

# Ceramic Balun RF Transformer

50Ω 700 to 1400 MHz

TCN2-14+



Generic photo used for illustration purposes only

CASE STYLE: FV1206-1

**+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, 3000

## Maximum Ratings

Operating Temperature -55°C to 100°C

Storage Temperature -55°C to 100°C

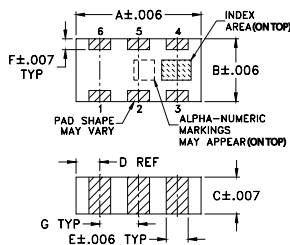
Input RF Power\*\* 5W

\*\* From 85°C derate linearly to 2.5W at 100°C  
Permanent damage may occur if any of these limits are exceeded.

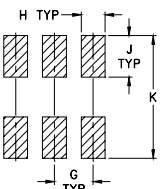
## Pin Connections

PRIMARY DOT	4
PRIMARY (GND)	2,5
SECONDARY DOT	1
SECONDARY	6
NOT USED	3

## Outline Drawing



### PCB Land Pattern

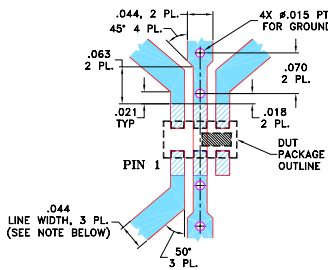


Suggested Layout,  
Tolerance to be within ±.002

## Outline Dimensions (Inch)

A	B	C	D	E	F
.126	.063	.035	.024	.022	.011
3.20	1.60	0.89	0.61	0.56	0.28
G	H	J	K	wt	
.039	.024	.042	.123	grams	
0.99	0.61	1.07	3.12	.020	

## Demo Board MCL P/N: TB-287 Suggested PCB Layout (PL-163)



- NOTE: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020" ± .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

### 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)

## Features

- wideband, 700 to 1400 MHz
- miniature size, 0.12"x.06"x.037"
- LTCC construction
- low cost
- aqueous washable

## Applications

- TDMA, CDMA
- GSM
- PDC
- WAN
- TACS
- AMPS, NAMPS

## Electrical Specifications (T<sub>AMB</sub> = 25°C)

Ω RATIO (Secondary/Primary)	FREQUENCY (MHz)	INSERTION* LOSS (dB)	PHASE UNBALANCE † (Deg.) Typ.	AMPLITUDE UNBALANCE (dB) Typ.
2	700-1400	0.8	8.0	0.7
	800-1000	0.5	8.0	0.3

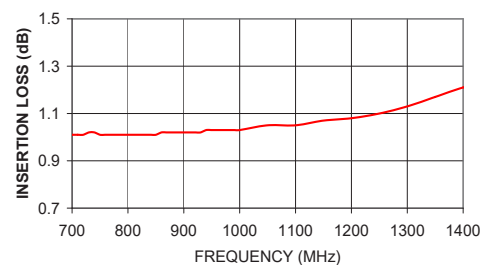
\* Insertion Loss is referenced to mid-band loss, 0.9 dB

† Relative to 180°

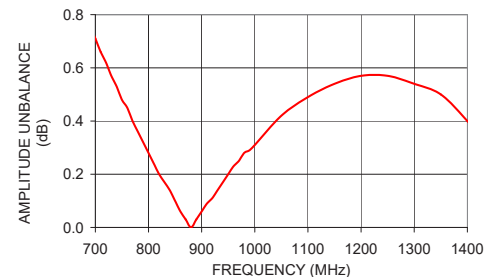
## Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT R. LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (Deg.)
700.00	1.01	10.56	0.71	6.90
750.00	1.01	10.63	0.48	7.89
800.00	1.01	10.75	0.28	8.23
850.00	1.01	10.95	0.10	8.15
900.00	1.02	11.08	0.06	7.79
950.00	1.03	11.29	0.20	6.89
1000.00	1.03	11.38	0.31	5.81
1200.00	1.08	11.27	0.57	0.76
1300.00	1.13	10.80	0.54	4.35
1400.00	1.21	10.23	0.40	7.76

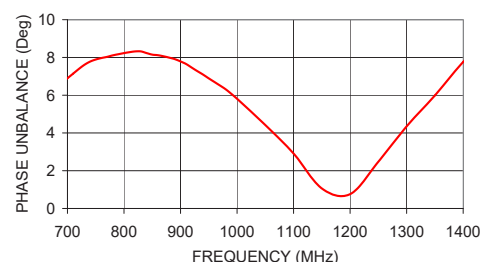
### INSERTION LOSS



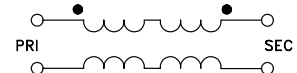
### AMPLITUDE UNBALANCE



### PHASE UNBALANCE



### configuration G



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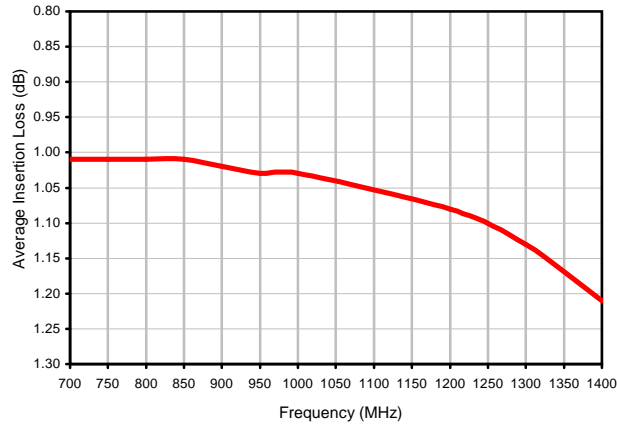
REV. E  
M158161  
TCN2-14+  
ED-11687/3  
DJ/RS/CP/AM  
160920

## Typical Performance Data

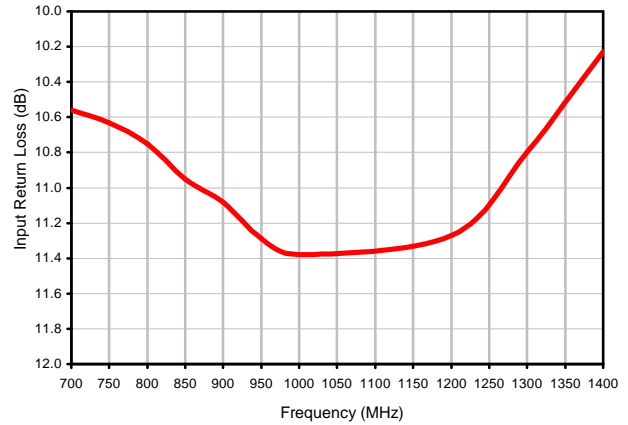
FREQUENCY (MHz)	AVERAGE INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (deg)
700	1.01	10.56	0.71	6.90
750	1.01	10.63	0.48	7.89
800	1.01	10.75	0.28	8.23
850	1.01	10.95	0.10	8.15
900	1.02	11.08	0.06	7.79
950	1.03	11.29	0.20	6.89
1000	1.03	11.38	0.31	5.81
1200	1.08	11.27	0.57	0.76
1300	1.13	10.80	0.54	4.35
1400	1.21	10.23	0.40	7.76

## Typical Performance Curves

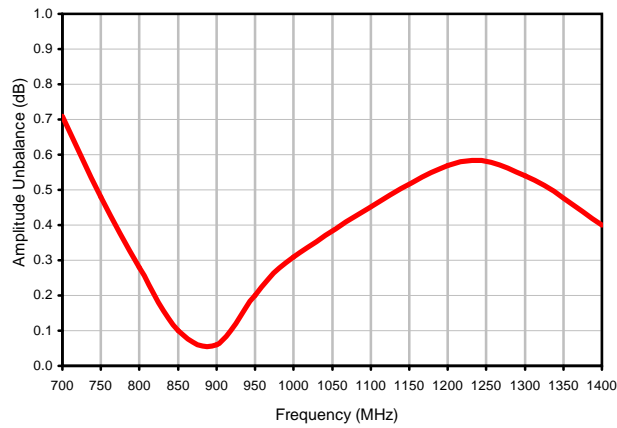
### Average Insertion Loss



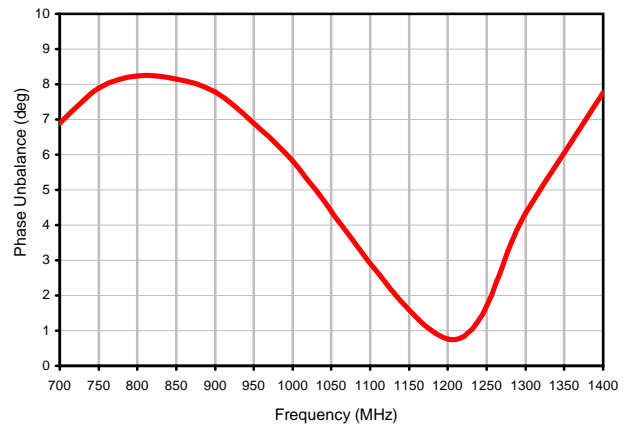
### Input Return Loss



### Amplitude Unbalance



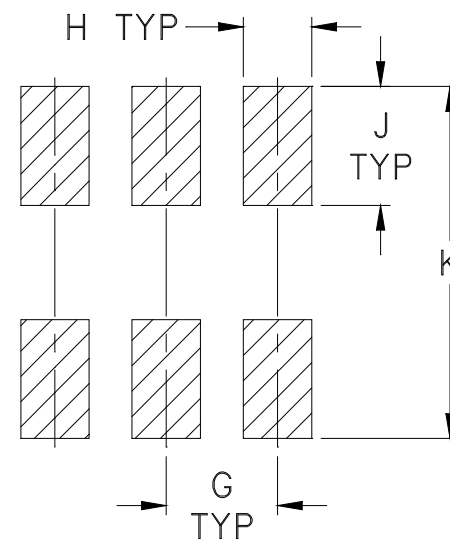
### Phase Unbalance



### 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	WT. GRAM
FV1206-1	.126 (3.20)	.063 (1.60)	.035 (0.89)	.024 (0.61)	.022 (0.56)	.011 (0.28)	.039 (0.99)	.024 (0.61)	.042 (1.07)	.123 (3.12)	--	--	--	--	.020

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm.01$ ; 3 Pl.  $\pm.005$

#### Notes:

- Open style, ceramic base.
- Termination finish: **as shown below or indicated on Data Sheet.**  
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.  
For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



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](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

## DEVICE ORIENTATION IN T&R

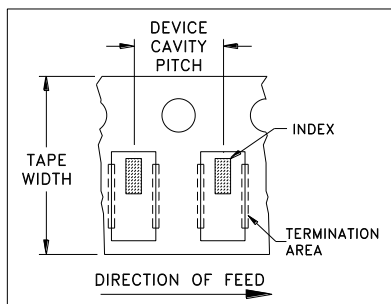


ILLUSTRATION 1

Applicable Case Styles
FV1206-1 FV1206-3

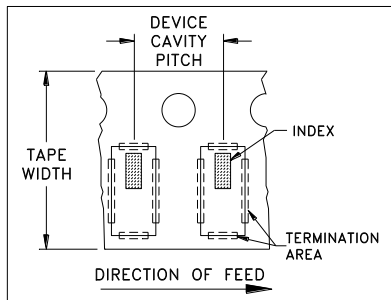


ILLUSTRATION 2

Applicable Case Styles
FV1206-4 FV1206-5 FV1206-6 FV1206-7 FV1206-9

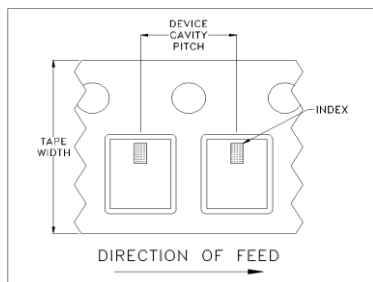


ILLUSTRATION 3

Applicable Case Styles
FV1206-12 GE0805C-18 NL1008C-6 NL1008C-7 NL1008C-9 NL1008C-10

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
8	4	7	Small quantity standards (see note)	20
				50
				100
				200
				500
			1000	
			Standard	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](http://www.minicircuits.com/pages/pdfs/tape.pdf)

Mini-Circuits ISO 9001 & ISO 14001 Certified

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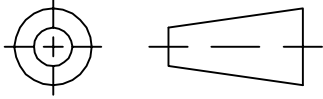
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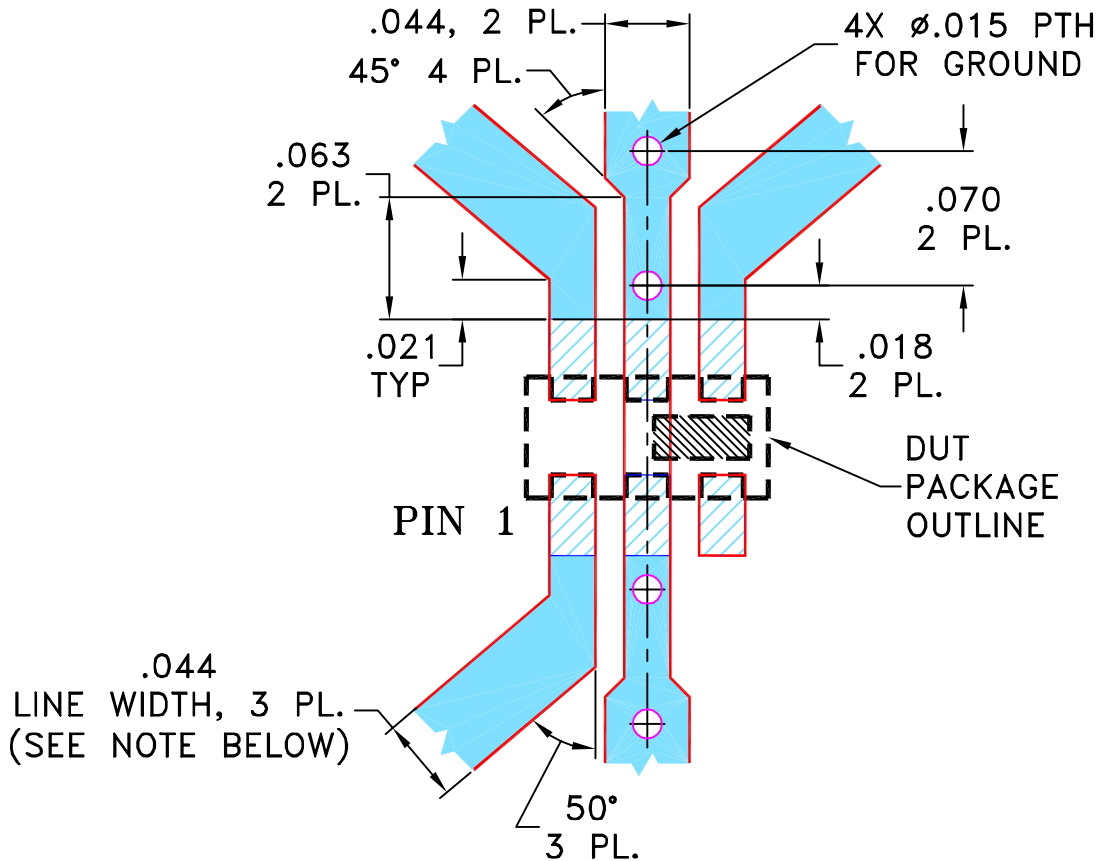
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M93213	NEW RELEASE	07/20/04	GF	LR
A	M102713	TCN WAS BCN-2, UPDATED NOTES	01/12/06	GF	IL

**SUGGESTED MOUNTING CONFIGURATION  
FOR FV1206-1 CASE STYLE, "px" PIN CONNECTION**



- NOTE:**
1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020" ± .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 GF	07/02/04
TOLERANCES ON:	CHECKED AY	07/20/04
2 PL DECIMALS ±	APPROVED LR	07/20/04
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		



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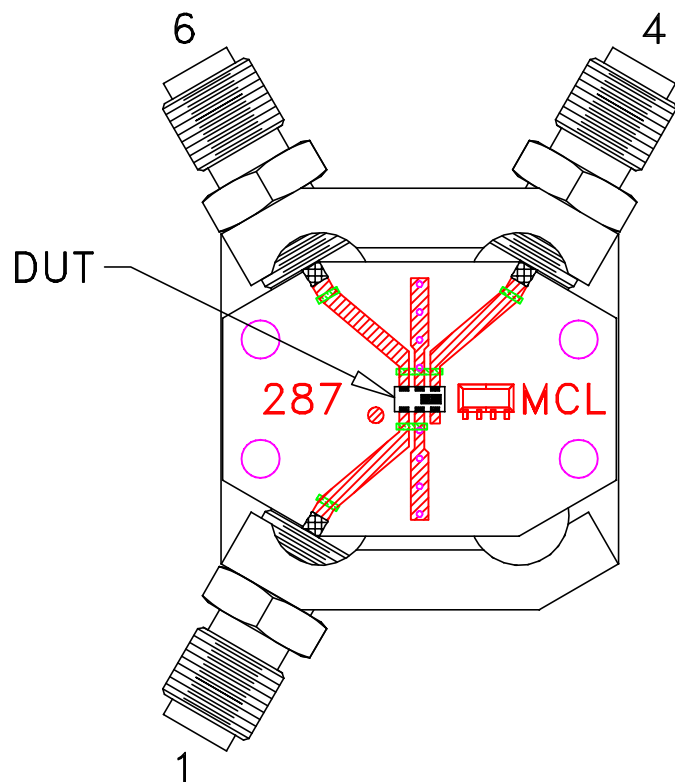
13 Neptune Avenue  
Brooklyn NY 11235

PL, px, FV1206-1, TCN, TB-287

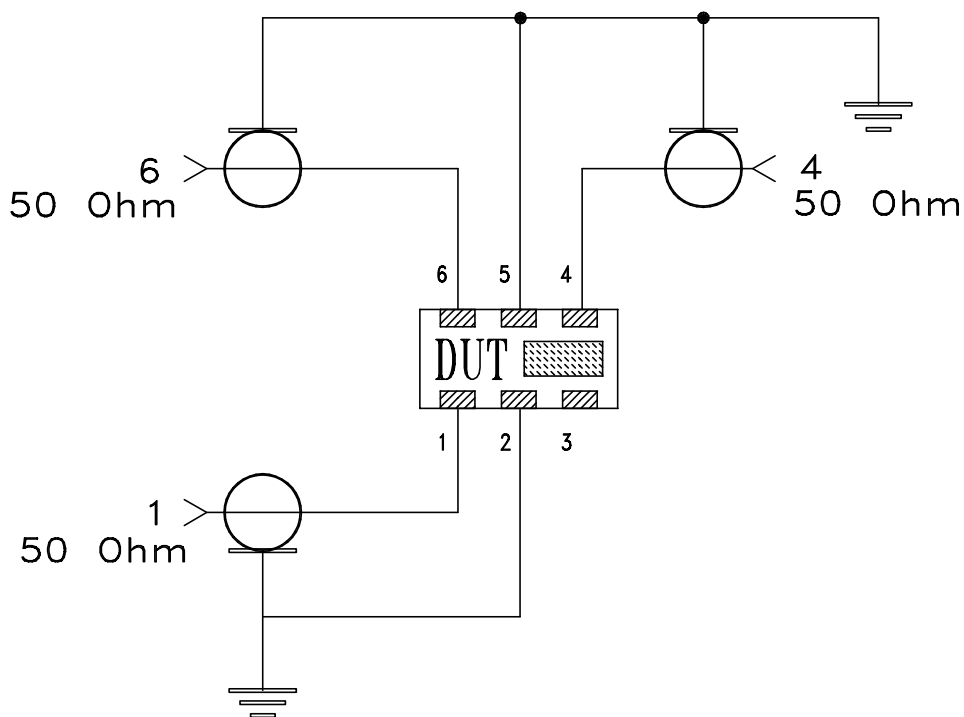
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SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-163	A
FILE:	98PL163	SCALE:	10:1
		SHEET:	1 OF 1

# Evaluation Board and Circuit




TB-287



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	-55° to 100°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°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, 12 times in each of three perpendicular directions (total 36)	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