

Low Noise, High IP3

# Monolithic Amplifier

CMA-5043+

50Ω      0.05 to 4 GHz

## The Big Deal

- Ceramic, Hermetically Sealed, Nitrogen filled
- Low profile case, .045" high
- Ultra Low Noise Figure, 0.75 dB
- High IP3 and Po at low DC power consumption
- Class 1B HBM ESD rating (500V)



CASE STYLE: DL1721

*MIL Screening Available  
Please consult Applications Dept.*

## Product Overview

Mini-Circuits CMA-5043+ is a E-PHEMT based Ultra-Low Noise MMIC Amplifier operating from 50 MHz to 4 GHz with a unique combination of low noise and high IP3 making this amplifier ideal for sensitive high dynamic range receiver applications. This design operates on +3 to +5V supply at only 33 mA at 3V and 56mA at +5V, is internally matched to 50 ohms. The MMIC amplifier is bonded to a multilayer integrated LTCC substrate and then hermetically sealed under a controlled nitrogen atmosphere with gold-plated covers and eutectic AuSn solder. These amplifiers are capable of meeting MIL requirements for gross leak, fine leak, thermal shock, vibration, acceleration, mechanical shock, and HTOL. The testing can be done if requested.

## Key Features

Feature	Advantages
Ultra Low Noise: 0.75 dB at 1 GHz 0.98 dB at 2 GHz	Outstanding Noise Figure, ideal for low noise input stages of receivers
High IP3, 33.5 dBm	Combining Low Noise and High IP3 makes this MMIC amplifier ideal for Low Noise Receiver Front End (RFE) because it gives the user advantages at both ends of the dynamic range: sensitivity & two-tone spur-free dynamic range
High Output Power, +21 dBm	The CMA-5043+ provides up to +21dBm output power at 1dB compression enabling this amplifier to support high linear dynamic range requirements
Broad Band, up to 4 GHz	Operating over a broadband from 50 MHz to 4 GHz, the CMA-5043+ covers the primary wireless communications bands: Cellular, PCS, LTE, WiMAX
Internally Matched	No external matching elements required to achieve the advertised noise and output power over the full band
Ceramic Hermetic Package	Low inductance, repeatable performance, excellent reliability
High Reliability	Low, small signal operating current of 53mA nominal maintains junction temperatures typically below 125°C at 85°C ground lead temperature
Class 1B ESD (500V, HBM)	The CMA-5043+ is a super low noise PHEMT based design. Unlike many other PHEMT designs. Mini-Circuits incorporates ESD protection on die to achieve industry leading ESD performance for a low noise amplifier



Low Noise, High IP3

# Monolithic Amplifier

0.05-4 GHz

## Product Features

- Ultra Low Noise Figure, 0.75 dB typ. at 1 GHz
- Gain, 18.4 dB typ. at 1GHz
- High Pout, P1dB up to 21 dBm typ.
- High IP3, up to 33.5 dBm typ. at 1 GHz
- Class 1B HBM ESD rating (500V)
- Small size - 3mm x 3mm x 1.14mm
- Ceramic, hermetic, Nitrogen filled
- No external matching components required



Generic photo used for illustration purposes only

CASE STYLE: DL1721

## CMA-5043+

**+RoHS Compliant**

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

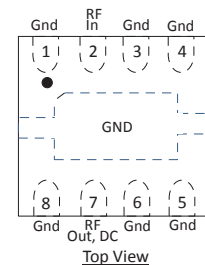
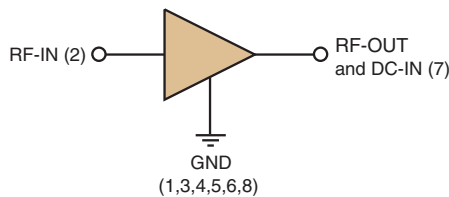
## Typical Applications

- Base station infrastructure
- Portable Wireless
- CATV & DBS
- MMDS & Wireless LAN
- LTE

## General Description

CMA-5043+ is an advanced wide band, high dynamic range, low noise, high IP3, high output power, monolithic amplifier. Manufactured using E-PHEMT\* technology enables it to work with a single positive supply voltage. Terminal finish is Ni-Pd-Au and it has repeatable performance from lot to lot due to fully automated, tightly controlled semiconductor and assembly processes.

## simplified schematic and pad description



Function	Pad Number	Description (See Application Circuit, Fig. 2)
RF IN	2	RF input pin (connect to RF-IN via DC blocking cap)
RF-OUT & DC-IN	7	RF output and bias pin. DC voltage is present on this pin; therefore a DC blocking capacitor is necessary for proper operation. An RF choke is needed to feed DC bias without loss of RF signal due to the bias connection, as shown in "Recommended Application Circuit", Fig. 2
GND	1,3,4,5,6,8 Bottom Center Paddle	Connections to ground: use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance.

\* Enhancement mode pseudomorphic High Electron Mobility Transistor.



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M172011  
CMA-5043+  
DJ/BT/CP  
200904  
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**Electrical Specifications<sup>(1)</sup> at 25°C, Zo=50Ω, (refer to characterization circuit, Fig. 1)**

Parameter	Condition (GHz)	Vd=5.0V <sup>(1)</sup>			Vd=3.0V <sup>(1)</sup>			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Frequency Range		0.05		4.0	0.05		4.0	GHz
Noise Figure	0.05	—	0.73	—		0.66		dB
	0.5	—	0.65	—		0.66		
	1.0	—	0.75	1.10		0.73		
	2.0	—	0.98	—		0.94		
	3.0	—	1.10	—		1.10		
	4.0	—	1.44	—		1.30		
Gain	0.05	—	25.4	—		24.3		dB
	0.5	—	22.1	—		21.2		
	1.0	16.5	18.4	20.2		17.5		
	2.0	—	13.3	—		12.5		
	3.0	—	10.2	—		9.6		
	4.0	—	8.0	—		7.2		
Input Return Loss	0.05		7.8			6.5		dB
	0.5		10.5			9.4		
	1.0		11.4			10.6		
	2.0		12.2			11.1		
	3.0		12.8			10.4		
	4.0		11.1			9.2		
Output Return Loss	0.05		13.7			13.2		dB
	0.5		15.0			15.9		
	1.0		13.9			15.1		
	2.0		12.5			14.5		
	3.0		11.7			13.3		
	4.0		12.8			15.7		
Output Power @1dB compression <sup>(2)</sup>	0.05		18.9			15.8		dBm
	0.5		19.3			16.5		
	1.0		19.8			17.4		
	2.0		20.7			19.0		
	3.0		21.2			19.4		
	4.0		21.5			19.8		
Output IP3	0.05		31.0			28.0		dBm
	0.5		32.1			28.0		
	1.0		33.5			28.7		
	2.0		32.7			30.0		
	3.0		33.6			31.0		
	4.0		32.6			31.0		
DC Volts (Vd)			5.0			3.0		V
DC Current (Id)			58	66		33		mA
DC Current Variation Vs. Temp. <sup>(3)</sup>			-0.007			-0.007		mA/°C
DC Current Variation Vs. Voltage			0.01			0.01		mA/mV
Thermal Resistance <sup>(4)</sup>			117			117		°C/W

<sup>(1)</sup> Measured on Mini-Circuits Characterization test board TB-757+. See Characterization Test Circuit (Fig. 1)

<sup>(2)</sup> Current increases at P1dB

<sup>(3)</sup> (Current at 85°C - Current at -45°C)/130

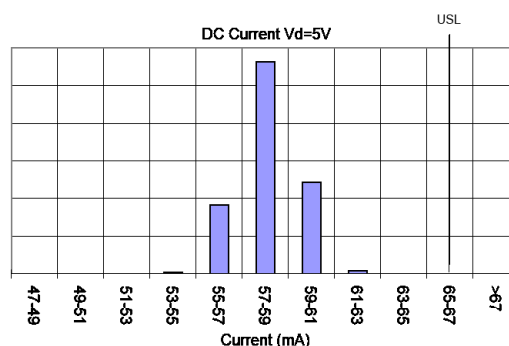
**Absolute Maximum Ratings<sup>(4)</sup>**

Parameter	Ratings
Operating Temperature <sup>(5)</sup>	-55°C to 105°C
Storage Temperature	-65°C to 125°C
Channel Temperature	150°C
DC Voltage	6V
Device Current	76 mA
Power Dissipation	380 mW
Input Power (CW)	23 dBm (5 minutes max), 17dBm (continuous)

<sup>(4)</sup> Permanent damage may occur if any of these limits are exceeded.

These maximum ratings are not intended for continuous normal operation.

<sup>(5)</sup> Defined with reference to ground pad temperature.



Characterization Test Circuit

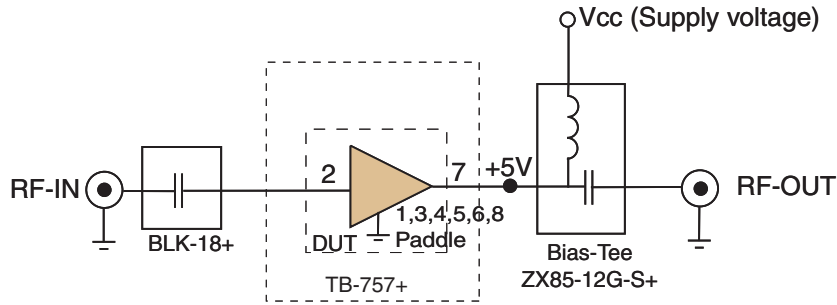


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-656-62+) Gain, Return loss, Output power at 1dB compression (P1 dB) , output IP3 (OIP3) and noise figure measured using Agilent’s N5242A PNA-X microwave network analyzer.

Conditions:

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

Recommended Application Circuit

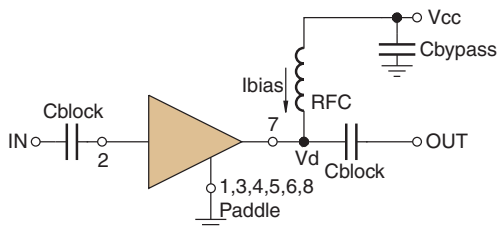
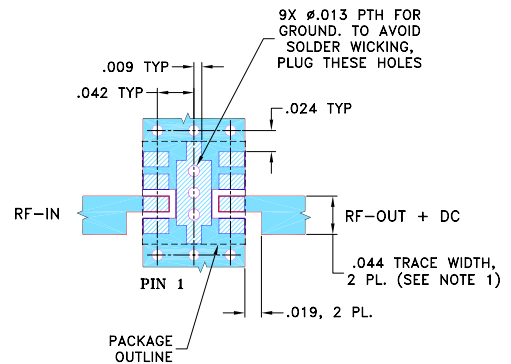


Fig 2. Test Board includes case, connectors, and components soldered to PCB for component values, please see evaluation board drawing.

Suggested PCB Layout (PL-366)

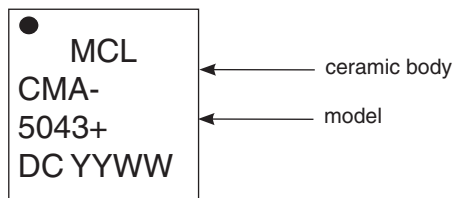


NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020" ± .0015"; 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.

- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

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>	DL1721 <i>Ceramic package, exposed paddle, Terminla finish: NiPdAu</i>
<b>Tape &amp; Reel</b> Standard quantities available on reel	F66-1 <i>7" reels with 20, 50, 100, 200, 500 or 1K, 2K devices.</i>
<b>Suggested Layout for PCB Design</b>	PL-366
<b>Evaluation Board</b>	TB-757+
<b>Environmental Ratings</b>	ENV-68

**ESD Rating**

Human Body Model (HBM): Class 1B (500 to <1000V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M1 (pass 35V) in accordance with ANSI/ESD STM5.2-1999

**MSL Rating**

Moisture Sensitivity: MSL1 (these parts are hermetic, air cavity and therefore, MSL ratings do not strictly apply. For handling purpose, use MSL1)

**Qualification Testing**

The table below shows the initial qualification testing performed. If required, parts can be subjected to 100% screening and qualifications testing per MIL standard requirement.

Test Description		Test Method/Process	Results
1	Hermeticity (fine and gross leak)	MIL-STD-202 Method 112, Cond. C & D	Pass
2	Acceleration, 30Kg, Y1 Direction	MIL-STD-883 Method 2001 Cond. E	Pass
3	Vibration , 10-2000Hz sine, 20g, 3 axis	MIL-STD-202 Method 204, Cond. D	Pass
4	Mechanical shock	MIL-STD-202 Method 213, Cond . A	Pass
5	PIND 20G's @130 Hz	MIL-STD-750 Method 2052.2	Pass
6	Temp Cycle -55C/+125C, 1000 Cycles	MIL-STD-202 Method 107	Pass
7	Autoclave, 121C, RH 100%, 15 Psig, 96 hrs	JESD22-A102C	Pass
8	HTOL, 1000hrs, 105C at rated Voltage condition	MIL-STD-202 Method 108, Cond . D	Pass
9	Bend Test	JESD22-B113	Pass
10	Resistance to soldering heat, 3x reflow, 260C peak	JESD22-B102	Pass
11	Drop Test	JESD22-B111	Pass
12	Adhesion Strength	Push Test>10 lb	Pass

**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 = 56.04mA @ 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)
50.0	25.37	29.21	7.58	15.33	0.95	0.72	33.03	19.95	0.86
60.0	25.30	28.91	8.30	17.75	0.96	0.69	32.22	19.79	0.70
70.0	25.19	28.95	8.49	18.31	0.98	0.70	32.83	19.72	0.69
80.0	25.10	28.91	8.80	18.98	0.99	0.70	32.86	19.80	0.64
90.0	25.04	28.86	9.05	19.69	1.00	0.69	32.18	19.72	0.60
100.0	24.98	28.83	9.19	20.11	1.00	0.69	32.37	19.70	0.62
150.0	24.76	28.74	9.58	21.20	1.02	0.69	32.18	19.78	0.60
200.0	24.54	28.67	9.71	21.54	1.03	0.71	32.43	19.71	0.60
300.0	23.97	28.51	9.76	20.96	1.04	0.75	33.82	19.91	0.59
350.0	23.66	28.37	9.65	20.57	1.04	0.77	32.99	19.88	0.66
400.0	23.32	28.25	9.57	20.31	1.05	0.79	33.49	20.02	0.66
450.0	22.97	28.09	9.50	20.03	1.05	0.82	34.61	20.05	0.64
500.0	22.61	27.93	9.47	19.72	1.06	0.83	33.50	20.11	0.71
550.0	22.22	27.78	9.44	19.34	1.06	0.85	34.46	20.15	0.67
600.0	21.86	27.57	9.33	18.95	1.07	0.87	33.79	20.25	0.70
650.0	21.51	27.39	9.30	18.73	1.07	0.88	34.51	20.30	0.75
700.0	21.15	27.19	9.29	18.53	1.08	0.89	34.49	20.31	0.83
750.0	20.78	27.01	9.32	18.28	1.09	0.90	35.24	20.36	0.78
800.0	20.42	26.83	9.36	17.88	1.11	0.91	34.16	20.44	0.76
850.0	20.07	26.60	9.27	17.48	1.11	0.92	34.36	20.47	0.79
900.0	19.74	26.35	9.23	17.19	1.12	0.92	34.91	20.54	0.77
950.0	19.41	26.11	9.20	16.96	1.12	0.92	34.70	20.65	0.75
1000.0	19.09	25.89	9.19	16.69	1.13	0.92	33.77	20.60	0.81
1200.0	17.88	25.01	9.25	15.79	1.18	0.91	34.84	20.79	0.83
1400.0	16.79	24.18	9.38	14.97	1.22	0.89	34.52	20.87	0.88
1600.0	15.83	23.36	9.47	14.32	1.26	0.87	34.34	20.98	0.93
1800.0	14.97	22.58	9.59	13.81	1.29	0.85	35.24	21.22	0.94
2000.0	14.20	21.86	9.71	13.48	1.30	0.83	35.89	21.24	0.91
2200.0	13.51	21.15	9.85	13.43	1.31	0.82	35.73	21.60	0.94
2400.0	12.88	20.46	10.09	13.59	1.30	0.83	35.64	21.60	0.97
2600.0	12.30	19.80	10.30	13.89	1.28	0.84	36.22	21.37	1.05
2800.0	11.78	19.19	10.56	14.28	1.26	0.85	36.89	21.48	1.14
3000.0	11.28	18.61	10.79	14.66	1.23	0.87	36.84	21.46	1.11
3200.0	10.81	18.08	11.03	14.96	1.21	0.89	36.12	21.10	1.28
3400.0	10.36	17.59	11.17	14.97	1.20	0.89	36.39	21.75	1.31
3600.0	9.91	17.16	11.29	14.65	1.20	0.89	36.68	21.65	1.21
3800.0	9.47	16.77	11.19	14.17	1.21	0.88	35.97	21.51	1.33
4000.0	9.04	16.42	11.07	13.73	1.23	0.86	36.33	21.40	1.25

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 4.75V, Id = 53.31mA @ 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)
50.0	25.25	29.28	7.66	15.18	0.96	0.73	32.01	19.81	0.90
60.0	25.20	28.87	8.24	17.54	0.96	0.70	31.89	19.63	0.72
70.0	25.09	28.87	8.45	18.08	0.98	0.70	32.36	19.60	0.67
80.0	25.00	28.81	8.76	18.72	0.99	0.70	32.31	19.69	0.70
90.0	24.94	28.77	8.99	19.42	1.00	0.69	31.58	19.58	0.61
100.0	24.88	28.76	9.15	19.82	1.00	0.69	32.19	19.59	0.62
150.0	24.67	28.65	9.58	20.86	1.02	0.69	31.57	19.65	0.70
200.0	24.45	28.59	9.65	21.21	1.03	0.71	32.30	19.62	0.61
300.0	23.88	28.42	9.64	20.73	1.04	0.75	32.86	19.81	0.58
350.0	23.58	28.30	9.53	20.37	1.04	0.77	32.53	19.75	0.67
400.0	23.24	28.15	9.49	20.16	1.04	0.80	33.47	19.93	0.67
450.0	22.89	28.00	9.46	19.91	1.05	0.82	33.82	19.99	0.64
500.0	22.53	27.83	9.40	19.64	1.05	0.84	33.27	20.08	0.69
550.0	22.15	27.68	9.38	19.29	1.06	0.85	33.93	20.18	0.67
600.0	21.79	27.48	9.28	18.91	1.06	0.87	33.35	20.25	0.68
650.0	21.44	27.28	9.24	18.71	1.07	0.88	34.22	20.32	0.73
700.0	21.08	27.09	9.24	18.53	1.08	0.89	34.17	20.35	0.76
750.0	20.72	26.92	9.27	18.30	1.09	0.90	34.71	20.43	0.77
800.0	20.36	26.73	9.31	17.92	1.10	0.91	34.24	20.51	0.75
850.0	20.01	26.50	9.23	17.52	1.11	0.92	34.49	20.48	0.79
900.0	19.68	26.25	9.18	17.24	1.11	0.92	34.56	20.59	0.75
950.0	19.36	26.03	9.15	17.02	1.12	0.92	34.34	20.70	0.71
1000.0	19.04	25.80	9.14	16.76	1.13	0.92	33.47	20.60	0.77
1200.0	17.83	24.93	9.20	15.87	1.18	0.91	34.12	20.87	0.78
1400.0	16.75	24.11	9.33	15.07	1.22	0.89	34.44	20.95	0.91
1600.0	15.79	23.30	9.42	14.42	1.26	0.87	34.17	21.03	0.93
1800.0	14.93	22.52	9.52	13.92	1.28	0.85	34.79	21.31	0.94
2000.0	14.17	21.80	9.66	13.60	1.30	0.83	35.92	21.34	0.90
2200.0	13.48	21.09	9.80	13.56	1.30	0.83	35.41	21.71	0.95
2400.0	12.84	20.41	10.04	13.73	1.30	0.83	35.05	21.71	0.95
2600.0	12.27	19.75	10.25	14.02	1.28	0.84	35.93	21.46	1.04
2800.0	11.75	19.15	10.50	14.43	1.26	0.85	36.10	21.58	1.18
3000.0	11.25	18.56	10.72	14.81	1.23	0.87	36.22	21.54	1.19
3200.0	10.79	18.04	10.95	15.14	1.21	0.89	35.84	21.15	1.15
3400.0	10.33	17.55	11.10	15.15	1.20	0.90	35.94	21.90	1.06
3600.0	9.89	17.12	11.21	14.82	1.20	0.89	36.35	21.79	1.07
3800.0	9.45	16.72	11.14	14.33	1.21	0.88	35.96	21.74	1.08
4000.0	9.01	16.37	11.01	13.88	1.23	0.86	35.36	21.62	1.05

## 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 = 59.30mA @ 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)
50.0	25.43	29.02	7.55	15.31	0.94	0.70	32.71	19.94	0.93
60.0	25.38	29.15	7.88	17.76	0.96	0.73	32.79	19.78	0.68
70.0	25.26	29.03	8.51	18.39	0.98	0.70	33.01	19.64	0.71
80.0	25.17	28.98	8.84	19.06	0.99	0.70	33.05	19.70	0.64
90.0	25.11	28.92	9.04	19.78	1.00	0.69	32.61	19.64	0.62
100.0	25.06	28.90	9.20	20.20	1.00	0.69	32.61	19.61	0.63
150.0	24.84	28.84	9.59	21.27	1.02	0.70	32.08	19.72	0.61
200.0	24.61	28.76	9.72	21.57	1.03	0.71	32.52	19.60	0.59
300.0	24.03	28.59	9.78	20.94	1.04	0.75	33.55	19.79	0.64
350.0	23.72	28.46	9.65	20.50	1.04	0.77	32.93	19.78	0.67
400.0	23.37	28.34	9.56	20.24	1.05	0.80	33.65	19.90	0.67
450.0	23.02	28.19	9.49	19.94	1.05	0.82	34.42	19.89	0.64
500.0	22.66	28.02	9.47	19.62	1.06	0.84	33.91	19.95	0.69
550.0	22.27	27.86	9.44	19.22	1.07	0.86	34.68	19.92	0.65
600.0	21.91	27.66	9.33	18.82	1.07	0.87	34.12	20.08	0.72
650.0	21.55	27.47	9.32	18.60	1.07	0.88	34.44	20.13	0.73
700.0	21.19	27.27	9.30	18.39	1.08	0.90	34.60	20.10	0.78
750.0	20.82	27.09	9.33	18.14	1.10	0.90	35.18	20.12	0.85
800.0	20.46	26.91	9.37	17.74	1.11	0.91	34.84	20.21	0.82
850.0	20.11	26.67	9.28	17.33	1.11	0.92	34.55	20.27	0.78
900.0	19.78	26.42	9.23	17.05	1.12	0.92	35.23	20.32	0.75
950.0	19.44	26.19	9.21	16.82	1.13	0.92	35.23	20.45	0.72
1000.0	19.13	25.96	9.20	16.55	1.14	0.92	33.92	20.42	0.81
1200.0	17.91	25.08	9.26	15.65	1.18	0.91	34.56	20.58	0.84
1400.0	16.82	24.24	9.40	14.83	1.23	0.89	34.58	20.64	0.89
1600.0	15.85	23.42	9.49	14.18	1.26	0.87	34.78	20.79	0.99
1800.0	14.99	22.64	9.61	13.67	1.29	0.85	35.59	20.98	0.93
2000.0	14.22	21.92	9.74	13.35	1.31	0.83	36.19	20.95	0.88
2200.0	13.53	21.20	9.89	13.30	1.31	0.82	35.79	21.31	0.93
2400.0	12.89	20.51	10.13	13.46	1.31	0.82	35.60	21.31	1.01
2600.0	12.32	19.85	10.34	13.74	1.29	0.83	36.77	21.05	1.07
2800.0	11.79	19.24	10.60	14.12	1.26	0.85	35.71	21.17	1.18
3000.0	11.30	18.66	10.83	14.48	1.24	0.87	36.79	21.12	1.12
3200.0	10.83	18.13	11.05	14.78	1.21	0.89	36.76	21.03	1.27
3400.0	10.37	17.64	11.22	14.79	1.20	0.89	36.28	21.37	1.23
3600.0	9.92	17.21	11.32	14.47	1.20	0.89	36.94	21.28	1.14
3800.0	9.48	16.82	11.25	14.00	1.21	0.88	36.38	21.07	1.13
4000.0	9.05	16.46	11.11	13.57	1.23	0.86	36.44	20.99	1.16



## 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 = 64.19mA @ 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)
50.0	25.39	28.44	7.72	16.24	0.89	0.69	34.50	19.54	0.87
60.0	25.24	28.59	8.87	18.61	0.94	0.70	33.33	19.39	0.65
70.0	25.09	28.47	9.64	19.83	0.97	0.67	34.17	19.63	0.67
80.0	24.98	28.39	10.11	21.19	0.98	0.66	33.78	19.80	0.57
90.0	24.91	28.37	10.48	22.50	0.99	0.66	33.29	19.65	0.48
100.0	24.84	28.33	10.74	23.68	1.00	0.65	33.91	19.69	0.51
150.0	24.62	28.23	11.59	29.94	1.03	0.64	33.33	19.73	0.53
200.0	24.42	28.16	11.84	40.96	1.04	0.64	33.46	19.85	0.50
300.0	23.90	28.04	11.78	37.60	1.06	0.68	34.91	20.16	0.41
350.0	23.63	27.97	11.59	34.43	1.07	0.70	34.63	20.04	0.56
400.0	23.33	27.84	11.49	31.88	1.08	0.72	34.86	20.25	0.56
450.0	23.02	27.73	11.37	30.42	1.09	0.74	35.71	20.46	0.52
500.0	22.69	27.60	11.17	28.99	1.09	0.76	34.85	20.51	0.55
550.0	22.32	27.48	11.02	27.31	1.10	0.78	35.61	20.78	0.52
600.0	21.99	27.31	10.75	25.70	1.10	0.80	34.97	20.68	0.56
650.0	21.67	27.14	10.58	24.56	1.10	0.82	35.97	20.87	0.60
700.0	21.33	26.96	10.46	23.58	1.11	0.83	36.21	20.94	0.64
750.0	20.99	26.79	10.41	22.72	1.12	0.84	36.90	21.09	0.66
800.0	20.63	26.64	10.42	21.78	1.13	0.86	36.22	21.20	0.70
850.0	20.28	26.43	10.25	20.84	1.13	0.87	36.22	21.12	0.68
900.0	19.98	26.18	10.08	20.33	1.13	0.88	36.35	21.26	0.62
950.0	19.68	25.94	10.00	19.96	1.13	0.88	36.23	21.43	0.58
1000.0	19.39	25.70	10.00	19.57	1.13	0.88	35.18	21.33	0.65
1200.0	18.23	24.81	9.98	18.26	1.16	0.88	35.92	21.76	0.67
1400.0	17.17	23.98	10.13	16.90	1.20	0.86	36.27	21.95	0.70
1600.0	16.22	23.15	10.10	15.92	1.22	0.85	35.68	22.22	0.76
1800.0	15.37	22.36	10.13	15.21	1.24	0.83	36.00	22.45	0.73
2000.0	14.61	21.63	10.25	14.54	1.26	0.81	37.95	22.42	0.69
2200.0	13.92	20.92	10.37	14.32	1.26	0.80	37.65	22.73	0.75
2400.0	13.28	20.23	10.61	14.25	1.26	0.80	36.98	22.90	0.75
2600.0	12.72	19.56	10.70	14.52	1.24	0.80	39.13	22.45	0.80
2800.0	12.21	18.93	10.99	15.03	1.22	0.81	39.04	22.53	0.94
3000.0	11.74	18.32	11.28	15.78	1.19	0.83	39.41	22.29	0.86
3200.0	11.28	17.78	11.79	15.70	1.17	0.84	39.35	21.84	1.02
3400.0	10.83	17.29	11.93	15.70	1.16	0.85	39.42	23.11	0.96
3600.0	10.38	16.86	11.86	15.40	1.15	0.85	39.53	22.75	0.88
3800.0	9.93	16.47	11.65	15.10	1.16	0.84	38.85	22.92	0.96
4000.0	9.45	16.18	11.20	14.41	1.19	0.83	39.26	22.41	0.90

## 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 = 55.49mA @ 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)
50.0	25.30	28.44	7.60	16.16	0.89	0.71	33.34	19.12	0.77
60.0	25.13	28.60	9.06	18.57	0.95	0.70	33.04	18.96	0.61
70.0	24.99	28.36	9.57	19.70	0.96	0.67	33.66	19.24	0.64
80.0	24.88	28.31	10.04	21.03	0.98	0.66	33.00	19.43	0.60
90.0	24.80	28.26	10.35	22.33	0.99	0.66	32.85	19.26	0.50
100.0	24.74	28.23	10.64	23.46	1.00	0.65	33.46	19.28	0.49
150.0	24.52	28.11	11.43	29.27	1.03	0.64	32.59	19.34	0.53
200.0	24.32	28.06	11.75	38.48	1.04	0.65	33.25	19.46	0.49
300.0	23.81	27.94	11.71	37.47	1.06	0.68	34.10	19.87	0.45
350.0	23.54	27.85	11.55	33.97	1.07	0.70	33.63	19.73	0.54
400.0	23.24	27.76	11.44	31.51	1.08	0.72	34.63	19.93	0.54
450.0	22.94	27.63	11.31	30.11	1.08	0.74	35.42	20.19	0.46
500.0	22.61	27.51	11.12	28.79	1.09	0.76	34.58	20.28	0.52
550.0	22.25	27.39	10.97	27.18	1.10	0.78	35.44	20.63	0.48
600.0	21.92	27.22	10.71	25.61	1.10	0.80	34.79	20.50	0.57
650.0	21.59	27.05	10.51	24.50	1.10	0.82	35.63	20.69	0.60
700.0	21.26	26.88	10.40	23.55	1.11	0.83	35.81	20.77	0.63
750.0	20.93	26.71	10.36	22.71	1.11	0.84	36.01	20.98	0.65
800.0	20.57	26.56	10.38	21.79	1.13	0.86	35.95	21.09	0.65
850.0	20.22	26.36	10.20	20.85	1.13	0.87	35.36	20.99	0.64
900.0	19.92	26.11	10.04	20.34	1.13	0.88	36.24	21.13	0.60
950.0	19.62	25.87	9.95	19.97	1.13	0.88	35.84	21.32	0.58
1000.0	19.33	25.64	9.95	19.59	1.13	0.88	34.80	21.22	0.62
1200.0	18.18	24.77	9.92	18.29	1.16	0.88	35.26	21.66	0.67
1400.0	17.12	23.94	10.08	16.94	1.20	0.87	35.76	21.86	0.69
1600.0	16.17	23.11	10.04	15.96	1.22	0.85	35.62	22.15	0.79
1800.0	15.33	22.33	10.07	15.26	1.24	0.83	36.00	22.30	0.75
2000.0	14.57	21.61	10.19	14.59	1.26	0.81	38.04	22.29	0.69
2200.0	13.88	20.90	10.31	14.37	1.26	0.80	37.06	22.59	0.72
2400.0	13.25	20.21	10.54	14.31	1.26	0.80	36.59	22.76	0.74
2600.0	12.68	19.54	10.63	14.59	1.24	0.80	37.83	22.31	0.77
2800.0	12.17	18.92	10.92	15.11	1.22	0.82	37.82	22.40	0.90
3000.0	11.71	18.30	11.20	15.86	1.19	0.83	38.71	22.15	0.84
3200.0	11.25	17.77	11.70	15.81	1.17	0.84	38.21	21.77	0.91
3400.0	10.79	17.28	11.84	15.82	1.16	0.85	38.19	22.99	0.77
3600.0	10.35	16.85	11.78	15.51	1.15	0.85	39.98	22.64	0.91
3800.0	9.90	16.46	11.58	15.20	1.17	0.84	38.64	22.87	0.77
4000.0	9.42	16.17	11.14	14.51	1.19	0.83	39.07	22.38	0.82

## 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 = 61.98mA @ 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)
50.0	25.47	29.01	8.42	16.41	0.92	0.72	34.25	20.08	0.87
60.0	25.31	28.73	8.94	18.71	0.94	0.70	34.42	19.93	0.66
70.0	25.16	28.51	9.77	19.88	0.97	0.67	35.03	20.10	0.67
80.0	25.05	28.43	10.26	21.29	0.98	0.65	33.85	20.23	0.65
90.0	24.98	28.40	10.61	22.62	0.99	0.65	33.94	20.12	0.51
100.0	24.91	28.37	10.92	23.85	1.00	0.65	34.26	20.13	0.50
150.0	24.69	28.26	11.79	30.64	1.03	0.63	33.55	20.18	0.60
200.0	24.48	28.21	11.99	42.45	1.04	0.64	34.50	20.23	0.49
300.0	23.96	28.10	11.87	37.04	1.07	0.68	35.72	20.49	0.43
350.0	23.68	28.03	11.71	35.41	1.07	0.70	35.18	20.40	0.55
400.0	23.38	27.91	11.64	32.72	1.08	0.71	35.43	20.58	0.55
450.0	23.07	27.78	11.47	31.03	1.09	0.73	36.62	20.68	0.48
500.0	22.73	27.67	11.28	29.40	1.10	0.76	35.36	20.76	0.52
550.0	22.37	27.55	11.11	27.64	1.11	0.78	36.98	20.86	0.49
600.0	22.03	27.38	10.85	26.02	1.11	0.80	35.86	20.92	0.56
650.0	21.71	27.20	10.65	24.83	1.11	0.82	36.41	21.01	0.59
700.0	21.37	27.02	10.53	23.78	1.11	0.83	36.79	21.02	0.62
750.0	21.03	26.85	10.49	22.87	1.12	0.84	37.52	21.12	0.62
800.0	20.67	26.70	10.50	21.89	1.13	0.86	36.48	21.21	0.61
850.0	20.32	26.49	10.32	20.93	1.13	0.87	37.04	21.22	0.66
900.0	20.02	26.23	10.15	20.40	1.13	0.88	37.70	21.30	0.59
950.0	19.71	25.99	10.06	20.01	1.13	0.88	36.59	21.49	0.60
1000.0	19.42	25.75	10.06	19.62	1.14	0.88	35.68	21.43	0.61
1200.0	18.26	24.86	10.04	18.27	1.17	0.88	36.81	21.75	0.68
1400.0	17.19	24.02	10.18	16.89	1.20	0.86	37.20	21.94	0.74
1600.0	16.25	23.19	10.16	15.88	1.23	0.85	36.60	22.20	0.77
1800.0	15.40	22.39	10.19	15.17	1.24	0.83	36.55	22.42	0.74
2000.0	14.63	21.67	10.32	14.49	1.26	0.81	37.48	22.39	0.70
2200.0	13.94	20.95	10.45	14.26	1.26	0.80	38.43	22.70	0.73
2400.0	13.30	20.25	10.67	14.19	1.26	0.79	37.89	22.85	0.73
2600.0	12.74	19.58	10.79	14.45	1.24	0.80	38.46	22.45	0.85
2800.0	12.22	18.96	11.07	14.95	1.22	0.81	39.01	22.53	0.93
3000.0	11.76	18.34	11.35	15.68	1.19	0.83	39.77	22.29	0.88
3200.0	11.30	17.80	11.85	15.62	1.17	0.84	39.96	21.77	0.94
3400.0	10.84	17.31	11.98	15.62	1.16	0.85	39.08	23.09	0.85
3600.0	10.39	16.88	11.92	15.31	1.15	0.85	39.71	22.72	0.80
3800.0	9.94	16.49	11.71	15.00	1.17	0.84	39.22	22.75	0.84
4000.0	9.46	16.20	11.27	14.32	1.19	0.83	40.34	22.27	0.87

## 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 = 55.58mA @ 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)
50.0	25.20	29.99	6.20	13.23	0.96	0.80	31.94	18.39	1.14
60.0	25.21	29.47	6.96	14.94	0.97	0.74	31.61	18.22	0.85
70.0	25.11	29.36	7.39	15.19	0.99	0.73	31.45	18.09	0.87
80.0	25.04	29.30	7.59	15.51	1.00	0.72	31.05	18.15	0.79
90.0	25.00	29.27	7.73	15.92	1.00	0.73	31.08	18.10	0.76
100.0	24.95	29.23	7.90	16.14	1.00	0.72	30.98	18.09	0.76
150.0	24.73	29.12	8.19	16.67	1.01	0.74	30.82	18.22	0.75
200.0	24.48	29.05	8.16	16.59	1.01	0.76	31.39	18.13	0.70
300.0	23.86	28.78	8.21	15.95	1.01	0.81	31.89	18.29	0.70
350.0	23.54	28.60	8.25	15.91	1.00	0.83	31.73	18.29	0.79
400.0	23.17	28.43	8.20	16.02	1.00	0.86	32.18	18.41	0.79
450.0	22.79	28.25	8.18	16.05	1.00	0.88	32.61	18.41	0.79
500.0	22.40	28.06	8.19	15.92	1.00	0.90	32.12	18.47	0.82
550.0	22.01	27.87	8.22	15.70	1.01	0.92	32.38	18.49	0.81
600.0	21.63	27.65	8.25	15.44	1.01	0.93	32.79	18.60	0.85
650.0	21.26	27.44	8.29	15.34	1.02	0.94	32.80	18.66	0.89
700.0	20.88	27.23	8.32	15.30	1.03	0.95	32.72	18.64	0.91
750.0	20.50	27.05	8.35	15.22	1.05	0.95	33.42	18.69	0.93
800.0	20.15	26.83	8.38	15.04	1.06	0.96	32.85	18.75	0.93
850.0	19.79	26.60	8.36	14.84	1.07	0.96	33.33	18.77	0.95
900.0	19.45	26.36	8.40	14.68	1.08	0.96	33.37	18.86	0.91
950.0	19.11	26.13	8.43	14.56	1.09	0.95	33.27	18.91	0.89
1000.0	18.78	25.91	8.45	14.44	1.11	0.95	32.51	18.87	0.93
1200.0	17.56	25.04	8.61	14.02	1.17	0.93	33.05	19.01	1.00
1400.0	16.48	24.22	8.80	13.62	1.23	0.91	33.12	19.04	1.09
1600.0	15.51	23.43	8.96	13.27	1.27	0.88	33.39	19.11	1.12
1800.0	14.64	22.67	9.09	13.04	1.31	0.86	33.50	19.27	1.14
2000.0	13.88	21.96	9.25	12.89	1.33	0.85	33.95	19.32	1.12
2200.0	13.18	21.28	9.42	12.85	1.34	0.84	34.24	19.65	1.17
2400.0	12.53	20.62	9.65	12.98	1.34	0.85	34.50	19.56	1.22
2600.0	11.94	19.98	9.85	13.24	1.32	0.86	34.28	19.48	1.32
2800.0	11.41	19.39	10.09	13.64	1.30	0.88	34.17	19.58	1.50
3000.0	10.91	18.82	10.26	13.99	1.27	0.90	34.46	19.64	1.48
3200.0	10.45	18.29	10.43	14.32	1.24	0.92	34.43	19.86	1.48
3400.0	9.99	17.80	10.59	14.38	1.23	0.93	33.89	19.58	1.49
3600.0	9.55	17.36	10.77	14.04	1.23	0.92	34.13	19.69	1.45
3800.0	9.12	16.99	10.85	13.54	1.24	0.91	33.44	19.39	1.46
4000.0	8.70	16.61	10.87	13.00	1.27	0.88	33.79	19.52	1.38

## 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 = 52.88mA @ 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)
50.0	25.12	29.80	6.45	13.19	0.97	0.78	31.90	18.46	1.01
60.0	25.13	29.29	6.85	14.88	0.97	0.74	31.44	18.31	0.87
70.0	25.03	29.27	7.32	15.11	0.98	0.73	31.57	18.22	0.82
80.0	24.96	29.22	7.54	15.44	0.99	0.73	31.16	18.29	0.84
90.0	24.92	29.18	7.73	15.84	1.00	0.72	31.07	18.24	0.75
100.0	24.87	29.14	7.88	16.06	1.00	0.72	31.16	18.24	0.74
150.0	24.65	29.04	8.18	16.59	1.01	0.74	30.92	18.35	0.77
200.0	24.40	28.95	8.13	16.50	1.01	0.76	31.30	18.29	0.72
300.0	23.79	28.69	8.24	15.94	1.00	0.81	31.91	18.43	0.70
350.0	23.47	28.51	8.18	15.92	1.00	0.83	31.42	18.44	0.78
400.0	23.11	28.33	8.18	16.02	1.00	0.86	32.27	18.55	0.78
450.0	22.74	28.15	8.17	16.06	1.00	0.88	32.78	18.59	0.74
500.0	22.35	27.96	8.17	15.93	1.00	0.90	32.12	18.65	0.80
550.0	21.96	27.77	8.21	15.71	1.01	0.91	32.85	18.72	0.77
600.0	21.58	27.55	8.22	15.48	1.01	0.93	32.61	18.77	0.83
650.0	21.22	27.34	8.26	15.39	1.02	0.94	32.90	18.84	0.86
700.0	20.84	27.14	8.30	15.36	1.03	0.94	32.95	18.83	0.90
750.0	20.46	26.95	8.32	15.29	1.04	0.95	33.52	18.92	0.91
800.0	20.11	26.74	8.37	15.11	1.06	0.95	33.01	18.95	0.89
850.0	19.76	26.50	8.35	14.91	1.06	0.96	33.19	18.95	0.92
900.0	19.42	26.26	8.38	14.75	1.08	0.95	33.37	19.05	0.88
950.0	19.08	26.03	8.41	14.65	1.09	0.95	33.52	19.10	0.87
1000.0	18.75	25.81	8.42	14.53	1.10	0.95	32.43	19.03	0.91
1200.0	17.54	24.95	8.60	14.13	1.16	0.93	33.39	19.21	0.98
1400.0	16.46	24.13	8.78	13.73	1.22	0.91	33.41	19.24	1.05
1600.0	15.49	23.35	8.93	13.38	1.27	0.88	33.09	19.27	1.13
1800.0	14.63	22.60	9.06	13.16	1.30	0.86	33.78	19.55	1.15
2000.0	13.87	21.89	9.23	13.01	1.33	0.85	34.82	19.59	1.11
2200.0	13.17	21.21	9.38	12.98	1.33	0.84	34.41	19.91	1.14
2400.0	12.52	20.55	9.60	13.11	1.33	0.85	34.24	19.80	1.17
2600.0	11.94	19.91	9.81	13.38	1.31	0.86	35.03	19.82	1.30
2800.0	11.40	19.32	10.05	13.79	1.29	0.88	34.78	19.96	1.45
3000.0	10.91	18.75	10.23	14.15	1.26	0.90	34.71	20.05	1.43
3200.0	10.44	18.23	10.39	14.49	1.24	0.92	34.56	20.22	1.54
3400.0	9.99	17.74	10.56	14.55	1.23	0.93	34.25	19.97	1.40
3600.0	9.55	17.30	10.73	14.21	1.22	0.92	34.36	20.13	1.50
3800.0	9.12	16.93	10.81	13.71	1.24	0.91	34.06	19.87	1.48
4000.0	8.71	16.55	10.83	13.16	1.26	0.88	33.72	20.02	1.55

## 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 = 58.27mA @ 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)
50.0	25.25	29.81	7.02	13.29	0.98	0.75	31.63	18.21	1.14
60.0	25.27	29.37	7.15	15.08	0.97	0.73	31.22	18.08	0.90
70.0	25.18	29.41	7.38	15.31	0.99	0.73	31.48	17.89	0.87
80.0	25.11	29.35	7.61	15.64	1.00	0.72	30.94	17.92	0.84
90.0	25.07	29.32	7.81	16.04	1.00	0.72	30.57	17.89	0.75
100.0	25.02	29.30	7.92	16.27	1.01	0.72	30.79	17.87	0.76
150.0	24.80	29.24	8.21	16.77	1.02	0.74	30.69	18.00	0.75
200.0	24.54	29.13	8.19	16.66	1.01	0.76	31.00	17.89	0.72
300.0	23.92	28.86	8.27	16.04	1.01	0.81	31.62	18.07	0.75
350.0	23.60	28.72	8.26	15.99	1.01	0.83	31.45	18.10	0.82
400.0	23.23	28.53	8.24	16.07	1.01	0.86	31.97	18.20	0.82
450.0	22.85	28.34	8.22	16.07	1.01	0.88	32.38	18.18	0.79
500.0	22.45	28.16	8.21	15.91	1.01	0.90	31.71	18.25	0.83
550.0	22.06	27.98	8.26	15.67	1.02	0.92	31.83	18.21	0.79
600.0	21.67	27.76	8.28	15.42	1.02	0.93	32.16	18.39	0.84
650.0	21.31	27.55	8.31	15.32	1.03	0.94	32.30	18.41	0.89
700.0	20.92	27.35	8.34	15.26	1.04	0.95	32.57	18.38	0.87
750.0	20.55	27.17	8.38	15.17	1.06	0.95	32.15	18.39	0.90
800.0	20.19	26.96	8.41	14.97	1.07	0.96	32.19	18.50	0.93
850.0	19.83	26.71	8.40	14.76	1.07	0.96	32.79	18.57	0.96
900.0	19.48	26.47	8.43	14.60	1.09	0.96	32.60	18.61	0.90
950.0	19.14	26.24	8.46	14.48	1.10	0.96	32.84	18.71	0.90
1000.0	18.82	26.02	8.48	14.35	1.11	0.95	32.17	18.70	0.94
1200.0	17.59	25.15	8.65	13.91	1.17	0.93	32.69	18.81	1.01
1400.0	16.51	24.32	8.84	13.50	1.23	0.91	32.83	18.86	1.07
1600.0	15.54	23.53	8.99	13.13	1.28	0.88	32.96	18.96	1.12
1800.0	14.67	22.77	9.13	12.89	1.32	0.86	33.25	19.10	1.17
2000.0	13.90	22.06	9.30	12.74	1.34	0.85	33.64	19.05	1.12
2200.0	13.20	21.38	9.45	12.70	1.35	0.84	33.83	19.37	1.18
2400.0	12.55	20.71	9.68	12.81	1.34	0.85	33.50	19.28	1.22
2600.0	11.96	20.07	9.88	13.07	1.33	0.86	33.45	19.14	1.31
2800.0	11.43	19.48	10.14	13.45	1.30	0.88	33.21	19.19	1.48
3000.0	10.93	18.90	10.31	13.79	1.27	0.90	33.38	19.30	1.42
3200.0	10.47	18.38	10.48	14.11	1.25	0.92	33.83	19.57	1.47
3400.0	10.01	17.89	10.64	14.17	1.24	0.93	32.87	19.22	1.31
3600.0	9.57	17.44	10.83	13.85	1.23	0.92	33.01	19.28	1.39
3800.0	9.14	17.07	10.91	13.36	1.25	0.91	32.67	19.00	1.46
4000.0	8.72	16.70	10.91	12.83	1.27	0.88	32.79	19.13	1.32

## 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 = 3.00V, Id = 33.47mA @ 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)
50.0	24.21	28.83	6.21	13.86	0.93	0.82	28.50	16.17	0.89
60.0	24.17	28.27	7.11	15.75	0.95	0.76	28.09	16.03	0.65
70.0	24.05	28.20	7.57	16.16	0.97	0.75	28.34	15.96	0.71
80.0	23.96	28.13	7.84	16.61	0.98	0.74	28.04	16.09	0.63
90.0	23.90	28.06	8.05	17.09	0.99	0.74	27.75	16.03	0.58
100.0	23.85	28.04	8.17	17.36	0.99	0.74	27.82	15.99	0.61
150.0	23.65	27.89	8.56	18.12	1.00	0.74	27.48	16.18	0.60
200.0	23.45	27.75	8.65	18.48	1.00	0.75	28.03	16.11	0.62
300.0	22.93	27.44	8.71	18.65	1.00	0.79	28.69	16.36	0.65
350.0	22.65	27.25	8.67	18.58	0.99	0.80	28.24	16.33	0.67
400.0	22.33	27.05	8.61	18.66	0.99	0.82	28.81	16.52	0.67
450.0	22.02	26.84	8.57	18.70	0.99	0.84	29.37	16.56	0.66
500.0	21.67	26.63	8.58	18.74	0.99	0.85	28.67	16.69	0.67
550.0	21.32	26.45	8.57	18.74	1.00	0.86	29.16	16.81	0.65
600.0	20.98	26.22	8.50	18.61	1.00	0.87	29.08	16.86	0.70
650.0	20.65	26.00	8.47	18.64	1.01	0.88	29.35	17.05	0.76
700.0	20.31	25.79	8.49	18.71	1.02	0.89	29.37	17.05	0.76
750.0	19.96	25.60	8.54	18.78	1.04	0.89	29.81	17.15	0.85
800.0	19.61	25.42	8.58	18.64	1.05	0.90	29.44	17.33	0.84
850.0	19.28	25.20	8.50	18.36	1.06	0.90	29.63	17.35	0.80
900.0	18.96	24.95	8.47	18.21	1.07	0.90	29.86	17.41	0.76
950.0	18.65	24.73	8.46	18.14	1.08	0.90	29.71	17.57	0.75
1000.0	18.35	24.51	8.44	18.02	1.09	0.90	28.87	17.57	0.78
1200.0	17.18	23.69	8.52	17.65	1.13	0.89	29.55	17.94	0.83
1400.0	16.13	22.92	8.64	17.24	1.17	0.89	29.61	18.17	0.88
1600.0	15.21	22.15	8.71	16.86	1.20	0.88	29.60	18.68	0.93
1800.0	14.38	21.42	8.80	16.56	1.23	0.87	29.92	18.73	0.96
2000.0	13.64	20.74	8.92	16.40	1.24	0.86	30.57	18.70	0.87
2200.0	12.97	20.06	9.03	16.57	1.24	0.86	30.72	19.05	0.91
2400.0	12.34	19.41	9.24	17.01	1.24	0.86	30.27	19.23	0.96
2600.0	11.78	18.78	9.40	17.58	1.22	0.87	30.94	18.75	1.03
2800.0	11.26	18.20	9.65	18.28	1.21	0.88	31.00	18.89	1.17
3000.0	10.77	17.64	9.83	18.86	1.19	0.90	31.33	18.75	1.12
3200.0	10.31	17.14	10.03	19.18	1.18	0.90	31.24	19.36	1.33
3400.0	9.86	16.68	10.17	18.89	1.17	0.91	31.09	19.44	1.23
3600.0	9.42	16.26	10.26	18.08	1.18	0.90	31.32	19.18	1.30
3800.0	8.99	15.88	10.21	17.17	1.19	0.89	31.21	19.44	1.30
4000.0	8.57	15.54	10.10	16.45	1.21	0.87	31.23	19.21	1.28

## 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 = 2.70V, Id = 29.19mA @ 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)
50.0	23.83	28.47	6.19	13.39	0.94	0.81	27.38	15.43	0.80
60.0	23.80	27.97	6.80	15.17	0.94	0.77	27.07	15.27	0.67
70.0	23.68	27.94	7.29	15.49	0.97	0.76	27.44	15.15	0.69
80.0	23.59	27.89	7.53	15.89	0.98	0.76	27.14	15.25	0.63
90.0	23.53	27.82	7.73	16.32	0.99	0.75	26.69	15.17	0.58
100.0	23.48	27.79	7.89	16.55	0.99	0.75	26.82	15.15	0.60
150.0	23.28	27.63	8.20	17.21	1.00	0.75	26.44	15.37	0.62
200.0	23.09	27.47	8.34	17.54	0.99	0.76	27.00	15.28	0.60
300.0	22.59	27.12	8.43	17.76	0.98	0.80	27.48	15.55	0.57
350.0	22.31	26.89	8.35	17.73	0.97	0.82	27.21	15.45	0.69
400.0	22.00	26.69	8.30	17.82	0.97	0.84	27.72	15.70	0.69
450.0	21.69	26.45	8.30	17.89	0.97	0.85	28.15	15.70	0.67
500.0	21.36	26.24	8.30	17.97	0.97	0.86	27.53	15.87	0.71
550.0	21.01	26.04	8.30	18.03	0.98	0.87	28.03	15.95	0.67
600.0	20.67	25.80	8.23	17.95	0.98	0.88	27.84	16.04	0.74
650.0	20.35	25.58	8.21	18.02	0.99	0.88	28.26	16.18	0.74
700.0	20.01	25.37	8.22	18.13	1.00	0.89	28.19	16.20	0.75
750.0	19.67	25.18	8.28	18.26	1.02	0.89	28.50	16.30	0.77
800.0	19.32	25.00	8.32	18.20	1.03	0.89	28.31	16.42	0.80
850.0	18.99	24.78	8.25	17.99	1.04	0.90	28.43	16.51	0.82
900.0	18.68	24.54	8.20	17.87	1.05	0.90	28.58	16.57	0.77
950.0	18.37	24.31	8.19	17.85	1.06	0.90	28.43	16.73	0.78
1000.0	18.07	24.10	8.19	17.79	1.07	0.90	27.73	16.76	0.82
1200.0	16.92	23.31	8.27	17.66	1.12	0.89	28.30	17.05	0.82
1400.0	15.88	22.56	8.37	17.48	1.16	0.89	28.43	17.32	0.91
1600.0	14.97	21.81	8.44	17.27	1.19	0.88	28.46	17.86	0.90
1800.0	14.14	21.10	8.54	17.14	1.21	0.87	28.84	17.88	0.97
2000.0	13.41	20.43	8.64	17.10	1.22	0.87	29.37	17.84	0.89
2200.0	12.75	19.77	8.73	17.40	1.22	0.87	29.59	18.22	0.93
2400.0	12.13	19.13	8.93	17.99	1.22	0.88	29.34	18.42	1.00
2600.0	11.57	18.51	9.09	18.69	1.21	0.89	29.96	17.87	1.11
2800.0	11.05	17.94	9.32	19.50	1.19	0.90	30.11	18.03	1.20
3000.0	10.57	17.40	9.49	20.10	1.18	0.91	30.66	17.89	1.14
3200.0	10.11	16.90	9.69	20.32	1.17	0.91	30.55	18.52	1.23
3400.0	9.65	16.45	9.82	19.77	1.17	0.91	30.34	18.62	1.22
3600.0	9.22	16.04	9.92	18.73	1.17	0.90	30.68	18.28	1.18
3800.0	8.79	15.67	9.87	17.68	1.19	0.89	30.42	18.61	1.25
4000.0	8.37	15.33	9.77	16.90	1.21	0.87	30.85	18.36	1.19



## 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 = 3.30V, Id = 36.47mA @ 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)
50.0	24.43	28.55	6.61	14.14	0.93	0.76	29.24	16.91	0.90
60.0	24.38	28.29	7.59	16.15	0.96	0.73	28.98	16.79	0.66
70.0	24.26	28.29	7.80	16.58	0.97	0.74	29.22	16.77	0.68
80.0	24.17	28.24	8.06	17.08	0.98	0.73	28.88	16.85	0.63
90.0	24.12	28.18	8.29	17.62	0.99	0.72	28.58	16.77	0.58
100.0	24.06	28.14	8.46	17.92	1.00	0.72	28.95	16.79	0.61
150.0	23.85	28.01	8.90	18.77	1.01	0.72	28.42	16.89	0.63
200.0	23.65	27.90	8.97	19.17	1.01	0.74	28.87	16.85	0.61
300.0	23.13	27.62	8.99	19.26	1.01	0.77	29.63	17.12	0.62
350.0	22.85	27.45	8.94	19.17	1.01	0.79	29.32	17.02	0.65
400.0	22.53	27.29	8.89	19.20	1.01	0.81	29.91	17.27	0.65
450.0	22.21	27.09	8.86	19.21	1.01	0.83	30.44	17.35	0.65
500.0	21.87	26.89	8.82	19.20	1.01	0.84	29.62	17.46	0.69
550.0	21.51	26.72	8.83	19.13	1.02	0.86	30.33	17.59	0.66
600.0	21.17	26.50	8.73	18.94	1.02	0.87	30.04	17.67	0.74
650.0	20.84	26.29	8.72	18.92	1.03	0.88	30.56	17.79	0.74
700.0	20.49	26.09	8.72	18.94	1.04	0.89	30.58	17.86	0.75
750.0	20.14	25.91	8.76	18.93	1.05	0.89	30.89	17.98	0.86
800.0	19.79	25.74	8.81	18.71	1.07	0.90	30.64	18.10	0.80
850.0	19.46	25.51	8.73	18.39	1.07	0.90	30.92	18.16	0.79
900.0	19.14	25.26	8.69	18.19	1.08	0.90	30.87	18.17	0.78
950.0	18.83	25.04	8.66	18.07	1.09	0.90	30.62	18.39	0.73
1000.0	18.52	24.82	8.66	17.90	1.10	0.90	29.99	18.34	0.80
1200.0	17.35	24.00	8.71	17.35	1.14	0.90	30.55	18.77	0.82
1400.0	16.30	23.21	8.85	16.77	1.19	0.89	30.55	18.95	0.87
1600.0	15.37	22.44	8.91	16.27	1.22	0.87	30.65	19.41	0.93
1800.0	14.53	21.70	9.01	15.87	1.24	0.86	31.08	19.47	0.91
2000.0	13.78	21.01	9.13	15.63	1.25	0.85	31.65	19.46	0.88
2200.0	13.11	20.33	9.24	15.71	1.26	0.85	31.76	19.81	0.95
2400.0	12.49	19.66	9.46	16.06	1.25	0.85	31.39	19.97	0.95
2600.0	11.92	19.02	9.65	16.54	1.24	0.86	31.94	19.51	1.07
2800.0	11.40	18.44	9.88	17.13	1.22	0.87	31.74	19.64	1.15
3000.0	10.91	17.88	10.08	17.65	1.20	0.89	31.79	19.54	1.11
3200.0	10.45	17.37	10.29	17.99	1.19	0.90	32.02	20.12	1.20
3400.0	9.99	16.90	10.45	17.84	1.18	0.90	31.73	20.17	1.10
3600.0	9.56	16.48	10.54	17.20	1.18	0.90	31.80	19.94	1.11
3800.0	9.12	16.09	10.49	16.43	1.19	0.88	31.41	20.17	1.15
4000.0	8.70	15.76	10.36	15.80	1.22	0.87	31.21	19.95	1.12

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 3.00V, Id = 34.28mA @ 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)
50.0	24.39	28.05	7.19	14.72	0.91	0.74	29.56	16.28	0.81
60.0	24.27	27.75	7.91	17.04	0.93	0.72	29.01	16.19	0.56
70.0	24.12	27.73	8.63	17.80	0.96	0.70	29.42	16.29	0.59
80.0	24.01	27.65	9.00	18.66	0.97	0.69	29.22	16.40	0.61
90.0	23.94	27.60	9.33	19.51	0.99	0.68	28.79	16.29	0.49
100.0	23.88	27.58	9.53	20.10	0.99	0.68	29.05	16.33	0.49
150.0	23.68	27.47	10.15	22.35	1.02	0.68	28.48	16.46	0.56
200.0	23.51	27.36	10.48	24.59	1.02	0.68	29.14	16.51	0.50
300.0	23.04	27.21	10.49	25.90	1.04	0.71	29.96	16.92	0.43
350.0	22.79	27.08	10.45	24.91	1.04	0.73	29.47	16.82	0.57
400.0	22.52	26.97	10.38	24.40	1.04	0.74	29.89	17.02	0.57
450.0	22.24	26.82	10.33	24.31	1.05	0.76	30.50	17.12	0.52
500.0	21.93	26.69	10.21	24.17	1.05	0.78	29.85	17.23	0.55
550.0	21.59	26.58	10.11	23.81	1.06	0.80	30.51	17.33	0.49
600.0	21.27	26.40	9.90	22.95	1.06	0.81	30.10	17.40	0.56
650.0	20.97	26.23	9.76	22.49	1.06	0.83	30.33	17.48	0.62
700.0	20.65	26.06	9.66	22.11	1.07	0.84	30.62	17.49	0.60
750.0	20.33	25.90	9.64	21.76	1.08	0.85	30.96	17.57	0.68
800.0	19.98	25.77	9.67	21.28	1.09	0.86	30.41	17.70	0.64
850.0	19.64	25.58	9.51	20.59	1.10	0.88	30.69	17.74	0.68
900.0	19.36	25.35	9.33	20.25	1.09	0.88	30.73	17.76	0.62
950.0	19.06	25.12	9.27	20.04	1.10	0.89	30.68	17.97	0.59
1000.0	18.78	24.91	9.28	19.75	1.11	0.89	29.90	17.98	0.63
1200.0	17.67	24.10	9.26	18.86	1.14	0.89	30.48	18.26	0.66
1400.0	16.64	23.34	9.40	17.69	1.18	0.87	30.51	18.45	0.68
1600.0	15.72	22.57	9.36	16.90	1.21	0.86	30.55	19.07	0.74
1800.0	14.90	21.82	9.37	16.33	1.22	0.85	30.81	18.92	0.73
2000.0	14.16	21.14	9.46	15.72	1.24	0.84	31.51	18.84	0.64
2200.0	13.48	20.46	9.56	15.59	1.24	0.83	31.35	19.11	0.67
2400.0	12.86	19.79	9.77	15.64	1.24	0.83	31.09	19.46	0.69
2600.0	12.31	19.14	9.84	16.06	1.23	0.83	31.42	18.89	0.79
2800.0	11.81	18.54	10.10	16.77	1.21	0.84	31.34	18.95	0.89
3000.0	11.35	17.94	10.36	17.78	1.18	0.86	31.66	18.69	0.86
3200.0	10.90	17.41	10.82	17.73	1.16	0.86	31.64	19.34	0.99
3400.0	10.46	16.93	10.96	17.77	1.15	0.87	31.59	19.67	0.88
3600.0	10.02	16.50	10.94	17.39	1.15	0.87	31.47	19.27	0.86
3800.0	9.58	16.12	10.76	16.99	1.16	0.86	31.25	19.64	0.93
4000.0	9.11	15.83	10.37	16.14	1.19	0.86	31.07	19.12	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 = 2.70V, Id = 29.72mA @ 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)
50.0	24.24	27.82	7.67	14.79	0.92	0.71	28.32	15.86	0.74
60.0	24.12	27.86	8.16	17.03	0.94	0.74	28.08	15.71	0.61
70.0	23.97	27.62	8.55	17.83	0.96	0.71	28.51	15.78	0.62
80.0	23.86	27.54	8.97	18.71	0.97	0.70	28.18	15.93	0.61
90.0	23.79	27.49	9.25	19.57	0.98	0.69	27.94	15.85	0.49
100.0	23.73	27.46	9.50	20.19	0.99	0.69	28.17	15.78	0.54
150.0	23.53	27.36	10.16	22.58	1.02	0.68	27.82	16.02	0.55
200.0	23.35	27.23	10.46	24.99	1.02	0.68	28.31	16.06	0.53
300.0	22.89	27.05	10.48	26.64	1.04	0.71	29.06	16.32	0.44
350.0	22.64	26.95	10.41	25.56	1.04	0.73	28.57	16.27	0.56
400.0	22.37	26.80	10.34	25.06	1.04	0.74	29.03	16.42	0.56
450.0	22.09	26.65	10.25	24.99	1.04	0.76	29.47	16.44	0.52
500.0	21.79	26.50	10.13	24.94	1.05	0.78	28.86	16.59	0.56
550.0	21.45	26.39	10.05	24.68	1.06	0.80	29.30	16.60	0.57
600.0	21.14	26.20	9.82	23.81	1.06	0.81	29.18	16.71	0.59
650.0	20.83	26.03	9.68	23.39	1.06	0.82	29.45	16.76	0.63
700.0	20.52	25.85	9.58	23.07	1.07	0.84	29.49	16.77	0.62
750.0	20.20	25.69	9.55	22.80	1.08	0.85	29.67	16.82	0.65
800.0	19.85	25.56	9.57	22.38	1.09	0.86	29.51	16.93	0.69
850.0	19.52	25.37	9.42	21.67	1.09	0.87	29.54	16.97	0.68
900.0	19.24	25.12	9.25	21.32	1.09	0.88	29.72	16.99	0.60
950.0	18.95	24.90	9.17	21.13	1.10	0.88	29.83	17.19	0.58
1000.0	18.67	24.68	9.18	20.83	1.10	0.88	29.07	17.21	0.65
1200.0	17.56	23.87	9.16	19.95	1.14	0.88	29.67	17.40	0.65
1400.0	16.54	23.11	9.28	18.72	1.17	0.87	29.68	17.63	0.76
1600.0	15.63	22.34	9.23	17.92	1.19	0.86	29.78	18.11	0.73
1800.0	14.81	21.59	9.24	17.35	1.21	0.85	30.25	18.08	0.75
2000.0	14.07	20.91	9.32	16.70	1.22	0.84	30.59	18.00	0.66
2200.0	13.40	20.22	9.42	16.59	1.23	0.84	31.04	18.25	0.73
2400.0	12.78	19.56	9.61	16.67	1.23	0.83	30.84	18.59	0.72
2600.0	12.23	18.91	9.67	17.18	1.21	0.84	30.95	18.00	0.81
2800.0	11.72	18.31	9.91	18.01	1.20	0.85	31.20	18.08	0.90
3000.0	11.27	17.72	10.16	19.23	1.17	0.86	31.49	17.83	0.87
3200.0	10.82	17.19	10.61	19.17	1.16	0.87	31.84	18.46	0.97
3400.0	10.38	16.71	10.72	19.20	1.15	0.87	31.93	18.76	0.92
3600.0	9.94	16.29	10.69	18.69	1.15	0.87	31.75	18.34	0.96
3800.0	9.50	15.91	10.51	18.16	1.16	0.86	31.82	18.71	0.94
4000.0	9.04	15.63	10.16	17.16	1.18	0.86	31.79	18.19	0.82

## 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 = 3.30V, Id = 38.53mA @ 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)
50.0	24.68	28.42	7.92	15.35	0.93	0.74	30.42	17.34	0.76
60.0	24.55	28.10	8.29	17.70	0.94	0.72	29.97	17.24	0.61
70.0	24.40	27.87	9.02	18.65	0.96	0.69	30.56	17.37	0.63
80.0	24.29	27.82	9.49	19.73	0.98	0.68	30.39	17.54	0.53
90.0	24.21	27.75	9.78	20.80	0.99	0.67	30.09	17.42	0.47
100.0	24.14	27.71	10.09	21.64	1.00	0.67	30.36	17.42	0.50
150.0	23.94	27.64	10.84	25.16	1.02	0.66	29.67	17.60	0.53
200.0	23.75	27.52	11.15	28.94	1.03	0.66	30.46	17.65	0.48
300.0	23.28	27.41	11.16	30.94	1.05	0.69	31.06	18.03	0.41
350.0	23.03	27.33	10.97	29.03	1.05	0.71	30.77	17.95	0.53
400.0	22.75	27.19	10.92	27.98	1.06	0.73	31.23	18.12	0.53
450.0	22.46	27.06	10.86	27.58	1.06	0.74	32.19	18.20	0.52
500.0	22.15	26.94	10.69	27.03	1.07	0.76	31.13	18.31	0.56
550.0	21.81	26.83	10.55	26.17	1.08	0.79	31.97	18.38	0.53
600.0	21.49	26.66	10.33	24.86	1.08	0.80	31.68	18.51	0.58
650.0	21.18	26.50	10.15	24.08	1.08	0.82	32.00	18.53	0.60
700.0	20.86	26.33	10.05	23.41	1.09	0.83	32.06	18.57	0.64
750.0	20.54	26.18	10.01	22.79	1.10	0.85	32.50	18.60	0.69
800.0	20.19	26.04	10.03	22.05	1.11	0.86	31.91	18.74	0.66
850.0	19.85	25.85	9.85	21.18	1.11	0.87	32.20	18.78	0.67
900.0	19.56	25.61	9.68	20.73	1.11	0.88	32.38	18.79	0.61
950.0	19.27	25.39	9.61	20.42	1.11	0.88	31.99	19.04	0.60
1000.0	18.99	25.17	9.60	20.06	1.12	0.88	31.47	19.02	0.67
1200.0	17.86	24.34	9.57	18.91	1.15	0.88	31.91	19.25	0.65
1400.0	16.83	23.56	9.70	17.59	1.19	0.87	31.94	19.46	0.71
1600.0	15.91	22.77	9.65	16.66	1.21	0.86	31.92	19.96	0.78
1800.0	15.08	22.02	9.68	16.01	1.23	0.84	32.07	19.83	0.75
2000.0	14.33	21.33	9.79	15.34	1.25	0.83	32.84	19.77	0.67
2200.0	13.65	20.63	9.88	15.16	1.25	0.82	32.54	20.01	0.72
2400.0	13.02	19.95	10.09	15.15	1.25	0.82	32.35	20.32	0.73
2600.0	12.47	19.29	10.18	15.50	1.23	0.82	32.57	19.75	0.80
2800.0	11.96	18.69	10.45	16.13	1.21	0.83	32.11	19.83	0.91
3000.0	11.51	18.08	10.71	17.05	1.19	0.85	32.15	19.55	0.87
3200.0	11.05	17.55	11.19	17.02	1.17	0.85	32.17	20.19	1.02
3400.0	10.61	17.06	11.32	17.05	1.16	0.86	32.14	20.50	0.91
3600.0	10.17	16.63	11.28	16.71	1.15	0.86	31.62	20.10	0.94
3800.0	9.72	16.25	11.10	16.36	1.16	0.85	31.37	20.46	1.06
4000.0	9.25	15.96	10.70	15.59	1.19	0.85	30.74	19.97	0.87

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 3.00V, Id = 32.25mA @ 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)
50.0	23.95	28.75	5.68	12.00	0.93	0.80	28.31	15.81	0.97
60.0	23.98	28.77	6.09	13.41	0.96	0.80	27.92	15.59	0.82
70.0	23.88	28.56	6.52	13.63	0.98	0.77	28.17	15.51	0.82
80.0	23.81	28.49	6.73	13.89	0.98	0.77	27.73	15.60	0.75
90.0	23.77	28.42	6.89	14.21	0.99	0.77	27.44	15.52	0.69
100.0	23.73	28.39	7.01	14.39	0.99	0.77	27.44	15.54	0.72
150.0	23.53	28.24	7.23	14.86	0.99	0.78	27.20	15.74	0.73
200.0	23.30	28.04	7.27	14.86	0.98	0.80	27.63	15.66	0.73
300.0	22.75	27.58	7.35	14.64	0.95	0.84	28.04	15.87	0.71
350.0	22.46	27.33	7.37	14.75	0.93	0.87	27.82	15.87	0.82
400.0	22.13	27.07	7.38	15.00	0.93	0.89	28.59	16.08	0.82
450.0	21.78	26.81	7.41	15.17	0.92	0.90	29.01	16.11	0.78
500.0	21.42	26.57	7.42	15.21	0.93	0.92	28.14	16.26	0.81
550.0	21.06	26.34	7.46	15.18	0.93	0.93	28.81	16.38	0.82
600.0	20.70	26.09	7.50	15.11	0.94	0.93	28.64	16.40	0.87
650.0	20.36	25.85	7.54	15.19	0.95	0.93	29.05	16.58	0.93
700.0	20.00	25.63	7.58	15.37	0.96	0.94	29.18	16.62	0.92
750.0	19.64	25.44	7.63	15.51	0.98	0.94	29.53	16.71	0.98
800.0	19.31	25.23	7.68	15.48	0.99	0.94	29.09	16.83	0.96
850.0	18.97	24.99	7.67	15.40	1.00	0.94	29.39	16.79	0.96
900.0	18.64	24.76	7.71	15.36	1.02	0.94	29.55	16.92	0.92
950.0	18.32	24.54	7.73	15.40	1.03	0.93	29.27	17.03	0.94
1000.0	18.01	24.33	7.76	15.41	1.05	0.93	28.49	16.96	0.99
1200.0	16.85	23.53	7.94	15.47	1.11	0.91	29.33	17.35	1.00
1400.0	15.81	22.77	8.11	15.47	1.16	0.90	29.27	17.52	1.08
1600.0	14.88	22.04	8.25	15.41	1.21	0.88	29.31	17.84	1.16
1800.0	14.05	21.34	8.37	15.45	1.24	0.88	29.85	18.08	1.19
2000.0	13.31	20.69	8.51	15.50	1.25	0.87	30.65	18.13	1.11
2200.0	12.63	20.05	8.64	15.68	1.26	0.88	30.53	18.48	1.18
2400.0	11.99	19.43	8.84	16.06	1.26	0.88	30.56	18.59	1.21
2600.0	11.42	18.82	9.01	16.59	1.24	0.90	31.29	18.32	1.36
2800.0	10.90	18.27	9.24	17.26	1.23	0.91	31.14	18.43	1.47
3000.0	10.41	17.73	9.40	17.81	1.21	0.93	31.43	18.43	1.45
3200.0	9.95	17.24	9.55	18.21	1.20	0.94	31.22	18.93	1.48
3400.0	9.49	16.79	9.69	18.02	1.19	0.94	31.19	18.81	1.47
3600.0	9.06	16.36	9.87	17.22	1.20	0.93	31.57	18.75	1.42
3800.0	8.64	16.00	9.95	16.32	1.22	0.91	31.67	18.85	1.33
4000.0	8.25	15.65	9.97	15.54	1.24	0.89	31.71	18.85	1.24

## 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 = 2.70V, Id = 28.53mA @ 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)
50.0	23.57	29.01	5.31	11.61	0.96	0.84	27.45	14.94	1.05
60.0	23.61	28.51	6.10	12.86	0.97	0.79	26.76	14.79	0.80
70.0	23.52	28.36	6.25	13.05	0.97	0.79	27.10	14.67	0.84
80.0	23.45	28.29	6.46	13.29	0.98	0.78	26.81	14.74	0.85
90.0	23.41	28.21	6.60	13.59	0.98	0.78	26.40	14.69	0.74
100.0	23.37	28.17	6.71	13.75	0.99	0.78	26.55	14.67	0.74
150.0	23.17	28.00	6.94	14.19	0.98	0.80	26.21	14.88	0.78
200.0	22.95	27.79	6.98	14.19	0.96	0.82	26.64	14.80	0.77
300.0	22.41	27.29	7.07	14.02	0.93	0.86	27.13	15.06	0.79
350.0	22.13	26.99	7.09	14.14	0.91	0.88	26.87	15.05	0.83
400.0	21.80	26.71	7.11	14.40	0.90	0.90	27.56	15.21	0.83
450.0	21.46	26.44	7.12	14.59	0.90	0.92	27.89	15.30	0.80
500.0	21.11	26.18	7.16	14.65	0.90	0.93	27.09	15.41	0.84
550.0	20.75	25.94	7.20	14.66	0.91	0.94	27.68	15.57	0.84
600.0	20.40	25.67	7.23	14.61	0.91	0.94	27.55	15.56	0.85
650.0	20.06	25.43	7.28	14.72	0.92	0.94	27.90	15.81	0.89
700.0	19.71	25.21	7.33	14.93	0.94	0.94	28.02	15.79	0.96
750.0	19.35	25.01	7.37	15.11	0.95	0.94	28.22	15.92	0.90
800.0	19.02	24.81	7.44	15.13	0.97	0.94	27.99	15.95	0.95
850.0	18.69	24.57	7.42	15.08	0.98	0.94	28.20	16.01	0.99
900.0	18.37	24.34	7.46	15.07	1.00	0.93	28.37	16.18	0.95
950.0	18.05	24.12	7.49	15.14	1.01	0.93	28.08	16.21	0.90
1000.0	17.74	23.91	7.51	15.19	1.03	0.93	27.39	16.19	0.98
1200.0	16.59	23.14	7.70	15.40	1.10	0.91	28.18	16.62	1.02
1400.0	15.56	22.40	7.87	15.54	1.15	0.90	28.13	16.82	1.07
1600.0	14.64	21.69	8.00	15.62	1.19	0.89	28.12	17.19	1.12
1800.0	13.82	21.02	8.13	15.77	1.22	0.88	28.69	17.36	1.16
2000.0	13.08	20.39	8.25	15.94	1.24	0.88	29.48	17.39	1.08
2200.0	12.41	19.77	8.37	16.21	1.24	0.89	29.47	17.75	1.18
2400.0	11.78	19.16	8.58	16.70	1.24	0.90	29.29	17.89	1.21
2600.0	11.21	18.57	8.74	17.33	1.23	0.91	30.22	17.52	1.35
2800.0	10.69	18.02	8.94	18.08	1.21	0.92	30.04	17.67	1.48
3000.0	10.20	17.50	9.10	18.66	1.20	0.94	30.73	17.65	1.41
3200.0	9.75	17.02	9.25	19.02	1.19	0.95	30.47	18.18	1.41
3400.0	9.29	16.57	9.39	18.67	1.19	0.95	30.27	18.09	1.43
3600.0	8.86	16.16	9.56	17.72	1.19	0.94	30.85	17.98	1.51
3800.0	8.44	15.80	9.65	16.71	1.21	0.92	31.05	18.12	1.37
4000.0	8.05	15.45	9.67	15.88	1.24	0.89	31.32	18.10	1.36

## Typical Performance Data

### Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

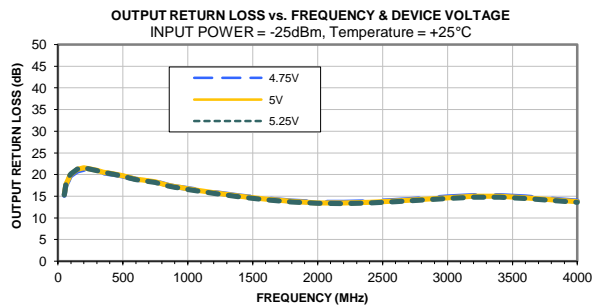
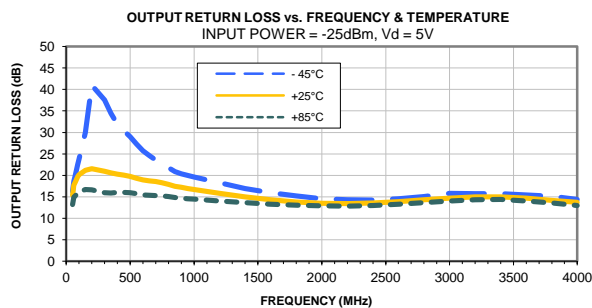
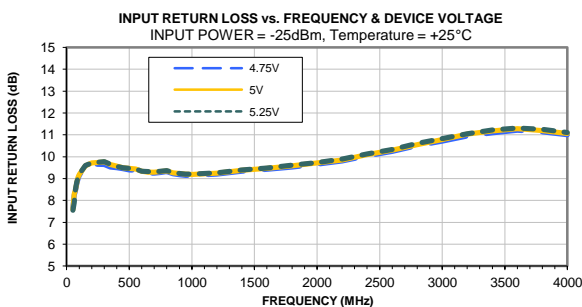
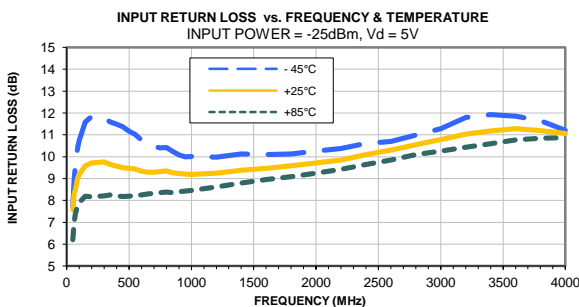
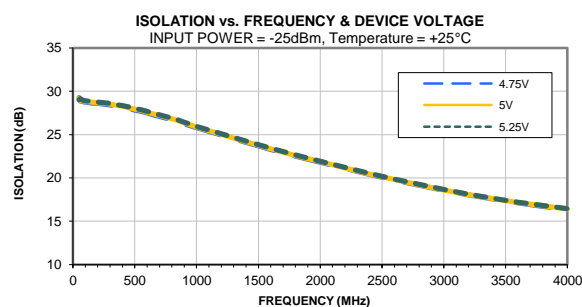
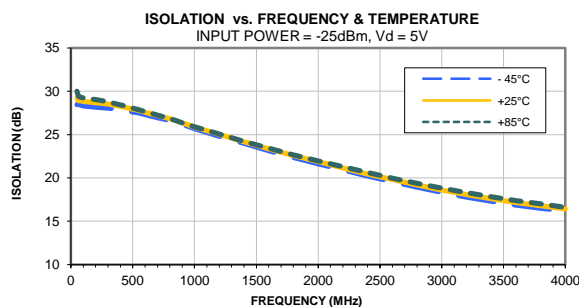
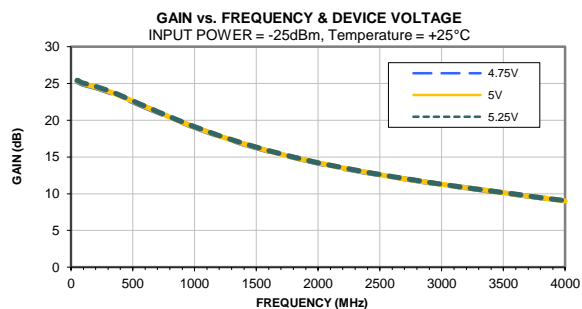
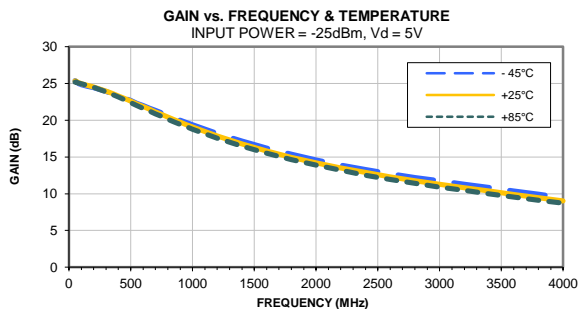
Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 3.30V, Id = 35.99mA @ Temperature = +85°C

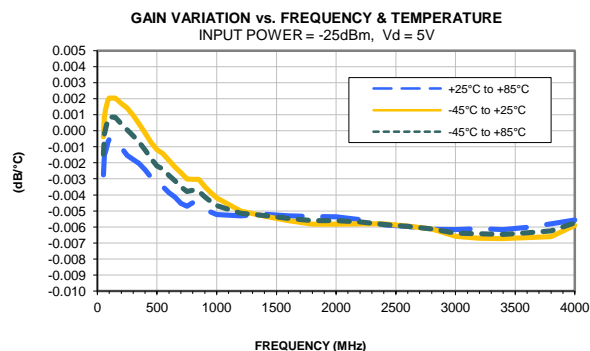
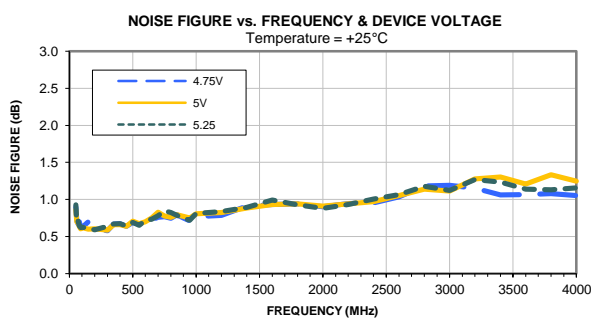
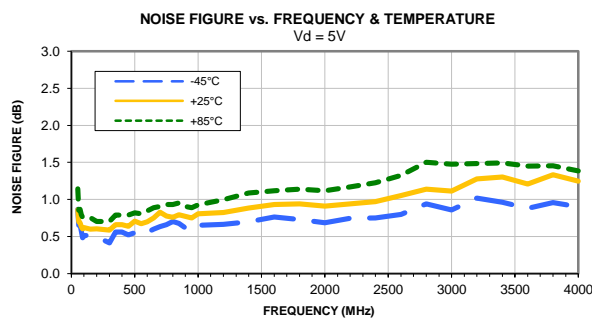
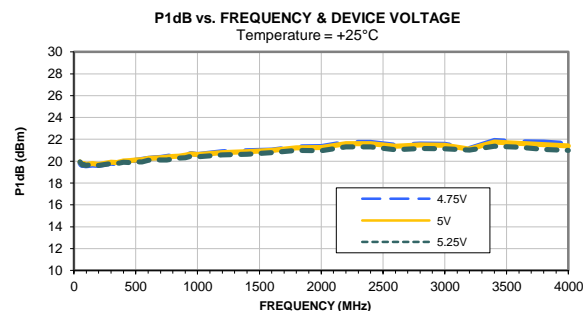
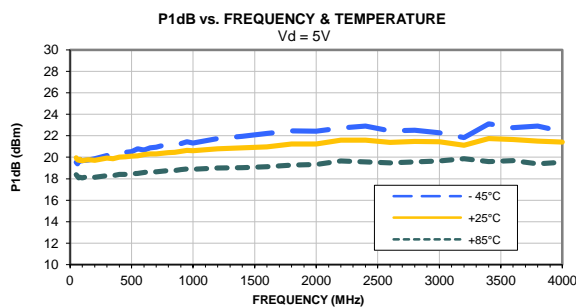
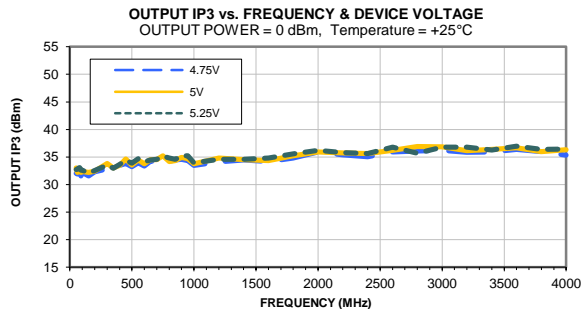
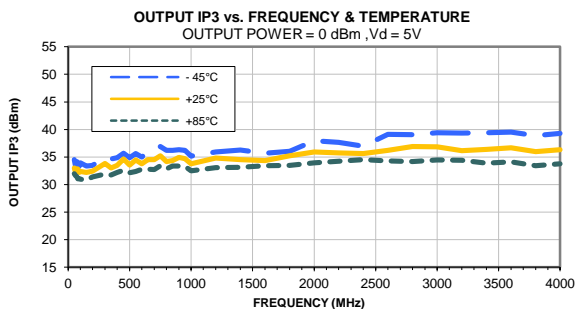
FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50.0	24.24	28.76	6.43	12.37	0.96	0.74	29.13	16.43	1.09
60.0	24.27	28.76	6.47	13.86	0.96	0.77	28.65	16.31	0.82
70.0	24.17	28.75	6.75	14.08	0.98	0.76	28.93	16.26	0.84
80.0	24.10	28.67	6.96	14.36	0.99	0.76	28.54	16.36	0.83
90.0	24.07	28.59	7.10	14.71	0.99	0.76	28.33	16.32	0.72
100.0	24.02	28.56	7.23	14.91	0.99	0.76	28.35	16.32	0.74
150.0	23.81	28.44	7.50	15.40	1.00	0.77	28.07	16.48	0.77
200.0	23.58	28.26	7.52	15.38	0.98	0.79	28.61	16.43	0.73
300.0	23.02	27.86	7.59	15.11	0.96	0.84	29.12	16.64	0.73
350.0	22.73	27.63	7.62	15.20	0.95	0.86	28.87	16.65	0.81
400.0	22.39	27.38	7.60	15.44	0.95	0.88	29.42	16.83	0.81
450.0	22.04	27.13	7.62	15.59	0.94	0.89	30.13	16.89	0.77
500.0	21.67	26.91	7.64	15.60	0.95	0.91	29.27	16.99	0.81
550.0	21.30	26.69	7.68	15.53	0.95	0.92	29.88	17.15	0.81
600.0	20.94	26.44	7.70	15.43	0.96	0.93	29.54	17.14	0.83
650.0	20.59	26.21	7.75	15.49	0.97	0.93	30.24	17.31	0.90
700.0	20.23	26.00	7.79	15.62	0.98	0.94	30.18	17.32	0.94
750.0	19.87	25.81	7.82	15.72	1.00	0.94	30.45	17.44	0.92
800.0	19.53	25.59	7.88	15.64	1.01	0.94	30.21	17.52	0.95
850.0	19.19	25.35	7.86	15.53	1.02	0.94	30.44	17.48	0.93
900.0	18.86	25.12	7.91	15.46	1.03	0.94	30.56	17.65	0.92
950.0	18.53	24.90	7.93	15.47	1.05	0.94	30.30	17.68	0.89
1000.0	18.22	24.68	7.95	15.44	1.06	0.93	29.55	17.63	0.97
1200.0	17.05	23.86	8.13	15.37	1.12	0.92	30.33	17.98	1.00
1400.0	16.00	23.08	8.30	15.25	1.18	0.90	30.41	18.13	1.11
1600.0	15.06	22.34	8.45	15.09	1.22	0.88	30.30	18.41	1.15
1800.0	14.22	21.63	8.57	15.03	1.25	0.87	30.98	18.67	1.15
2000.0	13.48	20.96	8.71	15.01	1.27	0.87	31.48	18.74	1.13
2200.0	12.79	20.31	8.86	15.11	1.27	0.87	31.46	19.08	1.17
2400.0	12.15	19.68	9.06	15.41	1.27	0.87	31.36	19.14	1.20
2600.0	11.58	19.06	9.25	15.86	1.26	0.89	32.06	18.94	1.29
2800.0	11.05	18.49	9.47	16.45	1.24	0.90	31.55	19.05	1.45
3000.0	10.56	17.95	9.62	16.96	1.22	0.92	31.64	19.10	1.44
3200.0	10.10	17.45	9.79	17.37	1.21	0.93	31.78	19.52	1.55
3400.0	9.64	16.99	9.94	17.30	1.20	0.93	31.17	19.36	1.52
3600.0	9.21	16.56	10.11	16.64	1.20	0.92	31.29	19.39	1.57
3800.0	8.79	16.20	10.18	15.85	1.22	0.91	30.88	19.44	1.54
4000.0	8.39	15.83	10.21	15.11	1.24	0.89	30.88	19.46	1.51

## Typical Performance Curves

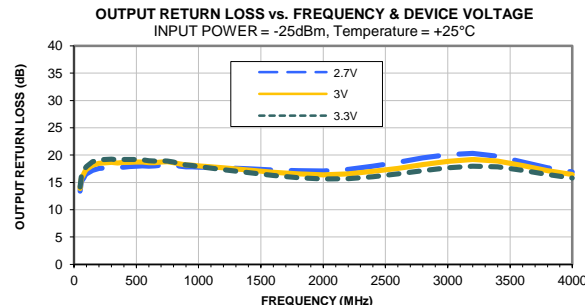
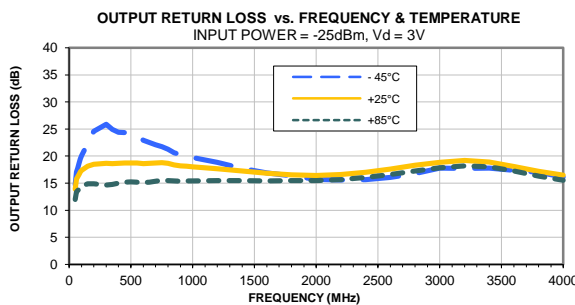
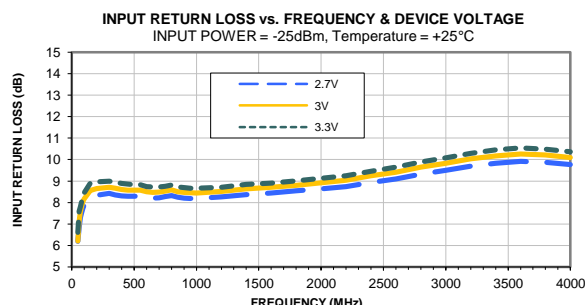
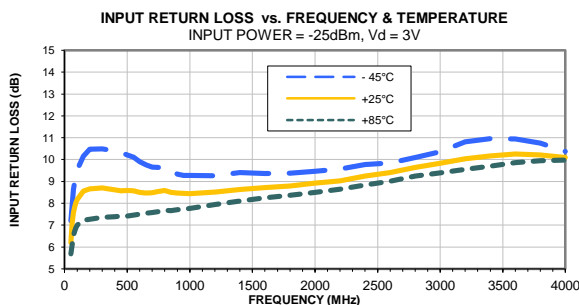
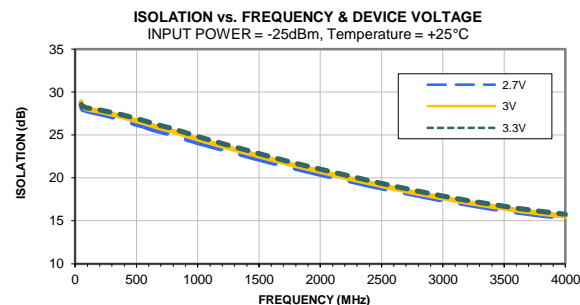
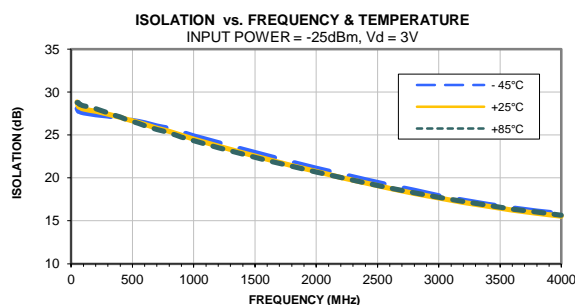
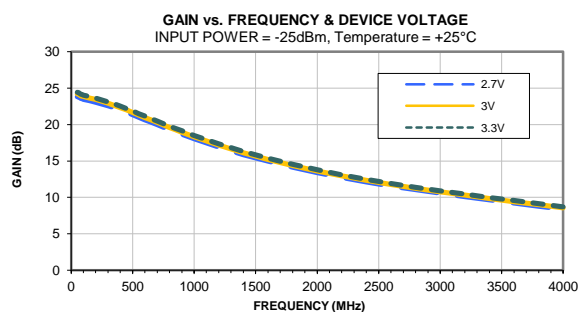
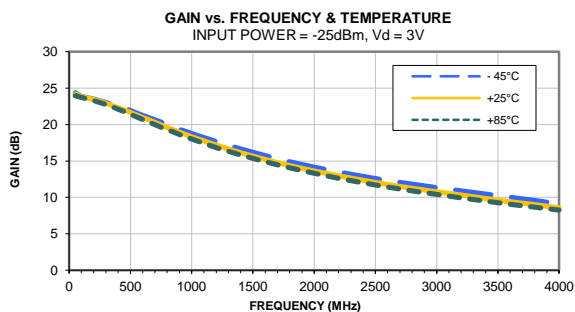




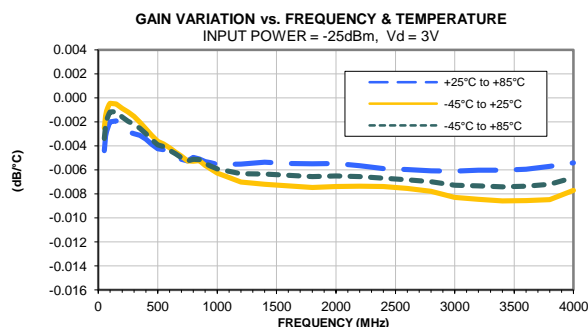
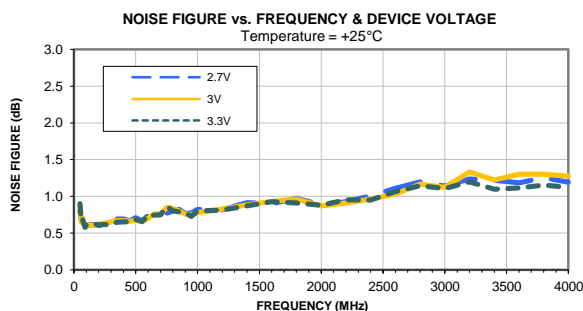
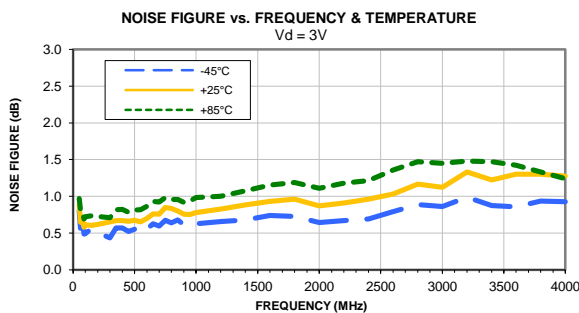
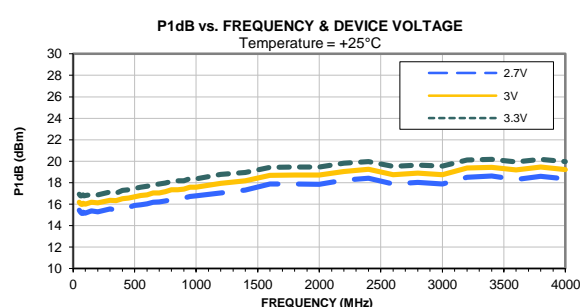
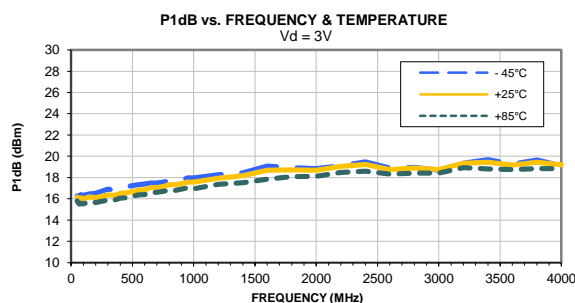
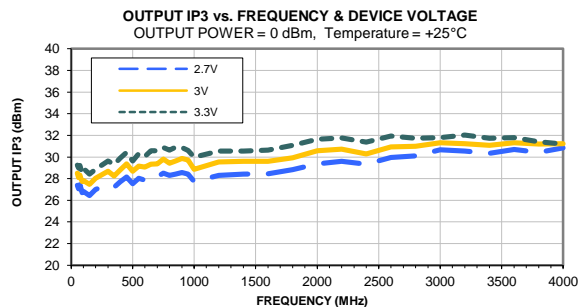
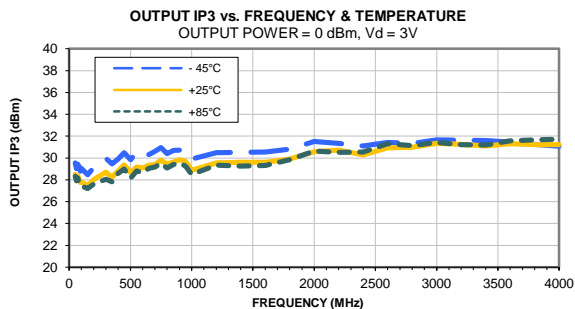
## Typical Performance Curves



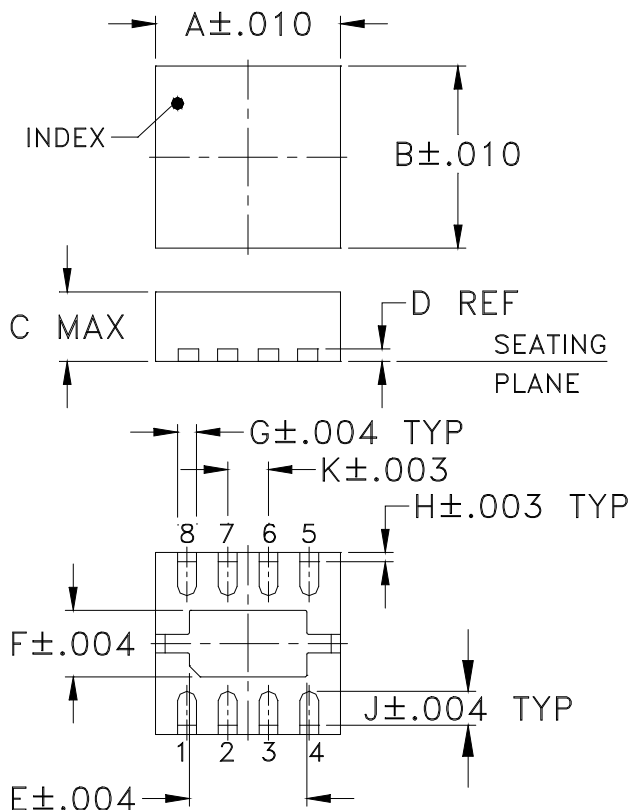
## Typical Performance Curves



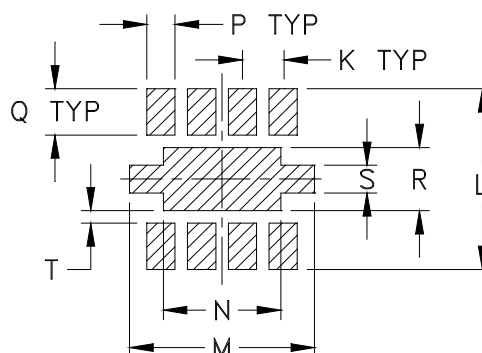
## Typical Performance Curves



### Outline Dimensions



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm .002$

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N
DL1721	.118 (3.00)	.118 (3.00)	.045 (1.14)	.008 (0.20)	.075 (1.91)	.043 (1.09)	.012 (0.30)	.006 (0.15)	.022 (0.56)	.026 (0.66)	.117 (2.97)	.118 (3.00)	.075 (1.91)

CASE #	P	Q	R	S	T	WT. GRAM
DL1721	.018 (0.46)	.030 (0.76)	.041 (1.04)	.018 (0.46)	.008 (0.20)	.02

Dimensions are in inches (mm). Tolerances: 3Pl.  $\pm .004$ , unless otherwise specified.

#### Notes:

1. Case material: LTCC.
2. Termination finish: Nickel-Palladium-Gold plating.



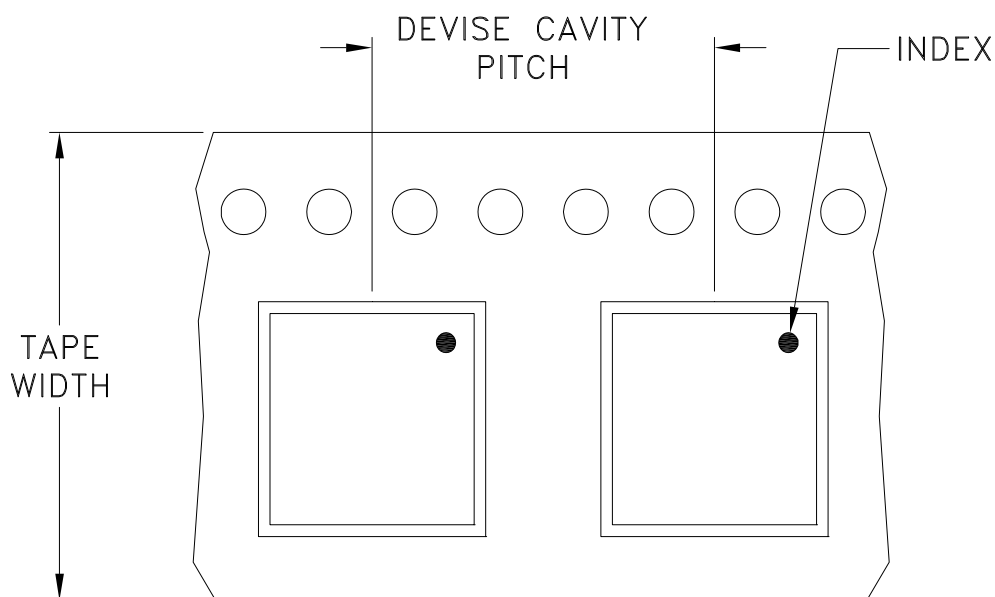
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F66-1



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

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)



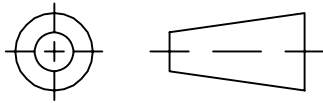
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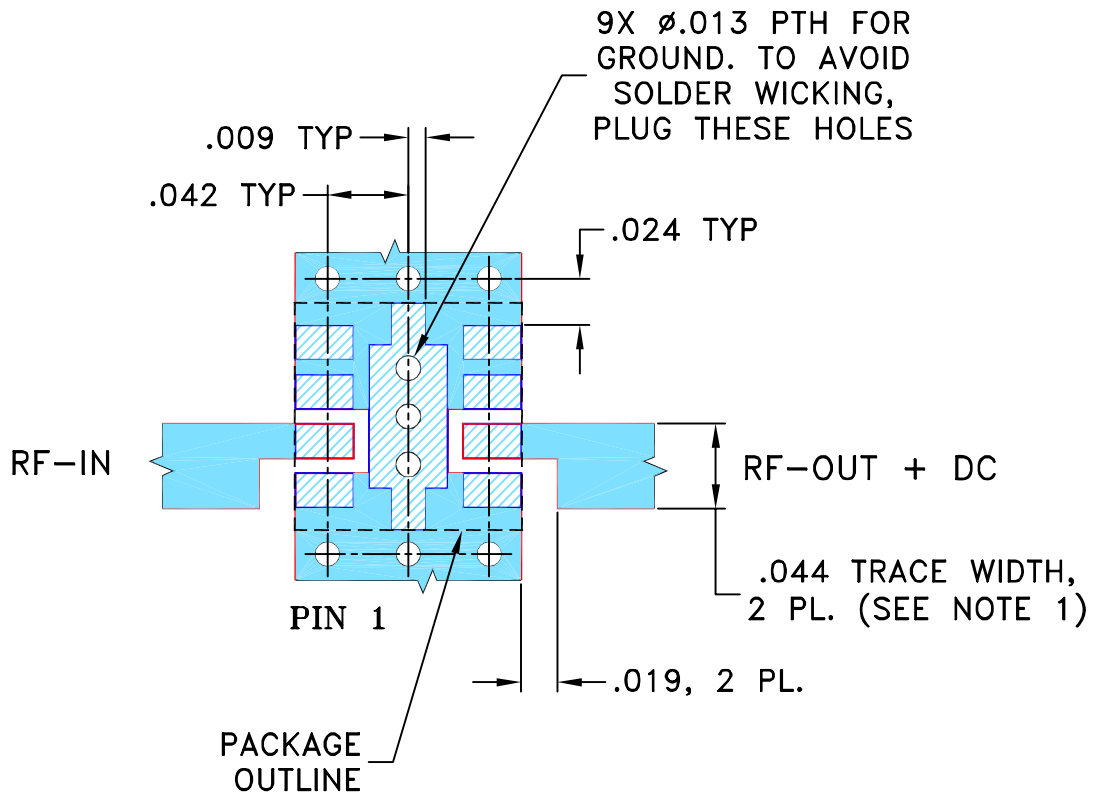
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M136376	NEW RELEASE	06/12/12	PW	DJ

SUGGESTED MOUNTING CONFIGURATION FOR DL1721 CASE STYLE, "08AM09" PIN CONNECTION



NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020" ± .0015"; 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.



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



DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES  
 TOLERANCES ON:  
 2 PL DECIMALS ±  
 3 PL DECIMALS ± .005  
 ANGLES ± 1°  
 FRACTIONS ±

	INITIALS	DATE
DRAWN	PW	05/18/12
CHECKED	IL	06/05/12
APPROVED	DJ	06/12/12



Mini-Circuits®

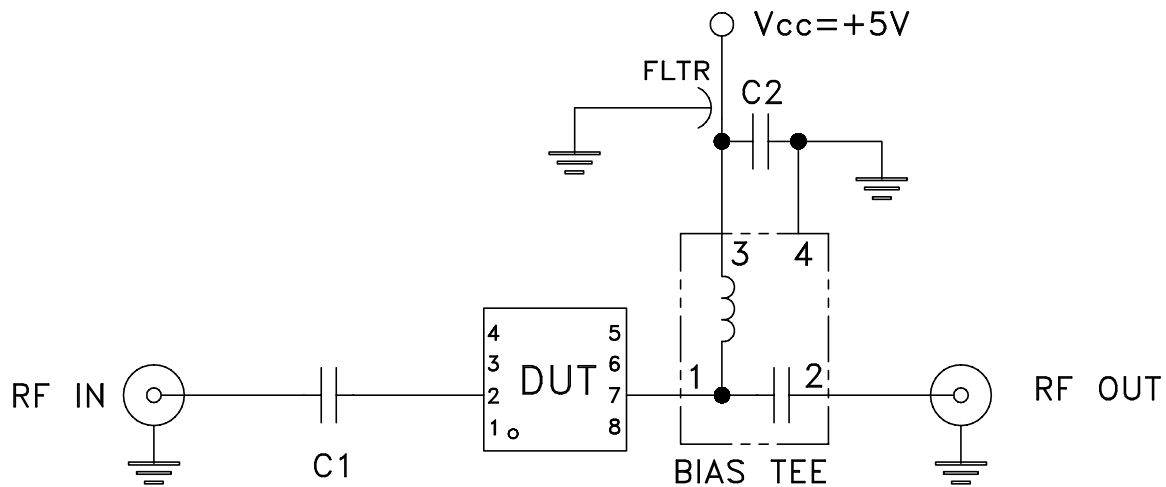
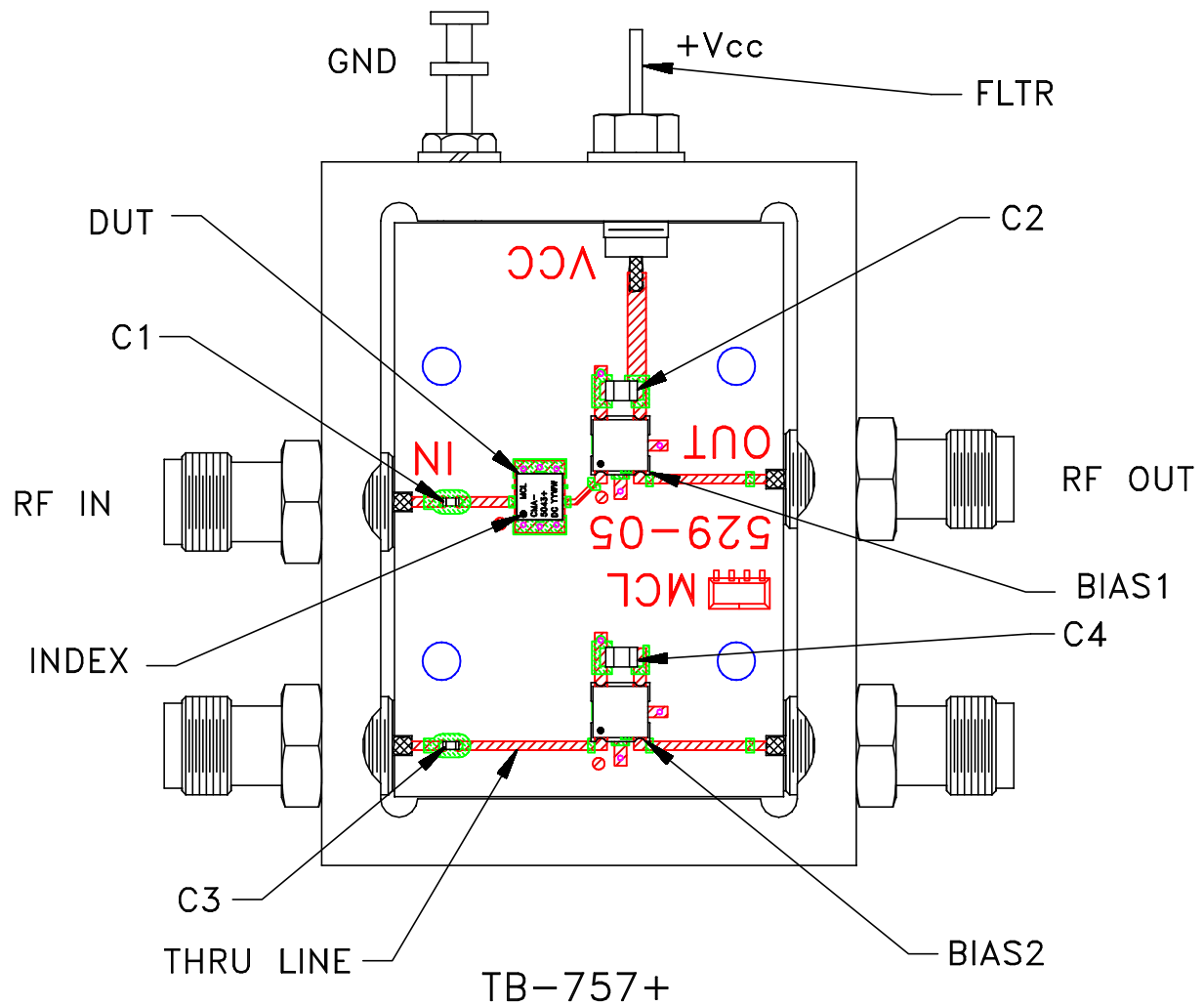
13 Neptune Avenue  
 Brooklyn NY 11235

PL, 08AM09, DL1721, CMA TB-656+

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SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-366	REV: OR
FILE: 98PL366	SCALE: 10:1	SHEET: 1 OF 1	

# Evaluation Board and Circuit




## Schematic Diagram

### Notes:

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

COMPONENT	VALUE
DUT	CMA-5043+
C1	1000 pF
C2	0.1 uF
FLTR	1500 pF
BIAS TEE	MCL BIAS-TEE TCBT-14+

 **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