



# RF Transformer

## TCM1-63AX+

50Ω 10 to 6000 MHz

### FEATURES

- Ultra wide bandwidth 10 to 6000 MHz
- One model covers all telecommunication bands
- Flat insertion loss
- Good return loss
- Aqueous washable



Generic photo used for illustration purposes only

CASE STYLE: DB1627

### +RoHS Compliant

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

### APPLICATIONS

- Differential modulator/demodulator and active mixers
- Wideband push-pull amplifiers
- LTE, Cellular, PCS, UMTS, WiFi, WiMAX

### ELECTRICAL SPECIFICATIONS AT 25°C

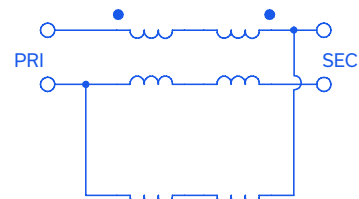
Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Impedance Ratio			1		
Frequency Range		10	–	6000	MHz
Insertion Loss	10-6000	–	1.3	2.5	dB
Amplitude Unbalance	10-6000	–	0.5	–	dB
Phase Unbalance	10-6000	–	8	–	Degree

### MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	0.2W
DC Current	30mA

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

### CONFIGURATION K





top hat  
SURFACE MOUNT  
RF Transformer

TCM1-63AX+

Mini-Circuits

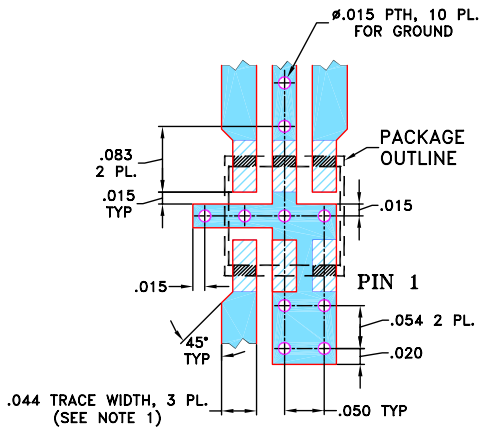
50Ω 10 to 6000 MHz

PIN CONNECTIONS

PRIMARY DOT	3
PRIMARY	2
SECONDARY DOT	6
SECONDARY	4
GND	2
NOT USED	1,5

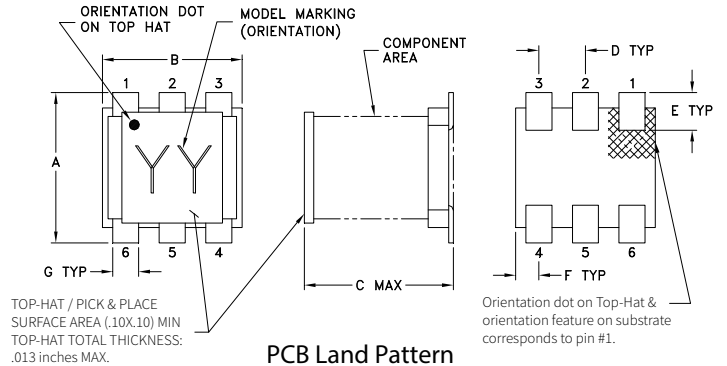
PRODUCT MARKING: GU

DEMO BOARD MCL P/N: TB-654+  
SUGGESTED PCB LAYOUT (PL-364)

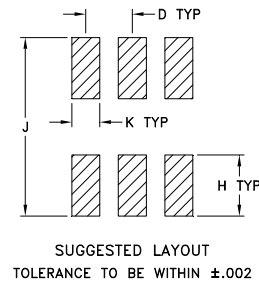


- NOTES:** 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020" ± .0015"; COPPER: 1/2 OZ. ON EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.  
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
  - DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

OUTLINE DRAWING



PCB Land Pattern



OUTLINE DIMENSIONS (Inches mm)

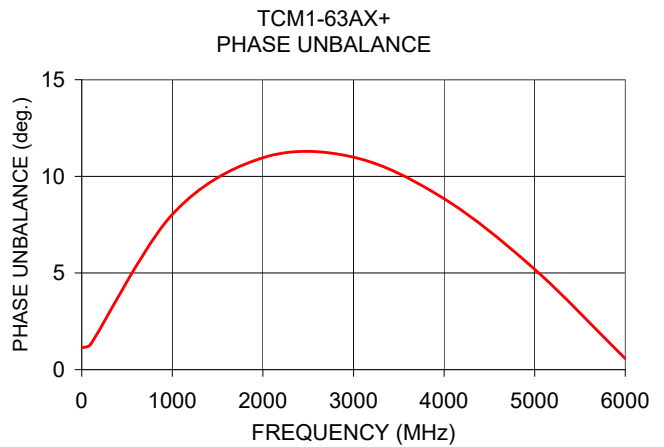
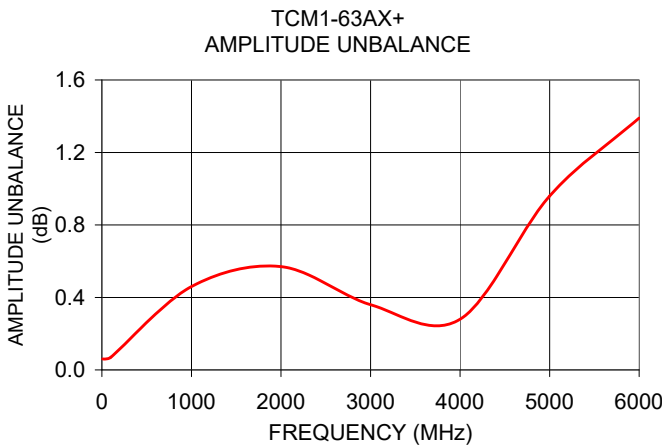
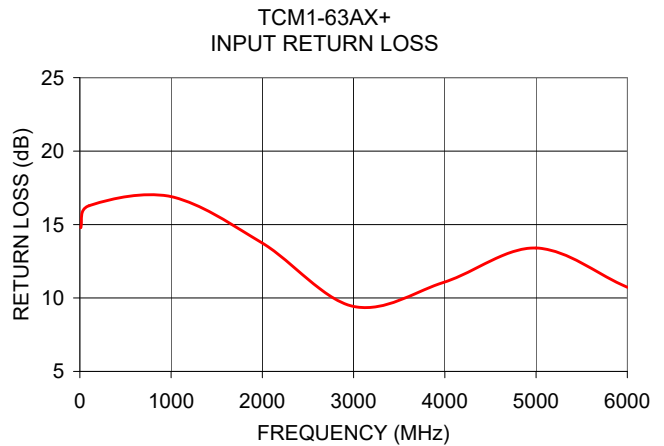
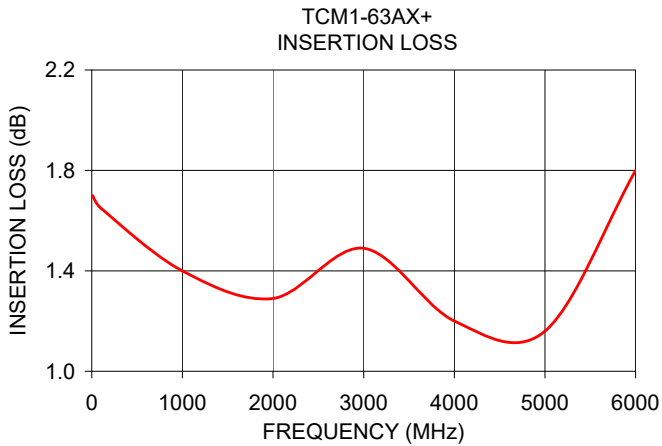
A	B	C	D	E	F
.160	.150	.160	.050	.040	.025
4.06	3.81	4.06	1.27	1.02	0.64
G	H	J	K		wt
.028	.065	.190	.030		grams
0.71	1.65	4.83	0.76		0.15

TAPE & REEL INFORMATION: F47



TYPICAL PERFORMANCE DATA

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)	Amplitude Unbalance (dB)	Phase Unbalance (deg)
10	1.70	14.78	0.06	1.15
100	1.65	16.28	0.07	1.32
500	1.57	16.68	0.26	5.05
1000	1.40	16.90	0.46	8.03
1500	1.29	15.98	0.52	9.87
2000	1.29	13.74	0.57	10.96
3000	1.49	9.42	0.36	10.99
4000	1.20	11.09	0.28	8.84
5000	1.16	13.40	0.96	5.19
6000	1.80	10.73	1.39	0.57



- 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/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)

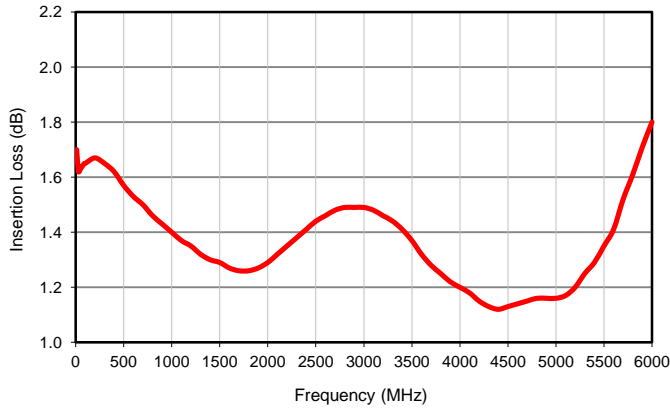
Typical Performance Data

FREQUENCY (MHz)	AVERAGE INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (deg.)
10.0	1.70	14.78	0.06	1.15
30.0	1.62	15.91	0.04	0.61
50.0	1.63	16.05	0.05	0.75
70.0	1.64	16.18	0.05	0.97
90.0	1.65	16.26	0.06	1.21
100.0	1.65	16.28	0.07	1.32
200.0	1.67	16.46	0.10	2.41
300.0	1.65	16.53	0.15	3.42
400.0	1.62	16.60	0.20	4.29
500.0	1.57	16.68	0.26	5.05
600.0	1.53	16.78	0.30	5.73
700.0	1.50	16.87	0.35	6.40
800.0	1.46	16.90	0.39	6.98
900.0	1.43	16.90	0.43	7.53
1000.0	1.40	16.90	0.46	8.03
1100.0	1.37	16.82	0.48	8.48
1200.0	1.35	16.69	0.49	8.88
1300.0	1.32	16.56	0.50	9.23
1400.0	1.30	16.34	0.52	9.56
1500.0	1.29	15.98	0.52	9.87
1600.0	1.27	15.57	0.53	10.12
1700.0	1.26	15.17	0.53	10.36
1800.0	1.26	14.74	0.55	10.54
1900.0	1.27	14.29	0.57	10.74
2000.0	1.29	13.74	0.57	10.96
2100.0	1.32	13.15	0.58	11.19
2200.0	1.35	12.56	0.57	11.41
2300.0	1.38	11.98	0.56	11.59
2400.0	1.41	11.41	0.53	11.66
2500.0	1.44	10.90	0.49	11.78
2600.0	1.46	10.44	0.46	11.74
2700.0	1.48	10.07	0.43	11.62
2800.0	1.49	9.78	0.40	11.43
2900.0	1.49	9.53	0.38	11.21
3000.0	1.49	9.42	0.36	10.99
3100.0	1.48	9.40	0.33	10.76
3200.0	1.46	9.43	0.32	10.54
3300.0	1.44	9.49	0.28	10.41
3400.0	1.41	9.55	0.24	10.32
3500.0	1.37	9.65	0.18	10.20
3600.0	1.32	9.86	0.11	10.04
3700.0	1.28	10.15	0.08	9.87
3800.0	1.25	10.49	0.09	9.57
3900.0	1.22	10.82	0.18	9.24
4000.0	1.20	11.09	0.28	8.84
4100	1.18	11.38	0.39	8.34
4200	1.15	11.82	0.48	7.84
4300	1.13	12.3	0.53	7.31
4400	1.12	12.84	0.56	6.91
4500	1.13	13.29	0.61	6.56
4600	1.14	13.59	0.66	6.3
4700	1.15	13.7	0.72	6.03
4800	1.16	13.62	0.78	5.76
4900	1.16	13.61	0.87	5.5
5000	1.16	13.4	0.96	5.19
5100	1.17	13.2	1.04	4.65
5200	1.20	13.01	1.09	4.07
5300	1.25	12.75	1.15	3.47
5400	1.29	12.93	1.24	2.98
5500	1.35	12.59	1.28	2.19
5600	1.41	12.41	1.29	1.41
5700	1.52	12.11	1.33	0.78
5800	1.61	11.56	1.36	0.59
5900	1.71	11.13	1.38	0.53
6000	1.80	10.73	1.39	0.57

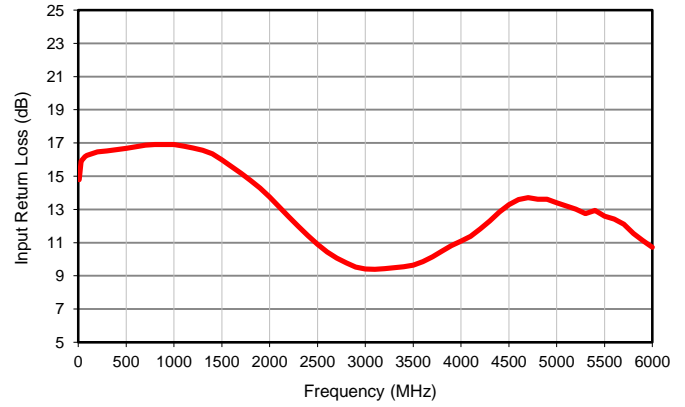


## Typical Performance Data

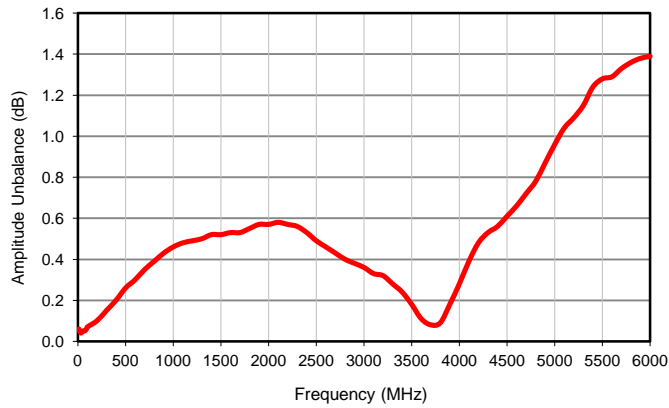
### Average Insertion Loss



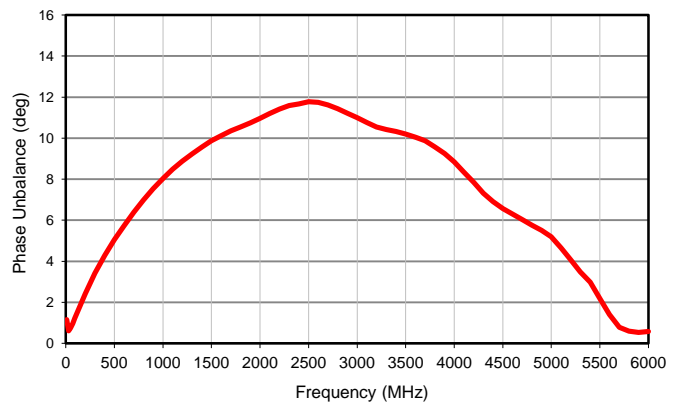
### Input Return Loss



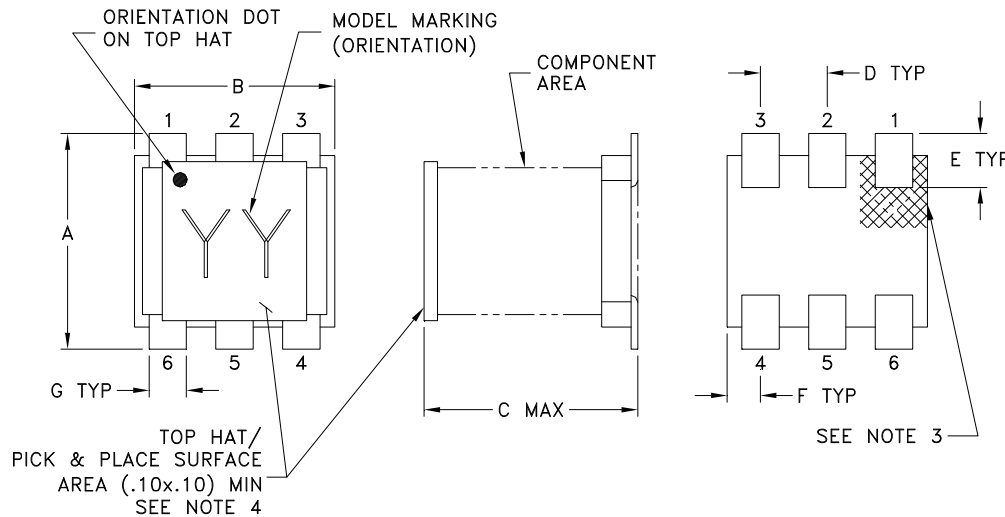
### Amplitude Unbalance



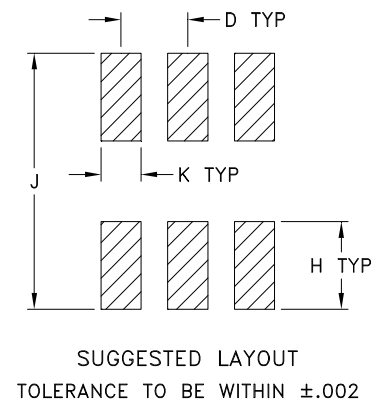
### Phase Unbalance



### Outline Dimensions



### PCB Land Pattern



CASE #	A	B	C	D	E	F	G	H	J	K	WT. GRAM
DB1627	.160 (4.06)	.150 (3.81)	.160 (4.06)	.050 (1.27)	.040 (1.02)	.025 (0.64)	.028 (0.71)	.065 (1.65)	.190 (4.83)	.030 (0.76)	.15

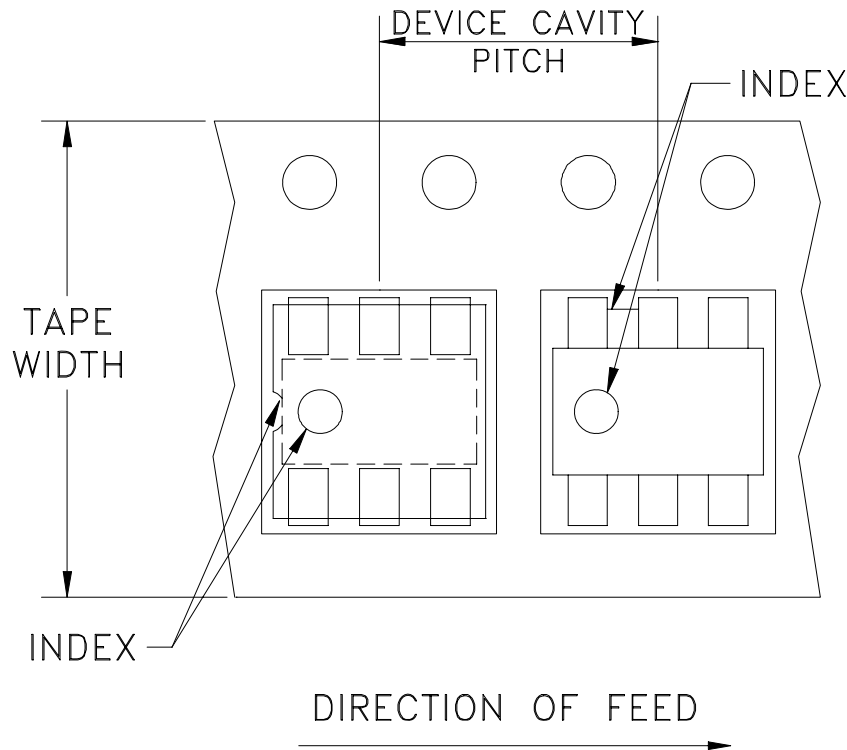
Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .01$ ; 3Pl.  $\pm .005$

### 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.
- Orientation dot on top hat & orientation feature on substrate correspondence to pin #1.
- Top-Hat total thickness: .013 inches MAX.

# Tape & Reel Packaging TR-F47

## DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note
12	8	13	1000, 2000
		7	20, 50, 100, 200, 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](http://www.minicircuits.com/pages/pdfs/tape.pdf)

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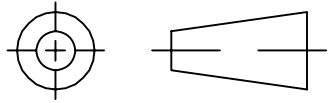
INTERNET <http://www.minicircuits.com>

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THIRD ANGLE PROJECTION

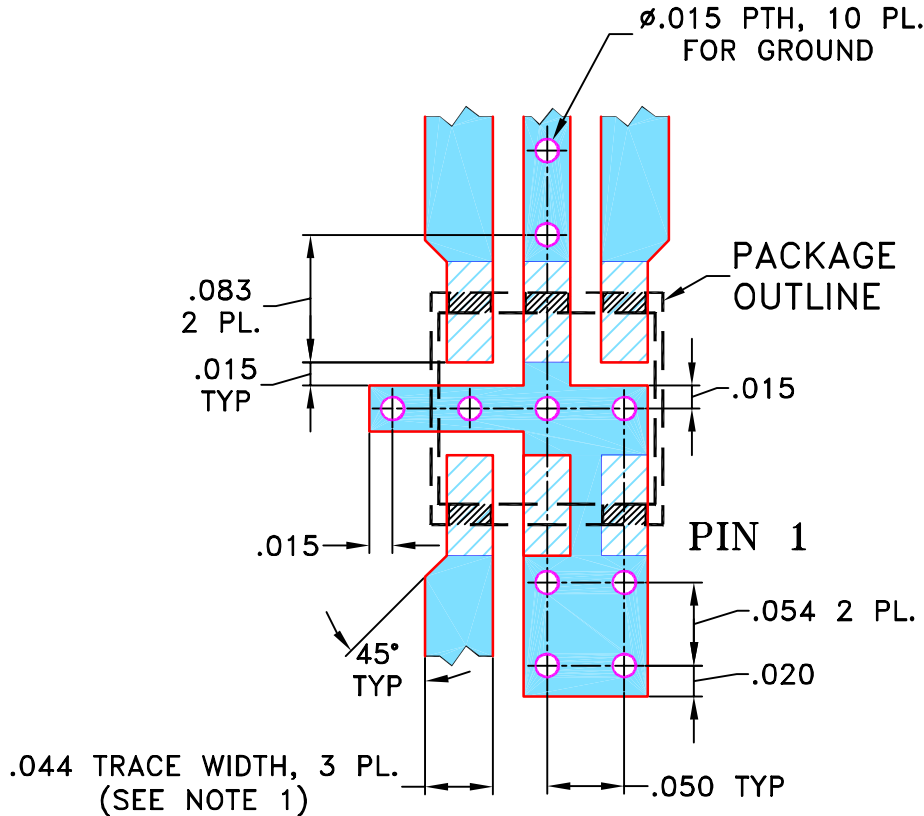


REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M136032	NEW RELEASE	03/07/12	GF	DJ
A	M141464	ADDED PIN CODE "06TK04"	05/06/13	IL	DJ

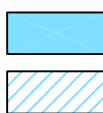
SUGGESTED MOUNTING CONFIGURATION

FOR DB1627 CASE STYLE, "06TN01" & "06TK04" PIN CODES



- NOTES:** 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020" ± .0015"; COPPER: 1/2 OZ. ON 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

DRAWN

GF

02/17/12

TOLERANCES ON:

CHECKED

IL

03/07/12

2 PL DECIMALS ±

APPROVED

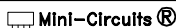
DJ

03/07/12

3 PL DECIMALS ± .005

ANGLES ±

FRACTIONS ±



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



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Brooklyn NY 11235

PL, 06TN01/06TK04, DB1627, TB-654+

SIZE

CODE IDENT

DRAWING NO:

REV:

A

15542

98-PL-364

A

FILE: 98PL364

SCALE:

8:1

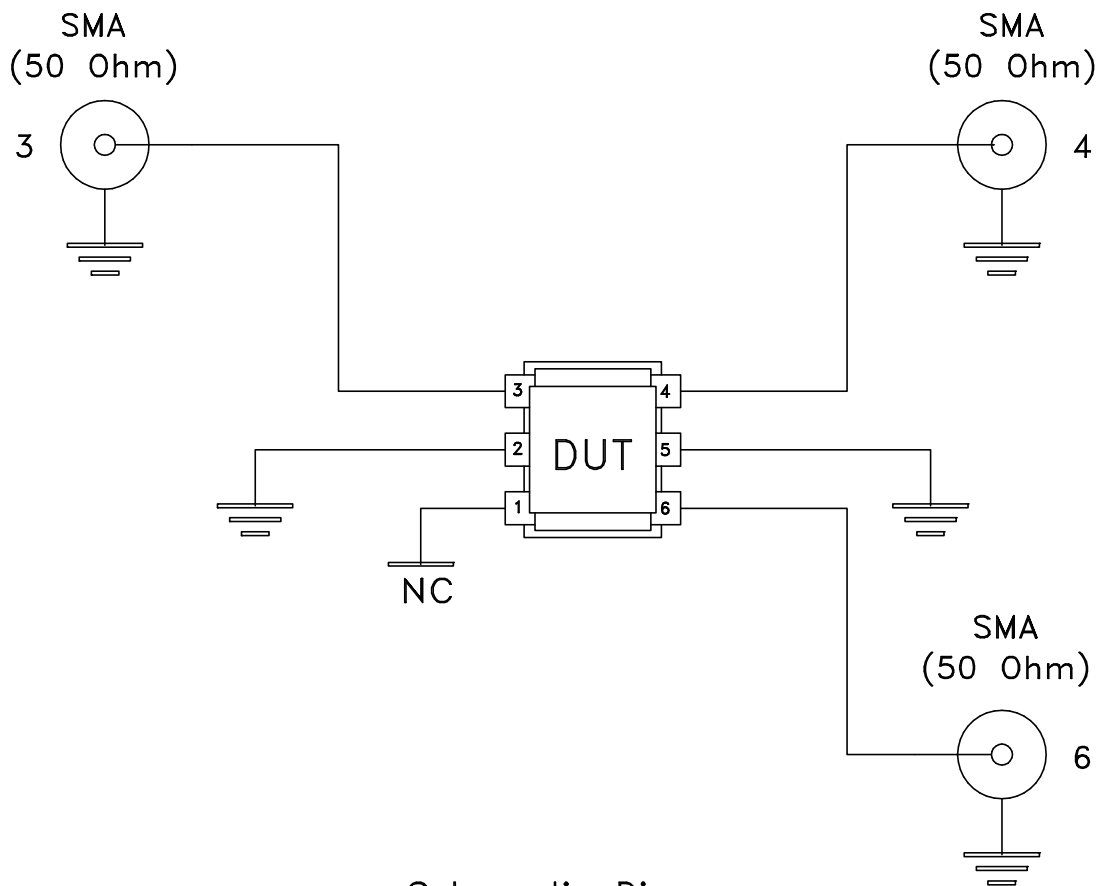
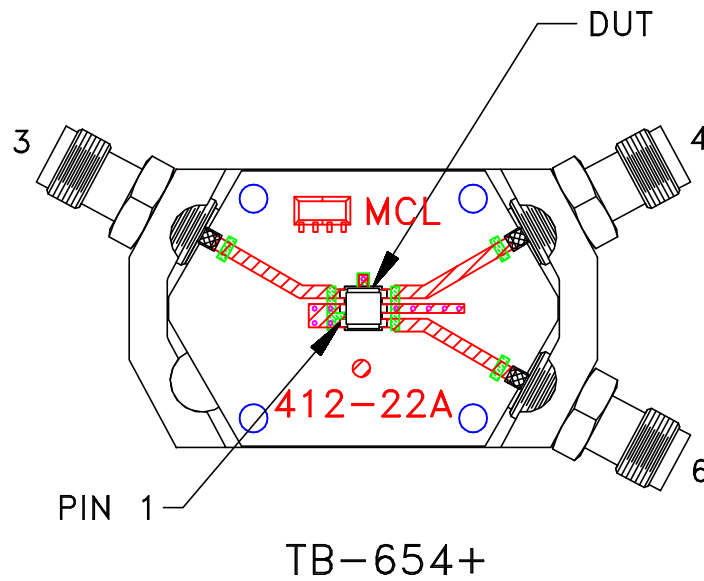
SHEET:

1 OF 1



# Evaluation Board and Circuit


For Pin Connections refer to Data Sheet of the DUT



Schematic Diagram

## Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.020 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