

Frequency Multiplier

50Ω Output 7000 to 10000 MHz

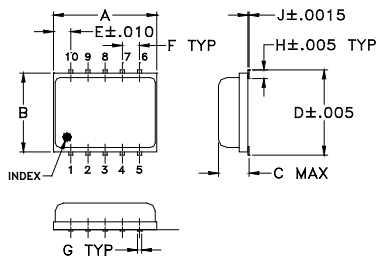
Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
RF Input, 25°C	200mW
Permanent damage may occur if any of these limits are exceeded.	

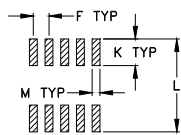
Pin Connections

INPUT	10
OUTPUT	5
50Ω TERMINATE EXT.	3
GROUND	1,2,4,6,7,8,9

Outline Drawing



PCB Land Pattern



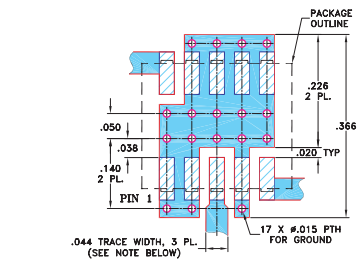
Suggested Layout,
Tolerance to be within ± 0.002

Outline Dimensions (inch/mm)

A	B	C	D	E	F	G
.30	.250	.085	.266	.050	.050	.012
7.62	6.35	2.16	6.76	1.27	1.27	0.30
H	J	K	L	M		wt
.029	.004	.085	.296	.030		grams
0.74	0.10	2.16	7.52	0.76		0.25

Demo Board MCL P/N: TB-144

Suggested PCB Layout (PL-045)



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020" $\pm$.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.

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

 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Features

- low conversion loss, 12.5 dB typ.
- LTCC design
- low profile, 0.085"
- low cost

Applications

- synthesizers
- local oscillators

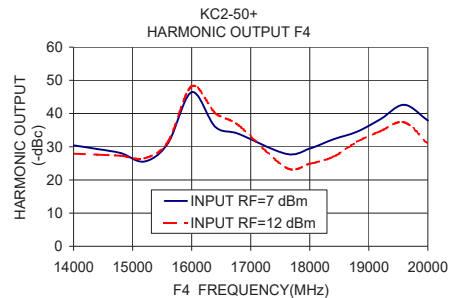
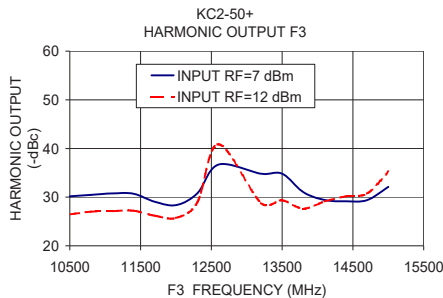
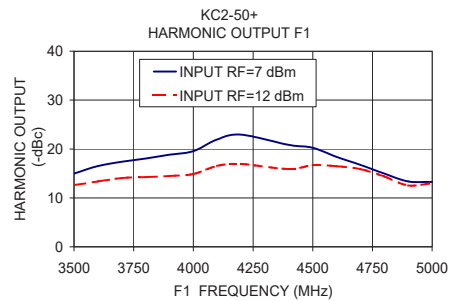
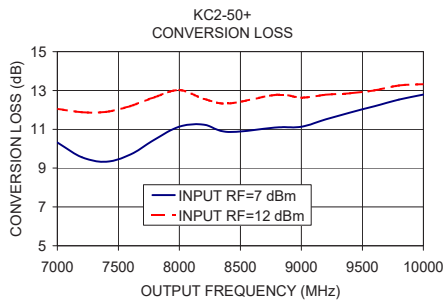
Electrical Specifications

Multiplication Factor	Frequency (MHz)		Input Power (dBm)		Conversion Loss (dB)		*Harmonic Output (dBc)					
	F1	F2					F1		F3		F4	
	Input	Output	Min.	Max.	Typ.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.
2	3500-5000	7000-10000	7	12	12.5	16.0	15	8	28	20	30	17
	3800-4500	7600-9000	7	12	11.3	14.8	20	10	30	20	30	17

* Harmonics of input frequency below the power level of F2

Typical Performance Data

INPUT RF= 7 dBm					INPUT RF= 12 dBm				
Input Frequency (MHz)	Conversion Loss (dB)	Harmonic Output Below F2 (-dBc)			Conversion Loss (dB)	Harmonic Output Below F2 (-dBc)			
		F2	F1	F3		F4	F2	F1	F3
3500.00	10.32	14.96	30.18	30.40	12.06	12.62	26.45	27.92	
3600.00	9.56	16.50	30.47	29.30	11.88	13.35	27.01	27.62	
3700.00	9.33	17.40	30.75	28.08	11.90	14.05	27.10	27.25	
3800.00	9.70	18.06	30.71	25.52	12.20	14.25	27.20	26.48	
3900.00	10.48	18.85	29.06	31.04	12.66	14.48	26.19	31.51	
4000.00	11.14	19.55	28.37	46.43	13.02	14.86	25.74	48.15	
4100.00	11.24	21.94	30.76	35.98	12.57	16.55	28.84	40.09	
4200.00	10.86	22.93	36.69	33.86	12.33	16.93	40.86	36.40	
4400.00	11.10	20.85	34.82	27.84	12.78	15.90	28.80	23.70	
4500.00	11.13	20.24	34.83	29.44	12.63	16.71	29.36	24.84	
4600.00	11.51	18.37	31.04	32.23	12.78	16.48	27.63	26.98	
4700.00	11.86	16.75	29.43	34.50	12.86	15.88	29.13	31.46	
4800.00	12.19	14.98	29.14	38.31	13.01	14.38	30.17	34.73	
4900.00	12.53	13.36	29.37	42.60	13.26	12.55	30.72	37.35	
5000.00	12.79	13.28	32.10	37.90	13.32	13.00	35.23	30.94	



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

REV. C
M151107
KC2-50+
ED-11593/4
DJ/RS/CP/AM
200512

Frequency Multiplier (Doubler)

KC2-50+

Typical Performance Data

FREQUENCY (MHz)				RF IN=+7dBm			
				CONVERSION LOSS (dB)	HARMONIC OUTPUT* (-dBc)		
X1 OUTPUT	X2 OUTPUT	X3 OUTPUT	X4 OUTPUT		X1 OUTPUT	X3 OUTPUT	X4 OUTPUT
3500.00	7000.00	10500.00	14000.00	10.32	14.96	30.18	30.40
3550.00	7100.00	10650.00	14200.00	9.92	15.95	30.32	29.86
3600.00	7200.00	10800.00	14400.00	9.56	16.50	30.47	29.30
3650.00	7300.00	10950.00	14600.00	9.36	16.95	31.22	29.39
3700.00	7400.00	11100.00	14800.00	9.33	17.40	30.75	28.08
3750.00	7500.00	11250.00	15000.00	9.50	17.65	30.36	26.61
3800.00	7600.00	11400.00	15200.00	9.70	18.06	30.71	25.52
3850.00	7700.00	11550.00	15400.00	9.97	18.49	30.63	26.09
3900.00	7800.00	11700.00	15600.00	10.48	18.85	29.06	31.04
3950.00	7900.00	11850.00	15800.00	10.80	19.10	28.38	40.84
4000.00	8000.00	12000.00	16000.00	11.14	19.55	28.37	46.43
4050.00	8100.00	12150.00	16200.00	11.20	20.63	28.70	39.62
4100.00	8200.00	12300.00	16400.00	11.24	21.94	30.76	35.98
4150.00	8300.00	12450.00	16600.00	11.11	22.18	31.52	34.10
4200.00	8400.00	12600.00	16800.00	10.86	22.93	36.69	33.86
4250.00	8500.00	12750.00	17000.00	11.06	22.96	39.40	32.56
4300.00	8600.00	12900.00	17200.00	10.94	22.29	38.29	30.85
4350.00	8700.00	13050.00	17400.00	10.91	21.55	36.06	28.94
4400.00	8800.00	13200.00	17600.00	11.10	20.85	34.82	27.84
4450.00	8900.00	13350.00	17800.00	10.93	20.68	34.43	28.26
4500.00	9000.00	13500.00	18000.00	11.13	20.24	34.83	29.44
4550.00	9100.00	13650.00	18200.00	11.27	19.40	33.30	30.63
4600.00	9200.00	13800.00	18400.00	11.51	18.37	31.04	32.23
4650.00	9300.00	13950.00	18600.00	11.65	17.51	29.86	33.45
4700.00	9400.00	14100.00	18800.00	11.86	16.75	29.43	34.50
4750.00	9500.00	14250.00	19000.00	12.08	15.76	29.22	36.28
4800.00	9600.00	14400.00	19200.00	12.19	14.98	29.14	38.31
4850.00	9700.00	14550.00	19400.00	12.46	14.10	29.43	40.85
4900.00	9800.00	14700.00	19600.00	12.53	13.36	29.37	42.60
4950.00	9900.00	14850.00	19800.00	12.63	13.07	30.45	39.44
5000.00	10000.00	15000.00	20000.00	12.79	13.28	32.10	37.90

* Harmonic Output below power level of X2 Output.



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



Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS



REV. X1

KC2-50+

8/1/2007

Page 1 of 2

Frequency Multiplier (Doubler)

KC2-50+

Typical Performance Data

FREQUENCY (MHz)				RF IN=+12dBm			
				CONVERSION LOSS (dB)	HARMONIC OUTPUT* (-dBc)		
X1 OUTPUT	X2 OUTPUT	X3 OUTPUT	X4 OUTPUT	X2 OUTPUT	X1 OUTPUT	X3 OUTPUT	X4 OUTPUT
3500.00	7000.00	10500.00	14000.00	12.06	12.62	26.45	27.92
3550.00	7100.00	10650.00	14200.00	11.93	13.22	26.23	27.25
3600.00	7200.00	10800.00	14400.00	11.88	13.35	27.01	27.62
3650.00	7300.00	10950.00	14600.00	11.86	13.53	26.23	28.56
3700.00	7400.00	11100.00	14800.00	11.90	14.05	27.10	27.25
3750.00	7500.00	11250.00	15000.00	12.04	13.77	27.24	27.03
3800.00	7600.00	11400.00	15200.00	12.20	14.25	27.20	26.48
3850.00	7700.00	11550.00	15400.00	12.34	14.44	27.85	27.71
3900.00	7800.00	11700.00	15600.00	12.66	14.48	26.19	31.51
3950.00	7900.00	11850.00	15800.00	12.84	14.71	26.03	40.01
4000.00	8000.00	12000.00	16000.00	13.02	14.86	25.74	48.15
4050.00	8100.00	12150.00	16200.00	12.77	15.46	26.13	43.78
4100.00	8200.00	12300.00	16400.00	12.57	16.55	28.84	40.09
4150.00	8300.00	12450.00	16600.00	12.50	16.40	30.88	37.05
4200.00	8400.00	12600.00	16800.00	12.33	16.93	40.86	36.40
4250.00	8500.00	12750.00	17000.00	12.58	16.83	36.67	35.84
4300.00	8600.00	12900.00	17200.00	12.56	16.60	29.41	32.35
4350.00	8700.00	13050.00	17400.00	12.52	16.51	28.92	29.67
4400.00	8800.00	13200.00	17600.00	12.78	15.90	28.80	23.70
4450.00	8900.00	13350.00	17800.00	12.61	16.46	28.29	24.47
4500.00	9000.00	13500.00	18000.00	12.63	16.71	29.36	24.84
4550.00	9100.00	13650.00	18200.00	12.82	16.74	28.63	25.19
4600.00	9200.00	13800.00	18400.00	12.78	16.48	27.63	26.98
4650.00	9300.00	13950.00	18600.00	12.71	16.13	28.38	24.90
4700.00	9400.00	14100.00	18800.00	12.86	15.88	29.13	31.46
4750.00	9500.00	14250.00	19000.00	12.91	14.83	29.40	32.63
4800.00	9600.00	14400.00	19200.00	13.01	14.38	30.17	34.73
4850.00	9700.00	14550.00	19400.00	13.09	13.71	30.33	35.90
4900.00	9800.00	14700.00	19600.00	13.26	12.55	30.72	37.35
4950.00	9900.00	14850.00	19800.00	13.35	12.77	33.21	33.61
5000.00	10000.00	15000.00	20000.00	13.32	13.00	35.23	30.94

* Harmonic Output below power level of X2 Output.



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



Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS



REV. X1

KC2-50+

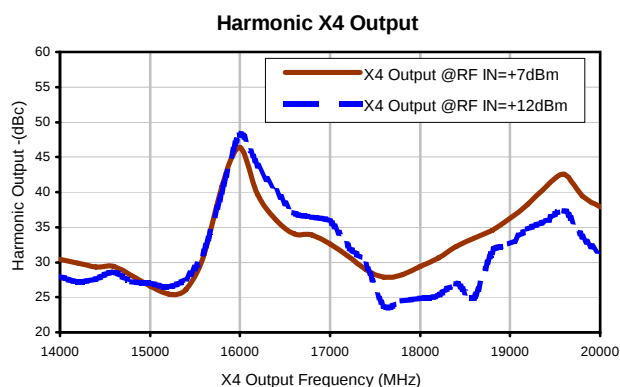
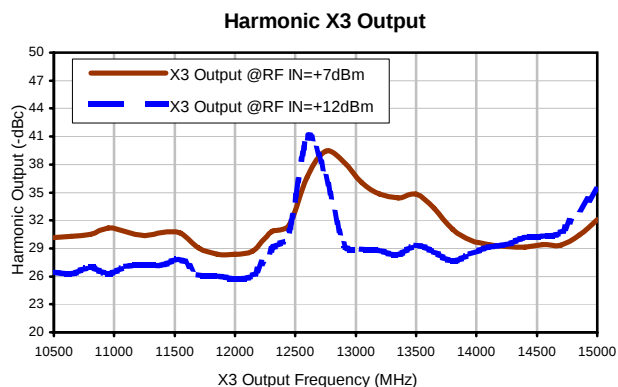
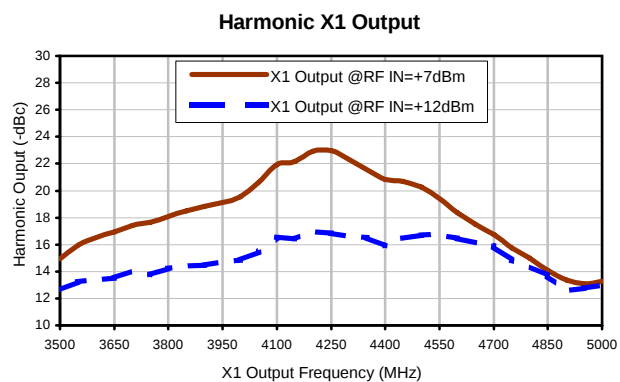
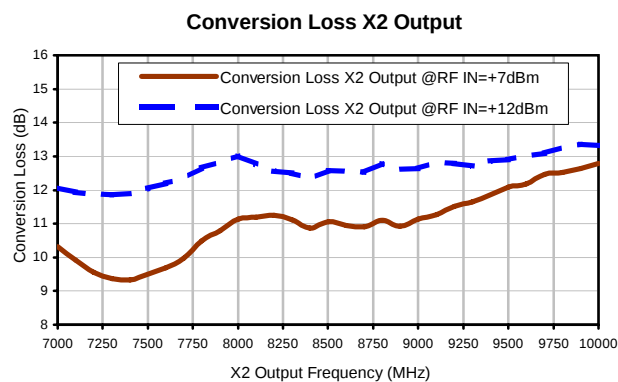
8/1/2007

Page 2 of 2

Frequency Multiplier (Doubler)

KC2-50+

Typical Performance Curves



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



Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

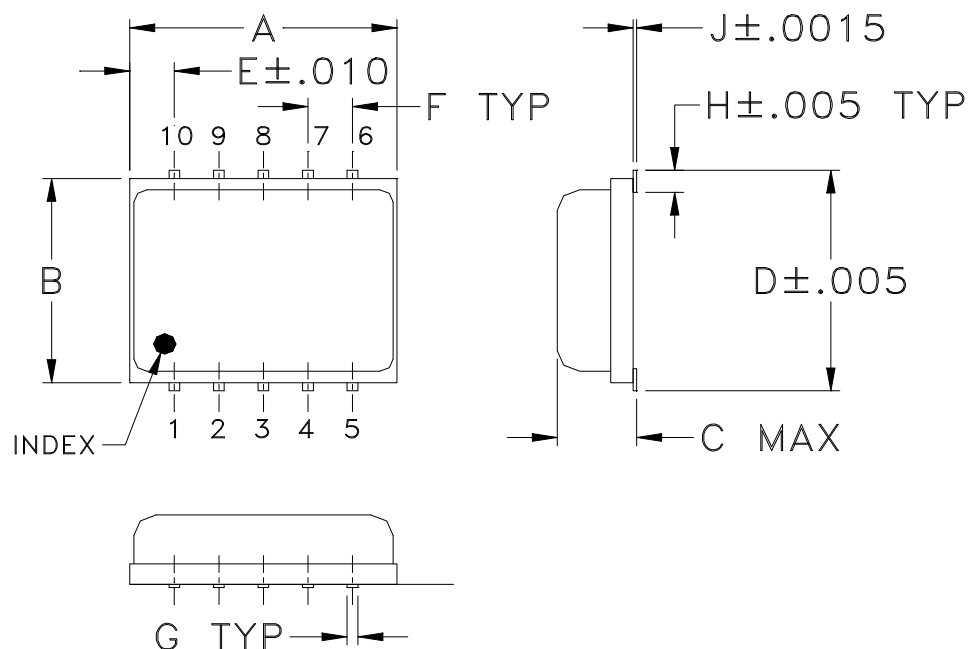
RF/IF MICROWAVE COMPONENTS



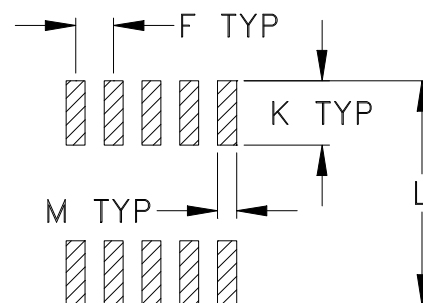
REV. X1
KC2-50+
8/1/2007
Page 1 of 1

Outline Dimensions

DZ885
DZ1034



PCB Land Pattern



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

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	WT. GRAMS
DZ885	.30 (7.62)	.250 (6.35)	.085 (2.16)	.266 (6.76)	.050 (1.27)	.050 (1.27)	.012 (0.30)	.029 (0.74)	.004 (0.10)	.085 (2.16)	.296 (7.52)	.030 (0.76)	0.25
DZ1034			.105 (2.67)										0.3

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

Notes:

- Case material: Plastic encapsulation on Ceramic base.
- Termination finish:
 - For RoHS Case Styles: Tin plate. All models, (+) suffix.
 - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



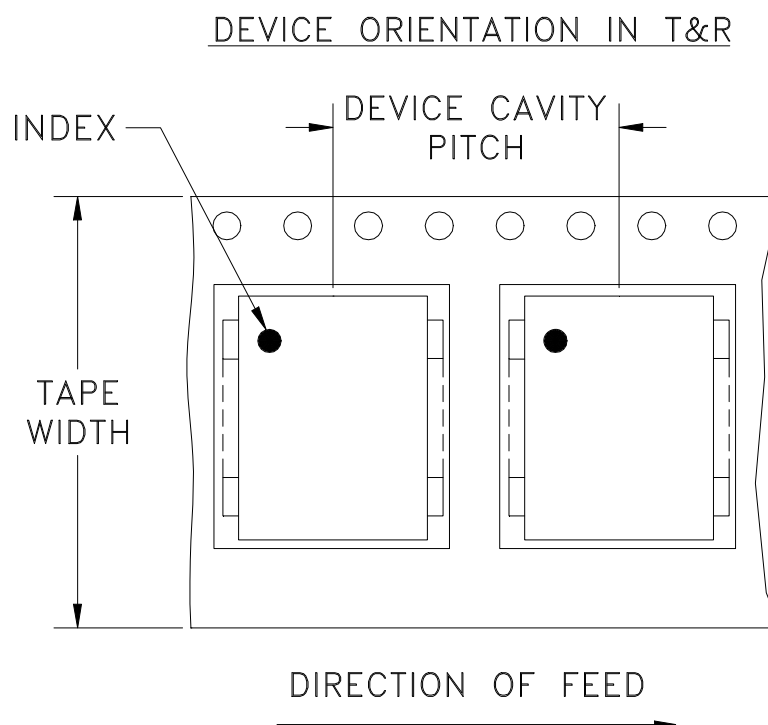
INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

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

Mini-Circuits ISO 9001 & ISO 14001 Certified

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.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf



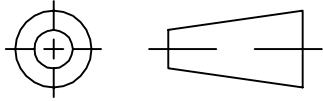
INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

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

Mini-Circuits ISO 9001 & ISO 14001 Certified

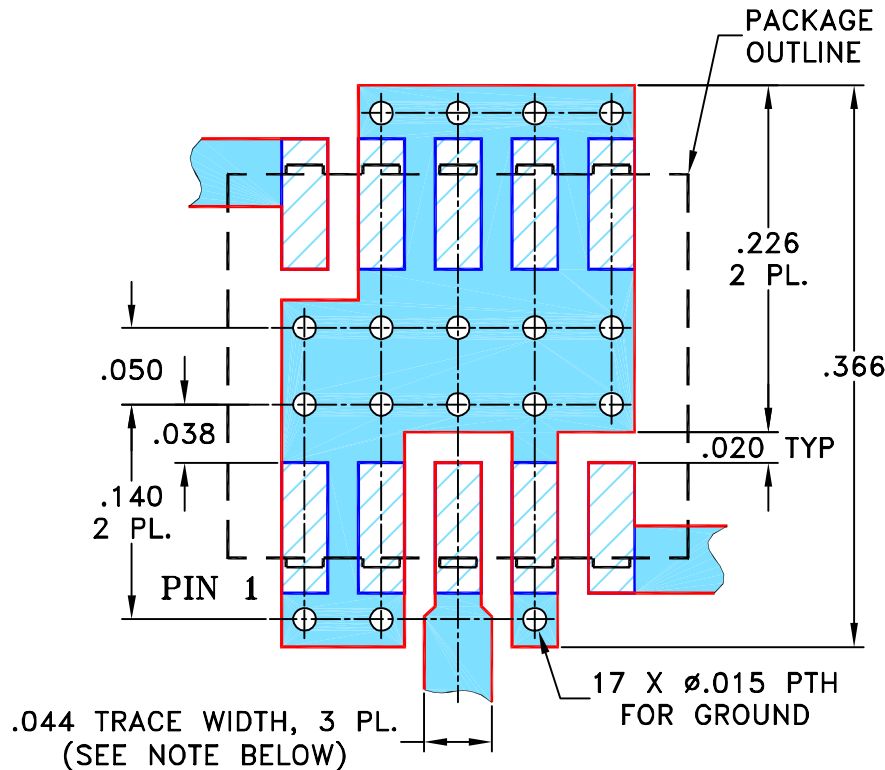
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
A	M81781	UPDATED PCB LAYOUT	06/07/02	GF	DJ
B	M82377	UPDATED DRAWING	07/31/02	AV	WL
C	M102713	ADDED NOTE 2 & "...WITH SMOBC"	01/17/06	MMG	IL
D	M135488	ADDED DZ1650, CHANGED PIN CONN.	02/02/12	GF	DJ

SUGGESTED MOUNTING CONFIGURATION FOR DZ883, DZ885 & DZ1650 CASE STYLES, "10MX01" PIN CONNECTION



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020" $\pm$.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.



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 $\pm$.005
ANGLES $\pm$
FRACTIONS $\pm$

DRAWN

AV

05/08/02

CHECKED

DB

05/16/02

APPROVED

WL

05/16/02



Mini-Circuits®

13 Neptune Avenue
Brooklyn NY 11235

PL, 10MX01, DZ883/885/1650, TB-144

Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

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

SIZE
A

CODE IDENT
15542

DRAWING NO:
98-PL-045

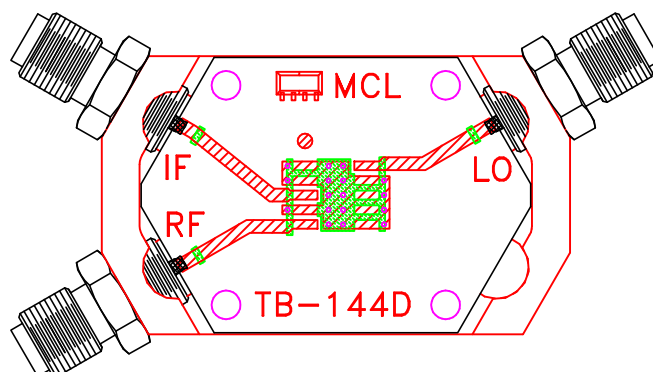
REV:
D

FILE: 98PL045

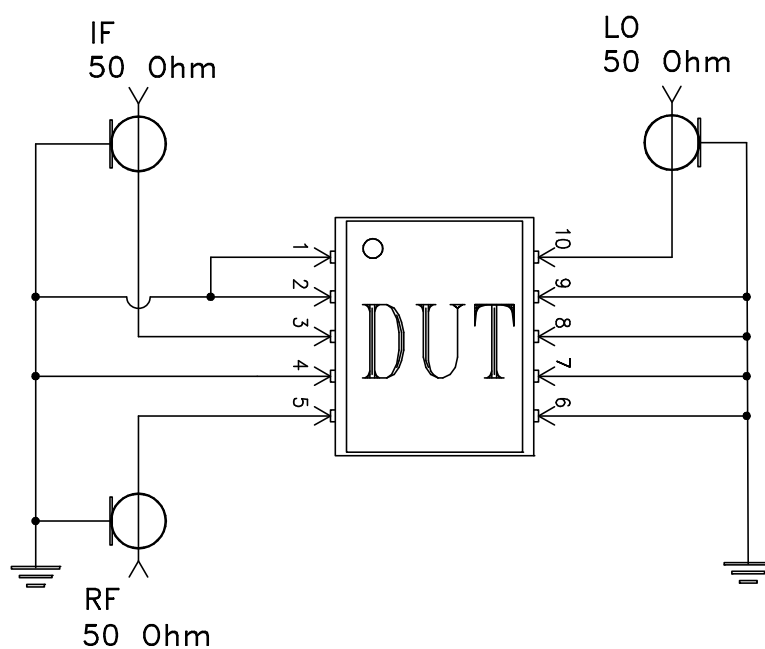
SCALE: 8:1

SHEET: 1 OF 1

Evaluation Board and Circuit



TB-144



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers 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	-55° to 100°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102-C, Condition C
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutectic Process: 225°C peak Pb-Free Process: 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 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