



MMIC SURFACE MOUNT

# Wideband Amplifier

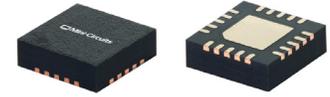
## AVA-2183+

Mini-Circuits

50Ω 2 to 20 GHz Excellent Gain Flatness

### THE BIG DEAL

- Wideband 2 to 20 GHz
- Flat Gain, Typ. 16 ± 1 dB
- P1dB, Typ. +19 dBm
- OIP3, Typ. +25 dBm
- 4x4 mm 20-Lead QFN-Style Package

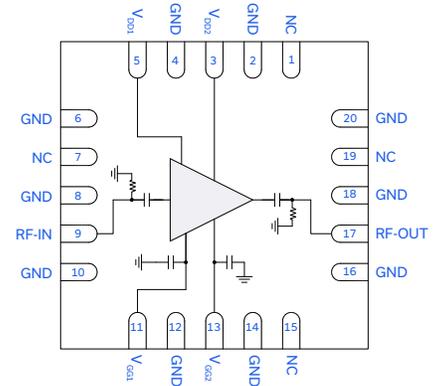


Generic photo used for illustration purposes only

### APPLICATIONS

- 5G MIMO and Back Haul Radio Systems
- Satellite Communications
- Test and Measurement Equipment
- Radar, EW, and ECM Defense Systems

### FUNCTIONAL DIAGRAM



### PRODUCT OVERVIEW

The AVA-2183+ is a GaAs pHEMT MMIC Amplifier that operates from 2 to 20 GHz. At 10 GHz the amplifier provides typical performance of 16.4 dB Gain, 5.2 dB Noise Figure, +19.3 dBm P1dB, and +24.7 dBm OIP3 from a +4 V supply drawing 210 mA. The AVA-2183+ MMIC amplifier is housed in an industry standard 4x4 mm 20-lead QFN-style package. With the RF ports internally matched to 50Ω, this amplifier enables easy integration into microwave systems.

### KEY FEATURES

Features	Advantages
Wideband: 2 to 20 GHz • Gain, Typ. 16 dB	Suitable for a variety of applications from wideband test and measurement equipment, and defense systems as well as narrowband telecommunications and satellite communications.
Good P1dB & OIP3 • P1dB, Typ. +19 dBm • OIP3, Typ. +25 dBm	Suitable as a linear gain block or as an LO driver for mixers in transmitter or receiver lineups.
Good Input and Output Return Loss	Internally matched to 50Ω, this eliminates the need for external matching components making the device easy to integrate.
4x4 mm 20-Lead QFN-Style Package	Small footprint saves space in dense layouts while providing low inductance, repeatable transitions, and excellent thermal contact to the PCB.

REV. OR  
ECO-017253  
AVA-2183+  
MCL NY  
250904





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## Wideband Amplifier

AVA-2183+

Mini-Circuits

50Ω 2 to 20 GHz Excellent Gain Flatness

ELECTRICAL SPECIFICATIONS<sup>1</sup> AT +25°C, Z<sub>0</sub> = 50Ω, V<sub>DD</sub> = +4 V, I<sub>DD</sub> = 210 mA, UNLESS NOTED OTHERWISE

Parameter	Condition (GHz)	Min.	Typ.	Max.	Units
Frequency Range		2		20	GHz
Gain	2	12.9	15.0		dB
	5	14.2	15.6		
	10	15.7	16.4		
	15	15.1	16.2		
	20	13.7	15.9		
Input Return Loss	2		11.4		dB
	5		15.6		
	10		14.8		
	15		14.6		
	20		16.4		
Output Return Loss	2		18.9		dB
	5		20		
	10		20		
	15		19.8		
	20		16.3		
Isolation	2-20		60.8		dB
Output Power at 1 dB Compression (P <sub>1dB</sub> )	2		+18.4		dBm
	5		+18.9		
	10		+19.3		
	15		+18.4		
	20		+16.9		
Output Third-Order Intercept Point (P <sub>OUT</sub> = 0 dBm/Tone)	2		+27.9		dBm
	5		+26.3		
	10		+24.7		
	15		+22.9		
	20		+20.0		
Noise Figure	2		6.7		dB
	5		6.3		
	10		5.2		
	15		4.5		
	20		5.1		
Device Operating Voltage (V <sub>DD</sub> )		+3.75	+4	+4.25	V
Device Operating Current (I <sub>DD</sub> ) <sup>2</sup>			210		mA
Gate Voltage (V <sub>GG</sub> ) <sup>3</sup>			-0.52		V
Gate Current (I <sub>GG</sub> )			-0.2		μA
Device Current Variation vs. Temperature <sup>4</sup>			0.48		μA/°C
Device Current Variation vs. Voltage <sup>5</sup>			0.005		mA/mV

1. Tested on Mini-Circuits Characterization Test/Evaluation Board TB-AVA-2183C+. See Figure 2. De-embedded to the device reference plane.

2. Current at P<sub>1dB</sub> = -25 dBm. Increases to 230 mA at P1dB.

3. Typical Gate Voltage for when I<sub>DD</sub> = 210 mA. V<sub>GG</sub> must be adjusted so that I<sub>DD</sub> = 210 mA.

4. (Current at T<sub>max</sub>°C - Current at T<sub>min</sub>°C) / (T<sub>max</sub>°C - T<sub>min</sub>°C)

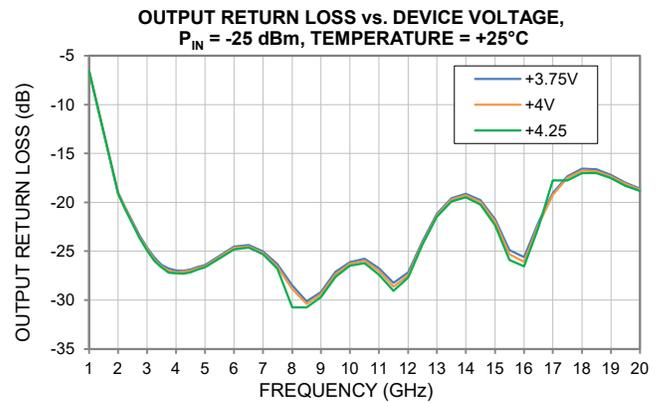
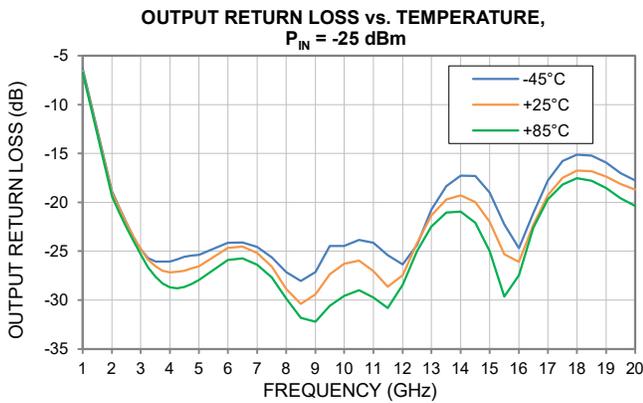
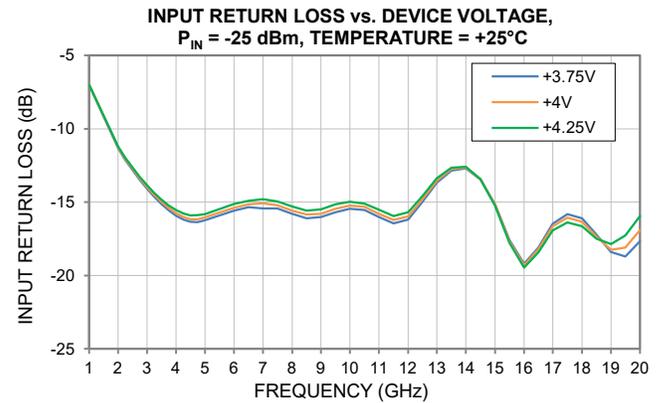
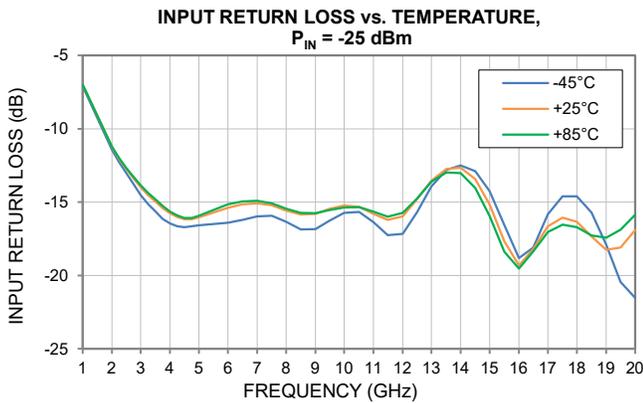
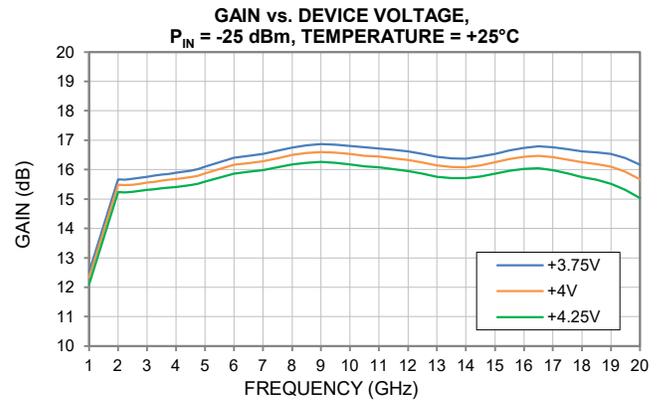
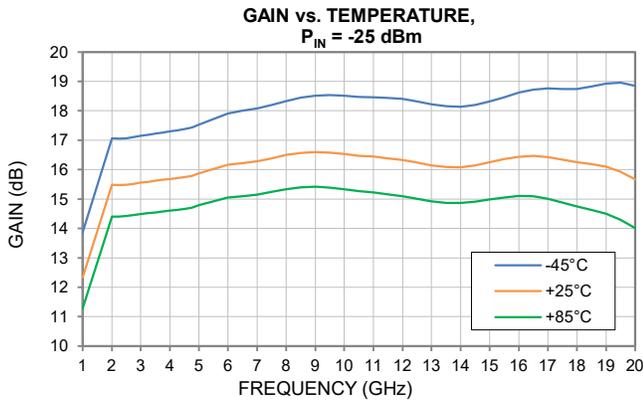
5. (Current at Nominal V +ΔV in mA) - (Current at Nominal V -ΔV mA)/(2ΔV mV)





### TYPICAL PERFORMANCE GRAPHS

All data taken was at nominal conditions  $V_{DD} = +4\text{ V}$  and  $I_{DD} = 210\text{ mA}$  unless noted otherwise. For over temperature data,  $V_{GG}$  is adjusted to achieve  $I_{DD} = 210\text{ mA}$  at each temperature specified. For over voltage data,  $V_{GG}$  is adjusted to achieve  $I_{DD} = 210\text{ mA}$  at each voltage specified.

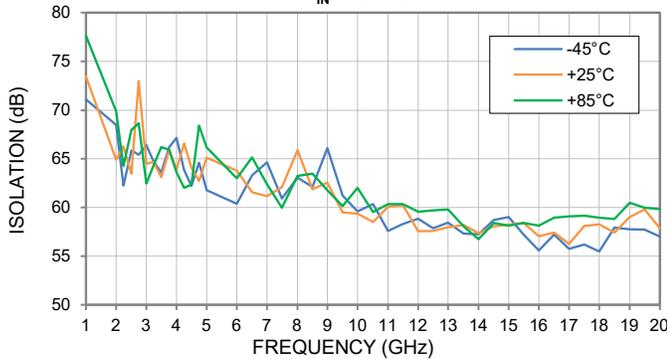




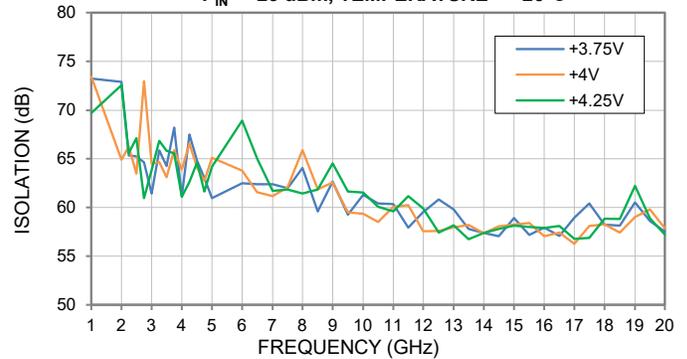
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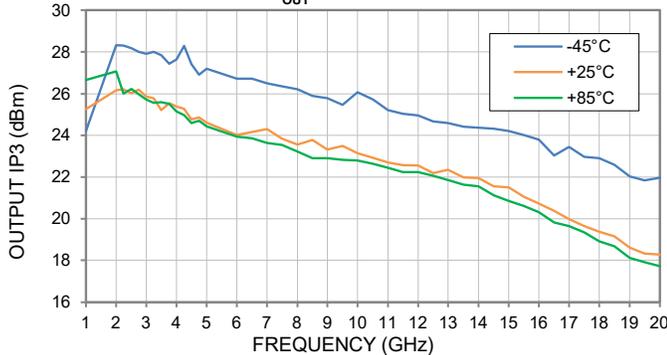
ISOLATION vs. TEMPERATURE,  
 $P_{IN} = -25\text{ dBm}$



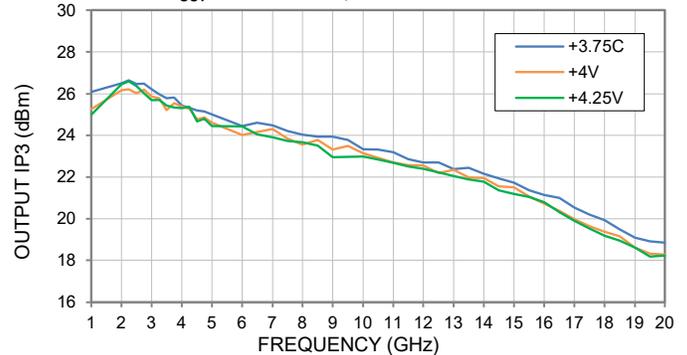
ISOLATION vs. DEVICE VOLTAGE,  
 $P_{IN} = -25\text{ dBm}$ , TEMPERATURE = +25°C



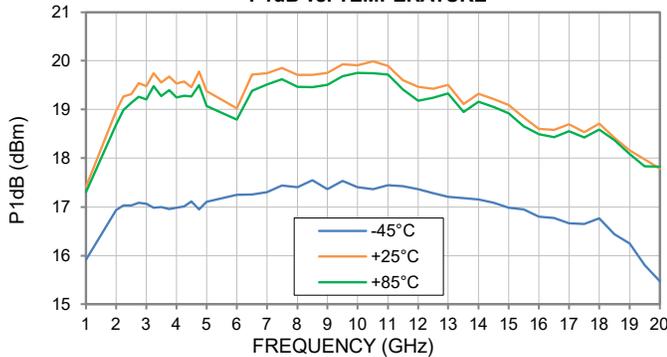
OUTPUT IP3 vs. TEMPERATURE,  
 $P_{OUT} = 0\text{ dBm/TONE}$



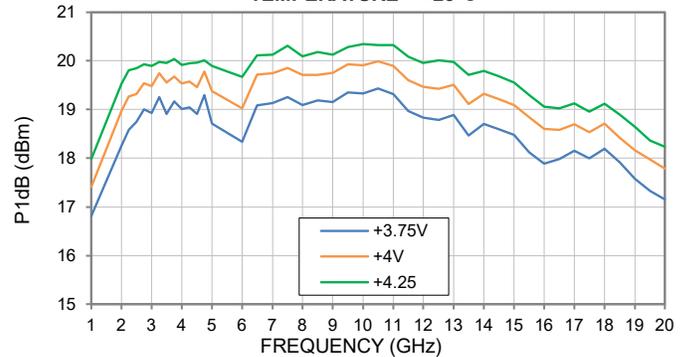
OUTPUT IP3 vs. DEVICE VOLTAGE,  
 $P_{OUT} = 0\text{ dBm/TONE}$ , TEMPERATURE = +25°C



P1dB vs. TEMPERATURE



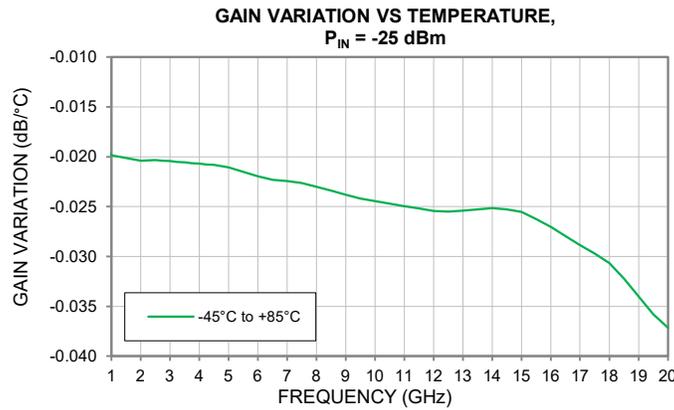
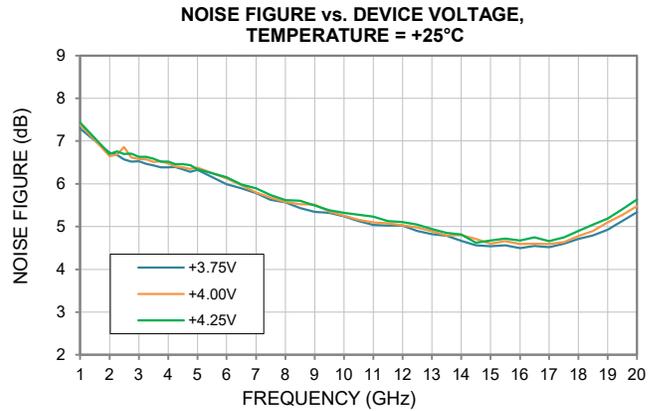
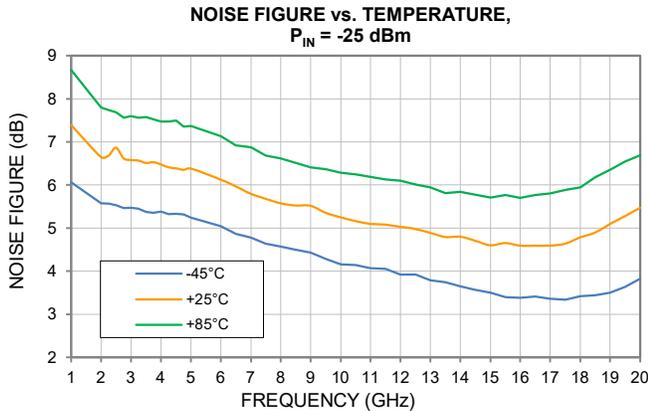
P1dB vs. DEVICE VOLTAGE,  
TEMPERATURE = +25°C





### TYPICAL PERFORMANCE GRAPHS

All data taken was at nominal conditions  $V_{DD} = +4\text{ V}$  and  $I_{DD} = 210\text{ mA}$  unless noted otherwise. For over temperature data,  $V_{GG}$  is adjusted to achieve  $I_{DD} = 210\text{ mA}$  at each temperature specified. For over voltage data,  $V_{GG}$  is adjusted to achieve  $I_{DD} = 210\text{ mA}$  at each voltage specified.



ABSOLUTE MAXIMUM RATINGS<sup>6</sup>

Parameter	Ratings
Operating Temperature	-45°C to +85°C
Storage Temperature	-65°C to +150°C
Total Power Dissipation	1.7 W
Junction Temperature <sup>7</sup>	+175°C
RF Input Power (CW)	+23 dBm (5 minutes max) +14 dBm (continuous)
DC Voltage on RF-OUT	+7 V
Current I <sub>GG</sub>	-5 mA to 0 mA
Current I <sub>DD</sub>	320 mA
DC Voltage on V <sub>DD</sub> (V <sub>DD1</sub> & V <sub>DD2</sub> )	+7 V
DC Voltage on V <sub>GG</sub> (V <sub>GG1</sub> & V <sub>GG2</sub> )	-1.5 V to -0.2 V

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

7. Peak temperature on top of the die.

## THERMAL RESISTANCE

Parameter	Ratings
Thermal Resistance ( $\Theta_{jc}$ ) <sup>8</sup>	38.8°C/W

8.  $\Theta_{jc}$  = (Hot Spot Temperature on Die - Temperature at Ground Lead) / Dissipated Power

## ESD RATING

	Class	Voltage Range	Reference Standard
Human Body Model (HBM)	1B	500 to <1000 V	ANSI/ESDA/JEDEC JS-001-2017
Charged Device Model (CDM)	C3	1000 V	JESD22-C101F



ESD HANDLING PRECAUTION: This device is designed to be Class 1B for HBM. Static charges may easily produce potentials higher than this with improper handling and can discharge into DUT and damage it. As a preventive measure Industry standard ESD handling precautions should be used at all times to protect the device from ESD damage.

## MSL RATING

Moisture Sensitivity: MSL3 in accordance with IPC/JEDEC J-STD-020E/JEDEC J-STD-033C



### FUNCTIONAL DIAGRAM

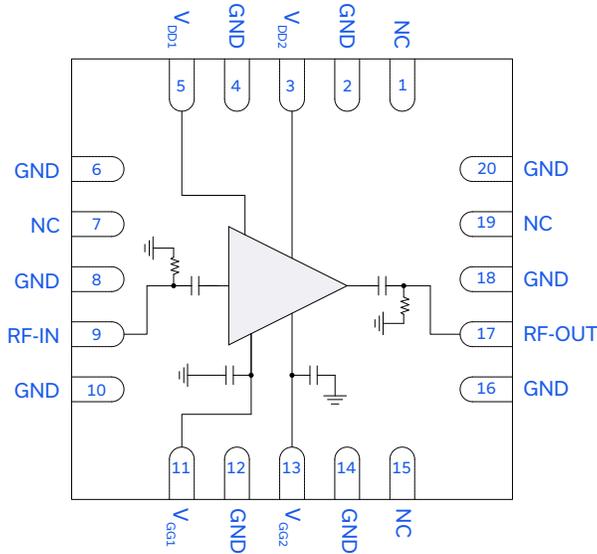


Figure 1. AVA-2183+ Functional Diagram

### PAD DESCRIPTION

Function	Pad Number	Description (Refer to Figure 2)
RF-IN	9	RF-IN Pad connects to RF-Input port. DUT includes an integrated shunt resistor for ESD protection and a DC blocking capacitor.
RF-OUT	17	RF-OUT Pad connects to RF-Output port. DUT includes an integrated shunt resistor for ESD protection and a DC blocking capacitor.
V <sub>DD1</sub>	5	DC Input Pad connects to voltage input port V <sub>DD1</sub> .
V <sub>DD2</sub>	3	DC Input Pad connects to voltage input port V <sub>DD2</sub> .
V <sub>GG1</sub>	11	DC Input Pad connects to voltage input port V <sub>GG1</sub> . DUT includes an integrated shunt capacitor.
V <sub>GG2</sub>	13	DC Input Pad connects to voltage input port V <sub>GG2</sub> . DUT includes an integrated shunt capacitor.
GND	2,4,6,8,10, 12,14,16,18, 20, & Paddle	Connects to ground.
NC	1,7,15, &19	Not used internally. Connected to ground on test board.

### CHARACTERIZATION TEST BOARD

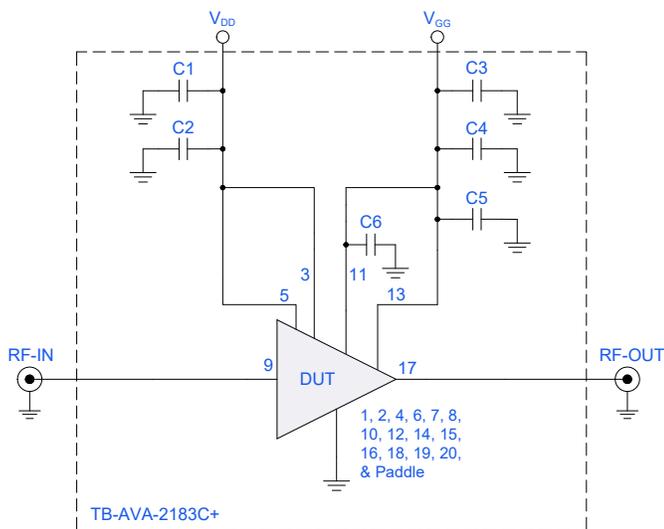


Figure 2. DUT soldered on Mini-Circuits Characterization Test Board: TB-AVA-2183C+

Gain, Return Loss, Output Power at 1 dB Compression (P1dB), Output IP3 (OIP3) and Noise Figure measured using PNA-X N5247B Microwave Network Analyzer.

Conditions:

1. Gain and Return Loss: P<sub>IN</sub> = -25 dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/tone at output
3. V<sub>DD</sub> = +4 V, I<sub>DD</sub> = 210 mA

Caution: Permanent damage to the device will occur if the Power ON and Power OFF Sequences are not followed.

Power ON Sequence:

1. Set V<sub>GG</sub> = -1.3 V. Apply V<sub>GG</sub>.
2. Set V<sub>DD</sub> = +4 V. Apply V<sub>DD</sub>.
3. Increase V<sub>GG</sub> to obtain desired I<sub>DD</sub> as shown in specification table.
4. Apply RF Signal.

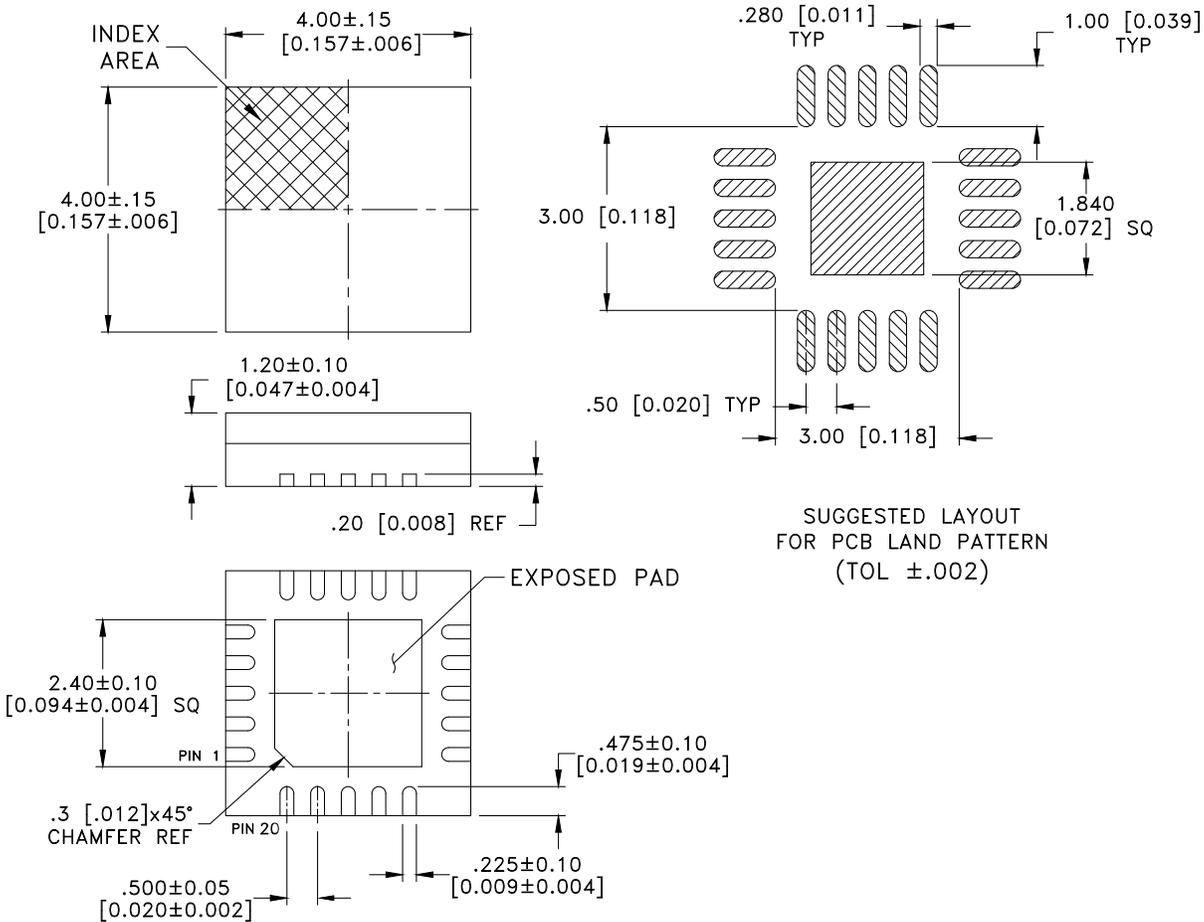
Power OFF Sequence:

1. Turn off RF Signal.
2. Adjust V<sub>GG</sub> down to -1.3 V.
3. Turn off V<sub>DD</sub>.
4. Turn off V<sub>GG</sub>.

Component	Vendor	Vendor P/N	Value	Size
C1, C3	Samsung	CL31B106KBHNNNE	10 μF	1206
C2, C4	AVX	06035C104KAT2A	0.1 μF	0603
C5, C6	Murata	GRM1885C1H101GA01D	100 pF	0603



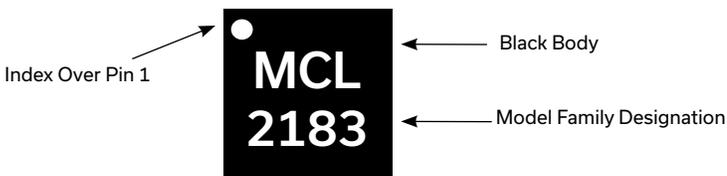
### CASE STYLE DRAWING



Weight: 0.1 grams  
Dimensions are in inches [mm].

Figure 3. DG1847-1 Case Style Drawing

### PRODUCT MARKING



Marking may contain other features or characters for internal lot control.

Figure 4. AVA-2183+ Product Marking



MMIC SURFACE MOUNT

# Wideband Amplifier

## AVA-2183+

50Ω 2 to 20 GHz Excellent Gain Flatness

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD

[CLICK HERE](#)

<b>Performance Data</b>	Data Graphs S-Parameter (S2P Files) Data Set (.zip file)
<b>Case Style</b>	DG1847-1. QFN-style package, exposed paddle, Lead Finish: PPF
<b>RoHs Status</b>	Compliant
<b>Tape &amp; Reel Standard Quantities Available on Reel</b>	F66 7" Reels with 20, 50, 100, 200, 500, 1000, 2000, or 3000 devices
<b>Suggested Layout for PCB Design</b>	PL-742
<b>Evaluation Board</b>	TB-AVA-2183C+ Gerber File
<b>Environmental Ratings</b>	ENV08T10
<b>Product Handling</b>	The use of no-clean solder is recommended. This package cannot be subjected to aqueous wash.

### NOTES

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)



## Typical Performance Data

**NOTE: Use PDF Bookmarks to view DATA at required conditions**

**Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: VDD = +3.75V, IDD = 210mA @ Temperature = +25°C

FREQ (GHz)	Gain (dB)	Isolation (dB)	Input Return Loss (dB)	Output Return Loss (dB)	Stability		IP-3 Output (dBm)	1dB Comp. Output (dBm)	Noise Figure (dB)
					K	Measure			
1.00	12.5	73.2	-7.0	-6.5	346.9	0.9	26.1	16.8	7.3
2.00	15.7	72.9	-11.3	-19.0	344.8	1.1	26.5	18.3	6.7
2.25	15.7	65.4	-12.1	-20.5	148.0	1.1	26.6	18.6	6.7
2.50	15.7	65.2	-12.8	-22.0	147.6	1.0	26.5	18.8	6.6
2.75	15.7	64.6	-13.5	-23.4	138.6	1.0	26.5	19.0	6.5
3.00	15.8	61.4	-14.1	-24.7	96.2	1.0	26.2	18.9	6.5
3.25	15.8	65.8	-14.6	-25.6	160.9	1.0	26.0	19.3	6.5
3.50	15.8	64.3	-15.1	-26.4	134.5	1.0	25.8	18.9	6.4
3.75	15.9	68.2	-15.6	-26.8	211.7	1.0	25.8	19.2	6.4
4.00	15.9	61.1	-15.9	-26.9	94.1	1.0	25.4	19.0	6.4
4.25	15.9	67.5	-16.2	-27.0	195.8	1.0	25.3	19.0	6.4
4.50	16.0	64.8	-16.3	-26.9	143.6	1.0	25.2	18.9	6.3
4.75	16.0	63.0	-16.4	-26.6	116.7	1.0	25.1	19.3	6.3
5.00	16.1	61.0	-16.2	-26.4	91.2	1.0	25.0	18.7	6.3
6.00	16.4	62.5	-15.6	-24.5	105.4	1.0	24.4	18.3	6.0
6.50	16.5	62.4	-15.4	-24.4	103.6	1.0	24.6	19.1	5.9
7.00	16.5	62.4	-15.4	-25.0	103.4	1.0	24.5	19.1	5.8
7.50	16.6	62.0	-15.4	-26.3	98.0	1.0	24.2	19.3	5.6
8.00	16.8	64.1	-15.8	-28.5	123.8	1.0	24.0	19.1	5.6
8.50	16.8	59.6	-16.1	-30.1	74.0	1.0	23.9	19.2	5.4
9.00	16.9	62.7	-16.0	-29.2	105.1	1.0	23.9	19.2	5.3
9.50	16.9	59.3	-15.7	-27.1	71.2	1.0	23.8	19.4	5.3
10.00	16.8	61.3	-15.5	-26.1	90.7	1.0	23.3	19.3	5.2
10.50	16.8	60.4	-15.5	-25.8	82.8	1.0	23.3	19.4	5.1
11.00	16.7	60.3	-16.0	-26.7	82.9	1.0	23.2	19.3	5.0
11.50	16.7	57.9	-16.5	-28.2	63.6	1.0	22.9	19.0	5.0
12.00	16.6	59.5	-16.2	-27.1	77.0	1.0	22.7	18.8	5.0
12.50	16.5	60.8	-15.0	-24.0	89.6	1.0	22.7	18.8	4.9
13.00	16.4	59.8	-13.7	-21.2	79.9	1.0	22.4	18.9	4.8
13.50	16.4	57.8	-12.9	-19.6	63.0	1.0	22.4	18.5	4.8
14.00	16.4	57.4	-12.7	-19.1	60.5	1.0	22.2	18.7	4.7
14.50	16.4	57.0	-13.5	-19.8	58.5	1.0	21.9	18.6	4.6
15.00	16.5	58.9	-15.2	-21.7	73.0	1.0	21.7	18.5	4.5
15.50	16.7	57.2	-17.6	-24.9	60.2	1.0	21.4	18.1	4.6
16.00	16.7	57.9	-19.2	-25.6	65.8	1.0	21.1	17.9	4.5
16.50	16.8	57.1	-18.1	-22.1	59.3	1.0	21.0	18.0	4.5
17.00	16.8	59.0	-16.5	-19.0	73.3	1.0	20.5	18.2	4.5
17.50	16.7	60.4	-15.8	-17.3	86.5	1.0	20.2	18.0	4.6
18.00	16.6	58.3	-16.1	-16.6	67.9	1.0	19.9	18.2	4.7
18.50	16.6	58.1	-17.2	-16.6	67.8	1.0	19.5	17.9	4.8
19.00	16.5	60.5	-18.4	-17.2	90.7	1.0	19.1	17.6	4.9
19.50	16.4	58.6	-18.7	-18.0	74.7	1.0	18.9	17.3	5.1
20.00	16.2	57.5	-17.7	-18.6	67.8	1.0	18.8	17.2	5.3

## Typical Performance Data

**NOTE: Use PDF Bookmarks to view DATA at required conditions**

**Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: VDD = +4.00V, IDD = 210mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(GHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
1.00	12.3	73.4	-7.0	-6.5	363.2	0.9	25.3	17.4	7.4
2.00	15.5	64.9	-11.2	-19.0	140.4	1.1	26.2	19.0	6.6
2.25	15.5	66.3	-12.0	-20.6	167.8	1.1	26.2	19.3	6.7
2.50	15.5	63.5	-12.7	-22.1	123.0	1.0	26.0	19.3	6.9
2.75	15.5	73.0	-13.4	-23.6	369.9	1.0	26.2	19.5	6.6
3.00	15.6	64.5	-14.0	-24.8	140.4	1.0	25.9	19.5	6.6
3.25	15.6	64.6	-14.5	-25.8	143.5	1.0	25.8	19.7	6.6
3.50	15.6	63.1	-15.0	-26.6	120.7	1.0	25.2	19.6	6.5
3.75	15.6	65.9	-15.4	-27.0	166.6	1.0	25.5	19.7	6.5
4.00	15.7	63.9	-15.8	-27.2	132.2	1.0	25.4	19.5	6.5
4.25	15.7	66.6	-16.0	-27.1	180.1	1.0	25.3	19.6	6.4
4.50	15.7	64.1	-16.2	-27.0	135.7	1.0	24.8	19.5	6.4
4.75	15.8	62.7	-16.2	-26.7	115.5	1.0	24.9	19.8	6.4
5.00	15.9	65.1	-16.0	-26.5	151.0	1.0	24.6	19.4	6.4
6.00	16.2	63.8	-15.4	-24.7	125.5	1.0	24.0	19.0	6.1
6.50	16.2	61.6	-15.2	-24.5	96.8	1.0	24.2	19.7	6.0
7.00	16.3	61.2	-15.1	-25.2	92.1	1.0	24.3	19.7	5.8
7.50	16.4	62.1	-15.2	-26.6	101.8	1.0	23.8	19.9	5.7
8.00	16.5	65.9	-15.6	-28.8	157.1	1.0	23.6	19.7	5.6
8.50	16.6	61.9	-15.9	-30.4	98.8	1.0	23.8	19.7	5.5
9.00	16.6	62.6	-15.8	-29.4	107.0	1.0	23.3	19.8	5.5
9.50	16.6	59.5	-15.4	-27.4	75.1	1.0	23.5	19.9	5.4
10.00	16.5	59.3	-15.2	-26.3	74.6	1.0	23.1	19.9	5.3
10.50	16.5	58.5	-15.3	-26.0	68.6	1.0	22.9	20.0	5.2
11.00	16.4	60.1	-15.8	-27.0	82.8	1.0	22.7	19.9	5.1
11.50	16.4	60.2	-16.2	-28.6	85.6	1.0	22.6	19.6	5.1
12.00	16.3	57.5	-16.0	-27.4	63.3	1.0	22.6	19.5	5.0
12.50	16.2	57.6	-14.8	-24.2	63.9	1.0	22.2	19.4	5.0
13.00	16.1	58.0	-13.5	-21.4	66.7	1.0	22.3	19.5	4.9
13.50	16.1	58.2	-12.8	-19.7	68.4	1.0	22.0	19.1	4.8
14.00	16.1	57.4	-12.6	-19.3	62.4	1.0	21.9	19.3	4.8
14.50	16.1	58.1	-13.4	-20.0	68.0	1.0	21.6	19.2	4.7
15.00	16.2	58.2	-15.2	-22.0	70.0	1.0	21.5	19.1	4.6
15.50	16.4	58.4	-17.7	-25.3	71.9	1.0	21.1	18.8	4.7
16.00	16.4	57.0	-19.3	-26.1	61.4	1.0	20.7	18.6	4.6
16.50	16.5	57.4	-18.2	-22.3	64.0	1.0	20.4	18.6	4.6
17.00	16.4	56.3	-16.6	-19.3	55.9	1.0	20.0	18.7	4.6
17.50	16.3	58.1	-16.1	-17.5	69.0	1.0	19.6	18.5	4.6
18.00	16.2	58.3	-16.3	-16.7	71.2	1.0	19.4	18.7	4.8
18.50	16.2	57.4	-17.3	-16.8	65.5	1.0	19.1	18.4	4.9
19.00	16.1	59.0	-18.2	-17.4	80.6	1.0	18.6	18.2	5.1
19.50	15.9	59.8	-18.1	-18.1	90.0	1.0	18.3	18.0	5.3
20.00	15.7	57.9	-16.9	-18.7	74.4	1.0	18.3	17.8	5.5

## Typical Performance Data

**NOTE: Use PDF Bookmarks to view DATA at required conditions**

**Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: VDD = +4.25V, IDD = 210mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(GHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
1.00	12.1	69.7	-7.0	-6.5	242.5	0.9	25.0	18.0	7.4
2.00	15.2	72.6	-11.2	-19.1	348.4	1.1	26.4	19.5	6.7
2.25	15.2	65.6	-12.0	-20.7	159.7	1.1	26.6	19.8	6.8
2.50	15.2	67.1	-12.6	-22.2	192.1	1.0	26.4	19.8	6.7
2.75	15.3	61.0	-13.3	-23.7	95.5	1.0	26.0	19.9	6.7
3.00	15.3	63.8	-13.9	-24.9	134.0	1.0	25.7	19.9	6.6
3.25	15.3	66.8	-14.4	-26.0	189.9	1.0	25.7	20.0	6.6
3.50	15.4	65.8	-14.8	-26.6	169.2	1.0	25.4	20.0	6.6
3.75	15.4	65.6	-15.2	-27.2	164.9	1.0	25.3	20.0	6.5
4.00	15.4	61.1	-15.6	-27.3	98.8	1.0	25.3	19.9	6.5
4.25	15.4	62.6	-15.8	-27.3	118.1	1.0	25.4	19.9	6.5
4.50	15.5	64.6	-15.9	-27.2	148.9	1.0	24.7	20.0	6.5
4.75	15.5	61.6	-15.9	-26.9	104.9	1.0	24.8	20.0	6.4
5.00	15.6	64.2	-15.8	-26.6	139.7	1.0	24.4	19.9	6.3
6.00	15.9	68.9	-15.1	-24.8	234.5	1.0	24.4	19.7	6.2
6.50	15.9	65.0	-14.9	-24.6	149.4	1.0	24.0	20.1	6.0
7.00	16.0	61.7	-14.8	-25.3	101.6	1.0	23.9	20.1	5.9
7.50	16.1	61.8	-14.9	-26.8	102.7	1.0	23.7	20.3	5.7
8.00	16.2	61.5	-15.3	-30.7	97.8	1.0	23.7	20.1	5.6
8.50	16.2	61.8	-15.6	-30.7	102.1	1.0	23.5	20.2	5.6
9.00	16.3	64.5	-15.5	-29.7	139.4	1.0	23.0	20.1	5.5
9.50	16.2	61.6	-15.2	-27.6	100.0	1.0	23.0	20.3	5.4
10.00	16.2	61.5	-15.0	-26.5	100.0	1.0	23.0	20.3	5.3
10.50	16.1	60.0	-15.1	-26.2	85.1	1.0	22.8	20.3	5.3
11.00	16.1	59.6	-15.5	-27.4	81.8	1.0	22.7	20.3	5.2
11.50	16.0	61.2	-16.0	-29.0	99.2	1.0	22.5	20.1	5.1
12.00	16.0	59.9	-15.7	-27.7	86.7	1.0	22.4	20.0	5.1
12.50	15.9	57.4	-14.6	-24.3	65.3	1.0	22.2	20.0	5.0
13.00	15.8	58.2	-13.4	-21.5	71.4	1.0	22.1	20.0	4.9
13.50	15.7	56.7	-12.6	-19.9	60.4	1.0	21.9	19.7	4.9
14.00	15.7	57.4	-12.6	-19.5	65.4	1.0	21.8	19.8	4.8
14.50	15.8	57.8	-13.4	-20.2	68.8	1.0	21.4	19.7	4.6
15.00	15.9	58.1	-15.2	-22.4	72.5	1.0	21.2	19.6	4.7
15.50	16.0	58.0	-17.8	-25.9	72.0	1.0	21.0	19.3	4.7
16.00	16.0	57.9	-19.5	-26.5	71.3	1.0	20.8	19.1	4.7
16.50	16.0	58.1	-18.4	-22.6	72.8	1.0	20.3	19.0	4.7
17.00	16.0	56.8	-16.9	-17.7	62.4	1.0	19.9	19.1	4.7
17.50	15.9	56.9	-16.4	-17.7	63.5	1.0	19.5	19.0	4.7
18.00	15.8	58.8	-16.7	-17.0	80.7	1.0	19.2	19.1	4.9
18.50	15.7	58.8	-17.5	-17.0	82.1	1.0	19.0	18.9	5.0
19.00	15.5	62.2	-17.9	-17.5	123.9	1.0	18.6	18.6	5.2
19.50	15.3	58.9	-17.3	-18.3	86.9	1.0	18.2	18.4	5.4
20.00	15.0	57.2	-16.0	-18.8	74.1	1.0	18.2	18.2	5.6

## Typical Performance Data

**NOTE: Use PDF Bookmarks to view DATA at required conditions**

**Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: VDD =+ 3.75V, IDD = 210mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(GHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
1.00	14.2	69.3	-11.5	-6.3	179.7	0.9	21.2	15.0	6.0
2.00	17.4	72.5	-11.5	-18.9	267.6	1.1	26.1	16.1	5.5
2.25	17.4	62.4	-12.4	-20.5	85.7	1.0	26.5	16.2	5.6
2.50	17.4	64.6	-13.2	-22.1	111.3	1.0	25.9	16.2	4.9
2.75	17.5	70.0	-14.0	-23.6	210.4	1.0	25.8	16.1	5.4
3.00	17.5	66.7	-14.8	-24.9	143.7	1.0	26.0	16.1	5.4
3.25	17.6	64.1	-15.4	-25.9	107.0	1.0	26.2	16.1	5.4
3.50	17.6	64.1	-16.0	-26.2	107.7	1.0	25.6	16.1	5.4
3.75	17.7	65.7	-16.5	-26.3	128.6	1.0	25.8	16.1	5.4
4.00	17.7	63.8	-16.9	-26.1	103.9	1.0	25.4	16.0	5.4
4.25	17.8	63.3	-17.1	-26.0	97.3	1.0	25.8	16.0	5.3
4.50	17.8	78.3	-17.1	-25.5	547.4	1.0	25.8	16.1	5.3
4.75	17.9	63.4	-17.1	-25.5	98.0	1.0	25.7	16.1	5.3
5.00	18.0	62.1	-17.1	-25.5	84.0	1.0	25.7	16.1	5.2
6.00	18.4	60.7	-16.9	-24.2	68.2	1.0	25.7	16.3	5.0
6.50	18.5	62.4	-16.7	-24.2	82.2	1.0	25.1	16.3	4.9
7.00	18.6	64.8	-16.5	-24.6	108.1	1.0	25.2	16.3	4.8
7.50	18.7	61.8	-16.4	-25.6	75.7	1.0	24.8	16.5	4.7
8.00	18.8	61.8	-16.9	-27.1	74.7	1.0	24.9	16.4	4.6
8.50	18.9	62.9	-17.5	-28.0	84.1	1.0	24.5	16.4	4.5
9.00	19.0	62.4	-17.5	-27.2	78.9	1.0	24.7	16.4	4.4
9.50	19.1	62.1	-16.9	-25.7	75.8	1.0	24.3	16.4	4.3
10.00	19.1	61.9	-16.3	-24.5	74.0	1.0	24.1	16.3	4.2
10.50	19.0	63.1	-16.2	-23.7	85.4	1.0	24.2	16.3	4.2
11.00	19.0	59.0	-16.9	-24.0	53.7	1.0	23.9	16.4	4.1
11.50	19.0	60.2	-17.9	-25.3	62.3	1.0	23.5	16.3	4.0
12.00	19.0	57.2	-17.9	-26.2	44.4	1.0	23.5	16.3	4.0
12.50	18.9	57.5	-16.3	-24.4	46.1	1.0	24.7	16.2	3.9
13.00	18.8	56.5	-14.4	-20.8	40.9	1.0	24.5	16.1	3.8
13.50	18.7	58.1	-13.1	-18.3	49.2	1.0	24.5	16.1	3.8
14.00	18.7	56.8	-12.7	-17.2	42.3	1.0	24.6	16.1	3.7
14.50	18.8	59.7	-13.0	-17.1	59.3	1.0	23.2	15.8	3.6
15.00	18.9	56.7	-14.3	-18.7	42.0	1.0	23.3	16.0	3.5
15.50	19.0	57.6	-16.6	-21.8	47.1	1.0	23.4	16.0	3.5
16.00	19.2	56.2	-18.8	-24.3	40.0	1.0	23.4	15.9	3.4
16.50	19.3	58.0	-18.1	-21.0	48.5	1.0	23.3	15.8	3.4
17.00	19.3	57.9	-15.7	-17.6	47.0	1.0	23.1	15.7	3.4
17.50	19.3	56.4	-14.3	-15.6	38.6	1.0	22.7	15.7	3.3
18.00	19.4	57.1	-14.2	-14.9	41.5	1.0	23.6	15.7	3.4
18.50	19.5	57.1	-15.1	-14.9	41.0	1.0	23.3	15.4	3.4
19.00	19.6	57.7	-17.1	-15.6	44.1	1.0	23.1	15.2	3.4
19.50	19.8	59.4	-20.0	-16.6	54.0	1.0	22.6	14.7	3.5
20.00	19.7	55.7	-22.3	-17.4	36.1	1.0	22.6	14.2	3.7

## Typical Performance Data

**NOTE: Use PDF Bookmarks to view DATA at required conditions**

**Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: VDD = +4.00V, IDD = 210mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(GHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
1.00	13.9	71.1	-7.1	-6.3	229.3	0.9	24.2	15.9	6.1
2.00	17.1	68.5	-11.4	-18.9	175.9	1.1	28.3	16.9	5.6
2.25	17.0	62.2	-12.3	-20.5	87.9	1.1	28.3	17.0	5.6
2.50	17.1	65.8	-13.0	-22.1	134.3	1.0	28.2	17.0	5.5
2.75	17.1	65.4	-13.8	-23.6	129.1	1.0	28.0	17.1	5.5
3.00	17.1	66.4	-14.5	-24.8	145.6	1.0	27.9	17.1	5.5
3.25	17.2	64.7	-15.1	-25.7	120.4	1.0	28.0	17.0	5.4
3.50	17.2	63.6	-15.7	-26.1	105.6	1.0	27.8	17.0	5.4
3.75	17.3	66.2	-16.1	-26.1	143.0	1.0	27.4	17.0	5.4
4.00	17.3	67.1	-16.4	-26.1	159.4	1.0	27.6	17.0	5.4
4.25	17.3	63.8	-16.7	-25.8	108.9	1.0	28.3	17.0	5.3
4.50	17.4	62.2	-16.7	-25.6	89.9	1.0	27.4	17.1	5.3
4.75	17.4	64.6	-16.7	-25.4	118.1	1.0	26.9	16.9	5.3
5.00	17.5	61.8	-16.6	-25.4	84.5	1.0	27.2	17.1	5.2
6.00	17.9	60.4	-16.4	-24.1	69.1	1.0	26.7	17.2	5.0
6.50	18.0	63.3	-16.2	-24.1	96.0	1.0	26.7	17.3	4.9
7.00	18.1	64.6	-16.0	-24.6	110.9	1.0	26.5	17.3	4.8
7.50	18.2	60.9	-15.9	-25.6	72.1	1.0	26.3	17.4	4.6
8.00	18.3	63.0	-16.3	-27.1	90.9	1.0	26.2	17.4	4.6
8.50	18.4	62.1	-16.8	-28.0	81.2	1.0	25.9	17.6	4.5
9.00	18.5	66.1	-16.8	-27.1	127.5	1.0	25.8	17.4	4.4
9.50	18.5	61.2	-16.3	-24.5	72.9	1.0	25.5	17.5	4.3
10.00	18.5	59.6	-15.7	-24.5	60.5	1.0	26.1	17.4	4.2
10.50	18.5	60.3	-15.7	-23.8	66.1	1.0	25.7	17.4	4.1
11.00	18.5	57.6	-16.3	-24.1	48.6	1.0	25.2	17.4	4.1
11.50	18.4	58.3	-17.3	-25.4	53.6	1.0	25.0	17.4	4.1
12.00	18.4	58.9	-17.2	-26.4	57.5	1.0	24.9	17.4	3.9
12.50	18.3	57.8	-15.7	-24.3	51.3	1.0	24.7	17.3	3.9
13.00	18.2	58.5	-13.9	-20.8	54.8	1.0	24.6	17.2	3.8
13.50	18.2	57.3	-12.8	-18.3	47.6	1.0	24.4	17.2	3.7
14.00	18.1	57.2	-12.5	-17.3	47.3	1.0	24.4	17.2	3.6
14.50	18.2	58.7	-12.9	-17.3	56.1	1.0	24.3	17.1	3.6
15.00	18.3	59.0	-14.3	-19.0	58.7	1.0	24.2	17.0	3.5
15.50	18.5	57.2	-16.6	-22.2	47.8	1.0	24.0	16.9	3.4
16.00	18.6	55.6	-18.8	-24.7	39.6	1.0	23.8	16.8	3.4
16.50	18.7	57.2	-18.1	-21.1	47.1	1.0	23.0	16.8	3.4
17.00	18.8	55.8	-15.8	-17.8	39.1	1.0	23.4	16.7	3.4
17.50	18.7	56.2	-14.6	-15.8	40.5	1.0	23.0	16.6	3.3
18.00	18.7	55.5	-14.6	-15.1	37.1	1.0	22.9	16.8	3.4
18.50	18.8	57.9	-15.7	-15.2	49.2	1.0	22.6	16.4	3.4
19.00	18.9	57.7	-17.9	-15.9	48.6	1.0	22.0	16.2	3.5
19.50	19.0	57.7	-20.5	-17.0	49.2	1.0	21.8	15.8	3.6
20.00	18.8	57.0	-21.5	-17.7	46.3	1.0	22.0	15.5	3.8

## Typical Performance Data

**NOTE: Use PDF Bookmarks to view DATA at required conditions**

**Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: VDD = +4.25V, IDD = 210mA @ Temperature = -45°C

FREQ (GHz)	Gain (dB)	Isolation (dB)	Input Return Loss (dB)	Output Return Loss (dB)	Stability		IP-3 Output (dBm)	1dB Comp. Output (dBm)	Noise Figure (dB)
					K	Measure			
1.00	13.5	75.7	-7.1	-6.3	405.4	0.9	24.3	16.7	6.1
2.00	16.7	70.0	-11.3	-18.9	220.6	1.1	28.3	17.9	5.6
2.25	16.6	67.0	-12.1	-20.5	158.1	1.1	27.6	17.9	5.6
2.50	16.7	62.8	-12.8	-22.1	99.4	1.0	27.9	18.0	5.8
2.75	16.7	68.9	-13.6	-23.6	201.1	1.0	27.7	17.9	5.5
3.00	16.7	62.8	-14.3	-24.9	100.7	1.0	27.3	18.0	5.5
3.25	16.8	67.5	-14.9	-25.8	174.3	1.0	27.8	18.0	5.5
3.50	16.8	68.7	-15.3	-26.1	200.0	1.0	27.0	18.0	5.5
3.75	16.8	64.4	-15.8	-26.2	121.6	1.0	26.9	17.9	5.4
4.00	16.9	62.2	-16.1	-26.0	94.4	1.0	27.1	18.0	5.4
4.25	16.9	62.0	-16.2	-25.8	92.2	1.0	26.6	18.0	5.4
4.50	16.9	61.7	-16.3	-25.6	89.1	1.0	26.9	18.1	5.4
4.75	17.0	64.2	-16.2	-25.4	118.2	1.0	27.2	18.1	5.3
5.00	17.1	63.5	-16.1	-25.3	108.8	1.0	27.0	18.1	5.3
6.00	17.4	61.8	-15.9	-24.2	85.3	1.0	26.0	18.2	5.1
6.50	17.5	62.4	-15.7	-24.1	91.3	1.0	26.3	18.4	4.9
7.00	17.6	62.6	-15.5	-24.7	93.0	1.0	25.8	18.4	4.8
7.50	17.7	63.6	-15.4	-25.8	103.7	1.0	25.8	18.5	4.7
8.00	17.8	64.0	-15.8	-27.3	107.2	1.0	25.8	18.5	4.6
8.50	17.9	62.8	-16.2	-28.2	93.8	1.0	25.4	18.5	4.5
9.00	18.0	64.3	-16.2	-27.3	110.7	1.0	25.5	18.4	4.4
9.50	18.0	61.2	-15.6	-25.7	77.6	1.0	25.2	18.6	4.3
10.00	17.9	62.3	-15.2	-24.6	87.5	1.0	25.2	18.6	4.3
10.50	17.9	59.3	-15.2	-24.0	62.7	1.0	25.1	18.6	4.2
11.00	17.9	60.0	-15.8	-24.4	68.6	1.0	24.8	18.5	4.1
11.50	17.8	59.3	-16.7	-25.8	64.3	1.0	24.7	18.6	4.1
12.00	17.8	58.1	-16.5	-26.6	56.4	1.0	24.2	18.6	4.0
12.50	17.7	59.1	-15.1	-24.3	63.7	1.0	24.0	18.5	3.9
13.00	17.6	57.6	-13.6	-20.8	53.4	1.0	23.9	18.4	3.8
13.50	17.5	57.3	-12.5	-18.5	51.0	1.0	24.1	18.2	3.8
14.00	17.5	59.0	-12.3	-17.5	61.9	1.0	24.0	18.2	3.6
14.50	17.6	57.4	-12.8	-17.6	51.9	1.0	23.8	18.2	3.6
15.00	17.7	59.8	-14.3	-19.4	68.8	1.0	23.6	18.2	3.5
15.50	17.9	57.9	-16.7	-22.9	55.6	1.0	23.5	18.0	3.5
16.00	18.0	58.3	-18.9	-25.3	58.2	1.0	23.3	17.9	3.4
16.50	18.1	57.2	-18.2	-21.4	50.6	1.0	22.9	17.8	3.4
17.00	18.1	56.5	-16.1	-18.0	46.2	1.0	22.8	17.7	3.4
17.50	18.1	58.8	-15.0	-16.1	59.3	1.0	22.5	17.7	3.4
18.00	18.0	57.9	-15.2	-15.5	53.6	1.0	22.3	17.8	3.5
18.50	18.1	56.5	-16.5	-15.6	46.3	1.0	21.7	17.6	3.6
19.00	18.1	58.5	-18.5	-16.3	59.0	1.0	21.9	17.3	3.6
19.50	18.0	58.8	-20.1	-17.4	62.2	1.0	21.2	16.9	3.8
20.00	17.8	55.8	-19.6	-18.1	45.3	1.0	21.2	16.7	4.0

## Typical Performance Data

**NOTE: Use PDF Bookmarks to view DATA at required conditions**

**Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: VDD = +3.75V, IDD = 210mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(GHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
1.00	11.5	78.4	-7.0	-6.7	714.8	0.9	26.5	16.7	8.6
2.00	14.7	70.1	-11.3	-19.3	280.4	1.1	26.4	18.1	7.9
2.25	14.7	65.3	-12.0	-20.8	164.9	1.1	26.1	18.5	7.7
2.50	14.7	67.1	-12.7	-22.4	206.4	1.0	26.0	18.6	7.7
2.75	14.7	66.8	-13.4	-23.8	199.4	1.0	26.1	18.8	7.6
3.00	14.7	62.6	-13.9	-25.1	123.8	1.0	25.8	18.7	7.6
3.25	14.8	61.5	-14.5	-26.3	110.2	1.0	25.7	19.1	7.5
3.50	14.8	65.8	-14.9	-27.3	181.5	1.0	25.6	18.8	7.5
3.75	14.8	62.4	-15.4	-28.0	122.4	1.0	25.5	18.9	7.4
4.00	14.9	66.3	-15.8	-28.4	192.0	1.0	25.3	18.9	7.4
4.25	14.9	64.7	-16.0	-28.4	159.4	1.0	25.0	18.9	7.4
4.50	14.9	63.6	-16.2	-28.3	140.7	1.0	24.8	18.6	7.5
4.75	15.0	60.2	-16.2	-27.9	95.2	1.0	24.8	19.2	7.3
5.00	15.1	60.7	-16.1	-27.7	99.6	1.0	24.5	18.5	7.2
6.00	15.3	62.6	-15.3	-25.5	120.8	1.0	24.0	18.1	7.1
6.50	15.4	61.7	-15.1	-25.4	108.7	1.0	23.8	18.9	6.9
7.00	15.5	64.6	-15.1	-26.1	151.5	1.0	23.9	19.0	6.8
7.50	15.6	62.4	-15.2	-27.3	117.5	1.0	23.6	19.1	6.7
8.00	15.7	66.3	-15.6	-29.4	182.8	1.0	23.5	19.0	6.6
8.50	15.7	63.0	-15.9	-31.3	125.4	1.0	23.3	19.0	6.4
9.00	15.7	60.9	-15.9	-31.4	97.9	1.0	23.2	19.0	6.4
9.50	15.7	66.6	-15.7	-30.0	190.5	1.0	23.1	19.3	6.3
10.00	15.7	60.7	-15.5	-29.0	97.5	1.0	23.0	19.3	6.2
10.50	15.6	59.3	-15.5	-28.3	83.6	1.0	22.9	19.3	6.1
11.00	15.6	61.8	-15.8	-29.0	113.1	1.0	22.7	19.3	6.1
11.50	15.5	59.3	-16.1	-30.0	85.8	1.0	22.5	18.8	6.0
12.00	15.4	59.2	-15.9	-28.0	85.7	1.0	22.2	18.7	6.1
12.50	15.4	56.7	-14.9	-24.7	64.7	1.0	21.9	18.7	5.9
13.00	15.3	56.8	-13.7	-22.1	65.5	1.0	22.0	18.9	5.9
13.50	15.2	59.4	-13.0	-20.8	87.8	1.0	21.8	18.5	5.7
14.00	15.2	58.2	-13.0	-20.6	76.7	1.0	21.6	18.7	5.8
14.50	15.3	57.3	-14.0	-21.7	70.0	1.0	21.3	18.6	5.7
15.00	15.4	58.3	-15.9	-24.4	79.4	1.0	21.1	18.5	5.7
15.50	15.4	57.3	-18.3	-28.7	71.7	1.0	20.8	18.2	5.7
16.00	15.5	58.3	-19.4	-26.9	80.6	1.0	20.3	18.0	5.6
16.50	15.5	60.3	-18.2	-22.3	100.9	1.0	20.2	18.0	5.7
17.00	15.4	57.6	-16.8	-19.5	74.3	1.0	19.8	18.2	5.7
17.50	15.3	57.4	-16.3	-17.9	72.5	1.0	19.4	18.0	5.7
18.00	15.2	60.1	-16.6	-17.3	100.8	1.0	19.1	18.2	5.9
18.50	15.1	58.5	-17.3	-17.5	84.9	1.0	18.7	17.9	6.0
19.00	15.0	58.8	-17.8	-18.3	90.2	1.0	18.3	17.6	6.2
19.50	14.8	61.6	-17.5	-19.4	127.3	1.0	18.0	17.5	6.4
20.00	14.6	58.2	-16.5	-20.1	89.6	1.0	17.9	17.4	6.6

## Typical Performance Data

**NOTE: Use PDF Bookmarks to view DATA at required conditions**

**Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: VDD = +4.00V, IDD = 210mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(GHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
1.00	11.3	77.6	-7.0	-6.7	670.9	0.9	26.7	17.3	8.7
2.00	14.4	69.9	-11.2	-19.4	281.7	1.1	27.1	18.7	7.8
2.25	14.4	64.3	-12.0	-21.0	150.9	1.1	26.0	19.0	7.7
2.50	14.4	68.0	-12.7	-22.5	234.0	1.0	26.2	19.1	7.7
2.75	14.5	68.7	-13.3	-24.0	255.3	1.0	26.0	19.3	7.6
3.00	14.5	62.4	-13.8	-25.3	125.6	1.0	25.7	19.2	7.6
3.25	14.5	64.3	-14.4	-26.6	156.3	1.0	25.5	19.5	7.6
3.50	14.5	66.2	-14.8	-27.6	194.9	1.0	25.6	19.3	7.6
3.75	14.6	65.9	-15.3	-28.3	189.3	1.0	25.5	19.4	7.5
4.00	14.6	63.6	-15.6	-28.7	145.0	1.0	25.1	19.3	7.5
4.25	14.6	62.0	-15.9	-28.8	121.3	1.0	25.0	19.3	7.5
4.50	14.7	62.4	-16.1	-28.7	126.1	1.0	24.6	19.3	7.5
4.75	14.7	68.4	-16.1	-28.3	252.5	1.0	24.7	19.5	7.4
5.00	14.8	66.2	-15.9	-27.9	194.1	1.0	24.4	19.1	7.4
6.00	15.1	63.0	-15.2	-25.9	130.8	1.0	23.9	18.8	7.1
6.50	15.1	65.1	-15.0	-25.7	167.2	1.0	23.9	19.4	6.9
7.00	15.2	62.4	-14.9	-26.4	121.5	1.0	23.6	19.5	6.9
7.50	15.3	60.0	-15.1	-27.7	91.5	1.0	23.6	19.6	6.7
8.00	15.3	63.2	-15.4	-29.8	132.7	1.0	23.2	19.5	6.6
8.50	15.4	63.5	-15.7	-31.8	136.7	1.0	22.9	19.5	6.5
9.00	15.4	61.8	-15.7	-32.2	112.4	1.0	22.9	19.5	6.4
9.50	15.4	60.1	-15.5	-30.6	93.8	1.0	22.8	19.7	6.4
10.00	15.3	62.0	-15.4	-29.6	117.7	1.0	22.8	19.8	6.3
10.50	15.3	59.5	-15.4	-29.0	89.2	1.0	22.6	19.7	6.2
11.00	15.2	60.3	-15.7	-29.7	98.8	1.0	22.5	19.7	6.2
11.50	15.2	60.4	-16.0	-30.8	100.5	1.0	22.2	19.4	6.1
12.00	15.1	59.6	-15.7	-28.4	92.6	1.0	22.2	19.2	6.1
12.50	15.0	59.7	-14.8	-25.0	94.4	1.0	22.1	19.2	6.0
13.00	14.9	59.8	-13.6	-22.5	95.7	1.0	21.8	19.3	5.9
13.50	14.9	58.1	-13.0	-21.0	78.6	1.0	21.6	18.9	5.8
14.00	14.9	56.7	-13.0	-20.9	67.7	1.0	21.6	19.2	5.8
14.50	14.9	58.4	-14.0	-22.1	82.9	1.0	21.1	19.1	5.8
15.00	15.0	58.1	-16.0	-25.0	81.2	1.0	20.9	18.9	5.7
15.50	15.1	58.4	-18.4	-29.6	84.5	1.0	20.6	18.7	5.8
16.00	15.1	58.1	-19.5	-27.4	82.4	1.0	20.3	18.5	5.7
16.50	15.1	58.9	-18.4	-22.6	90.3	1.0	19.8	18.4	5.8
17.00	15.0	59.1	-17.0	-19.7	92.2	1.0	19.7	18.6	5.8
17.50	14.9	59.2	-16.6	-18.2	93.8	1.0	19.3	18.4	5.9
18.00	14.8	58.9	-16.7	-17.5	92.9	1.0	18.9	18.6	5.9
18.50	14.6	58.8	-17.3	-17.8	93.5	1.0	18.7	18.4	6.2
19.00	14.5	60.5	-17.4	-18.5	115.7	1.0	18.1	18.1	6.4
19.50	14.3	60.0	-16.9	-19.6	112.6	1.0	17.9	17.8	6.5
20.00	14.0	59.8	-15.9	-20.3	114.6	1.0	17.7	17.8	6.7

## Typical Performance Data

**NOTE: Use PDF Bookmarks to view DATA at required conditions**

**Definitions:**

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Isolation = -S12 (dB)

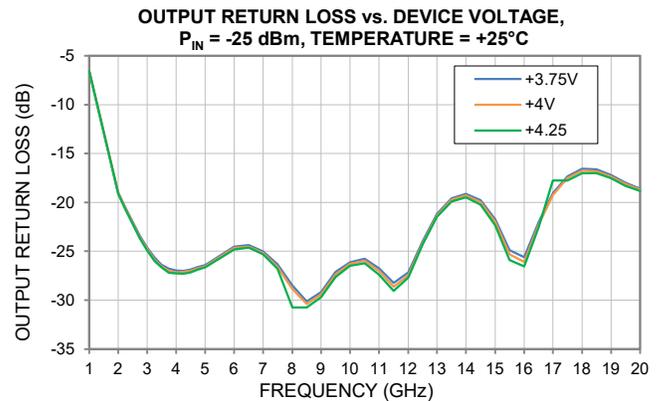
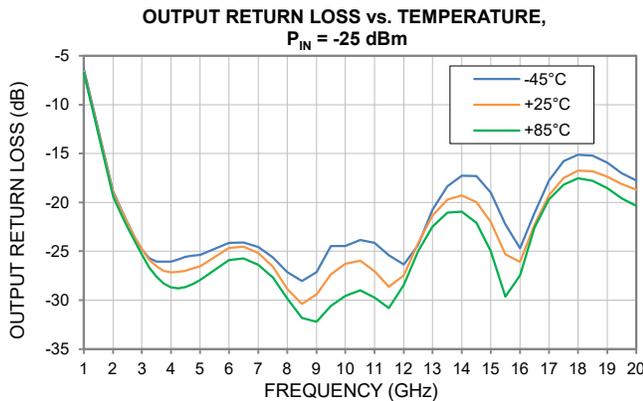
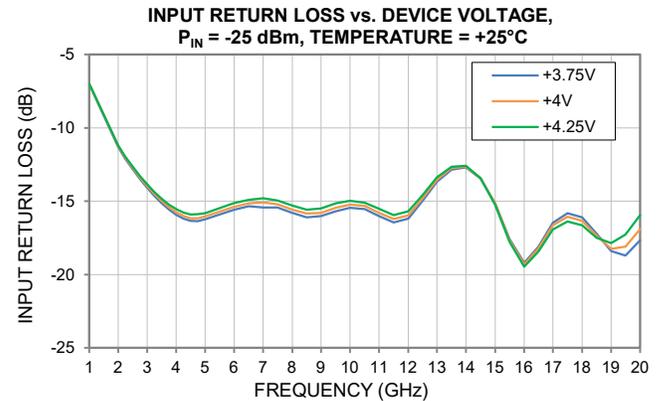
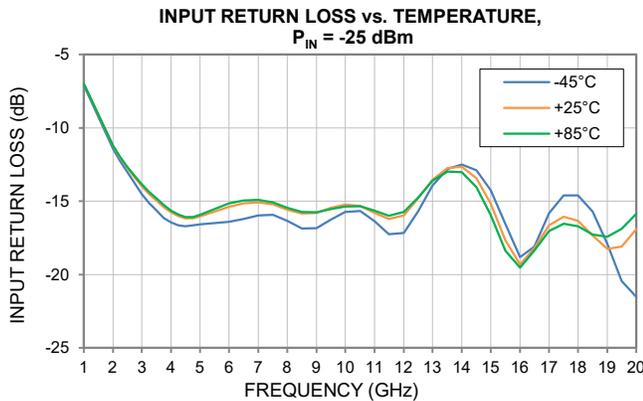
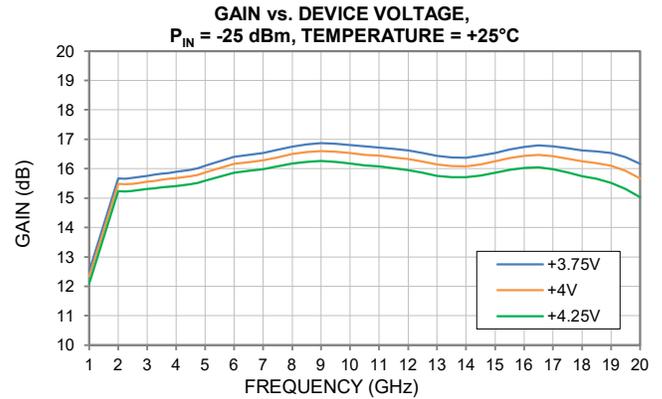
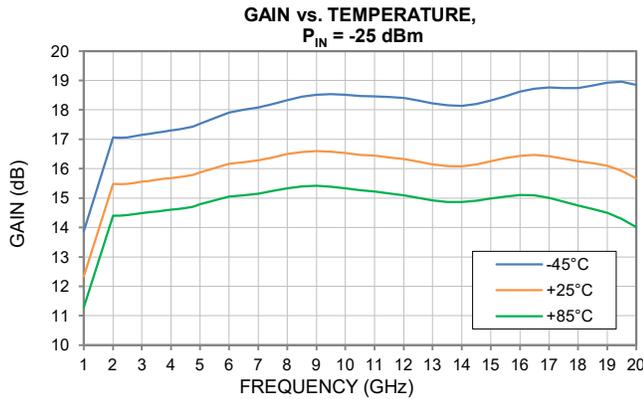
Output Return Loss = -S22 (dB)

TEST CONDITIONS: VDD = +4.25V, IDD = 210mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(GHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
1.00	11.1	66.8	-7.0	-6.7	197.8	0.9	26.6	17.7	8.7
2.00	14.2	69.7	-11.2	-19.5	285.6	1.1	26.6	19.2	7.9
2.25	14.2	67.0	-11.9	-21.1	212.5	1.1	26.5	19.4	7.8
2.50	14.2	67.9	-12.6	-22.7	238.3	1.0	26.3	19.5	7.8
2.75	14.2	72.2	-13.2	-24.2	395.1	1.0	26.1	19.6	7.7
3.00	14.2	66.5	-13.8	-25.6	206.2	1.0	25.8	19.6	7.7
3.25	14.3	64.3	-14.3	-26.9	161.1	1.0	25.6	19.8	7.7
3.50	14.3	63.7	-14.7	-27.9	150.2	1.0	25.3	19.6	7.7
3.75	14.3	64.8	-15.1	-28.6	171.5	1.0	25.5	19.7	7.6
4.00	14.4	60.9	-15.5	-29.0	109.6	1.0	24.9	19.6	7.6
4.25	14.4	71.0	-15.8	-29.1	349.9	1.0	25.2	19.6	7.5
4.50	14.4	63.2	-15.9	-29.0	143.3	1.0	24.5	19.6	7.5
4.75	14.4	62.5	-15.9	-28.6	131.9	1.0	24.2	19.8	7.5
5.00	14.5	60.6	-15.8	-28.3	104.9	1.0	24.3	19.5	7.4
6.00	14.8	60.1	-15.0	-26.1	97.0	1.0	23.9	19.3	7.2
6.50	14.8	60.8	-14.8	-26.1	104.7	1.0	23.7	19.8	7.0
7.00	14.9	64.4	-14.8	-26.7	158.2	1.0	23.4	19.9	6.9
7.50	15.0	61.3	-14.9	-28.1	109.7	1.0	23.5	20.0	6.8
8.00	15.0	63.1	-15.3	-30.3	134.8	1.0	23.1	19.8	6.7
8.50	15.1	59.4	-15.6	-32.6	88.0	1.0	23.1	19.9	6.6
9.00	15.1	60.3	-15.6	-33.0	98.9	1.0	23.0	19.9	6.5
9.50	15.1	59.9	-15.4	-31.3	95.1	1.0	22.8	20.1	6.5
10.00	15.0	61.7	-15.2	-30.2	117.2	1.0	22.7	20.1	6.4
10.50	14.9	62.2	-15.2	-29.6	126.1	1.0	22.4	20.1	6.3
11.00	14.9	60.9	-15.5	-30.3	109.4	1.0	22.5	20.0	6.2
11.50	14.8	58.3	-15.8	-31.4	82.4	1.0	22.3	19.8	6.2
12.00	14.8	58.2	-15.6	-28.9	81.8	1.0	22.1	19.6	6.1
12.50	14.7	56.8	-14.6	-25.4	70.3	1.0	21.8	19.7	6.1
13.00	14.6	58.4	-13.6	-22.8	84.6	1.0	21.7	19.7	6.0
13.50	14.5	58.2	-12.9	-21.4	83.2	1.0	21.6	19.4	6.0
14.00	14.5	58.5	-13.0	-21.3	86.2	1.0	21.5	19.6	5.9
14.50	14.6	57.8	-14.1	-22.5	80.6	1.0	21.0	19.5	5.8
15.00	14.6	59.4	-16.0	-25.7	98.5	1.0	20.9	19.3	5.8
15.50	14.7	56.8	-18.5	-30.8	73.6	1.0	20.5	19.1	5.8
16.00	14.7	58.0	-19.7	-28.0	84.2	1.0	20.2	18.8	5.8
16.50	14.7	58.2	-18.5	-22.9	86.9	1.0	19.8	18.8	5.9
17.00	14.6	59.5	-17.2	-20.0	102.0	1.0	19.6	18.9	5.9
17.50	14.5	59.2	-16.8	-18.4	98.6	1.0	19.3	18.8	6.0
18.00	14.3	56.7	-16.8	-17.8	75.2	1.0	18.8	18.9	6.1
18.50	14.2	58.0	-17.2	-18.0	90.1	1.0	18.6	18.7	6.2
19.00	14.0	61.0	-17.0	-18.7	129.5	1.0	18.2	18.4	6.5
19.50	13.8	62.8	-16.4	-19.8	165.5	1.0	17.9	18.2	6.7
20.00	13.5	58.9	-15.3	-20.6	108.7	1.0	17.8	18.1	6.9

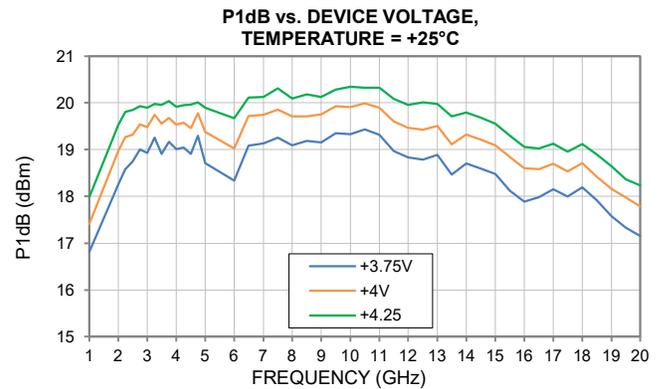
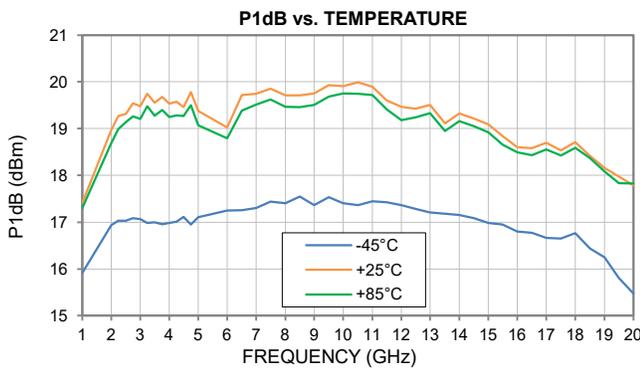
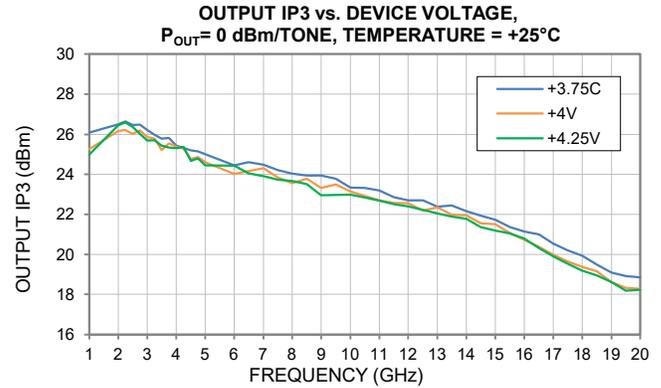
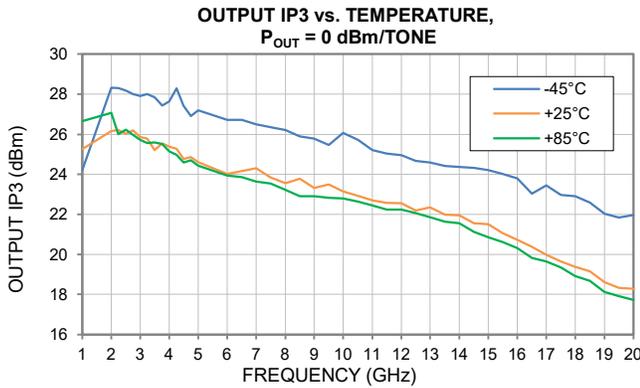
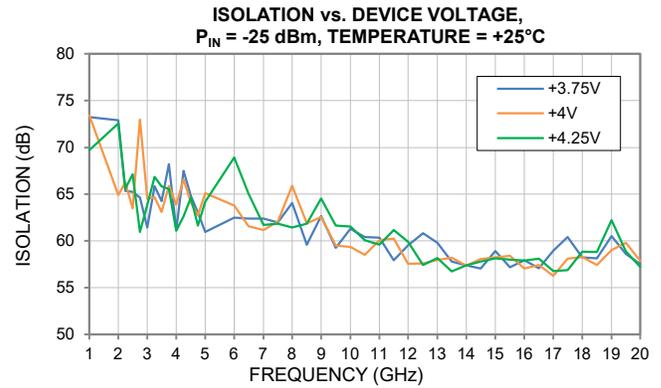
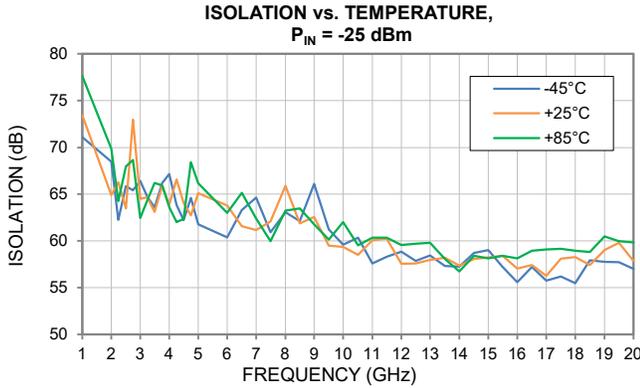
## Typical Performance Curves

Note: All data taken was at nominal conditions  $V_{DD} = +4V$ ,  $I_{DD} = 210$  mA, and  $V_{GG} = -0.52V$  unless noted otherwise. For over temperature data,  $I_{DD}$  is adjusted to 210 mA at each temperature specified. For over temperature data,  $I_{DD}$  is adjusted to 210 mA at each voltage specified.



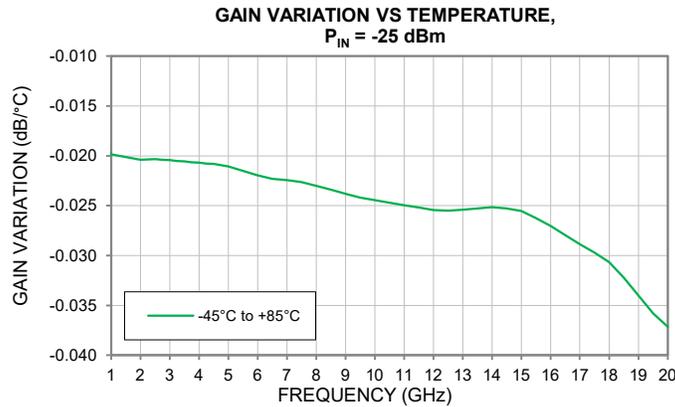
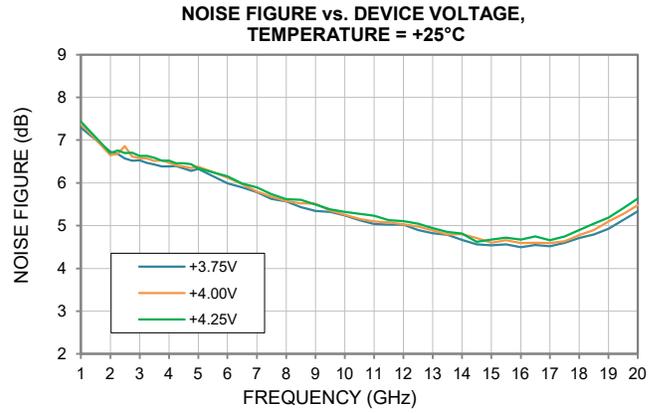
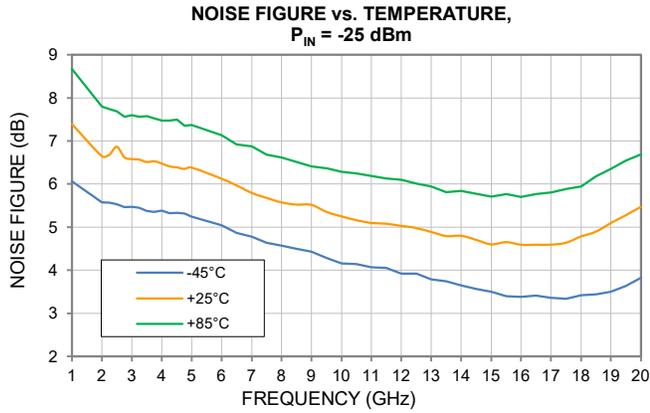
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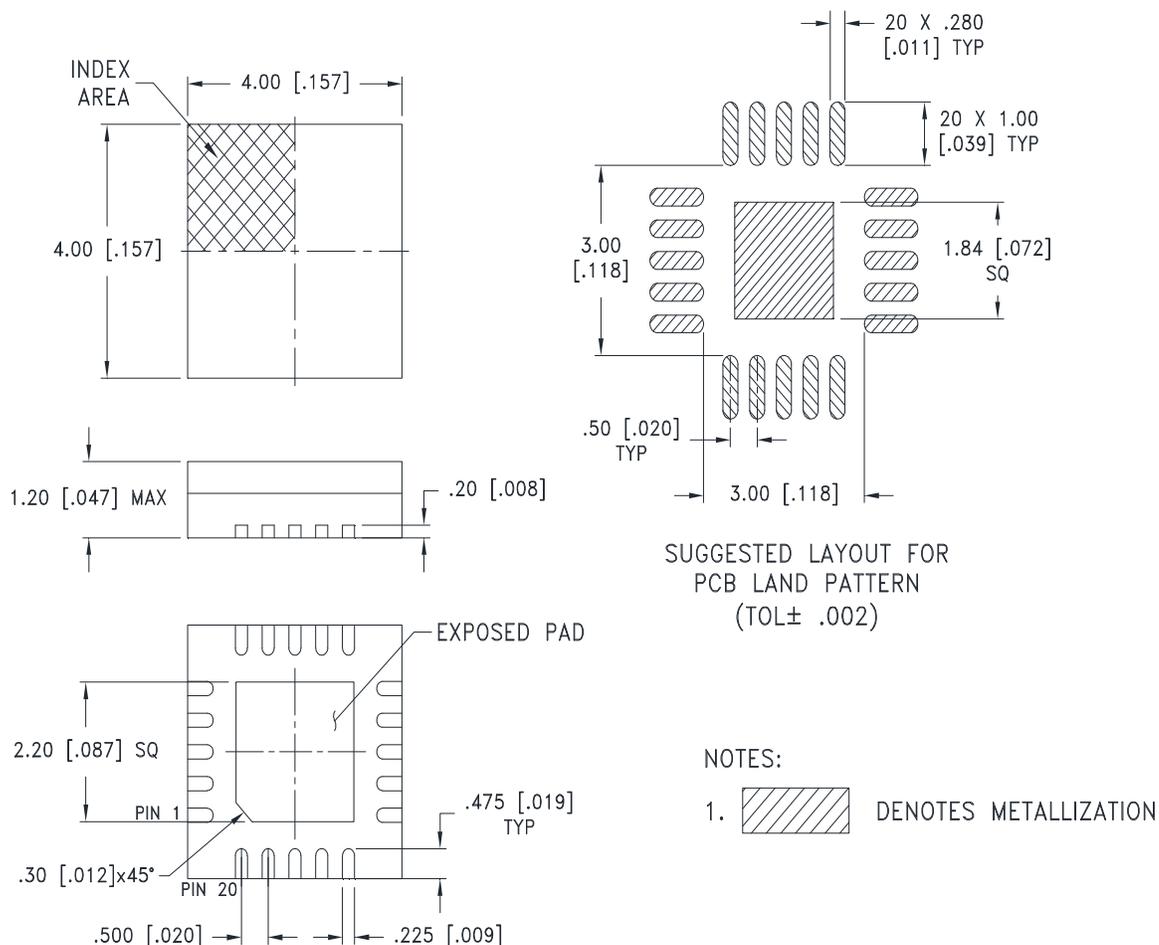
## Typical Performance Curves

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## Outline Dimensions

DG1847-1



**Weight: 0.1 Grams**

**Dimensions are in mm(inches). Tolerances: 2 Pl. ±.25(.01); 3 Pl. ± .127(.005)**

Notes:

1. Case material : Plastic
2. Termination finish: PPF (NiPdAu Plating 0.5 μm/0.02μm/0.05μm)



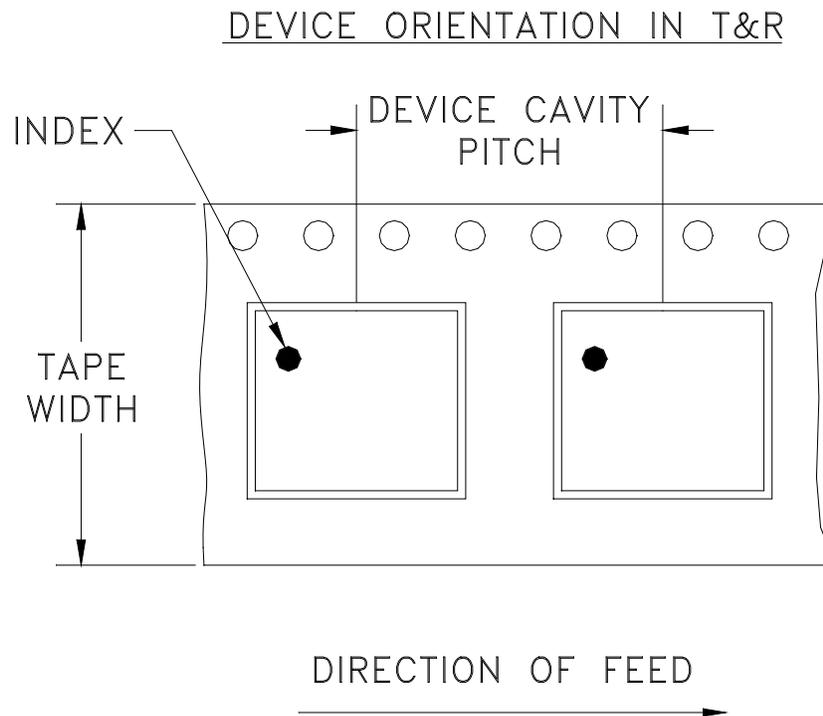
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
8	4	7	Small quantity standard	20
				50
				100
				200
				500
		7	Standard	1000, 2000, 3000

Note: Please consult individual model data sheet to determine device per reel availability.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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

**Mini-Circuits®**

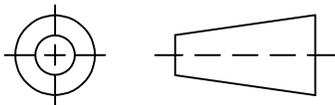
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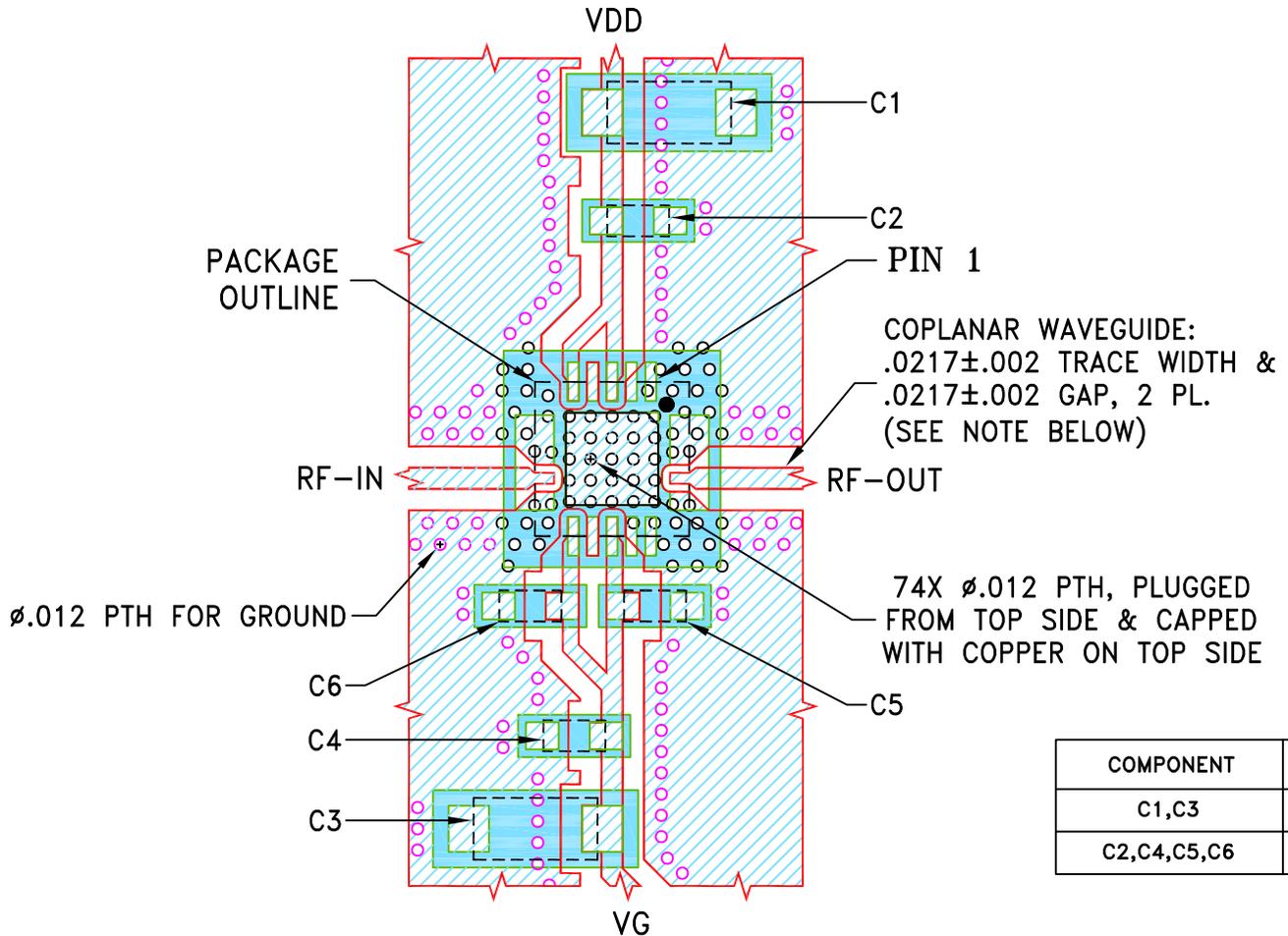
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-015709	NEW RELEASE	11/10/22	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR  
DG1847-1 CASE STYLE



NOTES:

1. TRACE WIDTH AND GAP PARAMETERS ARE SHOWN FOR ROGERS R04003 WITH DIELECTRIC THICKNESS  $.010 \pm .001$ "; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. UNIT FOOT PRINT IS OPTIMIZED FOR PERFORMANCE AND IS DIFFERENT FROM CASE STYLE DG1847-1 RECOMMENDATIONS.
3. CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB-AVA-2183+ OR TB-AVA-2183C+.
4. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DRAWN	ITG	11/09/22
CHECKED	GF	11/09/22
APPROVED	IL	11/09/22

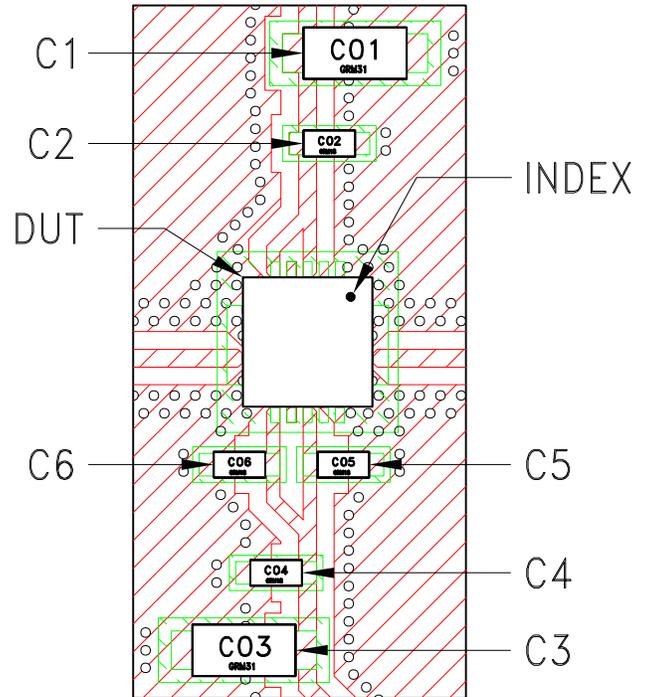
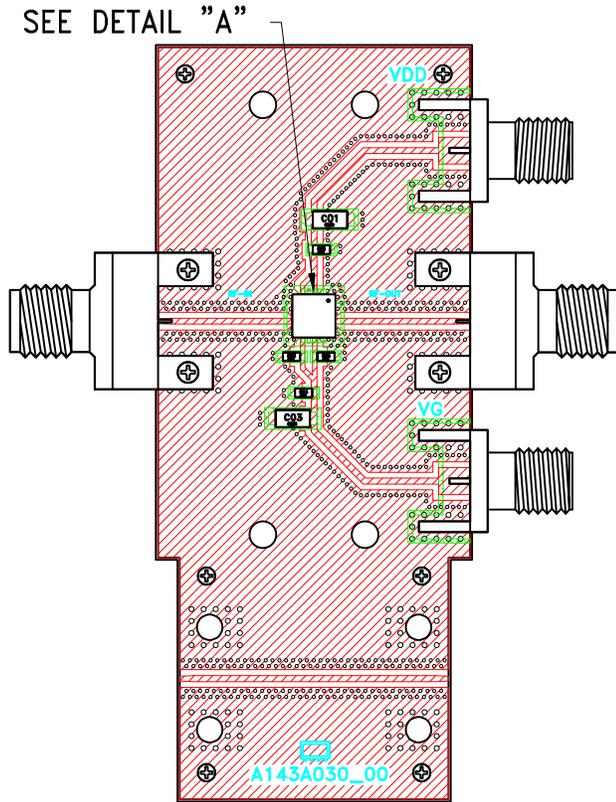
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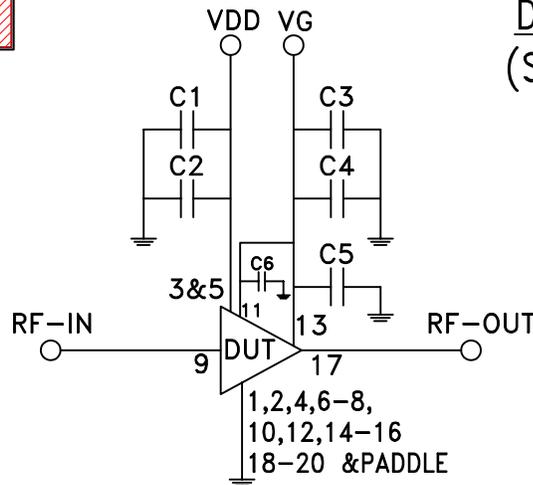
PL, DG1847-1, TB-AVA-2183(C)+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-742	OR
FILE:	98PL742	SCALE: 5:1	SHEET: 1 OF 1

# Evaluation Board and Circuit



DETAIL "A"  
(SCALE 3:1)



SCHMATIC DIAGRAM

Component	Size	Value	Part Number	Manufacturer
C1,C3	1206	10uF	B55-109-106K+	Samsung
C2,C4	0603	0.1uF	B55-18-104+	AVX
C5,C6	0603	100pF	B55-19-101G+	Murata

## Notes:

- 2.4mm Female Connectors.
- PCB Material: Roger RO4350B or equivalent,  
Dielectric constant=3.5, Thickness=0.010 inch

 Mini-Circuits®



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

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-45° to +85° C	Individual Model Data Sheet
Storage Temperature	-65° to 150°C	Individual Model Data Sheet
Moisture Sensitivity: Level 3	Bake at 125°C for 24 hours. Soak at 30°C/60%RH for 192 hours, Reflow 3 cycles at 260°C peak	J-STD-020D
Unbiased HAST	Temperature: 130°C, RH: 85%, Pressure: 33.3 psia Duration: 96 hours	JESD22-A118A, Test Condition A
Temperature Cycling	-65°C to +150°C, Dwell Time: 15 mins 500 cycles	JESD22-A104E, Condition C
HTSL	Temperature: 150°C Duration: 1000 hours	JESD22-A103E, Test Condition B
HTOL	1000 Hours at 125°C	JESD22-A108
ESD HBM	Refer datasheet for classification	JS-001
Vibration (Variable Frequency)	Sinusoidal vibration, 20 - 2000 Hz, 4 min sweeps, 16 min along each of 3 axis, amplitude limits of 20g and 0.06 in	MIL-STD-883, Method 2007, Condition A
Drop Test	1m drops onto concrete in final packed box in 6 orientations	--
Bend Test	1mm deflection for 5 seconds. Board thickness: 0.024", Span: 2.75"	--
Solderability	10x magnification	J-STD-002 Method B, B1



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
Resistance to Soldering Heat	Sn-Pb Eutectic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020