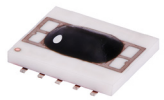
Ceramic

Frequency Mixer WIDE BAND

MCA1-85L+

Level 4 (LO Power+4 dBm) 2800 to 8500 MHz



Generic photo used for illustration purposes only

CASE STYLE: DZ885

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

Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	10, 20, 50, 100, 200
13"	500,1000

Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
RF Power	50 mW
IF Current	40 mA

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

Pin Connections

LO	10
RF	5
IF	3
GROUND	1,2,4,6,7,8,9

Features

- wide bandwidth, 2800 to 8500 MHz
- high L-R isolation, 35 dB typ.
- IF, DC to 1200 MHz
- LTCC double balanced mixer
- aqueous washable
- low cost
- low profile, 0.08"
- protected by US Patent 7,027,795

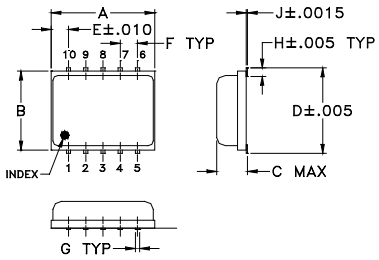
Recommended Replacement:
MAC-85L+
- *Footprint Compatible*
- *MIL Level Reliability*

Click here for data sheet

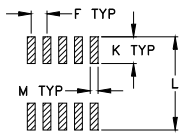
Applications

- satellite up and down converters
- line of sight links
- defense radar
- defense communication

Outline Drawing



PCB Land Pattern



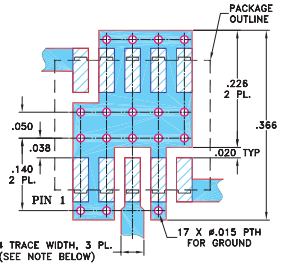
Suggested Layout,
Tolerance to be within ±.002

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 RO4350B WITH DIELECTRIC THICKNESS .020" ± .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

Electrical Specifications (T_{AMB}=-55°C to 100°C)

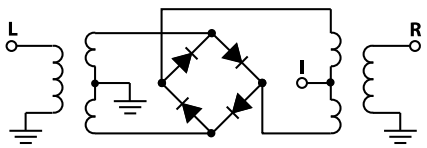
FREQUENCY (MHz)		CONVERSION LOSS (dB)			LO-RF ISOLATION (dB)		LO-IF ISOLATION (dB)		IP3 at center band (dBm)
LO/RF f_L-f_U	IF	$\overline{X}$	σ	Max.	Typ.	Min.	Typ.	Min.	Typ.
2800-8500	**DC-1200**								
2800-5000	DC-1200	5.7	0.2	8.4*	35	20	13	7	11
5000-7500	DC-1200	6.0	0.3	8.4*	35	20	38	20	7
7500-8500	DC-1200	7.0	0.3	—	31	—	32	—	8

1 dB COMPR. 0 dBm typ.
* Conversion loss at 30 MHz IF, increases with IF frequency.

Typical Performance Data

Frequency (MHz)		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF Port (:1)	VSWR LO Port (:1)
RF	LO	LO +4dBm	LO +4dBm	LO +4dBm	LO +4dBm	LO +4dBm
2800.10	2770.10	6.06	39.50	11.58	2.48	1.91
3000.10	2970.10	5.85	44.16	13.00	2.48	1.84
3500.10	3470.10	5.47	39.32	13.49	2.00	1.86
4000.10	3970.10	6.67	35.79	12.28	2.46	2.08
4500.10	4470.10	6.70	28.08	16.04	2.01	2.43
5000.10	4970.10	6.55	35.79	27.00	2.60	2.28
5500.10	5470.10	6.27	42.78	33.73	2.22	3.31
6000.10	5970.10	6.26	36.23	37.80	2.15	4.41
6500.10	6470.10	5.90	36.41	47.06	2.10	3.13
6700.10	6670.10	5.84	33.42	50.18	2.18	3.06
6800.10	6770.10	5.84	33.65	46.65	2.00	3.62
6900.10	6870.10	5.88	33.84	43.73	2.07	3.35
7000.10	6970.10	5.98	33.85	41.08	2.07	3.19
7500.10	7470.10	6.80	39.32	33.99	1.83	3.16
7600.10	7570.10	7.17	39.67	33.16	1.68	3.99
7700.10	7670.10	7.41	40.86	32.27	1.63	4.00
7800.10	7770.10	7.48	40.67	31.25	1.68	3.52
7900.10	7870.10	7.28	37.86	30.76	1.70	3.52
8000.10	7970.10	7.02	35.05	30.85	1.77	3.68
8500.10	8470.10	6.93	32.51	33.93	2.22	4.99

Electrical Schematic



Notes
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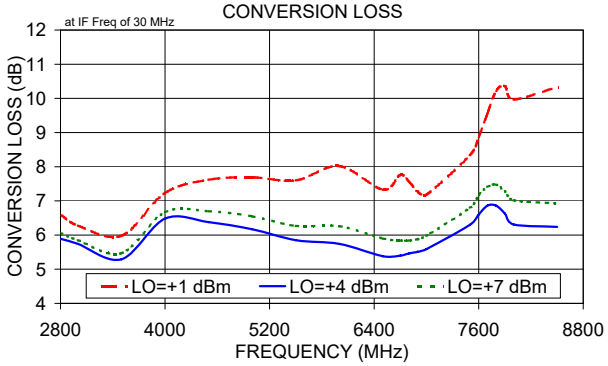
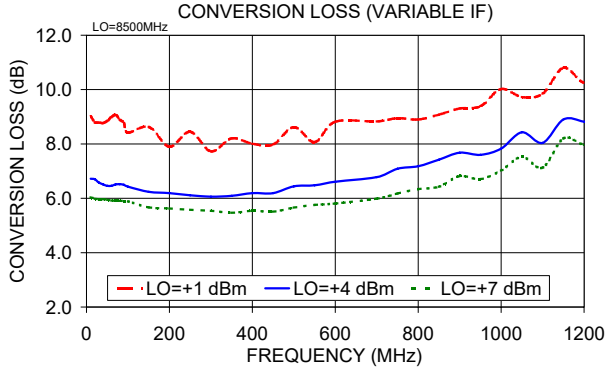
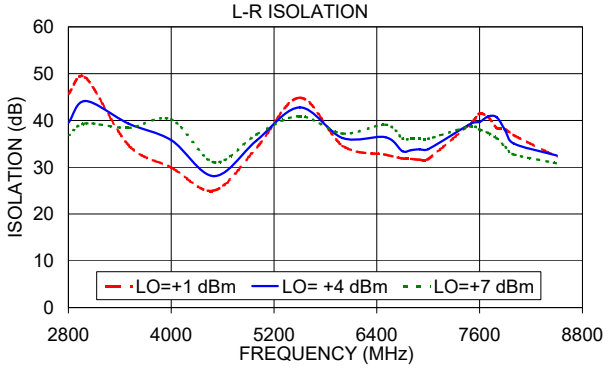
MCA1-85L+
CONVERSION LOSS



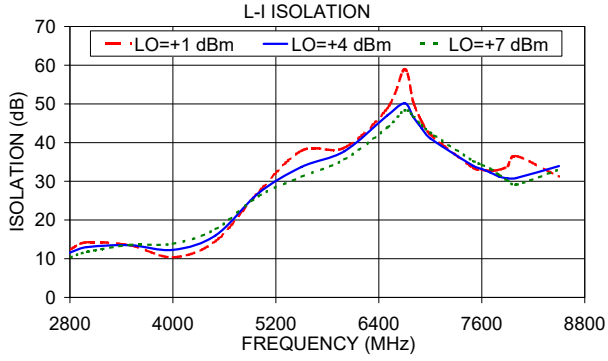
MCA1-85L+
CONVERSION LOSS (VARIABLE IF)



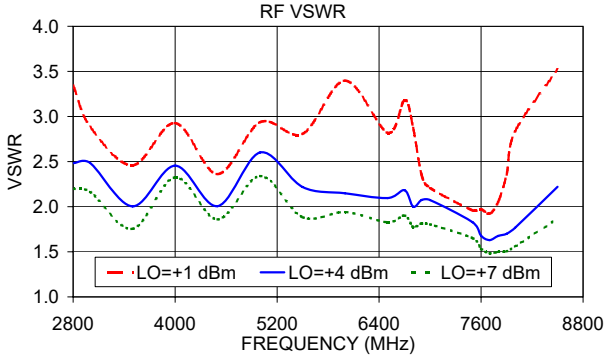
MCA1-85L+
L-R ISOLATION



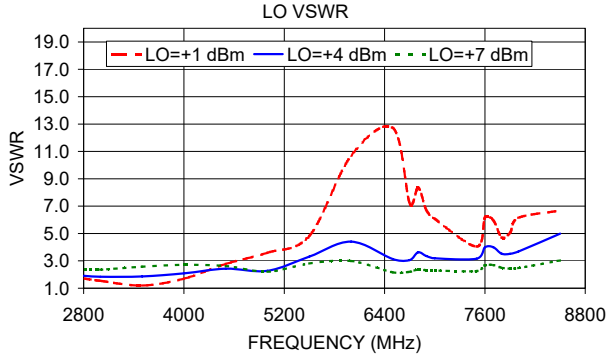
MCA1-85L+
L-I ISOLATION



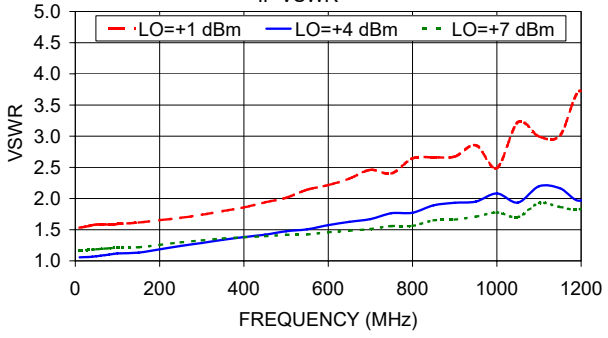
MCA1-85+L
RF VSWR



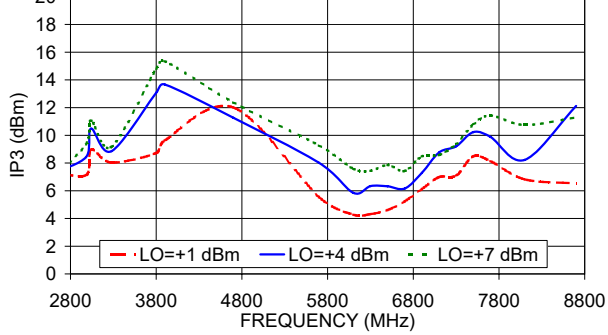
MCA1-85L+
LO VSWR



MCA1-85L+
IF VSWR



MCA1-85+L
IP3



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Frequency Mixer MCA1-85L+

Typical Performance Data

RF (MHz)	LO (MHz)	CONVERSION LOSS (dB) @LO (dBm)		
		+1	+4	+7
2800.1	2770.1	6.60	6.06	5.89
3000.1	2970.1	6.28	5.85	5.74
3500.1	3470.1	5.98	5.47	5.29
4000.1	3970.1	7.23	6.67	6.48
4500.1	4470.1	7.62	6.70	6.38
5000.1	4970.1	7.69	6.55	6.17
5500.1	5470.1	7.60	6.27	5.85
6000.1	5970.1	8.02	6.26	5.74
6500.1	6470.1	7.33	5.90	5.38
6700.1	6670.1	7.76	5.84	5.40
6800.1	6770.1	7.56	5.84	5.46
6900.1	6870.1	7.27	5.88	5.51
7000.1	6970.1	7.18	5.98	5.59
7500.1	7470.1	8.34	6.80	6.30
7600.1	7570.1	8.87	7.17	6.60
7700.1	7670.1	9.56	7.41	6.86
7800.1	7770.1	10.22	7.48	6.86
7900.1	7870.1	10.36	7.28	6.63
8000.1	7970.1	9.97	7.02	6.31
8500.1	8470.1	10.33	6.93	6.24

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+1	+4	+7	+1	+4	+7
2770.1	45.69	39.50	36.81	12.36	11.58	10.35
2970.1	49.14	44.16	39.38	14.26	13.00	11.75
3470.1	34.75	39.32	38.41	13.49	13.49	13.58
3970.1	29.94	35.79	40.21	10.39	12.28	13.89
4470.1	25.02	28.08	31.07	14.59	16.04	17.67
4970.1	34.25	35.79	37.03	27.28	27.00	26.23
5470.1	44.87	42.78	40.91	37.93	33.73	31.19
5970.1	34.59	36.23	37.20	38.70	37.80	35.68
6470.1	32.69	36.41	39.09	48.92	47.06	43.95
6670.1	31.88	33.42	36.15	58.91	50.18	48.35
6770.1	31.79	33.65	36.09	50.51	46.65	46.81
6870.1	31.61	33.84	36.10	45.47	43.73	44.52
6970.1	31.74	33.85	36.07	42.13	41.08	42.59
7470.1	39.48	39.32	38.79	33.47	33.99	35.25
7570.1	41.43	39.67	38.05	32.98	33.16	34.31
7670.1	40.67	40.86	37.33	32.74	32.27	33.25
7770.1	38.38	40.67	36.19	32.98	31.25	31.74
7870.1	38.09	37.86	34.32	33.92	30.76	30.19
7970.1	36.83	35.05	32.74	36.56	30.85	29.14
8470.1	32.27	32.51	30.84	31.22	33.93	33.04

LO (MHz)	RF (MHz)	IP3 Input (dBm) @LO (dBm)
		+4
2470.1	2500.1	9.06
2570.1	2600.1	7.53
2950.1	2980.1	8.42
3010.1	3040.1	10.48
3250.1	3280.1	8.86
3770.1	3800.1	13.07
3870.1	3900.1	13.67
4670.1	4700.1	11.27
5670.1	5700.1	8.02
6070.1	6100.1	5.85
6270.1	6300.1	6.34
6470.1	6500.1	6.32
6670.1	6700.1	6.16
6870.1	6900.1	7.29
7070.1	7100.1	8.76
7270.1	7300.1	9.21
7470.1	7500.1	10.23
7670.1	7700.1	9.89
8070.1	8100.1	8.23
8670.1	8700.1	12.12

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Typical Performance Data

RF/LO (MHz)	RF VSWR (:1) @LO (dBm)			LO VSWR (:1) @LO (dBm)		
	+1	+4	+7	+1	+4	+7
2770.1	3.34	2.48	2.20	1.71	1.91	2.37
2970.1	2.89	2.48	2.17	1.55	1.84	2.36
3470.1	2.46	2.00	1.75	1.21	1.86	2.57
3970.1	2.93	2.46	2.33	1.70	2.08	2.71
4470.1	2.36	2.01	1.86	2.78	2.43	2.62
4970.1	2.94	2.60	2.34	3.60	2.28	2.21
5470.1	2.81	2.22	1.88	4.83	3.31	2.81
5970.1	3.40	2.15	1.94	10.69	4.41	3.00
6470.1	2.82	2.10	1.83	12.71	3.13	2.16
6670.1	3.18	2.18	1.90	7.20	3.06	2.20
6770.1	2.87	2.00	1.78	8.35	3.62	2.38
6870.1	2.35	2.07	1.81	6.68	3.35	2.32
6970.1	2.21	2.07	1.80	6.09	3.19	2.29
7470.1	1.96	1.83	1.65	4.05	3.16	2.25
7570.1	1.97	1.68	1.53	6.17	3.99	2.67
7670.1	1.92	1.63	1.48	5.97	4.00	2.70
7770.1	2.05	1.68	1.50	4.72	3.52	2.50
7870.1	2.36	1.70	1.51	5.04	3.52	2.44
7970.1	2.84	1.77	1.56	6.15	3.68	2.47
8470.1	3.52	2.22	1.87	6.68	4.99	3.03

IF (MHz)	IF VSWR (:1) @LO (dBm)		
	+1	+4	+7
10.1	1.53	1.06	1.17
30.1	1.56	1.06	1.18
40.1	1.57	1.07	1.18
50.1	1.58	1.07	1.19
60.1	1.59	1.08	1.19
70.1	1.58	1.09	1.20
80.1	1.58	1.10	1.20
90.1	1.58	1.11	1.21
100.1	1.59	1.12	1.21
200.1	1.65	1.19	1.26
300.1	1.74	1.29	1.33
400.1	1.86	1.38	1.38
500.1	2.01	1.47	1.42
600.1	2.22	1.57	1.46
700.1	2.46	1.67	1.51
800.1	2.65	1.77	1.56
900.1	2.67	1.93	1.66
1000.1	2.49	2.08	1.78
1100.1	3.00	2.20	1.93
1200.1	3.73	1.97	1.83

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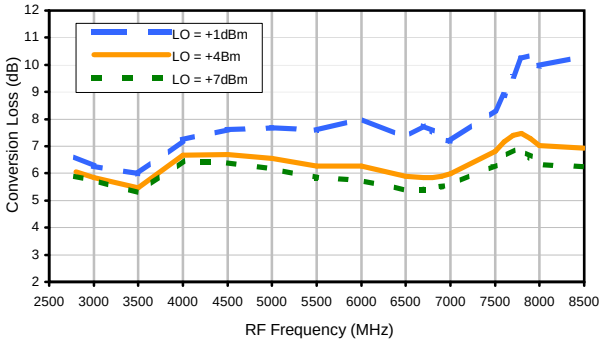
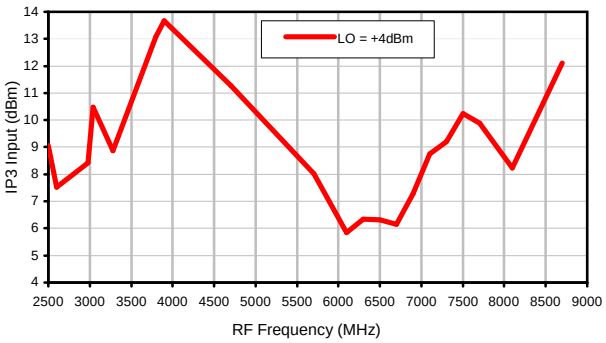
Frequency Mixer MCA1-85L+

Typical Performance Curves

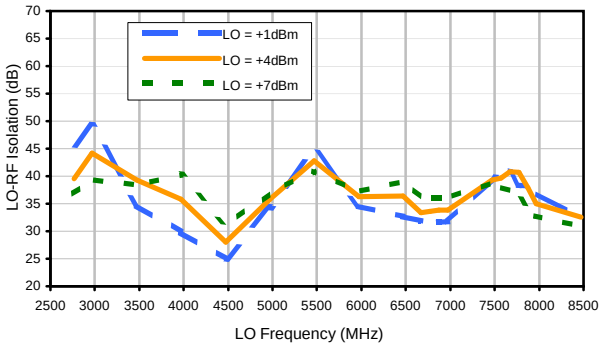
Conversion Loss



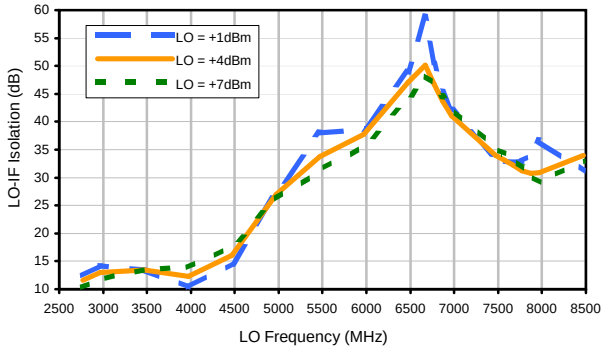
IP3 Input



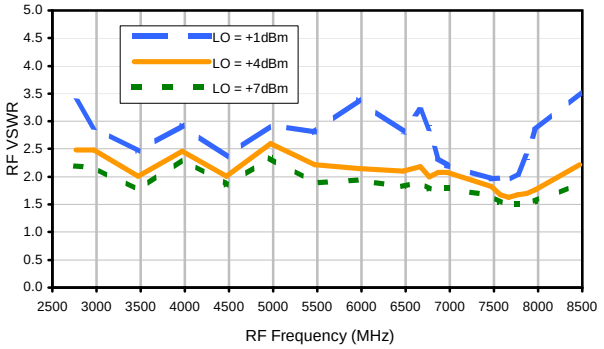
LO-RF Isolation



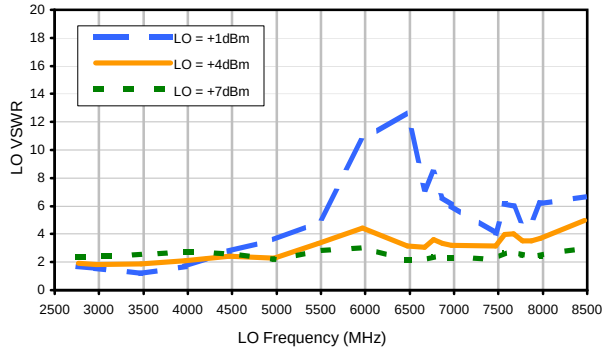
LO-IF Isolation



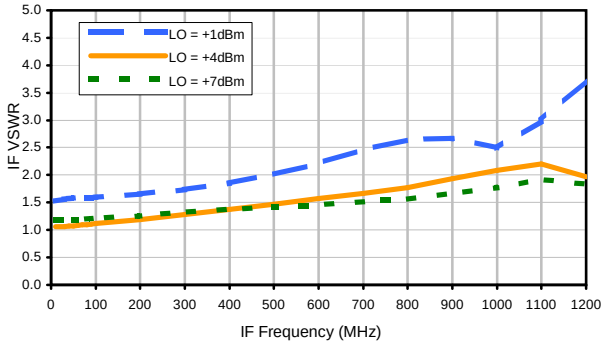
RF VSWR



LO VSWR



IF VSWR



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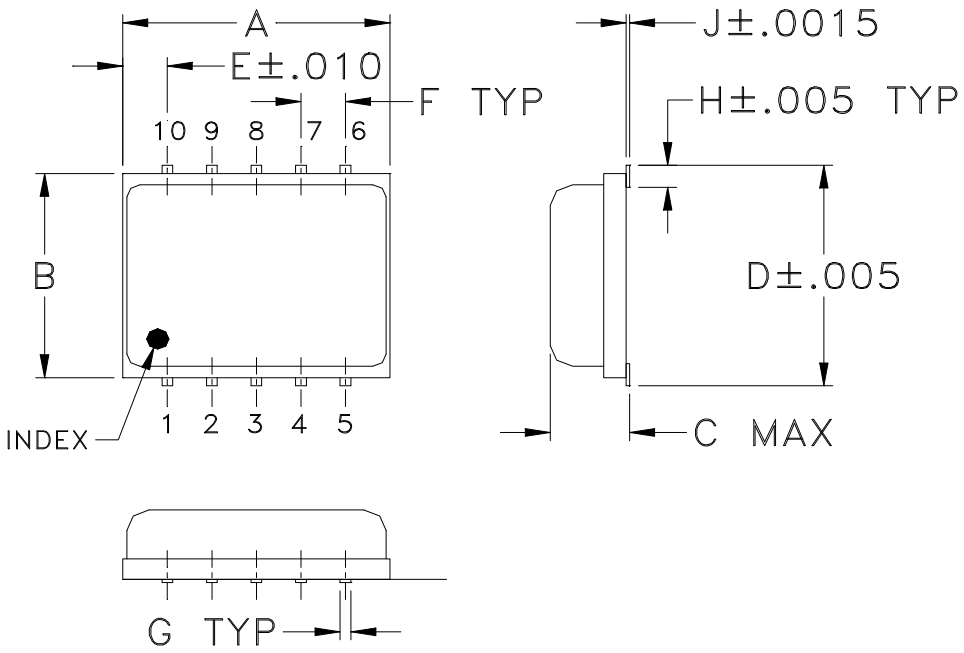
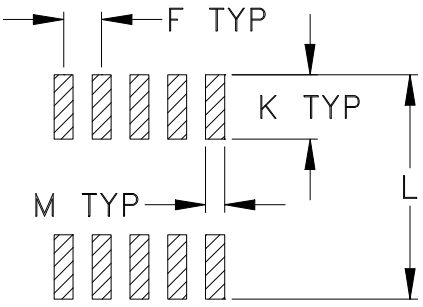
Case Style DZ

DZ885
DZ1034

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.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. ± .01; 3Pl. ± .005

Notes:

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

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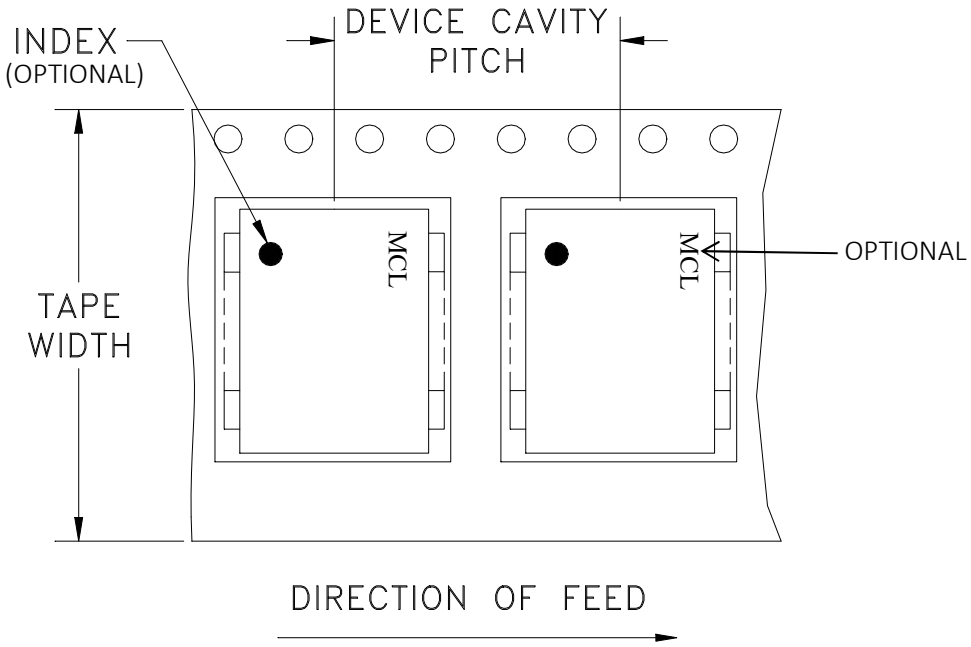
Tape & Reel Packaging TR-F34

DEVICE ORIENTATION IN T&R



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

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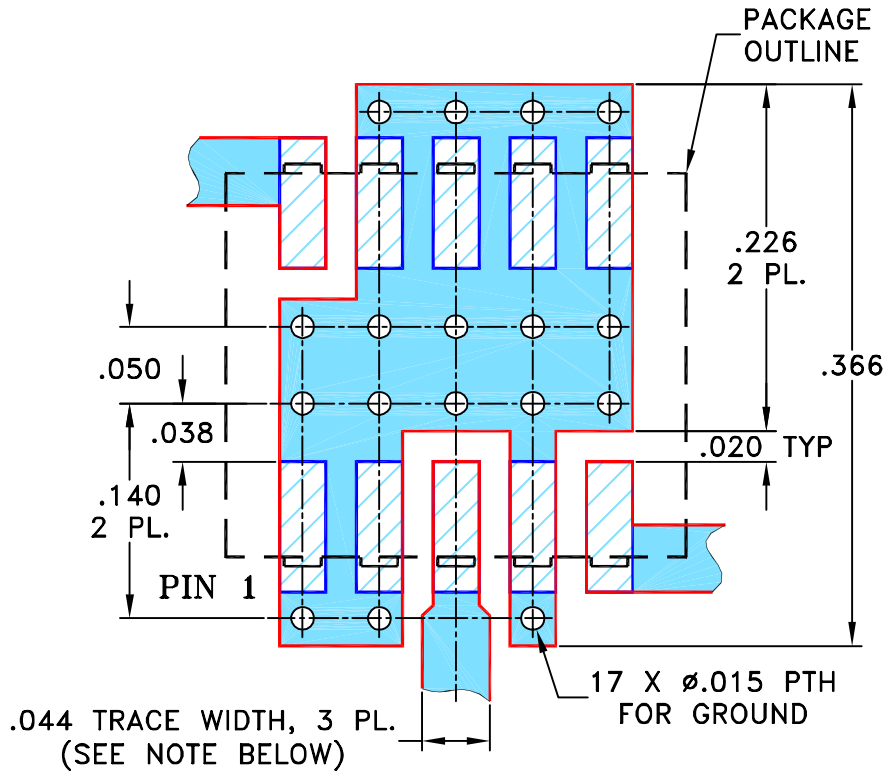
THIRD ANGLE PROJECTION

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" ± .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	DRAWN	AV	05/08/02
TOLERANCES ON:	CHECKED	DB	05/16/02
2 PL DECIMALS ±	APPROVED	WL	05/16/02
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

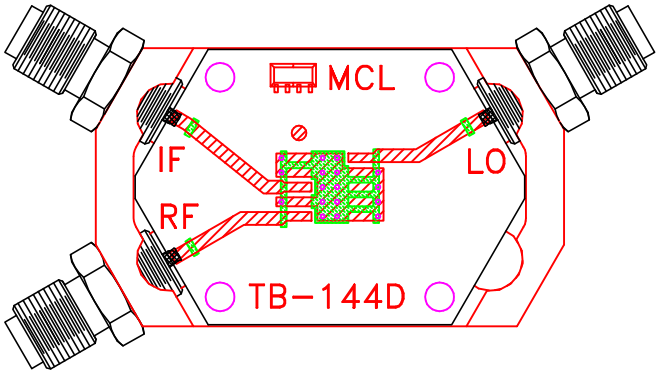
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

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

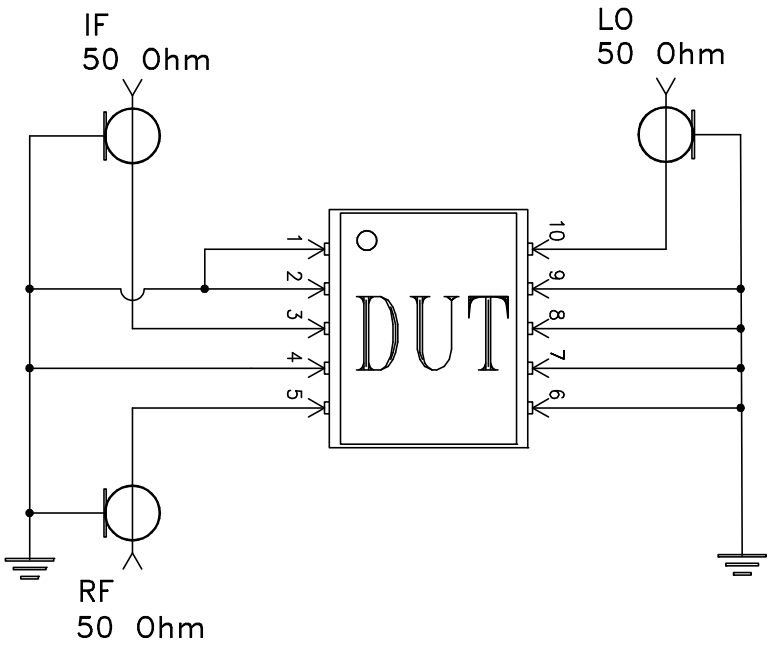
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-045	D

FILE:	SCALE:	SHEET:
98PL045	8:1	1 OF 1

Evaluation Board and Circuit



TB-144



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.020 inch.

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Environmental Specifications ENV10

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

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