

50Ω

868 to 895 MHz

Maximum Ratings

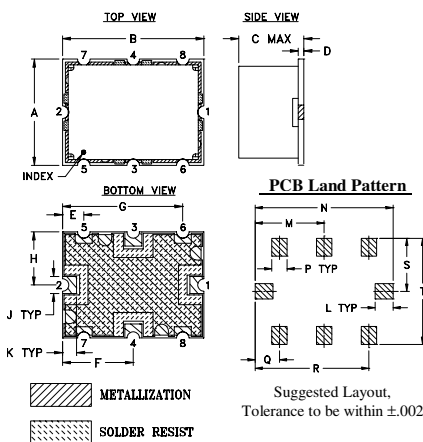
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
LO Power	50mW
I&Q Current	40mA
Permanent damage may occur if any of these limits are exceeded.	

Pin Connections

LO (carrier)	2
RF (signal)	1
I (0°)(ref.)	3
Q (90°)*	4
GROUND	5,6,7,8

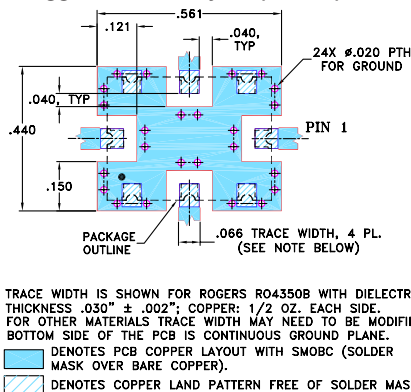
*Q= I +90° for lower sideband suppression

Outline Drawing



Outline Dimensions (inch mm)

A	B	C	D	E	F	G	H	J	K	
.38	.50	.23	.020	.075	.250	.425	.187	.060	.050	
9.65	12.70	5.84	0.51	1.91	6.35	10.80	4.75	1.52	1.27	
L	M	N	P	Q	R	S	T			wt.
.070	.270	.540	.060	.095	.445	.208	.415			grams
1.78	6.86	13.72	1.52	2.41	11.30	5.28	10.54			0.8

Demo Board MCL P/N: TB-459+
Suggested PCB Layout (PL-280)

NOTE: 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

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

Features

- low conversion loss, 6.4dB typ.
- excellent 3rd and 5th order harmonic suppression
- good carrier and sideband rejections
- good VSWR all ports, RF 1.35:1 typ., LO 1.3:1 typ., I&Q 1.35:1 typ.
- shielded case

Applications

- cellular
- radar and communication systems



CASE STY: TTT1289

+RoHS Compliant

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

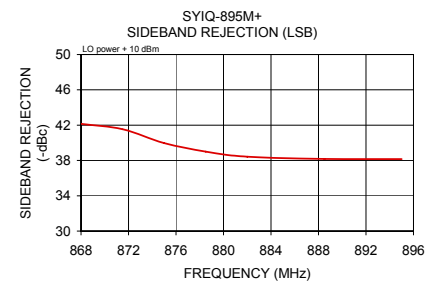
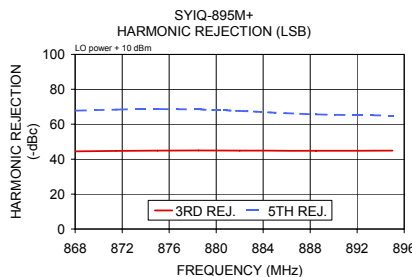
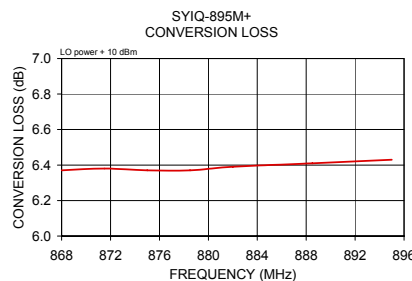
Modulator Electrical Specifications

FREQUENCY (MHz)				CONVERSION LOSS (dB)			CARRIER REJECTION (-dBc)		SIDE BAND REJECTION (-dBc)		HARMONIC SUPPRESSION (-dBc)			
RF (SIGNAL) LO (CARRIER)		I&Q									3XI/Q		5XI/Q	
f _L	f _U	Min.	Max.	$\overline{X}$	σ	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.
868	895	DC	5	6.4	0.10	7.5	38	30	39	30	45	35	64	50

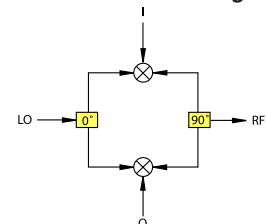
1. Operating LO power: 10±1dBm
2. 1dB Compression: 1 dBm typical.
3. Conversion Loss: (I + Q) power, dBm - RF power, dBm.
4. Carrier and sideband rejections measured at -5dBm I/Q power.

Typical Performance Data

Carrier Freq. (MHz)	Conversion Loss		Sideband Rejection (x)		Carrier Rejection (x)		3rd Harmonic Suppression (x)		5th. Harmonic Suppression (x)		DC Offset (mV)
	σ (dB)	σ (dB)	LSB (-dBc)	USB (-dBc)	LSB (-dBc)	USB (-dBc)	LSB (-dBc)	USB (-dBc)	LSB (-dBc)	USB (-dBc)	
868.00	6.37	0.06	42.15	42.93	36.93	37.03	44.46	59.83	67.77	64.01	1.54
871.50	6.38	0.06	41.54	41.56	37.35	37.41	44.73	59.66	68.39	63.72	1.54
875.00	6.37	0.07	39.97	40.22	37.95	37.98	44.92	58.95	68.72	63.65	1.53
878.50	6.37	0.07	39.00	39.39	38.67	38.64	44.96	58.43	68.44	63.72	1.51
882.00	6.39	0.07	38.42	38.89	39.42	39.38	44.90	57.98	67.57	63.89	1.48
888.50	6.41	0.06	38.17	38.55	39.85	40.83	44.84	55.82	65.63	63.68	1.42
895.00	6.43	0.07	38.16	38.50	40.01	40.00	44.89	52.30	64.99	62.73	1.39



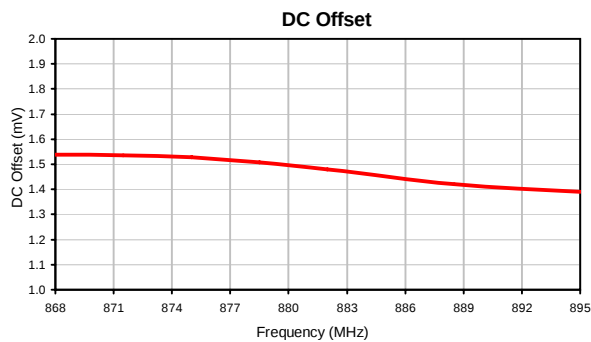
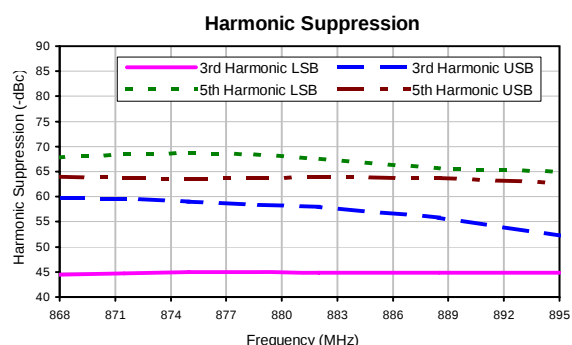
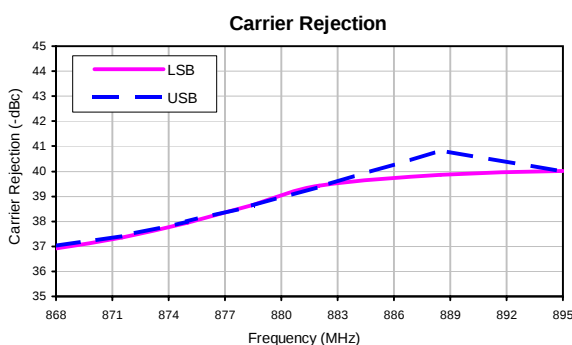
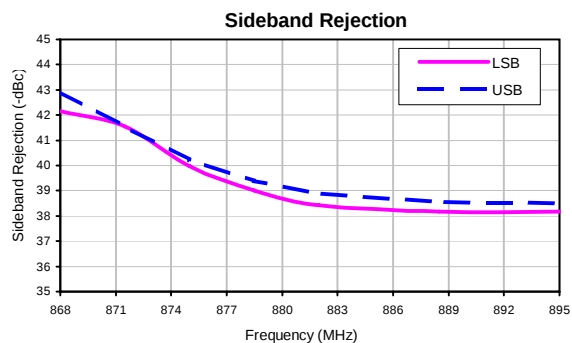
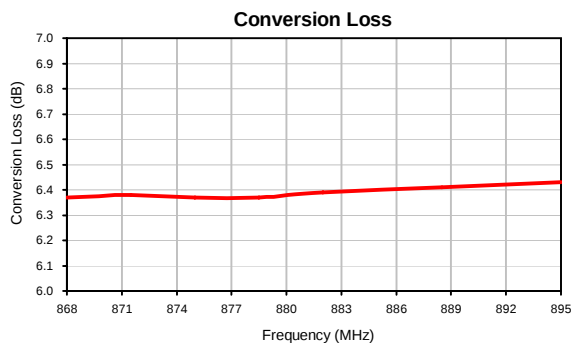
I&Q modulation block diagram



Typical Performance Data

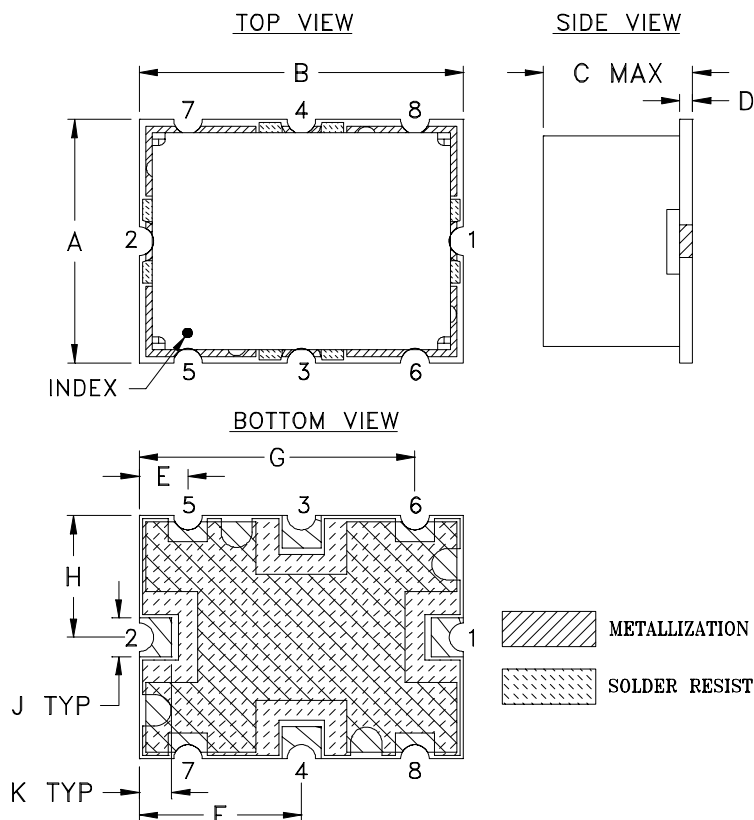
CARRIER FREQ. (MHz)	CONVERSION LOSS (dB)		SIDE BAND REJECTION (-dBc)		CARRIER REJECTION (-dBc)		3rd. HARMONIC SUPPRESSION (-dBc)		5th. HARMONIC SUPPRESSION (-dBc)		DC OFFSET (mV) MEAN
	MEAN	SIGMA	LSB	USB	LSB	USB	LSB	USB	LSB	USB	
868.00	6.37	0.06	42.15	42.93	36.93	37.03	44.46	59.83	67.77	64.01	1.54
871.50	6.38	0.06	41.54	41.56	37.35	37.41	44.73	59.66	68.39	63.72	1.54
875.00	6.37	0.07	39.97	40.22	37.95	37.98	44.92	58.95	68.72	63.65	1.53
878.50	6.37	0.07	39.00	39.39	38.67	38.64	44.96	58.43	68.44	63.72	1.51
882.00	6.39	0.07	38.42	38.89	39.42	39.38	44.90	57.98	67.57	63.89	1.48
888.50	6.41	0.06	38.17	38.55	39.85	40.83	44.84	55.82	65.63	63.68	1.42
895.00	6.43	0.07	38.16	38.50	40.01	40.00	44.89	52.30	64.99	62.73	1.39

Typical Performance Curves

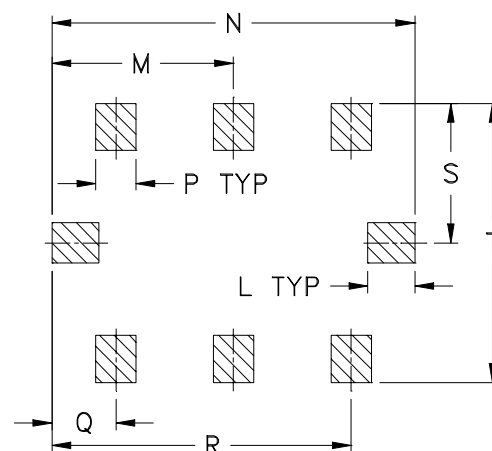


Outline Dimensions

TTT1289



PCB Land Pattern



Suggested Layout,
Tolerance to be within ± 0.002

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N
TTT1289	.38 (9.65)	.50 (12.70)	.23 (5.84)	.020 (0.51)	.075 (1.91)	.250 (6.35)	.425 (10.80)	.187 (4.75)	.060 (1.52)	.050 (1.27)	.070 (1.78)	.270 (6.86)	.540 (13.72)

CASE #	P	Q	R	S	T	WT. GRAM
TTT1289	.060 (1.52)	.095 (2.41)	.445 (11.30)	.208 (5.28)	.415 (10.54)	.8

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

Note:

- Case material: Nickel-Silver alloy.
- Base material: 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. All models, (+) suffix.
 - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



INTERNET <http://www.minicircuits.com>

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Mini-Circuits ISO 9001 & ISO 14001 Certified

Tape & Reel Packaging TR-F12



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
24	12	7	Small quantity standards (see note)	10
				20
				50
				100
				200
		13	Standard	500

Note: Please Consult individual model data sheet to determine device per reel availability.

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



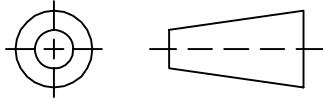
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

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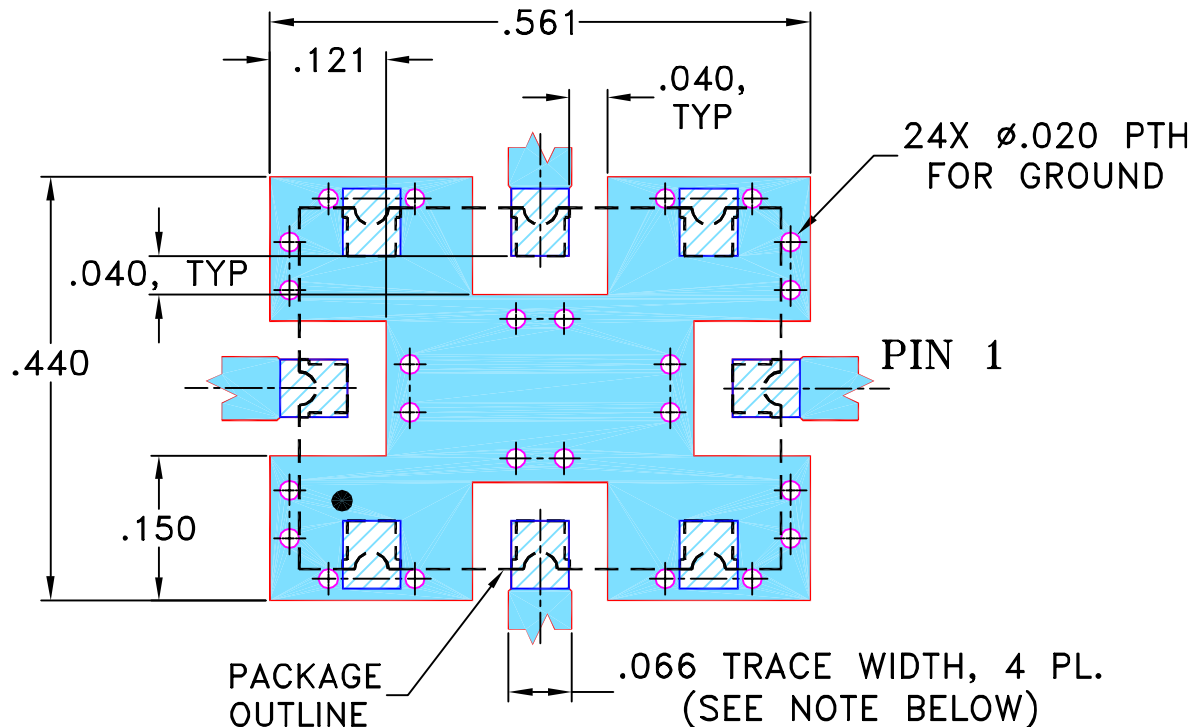
THIRD ANGLE PROJECTION



REVISIONS

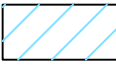
REV OR	ECN No.	DESCRIPTION	DATE	DR	AUTH
	M113234	NEW RELEASE	09/04/07	AV	DJ

SUGGESTED MOUNTING CONFIGURATION FOR TTT1289 CASE STYLE, "su" PIN CONNECTION



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 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 $\pm$
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ASHEETA1.DWG REV:A DATE:01/12/95



Mini-Circuits® 13 Neptune Avenue
Brooklyn NY 11235

PL, su, TTT1289, SYIQ-895M+, TB-459+

SIZE
A

CODE IDENT
15542

DRAWING NO:
98-PL-280

REV:
OR

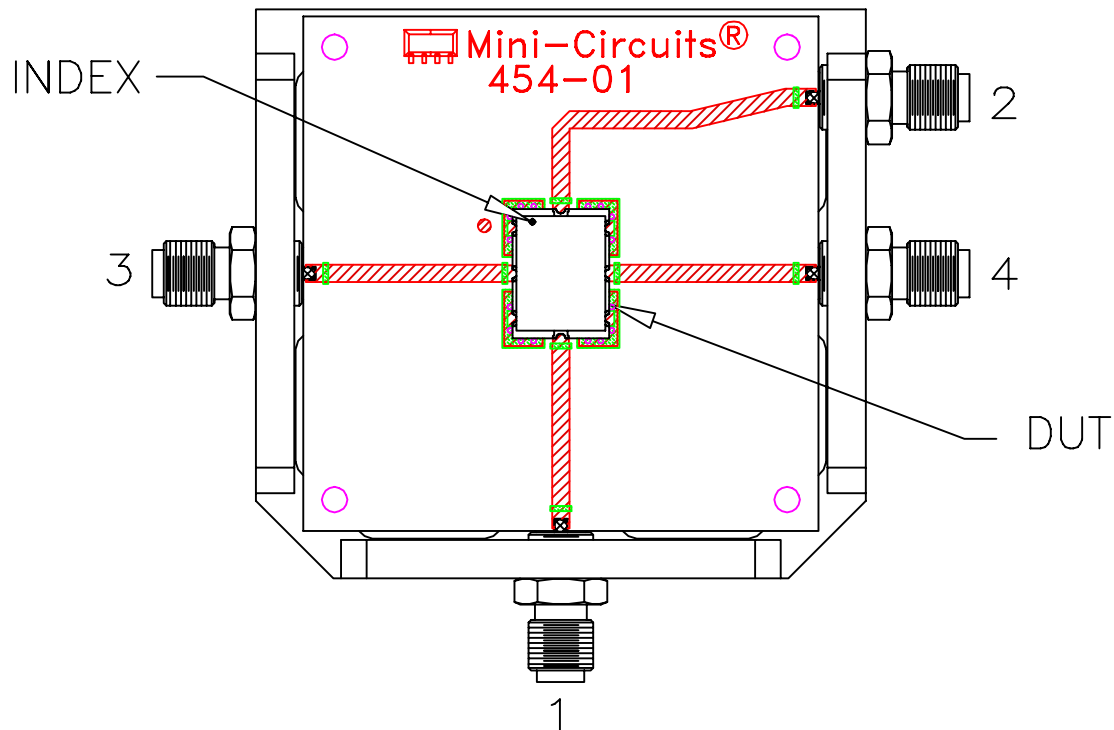
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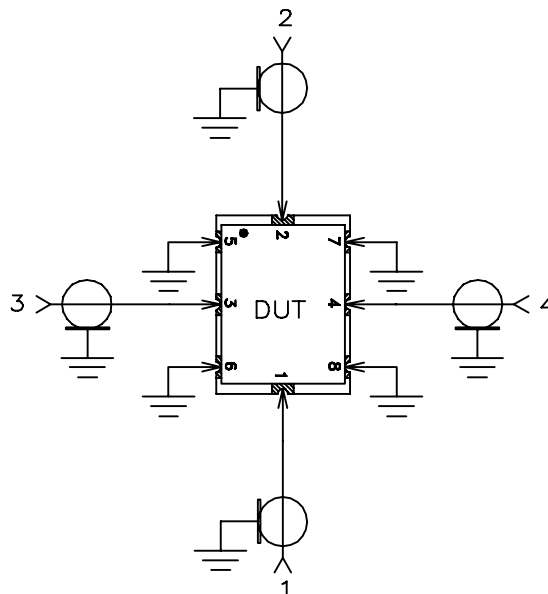
SHEET: 1 OF 1

Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT



TB-459+



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: Rogers R04350B or its equivalent,  Mini-Circuits® Dielectric Constant=3.5, Thickness=.010"



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