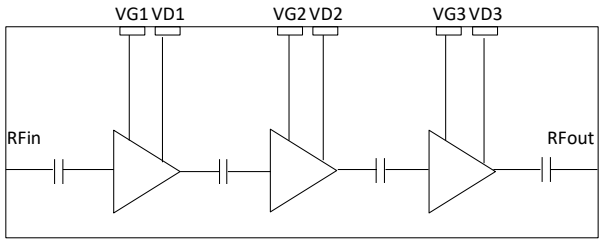
MECKULNAT

Ku-Band GaN HEMT Low Noise Amplifier



Product Description

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

In the frequency range from 12 GHz to 15 GHz MECKULNAT provides 23 dB of linear gain, 1.7 dB of noise figure, P1dB of 22 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.

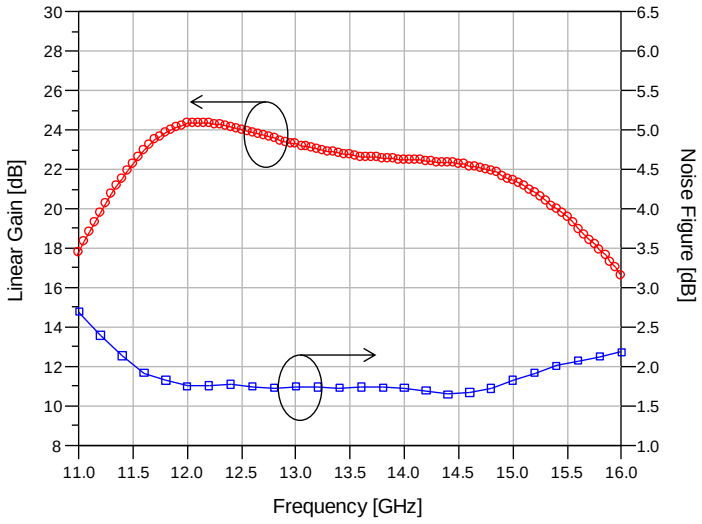
Main Features

- 0.25 µm GaN HEMT Technology
- 12 – 15 GHz full performance Frequency Range
- Small Signal Gain > 22 dB
- Noise Figure: < 1.75 dB
- P1dB > 21 dBm, Psat > 27 dBm
- Output TOI > 29 dBm
- Overdrive Pin > 25 dBm
- Bias: Vd = 10 V, Id = 70 mA, Vg = -2.9 V (Typ.)
- Chip Size: 4 x 2 x 0.1 mm^3

Typical Applications

- Radar
- Telecom

Measured Data



Main Characteristics

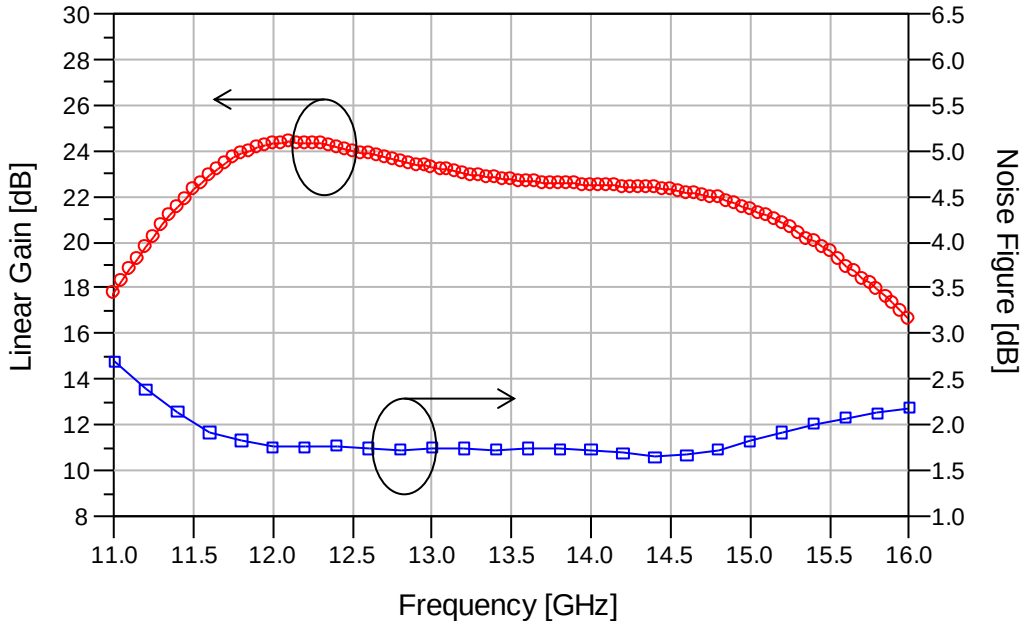
Test Conditions: T_{base_plate} = 25 °C, Vd = 10 V, Idq = 70 mA

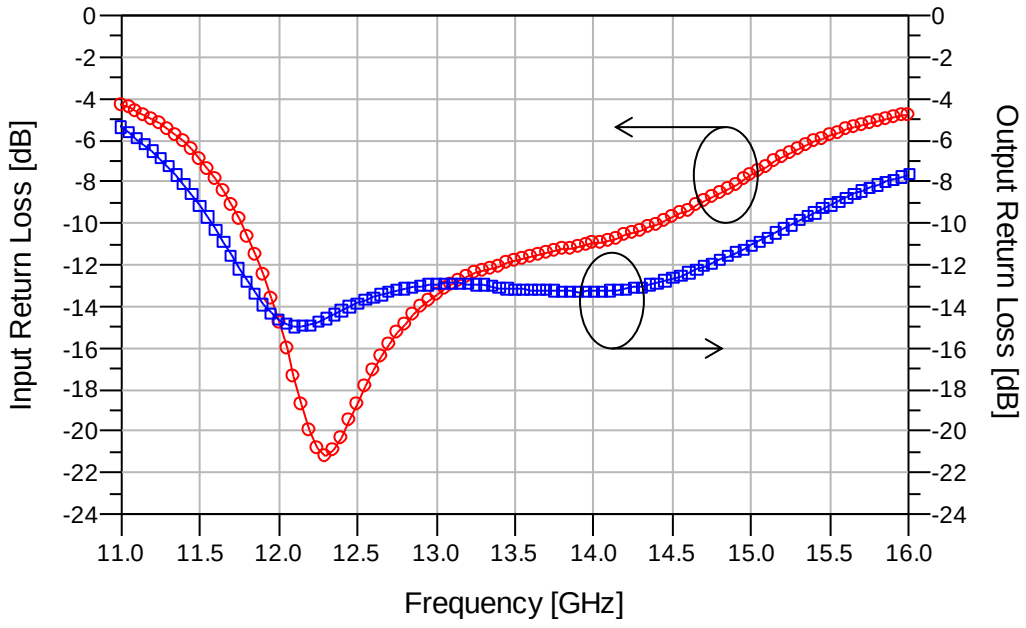
Parameter	Min	Typ	Max	Unit
Operating frequency	12		15	GHz
Small Signal Gain		23		dB
Noise Figure		1.7		dB
Input Return Loss		-10		dB
Output Return Loss		-12		dB
Output Power at 1 dB of Gain Compression		22		dBm
Output Power at 3 dB of Gain Compression		26		dBm
Max. Overdrive Input Power *	25			dBm
Output TOI (1 MHz tone spacing)		30		dBm
3rd Order C/I at 11 dB of Backoff (1 MHz tone spacing)	29.5			dBc
3rd Order C/I at 8 dB of Backoff (1 MHz tone spacing)	29			dBc
Drain Supply Voltage		10		V
Supply Quiescent Drain Current		70		mA
DC Power Consumption		0.7		W
DC Power Consumption at 1 dB of Gain Compr.		1		W

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

Linear Gain, Noise Figure, Input and Output Return Loss

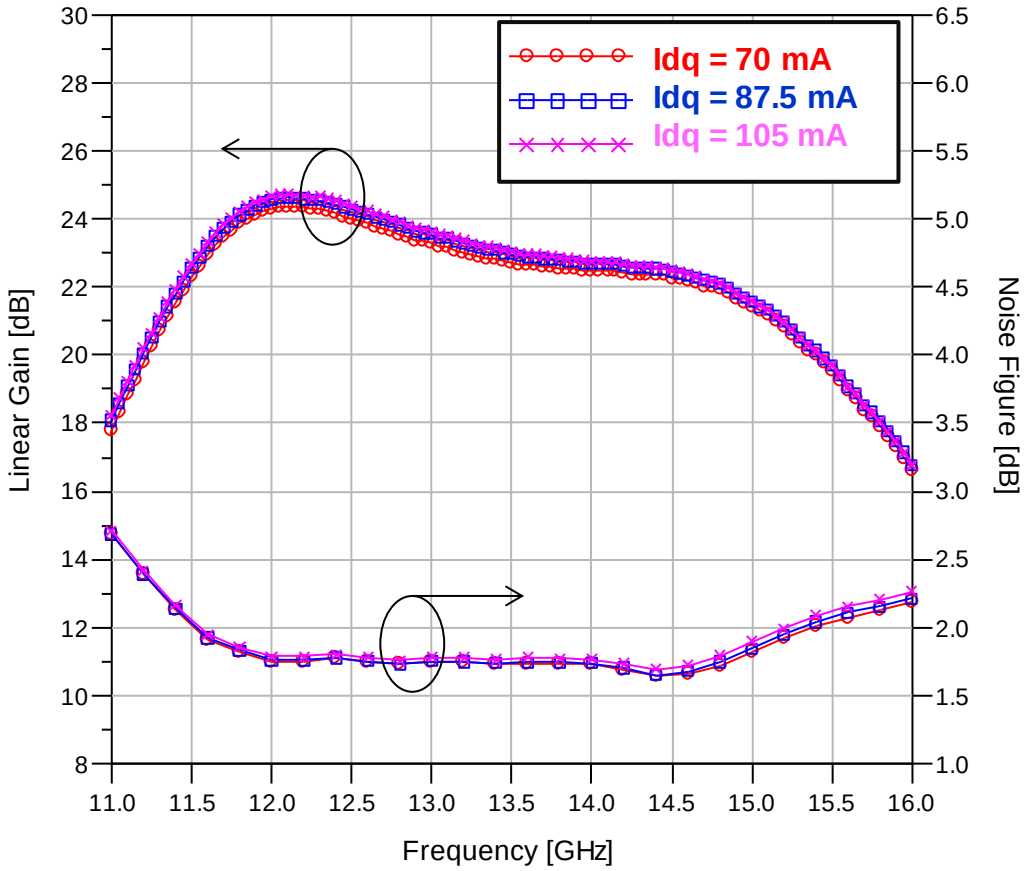
Test Conditions: T_{base_plate} = 25 °C, Vd = 10 V, Idq = 70 mA





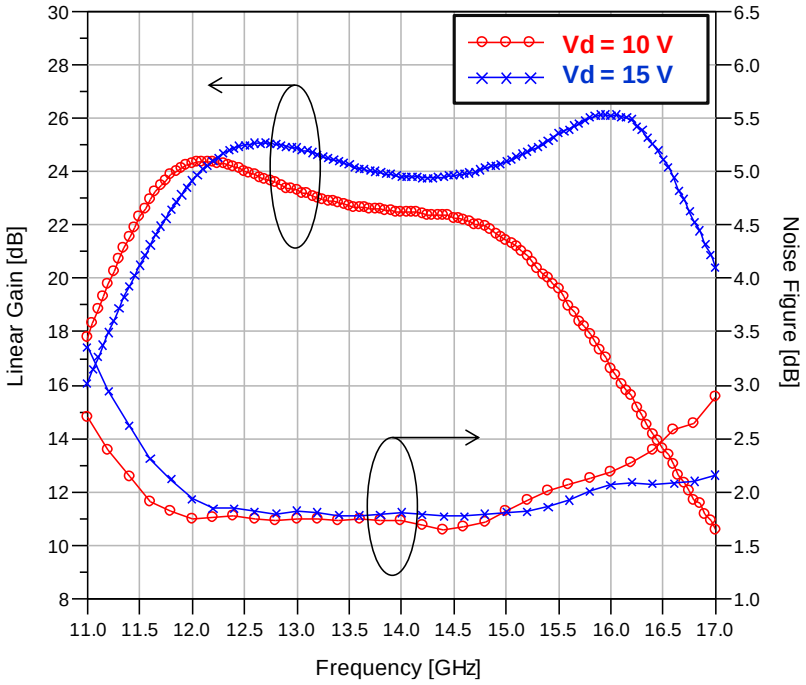
Linear Gain and Noise Figure over Quiescent Drain Current

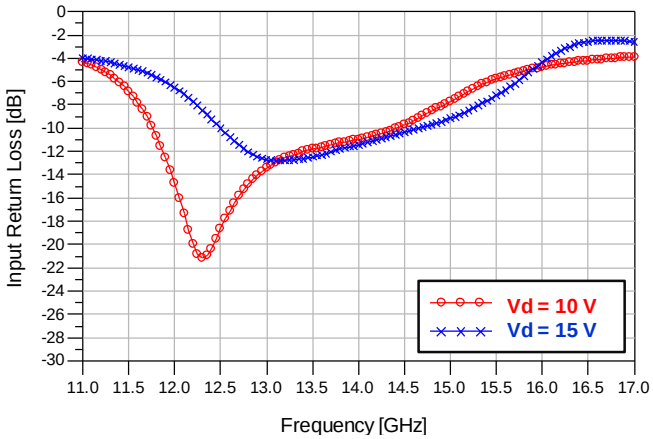
Test Conditions: T_{base_plate} = 25 °C, Vd = 10 V

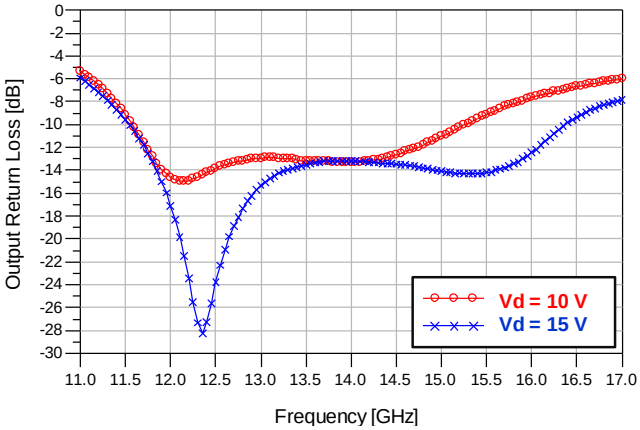


Linear Gain, Noise Figure, Input and Output Return Loss over Quiescent Drain Voltage

Test Conditions: T_{base_plate} = 25 °C, Idq = 70 mA



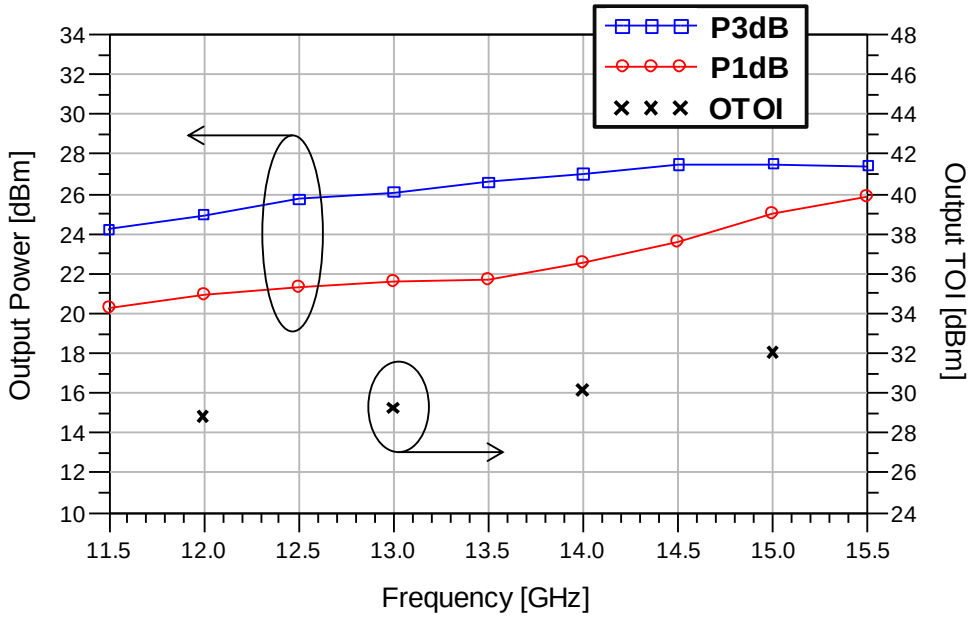


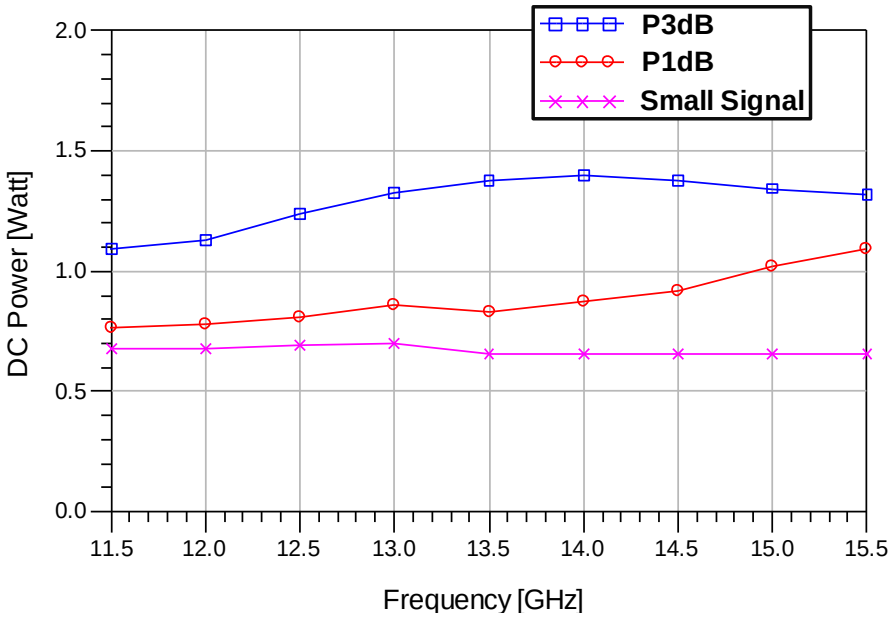


Nonlinear Measurement: Output Power, OTOI, DC Power

Test Conditions: T_{base_plate} = 25°C, Vd = 10 V, Idq = 70 mA

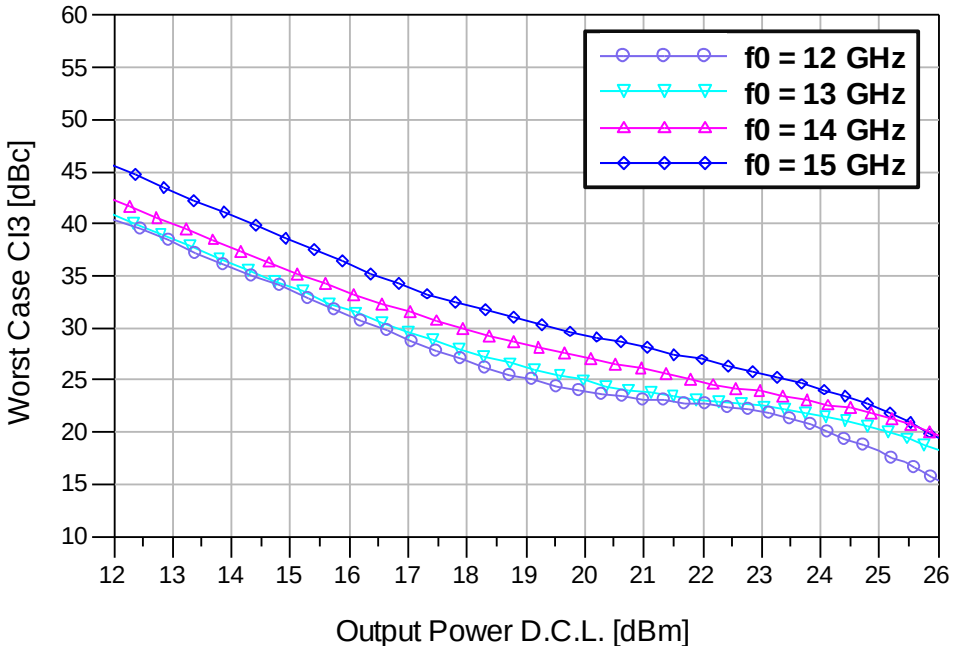
- OTOI: 2 tone measurements with tone spacing of 1 MHz. Linear regression formula with Pin D.C.L. = [-12, -6] dBm

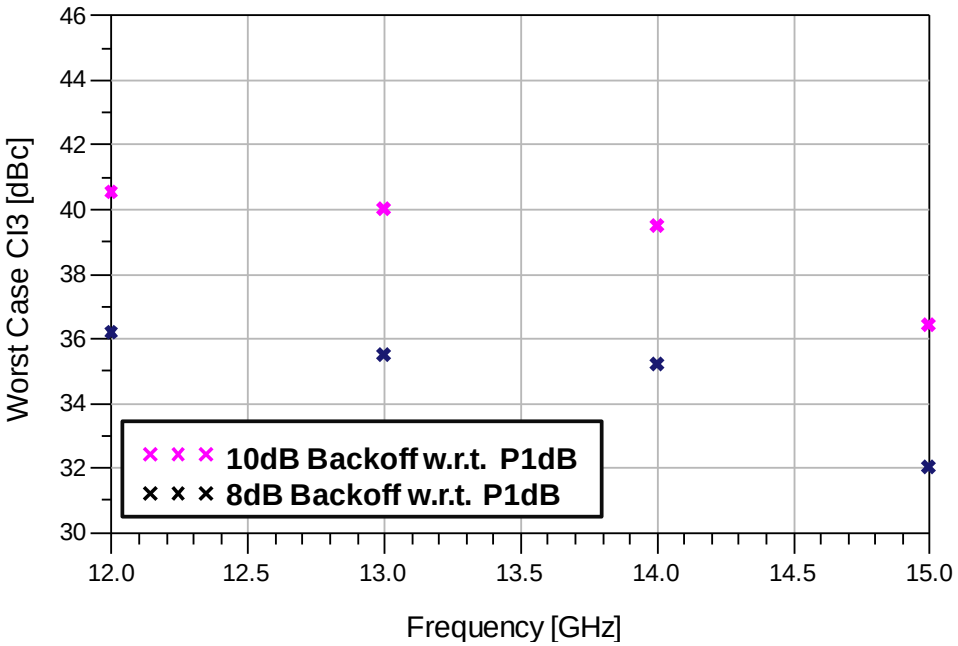




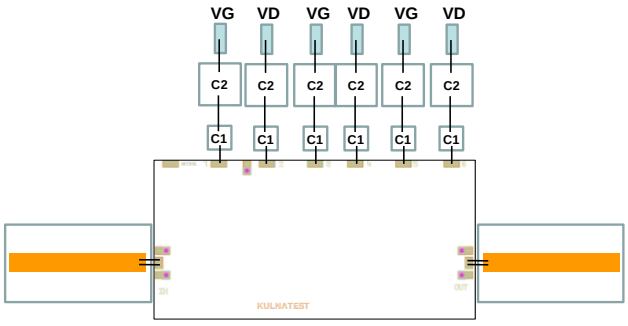
Nonlinear Measurement: 3rd Order Inter-Modulation Distortion

Test Conditions: T_{base_plate} = 25 °C, Vd = 10 V, Idq = 70 mA,
2-tone measurements with tone spacing of 1 MHz - Centre frequency from 12 GHz to 15 GHz

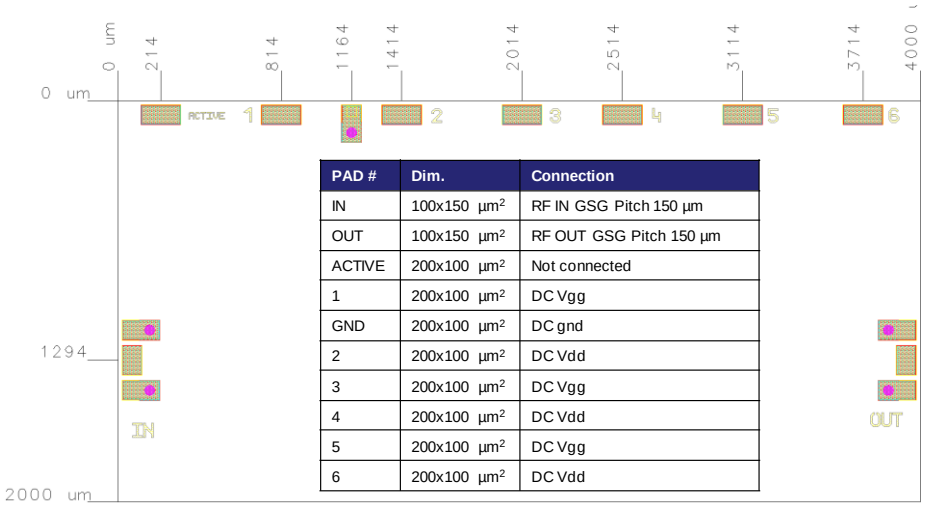




Bond Pad Configuration & Assembly Recommendations



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 +10 V.
3. Adjust Vg until quiescent Id is 70 mA (Vg = -2.9 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

For additional technical Information and Requirements:

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