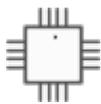




RF COMPONENTS PRODUCT CATALOGUE

Edition 3

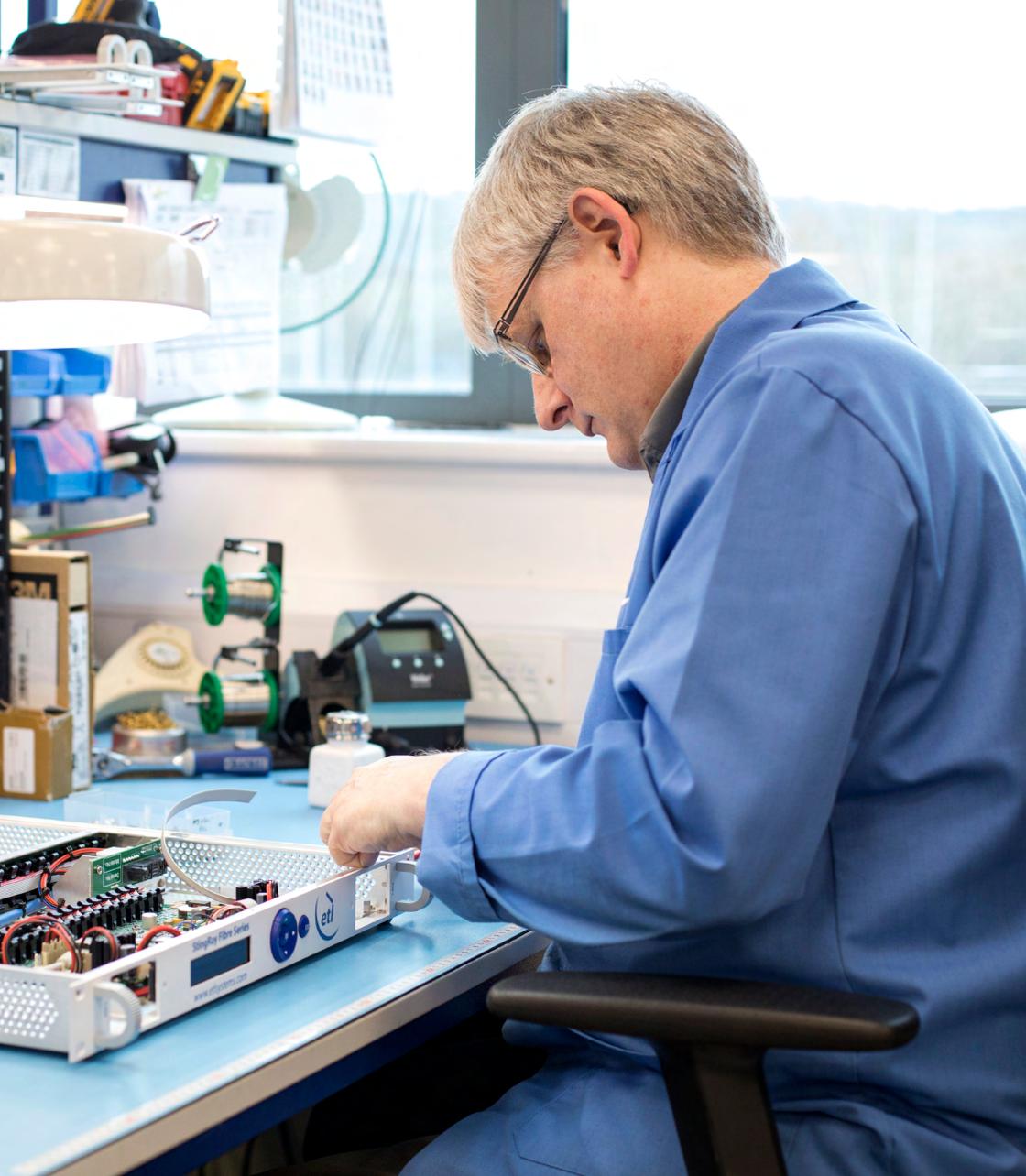


RF Components



Custom Build

New Technologies in RF Distribution



ETL Systems

New technologies in RF distribution

Our Company

ETL Systems design and manufacture Radio Frequency (RF) distribution and satellite communications equipment, where RF performance and reliability matter.

RF Distribution

We manufacture RF components, 19" rack mounted products, instrumentation and measurement equipment and custom build solutions to meet customers' specific RF needs.

The company has been operating since 1984. In 2013, ETL received its third Queens Award for Enterprise, marking impressive growth in International Trade.

Our Facilities

As well as our main office in Hereford (UK), we also have offices in Watford (UK), Washington D.C. (USA) and Dubai (UAE), which support our customers in over 112 countries.

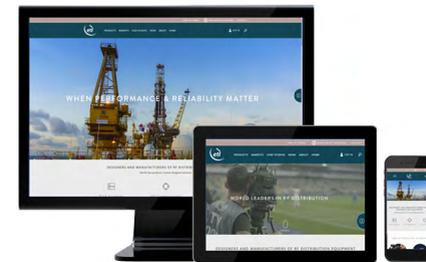
Many of our products are custom built and benefit from our extensive in-house capabilities, including RF testing facilities, software design, automated circuit board assembly, concept design areas, pick and place machinery, as well as machining workshops. This means that design, production and maintenance can be carried out under the umbrella of our ISO 9001 Quality Management System.

Instrumentation & Measurement

In 2019, we successfully acquired Atlantic Microwave, a leading provider of microwave components, quantum cryogenics and satcom test equipment. See page 21.

Buy RF Components online

We've made it quick and easy to place orders online for our RF components. Create an account to buy online, get web-exclusive discounts and download instant quotes.



Designers and Manufacturers of RF distribution
Equipment

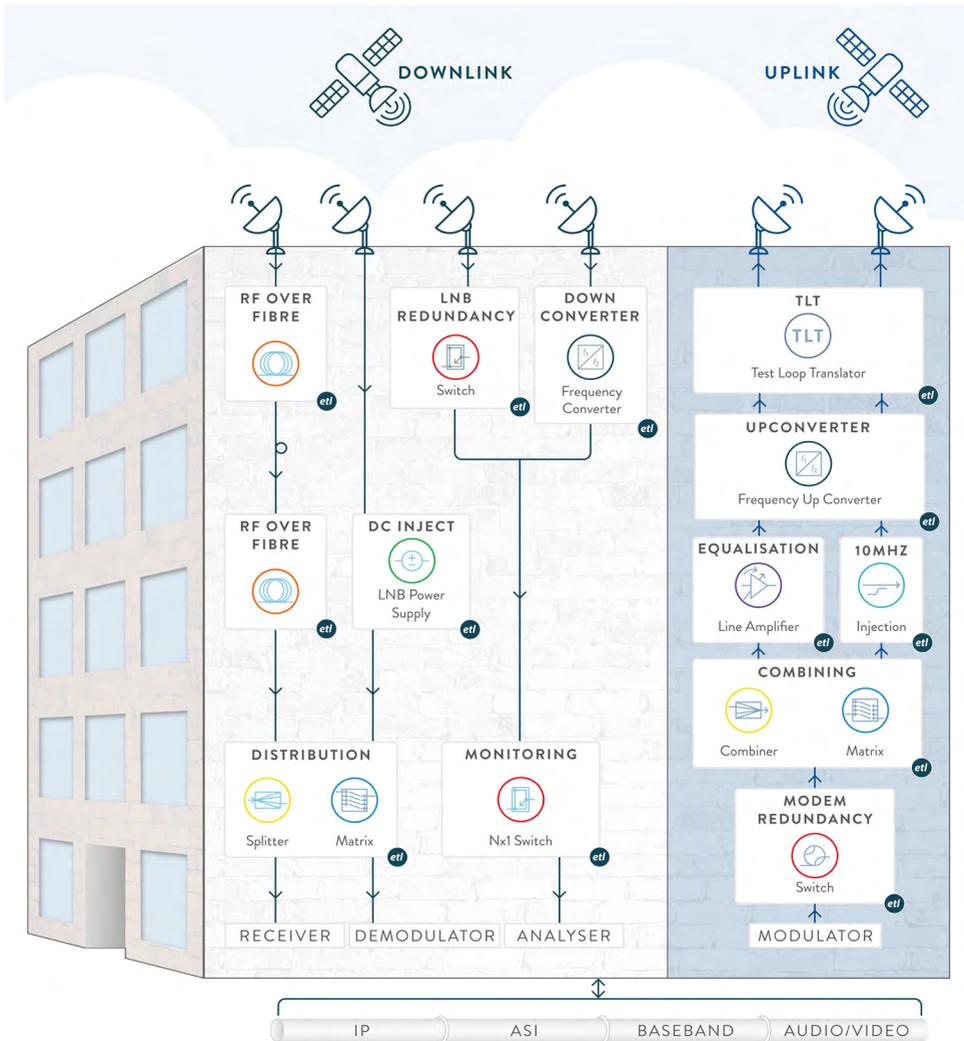
Please visit our website for all up to date ETL news and product information
www.etlsystems.com

Our Products & Their Role in the RF Chain

Our product range covers DC- 40GHz and includes Matrix Routers, Switches, Splitters, Combiners, and Amplifiers, as well as RF Over Fibre. These are used for RF routing, RF distribution, satellite signal handling and redundancy switching, in addition to more esoteric applications.

Our Focus

Reliability, resilience, and RF performance are at the heart of all ETL designs, driving product innovation and development.



Please visit our website for all up to date ETL news and product information
www.etlsystems.com



RF Components Overview

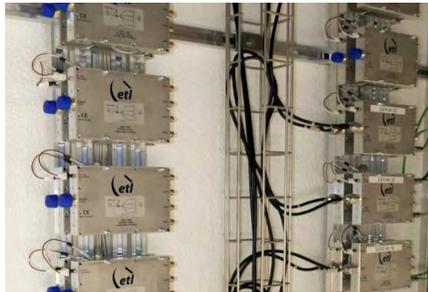
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Why use RF Components?

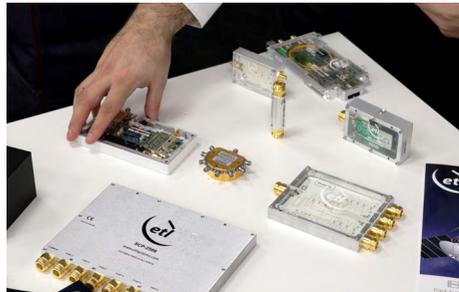
If space is an issue, ETL's wide range of high quality RF Components provide a compact and cost-effective solution which can be customised to meet your specific RF requirements. Designed and manufactured at the ETL factory, our components cover DC to 40GHz for satellite ground stations, teleports and other microwave users.

A key feature of many of ETL's standalone RF components is the ability to pass or block a 10MHz signal or DC voltage through the products, which can be used to power interconnecting components, or pass a stable frequency reference to a LNB or BUC within the system.

Contact components@etlsystems.com for more information.



Custom build RF components for a leading telecom company in Switzerland



A selection of compact RF components including switches, oscillators, amplifiers, splitters, combiners and RF Over Fibre.

BENEFITS OF RF COMPONENTS

- Order quickly via our website with no minimum order charge. Discounts available for bulk ordering.
- Dedicated technical account managers to help with your RF design.
- Huge range of compact & space-saving RF products.
- Covers a broad spectrum of RF frequencies, from DC to 40GHz.
- In-house RF engineering teams which provide custom and bespoke solutions.
- Indoor chassis options & weatherproof IP65 rated outdoor enclosures that can withstand harsh weather conditions.



2-way L-Band Passive Splitter



8-way Ku-Band Passive Splitter/Combiner



GPS Splitter



ODU (Outdoor Unit) Splitter

ETL's active and passive splitters and combiners cover a range of frequencies including IF, L, S, C, Ku and Ka-band and are available in 2, 3, 4, 6, 8 and 16-way capacities. IP rated housing for outdoor applications is also available.

Generic specifications include high linearity, very low amplitude unbalance and stable performance over temperature. Units can be provided with various connectors including either 50Ω or 75Ω impedances in a choice of SMA, N-type, BNC or F-type.

CUSTOM BUILD

Did you know? 40% of ETL's RF component orders are a result of custom build requirements. We have over 35 years' experience of providing solutions such as extra redundancy, frequencies and specific RF performance.

BENEFITS

- Ability to pass/block 10MHz and/or DC.
- Active units can have external or in-line DC bias.
- High linearity on active splitters & combiners.
- Low insertion loss on passive splitters & combiners.
- Very low amplitude unbalance.
- Stable performance over temperature.
- Indoor (IDU) & Outdoor (ODU) housing options.

APPLICATIONS

- Telecom infrastructures
- Satellite systems
- Microwave links
- ASI
- Test & instrumentation
- Military communications
- Radar networks
- GPS & GNSS

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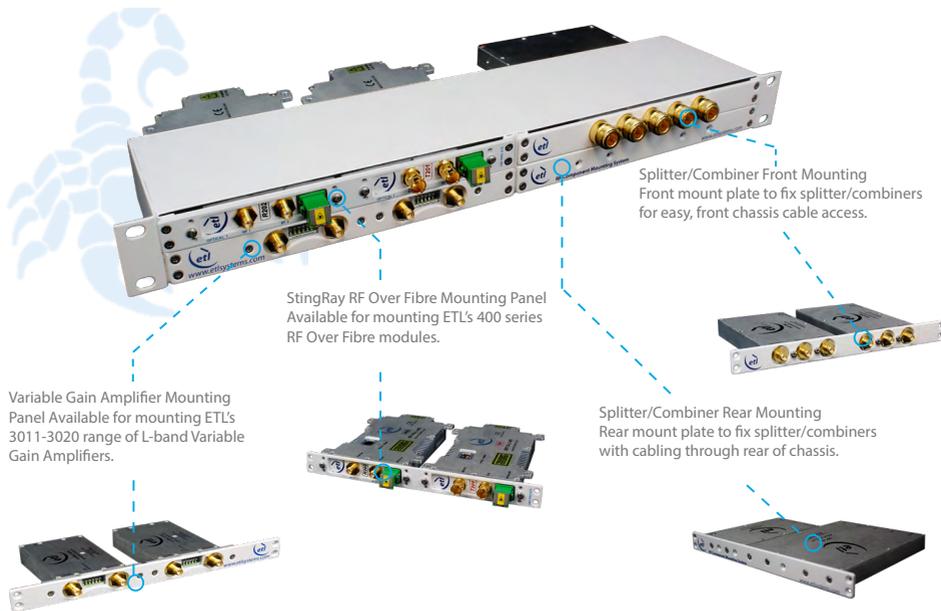
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Scorpion Component Mounting Chassis

The Scorpion component mounting chassis provides a neat solution that is cost effective, compact and easy to use. The Scorpion can be mounted on the front or rear of your 19" rack, and can be provided with either front or rear mounting plates to allow for easy ports access.

The shelf system is compatible with a range of ETL RF components, including Amplifiers, Couplers, Fibre Optics, Splitters and Combiner modules.



BENEFITS

- Compact, space-saving alternative to 19" rack chassis.
- Modular design with multiple module options.
- Easy to use & cost effective.

APPLICATIONS

- Telecom infrastructures
- Satellite systems
- Microwave links
- Test & instrumentation
- Military communications
- Radar networks

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Amplifiers



Inline Tubular Housing
RF Cable Powered Line Amplifier



Inline Rectangular Housing
Variable Gain Amplifier



IP65 ODU
Low Noise Amplifier (LNA)



SMART Ethernet control
Variable Gain Amplifier

ETL amplifiers cover a range of frequencies including IF, L, S, C, X, Ku, Ka, Wideband and Broadband. The units can be supplied with a variety of connectors including SMA, N-type, BNC or F-type, in 50Ω to 75Ω. Options available in the range include:

- Externally Powered Line Amplifiers
- RF Cable Powered Line Amplifiers
- Variable Gain Amplifiers
- AGC (Automatic Gain Control) Amplifiers
- LNA (Low Noise Amplifiers)
- SMART Amplifiers Ethernet/RS485 controlled

Different housings are available, including standard rectangular or a compact tubular design. The tubular design is in-line powered.

BENEFITS

- Variety of housing & connector types.
- Amplifiers cover IF, L, S, C, X, Ku, Wideband & Broadband frequency ranges.
- Easy to use & cost effective.

APPLICATIONS

- Telecom infrastructures
- Satellite systems
- Microwave links
- VSAT
- Test & instrumentation
- Military communications
- Radar networks
- GPS & GNSS

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SCORPION MOUNTING CHASSIS

AMPLIFIERS



Attenuators / Bias Tees / Couplers



Attenuator

Attenuators

ETL Attenuators, including variable rotary attenuators, cover IF, L-band and frequencies up to 40GHz and are available as DC pass or DC block. They also range from 3, 6, 10, 15, 20 or 30 dB.



Bias Tee

Bias Tees

ETL Bias Tees operate over a range of frequencies and are designed to facilitate mounting (onto a base of front/rear panel).

Supplied in EMC shielded non-hermetic housing, with options including traps for 10MHz rejection and high current modules up to 5A and 48V.



Coupler

Couplers

ETL Couplers provide low insertion loss and passive 10dB or 20dB directional proximity coupling, for RF monitoring over L-band frequency range 850-2150MHz.

These devices are designed with a number of options for 10MHz and DC passing/blocking on the through line and/or coupled ports. High current modules, IP65 rated housing and frequencies up to 40GHz are also available.



ODU Coupler

APPLICATIONS

- Telecom infrastructures
- Test & instrumentation
- Satellite systems
- Military communications
- Microwave links
- Radar networks



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DC Blocks / Equalisers / Multiplexers



DC Block

DC Blocks

ETL DC Block units provide reliable DC blocking, which can be used in conjunction with any of ETL's other products.



Equaliser

Equalisers

ETL's L-band series of Equalisers is available with either 50Ω or 75Ω impedances and is specifically tailored to the respective connector types, with fixed positive slope of 1 to 10dB or custom slope options available.

Their main function is to compensate for inherent negative slope versus gain frequency characteristics.



Multiplexer

Multiplexers

ETL's L-band Multiplexers are designed to multiplex L-band, 10MHz and DC in a number of alternative configurations.



ETL's twin head pick and place machine, capable of placing 32,000 components per hour

CUSTOM BUILD

Did you know? 40% of ETL's RF component orders are a result of custom build requirements. We have over 35 years' experience of providing solutions such as extra redundancy, frequencies and specific RF performance.

APPLICATIONS

- Telecom infrastructures
- Test & instrumentation
- Satellite systems
- Military communications
- Microwave links
- Radar networks
- VSAT
- GPS & GNSS

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PASSIVES

PASSIVES

Impedance Transformers / Frequency Converters



Tubular Impedance Transformer



Impedance Transformer



Block Down Converter



Block Up Converter

Impedance Transformers

Passive Impedance Transformers are one of ETL's most popular products and cover an L-band frequency range, of 850 to 2150MHz, an S-band frequency range of 500 to 2500MHz, or broadband DC-3000MHz

These transformers have low insertion loss for converting from 50Ω to 75Ω, and visa versa.

APPLICATIONS

- Telecom infrastructures
- Test & instrumentation
- Satellite systems
- Military communications
- Microwave links
- Radar networks

Frequency Converters

ETL's range of Block Up/Down Converters include fixed LO, external reference and synthesised, covering L, S, C, X, Ku and Ka-band frequencies in compact housings. Available options include:

- 0dB or 10dB Conversion Gain
- External or In Line Bias
- External or Internal 10MHz Reference
- Centrally Located or Off-Set RF Ports

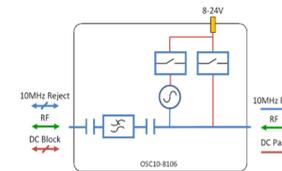
APPLICATIONS

- VSAT
- UAV
- Microwave Links

10MHz Oscillators / Isolators / Circulators



10MHz Oscillator with DIL Switch



10MHz Oscillator Mux Tee diagram



Ku-band Isolator



C-band Circulator

10MHz Oscillators

ETL's 10MHz Oscillators are ovenised, 10MHz reference frequency generators with excellent frequency stability over time and temperature, with built-in harmonic rejection filters. Options include:

- Preset 10MHz Output
- Single Output Port
- Power Levels
- L-band Multiplexing
- Switchable DC
- Externally Powered
- 10MHz Injection (On/Off)
- In-Line Powered
- Settable 10MHz Output Levels

APPLICATIONS

- VSAT
- TVRO Marine
- SNG Broadcast

Isolators and Circulators

ETL's Isolators and Circulators cover the L, S, C, X, Ku and Ka-band frequencies. Units can be provided with 50Ω SMA or N-type connectors. Options include:

- Custom Frequency Bands Available
- Coaxial or Waveguide
- Narrowband or broadband

APPLICATIONS

- Telecom infrastructures
- Test & instrumentation
- Satellite systems
- Microwave links



Power Over Ethernet (POE)
L-band Switch



Pin Diode Absorptive Switch



Miniature Signal Generators from
Atlantic Microwave, a division of
ETL Systems



Typical applications include small
teleports

Switches

ETL's Switches cover a range of frequencies from 0.5 up to 18GHz. Available in SPDT, SP3T, SP4T, SP6T, SP8T models. Options include:

- PIN Diode
- Absorptive and Non Reflective
- Broadband PIN
- Power Over Ethernet (POE)

APPLICATIONS

- Telecom infrastructures
- Test & instrumentation
- Satellite systems
- GPS & GNSS
- Microwave links

Signal Generators

Miniature Signal Generators from Atlantic Microwave provide a compact solution where there is a need to input microwave frequencies from up to 25-3000MHz and 25-6000MHz to L, S, C, Ku, DBS, Ka and Q band.

They provide a USB control interface connection to an unpowered hub with coaxial power input.

APPLICATIONS

- Testing in remote locations
- Antenna sites
- Satellite communications
- Radar networks
- EW systems
- Scientific apparatus

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Stand-Alone AGC Broadband
Receive Fibre Converter



Outdoor GNSS Over
Fibre Module



VSAT ODU
Fibre Module



Outdoor Rated Power Supply
Single and Dual Redundant

StingRay 400 Series

ETL's StingRay 400 series is designed to deliver long distance L-band, Broadband 50-2450MHz or S-band 500-3150MHz over fibre between the satellite dish and control room decoders.

10MHz over fibre and 1PPS over fibre for reference and timing applications are also available.

APPLICATIONS

- Telecom infrastructures
- Test & instrumentation
- Satellite systems
- Microwave links

StingRay 900 Series

ETL's StingRay 900 series offers GPS (GNSS) over fibre units as well as wireless extending for cameras and microphones and VSAT applications, all in a compact IP65-rated weatherproof housing.

Designed to work with ETL's weatherproof outdoor ready Power Supply Units (PSU), available as either single module or dual redundant.

APPLICATIONS

- Telecom infrastructures
- Test & instrumentation
- Satellite systems
- Microwave links
- GPS & GNSS
- VSAT

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Outdoor IP Rated Modules



Fibre ODU



Amplifier ODU



Splitter / Combiner ODU



Coupler ODU



Multiplexer ODU



Attenuator ODU

ETL's range of IP rated outdoor unit (ODU) modules are specifically designed for use where weatherproofing is required, and are IP65 rated as standard.

RF Over Fibre

Stand-alone RF Over Fibre ODU modules available in L-band and Broadband frequencies.

Amplifiers

Amplifier ODU modules available in L-band and IF-band frequencies. Options include variable gain, low noise, DC and 10MHz pass and block.

Splitters / Combiners

ODU modules available in L-band and C-band frequencies. Options include DC and 10MHz pass and block.

Couplers

Available in ODU modules in L-band frequency. Options include DC and 10MHz pass and block.

Multiplexers

Available in L-band frequency. Options include DC and 10MHz pass and block. Housed in an IP67 rated outdoor box.

Attenuators

Available in broadband frequency.

Filters



IF-Band LC Filter



Cavity Bandpass Filter



Waveguide Cavity Filter

ETL offer custom RF and Microwave Filters for 50 Ω or 75 Ω impedances and various connector types.

Options available range from 10MHz to 40GHz, C-band filters for 5G interference, and waveguide cavity bandpass filters to microstrip filters, including suspended substrate technologies, for broadband performances covering frequencies within DC to 20GHz.

IP rated housing for outdoor applications is also available. New designs can be delivered on short time scales and provide great value for money.

Customisable Filters

- Options include:
- Noch filter
 - Band pass
 - Band stop
 - Low pass
 - High pass

Low volume, custom designs also available.



Work with ETL's RF Component team to find a solution to meet your specific requirements.

CUSTOM BUILD

Did you know? 40% of ETL's RF component orders are a result of custom build requirements. We have over 35 years' experience of providing solutions such as extra redundancy, frequencies and specific RF performance.

APPLICATIONS

- Telecom infrastructures
- Test & instrumentation
- Satellite systems
- Microwave links



Waveguide Bend



Flex Twist Waveguide



Waveguide Twist



Waveguide Coupler



ETL's RF Components are designed and manufactured in-house.

ETL's range of precision-made Waveguide components are manufactured to the highest quality standards and use international flange styles and finishes to suit. Choose from complete solutions or complex custom builds. Custom designs are available even at low volumes.

Available in aluminium, brass or copper waveguide with aluminium or brass flanges covering frequency ranges up to 40GHz, & WR-650 to WR-22. Options include:

- Flex / Twist
- Filters
- Twists
- Bends
- Adaptors
- Couplers
- Straights
- Terminations / Loads
- Multi-bends

Waveguide Accessories

ETL offers compatible accessories for waveguide including: gaskets, o-rings, fixing kits, pressure windows and inlet.

With complete, pre-joined waveguide assemblies provided by ETL where required.



Waveguide Pressure Window



Waveguide Straight



Cable Assembly



Outdoor 12V Single ODU PSU



Terminators

ETL accessories include a variety of cable assemblies for molex DC connector options, available on any module with DC solder pin or biasing point. Available as male & female in 1M or 2M lengths.

Power Supplies

ETL offers a range of power supply modules for indoor and outdoor applications with various voltages. Options include:

- Fixed 12V
- Variable 12-24V Selectable Output
- Fixed 48V
- Fixed 12V IP65 Rated Single Module
- Fixed 12V IP65 Rated Dual Redundant

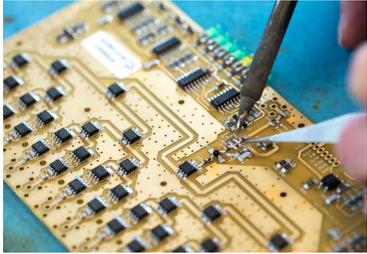
Terminators

ETL's 9800 series of male terminators are suitable for providing load to unused RF connector ports.

Operating frequencies range from DC to 18GHz. Available in 50Ω or 75Ω SMA, N-type, F-type or BNC.



Components are manufactured in ESD anti-static environment at ETL's purpose-built facility.



How do I get a custom RF product?

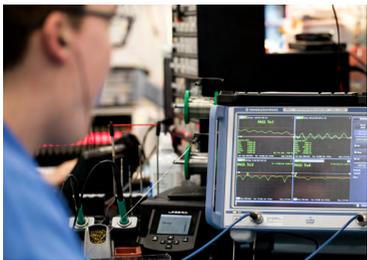
Contact us directly to define the product or technical specifications you require.

Visit our website for more information:
www.etlsystems.com/custom-build



Over 35 years providing custom solutions

Our dedicated RF design and engineering team can work with you to solve your RF signal handling challenges. This is the essence of ETL's RF skillset: providing bespoke solutions such as extra redundancy, specific RF performance or even building a chassis to fit certain architecture.



Did you know...? Over half of our 50 largest orders each year are specifically engineered to meet customer requirements.



L-band to Ku-Band Block Up Converter



IP67 Outdoor Unit (ODU) Amplifier

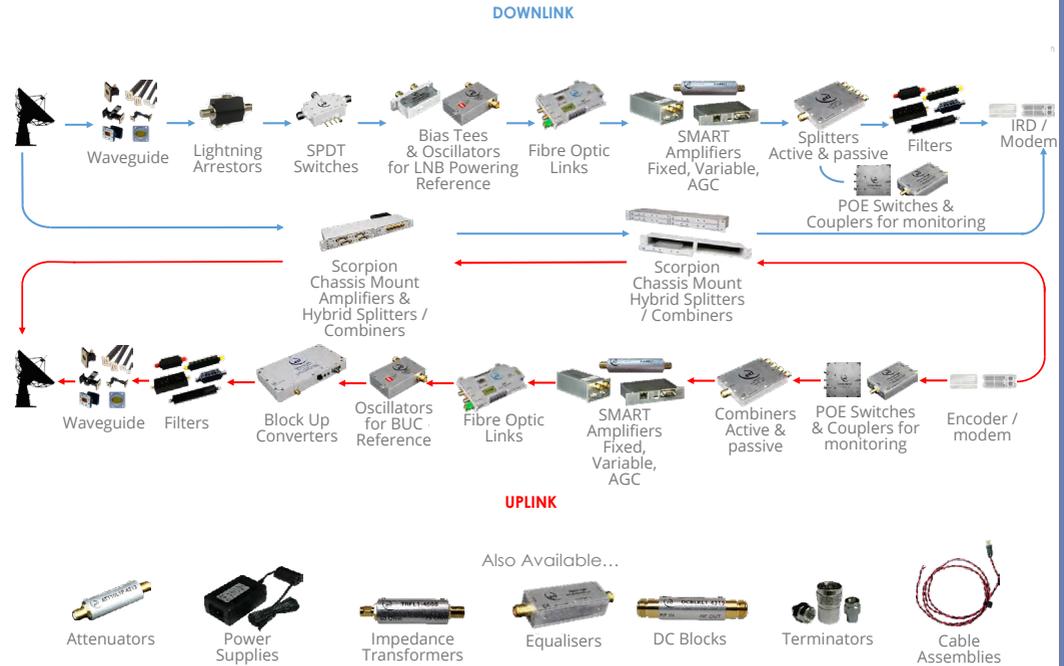


Waveguide Band Pass Ka-band Filter

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19" Rack Systems

As well as stand-alone RF Components, ETL also design and manufacture 19" rack mounted products for satellite ground stations, teleports and other microwave users around the world, covering DC-40GHz.

Products include:

- Switch Matrix / Routers
- Frequency Converters
- Line Amplifiers
- 10MHz Reference Source
- RF Over Fibre
- Splitters/ Dividers
- Power Supplies
- Switches
- Combiners
- Remote Controllers

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Instrumentation & Measurement Products

Atlantic Microwave are a division of ETL Systems manufacturing a range of test, instrumentation and measurement products, including microwave and RF components, satcom RF test equipment and interconnects.

The Atlantic Microwave team has over 30 years' experience producing standard and custom RF equipment, as well as multi-function modules and sub-assemblies.

Atlantic globally serve the **Test & Measurement, Aerospace, Satellite Communications, Broadcaster, Telecommunications, Government & Defence and Scientific Research markets** via representatives and distributors worldwide.

Applications include Radar, SNG testing, Multi-Path RF signal testing, HAPS (High-Altitude Pseudo Satellite) Testing and Cryogenic Temperature and Quantum Computing.



RF Testing and Satellite Simulation

For Satcom RF testing. Product range includes:

- Test Loop Translators
- Satellite Simulators
- Noise & Signal Generators



Quantum Cryogenic Components

For cryogenic & quantum computing. Products for this application include:

- Attenuators
- Cable Assemblies
- Isolators & Circulators



High Frequency RF Components

Product range includes:

- Cryogenic Components
- High Frequency Components
- Cable Assemblies
- Control Components



New Technologies in RF Distribution

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Atlantic Microwave
A Division of ETL Systems



RF Components

▶ AMPLIFY ▶

⊕ SWITCH ⊞

◁ SPLIT ▷

◁ COMBINE ▷

⊖ FIBRE ⊖

www.etlsystems.com/catalogue/rf-components

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