Product Line A - Z

Analogue, RF & Microwave, Millimetre Wave

- Components -

- Sub-Systems -

- Solutions -

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Absorber Material

A non-conductive magnetically filled silicon rubber which is flexible and with a high magnetic loss tangent from 1 GHz to 100 GHz. The material can be dispensable or supplied in thin flexible sheets.

The material can be dispensed via automated numerically controlled dispensing for high accuracy and therefore no need for adhesive.

Adaptors, Coax to Coax and Coax to Waveguide

Coax between Series:
1.0 to 1.85mm
1.85 to 2.40mm
1.85 to 2.92mm
2.40 to 2.92mm
2.40 to 36 GHz SSMA
2.92 to 3.5mm
2.40 to 3.5mm

In Series Coax:
1.00mm
1.85mm
2.40mm
2.92mm
Super SMA 27 GHz
3.5mm

Waveguide to Coax Adaptors
From WR-08 to WR90 Waveguide sizes to 1.00mm and SMA in Coax.

Uni-Guide
Allows direct conversion from coaxial connector to waveguide interface.

Amplifiers, Solid State

Broadband Bench Top Amplifiers from 10 MHz to 170 GHz in bands, waveguide and coax interface options.

Low Power Ultra Broadband Amplifiers from 0.01 GHz to 170 GHz in bands, to +30 dBm output power. Available in waveguide and coax styles.

High Power Amplifiers Coax and Waveguide
available in broad and narrow bands from 0.1 MHz up to 110 GHz, output power up to 20 kW depending on frequency bands. Custom configurations available.

Low Noise Amplifiers from 300 MHz to 170 GHz, noise figure from 2.0 dB in waveguide and coax interface

MMIC Amplifiers
- LNA DC to 42 GHz, noise figure from 1.8 dB.
- Driver Amplifiers, DC to 40 GHz.
- Power Amplifiers to 100 GHz, output power to 75 W GaN and 4 W GaAs. Also available in discrete bare die.

Antennas

A broad range of Antenna types are available, such as:

- **Standard Gain Horn** including wideband types 320 MHz to 220 GHz in bands.
- **Coaxial & Waveguide Gain Horn,** 1 GHz to 110 GHz in bands.
- **Dual Polarisation Gain Horn**, 8.2 GHz to 110 GHz in bands.
- **Conical Gain Horn**, 15 GHz to 260 GHz in bands.

Attenuators

Attenuators - Fixed
Coax types from DC to 67 GHz, up to 60 dB, power rating 1 to 2000 W.
Connector types include 1.85, 2.4, 2.92mm, SMA, TNC and N-Type.
Active types from 18 GHz to 40 GHz.
Waveguide - WR-06 to WR -42 from 3 to 50 dB.
High Power - WR-10 to WR-22, 10W, to 50 dB.

Attenuators - Variable
18 to 325 GHz, 0 to 60 dB.
Programmable - DC to 220 GHz, attenuation from 0.01 to 115 dB by increments.

Attenuators - Chip, BeO and AIN - From DC-12 GHz, power levels to 150 W, attenuation to 30 dB.

Attenuators - Flange, BeO and AIN - From DC-4.0 GHz, power levels to 250 W, attenuation to 30 dB.

Attenuators - Flange, Chip, Tab - High temperature to +250°C from DC to 8 GHz and up to 500 W.

Cable & Cable Assemblies

Cable Assemblies in **Low Loss, Phase Stable versus Flexure and/or Temperature, High Power, Phase Matched options - Multi Pin Types.**

Numerous connector options to 110 GHz in frequency.

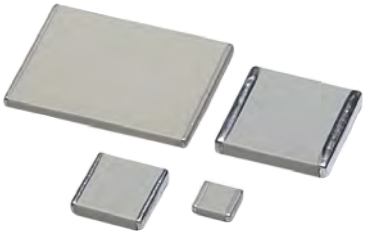
Semi-rigid also available.

Test cables to 67 GHz, including armoured and repairable options available.

VNA test cables from 26.5 GHz to 67 GHz and Coaxial Delay Lines.

Capacitors

Available to ESC/CSCC, CECC/IEC and MIL-QPL Standards



Ceramic - surface mount, thru hole and leaded configuration. Available in NPO, BX, 2CI, X7R and C48X dielectrics.

- Capacitance value to 180µF employing stacking configurations.
- High voltage up to 10 kV. High temperature up to 250°C.
- Custom designs available.

Tantalum - Solid, wet and high energy types. Surface mount, axial leaded. Voltage to 170 V, capacitance value to 10,000µF, up to 200°C.

Film - employing PET, PPS, PP and reconstituted Mica dielectrics. Package options include surface mount, thru hole and axial leaded. Standard designs offer capacitance values to 1600µF and rated up to 25 kV.

Electrolytic - voltage ratings up to 500 V, capacitance value up to 680,000µF, temperature range -55°C to +140°C.

Voltage Multipliers - miniaturised half wave voltage multipliers AC to DC, up to 7000 kV, 100µA, 100KHz. Custom solutions available.

Circulators, Ferrite

Available in **Surface Mount**, **Drop-In**, **Coax**, **Microstrip** and **Waveguide** configurations.

Frequency range from 10 MHz to 101 GHz in bands.

Power level to 2000 W CW with peak power levels of 5000 W.

Double junction configurations also available.

Connectors, Coaxial

A broad range of connectors: **Super SMA**, **N, TNC**, **SSMA, 2.92mm**, **2.40mm**, **1.85mm** and **1.0mm.**

The **0.9 mm SuperMini** is a superior performance, high frequency connector to 67 GHz in a miniaturised footprint.

The SuperMini Board-to-Board (SSBB) solutions optimise interconnect performance for board-to-board stacking applications with spacing as close as 3.00 mm to 67 GHz.

The **SSBP** push-on contacts are designed to be used in industry standard multi-contact connectors (for example 38999, D-sub, Micro-D) or can be arrayed in a custom envelope for maximum flexibility, mixed with DC and data contacts.

Combiners/Dividers

Coax Dividers from 0.5 GHz to 60 GHz, waveguide configurations from 18 MHz to 110 GHz. Options available in 2 to 32 way available.

Waveguide Dividers from 18 GHz to 170 GHz, up to 32 way.

Coax Combiners available from 0.01 MHz to 6000 MHz, from 2 to 16 ways and power rating of up to 6 kW, depending on type.

Radial power combiners from 4 to 32 ways up to 4.2 GHz and power rating up to 10 kW.

DC Blocks

Coax types from 10 MHz to 67 GHz, in bands, low insertion loss, voltage +50 V.

Directional Couplers

Coaxial, Surface Mount and **Drop-in package** options include:

- 3-port uni-directional.
- 4-port bi-directional.
- 4-port dual directional types.

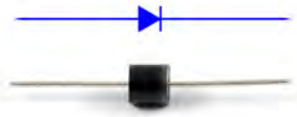
Frequency range of 0.01 MHz to 67 GHz.

Power levels to 10 kW.

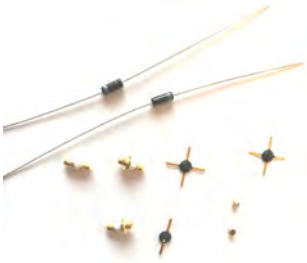
Standard coupling factors: 3, 6, 10, 20, 30 ,40, 50 and 60 dB.

Waveguide configurations from 18 GHz to 170 GHz and crossguide product to 110 GHz.

Diodes



- **GaAs Schottky** - Mixer type.
- **Limiter Diodes** - Zero punch through characteristics, low loss.
- **Mixer Ring Quads** - Anti parallel pairs.
- **Monolithic Bridge Quad** - Low leakage, high breakdown voltage.
- **PIN** - Low loss, glass passivated, high RF power handling. Low Inductance.
- **Sampling Phase Detectors** - Broadband, phase locking to 26 GHz.
- **Schottky Detector Types** - Low, intermediate, medium, high and very high barrier.
- **Schottky Ring Quads** -Zero bias, high sensitivity, broadband operation.
- **Silicon Tuning Varactors** - Abrupt and hyper-abrupt, high Q. Step recovery.
- **Tunnel Diodes** - Planar construction, zero bias detector operation.



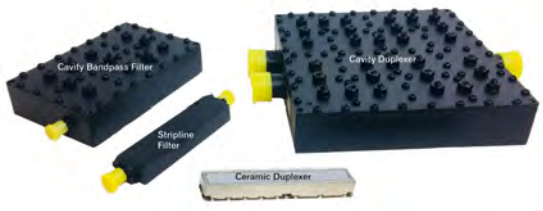
Equalisers

Coaxial and Waveguide parabolic adjustable and negative slope to 67 GHz in standard configurations.

Custom configurations also available.

Filters

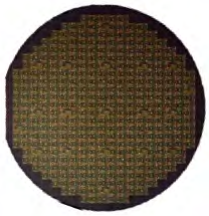
- Frequency range to 170 GHz.
- Bandpass, Low pass, High pass, Notch and Tuneable configurations. High power to 5 kW.
- Duplexers/Diplexers, Multiplexers, switched filter banks and voltage/digital control options.
- Topologies include:
  - Cavity
  - Ceramic
  - Discrete
  - SAW
  - BAW
  - Microstrip
  - Tubular
  - Waveguide



Foundry Services, GaN-On-SiC

Realise custom MMIC or discrete GaN-on-SiC designs in collaboration with available Foundry Services.

Production processes focuses on three basic families:



- 0.4-µm gate-length HEMT that can be operated at drain bias of 28 to 50 V.
- 0.25-µm gate-length HEMT, 28 to 40 V drain voltage.
- 0.15-µm gate-length with a drain voltage of 20 V.

Shared wafer option to minimise initial commitment in design process phase. Process design kits available to support design process.

Frequency Multipliers

Active configurations from 28 GHz to 110 GHz in bands with multiplication factors of 2, 4, 6 and 8.

Passive configurations from 1.5 GHz to 220 GHz in bands, with multiplication factors of 2 and 3.

Hybrid Couplers, 90° and 180°

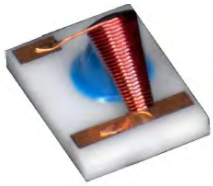
Surface Mount from 20 MHz to 8 GHz in bands, up to 500 W power rating.

Coax Solutions from 2 MHz to 40 GHz in bands up to 2500 W power rating.

Best in class insertion loss and amplitude balance.

Inductors

Broadband Conical Inductors to 67 GHz in surface mount and flying lead topologies. Also available in pre-mounted substrates for chip and wire applications.



Air Coil and **Fixed Inductors** for RF, Microwave and Millimetre wave applications.
QPL and space qualified inductors are also available.

Thin film gold spiral inductors deposited on a ceramic or quartz chip.

Integrated Front-End Solutions

For **5G applications** in the 24 to 30 GHz and 37 to 43.5 GHz bands.

Also available in S and X Band Radar applications.

Isolators, Ferrite

Available in **Surface Mount, Drop-in, Coax, Microstrip** and **Waveguide** configurations.

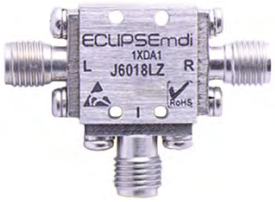
- Frequency range from 10 MHz to 260 GHz in bands.
- Power level to 500 W CW with peak power levels of 3000 W.
- Double junction configurations also available.

Limiters

MMIC Schottky available from 0.5 GHz to 8.0 GHz
Pin and Schottky Limiters in coax configuration from 0.5 GHz to 45 GHz.

Mixers

Available in **Coax** and **Waveguide Topologies**



- Double balanced to 170 GHz.
- Triple balanced to 26 GHz.
- IQ/Quadrature to 110 GHz
- Harmonic/Sub-harmonic and pumped types in bands from 26 to 140 GHz.

Oscillators

Crystal types:

- **XO** to 350 MHz, package sizes down to 1.6x1.2mm.
- **VCXOs** to 1500 MHz, package sizes down to 5.0x3.2mm.
- **TCXOs** to 200 MHz, package sizes down to 2.5x2.0mm.
- **OCXOs** a very broad range of types, including low power.
- **G-Compensated**, Low phase noise and ultra stable.

GPS/GNSS disciplined oscillators in OCXO and Rubidium Topologies.

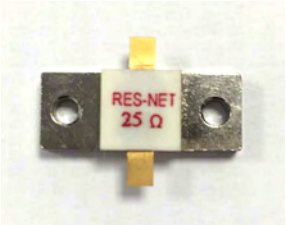
Gunn Oscillator types; bias, mechanical and varactor tuning options types to
110 GHz.
DROs from 1 GHz to 40 GHz, surface mount from 500 MHz to 14 GHz.
PDROs from 1 GHz to 110 GHz.
VCOs from 10 MHz to 40 GHz, surface mount 10 MHz to 11 GHz.

Phase Shifters

Manually variable coax types operating from DC to 18 GHz and manually adjustable waveguide options from 26.5 to 170 GHz.

Electronic phase shifters available from 17 MHz to 18 GHz. Also available in bare die format from 2.5 to 12.0 GHz.

Resistors



High Voltage to 30Kv, resistance values depending type from 10K ohm to 4.0 Tera ohms. Options include, precision, non-inductive and high power. Available in **BeO** and **AiN Substrates**

- Chip Resistors up to 18 GHz and up to 700 W.
- Rod types with power ratings to 75 W, frequency to 18 GHz with bespoke options to 40 GHz.
- Disc to 1.0 GHz, options to 18 GHz.
- Flange type up to 4 GHz with power rated to 1500 W.
- On Diamond substrate available in 0402 and 0603 size with power ratings to 50 W and up to 30 GHz.

Precision Resistors (Non RF) - Tolerances from 0.005 to 5% depending on type. Available in axial and surface mount packages. Power, high heat and temperature sensor variants also available.

Space Approved Products

Capacitors – Tantalum, Film, NPO, X7R and C48 topologies.
Oscillators – XO, TCXO, OCXO, GPS Disciplined, Clock Modules and MROs.
I**nductors** – Surface Mount and Fixed lead types.
Connectors – Large range of coaxial connector options to 110 GHz.
GaN Transistors and MMIC Amplifiers.
Thermal Interface Materials including non-silicon thermal paste and pads.
Slip Ring Assemblies for Solar array drive mechanism systems.
Filters - Bandpass, lowpass and highpass topologies.

Substrate Material

A pure PTFE Dielectric, copper plated utilising a proprietary process. The substrate has extremely low moisture absorption and is Iso-tropic. Standard panel sizes can be supplied whereby the materials can be easily cut, sheared and machined to shape.

Available with very thin copper coatings and dielectric thickness as low as 0.00025 in. (6 µm). Dielectric constant 2.05 +/- 0.05.

Uniform electrical properties over frequency to 18 GHz and an excellent solution for producing amplifiers and couplers.

Switches

Coaxial configuration - Pin diode, electromechanical absorptive and reflective topologies to 67 GHz and to SP16T.

High power (120 W) options available in SPST and SPDT configurations.

Electro Mechanical switches from SPDT to SP12T configurations to 52 GHz. Transfer types also available.
Numerous connector options, including surface mount configurations on offer.
High power and ruggedized options with low PIM also available.

Waveguide SPDT switches from 55 GHz in bands to 110 GHz, absorptive options available.

Motorised E-plane SPDT and transfer types available from 26.5 GHz in bands to 110 Ghz.

Synthesisers

Rack Mounted and Compact Modular Topologies, in either single or multi channel, operating in bands from 300 MHz to 40.0 GHz.
Typical switching speeds of 250nS and phase noise of -106 dBc @18 GHz (10 KHz offset).

Other benefits include:

- Small footprint.
- Reduced weight.
- Low power consumption.
- USB/Ethernet connectivity.
- User friendly GUI.
- Phase coherent multiple channels.
- Reference input and modulation capability.

Typical applications include ECM (Electronic Counter Measure), ESM (Electronic Support Measure), SAR (Synthetic Aperature), EW Simulation and SIGINT.

Terminations

Available in BeO and AiN substrates

- **Chip** - DC to 6.0 GHz, up to 500 W.
- **Tab & Cover** – DC to 6.0 GHz, up to 100 W.
- **Flange** – DC to 8.0 GHz, up to 1500 W.
- **Stripline** – DC to 18 GHz, 20 W.
- **Coax Terminations** available in BNC, TNC, N-type, 1.55mm, 2.4mm SMA, 3.5mm and 7/16 .
- **DC to 67 GHz** and up to 2 kW depending on topology.
- **Conduction cooled** from DC to 12 GHz and up to 250 W.
- **On Diamond Substrate** - DC to 26.5 GHz and up to 300 W. Available in 0402, 0603, 0805, 1310 and 1612 sizes.
- **Waveguide** from 8.2 GHz to 170 GHz, power rating up to 1100 W.

Thermal Management Solutions & EMC Shielding

Automated technology to dispense **Form-in-Place** conductive elastomer gaskets on metal or plastic housings. Gaskets beads can be applied on flanges as narrow as 0.50 mm with pinpoint accuracy in four axes, affording increased PCB size and smaller/lighter chassis.

Thermal Interface Material with thermal conductivity as high as 11.0 W/m-K.

Bespoke Heatsink/Heatpipe Modules designed to maximise heat transfer efficiency whilst minimising volume and weight.

Free of charge thermal modelling is available.

Plastic metallisation process known as Physical Vapour Deposition whereby a metallic layer is deposited on a non-metallic or metallic substrate. Used for Electromagnetic shielding for a cost effective method of shielding lighter weight materials or materials with unique geometries.

Thermal Jumpers Ceramic chips designed to help in thermal management by transferring heat from components in the PCB to an area where it can be safely dissipated. Thermal jumpers are electrically isolated and can be used in both RF and DC applications. Available in BeO, AiN and diamond substrates.

Transistors

GaN HEMT and LDMOS technologies available in DIE, Flange and Pill package types.

Frequency range up to 18 GHz, power rating 900 W depending on device type. Voltage options; 28 V, 40 V and 50 V.

Market sectors include Milcom, Radar, Satcom, Telecom, Datalink & Power Amplifiers.

Melcom Electronics offers a broad range of RF/Microwave and Millimetre components, to discuss further please contact Melcom with your requirements.

Miscellaneous

Melcom also offer the following products:

- Beamformers
- Bias-Tee
- Block Up Converters (BUC)
- Corner Reflectors
- Data Bus Transformers
- Demodulators
- Digital Frequency Discriminators (DFD)
- Downconverters
- Encoders
- Environmental Testing
- Frequency Comparators
- Frequency Converters
- Frequency Discriminators
- I & Q Networks
- Instantaneous Frequency Measurement (IFM)
- Integrated Microwave Assemblies (IMAs)
- Linearisers
- Magnetics
- Modems
- Magic Tees
- Modulators
- Multi-mix Technology
- Potentiometers
- Power Meter
- Receivers
- RF Monitoring Systems
- Rotary Joints
- Satcom Equipment
- Satcom Redundancy Switches
- Satellite Bandwidth
- Satellite VSAT IP Hub
- STALOs
- Synthesisers
- Test Fixtures
- Thin Film Technology
- Transceivers
- Transformers
- TWTAs

Test Equipment

Antenna Pattern Measurement
The system includes a high precision 360° computer-controllable turn table, with control, data collection software, National Instrument GPIB-USB adapter. Employing four commonly used antenna fixtures for wave standard flange mountings from 18 GHz to 1 THz.

Calibration Kits
VNA Calibration kits to 110 GHz.

Coaxial Matched Loads
Covering the frequency range of DC to 67 GHz employing SMA, K and 2.4 mm connectors.
Features include, low VSWR and CW power handling of 0.5 to 2 watt.

Frequency Extenders
These extenders offer a low cost means of producing millimetre wave signal sources while preserving the functionality and features of existing test equipment. The standard offering covers the frequency range of 26.5 to 320 GHz and requires a typical input power of +5 dBm to deliver up to +20 dBm output power.

Noise and Gain Frequency Extenders
Full band noise figure and gain test extenders are offered to extend noise and gain measuring capabilities from 26.5 to 170 GHz. frequency ranges. These extenders are designed to interface with noise and gain test systems that have an input IF of 10 MHz to 1.6 GHz.
The noise figure and gain test extenders include a high-performance, solid-state noise source and a full waveguide down converter.

Noise Sources.
These noise sources implement a high performance diode and proprietary circuit design to offer high ENR with extreme flatness across the entire waveguide bandwidth. The below standard models cover the frequency range of 26.5 to 170 GHz.

Phase Noise Analysers
Fully integrated Real Time Phase Noise Analyser system which utilises a pair high performance internal local oscillators paired with a powerful cross correlation engine.
Key features include:

- Input frequency range - 10 MHz to 40 GHz.
- Real-time data acquisition, fast measurement.
- Measurement offset - 0.1 Hz to 100 MHz.
- Measurement noise floor - < -190 dBc/Hz at 10 kHz.
- User friendly GUI.
- 1RU compact chassis.

Power Measurement

A wide range of RF/Microwave Peak and Average Power Meters operating from 10 KHz to 40 GHz. Typical uses are product design, production, maintenance and system integration. Applications include Semiconductor, Military, Aerospace, Medical and Communications industries.

Portfolio of products include:

- Peak and Average RF Power Meters.
- Real-Time USB Power Sensors.
- RF Voltmeters.
- Modulation Analysers.
- Audio Analysers.

Providing the following key advantages:

- Fastest measurement speed and better time resolution.
- Fastest rise times.
- Cost competitive.
- Wide dynamic range.

Digital Power Meters allows for local and remote power monitoring.

- Simultaneous forward and reverse power monitoring.
- Alarms for VSWR, temperature extremes and forward/reverse power can be set by the user.
- Operating frequency – 1.5 MHz to 2500 MHz in bands.
- Power rating to 100 kW, dependant on model type.
- Optimal accuracy - multi-octave solution within ± 5% of customer lab standard, across a full 40 dB dynamic range.
- Compact and easily transportable.
- No on-site calibration required.

Spectrum Analysers

PC driven Real Time Spectrum Analysers from 9 kHz to 27 GHz and Down-converter to extend capability to cover up to 31 GHz.

Key features:

- Real-time bandwidth – Up to 160 MHz.
- Sweep rate – 28 GHz/s.
- Low cost, small form-factor.

Switching Matrix

RF and Microwave Switching Systems, Matrices, Multi-Couplers and Components for Signal Distribution Systems to 18 GHz.

Synthesisers

Non-PLL based synthesiser single or multi channel, phase coherent platform employs a digital-analog hybrid design, providing excellent phase noise and spurious performance.

Key features include:

- Bandwidth 10 MHz to 40 GHz.
- Phase noise -112 dBc/Hz @ 40 GHz.
- 10 KHz offset.
- Harmonics -40 dBc.
- Spurious -70 dBc.
- Up to 8 phase coherent channels in one 1RU chassis.
- Multiple units can be daisy chained.

Thermal Test Systems
Forced air temperature cycling, thermal chambers & platforms for design characterisation and test. Options include:

- Thermal Chambers - Compressor based or cryogenic cooling from -185 to 500°C.
- Thermal Platforms (Plates) - Compressor based or cryogenic cooling from -100 to 250°C.
- Bench Top Systems - for isolating DUT exposure over temperature from -65 to 175°C.
- Portable Temperature Forcing Systems – with rapid thermal cycling and very low noise over temperature range -90 to 300°C.

VNA
PC based 1,2 and 4 port VNAs to 20 GHz delivering industry-leading dynamic range and sweep speed, with features included as standard: linear/logarithmic sweeps with multiple trace formats, power sweeps, time domain and gating conversion, frequency offset mode, fixture simulation (embedding/de-embedding), 16 independent channels with up to 16 traces each, markers with marker search tools and marker maths, various conversion algorithms, and limit tests for pass/fail criteria.

VNA With Frequency Extenders.
Designed to extend low frequency VNAs to achieve full 2-port, S-parameter testing at higher millimetre wave frequency ranges. These extenders offer a low cost means of performing measurements at millimetre wave frequencies while preserving the functionality and features of industry standard VNAs Offer.

Standard model covers the frequency range of 26.5 to 170 GHz and operate with a RF and LO input power of +10 dBm.