

X2 Frequency Multiplier

AMK-2-13+

50Ω Output 20 to 1000 MHz



CASE STYLE: CD542

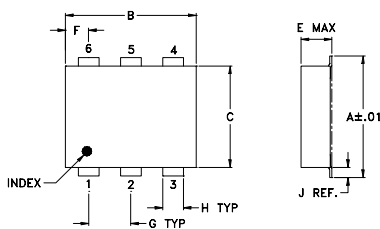
Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Input Power	23 dBm
Permanent damage may occur if any of these limits are exceeded.	

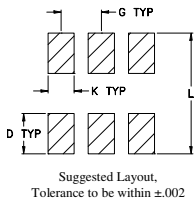
Pin Connections

INPUT	3
OUTPUT	6
GROUND	1,4,5
NOT USED	2

Outline Drawing



PCB Land Pattern

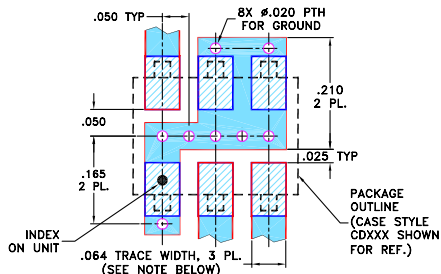


Suggested Layout, Tolerance to be within ±.002

Outline Dimensions (inch/mm)

A	B	C	D	E	F	G
.272	.310	.220	.100	.112	.055	.100
6.91	7.87	5.59	2.54	2.84	1.40	2.54
H	J	K	L	wt		
.030	.026	.065	.300	grams		
0.76	0.66	1.65	7.62	0.20		

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



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .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

Features

- broadband
- low conversion loss, 11.4 dB typ.
- high rejection F1 and F3, -45 dBc typ.
- low cost
- aqueous washable

Applications

- synthesizers
- local oscillators
- satellite up and down converters

+RoHS Compliant

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



Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	10, 20, 50, 100, 200, 500
13"	500, 1000

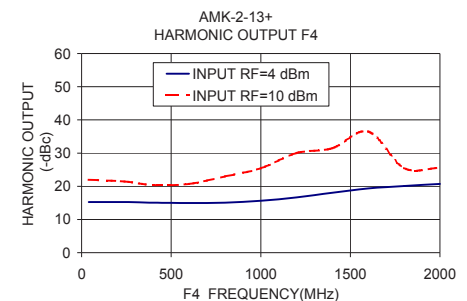
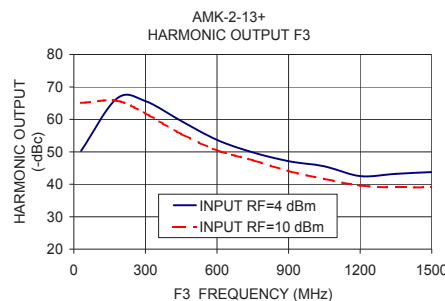
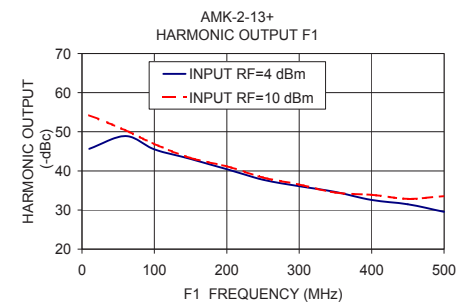
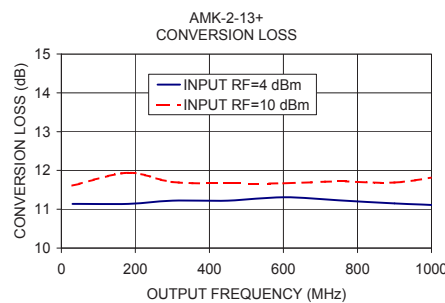
Electrical Specifications

MULTIPLICATION FACTOR	FREQUENCY (MHz)		INPUT POWER (dBm)		CONVERSION LOSS (dB)		*HARMONIC OUTPUT (dBc)					
	F1 Input	F2 Output	Min.	Max.	Typ.	Max.	F1		F3		F4	
2	10-500	20-1000	4	10	11.4	14.5	Typ.	Min.	Typ.	Min.	Typ.	Min.

* Harmonics of input frequency below the power level of F2

Typical Performance Data

Input Frequency (MHz)	INPUT RF= 4 dBm				INPUT RF= 10 dBm			
	Conversion Loss (dB) F2	F1	F3	F4	Conversion Loss (dB) F2	F1	F3	F4
10.00	11.14	45.65	50.28	15.24	11.61	54.24	65.09	21.97
60.00	11.14	48.90	66.44	15.25	11.94	50.38	65.74	21.45
100.00	11.22	45.52	65.65	15.06	11.70	46.86	61.85	20.36
150.00	11.22	43.05	59.50	14.95	11.67	43.30	55.49	20.72
200.00	11.31	40.43	53.67	15.06	11.67	41.16	50.45	22.99
250.00	11.23	37.72	49.84	15.65	11.72	38.29	47.40	25.43
300.00	11.15	36.08	47.09	16.63	11.69	36.49	44.07	30.03
350.00	11.09	34.61	45.52	18.06	11.88	34.46	41.61	31.49
400.00	10.99	32.56	42.50	19.34	11.97	33.87	39.61	36.48
450.00	11.16	31.45	43.20	20.09	12.21	32.85	39.01	25.48
500.00	11.41	29.56	43.75	20.71	12.72	33.56	39.13	25.56



Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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



Frequency Multiplier (Doublers)

AMK-2-13+

Typical Performance Data

FREQUENCY (MHz)				RF IN=+4dBm			
				CONVERSION LOSS (dB)	HARMONIC OUTPUT*		
					X 2 OUTPUT	X 1 OUTPUT	X 3 OUTPUT
X 1 OUTPUT	X 2 OUTPUT	X 3 OUTPUT	X 4 OUTPUT	X 2 OUTPUT	X 1 OUTPUT	X 3 OUTPUT	X 4 OUTPUT
10	20	30	40	11.14	45.65	50.28	15.24
60	120	180	240	11.14	48.90	66.44	15.25
100	200	300	400	11.22	45.52	65.65	15.06
150	300	450	600	11.22	43.05	59.50	14.95
200	400	600	800	11.31	40.43	53.67	15.06
250	500	750	1000	11.23	37.72	49.84	15.65
300	600	900	1200	11.15	36.08	47.09	16.63
350	700	1050	1400	11.09	34.61	45.52	18.06
400	800	1200	1600	10.99	32.56	42.50	19.34
450	900	1350	1800	11.16	31.45	43.20	20.09
500	1000	1500	2000	11.41	29.56	43.75	20.71

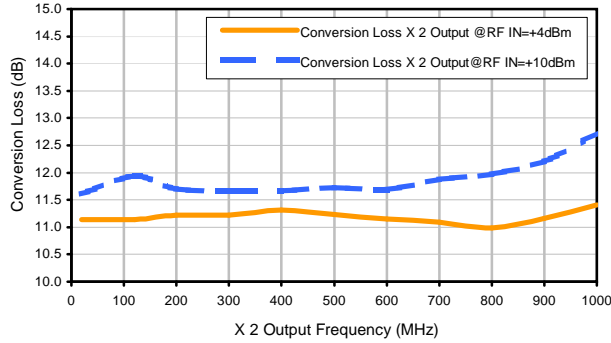
*Harmonic Output below power level of X 2 Output .

FREQUENCY (MHz)				RF IN=+10dBm			
				CONVERSION LOSS (dB)	HARMONIC OUTPUT*		
					X 2 OUTPUT	X 1 OUTPUT	X 3 OUTPUT
X 1 OUTPUT	X 2 OUTPUT	X 3 OUTPUT	X 4 OUTPUT	X 2 OUTPUT	X 1 OUTPUT	X 3 OUTPUT	X 4 OUTPUT
10	20	30	40	11.61	54.24	65.09	21.97
60	120	180	240	11.94	50.38	65.74	21.45
100	200	300	400	11.70	46.86	61.85	20.36
150	300	450	600	11.67	43.30	55.49	20.72
200	400	600	800	11.67	41.16	50.45	22.99
250	500	750	1000	11.72	38.29	47.40	25.43
300	600	900	1200	11.69	36.49	44.07	30.03
350	700	1050	1400	11.88	34.46	41.61	31.49
400	800	1200	1600	11.97	33.87	39.61	36.48
450	900	1350	1800	12.21	32.85	39.01	25.48
500	1000	1500	2000	12.72	33.56	39.13	25.56

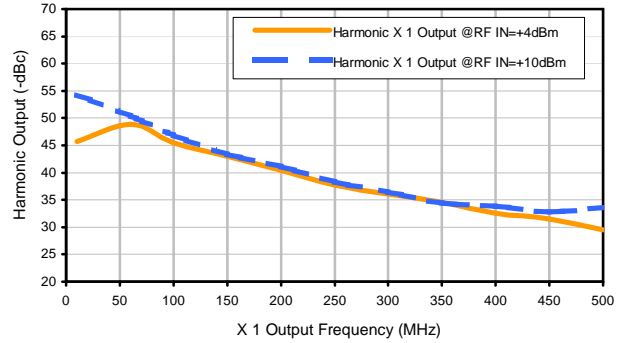
*Harmonic Output below power level of X 2 Output .

Typical Performance Curves

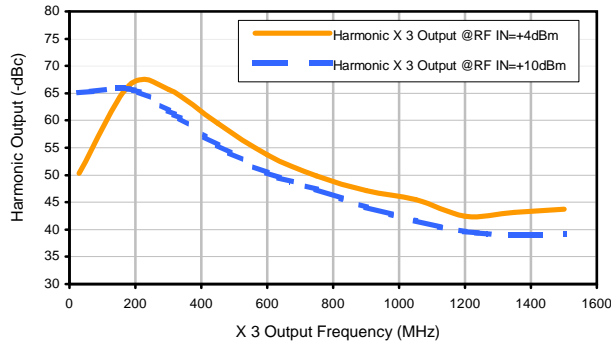
Conversion Loss X 2 Output



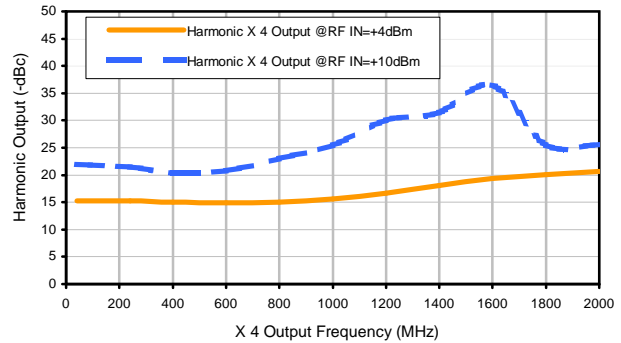
Harmonic X 1 Output



Harmonic X 3 Output



Harmonic X 4 Output



Case Style

CD

CD541
CD542
CD636
CD637

Outline Dimensions



PCB Land Pattern



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

CASE#	A	B	C	D	E	F	G	H	J	K	L	WT, GRAM
CD541					.082 (2.08)							.15
CD542	.272 (6.91)	.310 (7.87)	.220 (5.58)	.100 (2.54)	.112 (2.84)	.055 (1.40)	.100 (2.54)	.030 (0.76)	.026 (0.66)	.065 (1.65)	.300 (7.62)	.20
CD636					.162 (4.11)							.25
CD637					.206 (5.23)							.40

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

Notes:

- Case material: Plastic.
- Termination finish:
 - For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
 - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

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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.

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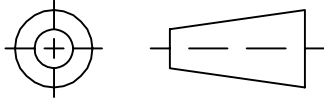
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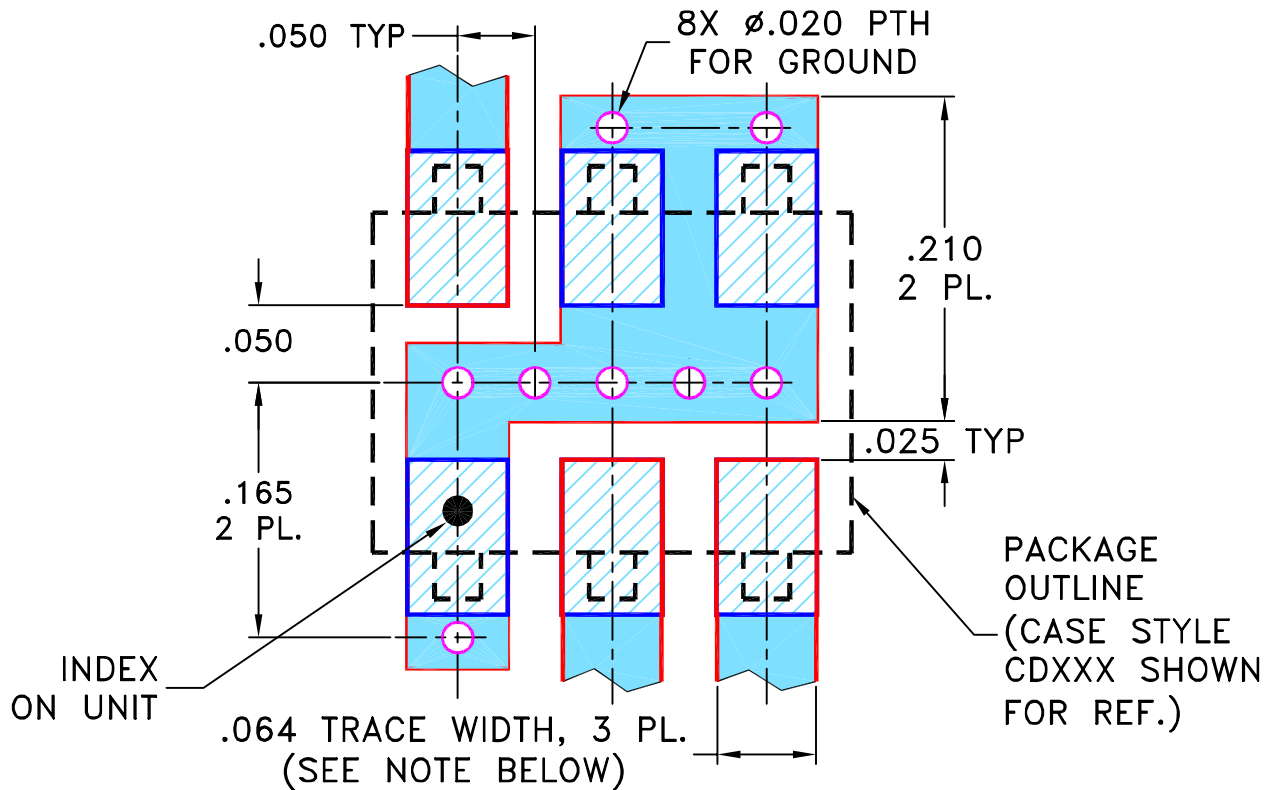
THIRD ANGLE PROJECTION



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" ± .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	MMG	07/17/02
TOLERANCES ON:	WL	08/02/02
2 PL DECIMALS ±	DJ	08/05/02
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		

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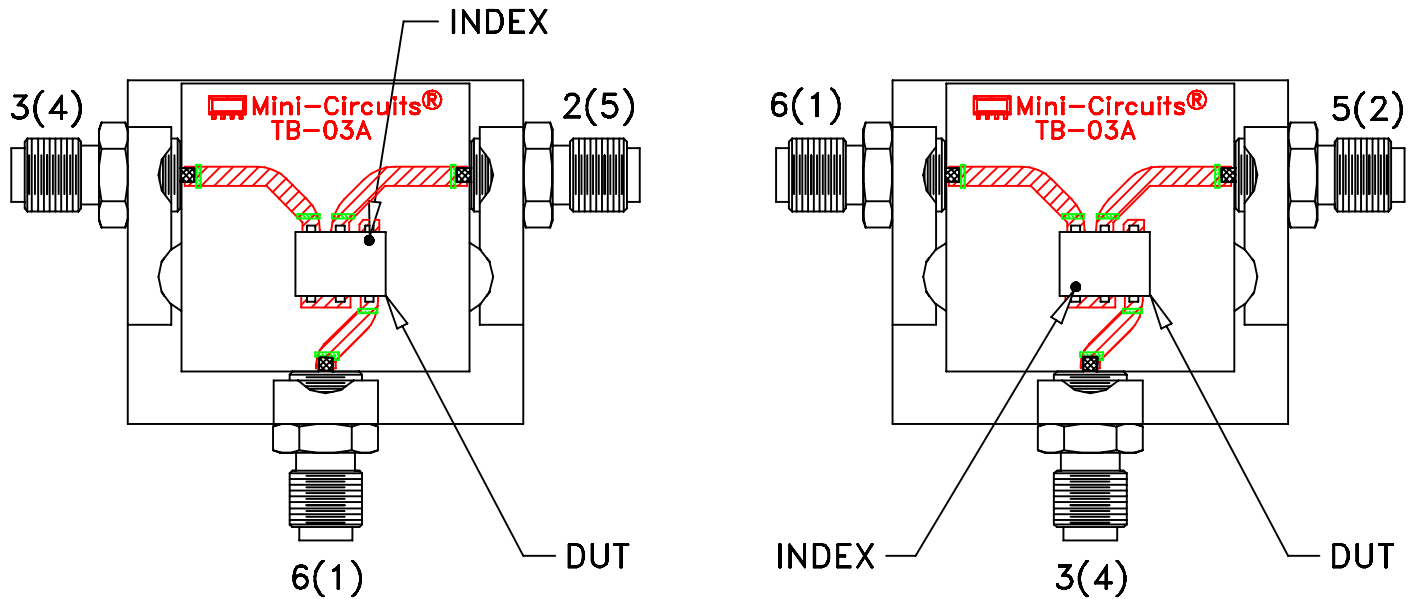
PL, gk/ht/hu/nd/w, BH292,
 CD541/542/636/637, TT100/240, TB-03

SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-052	REV: C
FILE: 98PL052	SCALE: 8:1	SHEET: 1 OF 1	

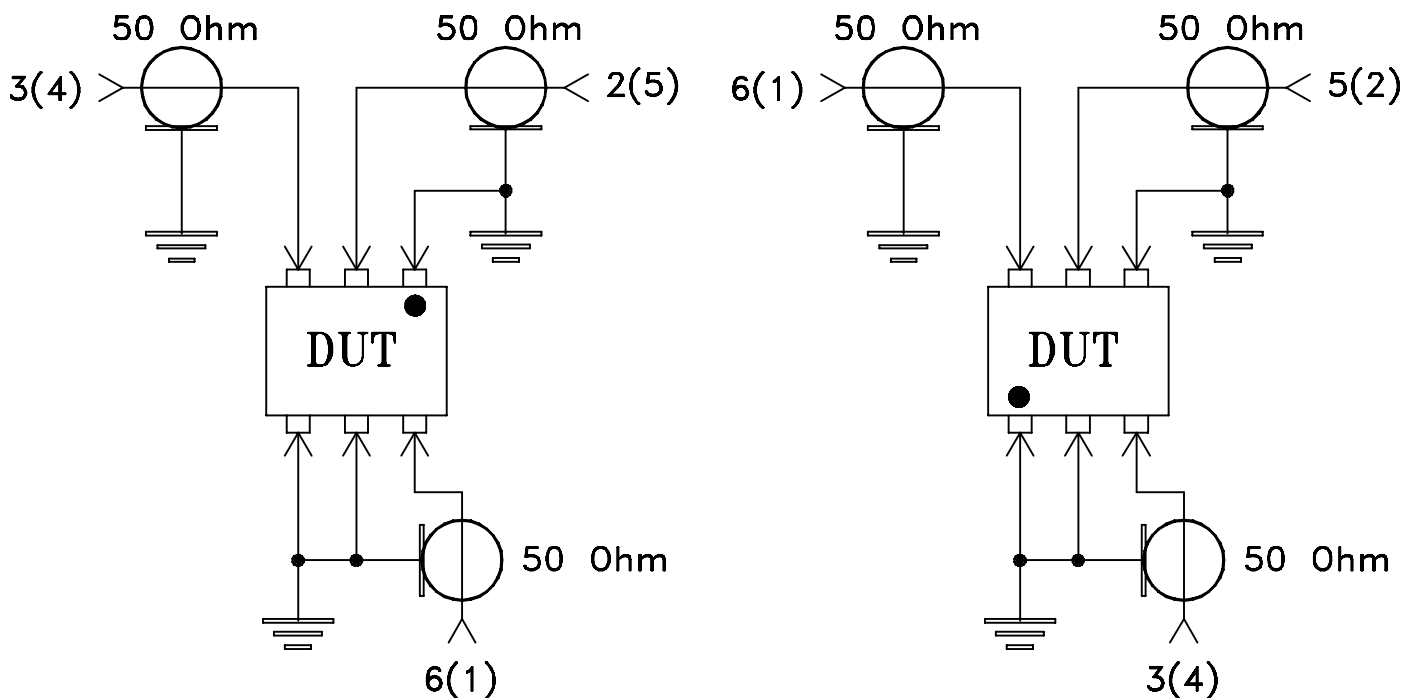
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Evaluation Board and Circuit

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




TB-03



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.030 inch.

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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