

SOLUTIONS FOR LOW-EARTH-ORBIT SATELLITE BUSES AND PAYLOADS

BALANCING RELIABILITY, COST, AND TIME WITH HIGH-PERFORMING
COTS AND SPACE-QUALIFIED SOLUTIONS

Balancing reliability, cost, and time with high-performing COTS and space-qualified solutions

Providing Broad Options for the Optimum Balance

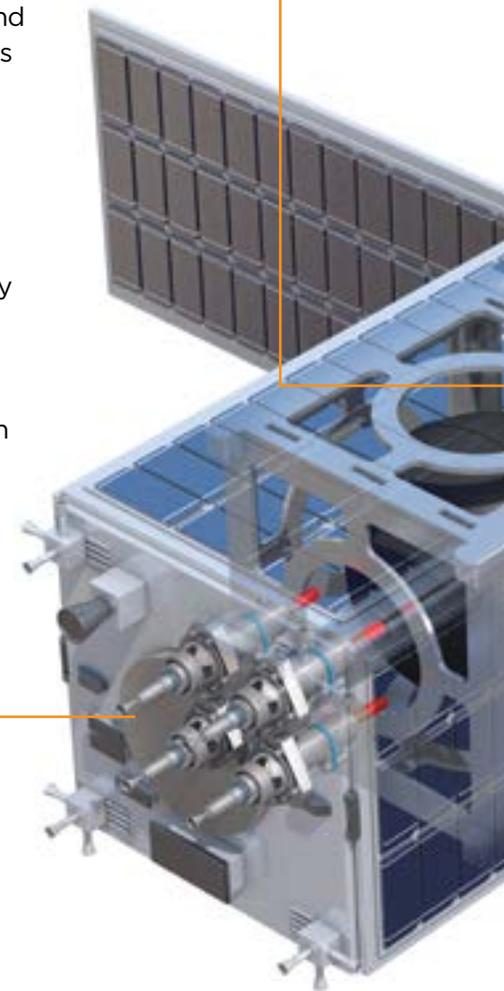
Today, the frontier of low-earth-orbit satellite networks is rapidly expanding. A vast constellation of cross-linked satellite platforms promises access to the Internet and mobile-phone voice and data across the entire planet. These opportunities have launched a new era in aerospace engineering, inspiring unprecedented innovation in low earth orbit (LEO) satellite design.

That's why TE Connectivity (TE) offers both space-qualified and commercial-off-the-shelf (COTS) components to meet novel bus and payload needs. Space-qualified solutions comply with demanding vibration, offgassing, electrostatic-discharge, tin-whisker-mitigation, temperature, radiation, and size-weight-and-power (SWAP) requirements. TE also accommodates new mission profiles where the performance, economy, and ready availability of COTS and COTS+ solutions are suited to LEO satellites with limited life cycles.

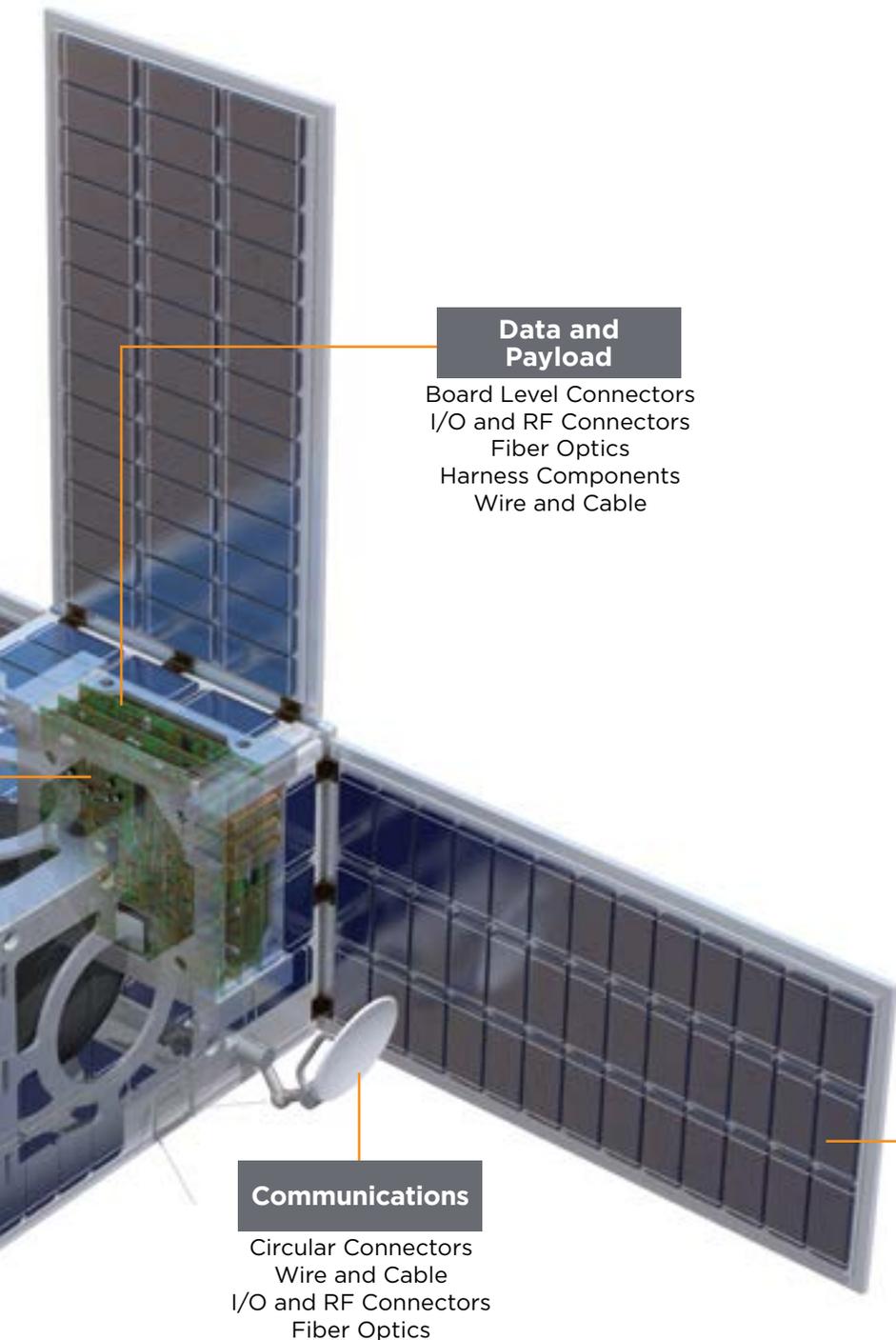
Our broad portfolio helps designers reach the optimum balance between performance, cost, and time to market. With a heritage in satellites beginning with Explorer 1, TE has been at the forefront in developing space-qualified SpaceVPX, VITA, and MIL-SPEC compliant products. That expertise extends to offering "up-ruggedized" COTS+ products commonly used in military, avionics, automotive, and other qualified applications. And benefitting from world-class-manufacturing, our COTS products are being applied under conservative design rules in next-generation satellite platforms. Discover how our high-performing solutions can help you reach the right balance for your mission.

System Interconnect
Circular Connectors
Wire and Cable
I/O and RF Connectors
Backshells

Propulsion
Relays and Contactors
Wire and Cable
Harness Components
Sensor Solutions



Solutions for Low-Earth-Orbit Satellite Buses and Payloads



Data and Payload

Board Level Connectors
I/O and RF Connectors
Fiber Optics
Harness Components
Wire and Cable

Communications

Circular Connectors
Wire and Cable
I/O and RF Connectors
Fiber Optics

Solar Panels

Wire and Cable
Circular Connectors
Sensor Solutions
Relays and Contactors

Propulsion

Relays and Contactors
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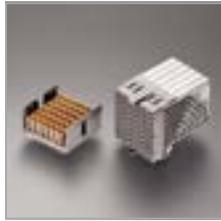
Circular Connectors
Wire and Cable
I/O and RF Connectors
Fiber Optics

Solar Panels

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Circular Connectors
Sensor Solutions
Relays and Contactors

Solutions for Low-Earth-Orbit Satellite Buses and Payloads

BOARD-LEVEL CONNECTORS



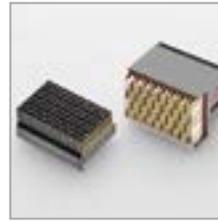
STRADA Whisper High Speed Backplane Connectors

High Speed

- Transfers data at speeds of 25 Gbps and offers unparalleled scalability up to 112 Gbps

Reliability

- Industry leading crosstalk performance
- Robust signal pins and ground shields
- Simple upgrade path



VITA 46 MULTIGIG RT-3 AND MULTIGIG RT 2-S Connectors

Speed

- Data transfer rates to 25+ Gb/s

Rugged

- Ruggedized multipoint contact system meets VITA vibration standards

Capable

- Modular design with backward interoperability



Fortis Zd Ruggedized Connectors

High Speed

- Data transfer rate 10+ Gb/s
- 2 and 3 pairs modules
- 3-bay metal shield modules

High Performance

- Extreme mechanical and electrical performance
- 4-points of contact per M55302
- Modular design allows for user configurability
- Space-compatible materials



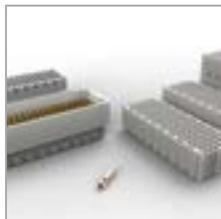
VITA 46 MULTIGIG RT 2-R Connectors

Ultra-Rugged

- Withstand high shock and vibration levels
- Redundant 4-point contact interface

Optimized Performance

- Supports data rates to 10+ Gb/s
- Compliant to VITA 46 standards
- Modularity and flexibility with a pinless wafer design
- Lightest weight VPX solution on the market



Mezalok Mezzanine Connectors-VITA 61 and VITA 48.8

Compatible

- Data transfer rate of 16+ Gb/s
- 114-position, compatible with XMC 2.0 VPX structure 10 mm to 18 mm stack heights availability
- 17 mm stack height compliant to VITA 48.8
- 60 and 320-position, 10 and 12 mm stack heights

Robust

- 4-points of contact per M55302
- Highly reliable, compliant with VITA 47 and 72 HALT
- Designed for excellent thermal stability and durability



VITA 62 MULTIBEAM XLE Power Connectors

Offering

- Standard connectors for 20 A and 50 A with signals. Connectors for 270 VDC up to 70k altitude
- 3-phase connectors
- 50 and 30 micron Au interface
- Hot plug capable

SPACE VPX



Space VPX

Rugged

- Configurations support VITA 78 SpaceUM (utility/management) modules
- Supports +125°C temp life
- Space-compatible materials

Solutions for Low-Earth-Orbit Satellite Buses and Payloads

CIRCULAR CONNECTORS



DEUTSCH Wildcat 38999 Connectors

Space and Weight Savings

- Almost double the contact density of MIL-DTL-38999 connectors
- Lightweight materials

Rugged

- Threaded anti-vibration coupling
- Scoop-proof interface
- Aggressive fluid resistance and dust ingress prevention



DEUTSCH 014 Series Connectors

High Reliability

- Pyrotechnic connectors offer reliability under harshest high-temperature conditions
- Meets ESA/SCC 3401 grade requirements
- Bayonet coupling for fast connections



DEUTSCH ACT Composite Connectors

Light Weight

- Composite shell
- Up to 40% lighter than DTS

Durable

- 2000 hrs salt spray for corrosion resistant
- Shell is resilient to impact



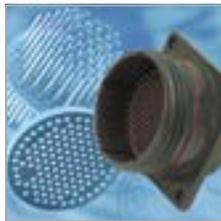
DTS 38999 Series III

Capable

- Lightweight
- Triple-start, self-locking threaded coupling

Space Qualified

- Class G qualified



DEUTSCH Filtered Connectors

Customizable

- Broad range of standard and custom options
- Rugged ceramic capacitors and inductors are used for the filtering
- Matched to application requirements



MIL-DTL-38999 Series IV

High Performance

- Optimized for SWAMP area applications
- Visual, audible and tactile full-mate indicators
- Quick-disconnect breech coupling mechanism

Space Qualified

- Class G qualified



DEUTSCH Hermetic Connectors

High Performance

- Maintains a pressure differential between the two sections
- Gastight glass-to-metal sealing
- Withstand high pressures, extreme temperatures and high vibration

Versatile

- Wide range of connector types and styles



DEUTSCH DBAS 9 Series Connectors

High Reliability

- Easy and secure locking with circular push/pull coupling ring for 100% mating
- -55°C to +200°C
- Scoop-proof shell

Standardized

- Insert arrangements and contacts are MIL-DTL-38999 Series III compatible

Versatile

- Hermetic, rackable, lanyard, and custom configurations



DEUTSCH DBAS 7 Series Connectors

High Reliability

- Easy and secure locking with circular push/pull coupling ring for 100% mating -55°C to +200°C

Versatile

- Hermetic, rackable, lanyard, dead-face, cryogenic, and custom configurations
- Meets ESA SCC 3401, Ariane 5, and Vega requirements

Solutions for Low-Earth-Orbit Satellite Buses and Payloads

WIRE AND CABLE



Raychem HI-FLEX Power Cable

Spec 80 FlexLine

- Operating temperature range: -65°C to +200°C
- Single and dual wall constructions
- Optional high strand count for increased flexibility

SHF-260

- Operating temperature range: -65°C to +260°C (10k hours)
- Tight routing bends without jacket wrinkling or cracking
- Conductors available in nickel coated copper



Raychem High-Speed Copper Cable

Rugged Choices

- Reduced size and weight
- Harness component system compatibility
- Custom constructions available

High-Speed Protocols

- Cat 5e, Cat 6a, 100Base-T, CANbus, IEEE 1394, USB 2.0/3.0, DVI, Fiber



Raychem SPEC 55 Signal and Power Radiation XL-ETFE Space Wire

Performance

- Excellent abrasion and cut-through resistance
- Excellent flexibility
- Low-fluoride and Electroloss filtering options
- Smallest and lightest performance wire
- Mechanically tough, low outgassing
- Meets ESA requirements ESCC 3901/012, /020 and /022

Mil Spec version available



Raychem Cheminax Controlled Electrical Cable

High Performance

- 25-40% smaller and lighter than RG cables
- Improved electrical performance over RG cables
- Custom constructions available
- Operating temperature range: -65°C to +200°C

Adaptable

- Small size, lightweight
- Coax, twinax, triax, balanced line, data bus available

Solutions for Low-Earth-Orbit Satellite Buses and Payloads

RECTANGULAR I/O AND RF



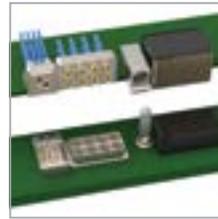
NanoRF VITA 67.3 Modules

Performance

- High frequency 70 GHz contacts

Offering

- Nanominature coax contacts with packaging designed for harsh environments
- 0.110 pitch compared to 0.240 SMPM pitch
- Precise alignment due to floating plate design
- RF-Optical hybrid modules
- Full range of contacts and tools



VITA 67.1 and VITA 67.2 Modules

Performance

- High frequency up to 40 GHz

Offering

- Full range of SMPM RF modules
- SMPM blind mate as well as special OSMM threaded mates
- Space and weight savings with aluminum modules
- Full range of contacts and tools



DEUTSCH EN4165/ARINC 809 Connectors

Save Weight, Control EMI

- Wide range of modules for signal and power
- Excellent EMI performance
- Robust composite shell saves weight



RF Connectors, Cable and Cable Assemblies

More Choice, More Performance

- Standard, subminiature, and microminiature interfaces and frequencies
- Flexible and semi-rigid cable
- Qualified to MIL-PRF-39012, Mil-DTL-83517, MIL-PRF-55339



DEUTSCH UR and RE Series Connectors

High Reliability

- Low general magnetism and outgassing

Extreme Weight and Space Savings

- Lightweight, high-density connector
- Companion RE series is intermateable and recommended for nonflight applications



DEUTSCH D-PASO Series Connectors

Capable

- Compact, ultra-flat designed for solar arrays
- Size 20 contacts: 7.5 A current rating

Robust

- High reliability, high density
- Extreme temperature range of -175°C to +130°C



Microminiature Connectors

Rugged Reliability

- High shock and vibration ratings
- Wide temperature range: -200°C to +200°C
- Lightweight and space-proven
- Low outgassing



AMPLIMITE ULTRA-LITE Subminiature-D Connectors

Weight-Saving Design

- Ultra-lite connector features up to 20% weight savings
- Designed for input/output and product break harnessing

Capable

- Improved EMI performance
- NASA qualified designs



MTC Connectors

Space-Saving Design

- Low profile for space and weight savings
- High density packaging
- Environmental sealing
- EMI protection
- Signal and power contacts



369 Space Series Connectors

Rugged and Reliable

- Small form factor with simple push pull mating
- Lightweight at 2.9 g per mated pair
- Integrated tie down reduces installation complexity
- Meets outgassing spec per ASTM 595

Solutions for Low-Earth-Orbit Satellite Buses and Payloads

HARNESS COMPONENTS



Raychem High-Temperature Devices

Reliable

- Heat shrinkable technology for one-step shield
- Transparent insulation sleeve saves time during installation
- Provides strain relief with ratings of up to 150°C
- Minimal tools required to achieve connection, insulation and protection
- Inhouse design and quality controlled process offers reliability and traceability



P-Clamps

Mechanically Tough

- Primary clamp installation mechanism decoupled from clamp closure mechanism for harness installation
- Captive locking pin
- Self-aligning ratcheting teeth
- Pinchless hinge
- Butterfly mounting capable (allows for stacked clamps)
- Weight and time savings



Raychem Tubing and Molded Parts

More Choice

- Available to fit TE backshell adapters

Capable

- Provides excellent strain relief at connector cable terminations
- Save weight and space



Raychem INSTALITE Molded Parts

Weight Savings

- 20-30% lighter than TE's -25 part

Time Savings

- Optimized interior geometry speeds installation time
- Faster recovery

Rugged

- Resists most common aviation fuels, oils and greases
- Abrasion resistant



Gold-Plated Terminals

Reliable

- Non-magnetic crimp terminals provide mechanical reliability, excellent corrosion protection, and low contact resistance required for space applications



Raychem INSTALITE Lightweight Braid

Weight Savings

- Up to 50% lighter than traditional braid

Excellent Shielding

- Covers wide frequency range
- Better low-frequency performance than expensive plated fibers or microfilaments



COPALUM Terminals and Splices

Efficient

- Terminate to aluminum or copper wire
- Aluminum wire: 8 AWG to 4/0 AWG
- Up to 300 amps
- Dry Crimp - no inhibitor agent
- Copper and aluminum terminal bodies



POLAMCO Backshells

Full Range

- Unshielded, shielded, and rugged conduit systems
- Rectangular and circular configurations
- Straight, 45, or 90-degree options

Rugged

- Versions to match any harsh environment

Solutions for Low-Earth-Orbit Satellite Buses and Payloads

POWER SOLUTIONS



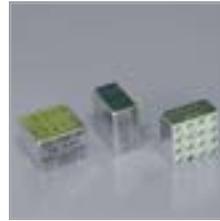
HARTMAN Space Qualified Relays

Space and Weight Savings

- Lightweight, hermetically sealed enclosures

Robust and Versatile

- Variety of switching configurations
- Efficient magnetic latching decision
- Self de-energizing coil
- Main contact ratings of 100 A at 28 VDC or 35 VDC



CII High Reliability Hermetic Relays

High Reliability

- Lightweight, low-outgassing materials
- Hermetic sealing
- Inert gas backfilling
- 28 VDC max contact voltage
- Operating temperature range: -65°C to +125°C

Wide Range of Sizes

- Available in the smallest and most reliable high-current, high-voltage, midrange and low signal configurations



KILOVAC Contactors

Rugged Reliability

- Lightweight high power DC or high-voltage DC
- Hermetically sealed, available with a variety of electrical configurations, power ratings, voltage ratings, and mounting styles to make your electrical system more reliable and capable



KILOVAC High Voltage Relays

- High reliability
- Many configurations and form factors available
- Operating temperature range -55°C to +125°C



HARTMAN N-Series Relays

High Reliability

- Magnetic latch or side stable
- Stainless steel-welded construction
- Hermetically sealed

Flexible Performance

- Operating temperature range: -55°C to +125°C
- Multiple mounting and auxiliary contact configurations
- Main contact current ratings 30 to 125 A



DRI Mid-Range Latching Relays

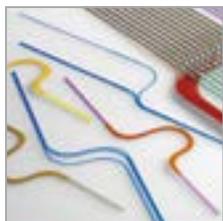
Versatile

- 5A to 25A product
- Internal voltage suppression options
- Variety of mounting and termination styles

Reliable

- Qualified to M83536
- Hermetically sealed
- Magnetic latching assures improper switching

FIBER OPTICS



Optical Flex Circuits

Versatile

- Symmetrical and asymmetrical designs
- Radiation hardened fiber
- Up to 10mm tight bend radii
- Very low insertion loss over a broad temperature range

Highly Customizable

- Up to 6 levels of fiber crossings in a single layer
- Up to 12 layers
- Range of packaging options for environmental conditions
- Qualified for space application



Rugged Optical Interconnects

Space Saving Design

- MTC connectors save space compared to circulars
- Accepts standard ARINC 801 optical termini



DEUTSCH RSC Connectors

Rugged

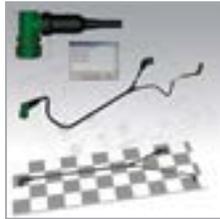
- Single-channel connectors
- Manufactured from ARCAP alloy for corrosion resistance
- Anti-vibration coupling mechanism

Versatile

- RSC: M29504/4 and /5 termini
- RSC EB: EB16 termini
- RSC-v: APC or tunable interface

Solutions for Low-Earth-Orbit Satellite Buses and Payloads

INTEGRATED ASSEMBLIES



HarnWare Harness Design Software

Powerful

- Speeds/simplifies harness design

Comprehensive

- Component selection
- Layout and assembly drawings
- Bills of material



Digital Cable Assemblies

More Speed, Less Weight

- Support for high-speed protocols
- Compact, lightweight designs
- Fully tested and characterized by TE



Composite Enclosures

Weight-Saving Rugged Performance

- Up to 50% lighter than aluminum
- Rugged and corrosion resistant

Customizable

- Composites and plating options
- Customizable with wire traces, antennas and connectors



Raychem MIL-STD-1553B Data Bus Components

SWaP Reduction

- Conserve space, weight, and power consumption
- Tin/nickel-plated metallic parts
- Baked silicone rubber components

Optimum Performance

- Cable with optimized single shield, double shield, or EMP hardened
- Low-fluoride-outgassing cable

HIGH SPEED INTERCONNECTS



Quadrax Connectors, Contacts and Cable

High Density, High Speed

- Up to 10 Gb/s (over Cat 6A cable)
- 2 differential pairs in a size 8 contact shell

Compatible

- Inserts for many popular aerospace connectors



Raychem HexaShield Backshells

High Performance

- 360° shield termination system for shielded wires and cables
- Excellent mechanical and environmental resistance

Versatile and Flexible

- Aluminum, stainless steel and composite versions
- Simple installation and re-entry



CeeLok FAS-T Nano Connectors

Extreme Space and Weight Savings

- .30" diameter
- Push-pull or threaded coupling

Fast

- 10G Ethernet-capable 8 position connector
- Innovative T-Shaped contact pattern reduces crosstalk



STRADA Whisper High Speed Connectors and Assemblies

High Speed

- Transfers data at speeds of 25 Gbps and offers unparalleled scalability up to 112 Gbps

Reliability

- Industry leading performance
- Robust signal pins and ground shields
- Simple upgrade path
- Best-in-class EMI performance



CeeLok FAS-T Connectors

Compact 10 GbE Performance

- Compact Size 8 shell for space and weight savings

Rugged

- Excellent shock, vibration, temperature, and sealing performance

Convenient

- Field terminable, with integral backshell for low-cost, low-weight strain-relief, and EMI protection

Configuration

- Traditional backplane
- Direct plug orthogonal (DPO)
- Cable backplane

Solutions for Low-Earth-Orbit Satellite Buses and Payloads

SENSOR SOLUTIONS



Linear Variable Differential Transformer (LVDT)

- Stainless steel, high stroke to length ratio
- Excellent choice for applications with size restrictions or harsh operating environments
- Excellent temperature coefficient



Pressure Transducers and Transmitters

- Pressures from 1 to 100,000 PSI
- Analog and digital output signals
- 1% total error band (-20°C to +85°C)
- Solid state reliability
- Survives high vibration and immersion



Thermopile Infrared (IR) Sensors

- Measures temperature from a distance by detecting an object's IR energy
- Sensing element absorbs the energy and produces an output signal



Negative Temperature Coefficient (NTC) Thermistors

- Rocket temperature
- Solar array panel temperature
- Motor temperature
- Battery temperature
- Bearings temperature
- Atomic clock
- Optics temperature
- Reference space wheel



Piezoelectric Accelerometer Plug and Play

- Integral strain relief
- Case isolated, internally shielded
- Noise monitoring
- Available in custom and standard packages



MEAS Space Qualified Sensor

- Radial, bead and custom package types
- ESA and NASA approved
- High reliability and accuracy
- 1kΩ to 100kΩ resistance range

Launch & Space Sensor Types

- Payload monitoring vibration sensors
- Thrust vectoring LVDT position sensors
- Electrical actuator position resolvers
- Booster separation potentiometers
- Cryogenic fuel pressure transducers
- Satellite temperature sensors
- Mirror/antenna position LVDT sensors

Empower Engineers to Solve Problems, Moving the World Forward.

AMP | AGASTAT | CII | DEUTSCH | DRI | HARTMAN | KILOVAC
MICRODOT | NANONICS | POLAMCO | Raychem | Rochester | SEACON

CONNECT WITH US

We make it easy to connect with our experts and are ready to provide all the support you need. Visit te.com/support to chat with a Product Information Specialist.

QUALITY STARTS WITH THE RIGHT APPLICATION TOOLING

Creating a quality crimp connection is essential to delivering high performance and reliability in extreme environments. From low to high volume wire processing, TE has you covered with a full range of application tooling and a global field service team.

- [View all application tooling](#)
- [Connect with our experts to find the right tool for your application](#)

te.com/space

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