WHEN TECHNOLOGY CONNECTS, SO DOES HUMANITY.
OUR PURPOSE

WE CREATE A SAFER, SUSTAINABLE, PRODUCTIVE AND CONNECTED FUTURE.

ADVANCING THE FUTURE OF TRANSPORTATION

REVOLUTIONIZING MEDICAL TECHNOLOGY

ENABLING GLOBAL COMMUNICATION NETWORKS

MAKING FACTORIES & HOMES SMARTER
ANY CONNECTION CAN CHANGE THE WORLD.

INDUSTRIAL TECHNOLOGY LEADERSHIP IN 140 COUNTRIES

FA22 SALES BY REGION

AMERICAS
$4.8B

EMEA
$5.7B

APAC
$5.8B

MANUFACTURING SITES | EMPLOYEES
--- | ---
AMERICAS | 36 | 28,000
EMEA | 45 | 37,000
APAC | 25 | 27,000

Sales figures have been rounded for presentation purposes
INDUSTRIAL TECHNOLOGY LEADERSHIP

15K+ PATENTS granted or pending

$715M+ INVESTED in engineering, research & development

8000+ ENGINEERS globally

20% of sales from new products

All figures from FY22
With Great Power Comes Great Sustainability

GREENHOUSE GAS ABSOLUTE
FY21 VS FY10

- \( \downarrow \) 52%

ENERGY USE INTENSITY
FY21 VS FY10

- \( \downarrow \) 44%

WATER USAGE
FY21 VS FY10

- \( \downarrow \) 29%

$5.57M
GLOBAL CHARITABLE GIVING FY21

1.5M
PEOPLE IMPACTED IN NEXT-GENERATION TECHNOLOGY EDUCATION FY20-21

$2.9B
LOCAL ECONOMIC IMPACT FROM SUPPLY CHAIN FY21

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EVERY CONNECTION COUNTS

TE Connectivity (TE) Data and Devices

Focused Portfolio for a Dynamic Market

EVERY CONNECTION COUNTS
Market Trends

High Speed and Density
- 28G → 56G → 112G → 224G
- Cables everywhere
- Finer Pitch: 1mm → 0.8mm → 0.6mm

Cloud
- Deepening purpose-built solutions
- Rising complexity
- Growth at scale
- Edge computing

IoT / Emerging Edge
- Mushrooming application
- Requirement diversification
- Low volume customers

TE Response
- Total solutions partnership
- Product / technology innovation
  - Embracing artificial intelligence and machine learning
- Global supply chain and manufacturing base

Market Trends

TE Response
- Rich product portfolio
  - Antennas (LDS, metal stamping / PCB / FPC / ceramic / external antennas)
  - RF connectors & RF cable assemblies
  - Interconnect solutions (I/O, FPC, Wire-to-Board)
  - Power and thermal management (MULTIBEAM, Busbar, Cable Assemblies)
## Why TE Connectivity (TE) Data and Devices?

### A Diverse and Comprehensive Portfolio to Support Your Connectivity Needs

**Partnerships that Enhance Innovation:**
TE helps shape the connector future through collaborating with customers and peers while pioneering new technologies.

**Solutions for High Performance:**
Our products can support the market trends of high-speed, energy-efficiency, and miniaturization in cloud, IoT end point and edge markets.

### Faster, Flexible Support:

TE’s manufacturing, value-added support and investments are focused on delivering top quality, highly-efficient products to address dynamic design cycles.

### End-to-End Connectivity:

TE offers a broad range of products which can be used across data communications and IoT applications, providing extensive options for customers and the opportunity to consolidate their supplier base.

### Sustainable Partnership:

TE’s engineering and manufacturing expertise, combined with our global footprint spanning multiple industries, allow us to deliver one of the largest connectivity and sensor product portfolios.
### Industries & Solutions

**INNOVATIVE CONNECTIVITY SOLUTIONS THAT HELP CUSTOMERS DELIVER PERFORMANCE BEYOND DATA CENTER AND IOT END DEVICES**

<table>
<thead>
<tr>
<th>Industry &amp; Solutions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AEROSPACE &amp; DEFENSE</strong></td>
<td>Faster data to address the most stringent quality and performance standards</td>
</tr>
<tr>
<td><strong>AUTOMATION &amp; CONTROL</strong></td>
<td>Focus on production equipment utilization and uptime with integrated diagnostic capabilities</td>
</tr>
<tr>
<td><strong>POWER DISTRIBUTION</strong></td>
<td>Drive for smarter power and increased efficiency in most harsh conditions</td>
</tr>
<tr>
<td><strong>SAFETY &amp; SECURITY</strong></td>
<td>Achieve real-time, mobile monitoring capability across multiple locations and facilities</td>
</tr>
<tr>
<td><strong>INTELLIGENT BUILDINGS</strong></td>
<td>Monitor and deliver resource efficiency of various building systems and location-based services.</td>
</tr>
<tr>
<td><strong>TEST &amp; MEASUREMENT</strong></td>
<td>Speed and accuracy of data collection for research, development, test and evaluation</td>
</tr>
<tr>
<td><strong>LIGHTING</strong></td>
<td>Meet the demand for increased energy efficiency and provide dimming and color control</td>
</tr>
<tr>
<td><strong>AUTOMOTIVE</strong></td>
<td>Focus on high-quality consumer port applications, vehicle-to-vehicle communication, and EV charging.</td>
</tr>
<tr>
<td><strong>HVAC</strong></td>
<td>Expectation of cloud-based systems to help drive Ethernet and wireless connectivity at the equipment level</td>
</tr>
<tr>
<td><strong>MEDICAL</strong></td>
<td>Provide seamless connectivity for smart health monitoring devices and equipment with connector, antenna, and sensor solutions.</td>
</tr>
<tr>
<td><strong>MATERIAL HANDLING</strong></td>
<td>Conservation of both space and power, while sharing large amounts of information</td>
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Data and Devices Product Portfolio

- Internal Interconnect Solutions
- Power Solutions
- Input / Output and Board-to-Board
- Optical Solutions
- Micro Markets
- Sockets
Sliver connector chosen for performance, density, flexibility, and robustness.

Rated up to 56G PAM-4 (112G).

## TE is Leading Innovation in Power Solutions

### OCP Open Rack V3 Busbar

- Increased current capacity (75A --> 100A).
- Dedicated chassis ground contacts.
- Sense contact(s) in the IT gear connector.
- Improved lead-in.
- Conductive surface on the busbar cage interior.

### Power Solutions for OCP

- TE's OCP power solutions provide a wide variety of power delivery options to energize your data center infrastructure. Meeting standard form factors, and with an eye on innovation, TE is your partner for power delivery.
TE is Leading Innovation in I/O & Board-to-Board Solutions

<table>
<thead>
<tr>
<th>Enabling 800G with OSFP</th>
<th>112G Per Lane with QSFP-DD</th>
<th>STRADA Whisper Absolute Connectors</th>
</tr>
</thead>
</table>
| • TE’s octal small form factor pluggable (OSFP) connectors and cable assemblies address next-generation data center needs by supporting aggregate data rates of 200 Gbps and up to 400 Gbps. These products are designed for both 28G NRZ and 56G PAM-4 protocols, with a roadmap to 112G PAM-4 for future system upgrades. | • Faceplate density equal to current 1xN QSFP28.  
• 1x1, 1x2, 1x3, 1x4, 1x5 and 1x6 cages available.  
• Cages are belly-to-belly compatible.  
• Connector is traditional SMT with 4 rows.  
• 56G QSFP-DD cages are drop-in compatible to QSFP-DD 112G connectors. | • STRADA Whisper Absolute high-speed backplane connectors are engineered for 112G PAM4, enabling next generation data centers with outstanding cross-talk control and helping to reduce insertion loss. The connectors allow seamless transition from 56G and 112G as mating interface is backward compatible to 56G STRADA Whisper and STRADA Whisper R connectors. The signal pairs can be quad-routable, achieving cost-effective 112G architecture design. |
TE is Leading Innovation in Sockets and Optics Solutions

LGA 4189 Sockets

• LGA 4189 sockets support next-generation central processing units (CPUs) for higher performance and better system scaling.
• LGA 4189 sockets are designed for next-generation processors, which can support PCIe Gen 4 and four or eight-multi-processor system architectures.

Active Optical Cabling

• Our active optical cable assembly portfolio provides improved cable flexibility and longer reach, as compared to both traditional passive copper solutions and emerging active copper and active electrical (ACC/AEC) cable solutions, supporting high performance computing, data center and networking interconnect applications.
TE is Leading Innovation in Portfolio Solutions

112G Portfolio Solutions

- TE’s 112G industry-leading product portfolio provides a robust and flexible array of solutions to enable next generation architectures.

Products:
- 112G and 224G support for QSFP, QSFP, SFP, SFP-DQ, QSFP-XD, QSFP-DD, CDFP Connectors, Cages, and Cable Assemblies
  - Direct Attached Copper Cables (DAC), Active Copper Cables (ACC), Active Electrical Cables (AEC), Active Optical Cables (AOC)
  - Leading (Switch, Server, and High Availability)
  - Stacked and Ganged
- Backbone (Standard, DPO, and Cabled Backbone Solutions)
  - AdrenalINE StingShot Interconnects
  - STRADA Whisper / Absolute
- Over the Board (OTB) I/O Solutions
  - OTB Connectors, Sockets and Assemblies
  - QSFP, QSFP XD, and QSFP DD I/O
- Enabling 112G and 224G Through PCIe
  - Silver Receptacles, Plugs, and Cable Assemblies
  - CEM Connectors
  - Silver Product Family (SFF-TA-1002/SFF-TA-1020)
  - MCIO Product Family (SFF-TA-1016)
- Powering 224G Operations
  - OR3, IT Gear, 48V, CROWN CLIP, ELCON, MULTI-BEAM PSU, DTC Cable, Busbar, ICCON, and RAPID LOCK Interconnects
  - Socket and Hardware
    - Co-Packaged, uLGA, CPU, Switch ASIC, AI ASIC
- Wire-to-Board and Accessories
  - AMP CT Family and HPI Family
  - Modular Jacks
  - USB Serial I/O

224G Portfolio Solutions

- With TE’s 224G portfolio solutions, a full array of customized options for compute and rack datacenter infrastructure is at your fingertips.

TE portfolio solutions are a holistic product offering leveraging the entirety of the product portfolio, with interconnectivity and compatibility in mind, while reducing time to market and overall product uncertainty. TE’s robust end-to-end product portfolio touches each part of the datacenter from server to infrastructure – and all devices in between.
## TE is Leading Innovation in Micro Markets

<table>
<thead>
<tr>
<th>External Antenna</th>
<th>Linx Technologies IoT Portfolio</th>
<th>LEMBAS USB/LTE Modem</th>
</tr>
</thead>
</table>

- **TE acquired Laird Connectivity’s External Antennas business and together offers a combined 7 decades of RF and antenna design and manufacture experience. The wide portfolio of antenna solutions includes options for IoT, public safety, vehicular/transportation, infrastructure, fixed wireless access and many more. In addition, custom antenna developments are regularly undertaken for OEMs and other customers.**

- **The Linx Technologies portfolio strives to minimize the risk, delays, and technical challenges for design engineers to make their products wireless and connect to the Internet of Things (IoT). The Linx Technologies IoT portfolio is made up of an array of wireless components including antennas, modules, remote controls and RF connectors.**

- **Our LEMBAS LTE/GNSS USB modem for LTE CAT4 network and GPS tracking is designed for use on a wide array of single board computers (SBCs) utilizing ARM chip-sets. Plug-and-play features and 1-command initial set-up enables instant access to cellular connectivity and GPS tracking in an easy-to-use package.**
## Data and Devices | Cable Assemblies and Compute ICC

### Data Center Infrastructure
- Networking and Telecommunication
- High Speed Compute
- Multimedia
- Smartphone
- Internet of Things
- Industrial and Automation

<table>
<thead>
<tr>
<th>USB &amp; Multimedia I/O</th>
<th>High Speed Cable Assemblies</th>
<th>Low Speed Cable Assemblies</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="USB &amp; Multimedia I/O" /></td>
<td><img src="image2" alt="High Speed Cable Assemblies" /></td>
<td><img src="image3" alt="Low Speed Cable Assemblies" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sliver Connector Family</th>
<th>Consumer HDTV, VR, USB</th>
<th>Mini PCIe &amp; SATA</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4" alt="Sliver Connector Family" /></td>
<td><img src="image5" alt="Consumer HDTV, VR, USB" /></td>
<td><img src="image6" alt="Mini PCIe &amp; SATA" /></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PCI Express</th>
<th>MCIO</th>
<th>SlimSAS and Mini SlimSAS</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image7" alt="PCI Express" /></td>
<td><img src="image8" alt="MCIO" /></td>
<td><img src="image9" alt="SlimSAS and Mini SlimSAS" /></td>
</tr>
</tbody>
</table>
Data and Devices | Input/Output (I/O) and Board-to-Board

External High Speed I/O

HDD / SSD

Card Edge

STRADA Whisper Connectors

High Speed

Mezzanine

Internal High Speed I/O

Telecommunications and Networking
Switch | Server | Storage
Hyperscale Datacenters
Wireless BTS
High Speed Compute
Data and Devices | Optical Solutions

Active Optical Cabling

Fiber Optics

Telecommunications and Networking
Switch | Server | Storage
Hyperscale Datacenters
Wireless BTS
High Speed Compute

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## Data and Devices | Sockets

<table>
<thead>
<tr>
<th>DIP/SIP Socket</th>
<th>x86 Sockets &amp; Hardware</th>
<th>Non-x86 Sockets &amp; Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="DIP/SIP Socket" /></td>
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<table>
<thead>
<tr>
<th>Memory Sockets</th>
<th>DMD Sockets</th>
<th>Heat Sinks</th>
</tr>
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<td><img src="image4" alt="Memory Sockets" /></td>
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<td><img src="image6" alt="Heat Sinks" /></td>
</tr>
</tbody>
</table>

- **Edge Computing**
  - Servers and Data Center
  - Artificial Intelligence
  - Machine Learning
- **Internet of Things**
  - Wearable Devices
  - Handheld Devices
Data and Devices | Portfolio Solutions
# Data and Devices | Micro-Markets and IoT

<table>
<thead>
<tr>
<th>AMPLIMATE D-Sub Connectors</th>
<th>Wire-to-Board</th>
<th>Modular Jacks</th>
<th>Linx Technologies</th>
<th>Coax</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Frequency Cables &amp; Connectors</td>
<td>STRADA Mesa Connectors</td>
<td>CHAMP Docking Connectors</td>
<td>Memory Card Connectors</td>
<td>External IoT &amp; Edge Antennas</td>
</tr>
<tr>
<td>Multi-Port Solutions for T&amp;M</td>
<td>A/V Jacks</td>
<td>On Board Antennas</td>
<td>Embedded / LDS Antennas</td>
<td></td>
</tr>
</tbody>
</table>

- Internet of Things
- Test and Measurement
- Industrial
- Consumer Products
- Automotive
- Public Safety
Bringing performance and reliability to edge computing with solutions that address ruggedization, cooling, EMI and physical security

EDGE COMPUTING SOLUTIONS

Quick Reference Guide

Bringing performance and reliability to edge computing with solutions that address ruggedization, cooling, EMI and physical security
RELIABILITY AND PERFORMANCE AT THE EDGE

As the expectation for consuming massive amounts of data at faster speeds with low latency is ever increasing, the need for edge computing has become paramount. Across a growing range of applications, from autonomous vehicles and smart power grids to industrial manufacturing and healthcare, the ability to compute data close to the source is critical for faster transfer and response times. Metro and premise edge data centers, servers and end devices must perform seamlessly to meet these demands. That’s why TE Connectivity (TE) offers products and expertise to help meet challenging and varied requirements.

HOW TE SUPPORTS THE EDGE ECOSYSTEM

<table>
<thead>
<tr>
<th>Core</th>
<th>Edge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud Data Center</td>
<td>Metro Edge/ Near Core</td>
</tr>
</tbody>
</table>

- **Core**
  - Cloud Data Center

- **Edge**
  - Metro Edge/ Near Core
  - Access/ Network Edge
  - Premise Edge

- **Device Edge**
  - Automotive/Transportation
  - Agriculture
  - Banking and Finance
  - Energy and Utilities
  - Healthcare
  - Machine Learning
  - Manufacturing
  - Public Sector
  - Retail

<table>
<thead>
<tr>
<th>Network Switch</th>
<th>Server/AI</th>
<th>Storage</th>
<th>Cellular Networks</th>
<th>IoT Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>- High Speed I/O&lt;br&gt;- Hybrid Cable Assemblies&lt;br&gt;- Internal Card Edge Cables &amp; Connectors&lt;br&gt;- Memory&lt;br&gt;- Power Connectors &amp; Cable Assemblies&lt;br&gt;- Sockets &amp; Hardware</td>
<td>- High Speed I/O&lt;br&gt;- High Speed Sockets&lt;br&gt;- Internal Cabling&lt;br&gt;- Power Interconnects</td>
<td>- Backplane Connectors&lt;br&gt;- High Speed I/O&lt;br&gt;- Internal cabling&lt;br&gt;- Power Connectors&lt;br&gt;- Storage Interconnects</td>
<td>- Antennas&lt;br&gt;- Connector Sealing System &amp; Cable Assemblies&lt;br&gt;- Power Connectors &amp; Cable Assemblies&lt;br&gt;- RF-Signal Interconnects</td>
<td>- Antennas&lt;br&gt;- Board Level Shielding&lt;br&gt;- Interface Connectors&lt;br&gt;- Memory Connectors&lt;br&gt;- Power Connectors&lt;br&gt;- RF-Signal Interconnects&lt;br&gt;- Sensors&lt;br&gt;- SIM Connectors</td>
</tr>
</tbody>
</table>
KEY REQUIREMENTS FOR EDGE DATA CENTERS

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Speed/Low Latency</td>
<td>Low latency should ideally be 5 milliseconds (Ms) or less.</td>
</tr>
<tr>
<td>Extreme Temperature Tolerance</td>
<td>Components must be able to operate in environments ranging from 40°C (-40°F) up to +125°C (257°F).</td>
</tr>
<tr>
<td>Power Supply Utilization</td>
<td>Server configuration, component selection and choice of thermal cooling technology can impact power usage.</td>
</tr>
<tr>
<td>Small Footprint</td>
<td>Server configuration design optimization and smaller format component selection play a critical role in maximizing floor space.</td>
</tr>
<tr>
<td>Silent Operation</td>
<td>Noise levels can reach up to 92 dB(A). Liquid cooling technologies, such as immersion or cold plate, can significantly reduce noise.</td>
</tr>
<tr>
<td>Minimize Electromagnetic Interference (EMI)</td>
<td>Antennas, components, shielding selection and positioning must be considered early in the design phase.</td>
</tr>
</tbody>
</table>
TE COMPONENTS SUPPORTING EDGE DATA CENTERS

A - High Speed I/O
- QSFP Connectors and Cages
- QSFP-DD Connectors and Cable Assemblies
- SFP Connectors
- RJ point five Connectors
- OSFP Connectors and Cages
- CDFP Connectors, Cages & Cable Assemblies
- CDFP PCIe Gen 5 and 6 Connectors
- Active and Passive Copper Cable Assemblies
- Active Optical Cable Assemblies

B - Internal Connectors and Cable Assemblies
- ICC Internal Cable Connectors
- Silver Cabled Interconnects
- Mini Cool Edge IO (MCIO) Interconnects
- PCIe Gen 5 CEM Connectors

C - Power Connectors & Cable Assemblies
- MINIPAK HDL Connectors
- ORv3 (Open Rack Version 3) IT Gear Power Input Solution
- MULTI-BEAM Plus Connectors
- Thermal Bridge I/O Connectors
- ICCON Block and ICCON Insert High Power Pins and Sockets
- Card Edge Power Connectors
- ELCON Mini Connectors and Cable Assemblies
- RAPID LOCK Power Connector

D - Busbar Solutions
- Power Busbar Connectors
- ELCON Drawer Connectors
- 48V Vertical Busbar
- Liquid Busbars

E - Backplane Connectors
- STRADA Whisper Connectors
- STRADA Whisper Absolute Connectors
- AdrenaLINE Catapult, AdrenaLINE Slingshot, and AdrenaLINE Fastlane Connectors

F - Sockets & Hardware
- LGA 4677 Socket
- LGA 3647 Socket
- PCIe GEN 5 CEM Connectors
- DDR5 DIMM Sockets

Accessories
- Performance Materials for EMI Protection
- Antennas
- Sensors
TE SOLUTIONS FOR THERMAL PERFORMANCE

As the demand to process more data increases every year, so too does the need for higher-power data racks and more efficient edge data centers. A forced air data rack can consume as much as 30 to 50 kilowatts of energy. Higher temperatures that occur due to higher power levels can directly affect the longevity of components in the data rack if the thermal design is not optimized. TE offers products for air and cold plate cooling solutions, but is also focused on developing a robust portfolio of products to support state-of-the-art immersion cooling technology.

IMMERSION COOLING

When comparing traditional air cooling, cold plate cooling and immersion cooling technologies, one can think of them as “good, better and best” choices.

• **Air Cooling (Good)** - Long-term operational costs add up from power consumption associated with running air conditioners and server fans.

• **Cold Plate Cooling (Better)** - Offers a more enhanced method with closed loop water cooling, but comes at a high cost with added system complexity and other required cooling equipment.

• **Immersion Cooling (Best)** - Removes the need for fans and air conditioning, introducing a host of benefits, including:

  - **Energy Savings**
  - **Increased Compute Density**
  - **Superior Thermal Management**
  - **Noise Reduction**
  - **Reduced Footprint**

MEETING THE COMPONENT REQUIREMENTS OF IMMERSION COOLING

Immersion cooling offers distinct advantages for edge data centers; however, the performance of the system is only as good as its components. As TE evolves existing products and develops new ones to support immersion cooling, we consider:

**Impact on performance**

Through simulations and testing, we evaluate how submersion impacts impedance in our existing products and identify required modifications.

**Material compatibility**

Engineering products with materials that can be submerged for long periods of time without degradation.

**Component protection**

Sealing of components that will be submerged is critical for long-term performance.
### KEY REQUIREMENTS FOR EDGE COMPUTING DEVICES

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robust I/O and Wireless Connectivity</td>
<td>Provide secure data transmission with low latency, failure detection and automatic fail-safe functionality.</td>
</tr>
<tr>
<td>Extreme Temperature Tolerance</td>
<td>-40°C (-40°F) up to +70°C (158°F).</td>
</tr>
<tr>
<td>Ingress Protection</td>
<td>Devices must be designed with components that can help minimize or prevent the ingress of dust and liquids per standards.</td>
</tr>
<tr>
<td>Shock and Vibration Resistance</td>
<td>Edge PCs and components should withstand up to 50 g of shock force.</td>
</tr>
<tr>
<td>Small Footprint</td>
<td>Given the space constraints of rugged edge PCs, smaller format components can be critical.</td>
</tr>
<tr>
<td>Low Power Consumption</td>
<td>Proper antenna and component selection and positioning within the device are key considerations in improving power efficiency.</td>
</tr>
<tr>
<td>Electromagnetic Interference (EMI)</td>
<td>Antennas, components, shielding selection and positioning must be considered early in the design phase to avoid degraded signal performance.</td>
</tr>
<tr>
<td>Physical Security</td>
<td>Helping to prevent unauthorized physical access, such as tampering, is an important consideration in remote, unattended applications.</td>
</tr>
</tbody>
</table>
TE COMPONENTS SUPPORTING EDGE DEVICES

Across a range of applications from fleet telematics and smart metering to smart buildings and medical devices, TE connectors, antennas and components help deliver performance, reliability and long operational lifetimes in harsh environments. Below are just a couple examples of how our products are incorporated into device designs.

FLEET TELEMATICS

SMART METERS
WHY PARTNER WITH TE?

Our history in design engineering, global manufacturing prowess, materials science expertise and signal integrity analysis are benefits that contribute to the value of partnering with us. At TE, we view our role of consultant as a trusted advisor, who helps to bring value to our customers through innovative and customized solutions.

Partnerships that Enhance Innovation
We collaborate closely with customers and peers in the development of new technologies.

Solutions for High Performance
Our products can support high-speed, energy-efficiency, and miniaturization in cloud, IoT end point and edge markets.

Faster, Flexible Service
TE’s manufacturing and value-added services deliver top quality, highly efficient products to meet dynamic design cycles.

End-to-End Connectivity
TE offers a broad range of product options across data communications and IoT applications, giving customers the opportunity to consolidate their supplier base.

Sustainable Partnership
TE’s engineering and manufacturing expertise, combined with our global footprint provides one of the largest connectivity and sensor portfolios.

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TE Connectivity has a long history in design engineering, global manufacturing prowess, materials science expertise and signal integrity analysis. These benefits contribute to the value of partnering with TE. At TE, we view our role as a trusted advisor, who helps to bring value to our customers through innovative and customized solutions.

Our products can support high-speed, energy-efficiency, and miniaturization in cloud, IoT end point and edge markets.

We collaborate closely with customers and peers in the development of new technologies.

TE’s manufacturing and value-added services deliver top-quality, highly efficient products to meet dynamic design cycles.

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In today’s rapidly evolving digital landscape, the need for 112G datacenter architectures has become more pressing than ever before. As data continues to grow exponentially, traditional datacenter infrastructures are struggling to keep up with the increasing demands for faster data transfer and processing.

112G datacenter architectures offer a compelling solution to address this challenge, providing a quantum leap in data transmission speeds and overall performance. With its capability to transmit data at 112 gigabits per second (Gbps), this technology empowers datacenters to handle massive workloads, real-time analytics, and high-performance computing tasks seamlessly.

By adopting 112G datacenter architectures, organizations can unlock the full potential of emerging technologies such as artificial intelligence (AI), machine learning, and 5G networks, while providing enhanced reliability, reduced latency, and improved scalability.

In an era where data is the lifeblood of businesses, 112G datacenter architectures have become an indispensable foundation for maintaining competitiveness and meeting the ever-increasing demands of the digital age.
CABLED BACKPLANE APPLICATIONS

The advent of 112G server backplane infrastructure marks a significant milestone in the realm of high-speed data transfer and server performance. With its capability to transmit data at a blazing speed of 112 gigabits per second (Gbps), this cutting-edge technology opens up a wide array of applications across various industries and computing environments.

1. **Data Centers and Cloud Computing**: In today’s data-driven world, data centers and cloud computing platforms are crucial for storing, processing, and managing vast amounts of information. The 112G server backplane allows for lightning-fast communication between servers and networking devices, enabling data centers to handle the increasing demands of real-time data analytics, artificial intelligence, and other high-performance workloads.

2. **High-Performance Computing (HPC)**: In the realm of scientific research, simulations, and complex modeling, HPC clusters rely heavily on fast and efficient data transfer. The 112G server backplane ensures that large-scale computations can be executed swiftly, reducing processing times and enhancing overall computational performance.

3. **Telecommunications and 5G Networks**: With the rapid deployment of 5G networks, there is an unprecedented need for high-speed data communication between network elements. The 112G backplane facilitates seamless connectivity between networking equipment, improving the efficiency and reliability of 5G infrastructure.

4. **AI and Machine Learning**: AI and machine learning algorithms demand immense computational power and data throughput. The 112G server backplane accelerates data access and transfer within AI hardware accelerators, enabling real-time inferencing and training for AI applications.

5. **Video Streaming and Content Delivery**: As video streaming services continue to gain popularity, the 112G backplane ensures smooth and uninterrupted data transmission, reducing buffering times and providing a seamless viewing experience to users worldwide.

6. **Financial Services and High-Frequency Trading**: In the realm of financial markets, where split-second decisions can make a significant difference, the ultra-fast data transfer enabled by the 112G server backplane can be important for high-frequency trading and real-time market analysis.

7. **Aerospace and Defense**: In critical aerospace and defense applications, reliability and data integrity are paramount. The 112G backplane provides the necessary speed and robustness to support advanced communication systems, radar processing, and defense networking infrastructures.

8. **Automotive and Autonomous Vehicles**: The automotive industry is embracing the era of connected and autonomous vehicles. The 112G server backplane contributes to the efficient exchange of data between in-vehicle systems, enhancing safety, and enabling advanced driver assistance systems (ADAS) and autonomous driving functionalities.
WHY TE FOR CABLED BACKPLANE SOLUTIONS?

SI Performance in De-mate Conditions
• TE’s STRADA Whisper connector ensures reliable signal integrity (SI) performance in 1.2mm de-mate conditions which occurs in larger modular systems
• SI performance is maintained in worst case or corner case conditions providing margin for channel performance

Automated Manufacturing Processes
• Consistent quality
• Proven scalability

Mechanically Robust
• Removes quality concerns
• Fantastic quality record

Electrically Superior & Best TCO
• Provides maximum amount of design margin in IL, RL, and XTLK. Applied cost savings.
• Allows for other system tradeoffs like board materials, retimers, etc
• Applied cost savings: optimized footprint has 2 less routing layers saving hundreds/thousands per system in PCB costs

Proven Supply Chain
• Successful track record of executing steep ramps
• Does not use any “exotic” or proprietary materials enabling a reduced supply chain risk

Industry Diversification
• STRADA Whisper Absolute connector is the default standard interface for LEO satellites demonstrating robustness
• Robust and high performance
STRADA WHISPER ABSOLUTE PORTFOLIO OVERVIEW

TE is a leader in cabled backplane assemblies with deep experience and application knowledge. Backplane cable assemblies are used across a broad industry and customer base. TE is highly focused on the AI market segment.

- Winning in AI at major GPU Player, and most cloud service providers. Diverse wins in other industry segments.
- Best in class signal integrity as echoed by numerous customers. 20% better z-axis unmate performance.
- STRADA Whisper Absolute cable assemblies are part of a high growth product family for TE.
- Large installed capacity base – 60M+ dps for cables and 294M dps for connectors and currently scaling higher.
- Execution: TE has successfully ramped multiple AI projects to high volume levels and met customer schedules.
- Mature automated manufacturing processes that are very high yield which allows for resiliency of manufacturing footprint.
- Vertically integrated factory in Dongguan, China for cables - bulk cable made in same facility as cable assemblies
- Vertically integrated connector factory in Qingdao, China - stamp, mold, plate assembly all in-house. No exotic materials used in mating interface like competition reducing supply chain risk.
- Proven robust interface which is now becoming default standard in several satellite deployments. Long cycle life segment.

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<thead>
<tr>
<th>56G</th>
<th>112G</th>
<th>224G</th>
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<tbody>
<tr>
<td>STRADA WHISPER CONNECTOR</td>
<td>STRADA WHISPER ABSOLUTE CONNECTOR</td>
<td>ADRENALINE SLINGSHOT CONNECTOR</td>
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</tbody>
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Available

- Proven 56G connector
- High signal integrity margin with 360-grounding design
- Maintain the electrical performance at 1.5mm un-mating condition
- Internal system versatility is enabled through over the board solutions
- Available in 4 to 12-pair for traditional backplane applications

- Backward compatible as connectors have same mating interface as STRADA Whisper connector/cables
- Reduce insertion loss and lower cross talk noise with new connector design and improved mating structure
- Mate-able with existing STRADA Whisper connectors and cabled headers
- Available in 4-pair and 8-pair for traditional backplane applications

- New hermaphroditic mating interface for 224G SI performance
- Modular construction - cablets and housings can be easily scaled up or down from 4x4 to 12x16
- 13% more dense than STRADA Whisper Absolute connector
- Design optimized for 25 to 32 AWG cabled backplane architecture
New footprint design provides improved performance without sacrificing and simplifying routing capabilities

Provides excellent cross talk, return loss, insertion loss performance to address 112G channel requirements

Provides quad-routability for signal traces

Mating interface is backward-compatible to existing 56G STRADA Whisper connector portfolio

Best in class crosstalk and insertion loss performance

92 Ohm impedance supporting both 85 Ohm and 100 Ohm applications

Minimize skew with noise isolation, 360-degree grounding design

1.75 mm wipe length, ensuring good electrical performance with 1.0mm of un-mate condition

Backward-compatible mating interface reduces engineering design effort when upgrading from 56G to 112G system

Manufactured with fully automated assembly process helping reduce operating cycle times, operating cost and enhance machine productivity

We offer 4 solutions:
1. Point-to-point Cables
2. Backshell
3. Bricked Cable Assembly
4. Full Backplane/Midplane Solution
5. Interoperability and Interconnectivity Options
6. Multiple Customization Options Available

1. **Point-to-point Cables**

   - Panel mount, floating, guided hardware solution keying / error proofing features
   - Connector floats within brick assemblies

   ![Images of various cable configurations for Point-to-point Cables]

STRADA WHISPER ABSOLUTE PORTFOLIO SOLUTIONS
2 Backshell

- Typically used in I/O applications or “rack to rack” interconnect
- Cable is fixed into position by an installer
- Field installation / deployment of cables
- Can be oriented in many angles to aid in installation
- Can provide EMI protection when used in conjunction with a metal braid

3 Bricked Cable Assembly

- Allow for the brick to be integrated into a midplane / backplane
- Minimizes assembly for the customer

4 Backplane / Midplane

- Complete solution provided
- No further midplane / backplane assembly required by the customer
Interoperability and Interconnectivity Options

STRADA Whisper Absolute Portfolio Enables:

- Blind mate connections (float & gatherability) enable eased serviceability
- Breakout cabling allows for complex network switching, accelerator pooling, and storage array topologies
- Compatibility with other standard interfaces fosters ecosystem development

Cartridge Systems Available

STRADA Whisper Absolute Backplane Solutions Guide

DATA & DEVICES / STRADA WHISPER ABSOLUTE BACKPLANE SOLUTIONS GUIDE
STRADA WHISPER ABSOLUTE CONNECTORS SIZING

- 3.90mm column to column pitch
- 2.50mm row to row pitch
- 4pr, 6pr, 8pr, and 12pr are most popular pair count sizes
- Even number column counts more typical
- Many configurations tooled and others are easily added with flexible tooling family

STRADA WHISPER ABSOLUTE CONNECTORS MATING SEQUENCE

Step 1 – Guide Pins

Step 2 – Housing Shroud

Step 3 – Housing Guides
TE IS YOUR PARTNER FOR 112G INFRASTRUCTURE

The 112G product portfolio supports standard form-factors and performance requirements, and is designed with reliability and upgradability in mind, enabling applications including compute/storage, high-speed networking and artificial intelligence/machine learning.

- Due to the demands on next generation high-speed designs, TE Connectivity (TE) has developed one of the most comprehensive, flexible and high performing internal and external connector and cable assembly portfolios in the market.
- Standard external I/O form factors enable ecosystem connectivity for intra-rack and inter-rack applications.
- Next generation products aligned with the industry’s 112G channel performance needs, delivering high marks in cross talk, return loss, insertion loss performance.
- Copper cable solutions provide cost-effective system design and connectivity options to achieve the performance demands of 112G architectures.
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<td><img src="image2.png" alt="STRADA Whisper Receptacle" /></td>
<td><img src="image3.png" alt="MULTI-BEAM Plus Power Connector" /></td>
<td><img src="image4.png" alt="QSFP-DD Cage &amp; Connector" /></td>
<td><img src="image5.png" alt="Mid Board Copper Cables" /></td>
<td><img src="image6.png" alt="QSFP-DD Cables" /></td>
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<td><img src="image7.png" alt="CPU socket" /></td>
<td><img src="image8.png" alt="STRADA Whisper Cables" /></td>
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<td><img src="image15.png" alt="QSFP Cage &amp; Connector" /></td>
<td><img src="image16.png" alt="OSFP Cage &amp; Connector" /></td>
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