Metal Shield

Bandpass Filter

RBP-204+

50Ω 175 to 237 MHz

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

Maximum Ratings

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

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

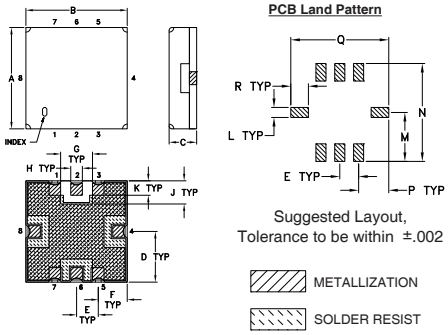
Features

- VSWR, 1.4:1 typ. @ passband
- small size 0.35" x 0.35"
- shielded case
- aqueous washable

Applications

- harmonic rejection
- transmitters / receivers
- military radio

Outline Drawing



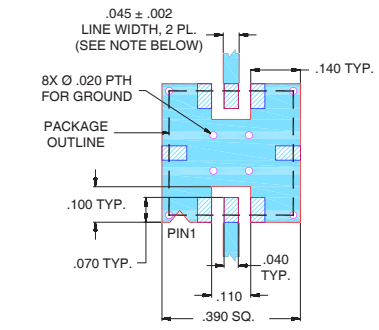
Outline Dimensions (inch / mm)

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)



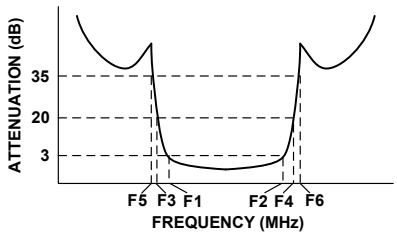
NOTES:
1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .025" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

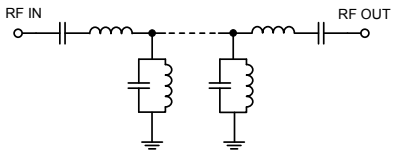
Bandpass Filter Electrical Specifications (T_{AMB}= 25ºC)

CENTER FREQ. (MHz)	PASSBAND (MHz) (Loss < 3dB)	STOPBANDS (MHz)				VSWR (:1)		
		Loss > 20dB		Loss > 35dB		Passband		Stopband
Fc	F1 - F2	F3	F4	F5	F6	Typ.	Max.	Typ.
204	175 - 237	135	300	115	350 - 2000	1.4	2.1	18

Typical Frequency Response



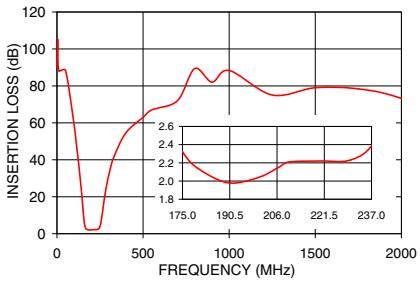
Functional Schematic



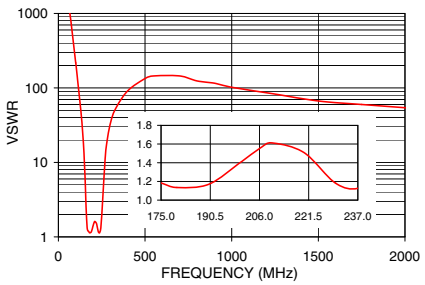
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
0.5	90.94	1737.18
50	88.29	1737.18
115	46.96	102.19
135	29.78	36.20
150	14.59	10.31
157	7.46	3.84
162	4.21	1.85
175	2.32	1.18
204	2.11	1.51
237	2.40	1.12
255	5.86	2.95
264	11.45	7.31
280	21.72	18.70
300	31.40	33.42
350	46.24	69.49
700	72.03	144.77
1500	79.02	66.82
2000	73.23	54.29

RBP-204+
INSERTION LOSS



RBP-204+
VSWR



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 Band Pass Filter RBP-204+

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	91.06	93.60	93.84	0.00	0.00	0.00	0.00	0.00	0.00
50	97.54	94.16	93.89	0.01	0.02	0.02	0.00	0.02	0.04
115	47.16	46.94	46.79	0.15	0.20	0.22	0.14	0.20	0.24
135	30.32	29.99	29.73	0.43	0.52	0.59	0.40	0.52	0.60
150	14.88	14.64	14.45	1.55	1.85	2.06	1.49	1.79	2.02
175	2.10	2.44	2.67	19.73	19.05	18.27	19.43	18.35	17.28
204	2.08	2.37	2.56	11.89	12.13	12.41	11.53	11.71	12.00
210	2.18	2.47	2.66	10.93	11.19	11.52	10.48	10.67	10.95
220	2.21	2.52	2.73	11.77	12.07	12.39	10.60	10.74	10.92
230	2.18	2.53	2.78	16.51	16.47	16.37	12.99	13.01	13.00
237	2.32	2.72	3.01	16.93	16.55	16.03	14.75	15.10	15.21
255	5.65	6.46	7.06	5.40	5.21	5.05	7.16	6.90	6.70
260	8.67	9.47	10.06	3.06	3.12	3.14	3.78	3.87	3.90
270	15.69	16.28	16.70	1.30	1.45	1.55	1.45	1.65	1.78
280	21.98	22.40	22.69	0.78	0.92	1.01	0.81	0.99	1.11
300	31.72	32.02	32.16	0.44	0.55	0.62	0.41	0.56	0.66
350	46.77	46.96	47.01	0.22	0.30	0.36	0.18	0.31	0.39
400	55.30	55.40	55.54	0.15	0.24	0.30	0.10	0.24	0.33
500	64.69	65.27	65.07	0.11	0.20	0.26	0.05	0.20	0.30
600	70.93	71.93	71.47	0.10	0.20	0.27	0.04	0.21	0.32
700	79.87	78.91	77.10	0.10	0.22	0.29	0.04	0.23	0.35
800	93.08	102.18	86.37	0.10	0.24	0.32	0.04	0.24	0.38
900	82.33	86.72	83.69	0.11	0.26	0.34	0.04	0.26	0.41
1000	78.83	79.78	78.52	0.13	0.28	0.37	0.05	0.29	0.44
1100	79.63	77.76	80.76	0.14	0.30	0.39	0.06	0.31	0.46
1200	80.21	80.95	78.30	0.15	0.32	0.42	0.07	0.33	0.49
1300	78.43	81.40	83.70	0.16	0.33	0.43	0.08	0.35	0.52
1400	81.51	87.35	79.80	0.17	0.35	0.46	0.09	0.37	0.54
1500	77.15	79.66	73.95	0.19	0.36	0.48	0.10	0.39	0.57
1600	74.46	74.97	70.32	0.20	0.38	0.50	0.11	0.40	0.59
1700	69.11	70.15	71.85	0.20	0.38	0.51	0.11	0.42	0.61
1800	78.75	86.21	77.85	0.21	0.40	0.52	0.11	0.43	0.63
1900	70.19	68.24	68.45	0.21	0.41	0.53	0.11	0.44	0.66
2000	71.30	69.11	72.96	0.22	0.41	0.55	0.11	0.44	0.68
2100	65.17	68.36	65.45	0.22	0.42	0.56	0.10	0.45	0.70
2200	56.57	58.56	63.44	0.23	0.44	0.57	0.11	0.46	0.71
2300	59.15	59.58	61.71	0.22	0.43	0.59	0.10	0.47	0.72
2400	55.83	57.93	51.75	0.23	0.44	0.60	0.10	0.47	0.73
2500	59.22	61.96	51.57	0.23	0.45	0.61	0.10	0.48	0.73
2600	50.94	52.10	51.39	0.23	0.46	0.61	0.10	0.48	0.72
2700	48.76	47.75	50.16	0.25	0.48	0.62	0.11	0.50	0.72
2800	48.04	48.12	53.42	0.26	0.49	0.64	0.10	0.49	0.71
2900	43.58	45.53	48.09	0.25	0.50	0.64	0.10	0.52	0.73
3000	46.17	46.41	47.58	0.24	0.50	0.65	0.10	0.52	0.74
3100	45.88	46.58	49.02	0.25	0.52	0.66	0.12	0.52	0.73
3200	46.11	44.58	45.45	0.24	0.52	0.68	0.07	0.51	0.74
3300	41.92	42.71	42.74	0.27	0.55	0.69	0.07	0.52	0.77
3400	41.45	41.20	42.96	0.29	0.58	0.76	0.08	0.53	0.79
3500	44.11	43.45	43.77	0.36	0.66	0.86	0.11	0.58	0.85
3600	40.23	41.32	48.57	0.39	0.69	0.90	0.13	0.60	0.92
3700	38.77	39.20	39.75	0.40	0.69	0.93	0.13	0.60	0.97
3800	39.77	39.81	37.58	0.37	0.70	0.91	0.08	0.58	0.99
3900	36.92	36.84	36.54	0.38	0.74	0.99	0.11	0.60	1.05
4000	37.52	35.62	36.01	0.44	0.79	1.06	0.14	0.63	1.17

Mini-Circuits®
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 minicircuits.com

Metal Shield Band Pass Filter RBP-204+

Typical Performance Data

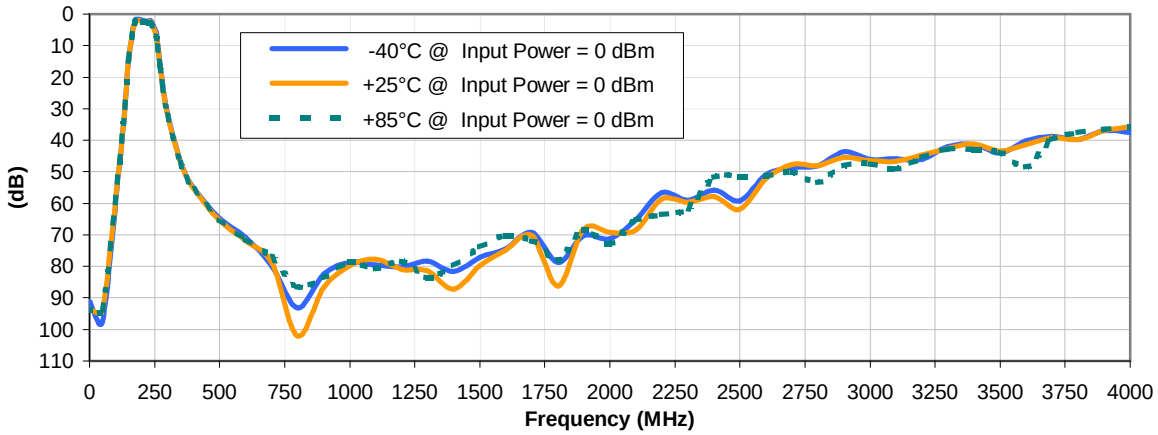
FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
175	18.00	17.70	17.46
180	16.06	15.88	15.73
185	14.86	14.75	14.64
190	14.04	13.95	13.87
195	13.38	13.32	13.26
200	12.82	12.77	12.74
204	12.35	12.33	12.32
210	12.04	12.04	12.06
215	11.96	11.97	12.00
220	12.13	12.16	12.19
225	12.54	12.57	12.59
230	13.10	13.14	13.17
235	13.73	13.79	13.83
237	14.09	14.16	14.21
238	14.51	14.60	14.65
240	15.03	15.11	15.15
245	16.24	16.19	16.12
250	17.10	16.81	16.55
255	16.72	16.21	15.79
260	14.82	14.24	13.79
270	9.10	8.88	8.69
280	5.50	5.52	5.50
290	3.76	3.82	3.86
300	2.83	2.86	2.92
310	2.28	2.30	2.34
320	1.90	1.90	1.95
330	1.63	1.60	1.66
340	1.40	1.43	1.40
350	1.26	1.26	1.24
360	1.18	1.22	1.13
370	1.09	1.07	1.06
380	1.03	0.84	0.93
390	0.89	0.82	0.96
400	0.80	0.84	0.92
410	0.76	0.78	0.81
420	0.67	0.74	0.74
430	0.73	0.65	0.73
440	0.60	0.57	0.77
450	0.63	0.47	0.70
460	0.68	0.62	0.78
470	0.65	0.51	0.54
480	0.57	0.58	0.49
490	0.41	0.28	0.58
500	0.52	0.57	0.45
510	0.71	0.39	0.44
520	0.50	0.49	0.28
530	0.71	0.58	0.49
540	0.77	0.41	0.58
550	0.02	0.27	0.59
560	0.67	0.43	0.35
570	0.25	0.59	0.16
580	0.31	0.63	0.79
590	0.85	0.40	0.97
600	0.20	0.34	0.10

Mini-Circuits®
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 minicircuits.com

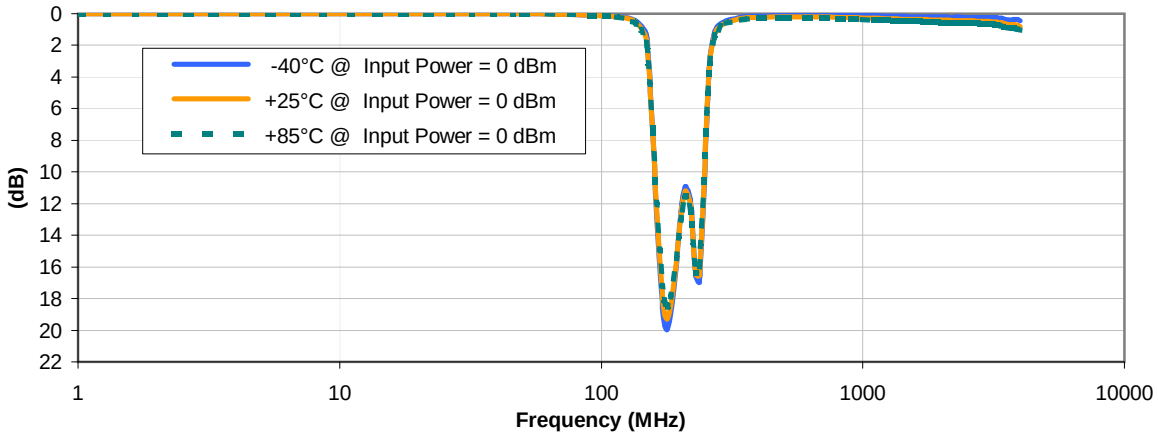
Metal Shield Band Pass Filter RBP-204+

Typical Performance Curves

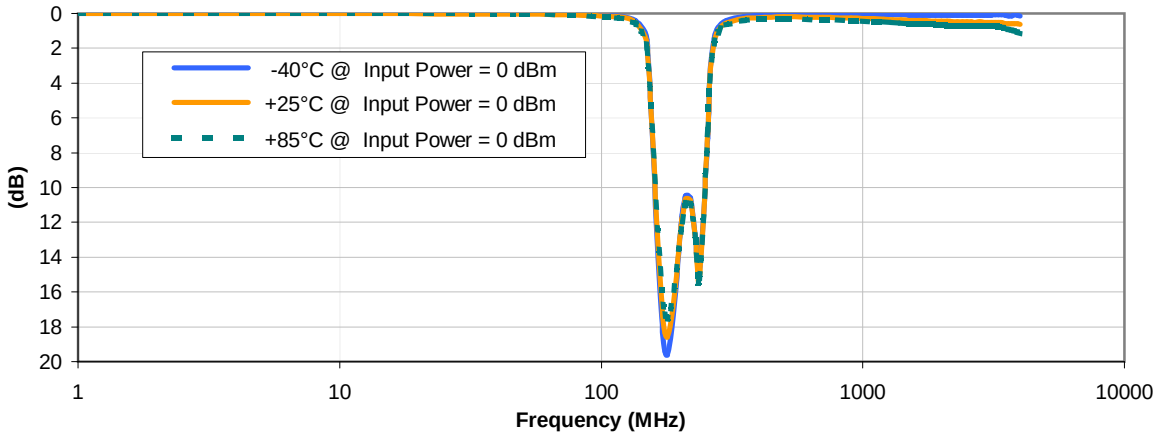
INSERTION LOSS vs. TEMPERATURE



INPUT RETURN LOSS vs. TEMPERATURE

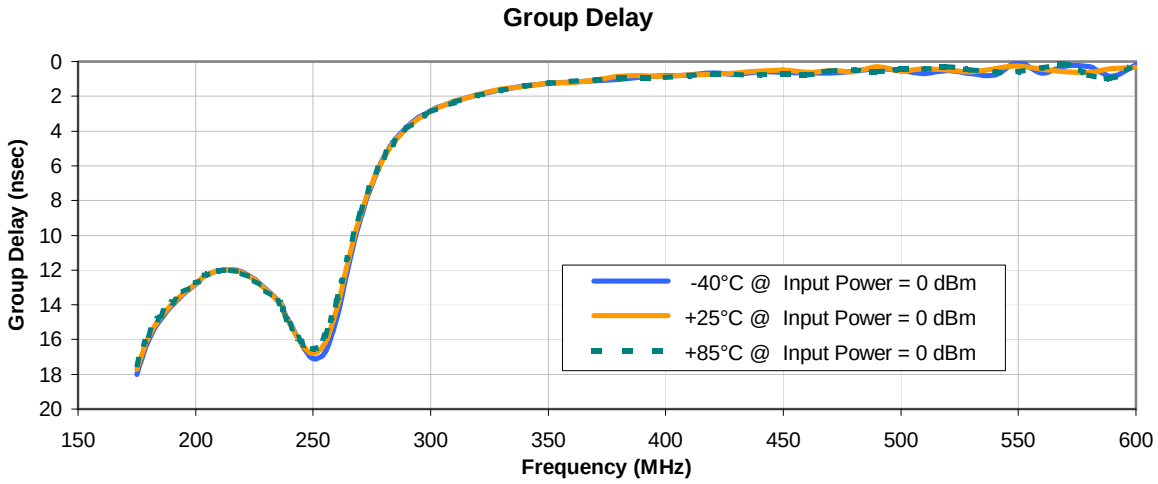


OUTPUT RETURN LOSS vs. TEMPERATURE



Mini-Circuits®
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 minicircuits.com

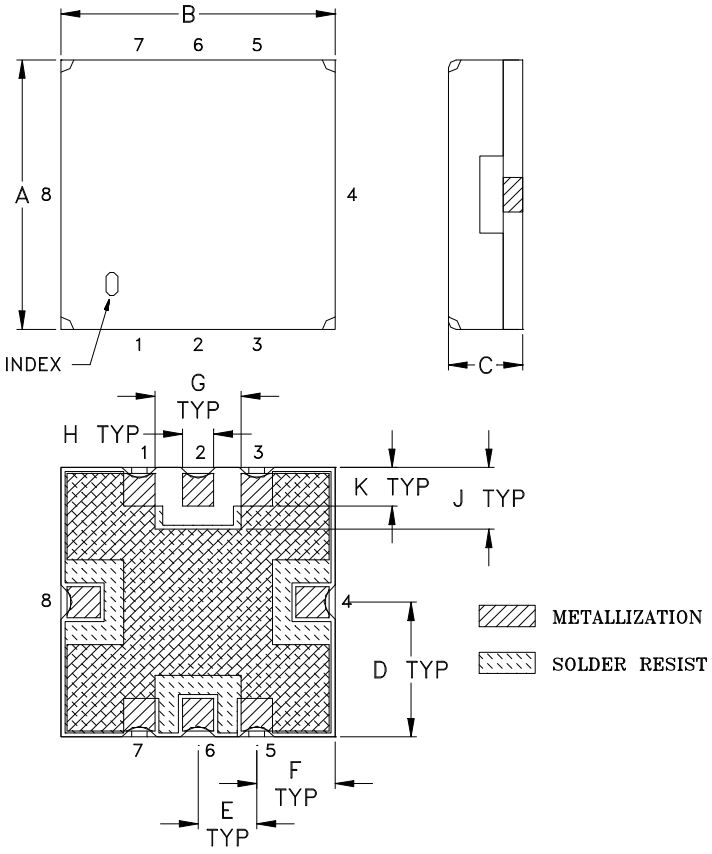
Typical Performance Curves

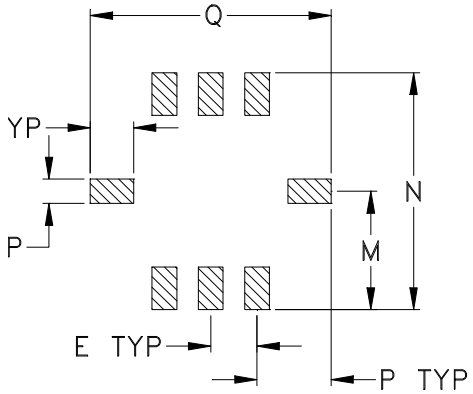


Mini-Circuits®
IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS9100 CERTIFIED RoHS compliant
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see minicircuits.com

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

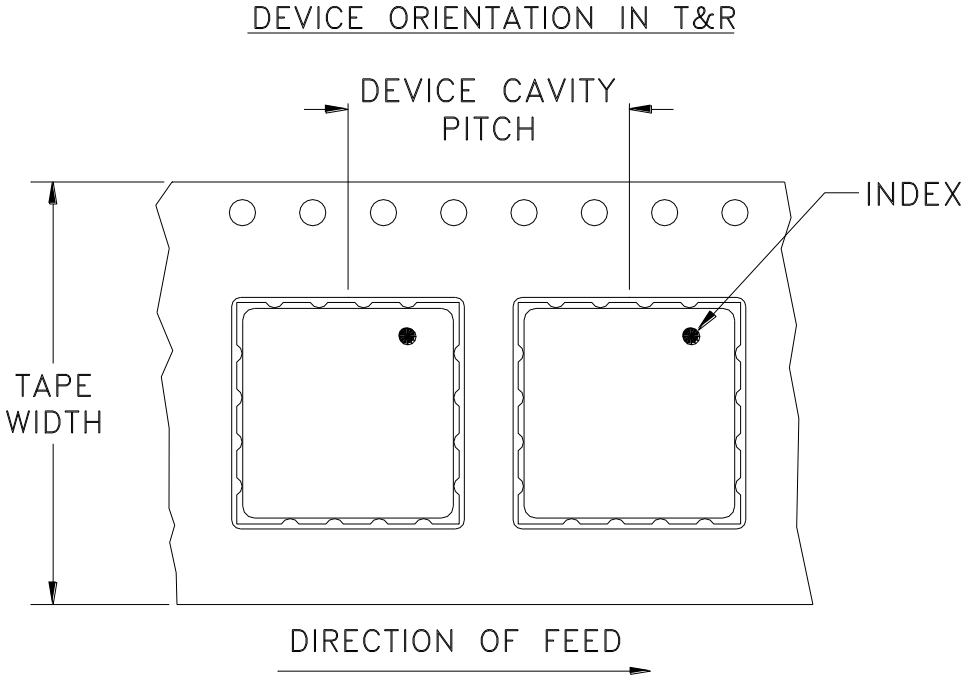
Dimensions are in inches (mm). Tolerances: 2 Pl. ± .03; 3Pl. ± .015

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.

This document and its contents are the property of Mini-Circuits.

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.

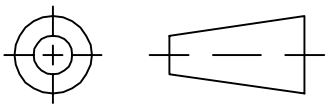
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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

Mini-Circuits®
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

This document and its contents are the property of Mini-Circuits.

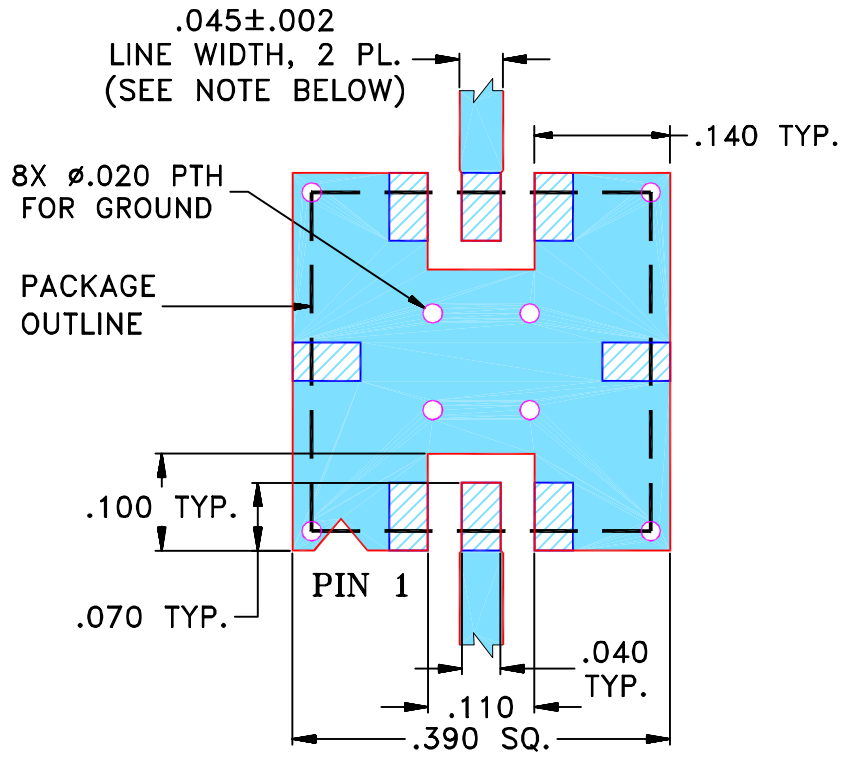
THIRD ANGLE PROJECTION



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	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 ±			

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

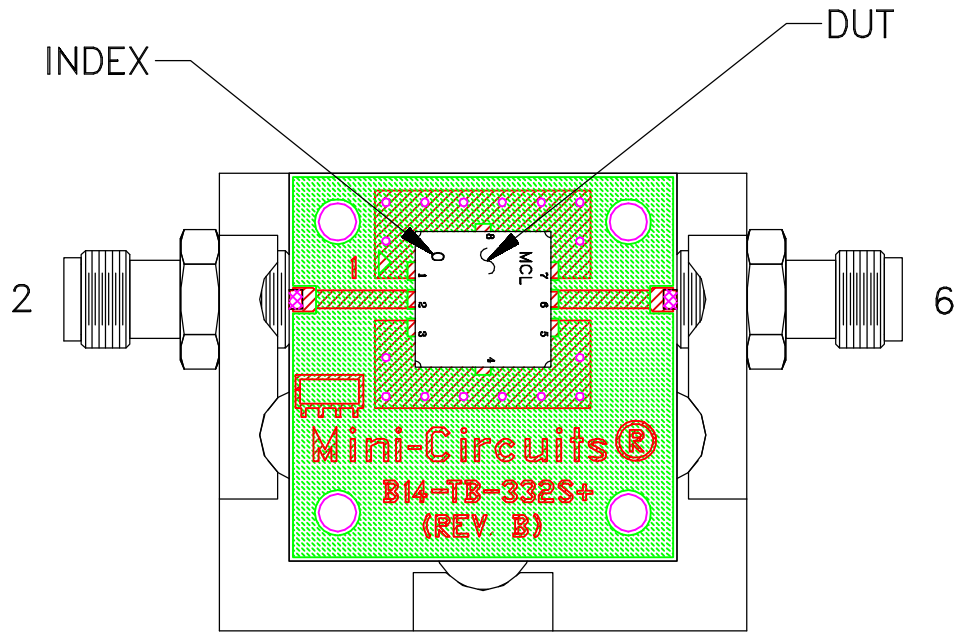
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, qf, GP731, RBP, TB-332

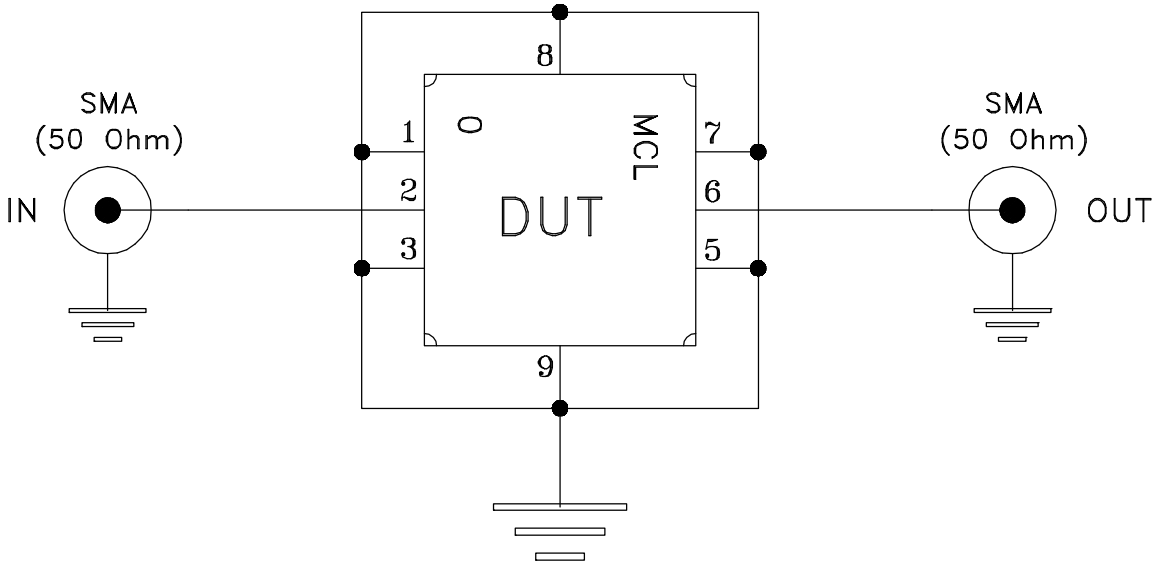
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-176	B

FILE:	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.

Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS.

Mini-Circuits

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

This document and its contents are the property of Mini-Circuits.