

Ceramic

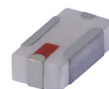
# Bandpass Filter

**BFCN-1860+**

50Ω     1580 to 2200 MHz

## The Big Deal

- LTCC construction
- Temperature stable from -55 to +100°C
- Small size (0.126 x .063 X .037")



CASE STYLE: FV1206-4

## Product Overview

The BFCN-1860+ LTCC bandpass filter covers the 1580 to 2200 MHz passband with 2 dB passband insertion loss and 20 dB upper/lower stopband rejection. This model handles up to 2.5W RF input power and provides a wide operating temperature range from -55 to +100°C. Utilizing LTCC multi-layer construction, the filter achieves excellent repeatability of performance and comes in a tiny 1206 ceramic package with wraparound terminations, minimizing performance variations due to parasitics and saving space in dense PCB layouts.

## Key Features

Feature	Advantages
LTCC Construction	Provides a rugged package well suited for tough environments such as high humidity and temperature extremes.
Tiny size (0.126 x .063 x .037")	Saves space in dense circuit boards and minimizes the effects of parasitics.
Wrap-around terminations	Provides excellent solderability and easy visual inspection
Wide operating temperature range, -55 to +100°C	Enables reliable performance in extreme environments

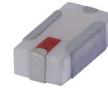


Ceramic

# Bandpass Filter

50Ω 1580 to 2200 MHz

**BFCN-1860+**



Generic photo used for illustration purposes only

CASE STYLE: FV1206-4

**+RoHS Compliant**

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

Available Tape and Reel at no extra cost  
Reel Size 7" Devices/Reel 20, 50, 100, 200, 500, 1000, 3000

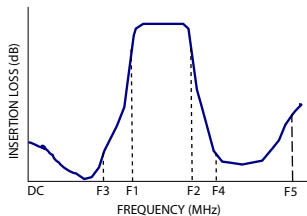
## Features

- Good VSWR, 1.5:1 typ. @ passband
- Small size(0.126 x .063 x .037)
- Temperature stable
- LTCC construction

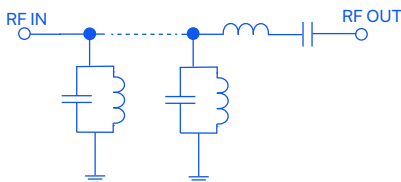
## Applications

- Harmonic rejection
- Transmitters / Receivers

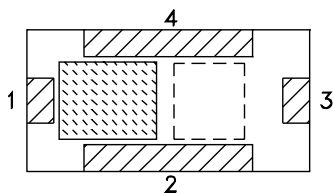
## Specification Definition



## Functional Schematic



## Top View



## Pad Connections

Input	1
Output	3
Ground	2,4

## Electrical Specifications<sup>1,2</sup> at 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
<b>Pass Band</b>	Center Frequency	—	—	1860	—	MHz
	Insertion Loss	F1 - F2	—	2.0	3.5	dB
	VSWR	F1 - F2	—	1.5	2.5	:1
<b>Stop Band, Lower</b>	Insertion Loss	DC - F3	—	20	—	dB
	VSWR	DC - F3	—	20	—	:1
<b>Stop Band, Upper</b>	Insertion Loss	F4 - F5	—	20	—	dB
	VSWR	F4 - F5	—	15	—	:1

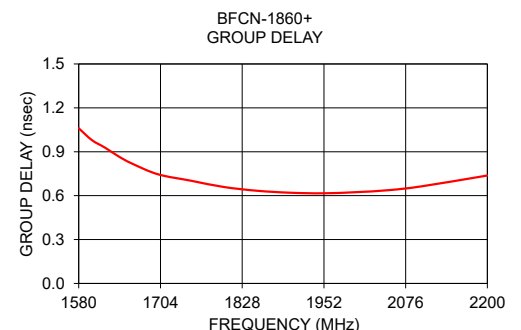
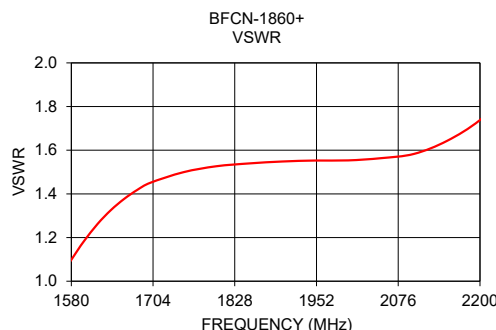
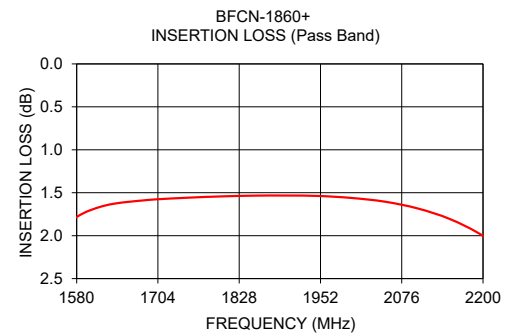
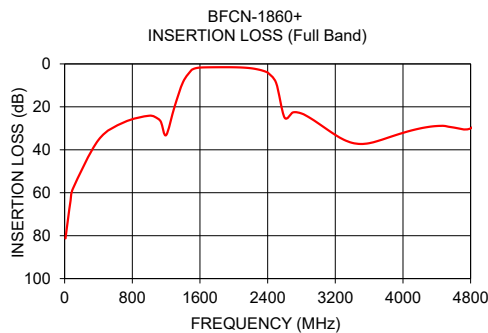
1. Measured on Mini-Circuits Characterization Test Board TB-824+.

2. This filter is not intended for use as a DC Blocking circuit element. In Application where DC voltage is present at either input or output ports, blocking capacitors are required at the corresponding RF port.

## Maximum Ratings

Operating Temperature	-55°C to +100°C
Storage Temperature	-55°C to +100°C
RF Power Input*	2.5W at 25°C

\*Passband rating, derate linearly to 0.7W at 100°C ambient  
Permanent damage may occur if any of these limits are exceeded.



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REV. A  
ECO-011185  
ED-16195  
BFCN-1860+  
AVB/CP/AM  
211221  
Page 2 of 3

## Full Band Performance

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Insertion Loss (dB)	Group Delay (nsec)
10	81.30	72.38	1580	1.78	1.06
40	72.24	67.32	1600	1.71	0.98
100	57.92	60.68	1620	1.66	0.93
400	35.41	43.01	1640	1.62	0.87
1000	24.12	22.58	1660	1.61	0.82
1300	19.87	10.75	1700	1.58	0.75
1580	1.78	1.10	1750	1.56	0.70
1660	1.61	1.38	1800	1.54	0.66
2000	1.56	1.55	1850	1.53	0.63
2200	2.00	1.74	1900	1.53	0.62
2600	24.98	5.02	1950	1.54	0.62
3000	27.70	17.47	2000	1.56	0.62
3500	37.29	23.88	2050	1.60	0.64
4100	31.00	24.03	2100	1.68	0.66
4800	30.01	2.93	2200	2.00	0.74

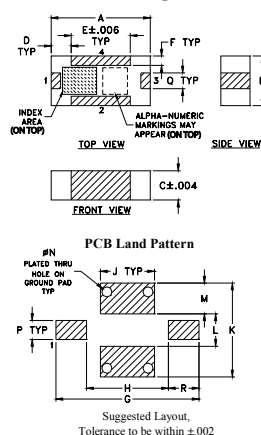
## Pass Band Performance

### Pad Connections

Input	1
Output	3
Ground	2,4

## Product Marking: GK

### Outline Drawing



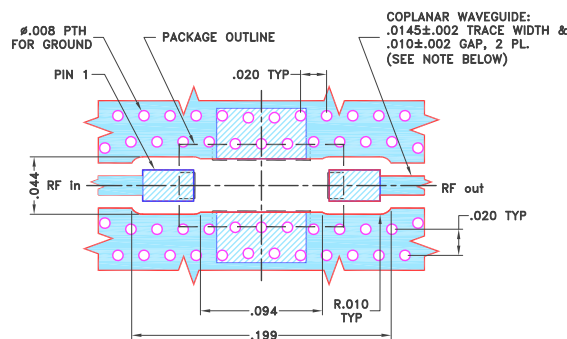
### Outline Dimensions ( inch mm )

A	B	C	D	E	F	G	H	J
.126	.063	.037	.026	.075	.012	.182	.104	.069
3.20	1.60	0.94	0.66	1.91	0.30	4.62	2.64	1.75
K	L	M	N	P	Q	R		wt
.119	.041	.039	.013	.024	.020	.039		grams
3.02	1.04	0.99	0.33	0.61	0.51	0.99		.020

### Additional 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)

### Demo Board MCL P/N: TB-824+ Suggested PCB Layout (PL-454)



### NOTES:

- TRACE WIDTH PARAMETERS ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .0066±.0007". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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 SOLDER MASK.

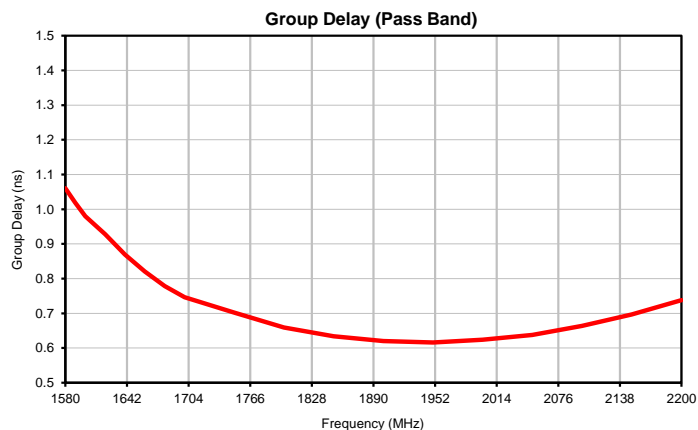
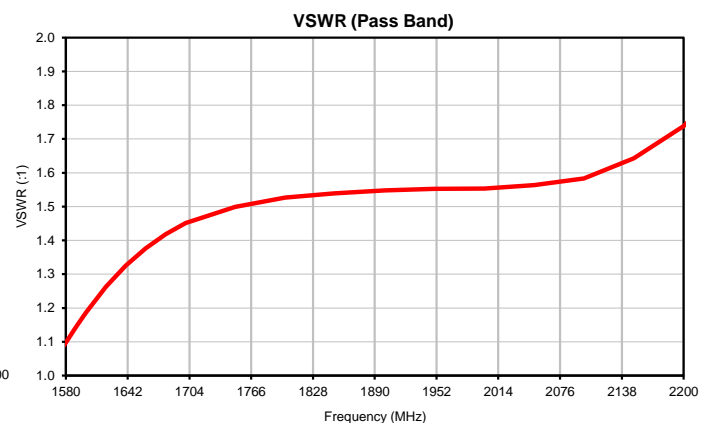
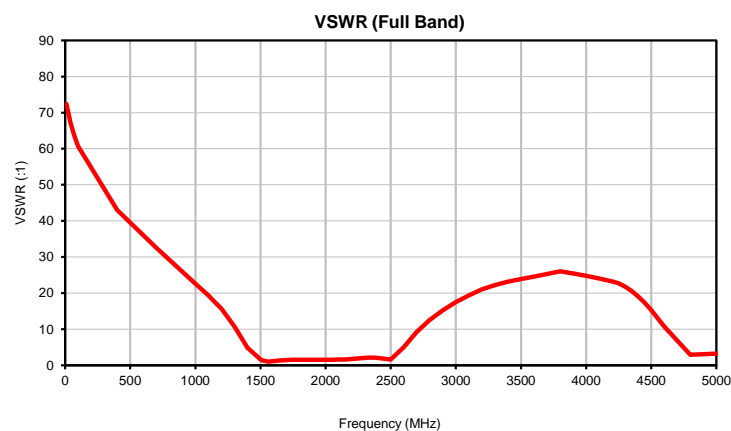
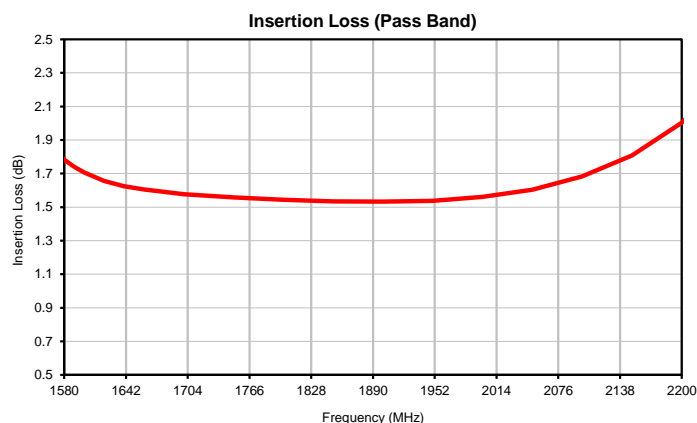
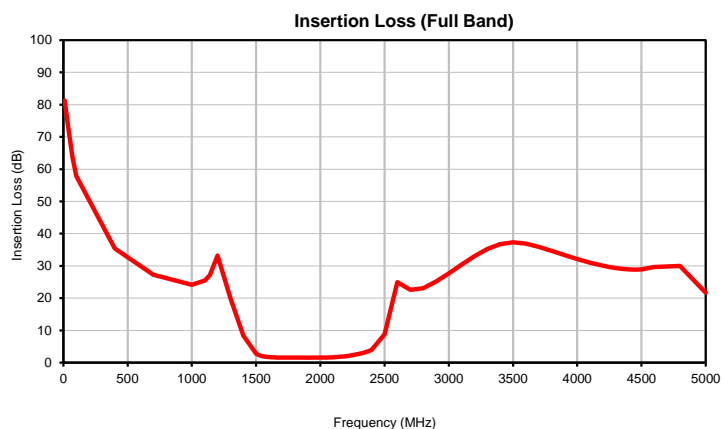
# Ceramic Bandpass Filter

# BFCN-1860+

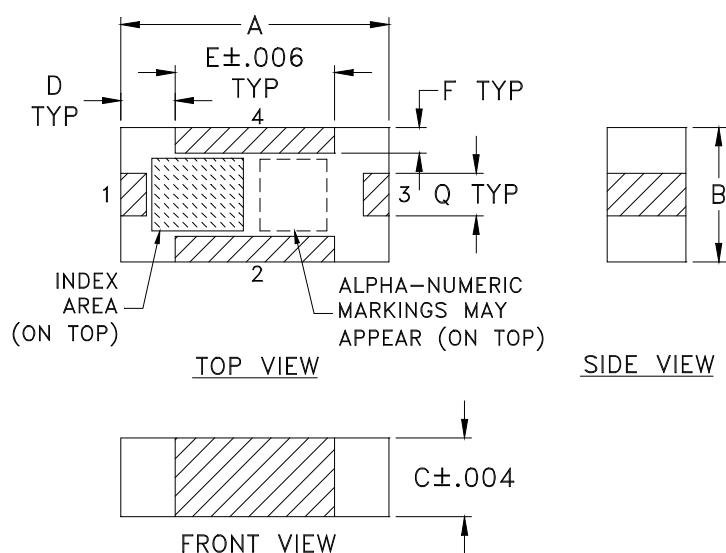
## Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	VSWR (:1)	FREQUENCY (MHz)	GROUP DELAY (ns)
10	81.30	72.38	1580	1.06
40	72.24	67.32	1590	1.02
70	63.71	63.58	1600	0.98
100	57.92	60.68	1620	0.93
400	35.41	43.01	1640	0.87
700	27.23	32.56	1660	0.82
1000	24.12	22.58	1680	0.78
1100	25.45	19.33	1700	0.75
1140	27.14	17.86	1750	0.70
1200	33.18	15.63	1800	0.66
1300	19.87	10.75	1850	0.63
1400	8.44	4.82	1900	0.62
1500	2.84	1.59	1950	0.62
1510	2.60	1.46	2000	0.62
1520	2.40	1.34	2050	0.64
1530	2.23	1.24	2100	0.66
1540	2.10	1.16	2150	0.70
1550	1.99	1.09	2200	0.74
1560	1.91	1.04		
1570	1.84	1.05		
1580	1.78	1.10		
1590	1.74	1.14		
1600	1.71	1.19		
1620	1.66	1.26		
1640	1.62	1.33		
1660	1.61	1.38		
1680	1.59	1.42		
1700	1.58	1.45		
1750	1.56	1.50		
1800	1.54	1.53		
1850	1.53	1.54		
1900	1.53	1.55		
1950	1.54	1.55		
2000	1.56	1.55		
2050	1.60	1.56		
2100	1.68	1.58		
2150	1.81	1.64		
2200	2.00	1.74		
2250	2.29	1.88		
2300	2.70	2.04		
2310	2.79	2.07		
2320	2.89	2.09		
2330	3.00	2.11		
2340	3.12	2.13		
2350	3.24	2.14		
2360	3.37	2.14		
2370	3.51	2.13		
2380	3.66	2.11		
2390	3.82	2.07		
2400	4.00	2.02		
2500	8.80	1.58		
2600	24.98	5.02		
2700	22.58	9.23		
2800	23.07	12.57		
2900	25.13	15.22		
3000	27.70	17.47		
3100	30.43	19.36		
3200	33.06	21.02		
3300	35.30	22.22		
3400	36.77	23.14		
3500	37.29	23.88		
3600	36.94	24.56		
3700	35.92	25.33		
3790	34.79	25.98		
3800	34.66	26.05		
3900	33.35	25.48		
4000	32.12	24.79		
4100	31.00	24.03		
4200	30.07	23.22		
4250	29.69	22.69		
4300	29.36	21.74		
4350	29.10	20.57		
4400	28.93	19.07		
4450	28.85	17.33		
4500	28.92	15.30		
4600	29.63	10.72		
4800	30.01	2.93		
5000	21.68	3.24		

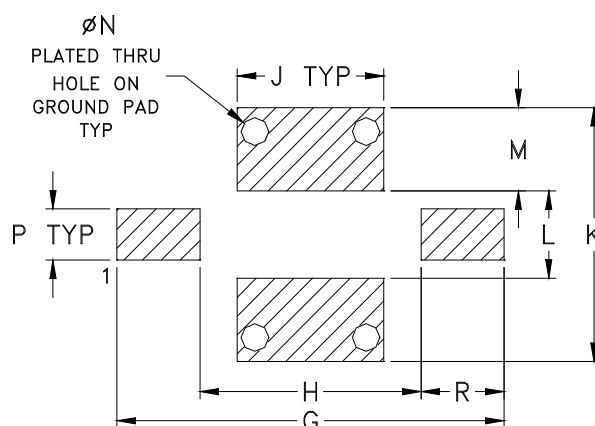
## Typical Performance Curves



### Outline Dimensions



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm .002$

CASE #	A	B	C	D	E	F	G	H	J	K	L	M
FV1206-4	.126 (3.20)	.063 (1.60)	.037 (0.94)	.026 (0.66)	.075 (1.91)	.012 (0.30)	.182 (4.62)	.104 (2.64)	.069 (1.75)	.119 (3.02)	.041 (1.04)	.039 (0.99)

CASE #	N	P	Q	R	WT. GRAM
FV1206-4	.013 (0.33)	.024 (0.61)	.020 (0.51)	.039 (0.99)	.020

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .01$ ; 3 Pl.  $\pm .005$

### Notes:

- Open style, ceramic base.
- Termination finish: **as shown below or indicated on Data Sheet.**  
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.  
For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



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RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging

# TR-F75

## DEVICE ORIENTATION IN T&R

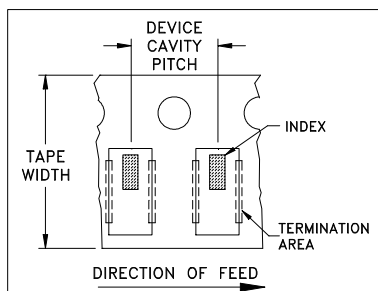


ILLUSTRATION 1

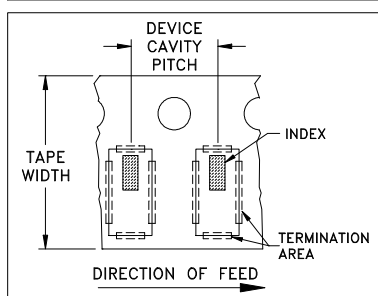


ILLUSTRATION 2

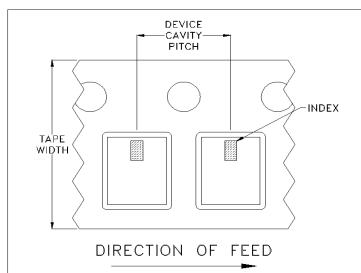


ILLUSTRATION 3

Applicable Case Styles
FV1206-1
FV1206-3

Applicable Case Styles
FV1206-4
FV1206-5
FV1206-6
FV1206-7
FV1206-9
JC0603C-1

Applicable Case Styles
NL1008C-6
FV1206-12
NL1008C-9
NL1008C-10

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
8	4	7	Small quantity standards (see note)	20
				50
				100
				200
				500
				1000
			Standard	3000

Note: Please consult individual model data sheet to determine device per reel availability.

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.

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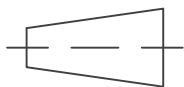
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REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M152168	NEW RELEASE	07/31/15	ITG	AVB

Technical drawing of a coplanar waveguide package. The drawing shows a top and bottom view of the package. The top view is a light blue rectangle with a red outline. It features a central hatched rectangle representing the package outline. The package outline is defined by a red line. The top view shows a series of circular holes (vias) arranged in a grid. The bottom view is a light blue rectangle with a red outline, showing a similar pattern of circular holes. The package is labeled with dimensions and features:

- PACKAGE OUTLINE**: Indicated by a red line.
- COPLANAR WAVEGUIDE**: Indicated by a blue line.
- Ø.008 PTH FOR GROUND**: Dimension for the through-hole diameter.
- PIN 1**: Indicated by a small circle on the left side.
- .020 TYP**: Typical dimension for the waveguide width.
- .0145±.002 TRACE WIDTH & .010±.002 GAP, 2 PL. (SEE NOTE BELOW)**: Dimension for the trace width and gap.
- RF in**: Input radio frequency port.
- RF out**: Output radio frequency port.
- .044**: Dimension for the package height.
- .094**: Dimension for the package length.
- .199**: Dimension for the package width.
- R.010 TYP**: Typical radius for the package corners.

1. TRACE WIDTH PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .0066"±.0007". 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 SOLDER MASK.

UNLESS OTHERWISE SPECIFIED		INITIALS		DATE	
DIMENSIONS ARE IN INCHES		DRAWN	ITG	07/30/15	
TOLERANCES ON:		CHECKED	GF	07/31/15	
2 PL DECIMALS ±	.005	APPROVED	AVB	07/31/15	
3 PL DECIMALS ±					
ANGLES ±					
FRACTIONS ±					



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Brooklyn NY 11235

PL, 04FL01, FV1206-4, TB-824+

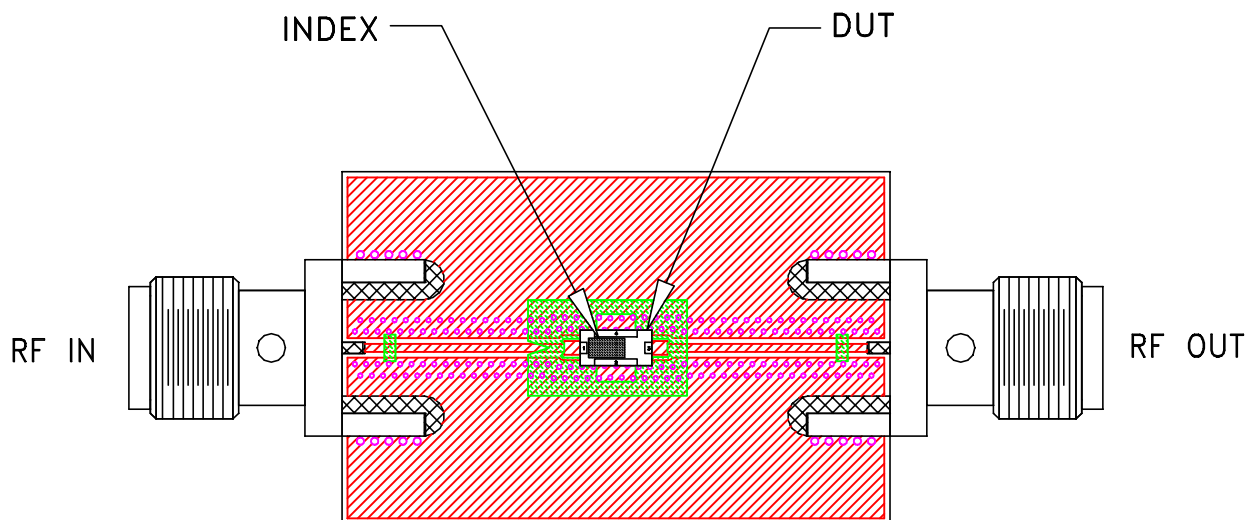
SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-454		REV: OR
FILE: 98PL454		SCALE: 16:1	SHEET: 1 OF 1	

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

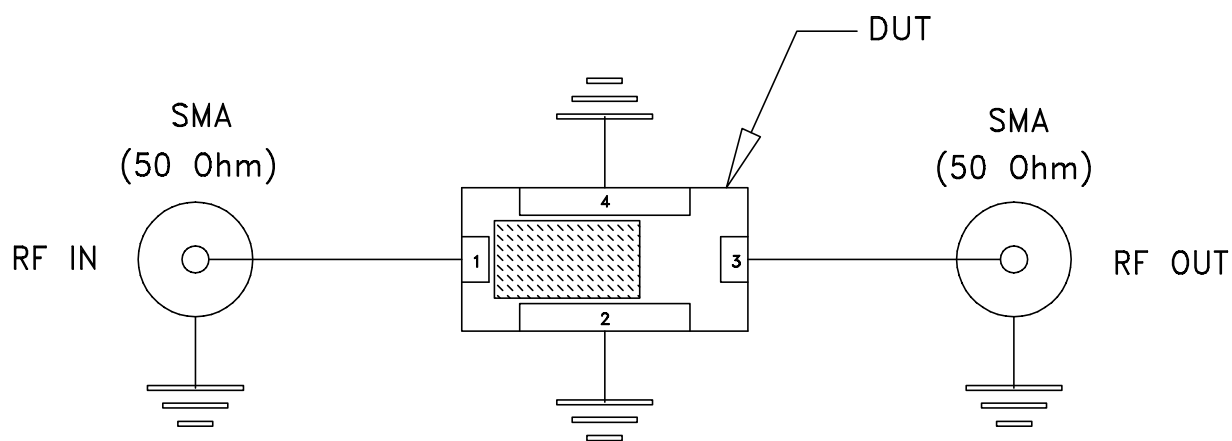
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# Evaluation Board and Circuit




TB-824+



Schematic Diagram

## Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.0066 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, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	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
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215