Surface Mount

Bandpass Filter

50Ω 350 to 390 MHz

BPHI-370+

Generic photo used for illustration purposes only

CASE STYLE: HQ1157

Features

- High rejection 70 dB typ.
- Wide stopband up to 4 GHz.
- Shielded package

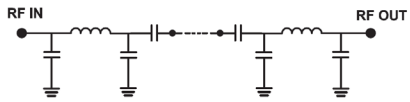
Applications

- Public safety communications
- Mobile satellite communication
- Air traffic control

Electrical Specifications at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—	—	—	370	—	MHz
	Insertion Loss	F1-F2	350 - 390	—	2.0	3.5	dB
	VSWR	F1-F2	350 - 390	—	1.3	1.9	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 200	53	68	—	dB
		F3-F4	200 - 305	18	28	—	dB
Stop Band, Upper	Insertion Loss	F5-F6	430 - 550	18	28	—	dB
		F6-F7	550 - 2500	53	68	—	dB
		F7-F8	2500 - 4000	—	38	—	dB

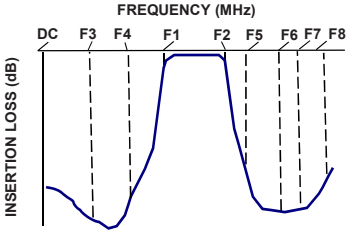
Functional Schematic



Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	2 W

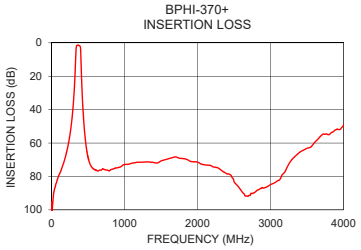
Permanent damage may occur if any of these limits are exceeded.

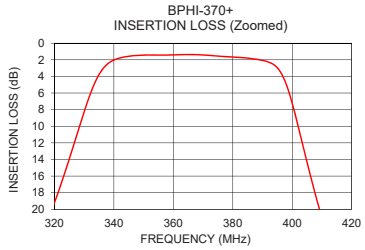
Typical Frequency Response

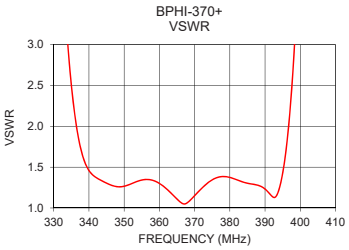


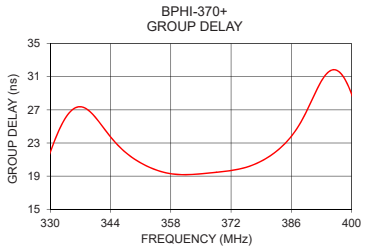
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
10	98.83	455.24	350	20.91
200	66.29	206.66	352	20.32
305	31.53	56.90	354	19.86
318	21.17	29.26	356	19.51
325	13.95	14.51	358	19.29
335	3.78	2.51	360	19.18
350	1.43	1.27	362	19.17
360	1.41	1.30	364	19.23
370	1.42	1.15	366	19.33
380	1.66	1.37	368	19.42
390	2.07	1.23	370	19.54
396	3.44	1.72	372	19.67
413	24.66	28.50	374	19.86
421	32.83	42.74	376	20.14
430	40.27	56.21	378	20.55
550	74.41	115.57	380	21.09
2000	71.40	43.83	382	21.78
2500	83.30	28.85	384	22.66
3000	84.83	30.25	386	23.80
4000	49.28	44.77	390	27.32









+RoHS Compliant

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

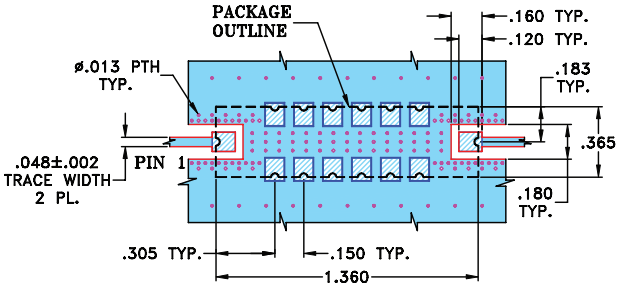
Notes

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

Pad Connections

INPUT	1
OUTPUT	8
GROUND	2-7,9-14

Demo Board MCL P/N: TB-BPHI-370+
Suggested PCB Layout (PL-227)



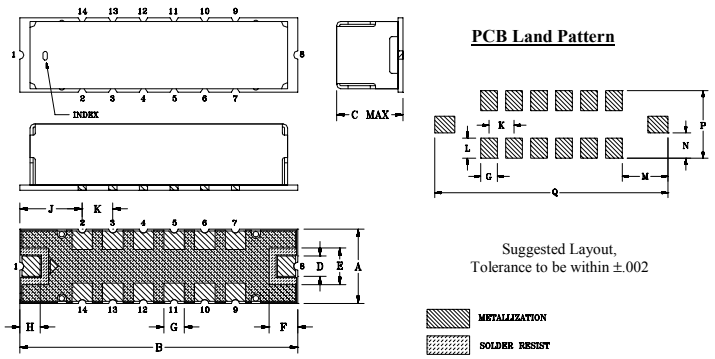
NOTE:

1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .025"±.002". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH 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 SOLDERMASK

Outline Drawing



Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H
.365	1.360	.35	.100	.180	.140	.100	.100
9.27	34.54	8.89	2.54	4.57	3.56	2.54	2.54

J	K	L	M	N	P	Q	wt
.305	.150	.120	.275	.152	.405	1.400	grams
7.75	3.81	3.05	6.99	3.86	10.29	35.56	4.0

Note: Please refer to case style drawing for details

Surface Mount Bandpass Filter BPHI-370+

Typical Performance Data

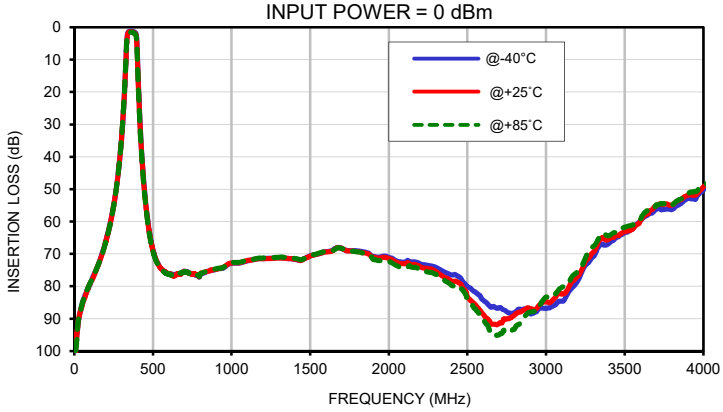
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
10	97.91	98.83	100.29	0.04	0.04	0.04	0.04	0.05	0.04
50	85.34	86.13	85.49	0.02	0.03	0.03	0.03	0.03	0.04
100	79.41	79.24	79.11	0.02	0.03	0.04	0.02	0.04	0.06
150	73.59	73.70	73.68	0.03	0.06	0.07	0.04	0.06	0.09
160	72.30	72.52	72.46	0.04	0.06	0.07	0.04	0.07	0.09
180	69.40	69.64	69.70	0.05	0.07	0.08	0.05	0.08	0.10
200	66.16	66.29	66.46	0.06	0.08	0.10	0.06	0.09	0.11
220	62.33	62.56	62.61	0.07	0.10	0.11	0.08	0.10	0.12
230	60.29	60.34	60.41	0.08	0.10	0.12	0.08	0.11	0.13
240	57.85	57.96	58.10	0.09	0.11	0.12	0.09	0.12	0.14
250	55.15	55.23	55.30	0.10	0.12	0.13	0.10	0.13	0.14
260	52.13	52.24	52.30	0.11	0.13	0.15	0.10	0.14	0.15
270	48.80	48.84	48.88	0.12	0.15	0.16	0.12	0.15	0.17
280	44.87	44.86	44.89	0.14	0.17	0.19	0.13	0.17	0.19
290	40.33	40.26	40.23	0.16	0.20	0.22	0.15	0.19	0.22
300	34.86	34.74	34.65	0.21	0.26	0.29	0.19	0.24	0.26
301	34.26	34.12	34.02	0.22	0.27	0.29	0.19	0.24	0.27
305	31.69	31.53	31.40	0.25	0.31	0.34	0.21	0.27	0.30
310	28.15	27.95	27.76	0.30	0.37	0.41	0.25	0.32	0.35
315	24.13	23.88	23.64	0.40	0.48	0.54	0.32	0.39	0.44
318	21.45	21.17	20.89	0.49	0.59	0.67	0.38	0.47	0.53
325	14.27	13.95	13.59	0.99	1.20	1.36	0.75	0.90	1.02
335	3.76	3.78	3.70	6.56	7.32	8.15	5.06	5.58	6.15
350	1.24	1.43	1.56	18.97	18.60	17.95	22.70	22.29	21.21
355	1.25	1.43	1.55	16.57	16.71	16.41	17.49	17.57	17.14
360	1.25	1.41	1.52	16.49	17.67	18.26	16.44	17.48	17.91
361	1.24	1.40	1.51	16.99	18.46	19.35	16.78	18.04	18.69
370	1.21	1.42	1.56	25.90	23.12	20.84	23.63	22.09	20.40
375	1.32	1.55	1.71	17.71	16.65	15.73	18.59	17.66	16.79
380	1.43	1.66	1.83	16.28	16.04	15.75	18.51	18.78	18.82
385	1.54	1.80	1.97	17.80	17.61	17.45	22.58	23.89	24.94
390	1.76	2.07	2.29	20.65	19.67	19.19	22.44	21.64	21.22
396	2.90	3.44	3.90	12.27	11.54	10.62	12.47	11.79	10.98
400	6.38	7.24	8.02	4.06	3.91	3.67	4.34	4.19	3.96
410	20.25	21.07	21.85	0.69	0.77	0.80	0.80	0.89	0.92
413	23.88	24.66	25.39	0.53	0.61	0.64	0.62	0.70	0.74
421	32.19	32.83	33.47	0.34	0.41	0.44	0.39	0.46	0.50
430	39.72	40.27	40.83	0.25	0.31	0.34	0.28	0.35	0.38
500	68.61	68.80	69.12	0.12	0.17	0.19	0.12	0.18	0.19
550	74.45	74.41	74.59	0.11	0.15	0.17	0.11	0.16	0.18
600	76.23	76.15	76.23	0.10	0.14	0.16	0.10	0.15	0.17
800	76.57	76.37	76.50	0.08	0.13	0.15	0.07	0.12	0.14
1000	72.90	72.82	72.69	0.06	0.12	0.15	0.05	0.12	0.14
1100	72.17	72.04	71.90	0.05	0.12	0.15	0.04	0.12	0.15
1200	71.41	71.50	71.29	0.04	0.12	0.16	0.04	0.13	0.16
1300	71.17	71.30	71.03	0.04	0.14	0.18	0.03	0.13	0.18
1500	70.64	70.67	70.52	0.04	0.17	0.24	0.03	0.17	0.24
2000	71.03	71.40	72.24	0.15	0.40	0.52	0.13	0.39	0.53
2200	73.08	73.96	74.85	0.22	0.50	0.65	0.20	0.49	0.65
2400	76.54	78.46	79.76	0.27	0.57	0.73	0.26	0.57	0.72
2500	80.08	83.30	84.24	0.30	0.60	0.75	0.29	0.61	0.76
2800	88.09	88.89	93.19	0.31	0.61	0.75	0.32	0.63	0.76
3000	86.85	84.83	83.32	0.27	0.57	0.70	0.28	0.59	0.72
3200	78.39	76.90	75.48	0.22	0.51	0.63	0.23	0.53	0.66
3400	66.75	65.45	64.35	0.16	0.44	0.56	0.20	0.47	0.60
3600	59.67	59.78	59.31	0.09	0.37	0.49	0.12	0.40	0.54
3700	56.30	55.16	54.88	0.07	0.34	0.47	0.08	0.36	0.50
3800	56.30	54.93	54.77	0.10	0.36	0.49	0.15	0.39	0.52
3900	52.67	51.98	51.89	0.13	0.41	0.53	0.15	0.42	0.59
4000	50.17	49.28	48.86	0.12	0.39	0.54	0.15	0.41	0.56

Typical Performance Data

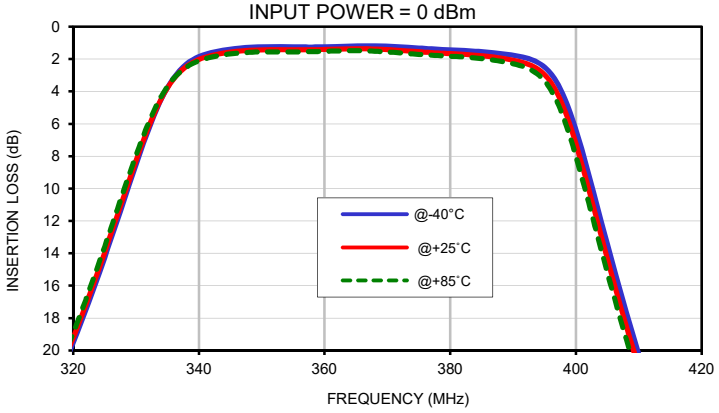
FREQ. (MHz)	GROUP DELAY (ns)		
	@-40°C	@+25°C	@+85°C
350.0	21.04	20.91	20.79
350.5	20.87	20.76	20.64
351.0	20.71	20.60	20.50
351.5	20.56	20.46	20.36
352.0	20.42	20.32	20.23
352.5	20.29	20.20	20.11
353.0	20.16	20.07	20.00
353.5	20.04	19.96	19.89
354.0	19.92	19.86	19.80
354.5	19.81	19.76	19.71
355.0	19.71	19.67	19.62
355.5	19.62	19.58	19.55
356.0	19.53	19.51	19.49
356.5	19.45	19.44	19.43
357.0	19.38	19.38	19.38
357.5	19.32	19.33	19.34
358.0	19.27	19.29	19.30
358.5	19.22	19.25	19.28
359.0	19.18	19.22	19.25
360.0	19.12	19.18	19.23
361.0	19.09	19.17	19.24
362.0	19.09	19.17	19.24
363.0	19.11	19.20	19.28
364.0	19.15	19.23	19.32
365.0	19.19	19.27	19.36
366.0	19.25	19.33	19.40
367.0	19.31	19.38	19.44
368.0	19.37	19.42	19.49
369.0	19.44	19.48	19.53
370.0	19.51	19.54	19.59
371.0	19.58	19.60	19.65
371.5	19.62	19.64	19.68
372.0	19.65	19.67	19.71
373.0	19.74	19.76	19.80
374.0	19.84	19.86	19.92
375.0	19.95	19.99	20.05
376.0	20.09	20.14	20.23
377.0	20.26	20.33	20.43
378.0	20.45	20.55	20.66
379.0	20.68	20.80	20.94
380.0	20.95	21.09	21.25
381.0	21.26	21.41	21.60
382.0	21.60	21.78	21.99
383.0	21.99	22.20	22.43
384.0	22.44	22.66	22.93
385.0	22.94	23.19	23.49
386.0	23.52	23.80	24.13
387.0	24.19	24.51	24.88
388.0	24.98	25.33	25.74
389.0	25.89	26.27	26.72
390.0	26.92	27.32	27.80

Typical Performance Curves

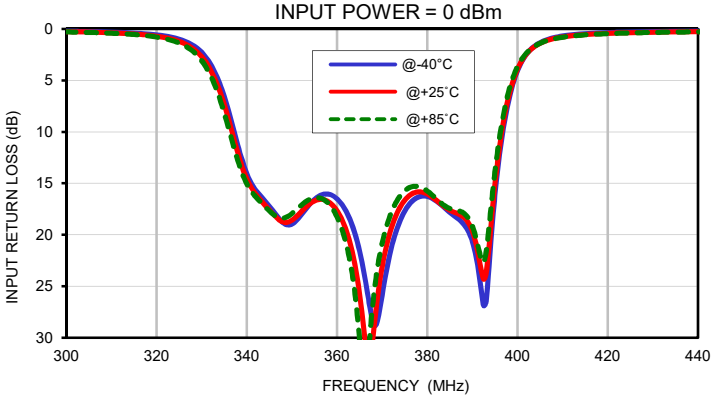
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



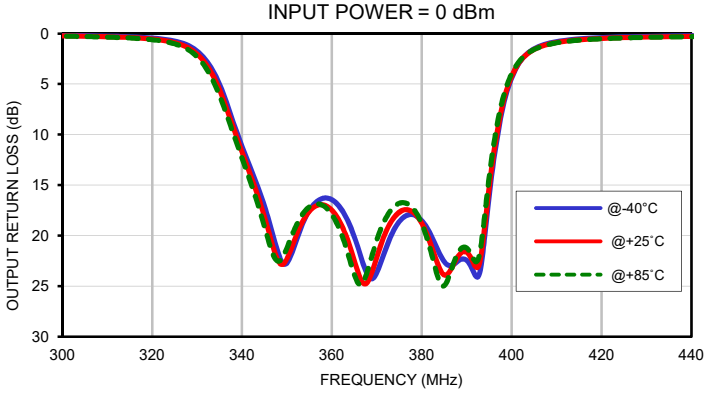
INSERTION LOSS vs. TEMPERATURE (Zoomed)
INPUT POWER = 0 dBm



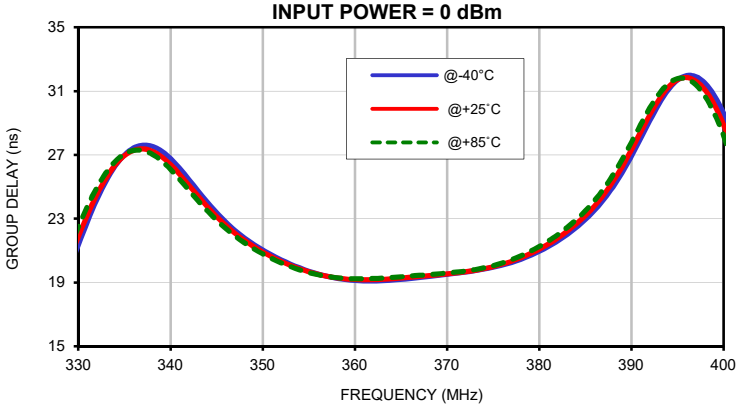
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



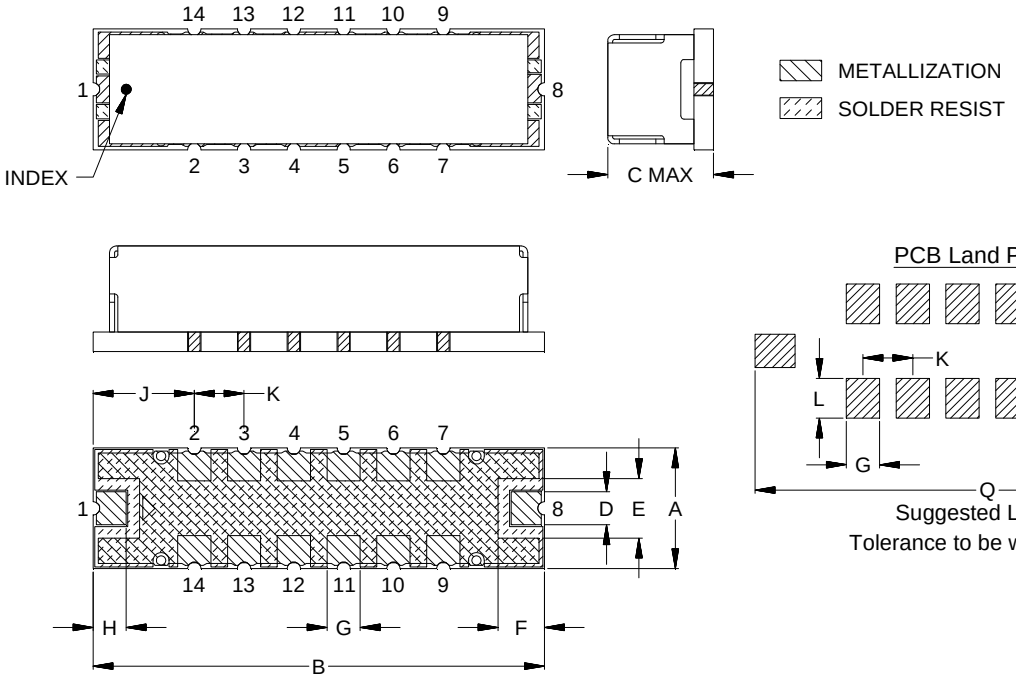
GROUP DELAY vs. TEMPERATURE
INPUT POWER = 0 dBm



Case Style HQ

Outline Dimensions

HQ1157



CASE#	A	B	C	D	E	F	G	H	J	K	L	M
HQ1157	.365 (9.27)	1.360 (34.54)	.350 (8.89)	.100 (2.54)	.180 (4.57)	.140 (3.56)	.100 (2.54)	.100 (2.54)	.305 (7.75)	.150 (3.81)	.120 (3.05)	.275 (6.99)

CASE#	N	P	Q	WT.GRAM
HQ1157	.152 (3.87)	.405 (10.29)	1.400 (35.56)	4.0

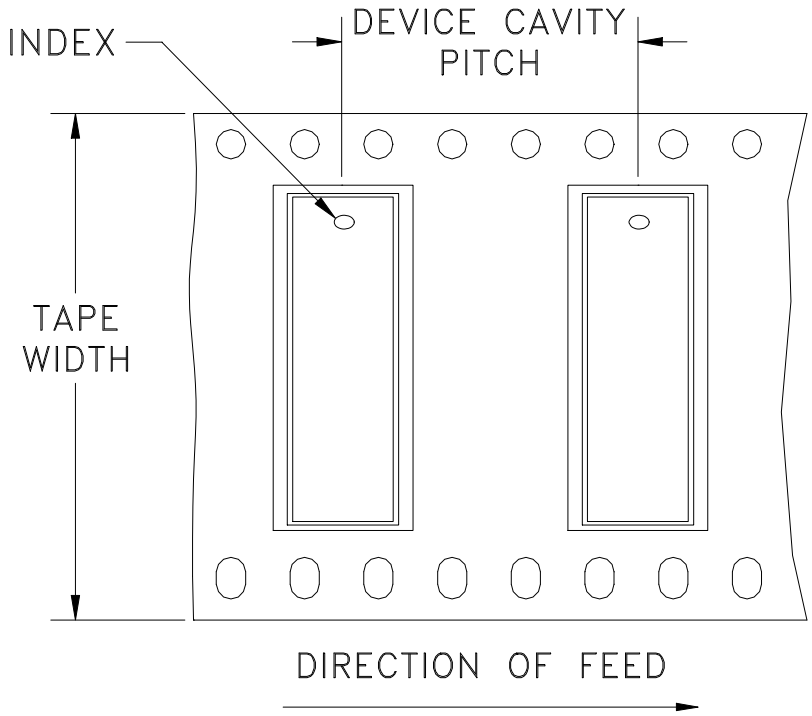
Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015

Notes:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. Termination finish:
   For RoHS Case Styles: 3-5 µ inch (.08-.13 microns) Gold over 120-240 µ inch (3.05-6.10 microns) Nickel plate.
   For RoHS-5 Case Styles: Tin-Lead plate.

Tape & Reel Packaging TR-F83

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
56	16	13	100

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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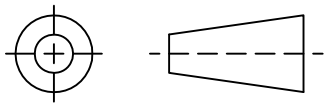
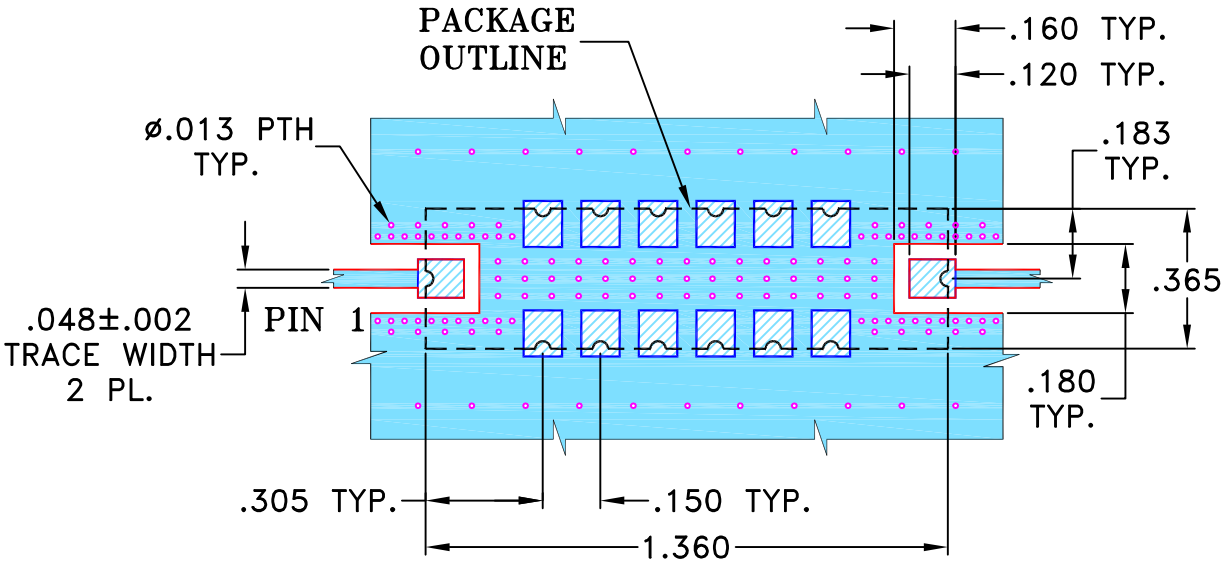
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M101212	NEW RELEASE (FROM RAVON)	11/05	DK	YB
A	M108938	SWITCH HATCHES	12/06	DK	HH
B	M118075	CHANGE LINE PLACES	06/08	HB	HH
C	M173459	CORRECTED CASE STYLE & TB PART#	03/27/19	ITG	IL

SUGGESTED MOUNTING CONFIGURATION
FOR HQ1157 CASE STYLE, rf PIN CONNECTION



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   FOR OTHER MATERIALS TRACE WIDTH 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 SOLDERMASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	HB (RAVON)	12 JUN 2008
TOLERANCES ON:	CHECKED	RZ (RAVON)	12 JUN 2008
2 PL DECIMALS ±	APPROVED	HH (RAVON)	12 JUN 2008
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, rf, HQ1157, TB-363+, 50 OHM

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-227	C

FILE:	SCALE:	SHEET:
98PL227	2:1	1 OF 1

Mini-Circuits

Environmental Specifications ENV02T1

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