

Ceramic Low Pass Filter

LFCN-2352+

50Ω

DC to 23500 MHz



Generic photo used for illustration purposes only
CASE STYLE: FV1206-11

The Big Deal

- Good rejection, 35 dB typical
- Rugged, ceramic construction
- Small size, 3.2mm X 1.6mm (1206)
- LTCC Low pass filter at mm wave frequency

Product Overview

Mini-Circuits' LFCN-2352+ is an LTCC low pass filter with a passband from DC to 23500 MHz, supporting a variety of applications. This model provides 1.4 dB typical passband insertion loss and provides a very good stopband rejection due to strategically constructed layout with minimal interaction between components. It handles up to 1W RF input power and provides a wide operating temperature range from -55 to +125°C. Housed in a small 1206 ceramic form factor, the filter is ideal for dense PCB layouts and with minimal performance variation due to parasitics.

Key Features

Feature	Advantages
Ultra-wide stopband	The LTCC lowpass filter provides a very good stopband rejection until 40 GHz suitable for high end applications.
LTCC Construction	Provides repeatable performance in a rugged, ceramic package well suited for tough environments such as high humidity and temperature extremes.
Small size 3.2mm X 1.6mm (1206)	Saves space in dense circuit board layouts and minimizes the effects of parasitics.

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



Low Pass Filter

50Ω

DC to 23500 MHz

LFCN-2352+



Generic photo used for illustration purposes only

CASE STYLE: FV1206-11

+RoHS Compliant

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

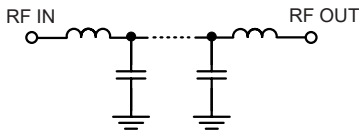
Features

- Low loss, 1.4 dB typical
- Good rejection 35 dB typical
- Good power handling, 1W
- Small size 3.2mm X 1.6mm (1206)
- Temperature stable
- LTCC construction

Applications

- 5G applications

Functional Schematic



Electrical Specifications^{1,2} at 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	DC-F1	DC - 13000	—	0.6	1.1	dB
	F1-F2	13000 - 22000	—	1.1	1.6	dB
	F2-F3	22000 - 23500	—	1.4	—	dB
	Frequency Cut-off	F4	25000	3	—	dB
Stop Band	Return Loss	DC-F3	DC - 23500	12	—	dB
	Rejection Loss	F5-F6	28500 - 30000	20	29	dB
		F6-F7	30000 - 39000	30	33	dB
		F7-F8	39000 - 40000	—	35	dB

1 DC de-coupling capacitors are required in Applications where DC voltage and/or current is present at either input or output ports. Please contact Mini-Circuits for alternatives if DC pass from IN-OUT is required.

2 Measured on Mini-Circuits Characterization Test Board TB-LFCN-2352C+

Maximum Ratings

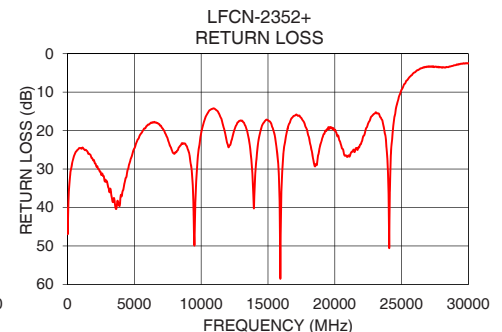
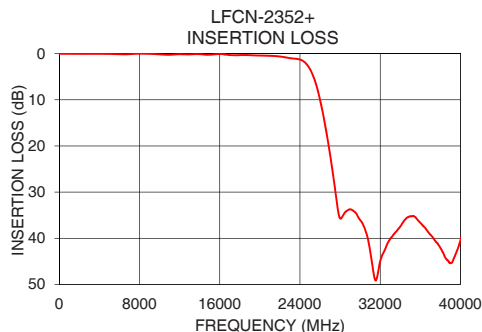
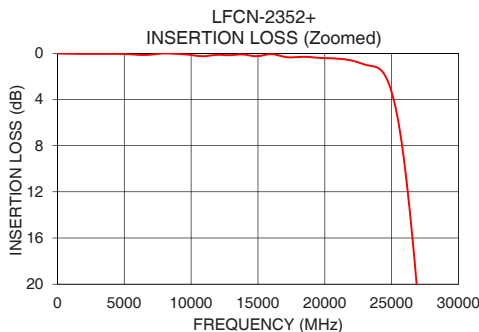
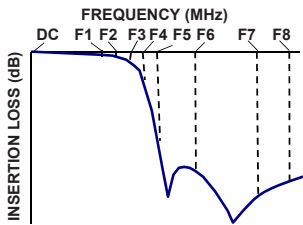
Operating Temperature	-55°C to 125°C
Storage Temperature	-55°C to 125°C
RF Power Input*	1W max. @25°C

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

Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)
10	0.02	40.10
100	0.02	36.03
300	0.03	29.46
500	0.03	26.49
1000	0.04	24.57
5000	0.06	24.65
13000	0.16	17.45
15000	0.24	17.30
22000	0.62	23.00
23500	1.10	17.05
25000	3.37	9.36
26000	9.96	4.83
26500	15.34	3.75
27000	21.83	3.29
27600	30.98	3.38
28500	34.38	3.49
30000	36.04	2.46
32000	44.95	3.49
39000	45.35	2.56
40000	40.43	2.54

Typical Frequency Response



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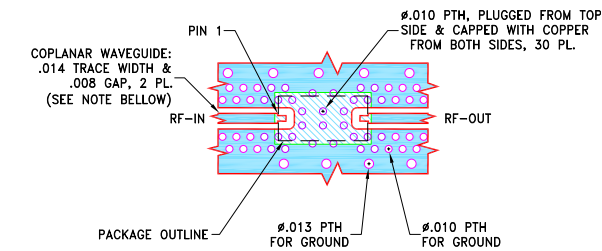


Pad Connections

INPUT	1
OUTPUT	2
GROUND	3

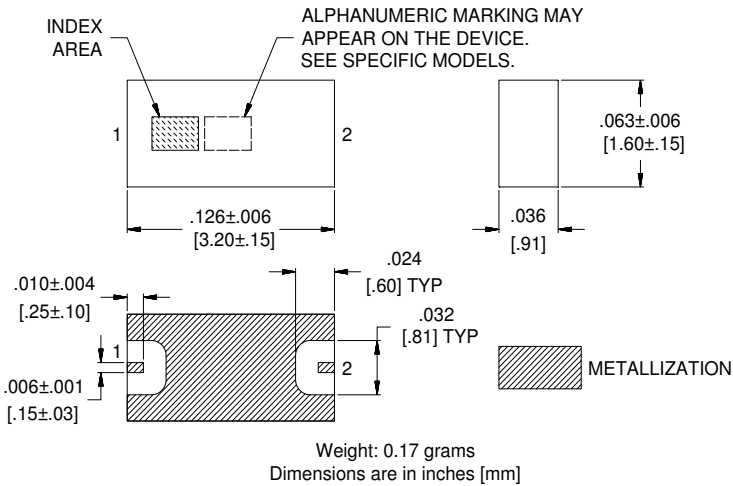
Product Marking: LY

Demo Board MCL P/N: TB-LFCN-2352C+
Suggested PCB Layout (PL-702)



- NOTES:
- TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR MEGTRON-7 R5785(N); DIELECTRIC THICKNESS: .0079±.001; COPPER: HVLP/HVLP, 1/2 Oz EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & 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.

Outline Drawing



Notes

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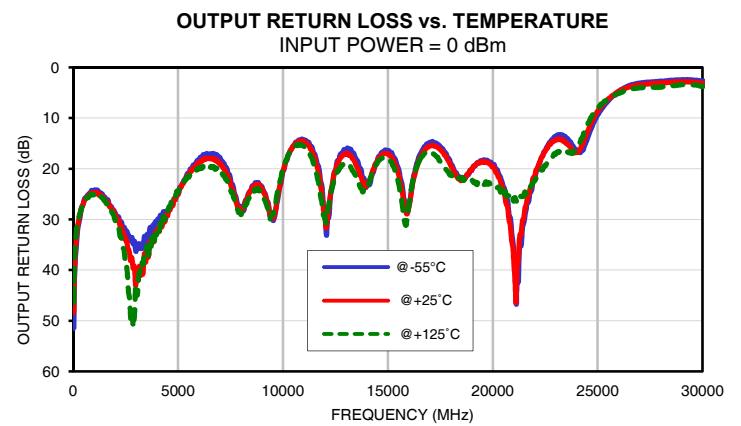
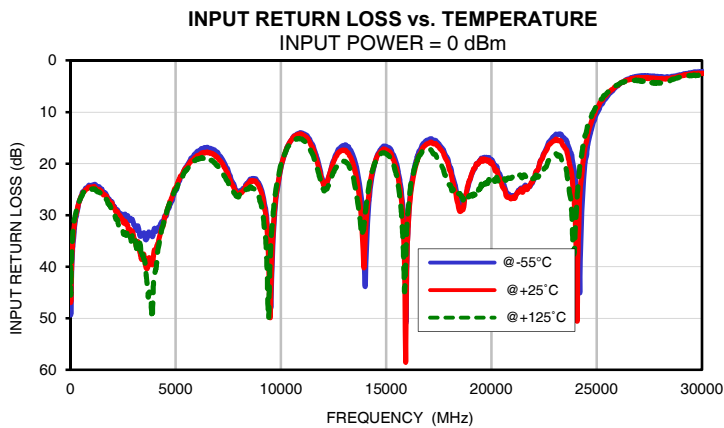
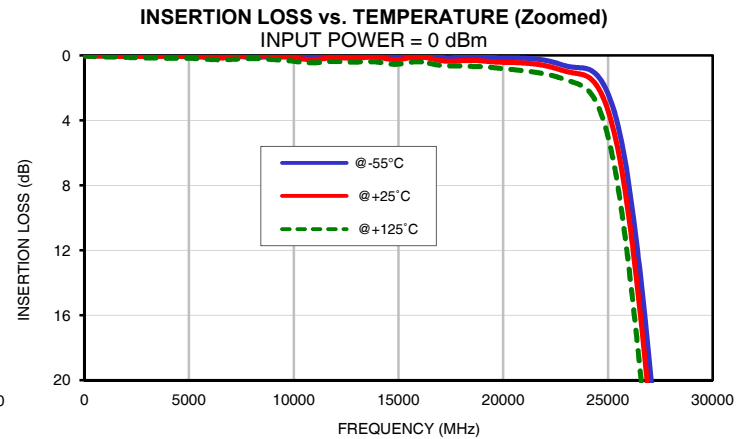
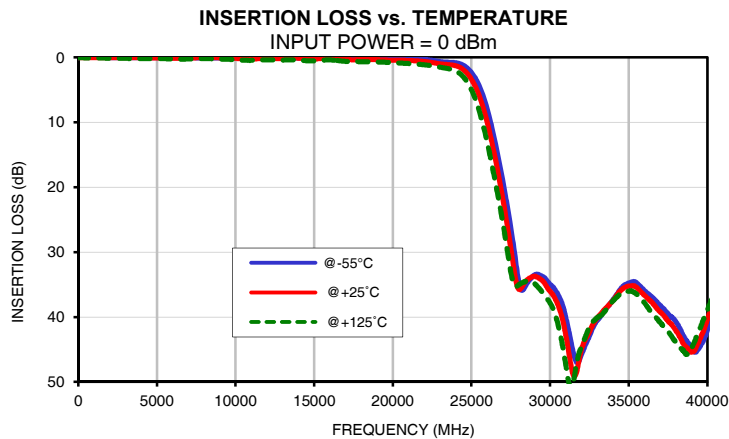
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Typical Performance Data

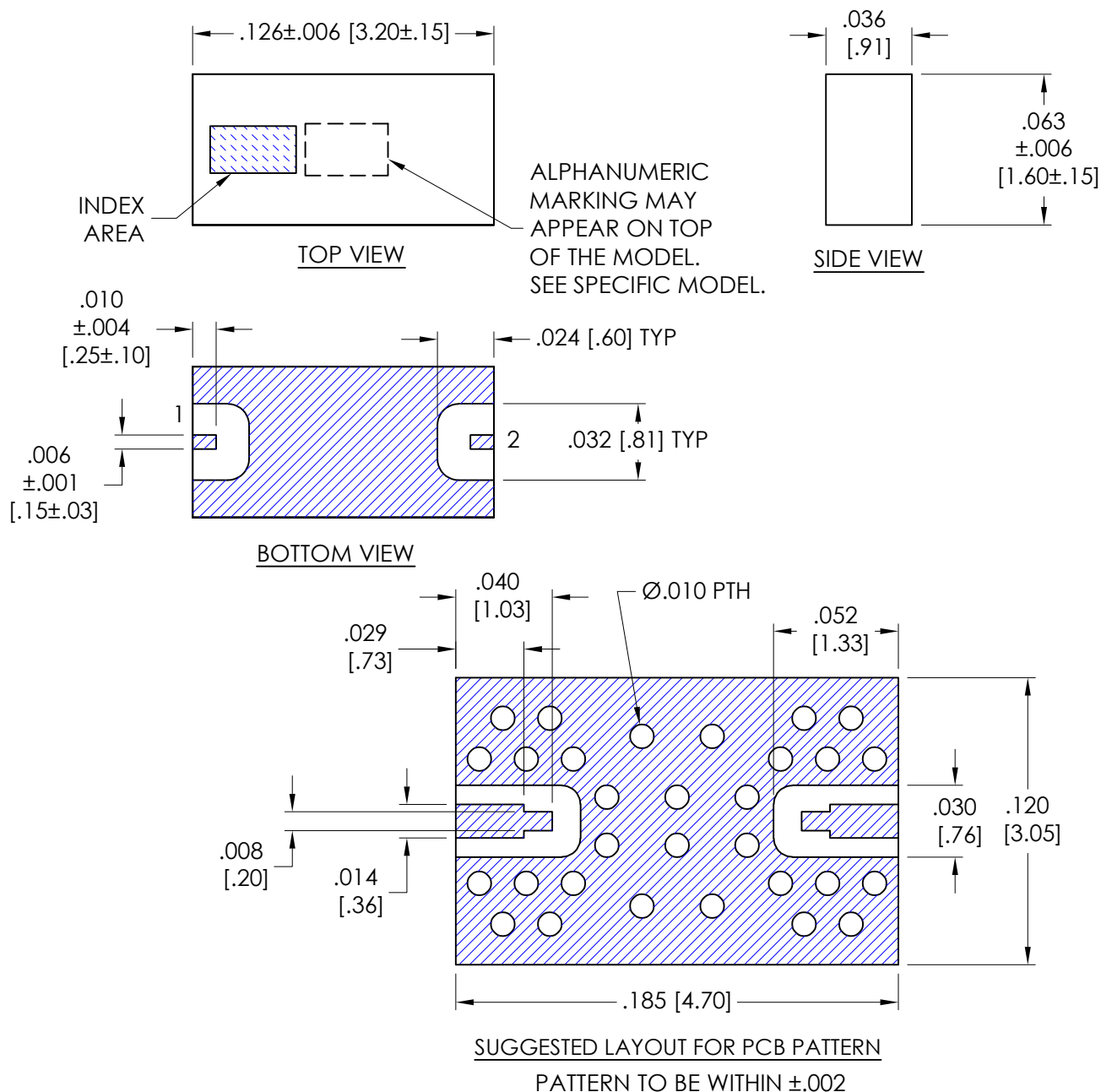
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-55°C	@+25°C	@+125°C	@-55°C	@+25°C	@+125°C	@-55°C	@+25°C	@+125°C
10	0.01	0.02	0.02	40.50	40.10	40.02	40.43	40.33	40.36
100	0.01	0.02	0.03	37.22	36.03	34.69	38.04	36.54	34.95
200	0.00	0.02	0.04	32.32	31.60	30.62	32.73	31.68	30.92
250	0.00	0.02	0.05	30.69	30.18	29.81	31.07	30.35	30.05
300	0.00	0.03	0.05	29.89	29.46	28.94	30.16	29.45	29.02
350	0.00	0.03	0.05	28.76	28.46	28.19	28.85	28.49	28.45
400	0.00	0.03	0.06	27.62	27.64	27.56	27.68	27.68	27.85
500	0.00	0.03	0.06	26.48	26.49	26.55	26.57	26.61	26.79
550	0.00	0.03	0.06	25.88	26.09	26.30	25.85	26.19	26.44
600	0.00	0.03	0.07	25.44	25.67	25.78	25.72	25.86	26.01
800	0.00	0.04	0.07	24.79	24.89	25.09	24.81	25.00	25.20
1000	0.00	0.04	0.08	24.22	24.57	24.88	24.29	24.75	25.13
2000	0.01	0.05	0.12	27.65	27.88	28.91	28.70	29.14	30.20
3000	0.00	0.05	0.15	31.58	33.97	34.43	36.30	42.37	42.87
4000	0.02	0.05	0.16	32.55	36.69	41.38	30.38	32.42	32.59
5000	0.04	0.06	0.17	25.29	24.65	25.06	25.07	25.06	24.68
6000	0.02	0.13	0.24	17.79	18.52	19.15	18.26	18.89	20.06
7000	0.02	0.12	0.24	17.84	18.78	20.40	17.86	18.99	20.49
8000	0.11	0.01	0.18	25.84	26.03	26.41	28.67	28.27	29.08
9000	0.07	0.06	0.25	24.30	24.85	27.25	23.59	23.94	25.05
10000	0.00	0.14	0.35	20.85	20.69	20.29	20.51	20.36	19.89
11000	0.11	0.25	0.45	14.06	14.30	15.24	14.35	14.64	15.56
12000	0.03	0.13	0.37	23.26	23.75	24.77	28.10	29.42	29.71
13000	0.01	0.16	0.40	16.54	17.45	19.58	16.41	17.17	19.16
14000	0.07	0.11	0.41	43.84	34.79	29.68	23.17	22.94	23.34
15000	0.06	0.24	0.53	16.67	17.30	18.08	16.41	17.08	18.06
20000	0.15	0.42	0.81	19.26	19.77	22.89	19.36	19.69	23.24
22000	0.29	0.62	1.13	23.25	23.00	22.78	22.02	21.45	22.40
23000	0.64	0.98	1.50	14.63	15.54	18.37	13.70	14.38	17.14
23500	0.74	1.10	1.71	15.26	17.05	20.69	13.92	14.98	16.79
24000	0.82	1.28	2.08	23.56	33.23	31.56	16.38	16.67	15.92
25000	2.35	3.37	4.98	10.30	9.36	8.78	9.37	8.63	7.89
26000	7.93	9.96	13.06	4.94	4.83	4.76	4.72	4.73	5.16
26500	12.98	15.34	18.93	3.59	3.75	3.94	3.61	3.87	4.45
27000	19.10	21.83	25.54	3.00	3.29	3.85	3.08	3.43	4.01
27600	27.77	30.98	34.16	3.00	3.38	4.25	2.83	3.16	3.94
28000	34.41	35.69	35.03	3.21	3.59	4.39	2.74	3.07	3.89
28500	34.95	34.38	34.49	3.23	3.49	3.88	2.54	2.90	3.67
29000	33.54	33.73	34.79	2.79	3.00	3.24	2.44	2.83	3.44
29500	33.72	34.36	36.19	2.36	2.61	2.92	2.46	2.88	3.41
30000	34.98	36.04	37.85	2.14	2.46	2.94	2.68	3.14	3.73
30500	36.51	38.14	41.09	2.40	2.80	3.49	3.11	3.57	4.43
31000	40.07	42.81	47.33	2.80	3.23	4.05	3.31	3.73	4.63
31500	45.71	49.06	49.77	3.28	3.63	4.36	3.02	3.35	4.04
32000	45.72	44.95	44.49	3.27	3.49	3.93	2.52	2.84	3.34
32500	42.93	42.32	41.57	2.65	2.89	3.25	2.13	2.47	2.91
33000	40.53	40.14	40.08	2.19	2.46	2.84	2.07	2.42	2.96
33500	38.85	38.74	39.06	2.04	2.38	2.81	2.23	2.64	3.35
34000	37.35	37.46	37.49	2.20	2.55	3.13	2.60	3.09	3.99
34500	35.62	35.90	36.32	2.50	2.86	3.60	3.08	3.63	4.44
35000	34.76	35.22	36.02	2.73	3.06	3.86	3.35	3.84	4.43
35500	34.70	35.39	36.45	2.69	3.01	3.67	3.09	3.44	3.99
36000	35.93	36.66	37.82	2.49	2.84	3.29	2.66	2.99	3.54
36500	36.94	37.78	39.38	2.49	2.84	3.17	2.37	2.73	3.33
37000	38.18	39.24	40.82	2.55	2.84	3.24	2.28	2.70	3.36
37500	39.51	40.60	42.18	2.66	2.96	3.47	2.33	2.80	3.49
38000	40.75	42.07	43.89	2.64	2.96	3.68	2.43	2.94	3.74
38500	42.97	44.22	45.24	2.35	2.72	3.58	2.57	3.09	3.94
39000	44.89	45.35	44.91	2.12	2.56	3.29	2.73	3.23	4.04
40000	42.05	40.43	38.96	2.18	2.54	3.00	3.22	3.70	4.19

Typical Performance Curves



Outline Dimensions

FV1206-11



Weight: .017 grams.

Dimensions are in inches [mm]. Tolerances: 2 Pl. $\pm .01$; 3 Pl. $\pm .005$ Inches

Notes:

1. Case material: Ceramic.
2. Termination Finish: **as shown below or indicated on Data Sheet.**
For RoHS Case Styles: Gold plate over Nickel plate. All models, (+) 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

RF/IF MICROWAVE COMPONENTS

DEVICE ORIENTATION IN T&R

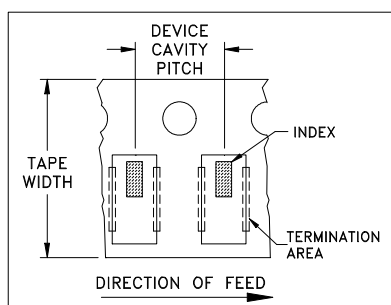


ILLUSTRATION 1

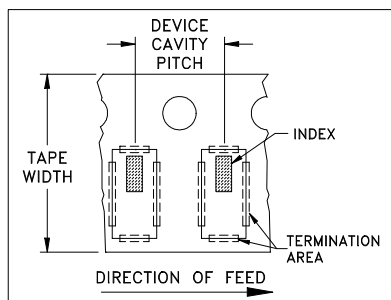


ILLUSTRATION 2

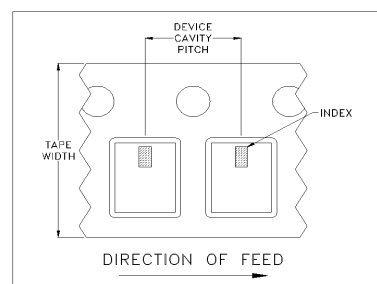


ILLUSTRATION 3

Applicable Case Styles

FV1206-1
FV1206-3

Applicable Case Styles

FV1206-4
FV1206-5
FV1206-6
FV1206-7
FV1206-9

Applicable Case Styles

FV1206-11
FV1206-12
GE0805C-18
NL1008C-6
NL1008C-7
NL1008C-9
NL1008C-10
NL1008C-12

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

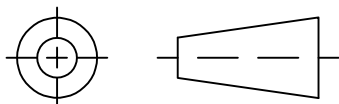


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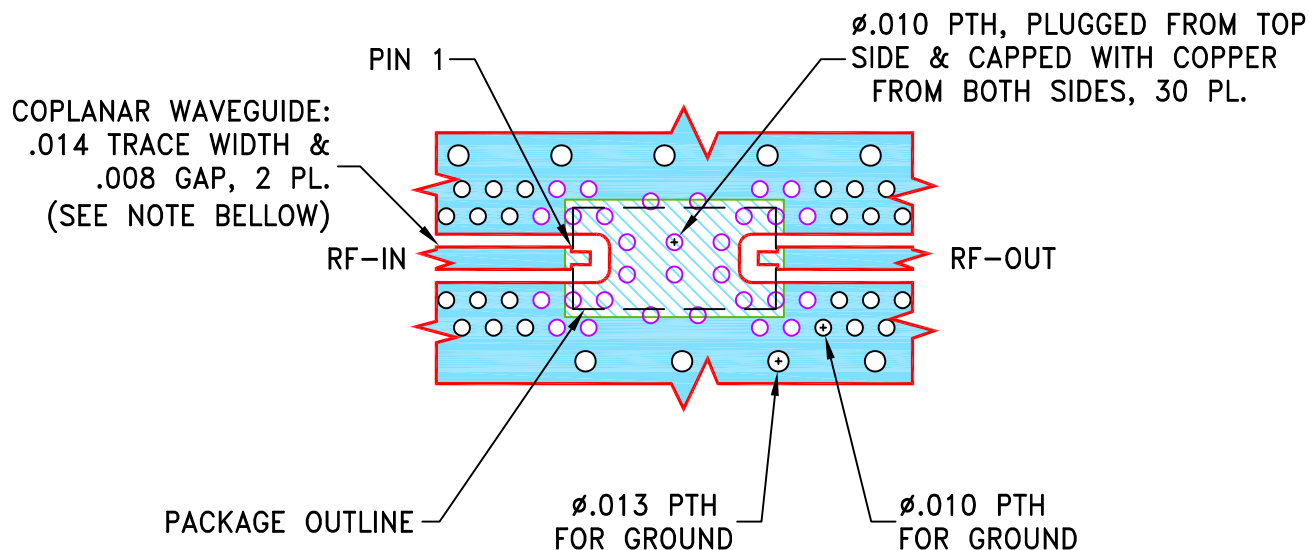
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THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-006066	NEW RELEASE	02/03/21	ITG	WY

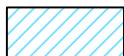
SUGGESTED MOUNTING CONFIGURATIONFV1206-11 CASE STYLE

NOTES:

- TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR MEGTRON-7 R5785(N); DIELECTRIC THICKNESS: $.0079 \pm .001$; COPPER: HVLP/HVLP, 1/2 Oz EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & 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.

UNLESS OTHERWISE SPECIFIED	INITIALS		DATE
DIMENSIONS ARE IN INCHES	DRAWN	ITG	02/03/21
TOLERANCES ON:	CHECKED	GF	02/03/21
2 PL DECIMALS $\pm$	APPROVED	WY	02/03/21
3 PL DECIMALS $\pm$.005			
ANGLES $\pm$			
FRACTIONS $\pm$			

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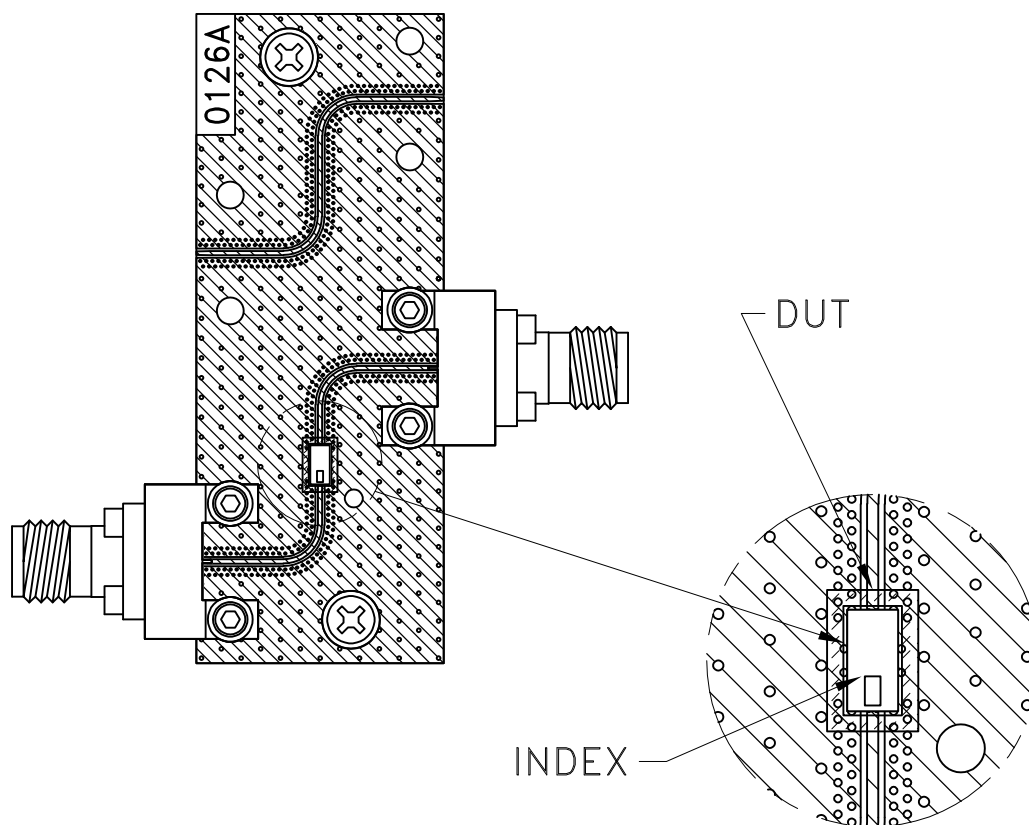
Mini-Circuits®

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Brooklyn NY 11235

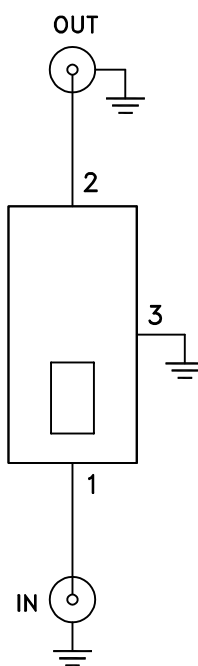
PL, FV1206-11, TB-LFCN-2352C+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-702	OR
FILE:	98PL702	SCALE: 8:1	SHEET: 1 OF 1

Evaluation Board and Circuit



TB-LFCN-2352C+



Schematic Diagram

1. 50 Ohm 2.4 End Launch Female connectors.
2. PCB Material: Megtron 7(N) or equivalent,
Dielectric Constant=3.4, Thickness=.0079 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	-55° to 125° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 125° C Ambient Environment	Individual Model Data Sheet
Thermal Cycling	-55 to 125°C, 100 cycles, Dwell Time 15 minutes.	MIL-STD-202, Method 107, Condition A-3
Mechanical Shock	50g, 11ms half-sine, 18 shocks applied each to 3 axes	MIL-STD-202 Method 213, Condition A
Vibration	10-2000Hz sine, 20g, 12 cycles applied each to 3 axes	MIL-STD-202, Method 204, Condition D
Constant Acceleration	30Kg, Y1 Direction	MIL-STD-883, Method 2001, Condition E
Humidity	85°C, 90-95% Relative Humidity, 250hours	
Solderability	10X / 30X Magnification	J-STD-002C Test S, J-STD-002C Test S1
High Temp Storage	125°C, 250 hours	