Ceramic

High Pass Filter

HFTC-16+

50Ω 1900 to 2700 MHz



Generic photo used for illustration purposes only

CASE STYLE: FR933

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

Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 125°C

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

Pin Connections

RF IN	2
RF OUT	5
GROUND	1,3,4,6

Product Marking: HF2

Features

- miniature size, 0.15"X0.15"X0.034"
- low profile, 0.034" height
- low pass-band insertion loss, 1.0 dB typ.
- excellent input power handling, 14W
- hermetically sealed

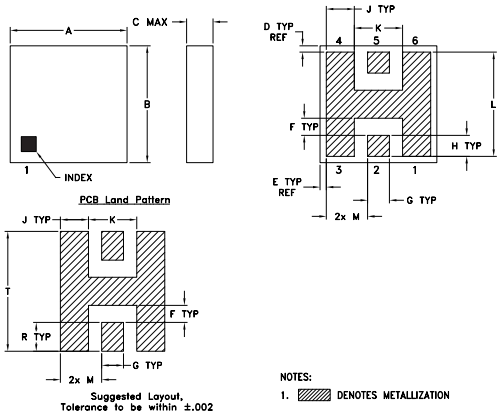
Applications

- sub-harmonic rejection
- transmitters/receivers

Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	20, 50, 100, 200, 500, 1000
13"	2000, 3000, 4000

Outline Drawing

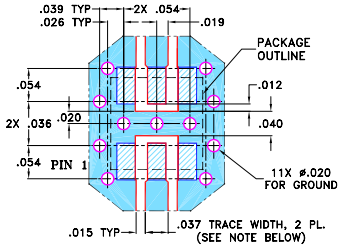


Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H
.150	.150	.034	.008	.008	.022	.028	.027
3.81	3.81	0.864	0.203	0.203	0.559	0.711	0.686

J	K	L	M	R	T		wt
.036	.062	.134	.053	.037	.154		grams
0.914	1.575	3.404	1.346	0.940	3.912		0.15

Demo Board MCL P/N: TB-233
Suggested PCB Layout (PL-112)



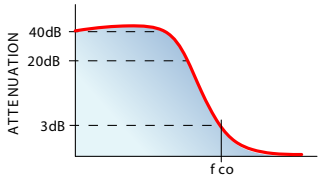
NOTES: 1.TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2.BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Electrical Specifications (T_{AMB}=25°C)

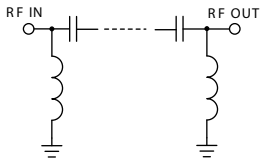
STOP BAND (MHz)		fco, MHz Nom.	PASSBAND (MHz)	VSWR (:1)		POWER INPUT* (W)	MARKING	NO. OF SECTIONS
		(loss 3 dB)		Stopband	Passband			
(loss > 40 dB)	(loss > 20 dB)	Typ.	(loss < 1.3 dB)	Typ.	Typ.			
DC-1030	1300	1580	1900-2700	18	1.3	14	HF2	7

* Derate linearly to 6W at 100°C ambient.
1.This filter is not intended for use as a DC Blocking circuit element. In Application where DC voltage is present at either input or output ports, blocking capacitors are required at the corresponding RF port.

typical frequency response

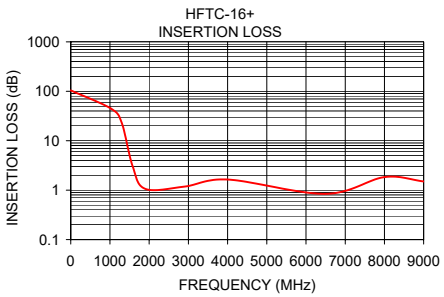


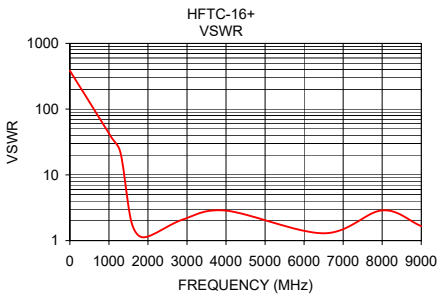
electrical schematic



Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
1.00	104.25	384.41
1030.00	44.43	40.06
1300.00	23.10	21.36
1580.00	3.03	1.89
1900.00	1.06	1.12
2900.00	1.18	2.10
4000.00	1.64	2.86
6500.00	0.84	1.29
8000.00	1.84	2.88
9000.00	1.50	1.66





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

REV. Q
ECO-026518
HFTC-16+
EDB-020517
AD/YB/CP/AM
250812

Ceramic High Pass Filter HFTC-16+

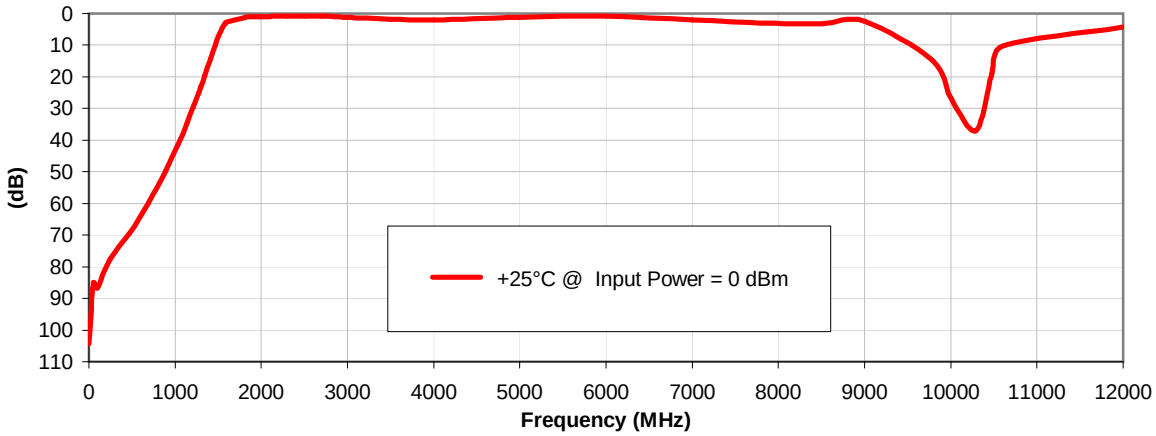
Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS @ +25° C (dB)	INPUT RETURN LOSS @ +25° C (dB)	OUTPUT RETURNLOSS @ +25° C (dB)
1	104.25	0.05	0.05
50	85.22	0.15	0.10
100	86.84	0.18	0.13
245	77.69	0.24	0.19
470	69.64	0.30	0.26
690	59.77	0.36	0.32
890	49.73	0.45	0.38
1030	41.53	0.54	0.45
1135	34.68	0.60	0.52
1210	29.55	0.69	0.60
1275	24.84	0.81	0.71
1300	23.00	0.87	0.76
1345	19.55	1.01	0.90
1410	14.41	1.45	1.30
1470	9.66	2.42	2.19
1545	4.69	6.01	5.43
1580	3.23	9.62	8.46
1590	2.92	11.00	9.55
1810	1.28	21.27	22.07
1900	1.11	26.75	33.42
1985	1.01	24.56	26.75
2000	1.00	23.67	25.33
2300	0.81	21.96	21.80
2500	0.72	30.59	26.44
2700	0.79	15.59	15.41
2850	0.96	11.61	11.48
3000	1.19	9.23	9.14
3500	1.91	5.99	5.95
4000	2.12	5.46	5.53
5000	1.30	8.93	8.99
6000	0.75	21.51	21.69
7000	1.93	6.80	6.63
7880	3.12	4.26	4.13
8500	3.23	4.10	4.05
9000	2.42	6.38	6.44
9790	14.82	1.77	1.78
10000	26.62	1.24	1.24
10290	37.02	1.29	1.23
10480	18.83	1.92	1.79
10620	10.21	3.81	3.53
12000	4.18	3.49	3.25

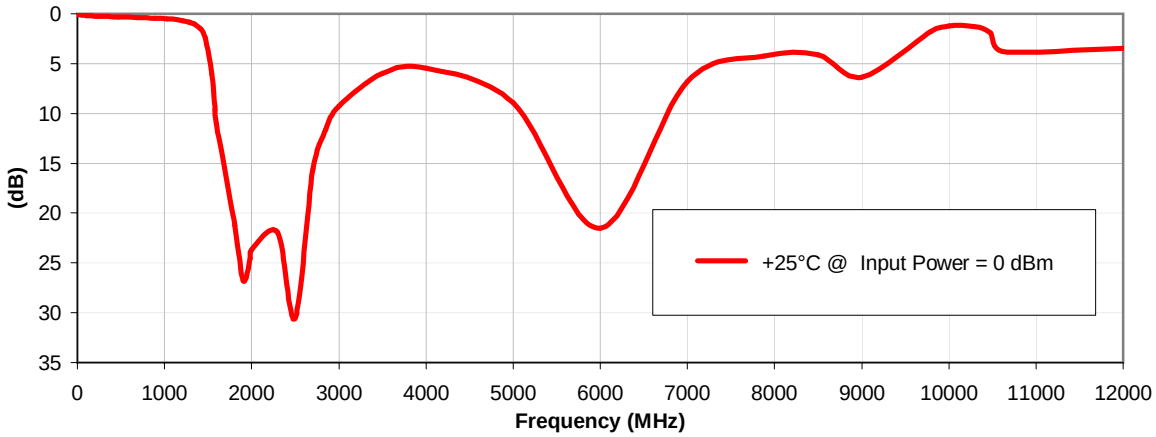
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Typical Performance Curves

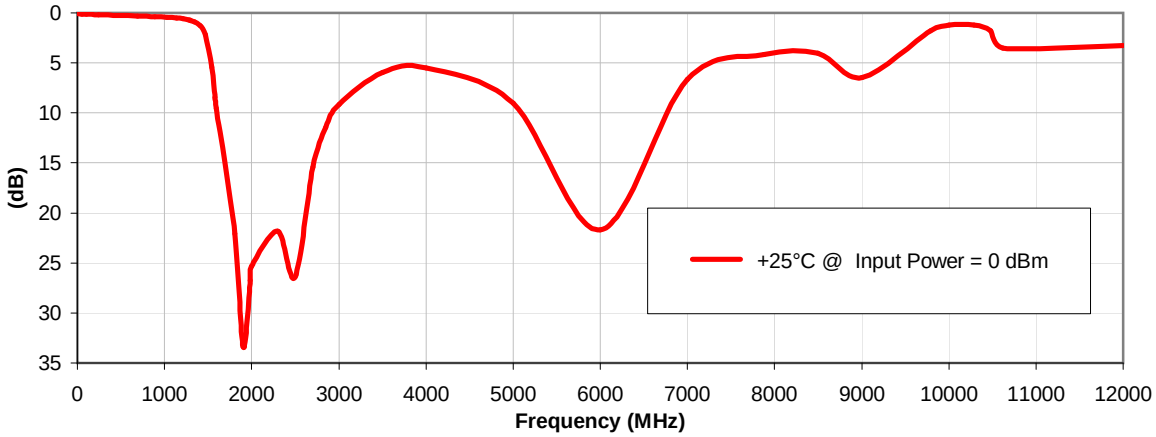
INSERTION LOSS



INPUT RETURN LOSS



OUTPUT RETURN LOSS

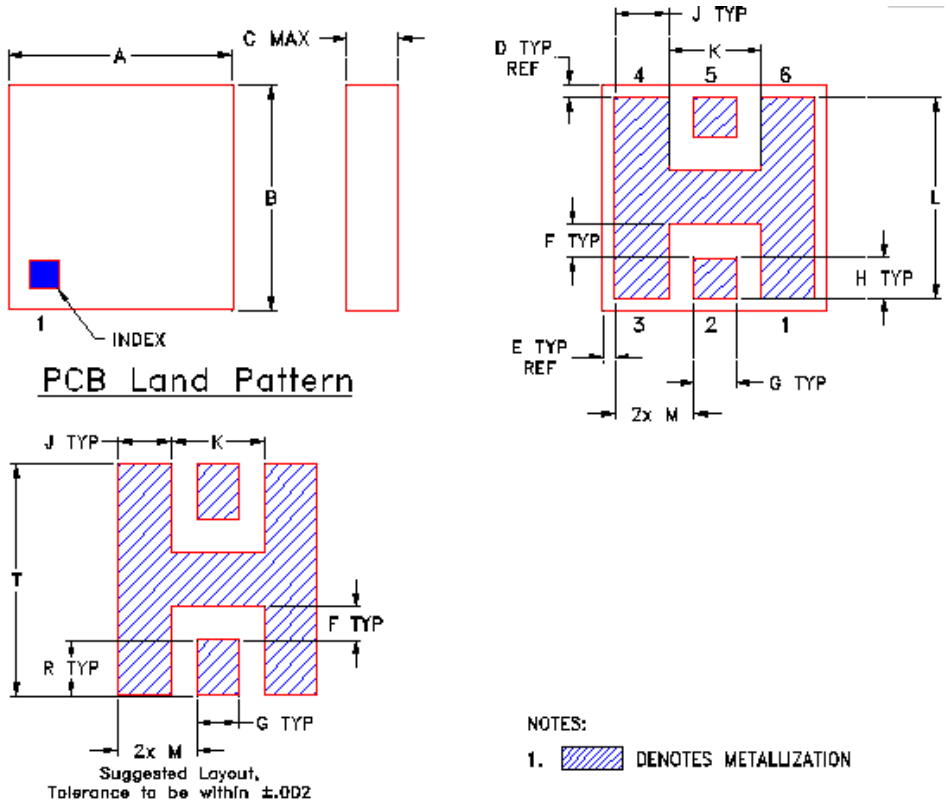


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Case Style FR

FR933

Outline Dimensions



CASE #	A	B	C	D	E	F	G	H	J	K	L	M	R
FR933	.150 (3.81)	.150 (3.81)	.034 (.864)	.008 (.203)	.008 (.203)	.022 (.559)	.028 (.711)	.027 (.686)	.036 (.914)	.062 (1.575)	.134 (3.404)	.053 (1.346)	.037 (.940)

CASE #	T		WT. GRAM
FR933	.154 (3.912)		0.15

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

Notes:

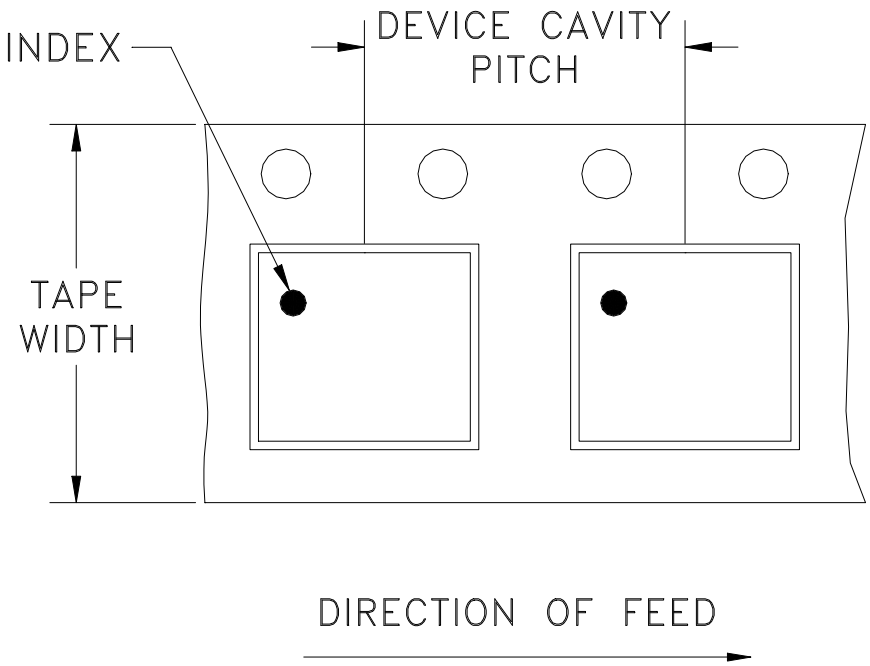
1. Open style, Ceramic Base.
2. Termination finish: Palladium Silver.

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Tape & Reel Packaging TR-F68

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
12	8	7	Small quantity standard	20
				50
				100
				200
				500
		7	Standard	1000
		13	Standard	2000
				3000
				4000

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Go to: www.minicircuits.com/pages/pdfs/tape.pdf

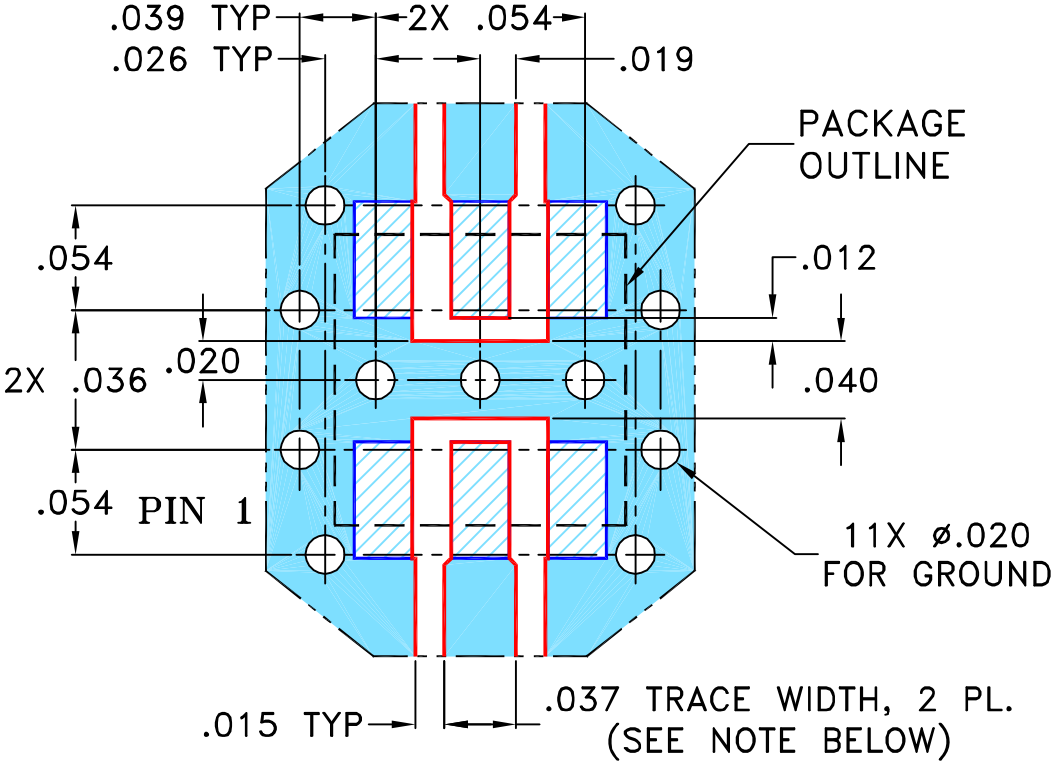
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THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M83007	NEW RELEASE	09/04/02	MMG	LER
A	M83501	CNG LAYOUT AS PER B14-TB-233	10/01/02	MMG	ABD
B	M102713	ADDED "...WITH SMOBC"	01/14/06	GF	IL
C	M164713	ADDED "933-1 & 06FL03"	11/15/17	CA	IL

SUGGESTED MOUNTING CONFIGURATION
FOR FR932/933/933-1 CASE STYLE, "06FL03" PIN CONNECTION



NOTES:
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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	MMG	09/04/02
TOLERANCES ON:	CHECKED		
2 PL DECIMALS ±	APPROVED	LER(BC)	09/04/02
3 PL DECIMALS ±			
ANGLES ±			
FRACTIONS ±			

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

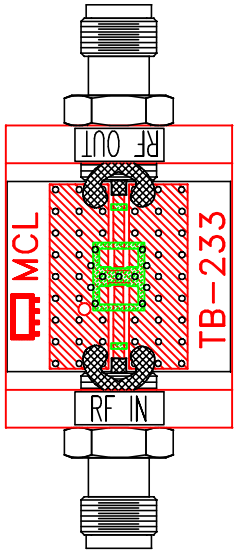
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PL, 06FL03, FR932/933/933-1, TB-233

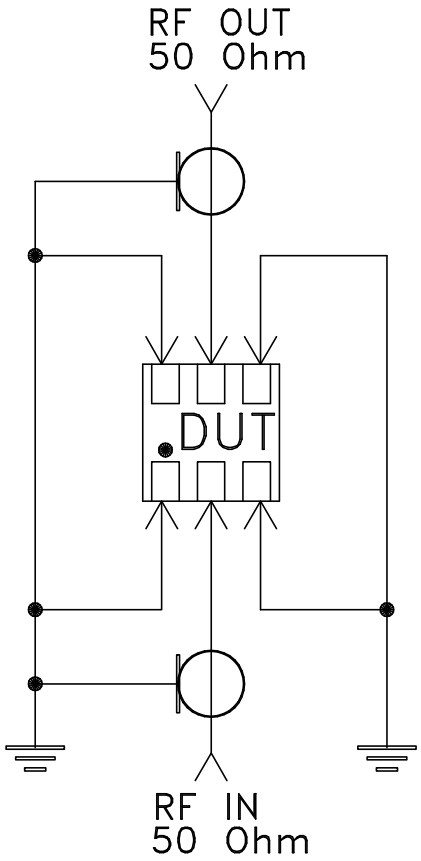
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-112	C

FILE:	SCALE:	SHEET:
98PL112	10:1	1 OF 1

Evaluation Board and Circuit



TB-233



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.020 inch.

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Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-55° to 100°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 125° 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, 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

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