Surface Mount

Bandpass Filter

BPF-A355+

50Ω 310 to 400 MHz

Generic photo used for illustration purposes only

CASE STYLE: HQ1157

The Big Deal

- Broader bandwidth
- High Rejection
- Good VSWR, 1.2:1 typical
- Miniature shielded package

Product Overview

BPF-A355+ is a 50Ω bandpass filter in a shielded package fabricated using SMT technology. This bandpass filter covers from 310 to 400 MHz. This filter build with high Q capacitors and wire welded inductors for high reliability. This filter has fast roll-off and general application in the UHF range

Key Features

Feature	Advantages
Low insertion loss	Can be used in industrial and medical application
Good rejection	This enables the filter attenuate spurious signals and reject harmonics for broad frequency band
Shielded package	The small surface mount package enables the BPF-A355+ to used in compact design

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CASE STYLE: HQ1157

Features

- Broader bandwidth
- High rejection
- Miniature shielded package

Applications

- UHF antenna
- Radio link
- Transmitters / Receivers

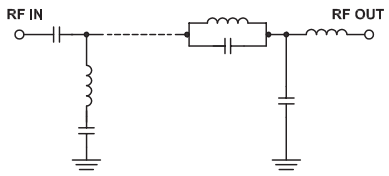
Electrical Specifications at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—	—	—	355	—	MHz
	Insertion Loss	F1-F2	310-400	—	1.90	3.50	dB
	VSWR	F1-F2	310-400	—	1.22	1.92	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC-237	20	27	—	dB
	VSWR	DC-F3	DC-237	—	20	—	:1
Stop Band, Upper	Insertion Loss	F4-F5	450-1400	20	30	—	dB
	VSWR	F4-F5	450-1400	—	20	—	:1

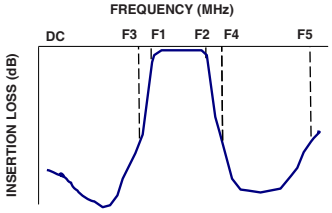
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	0.8W

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

Functional Schematic



Typical Frequency Response



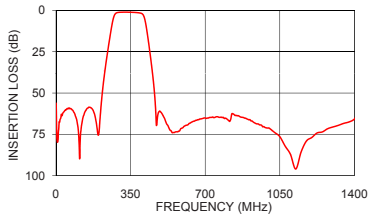
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
1	56.16	868.59	310	9.96
201	74.51	86.86	315	9.65
211	58.58	72.39	320	9.42
237	29.66	39.49	325	9.25
249	19.42	25.19	330	9.14
265	7.19	6.71	335	9.06
273	3.28	2.78	340	9.02
300	1.14	1.13	345	9.03
310	1.08	1.10	350	9.08
355	1.15	1.17	355	9.19
400	1.77	1.12	356	9.21
411	3.18	1.89	360	9.35
420	7.37	3.62	365	9.57
427	12.75	5.25	370	9.85
435	19.95	6.81	375	10.19
445	29.71	8.90	380	10.62
450	34.93	10.07	385	11.16
570	73.46	35.46	390	11.88
750	64.45	29.46	395	12.89
1400	65.76	27.59	400	14.31

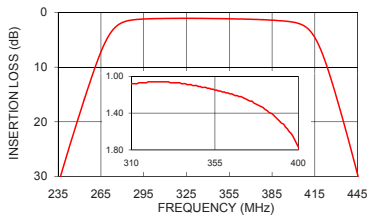
+RoHS Compliant

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

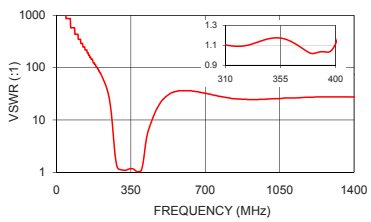
BPF-A355+
INSERTION LOSS (Full band)



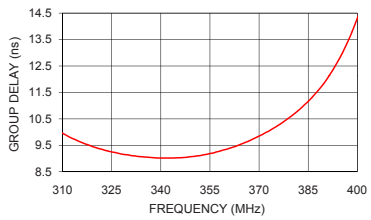
BPF-A355+
INSERTION LOSS (Pass band)



BPF-A355+
VSWR



BPF-A355+
GROUP DELAY



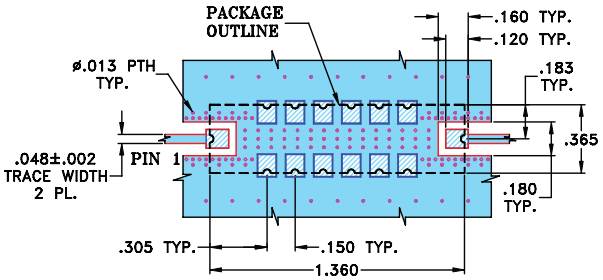
Notes

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	2,3,4,5,6,7,9,10,11,12,13,14

Demo Board MCL P/N: TB-363+
Suggested PCB Layout (PL-227)



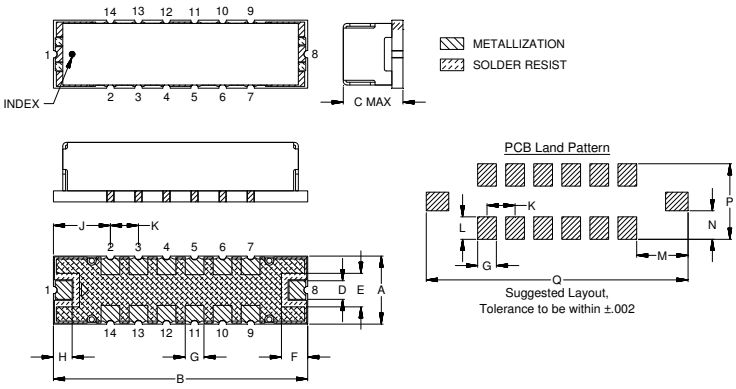
NOTE:

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

Band Pass Filter BPF-A355+

Typical Performance Data

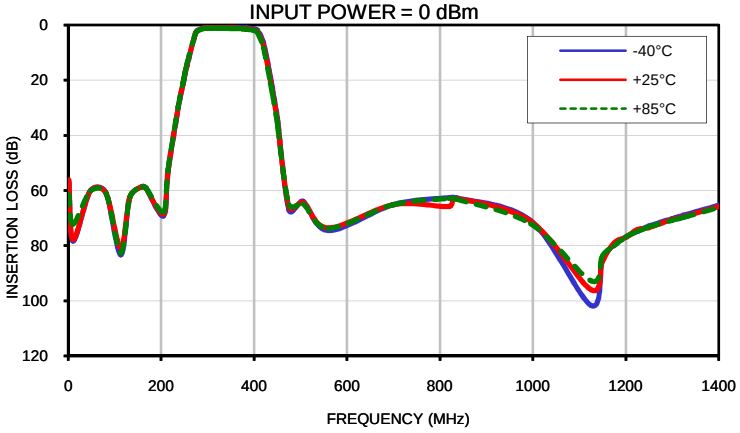
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1	56.67	56.16	61.41	0.00	0.02	0.02	0.04	0.03	0.03
10	78.34	77.76	72.18	0.00	0.00	0.00	0.00	0.01	0.01
47	60.14	60.21	60.22	0.01	0.02	0.02	0.12	0.15	0.16
81	60.84	60.89	60.96	0.02	0.03	0.05	0.35	0.41	0.45
113	83.35	80.74	82.63	0.03	0.05	0.07	0.46	0.53	0.58
133	62.37	62.34	62.41	0.04	0.07	0.09	0.43	0.52	0.58
159	58.57	58.60	58.65	0.07	0.11	0.13	0.42	0.53	0.61
167	59.07	59.17	59.07	0.08	0.12	0.14	0.44	0.55	0.63
205	69.21	68.52	67.72	0.17	0.22	0.25	0.73	0.86	0.95
215	53.28	52.90	52.41	0.21	0.26	0.29	0.85	0.99	1.07
237	29.92	29.66	29.40	0.36	0.44	0.48	1.06	1.25	1.36
247	21.38	21.08	20.80	0.53	0.63	0.70	1.16	1.39	1.54
249	19.72	19.42	19.14	0.58	0.69	0.77	1.19	1.43	1.60
255	14.87	14.55	14.25	0.85	1.01	1.12	1.38	1.66	1.88
274	2.93	2.97	2.96	6.48	7.27	8.00	6.56	7.25	7.90
278	1.97	2.10	2.16	9.76	10.70	11.64	9.66	10.34	11.02
291	1.06	1.25	1.38	22.97	22.52	22.24	22.31	21.10	20.40
299	0.96	1.15	1.28	26.71	24.45	22.80	27.35	24.60	22.74
305	0.93	1.11	1.24	27.13	25.32	23.58	28.92	26.66	24.46
306	0.92	1.10	1.23	27.13	25.48	23.78	29.03	27.01	24.82
310	0.91	1.08	1.21	27.09	26.15	24.75	29.12	28.38	26.45
321	0.89	1.06	1.18	27.65	27.34	27.10	28.88	30.35	31.83
323	0.88	1.06	1.18	27.90	27.24	26.93	29.01	30.18	31.76
332	0.88	1.07	1.19	28.47	25.39	23.99	29.92	27.88	26.97
339	0.89	1.08	1.22	27.06	23.51	21.70	29.71	25.94	24.00
350	0.92	1.12	1.27	24.31	21.92	20.12	27.52	24.51	22.24
355	0.95	1.15	1.29	23.80	22.01	20.31	26.96	24.75	22.53
360	0.97	1.17	1.32	23.93	22.75	21.19	27.03	25.71	23.60
366	1.00	1.21	1.36	25.05	24.79	23.46	28.03	28.07	26.18
375	1.06	1.27	1.43	28.95	32.16	32.28	30.54	32.36	30.79
381	1.11	1.34	1.51	31.92	41.70	46.72	30.77	30.26	27.99
382	1.12	1.36	1.53	32.19	41.16	41.12	30.66	29.80	27.45
384	1.15	1.39	1.56	32.42	38.52	35.93	30.51	29.10	26.58
388	1.20	1.45	1.64	32.07	35.32	32.20	30.95	28.87	25.90
390	1.23	1.49	1.68	31.84	35.29	32.11	31.87	29.64	26.26
396	1.34	1.62	1.84	28.87	33.60	41.21	36.07	48.77	33.35
400	1.47	1.77	2.01	23.65	24.97	27.23	25.46	26.09	26.78
407	1.95	2.38	2.71	14.60	14.37	14.41	13.91	13.30	12.93
420	6.35	7.37	8.27	4.84	4.92	4.89	3.38	3.24	3.08
435	18.83	19.95	21.00	2.26	2.57	2.73	0.97	1.09	1.14
437	20.73	21.84	22.88	2.12	2.43	2.60	0.90	1.02	1.07
439	22.67	23.76	24.78	2.00	2.30	2.47	0.84	0.96	1.01
450	33.85	34.93	35.92	1.48	1.73	1.91	0.67	0.79	0.84
451	34.92	36.01	37.00	1.44	1.69	1.86	0.66	0.78	0.83
475	67.12	66.03	65.18	0.83	1.01	1.15	0.52	0.62	0.68
505	63.93	64.31	64.88	0.53	0.68	0.79	0.43	0.53	0.59
560	74.51	73.55	73.75	0.37	0.50	0.58	0.34	0.44	0.51
700	65.13	65.12	65.17	0.43	0.54	0.59	0.23	0.35	0.44
820	62.62	65.76	62.94	0.54	0.67	0.77	0.20	0.34	0.45
835	62.67	62.93	63.19	0.53	0.68	0.78	0.20	0.34	0.45
995	70.96	71.18	72.11	0.46	0.69	0.88	0.20	0.36	0.48
1125	101.69	95.96	92.76	0.40	0.66	0.84	0.21	0.38	0.51
1150	84.73	85.70	83.66	0.40	0.65	0.83	0.21	0.39	0.52
1175	79.71	79.03	80.12	0.39	0.64	0.82	0.21	0.39	0.52
1200	76.89	76.91	76.87	0.39	0.64	0.82	0.22	0.40	0.53
1225	74.88	74.16	74.81	0.39	0.63	0.81	0.22	0.40	0.53
1250	72.95	73.51	73.19	0.39	0.63	0.80	0.22	0.40	0.54
1300	70.18	70.51	70.81	0.39	0.63	0.79	0.24	0.41	0.54
1325	68.99	69.54	69.77	0.39	0.63	0.78	0.24	0.42	0.55
1400	65.36	65.76	66.11	0.40	0.63	0.77	0.25	0.43	0.56

Typical Performance Data

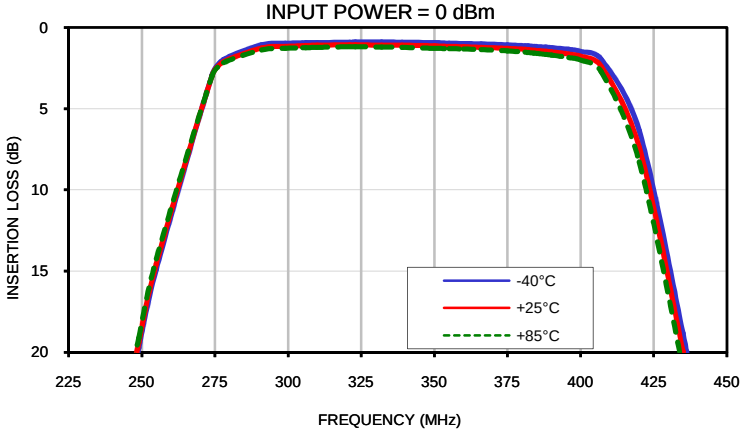
FREQ.	GROUP DELAY		
(MHz)	(nsec)		
	@-40°C	@+25°C	@+85°C
310	9.99	9.96	9.93
313	9.78	9.76	9.74
316	9.61	9.60	9.59
319	9.46	9.46	9.46
320	9.42	9.42	9.42
321	9.38	9.38	9.39
323	9.31	9.31	9.32
324	9.27	9.28	9.29
325	9.25	9.25	9.27
327	9.19	9.20	9.21
328	9.17	9.17	9.19
329	9.15	9.15	9.17
332	9.09	9.10	9.11
336	9.04	9.05	9.06
343	9.02	9.02	9.03
348	9.04	9.05	9.07
349	9.05	9.07	9.08
350	9.06	9.08	9.09
351	9.08	9.10	9.12
357	9.22	9.25	9.27
358	9.25	9.28	9.31
359	9.28	9.32	9.35
360	9.31	9.35	9.38
361	9.35	9.39	9.43
362	9.39	9.43	9.47
365	9.52	9.57	9.62
366	9.56	9.62	9.67
367	9.61	9.67	9.73
369	9.72	9.79	9.85
370	9.78	9.85	9.92
371	9.83	9.91	9.98
372	9.90	9.98	10.05
373	9.97	10.04	10.12
374	10.04	10.12	10.20
375	10.11	10.19	10.27
376	10.19	10.27	10.36
377	10.27	10.35	10.44
378	10.35	10.44	10.53
379	10.43	10.53	10.62
380	10.53	10.62	10.72
381	10.62	10.72	10.82
382	10.72	10.82	10.92
383	10.82	10.93	11.04
384	10.94	11.05	11.16
385	11.05	11.16	11.27
386	11.17	11.29	11.42
387	11.30	11.43	11.55
388	11.44	11.57	11.70
389	11.59	11.72	11.86
390	11.74	11.88	12.03
391	11.91	12.06	12.22
392	12.08	12.25	12.41
393	12.27	12.45	12.62
394	12.47	12.67	12.85
395	12.68	12.89	13.09
396	12.91	13.14	13.36
397	13.16	13.40	13.64
398	13.42	13.68	13.94
399	13.71	13.99	14.27
400	14.01	14.31	14.61

Typical Performance Curves

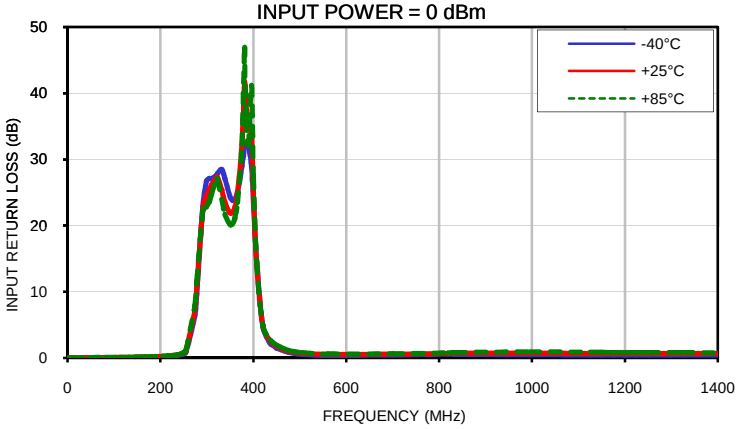
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



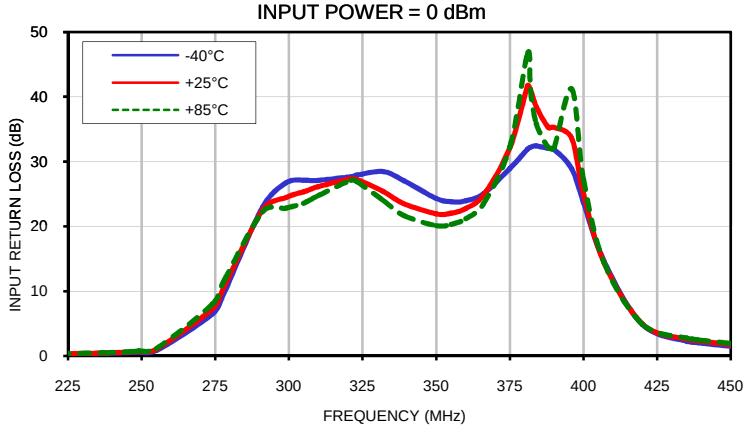
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



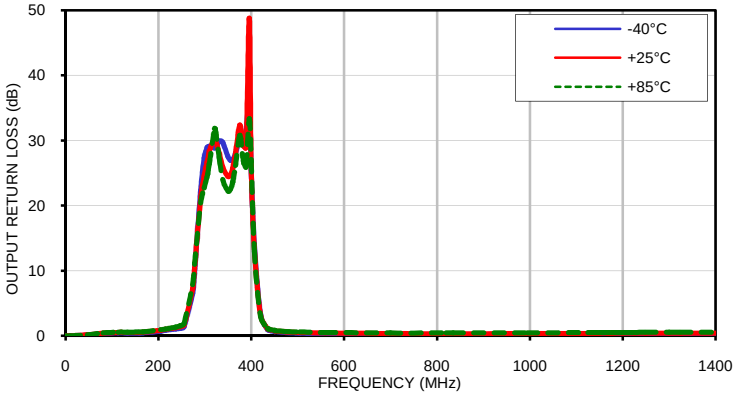
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



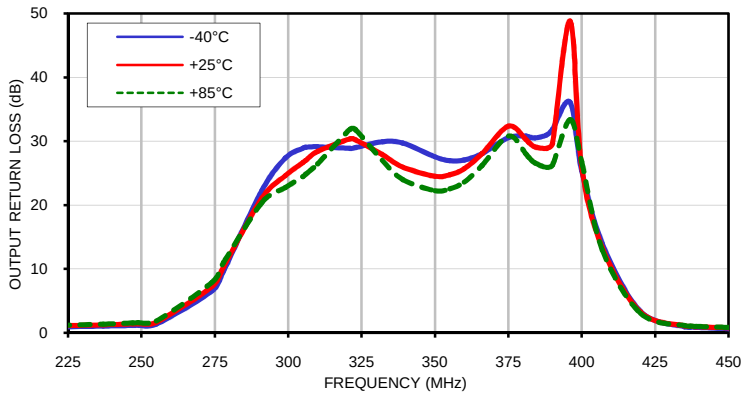
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



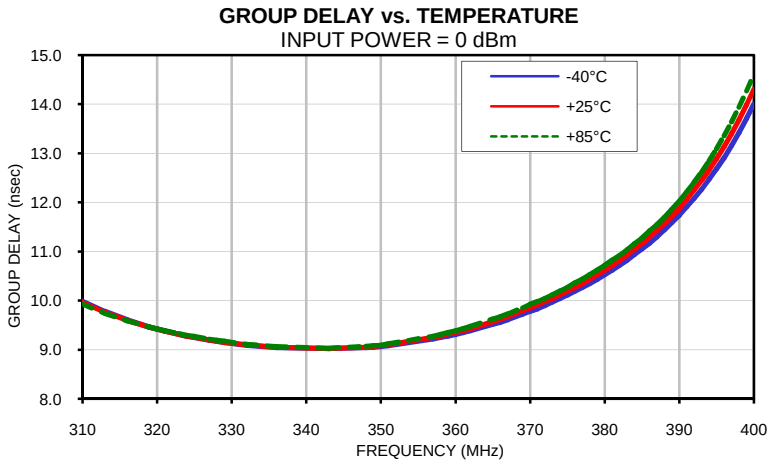
OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



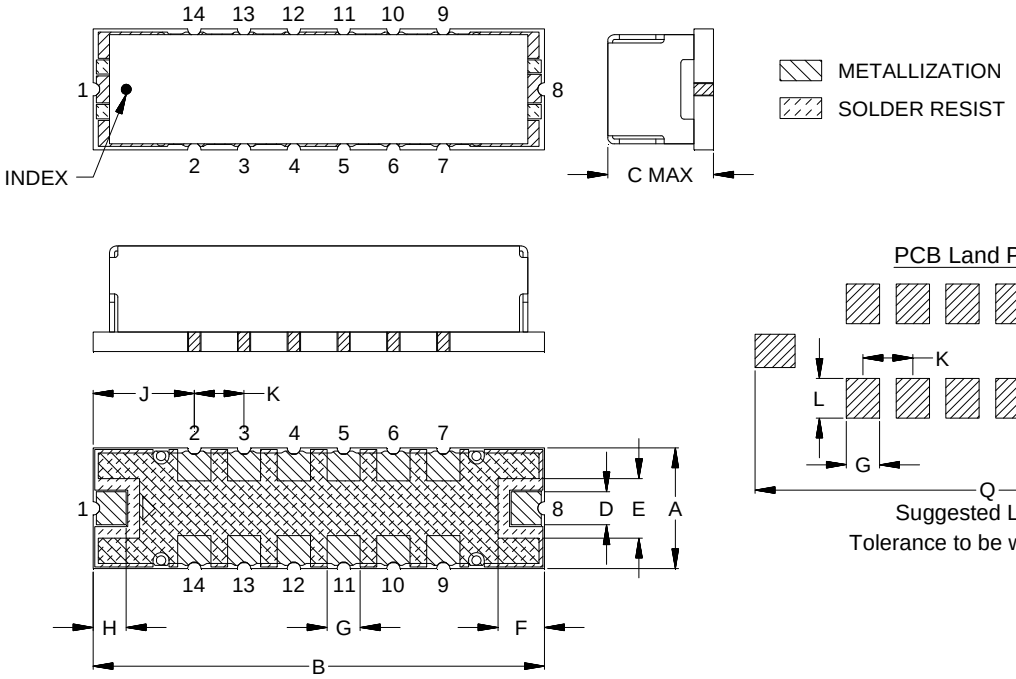
Typical Performance Curves



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

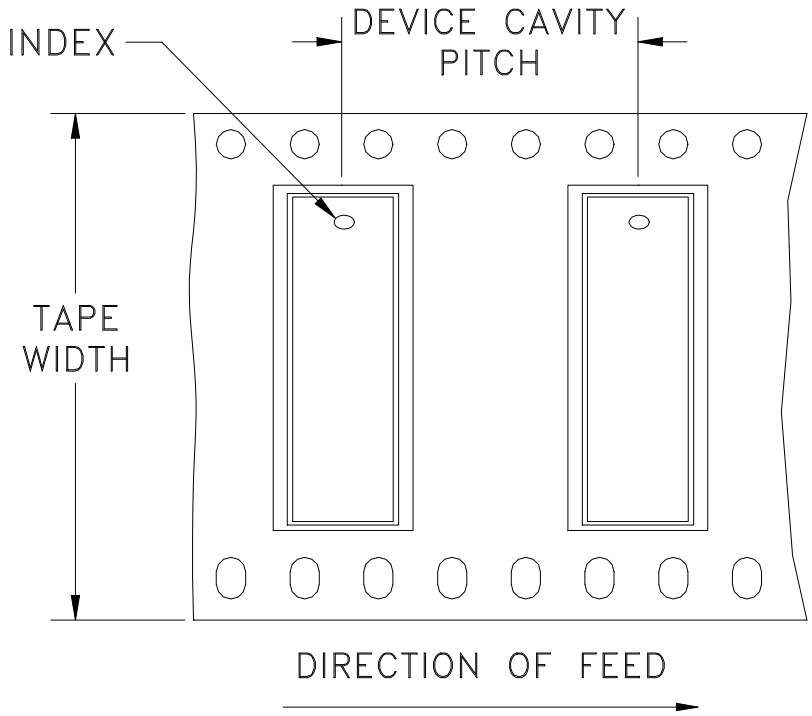
Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015

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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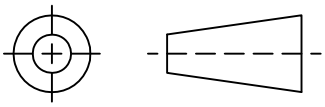
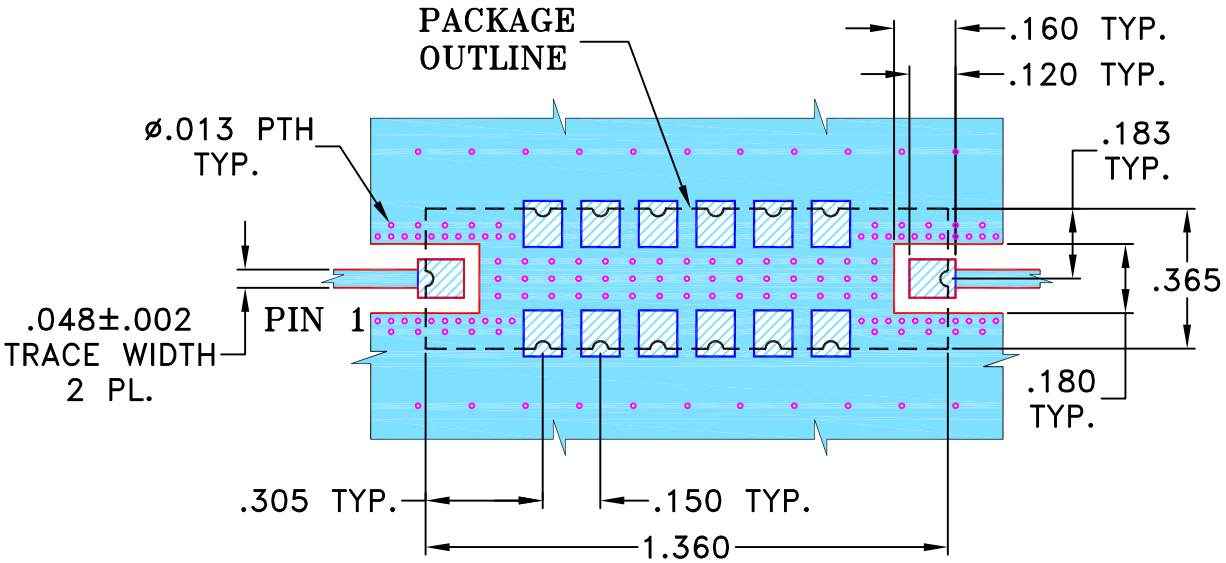
THIRD ANGLE PROJECTION



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



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

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

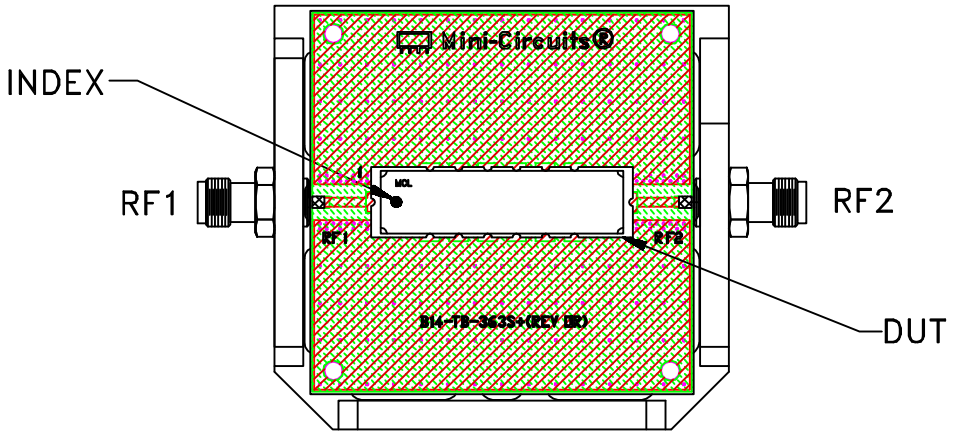
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

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

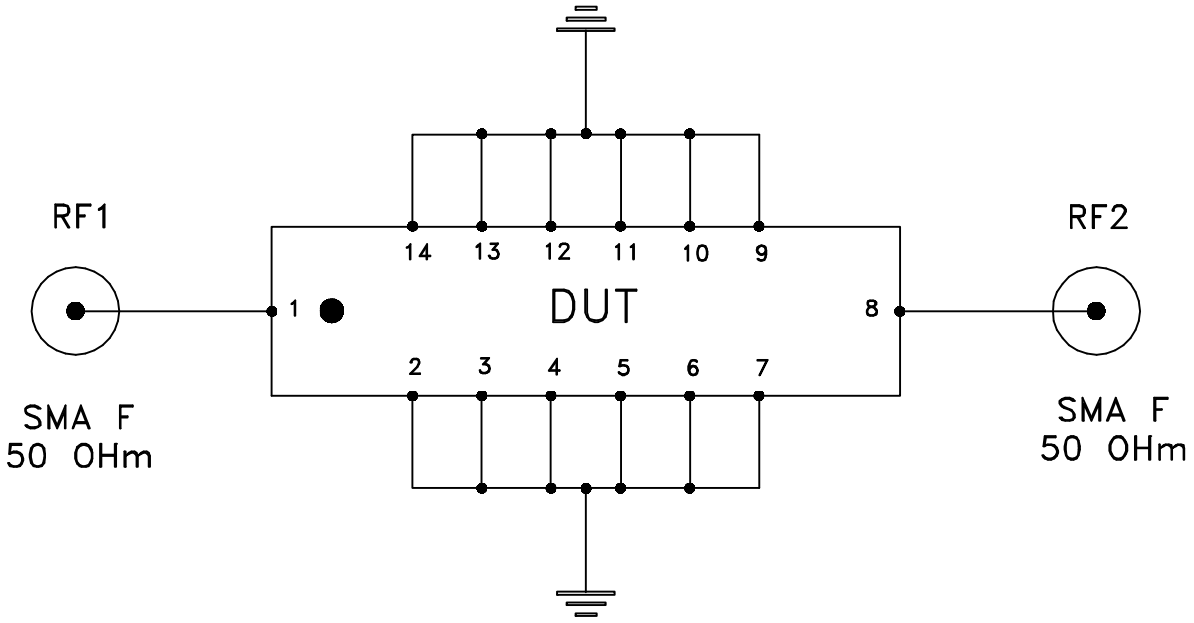
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-227	C

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

Evaluation Board and Circuit



TB-363+



Schematic Diagram

Notes:
1. 50 Ohm SMA Female connectors.
2. PCB Material: ROGERS R04350 or equivalent, Dielectric Constant=3.48, Thickness=.030 inch.

Mini-Circuits®

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Environmental Specifications ENV12

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	-65° to 150° C Ambient Environment	Individual Model Data Sheet
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102-C, Condition C
Temperature Cycling	-65° to 150°C, 100 cycles	JESD22-A104
Temperature Humidity	85°C/ 85% RH, 168 hours	JESD22-113
Solder Reflow Heat	Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1
Moisture Sensitivity: Level 1	Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 240°C peak (Non-RoHS) or 260°C (RoHS)	J-STD-020
Solderability	10X magnification, 95% coverage	JESD22-B102, Method 1: Dip and Look Test
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
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