

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.

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



Surface Mount Bandpass Filter

50 Ω 2000 to 2300 MHz

CBP-2150AN+



Generic photo used for illustration purposes only
CASE STYLE: TJ2826-1

Features

- Low Insertion loss
- Minimal Insertion loss variation over operating temperature
- Low-profile shielded package

Applications

- Broadcast
- PMR Communications
- Fixed mobile

Electrical Specifications at 25°C

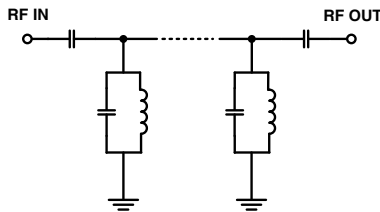
Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	-	-	2150	-	MHz
	Insertion Loss	F1-F2	2000 - 2300	1.2	1.8	dB
	VSWR	F1-F2	2000 - 2300	1.4	1.8	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 1500	50	60	dB
		F3-F4	1500 - 1700	20	27	dB
Stop Band, Upper	Insertion Loss	F5-F6	2760 - 3200	20	26	dB
		F6-F7	3200 - 3620	35	40	dB

Maximum Ratings

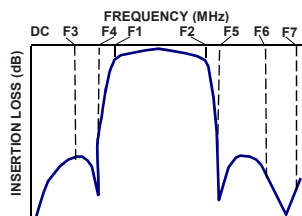
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	10 W at 25°C

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

Functional Schematic



Typical Frequency Response

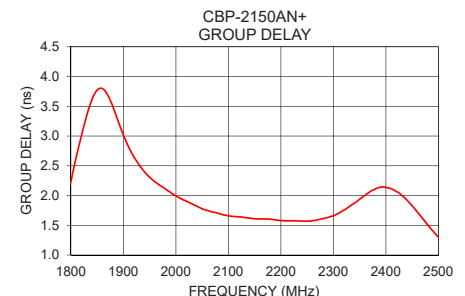
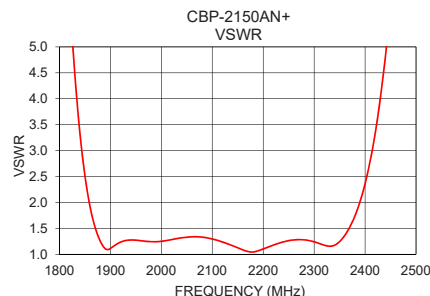
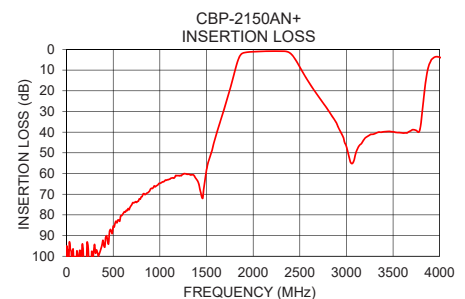
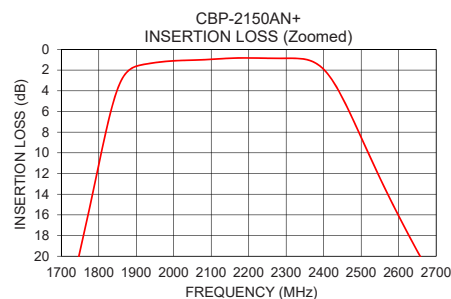


Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (ns)
1	100.60	172.74	2000	2.00
10	102.64	356.53	2015	1.92
100	113.14	790.59	2030	1.86
1000	64.78	158.94	2045	1.80
1500	58.28	65.28	2060	1.75
1700	27.24	32.57	2075	1.71
1860	3.00	1.93	2090	1.67
2000	1.11	1.25	2105	1.65
2100	0.96	1.30	2120	1.64
2150	0.85	1.12	2135	1.63
2200	0.82	1.10	2150	1.61
2300	0.86	1.24	2165	1.61
2425	3.09	3.66	2180	1.60
2660	20.18	65.24	2195	1.59
2760	26.53	102.24	2210	1.58
3000	46.94	124.26	2225	1.57
3100	50.17	112.31	2240	1.57
3200	42.86	105.73	2250	1.57
3500	39.86	58.65	2275	1.60
3620	40.44	40.90	2300	1.66

+RoHS Compliant

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



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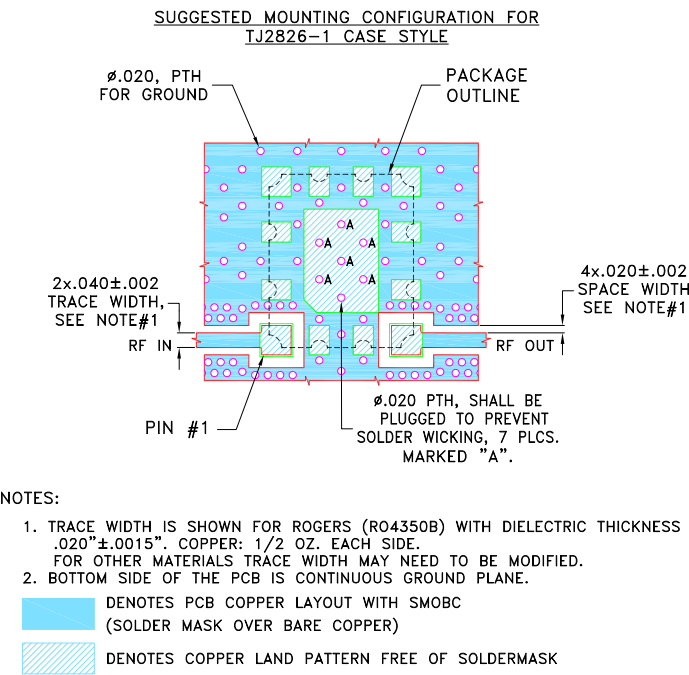
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Page 2 of 3

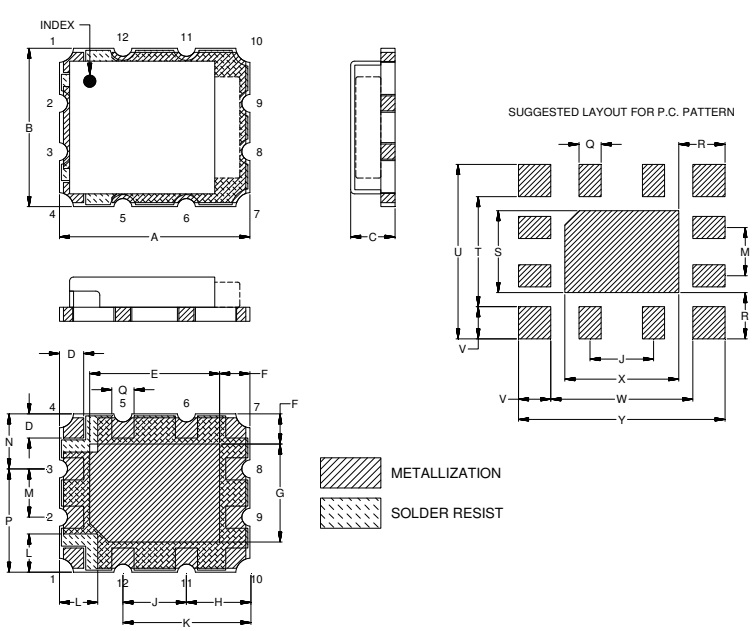
Pad Connections

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

Demo Board MCL P/N: TB-1099+
Suggested PCB Layout (PL-630)



Outline Drawing



Outline Dimensions (inch)
mm

A	B	C	D	E	F	G	H	J	K	L	M
.472	.394	.110	.060	.322	.075	.244	.160	.157	.317	.095	.120
12.00	10.00	2.79	1.52	8.19	1.91	6.19	4.06	4.00	8.06	2.41	3.05
N	P	Q	R	S	T	U	V	W	X	Y	Wt.
.137	.257	.055	.115	.204	.274	.434	.080	.352	.282	.512	grams
3.48	6.52	1.40	2.92	5.17	6.95	11.02	2.03	8.95	7.17	13.01	6

Note: Please refer to case style drawing for details

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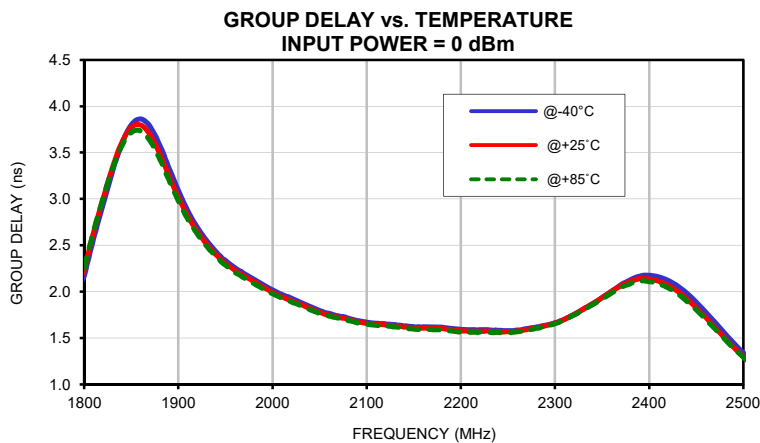
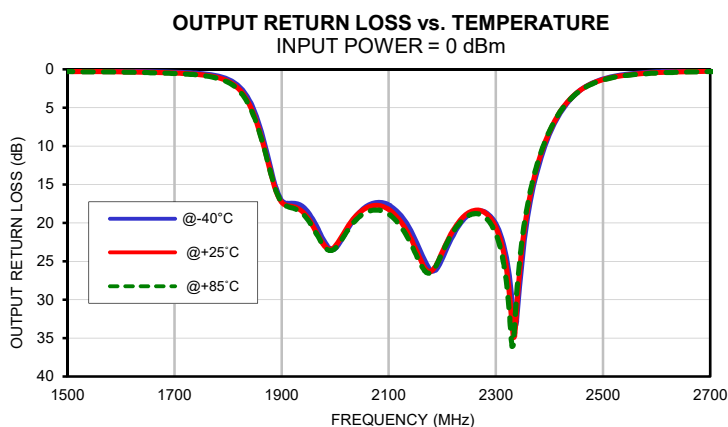
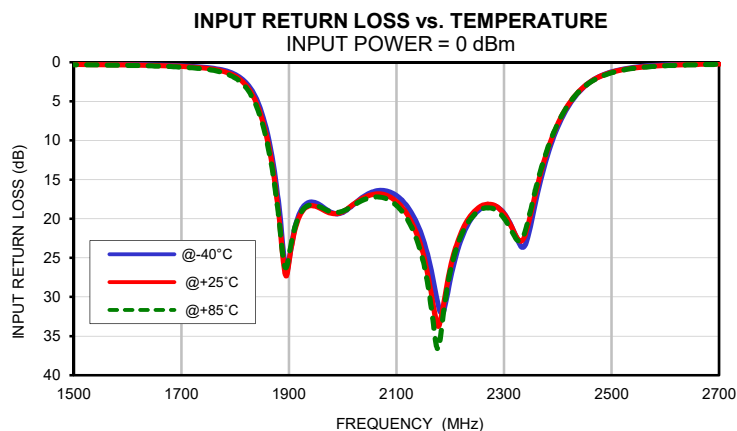
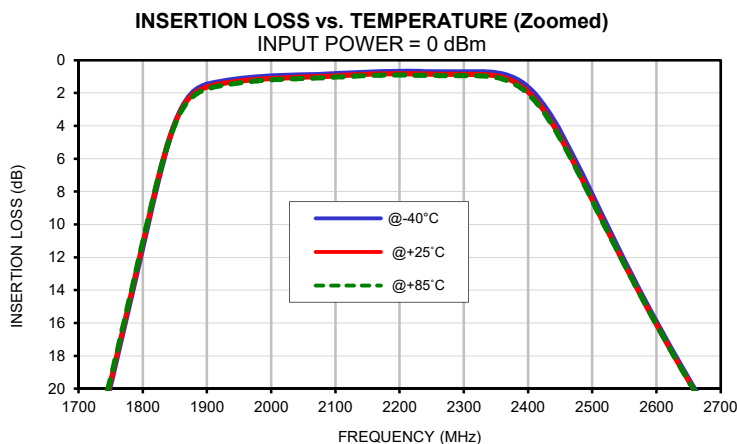
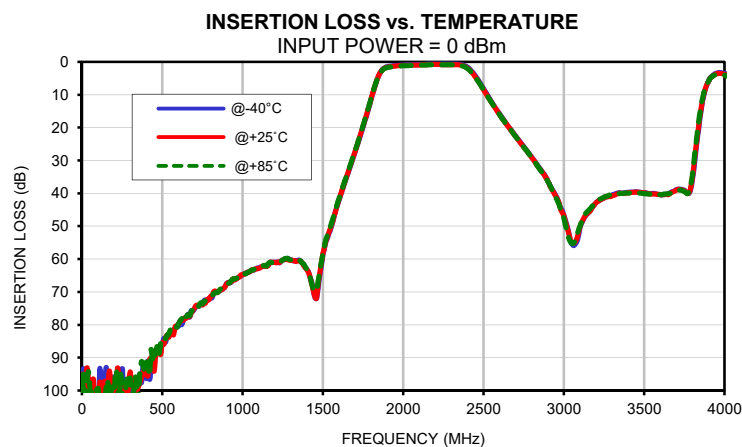
Typical Performance Data

FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1	98.03	100.60	109.13	0.10	0.10	0.10	0.10	0.10	0.10
5	94.80	112.10	97.48	0.06	0.06	0.06	0.06	0.06	0.06
50	98.31	97.85	99.50	0.03	0.03	0.03	0.04	0.04	0.04
100	112.15	113.14	99.37	0.02	0.02	0.02	0.02	0.03	0.03
500	85.96	85.49	85.09	0.01	0.02	0.03	0.01	0.04	0.05
1000	64.73	64.78	64.63	0.07	0.11	0.13	0.09	0.14	0.16
1250	60.33	60.35	60.26	0.13	0.17	0.20	0.16	0.21	0.23
1500	58.61	58.28	58.07	0.22	0.27	0.31	0.22	0.29	0.32
1600	41.97	41.84	41.54	0.28	0.33	0.39	0.27	0.34	0.38
1650	34.67	34.48	34.24	0.35	0.41	0.48	0.32	0.41	0.45
1700	27.45	27.24	27.01	0.46	0.53	0.62	0.40	0.50	0.56
1705	26.72	26.50	26.28	0.48	0.55	0.64	0.41	0.52	0.58
1725	23.69	23.46	23.26	0.55	0.63	0.73	0.47	0.59	0.65
1750	19.78	19.53	19.34	0.69	0.79	0.92	0.58	0.72	0.80
1770	16.51	16.25	16.08	0.90	1.03	1.18	0.75	0.92	1.02
1800	11.40	11.15	11.05	1.57	1.78	2.00	1.32	1.57	1.70
1860	2.93	3.00	3.10	9.18	10.00	10.47	7.66	8.35	8.52
1870	2.29	2.41	2.53	12.70	13.70	14.19	10.18	10.87	10.97
2000	0.96	1.11	1.20	19.21	19.11	19.04	23.34	23.06	23.32
2050	0.90	1.03	1.11	16.75	17.00	17.32	18.31	18.40	18.93
2100	0.83	0.96	1.03	17.05	17.80	18.31	17.68	18.26	18.87
2150	0.72	0.85	0.94	22.73	24.62	25.58	22.25	23.34	23.98
2200	0.68	0.82	0.90	27.74	26.27	26.71	24.62	23.80	23.86
2250	0.71	0.85	0.93	19.07	18.71	19.13	18.89	18.63	19.02
2280	0.71	0.86	0.94	18.31	18.25	18.73	18.62	18.71	19.28
2290	0.71	0.86	0.93	18.63	18.65	19.17	19.17	19.40	20.09
2300	0.71	0.86	0.94	19.30	19.39	19.95	20.13	20.57	21.43
2350	0.76	0.95	1.05	20.66	19.27	18.72	24.00	22.48	21.59
2400	1.64	1.93	2.05	8.24	7.85	7.80	8.45	8.12	8.06
2440	3.64	4.00	4.10	3.74	3.65	3.69	3.84	3.78	3.81
2500	8.20	8.51	8.56	1.22	1.28	1.34	1.28	1.35	1.40
2600	15.93	16.10	16.11	0.31	0.40	0.44	0.36	0.45	0.50
2650	19.39	19.52	19.54	0.20	0.28	0.33	0.24	0.33	0.38
2690	21.98	22.10	22.11	0.14	0.22	0.26	0.17	0.27	0.32
2700	22.61	22.73	22.75	0.12	0.21	0.26	0.17	0.26	0.31
2760	26.43	26.53	26.58	0.08	0.17	0.21	0.12	0.22	0.27
2800	29.04	29.13	29.24	0.07	0.16	0.21	0.10	0.20	0.26
2820	30.32	30.44	30.57	0.06	0.15	0.20	0.09	0.19	0.24
2850	32.44	32.56	32.67	0.04	0.14	0.19	0.08	0.18	0.24
2900	36.35	36.25	36.38	0.04	0.15	0.20	0.06	0.17	0.23
2950	40.74	40.92	41.38	0.04	0.14	0.20	0.04	0.15	0.22
3000	46.66	46.94	47.71	0.04	0.14	0.21	0.04	0.15	0.23
3050	55.38	54.95	55.24	0.04	0.15	0.23	0.04	0.15	0.23
3100	50.50	50.17	50.05	0.04	0.15	0.23	0.03	0.15	0.23
3150	46.03	45.95	45.35	0.04	0.15	0.23	0.03	0.15	0.24
3200	42.86	42.86	42.58	0.05	0.16	0.24	0.03	0.15	0.25
3250	41.38	41.43	41.16	0.05	0.17	0.26	0.03	0.16	0.26
3300	40.46	40.81	40.31	0.07	0.19	0.28	0.05	0.17	0.28
3350	39.84	39.97	40.04	0.09	0.22	0.30	0.06	0.19	0.29
3400	39.71	39.82	39.90	0.11	0.24	0.35	0.08	0.22	0.33
3450	39.58	39.64	39.83	0.15	0.29	0.38	0.10	0.25	0.34
3500	39.80	39.86	40.11	0.17	0.30	0.41	0.12	0.26	0.37
3510	39.85	39.89	40.16	0.18	0.31	0.42	0.13	0.27	0.37
3520	40.01	40.03	40.18	0.19	0.32	0.43	0.14	0.28	0.38
3530	40.11	40.14	40.24	0.20	0.33	0.44	0.15	0.28	0.39
3540	40.12	40.19	40.27	0.21	0.34	0.45	0.14	0.29	0.39
3550	40.07	40.21	40.38	0.21	0.35	0.46	0.15	0.29	0.40
3600	40.43	40.41	40.46	0.27	0.40	0.52	0.21	0.35	0.45
3610	40.47	40.44	40.43	0.29	0.41	0.54	0.21	0.35	0.46
3620	40.33	40.44	40.29	0.30	0.42	0.55	0.22	0.36	0.46

Typical Performance Data

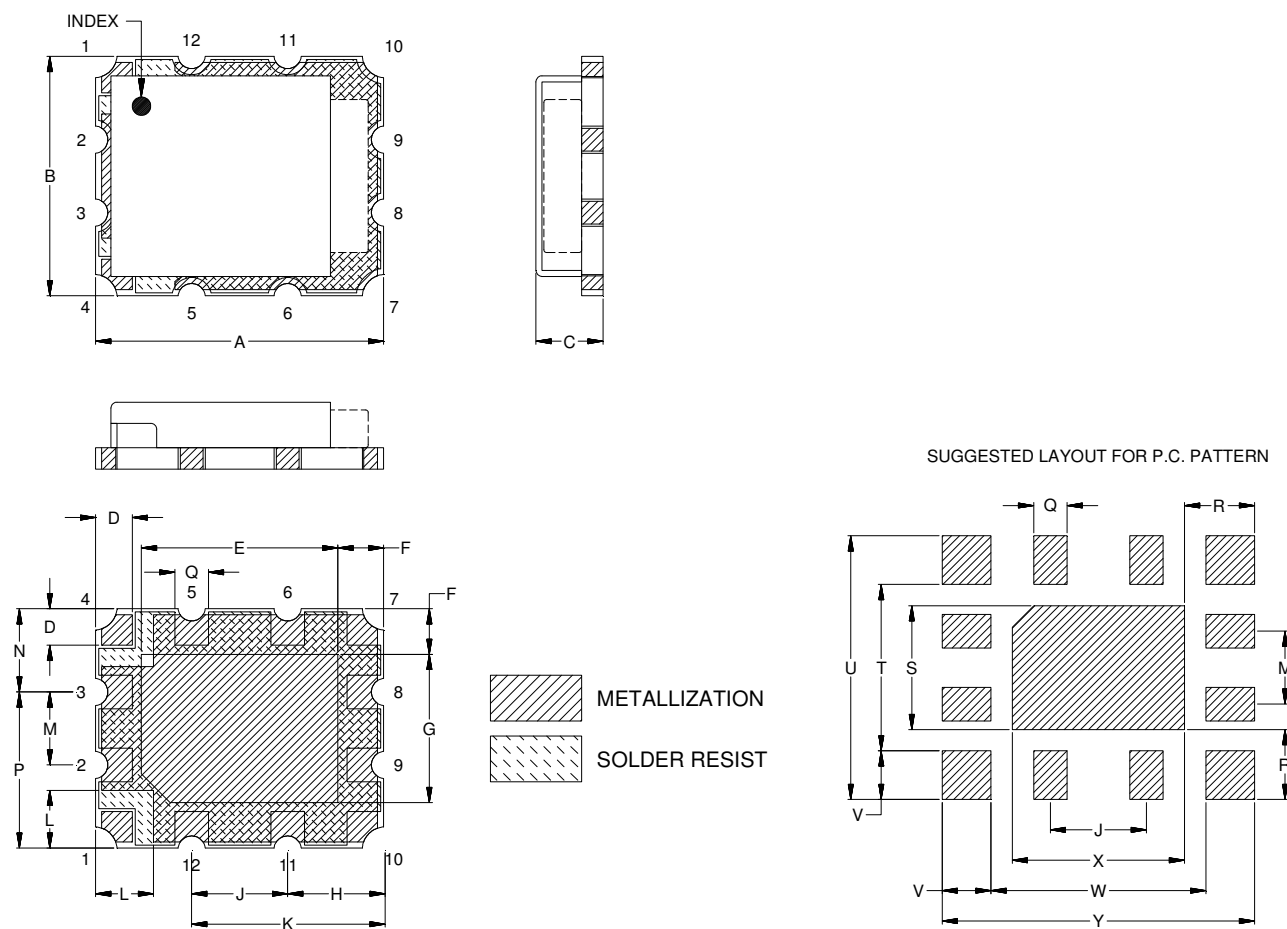
FREQ.	GROUP DELAY		
(MHz)	(nsec)		
	@-40°C	@+25°C	@+85°C
2000	2.02	2.00	1.98
2005	1.99	1.97	1.95
2010	1.97	1.94	1.93
2015	1.95	1.92	1.91
2020	1.93	1.90	1.89
2025	1.91	1.88	1.87
2030	1.89	1.86	1.85
2035	1.86	1.84	1.83
2040	1.84	1.82	1.81
2045	1.82	1.80	1.79
2050	1.80	1.78	1.77
2055	1.78	1.76	1.75
2060	1.77	1.75	1.74
2065	1.75	1.73	1.73
2070	1.74	1.72	1.71
2075	1.73	1.71	1.70
2080	1.72	1.70	1.69
2085	1.70	1.69	1.68
2090	1.69	1.67	1.66
2095	1.68	1.67	1.66
2100	1.67	1.66	1.65
2105	1.66	1.65	1.64
2110	1.66	1.65	1.64
2115	1.66	1.64	1.63
2120	1.65	1.64	1.63
2125	1.65	1.64	1.63
2130	1.64	1.63	1.62
2135	1.64	1.63	1.62
2140	1.63	1.62	1.61
2145	1.63	1.61	1.60
2150	1.62	1.61	1.60
2155	1.62	1.61	1.59
2160	1.62	1.61	1.59
2165	1.62	1.61	1.60
2170	1.62	1.61	1.59
2175	1.62	1.61	1.59
2180	1.62	1.60	1.59
2190	1.61	1.59	1.58
2200	1.59	1.58	1.57
2210	1.59	1.58	1.56
2220	1.59	1.58	1.56
2230	1.59	1.57	1.56
2240	1.58	1.57	1.56
2250	1.58	1.57	1.56
2260	1.59	1.58	1.57
2270	1.60	1.59	1.59
2280	1.62	1.61	1.61
2285	1.63	1.62	1.62
2290	1.64	1.63	1.63
2295	1.65	1.65	1.64
2300	1.67	1.66	1.66

Typical Performance Curves



Outline Dimensions

TJ2826-1



CASE#	A	B	C	D	E	F	G	H	J	K	L	M
TJ2826-1	.472 (12.00)	.394 (10.00)	.110 (2.79)	.060 (1.52)	.322 (8.19)	.075 (1.91)	.244 (6.19)	.160 (4.06)	.157 (4.00)	.317 (8.06)	.095 (2.41)	.120 (3.05)

CASE#	N	P	Q	R	S	T	U	V	W	X	Y	WT.GRAM
TJ2826-1	.137 (3.48)	.257 (6.52)	.055 (1.40)	.115 (2.92)	.204 (5.17)	.274 (6.95)	.434 (11.02)	.080 (2.03)	.352 (8.95)	.282 (7.17)	.512 (13.01)	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: 3-5 μ inch (.08-.13microns) Gold over 120-240 μ inch (3.05-6.10microns) Nickel plate.
For RoHS-5 Case Styles: Tin-Lead plate.

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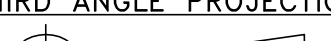
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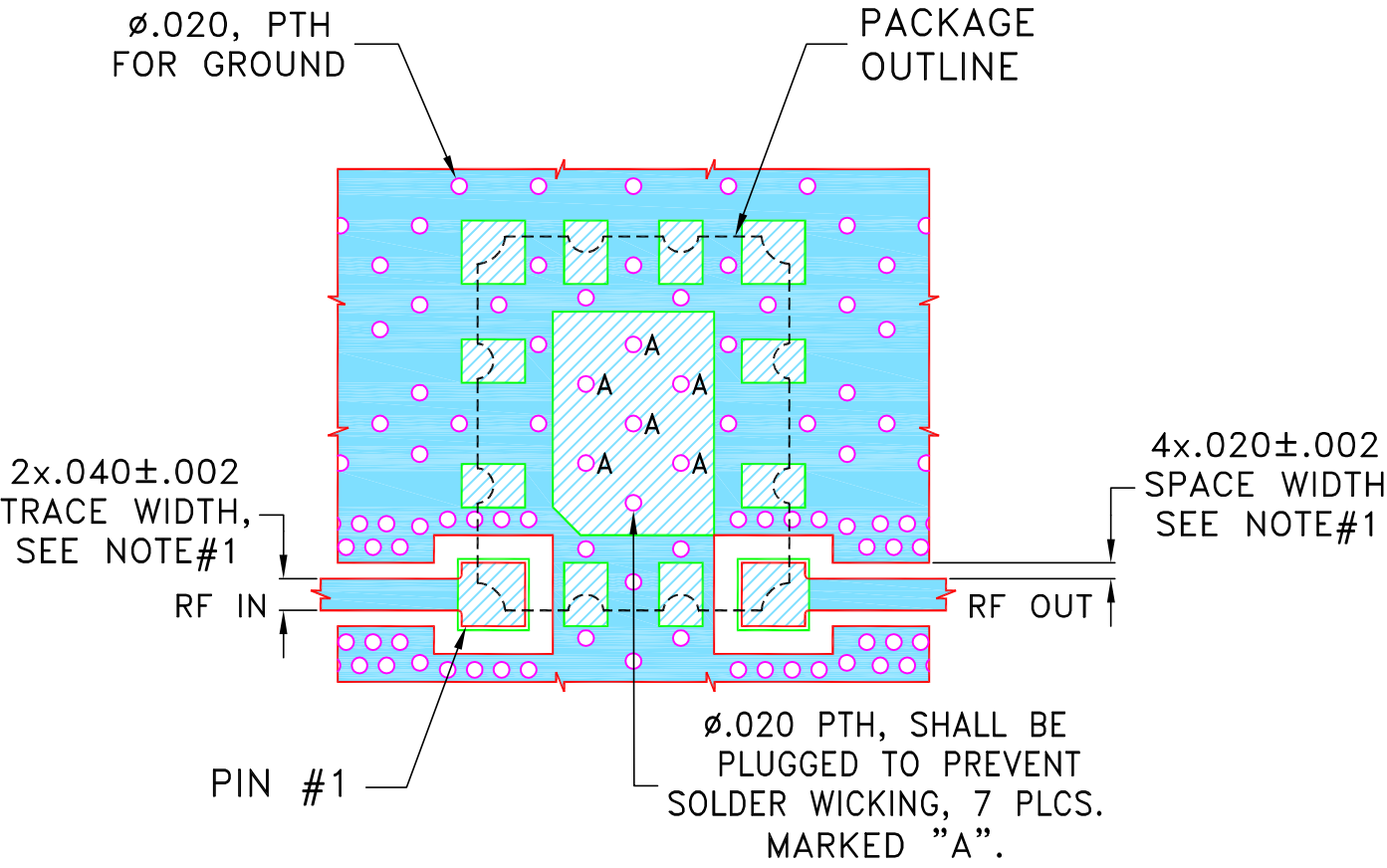


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RF/IF MICROWAVE COMPONENTS

THIRD ANGLE PROJECTION		REVISIONS					
	REV	ECN No.	DESCRIPTION		DATE	DR	AUTH
	OR	M173137	NEW RELEASE		JUN 19	AP	VC

SUGGESTED MOUNTING CONFIGURATION FOR
TJ2826 & TJ2826-1 CASE STYLE



NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS .020"±.0015". 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)

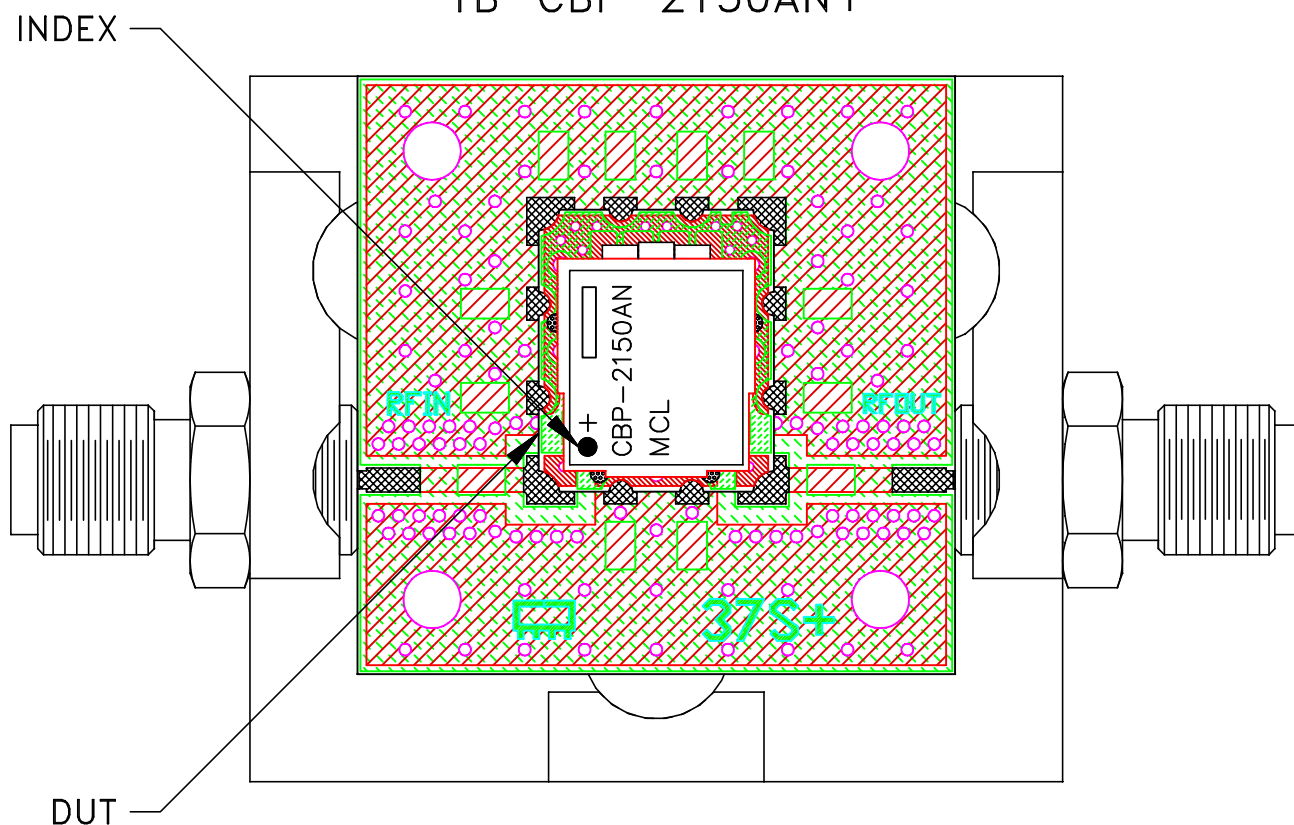


DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

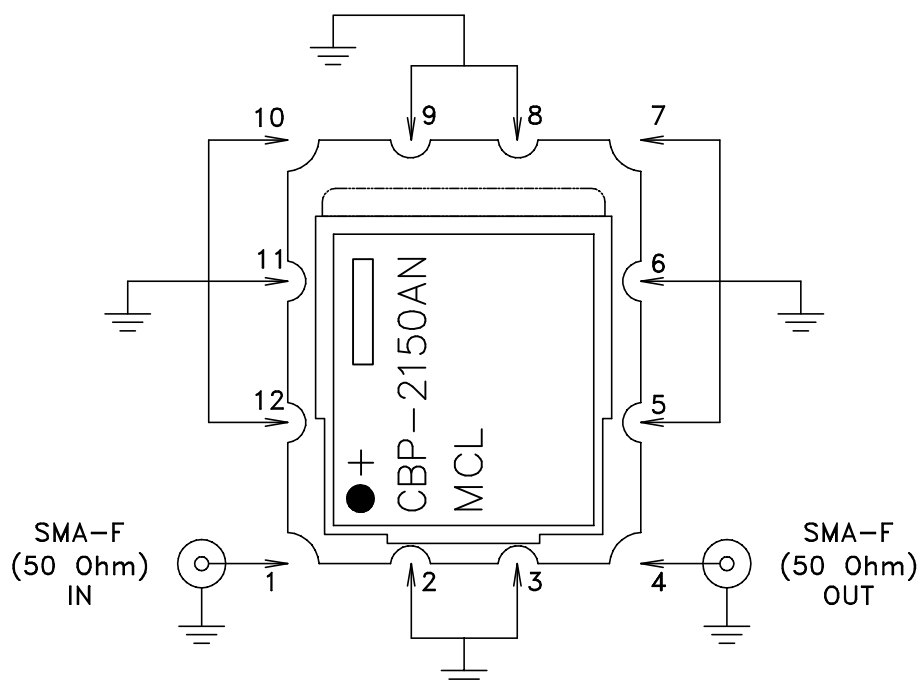
UNLESS OTHERWISE SPECIFIED		INITIALS		DATE		Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235	
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ± 		DRAWN	AP	3 JUN 19			
		CHECKED	DDR	3 JUN 19			
		APPROVED	KN	3 JUN 19			
						PL, TJ2826, TJ2826-1, TB-1099+.	
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ASHEETA1.DWG REV:A DATE:01/12/95							
SIZE		CODE IDENT		DRAWING NO:		REV:	
A		15542		98-PL-630		OR	
FILE:		98PL630		SCALE: 3.5:1		SHEET: 1 OF 2	

Evaluation Board and Circuit

TB-CBP-2150AN+



Schematic diagram



Notes:

1. PCB Material: ROGERS (R04350B) OR Equivalent, Dielectric Constant= $3.48 \pm .05$
Dielectric Thickness: $.020 \pm .0015$
2. 50 Ohm SMA Female Connectors.

 **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