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

Bandpass Filter

CBP-1400BD+

50Ω 1320 to 1480 MHz

Generic photo used for illustration purposes only
CASE STYLE: LW1611-1

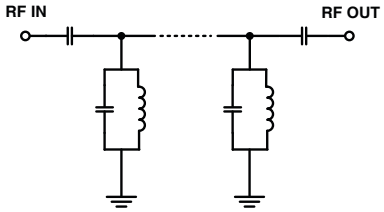
Features

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

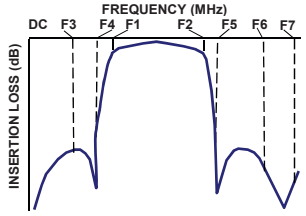
Applications

- Wireless medical telemetry
- Radio astronomy
- Aeronautical radio navigation
- Defense systems

Functional Schematic



Typical Frequency Response



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

Electrical Specifications at 25°C

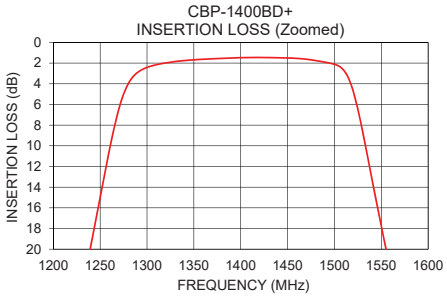
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	-	-	-	1400	-	MHz
	Insertion Loss	F1-F2	1320 - 1480	-	2.1	3.0	dB
	VSWR	F1-F2	1320 - 1480	-	1.32	1.67	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 1050	60	70	-	dB
		F3-F4	1050 - 1224	20	27	-	dB
Stop Band, Upper	Insertion Loss	F5-F6	1570 - 1700	20	25	-	dB
		F6-F7	1700 - 2300	50	55	-	dB

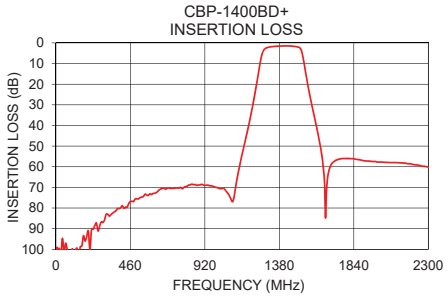
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	5 W Max. at 25°C

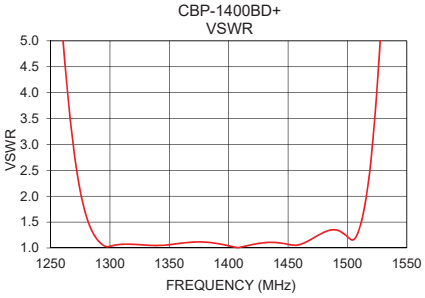
Permanent damage may occur if any of these limits are exceeded.

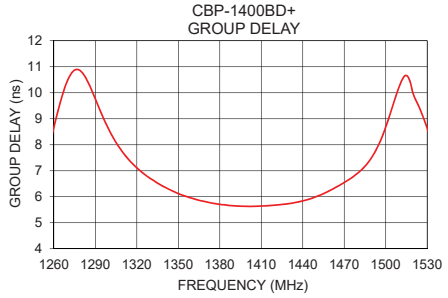
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (ns)
1	103.41	171.66	1320	7.11
100	99.89	442.63	1330	6.69
1050	71.69	57.55	1340	6.37
1215	30.56	21.86	1350	6.12
1224	26.82	18.45	1360	5.94
1288	3.05	1.20	1370	5.81
1320	1.98	1.07	1380	5.71
1350	1.69	1.06	1390	5.65
1400	1.48	1.04	1400	5.63
1450	1.51	1.07	1410	5.65
1480	1.76	1.30	1424	5.70
1514	3.27	1.74	1428	5.72
1570	26.07	26.35	1432	5.75
1585	31.73	32.39	1436	5.79
1600	37.16	37.46	1440	5.84
1700	58.96	57.01	1444	5.90
2000	57.71	84.08	1448	5.97
2100	58.00	86.28	1452	6.05
2200	58.82	84.88	1470	6.55
2300	60.12	71.33	1480	6.92







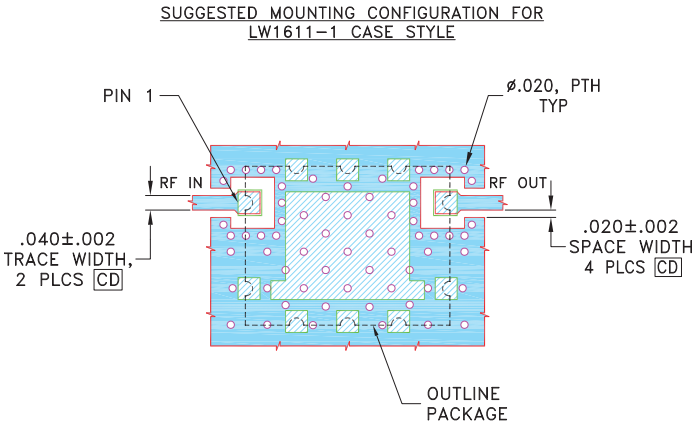


Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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

Pad Connections

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

Demo Board MCL P/N: TB-1100+
Suggested PCB Layout (PL-634)



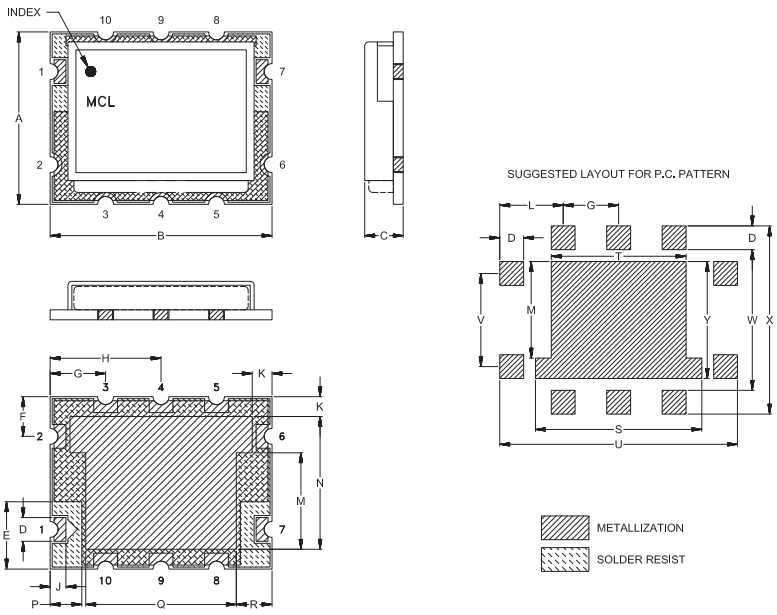
NOTES:

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

Outline Drawing



Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J	K	L	M
-	-	-	-	-	-	-	-	-	-	-	-
.435	**.560**	**.120**	**.060**	**.170**	**.100**	**.140**	**.280**	**.040**	**.050**	**.160**	**.244**
11.05	14.22	3.05	1.52	4.32	2.54	3.56	7.11	1.02	1.27	4.06	6.19

N	P	Q	R	S	T	U	V	W	X	Y	
-	-	-	-	-	-	-	-	-	-	-	Wt.
.355	**.080**	**.380**	**.090**	**.420**	**.340**	**.600**	**.235**	**.355**	**.475**	**.295**	grams
8.51	2.03	9.65	2.29	10.67	8.64	15.24	5.97	9.02	12.07	7.49	1.0

Note: Please refer to case style drawing for details

Surface mount Band Pass Filter CBP-1400BD+

Typical Performance Data

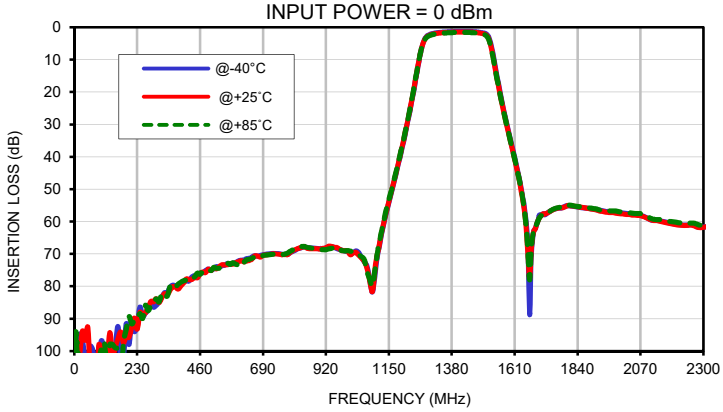
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1	94.94	104.41	100.81	0.01	0.01	0.01	0.03	0.03	0.03
5	105.59	98.00	102.42	0.01	0.01	0.01	0.02	0.02	0.02
50	101.66	92.91	102.26	0.01	0.01	0.01	0.01	0.01	0.01
100	96.76	99.06	99.08	0.02	0.01	0.01	0.00	0.01	0.01
130	98.28	94.34	98.02	0.02	0.01	0.01	0.00	0.01	0.01
170	103.00	94.13	108.19	0.02	0.01	0.00	0.00	0.01	0.01
200	98.00	95.76	89.33	0.01	0.00	0.00	0.00	0.01	0.02
500	75.04	75.14	75.13	0.04	0.07	0.08	0.05	0.08	0.09
650	70.95	71.57	71.36	0.07	0.10	0.11	0.08	0.11	0.13
690	70.29	70.47	70.51	0.08	0.11	0.13	0.08	0.12	0.13
730	69.85	69.94	70.10	0.09	0.13	0.14	0.10	0.13	0.15
770	70.12	70.18	70.09	0.10	0.13	0.15	0.11	0.14	0.16
810	68.75	68.58	68.34	0.11	0.14	0.16	0.12	0.15	0.17
850	68.06	68.19	67.98	0.12	0.16	0.18	0.13	0.17	0.19
900	68.40	68.46	68.68	0.14	0.18	0.20	0.15	0.18	0.20
1050	71.04	71.29	70.87	0.22	0.27	0.29	0.23	0.28	0.30
1100	75.86	74.48	74.56	0.28	0.33	0.36	0.28	0.33	0.36
1210	32.91	32.58	32.35	0.67	0.78	0.86	0.68	0.78	0.85
1224	27.18	26.85	26.63	0.88	1.02	1.12	0.87	1.00	1.09
1230	24.59	24.26	24.04	1.11	1.28	1.40	1.08	1.25	1.36
1288	2.82	3.01	3.16	21.60	23.03	24.32	18.58	19.36	20.15
1300	2.20	2.40	2.54	38.47	37.02	35.12	29.14	29.31	29.49
1310	1.95	2.14	2.28	30.53	30.64	30.13	34.20	34.30	33.38
1320	1.78	1.96	2.11	30.29	30.70	30.44	38.47	37.93	36.78
1330	1.66	1.84	1.98	31.09	31.72	31.44	38.64	37.37	36.82
1390	1.33	1.49	1.62	28.07	28.64	30.14	27.83	28.78	30.66
1400	1.30	1.46	1.59	34.84	36.06	37.50	34.67	37.75	42.71
1410	1.28	1.44	1.58	39.73	35.46	33.72	41.04	36.79	35.04
1420	1.28	1.44	1.58	29.31	28.13	27.94	29.42	28.32	28.27
1430	1.28	1.45	1.59	26.13	25.63	25.95	26.18	25.79	26.30
1440	1.30	1.47	1.61	26.16	26.02	26.61	26.30	26.42	27.44
1450	1.32	1.49	1.64	29.16	28.85	28.75	30.46	31.08	32.30
1480	1.54	1.75	1.92	17.11	16.78	16.51	17.23	16.92	16.66
1490	1.68	1.90	2.09	16.45	16.48	16.38	16.27	16.29	16.21
1500	1.84	2.10	2.30	21.19	21.37	20.92	19.33	19.40	19.21
1510	2.32	2.70	2.95	14.54	13.38	13.21	13.67	12.71	12.61
1514	2.82	3.27	3.55	10.05	9.37	9.38	9.69	9.07	9.10
1550	17.13	17.71	17.80	0.71	0.81	0.90	0.71	0.81	0.90
1570	25.50	25.99	26.00	0.44	0.52	0.59	0.44	0.52	0.58
1580	29.34	29.80	29.78	0.37	0.45	0.51	0.38	0.45	0.51
1600	36.64	37.09	37.02	0.30	0.36	0.42	0.31	0.37	0.42
1610	40.25	40.69	40.62	0.27	0.34	0.39	0.28	0.34	0.39
1650	58.55	59.89	59.56	0.22	0.28	0.32	0.23	0.28	0.32
1660	69.51	72.30	71.83	0.22	0.27	0.31	0.22	0.27	0.31
1700	58.10	58.96	58.94	0.20	0.25	0.28	0.20	0.25	0.28
1770	55.89	55.85	55.70	0.19	0.24	0.27	0.19	0.24	0.27
1800	55.10	55.23	55.11	0.19	0.23	0.27	0.19	0.24	0.27
1850	55.64	55.55	55.46	0.18	0.23	0.27	0.18	0.24	0.26
1890	56.02	56.12	55.88	0.18	0.24	0.27	0.19	0.24	0.26
1900	56.13	56.28	56.00	0.18	0.23	0.27	0.19	0.24	0.27
1970	56.98	57.26	56.70	0.18	0.24	0.27	0.19	0.24	0.27
2000	57.35	57.64	57.06	0.19	0.25	0.29	0.19	0.24	0.28
2050	57.77	58.03	57.55	0.19	0.25	0.29	0.20	0.25	0.28
2090	58.73	58.80	58.26	0.19	0.25	0.29	0.20	0.26	0.29
2100	59.13	59.15	58.70	0.19	0.25	0.30	0.20	0.26	0.29
2170	60.32	60.48	59.83	0.20	0.27	0.32	0.22	0.28	0.31
2200	60.84	60.96	60.21	0.20	0.27	0.32	0.22	0.28	0.32
2250	61.02	61.13	60.50	0.22	0.30	0.35	0.24	0.31	0.35
2270	61.38	61.42	60.60	0.23	0.31	0.36	0.25	0.32	0.36
2300	61.70	61.81	61.20	0.26	0.34	0.40	0.28	0.35	0.39

Typical Performance Data

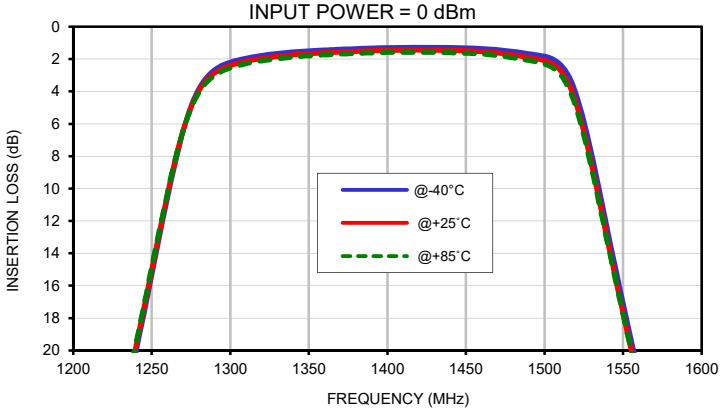
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25°C	@+85°C
1320	7.17	7.10	7.05
1322	7.07	7.01	6.96
1324	6.98	6.92	6.87
1326	6.89	6.84	6.79
1328	6.81	6.76	6.71
1330	6.74	6.69	6.64
1332	6.67	6.62	6.57
1334	6.60	6.55	6.51
1336	6.53	6.48	6.44
1338	6.47	6.43	6.39
1340	6.41	6.37	6.33
1342	6.36	6.32	6.28
1344	6.30	6.26	6.23
1346	6.25	6.21	6.18
1348	6.21	6.17	6.13
1350	6.16	6.12	6.09
1352	6.12	6.08	6.05
1354	6.08	6.05	6.01
1356	6.04	6.01	5.98
1358	6.00	5.97	5.94
1360	5.97	5.94	5.90
1362	5.94	5.91	5.88
1364	5.91	5.88	5.85
1366	5.88	5.85	5.82
1368	5.85	5.83	5.80
1370	5.83	5.80	5.78
1372	5.80	5.78	5.75
1374	5.78	5.76	5.73
1376	5.76	5.74	5.72
1378	5.74	5.72	5.70
1380	5.73	5.71	5.68
1382	5.71	5.69	5.67
1384	5.70	5.68	5.66
1386	5.68	5.66	5.64
1388	5.67	5.66	5.64
1390	5.66	5.65	5.63
1392	5.65	5.64	5.62
1394	5.65	5.64	5.61
1396	5.64	5.63	5.61
1398	5.64	5.63	5.60
1400	5.64	5.63	5.60
1402	5.64	5.63	5.60
1404	5.63	5.63	5.60
1410	5.64	5.64	5.61
1420	5.68	5.67	5.65
1430	5.74	5.73	5.71
1440	5.84	5.84	5.82
1450	6.00	6.01	5.99
1470	6.52	6.53	6.50
1474	6.65	6.66	6.63
1480	6.87	6.90	6.87

Typical Performance Curves

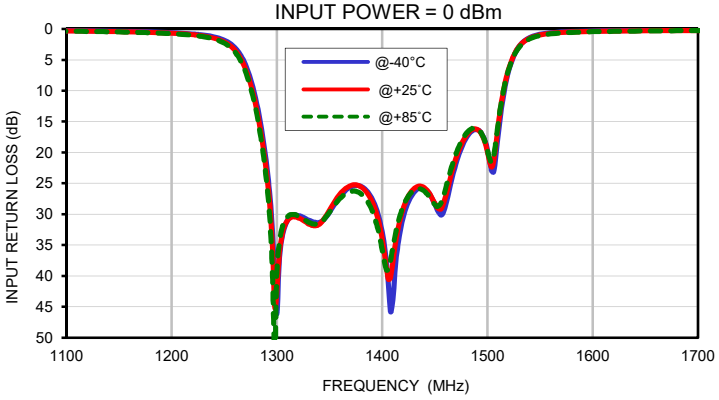
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



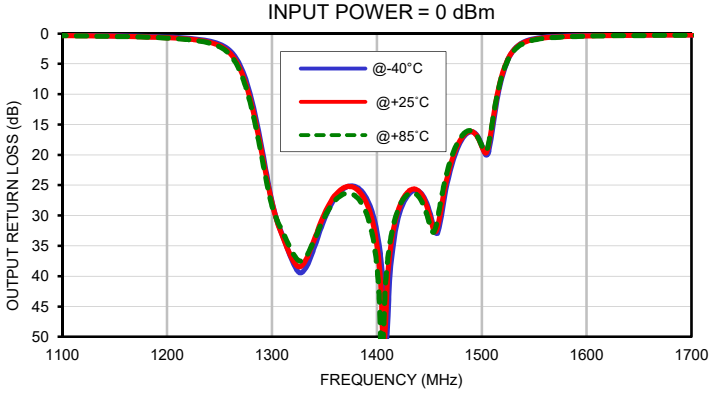
INSERTION LOSS vs. TEMPERATURE (Zoomed)
INPUT POWER = 0 dBm



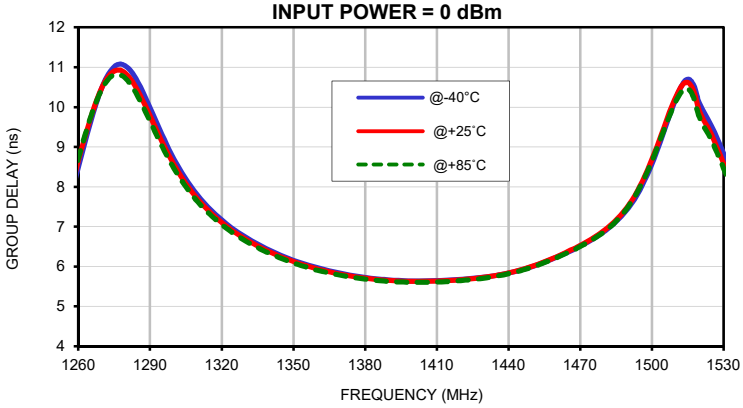
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm

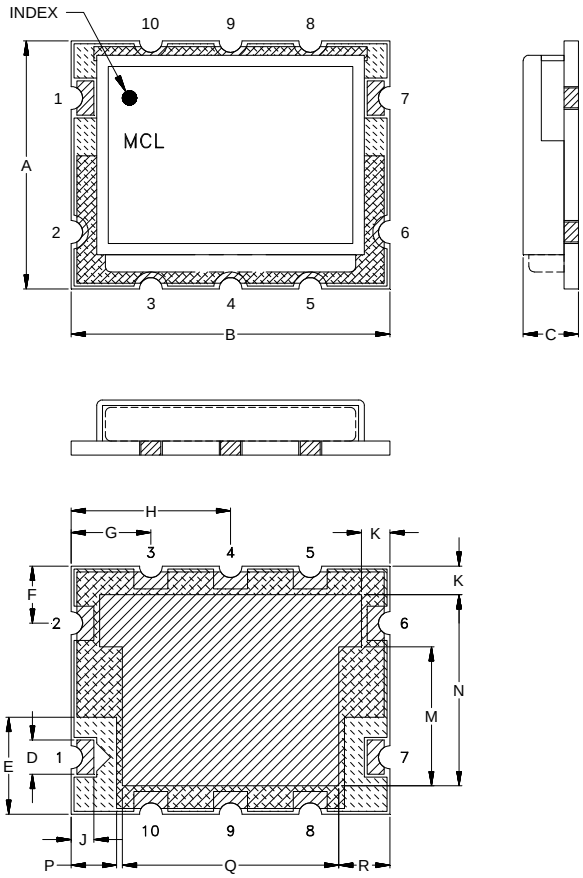


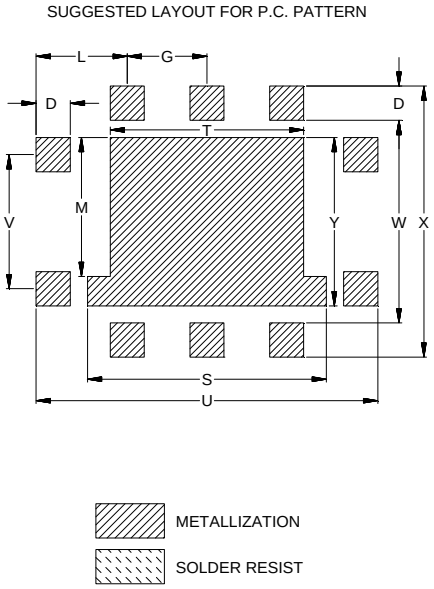
GROUP DELAY vs. TEMPERATURE
INPUT POWER = 0 dBm



Case Style LW

Outline Dimensions LW1611-1





CASE#	A	B	C	D	E	F	G	H	J	K	L	M
LW1611-1	.435 (11.05)	.560 (14.22)	.120 (3.05)	.060 (1.52)	.170 (4.32)	.100 (2.54)	.140 (3.56)	.280 (7.11)	.040 (1.02)	.050 (1.27)	.160 (4.06)	.244 (6.19)

CASE#	N	P	Q	R	S	T	U	V	W	X	Y	WT.GRAM
LW1611-1	.335 (8.51)	.080 (2.03)	.380 (9.65)	.090 (2.29)	.420 (10.67)	.340 (8.64)	.600 (15.24)	.235 (5.97)	.355 (9.02)	.475 (12.07)	.295 (7.49)	1.0

Dimensions are in inches (mm). Tolerances: 2Pl. ± --; 3Pl. ± .03

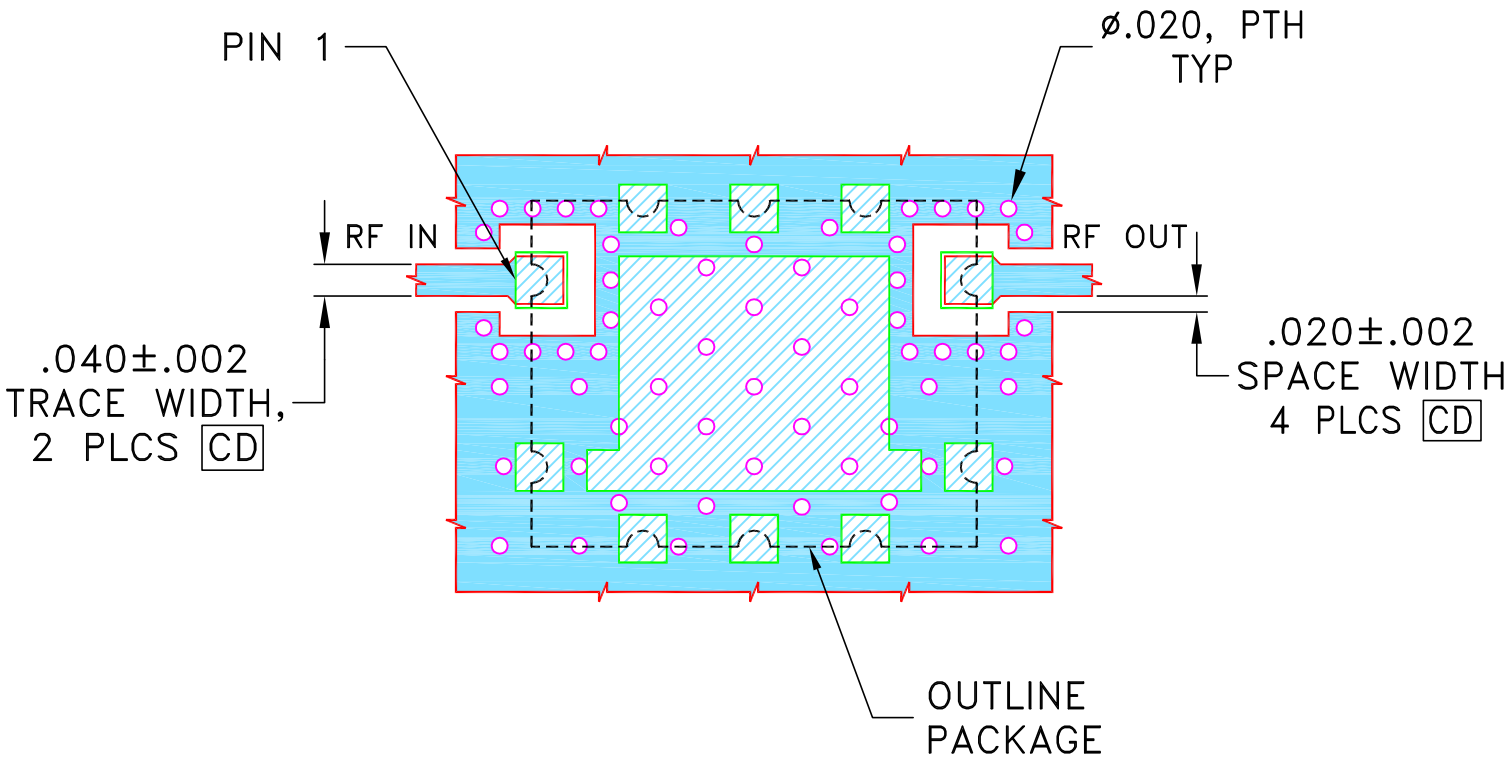
Notes:

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	M174345	NEW RELEASE	JUN 19	TM	VC

SUGGESTED MOUNTING CONFIGURATION FOR LW1611-1 CASE STYLE



NOTES:

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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	TM	13 JUN 19
TOLERANCES ON:	CHECKED	MD	13 JUN 19
2 PL DECIMALS ±	APPROVED	KN	13 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, LW1611-1, CBP, TB-1100+, 50 Ohm

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-634	OR
FILE: 98PL634	SCALE: 3.5:1	SHEET: 1 OF 2	

Mini-Circuits

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