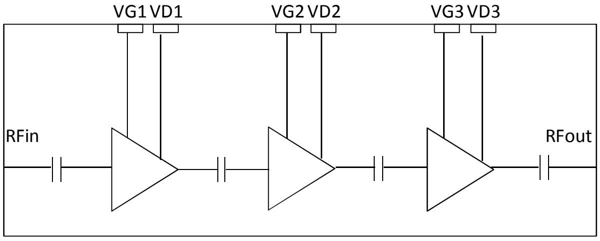
MECKULNA2

Ku-Band GaN HEMT Low Noise Amplifier



Product Description

MECKULNA2 is a 0.25 µm GaN HEMT based Low Noise Amplifier designed by MEC for Ku-Band applications.

In the frequency range from 13 GHz to 16 GHz MECKULNA2 provides more than 24.5 dB of linear gain, 2.2 dB of noise figure, P1dB of 21.5 dBm and Output TOI of 30 dBm.

In addition to the high electrical performances, this GaN LNA provides an high level of input power robustness being capable of surviving up to 25 dBm without degrading its performance.

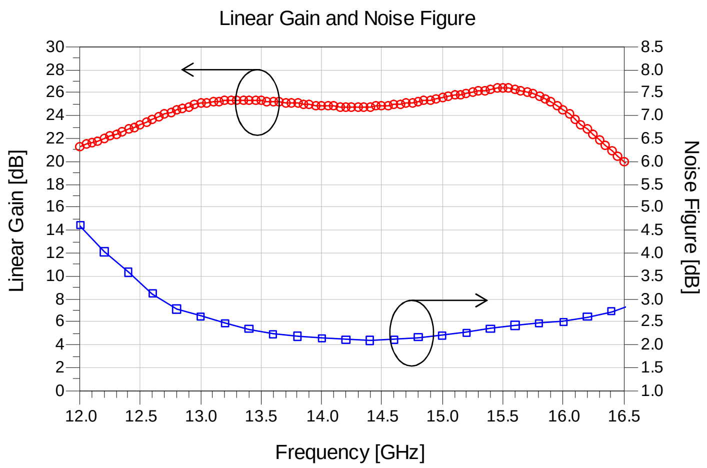
Main Features

- 0.25 µm GaN HEMT Technology
- 13 – 16 GHz full performance Frequency Range
- Small Signal Gain > 24.5 dB
- Noise Figure: < 2.5 dB
- P1dB > 21.5 dBm, Psat > 29.5 dBm
- Output TOI > 30 dBm
- Overdrive Pin > 25 dBm
- Bias: Vd = 15 V, Id = 84 mA, Vg = -2.8 V (Typ.)
- Chip Size: 4 x 2 x 0.1 mm^3

Typical Applications

- Radar
- Telecom

Measured Data



Main Characteristics

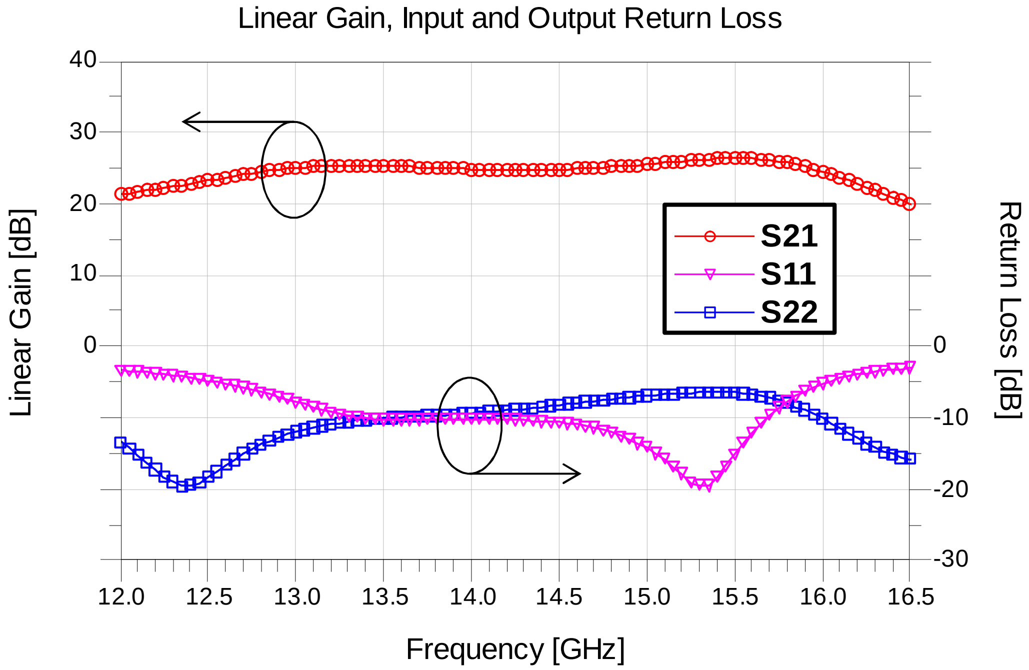
Test Conditions: T_{base_plate} = 25 °C , Vd = 15 V, Idq = 84 mA

Parameter	Min	Typ	Max	Unit
Operating frequency	13		16	GHz
Small Signal Gain		25		dB
Noise Figure		2.2	2.5	dB
Input Return Loss		-10		dB
Output Return Loss		-8		dB
Output Power at 1 dB of Gain Compression		21.5		dBm
Output Power at Saturation		29.5		dBm
Max. Overdrive Input Power *	25			dBm
Output TOI (1 MHz tone spacing)		30		dBm
Drain Supply Voltage		15		V
Supply Quiescent Drain Current		84		mA
DC Power Consumption		1.26		W
DC Power Consumption at 1 dB of Gain Compr.		1.5		W

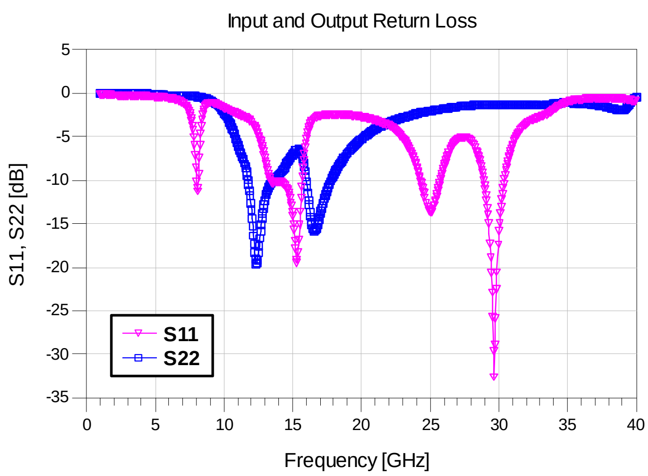
* LNA ruggedness to overdrive input power data are available upon request.

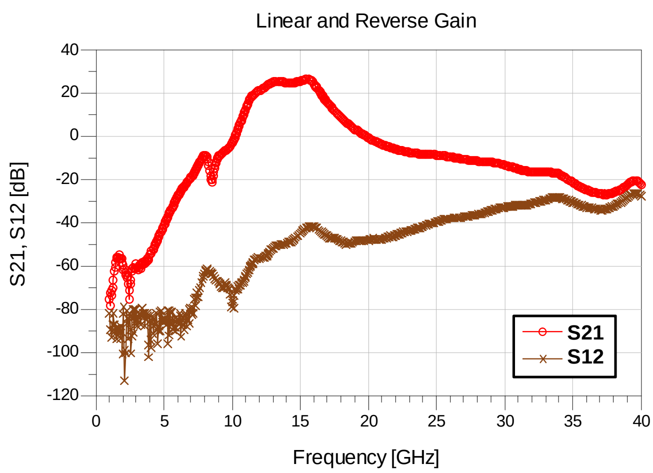
Small Signal Measurements

Test Conditions: T_{base_plate} = 25°C , Vd = 15 V, Idq = 84 mA



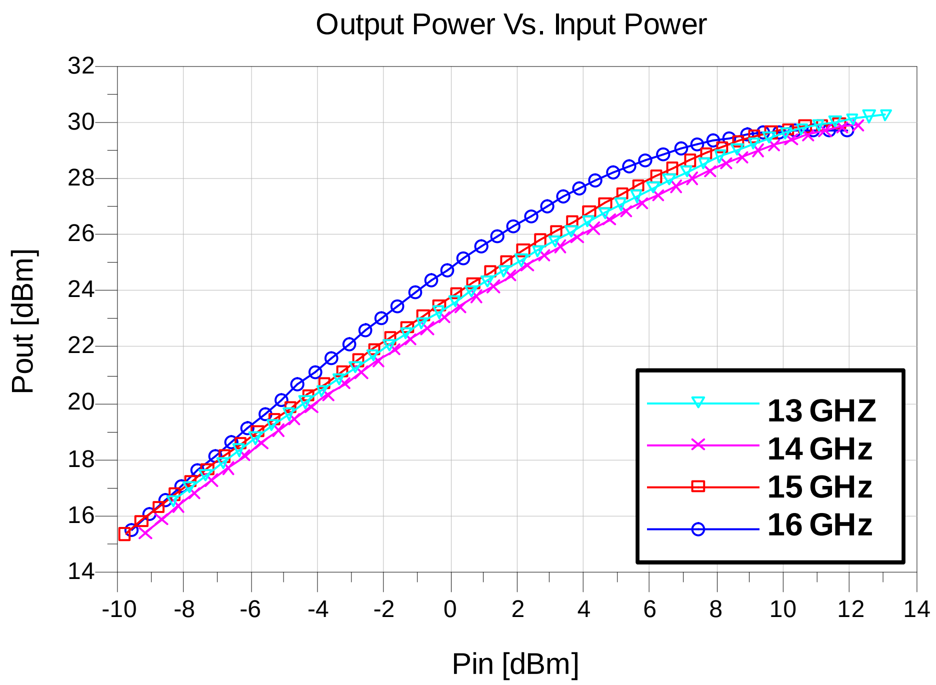
Broadband Small Signal Measurements

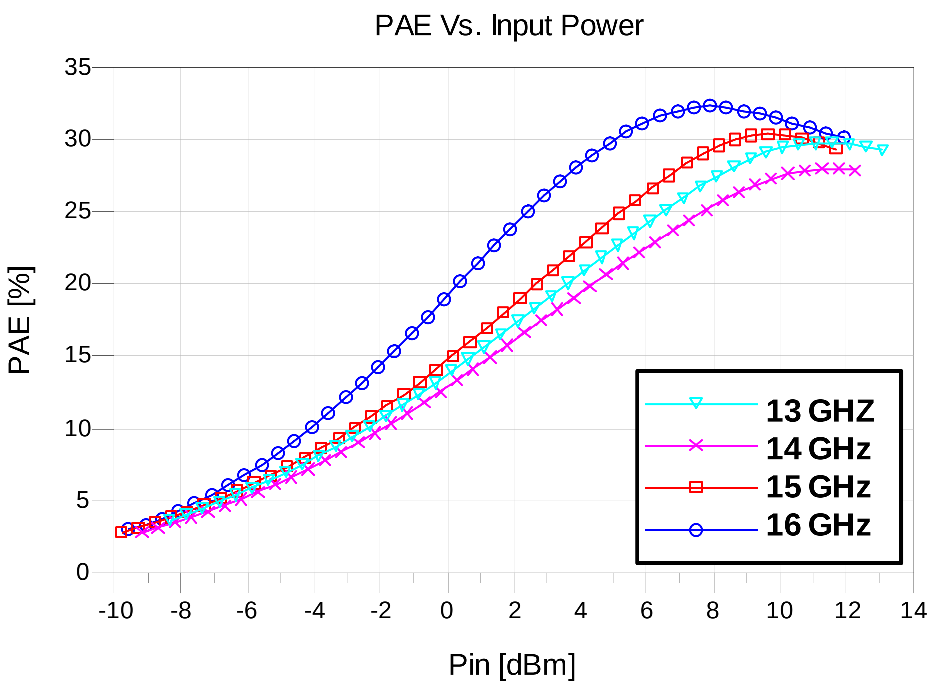




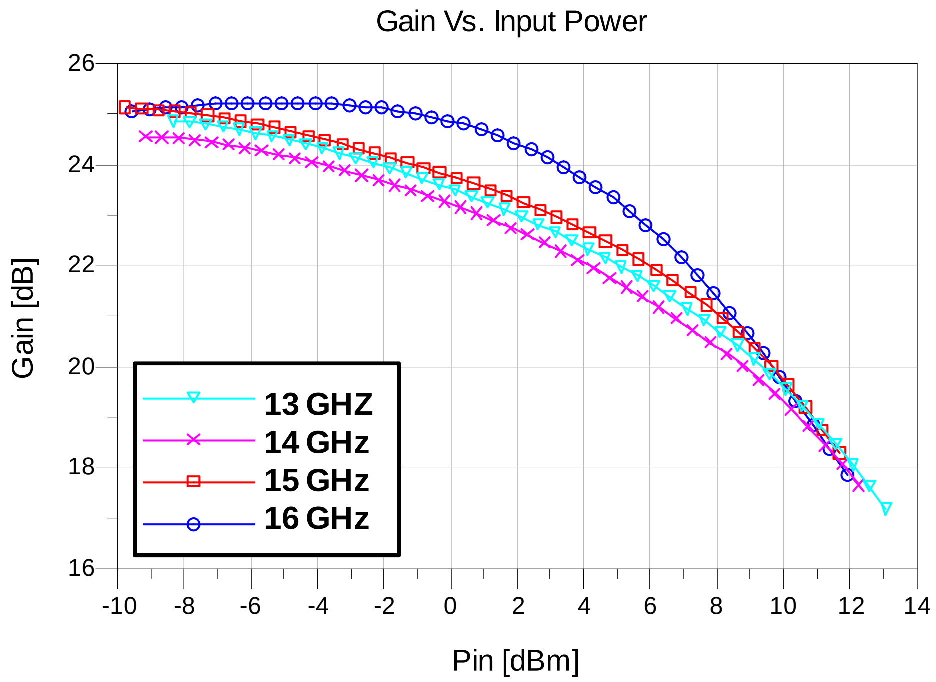
Measured Performances Vs. Pin @ Frequency [13, 14, 15, 16] GHz

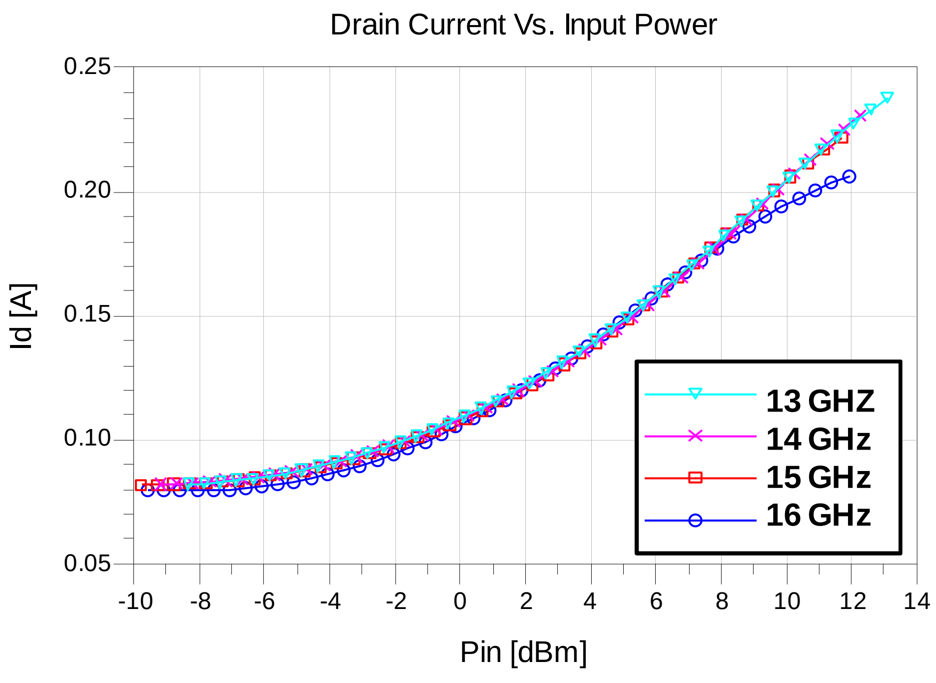
Test Conditions: T_{base_plate} = 25 °C , Vd = 15 V, Idq = 84 mA





Test Conditions: T_{base_plate} = 25 °C , Vd = 15 V, Idq = 84 mA

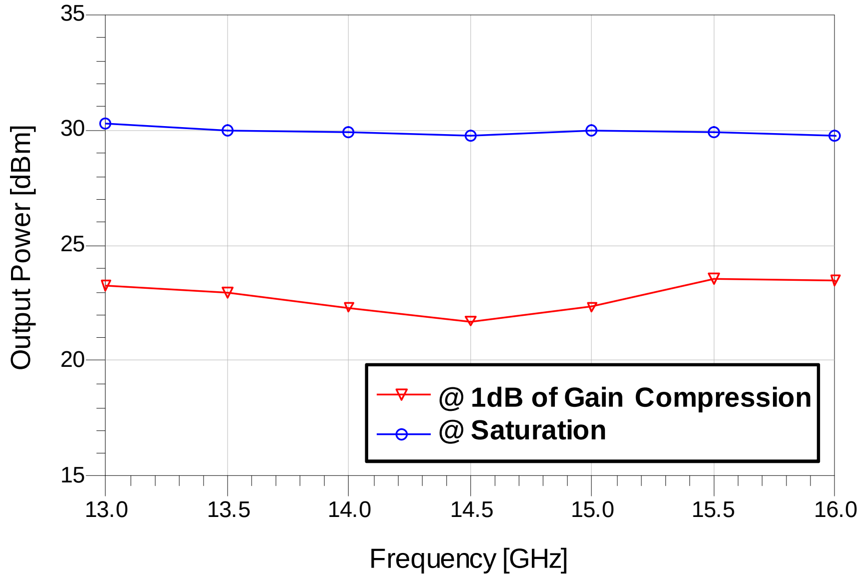


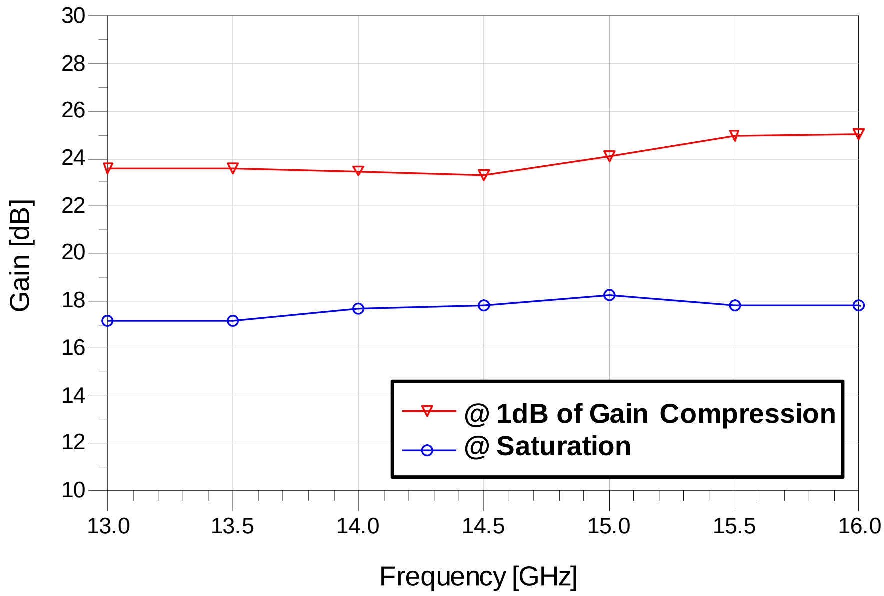


Measured Performances Vs. Frequency @ Saturation and @ 1dB of Gain Compression

Test Conditions: T_{base_plate} = 25 °C , Vd = 15 V, Idq = 84 mA

- P1dB condition reached at Pin = -1 dBm
- PSat condition reached at Pin = 12 dBm

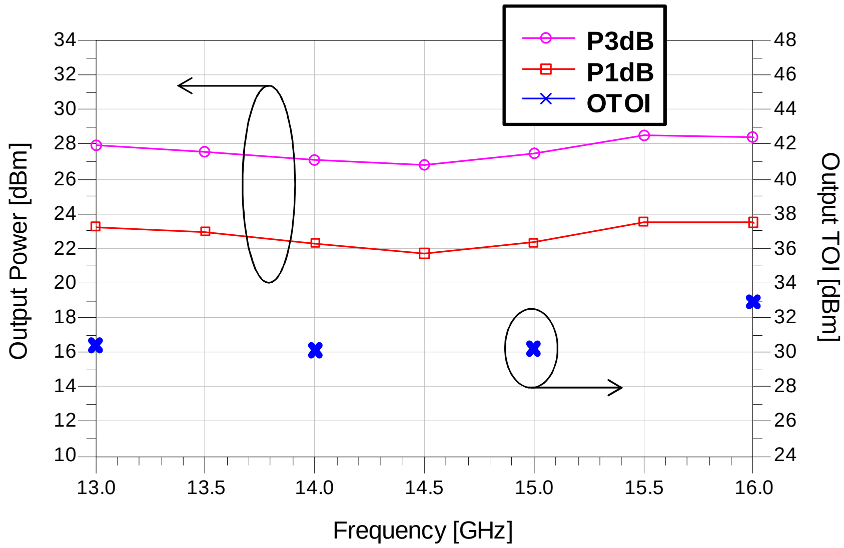


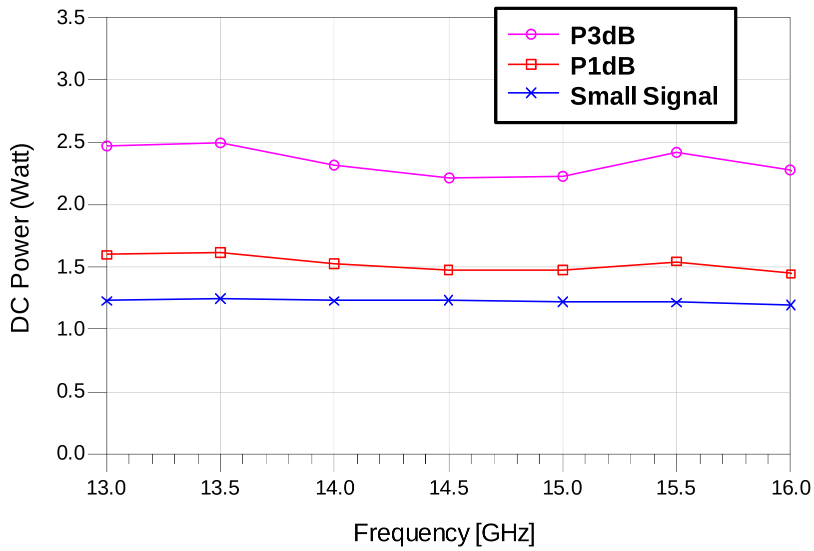


Nonlinear Measurement: Output Power, OTOI, DC Power

Test Conditions: T_{base_plate} = 25 °C , Vd = 15 V, Idq = 84 mA

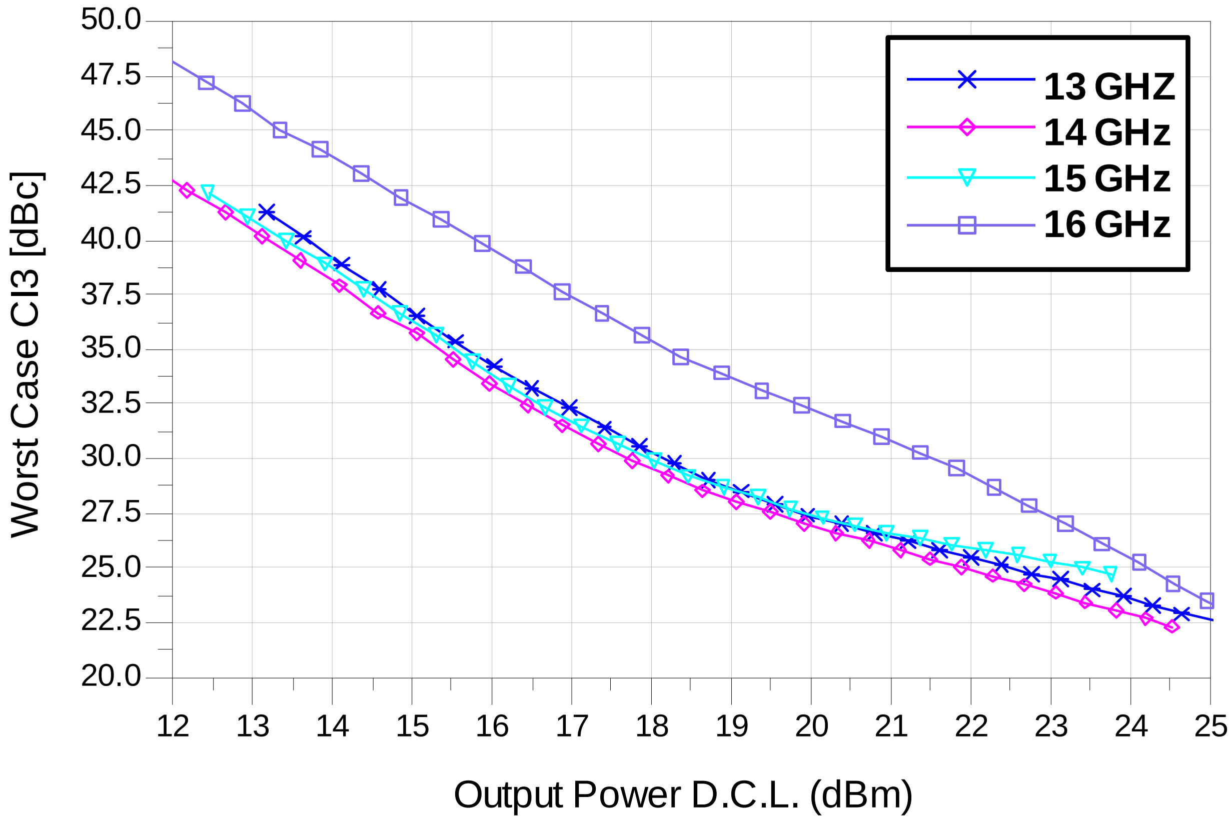
- P1dB condition reached at Pin = -1 dBm
- P3dB condition reached at Pin = 5 dBm
- OTOI: 2 tone measurements with tone spacing of 1 MHz. Linear regression formula with Pin D.C.L. = [-12, -8] dBm



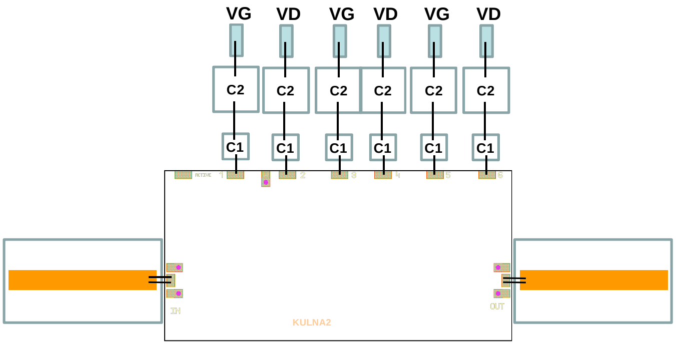


Nonlinear Measurement: 3rd Order Inter-Modulation Distortion

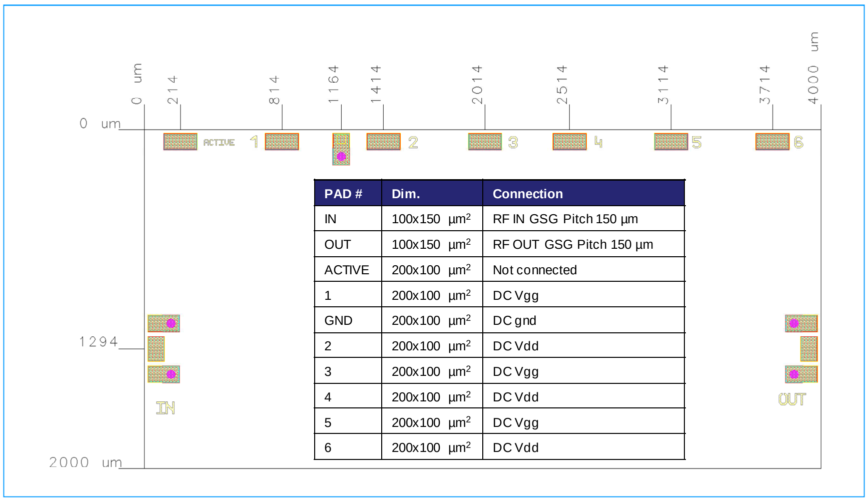
Test Conditions: T_{base_plate} = 25°C , Vd = 15 V, Idq = 84 mA,
2-tone measurements with tone spacing of 1 MHz - Centre frequency from 13 GHz to 16 GHz



Bond Pad Configuration & Assembly Recommendations



Bond Pad #	Connection	External Components
IN and OUT	2 Bonding Wires L_bond = 0.3nH	
1, 3, 5 **Vg**	L_bond ≤ 1 nH	C1 = 100pF/10V C2 = 10nF/10V
2, 4, 6, **Vd**	L_bond ≤ 1nH	C1 = 100pF/50V C2 = 10nF/50V



PAD #	Dim.	Connection
IN	100x150 μm²	RF IN GSG Pitch 150 μm
OUT	100x150 μm²	RF OUT GSG Pitch 150 μm
ACTIVE	200x100 μm²	Not connected
1	200x100 μm²	DC Vgg
GND	200x100 μm²	DC gnd
2	200x100 μm²	DC Vdd
3	200x100 μm²	DC Vgg
4	200x100 μm²	DC Vdd
5	200x100 μm²	DC Vgg
6	200x100 μm²	DC Vdd

Eutectic Die bond using AuSn (80/20) solder is recommended.

The backside of the die is the Source (ground) contact.

Thermosonic ball or wedge bonding are the preferred connection methods.

Gold wire must be used for connections.

Bias Procedure

Bias-Up

1. Vg set to - 4 V.
2. Vd set to +15 V.
3. Adjust Vg until quiescent Id is 84 mA (Vg = -2.8 V Typical).
4. Apply RF signal.

Bias-Down

1. Turn off RF signal.
2. Reduce Vg to -4 V (Id0 ≈ 0 mA).
3. Set Vd to 0 V.
4. Turn off Vd.
5. Turn off Vg.

Contact Information

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Notice

The furbished information is believed to be reliable. However, performances and specifications contained herein are based on preliminary characterizations and then susceptible to possible variations. On the basis of customer requirements the product can be tested and characterized in specific operating conditions and, if needed, tuned to meet custom specifications.