



Mini-Circuits®

SURFACE MOUNT 

RF Transformer

TCM4-452X+

50Ω

20 to 4500 MHz

FEATURES

- Wide bandwidth 20 to 4500 MHz
- Balanced transmission line
- Good return loss
- Aqueous washable

APPLICATIONS

- PCS
- Wideband push-pull amplifiers
- Cellular



Generic photo used for illustration purposes only

CASE STYLE: DB1627

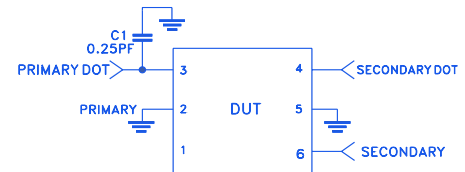
+RoHS Compliant

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

ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Impedance Ratio (secondary/primary)			4		Ohm
Frequency Range		20		4500	MHz
Insertion Loss	20-4500	—	1.5	3.0	dB
Amplitude Unbalance	20-4500	—	0.5	—	dB
Phase Unbalance	20-4500	—	5	—	Degree

ELECTRICAL SCHEMATIC

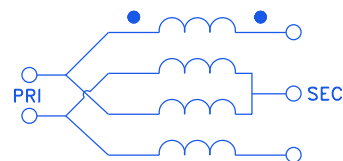


MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	0.25 W
DC Current	30 mA

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

CONFIGURATION H



REV. C
ECO-025163
TCM4-452X+
MCL NY
250408

Mini-Circuits®

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PAGE 1 OF 3



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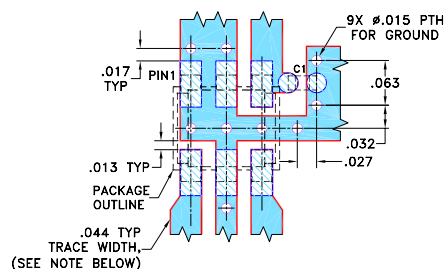
TCM4-452X+

50Ω

20 to 4500 MHz

PIN CONNECTIONS

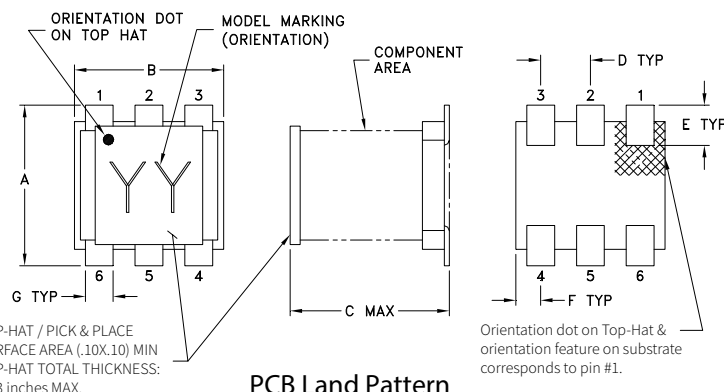
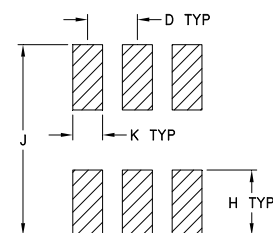
PRIMARY DOT	3
PRIMARY	2
SECONDARY DOT	4
SECONDARY	6
GND	2,5
NOT USED	1

PRODUCT MARKING: GL
DEMOBOARD MCL P/N: TB-TCM4-452X+
SUGGESTED PCB LAYOUT (PL-381)


- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS $0.020" \pm 0.0015"$; 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.
3. 0402 SIZE CHIP COMPONENT FOOTPRINT IS SHOWN FOR REFERENCE. FOR COMPONENT VALUE REFER TO TB-697+.

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

 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

OUTLINE DRAWING**PCB Land Pattern**

SUGGESTED LAYOUT
TOLERANCE TO BE WITHIN ± 0.002

OUTLINE DIMENSIONS (Inches)

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



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top hat[®]
SURFACE MOUNT
RF Transformer

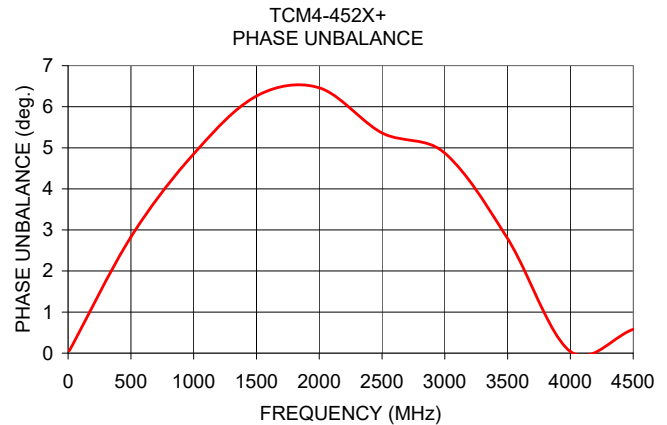
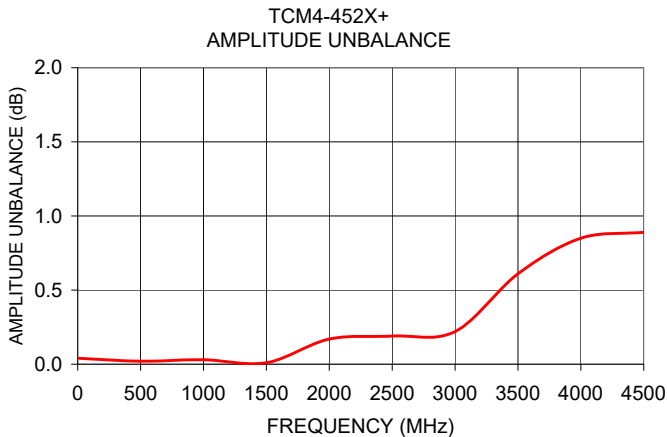
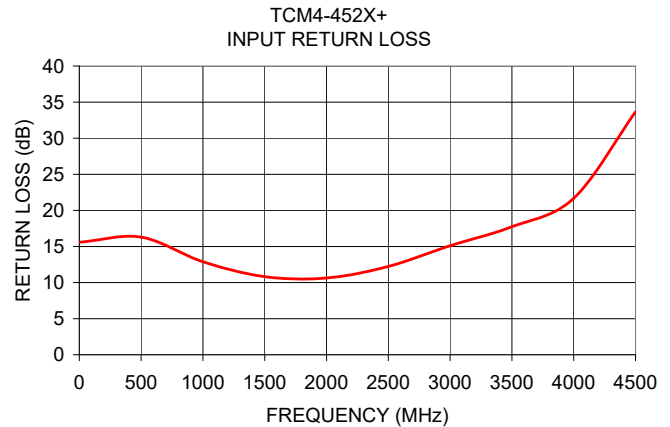
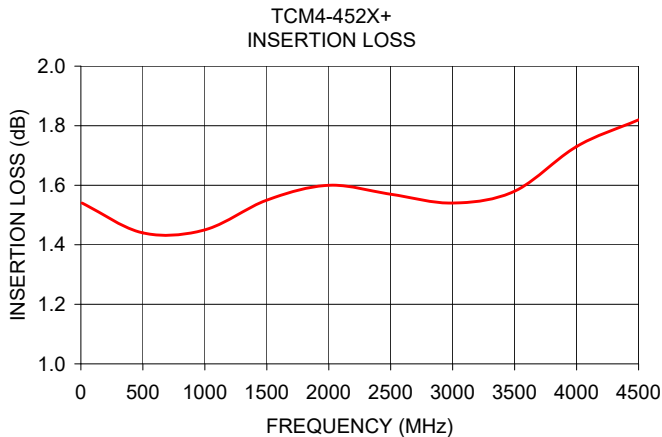
TCM4-452X+

50Ω

20 to 4500 MHz

TYPICAL PERFORMANCE DATA

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)	Amplitude Unbalance (dB)	Phase Unbalance (deg)
10.0	1.54	15.59	0.04	0.06
500.0	1.44	16.30	0.02	2.83
1000.0	1.45	12.89	0.03	4.85
1500.0	1.55	10.82	0.01	6.26
2000.0	1.60	10.63	0.17	6.46
2500.0	1.57	12.23	0.19	5.36
3000.0	1.54	15.11	0.22	4.87
3500.0	1.58	17.73	0.61	2.79
4000.0	1.73	21.68	0.85	0.04
4500.0	1.82	33.66	0.89	0.58



NOTES

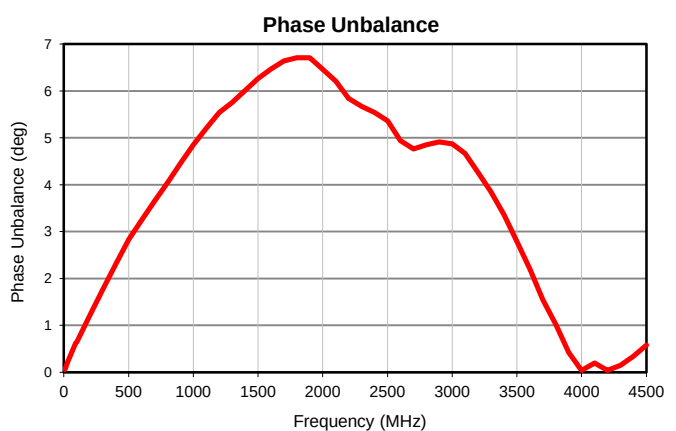
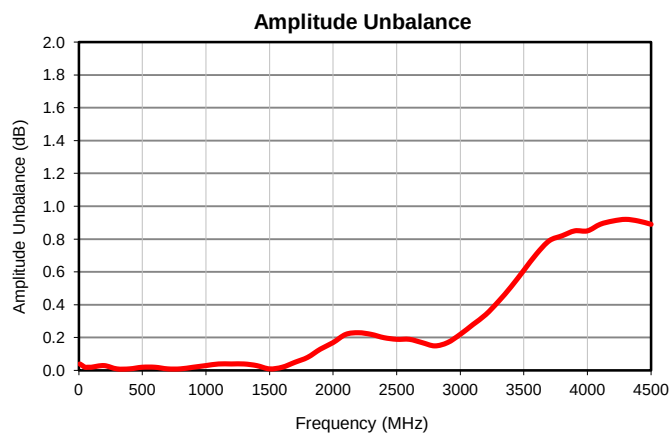
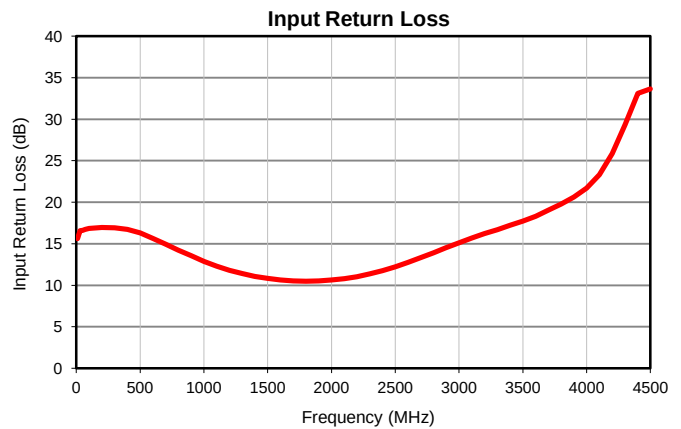
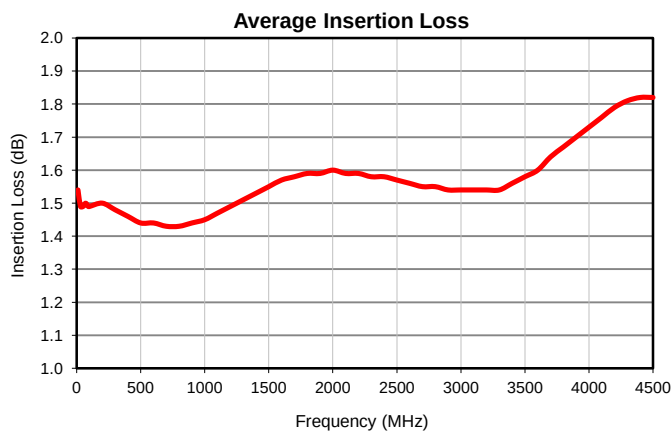
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- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document 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/terms/viewterm.html



Typical Performance Data

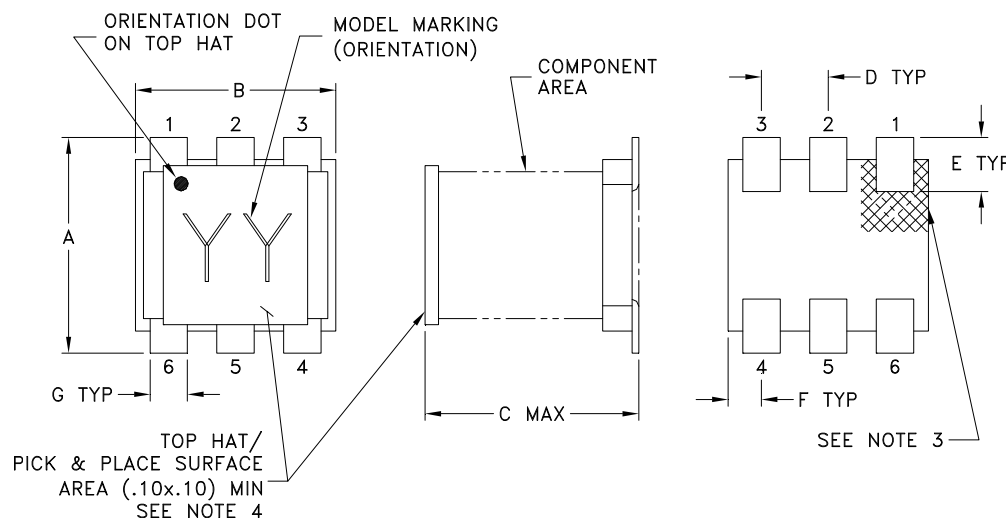
FREQUENCY (MHz)	AVERAGE INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (deg.)
10.0	1.54	15.59	0.04	0.06
30.0	1.49	16.57	0.03	0.22
50.0	1.49	16.62	0.02	0.36
70.0	1.50	16.73	0.02	0.49
90.0	1.49	16.79	0.02	0.62
100.0	1.49	16.83	0.02	0.65
200.0	1.50	16.95	0.03	1.21
300.0	1.48	16.92	0.01	1.77
400.0	1.46	16.72	0.01	2.30
500.0	1.44	16.30	0.02	2.83
600.0	1.44	15.66	0.02	3.24
700.0	1.43	14.95	0.01	3.64
800.0	1.43	14.23	0.01	4.04
900.0	1.44	13.55	0.02	4.45
1000.0	1.45	12.89	0.03	4.85
1100.0	1.47	12.30	0.04	5.20
1200.0	1.49	11.81	0.04	5.54
1300.0	1.51	11.40	0.04	5.75
1400.0	1.53	11.06	0.03	6.01
1500.0	1.55	10.82	0.01	6.26
1600.0	1.57	10.63	0.02	6.47
1700.0	1.58	10.52	0.05	6.64
1800.0	1.59	10.48	0.08	6.71
1900.0	1.59	10.53	0.13	6.71
2000.0	1.60	10.63	0.17	6.46
2100.0	1.59	10.80	0.22	6.21
2200.0	1.59	11.03	0.23	5.84
2300.0	1.58	11.37	0.22	5.67
2400.0	1.58	11.77	0.20	5.54
2500.0	1.57	12.23	0.19	5.36
2600.0	1.56	12.74	0.19	4.94
2700.0	1.55	13.32	0.17	4.76
2800.0	1.55	13.92	0.15	4.85
2900.0	1.54	14.52	0.17	4.91
3000.0	1.54	15.11	0.22	4.87
3100.0	1.54	15.69	0.28	4.67
3200.0	1.54	16.24	0.34	4.26
3300.0	1.54	16.69	0.42	3.85
3400.0	1.56	17.24	0.51	3.36
3500.0	1.58	17.73	0.61	2.79
3600.0	1.60	18.30	0.71	2.20
3700.0	1.64	19.02	0.79	1.55
3800.0	1.67	19.77	0.82	1.02
3900.0	1.70	20.62	0.85	0.42
4000.0	1.73	21.68	0.85	0.04
4100.0	1.76	23.33	0.89	0.20
4200.0	1.79	25.85	0.91	0.04
4300.0	1.81	29.34	0.92	0.15
4400.0	1.82	33.11	0.91	0.34
4500.0	1.82	33.66	0.89	0.58

Typical Performance Data

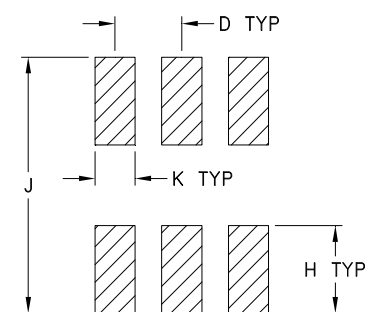


Outline Dimensions

DB1627



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.



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



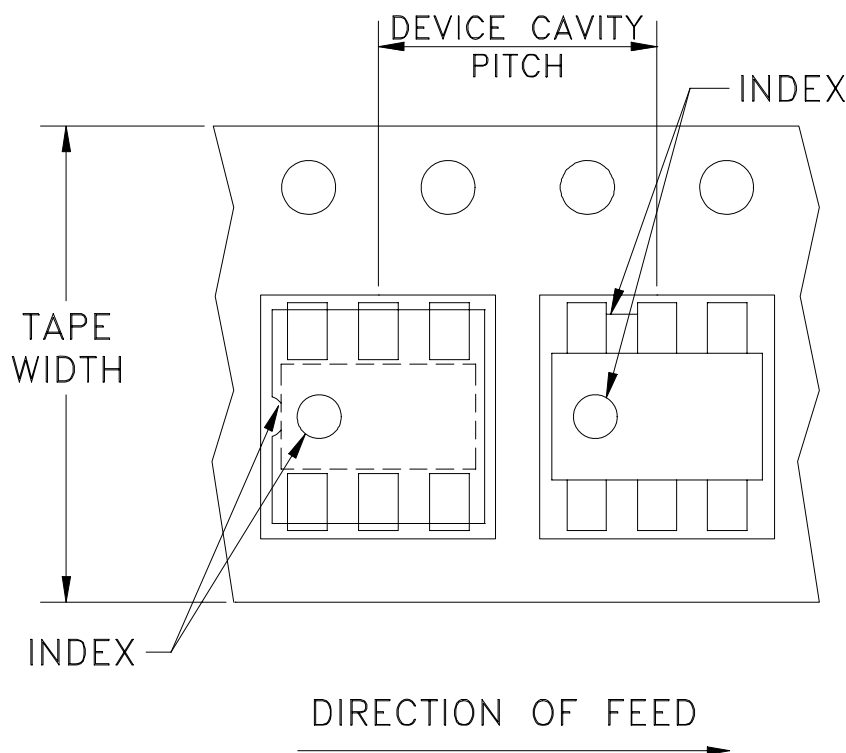
The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS



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



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REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M138571	NEW RELEASE	10/02/12	GF	DJ

Top view of a package layout. The package is a light blue irregular shape with a red outline. It features a central horizontal slot and three vertical slots. Dimensions are indicated with arrows: .017 TYP (top left), .013 TYP (bottom left), .044 TYP TRACE WIDTH, (SEE NOTE BELOW) (bottom left), .063 (top right), .032 (middle right), .027 (bottom right), and .027 (bottom right). A label 'PIN1' points to a pin on the left. A label '9X Ø.015 PTH FOR GROUND' points to a circular pad on the right. A label 'C1' points to a circular pad in the center. A label 'PACKAGE OUTLINE' points to the red outline.

- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS 0.020" $\pm$ 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.
3. 0402 SIZE CHIP COMPONENT FOOTPRINT IS SHOWN FOR REFERENCE. FOR COMPONENT VALUE REFER TO TB-697+.



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 ±
3 PL DECIMALS ± .005
ANGLES ±
FRACTIONS ±

DRAWN

GF

09/28/12

CHECKED

IL

10/02/12

APPROVED

DJ

10/02/12

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11


Mini-Circuits® 13 Neptune Avenue
Brooklyn NY 11235

13 Neptune Avenue
Brooklyn NY 11235

PL, 06TH02, DB1627, TB-697+

SIZE
A

CODE IDENT
15542

DRAWING NO:
98-PL-381

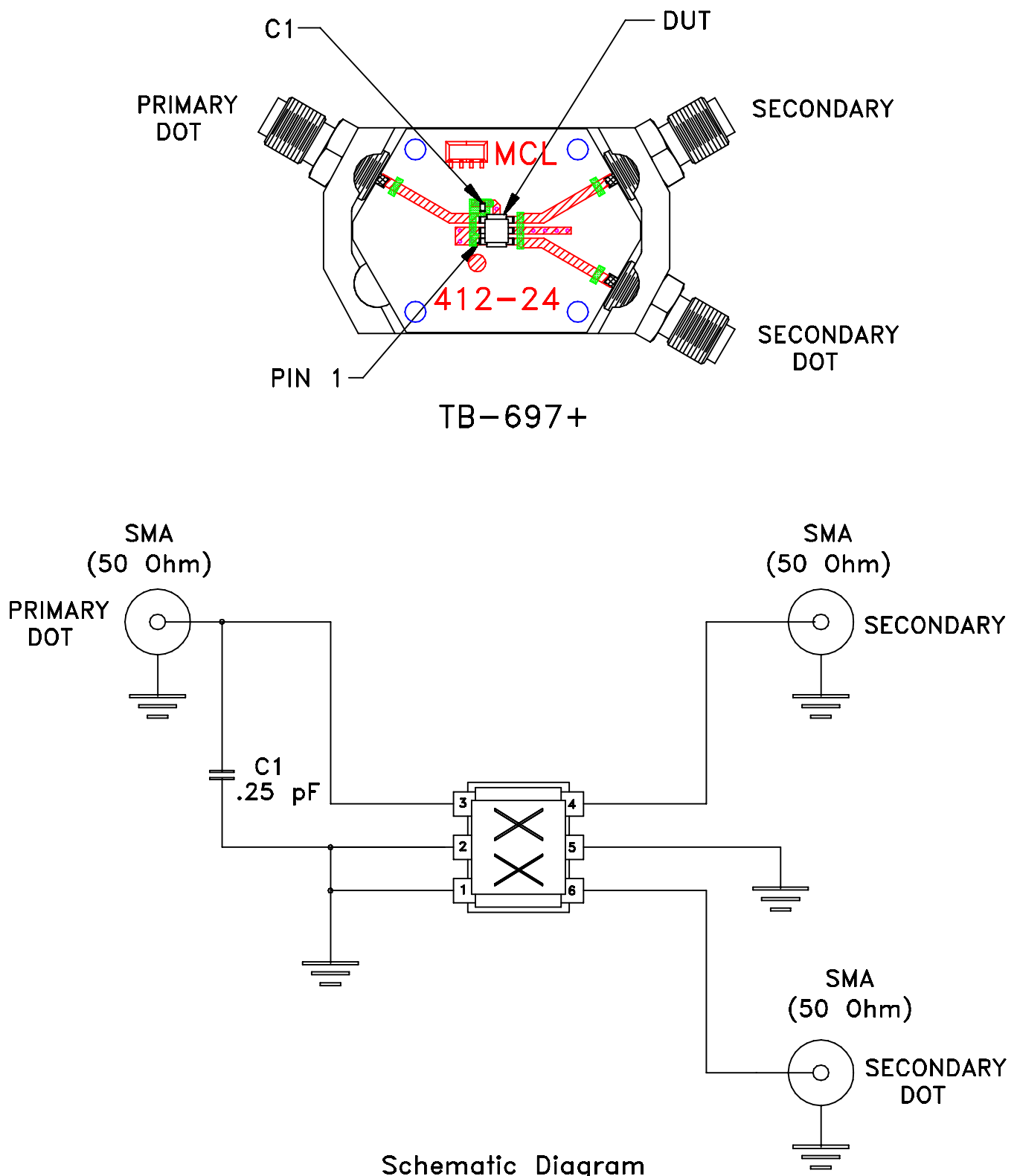
REV:	OR
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FILE: 98PL381

SCALE: 10:1

SHEET:	1 OF 1
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Evaluation Board and Circuit



Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: 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