

Low Current, Wideband, Ceramic

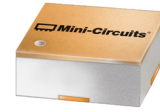
# Monolithic Amplifier

## CMA-183L+

50Ω DC to 18 GHz

### The Big Deal

- Ceramic, hermetically sealed, nitrogen filled
- Super Wideband, DC to 18 GHz, usable to 20 GHz
- Excellent Gain Flatness  $\pm 2.1$ dB
- Low Current, 20 mA typ



CASE STYLE: LZ1737

MIL Screening Available  
Please consult Applications Dept.

### Product Overview

The CMA-183L+ is a low current, wideband gain block that operates up to 20 GHz fabricated using highly reliable GaAs 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 packaged in an LTCC hermetic package utilizing fully automated and highly reliable manufacturing processes. CMA-series amplifiers are capable of meeting MIL requirements for gross leak, fine leak, thermal shock, vibration, acceleration, mechanical shock, and HTOL. The tests can be performed if requested.

### Key Features

Feature	Advantages
Super Wideband: DC to 18 GHz, usable to 20 GHz	General purpose wideband amplifier is suitable for various applications.
Low Current, 20 mA typ.	Low current consumption is ideal for use in amplifier chain.
Excellent gain flatness: $\pm 0.7$ dB to 10 GHz $\pm 2.1$ dB to 18 GHz	Minimize the need for gain slope compensation to achieve flat gain
No external matching component required	CMA-183L+ provides typical input & output return loss of 15 dB up to 20 GHz without the need for any external matching components.
Ceramic, hermetic package	Highly reliable hermetic package provides predictable and repeatable performance in military applications including ground, air, and ship requirements, and small size 2.25 x 2.25 mm
Very small size 2.25 x 2.25 x 1.1mm	Small size fits into tiny space on motherboard of PCB saving cost

Low Current, Wideband, Ceramic

# Monolithic Amplifier

DC-18 GHz

## Product Features

- Ceramic, hermetically sealed, high reliability
- Super Wideband, DC to 18 GHz, usable to 20 GHz
- Low Current, 20 mA
- Excellent Gain flatness,  $\pm 2.1$  dB
- Repeatable performance (HBT Process)



## CMA-183L+

CASE STYLE: LZ1737

### +RoHS Compliant

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

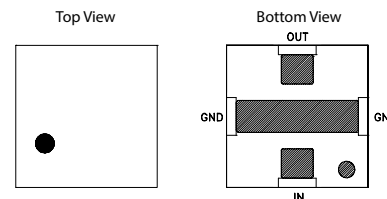
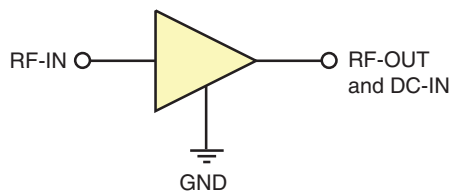
## Typical Applications

- Instrumentation
- Cable infrastructure
- 5G

## General Description

The CMA-183L+ is a low current, wideband gain block that operates up to 20 GHz fabricated using highly reliable GaAs 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 packaged in an LTCC hermetic package utilizing fully automated and highly reliable manufacturing processes.

### simplified schematic and pad description



Function	Pad Number	Description
RF IN	IN	RF-INPUT
RF-OUT and DC-IN	OUT	RF OUTPUT AND DC INPUT
GND	GND	GROUND

### Electrical Specifications at 25°C, Vs=5V, R=50Ω unless noted

Parameter	Condition (MHz)	Vs=5V <sup>1</sup>			Units
		Min.	Typ.	Max.	
Frequency Range <sup>5</sup>		10		18000	MHz
Gain	10	—	15.3	—	dB
	5000	—	14.2	—	
	8000	11.9	14.0	15.4	
	12000	—	13.8	—	
	18000	—	11.1	—	
Input Return Loss	10		16		dB
	5000		9		
	8000		13		
	12000		27		
	18000		20		
Output Return Loss	10		13		dB
	5000		9		
	8000		14		
	12000		16		
	18000		13		
Reverse Isolation	1000		17.1		
Output Power @ 1dB compression	10		7.0		dBm
	5000		5.4		
	8000		5.6		
	12000		5.0		
	18000		1.4		
Output IP3 <sup>2</sup>	10		20.1		dBm
	5000		17.5		
	8000		15.8		
	12000		13.3		
	18000		10.2		
Noise Figure	10		6.5		dB
	5000		5.5		
	8000		5.3		
	12000		4.9		
	18000		5.2		
DC Supply (Vs)		4.75	5.0	5.25	V
Device Operating Current		—	20	24	mA
DC Current Variation Vs. Temperature <sup>3</sup>			60		μA/°C
DC Current Variation Vs. Voltage <sup>4</sup>			0.018		mA/mV
Thermal Resistance, junction-to-ground at 85°C stage temp.			367		°C/W

1. Measured on Mini-Circuits Characterization test board TB-668+. See Characterization Test Circuit (Fig. 1)

2. Tested at Pout=-5dBm / tone.

3. (Current at 105°C — Current at -55°C)/160

4. (Current at 5.25V - Current at 4.75V)/((Voltage difference)\*1000)

5. Low frequency cut-off determined by external coupling capacitors & RF choke.

### Absolute Maximum Ratings<sup>6</sup>

Parameter	Ratings
Operating Temperature (ground lead)	-55°C to 85°C
Storage Temperature	-65°C to 125°C
Junction Temperature	150°C
Total Power Dissipation	0.2 W
Input Power (CW)	+22 dBm (5 minutes max.) +8 dBm (continuous)
Vs Supply Voltage (Pin OUT)	6V

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

Electrical maximum ratings are not intended for continuous normal operation.



### Characterization Test Circuit

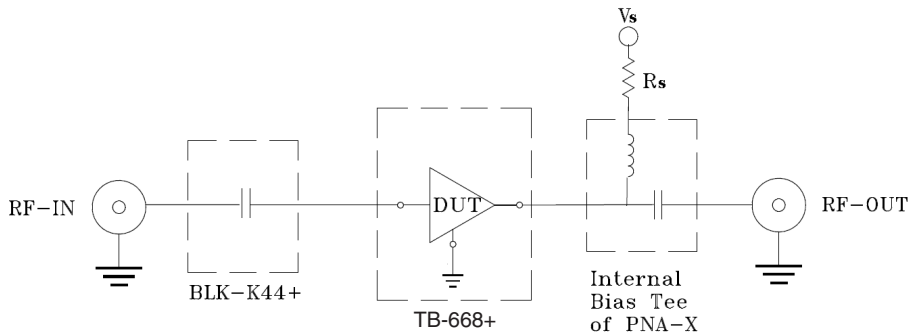


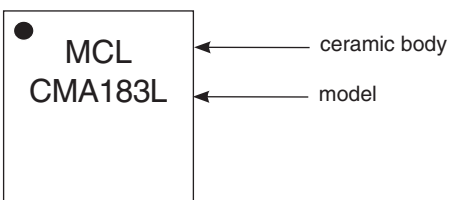
Fig 1. Characterization Circuit

Note: This block diagram is used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-668+) 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.  $R_S=49.9$  ohms,  $V_s = 5V$

Conditions:

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

### Product Marking



<b>Additional Detailed Technical Information</b>	
<i>additional information is available on our dash board. To access this information <a href="#">click here</a></i>	
<b>Performance Data</b>	Data Table
	Swept Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
<b>Case Style</b>	LZ1737 <i>Ceramic package Terminal finish: NiPdAu</i>
<b>Tape &amp; Reel</b> Standard quantities available on reel	F108 <i>7" reels with 20, 50, 100, 200, 500 or 1K, 2K devices.</i>
<b>Suggested Layout for PCB Design</b>	PL-386
<b>Evaluation Board</b>	TB-668+
<b>Environmental Ratings</b>	ENV-68

**ESD Rating**

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

**Additional 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](http://www.minicircuits.com/MCLStore/terms.jsp)



## 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 = 20.36mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
10	15.50	18.85	16.05	13.01	1.06	0.46	19.84	7.15	6.22
40	15.56	18.87	16.58	13.69	1.06	0.47	21.71	6.96	5.65
70	15.56	18.87	16.62	13.72	1.06	0.47	20.08	6.99	5.41
100	15.56	18.87	16.71	13.72	1.06	0.47	19.47	6.85	5.28
200	15.56	18.88	16.61	13.72	1.06	0.47	19.37	6.70	5.52
300	15.56	18.90	16.57	13.72	1.06	0.47	19.79	6.67	5.29
400	15.55	18.90	16.54	13.67	1.06	0.48	19.47	6.89	5.17
500	15.55	18.90	16.49	13.61	1.06	0.48	19.24	6.91	5.30
600	15.54	18.92	16.41	13.58	1.06	0.48	19.24	6.95	5.15
700	15.53	18.93	16.30	13.52	1.06	0.48	19.49	6.57	5.20
800	15.52	18.93	16.18	13.45	1.06	0.48	18.90	6.59	5.19
900	15.51	18.95	16.01	13.35	1.05	0.49	19.81	6.84	5.22
1000	15.50	18.95	15.87	13.22	1.05	0.49	19.17	6.56	5.21
2000	15.33	19.06	13.83	11.97	1.02	0.55	19.54	6.26	5.26
3000	15.05	19.20	11.74	10.61	0.95	0.65	18.02	6.07	5.45
4000	14.73	19.33	10.29	9.68	0.88	0.75	17.82	5.83	5.41
5000	14.45	19.40	9.71	9.47	0.89	0.77	17.52	5.59	5.37
6000	14.30	19.33	10.02	10.07	0.97	0.71	17.17	5.75	5.36
7000	14.27	19.16	11.38	11.76	1.07	0.65	16.90	5.96	5.28
8000	14.31	19.01	13.72	14.67	1.11	0.64	15.89	5.86	5.11
9000	14.38	18.87	17.58	18.52	1.12	0.63	15.74	6.62	5.03
10000	14.35	18.84	23.39	19.63	1.13	0.63	15.41	6.42	4.84
11000	14.18	18.80	26.70	17.10	1.12	0.64	15.15	5.81	4.78
11500	14.17	18.91	27.20	16.23	1.13	0.64	14.99	5.65	4.79
12000	14.11	18.92	27.70	15.68	1.13	0.64	14.43	5.08	4.74
12500	13.98	18.91	28.33	15.42	1.14	0.65	13.62	4.79	4.74
13000	13.84	18.88	29.23	15.12	1.15	0.65	13.53	4.29	4.77
13500	13.68	18.84	32.31	14.85	1.16	0.66	13.16	4.17	4.75
14000	13.48	18.85	40.12	14.98	1.17	0.68	12.64	3.73	4.83
14500	13.21	18.82	34.19	15.00	1.19	0.69	12.39	3.48	4.92
15000	12.92	18.75	27.80	14.83	1.20	0.71	12.00	3.05	4.99
15500	12.62	18.71	22.90	14.67	1.22	0.72	11.65	2.67	4.98
16000	12.31	18.69	20.65	14.11	1.25	0.73	11.35	2.25	4.96
16500	12.02	18.70	19.39	13.51	1.27	0.73	11.19	1.96	4.99
17000	11.72	18.68	19.17	12.95	1.29	0.74	10.98	2.04	4.97
17500	11.51	18.71	20.08	12.45	1.30	0.75	10.75	1.58	4.95
18000	11.28	18.74	21.16	11.95	1.31	0.76	10.29	1.40	5.04

## 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 = 15.94mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)			(dBm)	(dBm)	(dB)
10	14.71	18.49	13.72	11.20	1.06	0.47	14.17	3.30	6.17
40	14.78	18.50	14.08	11.71	1.06	0.48	15.97	3.24	5.67
70	14.78	18.51	14.09	11.74	1.06	0.48	15.80	3.20	5.39
100	14.79	18.50	14.21	11.74	1.06	0.48	15.27	3.08	5.23
200	14.79	18.51	14.14	11.74	1.06	0.48	15.13	2.92	5.53
300	14.79	18.53	14.13	11.75	1.06	0.48	15.39	2.96	5.24
400	14.78	18.53	14.11	11.72	1.06	0.48	15.37	3.16	5.14
500	14.78	18.53	14.07	11.65	1.06	0.48	15.51	3.15	5.26
600	14.77	18.55	14.02	11.66	1.06	0.49	15.35	3.17	5.09
700	14.76	18.56	13.95	11.61	1.06	0.49	15.50	2.80	5.14
800	14.75	18.57	13.87	11.56	1.06	0.50	15.09	2.83	5.12
900	14.74	18.58	13.75	11.50	1.06	0.50	15.59	3.11	5.16
1000	14.73	18.59	13.64	11.39	1.05	0.50	15.26	2.81	5.21
2000	14.56	18.72	12.15	10.46	1.00	0.58	15.61	2.53	5.23
3000	14.29	18.90	10.50	9.38	0.91	0.70	14.83	2.42	5.39
4000	14.00	19.03	9.31	8.61	0.83	0.79	14.79	2.22	5.36
5000	13.76	19.09	8.85	8.47	0.85	0.79	15.21	2.00	5.29
6000	13.66	19.00	9.15	9.02	0.96	0.71	15.20	2.34	5.27
7000	13.72	18.79	10.44	10.53	1.06	0.64	15.89	2.65	5.21
8000	13.81	18.61	12.58	13.10	1.11	0.62	15.35	2.89	4.98
9000	13.93	18.40	16.10	16.87	1.12	0.62	16.65	4.50	4.94
10000	13.94	18.32	22.38	20.26	1.12	0.62	17.88	5.10	4.71
11000	13.80	18.26	41.81	19.03	1.12	0.63	17.85	5.06	4.72
11500	13.80	18.39	43.40	18.10	1.13	0.64	17.59	5.04	4.68
12000	13.73	18.42	37.64	17.25	1.13	0.64	16.66	4.55	4.65
12500	13.60	18.44	32.56	17.02	1.14	0.66	15.77	4.30	4.62
13000	13.46	18.44	31.48	16.56	1.15	0.66	15.31	3.86	4.67
13500	13.28	18.41	31.52	16.13	1.15	0.67	14.37	3.78	4.66
14000	13.08	18.47	27.65	16.00	1.17	0.69	13.86	3.36	4.74
14500	12.80	18.49	24.20	15.80	1.19	0.71	13.39	3.11	4.79
15000	12.50	18.42	21.91	15.33	1.21	0.72	12.68	2.70	4.82
15500	12.19	18.43	19.11	14.83	1.24	0.73	12.50	2.35	4.86
16000	11.88	18.43	17.82	14.05	1.26	0.73	12.44	1.99	4.78
16500	11.59	18.43	17.16	13.34	1.29	0.74	12.10	1.87	4.89
17000	11.29	18.45	17.02	12.76	1.31	0.75	11.82	1.94	4.81
17500	11.09	18.47	17.82	12.28	1.31	0.76	11.45	1.52	4.85
18000	10.87	18.48	18.68	11.96	1.32	0.78	11.03	1.33	4.85

## 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 = 24.85mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
10	15.89	19.08	17.33	14.23	1.05	0.46	19.74	9.75	6.25
40	15.97	19.09	18.29	15.01	1.05	0.47	24.18	9.60	5.87
70	15.97	19.09	18.29	15.06	1.05	0.47	22.94	9.61	5.53
100	15.97	19.09	18.49	15.06	1.05	0.47	21.84	9.47	5.38
200	15.96	19.10	18.32	15.06	1.05	0.47	22.20	9.31	5.58
300	15.96	19.11	18.31	15.03	1.05	0.47	22.71	9.29	5.37
400	15.95	19.12	18.25	14.97	1.05	0.47	23.14	9.51	5.26
500	15.95	19.12	18.16	14.90	1.05	0.47	22.22	9.51	5.39
600	15.94	19.13	18.06	14.85	1.05	0.47	22.30	9.54	5.23
700	15.93	19.13	17.90	14.78	1.05	0.48	22.23	9.17	5.29
800	15.92	19.14	17.74	14.68	1.05	0.48	21.71	9.22	5.26
900	15.91	19.15	17.51	14.57	1.05	0.48	21.95	9.43	5.30
1000	15.89	19.15	17.30	14.42	1.05	0.48	22.36	9.14	5.30
2000	15.71	19.22	14.70	12.91	1.03	0.52	22.18	8.84	5.34
3000	15.40	19.34	12.20	11.29	0.97	0.62	21.03	8.67	5.52
4000	15.03	19.44	10.52	10.22	0.90	0.73	20.48	8.36	5.51
5000	14.67	19.50	9.81	9.92	0.89	0.77	20.41	8.07	5.46
6000	14.44	19.42	10.04	10.44	0.97	0.73	19.38	8.11	5.45
7000	14.34	19.25	11.30	12.03	1.06	0.68	18.61	8.03	5.34
8000	14.29	19.10	13.41	14.46	1.11	0.65	16.89	7.47	5.17
9000	14.30	18.93	16.78	17.00	1.12	0.64	16.23	7.32	5.12
10000	14.21	18.87	21.50	17.30	1.13	0.64	15.40	6.69	4.93
11000	14.02	18.77	25.27	15.63	1.13	0.64	15.04	5.97	4.89
11500	14.00	18.87	26.48	15.02	1.13	0.64	14.80	5.72	4.89
12000	13.92	18.84	27.47	14.57	1.14	0.64	14.17	5.34	4.86
12500	13.78	18.83	29.39	14.52	1.14	0.65	13.46	4.98	4.85
13000	13.63	18.80	30.97	14.33	1.15	0.65	13.04	4.51	4.90
13500	13.44	18.73	33.21	14.08	1.16	0.66	12.89	4.26	4.91
14000	13.24	18.73	49.29	14.12	1.17	0.68	12.27	3.83	4.97
14500	12.96	18.72	33.82	14.17	1.19	0.70	12.02	3.55	5.05
15000	12.67	18.63	27.11	13.94	1.20	0.71	11.71	3.19	5.13
15500	12.35	18.62	22.15	13.73	1.23	0.72	11.34	2.83	5.12
16000	12.04	18.62	20.06	13.18	1.26	0.72	11.02	2.33	5.11
16500	11.74	18.62	18.92	12.65	1.28	0.73	10.82	2.09	5.17
17000	11.45	18.64	18.68	12.19	1.31	0.74	10.50	2.07	5.14
17500	11.24	18.67	19.89	11.77	1.32	0.75	10.30	1.63	5.13
18000	11.02	18.70	21.37	11.47	1.32	0.76	9.95	1.41	5.17



## 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 = 16.33mA @ Temperature = -55°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
10	15.17	18.70	14.80	11.98	1.06	0.46	14.86	3.51	5.40
40	15.20	18.70	14.95	12.44	1.06	0.47	17.02	3.34	4.74
70	15.21	18.71	14.91	12.42	1.06	0.47	15.74	3.28	4.50
100	15.21	18.71	14.98	12.35	1.06	0.47	15.51	3.19	4.36
200	15.21	18.71	14.67	12.21	1.06	0.47	15.50	3.07	4.70
300	15.22	18.72	14.76	12.28	1.06	0.47	15.32	3.04	4.36
400	15.23	18.71	14.91	12.37	1.06	0.47	15.49	3.27	4.20
500	15.23	18.71	14.92	12.33	1.05	0.47	15.90	3.29	4.37
600	15.23	18.72	14.83	12.30	1.05	0.47	15.75	3.27	4.14
700	15.22	18.72	14.76	12.26	1.05	0.47	15.76	2.97	4.22
800	15.22	18.73	14.75	12.25	1.05	0.48	15.44	3.04	4.17
900	15.22	18.73	14.65	12.20	1.05	0.48	15.71	3.26	4.20
1000	15.21	18.74	14.55	12.09	1.05	0.48	15.55	2.96	4.22
2000	15.08	18.83	12.97	11.10	1.00	0.55	15.95	2.76	4.20
3000	14.84	18.98	11.16	9.84	0.92	0.66	15.10	2.62	4.37
4000	14.56	19.10	9.78	8.89	0.84	0.75	15.22	2.50	4.31
5000	14.38	19.11	9.59	8.95	0.87	0.74	15.42	2.19	4.21
6000	14.33	18.99	10.15	9.71	0.97	0.66	15.74	2.45	4.18
7000	14.37	18.82	11.29	11.09	1.05	0.58	16.03	2.60	4.11
8000	14.44	18.71	13.00	13.11	1.09	0.57	15.06	2.91	3.98
9000	14.56	18.56	16.55	16.79	1.10	0.58	16.36	4.48	3.92
10000	14.65	18.49	25.83	21.74	1.09	0.58	17.72	5.40	3.70
11000	14.59	18.47	24.02	18.10	1.08	0.59	19.08	5.84	3.63
11500	14.64	18.59	25.34	17.62	1.08	0.59	20.59	5.96	3.63
12000	14.67	18.62	29.44	17.28	1.09	0.58	19.05	5.90	3.63
12500	14.64	18.69	34.65	17.47	1.10	0.59	19.01	5.78	3.58
13000	14.49	18.68	30.50	16.61	1.10	0.59	19.18	5.30	3.62
13500	14.33	18.64	25.37	15.15	1.11	0.59	17.90	5.26	3.57
14000	14.18	18.65	23.56	13.99	1.11	0.59	17.11	4.87	3.63
14500	13.96	18.64	22.37	13.61	1.12	0.61	16.02	4.70	3.70
15000	13.75	18.50	23.30	13.83	1.13	0.61	15.20	4.29	3.69
15500	13.51	18.42	21.86	14.64	1.14	0.64	14.68	3.90	3.74
16000	13.25	18.40	18.76	14.83	1.16	0.65	14.86	3.41	3.77
16500	12.98	18.36	16.55	13.63	1.17	0.66	14.34	3.51	3.79
17000	12.66	18.44	16.04	12.60	1.19	0.67	14.06	3.36	3.72
17500	12.48	18.45	18.37	12.00	1.20	0.67	13.63	3.02	3.70
18000	12.29	18.45	24.25	11.49	1.19	0.68	12.93	2.88	3.69

## 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 = 12.13mA @ Temperature = -55°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)			(dBm)	(dBm)	(dB)
10	13.57	17.97	11.22	8.87	1.07	0.45	10.32	-2.21	5.35
40	13.60	18.00	11.39	9.32	1.07	0.47	10.88	-2.41	4.87
70	13.60	18.01	11.36	9.32	1.07	0.48	10.31	-2.41	4.50
100	13.59	18.01	11.36	9.24	1.07	0.47	9.77	-2.54	4.37
200	13.59	18.02	11.19	9.15	1.07	0.47	9.69	-2.69	4.77
300	13.61	18.03	11.24	9.25	1.07	0.48	9.94	-2.68	4.41
400	13.63	18.02	11.36	9.30	1.07	0.48	9.82	-2.44	4.23
500	13.63	18.00	11.35	9.22	1.06	0.48	10.05	-2.47	4.40
600	13.63	18.04	11.30	9.28	1.06	0.49	9.84	-2.45	4.19
700	13.62	18.03	11.25	9.22	1.06	0.49	9.98	-2.78	4.23
800	13.63	18.04	11.27	9.25	1.05	0.50	9.68	-2.69	4.23
900	13.63	18.05	11.22	9.23	1.05	0.50	9.91	-2.46	4.25
1000	13.62	18.05	11.15	9.12	1.04	0.51	9.82	-2.71	4.25
2000	13.49	18.19	10.17	8.56	0.95	0.61	10.05	-2.97	4.25
3000	13.25	18.39	8.94	7.70	0.82	0.75	9.29	-3.07	4.39
4000	12.98	18.50	7.96	6.93	0.72	0.83	9.16	-3.27	4.35
5000	12.87	18.48	7.85	6.98	0.77	0.79	8.88	-3.62	4.25
6000	12.93	18.31	8.26	7.60	0.92	0.66	8.98	-3.43	4.19
7000	13.09	18.05	9.16	8.59	1.04	0.55	9.20	-3.21	4.12
8000	13.25	17.86	10.45	10.08	1.09	0.53	8.06	-2.83	3.96
9000	13.47	17.50	13.03	12.45	1.07	0.54	9.03	-1.19	3.90
10000	13.72	17.17	19.53	18.17	1.06	0.54	9.80	0.12	3.69
11000	13.70	17.10	25.76	25.18	1.07	0.55	11.64	1.25	3.57
11500	13.74	17.32	23.13	24.23	1.08	0.57	12.70	1.44	3.64
12000	13.72	17.41	22.29	21.65	1.08	0.58	13.36	2.57	3.59
12500	13.69	17.50	21.04	21.04	1.08	0.59	12.78	3.13	3.54
13000	13.57	17.50	22.42	20.16	1.09	0.60	14.67	2.76	3.60
13500	13.44	17.48	24.37	19.50	1.09	0.60	17.55	2.96	3.56
14000	13.29	17.63	22.00	17.41	1.11	0.62	16.98	2.76	3.58
14500	13.07	17.69	18.73	16.68	1.12	0.64	19.83	2.70	3.63
15000	12.80	17.68	16.97	16.49	1.14	0.66	16.68	2.41	3.63
15500	12.52	17.72	15.07	15.78	1.16	0.67	15.91	2.21	3.64
16000	12.24	17.77	13.87	14.35	1.18	0.68	16.61	1.80	3.68
16500	11.96	17.78	13.27	12.56	1.18	0.68	15.38	2.31	3.72
17000	11.69	17.84	13.43	11.55	1.19	0.69	15.47	2.34	3.65
17500	11.57	17.83	15.25	11.30	1.19	0.70	14.81	1.93	3.64
18000	11.43	17.79	17.69	11.36	1.18	0.72	13.32	1.98	3.59

## 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 = 20.80mA @ Temperature = -55°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
10	15.80	19.00	16.87	13.71	1.05	0.46	16.19	7.19	5.44
40	15.85	19.02	17.30	14.29	1.05	0.46	20.05	7.07	4.78
70	15.86	19.03	17.28	14.26	1.05	0.46	19.98	7.05	4.52
100	15.86	19.03	17.32	14.19	1.05	0.46	19.84	6.91	4.37
200	15.86	19.04	16.89	14.00	1.05	0.46	19.78	6.77	4.66
300	15.87	19.04	17.01	14.08	1.05	0.46	20.35	6.76	4.39
400	15.87	19.04	17.22	14.21	1.05	0.46	19.94	6.97	4.24
500	15.87	19.04	17.22	14.16	1.05	0.46	20.32	6.99	4.39
600	15.87	19.05	17.09	14.08	1.05	0.46	19.84	7.03	4.19
700	15.86	19.05	17.00	14.04	1.05	0.47	20.12	6.69	4.26
800	15.86	19.05	16.98	14.03	1.05	0.47	19.71	6.73	4.20
900	15.86	19.06	16.85	13.96	1.05	0.47	19.99	6.94	4.24
1000	15.85	19.06	16.71	13.82	1.05	0.47	20.09	6.63	4.28
2000	15.73	19.13	14.68	12.54	1.01	0.52	20.07	6.41	4.26
3000	15.49	19.26	12.43	11.00	0.95	0.61	19.13	6.27	4.43
4000	15.21	19.38	10.80	9.89	0.88	0.70	18.84	6.05	4.36
5000	15.01	19.40	10.59	9.94	0.91	0.70	18.76	5.78	4.29
6000	14.93	19.30	11.24	10.80	0.99	0.64	18.78	5.98	4.24
7000	14.94	19.18	12.53	12.37	1.06	0.59	18.54	6.01	4.16
8000	14.97	19.10	14.45	14.75	1.09	0.58	17.31	6.12	4.01
9000	15.05	19.02	18.38	19.12	1.10	0.59	17.54	7.43	3.99
10000	15.11	19.04	22.75	20.64	1.09	0.60	17.31	7.78	3.76
11000	15.03	19.07	18.91	16.03	1.06	0.61	17.18	7.53	3.72
11500	15.10	19.18	19.75	15.64	1.07	0.61	17.29	7.31	3.70
12000	15.16	19.19	21.14	15.56	1.08	0.59	16.69	6.93	3.68
12500	15.16	19.25	22.68	15.88	1.09	0.58	16.14	6.65	3.65
13000	15.02	19.23	21.52	15.15	1.10	0.58	16.16	6.11	3.71
13500	14.85	19.16	19.39	13.76	1.10	0.57	15.54	5.98	3.64
14000	14.71	19.15	18.84	12.85	1.10	0.57	14.79	5.59	3.72
14500	14.51	19.06	19.41	12.40	1.11	0.57	14.71	5.33	3.75
15000	14.33	18.92	22.27	12.82	1.11	0.59	14.14	4.90	3.84
15500	14.13	18.75	29.00	13.88	1.12	0.61	13.64	4.45	3.87
16000	13.90	18.66	23.22	14.77	1.13	0.63	13.36	3.90	3.86
16500	13.65	18.61	18.57	14.29	1.14	0.64	13.20	3.80	3.90
17000	13.32	18.68	17.36	13.28	1.16	0.65	12.92	3.73	3.86
17500	13.12	18.69	19.84	12.50	1.17	0.65	12.66	3.28	3.85
18000	12.93	18.71	30.50	11.79	1.17	0.66	12.03	3.13	3.76

## 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 = 24.20mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
10	15.61	18.91	16.46	13.52	1.06	0.47	18.01	9.45	6.75
40	15.69	18.93	17.52	14.32	1.06	0.47	23.37	9.32	6.41
70	15.69	18.94	17.56	14.41	1.06	0.47	22.21	9.31	6.21
100	15.68	18.93	17.66	14.50	1.06	0.47	21.29	9.14	6.10
200	15.69	18.93	18.16	14.84	1.06	0.48	21.81	9.07	6.35
300	15.69	18.94	18.21	14.92	1.06	0.48	21.94	9.06	6.13
400	15.68	18.95	17.92	14.69	1.06	0.48	22.01	9.25	6.05
500	15.66	18.96	17.39	14.35	1.06	0.48	21.85	9.21	6.17
600	15.64	18.98	16.93	14.09	1.06	0.48	22.19	9.21	6.05
700	15.62	18.99	16.72	13.98	1.06	0.48	21.78	8.81	6.11
800	15.61	18.99	16.61	13.90	1.06	0.48	21.37	8.88	6.08
900	15.60	19.00	16.35	13.76	1.06	0.49	21.66	9.11	6.11
1000	15.58	19.01	16.03	13.53	1.06	0.49	21.71	8.76	6.13
2000	15.32	19.09	13.15	11.87	1.03	0.54	21.30	8.42	6.24
3000	14.96	19.16	11.16	10.69	0.96	0.64	20.81	8.29	6.37
4000	14.50	19.23	9.55	9.69	0.87	0.77	20.38	7.95	6.37
5000	14.04	19.27	8.78	9.32	0.86	0.83	19.88	7.72	6.36
6000	13.66	19.20	8.82	9.50	0.93	0.79	18.25	7.56	6.38
7000	13.44	19.01	9.89	10.65	1.04	0.73	17.12	7.06	6.29
8000	13.37	18.75	12.35	13.03	1.12	0.69	15.33	6.25	6.06
9000	13.29	18.48	16.54	15.04	1.15	0.67	14.75	5.82	5.96
10000	13.11	18.38	20.58	15.47	1.17	0.67	13.89	5.06	5.82
11000	12.78	18.29	23.79	15.63	1.19	0.69	13.19	4.29	5.81
11500	12.65	18.36	25.67	15.15	1.20	0.70	13.13	3.99	5.86
12000	12.49	18.36	27.86	14.84	1.20	0.71	12.40	3.52	5.84
12500	12.31	18.37	29.38	14.61	1.21	0.72	11.83	3.20	5.76
13000	12.06	18.41	26.31	14.62	1.23	0.74	11.58	2.77	5.86
13500	11.79	18.35	23.70	14.48	1.25	0.76	11.40	2.55	5.89
14000	11.51	18.34	21.34	14.18	1.27	0.77	11.00	2.16	6.00
14500	11.17	18.42	19.73	13.54	1.30	0.78	10.78	1.92	6.12
15000	10.80	18.43	19.57	12.96	1.34	0.78	10.40	1.57	6.16
15500	10.47	18.42	19.73	12.43	1.38	0.78	10.20	1.32	6.14
16000	10.13	18.44	20.23	11.97	1.42	0.78	10.06	1.01	6.12
16500	9.84	18.45	19.61	11.73	1.45	0.79	9.81	0.65	6.20
17000	9.55	18.45	18.02	11.77	1.47	0.81	9.60	0.80	6.14
17500	9.33	18.45	16.61	11.68	1.48	0.83	9.31	0.40	6.23
18000	9.11	18.48	15.74	11.72	1.49	0.85	9.24	0.28	6.32

## 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 = 19.65mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
10	15.11	18.69	14.69	12.25	1.06	0.48	17.56	6.74	6.74
40	15.19	18.69	15.54	12.90	1.06	0.48	21.11	6.58	6.38
70	15.20	18.69	15.68	12.99	1.06	0.48	19.17	6.57	6.18
100	15.20	18.69	15.82	13.07	1.06	0.48	18.32	6.43	6.05
200	15.21	18.68	16.19	13.36	1.06	0.48	18.73	6.34	6.31
300	15.21	18.69	16.25	13.42	1.06	0.49	19.24	6.34	6.05
400	15.19	18.70	15.98	13.21	1.06	0.49	19.22	6.53	5.98
500	15.17	18.72	15.57	12.92	1.06	0.49	19.18	6.50	6.09
600	15.16	18.74	15.29	12.76	1.06	0.49	18.80	6.50	5.99
700	15.14	18.75	15.15	12.67	1.06	0.49	18.85	6.13	6.03
800	15.13	18.76	15.06	12.60	1.06	0.49	18.37	6.18	5.99
900	15.12	18.77	14.86	12.48	1.06	0.50	18.89	6.40	6.05
1000	15.10	18.78	14.60	12.28	1.06	0.50	18.58	6.11	6.05
2000	14.87	18.92	12.43	10.98	1.02	0.57	18.66	5.73	6.12
3000	14.59	19.03	10.86	10.07	0.94	0.68	17.53	5.59	6.29
4000	14.24	19.14	9.50	9.26	0.86	0.78	17.09	5.32	6.30
5000	13.88	19.20	8.84	9.02	0.86	0.82	17.06	5.16	6.25
6000	13.63	19.14	8.92	9.34	0.94	0.77	16.28	5.30	6.25
7000	13.53	18.95	10.06	10.72	1.06	0.70	16.16	5.45	6.18
8000	13.55	18.70	12.72	13.79	1.13	0.67	14.99	5.22	5.93
9000	13.55	18.47	17.31	16.89	1.15	0.66	14.75	5.43	5.84
10000	13.41	18.39	21.70	17.56	1.16	0.66	14.08	4.94	5.69
11000	13.11	18.30	25.16	17.50	1.17	0.68	13.64	4.21	5.70
11500	13.02	18.42	27.13	16.82	1.18	0.69	13.50	4.05	5.69
12000	12.88	18.42	30.13	16.22	1.19	0.70	12.84	3.47	5.64
12500	12.69	18.44	30.55	15.80	1.20	0.71	12.25	3.17	5.59
13000	12.45	18.48	26.67	15.70	1.21	0.73	12.05	2.78	5.67
13500	12.19	18.42	24.03	15.51	1.23	0.75	11.86	2.61	5.70
14000	11.92	18.42	21.70	15.29	1.25	0.76	11.43	2.26	5.80
14500	11.58	18.48	19.97	14.65	1.28	0.77	11.11	2.06	5.87
15000	11.20	18.46	19.83	13.92	1.32	0.78	10.71	1.71	5.90
15500	10.86	18.46	20.12	13.32	1.36	0.78	10.58	1.40	5.92
16000	10.52	18.48	20.71	12.70	1.39	0.78	10.47	1.11	5.91
16500	10.22	18.47	19.95	12.33	1.42	0.78	10.12	0.77	5.90
17000	9.91	18.47	18.01	12.29	1.44	0.80	10.00	0.84	5.84
17500	9.68	18.48	16.43	12.13	1.45	0.83	9.84	0.55	5.92
18000	9.45	18.49	15.54	12.07	1.45	0.85	9.65	0.38	6.01

# MMIC Amplifier

# CMA-183L+

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

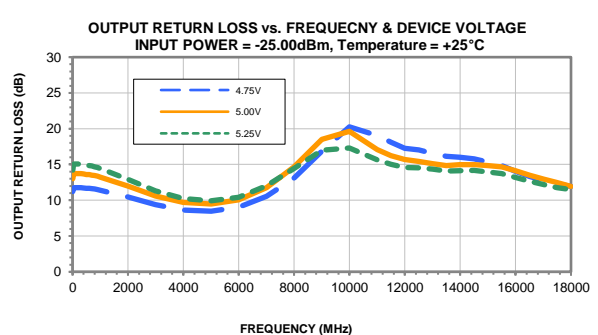
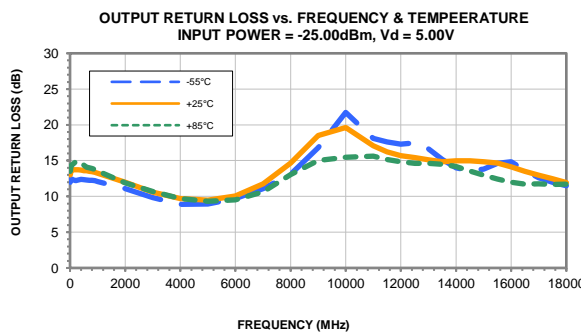
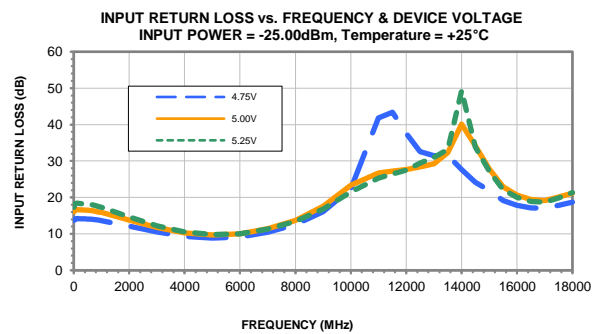
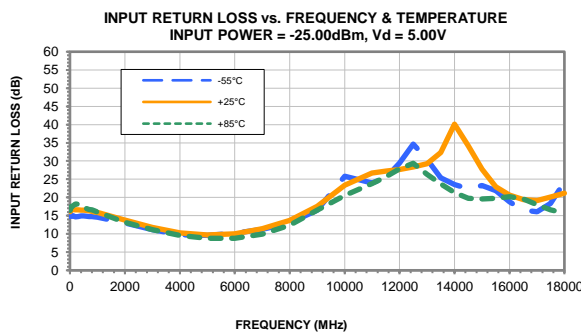
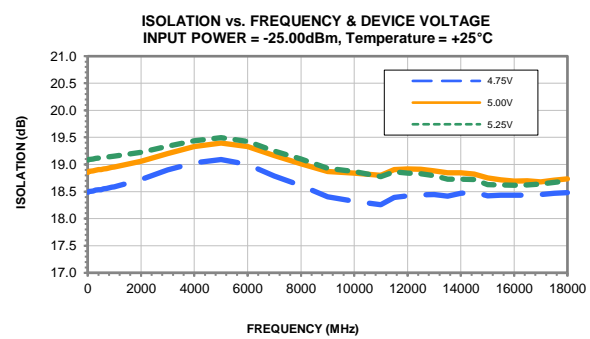
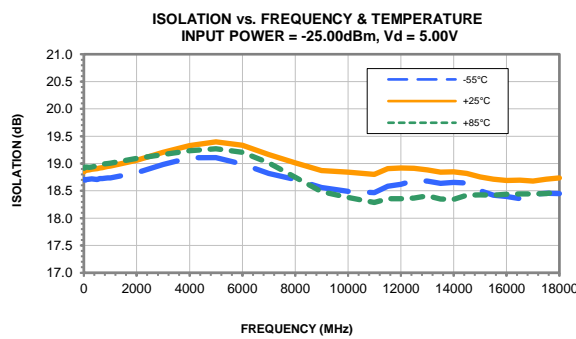
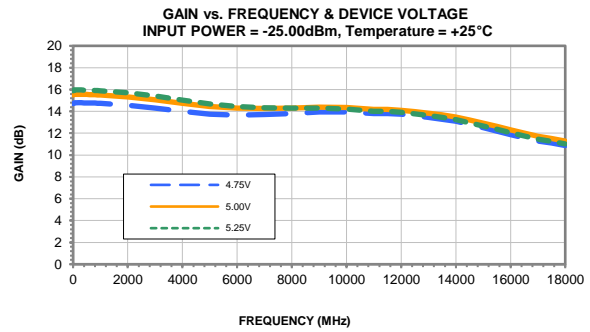
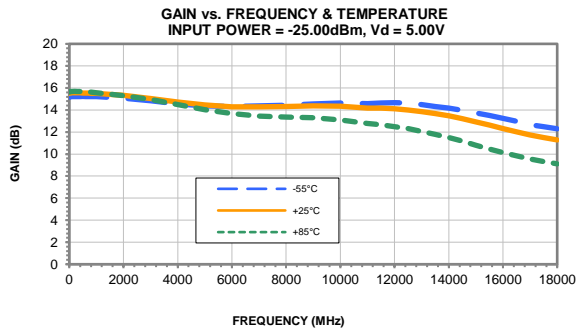
Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

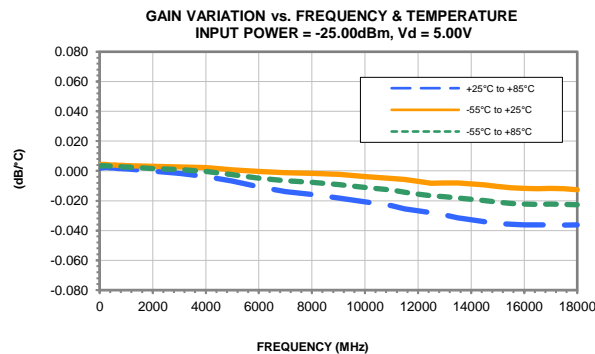
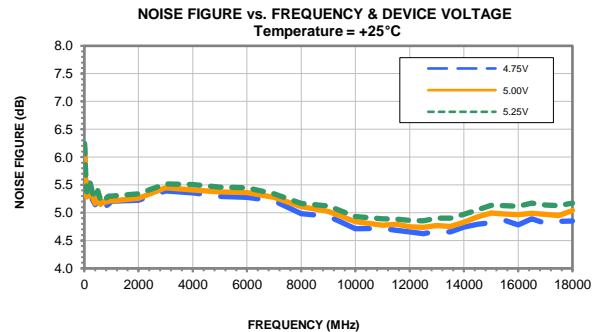
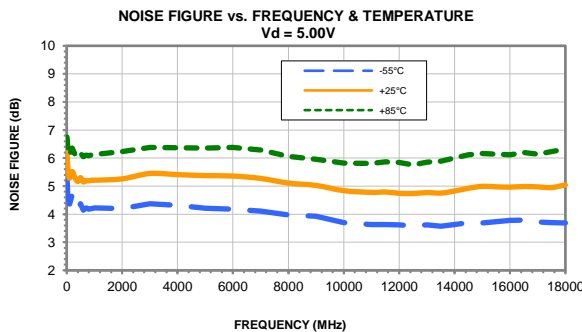
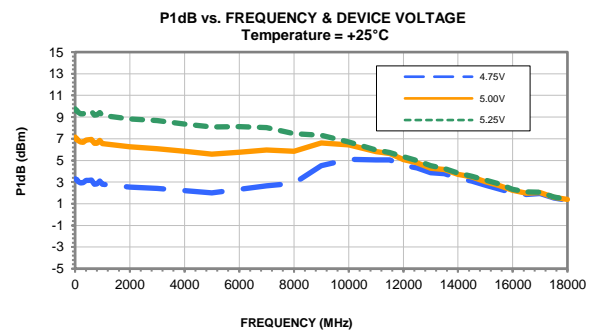
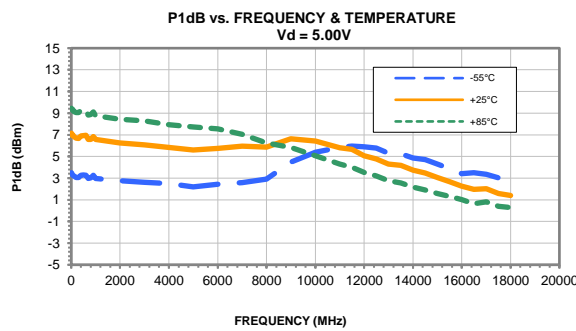
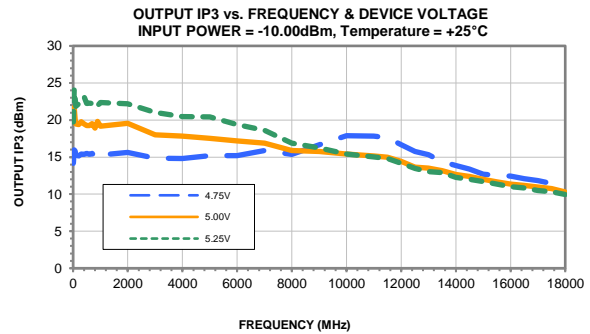
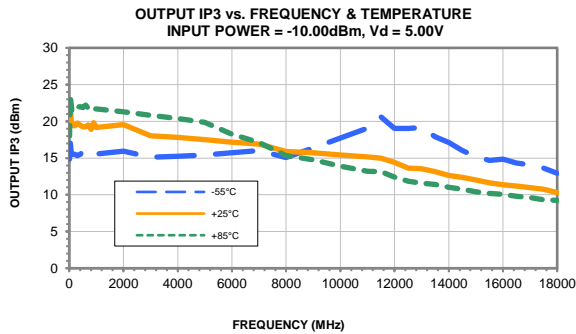
TEST CONDITIONS: Vd = 5.25V, Id = 28.82mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
10	15.91	19.04	18.11	14.42	1.05	0.46	17.71	11.68	6.84
40	15.99	19.09	18.81	15.37	1.05	0.47	23.74	11.48	6.53
70	15.98	19.10	18.97	15.49	1.05	0.47	23.52	11.50	6.33
100	15.98	19.09	19.28	15.61	1.06	0.47	23.59	11.35	6.22
200	15.99	19.09	19.75	16.00	1.06	0.47	22.58	11.26	6.44
300	15.98	19.09	19.74	16.02	1.06	0.47	21.96	11.26	6.24
400	15.97	19.10	19.23	15.68	1.06	0.47	24.34	11.43	6.18
500	15.95	19.11	18.60	15.31	1.06	0.47	23.22	11.37	6.29
600	15.93	19.12	18.13	15.07	1.06	0.48	23.85	11.41	6.16
700	15.91	19.13	17.83	14.94	1.06	0.48	24.36	11.03	6.23
800	15.90	19.13	17.60	14.79	1.06	0.48	23.07	11.07	6.20
900	15.88	19.14	17.20	14.59	1.06	0.48	24.04	11.26	6.23
1000	15.85	19.14	16.77	14.30	1.06	0.48	24.58	10.96	6.27
2000	15.53	19.16	13.21	12.28	1.04	0.52	23.28	10.64	6.36
3000	15.09	19.17	10.92	10.86	0.97	0.62	23.85	10.42	6.51
4000	14.51	19.20	9.20	9.68	0.87	0.77	21.93	9.91	6.53
5000	13.90	19.21	8.36	9.14	0.83	0.85	20.41	9.26	6.52
6000	13.39	19.13	8.33	9.11	0.89	0.83	18.46	8.27	6.56
7000	13.05	18.92	9.32	9.93	1.02	0.76	16.89	7.12	6.49
8000	12.90	18.61	11.65	11.71	1.12	0.71	15.25	6.10	6.28
9000	12.78	18.31	15.45	13.09	1.16	0.67	14.21	5.43	6.20
10000	12.53	18.18	18.76	13.43	1.19	0.67	13.42	4.54	6.10
11000	12.13	18.02	20.97	13.66	1.20	0.70	12.70	3.69	6.13
11500	12.00	18.14	22.14	13.47	1.21	0.71	12.65	3.42	6.19
12000	11.82	18.11	23.88	13.29	1.22	0.73	11.90	3.04	6.16
12500	11.61	18.11	25.24	13.26	1.23	0.74	11.44	2.75	6.13
13000	11.36	18.15	23.30	13.27	1.25	0.76	11.21	2.34	6.22
13500	11.07	18.10	21.04	13.12	1.27	0.77	11.03	2.14	6.29
14000	10.78	18.14	19.05	12.69	1.29	0.78	10.65	1.74	6.44
14500	10.42	18.25	17.85	12.06	1.34	0.79	10.34	1.53	6.58
15000	10.05	18.24	17.95	11.52	1.38	0.78	10.15	1.28	6.65
15500	9.72	18.25	18.48	11.13	1.43	0.78	9.87	1.05	6.64
16000	9.40	18.28	19.37	10.81	1.47	0.78	9.71	0.71	6.62
16500	9.11	18.29	18.94	10.70	1.50	0.79	9.49	0.46	6.73
17000	8.83	18.30	17.31	10.85	1.52	0.81	9.28	0.57	6.77
17500	8.63	18.34	15.87	10.89	1.53	0.84	9.13	0.17	6.81
18000	8.42	18.32	15.08	11.02	1.53	0.86	8.96	0.03	6.94

## Typical Performance Curves



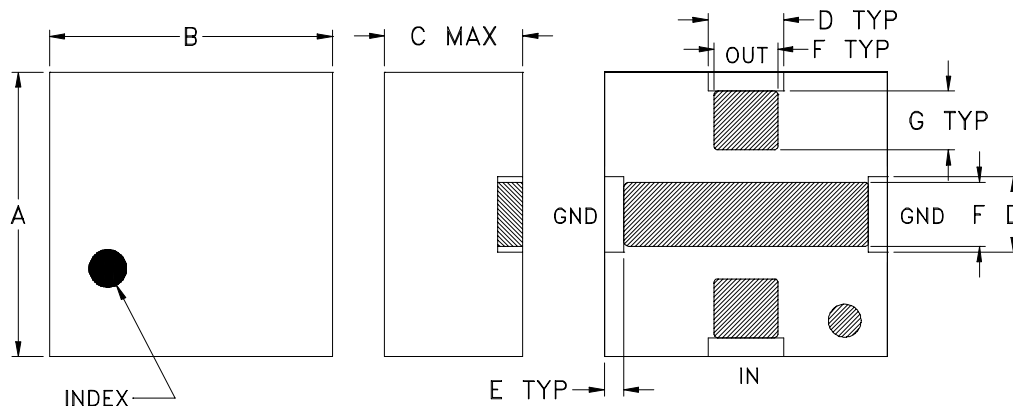
## Typical Performance Curves



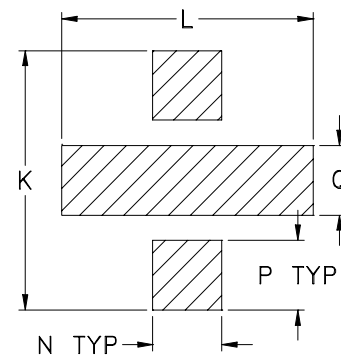


## Outline Dimensions

LZ1737



## PCB Land Pattern



Suggested Layout  
Pattern to be within  $\pm .002$

CASE #	A	B	C	D	E	F	G	H	J	K	L	M
LZ1737	.089 (2.250)	.089 (2.250)	.043 (1.10)	.024 (.600)	.006 (.150)	.020 (.508)	.018 (.465)	- -	.010 (.255)	.089 (2.26)	.089 (2.26)	- -

CASE #	N	P	Q	R	WT. GRAM
LZ1737	.022 (.550)	.026 (.66)	.017 (.432)	- -	.015

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

### Notes:

1. Case material: Ceramic.
2. Base material: 36 mil thk laminate.
3. Termination finish: Electroless Nickel-Palladium-Gold Plate.

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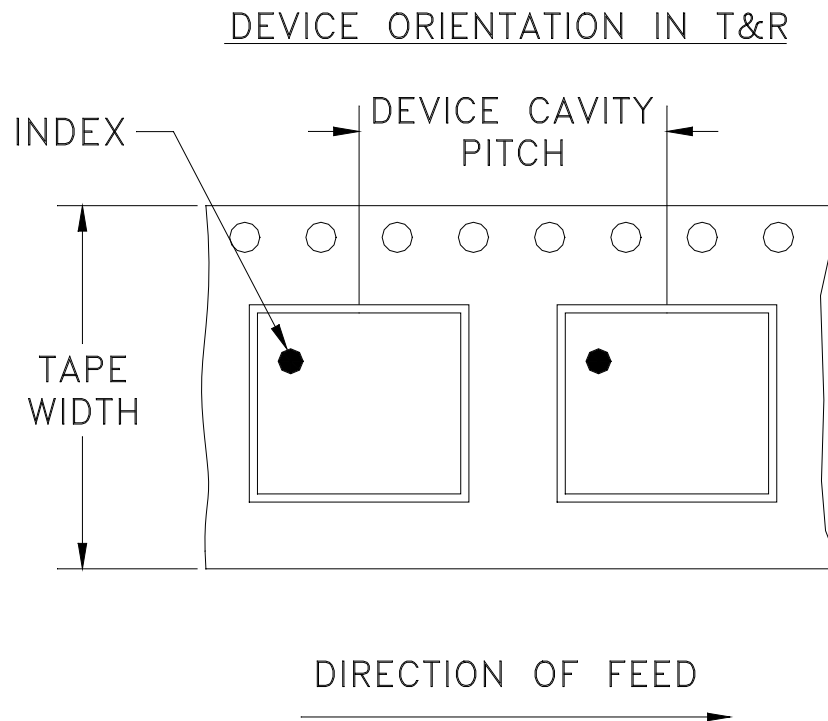
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P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

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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](http://www.minicircuits.com/pages/pdfs/tape.pdf)

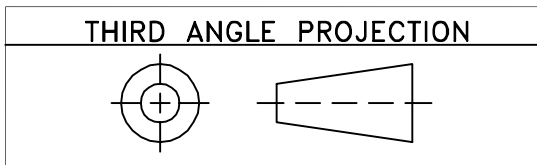
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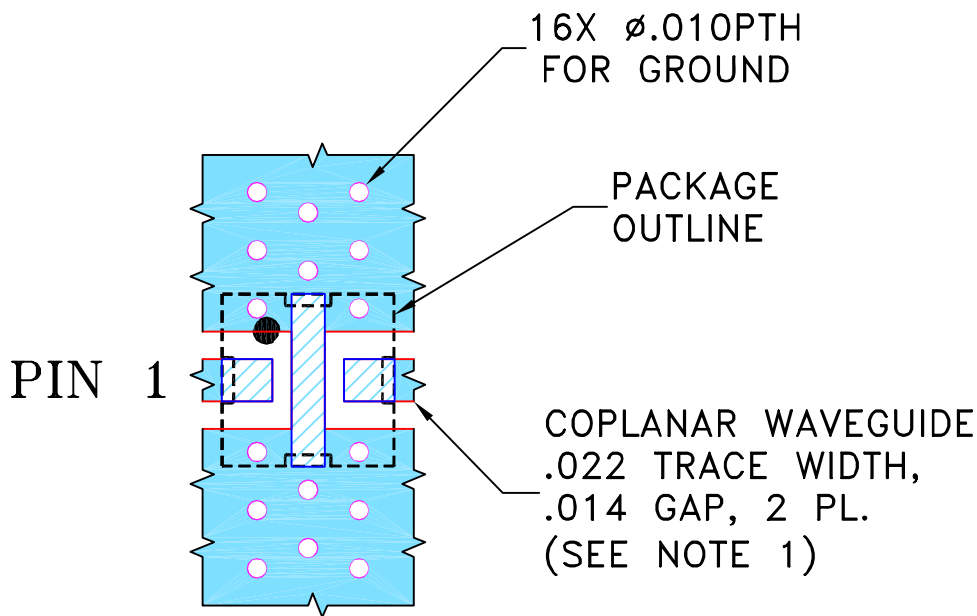
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REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M138802	NEW RELEASE	12/07/12	AV	BT
A	M142XXX	REDESIGNED PL-DRAWING	07/17/13	IL	RD

SUGGESTED MOUNTING CONFIGURATION FOR LZ1737 CASE STYLE, "04AF03" PIN CODE

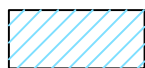


NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .010" ± .001"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
3. IN ORDER TO ACHIEVE PERFORMANCE AT HIGHER FREQUENCIES, THICKNESS OF SOLDER MASK SHALL BE MINIMAL.



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



DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED	INITIALS		DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±	DRAWN	AV	09/19/12
	CHECKED	IL	10/11/12
	APPROVED	BT	12/07/12



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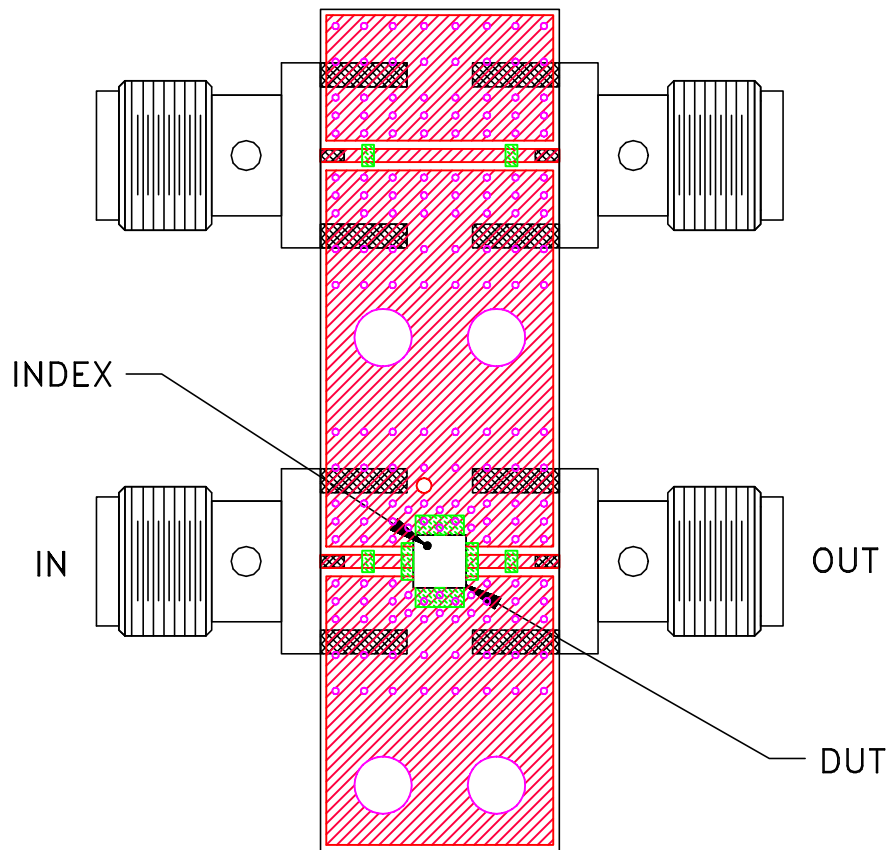
PL, 04AF03, LZ1737, TB-668-XX+

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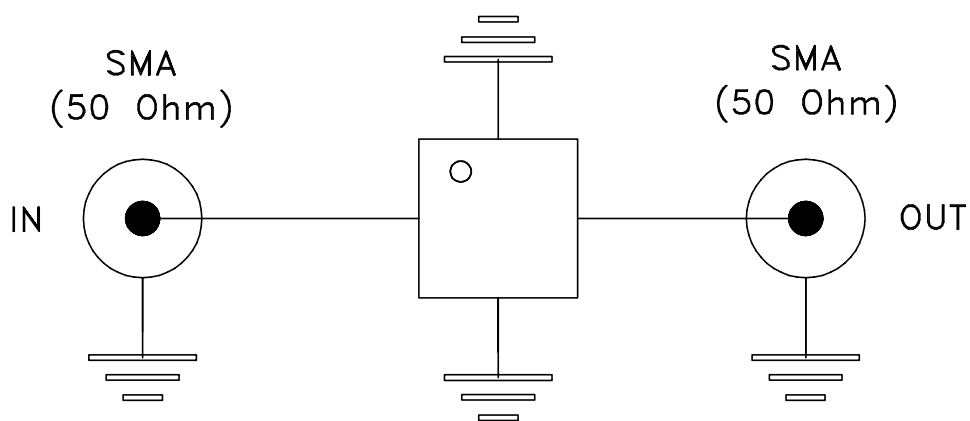
ASHEETA1.DWG REV:A DATE:01/12/95

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-386	A
FILE:	98PL386	SCALE: 10:1	SHEET: 1 OF 1

# Evaluation Board and Circuit




TB-668+



Schematic Diagram

## Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.010 inch.

 **Mini-Circuits®**



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-55° to 105°C	Individual Model Data Sheet
Storage Temperature	-65° to 125° C	Individual Model Data Sheet
Thermal Shock (device level)	-55° to 125°C, 100 cycles	MIL-STD-202, Method 107
Thermal Shock (board level)	-55° to 125°C, 1000 cycles	MIL-STD-202, Method 107
Constant Acceleration	Y1 plane only, 30 Kg	MIL-STD-883, Method 2001, Cond. E
Vibration	10-2000MHz sine, 20g, 3 axis	MIL-STD-202, Method 204, Cond. D
Mechanical Shock	Y1 plane, 5 pulses, .5ms, 1.5 Kg	MIL-STD-202, Method 213, Cond. A
PIND	20G's @130 Hz	MIL-STD-750, Method 2052.2
Resistance to Soldering Heat	3X Reflow, Peak Temperature 260°C, electrical End points	JESD22-B102
Resistance to Solvent	15 pieces, 5 pieces each solvent, marking permanency	MIL-STD-202, Method 215
Moisture Sensitivity Level	Hermetic device, MSL-1 by construction	JESD22-A113, MSL1/260
Hermeticity	Fine Leak, Gross Leak	MIL-STD-202, Method 112, Cond. C&D



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
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JEDEC-STD-22-B, Method A102