



MMIC BALUN

RF Transformer

MTX2-73+

Mini-Circuits

50Ω 2000 to 7000 MHz

THE BIG DEAL

- Wideband, 2000 to 7000 MHz
- Low phase unbalance, 4 deg. and amplitude unbalance, 0.8 dB typ.
- Miniature size, (3 x 3 x 0.89 mm)
- Low cost
- Aqueous washable



Generic photo used for illustration purposes only

CASE STYLE: DQ1225

+RoHS Compliant

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

APPLICATIONS

- WLAN
- WiMAX/WiBRO
- ISM
- RADAR

PRODUCT OVERVIEW

Mini-Circuits MTX2-73+ is a wideband MMIC balun transformer with an impedance ratio of 2:1 covering a wide range of applications from 2000 to 7000 MHz. Fabricated using IPD process technology, this model provides outstanding repeatability with low insertion loss, low amplitude unbalance, low phase unbalance, and RF input power handling up to +34 dBm (2.5W). The unit comes housed in a tiny 3 x 3 x 0.89mm QFN package with low inductance, excellent thermal efficiency, and high ESD rating.

KEY FEATURES

| Feature | Advantages |
|---|---|
| Wideband, 2000 to 7000 MHz | MTX2-73+ supports a broad variety of applications including WLAN, WiMAX, WiBRO, ISM, radar and more. |
| Low insertion loss <ul style="list-style-type: none"> • 0.6 dB, 2600 to 6000 MHz • 1.9 dB, 2000 to 7000 MHz | Enables excellent signal power transmission from input to output. |
| Low unbalance <ul style="list-style-type: none"> • 0.8 dB amplitude unbalance • 4° phase unbalance | Low unbalance can improve a system's electromagnetic compatibility by rejecting unwanted common-mode noise. |
| Tiny size, 3 x 3 x 0.89 mm | Accommodates tight space requirements for dense PCB layouts. |

REV. C
ECO-018306
MTX2-73+
ED-150122/8
AG/CP/AM
210622





ELECTRICAL SPECIFICATIONS AT 25°C

| Parameter | Frequency (MHz) | Min. | Typ. | Max. | Units |
|-------------------------------------|-----------------|------|------|------|--------|
| Impedance Ratio (secondary/primary) | | | 2 | | |
| Frequency Range | | 2000 | | 7000 | MHz |
| Insertion Loss ¹ | 2600 - 6000 | — | 0.6 | 1.0 | dB |
| | 2000 - 7000 | — | 1.9 | 2.3 | |
| Amplitude Unbalance | 2600 - 6000 | — | 0.5 | 0.9 | dB |
| | 2000 - 7000 | — | 0.8 | 1.2 | |
| Phase Unbalance ² | 2600 - 6000 | — | 3 | 5 | Degree |
| | 2000 - 7000 | — | 4 | 7 | |

1. Insertion loss is referenced to mid-band loss, 1.5 dB.

2. Relative to 180°

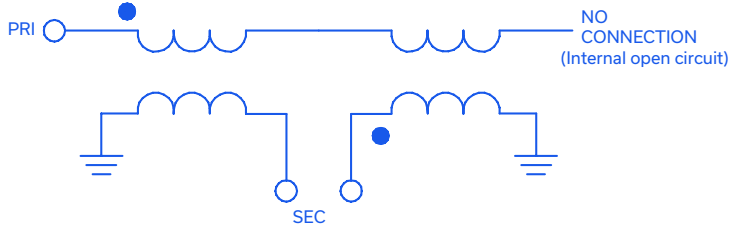
MAXIMUM RATINGS

| Parameter | Ratings |
|-----------------------|----------------|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature | -65°C to 150°C |
| Input RF Power | 34 dBm at 25°C |

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



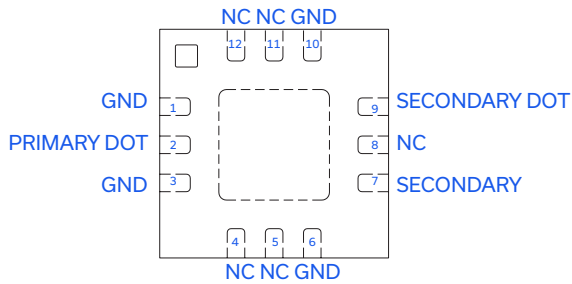
CONFIGURATION J



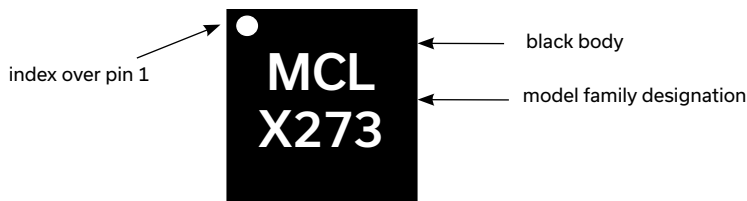
PAD CONNECTIONS

| Function | Pad Number |
|-------------------------------|-------------------|
| PRIMARY DOT (Unbalanced Port) | 2 |
| SECONDARY DOT (Balanced) | 9 |
| SECONDARY (Balanced) | 7 |
| EXTERNAL GND | 1,3,6,10 & paddle |
| NO CONNECTION | all other |

TOP VIEW



PRODUCT MARKING



Marking may contain other features or characters for internal lot control



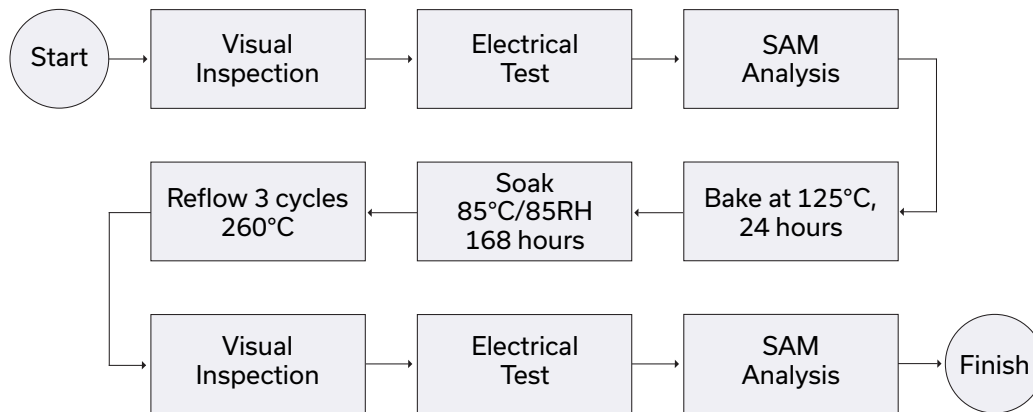
ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS [CLICK HERE](#)

| | |
|--|--|
| Performance Data | Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file) |
| Case Style | DQ1225 Plastic package, exposed paddle lead finish: Matte-Tin |
| Tape & Reel Standard quantities available on reel | F66 7" reels with 20, 50, 100, 200, 500 or 1K devices |
| Suggested Layout for PCB Design | PL-482 |
| Evaluation Board | TB-MTX2-73+ |
| Environmental Ratings | ENV12 |

ESD RATING

Human Body Model (HBM): Class 1B (500 to < 1000V) in accordance with ANSI/ESD STM 5.1 - 2001

MSL TEST FLOW CHART



- 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

RF Transformer

MTX2-73+

Typical Performance Data

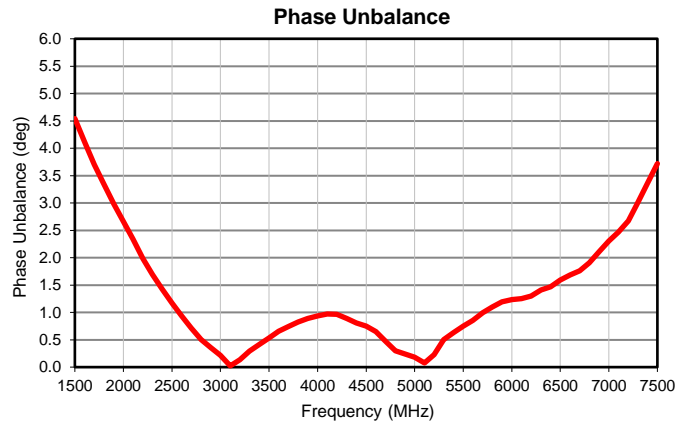
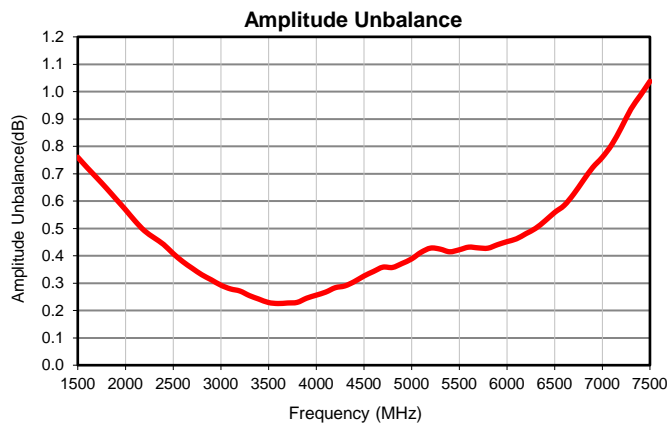
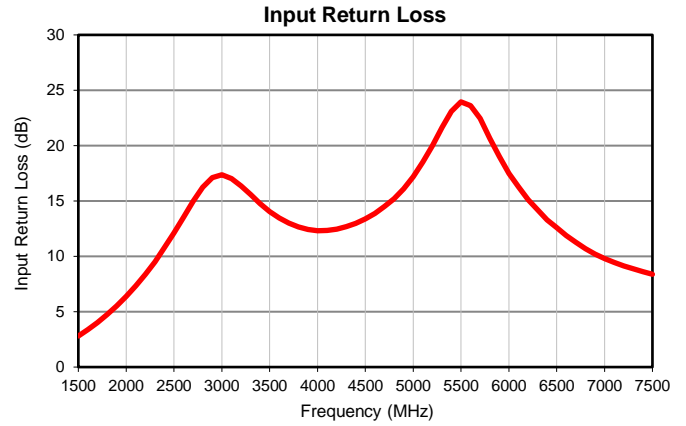
| FREQUENCY (MHz) | INSERTION LOSS ⁽¹⁾ (dB) | INPUT RETURN LOSS (dB) | AMPLITUDE UNBALANCE (dB) | PHASE UNBALANCE ⁽²⁾ (deg.) |
|-----------------|------------------------------------|------------------------|--------------------------|---------------------------------------|
| 1500 | 6.16 | 2.80 | 0.76 | 4.54 |
| 1600 | 5.41 | 3.38 | 0.72 | 4.11 |
| 1700 | 4.77 | 4.02 | 0.68 | 3.70 |
| 1800 | 4.22 | 4.74 | 0.65 | 3.35 |
| 1900 | 3.76 | 5.53 | 0.61 | 2.98 |
| 2000 | 3.37 | 6.39 | 0.57 | 2.66 |
| 2100 | 3.05 | 7.34 | 0.53 | 2.34 |
| 2200 | 2.77 | 8.38 | 0.49 | 1.98 |
| 2300 | 2.55 | 9.51 | 0.47 | 1.69 |
| 2400 | 2.36 | 10.77 | 0.44 | 1.43 |
| 2500 | 2.21 | 12.11 | 0.41 | 1.17 |
| 2600 | 2.09 | 13.51 | 0.38 | 0.94 |
| 2700 | 2.00 | 14.96 | 0.35 | 0.71 |
| 2800 | 1.93 | 16.24 | 0.33 | 0.50 |
| 2900 | 1.87 | 17.11 | 0.31 | 0.36 |
| 3000 | 1.83 | 17.37 | 0.29 | 0.22 |
| 3100 | 1.81 | 17.04 | 0.28 | 0.02 |
| 3200 | 1.79 | 16.37 | 0.27 | 0.14 |
| 3300 | 1.78 | 15.56 | 0.25 | 0.29 |
| 3400 | 1.78 | 14.76 | 0.24 | 0.42 |
| 3500 | 1.77 | 14.05 | 0.23 | 0.53 |
| 3600 | 1.77 | 13.46 | 0.23 | 0.66 |
| 3700 | 1.77 | 13.02 | 0.23 | 0.75 |
| 3800 | 1.77 | 12.65 | 0.23 | 0.83 |
| 3900 | 1.76 | 12.44 | 0.24 | 0.89 |
| 4000 | 1.75 | 12.32 | 0.26 | 0.93 |
| 4100 | 1.73 | 12.34 | 0.27 | 0.97 |
| 4200 | 1.72 | 12.45 | 0.28 | 0.96 |
| 4300 | 1.69 | 12.68 | 0.29 | 0.89 |
| 4400 | 1.67 | 12.98 | 0.31 | 0.81 |
| 4500 | 1.65 | 13.39 | 0.33 | 0.75 |
| 4600 | 1.63 | 13.86 | 0.34 | 0.65 |
| 4700 | 1.61 | 14.52 | 0.36 | 0.47 |
| 4800 | 1.59 | 15.21 | 0.36 | 0.30 |
| 4900 | 1.57 | 16.11 | 0.37 | 0.24 |
| 5000 | 1.55 | 17.21 | 0.39 | 0.18 |
| 5100 | 1.54 | 18.52 | 0.41 | 0.08 |
| 5200 | 1.53 | 20.01 | 0.43 | 0.23 |
| 5300 | 1.53 | 21.65 | 0.42 | 0.50 |
| 5400 | 1.54 | 23.09 | 0.41 | 0.63 |
| 5500 | 1.56 | 23.95 | 0.42 | 0.75 |
| 5600 | 1.59 | 23.62 | 0.43 | 0.86 |
| 5700 | 1.62 | 22.45 | 0.43 | 0.99 |
| 5800 | 1.66 | 20.66 | 0.43 | 1.10 |
| 5900 | 1.71 | 19.02 | 0.44 | 1.19 |
| 6000 | 1.77 | 17.48 | 0.45 | 1.23 |
| 6100 | 1.83 | 16.27 | 0.46 | 1.25 |
| 6200 | 1.90 | 15.10 | 0.48 | 1.30 |
| 6300 | 1.97 | 14.18 | 0.50 | 1.41 |
| 6400 | 2.05 | 13.30 | 0.53 | 1.47 |
| 6500 | 2.14 | 12.59 | 0.56 | 1.59 |
| 6600 | 2.23 | 11.89 | 0.58 | 1.68 |
| 6700 | 2.33 | 11.27 | 0.63 | 1.76 |
| 6800 | 2.44 | 10.71 | 0.67 | 1.91 |
| 6900 | 2.56 | 10.21 | 0.72 | 2.11 |
| 7000 | 2.68 | 9.80 | 0.76 | 2.30 |
| 7100 | 2.80 | 9.45 | 0.81 | 2.47 |
| 7200 | 2.93 | 9.13 | 0.87 | 2.68 |
| 7300 | 3.06 | 8.87 | 0.94 | 3.01 |
| 7400 | 3.21 | 8.61 | 0.99 | 3.36 |
| 7500 | 3.36 | 8.38 | 1.04 | 3.72 |

⁽¹⁾ Insertion Loss is referenced to mid-band loss, 1.5 dB

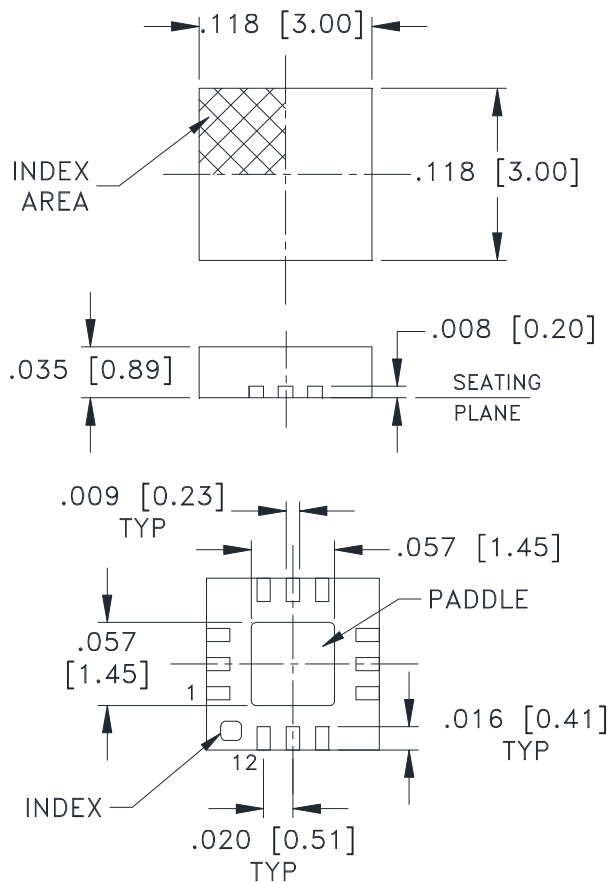
⁽²⁾ Relative to 180°



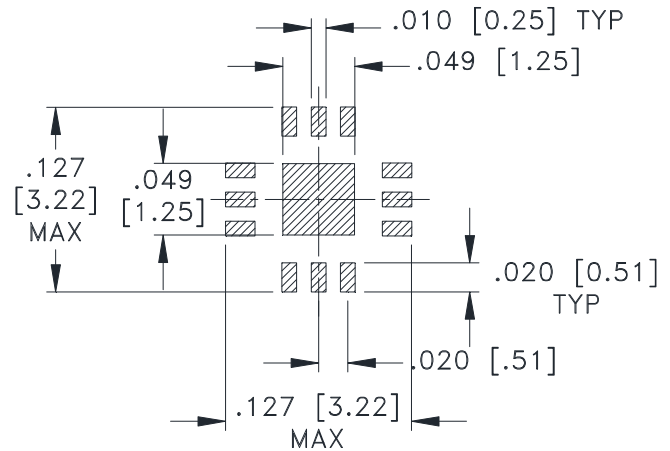
Typical Performance Data



Outline Dimensions



PCB Land Pattern



SUGGESTED LAYOUT,
TOLERANCE TO BE WITHIN $\pm .002$

Weight: .02 Grams

Dimensions are in inches (mm). Tolerances: 2Pl. $\pm .01$; 3 Pl. $\pm .004$

Notes:

1. Case material: Plastic.
2. Termination finish:
 - For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin. All models, (+) suffix. See Data sheet.
 - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

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Tape & Reel Packaging TR-F66



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel see note | |
|----------------|-------------------------|-------------------|------------------------------|------------------|
| 8 | 4 | 7 | Small quantity standard | 20 |
| | | | | 50 |
| | | | | 100 |
| | | | | 200 |
| | | | | 500 |
| | | 7 | Standard | 1000, 2000, 3000 |

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

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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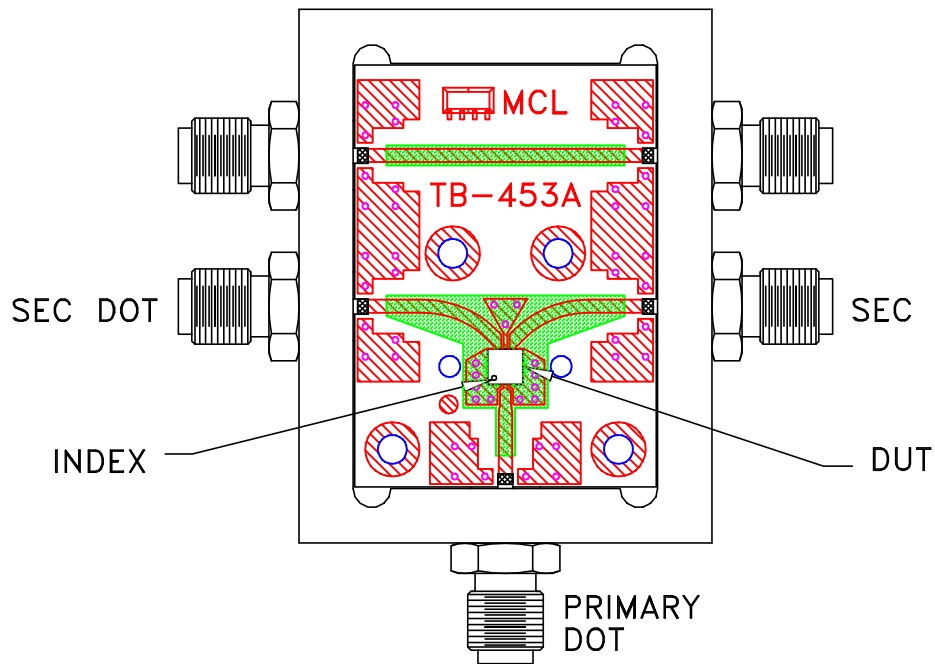
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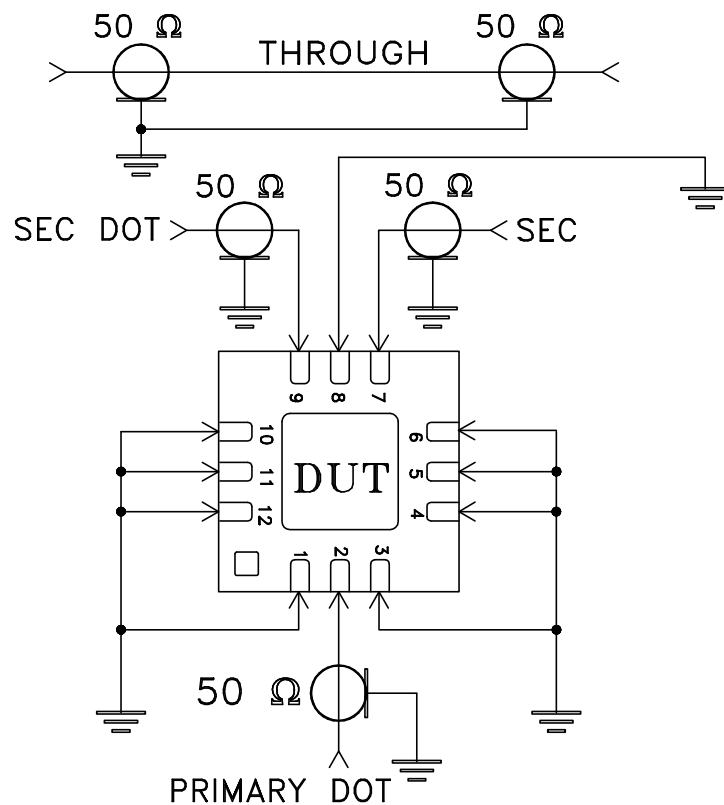
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Evaluation Board and Circuit

For Pins Connections Refer to Data Sheet of the DUT




TB-453-MTX273+



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent, Dielectric Constant=3.5, Thickness=.020 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 | -65° to 150° C Ambient Environment | Individual Model Data Sheet |
| Autoclave | 15 psig, 100% RH, 121°C, 96 hours | JESD22-A102-C, Condition C |
| Temperature Cycling | -65° to 150°C, 100 cycles | JESD22-A104 |
| Temperature Humidity | 85°C/ 85% RH, 168 hours | JESD22-113 |
| Solder Reflow Heat | Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak | J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1 |
| Moisture Sensitivity: Level 1 | Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 240°C peak (Non-RoHS) or 260°C (RoHS) | J-STD-020 |
| Solderability | 10X magnification, 95% coverage | JESD22-B102, Method 1: Dip and Look Test |
| Mechanical Shock | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes | MIL-STD-202, Method 213, Condition A |
| Vibration (High Frequency) | 20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36) | MIL-STD-202, Method 204, Condition D |