

Low Pass Filter

50Ω DC to 900 MHz

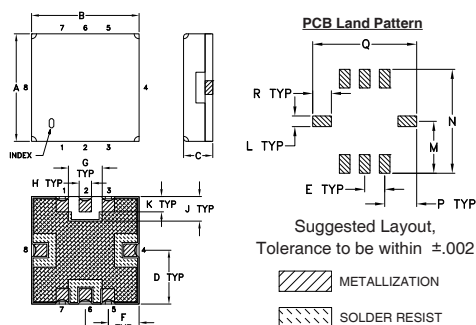
Maximum Ratings

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

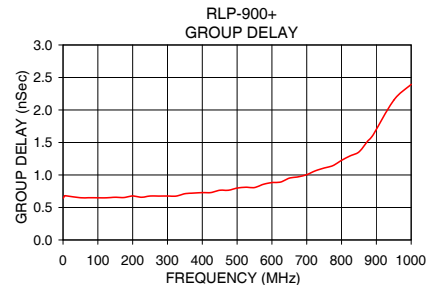
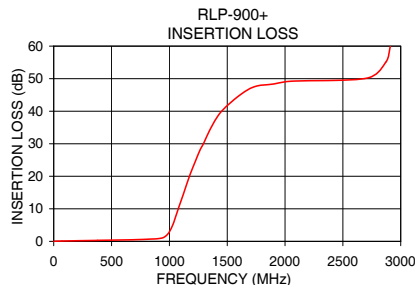
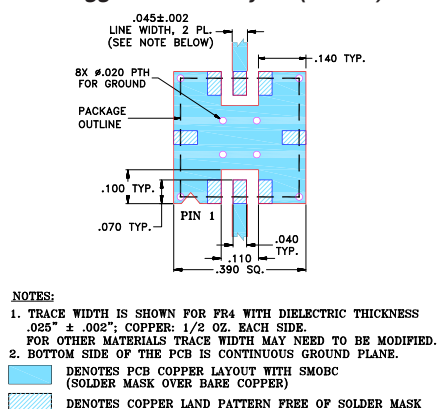


Outline Dimensions (inch/mm)

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

- 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-Circuit's 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-Circuit's website at www.minicircuits.com/MCLStore/terms.jsp



www.minicircuits.com P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com

Features

- high rejection
- sharp insertion loss roll off
- excellent VSWR, 1.2:1 typ. @ passband
- aqueous washable

Applications

- wireless communications
- receivers / transmitters



Generic photo used for illustration purposes only
CASE STYLE: GP731

+RoHS Compliant

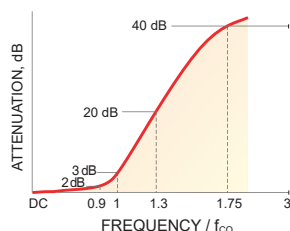
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

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

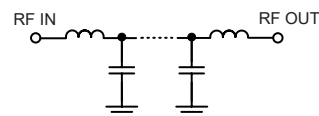
Low Pass Filter Electrical Specifications (T_{AMB} = 25°C)

PASSBAND (MHz)	f _{co} , MHz Nom.	STOPBAND (MHz)		VSWR (:1)	
		(Loss > 20dB)	(Loss > 40dB)	Passband Typ.	Stopband Typ.
DC - 900	1000	1300 - 1750	1750 - 2900	1.2	20

Typical Frequency Response



Functional Schematic



Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)		Return Loss (dB)	Frequency (MHz)	Group Delay (nSec)
	$\bar{x}$	σ			
0.5	0.02	0.00	51.49	1.0	0.64
50.0	0.08	0.00	41.46	50.0	0.65
250.0	0.21	0.01	31.46	100.0	0.65
400.0	0.31	0.01	23.11	150.0	0.66
600.0	0.44	0.01	21.51	200.0	0.68
800.0	0.62	0.02	23.69	300.0	0.68
900.0	0.82	0.02	30.02	350.0	0.71
960.0	1.40	0.08	13.20	400.0	0.73
1000.0	2.94	0.25	6.03	450.0	0.77
1040.0	6.07	0.38	2.71	500.0	0.80
1100.0	12.23	0.42	1.08	550.0	0.81
1200.0	22.10	0.36	0.54	650.0	0.95
1300.0	30.42	0.35	0.38	700.0	1.01
1400.0	36.91	0.35	0.32	750.0	1.11
1750.0	47.65	0.37	0.26	800.0	1.23
2000.0	48.61	0.31	0.26	850.0	1.35
2500.0	49.49	0.52	0.28	900.0	1.65
2900.0	58.98	3.62	0.33	1000.0	2.39

Metal Shield Low Pass Filter

RLP-900+

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
0.5	0.00	0.01	0.02	50.50	48.47	47.04	41.64	41.31	41.23
10	0.02	0.03	0.04	47.34	44.55	43.02	45.66	44.03	43.08
25	0.03	0.05	0.06	45.79	41.68	39.81	42.30	41.87	41.45
50	0.05	0.07	0.09	42.87	39.95	38.09	38.38	40.05	41.49
100	0.07	0.10	0.13	36.77	39.07	40.41	37.16	38.84	39.57
200	0.11	0.15	0.19	38.58	41.60	38.61	38.30	39.96	37.46
250	0.12	0.18	0.22	42.86	38.42	35.06	40.78	37.38	34.14
300	0.14	0.21	0.26	37.30	33.07	31.03	35.58	32.50	30.72
400	0.18	0.26	0.33	26.17	25.77	25.58	25.84	25.49	25.28
500	0.24	0.34	0.41	21.75	22.23	22.86	21.58	22.02	22.55
600	0.29	0.40	0.48	21.10	22.39	23.87	20.92	22.08	23.25
700	0.32	0.47	0.57	26.66	29.30	31.59	25.95	27.35	27.87
800	0.43	0.61	0.73	22.66	21.93	21.37	22.24	21.58	21.15
900	0.59	0.81	0.98	22.49	22.97	22.96	24.40	27.74	33.80
960	1.03	1.42	1.74	13.59	12.15	10.97	14.12	12.74	11.52
1000	2.56	3.16	3.65	5.93	5.47	5.05	5.93	5.56	5.18
1100	12.39	12.95	13.43	0.85	0.94	1.00	0.75	0.92	1.02
1200	22.54	22.91	23.22	0.38	0.50	0.59	0.28	0.48	0.61
1300	30.67	30.93	31.16	0.29	0.41	0.52	0.19	0.40	0.55
1400	36.71	36.90	37.07	0.26	0.39	0.52	0.15	0.38	0.55
1500	41.17	41.20	41.29	0.25	0.39	0.54	0.13	0.38	0.57
1600	43.68	43.78	43.90	0.25	0.41	0.56	0.13	0.38	0.60
1750	45.81	46.00	46.07	0.25	0.42	0.60	0.12	0.40	0.63
1800	46.26	46.35	46.51	0.24	0.42	0.60	0.11	0.41	0.65
2000	47.24	47.36	47.59	0.25	0.45	0.64	0.12	0.43	0.70
2200	47.40	47.62	47.89	0.27	0.48	0.68	0.12	0.46	0.73
2400	47.17	47.63	47.78	0.28	0.49	0.69	0.14	0.48	0.77
2500	47.24	47.41	47.75	0.29	0.50	0.71	0.12	0.48	0.77
2600	47.26	47.71	47.70	0.29	0.51	0.70	0.13	0.49	0.78
2800	49.92	50.20	52.52	0.31	0.52	0.71	0.13	0.50	0.78
2900	54.59	55.18	56.47	0.31	0.53	0.72	0.12	0.50	0.79
3000	56.84	55.89	53.10	0.35	0.56	0.75	0.13	0.50	0.79
3200	29.59	29.11	28.48	0.66	1.01	1.35	0.14	0.53	0.84
3400	19.86	21.11	22.20	0.97	1.16	1.28	0.18	0.57	0.85
3500	22.29	23.14	23.74	0.50	0.72	0.91	0.16	0.55	0.85
3600	22.46	23.14	23.50	0.42	0.63	0.82	0.16	0.55	0.85
3800	19.98	20.25	20.60	0.42	0.65	0.85	0.21	0.63	0.95
4000	13.16	12.97	12.60	0.77	1.08	1.43	0.71	1.30	1.88
4200	6.10	8.10	9.80	2.92	2.39	2.11	4.46	3.60	3.13
4400	15.59	16.59	17.36	0.55	0.80	0.98	0.38	0.88	1.19
4500	17.82	18.66	19.47	0.46	0.75	0.91	0.29	0.74	1.07
4600	19.19	19.89	20.74	0.44	0.67	0.91	0.20	0.70	1.12
4800	21.14	21.63	22.11	0.37	0.66	0.90	0.19	0.71	1.09
5000	21.71	22.61	22.56	0.50	0.77	0.97	0.20	0.68	1.06
5200	21.49	21.48	22.09	0.47	0.81	1.14	0.25	0.77	1.26
5400	21.50	21.42	21.21	0.57	0.85	1.17	0.23	0.79	1.28
5500	22.23	22.00	20.51	0.56	0.91	1.21	0.32	0.90	1.38
5600	20.17	19.72	19.24	0.53	0.98	1.39	0.28	0.88	1.40
5800	18.66	17.70	16.92	0.82	1.34	1.95	0.46	1.12	1.80
6000	14.96	13.43	14.09	1.24	2.76	4.19	0.70	2.11	2.99
6500	23.21	26.95	29.49	1.03	1.29	1.54	0.57	1.08	1.53
7000	34.77	36.83	32.37	0.99	1.32	1.61	0.62	1.14	1.87
8000	30.12	30.89	33.50	0.87	1.31	1.71	0.57	1.43	2.03
8500	35.99	38.33	39.93	0.73	1.14	1.62	0.41	1.27	1.90

REV. X2

RLP-900+

101006

Page 1 of 2



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED • RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
0.5	0.65	0.67	0.67
10	0.82	0.83	0.83
50	0.92	0.92	0.93
100	0.95	0.95	0.95
200	0.97	0.96	0.97
300	1.00	0.99	0.99
400	1.04	1.03	1.03
500	1.10	1.09	1.10
600	1.19	1.19	1.19
700	1.33	1.33	1.33
800	1.55	1.55	1.56
900	2.03	2.04	2.07
1000	2.59	2.54	2.50
1200	1.03	1.02	1.02
1300	0.77	0.77	0.78
1400	0.66	0.65	0.66
1500	0.56	0.57	0.57
1600	0.51	0.52	0.52
1700	0.48	0.48	0.47
1800	0.45	0.44	0.44
1900	0.43	0.42	0.42
2000	0.42	0.41	0.41
2200	0.40	0.40	0.39
2400	0.41	0.41	0.37
2500	0.41	0.39	0.37
2600	0.30	0.42	0.26
2700	0.27	0.27	0.09
2800	0.22	0.06	0.34
2900	0.28	1.11	2.72
3000	4.19	4.15	3.42
3200	0.82	1.07	1.34
3400	1.29	1.07	0.91
3500	0.51	0.50	0.50
3600	0.43	0.41	0.42
3700	0.41	0.41	0.39
3800	0.39	0.39	0.38
3900	0.43	0.46	0.47
4000	0.71	0.80	0.94
4200	1.97	1.69	1.42
4400	0.47	0.45	0.43
4500	0.36	0.36	0.33
4600	0.32	0.29	0.28
4700	0.31	0.33	0.38
4800	0.35	0.33	0.24
4900	0.33	0.30	0.31
5000	0.29	0.30	0.40
5200	0.35	0.43	0.34
5400	0.31	0.28	0.42
5500	0.20	0.29	0.46
5600	0.50	0.44	0.44
5700	0.35	0.40	0.52
5800	0.39	0.50	0.66
5900	0.52	0.65	0.97
6000	0.55	1.11	1.30

REV. X2

RLP-900+

101006

Page 2 of 2



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

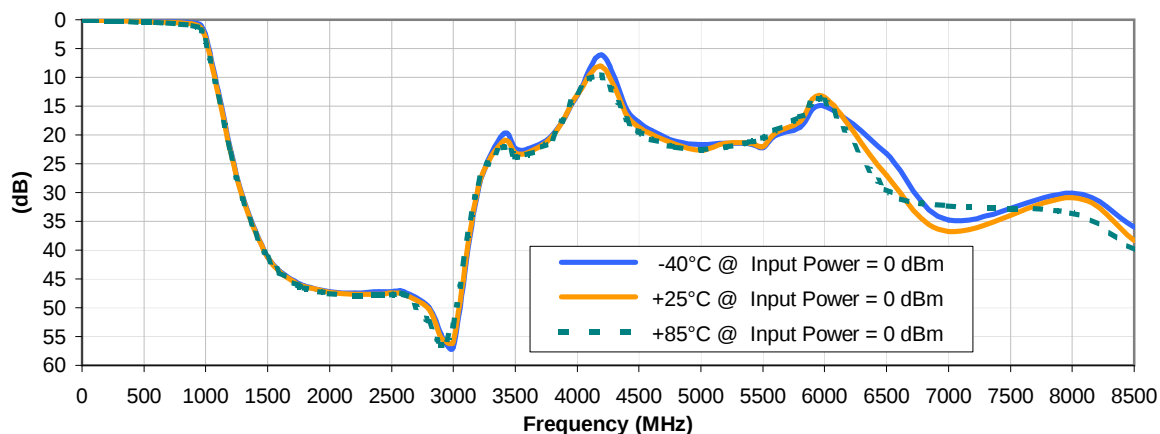


The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see

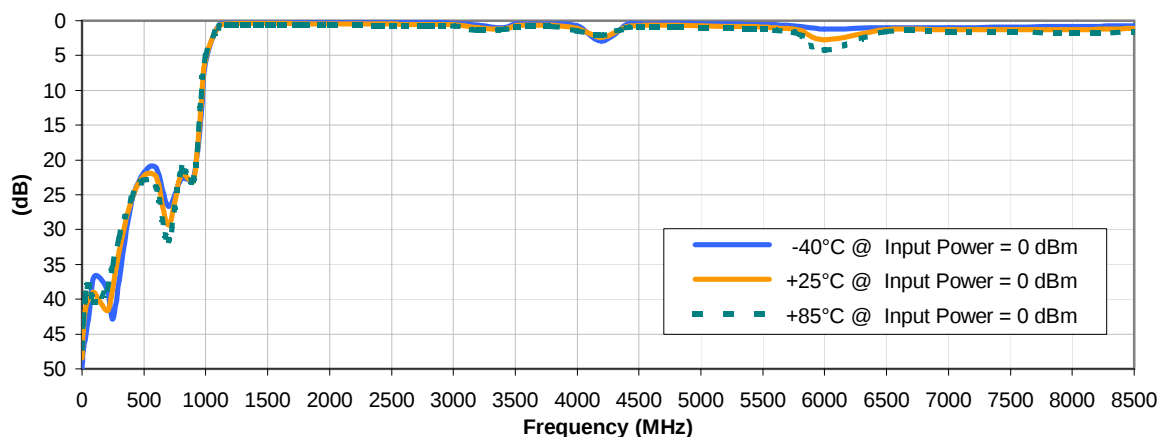


Typical Performance Curves

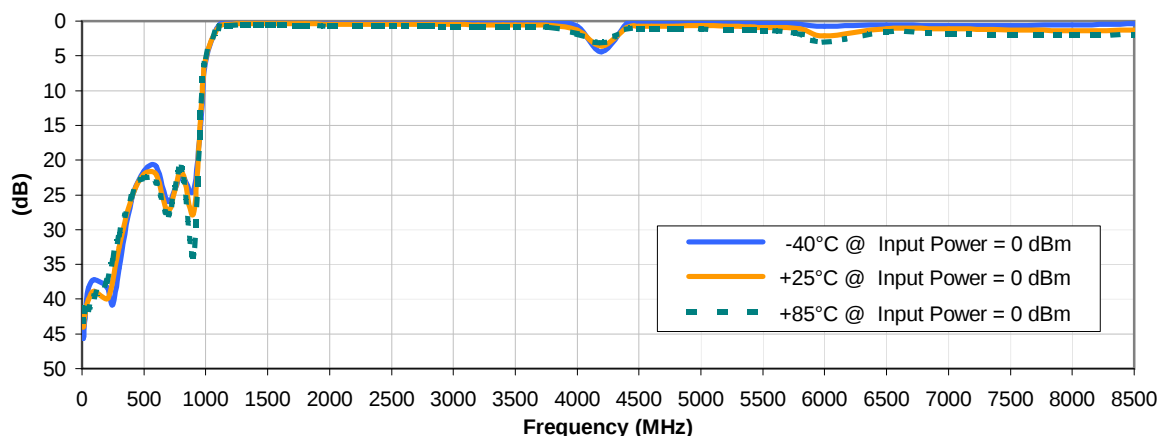
INSERTION LOSS vs. TEMPERATURE



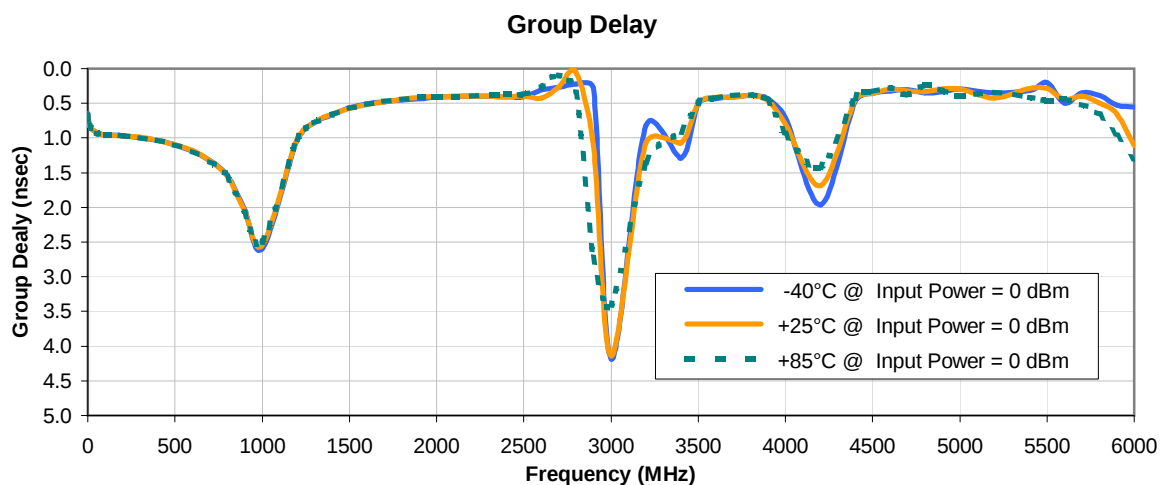
INPUT RETURN LOSS vs. TEMPERATURE



OUTPUT RETURN LOSS vs. TEMPERATURE



Typical Performance Curves



REV. X2

RLP-900+

101006

Page 2 of 2



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661



The Design Engineers Search Engine finds the model you need, instantly • For detailed performance specs & shopping online see



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.



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

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.

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



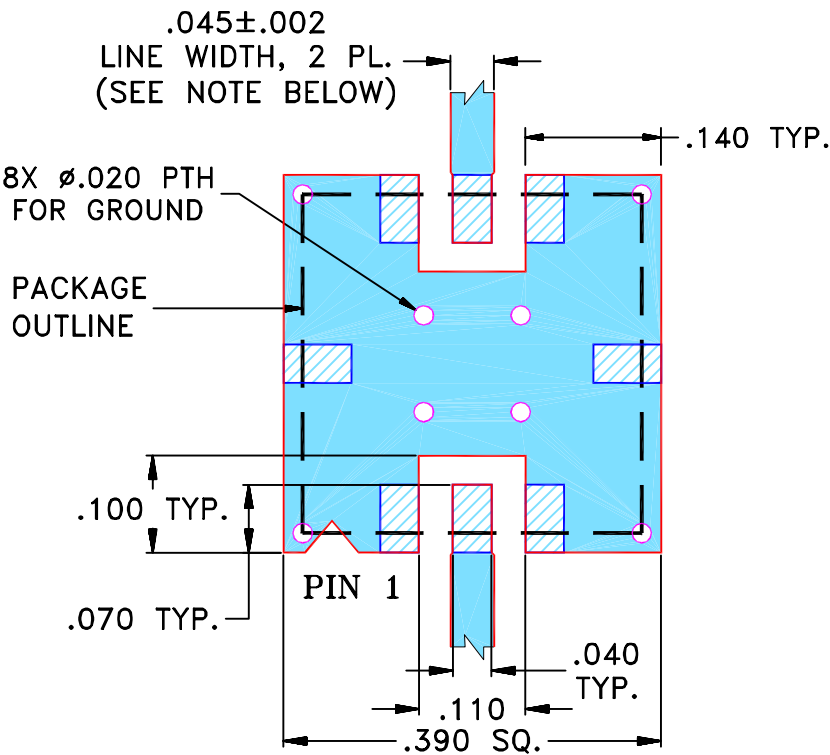
INTERNET <http://www.minicircuits.com>
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

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®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

ASHEETA1.DWG REV:A

DATE:01/12/95

Mini-Circuits®

13 Neptune Avenue
 Brooklyn NY 11235

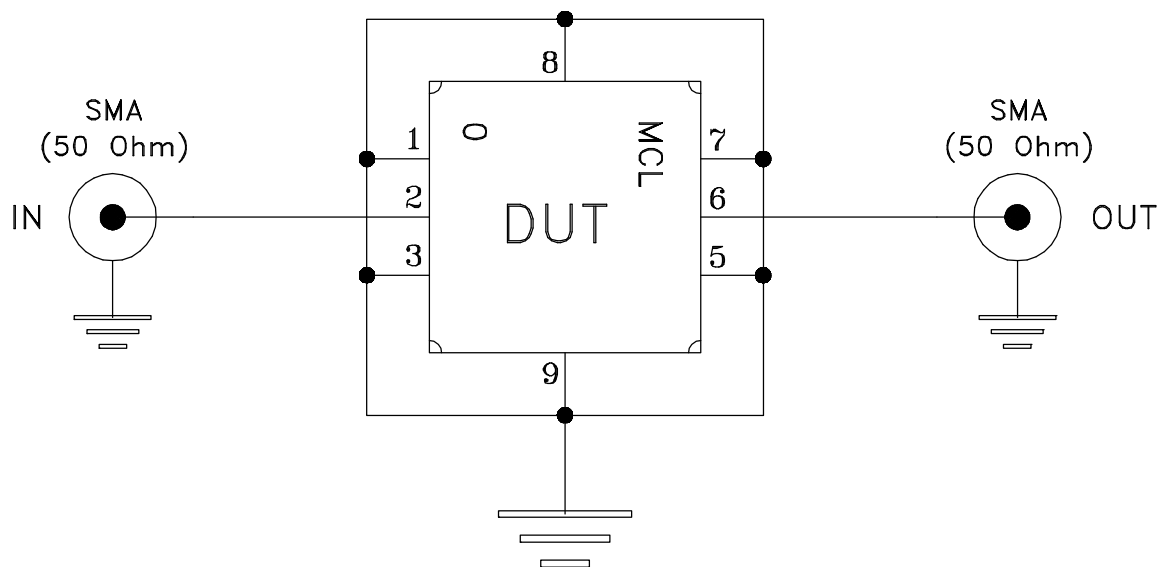
PL, qf, GP731, RBP, TB-332

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.

 **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
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