

smiths interconnect



# Space

Connectivity Solutions

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CUTTING-EDGE  
CONNECTIVITY

# About Smiths Interconnect



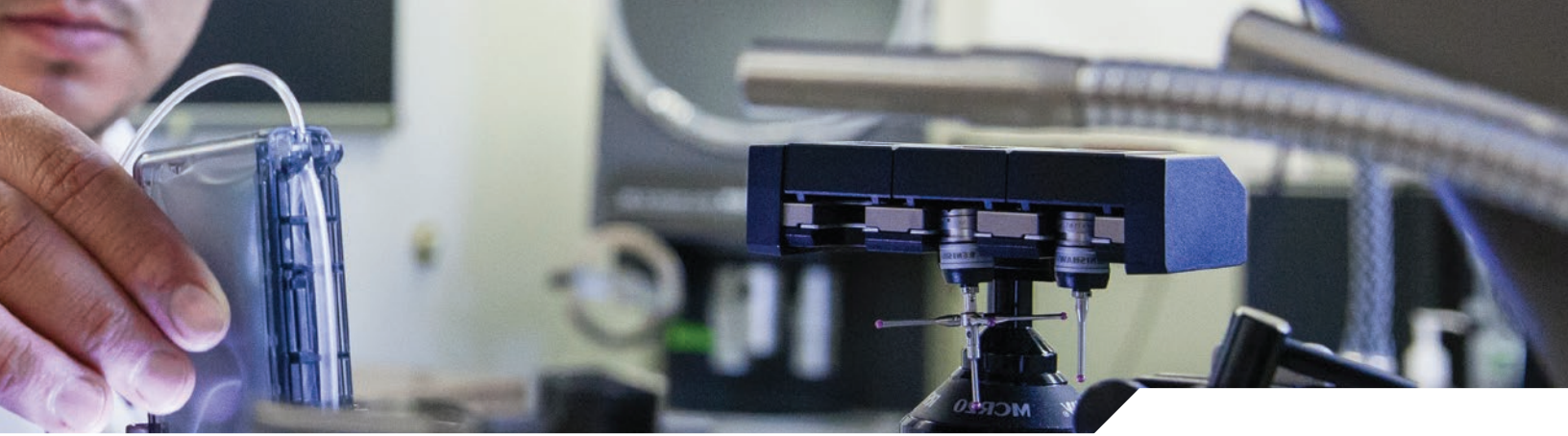
## We Offer



Smiths Interconnect is a leading provider of technically differentiated electronic components, subsystems, microwave, optical and radio frequency products that connect, protect and control critical applications in the Defense and Aerospace, Communications and Industrial markets.

Smiths Interconnect is the supplier of choice for safe, efficient and highly reliable connectivity in space applications. Our proven expertise and know how, gained over more than 60 years in the space market, enable us to design innovative solutions that are smaller, lighter weight and robust where increased ruggedness is paramount to withstand vibration, shock, temperature extremes and radiation.

Our technology brands (EMC, Hypertac, IDI, Lorch, Millitech, Reflex Photonics, RF Labs, Sabritec, TECOM, TRAK and HSI) are synonymous with exceptional performance in technologically advanced, high quality solutions required for a high degree of safety and durability. Our extensive product portfolio includes high reliability electrical connectors and cable assemblies, rugged embedded transceivers, solutions for antenna systems, and a wide range of innovative RF and microwave solutions.



## Defense & Aerospace



## Communications



## Industrial



# Your partner of choice for cutting-edge connectivity solutions

**60+** Years  
Experience

### Technology

Broad Range of Advanced  
Interconnect Technologies

### Flexibility

High Volume Product Platforms  
& Complete Tailored Solutions

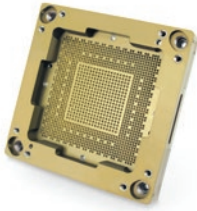
### Service

Global Reach with  
Local Support

Smiths Interconnect is part of Smiths Group plc, a global leader in applying advanced technologies for markets in threat and contraband detection, energy, communications and engineered components. Smiths Group has a presence in more than 50 countries.

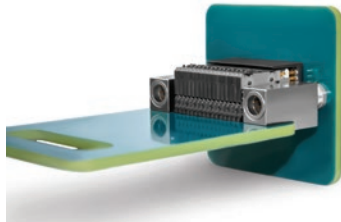


# Technology Brands



## IDI

World's most comprehensive offering of spring probe based solutions, including: contacts, connectors, interposers, semiconductor test sockets, and ATE interfaces. Proven off-the-shelf and custom products deliver the best solution for the customer's specific application.



## HYPERTAC

Premium interconnect solutions for electrical and electronic applications requiring optimized quality, performance, and reliability. Hypertac connectors utilize the original high performance hyperboloid contact technology; ideal for harsh environments and safety critical applications.



## HSI

Joint venture with Sichuan Huafeng Enterprise Group Co. Ltd, one of the major manufacturers of electronic components in China. Industry-leading connectivity solutions for commercial aerospace and railway markets in mainland China.



## SABRITEC

High speed quadrx, twinax, fiber optic, filter, coax and triax connectors, contacts and cable assemblies. Custom multi-pin circular, D-Sub rack and panel connectors and MIL-Spec interface type products.



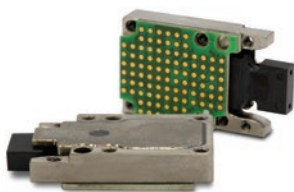
## EMC

Board-level components incorporating advanced resistive and signal distribution technologies for a broad range of frequency spectrum applications. Extensive portfolio of RF devices used to attenuate, level, or terminate signals available in a variety of packages and footprints.



## LORCH

Innovative solutions for the electronics and communications industries. Ranging from high performance wireless and RF products to micro-miniature, cavity, discrete, waveguide, tunable, ceramic, and tubular filters and integrated assemblies.



## REFLEX PHOTONICS

Embedded transceivers and transmit/receive modules for advanced interconnect-based solutions. Targeting high data rate interconnects where ruggedness and radiation resistance are required for defense, space, commercial aerospace and industrial applications.



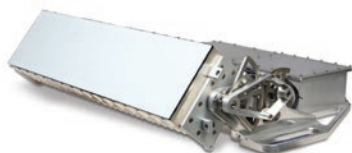
## RF LABS

High performance microwave cable assemblies and coaxial components supporting high performance operations, application-specific premium interconnects for high durability and harsh environments.



## MILLITECH

Specializing in the engineering, manufacturing, and testing of millimeter-wave components, assemblies, and fully integrated subsystems for space, SATCOM, test and measurement, radar, and scientific applications.



## TECOM

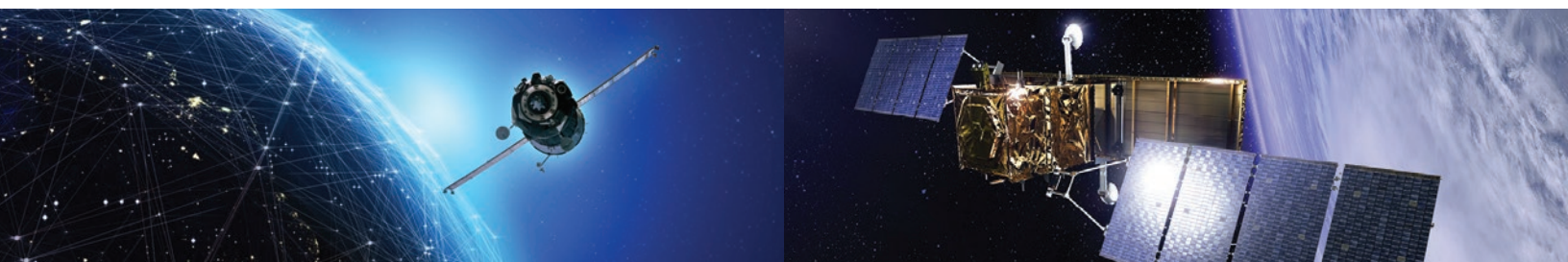
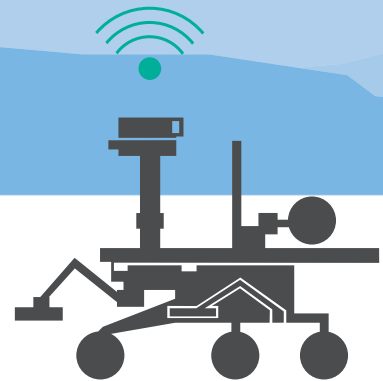
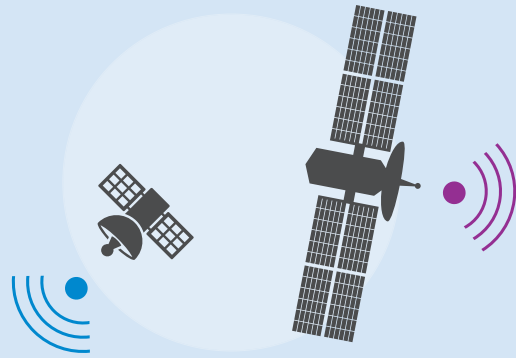
Industry leading innovator of antennas and positioning systems for SATCOM in-flight connectivity, instrumentation, datalink, command & control, and telemetry applications integrated into the world's most advanced commercial and military platforms.



## TRAK

High reliability multi-function RF systems, ferrite microwave products, and precision time & frequency systems for defense, commercial aerospace, space, homeland security, and public safety applications.

# Applications



## Satellites GEO/MEO

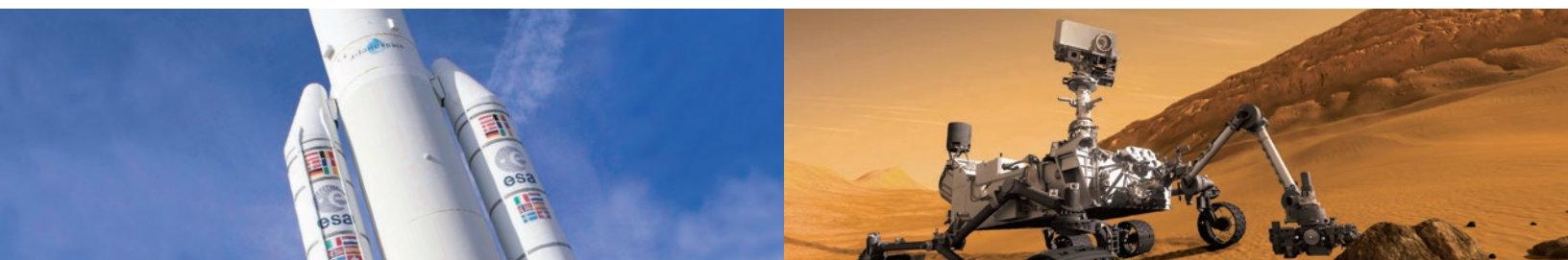
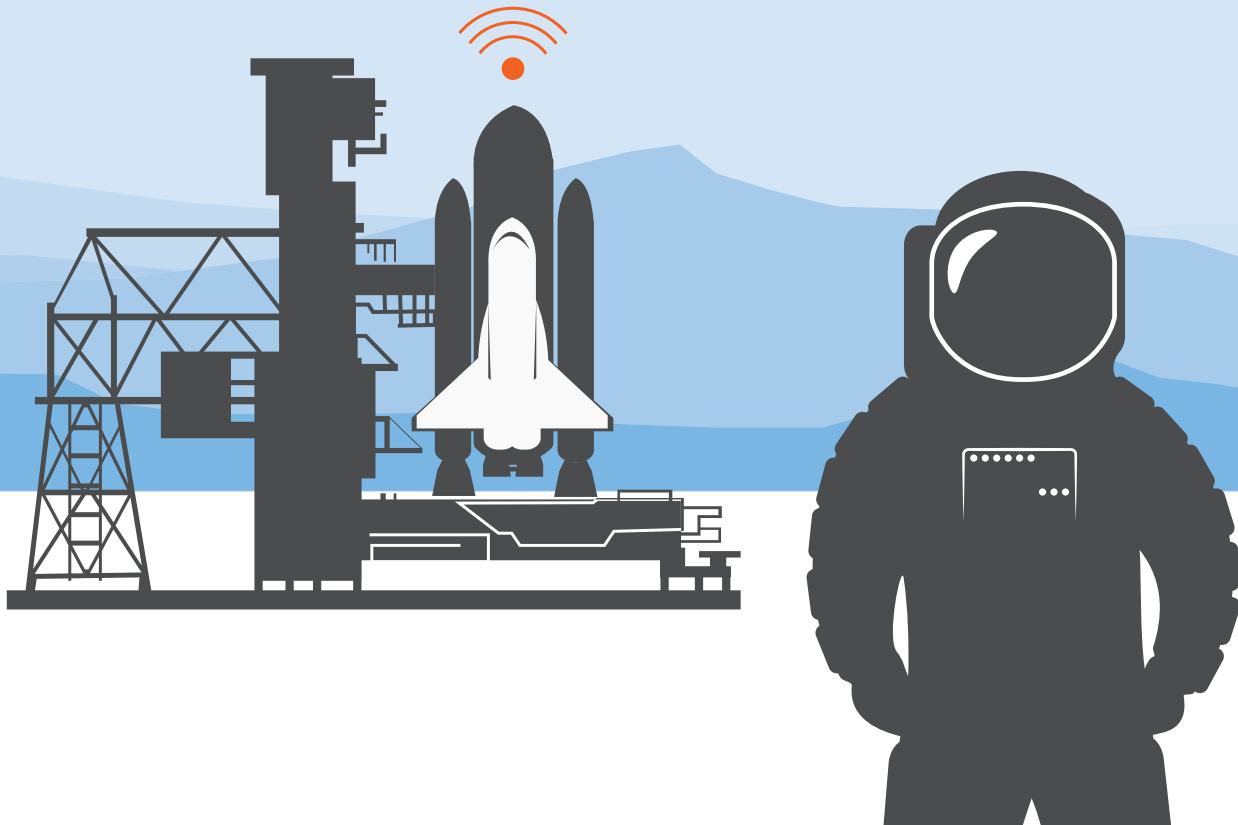
- Navigation & Communication
- Gamma Ray Detection
- Weather Monitoring
- Radio/TV Networks
- Broadband
- Space Environmental Sciences

## Satellites LEO

- Earth Observation
- Surveillance
- Telecom
- Space Telescopes
- Earth Sensing
- Space Cubes

# Providing A Competitive Advantage

We design, develop and manufacture high reliability RF, microwave and mmW systems and components, connectors and cable assemblies that ensure optimal performance, durability and safety in space-related operating environments. We are an approved vendor for international space agencies including ESA, ISRO, JAXA and NASA, and have proudly delivered failure-free performance in numerous spaceflight programs. We work globally with our customers and space agencies to design the next generation of solutions for launchers, satellites, manned space flight and ground systems support.



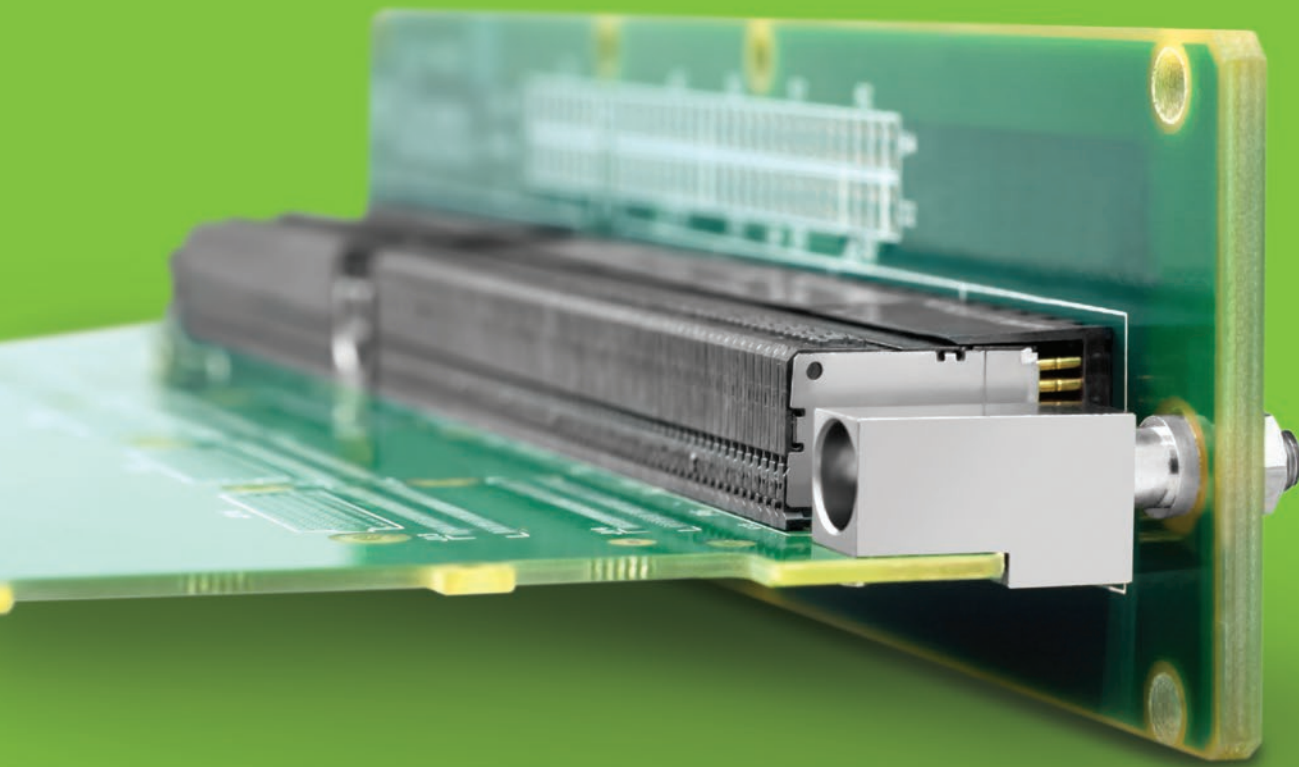
## Launchers

- Attitude Correction Module
- Central Units / Communication
- Command Memory Boxes
- Control Boxes
- Sensors

## Ground Systems

- Docking Systems
- Ground Stations
- Communications
- Mars Rovers
- Mobility
- Navigation Systems

# Connectors



## Reliability & Safety

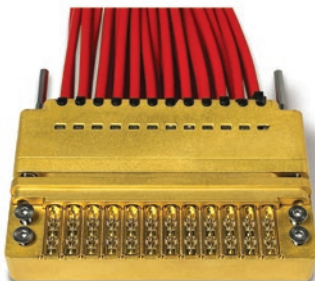
Through our Hypertac, HSI, IDI and Sabritec technology brands, we supply application-specific, high-reliability electrical interconnect solutions from highly integrated assemblies to microminiature connectors and spring probe contacts. Our reliable contact technologies are the core of our advanced interconnect solutions: Hyperboloid, Spring Probe, High Speed, Fiber Optic, High Power and High Temperature.

**Providing  
exceptional  
performance  
in critical  
applications**



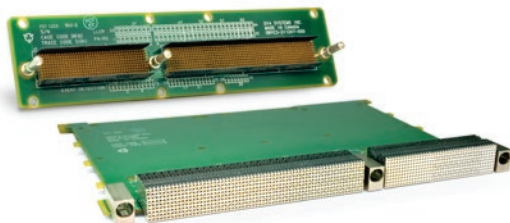
## Ultra-High Density, Space Qualified

- Tested for high speed space applications up to 10 Gbps per channel
- Available in 4 and 12 high speed quadrx modules, 2-dual twinax at 100  $\Omega$  each pair
- Solderless PCB termination reducing risks and damages to the board
- Gold plated, low mass composite shell
- Using Micro-Hyperboloid contact technology
- Withstands high shock and vibration, above 2100G



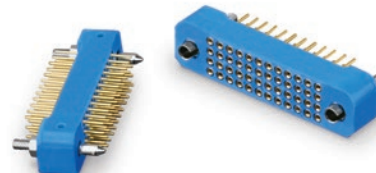
## Rugged, High Speed VITA Backplane

- Fully footprint compatible with VITA 46/48 standards
- Flexible modular design for standard 3U, 6U and custom configurations
- 100  $\Omega$  impedance for differential pair configurations
- Data rate performance up to 10 Gbps



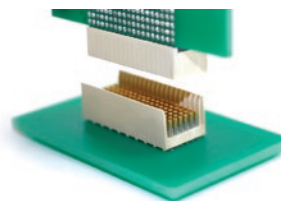
## High Density PCB

- Up to 5 rows and 400 contacts
- Signal, power & coaxial
- ESA & NASA space approved
- Next generation VITA 63 connectors
- Space approved VME architecture and multi-channel



## Rugged, 2mm Hard Metric Backplane

- NASA GSFC qualified
- Reliable Hypertac® contact technology
- High-temp LCP insulator meeting outgassing requirements
- Reverse gender to commercial 2mm products
- Keying feature ensures proper mating
- Modular design for 3U/6U configurations



## Stacking, Spring Probe Interposers

- ESA ESCC 3401/076 approved
- Z-Axis interconnects with solderless contacts
- High density button contact
- Design flexibility



# Enhancing high reliability in mission-critical applications





## High Speed Copper

- Standard 100 and 150  $\Omega$  quadrax & twinax contacts
- Micro twinax and quadrax connectors
- Rugged D-Sub, ARINC and MIL-DTL-38999 standard quadrax and twinax
- Data rates up to 6.25 Gbps
- Reverse gender quadrax contacts



## Modular Rectangular

- Mixed signal, power, and coaxial modules
- Up to 200 A power
- Cable to chassis and rack and panel
- Plastic backshell with strain relief and half turn quick disconnect jackscrew
- Float mountable for blind mating



## EMI Filter

- Optimized filter style and value on receipt of signal type and data rate
- Improved shock and vibration resistance
- Transient protection in accordance with RTCA D 160F waveform and level specifications



## Fiber Optic

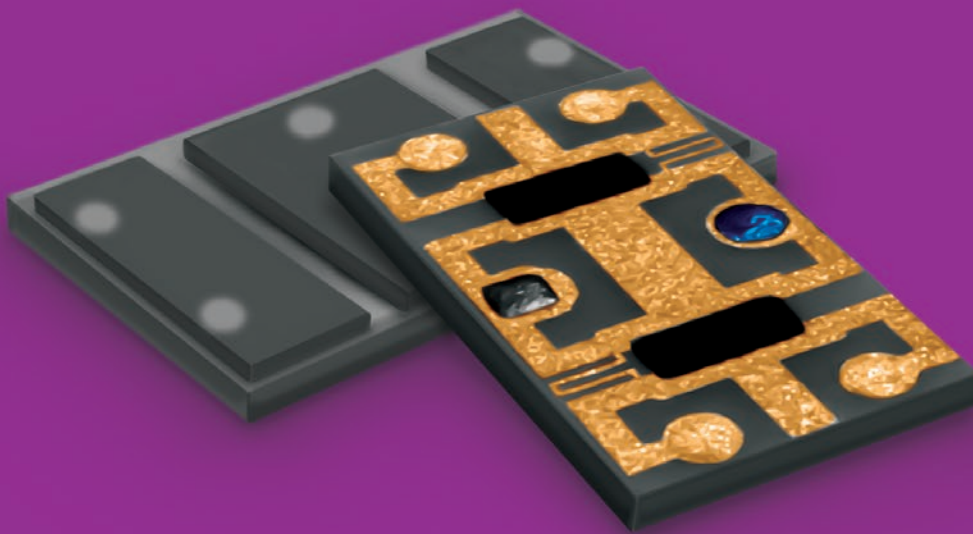
- Single and multimode
- Expanded beam & butt joint termini
- Electro-optical transceiver products
- MIL-DTL-38999 connectors
- Added value solution with cable assemblies



## Did you know?

Our high performance ruggedized cPCI 2mm is assisting the Mars Perseverance Rover to explore the Red Planet and seek signs of ancient microbial life.

# Fiber Optics & RF Components



## Ruggedized & Small Form Factors

Through our EMC, RF Labs, Lorch, Reflex Photonics and Trak brands we provide RF/Microwave components including: resistive & signal distribution components; cable assemblies; ferrite devices and waveguide products; filters, multiplexers and integrated assemblies; embedded transceivers and transceiver modules for demanding high reliability environments.

**Extensive  
portfolio in a  
variety of  
packages and  
footprints**



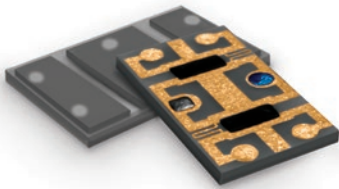
## Diamonds RF Resistives

- High power-to-size ratings to 300 W
- Excellent peak power performance
- Extremely low parasitic capacitance
- Super compact form factor
- Space qualified



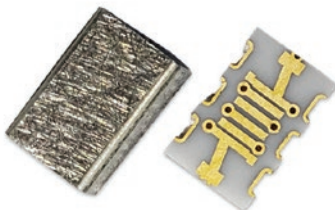
## Attenuators

- Surface mount, wire bondable, tab and cover, coaxial configurations
- Support every application from DC to 50 GHz
- 0.1 to 400 watt versions
- Commercial and high reliability product lines
- Space and military qualified



## RF Filters

- RF filters, multiplexers, switched filter banks, and integrated assemblies, from 100 KHz to 65 GHz
- Bandpass, lowpass, highpass, notch, diplexed & multiplex options
- Small footprint and light weight
- Surface mountable for pick and place applications with Planar X topology



## RF Components

- Product versions from DC to 50 GHz
- Excellent RF broadband performance
- Footprint compatibility with Thermopad®
- Surface mount, wire bond, tab, flange and coaxial configurations



## RF Ferrites & Passives

- Microwave and millimeter-wave
- Waveguide coaxial, drop-in and stripline isolators and circulators
- Low loss and high power single and multiple junctions with integrated terminations



## Flexible Cable Assemblies

- Qualified to NASA & ESA requirements
- Flexible low loss up to 40 GHz
- Robust and reliable cable to connector technology



Securing optimal  
performance,  
durability & safety in  
demanding applications



## Semi-rigid Assemblies

- High performance RF
- Wide range of connector, plating and jacket type options
- Custom bent configurations or packaged straight for on-site routing
- Space qualified



## Radiation-Resistant Optical Transceiver, Surface Mount

- Solder attach BGA & pluggable surface mount options
- 4+4 transceiver and 12-channel transmit and receive versions
- Operates at 10.3125 Gbps per channel over  $-40^{\circ}\text{C}$  to  $100^{\circ}\text{C}$
- Meet highest level SWaP requirement: 5.4mm height (SMT)
- Resistant to temperature extremes

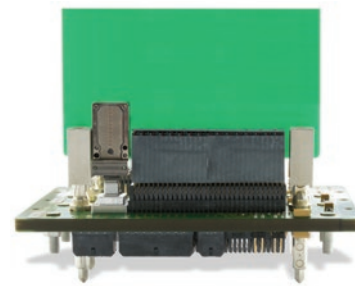


## Did you know?

We are providing the entire Ethernet data cabling network for the Orion spacecraft that will fly astronauts to Mars.

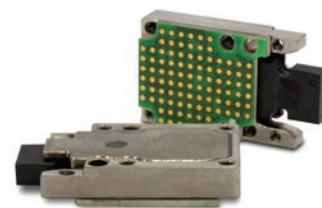
## Active Blind Mate Interconnect

- VITA 66.5 standard (forthcoming)
- Plug-in module and backplane connectors in Styles A, C and D
- Saves board space and eliminates fiber cable handling
- 28 Gbps per channel over  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
- 4+4 transceiver and 12-channel transmit and receive versions
- Transceiver plug-in screw attaches to PCB with LGA interposer



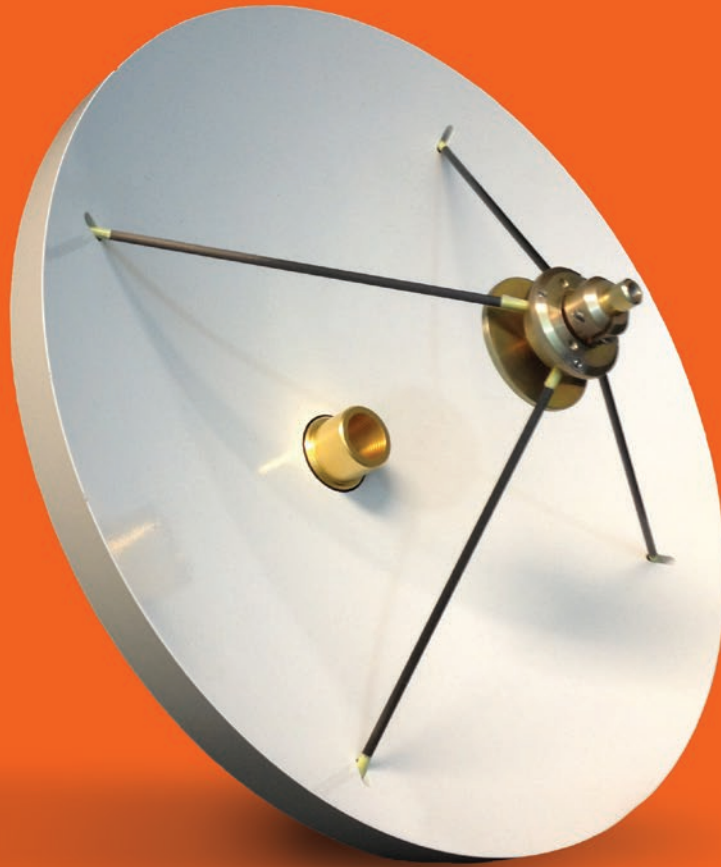
## Radiation-Resistant Optical Transceiver, Board Mount

- Transceivers screw attach to PCB with LGA interposer
- 4+4 transceiver and 12-channel transmit and receive versions
- 10 and 28 Gbps per channel over  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
- Small size: less than 6 mm high (module & interposer)
- Low power consumption: 120 mW/channel





# RF/MW Subsystems



## Advanced Technologies & Solutions

Whether it's a custom design or build-to-print, our Millitech, TECOM, and TRAK brands offer a broad range of advanced antenna systems as well as high-reliability RF/Microwave/Millimeter-wave components, assemblies and fully integrated subsystems, providing significant leverage in tackling space mission-critical challenges.

**Extensive  
knowledge  
supporting  
customers'  
current & future  
needs**



## Antenna & Quasioptical

- Full range includes aperture, reflector and lens-based options
- Standard and custom designed models from 18 to 325 GHz
- Additional offerings: polarizers, orthomode transducers, monopulse comparators, and waveguide rotary joints



## Telemetry & Tracking Beacon Antennas

- Adjustable mounting flange
- Heat resistant, survives 3000°F
- Environmentally qualified
- Flush mounted for zero drag
- Rugged construction, quartz aperture, S.S. body
- Small and lightweight



## Up/Down Converters

- Single and multichannel
- High dynamic range
- Radiometer front ends
- Through 220 GHz



## S-Band QFH Antenna

- Perfect communication link between ground-based stations & spacecraft
- High isolation between TX and RX bands through sophisticated feeding circuitry
- Multiple frequency coverage: S-Band, L-Band and GPS (L1 and L2)



## High Frequency Amplifiers

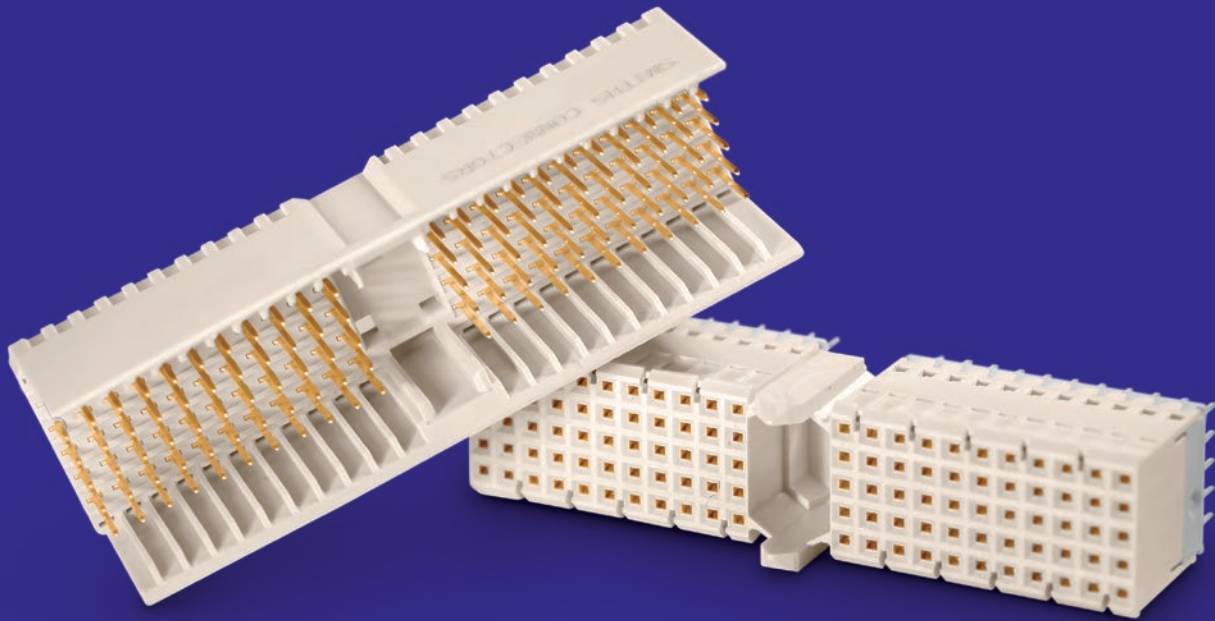
- Broad array of power amplifiers (AMP) up to 16-way, and low noise amplifier (LNA) solutions
- Standard and custom multicomponent solutions from 18 to 110 GHz
- Superior performance and efficiency for high frequency applications
- GaN, GaAs, InP, and SiGe technologies



## Did you know?

Being part of the Global Observing SATellite for Greenhouse gases and Water cycle (GOSAT-GW) program, our millimeter antenna systems will assist in preventing disasters attributed to global warming and climate change.

# Space NXT™ Range



## Pre-tested & Qualified for Space Use

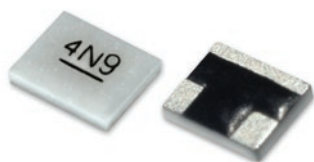
SpaceNXT™ Range is an overarching initiative that entails the creation of higher reliability products for next generation space applications that are readily available to the market. By offering solutions that are pre-tested and qualified for space use, Smiths Interconnect helps customers reduce their lead times.

**A combination  
of technology  
and lower cost  
of ownership  
solutions**

## Temperature Variable Attenuators

### SpaceNXT™ HC Series

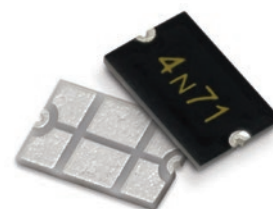
- Up to 18 GHz, with attenuation values from 0 dB to 20 dB
- Design flexibility, small footprint
- Solderable surface mount
- Wide attenuation and TCA shifts available
- High volume solution



## Temperature Variable Attenuators

### SpaceNXT™ K2TVA Thermopad® Series

- Rated for 17-22 GHz and 27-32 GHz
- Up to 4 times temperature coefficient of attenuation over the original KTVA series
- Using robust proven thick film process technology on an alumina substrate
- Mounting configuration options available



## Ku-Band Multiway Isolated Splitter

### SpaceNXT™ MWC Series

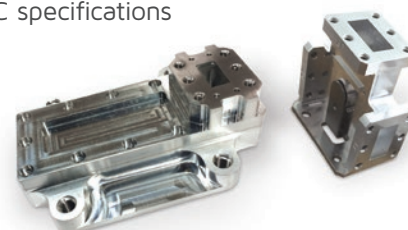
- 2-port Ku-Band isolated splitter
- Operating from 10.7 to 12.8 GHz
- EMC shielded, RoHS stackable housing
- Factory configuration to operate as a combiner or a splitter
- Low insertion loss, <1.4 dB over temperature



## High Power Waveguide Circulators & Loads

### SpaceNXT™ Ku Series

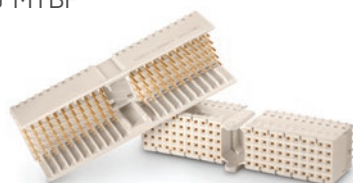
- Guaranteed low and stable insertion loss under maximum power
- Proven circulator design tested to 350 Watts CW Power. Unconditionally linear
- Meeting EMC specifications to -80 dBi



## ESA Qualified Backplane Connector

### SpaceNXT™ Aurora Series

- COTS Plus 2mm hard metric solution
- Qualified to ESA ESCC 3401 specifications
- Available in 55, 110 and 125 contacts size
- Right angle and mezzanine configurations
- Enhanced gold plating with 1.27µm (50 µin) for increased MTBF



## Coaxial Cable Assemblies

### SpaceNXT™ QT Series

- Mode Free performance up to 50 GHz
- Phase Stable Fluoropolymer dielectric – Minimized electrical length changes over a wide temperature range
- >-90dB shielding effectiveness
- Compliant to NASA/ESA outgassing specifications



# Global Capabilities



## Reliable Solutions

In-house capabilities encompassing design, development, manufacturing and testing to anticipate market needs, respond quickly and accurately to customers, and provide the most reliable connectivity solutions.

Market-leading  
Engineering and  
Technology Solutions

60+

Years  
Experience







## Certifications, Standards & Compliance

- ISO 9001
- ISO 14001
- ISO 45001
- AS 9100 Rev. D
- DOD Internal
- IPC
- ESA/SCC 3401/016, 017, 039, 065 & 076
- NASA GSFC S-311-P-822, 826 & 835
- NASA EEE-INST-002
- NASA STD 8739.3
- MIL-PRF-38534
- MIL-DTL-55302
- ANSI/J-STD-001

## Engineering

- 3D EM Modeling
- Advanced RF & System Modeling
- CAD/CAM & Solid Modeling
- Electromagnetic & Modeling Simulation
- Finite Element Analysis
  - Thermal Analysis
  - Shock & Vibration Analysis
- Reliability Analysis

## Prototyping

- CNC Turning & Milling Centers
- Cabling / Prototype Assembly
- 3D Printing

## Manufacturing

- Precision Machine Shops
- Connector, Contact & Cable Assembly
- Automated PCB Assembly & Inspection
- Automated Hybrid Assembly
  - Die Placement
  - Wedge & Wire Bonding
  - Gap Welding
- NASA Certified Soldering
- Automated Test & Tune
- Optical Alignment
- System Integration
- Validation Testing

## Testing/Qualification

- Electrical
- Metallurgical
- Mechanical
- Environmental
- Real Time X-Ray
- RF Test Capability up to 300 GHz
- High Speed Digital
- Anechoic Chamber Testing
- ESS & Environmental Qualification
- High Power RF Testing
- Multipaction
- Optical Testing



# Connecting Global Markets

Smiths Interconnect's strong focus on serving international markets and customers is supported by our sales and technical teams across the Americas, Europe and Asia.

[more > smithsinterconnect.com](#) | [in](#) [twitter](#) [youtube](#)

## Business Unit

Connectors

Fiber Optics &  
RF Components

Semiconductor  
Test

RF/MW  
Subsystems

# Worldwide Support

## Americas

### Sales

connectors.uscsr@smithsinterconnect.com

### Technical Support

connectors.ustechsupport@smithsinterconnect.com

### Sales

focom.uscsr@smithsinterconnect.com

### Technical Support

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### Sales

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### Technical Support

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### Sales

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### Technical Support

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## Europe

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# Pioneers of Progress

## Advancing the world through cutting-edge connectivity

We aim to be the partner of choice for innovative connectivity solutions where reliability, high quality, technical expertise, application knowledge, and a reputation for excellence is vital.

more > [smithsinterconnect.com](https://smithsinterconnect.com) | [in](#) [twitter](#) [youtube](#)

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