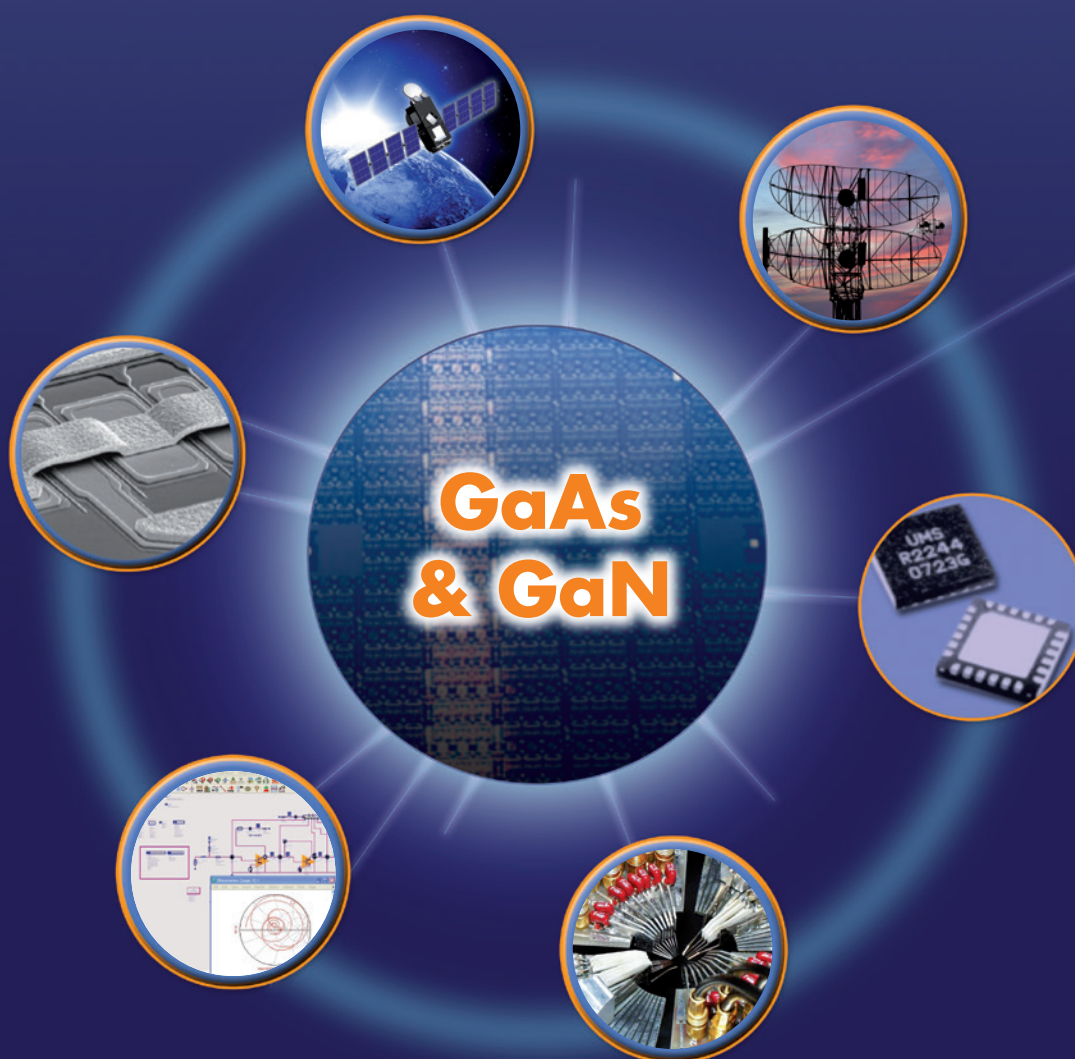


Build your own solution with UMS

Your innovative partner for high performance, high yield MMIC solutions

2016 - 2017



UMS has developed a proven family of GaAs and GaN based processes for **high performance low noise** and **high power MMICs**. These processes are extensively used by foundry customers and by UMS to offer MMIC solutions for the Defence, Automotive, Space, Telecom and Industrial markets.

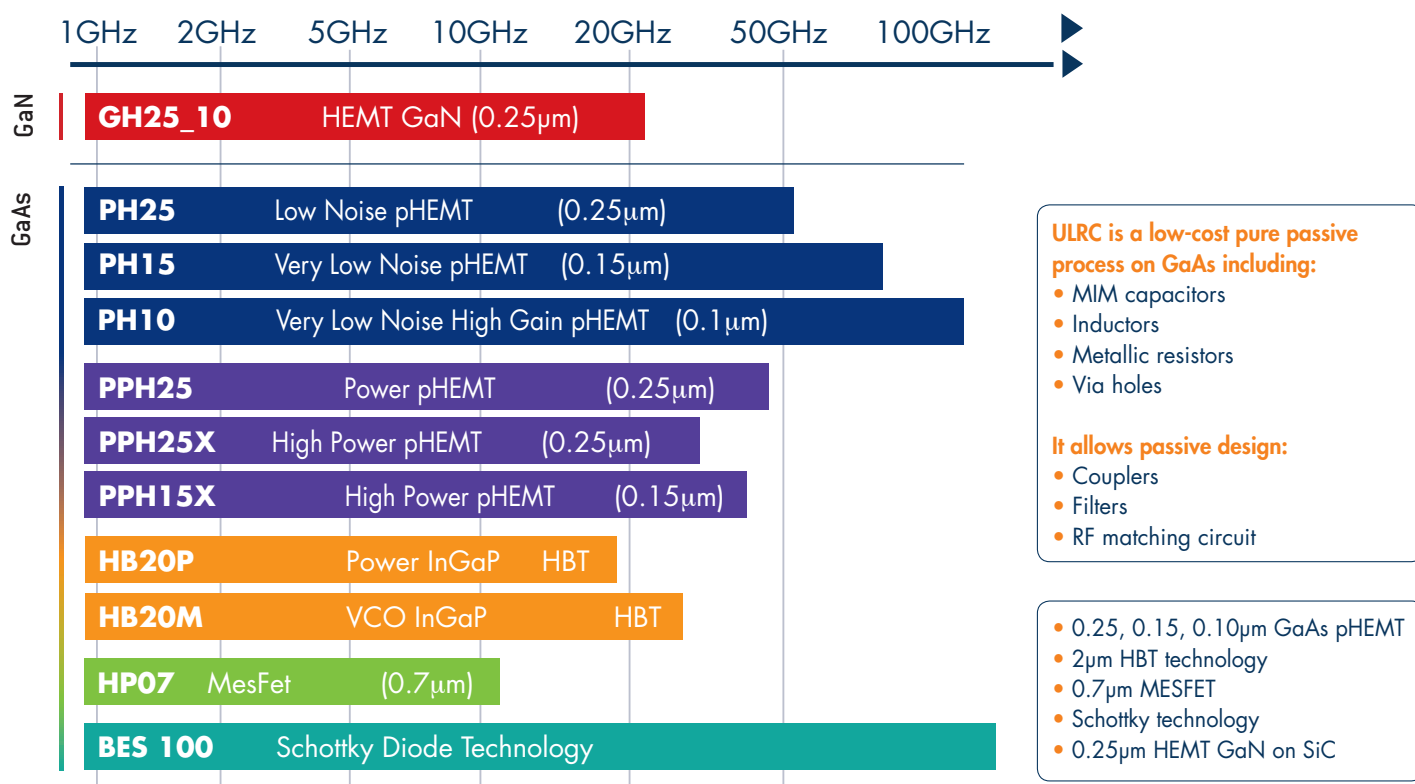
UMS **Design Manuals** and **Design Kits** developed by highly skilled engineers support the realisation of your own MMICs. During the design phase, the UMS Foundry team provides support and supplies you with wafers that meet **Process Control Monitor** specifications.

In addition, UMS offers several optional services including, **foundry training, on-wafer tests** (DC, RF, noise, power), **wafer dicing, die sorting, visual inspection, picking** and **packaging**.

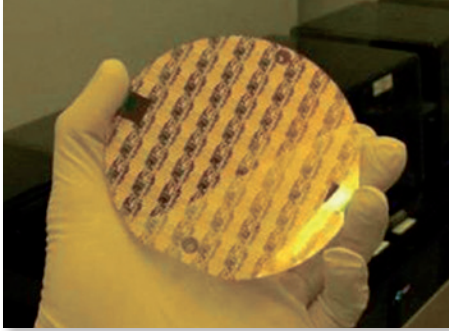
This comprehensive range of services contributes to successful partnerships with customers involved in different areas of activities for example *Defence, Space, Telecom and ISM*.

RF & mm-wave Applications

UMS offers a large portfolio of fully tested, high-performance and reliable GaAs and GaN on SiC processes for MMIC design and production. Our state-of-the-art HBT and pHEMT technologies and our support services allow you to efficiently design and have your own circuits manufactured.



Open Processes / Wafer fabrication



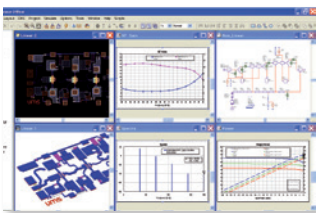
Our processes include:

- Air bridges
- MIM capacitors
- TaN and TiWSi resistors
- 100 μ m & 70 μ m thinning
- Via-holes
- Coating for packaging

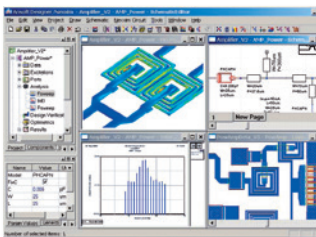


Process	GH25 10 GaN	PH25 Low Noise	PH15 Low Noise	PH10 Low Noise	PPH25 Power	PPH25X High Power	PPH15X High Power	HB20P Power	HB20M VCO	HP07	BES
Active device	HEMT	pHEMT	pHEMT	pHEMT	pHEMT	pHEMT	pHEMT	HBT	HBT	MESFET	Schottky
Power Density	4.5W/mm	250mW/mm	300mW/mm	250mW/mm	700mW/mm	900mW/mm	800mW/mm	3.5W/mm	2W/mm	400mW/mm	-
Gate Length	0.25 μ m	0.25 μ m	0.15 μ m	0.1 μ m	0.25 μ m	0.25 μ m	0.15 μ m	2 μ m Emitter width	2 μ m Emitter width	0.7 μ m	1 μ m
I _{ds} (gm max) I _{ds sat} /I _c	750mA/mm 1000mA/mm	200mA/mm 500mA/mm	220mA/mm 550mA/mm	280mA/mm	200mA/mm 500mA/mm	170mA/mm 450mA/mm	350mA/mm 575mA/mm	0.3mA/ μ m ²	0.3mA/ μ m ²	300mA/mm 450mA/mm	-
V _{DS} / V _{BCE}	>100V	> 6V	> 4.5V	> 5V	> 12V	> 18V	> 12V	> 16V	> 14V	> 14V	< -5V (Anode/ Cathode)
Cut off freq.	30GHz	90GHz	110GHz	130GHz	50GHz	45GHz	70GHz	25GHz	30GHz	15GHz	3THz
V _{pinch}	-3.4V	- 0.8V	- 0.7V	-0.45V	- 0.9V	- 0.9V	- 0.95V	-	-	- 4.0V	-
G _m max / β	300mS/mm	560mS/mm	640mS/mm	750mS/mm	450mS/mm	400mS/mm	480mS/mm	65	60	110mS/mm	-
Noise / Gain	1.8dB/11dB @15GHz	0.6dB / 13dB @10GHz 2dB / 8dB @40GHz	0.5dB / 14dB @10GHz 1.9dB / 6dB @60GHz	2.3dB / 4.5dB @70GHz	0.6dB / 12dB @10GHz	-	1.8dB / 6dB @40GHz	-	-	-	-

Process Design Kits



Microwave Office (NI-AWR)

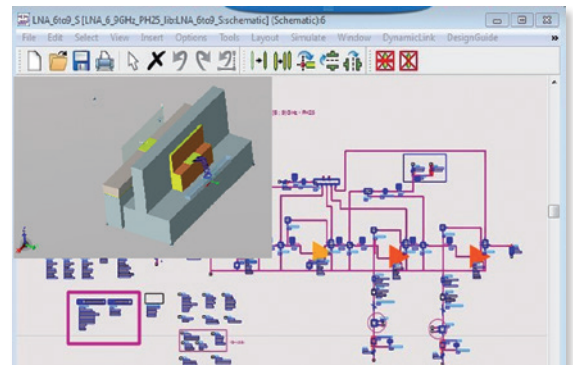


Ansoft Designer - Nexxim

UMS modeling and CAD Teams work on well established and advanced process technologies in order to provide complete and accurate Process Design Kits (PDK). These PDK include scalable active (small and large signal models) and passive models directly linked to auto-layout and library options, compatible with your CAD tools.

UMS PDKs include schematic capture, layout generation, layout verification (DRC) and 3D view generation for EM simulation. They are fully compatible with :

- ADS 2015 to ADS 2016 from Keysight for all processes.
- Microwave Office from NI-AWR for GaAs and GaN HEMT, HBT and Schottky diodes.
- Nexxim from Ansys for low noise pHEMTs , BES and HB20P.



Keysight ADS 2015

Build your own solution with UMS

www.ums-gaas.com

Foundry Services

The Standard UMS Foundry Services include:

- Delivery of a Design Kit related to suitable process, compliant with your simulation tools,
- Design Rule Check (DRC) for layout verification,
- Mask manufacturing,
- Wafers manufacturing: 2 wafers for a prototyping run,
- RF & DC PCMs measurements and visual inspection for wafer acceptance,
- Delivery of wafers in GelPak® box or diced on UV-Film,
- Lot tracking tool available on our website,



The Standard Services may be completed with the following options:

- Foundry course training in UMS-France (2-day session),
- On-wafer DC or RF testing (see below),
- Delivery of tested and visually inspected chips according to the required level (commercial or space),
- Picking and delivery of Known Good Dies (KGD) in GelPak® box,
- Production of ASICs: production consulting and product review,
- Packaging services,
- Early access to process under development.



Measurements

In addition to wafer fabrication, UMS provides a unique set of automated on-wafer or package testing solutions for circuit characterization and sorting according to your product specifications.

17 automatic test stations, including very high volume testers, enable full circuits characterization from 1 to 110GHz.

100% functional on-wafer tests are available (S parameters, Noise, DC or pulsed power).

Individual die numbering allows identification of chips for sorting and picking, according to your sorting criteria definition.

Manufacturing and production support and services are also offered.



Foundry Course

The UMS Foundry Training Course gives you the opportunity to access to the complete GaAs and GaN MMIC design methodology provided by our experienced Product Line designers and engineers. Topics presented cover all aspects: process, modeling, CAD demo, design, reliability, electrical measurement, picking, packaging and industrialisation.

Technological processes, Low Noise Amplifier, Power Amplifier and Mixer design flows and production rules are addressed in detail during these 2-day sessions.

Foundry courses are organised regularly and on request.



Multi Project Wafer (MPW)

Shared Foundry runs or Multi-Project Wafers is a cost saving foundry approach well suited for institutes, labs, research centers and universities. This service allows different customer projects on a single wafer.

Participants have free access to design kits and will receive 20 diced & untested dies in Gelpak® box. Leadtime is about 16 weeks.

The possible die length and width are:

- For high power processes PPH25X, PPH15X, HB20P:

1.4; 2; 2.4; 3.4; 4; 4.4mm with maximum aspect ratio 1:3

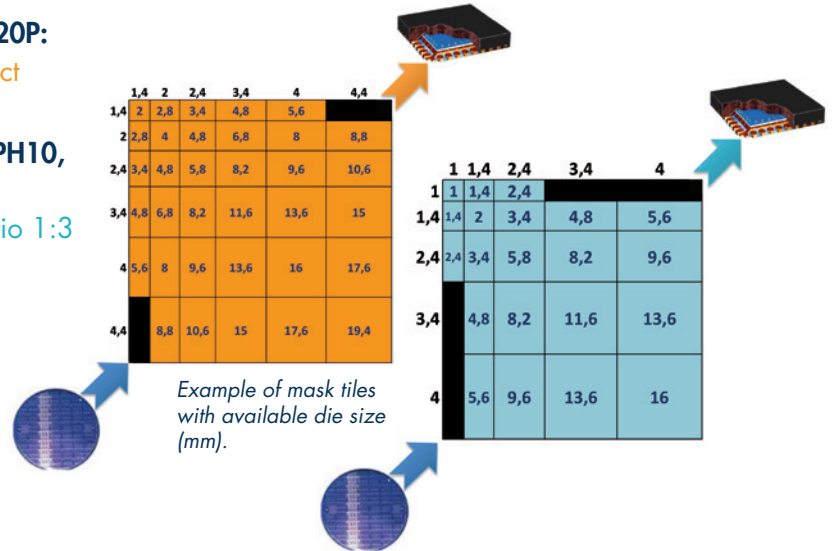
- For low-medium power processes PH25, PH15, PH10, PPH25, HB20M, HP07, BES:

1; 1.4; 2.4; 3.4; 4mm with maximum aspect ratio 1:3

- For passive process ULRC: 1.4; 2; 2.4; 3.4mm

Price is determined according to die area and process.

You will find on our website www.ums-gaas.com all additional details and planning.



Partner Design Centers

UMS is developing specific partnerships consolidating a worldwide network with a set of selected Design Centers. These partners can provide a successful design of your specific MMIC and therefore can offer a powerful alternative and/or support to your initial design.

UMS has recognized these Design Centers for their high skill and expertise on UMS processes and Design Kits.

Our partners are:



The Fraunhofer Institute for Integrated Circuits IIS (Erlangen, Germany) is the largest institute of the Fraunhofer-Gesellschaft, Europe's leading application-oriented research organization. The areas in which the Fraunhofer IIS is specialized are: Communication, multimedia, RFICs and RF mixed signal ASICs, circuits and system design.



MEC (Bologna, Italia) is a MMIC design Company, skilled on wafer characterization up to 50GHz, modeling, RF Hybrids and TR modules. They offer the complete development cycle : from system simulation, process selection, process modeling, chip design, layout, test, prototyping.

www.mec-mmich.com



UM-Service (Tokyo, Japan) has MMIC design activities, mainly focusing on very high frequency applications above 30GHz, like 60GHz Network...

www.ums-gaas.jp



Contact UMS

For further technical information about foundry services,
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Tel: + 33 1 69 86 32 96

In addition to Foundry services, UMS offers a complete family of
microwave products and solutions, both in standard and ASIC forms.

For further information about our products and ASICs, please contact:

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Visit our website : www.ums-gaas.com

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*UMS is committed to offer full space evaluated processes.
UMS is certified ISO 9001, ISO 14001 and ISO TS16949.*