Metal Shield

Low Pass Filter

RLP-264+

50Ω DC to 264 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

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

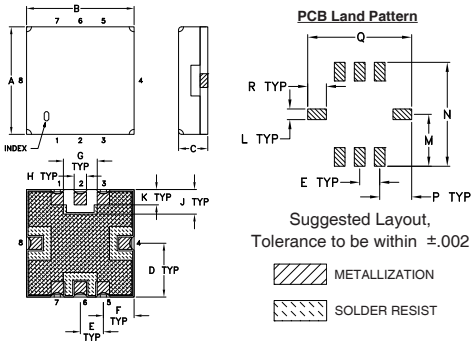
+RoHS Compliant

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

Available Tape and Reel at no extra cost

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

Outline Drawing



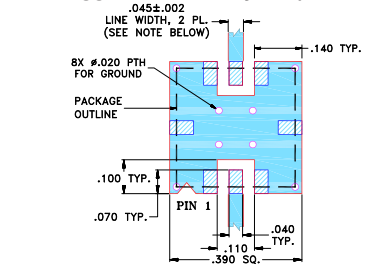
Outline Dimensions (inch / mm)

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:
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.

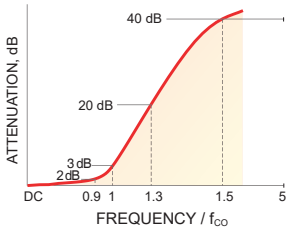
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

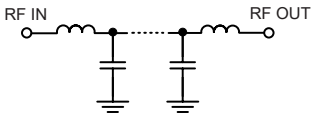
Low Pass Filter Electrical Specifications (T_{AMB} = 25°C)

PASSBAND (MHz)	fco, MHz Nom.	STOPBAND (MHz)		VSWR (:1)	
(Loss < 2dB)	(Loss 3dB)	(Loss > 20dB)	(Loss > 40dB)	Passband Typ.	Stopband Typ.
DC - 264	288	365 - 425	425 - 1500	1.2	20

Typical Frequency Response



Functional Schematic

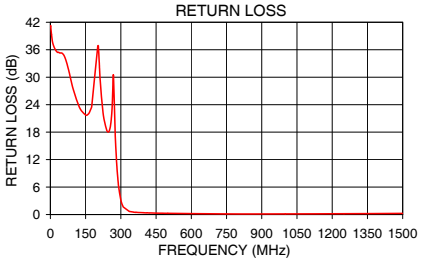


Typical Performance Data at 25°C

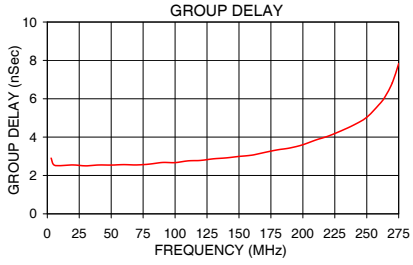
Frequency (MHz)	Insertion Loss (dB) x̄	Insertion Loss (dB) σ	Return Loss (dB)	Frequency (MHz)	Group Delay (nSec)
0.5	0.08	0.07	40.94	3.0	2.90
50.0	0.19	0.07	35.24	5.0	2.56
80.0	0.26	0.07	31.06	10.0	2.51
125.0	0.38	0.07	23.29	30.0	2.50
150.0	0.45	0.07	21.73	50.0	2.54
202.0	0.58	0.07	36.85	70.0	2.55
264.0	1.09	0.08	24.64	90.0	2.68
276.0	1.52	0.10	17.67	100.0	2.67
288.0	3.07	0.21	7.44	120.0	2.79
300.0	6.45	0.33	3.13	140.0	2.92
311.0	10.57	0.37	1.62	160.0	3.06
335.0	19.87	0.37	0.71	190.0	3.44
365.0	30.57	0.37	0.48	200.0	3.60
425.0	51.05	0.76	0.36	220.0	4.05
500.0	76.32	8.01	0.27	240.0	4.64
1000.0	71.79	6.79	0.14	250.0	5.03
1250.0	66.32	2.76	0.18	264.0	6.07
1500.0	73.26	6.64	0.25	275.0	7.83

RLP-264+
INSERTION LOSS

RLP-264+
RETURN LOSS



RLP-264+
GROUP DELAY



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

Metal Shield Low Pass Filter RLP-264+

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	0.06	0.07	0.09	40.40	39.57	38.55	44.48	42.16	40.19
50	0.16	0.18	0.21	36.86	35.44	34.28	34.54	35.06	35.56
80	0.20	0.24	0.28	33.44	32.77	32.02	35.50	33.38	31.64
150	0.37	0.44	0.49	19.54	19.49	19.49	19.54	19.54	19.60
200	0.46	0.55	0.62	24.97	25.68	26.66	25.14	26.13	27.62
264	0.89	1.05	1.19	21.11	21.85	22.65	20.35	20.83	21.33
276	1.14	1.36	1.57	22.38	20.80	19.12	20.56	19.30	18.00
288	2.29	2.64	3.01	8.60	8.24	7.80	8.47	8.16	7.75
300	5.45	5.90	6.37	3.38	3.35	3.27	3.34	3.34	3.29
365	30.18	30.46	30.78	0.37	0.44	0.49	0.34	0.44	0.53
425	49.99	50.22	50.51	0.25	0.30	0.36	0.21	0.31	0.39
500	73.35	72.73	72.66	0.18	0.24	0.30	0.15	0.25	0.34
600	76.06	75.35	76.02	0.14	0.21	0.28	0.10	0.22	0.32
700	73.92	76.12	75.12	0.12	0.19	0.27	0.07	0.20	0.32
800	75.46	75.20	75.15	0.12	0.19	0.28	0.06	0.20	0.33
900	73.86	74.31	74.42	0.11	0.19	0.29	0.05	0.21	0.35
1000	72.14	72.60	72.42	0.11	0.20	0.31	0.04	0.21	0.37
1200	68.11	68.04	68.55	0.12	0.23	0.36	0.04	0.24	0.42
1250	67.90	67.77	68.20	0.13	0.24	0.37	0.05	0.25	0.44
1400	68.63	68.79	69.65	0.14	0.26	0.40	0.05	0.27	0.47
1500	80.70	81.56	81.03	0.15	0.27	0.43	0.05	0.28	0.50
1800	38.21	38.71	39.24	0.18	0.31	0.48	0.09	0.34	0.58
2000	38.13	38.45	38.75	0.20	0.34	0.50	0.08	0.34	0.58
2200	20.96	20.69	20.10	0.82	1.11	1.55	0.42	0.77	1.17
2400	38.99	39.64	40.33	0.23	0.37	0.54	0.09	0.36	0.61
2500	42.57	42.93	43.09	0.23	0.37	0.54	0.09	0.37	0.63
2800	48.04	48.72	49.46	0.23	0.37	0.53	0.08	0.35	0.62
3000	49.29	49.23	50.63	0.21	0.35	0.52	0.06	0.36	0.63
3200	51.22	51.97	50.43	0.21	0.35	0.53	0.03	0.34	0.62
3400	50.50	49.59	49.03	0.20	0.34	0.52	0.06	0.38	0.66
3500	51.84	50.75	50.89	0.21	0.36	0.52	0.04	0.38	0.68
3800	44.82	45.56	44.44	0.25	0.39	0.58	0.02	0.38	0.71
4000	41.66	42.52	40.88	0.24	0.40	0.56	0.07	0.45	0.78
4200	40.75	40.69	39.59	0.25	0.44	0.63	0.04	0.47	0.83
4400	37.95	38.48	38.15	0.24	0.42	0.63	0.04	0.46	0.85
4500	41.95	41.93	43.27	0.26	0.45	0.64	0.02	0.45	0.86
4800	39.54	38.31	40.29	0.34	0.52	0.72	0.05	0.49	0.92
5000	34.31	34.28	34.27	0.34	0.54	0.77	0.17	0.62	1.07
5200	36.30	35.73	34.56	0.34	0.57	0.91	0.26	0.79	1.45
5400	30.08	33.49	37.71	0.55	0.80	0.97	0.61	1.39	1.45
5500	36.87	44.72	38.92	0.62	0.72	1.00	1.10	0.98	1.26
5800	34.87	35.34	38.07	0.61	0.81	1.06	0.38	0.88	1.35
6000	39.75	38.36	35.54	0.58	0.94	1.13	0.40	0.97	1.50
6200	33.85	35.02	36.88	0.46	0.71	1.09	0.37	0.89	1.46
6400	34.20	33.12	34.46	0.59	0.84	1.12	0.41	0.91	1.48
6500	34.46	33.44	36.02	0.65	0.83	1.19	0.42	0.96	1.52
6800	39.94	40.83	35.71	0.73	0.90	1.24	0.35	0.94	1.53
7000	37.68	42.21	40.17	0.66	1.02	1.45	0.44	1.03	1.71
7200	36.14	36.62	38.20	0.71	1.08	1.58	0.47	1.08	1.77
7400	37.06	38.51	47.19	0.71	1.12	1.48	0.37	1.03	1.71
7500	35.62	37.49	42.58	0.72	1.04	1.47	0.34	1.01	1.74
7800	37.42	37.34	40.47	0.77	1.13	1.54	0.30	0.97	1.72
8000	34.89	34.99	33.44	0.69	1.20	1.80	0.30	1.03	1.88
8500	22.96	22.60	22.06	0.87	1.55	2.62	0.53	1.24	2.22

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Metal Shield Low Pass Filter RLP-264+

Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
0.5	2.76	2.76	2.78
3	2.77	2.76	2.78
5	2.77	2.77	2.78
10	2.76	2.77	2.78
20	2.76	2.76	2.78
30	2.76	2.77	2.78
40	2.78	2.78	2.79
50	2.80	2.80	2.81
60	2.83	2.83	2.84
80	2.88	2.89	2.89
100	2.96	2.96	2.97
120	3.06	3.07	3.07
140	3.21	3.21	3.22
150	3.30	3.30	3.31
160	3.40	3.41	3.42
180	3.67	3.67	3.69
200	4.04	4.05	4.07
210	4.32	4.33	4.36
220	4.70	4.72	4.75
230	5.14	5.15	5.18
240	5.53	5.52	5.53
250	5.76	5.74	5.73
260	5.86	5.83	5.81
270	5.86	5.83	5.80
280	5.79	5.75	5.73
282	5.77	5.74	5.71
284	5.75	5.71	5.68
286	5.72	5.69	5.65
288	5.70	5.66	5.63
289	5.68	5.64	5.61
290	5.67	5.63	5.60
300	5.50	5.46	5.42
350	3.87	3.80	3.74
400	1.66	1.64	1.60
450	1.04	1.06	1.20
500	1.04	0.98	0.99
550	0.86	0.92	1.03
600	0.74	0.72	0.54
650	0.32	0.72	0.48
700	0.47	0.60	0.51
750	0.52	0.42	0.50
800	0.37	0.35	0.50
850	0.38	0.38	0.28
900	0.49	0.43	0.41
950	0.48	0.50	0.51
1000	0.51	0.45	0.56
1050	0.48	0.24	0.51
1100	0.43	0.36	0.33
1150	0.37	0.34	0.29
1200	0.33	0.28	0.35
1250	0.26	0.30	0.28
1300	0.35	0.40	0.28
1350	0.44	0.40	0.35
1400	0.11	0.00	0.05

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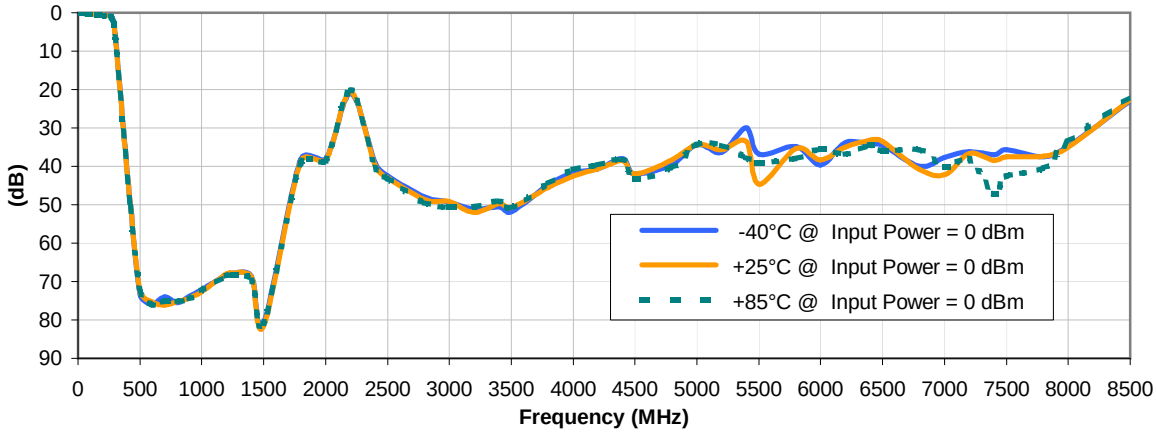
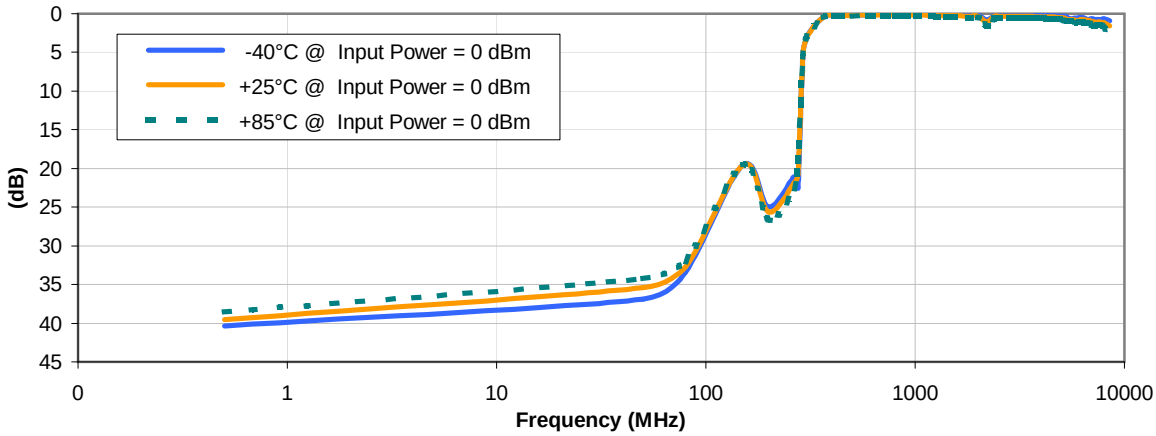
Metal Shield Low Pass Filter RLP-264+

Typical Performance Curves

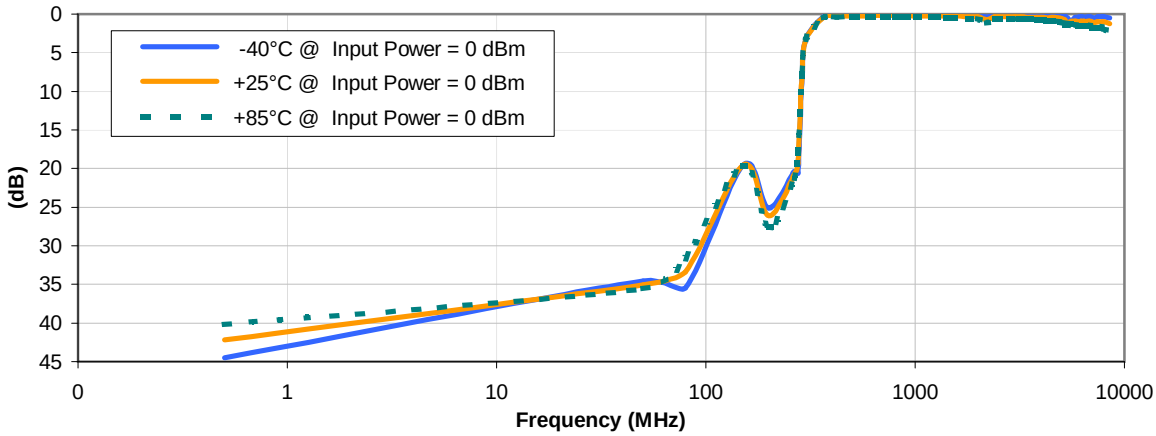
INSERTION LOSS vs. TEMPERATURE



INPUT RETURN LOSS vs. TEMPERATURE



OUTPUT RETURN LOSS vs. TEMPERATURE



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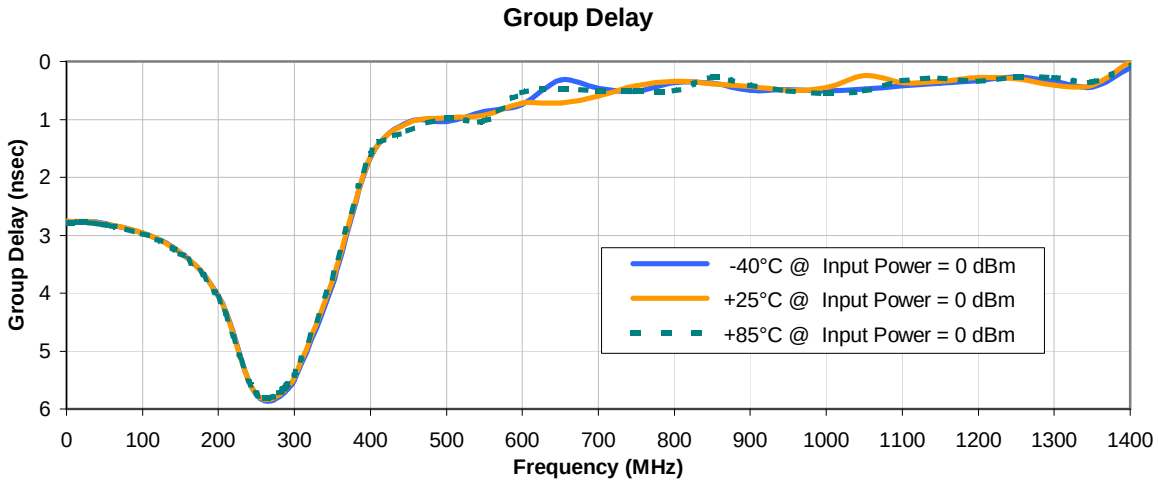

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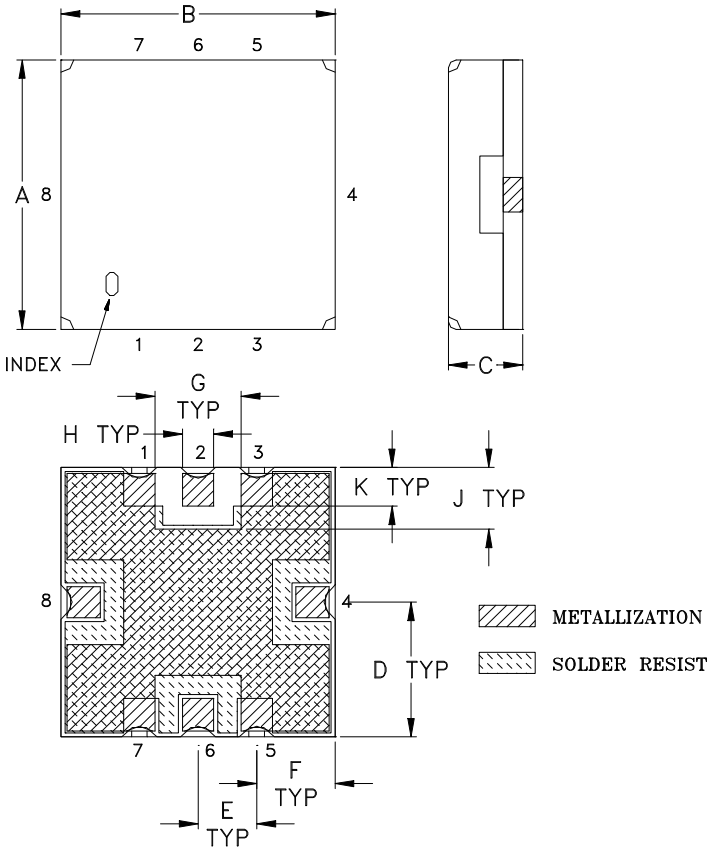
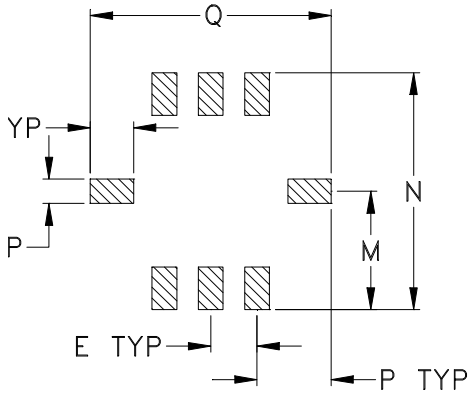
Case Style GP

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. ± .03; 3Pl. ± .015

Notes:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. 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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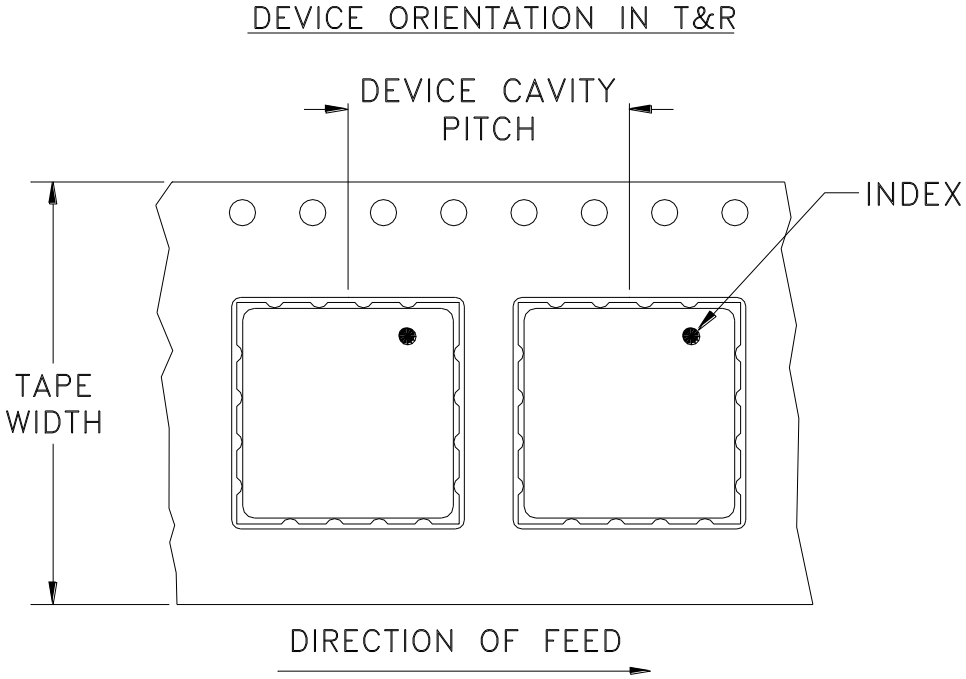
Tape & Reel Packaging TR-F78



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

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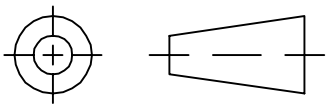
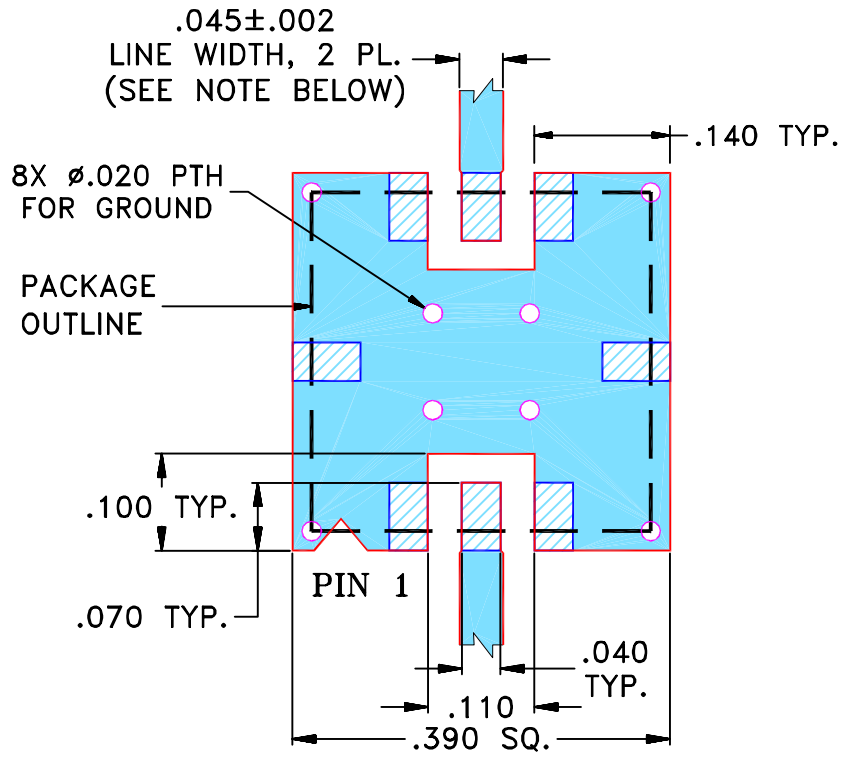
THIRD ANGLE PROJECTION



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:
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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	DK (RAVON)	10 FEB 05
TOLERANCES ON:	CHECKED	RZ (RAVON)	10 FEB 05
2 PL DECIMALS ±	APPROVED	HH (RAVON)	10 FEB 05
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

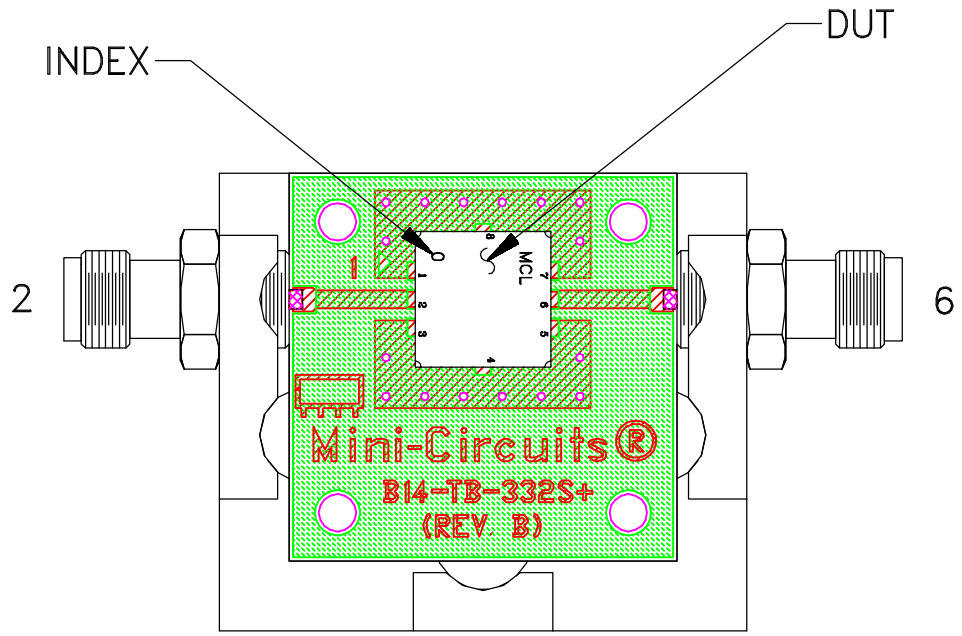
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, qf, GP731, RBP, TB-332

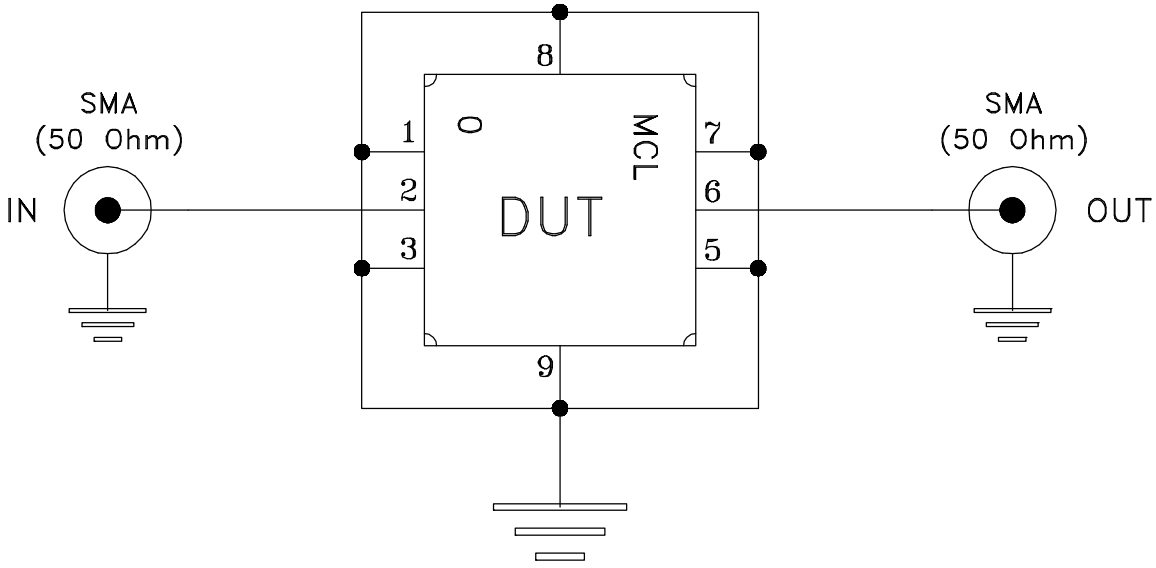
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-176	B

FILE:	SCALE:	SHEET:
98PL176	5:1	1 OF 1

Evaluation Board and Circuit



TB-332



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.020 inch.

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Environmental Specifications ENV03T2

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

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