SOLUTIONS FOR ADVANCED AIR MOBILITY/EVTOLS

HIGH-POWER, HIGH-VOLTAGE, HIGH-BANDWIDTH INTERCONNECT TECHNOLOGIES FOR ELECTRIC VERTICAL TAKEOFF AND LANDING AIRCRAFT (EVTOLS)

Providing Broad Options to Meet SWaP Challenges

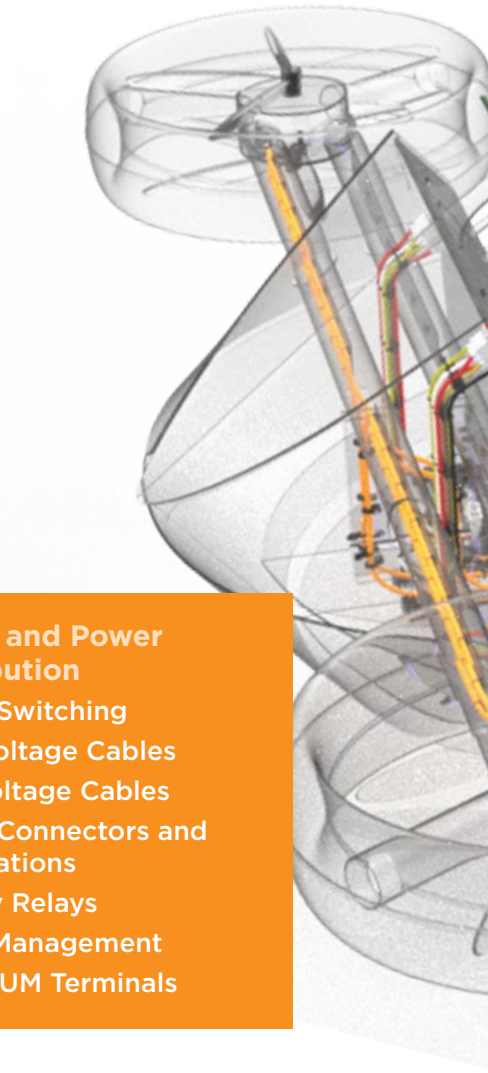
Yesterday's dreams of electric-powered air taxis and flying cars/personal air vehicles (PAVs) are turning into real Urban Air Mobility (UAM) projects. Hundreds of commercial-drone and electric-vertical-takeoff-and-landing aircraft (eVTOL) programs are driving advances in electric-propulsion motors, power distribution, positioning systems, telenetworking, and cockpit/mission systems. These opportunities are inspiring designers to explore components that can optimize size, weight, and power (SWaP) for line replaceable units (LRUs) in UAM innovations.

That's why TE Connectivity (TE) offers solutions to handle high voltages and high kW peak output. We also provide interconnect technologies to handle the low-voltage and high-bandwidth needs of mission systems andinflight entertainment (IFE), connectivity, and control applications.

Moreover, TE designs and builds components and solutions for sophisticated avionics that provide higher bandwidth and high-speed connectivity for autonomous flight-control and navigation. Hardware components in the physical layer include fiber optics, CANbus (Controller Area Network) cables, single pair Ethernet products, and compact, high-performance board-level and I/O interconnects. For distributed architectures, Mini Modular Rack Principle (MiniMRP) modules provide increased computing power in 40 percent smaller package sizes for design flexibility. A wide range of sensors is also available for actuation, flight-control, and other critical functions.

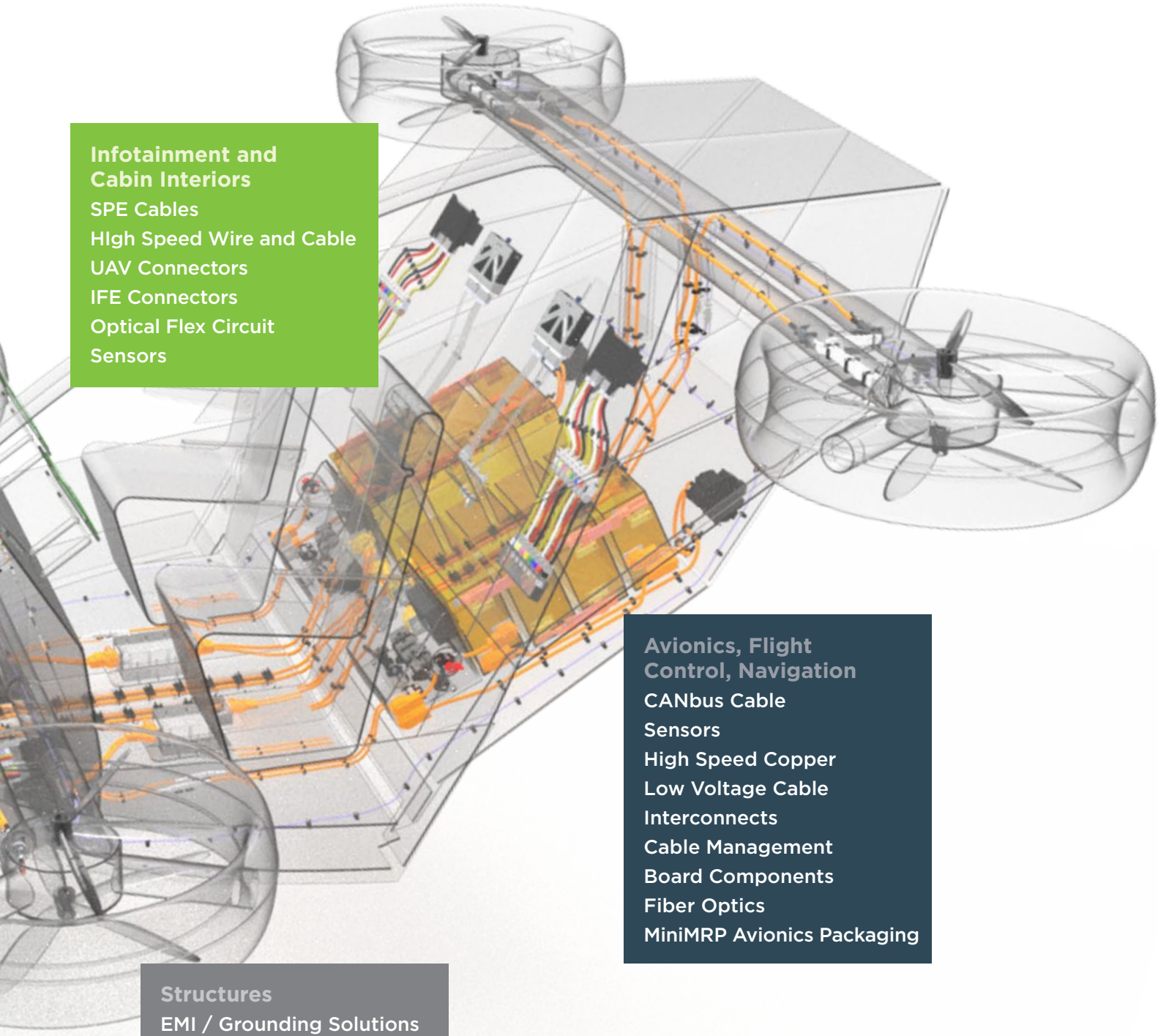
Our broad portfolio helps designers meet critical SWaP (size, weight and power) challenges and project milestones to speed up development. With a heritage in automotive, aerospace, and energy sectors, TE works with industry standards groups—such as the Society of Automotive Engineers (SAE) and ARINC—to handle tomorrow's pressing challenges. TE experts are directly involved in Voice of Customer (VOC) initiatives to help designers "follow-the-wire" to select the appropriate solutions. Discover how our solutions can help your UAM innovations take flight.

TE IFE and cabin solutions lighten the load, save space, and boost performance. TE solutions give passengers the power and convenience of high-speed networks from flexible and capable in-flight entertainment systems to high-speed Internet access.



Power and Power Distribution

- Power Switching
- High Voltage Cables
- Low Voltage Cables
- Power Connectors and Terminations
- Battery Relays
- Cable Management
- COPALUM Terminals



Infotainment and Cabin Interiors

- SPE Cables
- HIgh Speed Wire and Cable
- UAV Connectors
- IFE Connectors
- Optical Flex Circuit
- Sensors

Avionics, Flight Control, Navigation

- CANbus Cable
- Sensors
- High Speed Copper
- Low Voltage Cable
- Interconnects
- Cable Management
- Board Components
- Fiber Optics
- MiniMRP Avionics Packaging

Structures

- EMI / Grounding Solutions
- Flex PCB's
- Low Voltage Cable
- Circular Connectors
- Cable Management
- Sensors
- Solinoids
- Sealed Harnesses
- Lightweight Power Connectors

Power and Power Distribution

HIGH VOLTAGE RELAYS AND CONTACTORS

TE's high-performance relays are designed specifically to operate in extremely rigorous environments in military and aerospace applications.

Lightweight DC Contactors

- True flight rated contactors to 1,000 amps and 1,000 Vdc for high reliability and ease of system certification
- Hermetically sealed package helps improve switching environment
- Long life dual coil electronic coil economizers

Mid-Range Relays

- Contact ratings from low level to 60 amps, 28 Vdc or 115 Vac/400 Hz
- Wide temperature range from -70°C to +125°C
- Mil-spec qualifications in the industry for reliability and ease of certification

Lightweight 28 VDC Contactors

- Up to 1,000 amp contact rating for 28 Vdc and 115 Vac/400 Hz
- Current sensing, remote power controller, RCCB, and smart contactor options
- Capability to design, qualify and manufacture complete power distribution assemblies

Power Distribution Units

- For primary and secondary power distribution
- Backplanes are a permanent installation on the mother vehicle
- Modular systems with various plug-in and bus bar line-replaceable modules (LRMs)
- Optional current/voltage sensing, fuses, circuit breakers, power monitors, etc.
- Optional integration of generator control / logic control units

POWER INTERCONNECTS

TE offers one of the broadest range of high density power connectivity solutions for aircraft applications. With extra emphasis on reduced size and weight along with increased power the products listed in this brochure are particularly useful for use in Urban Air Mobility applications.

987 HV HP Series Connectors

- Rugged 38999 style shell
- Lightweight by optimum insert arrangement
- Contact latching with safety pin protection
- Helps withstand vibration under harsh and demanding conditions
- Corona free design suitable for high voltages
- Wide contact range available, from large (0000 AWG) to small gauges (22 AWG)
- Touch proof contacts
- Performance at high altitude—up to 50,000 ft

UAV Wildcat Series Connectors

- Compact design
- Interfacial and wire sealing
- Boot termination feature
- PCB option available
- Standard crimp tooling
- Suitable for blind mating
- Scoop-proof interface
- Surface finishing / keyway options
- Positive locking coupling mechanism

DMC-M Series Connectors

- Qualified to MIL Specs
- Quick-install and remove
- High density / space savings
- 24 - 12 AWG, Up to 1000 V

Snap-Lug Quick Disconnect Power Connectors

- Easy - quick mating
- Push-button locking/un-mating
- Up to 250 amps per pin
- Color coded

COPALUM Terminals and Splices

- Industry leading design
- Terminates to copper or aluminum wire
- Options to seal to wire insulation
- Qualified for commercial aircraft

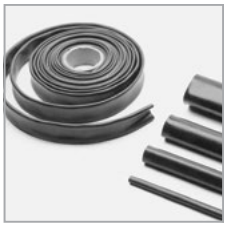
Power and Power Distribution

HARNESSING AND CABLE MANAGEMENT

Whether your challenge is size, weight, extreme temperatures or harsh environments, TE's line of Raychem heat-shrinkable harness sealing components were developed for these wide range of applications.

High-Temperature Terminations

- Crimp (M81824) and controlled solder splices and shield terminations (M83519)
- Rated between +125°C to +260°C
- Heat-shrinkable insulation sleeve for sealing and strain relief



Heat Shrinkable Tubing

- With or without adhesive lining
- Wide range of sizes, shrink ratios, and environmental resistance

Soldered Contacts

- One step installation accelerates production while reducing handling cost
- The design is exceptionally suitable for high vibration environment and instrumentation application. Available for co-axial, twisted pair, tri-axial cables
- Rated up to +150°C

INSTALITE Boots

- 20-30% lighter than TE's -25 part
- INSTALITE boots available with Rayaten shielding provides light weight screening and enhanced performance
- Heat shrinkable cross-linked polymer provides abrasion resistance and resists most common military fuels, oils and greases
- Rayaten INSTALITE versions provide light weight screening capability of 70 db of attenuation up to 1 Ghz

Harnessing Components

- Complete product suites matched to application needs
- Tubing, molded parts, adhesives, backshells, and insulation/jacketing materials
- Flame-retarded, flame-resistant, and LSZH solutions
- Thin-wall insulation and composite material

P-Clamps

- Separate mounting and latching features allow for quick and tool-less harness installation
- High strength composite material offers weight savings while maintaining structural integrity
- Simple and tool free latching creates a comfortable working environment for operators
- Visit www.te.com/p-clamp for more information

Cable Management / Customized 3D Print4Production

- Remove tools from the bracket and harness installation process
- Rapid curing adhesive process for attachment to composite structures
- Composite brackets optimized for highest performance at the lowest weight
- Custom and low volume production parts made possible with no tooling costs

Power and Power Distribution

POWER FEEDER CABLES

TE's line of Raychem flexible power feeders are designed to be routed in tight spaces. Serving a diverse number of applications, TE's range of power feeders maybe customized to fit your Urban Air Mobility application.

SHF-260 Power Cable

- Operating temperature range: -65° to +260°C (10k hours)
- Single and dual wall constructions available
- Conductors available in nickel coated copper

SPEC 80 Power Cable

- Operating temperature range: -65° to +200°C
- Single and dual wall constructions
- Highly stranded specialized conductor and insulation materials give greatly improved flexibility

FDR25S Flexible Power Cable

- Highly flexible small bend radius allows for fitting into complex routing
- Extruded polymer notch and abrasion resistant — mechanically tough
- Vibration stability helps support a long life cycle in engine compartments

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

- 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

Avionics, Flight Control, Navigation

HIGH SPEED COPPER CABLES

Raychem offers a diverse portfolio of high speed copper cables to support the various data standards used in the air mobility vehicle market. Easier to process than competitive tape-wrapped designs, these cables may also be customized to fit your architectural needs. Compatible with a suite of TE contacts & connectors, we are able to offer an end to end solution.

CANbus Cable

- 120 ohm twisted pair cables available in 22-26 AWG
- Speeds up to 100 Mb/s
- Compatible with 38999 22D contacts (22-24 AWG)
- Temperature range: -65°C to +200°C (depending on materials)

Quadrax

- 2 pair ethernet available in 24 and 26 AWG
- Speeds up to 100 Mb/s
- Compatible with 38999 22D contacts (22-24 AWG)
- Temperature range: -65°C to +200°C (depending on materials)

Cat 5e

- 4 pair ethernet available in 24 AWG
- Speeds up to 1 Gb/s
- Compatible with CeeLok FAS-T and FAS-X connectors
- Temperature range: -65°C to +200°C (depending on materials)

Cat 6a

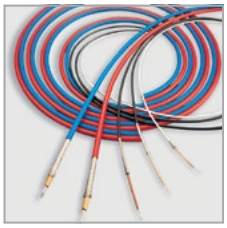
- 4 pair ethernet available in 24 AWG and 26 AWG
- Speeds up to 10 Gb/s
- Compatible with CeeLok FAS-T and FAS-X connectors
- Temperature range: -65°C to +200°C (depending on materials)

Avionics, Flight Control, Navigation

HIGH SPEED COPPER CABLES

Mini-ETH (TwinAx) Cable

- Single pair ethernet in 24 AWG and 26 AWG
- Speeds up to 100 Mb/s
- Compatible with Mini-ETH 369 connector
- Temperature range: -65°C to +200°C (depending on materials)

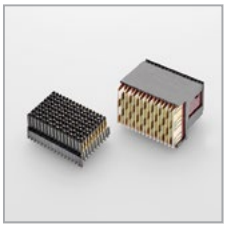


RF Cheminax Cable

- Controlled Impedance cables that are 25%-40% smaller and lighter than Mil-C-17 RG cables
- Impendence Range: 50 Ω – 125 Ω
- Available conductor range: 12 AWG – 30 AWG
- Temperature range: -65°C to +200°C (depending on materials)

INTERCONNECTS

Today's sophisticated networks require avionics with the bandwidth to ensure monitoring and control of all flight systems—while offering the size and weight reductions needed to increase efficiency.



MULTIGIG RT Connectors

- Supports increased bandwidth up to 25+ Gb/s
- Contact utilizes quad redundant contacts for optimum performance in shock and vibration
- Backwards compatible with legacy VPX products

DMC-M Quick Install Multicavity Connector System

- EN4165 standard qualified
- Direct board/equipment to harness
- Modular solution for signal, RF, RFO, power and high speed
- Contacts #24 (3 Amps) to contacts #8 (up to 90 A)
- Up to 20x faster to assemble than standard

369 Series Shielded

- Compact design, lightweight small form factor design
- Tight mounting pitch of multiple connectors
- Meets ARINC 854 ethernet over single twisted pair (100Base-T1)

High Speed I/O Connectors

- Our high-reliability, high-performance connectivity solutions support VITA standards, VPX protocols, Embedded Computing, and wired connections for various protocols up to 10 GB/s

RF Coax Connectors

- Tight-tolerance electrical characteristics, small sizes, and rugged yet lighter weight materials, our RF and coax connectors – which include SMP, SMA, BNC, and TNC products – support frequencies to Ka bands and above, with the versatility needed in high-density packaging

One-Step BNC/TNC Connectors for Coaxial Cable

- Easy and quick heat shrinkable installation
- Excellent cable retention force to withstand high vibration ensures long term reliability
- Meets performance requirement of MIL-C-39012 up to 2.8 GHz

ACTIVE FIBER OPTICS

Rugged and small form factor transceiver solutions enable the transition for copper harnesses to light smaller fiber optic cables.

Actives

- High speed 10+ Gbps links leveraging FO EMI immunity weight reduction over copper
- Low power consumption
- Compatible with many avionic databus protocols
- Accommodate 10G ethernet — with the capacity to handle next-generation 40G and 100G when needed — without the severe distance limitations of copper cable.
- Easy to maintain in the field, and reliable when operating in harsh environments, our optical products offer significant size and weight savings

Avionics, Flight Control, Navigation

SENSORS

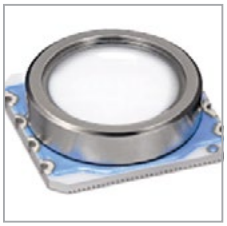
TE's broad portfolio of sensor technologies is designed for a wide range of mission critical applications in aerospace industries. By leveraging our core competencies in high reliability sensors for harsh environments such as temperature, RFI, EMI, vibration, and lightning.

KMA36 Magnetic Encoder IC

- Small TSSOP package
- Digital output
- I²C interface
- High resolution up to 0.01°
- Rotational or linear measurement mode
- AMR Technology

SMD NTC Thermistor

- 2.0 to 200K Ohms resistance @ +25°C
- 0402, 0603, 0805 package sizes
- Tape and reel packaging
- Low cost
- Temperature range -40°C to +125°C
- RoHS compliant



MS5840 Altimeter Module

- 10 - 1100 mbar absolute pressure range
- 6 coefficients for software compensation stored on-chip
- Piezoresistive silicon micromachined sensor
- Integrated miniature pressure sensor 6.2 x 6.4 mm
- 16 Bit ADC
- Low voltage and low power consumption

MS4525DO Digital Pressure Sensor

- PCB mounted digital output transducer
- Combination temperature and pressure
- I²C or SPI protocol
- Differential, gage, absolute, compound, and vacuum
- Temperature compensated
- Air-speed measurement

VALUE-ADD

Selecting from TE's systems of components, designed specifically to meet environmental and application requirements, engineers can quickly and confidently design and implement interconnect solutions.

Fiber Optic Cable Assemblies

- When it comes to capacity and throughput, no other physical media can come close to matching fiber optics. Whether it's a component, system, or a network, TE can help you deliver more bandwidth with our fiber optics solutions and products

MiniMRP

- Increased computing power
- Small form factor devices enables distributed systems
- Distributed avionics for flexible design in a smaller, lighter package

M2M Antenna with MiMo Cellular / LTE Antenna Function

- Machine-to-Machine (M2M) MiMo LTE antennas have been designed to provide MiMo Cellular/LTE antenna function for Internet of Things (IOT) and M2M applications.
- Our M2M antenna range features a compact, robust, low-profile weatherproof housing that's perfect for a variety of applications.

Mini-ETH

- Mini-ETH system consists of a range of TE products including: 369 Shielded, DMC-M Connectors, Cheminax twinax high speed copper cables and end-to-end ethernet assemblies
- Faster installation time
- Increased speed – qualified on 100 Mb/s

Infotainment and Cabin Interiors

HIGH SPEED WIRE AND CABLE

TE offers a range of copper cable for high speed protocols such as IEEE 1394, Fiber Channel, USB, and Gigabit Ethernet—and even 10G Ethernet for a high-performance backbone.

Mini-ETH (TwinAx) Cable

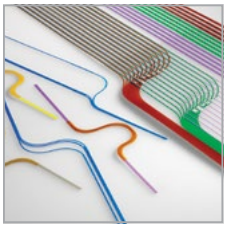
- Single pair ethernet in 24 AWG and 26 AWG
- Speeds up to 100 Mb/s
- Compatible with Mini-ETH 369 connector
- Temperature range: -65°C to +200°C (depending on materials)

Cat 6a

- 4 pair ethernet available in 24 AWG and 26 AWG
- Speeds up to 10 Gb/s
- Compatible with CeeLok FAS-T and FAS-X connectors
- Temperature range: -65°C to +200°C (depending on materials)

FIBER OPTICS

Give passengers the power and convenience of high-speed networks. Fiber Optical Flex Circuit assemblies were developed to maximize performance in minimal space. For card to card or backplane applications, TE offers the designer multiple options in cable assembly design, connectorization, and routing.



Optical Flex Circuit

- Customizable design to specific substrate size, shape and packaging
- Cable assemblies can be routed
- Allows for high density packaging
- Thin film encapsulated fibers for enhanced protection

RFO MULTIGIG RT FO Platform

- Enhanced PCB wafer and contact design supports increased bandwidth up to 32+ Gb/s
- Meets interface requirements for VITA 46 connectors allowing backward compatibility with legacy VPX products
- Customizable to meet unique application requirements
- Modular design enables numerous configurations by interchanging higher-speed MULTIGIG RT 3 connectors with the legacy MULTIGIG RT 2 and MULTIGIG RT 2-R connectors
- Contact design utilizes quad redundant contacts for optimum performance in shock and vibration

INTERCONNECTS

Save space, reduce weight, and increase reliability easily with our broad range of connectors. Each is designed to install faster and easier, perform better, and increase in-cabin capabilities.

DMC-M Quick Install Multicavity Connector System

- EN4165 standard qualified
- Direct board/equipment to harness
- Modular solution for signal, RF, RFO, power and high speed
- Contacts #24 (3 Amps) to contacts #8 (up to 90 A)
- Up to 20x faster to assemble than standard

Micro XtraLITE HE (UAVX)

- Minimum space envelope
- Smaller and lighter
- Positive locking coupling mechanism
- Suitable for blind mating
- Built to withstand harsh environment

Structures

INTERCONNECTS

TE is not only a supplier for subsystems. TE helps you connect your whole eVTOL system by offering one of the broadest portfolios of interconnects, harnessing, sensors, and fiber optics for use throughout your airframe.

AMP+ Charging Inlet 500 Series

- High-performance charging for EVs (EVTOLs)
- Touch-safe
- Modular, highly customizable design
- TE-designed terminals deliver enhanced conductivity
- TE-designed locking actuators for greater safety
- Thermal sensing options for maintaining high currents
- Variations for all standards and markets

D-Easy Series Connectors

- Removable seal fittings facilitating bundle and wire repairs in aerospace applications
- Allow rework of the seal without wire removal
- Available with or without shielding protection and accessory interfaces
- Compliant with ABS1571 and BACS31T/U
- Operates in temperatures from -55°C to +105°C
- Offers a fuel-resistant version

369 Series Connectors

- Lightweight form factor design
- Allows tight mounting pitch of multiple connectors
- Shielding for Grounding and EMI Protection
- Meets ARINC 854 Ethernet over single twisted pair (100Base-T1)

Double Density (UAVDD)

- Next generation connector, high density and high performance
- Very lightweight
- Almost double the number of contacts compared with standard range
- Conductive black zinc nickel finish

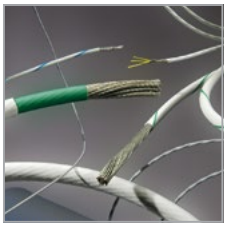
WIRE AND CABLE

FDR25S Flexible Power Cable

- Highly flexible small bend radius allows for fitting into complex routing
- Extruded polymer notch and abrasion resistant — mechanically tough
- Vibration stability helps support a long life cycle in engine compartments

SHF260 Wire and Cable

- All extruded fluoropolymer based insulation system
- Outstanding chemical and fluid resistance when tested to SAE-AS-22759/41
- Corona resistant when tested to ASTM D1868
- Arc track resistant to the current SAE-AS-22759 specification



Spec 80 FlexLine Cable

- Lightweight aluminum conductor offering reduced weight up to 40%
- Flexible copper conductor offering facilitates routing through tight spaces

SENSORS

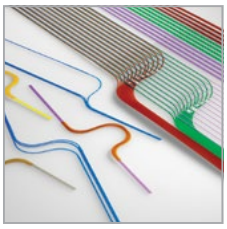
Our range of aerospace sensors covering position, pressure, temperature, tilt and vibration can aid the safety and comfort of your passengers

Humidity Sensors

- Cabin and cargo

Structures

FIBER OPTICS



Optical Flex Circuit

- Customizable design to specific substrate size, shape and packaging
- Preselected breakout positions for optimum routing
- Thin film encapsulated fibers for enhanced protection
- Crossovers that minimize stress while maximizing complex routing
- Allows for high density packaging
- Up to 12 layers stacked
- Up to 6 level fiber crossings
- Maximum size: 900 mm x 1300 mm
- Broad range of fiber selections
- <.05 dB loss

RFO MULTIGIG RT FO Platform

- Enhanced PCB wafer and contact design supports increased bandwidth up to 32+ Gb/s
- Meets interface requirements for VITA 46 connectors allowing backward compatibility with legacy VPX products
- Customizable to meet unique application requirements
- Modular design enables numerous configurations by interchanging higher-speed MULTIGIG RT 3 connectors with the legacy MULTIGIG RT 2 and MULTIGIG RT 2-R connectors
- Contact design utilizes quad redundant contacts for optimum performance in shock and vibration

CABLE MANAGEMENT

P Clamp

- Light, fast, and efficient solution to mounting cable harnesses
- (10) TE P-Clamp sizes cover the full cable diameter range of (21) AS21919 P-Clamp sizes
- Faster install times and lighter weight
- Give TE P-Clamps a lower applied cost than standard AS21919 P-Clamps

Define, Design, Deliver

- Our extensive ranges of products help you building your harnesses for all applications with our HarnWare software, a user-friendly, computer aided software system

SENSORS

Proximity Sensors

- Vehicles doors and other restraint devices

Piezoelectric Accelerometer

- Stainless steel housing
- Voltage mode plug
- Annular shear mode
- Integral strain relief
- Case isolated, internally shielded
- 3 pin connector
- Temperature range -55°C to +130°C
- Typical application HUMS, rotor track and balance

Resolver

- Angular position sensor
- Robust, wear-free sensing principal
- EMI insensitive
- Analog output (sin, cos)
- Angular error ±7 arcmin to ± 20 arcmin
- Temperature range -55°C to +150°C
- E-Motor commutation / angular rotor position

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.

te.com/evtol

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SOLUTIONS FOR ADVANCED AIR MOBILITY/EVTOLS

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