

# Bandpass Filter

## RBP-400+

50Ω 292 to 490 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

### Features

- good VSWR, 1.5:1 typ. @ passband
- small size 0.35" x 0.35"
- shielded case
- aqueous washable

### Applications

- harmonic rejection
- transmitters / receivers
- navigation



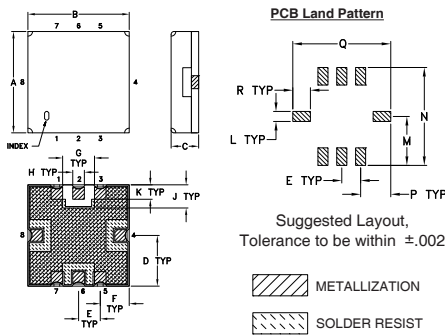
Generic photo used for illustration purposes only  
CASE STYLE: GP731

### +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

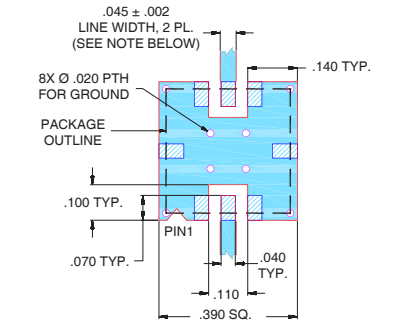


### Outline Dimensions (inch/mm)

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)

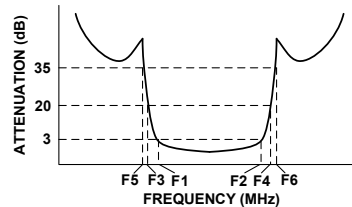


- NOTES:
1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .025" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
  2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

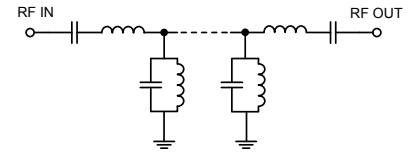
### Bandpass Filter Electrical Specifications (T<sub>AMB</sub> = 25°C)

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.
391	292 - 490	230	620	200	700 - 2000	1.5	2.3	18

### Typical Frequency Response

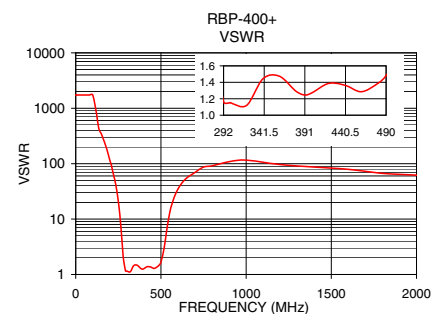
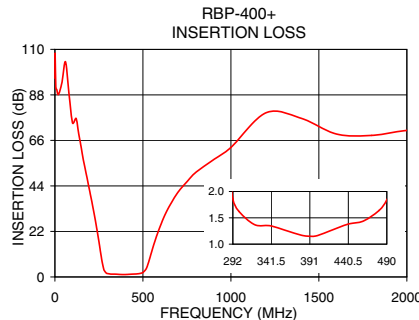


### Functional Schematic



### Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
0.3	96.06	1737.18
200	40.54	115.81
230	27.24	49.64
252	16.05	18.50
267	8.01	6.11
277	3.93	2.45
292	1.86	1.16
300	1.62	1.15
391	1.15	1.25
400	1.16	1.27
490	1.84	1.48
518	3.85	2.91
535	7.85	6.58
560	15.13	16.72
620	28.98	43.44
700	41.02	69.49
1400	76.67	86.86
2000	70.80	62.05



### 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-Circuits' applicable established test performance criteria and measurement instructions.
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# Metal Shield Band Pass Filter

# RBP-400+

## 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	84.48	91.38	106.47	0.00	0.00	0.00	0.01	0.01	0.01
50	95.87	92.73	90.96	0.01	0.02	0.02	0.01	0.01	0.02
100	91.93	89.42	86.92	0.02	0.03	0.04	0.01	0.02	0.05
120	76.14	76.43	77.38	0.02	0.03	0.05	0.00	0.03	0.06
140	66.44	67.02	66.74	0.03	0.05	0.07	0.01	0.05	0.08
150	62.02	62.25	62.11	0.04	0.06	0.09	0.02	0.06	0.09
160	57.72	57.73	57.64	0.04	0.07	0.10	0.03	0.07	0.10
190	45.10	44.96	44.84	0.09	0.13	0.16	0.08	0.13	0.17
200	40.87	40.71	40.60	0.12	0.16	0.20	0.10	0.16	0.21
210	36.56	36.39	36.24	0.16	0.20	0.25	0.14	0.20	0.26
220	32.12	31.95	31.78	0.21	0.26	0.31	0.19	0.27	0.33
230	27.47	27.28	27.09	0.29	0.35	0.42	0.28	0.37	0.45
240	22.52	22.31	22.11	0.43	0.51	0.60	0.43	0.54	0.64
250	17.21	16.99	16.77	0.71	0.85	0.96	0.74	0.91	1.06
260	11.55	11.34	11.15	1.44	1.69	1.91	1.55	1.86	2.13
270	6.11	6.07	6.00	3.81	4.35	4.83	4.26	4.98	5.63
280	2.76	2.96	3.10	10.69	11.38	11.89	13.80	15.93	18.00
292	1.73	2.00	2.20	16.32	15.69	15.27	18.76	17.51	16.64
300	1.55	1.80	1.99	16.18	16.05	16.02	15.29	14.95	14.71
391	1.03	1.24	1.41	19.13	18.80	18.50	22.07	22.30	22.29
400	1.05	1.27	1.44	18.74	18.19	17.73	20.99	20.63	20.18
490	1.70	2.06	2.36	14.73	13.87	13.29	17.67	17.26	16.91
500	2.13	2.59	2.96	11.41	10.62	10.08	14.31	13.60	13.02
518	4.47	5.12	5.66	5.01	4.81	4.67	5.84	5.73	5.63
530	7.43	8.12	8.69	2.66	2.69	2.71	3.02	3.12	3.18
540	10.36	11.02	11.57	1.67	1.76	1.84	1.86	2.02	2.13
560	16.22	16.78	17.25	0.85	0.98	1.08	0.90	1.07	1.20
620	29.99	30.34	30.66	0.34	0.45	0.55	0.31	0.47	0.58
700	41.92	42.15	42.33	0.22	0.32	0.42	0.16	0.31	0.42
800	51.41	51.51	51.64	0.18	0.29	0.38	0.11	0.27	0.38
900	58.07	57.93	58.01	0.17	0.28	0.38	0.09	0.26	0.38
1000	64.41	63.91	64.06	0.17	0.29	0.39	0.10	0.27	0.40
1200	82.48	85.87	84.20	0.18	0.31	0.43	0.11	0.31	0.45
1300	76.50	76.64	78.06	0.19	0.32	0.44	0.12	0.33	0.48
1400	70.20	72.00	70.86	0.19	0.33	0.45	0.14	0.36	0.51
1500	67.46	68.77	67.68	0.20	0.35	0.47	0.15	0.37	0.54
1600	64.80	65.06	64.82	0.22	0.36	0.49	0.15	0.39	0.56
1700	64.68	65.43	65.05	0.23	0.37	0.50	0.17	0.40	0.58
1800	60.26	62.01	62.08	0.23	0.38	0.51	0.19	0.42	0.61
1900	60.40	63.29	61.02	0.25	0.40	0.52	0.19	0.44	0.62
2000	61.17	62.56	61.51	0.25	0.40	0.52	0.20	0.45	0.63
2200	58.94	59.49	59.01	0.26	0.41	0.54	0.20	0.47	0.66
2300	62.60	60.89	60.44	0.26	0.41	0.53	0.20	0.47	0.66
2400	59.17	61.99	62.14	0.26	0.42	0.54	0.21	0.48	0.68
2500	64.87	61.83	62.45	0.26	0.41	0.54	0.19	0.48	0.68
2600	59.46	61.52	63.10	0.25	0.41	0.53	0.19	0.48	0.68
2700	63.23	58.28	61.06	0.25	0.42	0.54	0.20	0.49	0.69
2800	50.57	50.35	47.16	0.26	0.43	0.55	0.20	0.51	0.74
2900	48.24	50.66	51.66	0.26	0.42	0.55	0.19	0.49	0.72
3000	49.28	47.97	50.77	0.26	0.43	0.56	0.18	0.50	0.72
3500	41.39	41.96	41.96	0.28	0.48	0.63	0.14	0.52	0.80
4000	33.58	33.94	33.83	0.37	0.61	0.84	0.18	0.61	0.93
4500	20.13	19.57	23.34	1.59	3.87	2.82	0.43	1.05	1.27
5000	46.51	40.05	40.68	0.65	0.95	1.23	0.33	0.81	1.21

REV. X2  
RBP-400+  
101011  
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# Metal Shield Band Pass Filter

# RBP-400+

## Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
292	8.91	8.88	8.85
293	8.92	8.88	8.86
294	8.93	8.89	8.86
295	8.92	8.88	8.85
296	8.92	8.87	8.84
297	8.92	8.87	8.83
298	8.91	8.85	8.81
299	8.89	8.83	8.79
300	8.87	8.81	8.77
310	8.39	8.29	8.21
320	7.46	7.37	7.30
330	6.65	6.59	6.56
340	6.14	6.11	6.10
350	5.81	5.79	5.78
360	5.55	5.54	5.54
370	5.36	5.36	5.36
380	5.23	5.23	5.23
400	5.10	5.10	5.11
410	5.08	5.09	5.09
420	5.09	5.10	5.11
430	5.13	5.14	5.16
440	5.22	5.24	5.26
450	5.36	5.39	5.42
460	5.60	5.63	5.67
470	5.92	5.95	5.98
480	6.27	6.28	6.29
500	6.61	6.56	6.52
510	6.50	6.43	6.37
520	6.23	6.14	6.07
530	5.82	5.71	5.62
540	5.26	5.14	5.05
550	4.56	4.45	4.36
560	3.81	3.72	3.65
570	3.14	3.07	3.03
580	2.60	2.56	2.53
600	1.89	1.88	1.88
610	1.66	1.66	1.66
620	1.49	1.49	1.48
630	1.34	1.34	1.35
640	1.23	1.23	1.24
650	1.14	1.14	1.15
660	1.06	1.07	1.06
670	0.99	1.00	1.00
680	0.93	0.95	0.95
700	0.85	0.84	0.86
710	0.78	0.80	0.80
720	0.76	0.79	0.79
750	0.69	0.70	0.68
800	0.62	0.57	0.56
850	0.46	0.52	0.52
900	0.51	0.46	0.47
950	0.44	0.46	0.40
1000	0.48	0.29	0.35
1050	0.31	0.40	0.26

REV. X2  
RBP-400+  
101011  
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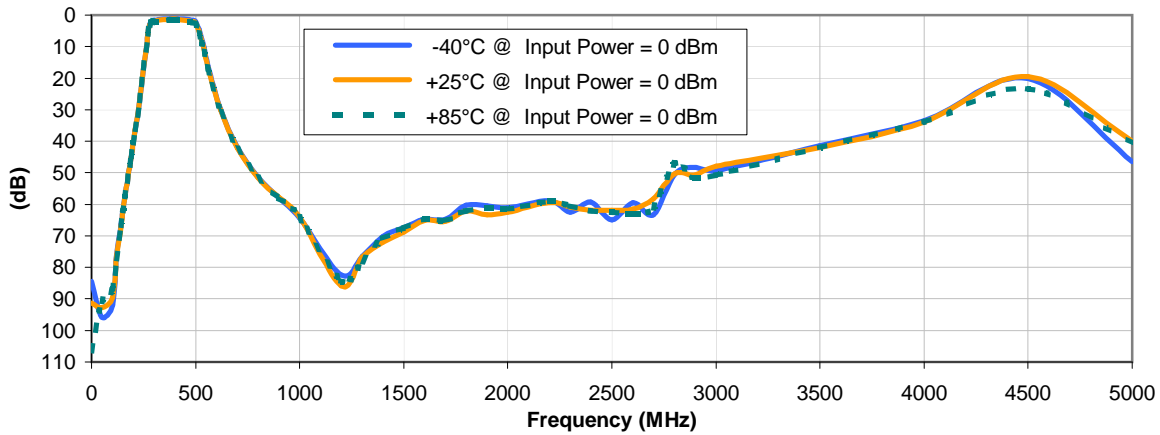


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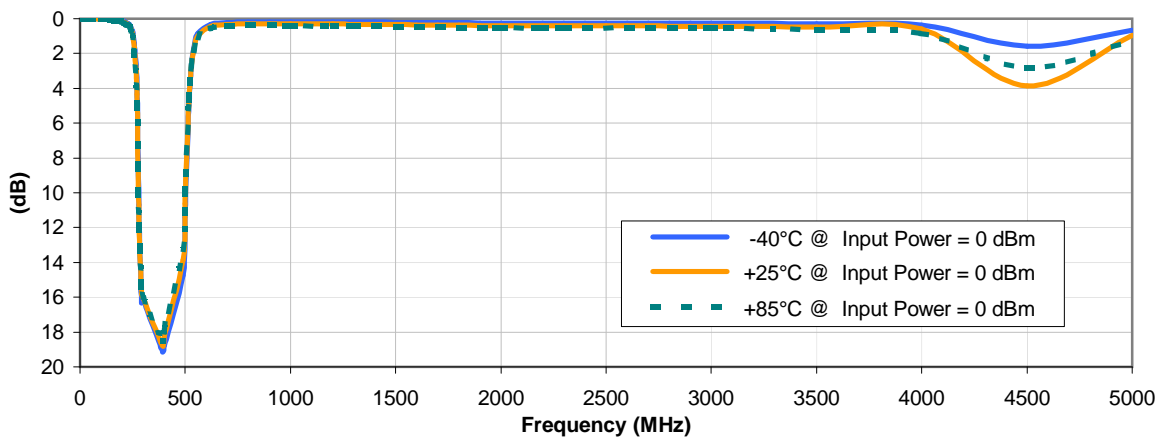


## Typical Performance Curves

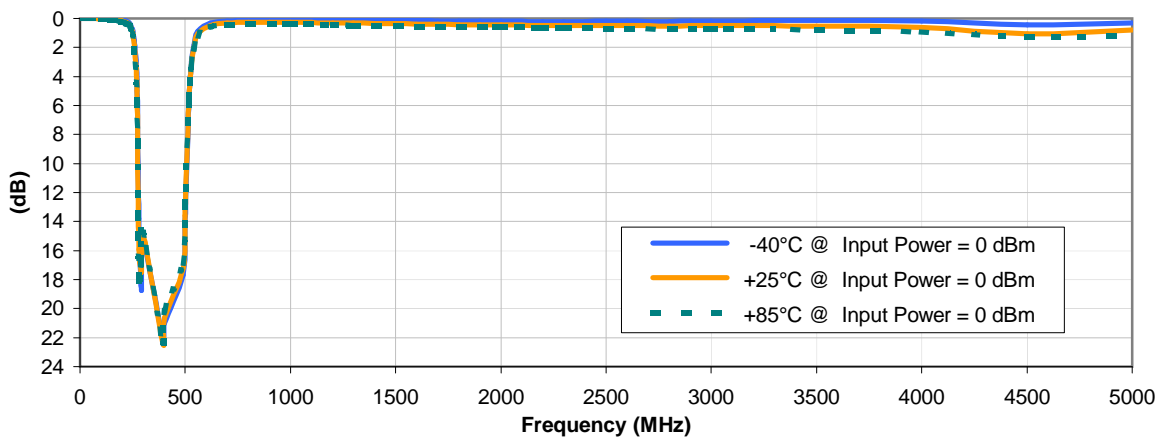
### INSERTION LOSS vs. TEMPERATURE



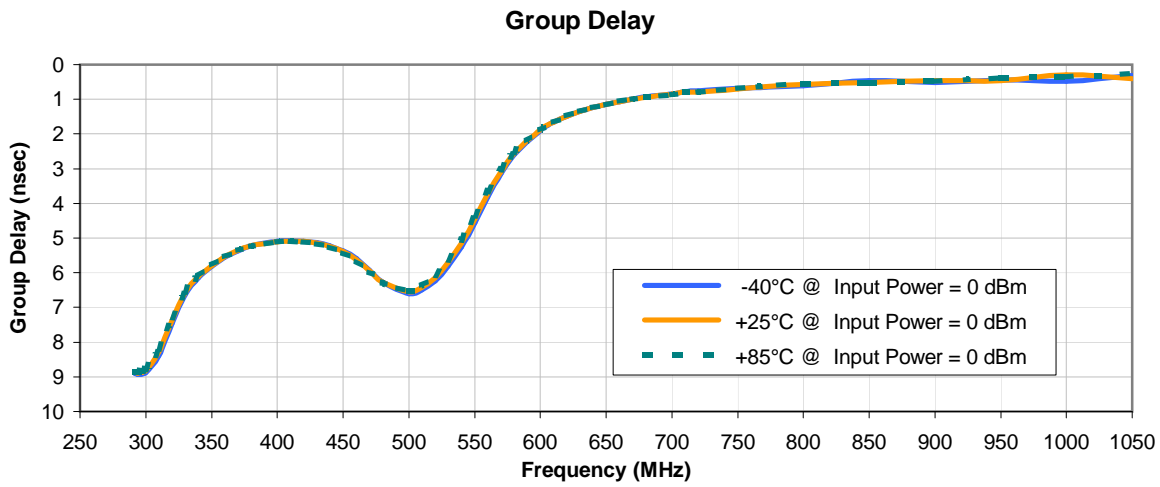
### INPUT RETURN LOSS vs. TEMPERATURE



### OUTPUT RETURN LOSS vs. TEMPERATURE



## Typical Performance Curves



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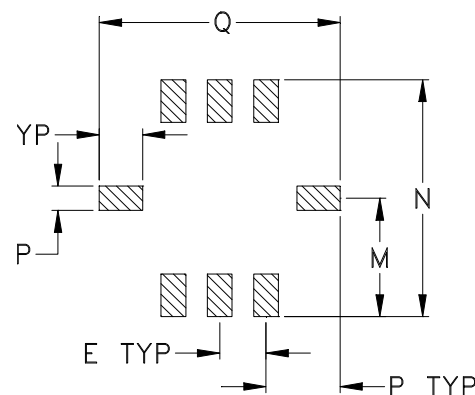
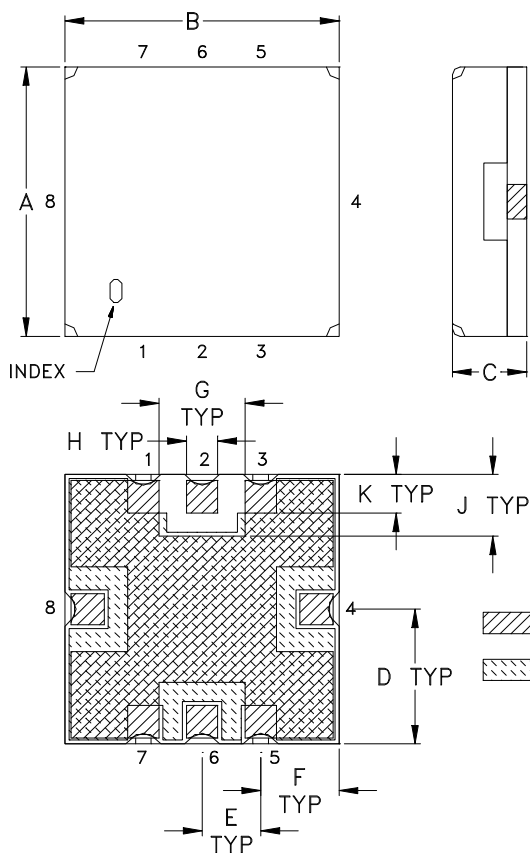


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## Outline Dimensions

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



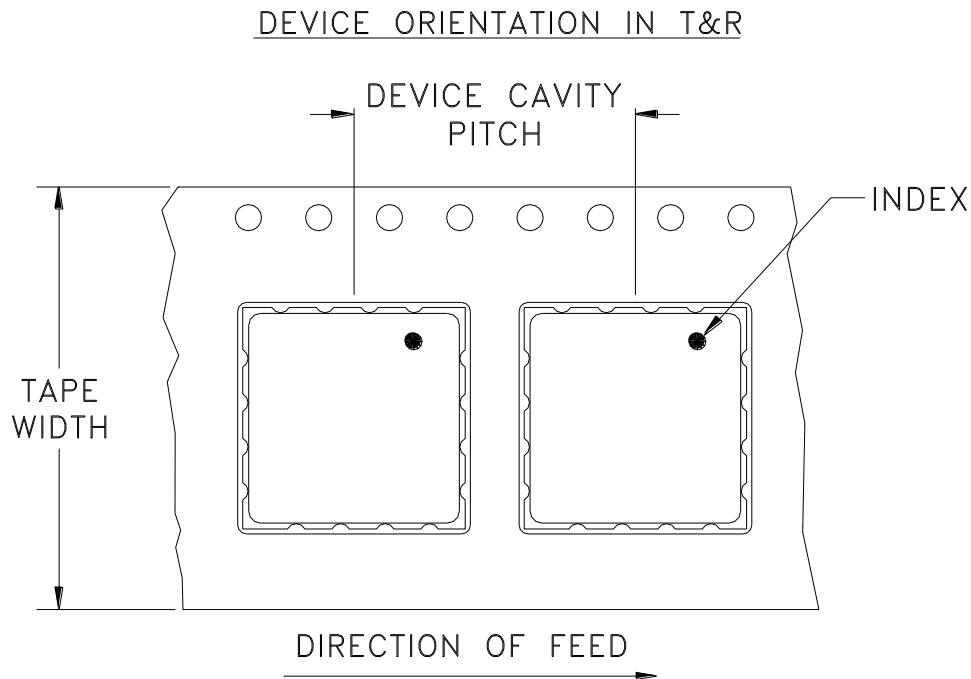
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RF/IF MICROWAVE COMPONENTS

# 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.

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.

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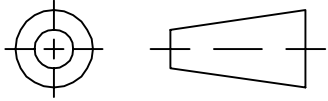
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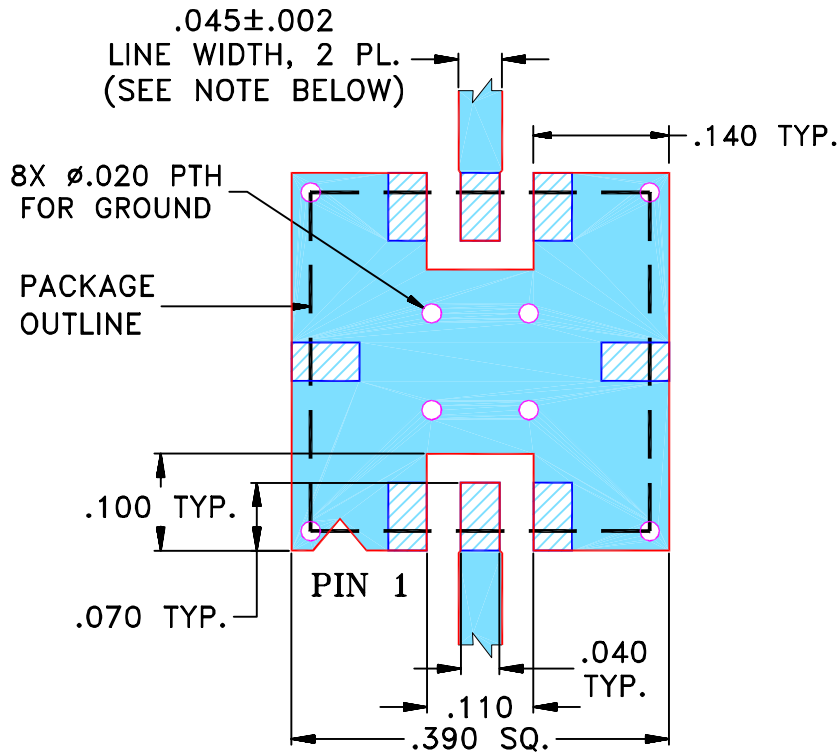
THIRD ANGLE PROJECTION



REVISIONS

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

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



- 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

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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**PL, qf, GP731, RBP, TB-332**

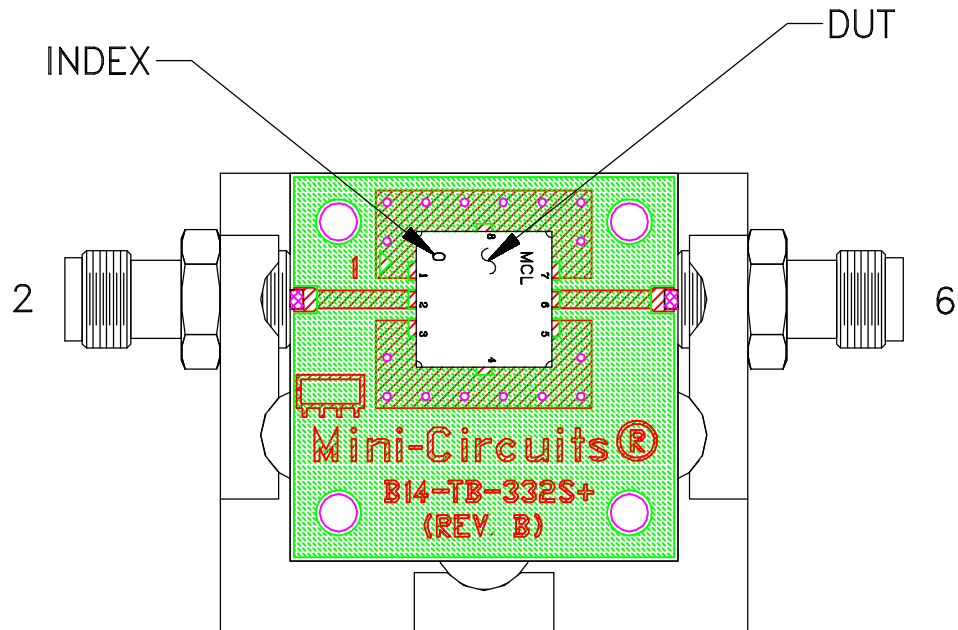
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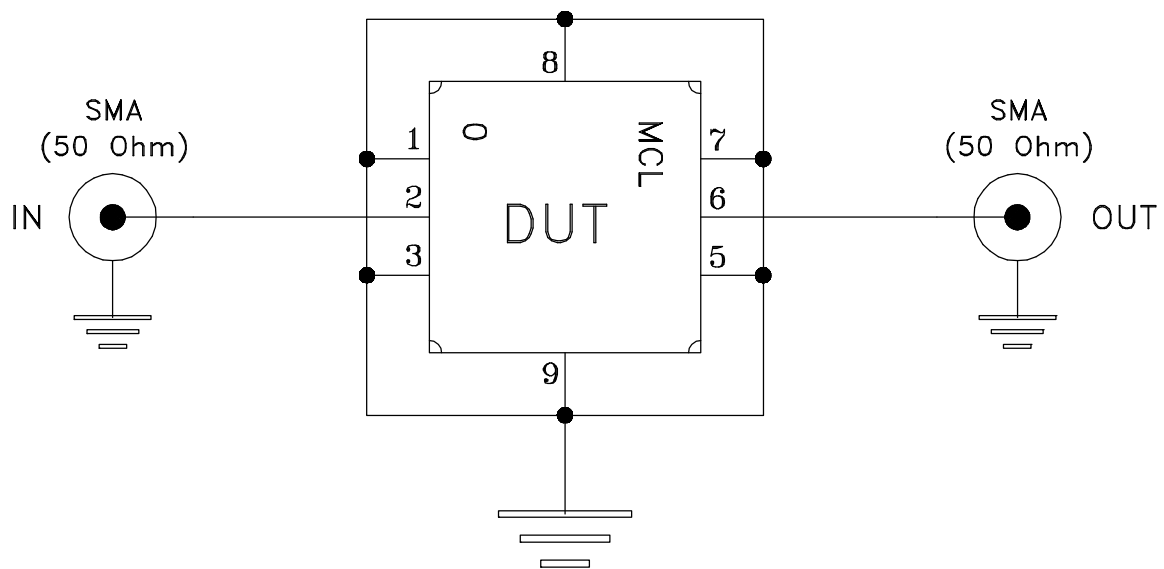
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-176	B
FILE:	98PL176	SCALE: 5:1	SHEET: 1 OF 1



# 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