CERAMIC RESONATOR SURFACE MOUNT

Bandpass Filter

CBP2-1600AN+

50Ω 1580 to 1620 MHz

KEY FEATURES

- High Rejection, 60 dB Typ.
- Fractional Bandwidth : 2.5%
- Excellent Power Handling: 5 Watts
- Low Profile Shielded Package, 10x12mm

Generic photo used for illustration purposes only

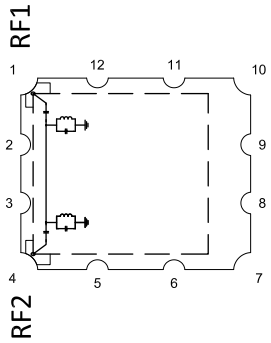
APPLICATIONS

- Test and Measurement
- Radio Astronomy

PRODUCT OVERVIEW

All our Surface Mount 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.

FUNCTIONAL DIAGRAM



ELECTRICAL SPECIFICATIONS[1,2] AT +25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Units
Passband	Center Frequency	—	—	—	1600	—	MHz
	Insertion Loss	F1-F2	1580 - 1620	—	2.6	3.3	dB
	Return Loss	F1-F2	1580 - 1620	10	15	—	dB
Stop Band, Lower	Rejection	DC-F3	DC - 1000	50	60	—	dB
		F3-F4	1000 - 1495	20	26	—	
Stop Band, Upper	Rejection	F5-F6	1715 - 1805	20	29	—	dB
		F6-F7	1805 - 2700	—	35	—	

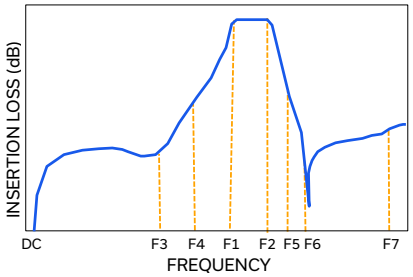
1. Tested in Evaluation Board P/N TB-CBP2-1600AN+.
2. This filter is bi-directional RF1 and RF2 ports may be interchanged, see S-Parameters for actual performance.

ABSOLUTE MAXIMUM RATINGS[3]

Parameter	Ratings
Operating Temperature	-40 °C to +85 °C
Storage Temperature	-55 °C to +100 °C
Input Power[4]	5 W at 25°C

3. Permanent damage may occur if any of these limits are exceeded.
4. Power rating applies only to signals within the passband.

TYPICAL FREQUENCY RESPONSE



REV. A
ECO-018838
CBP2-1600AN+
EDU4563
URJ
230810

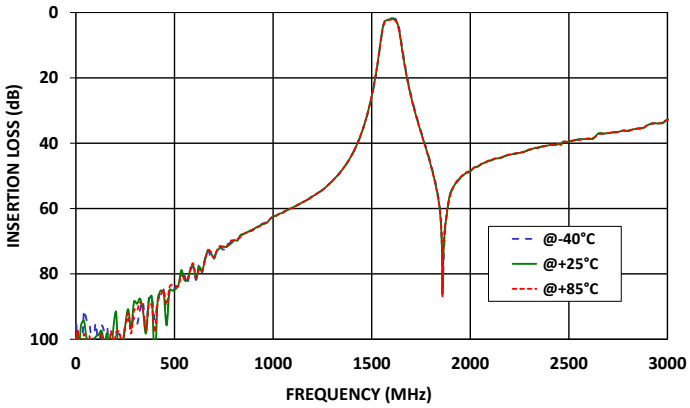
Bandpass Filter

CBP2-1600AN+

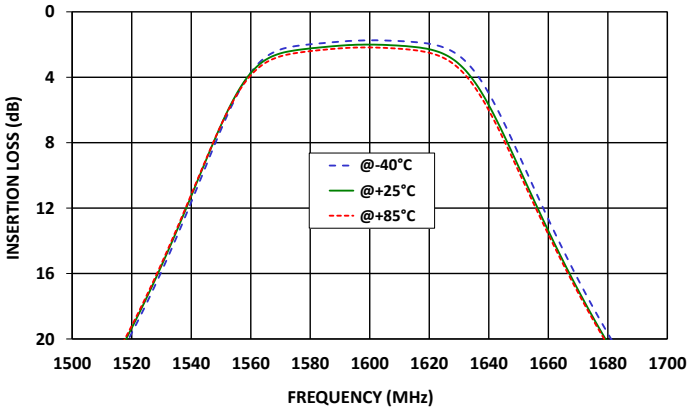
50Ω 1580 to 1620 MHz

TYPICAL PERFORMANCE GRAPHS

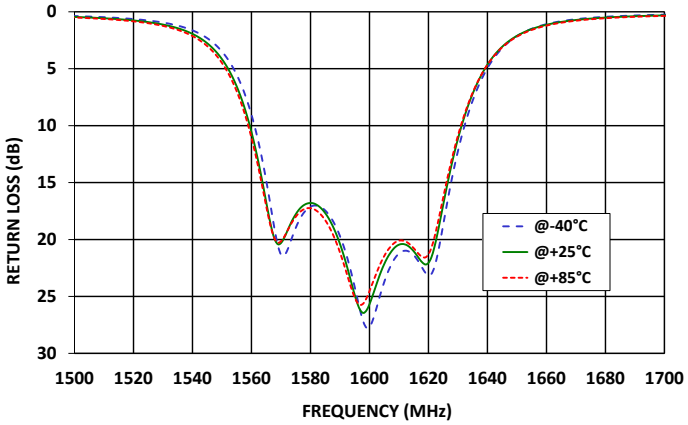
CBP2-1600AN+
INSERTION LOSS



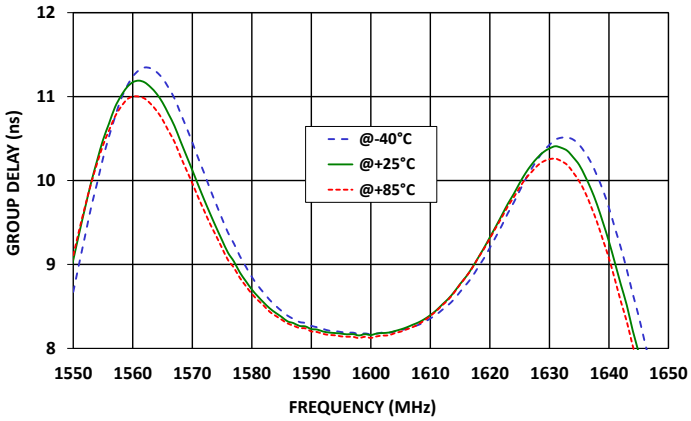
CBP2-1600AN+
INSERTION LOSS (Zoomed)



CBP2-1600AN+
RETURN LOSS



CBP2-1600AN+
GROUP DELAY



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Bandpass Filter

CBP2-1600AN+

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FUNCTIONAL DIAGRAM

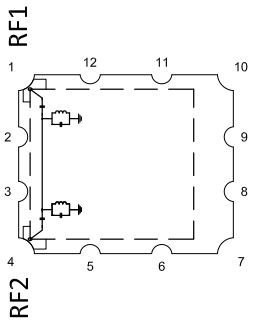
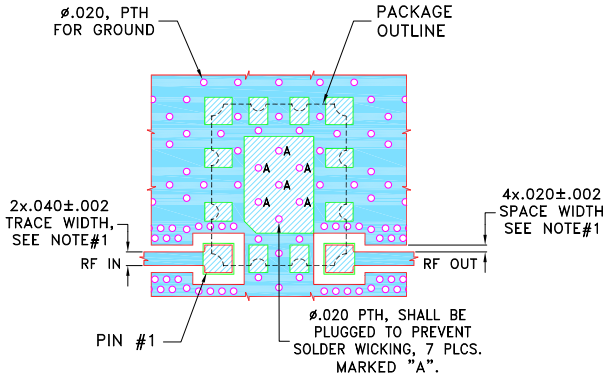


Figure 1. CBP2-1600AN+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Description
RF1(Note 2)	1	Connects to RF Input Port
RF2(Note 2)	4	Connects to RF Output Port
GROUND	2,3,5,6,7,8, 9,10,11,12	Connects to Ground on PCB, (See drawing PL-630)
NC	—	No connection, not used internally. See drawing PL-630 for connection to PCB

SUGGESTED PCB LAYOUT (PL-630)



NOTES:

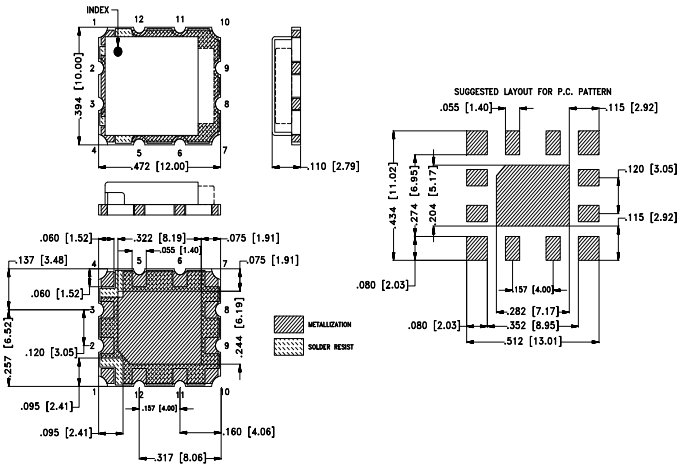
1. TRACE WIDTH IS SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .020"±.0015". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

Figure 2. Suggested PCB Layout PL-630

CASE STYLE DRAWING



Weight: 6 grams

Dimensions are in inches[mm]. Tolerance:2PL ±.03; 3PL ±.015

PRODUCT MARKING*: CBP2-1600AN

*Marking may contain other features or characters for internal lot control.

Bandpass Filter

CBP2-1600AN+

50Ω 1580 to 1620 MHz

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASH BOARD. CLICK HERE

Performance Data and Graphs	Data Graphs S-Parameter (S2P Files) Data Set (.zip file) De-embedded to device pads
Case Style	TJ2826-1 Lead Finish: Electroless Nickel Immersion Gold
RoHS Status	Compliant
Tape and Reel	TR-F002
Suggested Layout for PCB Design	98-PL-630
Evaluation Board	TB-CBP2-1600AN+
	Gerber File
Environmental Rating	ENV54

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-Circuits' 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/terms/viewterm.html

Surface mount Band Pass Filter CBP2-1600AN+

Typical Performance Data

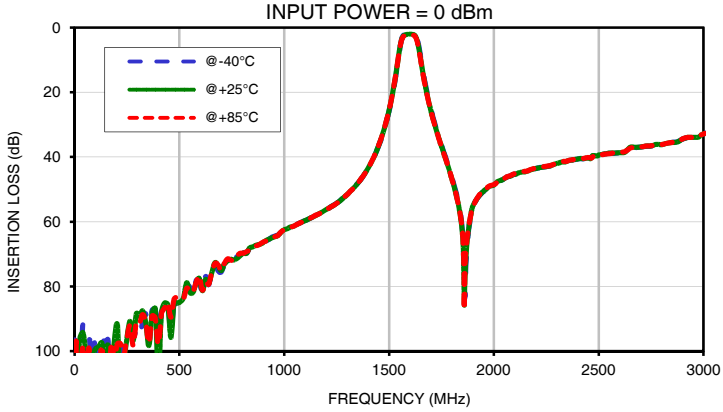
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1	101.28	101.68	102.99	0.05	0.05	0.05	0.05	0.05	0.05
5	102.04	98.11	115.96	0.05	0.05	0.05	0.05	0.04	0.05
10	109.65	109.58	107.97	0.04	0.04	0.04	0.04	0.04	0.04
25	116.85	96.09	110.35	0.04	0.04	0.04	0.04	0.04	0.04
40	91.57	94.23	98.45	0.03	0.03	0.03	0.03	0.03	0.03
70	95.49	101.83	99.29	0.03	0.03	0.03	0.02	0.03	0.03
100	95.17	99.29	105.28	0.02	0.02	0.02	0.01	0.02	0.02
130	95.92	97.40	98.25	0.01	0.02	0.02	0.01	0.01	0.02
160	96.48	98.21	116.28	0.01	0.02	0.02	0.01	0.01	0.02
190	103.93	96.67	102.28	0.01	0.01	0.02	0.00	0.01	0.02
250	95.92	95.99	95.95	0.00	0.01	0.02	0.00	0.01	0.02
310	95.44	89.18	91.27	0.00	0.01	0.02	0.00	0.01	0.02
400	93.98	106.48	97.83	0.01	0.01	0.02	0.00	0.02	0.03
460	93.93	95.75	89.46	0.01	0.01	0.02	0.01	0.01	0.02
550	80.31	81.84	81.36	0.01	0.02	0.03	0.00	0.02	0.03
640	79.47	79.11	79.29	0.01	0.01	0.03	0.00	0.03	0.04
700	75.51	75.10	74.98	0.01	0.02	0.03	0.00	0.03	0.04
850	67.95	67.78	67.81	0.01	0.02	0.04	0.01	0.05	0.06
1000	62.58	62.45	62.44	0.01	0.04	0.06	0.04	0.07	0.09
1120	59.05	59.03	59.05	0.03	0.07	0.09	0.06	0.09	0.11
1210	55.92	55.93	55.92	0.04	0.08	0.11	0.08	0.11	0.13
1330	49.64	49.70	49.67	0.08	0.12	0.14	0.11	0.15	0.17
1495	27.23	27.03	26.90	0.34	0.41	0.46	0.36	0.43	0.48
1520	19.64	19.33	19.19	0.64	0.76	0.84	0.65	0.77	0.85
1542	10.74	10.38	10.29	1.87	2.22	2.43	1.85	2.21	2.41
1565	2.77	2.94	3.11	14.82	16.72	17.07	14.49	16.34	16.65
1580	1.99	2.24	2.40	17.12	16.79	17.25	17.32	17.01	17.48
1585	1.90	2.15	2.31	17.45	17.68	18.31	17.67	17.92	18.59
1590	1.82	2.07	2.23	19.70	20.39	21.13	19.95	20.70	21.54
1595	1.76	2.02	2.19	24.18	24.87	25.09	24.66	25.50	25.89
1600	1.74	2.00	2.18	27.69	25.69	24.54	28.78	26.51	25.29
1605	1.75	2.02	2.20	23.74	22.16	21.45	24.30	22.66	21.93
1610	1.79	2.07	2.26	21.23	20.46	20.10	21.75	20.97	20.63
1615	1.85	2.15	2.34	21.38	21.03	20.76	22.06	21.77	21.55
1620	1.95	2.29	2.50	23.14	22.05	21.30	24.20	22.97	22.23
1650	8.70	9.47	9.74	2.13	2.11	2.18	2.16	2.13	2.21
1680	19.66	20.25	20.38	0.44	0.51	0.56	0.48	0.54	0.60
1715	28.95	29.41	29.46	0.19	0.25	0.29	0.23	0.29	0.32
1745	35.31	35.72	35.74	0.12	0.18	0.21	0.16	0.22	0.25
1805	47.49	47.95	47.94	0.09	0.13	0.16	0.12	0.17	0.20
1845	59.55	60.12	60.06	0.08	0.12	0.15	0.11	0.15	0.18
1900	55.30	55.08	55.55	0.07	0.11	0.14	0.10	0.14	0.17
1950	50.69	50.63	50.40	0.07	0.12	0.14	0.10	0.14	0.17
2000	48.65	48.68	48.51	0.06	0.11	0.14	0.09	0.14	0.16
2030	47.33	47.29	47.14	0.06	0.11	0.14	0.08	0.13	0.16
2060	46.24	46.25	46.16	0.07	0.12	0.15	0.08	0.14	0.17
2090	45.42	45.44	45.37	0.07	0.12	0.15	0.09	0.14	0.17
2120	44.81	44.82	44.77	0.07	0.12	0.15	0.08	0.13	0.16
2150	44.58	44.58	44.43	0.07	0.12	0.15	0.08	0.13	0.16
2180	43.85	43.84	43.78	0.07	0.12	0.15	0.08	0.13	0.16
2210	43.44	43.42	43.36	0.07	0.13	0.16	0.09	0.14	0.17
2250	42.98	42.96	42.85	0.07	0.13	0.17	0.08	0.13	0.17
2300	41.99	41.99	41.89	0.07	0.13	0.17	0.07	0.13	0.17
2350	41.27	41.24	41.27	0.08	0.14	0.18	0.08	0.14	0.18
2400	40.60	40.60	40.53	0.08	0.15	0.19	0.07	0.13	0.17
2450	40.40	40.35	40.16	0.08	0.15	0.19	0.08	0.14	0.18
2500	39.42	39.38	39.55	0.09	0.16	0.21	0.09	0.15	0.20
2550	38.88	38.81	39.01	0.09	0.17	0.22	0.08	0.15	0.20
2600	38.67	38.65	38.53	0.10	0.17	0.00	0.09	0.16	0.21
2700	36.95	36.90	36.92	0.12	0.20	0.27	0.10	0.18	0.24

Typical Performance Data

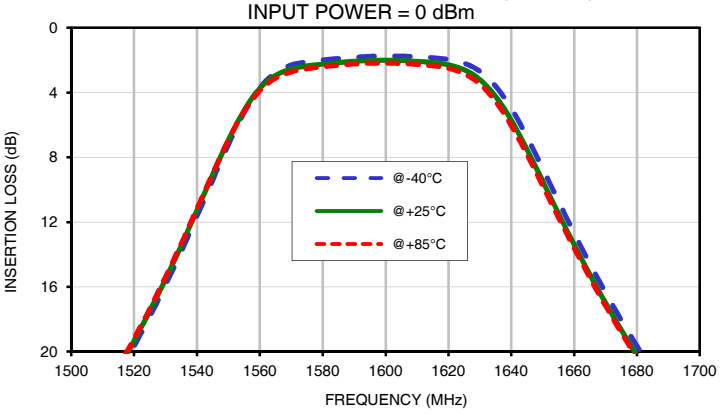
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25°C	@+85°C
1580	8.85	8.70	8.65
1581	8.75	8.62	8.58
1582	8.66	8.55	8.51
1583	8.58	8.48	8.44
1584	8.51	8.42	8.39
1585	8.45	8.38	8.34
1586	8.39	8.32	8.30
1587	8.35	8.30	8.27
1588	8.31	8.27	8.24
1589	8.30	8.26	8.24
1590	8.27	8.23	8.20
1591	8.25	8.22	8.19
1592	8.23	8.20	8.17
1593	8.21	8.19	8.16
1594	8.21	8.18	8.16
1595	8.20	8.18	8.14
1596	8.19	8.17	8.14
1597	8.19	8.17	8.14
1598	8.17	8.15	8.12
1599	8.18	8.17	8.14
1600	8.17	8.16	8.13
1601	8.18	8.18	8.14
1602	8.19	8.18	8.15
1603	8.19	8.19	8.16
1604	8.20	8.21	8.18
1605	8.22	8.23	8.20
1606	8.23	8.25	8.23
1607	8.26	8.28	8.25
1608	8.28	8.31	8.29
1609	8.31	8.35	8.33
1610	8.36	8.40	8.39
1611	8.40	8.45	8.45
1612	8.46	8.52	8.51
1613	8.52	8.59	8.58
1614	8.59	8.67	8.67
1615	8.67	8.77	8.76
1616	8.76	8.86	8.85
1617	8.85	8.96	8.95
1618	8.96	9.08	9.07
1619	9.07	9.20	9.19
1620	9.20	9.32	9.31

Typical Performance Curves

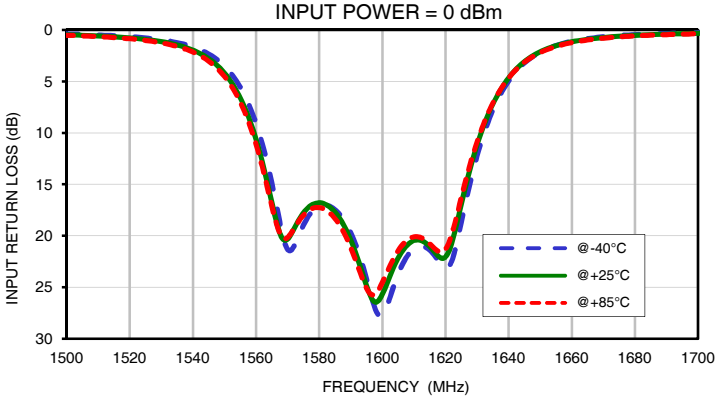
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



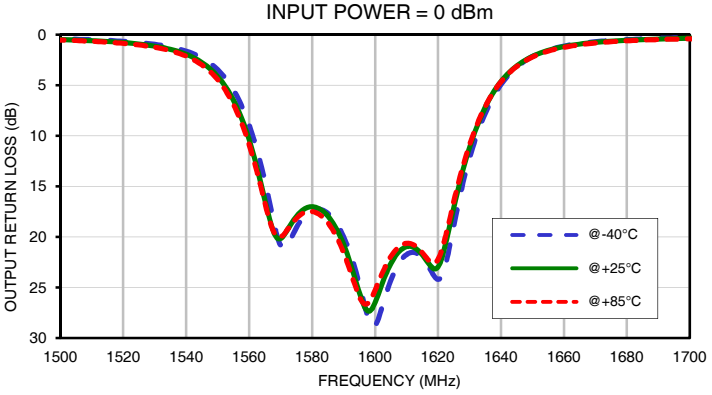
INSERTION LOSS vs. TEMPERATURE (Zoomed)
INPUT POWER = 0 dBm



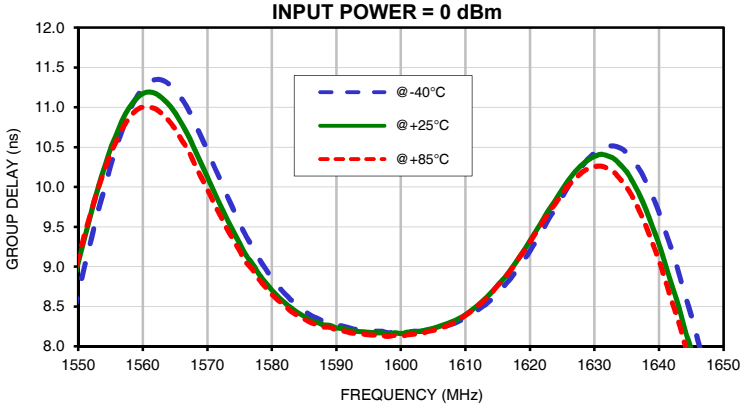
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



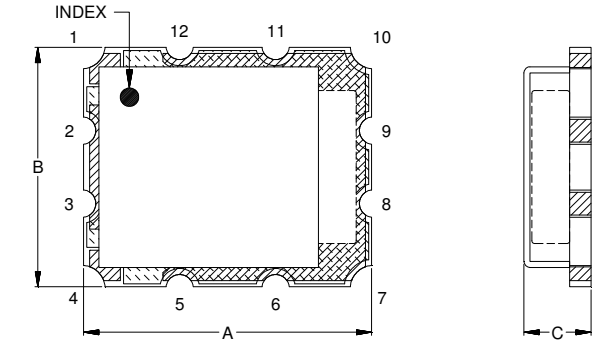
GROUP DELAY vs. TEMPERATURE
INPUT POWER = 0 dBm

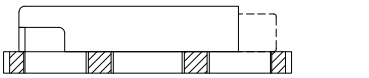


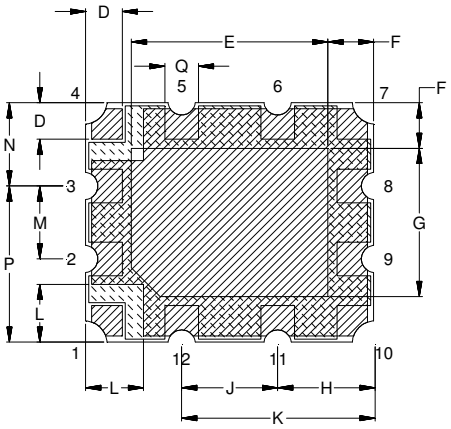
Case Style TJ

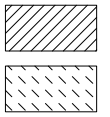
Outline Dimensions

TJ2826-1

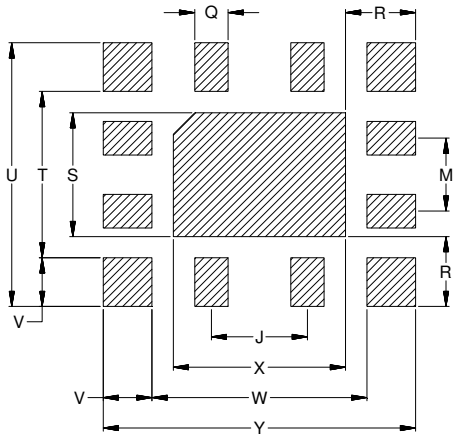








SUGGESTED LAYOUT FOR P.C. PATTERN



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. ± .03; 3Pl. ± .015

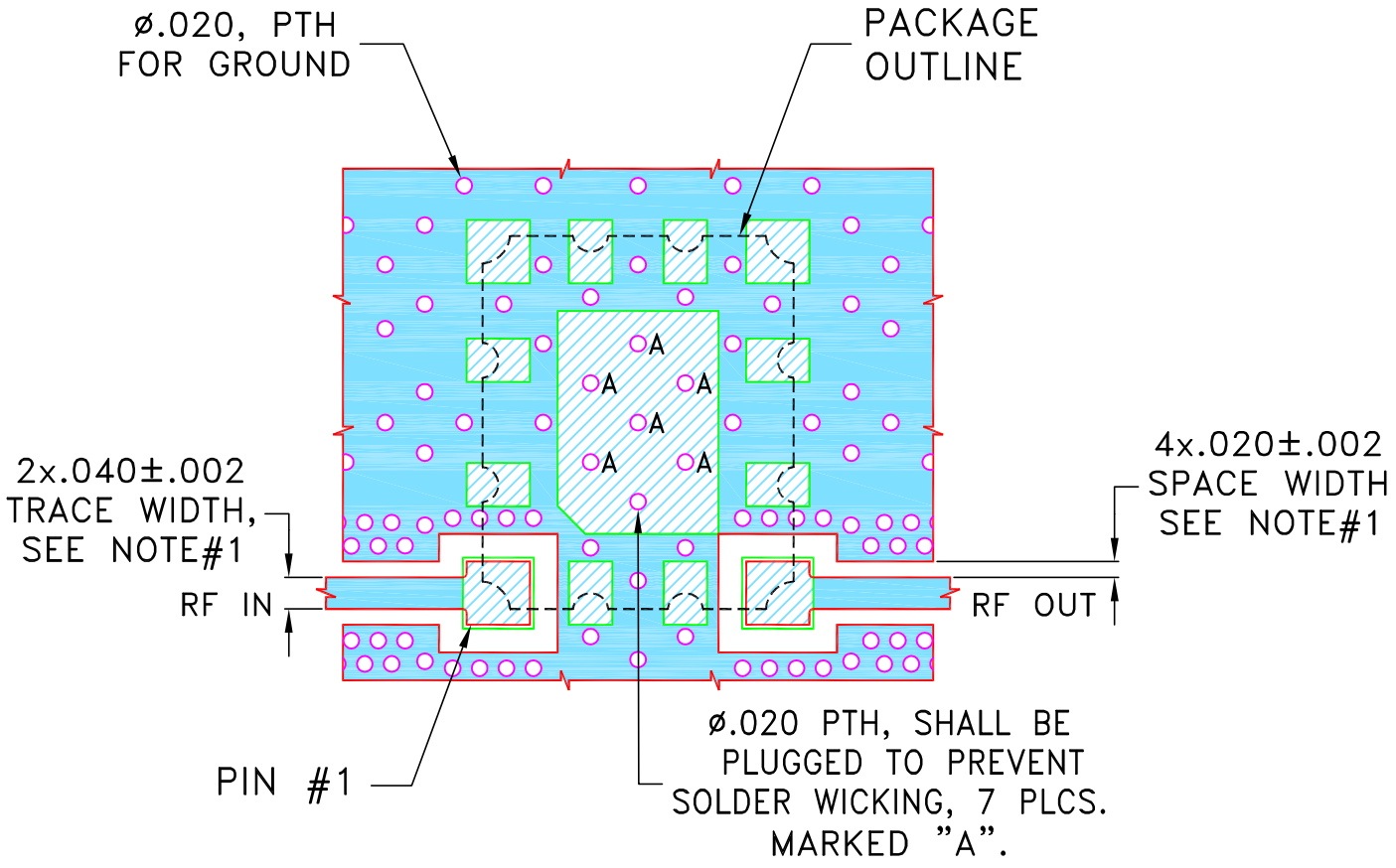
Notes:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. Termination finish:
   For RoHS Case Styles: 3-5µinch (.08-.13microns) Gold over 120-240µinch (3.05-6.10microns) Nickel plate.
   For RoHS-5 Case Styles: Tin-Lead plate.

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



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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	AP	3 JUN 19
TOLERANCES ON:	CHECKED	DDR	3 JUN 19
2 PL DECIMALS ±	APPROVED	KN	3 JUN 19
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

ASHEETA1.DWG REV:A DATE:01/12/95

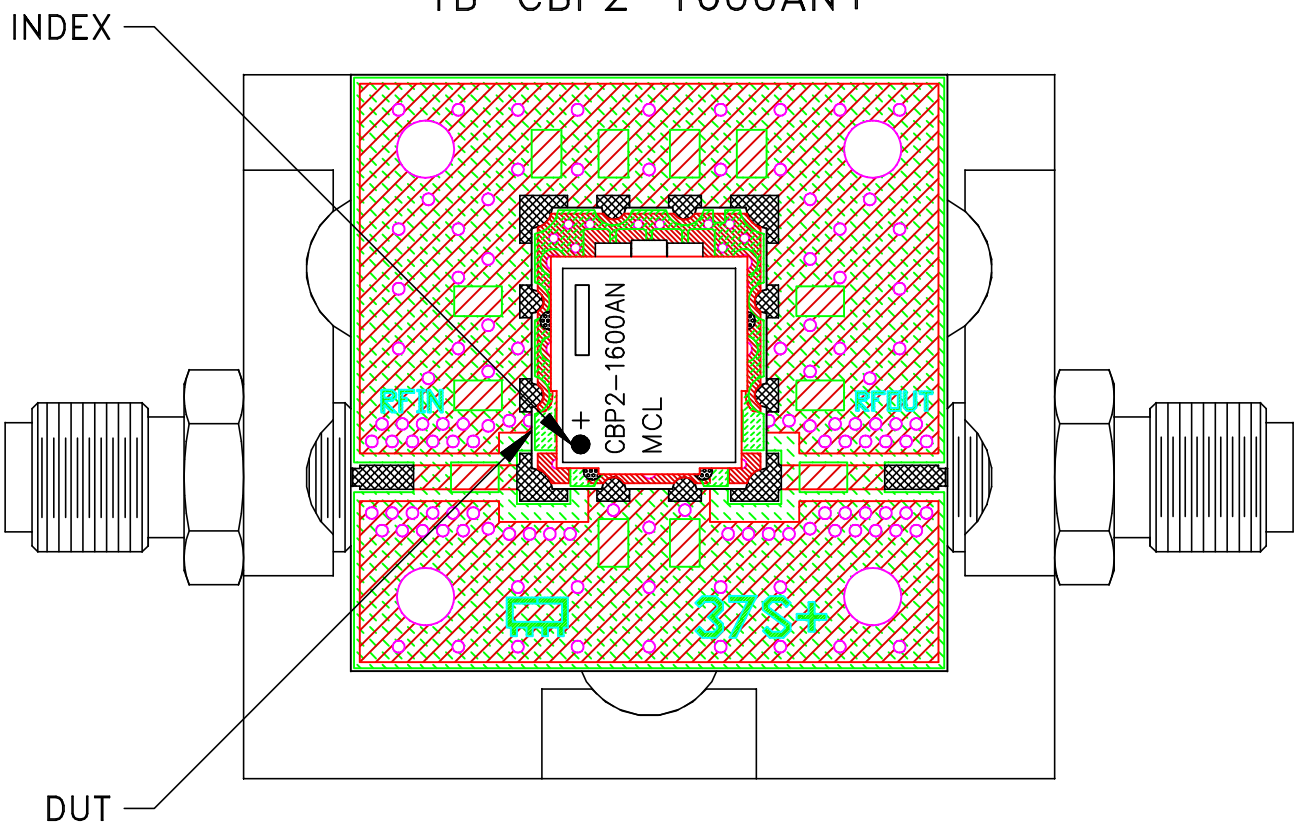
Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

PL, TJ2826, TJ2826-1, TB-1099+.

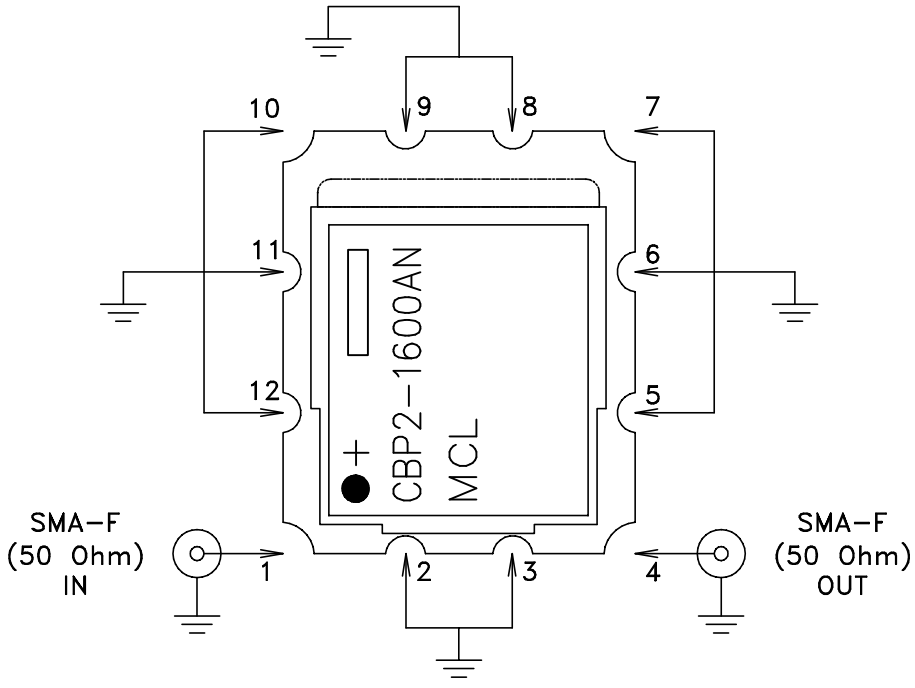
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-630	OR
FILE: 98PL630		SCALE: 3.5:1	SHEET: 1 OF 2

Evaluation Board and Circuit

TB-CBP2-1600AN+



Schematic diagram



Notes:

1. PCB Material: ROGERS (RO4350B) OR Equivalent, Dielectric Constant=3.48±.05
Dielectric Thickness: .020±.0015
2. 50 Ohm SMA Female Connectors.

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Environmental Specifications ENV54

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