

Surface Mount Low Pass Filter

50Ω DC to 396 MHz

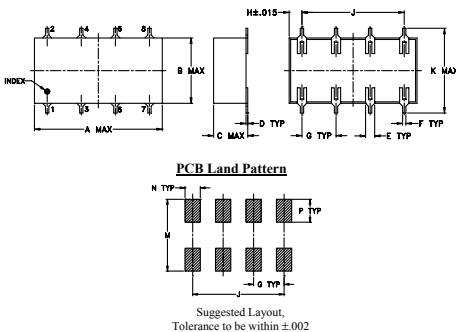
Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Power Input	0.5W max.
Permanent damage may occur if any of these limits are exceeded.	

Pin Connections

INPUT	1
OUTPUT	8
GROUND	2,3,4,5,6,7

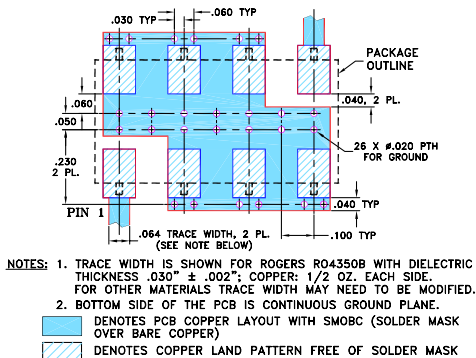
Outline Drawing



Outline Dimensions (inch)

A	B	C	D	E	F	G
.75	.38	.20	.010	.050	.020	.200
19.05	9.65	5.08	0.25	1.27	0.51	5.08
H	J	K	M	N	P	wt
.075	.600	.450	.470	.100	.150	grams
1.91	15.24	11.43	11.94	2.54	3.81	1.6

Demo Board MCL P/N: TB-187+ Suggested PCB Layout (PL-049)



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

Features

- 7-section elliptic function
- excellent rejection

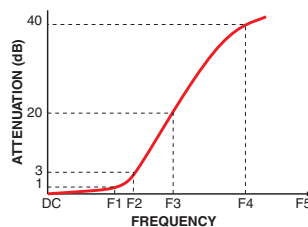
Applications

- defense communications
- receivers/transmitters
- harmonic rejection of VCOs

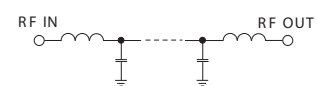
Electrical Specifications

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Insertion Loss	DC-F1	DC-396	—	1.0	dB
	Freq. Cut-Off	F2	458	3.0	—	dB
	VSWR	DC-F1	DC-396	1.3	—	:1
Stop Band	Rejection Loss	F3-F4	570-620	20	—	dB
		F4-F5	620-1430	35	—	dB
	VSWR	F3-F5	570-1430	18	—	:1

Typical Frequency Response



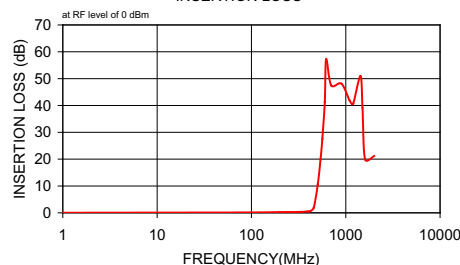
Electrical Schematic



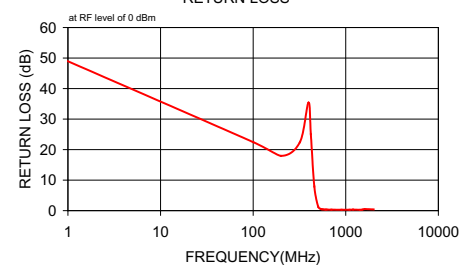
Typical Performance Data

Frequency (MHz)	Insertion Loss (dB)		Return Loss (dB)
	$\bar{x}$	σ	
1.00	0.03	0.00	48.94
100.00	0.15	0.00	22.44
200.00	0.27	0.00	17.96
320.00	0.35	0.01	22.46
396.00	0.51	0.01	35.39
420.00	0.66	0.02	25.04
458.00	1.95	0.19	7.92
505.00	10.58	0.60	1.23
540.00	19.96	0.78	0.53
565.00	27.57	1.00	0.43
600.00	41.32	2.14	0.35
620.00	57.20	5.41	0.34
700.00	47.53	0.98	0.32
900.00	48.13	0.53	0.30
1100.00	41.85	0.37	0.30
1200.00	40.69	0.38	0.34
1430.00	50.93	1.56	0.26
1505.00	39.15	1.05	0.32
1600.00	19.94	1.20	0.52
2000.00	21.19	0.18	0.42

SALF-396 INSERTION LOSS



SALF-396 RETURN LOSS



Surface Mount Low Pass Filter

SALF-396+

Typical Performance Data

FREQ. (MHz)	INSERTION LOSS (dB)			INPUT RETURN LOSS (dB)			OUTPUT RETURN LOSS (dB)		
	@ -40° C	@ +25° C	@ +85° C	@ -40° C	@ +25° C	@ +85° C	@ -40° C	@ +25° C	@ +85° C
1	0.02	0.05	0.06	51.68	44.58	43.43	52.89	45.06	43.86
10	0.03	0.06	0.07	41.29	39.35	38.32	41.59	39.27	38.27
20	0.04	0.07	0.08	35.90	34.79	33.79	36.24	34.68	33.69
30	0.05	0.09	0.09	32.71	31.88	31.00	32.93	31.66	30.75
40	0.06	0.10	0.11	30.36	29.77	29.00	30.47	29.47	28.68
50	0.07	0.11	0.12	28.47	28.10	27.51	28.54	27.76	27.14
60	0.08	0.12	0.13	26.90	26.75	26.35	26.91	26.37	25.93
70	0.09	0.13	0.14	25.49	25.60	25.42	25.54	25.23	24.99
80	0.10	0.14	0.15	24.26	24.58	24.62	24.37	24.30	24.27
90	0.11	0.16	0.16	23.16	23.73	23.99	23.32	23.46	23.68
100	0.12	0.17	0.18	22.18	22.96	23.47	22.38	22.73	23.17
110	0.13	0.18	0.19	21.34	22.31	23.05	21.52	22.07	22.73
120	0.15	0.19	0.20	20.61	21.74	22.70	20.75	21.47	22.34
130	0.16	0.20	0.21	19.98	21.26	22.40	20.05	20.91	21.96
140	0.16	0.21	0.21	19.42	20.80	22.12	19.44	20.42	21.62
150	0.18	0.22	0.22	18.98	20.43	21.90	18.93	19.99	21.30
200	0.23	0.28	0.28	17.95	19.36	20.86	18.00	19.03	20.43
300	0.26	0.36	0.39	24.10	23.64	22.93	24.25	23.56	22.89
320	0.27	0.37	0.41	27.80	26.69	25.07	28.14	26.94	25.30
396	0.41	0.55	0.62	35.26	34.48	32.24	37.26	36.82	35.85
400	0.42	0.57	0.63	35.25	34.22	31.44	36.26	36.01	33.84
420	0.53	0.70	0.78	23.78	23.21	22.24	23.42	23.42	22.48
458	1.75	2.08	2.26	8.00	7.74	7.63	7.99	7.83	7.71
500	8.50	9.10	9.46	1.47	1.55	1.59	1.48	1.58	1.61
505	9.72	10.33	10.70	1.22	1.31	1.36	1.23	1.34	1.38
540	18.97	19.57	20.00	0.48	0.61	0.66	0.49	0.62	0.67
565	26.10	26.70	27.18	0.35	0.47	0.52	0.34	0.47	0.52
600	38.67	39.37	39.96	0.28	0.39	0.44	0.27	0.40	0.44
620	50.62	52.00	52.68	0.26	0.37	0.41	0.25	0.38	0.42
700	47.15	47.49	47.93	0.20	0.30	0.34	0.21	0.34	0.38
800	65.34	67.74	70.28	0.17	0.25	0.29	0.20	0.33	0.37
900	50.40	50.04	49.84	0.16	0.23	0.26	0.20	0.33	0.37
1000	45.89	45.73	45.63	0.15	0.21	0.24	0.20	0.34	0.38
1100	43.97	43.98	43.83	0.14	0.20	0.23	0.20	0.34	0.38
1200	43.05	43.10	42.96	0.13	0.19	0.22	0.19	0.34	0.39
1300	45.49	45.63	45.41	0.13	0.18	0.22	0.19	0.35	0.40
1400	59.18	60.35	60.66	0.12	0.18	0.22	0.19	0.36	0.42
1430	51.40	50.70	50.18	0.12	0.18	0.23	0.19	0.36	0.42
1500	34.77	34.47	34.12	0.14	0.21	0.27	0.24	0.42	0.49
1600	15.17	14.44	13.60	0.63	0.85	1.11	1.28	1.86	2.43
1700	17.66	18.23	18.65	0.28	0.36	0.42	0.44	0.63	0.69
1800	21.39	21.72	21.90	0.20	0.29	0.38	0.30	0.50	0.59
1900	22.17	22.39	22.50	0.22	0.33	0.44	0.29	0.50	0.61
2000	22.48	22.68	22.75	0.24	0.36	0.49	0.29	0.52	0.65
2100	22.44	22.61	22.67	0.26	0.39	0.54	0.31	0.55	0.70
2200	22.68	22.87	22.90	0.30	0.44	0.61	0.34	0.59	0.75
2300	22.92	23.14	23.19	0.31	0.46	0.65	0.36	0.62	0.81
2400	23.52	23.74	23.77	0.32	0.48	0.69	0.37	0.63	0.84
2500	24.85	25.04	25.10	0.31	0.48	0.70	0.38	0.65	0.87
2600	28.82	28.96	29.02	0.31	0.49	0.72	0.39	0.66	0.89
2700	45.93	47.43	46.44	0.37	0.55	0.77	0.41	0.67	0.91
2800	20.43	20.89	20.99	0.43	0.63	0.87	0.55	0.83	1.10
2900	9.94	9.87	9.77	1.02	1.34	1.68	1.48	1.91	2.34
3000	2.72	3.00	3.30	6.46	6.93	7.13	13.26	16.74	19.43

REV. X2

SALF-396+

101024

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Surface Mount Low Pass Filter

SALF-396+

Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
1	1.21	1.21	1.21
10	1.22	1.22	1.22
20	1.20	1.21	1.21
30	1.20	1.21	1.21
40	1.20	1.21	1.20
50	1.20	1.21	1.20
60	1.21	1.21	1.21
70	1.21	1.21	1.21
80	1.22	1.22	1.21
90	1.22	1.22	1.22
100	1.23	1.23	1.23
110	1.23	1.24	1.24
120	1.24	1.25	1.25
130	1.25	1.26	1.26
140	1.27	1.27	1.28
150	1.28	1.29	1.29
160	1.30	1.30	1.31
170	1.31	1.32	1.32
180	1.32	1.33	1.34
200	1.36	1.36	1.37
210	1.38	1.39	1.40
220	1.41	1.42	1.43
230	1.45	1.45	1.46
240	1.48	1.48	1.49
250	1.51	1.52	1.52
260	1.55	1.55	1.55
270	1.58	1.59	1.59
280	1.62	1.63	1.63
290	1.67	1.67	1.68
300	1.73	1.73	1.73
310	1.79	1.79	1.79
320	1.85	1.85	1.86
330	1.91	1.92	1.93
340	1.98	2.00	2.00
350	2.06	2.08	2.09
396	2.64	2.66	2.68
400	2.71	2.74	2.76
450	4.35	4.39	4.42
458	4.61	4.63	4.65
460	4.67	4.68	4.69
470	4.83	4.78	4.78
480	4.76	4.66	4.63
490	4.43	4.29	4.25
500	3.90	3.77	3.71
505	3.61	3.48	3.42
540	2.13	2.07	2.03
565	1.70	1.64	1.60
600	0.74	0.74	0.65
650	3.21	2.45	0.68
700	0.30	0.14	0.21
750	0.48	0.44	0.35
800	6.85	12.05	15.73
850	0.11	0.03	0.23
900	0.01	0.31	0.80

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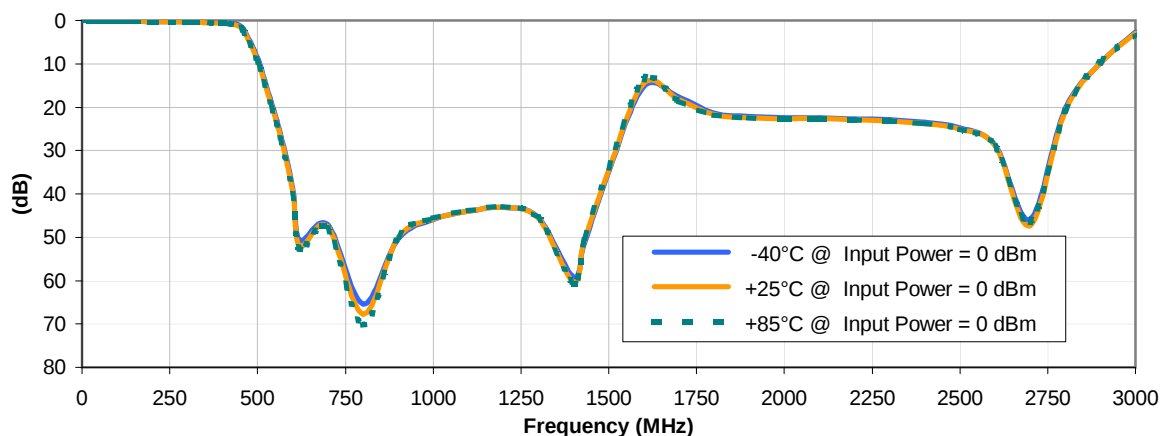
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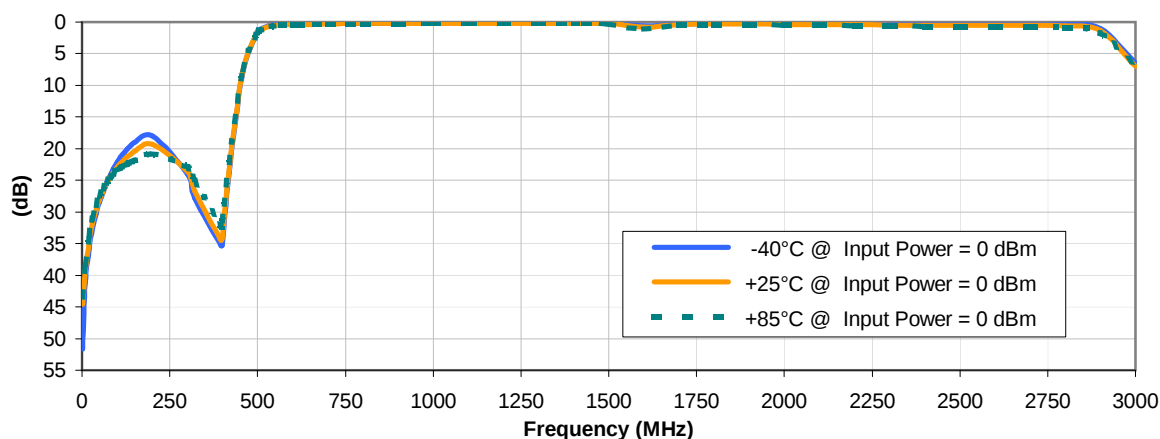


Typical Performance Curves

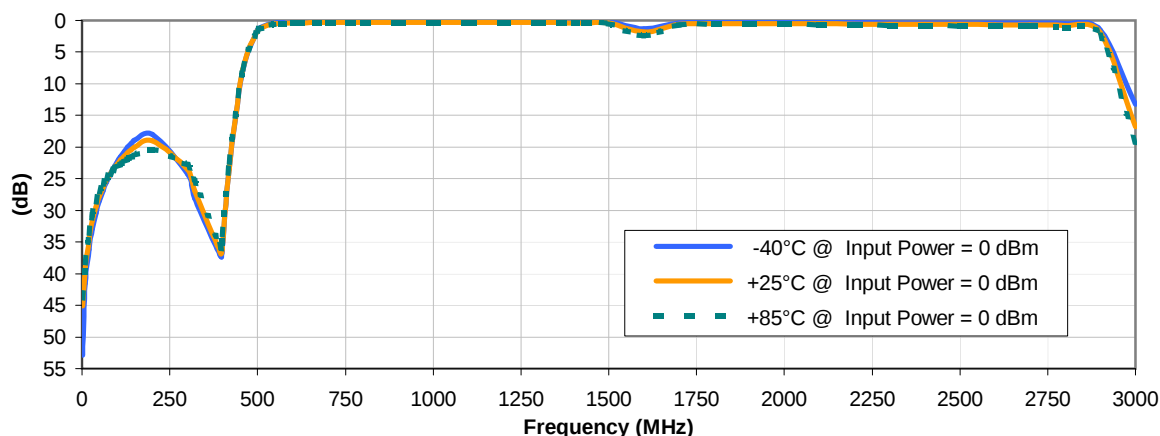
INSERTION LOSS vs. TEMPERATURE



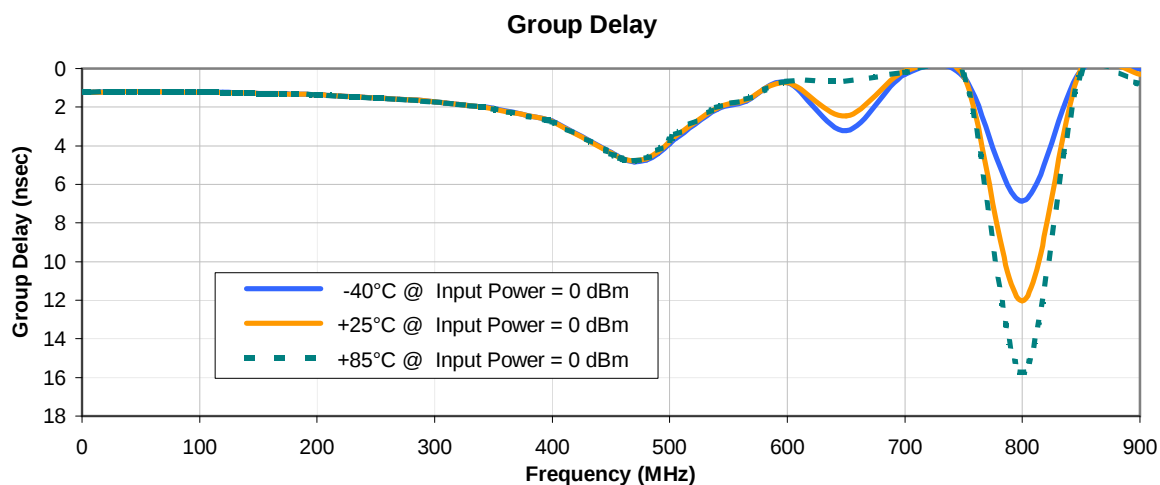
INPUT RETURN LOSS vs. TEMPERATURE



OUTPUT RETURN LOSS vs. TEMPERATURE



Typical Performance Curves



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Case Style

YY

Outline Dimensions

YY101
YY109
YY161



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	Q	WT. GRAM S
YY101*			.20 (5.08)							.450 (11.43)	--	.470 (11.94)				1.6
YY109*	.75 (19.05)	.38 (9.65)	.20 (5.08)	.010 (0.25)	.050 (1.27)	.020 (0.51)	.200 (5.08)	.075 (1.91)	.600 (15.24)	.720 (18.29)	--	.740 (18.80)	.100 (2.54)	.150 (3.81)	.148 (3.76)	1.6
YY161			.28 (7.11)							.450 (11.43)	--	.470 (11.94)				1.6

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

Notes:

- Case material: Plastic.
- Termination finish:
For RoHS Case Styles: Tin plate over Nickel plate.
For RoHS-5 Case Styles: Tin-Lead plate.
- Special Tolerances: Termination thickness $\pm .003$ inch.
- * Denotes: For SCM mixers, long termination version (case YY109) is available upon request, consult factory. To order short termination version (case YY101) add -NL suffix.



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Tape & Reel Packaging TR-F5



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, 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.

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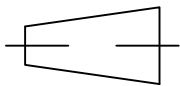


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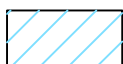
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M81561	NEW RELEASE	09/11/02	GF	ABD
A	M101145	ADDED YY101 CASE STYLE & NOTE 2	10/07/05	MMG	ABD
B	M102713	ADDED "...WITH SMOBC"	01/16/06	GT	IL
C	M165986	TB-187+ (WAS TB-187)	02/01/18	ITG	IL

NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" $\pm$.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 SOLDER MASK

UNLESS OTHERWISE SPECIFIED	INITIALS		DATE
DIMENSIONS ARE IN INCHES	DRAWN	GF	08/12/02
TOLERANCES ON:	CHECKED	AV	09/11/02
2 PL DECIMALS ±	APPROVED	ABD	09/11/02
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			



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PL, cr, YY101/YY161, SCLF, TB-187+

SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-049		REV: C
FILE: 98PL049		SCALE: 5:1	SHEET: 1 OF 1	

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

Evaluation Board and Circuit



TB-187+



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, 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 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
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
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, 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
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215