

Bandpass Filter

50Ω 190 to 250 MHz

Maximum Ratings

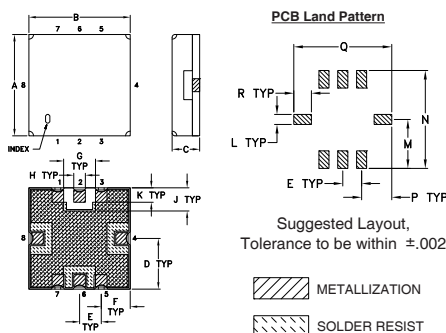
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	0.5W at 25°C

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

Pin Connections

RF IN	2
RF OUT	6
GROUND	1,3,4,5,7,8

Outline Drawing

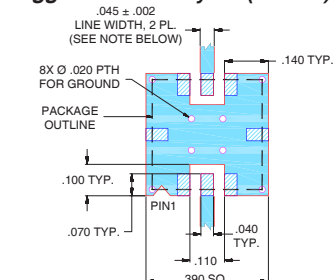


Outline Dimensions (inch/mm)

	A	B	C	D	E	F	G	H	J
	.350	.350	.100	.175	.075	.100	.110	.040	.080
	8.89	8.89	2.54	4.45	1.91	2.54	2.79	1.02	2.03
	K	L	M	N	P	Q	R	wt	
	.050	.040	.195	.390	.120	.390	.070	grams	
	1.27	1.02	4.95	9.91	3.05	9.91	1.78	0.25	

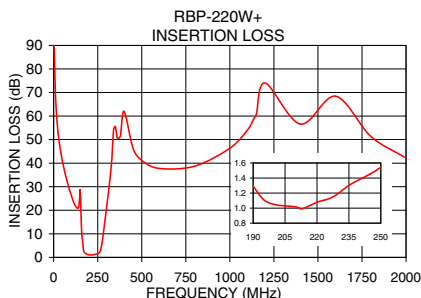
Note: Please refer to case style drawing for details

Demo Board MCL P/N: TB-332 Suggested PCB Layout (PL-176)



NOTES:

- TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .025" ± .002; 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 SOLDER MASK



Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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

- linear phase, up to ±3deg typ. @ Fc ±30MHz
- small size 0.35" x 0.35"
- shielded case
- aqueous washable

Applications

- harmonic rejection
- transmitters / receivers
- WCDMA
- GSM



Generic photo used for illustration purposes only

CASE STYLE: GP731

+RoHS Compliant

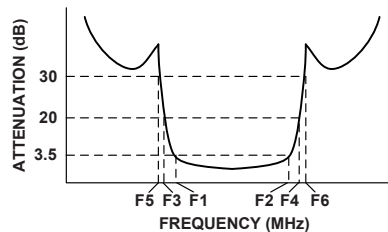
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Reel Size	Devices/Reel
7"	10, 20, 50, 100, 200
13"	500, 1000

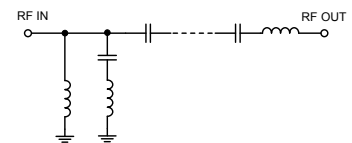
Bandpass Filter Electrical Specifications (T_{AMB} = 25°C)

CENTER FREQ. (MHz) Fc	PASSBAND (MHz) (Loss < 3.5dB) F1 - F2	STOPBANDS (MHz)				MAXIMUM DEVIATION FROM LINEAR PHASE (deg.) Fc ± 30MHz	VSWR (:1)		
		Loss > 20dB		Loss > 30dB			Passband		Stopband
		F3	F4	F5	F6		Typ.	Max.	Typ.
220	190 - 250	80	310	50	330-2000	±6	1.4	1.8	18

Typical Frequency Response

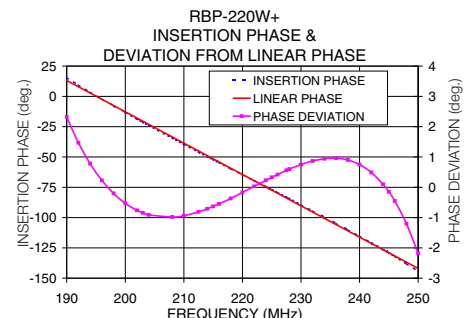
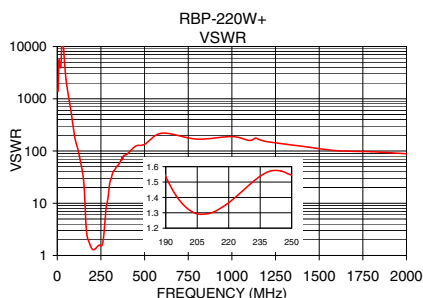


Functional Schematic



Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Deviation from Linear Phase (deg)
1.0	90.42	1506.73	190.0	2.32
50.0	40.56	2348.96	194.0	0.78
80.0	31.28	543.36	198.0	-0.20
156.5	15.58	14.09	202.0	-0.76
163.0	7.51	4.65	204.0	-0.91
169.5	3.07	2.50	210.0	-0.94
190.0	1.29	1.53	214.0	-0.71
210.0	1.02	1.29	218.0	-0.37
220.0	1.08	1.37	220.0	-0.17
230.0	1.19	1.48	222.0	0.03
250.0	1.55	1.54	224.0	0.23
265.0	2.83	2.24	228.0	0.60
275.0	6.33	5.31	230.0	0.75
290.0	14.87	12.19	234.0	0.94
310.0	27.00	31.00	238.0	0.90
330.0	41.62	43.84	242.0	0.49
1000.0	46.35	188.62	246.0	-0.45
2000.0	42.15	88.61	250.0	-2.18



Metal Shield Band Pass Filter

RBP-220W+

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	109.18	103.68	101.19	0.05	0.06	0.08	0.00	0.00	0.00
50	40.81	40.74	40.60	0.18	0.22	0.24	0.00	0.02	0.03
80	31.42	31.40	31.33	0.27	0.31	0.35	0.02	0.05	0.08
90	28.84	28.84	28.81	0.30	0.35	0.38	0.03	0.07	0.09
100	26.45	26.48	26.50	0.35	0.40	0.44	0.05	0.08	0.11
110	24.22	24.27	24.30	0.40	0.46	0.51	0.09	0.13	0.16
120	22.16	22.22	22.27	0.49	0.56	0.61	0.13	0.18	0.21
130	20.50	20.58	20.63	0.59	0.69	0.76	0.20	0.25	0.29
140	19.91	20.05	20.13	0.79	0.92	1.03	0.29	0.36	0.40
157	24.29	22.49	21.16	1.81	2.23	2.60	0.69	0.85	0.97
163	9.94	9.52	9.14	3.92	4.78	5.51	1.79	2.10	2.35
170	3.89	4.01	4.07	8.98	9.86	10.42	5.02	5.25	5.46
190	1.21	1.37	1.49	14.24	14.79	15.27	12.82	12.91	13.03
210	0.85	1.02	1.14	21.66	20.72	19.79	19.63	18.59	17.72
220	0.87	1.06	1.19	18.92	17.65	16.63	18.47	17.34	16.41
230	0.98	1.18	1.32	16.02	15.29	14.66	16.13	15.50	14.95
250	1.24	1.47	1.63	17.33	18.32	19.16	15.17	15.50	15.70
265	2.25	2.71	3.08	11.98	11.14	10.38	9.54	9.03	8.63
275	5.58	6.27	6.82	4.04	3.90	3.74	3.59	3.55	3.50
290	14.15	14.82	15.41	1.12	1.19	1.22	1.06	1.19	1.28
310	26.75	27.34	27.90	0.52	0.59	0.63	0.49	0.62	0.69
330	43.43	44.18	45.00	0.39	0.46	0.50	0.33	0.45	0.51
400	53.55	53.94	54.11	0.30	0.37	0.41	0.15	0.26	0.32
500	41.62	41.61	41.49	0.31	0.40	0.46	0.08	0.21	0.27
600	37.68	37.79	37.84	0.42	0.56	0.64	0.10	0.23	0.30
700	37.08	37.33	37.46	0.46	0.64	0.74	0.08	0.24	0.31
800	38.44	38.82	39.17	0.59	0.79	0.89	0.10	0.26	0.34
900	41.34	41.83	42.27	0.64	0.83	0.91	0.11	0.28	0.36
1000	45.99	46.74	47.22	0.61	0.76	0.84	0.14	0.32	0.41
1100	53.64	54.40	54.99	0.54	0.66	0.73	0.15	0.35	0.45
1200	71.41	70.63	70.97	0.46	0.57	0.63	0.16	0.37	0.47
1300	57.67	58.85	59.16	0.40	0.49	0.56	0.20	0.40	0.50
1400	54.65	56.02	56.29	0.35	0.45	0.51	0.19	0.41	0.51
1500	55.60	57.55	58.36	0.31	0.41	0.48	0.21	0.43	0.55
1600	59.40	63.98	66.07	0.28	0.39	0.47	0.20	0.46	0.58
1700	74.85	66.90	60.88	0.27	0.38	0.48	0.20	0.47	0.60
1800	56.90	54.81	53.24	0.27	0.40	0.50	0.19	0.46	0.59
1900	50.32	48.57	47.77	0.27	0.42	0.52	0.18	0.47	0.61
2000	45.25	44.20	43.71	0.32	0.48	0.60	0.16	0.45	0.61
2100	41.25	40.81	40.47	0.36	0.54	0.69	0.17	0.46	0.64
2200	38.29	37.89	37.72	0.40	0.62	0.79	0.18	0.46	0.63
2300	35.23	35.07	34.77	0.47	0.72	0.90	0.17	0.46	0.65
2400	32.93	32.54	32.42	0.52	0.79	1.01	0.19	0.47	0.65
2500	30.90	30.42	30.28	0.55	0.89	1.13	0.19	0.48	0.66
2600	29.12	28.62	28.47	0.61	0.98	1.24	0.21	0.51	0.68
2700	27.54	27.00	26.76	0.66	1.07	1.38	0.23	0.52	0.67
2800	26.03	25.47	25.30	0.66	1.11	1.43	0.24	0.53	0.68
2900	24.79	24.40	24.30	0.69	1.18	1.49	0.26	0.55	0.70
3000	24.02	23.79	23.72	0.74	1.24	1.57	0.25	0.55	0.68
3100	23.43	23.21	23.00	0.79	1.28	1.60	0.27	0.58	0.68
3200	22.96	22.59	22.25	0.86	1.37	1.66	0.26	0.58	0.69
3300	22.07	21.79	21.51	0.94	1.43	1.71	0.19	0.57	0.71
3400	20.86	20.93	20.78	0.99	1.49	1.77	0.22	0.60	0.73
3500	20.02	20.35	20.42	1.00	1.53	1.82	0.19	0.60	0.77

REV. X2

RBP-220W+

101011

Page 1 of 2



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Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
190	8.74	8.66	8.58
195	8.07	8.03	7.97
200	7.65	7.58	7.56
205	7.30	7.27	7.26
210	7.11	7.08	7.02
215	6.95	6.94	6.92
220	6.89	6.88	6.87
221	6.90	6.86	6.85
222	6.87	6.85	6.81
223	6.87	6.84	6.84
224	6.86	6.84	6.85
225	6.87	6.85	6.82
226	6.84	6.85	6.82
227	6.89	6.87	6.88
228	6.89	6.86	6.86
229	6.90	6.88	6.85
230	6.89	6.88	6.88
231	6.92	6.89	6.89
232	6.90	6.91	6.89
233	6.92	6.93	6.93
234	6.98	6.95	6.96
235	6.98	6.97	6.99
236	7.03	7.05	7.06
237	7.06	7.07	7.12
238	7.12	7.15	7.17
239	7.16	7.21	7.24
240	7.23	7.29	7.31
241	7.29	7.34	7.38
242	7.38	7.44	7.48
243	7.48	7.52	7.59
244	7.54	7.62	7.67
245	7.66	7.74	7.82
246	7.80	7.88	7.97
247	7.90	7.99	8.08
248	8.04	8.17	8.23
249	8.19	8.31	8.43
250	8.38	8.50	8.62
255	9.36	9.52	9.64
260	10.67	10.80	10.90
265	11.91	11.85	11.82
270	12.34	11.99	11.73
275	11.34	10.85	10.48
280	9.46	8.98	8.64
285	7.55	7.17	6.91
290	6.09	5.81	5.53
295	4.92	4.73	4.57
300	4.21	4.05	3.85
305	3.41	3.21	3.07
310	2.83	2.64	2.45
315	2.08	1.87	1.70
320	1.25	0.99	0.56
321	1.10	0.64	0.46
322	0.85	0.38	0.15

REV. X2

RBP-220W+

101011

Page 2 of 2



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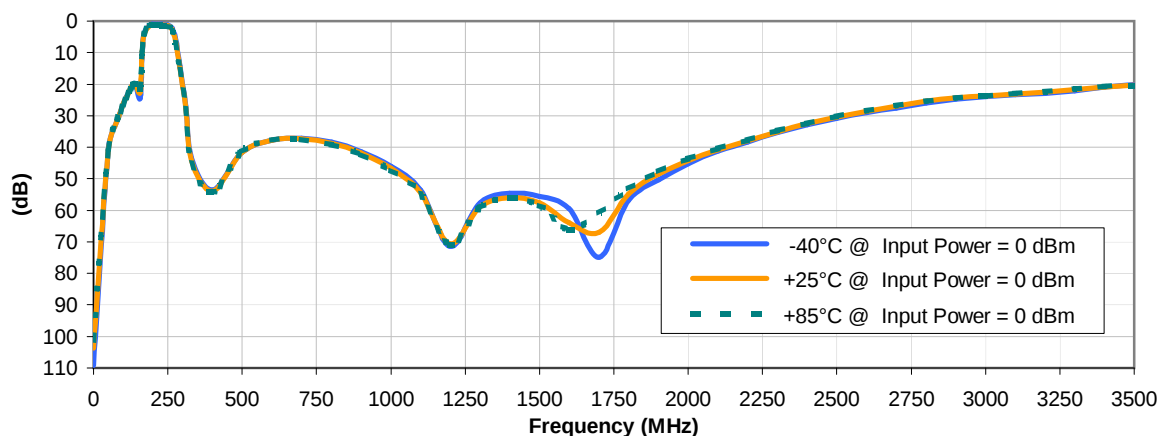


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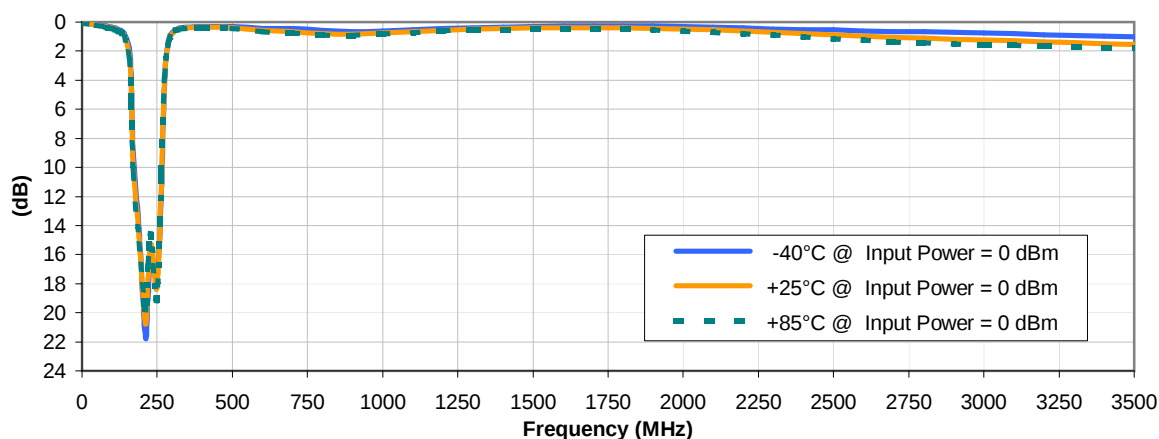


Typical Performance Curves

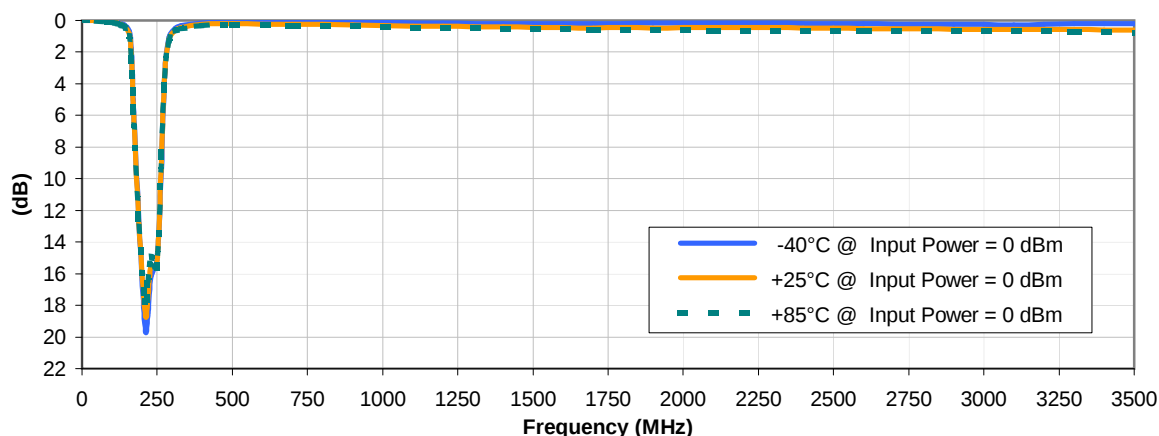
INSERTION LOSS vs. TEMPERATURE



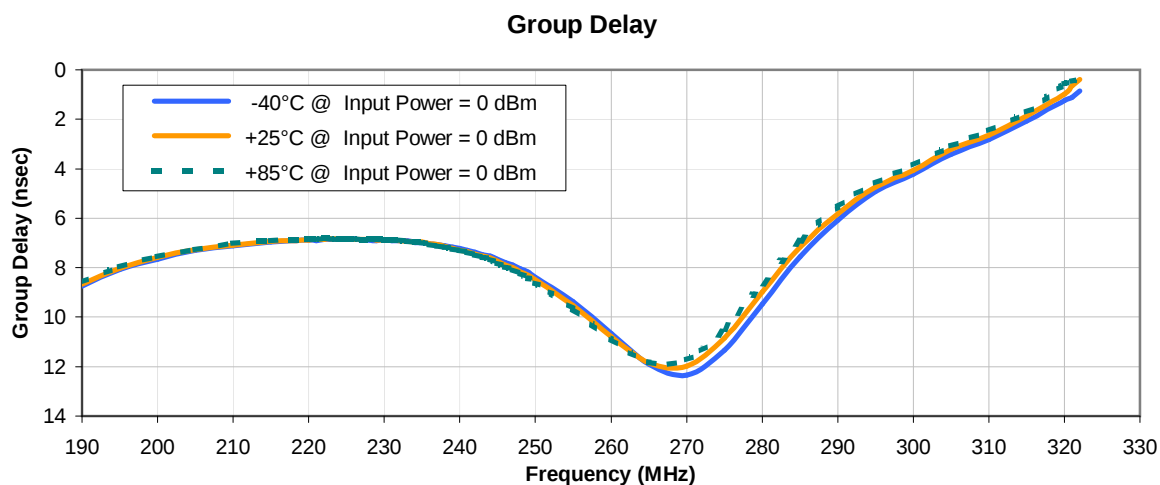
INPUT RETURN LOSS vs. TEMPERATURE



OUTPUT RETURN LOSS vs. TEMPERATURE



Typical Performance Curves



REV. X2
RBP-220W+
101011
Page 2 of 2

Outline Dimensions

GP731



CASE #	A	B	C	D	E	F	G	H	J	K	L	M
GP731	.350 (8.89)	.350 (8.89)	.100 (2.54)	.175 (4.45)	.075 (1.91)	.100 (2.54)	.110 (2.79)	.040 (1.02)	.080 (2.03)	.050 (1.27)	.040 (1.02)	.195 (4.95)

CASE #	N	P	Q	R	WT. GRAM
GP731	.390 (9.91)	.120 (3.05)	.390 (9.91)	.070 (1.78)	.4 +0.3 -0.0

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .03$; 3Pl. $\pm .015$

Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:

For RoHS Case Styles: 3-5 μ inch (.08-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate.
For RoHS-5 Case Styles: Tin-Lead plate.

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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F78



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note
16	12	7	10
			20
			50
			100
			200
		13	500, 1000

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

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THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	R59289	NEW RELEASE (FROM RAVON)	02/05	DK	HH
A	M101151	ADDED "RBP" & CORRECTED PIN	10/10/05	MMG	DJ
		CONNECTION TO DESCRIPTION OF PL-DWG.			
B	M102713	UPDATED NOTES, ADDED "...WITH SMOBC"	01/20/06	GT	IL

SUGGESTED MOUNTING CONFIGURATION
 FOR GP731 CASE STYLE, "qf" PIN CONNECTION.



- NOTES: 1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .025" ± .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 TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±	DRAWN	DK (RAVON)	10 FEB 05
	CHECKED	RZ (RAVON)	10 FEB 05
	APPROVED	HH (RAVON)	10 FEB 05



Mini-Circuits®
 13 Neptune Avenue
 Brooklyn NY 11235

PL, qf, GP731, RBP, TB-332

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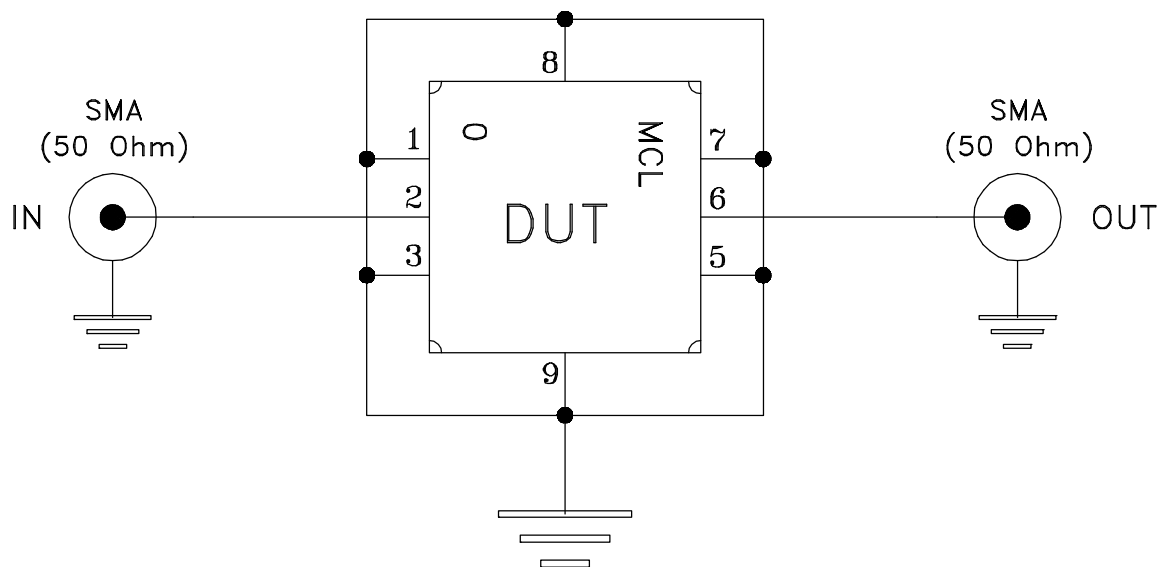
ASHEETA1.DWG REV:A DATE:01/12/95

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-176	B
FILE:	98PL176	SCALE: 5:1	SHEET: 1 OF 1

Evaluation Board and Circuit



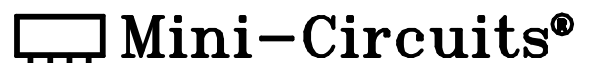
TB-332



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.020 inch.





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
HAST	130°C, 85% RH, 96 hours	JESD22-A110
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 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, 20-2000 Hz, 4 times in each of three axes (total 12)	MIL-STD-883, Method 2007.3, Condition A
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