Ceramic

Bandpass Filter

BFHK-2802+

50Ω 26.50 to 29.50 GHz

The Big Deal

- 5G n257 bandpass filter
- Low Insertion Loss – Mid band 2.0dB typical
- Pick and place standard case style
- Small size 4.5mm x 3.2mm
- High quality distributed filter topology

CASE STYLE: NM1812C-2

Product Overview

The BFHK-2802+ LTCC Bandpass Filter covers the 5G n257 band. This corresponds to a passband of 26.5 to 29.5 GHz, with as low as 2dB passband loss, and up to 50dB stopband rejection. This model handles up to 1W RF input power and provides a wide operating temperature range from -55 to +125°C. Utilizing a proprietary LTCC material system and a distributed filter topology, this filter is able to achieve repeatable performance on a lot to lot basis, up to mmWave frequencies.

Key Features

Feature	Advantages
5G n257 band compatible	Designed for 5G Telecommunications, n257 band, 26.5 - 29.5 GHz
Proprietary mmWave compatible LTCC material system	Low loss and repeatable performance on a lot to lot basis up to mmWave frequencies.
Cost effective	LTCC is scalable technology that allows for cost reduction at volume.
Small size (4.5mm x 3.2mm)	Allows for high layout density of circuit boards, while minimizing effects of parasitics.

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Generic photo used for illustration purposes only

CASE STYLE: NM1812C-2

Features

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

Applications

- 5G Telecommunications

+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

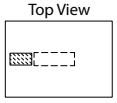
Reel Size	Devices/Reel
7"	20, 50, 100, 200, 500,1000, 3000

Maximum Ratings

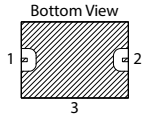
Operating Temperature	-55°C to +125°C
Storage Temperature	-55°C to +125°C
RF Power Input	1W

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

Top View



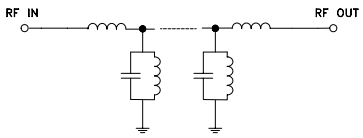
Bottom View



Pad Connections

Input	1
Output	2
Ground	3

Functional Schematic



Electrical Specifications[1] at 25°C

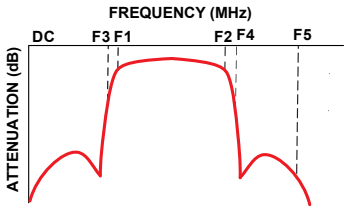
Parameter		F#	Frequency (GHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—			28		GHz
	Insertion Loss	F1-F2	26.5 - 27.3	—	3.7	—	dB
			27.3 - 28.6	—	2	4.5	
			28.6 - 29.5	—	3.7	—	
	Return Loss	F1-F2	26.5 - 29.5	—	10	—	dB
Stop Band, Lower	Insertion Loss	DC-F3	DC - 14	45	50	—	dB
			14 - 20	39	43	—	
			20 - 23.39	30	40	—	
			23.39 - 24.5	—	25	—	
Stop Band, Upper	Insertion Loss	F4-F5	32 - 32.7	—	33	—	dB
			32.7 - 37	25	33	—	
			37 - 40	31	37	—	
			40 - 44	—	40	—	

1. Measured on Mini-Circuits Characterization Test Board TB-BFHK-2802C+ with feedline losses removed by normalization of S12 and S21 traces to measurement of TB thru-line.

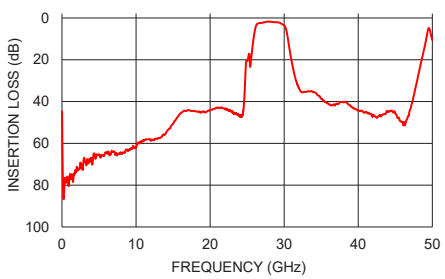
Typical Performance Data at 25°C

Frequency (GHz)	Insertion Loss (dB)	Return Loss (dB)
1	76.86	0.37
5	65.70	1.02
10	62.05	1.09
15	50.54	1.36
20	44.17	1.63
25	20.54	2.50
26	6.78	8.29
27	2.31	12.88
28	1.75	28.00
29	2.05	16.16
30	3.62	12.95
31	20.66	3.07
35	38.68	2.71
40	44.14	3.61
45	45.79	3.52
50	10.55	4.05

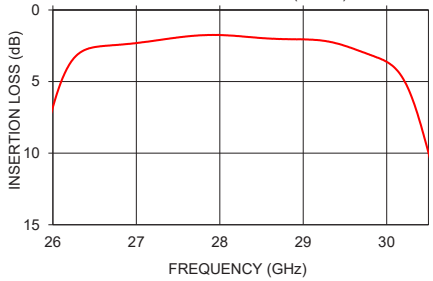
Specification Definition



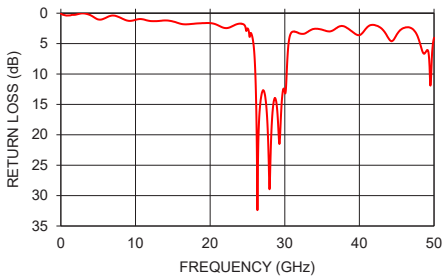
BFHK-2802+
INSERTION LOSS



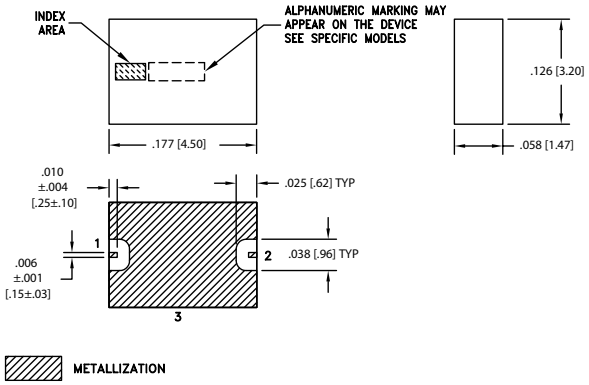
BFHK-2802+
INSERTION LOSS (ZOOM)



BFHK-2802+
RETURN LOSS

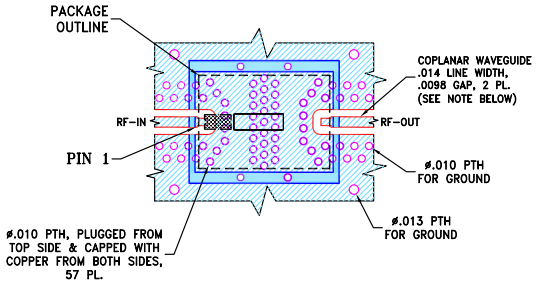


Outline Drawing



Weight: .064 grams.
Dimensions are in inches [mm]

Demo Board MCL P/N: TB-BFHK-2802C+
Suggested PCB Layout (PL-677)



NOTES:
1. TRACE WIDTH AND GAP ARE SHOWN FOR MEGTRON7 WITH DIELECTRIC THICKNESS: .0079±.001"; COPPER: HVLP/HVLP.
   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.

Product Marking: F413

Pad Connections

Input	1
Output	2
Ground	3

Additional 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

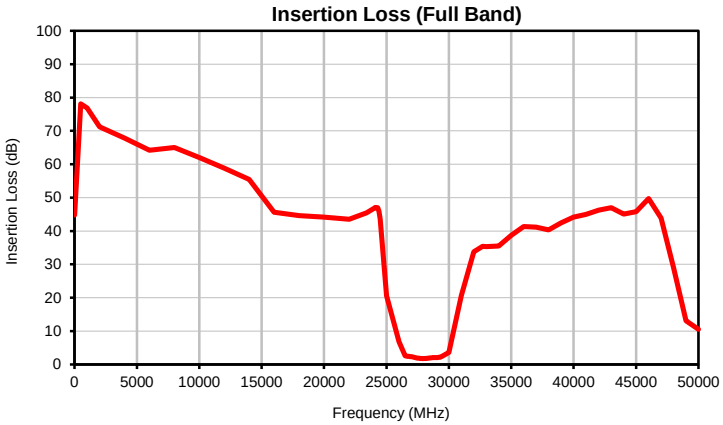
Ceramic Bandpass Filter BFHK-2802+

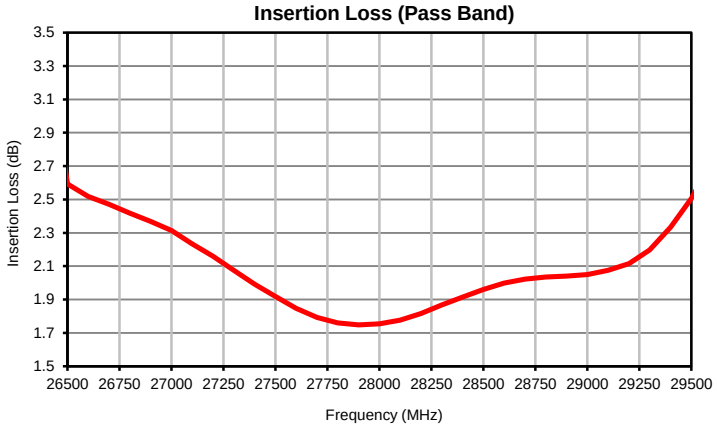
Typical Performance Data

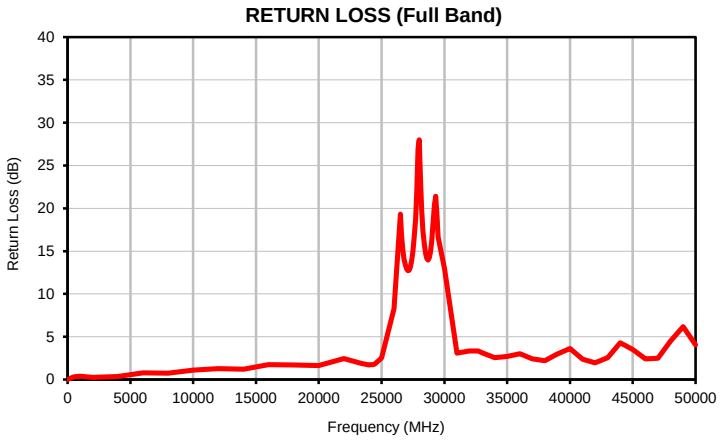
FREQUENCY (MHz)	INSERTION LOSS (dB)	RETURN LOSS (dB)
10	44.82	0.02
500	78.11	0.32
1000	76.86	0.37
2000	71.18	0.24
4000	67.85	0.35
6000	64.24	0.78
8000	64.98	0.76
10000	62.05	1.09
12000	58.81	1.29
14000	55.42	1.19
16000	45.58	1.72
18000	44.65	1.71
20000	44.17	1.63
22000	43.54	2.44
23390	45.40	1.90
24000	46.84	1.72
24100	47.11	1.72
24200	46.91	1.73
24300	47.01	1.76
24400	45.93	1.79
24500	43.65	1.85
25000	20.54	2.50
26000	6.78	8.29
26500	2.59	19.31
26600	2.52	16.67
26700	2.47	15.13
26800	2.42	14.04
26900	2.37	13.32
27000	2.31	12.88
27100	2.23	12.70
27200	2.16	12.79
27300	2.07	13.18
27400	1.99	13.89
27500	1.92	14.94
27600	1.85	16.51
27700	1.79	18.75
27800	1.76	22.13
27900	1.75	26.95
28000	1.75	28.00
28100	1.78	23.40
28200	1.82	19.74
28300	1.87	17.35
28400	1.91	15.74
28500	1.96	14.69
28600	2.00	14.14
28700	2.02	13.95
28800	2.03	14.25
28900	2.04	14.90
29000	2.05	16.16
29100	2.08	18.07
29200	2.12	20.40
29300	2.20	21.41
29400	2.33	19.34
29500	2.50	16.64
30000	3.62	12.95
31000	20.66	3.07
32000	33.75	3.33
32700	35.41	3.33
33000	35.36	3.12
34000	35.47	2.56
35000	38.68	2.71
36000	41.37	3.00
37000	41.14	2.40
38000	40.37	2.19
39000	42.43	2.99
40000	44.14	3.61
41000	44.95	2.38
42000	46.27	1.94
43000	46.96	2.55
44000	45.09	4.31
45000	45.79	3.52
46000	49.71	2.41
47000	43.85	2.49
48000	29.07	4.49
49000	13.13	6.18
50000	10.55	4.05

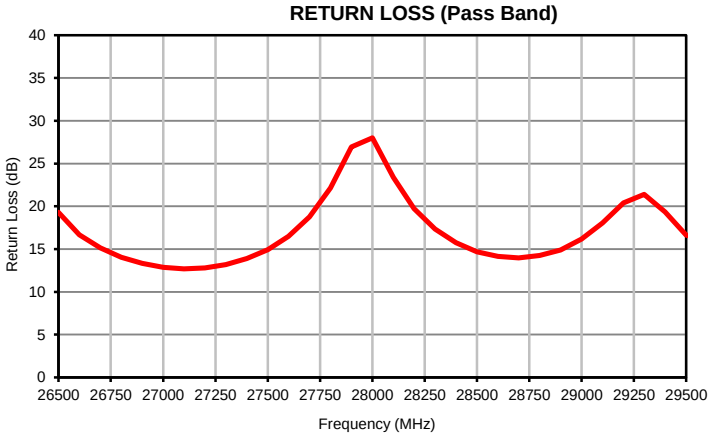
Ceramic Bandpass Filter BFHK-2802+

Typical Performance Curves



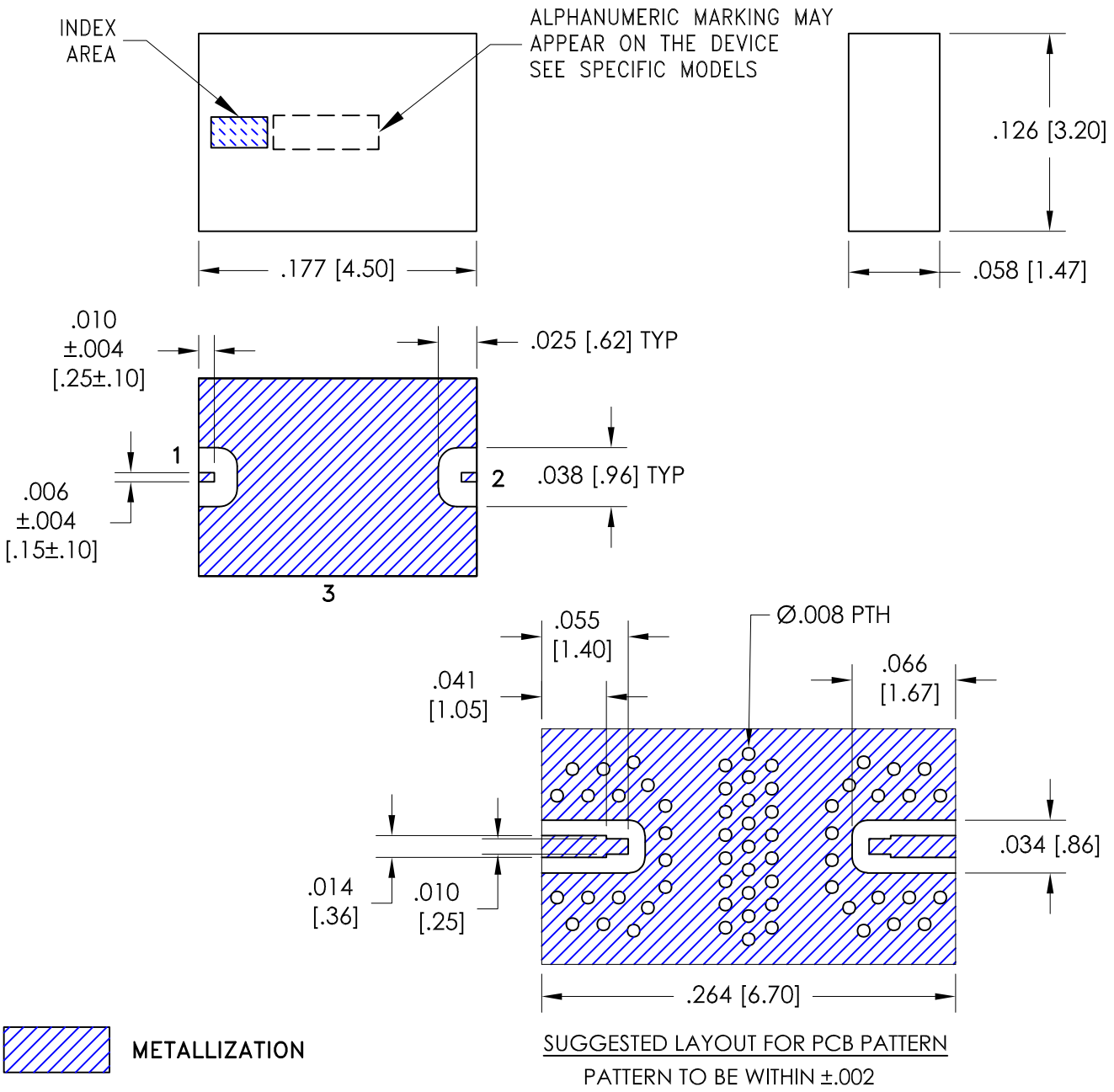






Case Style NM

Outline Dimensions NM1812C-2



Weight: .064 grams.

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

Notes:

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

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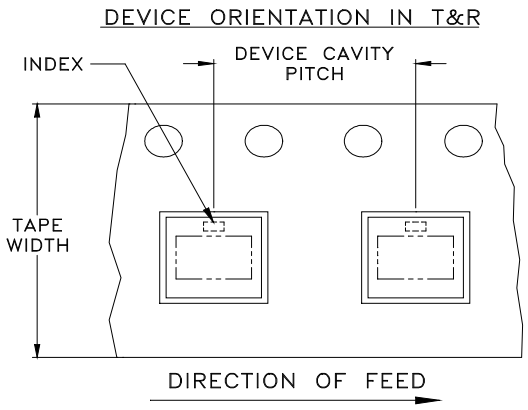
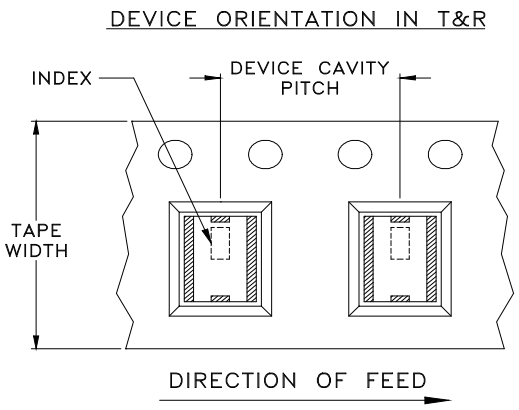
Tape & Reel Packaging TR-F77



Note: The shape of the pocket may differ



Note: The location and shape of the metallization may differ

Applicable Case Styles
GU1604, GU1804, GU2644, TT1618-2

Applicable Case Styles
MZ4532C, NM1812C, NM1812C-1, NM1812C-2, NM1812C-3, NM1812C-5, NM1812C-6, NM3237 NM1812C-9

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
12	8	7	Small quantity standards (see note)	20
				50
				100
				200
				500
				1000
		13	Standard	2000

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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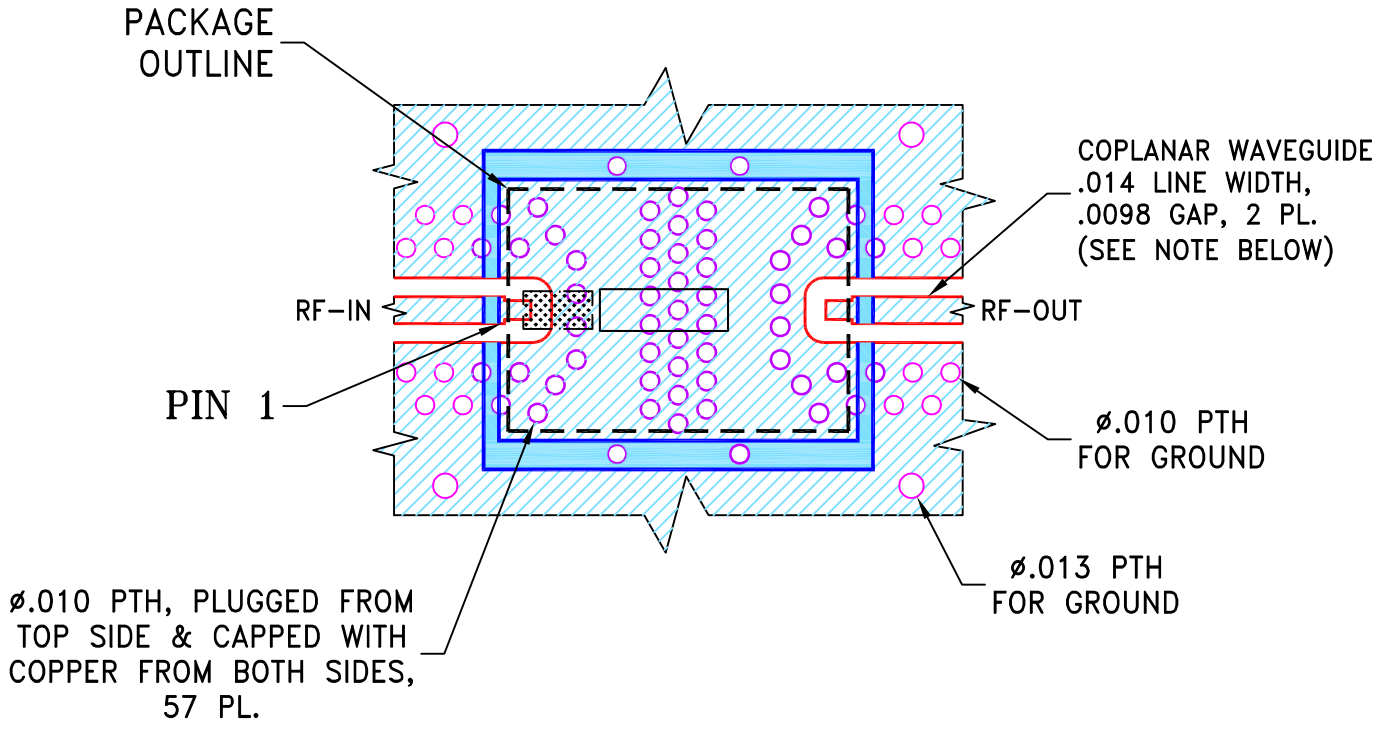
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-003081	NEW RELEASE	06/24/20	ITG	WY
A	ECO-003526	UPDATED PATTERN	08/03/20	GF	WY

SUGGESTED MOUNTING CONFIGURATION FOR NM1812C-2 CASE STYLE



NOTES:

1. TRACE WIDTH AND GAP ARE SHOWN FOR MEGTRON7 WITH DIELECTRIC THICKNESS: .0079±.001";
   COPPER: HVLP/HVLP.
   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	06/24/20
TOLERANCES ON:	CHECKED	GF	06/24/20
2 PL DECIMALS ±	APPROVED	WY	06/24/20
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

PL, NM1812C-2, TB-1135+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-677	A

FILE:	SCALE:	SHEET:
98PL677	10:1	1 OF 1

Mini-Circuits

Environmental Specifications ENV06T8

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	

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