

Frequency Mixer

RMS-11F+

Level 7 (LO Power +7dBm) 350 to 2000 MHz



Generic photo used for illustration purposes only

CASE STYLE: TT240

Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	200mW
IF Current	40mA
Permanent damage may occur if any of these limits are exceeded.	

Pin Connections

LO	1
RF	4
IF	5
GROUND	2,3,6

Features

- excellent L-R isolation, 36 dB typ.
- conversion loss, 55 dB typ.
- small size, 0.25"x0.31"x0.2"

Applications

- GSM
- GPS
- PCS
- satellite distribution

Electrical Specifications

FREQUENCY (MHz)		CONVERSION LOSS (dB)				LO-RF ISOLATION (dB)						LO-IF ISOLATION (dB)						IP3 at center band (dBm)
LO/Rf	IF					L		M		U		L		M		U		Typ.
		$f_L - f_U$	$\bar{X}$	σ	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	
350-2000	DC-400	5.5	.20	7.0	9.2	37	26	36	20	32	20	22	14	29	20	28	20	12

1 dB COMP.: +1 dBm typ.

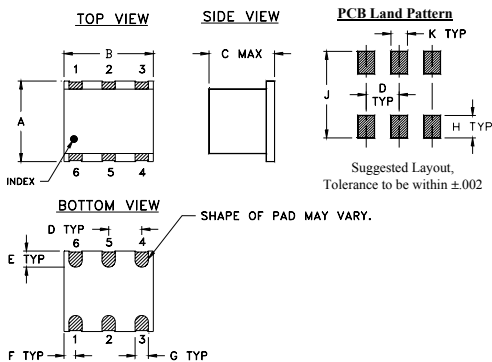
L = 350-750 MHz
m = 350-1000 MHz

M = 750-1000 MHz U = 1000-2000 MHz

Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +7dBm	LO +7dBm	LO +7dBm	LO +7dBm	LO +7dBm
350.00	380.00	4.65	36.37	19.43	2.22	3.48
383.67	413.67	4.63	36.83	19.55	2.12	3.31
417.35	447.35	4.67	38.11	20.39	2.23	3.24
451.02	481.02	4.68	39.27	20.76	2.31	3.21
484.69	514.69	4.61	40.31	21.53	2.49	3.20
552.04	582.04	4.69	40.08	23.23	2.89	3.16
619.39	649.39	4.86	38.80	25.64	3.33	3.17
700.00	730.00	5.08	38.87	28.43	3.73	3.25
720.41	750.41	5.03	39.51	29.35	3.81	3.43
754.08	784.08	5.06	40.27	30.58	3.83	3.34
855.10	885.10	5.48	45.01	42.88	3.50	3.43
1000.00	1030.00	6.00	47.36	33.91	2.12	3.56
1124.49	1154.49	6.85	36.96	29.41	1.26	3.79
1292.86	1262.86	6.99	35.46	29.97	2.50	3.51
1427.55	1397.55	6.54	41.21	27.91	3.59	3.42
1562.24	1532.24	6.52	41.00	27.02	4.61	3.39
1696.94	1666.94	7.61	38.30	26.09	5.43	3.16
1797.96	1767.96	7.75	36.56	25.61	5.81	3.01
1898.98	1868.98	8.07	35.37	25.71	5.65	2.81
2000.00	1970.00	8.43	34.77	26.20	5.59	2.59

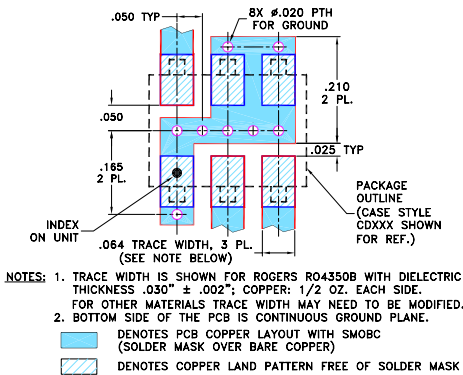
Outline Drawing



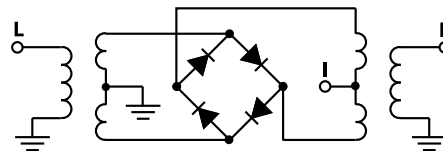
Outline Dimensions ($\frac{\text{inch}}{\text{mm}}$)

A	B	C	D	E	F
.250	.31	.20	.100	.050	.055
6.35	7.87	5.08	2.54	1.27	1.40
G	H	J	K		wt
.040	.070	.270	.050		grams
1.02	1.78	6.86	1.27		0.50

Demo Board MCL P/N: TB-03
Suggested PCB Layout (PL-052)



Electrical Schematic

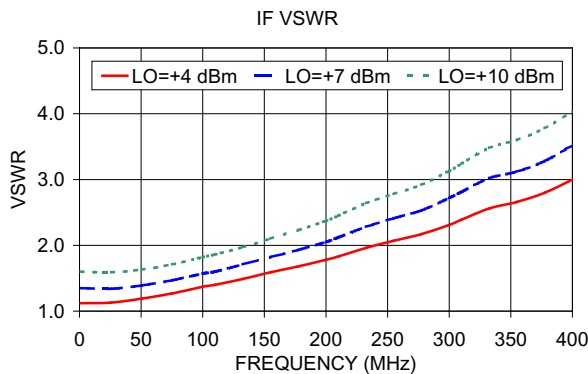
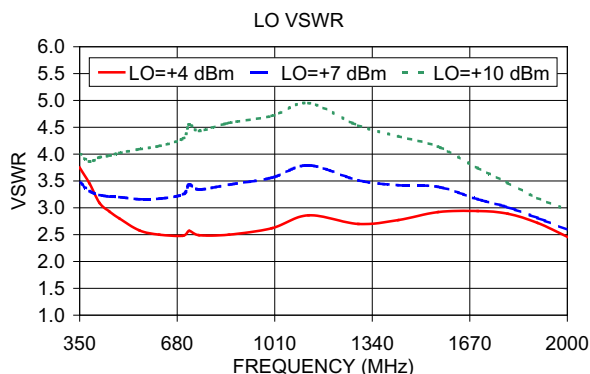
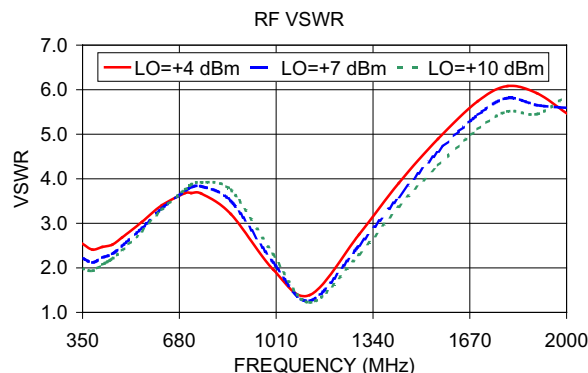
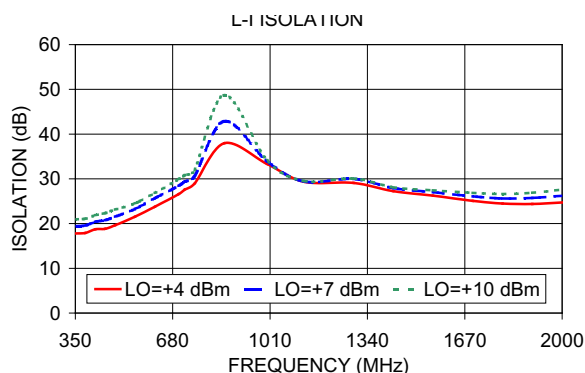
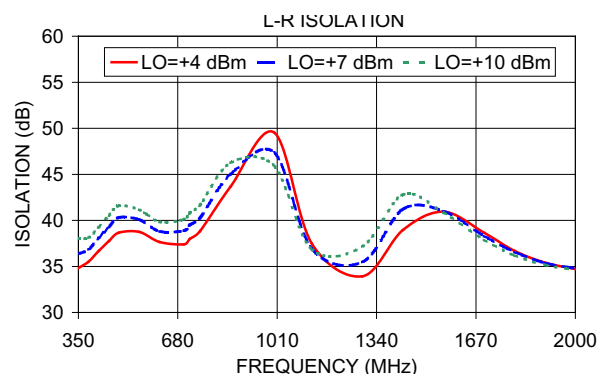
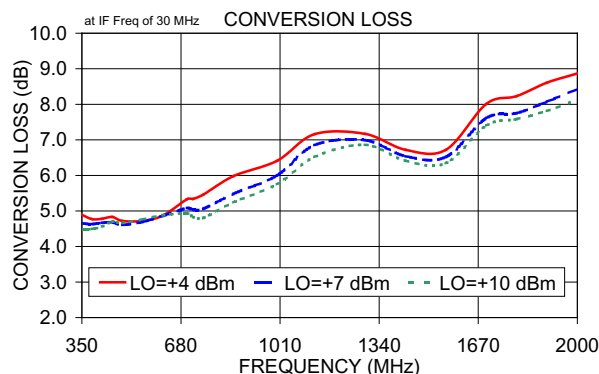


Notes

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Typical Performance Data

RF (MHz)	LO (MHz)	CONVERSION LOSS (dB)			LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
		@LO (dBm)				@LO (dBm)			@LO (dBm)		
		+4	+7	+10		+4	+7	+10	+4	+7	+10
350.0	380.0	4.89	4.65	4.48	350.0	34.82	36.37	38.04	17.79	19.43	20.93
383.7	413.7	4.77	4.63	4.49	383.5	35.52	36.83	38.09	17.90	19.55	21.05
417.4	447.4	4.78	4.67	4.56	417.6	36.68	38.11	39.24	18.71	20.39	21.86
451.0	481.0	4.83	4.68	4.70	450.6	37.75	39.27	40.51	18.84	20.76	22.33
484.7	514.7	4.72	4.61	4.66	484.2	38.67	40.31	41.58	19.62	21.53	23.11
552.0	582.0	4.72	4.69	4.76	551.9	38.75	40.08	41.15	21.54	23.23	24.47
619.4	649.4	4.87	4.86	4.88	619.4	37.65	38.80	39.83	23.75	25.64	26.83
700.0	730.0	5.33	5.08	4.93	699.8	37.40	38.87	40.11	26.59	28.43	29.91
720.4	750.4	5.34	5.03	4.83	719.9	37.99	39.51	40.81	27.59	29.35	30.79
754.1	784.1	5.46	5.06	4.80	753.6	38.84	40.27	41.66	28.94	30.58	31.92
855.1	885.1	5.98	5.48	5.24	855.1	43.67	45.01	46.24	37.95	42.88	48.69
1000.0	1030.0	6.41	6.00	5.75	1000.3	49.53	47.36	45.88	33.32	33.91	34.14
1124.5	1154.5	7.16	6.85	6.52	1125.2	37.52	36.96	36.86	29.35	29.41	29.50
1292.9	1262.9	7.17	6.99	6.86	1293.6	33.92	35.46	37.14	29.09	29.97	30.05
1427.6	1397.6	6.72	6.54	6.41	1426.8	38.95	41.21	42.78	27.25	27.91	28.08
1562.2	1532.2	6.72	6.52	6.34	1563.5	40.94	41.00	40.82	26.24	27.02	27.43
1696.9	1666.9	8.01	7.61	7.40	1698.5	38.66	38.30	37.88	25.07	26.09	26.85
1798.0	1768.0	8.23	7.75	7.58	1797.5	36.69	36.56	36.18	24.47	25.61	26.59
1899.0	1869.0	8.61	8.07	7.81	1898.1	35.41	35.37	35.14	24.38	25.71	26.87
2000.0	1970.0	8.87	8.43	8.13	2000.0	34.72	34.77	34.59	24.72	26.20	27.56

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Typical Performance Data

RF/LO (MHz)	RF VSWR (:1)			LO VSWR (:1)			IF (MHz)	IF VSWR (:1)			LO/RF (MHz)	max. DC output (mV)	DC Offset (mV)
	@LO (dBm)			@LO (dBm)				@LO (dBm)			@LO (dBm)		
	+4	+7	+10	+4	+7	+10		+4	+7	+10	+7		
350.0	2.54	2.22	1.98	3.75	3.48	4.01	1.0	1.12	1.35	1.60	350.00	-203.6	2.17
383.7	2.41	2.12	1.93	3.45	3.31	3.86	25.8	1.13	1.34	1.59	436.84	-210.6	1.44
417.4	2.47	2.23	2.07	3.09	3.24	3.94	50.5	1.19	1.39	1.63	523.68	-221.6	0.58
451.0	2.52	2.31	2.20	2.93	3.21	3.97	75.3	1.27	1.47	1.71	610.53	-164.7	-0.28
484.7	2.68	2.49	2.39	2.80	3.20	4.02	100.0	1.37	1.57	1.82	697.37	-131.4	-0.54
552.0	3.03	2.89	2.82	2.58	3.16	4.09	110.0	1.40	1.60	1.86	784.21	-148.1	-1.05
619.4	3.40	3.33	3.30	2.50	3.17	4.15	132.5	1.49	1.71	1.97	871.05	-129.5	-1.50
700.0	3.68	3.73	3.76	2.48	3.25	4.29	155.0	1.59	1.82	2.10	1000.00	-87.1	-1.89
720.4	3.68	3.81	3.87	2.57	3.43	4.55	177.5	1.68	1.93	2.23	1044.74	-65.6	-2.31
754.1	3.67	3.83	3.92	2.49	3.34	4.43	200.0	1.78	2.05	2.37	1131.58	-61.4	-3.22
855.1	3.21	3.50	3.75	2.50	3.43	4.58	210.0	1.83	2.12	2.45	1218.42	-79.3	-3.57
1000.0	1.96	2.12	2.30	2.62	3.56	4.71	232.5	1.96	2.28	2.64	1305.26	-103.1	-5.71
1124.5	1.39	1.26	1.22	2.86	3.79	4.95	255.0	2.07	2.41	2.78	1392.11	-107.0	-8.31
1292.9	2.75	2.50	2.30	2.70	3.51	4.53	277.5	2.17	2.53	2.92	1478.95	-110.5	-7.15
1427.6	3.90	3.59	3.37	2.77	3.42	4.33	300.0	2.31	2.72	3.13	1565.79	-58.9	-7.31
1562.2	4.90	4.61	4.30	2.92	3.39	4.14	310.0	2.39	2.81	3.24	1652.63	-30.0	-7.40
1696.9	5.74	5.43	5.11	2.94	3.16	3.74	332.5	2.56	3.02	3.48	1739.47	-37.6	-8.67
1798.0	6.08	5.81	5.51	2.89	3.01	3.46	355.0	2.66	3.12	3.60	1826.32	-59.8	-9.21
1899.0	5.92	5.65	5.45	2.72	2.81	3.18	377.5	2.80	3.28	3.78	1913.16	-61.2	-9.27
2000.0	5.47	5.59	5.85	2.46	2.59	2.96	400.0	3.00	3.52	4.04	2000.00	-36.7	-11.20

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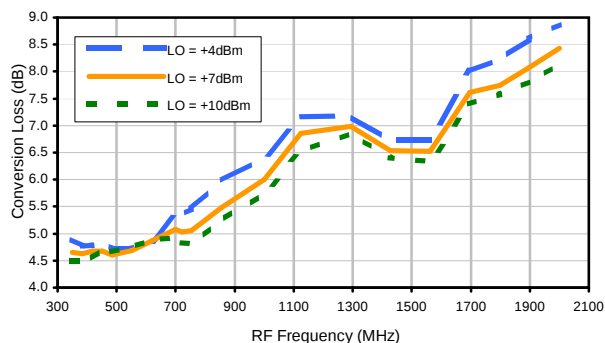


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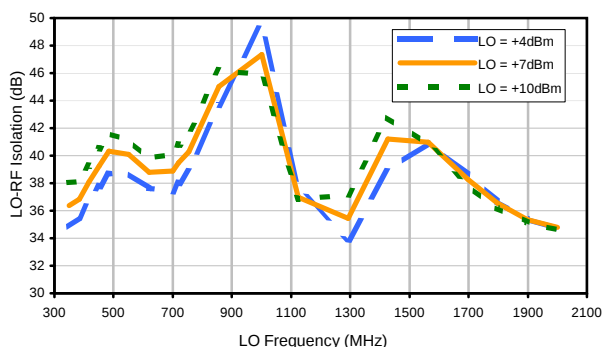


Typical Performance Curves

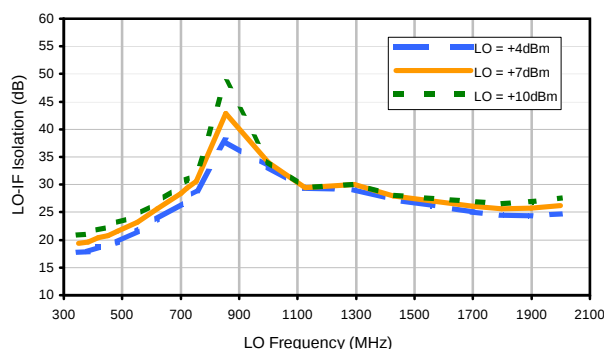
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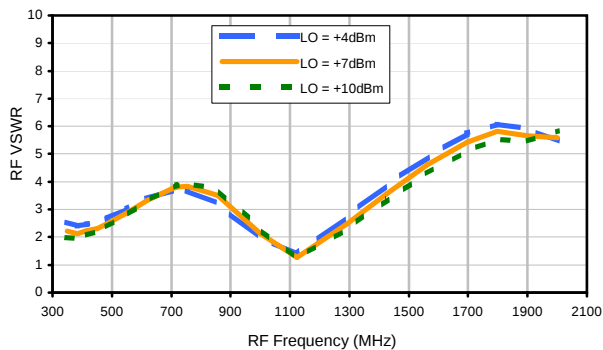
LO-RF Isolation



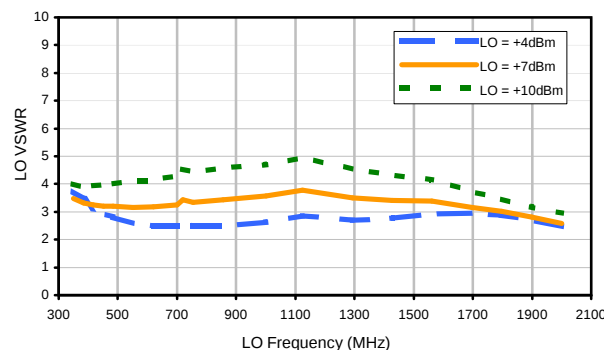
LO-IF Isolation



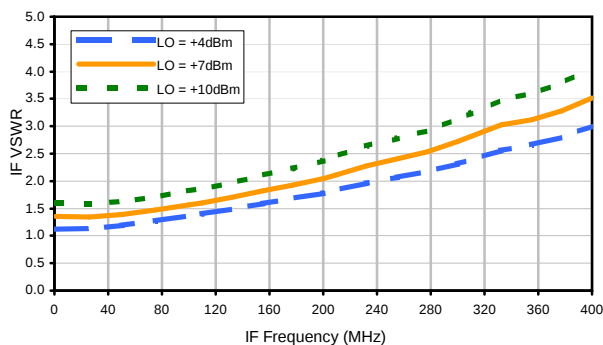
RF VSWR



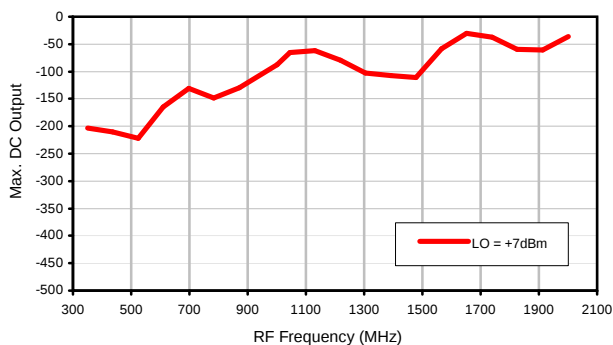
LO VSWR



IF VSWR



Max. DC Output



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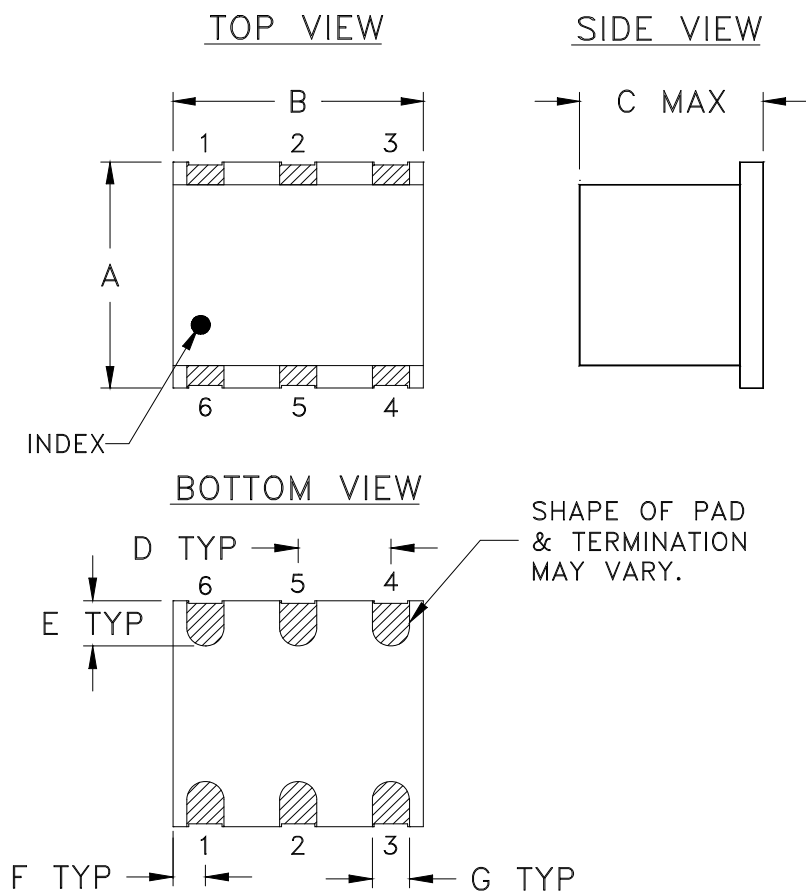
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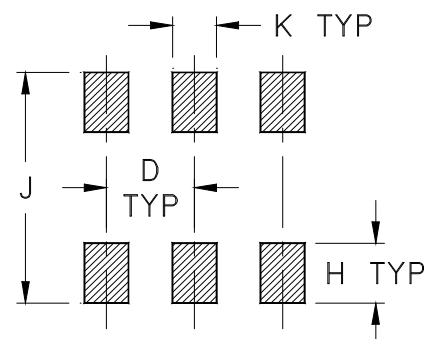
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Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm .002$

CASE #	A	B	C	D	E	F	G	H	J	K	WT. GRAM
TT240	.250 (6.35)	.31 (7.87)	.20 (5.08)	.100 (2.54)	.050 (1.27)	.055 (1.40)	.040 (1.02)	.070 (1.78)	.270 (6.86)	.050 (1.27)	.50

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

Notes:

- Case material: Ceramic.
- Termination finish:
 - For RoHS Case Styles: 2-10 μ inch (.05-.25 microns) Gold plate over 100-300 μ inch (2.54-7.62 microns) Nickel plate. All models, (+) suffix.
 - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



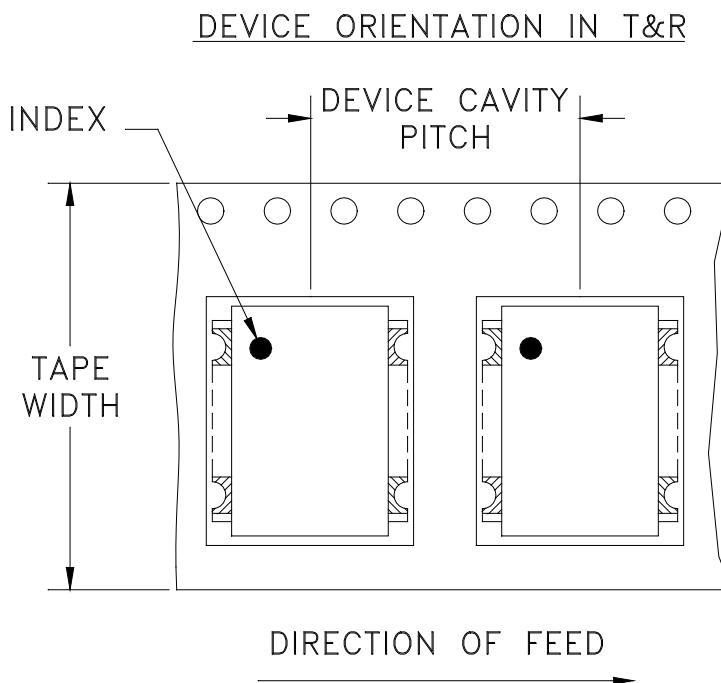
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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F2



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel See note
16	12	7	10
			20
			50
			100
			200
		13	500
			1000

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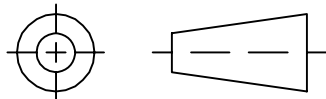
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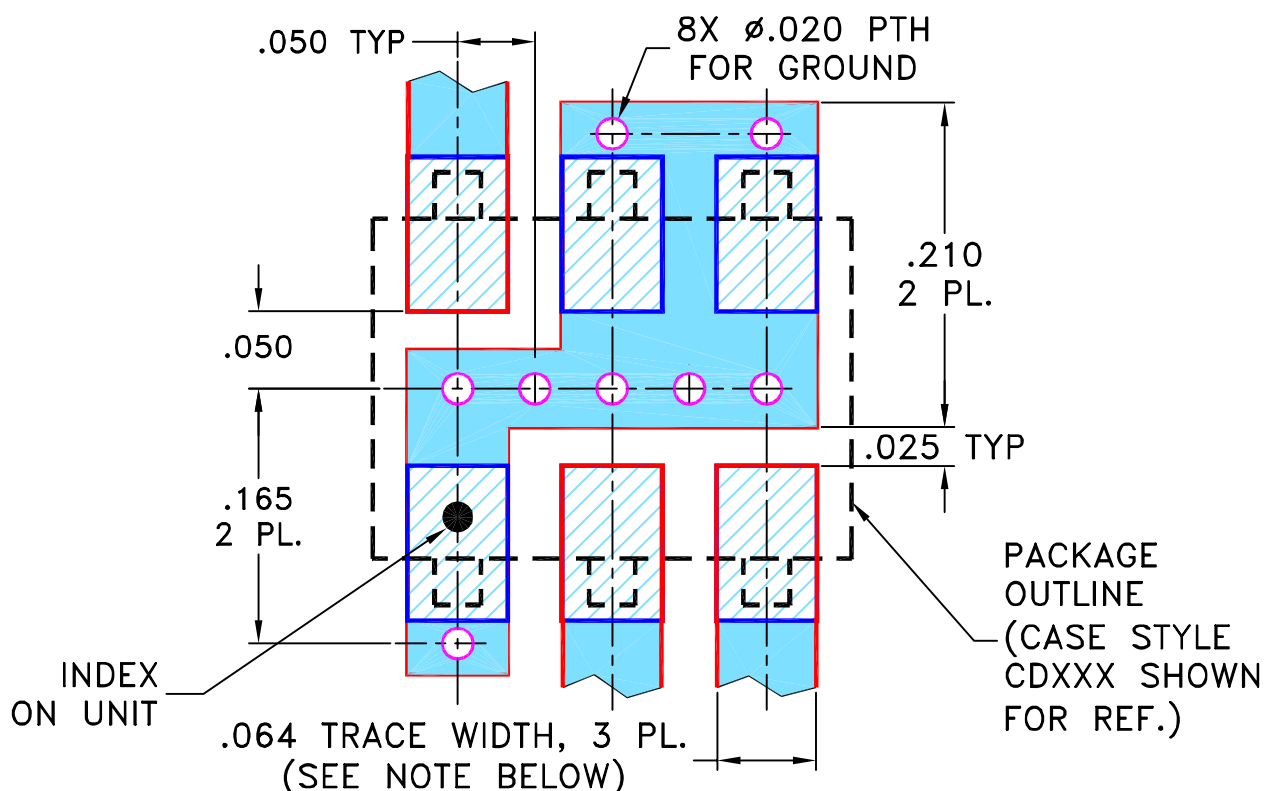
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
A	M101143	ADDED "gk" PIN CONNECTION, TT100 CASE STYLE & NOTE 2	10/10/05	MMG	DJ
B	M102713	ADDED "...WITH SMOBC"	01/17/06	MMG	IL
C	M108637	REMOVED "PIN 1", ADDED INDEX ON UNIT	12/01/06	MYG	FL

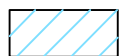
SUGGESTED MOUNTING CONFIGURATION
FOR BH292, CD541/542/636/637, TT100/240 CASE
STYLES, "gk", "ht", "hu", "nd", "w" PIN CONNECTIONS



- NOTES:** 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030" $\pm$.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 SOLDER MASK

UNLESS OTHERWISE SPECIFIED

INITIALS

DATE

DIMENSIONS ARE IN INCHES

TOLERANCES ON:

2 PL DECIMALS $\pm$ 3 PL DECIMALS $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$

DRAWN

MMG

07/17/02

CHECKED

WL

08/02/02

APPROVED

DJ

08/05/02



Mini-Circuits®

13 Neptune Avenue
 Brooklyn NY 11235

PL, gk/ht/hu/nd/w, BH292,
 CD541/542/636/637, TT100/240, TB-03

SIZE

A

CODE IDENT

15542

DRAWING NO:

98-PL-052

REV:

C

FILE:

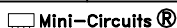
98PL052

SCALE:

8:1

SHEET:

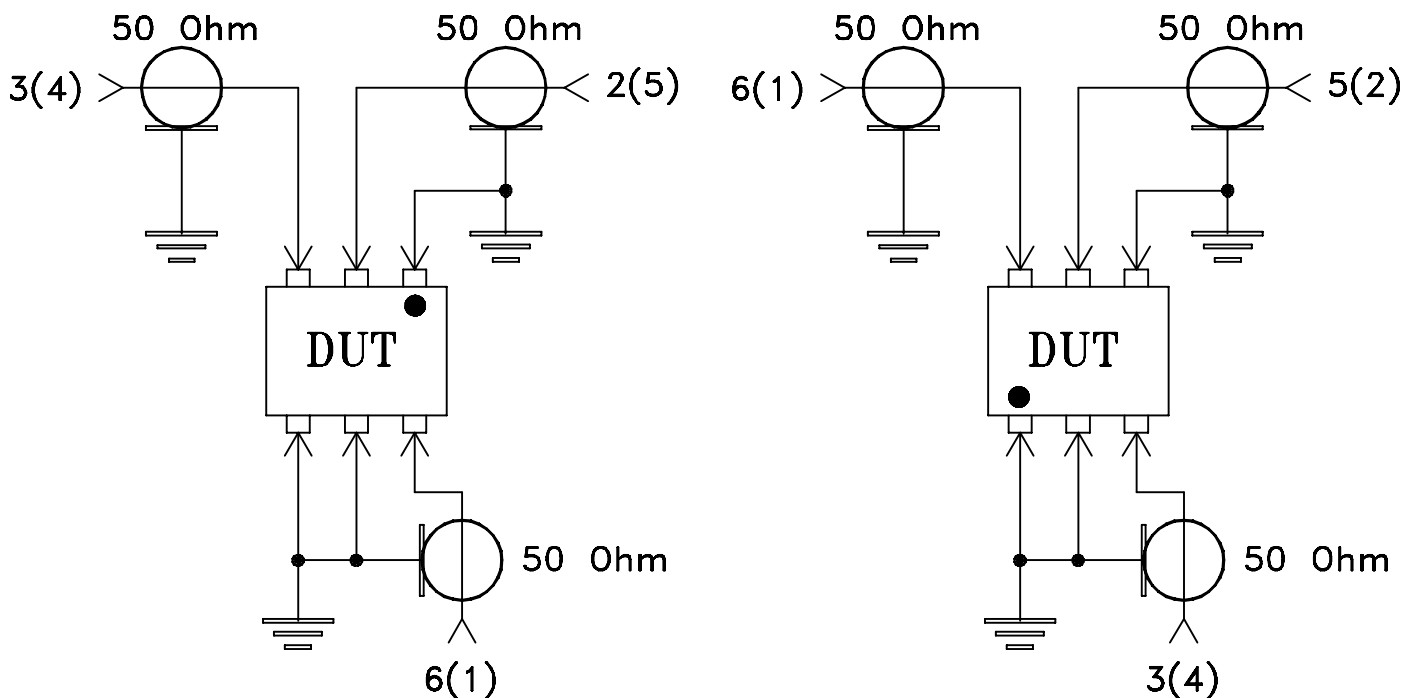
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ASHEETA1.DWG REV:A DATE:01/12/95

For Pin Connections and DUT Orientation Refer to
Data Sheet of the DUT



Notes:

- 
- 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