

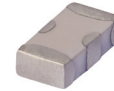
# LTCC Bandpass Filter

**BFCN-2360+**

50Ω      2250 to 2470 MHz

## The Big Deal

- Small size 3.2mm x 1.6mm
- Pass band (2250-2470 MHz)
- Low Insertion Loss (2.0 dB typical)
- Sharp rejection peaks close to stop band



CASE STYLE: FV1206

## Product Overview

The BFCN-2360+ LTCC Band Pass Filter is constructed with 12 layers in order to achieve a miniature size and high repeatability of performance. Wrap-around terminations minimize variations in performance due to parasitics. Covering 2360 MHz  $\pm$ 110 MHz, these units offer low insertion loss and good rejection.

## Key Features

Feature	Advantages
Small Size (3.20mm x1.6 mm)	Allows for high layout density of circuit boards, while minimizing affects of parasitics.
Rejection peaks at harmonic frequencies	Provides good rejection of signals at harmonic frequencies, for improved system performance.
Wrap around termination	Provides excellent solderability and easy visual inspection capability.
LTCC construction	Provides a rugged package that is well suited for tough environments including high humidity and high temperature extremes.

### 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](http://www.minicircuits.com/MCLStore/terms.jsp)



# Bandpass Filter

50Ω 2250 to 2470 MHz

## BFCN-2360+



Generic photo used for illustration purposes only

CASE STYLE: FV1206

**+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	Devices/Reel
7"	20, 50, 100, 200, 500, 1000, 3000

### Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
RF Power Input*	1.5W max. at 25°C

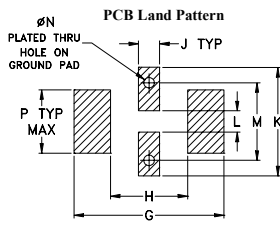
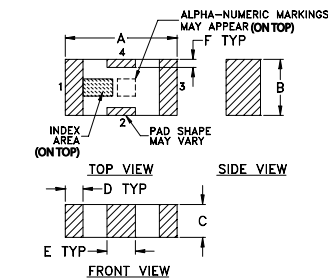
\*Passband rating, derate linearly to 0.25W at 100°C ambient  
Permanent damage may occur if any of these limits are exceeded.

### Pin Connections

RF IN	1
RF OUT	3
GROUND	2,4

### Product Marking: 38

### Outline Drawing

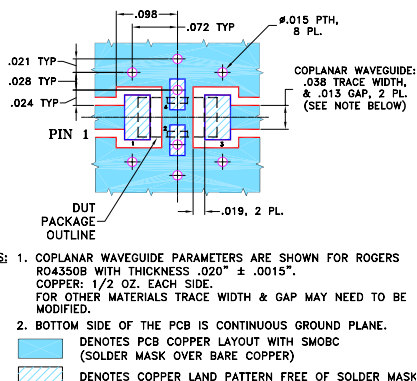


Suggested Layout, Tolerance to be within ±0.02

### Outline Dimensions (inch/mm)

A	B	C	D	E	F	G		
.126	.063	.037	.020	.032	.009	.169		
3.20	1.60	0.94	0.51	0.81	0.23	4.29		
H	J	K	L	M	N	P	wt	
.087	.024	.122	.024	.087	.012	.071	grams	
2.21	0.61	3.10	0.61	2.21	0.30	1.80	.020	

### Demo Board MCL P/N: TB-270 Suggested PCB Layout (PL-137)



- NOTES:**
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH THICKNESS .020" ± .0015". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & 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

### Notes

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### Features

- Small size
- Temperature stable
- Hermetically sealed
- LTCC construction

### Applications

- Harmonic Rejection
- Transmitters / Receivers

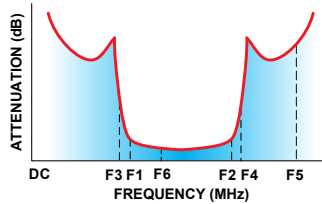
### Electrical Specifications<sup>1,2</sup> at 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—	—	2360	—	MHz
	Insertion Loss	F1-F6	2250-2330	—	5.5	dB
	VSWR	F6-F2	2330-2470	—	3.0	dB
Stop Band, Lower	Insertion Loss	DC-F3	DC-1700	—	20	dB
	VSWR	DC-F3	DC-1700	—	25	:1
Stop Band, Upper	Insertion Loss	F4-F5	4300-6200	—	25	dB
	VSWR	F4-F5	4300-6200	—	20	:1

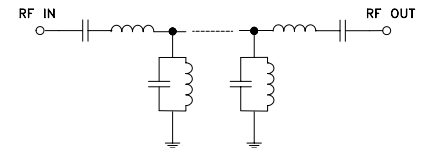
1. Measured on Mini-Circuits Characterization Test Board TB-270.

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.

### Typical Frequency Response

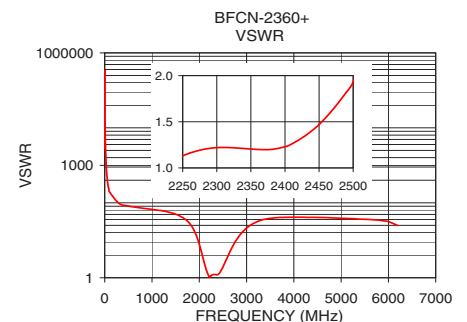
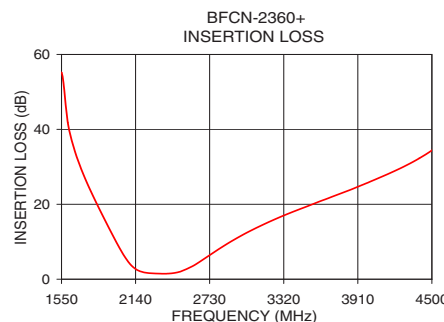
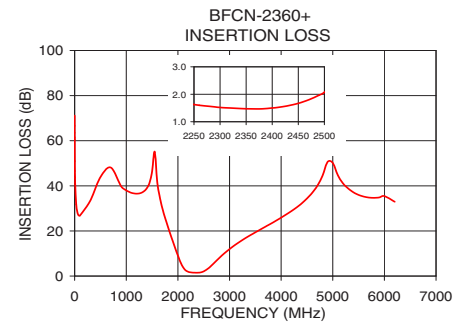


### Functional Schematic



### Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
0.30	71.17	2878.39
300.00	33.29	96.92
1000.00	37.99	66.84
1300.00	37.00	58.44
1700.00	30.04	36.63
1850.00	18.85	22.64
2260.00	1.60	1.16
2470.00	1.80	1.63
3600.00	20.68	39.85
3800.00	23.21	40.82
4000.00	25.91	41.22
4400.00	32.27	40.97
5500.00	35.96	36.32
5800.00	34.66	34.47
6200.00	32.93	24.67



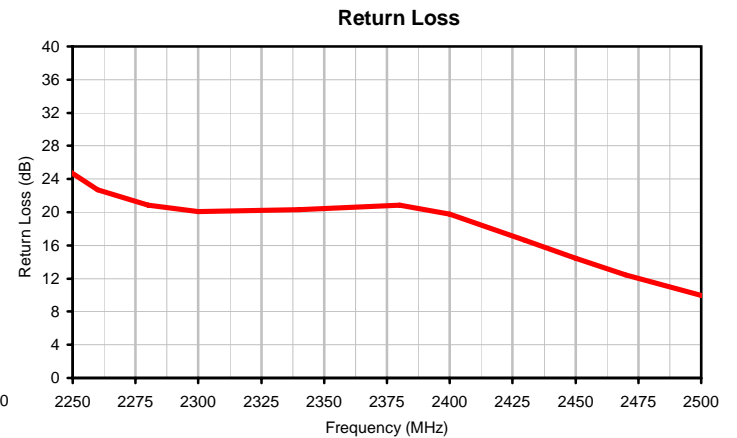
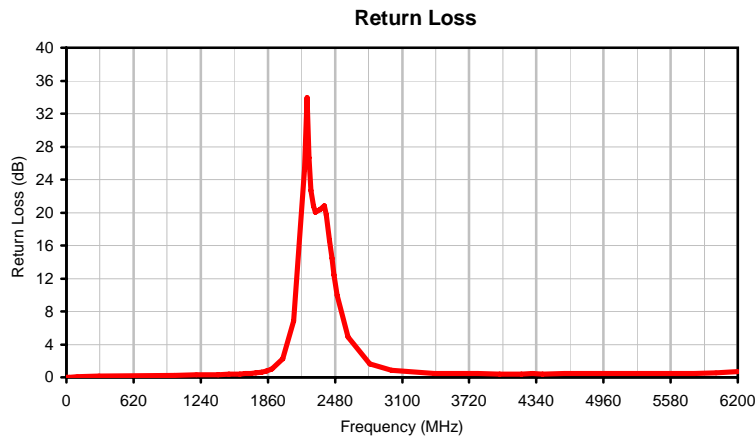
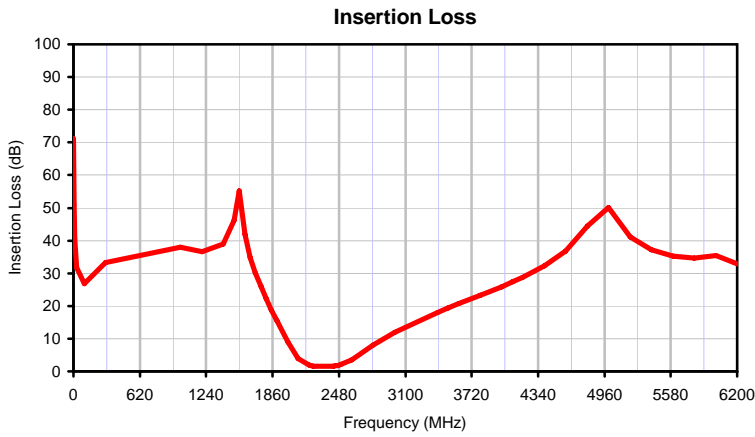
## Typical Performance Data

FREQUENCY	INSERTION LOSS	RETURN LOSS
(MHz)	(dB)	(dB)
0.3	71.17	0.01
3.0	50.95	0.00
10.0	40.60	0.00
30.0	31.75	0.02
100.0	26.72	0.09
300.0	33.29	0.18
1000.0	37.99	0.26
1200.0	36.53	0.28
1400.0	39.01	0.32
1500.0	46.28	0.35
1550.0	55.16	0.37
1600.0	41.84	0.40
1650.0	34.93	0.43
1700.0	30.04	0.47
1750.0	25.96	0.54
1800.0	22.30	0.63
1850.0	18.85	0.77
1900.0	15.52	1.01
2000.0	9.07	2.23
2100.0	3.91	6.85
2200.0	1.87	25.23
2220.0	1.74	33.92
2240.0	1.66	26.61
2260.0	1.60	22.70
2280.0	1.56	20.83
2300.0	1.52	20.04
2340.0	1.48	20.32
2380.0	1.47	20.85
2400.0	1.50	19.76
2430.0	1.58	16.64
2450.0	1.67	14.44
2470.0	1.80	12.46
2500.0	2.07	9.98
2600.0	3.60	4.89
2800.0	7.98	1.60
3000.0	11.96	0.82
3400.0	18.08	0.47
3500.0	19.37	0.45
3600.0	20.68	0.44
3800.0	23.21	0.43
4000.0	25.91	0.42
4100.0	27.34	0.42
4200.0	28.83	0.42
4300.0	30.45	0.43
4400.0	32.27	0.42
4600.0	36.88	0.43
4800.0	44.42	0.44
5000.0	50.16	0.45
5200.0	41.03	0.46
5400.0	37.12	0.48
5600.0	35.22	0.48
5800.0	34.66	0.50
6000.0	35.44	0.55
6200.0	32.93	0.70

# Ceramic Bandpass Filter

# BFCN-2360+

## Typical Performance Curves



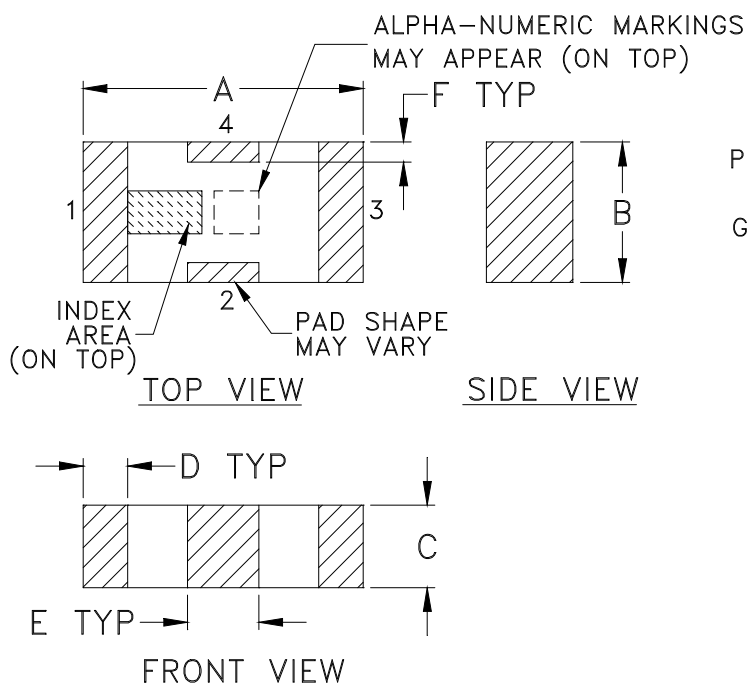
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 • Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site  
The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)



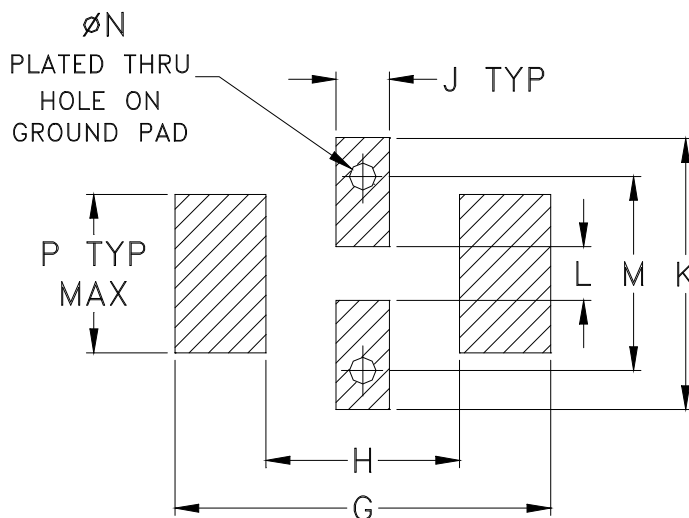
IF/RF MICROWAVE COMPONENTS

REV. X2  
BFCN-2360+  
2/11/2010  
Page 1 of 1

### 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	N	P	WT. GRAM
FV1206	.126 (3.20)	.063 (1.60)	.037 (0.94)	.020 (0.51)	.032 (0.81)	.009 (0.23)	.169 (4.29)	.087 (2.21)	.024 (0.61)	.122 (3.10)	.024 (0.61)	.087 (2.21)	.012 (0.30)	.071 (1.80)	.020

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

#### Notes:

1. Open style, ceramic base.
2. 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.



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

# Tape & Reel Packaging TR-F71

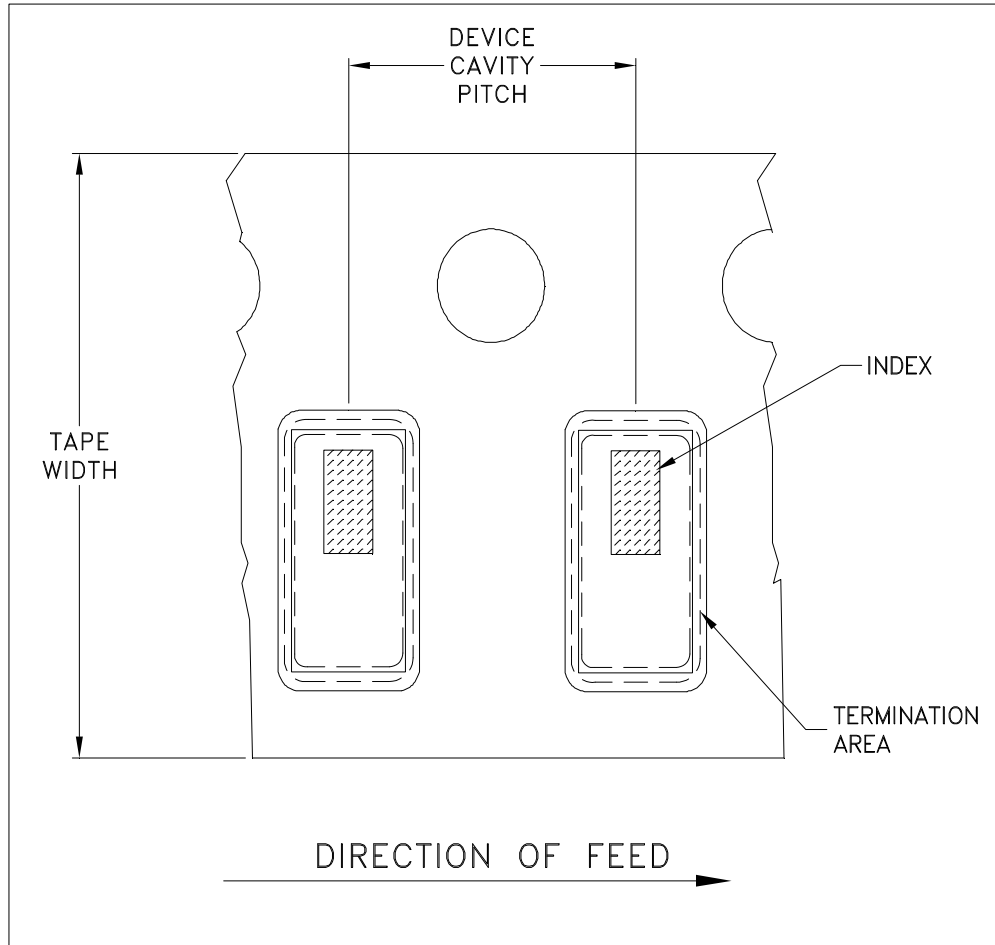


ILLUSTRATION 1

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.

Go to: [www.minicircuits.com/pages/pdfs/tape.pdf](http://www.minicircuits.com/pages/pdfs/tape.pdf)



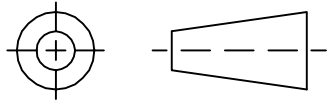
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RF/IF MICROWAVE COMPONENTS

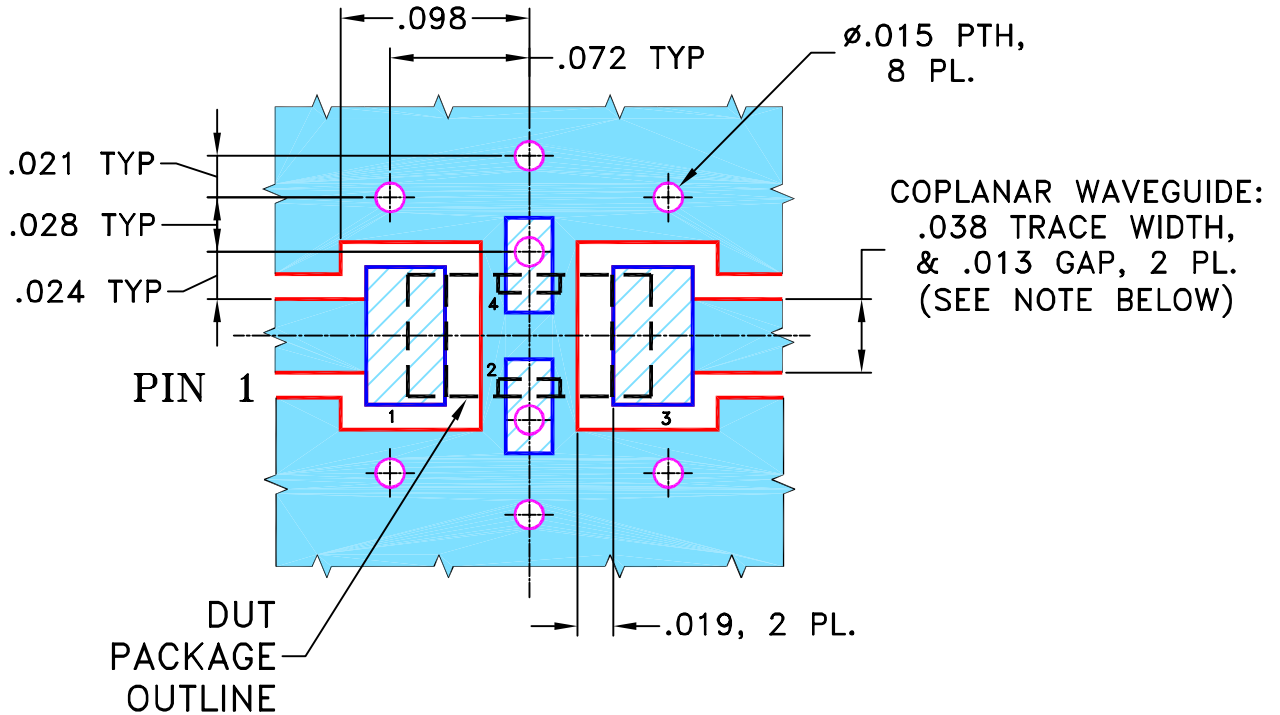
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M88634	NEW RELEASE	08/28/03	GF	ABD
A	M102713	ADDED "...WITH SMOBC"	01/17/06	MMG	IL

SUGGESTED MOUNTING CONFIGURATION  
FOR FV1206 CASE STYLE, "nx" PIN CONNECTION



- NOTES:**
- COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS R04350B WITH THICKNESS .020" ± .0015".  
 COPPER: 1/2 OZ. EACH SIDE.  
 FOR OTHER MATERIALS TRACE WIDTH & 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

DIMENSIONS ARE IN INCHES  
 TOLERANCES ON:  
 2 PL DECIMALS ±  
 3 PL DECIMALS ± .005  
 ANGLES ±  
 FRACTIONS ±

	INITIALS	DATE
DRAWN	GF	08/27/03
CHECKED	AV	08/28/03
APPROVED	ABD	08/28/03



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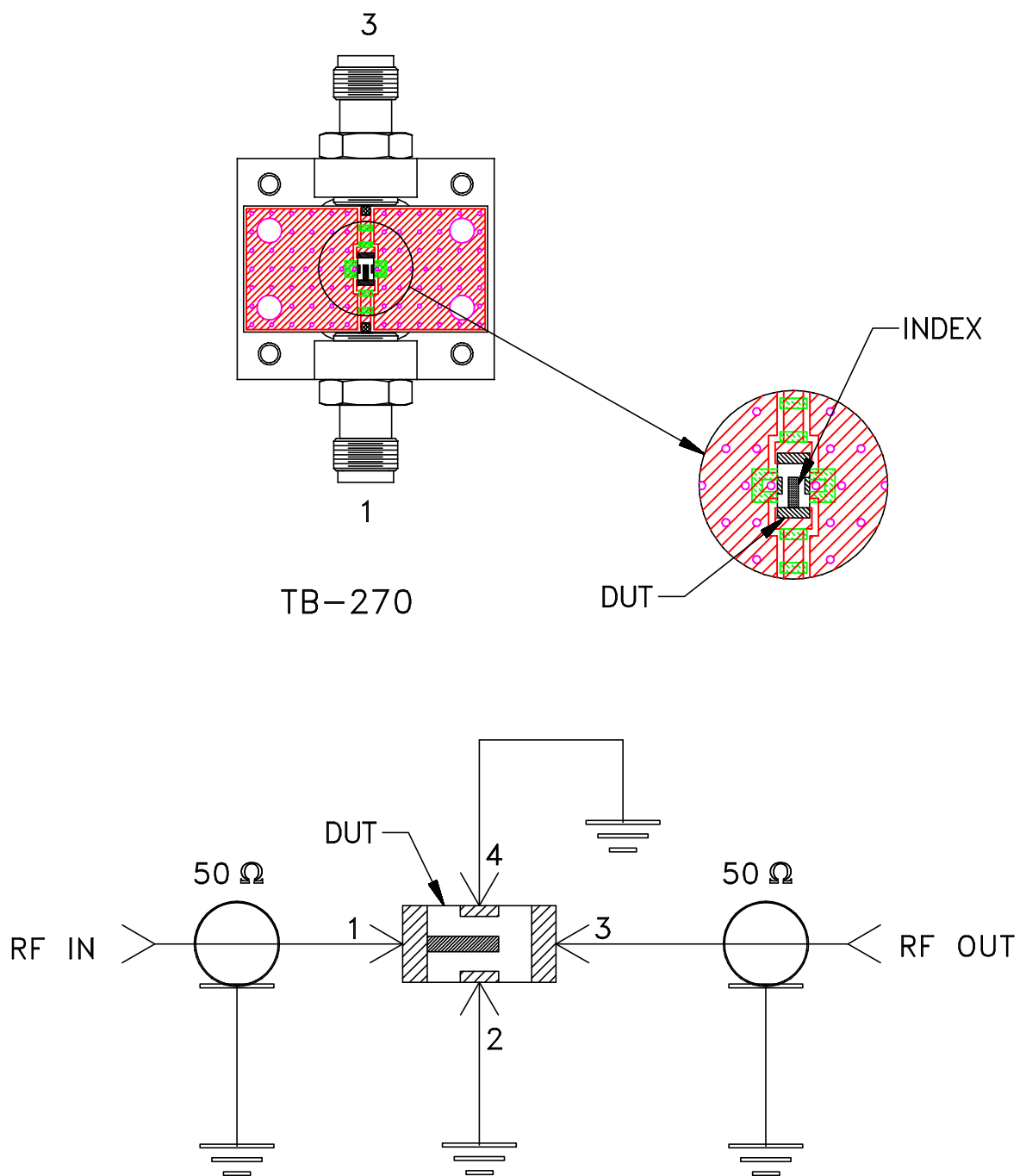
PL, nx, FV1206, LFCN/HFCN, TB-270

SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-137	REV: A
FILE: 98PL137	SCALE: 10:1	SHEET: 1 OF 1	

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


# Evaluation Board and Circuit



Schematic Diagram

## Notes:

1. SMA Female connectors.
2. PCB Material: ROGERS R04350 or equivalent, Dielectric Constant=3.5, Thickness=.020 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.

<b>Specification</b>	<b>Test/Inspection Condition</b>	<b>Reference/Spec</b>
Operating Temperature	-55° to 100°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D
Humidity	90% RH, 65°C Units may require bake-out after humidity to restore full performance.	MIL-STD-202, Method 103
Thermal Shock	-65° to 125°C, 5 cycles	MIL-STD-202, Method 107, Condition B
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	100g, 6ms sawtooth, 3 shocks each direction 3 axes (total 18)	MIL-STD-202, Method 213, Condition I