



Mini-Circuits®

SURFACE MOUNT 

RF Transformer

TCM2-452X-2+

50Ω 20 to 4000 MHz

THE BIG DEAL

- Wide bandwidth 20 to 4000 MHz
- Balanced transmission line
- Excellent return loss
- Aqueous washable



Generic photo used for illustration purposes only

CASE STYLE: DB1627

APPLICATIONS

- PCS
- Wideband push-pull amplifiers
- Cellular

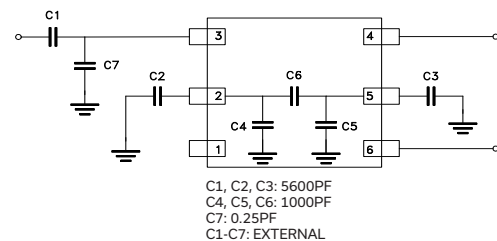
+RoHS Compliant

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)		2			Ohm
Frequency Range		20		4000	MHz
Insertion Loss	20-4000	—	1.5	2.5	dB
Amplitude Unbalance	20-4000	—	0.5	—	dB
Phase Unbalance	20-4000	—	10	—	Degree

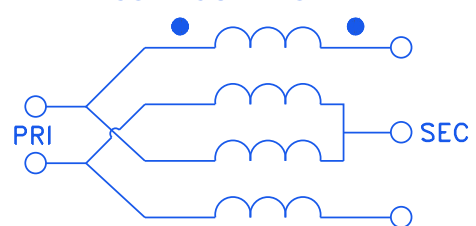
ELECTRICAL SCHEMATIC



MAXIMUM RATINGS

Parameter	Ratings
Operating temperature	-40°C to 85°C
Storage temperature	-55°C to 100°C
RF Power	0.4 W
DC Current	60 mA

CONFIGURATION H



REV. C
ECO-013842
TCM2-452X-2+
WZ/CP/AM
220620

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PAGE 1 OF 3



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SURFACE MOUNT ^{top hat} RF Transformer

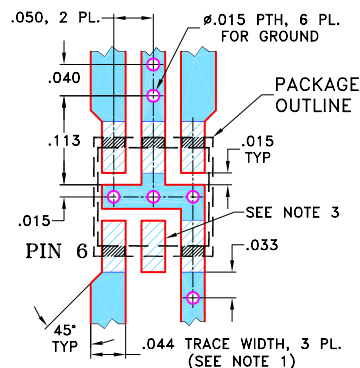
TCM2-452X-2+

50Ω 20 to 4000 MHz

PIN CONNECTIONS

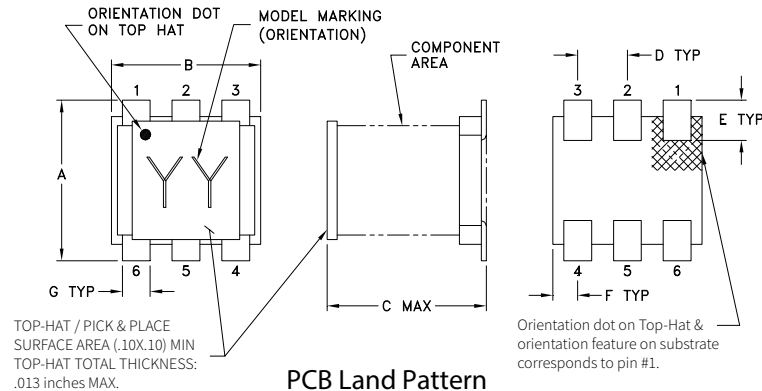
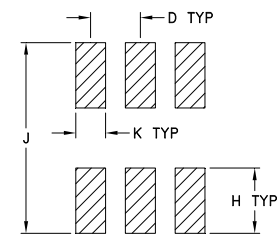
PRIMARY DOT	3
PRIMARY	2
SECONDARY DOT	4
SECONDARY	6
GND (RF)	2,5
NOT USED	1

Note: Using schematic above apply DC at pin 5 to distribute to pin 4 and 6

PRODUCT MARKING: JT
DEMOBOARD MCL P/N: TB-697+
SUGGESTED PCB LAYOUT (PL-381)


- 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.
 3. THIS PAD IS NOT REQUIRED FOR AT224 CASE STYLE.

 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 ±.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

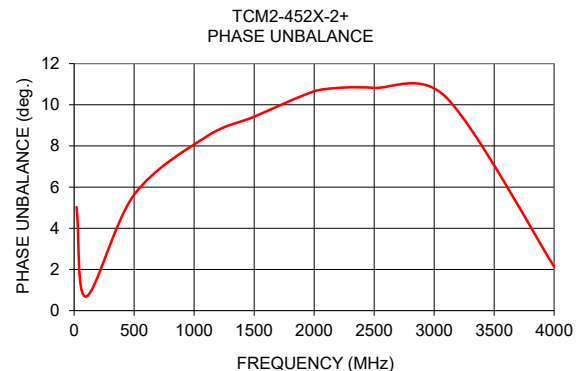
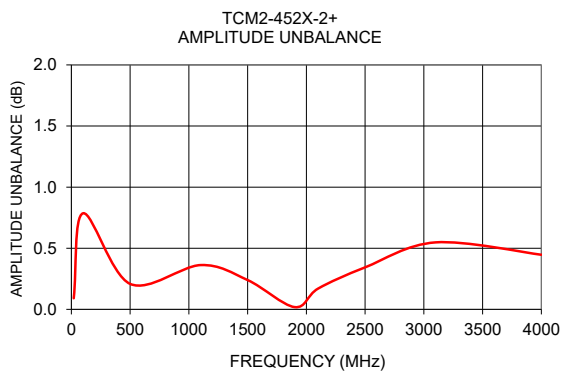
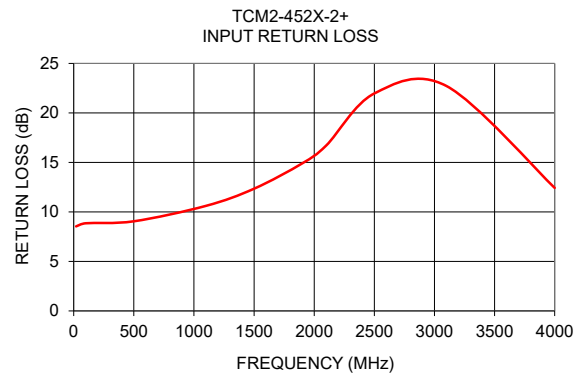
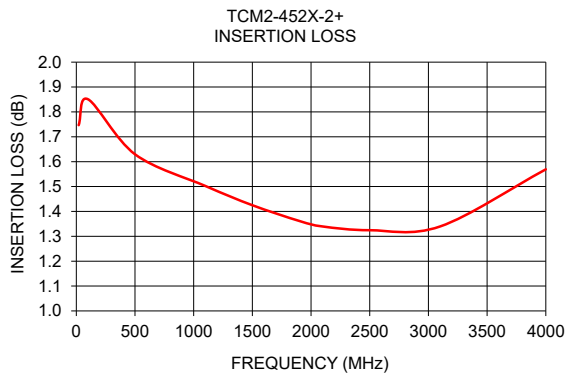
TCM2-452X-2+

50Ω 20 to 4000 MHz

TYPICAL PERFORMANCE DATA

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)	Amplitude Unbalance (dB)	Phase Unbalance (deg)
20	1.75	8.54	0.09	5.03
100	1.85	8.85	0.79	0.68
500	1.63	9.05	0.21	5.63
1100	1.50	10.61	0.36	8.44
1500	1.42	12.35	0.24	9.42
1900	1.36	14.90	0.02	10.43
2100	1.34	16.71	0.17	10.77
2500	1.32	21.96	0.34	10.82
3100	1.34	22.72	0.55	10.36
4000	1.57	12.43	0.45	2.13

Note: 0.25 PF capacitor is suggested to be added at primary to ground to improve return loss.



- 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

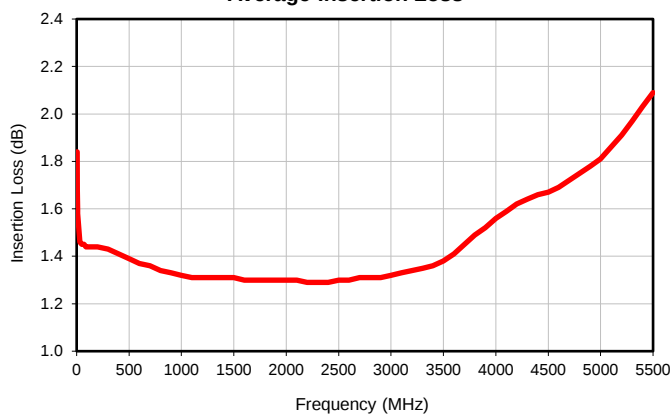


Typical Performance Data

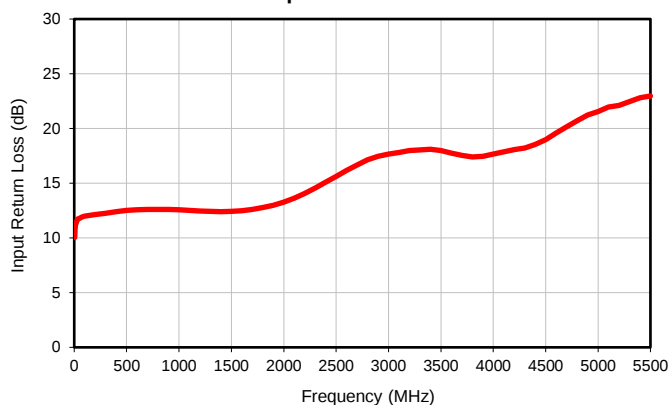
FREQUENCY (MHz)	AVERAGE INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (deg.)
5	1.84	10.04	0.01	0.06
7	1.68	10.64	0.01	0.07
9	1.60	10.99	0.01	0.07
10	1.58	11.11	0.01	0.07
30	1.46	11.72	0.01	0.27
50	1.45	11.79	0.02	0.43
70	1.45	11.89	0.02	0.59
90	1.44	11.95	0.02	0.73
100	1.44	11.98	0.02	0.78
200	1.44	12.13	0.01	1.44
300	1.43	12.26	0.02	2.15
400	1.41	12.40	0.03	2.77
500	1.39	12.51	0.03	3.37
600	1.37	12.56	0.03	3.93
700	1.36	12.59	0.05	4.46
800	1.34	12.60	0.06	4.97
900	1.33	12.60	0.08	5.44
1000	1.32	12.58	0.09	5.92
1100	1.31	12.51	0.11	6.34
1200	1.31	12.47	0.13	6.74
1300	1.31	12.43	0.14	7.15
1400	1.31	12.40	0.14	7.55
1500	1.31	12.44	0.14	7.91
1600	1.30	12.50	0.13	8.26
1700	1.30	12.61	0.14	8.57
1800	1.30	12.77	0.15	8.87
1900	1.30	12.98	0.16	9.05
2000	1.30	13.27	0.17	9.03
2100	1.30	13.64	0.18	8.90
2200	1.29	14.06	0.18	8.77
2300	1.29	14.56	0.19	8.66
2400	1.29	15.09	0.19	8.68
2500	1.30	15.62	0.18	8.53
2600	1.30	16.17	0.18	8.42
2700	1.31	16.68	0.18	8.31
2800	1.31	17.12	0.18	8.35
2900	1.31	17.45	0.19	8.31
3000	1.32	17.66	0.21	8.24
3100	1.33	17.81	0.23	8.13
3200	1.34	17.97	0.27	7.81
3300	1.35	18.04	0.34	7.43
3400	1.36	18.10	0.41	7.00
3500	1.38	17.99	0.46	6.49
3600	1.41	17.75	0.50	5.86
3700	1.45	17.55	0.55	5.18
3800	1.49	17.39	0.58	4.48
3900	1.52	17.46	0.63	4.02
4000	1.56	17.66	0.67	3.78
4100	1.59	17.87	0.71	3.72
4200	1.62	18.08	0.72	3.76
4300	1.64	18.23	0.71	3.91
4400	1.66	18.55	0.74	4.03
4500	1.67	18.98	0.76	4.17
4600	1.69	19.60	0.79	4.26
4700	1.72	20.15	0.82	4.38
4800	1.75	20.70	0.84	4.48
4900	1.78	21.24	0.81	4.57
5000	1.81	21.54	0.77	4.64
5100	1.86	21.95	0.72	4.67
5200	1.91	22.10	0.67	4.76
5300	1.97	22.46	0.63	5.08
5400	2.03	22.80	0.58	5.55
5500	2.09	22.97	0.54	6.07

Typical Performance Data

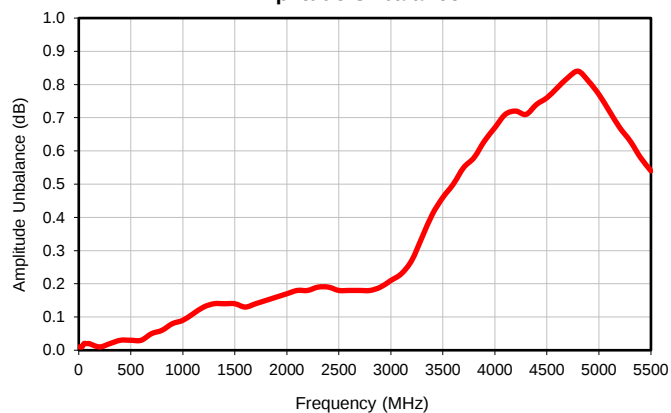
Average Insertion Loss



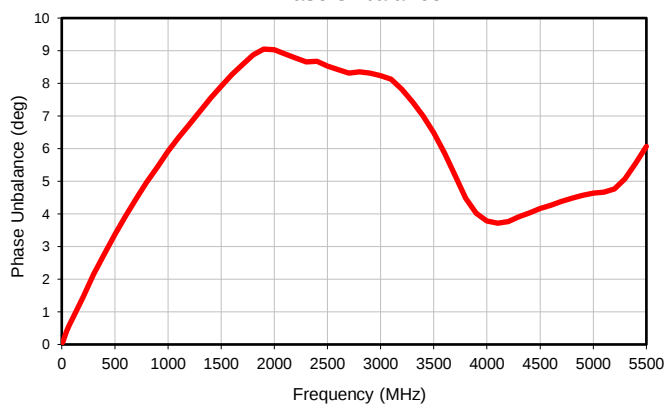
Input Return Loss



Amplitude Unbalance

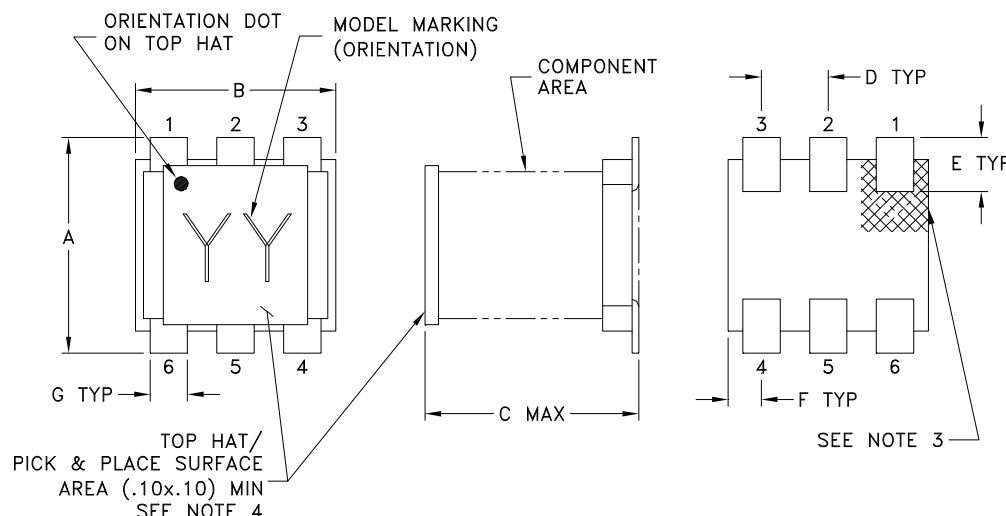


Phase Unbalance

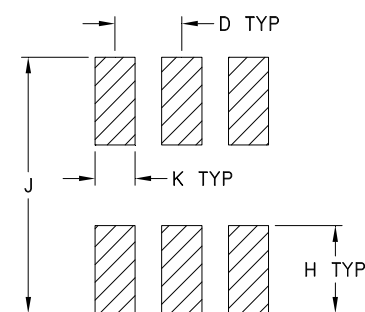


Outline Dimensions

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

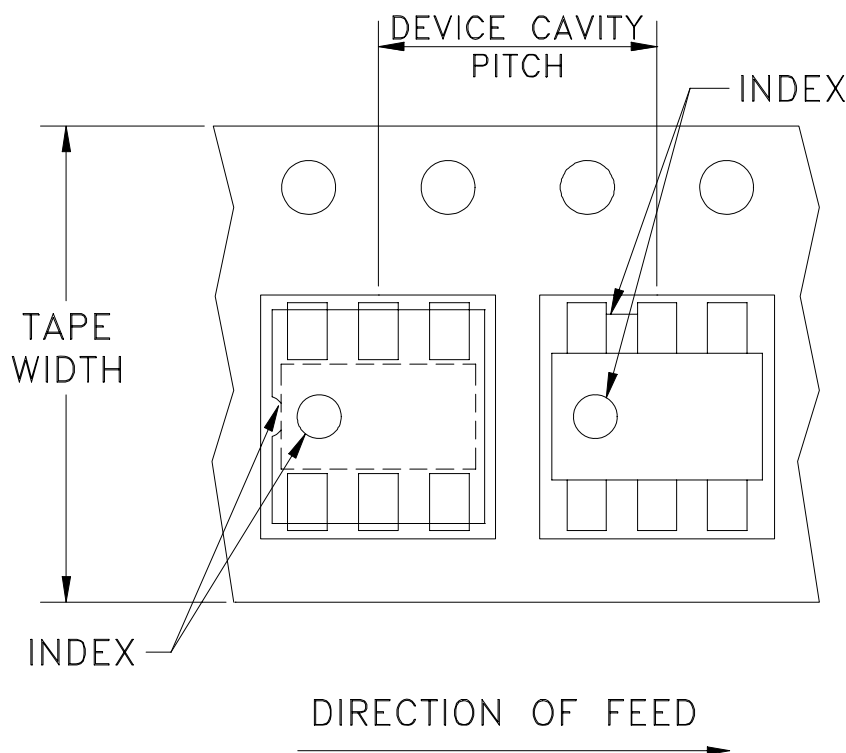


The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

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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Mini-Circuits ISO 9001 & ISO 14001 Certified

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

Top view of a PCB layout for a 14-pin package. The package outline is shown in red, and the copper traces are in blue. Dimensions are given in inches. Key features include: 14 pins (7 on each side), a central cutout, and a 9x grid of 0.015 inch diameter through holes for ground. Dimensions include: .017 TYP for pin spacing, .013 TYP for package outline spacing, .044 TYP for trace width, .063 for the central cutout width, .032 for the central cutout height, .027 for the central cutout radius, and .017 TYP for the central cutout width. A callout 'C1' points to a specific feature.

- 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


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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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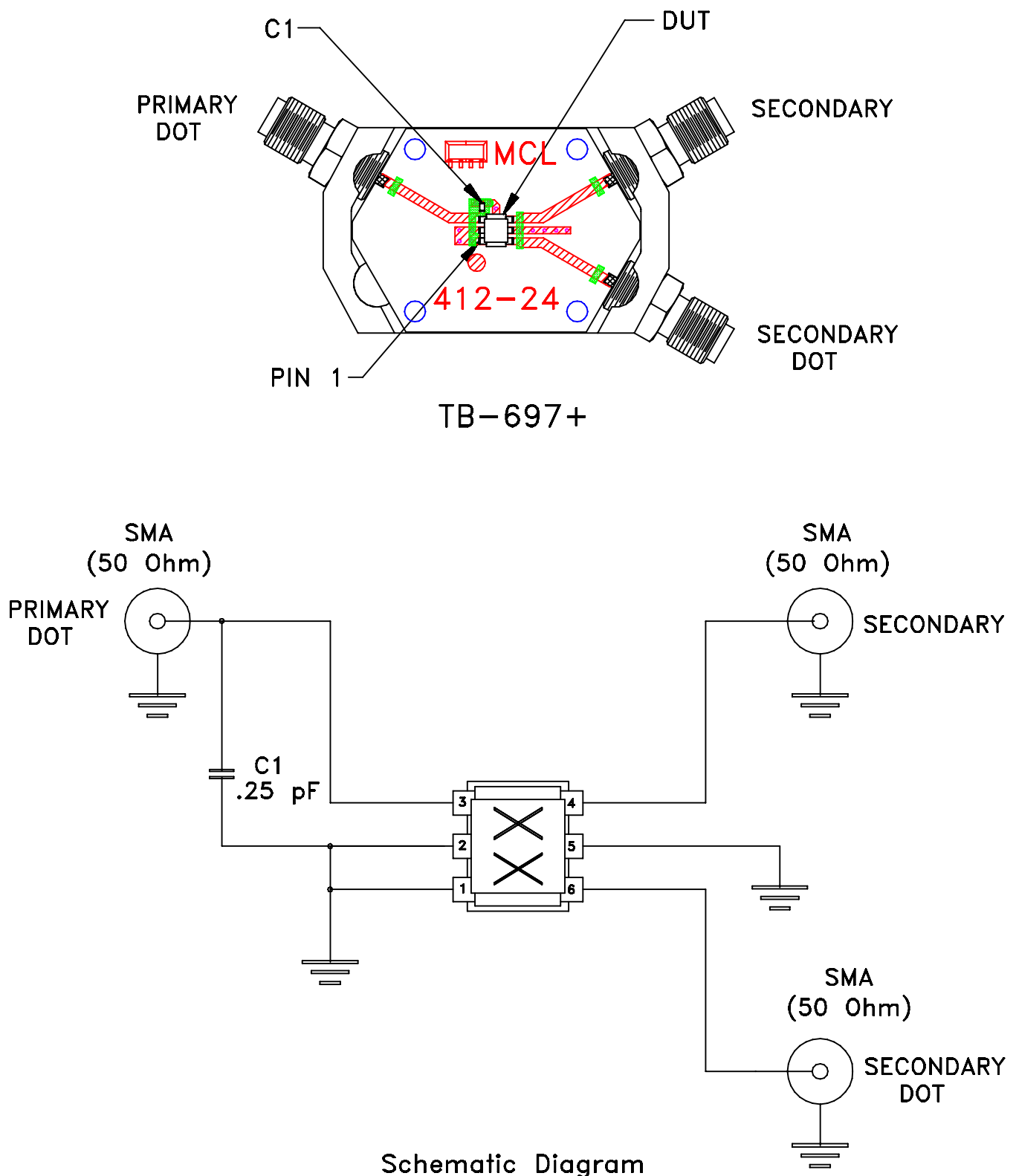
FILE: 98PL381

SCALE: 10:1

SHEET:	1 OF 1
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ASHEETA1.DWG REV:A DATE:01/12/95

Evaluation Board and Circuit



Schematic Diagram

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