



# Advanced Solutions Seamless Performance



## About Us

Alaris Linwave is a member of the Alaris Group. We are based in Lincoln in the UK, have been operating for over 20 years, and now have a staff of 50 persons.

Our main business is the design and manufacture of active RF modules and subsystems intended for use in harsh environments.

### Our Current Product Portfolio Includes:

- Custom Integrated RF Solutions
- Block Upconverters Ka, Ku, X and S-band. Output powers up to 30 W linear
- Ultra Low Phase Noise Oscillators
- QFN System in Package (SiP) implementing numerous complex applications
- Solid State Power Amplifiers X, Ku, Ka-band. Output powers up to 200 W saturated
- Block Downconverters Ka, Ku, X and S-band
- Transceivers
- Wideband Receivers
- T/R Modules
- Gunn Diodes
- Low Noise Amplifiers
- Phased Arrays

The majority of our products operate up to 40 GHz, but we have design, manufacturing, and test capability up to 100 GHz. Our products are principally aimed at the aerospace, defence, SATCOM, space, industrial, scientific, and medical markets. We are approved to AS9100, ISO14001, and Cyber Essentials Plus.



## Capabilities

Alaris Linwave possess a full range of design, qualification, manufacture, and testing capability, to deliver a wide range of high value, high quality RF solutions. The company excels in managing complex customised projects through its robust New Product Introduction (NPI) process with gated reviews for a wide range of applications.

We offer the following routes for customers:

- Custom RF designs based on user specifications
- Provide alternative solutions to address obsolescence issues
- Modification of existing products to customer specific requirements
- Items directly from our current product lines
- Contract design and manufacture

## Certification and Approvals

Alaris Linwave qualify their products to extended temperature, high altitude, vibration, SaltFog, EMC, safety, CE, and other environmental standards. We have successfully delivered systems compliant to aerospace standards such as DO-160, defence standards (MIL-STD-704F, MIL-STD-883), marine standards (ITU-R M.824-2), and medical standards. In addition, the company can offer customer specific qualification and certification programs.

## Design, Manufacturing and Test

### DESIGN

- Experienced and Extensive Design Team
- DC to 100 GHz Capability
- RF, Microwave, Analogue, Digital
- PCB Design and Layout
- Mechanical Design
- Design Tools - Solidworks, Altium
- Simulation Tools - AWR Microwave Office, Altair FEKO, Dassault Systems CST

### MANUFACTURE

- Custom Built 1100 m<sup>2</sup> Facility
- Class 10 000 250 m<sup>2</sup> Clean Room
- System Build and Integration
- RF Module Manufacture and Test
- Fine Pitch Assembly
- Manual Placement and Solder Reflow
- LPKF Fast Prototyping PCB Machine
- Hybrid Chip and Wire Assembly
- Gold Wedge, Ball and Ribbon Bonders
- Semi-automatic and Manual Bonding
- Epoxy and Eutectic Die Attach
- Dry Nitrogen Backfill
- Hermetic Sealing and Laser Welding

### TEST

- Test Capability to 100 GHz
- Spectrum, Vector, Scalar Analysis and Measurement
- Measurement Automation Routines for Repetitive Tests
- Environmental Testing (temp cycle, burn-in, vibration)
- Power, Noise Figure, Phase Noise Measurement
- Modulated Test Sources and AW Capability
- Die Probe Test
- Bond Pull Testing

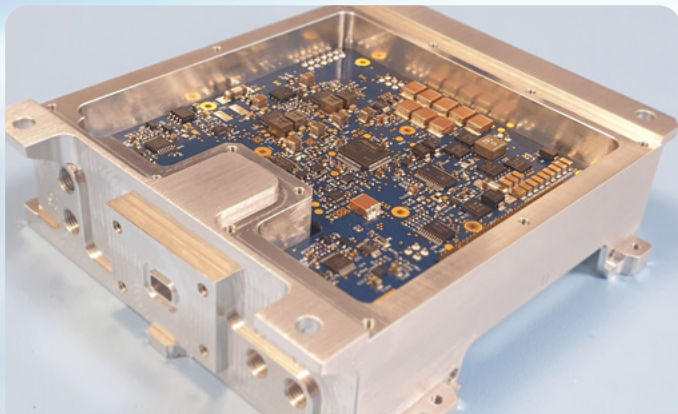
# Markets and Applications

Market	Applications	Alaris Linwave Products
 <p><b>SATCOM</b></p>	<ul style="list-style-type: none"> <li>• Commercial Aircraft SATCOM</li> <li>• Manpack</li> <li>• VSAT User Terminals</li> <li>• MILSATCOM</li> <li>• Secure Comms</li> <li>• Ground Stations</li> </ul>	<ul style="list-style-type: none"> <li>• BUCs</li> <li>• SSPAs</li> <li>• LNAs</li> <li>• BDCs</li> <li>• T/R Modules</li> <li>• Chip and Wire Capability</li> </ul>
 <p><b>AEROSPACE AND DEFENCE</b></p>	<ul style="list-style-type: none"> <li>• C4ISR</li> <li>• Radar</li> <li>• SIGINT</li> <li>• Electronic Warfare</li> <li>• Electronic Counter Measures</li> <li>• Direction Finding</li> <li>• Counter IED</li> <li>• Search and Rescue</li> </ul>	<ul style="list-style-type: none"> <li>• Chip and Wire Capability</li> <li>• T/R Modules</li> <li>• Wideband Receivers</li> <li>• BUCs</li> <li>• Transceivers</li> <li>• Ultra-Low Phase Noise Oscillators</li> <li>• Detectors</li> <li>• System in Package MCMs</li> </ul>
 <p><b>SPACE</b></p>	<ul style="list-style-type: none"> <li>• Downlinks and TT&amp;C</li> <li>• Transmit and Receive Comms Chain</li> <li>• Beamforming</li> <li>• Inter Satellite Links</li> <li>• Earth Observation Instruments</li> <li>• SAR Radar</li> <li>• SIGINT</li> </ul>	<ul style="list-style-type: none"> <li>• BUCs</li> <li>• SSPAs</li> <li>• LNAs</li> <li>• BDCs</li> <li>• T/R Modules</li> <li>• System in Package MCMs</li> </ul>
 <p><b>HEALTHCARE</b></p>	<ul style="list-style-type: none"> <li>• Ablation</li> <li>• Radiotherapy</li> </ul>	<ul style="list-style-type: none"> <li>• Custom Source Modules</li> <li>• SSPAs</li> </ul>
 <p><b>COMPUTING AND SCIENCE</b></p>	<ul style="list-style-type: none"> <li>• Quantum Computing</li> <li>• Quantum Networks</li> <li>• Frequency Generation</li> <li>• Clock Distribution</li> <li>• Frequency Synthesis</li> <li>• Master Reference Oscillator</li> <li>• Test and Measurement</li> </ul>	<ul style="list-style-type: none"> <li>• Ultra-Low Phase Noise Oscillators</li> <li>• Switch Modules</li> </ul>
 <p><b>SECURITY</b></p>	<ul style="list-style-type: none"> <li>• Proximity Detectors</li> <li>• Surveillance</li> <li>• Spectrum Monitoring</li> <li>• Speed Detection</li> <li>• Traffic Monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Gunn Diodes</li> <li>• System in Package MCMs</li> <li>• FMCW Radar Front End</li> <li>• Transceivers</li> <li>• Switch Modules</li> </ul>

# Block Upconverters (BUCs)

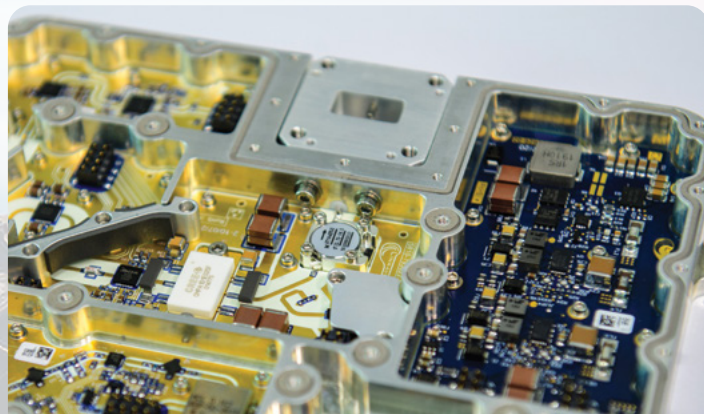
Engineered for demanding environments, our Block Upconverters (BUCs) deliver unmatched performance in a compact, fanless design. Built to withstand extreme temperatures, high altitudes, and the toughest conditions, they provide seamless connectivity with adjustable gain, advanced filtering, and integrated power amplification for optimal efficiency. Whether for defence, aerospace, or critical communications, our BUCs ensure reliable, high-power signal transmission when it matters most.

With Ka, Ku, X, and S-band available, our next-generation BUCs offer flexible interfaces, including CANbus, Ethernet, I<sup>2</sup>C, SPI and RS-422, and offer iDirect OpenBMIP™ compatibility. Designed for SWaP efficiency and compliance with IESS 308/309 and DO-160 standards, they are the perfect fit for mission-critical applications requiring durability, precision, and superior RF performance.



## Ka-BAND

- Frequency range 27.5 GHz - 31.0 GHz
- 4 selectable bands (1 GHz BW)
- IF input frequencies 950 MHz to 2,000 MHz
- Output power 10 W or 16 W linear
- Lower power options available
- Adjustable gain
- GUI controlled custom interface
- CANbus, Ethernet, I<sup>2</sup>C, SPI, RS-422 also available
- iDirect OpenBMIP™ compatible
- Integrated power amp for SWaP improvements
- Temperature compensated
- Conduction cooled fanless operation
- Temperature range -55 °C to +85 °C
- Custom enclosure for exposure to high altitude 55,000 ft
- IESS 308/309 compliant
- DO-160 testing option



## Ku-BAND

- Frequency range 13.75 GHz - 14.5 GHz
- IF input frequencies 950 MHz to 1,700 MHz
- Output power 16 W linear
- Integrated power amp and output filtering
- RS-422 interface
- Temperature range -55 °C to +85 °C
- Fanless operation
- Custom enclosure for exposure to high altitude 55,000 ft
- Lower Ku-band 12.75 GHz - 13.25 GHz option
- Dual band 12.75 GHz - 13.25 GHz, 13.75 GHz - 14.5 GHz option
- Lower output power options available
- IESS 308/309 compliant
- DO-160 testing option
- Temperature compensated
- Adjustable gain
- CANbus, Ethernet, I<sup>2</sup>C, SPI interface options
- iDirect OpenBMIP™ compatible option

## X-BAND

- Frequency range 7.9 GHz - 8.4 GHz
- IF input frequencies 950 MHz to 1450 MHz
- Output power 16 W linear
- Integrated power amp
- Open collector/logic interface
- IESS 308 compliant
- Temperature range -40 °C to +70 °C
- Fanless operation
- CANbus, Ethernet, I<sup>2</sup>C, SPI, RS-422 interface options



# Ultra-low Phase Noise Oscillator (XMU)

Alaris Linwave's ultra-low phase noise oscillators provide exceptional frequency stability for mission-critical systems. Our advanced XMU series, covering 200 MHz to 12 GHz, delivers industry-leading phase noise performance for enhanced signal integrity.

Designed for applications in radar, quantum computing, and high-speed data systems, these oscillators ensure reliable operation even in the most demanding environments. With customisable configurations and robust design, our oscillators deliver the precision and consistency required for superior RF performance across defence, aerospace, and advanced scientific applications.

## World Leading XMU Range of Multiplied Oscillators

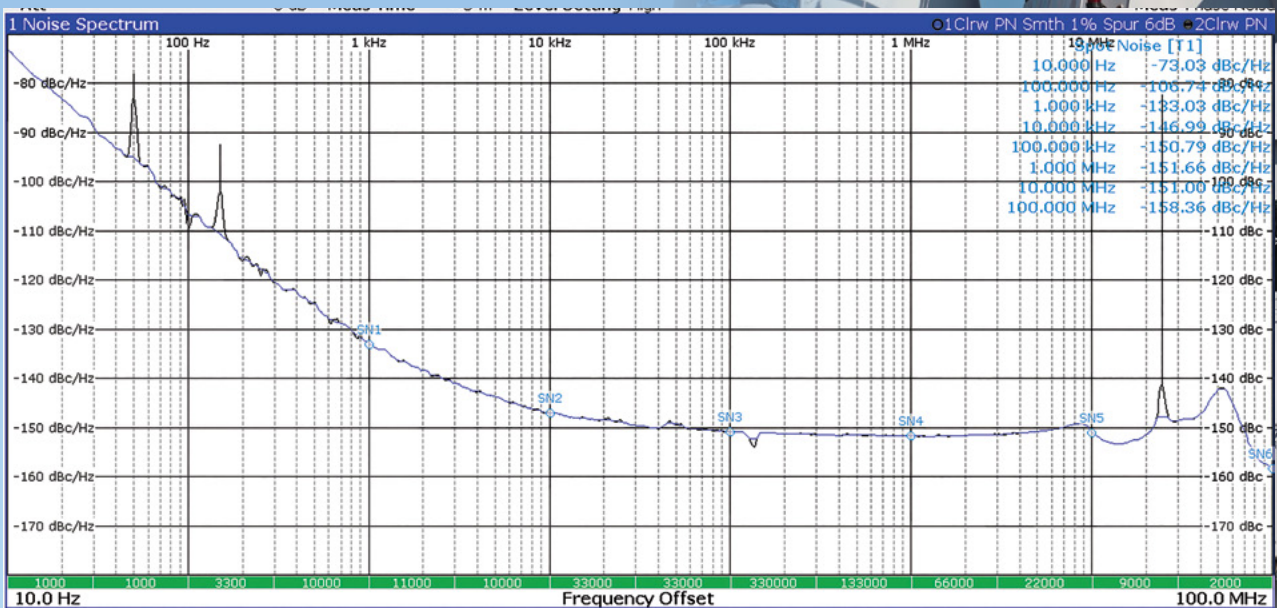
- -137 dBc/Hz (100 Hz) @ 200 MHz output
- -181 dBc/Hz (1 MHz) @ 200 MHz output
- -100 dBc/Hz (100 Hz) @ 11 GHz output
- -143 dBc/Hz (1 MHz) @ 11 GHz output

## FEATURES

- Frequency Range 200 MHz – 12 GHz
- Integrated Integer Multiplier Stages
- RS-422 Electronic Tuning Capability
- Phase Noise @ 200 MHz output
  - 181 dBc/Hz (1 MHz), -137 dBc/Hz (100 Hz)
- Phase Noise @ 11 GHz output
  - 143 dBc/Hz (1 MHz), -100 dBc/Hz (100 Hz)
- RF Output Power up to +16 dBm
- Input Output Isolation 50 dB
- RF Interface - SMA
- High Reliability MTBF > 50,000 hours

## APPLICATIONS

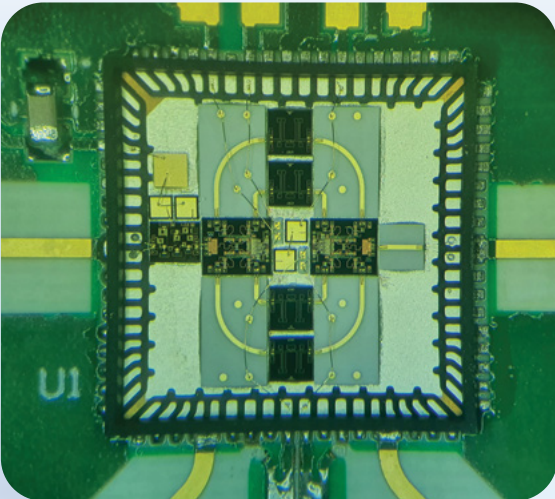
- Radar
- Frequency Synthesis
- Master Reference Oscillator
- Clock Distribution
- Quantum Computing
- Test and Measurement



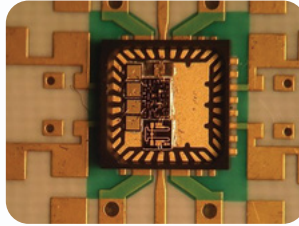
# Advanced System in Package (SiP) Capability

## COMPLEX MULTI-DIE MODULES

- RF Designs up to 40 GHz
- Gold on Alumina Tracking
- Standard QFN Packages (20 GHz)
- Other Custom Packages Available



## DESIGN



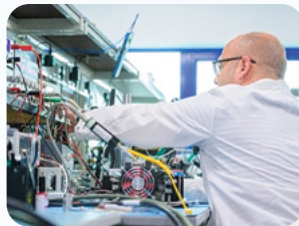
- Attenuators
- Limiters and Limiters+LNAs
- Zero-bias Detectors
- Beamforming Elements
- Switched Filter Banks
- Customer Specific Designs
- VCO

## MANUFACTURE



- Hybrid Chip and Wire Assembly
- Wet Etch Capability
- Gold Wedge, Ball, Ribbon Bonders
- Semi-Auto and Manual Bonding
- Epoxy and Eutectic Die Attach
- Dry Nitrogen Backfill
- Hermetic Sealing and Laser Welding

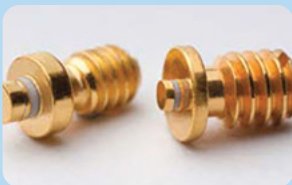
## TEST



- Test Capability to 100 GHz
- Spectrum, Vector, Scalar Measurement
- Power, Noise Figure, Measurement
- Phase Noise Measurement
- Full Environmental Testing
- Die Probe and Bond Pull Testing
- Unique Solderless Test Fixture

## Diodes 26 GHz - 100 GHz

Unlock the power of precision with high-performance diodes designed for 26 GHz to 100 GHz applications. From Gunn diodes driving microwave generation to detector diodes capturing low-level RF signals and limiter diodes providing critical circuit protection, our advanced solutions deliver reliability and performance for demanding RF and microwave systems. Whether for defence, aerospace, or scientific research, our diodes ensure superior functionality across a wide range of applications.



### GUNN DIODES

The Gunn oscillator diode is the best known and most readily available device in the family of transferred electron devices (TED). They are employed as DC to microwave converters using negative resistance characteristics of bulk Gallium Arsenide (GaAs) and only require a standard low impedance voltage power supply, therefore eliminating complex circuitry.



### DETECTOR AND LIMITER DIODES

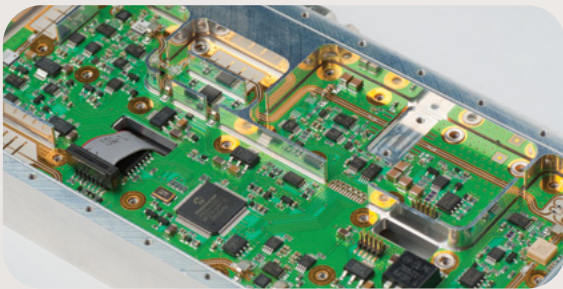
For detection applications, the diode is used as a rectifier to produce a DC output proportional to the very low levels of RF power incident upon it. Detector diodes can be un-biased, but they are much more sensitive to low level signals if they have a small applied DC bias. At higher bias levels, the detector becomes much easier to match over a wide frequency range. Alaris Linwave also packages and tests bespoke limiter diodes based on customer specific frequency and application.

# Custom Microwave Modules

Alaris Linwave specialises in the design and manufacture of Custom Microwave Modules for customer specific applications. Our integrated modules are used in a wide range of market sectors including defence, aerospace, industrial, medical and space. We work collaboratively with our customers to develop the optimum solution and then manufacture the product in our AS9100 accredited facility. We adapt the appropriate technologies depending upon the end application.

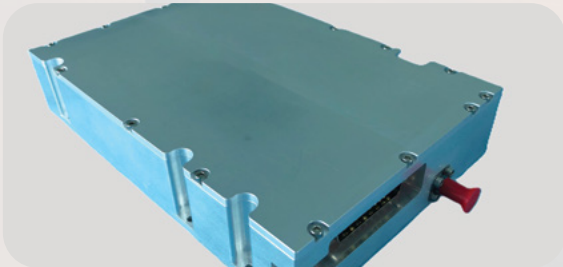
These include a traditional SMT approach through to full chip and wire designs, including hybrids of both technologies. This design philosophy allows optimal form, size, weight and power performance whilst also considering commercial aspects.

## EXAMPLE APPLICATIONS:



### AEROSPACE TRANSCEIVER MODULE

- Dual Channel Rx, Single Channel Tx
- Agile LO Frequency Generation
- Programmable Gain / Bandwidth
- Internal System Reference Oscillator
- Multiple Operational Modes
- Built-in Test
- Harsh Environment



### 150 W MICROWAVE ENERGY MODULE

- Low Power Microwave Generation
- Integral High-Power Amplifier
- Power and Control Electronics
- RF Power Detection and Protection
- Programmable Operational Modes
- Integrated Cooling Solution

# Receivers and T/R Modules

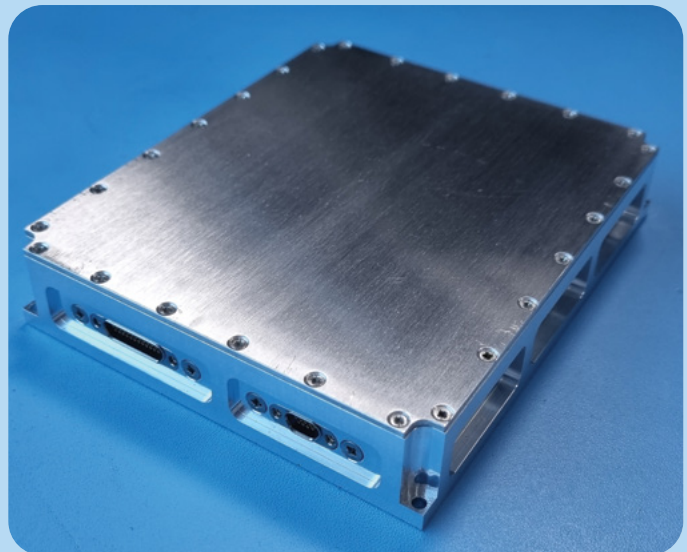
Alaris Linwave designs and manufactures an extensive family of high-performance wideband and narrowband receivers for a wide range of applications including spectrum monitoring, SIGINT, electronic warfare and radar. Markets include defence, aerospace, industrial and space. Provide us with your specification today. Alaris Linwave also manufactures a range of complementary T/R Modules primarily for communication and defence-based applications.

**Frequency:** 20 MHz – 20 GHz  
**Output power:** Up to 20 W  
**Gain:** 30 dB typ.

## EXAMPLE PRODUCT:

### WIDEBAND T/R MODULE

- Frequency Range 1 GHz - 6 GHz
- Tx Saturated Power 40 dBm Typical
- Tx Gain 40 dB
- Rx Gain 20 dB
- Rx Noise Figure 5 dB
- Duty Cycle – up to 100%
- Switching Speed < 250 ns
- Temperature, Overcurrent, and Fault Monitoring
- I/O RF Connectors – SMA
- Weight 0.7 kg





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