MMIC SURFACE MOUNT WIDEBAND

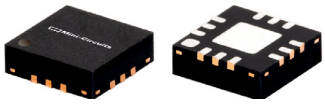
Double Balanced Mixer

MDB-54H+

Level 15 (LO Power 15dBm) 20-50 GHz

THE BIG DEAL

- Super wideband RF & LO, 20-50 GHz
- Super wideband IF, DC-20 GHz
- High L-R Isolation, 45 dB typ.
- Excellent Input IP3, 20 dBm Typ.
- Usable as Up & Down Converter



CASE STYLE: DQ1225

Generic photo used for illustration purposes only

+RoHS Compliant

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

APPLICATIONS

- Satellite up and down converters
- Defense radar & communication
- WiGig
- 5G
- ISM

PRODUCT OVERVIEW

MDB-54H+ is super-wideband double balanced mixer fabricated using InGaP HBT technology. The MDB-54H+ mixer functions as an up converter or down converter for LO and RF frequencies from 20 to 50 GHz and covers IF bandwidths from DC-20 GHz. The Mixer operates with 15 dBm LO power level while providing 11 dB conversion loss, 45 dB LO/RF isolation and 20 dBm input IP3. The mixer is ideal for use in wideband millimeter wave systems for communications, defense and test and measurement applications.

KEY FEATURES

Feature	Advantages
Double Balanced	Results in excellent LO-RF (35-55 dB typical) & LO-IF (23-52 dB typical) Isolations mini-mizing need for external filtering
Wide Bandwidth, 20 to 50 GHz	Useful in wideband systems or in in several narrowband systems. Reducing inventory
Wide IF Bandwidth DC-20 GHz	Usable in first and second down converter applications. IF as low as DC enables use in phase detector applications.
3 mm x 3 mm, 12 lead MCLP Package	Low Inductance, repeatable transitions, excellent thermal contact to PCB

REV. A
ECO-009182
MDB-54H+
MCL NY
210810

Double Balanced Mixer MDB-54H+

ELECTRICAL SPECIFICATIONS[1] AT 25°C, UNLESS NOTED

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
RF Frequency Range	-	20	-	50	GHz
LO Frequency Range	-	20	-	50	GHz
IF Frequency Range	-	DC	-	20	GHz
LO Power	-	14	+15	16	dBm
Conversion Loss (at IF=2 GHz)	20	-	9.8	12	dB
	30	-	10.2	12	
	40	-	12.6	-	
	50	-	13	-	
LO-RF Isolation	20	25	36	-	dB
	30	25	42	-	
	40	-	40	-	
	50	-	45	-	
LO-IF Isolation	20	20	34	-	dB
	30	20	44	-	
	40	-	31	-	
	50	-	30	-	
RF-IF Isolation	20	20	30	-	dB
	30	20	34	-	
	40	-	24	-	
	50	-	26	-	
Pin at 1dB Compression	20-50	-	10	-	dBm
Input IP3	20-50	-	20	-	dBm

1. Measured on Mini-Circuits Characterization test board TB-MDB-54H+. See Characterization Test Circuit Figure 1A-1F

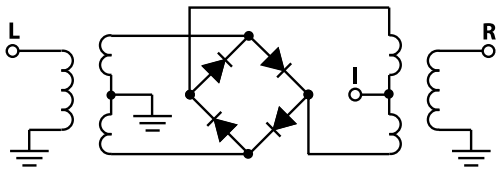
MAXIMUM RATINGS[2]

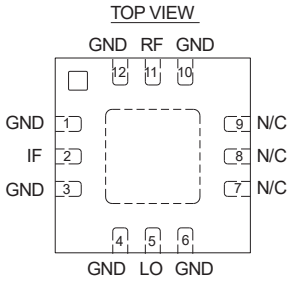
Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-65°C to 150°C
RF Power	21 dBm
LO Power	21 dBm
IF Current	30 mA

2. Permanent damage may occur if any of these limits are exceeded.
Electrical maximum ratings are not intended for continuous normal operation.

Double Balanced Mixer MDB-54H+

SIMPLIFIED SCHEMATIC AND BONDING PAD DESCRIPTION

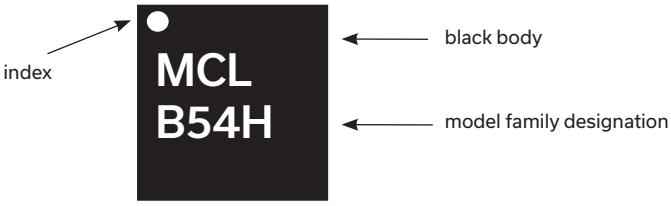




PAD CONNECTIONS

Function	Pad Number	Description
RF	11	RF port
LO	5	LO port
IF	2	IF port
GND	1,3,4,6,10,12 & Paddle	Connects to Ground Pads at Die Level. Grounded on PCB.
NC	7,8 & 9	Not Connected, Grounded on PCB

PRODUCT MARKING



CHARACTERIZATION TEST CIRCUITS

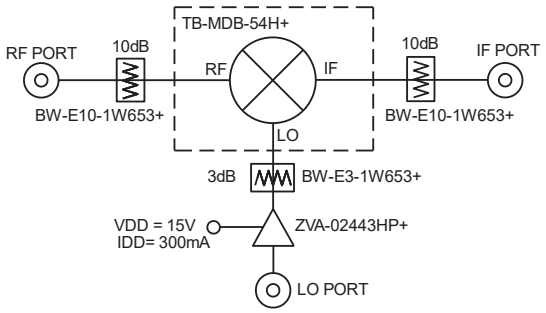


Figure 1A. Block Diagram of Test Circuit used for characterization of Conversion Loss, Isolation (L-R,L-I, R-I) & VSWR from 20 to 35 GHz.

Test Condition:
RF =-10dBm,LO=15dBm, IF =30MHz,2GHz & 3GHz

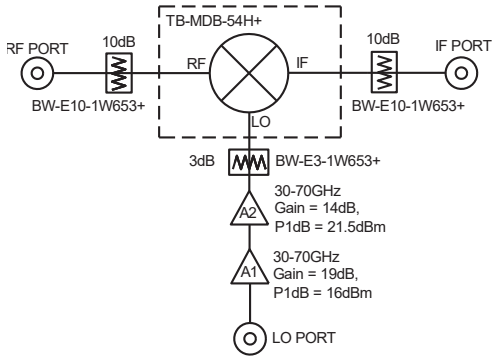


Figure 1B. Block Diagram of Test Circuit used for characterization of Conversion Loss, Isolation(L-R,L-I, R-I) & VSWR from 35 to 50 GHz.

Test Condition:
RF =-10dBm,LO=15dBm, IF =30MHz,2GHz & 3GHz

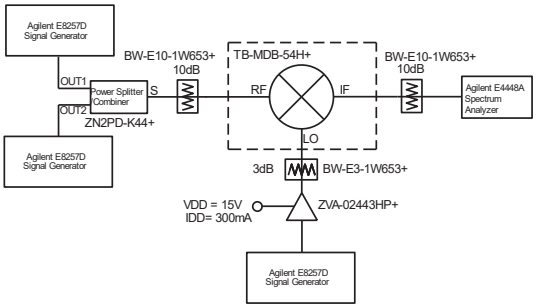


Figure 1C. Block Diagram of Test Circuit used for characterization of Input IP3 from 20 to 35GHz

Test Condition: RF= -10dBm/Tone, LO=15dBm, IF = 2GHz
Input IP3(IIP3):Two tones, spaced 1MHz apart

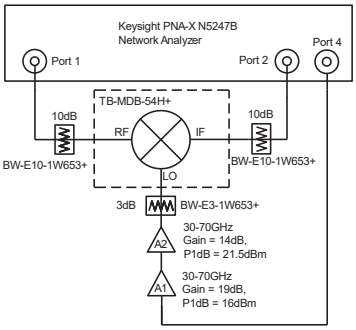


Figure 1D. Block Diagram of Test Circuit used for characterization of Input IP3 from 35 to 50 GHz

Test Condition:
RF=-10dBm/Tone, LO = 15dBm, IF= 2GHz
Input IP3 (IIP3): Two tones, spaced 1MHz apart

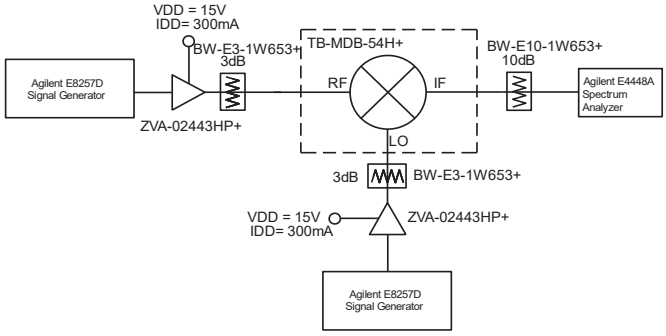


Figure 1E. Block Diagram of Test Circuit used for characterization of Compression from 20 to 35 GHz

Test Condition:
RF=10dBm & -10dBm, LO = 15dBm, IF = 2GHz
Compression = CL(RF=10dBm) - CL(RF = -10dBm)

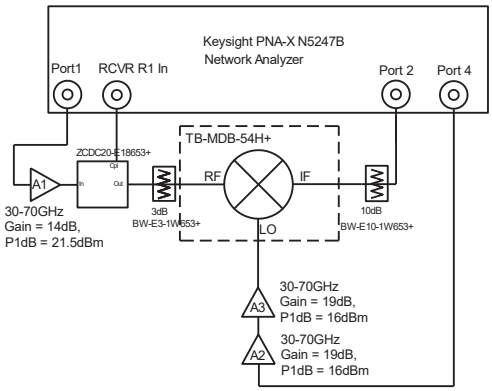


Figure 1F. Block Diagram of Test Circuit used for characterization of Compression from 35 to 50GHz

Test Condition:
RF=10dBm & -10dBm, LO = 15dBm, IF = 2GHz
Compression = CL(RF=10dBm) - CL(RF = -10dBm)

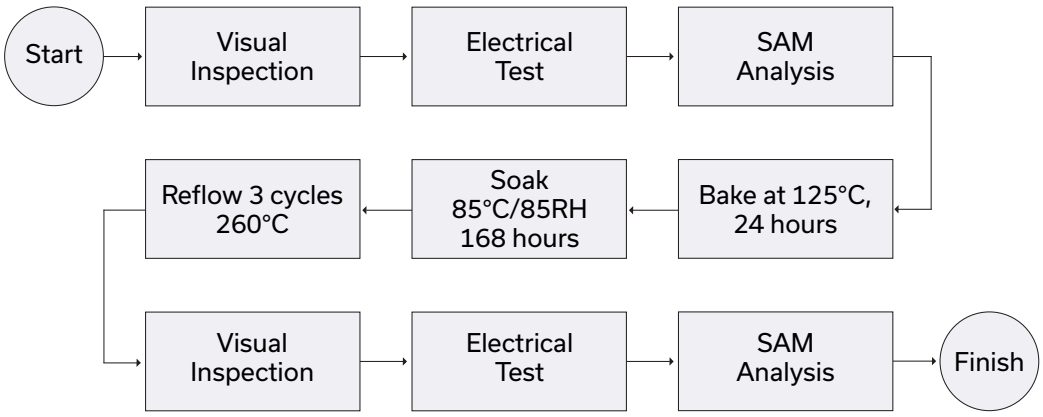
ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS CLICK HERE

Performance Data	Data Table Swept Graphs S-Parameter (S1P Files) Data Set (.zip file)
Case Style	DQ1225 Plastic package, exposed paddle, lead finish: matte-tin
Tape & Reel **Standard quantities available on reel**	F66 7" reels with 20, 50, 100, 200, 500, 1K and 2K devices
Suggested Layout for PCB Design	PL-705
Evaluation Board	TB-MDB-54H+
Environmental Ratings	ENV08T1

ESD RATING
Human Body Model (HBM): Class 1A (250 to <500V) in accordance with ANSI/ESD STM 5.1 - 2001

MSL RATING
Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

MSL TEST FLOW CHART



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

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @ IF(OUT)=30MHz (dB)		
		@LO (dBm)		
		+14	+15	+16
18000	18030	10.6	10.6	10.8
19000	19030	10.2	10.0	10.0
20000	20030	10.3	10.2	10.2
21000	21030	11.1	11.0	10.8
22000	22030	10.7	10.6	10.6
23000	23030	11.0	11.0	11.2
24000	24030	11.7	11.7	11.8
25000	25030	11.8	11.9	12.3
26000	26030	11.2	11.4	11.8
27000	27030	11.6	11.9	12.3
28000	28030	11.2	11.5	12.0
29000	29030	10.4	10.4	10.7
30000	30030	9.7	9.8	10.1
31000	31030	9.5	9.2	9.3
32000	32030	9.2	9.1	9.2
33000	33030	10.5	10.4	10.3
34000	34030	9.7	9.8	10.2
35000	35030	11.4	11.3	10.5
36000	36030	11.2	11.4	11.9
37000	37030	12.3	12.2	12.2
38000	38030	12.3	12.3	12.4
39000	39030	11.8	11.9	12.0
40000	40030	11.8	11.9	12.1
41000	41030	11.7	11.7	11.9
42000	42030	11.9	11.9	12.1
43000	43030	12.0	12.1	12.5
44000	44030	11.4	11.5	11.9
45000	45030	10.9	11.0	11.3
46000	46030	10.5	10.5	10.8
47000	47030	10.9	10.9	10.9
48000	48030	10.7	10.7	10.6
49000	49030	11.1	11.0	10.9
50000	50030	12.5	11.9	11.4
51000	51030	13.6	13.0	12.5
52000	52030	15.5	14.2	13.2

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @ IF(OUT)=2GHz (dB)		
		@LO (dBm)		
		+14	+15	+16
18000	20000	11.0	11.0	11.1
19000	21000	9.6	9.6	9.6
20000	22000	9.7	9.8	9.9
21000	23000	10.7	10.8	11.0
22000	24000	10.7	10.7	10.8
23000	25000	11.2	11.2	11.4
24000	26000	12.0	12.1	12.4
25000	27000	11.9	12.1	12.5
26000	28000	11.4	11.6	11.9
27000	29000	11.7	11.6	11.7
28000	30000	11.3	11.3	11.6
29000	31000	11.1	10.6	10.5
30000	32000	9.8	9.7	9.9
31000	33000	9.9	9.8	9.7
32000	34000	9.8	9.8	10.1
33000	35000	10.3	11.6	10.6
34000	36000	9.9	10.2	10.6
35000	37000	11.1	10.9	10.2
36000	38000	11.6	11.8	12.2
37000	39000	12.2	12.2	12.3
38000	40000	12.1	12.2	12.5
39000	41000	11.8	11.8	12.0
40000	42000	12.1	12.0	12.3
41000	43000	11.9	11.9	12.2
42000	44000	12.1	12.2	12.4
43000	45000	12.2	12.2	12.5
44000	46000	11.5	11.6	11.8
45000	47000	10.8	10.8	10.9
46000	48000	10.5	10.4	10.4
47000	49000	11.1	10.9	10.8
48000	50000	12.4	11.2	10.7
49000	51000	12.5	11.5	11.1
50000	52000	12.5	12.7	12.0
51000	53000	---	---	---
52000	54000	---	---	---

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @ IF(OUT)=3GHz (dB)		
		@LO (dBm)		
		+14	+15	+16
18000	21000	11.2	11.2	11.3
19000	22000	9.7	9.9	10.0
20000	23000	10.2	10.4	10.6
21000	24000	10.9	11.0	11.2
22000	25000	10.9	11.0	11.2
23000	26000	11.2	11.4	11.7
24000	27000	12.0	12.3	12.7
25000	28000	12.0	12.2	12.5
26000	29000	11.4	11.3	11.4
27000	30000	11.7	11.8	12.0
28000	31000	11.8	11.4	11.2
29000	32000	10.7	10.6	10.7
30000	33000	10.3	10.2	10.1
31000	34000	10.1	10.2	10.6
32000	35000	10.5	11.2	10.3
33000	36000	10.4	10.6	11.1
34000	37000	10.4	11.0	10.2
35000	38000	10.3	10.5	11.0
36000	39000	11.6	11.5	11.5
37000	40000	11.74	11.84	12.14
38000	41000	11.92	11.95	12.17
39000	42000	11.81	11.79	11.95
40000	43000	11.99	11.99	12.20
41000	44000	11.73	11.77	11.98
42000	45000	11.93	12.00	12.26
43000	46000	11.93	11.98	12.18
44000	47000	11.26	11.26	11.34
45000	48000	10.57	10.50	10.54
46000	49000	10.34	10.13	10.10
47000	50000	12.26	11.11	10.66
48000	51000	11.90	10.89	10.51
49000	52000	14.35	11.98	11.31
50000	53000	---	---	---
51000	54000	---	---	---
52000	55000	---	---	---

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	IP-3 INPUT (dBm) @LO (dBm)		
		+14	+15	+16
20000	22000	20.11	20.87	21.61
21000	23000	21.26	21.89	22.55
22000	24000	23.32	23.37	23.76
23000	25000	24.35	24.58	24.30
24000	26000	25.25	25.84	26.22
25000	27000	26.66	26.98	26.86
26000	28000	24.70	26.09	27.96
27000	29000	23.08	23.49	25.19
28000	30000	23.96	24.80	25.08
29000	31000	21.36	22.73	23.51
30000	32000	20.94	21.41	21.98
31000	33000	23.75	23.70	23.49
32000	34000	25.90	25.29	24.34
33000	35000	23.06	20.55	21.99
34000	36000	23.56	22.74	22.23
35000	37000	22.27	23.95	24.18
36000	38000	24.70	24.82	23.70
37000	39000	26.16	24.41	24.96
38000	40000	24.67	24.01	23.37
39000	41000	24.31	25.28	23.10
40000	42000	20.17	19.95	19.45
41000	43000	24.44	23.70	24.43
42000	44000	20.10	19.83	19.74
43000	45000	21.55	21.41	21.08
44000	46000	19.38	19.30	18.93
45000	47000	19.90	19.93	19.67
46000	48000	19.13	19.73	19.82
47000	49000	18.20	18.66	18.77
48000	50000	15.14	16.33	16.90
49000	51000	18.67	19.57	19.46
50000	52000	17.13	14.29	15.05

RF (IN) (MHz)	LO (MHz)	COMPRESSION @ RF IN=+10dBm (dB) @LO (dBm)		
		+14	+15	+16
20000	22000	0.96	0.96	0.83
21000	23000	0.66	0.58	0.52
22000	24000	0.43	0.42	0.39
23000	25000	0.34	0.30	0.28
24000	26000	0.75	0.73	0.47
25000	27000	0.37	0.35	0.38
26000	28000	0.37	0.31	0.26
27000	29000	0.32	0.28	0.23
28000	30000	0.31	0.29	0.27
29000	31000	0.71	0.39	0.34
30000	32000	0.57	0.37	0.35
31000	33000	0.30	0.26	0.25
32000	34000	0.20	0.14	0.15
33000	35000	0.48	0.37	0.43
34000	36000	0.33	0.31	0.26
35000	37000	0.55	0.59	0.63
36000	38000	0.25	0.23	0.35
37000	39000	0.44	0.33	0.27
38000	40000	0.34	0.30	0.44
39000	41000	0.46	0.49	0.49
40000	42000	0.65	0.60	0.63
41000	43000	0.39	0.37	0.61
42000	44000	0.51	0.51	0.54
43000	45000	0.49	0.51	0.66
44000	46000	0.27	0.49	0.56
45000	47000	0.73	0.77	0.87
46000	48000	1.12	1.14	1.12
47000	49000	0.90	0.73	0.86
48000	50000	1.16	1.35	1.39
49000	51000	0.76	0.70	0.88
50000	52000	0.33	0.77	0.81

Typical Performance Data

IF (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @ RF=20GHz (dB) @LO (dBm)		
		+14	+15	+16
10	20010	10.4	10.2	10.2
100	20100	10.3	10.2	10.2
500	20500	10.2	10.1	10.0
1000	21000	10.1	10.1	10.1
1500	21500	10.1	10.2	10.3
2000	22000	10.1	10.2	10.3
2500	22500	10.4	10.5	10.6
3000	23000	10.6	10.8	11.0
3500	23500	10.8	10.9	11.1
4000	24000	10.8	10.9	11.1
4500	24500	11.2	11.4	11.6
5000	25000	11.4	11.6	11.8
5500	25500	11.5	11.7	11.9
6000	26000	11.8	11.9	12.1
6500	26500	11.9	12.1	12.4
7000	27000	11.8	12.1	12.4
7500	27500	11.9	12.1	12.4
8000	28000	12.1	12.3	12.6
8500	28500	12.1	12.2	12.4
9000	29000	12.1	12.3	12.5
9500	29500	12.5	12.8	13.3
10000	30000	12.7	12.8	13.1
10500	30500	12.7	12.7	12.8
11000	31000	13.0	13.0	13.0
11500	31500	13.1	13.3	13.5
12000	32000	12.9	13.0	13.2
12500	32500	12.9	12.9	13.0
13000	33000	13.2	13.2	13.3
13500	33500	13.6	13.7	13.9
14000	34000	14.4	14.6	15.1
14500	34500	14.9	14.9	14.9
15000	35000	17.3	15.7	15.1
15500	35500	15.1	14.9	14.9
16000	36000	15.0	15.4	16.0
16500	36500	15.0	14.9	15.0
17000	37000	17.2	15.7	15.2
18000	38000	15.4	15.6	16.1
19000	39000	15.5	15.5	15.5
20000	40000	17.0	17.1	17.4

IF (MHz)	RF (MHz)	CONVERSION LOSS VS. IF FREQUENCY @ LO=20GHz (dB) @LO (dBm)		
		+14	+15	+16
10	20010	10.3	10.2	10.2
100	20100	10.5	10.4	10.4
500	20500	11.2	11.0	11.0
1000	21000	12.1	11.9	11.9
1500	21500	12.6	12.4	12.4
2000	22000	12.8	12.6	12.6
2500	22500	13.0	12.9	12.9
3000	23000	13.2	13.2	13.2
3500	23500	13.4	13.5	13.5
4000	24000	13.6	13.6	13.6
4500	24500	13.6	13.6	13.6
5000	25000	13.4	13.4	13.4
5500	25500	13.0	13.0	13.0
6000	26000	12.9	12.9	12.9
6500	26500	13.0	13.0	13.0
7000	27000	13.1	13.1	13.1
7500	27500	13.1	13.1	13.1
8000	28000	12.8	12.7	12.7
8500	28500	12.6	12.4	12.4
9000	29000	12.2	12.1	12.1
9500	29500	11.9	11.8	11.8
10000	30000	11.9	11.8	11.8
10500	30500	11.7	11.5	11.5
11000	31000	11.5	11.3	11.3
11500	31500	11.3	11.1	11.1
12000	32000	11.3	11.1	11.1
12500	32500	11.4	11.2	11.2
13000	33000	12.0	11.8	11.8
13500	33500	12.5	12.3	12.3
14000	34000	12.9	12.6	12.6
14500	34500	13.2	12.9	12.9
15000	35000	13.6	13.3	13.3
15500	35500	14.1	13.9	13.9
16000	36000	14.9	14.6	14.6
16500	36500	15.4	15.2	15.2
17000	37000	15.6	15.4	15.4
18000	38000	15.1	15.0	15.0
19000	39000	14.9	14.9	14.9
20000	40000	16.2	16.3	16.3

Wideband Double Balanced Mixer MDB-54H+

Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB) @LO (dBm)			LO-IF ISOLATION (dB) @LO (dBm)		
	+14	+15	+16	+14	+15	+16
18000	31.7	32.9	33.8	32.3	32.7	33.4
19000	35.2	37.1	38.1	33.3	33.9	34.7
20000	35.3	36.1	36.6	32.7	33.8	35.3
21000	38.5	39.6	40.5	35.1	36.1	37.3
22000	40.3	40.9	41.2	36.6	37.8	39.1
23000	40.9	41.2	41.2	38.1	39.4	40.8
24000	41.3	42.0	42.6	38.7	40.1	41.6
25000	41.9	42.3	42.6	39.4	41.0	42.7
26000	41.7	42.6	43.6	40.4	42.3	44.2
27000	40.4	41.6	42.8	42.2	44.0	45.8
28000	40.9	41.8	42.7	43.4	44.9	46.3
29000	42.0	42.8	43.6	42.0	43.7	45.1
30000	42.6	43.2	43.5	42.2	43.2	44.1
31000	42.2	42.1	41.8	41.8	43.1	44.3
32000	39.8	40.4	40.7	40.1	40.8	41.5
33000	37.2	37.4	37.4	37.8	38.4	38.9
34000	37.4	37.7	37.5	33.9	33.6	33.4
35000	39.7	39.4	39.4	47.5	48.5	47.6
36000	37.4	37.3	37.1	36.6	36.2	36.1
37000	40.3	40.3	40.3	34.2	34.4	34.6
38000	40.2	40.4	40.5	32.8	33.1	33.3
39000	40.4	40.7	41.0	31.9	32.4	32.7
40000	39.2	39.5	39.7	31.3	31.7	32.0
41000	37.6	37.8	38.1	30.6	30.9	31.3
42000	36.5	36.6	36.9	28.6	29.0	29.3
43000	35.9	36.0	36.2	28.1	28.5	28.8
44000	34.6	34.8	35.0	28.3	28.7	29.1
45000	34.1	34.3	34.4	28.3	28.7	29.0
46000	33.4	33.6	33.6	27.5	27.9	28.2
47000	34.1	34.3	34.3	25.5	25.8	26.1
48000	36.4	36.4	36.2	24.3	24.6	24.9
49000	40.1	39.7	39.1	25.5	25.6	25.8
50000	46.7	45.5	44.5	29.6	29.6	29.6
51000	45.0	44.0	43.1	32.6	32.5	32.4
52000	45.2	44.2	43.3	37.2	36.9	36.7

RF (MHz)	LO (MHz)	RF-IF ISOLATION (dB) @LO (dBm)		
		+14	+15	+16
18000	20000	28.1	28.8	29.5
19000	21000	28.3	29.1	29.1
20000	22000	35.8	35.1	33.8
21000	23000	35.0	32.5	31.4
22000	24000	34.8	32.6	31.4
23000	25000	33.1	31.9	32.2
24000	26000	37.4	36.9	37.4
25000	27000	40.1	40.5	41.7
26000	28000	42.0	41.9	42.3
27000	29000	43.0	43.4	43.6
28000	30000	40.8	40.9	41.0
29000	31000	36.9	37.0	36.3
30000	32000	34.6	34.8	35.1
31000	33000	31.4	31.3	31.1
32000	34000	28.5	28.5	28.5
33000	35000	25.6	26.1	26.3
34000	36000	26.8	26.9	26.9
35000	37000	25.5	25.9	26.1
36000	38000	25.0	25.0	25.1
37000	39000	23.5	23.5	23.5
38000	40000	23.5	23.5	23.5
39000	41000	23.7	23.6	23.7
40000	42000	24.4	24.4	24.4
41000	43000	23.9	24.0	23.9
42000	44000	22.7	22.7	22.7
43000	45000	23.2	23.3	23.3
44000	46000	23.4	23.6	23.6
45000	47000	23.3	23.4	23.5
46000	48000	22.3	22.5	22.5
47000	49000	20.3	20.4	20.4
48000	50000	19.4	19.5	19.6
49000	51000	21.1	21.2	21.2
50000	52000	25.2	25.1	25.1
51000	53000	30.1	29.8	29.3
52000	54000	36.6	36.3	35.3

Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1) @LO (dBm)		
		+14	+15	+16
18000	20000	3.03	3.10	3.13
19000	21000	2.04	2.15	2.23
20000	22000	2.58	2.67	2.70
21000	23000	3.44	3.43	3.42
22000	24000	3.57	3.51	3.47
23000	25000	3.20	3.12	3.08
24000	26000	3.52	3.47	3.44
25000	27000	3.88	3.82	3.79
26000	28000	3.43	3.35	3.32
27000	29000	3.02	2.89	2.84
28000	30000	3.12	3.05	3.04
29000	31000	3.75	3.23	3.10
30000	32000	2.29	2.13	2.07
31000	33000	1.48	1.42	1.39
32000	34000	1.71	1.59	1.55
33000	35000	2.15	1.85	1.71
34000	36000	1.64	1.59	1.57
35000	37000	2.79	2.37	2.19
36000	38000	2.51	2.44	2.41
37000	39000	3.34	3.30	3.27
38000	40000	3.88	3.84	3.80
39000	41000	3.37	3.32	3.28
40000	42000	2.43	2.40	2.37
41000	43000	2.62	2.59	2.57
42000	44000	2.97	2.93	2.92
43000	45000	2.53	2.51	2.50
44000	46000	1.89	1.86	1.85
45000	47000	1.62	1.60	1.58
46000	48000	1.26	1.26	1.27
47000	49000	1.54	1.54	1.55
48000	50000	2.26	2.15	2.09
49000	51000	1.87	1.78	1.72
50000	52000	1.84	1.74	1.69

LO (MHz)	LO VSWR (:1) @LO (dBm)		
	+14	+15	+16
18000	3.35	3.19	3.08
19000	3.28	3.11	2.98
20000	2.86	2.78	2.71
21000	2.38	2.34	2.31
22000	2.07	2.04	2.03
23000	1.72	1.74	1.78
24000	1.50	1.56	1.62
25000	1.34	1.42	1.48
26000	1.34	1.39	1.44
27000	1.47	1.49	1.50
28000	1.58	1.57	1.56
29000	1.78	1.75	1.74
30000	2.46	2.32	2.22
31000	3.35	3.04	2.79
32000	3.25	2.98	2.73
33000	2.64	2.43	2.27
34000	2.86	2.63	2.45
35000	4.06	3.65	3.46
36000	4.30	3.90	3.66
37000	4.34	3.47	3.19
38000	2.75	2.30	2.19
39000	2.67	2.22	2.09
40000	2.98	2.42	2.27
41000	2.34	1.96	1.90
42000	1.76	1.57	1.52
43000	1.49	1.31	1.27
44000	1.29	1.15	1.12
45000	1.30	1.20	1.18
46000	1.70	1.58	1.55
47000	2.35	2.09	2.00
48000	2.63	2.35	2.28
49000	3.23	2.84	2.68
50000	3.59	3.12	2.93

IF (OUT) (MHz)	IF VSWR @ LO=2GHz (:1) @LO (dBm)		
	+14	+15	+16
10	1.18	1.22	1.21
100	1.18	1.22	1.20
500	1.17	1.21	1.19
1000	1.16	1.20	1.20
2000	1.17	1.21	1.22
3000	1.19	1.21	1.23
4000	1.34	1.31	1.33
5000	1.70	1.66	1.65
6000	2.00	1.94	1.92
7000	2.05	1.99	1.97
8000	2.18	2.12	2.10
9000	2.59	2.53	2.50
10000	2.81	2.72	2.70
11000	2.59	2.50	2.47
12000	2.23	2.15	2.13
13000	2.26	2.18	2.16
14000	2.76	2.65	2.61
15000	3.39	3.27	3.22
16000	4.05	3.94	3.88
17000	4.43	4.32	4.24
18000	4.04	3.95	3.87
19000	4.22	4.12	4.03
20000	5.68	5.55	5.44
21000	6.34	6.21	6.10
22000	5.25	5.15	5.08
23000	3.60	3.57	3.62
24000	3.35	3.38	3.47
25000	4.26	4.34	4.38
26000	4.83	4.89	4.89
27000	5.26	5.27	5.27
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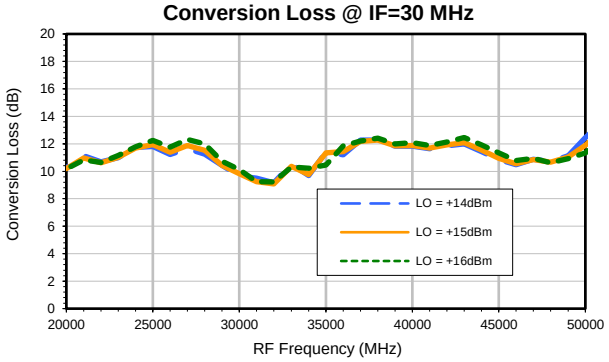
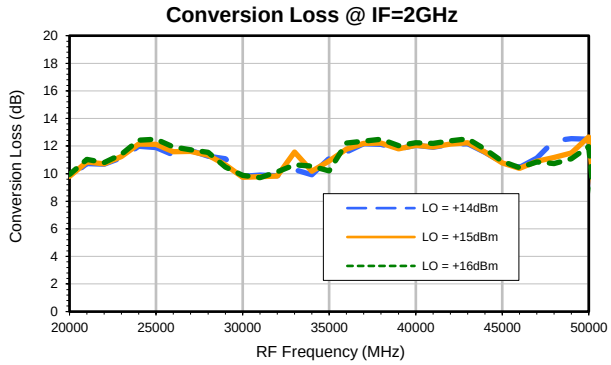
Typical Performance Curves

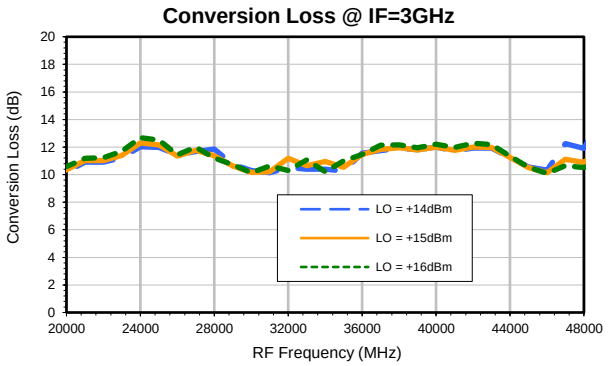
Conversion Loss @ IF=30 MHz



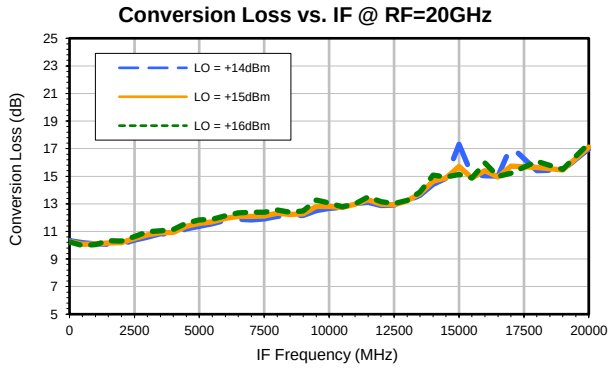
Conversion Loss @ IF=2GHz



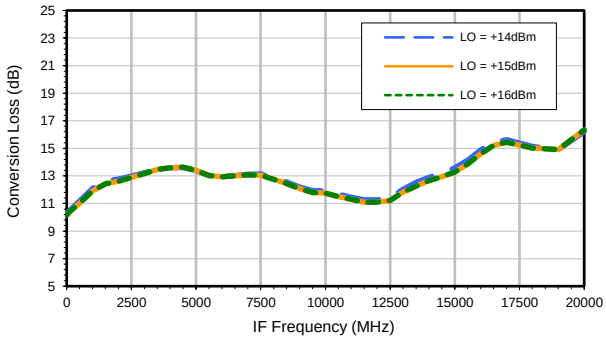
Conversion Loss @ IF=3GHz



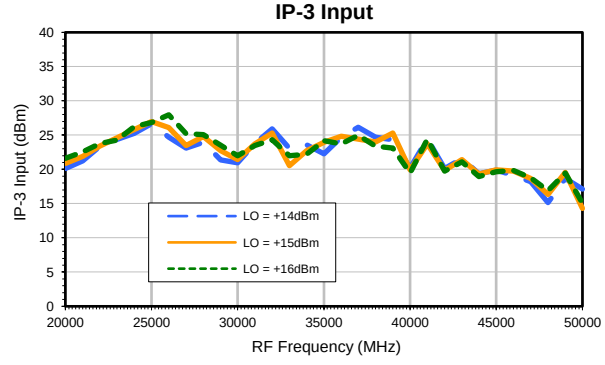
Conversion Loss vs. IF @ RF=20GHz



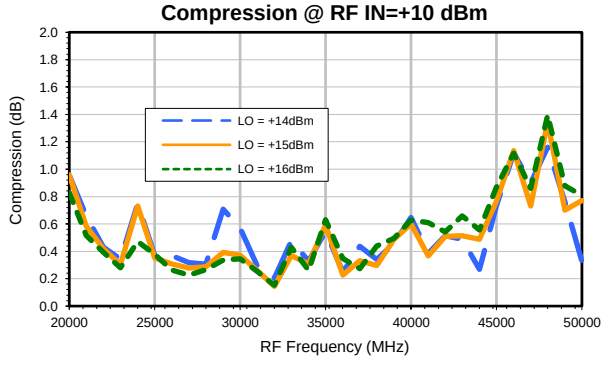
Conversion Loss vs. IF @ LO=20GHz



IP-3 Input

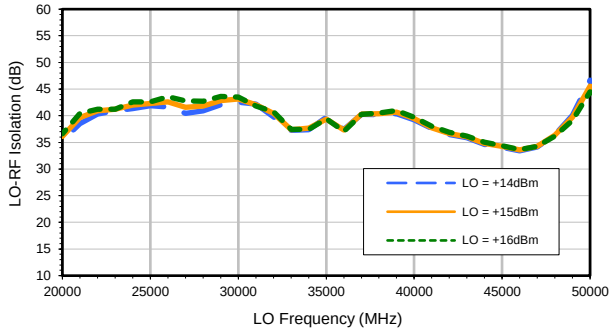


Compression @ RF IN=+10 dBm

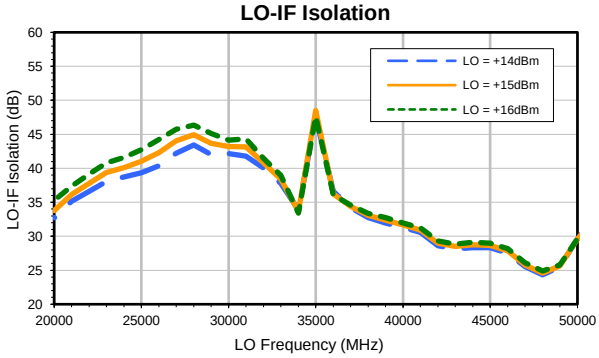


Typical Performance Curves

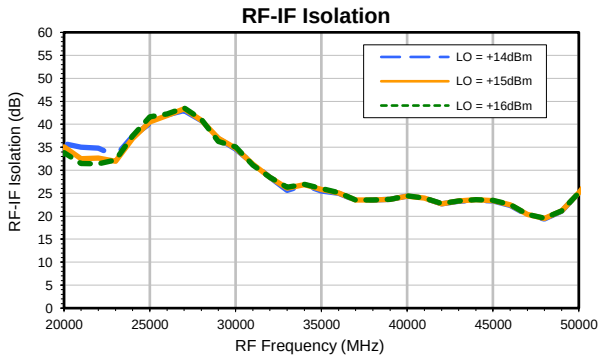
LO-RF Isolation



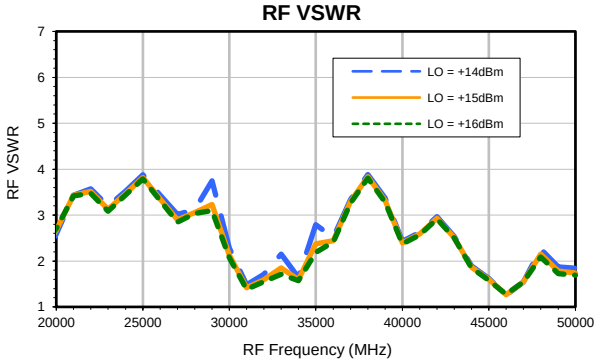
LO-IF Isolation



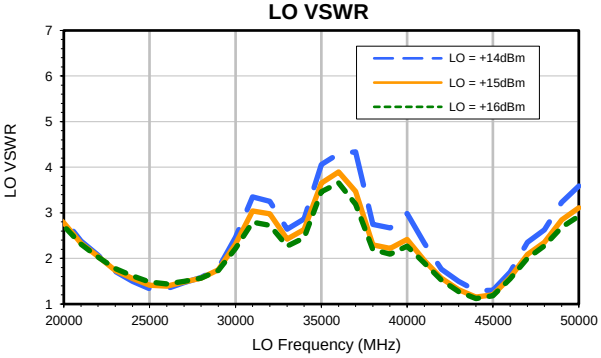
RF-IF Isolation



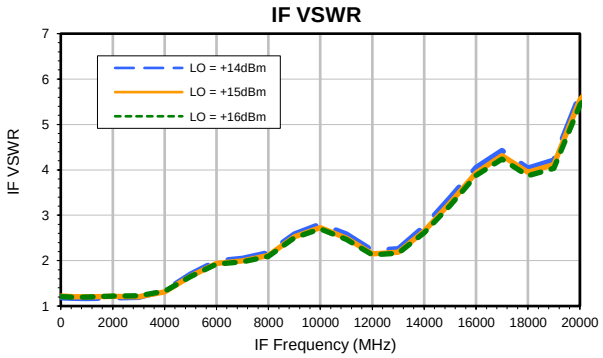
RF VSWR



LO VSWR



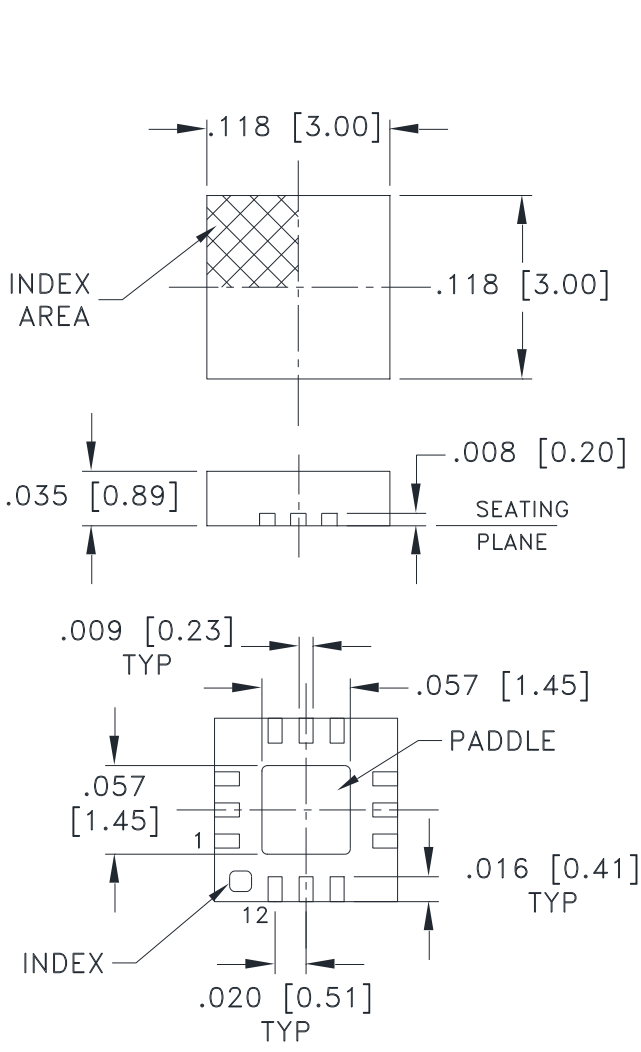
IF VSWR



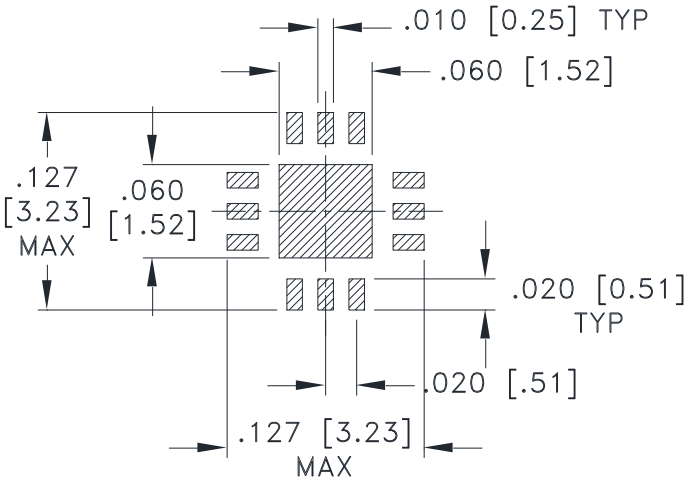
Case Style DQ

DQ1225

Outline Dimensions



PCB Land Pattern



SUGGESTED LAYOUT,
TOLERANCE TO BE WITHIN ±.002

Weight: .02 Grams

Dimensions are in inches (mm). Tolerances: 2Pl. ± .01; 3 Pl. ± .004

Notes:

1. Case material: Plastic.
2. Termination finish:
   - For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin. All models, (+) suffix. See Data sheet.
   - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

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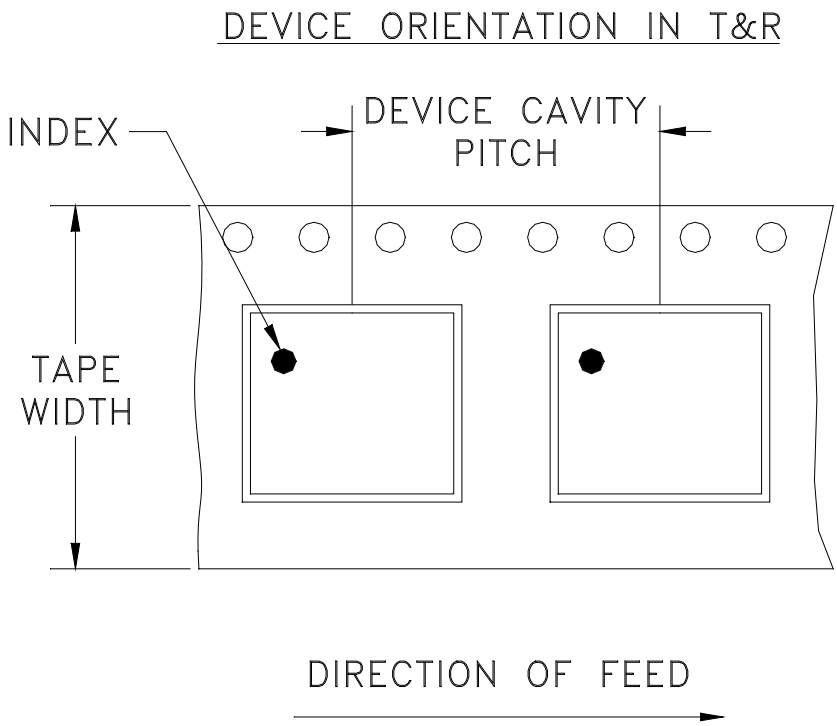
Tape & Reel Packaging TR-F66



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
8	4	7	Small quantity standard	20
				50
				100
				200
				500
		7	Standard	1000, 2000, 3000

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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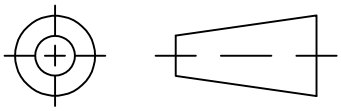
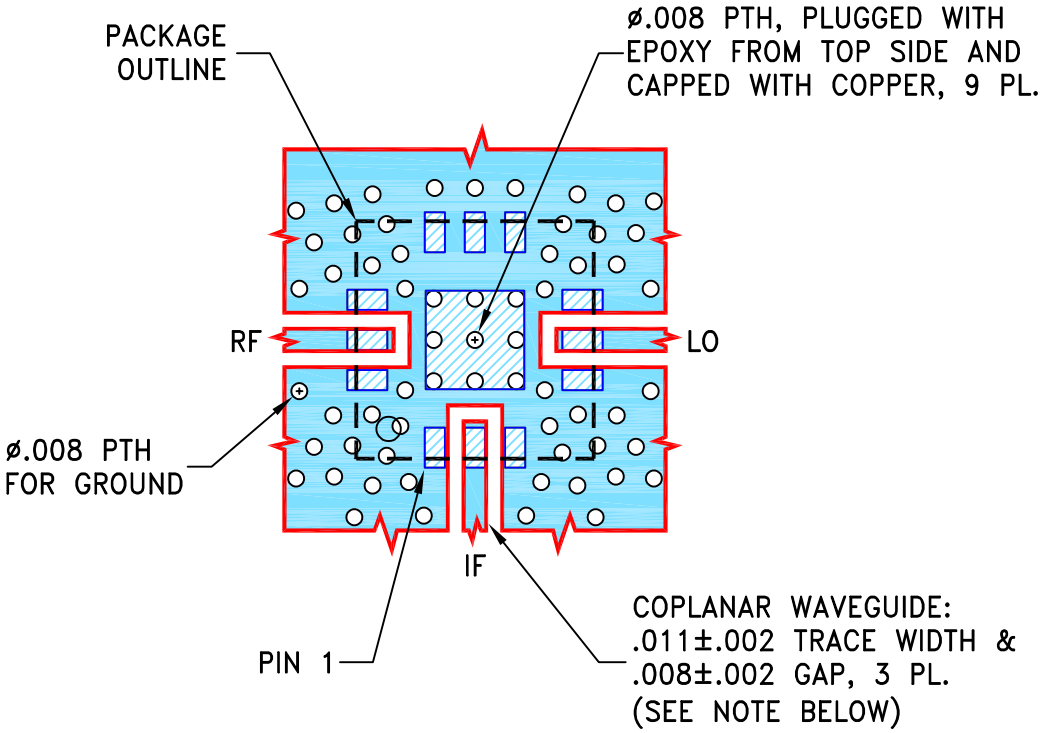
THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-007017	NEW RELEASE	03/22/21	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR DQ1225 CASE STYLE



NOTES:

1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .0066±.0007". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. UNIT LAND PATTERN WAS OPTIMIZED FOR BETTER PERFORMANCE.
3. 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	ITG	03/22/21
TOLERANCES ON:	CHECKED	GF	03/22/21
2 PL DECIMALS ±	APPROVED	IL	03/22/21
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

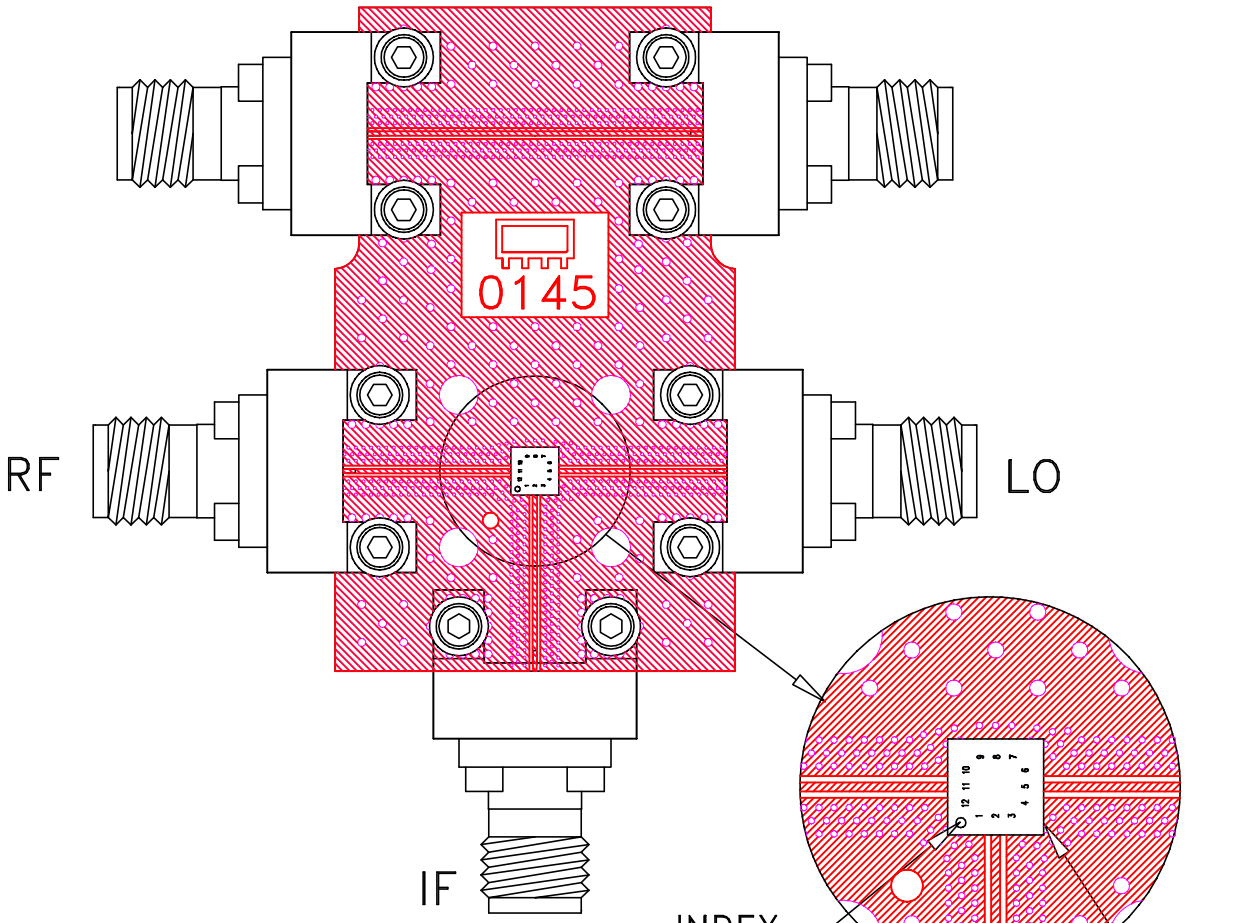
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, DQ1225, TB-MDB-54H+

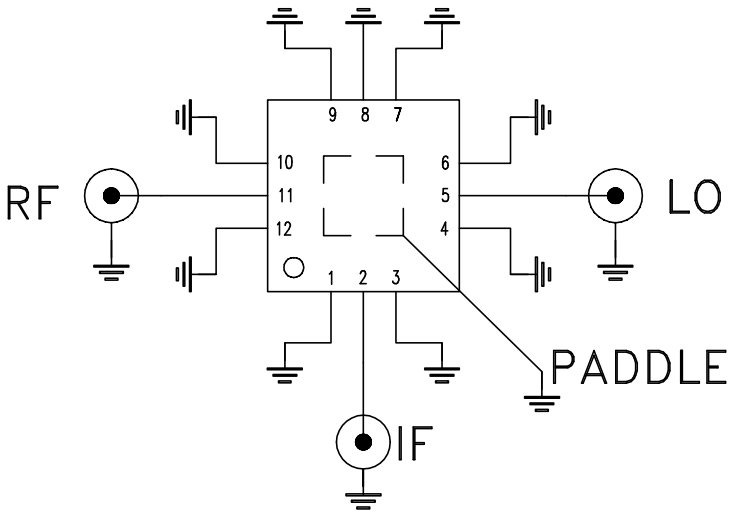
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-705	OR

FILE:	SCALE:	SHEET:
98PL705	10:1	1 OF 1

Evaluation Board and Circuit



TB-MDB-54H+



Schematic Diagram

Notes:

1. 2.4mm Female connectors.
2. PCB Material: RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.0066 inch.

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Environmental Specifications ENV08T1

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 or -45° to 85° C or -55° to 105° C or -40° to 105° C or -40° to 95° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C or -65° to 150° Ambient Environment	Individual Model Data Sheet
HTOL	1000 hours at 125°C	MIL-STD-883, Method 1005, Condition B
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Mechanical Shock	1.5Kg, 0.5 ms, 5 shock pulses, Y1 direction only	MIL-STD-883, Method 2002, Condition B, except Y1 direction only
Vibration (Variable Frequency)	50g peak	MIL-STD-883, Method 2007, Condition B
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102, Condition C
HAST	130°C, 85% RH, 96 hours	JESD22-A110
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Solder Reflow Heat	Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1
Moisture Sensitivity: Level 1	Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 260°C peak	J-STD-020

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Specification	Test/Inspection Condition	Reference/Spec
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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