

Surface Mount Bandpass Filter

CBP-1350C+

50Ω 1300 to 1400 MHz



Generic photo used for illustration purposes only
CASE STYLE: MP1766

The Big Deal

- Excellent Rejection
- Low passband Insertion Loss
- Miniature shielded package

Product Overview

CBP-1350C+ is a ceramic-coaxial-resonator based bandpass filter in a shielded package fabricated using SMT technology. This filter offers outstanding close in rejection, low insertion loss and high power handling for use in aviation, mobile radio, broadband and fixed wireless.

Key Features

Feature	Advantages
High Selectivity	The CBP-1350C+ filter incorporates High-Q ceramic resonators that enables sharp rejection near passband.
Low Passband VSWR	This filter maintains typical VSWR over passband frequency range making this filter easier to integrate into receiver and transmitter RF chains with less concerns for in band frequency ripple.
Rugged construction	The CBP-1350C+ has been qualified over wide range of thermal, mechanical and environmental conditions including withstanding the stress of extensive solder reflow cycles.

Notes

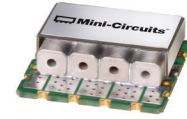
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C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. 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



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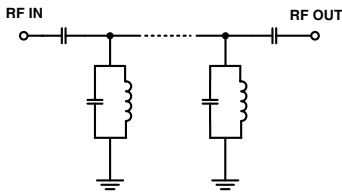
Features

- Low Insertion loss
- High selectivity
- Miniature shielded package

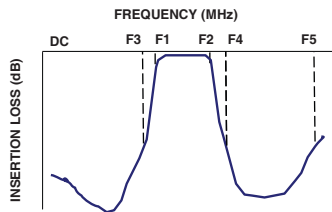
Applications

- Traffic collision avoidance system (TCAS)
- Aeronautical radio navigation
- Fixed satellite
- Radio astronomy
- Radar and navigation system

Functional Schematic



Typical Frequency Response



Electrical Specifications at 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Center Frequency	—	—	1350	—	MHz	
	Insertion Loss	F1-F2	1300-1400	—	0.8	2	dB
	VSWR	F1-F2	1300-1400	—	1.3	—	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC-1125	20	30	—	dB
	VSWR	DC-F3	DC-1125	—	20	—	:1
Stop Band, Upper	Insertion Loss	F4-F5	1665-2700	20	30	—	dB
	VSWR	F4-F5	1665-2700	—	20	—	:1

Maximum Ratings

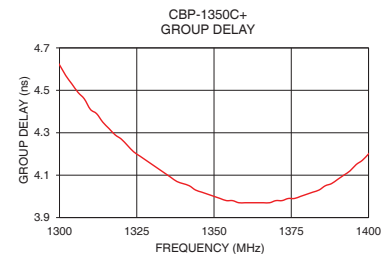
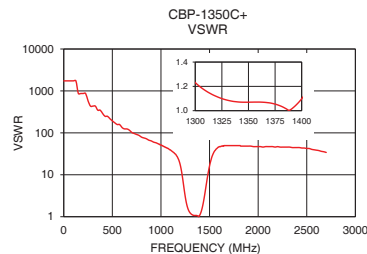
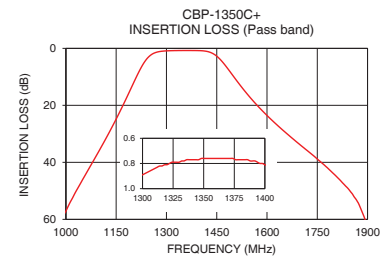
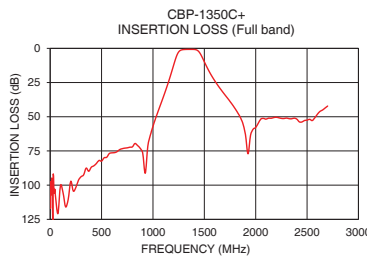
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	5W

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

Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
1	101.60	1737.18	1300	4.62
600	76.39	133.63	1306	4.49
1025	51.31	48.26	1310	4.41
1125	30.43	34.75	1314	4.35
1185	16.38	22.00	1320	4.27
1218	8.21	9.85	1326	4.19
1236	4.55	4.98	1330	4.15
1254	2.30	2.63	1336	4.09
1280	1.12	1.50	1340	4.06
1300	0.89	1.23	1344	4.03
1320	0.81	1.12	1350	4.00
1350	0.76	1.07	1356	3.98
1400	0.81	1.10	1360	3.97
1440	1.93	2.44	1364	3.97
1470	5.18	6.66	1370	3.98
1505	10.62	18.50	1376	3.99
1590	22.38	45.72	1380	4.01
1665	30.51	49.64	1384	4.03
1900	62.89	48.26	1390	4.08
2700	42.20	34.07	1400	4.20

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



Notes

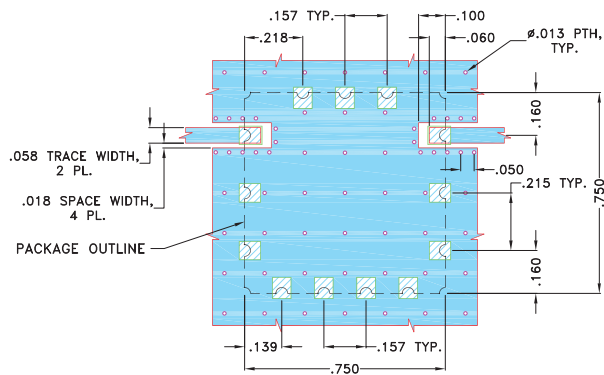
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Pad Connections

INPUT	1
OUTPUT	10
GROUND	2,3,4,5,6,7,8,9,11,12,13

Demo Board MCL P/N: TB-684+
Suggested PCB Layout (PL-373)

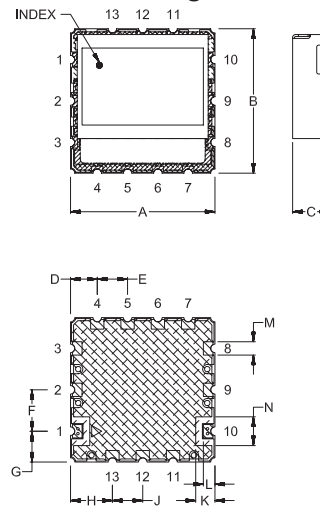


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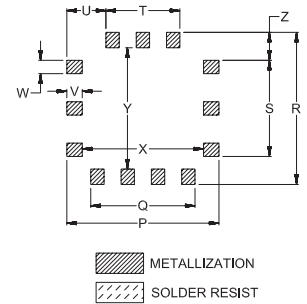
- TRACE WIDTH IS SHOWN FOR OAK (OAK-602) WITH DIELECTRIC THICKNESS .022"±.0015". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

Outline Drawing



PCB Land Pattern



Outline Dimensions (inch/mm)

A	B	C	D	E	F	G	H	J	K	L	M	N
.750	.750	.210	.139	.157	.215	.160	.218	.157	.100	.060	.069	.149
19.05	19.05	5.33	3.53	3.99	5.46	4.06	5.54	3.99	2.54	1.52	1.75	3.78
P	Q	R	S	T	U	V	W	X	Y	Z	wt.	
.790	.541	.790	.499	.384	.203	.080	.069	.630	.630	.145	grams	
20.07	13.74	20.07	12.67	9.75	5.16	2.03	1.75	16.00	16.00	3.68	4.6	

Note: Please refer to case style drawing for details

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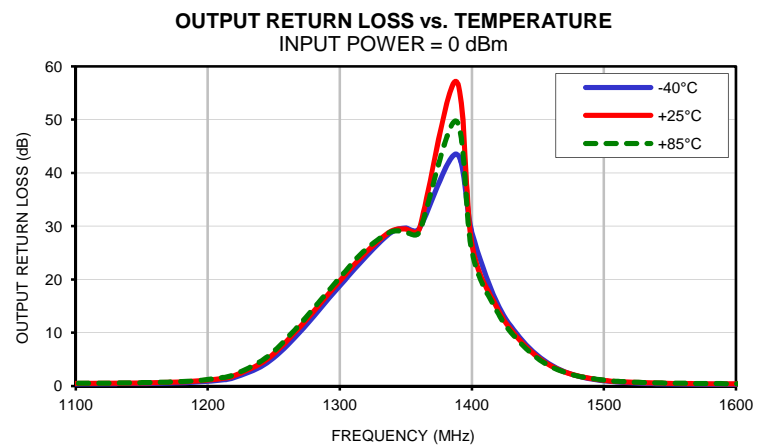
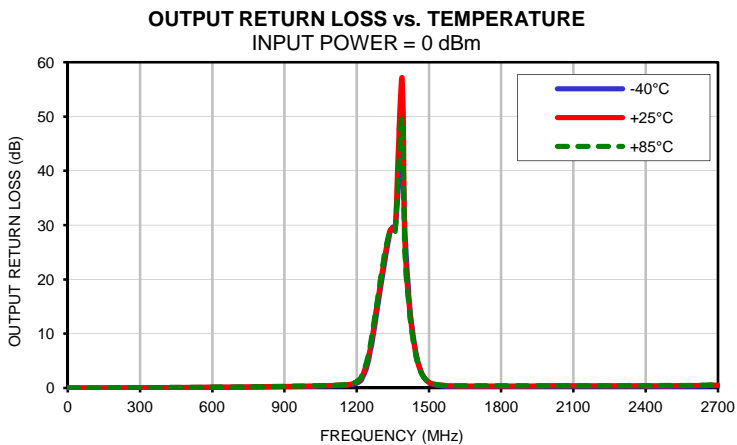
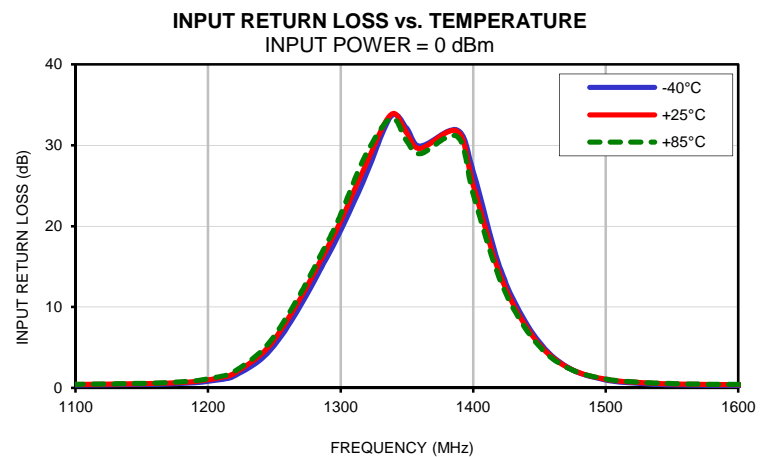
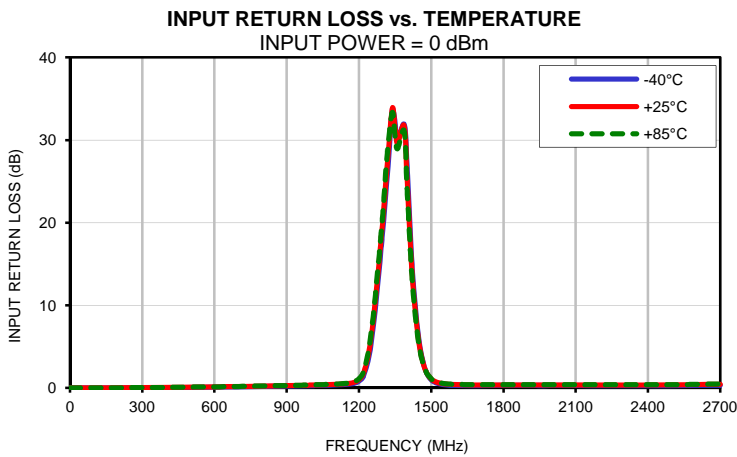
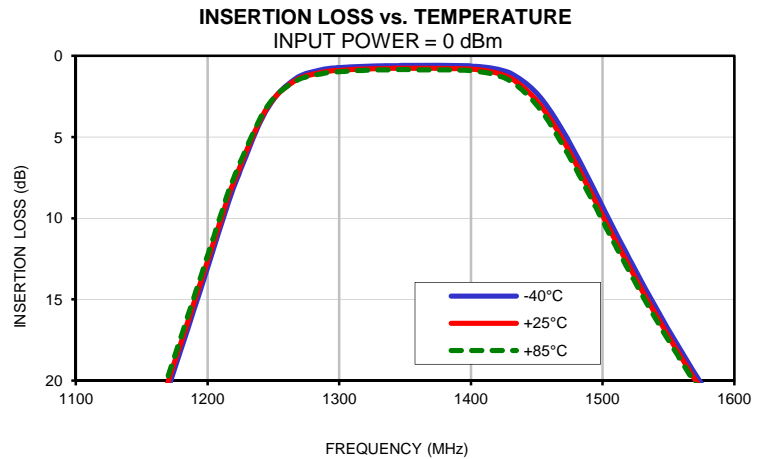
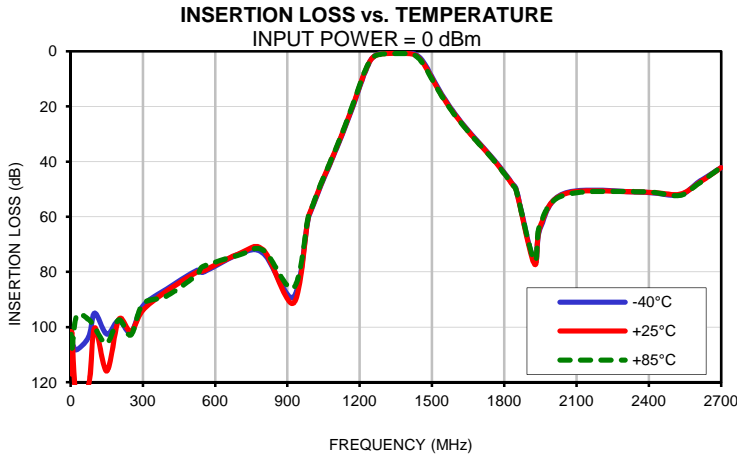
Typical Performance Data

FREQ. (MHz)	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1	102.92	101.60	102.78	0.00	0.00	0.00	0.00	0.00	0.00
2	113.89	116.93	102.63	0.00	0.00	0.00	0.00	0.00	0.00
5	106.24	101.80	108.61	0.00	0.00	0.00	0.00	0.00	0.00
25	108.21	127.06	95.88	0.00	0.00	0.00	0.00	0.00	0.00
75	103.51	120.80	97.29	0.00	0.01	0.01	0.01	0.01	0.01
100	94.93	100.28	100.18	0.00	0.01	0.01	0.00	0.01	0.01
150	102.52	115.92	105.91	0.00	0.01	0.02	0.00	0.02	0.02
200	97.62	97.22	97.38	0.00	0.02	0.02	0.01	0.02	0.02
250	101.96	101.64	102.87	0.01	0.03	0.03	0.01	0.03	0.04
300	92.35	93.86	91.64	0.02	0.04	0.04	0.02	0.04	0.04
400	86.08	86.89	88.68	0.03	0.06	0.06	0.03	0.06	0.07
525	79.40	80.00	81.00	0.07	0.10	0.11	0.07	0.10	0.11
550	80.14	79.63	78.04	0.08	0.11	0.11	0.07	0.11	0.12
700	73.52	73.38	73.86	0.13	0.17	0.18	0.13	0.17	0.18
800	73.29	72.01	72.16	0.18	0.22	0.24	0.17	0.22	0.24
925	89.13	91.30	85.78	0.24	0.29	0.31	0.23	0.29	0.31
985	61.06	60.65	60.57	0.28	0.33	0.35	0.27	0.33	0.35
995	58.55	58.20	58.12	0.28	0.34	0.36	0.28	0.34	0.36
1030	50.56	50.21	49.98	0.31	0.36	0.38	0.31	0.37	0.39
1050	46.36	46.04	45.80	0.32	0.38	0.40	0.32	0.39	0.41
1075	41.23	40.92	40.65	0.34	0.40	0.43	0.35	0.41	0.44
1100	36.10	35.77	35.49	0.36	0.43	0.46	0.38	0.45	0.48
1125	30.77	30.43	30.13	0.39	0.47	0.50	0.41	0.50	0.54
1130	29.69	29.34	29.03	0.40	0.48	0.51	0.42	0.51	0.55
1150	25.21	24.83	24.50	0.44	0.53	0.57	0.46	0.56	0.61
1170	20.49	20.08	19.74	0.50	0.61	0.67	0.54	0.66	0.72
1190	15.55	15.13	14.79	0.65	0.80	0.89	0.69	0.86	0.95
1210	10.50	10.12	9.81	1.06	1.31	1.45	1.11	1.37	1.53
1220	8.08	7.75	7.49	1.51	1.85	2.05	1.56	1.91	2.13
1244	3.44	3.35	3.27	4.14	4.80	5.20	4.17	4.84	5.26
1266	1.44	1.55	1.59	9.14	10.07	10.62	9.11	10.01	10.54
1288	0.83	1.00	1.07	15.64	16.71	17.38	15.35	16.28	16.86
1300	0.72	0.89	0.97	19.46	20.61	21.43	18.79	19.70	20.31
1318	0.64	0.81	0.89	25.88	27.23	28.50	23.82	24.65	25.27
1338	0.60	0.77	0.85	33.55	33.80	33.32	28.68	28.95	28.85
1350	0.59	0.76	0.84	32.06	31.47	30.48	29.65	29.46	28.88
1360	0.59	0.76	0.85	29.89	29.60	28.95	29.49	29.32	28.82
1388	0.59	0.78	0.87	31.88	31.71	31.07	43.53	57.18	49.74
1400	0.62	0.81	0.91	26.80	25.10	23.97	28.87	26.60	25.28
1418	0.78	1.02	1.15	15.99	15.02	14.35	16.15	15.17	14.49
1434	1.24	1.57	1.76	9.76	9.18	8.77	9.80	9.21	8.80
1454	2.67	3.15	3.44	4.86	4.63	4.45	4.87	4.63	4.45
1476	5.49	6.06	6.39	2.15	2.15	2.12	2.15	2.14	2.11
1500	9.28	9.83	10.15	0.99	1.08	1.11	0.97	1.06	1.09
1515	11.67	12.18	12.48	0.68	0.79	0.82	0.66	0.77	0.80
1540	15.45	15.89	16.15	0.44	0.55	0.59	0.42	0.53	0.57
1575	20.19	20.55	20.76	0.33	0.44	0.47	0.30	0.41	0.45
1605	23.82	24.13	24.30	0.30	0.40	0.43	0.28	0.37	0.41
1660	29.74	30.01	30.13	0.29	0.37	0.40	0.26	0.35	0.38
1665	30.25	30.51	30.63	0.29	0.37	0.40	0.26	0.35	0.38
1765	40.10	40.35	40.43	0.30	0.37	0.39	0.28	0.35	0.38
1835	48.09	48.38	48.49	0.30	0.37	0.38	0.29	0.36	0.38
1850	50.11	50.42	50.53	0.30	0.37	0.38	0.29	0.36	0.38
1925	76.22	77.09	75.77	0.30	0.36	0.38	0.30	0.36	0.38
1950	64.11	63.41	62.47	0.29	0.36	0.38	0.30	0.37	0.38
2050	51.47	51.70	52.11	0.30	0.36	0.38	0.31	0.38	0.39
2375	51.09	51.03	50.93	0.28	0.36	0.38	0.30	0.39	0.41
2525	52.19	51.86	52.33	0.28	0.37	0.40	0.32	0.41	0.45
2600	47.83	48.21	48.40	0.30	0.41	0.43	0.34	0.45	0.49
2700	42.19	42.20	42.03	0.33	0.44	0.48	0.39	0.51	0.57

Typical Performance Data

FREQ. (MHz)	GROUP DELAY		
	(nsec)		
	@-40°C	@+25°C	@+85°C
1300	4.68	4.62	4.58
1302	4.63	4.57	4.53
1304	4.59	4.53	4.50
1306	4.55	4.49	4.46
1308	4.51	4.46	4.42
1310	4.47	4.41	4.39
1312	4.44	4.39	4.36
1314	4.40	4.35	4.32
1316	4.37	4.32	4.29
1318	4.34	4.29	4.27
1320	4.31	4.27	4.25
1322	4.28	4.24	4.22
1324	4.25	4.21	4.20
1326	4.23	4.19	4.17
1328	4.21	4.17	4.15
1330	4.18	4.15	4.13
1332	4.17	4.13	4.11
1334	4.14	4.11	4.09
1336	4.12	4.09	4.08
1338	4.10	4.07	4.06
1340	4.09	4.06	4.05
1342	4.07	4.05	4.03
1344	4.05	4.03	4.02
1346	4.04	4.02	4.01
1348	4.03	4.01	4.00
1350	4.02	4.00	3.98
1352	4.01	3.99	3.98
1354	4.00	3.98	3.97
1356	3.99	3.98	3.97
1358	3.99	3.97	3.97
1360	3.98	3.97	3.96
1362	3.98	3.97	3.96
1364	3.98	3.97	3.97
1366	3.98	3.97	3.97
1368	3.98	3.97	3.97
1370	3.98	3.98	3.97
1372	3.98	3.98	3.98
1374	3.99	3.99	3.99
1376	3.99	3.99	4.00
1378	4.00	4.00	4.01
1380	4.01	4.01	4.02
1382	4.02	4.02	4.03
1384	4.02	4.03	4.04
1386	4.04	4.05	4.06
1388	4.05	4.06	4.07
1390	4.07	4.08	4.10
1392	4.08	4.10	4.12
1394	4.10	4.12	4.14
1396	4.13	4.15	4.17
1398	4.15	4.17	4.20
1400	4.17	4.20	4.22

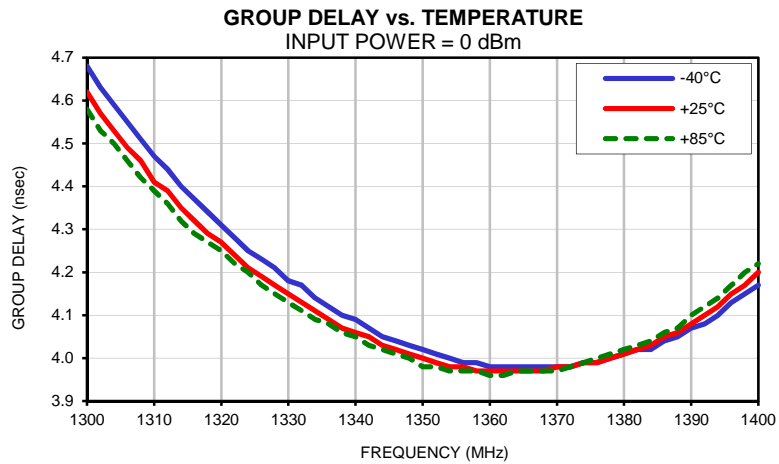
Typical Performance Curves



Band Pass Filter

CBP-1350C+

Typical Performance Curves

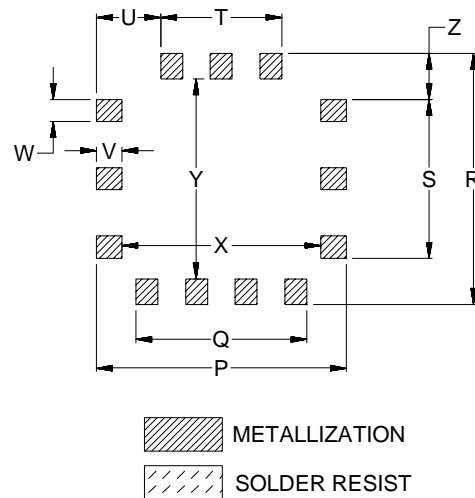


Outline Dimensions

MP1766



PCB Land Pattern



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
MP1766	.750 (19.05)	.750 (19.05)	.210 (5.33)	.139 (3.53)	.157 (3.99)	.215 (5.46)	.160 (4.06)	.218 (5.54)	.157 (3.99)	.100 (2.54)	.060 (1.52)	.069 (1.75)	.149 (3.78)

CASE#	P	Q	R	S	T	U	V	W	X	Y	Z	WT.GRAMS
MP1766	.790 (20.07)	.541 (13.74)	.790 (20.07)	.499 (12.67)	.384 (9.75)	.203 (5.16)	.080 (2.03)	.069 (1.75)	.630 (16.00)	.630 (16.00)	.145 (3.68)	4.6

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

Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:
For RoHS Case Styles: 2-5 μ inch (.05-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate.
All models, (+) suffix.

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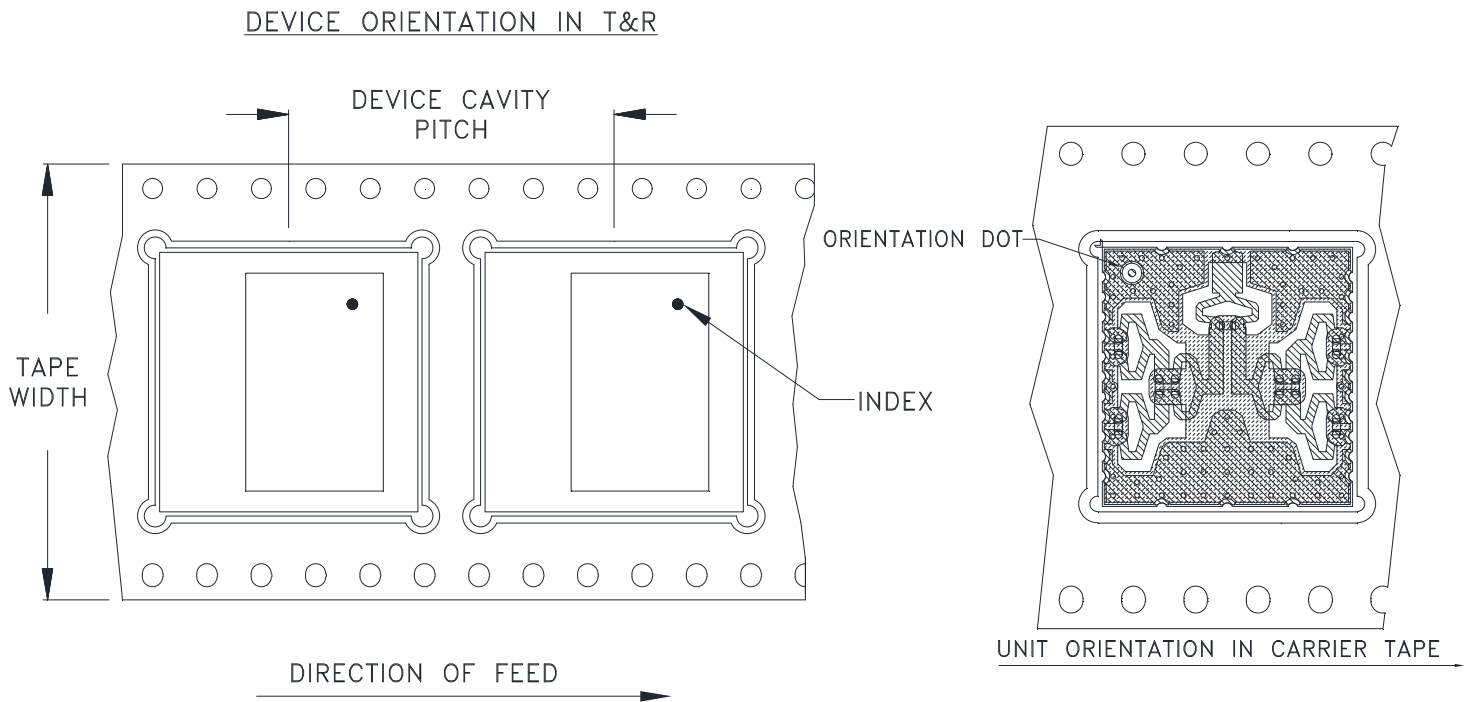
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The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F111



Applicable Case styles:

Applicable Case styles:RS1539

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
32	24	13	250

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



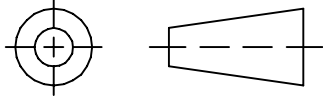
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THIRD ANGLE PROJECTION



REVISIONS

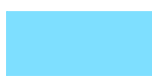
REV OR	ECN No.	DESCRIPTION	DATE	DR	AUTH
	M137721	NEW RELEASE	JUN 12	DDR	KG

**SUGGESTED MOUNTING CONFIGURATION FOR
MP1766 CASE STYLE "13FL01" PIN CODE**



NOTES:

- TRACE WIDTH IS SHOWN FOR OAK (OAK-602) WITH DIELECTRIC THICKNESS .022"±.0015". 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.

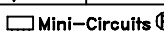
 DENOTES PCB COPPER LAYOUT WITH SMOBC
(SOLDER MASK OVER BARE COPPER)

 DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

UNLESS OTHERWISE SPECIFIED	INITIALS		DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005" ANGLES ± FRACTIONS ±	DRAWN	DDR	22 JUN 12
	CHECKED	MD	22 JUN 12
	APPROVED	GM	22 JUN 12

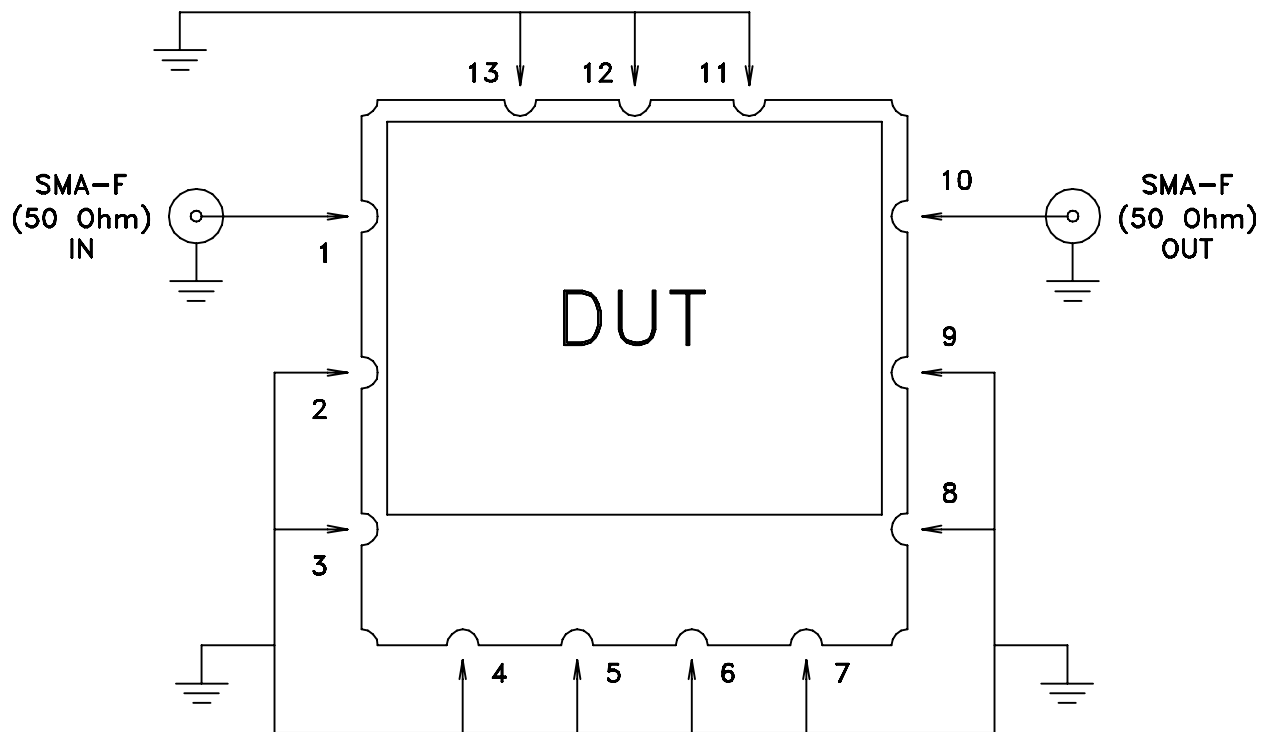
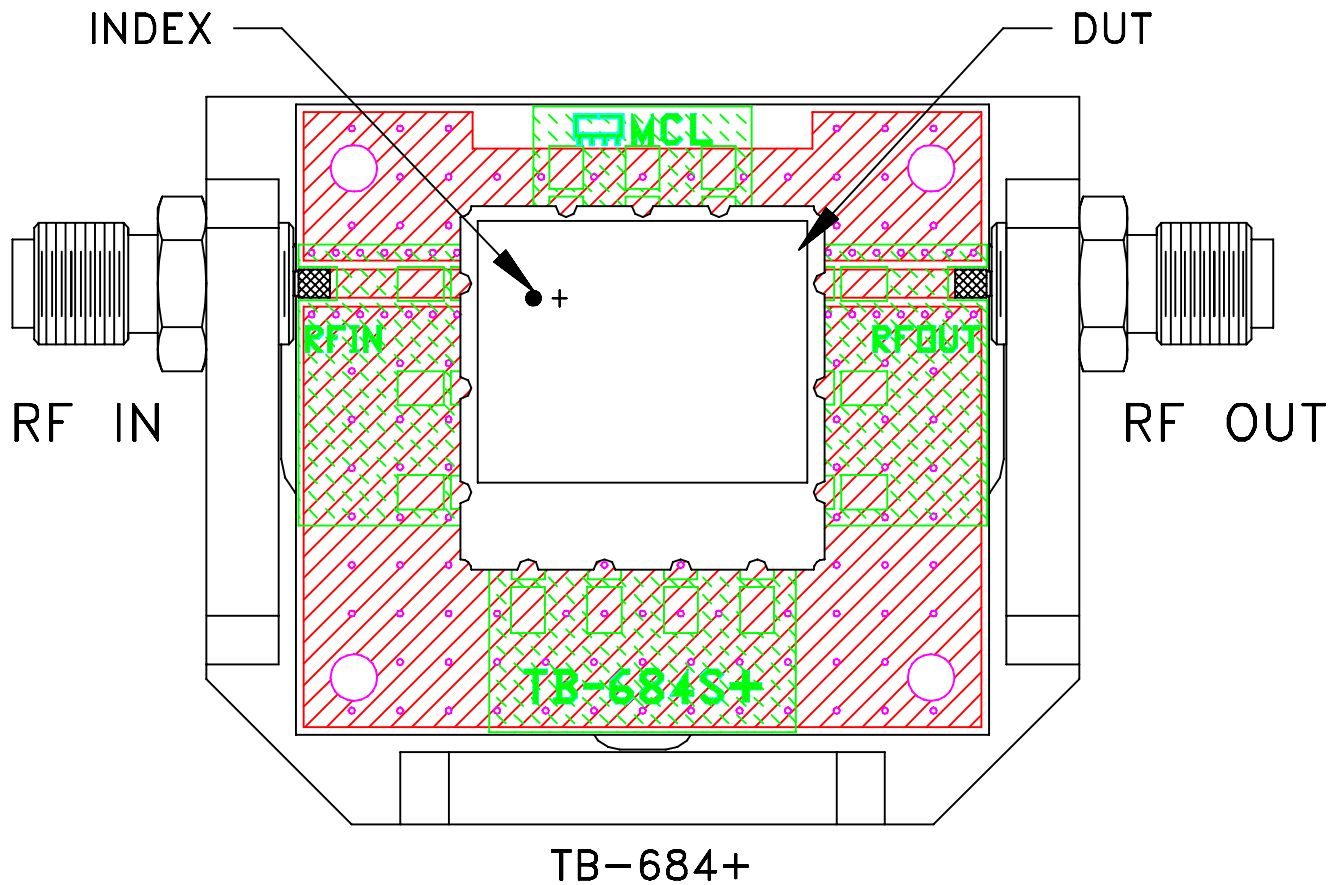
 **Mini-Circuits®** 13 Neptune Avenue
Brooklyn NY 11235

**PL, 13FL01, MP1766, BPF,
TB-684+, 50 Ohm**

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SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-373	REV: OR
FILE: 98PL373	SCALE: 4:1	SHEET: 1 OF 1	


Evaluation Board and Circuit



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: OAK-602 OR Equivalent
Dielectric Constant= $2.50 \pm .04$, Thickness=.022 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
Humidity	90 to 95% RH, 96 hours, 40°C	MIL-STD-202, Method 103B, Condition B, Except 50°C
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, 10-2000 Hz, 4 times in each of three axes (total 12)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A