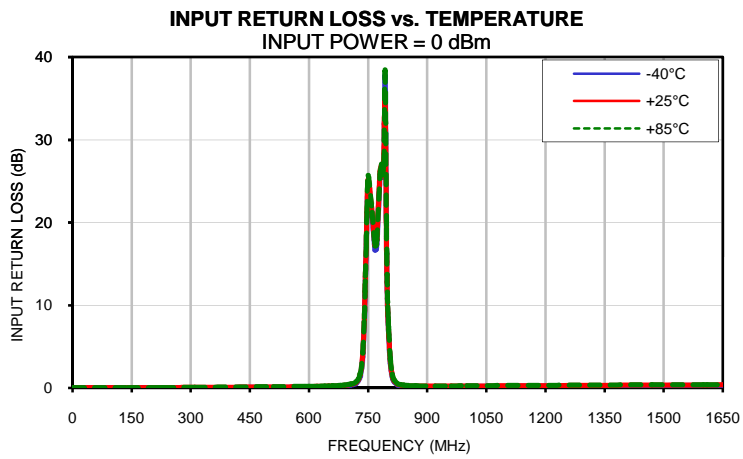
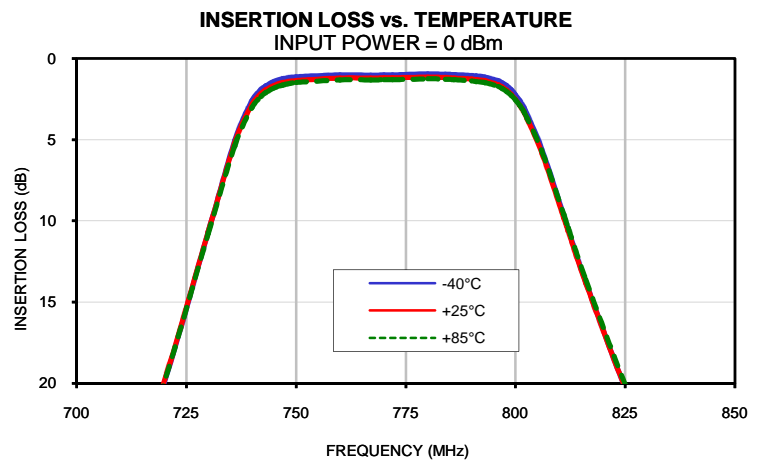
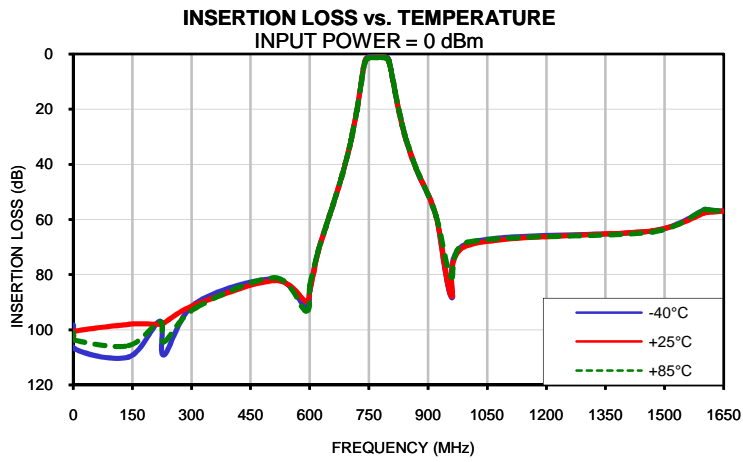
Typical Performance Data

| FREQ. (MHz) | INSERTION LOSS | | | INPUT RETURN LOSS | | | OUTPUT RETURN LOSS | | |
|--------------------|----------------|--------|--------|-------------------|--------|--------|--------------------|--------|--------|
| | (dB) | | | (dB) | | | (dB) | | |
| | @-40°C | @+25°C | @+85°C | @-40°C | @+25°C | @+85°C | @-40°C | @+25°C | @+85°C |
| 1 | 98.28 | 102.23 | 101.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4 | 106.86 | 100.47 | 103.72 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 140 | 109.88 | 98.04 | 105.75 | 0.00 | 0.01 | 0.02 | 0.00 | 0.01 | 0.01 |
| 220 | 96.90 | 98.02 | 97.16 | 0.01 | 0.02 | 0.03 | 0.01 | 0.03 | 0.03 |
| 230 | 109.06 | 97.48 | 104.33 | 0.01 | 0.02 | 0.03 | 0.01 | 0.03 | 0.03 |
| 310 | 90.43 | 90.92 | 92.18 | 0.02 | 0.04 | 0.05 | 0.02 | 0.04 | 0.05 |
| 510 | 81.60 | 82.15 | 81.13 | 0.07 | 0.10 | 0.12 | 0.08 | 0.12 | 0.13 |
| 590 | 91.75 | 89.64 | 93.16 | 0.10 | 0.15 | 0.17 | 0.12 | 0.17 | 0.19 |
| 600 | 85.89 | 86.13 | 83.95 | 0.11 | 0.15 | 0.17 | 0.13 | 0.18 | 0.20 |
| 620 | 72.23 | 72.21 | 72.12 | 0.12 | 0.17 | 0.19 | 0.15 | 0.20 | 0.22 |
| 640 | 62.97 | 62.91 | 62.88 | 0.14 | 0.19 | 0.22 | 0.17 | 0.22 | 0.24 |
| 650 | 58.65 | 58.48 | 58.53 | 0.15 | 0.21 | 0.23 | 0.18 | 0.24 | 0.26 |
| 660 | 54.40 | 54.25 | 54.18 | 0.17 | 0.22 | 0.25 | 0.20 | 0.26 | 0.28 |
| 680 | 45.09 | 44.98 | 44.98 | 0.21 | 0.27 | 0.30 | 0.24 | 0.31 | 0.34 |
| 690 | 39.92 | 39.81 | 39.83 | 0.24 | 0.31 | 0.34 | 0.28 | 0.35 | 0.38 |
| 700 | 34.20 | 34.08 | 34.10 | 0.29 | 0.36 | 0.40 | 0.33 | 0.41 | 0.45 |
| 705 | 31.06 | 30.93 | 30.97 | 0.33 | 0.41 | 0.45 | 0.37 | 0.46 | 0.49 |
| 706 | 30.41 | 30.28 | 30.31 | 0.33 | 0.42 | 0.46 | 0.38 | 0.47 | 0.50 |
| 719 | 20.80 | 20.69 | 20.76 | 0.54 | 0.65 | 0.72 | 0.60 | 0.72 | 0.78 |
| 730 | 10.67 | 10.65 | 10.79 | 1.39 | 1.61 | 1.72 | 1.52 | 1.75 | 1.85 |
| 736 | 5.06 | 5.20 | 5.38 | 3.76 | 4.13 | 4.26 | 4.02 | 4.42 | 4.56 |
| 740 | 2.58 | 2.81 | 3.00 | 7.95 | 8.39 | 8.51 | 8.51 | 9.04 | 9.18 |
| 742 | 1.90 | 2.15 | 2.33 | 11.15 | 11.59 | 11.68 | 12.09 | 12.68 | 12.80 |
| 743 | 1.68 | 1.93 | 2.10 | 13.00 | 13.43 | 13.51 | 14.24 | 14.86 | 15.00 |
| 745 | 1.40 | 1.64 | 1.80 | 16.98 | 17.37 | 17.46 | 19.12 | 19.94 | 20.18 |
| 747 | 1.24 | 1.48 | 1.63 | 20.70 | 21.12 | 21.30 | 23.64 | 24.88 | 25.53 |
| 750 | 1.12 | 1.35 | 1.48 | 24.52 | 25.19 | 25.68 | 25.35 | 26.48 | 27.25 |
| 760 | 1.00 | 1.19 | 1.31 | 20.69 | 21.17 | 21.23 | 19.97 | 20.36 | 20.36 |
| 767 | 1.01 | 1.19 | 1.31 | 16.66 | 17.21 | 17.16 | 16.74 | 17.30 | 17.22 |
| 770 | 1.00 | 1.18 | 1.30 | 16.75 | 17.35 | 17.26 | 17.00 | 17.64 | 17.51 |
| 772 | 0.99 | 1.17 | 1.29 | 17.37 | 18.01 | 17.87 | 17.78 | 18.48 | 18.31 |
| 780 | 0.94 | 1.13 | 1.24 | 25.51 | 26.15 | 25.82 | 30.84 | 33.01 | 31.90 |
| 784 | 0.96 | 1.16 | 1.27 | 26.86 | 26.93 | 27.07 | 30.38 | 30.21 | 31.10 |
| 786 | 0.98 | 1.19 | 1.30 | 25.45 | 25.70 | 25.74 | 26.06 | 26.24 | 26.57 |
| 790 | 1.04 | 1.26 | 1.38 | 27.29 | 28.33 | 27.37 | 24.00 | 24.47 | 24.40 |
| 791 | 1.07 | 1.29 | 1.41 | 30.20 | 31.94 | 29.96 | 24.07 | 24.50 | 24.48 |
| 793 | 1.13 | 1.36 | 1.48 | 37.57 | 35.30 | 38.21 | 22.84 | 22.89 | 23.46 |
| 796 | 1.35 | 1.61 | 1.71 | 18.29 | 18.01 | 19.25 | 16.24 | 16.16 | 17.08 |
| 797 | 1.48 | 1.75 | 1.85 | 15.30 | 15.16 | 16.20 | 13.99 | 13.97 | 14.83 |
| 798 | 1.67 | 1.94 | 2.02 | 12.84 | 12.80 | 13.70 | 11.96 | 11.99 | 12.78 |
| 799 | 1.91 | 2.19 | 2.25 | 10.78 | 10.81 | 11.60 | 10.14 | 10.23 | 10.95 |
| 800 | 2.21 | 2.50 | 2.54 | 9.02 | 9.11 | 9.81 | 8.56 | 8.68 | 9.33 |
| 801 | 2.60 | 2.88 | 2.90 | 7.53 | 7.66 | 8.28 | 7.17 | 7.33 | 7.92 |
| 802 | 3.05 | 3.34 | 3.33 | 6.27 | 6.43 | 6.98 | 5.99 | 6.17 | 6.70 |
| 806 | 5.60 | 5.84 | 5.72 | 3.01 | 3.20 | 3.53 | 2.88 | 3.09 | 3.40 |
| 811 | 9.66 | 9.80 | 9.60 | 1.33 | 1.49 | 1.66 | 1.27 | 1.44 | 1.61 |
| 812 | 10.49 | 10.62 | 10.42 | 1.15 | 1.31 | 1.46 | 1.10 | 1.27 | 1.41 |
| 816 | 13.75 | 13.82 | 13.60 | 0.71 | 0.84 | 0.94 | 0.68 | 0.82 | 0.92 |
| 825 | 20.28 | 20.27 | 20.06 | 0.34 | 0.44 | 0.50 | 0.34 | 0.45 | 0.50 |
| 834 | 25.77 | 25.71 | 25.51 | 0.23 | 0.31 | 0.36 | 0.24 | 0.33 | 0.37 |
| 840 | 28.98 | 28.90 | 28.71 | 0.20 | 0.27 | 0.31 | 0.21 | 0.29 | 0.33 |
| 845 | 31.44 | 31.35 | 31.16 | 0.18 | 0.25 | 0.29 | 0.19 | 0.27 | 0.30 |
| 870 | 41.83 | 41.68 | 41.52 | 0.14 | 0.20 | 0.23 | 0.16 | 0.23 | 0.26 |
| 920 | 58.88 | 58.81 | 58.61 | 0.14 | 0.19 | 0.22 | 0.17 | 0.23 | 0.25 |
| 960 | 88.29 | 87.87 | 81.06 | 0.14 | 0.20 | 0.23 | 0.18 | 0.24 | 0.26 |
| 1000 | 68.66 | 69.42 | 68.30 | 0.16 | 0.21 | 0.24 | 0.19 | 0.26 | 0.27 |
| 1470 | 64.24 | 64.03 | 64.49 | 0.27 | 0.32 | 0.35 | 0.28 | 0.35 | 0.36 |
| 1600 | 56.49 | 57.64 | 56.45 | 0.28 | 0.34 | 0.37 | 0.29 | 0.37 | 0.38 |
| 1610 | 56.57 | 57.41 | 56.55 | 0.28 | 0.34 | 0.37 | 0.29 | 0.36 | 0.38 |
| 1650 | 56.97 | 57.04 | 57.10 | 0.28 | 0.35 | 0.38 | 0.28 | 0.36 | 0.38 |

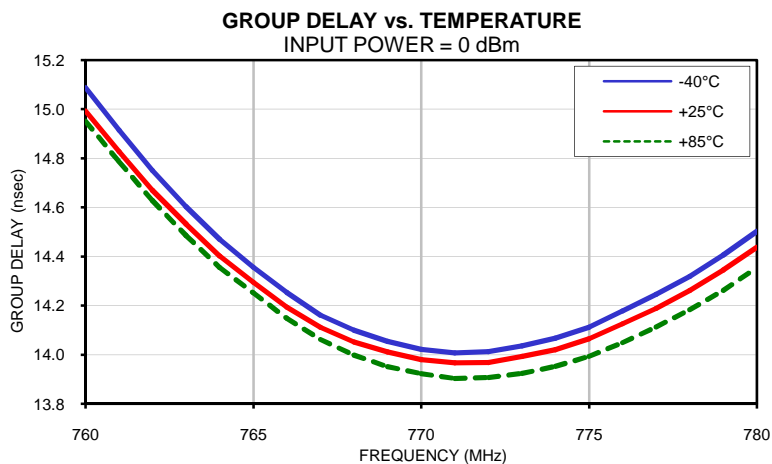
Typical Performance Data

| FREQ. (MHz) | GROUP DELAY | | |
|--------------------|-------------|--------|--------|
| | (nsec) | | |
| | @-40°C | @+25°C | @+85°C |
| 760 | 15.09 | 14.99 | 14.95 |
| 761 | 14.92 | 14.83 | 14.79 |
| 762 | 14.75 | 14.67 | 14.63 |
| 763 | 14.60 | 14.53 | 14.49 |
| 764 | 14.47 | 14.40 | 14.36 |
| 765 | 14.36 | 14.30 | 14.25 |
| 766 | 14.25 | 14.19 | 14.15 |
| 767 | 14.16 | 14.11 | 14.06 |
| 768 | 14.10 | 14.05 | 14.00 |
| 769 | 14.05 | 14.01 | 13.95 |
| 770 | 14.02 | 13.98 | 13.92 |
| 771 | 14.01 | 13.97 | 13.90 |
| 772 | 14.01 | 13.97 | 13.91 |
| 773 | 14.04 | 13.99 | 13.92 |
| 774 | 14.07 | 14.02 | 13.95 |
| 775 | 14.11 | 14.06 | 13.99 |
| 776 | 14.18 | 14.13 | 14.05 |
| 777 | 14.25 | 14.19 | 14.11 |
| 778 | 14.32 | 14.26 | 14.18 |
| 779 | 14.41 | 14.35 | 14.26 |
| 780 | 14.50 | 14.44 | 14.36 |

Typical Performance Curves

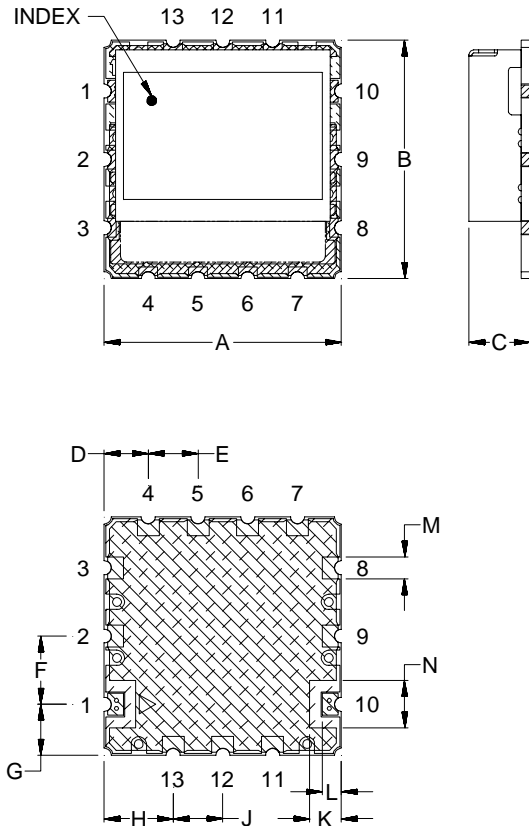


Typical Performance Curves

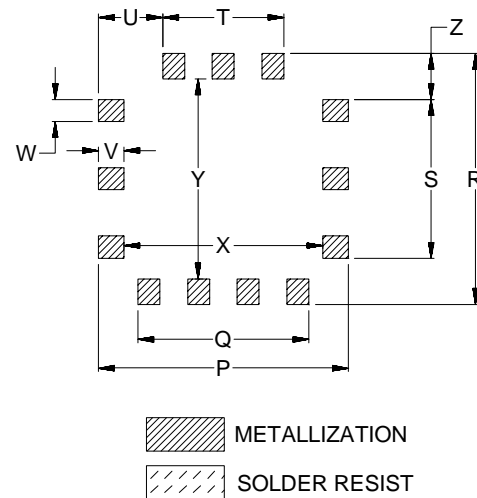


Outline Dimensions

MP1766



PCB Land Pattern



| CASE# | A | B | C | D | E | F | G | H | J | K | L | M | N |
|--------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| MP1766 | .750 (19.05) | .750 (19.05) | .210 (5.33) | .139 (3.53) | .157 (3.99) | .215 (5.46) | .160 (4.06) | .218 (5.54) | .157 (3.99) | .100 (2.54) | .060 (1.52) | .069 (1.75) | .149 (3.78) |

| CASE# | P | Q | R | S | T | U | V | W | X | Y | Z | WT.GRAMS |
|--------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|----------------|----------|
| MP1766 | .790 (20.07) | .541 (13.74) | .790 (20.07) | .499 (12.67) | .384 (9.75) | .203 (5.16) | .080 (2.03) | .069 (1.75) | .630 (16.00) | .630 (16.00) | .145 (3.68) | 4.6 |

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

Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:
For RoHS Case Styles: 2-5 μ inch (.05-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate.
All models, (+) suffix.

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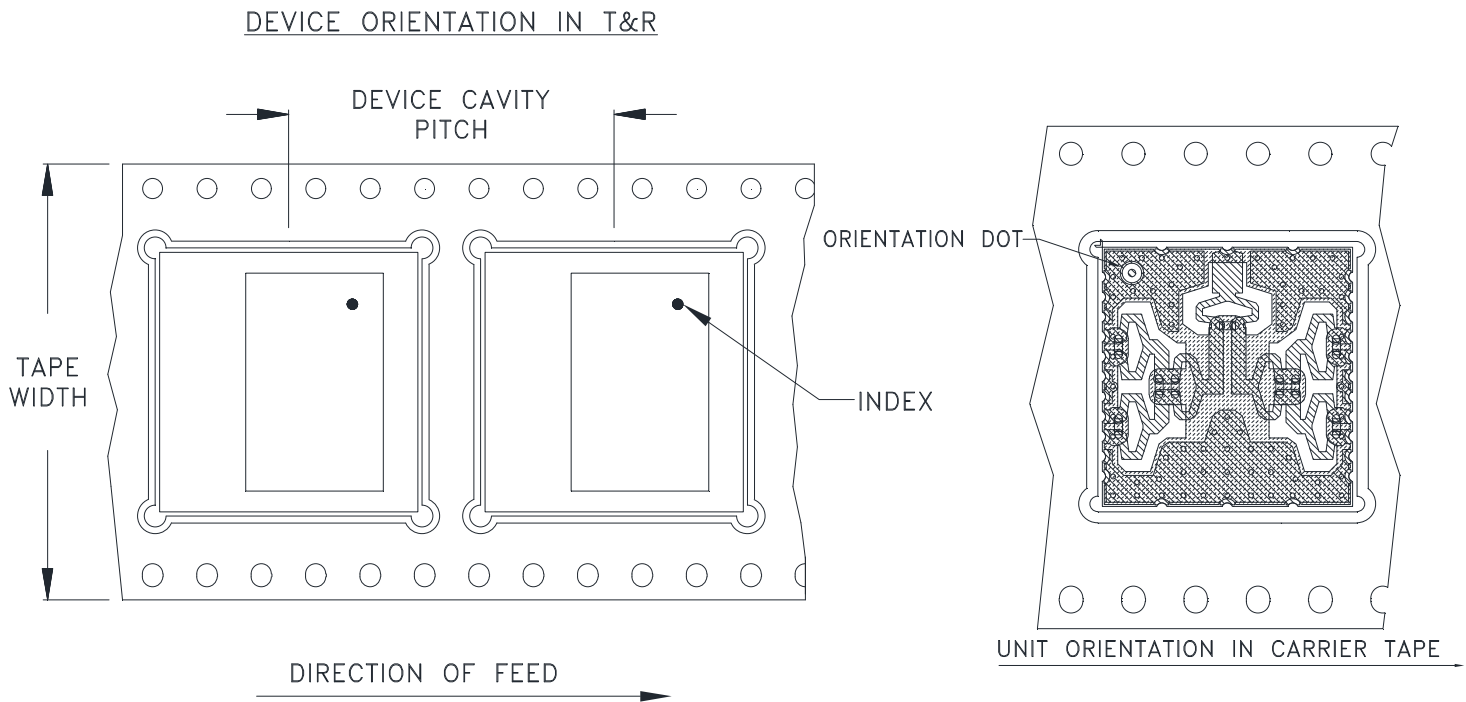
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F111



Applicable Case styles:

Applicable Case styles:RS1539

| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel |
|----------------|-------------------------|-------------------|------------------|
| 32 | 24 | 13 | 250 |

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



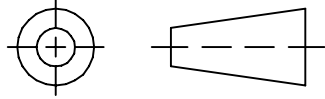
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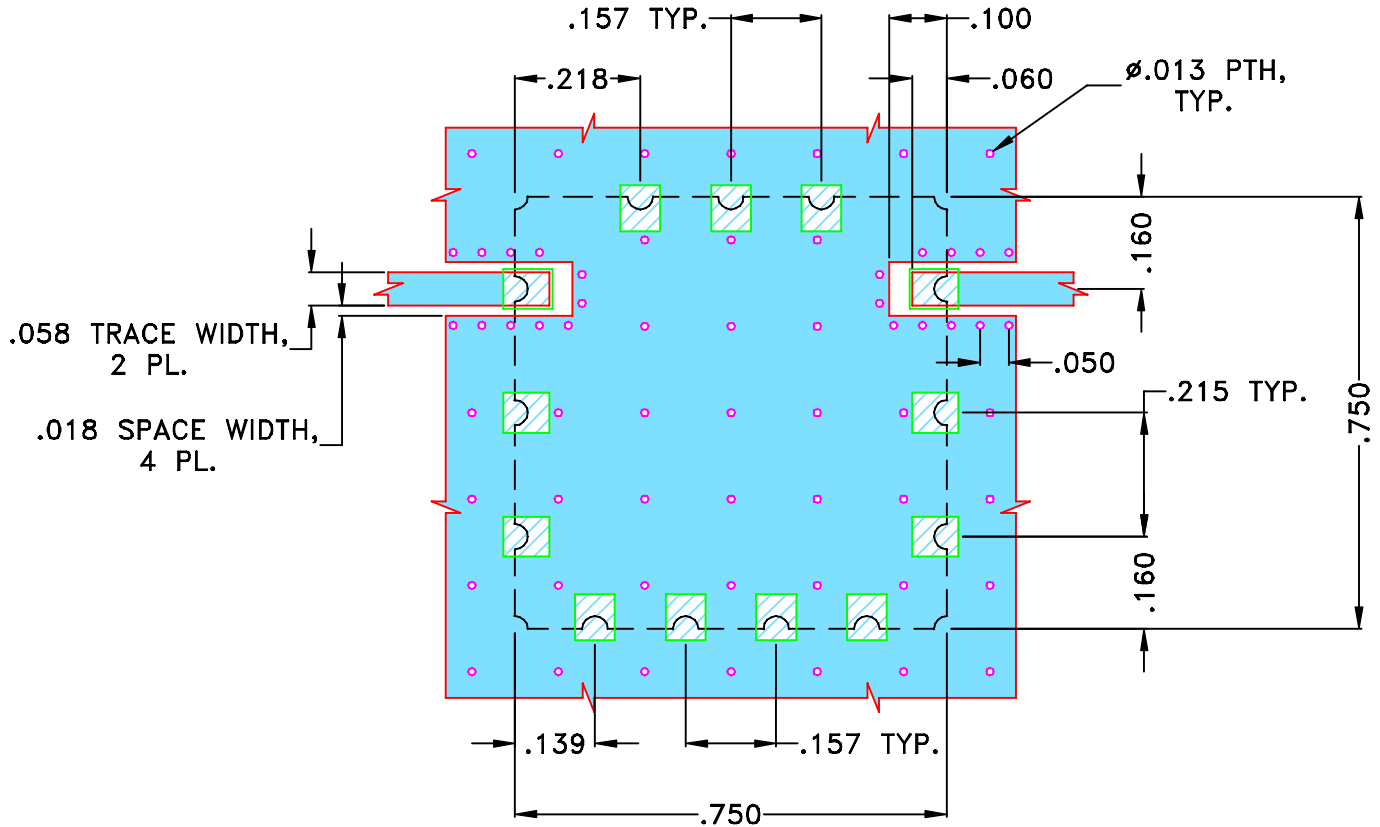
THIRD ANGLE PROJECTION



REVISIONS

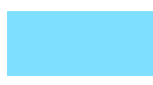
| REV OR | ECN No. | DESCRIPTION | DATE | DR | AUTH |
|--------|---------|-------------|--------|-----|------|
| | M137721 | NEW RELEASE | JUN 12 | DDR | KG |
| | | | | | |
| | | | | | |

SUGGESTED MOUNTING CONFIGURATION FOR MP1766 CASE STYLE "13FL01" PIN CODE




NOTES:

- TRACE WIDTH IS SHOWN FOR OAK (OAK-602) WITH DIELECTRIC THICKNESS .022"±.0015". 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)

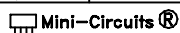
 DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

| UNLESS OTHERWISE SPECIFIED | INITIALS | | DATE |
|---|----------|-----|-----------|
| DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005" ANGLES ± FRACTIONS ± | DRAWN | DDR | 22 JUN 12 |
| | CHECKED | MD | 22 JUN 12 |
| | APPROVED | GM | 22 JUN 12 |

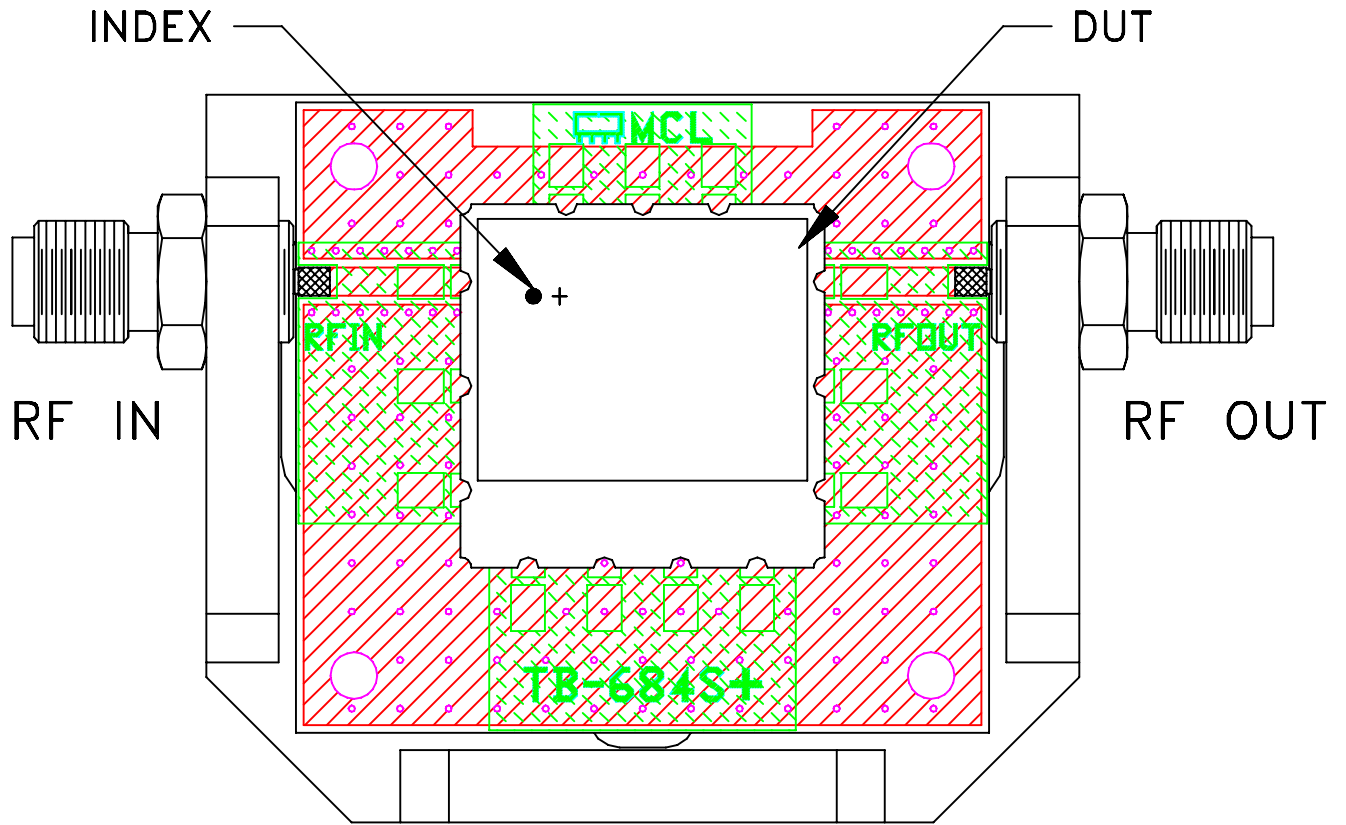
 **Mini-Circuits**® 13 Neptune Avenue
Brooklyn NY 11235

PL, 13FL01, MP1766, BPF,
TB-684+, 50 Ohm

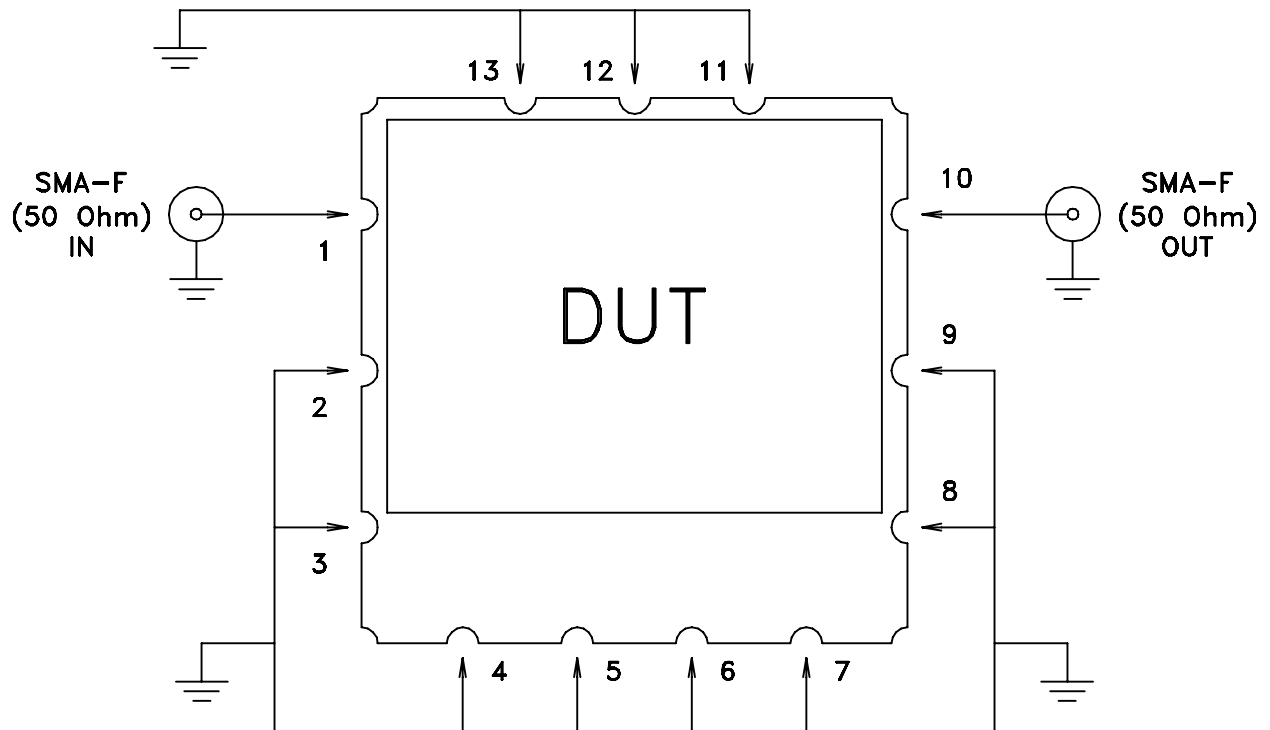
| | | | |
|------------------|---------------------|--------------------------|------------|
| SIZE A | CODE IDENT 15542 | DRAWING NO: 98-PL-373 | REV: OR |
| FILE: 98PL373 | SCALE: 4:1 | SHEET: 1 OF 1 | |

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Evaluation Board and Circuit




TB-684+



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: OAK-602 OR Equivalent
Dielectric Constant= $2.50 \pm .04$, Thickness=.022 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 Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C 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 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 |