

# BLUE CELL™ Surface Mount Frequency Mixer

## MBA-9H

Level 17 (LO Power +17 dBm) 800 to 1000 MHz

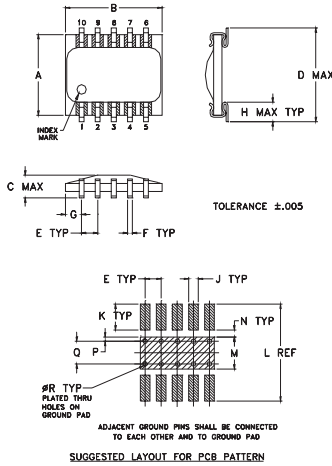
### Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	200mW
IF Current	40mA

### Pin Configuration

LO	10
RF	5
IF	3
GROUND	1,4,7,8,9
ISOLATE	2,6

### Outline Drawing



### Outline Dimensions (inch/mm)

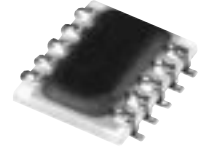
A	B	C	D	E	F	G	H	J
.250	.300	.070	.290	.050	.015	.050	.060	.030
6.35	7.62	1.78	7.37	1.27	.38	1.27	1.52	.76
K	L	M	N	P	Q	R	wt.	
.080	.300	.100	.020	.015	.070	.014	grams	
2.03	7.62	2.54	.51	.38	1.78	.36	.3	

### Features

- excellent temperature stability
- performance repeatability
- solder plated leads with strain relief
- very low cost
- ultra low height, 0.07"

### Applications

- cellular
- WLAN
- ISM band
- PCMCIA



CASE STYLE: SM2  
PRICE: \$9.95 ea. QTY.: (10-49)

### Electrical Specifications

MODEL NO.	FREQUENCY (MHz)		CONVERSION LOSS (dB)		LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)			IP3@ center band Typ. (dBm)
	LO/RF $f_L - f_U$	IF	Mid-Band m $\bar{x}$ $\sigma$	Total Range Max.	L Typ.	M Typ.	U Typ.	L Typ.	M Typ.	U Typ.	
MBA-9H	800-1000	DC-200	6.4	0.3	—	9.0	24(typ.)	19(min.)	17(typ.)	12(min.)	18

1 dB COMP.: +10 dBm typ.  
L = low range [ $f_L$  to  $f_U/2$ ] M = mid range [ $f_U/2$  to  $f_L/2$ ] U = upper range [ $f_L/2$  to  $f_U$ ]  
m = mid band [ $2f_L$  to  $f_U/2$ ]

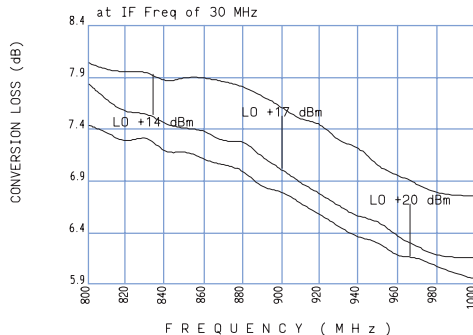
### Typical Performance Data

Frequency		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR LO port (:1)	VSWR RF port (:1)
RF MHz	LO MHz	LO +17dBm	LO +17dBm	LO +17dBm	LO +17dBm	LO +17dBm
800.00	830.00	7.83	26.00	16.40	2.01	2.84
810.00	840.00	7.66	25.90	16.30	2.03	2.76
820.00	850.00	7.54	25.80	16.20	2.03	2.84
830.00	860.00	7.56	25.70	16.20	2.06	2.84
840.00	870.00	7.43	25.60	16.30	2.06	2.88
850.00	880.00	7.40	25.60	16.50	2.04	2.92
860.00	890.00	7.39	25.80	16.50	2.01	2.92
870.00	900.00	7.25	25.50	16.50	1.96	2.88
880.00	910.00	7.31	25.10	16.40	1.91	2.84
890.00	920.00	7.11	24.90	16.40	1.88	2.80
900.00	930.00	7.01	24.90	16.30	1.88	2.76
910.00	940.00	6.87	24.80	16.20	1.89	2.72
920.00	950.00	6.77	24.90	16.30	1.91	2.61
930.00	960.00	6.65	25.10	16.30	1.88	2.58
940.00	970.00	6.54	25.20	16.30	1.88	2.58
950.00	980.00	6.52	25.20	16.30	1.89	2.52
960.00	990.00	6.35	25.20	16.10	1.87	2.49
970.00	1000.00	6.27	24.90	16.00	1.87	2.46
980.00	1010.00	6.16	24.90	15.80	1.81	2.46
1000.00	1030.00	6.15	25.10	15.60	1.80	2.52

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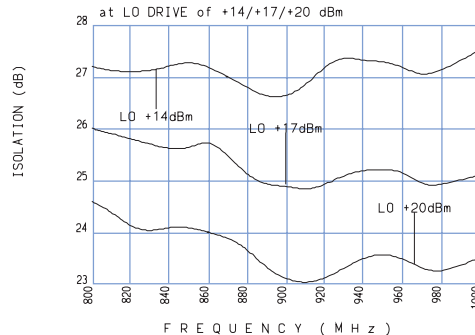
MBA-9H

### CONVERSION LOSS



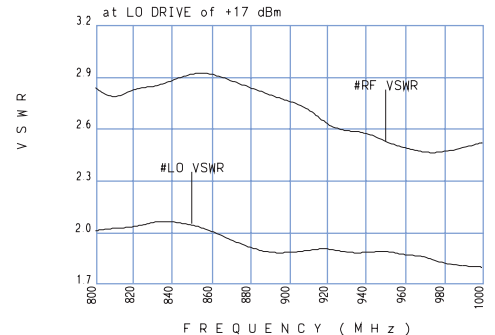
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### ISOLATION L - R



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### VSWR



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REV. A  
M79100  
EE-7756/27  
MBA-9H  
RD/TD/CP  
011116

# Frequency Mixer

# MBA-9H

## Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=30MHz (dB)			LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
		@LO (dBm)				@LO (dBm)			@LO (dBm)		
		+14	+17	+20		+14	+17	+20	+14	+17	+20
730.0	760.0	8.31	8.11	7.91	760.0	27.2	26.70	25.80	18.20	16.70	15.90
800.0	830.0	8.03	7.83	7.43	830.0	27.2	26.00	24.60	17.50	16.40	15.80
810.0	840.0	7.96	7.66	7.36	840.0	27.1	25.90	24.40	17.40	16.30	15.60
820.0	850.0	7.94	7.54	7.24	850.0	27.1	25.80	24.10	17.20	16.20	15.40
830.0	860.0	7.96	7.56	7.36	860.0	27.1	25.70	24.00	17.30	16.20	15.50
840.0	870.0	7.83	7.43	7.13	870.0	27.2	25.60	24.10	17.30	16.30	15.70
850.0	880.0	7.90	7.40	7.20	880.0	27.3	25.60	24.10	17.40	16.50	15.90
860.0	890.0	7.89	7.39	7.09	890.0	27.2	25.80	24.00	17.30	16.50	16.10
870.0	900.0	7.85	7.25	7.05	900.0	27.0	25.50	23.90	17.10	16.50	16.20
880.0	910.0	7.81	7.31	7.01	910.0	26.8	25.10	23.70	16.90	16.40	16.10
890.0	920.0	7.71	7.11	6.81	920.0	26.6	24.90	23.30	16.70	16.40	16.00
900.0	930.0	7.61	7.01	6.81	930.0	26.6	24.90	23.10	16.50	16.30	15.80
910.0	940.0	7.47	6.87	6.67	940.0	26.8	24.80	23.00	16.40	16.20	15.90
920.0	950.0	7.47	6.77	6.57	950.0	27.2	24.90	23.10	16.40	16.30	16.00
930.0	960.0	7.25	6.65	6.45	960.0	27.4	25.10	23.30	16.30	16.30	16.10
940.0	970.0	7.24	6.54	6.34	970.0	27.3	25.20	23.50	16.10	16.30	16.40
950.0	980.0	7.02	6.52	6.32	980.0	27.3	25.20	23.60	15.90	16.30	16.50
960.0	990.0	6.95	6.35	6.15	990.0	27.2	25.20	23.50	15.60	16.10	16.40
970.0	1000.0	6.87	6.27	6.17	1000.0	27.0	24.90	23.30	15.30	16.00	16.20
980.0	1010.0	6.76	6.16	6.06	1010.0	27.1	24.90	23.20	15.10	15.80	16.10
990.0	1020.0	6.79	6.19	5.99	1020.0	27.4	25.00	23.30	15.00	15.70	16.00
1000.0	1030.0	6.75	6.15	5.95	1030.0	27.5	25.10	23.50	14.80	15.60	16.20
1060.0	1090.0	6.75	6.25	6.05	1090.0	27.2	25.00	23.80	13.50	15.00	16.30
1170.0	1200.0	6.12	5.72	5.62	1200.0	27.0	25.80	24.70	12.20	14.00	15.90
1280.0	1310.0	5.90	5.50	5.40	1310.0	24.3	25.30	26.10	11.60	13.50	15.50
1390.0	1420.0	5.93	5.53	5.43	1420.0	24.0	25.20	26.30	11.10	12.90	14.20
1500.0	1530.0	5.81	5.51	5.51	1530.0	23.2	24.30	24.80	10.60	12.00	12.90



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IF/RF MICROWAVE COMPONENTS



# Frequency Mixer

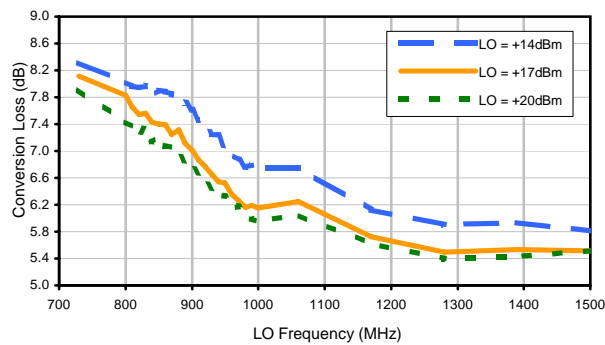
# MBA-9H

## Typical Performance Data

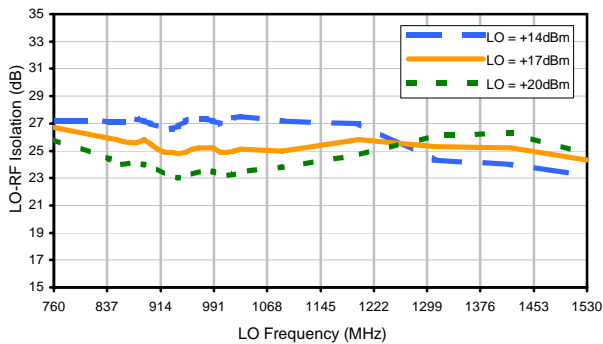
RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)			LO (MHz)	LO VSWR (:1)			IF (OUT) (MHz)	IF VSWR (:1)		
		@LO (dBm)				@LO (dBm)				@LO (dBm)		
		+14	+17	+20		+14	+17	+20		+14	+17	+20
730.0	760.0	3.01	2.88	2.80	760.0	2.49	2.46	2.88	0.1	1.09	1.31	1.43
800.0	830.0	3.06	2.84	2.65	830.0	1.91	2.01	2.43	0.3	1.08	1.30	1.43
810.0	840.0	2.96	2.76	2.58	840.0	1.89	2.03	2.43	0.5	1.06	1.28	1.40
820.0	850.0	3.11	2.84	2.65	850.0	1.88	2.03	2.52	0.8	1.04	1.26	1.38
830.0	860.0	3.06	2.84	2.65	860.0	1.88	2.06	2.55	1.0	1.03	1.26	1.38
840.0	870.0	3.11	2.88	2.68	870.0	1.89	2.06	2.61	5.0	1.05	1.27	1.38
850.0	880.0	3.16	2.92	2.72	880.0	1.87	2.04	2.58	10.0	1.05	1.28	1.39
860.0	890.0	3.16	2.92	2.68	890.0	1.87	2.01	2.52	20.0	1.06	1.27	1.38
870.0	900.0	3.16	2.88	2.68	900.0	1.82	1.96	2.40	30.0	1.07	1.26	1.37
880.0	910.0	3.16	2.84	2.61	910.0	1.78	1.91	2.32	36.8	1.08	1.26	1.38
890.0	920.0	3.16	2.80	2.55	920.0	1.76	1.88	2.32	50.0	1.09	1.23	1.34
900.0	930.0	3.11	2.76	2.49	930.0	1.75	1.88	2.32	70.0	1.13	1.21	1.32
910.0	940.0	3.06	2.72	2.40	940.0	1.76	1.89	2.40	73.4	1.14	1.21	1.30
920.0	950.0	3.11	2.61	2.35	950.0	1.81	1.91	2.43	100.0	1.23	1.20	1.27
930.0	960.0	3.06	2.58	2.30	960.0	1.82	1.88	2.37	110.0	1.27	1.21	1.27
940.0	970.0	3.06	2.58	2.25	970.0	1.85	1.88	2.37	130.0	1.35	1.23	1.26
950.0	980.0	2.96	2.52	2.23	980.0	1.85	1.89	2.37	140.0	1.40	1.24	1.26
960.0	990.0	2.96	2.49	2.20	990.0	1.82	1.87	2.32	146.7	1.42	1.26	1.26
970.0	1000.0	2.92	2.46	2.18	1000.0	1.78	1.87	2.30	150.0	1.44	1.27	1.26
980.0	1010.0	2.92	2.46	2.18	1010.0	1.71	1.81	2.27	170.0	1.55	1.35	1.30
990.0	1020.0	2.92	2.49	2.23	1020.0	1.71	1.80	2.25	183.4	1.63	1.40	1.34
1000.0	1030.0	2.92	2.52	2.27	1030.0	1.75	1.80	2.27	190.0	1.67	1.43	1.36
1060.0	1090.0	2.92	2.76	2.58	1090.0	1.74	1.81	2.35	200.0	1.73	1.47	1.39
1170.0	1200.0	2.20	2.14	2.08	1200.0	1.56	1.73	2.27	220.1	1.87	1.59	1.48
1280.0	1310.0	1.85	1.69	1.63	1310.0	1.43	1.70	2.30	256.7	2.14	1.82	1.68
1390.0	1420.0	1.70	1.59	1.58	1420.0	1.37	1.85	2.58	293.4	2.46	2.12	1.94
1500.0	1530.0	1.85	1.91	1.97	1530.0	1.37	1.75	2.55	330.0	2.80	2.40	2.23

## Typical Performance Curves

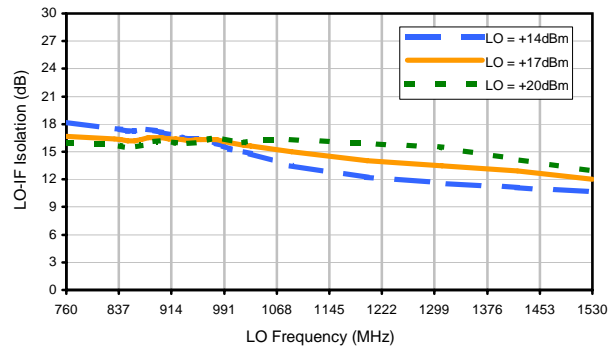
Conversion Loss @ IF=30MHz



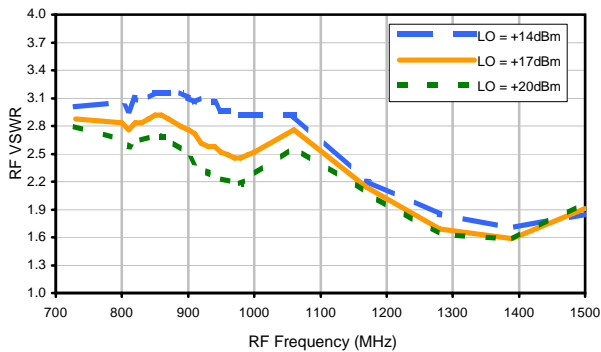
LO-RF Isolation



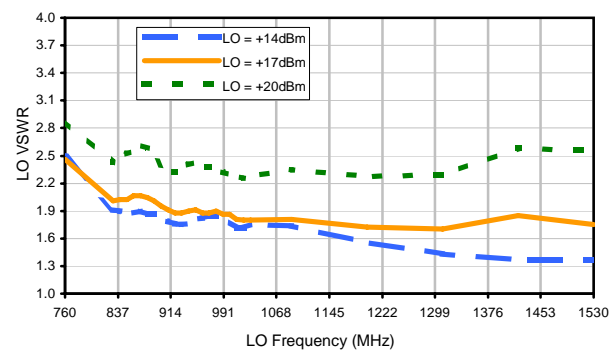
LO-IF Isolation



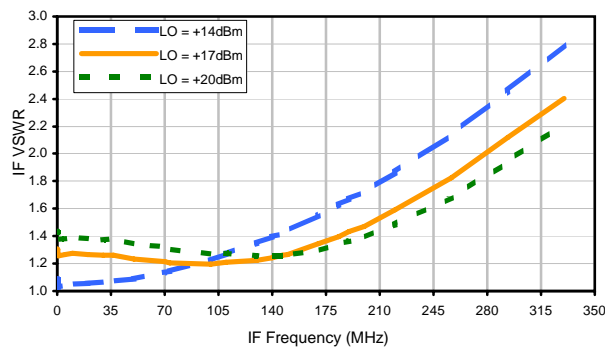
RF VSWR



LO VSWR



IF VSWR

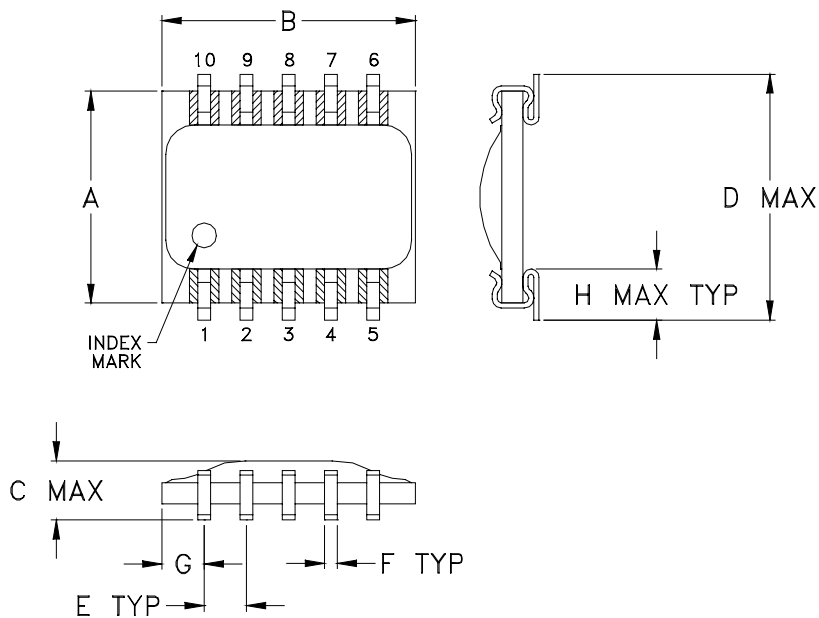


# Case Style

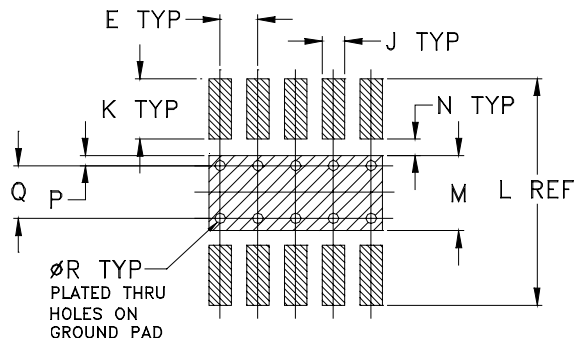
# SM2

SM2

## Outline Dimensions



## PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm 0.002$

ADJACENT GROUND PINS SHALL BE CONNECTED  
TO EACH OTHER AND TO GROUND PAD

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N	P
SM2	.250 (6.35)	.300 (7.62)	.095 (2.41)	.290 (7.37)	.050 (1.27)	.015 (0.38)	.050 (1.27)	.060 (1.52)	.030 (0.76)	.080 (2.03)	.300 (7.62)	.100 (2.54)	.020 (0.51)	.015 (0.38)

CASE #	Q	R	WT. GRAM
SM2	.070 (1.78)	.014 (0.36)	.3

Dimensions are in inches (mm). Tolerances:  $\pm .005$

### Notes:

1. Case material: Plastic encapsulation on Ceramic base.
2. Termination finish:  
For RoHS Case Styles: Tin plate over Nickel plate.  
For RoHS-5 Case Styles: Tin-Lead plate.



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# Tape & Reel Packaging TR-F34



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
16	12	7	Small quantity standard (see note)	20
				50
				100
				200
		13	Standard	500
1000				

Note: Availability of small reel quantity varies by model.  
Refer to pricing and availability on individual model dashboard.

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](http://www.minicircuits.com/pages/pdfs/tape.pdf)



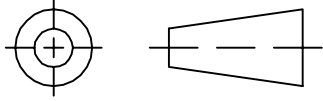
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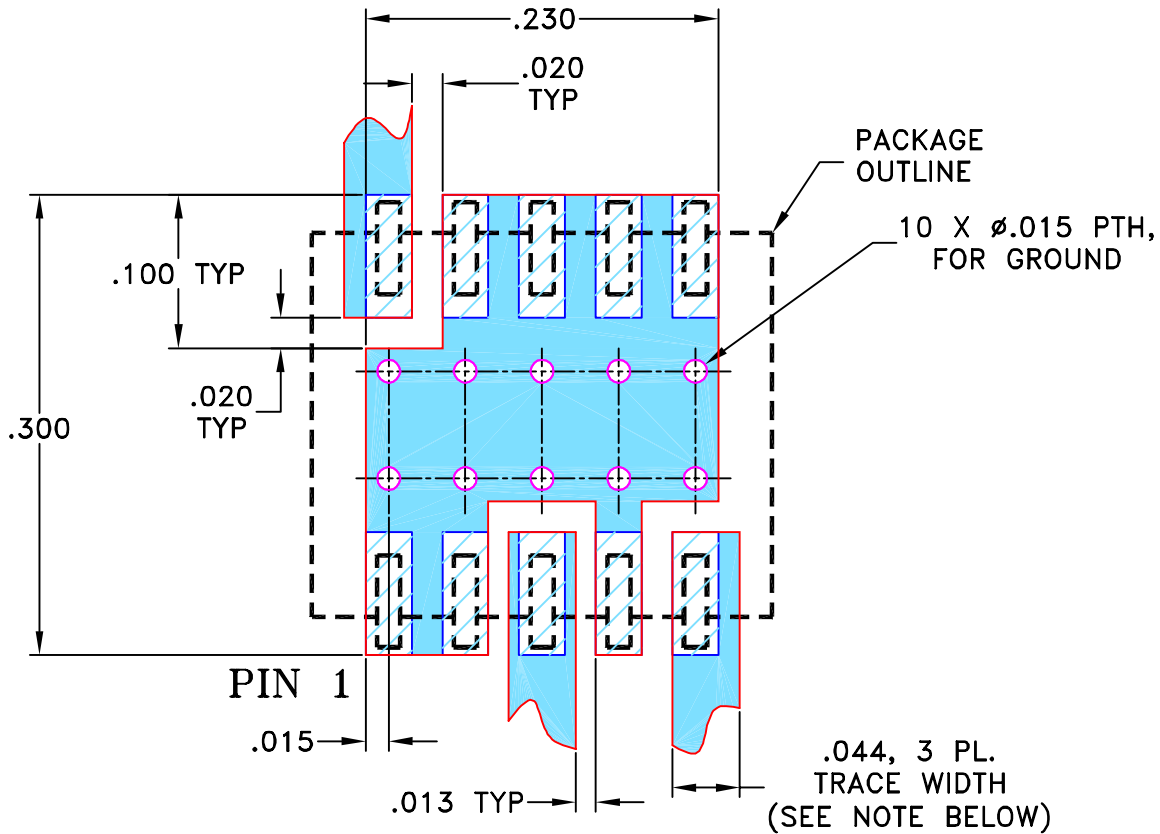
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M82272	NEW RELEASE	08/02/02	GF	DJ
A	M102713	UPDATED NOTES, ADDED "...WITH SMOBC"	01/16/06	GT	IL

SUGGESTED MOUNTING CONFIGURATION FOR SM2 CASE STYLE, "Id" PIN CONNECTION



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015". 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.

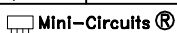
 DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DRAWN	GF	07/18/02
CHECKED	WL	08/02/02
APPROVED	DJ	08/02/02

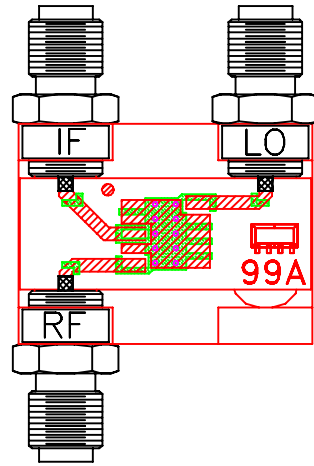
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PL, Id, SM2, MBA, TB-99

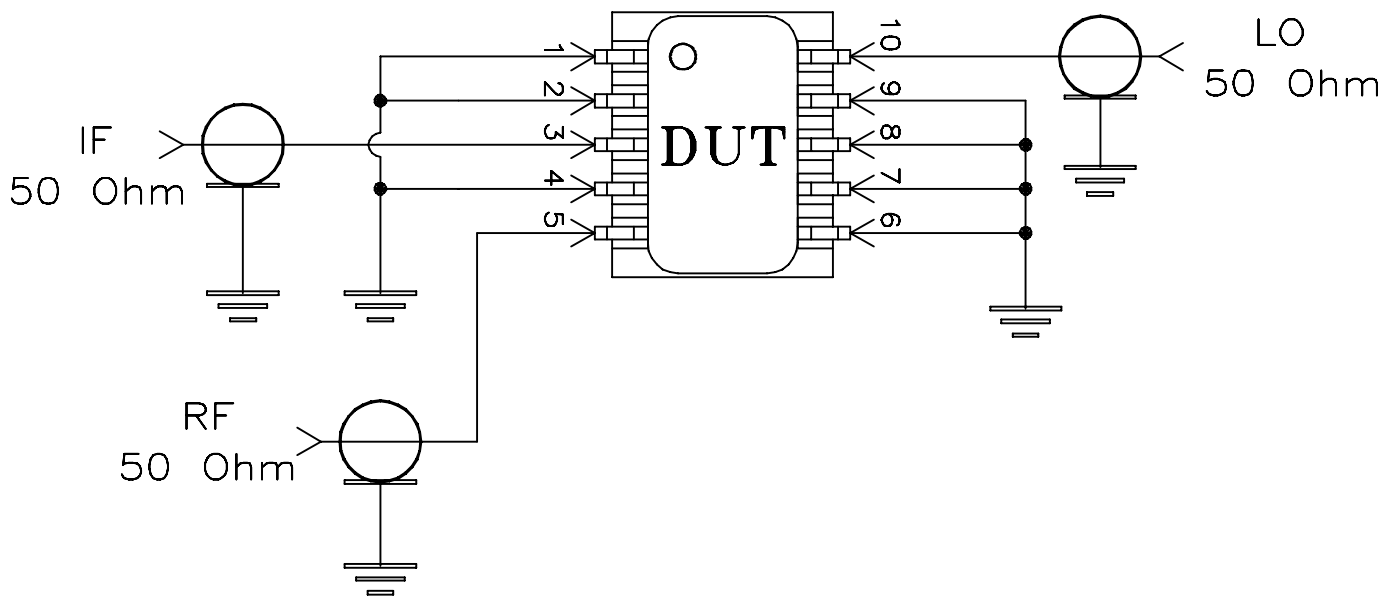
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SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-066	A
FILE:	98PL066	SCALE:	8:1
		SHEET:	1 OF 1

# Evaluation Board and Circuit




TB-99



Schematic Diagram

## Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent, Dielectric Constant=3.5, Thickness=.020 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	-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