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

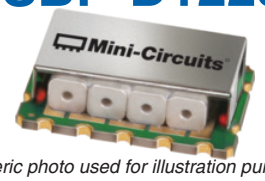
Feature	Advantages
Low insertion loss	Low signal loss results in better SNR in signal chain
Fast roll-off	Higher selectivity results in better adjacent channel rejection and dynamic range
Wide stop band	Wide spur-free stopband results in better receiver sensitivity
Excellent power handling	Well suited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

50Ω 1203 to 1253 MHz

CSBP-D1228+



Generic photo used for illustration purposes only
CASE STYLE: KS1509

Features

- Low Insertion Loss, 0.9 dB typ.
- Minimal Insertion loss variation over operating temperature ±0.3 dB
- High power handling, 16.5 W
- Wide pass band (4%), high selectivity

Applications

- Sub harmonic filtering
- Image Rejection
- Transmitter filtering

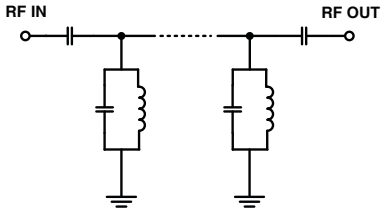
Electrical Specifications at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	-	-	-	1228	-	MHz
	Insertion Loss	F1-F2	1203 - 1253	-	0.9	2.0	dB
	VSWR	F1-F2	1203 - 1253	-	1.4	1.7	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 1020	20	30	-	dB
Stop Band, Upper	Insertion Loss	F4-F5	1425 - 2500	20	30	-	dB

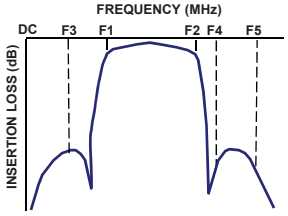
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input*	16.5W max. at 25°C

*Derate linearly to 8W at 85°C
Permanent damage may occur if any of these limits are exceeded.

Functional Schematic



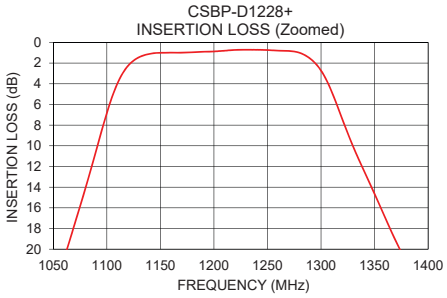
Typical Frequency Response

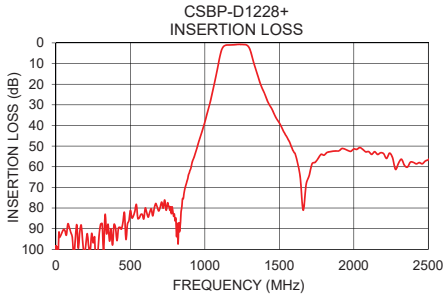


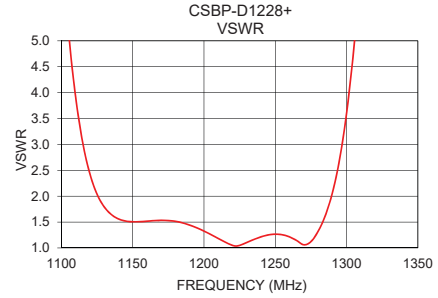
+RoHS Compliant
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

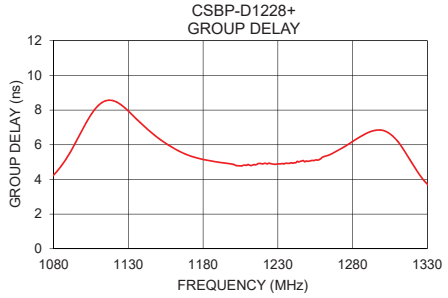
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (ns)
1	98.36	15758.32	1203	4.79
920	56.68	107.78	1205	4.78
1010	35.58	59.82	1207	4.82
1020	32.88	55.40	1209	4.81
1100	6.83	6.90	1211	4.83
1120	2.24	2.43	1213	4.83
1125	1.76	2.04	1215	4.84
1130	1.44	1.79	1217	4.92
1203	0.86	1.28	1219	4.91
1228	0.71	1.08	1221	4.93
1253	0.77	1.26	1223	4.90
1280	1.01	1.32	1225	4.92
1300	2.72	3.60	1228	4.87
1035	28.88	46.32	1229	4.88
1310	4.77	6.43	1231	4.89
1370	19.26	53.11	1233	4.92
1425	28.91	82.92	1235	4.93
1600	53.16	90.98	1237	4.93
2000	51.38	62.58	1250	5.05
2500	56.65	43.91	1253	5.10







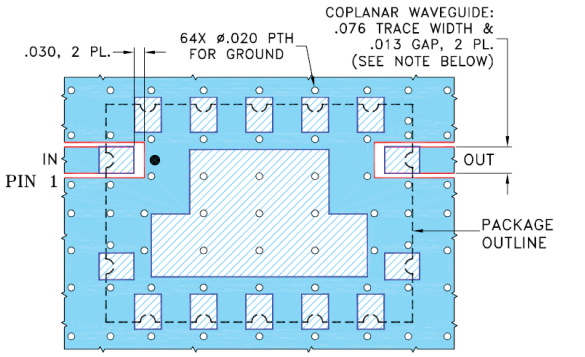


Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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	9
GROUND	2 to 8,10 to 14

Demo Board MCL P/N: TB-577+
Suggested PCB Layout (PL-332)

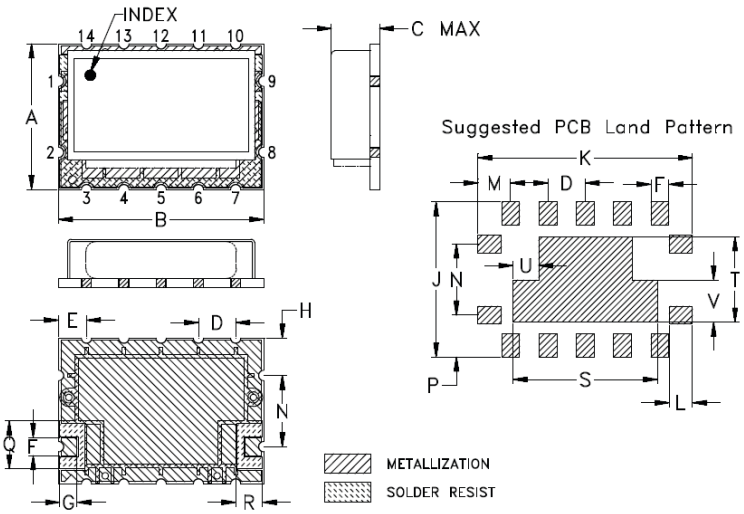


NOTE: 1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .060" ± .004"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Outline Drawing



Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J	K	L
.625	.880	.225	.160	.120	.077	.070	.160	.665	.920	.100
15.88	22.35	5.72	4.06	3.05	1.96	1.78	4.06	16.89	23.37	2.54

M	N	P	Q	R	S	T	U	V	wt
.140	.305	.180	.205	.115	.620	.365	.110	.180	grams
3.56	7.75	4.57	5.21	2.92	15.75	9.27	2.79	4.57	4.4

Note: Please refer to case style drawing for details

Surface Mount Band Pass Filter CSBP-D1228+

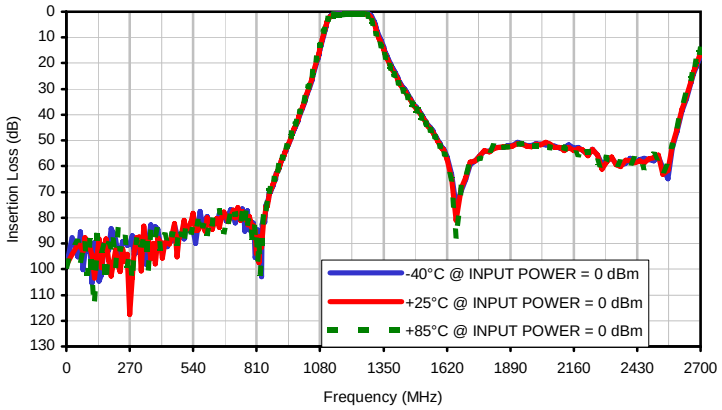
Typical Performance Data

FREQ.	INSERTION LOSS			INPUT VSWR			OUTPUT VSWR		
(MHz)	(dB)			(:1))			(:1))		
	@ -40° C	@ +25° C	@ +85° C	@ -40° C	@ +25° C	@ +85° C	@ -40° C	@ +25° C	@ +85° C
1.0	98.66	98.36	98.87	378199.63	9454.68	6002.84	6520.72	15758.32	31516.63
50.0	95.30	90.49	89.55	1949.55	94549.92	37819.96	2760.57	3534.44	11123.20
100.0	91.54	91.85	89.04	1089.91	2264.57	992.62	6753.72	2682.22	1264.84
200.0	85.82	98.20	87.20	879.56	1089.84	806.36	2237.86	1405.91	718.99
400.0	90.82	89.52	91.78	717.66	494.35	314.63	969.74	881.56	402.75
500.0	88.36	81.13	90.88	1102.64	345.06	211.87	2720.88	378.56	295.46
800.0	88.87	86.20	83.50	387.49	122.31	97.48	414.22	162.60	131.54
900.0	62.21	61.78	61.71	190.72	90.22	74.36	224.18	118.11	97.40
940.0	52.78	52.56	52.12	147.96	78.21	64.64	162.03	97.53	80.90
1000.0	38.75	38.27	37.68	89.88	55.29	46.47	98.51	65.75	55.27
1010.0	36.11	35.58	34.93	81.79	52.05	44.33	88.51	59.82	50.19
1020.0	33.45	32.88	32.14	73.34	47.91	39.91	77.45	55.40	45.20
1060.0	21.69	20.92	20.01	43.00	29.02	23.47	44.28	31.33	25.11
1100.0	7.46	6.83	6.13	9.43	6.89	5.37	9.35	6.90	5.33
1150.0	0.70	1.00	1.23	1.48	1.50	1.57	1.48	1.50	1.57
1160.0	0.69	0.99	1.22	1.47	1.51	1.58	1.47	1.52	1.59
1200.0	0.65	0.88	1.01	1.36	1.32	1.26	1.37	1.33	1.26
1203.0	0.64	0.86	0.99	1.33	1.28	1.22	1.34	1.28	1.21
1204.0	0.62	0.85	0.97	1.32	1.27	1.20	1.32	1.27	1.20
1206.0	0.61	0.84	0.96	1.29	1.24	1.17	1.30	1.24	1.17
1208.0	0.60	0.82	0.95	1.26	1.21	1.14	1.27	1.21	1.13
1210.0	0.59	0.81	0.94	1.24	1.18	1.12	1.25	1.18	1.10
1212.0	0.57	0.79	0.92	1.21	1.15	1.09	1.22	1.15	1.07
1214.0	0.54	0.76	0.91	1.18	1.12	1.07	1.19	1.13	1.04
1216.0	0.52	0.75	0.90	1.15	1.09	1.06	1.17	1.10	1.02
1218.0	0.51	0.74	0.89	1.13	1.07	1.06	1.14	1.07	1.03
1220.0	0.50	0.73	0.89	1.10	1.04	1.08	1.12	1.05	1.06
1222.0	0.48	0.72	0.88	1.07	1.02	1.10	1.09	1.04	1.08
1224.0	0.47	0.71	0.89	1.05	1.03	1.13	1.07	1.04	1.11
1226.0	0.46	0.71	0.89	1.02	1.05	1.15	1.06	1.06	1.14
1227.0	0.46	0.71	0.89	1.01	1.06	1.16	1.06	1.07	1.16
1228.0	0.46	0.71	0.90	1.01	1.08	1.18	1.05	1.08	1.17
1230.0	0.45	0.71	0.89	1.03	1.10	1.20	1.06	1.11	1.20
1232.0	0.45	0.71	0.90	1.06	1.13	1.23	1.07	1.13	1.22
1234.0	0.45	0.71	0.91	1.08	1.15	1.25	1.09	1.15	1.25
1236.0	0.45	0.72	0.91	1.10	1.17	1.27	1.11	1.18	1.27
1238.0	0.45	0.71	0.91	1.12	1.20	1.29	1.13	1.20	1.29
1240.0	0.44	0.72	0.91	1.14	1.21	1.31	1.15	1.22	1.31
1242.0	0.44	0.72	0.91	1.16	1.23	1.32	1.17	1.23	1.32
1244.0	0.45	0.72	0.92	1.18	1.25	1.33	1.18	1.25	1.33
1246.0	0.46	0.73	0.93	1.20	1.26	1.33	1.20	1.26	1.33
1248.0	0.46	0.73	0.93	1.21	1.26	1.33	1.21	1.26	1.33
1250.0	0.46	0.74	0.94	1.22	1.27	1.33	1.22	1.27	1.33
1252.0	0.48	0.75	0.94	1.22	1.26	1.32	1.22	1.26	1.32
1253.0	0.48	0.77	0.96	1.22	1.26	1.31	1.22	1.26	1.31
1260.0	0.52	0.80	1.00	1.20	1.22	1.23	1.20	1.21	1.23
1275.0	0.54	0.88	1.15	1.07	1.13	1.21	1.06	1.12	1.21
1300.0	1.86	2.72	3.60	3.15	3.60	4.19	3.13	3.60	4.22
1350.0	13.64	14.65	15.60	46.54	32.43	28.88	45.14	34.62	31.54
1380.0	20.37	21.20	21.95	113.81	55.02	43.79	104.97	62.03	49.69
1400.0	23.66	24.41	25.05	137.72	59.52	47.99	145.69	75.75	57.96
1420.0	27.45	28.10	28.63	189.85	71.59	56.09	166.53	81.72	65.38
1425.0	28.28	28.91	29.45	173.33	71.16	55.79	174.60	82.92	65.82
1450.0	31.42	32.01	32.48	160.52	70.22	55.06	183.23	89.75	70.88
1500.0	38.29	38.77	39.14	173.17	72.86	60.05	196.77	93.96	77.11
1600.0	52.62	53.16	53.51	151.76	72.70	61.07	162.94	90.98	72.77
1700.0	65.06	64.34	63.47	130.55	69.09	55.75	139.97	80.71	67.38
1900.0	52.07	52.31	51.40	117.74	61.81	48.66	110.94	69.86	56.89
2000.0	51.13	51.38	51.87	125.31	61.37	46.66	99.76	62.58	51.64
2200.0	53.96	53.64	52.05	125.86	54.48	40.34	89.53	54.59	43.18
2300.0	57.96	58.31	56.60	126.78	51.00	36.94	86.21	51.50	39.49
2500.0	57.98	56.65	55.59	134.06	46.46	32.71	79.42	43.91	32.42
2600.0	46.64	45.63	44.52	93.94	36.74	25.27	70.21	36.85	25.83
2675.0	22.85	21.93	20.77	37.43	19.39	13.50	38.75	22.57	15.60
2700.0	16.62	15.70	14.41	19.45	11.24	7.64	21.83	13.33	9.14

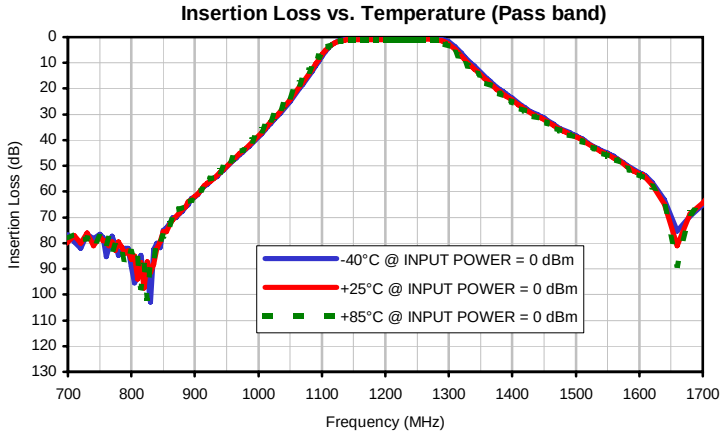
Surface Mount Band Pass Filter CSBP-D1228+

Typical Performance Curves

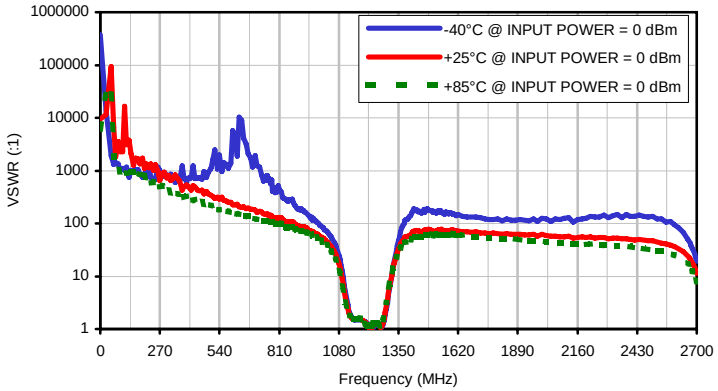
Insertion Loss vs. Temperature (Full band)



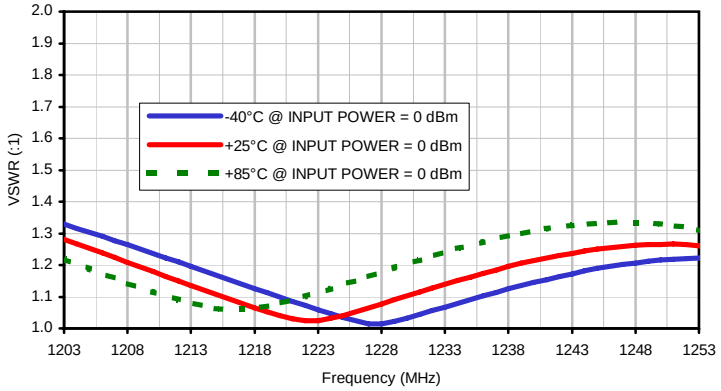
Insertion Loss vs. Temperature (Pass band)



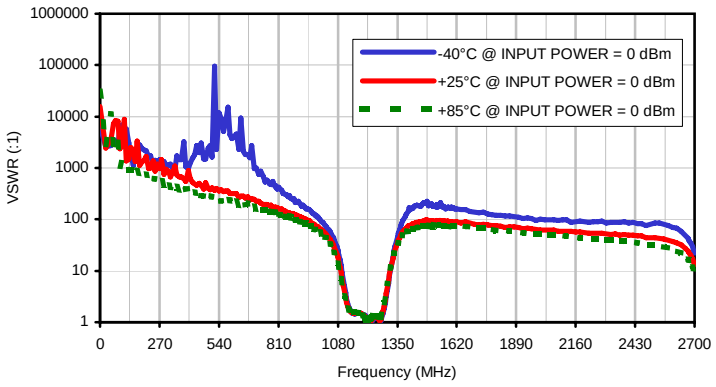
Input VSWR vs. Temperature



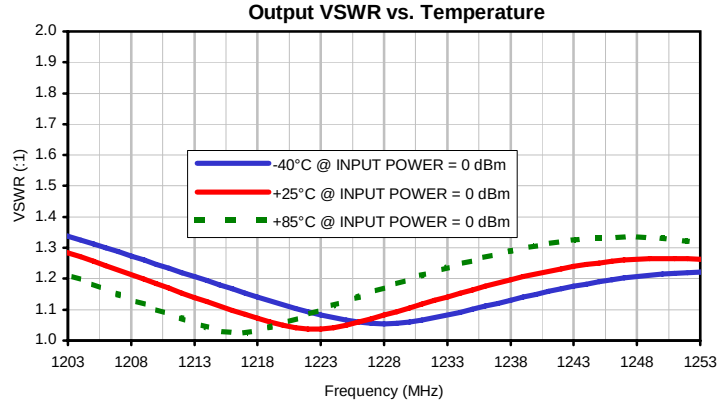
Input VSWR vs. Temperature



Output VSWR vs. Temperature



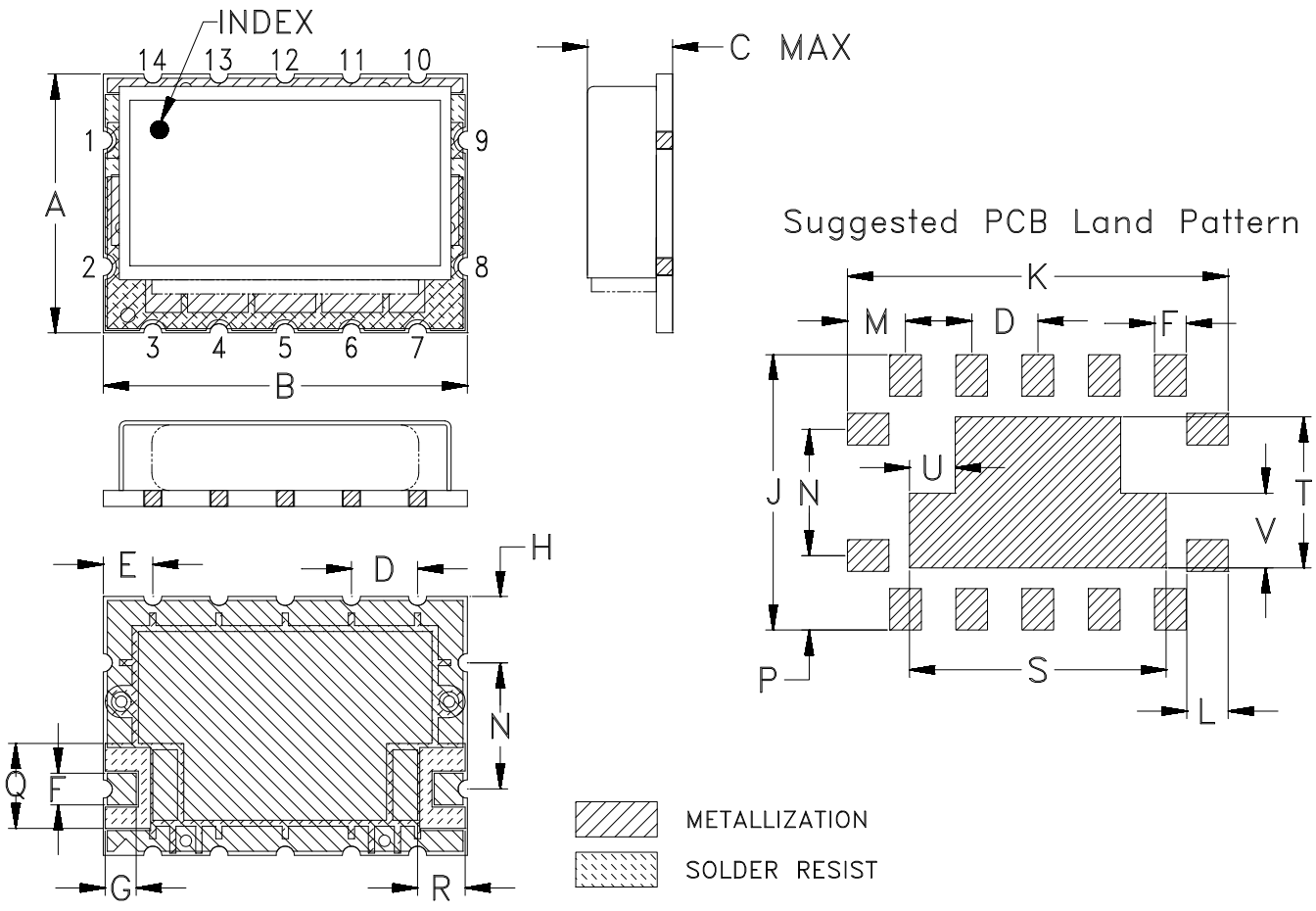
Output VSWR vs. Temperature



Case Style KS

KS1509

Outline Dimensions



CASE#	A	B	C	D	E	F	G	H	J	K	L	M
KS1509	.625 (15.88)	.880 (22.35)	.225 (5.71)	.160 (4.06)	.120 (3.05)	.077 (1.96)	.070 (1.78)	.160 (4.06)	.665 (16.89)	.920 (23.37)	.100 (2.54)	.140 (3.56)

CASE#	N	P	Q	R	S	T	U	V	WT, GRAMS
KS1509	.305 (7.75)	.180 (4.57)	.205 (5.21)	.115 (2.92)	.620 (15.75)	.365 (9.27)	.110 (2.79)	.180 (4.57)	4.4

Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3PL. ± .015

Mini-Circuits®
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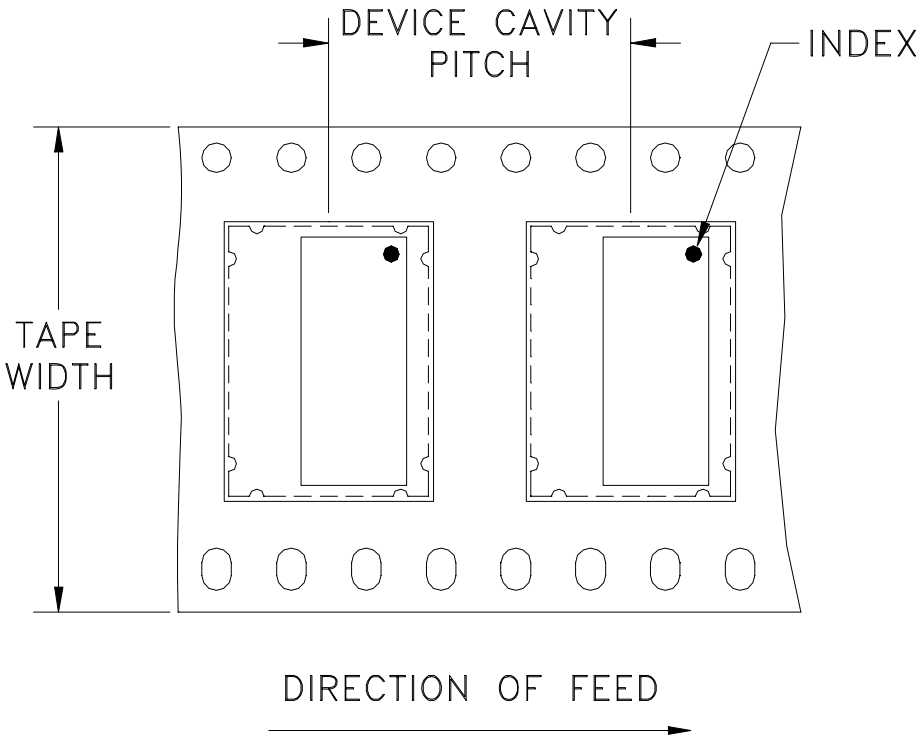
Mini-Circuits ISO 9001 & ISO 14001 Certified

Tape & Reel Packaging TR-F106

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
44	24	13	250

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

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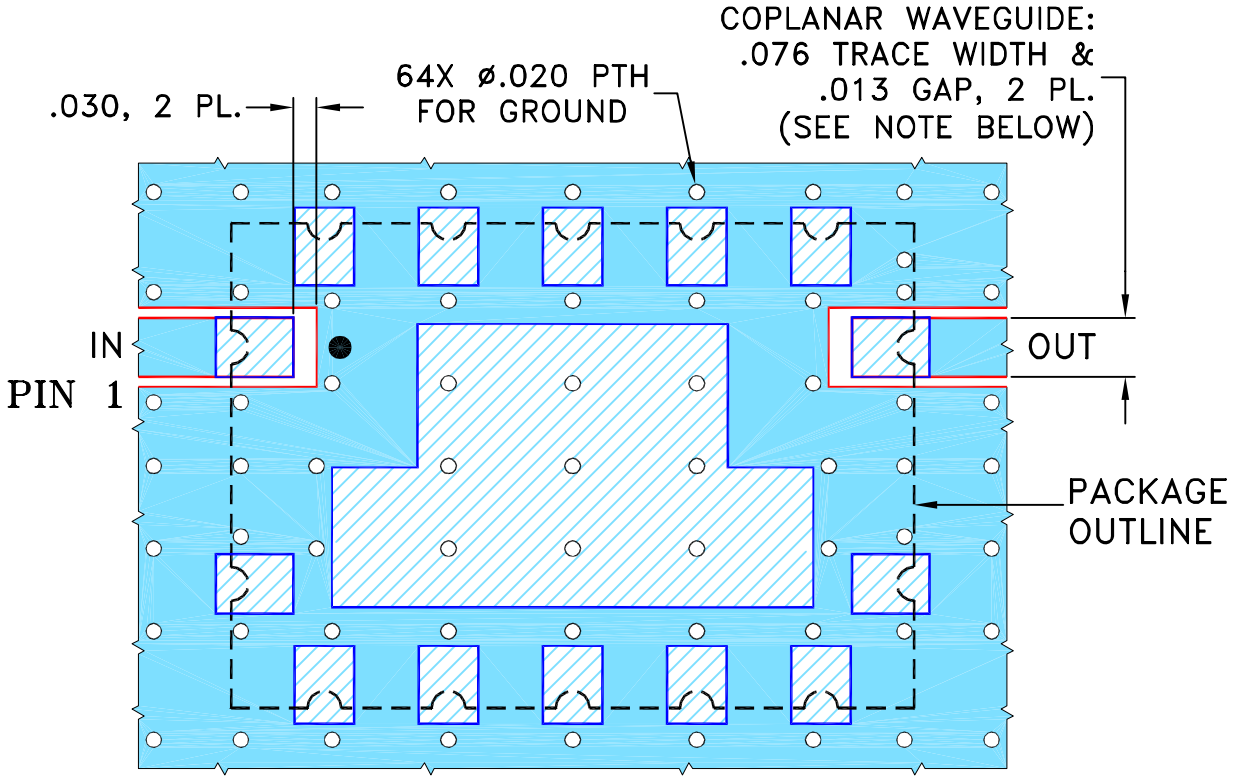
Mini-Circuits ISO 9001 & ISO 14001 Certified

THIRD ANGLE PROJECTION

REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M126877	NEW RELEASE	04/19/10	MMG	RD

SUGGESTED MOUNTING CONFIGURATION FOR KS1509 CASE STYLE, "14FL04" PIN CODE



NOTE: 1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .060" ± .004";
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 SOLDER MASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	MMG	03/26/10
TOLERANCES ON:	CHECKED	IL	04/19/10
2 PL DECIMALS ±	APPROVED	RD	04/19/10
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

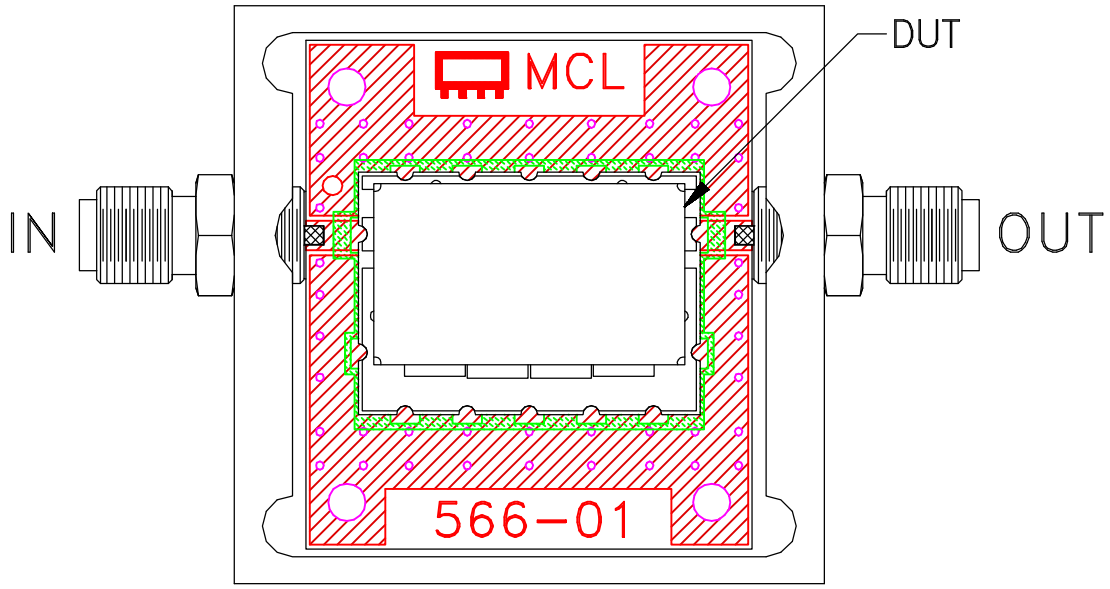
ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

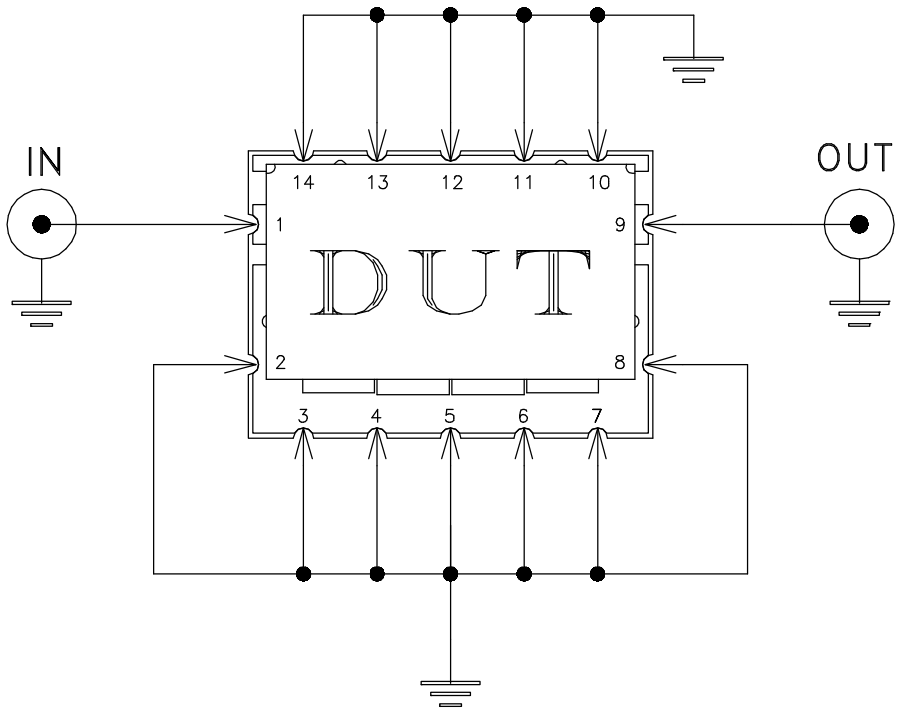
PL, 14FL04, KS1509, TB-577+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-332	OR
FILE: 98PL332	SCALE: 4:1	SHEET: 1 OF 1	

Evaluation Board and Circuit



TB-577+



SCHEMATIC DIAGRAM

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.020 inch.

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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