



# Automotive Solutions

Amphenol has a successful history providing interconnect solutions that adhere to industry standards like USCAR and meeting LV214 severity levels.





# 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.**

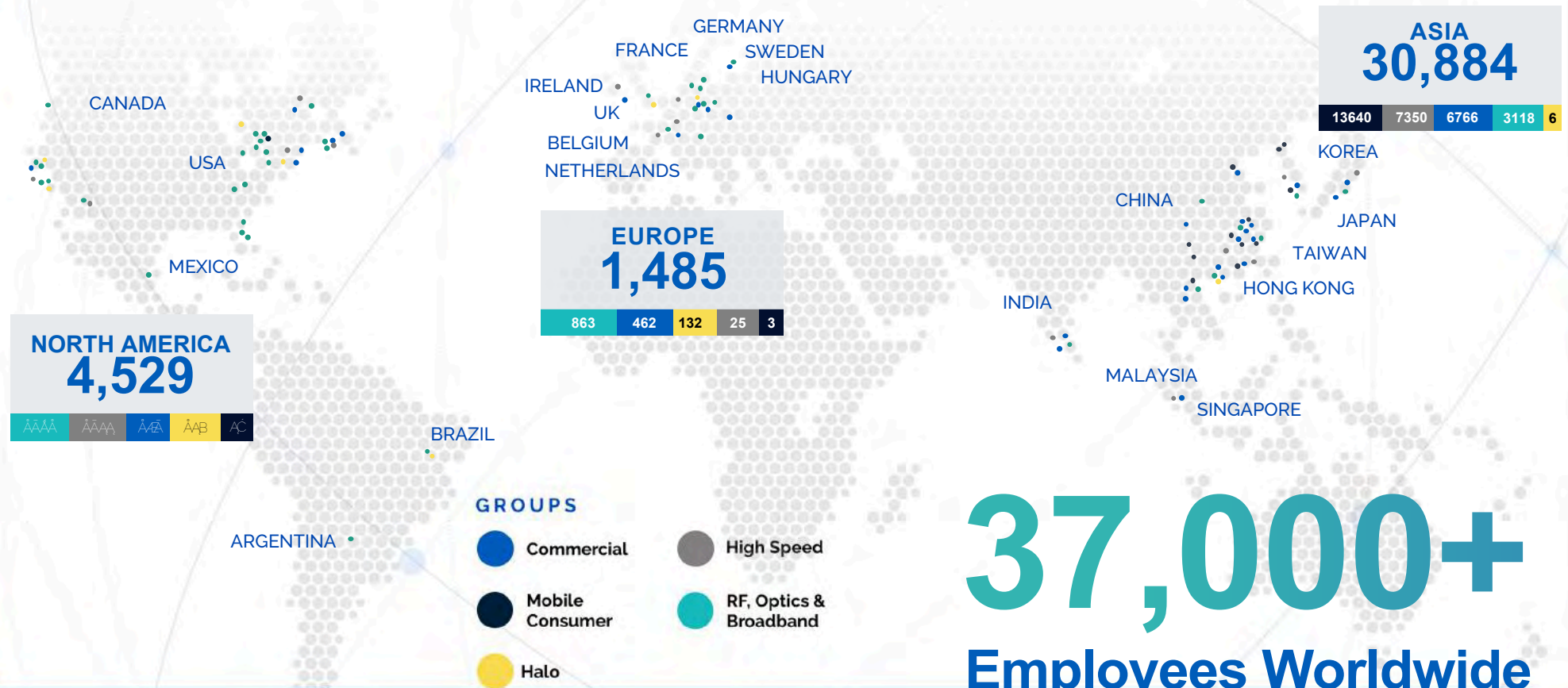
Amphenol Corporation is one of the world's largest designers and manufacturers of electrical, electronic and fiber optic connectors and interconnect systems, antennas, sensors and sensor-based products and coaxial and high-speed specialty cable.

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.





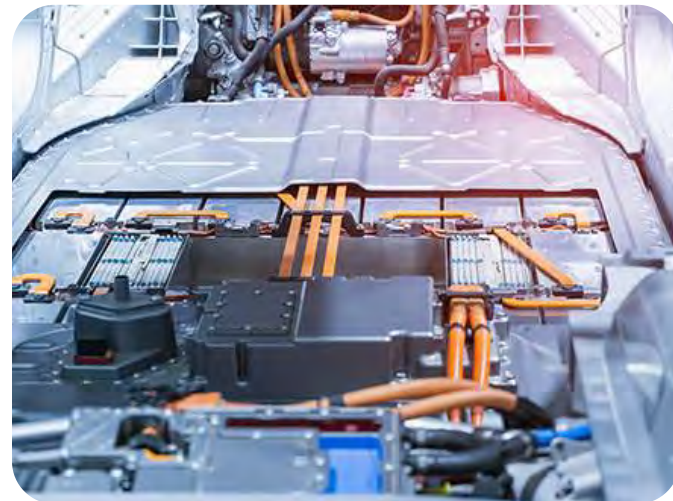


## EV Charging

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.

## 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.

## Battery Management Systems

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

## Automotive



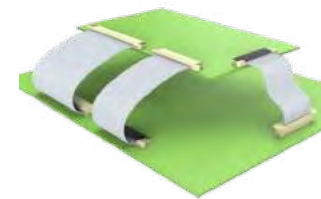
### Ve-NET™

- Developed according to USCAR-2 & LV214
- Using shielded twisted pair cables to support MULTI-GIG high data transmission rate.
- Supports Automotive Ethernet, LVDS, APIX3, and FPD-Link IV



### HSC Connector System

USCAR-2 COMPLIANT COMPACT HIGH SPEED INTERCONNECT SYSTEM  
HSC connector system is a fully shielded interconnect system that supports data rates up to 1Gb/s and more. With 0.50mm square terminals, it allows a lighter and smaller connector design.



### 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



### Mini HSbridge+ / HSbridge+

- Compliant with USCAR-30 USB and USCAR-2
- High data rate up to 10Gb/s, current rating up to 5 amps of power output
- Multiple volume and colour coding effectiveness compliant with automotive requirements



### HSD (High Speed Data) Connector System

COMPLIANT WITH USCAR-2 SPECS  
HSD connector system is a fully shielded interconnect system that can be used with shielded twisted quad cables. It has a high performance digital system for low-voltage differential signals which prevents interference from crosstalk and external sources.



### 2.00mm FFC/FPC Connectors with Autolock Mechanism

NON-ZIF FLEX CONNECTOR WITH AUTOLOCK  
LV214 S1 qualified non-ZIF flex connector with an autolock mechanism and surface mount termination.



### NETBridge+™ Automotive Ethernet Connector System

USCAR-2 COMPLIANT AUTOMOTIVE ETHERNET CONNECTORS  
NETBridge+™ Automotive Ethernet Connector System is designed for automotive applications and can transmit up to 100Mb/s and 1Gb/s according to IEEE 100BASE-T1 and 1000BASE-T1 and will be upgraded to 10Gb/s.



### 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 8mm to 30mm with large floating allowance
- USCAR-2 T3V2 qualified



USCAR  
USCAR-2 T3V2 QUALIFIED

### 0.50mm FFC/FPC Connectors with Autolock Mechanism - F308/F332 Series

- RIGHT ANGLE NON-ZIF FLEX AUTOLOCK CONNECTORS  
USCAR-2 T3V2 qualified 0.50mm pitch right angle non-ZIF flex connector with an auto lock mechanism and surface mount termination.





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

PCIe® Gen 5 straddle mount connectors outperform the industry standards with higher speed along with complying to USCAR. The optimized series supports backwards mating and is footprint compatible with PCIe® 4/3/2/1



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

**HIGH DENSITY HIGH PERFORMANCE CONNECTOR**  
Amphenol's PCIe® M.2 Gen 4 connectors provide 67 contacts on 0.50mm pitch and signal transmission speed of 16Gb/s. It is designed for PCIe® 4.0, USB 3.0/3.1 and SATA 3.0 applications, and USCAR compliant, making it suitable for automotive applications.



**FlexFast™ Flex to Board Connector Solution**

- Small size and low height flex to board connection solution.
- 0.45mm/0.75mm/0.9mm/1.5mm/1.8mm pitch. Pin counts from 12-100pin
- Automotive grade compliant to USCAR2 and LV214
- Designed for BMS, battery pack, Inverter+DCDC applications



**BarKlip® XP Series**

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



**BarKlip® BK200 I/O for EV Charging**

**DIRECT PLUGGABLE CLIP THAT CONNECTS TO BUSBARS IN EV CHARGING STATIONS**  
Amphenol's BarKlip® BK200 I/O provides a convenient method of distributing up to 200A between busbars, cables and circuit boards. It features 14 fully independent cantilevered beams, providing a true compliant spring to adjust for variations in busbar alignment and surface finish.



**PwrBlade+® I/O**

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



**FlexLock™ 3.20mm / 2.54mm**

- Easier assembly, less weight, lower cost
- USCAR-T2V2 LV-214 S3 specifications
- 3A per contact, TPA and CPA



**WireLock® 1.80mm**

- Highly vibration resistant, low mating force
- USCAR-T2V2, LV 214 S2 compliant
- 2A per contact, TPA and CPA



**MicroSpace™ High Voltage Selective Loaded Crimp-to-Wire Connector Platform**

- Compact, robust and versatile
- LV214 S2 compatible
- 3.81 / 6.35 / 8.89mm pitch; 400V, 800V and 1200V.



**EnergyKlip™ EK160**

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



**EnergyKlip™ EK350**

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



**IPC-M50 Connector**

- Rated up to 50A per 6AWG contact (UL rated currents up to 120A)
- Rated up to 10,000 mating cycles
- UL tested and approved when cross-mated with competitive connectors



**MicroSpaceXS™ 1.27mm**

- Crimp to Wire and Wire to Wire solutions
- LV214 Severity-3 and USCAR-T2V2 compatible
- 4A per contact, TPA and CPA



**MicroSpaceXS™ Waterproof**

- Crimp to Wire and Wire to Wire solutions
- USCAR-T2V2 and LV214 Severity 2 specifications
- 3A per contact, TPA and CPA, IP68



**Minitek® Pwr Connector and Cable Assembly**

- Wire-to-wire and wire-to-board solutions
- Current rating from 5A to 25A
- Available in pitch sizes of 3.00mm, 4.20mm, and 5.70mm



**IPC-M350 Connector**

- Rated up to 500A per 350MCM (185mm<sup>2</sup>) contact
- Rated up to 10,000 mating cycles
- UL tested and approved when cross-mated with competitive connectors



**DuraEV™**

- Provides continuous current of 70A and withstands 10,000 mating cycles
- IP67 rated portable and fixed battery connectors for charging and discharging electric vehicles
- Robust and durable solution



**DuraSWAP™ Swappable Battery Connectors**

- IP67 rated swappable battery connector
- Provides continuous current of 100A and withstands 10,000 mating cycles
- Connector mates in four different orientations

## Automotive High Speed



### MEG-Array®

#### INDUSTRY-PROVEN BGA ARRAY CONNECTOR

The MEG-Array® Mezzanine Connector system provides the high density and high-speed benefits of a large array supported by the reliability and low costs of standard surface mount PCB assembly.



### TR Multicoax Connector

#### THE HIGHEST DENSITY, HIGH SPEED COAX CONNECTOR

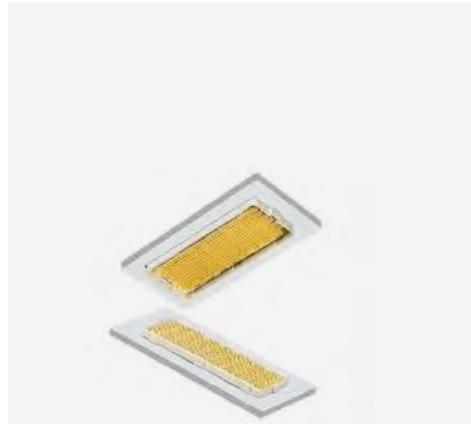
TR Multicoax connectors deliver superior signal integrity from multiple high speed analog or digital channels. With a choice of 20GHz, 40GHz, 70GHz, and 90 GHz configurations, users can upgrade their connectors according to bandwidth requirements of their application



### cStack™

#### CUSTOMIZABLE SOLDERLESS INTERPOSER-BASED ONE-PIECE STACKER

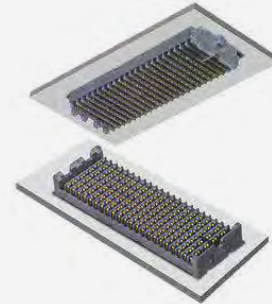
The Amphenol cStack™ high speed solderless interconnect solution provides limitless flexibility for board-to-board mezzanine applications and board-to-board stackable and coplanar applications.



### MEG-Array® R+

#### 56GB/S HIGH SPEED MEZZANINE BGA CONNECTOR SYSTEM

Leveraging proven technologies, including an industry leading BGA design, offering superior self-aligning and self-leveling.



### Chameleon®

#### ADAPT AND ADVANCE TO THE NEXT GENERATION

With performance speeds up to 25 Gbps+, Chameleon meets the demand for faster, smaller and more compact connector solutions. Chameleon delivers a new level of performance unlike any other platform connector on the market today.



### Lynx™

#### HIGH SPEED AND DOUBLE DENSITY LOW-PROFILE BOARD-TO-BOARD CONNECTOR

Amphenol's Lynx™ is a 4-row product offering doubling the density in a 2-row footprint that is suitable for a wide variety of applications in datacom, enterprise server, telecommunication, industrial.



### InfinX®

#### OPTIMIZED FOR PERFORMANCE AND DIFFERENTIAL PAIR SIGNALING

The InfinX® high-speed mezzanine connector solution is designed to meet the needs of 25+Gb/s applications. Available in 4- and 6-Pair configurations, InfinX is your best choice for high speed board-to-board applications.

## Automotive 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 20 Gbps. 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 vehicles 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 cables 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 9 GHz 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 6 GHz. Commonly used in compute modules, wire harnesses and camera applications.

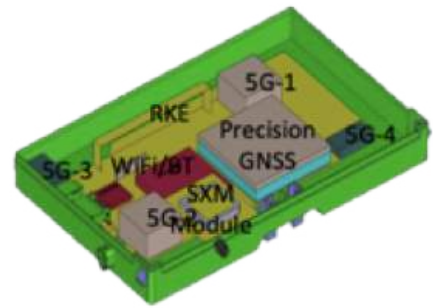


### FAKRA to AMC/AMC4 Cable Assemblies

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.

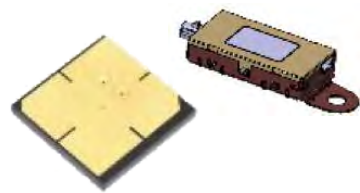


# Automotive SAA Automotive Antennas



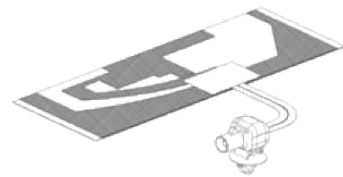
## Smart Antenna Modules

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



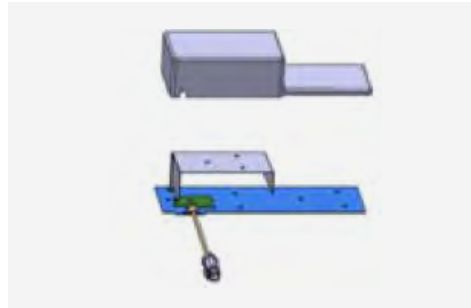
## Passive and Active Antenna components

- Amplifier LNA
- Switches / Gateways
- Multiplexer / Splitter



## Antenna Wiring Solutions

- FAKRA / Coax
- HSD
- Ethernet



## Data Communication

- GSM to LTE / Future 5G
- Telematic Data



## Comfort and Safety: Low Frequency – Short Range

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



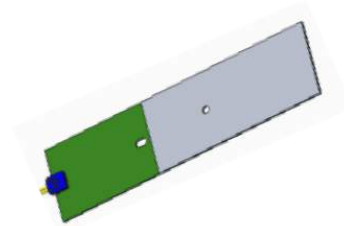
## Broadcast / Infotainment

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



## Autonomous Driving

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



## Remote Controlled Functions

- Keyless Entry
- Remote HVAC Control
- Vehicle Pre Condition



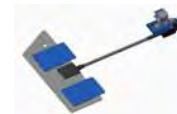
## Hidden 5G



## Transparent Antenna



## V2X



## LTE/WIFI



## Spoiler Ant AM/FM/DAB



## AM/FM LNA

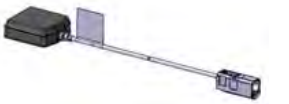


## Battery coil

## AM/FM/DAB Printed on Glass



## Battery coil



## GPS



## V2X Compensator



## NFC/Reader



## V2X Antenna



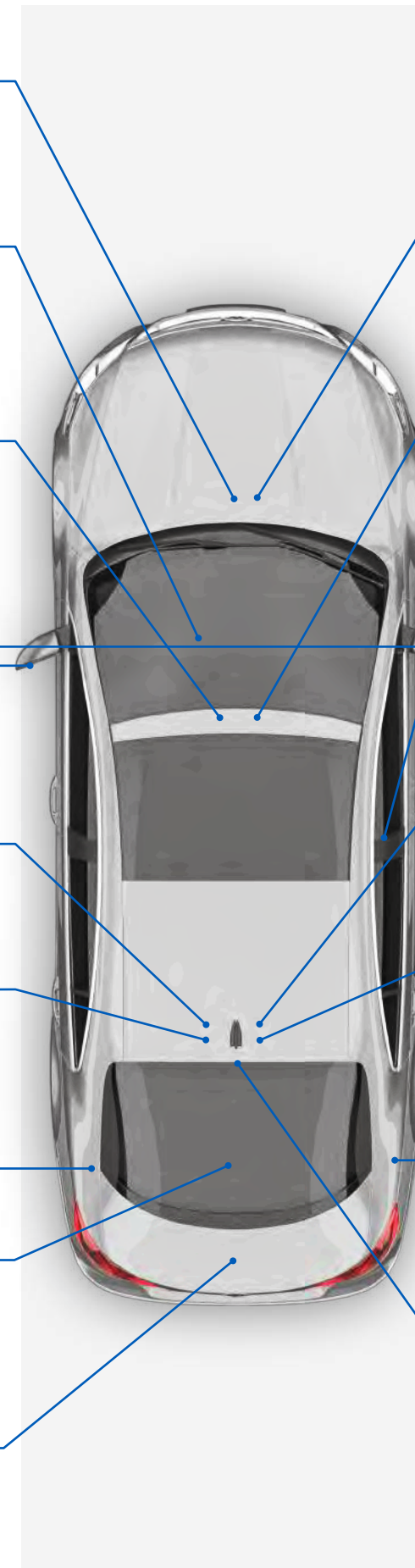
## Sharkfin Antenna 5G, GNSS, V2X, WIFI



## Battery Coil



## BT/UWB Module



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COMMUNICATIONS SOLUTIONS

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