



## SURFACE MOUNT

# Coaxial-Ceramic Resonator Filters and Multiplexers

50Ω DC to 6 GHz

### THE BIG DEAL

- Low insertion loss with excellent power handling
- Passbands up to 6 GHz
- Fractional bandwidth from <1 to 25%
- Low profile designs with min. height of 0.120"
- Excellent temperature stability
- Rugged construction to handle demanding environmental conditions



### PRODUCT OVERVIEW

Mini-Circuits' Coaxial-Ceramic Resonator filters offer low insertion loss in very small form factors, using ceramic material with high dielectric constant and superior Q factor. Bandpass and bandstop filters, diplexer and multiplexer designs can be constructed using this technology. Low insertion loss combined with excellent power handling makes these filters well suited for transmitter and receiver signal chains. Advanced filter design and construction can achieve stopband width greater than 3x the center frequency as high as 20 GHz.

All our coaxial-ceramic resonator filters are built with rugged construction, qualified to withstand multiple demanding reflow cycles. Excellent repeatability across units is achieved through precise tuning and process control.

### KEY FEATURES

Feature	Advantages
Low insertion loss	Low signal loss results in better SNR in signal chain
Fast roll-off	Higher selectivity results in better adjacent channel rejection and dynamic range
Wide stop band	Wide spur-free stopband results in better receiver sensitivity
Excellent power handling	Well suited for transmitter applications
Rugged Construction	These filter assemblies have been qualified over a wide range of thermal, mechanical and environmental conditions including withstanding the stress of extensive solder reflow cycles
Small Size	Very well suited for high performance applications where size is a constraint.
Temperature stability	Very minimal change in electrical performance across temperature makes these filters suitable for a wide range of operating conditions.





# SURFACE MOUNT CERAMIC RESONATOR

# Bandpass Filter

# CBP2-3050BN+



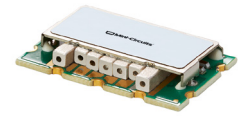
50Ω 2700 to 3400 MHz

## FEATURES

- Low-profile shielded package
- High rejection, 50dB typ.
- Low passband Insertion loss, 2.4dB typ.

## APPLICATIONS

- Defense / Military
- Aeronautical radionavigation service



Generic photo used for illustration purposes only

CASE STYLE: WA3176

### +RoHS Compliant

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

## ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Units
Center Frequency	—	—	—	3050	—	MHz
Passband	Insertion Loss	F1-F2	2700 - 3400	2.4	3.0	dB
	Return Loss	F1-F2	2700 - 3400	13	—	dB
Stop Band, Lower	Insertion Loss	DC-F3	DC - 2000	50	60	dB
		F3-F4	2000 - 2465	20	29	—
Stop Band, Upper	Insertion Loss	F5-F6	3640 - 3900	20	29	dB
		F6-F7	3900 - 4500	35	50	—

1. Measured on Mini-Circuits Test Board TB-CBP2-3050BN+

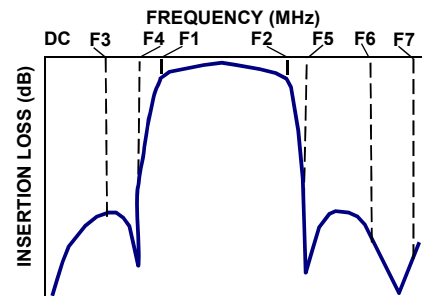
## MAXIMUM RATINGS

Parameter	Ratings
Operating temperature	-40°C to +85°C
Storage temperature	-55°C to +100°C
RF Power Input *	6W at 25°C

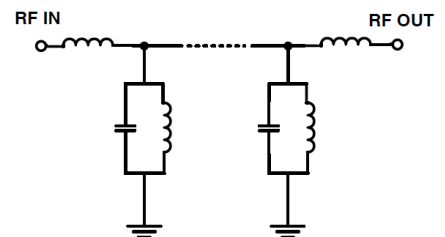
Permanent damage may occur if any of these limits are exceeded.

\*Passband rating

## TYPICAL FREQUENCY RESPONSE



## FUNCTIONAL SCHEMATIC



REV. OR  
ECO-011220  
CBP2-3050BN+  
EDU4237  
URJ  
211216

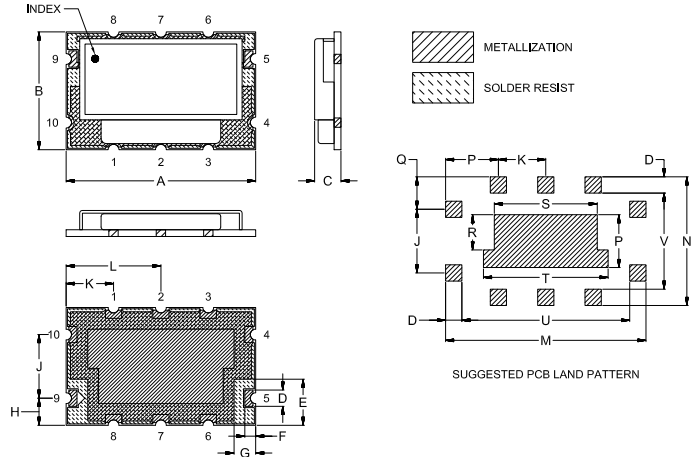




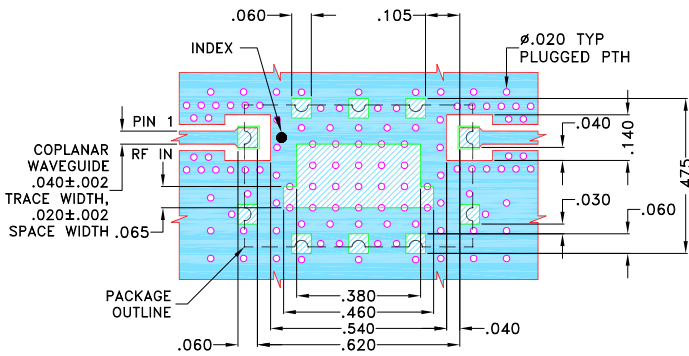
### PAD CONNECTIONS

RF IN	9
RF OUT	5
GROUND	1,2,3,4,6,7,8,10

### OUTLINE DRAWING



### DEMO BOARD MCL P/N: TB-CBP2-3050BN+ SUGGESTED PCB LAYOUT (PL-721)



#### NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS .020±.0015. COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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 SOLDERMASK

### OUTLINE DIMENSIONS (Inches / mm)

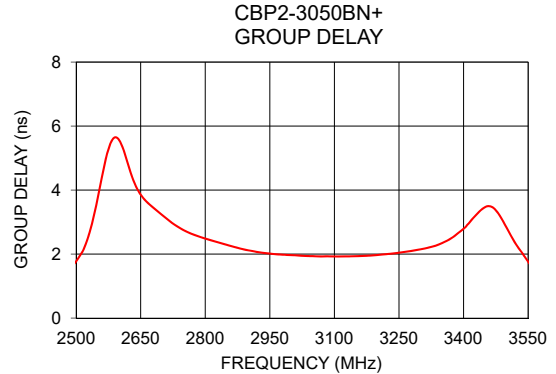
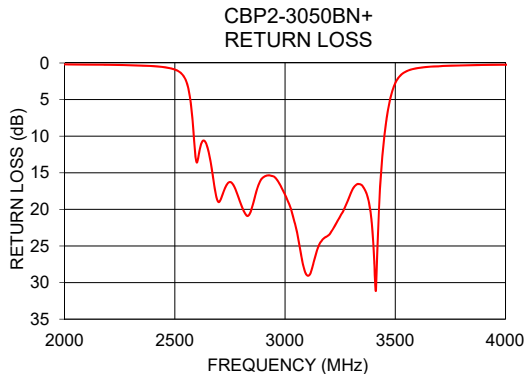
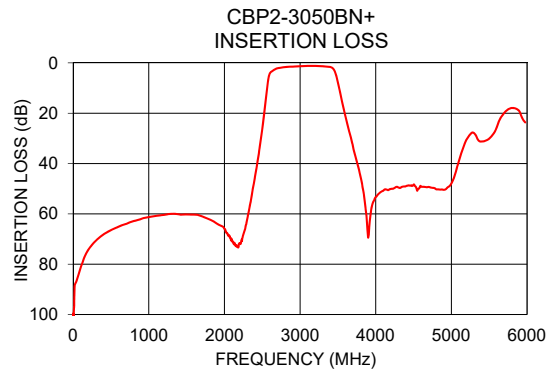
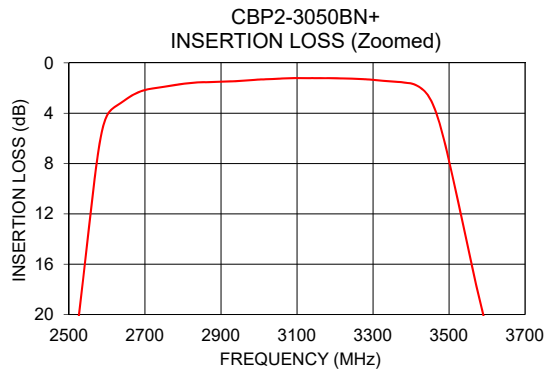
A	B	C	D	E	F	G	H	J	K	L	M
.700	.435	.120	.060	.170	.040	.080	.100	.235	.175	.350	.740
17.78	11.05	3.05	1.52	4.32	1.02	2.03	2.54	5.97	4.45	8.89	18.80
N	P	Q	R	S	T	U	V				Wt.
.475	.195	.120	.130	.380	.460	.620	.355				grams
12.07	4.95	3.05	3.30	9.65	11.68	15.75	9.02				1.1

Note: Please refer to case style drawing for details



### TYPICAL PERFORMANCE DATA

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)	Frequency (MHz)	Group Delay (ns)
1	102.44	0.06	2500	1.77
104	81.03	0.12	2550	3.72
2000	65.94	0.20	2700	3.22
2465	33.79	0.64	2750	2.75
2525	20.38	1.30	2800	2.48
2645	3.01	11.23	2850	2.29
2700	2.16	19.01	2900	2.12
3050	1.26	22.54	3000	1.97
3200	1.22	23.47	3050	1.94
3400	1.63	24.48	3100	1.93
3456	3.20	8.62	3150	1.93
3592	20.30	0.75	3200	1.97
3640	26.20	0.55	3250	2.04
3900	69.44	0.27	3300	2.15
4500	48.40	0.20	3600	1.17



- 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)

# Surface mount Band Pass Filter

# CBP2-3050BN+

## 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	95.83	102.44	104.98	0.06	0.06	0.07	0.06	0.07	0.07
5	100.36	100.02	101.05	0.06	0.06	0.07	0.06	0.07	0.07
10	97.98	98.90	99.38	0.06	0.07	0.07	0.07	0.07	0.08
64	84.54	84.93	84.83	0.09	0.10	0.11	0.11	0.12	0.13
104	81.26	81.03	81.20	0.10	0.12	0.12	0.12	0.14	0.15
144	77.81	77.66	77.52	0.12	0.13	0.14	0.13	0.15	0.16
184	75.30	75.12	75.18	0.13	0.14	0.15	0.14	0.16	0.17
224	73.32	73.30	73.37	0.13	0.15	0.15	0.14	0.16	0.17
304	70.65	70.59	70.64	0.13	0.15	0.16	0.14	0.17	0.18
344	69.58	69.51	69.52	0.12	0.15	0.17	0.14	0.17	0.18
404	68.17	68.14	68.07	0.12	0.15	0.17	0.14	0.17	0.18
444	67.43	67.40	67.29	0.12	0.15	0.17	0.14	0.17	0.19
504	66.38	66.43	66.30	0.12	0.15	0.17	0.14	0.17	0.19
564	65.52	65.58	65.46	0.12	0.16	0.18	0.14	0.17	0.19
604	65.01	65.06	64.95	0.12	0.16	0.18	0.14	0.17	0.20
704	64.00	63.96	63.86	0.12	0.16	0.18	0.14	0.18	0.20
804	62.90	62.84	62.79	0.11	0.16	0.18	0.13	0.17	0.20
1004	61.28	61.26	61.22	0.10	0.15	0.18	0.12	0.17	0.19
1504	60.27	60.23	60.32	0.07	0.14	0.18	0.08	0.15	0.18
2000	65.70	65.94	66.23	0.11	0.19	0.24	0.10	0.18	0.22
2465	34.23	33.79	33.41	0.53	0.64	0.70	0.52	0.64	0.70
2485	30.08	29.57	29.18	0.64	0.76	0.84	0.64	0.78	0.84
2525	20.94	20.38	19.97	1.09	1.29	1.42	1.11	1.34	1.48
2565	10.31	9.86	9.58	3.34	3.98	4.40	3.41	4.11	4.56
2645	2.80	3.01	3.13	10.76	11.22	11.48	11.55	12.20	12.55
2700	1.94	2.16	2.29	19.32	19.02	18.91	31.22	28.44	27.21
2800	1.47	1.66	1.78	18.84	19.27	19.50	21.71	23.09	23.84
2900	1.31	1.50	1.60	15.60	15.65	15.71	16.77	16.86	16.86
2950	1.25	1.43	1.54	15.17	15.52	15.69	15.43	15.71	15.77
3000	1.15	1.33	1.44	17.56	17.97	18.28	17.30	17.45	17.45
3050	1.07	1.26	1.37	22.35	22.52	22.97	19.89	19.58	19.44
3100	1.03	1.21	1.32	28.06	28.96	29.67	22.54	22.45	22.40
3150	1.02	1.21	1.32	24.68	25.18	25.55	21.28	21.35	21.62
3200	1.02	1.22	1.33	23.98	23.47	23.64	21.27	21.10	21.37
3300	1.13	1.35	1.48	18.03	17.68	17.64	17.77	17.40	17.39
3400	1.39	1.63	1.80	22.49	24.42	25.15	19.65	20.35	20.73
3456	2.71	3.20	3.54	9.22	8.65	8.31	8.64	8.10	7.82
3520	9.89	10.50	10.97	1.68	1.81	1.87	1.56	1.70	1.76
3592	19.92	20.30	20.70	0.60	0.75	0.83	0.50	0.64	0.72
3640	25.85	26.20	26.54	0.41	0.55	0.63	0.35	0.48	0.55
3676	30.02	30.18	30.40	0.35	0.48	0.53	0.29	0.40	0.46
3700	33.23	33.33	33.36	0.32	0.45	0.50	0.25	0.37	0.42
3760	40.02	40.34	40.58	0.26	0.37	0.42	0.18	0.29	0.33
3800	44.89	45.28	45.74	0.24	0.34	0.39	0.17	0.26	0.30
3840	51.34	51.68	52.23	0.21	0.30	0.35	0.16	0.25	0.28
3900	71.69	69.44	68.88	0.17	0.27	0.31	0.12	0.21	0.24
3936	58.68	59.24	58.86	0.16	0.25	0.30	0.12	0.21	0.24
4009	53.10	53.11	52.93	0.14	0.24	0.28	0.11	0.19	0.21
4049	51.69	51.72	51.57	0.13	0.23	0.27	0.09	0.17	0.20
4089	50.81	50.93	50.86	0.11	0.21	0.26	0.07	0.16	0.18
4108	50.44	50.53	50.51	0.11	0.20	0.25	0.08	0.15	0.18
4144	50.71	50.36	50.20	0.10	0.19	0.24	0.09	0.17	0.20
4200	50.01	50.10	50.05	0.09	0.19	0.23	0.06	0.14	0.17
4236	49.75	49.92	49.98	0.09	0.19	0.24	0.06	0.15	0.18
4300	49.51	49.52	49.51	0.08	0.18	0.23	0.06	0.15	0.18
4200	50.01	50.10	50.05	0.09	0.19	0.23	0.06	0.14	0.17
4336	49.19	49.43	49.57	0.08	0.17	0.22	0.05	0.14	0.17
4400	48.92	48.99	48.95	0.07	0.17	0.22	0.05	0.15	0.19
4440	48.73	48.70	48.59	0.08	0.18	0.23	0.04	0.14	0.17
4500	48.50	48.40	48.60	0.09	0.20	0.25	0.05	0.15	0.19



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IF/RF MICROWAVE COMPONENTS

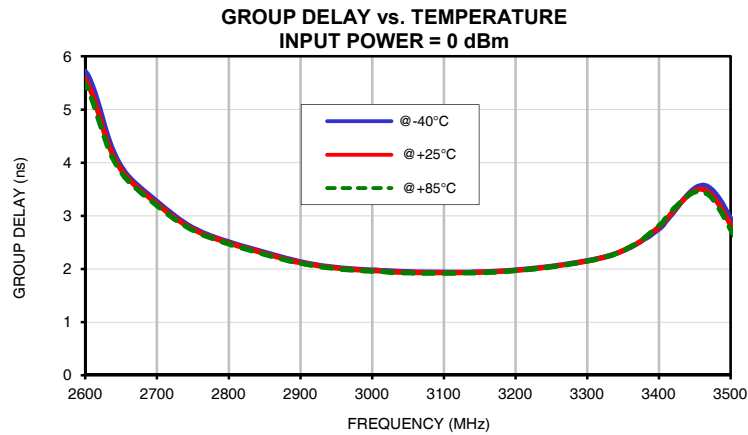
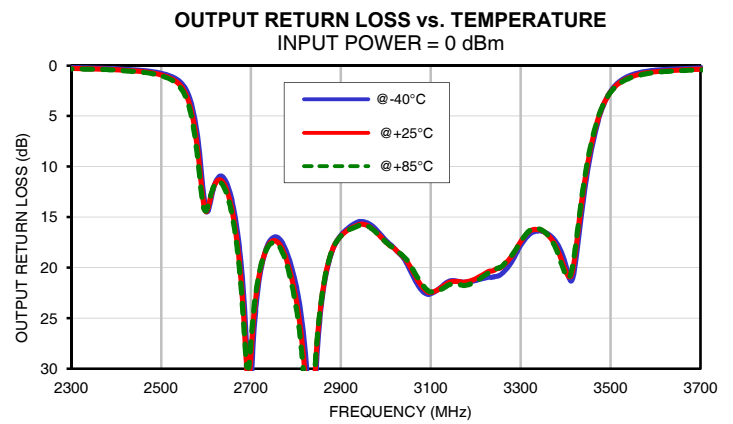
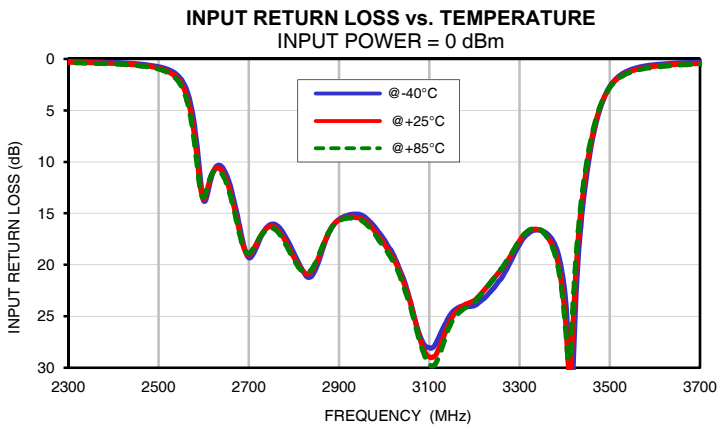
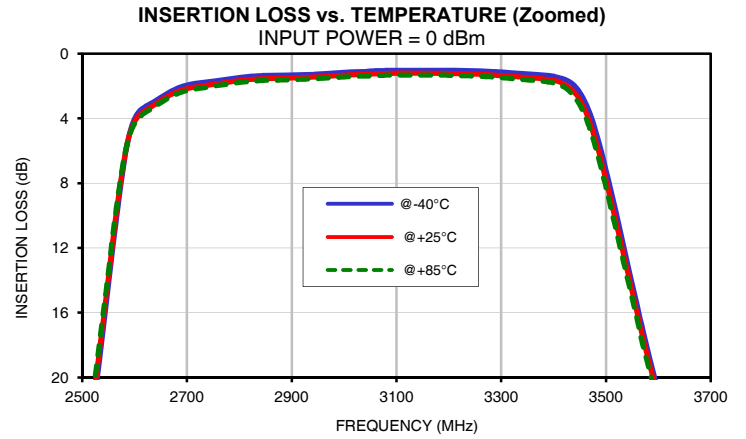
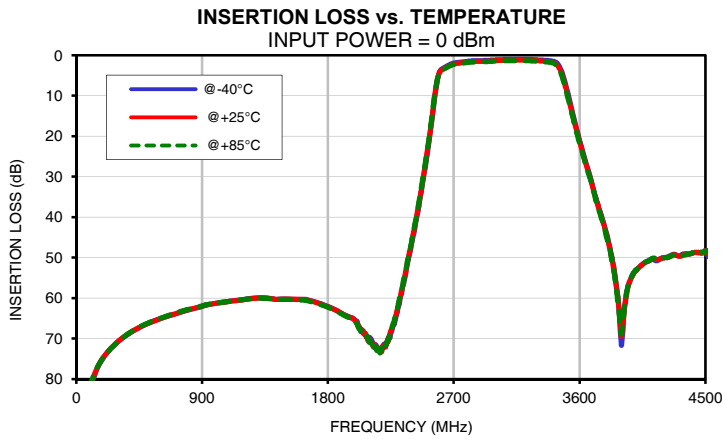
REV. OR  
CBP2-3050BN+  
211228

Page 1 of 2

## Typical Performance Data

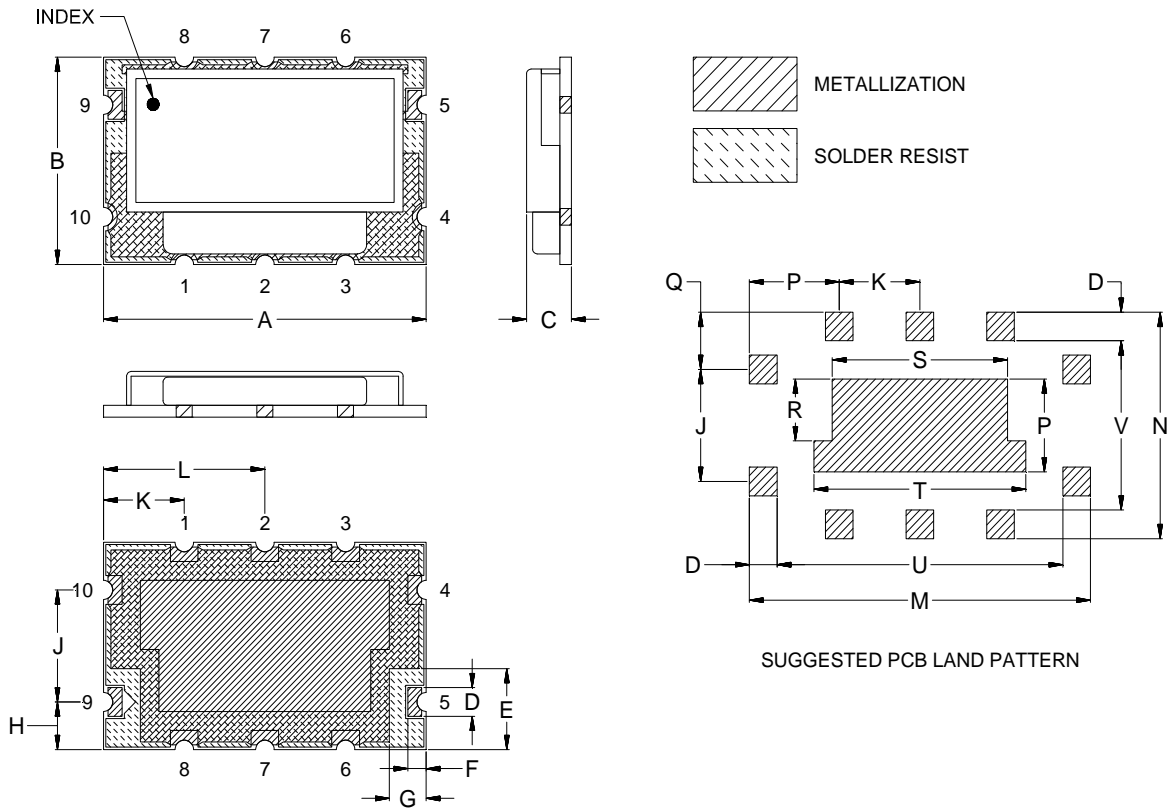
FREQ.  (MHz)	GROUP DELAY		
	(nsec)		
	@-40°C	@+25°C	@+85°C
2700	3.27	3.22	3.19
2710	3.16	3.11	3.08
2720	3.05	3.01	2.98
2730	2.95	2.91	2.89
2740	2.86	2.83	2.80
2750	2.78	2.75	2.73
2760	2.71	2.68	2.66
2770	2.65	2.63	2.61
2780	2.60	2.57	2.56
2790	2.55	2.53	2.51
2800	2.51	2.49	2.47
2810	2.47	2.44	2.43
2820	2.43	2.41	2.39
2830	2.39	2.37	2.35
2840	2.35	2.33	2.32
2850	2.31	2.29	2.28
2860	2.28	2.25	2.24
2870	2.24	2.21	2.20
2880	2.20	2.18	2.17
2890	2.17	2.14	2.13
2900	2.14	2.12	2.11
2910	2.11	2.10	2.08
2920	2.08	2.07	2.06
2930	2.06	2.05	2.04
3000	1.98	1.97	1.96
3050	1.95	1.94	1.93
3100	1.94	1.93	1.92
3120	1.94	1.93	1.92
3140	1.94	1.93	1.93
3160	1.95	1.94	1.93
3180	1.96	1.95	1.95
3200	1.98	1.97	1.97
3220	2.01	2.00	1.99
3240	2.03	2.03	2.02
3260	2.07	2.06	2.06
3280	2.11	2.10	2.10
3300	2.16	2.15	2.15
3320	2.21	2.21	2.21
3340	2.29	2.29	2.29
3360	2.40	2.41	2.41
3400	2.75	2.79	2.81

## Typical Performance Curves



## Outline Dimensions

WA3176



CASE#	A	B	C	D	E	F	G	H	J	K	L	M
WA3176	.700 (17.78)	.435 (11.05)	.120 (3.05)	.060 (1.52)	.170 (4.32)	.040 (1.02)	.080 (2.03)	.100 (2.54)	.235 (5.97)	.175 (4.45)	.350 (8.89)	.740 (18.80)

CASE#	N	P	Q	R	S	T	U	V	WT.GRAMS
WA3176	.475 (12.07)	.195 (4.95)	.120 (3.05)	.130 (3.30)	.380 (9.65)	.460 (11.68)	.620 (15.75)	.355 (9.02)	1.1

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

### Notes:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. Termination finish:
  - For RoHS Case Styles: 3-5  $\mu$  inch Gold over 120-240  $\mu$  inch Nickel plate.
  - For RoHS-5 Case Styles: Tin-Lead plate.



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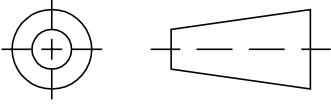


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RF/IF MICROWAVE COMPONENTS



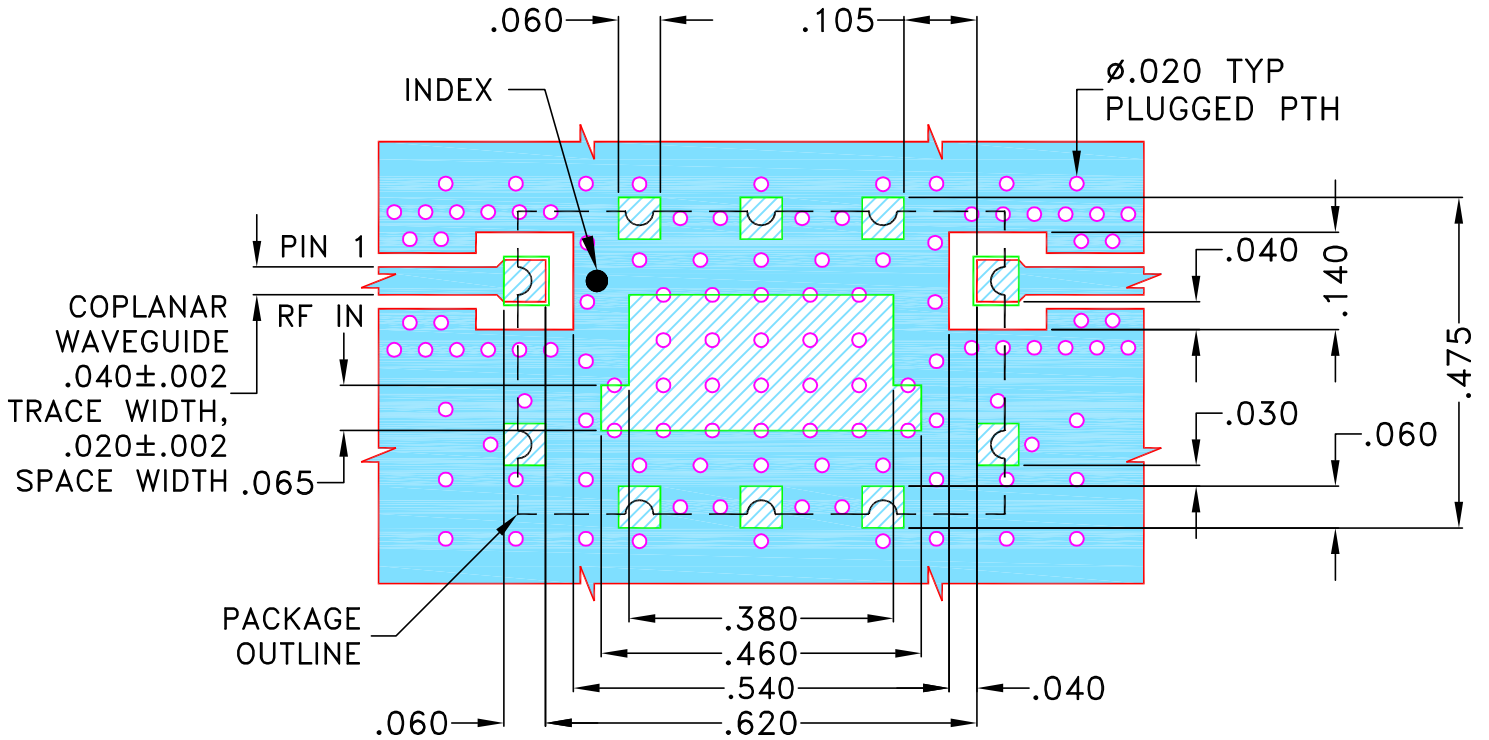
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-010788	NEW RELEASE	NOV 21	DDR	VC

**SUGGESTED MOUNTING CONFIGURATION FOR  
WA3176 CASE STYLE**



**NOTES:**

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS  $.020 \pm .0015$ . COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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 SOLDERMASK

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN DDR	23 NOV 21
TOLERANCES ON:	CHECKED DDR	23 NOV 21
2 PL DECIMALS ±	APPROVED KN	23 NOV 21
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		



**Mini-Circuits®**

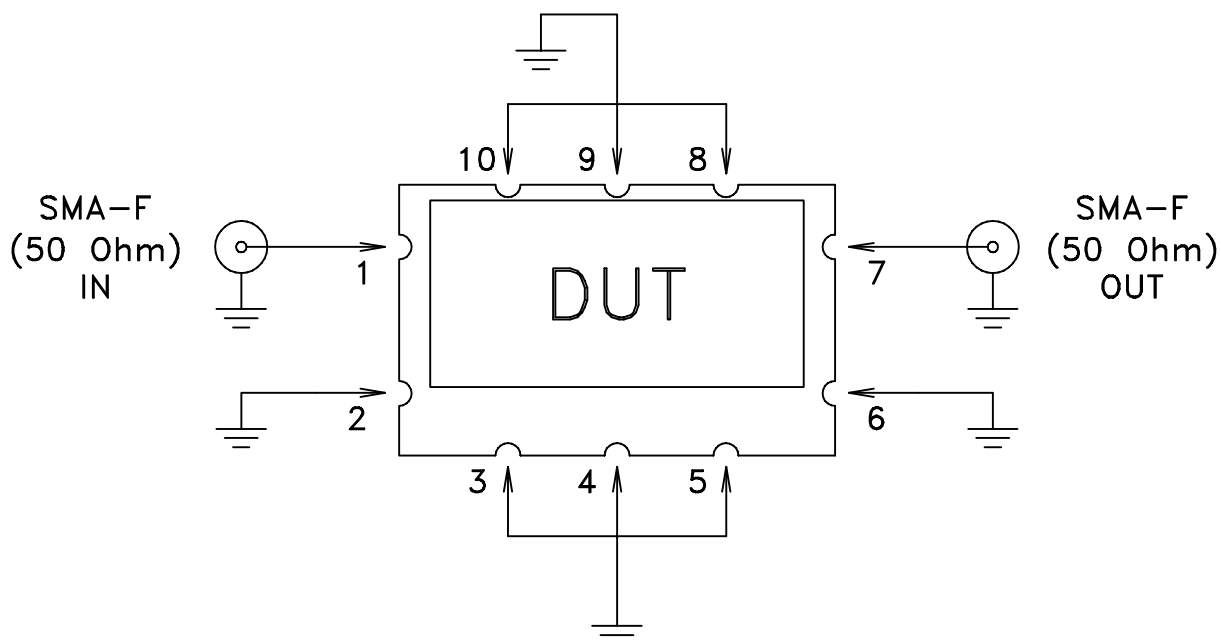
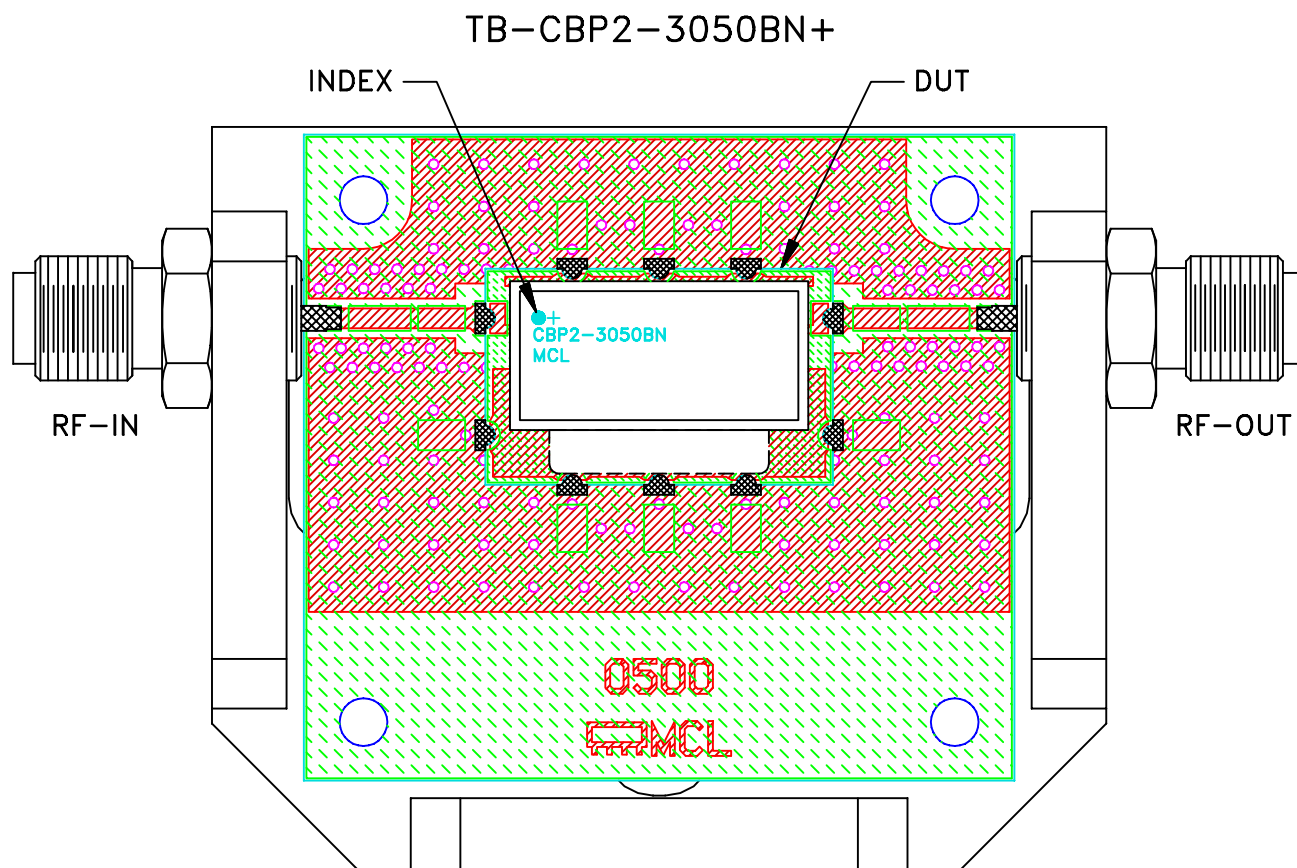
13 Neptune Avenue  
Brooklyn NY 11235

**PL DWG WA3176 C.S 50 OHM CBP2**

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SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-721	OR
FILE:	98-PL-721	SCALE:	3.5:1
		SHEET:	1 OF 1

# Evaluation Board and Circuit



Schematic diagram

**Notes:**

1. 50 Ohm SMA female connectors.
2. PCB Material: R04350B OR Equivalent  
Dielectric Constant=3.48±.05, Thickness=.020 inch.



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