

# Semiconductor

## Test Capabilities

# About Us

**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, defence, space, medical, rail, semiconductor test and industrial markets.

Smiths Interconnect provides test socket and probe card solutions that ensure superior quality and reliability in IC testing applications. Our extensive product portfolio accommodates devices with the finest micron pitches as well as those with very high bandwidth requirements.

Our technology brands (EMC, Hypertac, IDI, Lorch, Millitech, RF Labs, TECOM, and TRAK) are synonymous with exceptional performance whenever a technologically advanced, high quality solution is required to ensure reliability and safety

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
- A 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 methods, 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 and applications. Extensive portfolio of RF devices used to attenuate, level or terminate signals available in a variety of packages and footprints.



**HYPERTAC**

High Performance Electrical Connectors for the Most Demanding Applications

Premium interconnect solutions for electrical and electronic applications requiring superior quality, performance and reliability. Hypertac connectors utilize the superior performing 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. Off-the-shelf and custom products proven to deliver the best solution for the customer's specific application.



**LORCH**

RF/Microwave Conditioning Products with High Selectivity Using Multiple Topologies

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 Technology & Product Solutions

Specializing in the engineering, manufacturing, and test 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 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.

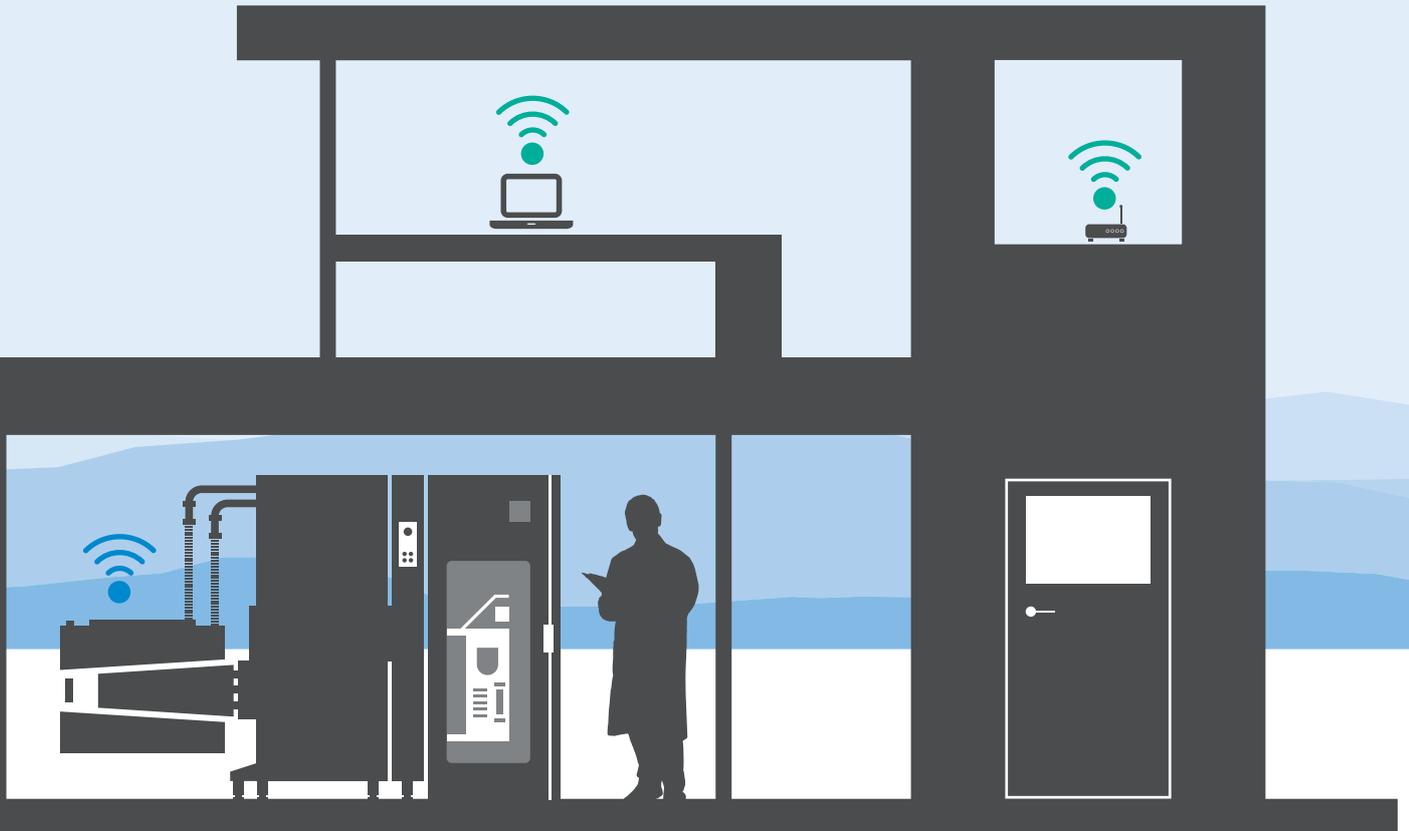


**TRAK**

High Reliability RF/Microwave Subsystems & Components

Integrated microwave subsystems and assemblies, high performance ferrites, and time and frequency systems for defence, commercial aerospace, space, homeland security and public safety applications.

# Applications



## Area Array Test



- GPU
- CPU
- Artificial Intelligence
- Deep Learning
- High-speed Memory
- Analog RF

## Package on Package Test



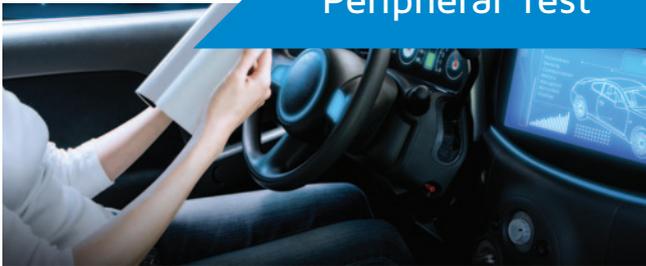
- Smart Phone CPU
- Wearable
- NFC - Near Field Communications

# Providing A Competitive Advantage

Proliferation of data devices and the growth of cloud computing, artificial intelligence and big data is resulting in complex systems and new materials that require rigorous, efficient validation. Smiths Interconnect's test sockets and probe card solutions ensure superior quality and reliability in the semiconductor test applications. Our best-in-class engineering, development and technical expertise ensure support of automated, system level and development platforms for area array, peripheral, wafer level and Package on Package (PoP) as well as high performance spring probe technology and cable assemblies.



## Peripheral Test



- Wireless Communications
- Infotainment
- Automotive
- Industrial

## Wafer Level Test



- Bluetooth
- Wi-Fi
- Power Management



# Area Array

Test



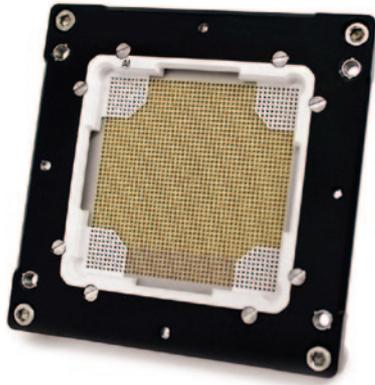
**Top:** Smiths Interconnect's area arrays are enabling technologies in high speed test applications.

## Quality and Reliability

Smiths Interconnect offers high pin-count and high speed signal, with the new structure of low power inductance, higher current carrying capacity and lower contact embedding quality and reliability in testing of GPUs, CPUs and other high speed digital applications.

## Key Benefits

- Easily configurable
- Field maintainable
- Entirely signal path shielded (DaVinci only)
- Controlled impedance (DaVinci only)
- High speed analog and digital

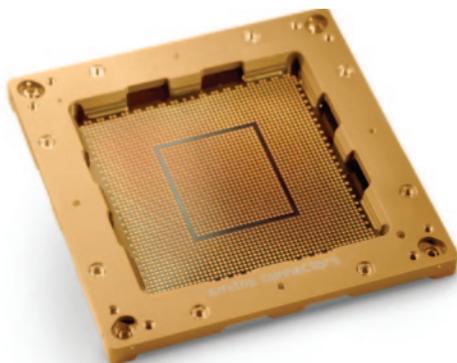
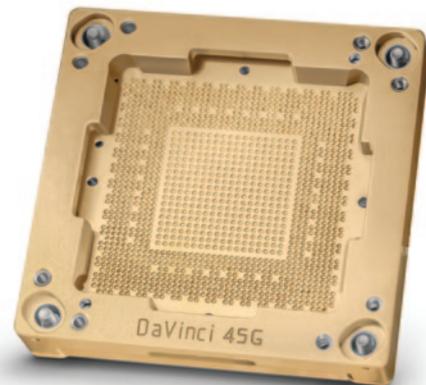


## Array Test Socket

- Innovative design with a wide range of material options
- Proprietary engineering plastic body for larger size BGA / LGA test
- Precision alignment calculation
- Replaceable floating or fix device alignment guide feature
- Z-axis tolerance stacking analysis
- FEA analysis
- Customization and design flexibility

## DaVinci – High Speed Test Socket

- High performance coaxial socket
- Proprietary insulated metal socket
- Spring probe simplicity
- Entire signal path shielded
- Insensitive to temperature and humidity
- Extreme rigidity (very low deflection rate)
- Impedance controlled
- Low contact resistance
- High current carrying capacity
- High speed: up to 45 GHz / 32Gbps



## Silmat® Array Test Socket

- Electrically transparent contact
- Low and stable contact resistance
- High frequency bandwidth > 80 GHz
- Signal path length < 1mm



# Package on Package

Test



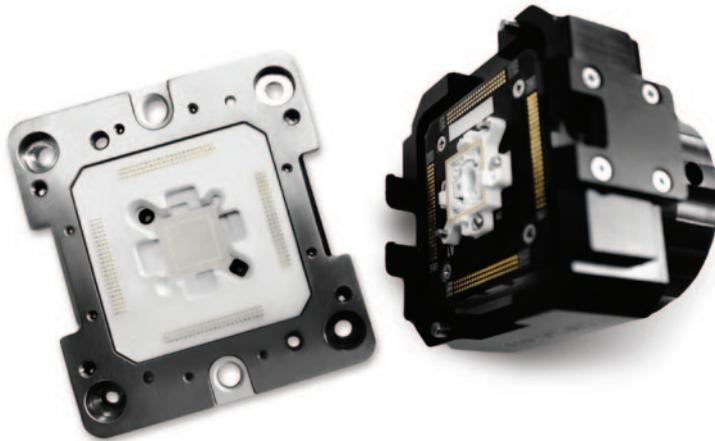
**Top:** Smiths Interconnect's PoP test solutions are used in smart phone CPUs and portable devices.

## Best-in-class Design

Smiths Interconnect's advanced, low profile contact technology enhanced by best-in-class design, engineering and test development practices provided customers with a competitive edge in Package-on-Package (PoP) test of smart phone CPUs and wearable device chips. The unique ability of our PoP test sockets to accurately and simultaneously align both the upper and lower device pads increases fault coverage and lowers the cost of test.

## Key Benefits

- Maximum signal integrity
- Reduced maintenance and tester downtime through quicker changeovers
- Long life cycle
- Extreme precision
- Memory function availability during test
- Simultaneous alignment

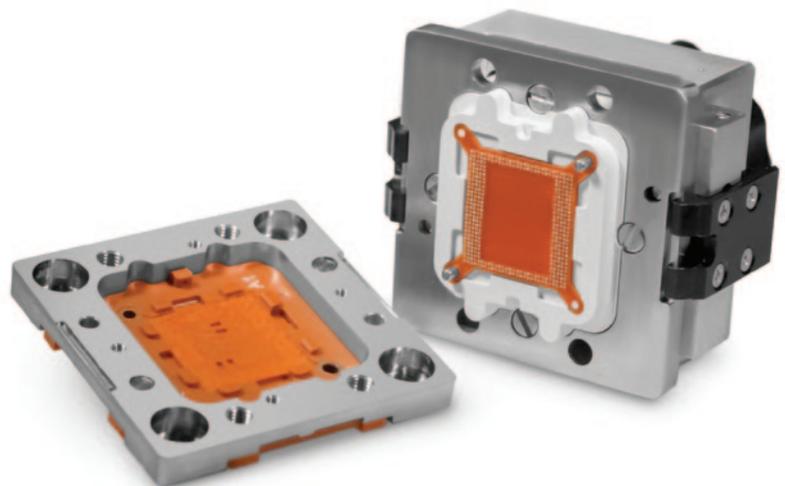


## Euclid PoP Test Socket

- Memory-bearing, memory-less and manual sockets
- Advanced alignment features for both top and bottom devices
- Refined analysis tools ensure production-ready solutions
- Controlled impedance available for maximum signal integrity
- Features optional coaxial interposer for memory-less test
- RF simulation used to determine appropriate signal integrity solution
- 6 Gbps options available
- Tester or socket supplies memory function during test through topside attach features
- Solutions are valid in both manual and automated test environments

## Silmat® PoP Test Socket

- Electrically transparent contact
- Solderless memory replacement
- Short signal path <math>< 1\text{mm}</math>
- Conformal to recessed LGAs
- High frequency bandwidth > 40 GHz
- Low inductance
- Long cycle life > 500,000 cycles (application dependent)
- No PCB or solder ball damage
- Minimal labour and tester downtime





# Peripheral

## Test



**Top:** Smiths Interconnect's technology is widely used in peripheral test of wireless communications, automotive and industrial applications.

## Consistently Stable

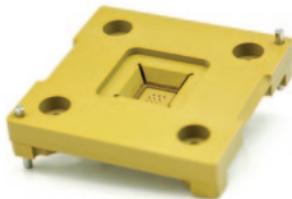
Smiths Interconnect's innovative test sockets offer significant advantages in peripheral test of automotive and industrial applications. Our peripheral test solutions utilize vertical spring probe technology to provide consistently low and stable contact resistance with minimal cleaning and extended mechanical life.

## Key Benefits

- Product stability
- Easy maintenance
- Design flexibility
- Wide temperature range
- High compliance

## Celsius Peripheral IC Package Test Socket

- Wiping action ensures good device contact with minimal board side scrub
- Requires minimal cleaning
- Patented technology
- Suited for tri-temp peripheral testing
- Resistance < 20 m
- Bandwidth > 10 GHz @ -1 dB
- Temperature rated: -50°C to 175°C



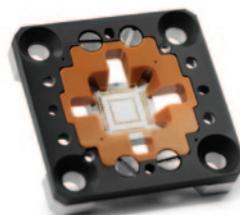
## Gutenberg Peripheral Lead Frame Test Socket

- Excellent co-planarity
- High suitability to auto cleaning
- High reliability
- Mendeleev contact technology available
- Minimised overdrive and simplified bring-up
- Analysis of thermal, alignment and pin travel
- Capable of high parallelism



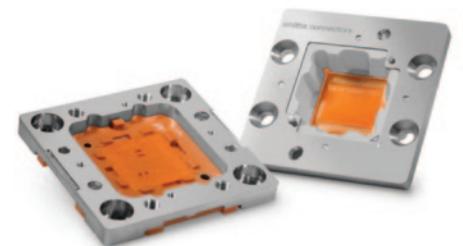
## Peripheral IC Package Test Socket

- Innovative design with a wide range of material selection
- Precision alignment calculation
- Replaceable device alignment guide feature
- Customisation and design flexibility
- Harder Mendeleev spring pins



## Silmat® Peripheral IC Package Socket Test

- Electrically transparent contact
- Low, stable contact resistance
- High frequency bandwidth > 80 GHz
- Signal path length < 1mm





# Wafer Level

Test



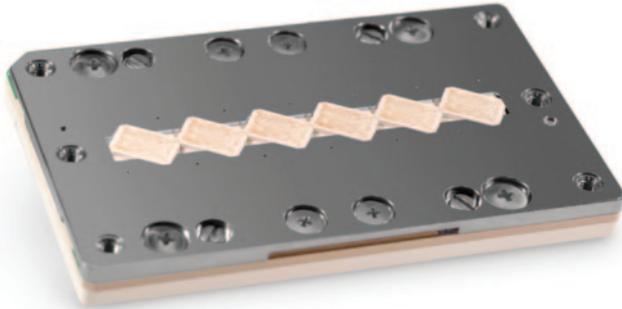
**Top:** Smiths Interconnect offers advanced technology in wafer level packaging testing.

## Ensuring Product Performance

As phones and smart devices get more powerful, so do the integrated chips that support them. Smiths Interconnect's innovative wafer-level packaging testing solutions help customers deliver higher quality products by ensuring the chips in them perform as they should.

## Key Benefits

- Reliable RF signal integrity
- Excellent compliance and contact force
- Easy maintenance
- Quick installation



## Monet Probe Head

- Reduced cost of ownership
- End user serviceable
- Replaceable cartridges
- High degree of parallelism
- Ideal for pitches  $\geq 200\mu\text{m}$
- Short signal path  $< 3\text{ mm}$
- Stable C-res over 750k cycles
- Superior signal integrity
- High contact density
- Short length with optimized compliance
- Reliable contact force
- HVM robustness
- Excellent accuracy

## Volta Probe Head

- Minimal compression force
- Exceptional mating cycles
- Unrivaled signal reliability
- Optimized travel at 500, 400, 350, 300  $\mu\text{m}$  pitch
- Exceptional DC and RF performance
- Floating spring probe designs allow for seamless deployment in test WLCS
- Replacement for cantilever and traditional vertical probe card technologies
- Easy maintenance
- High performance engineering plastic and ceramic material
- Lowest trip co-planarity



# Signal Path

Contacts & Cables



# Quality & Clarity

Smiths Interconnect's signal path contacts and cables ensure the quality and clarity of the entire signal path from the tester through to the device under test.

Our high performance cables are designed to rigorous quality standards in support of customer technical requirements with attention to quick delivery. Our extensive spring probe portfolio is developed to ensure the highest possible test yields and longest cycle life through careful material selection and consideration of spring force to optimize the balance between contact reliability and socket fatigue.

Our broad portfolio of high reliability cable assemblies offers our customers the best solution for their application with short lead times and technical assistance during the initial design phase.

## Key Benefits

- Premium, high performance flexible cable assemblies with the lowest insertion loss and highest frequency response when compared to other cables of the same diameter (Lab-Flex® family)
- Solutions for test application up to 18 GHz in a durable, cost effective, premier test cable (Titan-Flex family)
- Cost effective alternatives to our premium Lab-Flex® product line, for applications where slightly higher loss is not an issue (Mini-Flex family)

## Mendeleviev Homogeneous Tips

- 100% precious metal tips
- Optimized for aggressive cleaning
- Sharper, harder tips for enhanced first pass yields
- Significantly reduced cost per cycle
- Incomparable durability



## Spring Probe Technology

- Internally designed and manufactured
- Dual plunger, floating probe and modular designs
- 250 µm pitch and higher
- Long cycle life
- Low and stable contact resistance
- Superior compliance
- High signal integrity



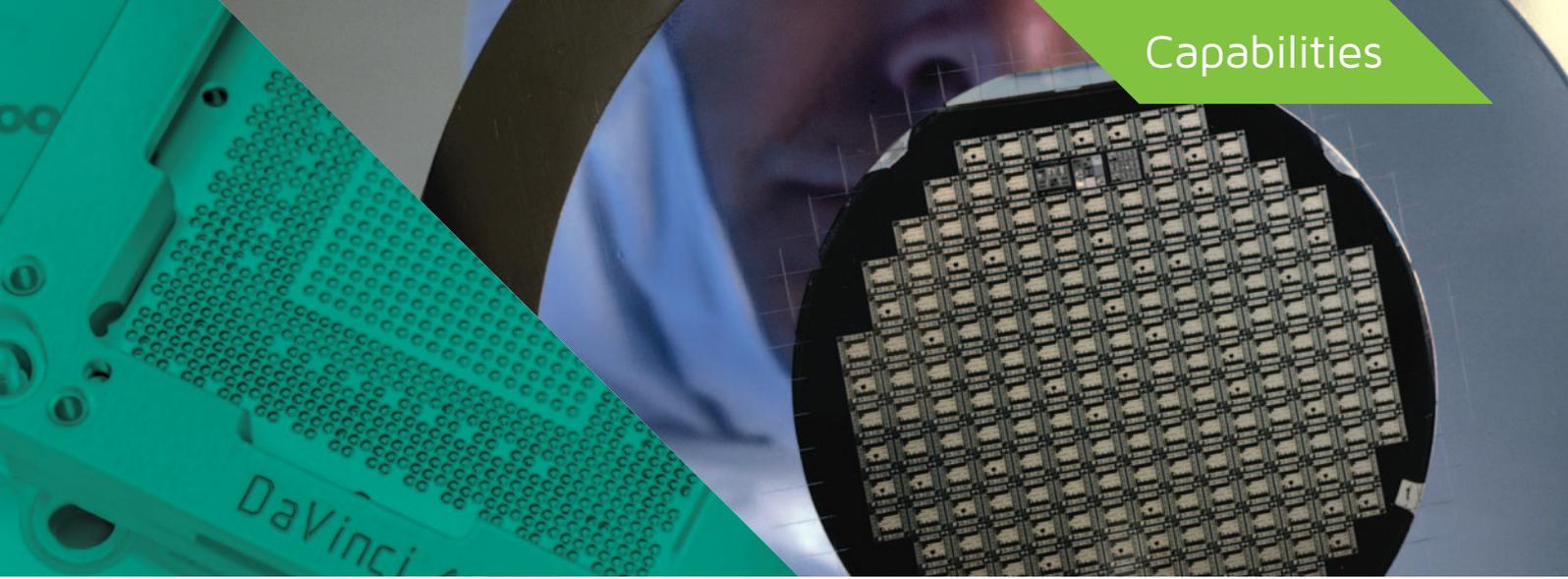
# Capabilities

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.

## Certifications Standards Compliance

- AS9100C
- ISO 9001
- ISO 14001
- ISO 13485
- OHSAS 18001:2007
- QPL (MIL-DTL-55302)
- MIL-I-45208A





## Engineering

- 3D EM Modelling
- Advanced RF & System Modelling
- CAD/CAM & Solid Modelling
- Finite Element Analysis
- Reliability Analysis

## Prototyping

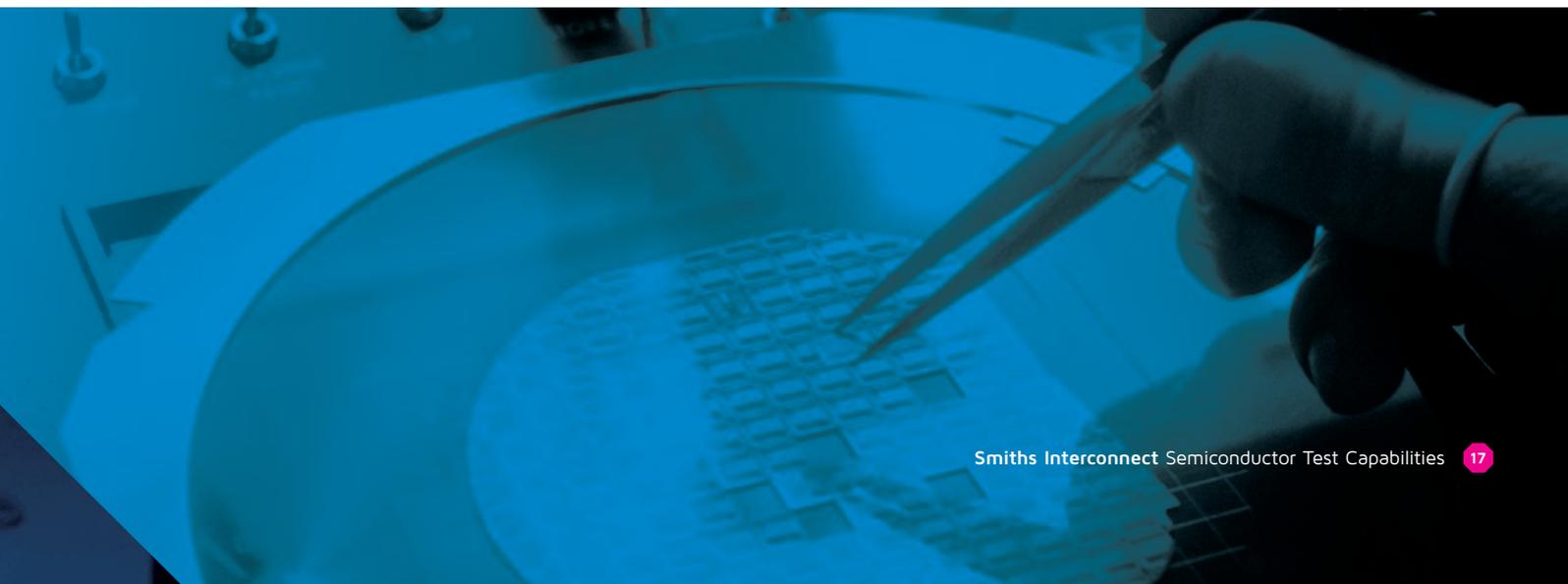
- CNC Turning & Milling Centres
- Cabling / Prototype Assembly
- 3D Printing
- Ceramic Grinding
- EDM
- Circuit Board Routing

## Manufacturing

- Precision Machine Shops
- Connector, Contact & Cable Assembly
- Automated PCB Assembly & Inspection
- Automated Hybrid Assembly
- Automated Test & Tune
- System Integration
- Validation Testing

## Testing/Qualification

- Electrical Acceptance & Lot Test
- Mechanical
- Environmental
- RF Test Capability 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
- Probe Analysis Capabilities



# 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.

## Americas

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

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