

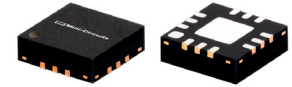


# Monolithic Amplifier PMA3-223GLN+

50Ω 10 to 22 GHz

## THE BIG DEAL

- Wideband, 10 to 22 GHz
- High Gain, 27.9 dB typ. at 15 GHz
- Low NF, 1.8 dB typ. at 15 GHz
- P1dB, 10 dBm typ. at 20 GHz
- OIP3, 22.1 dBm typ. at 15 GHz
- Built-in Bias Tee and DC Blocks
- Patent Pending



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

- 5G
- Space Research
- Mobile

## PRODUCT OVERVIEW

The PMA3-223GLN+ is a PHEMT based wideband, low noise MMIC amplifier with a unique combination of high gain and low noise figure over a very board bandwidth making it ideal for using as the first stage driver amplifier of receiver applications. This design operates on a single 4V supply, is matched to 50Ohm and comes in a tiny plastic package (3 x 3 x 0.89mm), accommodating dense circuit board layouts.

## KEY FEATURES

Feature	Advantages
Low noise, 1.8 dB at 15 GHz	Enables lower system noise figure performance.
High Gain, 27.9 dB at 15 GHz	Enables signal amplification without the need for multiple gain stage, minimizing the effect of subsequent stages on noise figure.
Built-in Bias Tee & DC Blocks	Minimizes the external component count & PC board space, making it less expensive and user friendly for system designers.
3 x 3mm 12-lead MCLP package	Tiny footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB.

REV. C  
ECO-011519  
PMA3-223GLN+  
GY/RS/CP/AM  
220120



WIDEBAND, HIGH GAIN, LOW NOISE

# Monolithic Amplifier PMA3-223GLN+

Mini-Circuits

## ELECTRICAL SPECIFICATIONS<sup>1</sup> AT 25°C, V<sub>s</sub>=4V AND R<sub>1</sub>=18Ω, UNLESS NOTED OTHERWISE

Parameter	Condition (GHz)	V <sub>s</sub> =4.0V			Units
		Min.	Typ.	Max.	
Frequency Range	—	10		22	GHz
Noise Figure	10		1.9		dB
	15		1.8		
	20		1.6		
	22		1.6		
Gain	10	22.5	25.3	29.2	dB
	15	24.7	27.9	31.5	
	20	22.2	25.5	31.1	
	22	—	24.0	—	
Input Return Loss	10		13		dB
	15		13		
	20		21		
	22		15		
Output Return Loss	10		12		dB
	15		10		
	20		10		
	22		8		
Output Power @ 1 dB compression	10		8.5		dBm
	15		9.5		
	20		10.0		
	22		10.7		
Output IP3	10		18.6		dBm
	15		22.1		
	20		22.0		
	30		22.3		
Device Operating Voltage (V <sub>s</sub> )		3.75	4.0	4.25	V
Device Operating Current (I <sub>S</sub> )			68	112	mA
Device Current Variation vs. Temperature <sup>2</sup>			-50		μA/°C
Device Current Variation vs. Voltage			0.02		mA/mV
Thermal Resistance, junction-to-ground lead			106		°C/W

1. Measured on Mini-Circuits Characterization test board TB-PMA3-223GLN+ with thru-line loss being deducted. See Characterization Test Circuit (Fig. 1)

2. Device Current Variation vs. Temperature = (Current at 85°C - Current at -45°C)/130°C

## MAXIMUM RATINGS<sup>3</sup>

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Junction Temperature	146°C
Total Power Dissipation	0.65W
Input Power (CW), V <sub>s</sub> =4V	+23 dBm (5 minutes max.) +13 dBm (continuous)
DC Voltage at Port 2 & 8	2V
DC Voltage (V <sub>s</sub> )	6V

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

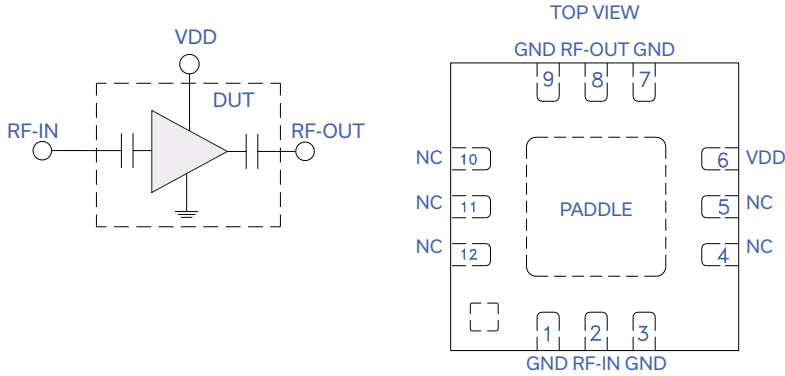




WIDEBAND, HIGH GAIN, LOW NOISE

# Monolithic Amplifier PMA3-223GLN+

## SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION



Function	Pad Number	Description (Fig. 1)
RF-IN	2	RF Input Pad. Connects to RF input
RF-OUT	8	RF Output Pad. Connects to RF output
VDD	6	DC Power Supply Pad. Connects to Voltage Source Vs via R1
Ground	1,3,7,9 & Paddle	Connects to ground
No Connection	4,5,10,11&12	Not used internally. Connected to ground on test board

## RECOMMENDED APPLICATION AND CHARACTERIZATION TEST CIRCUIT

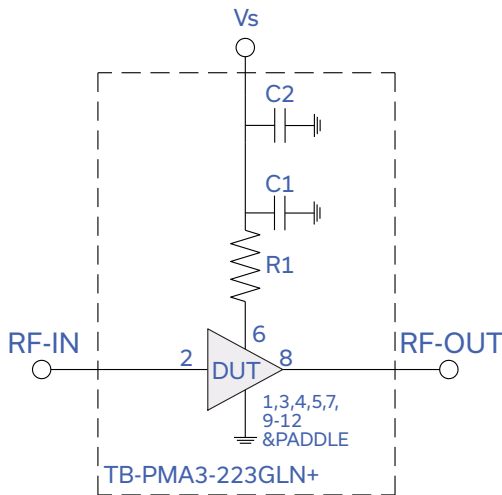


Fig 1. Application and Characterization Circuit

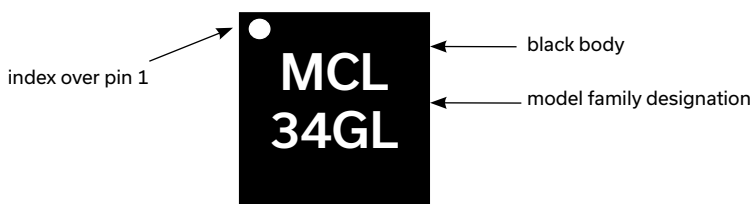
Note: This block diagram is used for characterization. (DUT is soldered on Mini-Circuits Characterization test board TB-PMA3-223GLN+) Gain, Return loss, Output power at 1dB compression (P1 dB), output IP3 (OIP3) and noise figure measured using Agilent's N5245A microwave network analyzer.

Conditions:

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

Component	Size	Value	Part Number	Manufacturer
R1	0603	18 Ohm	SG73G1JTTD18R0C	KOA
C1	0402	5 pF	GJM1555C1H5R0CB01D	Murata
C2	0402	0.1 uF	GRM155R71C104KA88D	Murata

## PRODUCT MARKING



Marking may contain other features or characters for internal lot control





WIDEBAND, HIGH GAIN, LOW NOISE

# Monolithic Amplifier PMA3-223GLN+

Mini-Circuits

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS [CLICK HERE](#)

Performance Data	Data Table graphs, s-parameter data set (.zip file)
Case Style	DQ1225 Plastic package, exposed paddle, lead finish: Matte Tin
Tape & Reel Standard quantities available on reel	F66 7" reels with 20, 50, 100, 200, 500, 1K, or 2K devices.
Suggested Layout for PCB Design	PL-674
Evaluation Board	TB-PMA3-223GLN+ (Without connectors) TB-PMA3223GLNC+ (With connectors)
Environmental Ratings	ENV08T1

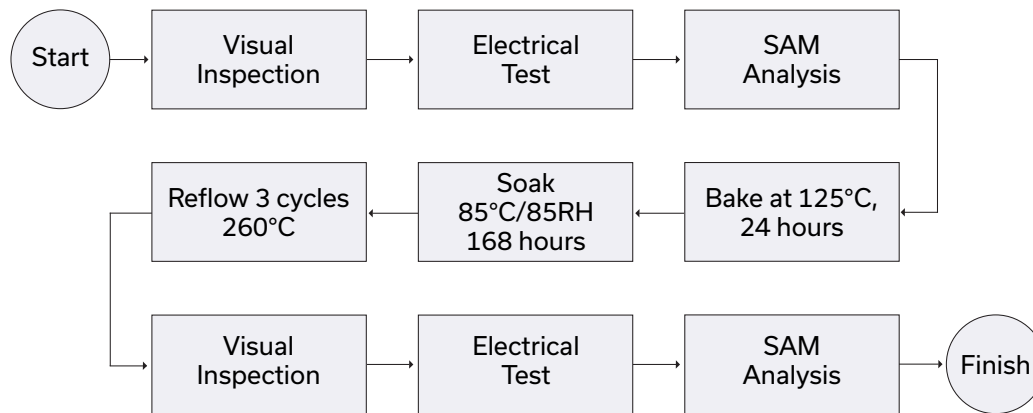
### ESD RATING

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

### MSL RATING

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

### MSL TEST FLOW CHART



- NOTES**
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
  - B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuits' 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

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 4.00V, Id = 68mA @ 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)
9000	22.92	67.81	10.44	11.99	81.23	1.02	17.62	6.34	2.23
9500	24.29	61.86	11.60	12.18	36.15	1.00	18.40	7.53	1.98
10000	25.39	60.57	12.03	12.15	27.79	1.00	18.22	8.15	1.81
10500	26.29	58.61	11.50	12.20	19.88	1.00	19.40	8.27	1.74
11000	27.02	60.08	10.36	12.65	21.27	1.03	19.26	8.11	1.70
11200	27.29	60.77	9.90	12.97	22.16	1.05	19.47	8.43	1.78
11400	27.54	60.34	9.44	13.48	20.31	1.07	18.96	8.29	1.80
11600	27.77	61.55	9.01	14.07	22.59	1.08	19.16	8.55	1.83
11800	28.00	62.42	8.70	14.75	24.22	1.10	19.22	8.38	1.80
12000	28.20	61.13	8.44	15.64	20.35	1.11	18.58	8.65	1.77
12200	28.36	61.68	8.28	16.66	21.29	1.13	18.88	8.21	1.77
12400	28.50	59.70	8.18	17.64	16.71	1.13	18.51	8.25	1.83
12600	28.63	60.72	8.20	18.32	18.57	1.14	19.03	8.85	1.85
12800	28.69	60.06	8.29	18.54	17.20	1.13	19.95	8.49	1.87
13000	28.77	59.85	8.41	17.94	16.68	1.13	19.02	8.68	1.83
13200	28.82	59.69	8.68	16.76	16.38	1.11	19.86	9.08	1.88
13400	28.83	56.80	9.03	15.53	11.81	1.10	20.31	8.41	1.88
13600	28.82	56.10	9.49	14.27	10.98	1.07	19.54	9.02	1.88
13800	28.74	57.52	9.97	13.30	13.13	1.05	19.65	8.83	1.80
14000	28.70	56.31	10.46	12.54	11.52	1.03	19.73	8.62	1.79
14200	28.62	55.42	11.09	11.84	10.54	1.01	20.48	8.96	1.79
14400	28.52	54.91	11.74	11.29	10.11	0.99	20.58	9.08	1.79
14600	28.42	53.62	12.39	10.91	8.88	0.97	20.96	9.34	1.78
14800	28.30	55.13	13.02	10.69	10.75	0.96	20.68	9.18	1.76
15000	28.20	54.41	13.69	10.53	10.07	0.95	20.49	9.15	1.69
15200	28.09	52.76	14.44	10.48	8.51	0.94	20.97	8.97	1.73
15400	28.00	53.57	14.99	10.47	9.47	0.94	20.64	9.32	1.64
15600	27.91	51.61	15.62	10.53	7.72	0.93	20.81	9.45	1.64
15800	27.79	51.74	16.15	10.58	7.98	0.93	20.59	9.01	1.66
16000	27.68	51.56	16.58	10.77	7.96	0.93	21.06	9.41	1.61
16200	27.56	51.62	16.79	10.91	8.16	0.93	20.08	9.03	1.61
16400	27.46	51.24	16.80	11.11	7.93	0.94	20.96	9.13	1.60
16600	27.35	50.75	16.67	11.35	7.63	0.94	22.04	9.44	1.55
16800	27.23	49.95	16.41	11.57	7.08	0.95	21.44	8.85	1.59
17000	27.13	50.77	16.15	11.78	7.88	0.95	21.38	9.21	1.56
17500	26.86	50.52	15.33	12.15	7.91	0.96	20.50	8.97	1.51
18000	26.59	49.29	14.63	12.22	7.08	0.96	20.90	8.94	1.57
18500	26.35	49.17	14.32	11.99	7.16	0.96	20.44	9.19	1.48
19000	26.11	48.93	14.29	11.55	7.14	0.96	19.54	8.68	1.55
19500	25.92	48.77	14.58	11.16	7.18	0.95	21.40	8.76	1.52
20000	25.73	47.20	15.35	10.87	6.16	0.93	20.34	9.44	1.59
21000	25.16	46.32	16.74	10.38	5.95	0.92	19.21	9.91	1.51
22000	24.01	46.70	14.76	9.21	6.80	0.90	20.96	10.65	1.54
23000	23.23	47.32	12.27	8.81	7.69	0.91	22.11	10.48	1.59

## 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 = 3.75V, Id = 63mA @ 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)
9000	22.62	69.03	10.61	12.09	97.34	1.02	16.77	5.68	2.29
9500	23.98	63.57	11.73	12.29	45.72	1.00	17.71	6.89	2.01
10000	25.07	58.79	12.08	12.24	23.53	1.00	17.26	7.51	1.79
10500	25.97	61.72	11.43	12.26	29.46	1.01	18.68	7.76	1.82
11000	26.69	60.80	10.21	12.69	23.91	1.04	18.50	7.58	1.81
11200	26.96	63.20	9.73	13.01	30.31	1.05	18.62	7.77	1.74
11400	27.21	59.97	9.25	13.52	20.13	1.07	18.36	7.76	1.82
11600	27.44	60.03	8.81	14.10	19.57	1.09	18.94	8.03	1.78
11800	27.67	59.33	8.49	14.76	17.49	1.11	18.56	7.85	1.79
12000	27.87	61.71	8.21	15.65	22.40	1.12	18.09	8.12	1.84
12200	28.03	59.90	8.05	16.67	17.85	1.13	18.35	7.68	1.80
12400	28.18	60.27	7.95	17.69	18.34	1.14	17.67	7.72	1.89
12600	28.31	60.80	7.97	18.50	19.28	1.14	18.28	8.20	1.89
12800	28.38	61.25	8.03	18.81	20.22	1.14	19.01	7.98	1.91
13000	28.47	57.87	8.16	18.25	13.64	1.14	18.55	8.06	1.93
13200	28.53	58.60	8.41	17.09	14.82	1.12	19.27	8.45	1.93
13400	28.53	58.29	8.74	15.76	14.39	1.10	19.45	7.92	1.95
13600	28.54	56.56	9.21	14.52	11.88	1.08	18.87	8.41	1.86
13800	28.46	56.70	9.69	13.51	12.26	1.06	19.15	8.35	1.87
14000	28.43	54.72	10.16	12.70	9.85	1.04	19.01	8.14	1.85
14200	28.36	55.23	10.79	11.99	10.59	1.01	19.74	8.48	1.79
14400	28.26	54.60	11.41	11.42	10.02	0.99	19.86	8.61	1.82
14600	28.17	55.24	12.05	11.03	10.98	0.98	20.57	8.88	1.78
14800	28.04	53.87	12.68	10.79	9.56	0.96	20.44	8.59	1.81
15000	27.95	52.49	13.35	10.63	8.31	0.95	19.76	8.69	1.75
15200	27.84	53.12	14.10	10.54	9.10	0.94	20.84	8.37	1.72
15400	27.75	52.14	14.62	10.55	8.27	0.94	20.01	8.86	1.68
15600	27.65	52.24	15.22	10.59	8.52	0.94	19.76	8.85	1.63
15800	27.53	51.95	15.74	10.67	8.40	0.93	19.69	8.41	1.74
16000	27.42	51.84	16.15	10.85	8.46	0.93	20.52	8.81	1.63
16200	27.30	51.31	16.37	11.00	8.11	0.94	19.62	8.56	1.64
16400	27.20	51.36	16.40	11.21	8.29	0.94	20.47	8.66	1.60
16600	27.08	50.55	16.30	11.44	7.68	0.94	20.79	8.84	1.62
16800	26.96	49.95	16.07	11.66	7.29	0.95	20.31	8.24	1.59
17000	26.86	49.85	15.83	11.89	7.31	0.95	20.86	8.73	1.61
17500	26.59	49.13	15.05	12.22	6.96	0.96	20.51	8.36	1.61
18000	26.32	48.56	14.38	12.32	6.72	0.97	20.19	8.45	1.59
18500	26.08	48.74	14.12	12.06	7.03	0.97	20.07	8.71	1.59
19000	25.83	48.32	14.04	11.64	6.88	0.96	19.62	8.19	1.58
19500	25.64	47.76	14.32	11.26	6.60	0.95	20.67	8.28	1.53
20000	25.46	46.87	15.08	10.96	6.12	0.94	19.09	8.83	1.55
21000	24.91	46.06	16.61	10.48	5.95	0.92	19.04	9.31	1.54
22000	23.79	46.98	14.85	9.31	7.23	0.90	20.51	10.07	1.49
23000	23.02	47.30	12.32	8.90	7.89	0.91	21.02	9.90	1.56

## 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 = 4.25V, Id = 73mA @ 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)
9000	23.16	63.93	10.31	11.90	50.30	1.02	18.43	6.94	2.24
9500	24.54	64.38	11.49	12.10	46.76	1.00	19.23	8.13	1.96
10000	25.64	64.95	11.98	12.07	44.52	1.00	18.54	8.62	1.80
10500	26.56	58.53	11.56	12.16	19.11	1.00	19.57	8.73	1.75
11000	27.30	59.77	10.49	12.61	19.91	1.03	19.54	8.58	1.75
11200	27.57	60.77	10.05	12.97	21.52	1.04	19.99	8.90	1.76
11400	27.82	62.41	9.60	13.48	25.12	1.06	19.49	8.76	1.80
11600	28.05	60.53	9.19	14.08	19.57	1.08	20.03	9.02	1.75
11800	28.28	62.35	8.87	14.78	23.41	1.09	20.03	8.85	1.77
12000	28.48	63.04	8.63	15.65	24.72	1.11	19.37	9.24	1.80
12200	28.63	63.96	8.47	16.69	27.06	1.12	19.32	8.81	1.84
12400	28.77	61.67	8.39	17.58	20.48	1.13	19.20	8.72	1.80
12600	28.89	60.79	8.43	18.20	18.34	1.13	19.64	9.31	1.85
12800	28.95	60.67	8.52	18.31	18.04	1.13	20.31	8.94	1.90
13000	29.02	60.77	8.65	17.67	18.17	1.12	19.69	9.13	1.88
13200	29.07	61.77	8.92	16.51	20.38	1.10	20.74	9.52	1.90
13400	29.07	59.82	9.27	15.26	16.36	1.09	20.25	8.84	1.85
13600	29.05	57.39	9.75	14.06	12.48	1.06	20.03	9.45	1.86
13800	28.96	58.61	10.25	13.15	14.56	1.04	20.19	9.26	1.81
14000	28.92	56.45	10.72	12.39	11.46	1.02	20.17	9.04	1.79
14200	28.84	56.20	11.36	11.70	11.28	1.00	20.98	9.38	1.79
14400	28.74	54.44	12.02	11.17	9.37	0.98	21.03	9.49	1.77
14600	28.63	53.41	12.68	10.81	8.47	0.96	21.58	9.75	1.74
14800	28.51	54.87	13.31	10.61	10.21	0.95	21.77	9.58	1.83
15000	28.41	54.31	13.99	10.46	9.74	0.94	21.39	9.69	1.73
15200	28.30	53.06	14.75	10.40	8.59	0.93	21.58	9.38	1.70
15400	28.21	52.90	15.33	10.40	8.58	0.93	21.03	9.72	1.73
15600	28.12	53.44	15.96	10.44	9.28	0.93	21.05	9.87	1.64
15800	28.01	51.90	16.49	10.53	7.92	0.93	21.07	9.43	1.62
16000	27.89	51.75	16.96	10.71	7.95	0.93	21.65	9.83	1.65
16200	27.77	50.81	17.13	10.88	7.27	0.93	20.64	9.58	1.65
16400	27.67	51.40	17.16	11.05	7.89	0.93	22.57	9.55	1.56
16600	27.56	51.65	16.98	11.28	8.25	0.94	22.14	9.87	1.59
16800	27.45	50.45	16.72	11.50	7.31	0.94	22.31	9.28	1.60
17000	27.35	50.42	16.43	11.71	7.38	0.95	22.03	9.77	1.54
17500	27.09	49.63	15.56	12.06	6.97	0.96	21.34	9.40	1.57
18000	26.82	49.92	14.84	12.16	7.41	0.96	21.20	9.51	1.57
18500	26.58	49.19	14.52	11.90	7.00	0.96	20.72	9.75	1.61
19000	26.33	48.70	14.49	11.48	6.79	0.95	21.13	9.12	1.58
19500	26.14	48.71	14.82	11.08	6.95	0.94	21.09	9.33	1.52
20000	25.95	47.19	15.60	10.79	6.00	0.93	20.60	9.86	1.59
21000	25.37	47.13	16.84	10.28	6.36	0.91	20.01	10.32	1.57
22000	24.19	46.84	14.70	9.12	6.75	0.90	21.01	11.05	1.50
23000	23.41	47.58	12.22	8.73	7.74	0.91	23.43	10.87	1.53

## 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 = 4.00V, Id = 73.00mA @ Temperature = -45°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)
9000	24.56	67.03	9.90	11.46	59.59	1.02	18.84	7.31	1.54
9500	25.87	62.49	11.18	11.61	31.52	1.00	19.52	8.32	1.29
10000	26.93	62.18	11.82	11.41	27.32	0.99	19.29	8.88	1.23
10500	27.80	62.33	11.54	11.21	25.01	0.99	20.33	8.94	1.18
11000	28.52	61.71	10.54	11.47	21.10	1.01	20.38	8.80	1.14
11200	28.79	63.62	10.04	11.70	25.25	1.03	20.47	9.11	1.15
11400	29.04	60.04	9.55	12.10	16.13	1.04	20.50	9.02	1.18
11600	29.26	59.14	9.09	12.64	14.07	1.07	20.51	9.23	1.17
11800	29.51	59.10	8.71	13.23	13.53	1.08	20.25	9.07	1.22
12000	29.70	66.80	8.43	14.11	32.12	1.10	19.93	9.35	1.24
12200	29.88	61.85	8.22	15.06	17.79	1.12	20.22	8.92	1.26
12400	30.02	64.53	8.05	16.01	23.87	1.13	19.60	9.00	1.30
12600	30.14	62.90	8.07	16.73	19.61	1.13	20.22	9.44	1.25
12800	30.21	62.60	8.13	17.11	18.89	1.13	20.53	9.42	1.24
13000	30.29	60.25	8.29	16.70	14.35	1.13	20.42	9.25	1.28
13200	30.35	62.33	8.53	15.66	18.21	1.11	20.83	9.65	1.29
13400	30.34	58.96	8.91	14.51	12.41	1.09	21.39	9.10	1.28
13600	30.34	57.79	9.49	13.30	10.95	1.06	20.81	9.58	1.32
13800	30.25	57.39	9.92	12.43	10.61	1.04	20.42	9.40	1.23
14000	30.20	58.82	10.50	11.68	12.64	1.02	21.19	9.30	1.19
14200	30.14	55.19	11.16	10.98	8.41	0.99	22.12	9.68	1.17
14400	30.02	54.83	11.81	10.56	8.23	0.97	21.06	9.78	1.16
14600	29.92	55.39	12.42	10.21	8.92	0.95	22.31	10.04	1.15
14800	29.78	55.39	13.14	9.99	9.10	0.94	22.79	9.87	1.15
15000	29.67	54.55	13.79	9.83	8.41	0.93	21.85	9.85	1.08
15200	29.56	53.18	14.42	9.79	7.32	0.92	22.27	9.70	1.06
15400	29.46	53.16	14.94	9.77	7.43	0.92	22.13	10.01	1.09
15600	29.36	52.97	15.58	9.79	7.39	0.91	22.31	10.02	1.03
15800	29.24	52.61	16.04	9.86	7.22	0.91	21.72	9.71	1.05
16000	29.13	52.65	16.32	9.99	7.39	0.91	22.34	10.12	1.08
16200	29.00	51.95	16.62	10.09	6.95	0.91	22.05	9.90	1.02
16400	28.90	51.56	16.92	10.21	6.76	0.92	22.99	9.80	1.00
16600	28.80	51.26	16.99	10.39	6.64	0.92	22.15	10.13	0.99
16800	28.70	51.29	16.99	10.58	6.77	0.92	22.49	9.39	1.01
17000	28.60	50.00	16.97	10.79	5.95	0.93	22.88	9.89	0.96
17500	28.36	50.34	16.35	11.26	6.39	0.94	22.12	9.55	0.96
18000	28.11	49.46	15.20	11.50	5.94	0.95	21.67	9.48	1.00
18500	27.88	49.57	14.10	11.51	6.16	0.95	21.25	9.75	0.95
19000	27.65	49.10	13.66	11.32	5.97	0.95	21.09	9.29	0.94
19500	27.48	48.56	13.62	11.10	5.73	0.95	21.14	9.26	0.97
20000	27.35	47.67	14.29	10.73	5.28	0.93	21.71	9.99	0.94
21000	26.90	46.07	17.57	9.94	4.66	0.90	20.88	10.36	0.96
22000	25.60	46.68	14.32	8.55	5.44	0.88	21.78	11.06	0.94
23000	24.87	47.51	11.79	8.49	6.30	0.90	23.13	10.86	0.97



## 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 = 3.75V, Id = 68mA @ Temperature = -45°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)
9000	24.29	68.38	10.06	11.57	72.23	1.02	18.06	6.53	1.60
9500	25.60	63.80	11.31	11.71	38.02	1.00	19.06	7.67	1.25
10000	26.64	60.10	11.91	11.49	22.32	0.99	18.48	8.37	1.20
10500	27.50	58.31	11.51	11.33	16.34	0.99	19.99	8.43	1.14
11000	28.22	60.24	10.42	11.54	18.42	1.01	19.43	8.15	1.13
11200	28.48	61.85	9.90	11.78	21.29	1.03	19.95	8.46	1.17
11400	28.73	61.76	9.40	12.13	20.28	1.05	19.53	8.48	1.16
11600	28.95	60.51	8.94	12.68	17.00	1.07	19.78	8.69	1.20
11800	29.20	60.85	8.53	13.26	17.04	1.09	19.78	8.53	1.21
12000	29.39	63.00	8.24	14.12	21.33	1.11	19.81	8.81	1.25
12200	29.57	62.87	8.03	15.09	20.60	1.12	19.76	8.38	1.23
12400	29.71	61.65	7.87	16.09	17.60	1.14	18.80	8.34	1.31
12600	29.84	62.26	7.87	16.87	18.69	1.14	19.21	8.91	1.26
12800	29.92	65.48	7.91	17.29	26.95	1.14	19.92	8.55	1.28
13000	30.00	61.84	8.06	16.95	17.67	1.13	19.66	8.74	1.32
13200	30.07	61.19	8.27	15.93	16.33	1.12	20.55	9.02	1.29
13400	30.07	58.33	8.66	14.76	11.84	1.10	20.56	8.48	1.33
13600	30.08	57.44	9.20	13.50	10.77	1.07	20.48	9.08	1.28
13800	29.99	57.76	9.63	12.61	11.34	1.05	20.25	8.91	1.30
14000	29.94	57.13	10.18	11.83	10.67	1.02	20.48	8.82	1.15
14200	29.89	55.75	10.86	11.14	9.20	1.00	21.09	9.06	1.25
14400	29.78	55.23	11.51	10.67	8.82	0.98	21.17	9.31	1.20
14600	29.68	55.03	12.12	10.31	8.78	0.96	21.70	9.44	1.19
14800	29.54	54.84	12.83	10.08	8.75	0.94	21.90	9.28	1.15
15000	29.43	54.66	13.49	9.90	8.73	0.93	20.82	9.38	1.14
15200	29.33	53.21	14.15	9.84	7.54	0.93	21.34	9.10	1.07
15400	29.23	52.64	14.66	9.83	7.18	0.92	21.33	9.41	1.12
15600	29.13	53.06	15.30	9.87	7.67	0.92	21.35	9.54	1.04
15800	29.01	52.21	15.75	9.92	7.09	0.91	20.86	9.10	1.11
16000	28.89	52.91	16.03	10.06	7.82	0.92	21.78	9.65	1.03
16200	28.77	51.31	16.41	10.13	6.65	0.92	21.78	9.28	1.12
16400	28.67	51.37	16.59	10.29	6.79	0.92	22.18	9.19	0.99
16600	28.56	51.27	16.62	10.47	6.83	0.92	21.71	9.53	1.02
16800	28.45	50.64	16.61	10.67	6.47	0.93	21.33	8.78	1.02
17000	28.35	50.53	16.52	10.85	6.48	0.93	22.93	9.28	0.98
17500	28.11	49.78	15.94	11.34	6.16	0.94	21.68	9.05	1.00
18000	27.86	49.51	14.94	11.58	6.15	0.95	21.57	8.87	1.01
18500	27.62	49.05	13.96	11.57	5.97	0.96	21.36	9.14	1.00
19000	27.39	48.48	13.51	11.39	5.72	0.96	21.92	8.65	0.99
19500	27.23	48.67	13.54	11.17	5.97	0.95	22.48	8.76	0.94
20000	27.10	47.24	14.16	10.80	5.18	0.93	21.76	9.36	1.00
21000	26.66	46.22	17.15	10.05	4.87	0.90	20.23	9.75	1.00
22000	25.40	46.51	14.49	8.68	5.48	0.88	21.22	10.47	0.94
23000	24.67	47.37	11.86	8.57	6.37	0.90	24.75	10.28	0.98

## 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 = 4.25V, Id = 78mA @ Temperature = -45°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)
9000	24.79	64.81	9.78	11.38	44.71	1.03	19.35	7.92	1.50
9500	26.11	64.92	11.05	11.54	40.43	1.00	20.01	8.91	1.31
10000	27.17	63.81	11.76	11.31	31.96	0.99	19.73	9.47	1.19
10500	28.05	60.06	11.56	11.16	18.74	0.98	21.32	9.53	1.14
11000	28.78	60.47	10.63	11.42	17.78	1.01	20.56	9.27	1.15
11200	29.06	61.50	10.15	11.69	19.24	1.02	20.80	9.58	1.12
11400	29.31	64.13	9.68	12.07	25.13	1.04	20.56	9.50	1.15
11600	29.53	62.89	9.26	12.66	21.18	1.06	21.35	9.70	1.25
11800	29.78	61.32	8.86	13.24	17.02	1.08	21.48	9.55	1.24
12000	29.97	62.74	8.59	14.13	19.61	1.10	20.93	9.95	1.20
12200	30.15	62.61	8.40	15.07	18.97	1.11	20.62	9.40	1.14
12400	30.28	62.78	8.24	16.02	19.07	1.12	19.89	9.48	1.22
12600	30.40	65.16	8.26	16.67	24.88	1.13	20.71	9.91	1.23
12800	30.46	62.86	8.34	16.97	19.04	1.13	21.59	9.66	1.32
13000	30.54	60.98	8.51	16.49	15.28	1.12	20.71	9.71	1.31
13200	30.59	62.34	8.74	15.46	17.82	1.10	21.79	10.10	1.22
13400	30.58	59.34	9.15	14.29	12.71	1.08	21.81	9.54	1.21
13600	30.58	57.52	9.75	13.10	10.39	1.05	21.45	10.15	1.22
13800	30.47	57.61	10.20	12.27	10.65	1.03	21.56	9.84	1.20
14000	30.42	58.50	10.77	11.55	11.92	1.01	21.53	9.86	1.22
14200	30.35	56.14	11.45	10.88	9.18	0.98	22.60	10.11	1.12
14400	30.23	55.35	12.11	10.46	8.54	0.96	22.31	10.20	1.14
14600	30.12	55.17	12.71	10.13	8.51	0.95	21.93	10.46	1.15
14800	29.99	54.88	13.43	9.91	8.39	0.93	23.42	10.29	1.15
15000	29.87	54.38	14.08	9.77	8.07	0.92	22.01	10.39	1.02
15200	29.76	53.41	14.74	9.73	7.35	0.92	22.47	10.13	1.04
15400	29.67	54.17	15.23	9.72	8.15	0.91	22.39	10.43	1.09
15600	29.57	52.96	15.88	9.76	7.22	0.91	22.48	10.57	1.06
15800	29.45	52.21	16.34	9.80	6.75	0.91	22.39	10.14	1.10
16000	29.33	52.34	16.62	9.92	6.97	0.91	23.27	10.68	0.97
16200	29.21	52.20	16.92	10.01	6.99	0.91	22.23	10.32	1.05
16400	29.11	51.76	17.28	10.15	6.76	0.91	24.32	10.36	1.00
16600	29.01	51.44	17.36	10.33	6.62	0.92	24.28	10.68	1.00
16800	28.91	50.91	17.33	10.51	6.33	0.92	22.32	9.96	1.06
17000	28.81	50.54	17.37	10.71	6.17	0.92	24.00	10.45	0.97
17500	28.58	49.96	16.67	11.18	5.97	0.93	22.94	10.11	0.97
18000	28.33	50.69	15.51	11.41	6.65	0.95	22.47	10.05	0.95
18500	28.10	49.67	14.29	11.43	6.07	0.95	22.25	10.33	0.99
19000	27.87	48.97	13.82	11.26	5.73	0.95	22.71	9.87	0.92
19500	27.71	48.19	13.74	11.05	5.35	0.94	22.14	9.84	0.91
20000	27.57	47.98	14.47	10.66	5.33	0.93	22.16	10.56	0.95
21000	27.10	46.51	17.91	9.84	4.78	0.89	20.92	10.91	0.97
22000	25.78	46.48	14.19	8.46	5.19	0.87	22.57	11.60	1.00
23000	25.04	47.75	11.75	8.42	6.33	0.90	23.01	11.41	0.93

## 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 = 4.00V, Id = 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)
9000	21.52	75.40	11.12	12.64	236.03	1.02	16.60	5.42	2.88
9500	22.94	63.90	12.20	12.86	54.77	1.00	17.52	6.66	2.56
10000	24.07	59.56	12.40	12.85	29.39	1.00	17.28	7.31	2.45
10500	24.98	58.23	11.47	12.98	22.48	1.02	18.39	7.44	2.29
11000	25.72	61.37	10.18	13.58	29.03	1.05	18.27	7.30	2.35
11200	25.98	59.69	9.68	14.01	23.02	1.06	18.44	7.61	2.32
11400	26.23	59.40	9.19	14.55	21.40	1.08	18.40	7.49	2.33
11600	26.50	61.66	8.78	15.19	26.73	1.10	18.41	7.76	2.34
11800	26.69	60.39	8.53	16.29	22.56	1.12	18.61	7.70	2.35
12000	26.90	60.85	8.28	17.42	23.16	1.13	17.77	7.97	2.40
12200	27.06	60.28	8.14	18.70	21.28	1.14	18.11	7.54	2.36
12400	27.21	62.17	8.07	19.92	26.06	1.15	17.56	7.60	2.40
12600	27.35	61.06	8.11	20.56	22.65	1.15	18.15	8.05	2.41
12800	27.42	60.12	8.16	20.26	20.19	1.14	18.93	7.82	2.40
13000	27.53	60.61	8.37	18.92	21.25	1.13	18.35	7.92	2.43
13200	27.57	58.41	8.75	17.37	16.56	1.11	19.15	8.29	2.31
13400	27.57	58.32	9.08	15.98	16.50	1.10	19.16	7.76	2.43
13600	27.59	57.33	9.46	14.77	14.76	1.08	18.93	8.26	2.44
13800	27.53	56.07	10.04	13.70	12.96	1.05	19.07	8.09	2.44
14000	27.47	55.28	10.61	12.90	11.99	1.03	18.99	8.00	2.39
14200	27.40	56.81	11.14	12.36	14.49	1.01	20.37	8.34	2.32
14400	27.33	54.49	11.76	11.93	11.28	1.00	19.96	8.35	2.34
14600	27.25	54.71	12.37	11.60	11.74	0.98	20.11	8.62	2.38
14800	27.13	53.18	12.94	11.37	10.03	0.97	20.12	8.47	2.31
15000	27.04	53.77	13.45	11.28	10.92	0.96	19.84	8.58	2.28
15200	26.95	53.18	14.12	11.27	10.39	0.96	20.22	8.30	2.22
15400	26.84	52.06	14.65	11.27	9.30	0.95	19.90	8.62	2.21
15600	26.74	51.84	15.10	11.34	9.23	0.95	20.11	8.75	2.18
15800	26.63	52.03	15.55	11.42	9.61	0.95	19.90	8.33	2.21
16000	26.52	50.76	16.04	11.61	8.47	0.95	20.83	8.72	2.22
16200	26.39	50.73	16.09	11.73	8.60	0.95	19.40	8.50	2.16
16400	26.29	51.20	16.10	11.84	9.19	0.95	21.11	8.56	2.15
16600	26.17	50.48	16.00	12.03	8.61	0.96	21.28	8.74	2.14
16800	26.06	50.94	15.82	12.19	9.22	0.96	20.56	8.16	2.10
17000	25.97	49.89	15.67	12.36	8.27	0.96	20.53	8.63	2.13
17500	25.67	49.89	14.96	12.66	8.57	0.97	19.95	8.38	2.08
18000	25.40	49.14	14.37	12.69	8.11	0.97	19.84	8.34	2.12
18500	25.14	49.29	14.11	12.42	8.48	0.97	19.75	8.70	2.11
19000	24.89	49.32	14.15	11.94	8.74	0.97	19.63	8.19	2.12
19500	24.68	48.47	14.68	11.47	8.13	0.95	20.09	8.27	2.10
20000	24.45	47.38	15.95	11.01	7.41	0.94	19.94	8.91	2.07
21000	23.79	46.20	16.88	10.24	6.92	0.91	19.06	9.31	2.12
22000	22.70	46.97	14.28	9.39	8.26	0.91	20.55	10.11	2.11
23000	22.00	47.54	12.40	9.47	9.40	0.93	21.72	9.84	2.15

## 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 = 3.75V, Id = 60mA @ 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)
9000	21.22	66.65	11.27	12.74	89.59	1.02	16.30	4.77	2.99
9500	22.63	63.04	12.32	12.98	51.53	1.00	16.87	6.15	2.59
10000	23.76	61.99	12.42	12.92	40.37	1.00	16.60	6.81	2.44
10500	24.65	58.80	11.37	13.06	24.90	1.02	18.22	6.94	2.40
11000	25.39	59.15	10.02	13.63	23.26	1.05	17.66	6.79	2.31
11200	25.65	60.04	9.50	14.03	24.78	1.07	18.06	7.11	2.40
11400	25.90	59.25	9.00	14.55	21.72	1.09	17.65	6.98	2.33
11600	26.17	62.09	8.59	15.19	28.99	1.11	17.87	7.25	2.37
11800	26.36	61.93	8.32	16.24	27.75	1.12	17.95	7.19	2.41
12000	26.57	60.81	8.07	17.37	23.73	1.14	17.52	7.47	2.46
12200	26.74	61.18	7.92	18.70	24.28	1.15	17.37	7.03	2.42
12400	26.89	59.31	7.85	20.00	19.27	1.15	16.86	7.10	2.43
12600	27.05	59.87	7.86	20.74	20.25	1.15	17.58	7.56	2.44
12800	27.11	60.68	7.91	20.61	22.09	1.15	18.30	7.34	2.47
13000	27.23	59.82	8.12	19.31	19.89	1.14	17.75	7.44	2.51
13200	27.29	56.46	8.48	17.75	13.55	1.12	18.52	7.82	2.39
13400	27.29	58.14	8.81	16.30	16.57	1.11	18.69	7.30	2.46
13600	27.32	56.47	9.18	15.06	13.70	1.09	18.23	7.80	2.47
13800	27.26	56.31	9.74	13.92	13.65	1.06	18.26	7.64	2.41
14000	27.21	54.43	10.31	13.10	11.15	1.04	18.31	7.55	2.39
14200	27.14	54.63	10.83	12.55	11.59	1.02	19.47	7.89	2.42
14400	27.08	55.35	11.45	12.08	12.75	1.01	18.98	8.04	2.36
14600	27.00	53.99	12.04	11.71	11.09	0.99	19.85	8.18	2.37
14800	26.88	53.97	12.61	11.49	11.29	0.98	19.64	8.03	2.35
15000	26.80	53.32	13.11	11.38	10.64	0.97	19.27	8.15	2.28
15200	26.70	52.70	13.75	11.36	10.10	0.96	19.67	7.86	2.33
15400	26.60	51.90	14.28	11.36	9.38	0.96	19.14	8.18	2.23
15600	26.50	51.99	14.73	11.40	9.65	0.95	19.56	8.30	2.19
15800	26.38	51.62	15.19	11.49	9.43	0.95	19.20	7.88	2.26
16000	26.27	50.97	15.64	11.67	8.93	0.95	19.73	8.28	2.23
16200	26.15	50.70	15.72	11.80	8.80	0.95	19.11	8.05	2.18
16400	26.04	49.95	15.76	11.91	8.20	0.96	20.05	8.12	2.12
16600	25.92	50.40	15.67	12.13	8.78	0.96	20.28	8.28	2.17
16800	25.80	49.96	15.50	12.28	8.49	0.96	19.67	7.70	2.15
17000	25.71	50.01	15.38	12.46	8.64	0.97	19.92	8.18	2.13
17500	25.40	49.15	14.71	12.77	8.11	0.97	19.66	7.93	2.13
18000	25.14	49.07	14.15	12.81	8.28	0.98	19.38	7.89	2.13
18500	24.88	49.33	13.89	12.52	8.78	0.98	19.52	8.24	2.04
19000	24.62	48.33	13.91	12.05	8.04	0.97	19.10	7.61	2.13
19500	24.42	48.04	14.42	11.55	7.97	0.96	19.93	7.81	2.04
20000	24.20	47.16	15.66	11.11	7.44	0.94	19.14	8.33	2.17
21000	23.56	45.86	16.78	10.37	6.86	0.92	18.58	8.87	2.13
22000	22.50	46.44	14.36	9.51	7.99	0.91	19.61	9.55	2.17
23000	21.80	47.22	12.41	9.57	9.30	0.93	20.32	9.29	2.10

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

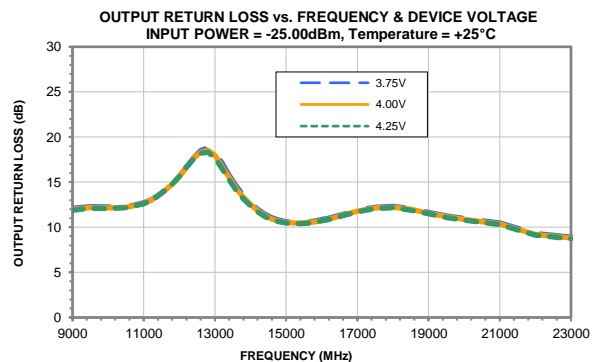
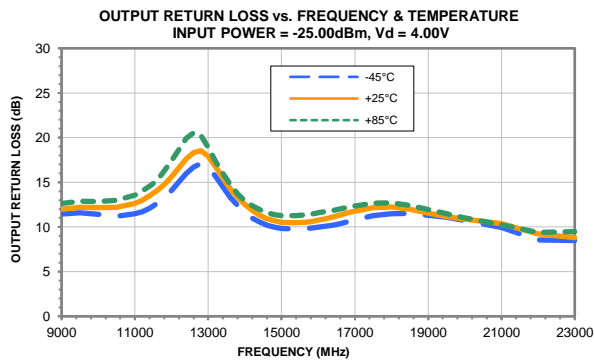
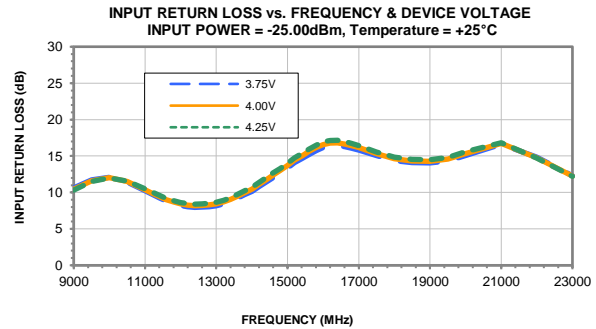
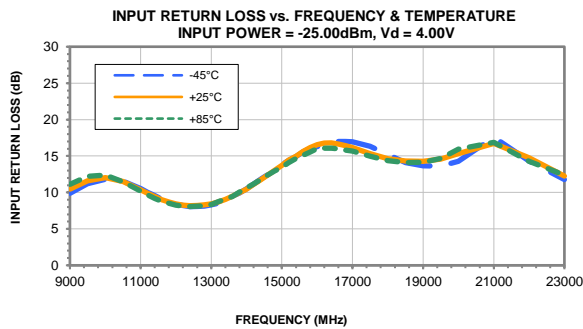
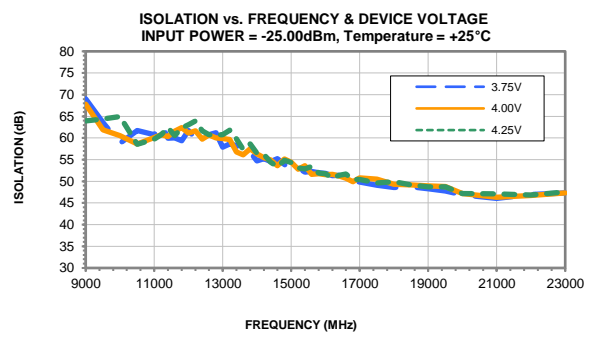
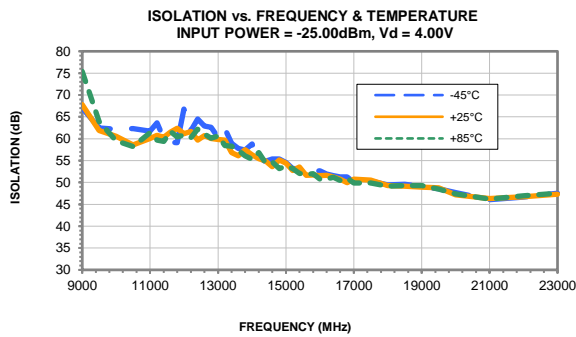
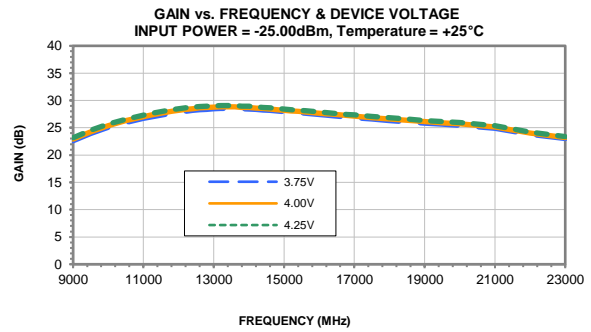
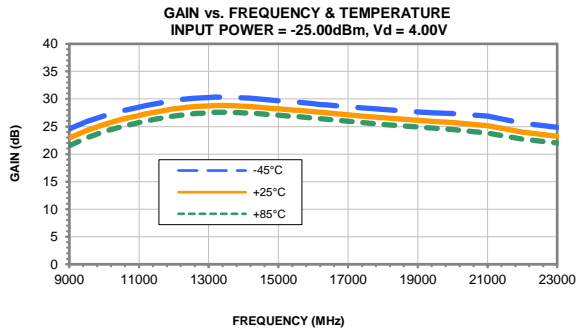
Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 4.25V, Id = 69mA @ Temperature = +85°C

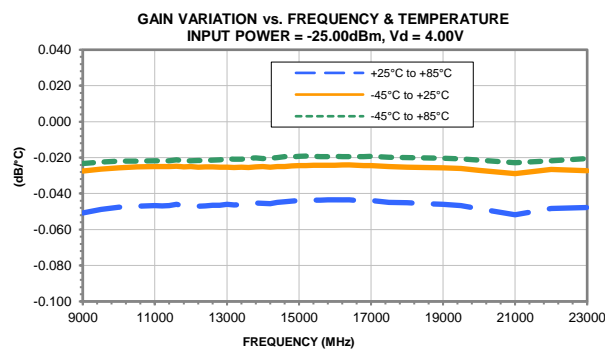
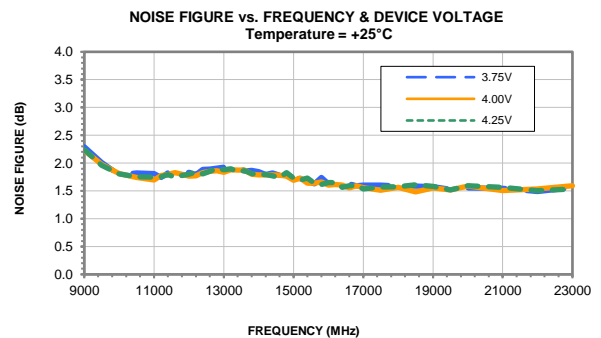
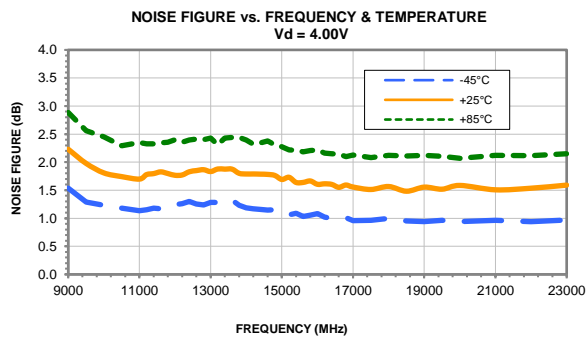
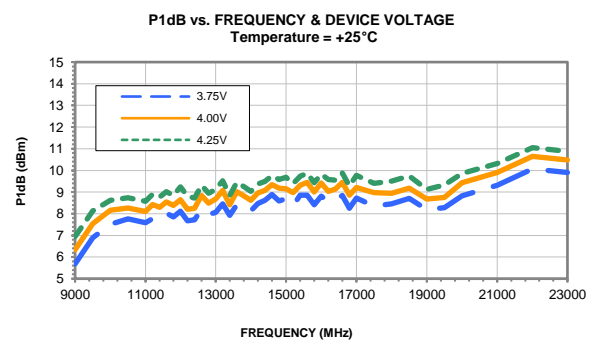
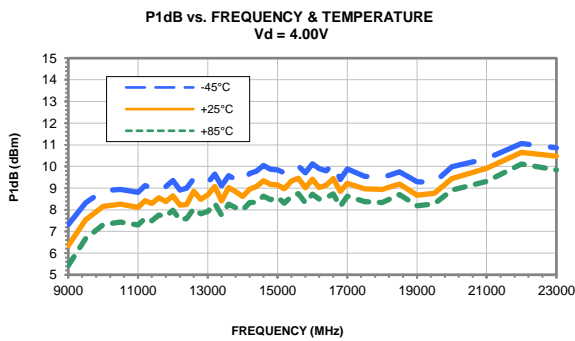
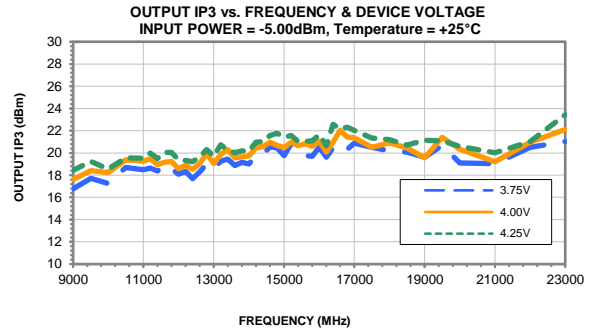
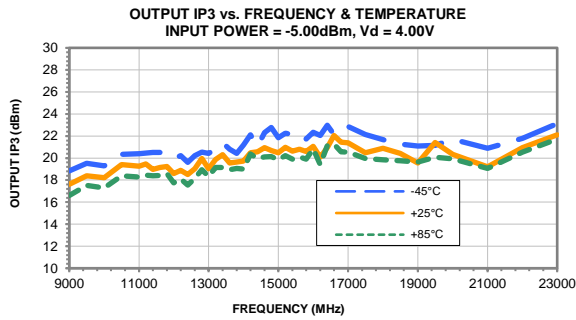
FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
9000	21.77	64.96	10.97	12.54	68.57	1.02	17.19	6.02	2.88
9500	23.20	63.83	12.09	12.78	52.61	1.01	17.87	7.24	2.58
10000	24.34	60.01	12.38	12.74	29.97	1.00	17.64	7.76	2.45
10500	25.25	59.37	11.54	12.93	24.84	1.01	18.78	7.88	2.35
11000	26.00	59.24	10.31	13.57	22.07	1.05	18.85	7.75	2.30
11200	26.26	60.31	9.83	14.00	24.01	1.06	19.13	8.07	2.32
11400	26.52	61.48	9.35	14.54	26.45	1.08	18.93	7.95	2.31
11600	26.78	60.38	8.95	15.21	22.47	1.10	18.95	8.21	2.28
11800	26.97	62.44	8.70	16.33	27.84	1.11	18.84	8.03	2.38
12000	27.17	60.87	8.48	17.46	22.65	1.12	18.67	8.42	2.36
12200	27.33	60.93	8.32	18.76	22.40	1.13	18.75	7.99	2.30
12400	27.47	60.31	8.28	19.91	20.59	1.14	18.35	8.05	2.34
12600	27.61	61.40	8.31	20.38	23.04	1.14	18.55	8.49	2.40
12800	27.67	60.66	8.37	19.97	21.04	1.13	19.54	8.14	2.45
13000	27.78	59.41	8.59	18.63	18.12	1.12	18.94	8.34	2.40
13200	27.81	58.82	8.98	17.07	17.00	1.11	20.04	8.71	2.36
13400	27.80	57.90	9.33	15.72	15.40	1.09	19.81	8.16	2.47
13600	27.82	57.07	9.72	14.58	14.04	1.07	19.36	8.66	2.41
13800	27.75	57.42	10.32	13.51	14.82	1.05	19.47	8.49	2.41
14000	27.68	56.75	10.90	12.77	13.93	1.02	19.55	8.39	2.39
14200	27.61	56.44	11.42	12.25	13.62	1.01	20.91	8.74	2.31
14400	27.54	55.69	12.05	11.83	12.67	0.99	20.67	8.74	2.35
14600	27.46	53.56	12.68	11.50	10.08	0.98	20.93	9.01	2.28
14800	27.34	53.08	13.23	11.29	9.72	0.97	20.90	8.85	2.30
15000	27.25	54.19	13.76	11.20	11.20	0.96	20.41	8.85	2.31
15200	27.15	53.57	14.43	11.20	10.63	0.95	20.60	8.70	2.26
15400	27.05	52.27	14.98	11.20	9.32	0.95	20.83	9.01	2.17
15600	26.95	52.55	15.44	11.26	9.79	0.95	20.44	9.15	2.13
15800	26.84	52.60	15.89	11.36	10.03	0.95	20.58	8.72	2.23
16000	26.73	51.64	16.37	11.52	9.16	0.95	21.41	9.11	2.22
16200	26.60	50.54	16.43	11.65	8.22	0.95	20.09	8.89	2.19
16400	26.50	51.55	16.42	11.76	9.36	0.95	21.58	8.95	2.07
16600	26.38	51.03	16.28	11.95	8.95	0.95	22.16	9.14	2.08
16800	26.27	50.00	16.06	12.10	8.08	0.96	21.00	8.56	2.14
17000	26.18	49.83	15.93	12.27	8.02	0.96	21.46	9.02	2.14
17500	25.88	50.13	15.20	12.58	8.60	0.97	20.68	8.79	2.07
18000	25.62	49.53	14.59	12.60	8.27	0.97	20.71	8.87	2.13
18500	25.36	49.86	14.32	12.33	8.83	0.97	20.25	9.10	2.10
19000	25.10	48.88	14.34	11.87	8.11	0.96	20.66	8.60	2.11
19500	24.89	48.29	14.92	11.40	7.79	0.95	20.80	8.68	2.09
20000	24.65	47.36	16.21	10.92	7.21	0.93	20.34	9.31	2.15
21000	23.98	46.71	16.94	10.15	7.17	0.91	19.57	9.69	2.08
22000	22.87	47.27	14.20	9.30	8.35	0.91	20.77	10.48	2.03
23000	22.17	47.40	12.34	9.40	9.06	0.93	22.55	10.20	2.12

## Typical Performance Curves

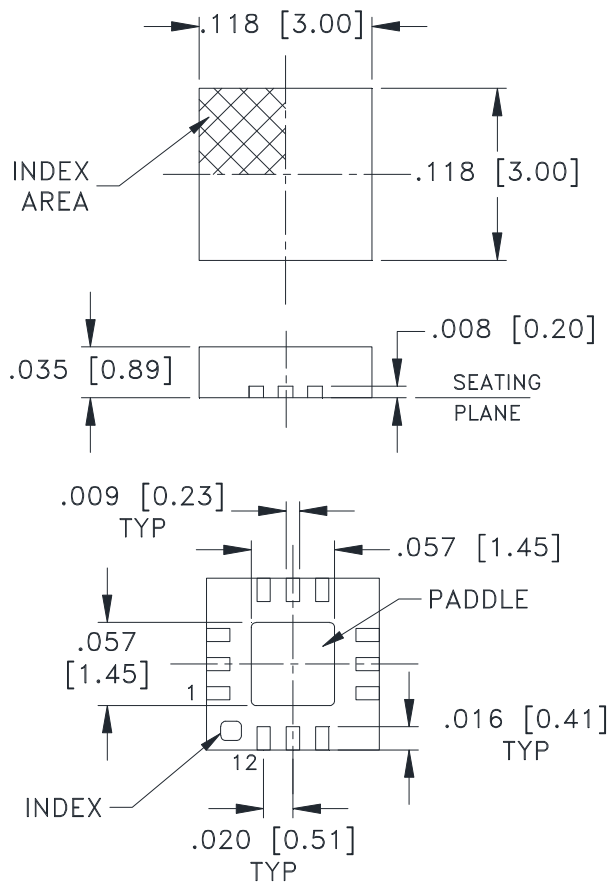




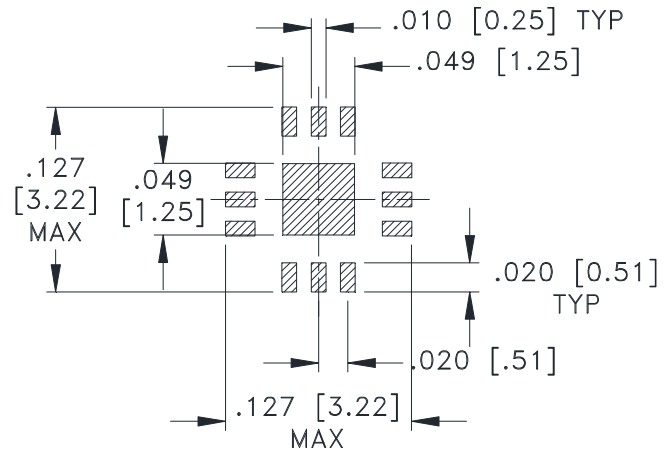
## Typical Performance Curves



### Outline Dimensions



### PCB Land Pattern



SUGGESTED LAYOUT,  
TOLERANCE TO BE WITHIN  $\pm .002$

**Weight: .02 Grams**

**Dimensions are in inches (mm). Tolerances: 2Pl.  $\pm .01$ ; 3 Pl.  $\pm .004$**

### Notes:

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

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Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

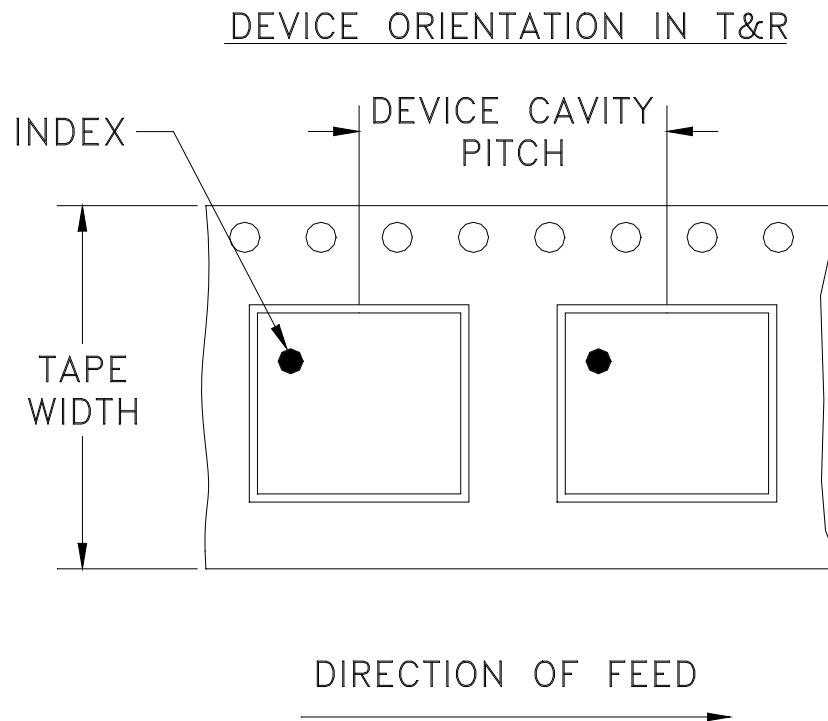
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INTERNET <http://www.minicircuits.com>

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



# 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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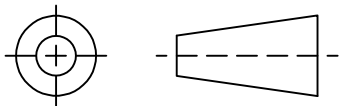
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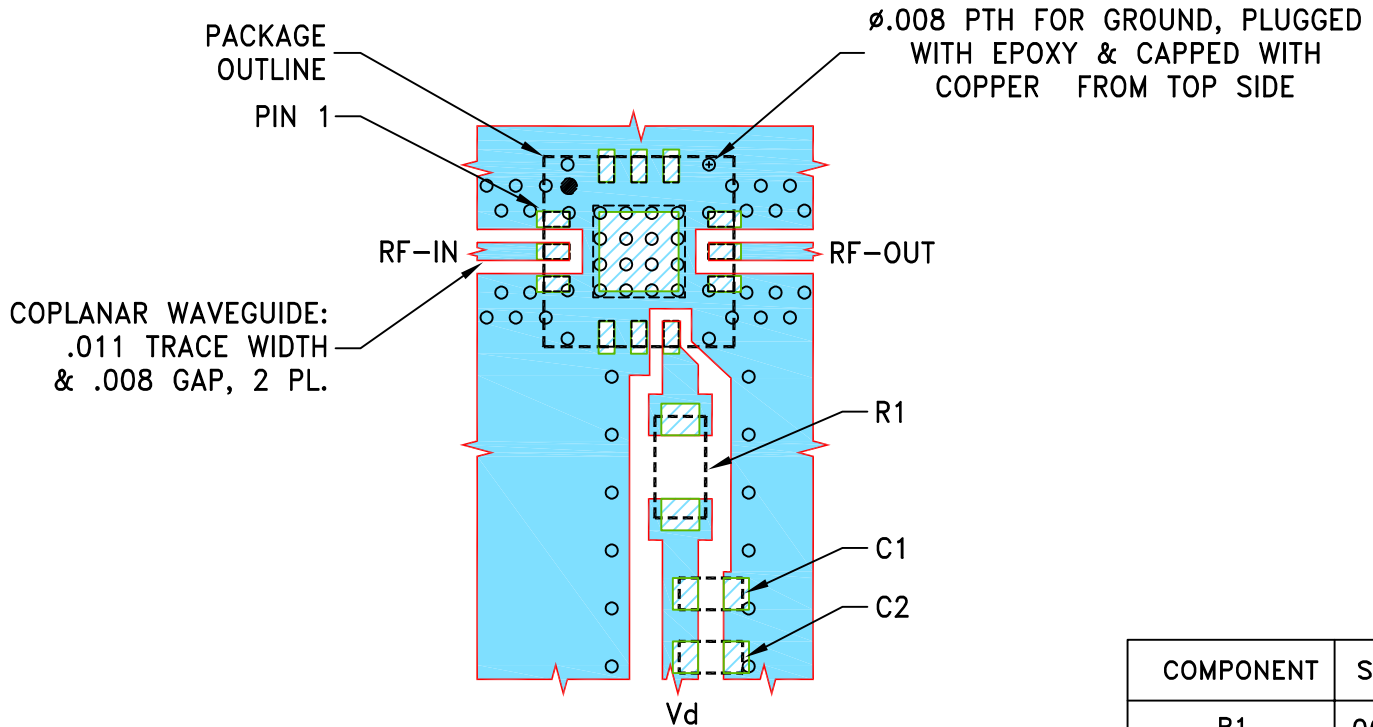
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-002696	NEW RELEASE	05/27/20	ITG	CC
A	ECO-011382	UPDATED LAYOUT AND NEW R1 SIZE	01/12/22	ITG	IL

SUGGESTED MOUNTING CONFIGURATION  
FOR DQ1225 CASE STYLE



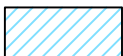
COMPONENT	SIZE
R1	0603
C2,C2	0402

NOTES:

1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS  $.0066" \pm .0007"$ . COPPER: 1 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-PMA3-223GLNC+; TB-PMA3-313GLNC+; TB-PMA3-346GLNC+.
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	05/27/20
TOLERANCES ON:	CHECKED GF	05/27/20
2 PL DECIMALS ±	APPROVED CC	05/27/20
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		



**Mini-Circuits®**

13 Neptune Avenue  
Brooklyn NY 11235

PL. DQ1225, TB-PMA3-XXXGLNC+

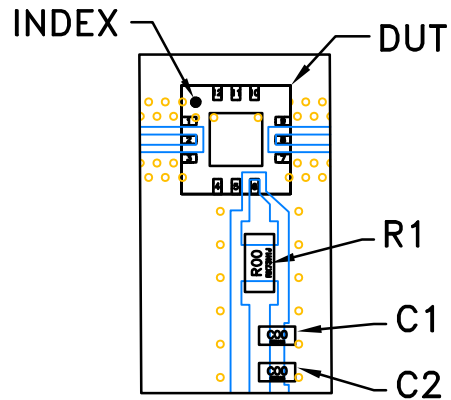
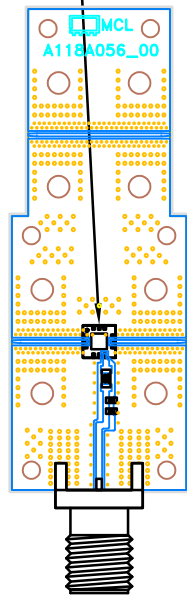
SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-674	REV: A
FILE: 98PL674	SCALE: 8:1	SHEET: 1 OF 1	

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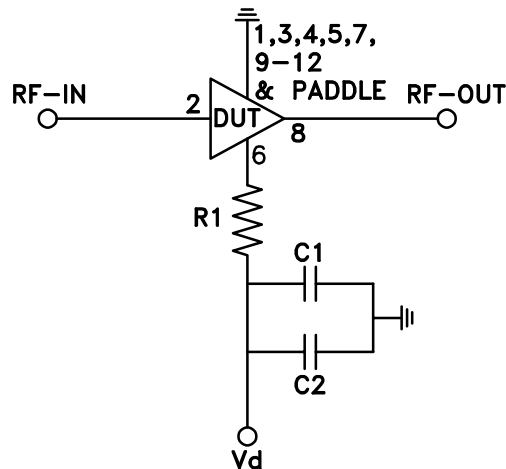
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# Evaluation Board and Circuit

SEE DETAIL "A"



DETAIL "A"  
(SCALE 3:1)



SCHEMATIC DIAGRAM

Component	Size	Value	Part Number	Manufacturer
R1	0603	180hm	SG73G1JTTD18R0C	Koa Speer
C1	0402	5pF	GJM1555C1H5R0CB01D	Murata
C2	0402	0.1uF	GRM155R71C104KA88D	Murata

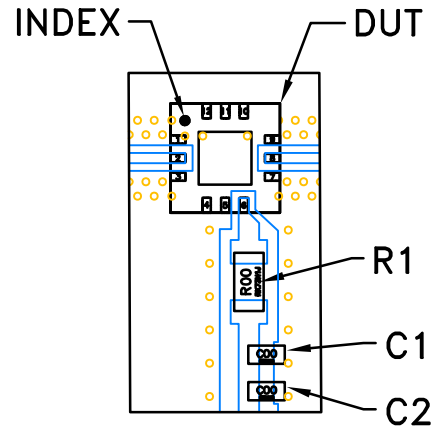
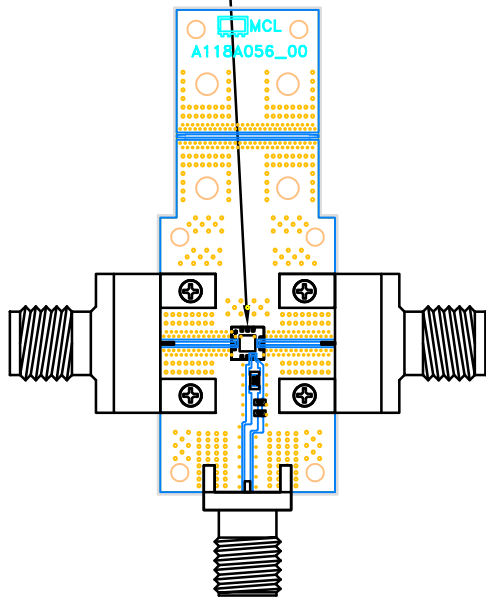
## Notes:

- 2.4mm Female Connectors,
- PCB Material: Roger R04350B or equivalent,  
Dielectric constant=3.5, Thickness=0.0066 inch.

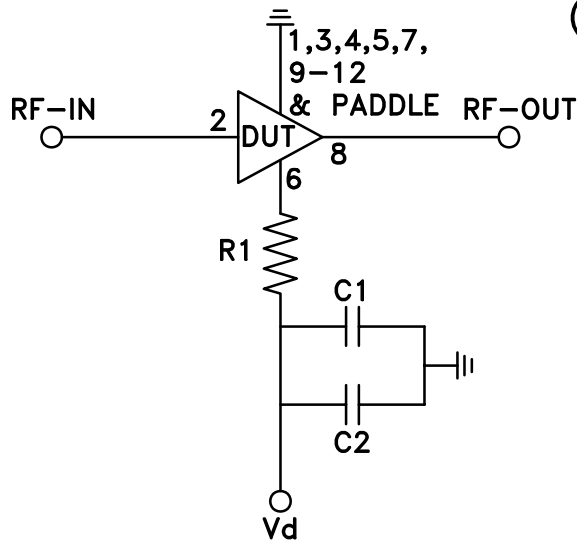
 Mini-Circuits®

# Evaluation Board and Circuit

SEE DETAIL "A"



DETAIL "A"  
(SCALE 3:1)



SCHEMATIC DIAGRAM

Component	Size	Value	Part Number	Manufacturer
R1	0603	180hm	SG73G1JTDD18R0C	Koa Speer
C1	0402	5pF	GJM1555C1H5R0CB01D	Murata
C2	0402	0.1uF	GRM155R71C104KA88D	Murata

## Notes:

1. 2.4mm Female Connectors,
2. PCB Material: Roger R04350B or equivalent,  
Dielectric constant=3.5, Thickness=0.0066 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	-40° to 85°C or -45° to 85°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, 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
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.

<b>Specification</b>	<b>Test/Inspection Condition</b>	<b>Reference/Spec</b>
	monoethanolamine at 63°C to 70°C	