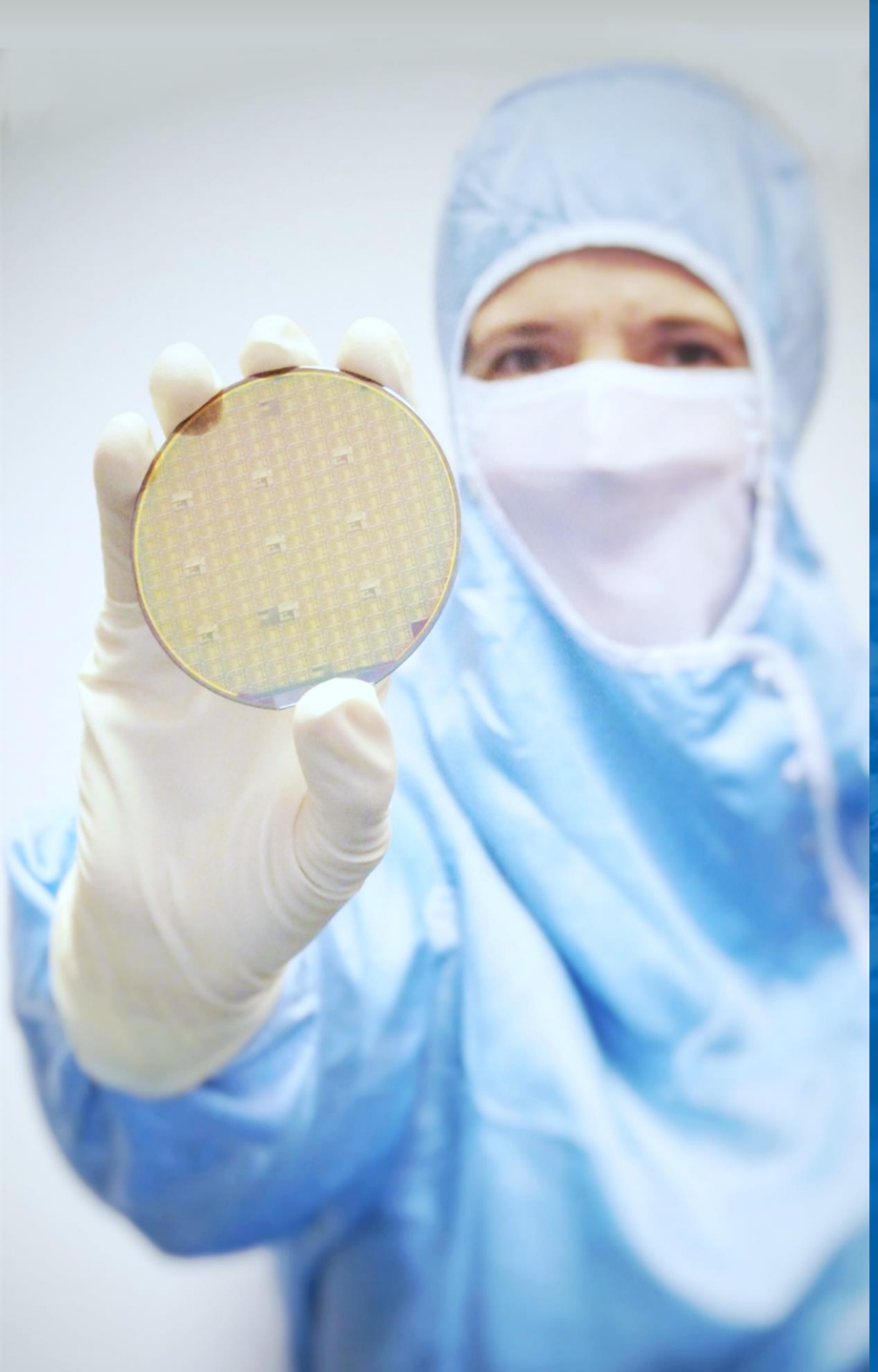


Europe's Leading Foundry

OMMIC

New Generation of GaN MMICs for SATCOM & Electronic Warefare from X- to Ka-band

Cédric CORRÈGE

OMMIC
innovating with III-V'S

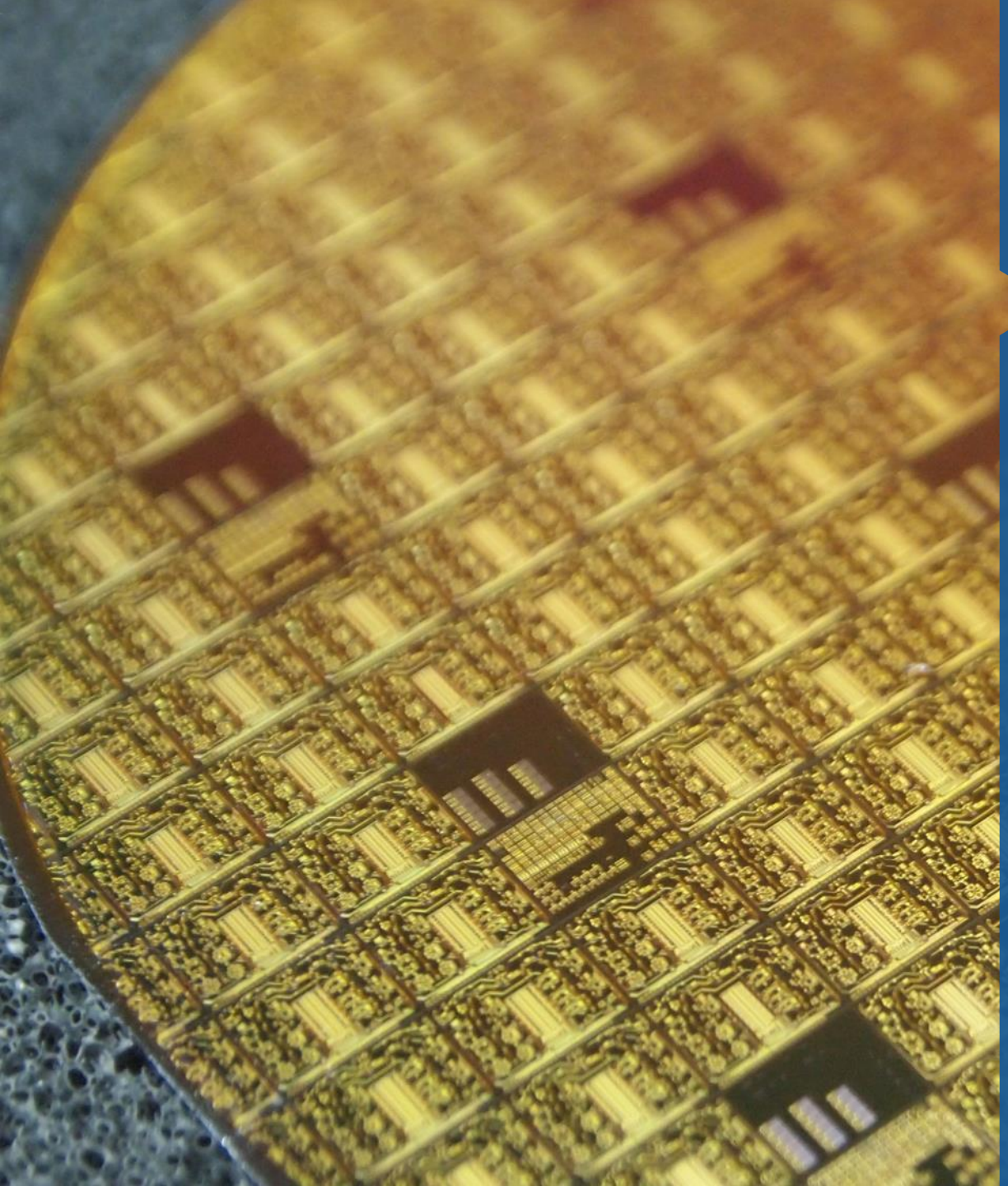
1st

6 Inch GaN line in Europe

- Created in 2000
- Former Philips Semiconductor division
- Over 40 years of experience in III-V semiconductors, including GaAs and InP
- Unique GaN Process : the third revolution of III – V compounds
- Only foundry in Europe offering complete service including Epitaxial Growth, Process Development, MMIC Design & Fabrication, Test & Product Qualification

OUTLINE

- GaN/Si technology advantages
- GaN for defence application
- Moving to Q/V band for SATCOM systems



III-V Technology

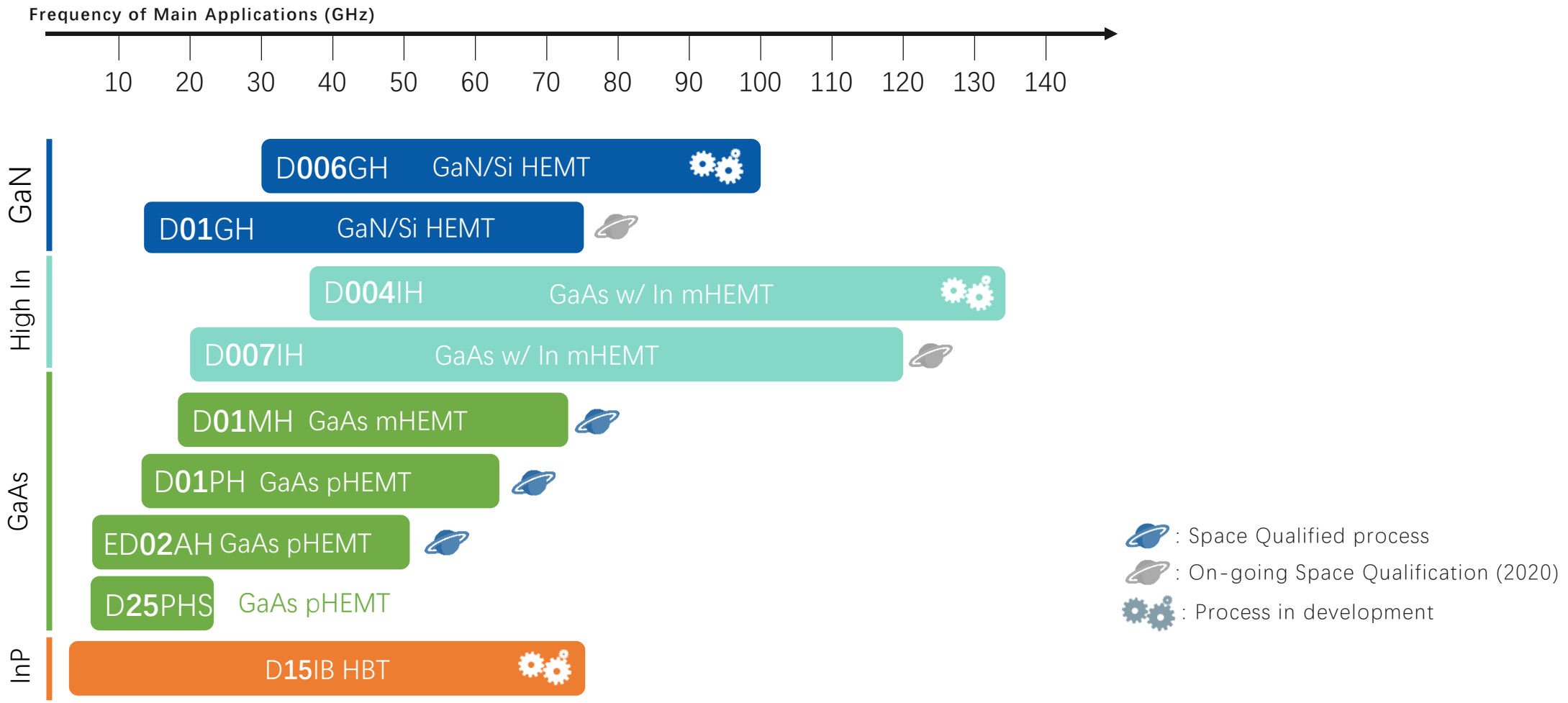
GaAs / InP / GaN

World leader in 3rd Gen III-V technology

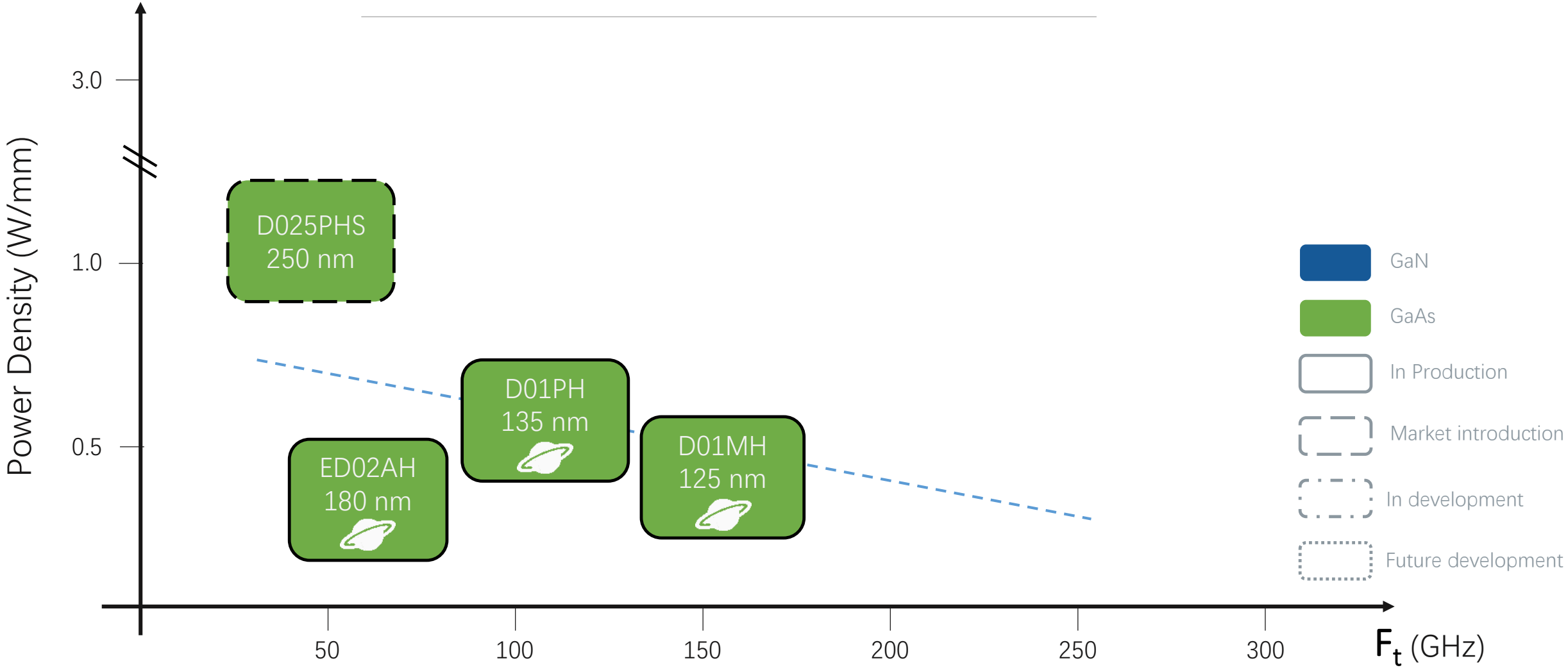
OMMIC offers high performance HEMT, pHEMT, mHEMT and HBT III-V process, enabling cut-off frequencies up to 400 GHz.

OMMIC is the 1st company in the world to successfully develop mmW GaN/Si solutions, perfect for 5G application.

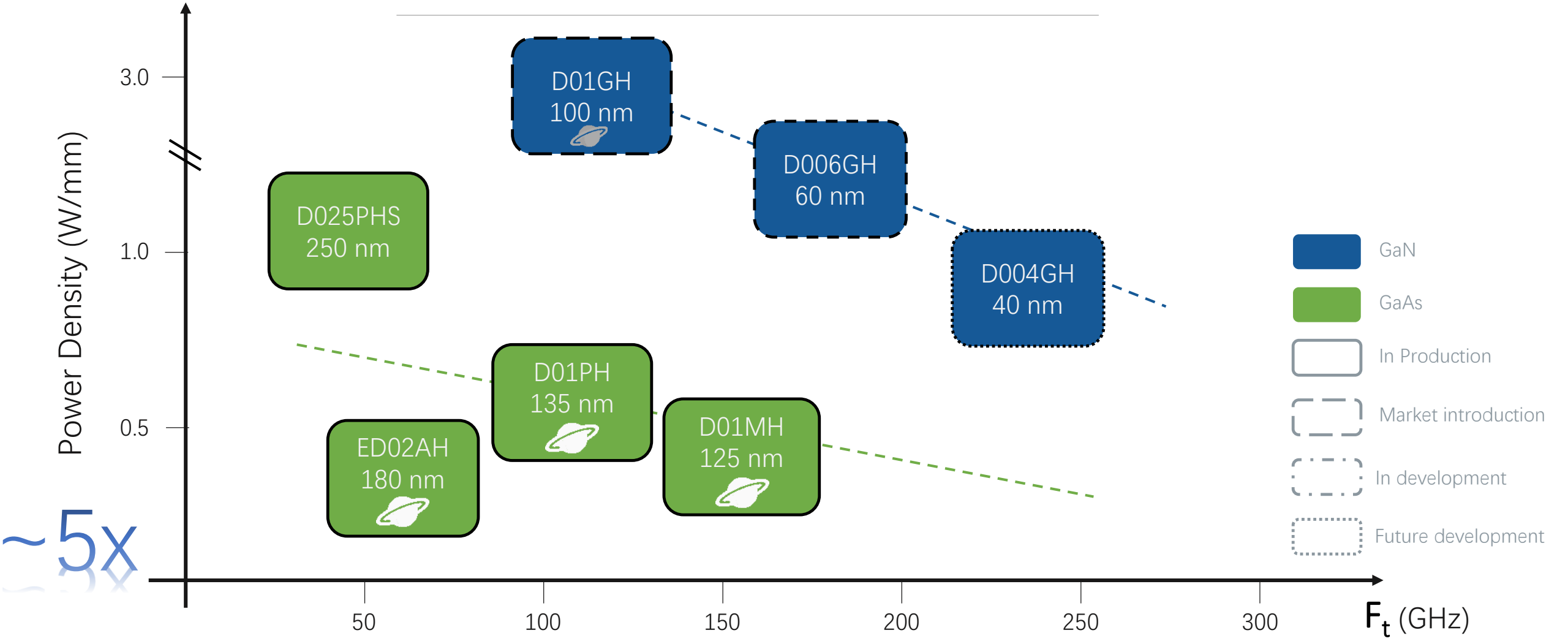
OMMIC PROCESSES



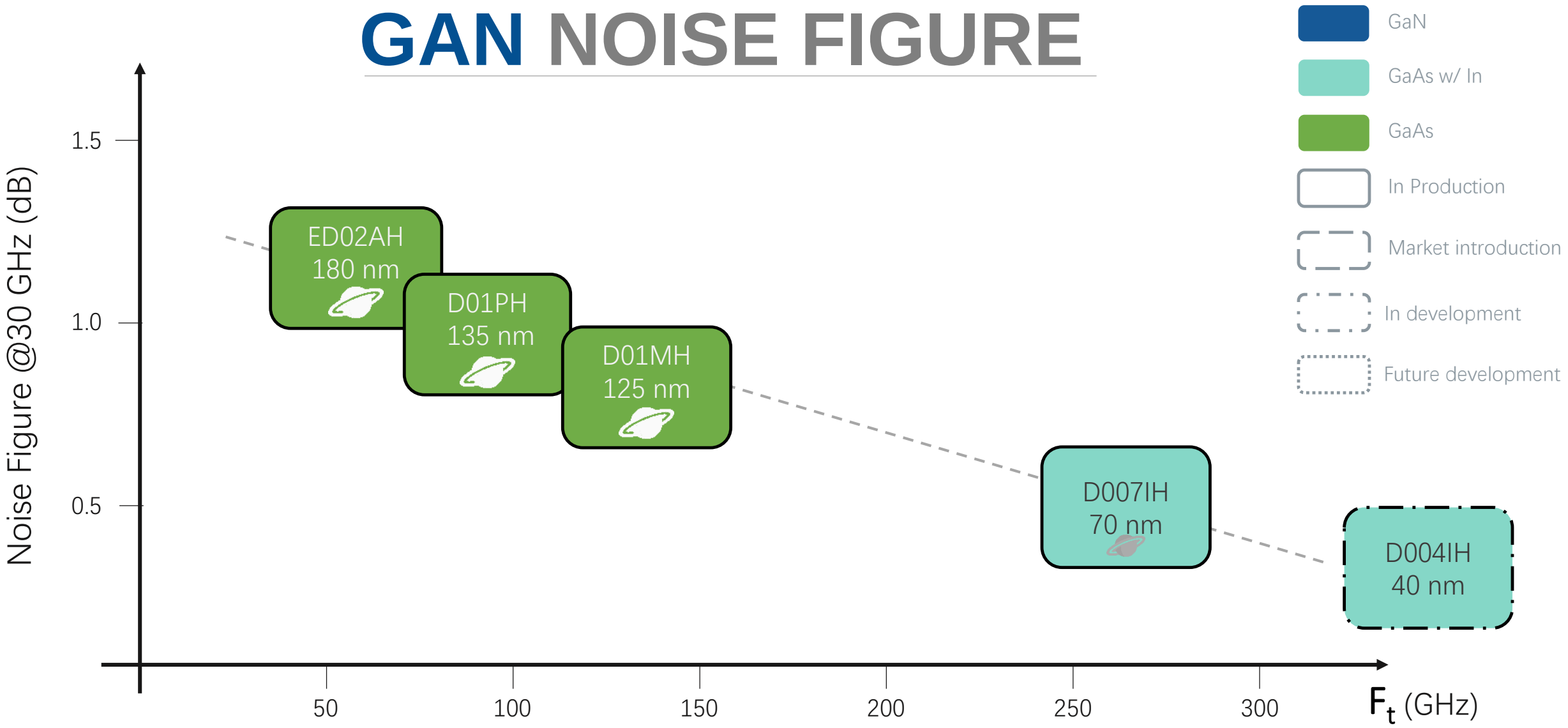
GAN POWER DENSITY



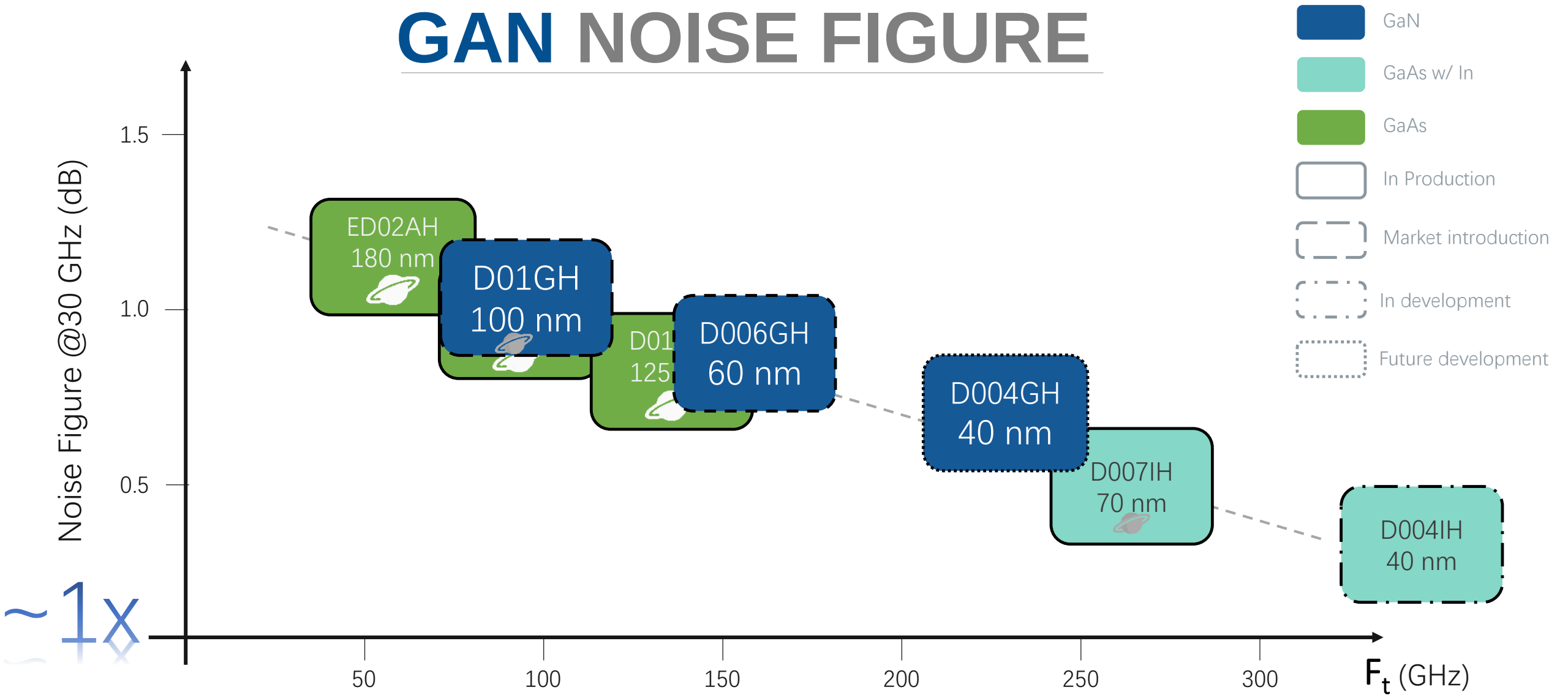
GAN POWER DENSITY



GAN NOISE FIGURE



GAN NOISE FIGURE

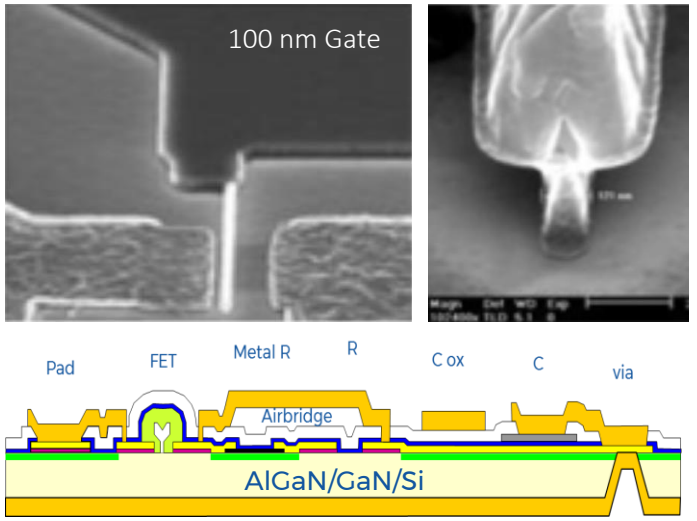


D01GH GaN/Si

D01GH FEATURE

f_{max} : 180 GHz
f_t : 110 GHz

Gate length: 100 nm
V_{bgd} > 40 V



ON-WAFER MEASUREMENTS

PW @ 30 GHz : 3.5 W/mm
PAE : 48%

MAIN APPLICATIONS

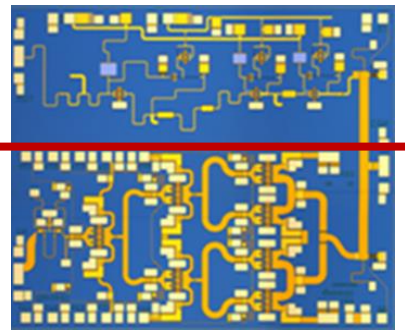
- High frequency PA : 15 – 50 GHz
- Instrumentation wide band amplifier DC – 50 GHz
- Robust LNA (< 40 GHz) : > 40 dBm Pin
- Integration (T/R chips, SiGe or CMOS w/ GaN hybrids)

GaN for Defense

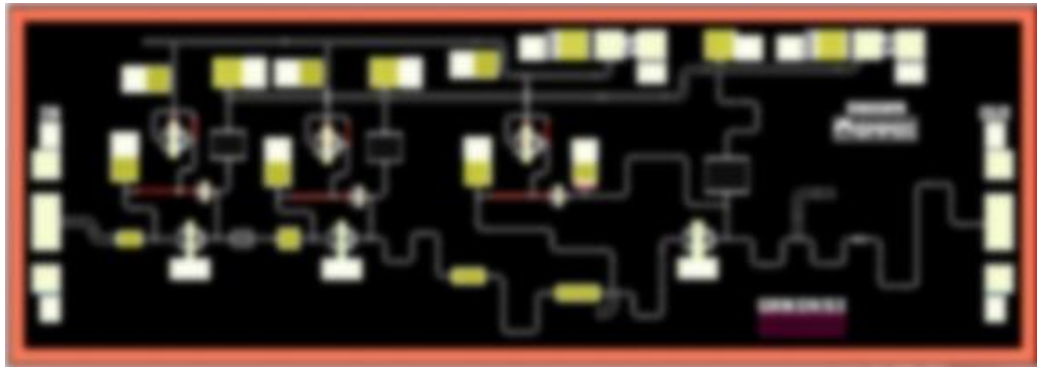
Electronic warfare and radar

Space systems

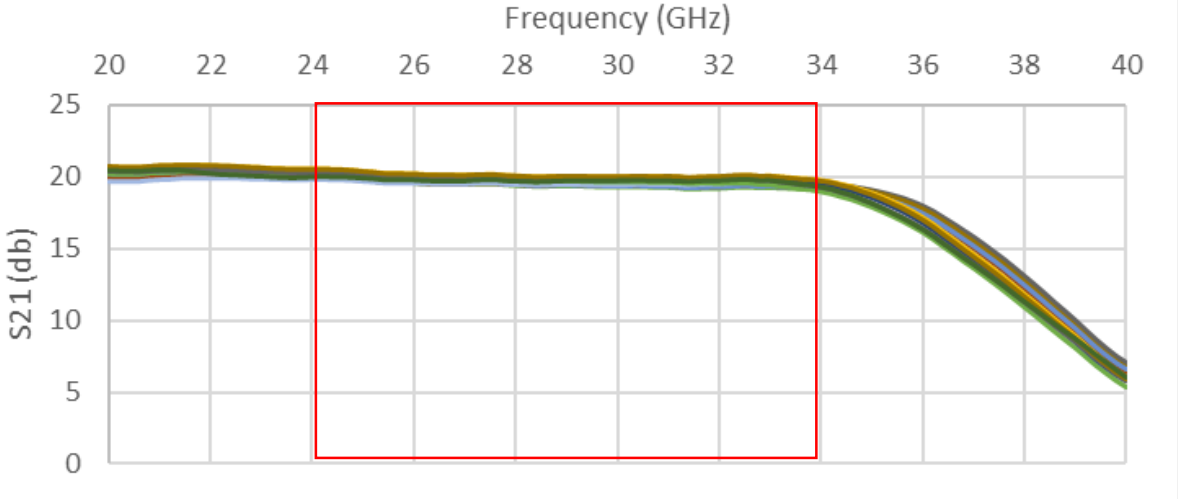
- Robust GaN LNA
- High Power Amplifier
- Integrated Frontend die

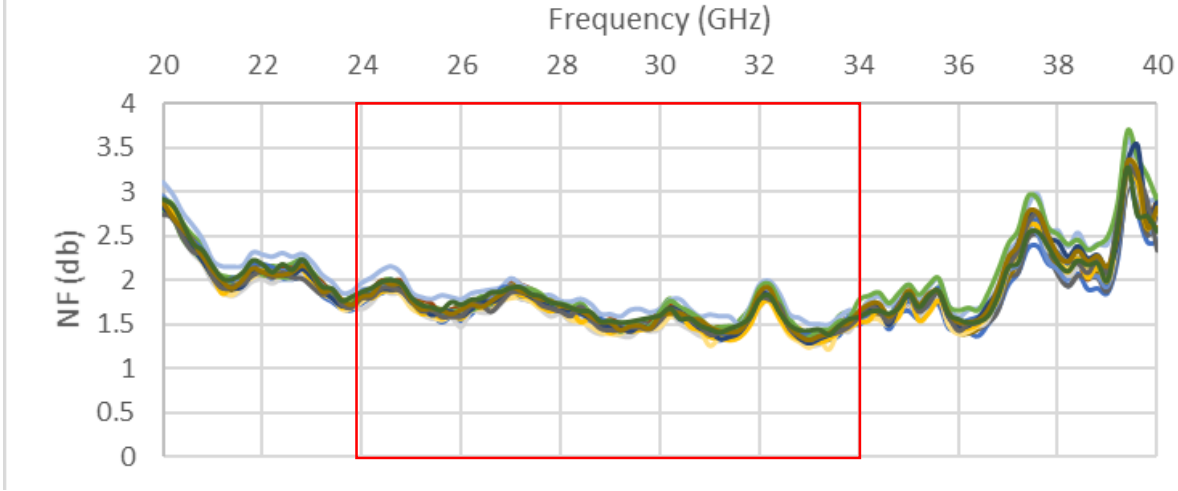


ROBUST KA-BAND LNA

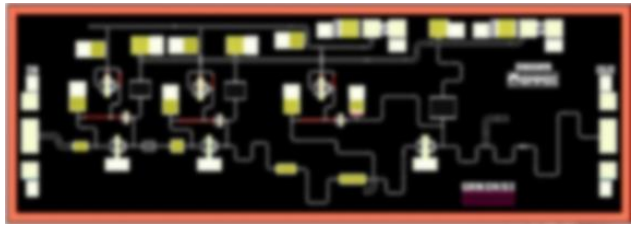


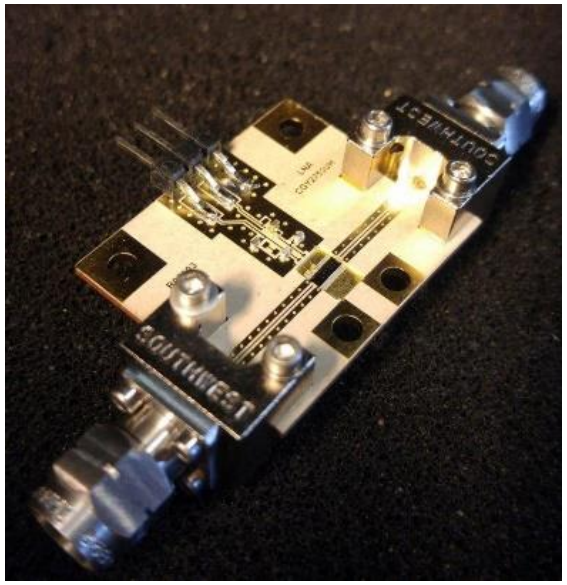
24-34GHz GaN LNA
On-Wafer (probe) measurements

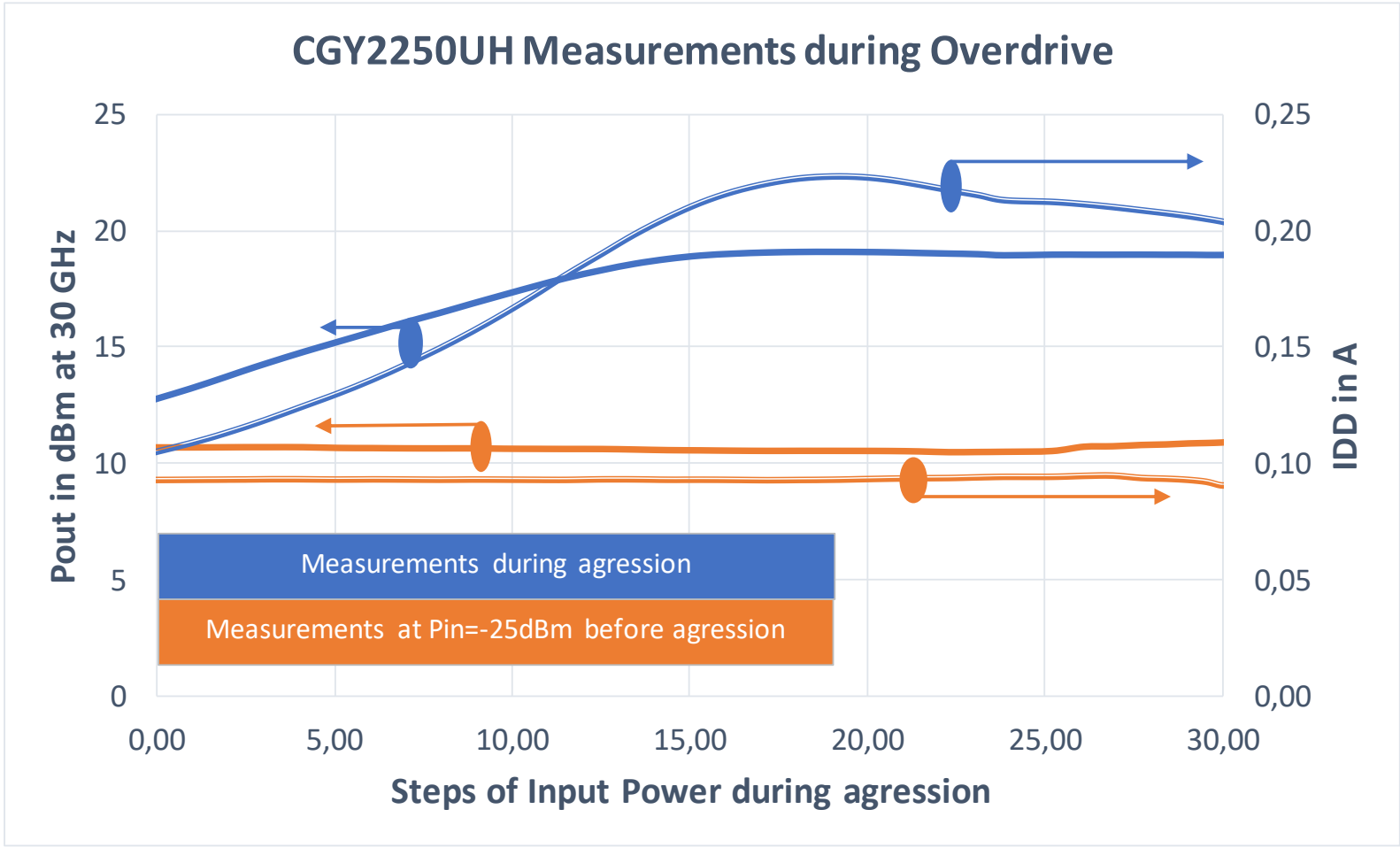




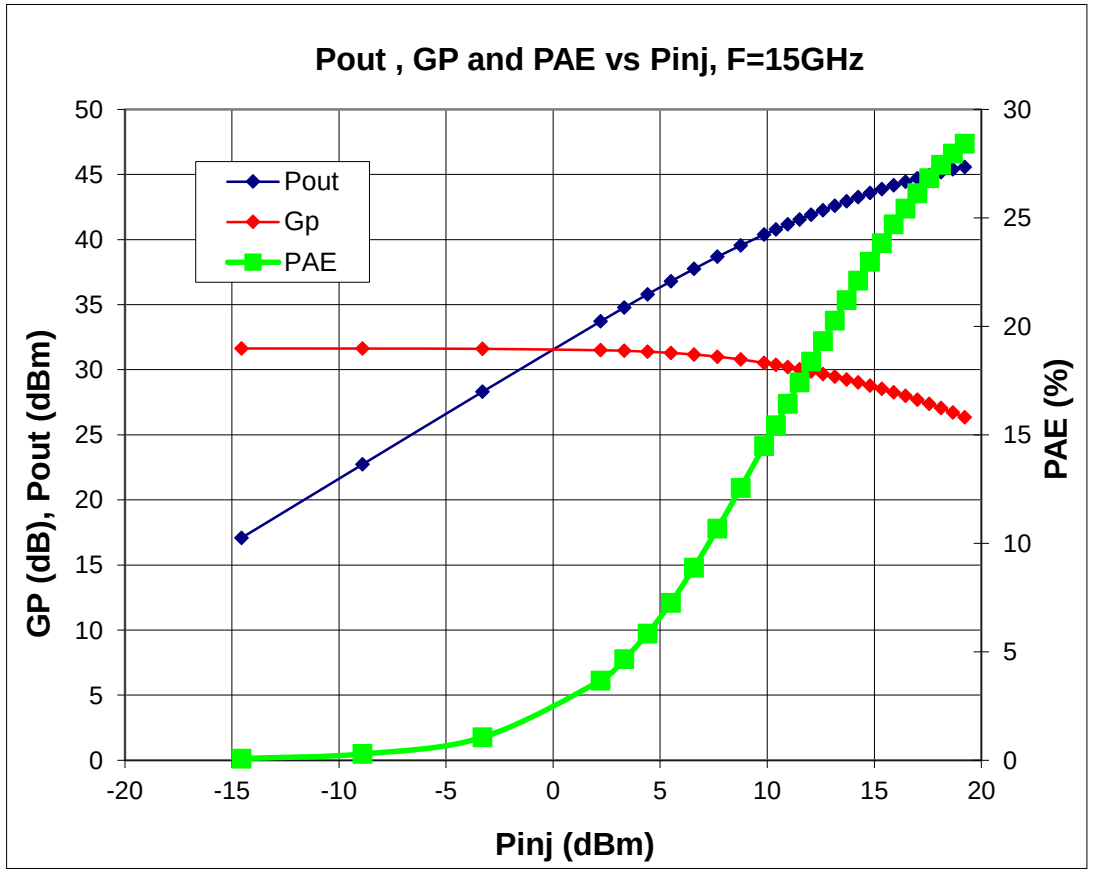
ROBUST KA-BAND LNA



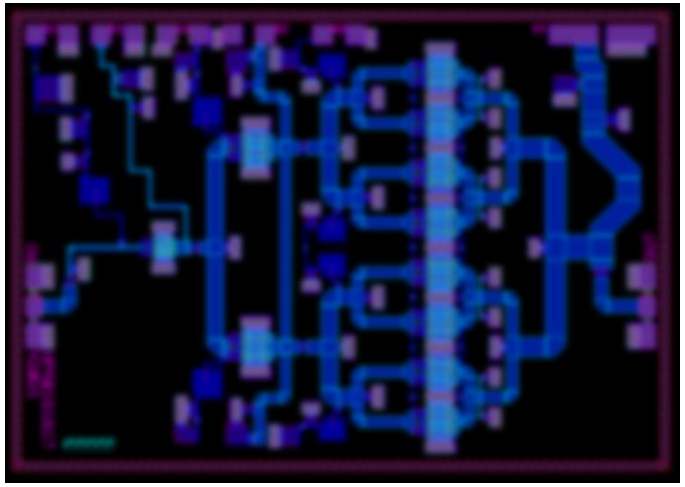




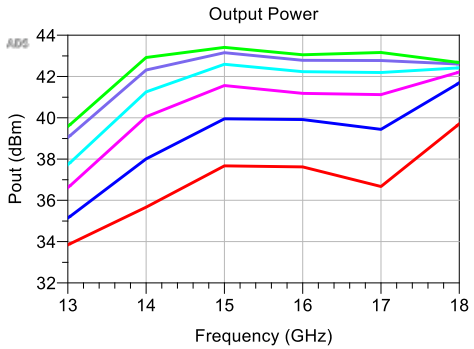
DEFENSE REALISATION

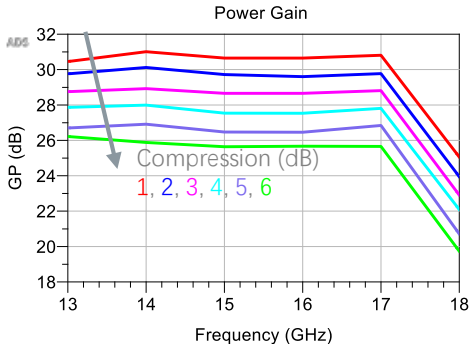


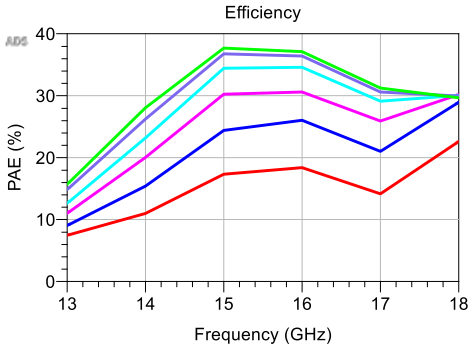
GaN 13-17 GHz 20 W PA



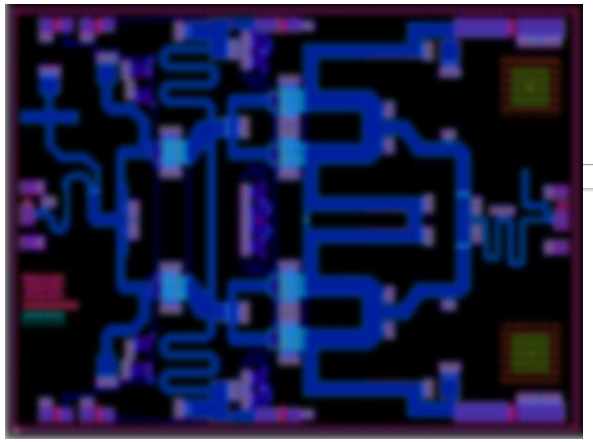
New Version w/ 50 W Psat



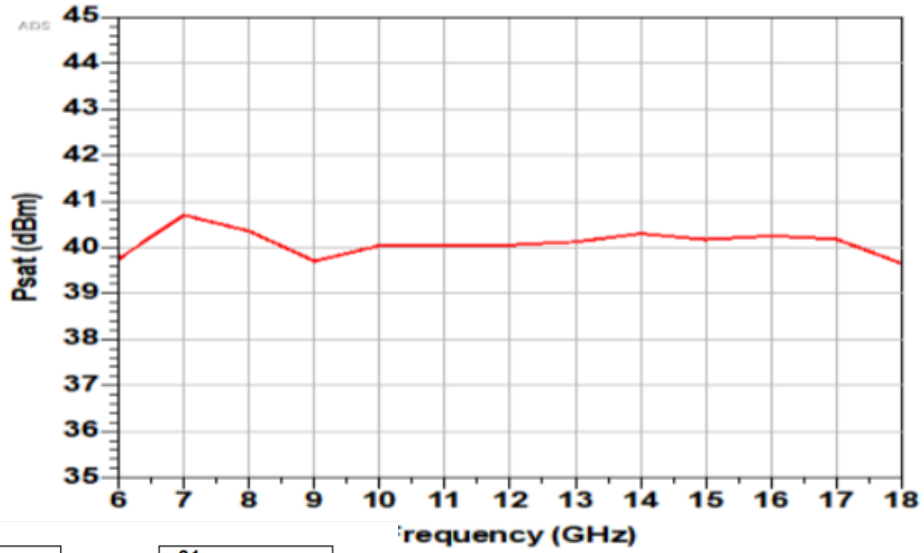


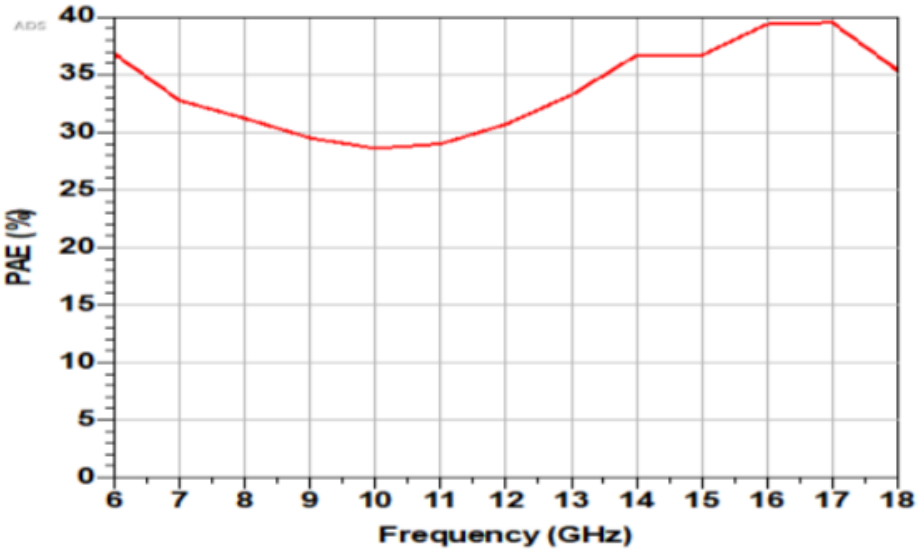


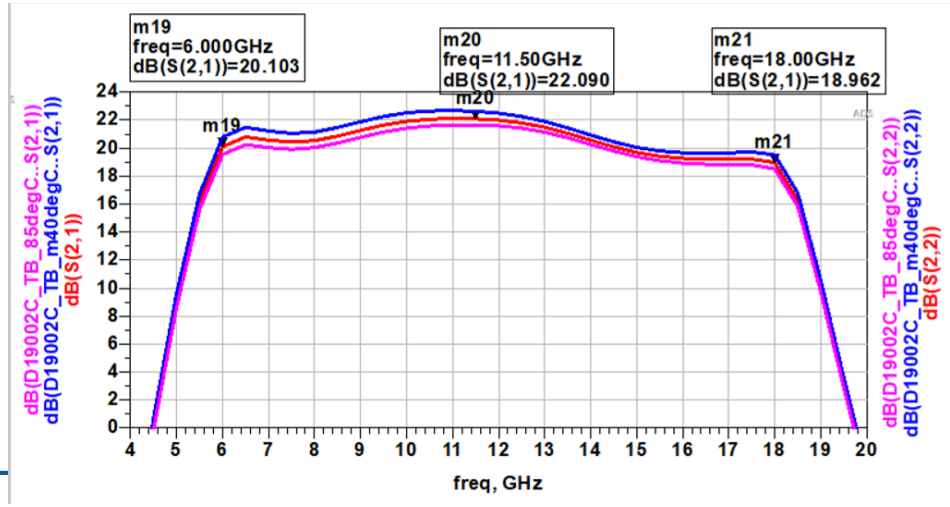
ELECTRONIC WARFARE



4160 X 3100 mm²





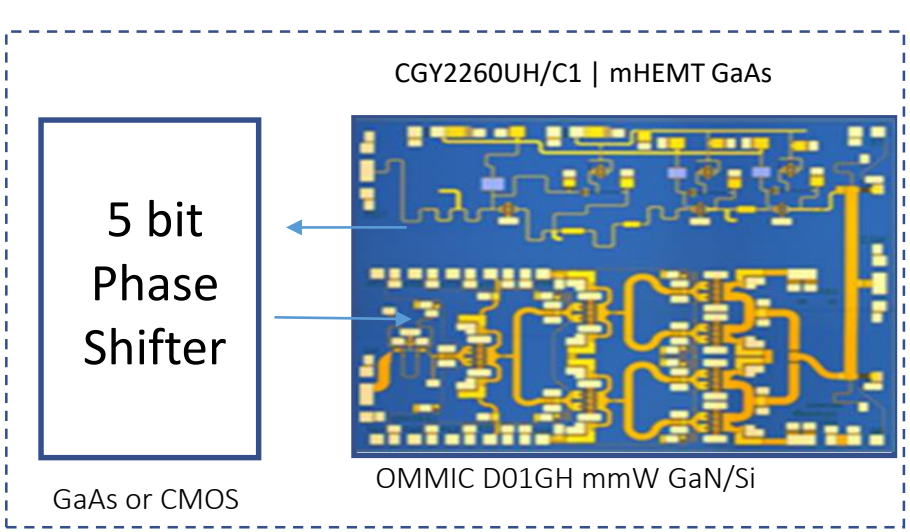


6 – 18 GHz HPA

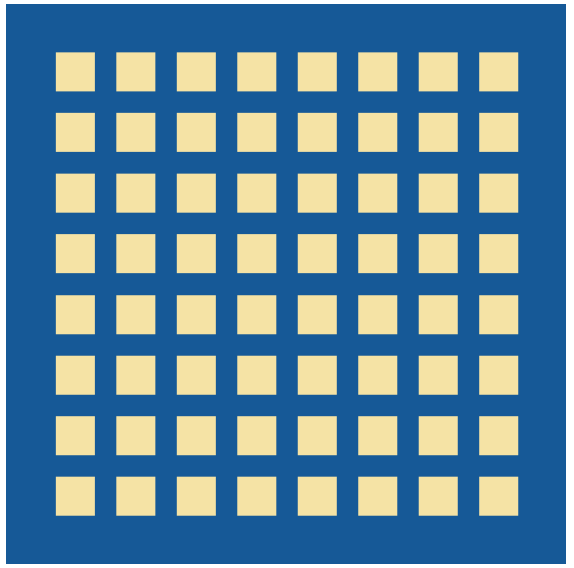
Simulated Results :

- Psat : ~40 dBm
- PAE @ Sat : > 30 %
- Ss Gain : 20 dB
- Bias : 12 V Vd / -1.4 V Vg

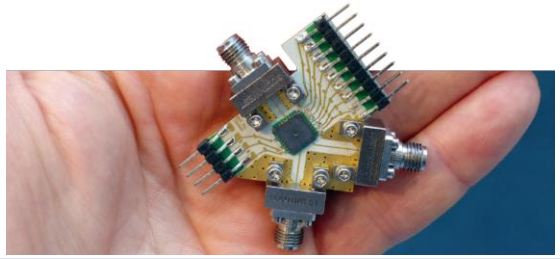
GaN AESA RADAR



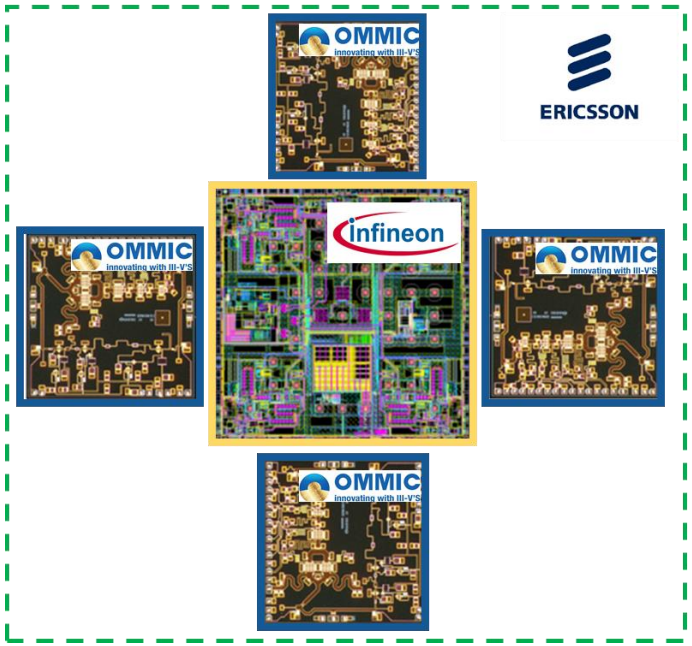
Single Chipset ED GaN/Si (ED01GH)

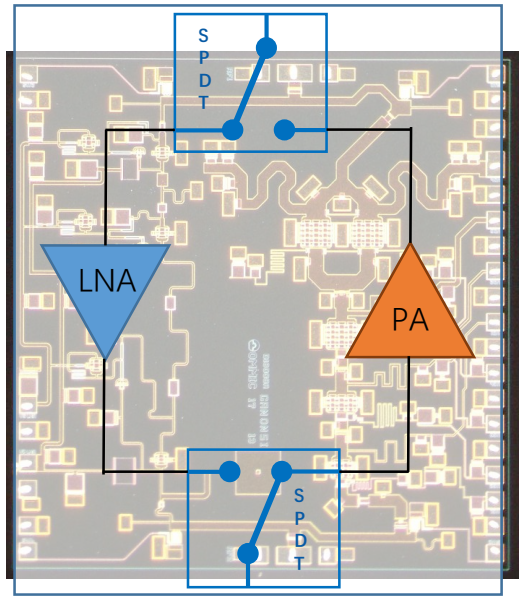


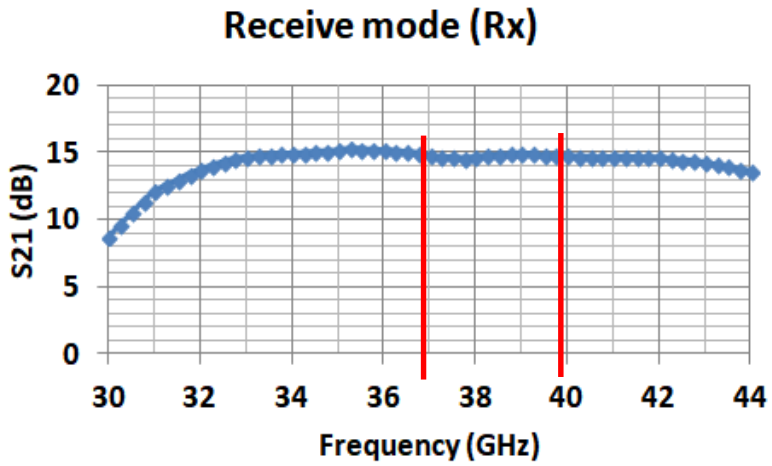
Phase Array Antenna

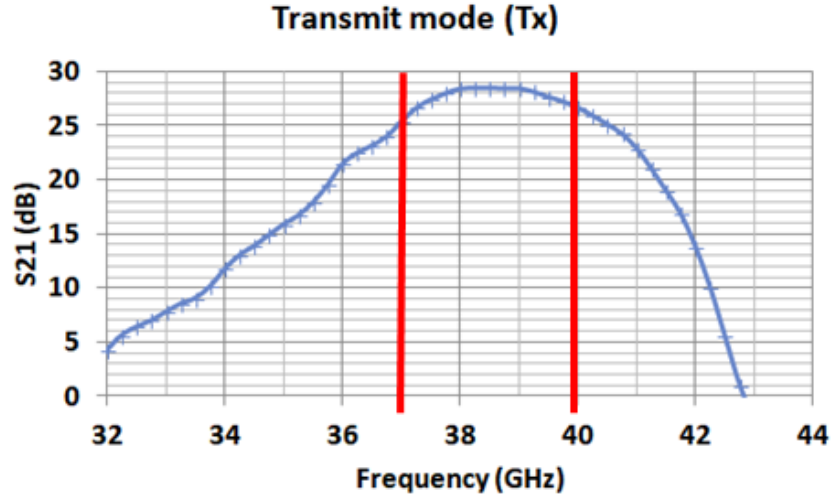


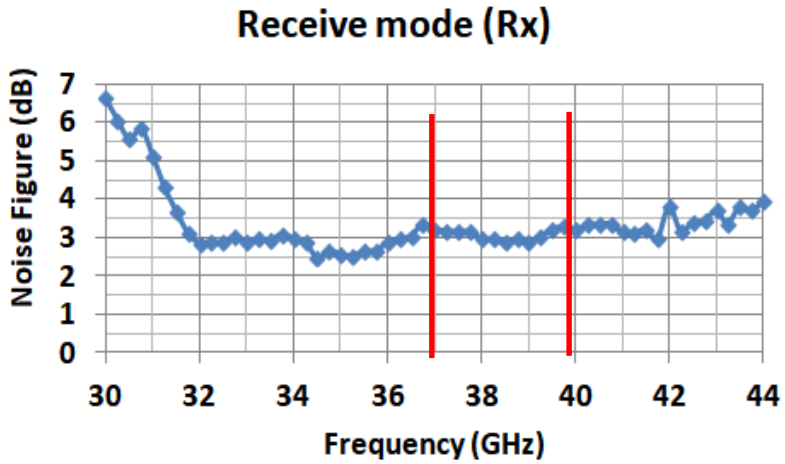
40 GHz AESA RADAR

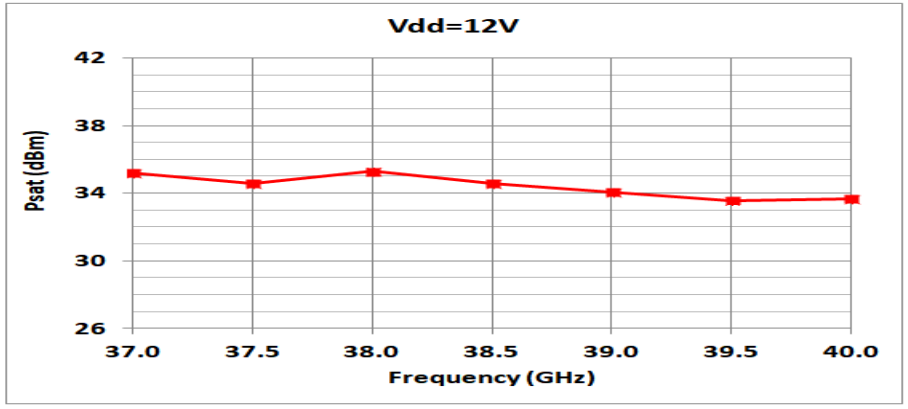


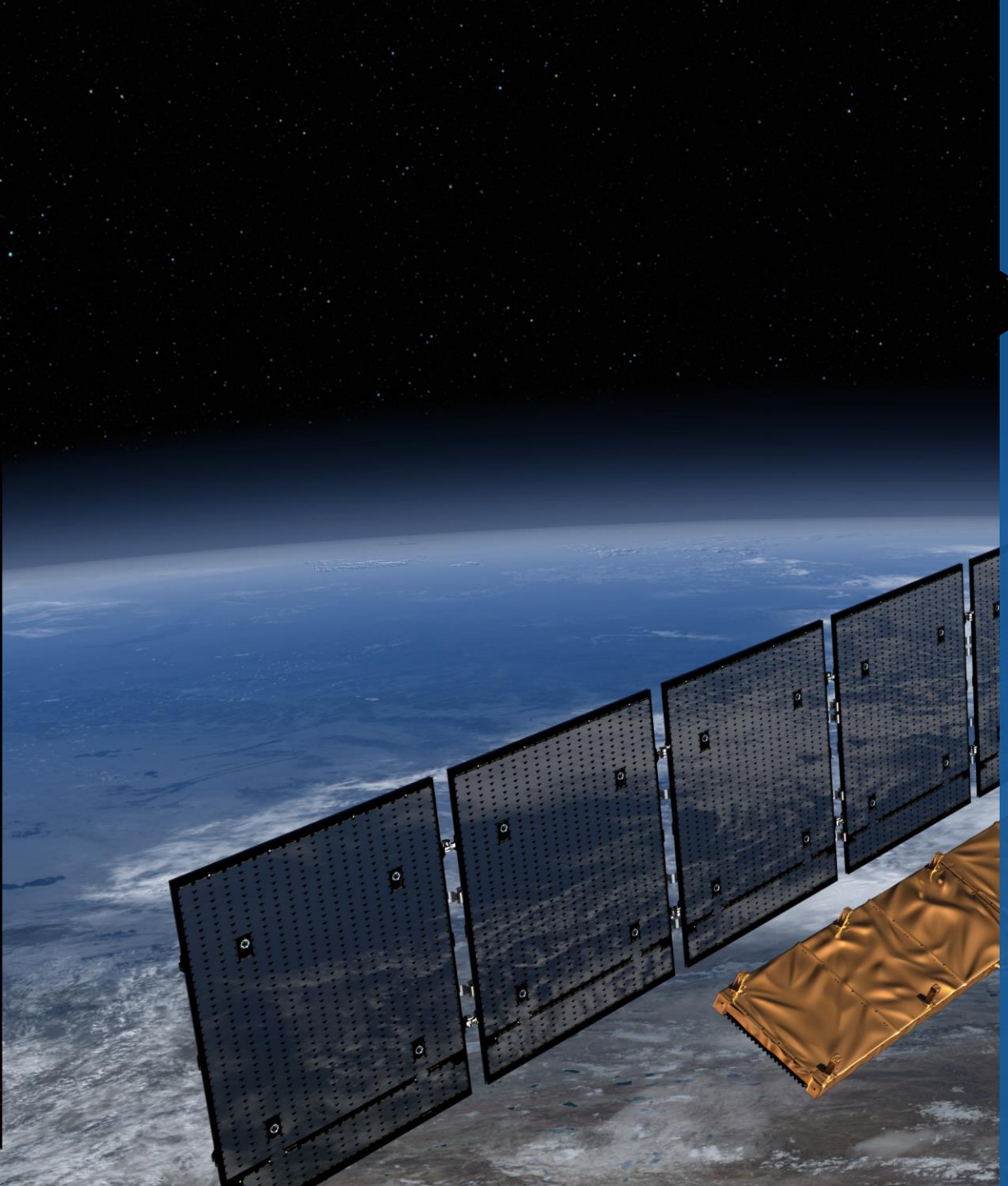












Q/V Band MMIC

For future high throughput

Space systems

V band Uplink : 50 GHz HPA

Q band Downlink : 40 GHz HPA

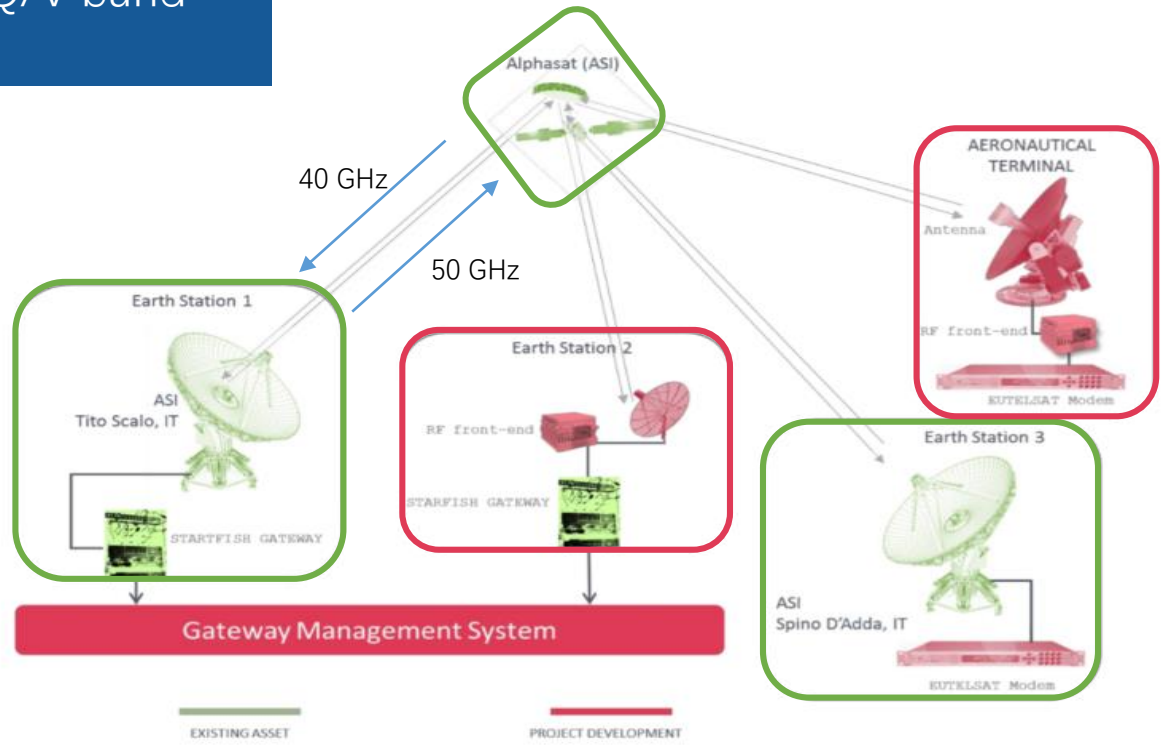
QVLIFT PROJECT

Developing the foundation of the ground segment Technology for the Future Q/V band SatCom systems.

Call : H2020-COMPET-2016
Topic : COMPET-2-2016, Maturing satellite communication technologies
Type of action : Research and Innovation action (RIA)
Start : November 2016
Duration : 30 months

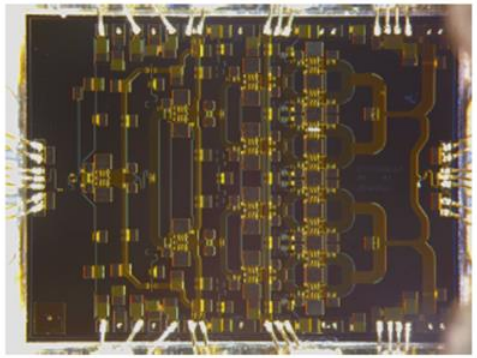
PROJECT'S INNOVATIONS

- High power SSPA @ V-band
- Smart Gateway passing the signal through non-raining environment

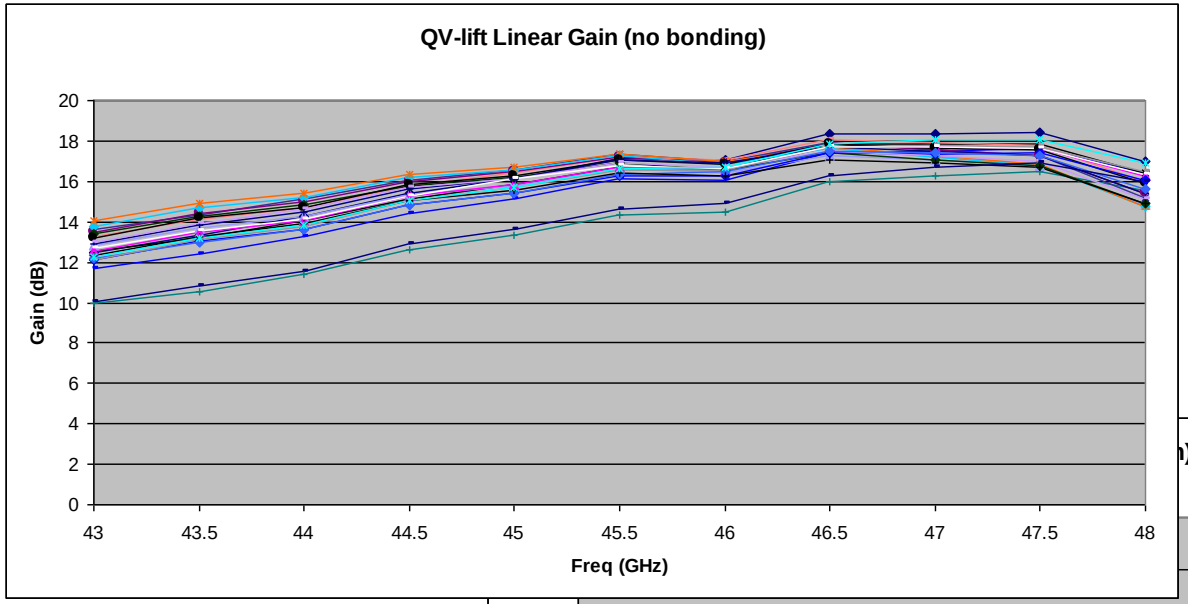


50GHz DOWNLINK MMIC

SPECIFICATION	OBJECTIVE
Bandwidth demonstrator	47.2 – 50.2 GHz
Bandwidth future use	48 - 52GHz
Output Power P2dB	37 dBm (5W)
Output Power Psat	39 dBm (8W)
Gain	> 16dB
Gain flatness	< +/-1.5dB
S11	< -10dB
S22	< -10dB
VDD	+12V
PAE	> 20%
Process	D01GH



State of the Art MMIC



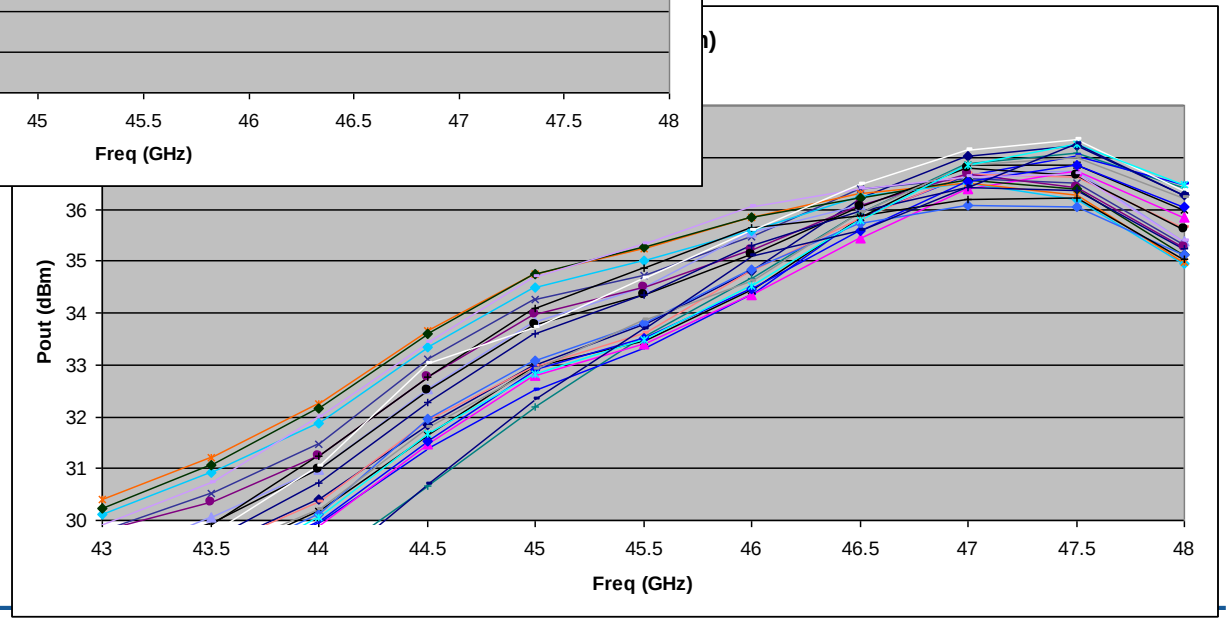
Pulsed on-wafer RF-power measurement

10µs Pulse on VG

1µs power-meter measurement

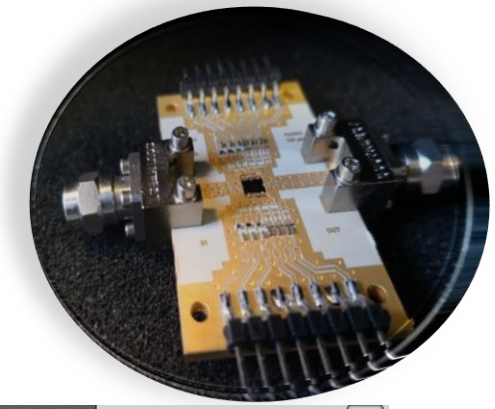
Psat : around 4dB compression

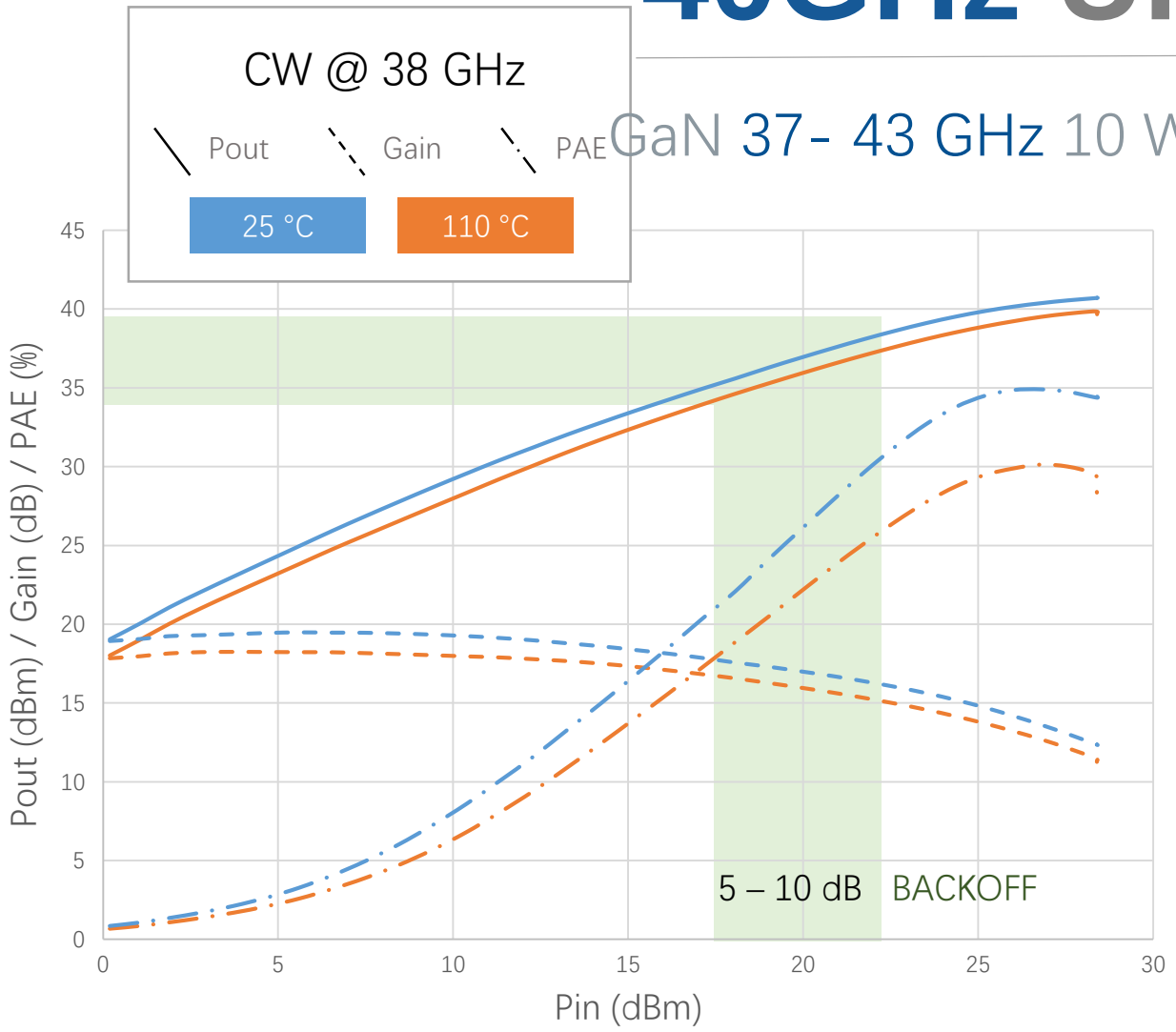
D17003A

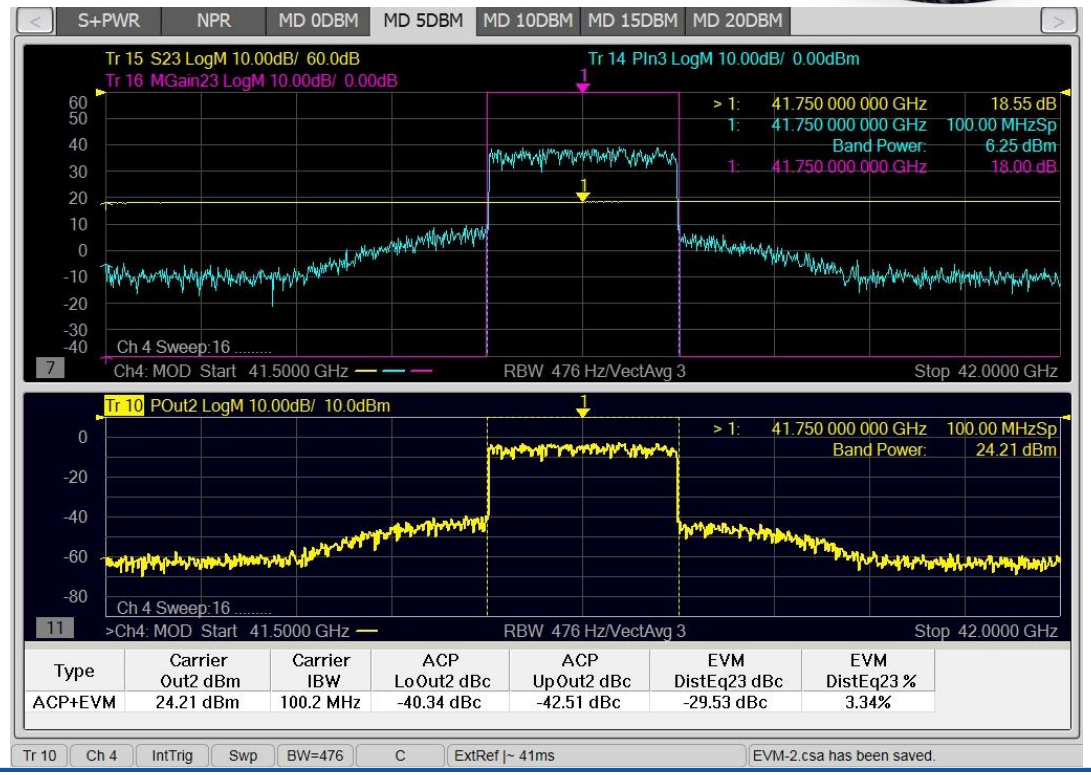


40GHz UPLINK MMIC

GaN 37- 43 GHz 10 W PA PCB measurement

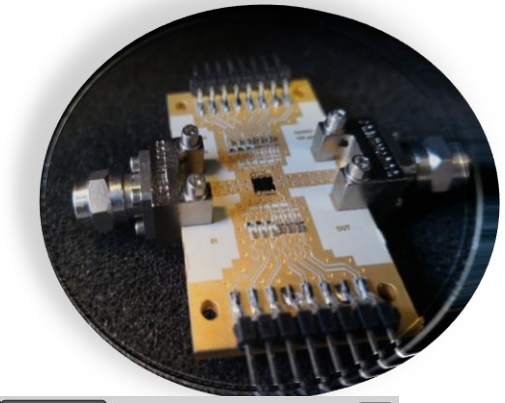


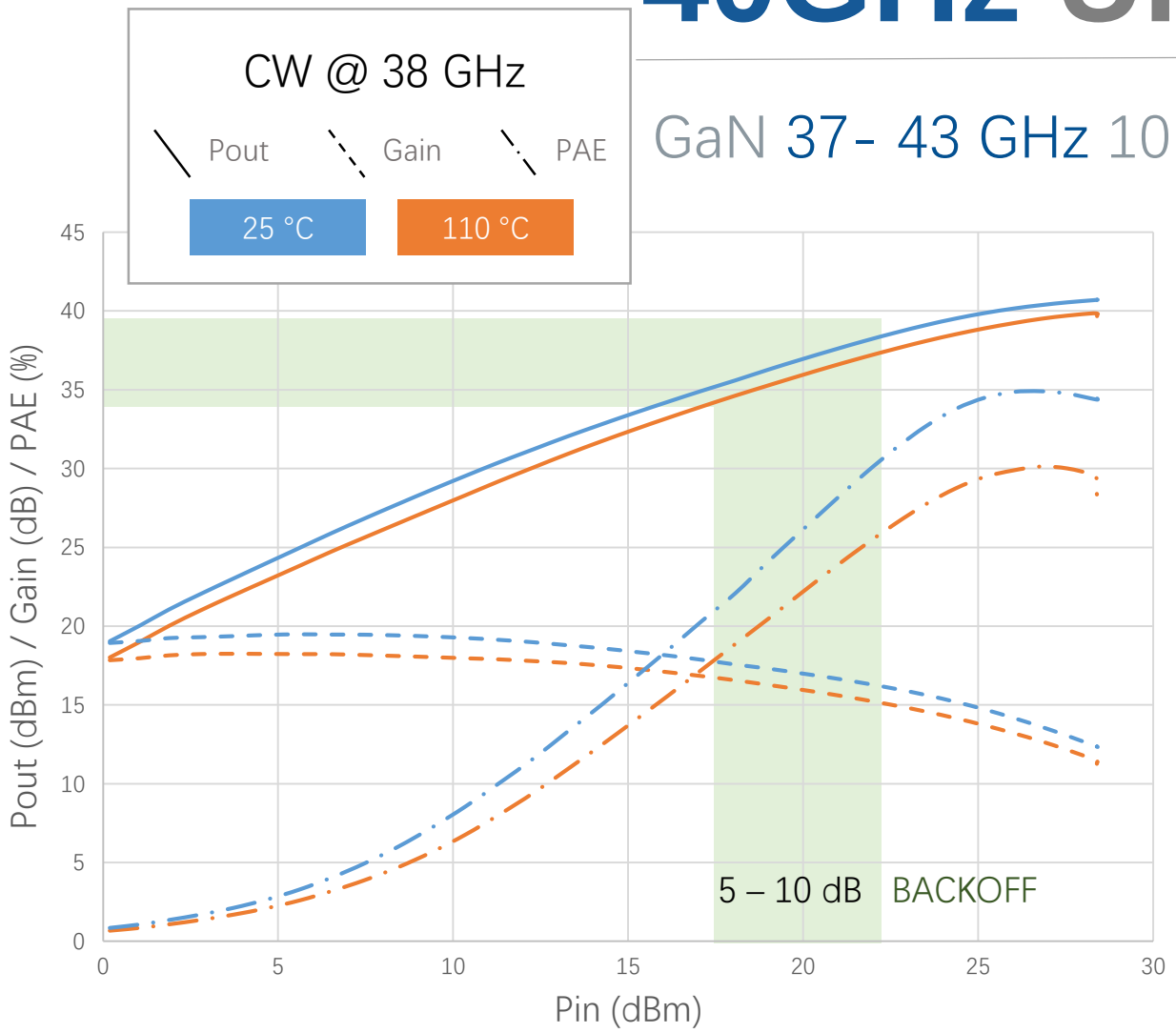


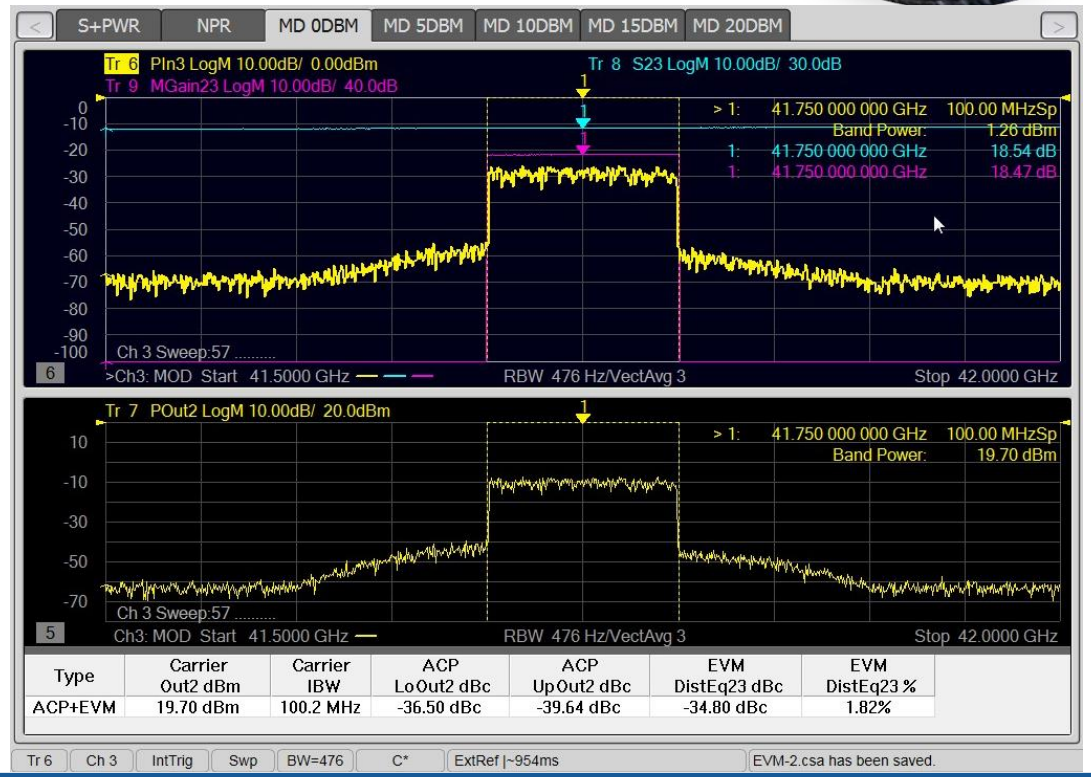


40GHz UPLINK MMIC

GaN 37- 43 GHz 10 W PA PCB measurement







CONCLUSION

GaN is the 3rd revolution of III – V compounds, so :

… it naturally gets into the defence market, pushing integration one step further

… but technology is improving fast and space system are also starting to get their hands on it.

THANK YOU

www.ommic.com

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