Application Note

Evaluation Board : P/N VM209FE

Device : VM209F

[2-18] GHz 10W GaN power amplifier Evaluation board

	Written	Controlled by	Approved by
Name	DLA	GDE	
Date	01/07/25	01/07/25	
Signature	OK	OK	

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I. HISTORIC

Edition	Date	Description of Evolutions
1.0	01/07/25	Creation

II. SUMMARY

III. LIST OF ILLUSTRATION

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IV. INTRODUCTION

IV-1. Description

The VM209FE is an evaluation board of the VM209F flange component. It is working in the [2-18] GHz frequency bandwidth.

The evaluation board is composed of 2 mains parts:

- VM209F [2-18] GHz 10W GaN power amplifier (1) in flange package
- Test structure support: PCB's with SMA/DC connectors and heatsink (2)

The test structure support uses a RF PCB with SMA connectors and second order decoupling components and connectors to bias the component, all this on an aluminum mechanical support screwed on a heat sink (with fan).

Supply cables are not provided.

This document describes the way to use the VM209FE Evaluation board

Typical RF results are included.

IV-2. Evaluation Board photo

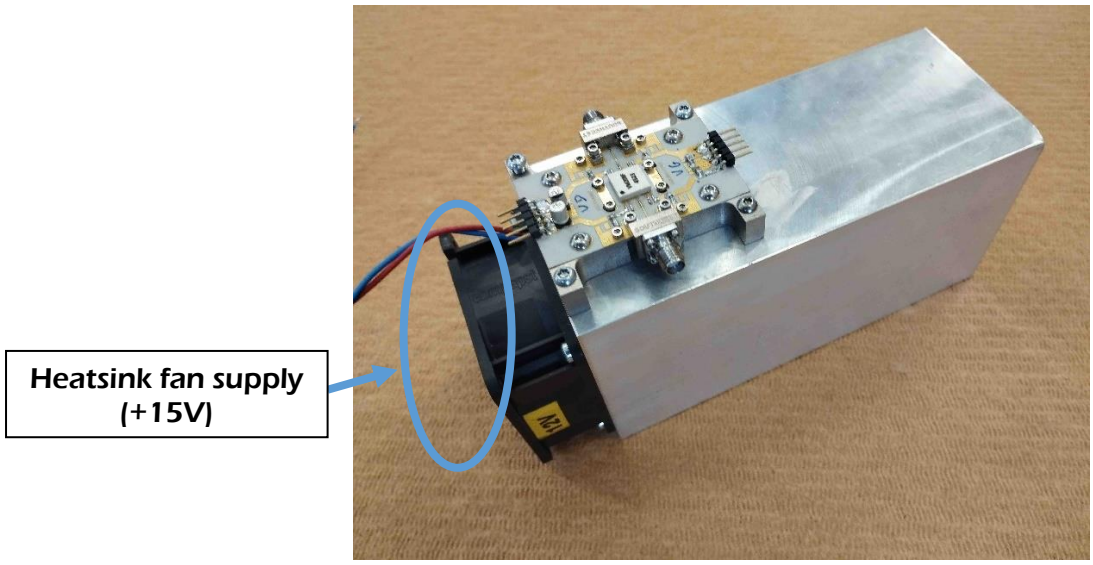

Figure 1. VM209FE evaluation board with its dissipator

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V. INTERFACE AND COMPONENTS

V-1. VM209FE interface

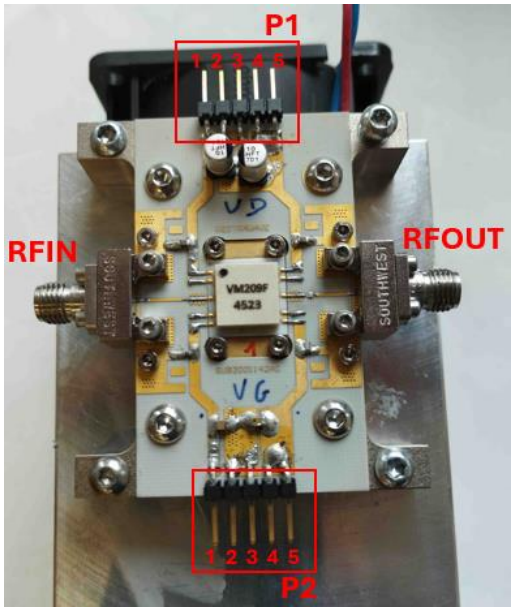

Figure 2. Evaluation board VM209FE interface

Connector	Type	Allocation
P1	DC connector	- V_D power supply - GND
P2	DC connector	- V_G power supply - GND
RF IN	SMA female	PA RF input
RF OUT	SMA female	PA RF output

P1	
PIN	P1 Identification
1	V_D
2	GND
3	GND
4	V_D
5	V_D

P2	
PIN	P2 Identification
1	V_G
2	GND
3	GND
4	V_G
5	V_G

Table 1. VM209FE PINOUT

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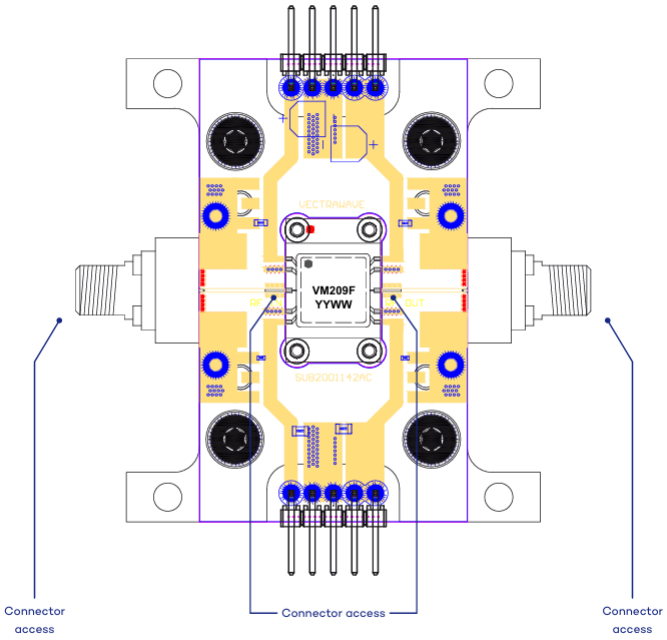
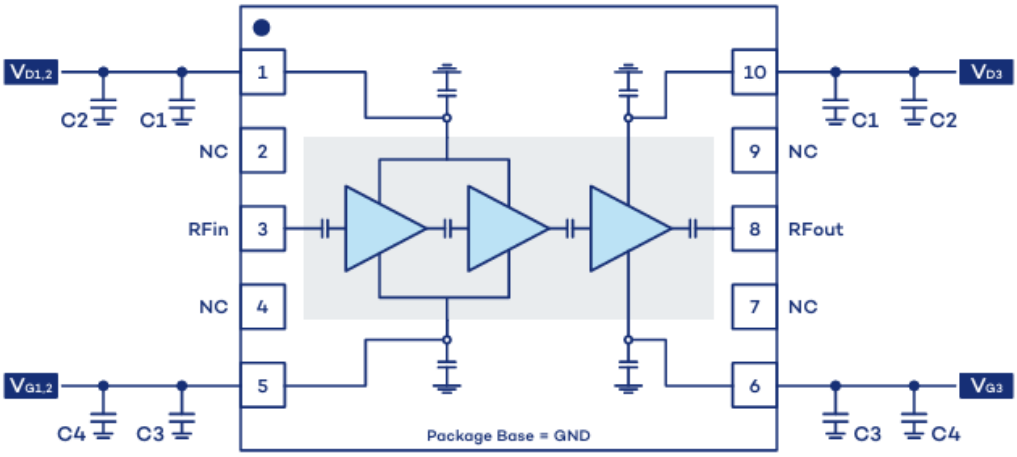


Figure 3. PCB cabling



Components	Value	Type
C4	100µF/6.3V	0805
C3	1µF/16V	0402
C2	1µF/50V	0603
C1	10µF / 50V	electrolytic

Table 2. External decoupling

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VI. BIASING PROCEDURE AND OPERATING CONDITIONS

VI-1. Electrical operating conditions

- V_D = +28V
- I_{DQ} = 1.12A (Typically V_G= -1.7 V)
- RF CW
- Room temperature 25°C

VI-2. Biasing procedure

Switch on

1. Set V_G to 0V
2. Set V_D to 0V
3. Set +15V on dissipator fan
4. Set V_G to -3V
5. Set V_D to +28V
6. Increase V_G to obtain I_{DQ}= 1.12A (Typically V_G= -1.7V)
7. Turn RF (CW) ON

- Always apply V_G before applying V_D
- Do not respect this may cause permanent damage on component.

Switch off

1. Turn RF OFF
2. Decrease V_G to -3V
3. Decrease V_D to 0V
4. Decrease V_G to 0V
5. Turn OFF dissipator fan

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VII. ABSOLUTE MAXIMUM RATING

Symbols	Parameter	Max	Units
V_D	Drain voltage	35	V
I_D	Drain bias current	2.4	A
Pin	maximum input power overdrive	22	dBm

Table 5. Absolute Maximum Rating

Operation of this device above any of these parameters may cause permanent damages.

VIII. TYPICAL EVB MEASUREMENTS RESULTS

VIII-1. Measurements conditions

Reference plane measurements :

SMA connectors

Losses estimation :

For information, the losses of a 50Ohms line in the same structure and dimensions that the VM209FE Evaluation board RF PCB :

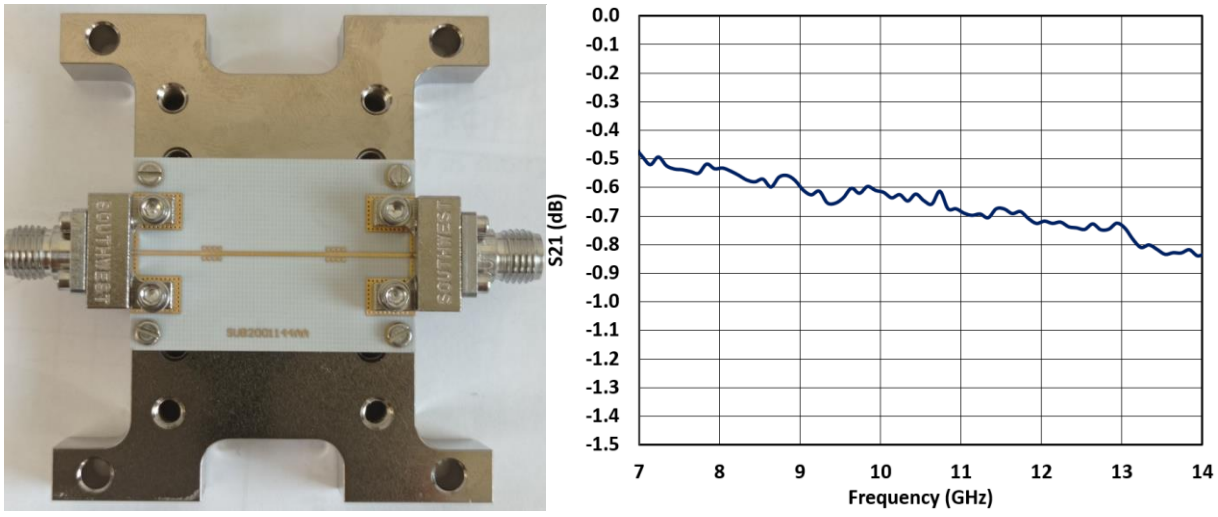

Figure 4. Losses estimation

50Ohms line S2P files can be provided on demand

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VIII-2. S-Parameters

RF CW (Pin =-25 dBm).

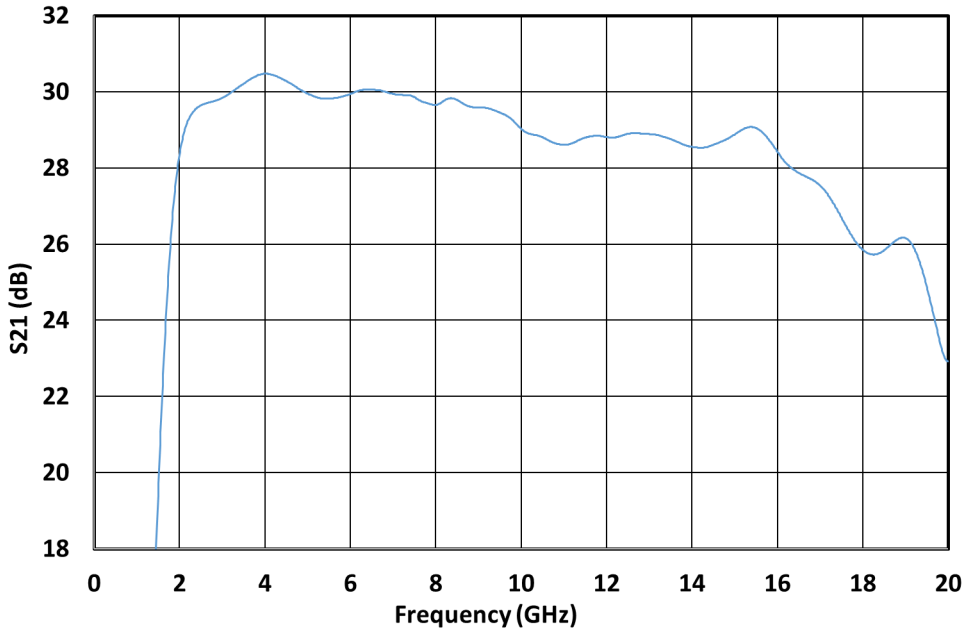

Figure 5. Gain (S21)

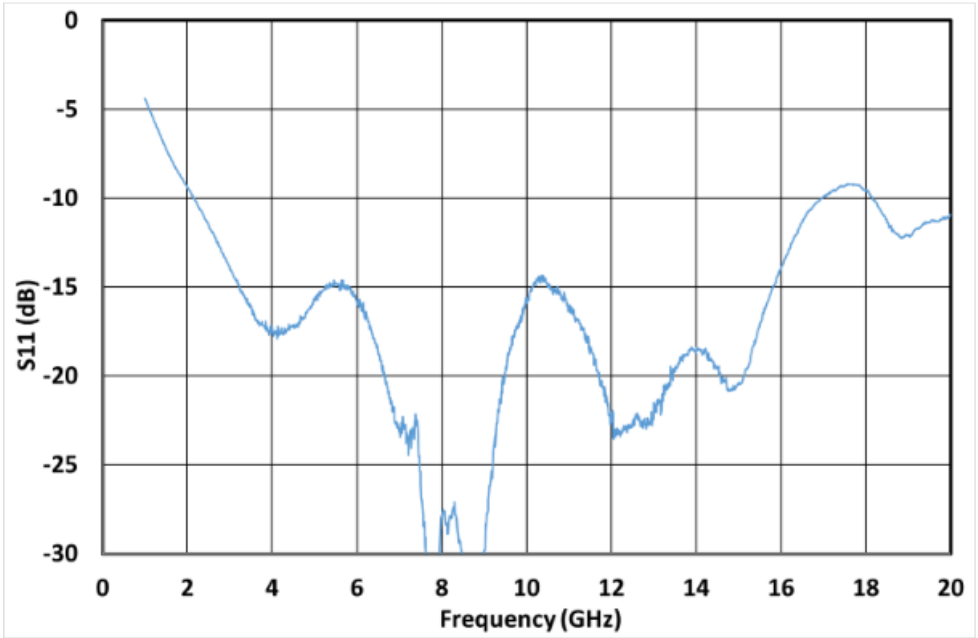

Figure 6. Input return loss (S11)

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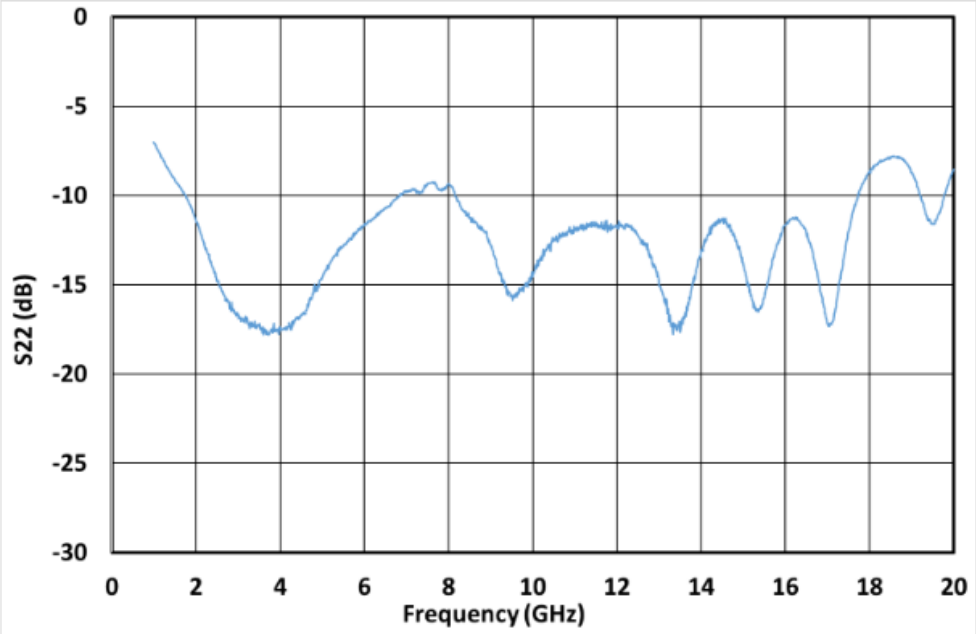

Figure 7. Output return loss (S22)

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VIII-3. Large Signal

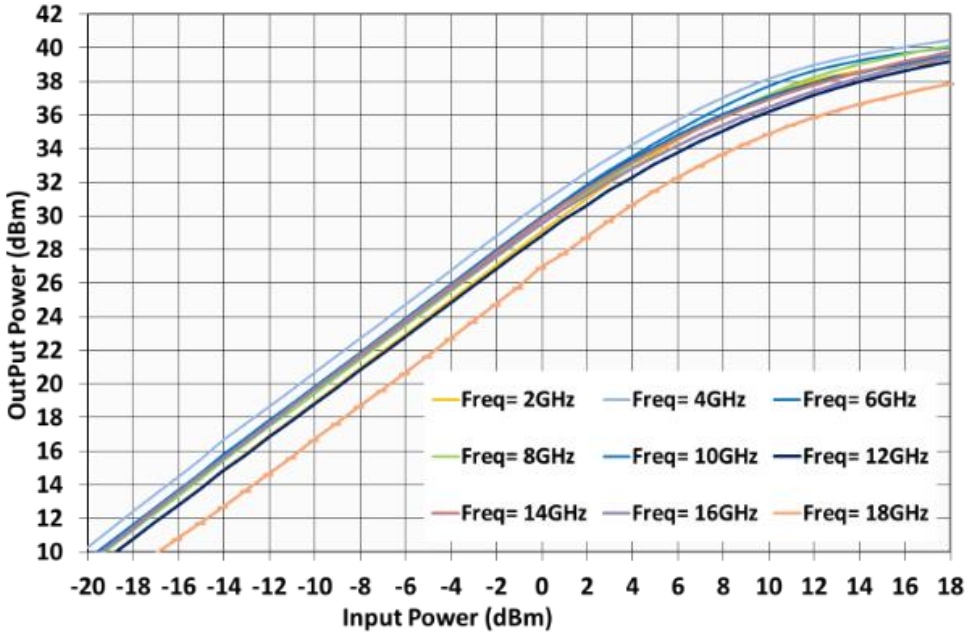

Figure 8. Output Power vs Input Power vs Frequency

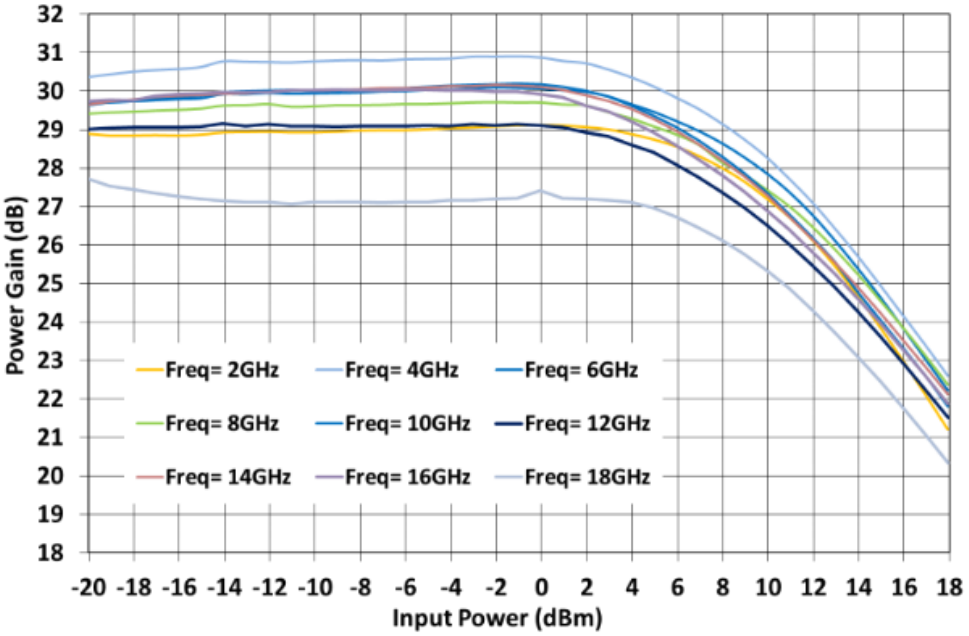

Figure 9. Gain vs Input Power vs Frequency

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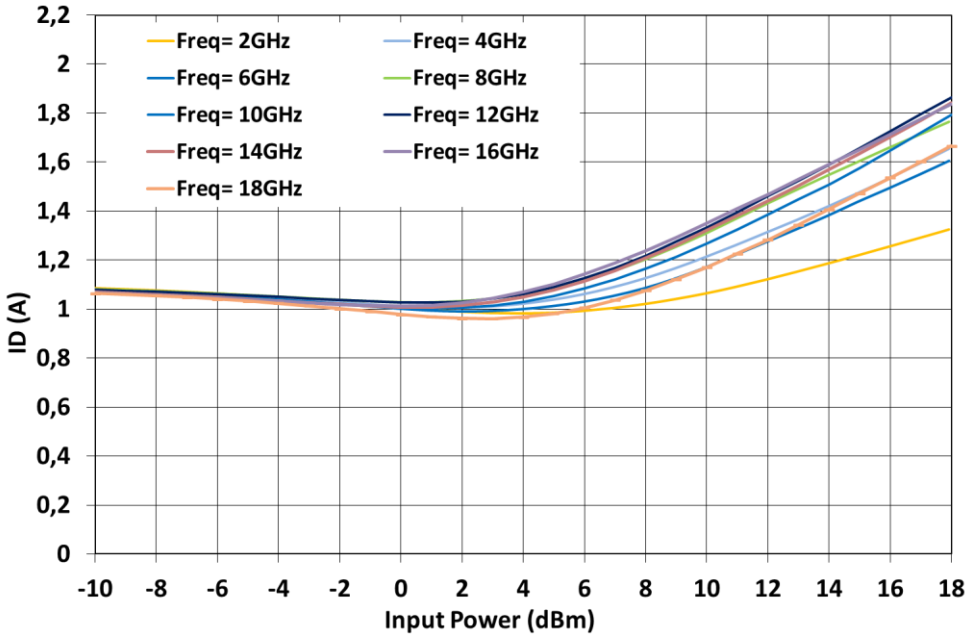

Figure 10. Drain current vs Input Power vs Frequency

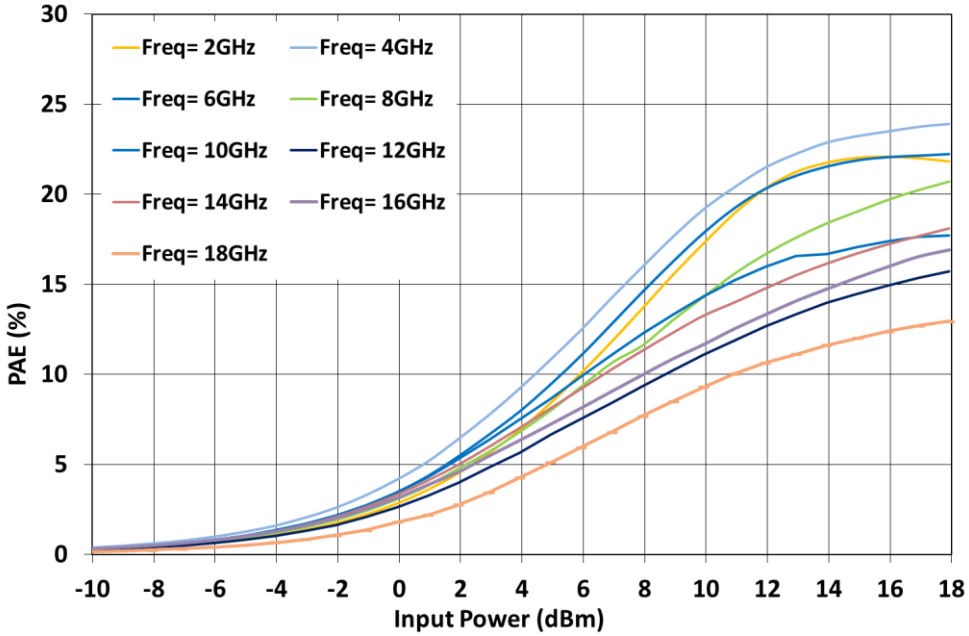

Figure 11. Efficiency vs Input Power vs Frequency

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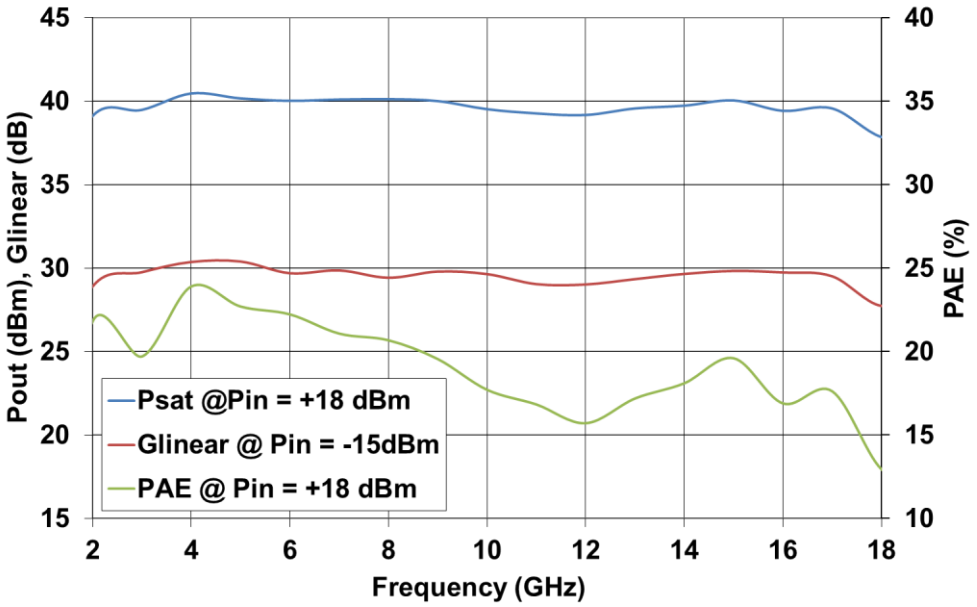

Figure 12. Saturated Output Power, Gain and Efficiency vs Frequency

End of document

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