ULTRA HIGH DYNAMIC RANGE

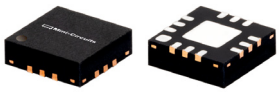
Monolithic Amplifier

LHA-23LN+

50Ω 30 MHz to 2 GHz

THE BIG DEAL

- Ultra-High IP3, +36.9 dBm typ
- Gain, 21.2 dB typ. at 1 GHz
- Low noise figure, 1.2 dB at 1 GHz
- Low voltage, +5V and +3V.



Generic photo used for illustration purposes only

CASE STYLE: DQ1225

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

APPLICATIONS

- Base station infrastructure
- CATV
- Cellular

PRODUCT OVERVIEW

LHA-23LN+ (RoHS compliant) is an advanced wideband amplifier fabricated using E-PHEMT technology and offers extremely high dynamic range over a broad frequency range and with low noise figure. In addition, the LHA-23LN+ has good input and output return loss over a broad frequency range. LHA-23LN+ is enclosed in a 3mm x 3mm, 12-lead MCLP package and has very good thermal performance.

KEY FEATURES

Feature	Advantages
Broad Band: 30 MHz to 2 GHz	Broadband covering primary wireless communications bands: VHF, UHF, Cellular
Extremely High IP3 +40.3 dBm typical at 0.5 GHz +36.9 dBm typical at1GHz	The LHA-23LN+ matches industry leading IP3 performance relative to device size and power consumption. The combination of the design and E-PHEMT Structure provides enhanced linearity over a broad frequency range as evidence in the IP3 being approximately 11-17 dB above the P1dB point. This feature makes this amplifier ideal for use in: • Driver amplifiers for complex waveform up converter paths • Drivers in linearized transmit systems • Secondary amplifiers in ultra-High Dynamic range receivers
Low Noise Figure 1.2 dB at 1 GHz	Enables lower system noise figure performance and along with High OIP3 provides high dynamic range
Low Supply Voltage	LHA-23LN+ supports low supply voltage operation which indicate low power consumption.

REV. A
ECO-011665
LHA-23LN+
MCL NY
240725

Monolithic Amplifier LHA-23LN+

50Ω 30 MHz to 2 GHz

ELECTRICAL SPECIFICATIONS[1] AT +25°C, 50Ω, UNLESS NOTED OTHERWISE

Parameter	Condition (MHz)	Vd=+5V[1] Min.	Vd=+5V[1] Typ.	Vd=+5V[1] Max.	Vd=+3V[1] Typ.	Units
Frequency Range		30		2000	30-2000	MHz
Gain	30	—	23.0	—	22.3	dB
	500	—	21.9	—	21.1	
	1000	18.9	21.2	23.1	19.9	
	1500	18.1	20.4	22.1	18.8	
	2000	—	19.6	—	17.6	
Input Return Loss	30		12		12	dB
	500		11		11	
	1000		10		8	
	1500		10		7	
	2000		10		8	
Output Return Loss	30		14		16	dB
	500		15		18	
	1000		19		23	
	1500		15		13	
	2000		11		9	
Reverse Isolation	1000		26.9		26.6	dB
Output Power @1 dB compression	30		+22.8		+17.1	dBm
	500		+24.2		+19.2	
	1000		+23.8		+18.8	
	1500		+23.2		+18.4	
	2000		+23.0		+18.0	
Output IP3 [2]	30		+39.8		+33.9	dBm
	500		+39.0		+33.5	
	1000		+36.9		+31.6	
	1500		+35.2		+30.7	
	2000		+34.6		+30.0	
Noise Figure	30		1.0		1.0	dB
	500		1.1		1.1	
	1000		1.2		1.2	
	1500		1.3		1.3	
	2000		1.5		1.6	
Device Operating Voltage			+5.0		+3.0	V
Device Operating Current			146	162	75	mA
Device Current Variation vs. Temperature[3]			-26.1		17.5	µA/°C
Device Current Variation vs Voltage			0.0359		0.0364	mA/mV
Thermal Resistance, junction-to-ground lead Junction-to-ground lead at 85°C stage temperature			23.3		23.3	°C/W

1. Measured on Mini-Circuits Characterization test board TB-1061-23LN+. See Characterization Test Circuit (Fig. 1)
2. Tested at Pout= 0 dBm / tone.
3. (Current at 105°C — Current at -45°C)/150

ABSOLUTE MAXIMUM RATINGS[4]

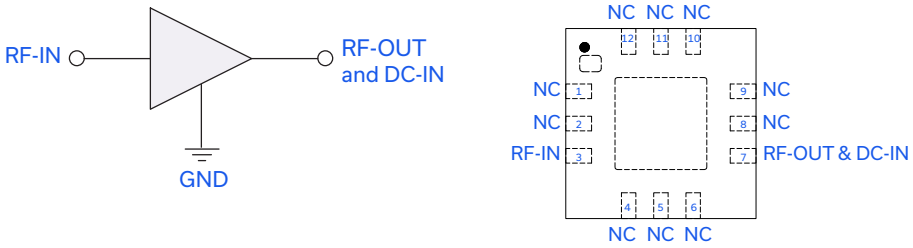
Parameter	Ratings
Operating Temperature (ground lead)	-40°C to +105°C
Storage Temperature	-65°C to +150°C
Power Dissipation[5]	3.3 W
Input Power (CW)	+22 dBm (5 minutes max)[6] +4 dBm (continuous) for 0.03-1GHz at 3V +8 dBm (continuous) for 0.03-1GHz at 5V +12 dBm (continuous) for 1-2GHz at 3V +15 dBm (continuous) for 1-2GHz at 5V
DC Voltage on Pin 7	+10 V

4. Permanent damage may occur if any of these limits are exceeded. Electrical maximum ratings are not intended for continuous normal operation.
5. Up to 85°C, derate linearly to 2.5W at 105°C.
6. Up to 85°C, derate linearly to +19dBm at 105°C.

Monolithic Amplifier LHA-23LN+

50Ω 30 MHz to 2 GHz

SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION



Function	Pad Number	Description
RF-IN	3	RF Input
RF-OUT and DC-IN	7	RF Output and DC Bias
GND	Paddle	Connections to ground.
NC	1-2, 4-6, 8-12	No connection, grounded externally

CHARACTERIZATION TEST / RECOMMENDED APPLICATION CIRCUIT

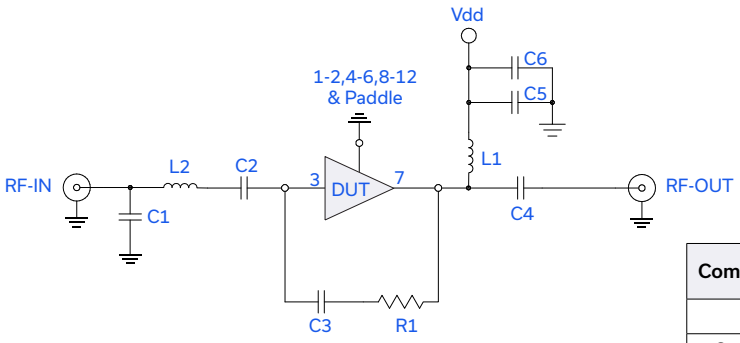
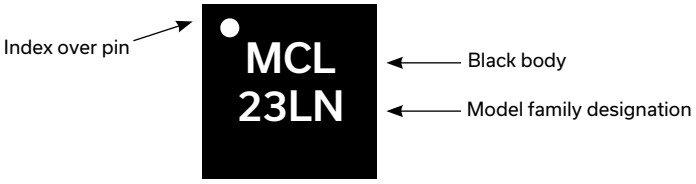


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-1061-23LN+)
Gain, Return loss, Output power at 1dB compression (P1 dB), output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:
1. Gain and Return loss: P_{IN}= -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/ tone at output.

Components	Size	Value	Manu-facturer	P/N
C1	0402	1.2pF	Murata	GRM1555C1H1R2WA01D
C2,C3,C6		0.1uF		GRM155R71C104KA88D
C4		0.001uF		GRM1555C1H102JA01D
C5		0.01uF		GRM155R71E103KA01D
R1		1.21KOhm	KOA	RK73H1ETTP1211F
L1	0805	0.68uH	Coilcraft	0805LS-681XJLB
L2	0402	1nH		0402CS-1N0XJLW

PRODUCT MARKING



Marking may contain other features or characters for internal lot control

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. CLICK HERE

Performance Data	Data Table Swept Graphs
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, 2K or 3K devices
Suggested Layout for PCB Design	PL-587
Evaluation Board	TB-1061-23HLN+
Environmental Ratings	ENV08T9

ESD RATING
Human Body Model (HBM): Class 1B (Pass 500 V) in accordance with ANSI/ESD STM 5.1 - 2001

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

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

NOTE: Use PDF Bookmarks to view DATA at required conditions

Definitions:

Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 5.00V, Id = 146.02mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20	23.34	26.48	10.46	14.41	1.02	0.50	38.94	21.73	1.11
30	23.00	25.96	11.61	14.37	1.02	0.47	40.04	22.78	1.08
40	22.77	25.72	12.24	13.86	1.03	0.46	42.34	23.50	1.03
50	22.63	25.59	12.58	13.52	1.03	0.45	41.40	23.86	1.04
60	22.54	25.52	12.78	13.29	1.03	0.44	40.96	23.81	1.06
70	22.48	25.47	12.91	13.15	1.03	0.44	40.71	23.77	1.07
80	22.44	25.44	13.00	13.07	1.04	0.43	40.92	23.83	0.96
90	22.41	25.43	13.06	13.04	1.04	0.44	41.61	23.81	0.97
100	22.38	25.41	13.08	13.00	1.04	0.44	41.79	23.67	1.04
150	22.30	25.40	13.07	12.98	1.04	0.44	40.48	24.02	1.02
200	22.25	25.42	12.97	13.04	1.04	0.45	40.75	24.03	0.94
250	22.20	25.46	12.76	13.19	1.05	0.47	40.00	24.19	0.96
300	22.16	25.50	12.56	13.37	1.05	0.48	40.54	24.10	1.07
350	22.10	25.56	12.32	13.55	1.05	0.50	39.20	24.16	1.02
400	22.05	25.63	12.03	13.78	1.06	0.52	39.60	24.03	1.00
450	21.99	25.70	11.76	14.05	1.06	0.54	39.51	24.18	1.04
500	21.94	25.78	11.51	14.37	1.07	0.56	39.15	24.16	1.08
550	21.86	25.87	11.24	14.71	1.07	0.58	38.35	23.76	1.06
600	21.80	25.96	11.01	15.12	1.08	0.60	38.72	23.92	1.16
650	21.73	26.06	10.77	15.46	1.08	0.63	38.18	23.81	1.07
700	21.66	26.17	10.52	15.92	1.09	0.65	37.70	23.78	1.12
750	21.58	26.29	10.33	16.29	1.10	0.68	37.75	23.95	1.21
800	21.51	26.42	10.16	16.78	1.11	0.70	36.96	23.67	1.12
850	21.44	26.54	9.99	17.25	1.12	0.72	36.73	23.50	1.14
900	21.37	26.66	9.82	17.66	1.12	0.74	36.36	23.40	1.14
1000	21.23	26.91	9.50	18.15	1.14	0.78	36.76	23.82	1.21
1100	21.08	27.18	9.29	18.16	1.16	0.82	35.47	23.25	1.18
1200	20.93	27.45	9.17	17.62	1.18	0.85	35.60	23.35	1.27
1300	20.78	27.71	9.16	16.76	1.21	0.87	34.99	23.16	1.27
1400	20.63	27.97	9.24	15.72	1.23	0.89	34.92	23.00	1.31
1500	20.49	28.20	9.42	14.72	1.26	0.90	35.01	23.29	1.25
1600	20.36	28.45	9.66	13.74	1.28	0.90	34.54	22.95	1.31
1700	20.22	28.68	9.97	12.90	1.31	0.91	34.81	23.20	1.32
1800	20.08	28.90	10.27	12.13	1.33	0.91	33.98	22.77	1.38
1900	19.92	29.14	10.45	11.50	1.36	0.92	34.13	22.84	1.43
2000	19.73	29.39	10.38	10.98	1.38	0.93	34.55	23.09	1.48
2100	19.49	29.68	9.92	10.54	1.40	0.95	33.86	22.62	1.54
2200	19.19	30.00	9.12	10.19	1.43	0.99	34.42	23.12	1.61
2300	18.82	30.36	8.09	9.90	1.45	1.03	33.48	22.48	1.71
2400	18.37	30.81	7.00	9.64	1.47	1.08	32.88	22.10	1.87
2500	17.83	31.31	5.94	9.40	1.49	1.14	32.71	22.03	2.10

Typical Performance Data

Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 3.00V, Id = 73.79mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20	22.61	26.02	10.50	15.25	1.03	0.54	32.37	15.49	1.01
30	22.31	25.45	12.05	15.91	1.03	0.51	33.80	17.01	0.98
40	22.11	25.19	12.99	15.51	1.03	0.49	34.08	18.14	0.93
50	21.98	25.05	13.55	15.16	1.04	0.48	33.83	18.68	0.95
60	21.90	24.97	13.88	14.92	1.04	0.48	34.26	18.81	0.98
70	21.84	24.92	14.12	14.78	1.04	0.47	34.25	18.90	1.00
80	21.80	24.88	14.25	14.69	1.04	0.47	34.18	18.94	0.91
90	21.77	24.87	14.33	14.67	1.04	0.47	34.63	18.95	0.89
100	21.74	24.85	14.36	14.64	1.04	0.47	34.72	18.88	1.00
150	21.66	24.84	14.18	14.69	1.05	0.48	34.02	19.12	0.94
200	21.59	24.88	13.79	14.85	1.05	0.50	34.04	19.15	0.90
250	21.52	24.93	13.25	15.15	1.05	0.52	33.98	19.24	0.91
300	21.45	24.99	12.69	15.53	1.05	0.54	34.39	19.18	0.98
350	21.37	25.07	12.12	15.94	1.06	0.57	33.93	19.19	0.97
400	21.28	25.16	11.56	16.45	1.06	0.60	33.89	19.09	0.97
450	21.19	25.25	11.04	17.08	1.06	0.63	33.91	19.17	0.99
500	21.10	25.35	10.56	17.82	1.07	0.66	33.46	19.14	1.04
550	20.98	25.48	10.12	18.66	1.07	0.69	33.62	18.84	1.01
600	20.88	25.59	9.71	19.71	1.08	0.72	33.38	18.95	1.12
650	20.77	25.72	9.34	20.72	1.08	0.76	33.00	18.86	1.03
700	20.66	25.85	8.97	22.05	1.09	0.79	32.76	18.81	1.07
750	20.53	25.99	8.68	23.22	1.10	0.82	32.54	18.92	1.16
800	20.40	26.13	8.43	24.48	1.11	0.85	32.25	18.70	1.09
850	20.28	26.26	8.18	25.34	1.11	0.88	32.00	18.55	1.13
900	20.17	26.39	7.95	25.35	1.12	0.90	31.85	18.48	1.13
1000	19.94	26.64	7.58	23.13	1.13	0.95	31.48	18.79	1.19
1100	19.70	26.87	7.33	20.31	1.14	0.98	31.01	18.40	1.18
1200	19.46	27.08	7.19	17.90	1.16	1.01	30.97	18.48	1.24
1300	19.24	27.26	7.16	16.00	1.17	1.02	30.91	18.35	1.27
1400	19.02	27.40	7.20	14.43	1.18	1.03	30.78	18.26	1.32
1500	18.81	27.51	7.33	13.17	1.19	1.03	30.67	18.45	1.26
1600	18.61	27.61	7.50	12.11	1.20	1.02	30.60	18.21	1.38
1700	18.41	27.70	7.70	11.24	1.21	1.02	30.36	18.36	1.37
1800	18.19	27.77	7.86	10.49	1.22	1.01	30.24	18.00	1.42
1900	17.95	27.86	7.92	9.91	1.23	1.01	30.12	17.98	1.45
2000	17.67	27.97	7.80	9.45	1.24	1.02	30.07	18.03	1.50
2100	17.33	28.12	7.42	9.09	1.24	1.04	29.81	17.78	1.58
2200	16.91	28.34	6.85	8.83	1.26	1.06	29.44	17.90	1.66
2300	16.42	28.63	6.12	8.65	1.27	1.10	29.20	17.56	1.78
2400	15.84	29.01	5.33	8.51	1.29	1.15	28.82	17.38	1.94
2500	15.17	29.46	4.57	8.43	1.32	1.20	28.77	17.25	2.25

Typical Performance Data

Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 5.25V, Id = 154.52mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20	23.38	26.51	10.46	14.41	1.02	0.50	40.40	22.24	1.07
30	23.04	25.98	11.59	14.33	1.02	0.47	39.86	23.18	1.04
40	22.81	25.75	12.19	13.82	1.03	0.45	40.92	23.95	0.98
50	22.67	25.62	12.53	13.47	1.03	0.44	41.67	24.28	0.99
60	22.58	25.54	12.71	13.23	1.03	0.44	41.48	24.23	1.02
70	22.52	25.51	12.84	13.09	1.03	0.44	42.02	24.19	1.01
80	22.48	25.47	12.93	13.01	1.03	0.43	42.19	24.26	0.92
90	22.45	25.46	12.97	12.98	1.04	0.43	42.33	24.24	0.92
100	22.42	25.44	13.01	12.94	1.04	0.43	42.31	24.11	1.01
150	22.34	25.43	13.00	12.91	1.04	0.44	41.15	24.44	0.96
200	22.29	25.45	12.92	12.97	1.04	0.45	40.57	24.46	0.90
250	22.24	25.49	12.72	13.10	1.05	0.46	40.45	24.62	0.92
300	22.20	25.53	12.54	13.26	1.05	0.48	41.05	24.55	0.98
350	22.15	25.59	12.30	13.42	1.05	0.49	40.55	24.61	0.96
400	22.09	25.66	12.03	13.63	1.06	0.51	39.52	24.48	0.98
450	22.04	25.73	11.80	13.87	1.06	0.53	41.09	24.63	1.01
500	21.99	25.81	11.54	14.16	1.07	0.55	39.81	24.61	1.02
550	21.91	25.90	11.29	14.46	1.07	0.57	38.84	24.20	0.99
600	21.86	25.99	11.07	14.83	1.08	0.60	39.08	24.37	1.10
650	21.79	26.09	10.85	15.11	1.08	0.62	38.42	24.26	1.02
700	21.72	26.20	10.61	15.52	1.09	0.64	38.31	24.24	1.22
750	21.64	26.32	10.43	15.84	1.10	0.67	38.58	24.41	1.29
800	21.57	26.44	10.28	16.25	1.11	0.69	37.73	24.12	1.07
850	21.50	26.56	10.10	16.65	1.12	0.71	37.15	23.97	1.10
900	21.44	26.68	9.94	17.00	1.12	0.73	36.80	23.89	1.08
1000	21.30	26.94	9.64	17.40	1.14	0.77	37.29	24.29	1.13
1100	21.16	27.21	9.44	17.41	1.16	0.81	36.08	23.73	1.17
1200	21.01	27.49	9.32	16.97	1.19	0.83	36.22	23.85	1.21
1300	20.86	27.77	9.32	16.25	1.21	0.86	35.59	23.66	1.22
1400	20.72	28.04	9.40	15.34	1.24	0.87	35.41	23.52	1.26
1500	20.59	28.28	9.58	14.44	1.27	0.88	35.70	23.75	1.21
1600	20.46	28.55	9.83	13.55	1.29	0.89	35.13	23.42	1.32
1700	20.33	28.80	10.16	12.76	1.32	0.90	35.50	23.66	1.31
1800	20.19	29.05	10.47	12.03	1.35	0.90	34.55	23.21	1.37
1900	20.03	29.31	10.67	11.43	1.38	0.91	34.70	23.26	1.40
2000	19.84	29.59	10.59	10.92	1.40	0.92	35.03	23.58	1.47
2100	19.62	29.89	10.13	10.49	1.43	0.95	34.42	23.11	1.51
2200	19.32	30.24	9.31	10.14	1.45	0.98	35.08	23.61	1.61
2300	18.96	30.63	8.26	9.83	1.48	1.02	34.09	22.97	1.67
2400	18.52	31.10	7.14	9.55	1.50	1.07	33.35	22.50	1.88
2500	17.99	31.62	6.06	9.30	1.53	1.13	33.31	22.48	2.13

Typical Performance Data

Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 5.00V, Id = 145.64mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20	23.31	26.27	10.45	15.09	1.02	0.49	39.18	21.55	0.85
30	22.97	25.76	11.74	15.30	1.02	0.46	40.68	22.92	0.80
40	22.74	25.53	12.49	14.79	1.02	0.45	41.89	23.76	0.75
50	22.60	25.40	12.93	14.46	1.03	0.44	42.02	24.15	0.73
60	22.51	25.32	13.19	14.25	1.03	0.43	42.43	24.07	0.77
70	22.46	25.28	13.43	14.15	1.03	0.43	42.38	24.03	0.77
80	22.43	25.24	13.61	14.12	1.03	0.43	43.07	24.08	0.67
90	22.39	25.22	13.75	14.14	1.03	0.43	43.51	24.06	0.66
100	22.37	25.20	13.85	14.15	1.04	0.43	43.56	23.88	0.73
150	22.31	25.17	14.13	14.32	1.04	0.43	43.32	24.28	0.71
200	22.27	25.20	14.04	14.27	1.04	0.44	42.75	24.29	0.67
250	22.21	25.24	13.58	14.00	1.04	0.45	43.63	24.46	0.68
300	22.16	25.30	13.12	13.71	1.05	0.46	42.58	24.31	0.75
350	22.11	25.37	12.72	13.55	1.05	0.47	41.89	24.34	0.72
400	22.06	25.44	12.41	13.60	1.05	0.49	41.42	24.18	0.72
450	22.02	25.50	12.22	13.82	1.06	0.50	42.02	24.35	0.74
500	21.98	25.57	12.04	14.10	1.06	0.52	41.67	24.32	0.78
550	21.92	25.66	11.82	14.33	1.07	0.54	40.64	23.91	0.76
600	21.87	25.75	11.59	14.56	1.07	0.56	41.20	24.09	0.82
650	21.82	25.84	11.34	14.67	1.08	0.58	40.41	23.98	0.76
700	21.77	25.95	11.10	14.91	1.08	0.60	40.19	23.96	0.76
750	21.71	26.07	10.96	15.07	1.09	0.62	40.08	24.16	0.80
800	21.65	26.19	10.86	15.25	1.10	0.64	39.59	23.87	0.78
850	21.58	26.31	10.73	15.35	1.11	0.66	39.22	23.70	0.82
900	21.53	26.43	10.54	15.34	1.11	0.67	38.79	23.61	0.81
1000	21.42	26.69	10.15	15.15	1.13	0.71	39.61	24.13	0.86
1100	21.31	26.96	9.93	15.04	1.15	0.74	38.25	23.50	0.89
1200	21.19	27.26	9.80	14.80	1.17	0.77	38.36	23.63	0.95
1300	21.06	27.56	9.73	14.45	1.20	0.80	37.17	23.38	0.90
1400	20.95	27.86	9.79	13.97	1.22	0.82	36.94	23.22	0.95
1500	20.84	28.15	10.01	13.32	1.25	0.83	37.29	23.51	0.91
1600	20.73	28.48	10.25	12.56	1.28	0.84	36.96	23.18	1.02
1700	20.62	28.79	10.61	11.92	1.32	0.84	37.37	23.58	0.99
1800	20.52	29.11	11.07	11.34	1.35	0.85	36.21	22.99	1.04
1900	20.40	29.44	11.40	10.89	1.38	0.86	36.31	23.13	1.05
2000	20.26	29.79	11.39	10.53	1.42	0.88	37.06	23.46	1.10
2100	20.08	30.18	10.98	10.23	1.45	0.90	36.16	23.03	1.13
2200	19.84	30.62	10.18	9.91	1.49	0.94	37.21	23.59	1.21
2300	19.54	31.09	9.05	9.56	1.51	0.98	35.84	22.88	1.29
2400	19.16	31.70	7.84	9.16	1.55	1.02	34.92	22.44	1.39
2500	18.70	32.32	6.65	8.78	1.58	1.07	34.78	22.39	1.63

Typical Performance Data

Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 3.00V, Id = 72.11mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20	22.61	25.93	10.42	15.46	1.03	0.54	32.49	15.36	0.77
30	22.31	25.36	12.05	16.40	1.03	0.51	33.98	16.92	0.75
40	22.11	25.10	13.06	16.08	1.03	0.49	34.49	18.11	0.71
50	21.99	24.96	13.69	15.79	1.03	0.48	33.98	18.68	0.70
60	21.91	24.87	14.11	15.61	1.04	0.47	34.35	18.85	0.74
70	21.86	24.82	14.42	15.52	1.04	0.47	34.34	18.96	0.73
80	21.83	24.78	14.65	15.51	1.04	0.47	34.58	19.01	0.66
90	21.80	24.76	14.80	15.56	1.04	0.47	34.51	19.03	0.64
100	21.77	24.74	14.93	15.61	1.04	0.47	34.71	18.97	0.75
150	21.71	24.72	15.04	15.94	1.04	0.47	33.84	19.23	0.72
200	21.65	24.75	14.65	15.99	1.05	0.49	34.07	19.26	0.65
250	21.58	24.80	13.91	15.83	1.05	0.50	33.84	19.34	0.68
300	21.51	24.87	13.18	15.72	1.05	0.52	33.83	19.28	0.78
350	21.44	24.95	12.50	15.79	1.05	0.54	33.35	19.28	0.72
400	21.36	25.03	11.92	16.11	1.06	0.57	33.14	19.18	0.71
450	21.28	25.12	11.45	16.70	1.06	0.60	33.12	19.24	0.73
500	21.21	25.22	11.02	17.46	1.06	0.62	32.72	19.21	0.78
550	21.11	25.33	10.59	18.26	1.07	0.66	32.48	18.93	0.74
600	21.02	25.44	10.18	19.19	1.07	0.69	32.16	19.03	0.87
650	20.93	25.56	9.79	20.04	1.08	0.72	31.86	18.96	0.77
700	20.83	25.68	9.42	21.17	1.08	0.75	31.70	18.90	0.81
750	20.73	25.81	9.15	22.01	1.09	0.77	31.56	19.03	1.05
800	20.62	25.95	8.92	22.56	1.10	0.80	31.21	18.79	0.79
850	20.51	26.08	8.70	22.68	1.11	0.83	30.90	18.66	0.83
900	20.42	26.20	8.46	22.38	1.11	0.85	30.71	18.59	0.82
1000	20.23	26.45	8.03	21.19	1.12	0.89	30.59	18.91	0.85
1100	20.03	26.69	7.76	19.72	1.13	0.93	30.02	18.51	0.86
1200	19.83	26.91	7.59	18.13	1.15	0.96	29.99	18.57	0.96
1300	19.62	27.13	7.49	16.58	1.16	0.98	29.72	18.41	0.93
1400	19.42	27.32	7.51	14.97	1.17	0.99	29.60	18.30	0.98
1500	19.24	27.46	7.64	13.51	1.18	0.99	29.59	18.49	0.90
1600	19.06	27.61	7.79	12.40	1.20	0.99	29.35	18.27	1.06
1700	18.89	27.73	8.00	11.52	1.21	0.99	29.29	18.42	1.05
1800	18.72	27.83	8.25	10.76	1.22	0.98	28.96	18.05	1.07
1900	18.52	27.93	8.35	10.18	1.22	0.98	28.84	18.02	1.07
2000	18.28	28.07	8.22	9.78	1.23	0.99	28.91	18.02	1.14
2100	18.00	28.23	7.86	9.44	1.23	1.01	28.51	17.76	1.16
2200	17.64	28.45	7.28	9.14	1.23	1.04	28.47	17.89	1.23
2300	17.19	28.73	6.51	8.87	1.24	1.08	28.01	17.55	1.31
2400	16.66	29.12	5.68	8.65	1.25	1.13	27.61	17.35	1.45
2500	16.05	29.56	4.87	8.50	1.26	1.18	27.52	17.18	1.70

Typical Performance Data

Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 5.25V, Id = 154.75mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20	23.35	26.29	10.46	15.07	1.02	0.48	41.26	22.08	0.88
30	23.00	25.79	11.73	15.24	1.02	0.46	40.66	23.36	0.82
40	22.78	25.56	12.47	14.73	1.02	0.45	42.50	24.24	0.74
50	22.64	25.43	12.87	14.39	1.03	0.44	44.25	24.59	0.73
60	22.55	25.35	13.16	14.19	1.03	0.43	43.80	24.51	0.78
70	22.50	25.31	13.37	14.09	1.03	0.43	43.45	24.45	0.77
80	22.46	25.27	13.54	14.06	1.03	0.43	43.29	24.53	0.69
90	22.43	25.25	13.69	14.07	1.03	0.43	45.95	24.50	0.68
100	22.41	25.23	13.78	14.09	1.03	0.43	44.12	24.32	0.77
150	22.35	25.20	14.04	14.23	1.04	0.43	43.55	24.72	0.71
200	22.30	25.23	13.96	14.15	1.04	0.44	43.86	24.73	0.67
250	22.25	25.27	13.53	13.89	1.04	0.45	43.63	24.91	0.70
300	22.20	25.33	13.08	13.61	1.05	0.46	44.42	24.77	0.80
350	22.14	25.40	12.67	13.44	1.05	0.47	42.38	24.80	0.71
400	22.09	25.46	12.39	13.48	1.05	0.48	43.52	24.64	0.72
450	22.06	25.53	12.21	13.68	1.06	0.50	44.62	24.80	0.76
500	22.02	25.60	12.04	13.93	1.06	0.52	43.04	24.80	0.77
550	21.96	25.69	11.83	14.13	1.06	0.54	42.46	24.36	0.75
600	21.91	25.78	11.61	14.36	1.07	0.56	44.24	24.56	0.87
650	21.86	25.87	11.39	14.46	1.07	0.57	43.80	24.46	0.75
700	21.81	25.97	11.15	14.68	1.08	0.59	43.88	24.43	0.77
750	21.75	26.09	11.02	14.81	1.09	0.61	43.29	24.65	0.83
800	21.69	26.21	10.92	14.95	1.10	0.63	42.87	24.40	0.79
850	21.63	26.33	10.80	15.03	1.10	0.65	42.68	24.18	0.83
900	21.58	26.45	10.62	15.03	1.11	0.67	41.78	24.10	0.82
1000	21.47	26.71	10.25	14.85	1.13	0.70	43.56	24.63	0.86
1100	21.36	26.99	10.03	14.73	1.15	0.73	41.53	24.04	0.85
1200	21.24	27.28	9.90	14.49	1.17	0.76	40.84	24.18	0.92
1300	21.12	27.59	9.85	14.19	1.20	0.79	39.91	23.91	0.92
1400	21.01	27.90	9.91	13.74	1.22	0.81	40.19	23.74	0.96
1500	20.90	28.19	10.13	13.11	1.25	0.82	40.40	24.05	0.91
1600	20.79	28.53	10.38	12.41	1.29	0.83	39.89	23.73	1.00
1700	20.68	28.85	10.76	11.80	1.32	0.84	40.70	24.09	0.98
1800	20.58	29.18	11.24	11.23	1.35	0.84	38.96	23.51	1.03
1900	20.47	29.53	11.57	10.79	1.39	0.85	39.15	23.67	1.06
2000	20.32	29.90	11.56	10.44	1.43	0.87	39.89	24.03	1.13
2100	20.15	30.30	11.15	10.14	1.46	0.90	39.50	23.56	1.14
2200	19.92	30.76	10.32	9.82	1.50	0.93	40.58	24.14	1.22
2300	19.62	31.26	9.17	9.47	1.53	0.97	38.81	23.40	1.28
2400	19.24	31.89	7.94	9.06	1.58	1.02	37.93	22.96	1.39
2500	18.79	32.53	6.74	8.67	1.61	1.07	37.76	22.90	1.62

Typical Performance Data

Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 5.00V, Id = 141.49mA @ Temperature = +105°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20	22.82	26.72	10.65	13.44	1.05	0.57	36.63	20.56	1.30
30	22.52	26.16	11.98	13.59	1.04	0.54	37.58	21.68	1.28
40	22.31	25.90	12.75	13.20	1.05	0.52	38.38	22.38	1.23
50	22.18	25.76	13.17	12.89	1.05	0.51	38.41	22.73	1.23
60	22.10	25.68	13.37	12.66	1.05	0.50	37.91	22.82	1.32
70	22.04	25.63	13.50	12.50	1.05	0.49	38.15	22.86	1.32
80	22.00	25.60	13.55	12.37	1.05	0.49	38.93	22.95	1.22
90	21.96	25.58	13.53	12.29	1.06	0.49	38.95	22.95	1.24
100	21.93	25.57	13.50	12.21	1.06	0.49	39.64	22.91	1.29
150	21.84	25.57	13.08	11.98	1.06	0.49	39.36	23.18	1.30
200	21.78	25.61	12.68	11.98	1.06	0.51	38.87	23.22	1.23
250	21.72	25.64	12.34	12.20	1.07	0.52	38.57	23.34	1.23
300	21.68	25.69	12.09	12.59	1.07	0.54	39.89	23.33	1.27
350	21.64	25.74	11.85	13.03	1.07	0.56	39.03	23.42	1.29
400	21.58	25.80	11.55	13.49	1.08	0.59	39.37	23.36	1.30
450	21.53	25.87	11.25	13.97	1.08	0.61	39.83	23.46	1.38
500	21.47	25.96	10.92	14.43	1.09	0.63	38.66	23.44	1.39
550	21.39	26.06	10.58	14.86	1.09	0.66	39.17	23.21	1.36
600	21.33	26.16	10.27	15.32	1.10	0.68	38.97	23.33	1.54
650	21.25	26.26	9.98	15.74	1.11	0.70	38.63	23.25	1.40
700	21.17	26.38	9.71	16.30	1.12	0.73	38.54	23.23	1.38
750	21.09	26.50	9.51	16.83	1.13	0.75	38.31	23.41	1.52
800	21.03	26.62	9.32	17.43	1.13	0.77	38.18	23.18	1.43
850	20.96	26.74	9.14	17.97	1.14	0.79	37.51	23.05	1.45
900	20.89	26.86	8.99	18.39	1.15	0.81	37.15	22.96	1.45
1000	20.75	27.11	8.72	18.77	1.17	0.85	37.30	23.26	1.47
1100	20.61	27.36	8.57	18.50	1.19	0.88	36.23	22.85	1.49
1200	20.47	27.61	8.49	17.64	1.21	0.90	36.22	22.89	1.56
1300	20.34	27.85	8.50	16.55	1.23	0.92	35.76	22.79	1.57
1400	20.21	28.07	8.60	15.45	1.26	0.93	35.90	22.63	1.65
1500	20.08	28.27	8.78	14.47	1.28	0.93	35.77	22.77	1.57
1600	19.95	28.50	9.01	13.55	1.30	0.94	35.32	22.52	1.71
1700	19.81	28.71	9.27	12.73	1.33	0.94	35.48	22.66	1.70
1800	19.65	28.91	9.48	12.00	1.35	0.95	34.92	22.32	1.77
1900	19.47	29.13	9.53	11.38	1.37	0.96	34.93	22.45	1.82
2000	19.24	29.39	9.37	10.84	1.39	0.97	35.38	22.53	1.91
2100	18.96	29.67	8.89	10.37	1.41	0.99	34.68	22.17	1.97
2200	18.61	30.00	8.16	10.00	1.44	1.03	34.92	22.41	2.11
2300	18.19	30.36	7.26	9.67	1.46	1.07	34.11	21.91	2.22
2400	17.68	30.83	6.33	9.36	1.49	1.11	33.53	21.46	2.41
2500	17.08	31.31	5.44	9.10	1.52	1.16	33.42	21.39	2.72

Typical Performance Data

Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 3.00V, Id = 74.81mA @ Temperature = +105°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20	22.18	26.13	10.56	14.67	1.05	0.60	31.78	15.04	1.23
30	21.91	25.53	12.26	15.37	1.05	0.56	32.82	16.48	1.23
40	21.71	25.26	13.37	15.03	1.05	0.54	33.55	17.53	1.18
50	21.59	25.11	14.01	14.69	1.05	0.53	33.49	18.05	1.19
60	21.51	25.02	14.42	14.43	1.05	0.52	33.39	18.21	1.24
70	21.45	24.98	14.65	14.23	1.05	0.52	33.44	18.32	1.21
80	21.41	24.94	14.77	14.09	1.06	0.52	33.69	18.39	1.16
90	21.38	24.93	14.80	14.00	1.06	0.52	33.87	18.41	1.16
100	21.35	24.91	14.76	13.91	1.06	0.52	34.18	18.36	1.25
150	21.24	24.92	14.16	13.67	1.06	0.53	33.45	18.61	1.22
200	21.16	24.97	13.45	13.73	1.06	0.54	33.65	18.64	1.17
250	21.08	25.03	12.77	14.10	1.07	0.57	33.44	18.72	1.22
300	21.01	25.10	12.20	14.71	1.07	0.60	33.89	18.68	1.32
350	20.93	25.18	11.63	15.43	1.07	0.63	33.42	18.71	1.25
400	20.84	25.27	11.09	16.24	1.08	0.66	33.57	18.61	1.23
450	20.75	25.37	10.55	17.14	1.08	0.69	33.62	18.69	1.27
500	20.65	25.49	10.04	18.07	1.09	0.72	33.05	18.67	1.31
550	20.53	25.62	9.55	19.04	1.09	0.76	33.40	18.40	1.32
600	20.42	25.75	9.11	20.17	1.10	0.79	33.08	18.50	1.33
650	20.30	25.88	8.71	21.30	1.11	0.82	32.63	18.40	1.34
700	20.18	26.03	8.35	22.78	1.11	0.85	32.47	18.35	1.33
750	20.05	26.18	8.07	24.16	1.12	0.88	32.19	18.48	1.34
800	19.93	26.32	7.80	25.40	1.13	0.91	31.85	18.27	1.39
850	19.81	26.45	7.57	25.83	1.14	0.94	31.53	18.14	1.42
900	19.69	26.58	7.36	25.11	1.14	0.96	31.41	18.06	1.42
1000	19.46	26.82	7.05	22.19	1.15	1.00	31.09	18.34	1.52
1100	19.24	27.03	6.85	19.40	1.17	1.03	30.60	17.98	1.48
1200	19.02	27.21	6.76	17.17	1.18	1.04	30.59	18.05	1.56
1300	18.81	27.35	6.76	15.43	1.19	1.05	30.43	17.95	1.57
1400	18.61	27.46	6.83	14.03	1.20	1.06	30.33	17.85	1.65
1500	18.42	27.54	6.97	12.89	1.21	1.05	30.25	18.03	1.60
1600	18.22	27.62	7.15	11.91	1.22	1.05	30.17	17.80	1.73
1700	18.02	27.70	7.33	11.09	1.23	1.04	30.00	17.99	1.72
1800	17.79	27.77	7.46	10.39	1.23	1.04	29.85	17.62	1.77
1900	17.53	27.87	7.47	9.82	1.24	1.04	29.75	17.67	1.84
2000	17.21	28.00	7.32	9.35	1.25	1.04	29.64	17.60	1.92
2100	16.83	28.18	6.94	8.96	1.26	1.06	29.31	17.37	2.00
2200	16.37	28.44	6.40	8.68	1.29	1.09	29.07	17.53	2.12
2300	15.83	28.75	5.74	8.46	1.31	1.12	28.75	17.19	2.25
2400	15.21	29.16	5.04	8.28	1.34	1.16	28.43	16.92	2.48
2500	14.50	29.63	4.38	8.17	1.39	1.21	28.32	16.79	2.80

Typical Performance Data

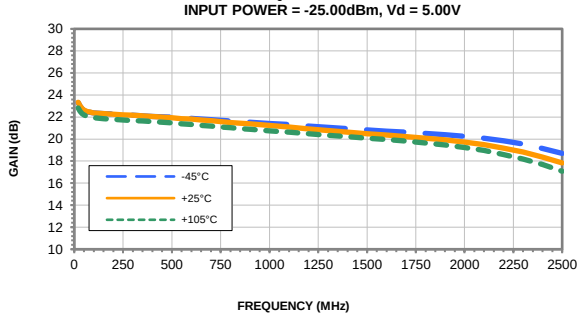
Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 5.25V, Id = 148.94mA @ Temperature = +105°C

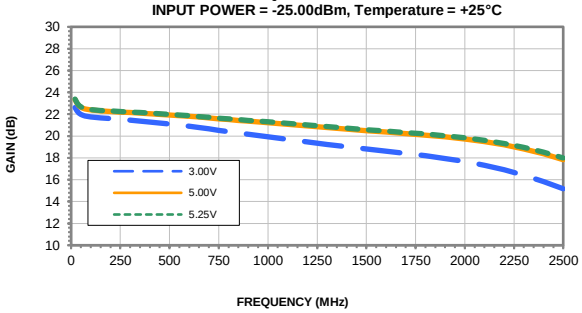
FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20	22.48	27.10	9.73	11.51	1.07	0.60	36.48	20.28	1.36
30	22.27	26.45	11.27	12.27	1.06	0.57	37.65	21.71	1.31
40	22.11	26.15	12.22	12.21	1.06	0.55	38.03	22.49	1.26
50	22.00	25.99	12.74	12.06	1.06	0.53	37.88	22.86	1.26
60	21.93	25.88	13.05	11.92	1.06	0.52	38.24	23.00	1.33
70	21.89	25.83	13.22	11.82	1.06	0.52	39.13	23.07	1.33
80	21.86	25.78	13.31	11.73	1.06	0.51	38.83	23.19	1.23
90	21.83	25.76	13.31	11.68	1.06	0.51	39.47	23.20	1.26
100	21.81	25.74	13.27	11.63	1.06	0.51	39.46	23.19	1.35
150	21.74	25.72	12.79	11.46	1.07	0.51	39.55	23.51	1.31
200	21.70	25.73	12.34	11.46	1.07	0.51	39.59	23.56	1.24
250	21.67	25.75	11.96	11.69	1.07	0.53	39.83	23.73	1.27
300	21.65	25.78	11.71	12.05	1.07	0.54	40.11	23.73	1.30
350	21.62	25.81	11.47	12.45	1.07	0.56	40.31	23.83	1.33
400	21.59	25.86	11.21	12.87	1.08	0.58	39.24	23.79	1.34
450	21.55	25.92	10.96	13.28	1.08	0.60	39.79	23.89	1.35
500	21.51	25.99	10.69	13.67	1.09	0.62	39.28	23.90	1.40
550	21.44	26.07	10.41	14.03	1.09	0.64	39.59	23.67	1.36
600	21.39	26.16	10.15	14.42	1.10	0.66	39.69	23.79	1.60
650	21.33	26.26	9.93	14.76	1.10	0.68	38.95	23.71	1.40
700	21.27	26.37	9.70	15.23	1.11	0.70	39.18	23.70	1.40
750	21.20	26.48	9.55	15.65	1.12	0.73	38.96	23.87	1.50
800	21.14	26.59	9.41	16.13	1.13	0.75	38.62	23.66	1.43
850	21.08	26.71	9.25	16.55	1.14	0.77	37.87	23.53	1.47
900	21.02	26.82	9.12	16.89	1.14	0.79	37.75	23.44	1.49
1000	20.89	27.07	8.90	17.22	1.16	0.82	37.87	23.73	1.54
1100	20.76	27.34	8.76	17.10	1.18	0.85	36.80	23.30	1.52
1200	20.62	27.60	8.68	16.52	1.21	0.87	36.92	23.38	1.60
1300	20.49	27.86	8.70	15.72	1.23	0.89	36.44	23.28	1.61
1400	20.35	28.11	8.79	14.85	1.26	0.91	36.16	23.10	1.65
1500	20.22	28.34	8.97	14.04	1.28	0.91	36.09	23.24	1.59
1600	20.09	28.59	9.20	13.25	1.31	0.92	35.78	22.97	1.74
1700	19.95	28.83	9.47	12.52	1.34	0.93	35.89	23.12	1.73
1800	19.80	29.06	9.67	11.86	1.36	0.93	35.42	22.82	1.80
1900	19.62	29.31	9.73	11.29	1.39	0.94	35.43	22.91	1.84
2000	19.40	29.59	9.56	10.78	1.41	0.96	35.79	23.02	1.92
2100	19.13	29.90	9.07	10.33	1.44	0.98	35.11	22.62	1.98
2200	18.78	30.25	8.32	9.96	1.46	1.02	35.33	22.85	2.11
2300	18.36	30.65	7.40	9.63	1.49	1.06	34.62	22.34	2.24
2400	17.87	31.14	6.44	9.32	1.52	1.10	33.99	21.84	2.43
2500	17.27	31.64	5.53	9.00	1.56	1.15	33.87	21.79	2.77

Typical Performance Curves

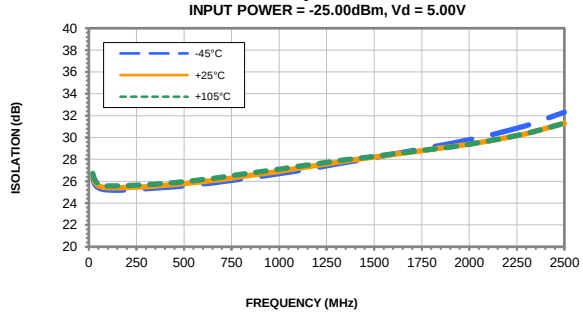
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



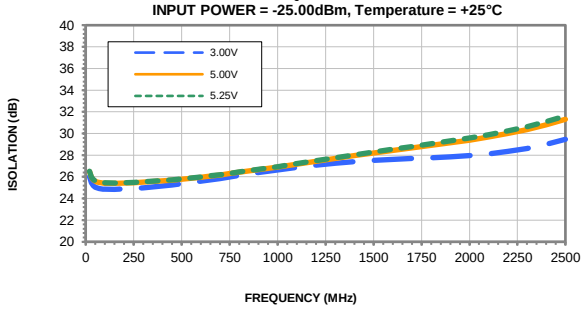
GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



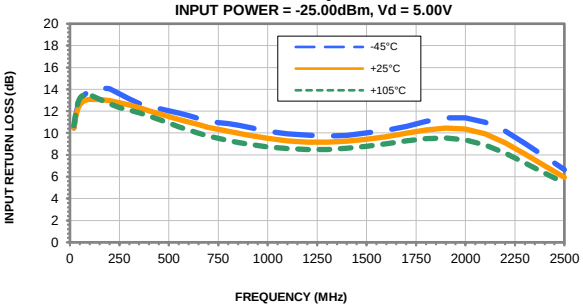
ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



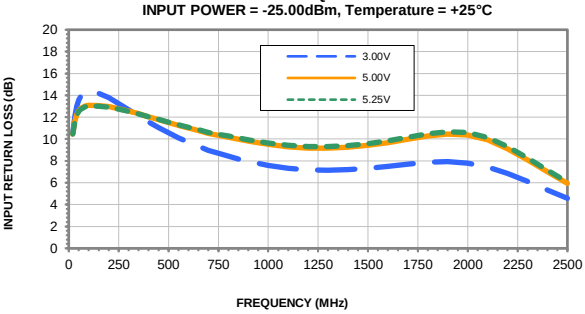
ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



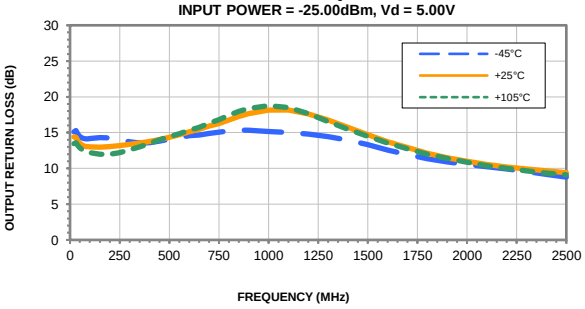
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



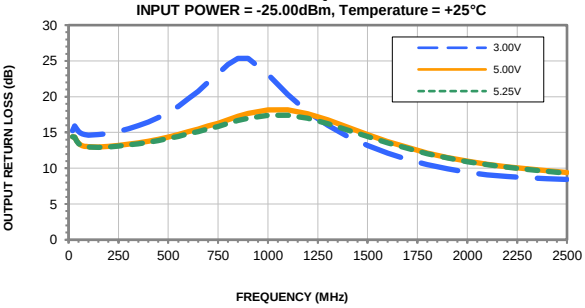
INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V

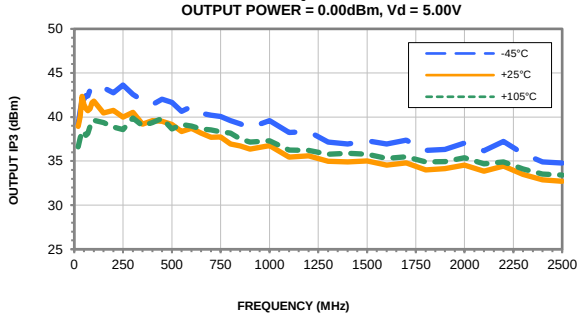


OUTPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C

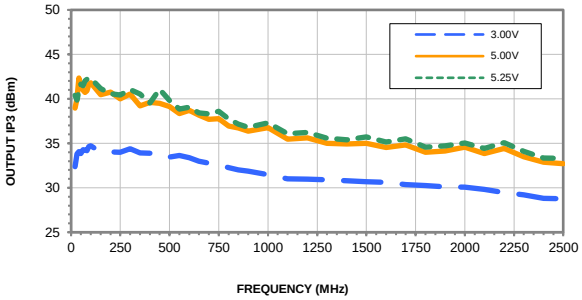


Typical Performance Curves

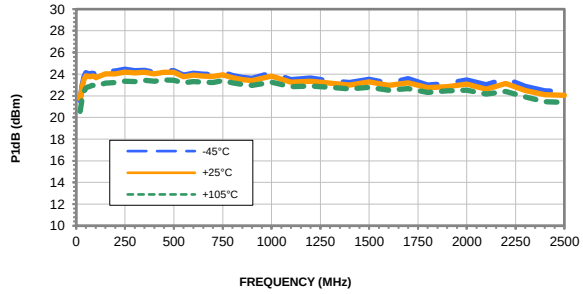
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE
OUTPUT POWER = 0.00dBm, Vd = 5.00V



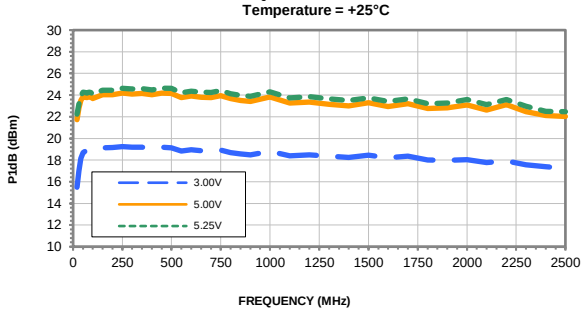
OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE
OUTPUT POWER = 0.00dBm, Temperature = +25°C



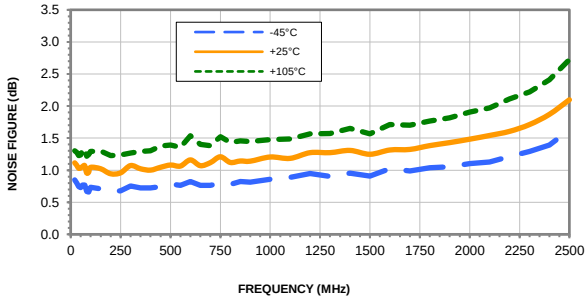
P1dB vs. FREQUENCY & TEMPERATURE
Vd = 5.00V



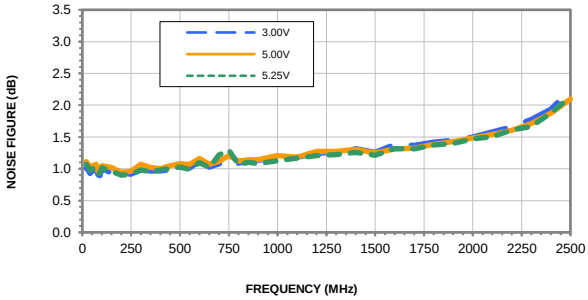
P1dB vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



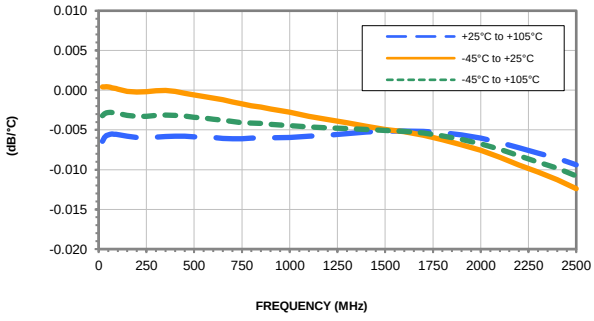
NOISE FIGURE vs. FREQUENCY & TEMPERATURE
Vd = 5.00V



NOISE FIGURE vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



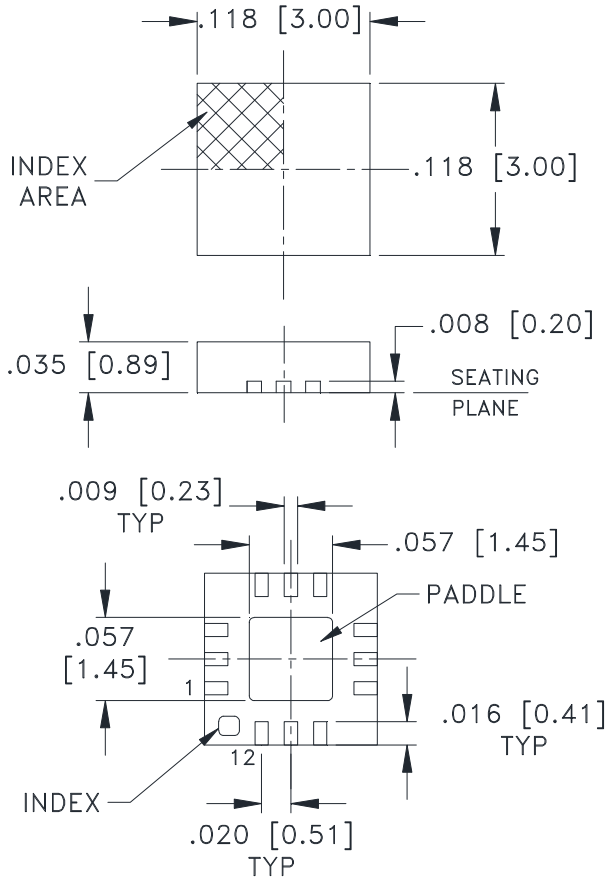
GAIN VARIATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V

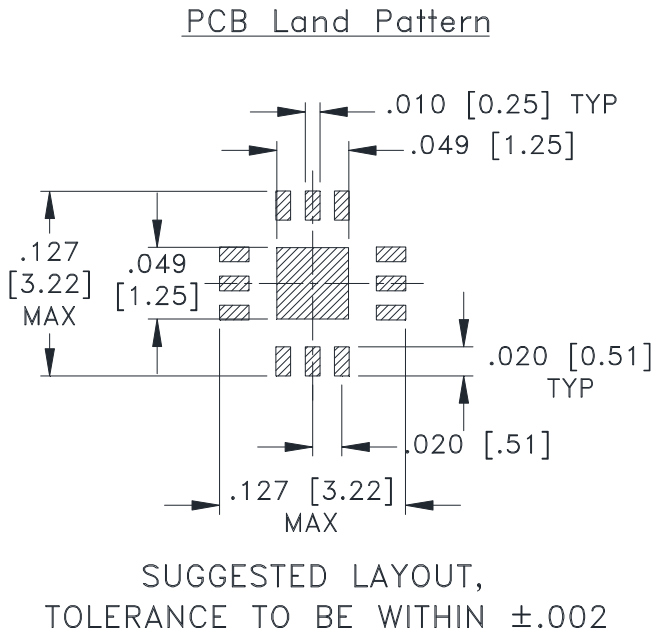


Case Style DQ

DQ1225

Outline Dimensions





Weight: .02 Grams

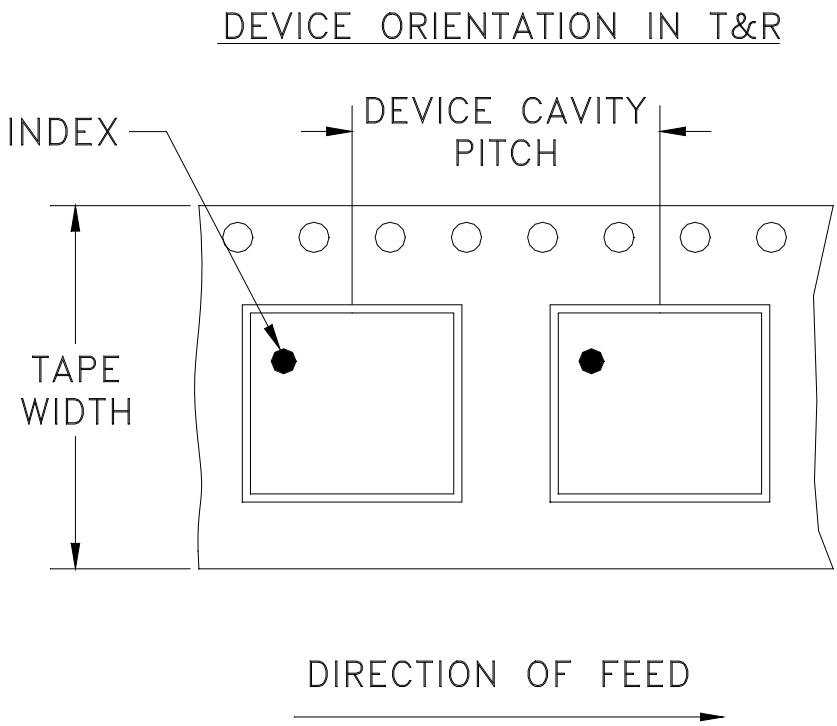
Dimensions are in inches (mm). Tolerances: 2Pl. ± .01; 3 Pl. ± .004

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.

Mini-Circuits®
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-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.

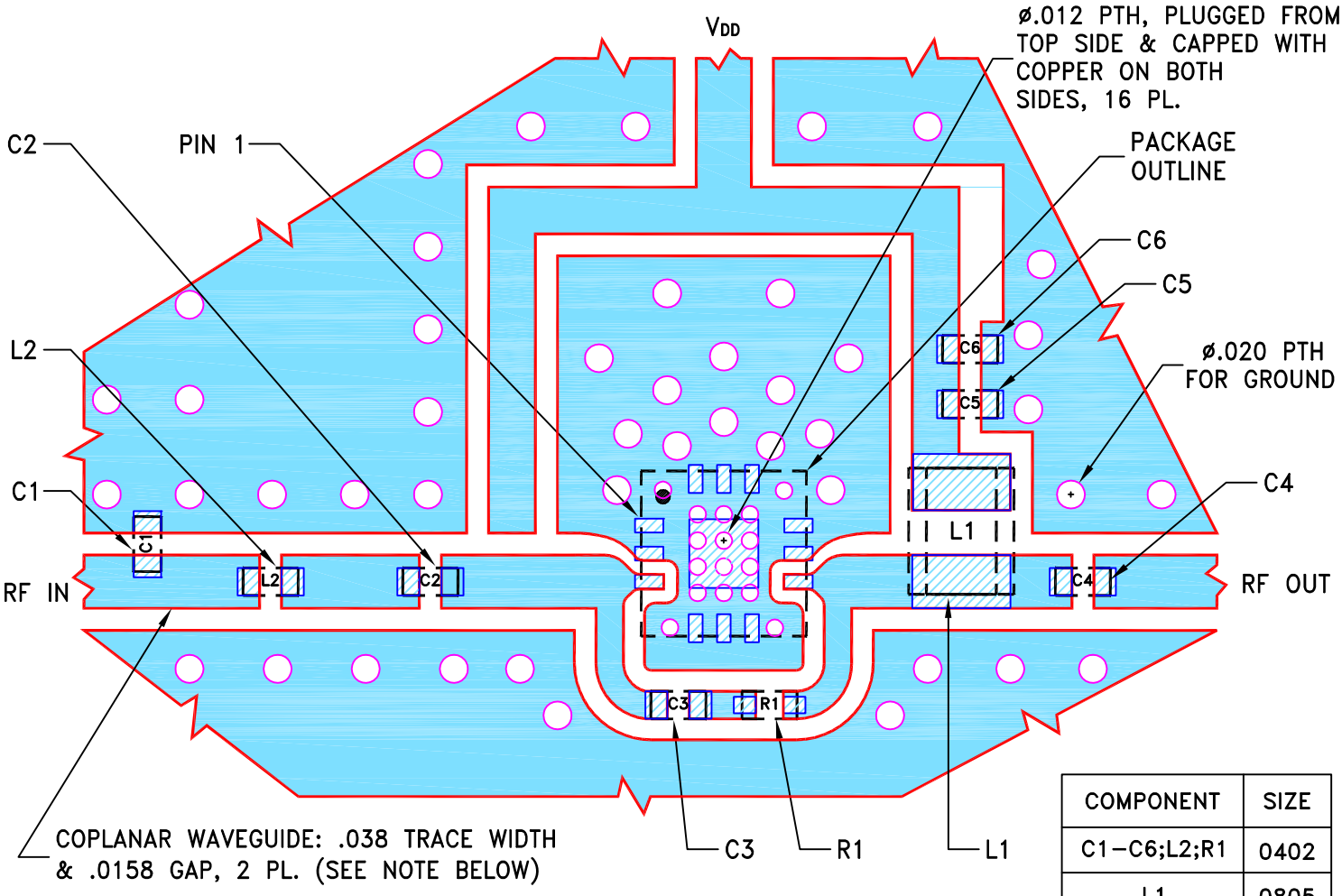
Go to: www.minicircuits.com/pages/pdfs/tape.pdf

Mini-Circuits®
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
OR	M167803	NEW RELEASE	05/11/18	ITG	RS

SUGGESTED MOUNTING CONFIGURATION
FOR DQ1225 CASE STYLE, "12AM03" PIN CODE



COMPONENT	SIZE
C1–C6;L2;R1	0402
L1	0805

NOTES:
1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020"±.0015". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB-1061-23LN+ OR TB-1061-23HLN+, WHICHEVER IS APPLICABLE.
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	05/09/18
TOLERANCES ON:	CHECKED	IL	05/11/18
2 PL DECIMALS ±	APPROVED	RS	05/11/18
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

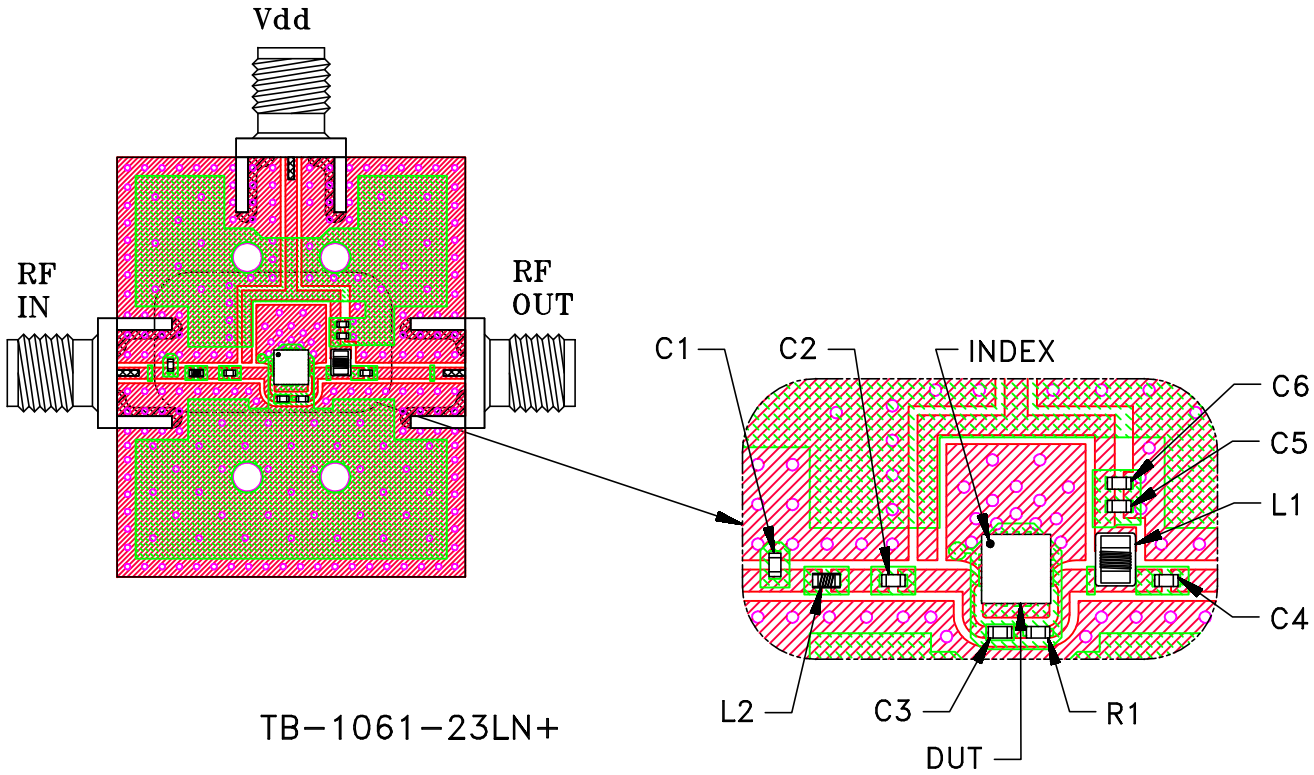
Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

PL, 12AM03, DQ1225, TB-1061-23(H)LN+

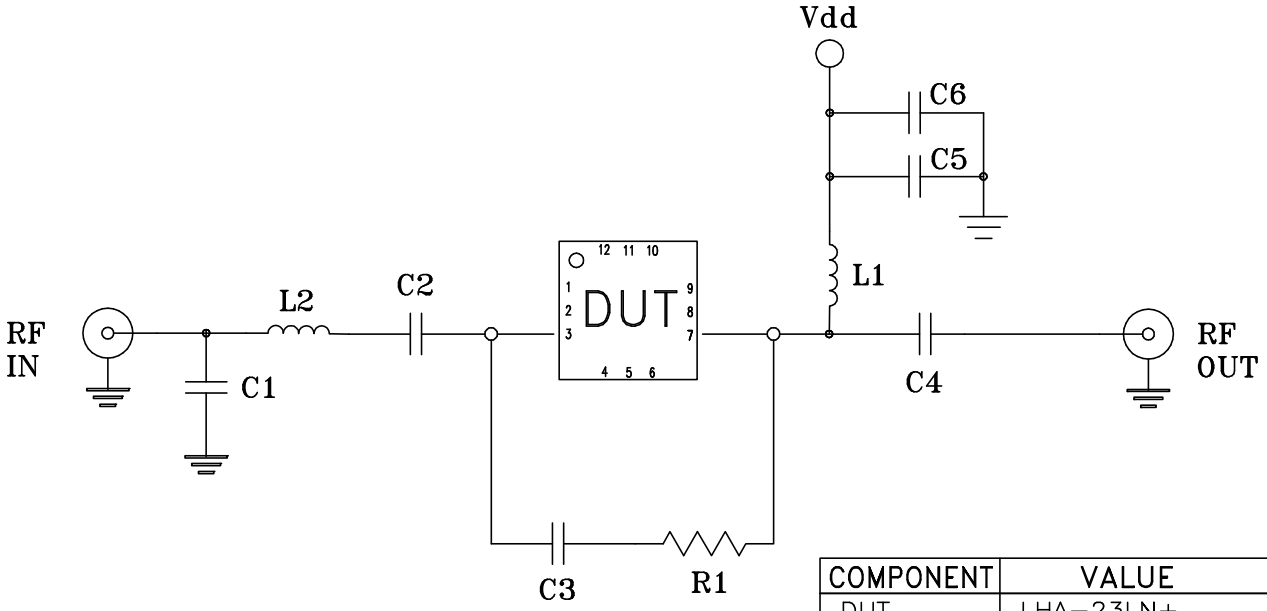
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-587	OR

FILE:	SCALE:	SHEET:
98PL587	8:1	1 OF 1

Evaluation Board and Circuit



TB-1061-23LN+



Schematic Diagram

COMPONENT	VALUE	SIZE
DUT	LHA-23LN+	3X3 MM
C1	Capacitor 1.2 pF	0402
C2,C3,C6	Capacitor 0.1 uF	
C4	Capacitor 0.001 uF	
C5	Capacitor 0.01 uF	
R1	Resistor 1.21 KOhm	
L1	Inductor 0.680 uH	0805
L2	Inductor 1.0 nH	0402

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.020 inch.

Mini-Circuits®

Mini-Circuits

Environmental Specifications **ENV08T9**

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 95° C / 105° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C or -65° to 150° Ambient Environment	Individual Model Data Sheet
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-C, 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-020C, 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
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether +	MIL-STD-202, Method 215

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
	monoethanolamine at 63°C to 70°C	