PRODUCT CATALOGUE
Edition 3

Rack Systems
RF Components
Custom Build

New technologies in RF Distribution
ETL Systems

New technologies in RF distribution

Our Company
ETL Systems are world leaders in designing and manufacturing Radio Frequency (RF) distribution and satellite communications equipment, where RF performance and reliability matter.

The company has been operating since 1984, benefitting from new management of Ian Hilditch and Dr Esen Bayar in 2003. In 2013 we received our third Queens Award for Enterprise, marking impressive growth in International Trade.

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

Many of our products are custom built, benefit from in-house 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.

Our Products & Their Role In The RF Chain
Our product range covers DC-40GHz and includes Matrix Routers, Switches, Splitters, Combiners, Amplifiers, as well as RF over Fibre. These are used for RF routing, RF distribution, satellite signal handling and redundancy switching, as well as more esoteric applications.

Atlantic Microwave Ltd
In 2019 we successfully acquired Atlantic Microwave Ltd, a leading provider of microwave components, quantum cryogenics and satellite communication test equipment. Atlantic Microwave manufacture and supply a comprehensive range to the Satcom, Telecommunications, Broadcast, Aerospace, Defence and Scientific Research industries. For contact details & more information visit page 81.

Our Focus
Reliability, Resilience, and RF performance are at the heart of all ETL designs and these drive product innovation and development. Also, adaptability and scale-ability allows future expansion for growing Satcom users.

Please visit our website for all up to date ETL news and product information
www.etlsystems.com
Our Customers
Our RF equipment is used by customers in a wide range of sectors.

Broadcasters
We work with a large array of the world’s leading broadcasters. Our products are used in TVRO applications for playout centres, news gathering and sports events; requiring rapid changing of occasional use services.

Satellite Operators
14 of the top 20 satellite operators use our switch matrices and RF products. Our range of satellite signal handling equipment is used for TT & C, monitoring and traffic management applications, including for new fleets of HTS and Ka Band satellites.

Oil & Gas
Communications on land and off-shore in remote areas for the oil and gas sector are essential to successful operation. Our range of VSAT system products are ideal for this sector, providing reliability and a compact form factor.

Government & Defence
75% of the main NATO governments use our products to protect their citizens. Our large RF router range can be used for uplink and downlink satcoms, including general traffic and data management, and TVRO applications, as well as receive (RX) only satcoms.

Telecoms
Telecoms companies with traditional satcoms for telephony, use our splitters and combiners, as well as LNB service shelves and other equipment. ETL has also provided both straight RF distribution via splitters, and full fan-out switch matrices for more demanding IPTV applications.

Marine
29 out of the top 50 largest cruise ships use our matrices to switch their RF signals. We have a wide range of RF solutions for reliable satellite communications on cruise liners and super yachts, which can be used as part of a VSAT system or for a TVRO system.

Global Sales And Support
We ship to 112 countries, and have a team of experts handling your equipment through customs and shipping. ETL’s worldwide partners provide support to our customers around the world. To see if we have a dedicated partner in your region, please visit the website, www.etlsystems.com/worldwide-partners.

Our Capabilities
Our in-house services and facilities provide a greater range of production capabilities for design, production and maintenance under the ISO 9001 Quality Management System.

In-house RF, PCB, mechanical and software design engineers
Support, FAT, commissioning and system training
Custom build design with modest NRE costs
Ad-hoc on-site support
Fully integrated production and test with two pick and place (SMT) lines
100% testing at sub-assembly and finished product levels
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Matrix Range & Options

ETL has a broad RF switch matrix / router range, providing RF signal distribution for satellite communications. The switch matrix / router products are available in a variety of frequencies including IF-band, L-band and Ka-band and in distributive fan-out or combining fan-in. ETL also has the Ensign fan-in fan-out L-band matrix.

**Did you know...** our range of L-band matrices is more than double that of our nearest competitor, enabling us to offer you the best fit for your requirements.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

**Matrix Range & Options**

<table>
<thead>
<tr>
<th>Matrix Overview</th>
<th>128 x 128 Harrier Matrix / Router</th>
</tr>
</thead>
</table>

ETL’s ultra compact, fully featured 128 x 128 Harrier L-band matrix (router) offers full fan-out / distributive routing in a compact form factor (10U high) with optional integrated LNB powering and fibre inputs, via compatible IO modules. The Harrier’s configurable design offers a range of input and output modules (IO) with features to suit specific RF needs for each satellite feed. The Harrier can be expanded from 8 x 8 up to 128 x 128 in blocks of 8.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.
ETL's Vulcan high density RF matrix (router) offers up to 128 x 128 routing in a 16U high chassis. The dependable Vulcan is a cost-effective fan-out / distributive system.

Designed for use in modern multiple antenna sites, particularly for Government and large commercial teleports. This resilient matrix is a high performance solution to frequent signal routing changes and handling a high volume of downlink feeds.

For our full range, along with up-to-date RF specifications, please visit our website: [www.etlsystems.com](http://www.etlsystems.com).

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**Features**

**Model:** VCN-11, VCN-12

**Frequency**: 850-2550 MHz (L-band), 40-200 MHz (IF)

**Matrix Type**: Distributive (fan-out)

**Capacity**: 128 inputs x 128 outputs

**Hot-Swap**: RF Matrix Cards, CPUs, PSUs & Fans

**Dual Redundant CPUx & PSUx**: As standard

**Redundant Mid-Matrix Paths**: 16U high x 620mm deep x 19" wide

**RF Connectors & Impedances**: 50Ω SMA, 50Ω BNC, 75Ω BNC & 75Ω F-type

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**Benefits & Applications**

- Compact 128 x 128 routing in a 16U chassis.
- Simple ‘plug & go’ installation.
- Further expansion of RF Matrix in steps up to 1024 x 1024.
- Self diagnostics with continuous monitoring & reporting of all active components (e.g. amplifiers).
- Reliability in service with dual redundant PSU & CPU modules & hot-swappable active components.
- Applications include RF content acquisition for TVRO & PTV head-ends, remote controlled unmanned satcom sites & telecoms.
64 x 64 Vortex Matrix / Router

ETL’s Vortex high density RF matrix (router) offers up to 64 x 64 routing in 8U high chassis. The dependable Vortex is a cost-effective fan-out / distributive system.

The Vortex has been designed to provide high resilience for mission-critical applications, with redundant, hot-swap active components. Operating over a range of frequencies including IF-band, L-band & extended L-band.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

BENEFITS & APPLICATIONS
- Compact 64 x 64 routing in an 8U shelf.
- Simple ‘plug & go’ installation.
- Further expansion of RF matrix to 1024 x 1024.
- Self diagnostics with continuous monitoring and reporting of all active components.
- Reliability in service with hot-swappable active components.
- Applications include RF content acquisition for TVRP & IPTV head-ends; remote controlled unmanned satcom sites & broadcasters.

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<table>
<thead>
<tr>
<th>Model</th>
<th>VTX-10</th>
<th>VTX-30</th>
<th>VTX-31</th>
</tr>
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<tr>
<td>Frequency</td>
<td>850-2450 MHz (L-band)</td>
<td>50-200 MHz (IF)</td>
<td>50-2450 MHz (Extended L-band)</td>
</tr>
<tr>
<td>Matrix Type</td>
<td>Distributive (fan-out)</td>
<td></td>
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<tr>
<td>Capacity</td>
<td>64 inputs x 64 outputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dual Redundant CPUs &amp; PSUs</td>
<td>As standard</td>
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<td></td>
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<tr>
<td>Hot-Swap</td>
<td>RF Matrix Cards, CPUs, PSUs &amp; Fans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>8U high x 620mm deep x 19” wide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RF Connectors &amp; Impedances</td>
<td>50Ω SMA</td>
<td>50Ω BNC</td>
<td>75Ω BNC</td>
</tr>
</tbody>
</table>

32 x 32 Enigma Matrix / Router

ETL’s flagship Enigma matrix (router) range offers up to 32 x 32 routing in a 6U chassis. With fan-out / distributive and fan-in / combining options.

The Enigma matrix is designed to improve resilience and minimise the risk of expensive downtime for the satcoms user, with single input and output cards and hot-swap active components.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

BENEFITS & APPLICATIONS
- Inputs & outputs can be expanded in single increments.
- New capacitive touchscreen for ease of use & durability (NGM-1xx).
- Simple ‘plug & go’ installation.
- Expansion of RF Matrix to 512 x 512.
- Self diagnostics with continuous monitoring & reporting of all active components (e.g. amplifiers).
- Reliability in service with hot-swappable active components.
- Applications include live news & sport traffic, satellite communications & signal monitoring of satellite traffic.

FEATURES

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<tr>
<td>Matrix Type*</td>
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<td>C</td>
<td>C</td>
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<td>Capacity</td>
<td>32 inputs x 32 outputs</td>
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<tr>
<td>Dual Redundant CPUs &amp; PSUs</td>
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<tr>
<td>Hot-Swap</td>
<td>RF Matrix Cards, CPUs, PSUs &amp; Fans</td>
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<tr>
<td>Dimensions</td>
<td>6U high x 450mm deep x 19” wide</td>
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</tr>
<tr>
<td>RF Connectors &amp; Impedances</td>
<td>50Ω SMA</td>
<td>50Ω BNC</td>
<td>75Ω BNC</td>
<td>75Ω F-type</td>
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</tbody>
</table>

*Matrix Type defined as D - Distributive or C - Combining

Did you know.. over 1000 Enigma matrices are used in teleporta around the world

New technologies in RF distribution
ETL’s Ensign RF matrix (router) offers up to 32 x 32 routing in a 6U chassis. The resilient Fan-In and Fan-Out (FIFO) L-band matrix allows multiple inputs to be combined. The combined signal can then be routed (distributed) to multiple outputs.

This design provides modem access to multiple uplink and downlink chains. The Ensign can also be used as a Transmit and Receive matrix for smaller teleports or ground stations.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

### BENEFITS & APPLICATIONS
- Switching flexibility with ability to split and combine feeds at the same time.
- Single expansion of input & output cards.
- Further expansion of RF Matrix to 512 x 512.
- Self diagnostics with continuous monitoring & reporting of all active components (e.g. amplifiers).
- Reliability in service with hot-swappable active components.
- Applications include VSAT traffic distribution, RF distribution in cruise liners or luxury yachts, and downlink & uplink applications.

### FEATURES

<table>
<thead>
<tr>
<th>Model</th>
<th>NSN-11</th>
<th>NSN-15</th>
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</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>850-2450 MHz (Extended L-band)</td>
<td>50-2450 MHz (IF to L-band)</td>
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<tr>
<td>Matrix type</td>
<td>Distributive &amp; Combining / Fan-in Fan-out (FIFO)</td>
<td>Distributive (fan-out)</td>
</tr>
<tr>
<td>Capacity</td>
<td>32 inputs x 32 outputs</td>
<td>16 inputs x 32 outputs</td>
</tr>
<tr>
<td>Gain</td>
<td>Fixed</td>
<td>Variable</td>
</tr>
<tr>
<td>Hot-swap</td>
<td>RF Matrix Cards, CPU &amp; PSU's</td>
<td>RF Matrix Cards, CPU &amp; PSU's</td>
</tr>
<tr>
<td>Dimensions</td>
<td>6U high x 450mm deep x 19” wide</td>
<td>3U high x 300mm deep x 19” wide</td>
</tr>
<tr>
<td>RF Connectors &amp; Impedances</td>
<td>50Ω SMA</td>
<td>50Ω SMA</td>
</tr>
</tbody>
</table>

ETL’s Valiant RF matrix (router) offers up to 16 x 32 routing in a compact 3U chassis. The Valiant has a hot-swap configuration, and includes the option of LNB powering.

This RF matrix is ideal for smaller broadcasters, satellite ground stations, cruise liners and luxury yachts, providing the flexibility of RF routing. The matrix can be used for L-band, IF and broadband signals.

Larger systems such as 16 x 48 or 16 x 64 can be built by adding more matrix modules and splitters or combiners.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

### BENEFITS & APPLICATIONS
- Reliability in service with hot-swappable active components.
- Excellent RF signal performance with high isolation, unity gain & excellent flatness across band.
- Broad frequency handling of L-band, IF & Broadband signals.
- Applications include SNG or outside broadcast trucks, marine cruise liners and luxury yachts and satellite ground stations.

### FEATURES

<table>
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<tr>
<th>Model</th>
<th>VLT-50</th>
<th>VLT-10</th>
</tr>
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<tr>
<td>Frequency</td>
<td>50-2450 MHz (IF to L-band)</td>
<td>50-2450 MHz (IF to L-band)</td>
</tr>
<tr>
<td>Matrix Type</td>
<td>Distributive (fan-out)</td>
<td>RF Matrix Cards, CPU &amp; PSU's</td>
</tr>
<tr>
<td>Capacity</td>
<td>16 inputs x 32 outputs</td>
<td>32 inputs x 32 outputs</td>
</tr>
<tr>
<td>Dual Redundant PSUs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>3U high x 300mm deep x 19” wide</td>
<td></td>
</tr>
<tr>
<td>RF Connectors &amp; Impedances</td>
<td>50Ω SMA</td>
<td>50Ω SMA</td>
</tr>
</tbody>
</table>

New technologies in RF distribution
ETL’s compact Victor RF matrix (router) offers up to 16 x 16 routing in a 1U chassis. The matrix series provides fan-out / distributive and fan-in / combining routing options and optional LNB powering.

The matrix can be used for L-band, IF and broadband applications. It can be supplied part populated and expanded via software keys.

It is ideal for TVRO, smaller teleports and satellite ground stations, providing the flexibility of RF routing.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

**FEATURES**

<table>
<thead>
<tr>
<th>Model</th>
<th>VTR-71</th>
<th>VTRC-71</th>
<th>VTR-80</th>
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</thead>
<tbody>
<tr>
<td>Matrix Type</td>
<td>Distributive (fan-out)</td>
<td>Combining (fan-in)</td>
<td>Distributive (fan-out)</td>
</tr>
<tr>
<td>Frequency</td>
<td>50-2000 MHz (L to Extended L-band)</td>
<td></td>
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</tr>
<tr>
<td>Capacity</td>
<td>16 inputs x 16 outputs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dual Redundant PSUs</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable Gain</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNB Powering</td>
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<td></td>
</tr>
<tr>
<td>Software Enabled Expansion</td>
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<tr>
<td>RF Selection</td>
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<tr>
<td>Dimensions</td>
<td>1U high x 550mm deep x 19” wide</td>
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<tr>
<td>RF Connectors &amp; Impedances</td>
<td>50Ω SMA</td>
<td>50Ω BNC</td>
<td>75Ω BNC</td>
</tr>
</tbody>
</table>

Did you know… 29 of the world’s largest 50 cruise ships already use our matrices to switch their RF signals.

**BENEFITS & APPLICATIONS**

- Variable gain on each input, to allow for signal balancing.
- RF detection for signal strength monitoring.
- Reliability in service with dual redundant power supplies.
- Simple plug & go installation.
- Compact 1U chassis, ideal for restricted rack space.
- Applications include marine, SNG trucks & mobile satcoms.

ETL’s Optimus RF matrix (router) offers up to 4 x 64 routing in a 1U chassis. The matrix provides fan-out / distributive routing and combines all the features of a multiswitch and a distribution RF matrix in one chassis.

The Optimus chassis can be configured in a number of sizes depending on the number of modern RF applications. This includes quad 4 x 16, dual 4 x 32 and single 4 x 64.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

**FEATURES**

<table>
<thead>
<tr>
<th>Model</th>
<th>OPT-20</th>
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<tbody>
<tr>
<td>Matrix Type</td>
<td>Distributive (fan-out)</td>
</tr>
<tr>
<td>Frequency</td>
<td>850-2150 MHz (L-band)</td>
</tr>
<tr>
<td>Capacity</td>
<td>Quad 4 x 16 or Dual 4 x 32 or Single 4 x 64</td>
</tr>
<tr>
<td>Dual Redundant PSUs</td>
<td>✓</td>
</tr>
<tr>
<td>Hot-swap</td>
<td>RF Matrix Cards, CPU &amp; PSUs</td>
</tr>
<tr>
<td>LNB Powering &amp; 22kHz tone</td>
<td>3U high x 550mm deep x 19” wide</td>
</tr>
<tr>
<td>RF Connectors &amp; Impedances</td>
<td>50Ω SMA</td>
</tr>
</tbody>
</table>

**BENEFITS & APPLICATIONS**

- Choice of multiswitch or RF matrix mode.
- Configurable as quad 4 x 16, dual 4 x 32 or single 4 x 64 matrices.
- LNB current monitoring.
- Reliability from dual redundant power supplies.
- The risk of failure is minimised with hot-swappable active components.
- Applications include RF content acquisition for TVRO and IPTV headends, bulk distribution of satellite transponders and RF distribution in cruise liners or luxury yachts.
ETL's compact Hawk RF Matrix (router) offers up to 16 x 8 or 8 x 16 routing in a 1U chassis. Designed for the latest LEO constellations the matrix has capacity for two fan-out / distributive or fan-in / combining 8 x 8 matrix cards.

The Hawk can be fitted with any combination of combining (fan-in) or distributive (fan-out) cards depending on application, but is ideally suited for smaller gateways with multiple modems and one or two antennas.

Single 8 x 16 & 16 x 8 configurations are also available upon enquiry. For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

**BENEFITS & APPLICATIONS**

- Flexible module configurations providing routing solutions with dual 8 x 8 distribution modules, dual 8 x 8 combining modules or a combination of distributive and combining modules.
- Resilience with dual redundant power supplies.
- The risk of failure is minimised with hot-swap power supplies & field serviceable matrix modules.
- Applications include LEO satellite constellations, small gateways, uplink and downlink systems.

**FEATURES**

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<tr>
<th>Model</th>
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<tr>
<td>Matrix Type</td>
<td>Distributive (fan-out) or Combining (fan-in)</td>
</tr>
<tr>
<td>Frequency</td>
<td>850-2450 MHz (Extended L-band)</td>
</tr>
<tr>
<td>Capacity</td>
<td>2 matrix cards, each 8 x 8</td>
</tr>
<tr>
<td>Dual Redundant PSUs</td>
<td>√</td>
</tr>
<tr>
<td>Hot-swap</td>
<td>PSUs &amp; CPU</td>
</tr>
<tr>
<td>Field Serviceable</td>
<td>2U Matrix Cards</td>
</tr>
<tr>
<td>Dimensions</td>
<td>1U high x 550mm deep x 19” wide</td>
</tr>
<tr>
<td>RF Connectors &amp; Impedances</td>
<td>50Ω SMA</td>
</tr>
</tbody>
</table>

**Typical applications include small gateways**

Where a large number of satellite feeds is required, ETL’s matrix range can be supplied as a multi-module matrix system, using splitters and combiners.

Matrix system splitters and combiners can add additional requirements to the system such as variable gain, variable slope compensation, LNB powering and RF detection.

**Matrix Expansion**

Satellite ground stations constantly change and expand their satellite feeds.

Matrices can also be easily expanded on the inputs, outputs or both, by adding additional matrix cards/software keys, matrix modules, splitters and/or combiners.
StingRay RF over Fibre Overview

The StingRay RF over Fibre links are used as an alternative to copper coaxial cable. They convert high quality RF to optical signals over single mode fibre from, for example, a satellite antenna to reception equipment room, up to 10 km away, with options for distances up to 500 km.

StingRay RF over Fibre uses single-mode fibre, as the optical performance is improved over long distances and wider bandwidths.

ETL offer a range of ultra-compact indoor and outdoor chassis options which can hold a combination of fibre modules.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

StingRay RF over Fibre Module Overview

ETL’s StingRay RF over Fibre modules are designed to be housed in the indoor and outdoor chassis. The module range is split in to 100 and 200 series.

The 100 series range is ideal for ultra-compact requirements or for smaller applications, such as a single antenna, with up to 16 RF modules housed in a 1U high chassis.

The 200 series range offer twin module options, where 2 separate links are provided on one module or a -20 dB monitoring port for input signal monitoring.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.
Optical Fibre Connectors

ETL offer APC connectors (Angled Physical Contact). APC connectors are used as they provide an extremely reliable way of achieving the high return losses essential in RF systems.

ETL offer 2 optical fibre connector types that offer low loss and create an extremely reliable connection:

- **FC/APC (Angled ferrule connector / fibre connector).**
  - Ferrule diameter: 2.5 mm
  - Coupling type: Screw

- **SC/APC (Angled subscriber connector / square connector / standard connector).**
  - Ferrule diameter: 2.5 mm
  - Coupling type: Snap (push-pull coupling)

**Up To 10km - Short distance fibre**

**100 Series**

Our 100 series range is ideal for ultra-compact requirements or for smaller applications, such as a single antenna, with up to 16 RF modules housed in a 1U high chassis.

**100 Series Module Options**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Fibre TX</td>
<td>Fibre RX</td>
<td>Fibre TX</td>
<td>Fibre RX</td>
<td>Fibre TX</td>
<td>Fibre RX</td>
<td>Fibre TX</td>
<td>Fibre RX</td>
<td>Fibre TX</td>
<td>Fibre RX</td>
<td>Fibre RX</td>
</tr>
<tr>
<td>Frequency</td>
<td>RO-1550 MHz (Standard L-band)</td>
<td>RO-1550 MHz (Standard L-band)</td>
<td>RO-1550 MHz (Standard L-band)</td>
<td>RO-1550 MHz (Standard L-band)</td>
<td>RO-1550 MHz (Standard L-band)</td>
<td>RO-1550 MHz (Standard L-band)</td>
<td>RO-1550 MHz (Standard L-band)</td>
<td>RO-1550 MHz (Standard L-band)</td>
<td>RO-1550 MHz (Standard L-band)</td>
<td>RO-1550 MHz (Standard L-band)</td>
<td>RO-1550 MHz (Standard L-band)</td>
</tr>
<tr>
<td>Gain</td>
<td>AGC</td>
<td>AGC</td>
<td>Fixed</td>
<td>Fixed</td>
<td>ACC</td>
<td>ACC</td>
<td>Fixed</td>
<td>Fixed</td>
<td>Fixed</td>
<td>Fixed &amp; AGC</td>
<td>Fixed &amp; AGC</td>
</tr>
<tr>
<td>LNB DC*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*LNB DC only available with compatible chassis**

**100 Series 10 MHz Reference Module Options**

The 100 series 10 MHz Reference RF over fibre modules can be used to provide a timing reference signal to lock oscillators in both up and down converters (LNB and BUC).

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>Model</th>
<th>SRY-TX-Y-107</th>
<th>SRY-RX-Y-108</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Fibre TX</td>
<td>Fibre RX</td>
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</tr>
<tr>
<td>Frequency</td>
<td>10 MHz</td>
<td>10 MHz</td>
<td></td>
</tr>
</tbody>
</table>

New technologies in RF distribution

UK Office: Telephone: +44(0)1981 259020
Email: info@etlsystems.com

US Office: Telephone: +1 703 657 0411
Email: ussales@etlsystems.com

UAE Office: Telephone: +971 4 428 0918
Email: menasales@etlsystems.com

New technologies in RF distribution
200 Series Module Options

### FEATURES

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
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<th></th>
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<td>Fibre RX</td>
<td>Fibre TX</td>
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<td>Fibre RX</td>
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<tr>
<td><strong>Frequency</strong></td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
</tr>
<tr>
<td><strong>Gain</strong></td>
<td>AGC</td>
<td>AGC</td>
<td>AGC</td>
<td>AGC</td>
<td>AGC</td>
<td>AGC</td>
<td>Fixed</td>
<td>Fixed</td>
<td>Fixed</td>
<td>Fixed</td>
</tr>
<tr>
<td><strong>LNB Powering</strong></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
</tbody>
</table>

### 200 Series Redundancy System Module Options

For enhanced resilience the 200 series StingRay redundancy RF over fibre modules can be configured to provide a 1+1 or 4+1 or 4+2 redundancy systems. Redundancy provides additional resilience for uplink and downlink transmissions over fibre. If one fibre link fails, the signal is automatically switched to the redundant path.

### FEATURES

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Fibre TX</td>
<td>Fibre RX</td>
<td>Fibre TX</td>
<td>Fibre RX</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>10 MHz</td>
<td>10 MHz</td>
<td>10 MHz</td>
<td>10 MHz</td>
</tr>
<tr>
<td><strong>Gain</strong></td>
<td>AGC</td>
<td>AGC</td>
<td>AGC</td>
<td>AGC</td>
</tr>
<tr>
<td><strong>LNB Powering</strong></td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>20dB monitor port</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

### RF OVER FIBRE

New technologies in RF distribution
StingRay
RF over Fibre

200 Series Indoor Chassis Options - High Capacity Chassis

<table>
<thead>
<tr>
<th>Model</th>
<th>SRY-C200-1U</th>
<th>SRY-C201-2U</th>
<th>SRY-C206-2U</th>
<th>SRY-C207-1U</th>
<th>SRY-C209-2U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Up to 8 modules</td>
<td>Up to 16 modules</td>
<td>Up to 16 modules</td>
<td>Up to 4 modules</td>
<td>Up to 12 modules</td>
</tr>
<tr>
<td>Redundancy Options</td>
<td>1+1 redundancy configuration available with modules SRY-L1-QX2I &amp; SRY-L1-QX2K</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LNB DC**

- In
- In

**10 MHz Inject**

- +
- +

**Remote Control & Monitoring**


**Local Control & Monitoring**

Applicable to all models above. Front panel keypad & display.

**Dual Redundant PSUs**

- Yes
- Yes
- Yes
- Yes
- Yes

**Hot-swap**

Applicable to all models above. Power supplies, fibre modules & fan modules.

StingRay
RF over Fibre

200 Series Outdoor Chassis Options

The StingRay RF over Fibre Outdoor unit (ODU) is a robust weatherproof (IP65 rated) enclosure which has been designed to be wall or post mounted close to an antenna.

ETL offers advanced, extended temperature or basic ODU versions as follows:

<table>
<thead>
<tr>
<th>Model</th>
<th>ODU-201</th>
<th>ODU-205</th>
<th>ODU-206</th>
<th>ODU-203</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Up to 10 modules</td>
<td>Up to 10 modules</td>
<td>Up to 10 modules</td>
<td>Up to 4 modules (K0 series only)</td>
</tr>
<tr>
<td>Redundancy Options</td>
<td>1+1 redundancy</td>
<td>1+1 redundancy</td>
<td>1+1 redundancy</td>
<td>-</td>
</tr>
<tr>
<td>Remote Control &amp; Monitoring</td>
<td>RS232/RS485 Serial Port, RJ45 Ethernet Port, SNMP &amp; Web Browser Interface &amp; PC Software (optional)</td>
<td>-</td>
<td>-</td>
<td>Module DI/DO Switches</td>
</tr>
<tr>
<td>Local Control &amp; Monitoring</td>
<td>Optional keypad &amp; display</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>LNB DC</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>10 MHz Inject</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Temperature Rating**

- Standard temperature
- Extended temperature with AC units
- Elevated temperature
- Standard temperature

**Dual Redundant PSUs**

- Yes
- Yes
- Yes
- Yes

**Hot-swap PSU’s**

- Yes
- Yes
- Yes
- Yes

Field serviceable

The StingRay RF over Fibre Outdoor unit (ODU) is a robust weatherproof (IP65 rated) enclosure which has been designed to be wall or post mounted close to an antenna.

ETL offers advanced, extended temperature or basic ODU versions as follows:

<table>
<thead>
<tr>
<th>Model</th>
<th>ODU-201</th>
<th>ODU-205</th>
<th>ODU-206</th>
<th>ODU-203</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
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<td>Up to 10 modules</td>
<td>Up to 10 modules</td>
<td>Up to 4 modules (K0 series only)</td>
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<tr>
<td>Redundancy Options</td>
<td>1+1 redundancy</td>
<td>1+1 redundancy</td>
<td>1+1 redundancy</td>
<td>-</td>
</tr>
<tr>
<td>Remote Control &amp; Monitoring</td>
<td>RS232/RS485 Serial Port, RJ45 Ethernet Port, SNMP &amp; Web Browser Interface &amp; PC Software (optional)</td>
<td>-</td>
<td>-</td>
<td>Module DI/DO Switches</td>
</tr>
<tr>
<td>Local Control &amp; Monitoring</td>
<td>Optional keypad &amp; display</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>LNB DC</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>10 MHz Inject</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Temperature Rating**

- Standard temperature
- Extended temperature with AC units
- Elevated temperature
- Standard temperature

**Dual Redundant PSUs**

- Yes
- Yes
- Yes
- Yes

**Hot-swap PSU’s**

- Yes
- Yes
- Yes
- Yes

Field serviceable

104 x RF over Fibre Links required for an antenna array. ETL supplied StingRay 200 Series fibre chassis with redundant 10MHz distribution housed in a environmentally controlled 42U custom outdoor cabinet.

200 Series Indoor Chassis Options - High Capacity Chassis

<table>
<thead>
<tr>
<th>Model</th>
<th>SRY-C200-1U</th>
<th>SRY-C201-2U</th>
<th>SRY-C206-2U</th>
<th>SRY-C207-1U</th>
<th>SRY-C209-2U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Up to 8 modules</td>
<td>Up to 16 modules</td>
<td>Up to 16 modules</td>
<td>Up to 4 modules</td>
<td>Up to 12 modules</td>
</tr>
<tr>
<td>Redundancy Options</td>
<td>1+1 redundancy configuration available with modules SRY-L1-QX2I &amp; SRY-L1-QX2K</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LNB DC**

- In
- In

**10 MHz Inject**

- +
- +

**Remote Control & Monitoring**


**Local Control & Monitoring**

Applicable to all models above. Front panel keypad & display.

**Dual Redundant PSUs**

- Yes
- Yes
- Yes
- Yes
- Yes

**Hot-swap**

Applicable to all models above. Power supplies, fibre modules & fan modules.

New technologies in RF distribution

Pages 26 and 27
STINGRAY ODU ADDITIONAL OPTIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>ODU-201</th>
<th>ODU-205</th>
<th>ODU-206</th>
<th>ODU-203</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
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</tr>
<tr>
<td>SRY-OPT-23-CPU</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>SRY-OPT-23-ECI</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Floor / Mounting / Locks</td>
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<td></td>
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</tr>
<tr>
<td>SRY-OPT-23-CPU</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>SRY-OPT-24-ECI</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Patch Panels / Cables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SRY-OPT-23-CPU</td>
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<td>✓</td>
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<tr>
<td>SRY-OPT-24-ECI</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
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</tr>
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<td>SRY-OPT-24-ECI</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Model SRY-ODU201 - Outdoor Fibre Chassis

- **IP65 rated weatherproof enclosure** can house up to 10 single or dual RX or TX 200 series modules
- **Fibre management tray & patch panel** for termination of the incoming fibre cable & stack cable storage (O)
- **Remote control & monitoring** via Ethernet port with SNMP & web browser interface.
  - Copper Ethernet interface
  - Single optical Ethernet interface
  - Custom Ethernet interface (O)
- **Remote control & monitoring** via RJ45 Ethernet port with SNMP & web browser interface.
- **Reliability** from dual redundant hot-swap fibre modules, power supplies & CPU
- **Sunshade** to protect from direct sunlight/thermal load (O)
- **Thermostat/Heater** options for operation below 20°C to -60°C & humidity detection (O)

**Cable options:**
- RF patch coax cables (O)
- Optical pigtails (O)
- Ethernet cables (O)
- RF patch up to modules (O)
- Ethernet switch (O)
- EMC cable gland (O)
- RF patch panel allowing incoming RF cables to be connected to the panel & then patch up to modules (O)
- Sunshade to protect from direct sunlight/thermal load (O)
- Thermostat/Heater options for operation below 20°C to -60°C & humidity detection (O)
- Remote control & monitoring via RJ45 Ethernet port with SNMP & web browser interface.
- **LNB powering** (UAV & 22KV) tone (provided on TX modules)
- **Local control & monitoring** via local control unit push buttons & display (O)
- **Reliability** from dual redundant hot-swap fibre modules, power supplies & CPU
- **Sunshade** to protect from direct sunlight/thermal load (O)
- **Thermostat/Heater** options for operation below 20°C to -60°C & humidity detection (O)
- **Remote control & monitoring** via RJ45 Ethernet port with SNMP & web browser interface.
- **LNB powering** (UAV & 22KV) tone (provided on TX modules)
- **Local control & monitoring** via local control unit push buttons & display (O)
- **Reliability** from dual redundant hot-swap fibre modules, power supplies & CPU
- **Sunshade** to protect from direct sunlight/thermal load (O)
- **Thermostat/Heater** options for operation below 20°C to -60°C & humidity detection (O)
- **Remote control & monitoring** via RJ45 Ethernet port with SNMP & web browser interface.
- **LNB powering** (UAV & 22KV) tone (provided on TX modules)
- **Local control & monitoring** via local control unit push buttons & display (O)
- **Reliability** from dual redundant hot-swap fibre modules, power supplies & CPU

**New technologies in RF distribution**

**New technologies in RF distribution**
**StingRay RF over Fibre**

**Model SRY-ODU205 - Extended temperature with AC units**

- IP65 rated weatherproof enclosure can house up to 10 single or dual RX or TX 200 series modules.
- Fibre management tray & patch panel for termination of the incoming fibre cable & slack cable storage.
- Cable options: - RF patch coax cables - Optical patch cables - Ethernet cables - EMC cable gland.
- RF patch panel allowing incoming RF cables to be connected to the panel & then patch up to modules.
- Sunshade to protect from direct sunlight/solar loading.
- Thermostat/Heater options for operation below -40 °C to -60 °C & humidity detection.
- AC units for operation from -40 °C to +65 °C & humidity detection.
- LNB powering 13/18V & 22KHz tone (provided on TX modules).
- Reliability from dual redundant hot-swap fibre modules, power supplies & CPU.
- Remote control & monitoring via local control unit push buttons & display.
- Remote control & monitoring via RJ45 Ethernet port with SNMP & web browser interface.
- Ethernet options: - Copper Ethernet interface - Single optical Ethernet interface - Single optical Ethernet interface (O) - Ethernet switch (O).
- Fibre management tray & patch panel for termination of the incoming fibre cable & slack cable storage.
- Sunshade to protect from direct sunlight/solar loading.
- Thermostat/Heater options for operation below -40 °C to -60 °C & humidity detection.
- LNB powering 13/18V & 22KHz tone (provided on TX modules).
- Reliability from dual redundant hot-swap fibre modules, power supplies & CPU.
- Local control & monitoring via local control unit push buttons & display.
- Remote control & monitoring via RJ45 Ethernet port with SNMP & web browser interface.
- Ethernet options: - Copper Ethernet interface - Single optical Ethernet interface - Single optical Ethernet interface (O) - Ethernet switch (O).
- Alarm to notify if door is left open.
- LNB powering 13/18V & 22KHz tone (provided on TX modules).
- Reliability from dual redundant hot-swap fibre modules, power supplies & CPU.
- Local control & monitoring via local control unit push buttons & display.
- Remote control & monitoring via RJ45 Ethernet port with SNMP & web browser interface.
- Ethernet options: - Copper Ethernet interface - Single optical Ethernet interface - Single optical Ethernet interface (O) - Ethernet switch (O).
- Alarm to notify if door is left open.

(O) = Optional Item

**New technologies in RF distribution**

[Image of StingRay Series RF over Fibre]

**Page 30**
Model SRY-ODU203 - Compact 4-channel outdoor chassis

- **IP65 rated weatherproof enclosure** can house up to 4 single RX or TX 400 series modules
- **LNB powering 13/18 V & 22kHz tone** (provided on TX modules)
- **Reliability** from dual redundant, field serviceable power supplies

- **Remote control & monitoring** via 10/100 Ethernet port with SNMP & web browser interface. Ethernet options:
  - Copper Ethernet interface (O)
  - Single optical Ethernet interface (O)

- **Sunshade** to protect from direct sunlight/solar loading (O)

- **Local control & monitoring** via dip switches located under access panel

**FEATURES**

- **Model**
  - SRY-TR-L1-931
  - SRY-TR-L1-932

- **Type**
  - Outdoor - IP65 rated
  - Indoor

- **Dual Redundant PSUs**
  - Yes
  - Yes

- **LNB / BUC**
  - Yes
  - Yes

- **10 MHz Reference**
  - Yes
  - Yes

- **Ethernet over Fibre**
  - Optional

**Typical applications** include SNG trucks

The StingRay VSAT fibre system provides connectivity between a VSAT antenna to a remote control room, up to 10km away. It is ideal for applications such as SNG trucks, mobile satcoms, flyaway VSAT systems and government and military.

The system consists of one downlink transmission path, with a multiplexed 10 MHz reference signal, and one uplink path with a 10 MHz reference signal. The 10MHz tone is extracted from the uplink input, carried on a separate fibre, for best performance, and injected into both L-band connectors at the ODU.
The StingRay CWDM system transmits RF signals up to 45km in distance. It comprises transmit modules and a multiplexer module to combine up to 8 wavelengths on to a single fibre cable at the transmit end. A demultiplexer module and receive modules are then used at the receive end to split the separate wavelengths.

**CWDM System Module Options**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Up to 16 modules</td>
<td>Up to 12 modules</td>
<td>Up to 12 modules</td>
<td>Up to 12 modules</td>
<td>Up to 12 modules</td>
<td>Up to 12 modules</td>
</tr>
<tr>
<td>Single/Dual IECs</td>
<td>Single</td>
<td>Dual</td>
<td>Single</td>
<td>Dual</td>
<td>Single</td>
<td>Dual</td>
</tr>
<tr>
<td>LNB DC</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10 Mbit/s injection</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Remote control &amp; monitoring</td>
<td>ILM Ethernet Port</td>
<td>SNMP: Web Browser Interface &amp; PC Software (optional)</td>
<td>ILM Ethernet Port</td>
<td>SNMP: Web Browser Interface &amp; PC Software (optional)</td>
<td>Summary alarm port</td>
<td>ILM Ethernet Port</td>
</tr>
<tr>
<td>Local control &amp; monitoring</td>
<td>Applicable to all models above: Front panel keypad &amp; display</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dual Redundant PSUs</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hot swap</td>
<td>Applicable to all models above: Power supplies, fibre modules &amp; fan modules</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**DWDM System Module Options**

<table>
<thead>
<tr>
<th>Model</th>
<th>SRV-OAM-08-645-47</th>
<th>SRV-OAM-08-646-47</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>StingRay Series 100</td>
<td>200</td>
</tr>
<tr>
<td>Frequency</td>
<td>850-2450 MHz (Extended L-band)</td>
<td>50-2450 MHz (Broadband)</td>
</tr>
<tr>
<td>Gain</td>
<td>AGC</td>
<td>Fixed</td>
</tr>
<tr>
<td>LNB DC</td>
<td>P</td>
<td>-</td>
</tr>
<tr>
<td>Enhanced Performance</td>
<td>+10 dBm output power</td>
<td>-</td>
</tr>
</tbody>
</table>

**Up To 45km - Medium Distance Fibre**

**CWDM (Coarse Wavelength Division Multiplexing)**

The StingRay CWDM system transmits RF signals up to 45km in distance. It comprises transmit modules and a multiplexer module to combine up to 8 wavelengths on to a single fibre cable at the transmit end. A demultiplexer module and receive modules are then used at the receive end to split the separate wavelengths.

**Up to 500 km - Long Distance Fibre**

**DWDM (Dense Wavelength Division Multiplexing)**

The StingRay DWDM system transmits RF signals up to 500km in distance, for diverse sites. It comprises transmit modules and a multiplexer module to combine up to 40 wavelengths on to a single fibre cable at the transmit end.

An EDFA (Erbium-Doped Fibre Amplifier) is used to boost the signal at the receive end, to overcome excessive optical loss on long fibre runs. A DCF (Dispersion Compensation Fibre) module may need to be used for distances approaching 100km. A demultiplexer module and receive modules are then used to split the separate wavelengths.
Typical DWDM System
The below schematic shows a typical application for DWDM fibre optic transmission. This is a Ka-band gateway with two remote antenna sites for site diversity. The purpose of this is to have back up transmission and reception sites, in case of adverse weather conditions that can seriously attenuate transmission in the Ka band spectrum.

The system shown uses L-band matrix switches to perform the diversity switching for both transmit and received signals between the two sites. This switching can also be performed in the optical domain, using ETL’s optical switches, that are designed to be housed in the Griffin modular switch chassis.

ETL products available for this system are:
- RF Matrix Switch
- Optical switch e.g. Griffin optical switch
- Optical amplifiers (EDFA)
- Optical multiplexer / demultiplexer
- Optical delay lines
- Optical transmit / receive modules
- Dispersion compensation modules

**CWDM & DWDM 200 Series Indoor Chassis Options**

<table>
<thead>
<tr>
<th>Model</th>
<th>SRY-C200-1U</th>
<th>SRY-C201-2U</th>
<th>SRY-C205-2U</th>
<th>SRY-C206-2U</th>
<th>SRY-C207-1U</th>
<th>SRY-C209-2U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Up to 4 modules</td>
<td>Up to 16 modules</td>
<td>Up to 16 modules</td>
<td>Up to 16 modules</td>
<td>Up to 4 modules</td>
<td>Up to 12 modules</td>
</tr>
<tr>
<td>Redundancy Options</td>
<td>1+1 redundancy configuration available with modules SRY-L1-DIV213 &amp; SRY-L1-SW214</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CWDM & DWDM 200 Series Outdoor Chassis Options**

<table>
<thead>
<tr>
<th>Model</th>
<th>ODU-201</th>
<th>ODU-205</th>
<th>ODU-206</th>
<th>ODU-203</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Up to 10 modules</td>
<td>Up to 10 modules</td>
<td>Up to 10 modules</td>
<td>Up to 4 modules (400 series only)</td>
</tr>
</tbody>
</table>

**New technologies in RF distribution**
Dextra Splitters & Combiners

The Dextra range of RF splitters and combiners has been designed for high resilience RF distribution and combining of uplink and downlink satellite signals.

Active splitters and combiners are available as 4-way (single & dual), 8-way (single & dual) and 16-way.

The range benefits from excellent RF performance and a compact form factor, as well as advanced functionality including; web enabled control and monitoring, LNB powering and an option for dual redundant amplifiers for added resilience.

All models are equipped with a -20 dB SMA monitor port on the front panel.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

BENEFITS & APPLICATIONS

- Highly resilient solution minimising the risk of expensive downtime for the satcoms user.
- Single or Dual configurations available.
- Peace of mind for mission critical applications with extensive remote monitoring facilities.
- Compact 1U 19" chassis.
- Improved RF performance using latest components.
- Applications include Satellite operators, VSAT, teleports and broadcasters. High resilience RF distribution and Ka-band and HTS applications.
**RF Combiners**

### Single Combiners

**FEATURES**

<table>
<thead>
<tr>
<th>Model</th>
<th>C0401SULA-22418</th>
<th>C0801SULA-22420</th>
<th>C1601SULA-22432</th>
<th>C0401S1ULA-22455</th>
<th>C0801S1ULA-22420</th>
<th>C1601S1ULA-22457</th>
<th>C0401S1UIA-22475</th>
<th>C0801S1UIA-22477</th>
<th>C1601S1UIA-22479</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
<td>5-1000 MHz</td>
<td>5-1000 MHz</td>
<td>5-1000 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>4-way</td>
<td>4-way</td>
<td>8-way</td>
<td>8-way</td>
<td>8-way</td>
<td>4-way</td>
<td>8-way</td>
<td>8-way</td>
<td></td>
</tr>
<tr>
<td>DC Pass**</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>LNB Powering</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
<td></td>
</tr>
</tbody>
</table>

*Please use suffixes OPT-R, OPT-D, or OPT-P to the model number to specify the option.*

### Dual Combiners

**FEATURES**

<table>
<thead>
<tr>
<th>Model</th>
<th>C0401DULA-22419</th>
<th>C0801DULA-22421</th>
<th>C0401D1ULA-22456</th>
<th>C0801D1ULA-22458</th>
<th>C0401D1UIA-22476</th>
<th>C0801D1UIA-22478</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
<td>5-1000 MHz</td>
<td>5-1000 MHz</td>
</tr>
<tr>
<td>Size</td>
<td>4-way</td>
<td>8-way</td>
<td>4-way</td>
<td>8-way</td>
<td>4-way</td>
<td>8-way</td>
</tr>
<tr>
<td>Dual Redundant Amplifiers*</td>
<td>Applicable to all models above: Optional</td>
<td>Applicable to all models above: Optional</td>
<td>Applicable to all models above: Optional</td>
<td>Applicable to all models above: Optional</td>
<td>Applicable to all models above: Optional</td>
<td>Applicable to all models above: Optional</td>
</tr>
<tr>
<td>DC Pass**</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
</tr>
</tbody>
</table>

*Please use suffixes OPT-R, OPT-D, or OPT-P to the model number to specify the option.*

**Hybrid Splitters & Combiners**

Dextra hybrid units contain one splitter and one combine module in a compact 1U high 19" rack mountable shelf.

### Single Combiners

**FEATURES**

<table>
<thead>
<tr>
<th>Model</th>
<th>H0104S1ULA-22430</th>
<th>H0108S1ULA-22432</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
</tr>
<tr>
<td>Size</td>
<td>4-way</td>
<td>8-way</td>
</tr>
<tr>
<td>DC Pass**</td>
<td>Optional</td>
<td>Optional</td>
</tr>
<tr>
<td>Remote Control &amp; Monitoring</td>
<td>-20 dB monitor port, RS232/RS485 Serial port, RJ45 Ethernet port, SNMP &amp; Web Browser Interface</td>
<td>-20 dB monitor port, RS232/RS485 Serial port, RJ45 Ethernet port, SNMP &amp; Web Browser Interface</td>
</tr>
</tbody>
</table>

*Please use suffixes OPT-R, OPT-D, or OPT-P to the model number to specify the option.*

### Dual Combiners

**FEATURES**

<table>
<thead>
<tr>
<th>Model</th>
<th>H0104D1ULA-22431</th>
<th>H0108D1ULA-22432</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>850-2450 MHz</td>
<td>850-2450 MHz</td>
</tr>
<tr>
<td>Size</td>
<td>4-way</td>
<td>8-way</td>
</tr>
<tr>
<td>LNB Powering</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>Remote Control &amp; Monitoring</td>
<td>-20 dB monitor port, RS232/RS485 Serial port, RJ45 Ethernet port, SNMP &amp; Web Browser Interface</td>
<td>-20 dB monitor port, RS232/RS485 Serial port, RJ45 Ethernet port, SNMP &amp; Web Browser Interface</td>
</tr>
</tbody>
</table>

*Please use suffixes OPT-R, OPT-D, or OPT-P to the model number to specify the option.*

**SPLITTERS & COMBINERS**

**New technologies in RF distribution**

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**Page 40**

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**Page 41**
ETL’s LD series of RF splitters and combiners are designed to provide affordable L-band (850-2150MHz) splitting and combining with excellent RF performance in a compact 1U high, 19” rack mountable chassis.

The LD range offers 4, 8 and 16-way distribution for basic splitting, combining and integrated LNB powering.

These are designed to provide low cost RF distribution to the budget conscious satcoms customer.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

***FEATURES***

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Frequency</th>
<th>Capacity</th>
<th>LNB Powering</th>
<th>Dual Redundant PSUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>D0104S1ULA-22239</td>
<td>Combiner</td>
<td>850-2150 MHz</td>
<td>4-way</td>
<td>-</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>D0108S1ULA-22245</td>
<td>Combiner</td>
<td>850-2150 MHz</td>
<td>8-way</td>
<td>-</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>D0116S1ULA-22235</td>
<td>Combiner</td>
<td>850-2150 MHz</td>
<td>16-way</td>
<td>-</td>
<td>✓ ✓ ✓</td>
</tr>
</tbody>
</table>

***RF Splitter Cards***

ETL’s Modular System Splitter and Combiner cards offer flexibility and resilience in managing L-band signals. The cards are housed in a 4U Modular System chassis (26128), designed to hold a mixture of hot-swap RF distribution cards, and benefits from hot-swap CPU and dual redundant PSU’s. RF cards are front mounted and allow for easy future expansion as a teleport grows.

See page 65 for more information on the modular system chassis.

***FEATURES***

<table>
<thead>
<tr>
<th>Model</th>
<th>Frequency</th>
<th>Capacity</th>
<th>Variable Slope Compensation</th>
<th>Fixed Gain</th>
<th>Variable Gain</th>
<th>LNB Power &amp; 22KHz tone</th>
</tr>
</thead>
<tbody>
<tr>
<td>26128-DIV404</td>
<td>850-2150 MHz</td>
<td>4-way</td>
<td>✓</td>
<td>✓</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>26128-DIV429</td>
<td>850-2450 MHz</td>
<td>4-way</td>
<td>-</td>
<td>✓</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>26128-DIV450</td>
<td>850-2150 MHz</td>
<td>4-way</td>
<td>-</td>
<td>✓</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>26128-DIV808</td>
<td>850-2150 MHz</td>
<td>8-way</td>
<td>-</td>
<td>✓</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>26128-DIV828</td>
<td>850-2150 MHz</td>
<td>8-way</td>
<td>-</td>
<td>✓</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓ ✓</td>
</tr>
</tbody>
</table>

***RF Combiner Cards***

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.
ETL's Griffin redundancy switch offers total flexibility in managing RF, ASI and optical signals.

The modular design comprises a 1U chassis with 2 switch module slots. Different modules can be fitted dependent on application, and can be switched independently (individual mode) or together (simultaneous mode).

Switching may be triggered by front panel, RF level detection, alarm contacts, pulsed voltage or NMS.

The Griffin switch is suitable for satellite modulator, LNB/down converter and modem redundancy applications.

### BENEFITS & APPLICATIONS
- User flexibility with range of switch modules & 3 operational mode options.
- Resilience from dual redundant power supplies & hot swap modules.
- Compact 1U chassis which can house 2 switch modules.
- Local & remote control & monitoring.
- Applications include satellite modulator, LNB/down converter & modems.

### Chassis Options

<table>
<thead>
<tr>
<th>Model</th>
<th>GRF-C900-1U</th>
<th>GRF-C910-1U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Up to 2 switch modules</td>
<td>Up to 2 switch modules</td>
</tr>
<tr>
<td>Remote Control &amp; Monitoring</td>
<td>Via RS232/RS485, RS45 Ethernet and web browser interface</td>
<td>Switches on receipt of a +24VDC pulse and sends out feedback via dry contact relay closure. Also controlled via RS45 Ethernet and web browser interface.</td>
</tr>
<tr>
<td>Local Control &amp; Monitoring</td>
<td>Applicable to all models above: Via front panel push buttons</td>
<td>Applicable to all models above: Switch module</td>
</tr>
<tr>
<td>Dual Redundant Power</td>
<td>Applicable to all models above: Dual Redundant Power Supply</td>
<td>Applicable to all models above: Dual Redundant Power Supply</td>
</tr>
<tr>
<td>Hot-swap</td>
<td>Applicable to all models above: Switch modules</td>
<td>Applicable to all models above: Switch modules</td>
</tr>
</tbody>
</table>
Redundancy Switching is a critical feature for many satellite ground stations, and ETL have developed a number of redundancy switch products to meet specific customer requirements.

The redundancy switch includes RF detection, to monitor the main and standby signals, and auto switch-over to the standby feed in the event of signal failure.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

**FEATURES**

<table>
<thead>
<tr>
<th>Model</th>
<th>23116</th>
<th>23235</th>
<th>23192</th>
<th>23177</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>850-2150 MHz (L-band)</td>
<td>50-2150 MHz (IF-L-band)</td>
<td>850-2150 MHz (L-band)</td>
<td>DC-6 GHz (SHF)</td>
</tr>
<tr>
<td>Capacity</td>
<td>2 x 1</td>
<td>2 x 1</td>
<td>2 x 1</td>
<td>2 x 2</td>
</tr>
</tbody>
</table>

- RF detection
- Auto switchover from main to standby
- Remote Control & Monitoring: RS232/RS422/485 Serial port, RJ45 Ethernet port, SNMP & Web Browser Interface
- Local Control: Applicable to all models above
- Dual Redundant PSUs

**BENEFITS & APPLICATIONS**

- Auto switching from main to standby feed with RF monitoring in the event of a signal failure.
- Automatic and manual switching modes.
- Reliability in service with dual redundant power supplies.
- Simple protocol for M & C integration.
- Redundancy switches are also available in the modular system chassis (26128) with up to 16 switch modules - see page 65.
- Applications include signal carrier monitoring of satellite feeds, redundancy switching from main & standby satellite dishes.

ETL’s LS series RF monitoring switches are designed principally for satellite signal carrier monitoring applications.

They are available in various sizes and can be linked together for larger number of feeds.

The LS series switch range can be used for signal carrier monitoring of satellite feeds, redundancy switching for main applications, remote controlled unmanned satcom sites and routing signals to multiple IRD’s.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

** FEATURES**

<table>
<thead>
<tr>
<th>Model</th>
<th>23225</th>
<th>23226</th>
<th>23227</th>
<th>23228</th>
<th>23229</th>
<th>23230</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>50-2150 MHz (IF - Extended L-band)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch Type</td>
<td>Solid state</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity</td>
<td>8 x 1</td>
<td>16 x 1</td>
<td>32 x 1</td>
<td>1 x 8</td>
<td>1 x 16</td>
<td>1 x 32</td>
</tr>
<tr>
<td>Remote Control &amp; Monitoring</td>
<td>RS232 or RS422/485 Serial port, Ethernet (100BASE-TX) on rear panel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Control</td>
<td>Applicable to all models above: LCD &amp; push buttons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dual Redundant PSUs</td>
<td>✓ ✓ ✓ ✓ ✓ ✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BENEFITS & APPLICATIONS**

- Cost effective solution for carrier monitoring applications.
- Fast switching time and long life from solid state switch design.
- Resilience in service with dual redundant power supplies.
- Can be expanded to create larger switch systems.
- Applications include routing signal to multiple IRDs & redundancy switching for main applications.
ETL’s SHF Switch range operates between DC to 40GHz and are designed for multiple satcom applications, including carrier monitoring and system redundancy. Different configurations and designs can be easily adapted according to the customers’ requirements.

Choose between either 1U, 2U or 3U solid state or coaxial relay switches, which both benefit from long life and excellent RF performance. Each switch is also designed to offer a variety of local and remote control features.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

**SHF Switch**

**FEATURES**

- High operating frequency range (up to 40 GHz)
- Coaxial relay or PIN diode based switch variants
- Fast switching speeds using solid state switch design
- Resilience in service with dual redundant power supplies
- Reliable designs for RF signal redundancy
- Applications include signal carrier monitoring of satellite feeds, RF switching for yachts, ships & other marine applications & redundancy switching for upconverters & downconverters.

**BENEFITS & APPLICATIONS**

- Configurable chassis which can hold a mixture of RF cards
- Auto switchover with RF level detection
- Optimise RF signals with fixed gain, slope & LNB powering
- Resilience in service with hot-swappable active components
- Applications include satellite operators, VSAT, teleports & broadcasters.

**Modular System Switch Cards**

ETL's Modular System Redundancy Switch card offers flexibility and resilience in managing multiple L-band signals. Each switch card is designed to automatically switch between a main and a standby satellite antenna if signal failure is detected.

The cards are housed in a 4U Modular System chassis (26128), which is designed to hold a mixture of hot-swap RF distribution cards, and benefits from hot-swap CPU and dual redundant PSUs. The RF cards are front mounted and allow for easy future expansion as a teleport grows.

For more information about the modular system chassis, visit page 65 and for our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

**FEATURES**

- **Model:** 2428 - SW103
- **Frequency:** 850-2150 MHz (L-band)
- **Switch Type:** Solid state
- **Capacity:** 2 x 1 switch module, 16 modules (in chassis)
- **Fixed Gain**
- **RF Detection**
- **LNB Powering & 22kHz tone**

The specifications above are based on 50Ω SMA connectors. Specifications may vary for other impedances and connector types.

**BENEFITS & APPLICATIONS**

- New technologies in RF distribution
Alto Amplifiers
Overview

The Alto series of amplifiers provide excellent RF performance in a modular design with a variety of chassis and modules which can be configured to suit a range of applications.

The Alto range is split into 4 categories:

Manual control amplifiers
Local control only, with dip switches for gain control.

SMART Amplifiers
Local and remote control amplifier system with variable gain and variable slope compensation.

Automatic Gain Control (AGC) Amplifiers
Local and remote control, when constant signals into an RF chain are required despite varying received levels.

Redundant Amplifiers
Local and remote control amplifier system with variable gain and variable slope compensation. Designed for more demanding applications where extra resilience is required.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

ALTO AMPLIFIER

FEATURES - CHASSIS

<table>
<thead>
<tr>
<th>Model</th>
<th>ALT-C100-1U</th>
<th>ALT-C101-2U</th>
<th>ALT-C102-2U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>850-2150 MHz (L-band)</td>
<td>850-2150 MHz (L-band)</td>
<td>3000-4200 MHz (C-band)</td>
</tr>
<tr>
<td>Power Supplies</td>
<td>Dual Redundant</td>
<td>Dual Redundant</td>
<td>Dual Redundant</td>
</tr>
<tr>
<td>Control &amp; monitoring</td>
<td>Local only</td>
<td>Local only</td>
<td>Local only</td>
</tr>
<tr>
<td>LNB Power</td>
<td>-</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Dimensions</td>
<td>1U high x 350mm deep x 19&quot; wide</td>
<td>2U high x 450mm deep x 19&quot; wide</td>
<td>2U high x 450mm deep x 19&quot; wide</td>
</tr>
</tbody>
</table>

BENEFITS & APPLICATIONS

- Flexible amplifier chassis, which can house different amplifier modules, allowing control of a variety of satellite feeds.
- Resilience in service from hot-swappable amplifier modules.
- Compact chassis with various control options.
- Reliability from dual redundant power supplies.
- Redundant amplifier design options for 24x7 operations.
- Latest components provide excellent RF performance.
- Applications include compensation for passive splitters/ combiners and cable loss and general satcoms.

Manual Control Amplifiers
Local control amplifiers with dip switches for gain control.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

FEATURES - AMPLIFIER MODULES

<table>
<thead>
<tr>
<th>Model</th>
<th>ALT-M-L1-001</th>
<th>ALT-M-L1-003</th>
<th>ALT-M-C1-007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>850-2150 MHz (L-band)</td>
<td>850-2150 MHz (L-band)</td>
<td>3000-4200 MHz (C-band)</td>
</tr>
<tr>
<td>Variable Gain</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Slope Compensation</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>LNB Power</td>
<td>-</td>
<td>-</td>
<td>✓</td>
</tr>
</tbody>
</table>

BENEFITS & APPLICATIONS

- Compact chassis options which can house 8 to 16 amplifier modules.
- Local control & monitoring via module DIP switches & front panel LEDs.
- Resilience from dual redundant power supplies & hot- swap amplifier modules.
- Applications include redundancy teleport sites with main & standby dishes, cable loss offset for long runs & signal loss offset from passive RF splitters or combiners.
SMART Ethernet Remote Control & Monitoring

Local and remote control amplifiers with variable gain and variable slope.

Automatic Gain Control (AGC) Amplifiers

AGC amplifiers are used where an output level is required at a constant. The AGC amplifier circuit will adjust the gain to ensure the output signal level remains at a set constant.

FEATURES - CHASSIS

<table>
<thead>
<tr>
<th>Chassis</th>
<th>Model</th>
<th>Frequency</th>
<th>Power Supplies</th>
<th>Control &amp; Monitoring</th>
<th>LNB Power</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alt-C201-2U</td>
<td>ALT-C201-2U</td>
<td>Up to 16 modules (4 modules for Ku-type)</td>
<td>Dual Redundant</td>
<td>Dual &amp; Local</td>
<td>LNB Power</td>
<td>2U high x 450mm deep x 19” wide</td>
</tr>
<tr>
<td>Alt-C202-2U</td>
<td>ALT-C203-2U</td>
<td>Up to 16 modules (4 modules for Ku-type)</td>
<td>Dual Redundant</td>
<td>Dual &amp; Local</td>
<td>LNB Power</td>
<td>2U high x 450mm deep x 19” wide</td>
</tr>
<tr>
<td>Alt-C204-2U</td>
<td>ALT-C205-2U</td>
<td>Up to 16 modules (4 modules for Ku-type)</td>
<td>Dual Redundant</td>
<td>Dual &amp; Local</td>
<td>LNB Power</td>
<td>2U high x 450mm deep x 19” wide</td>
</tr>
</tbody>
</table>

FEATURES - AMPLIFIER MODULES

<table>
<thead>
<tr>
<th>Module</th>
<th>Frequency</th>
<th>Variable Gain</th>
<th>Slope Compensation</th>
<th>LNB Power</th>
<th>High Linearity</th>
<th>DC &amp; 10 MHz Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT-A-B2-009-xxxx</td>
<td>950-2550 MHz (L-band)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>ALT-A-L1-011-xxxx</td>
<td>850-2150 MHz (L-band)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>ALT-A-L1-031-xxxx</td>
<td>850-2150 MHz (L-band)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

New technologies in RF distribution

UK Office: Telephone +44(0)1981 259020 Email: info@etlsystems.com

US Office: Telephone +1 703 657 0411 Email: ussales@etlsystems.com

UAE Office: Telephone +971 4 428 0918 Email: menasales@etlsystems.com
Redundant Amplifiers

Designed for demanding applications, the redundant range benefits from dual redundant amplifiers, with amplifier current monitoring. This normally triggers automatic switchover from a main to standby amplifier. The standby amplifier can be on hot or cold standby. In general, these redundant amplifiers can be hot swapped so that a failed amplifier module can be changed out during a planned maintenance break.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.
1+1 Redundancy without standby output

Front and rear view Model ALT-C320-IU

Rear view Model ALT-C402-2U rear view

### FEATURES - CHASSIS

<table>
<thead>
<tr>
<th>Model</th>
<th>ALT-C320-IU-x4S</th>
<th>ALT-C402-2U-x5S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>Module dependent</td>
<td>Module dependent</td>
</tr>
<tr>
<td>Capacity</td>
<td>2 modules</td>
<td>3 outputs &amp; 3 outputs</td>
</tr>
<tr>
<td>Gain Range Max</td>
<td>15dB</td>
<td>15dB</td>
</tr>
<tr>
<td>Noise Figure Min</td>
<td>4.5dB</td>
<td>4.5dB</td>
</tr>
<tr>
<td>Noise Figure Max</td>
<td>6.5dB</td>
<td>6.5dB</td>
</tr>
</tbody>
</table>

### COMPATIBLE MODULE FEATURES IN CHASSIS ALT-C320-IU-x4S

<table>
<thead>
<tr>
<th>Model</th>
<th>ALT-R-KB-200</th>
<th>ALT-R-KD-200</th>
<th>ALT-R-KB-300</th>
<th>ALT-R-KB-200</th>
<th>ALT-R-KB-300</th>
<th>ALT-R-KB-400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Gain</td>
<td>21dB</td>
<td>21dB</td>
<td>22dB</td>
<td>22dB</td>
<td>22dB</td>
<td>21dB</td>
</tr>
<tr>
<td>Noise Figure Min</td>
<td>5dB</td>
<td>5dB</td>
<td>5dB</td>
<td>5dB</td>
<td>5dB</td>
<td>5dB</td>
</tr>
<tr>
<td>Noise Figure Max</td>
<td>6.5dB</td>
<td>6.5dB</td>
<td>6.5dB</td>
<td>6.5dB</td>
<td>6.5dB</td>
<td>6.5dB</td>
</tr>
</tbody>
</table>

### COMPATIBLE MODULE FEATURES IN CHASSIS ALT-C402-2U-x5S

<table>
<thead>
<tr>
<th>Model</th>
<th>ALT-R-LI-006</th>
<th>ALT-R-LI-012</th>
<th>ALT-R-LI-019</th>
<th>ALT-R-LI-032</th>
<th>ALT-R-LI-038</th>
<th>ALT-R-LI-079</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>L-band (850-2150 MHz)</td>
<td>L-band (850-2150 MHz)</td>
<td>L-band (850-2150 MHz)</td>
<td>L-band (850-2150 MHz)</td>
<td>L-band (850-2150 MHz)</td>
<td>L-band (850-2150 MHz)</td>
</tr>
<tr>
<td>Gain Range Min</td>
<td>10dB</td>
<td>10dB</td>
<td>10dB</td>
<td>10dB</td>
<td>10dB</td>
<td>10dB</td>
</tr>
<tr>
<td>Gain Range Max</td>
<td>35dB</td>
<td>35dB</td>
<td>35dB</td>
<td>35dB</td>
<td>35dB</td>
<td>35dB</td>
</tr>
<tr>
<td>Stage Compensation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>High Linearity</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tbody>
</table>

2+1 Redundancy

Front & rear view Model ALT-25104

### FEATURES - CHASSIS

<table>
<thead>
<tr>
<th>Model</th>
<th>ALT-25104</th>
<th>ALT-25702</th>
<th>ALT-25703</th>
<th>ALT-C303-2U</th>
<th>ALT-C315-2U</th>
<th>ALT-C400-2U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>L-band (850-2150 MHz)</td>
<td>L-band (850-2150 MHz)</td>
<td>L-band (850-2150 MHz)</td>
<td>Module dependent</td>
<td>Module dependent</td>
<td>Module dependent</td>
</tr>
<tr>
<td>Capacity</td>
<td>3 inputs &amp; 3 outputs</td>
<td>4 RF monitor points</td>
<td>3 inputs &amp; 3 outputs</td>
<td>3 modules</td>
<td>2+1 redundancy</td>
<td>3 modules</td>
</tr>
<tr>
<td>Gain Range Max</td>
<td>40dB</td>
<td>40dB</td>
<td>40dB</td>
<td>40dB</td>
<td>40dB</td>
<td>40dB</td>
</tr>
</tbody>
</table>

### COMPATIBLE MODULE FEATURES IN CHASSIS ALT-C303-2U-x5S

<table>
<thead>
<tr>
<th>Model</th>
<th>ALT-R-KB-200</th>
<th>ALT-R-KD-200</th>
<th>ALT-R-KB-300</th>
<th>ALT-R-KB-200</th>
<th>ALT-R-KB-300</th>
<th>ALT-R-KB-400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Gain</td>
<td>21dB</td>
<td>21dB</td>
<td>22dB</td>
<td>22dB</td>
<td>22dB</td>
<td>21dB</td>
</tr>
<tr>
<td>Noise Figure Min</td>
<td>5dB</td>
<td>5dB</td>
<td>5dB</td>
<td>5dB</td>
<td>5dB</td>
<td>5dB</td>
</tr>
<tr>
<td>Noise Figure Max</td>
<td>6.5dB</td>
<td>6.5dB</td>
<td>6.5dB</td>
<td>6.5dB</td>
<td>6.5dB</td>
<td>6.5dB</td>
</tr>
</tbody>
</table>

### COMPATIBLE MODULE FEATURES IN CHASSIS ALT-C315-2U-x5S

<table>
<thead>
<tr>
<th>Model</th>
<th>ALT-R-LI-006</th>
<th>ALT-R-LI-012</th>
<th>ALT-R-LI-019</th>
<th>ALT-R-LI-032</th>
<th>ALT-R-LI-038</th>
<th>ALT-R-LI-079</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>L-band (850-2150 MHz)</td>
<td>L-band (850-2150 MHz)</td>
<td>L-band (850-2150 MHz)</td>
<td>L-band (850-2150 MHz)</td>
<td>L-band (850-2150 MHz)</td>
<td>L-band (850-2150 MHz)</td>
</tr>
<tr>
<td>Gain Range Min</td>
<td>15dB</td>
<td>15dB</td>
<td>15dB</td>
<td>15dB</td>
<td>15dB</td>
<td>15dB</td>
</tr>
<tr>
<td>Gain Range Max</td>
<td>30dB</td>
<td>30dB</td>
<td>30dB</td>
<td>30dB</td>
<td>30dB</td>
<td>30dB</td>
</tr>
<tr>
<td>Stage Compensation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>High Linearity</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

The specifications above are based on 50Ω impedances. Specifications may vary for other impedances and connector types.

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UK Office: +44(0)1981 259020
Email: info@etlsystems.com

UK Office: +44(0)1981 259020
Email: ussales@etlsystems.com

UK Office: +971 4 428 0918
Email: menasales@etlsystems.com

New technologies in RF distribution

Local & remote: 10/100 Base T. TCP/IP, SNMP & Web Browser Interface, 9 pin D-type port for dry contact alarms, RS485 & RS232.

Dimensions 1U high x 450mm deep x 19” wide 2U high x 450mm deep x 19” wide

Dimensions 2U high x 450mm deep x 19” wide 2U high x 450mm deep x 19” wide

Dimensions 1U high x 450mm deep x 19” wide 1U high x 450mm deep x 19” wide

Dimensions 2U high x 350mm deep x 19” wide 2U high x 450mm deep x 19” wide

Dimensions 2U high x 350mm deep x 19” wide 2U high x 450mm deep x 19” wide

Dimensions 2U high x 450mm deep x 19” wide 2U high x 450mm deep x 19” wide

Dimensions 2U high x 450mm deep x 19” wide 2U high x 450mm deep x 19” wide
2+1 Redundancy

| Model       | L1-006 L1-021 L1-022 L1-023 L1-024 L1-041 L1-044 L1-047 L1-048 |
|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Frequency   | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) |
| Gain Range Min | 1dB  | 1.5dB  | 1.5dB  | 1.5dB  | 1.5dB  | 1.5dB  | 1.5dB  | 1.5dB  | 1.5dB  |
| Slope Compensation | ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ |
| High Linearity | ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ |

| Model       | L1-006 L1-021 L1-022 L1-023 L1-024 L1-041 L1-044 L1-047 L1-048 |
|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Frequency   | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) | L-band  (850-2150 MHz) |
| Gain Range Min | 1dB  | -2dB  | 9dB  | 9dB  | 9dB  | 9dB  | 9dB  | 9dB  | 9dB  |
| Gain Range Max | 32dB | 22dB  | 40dB  | 40dB  | 40dB  | 40dB  | 40dB  | 40dB  | 40dB  |
| Slope Compensation | ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ |
| High Linearity | ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ |

4+2 Redundancy

| Model       | ALT-R-KB-200 ALT-R-KB-300 ALT-R-KB-400 ALT-R-KB-500 ALT-R-KB-600 |
|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Frequency   | Wideband  (2.0-18 GHz) | Wideband  (2.0-12 GHz) | Wideband  (2.0-12 GHz) | Wideband  (2.0-12 GHz) | Wideband  (2.0-12 GHz) |
| Fixed Gain | 25dB | 24dB | 22dB | 22dB | 22dB |
| Noise Gain Min | 5dB  | 5dB  | 5dB  | 5dB  | 5dB  |
| Noise Gain Max | 7dB  | 7dB  | 6.5dB | 6.5dB | 6.5dB |

ALTO AMPLIFIERS
Redundant Designs

UK Office: Telephone: +44(0)1981 259020 Email: info@etlsystems.com

UAE Office: Email: menasales@etlsystems.com Telephone: +971 4 428 0918

US Office: Telephone: +1 703 657 0411 Email: ussales@etlsystems.com

New technologies in RF distribution

New technologies in RF distribution
### Dual 1+1 Redundancy

**FEATURES - CHASSIS**

- **Model**: ALT-310-1U-x5x5
- **Model**: ALT-310-1U-x7x7

**Frequency**

- Module dependent

**Capacity**

- 4 modules Dual Redundancy

**Connector Type**

- 50 ohm BNC / SMA / F-type
- 75 ohm BNC / F-type

**Power Supplies**

- Dual Redundant, hot-swap

**Control & Monitoring**

- Local & remote:
  - RJ45 Ethernet Port, 10BaseT/100BaseTx, ETL TCP/IP Protocol, SNMP & Web Browser Interface

**Dimensions**

- 1U high x 450mm deep x 19” wide

**COMPATIBLE MODULE FEATURES IN CHASSIS ALT-C310-1U-x5x5**

- Model: ALT-R-L1-006
- Model: ALT-R-L1-020
- Model: ALT-R-L1-008
- Model: ALT-R-L1-078
- Model: ALT-R-L1-012
- Model: ALT-R-L1-023
- Model: ALT-R-L1-032
- Model: ALT-R-L1-038
- Model: ALT-R-L1-044
- Model: ALT-R-L1-048
- Model: ALT-R-L1-075
- Model: ALT-R-L1-087
- Model: ALT-R-L1-097

**Frequency**

- L-band (850-2150 MHz)
- If-band (50-200 MHz)

**Gain Range Min**

- 2dB
- 5dB
- 10dB
- 10dB
- 10dB
- 10dB
- 15dB
- 15dB
- 15dB
- 15dB
- 15dB
- 15dB
- 15dB

**Gain Range Max**

- 32dB
- 22dB
- 40dB
- 40dB
- 40dB
- 40dB
- 40dB
- 40dB
- 40dB
- 40dB
- 40dB
- 40dB
- 40dB

**Slope Compensation**

- P
- P
- P
- P
- P
- P
- P
- P
- P
- P
- P
- P

**High Linearity**

- -
- -
- -
- -
- -
- -
- -
- -
- -
- -
- -

### Quad 4+1 Redundancy

**FEATURES - CHASSIS**

- **Model**: ALT-C305-SU-x5x5
- **Model**: ALT-C306-SU-x5x7
- **Model**: ALT-C307-SU-x7x7

**Impedances & RF Connectors**

- 50Ω SMA | 50Ω BNC
- 50Ω SMA | 50Ω BNC | 75Ω BNC | 75Ω F-type
- 75Ω BNC | 75Ω F-type

**Frequency**

- Applicable to all models above: L-band (800-2500 MHz)

**Gain Range Min**

- 0dB
- 10dB
- 10dB
- 10dB
- 10dB
- 10dB
- 10dB
- 10dB
- 10dB
- 10dB
- 10dB

**Gain Range Max**

- 32dB
- 22dB
- 40dB
- 40dB
- 40dB
- 40dB
- 40dB
- 40dB
- 40dB
- 40dB
- 40dB

**Slope Compensation**

- P
- P
- P
- P
- P
- P
- P
- P
- P
- P
- P

**High Linearity**

- -
- -
- -
- -
- -
- -
- -
- -
- -
- -
- -

New technologies in RF distribution
### Quad 4+1 Redundancy

#### COMPATIBLE MODULE FEATURES - ALT-C306-2U-x5v7

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>L-band (850-2150 MHz)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Gain Range Min</td>
<td>1dB</td>
<td>2dB</td>
<td>9dB</td>
<td>9dB</td>
<td>9dB</td>
<td>11dB</td>
<td>9dB</td>
</tr>
<tr>
<td>Gain Range Max</td>
<td>31dB</td>
<td>21dB</td>
<td>39dB</td>
<td>39dB</td>
<td>39dB</td>
<td>39dB</td>
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<tr>
<td>Slope Compensation</td>
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<td>✓</td>
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</table>

The specifications above are based on 50Ω impedances. Specifications may vary for other impedances and connector types.

#### COMPATIBLE MODULE FEATURES IN CHASSIS ALT-C307-2U-x7v7

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<thead>
<tr>
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<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>L-band (850-2150 MHz)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gain Range Min</td>
<td>1dB</td>
<td>2dB</td>
<td>9dB</td>
<td>9dB</td>
<td>11dB</td>
<td>9dB</td>
<td></td>
</tr>
<tr>
<td>Gain Range Max</td>
<td>31dB</td>
<td>21dB</td>
<td>39dB</td>
<td>39dB</td>
<td>39dB</td>
<td>39dB</td>
<td>39dB</td>
</tr>
<tr>
<td>Slope Compensation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

The specifications above are based on 50Ω impedances. Specifications may vary for other impedances and connector types.

#### ETL’s Modular System Amplifier Cards

ETL’s Modular System Amplifier cards offer flexibility and resilience in managing L-band signals. The cards are housed in a 4U Modular System chassis (26128), which is designed to hold a mixture of hot-swap RF distribution cards, and benefits from hot-swap CPU and dual redundant PSU’s. The RF cards are front mounted and allow for easy future expansion as a teleport grows.

With a number of options available, including variable slope compensation and redundant amplifier paths, each amplifier card is ideal for improving satellite signal distribution.

For more information about the modular system chassis, visit page 65 and for our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com.

#### BENEFITS & APPLICATIONS

- Configurable chassis which can hold a mixture of RF cards.
- Redundancy amplifier options available.
- Optimise RF signals with gain, slope & LNB powering options.
- Resilience in service with hot-swappable active components.
- Applications include compensating for cable & other system losses of RF signals between satellite dishes & teleport, low-cost high resilience applications.
The Piranha series of power inserters provides DC powering options for a range of components and devices in satellite ground stations, in addition to RF and power distribution chains.

The Piranha offers flexible energy consumption from 100W, 200W and 500W power supply module options, as well as a range of power inserter modules.

The modular 1U design means the Piranha can be part populated and expanded as requirements grow.

For our full range, along with up-to-date RF specifications, please visit our website www.etsystems.com.

<table>
<thead>
<tr>
<th>FEATURES - CHASSIS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>PRN-10</td>
</tr>
<tr>
<td>Frequency</td>
<td>290 MHz</td>
</tr>
<tr>
<td>LNB &amp; BUC Power</td>
<td>✓</td>
</tr>
<tr>
<td>Capacity</td>
<td>Up to 16 modules</td>
</tr>
<tr>
<td>Slotless Reference</td>
<td>-</td>
</tr>
<tr>
<td>Power Supplies</td>
<td>Dual redundant, hot-swap</td>
</tr>
<tr>
<td>Remote Control &amp; Monitoring</td>
<td>Remote via RS485 Ethernet Port</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FEATURES - MODULES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>850-2450 MHz</td>
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<tr>
<td>LNB Power</td>
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</tr>
<tr>
<td>BUC Power</td>
<td>✓</td>
</tr>
<tr>
<td>50/69 MHz</td>
<td>-</td>
</tr>
<tr>
<td>Variable Voltage</td>
<td>✓</td>
</tr>
<tr>
<td>RF Power Detect</td>
<td>50 - 500 MHz</td>
</tr>
</tbody>
</table>

The 4U Modular System chassis accommodates up to 16 hot-swap RF cards (8 modules for 8-way versions).

The flexible and resilient RF signal management chassis can hold a mixture of splitter, combiner, switch, amplifier and attenuator cards, with dual redundant hot-swap PSUs and a hot-swap CPU.

The RF cards are front mounted and inserted whilst the shelf is in service, allowing for easy future expansion as a teleport grows.

For our full range, along with up-to-date RF specifications, please visit our website www.etsystems.com.
Modular System
Card Overview

### RF CARD OPTIONS

<table>
<thead>
<tr>
<th>RF Card Functionality Options</th>
<th>Operating Frequency</th>
<th>Active</th>
<th>Passive</th>
<th>Gain</th>
<th>Slope Compensation</th>
<th>LNB</th>
<th>Powering</th>
<th>Dual Redundant Amplifiers</th>
<th>RF Level Detection</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-way splitter cards</td>
<td>L-band</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
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<tr>
<td>4-way combiner cards</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tr>
<tr>
<td>Amplifier cards</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>Redundancy switch cards</td>
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</tr>
<tr>
<td>Attenuator cards</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>See website</td>
</tr>
</tbody>
</table>

**Modular System Card Showing hot-swap RF module, power supply and CPU module**

### Attenuator Cards

The 4U modular system chassis accommodates up to 16 hot-swap variable attenuator cards. For our full range, along with up-to-date RF specifications, please visit our website [www.etlsystems.com](http://www.etlsystems.com).

### Applications for the modular system chassis include VSAT, Broadcast & Teleports

**New Technologies in RF Distribution**

At ETL we are constantly growing and diversifying our range of RF products and we have a number of new product launches coming to market in 2020.

For updates on our newest products and up-to-date specifications please visit the ETL website [www.etlsystems.com](http://www.etlsystems.com).

Alternatively you can join us at international exhibitions for product launches (see page 83), sign up to our e-newsletter for announcements and follow us on social media for sneak peeks!

#### New products for 2020

- Frequency Converters
- Hurricane Combining Matrix
- Low Noise High Gain Alto Amplifiers
- High Frequency Fibre Links
- Smart Modular System

If you are interested in the above products please enquire with the sales manager for your region.
Why use RF Components?
If space is an issue and you are looking for high quality RF Components, ETL's wide range is designed and manufactured at the ETL factory. Covering DC to 40GHz, these are at the heart of many of our 19” Rack Systems.

A key feature of many of ETL's components is the ability to pass or block a 10 MHz 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.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com/catalogue/rf-components.

RF Components Overview

BENEFITS
- Compact & space saving RF products.
- A huge range of products that covers a broad spectrum of RF frequencies, from DC to 40GHz.
- Many RF components can pass or block a 10 MHz signal or DC voltage.
- Indoor chassis options and weatherproof IP65 rated outdoor enclosures that can withstand harsh weather conditions.
- Order quickly via our website with no minimum order charge.

APPLICATIONS
- Telecom infrastructures
- Satellite systems
- Military communications
- Microwave links
- Radar networks

CUSTOM BUILD RF COMPONENTS FOR A LEADING TELECOM COMPANY IN SWITZERLAND

RF COMPONENTS

RF Components
New technologies in RF distribution

Active & Passive Splitters & Combiners

ETL’s RF component active and passive splitters and combiners cover a range of frequencies including C, IF, L, S, Ka and Ku-band and are available in 2, 3, 4, 6, 8 and 16-way capacities.

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.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com/catalogue/rf-components.

NEW TECHNOLOGIES
IN RF DISTRIBUTION

UK Office
Telephone: +44(0)1981 259020
Email: info@etlsystems.com

US Office
Telephone: +1 703 657 0411
Email: ussales@etlsystems.com

UAE Office
Telephone: +971 4 428 0918
Email: menasales@etlsystems.com

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.

APPLICATIONS
- Telecom infrastructures
- Test and instrumentation
- Satellite systems
- Military communications
- Microwave links
- Radar networks
The Scorpion component mounting chassis provides a neat solution that is cost effective, compact and easy to use. Compatible with a range of ETL RF components, the shelf system is configurable with Amplifiers, Couplers, Fibre Optics, Splitters and Combiner modules.

Available with front, or rear mounting plates for easy access to ports, when fitting to either the front or rear of your 19" rack. For our full range, along with up-to-date RF specifications, please visit our website www.etsystems.com/catalogue/rf-components.

**APPLICATIONS**
- Telecom infrastructures
- Satellite systems
- Military communications
- Radar networks

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

---

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

Different housings are available, as shown below, including standard rectangular or a compact tubular design. The tubular design is in-line powered. For our full range, along with up-to-date RF specifications, please visit our website www.etsystems.com/catalogue/rf-components.

**APPLICATIONS**
- Telecom infrastructures
- Test and instrumentation
- Military communications
- Radar networks
- VSAT

**BENEFITS**
- Variety of housing & connector types.
- Amplifiers cover IF, L, S, C, X, Ku, Ka, wideband and broadband frequency ranges.
- Easy to use & cost effective.
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 Tees
ETL Bias Tees operate over a range of frequencies and are designed to facilitate mounting (onto a base of front/rear panel). They are supplied in EMC shielded non-hermetic housing, with options including traps for 10MHz rejection and high current modules up to 5A and 48V.

Couplers
ETL Couplers provide low insertion loss and passive 10dB or 20dB directional proximity coupling, for RF monitoring over L-band frequency range 850-2150 MHz. These devices are designed with a number of options for 10MHz and DC passing/blocking on the through line and/or coupled ports. Also available as high current modules for frequencies up to 40GHz.

DC Blocks
ETL DC block units provide reliable DC blocking which can be used in conjunction with any of ETL’s other products.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com/catalogue/rf-components.

Equalisers
ETL’s L-band series of Equalisers are available with either 50Ω or 75Ω impedances and are 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.

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

Impedance Transformers
ETL passive impedance transformers are one of ETL’s most popular products and cover either an L-band frequency range, of 850 to 2150MHz, or an S-band frequency range of 500 to 2500MHz.

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

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com/catalogue/rf-components.
10MHz Oscillators

ETL’s 10 MHz oscillators are ovenised, 10MHz reference frequency generators with excellent frequency stability over time and temperature, with built in harmonic rejection filters.

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

Frequency Convertors

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

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

Switches

ETL’s switches cover a range of frequencies from 0.5 up to 18GHz.

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

APPLICATIONS

- Telecom infrastructures
- Microwave Links
- Satellite Systems
- GPS & GNSS
- Test and Instrumentation

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
- Microwave Links
- Satellite Systems
- Test and Instrumentation

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com/catalogue/rf-components.
ETL's range of IP rated outdoor modules are specifically designed for use where weatherproofing is required.

**Options available in the range include:**

**RF Over Fibre**
Stand alone RF Over Fibre ODU modules available in L-band and Broadband frequencies. Housed in an IP65 rated outdoor unit.

**Amplifiers**
Housed in an IP65 rated outdoor box. Available in L-band and IF-band frequencies. Options include variable gain, low noise, DC and 10MHz pass and block.

**Splitters / Combiners**
Available in L-band and C-band frequencies. Options include DC and 10MHz pass and block. Housed in an IP65 rated outdoor box.

**Couplers**
Available in L-band frequency. Options include DC and 10MHz pass and block. Housed in an IP65 rated outdoor box.

**Multiplexers**
Available in L-band frequency. Options include DC and 10MHz pass and block. Housed in an IP65 rated outdoor box.

**Attenuators**
Available in broadband frequency. Housed in an IP65 rated outdoor casing.

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com/catalogue/rf-components.

**StingRay RF Over Fibre**

**Options available in the range include:**

**StingRay 400 Series**
ETL's StingRay range of stand-alone RF Over Fibre (RoF) products are compact and offer excellent value for money. The 400 series is designed to deliver long distance L-band and Broadband over fibre between the satellite dish and control room decoders. With optical input to 10MHz signal output for timing applications also available.

**APPLICATIONS**
- Telecom infrastructures
- Microwave Links
- Satellite Systems
- Test and Instrumentation

**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
- Microwave Links
- Satellite Systems
- Test and Instrumentation
- GPS & GNSS
- VSAT

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com/catalogue/rf-components.
Filters
ETL is able to offer custom RF and Microwave filters for 50 Ω or 75 Ω impedances and various connector types.

Options available range from 100MHz to 40GHz, waveguide cavity bandpass filters and also microstrip filters, including suspended substrate technologies, for broadband performances covering frequencies within DC to 20GHz.

New designs can be delivered on short time scales and provide great value for money.

Waveguides
ETL's range of precision made Waveguide components are made to the highest quality standards and use international flange styles and finishes to suit.

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

Options include:
- Flex / Twist
- Pressure Windows
- Terminations / Loads
- Multi-bends
- Adaptors
- Couplers
- Straights
- Bends
- Twists
- Gaskets

For our full range, along with up-to-date RF specifications, please visit our website www.etlsystems.com/catalogue/rf-components.
ETL has an extensive product range and many products are the result of custom build requirements. This is the essence of ETL’s RF skill set and we fully understand that no two satellite operators have the same challenges.

Did you know... that over half of our top 50 orders annually are specifically engineered to meet customer requirements.

Our dedicated RF design and engineering team can work with you to solve your RF signal handling challenges. We have over 25 years’ experience of providing solutions, such as extra redundancy, specific RF performance or even building a chassis to fit certain architecture.

How do I get a custom RF product?

Whether you require an RF component or rack system, contact us directly and together we can define the product or technical specifications you require.

When contacting ETL, please remember to include important specifications like RF connectors, impedances, dual or single PSU’s, remote control ports, and any special RF parameters, such as insertion or return loss, isolation, and flatness, if you know them.

For more information about our custom build products please visit our website www.etlsystems.com(custom-build).

Atlantic Microwave manufacturers a wide range of microwave and RF components, equipment and interconnects from their headquarters and R&D base in Braintree, England, UK. With over 30 years’ experience, their product range and capability include both standard and custom equipment, as well as multi-function modules and sub-assemblies.

Atlantic supply globally to the Aerospace, Telecommunications, Defence & Military and Scientific Research markets via representatives and distributors worldwide. Atlantic Microwave offer a range of complementary RF products to ETL and are also very focused on customisation of its RF range.

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International Exhibitions

Join us at the following exhibitions each year:

- **Cabsat, Dubai**
  - NAB, Las Vegas, USA
  - Satellite, Washington D.C., USA

- **IMS, USA**
  - CommunicAsia, Singapore
  - IBC, Amsterdam

For up to date exhibition details, please visit our website www.etlsystems.com
New technologies in RF Distribution
www.etlsystems.com