

## 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

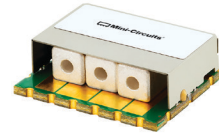
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# Surface Mount Bandpass Filter

## CBP6-950BB+

50Ω 940 to 960 MHz



Generic photo used for illustration purposes only  
CASE STYLE: KV1710-2

### Features

- Sharp roll-off
- Low passband Insertion loss
- Miniature shielded package

### Applications

- GSM
- Broadcasting
- Mobile Satellite

### Electrical Specifications at 25°C

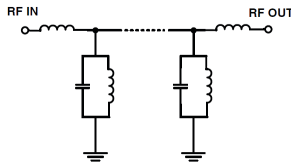
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	-	-	-	950	-	MHz
	Insertion Loss	F1-F2	940 - 960	-	1.6	2.2	dB
	VSWR	F1-F2	940 - 960	-	1.47	1.78	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 800	40	52	-	dB
Stop Band, Upper		F4-F5	1040 - 1800	40	52	-	dB

### Maximum Ratings

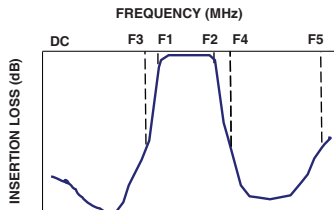
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	10 W at 25°C

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

### Functional Schematic



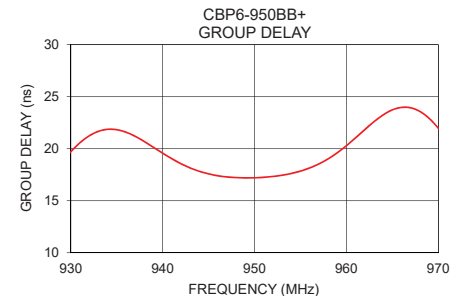
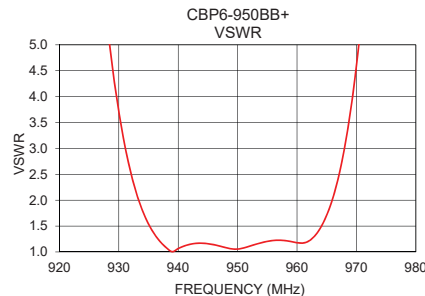
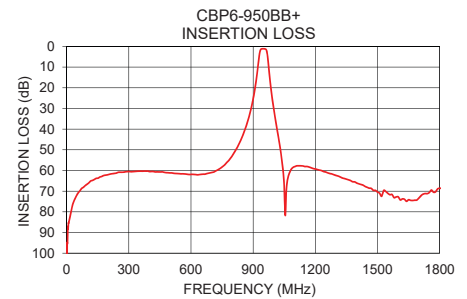
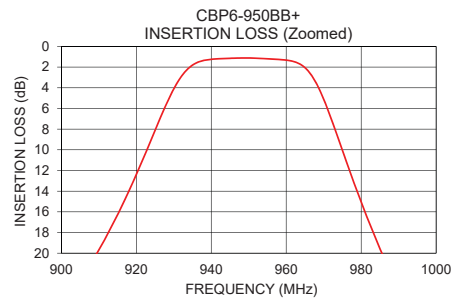
### Typical Frequency Response



### Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (ns)
1.00	95.74	1103.15	940	19.57
10.00	85.45	106.20	941	19.04
107.64	65.96	82.94	942	18.56
302.92	60.53	97.65	943	18.15
800.00	52.79	273.25	944	17.83
890.00	30.13	118.40	945	17.59
900.00	25.45	84.16	946	17.40
931.00	3.48	3.06	947	17.29
940.00	1.25	1.07	948	17.23
945.00	1.15	1.16	949	17.20
950.00	1.12	1.06	950	17.21
955.00	1.20	1.21	951	17.26
960.00	1.33	1.18	952	17.34
968.00	3.54	3.01	953	17.45
986.00	20.39	41.87	954	17.62
1000.00	30.62	85.43	955	17.85
1040.00	56.04	181.39	956	18.15
1500.00	70.43	224.62	957	18.54
1600.00	72.75	201.40	958	19.03
1800.00	68.61	149.34	960	20.30

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



### Notes

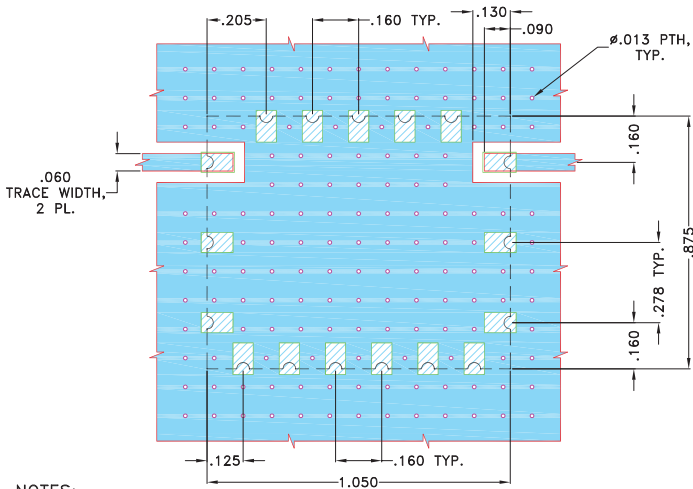
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## Pad Connections

INPUT	1
OUTPUT	12
GROUND	2,3,4,5,6,7,8,9,10,11,13,14,15,16,17

**Demo Board MCL P/N: TB-693+**  
**Suggested PCB Layout (PL-378)**

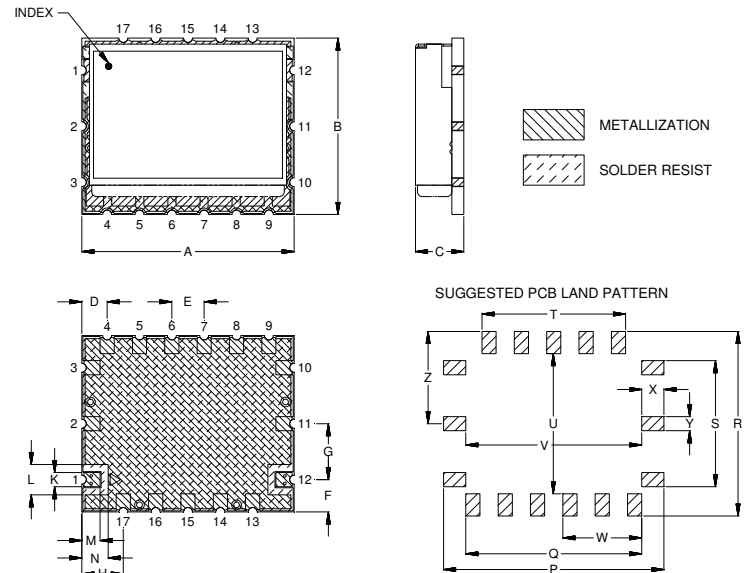


### NOTES:

- TRACE WIDTH IS SHOWN FOR OAK (OAK-602) WITH DIELECTRIC THICKNESS .022" ± .0015". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- 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
1.050	.875	.330	.125	.160	.160	.278	.205	.160	.070	.150	.090	.130
26.67	22.23	8.38	3.18	4.06	4.06	7.06	5.21	4.06	1.78	3.81	2.29	3.30
P	Q	R	S	T	U	V	W	X	Y	Z	Wt.	
1.090	.870	.915	.625	.710	.695	.870	.390	.110	.070	.458	grams	
27.69	22.10	23.24	15.88	18.03	17.65	22.10	9.91	2.79	1.78	11.63	8.5	

*Note: Please refer to case style drawing for details*

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# Surface mount Band Pass Filter

# CBP6-950BB+

## 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	94.15	95.66	95.62	0.01	0.01	0.02	0.04	0.05	0.05
10.00	85.22	85.11	83.29	0.16	0.16	0.16	0.13	0.13	0.14
107.64	65.95	65.92	66.20	0.21	0.21	0.20	0.18	0.18	0.18
116.52	65.30	65.52	65.58	0.21	0.21	0.20	0.18	0.19	0.18
125.39	64.72	64.74	64.89	0.21	0.21	0.21	0.18	0.19	0.18
134.27	64.38	64.45	64.48	0.21	0.21	0.21	0.18	0.19	0.18
143.15	63.78	64.02	64.03	0.21	0.22	0.21	0.18	0.19	0.19
152.02	63.37	63.65	63.64	0.21	0.21	0.21	0.18	0.19	0.19
302.92	60.71	60.66	60.64	0.16	0.18	0.19	0.13	0.16	0.17
311.80	60.61	60.63	60.44	0.15	0.18	0.18	0.13	0.15	0.16
400.56	60.62	60.62	60.50	0.12	0.14	0.16	0.10	0.13	0.14
507.08	61.32	61.29	61.38	0.08	0.11	0.12	0.07	0.10	0.11
800.00	52.78	52.71	52.74	0.02	0.07	0.09	0.02	0.07	0.09
810.00	51.20	51.21	51.14	0.02	0.07	0.10	0.02	0.07	0.09
840.00	45.52	45.43	45.36	0.03	0.08	0.11	0.02	0.07	0.10
850.00	43.18	43.05	43.01	0.03	0.08	0.11	0.03	0.08	0.11
860.00	40.55	40.42	40.34	0.04	0.09	0.12	0.03	0.09	0.12
890.00	30.37	30.13	30.05	0.09	0.15	0.19	0.08	0.14	0.18
900.00	25.76	25.47	25.36	0.14	0.21	0.26	0.12	0.20	0.24
905.00	23.10	22.77	22.65	0.18	0.27	0.32	0.16	0.24	0.30
910.00	20.11	19.74	19.61	0.26	0.36	0.42	0.23	0.33	0.39
915.00	16.74	16.32	16.18	0.40	0.53	0.60	0.36	0.49	0.56
920.00	12.89	12.43	12.30	0.71	0.90	1.01	0.65	0.84	0.95
931.00	3.71	3.50	3.51	4.94	5.91	6.33	4.61	5.54	5.98
935.00	1.78	1.83	1.93	11.65	13.53	14.23	10.59	12.25	12.98
940.00	1.09	1.26	1.40	32.23	29.03	28.36	21.81	22.66	23.25
942.00	1.04	1.21	1.34	22.62	22.74	23.01	20.78	21.48	21.96
945.00	1.00	1.17	1.29	20.69	22.13	22.84	20.38	21.95	22.66
950.00	0.95	1.14	1.27	30.48	31.88	30.68	28.10	29.07	28.39
952.00	0.96	1.16	1.29	30.92	26.33	25.20	27.45	25.04	24.25
955.00	1.00	1.21	1.35	22.47	21.02	20.72	21.84	20.85	20.64
960.00	1.11	1.34	1.50	21.14	21.71	22.19	23.74	26.93	28.28
968.00	2.84	3.56	3.88	6.85	6.01	5.88	7.29	6.33	6.14
970.00	4.25	5.11	5.47	4.32	3.85	3.82	4.56	4.04	3.97
980.00	14.18	15.04	15.32	0.68	0.73	0.78	0.72	0.76	0.81
986.00	19.65	20.38	20.62	0.35	0.42	0.47	0.38	0.44	0.48
1000.00	30.05	30.60	30.77	0.14	0.21	0.25	0.15	0.22	0.25
1020.00	42.26	42.73	42.87	0.07	0.13	0.16	0.07	0.13	0.17
1040.00	55.45	56.00	56.14	0.04	0.10	0.14	0.04	0.10	0.13
1100.00	58.14	58.23	58.18	0.01	0.07	0.10	0.01	0.07	0.10
1150.00	57.88	58.01	58.07	0.00	0.06	0.10	0.00	0.06	0.10
1170.00	58.32	58.45	58.47	0.00	0.06	0.10	0.00	0.06	0.10
1200.00	59.23	59.36	59.35	0.00	0.06	0.10	0.00	0.06	0.10
1220.00	59.91	59.79	60.00	0.00	0.06	0.10	0.00	0.06	0.10
1250.00	60.78	60.93	60.94	0.00	0.06	0.10	0.00	0.06	0.10
1270.00	61.39	61.48	61.51	0.00	0.07	0.11	0.00	0.06	0.10
1300.00	62.39	62.65	62.83	0.00	0.06	0.11	0.00	0.06	0.10
1310.00	62.69	62.79	63.03	0.00	0.06	0.11	0.00	0.07	0.11
1350.00	64.12	64.15	64.31	0.00	0.07	0.11	0.00	0.07	0.11
1370.00	65.04	64.93	65.13	0.00	0.07	0.11	0.00	0.07	0.11
1400.00	66.19	65.87	66.20	0.00	0.07	0.12	0.00	0.07	0.11
1410.00	66.53	66.54	66.66	0.00	0.07	0.11	0.00	0.07	0.11
1420.00	66.67	67.04	67.26	0.00	0.07	0.11	0.00	0.07	0.11
1500.00	70.48	70.87	70.89	0.01	0.08	0.13	0.01	0.08	0.13
1550.00	71.64	71.47	71.27	0.01	0.08	0.13	0.00	0.08	0.13
1600.00	73.38	73.77	73.09	0.02	0.09	0.14	0.01	0.09	0.13
1610.00	73.67	74.39	74.21	0.02	0.10	0.14	0.01	0.09	0.14
1700.00	73.41	74.07	73.32	0.03	0.11	0.16	0.02	0.10	0.15
1750.00	70.61	70.59	70.57	0.03	0.11	0.16	0.02	0.10	0.15
1800.00	69.28	71.07	69.57	0.04	0.12	0.17	0.03	0.11	0.16



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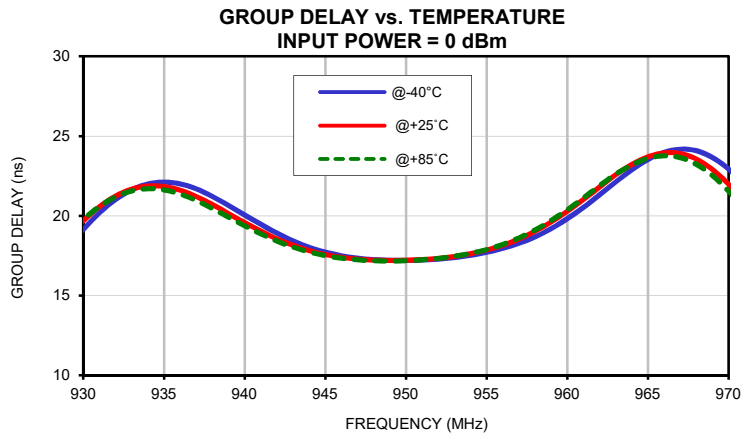
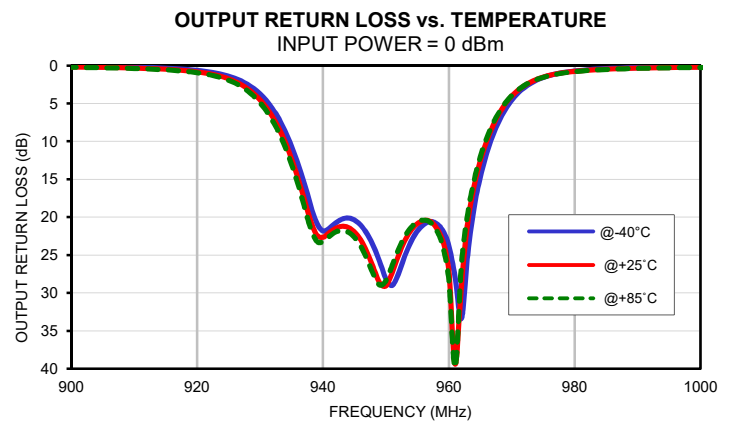
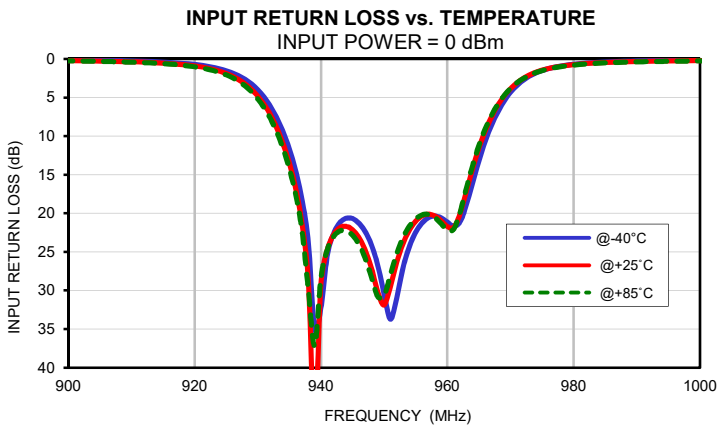
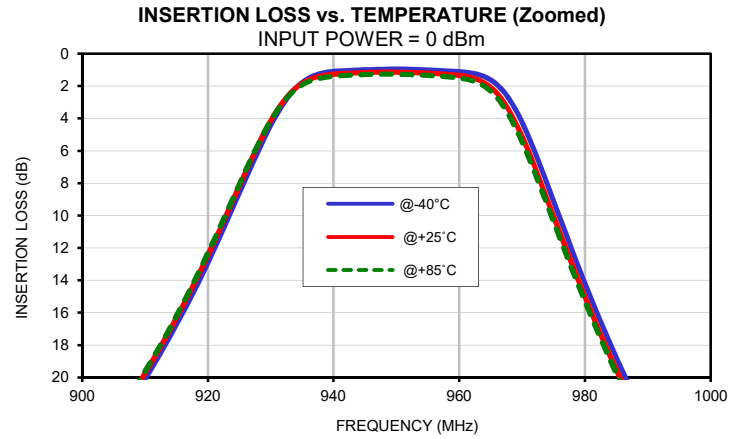
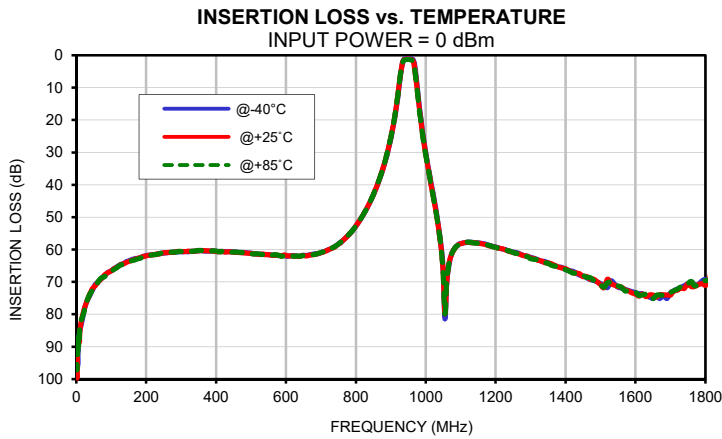
IF/RF MICROWAVE COMPONENTS

REV. OR  
CBP6-950BB+  
200817

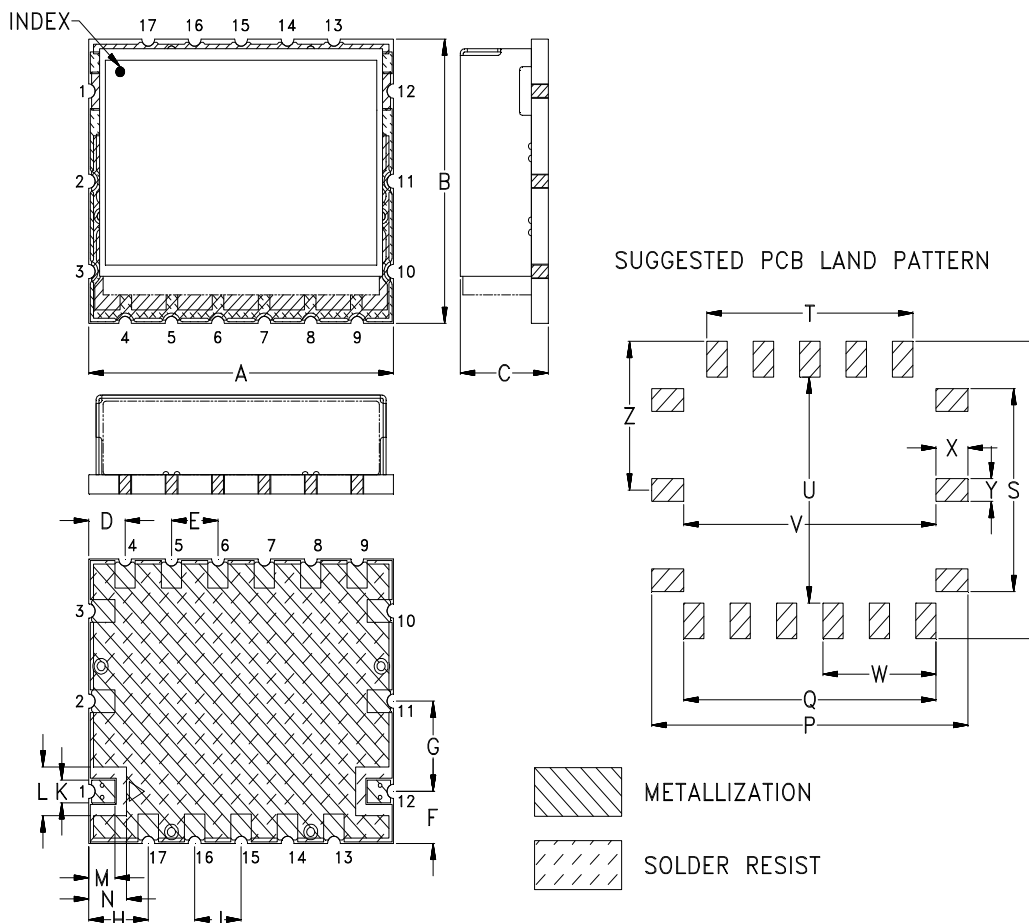
*Typical Performance Data*

FREQ.  (MHz)	GROUP DELAY		
	(nsec)		
	@-40°C	@+25°C	@+85°C
925	13.04	13.85	14.13
926	14.24	15.06	15.32
927	15.49	16.30	16.53
928	16.76	17.52	17.72
929	18.01	18.68	18.82
930	19.16	19.70	19.79
931	20.18	20.58	20.59
932	21.02	21.24	21.19
933	21.64	21.68	21.56
934	22.00	21.87	21.70
935	22.12	21.84	21.63
936	22.01	21.61	21.37
937	21.69	21.21	20.96
938	21.22	20.71	20.46
939	20.66	20.14	19.92
940	20.06	19.58	19.37
941	19.46	19.04	18.87
942	18.91	18.55	18.41
943	18.43	18.15	18.03
944	18.04	17.82	17.73
945	17.73	17.57	17.51
946	17.50	17.39	17.34
947	17.35	17.28	17.24
948	17.25	17.22	17.18
949	17.21	17.20	17.17
950	17.19	17.20	17.18
951	17.23	17.26	17.24
952	17.29	17.33	17.33
953	17.38	17.45	17.46
954	17.52	17.63	17.64
955	17.70	17.85	17.89
956	17.95	18.15	18.20
957	18.27	18.54	18.61
958	18.68	19.02	19.10
959	19.20	19.60	19.71
960	19.81	20.28	20.38
961	20.52	21.03	21.12
962	21.31	21.81	21.88
963	22.12	22.56	22.60
964	22.88	23.22	23.19
965	23.53	23.70	23.60
966	23.98	23.95	23.77
967	24.18	23.90	23.65
968	24.08	23.56	23.23
969	23.66	22.91	22.53
970	22.94	21.98	21.56
971	21.93	20.81	20.36
972	20.66	19.45	18.99
973	19.26	18.00	17.56
974	17.76	16.51	16.11
975	16.25	15.06	14.70

## Typical Performance Curves



### Outline Dimensions



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
KV1710-2	1.050 (26.67)	.875 (22.23)	.330 (8.38)	.125 (3.18)	.160 (4.06)	.160 (4.06)	.278 (7.06)	.205 (5.21)	.160 (4.06)	.070 (1.78)	.150 (3.81)	.090 (2.29)	.130 (3.30)

CASE#	P	Q	R	S	T	U	V	W	X	Y	Z	WT, GRAMS
KV1710-2	1.090 (27.69)	.870 (22.10)	.915 (23.24)	.625 (15.88)	.710 (18.03)	.695 (17.65)	.870 (22.10)	.390 (9.91)	.110 (2.79)	.070 (1.78)	.458 (11.63)	8.5

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

#### Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:  
For RoHS Case Styles: 2-5  $\mu$  inch (.05-.13 microns) Gold over 120-240  $\mu$  inch (3.05-6.10 microns) Nickel plate.  
All models, (+) suffix.



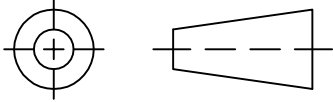
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RF/IF MICROWAVE COMPONENTS

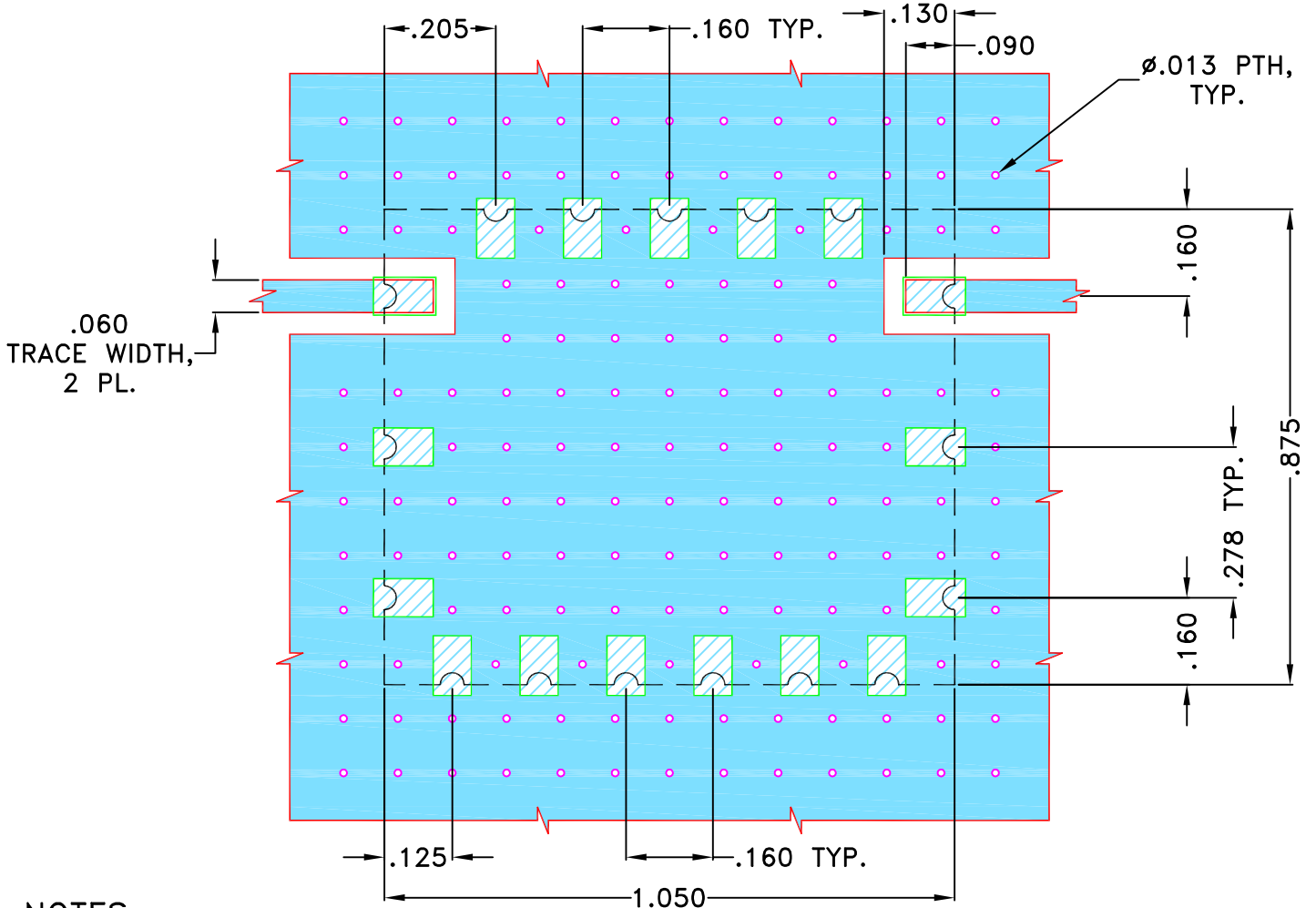
THIRD ANGLE PROJECTION



REVISIONS

REV OR	ECN No.	DESCRIPTION	DATE	DR	AUTH
	M138032	NEW RELEASE	JUL 12	DDR	KG

**SUGGESTED MOUNTING CONFIGURATION FOR KV1710 CASE STYLE "17FL01" PIN CODE**



NOTES:

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FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
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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 DDR	17 JUL 12
TOLERANCES ON:	CHECKED DDR	17 JUL 12
2 PL DECIMALS ±	APPROVED GM	17 JUL 12
3 PL DECIMALS ± .005"		
ANGLES ±		
FRACTIONS ±		



**Mini-Circuits®**

13 Neptune Avenue  
Brooklyn NY 11235

**PL, 17FL01, KV1710, CSBP,  
TB-693+, 50 Ohm**

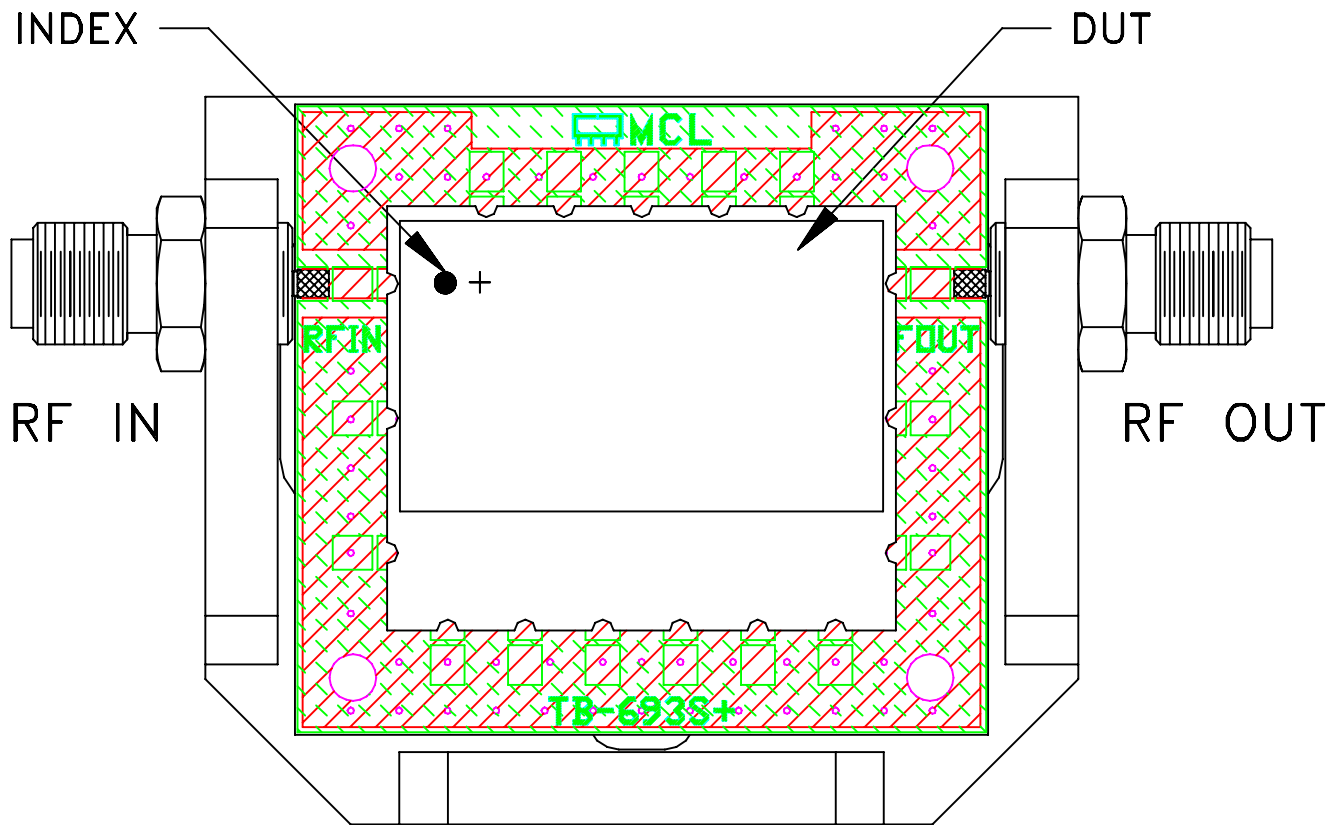
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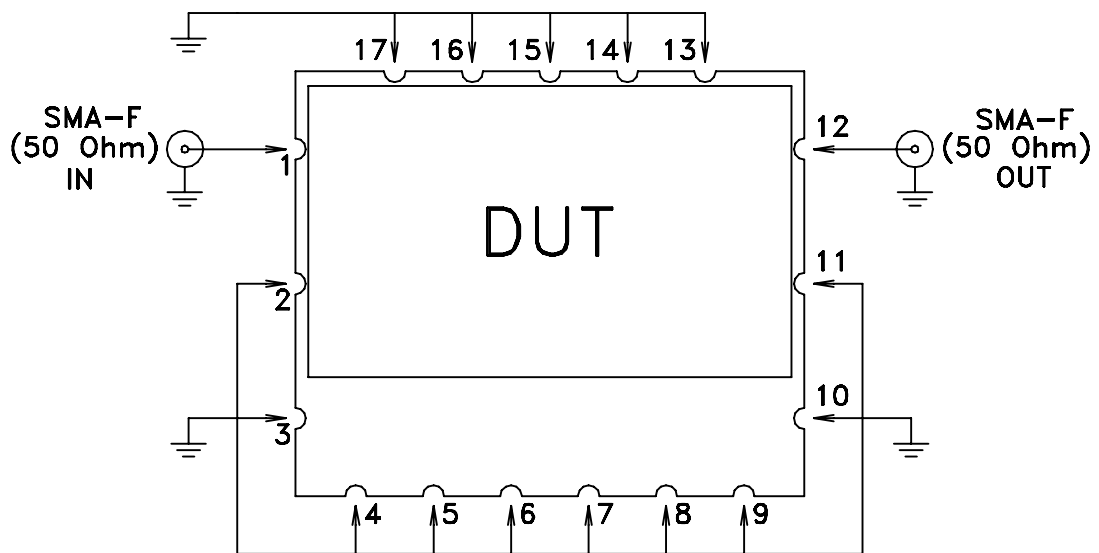
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A	15542	98-PL-378	OR
FILE:	98PL378	SCALE:	SHEET:
		3:1	1 OF 1



# Evaluation Board and Circuit




TB-693+



Schematic Diagram

**Notes:**

1. 50 Ohm SMA Female connectors.
2. PCB Material: OAK-602 OR Equivalent  
Dielectric Constant= $2.50 \pm .04$ , Thickness=.022 inch.

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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
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