Corporate Overview

Smiths Interconnect
bringing technology to life
**Smiths Interconnect** is a leading provider of technically differentiated electronic components, subsystems, microwave, and radio frequency products that connect, protect, and control critical applications in the commercial aviation, defense, space, medical, rail, semiconductor test, wireless telecommunications, and industrial markets.

Our technology brands (EMC, Hypertac, IDI, Lorch, Millitech, RF Labs, TECOM, and TRAK) 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, solutions for antenna systems, and a wide range of innovative RF and microwave solutions.

Smiths Interconnect is part of Smiths Group plc, a global leader in applying advanced technologies for markets in threat and contraband detection, energy, medical devices, communications, and engineered components. Smiths Group employs around 22,000 people in more than 50 countries.

By unifying the competencies and capabilities of its world-leading interconnect brands, Smiths Interconnect offers:

- Technical excellence and vast market experience
- Comprehensive product portfolio providing customers with a single point of supply across multiple markets
- Advanced engineered solutions integrating the combined expertise of our technology brands to create value for our customers
- Optimized quality through first-class materials, state-of-the-art development practices, and world-class talent
- Robust financial pedigree and reputable heritage of Smiths Group
Technology Brands

EMC
High Reliability RF/Microwave Resistive & Signal Distribution Components
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.

HYPERTAC
Superior Performing Electrical Connectors for the Most Demanding Applications
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.

IDI
High Density Interconnect & Semiconductor Test Solutions with Spring Probe Technology
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.

LORCH
RF/Microwave Conditioning Products with High Selectivity Using Multiple Topographies
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.

MILLITECH
Leader in Millimeter-Wave Technologies & Product Solutions
Specializing in the engineering, manufacturing, and testing of millimeter-wave components, assemblies, and fully integrated subsystems for SATCOM, test and measurement, radar, and scientific applications.

RF LABS
High Frequency Microwave Cable Assemblies & Coaxial Components
High performance microwave cable assemblies and coaxial components supporting high performance operations, application-specific premium interconnects for high durability and harsh environments.

TECOM
Advanced Antenna Systems & Solutions for RF/Microwave Applications
Best-in-class high frequency antennas and positioners for instrumentation, flight termination, datalink, in-flight connectivity, and telemetry applications integrated into the world’s most respected commercial and military platforms.

TRAK
High Reliability RF/Microwave Subsystems & Components
Integrated microwave sub-systems and assemblies, high performance ferrites, and time and frequency systems for defense, commercial aerospace, space, homeland security, and public safety applications.
Commercial Aerospace
We deliver lightweight standard and custom connectivity solutions featuring: high density, high power, EMI/EMP protection, RF, and high speed capabilities in line with the next generation of airframe applications.
- Avionics Equipment
- Engine Systems
- Power Distribution
- SATCOM Connectivity

Industrial
We design durable and robust platform products and customized solutions combining rugged backshells with high reliability contact technologies and easy assembly procedures.
- Heavy Equipment/Machinery
- Servo-Drives & Encoders
- Factory Automation
- Power Supplies

Railway
We offer multiple interconnect technologies able to withstand harsh environments capable of extreme temperatures, pressures, and shock and vibration; ensuring system quality and reliability.
- Rolling Stock
- Signaling
- Infrastructures

Space
We engineer superior NASA and ESA-certified solutions to ensure continuous connectivity within environments where shock and vibration, corrosive atmosphere, and thermal deviations are prevalent.
- GEO/MEO Satellites
- LEO Satellites
- Launchers
- Manned Space Flight
- Ground Support Equipment
**Medical**
We provide solutions that protect, connect, and control critical medical devices that meet requirements for invasive procedures, disposable components, embedded electronics, high cycle life, and sterilization.

- Surgical & Monitoring Systems
- Imaging Systems
- Disposables

**Defense**
We manufacture connector solutions, cable assemblies, integrated microwave assemblies, subsystems, direction finders, SATCOM, datalinks, and antennas designed to achieve optimal system performance in the most demanding environmental conditions.

- Radar
- Electronic Warfare
- Intelligence, Surveillance, Reconnaissance (ISR)
- Communications

**Semiconductor Test**
We develop sockets and probe card products that ensure superior quality and reliability in testing applications. Our solutions support the finest micron pitches while meeting requirements for higher bandwidths.

- Area Array Test
- Package-on-Package Test
- Wafer Level Test
- Peripheral Package Test

**Test & Measurement**
We create high quality connector and cable assemblies that deliver increased phase stability, decreased insertion loss, and design flexibility for long lasting performance in lab and production test environments.

- Electronics Testing
- Automotive Testing
- Telecommunications
Product Overview

50+ Years Experience
Technology
Broad Range of Advanced Interconnect Technologies

Flexibility
High Volume Product Platforms & Complete Tailored Solutions

Service
Global Reach with Local Support
Antenna Systems
Positioners/Controllers

- Our fixed and mobile positioning systems are used in range telemetry, flight termination, airborne and ground datalink, target tracking and jamming, signal intelligence, and direction finding applications. Positioning systems range from man-portable to 7 meter installations. Both positioning/controlling systems and turnkey solutions are available with reflector and feed assemblies reaching 0.5 to 325 GHz. With all positioners designed to meet environmental MIL-STD requirements, developing complete solutions for harsh conditions has become one of our core capabilities.

Airborne/Missile/Space

- Our broad range of off-the-shelf and build-to-print antenna systems are designed to meet program-specific needs. We offer flush mounted, blade and microstrip antennas that maximize performance and minimize physical size. Used for instrumentation, flight termination, datalink, and telemetry applications in aircraft and missile platforms, our antennas support hemispherical and spherical pattern coverage while operating in both normal and extreme thermal environments.

SATCOM

- A complete line of Inmarsat-certified antennas that meet and exceed service specifications. The T-4000 antenna system, used on large commercial, military, and business aircraft, is a high gain, electronically steerable, phased array antenna that supports Inmarsat Aero-H, Aero-H+, and Swift 64 satellite communication services. Our Aero-I-qualified antenna system is designed to meet short and medium-haul aircraft needs with an integrated assembly including the LNA/Diplexer and antenna. This provides a lower cost installation, eliminating the use of internal cabin space and providing better noise-figure performance.

Wideband Antennas

- A vast portfolio of wideband and directional antennas, including log-periodic and horn antennas, ranging from 20 MHz to 325 GHz. For use as standalone antennas or reflector feeds in parabolic antenna systems, they are deployed in broadband surveillance, tracking, and jamming systems. Our vast array of omnidirectional antennas include: conical spirals for broadband surveillance; slant linear bicones for shipboard DF applications; UHF/VHF stackables for air-to-ground communications; and airborne instrumentation antennas.

Best-in-class antenna technologies for critical aerospace and defense applications
Cable Assemblies
Industry leader in manufacturing excellence, tailored performance, and rapid delivery of custom cable assemblies.

**ASR Precision Test**
- High performance VNA test cables for precision testing applications
- Maintains its mechanical configuration for consistent, repeatable test results
- Available with 2.4 mm and 2.92 mm NMD connectors
- Individual or phase matched pairs
- Frequencies up to 50 GHz

**Lab-Flex®**
- Field-proven up to 65 GHz
- 40% lower insertion loss than solid dielectrics
- Solder sleeve cable-connector termination delivers superior electrical performance and highest pull retention
- Shielding: <90 dB
- Stranded center conductors available

**Titan-Flex Test**
- Robust solder termination
- Crush-resistant and durable
- Superior electrical performance
- Optimized to 18 GHz

**Semi-Rigid, Conformable, & Flexible**
- High frequency
- High isolation: Up to >100 dB
- Copper or aluminum jackets
- Range of protective coverings available
Connectors
High Speed
- Standard 100 and 150 \( \Omega \) quadrax and twinax contacts
- Formats MIL-DTL-38999, ARINC 600, MIL-DTL-83527, and D-Subminiature
- Manufacturing to Fibre Channel, Ethernet, Firewire, USB, and DVI protocols

Circular
- Available in metal and plastic shells
- Crimp and solder terminations
- Push-pull and color-coded options

EMI/EMP Filter
- Intermateable and interchangeable with standard non-filter connectors
- C, L, and Pi style EMI filters
- TVS protection meeting the requirements of RTCA D160, Section 22, up to Level 5

High Power
- Rugged, single, and multi-way formats
- Excellent power performance up to 700 Amps
- Suitable for harsh environmental conditions
- High number of mating cycles

Modular/Rectangular
- Configurable with signal, power, RF, twinax, triax, quadrax, and fiber optic contacts into a single connector
- Guided hardware for blind mating

PCB
- Low, medium, and high density connectors with long life cycle
- Signal, power, coaxial, and high speed configurations
- Board-to-board, cable-to-cable, cable-to-board, and stacking

Spring Probe
- Low profile, high compliance ratio
- Z-axis compliance
- Blind mate engagement
- Low, stable resistance with long cycle life

High reliability interconnect solutions that create value for customers
Ferrites & Passive Sub-Assemblies
Coaxial
- Wide range of isolators, circulators, loads, terminations, and attenuators
- Designed to operate from 300 MHz to 240 GHz
- Unique solid connectors available including female and male orientations, and SMA, TNC and SMP styles
- Male/female connector barrel machined to be integrated in housing
- All products are optimized for thermal and dynamic operational environments

Microstrip, Surface Mount & Stripline
- Isolators and circulators
- Operating in assigned bands from 400 MHz to 31 GHz
- Used in a variety of interfaces including MIC, tabbed, and SMD interfaces
- Microstrip offers a unique blend of broad band operation, low mass and low profile
- Surface mount and Stripline suitable for pick and place and reflow soldering

Waveguide
- Isolators, circulators, combiners, couplers, loads, transitions, terminations, and multi-function assemblies
- Breadth of products operate from 1.0 GHz to 53 GHz
- All products are optimized for thermal and dynamic operational environments
- High power devices are supplied as junction or differential phase shift types
- Where appropriate, devices are supplied with cooling/thermal management systems and additional functionalities as required

High performance ferrite components optimized for challenging and harsh environmental applications
Filters
**Cavity**
- 30 MHz to 40 GHz
- Bandwidth: 3 dB from 0.5 to 66%
- High “Q”, low loss
- High power
- Helical, combline, interdigital, and waveguide

**Discrete**
- 5 MHz to 7.5 GHz
- Bandwidth: 3 dB to >100%
- Band-pass, low-pass, high-pass, or notch
- Surface mounts, pins or connectors
- Monotonic and elliptic responses

**Ceramic**
- 400 MHz to 6,000 MHz
- Bandwidth: 0.5 to 10%
- Surface mount, PC mount, and connectorized options
- Stand-alone or diplexed

**Integrated Assemblies**
- 500 MHz to 18 GHz
- 2 to 9 channels available
- Use of both MMIC and solid state switching
- Connector or RF pin launch
- Hermetic seal available

**Tunable**
- 24 MHz to 4,000 MHz
- Direct readout
- Octave tuning
- High power
- Digitally controlled available

**Waveguide**
- Frequency range: 2 GHz to 325 GHz
- 2 through 20 sections
- W/G, flange, or connectorized
- Stand-alone filters or diplexed
- WR-159 to WR-03
- Band-pass, low-pass, high-pass, and notch filters

**Innovative filter products optimized for RF and microwave applications**
Frequency Multipliers & Comb Generators
- SRD and NLTL-based comb generators
- Active and passive multiplier chains
- Up to full waveguide bandwidths
- Standard models available through 305 GHz

Frequency Sources
- Low phase noise
- Low spurious
- Synthesized and direct

Receiver Protectors
- Communications and RADAR receiver protectors
- Incorporating discrete diode and MMIC limiter, LNA, receiver filter, T/R blanking switch, and ferrite isolator products

Master Oscillators
- Ultra-low phase noise
- Crystal based
- Ovenized and nonovenized

Transceivers
- Communications and RADAR
- Integrated BDC/BUC, power supply, 10 MHz reference, and 25W power amplifier

Up/Down Converters & Receivers
- Single and multi-channel
- Control at high dynamic range
- Phase and gain matching
- Radiometer and RADAR front-ends
- Through 325 GHz

Switched Filter Banks
- Shunt, series, and series-shunt discrete N-throw switches
- Comb selector filters or contiguous overlapping bonds
- High power handling and fast switching options
- C to KA Band

Advanced solutions for the most challenging integrated assemblies
Amplifiers
- Broad array of power amplifiers (AMP) up to 16-way, and low noise amplifier (LNA) solutions
- Standard models from 18 to 110 GHz
- Custom variations of standard MMW components, as well as multi-component assemblies and solutions
- Superior performance and efficiency for high frequency applications
- GaN, GaAs, InP, and SiGe technologies

Antenna & Quasioptical Products
- Full range of MMW antenna products and technologies including aperture, reflector, and lens-based antennas
- Standard models from 18 to 325 GHz
- Custom designed antenna arrays available
- Additional offerings: polarizers, orthomode transducers, monopulse comparators, and waveguide rotary joints

Active Components
- Full waveguide band balanced mixers and models
- Fundamental, harmonic, biased, and I/Q models available
- Active and passive multiplier chains
- SPDT and PDT switches
- PIN diode based attenuators
- Standard models from 18 to 325 GHz

Passive Components
- Full waveguide band isolators and circulators
- High power waveguide circulators for protecting TWTs
- Standard models from 18 to 260 GHz
- Low-pass, band-pass, and high-pass waveguide filters
- Waveguide diplexers and triplexers
- Notch filters

Highly renowned millimeter-wave technology products and systems from 8 to 325 GHz

Test & Measurement
- Metrology-grade lab assets
- VNA extenders
- Direct reading and motorized rotary vane attenuators
Radio Frequency Components
### Attenuators
- Fixed and temperature variable up to 50 GHz
- Entirely passive with no signal distortion
- Superior broadband performance
- Space and military-qualified
- Numerous dB values

### Resistors
- Optimized for parasitic capacitance reduction
- Wide range of resistance values
- RoHS, non-magnetic, and low PIM versions
- Designs up to 1K and 40 GHz
- SMT chips, tab and cover, flange-mounted, and rod

### Diamond RF Resistives®
- Highest power and frequency, smallest size
- Extremely low parasitic capacitance
- Footprints from 0402 (20W) to 1320 (125W)
- Size and weight reduction in space and high reliability applications
- Easy-to-use packages: chips, flange, and tabbed

### Signal Distribution
- Hybrid, directional, and Doherty
- SMT couplers >8 GHz
- Available in all mobile frequencies
- Multi-octave models for wideband applications

### Terminations
- Tuned circuits for lowest VSWR
- Designs up to 1K and 40 GHz
- Diamond, Alumina, BeO, and ALN substrates
- Large selection of chip styles, planar, and SMT

### Extensive portfolio of commercial and high reliability components in a variety of packages up to 50 GHz
Semiconductor
Test
Test Sockets

- Extensive portfolio of spring probes and other contact technologies
- Variety of verification tools and design standards to ensure simultaneous engagement and alignment to both sides of the package
- Featuring Silmat® low profile contact technology
- High speed signal integrity

WLCSP Probe Head

- Utilizing spring probe and other contact technologies
- High site-to-site test parallelism
- Superior signal integrity and high speed/RF testing capabilities
- Stable contact resistance over 750K cycles

World’s most comprehensive offering of spring probe-based test technologies
Time & Frequency Systems
Distribution Systems
- Stand-alone and modular solutions
- Pulse rates, reference frequencies, and time codes
- Redundant and non-redundant configurations
- Low phase noise reference frequency distribution

GPS Clocks
- High performance, cost effective, small form factor
- High stability ovenized oscillator or optional rubidium oscillator
- AC and DC power inputs to meet power requirements
- Remote configuration and monitoring through Ethernet and RS-232

Network Time Protocol (NTP) Servers
- Designed for time synchronizing networks using IRIG-B as the time reference
- Accepts a fiber optic or wireline IRIG-B time code
- Time synchronization of SIPSNET and NIPRNET
- Remote configuration and monitoring via Ethernet and RS-232

Time & Frequency Systems
- Dual-redundant modular system
- Designed for high reliability applications requiring uninterruptable 24/7 service
- Redundant GPS RX, high stability OCXO or rubidium, time and frequency generator, and NTP servers
- Six 4-channel distribution modules providing 24 outputs (expansion shelf available for more outputs)

Tactical Global Positioning Systems (GPS)
- Compact, rugged enclosure
- Contains a rubidium oscillator and low phase noise clean-up oscillator, meeting frequency stability and phase noise requirements of the military SATCOM system
- Remote configuration and monitoring via Ethernet and RS-232
- Standard C/A-Code GPS or optional SAASM GPS

Time Code Processors
- Modular construction with over 100 module options
- Standard C/A-Code GPS or optional SAASM GPS
- Wide variety of outputs are available
- Remote configuration and monitoring is available through Ethernet and RS-232

Next generation synchronization solutions for the most critical applications
Global Capabilities

Smiths Interconnect’s in-house capabilities encompass design, development, manufacturing, and testing to respond quickly and accurately to customers’ needs and provide the most reliable connectivity solutions.

Engineering

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

Prototyping

- CNC Turning & Milling Centers
- Cabling/Prototype Assembly
- 3D Printing
- Ceramic Grinding
- EDM
- Circuit Board Routing

Testing/Qualification

- Electrical Acceptance & LOT Test
- RF Testing Capabilities up to 325 GHz
- High Speed Digital
- Anechoic Chamber Testing
- ESS Environmental Qualification
- ESS Temperature, Shock & Vibration
- Metallurgical
- Real-Time X-Ray
- Near Field/Compact Antenna Range
- Thermal Vacuum
- High Power RF Testing
Locations
# Connecting Global Markets

Smiths Interconnect’s strong focus on serving international markets and customers is supported by our global network of sales offices across America, Europe, and Asia.

<table>
<thead>
<tr>
<th>UK Headquarters</th>
<th>US Headquarters</th>
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<tbody>
<tr>
<td>London, UK</td>
<td>Stuart, FL</td>
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<tr>
<td>+44 20 7004 1600</td>
<td>+1 772 286 9300</td>
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### Americas

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<thead>
<tr>
<th>Costa Mesa, CA</th>
<th>Hudson, MA</th>
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<tr>
<td>+1 714 371 1100</td>
<td>+1 978 568 0451</td>
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<th>Milpitas, CA</th>
<th>Northampton, MA</th>
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<td>+1 413 582 9620</td>
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<td>+1 813 901 7200</td>
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### Europe

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<tr>
<th>Deggendorf, Germany</th>
<th>Dundee, UK</th>
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<tr>
<td>+49 991 250 120</td>
<td>+44 1382 427 200</td>
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<th>Elstree, UK</th>
<th>Rouen, France</th>
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<tr>
<td>+44 20 8236 2400</td>
<td>+33 2 32 96 91 76</td>
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### Asia

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<tr>
<th>Shanghai, China</th>
<th>Singapore</th>
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<tr>
<td>+86 21 3318 4650</td>
<td>+65 6846 1655</td>
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<th>Suzhou, China</th>
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<td>+86 512 6273 1188</td>
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We aim to be your global partner for innovative connectivity solutions where reliability, high quality, technical excellence, application knowledge, product expertise, and a reputation for excellence is vital.