MMIC SURFACE MOUNT

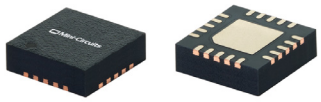
Wideband Amplifier

AVA-2183+

50Ω 2 to 20 GHz Excellent Gain Flatness

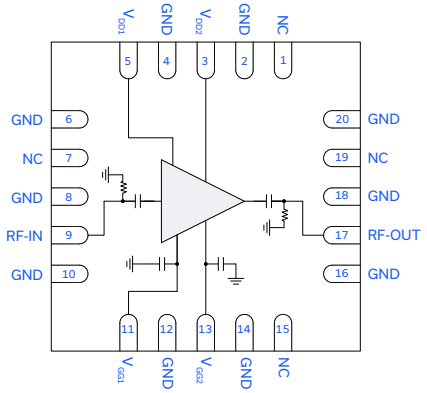
THE BIG DEAL

- 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

FUNCTIONAL DIAGRAM



APPLICATIONS

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

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

Wideband Amplifier

AVA-2183+

50Ω 2 to 20 GHz Excellent Gain Flatness

ELECTRICAL SPECIFICATIONS[1] AT +25°C, Zo = 50Ω, V_{DD} = +4 V, I_{DD} = 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 (P1dB)	2		+18.4		dBm
	5		+18.9		
	10		+19.3		
	15		+18.4		
	20		+16.9		
Output Third-Order Intercept Point (P_{OUT} = 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_{DD})		+3.75	+4	+4.25	V
Device Operating Current (I_{DD})[2]			210		mA
Gate Voltage (V_{GG})[3]			-0.52		V
Gate Current (I_{GG})			-0.2		µA
Device Current Variation vs. Temperature[4]			0.48		µA/°C
Device Current Variation vs. Voltage[5]			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_{IN} = -25 dBm. Increases to 230 mA at P1dB.
3. Typical Gate Voltage for when I_{DD} = 210 mA. V_{GG} must be adjusted so that I_{DD} = 210 mA.
4. (Current at Tmax°C - Current at Tmin°C) / (Tmax °C - Tmin °C)
5. (Current at Nominal V +ΔV in mA) - (Current at Nominal V -ΔV mA)/(2ΔV mV)

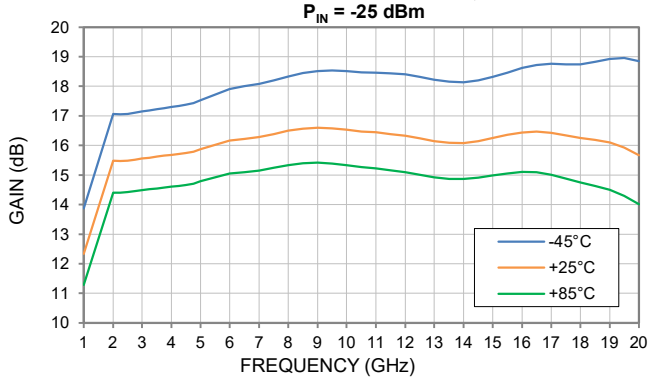
Wideband Amplifier AVA-2183+

50Ω 2 to 20 GHz Excellent Gain Flatness

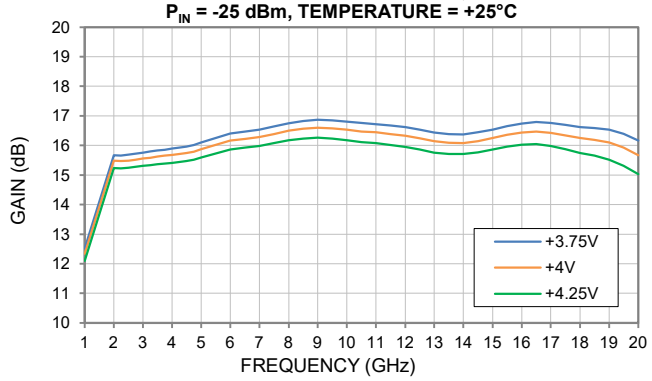
TYPICAL PERFORMANCE GRAPHS

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

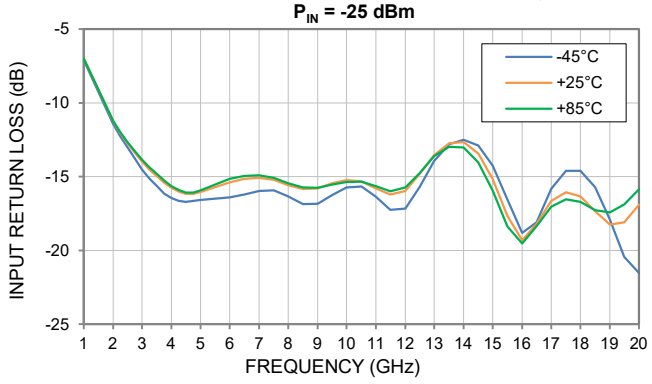
GAIN vs. TEMPERATURE, P_{IN} = -25 dBm



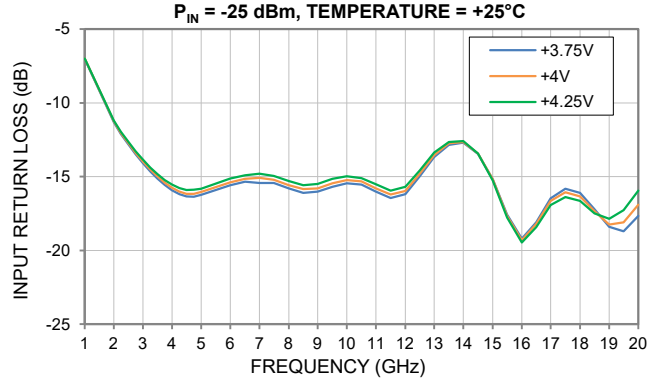
GAIN vs. DEVICE VOLTAGE, P_{IN} = -25 dBm, TEMPERATURE = +25°C



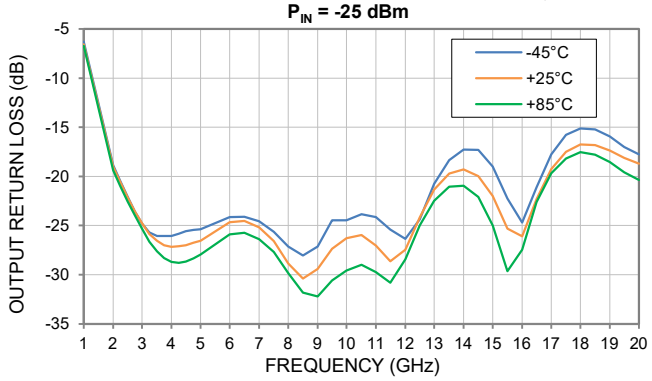
INPUT RETURN LOSS vs. TEMPERATURE, P_{IN} = -25 dBm



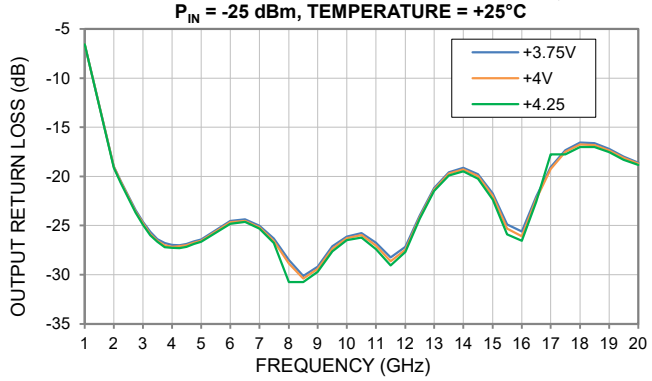
INPUT RETURN LOSS vs. DEVICE VOLTAGE, P_{IN} = -25 dBm, TEMPERATURE = +25°C



OUTPUT RETURN LOSS vs. TEMPERATURE, P_{IN} = -25 dBm



OUTPUT RETURN LOSS vs. DEVICE VOLTAGE, P_{IN} = -25 dBm, TEMPERATURE = +25°C



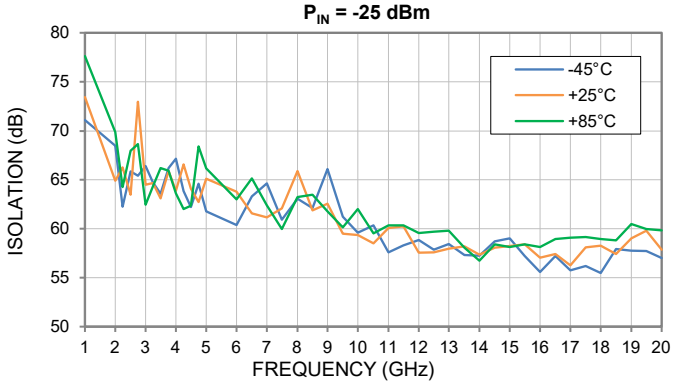
Wideband Amplifier AVA-2183+

50Ω 2 to 20 GHz Excellent Gain Flatness

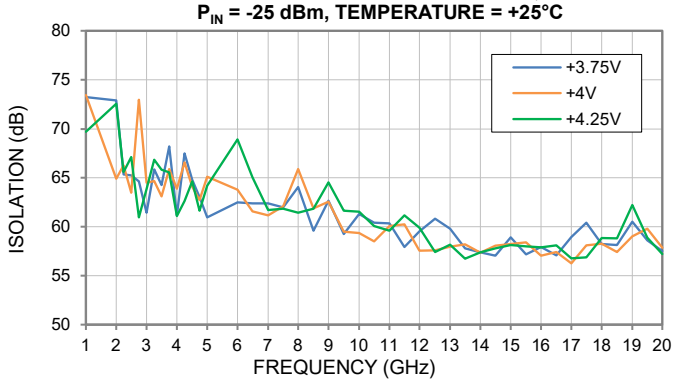
TYPICAL PERFORMANCE GRAPHS

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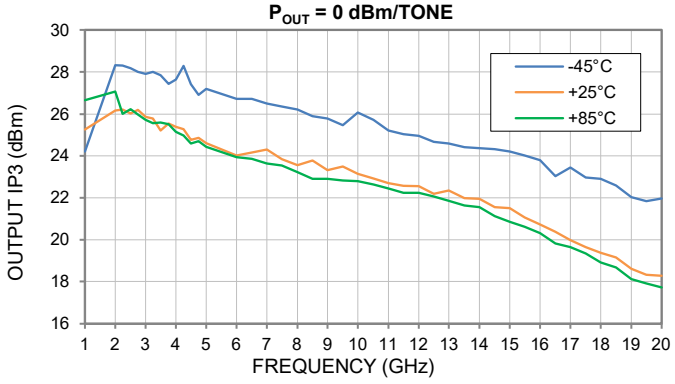
ISOLATION vs. TEMPERATURE, P_{IN} = -25 dBm



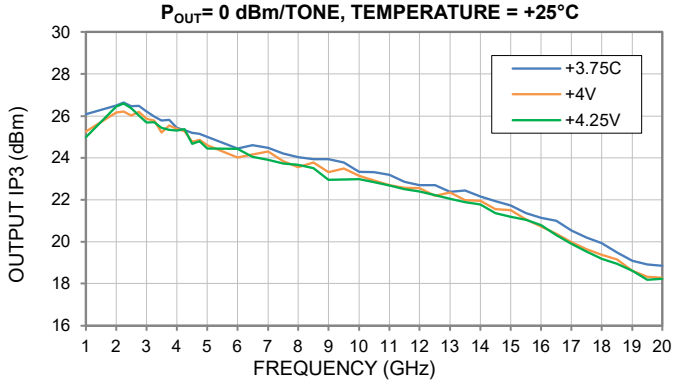
ISOLATION vs. DEVICE VOLTAGE, P_{IN} = -25 dBm, TEMPERATURE = +25°C



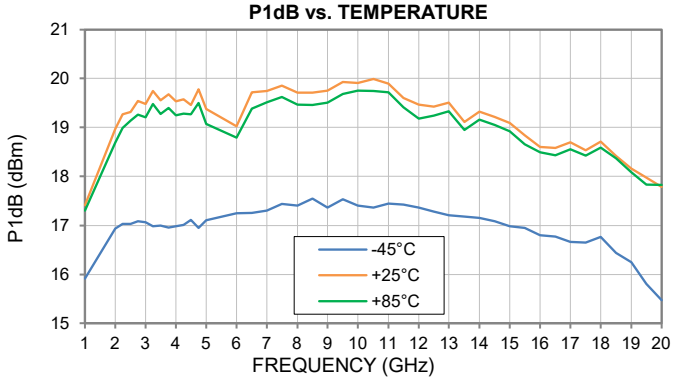
OUTPUT IP3 vs. TEMPERATURE, P_{OUT} = 0 dBm/TONE



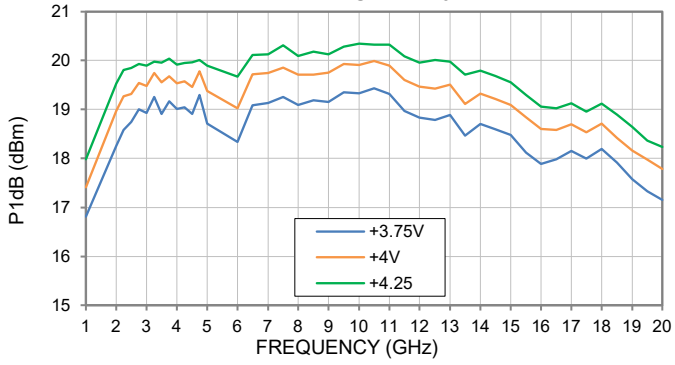
OUTPUT IP3 vs. DEVICE VOLTAGE, P_{OUT}= 0 dBm/TONE, TEMPERATURE = +25°C



P1dB vs. TEMPERATURE



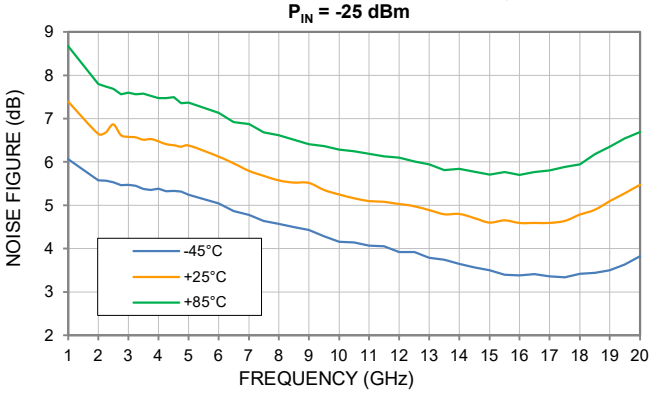
P1dB vs. DEVICE VOLTAGE, TEMPERATURE = +25°C



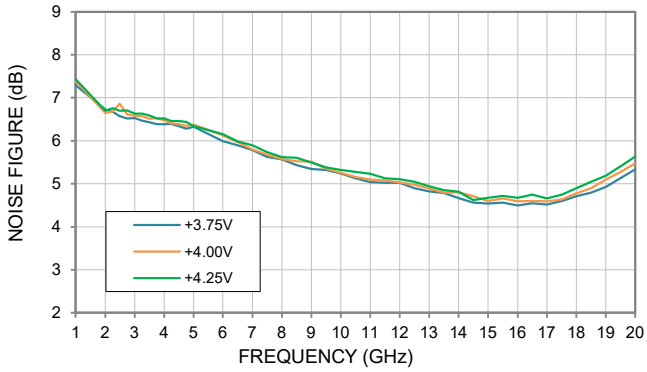
TYPICAL PERFORMANCE GRAPHS

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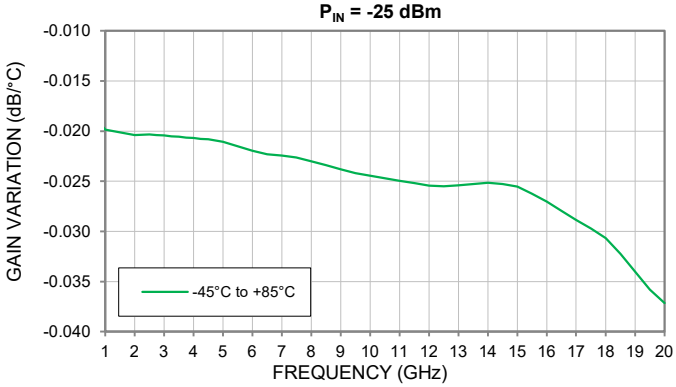
NOISE FIGURE vs. TEMPERATURE, P_{IN} = -25 dBm



NOISE FIGURE vs. DEVICE VOLTAGE, TEMPERATURE = +25°C



GAIN VARIATION VS TEMPERATURE, P_{IN} = -25 dBm



ABSOLUTE MAXIMUM RATINGS[6]

Parameter	Ratings
Operating Temperature	-45°C to +85°C
Storage Temperature	-65°C to +150°C
Total Power Dissipation	1.7 W
Junction Temperature[7]	+175°C
RF Input Power (CW)	+23 dBm (5 minutes max) +14 dBm (continuous)
DC Voltage on RF-OUT	+7 V
Current I_{GG}	-5 mA to 0 mA
Current I_{DD}	320 mA
DC Voltage on V_{DD} (V_{DD1} & V_{DD2})	+7 V
DC Voltage on V_{GG} (V_{GG1} & V_{GG2})	-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 (Θ_{jc})[8]	38.8°C/W

8. Θ_{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

Wideband Amplifier AVA-2183+

50Ω 2 to 20 GHz Excellent Gain Flatness

FUNCTIONAL DIAGRAM

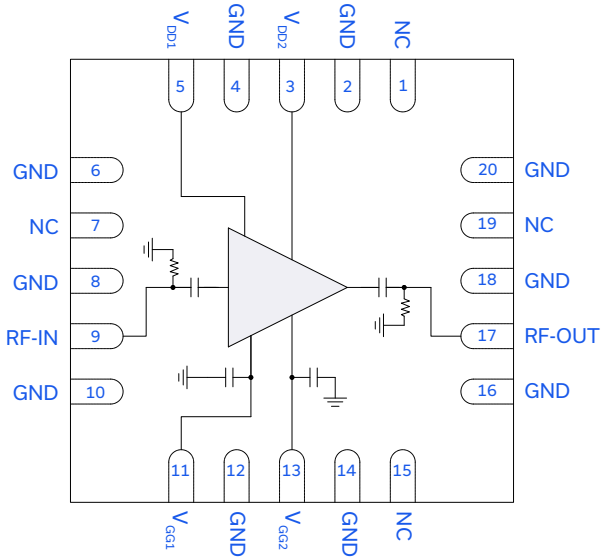


Figure 1. AVA-2183+ Functional Diagram

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_{DD1}	5	DC Input Pad connects to voltage input port V_{DD1}.
V_{DD2}	3	DC Input Pad connects to voltage input port V_{DD2}.
V_{GG1}	11	DC Input Pad connects to voltage input port V_{GG1}. DUT includes an integrated shunt capacitor.
V_{GG2}	13	DC Input Pad connects to voltage input port V_{GG2}. 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

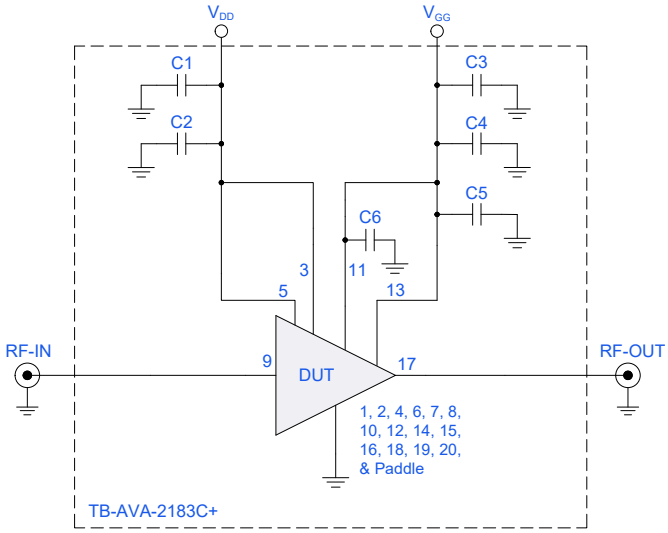


Figure 2. DUT soldered on Mini-Circuits Characterization Test Board: TB-AVA-2183C+

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_{IN} = -25 dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/tone at output
3. V_{DD} = +4 V, I_{DD} = 210 mA

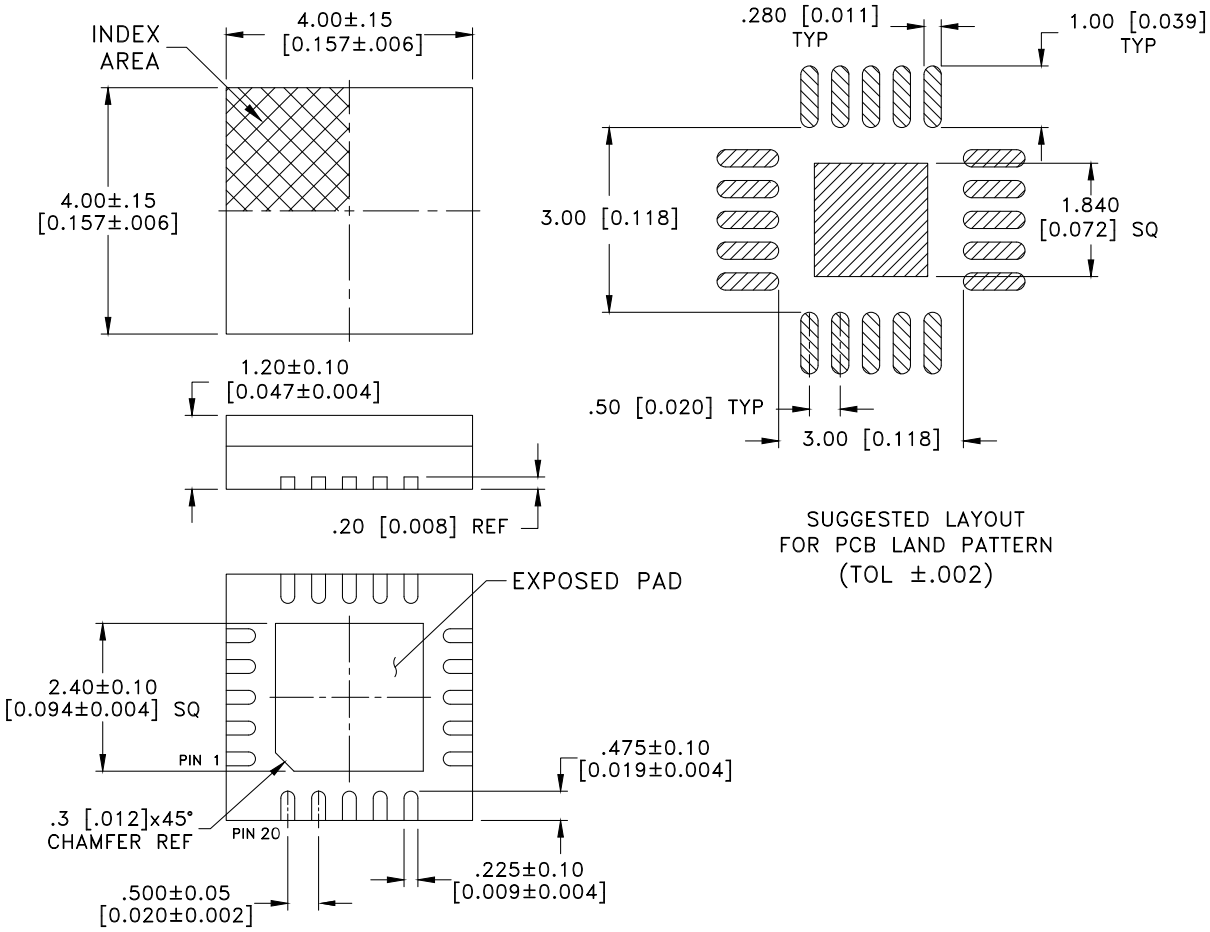
Caution: Permanent damage to the device will occur if the Power ON and Power OFF Sequences are not followed.

Power ON Sequence:
1. Set V_{GG} = -1.3 V. Apply V_{GG}.
2. Set V_{DD} = +4 V. Apply V_{DD}.
3. Increase V_{GG} to obtain desired I_{DD} as shown in specification table.
4. Apply RF Signal.

Power OFF Sequence:
1. Turn off RF Signal.
2. Adjust V_{GG} down to -1.3 V.
3. Turn off V_{DD}.
4. Turn off V_{GG}.

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

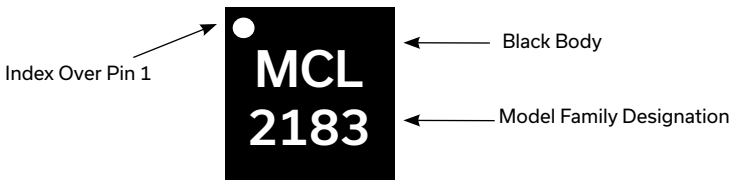
CASE STYLE DRAWING



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

Wideband Amplifier AVA-2183+

50Ω 2 to 20 GHz Excellent Gain Flatness

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD CLICK HERE

Performance Data	Data Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DG1847-1. QFN-style package, exposed paddle, Lead Finish: PPF
RoHs Status	Compliant
Tape & Reel **Standard Quantities Available on Reel**	F66 7" Reels with 20, 50 , 100, 200, 500, 1000, 2000, or 3000 devices
Suggested Layout for PCB Design	PL-742
Evaluation Board	TB-AVA-2183C+ Gerber File
Environmental Ratings	ENV08T10
Product Handling	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

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	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(GHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
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
(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
(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
(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
(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	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(GHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
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
(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
(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)

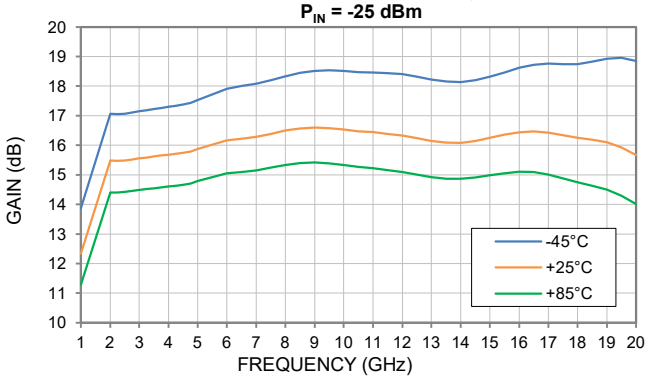
TEST CONDITIONS: VDD = +4.25V, IDD = 210mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(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

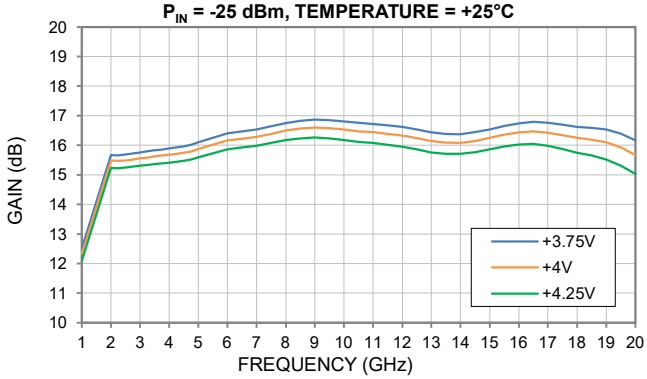
Typical Performance Curves

Note: All data taken was at nominal conditions VDD = +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.

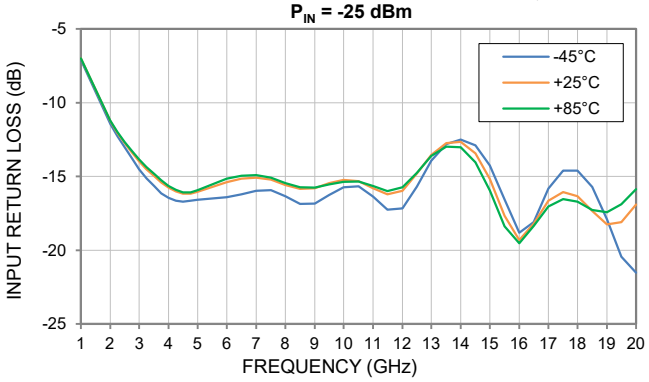
GAIN vs. TEMPERATURE, P_{IN} = -25 dBm



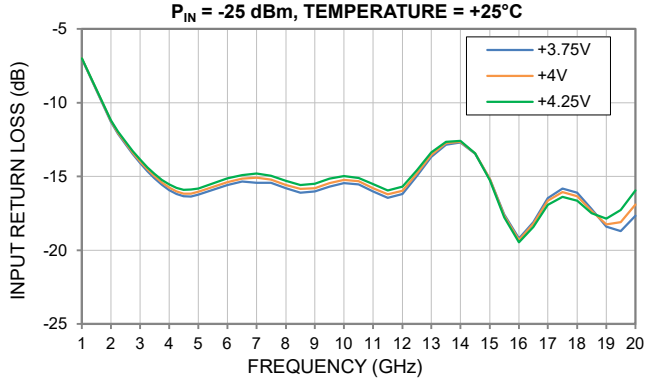
GAIN vs. DEVICE VOLTAGE, P_{IN} = -25 dBm, TEMPERATURE = +25°C



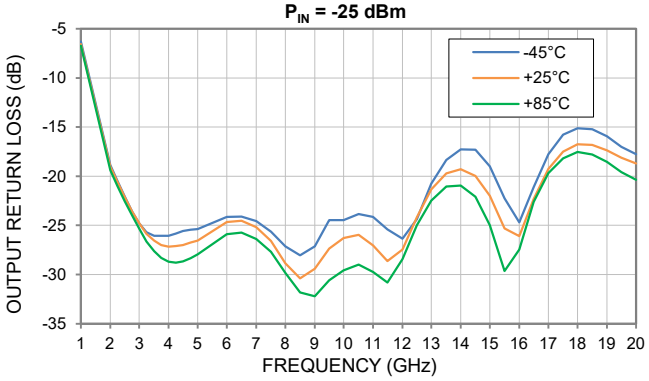
INPUT RETURN LOSS vs. TEMPERATURE, P_{IN} = -25 dBm



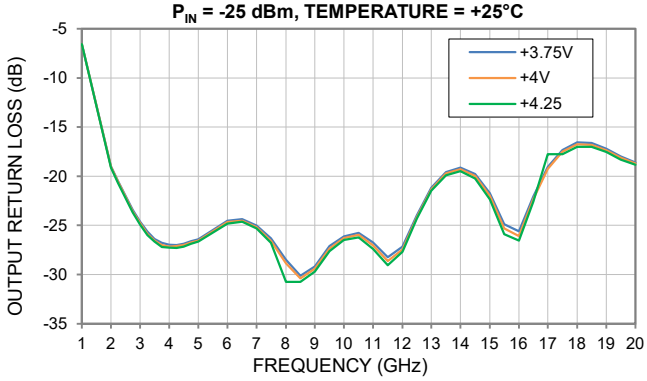
INPUT RETURN LOSS vs. DEVICE VOLTAGE, P_{IN} = -25 dBm, TEMPERATURE = +25°C



OUTPUT RETURN LOSS vs. TEMPERATURE, P_{IN} = -25 dBm



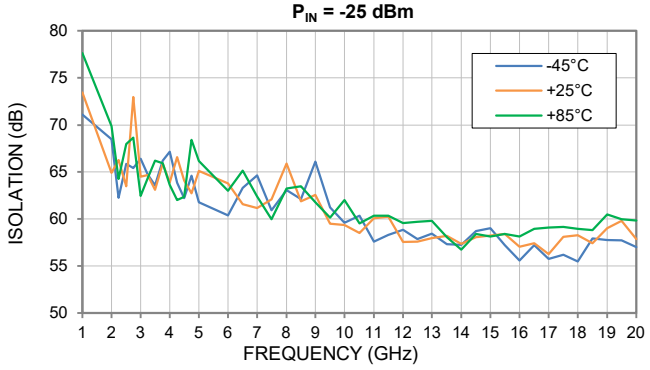
OUTPUT RETURN LOSS vs. DEVICE VOLTAGE, P_{IN} = -25 dBm, TEMPERATURE = +25°C



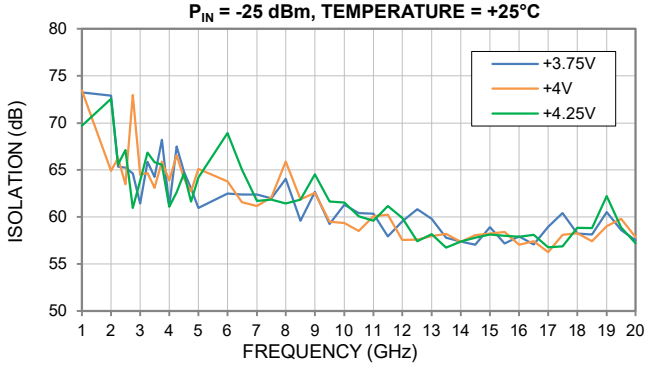
Typical Performance Curves

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.

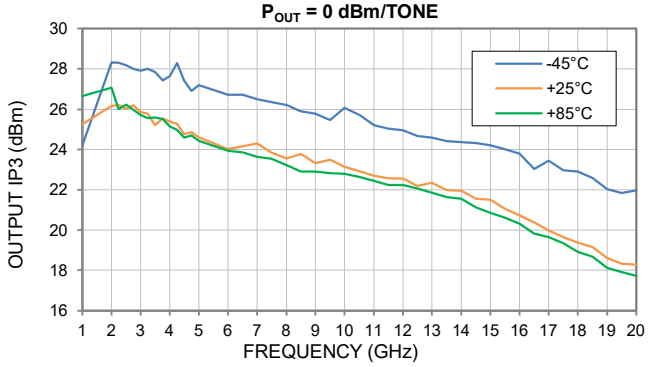
ISOLATION vs. TEMPERATURE, P_{IN} = -25 dBm



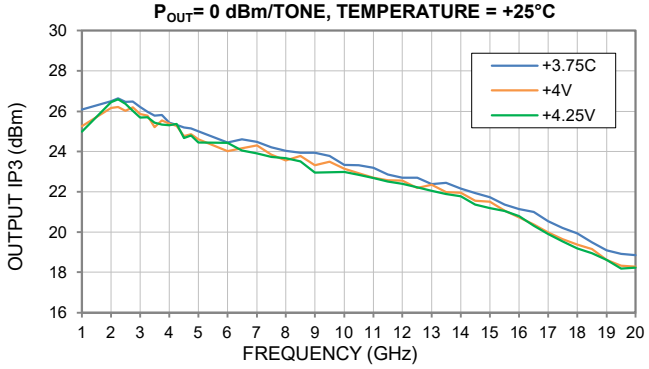
ISOLATION vs. DEVICE VOLTAGE, P_{IN} = -25 dBm, TEMPERATURE = +25°C



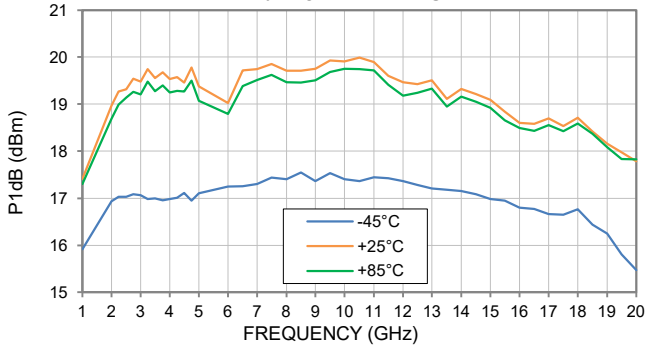
OUTPUT IP3 vs. TEMPERATURE, P_{OUT} = 0 dBm/TONE



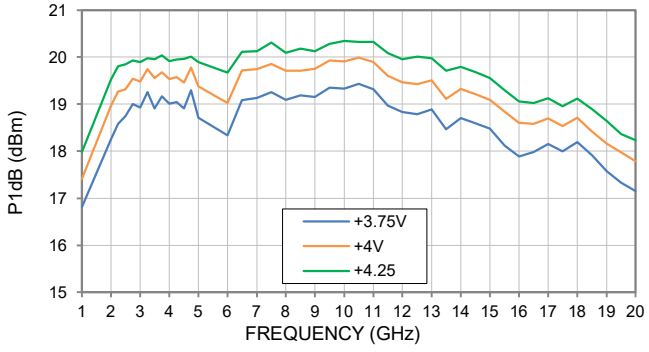
OUTPUT IP3 vs. DEVICE VOLTAGE, P_{OUT}= 0 dBm/TONE, TEMPERATURE = +25°C



P1dB vs. TEMPERATURE



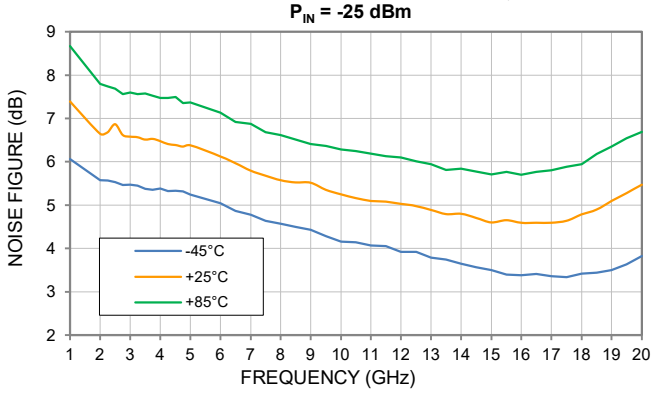
P1dB vs. DEVICE VOLTAGE, TEMPERATURE = +25°C



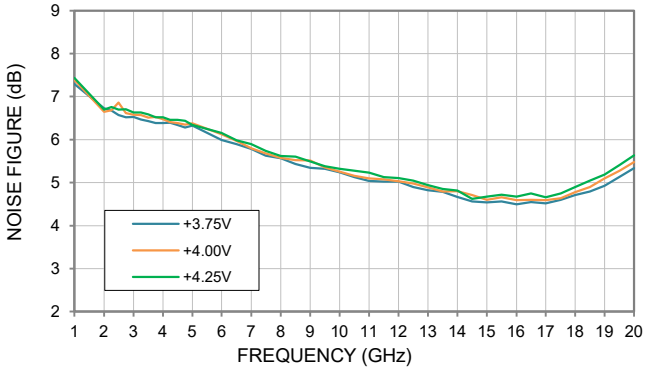
Typical Performance Curves

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.

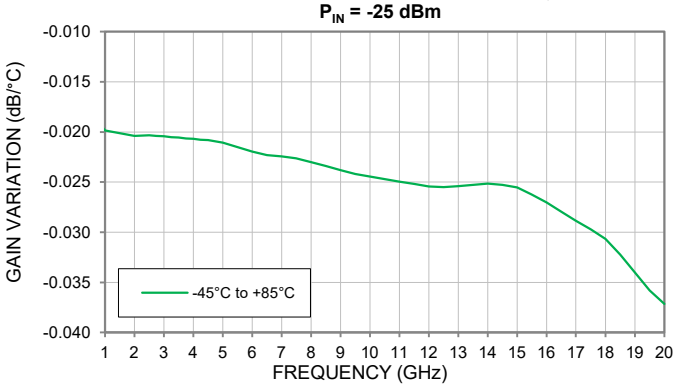
NOISE FIGURE vs. TEMPERATURE, P_{IN} = -25 dBm



NOISE FIGURE vs. DEVICE VOLTAGE, TEMPERATURE = +25°C



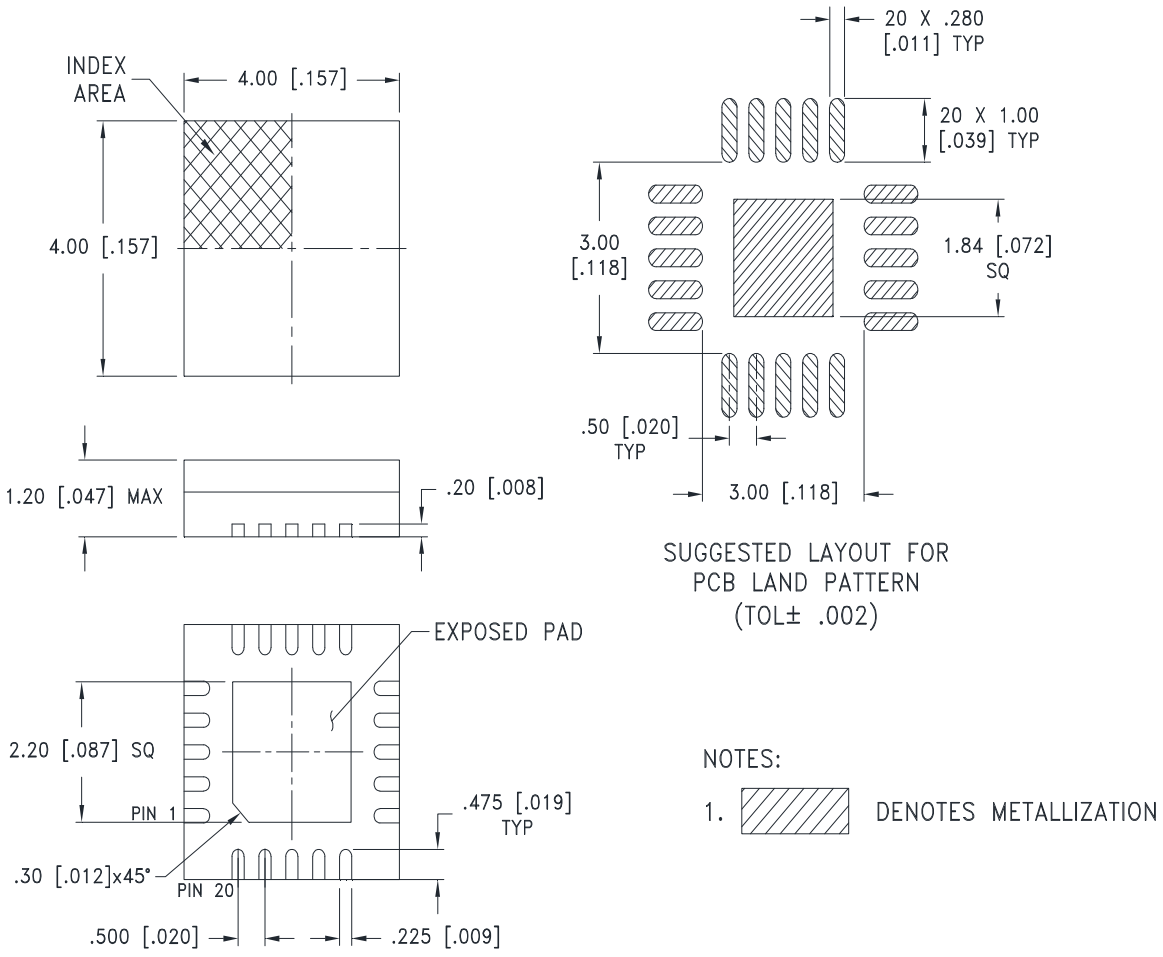
GAIN VARIATION VS TEMPERATURE, P_{IN} = -25 dBm



Case Style DG

Outline Dimensions

DG1847-1



Weight: 0.1 Grams

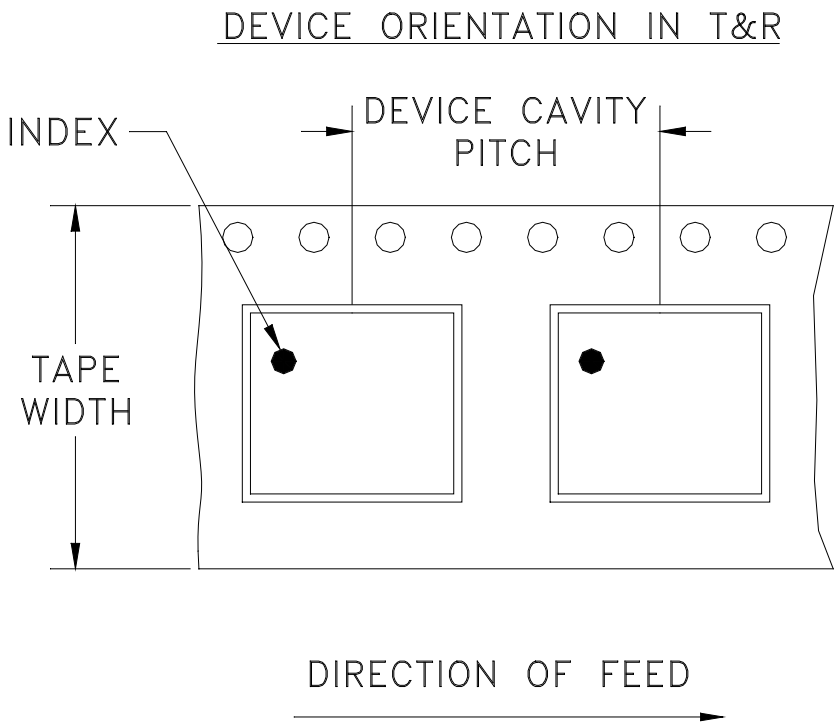
Dimensions are in mm(inches). Tolerances: 2 Pl. ±.25(.01); 3 Pl. ± .127(.005)

Notes:

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

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Tape & Reel Packaging TR-F66



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

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

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

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

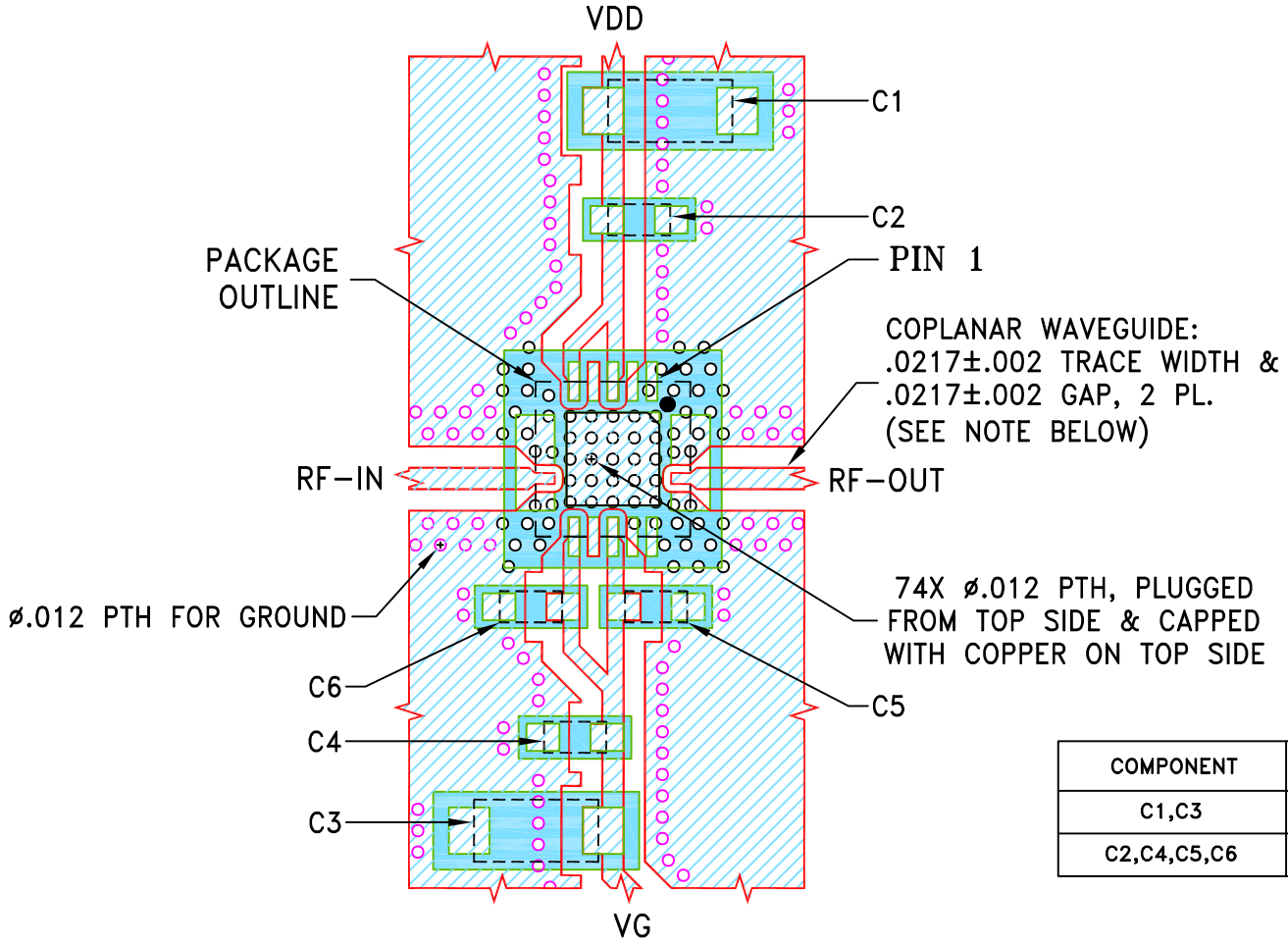
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THIRD ANGLE PROJECTION

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



COMPONENT	SIZE
C1,C3	1206
C2,C4,C5,C6	0603

NOTES:

1. TRACE WIDTH AND GAP PARAMETERS ARE SHOWN FOR ROGERS RO4003 WITH DIELECTRIC THICKNESS .010±.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
DIMENSIONS ARE IN INCHES	DRAWN	ITG	11/09/22
TOLERANCES ON:	CHECKED	GF	11/09/22
2 PL DECIMALS ±	APPROVED	IL	11/09/22
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

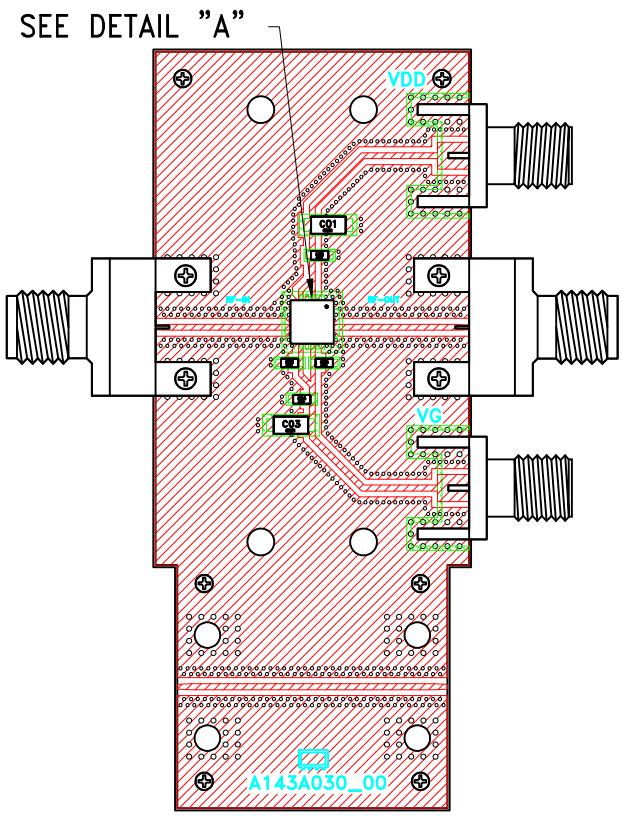
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

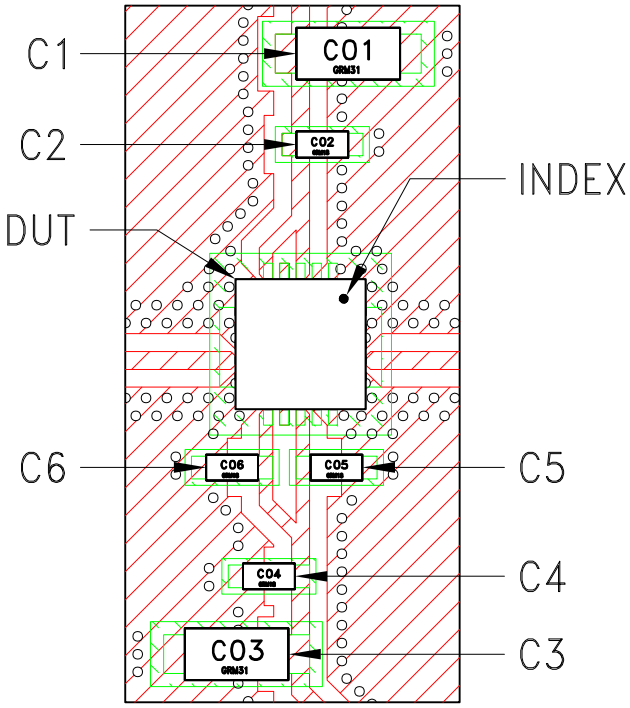
PL, DG1847-1, TB-AVA-2183(C)+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-742	OR

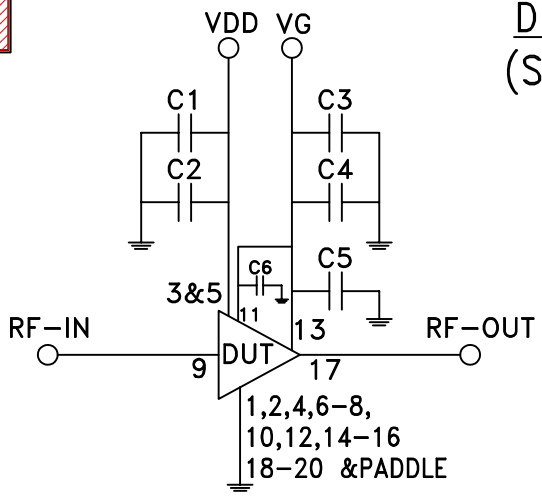
FILE:	SCALE:	SHEET:
98PL742	5:1	1 OF 1

Evaluation Board and Circuit





DETAIL "A"
(SCALE 3:1)



SCHEMATIC 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:

1. 2.4mm Female Connectors.
2. PCB Material: Roger RO4350B or equivalent, Dielectric constant=3.5, Thickness=0.010 inch

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Environmental Specifications **ENV08T10**

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, -55° to +95°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
ESD CDM	Refer datasheet for classification	JESD22-C101
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	--

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Specification	Test/Inspection Condition	Reference/Spec
Bend Test	1mm deflection for 5 seconds. Board thickness: 0.024", Span: 2.75"	--
Solderability	10x magnification	J-STD-002 Method B, B1
Resistance to Soldering Heat	Sn-Pb Eutectic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020

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