LOW CURRENT, WIDEBAND, FLAT GAIN

Monolithic Amplifier

EHA-163L+

50Ω DC to 16 GHz

THE BIG DEAL

- Super Wideband, DC to 16 GHz
- Excellent Flat Gain, ±0.75 dB up to 12 GHz
- Low Current, 20 mA
- Good Input & Output Return Loss (>10 dB)
- Repeatable performance (HBT Process)
- Small Package (2x2mm 6L MCLP)

Generic photo used for illustration purposes only

CASE STYLE: MC1630-1

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

APPLICATIONS

- Instrumentation
- Cable Infrastructure
- 5G

PRODUCT OVERVIEW

The EHA-163L+ is a low current, wideband gain block that operates up to 16 GHz fabricated using highly reliable HBT process. This Darlington pair amplifier delivers excellent gain flatness, good return loss, low current with acceptable P1dB and OIP3 across a wide bandwidth without the need of external matching network. It has highly repeatable performance from lot to lot and it is enclosed in a 2mm x 2mm 6-lead package.

KEY FEATURES

Feature	Advantages
Super Wideband: DC to 16 GHz	Generate purpose wideband amplifier is suitable for various applications.
Low Current, 20mA	Low current consumption is ideal for driver amplifier.
Excellent gain flatness, ±0.75 dB up to 12 GHz	As a desirable characteristic of a wideband amplifier, excellent gain flatness allows amplification of a signal without changing the waveform in time domain.
No external matching component required	EHA-163L+ provides input & output return loss of 10 dB up to 16 GHz without the need for any external matching components.

REV. A
ECO-014399
EHA-163L+
MCL NY
220802

Monolithic Amplifier EHA-163L+

50Ω DC to 16 GHz

ELECTRICAL SPECIFICATIONS AT 25°C, V_{CC}= +5V, R=50Ω UNLESS NOTED OTHERWISE

Parameter	Condition (MHz)	Vcc = +5V[1]			Vcc = +5V[2]	Units
		Min.	Typ.	Max.	Typ.	
Frequency Range[6]		0.01		16	0.01-16	GHz
Gain	10	—	15.7	—	15.3	dB
	5000	—	15.6	—	14.8	
	8000	13.1	15.3	16.0	14.2	
	10000	—	14.9	—	13.5	
	12000	—	14.2	—	13.1	
	16000	—	11.6	—	8.9	
Input Return Loss	10		18		17	dB
	5000		13		18	
	8000		12		15	
	10000		12		15	
	12000		11		15	
	16000		16		12	
Output Return Loss	10		14		14	dB
	5000		13		14	
	8000		13		16	
	10000		14		16	
	12000		13		11	
	16000		15		8	
Reverse Isolation	8000		19		20	dB
Output Power @1dB Compression	10		7.7		6.2	dBm
	5000		6.0		5.2	
	8000		6.5		6.8	
	10000		4.4		3.9	
	12000		2.7		2.1	
	16000		2.0		0.3	
Output IP33	10		21.0		19	dBm
	5000		17.3		17.8	
	8000		15.6		16.2	
	10000		13.2		13.3	
	12000		12.0		11.6	
	16000		11.8		10.7	
Noise Figure	10		5.2		5.2	dB
	5000		5.0		5.0	
	8000		5.2		5.2	
	10000		5.5		5.3	
	12000		5.4		5.3	
	16000		5.2		6.2	
DC Supply (Vcc)		+4.75	+5	+5.25	+5	V
Device operating current			20.9	24	19.3	mA
Device current variation vs. temperature[4]			59		59	µA/°C
Device current variation vs voltage[5]			0.0178		0.0178	mA/mV
Thermal Resistance, junction-to-ground lead at 85°C stage temp.			349		349	°C/W

1. Measured on Mini-Circuits Characterization test circuit TB-883-163L+. See Characterization Test Circuit (Fig. 1)
2. Measured on Mini-Circuits Recommended Application Circuit TB-995+. See Application Test Circuit (Fig. 2)
3. Tested at Pout = -5 dBm / tone.
4. (Current at 85°C - Current at -45°C)/130
5. (Current at 5.25V- Current at 4.75V)/1000
6. Low frequency cut-off determined by external coupling capacitors & RF choke.

MAXIMUM RATINGS[7]

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Junction Temperature	150°C
Power Dissipation	0.2W
Input Power (CW)	+22 dBm (5 minutes max.) +8 dBm (continuous)
Vcc (Supply Voltage)	+6V

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

SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION

Function	Pad Number	Description
RF-IN	2	RF input
RF-OUT and DC-IN	5	RF output and DC input
GND	Paddle	Ground
NC	1,3,4,6	No connections

CHARACTERIZATION TEST CIRCUIT

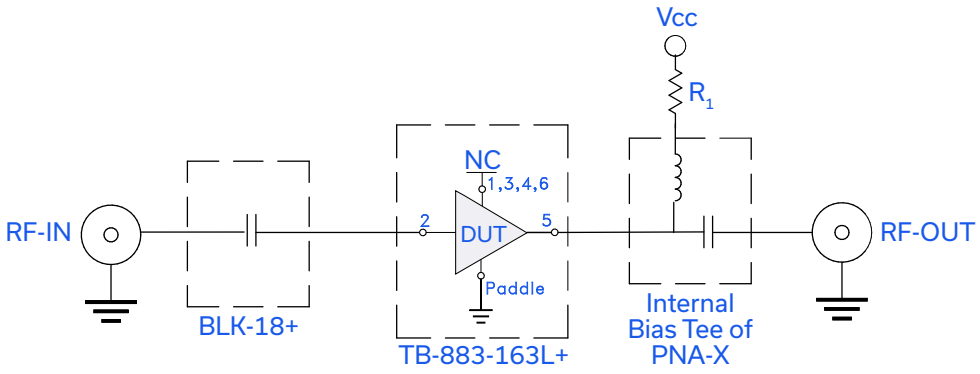
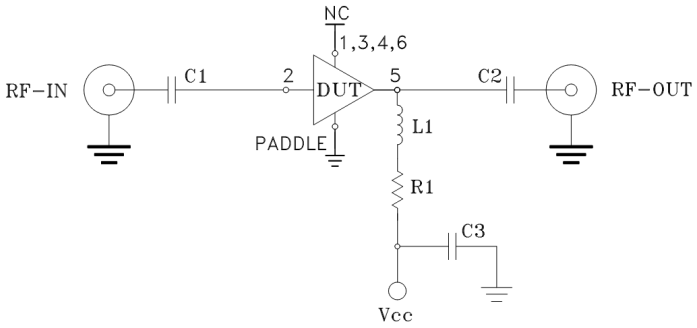


Fig 1. Characterization Circuit
Note: This block diagram is used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-883-163L+)
Gain, Return loss, Output power at 1dB compression (P1 dB), output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer. Rc=49.9 ohms

Conditions:
1. Gain and Return loss: Pin= -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -5 dBm/tone at output.

APPLICATION TEST CIRCUIT

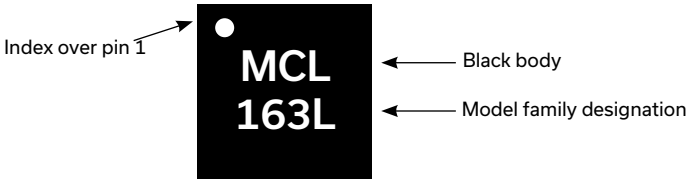


Component	P/N	Supplier	Value	Size
DUT	EHA-163L+	MCL	NA	2mm x 2mm
C1,C2	LBB0402X104MGT1C8	Presidio Components Inc	0.1 µF	0402
C3	GRM155R71E103KA01D	Murata	0.01 µF	0402
R1	RK73H1JTTD4R99F	KOA	49.9 ohms	0603
L1	BCR-652JLC	Coilcraft	6.5 µH	4422

Fig 2. Application Test Circuit
Note: (DUT soldered on Mini-Circuits Application test board TB-995+)
Gain, Return loss, Output power at 1 dB 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: Pin= -25 dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -5 dBm/tone at output.

PRODUCT MARKING



Marking may contain other features or characters for internal lot control

Monolithic Amplifier EHA-163L+

50Ω DC to 16 GHz

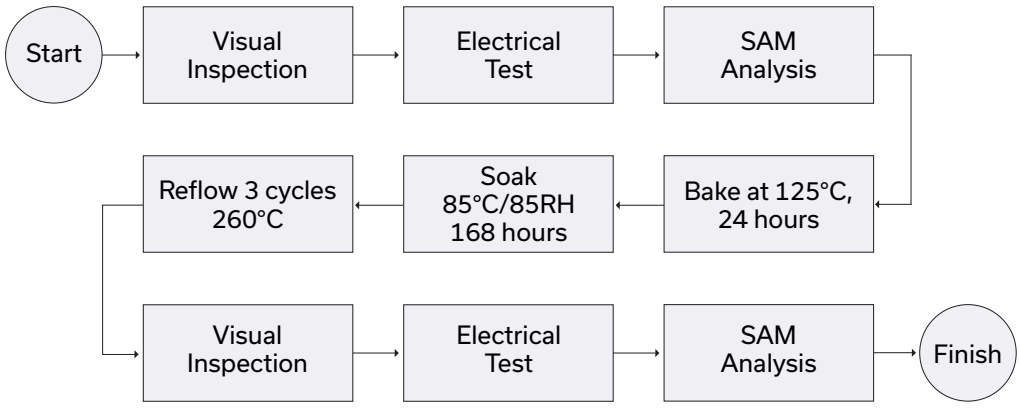
ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS CLICK HERE

Performance Data	Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	MC1630-1 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, or 2K devices
Suggested Layout for PCB Design	PL-544
Evaluation Board	TB-995+
Environmental Ratings	ENV08T1

ESD RATING

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

MSL 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/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 = 19.27mA @ 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)
10	15.30	18.80	17.18	14.38	1.07	0.49	18.64	6.01	5.15
50	15.45	18.73	18.15	14.74	1.06	0.48	17.36	5.09	4.87
100	15.46	18.75	18.13	14.70	1.06	0.48	18.19	5.61	4.67
200	15.28	18.93	17.06	15.23	1.08	0.53	17.19	4.99	4.70
300	15.26	18.96	16.89	15.23	1.08	0.54	17.55	5.12	4.81
400	15.40	18.85	17.29	14.32	1.07	0.50	17.52	5.33	4.70
500	15.29	18.96	16.67	14.65	1.08	0.53	16.92	4.81	4.79
600	15.18	19.08	15.96	14.71	1.09	0.56	17.50	4.97	4.81
700	15.30	18.97	15.93	13.50	1.08	0.52	17.68	5.14	4.82
800	15.18	19.09	15.38	13.61	1.09	0.54	17.39	4.95	4.81
900	15.18	19.10	14.84	12.83	1.09	0.53	17.54	4.95	4.82
1000	15.13	19.15	14.62	12.84	1.09	0.55	16.71	4.43	4.81
1500	14.96	19.35	13.03	11.20	1.10	0.55	16.03	3.94	5.00
2000	14.83	19.47	12.56	10.71	1.11	0.56	15.80	3.62	5.05
2500	14.75	19.53	12.75	10.77	1.12	0.57	16.11	3.68	5.07
3000	14.71	19.53	13.23	11.11	1.13	0.59	16.88	4.00	5.11
3500	14.70	19.53	13.74	11.39	1.13	0.60	15.97	3.60	5.12
4000	14.68	19.47	14.51	11.65	1.14	0.61	16.30	3.85	5.09
4500	14.69	19.44	15.71	12.09	1.14	0.62	16.60	4.18	5.02
5000	14.71	19.39	17.55	12.76	1.14	0.61	17.76	4.83	4.91
5500	14.71	19.31	20.35	13.97	1.15	0.63	18.64	5.49	4.91
6000	14.64	19.33	20.10	14.99	1.16	0.65	18.63	5.78	4.87
6500	14.55	19.36	19.40	15.43	1.17	0.67	18.21	6.25	4.86
7000	14.47	19.37	20.98	16.09	1.18	0.68	17.60	6.76	4.98
7500	14.39	19.38	22.71	17.19	1.19	0.70	17.12	7.15	5.05
8000	14.29	19.42	21.25	19.02	1.20	0.73	16.25	6.81	5.14
8500	14.20	19.43	18.03	20.40	1.21	0.76	15.19	5.51	5.14
9000	14.05	19.55	16.15	20.33	1.23	0.79	14.76	5.04	5.30
9500	13.92	19.59	16.10	17.88	1.24	0.76	14.08	4.33	5.29
10000	13.80	19.60	17.36	15.12	1.25	0.73	13.50	4.11	5.27
10500	13.68	19.66	19.21	12.79	1.26	0.72	12.84	3.75	5.24
11000	13.55	19.62	21.02	11.38	1.24	0.73	12.40	3.04	5.21
11500	13.43	19.57	19.04	11.19	1.24	0.75	11.61	2.44	5.19
12000	13.27	19.50	15.10	11.96	1.25	0.77	11.60	2.17	5.19
12500	12.92	19.51	12.35	12.58	1.29	0.80	11.10	1.40	5.26
13000	12.46	19.60	10.92	11.70	1.34	0.82	10.86	0.81	5.42
13500	11.86	19.85	10.50	10.32	1.41	0.82	10.75	0.38	5.57
14000	11.20	20.01	11.29	9.60	1.50	0.78	10.86	0.31	5.67
14500	10.63	20.09	11.89	9.43	1.59	0.76	10.88	0.63	5.84
15000	10.22	19.97	12.43	9.53	1.65	0.75	11.04	0.64	6.08
15500	9.80	19.86	13.22	9.77	1.73	0.79	10.90	0.65	6.26
16000	9.37	19.72	13.92	10.05	1.80	0.85	10.90	0.47	6.24
16500	9.02	19.58	13.77	10.34	1.87	0.90	10.26	0.35	6.20
17000	8.50	19.65	12.60	10.60	1.95	0.91	9.98	-0.05	6.06
17500	7.97	19.71	12.39	10.95	2.06	0.90	9.25	-0.76	6.13
18000	7.47	19.88	13.46	11.40	2.24	0.88	8.68	-1.47	6.33

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 = 4.75V, Id = 14.98mA @ 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)
10	14.34	18.31	14.14	11.84	1.07	0.50	14.67	1.93	5.13
50	14.47	18.25	14.62	12.02	1.07	0.49	13.56	1.12	4.84
100	14.48	18.26	14.63	11.95	1.07	0.49	14.25	1.60	4.69
200	14.30	18.45	13.96	12.48	1.09	0.54	13.32	1.00	4.73
300	14.28	18.49	13.85	12.49	1.09	0.55	13.66	1.14	4.75
400	14.42	18.36	14.13	11.73	1.08	0.51	13.63	1.35	4.72
500	14.31	18.49	13.71	12.07	1.09	0.54	13.19	0.88	4.74
600	14.19	18.63	13.24	12.20	1.10	0.57	13.72	1.00	4.80
700	14.31	18.51	13.25	11.22	1.09	0.53	13.85	1.19	4.80
800	14.19	18.64	12.84	11.37	1.10	0.55	13.63	0.99	4.80
900	14.17	18.66	12.48	10.77	1.10	0.54	13.75	0.96	4.80
1000	14.12	18.71	12.31	10.78	1.10	0.55	13.14	0.49	4.83
1500	13.93	18.95	11.14	9.56	1.11	0.55	12.48	-0.03	4.98
2000	13.80	19.09	10.78	9.21	1.12	0.56	12.37	-0.32	5.06
2500	13.73	19.14	10.92	9.27	1.13	0.57	12.45	-0.25	5.07
3000	13.71	19.11	11.29	9.54	1.14	0.59	12.83	0.05	5.07
3500	13.72	19.09	11.66	9.80	1.15	0.60	12.11	-0.26	5.09
4000	13.74	19.01	12.24	10.04	1.15	0.61	12.20	-0.01	5.07
4500	13.79	18.95	13.10	10.45	1.15	0.61	12.60	0.36	4.98
5000	13.87	18.83	14.54	11.09	1.15	0.60	13.55	1.07	4.89
5500	13.94	18.68	17.33	12.51	1.15	0.61	14.95	1.81	4.95
6000	13.94	18.64	19.56	14.28	1.16	0.64	15.49	2.29	4.82
6500	13.88	18.63	21.53	15.93	1.17	0.67	16.25	2.82	4.86
7000	13.81	18.65	26.53	17.64	1.18	0.68	17.59	3.40	4.95
7500	13.72	18.68	38.07	20.08	1.20	0.71	19.05	3.93	5.00
8000	13.59	18.75	22.45	23.94	1.21	0.74	18.48	3.79	5.10
8500	13.45	18.81	17.60	26.71	1.22	0.78	16.53	2.35	5.11
9000	13.27	18.93	15.51	24.77	1.24	0.80	16.49	2.20	5.25
9500	13.11	18.99	15.45	20.49	1.26	0.79	16.02	1.80	5.23
10000	12.98	19.00	16.68	16.66	1.27	0.76	16.52	2.05	5.21
10500	12.85	19.04	17.84	13.75	1.27	0.76	15.90	2.06	5.17
11000	12.70	19.01	17.60	11.91	1.26	0.77	15.16	1.57	5.15
11500	12.55	18.98	15.26	11.22	1.25	0.77	14.08	1.04	5.13
12000	12.33	18.97	12.38	11.29	1.25	0.79	14.08	1.06	5.10
12500	11.91	19.04	10.42	11.09	1.30	0.82	13.42	0.53	5.20
13000	11.40	19.19	9.41	10.15	1.35	0.83	13.10	0.13	5.31
13500	10.79	19.46	9.21	9.20	1.43	0.82	13.07	-0.03	5.45
14000	10.18	19.62	9.95	8.86	1.54	0.79	12.98	0.22	5.57
14500	9.68	19.68	10.51	8.91	1.63	0.76	12.64	0.61	5.77
15000	9.33	19.54	11.08	9.16	1.69	0.76	12.36	0.75	5.93
15500	8.98	19.40	11.82	9.48	1.76	0.80	11.81	0.78	6.12
16000	8.65	19.22	12.64	9.87	1.83	0.87	11.43	0.50	6.14
16500	8.37	19.03	12.71	10.44	1.87	0.91	10.45	0.52	6.05
17000	7.92	19.06	12.01	11.00	1.95	0.92	10.01	-0.20	5.88
17500	7.44	19.10	12.00	11.68	2.07	0.91	9.29	-0.84	5.94
18000	6.94	19.28	12.95	12.41	2.24	0.90	8.83	-1.70	6.18

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 = 23.55mA @ 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)
10	15.80	19.07	19.42	16.05	1.06	0.49	22.24	8.91	5.20
50	15.95	19.01	20.94	16.69	1.06	0.48	20.67	7.96	4.91
100	15.95	19.02	20.92	16.66	1.06	0.48	21.55	8.48	4.73
200	15.79	19.20	19.37	17.18	1.07	0.52	20.47	7.86	4.78
300	15.77	19.23	19.13	17.17	1.07	0.53	20.89	7.96	4.73
400	15.89	19.12	19.66	16.14	1.06	0.50	20.79	8.20	4.76
500	15.79	19.23	18.83	16.47	1.07	0.52	20.17	7.67	4.81
600	15.68	19.34	17.89	16.46	1.08	0.55	20.79	7.82	4.82
700	15.80	19.23	17.82	15.07	1.07	0.51	20.96	7.97	4.83
800	15.69	19.34	17.11	15.16	1.08	0.54	20.63	7.81	4.85
900	15.69	19.34	16.42	14.22	1.08	0.53	20.75	7.80	4.89
1000	15.65	19.39	16.16	14.24	1.08	0.54	19.92	7.26	4.86
1500	15.49	19.56	14.21	12.26	1.09	0.54	19.13	6.79	5.04
2000	15.36	19.68	13.67	11.65	1.10	0.55	18.75	6.45	5.10
2500	15.26	19.74	13.87	11.67	1.11	0.57	18.86	6.52	5.09
3000	15.19	19.74	14.44	12.01	1.12	0.58	19.47	6.80	5.15
3500	15.15	19.75	15.04	12.27	1.13	0.60	18.31	6.38	5.16
4000	15.10	19.70	16.00	12.49	1.13	0.61	18.30	6.63	5.14
4500	15.07	19.67	17.42	12.85	1.14	0.62	18.02	6.88	5.06
5000	15.05	19.65	19.64	13.31	1.14	0.62	18.51	7.45	4.99
5500	14.99	19.60	22.21	14.09	1.15	0.63	18.57	8.01	5.01
6000	14.90	19.63	20.01	14.45	1.16	0.65	18.06	8.11	4.92
6500	14.77	19.65	18.59	14.40	1.17	0.67	17.37	8.38	4.96
7000	14.70	19.64	19.40	14.81	1.17	0.67	16.79	8.52	5.05
7500	14.62	19.61	20.17	15.70	1.18	0.69	16.30	8.35	5.10
8000	14.54	19.60	19.12	17.36	1.19	0.72	15.49	7.73	5.22
8500	14.45	19.58	16.97	18.89	1.19	0.76	14.44	6.65	5.21
9000	14.30	19.67	15.43	19.47	1.21	0.78	13.87	6.04	5.37
9500	14.15	19.72	15.44	17.65	1.23	0.76	13.12	5.24	5.34
10000	14.01	19.72	16.58	15.14	1.24	0.72	12.56	4.79	5.34
10500	13.87	19.77	18.37	12.95	1.25	0.72	11.95	4.30	5.30
11000	13.73	19.73	20.64	11.66	1.24	0.73	11.55	3.57	5.23
11500	13.59	19.66	19.55	11.62	1.25	0.75	10.74	2.91	5.25
12000	13.41	19.58	15.72	12.54	1.26	0.77	10.71	2.48	5.26
12500	13.07	19.58	12.79	13.09	1.30	0.80	10.20	1.76	5.35
13000	12.57	19.67	11.31	11.84	1.34	0.82	10.02	1.10	5.50
13500	11.94	19.92	10.92	10.24	1.41	0.81	9.91	0.73	5.64
14000	11.27	20.08	11.71	9.41	1.50	0.77	10.08	0.60	5.76
14500	10.71	20.16	12.24	9.22	1.58	0.75	10.12	0.78	5.99
15000	10.30	20.03	12.94	9.31	1.65	0.74	10.29	0.75	6.16
15500	9.85	19.92	13.67	9.58	1.73	0.78	10.27	0.74	6.34
16000	9.45	19.76	14.43	9.89	1.80	0.84	10.32	0.56	6.38
16500	9.09	19.62	14.11	10.16	1.86	0.89	9.73	0.48	6.32
17000	8.57	19.67	12.80	10.43	1.94	0.90	9.56	-0.06	6.21
17500	8.06	19.73	12.50	10.76	2.06	0.89	8.88	-0.56	6.28
18000	7.58	19.89	13.54	11.26	2.22	0.88	8.21	-1.40	6.41

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 = 15.55mA @ 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)
10	14.91	18.58	15.53	12.89	1.07	0.49	14.38	2.12	4.12
50	15.02	18.51	15.89	13.02	1.06	0.48	13.27	1.29	3.85
100	15.02	18.53	15.57	12.68	1.06	0.48	14.01	1.76	3.74
200	14.92	18.65	14.80	12.66	1.07	0.50	13.19	1.26	3.79
300	14.93	18.66	15.14	13.11	1.07	0.51	13.57	1.46	3.80
400	15.02	18.58	15.84	13.06	1.07	0.49	13.56	1.65	3.73
500	14.86	18.75	15.26	13.75	1.09	0.54	12.92	1.05	3.78
600	14.78	18.84	14.54	13.20	1.09	0.55	13.43	1.22	3.81
700	14.92	18.72	14.56	12.13	1.07	0.51	13.62	1.40	3.83
800	14.74	18.90	13.73	12.24	1.09	0.55	13.27	1.12	3.81
900	14.81	18.84	13.44	11.41	1.08	0.52	13.51	1.21	3.85
1000	14.69	18.96	13.18	11.74	1.09	0.55	12.70	0.62	3.86
1500	14.62	19.07	12.23	10.37	1.09	0.53	12.19	0.28	4.00
2000	14.45	19.25	11.58	9.89	1.11	0.55	11.96	-0.07	4.01
2500	14.40	19.29	11.51	9.66	1.11	0.55	12.08	0.00	4.03
3000	14.38	19.26	11.75	9.85	1.11	0.56	12.65	0.30	4.05
3500	14.40	19.23	12.32	10.20	1.12	0.58	11.63	-0.13	4.09
4000	14.44	19.12	13.45	10.82	1.12	0.58	11.93	0.23	4.06
4500	14.44	19.11	13.86	10.91	1.12	0.58	12.09	0.46	3.96
5000	14.52	19.00	15.60	11.80	1.12	0.58	12.94	1.04	3.88
5500	14.59	18.86	18.35	13.56	1.13	0.60	14.43	1.90	3.86
6000	14.59	18.82	18.81	15.59	1.13	0.63	14.99	2.34	3.78
6500	14.51	18.85	18.91	16.43	1.14	0.64	15.57	2.93	3.82
7000	14.48	18.86	22.72	17.40	1.15	0.65	16.62	3.40	3.91
7500	14.40	18.88	27.24	18.58	1.16	0.67	18.35	4.02	3.90
8000	14.31	18.94	23.66	19.07	1.17	0.70	18.32	3.88	3.98
8500	14.25	18.97	20.34	19.25	1.17	0.72	16.53	2.79	3.92
9000	14.16	19.03	17.58	19.99	1.18	0.73	16.25	2.64	4.05
9500	14.09	19.06	16.46	18.47	1.19	0.71	15.33	2.13	4.08
10000	14.01	19.06	17.46	15.25	1.19	0.69	16.01	2.49	4.07
10500	13.92	19.15	18.94	12.25	1.19	0.69	15.84	2.14	4.01
11000	13.84	19.13	18.60	10.96	1.17	0.69	15.89	1.90	3.98
11500	13.80	19.06	15.96	10.94	1.16	0.69	14.46	1.10	3.98
12000	13.77	18.91	14.19	12.43	1.16	0.71	15.00	1.47	3.91
12500	13.58	18.81	13.53	14.33	1.18	0.75	14.69	1.18	3.94
13000	13.15	18.93	11.98	14.18	1.23	0.79	14.20	0.81	4.09
13500	12.51	19.29	9.92	10.98	1.29	0.77	14.53	0.77	4.26
14000	11.79	19.58	9.78	9.07	1.35	0.70	15.12	0.88	4.32
14500	11.19	19.73	10.82	8.23	1.42	0.68	15.45	1.51	4.48
15000	10.88	19.58	12.90	8.48	1.47	0.71	15.08	1.87	4.58
15500	10.52	19.44	12.52	9.22	1.54	0.80	14.06	2.17	4.71
16000	10.17	19.30	11.40	9.91	1.59	0.88	13.26	1.88	4.81
16500	9.80	19.12	11.68	9.96	1.63	0.85	11.76	1.73	4.80
17000	9.46	18.99	13.06	10.28	1.70	0.81	11.37	1.10	4.62
17500	8.92	19.12	12.84	9.84	1.76	0.79	9.87	0.40	4.44
18000	8.25	19.42	10.99	9.48	1.87	0.80	9.32	-0.49	4.56

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 = 4.75V, Id = 11.50mA @ 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)
10	12.63	17.53	10.74	8.47	1.08	0.48	16.90	-4.38	4.21
50	12.75	17.57	10.86	8.79	1.09	0.49	20.97	-4.99	3.99
100	12.73	17.57	10.67	8.51	1.08	0.48	17.50	-4.65	3.89
200	12.61	17.70	10.29	8.57	1.10	0.51	17.29	-5.14	3.94
300	12.63	17.70	10.49	8.85	1.10	0.52	16.79	-4.90	4.00
400	12.75	17.60	10.86	8.73	1.09	0.50	16.59	-4.71	3.89
500	12.57	17.81	10.58	9.36	1.12	0.56	25.17	-5.19	3.90
600	12.48	17.93	10.23	9.14	1.12	0.57	20.29	-5.11	3.95
700	12.61	17.80	10.24	8.32	1.10	0.51	19.26	-4.94	3.93
800	12.41	18.02	9.78	8.58	1.12	0.56	19.06	-5.18	3.94
900	12.47	17.97	9.64	7.99	1.11	0.52	18.08	-5.14	3.99
1000	12.34	18.09	9.50	8.26	1.13	0.56	16.13	-5.56	3.99
1500	12.24	18.28	8.99	7.47	1.13	0.54	15.73	-5.97	4.17
2000	12.05	18.50	8.61	7.25	1.14	0.55	13.59	-6.34	4.16
2500	12.01	18.53	8.55	7.07	1.14	0.55	13.89	-6.36	4.16
3000	12.04	18.44	8.68	7.12	1.14	0.55	15.20	-6.20	4.21
3500	12.14	18.37	8.98	7.37	1.14	0.57	13.58	-6.47	4.19
4000	12.27	18.19	9.65	7.78	1.14	0.57	16.77	-6.25	4.18
4500	12.36	18.15	9.87	7.94	1.14	0.56	16.71	-6.00	4.05
5000	12.57	17.84	10.82	8.35	1.12	0.53	18.54	-5.42	3.96
5500	12.83	17.51	12.76	9.84	1.11	0.54	16.07	-4.66	3.96
6000	13.01	17.31	14.64	12.07	1.12	0.58	16.48	-4.20	3.87
6500	13.03	17.28	16.24	14.65	1.13	0.63	16.02	-3.64	3.88
7000	12.98	17.36	17.52	16.65	1.15	0.66	14.65	-3.37	3.98
7500	12.91	17.37	20.26	21.11	1.16	0.68	14.19	-2.92	4.02
8000	12.81	17.51	20.72	31.94	1.18	0.71	14.60	-3.04	4.06
8500	12.70	17.69	18.02	26.72	1.20	0.74	14.43	-4.01	3.98
9000	12.54	17.80	15.15	20.76	1.21	0.76	14.90	-3.91	4.13
9500	12.45	17.90	14.01	18.21	1.22	0.75	16.30	-4.19	4.10
10000	12.39	17.86	14.64	15.62	1.21	0.74	17.60	-3.75	4.09
10500	12.33	17.99	15.41	12.39	1.20	0.74	16.86	-3.99	4.03
11000	12.22	18.01	13.67	10.25	1.16	0.73	15.81	-4.26	4.00
11500	12.17	18.00	11.53	9.30	1.13	0.71	12.81	-4.98	3.99
12000	12.14	17.88	10.10	9.73	1.11	0.74	13.50	-4.54	3.94
12500	11.98	17.80	9.60	10.40	1.13	0.78	12.24	-4.54	3.92
13000	11.58	17.99	8.66	10.29	1.18	0.82	12.01	-4.56	4.07
13500	10.91	18.48	7.47	8.81	1.26	0.77	11.21	-4.36	4.23
14000	10.35	18.75	7.51	7.90	1.34	0.71	10.74	-3.29	4.33
14500	9.90	18.85	8.38	7.67	1.41	0.69	11.22	-1.79	4.44
15000	9.78	18.62	9.93	8.45	1.45	0.74	11.47	-0.53	4.59
15500	9.54	18.46	9.93	9.55	1.51	0.85	11.57	0.79	4.67
16000	9.26	18.37	9.28	10.39	1.54	0.93	11.72	0.59	4.75
16500	8.97	18.15	9.60	10.46	1.57	0.87	10.21	1.02	4.77
17000	8.77	17.94	11.01	11.32	1.63	0.83	9.98	0.29	4.54
17500	8.34	18.05	11.75	11.33	1.73	0.82	8.72	-0.22	4.45
18000	7.61	18.48	10.48	10.95	1.83	0.85	8.43	-1.17	4.56

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 = 19.76mA @ 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)
10	15.71	19.02	18.64	15.40	1.06	0.49	19.28	6.25	4.19
50	15.83	18.94	19.41	15.66	1.06	0.47	17.70	5.33	3.88
100	15.84	18.97	18.93	15.27	1.06	0.47	18.53	5.82	3.77
200	15.74	19.07	17.73	15.15	1.06	0.49	17.62	5.30	3.79
300	15.74	19.09	18.22	15.74	1.07	0.50	18.13	5.49	3.79
400	15.83	19.02	19.23	15.74	1.06	0.49	18.05	5.67	3.74
500	15.67	19.18	18.35	16.47	1.08	0.53	17.29	5.07	3.77
600	15.60	19.26	17.30	15.64	1.08	0.54	17.87	5.24	3.85
700	15.74	19.13	17.30	14.36	1.07	0.50	18.09	5.42	3.78
800	15.57	19.30	16.16	14.37	1.08	0.54	17.68	5.14	3.83
900	15.64	19.24	15.74	13.37	1.07	0.51	17.98	5.25	3.83
1000	15.53	19.35	15.42	13.73	1.08	0.54	16.98	4.62	3.85
1500	15.48	19.43	14.16	11.98	1.08	0.52	16.50	4.31	3.97
2000	15.31	19.59	13.31	11.31	1.10	0.54	16.23	3.94	4.03
2500	15.26	19.63	13.21	11.04	1.10	0.54	16.53	4.02	4.06
3000	15.23	19.62	13.53	11.29	1.11	0.56	17.48	4.33	4.04
3500	15.23	19.61	14.26	11.70	1.11	0.58	16.27	3.83	4.09
4000	15.24	19.53	15.67	12.42	1.11	0.59	16.85	4.21	4.07
4500	15.22	19.54	16.07	12.41	1.12	0.59	17.04	4.41	3.98
5000	15.24	19.49	18.02	13.41	1.12	0.59	18.20	4.95	3.90
5500	15.25	19.42	19.37	15.00	1.12	0.61	19.58	5.72	3.89
6000	15.20	19.45	17.37	16.19	1.13	0.64	20.02	6.05	3.82
6500	15.08	19.50	16.50	15.86	1.14	0.65	20.11	6.61	3.85
7000	15.06	19.49	18.70	16.36	1.15	0.65	19.94	7.11	3.94
7500	14.99	19.52	19.57	16.46	1.16	0.66	19.61	7.76	4.00
8000	14.91	19.59	18.69	16.21	1.16	0.69	18.73	7.63	4.02
8500	14.88	19.58	17.93	16.16	1.17	0.70	17.64	6.54	3.98
9000	14.84	19.62	17.00	16.91	1.17	0.71	17.22	6.25	4.13
9500	14.80	19.64	16.44	16.06	1.18	0.68	16.68	5.52	4.12
10000	14.74	19.65	17.13	13.55	1.18	0.66	15.87	5.59	4.13
10500	14.66	19.76	18.16	11.09	1.17	0.65	15.28	5.02	4.02
11000	14.63	19.73	20.00	10.20	1.15	0.65	14.67	4.55	4.05
11500	14.65	19.64	18.96	10.60	1.15	0.66	13.70	3.76	4.04
12000	14.67	19.45	17.58	12.60	1.15	0.68	13.61	3.83	4.01
12500	14.52	19.34	16.88	15.71	1.17	0.71	13.00	3.35	4.01
13000	14.17	19.38	14.58	17.10	1.21	0.76	12.49	2.65	4.16
13500	13.60	19.65	11.67	12.77	1.26	0.75	12.64	2.28	4.33
14000	12.87	19.93	11.18	10.01	1.32	0.70	12.55	1.95	4.40
14500	12.22	20.10	12.25	8.75	1.37	0.68	12.63	2.12	4.60
15000	11.83	19.97	14.70	8.72	1.42	0.70	12.62	2.22	4.69
15500	11.37	19.85	13.63	9.28	1.49	0.77	12.49	2.33	4.79
16000	10.99	19.73	12.21	9.92	1.55	0.85	12.45	2.18	4.87
16500	10.55	19.53	12.68	9.92	1.60	0.83	11.53	1.97	4.89
17000	10.14	19.47	13.94	10.02	1.67	0.80	11.38	1.44	4.65
17500	9.45	19.71	12.32	9.16	1.74	0.78	10.08	0.67	4.57
18000	8.80	20.00	10.53	8.66	1.85	0.77	9.48	-0.01	4.70

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 = 5.00V, Id = 22.49mA @ Temperature = +85°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)
10	15.46	18.87	17.97	15.12	1.06	0.49	21.49	8.48	5.81
50	15.61	18.82	19.52	15.71	1.06	0.49	20.01	7.48	5.71
100	15.62	18.82	19.93	15.99	1.06	0.49	20.86	8.04	5.53
200	15.36	19.09	18.69	17.76	1.09	0.56	19.71	7.26	5.54
300	15.37	19.09	18.44	17.22	1.09	0.55	20.18	7.48	5.50
400	15.53	18.94	18.40	15.26	1.07	0.51	20.10	7.73	5.51
500	15.44	19.03	17.46	15.20	1.08	0.53	19.51	7.25	5.60
600	15.35	19.13	16.74	15.26	1.09	0.55	20.17	7.42	5.61
700	15.41	19.08	16.28	14.05	1.08	0.53	20.22	7.48	5.63
800	15.33	19.16	15.72	13.91	1.08	0.54	19.95	7.25	5.64
900	15.26	19.23	14.92	13.27	1.09	0.55	19.96	7.18	5.67
1000	15.26	19.23	14.65	12.93	1.09	0.54	19.23	6.72	5.68
1500	15.06	19.43	13.13	11.55	1.10	0.56	18.48	6.26	5.84
2000	14.95	19.50	13.09	11.29	1.11	0.57	18.19	5.97	5.92
2500	14.83	19.56	13.47	11.52	1.12	0.58	18.42	6.06	5.90
3000	14.70	19.59	13.52	11.50	1.13	0.60	18.88	6.26	6.00
3500	14.57	19.64	13.57	11.39	1.15	0.62	17.84	5.87	6.02
4000	14.50	19.60	14.42	11.64	1.16	0.63	17.68	6.08	6.00
4500	14.47	19.51	16.25	12.12	1.16	0.64	17.47	6.29	5.88
5000	14.43	19.46	18.79	12.37	1.16	0.64	17.97	6.98	5.81
5500	14.35	19.38	23.15	12.73	1.17	0.64	17.74	7.43	5.80
6000	14.23	19.36	24.58	12.97	1.18	0.66	17.10	7.46	5.76
6500	14.10	19.32	23.62	13.49	1.19	0.68	16.27	7.48	5.80
7000	13.99	19.25	26.01	14.77	1.20	0.69	15.51	7.28	5.93
7500	13.88	19.18	23.81	17.24	1.21	0.72	14.90	6.82	6.01
8000	13.71	19.17	17.84	20.91	1.22	0.77	14.11	6.06	6.15
8500	13.48	19.19	15.36	23.46	1.23	0.81	13.12	5.04	6.09
9000	13.20	19.31	14.83	23.45	1.27	0.84	12.53	4.37	6.25
9500	12.94	19.38	15.89	20.17	1.31	0.83	11.84	3.62	6.26
10000	12.66	19.40	17.31	17.21	1.35	0.80	11.33	3.00	6.47
10500	12.39	19.47	17.82	14.79	1.37	0.79	10.82	2.61	6.30
11000	12.14	19.42	17.07	13.29	1.37	0.81	10.44	1.88	6.26
11500	11.87	19.39	15.18	12.53	1.39	0.82	9.90	1.35	6.26
12000	11.53	19.37	13.13	12.15	1.42	0.83	9.96	0.87	6.21
12500	10.99	19.48	11.25	10.93	1.47	0.83	9.60	0.22	6.33
13000	10.31	19.72	10.07	9.52	1.55	0.84	9.46	-0.24	6.50
13500	9.67	19.94	10.20	8.76	1.65	0.85	9.12	-0.57	6.60
14000	9.13	19.97	11.10	8.95	1.76	0.86	9.33	-0.49	6.79
14500	8.67	19.91	11.55	9.49	1.87	0.84	9.33	-0.38	7.02
15000	8.26	19.83	11.61	9.77	1.96	0.81	9.56	-0.27	7.28
15500	7.81	19.80	12.24	9.53	2.05	0.80	9.51	-0.42	7.54
16000	7.43	19.67	14.43	9.33	2.14	0.82	9.52	-0.59	7.48
16500	7.07	19.50	14.64	9.61	2.20	0.87	9.05	-0.76	7.38
17000	6.52	19.63	11.30	10.24	2.31	0.94	8.66	-1.14	7.28
17500	6.03	19.75	10.17	11.97	2.48	1.01	8.45	-1.71	7.61
18000	5.55	19.82	11.13	15.22	2.71	1.03	7.74	-2.57	8.02

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 = 4.75V, Id = 18.28mA @ Temperature = +85°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)
10	14.85	18.56	15.85	13.33	1.07	0.50	18.26	5.50	5.76
50	15.00	18.50	16.72	13.69	1.07	0.49	16.89	4.59	5.64
100	15.02	18.50	17.05	13.89	1.07	0.49	17.71	5.13	5.47
200	14.76	18.77	16.21	15.38	1.09	0.57	16.59	4.41	5.49
300	14.77	18.77	16.02	14.94	1.09	0.56	17.01	4.56	5.46
400	14.93	18.63	16.03	13.35	1.08	0.51	16.98	4.81	5.47
500	14.83	18.73	15.35	13.37	1.08	0.53	16.43	4.32	5.55
600	14.74	18.84	14.80	13.47	1.09	0.56	17.04	4.49	5.57
700	14.79	18.79	14.48	12.44	1.09	0.53	17.09	4.56	5.55
800	14.71	18.87	14.04	12.34	1.09	0.55	16.85	4.42	5.59
900	14.64	18.95	13.41	11.83	1.10	0.55	16.89	4.29	5.60
1000	14.63	18.96	13.19	11.55	1.10	0.55	16.18	3.84	5.66
1500	14.43	19.19	11.97	10.43	1.11	0.56	15.48	3.37	5.78
2000	14.34	19.27	11.99	10.29	1.12	0.57	15.27	3.13	5.84
2500	14.26	19.32	12.34	10.57	1.13	0.59	15.58	3.15	5.86
3000	14.17	19.36	12.40	10.61	1.14	0.60	16.09	3.33	5.89
3500	14.09	19.41	12.44	10.55	1.15	0.62	15.34	3.08	5.98
4000	14.07	19.36	13.20	10.87	1.16	0.63	15.51	3.21	5.93
4500	14.12	19.25	14.75	11.52	1.16	0.63	15.81	3.58	5.81
5000	14.14	19.18	16.76	12.06	1.16	0.63	16.93	4.37	5.70
5500	14.12	19.09	19.95	12.88	1.17	0.64	17.38	4.93	5.74
6000	14.05	19.08	21.87	13.71	1.18	0.66	17.14	5.24	5.67
6500	13.96	19.06	23.09	14.69	1.19	0.68	16.52	5.61	5.72
7000	13.86	19.05	27.53	16.26	1.20	0.69	15.80	5.92	5.83
7500	13.75	19.03	27.56	19.17	1.22	0.72	15.27	5.88	5.93
8000	13.58	19.06	18.99	23.47	1.23	0.76	14.51	5.38	6.03
8500	13.38	19.11	16.05	26.16	1.24	0.81	13.55	4.16	6.01
9000	13.14	19.24	15.35	24.31	1.28	0.84	13.08	3.55	6.16
9500	12.91	19.30	16.44	19.71	1.31	0.82	12.39	2.91	6.15
10000	12.67	19.33	17.79	16.35	1.34	0.79	11.92	2.42	6.20
10500	12.43	19.39	18.01	13.93	1.35	0.78	11.40	2.14	6.17
11000	12.22	19.34	16.89	12.54	1.34	0.80	11.02	1.39	6.11
11500	11.99	19.30	14.92	11.92	1.35	0.81	10.51	0.94	6.11
12000	11.67	19.27	12.87	11.79	1.37	0.82	10.58	0.59	6.06
12500	11.15	19.37	10.97	10.94	1.43	0.83	10.24	-0.11	6.16
13000	10.50	19.60	9.76	9.71	1.51	0.84	10.08	-0.55	6.33
13500	9.87	19.82	9.87	8.98	1.60	0.86	9.75	-0.93	6.39
14000	9.33	19.85	10.80	9.15	1.72	0.86	9.94	-0.69	6.57
14500	8.86	19.80	11.30	9.75	1.82	0.85	9.94	-0.56	6.83
15000	8.43	19.75	11.29	10.02	1.92	0.81	10.17	-0.46	7.07
15500	7.95	19.73	11.90	9.73	2.01	0.80	10.09	-0.51	7.32
16000	7.56	19.59	14.04	9.48	2.10	0.82	10.03	-0.69	7.28
16500	7.18	19.46	14.41	9.67	2.17	0.87	9.54	-0.91	7.15
17000	6.62	19.59	11.16	10.18	2.28	0.94	9.04	-1.23	7.01
17500	6.08	19.71	9.98	11.74	2.44	1.01	8.90	-1.75	7.32
18000	5.56	19.79	10.93	15.01	2.68	1.03	8.22	-2.71	7.74

Typical Performance Data

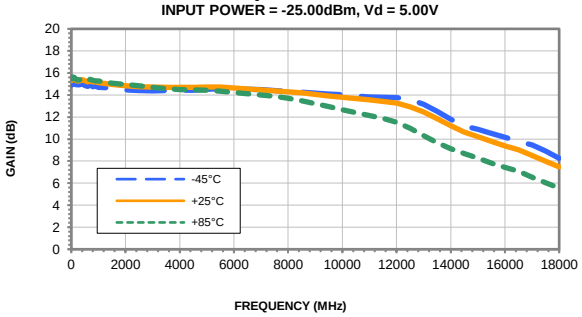
Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 5.25V, Id = 26.88mA @ Temperature = +85°C

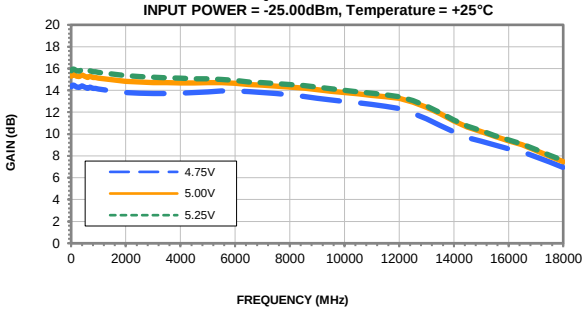
FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
10	15.82	19.07	19.99	16.39	1.06	0.49	24.52	10.71	5.87
50	15.97	19.02	21.93	17.29	1.06	0.48	22.56	9.74	5.77
100	15.98	19.03	22.46	17.65	1.06	0.48	23.42	10.31	5.59
200	15.73	19.28	20.69	19.55	1.08	0.55	22.27	9.59	5.62
300	15.74	19.28	20.31	18.91	1.08	0.54	22.72	9.75	5.58
400	15.89	19.14	20.19	16.70	1.06	0.50	22.61	9.97	5.59
500	15.81	19.22	19.02	16.64	1.07	0.52	22.03	9.46	5.70
600	15.71	19.32	18.12	16.68	1.08	0.54	22.78	9.69	5.70
700	15.78	19.26	17.47	15.26	1.07	0.52	22.87	9.73	5.69
800	15.70	19.33	16.79	15.06	1.08	0.53	22.63	9.60	5.72
900	15.63	19.39	15.84	14.30	1.08	0.54	22.72	9.49	5.76
1000	15.63	19.39	15.51	13.94	1.08	0.54	21.96	8.97	5.74
1500	15.41	19.56	13.70	12.27	1.09	0.55	21.41	8.52	5.93
2000	15.27	19.62	13.60	11.87	1.10	0.56	21.33	8.25	5.98
2500	15.10	19.66	13.95	11.97	1.11	0.58	21.78	8.36	5.99
3000	14.92	19.69	13.91	11.80	1.13	0.60	22.29	8.55	6.05
3500	14.73	19.73	13.90	11.57	1.14	0.62	20.85	8.13	6.14
4000	14.58	19.68	14.73	11.67	1.15	0.64	20.19	8.21	6.12
4500	14.49	19.57	16.60	11.93	1.16	0.64	19.32	8.32	6.00
5000	14.38	19.51	19.42	11.83	1.16	0.64	19.13	8.78	5.90
5500	14.24	19.41	25.07	11.80	1.16	0.64	18.32	8.85	5.88
6000	14.09	19.36	29.81	11.80	1.17	0.66	17.38	8.46	5.87
6500	13.95	19.25	27.31	12.24	1.17	0.67	16.35	8.01	5.91
7000	13.84	19.12	27.07	13.50	1.18	0.68	15.42	7.50	6.03
7500	13.71	18.99	21.45	15.84	1.19	0.72	14.68	6.86	6.11
8000	13.50	18.93	16.31	19.36	1.20	0.77	13.82	6.00	6.30
8500	13.22	18.95	14.22	21.92	1.21	0.83	12.83	4.98	6.27
9000	12.89	19.07	13.89	23.75	1.26	0.86	12.20	4.27	6.43
9500	12.58	19.13	14.99	22.33	1.32	0.85	11.52	3.51	6.41
10000	12.25	19.17	16.31	19.61	1.37	0.82	10.98	2.89	6.46
10500	11.92	19.23	16.70	16.60	1.41	0.82	10.47	2.35	6.47
11000	11.62	19.20	15.90	14.61	1.42	0.84	10.09	1.69	6.45
11500	11.31	19.19	14.31	13.33	1.44	0.84	9.54	1.09	6.42
12000	10.91	19.20	12.54	12.19	1.47	0.83	9.57	0.60	6.42
12500	10.29	19.36	10.87	10.27	1.53	0.83	9.21	-0.08	6.53
13000	9.56	19.66	9.81	8.71	1.62	0.83	9.06	-0.52	6.72
13500	8.92	19.88	10.01	8.05	1.72	0.84	8.71	-0.80	6.84
14000	8.43	19.88	10.98	8.29	1.83	0.85	8.92	-0.62	7.04
14500	8.01	19.78	11.48	8.95	1.94	0.83	8.91	-0.51	7.27
15000	7.62	19.73	11.37	9.26	2.03	0.80	9.14	-0.44	7.53
15500	7.19	19.67	11.91	9.06	2.12	0.79	9.08	-0.65	7.86
16000	6.88	19.52	14.09	8.88	2.20	0.81	9.14	-0.77	7.81
16500	6.59	19.32	14.81	9.30	2.26	0.86	8.65	-0.93	7.70
17000	6.15	19.35	11.41	10.26	2.34	0.94	8.33	-1.25	7.52
17500	5.68	19.42	10.01	12.32	2.49	1.02	8.10	-1.86	7.93
18000	5.16	19.52	10.78	16.35	2.73	1.04	7.36	-2.76	8.37

Typical Performance Curves

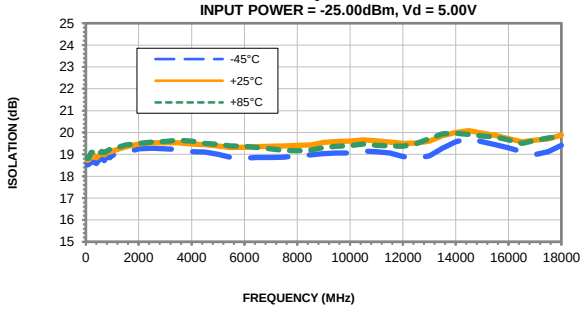
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



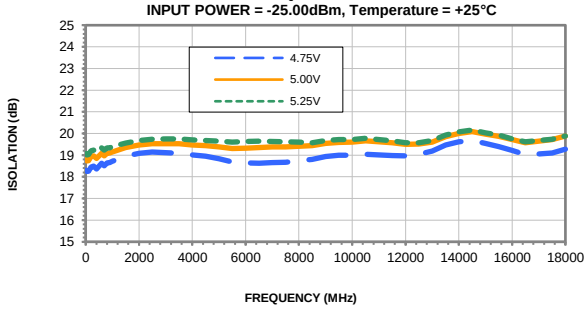
GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



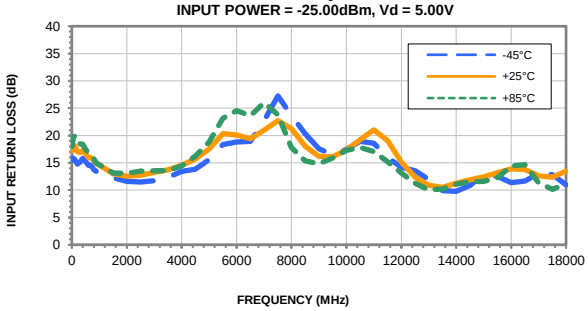
ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



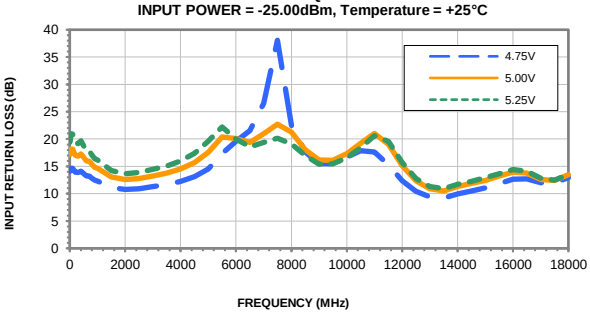
ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



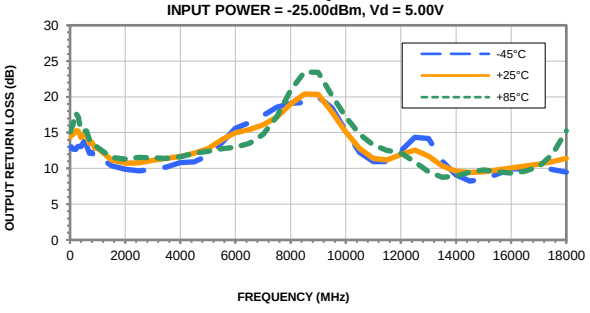
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 5.00V



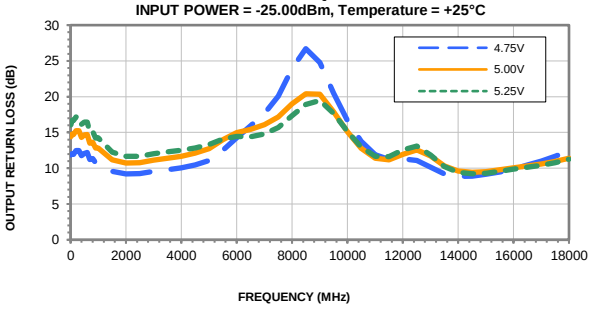
INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



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

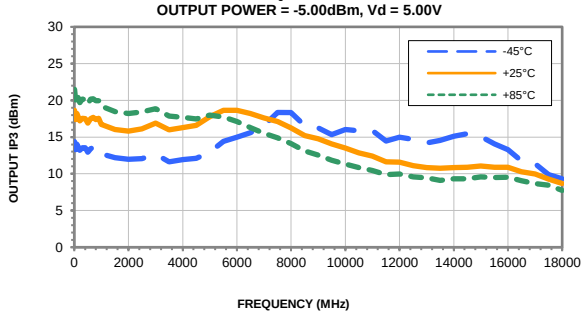


OUTPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C

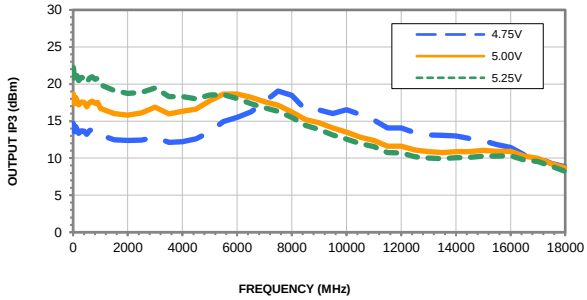


Typical Performance Curves

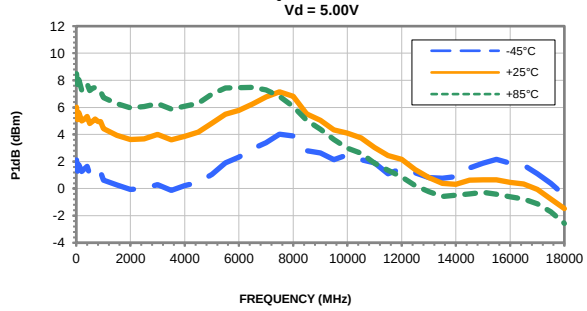
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE
OUTPUT POWER = -5.00dBm, Vd = 5.00V



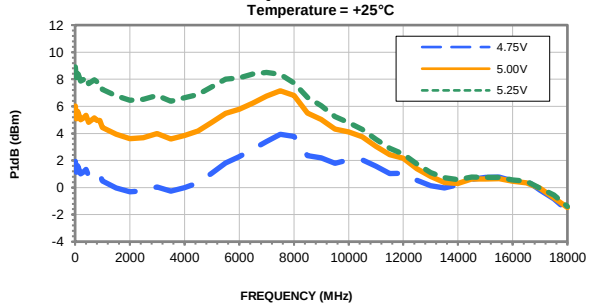
OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE
OUTPUT POWER = -5.00dBm, Temperature = +25°C



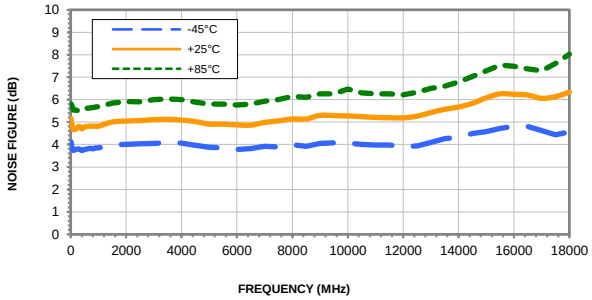
P1dB vs. FREQUENCY & TEMPERATURE
Vd = 5.00V



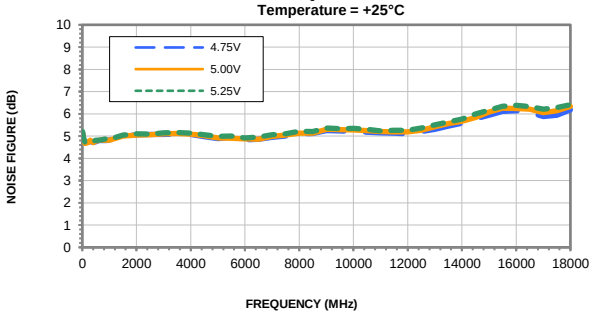
P1dB vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



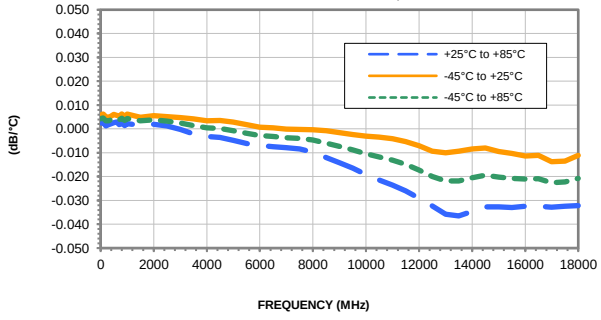
NOISE FIGURE vs. FREQUENCY & TEMPERATURE
Vd = 5.00V



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



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

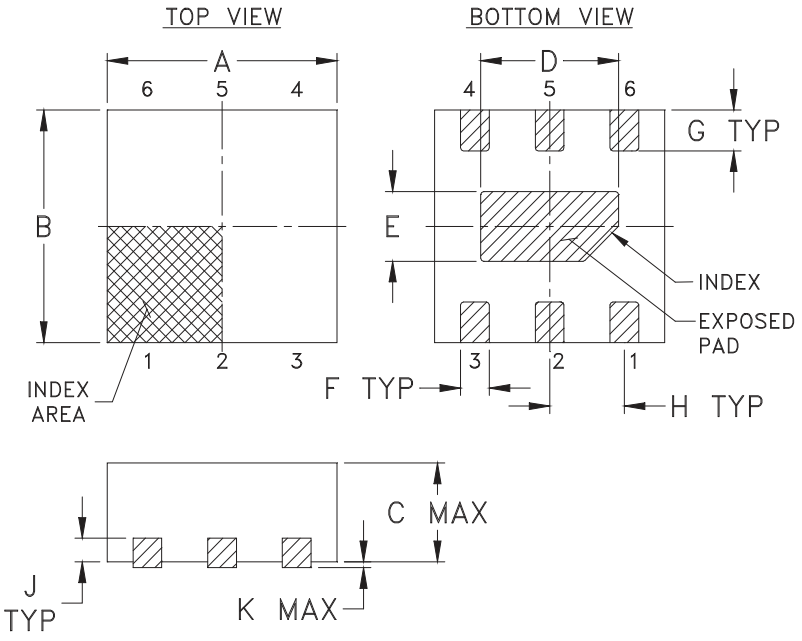


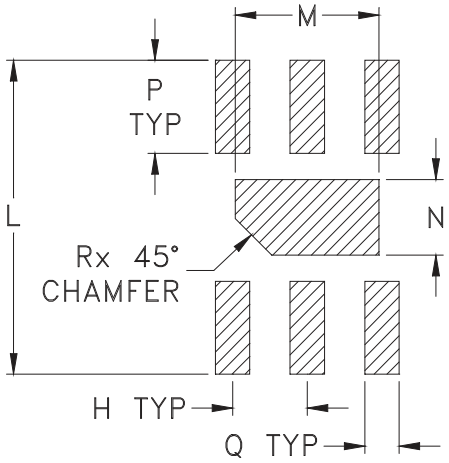
Case Style MC

MC1630-1

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	N	P
MC1630-1	.079 (2.00)	.079 (2.00)	.039 (1.00)	.047 (1.20)	.024 (.60)	.010 (.25)	.014 (.35)	.026 (.65)	.008 (.20)	.002 (.05)	.106 (2.70)	.049 (1.25)	.026 (.65)	.031 (.80)

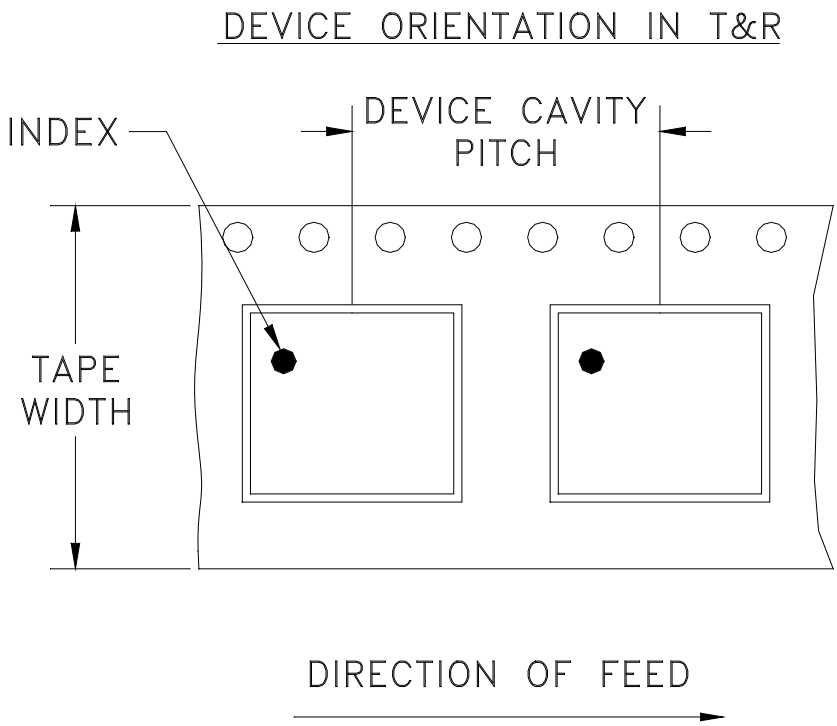
CASE #.	Q	R	WT, GRAM
MC1630-1	.012 (.30)	.012 (.30)	.006

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

Notes:

1. Case material: Plastic.
2. Termination finish:
   For RoHS Case Styles: Tin-Silver over Nickel plated or Matte-Tin plated (See Data sheet).
   All models, (+) suffix.
3. Lead #1 identifier shall be located in the cross-hatched area shown.
   Identifier may be either a molded or marked feature.

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®
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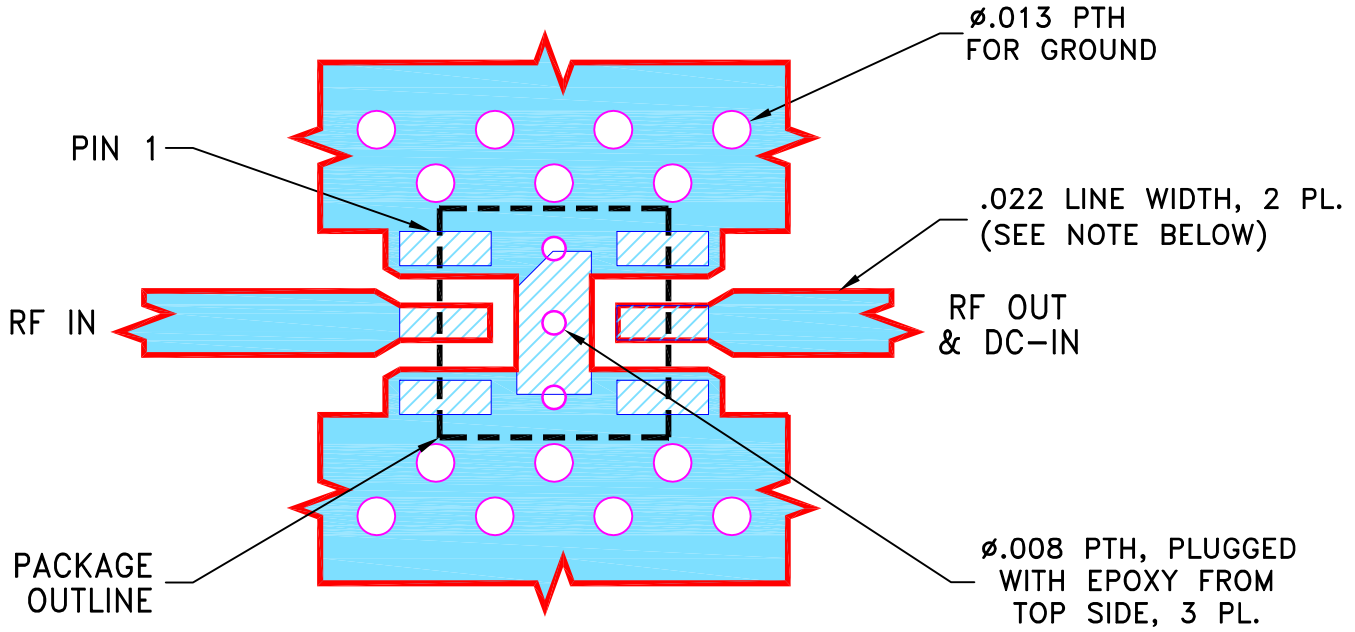
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M166967	NEW RELEASE	03/21/18	ITG	GL

SUGGESTED MOUNTING CONFIGURATION
FOR MC1630-1 CASE STYLE, "06AM04" PIN CODE



NOTES:

1. LINE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010"±.001".
   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	ITG	03/21/18
TOLERANCES ON:	CHECKED	GF	03/21/18
2 PL DECIMALS ±	APPROVED	GL	03/21/18
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

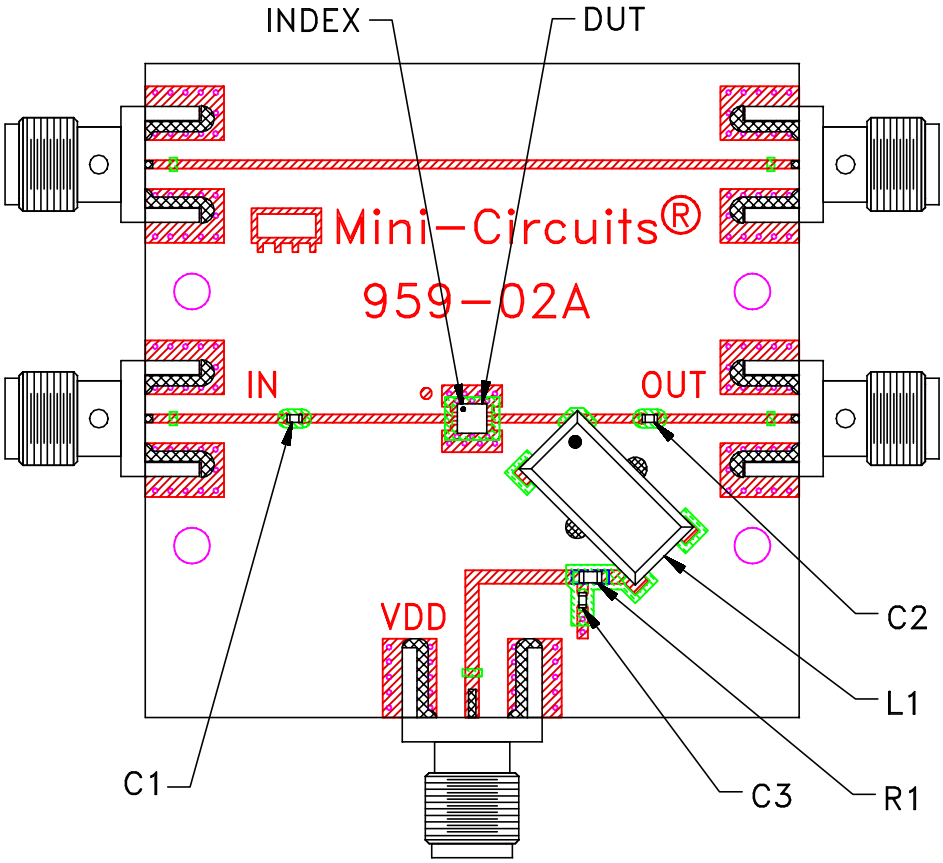
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 06AM04, MC1630-1, TB-995+

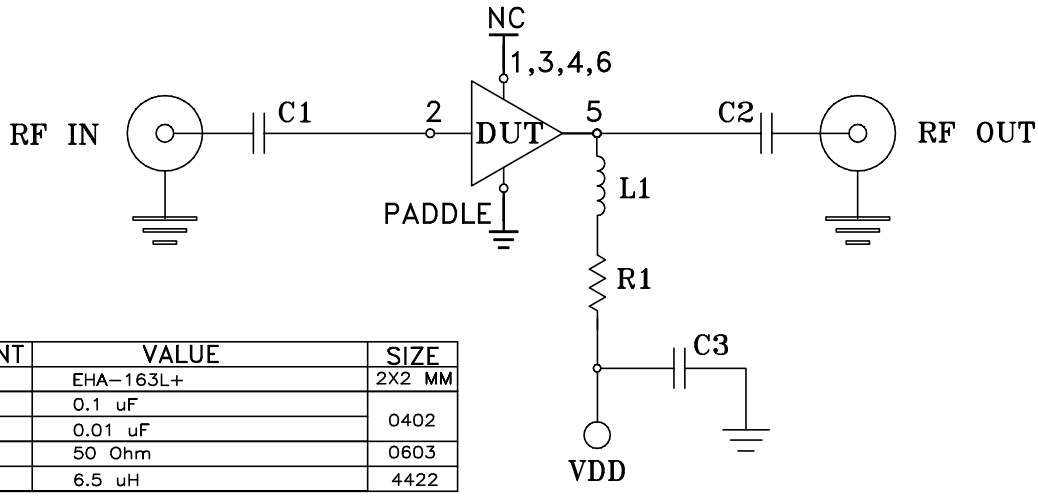
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-544	OR

FILE:	SCALE:	SHEET:
98PL544	15:1	1 OF 1

Evaluation Board and Circuit



TB-995+



COMPONENT	VALUE	SIZE
DUT	EHA-163L+	2X2 MM
C1,C2	0.1 uF	0402
C3	0.01 uF	
R1	50 Ohm	0603
L1	6.5 uH	4422

Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.010 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

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
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