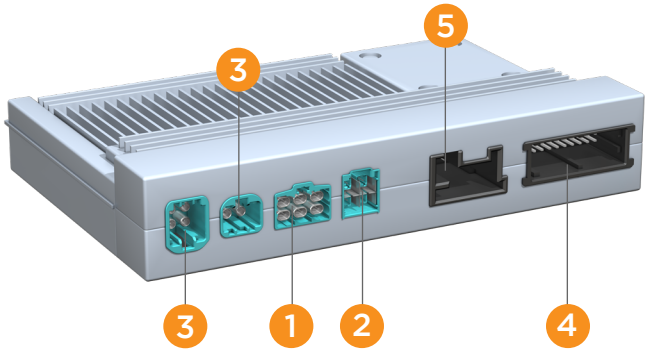
Connector Solutions for Automotive High Performance Computers

Automotive electrical/electronic (E/E) architectures have evolved from decentralized models with single electronic control units (ECUs) to domain-centralized architectures over the past few years. The introduction of Autonomous Driving/Advanced Driver Assistance (ADAS) ECUs and domain controllers has resulted in nodes with increased port density, driving the widespread adoption of Ethernet within the industry.

The most recent zonal architecture introduces zonal controllers and central compute units, which will have enormous port density in multi-hybrid configurations, with data, signal and power. These have the potential to manage rising numbers of control units, as well as simplify software upgrade and feature deployment.

In summary, for next-generation high performance computing units (HPCs), the number of nodes is expected to decrease, while the number of ports per node is likely to increase. TE Connectivity's (TE) portfolio provides high performance, miniaturized, as well as modular hybrid connectors to fulfill the requirement of the current ECUs and next generation central compute units.



Application Transformation and Connectivity Requirements

ECUs Transformation		2024	2028+
		Function-oriented setup distributed over multiple domains	Function-integration/centralization, SW-driven, vehicle-centric/zonal architecture with powerful HPCs
ECUs Type and No.		Up to 100 distributed controllers	1-3 central HPCs with 3-4 zone controllers
Link Requirements	**Coaxial**	Up to 6 Gbps SerDes (mainly Cams)	12 Gbps+ SerDes (mainly cams)
	Differential	Up to 1 Gbps Ethernet (Backbone)	Up to 10 Gbps Ethernet (Backbone)
	Type	Discrete connectors	Trend to multi-hybrid and integrated solutions

CONNECTOR DESIGN DRIVER

High Speed Connectivity

Miniaturization

Smart/Integrated Solutions	Multi-Hybrid Data, Signal and Power Solutions	End-to-End Automated Production Ready

Discrete Connector Solutions for Automotive HPCs

Data Connectivity Solutions

	Product	Product Type	Speed	Bandwidth	Protocols	Applications Source	Portfolio Varity
1	GEMnet	multi-gigabit differential connector system	Up to 56 Gbps	15 GHz	100/1000BASE-T1 2.5/5/10/25GBASE-T1	LiDAR, Radar, 8K display, USB, ethenet domain ECU, HPC	Unsealed, sealed; 90° and 180°; 1,2,4 and 6 ports available
2	MATEnet	miniaturized differential connector system	Up to 1 Gbps	1 GHz	1000BASE-T1 100BASE-T1 HDBASET, PCIe A2B/C2B	LiDAR, Radar, 4K display, ethenet domain ECU, HPC	Unsealed, sealed; 90° and 180°; 1,2,3,4,5 and 6 frames, with double row option available
3	MATE-AX	miniaturized coaxial connector system	Up to 24 Gbps	9 GHz	SerDes: GMSL2/3, FPDIV, APIX3, MIPI Analog (Antennas)	Camera, antennas	Unsealed, sealed; 90° and 180°; 1,2 and 4 ports available

Signal and Power Connectivity Solutions

	Product	Product Type	Wire Size	Current	USCAR/ LV214	Temperature Range	Orientation	Sealed/ Unsealed	#Positions
4&5	NanoMQS 0.5	Miniaturized Automotive Connector System	0.13 mm^2 – 0.75 mm^2	6 Amps	LV214/ USCAR	-40°C to +140°C (+120°C for tin)	90°/180° >header	Sealed/ Unsealed	Hybrid Solutions: 2-280 positions Mixed Solutions: 2 – 152 positions
	MQS 0.63	Automotive Signal Connector System	0.08 mm^2 – 0.75 mm^2	7.5 Amps	LV214/ USCAR				
	GenY 0.64	Automotive Signal Connector System	0.13 mm^2 – 0.75 mm^2	10.5 Amps	USCAR/ Japanese OEMs				
	MCON 1.2	Automotive Low Power Connector System	0.5 mm^2 – 1.5 mm^2	17 Amps	LV214/ USCAR				
	AMP MCP 2.8	Automotive Low Power Connector System	0.2 mm^2 – 4.0 mm^2	40 Amps	LV214/ USCAR				
	AMP MCP 6/3/4.8K	Automotive Medium Power Connector System	0.2 mm^2 – 6.0 mm^2	78 Amps	LV214/ USCAR				

These products are 48V ready. If you have a need for Board-to-Board Connections we can recommend our ERNI connector products.

Note:

Mixed (Signal, Power)
Mixed connectors are designed to combine multiple Signal and Power terminal sizes within a single connector interface (i.e. 0.50mm, 0.64mm, 1.2mm, 2.8mm, etc.)

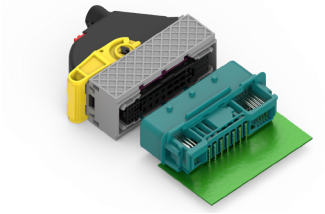
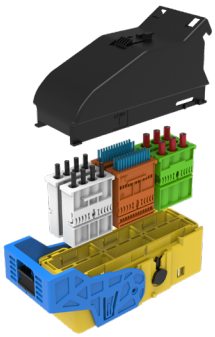
Hybrid (Signal, Power, and Data)
Hybrid connectors take the concept of mixed connectors further by integrating high-speed Data Connectivity terminals within a single connector

For further information on TE's Hybrid and Mixed products, please visit TE's Next Generation E/E Architecture portfolio of solutions.

LEARN MORE ▶

Hybrid Connector Solutions for Automotive HPCs

Modular Hybrid Connector System

Product	Available Connector Interfaces / Platform	Applications	Benefits
 NET-AX+ Modular Hybrid Data Connector System	GEMnet, BEAMnet, MATE-AX, NanoMQS, AMP MCP 2.8, MCON 1.2	• High performance computers • Control units: - Autonomous driving/ Advanced Driver Assistance - Infotainment - Zonal controllers	**Scalability:** Supporting signal, power and data connectivity. **Miniaturized:** Up to 40% reduced space saving and weight reduction **Assembly efficiency:** Enabling up to 80%* reduction of connector mating assemblies
 Modular Hybrid System	NanoMQS 0.50, MQS 0.63, Generation Y 0.64, MCON 1.2, AMP MCP 2.8, AMP MCP 6.3/4.8K, GEMnet MATE-AX HSD	• Zonal Control Units - Wire-to-board applications - Wire-to-wire applications (inline harnesses) • High Performance Computers/Control Units	**Modularity:** Full mix and match hybrid connectivity system supporting signal, power, and data connectivity. **Automation:** Top-loaded, gripper-friendly design enabling semi/automated product of (sub-) harnesses. **Flexibility:** Wide coverage of existing contact systems for fast time-to-market and scalability. **Customization:** Additional connector modules available upon request, which can be easily integrated. **Space-saving:** Space-saving and weight-reduction compared to multiple single connectors. **Sustainability:** Manufactured with sustainable resins, and optimized surface technology.

*Based on real case