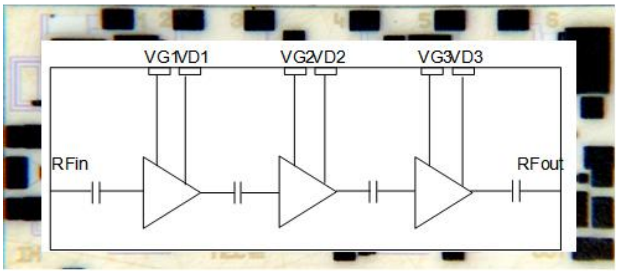
MECGaNLNACX

C- to X-Band GaN HEMT Low Noise Amplifier



Main Features

- 0.25µm GaN HEMT Technology
- 5– 12 GHz full performance Frequency Range
- Small Signal Gain > 21 dB
- Noise Figure: <1.8 (6 - 9 GHz)
- Noise Figure: <2.1 (5 - 12 GHz)
- P1dB > 18 dBm, Psat > 23 dBm
- Overdrive Pin: 25 dBm
- Bias: Vd = 10 ÷ 15V, Id = 90mA, Vg = -2.7V (Typ.)
- Chip Size: 3.00 x 1.35 x 0.10 mm^3

Product Description

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

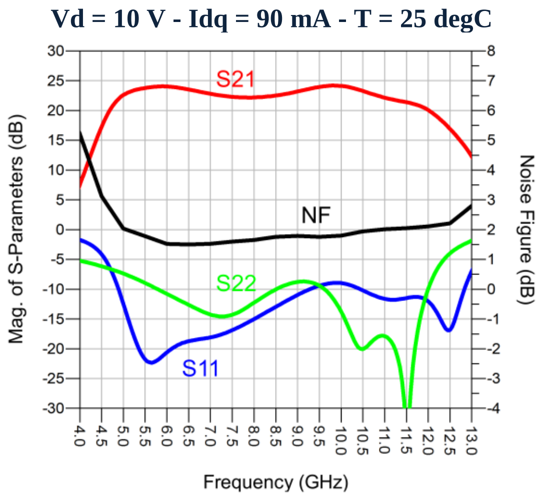
In the frequency range from 5 GHz to 12 GHz MECGaNLNACX provides at least 22dB of linear gain, less than 2 dB of noise figure and a P1dB of at least 18 dBm.

In addition to the high electrical performances, this GaN LNA is capable of working in safe operation up to 20÷27 dB of gain compression (26 dBm of CW overdrive power).

Typical Applications

- Commercial and Military Radar
- Communications
- Test Instrumentation

Measured Data



Main Characteristics

Test Conditions: T_{base_plate} = 25°C , Vd = 10 V, Idq = 90 mA - CW

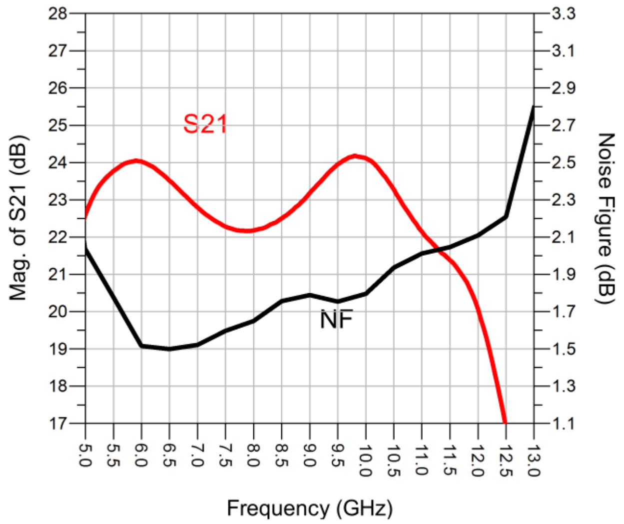
Parameter	Min	Typ	Max	Unit
Operating frequency	5		11	GHz
Small Signal Gain	22		24	dB
Noise Figure	1.5		2.0	dB
Input Return Loss		-9		dB
Output Return Loss		-9		dB
Output Power at 1 dB of Gain Compression		19.5		dBm
Output Power at Saturation		23		dBm
Overdrive Input Power (CW)			25	dBm
Overdrive Gain Compression Level			25	dB
Drain Supply Voltage		10		V
Supply Quiescent Drain Current		90		mA
DC Power Consumption		0.90		W
DC Power Consumption at 1 dB of Gain Compr.		1.50		W

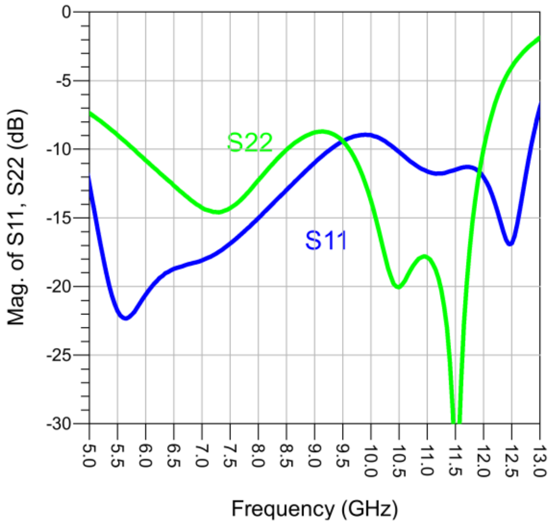
Test Conditions: T_{base_plate} = 25°C , Vd = 15 V, Idq = 90 mA - CW

Parameter	Min	Typ	Max	Unit
Operating frequency	5		12.5	GHz
Small Signal Gain	22		27	dB
Noise Figure	1.5		2.1	dB
Input Return Loss		-8		dB
Output Return Loss		-5		dB
Output Power at 1 dB of Gain Compression		18		dBm
Output Power at Saturation		26		dBm
Overdrive Input Power (CW)			26	dBm
Overdrive Gain Compression Level			27	dB
Drain Supply Voltage		15		V
Supply Quiescent Drain Current		90		mA
DC Power Consumption		1.35		W
DC Power Consumption at 1 dB of Gain Compr.		1.95		W

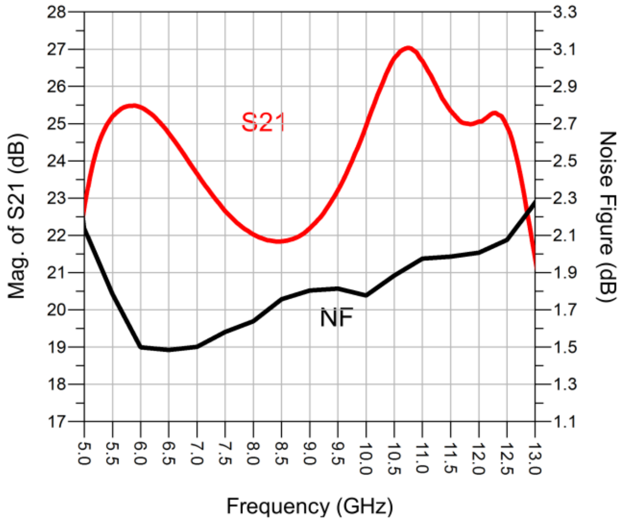
Linear Gain, Noise Figure, Input and Output Return Loss

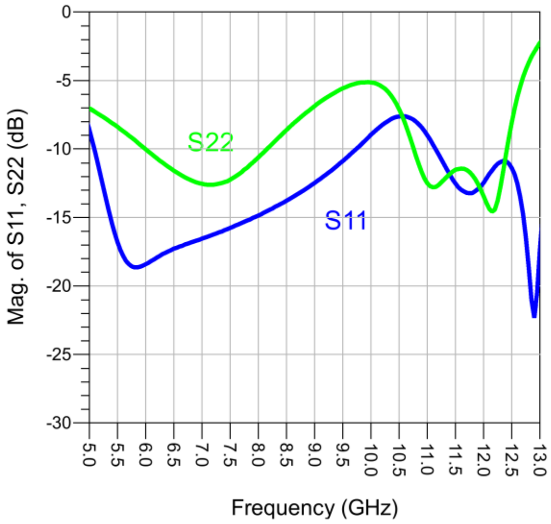
Test Conditions: T_{base_plate} = 25°C , Vd = 10 V, Idq = 90 mA





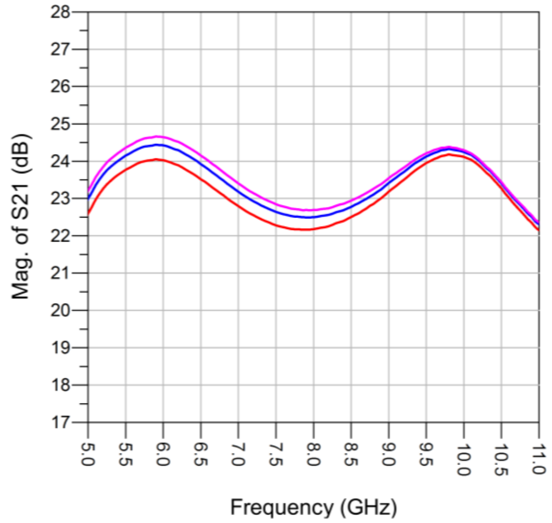
Test Conditions: T_{base_plate} = 25°C , Vd = 15 V, Idq = 90 mA

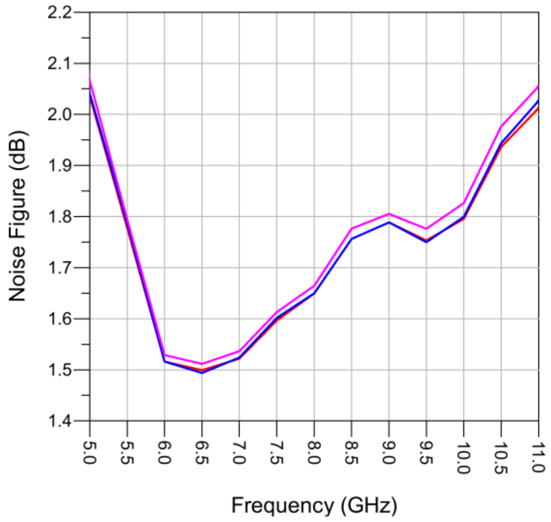




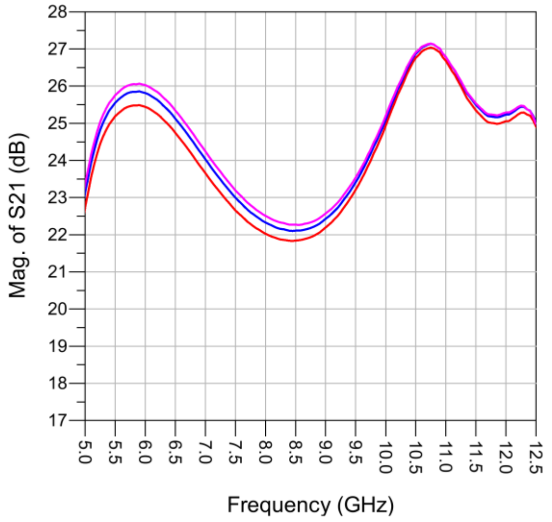
Linear Gain and Noise Figure over Quiescent Drain Current

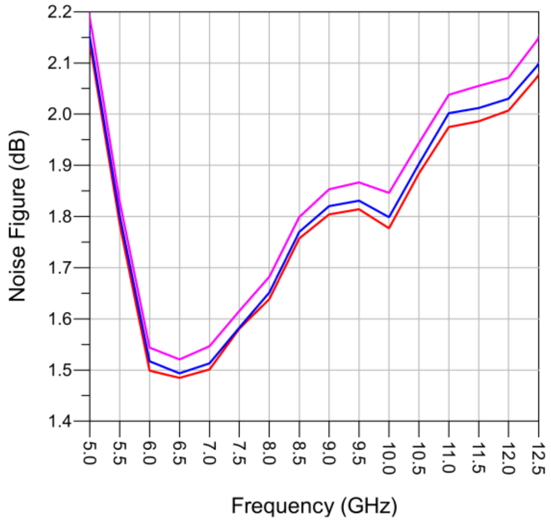
Test Conditions: T_{base_plate} = 25°C , Vd = 10 V
Idq = 90mA - Idq = 112mA - Idq = 135mA





Test Conditions: T_{base_plate} = 25°C , Vd = 15 V
Idq = 90mA - Idq = 112mA - Idq = 135mA

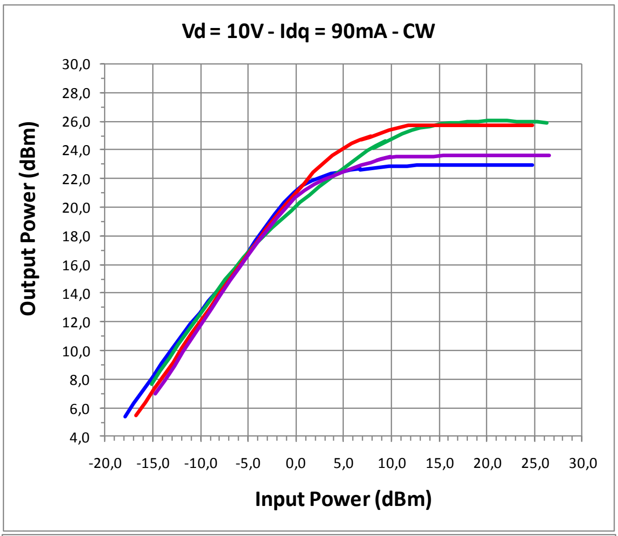


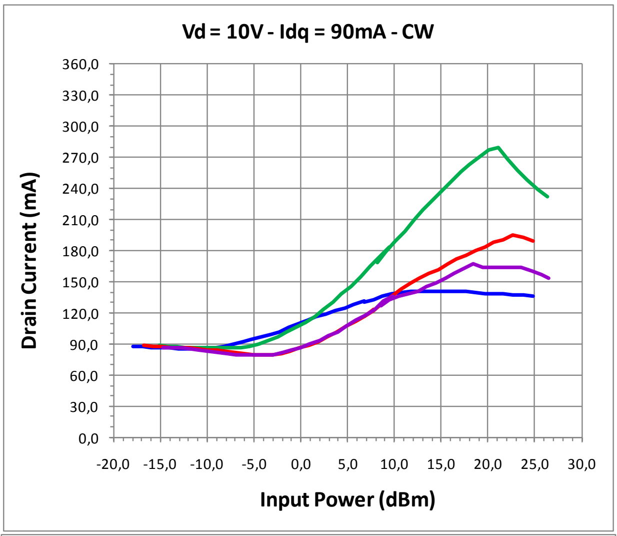


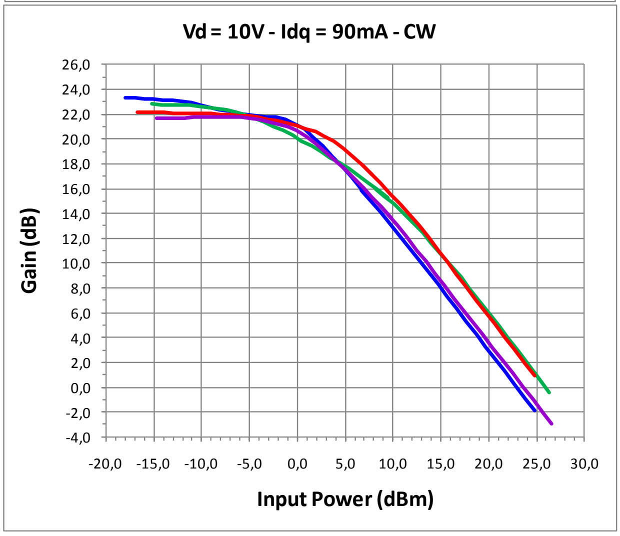
Nonlinear Measurement: Output Power, Drain Current, Gain Compr.

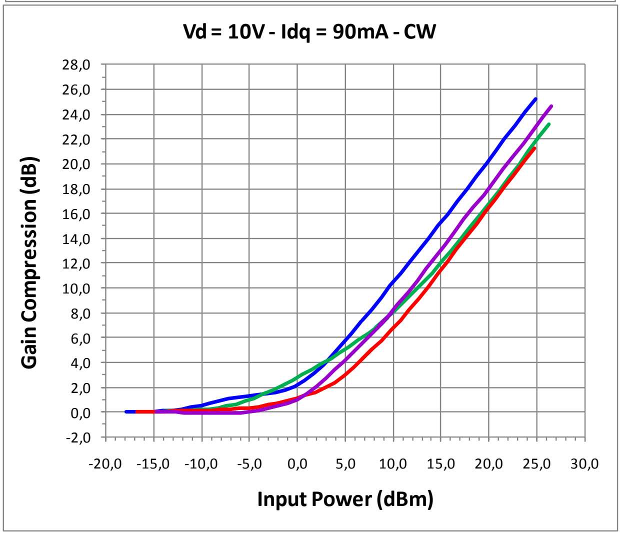
Test Conditions: T_{base_plate} = 25°C , Vd = 10 V, Idq = 90 mA

Frequency: 5 GHz - 7 GHz - 9 GHz - 11 GHz





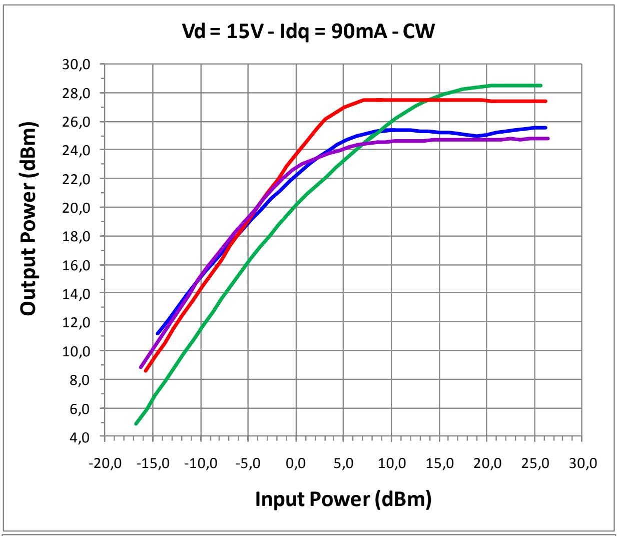


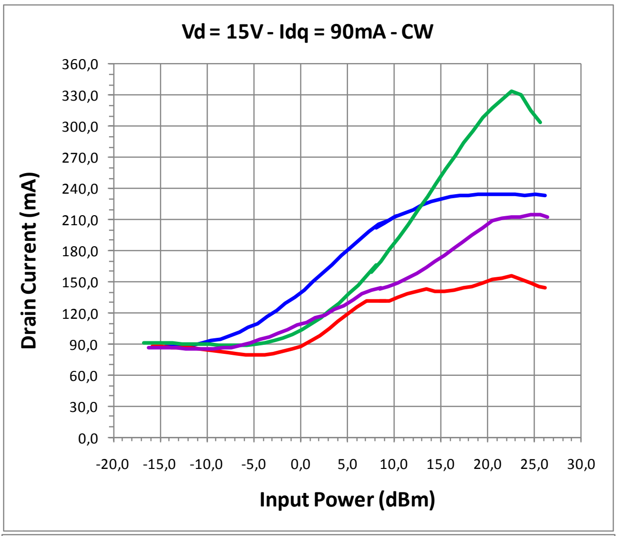


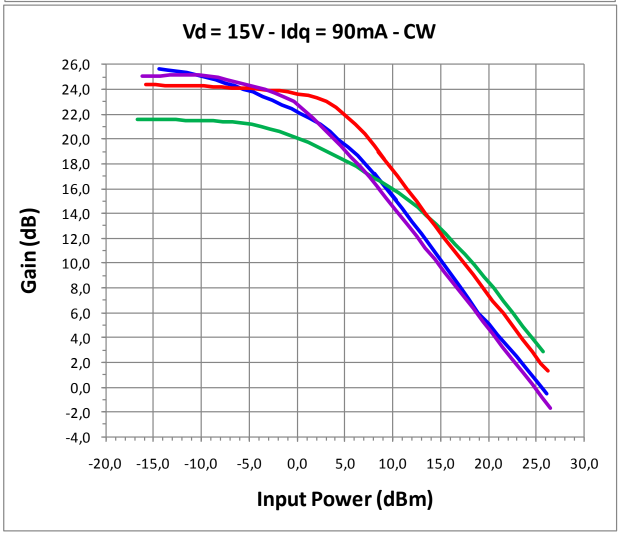
Nonlinear Measurement: Output Power, Drain Current, Gain Compr.

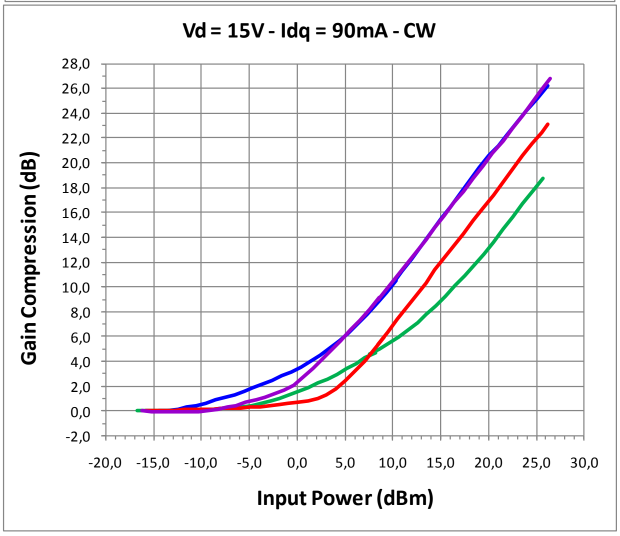
Test Conditions: T_{base_plate} = 25°C , Vd = 15 V, Idq = 90 mA

Frequency: 6 GHz - 8 GHz - 10 GHz - 12 GHz





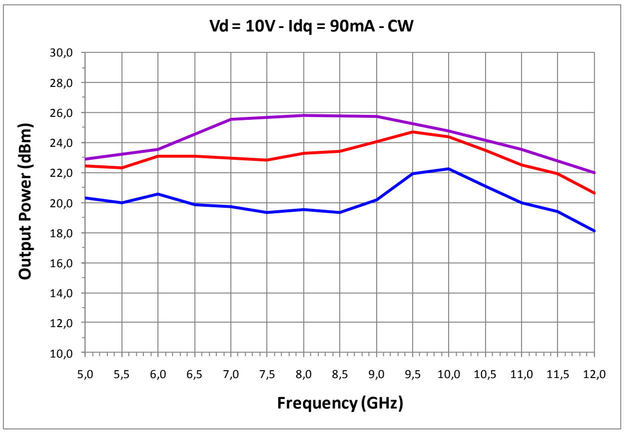


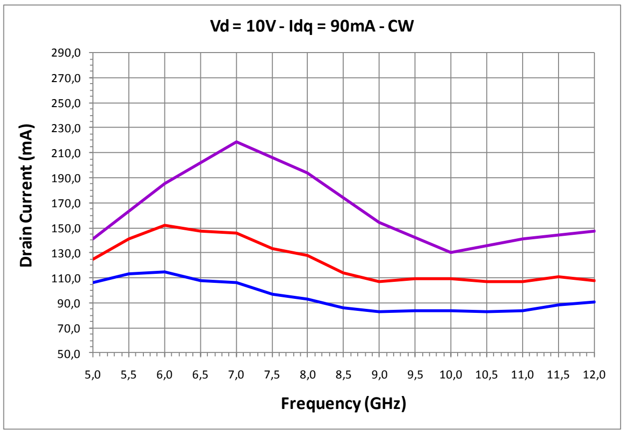


Nonlinear Measurement: Output Power, Drain Current, Gain Compr.

Test Conditions: T_{base_plate} = 25°C , Vd = 10 V, Idq = 90 mA

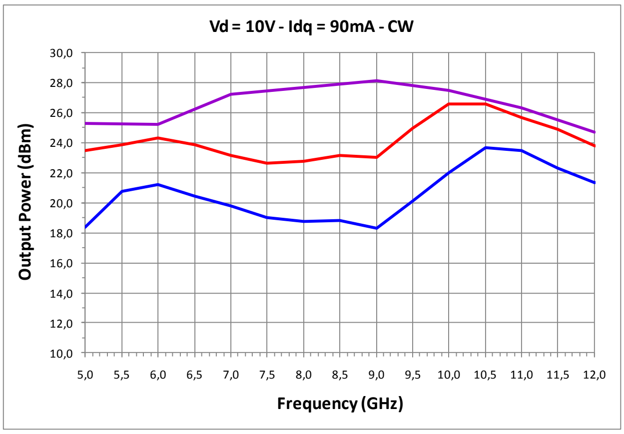
- Pout and Drain Current at Pin = -1 dBm (1 dB of Gain Compression)
- Pout and Drain Current at Pin = 5 dBm (4 dB of Gain Compression)
- Pout and Drain Current at Pin = 13 dBm (saturation)

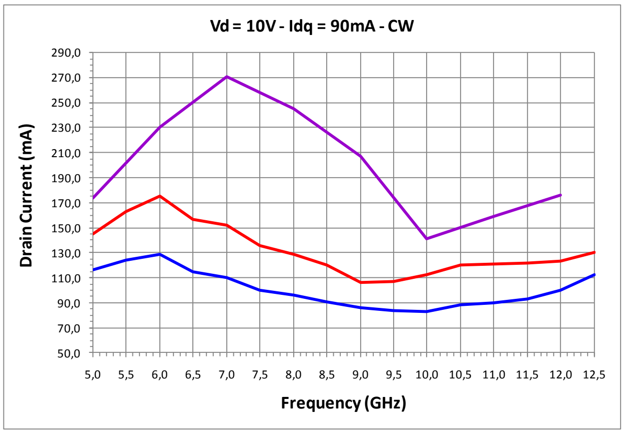




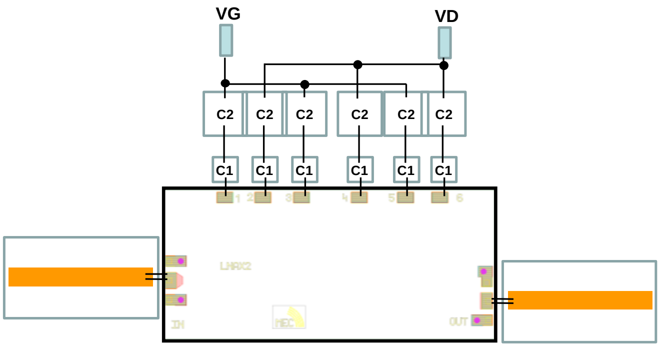
Test Conditions: T_{base_plate} = 25°C , Vd = 15 V, Idq = 90 mA

- Pout and Drain Current at Pin = -2 dBm (1 dB of Gain Compression)
- Pout and Drain Current at Pin = 4 dBm (4 dB of Gain Compression)
- Pout and Drain Current at Pin = 15 dBm (saturation)

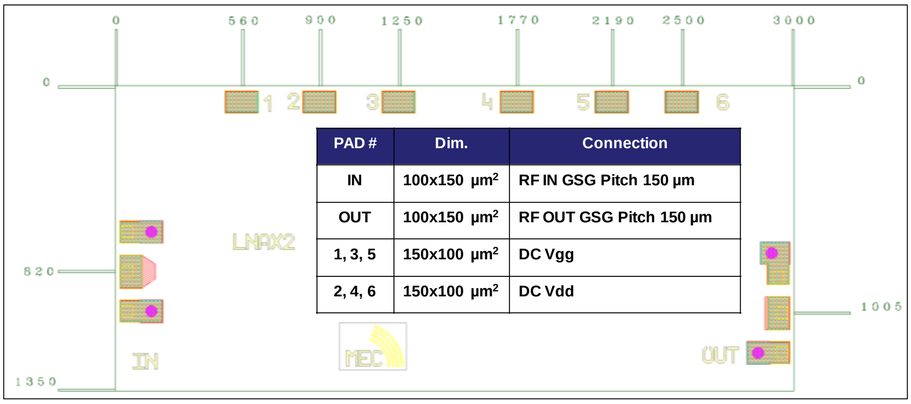




Bond Pad Configuration & Assembly Recommendations



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
1, 3, 5	150x100 μm²	DC Vgg
2, 4, 6	150x100 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 - 5 V.
2. Vd set to +10 ÷ +15 V.
3. Adjust Vg until quiescent Id is 90 mA (Vg = -2.7 V Typical).
4. Apply RF signal.

Bias-Down

1. Turn off RF signal.
2. Reduce Vg to -5 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.