

# Surface Mount Bandpass Filter

## CBP-1228C+

50Ω 1217 to 1238 MHz

### The Big Deal

- Narrow bandwidth
- Excellent Rejection
- High power handling
- Miniature shielded package



Generic photo used for illustration purposes only  
CASE STYLE: MP1766

### Product Overview

CBP-1228C+ 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 space and military applications

### Key Features

Feature	Advantages
High Selectivity	The CBP-1228C+ 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-1228C+ has been qualified over wide range of thermal, mechanical and environmental conditions including withstanding the stress of extensive solder reflow cycles.

#### 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](http://www.minicircuits.com/MCLStore/terms.jsp)



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CASE STYLE: MP1766

### Features

- Narrow bandwidth
- Excellent rejection
- High selectivity
- High power handling
- Miniature shielded package

### Applications

- Space operation and space research
- GPS
- Military

### Electrical Specifications at 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Center Frequency	—	—	1228	—	MHz	
	Insertion Loss	F1-F2	1217-1238	—	1.30	3.00	dB
	VSWR	F1-F2	1217-1238	—	1.50	2.32	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC-1140	20	30	—	dB
	VSWR	DC-F3	DC-1140	—	20	—	:1
Stop Band, Upper	Insertion Loss	F4-F5	1330-3000	20	29	—	dB
	VSWR	F4-F5	1330-3000	—	20	—	:1

### Maximum Ratings

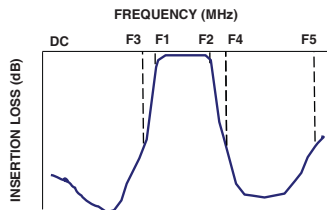
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	10W

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

### Functional Schematic



### Typical Frequency Response

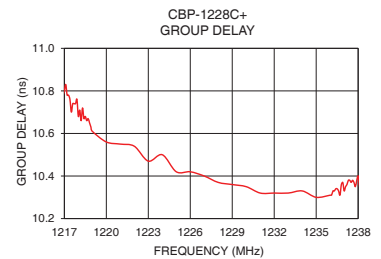
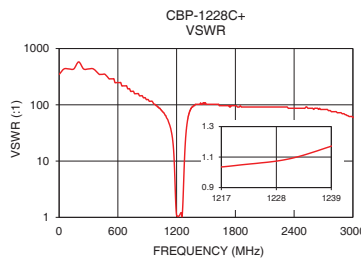
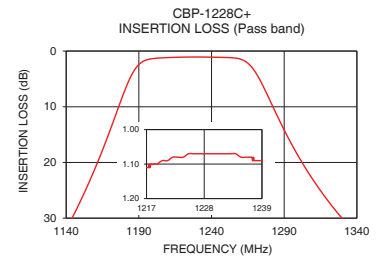
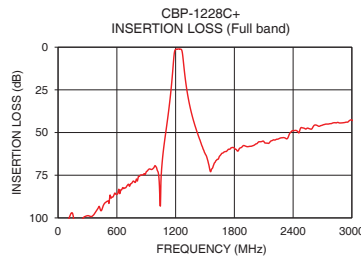


### Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
1	107.94	347.44	1217	10.80
750	79.85	173.72	1218	10.68
1140	32.06	37.77	1219	10.61
1144	30.03	34.75	1220	10.56
1160	20.98	23.49	1221	10.55
1174	11.52	11.24	1222	10.54
1180	7.29	6.28	1223	10.47
1188	3.03	2.43	1224	10.50
1217	1.11	1.04	1225	10.42
1228	1.07	1.07	1226	10.42
1238	1.09	1.16	1227	10.40
1268	3.00	2.72	1228	10.37
1277	7.10	7.63	1229	10.36
1286	12.06	17.39	1230	10.35
1304	20.74	42.38	1232	10.32
1330	30.08	72.39	1233	10.32
1550	71.88	102.19	1234	10.33
2200	54.26	91.43	1235	10.30
2600	47.02	82.73	1237	10.33
3000	42.69	59.91	1238	10.40

### +RoHS Compliant

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



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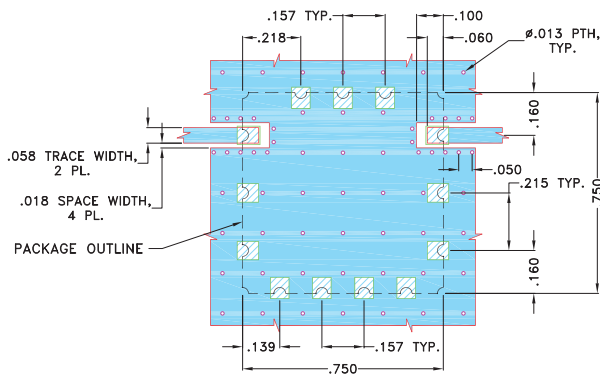
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REV.B  
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200811  
Page 2 of 3

## 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)**

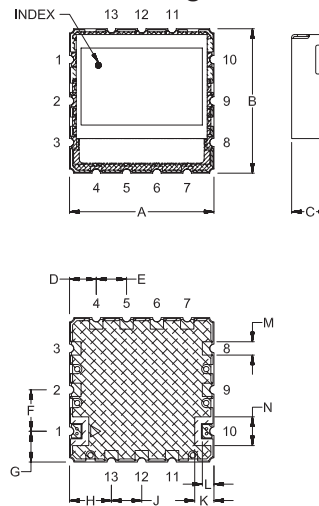


### NOTES:

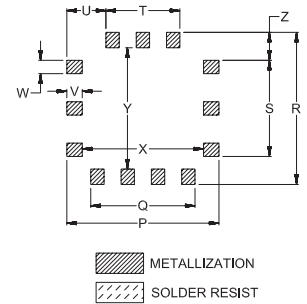
- TRACE WIDTH IS SHOWN FOR OAK (OAK-602) WITH DIELECTRIC THICKNESS .022"±.0015". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

## Outline Drawing



## PCB Land Pattern



## Outline Dimensions (inch)

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		
20.07	13.74	20.07	12.67	9.75	5.16	2.03	1.75	16.00	16.00	3.68	grams	
											4.6	

Note: Please refer to case style drawing for details

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# Band Pass Filter

# CBP-1228C+

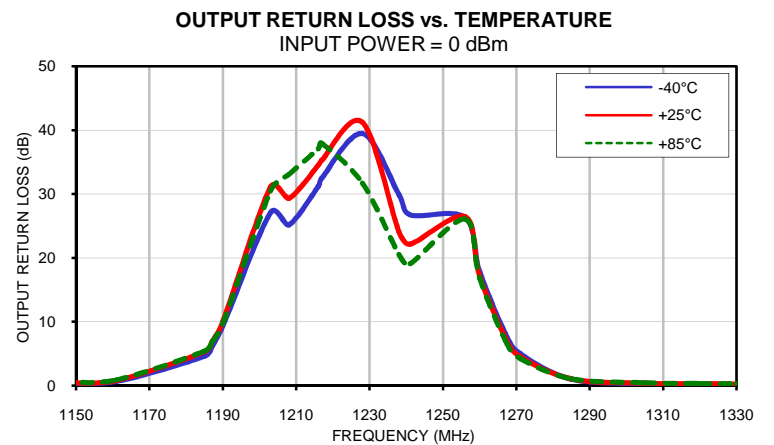
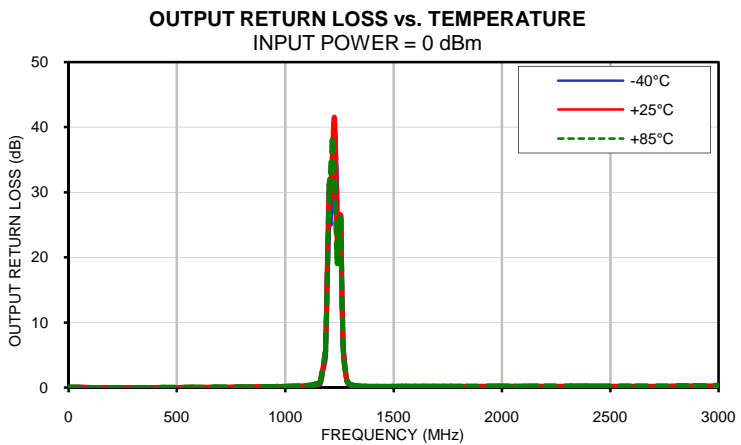
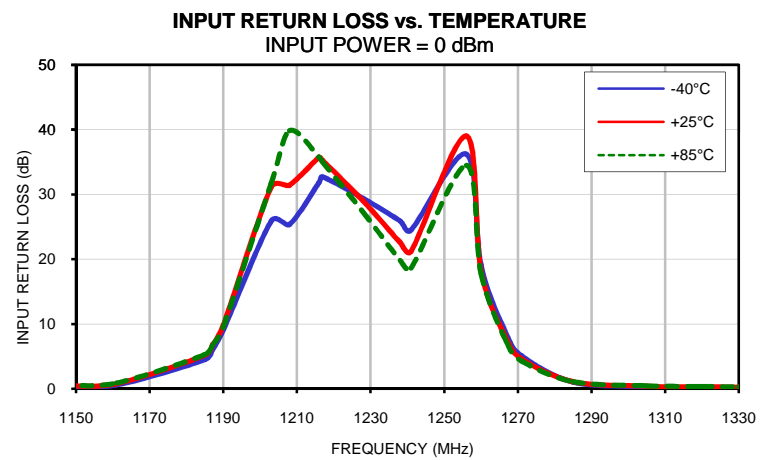
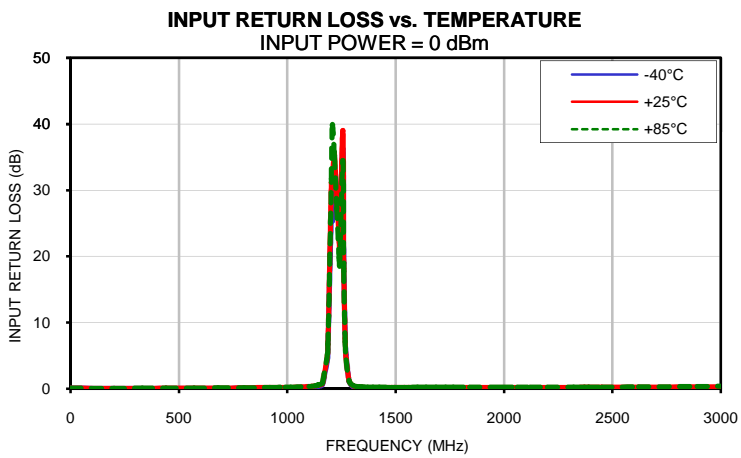
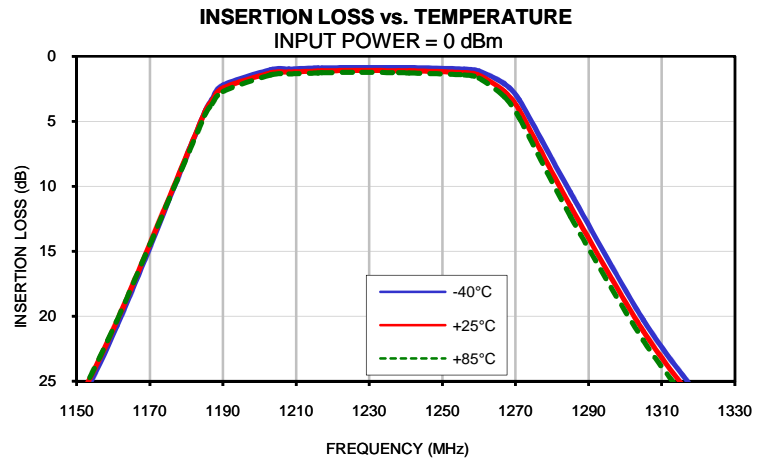
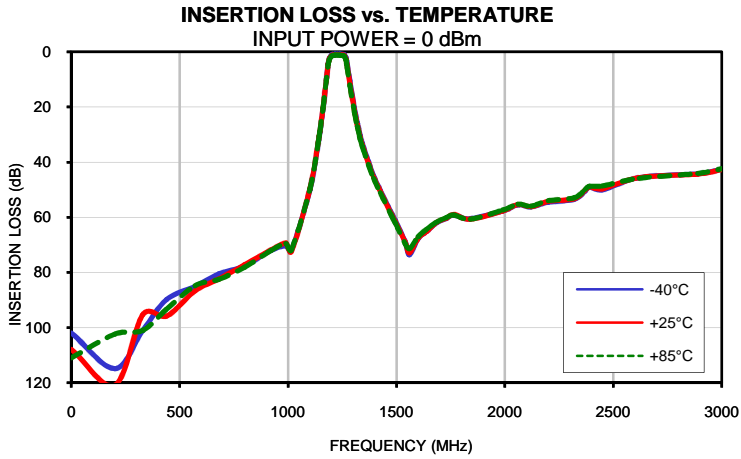
## Typical Performance Data

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
1.0	101.99	107.94	110.94	0.05	0.05	0.05	0.05	0.05	0.05
200.0	114.88	120.90	102.38	0.02	0.03	0.04	0.02	0.03	0.03
330.0	101.01	95.26	100.97	0.02	0.04	0.05	0.01	0.04	0.04
440.0	89.79	95.83	93.33	0.02	0.05	0.06	0.01	0.04	0.05
570.0	85.11	86.66	84.87	0.03	0.07	0.08	0.03	0.06	0.07
680.0	80.51	82.39	82.52	0.04	0.08	0.10	0.04	0.08	0.10
800.0	77.61	77.21	78.13	0.06	0.11	0.13	0.06	0.11	0.13
920.0	72.11	71.87	72.04	0.09	0.15	0.17	0.10	0.15	0.18
990.0	70.37	69.35	69.51	0.11	0.18	0.20	0.13	0.19	0.21
1015.0	71.98	72.39	71.85	0.13	0.19	0.22	0.14	0.21	0.23
1100.0	49.99	49.74	49.83	0.22	0.30	0.33	0.24	0.32	0.36
1140.0	32.41	32.06	32.03	0.35	0.46	0.53	0.39	0.50	0.56
1143.0	30.90	30.55	30.51	0.37	0.49	0.56	0.41	0.53	0.60
1146.0	29.35	28.99	28.95	0.39	0.52	0.59	0.43	0.55	0.63
1161.0	20.77	20.36	20.32	0.59	0.76	0.87	0.64	0.81	0.92
1185.0	4.29	4.31	4.56	4.47	5.16	5.29	4.62	5.32	5.41
1187.0	3.30	3.40	3.67	5.95	6.69	6.72	6.13	6.88	6.87
1190.0	2.21	2.42	2.69	9.05	9.76	9.53	9.35	10.06	9.73
1203.0	1.03	1.27	1.42	25.90	31.13	31.73	27.11	31.11	30.46
1208.0	0.97	1.19	1.34	25.32	31.39	39.84	25.16	29.30	33.04
1216.0	0.89	1.12	1.26	31.82	35.71	35.74	31.22	34.49	37.05
1217.0	0.89	1.11	1.25	32.69	35.20	34.97	32.43	35.27	37.92
1228.0	0.85	1.07	1.22	29.38	29.01	27.26	39.45	41.22	31.68
1238.0	0.85	1.09	1.25	25.90	22.57	19.81	29.92	24.09	20.52
1241.0	0.85	1.10	1.27	24.48	21.20	18.62	26.72	22.15	19.10
1256.0	0.97	1.24	1.42	36.22	39.01	34.48	26.30	26.45	26.06
1260.0	1.13	1.45	1.67	18.99	18.12	17.72	17.87	17.18	16.87
1267.0	2.11	2.69	3.12	8.31	7.59	7.11	8.14	7.46	7.00
1271.0	3.35	4.13	4.72	5.07	4.63	4.31	5.00	4.57	4.26
1285.0	10.47	11.52	12.32	1.02	1.08	1.08	1.02	1.07	1.08
1305.0	20.29	21.16	21.87	0.28	0.39	0.44	0.28	0.39	0.44
1319.0	25.74	26.49	27.13	0.18	0.28	0.32	0.19	0.29	0.34
1320.0	26.09	26.84	27.46	0.17	0.27	0.32	0.19	0.29	0.33
1330.0	29.41	30.08	30.67	0.14	0.24	0.28	0.15	0.25	0.29
1333.0	30.33	30.99	31.57	0.13	0.23	0.27	0.15	0.24	0.28
1343.0	33.22	33.83	34.36	0.12	0.21	0.25	0.14	0.22	0.26
1370.0	39.85	40.36	40.84	0.10	0.18	0.22	0.11	0.20	0.23
1395.0	44.91	45.42	45.83	0.09	0.17	0.20	0.11	0.19	0.22
1425.0	50.25	50.64	51.10	0.09	0.17	0.20	0.12	0.19	0.22
1480.0	59.02	59.49	59.92	0.10	0.16	0.19	0.12	0.19	0.22
1495.0	61.17	61.68	62.12	0.10	0.16	0.19	0.12	0.19	0.22
1540.0	68.98	69.03	69.69	0.10	0.17	0.19	0.13	0.20	0.23
1560.0	73.61	72.84	71.38	0.10	0.17	0.19	0.14	0.20	0.23
1600.0	67.74	67.64	67.08	0.11	0.17	0.20	0.14	0.21	0.23
1640.0	65.08	65.07	64.29	0.11	0.18	0.20	0.14	0.21	0.23
1685.0	61.99	61.91	61.75	0.11	0.18	0.20	0.15	0.21	0.23
1730.0	60.47	60.41	60.10	0.12	0.18	0.21	0.15	0.21	0.24
1765.0	59.18	59.00	59.16	0.12	0.18	0.21	0.16	0.22	0.24
1840.0	60.52	60.68	60.67	0.13	0.19	0.21	0.16	0.22	0.24
1990.0	57.65	57.69	57.40	0.13	0.19	0.21	0.17	0.22	0.25
2060.0	55.47	55.42	55.22	0.13	0.19	0.22	0.16	0.22	0.24
2120.0	56.22	56.15	55.96	0.12	0.19	0.22	0.16	0.23	0.25
2200.0	54.52	54.26	54.02	0.12	0.19	0.22	0.16	0.22	0.25
2320.0	53.50	53.26	52.97	0.12	0.19	0.23	0.15	0.22	0.25
2370.0	50.49	50.14	49.91	0.13	0.20	0.24	0.15	0.23	0.26
2390.0	49.05	48.97	48.82	0.12	0.20	0.24	0.15	0.23	0.26
2450.0	50.05	49.67	48.67	0.11	0.20	0.23	0.14	0.22	0.25
2620.0	45.61	45.62	45.83	0.10	0.20	0.25	0.13	0.23	0.27
2890.0	44.19	44.38	44.11	0.12	0.25	0.31	0.14	0.26	0.33
3000.0	42.63	42.69	42.43	0.15	0.29	0.37	0.15	0.29	0.37

*Typical Performance Data*

FREQ.  (MHz)	GROUP DELAY		
	(nsec)		
	@-40°C	@+25°C	@+85°C
1217.0	10.87	10.80	10.81
1217.1	10.83	10.83	10.87
1217.2	10.84	10.78	10.79
1217.3	10.82	10.78	10.85
1217.4	10.77	10.76	10.78
1217.5	10.74	10.70	10.78
1217.6	10.75	10.74	10.77
1217.7	10.78	10.74	10.81
1217.8	10.78	10.74	10.80
1217.9	10.78	10.76	10.80
1218.0	10.71	10.68	10.73
1218.1	10.72	10.71	10.73
1218.2	10.71	10.66	10.73
1218.3	10.74	10.72	10.80
1218.4	10.68	10.67	10.70
1218.5	10.67	10.68	10.75
1218.6	10.67	10.66	10.70
1218.7	10.66	10.67	10.74
1218.8	10.65	10.65	10.69
1218.9	10.65	10.63	10.68
1219.0	10.60	10.61	10.65
1220.0	10.56	10.56	10.62
1221.0	10.53	10.55	10.60
1222.0	10.55	10.54	10.60
1223.0	10.49	10.47	10.55
1224.0	10.47	10.50	10.54
1225.0	10.41	10.42	10.49
1226.0	10.41	10.42	10.50
1227.0	10.38	10.40	10.47
1228.0	10.36	10.37	10.45
1229.0	10.34	10.36	10.44
1230.0	10.32	10.35	10.43
1231.0	10.30	10.32	10.40
1232.0	10.26	10.32	10.35
1233.0	10.26	10.32	10.40
1234.0	10.29	10.33	10.38
1235.0	10.24	10.30	10.36
1236.0	10.27	10.31	10.39
1236.1	10.25	10.31	10.38
1236.2	10.26	10.33	10.39
1236.3	10.27	10.33	10.36
1236.4	10.25	10.34	10.38
1236.5	10.27	10.34	10.39
1236.6	10.27	10.33	10.39
1236.7	10.26	10.31	10.36
1236.8	10.28	10.36	10.39
1236.9	10.33	10.37	10.44
1237.0	10.30	10.33	10.38
1237.1	10.31	10.35	10.42
1237.2	10.32	10.36	10.43
1237.3	10.32	10.38	10.41
1237.4	10.35	10.38	10.44
1237.5	10.35	10.37	10.43
1237.6	10.33	10.38	10.46
1237.7	10.33	10.37	10.43
1237.8	10.32	10.35	10.41
1237.9	10.34	10.38	10.46
1238.0	10.35	10.40	10.48

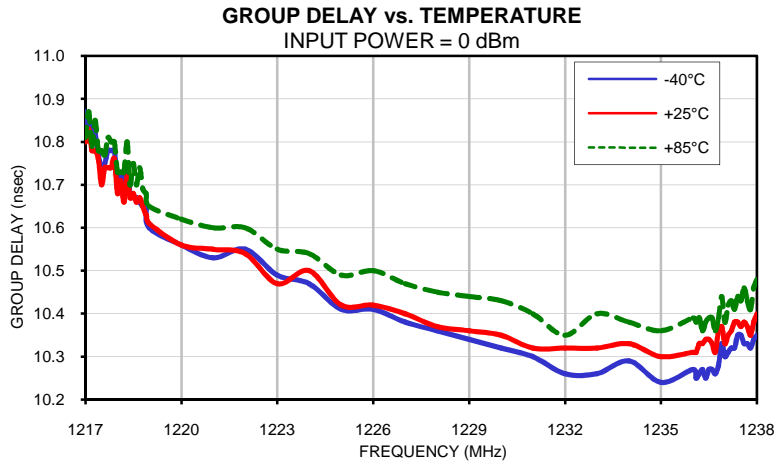
## Typical Performance Curves



# Band Pass Filter

# CBP-1228C+

## Typical Performance Curves



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The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)



IF/RF MICROWAVE COMPONENTS

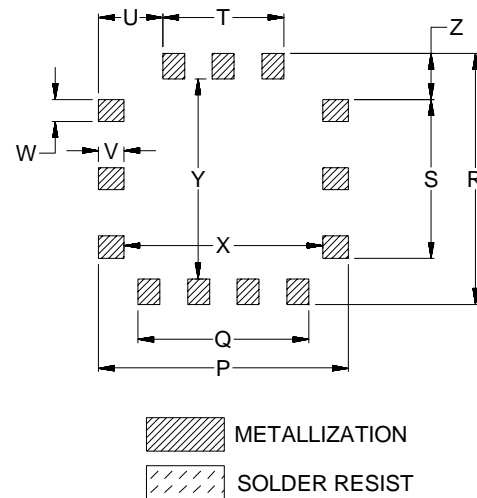
REV. OR  
CBP-1228C+  
140204  
Page 2 of 2

## 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.  $\pm .03$ ; 3PL.  $\pm .015$

### Notes:

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

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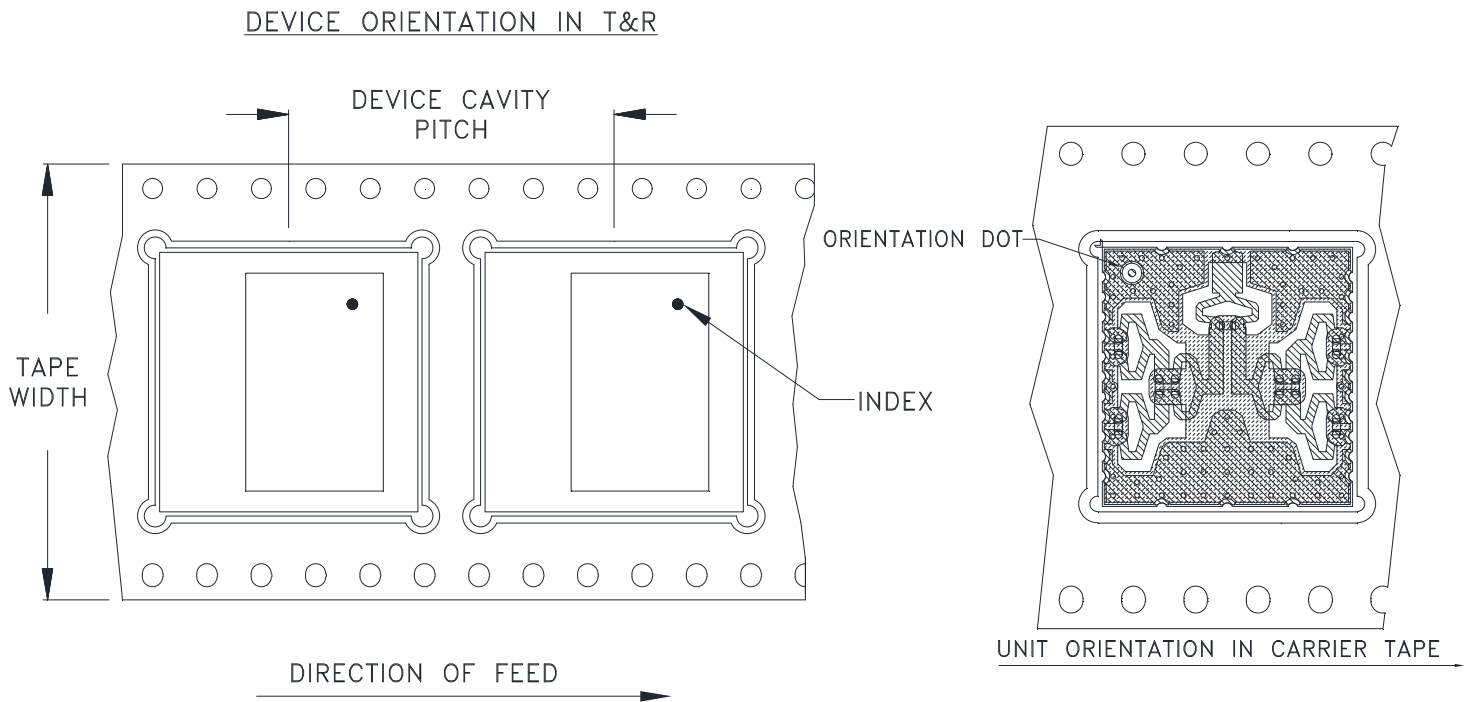


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RF/IF MICROWAVE COMPONENTS



# 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](http://www.minicircuits.com/pages/pdfs/tape.pdf)



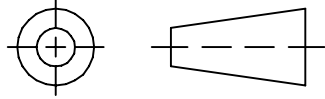
INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

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THIRD ANGLE PROJECTION



REVISIONS

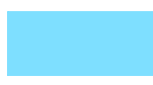
REV OR	ECN No.	DESCRIPTION	DATE	DR	AUTH
	M137721	NEW RELEASE	JUN 12	DDR	KG

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)

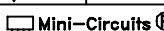
 DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

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

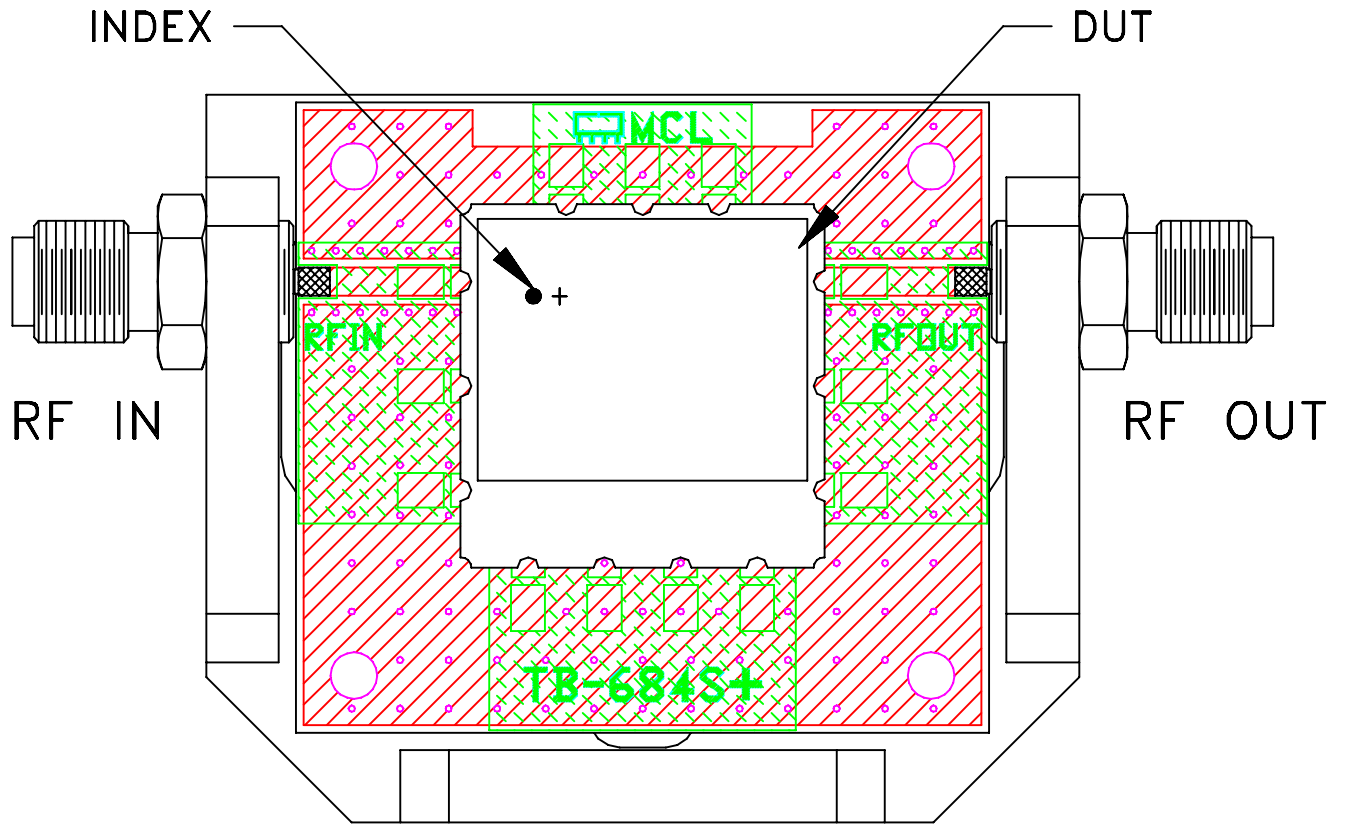
 **Mini-Circuits®** 13 Neptune Avenue  
Brooklyn NY 11235

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

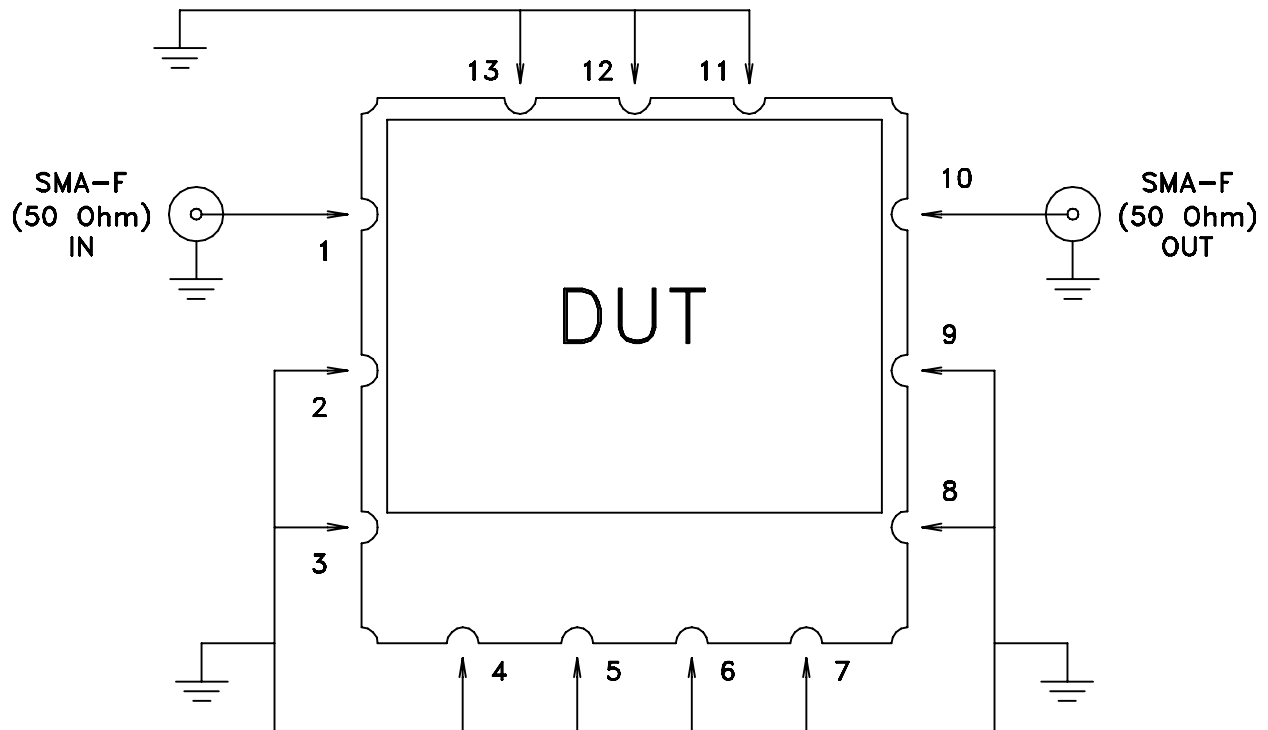
SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-373	REV: OR
FILE: 98PL373	SCALE: 4:1	SHEET: 1 OF 1	

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# Evaluation Board and Circuit




TB-684+



Schematic Diagram

**Notes:**

1. 50 Ohm SMA Female connectors.
2. PCB Material: OAK-602 OR Equivalent  
Dielectric Constant=2.50±.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