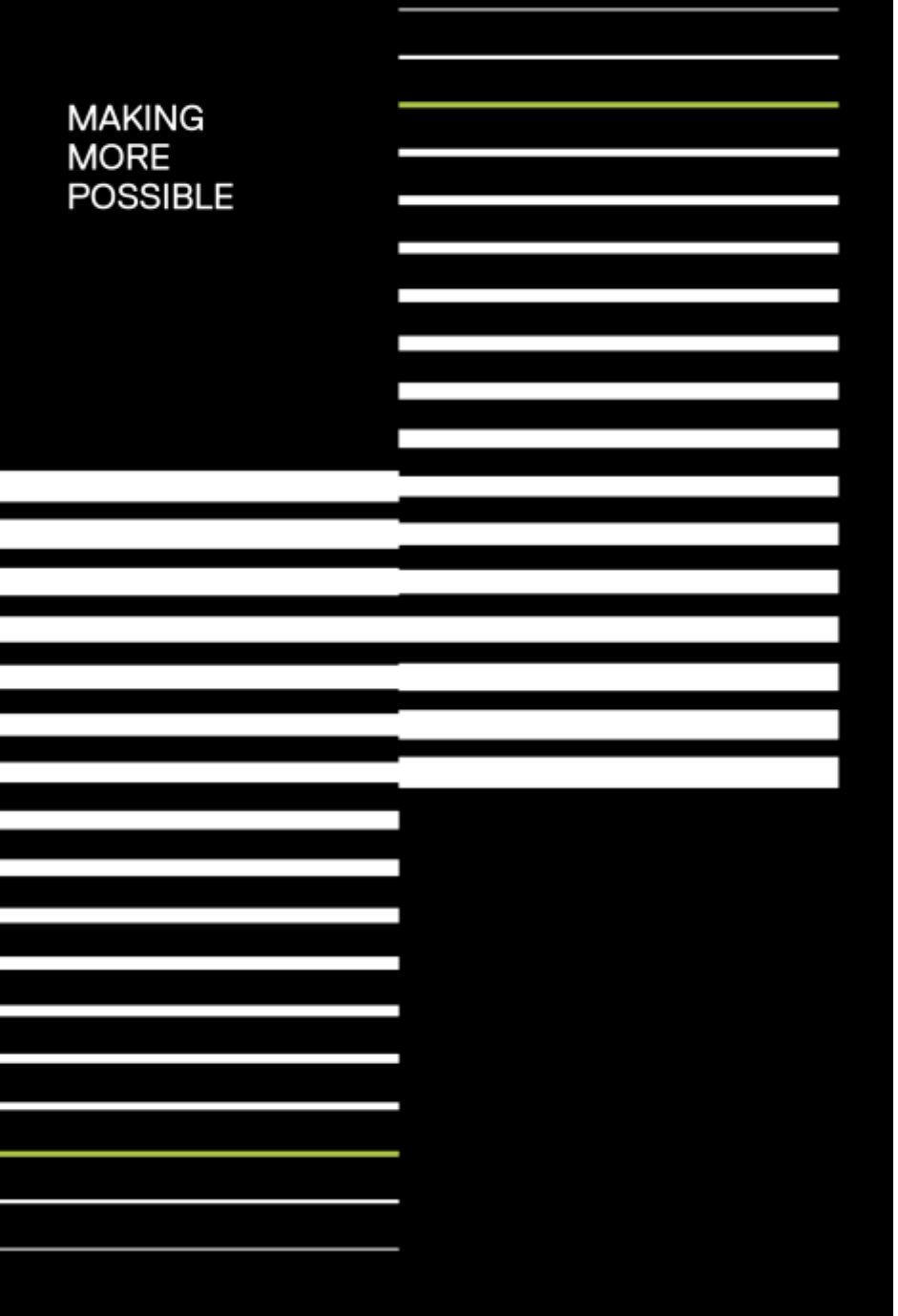


ICONIC RF

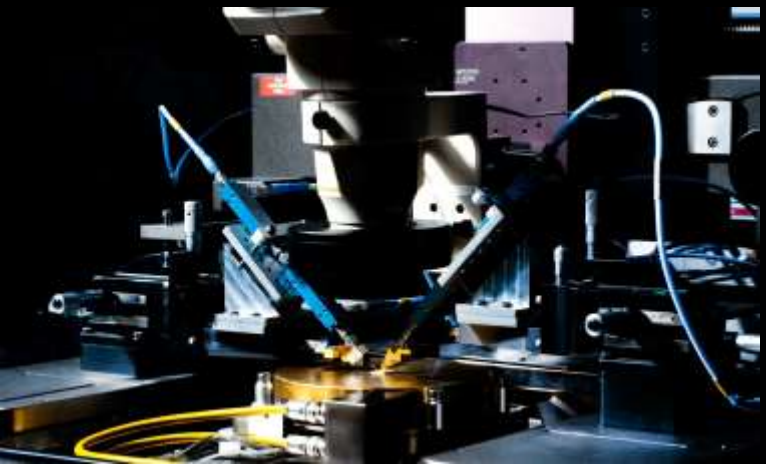
ICONIC RF

AN INTRODUCTION

INFO@ICONIC RF.COM WWW.ICONICRF.COM

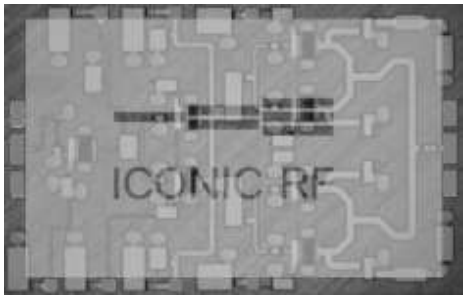
MORE INNOVATION
MORE PERFORMANCE
MORE EFFICIENCY

We deliver higher performance GaN and GaAs RF products to the worldwide market, servicing satellite, A&D and mm-wave 5G with innovative MMIC and discrete solutions.



AN INTRODUCTION

- Committed to delivering GaN and GaAs MMIC products with the highest levels of performance and innovation.
- RF MMIC products to enable rapidly developing markets in Satellite, Aerospace & Defence, and mm-wave 5G.
- Fabless design house that has state of the art characterisation, modelling and custom design capabilities for high power amplifiers.
- Delivering MMIC solutions in volume production through supply chain partners.



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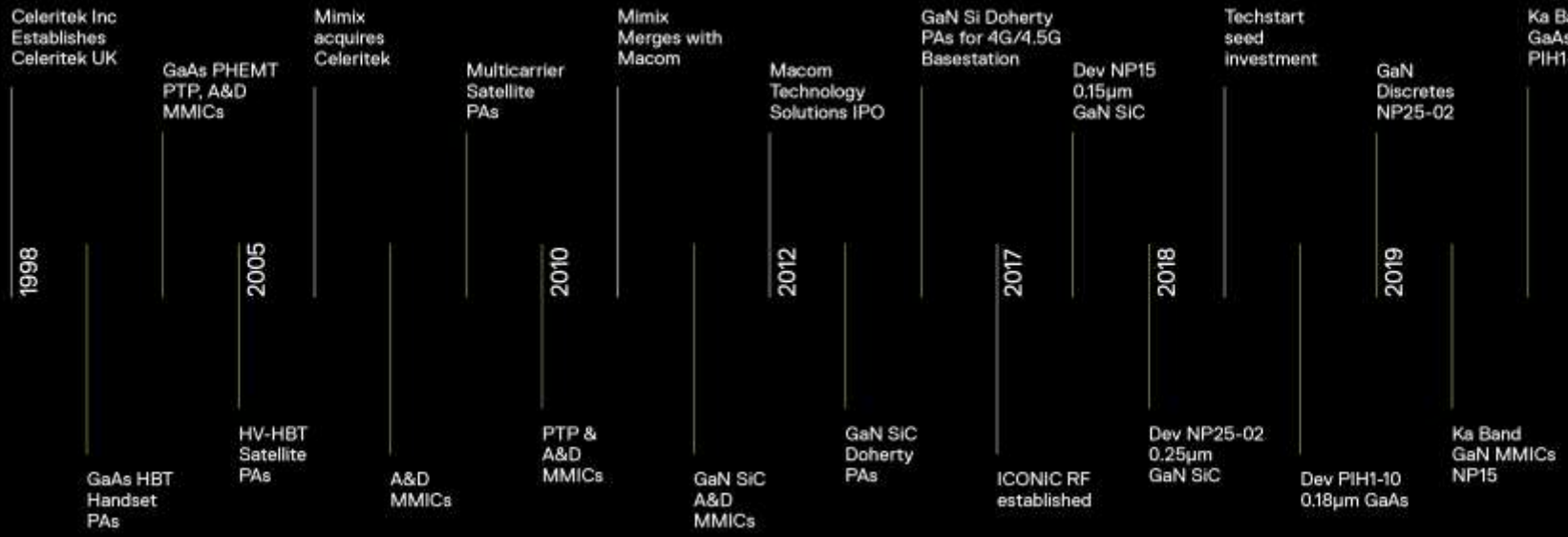
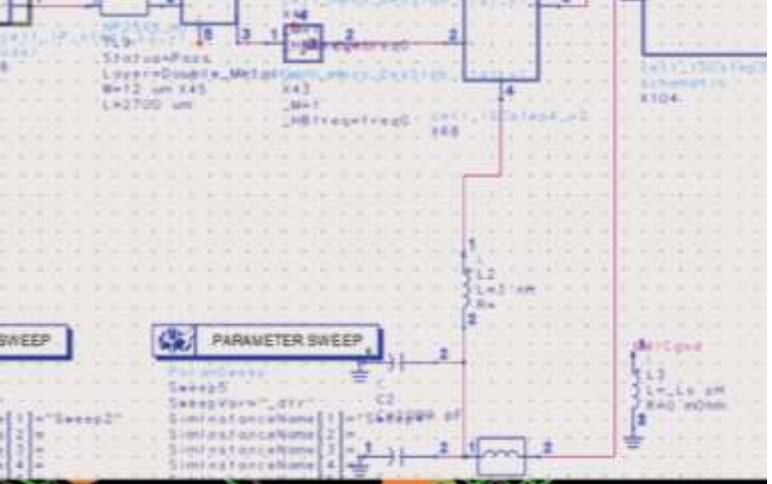
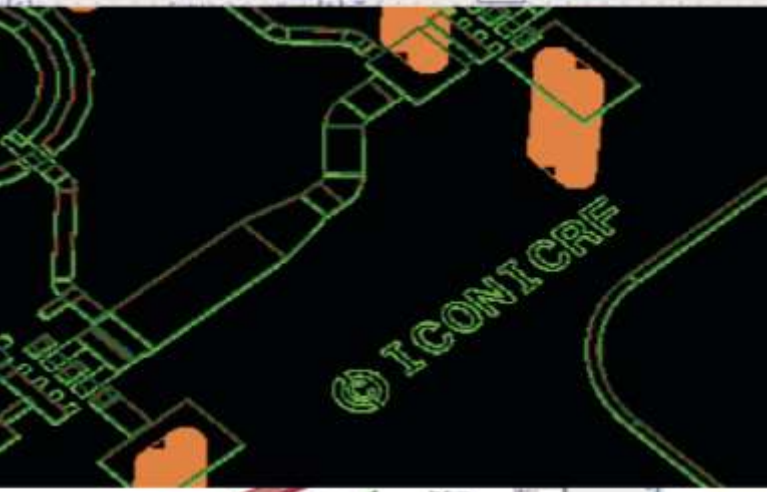
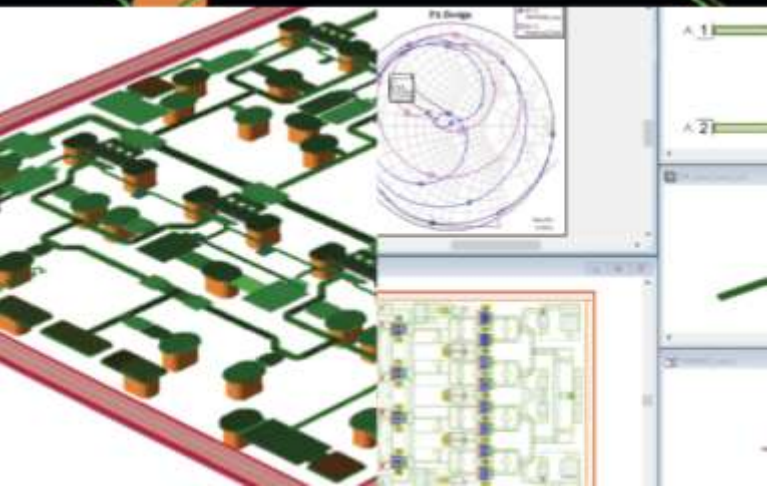
OUR STORY SO FAR



ICONIC RF is a new brand. It is also a highly experienced team that has been developing innovative RF MMICs and module solutions in the industry for more than 20 years.

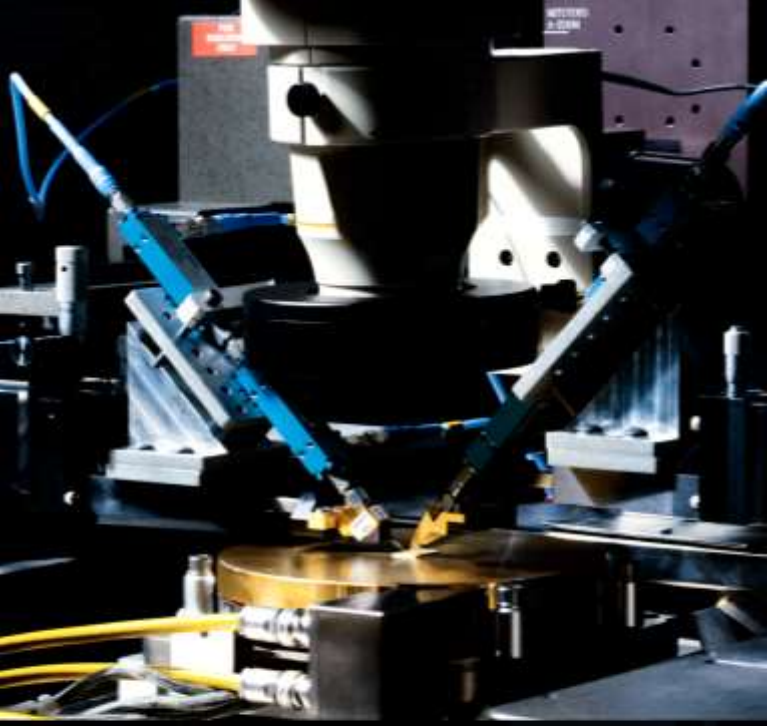


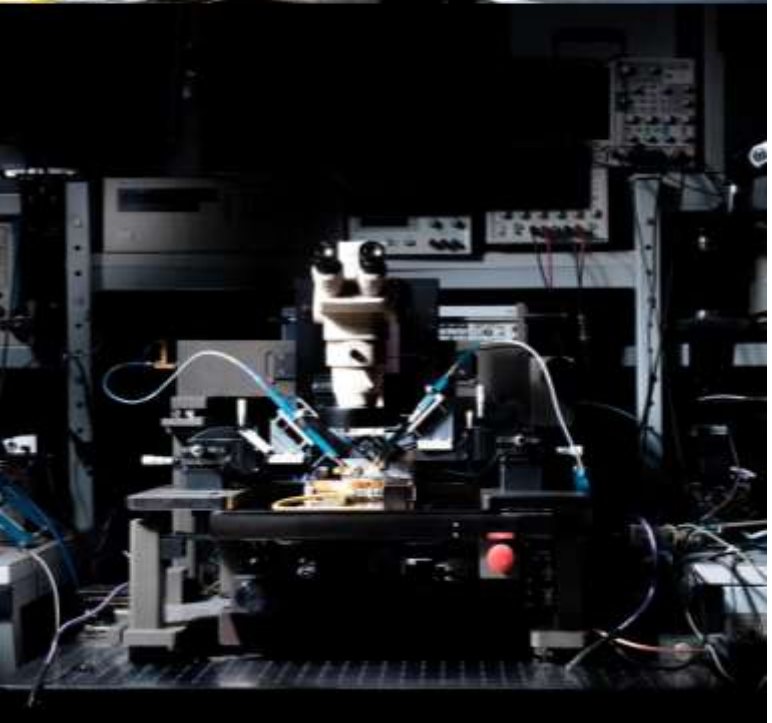




MMIC DESIGN

- Custom MMIC design to mm-wave frequencies
- Comprehensive expertise with GaN and GaAs using multiple fabs (WIN, Macom, GCS, Triquint, UMS, OMMIC, Celeritek, Filtronic)
- Innovative characterisation and design for best performance, with least time.
- Circuit design using Keysight Advanced Design System and NI AWR Microwave Office
- EM simulation using Momentum, RF Pro, Axiem
- Design for nonlinear stability using NDF
- Raman, IR and thermoreflectance thermal imaging and Ansys NLTS thermal simulation in conjunction with Bristol University
- Extensive high frequency packaging and modules capability and experience





TEST AND MEASUREMENT

- State of the art test lab developed by our team over many years in conjunction with Cardiff University and several PhDs.
- Active harmonic load pull to 67 GHz -40C to 125C
- Passive load pull to 50 GHz
- Pulsed IV and pulsed S-parameters -40C to 125C
- Very detailed device characterisation to support design
- Test devices in the same harmonic environment as the final MMIC
- Create designs with more performance
- Increase accuracy and obtain first pass success
- 130 GHz S-Pars and 110 GHz active load pull through Cardiff University

ICONIC RF
GIVES YOU
MORE CAPABILITY

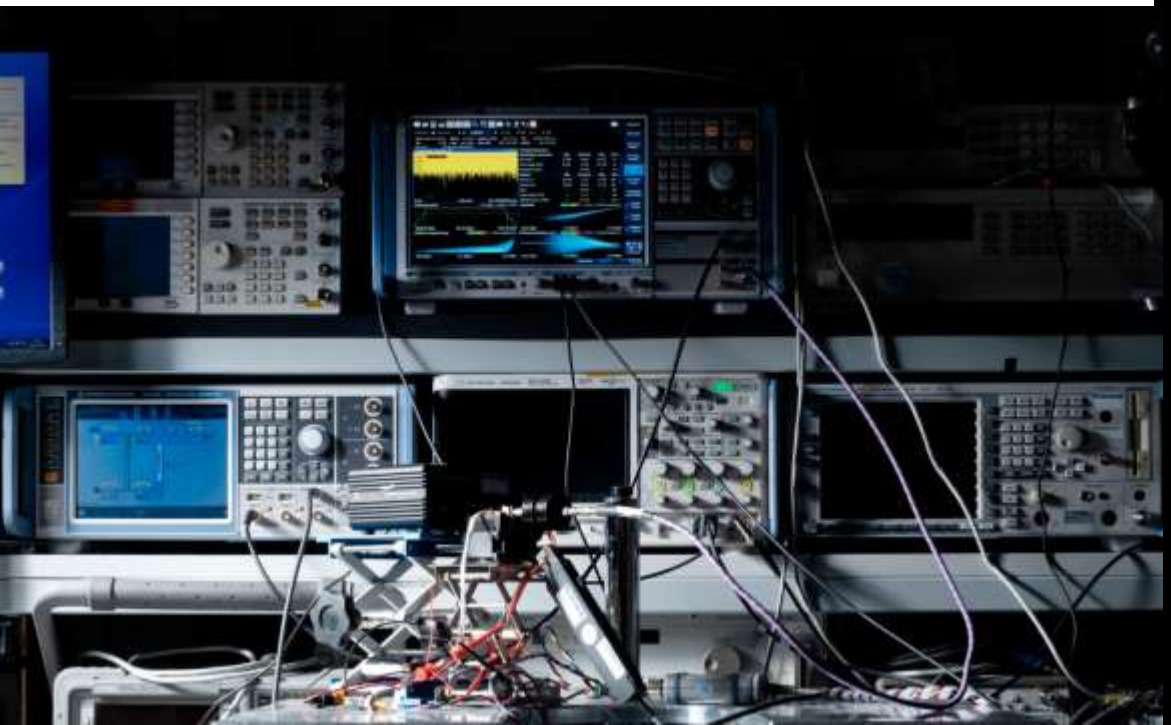
NONLINEAR DEVICE MODELLING

- We develop and validate our own GaN and GaAs device models
- Compact model for GaN HEMTs provides excellent accuracy and converges robustly in large PA simulations with many instances
- Important in design for nonlinear stability using NDF
- Available to support customer design requirements
- Harmonic load-pull based Cardiff behavioural models – very accurate measurement based nonlinear models
- Experienced with GaN from many sources, we are familiar with the unique challenges presented by thermal and trapping responses
- We are well equipped to deal with these and assess any impact on performance and reliability

ICONIC RF
GIVES YOU
MORE INSIGHT

OPTIMISING GaN SOLUTIONS

GaN has become the dominant semiconductor technology for many high power RF devices, but still offers unique challenges in design. ICONIC RF has extensive experience in product development on many different GaN processes. We can optimise the GaN solution at every level, from evaluation of epi to final application development.



APPLICATION LEVEL

- Continuous modes
- Doherty applications
- Thermal considerations
- Linearization

PACKAGE LEVEL

- Optimal transitioning from die to package
- Internal (IPD) matching
- Die attach

DIE LEVEL

- Optimising building block
- and harmonic terminations Doherty on chip
- Thermal layout

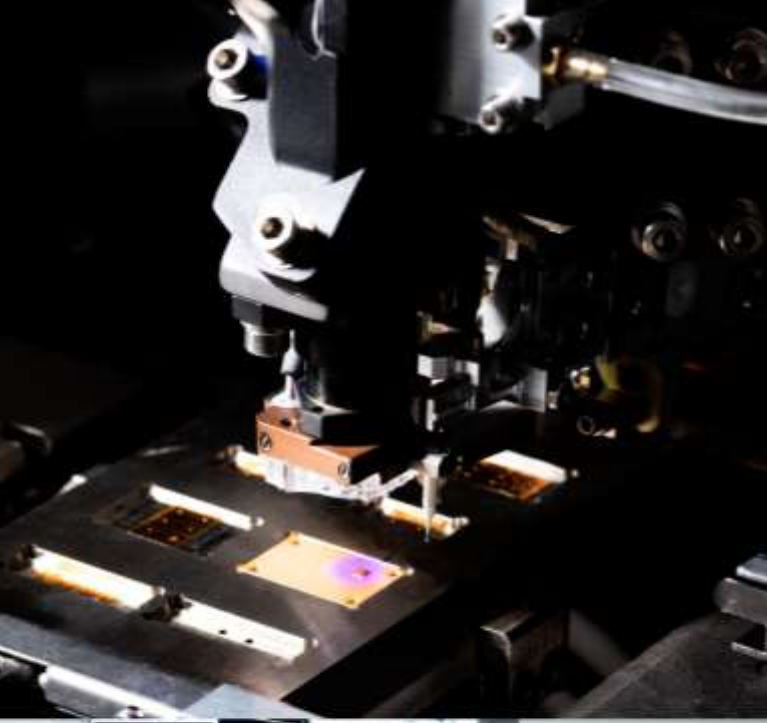
UNIT CELL

- Cell layout and field plate optimisation through waveform engineering for efficiency, gain, linearity and reliability

EPI

- Characterisation of GaN epi
- considering DCIV behaviour, trapping, parasitics and performance

COMPACT AND BEHAVIOURAL MODEL`S AID DESIGN AT EACH LEVEL



RAPID PROTOTYPING

- Advanced prototype assembly in house with fully automatic K&S ICONN production wire bonder.
- Principal engineer with vast experience of prototyping and transferring complex assemblies to production.
- Die attach using AuSn eutectic and silver sintered epoxies.
- Experience with a wide range of ceramic, plastic and laminate package technologies.
- Fast design verification, sampling, and transfer to supply chain partners in Taiwan for volume production.

ICONIC RF
GIVES YOU
MORE AGILITY

CUSTOM MMIC SOLUTIONS

- As well as developing standard MMIC products ICONIC RF develops custom MMIC solutions to customer requirements.
- The company is proficient in all aspects of product development, from specification to design, verification and qualification.
- The development process is ISO9001:2015 compliant with registration in process.
- MMIC solutions delivered in volume production through supply chain partners.

OUR TEAM

ICONIC RF team of experts lead the way to high performance, advanced RF solutions

ANDREW PATTERSON, PHD
MANAGING DIRECTOR

25years+ RF and design team management experience

JONATHAN LECKEY, PHD
PRINCIPAL ENGINEER

25years+ RF design, modelling and device expert

LYNDON PATTISON, PHD
PRINCIPAL ENGINEER

20years+ RF design, GaN and packaging expert

ANDREW ALEXANDER, MENG
PRINCIPAL ENGINEER

18years+ RF design, GaAs and GaN MMIC expert

DAVID WILLIAMS, PHD
PRINCIPAL ENGINEER

18years+ RF design, waveform engineering expert

SEAN MCALISTER, MSC PRINCIPAL PROTOTYPING ENGINEER

25years+ RF assembly, prototype and production expert

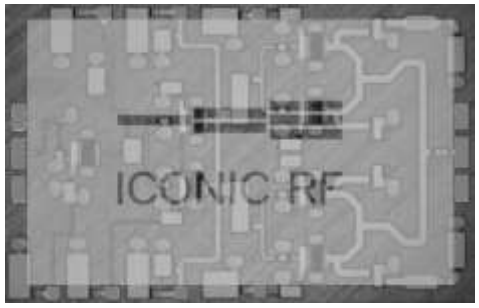
PROF. PAUL TASKER, PHD
TECHNICAL ADVISOR

Renowned expert in RF characterisation and modelling

BIOs available on request

ICONIC RF SOLUTIONS
↗ GaN MMICs

- ICONIC RF is introducing a range of matched GaN MMIC power amplifiers up to Ka band for Satellite, A&D and mm-wave 5G applications.
- ICONIC RF has used its GaN expertise and innovation to produce new high performance MMICS using the 0.25 µm NP25-02 and 0.15 µm NP15-00 GaN SiC processes from WIN Semiconductors.



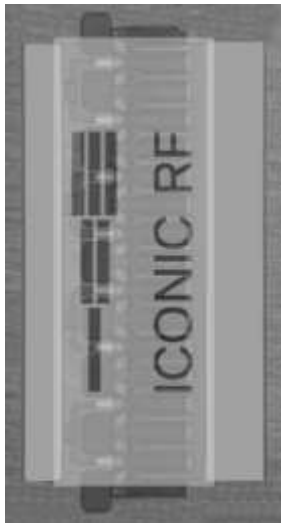
GaN MMICs

50 ohm matched GaN on SiC MMICs

Part No.	Frequency Range (GHz)	Output Power (dBm)	Gain (dB)	PAE (%)	PAE @ 6dB OBO (%)	Drain Bias (V)	Die Size (mm)
ICP2637	24-30	37	25	44	25	20	2.8 x 1.75
ICP2837	26-31	37	25	39	23	20	2.8 x 1.75
ICP2834	26-31	34	16	38	22	20	2.05 x 1.0
ICP1940	17-21	40	20	38	-	20	2.8 x 2.2
ICP0350	2.7-3.5	50	24	59	-	28	4.8 x 4.9
ICP1240	6-18	40	20	>20	-	20	
ICP1037	2-18	37	18	>18	-	20	

ICONIC RF SOLUTIONS
↗ GaN DISCRETE TRANSISTORS

- ICONIC RF has developed a range of discrete GaN SiC HEMTs for use at greater than 14 GHz and 100W saturated power. Using the latest WIN NP25-02 0.25 µm technology to provide high power and efficiency with increased reliability.
- Supported with ICONIC RF's proprietary compact nonlinear model, available in Keysight ADS and NI AWR Microwave Office.



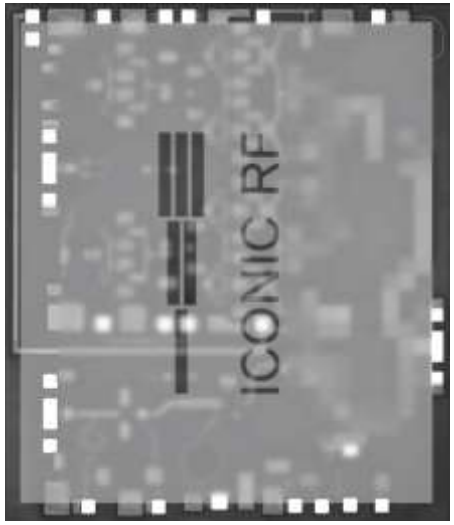
GaN DISCRETES

Part No.	Frequency Range (GHz)	Output Power P3dB @ 10GHz (dBm)	Linear Gain @ 10GHz (dB)	PAE @ 10GHz (%)	Drain Bias (V)	Die Size (mm)
ICPB1001	DC-14	38	10	60	12-28	0.82 x 0.53
ICPB1002	DC-14	41	10	60	12-28	0.82 x 0.92
ICPB1005	DC-14	44	9	54	12-28	0.82 x 1.44
ICPB1010	DC-14	47	9	54	12-28	0.82 x 2.48
ICPB1020	DC-14	50	9	54	12-28	0.82 x 4.56

ICONIC RF SOLUTIONS

↗ mm-wave 5G

- ICONIC RF introduces high performance GaN and GaAs MMICs for mm-wave 5G applications.
- Standalone LNA, SP2T PIN switch and Doherty PA with high back-off efficiency.
- Fully integrated PA-Switch-LNA FEM, with class leading performance and footprint.



mm-wave 5G						
Part No.	Description	Frequency (GHz)	Tx Power P3dB (dBm)	Rx Noise Figure (dB)	Tx Eff @8dB OBO (%)	Die Size (mm)
ICD2629	Doherty PA	24-27.5	28.5	-	20	1.7 x 1.65
ICRF4001	LNA	20-30	-	3.0	-	1.7 x 0.8
ICRF4003	LNA Switch	20-28	-	3.5	-	1.7 x 1.4
ICRF4004	FEM	24-27.5	28.0	3.5	15.5	2.15 x 2.5

mm-wave 5G						
Part No.	Description	Frequency (GHz)	Return Loss (dB)	Loss (dB)	Isolation (dB)	Die Size (mm)
ICRF4002	PIN SPDT Switch	19-31	>15	<1	>20	1.7 x 0.82

MAKING
MORE
POSSIBLE

ICONIC RF LTD
INNOVATION FACTORY
385 SPRINGFIELD ROAD
BELFAST BT12 7DG
NORTHERN IRELAND
UNITED KINGDOM

+44 (0) 2895 902 860
INFO@ICONICRF.COM
WWW.ICONICRF.COM