



Mini-Circuits

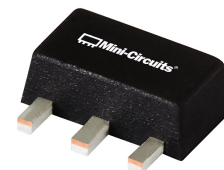
FLAT GAIN, HIGH DYNAMIC RANGE

Monolithic Amplifier **PGA-106R-75+**

75Ω 5 to 250 MHz

THE BIG DEAL

- 5V/3V operation
- High IP3, 45 dBm typ. at 2 GHz, Vd=5V
- Low Noise Figure, 0.6 at 1 GHz; 0.9 dB at 2 GHz
- Gain, 11.0 dB typ. at 2 GHz
- P1dB 22.5 dBm typ. at 2 GHz at Vd=5V
- Protected under US Patent 8,803,612



Generic photo used for illustration purposes only

CASE STYLE: DF782

+RoHS Compliant

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

APPLICATIONS

- CATV Return path

PRODUCT OVERVIEW

PGA-106R-75+ (RoHS compliant) is an advanced 75 ohm amplifier fabricated using E-PHEMT technology and offers extremely high dynamic range over a broad frequency range with low noise figure and flat gain. Lead finish is SnAgNi. It has repeatable performance from lot to lot and is enclosed in a SOT-89 package for very good thermal performance.

KEY FEATURES

Feature	Advantages
Broad Band: 5 to 250 MHz	Broadband covering CATV return path applications.
High IP3 Versus DC power Consumption: 34 dBm typical	The PGA-106R-75+ matches industry leading IP3 performance relative to device size and power consumption. The combination of the design and E-PHEMPT structure provides enhanced linearity over a broad frequency range as evidence in the IP3 being typically 15 dB above the P 1dB point. This feature makes this amplifier ideal for use in CATV applications.
High IP2, 62 dBm	Suppresses second order product on wideband applications such as CATV
Low Noise Figure: 3.3 dB at 50 - 250 MHz 6.0 dB at 10 MHz	Low noise figure performance in combination with the high output IP3 results in high dynamic range.

REV. B
ECO-011959
PGA-106R-75+
TH/RS/CP
220214





FLAT GAIN, HIGH DYNAMIC RANGE

Monolithic Amplifier **PGA-106R-75+**

ELECTRICAL SPECIFICATIONS⁽¹⁾ AT 25°C, 75Ω AND 5.0V, UNLESS NOTED OTHERWISE

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		5		250	MHz
Gain	5 - 250	16.3	17.9	19.9	dB
Gain Flatness (±)	5 - 250		0.1		dB
Input Return Loss	5 - 250		15.3		dB
Output Return Loss	5 - 250		19.0		dB
Reverse Isolation	5 - 250		23.4		dB
Output Power @ 1dB compression	5 - 250		19.5		dBm
Output IP3	5 - 250		34.4		dBm
Output IP2 ⁽²⁾	5 - 250		62.0		dBm
Noise Figure	10	—	6.0	—	dB
	50	—	3.3	—	
	250	—	3.1	—	
Device Operating Voltage (Vd)		4.8	5.0	5.2	V
Device Operating Current		—	116	132	mA
Device Current Variation vs. Temperature ⁽⁴⁾			97		μA/°C
Device Current Variation vs Voltage			0.05		mA/mV
Thermal Resistance ⁽³⁾			76		°C/W

(1) Measured on Mini-Circuits Characterization Test board TB-587+. See Characterization Test Circuit (Fig. 1)

(2) Output IP2 measured at sum frequency of the two tones ($f_{\text{meas}} = f_1 + f_2$).

(3) Junction to ground lead.

(4) (Current at 85°C - Current at -45°C)/130

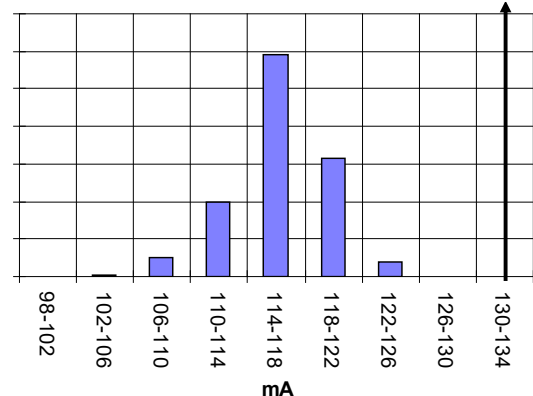
MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Operating Current at 5.0V	170 mA
Power Dissipation	0.85 W
Input Power (CW)	+23 dBm (5 minutes) +14 dBm (continuous)
DC Voltage on Pin 3	6 V

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

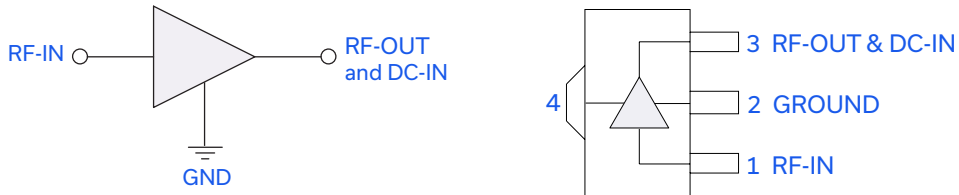
Electrical maximum ratings are not intended for continuous normal operation.

HISTOGRAM





Monolithic Amplifier

PGA-106R-75+**SIMPLIFIED SCHEMATIC AND PIN DESCRIPTION**

Function	Pin Number	Description
RF-IN	1	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
RF-OUT and DC-IN	3	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	2,4	Connections to ground. Use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance.

*Enhanced mode pseudomorphic High Electron Mobility Transistor.



FLAT GAIN, HIGH DYNAMIC RANGE

Monolithic Amplifier **PGA-106R-75+**

CHARACTERIZATION TEST CIRCUIT

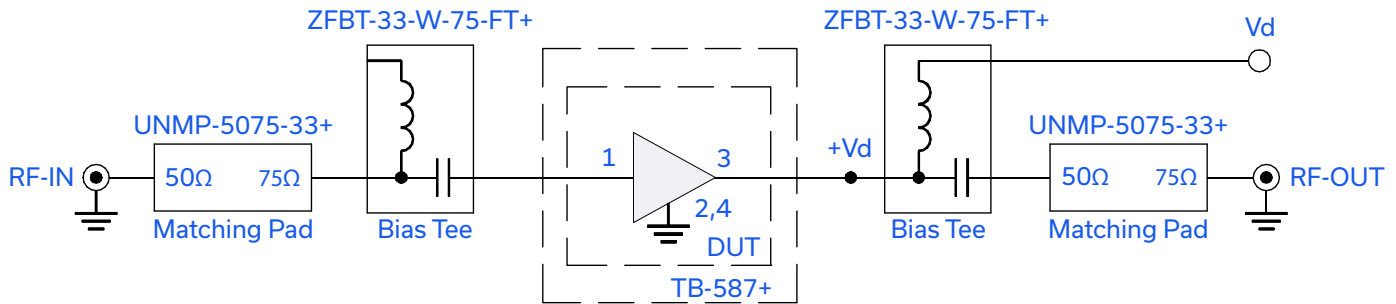


Fig 1. Block Diagram of Test Circuit used for characterization. (DUT tested on Mini-Circuits Characterization test board TB-587+)

Gain, Return loss, Output power at 1dB compression (P1 dB), output IP3 (OIP3), output IP2 (OIP2) 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, 5 dBm/tone at output.
3. Output IP2 (OIP2): Two tones, spaced 1 MHz apart, 5 dBm/tone at output.

RECOMMENDED APPLICATION CIRCUIT

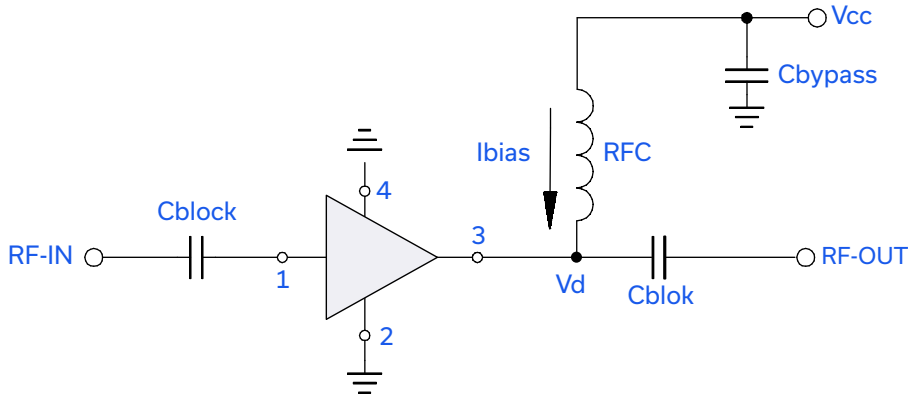
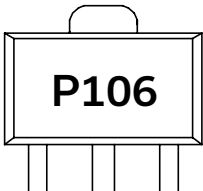


Fig 2. Evaluation board includes case, connectors, and components soldered to PCB

PRODUCT MARKING



Marking may contain other features or characters for internal lot control



Mini-Circuits®

FLAT GAIN, HIGH DYNAMIC RANGE

Monolithic Amplifier

PGA-106R-75+

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

Performance Data	Data Table
	Swept Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DF782 (SOT 89) Plastic package, exposed paddle lead finish: tin-silver over nickel
Tape & Reel Standard quantities available on reel	F55 7" reels with 20, 50, 100, 200, 500 or 1K devices
Suggested Layout for PCB Design	PL-384
Evaluation Board	TB-699+
Environmental Ratings	ENV08T1

ESD RATING

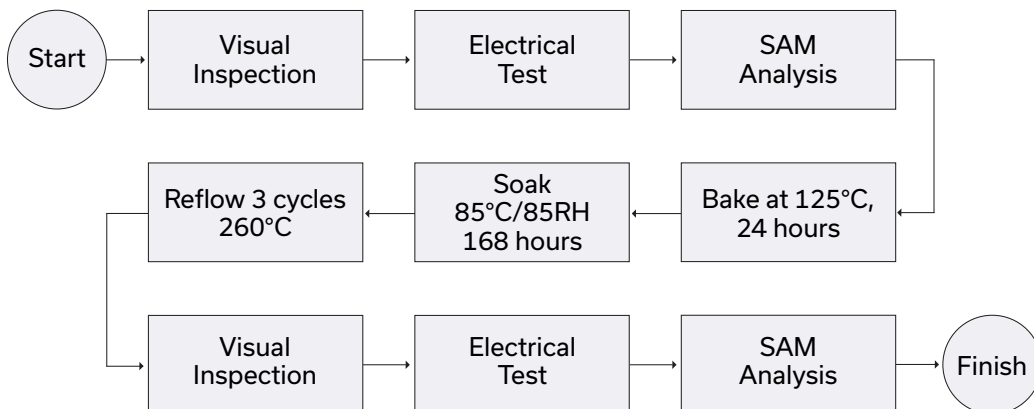
Human Body Model (HBM): Class 1B (500<1000) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class class M1 (50V) in accordance with ANSI/ESD STM5.2-1999

MSL RATING

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

MSL TEST FLOW CHART



NOTES

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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



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 = 116.51mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
2.0	17.94	23.68	17.08	20.59	1.21	0.73	37.37	19.93	--
3.0	17.95	23.77	16.79	21.81	1.22	0.74	36.73	20.09	--
4.0	17.94	23.73	16.87	21.96	1.22	0.74	36.25	20.14	--
5.0	17.94	23.77	16.83	22.05	1.22	0.74	35.35	19.92	--
6.0	17.96	23.69	16.90	21.94	1.21	0.73	34.82	19.87	--
7.0	17.96	23.65	16.87	22.06	1.21	0.73	34.62	19.84	--
8.0	17.96	23.66	16.87	21.96	1.21	0.73	34.41	19.71	--
9.0	17.96	23.64	16.91	21.76	1.21	0.73	34.25	19.70	--
10.0	17.98	23.69	16.85	22.01	1.21	0.73	34.42	19.51	5.44
20.0	18.00	23.70	16.85	21.97	1.21	0.73	35.10	19.41	3.98
30.0	18.00	23.65	16.78	22.08	1.20	0.73	37.61	19.85	3.25
40.0	18.04	23.62	16.80	22.26	1.20	0.73	42.96	19.93	3.16
50.0	18.05	23.60	16.76	22.26	1.20	0.72	38.88	20.02	3.03
60.0	18.05	23.64	16.79	22.48	1.20	0.73	38.70	20.12	3.03
80.0	18.07	23.58	16.85	22.21	1.19	0.72	38.61	19.99	3.19
90.0	18.06	23.63	16.84	22.34	1.20	0.73	38.36	19.86	3.04
100.0	18.07	23.60	16.92	22.30	1.20	0.72	37.81	19.77	2.93
120.0	18.08	23.60	16.96	22.51	1.20	0.72	37.60	19.73	2.93
140.0	18.05	23.61	16.57	21.68	1.20	0.73	38.16	19.99	2.94
150.0	18.06	23.59	16.59	21.78	1.19	0.72	37.87	19.94	2.99
180.0	18.11	23.61	16.31	21.19	1.19	0.72	37.72	19.62	3.09
200.0	18.12	23.57	16.30	21.20	1.19	0.72	38.07	19.74	3.09
210.0	18.08	23.64	16.32	21.14	1.19	0.72	37.87	19.91	3.05
220.0	18.06	23.50	16.26	20.95	1.19	0.72	38.05	19.81	3.00
230.0	18.09	23.56	16.40	20.96	1.19	0.72	38.34	19.75	2.97
240.0	18.07	23.61	16.61	20.99	1.19	0.72	37.97	19.61	3.03
250.0	18.06	23.54	16.52	21.02	1.19	0.72	37.58	19.53	3.10
300.0	18.06	23.58	16.33	20.92	1.19	0.72	37.66	19.68	3.10
350.0	18.07	23.53	15.64	20.68	1.18	0.72	37.49	19.79	3.16
400.0	18.01	23.56	15.46	19.83	1.19	0.73	37.79	19.69	3.43

*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 = 105.17mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
2.0	17.95	23.82	16.94	20.40	1.22	0.74	38.09	19.77	--
3.0	17.92	23.75	16.70	21.66	1.22	0.74	37.34	20.00	--
4.0	17.92	23.76	16.75	21.87	1.22	0.74	36.09	19.91	--
5.0	17.91	23.75	16.78	21.79	1.22	0.74	35.93	19.85	--
6.0	17.93	23.76	16.73	21.82	1.22	0.74	34.94	19.78	--
7.0	17.93	23.67	16.73	21.87	1.21	0.74	34.79	19.79	--
8.0	17.95	23.66	16.78	21.72	1.21	0.73	34.62	19.65	--
9.0	17.94	23.68	16.80	21.95	1.21	0.74	34.70	19.68	--
10.0	17.97	23.71	16.73	21.47	1.21	0.73	34.90	19.53	5.69
20.0	17.96	23.66	16.74	21.78	1.21	0.73	35.42	19.38	3.93
30.0	17.99	23.65	16.67	21.83	1.21	0.73	38.05	19.77	3.18
40.0	18.03	23.62	16.63	22.04	1.20	0.73	51.15	19.92	3.11
50.0	18.05	23.57	16.66	22.16	1.19	0.72	40.10	19.89	2.94
60.0	18.02	23.59	16.76	22.23	1.20	0.73	39.53	20.01	2.94
80.0	18.04	23.59	16.72	22.22	1.20	0.72	39.14	19.94	3.14
90.0	18.04	23.58	16.71	21.96	1.20	0.72	39.82	19.83	2.96
100.0	18.05	23.56	16.77	22.15	1.19	0.72	38.92	19.62	2.89
120.0	18.03	23.56	16.73	21.80	1.19	0.72	38.86	19.66	2.89
140.0	18.04	23.56	16.73	21.99	1.19	0.72	38.89	19.81	2.88
150.0	18.02	23.52	16.62	21.55	1.19	0.72	39.12	19.76	2.90
180.0	18.06	23.51	16.22	21.49	1.19	0.72	38.77	19.54	3.23
200.0	18.01	23.55	16.31	20.57	1.19	0.72	38.85	19.57	3.23
210.0	18.07	23.49	16.04	21.10	1.18	0.72	39.23	19.80	3.05
220.0	18.09	23.51	16.22	21.04	1.18	0.72	39.18	19.69	2.95
230.0	18.10	23.58	16.03	20.91	1.19	0.72	39.21	19.71	2.96
240.0	18.07	23.47	16.23	20.83	1.18	0.71	38.74	19.50	2.97
250.0	18.11	23.54	16.46	21.01	1.19	0.71	38.60	19.50	3.04
300.0	18.04	23.57	16.20	21.05	1.19	0.72	39.13	19.59	3.04
350.0	18.06	23.61	15.60	20.39	1.19	0.73	38.49	19.72	3.12
400.0	18.03	23.57	15.41	20.26	1.19	0.73	38.97	19.56	3.35

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 = 127.91mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
2.0	18.06	23.48	17.06	20.18	1.19	0.71	35.27	19.74	--
3.0	17.97	23.71	17.02	21.54	1.21	0.73	35.06	20.00	--
4.0	17.97	23.74	16.97	21.94	1.21	0.74	34.69	20.14	--
5.0	17.94	23.71	17.03	22.06	1.21	0.74	34.08	19.83	--
6.0	17.96	23.72	16.98	21.85	1.21	0.74	33.74	19.79	--
7.0	17.96	23.77	16.99	22.14	1.22	0.74	33.53	19.78	--
8.0	17.96	23.62	17.05	22.05	1.21	0.73	33.54	19.73	--
9.0	17.98	23.66	16.99	21.99	1.21	0.73	33.38	19.66	--
10.0	18.00	23.65	17.00	21.76	1.20	0.73	33.26	19.51	6.09
20.0	18.02	23.64	16.92	22.11	1.20	0.73	33.90	19.34	4.19
30.0	18.03	23.66	16.85	21.97	1.20	0.73	35.98	19.91	3.40
40.0	18.04	23.65	16.87	22.36	1.20	0.73	38.24	20.01	3.27
50.0	18.07	23.59	16.87	22.42	1.20	0.72	36.26	20.06	3.13
60.0	18.08	23.60	16.86	22.43	1.20	0.72	36.02	20.08	3.13
80.0	18.06	23.60	16.94	22.35	1.20	0.72	36.13	20.04	3.28
90.0	18.08	23.59	16.89	22.35	1.19	0.72	35.79	19.87	3.10
100.0	18.08	23.63	16.96	22.41	1.20	0.72	35.40	19.70	3.02
120.0	18.09	23.56	17.06	22.43	1.19	0.72	35.42	19.71	3.02
140.0	18.08	23.56	16.74	21.86	1.19	0.72	35.71	19.97	3.01
150.0	18.06	23.51	16.70	21.32	1.19	0.72	35.58	19.99	3.04
180.0	18.08	23.56	16.57	21.32	1.19	0.72	35.14	19.57	3.36
200.0	18.09	23.55	16.45	21.18	1.19	0.72	35.51	19.76	3.36
210.0	18.06	23.58	16.32	21.42	1.19	0.72	35.64	19.90	3.18
220.0	18.12	23.50	16.23	20.84	1.18	0.71	35.54	19.83	3.10
230.0	18.07	23.54	16.37	21.10	1.19	0.72	35.30	19.71	3.07
240.0	18.09	23.63	16.54	20.99	1.19	0.72	35.28	19.65	3.13
250.0	18.07	23.52	16.52	21.34	1.19	0.72	35.07	19.64	3.21
300.0	18.08	23.53	16.51	21.38	1.19	0.72	35.41	19.79	3.21
350.0	18.08	23.55	15.89	20.79	1.18	0.72	35.72	19.89	3.22
400.0	18.02	23.56	15.40	19.97	1.19	0.72	35.22	19.60	3.47

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= 107.31mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
2.0	18.05	23.63	16.57	19.51	1.20	0.72	39.49	20.44	--
3.0	18.04	23.75	16.63	20.55	1.21	0.73	38.34	20.65	--
4.0	18.01	23.71	16.67	20.74	1.21	0.73	37.48	20.65	--
5.0	18.02	23.69	16.56	20.83	1.20	0.73	36.48	20.44	--
6.0	18.01	23.70	16.51	21.13	1.21	0.73	35.94	20.39	--
7.0	18.02	23.75	16.44	21.18	1.21	0.73	35.84	20.32	--
8.0	18.01	23.69	16.46	21.27	1.21	0.73	35.82	20.28	--
9.0	18.03	23.68	16.48	21.37	1.20	0.73	35.58	20.10	--
10.0	18.04	23.72	16.51	21.13	1.21	0.73	35.62	20.02	6.68
20.0	18.05	23.66	16.42	21.09	1.20	0.73	36.59	20.01	4.04
30.0	18.10	23.67	16.29	20.77	1.20	0.72	37.70	20.36	2.89
40.0	18.12	23.63	16.14	20.91	1.19	0.72	40.98	20.44	2.39
50.0	18.13	23.59	15.97	20.45	1.19	0.72	49.69	20.51	2.15
60.0	18.12	23.59	15.90	20.28	1.19	0.72	44.00	20.62	2.15
80.0	18.16	23.58	15.71	20.15	1.18	0.71	44.98	20.48	2.17
90.0	18.15	23.57	15.65	20.11	1.18	0.71	42.72	20.41	1.94
100.0	18.16	23.58	15.65	20.01	1.18	0.71	44.92	20.26	1.87
120.0	18.17	23.53	15.77	20.28	1.18	0.71	43.96	20.25	1.87
140.0	18.15	23.51	16.03	20.40	1.18	0.71	43.77	20.49	1.87
150.0	18.21	23.51	16.03	20.90	1.18	0.71	42.06	20.48	1.84
180.0	18.17	23.55	16.57	21.34	1.18	0.71	42.72	20.10	2.23
200.0	18.15	23.51	16.72	21.81	1.18	0.71	42.21	20.28	2.23
210.0	18.19	23.48	16.76	21.83	1.18	0.71	43.17	20.43	1.97
220.0	18.22	23.50	16.78	21.96	1.18	0.71	42.18	20.29	1.92
230.0	18.19	23.49	16.92	21.72	1.18	0.71	41.79	20.27	1.92
240.0	18.15	23.51	16.95	21.69	1.18	0.71	41.78	20.13	1.95
250.0	18.13	23.47	17.04	21.45	1.18	0.71	41.65	20.20	2.00
300.0	18.21	23.48	16.57	21.04	1.17	0.71	40.53	20.27	2.00
350.0	18.12	23.53	15.83	20.69	1.18	0.72	40.58	20.40	2.14
400.0	18.18	23.46	15.84	20.67	1.17	0.71	40.73	20.31	2.16

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 = 4.75V, Id = 95.72mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
2.0	18.01	23.58	16.43	19.22	1.20	0.72	39.18	20.19	--
3.0	17.96	23.69	16.41	20.14	1.21	0.73	38.14	20.34	--
4.0	17.95	23.68	16.52	20.23	1.21	0.73	37.20	20.31	--
5.0	17.96	23.70	16.43	20.28	1.21	0.73	36.46	20.16	--
6.0	17.95	23.65	16.30	20.66	1.21	0.73	35.53	20.17	--
7.0	17.94	23.75	16.33	20.83	1.22	0.74	35.49	20.08	--
8.0	17.96	23.65	16.32	20.73	1.21	0.73	35.34	19.99	--
9.0	17.97	23.71	16.30	20.68	1.21	0.73	35.46	19.98	--
10.0	17.96	23.68	16.26	20.63	1.21	0.73	35.34	19.76	6.48
20.0	18.02	23.62	16.17	20.65	1.20	0.73	36.22	19.76	3.76
30.0	18.05	23.54	16.02	20.34	1.19	0.72	37.70	20.07	2.54
40.0	18.06	23.58	15.93	20.34	1.19	0.72	41.57	20.27	2.24
50.0	18.06	23.58	15.72	20.10	1.19	0.72	43.56	20.25	2.01
60.0	18.07	23.56	15.64	19.95	1.19	0.72	42.30	20.32	2.01
80.0	18.07	23.54	15.53	19.62	1.19	0.71	42.00	20.33	2.07
90.0	18.09	23.56	15.43	19.57	1.19	0.71	42.13	20.12	1.84
100.0	18.10	23.55	15.49	19.73	1.18	0.71	41.67	20.02	1.76
120.0	18.09	23.52	15.70	20.05	1.18	0.71	42.17	20.02	1.76
140.0	18.15	23.49	15.73	20.08	1.18	0.71	41.87	20.16	1.82
150.0	18.11	23.48	15.90	20.34	1.18	0.71	42.71	20.17	1.84
180.0	18.10	23.46	16.35	21.17	1.18	0.71	41.26	19.89	2.16
200.0	18.12	23.47	16.61	21.49	1.18	0.71	42.13	20.02	2.16
210.0	18.13	23.47	16.55	21.12	1.18	0.71	40.63	20.16	1.96
220.0	18.13	23.45	16.72	20.82	1.18	0.71	40.53	19.96	1.88
230.0	18.12	23.47	16.63	20.81	1.18	0.71	41.99	19.99	1.87
240.0	18.10	23.51	16.76	20.93	1.19	0.71	40.73	19.88	1.88
250.0	18.08	23.49	16.87	21.37	1.19	0.71	41.07	19.89	2.00
300.0	18.15	23.44	16.16	20.77	1.17	0.71	41.63	19.96	2.00
350.0	18.12	23.49	15.66	20.40	1.18	0.71	40.35	20.11	2.05
400.0	18.12	23.36	15.54	20.15	1.17	0.71	41.35	19.97	2.16

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 = 5.25V, Id = 119.78mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
2.0	18.04	23.86	17.04	20.30	1.22	0.73	39.97	20.57	--
3.0	18.05	23.78	16.83	20.85	1.21	0.73	39.08	20.71	--
4.0	18.07	23.76	16.82	21.09	1.21	0.73	37.32	20.75	--
5.0	18.07	23.64	16.82	21.25	1.20	0.72	36.93	20.63	--
6.0	18.06	23.77	16.76	21.43	1.21	0.73	35.93	20.60	--
7.0	18.06	23.75	16.70	21.56	1.21	0.73	35.98	20.46	--
8.0	18.04	23.71	16.73	21.72	1.21	0.73	36.12	20.46	--
9.0	18.07	23.77	16.74	21.48	1.21	0.73	35.95	20.27	--
10.0	18.09	23.72	16.73	21.55	1.20	0.73	35.77	20.10	6.87
20.0	18.12	23.69	16.58	21.52	1.20	0.72	36.51	20.09	4.21
30.0	18.15	23.67	16.44	21.29	1.19	0.72	37.52	20.42	3.08
40.0	18.18	23.67	16.29	21.13	1.19	0.72	41.14	20.63	2.59
50.0	18.17	23.65	16.21	20.96	1.19	0.72	46.68	20.63	2.32
60.0	18.17	23.64	15.99	20.82	1.19	0.72	44.65	20.77	2.32
80.0	18.19	23.60	15.85	20.48	1.18	0.71	44.17	20.64	2.30
90.0	18.20	23.59	15.80	20.38	1.18	0.71	44.89	20.48	2.06
100.0	18.23	23.59	15.86	20.45	1.18	0.71	43.37	20.37	1.93
120.0	18.20	23.66	15.96	20.65	1.19	0.72	43.24	20.40	1.93
140.0	18.21	23.60	16.16	21.12	1.18	0.71	42.95	20.63	1.95
150.0	18.23	23.63	16.27	21.44	1.18	0.71	43.07	20.63	1.95
180.0	18.22	23.63	16.67	22.00	1.19	0.71	42.64	20.27	2.27
200.0	18.23	23.49	16.81	22.19	1.18	0.70	42.48	20.42	2.27
210.0	18.24	23.58	16.97	22.03	1.18	0.71	43.31	20.56	2.07
220.0	18.25	23.50	17.14	22.10	1.18	0.70	41.70	20.50	2.02
230.0	18.19	23.62	17.23	22.44	1.19	0.72	41.16	20.45	1.97
240.0	18.23	23.51	17.14	21.90	1.18	0.70	42.34	20.29	2.00
250.0	18.23	23.51	17.32	22.36	1.18	0.71	41.81	20.20	2.09
300.0	18.25	23.42	16.80	21.57	1.17	0.70	40.70	20.41	2.09
350.0	18.22	23.57	16.08	21.42	1.18	0.71	41.65	20.59	2.18
400.0	18.27	23.52	15.86	20.71	1.17	0.71	41.06	20.43	2.24

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 = 5.00V, Id = 120.88mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
2.0	17.87	23.38	16.62	18.92	1.19	0.71	31.74	19.38	--
3.0	17.81	23.56	16.71	19.99	1.21	0.73	31.89	19.46	--
4.0	17.79	23.55	16.75	20.05	1.21	0.73	31.75	19.43	--
5.0	17.76	23.52	16.59	20.73	1.21	0.73	31.47	19.26	--
6.0	17.76	23.58	16.60	20.76	1.22	0.74	31.08	19.05	--
7.0	17.78	23.55	16.56	20.74	1.21	0.73	31.10	19.02	--
8.0	17.77	23.53	16.62	20.66	1.21	0.73	30.95	18.96	--
9.0	17.77	23.58	16.60	20.73	1.22	0.74	30.91	18.99	--
10.0	17.76	23.54	16.58	20.73	1.21	0.74	30.81	18.81	6.90
20.0	17.80	23.49	16.56	20.81	1.21	0.73	31.29	18.60	4.88
30.0	17.80	23.53	16.58	20.97	1.21	0.73	32.38	19.11	4.17
40.0	17.82	23.52	16.67	21.50	1.21	0.73	32.97	19.35	4.02
50.0	17.83	23.54	16.70	21.70	1.21	0.73	32.53	19.39	3.89
60.0	17.84	23.49	16.89	21.97	1.21	0.73	32.50	19.44	3.89
80.0	17.84	23.47	17.05	22.49	1.20	0.73	32.27	19.46	4.12
90.0	17.85	23.45	17.17	22.54	1.20	0.73	32.06	19.21	3.90
100.0	17.85	23.45	17.22	22.65	1.20	0.73	31.80	19.13	3.79
120.0	17.87	23.45	17.23	22.48	1.20	0.73	31.65	19.09	3.79
140.0	17.86	23.47	16.83	21.56	1.20	0.73	32.10	19.30	3.83
150.0	17.83	23.40	16.66	21.09	1.20	0.73	32.07	19.24	3.83
180.0	17.86	23.44	16.04	19.58	1.19	0.72	31.50	18.98	4.14
200.0	17.86	23.52	15.80	19.25	1.20	0.73	31.91	19.09	4.14
210.0	17.83	23.45	15.72	19.11	1.20	0.72	32.12	19.30	4.00
220.0	17.86	23.49	15.57	18.98	1.20	0.72	32.16	19.16	3.90
230.0	17.84	23.49	15.50	18.82	1.20	0.72	31.78	19.02	3.85
240.0	17.85	23.39	15.61	19.24	1.19	0.72	31.72	18.93	3.95
250.0	17.82	23.45	15.66	19.18	1.20	0.72	31.55	18.95	4.06
300.0	17.83	23.49	15.84	20.36	1.20	0.73	31.84	19.02	4.06
350.0	17.81	23.56	15.52	20.15	1.20	0.74	32.24	19.21	4.09
400.0	17.81	23.39	15.13	19.05	1.19	0.72	31.95	18.95	4.30

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 = 109.89mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
2.0	17.81	23.59	16.62	19.31	1.21	0.73	33.71	19.21	--
3.0	17.78	23.60	16.57	20.09	1.22	0.74	33.68	19.34	--
4.0	17.77	23.54	16.60	20.24	1.21	0.73	33.48	19.36	--
5.0	17.73	23.55	16.48	20.66	1.22	0.74	33.01	19.20	--
6.0	17.75	23.60	16.40	20.89	1.22	0.74	32.53	19.29	--
7.0	17.74	23.61	16.44	20.74	1.22	0.74	32.41	19.17	--
8.0	17.74	23.61	16.42	20.80	1.22	0.74	32.38	19.11	--
9.0	17.77	23.56	16.45	20.73	1.21	0.74	32.32	19.06	--
10.0	17.76	23.60	16.49	20.63	1.22	0.74	32.28	18.83	6.77
20.0	17.79	23.60	16.33	21.01	1.22	0.74	32.79	18.86	4.76
30.0	17.80	23.57	16.45	20.99	1.21	0.74	34.26	19.05	4.02
40.0	17.81	23.53	16.53	21.50	1.21	0.73	35.32	19.24	3.91
50.0	17.81	23.52	16.59	21.72	1.21	0.73	34.67	19.32	3.81
60.0	17.82	23.53	16.66	22.03	1.21	0.73	34.47	19.42	3.81
80.0	17.84	23.49	16.88	22.53	1.20	0.73	34.27	19.33	4.05
90.0	17.84	23.51	17.00	22.55	1.21	0.73	34.10	19.16	3.85
100.0	17.85	23.49	17.11	22.55	1.20	0.73	33.78	19.10	3.76
120.0	17.78	23.48	17.20	21.81	1.21	0.73	33.90	19.03	3.76
140.0	17.81	23.48	16.77	21.87	1.20	0.73	34.13	19.28	3.74
150.0	17.85	23.50	16.46	20.86	1.20	0.73	34.02	19.31	3.79
180.0	17.82	23.46	15.94	19.76	1.20	0.73	33.61	18.91	4.09
200.0	17.83	23.49	15.72	19.33	1.20	0.73	33.97	19.03	4.09
210.0	17.88	23.44	15.62	19.06	1.19	0.72	34.02	19.20	3.90
220.0	17.79	23.45	15.64	19.03	1.20	0.73	34.01	19.12	3.88
230.0	17.78	23.47	15.52	19.02	1.20	0.73	33.85	19.00	3.81
240.0	17.82	23.44	15.60	19.11	1.20	0.72	33.78	18.89	3.87
250.0	17.86	23.53	15.74	19.39	1.20	0.73	33.71	18.92	3.94
300.0	17.86	23.47	15.72	19.95	1.20	0.73	33.83	19.01	3.94
350.0	17.75	23.46	15.38	20.27	1.20	0.74	34.15	19.19	4.04
400.0	17.75	23.37	15.13	18.96	1.19	0.73	34.07	19.05	4.09

Typical Performance Data

Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

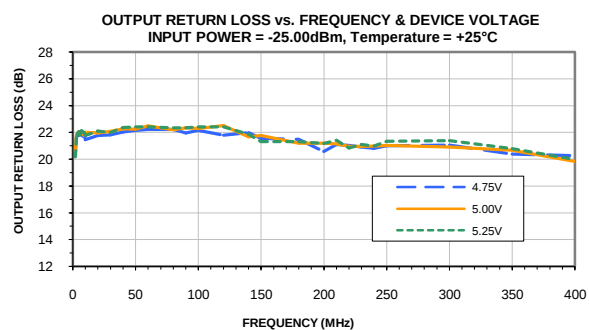
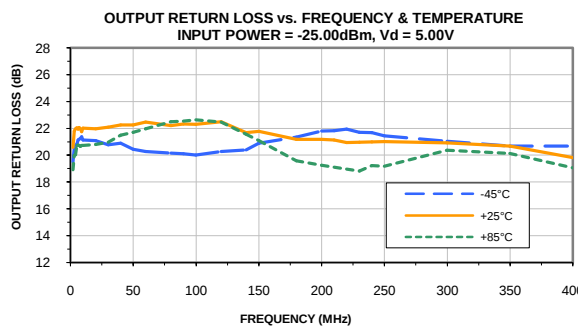
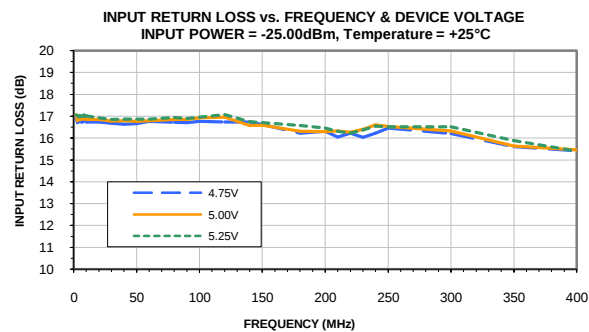
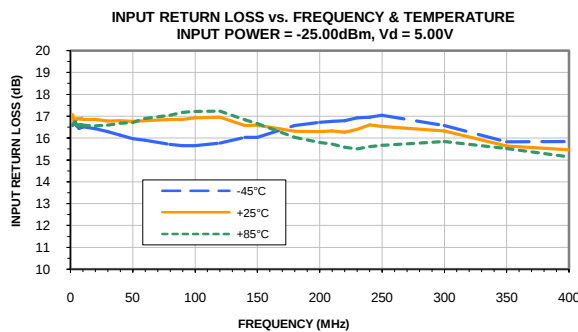
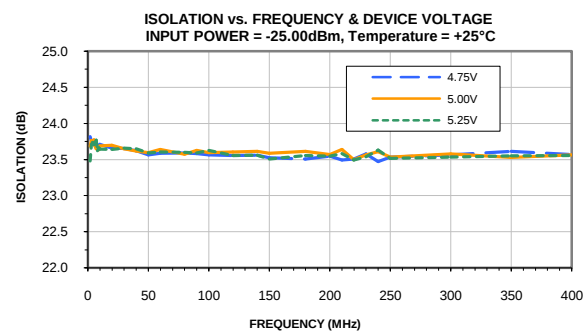
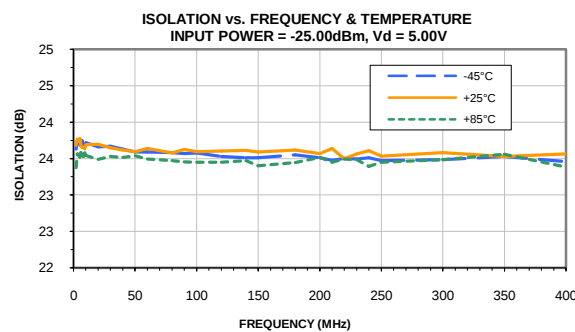
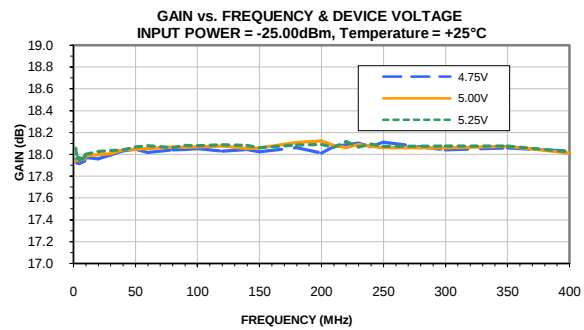
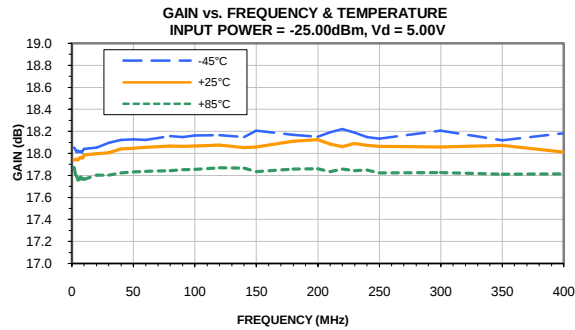
Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

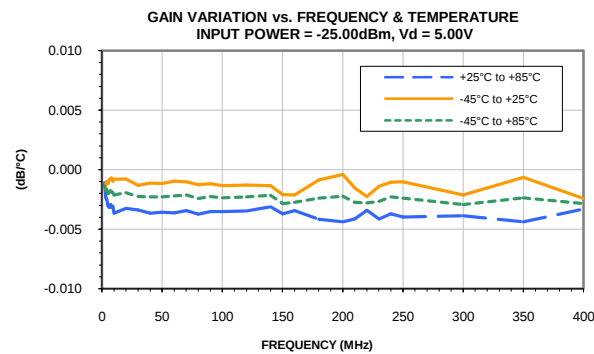
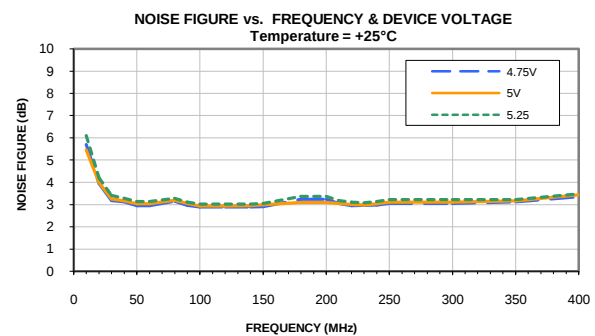
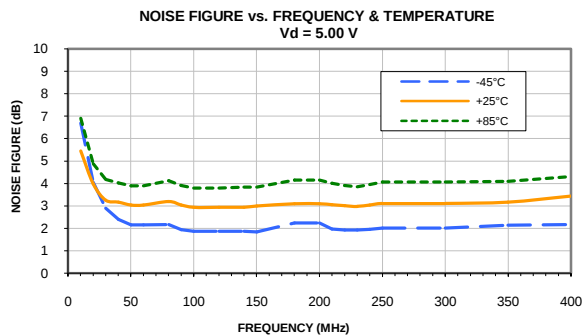
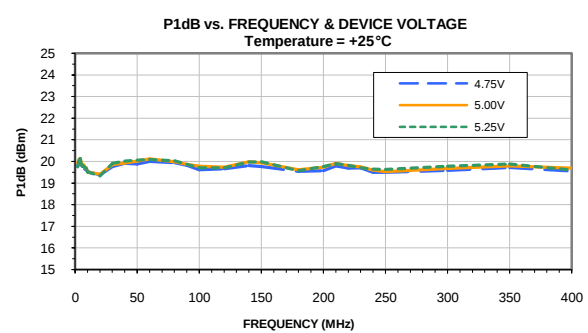
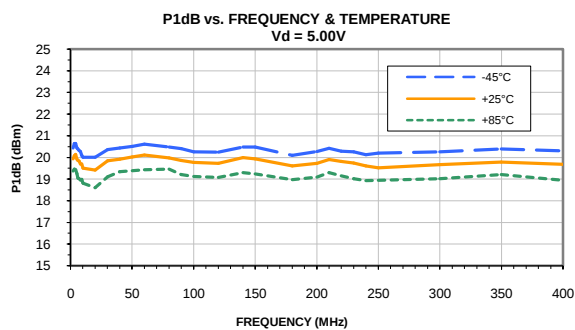
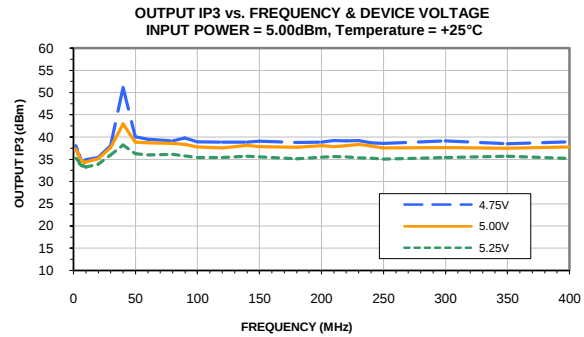
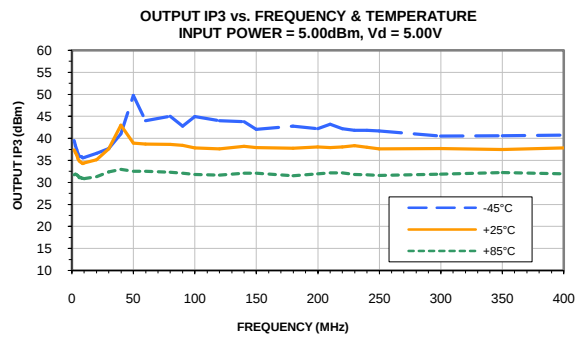
TEST CONDITIONS: Vd = 5.25V, Id= 131.51mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
2.0	17.78	23.39	16.57	19.00	1.20	0.72	29.38	18.61	--
3.0	17.72	23.57	16.65	20.11	1.22	0.74	29.68	18.72	--
4.0	17.70	23.59	16.66	20.19	1.22	0.74	29.57	19.09	--
5.0	17.68	23.54	16.59	20.59	1.22	0.74	29.35	18.78	--
6.0	17.68	23.57	16.44	20.82	1.22	0.74	29.16	18.66	--
7.0	17.66	23.61	16.53	20.72	1.23	0.75	29.04	18.50	--
8.0	17.66	23.58	16.54	20.70	1.22	0.74	28.99	18.71	--
9.0	17.67	23.62	16.50	20.75	1.23	0.75	29.02	18.36	--
10.0	17.68	23.58	16.53	20.78	1.22	0.74	28.91	18.35	7.13
20.0	17.70	23.60	16.44	21.02	1.22	0.74	29.17	18.14	5.11
30.0	17.71	23.57	16.54	21.08	1.22	0.74	29.68	18.72	4.35
40.0	17.72	23.54	16.58	21.42	1.22	0.74	30.05	19.05	4.20
50.0	17.71	23.60	16.66	21.81	1.22	0.74	29.93	18.79	4.02
60.0	17.73	23.52	16.80	22.16	1.22	0.74	29.96	19.06	4.02
80.0	17.74	23.49	16.93	22.79	1.21	0.74	29.85	19.01	4.28
90.0	17.75	23.48	17.04	22.84	1.21	0.74	29.51	18.91	4.03
100.0	17.75	23.50	17.10	22.73	1.21	0.74	29.24	18.75	3.91
120.0	17.73	23.53	17.23	22.29	1.22	0.74	29.07	18.72	3.91
140.0	17.72	23.55	16.85	21.95	1.22	0.74	29.50	18.96	3.96
150.0	17.69	23.52	16.46	21.01	1.22	0.74	29.47	19.04	3.96
180.0	17.76	23.51	15.87	19.97	1.21	0.74	28.95	18.59	4.26
200.0	17.78	23.44	15.79	19.46	1.20	0.73	29.36	18.73	4.26
210.0	17.75	23.53	15.54	19.03	1.21	0.73	29.59	18.93	4.12
220.0	17.74	23.50	15.46	18.94	1.21	0.73	29.50	18.84	4.05
230.0	17.76	23.48	15.41	19.29	1.20	0.73	29.29	18.76	4.02
240.0	17.69	23.44	15.63	19.22	1.21	0.73	29.13	18.68	4.06
250.0	17.70	23.51	15.71	19.57	1.21	0.74	29.07	18.56	4.12
300.0	17.69	23.50	15.74	19.80	1.21	0.74	29.33	18.78	4.12
350.0	17.72	23.52	15.52	20.64	1.21	0.74	29.73	18.90	4.26
400.0	17.69	23.52	15.07	19.05	1.21	0.74	29.49	18.69	4.43

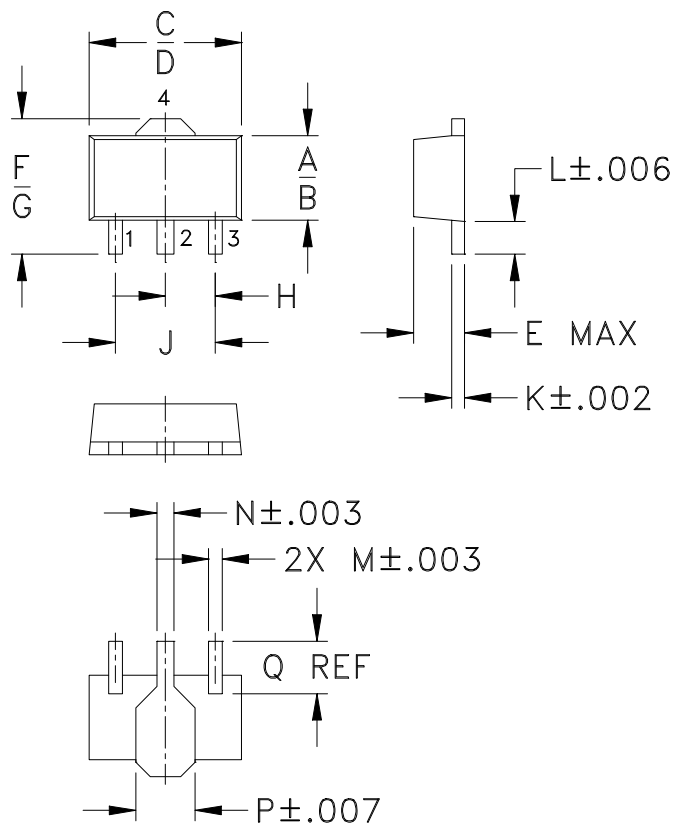
Typical Performance Curves



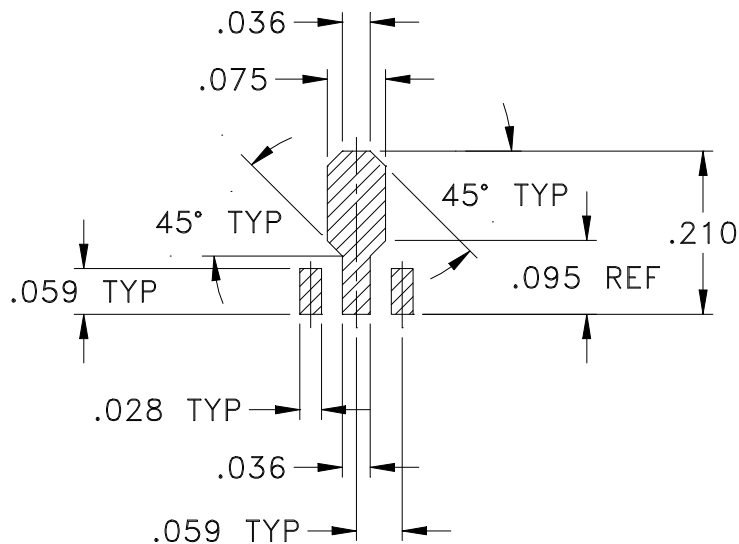
Typical Performance Curves



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
DF782	.102 (2.59)	.090 (2.29)	.181 (4.60)	.173 (4.39)	.063 (1.60)	.167 (4.24)	.155 (3.94)	.059 (1.50)	.118 (3.00)	.015 (0.38)	.041 (1.04)	.016 (0.41)

CASE #	N	P	Q	WT. GRAM
DF782	.019 (0.48)	.065 (1.65)	.062 (1.57)	.2

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

Notes:

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



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

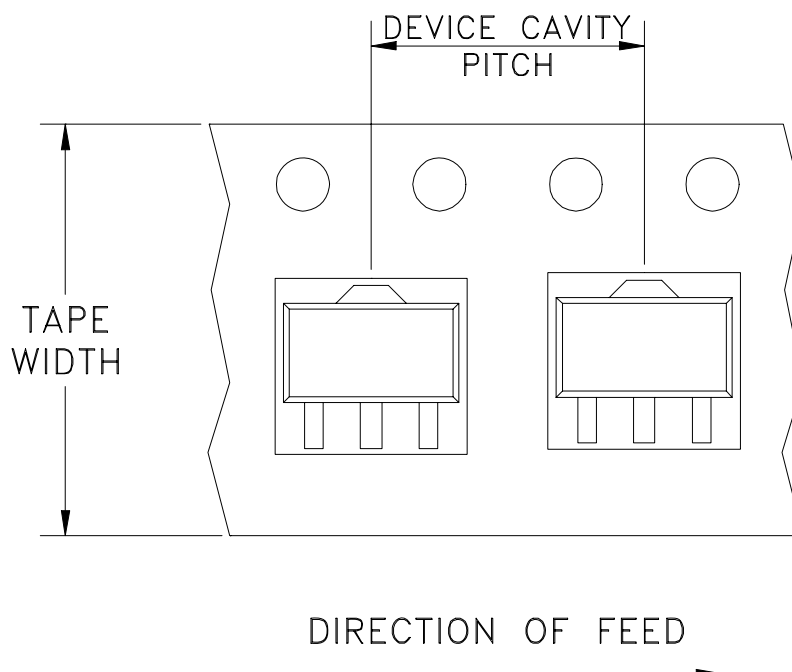
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

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Tape & Reel Packaging TR-F55

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
12	8	7	Small quantity standard (see note)	20
				50
				100
				200
				500
			Standard	1000

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.

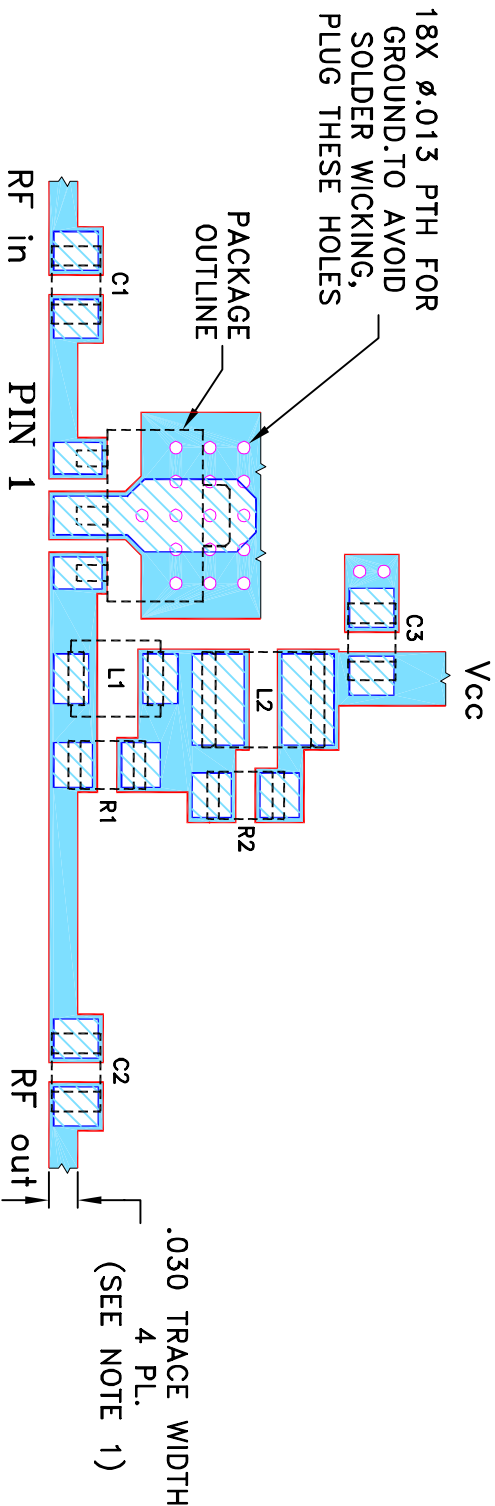
Go to: www.minicircuits.com/pages/pdfs/tape.pdf



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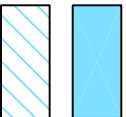
SUGGESTED MOUNTING CONFIGURATION
FOR DF782 CASE STYLE, "04AM03" PIN CODE

REVISIONS				
REV	ECN No.	DESCRIPTION	DATE	DR AUTH
OR	M138617	NEW RELEASE	10/22/12	GF DJ



NOTES:

- TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE.
 - FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
 - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
 - CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE.
- FOR COMPONENT VALUES REFER TO TB-699+.



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

DENOTES COPPER LAND PATTERN
FREE OF SOLDER MASK

COMPONENT	SIZE
C1-C3, R1, R2	0805
L1	1008
L2	1210

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	GF
TOLERANCES ON:	CHECKED	IL
1 PL. DECIMALS ± .005	APPROVED	DJ
2 PL. DECIMALS ± .005		10/19/12
3 PL. DECIMALS ± .005		10/22/12
FRACTIONS ±		

THIRD ANGLE PROJECTION



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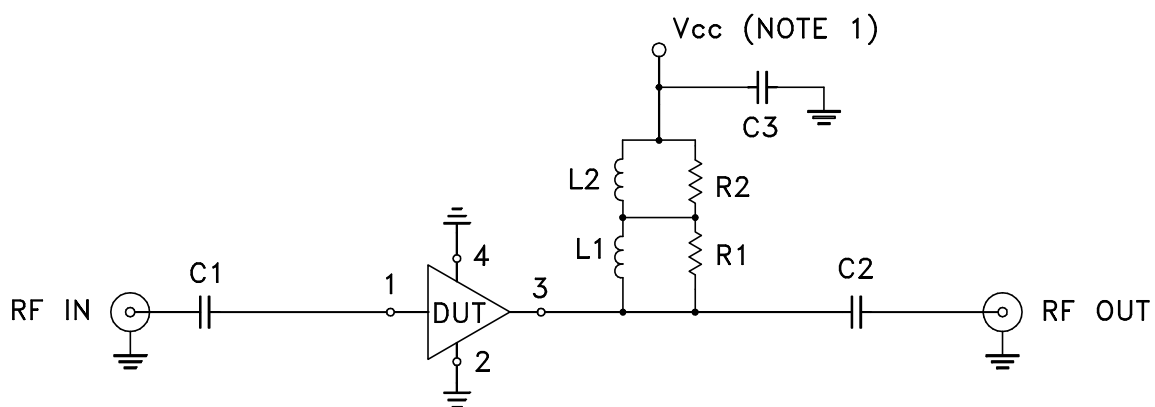
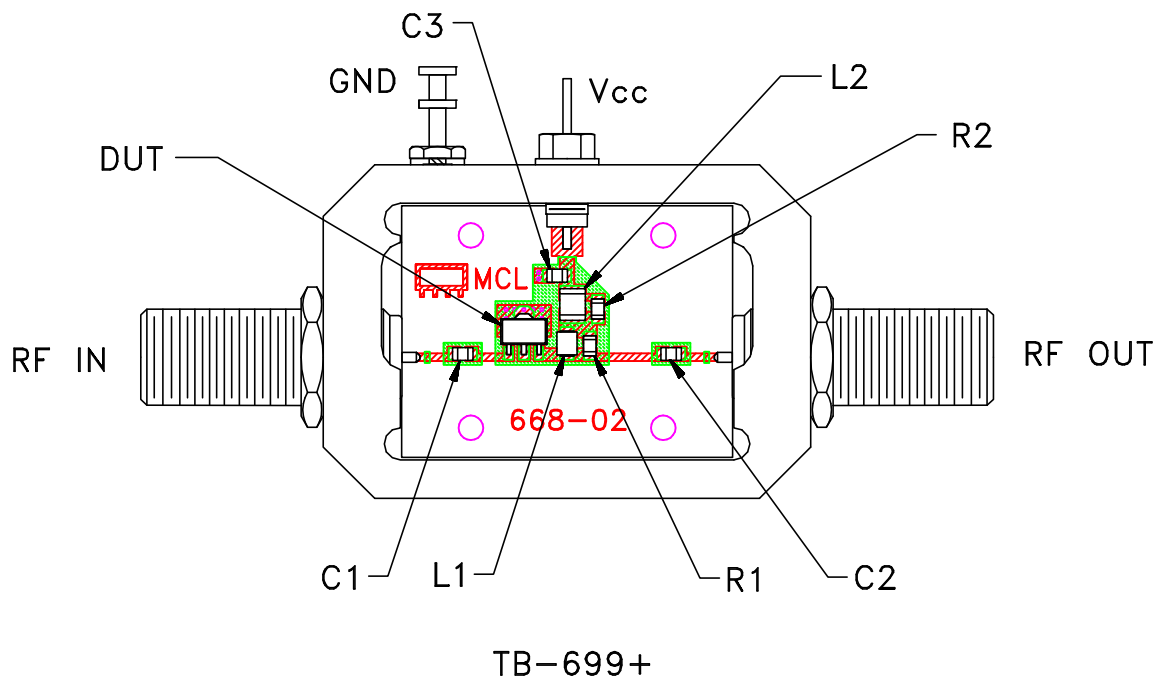


PL, 04AM03, 75, DF782, TB-699+

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-384	OR
FILE: 98PL384	SCALE: 5:1	SHEET: 1 OF 1	

Evaluation Board and Circuit



COMPONENT	VALUE
DUT	PGA-106R-75+
C1,C2	.01 μ F
C3	.1 μ F
R1,R2	1210 OHM
L1	1.5 UH
L2	22UH

Schematic Diagram

NOTES:

1. Vcc voltage: $+5 \pm 0.2V$.
2. F Type Female 75 Ohm connectors.
3. PCB material: Rogers R04350 or equivalent, dielectric constant=3.5, dielectric thickness=.030 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.

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