

## 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

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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](http://www.minicircuits.com/MCLStore/terms.jsp)



# Surface Mount Bandpass Filter

## CBP4-T2656R25+

50Ω 2631.5 to 2681 MHz



Generic photo used for illustration purposes only  
CASE STYLE: VS2537

### Features

- Low Insertion Loss, 1.8dB typ.
- High rejection, 50dB typ.
- Compact shielded package

### Applications

- Defense systems
- Fixed satellite service
- Radio astronomy

### Electrical Specifications<sup>1</sup> at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	-	-	-	2656.25	-	MHz
	Insertion Loss	F1-F2	2631.5 - 2681	-	1.8	2.4	dB
	VSWR	F1-F2	2631.5 - 2681	-	1.42	1.92	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 2200	55	65	-	dB
		F3-F4	2200 - 2535	20	27	-	dB
Stop Band, Upper	Insertion Loss	F5-F6	2775 - 2920	20	27	-	dB
		F6-F7	2920 - 3500	40	50	-	dB
		F7-F8	3500 - 4500	-	38	-	dB

1. Measured on Mini-Circuits Characterization Test Board TBCBP4T2656R25+

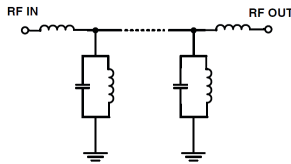
### Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input*	6W at 25°C

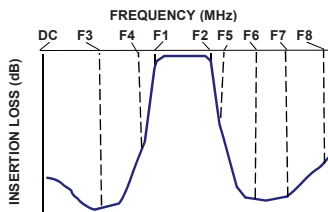
Permanent damage may occur if any of these limits are exceeded.

\*Passband rating

### Functional Schematic



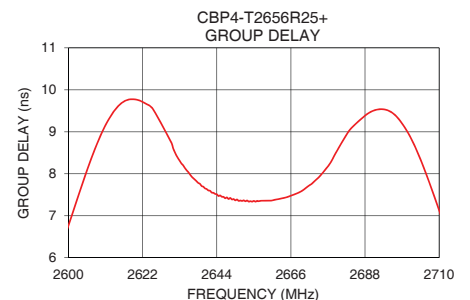
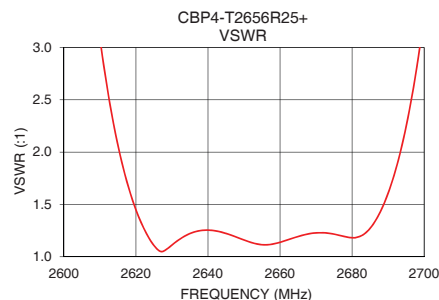
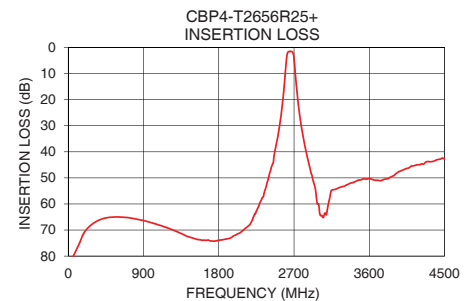
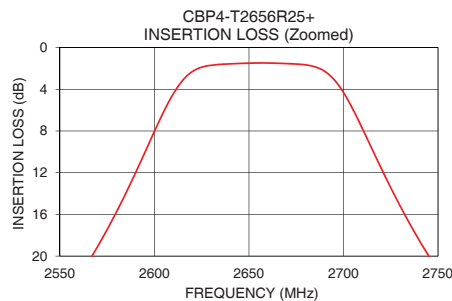
### Typical Frequency Response



### Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (ns)
1.00	103.25	288.90	2631.50	8.52
100.00	77.36	204.23	2634.50	8.14
1000.00	67.23	390.99	2637.50	7.86
2000.00	71.94	623.76	2640.00	7.69
2200.00	66.20	332.99	2643.50	7.52
2535.00	28.33	62.35	2646.00	7.45
2565.00	20.59	33.76	2649.50	7.37
2617.00	2.75	1.78	2652.00	7.37
2631.50	1.66	1.15	2654.50	7.34
2645.00	1.53	1.22	2656.25	7.35
2656.25	1.48	1.11	2658.25	7.36
2665.25	1.51	1.20	2661.25	7.38
2681.00	1.69	1.18	2664.25	7.43
2693.00	2.70	1.95	2667.25	7.52
2747.00	20.54	38.23	2670.25	7.65
2775.00	27.62	66.08	2672.25	7.77
2920.00	49.84	168.46	2674.25	7.91
3500.00	50.76	191.43	2676.25	8.10
4000.00	46.98	171.25	2678.25	8.33
4500.00	42.71	194.12	2681.00	8.82

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



### Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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](http://www.minicircuits.com/MCLStore/terms.jsp)

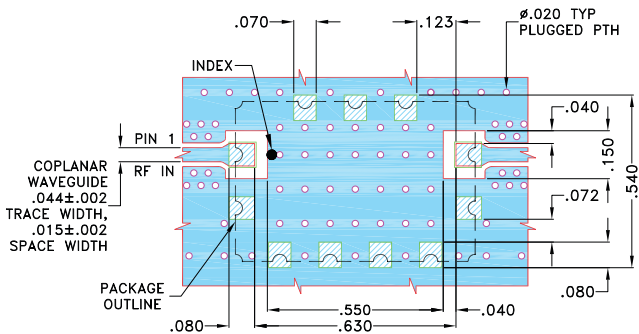


## Pad Connections

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

**Demo Board MCL P/N: TBCBP4T2656R25+**  
**Suggested PCB Layout (PL-716)**

### SUGGESTED MOUNTING CONFIGURATION FOR VS2537 CASE STYLE

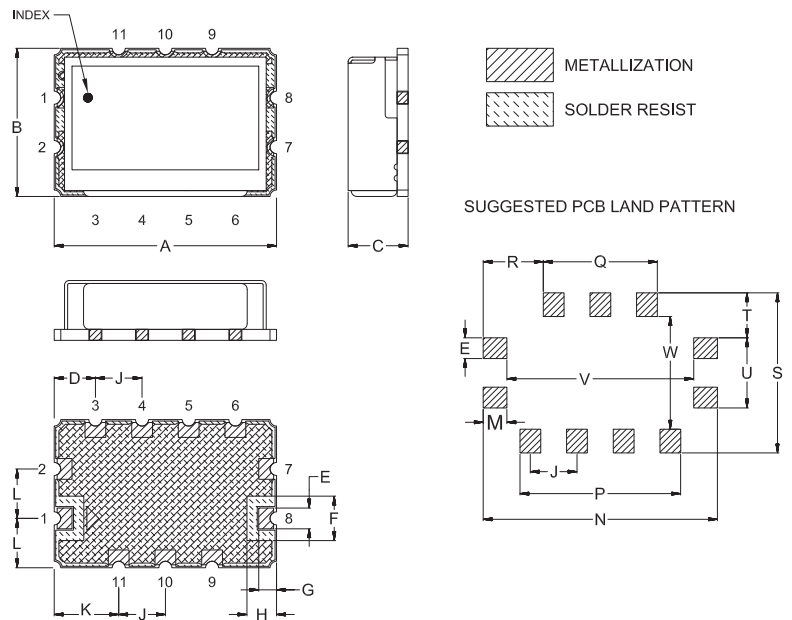


#### NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .023±.002. COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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	N	
.750	.500	.210	.139	.070	.150	.060	.100	.157	.218	.167	.080	.790	
19.05	12.70	5.33	3.53	1.78	3.81	1.52	2.54	3.99	5.54	4.24	2.03	20.06	
P	Q	R	S	T	U	V	W						Wt.
.542	.385	.203	.540	.152	.237	.630	.380						grams
13.77	9.78	5.16	13.72	3.86	6.02	16.00	9.65						2.0

Note: Please refer to case style drawing for details

#### Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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](http://www.minicircuits.com/MCLStore/terms.jsp)

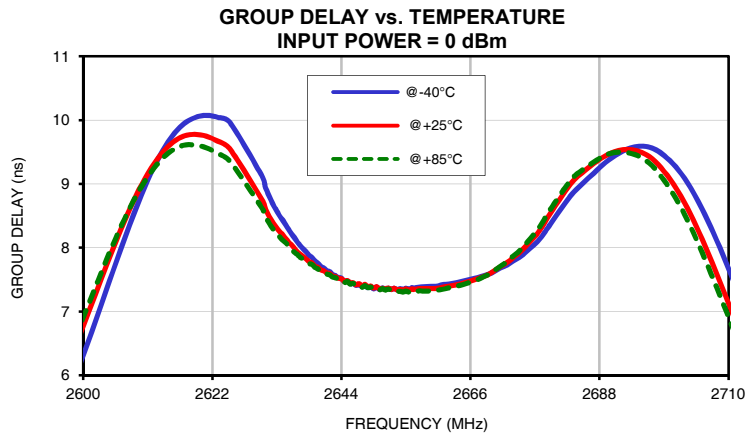
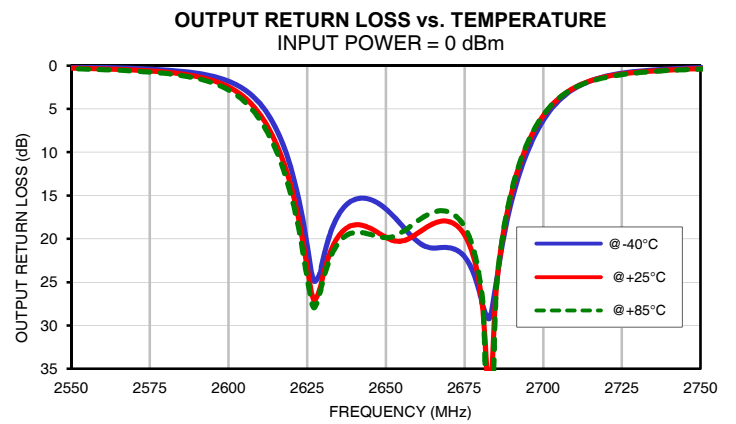
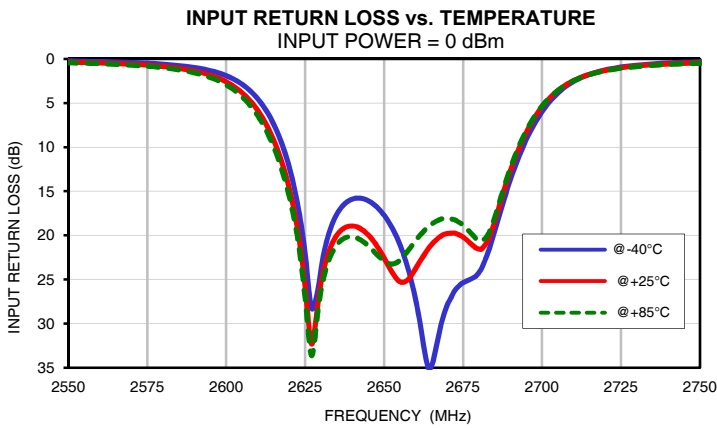
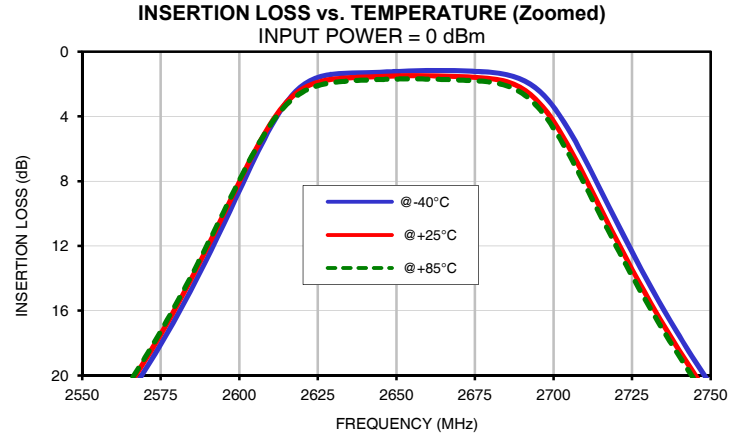
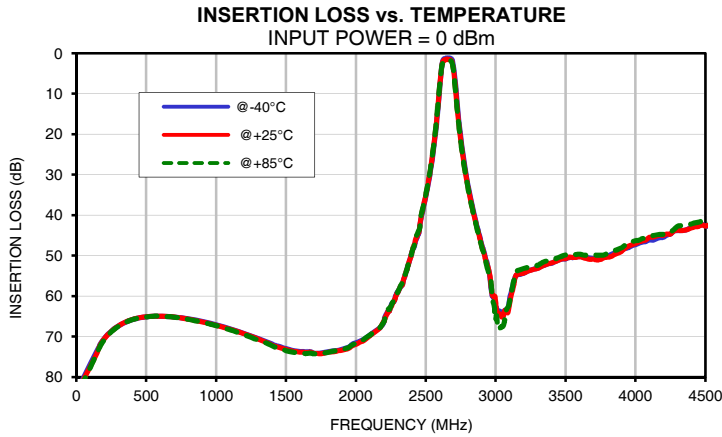
## Typical Performance Data

FREQ.  (MHz)	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1.00	109.14	103.25	97.71	0.06	0.06	0.06	0.06	0.06	0.06
10.00	93.81	96.29	94.65	0.06	0.07	0.07	0.06	0.07	0.07
50.00	80.28	80.71	81.24	0.07	0.08	0.08	0.09	0.10	0.10
100.00	76.85	77.36	77.70	0.07	0.09	0.09	0.10	0.11	0.12
300.00	67.43	67.43	67.51	0.07	0.09	0.10	0.07	0.10	0.11
500.00	65.15	65.09	65.14	0.05	0.07	0.09	0.04	0.07	0.09
700.00	65.18	65.17	65.21	0.03	0.06	0.08	0.03	0.07	0.09
1000.00	67.09	67.23	67.31	0.01	0.04	0.07	0.01	0.04	0.07
1200.00	69.22	69.31	69.54	0.02	0.03	0.07	0.04	0.02	0.06
1400.00	71.84	72.09	72.30	0.04	0.03	0.06	0.05	0.02	0.05
1500.00	72.98	73.18	73.47	0.04	0.02	0.06	0.06	0.01	0.04
1700.00	74.10	74.17	74.29	0.05	0.02	0.06	0.08	0.01	0.03
1800.00	73.74	73.90	73.94	0.05	0.02	0.05	0.08	0.01	0.03
1900.00	73.18	73.39	73.22	0.05	0.02	0.06	0.08	0.01	0.02
2000.00	71.56	71.94	71.71	0.04	0.03	0.06	0.08	0.01	0.03
2100.00	69.68	69.85	69.65	0.03	0.03	0.07	0.07	0.00	0.03
2200.00	66.45	66.20	66.40	0.02	0.05	0.08	0.07	0.00	0.03
2300.00	58.86	59.07	58.99	0.00	0.07	0.10	0.05	0.02	0.05
2411.00	48.25	47.93	48.04	0.02	0.10	0.13	0.03	0.05	0.08
2527.00	30.49	30.05	29.92	0.14	0.25	0.30	0.09	0.19	0.25
2535.00	28.80	28.33	28.20	0.16	0.28	0.33	0.11	0.22	0.28
2565.00	21.16	20.59	20.43	0.34	0.51	0.60	0.28	0.44	0.55
2595.00	10.66	10.04	9.90	1.32	1.84	2.10	1.25	1.73	2.01
2617.00	2.65	2.75	2.92	9.03	11.06	11.87	8.84	10.70	11.58
2631.50	1.36	1.66	1.87	21.09	22.97	23.92	20.32	22.40	23.00
2635.00	1.32	1.62	1.81	17.61	19.99	21.07	17.21	19.67	20.44
2640.00	1.30	1.57	1.76	15.88	18.93	20.17	15.47	18.40	19.27
2645.00	1.27	1.53	1.71	16.08	19.96	21.20	15.46	18.77	19.49
2650.00	1.23	1.50	1.69	17.71	22.56	22.91	16.54	19.82	19.85
2656.25	1.18	1.48	1.68	22.27	25.31	22.32	18.94	20.16	18.98
2660.25	1.16	1.49	1.70	27.74	23.62	20.48	20.36	19.31	17.89
2665.25	1.16	1.51	1.72	34.59	20.95	18.66	21.06	18.22	16.91
2670.25	1.18	1.54	1.75	27.71	19.77	18.08	21.03	18.03	16.94
2675.25	1.22	1.59	1.80	25.31	20.25	18.93	22.17	19.70	18.78
2681.00	1.30	1.69	1.92	23.64	21.51	20.64	27.99	28.96	28.23
2693.00	2.06	2.70	3.03	10.79	9.87	9.63	11.88	10.93	10.74
2717.00	9.34	10.46	10.91	1.51	1.54	1.58	1.52	1.55	1.62
2747.00	19.70	20.54	20.88	0.35	0.45	0.51	0.29	0.40	0.46
2775.00	26.97	27.62	27.89	0.17	0.26	0.31	0.09	0.19	0.24
2787.00	29.55	30.14	30.40	0.14	0.22	0.26	0.06	0.15	0.19
2851.00	40.47	40.91	41.10	0.06	0.13	0.16	0.02	0.06	0.09
2899.00	47.10	47.43	47.65	0.04	0.11	0.14	0.05	0.03	0.06
2920.00	49.54	49.84	50.07	0.03	0.10	0.13	0.05	0.03	0.06
3000.00	62.79	61.38	66.05	0.02	0.09	0.12	0.05	0.02	0.04
3050.00	64.84	65.16	67.56	0.02	0.09	0.12	0.05	0.03	0.05
3100.00	60.77	61.79	61.36	0.02	0.09	0.12	0.05	0.03	0.05
3200.00	54.34	54.33	53.20	0.01	0.09	0.12	0.05	0.03	0.06
3300.00	53.12	53.19	52.41	0.01	0.08	0.12	0.05	0.04	0.06
3400.00	51.89	51.82	51.18	0.02	0.09	0.14	0.04	0.04	0.08
3500.00	50.84	50.76	49.84	0.01	0.09	0.14	0.04	0.05	0.09
3600.00	50.22	50.27	49.63	0.01	0.10	0.16	0.04	0.06	0.11
3700.00	50.69	50.89	49.81	0.01	0.10	0.16	0.01	0.08	0.12
3800.00	50.12	50.42	49.44	0.00	0.10	0.16	0.04	0.07	0.13
3900.00	48.76	48.97	48.08	0.00	0.11	0.16	0.03	0.09	0.16
4000.00	47.28	46.98	46.31	0.01	0.10	0.19	0.03	0.09	0.17
4100.00	46.09	45.49	45.42	0.00	0.11	0.19	0.02	0.11	0.19
4200.00	45.47	44.98	44.76	0.03	0.08	0.18	0.03	0.10	0.19
4300.00	43.78	43.71	42.77	0.02	0.10	0.20	0.03	0.10	0.21
4400.00	42.95	43.15	42.20	0.04	0.17	0.22	0.01	0.17	0.25
4500.00	42.67	42.71	41.36	0.03	0.09	0.20	0.00	0.14	0.22

*Typical Performance Data*

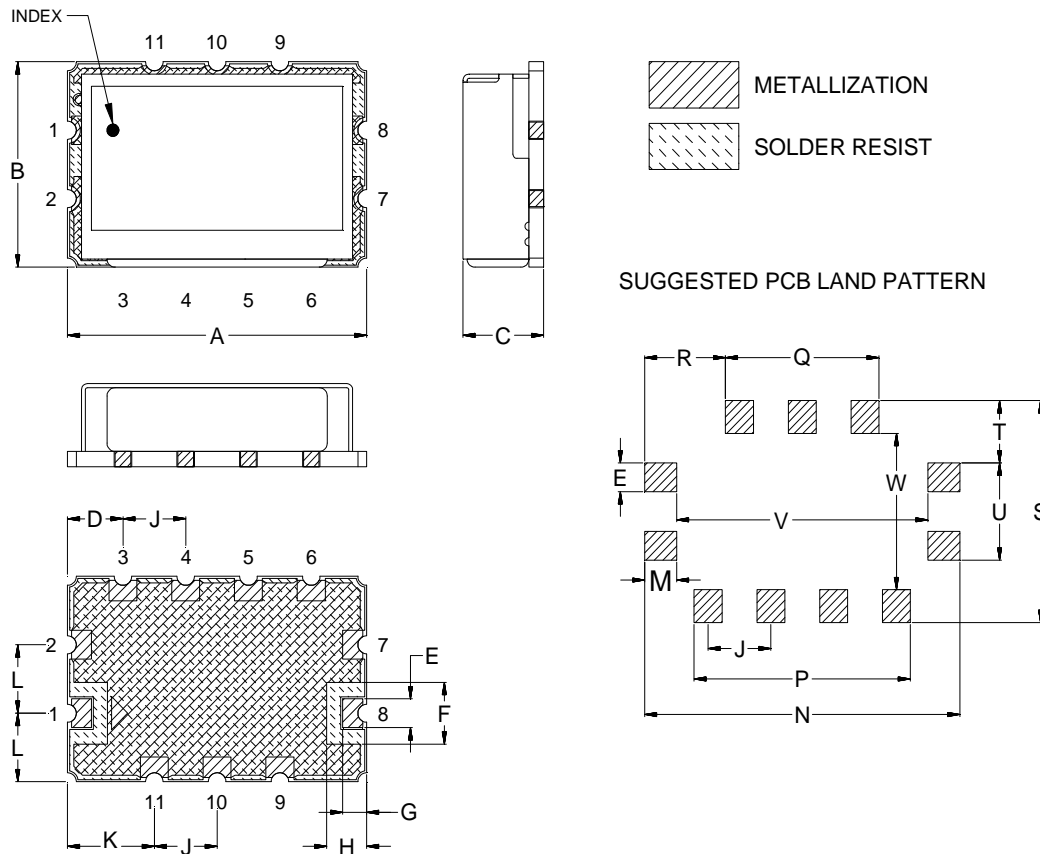
FREQ.  (MHz)	GROUP DELAY		
	(nsec)		
	@-40°C	@+25°C	@+85°C
2631.50	8.85	8.52	8.41
2632.00	8.75	8.44	8.34
2633.00	8.58	8.31	8.22
2634.00	8.43	8.20	8.12
2635.00	8.29	8.09	8.03
2636.00	8.16	7.99	7.93
2637.00	8.03	7.90	7.85
2638.00	7.93	7.82	7.79
2639.00	7.85	7.76	7.74
2640.00	7.76	7.69	7.67
2641.00	7.68	7.64	7.61
2642.00	7.63	7.60	7.57
2643.00	7.56	7.55	7.53
2644.00	7.52	7.51	7.50
2645.00	7.48	7.48	7.47
2646.00	7.44	7.45	7.44
2647.00	7.42	7.44	7.42
2648.00	7.40	7.42	7.40
2649.00	7.39	7.40	7.38
2650.00	7.38	7.39	7.37
2651.00	7.37	7.36	7.36
2652.00	7.36	7.37	7.35
2653.00	7.36	7.36	7.34
2654.00	7.36	7.35	7.32
2655.00	7.36	7.35	7.32
2656.00	7.37	7.36	7.32
2656.25	7.37	7.35	7.31
2657.25	7.38	7.36	7.32
2658.25	7.39	7.36	7.32
2659.25	7.39	7.36	7.32
2660.25	7.39	7.36	7.33
2661.25	7.42	7.38	7.35
2662.25	7.43	7.40	7.37
2663.25	7.45	7.41	7.39
2664.25	7.46	7.43	7.41
2665.25	7.49	7.46	7.44
2666.25	7.51	7.49	7.47
2667.25	7.53	7.52	7.50
2668.25	7.56	7.55	7.54
2669.25	7.59	7.59	7.59
2670.25	7.64	7.65	7.65
2671.25	7.69	7.71	7.72
2672.25	7.73	7.77	7.78
2673.25	7.79	7.84	7.87
2674.25	7.84	7.91	7.94
2675.25	7.92	8.00	8.04
2676.25	8.00	8.10	8.15
2677.25	8.08	8.20	8.26
2678.25	8.19	8.33	8.39
2679.25	8.32	8.49	8.55
2681.00	8.63	8.82	8.88

## Typical Performance Curves



## Outline Dimensions

VS2537



CASE#	A	B	C	D	E	F	G	H	J	K	L	M
VS2537	.750 (19.05)	.500 (12.70)	.210 (5.33)	.139 (3.53)	.070 (1.78)	.150 (3.81)	.060 (1.52)	.100 (2.54)	.157 (3.99)	.218 (5.54)	.167 (4.24)	.080 (2.03)

CASE#	N	P	Q	R	S	T	U	V	W	WT.GRAMS
VS2537	.790 (20.06)	.542 (13.77)	.385 (9.78)	.203 (5.16)	.540 (13.72)	.152 (3.86)	.237 (6.02)	.630 (16.00)	.380 (9.65)	2.0

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .03$ ; 3 Pl.  $\pm .015$

### Notes:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. Termination finish:
  - For RoHS Case Styles: 3-5  $\mu$  inch Gold over 120-240  $\mu$  inch Nickel plate.
  - For RoHS-5 Case Styles: Tin-Lead plate.



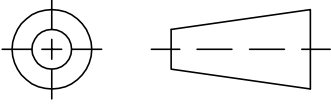
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

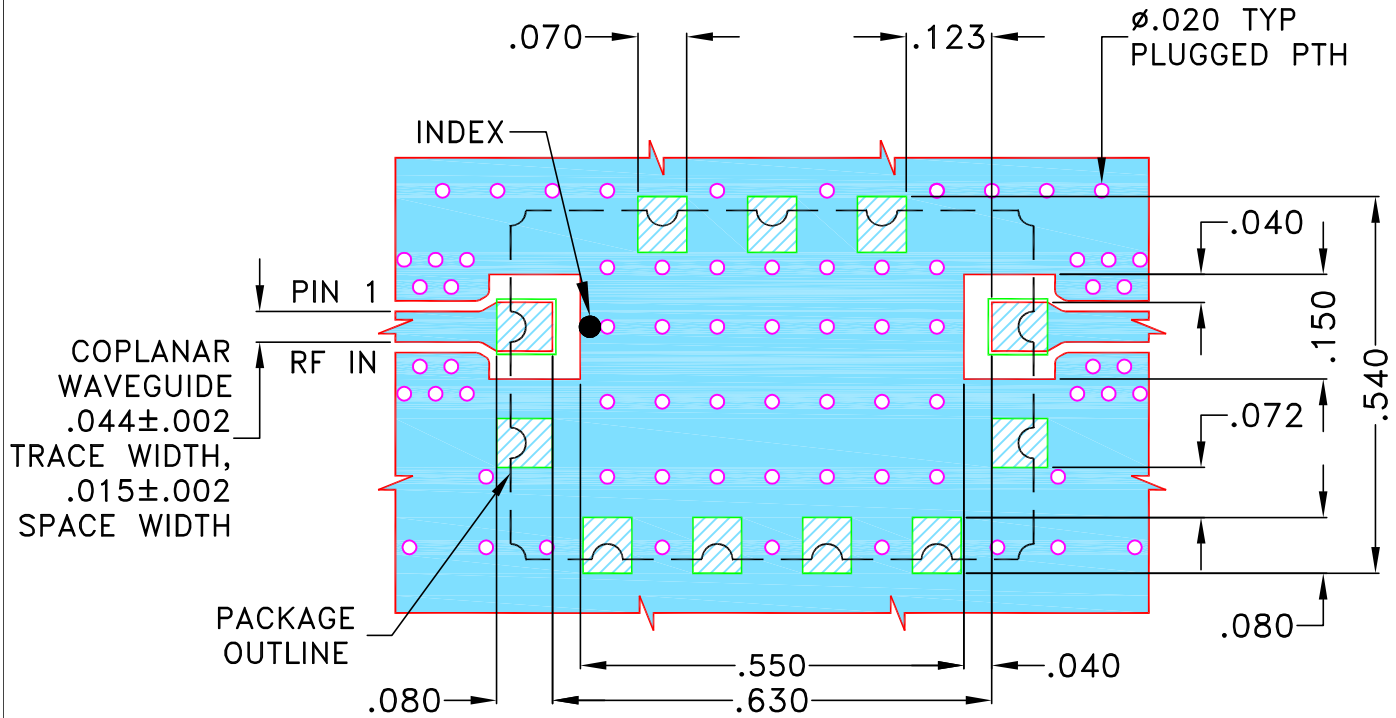
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	NPO-001982	NEW RELEASE	AUG 21	AP	VC

SUGGESTED MOUNTING CONFIGURATION FOR VS2537 CASE STYLE



NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS  $.023 \pm .002$ . COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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

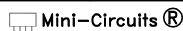
UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN AP	11 AUG 21
TOLERANCES ON:	CHECKED DDR	11 AUG 21
2 PL DECIMALS ±	APPROVED KN	11 AUG 21
3 PL DECIMALS ± .005"		
ANGLES ±		
FRACTIONS ±		



Mini-Circuits®

13 Neptune Avenue  
Brooklyn NY 11235

PL DWG VS2537 C.S 50 OHM CBP4

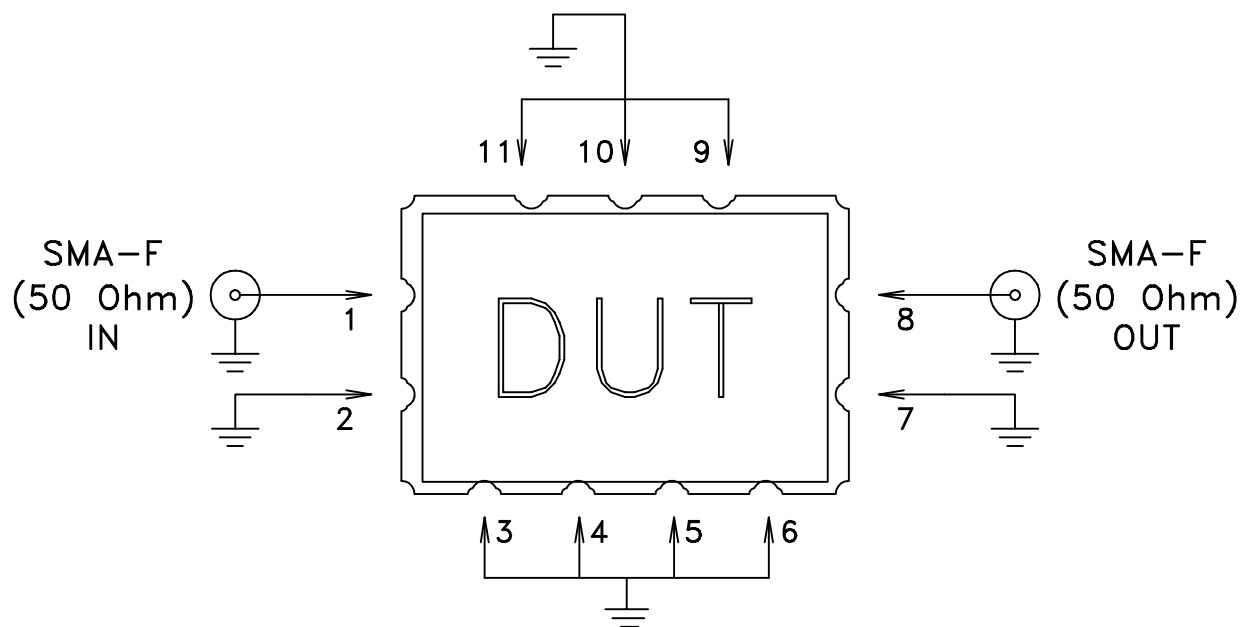
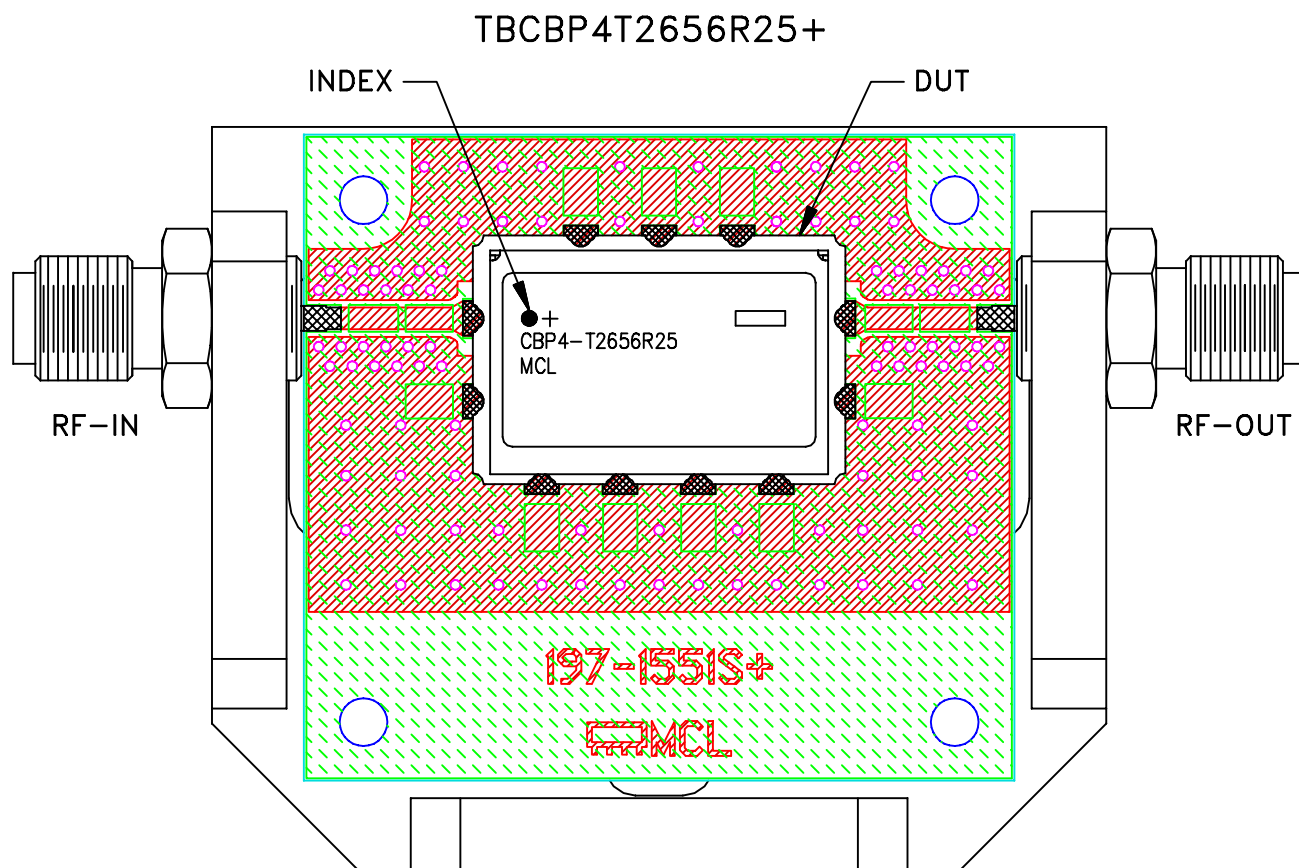


THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-716	OR
FILE:	98-PL-716	SCALE:	3:1
		SHEET:	1 OF 1



# Evaluation Board and Circuit



Schematic diagram

**Notes:**

1. 50 Ohm SMA female connectors.
2. PCB Material: R04350B OR Equivalent  
Dielectric Constant=3.48±.05, Thickness=.023 inch.

 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