MECGaNX13

8.6 to 10.4 GHz GaN HEMT Power Amplifier

MICROWAVE ELECTRONICS FOR COMMUNICATIONS

Product Description

MECGaNX13 is a GaN HEMT based High Power Amplifier designed by MEC for X-Band applications and fabricated on 0.25µm GaN on SiC process.

The MECGaNX13 provides more than 13W of output power in the frequency range from 8.6 GHz to 10.4 GHz with a PAE higher than 38% and 24 dB of Linear Gain.

The MECGaNX13 is fully matched to 50 Ω with DC decoupling capacitors on both Input and Output ports. Bond Pad are gold plated for compatibility with thermo-compression bonding process.

Main Features

- 0.25µm GaN HEMT Technology
- 8.6 – 10.4 GHz full performances Frequency Range
- 13W Output Power @ Pin 24 dBm
- 40% PAE @ Pin 24 dBm
- 24 dB Linear Gain
- Bias: Vd = 25V, Id = 480 mA, Vg = -2.85V (Typ.)
- Chip Size: 4.5 x 4.0 x 0.1 mm

Applications

- Radar
- Telecom

Main Characteristics

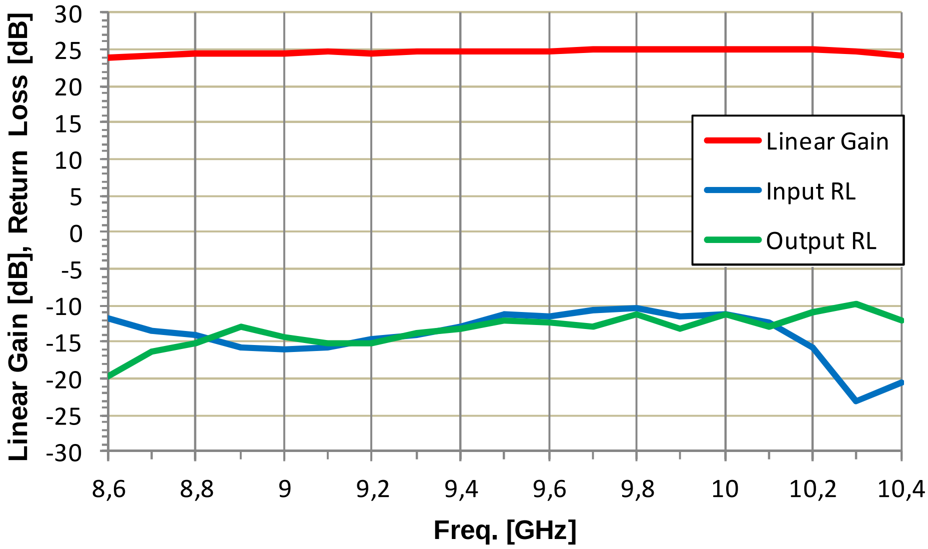
Test Conditions: T_{base_plate} = 25°C , Vd = 25 V, Idq = 480 mA, Pulse Width = 50 µs, Duty Cycle = 15%

Parameter	Min	Typ	Max	Unit
Operating frequency	8.6		10.4	GHz
Small Signal Gain	23	24	25	dB
Input Return Loss		10		dB
Output Return Loss		10		dB
Output Power @ Pin = 24 dBm	13.5		14.5	W
Power Added Efficiency	38		44	%
Drain Supply Voltage		25		V
Supply Quiescent Drain Current		480		mA
Supply Drain Current	1.2		1.45	A
Gate Voltage		-2.85		V

* Performances described in this document are based on preliminary on-jig characterization.
More details and new parameter will be carried out by the ongoing test campaign.

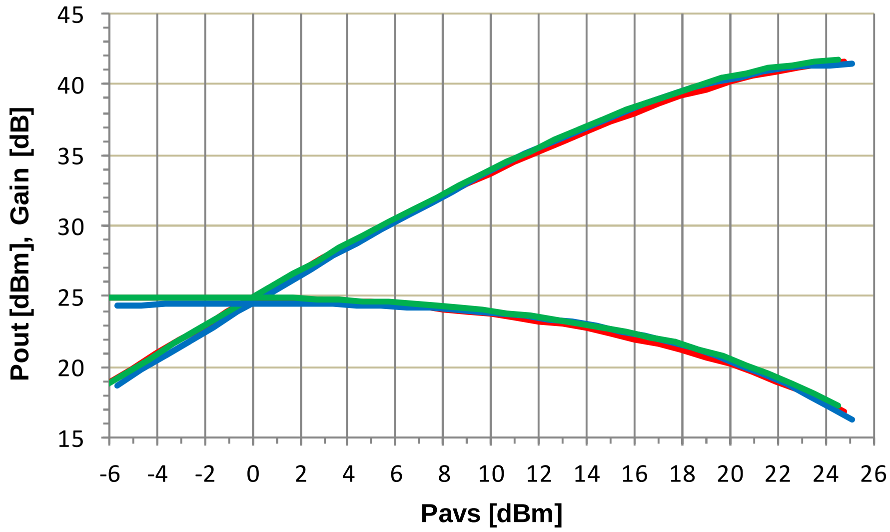
Typical Measured Performances

Linear Gain, Input and Output Return Loss Vs. Frequency



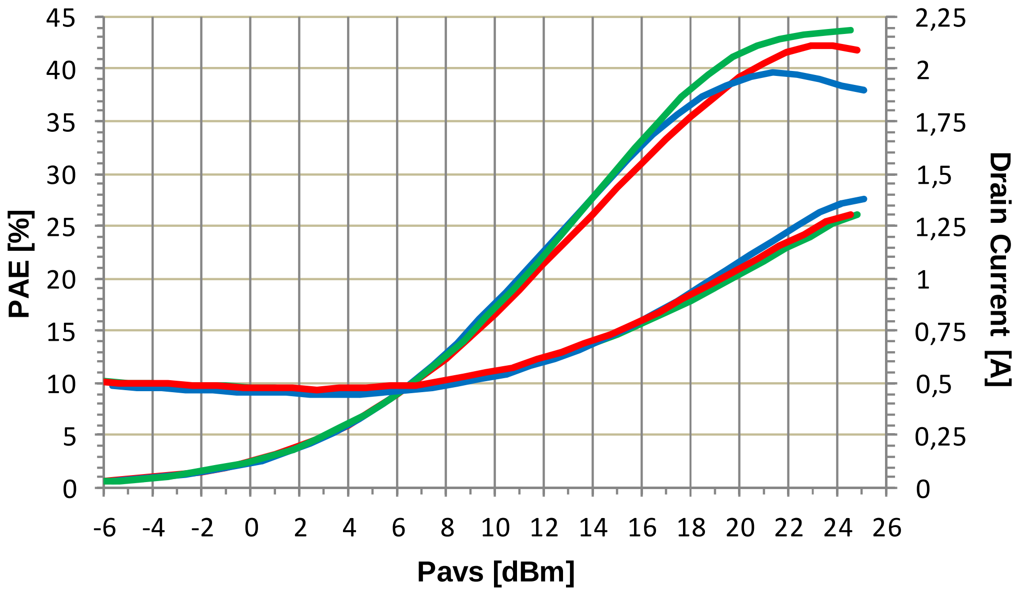
Output Power and Gain Vs. Input Power

___ 8.6 GHz; ___ 9.5 GHz; ___ 10.4 GHz

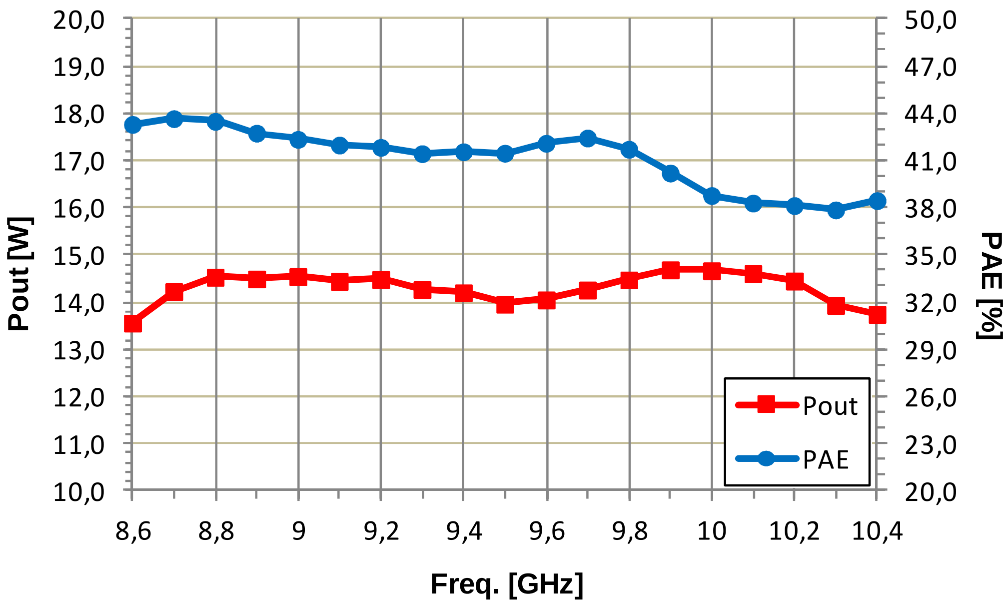


PAE and Drain Current Vs. Input Power

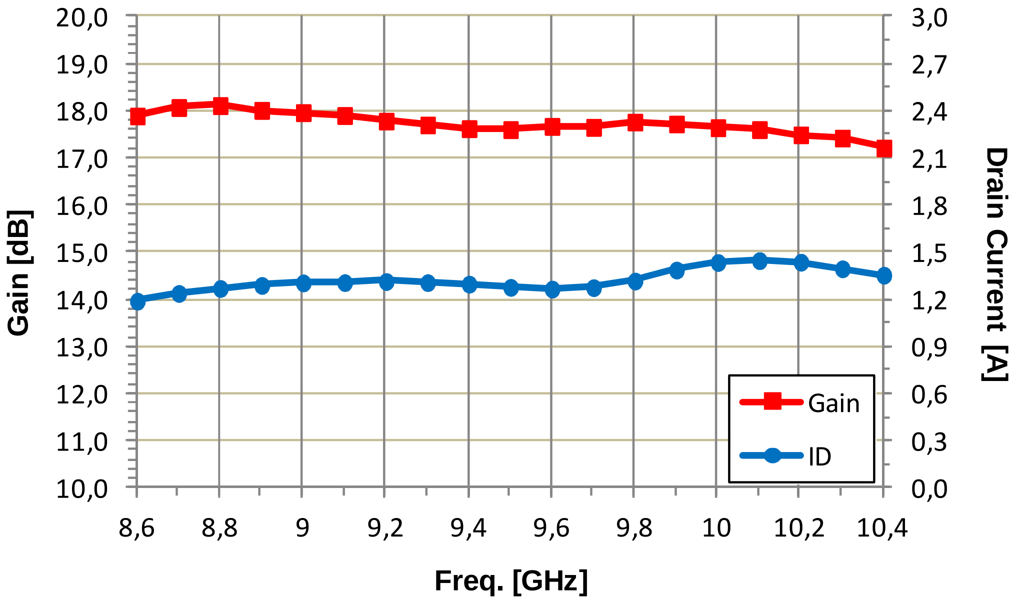
___ 8.6 GHz; ___ 9.5 GHz; ___ 10.4 GHz



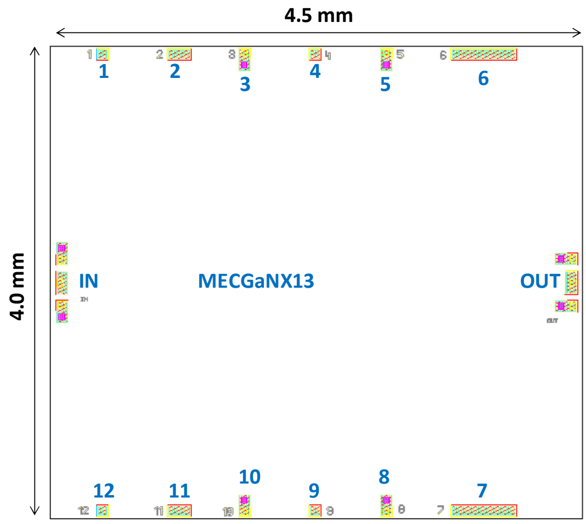
Output Power and PAE @ Pin = 24 dBm Vs. Frequency



Gain and Drain Current @ Pin = 24 dBm Vs. Frequency



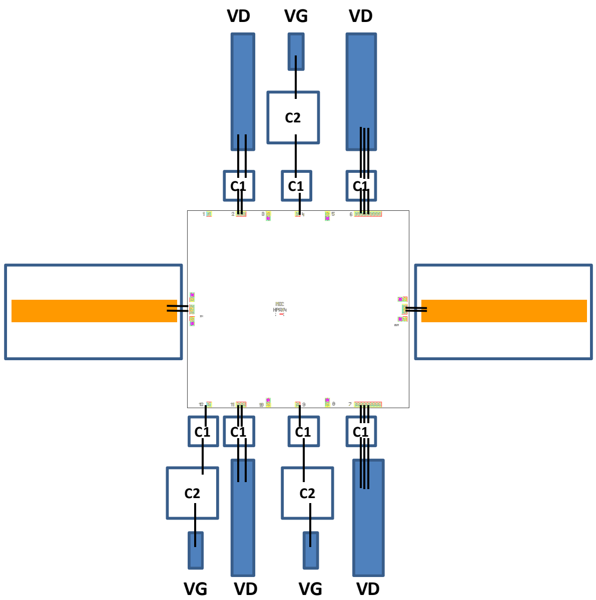
Bond Pad Configuration



- A tolerance of ± 35µm has to be considered for chip dimensions
- Chip Thickness is 100 µm ± 10 µm
- RF Pads [IN, OUT] = 100µm x 200µm
- DC Pads [1, 3, 4, 5, 8, 9, 10, 12] = 100µm x 100µm
- DC Pads [2, 11] = 200µm x 100µm
- DC Pads [6, 7] = 550µm x 100µm

Bond Pad #	Symbol	Description
IN	RFin	Input RF Port
OUT	RFout	Output RF Port
4, 9, 12	Vg	Gate Negative Supply Voltage
2, 6, 7, 11	Vd	Drain Positive Supply Voltage
3, 5, 8, 10	GND	Ground Pads – Not Connected
1		Not Connected

Assembly Recommendations



Bond Pad #	Connection	External Components
IN and OUT	**2** Bonding Wires L_bond = 0.3nH	
4, 9, 12 - **Vg**	L_bond ≤ 1 nH	C1 = 100pF/10V C2 = 10nF/10V
2, 11 - **Vd**	**2** Bonding Wires L_bond ≤ 1nH	**Pulsed mode** C1 = 100pF/50V **CW mode:** C1 = 100pF/50V C2 = 10nF/50V
6, 7 - **Vd**	**3** Bonding Wires L_bond ≤ 1nH	

- Eutectic Die bond using AuSn (80/20) solder is recommended.
- Great care must be used for thermal dimensioning.
- 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 +25 V.
3. Adjust Vg until quiescent Id is 480 mA (Vg = -3.0 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. Set Vg to 0 V.

Contact Information

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