

Surface Mount

Bandpass Filter

BPF-A600+

50Ω

500 to 700 MHz

The Big Deal

- Sharp roll-off
- High rejection (50 dB typical)
- Miniature shielded package



CASE STYLE: HQ1157

Product Overview

The BPF-A600+ is a band pass filter in a shielded package (size of 0.365" x 1.360" x .35") fabricated using SMT technology. Covering 600 MHz ± 100 MHz bandwidth, these units offer good matching within the passband and high rejection. This unit uses a miniature high Q capacitors and wire welded inductors for high reliability. In addition it has repeatable performance across production lots and consistent performance across temperature.

Key Features

Feature	Advantages
More than 40dB rejection up to 1800 MHz	This enables the filter to attenuate spurious signals and reject harmonics for broad band of frequency.
Sharp shape factor of 1.2	Sharp shape factor helps in adjacent channel rejection and hence increased selectivity.
Shielded case	Reduced interference with and from the surrounding components.

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



Bandpass Filter

BPF-A600+

50Ω 500 to 700 MHz



CASE STYLE: HQ1157

Features

- Sharp roll-off
- High rejection, 50 dB typical
- Shielded case
- Aqueous washable

Applications

- Broad band wireless 4G system (UHF Wimax)
- Harmonic rejection
- Transmitters / receivers

Electrical Specifications at 25°C

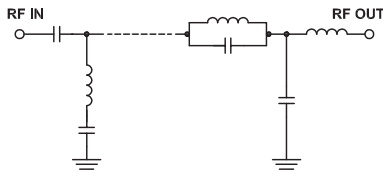
Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Center Frequency	—	—	600	—	MHz	
	Insertion Loss	F1-F2	500-700	—	1.6	2.5	dB
	VSWR	F1-F2	500-700	—	1.6	2.2	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC-380	20	32	—	dB
	VSWR	DC-F3	DC-380	—	14	—	:1
Stop Band, Upper	Insertion Loss	F4-F5	795-1800	20	36	—	dB
	VSWR	F4-F5	795-1800	—	13	—	:1

Maximum Ratings

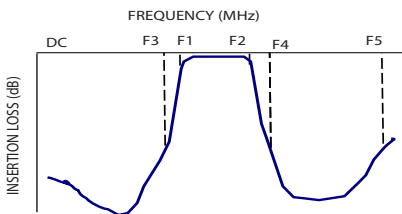
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	1W max.

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

Functional Schematic



Typical Frequency Response

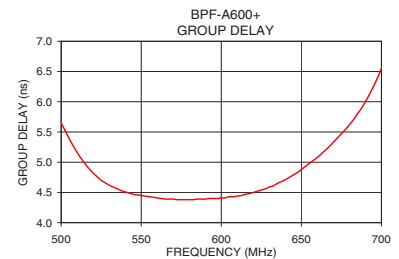
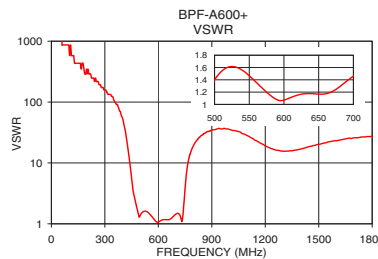
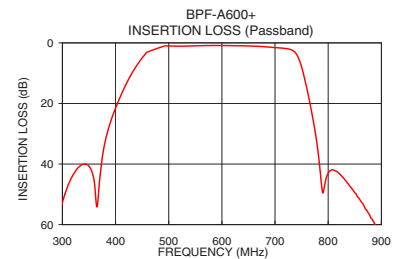
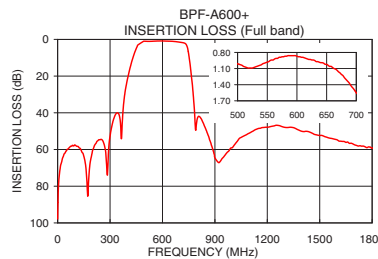


Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
0.5	97.89	5790.59	500.0	5.65
150.0	63.66	434.30	510.0	5.16
300.0	52.69	157.93	520.0	4.82
380.0	32.96	75.53	530.0	4.62
402.5	20.44	49.64	540.0	4.51
430.0	10.28	16.89	550.0	4.45
450.0	4.99	5.70	560.0	4.41
460.0	3.01	3.27	570.0	4.39
500.0	1.01	1.40	580.0	4.38
600.0	0.87	1.07	600.0	4.41
700.0	1.55	1.45	610.0	4.44
740.0	3.63	1.61	620.0	4.50
750.0	7.97	3.76	630.0	4.59
760.0	15.14	7.53	640.0	4.71
780.0	34.74	14.50	650.0	4.88
795.0	45.55	18.70	660.0	5.08
890.0	60.57	33.42	670.0	5.33
1000.0	58.98	35.46	680.0	5.62
1500.0	52.38	20.22	690.0	6.00
1800.0	59.23	27.59	700.0	6.55

+RoHS Compliant

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



Notes

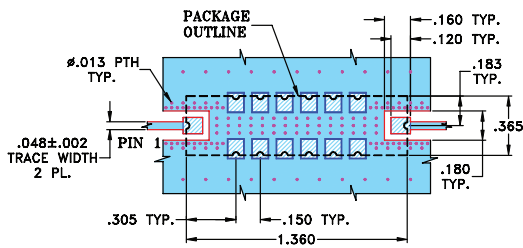
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Pad Connections

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)

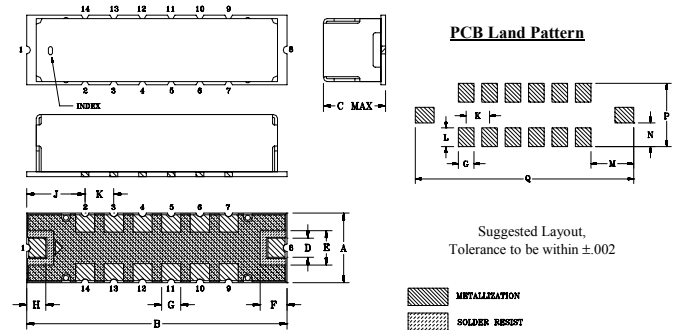


NOTE:

- 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.
- 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

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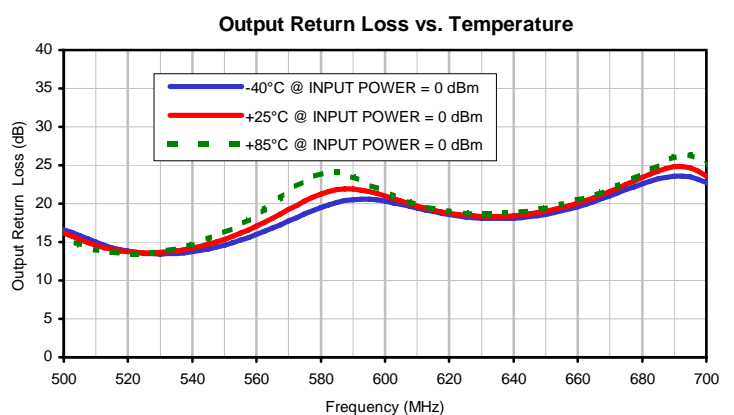
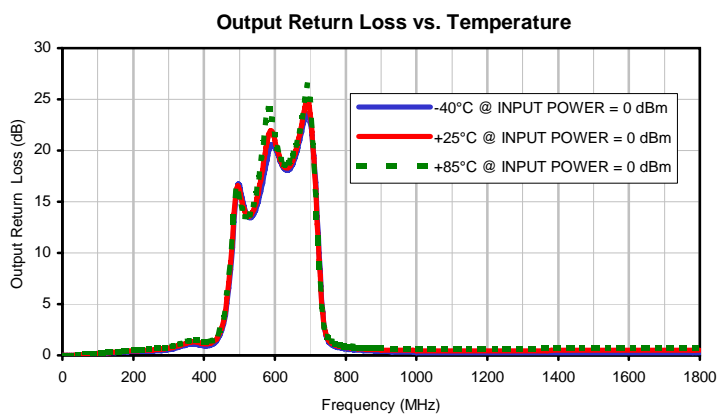
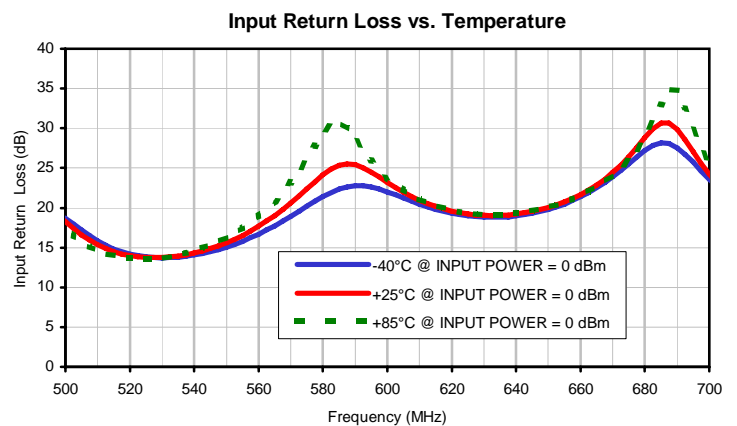
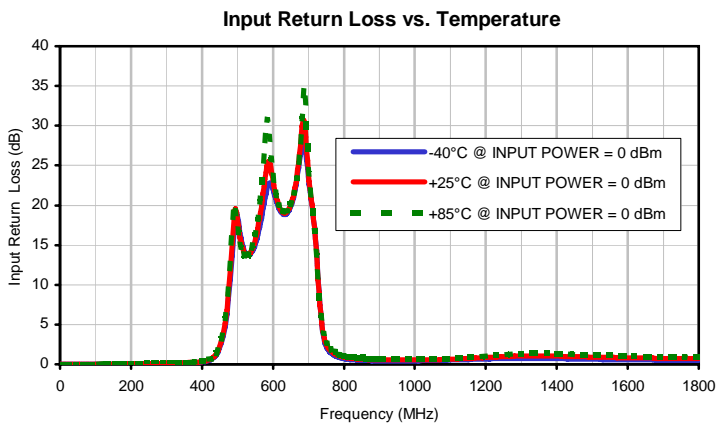
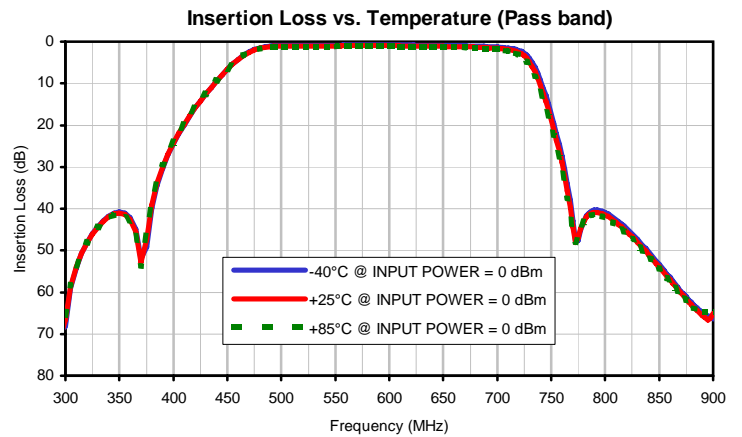
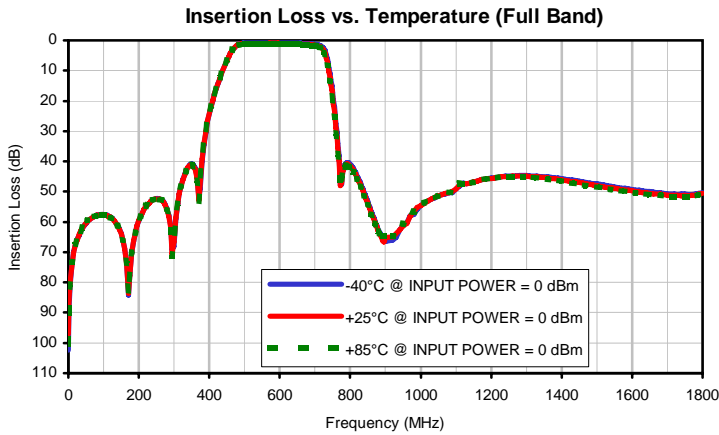
Typical Performance Data

FREQ. (MHz)	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
0.5	102.45	97.17	100.30	0.00	0.00	0.01	0.01	0.00	0.01
50.0	60.44	60.37	60.34	0.00	0.01	0.02	0.03	0.05	0.07
100.0	57.57	57.61	57.72	0.01	0.02	0.04	0.14	0.17	0.20
150.0	63.96	64.09	64.09	0.02	0.04	0.07	0.28	0.33	0.37
200.0	59.55	59.50	59.47	0.04	0.07	0.10	0.36	0.44	0.50
220.0	55.04	54.98	54.89	0.05	0.08	0.11	0.37	0.47	0.55
240.0	52.76	52.77	52.70	0.06	0.09	0.13	0.39	0.50	0.60
250.0	52.32	52.36	52.38	0.06	0.09	0.13	0.39	0.52	0.62
260.0	52.43	52.54	52.57	0.07	0.10	0.14	0.41	0.54	0.65
280.0	55.60	55.91	56.15	0.08	0.12	0.16	0.46	0.60	0.71
300.0	68.18	66.64	65.66	0.10	0.13	0.17	0.54	0.70	0.81
340.0	41.79	41.98	42.16	0.14	0.18	0.22	0.91	1.08	1.21
350.0	40.77	41.05	41.31	0.15	0.19	0.23	1.01	1.19	1.33
360.0	42.16	42.59	43.09	0.17	0.21	0.25	1.08	1.28	1.44
380.0	39.88	39.12	38.29	0.21	0.25	0.29	1.05	1.29	1.48
400.0	24.44	24.25	23.99	0.29	0.33	0.38	0.91	1.15	1.34
460.0	4.24	4.24	4.18	3.52	3.86	4.23	3.93	4.33	4.71
480.0	1.47	1.58	1.64	10.65	11.76	13.21	10.57	11.40	12.29
500.0	0.90	1.09	1.24	18.66	18.27	17.36	16.61	16.13	15.39
550.0	0.87	1.03	1.15	15.05	15.61	16.28	14.62	15.37	16.28
555.0	0.85	1.00	1.12	15.79	16.53	17.48	15.24	16.16	17.35
560.0	0.82	0.98	1.10	16.69	17.67	18.98	15.97	17.08	18.60
565.0	0.80	0.96	1.08	17.74	19.01	20.83	16.80	18.11	20.01
570.0	0.79	0.95	1.07	18.93	20.60	23.18	17.71	19.22	21.52
575.0	0.77	0.94	1.07	20.20	22.39	26.12	18.63	20.31	22.93
580.0	0.77	0.93	1.07	21.41	24.12	29.38	19.48	21.24	23.89
585.0	0.76	0.93	1.08	22.36	25.34	30.76	20.17	21.84	24.06
590.0	0.76	0.94	1.09	22.77	25.40	28.62	20.54	21.92	23.46
595.0	0.77	0.95	1.10	22.60	24.48	25.95	20.58	21.58	22.50
600.0	0.78	0.96	1.11	22.01	23.21	23.85	20.33	20.99	21.51
650.0	0.92	1.14	1.32	19.79	20.06	20.10	18.62	19.00	19.44
655.0	0.93	1.16	1.35	20.48	20.76	20.73	19.07	19.49	19.92
660.0	0.95	1.18	1.37	21.37	21.68	21.54	19.62	20.07	20.47
665.0	0.97	1.21	1.41	22.50	22.87	22.62	20.27	20.78	21.12
670.0	0.99	1.24	1.44	23.92	24.44	24.07	21.01	21.58	21.87
675.0	1.02	1.27	1.49	25.54	26.41	26.04	21.80	22.48	22.77
680.0	1.06	1.32	1.53	27.19	28.78	28.88	22.57	23.41	23.82
685.0	1.10	1.37	1.59	28.15	30.67	32.99	23.21	24.26	24.99
690.0	1.15	1.43	1.67	27.56	29.87	34.73	23.58	24.80	26.06
695.0	1.21	1.50	1.76	25.72	27.02	29.85	23.49	24.68	26.33
700.0	1.29	1.60	1.87	23.58	24.21	25.56	22.76	23.61	24.97
750.0	17.29	18.71	20.19	2.28	2.56	2.77	1.42	1.59	1.68
755.0	22.09	23.54	25.08	1.85	2.12	2.34	1.18	1.36	1.46
760.0	27.49	29.00	30.65	1.56	1.82	2.03	1.03	1.21	1.32
765.0	34.00	35.64	37.48	1.35	1.60	1.80	0.93	1.10	1.21
770.0	42.88	44.49	46.15	1.20	1.43	1.63	0.86	1.03	1.13
775.0	47.67	47.08	46.50	1.07	1.30	1.49	0.80	0.96	1.07
780.0	42.99	43.12	43.19	0.98	1.19	1.38	0.75	0.91	1.01
790.0	40.35	40.90	41.43	0.83	1.03	1.20	0.68	0.83	0.93
795.0	40.41	41.04	41.58	0.77	0.96	1.13	0.65	0.80	0.90
800.0	40.88	41.53	42.15	0.72	0.91	1.08	0.62	0.77	0.87
850.0	53.35	54.00	54.47	0.48	0.64	0.78	0.46	0.61	0.72
890.0	64.80	65.62	64.67	0.43	0.57	0.69	0.39	0.54	0.67
900.0	66.36	65.18	64.80	0.42	0.56	0.68	0.38	0.53	0.66
1000.0	54.62	54.65	54.28	0.43	0.54	0.64	0.28	0.46	0.62
1100.0	48.99	49.11	48.34	0.53	0.64	0.76	0.24	0.44	0.62
1200.0	45.55	45.62	45.65	0.67	0.85	1.03	0.22	0.44	0.63
1300.0	44.74	44.93	45.12	0.75	1.04	1.32	0.22	0.45	0.65
1400.0	45.66	46.11	46.55	0.71	1.02	1.30	0.23	0.47	0.67
1500.0	47.48	48.00	48.50	0.62	0.90	1.16	0.23	0.48	0.69
1600.0	49.25	49.75	50.25	0.56	0.81	1.04	0.24	0.49	0.70
1700.0	50.67	51.10	51.49	0.52	0.75	0.96	0.24	0.51	0.72
1800.0	50.30	50.66	50.92	0.49	0.71	0.91	0.26	0.52	0.74

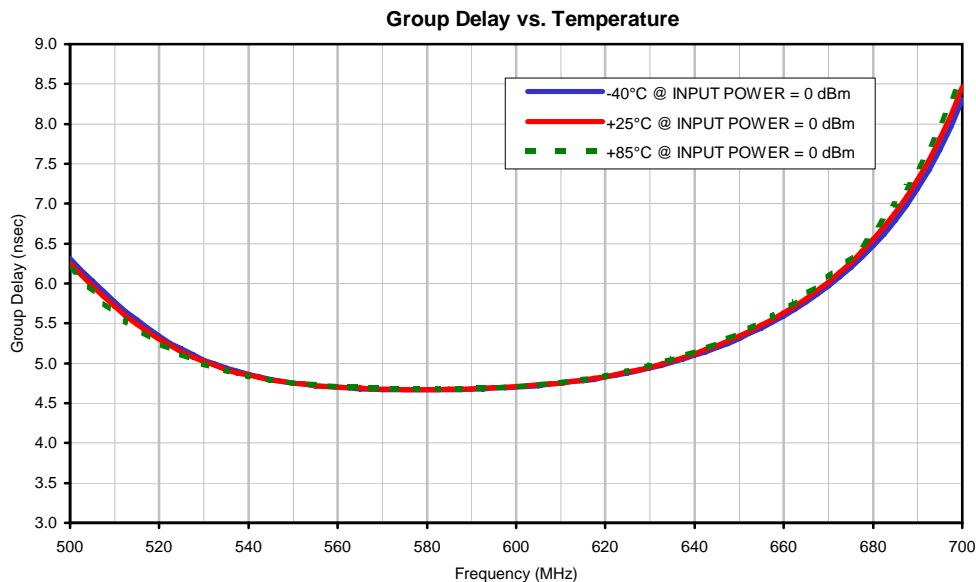
Typical Performance Data

FREQ. (MHz)	GROUP DELAY		
	(nsec)		
	@-40°C	@+25°C	@+85°C
500.0	6.31	6.25	6.18
505.0	6.03	5.97	5.90
510.0	5.77	5.71	5.65
515.0	5.54	5.49	5.43
530.0	5.04	5.02	4.99
545.0	4.80	4.79	4.79
550.0	4.75	4.75	4.75
555.0	4.72	4.72	4.73
560.0	4.70	4.70	4.71
565.0	4.68	4.69	4.70
570.0	4.67	4.68	4.69
575.0	4.67	4.67	4.68
585.0	4.67	4.68	4.68
590.0	4.68	4.68	4.69
592.5	4.68	4.69	4.69
595.0	4.69	4.69	4.69
600.0	4.70	4.71	4.71
605.0	4.72	4.73	4.73
615.0	4.78	4.79	4.80
630.0	4.94	4.95	4.97
635.0	5.01	5.03	5.05
640.0	5.10	5.12	5.14
645.0	5.20	5.22	5.25
650.0	5.31	5.34	5.37
655.0	5.44	5.48	5.51
660.0	5.59	5.63	5.68
665.0	5.77	5.81	5.86
670.0	5.97	6.02	6.08
675.0	6.20	6.26	6.33
680.0	6.47	6.55	6.63
685.0	6.79	6.88	6.99
690.0	7.19	7.30	7.43
695.0	7.68	7.81	7.97
700.0	8.30	8.46	8.65

Typical Performance Curves



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



IF/RF MICROWAVE COMPONENTS

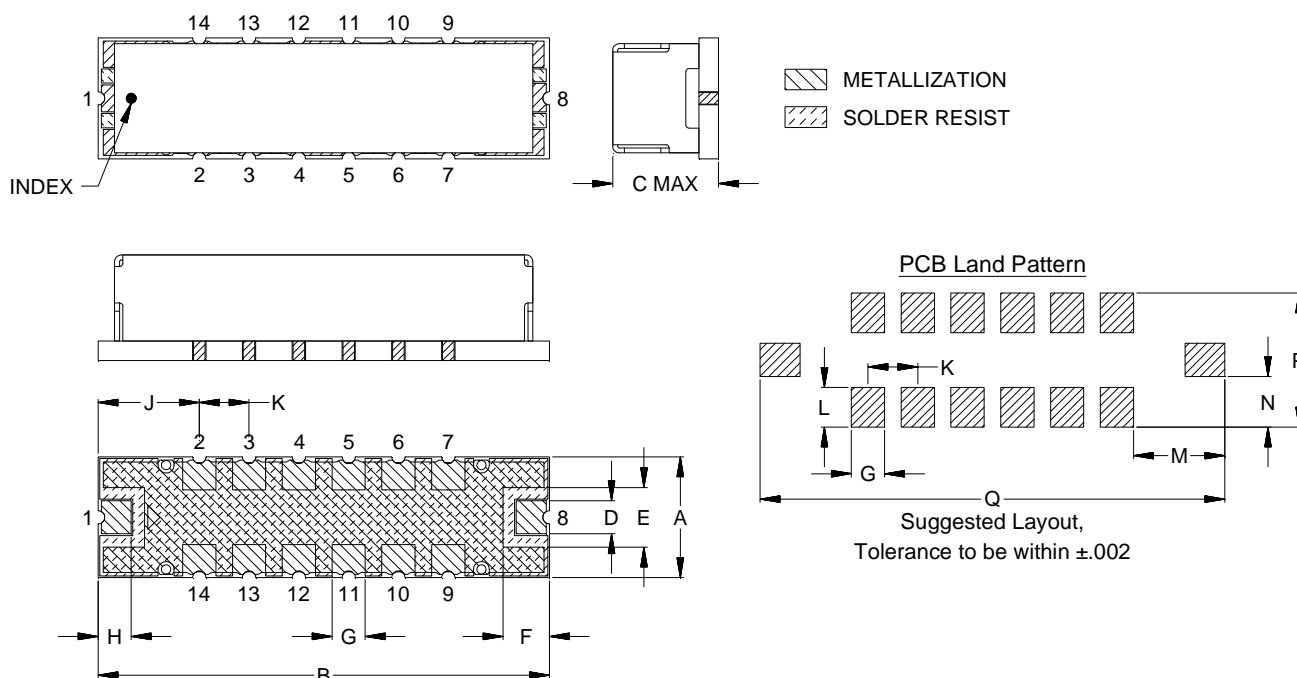
REV. X1
BPF-A600+
3/18/2011
Page 2 of 2

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:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- 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.

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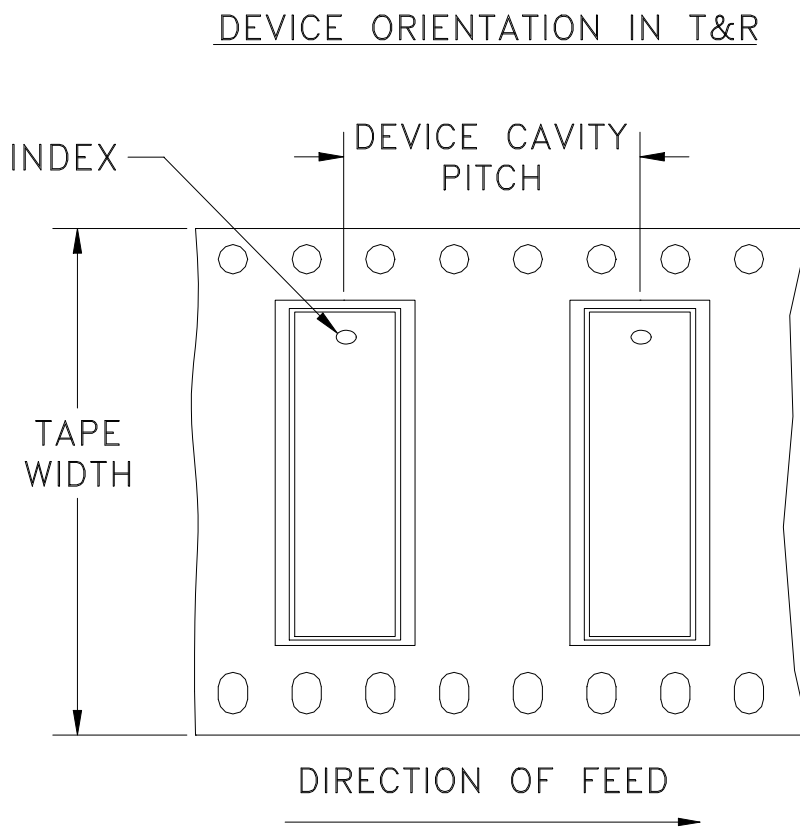
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The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F83



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



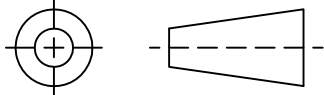
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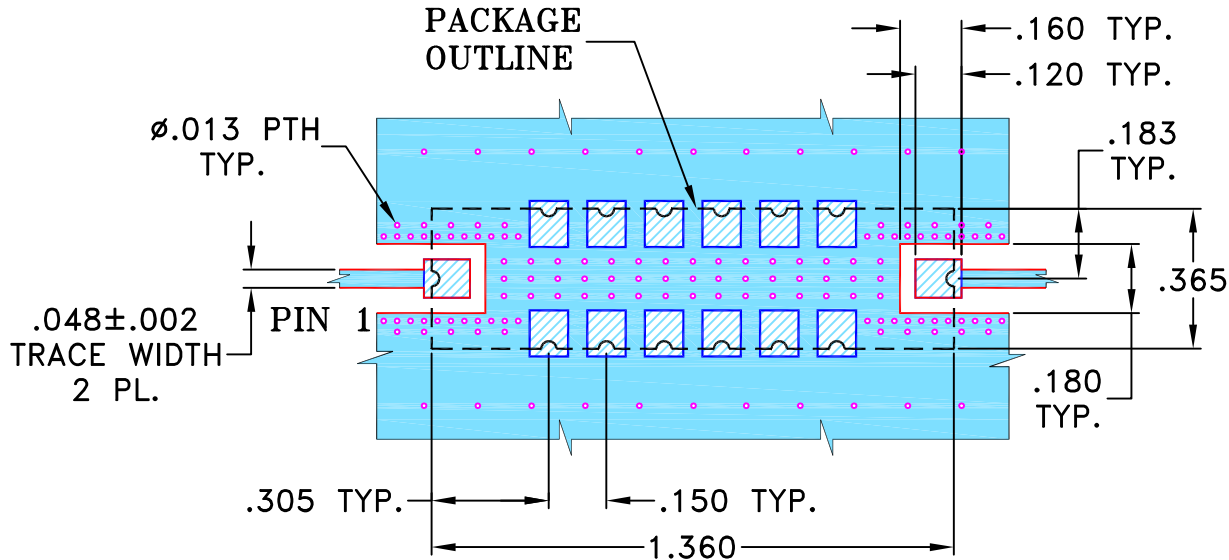
THIRD ANGLE PROJECTION



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:

- 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.
- 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 TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±	DRAWN	HB (RAVON)	12 JUN 2008
	CHECKED	RZ (RAVON)	12 JUN 2008
	APPROVED	HH (RAVON)	12 JUN 2008

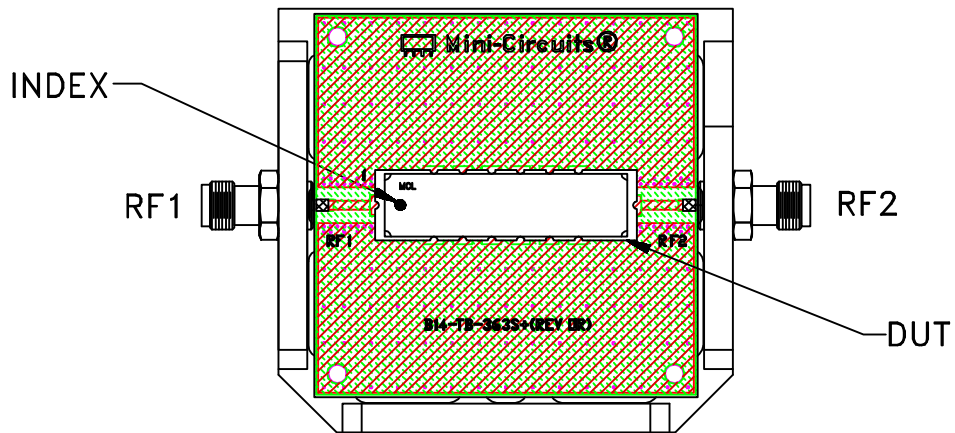
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Brooklyn NY 11235

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

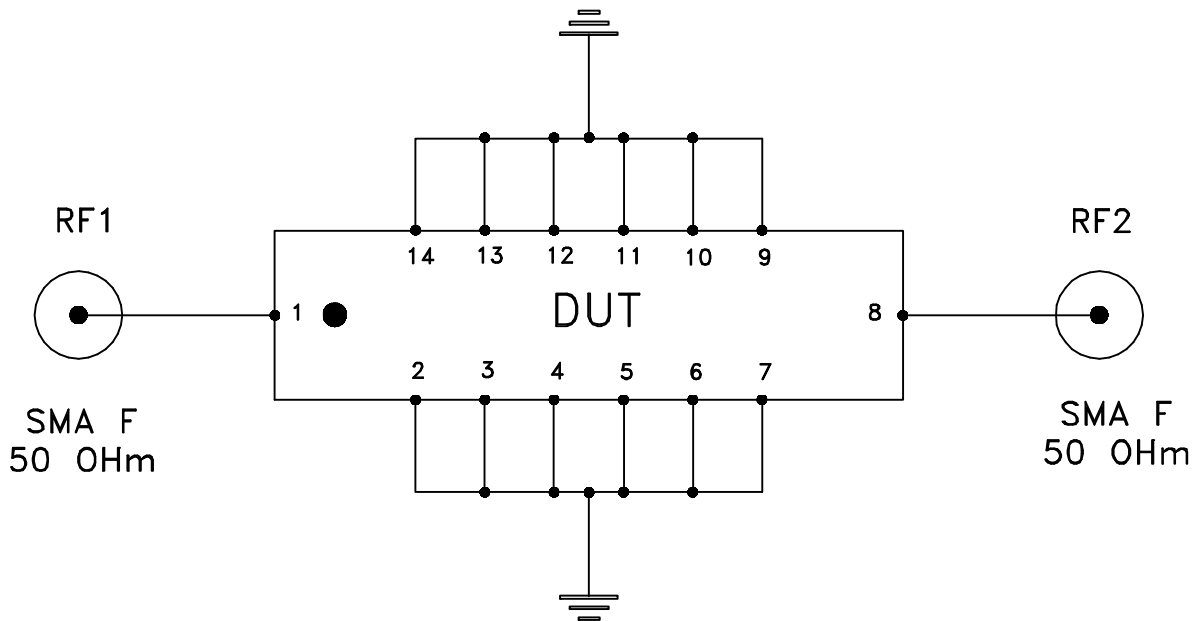
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SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-227	REV: C
FILE: 98PL227	SCALE: 2:1	SHEET: 1 OF 1	

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®**

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