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

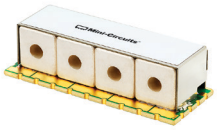
Feature	Advantages
Low insertion loss	Low signal loss results in better SNR in signal chain
Fast roll-off	Higher selectivity results in better adjacent channel rejection and dynamic range
Wide stop band	Wide spur-free stopband results in better receiver sensitivity
Excellent power handling	Well suited 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

CBP12-1090BE+

50Ω 1087 to 1093 MHz



Generic photo used for illustration purposes only
CASE STYLE: UP2912

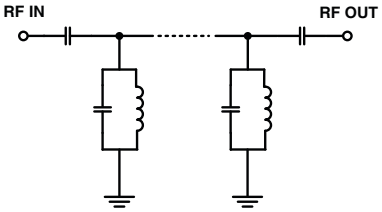
Features

- Excellent roll-off
- Excellent rejection
- Good passband IL
- Cavity filter standard specs in compact profile

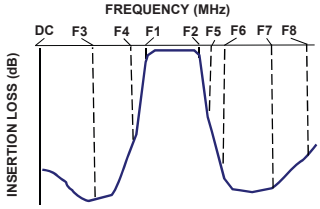
Applications

- Traffic Alert and Collision Avoidance System (TCAS)
- Military IFF

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

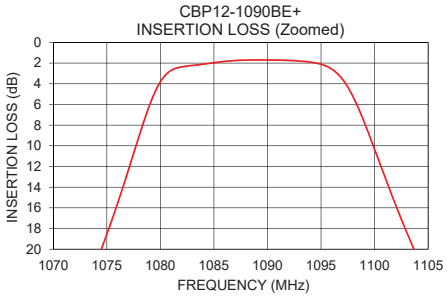
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	-	-	-	1090	-	MHz
	Insertion Loss	F1-F2	1087 - 1093	-	1.9	2.5	dB
	VSWR	F1-F2	1087 - 1093	-	1.5	1.92	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 1000	70	80	-	dB
		F3-F4	1000 - 1068	20	30	-	dB
Stop Band, Upper	Insertion Loss	F5-F6	1112 - 1170	20	30	-	dB
		F6-F7	1170 - 1800	60	67	-	dB
		F7-F8	1800 - 2000	-	40	-	dB

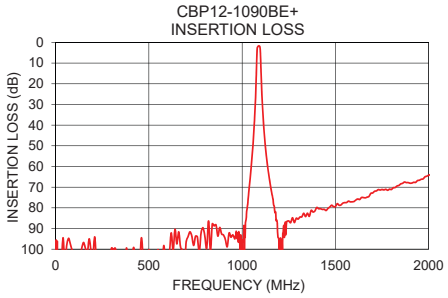
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	10 W max. at 25°C

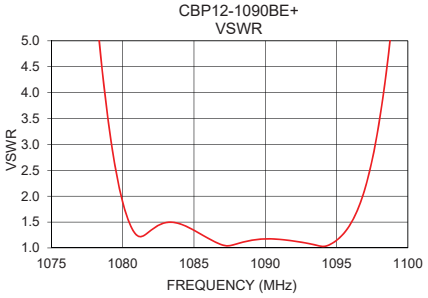
Permanent damage may occur if any of these limits are exceeded.

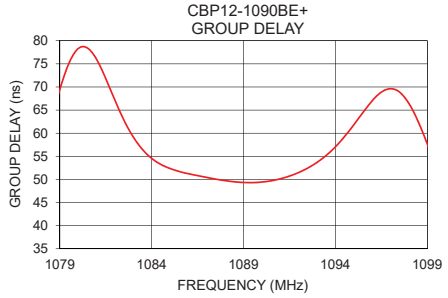
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (ns)
1	98.78	356.16	1087.0	50.44
10	105.21	348.43	1088.5	49.49
100	102.26	429.02	1088.8	49.40
1000	95.69	245.63	1089.0	49.34
1068	34.50	48.27	1089.3	49.31
1074	21.32	22.24	1089.5	49.31
1080	3.81	1.89	1089.8	49.35
1087	1.76	1.06	1090.0	49.45
1088	1.71	1.08	1090.3	49.55
1090	1.70	1.18	1090.5	49.70
1091	1.71	1.17	1090.8	49.91
1093	1.80	1.09	1091.0	50.14
1097	3.56	2.15	1091.3	50.42
1104	20.77	29.27	1091.5	50.72
1112	35.59	84.98	1091.8	51.10
1170	78.90	337.23	1092.0	51.50
1500	79.40	242.55	1092.3	51.97
1800	71.14	219.56	1092.5	52.47
1900	68.08	218.91	1092.8	53.05
2000	64.22	194.57	1093.0	53.69









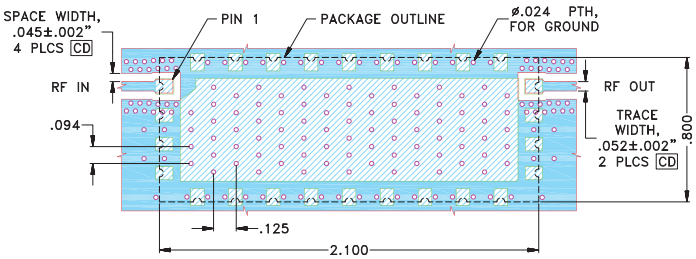
Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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	17
GROUND	2-16, 18-26

Demo Board MCL P/N: TB-1137+
Suggested PCB Layout (PL-686)

SUGGESTED MOUNTING CONFIGURATION
FOR UP2912 CASE STYLE



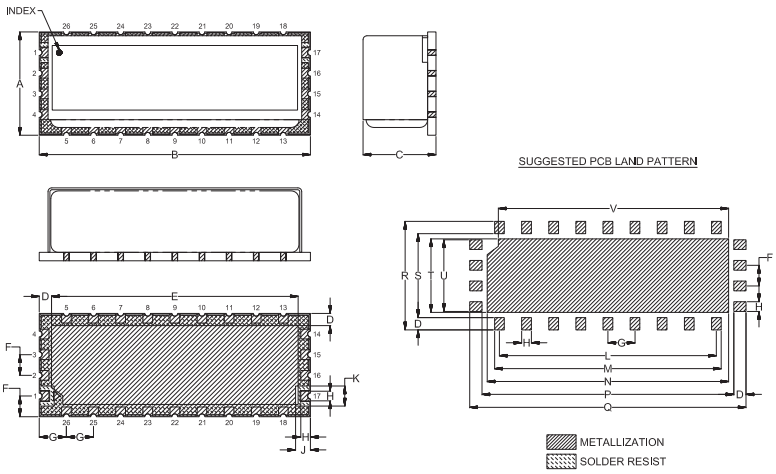
NOTES:

1. COPLANAR WAVEGUIDE PARAMETER ARE SHOWN FOR ROGERS(RO4350B), WITH DIELECTRIC THICKNESS .023"±.002". 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
.800	**2.100**	**.580**	**.095**	**1.910**	**.160**	**.210**	**.075**	**.115**	**.155**	**1.680**
20.32	53.34	14.73	2.41	48.51	4.06	5.33	1.91	2.92	**3**.94	42.67

M	N	P	Q	R	S	T	U	V		Wt.
1.755	**1.870**	**1.950**	**2.140**	**.840**	**.650**	**.570**	**.555**	**1.783**		grams
44.58	47.50	49.53	54.36	21.34	16.51	14.48	14.10	45.29		40

Note: Please refer to case style drawing for details

Surface mount Band Pass Filter CBP12-1090BE+

Typical Performance Data

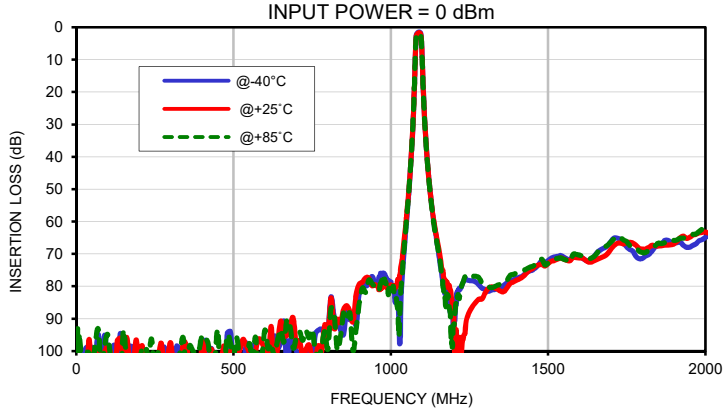
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1	99.55	103.03	105.11	0.05	0.05	0.05	0.05	0.05	0.05
10	99.84	100.80	94.57	0.05	0.05	0.05	0.05	0.05	0.05
100	103.39	98.26	94.94	0.03	0.03	0.03	0.03	0.04	0.04
150	100.50	101.79	93.67	0.02	0.03	0.03	0.02	0.03	0.03
200	99.68	103.06	102.56	0.01	0.02	0.02	0.01	0.03	0.03
220	104.49	109.68	98.64	0.01	0.02	0.02	0.01	0.02	0.03
250	102.89	106.52	111.46	0.00	0.02	0.02	0.01	0.02	0.03
300	101.85	97.43	111.83	0.00	0.02	0.02	0.00	0.02	0.03
320	98.43	101.40	105.52	0.00	0.01	0.02	0.00	0.02	0.02
350	117.76	98.06	105.82	0.01	0.01	0.02	0.00	0.02	0.03
400	103.67	97.56	95.24	0.01	0.02	0.02	0.01	0.02	0.02
420	102.11	107.61	97.85	0.01	0.02	0.02	0.01	0.02	0.02
500	105.34	113.51	101.90	0.01	0.02	0.02	0.01	0.02	0.02
600	104.37	99.95	93.50	0.00	0.03	0.03	0.01	0.02	0.03
700	100.00	98.37	95.71	0.00	0.03	0.04	0.01	0.03	0.04
800	94.10	95.55	99.43	0.01	0.04	0.05	0.00	0.05	0.04
950	78.73	79.50	80.38	0.03	0.07	0.08	0.03	0.09	0.07
990	78.97	80.30	79.23	0.04	0.08	0.09	0.05	0.10	0.08
1000	78.74	79.56	80.08	0.04	0.08	0.09	0.05	0.11	0.09
1008	81.28	79.80	80.02	0.05	0.09	0.10	0.06	0.11	0.09
1014	84.99	79.81	81.68	0.05	0.09	0.10	0.06	0.12	0.10
1020	81.55	79.49	86.06	0.05	0.09	0.10	0.07	0.13	0.10
1030	97.19	75.97	85.98	0.06	0.11	0.12	0.08	0.14	0.12
1050	59.91	58.45	59.60	0.11	0.15	0.17	0.13	0.19	0.17
1060	47.40	46.88	47.05	0.16	0.22	0.23	0.19	0.26	0.24
1068	34.73	34.43	34.30	0.29	0.36	0.39	0.32	0.41	0.40
1074	21.48	21.21	20.92	0.65	0.79	0.86	0.68	0.81	0.85
1076	15.71	15.44	15.13	1.09	1.30	1.44	1.10	1.31	1.42
1080	3.61	3.76	3.79	9.43	10.54	11.57	9.27	10.32	11.32
1087	1.53	1.76	1.89	28.74	32.75	39.45	21.72	22.09	22.25
1088	1.49	1.72	1.86	28.83	27.86	26.64	23.46	23.17	22.64
1089	1.48	1.71	1.85	23.60	23.12	22.72	23.09	22.82	22.40
1090	1.48	1.71	1.85	21.99	21.86	21.86	23.39	23.48	23.48
1091	1.49	1.72	1.86	22.28	22.38	22.61	25.39	26.02	26.73
1092	1.51	1.75	1.90	23.90	24.17	24.41	29.22	31.00	33.71
1093	1.56	1.81	1.96	27.09	27.58	27.60	32.39	35.51	41.77
1097	3.25	3.59	3.89	8.49	8.65	8.57	8.55	8.76	8.76
1100	10.11	10.45	10.84	1.79	1.95	2.00	1.87	2.04	2.11
1104	20.65	20.89	21.21	0.50	0.60	0.66	0.54	0.66	0.70
1110	32.40	32.57	32.79	0.20	0.27	0.30	0.22	0.30	0.31
1112	35.54	35.67	35.88	0.16	0.22	0.25	0.18	0.25	0.26
1120	45.68	45.74	45.93	0.08	0.14	0.16	0.10	0.17	0.16
1150	68.03	67.16	68.29	0.03	0.08	0.09	0.05	0.11	0.09
1160	75.20	72.75	74.84	0.03	0.08	0.08	0.05	0.11	0.08
1170	81.24	78.04	83.63	0.02	0.07	0.08	0.05	0.11	0.08
1200	95.42	88.71	91.78	0.02	0.07	0.08	0.06	0.10	0.08
1300	81.01	82.07	79.43	0.04	0.08	0.08	0.06	0.10	0.09
1320	81.14	80.20	80.42	0.04	0.08	0.09	0.05	0.10	0.09
1340	80.71	80.95	79.62	0.03	0.08	0.08	0.05	0.10	0.09
1360	79.69	81.64	78.95	0.03	0.08	0.08	0.05	0.09	0.09
1380	78.11	79.12	76.59	0.03	0.08	0.08	0.05	0.10	0.09
1400	77.48	78.12	75.85	0.04	0.08	0.09	0.05	0.10	0.09
1500	72.03	72.93	72.87	0.03	0.08	0.09	0.05	0.10	0.10
1600	70.79	71.25	70.38	0.03	0.08	0.09	0.04	0.10	0.10
1700	66.15	68.52	66.31	0.03	0.08	0.09	0.04	0.09	0.10
1800	71.36	68.53	69.57	0.03	0.08	0.09	0.03	0.09	0.10
1850	67.39	67.57	66.69	0.03	0.08	0.09	0.03	0.09	0.10
1900	66.58	66.94	65.82	0.02	0.07	0.08	0.03	0.09	0.10
1950	67.95	64.90	64.42	0.03	0.08	0.10	0.03	0.09	0.11
2000	64.89	63.26	62.11	0.05	0.11	0.11	0.02	0.09	0.11

Typical Performance Data

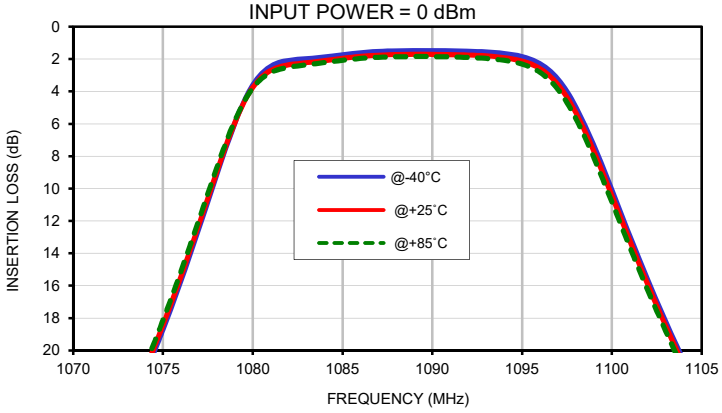
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25°C	@+85°C
1084.0	54.50	54.08	53.74
1084.3	53.72	53.42	53.16
1084.5	53.21	52.93	52.88
1084.8	52.72	52.51	52.22
1085.0	52.25	52.07	52.02
1085.3	52.17	51.97	51.85
1085.5	51.89	51.55	51.38
1085.8	51.67	51.53	51.20
1086.0	51.36	51.02	50.88
1086.3	51.31	51.00	50.80
1086.5	51.08	50.92	50.61
1086.8	50.83	50.46	50.25
1087.0	50.60	50.37	50.29
1087.3	50.50	50.15	49.90
1087.5	50.25	49.93	49.58
1087.8	50.07	49.75	49.63
1088.0	49.82	49.66	49.34
1088.3	49.77	49.49	49.29
1088.5	49.61	49.21	49.01
1088.8	49.54	49.46	49.32
1089.0	49.44	48.96	48.95
1089.3	49.27	49.11	48.98
1089.5	49.33	49.13	48.97
1089.8	49.29	49.21	49.07
1090.0	49.45	49.31	49.39
1090.3	49.75	49.42	49.35
1090.5	49.64	49.61	49.63
1090.8	49.81	49.69	49.74
1091.0	50.23	50.08	49.88
1091.3	50.34	50.20	50.49
1091.5	50.68	50.66	50.69
1091.8	51.14	50.89	50.97
1092.0	51.55	51.39	51.47
1092.3	51.76	51.83	51.99
1092.5	52.46	52.49	52.32
1092.8	52.89	52.86	53.04
1093.0	53.66	53.42	53.72
1093.3	54.41	54.44	54.51
1093.5	54.97	54.84	55.11
1093.8	55.95	55.87	55.98
1094.0	56.85	56.71	56.92
1094.3	58.06	58.08	58.26
1094.5	59.03	59.04	59.48
1094.8	60.49	60.36	60.70
1095.0	61.96	61.96	61.99
1095.3	63.42	63.23	63.62
1095.5	64.90	64.67	65.02
1095.8	66.60	66.49	66.63
1096.0	68.22	67.86	67.93
1096.3	69.29	68.94	69.25
1097.0	72.18	71.44	71.22

Typical Performance Curves

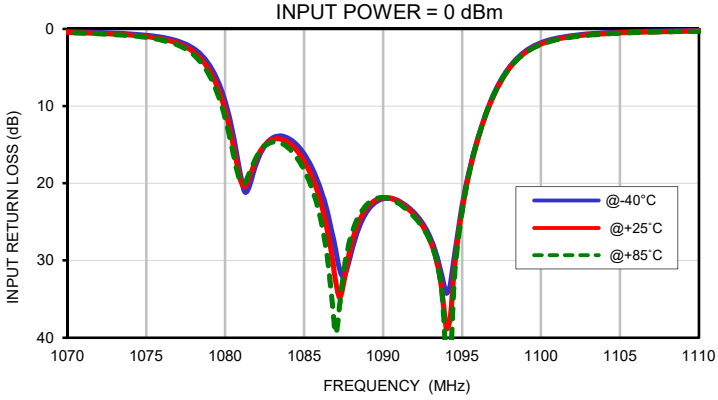
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



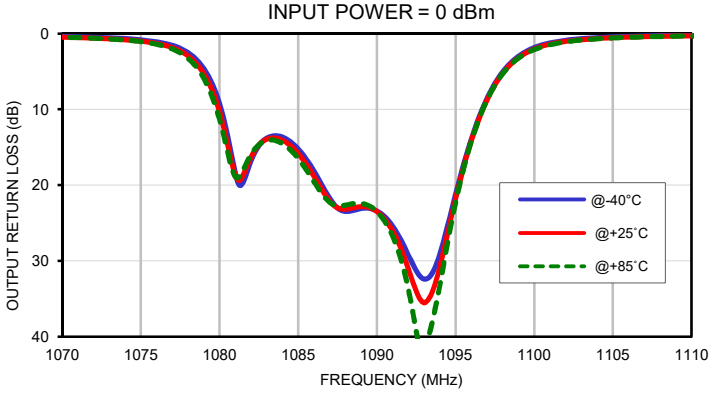
INSERTION LOSS vs. TEMPERATURE (Zoomed)
INPUT POWER = 0 dBm



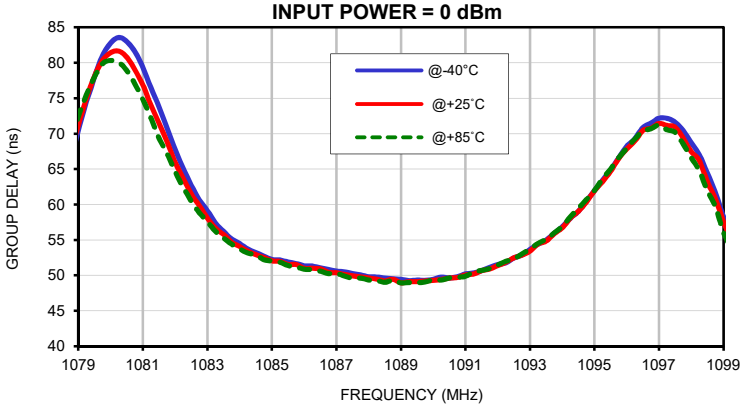
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm

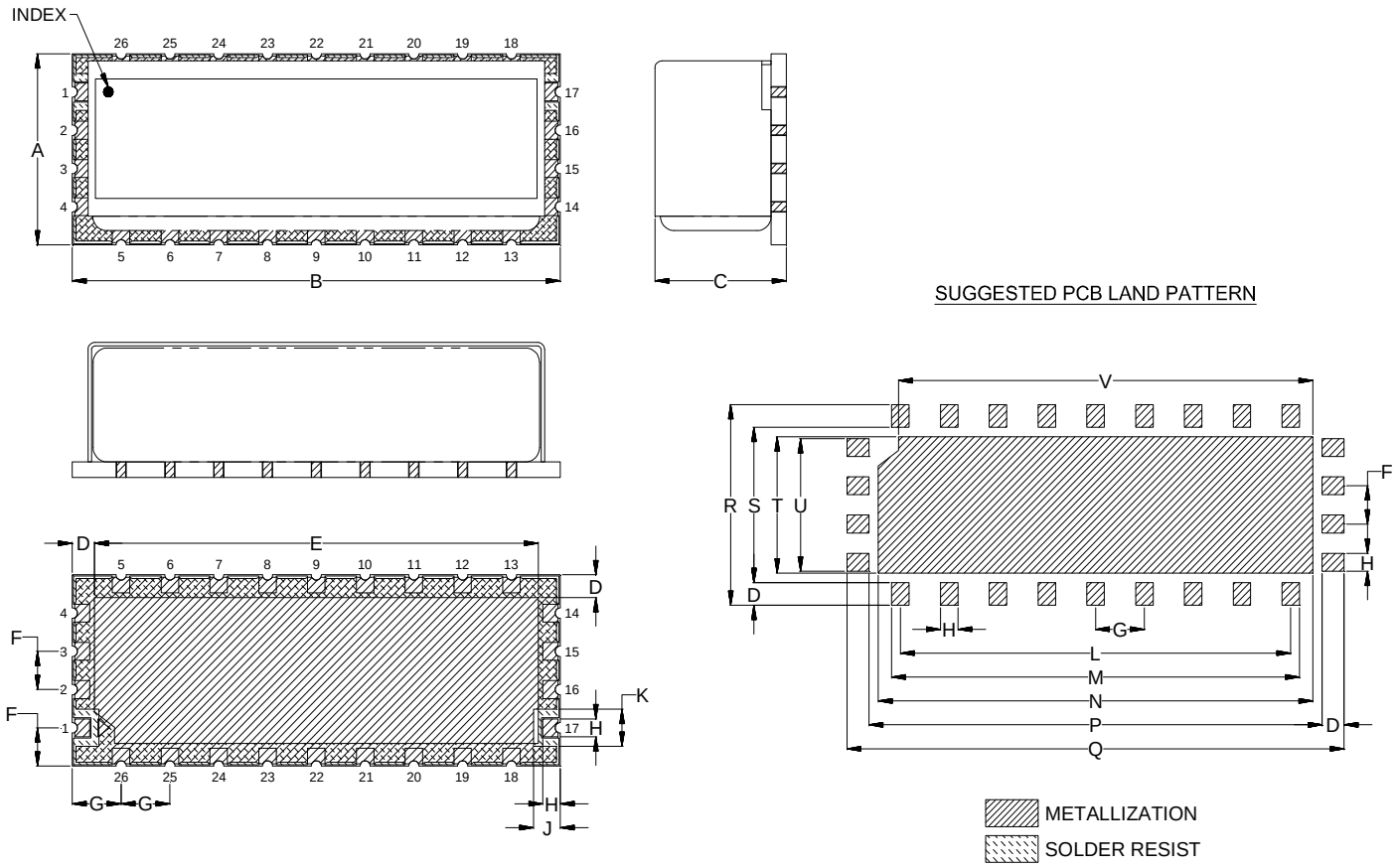


GROUP DELAY vs. TEMPERATURE
INPUT POWER = 0 dBm



Case Style UP

Outline Dimensions UP2912



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
UP2912	.800 (20.32)	2.100 (53.34)	.580 (14.73)	.095 (2.41)	1.910 (48.51)	.160 (4.06)	.210 (5.33)	.075 (1.91)	.115 (2.92)	.155 (3.94)	1.680 (42.67)	1.755 (44.58)	1.870 (47.50)

CASE#	P	Q	R	S	T	U	V	WT.GRAM
UP2912	1.950 (49.53)	2.140 (54.36)	.840 (21.34)	.650 (16.51)	.570 (14.48)	.555 (14.10)	1.783 (45.29)	40

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: 2-5µinch (.05-.13microns) Gold over 120-240µinch (3.05-6.10microns) Nickel plate.
   All models, (+) suffix.

Mini-Circuits

Environmental Specifications ENV115

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
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-020C, 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