



# MHZ TECHNOLOGIES



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Manufacturer's Representative, Distributor  
and Technical Sales Consultants

# MHz Technologies Leads The Way

MHz technologies is a global technical equipment supplier, distributor and technical consultancy specializing in RF, Microwave and Millimeter wave technologies. We are supporting leading technology companies to market and sell products in the United Kingdom and globally. The personnel have vast experience in this field having worked at senior and board level positions in various leading technology companies and successfully collaborated with leading technology companies across the world



## APPLICATIONS INCLUDE

- INDUSTRIAL
- DEFENCE
- AEROSPACE
- TEST EQUIPMENT
- SPACE
- MEDICAL
- TELECOMMUNICATIONS
- 5G

📍 Based in Salisbury, Wiltshire, England

ISO9001 CERTIFIED

**LINWAVE**



Linwave is a specialist in the supply of Custom Microwave Integrated Modules for harsh environments. Linwave operate to 100GHz and experienced in the supply of Transceivers, Amplifiers, Converters, Timing Sources and Multi-Chip Hybrids (System in Package) for Defense and Aero applications. Customers engaging Linwave for External Enterprise Engineering solutions benefit from our experience in module integration, wide RF product knowledge and use of multiple manufacturing techniques based on work in diverse markets.

Heritage dates back to the early years of Microwave in Lincoln (UK), through companies like Marconi Electronic Devices (MEDL), AEI Semiconductors, EEV, Plessey. In 2003 the company was founded by an MBO from Celeritek – a Silicon Valley based leader in RF Semiconductors and systems. Linwave is powered by Business Central, approved to AS9100D, ISO14001, and Cyber Essentials, and utilizes specialist design software such as Microwave Office, SolidWorks and Altium.



# PRODUCTS LINEUP

## 1) Ka-band Block Up-Converters (BUC) (27.5GHz to 31GHz)

Applications:  
Ground and Airborne SATCOM,  
Secure Comms

## 2) Ku-band Block Up-Converters (BUCs) (13.75 - 14.5GHz)

Applications:  
Ground and Airborne  
SATCOM, Secure Comms

## 3) Block Up-Converters (12.75GHz – 13.25GHz)

Applications:  
Ground and Airborne  
SATCOM, Secure Comms

## 4) Ultra Low Phase Noise Oscillator (200 MHz – 12 GHz)

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

## 5) Wide-Band Naval Digital Receiver (2.0-18GHz)

Application:  
EW Receiver for  
Passive Surveillance

## 6) FMCW Radar Front End

Application:  
Surveillance

## 7) X-band Radar Transceiver

Application:  
Airborne RADAR

## 8) X-band Power Amplifiers (8.5-9.5GHz)

Application:  
Solid State GaN Amp X-band

## 9) Gunn Diodes (24 – 110GHz)

Applications:  
Signal Generation, Modulation,  
Radar Systems, Proximity  
Detectors

## 10) Ka-band Phased Array

Application:  
Airborne Data link  
Tx Rx Ka-band Array

## 11) Wide-Band EW ( 5MHz – 8GHz)

Application:  
Signal control for  
Direction Finding

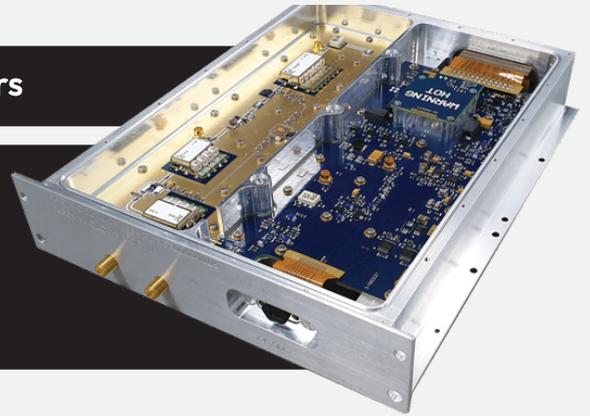
# ULTRA-LOW PHASE NOISE OSCILLATOR (XMU)

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 (100Hz) @ 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 (100Hz)
- 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

# DIODES 25-100 GHZ

Unlock the power of precision with high-performance diodes designed for 26 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



## LIMITER DIODES

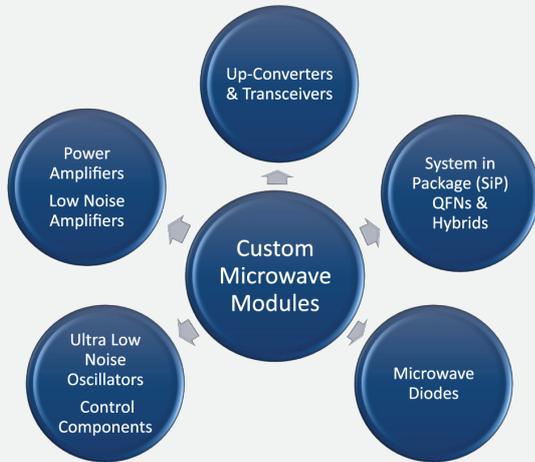
Alaris Linwave packages and tests bespoke limiter diodes based on customer specific frequency and application.



## DETECTOR 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 unbiased, 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.

## Products & Technologies Summary



## Capabilities & Facilities Summary

### Custom built design & manufacturing facility completed 2012

- 11,000sq ft over 2 floors with 2,500 sq ft class 10,000 clean room facility
  - Targeting government approved site for military projects
  - Internal Access control points installed
- Environmental initiatives in-built – LED lighting, rainwater harvesting
  - Approved to AS9100D, ISO9001, ISO14001, Cyber Essentials

Engineering

- Harsh environment specialists
- NPI process
- RF design
- Analog design
- PCB design and layout
- Mechanical design
- Digital embedded and control electronics

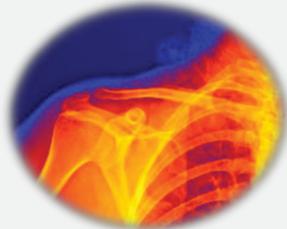
Manufacture and Assembly

- Class 10000 clean room
- LPKF fast prototyping PCB machine
- Fine pitch assembly
- Manual placement and solder reflow
- Hybrid chip and wire assembly
- Gold wedge, ball, ribbon bonders
- Semi-automatic and manual bonding
- Epoxy and eutectic die attach
- Dry nitrogen backfill
- Hermetic sealing and laser welding

Test

- Test capability to 100GHz
- Spectrum, vector, scalar measurement
- Power, noise figure, phase noise measurement
- Modulated test sources & AW capability
- Environmental testing (temp cycle, hot/cold plates, vibe)
- Measurement automation routines
- Die probe
- Bond pull testing

## Markets

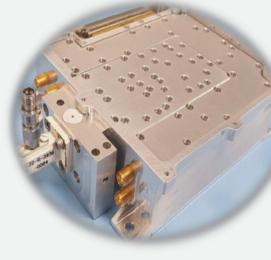
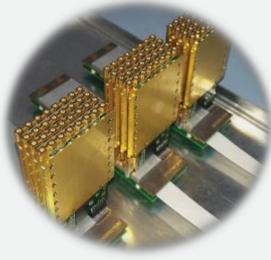
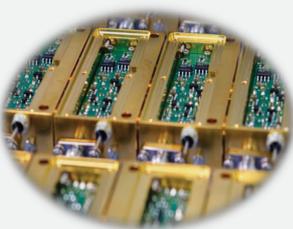


Defence	Satcom & Broadcast	Space	Aerospace	Healthcare
Radar, C-IED, Seekers, EW	BUC's , SSPAs	Converters, Amps, Oscillators, Phased Arrays	Transceivers, BUC's	RF Therapy, RF Energy



Marine	Industrial	Wireless & Radio	Transport	Security & Imaging
Safety Beacon	RF Heating, Moisture Detection, FOD	Boosters and Repeaters	Speed Detection and Traffic monitoring	Sensors

## Product Examples





**ALARIS**  
**KUHNE**

■ INSPIRING THE NEXT RF SOLUTION

## **Solutions for the wireless world**

Kuhne is Specialist in for process and measurement technology in the high frequency and microwave sector. Kuhne offers a wide range of off the shelf LNAs, Linear SSPAs, Block Down Converters, Microwave Source Modules, Frequency Multipliers and many other microwave components and sub-systems covering up to 50GHz.

### **1) Microwave Power Generator (2400- 2500 MHz)**

KU SG 2.45-450 A  
KU SG 2.45 - 250 D

### **2) Power Amplifier**

KU PA 440500-25 B (4400-5000 MHz)  
KU PA 200240 - 80 LIN (2000 - 2400 MHz)  
KU PA BB 070270 - 80 B (600 to 2700 MHz)

### **3) Low Noise Amplifier**

U LNA 500590 A (5000- 5900 MHz)  
KU LNA 200250 A – SMA (2000-2500MHz)

### **4) Low Noise Converter (2200-2900 MHz)**

KU LNC 2229 C PRO2

### **5) Oscillator (54 -13600 MHz)**

MKU LO 8-13 PLL-2

# SOLUTIONS



Microwave  
Power  
Generators

2.45 GHz  
ISM-Band

25 W 250 W  
450 W

Plasma Generation  
Medical Treatments  
Industrial



Power  
Amplifiers

30 MHz – 15.4 GHz  
L- S- C- X- KU- K-  
Band

Up to 1200 W

Jamming  
Broadcast  
EMV / PIM  
Communication



Low Noise  
Amplifiers

5 MHz – 26.5 GHz

Super low noise

Test&Measurement  
Ground station  
Industrial  
Defence



Low Noise Block  
Down  
Converters

1200 MHz - 13.25  
GHz  
L- S- C- K-band

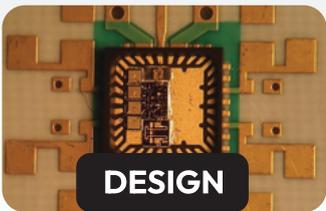
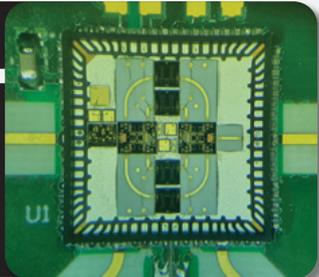
Flexible LO  
Frequency

Broadcast  
MMDS, DVB-T and  
DVB-S

## ADVANCED SYSTEM IN PACKAGE (SIP) CAPABILITY

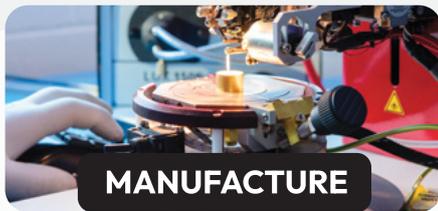
### COMPLEX MULTI-DIE MODULES

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



#### DESIGN

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



#### MANUFACTURE

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



#### TEST

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

# MARKETS & 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>• Phased Arrays</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 Counter Measures</li> <li>• Electronic Warfare</li> <li>• Direction Finding</li> <li>• Counter IED</li> <li>• Search and Rescue</li> </ul>	<ul style="list-style-type: none"> <li>• Phased Arrays</li> <li>• T/R Modules</li> <li>• Wideband Receivers</li> <li>• BUCs</li> <li>• Transceivers</li> <li>• Ultra Low Phase 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 &amp; 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 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>

IMS has served as an industry leader providing component solutions and thick film innovations to customers. By offering integrated areas of production, sales, engineering, quality and management under one roof IMS is well suited to serve customers as a solutions provider. IMS passion is solving all levels of challenges through creative and innovative component solutions, knowledge and experience. IMS has continued its growth through product innovation and meeting the demands of advanced technology. IMS is privately owned and dedicated to serving customers and partners. IMS headquartered in Portsmouth, Rhode Island with regional representation throughout the United States and Worldwide.

IMS is an ISO 9001:2015 certified company.

### **Short Lead Times**

IMS offers the shortest lead times in the industry!

### **International Coverage**

IMS has sales representatives around the globe.

### **Packaging Options**

We can meet your packaging needs!



# PRODUCTS LINEUP

## RESISTORS

Wraparound Thick Film  
RCX Series  
RXI Series  
HCX Series  
Wraparound Thin Film  
LCI Series  
TPI Series  
Wraparound Metal Foil  
MLI Series  
Single Sided Thick Film  
IMS Single Sided Resistors  
IMS Power Series  
Power Chip  
N-Series  
Super RCX Series  
Advanced Chip  
RCX PW Series  
HVI Series

## ATTENUATORS

Fixed Attenuators  
A Series  
V Series Power  
IAX Series  
IMA Series  
Temperature Variable  
Attenuators  
AV-0805  
AV-0607

## THERMAL DEVICES

ThermaBridge™

ThermaPlane™

## SPLITTERS & COUPLERS

Broadband Splitters

IPS 6dB 2-Way Power Splitter

IPS 9.5dB 3-Way Power Splitter

IPS 12dB 4-Way Power Splitter

IPT 6dB Power Splitter

Broadband Couplers

IMK Series

## DIVIDERS

Planar Dividers

0° Outputs Wilkinson

6 GHz Wilkinson Divider

7 GHz Wilkinson Divider

90° Outputs Quadrature

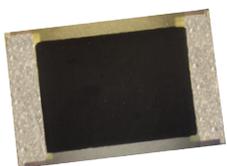
4 GHz Quadrature

4.5 GHz Quadrature

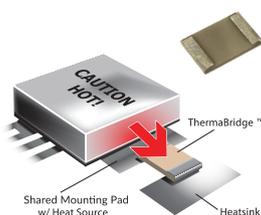
180° Outputs Rat Race

Rat Race Hybrid

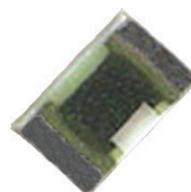
High Power A/N Resistors  
**N-Series**



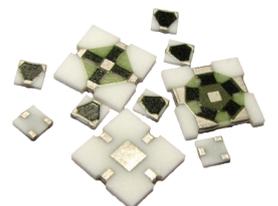
**Thermal Bridge**



**Super RCX Series**



**IPS Series**



# PRODUCT BY INDUSTRY

## MEDICAL

Medical applications demand precision, quality, non-ferroresonant, and often micro and high voltage products to deliver the next generation devices.

- Non-Magnetic for MRI applications
- Small Package Sizes available 0201 and 01005
- Ultra Leach Resistant (ULR) metallization
- RoHS compliant options for all products

### TPI SERIES

*Thin Film Nickel Barrier Resistors*

### A SERIES

*Thin Film Attenuators*

### RCI SERIES

*Thick Film Nickel Barrier Resistors*

### HVI SERIES

*High Voltage Resistors*

### RCX SERIES

*Resistors for RF, Microwave and Low PIM*

### N-SERIES

*High Power AlN Resistors*

## AEROSPACE

IMS offers all products suitable for aerospace applications, but can also be customized for common requirements such as:

- Satellite Communications
- Commercial Space Applications
- 100% Value Testing

### N-SERIES

*High Power AlN Resistors*

### ThermaBridge™

*Thermal Management Device*

### AV-0805

*Temperature Variable Attenuator*

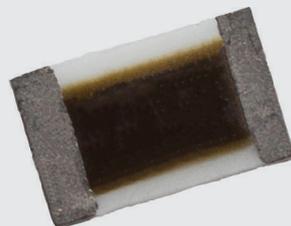
### IAX SERIES

*Thick Film Attenuators*

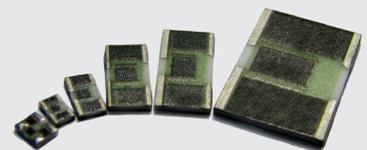
### LCI Series



### TPI Series



### IAX Series



## COMMUNICATIONS

IMS offers all products suitable for communication applications. Supporting the earthbound, airborne, underwater systems that make up the telecommunications infrastructure, base stations, transmission towers, satellites, submarine communications, line cards and mesh networks.

### **N-SERIES**

*High Power AlN Resistors*

### **A SERIES**

*Thin Film Attenuators*

### **RCX SERIES**

*Resistors for RF, Microwave and Low PIM*

### **IPS & IPT SERIES**

*Broadband Resistive Splitters*

## DEFENSE

IMS offers all products suitable for military and aerospace applications, but can also be customized for common requirements such as:

- 100% Value Testing
- Sn62 Leaded Solder Pre-Tin Option
- Application Support for Thermal Management Devices Available

### **N-SERIES**

*High Power AlN Resistors*

### **ThermaBridge™**

*Thermal Management Device*

### **RCX PW SERIES**

*Resistors for RF & Microwave and Low PIM*

### **IPS & IPT SERIES**

*Broadband Resistive Splitters*

### **IAX SERIES**

*Thick Film Attenuators*

## INSTRUMENTATION

IMS offers a full complement of resistor and attenuator solutions for applications where data integrity and signal fidelity are integral in the design. IMS resistors can be offered from under 1 ohm to over 1 Trillion Ohms. The “High Megaohm” products are common to be seen in applications for metering devices.

### **N-SERIES**

*High Power AlN Resistors*

### **ThermaBridge™**

*Thermal Management Device*

### **IPS & IPT SERIES**

*Broadband Resistive Splitters*

### **RCX SERIES**

*Resistors for RF, Microwave and Low PIM*

### **RCI**

*Thick Film Nickel Barrier Resistors*

### **A SERIES**

*Thin Film Attenuators*

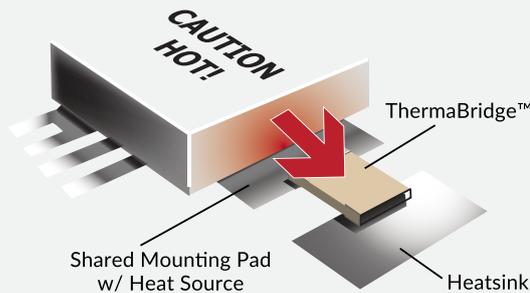
# AlN Ceramic Thermal Transfer Devices ThermaBridge™

The **ThermaBridge™** provides the user with a simple, cost effective way to manage thermal issues at the board level. ThermaBridge™ moves heat from one area to another through an electrically isolated, thermally conductive ceramic chip device with metallized terminals.

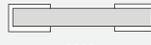
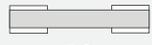
- Electrically Isolated Thermal Conductor
- Thermal Design Tool
- Passive Thermal Control
- Extends Component Life
- Dramatic Temperature Reduction
- Epoxy or Solder Mountable

## Applications include:

- RF Amplifiers
- Heat Sensing
- Conduction Cooled Computers
- Power Supplies & Converters
- JTRS, MIDS-J, GMR
- Temperature Controlled Oscillators
- Extracting Heat from Power FETS, LEDs, Pin & Laser Diodes
- Lighting Ballasts
- Protecting Neighboring Components
- Conduction Cooled Handheld Devices
- P25 Radios, Basestations & Repeaters
- Electrically Isolated Thermal Coupling
- Transformers



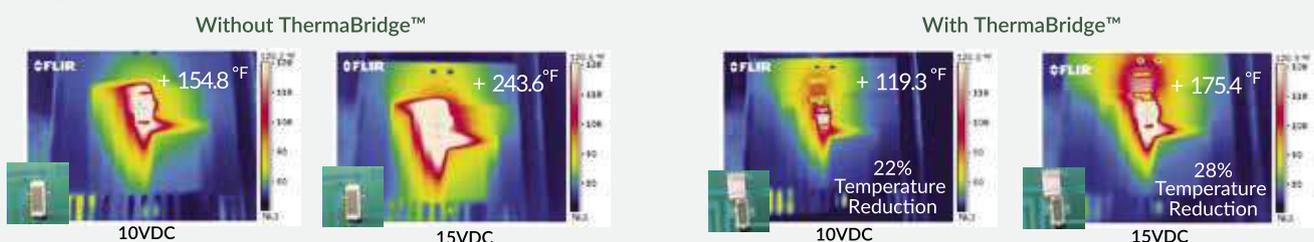
**SAMPLE PN: B G 3 - 0805WA** (0805 size, 0.025" Thickness ThermaBridge™, PtAg Terminals)

PN Prefix	Thickness	Term Metals	Sizes			Configuration
<b>B</b>	<b>C</b> = 0.010" <sup>1</sup> <b>D</b> = 0.015" <b>G</b> = 0.025" <b>T</b> = 0.040" <sup>2</sup>  <sup>1</sup> Available in sizes 0203, 0402 <sup>2</sup> Available in sizes 1010 and larger	<input checked="" type="checkbox"/> <b>3-</b> PtAg <input checked="" type="checkbox"/> <b>8-</b> ULR PtAg <b>C-</b> PtAg with Sn62 Solder <b>H-</b> ULR PtAg with Sn62 Solder <input checked="" type="checkbox"/> <b>P-</b> PtAg w/ Sn96 Solder <input checked="" type="checkbox"/> <b>R-</b> ULR PtAg with Sn96 RoHS Solder	0203	0612	2010	<b>WA=</b> Wraparound
		0402	0805	2512		
		0505	1005	2525	<input type="checkbox"/> <b>DS=</b> Double sided without wrap   <b>WA</b> Wraparound  <b>DS</b> Double sided	
		0510	1206	3725		
		0603	1010			
		0605	1020			
			Standard Sizes (Custom Sizes Available) *DS only available in termination material 8, H & R			



## Thermal Image Heat Transfer Demonstration

Below is an actual test of the ThermaBridge™ showing a heat generating component mounted on an FR4 board. The images on the right show the temperature of the component being thermally aided by the ThermaBridge™ connected to a heat sink.





AccuBeat is a leading provider of Accurate Frequency and Timing solutions used in Defense, HLS, Aerospace, Communications and other industries. Based on Rubidium Atomic Clock or OCXO technology with optional GPS disciplining, AccuBeat's products achieve the highest levels of accuracy and reliability and are deployed by IDF, the USAF, Project Galileo, Tier 1 Telecommunication companies and many other sensitive Military, HLS, infrastructure and Government programs worldwide.

AccuBeat provides COTS and customized, ruggedized products and solutions and we work closely with the customer to provide the exact requirements for each project. AccuBeat's Time and Frequency centers are battle-proven in numerous tactical applications, including combat planes, UAVs, transport aircraft, helicopters, ships, missile platforms and ground mobile vehicles. With more and more devices, systems and platforms relying on data from GNSS, these environments are prone to jamming, spoofing, interference and other time related cyber-attacks. AccuBeat has developed solutions and systems that can detect and identify threats to the GNSS system and ensure continuous and uninterrupted accurate timekeeping and synchronization even in a GPS denied or threatened environment. AccuBeat solutions protect critical infrastructure, telecoms, HLS and Defense equipment and ensure continued operations where other systems fail. AccuBeat's highly professional and experienced team of managers, PhDs, engineers and technicians provide on-time solutions to all our customers' needs, applying years of know-how and experience to the development and manufacture of the most demanding and most accurate Rubidium based clocks. "Fast is fine, but accuracy is everything" (Xenophon, 430-354 BC)



## PRODUCTS LINEUP

- Rubidium Frequency Standards  
(stand alone and miniature PCB mountable)
- GNSS Disciplined Rubidium/OCXO Time & Frequency Centers
- Portable Calibration Suitcase
- Solutions of GPS-Denied environments
- NTP/PTP Time Servers
- Redundancy Switches & Distributors
- Oven Controlled Crystal Oscillators

## LINE OF BUSINESS

- Atomic Clocks
- Accurate Frequency & Time Systems
- GPS Disciplined Solutions
- Protection in a GPS-denied environment





Netcom provide high quality, high-performing tunable RF filters for major military/defense and communications companies. For over 45 years, we have been designing, manufacturing, and delivering proven performance for critical communication systems.

Netcom have our own manufacturing facility and processes to ensure quality, an in-house engineering team to design & continuously improve products, and a responsive sales team to ensure our clients get fast and accurate answers to keep projects moving forward.

## CAPABILITIES, EXPERTISE, & PERFORMANCE

- Physical plant in Wheeling, Illinois, with over 40,000 square feet dedicated to manufacturing.
- Streamlined processes and design-in support activities to meet timely deliverables.
- In-house capabilities include experience with programs ranging from 100 to 100,000-unit orders.
- Automated SMT lines, in-house compliance testing, computerized test stations, certified RF screen room, machine shop, trained and certified technical staff.
- Extensive knowledge of RF and Microwave applications, pertinent materials, outstanding quality control system.
- In-house engineering team with a broad range of skill sets for RF and microwave designs with an emphasis on modular design techniques.

## PRODUCTS LINEUP

Netcom's product lines, including tunable filters, RF amplifiers, LC filters, other RF components, and custom integrated assemblies are designed for the military, aerospace, wireless communications and medical industries. Netcom's engineers are experienced in designing products used in all frequency bands for point-to-point communication systems, defense and security systems and medical imaging applications. The product categories listed below illustrate some of the abilities of Netcom's engineering team.



Netcom has developed a line of cost-effective tunable filters for software defined radios ("SDR") and co-site mitigation applications. These products have been designed and manufactured for multinational corporations throughout the world. See currently available products in our online catalogue or contact our team for inquiries about standard and custom configurations.



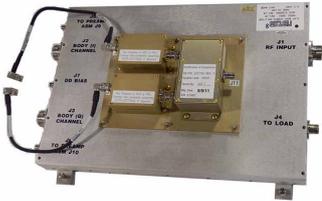
Netcom designs and manufactures bandpass, low-pass, high-pass, notch & diplexer LC filters for radio frequencies from audio to 3 GHz and microwave frequencies up to 18 GHz. Special characteristics such as inter-modulation distortion phase & amplitude match, linear phase, pulse ringing and power dissipation are included within designs as part of the manufacturing process. Netcom's surface mount LC filters are compatible with today's SMT systems.



Netcom's team has amplifier experience with frequencies of up to 3 GHz in high power applications and up to 10 GHz in low power applications. Existing programs have a power of up to 200W and include several ancillary functions in a variety of packaging requirements. Netcom also has experience with high power medical devices including 20 kW transmit / receive switch, body hybrids.

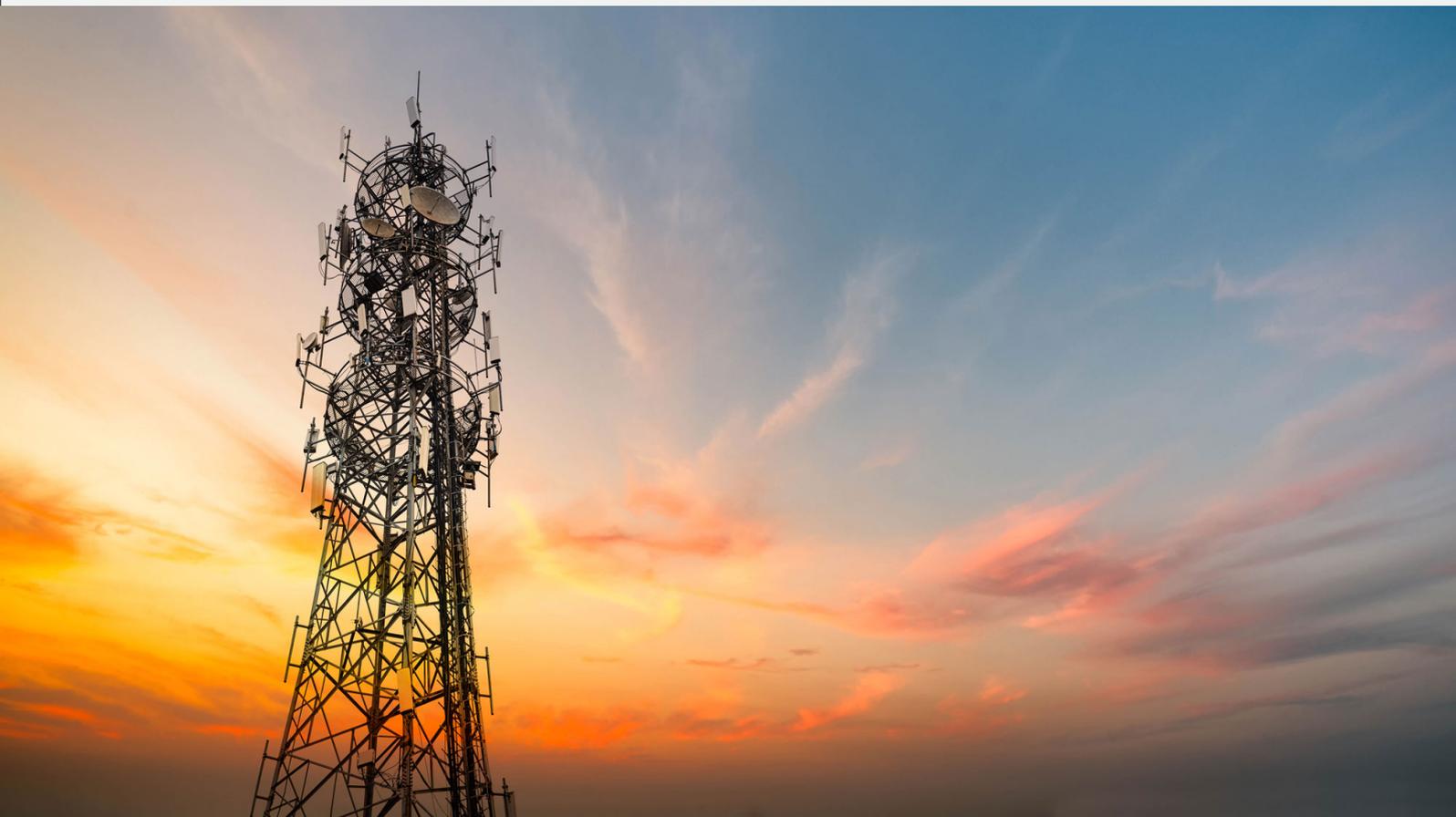


Netcom's RF components consist of unique designs for custom applications. Products include quality components that are reliable solutions for military and commercial applications. In addition to our extensive list of legacy products, Netcom is continually designing new custom solutions for custom applications. Components include filter banks, low noise amplifiers, IF strips, mixers, combiners, and other technologies at the component level.



Netcom has extensive experience in designing RF and microwave systems for specific military, aerospace, and medical diagnostic applications. Our multi-disciplined product development team works concurrently with the customer's engineering team, to segregate the RF and microwave needs of the program. Subsequently Netcom develops a turnkey assembly for easy integration into the customer's assembly line. Complex manufacturing, testing and tuning are part of the engineering services provided by Netcom engineers.

Our team has developed products ranging from board level RF modules to complete transceiver units. Netcom's experience includes co-site-filtering systems for military radios, spike noise filtering on MRI systems, high power T/R switches for MRI systems, and a complete line of RF transceiver assemblies for wireless communications, military and medical applications.



**Tactical Radios, Land and Amphibious:** military VHF radio and UHF radio sets designed to provide secure integrated voice, data services to soldiers, vehicles and command centers

- Integrated Filter Power Amplifier
- Tunable Filters
- LC Filters

**Software Defined Radios:** Army and Navy portable two-way radios using JTRS software communications architecture.

**Tunable Filters**

**Shipboard Cosite Mitigation Systems:** fully integrated communications system for combat ships that includes digital radio system requiring the minimization of interference among collocated radios.

- Integrated Filter Power Amplifier

**Airborne Early Warning Avionics Systems:** modular communication system involving secure voice and data communications.

- Filter Amplifiers
- LC Filters

**Commercial Avionics Communications Systems:** major commercial aircraft communication & surveillance systems and datalink networks involving VHF, HFS, and SAT capabilities.

- LC Filters

**MRI, or Magnetic Resonance Imaging,** is a diagnostic imaging tool which transmits an RF signal to a patient under a powerful magnetic field.

- High Power Body Hybrid



Paricon Technologies was founded in 1997 with the goal of providing next-generation separable interconnection products to the fastest growing and most demanding segments of the electronics market.

In 2011, Paricon moved to its current location in a modern industrial park near Boston, MA. This 10,000 square foot facility houses sales, engineering and manufacturing for all the Paricon products, including the proprietary equipment used to make its unique PariPoser® material.

The PariPoser® concept was initially developed at Bell Labs to address the future trends of the electronic industry. Trends like higher device speeds, increased densities and lower manufacturing cost. In 1997, Paricon acquired the exclusive rights to Bell Labs technology, patents and manufacturing equipment. And for the past 20 years, Paricon has pioneered economical interconnect products that work at a pitch as small as 100 microns and at speeds over 100 GHz – products that are used in satellites and cellphones, and products for both microwave and medical applications.

PariPosers are available as a sheet of fabric, or as a component in assembled connectors and sockets. Products are developed with the technical staff in Massachusetts or with selected business partners in specific markets or geographical areas

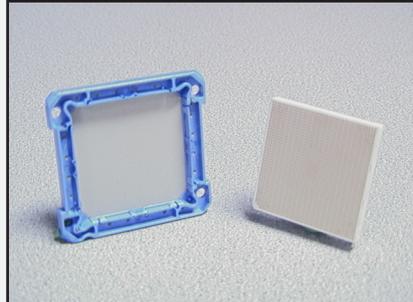
A decorative graphic at the bottom of the page features a blue globe with glowing white circuit traces and nodes. The background is dark blue with light rays and a bright sun-like glow on the right side.

**Innovative Interconnects**

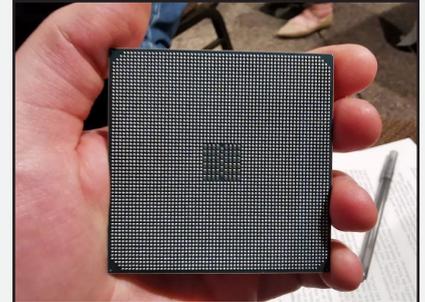
## PRODUCT AND APPLICATION



Test sockets for copper pillars



LGA Socket



Sockets for large BGAs

The Test market needs dependability and low cost per line. Paricon's signature product (anisotropic elastomeric fabric – the PariPoser® fabric) excels at both.

When properly implemented and maintained, the contact resistance will stay below 30 mΩ for over a million cycles and 10 years of use. For some PariPoser® fabric options, the contact resistance is actually below 10 mΩ – and stable over cycles and time.

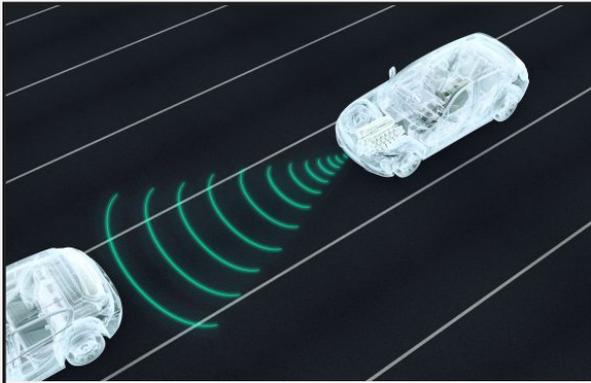
The excellent mechanical durability is due to the relatively low metal fill (10%) used to make the fabric. Other elastomeric contact technologies use about 85% metal fill to achieve sufficient conductivity. As a result, their elastomers quickly lose elastomeric strength after a low number of cycles or the passing of time.

Elastomeric contacts are a very different approach for test engineers familiar with spring pins. To help you make the adjustments in your project, be sure to inquire about one of the information packets found in the Contact section.

If other contact methods are better for your project, we will make sure that you will get the precise performance and products you need.

### Features

Resistance vs. Compression	< 30 mΩ after 0.07mm/0.003" compression
Resistance vs. Time	Minimal change after 10 years: < 15%
Vibration Tolerant	No fretting corrosion



OEM RF Applications



Large Scale Microwave Systems

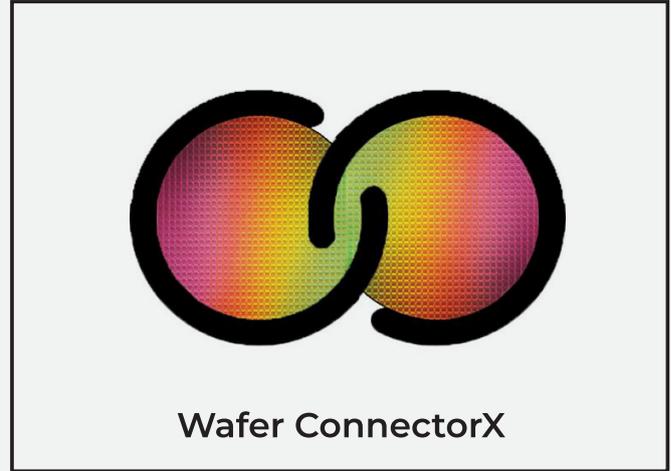
In the world of microwaves, interconnect speed is king. And, speed is what you will get when using a PariPoser® interconnect. It's because the entire interconnect mechanism is contained in incredibly thin elastomeric fabric (as thin as 0.05mm/0.002").

You also get low profile, high bandwidth, low resistance and low inductance -just what is needed for automotive radar ICs or advanced telecommunications devices.

Paricon's microwave products are available in many forms: from simple sheets of PariPoser® fabric, to sockets & connectors, and to complex subassemblies.

### Features

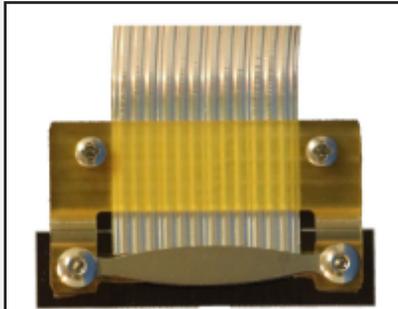
<b>High Speed</b>	Bandwidth up to 110GHz
<b>Low Resistance</b>	Typically < 20 mΩ
<b>Low Inductance</b>	Typically < 0.07 nH
<b>Impervious to liquids</b>	Ball columns are sealed in the elastomer



PariPoser® fabric presents a unique combination of features for low cost and high-performance interconnections to wafers or bare die.

The contact mechanism acts like a traditional bending beam contact, but with a few improvements:

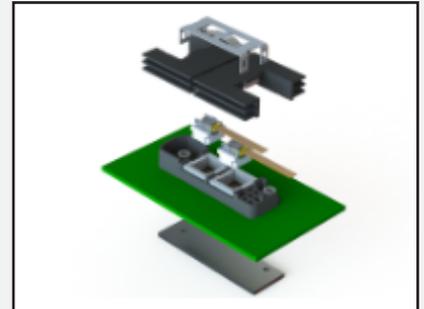
- The particle columns are magnetically aligned and then set in the elastomer before assembly in a prober, so there is no labor-intensive loading or alignment needed.
- The particle columns bend quite easily, but retain their orientation and low contact resistance due to the lateral support of the elastomer.
- There are typically multiple redundant ball columns per pad.
- The cost is typically pennies per contact pad



Cable-to-Board  
for High Speed I/O



Socket for DNA  
Sequencer



Low Profile Socket  
for Fiber Optics

Sometimes, the connector you need just isn't in a catalog. Sometimes you need more speed, sometimes you need finer pitch, sometimes you need lower profile, sometimes you need it to be impervious to liquids. And, sometimes, you need it all.

Paricon's technical team is always eager to take on the most challenging jobs.

### Features

<b>High Speed</b>	Bandwidth > 40 GHz
<b>Low Resistance</b>	Typically < 20 mΩ
<b>Low profile</b>	Thin Pariposers, results in thin connectors
<b>Solderless interconnect</b>	Easy to assemble
<b>Impervious to liquids</b>	Contact ball columns are sealed in the elastomer



Quartz Crystal Technology GmbH

As a technology leader in the FCP industry, KVG drives technical innovation and new product development for key global communication applications, helping to improve people's lives.

## RESPONSIBILITY



United Nations  
Global Compact



Long-term success requires the economic, ecological and social development of a company as well as a standardized control system. All processes, responsibilities and competences are based on this set of rules, taking into account sustainability, productivity, quality, safety, health and the environment.

## SUSTAINABILITY



As a manufacturing company, KVG is constantly working on optimizing each individual process in order to save raw materials and costs, minimize waste and use energy as efficiently as possible. Our integrated management system (IMS) serves as an internal control element for assessing environmental quality.

## QUALITY



KVG successfully introduced a quality system according to ISO 9100 and an environmental management system according to ISO 14001 for the development, manufacture and sale of oscillating crystals, oscillators and filters.

## MISSION



As a technology leader in the FCP industry with more than 75 years of experience, KVG enforces the technical innovation and new product development for global key applications of communication, helping to improve people's lives.

# MEDICAL ENGINEERING

The resolution of MRI, CT and ultrasound images is highly dependent on the short-term stability, jitter and phase noise of the reference oscillator used. Lower image noise and better image resolution can make diagnoses more precise and improve treatment. Well-known German and international manufacturers of medical devices rely on low-noise quartz oscillators from KVG.

## AREAS OF APPLICATION

Ultrasound Diagnostics

Radiography

Magnetic Resonance Tomography

NMR Spectroscopy

Angiography

Computed Tomography

Laser Scanning Microscopy

Nuclear Medicine



# HIGH-END AUDIO



Digitally recorded music is converted back into an analog signal before being played back in the loudspeaker. The more accurate this conversion is, the better and closer to reality the listening impression is. The best audio streamers in the world are equipped with KVG oscillators with extremely low jitter/phase noise to ensure the most perfect music experience and listening pleasure.

## REFERENCE CLOCK FOR:

Digital Audio Processing and Distribution

Video Processing and Distribution

Audio Streaming

Analog-to-Digital Conversion (ADC)

Digital-to-Analog Conversion (DAC)

Recording Studio Equipment

# RESEARCH

The days of simple laboratory experiments in modern cutting-edge research are long gone. Physics is trying to uncover the secrets of this world with ever larger and more complex experiments. In particle accelerators, particles are accelerated to nearly the speed of light and brought to collision. Frequency modules and highly stable oscillators from KVG ensure perfect synchronization of all components.



## AREAS OF APPLICATION

Main Oscillators

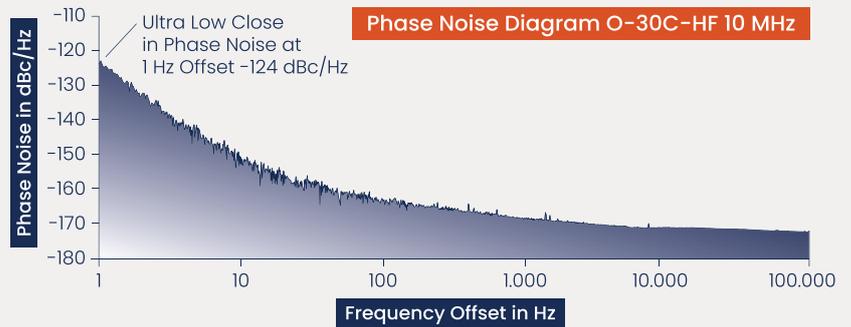
Reference Clocks

Particle Accelerators

Material Analysis

# TEST & MEASUREMENT

Precise measurement devices require extremely accurate and stable time references to guarantee the highest level of measurement accuracy. Crystal oscillators from KVG with extremely low phase noise are used in test equipment for network optimization of mobile networks such as 4G or 5G to ensure the desired network performance. Leading manufacturers of laboratory measurement technology rely on KVG's reliable quality.



## AREAS OF APPLICATION

Spectrum Analyzer

Frequency Counter

Network Analyzer

Signal Analyzer

Signal Sources

Functional Generators

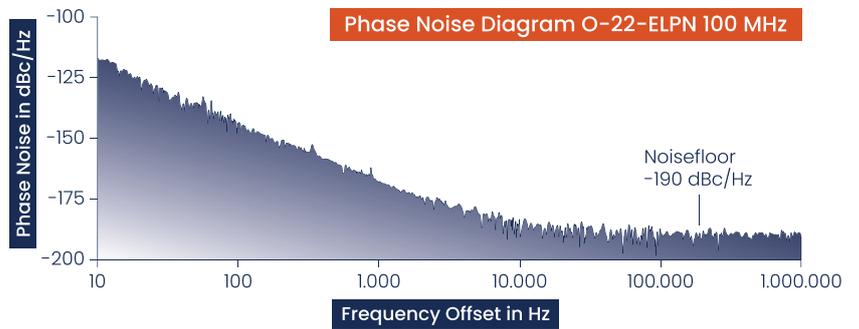
Protocol Analyzer

EMI Test Receiver

Mobile Radio Test Sets

# DEFENCE & SECURITY TECHNOLOGY

Functionality and reliability in harsh environments are the key to any product for avionics and defense applications. KVG's anti-vibration OCXOs combine small package size with best-in-class vibration protection. The ULGS series OCXO offers G-sensitivity down to 0.05 ppb/g in a hermetically sealed 1" x 1" package combined with excellent static phase noise.



*The evaluation of radar signals is essential, for example, to monitor air-space. High-precision, low-phase noise oscillators can increase the resolution and accuracy of radar systems.*



## AREAS OF APPLICATION

Combat Aircraft

Mobile Radar

Synthetic-Aperture Radar (SAR)

Identification Friend or Foe (IFF)

Tactical Communication

Software defined Radio

Manpack Radios

UAV

Anti Spoofing





## Reach Out Today!

Get in touch with us for all your technology needs



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