Surface Mount

Bandpass Filter

RBP-140+

50Ω 130 to 150 MHz

Generic photo used for illustration purposes only

CASE STYLE: GP731

The Big Deal

- Good VSWR, 1.35:1 typical
- High rejection, 40 dB typical
- Linear phase
- Symmetrical band pass response
- Small size 0.35" x 0.35" x 0.10"

Product Overview

The RBP-140+ is a narrow-band bandpass filter in a small shielded package (size of 0.35" x 0.35" x .10") fabricated using SMT technology. The RBP-140+ offers a symmetrical bandpass and linear phase characteristics. In addition it has repeatable performance across production lots and consistent performance across temperature.

Key Features

Feature	Advantages
Small size, 0.35” x 0.35” x 0.10”	The unique surface mount package enables the RBP-140+ to be used in compact designs.
More than 40 dB rejection up to 3000MHz	This enables the filter to attenuate spurious signals and reject harmonics for broad band of frequency.
Symmetrical band pass response	Uniform passband insertion loss.
Minimal phase deviation over attenuation range, ± 7deg typical at Fc ±15 MHz	Can provide low signal distortion over the attenuation range
Good VSWR, 1.35:1 typical in Passband	The RBP-140+ has very good return loss for a narrow bandwidth which provides good matching when used with other devices.

Surface Mount

Bandpass Filter

RBP-140+

50Ω 130 to 150 MHz

Generic photo used for illustration purposes only
CASE STYLE: GP731

Features

- High rejection, 40dB typical
- Linear phase, up to ±7deg typical over Fc ±15MHz
- Good VSWR, 1.35:1 typical in passband
- Small size 0.35" x 0.35" x 0.1"
- Shielded case
- Aqueous washable

Applications

- Mobile application
- Space research
- Defence system
- Satellite

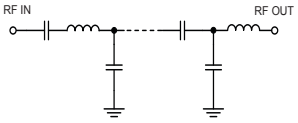
Electrical Specifications at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	Fc			140		MHz
	Insertion Loss	F1-F2	130-150		2.6	3.5	dB
	VSWR	F1-F2	130-150		1.35	1.7	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC-100	20	29		dB
	VSWR	DC-F3	DC-100		25		:1
Stop Band, Upper	Insertion Loss	F4-F5	178-3000	20	27		dB
	VSWR	F4-F5	178-3000		13		:1
Maximum Deviation from Linear Phase		Fc ±15MHz	125-155		±9	±14	deg

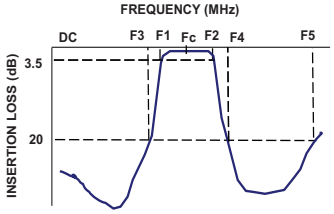
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	0.3W max.

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

Functional Schematic



Typical Frequency Response

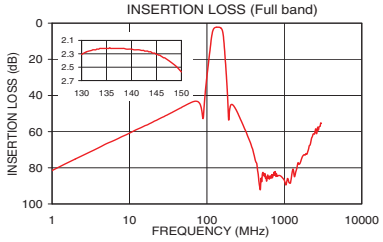


+RoHS Compliant
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

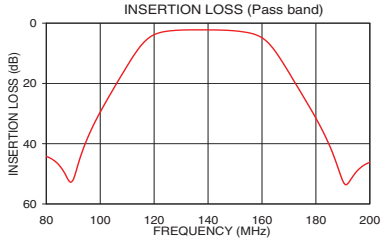
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Deviation from Linear Phase (deg)
1	81.53	7360.92	125.00	3.42
60	44.27	579.06	126.00	2.16
100	29.51	31.03	128.00	0.35
109	15.66	10.56	130.00	-0.73
114	8.73	4.20	132.00	-1.24
120	3.83	1.44	134.24	-0.97
125	2.66	1.16	134.44	-0.93
130	2.31	1.22	136.24	-0.62
140	2.23	1.34	138.24	-0.12
150	2.57	1.11	140.00	0.29
161	5.47	2.56	142.24	0.96
166	10.71	6.05	144.24	1.24
178	28.39	22.29	146.04	1.21
180	31.55	25.19	146.84	1.11
182	34.88	28.03	147.04	1.08
190	52.41	40.41	148.00	0.54
200	46.17	57.91	150.00	-0.30
600	85.00	289.53	151.00	-0.91
2200	65.48	31.60	153.00	-2.68
3000	55.39	26.33	155.00	-5.42

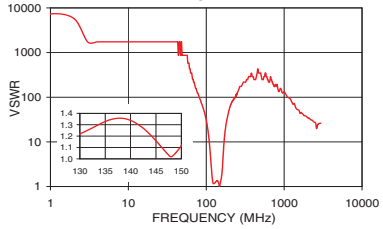
RBP-140+
INSERTION LOSS (Full band)



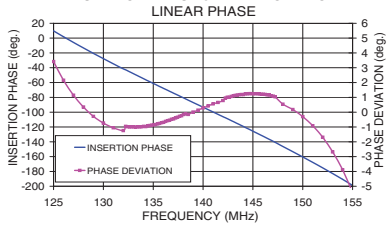
RBP-140+
INSERTION LOSS (Pass band)



RBP-140+
VSWR



RBP-140+
INSERTION PHASE & DEVIATION FROM LINEAR PHASE

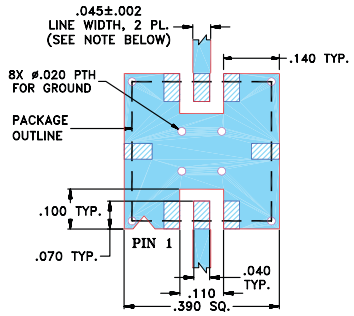


Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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

Pad Connections

INPUT	2
OUTPUT	6
GROUND	1,3,4,5,7,8

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

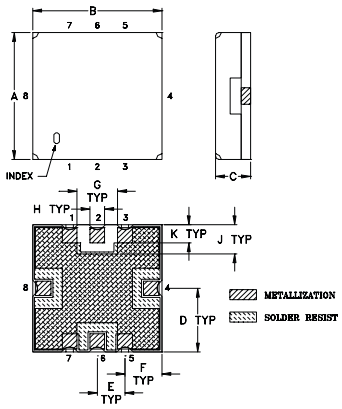


NOTES: 1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .025" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

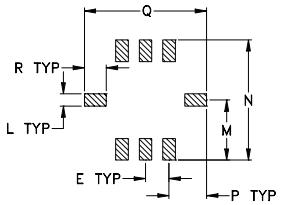
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Outline Drawing



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

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

Metal Shield Band Pass Filter RBP-140+

Typical Performance Data

FREQ. (MHz)	INSERTION LOSS (dB)			INPUT RETURN LOSS (dB)			OUTPUT RETURNLOSS (dB)		
	@ -40° C	@ +25° C	@ +85° C	@ -40° C	@ +25° C	@ +85° C	@ -40° C	@ +25° C	@ +85° C
1	81.41	81.32	81.36	0.00	0.00	0.00	0.01	0.01	0.01
10	60.95	61.00	61.04	0.00	0.00	0.01	0.00	0.00	0.01
20	54.88	54.95	54.81	0.01	0.01	0.01	0.01	0.01	0.01
30	51.21	51.10	51.12	0.02	0.02	0.02	0.02	0.02	0.03
40	48.50	48.44	48.39	0.02	0.02	0.03	0.02	0.03	0.04
50	46.27	46.22	46.18	0.00	0.00	0.01	0.00	0.01	0.03
60	44.62	44.60	44.54	0.02	0.03	0.04	0.01	0.04	0.06
70	43.68	43.68	43.65	0.08	0.09	0.10	0.07	0.10	0.13
80	45.07	45.10	45.14	0.12	0.14	0.16	0.11	0.15	0.19
90	51.57	50.17	49.11	0.13	0.17	0.21	0.15	0.21	0.27
100	29.03	28.70	28.43	0.35	0.42	0.49	0.40	0.50	0.59
109	15.13	14.95	14.82	1.20	1.41	1.60	1.40	1.65	1.88
114	7.99	8.04	8.09	3.41	3.85	4.22	3.97	4.53	5.00
120	3.19	3.51	3.77	12.18	12.45	12.62	17.08	18.32	19.21
130	1.95	2.24	2.48	27.22	26.90	26.38	29.45	28.41	27.73
140	1.91	2.20	2.44	19.80	20.60	21.33	17.44	17.67	17.87
150	2.18	2.55	2.86	25.72	24.71	24.05	40.38	35.32	32.77
160	4.32	5.06	5.69	14.53	13.99	13.58	9.27	8.71	8.29
161	4.97	5.78	6.45	11.52	11.20	10.97	7.66	7.25	6.94
166	10.48	11.40	12.15	4.01	4.17	4.30	2.78	2.84	2.88
170	16.33	17.17	17.85	2.15	2.34	2.49	1.49	1.62	1.71
173	20.86	21.64	22.27	1.55	1.72	1.85	1.09	1.22	1.31
180	31.72	32.45	33.04	0.93	1.05	1.15	0.69	0.79	0.87
182	35.14	35.87	36.47	0.83	0.94	1.03	0.62	0.72	0.79
190	53.74	53.13	52.52	0.54	0.63	0.70	0.42	0.50	0.56
200	45.78	45.66	45.58	0.36	0.42	0.48	0.28	0.36	0.41
300	57.19	57.42	57.58	0.11	0.16	0.19	0.07	0.14	0.18
400	72.01	71.66	71.93	0.07	0.12	0.16	0.03	0.11	0.16
500	97.18	93.91	87.43	0.09	0.16	0.20	0.04	0.14	0.19
600	83.16	83.98	82.60	0.07	0.15	0.21	0.03	0.14	0.20
700	80.04	81.55	80.15	0.06	0.15	0.20	0.01	0.14	0.21
800	80.81	80.67	85.42	0.11	0.21	0.28	0.05	0.19	0.26
900	81.76	85.70	84.39	0.09	0.20	0.27	0.04	0.19	0.27
1000	85.96	88.07	89.93	0.08	0.21	0.28	0.02	0.19	0.28
1100	90.55	89.44	88.25	0.12	0.25	0.33	0.04	0.22	0.32
1200	82.25	82.14	80.82	0.12	0.25	0.34	0.04	0.23	0.33
1300	85.01	88.95	93.84	0.12	0.26	0.35	0.04	0.24	0.35
1400	79.45	81.94	81.00	0.15	0.30	0.39	0.05	0.26	0.37
1500	92.24	86.22	85.17	0.18	0.32	0.41	0.05	0.27	0.38
1600	89.55	92.32	96.56	0.16	0.31	0.41	0.07	0.29	0.42
1700	76.63	73.71	75.52	0.19	0.35	0.45	0.08	0.31	0.44
1800	76.14	77.89	73.09	0.18	0.34	0.44	0.07	0.31	0.44
1900	66.03	66.43	66.00	0.19	0.36	0.46	0.09	0.33	0.46
2000	71.03	69.63	70.88	0.20	0.36	0.47	0.10	0.36	0.50
2100	68.51	68.99	72.61	0.19	0.37	0.47	0.10	0.35	0.49
2200	64.20	64.32	61.03	0.21	0.38	0.49	0.10	0.36	0.51
2300	58.49	57.13	59.74	0.21	0.39	0.50	0.12	0.39	0.55
2400	59.23	59.38	57.02	0.22	0.40	0.52	0.11	0.42	0.60
2500	61.77	58.73	67.77	0.24	0.43	0.56	0.56	0.77	0.74
2600	62.99	63.86	62.17	0.30	0.62	0.85	0.16	0.43	0.60
2700	60.00	58.65	61.09	0.59	0.60	0.68	0.10	0.40	0.58
2800	55.66	55.77	54.40	0.28	0.46	0.59	0.15	0.44	0.62
2900	55.33	55.06	55.51	0.22	0.43	0.56	0.13	0.43	0.59
3000	53.68	52.99	53.25	0.24	0.44	0.57	0.10	0.43	0.63

Metal Shield Band Pass Filter RBP-140+

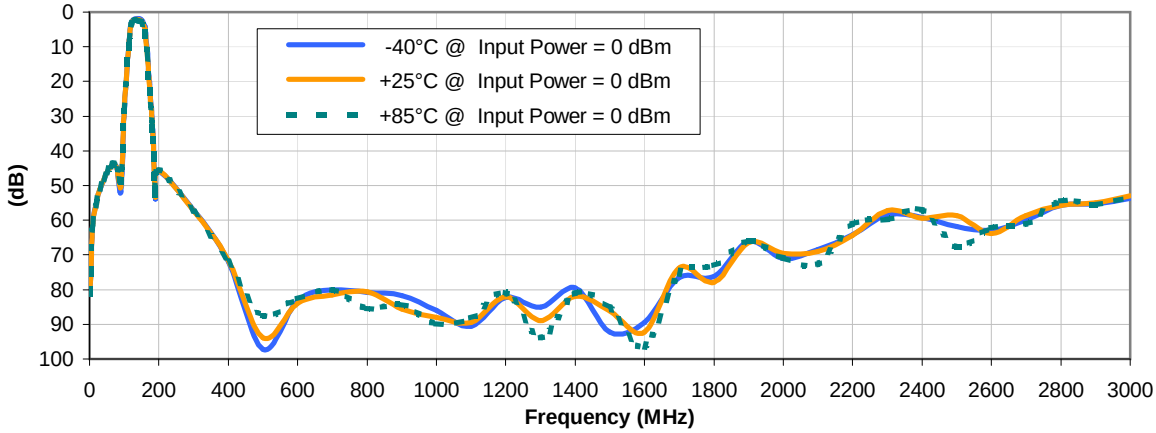
Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
130.00	19.51	19.39	19.29
131.00	19.12	19.08	18.95
132.00	18.86	18.76	18.68
133.84	18.53	18.49	18.44
134.04	18.60	18.47	18.47
134.24	18.52	18.48	18.44
134.44	18.46	18.40	18.37
134.64	18.41	18.38	18.34
134.84	18.36	18.33	18.28
135.04	18.36	18.31	18.29
135.24	18.33	18.27	18.23
135.44	18.23	18.24	18.19
135.64	18.24	18.18	18.14
135.84	18.23	18.18	18.15
136.04	18.16	18.14	18.10
136.24	18.13	18.15	18.13
136.44	18.11	18.09	18.08
136.64	18.11	18.09	18.11
136.84	18.05	18.05	18.07
137.04	18.02	18.06	18.04
137.24	18.02	18.01	18.01
137.44	17.98	17.98	17.99
137.64	17.96	17.95	17.92
137.84	18.08	18.12	18.10
138.04	18.08	18.10	18.05
138.24	18.07	18.09	18.09
138.50	18.07	18.07	18.09
139.00	18.02	18.07	18.08
139.50	18.06	18.08	18.10
140.00	18.08	18.10	18.15
140.50	17.91	17.95	17.99
141.00	17.73	17.77	17.85
141.50	17.79	17.88	17.91
142.00	17.75	17.86	17.89
142.24	17.84	17.93	18.00
142.44	17.85	17.96	18.00
142.64	17.91	17.97	18.05
142.84	17.91	17.99	18.07
143.04	18.17	18.27	18.28
143.24	18.19	18.25	18.29
143.44	18.25	18.29	18.39
143.64	18.27	18.33	18.38
143.84	18.33	18.41	18.49
144.04	18.33	18.49	18.54
144.24	18.41	18.53	18.55
144.44	18.51	18.57	18.68
144.64	18.48	18.55	18.70
144.84	18.58	18.69	18.74
145.04	18.60	18.72	18.79
145.24	18.69	18.75	18.84
145.44	18.72	18.84	18.89
148.00	19.88	19.99	20.07
149.00	20.15	20.27	20.41
150.00	20.59	20.72	20.86

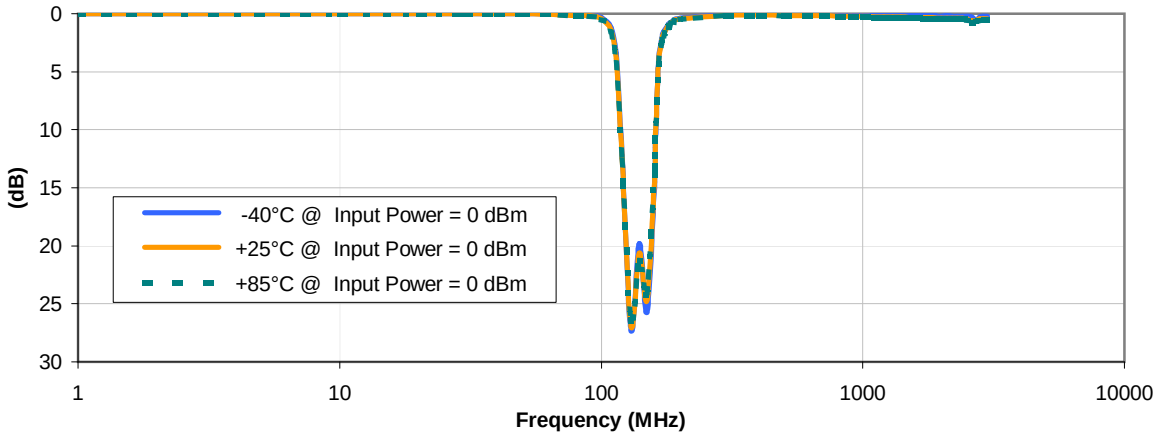
Metal Shield Band Pass Filter RBP-140+

Typical Performance Curves

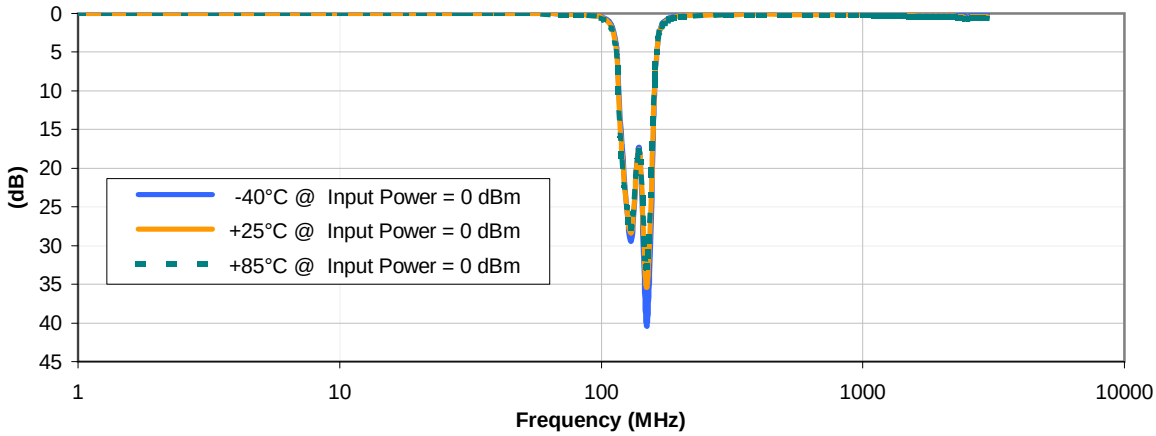
INSERTION LOSS vs. TEMPERATURE



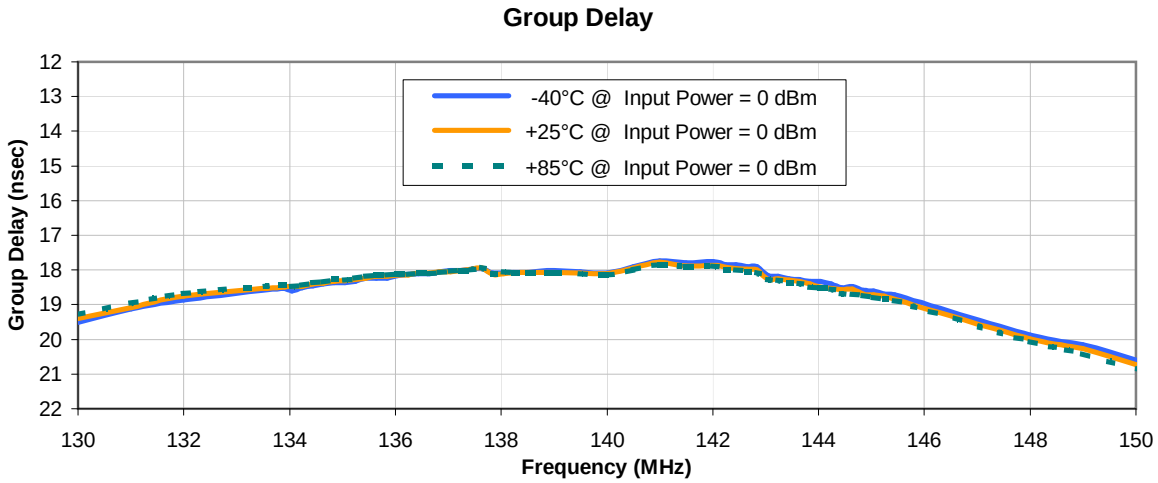
INPUT RETURN LOSS vs. TEMPERATURE



OUTPUT RETURN LOSS vs. TEMPERATURE

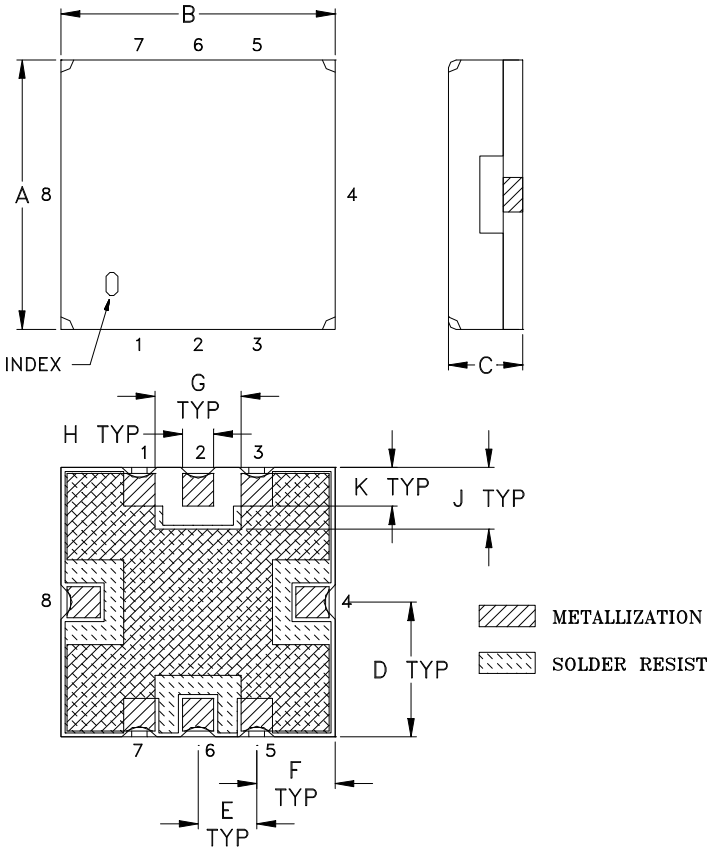


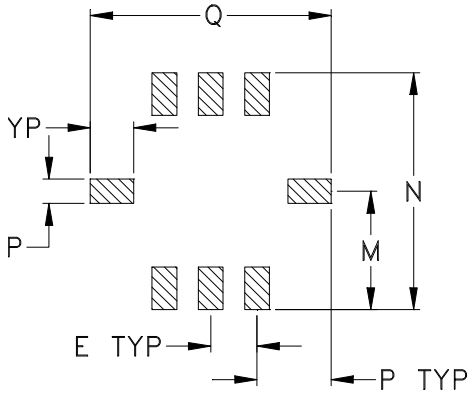
Typical Performance Curves



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)

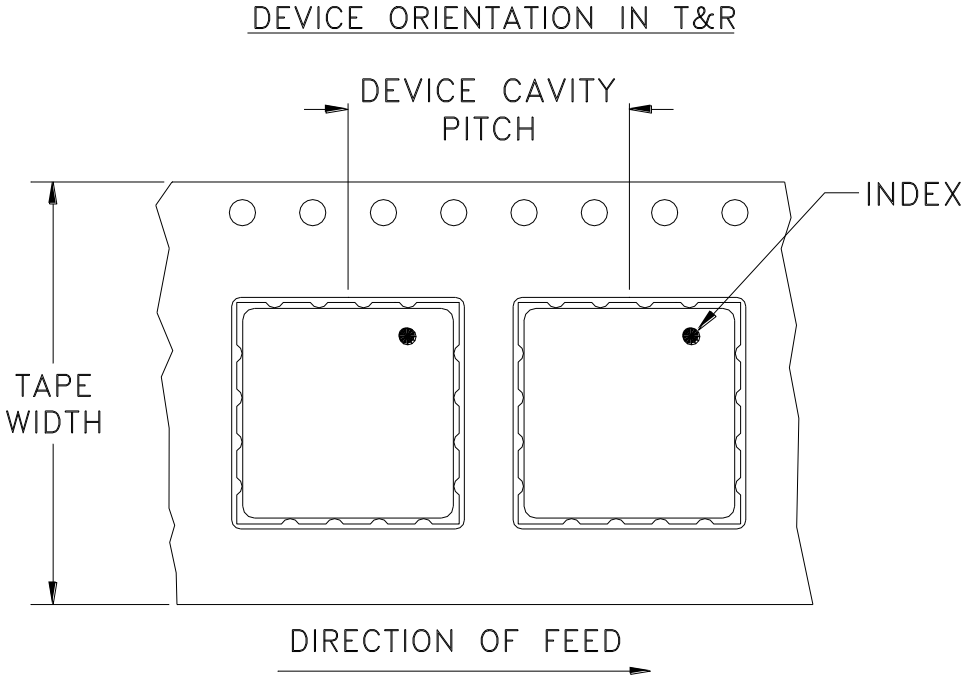
CASE #	N	P	Q	R	WT. GRAM	
GP731	.390 (9.91)	.120 (3.05)	.390 (9.91)	.070 (1.78)	.4	+0.3
						-0.0

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.

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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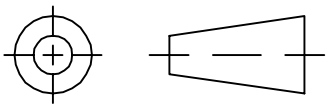
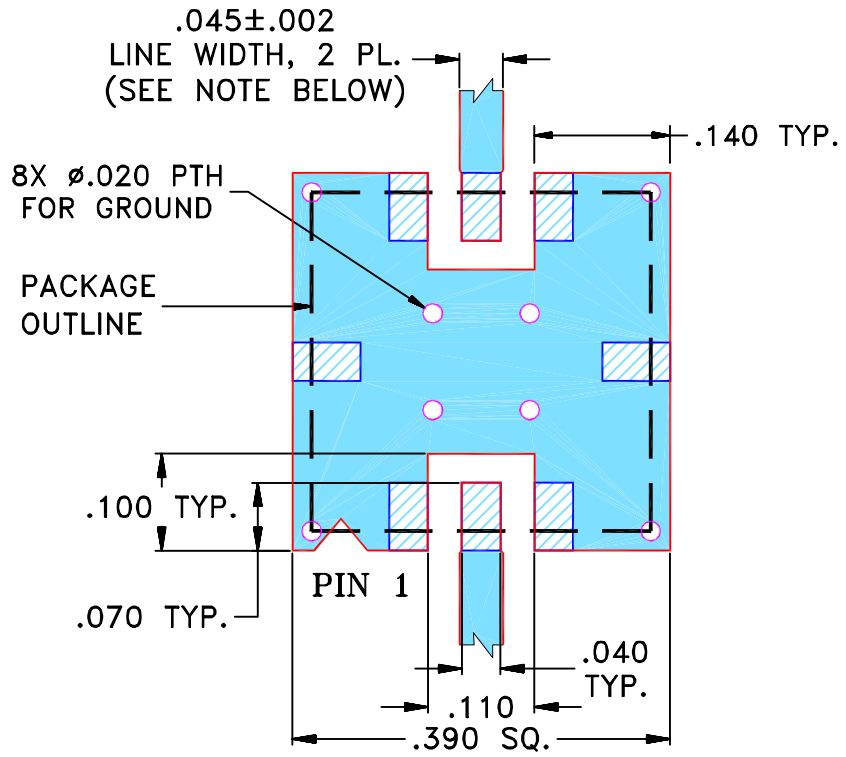
THIRD ANGLE PROJECTION



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:
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 ±			

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

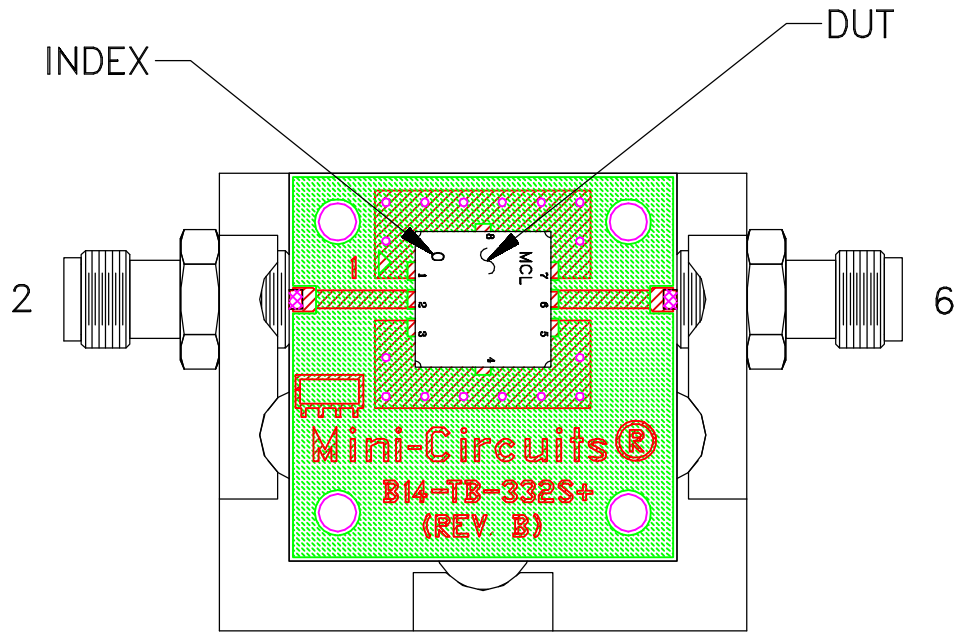
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, qf, GP731, RBP, TB-332

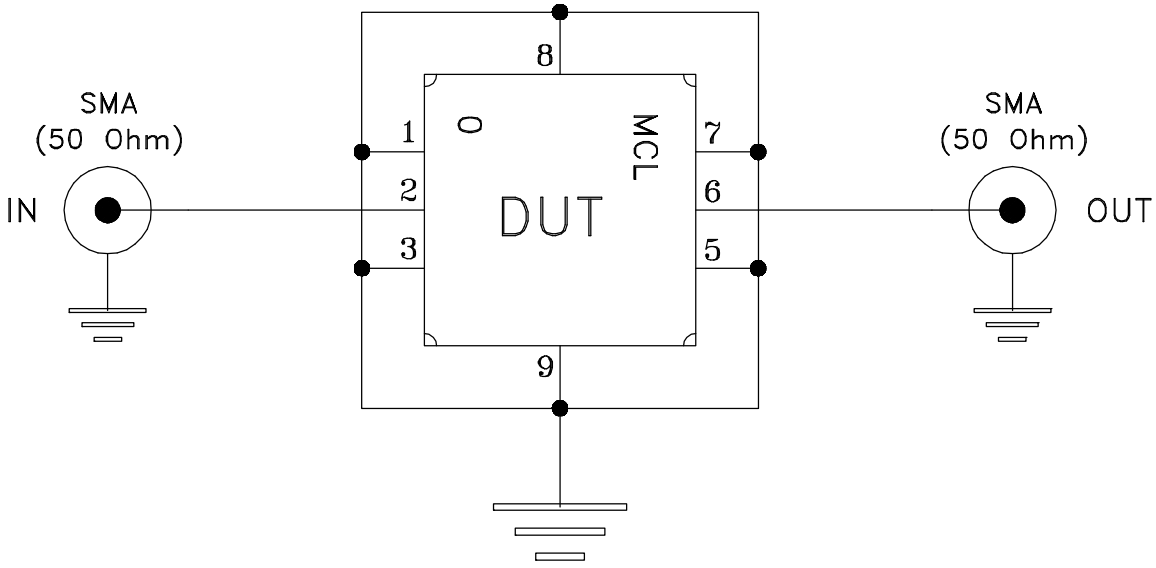
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-176	B

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