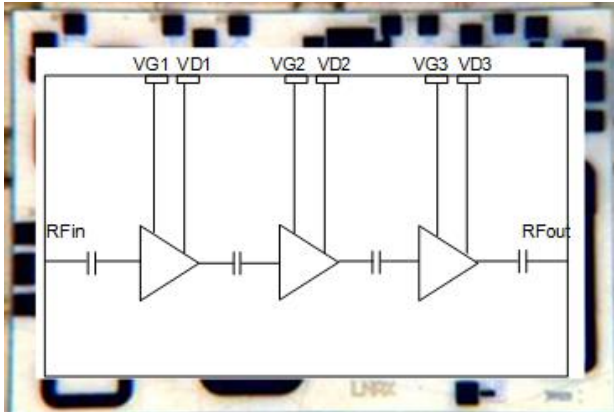


X-Band GaN HEMT Low Noise Amplifier



Main Features

- 0.25 μm GaN HEMT Technology
- 7.4 – 11.4 GHz full performance Frequency Range
- Small Signal Gain > 23 dB
- Noise Figure: 1.6 dB
- P1dB > 22 dBm, Psat > 26 dBm
- Bias: Vd = 10 V, Id = 120 mA, Vg = -2.7 V (Typ.)
- Chip Size: 3 x 2.02 x 0.1 mm³

Product Description

MECLNAX is a 0.25 μm GaN HEMT based Low Noise Amplifier designed and tested by MEC for X-Band applications.

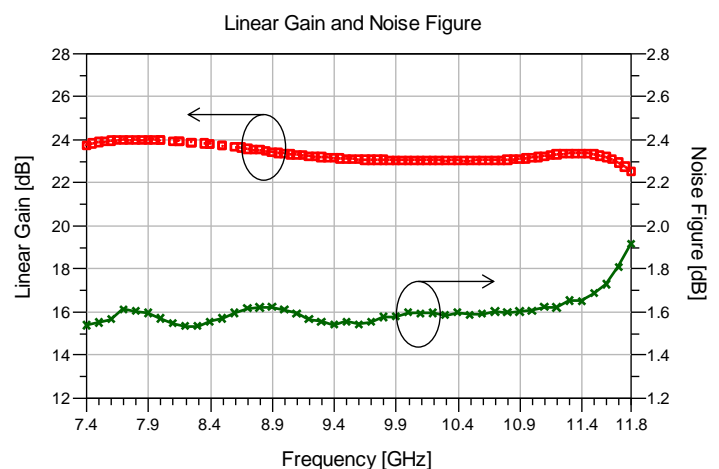
In the frequency range from 7.4 GHz to 11.6 GHz MECLNAX provides more than 23 dB of linear gain with ± 0.5 dB of gain flatness and 1.6 dB of noise figure.

In addition to the high electrical performances, this GaN LNA provides an high level of input power robustness being capable of surviving up to 24 dBm without degrading its performance.

Typical Applications

- Radar
- Telecom

Measured Data



X-Band GaN HEMT Low Noise Amplifier

Main Characteristics

Test Conditions: $T_{\text{base_plate}} = 25\text{ }^{\circ}\text{C}$, $V_d = 10\text{ V}$, $I_{dq} = 120\text{ mA}$

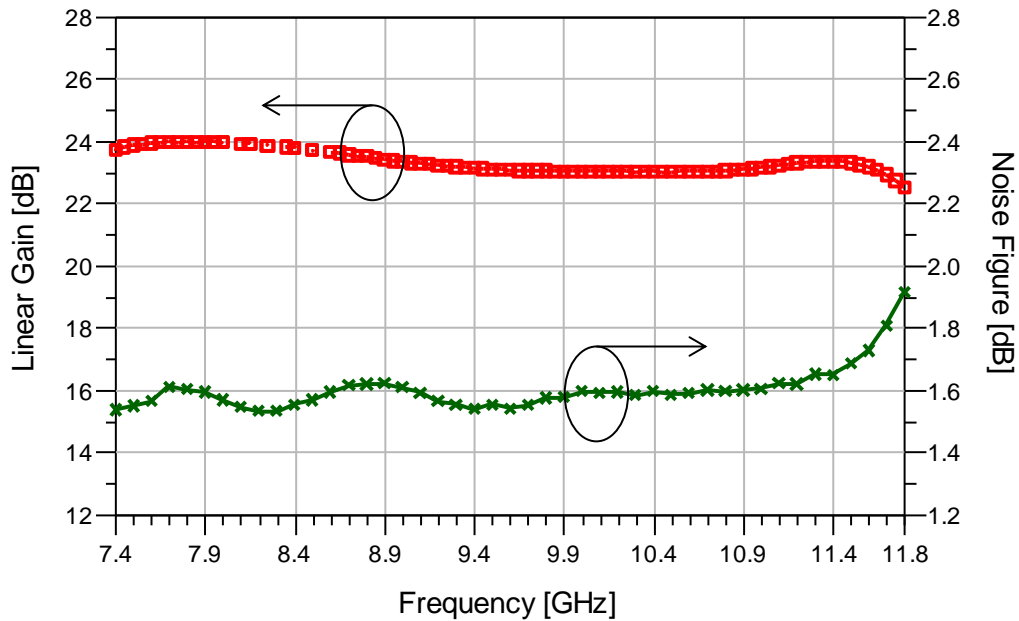
Parameter	Min	Typ	Max	Unit
Operating frequency	7.4		11.6	GHz
Small Signal Gain		23		dB
Noise Figure		1.6		dB
Input Return Loss		-15		dB
Output Return Loss		-15		dB
Output Power at 1 dB of Gain Compression*		22.5		dBm
Output Power at Saturation*		26.5		dBm
Max. Overdrive Input Power			24	dBm
Drain Supply Voltage		10		V
Supply Quiescent Drain Current		120		mA
DC Power Consumption		1.2		W
DC Power Consumption at 1 dB of Gain Compr.		1.2		W

X-Band GaN HEMT Low Noise Amplifier

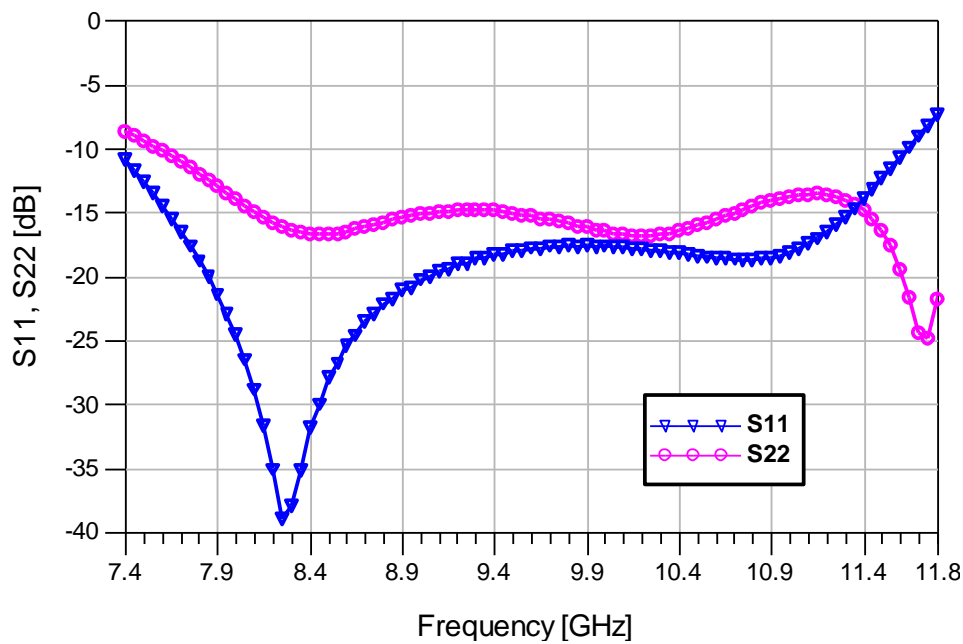
Small Signal Measurements

Test Conditions: $T_{\text{base_plate}} = 25^{\circ}\text{C}$, $V_d = 10\text{ V}$, $I_{dq} = 120\text{ mA}$

Linear Gain and Noise Figure



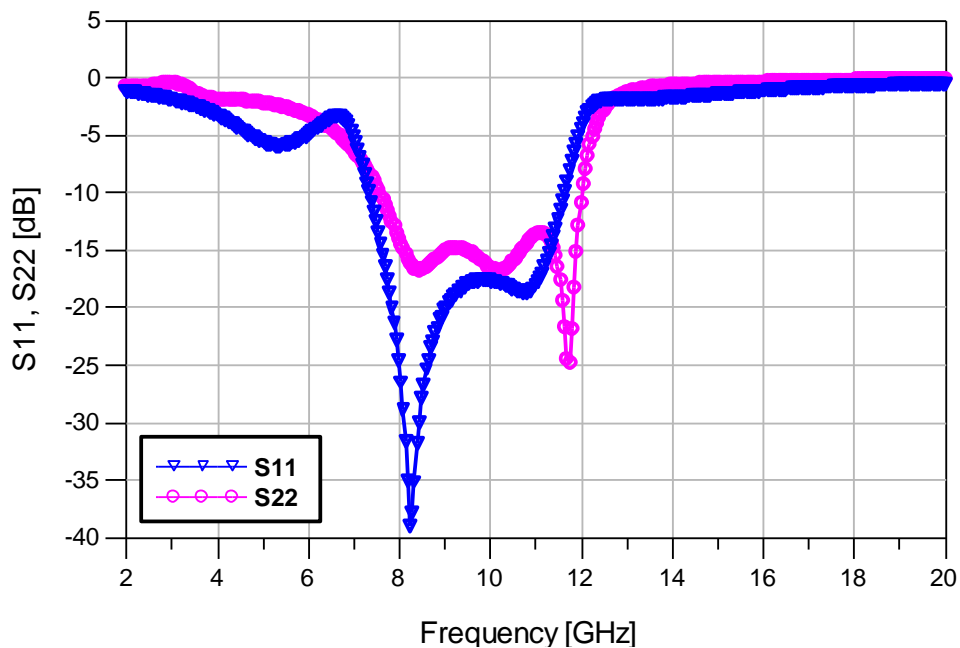
Input and Output Return Loss



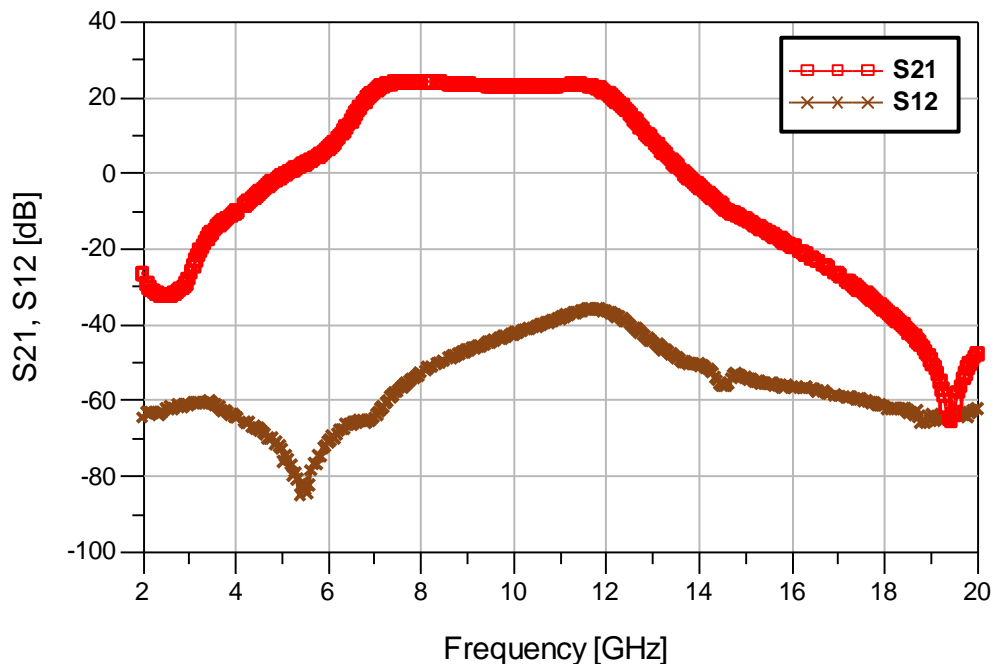
X-Band GaN HEMT Low Noise Amplifier

Broadband Small Signal Measurements

Input and Output Return Loss



Linear and Reverse Gain

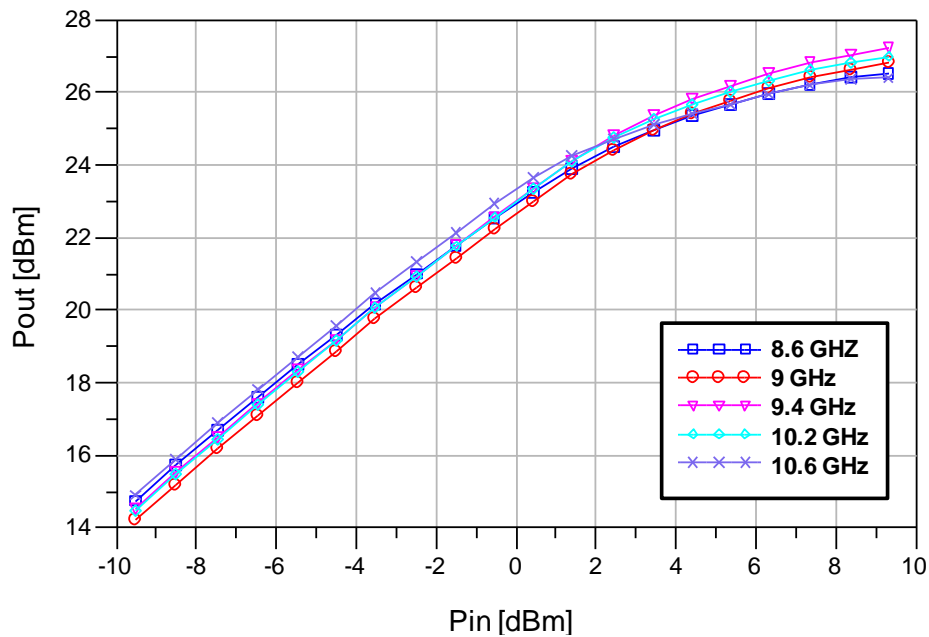


X-Band GaN HEMT Low Noise Amplifier

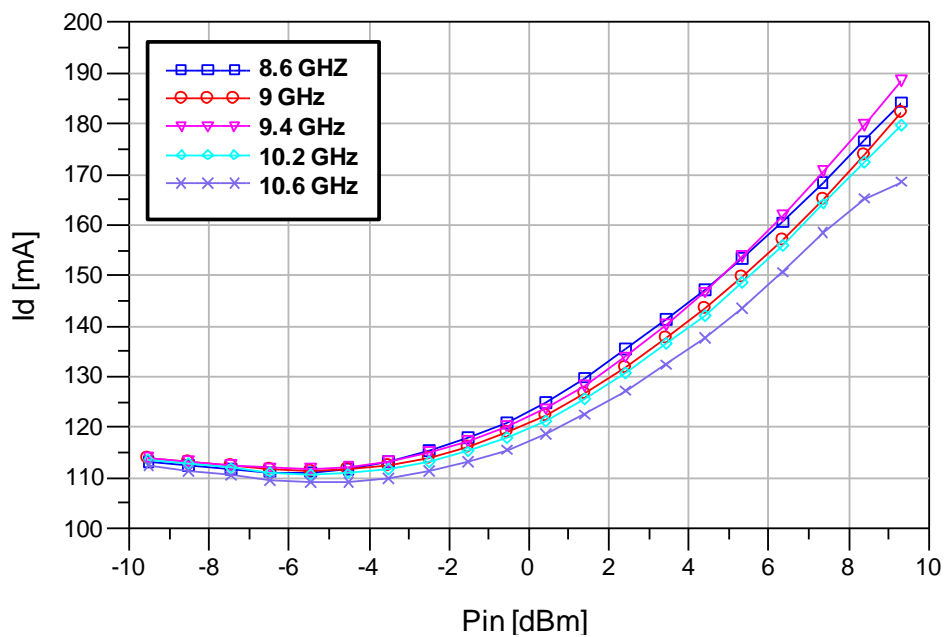
Measured Performances Vs. Pin @ Freq. [8.6, 9, 9.4, 10.2, 10.6] GHz

Test Conditions: $T_{base_plate} = 25\text{ }^{\circ}\text{C}$, $V_d = 10\text{ V}$, $I_{dq} = 120\text{ mA}$

Output Power Vs. Input Power

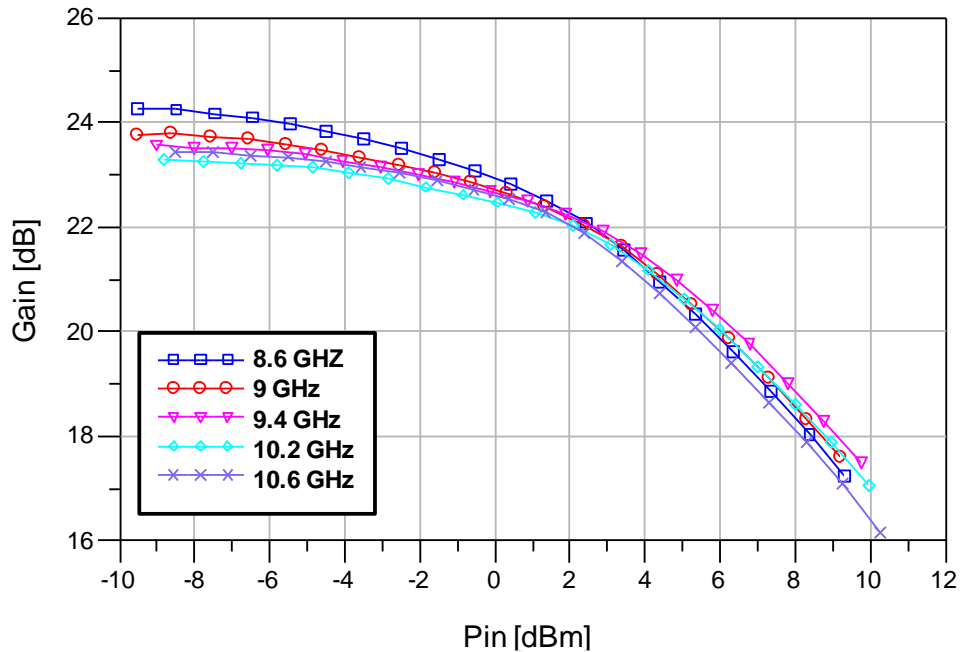


Drain Current Vs. Input Power

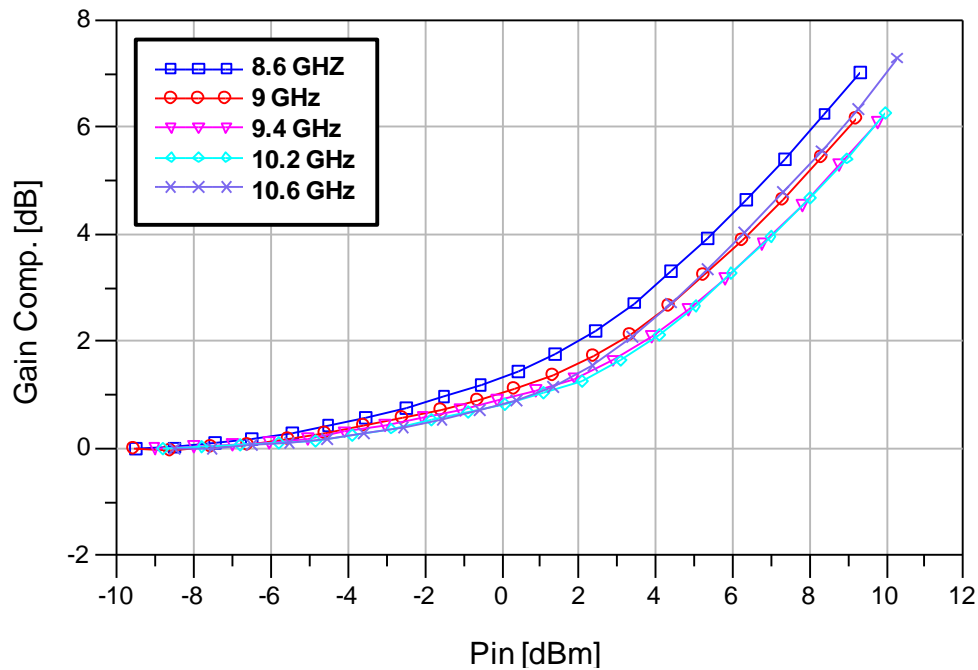


Test Conditions: $T_{\text{base_plate}} = 25\text{ }^{\circ}\text{C}$, $V_d = 10\text{ V}$, $I_{dq} = 120\text{ mA}$

Gain Vs. Input Power



Gain Compression Vs. Input Power

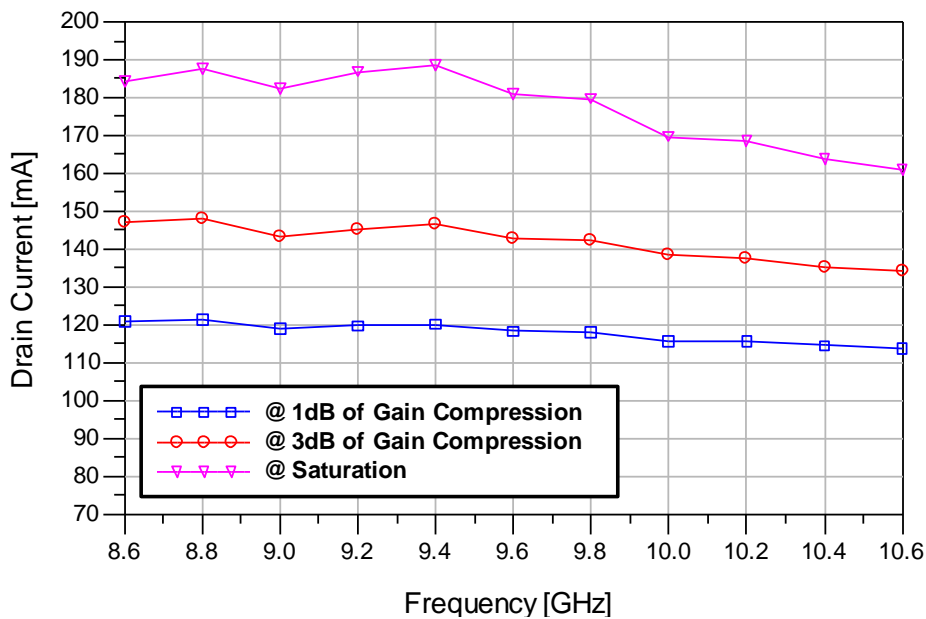
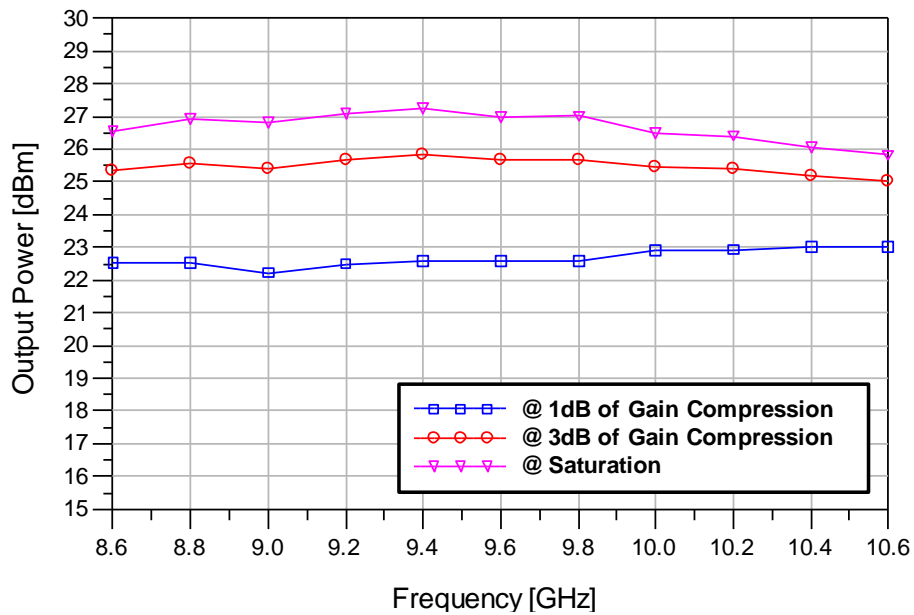


X-Band GaN HEMT Low Noise Amplifier

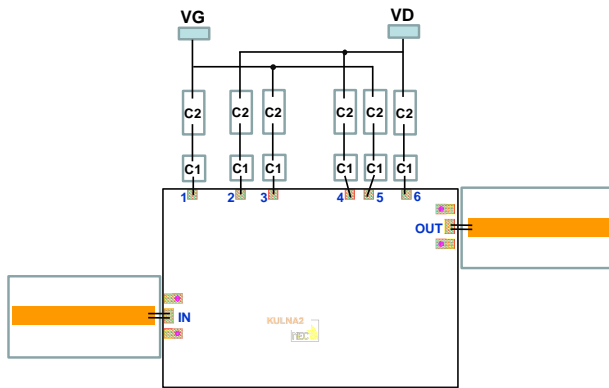
Measured Performances Vs. Frequency

Test Conditions: $T_{\text{base_plate}} = 25\text{ }^{\circ}\text{C}$, $V_d = 10\text{ V}$, $I_{dq} = 120\text{ mA}$

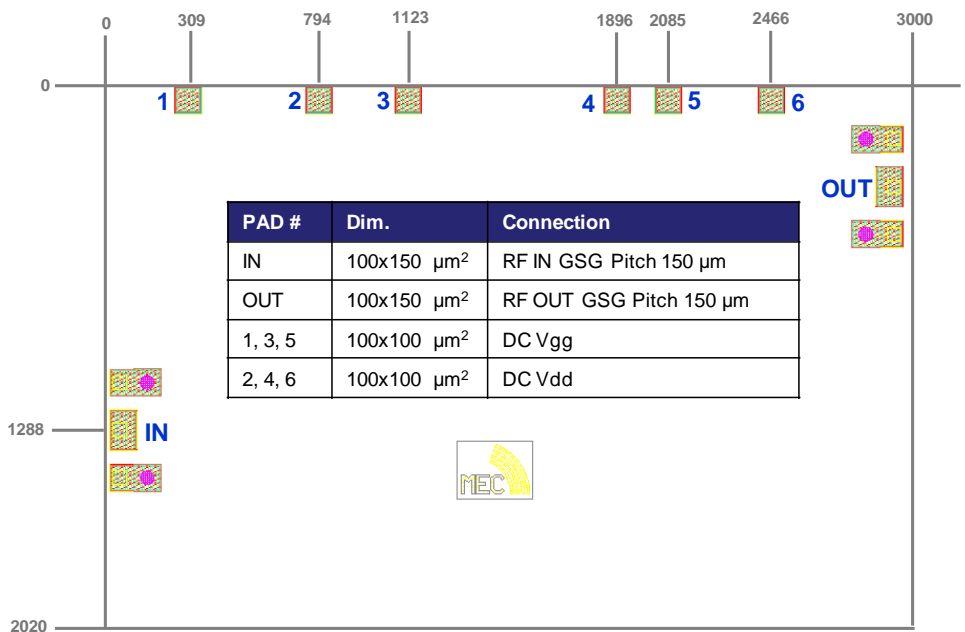
- P1dB condition reached at $P_{in} = 0\text{ dBm}$
- P3dB condition reached at $P_{in} = 5\text{ dBm}$
- PSat condition reached at $P_{in} = 10\text{ dBm}$



Bond Pad Configuration & Assembly Recommendations



Bond Pad #	Connection	External Components
IN and OUT	2 Bonding Wires $L_{\text{bond}} = 0.3\text{nH}$	
1, 3, 5 Vg	$L_{\text{bond}} \leq 1\text{ nH}$	C1 = 100pF/10V C2 = 10nF/10V
2, 4, 6, Vd	$L_{\text{bond}} \leq 1\text{ nH}$	C1 = 100pF/50V C2 = 10nF/50V



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 -5 V.
2. Vd set to +10 V.
3. Adjust Vg until quiescent Id is 120 mA (Vg = -2.7 V Typical).
4. Apply RF signal.

Bias-Down

1. Turn off RF signal.
2. Reduce Vg to -5 V ($I_{d0} \approx 0\text{ mA}$).
3. Set Vd to 0 V.
4. Turn off Vd.
5. Turn off Vg.

MECGANLNAX

X-Band GaN HEMT Low Noise Amplifier



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