

# Automotive Solutions

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[amphenol-cs.com](http://amphenol-cs.com)





# Amphenol Overview

**Amphenol Communications Solutions (ACS), a division of Amphenol Corporation, is a world leader in interconnect solutions for Communications, Mobile Consumer Products, RF, Optics, Broadband and Commercial electronics markets.**

Amphenol Corporation is one of the world's largest designers and manufacturers of electrical, electronic and fiber optic connectors and interconnect systems, antennas, sensors and sensor-based products and coaxial and high-speed specialty cable.

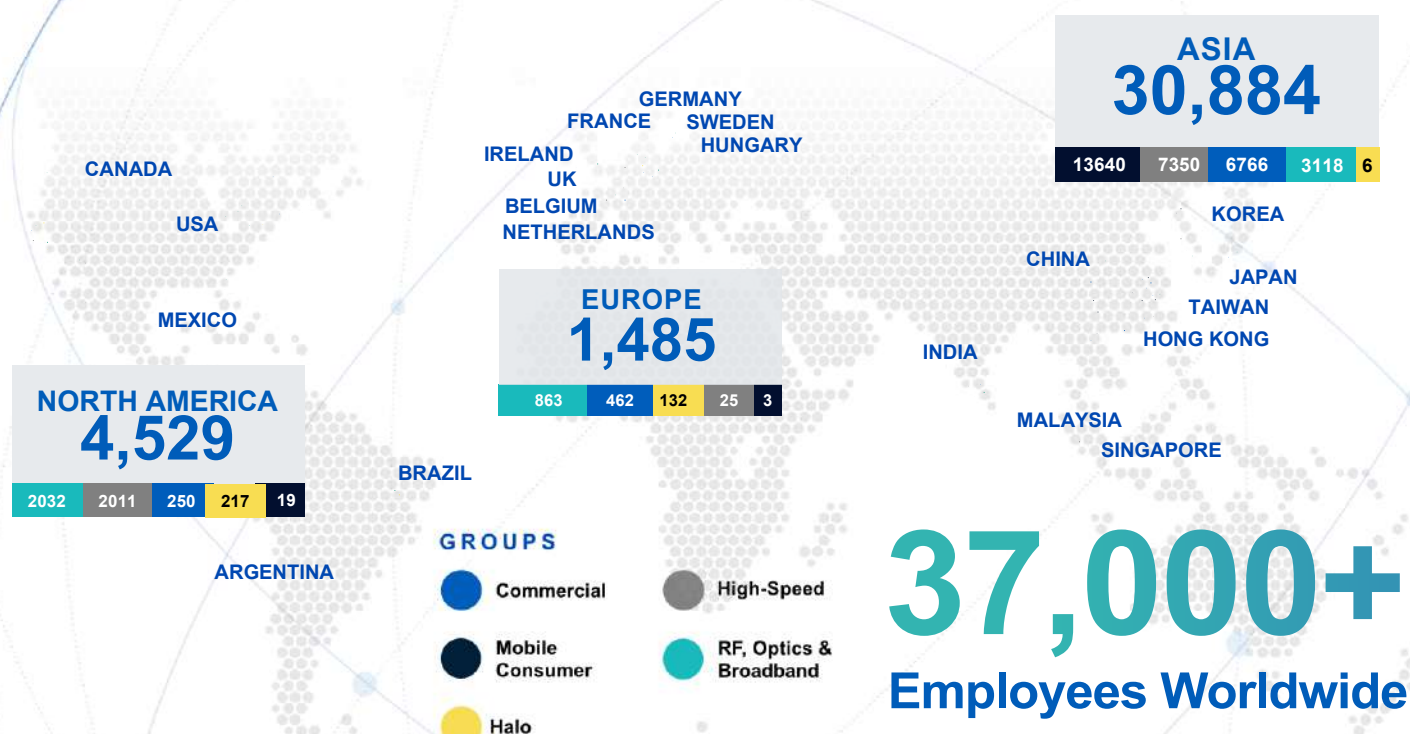
ACS has an expansive global presence in research and development, manufacturing, and sales. We design and manufacture a wide range of innovative connectors as well as cable assemblies for diverse applications including server, storage, data center, mobile, RF, networking, industrial, business equipment ,and automotive.



# Strong Global Presence

We place heavy emphasis on R&D for both new product and technology development, focusing on the advancement of the next generation of high-speed interconnects and power distribution solutions as well as innovative manufacturing solutions.

- Our R&D centers worldwide have registered thousands of patents and licensing agreements, developing some of the world's first innovations in connectors such as Shield-less High-Speed Connectors, Ball-Grid-Array Attachments, economical Stamped High-Power Contacts and cost effective yet reliable plating processes.
- We relentlessly seek improvements of our products, increasing our solutions' overall cost effectiveness, precision and reliability. This ensures that we meet or even surpass the ever changing needs and expectations of market trends.





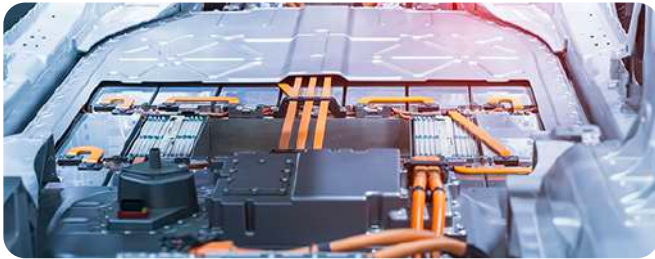
## Advanced Driver Assistance Systems

Advanced Driver Assistance Systems (ADAS) rely on robust connections for high-speed data transmission, withstanding vibration and temperature fluctuations. Amphenol offers reliable, high-performance automotive connectors for secure connections between the sensors, cameras, and control units.



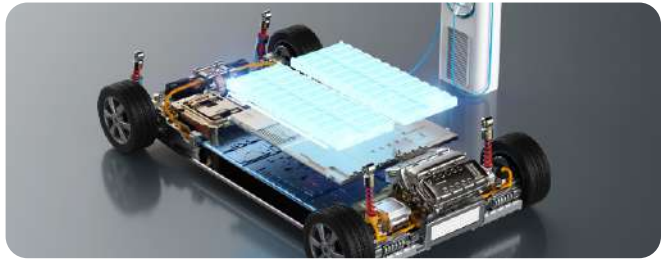
## Central Computing Unit

The Central Computing Unit (CCU) can be interpreted as the vehicle's brain, managing data from sensors and systems to process and utilize it for safety, efficiency, and autonomous driving. It also integrates advanced electronic functions like body control, EV powertrain management, and more.



## Battery Management Systems

The battery is considered the strategic component of any electric vehicle. Amphenol offers a range of compact, flexible, high performing automotive grade connectors for these power circuit designs.



## EV Powertrain

The EV Powertrain facilitates the storage of energy in lithium-ion batteries as DC and when the energy is released, converts it to AC through an inverter to power traction motors which in turn propels the vehicle. A VCU (Vehicle Control Unit) manages this charging, battery distribution, and power conversion for efficient propulsion.



## Automotive Lighting

Modern automobiles are rich with ADAS features like smart LED lighting for adaptive headlights, and superior interior lighting. Amphenol provides a range of advanced USCAR2 compliant connectors like Microspace™, which are compact and meet LV214 standards.



## Advanced Electronics Systems

Amphenol brings a broad array of innovative technology and solutions to support the growth in the automotive industry, particularly in plating, signal integrity performance, and power management.



## EV Charging

With a wide portfolio of power products supporting 15A-1000A ratings, low contact resistance, high thermal support, and component modularity, Amphenol offers the most efficient solutions for the modern EV charging station.





### Ve-NET™

- Meets USCAR-2, USCAR12-6, USCAR-25, LV214, IEEE 802.3bw, IEEE802.3bp, IEEE 802.3ch, and USCAR Ethernet interface standards
- Available for UTP (Unshielded Twisted Pair) and STP (Shielded Twisted Pair) cable
- Sealed, unsealed versions available



### NETBridge+™ Automotive Ethernet Connector System

- Meets USCAR-2, USCAR12-6, USCAR-25, LV214, IEEE 802.3bw, IEEE802.3bp, IEEE 802.3ch
- Available for STP (Shielded Twisted Pair) cable
- Offered in sealed and unsealed configurations
- Interface allows flexibility and ease of interchange between sealed and unsealed configurations



### FloatCombo™ Floating Board-to-Board Connector System with Power Pin

- 0.50mm pitch connector with 4 independent power pins
- Supports 5A current per power pin and high-speed data rates up to 16Gb/s
- Various stacking heights from 8.00mm to 30.00mm with large floating allowance
- USCAR-2 T3V2 qualified



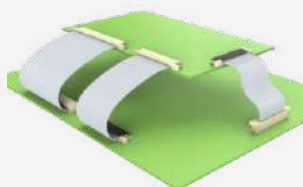
### Mini HSbridge+™

- Compliant with USCAR-2, USCAR-30 and USB3.2 Gen2 performance
- High data rate up to 10Gb/s, current rating up to 5A of power output
- Multiple volume and color coding, effectiveness compliant with automotive requirements



### HSC Connector System

- USCAR-2 compliant high-speed interconnect system
- Fully shielded interconnect system supporting USB / LVDS
- Compact design using 0.50mm square terminals
- Supports data rates up to 1Gb/s+



### FFC Jumper

- Easy to operate
- Available in numerous circuit sizes (4 to 60)
- Both Type S (same-side) and Type O (opposite-side) available
- PET Insulation



### ComboNET™

- Features a scalable and compact size integrating Ve-NET™, power pins, and various interfaces. Ideal for automotive zonal control units
- Each submodule is interchangeable, offering flexibility and convenience
- Compliant with USCAR-2 and LV214, and both sealed and unsealed versions are available



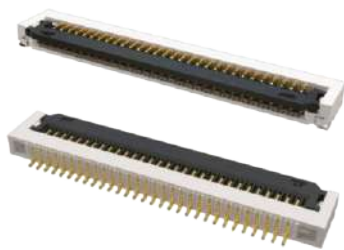
### HSD (High-Speed Data) Connector System

- USCAR-2 compliant, fully-shielded interconnect system for optimal signal protection
- Features enhanced 2.5x retention force and a compact size
- Supports shielded twisted quad cables
- High-performance digital system for low-voltage differential signals, minimizing crosstalk and external electromagnetic interference
- Ideal for applications like LVDS camera, USB, and IEEE 1394



### FlexFast™ Flex-to-Board Connector Solution

- Compact size and low-profile flex-to-board connection solution
- Available in pitch sizes of 0.65mm, 1.00mm, 1.80mm, 2.00mm, and 3.00mm, with pin counts ranging from 12 to 80 pins, offering a complete product family for customer selection
- Automotive-grade compliant with USCAR-2 and LV 214 specs
- Designed for Battery Management Systems (BMS), battery packs, and inverter+DC-DC converter applications
- Capable of handling high-current applications while remaining lightweight for automotive use



### FFC/FPC Connectors

- From 0.21mm to 2.00mm pitch with various heights ranging from 0.50mm to 6.25mm
- Easy to operate and high vibration-proof performance
- Automotive grade versions compliant with USCAR-2 and LV 214 are available
- FFC cable can be supported as a whole solution
- Autolock option available



### HVLock®

- 4.50mm pitch
- Single Row, 6 to 10 positions
- USCAR-2, LV-214 S2 compatible



### DensiStak™

- 0.80mm x 1.25mm pitch
- High Density up to 1034 pos
- Speed up to 16Gb/s, USCAR-2 compliant



### Automotive Grade PCI Express® Gen 5 Card Edge Connectors

- High-speed performance supporting signaling up to 32GT/s in next-gen automotive systems
- USCAR compliant & backward compatible with PCIe® Gen 1–4, allowing seamless upgrades
- Flexible Integration with straddle mount card edge connectors available in x1, x4, x8, x16 configurations and fit multiple host board thicknesses (1.57–2.54mm)



### MicroSpace™ / MicroSpaceXS™

- 1.27mm pitch
- Crimp to Wire and Wire to Wire solutions
- LV214 S3, USCAR-T2V2 compatible



### BergStak®

- 0.40mm pitch
- Wide range of stack heights and positions
- Speed up to 16Gb/s, USCAR-2 V2 qualified

### Automotive Grade PCIe® M.2 Gen 4 Card Edge Connectors

- USCAR compliant and fully meets PCI-SIG PCIe® M.2 specifications for use in automotive systems
- Performs to PCIe® 4.0, USB 3.0/3.1, and SATA 3.0 specifications
- Miniature and high-density design with 67 contacts on a 0.50mm pitch
- Support higher data rate transmission with both single and double-sided modules



### FlexLock™

- 2.54 / 3.20mm pitch
- Easier assembly, less weight, lower cost
- USCAR-T2V2, LV-214 S3 compatible



### WireLock®

- 1.80mm pitch
- Highly vibration resistant, low mating force
- USCAR-2 V2 and LV-214 S2 compliant, 2A contact



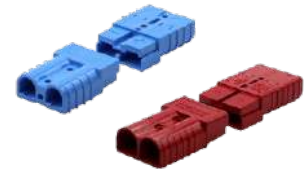
### EnergyKlip™ EK350

- Rated up to 350A per contact
- IP67 seal
- Robust latching system



### EnergyKlip™ EK160

- Rated up to 160A per contact
- IP67 seal available
- Robust latching system



### IPC-M Connectors

- Wide power range from 50A – 350A per contact
- Wire-to-wire and Wire-to-board designs
- Touch-safe contacts



### BarKlip® XP Series

- Connectors Rated from 200A-1000A
- No housings to maximize power-density
- Mounts directly to PCB or busbar



### PwrBlade+® Cable Connectors

- Rated up to 50A per contact
- Power and signal contacts are highly configurable
- Wide wire size range available



### Type-6 Charging Gun

- Fast and normal charging compatibility
- First mate-last break capability
- Drainage hole to prevent water retention

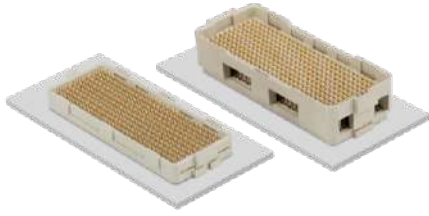
# Custom Automotive Solutions

Integrated manufacturing and engineering capabilities at Amphenol





# High-Speed



## MEG-Array®

- Offers high-density, high-speed benefits of a large array, combined with the reliability and cost-effectiveness of standard surface mount PCB assembly
- Supports a patented BGA interconnect design
- 32Gb/s differential pair performance documented for 4mm and 6mm stack height



## TR Multicoax Connector

- Exceptional signal integrity out to 90 GHz
- Mates directly to PCB Footprint, no costly PCB solder-down leave behinds required
- Dense footprint (2.54mm signal-to-signal) gets TR closer to device under test
- Easy transition from existing TR40/70 GHz Multicoax implementations



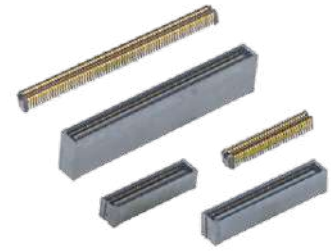
## M-Series™ VR

- Designed to support high technology products in board-to-board or flex assembly architectures from 4-15mm
- Next-generation differential pair contact design for 56G NRZ, 112Gb/s PAM4 performance



## Flex Cable Assemblies

- Engineered to use any mezzanine connector in the Amphenol portfolio
- Designed to meet unique signal integrity, mechanical, power, and environmental requirements
- Available with BGA, LGA, SMT, press-fit, or thru-hole connector terminations



## Lynx™

- 4-row connector doubling the density in a 2-row footprint, suitable for a wide variety of applications
- 25Gb/s flexible 0.60mm pitch designed for high-speed and high-density in differential or single-ended signaling board-to-board applications



## cStack™

- Configurable low profile compression solution available on .60mm to 1.27mm pitch in LGA/ LGA form factors
- Ideal for board-to-board and module-to-board applications

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# RF



## AUTOMATE® Mini-FAKRA Connectors

The AUTOMATE® Mini-FAKRA connector series is a space-conscious, high-performance interface capable of supporting data transfer rates up to 20Gb/s. Ideal for compute modules, wire harnesses and camera applications. Custom sealed solutions available.



## Smart Antenna Interconnect

Consolidates wireless functions into a single module that utilizes custom RF products to enable the mounting of these modules directly to external vehicle antennas. Ruggedized for use in automotive environments against mechanical and environmental stresses.



## FAKRA to FAKRA Cable Assemblies

FAKRA to FAKRA assemblies are used to connect cameras, antennas, sensors and other devices to a vehicle's ECU or compute modules. Standard configurations feature straight and right-angle FAKRA plugs and jacks terminated to RG-174 or RG-58 low loss cable. Custom FAKRA cable assemblies and harnesses are available in any configuration utilizing a wide array of automotive cable types.



## AUTOMATE® Mini-FAKRA Cable Assemblies

AUTOMATE® Mini-FAKRA cable assemblies are designed with a compact, modular housing and available in multi-port configurations for camera and other high-bandwidth automotive applications. High-performance up to 9GHz with secure and easy mating and unmating.



## Camera Module Interconnect

Custom camera backs and high-float blindmateable internal interconnect connect high bandwidth camera modules used for ADAS, 360 surround view and safety applications. External connectivity options include FAKRA, Mini-FAKRA and pre-terminated cable with an overmolded strain relief.



## FAKRA Connectors

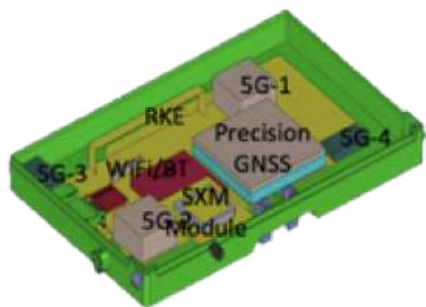
Color-coded and mechanically keyed for easy installation and to prevent mismatching, the FAKRA interface is available in IP67 and non-IP67 PCB and cable-mount configurations designed to perform up to 6GHz. Commonly used in compute modules, wire harnesses and camera applications.



## FAKRA to AMC/AMC4 Cable Assemblies

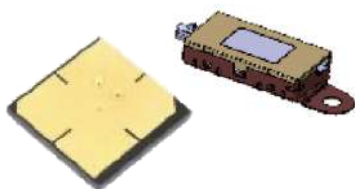
FAKRA to AMC and AMC4 assemblies combine the automotive industry-standard FAKRA connector with the ultraminiature AMC or AMC4 connectors on micro-coax cable. Ideal for tight spaces, these configurations are commonly used to connect cameras, antennas, sensors or other devices in the cab of a vehicle. Custom solutions are available.

# SAA Automotive Antennas



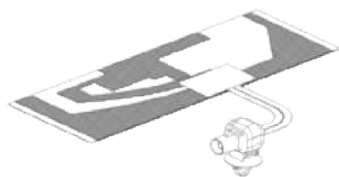
## Smart Antenna Modules

- Receiver / Tuner next to Antenna
- MIMO Antenna
- Digital communication HSD /
- Ethernet



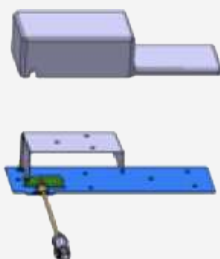
## Passive and Active Antenna components

- Amplifier LNA
- Switches / Gateways
- Multiplexer / Splitter



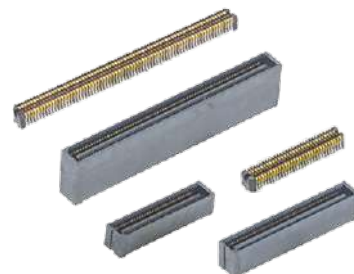
## Antenna Wiring Solutions

- FAKRA / Coax
- HSD
- Ethernet



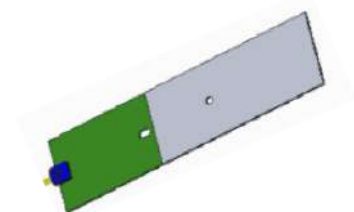
## Data Communication

- GSM to LTE / Future 5G
- Telematic Data



## Autonomous Driving

- GPS / Glonass / Galileo
- Precision GNSS Recognition
- Car 2 X communication
- Traffic data broadcasting



## Comfort and Safety: Low Frequency – Short Range

- Bluetooth / WIFI
- Wireless Charging
- Keyless Entry
- TPMS



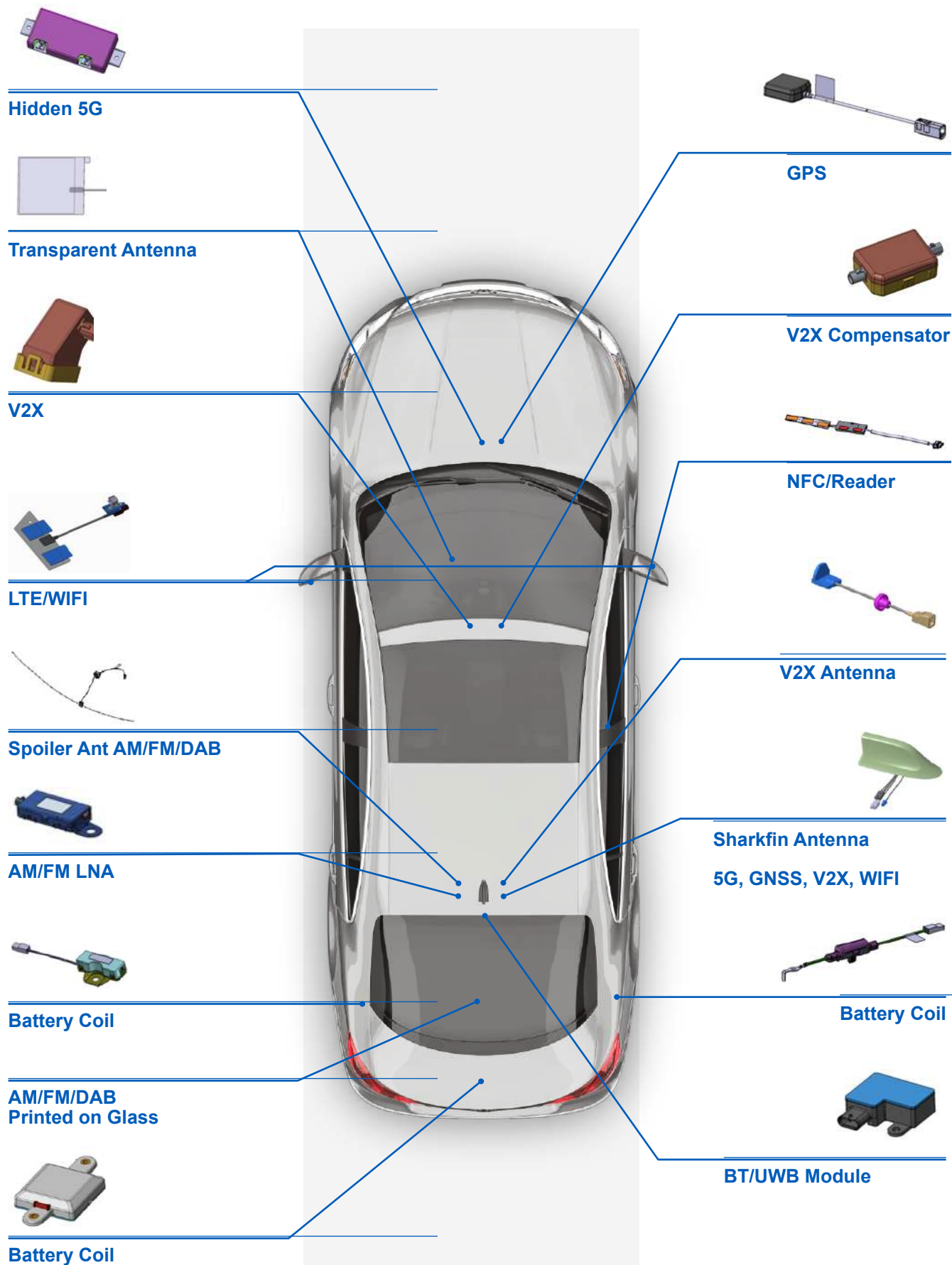
## Broadcast / Infotainment

- Satellite Radio SDARS
- Television UHF/VHF
- Glass Antennas
- FM / AM Radio
- DAB Radio
- DTV

## Remote Controlled Functions

- Keyless Entry
- Remote HVAC Control
- Vehicle Pre Condition





# Amphenol

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