

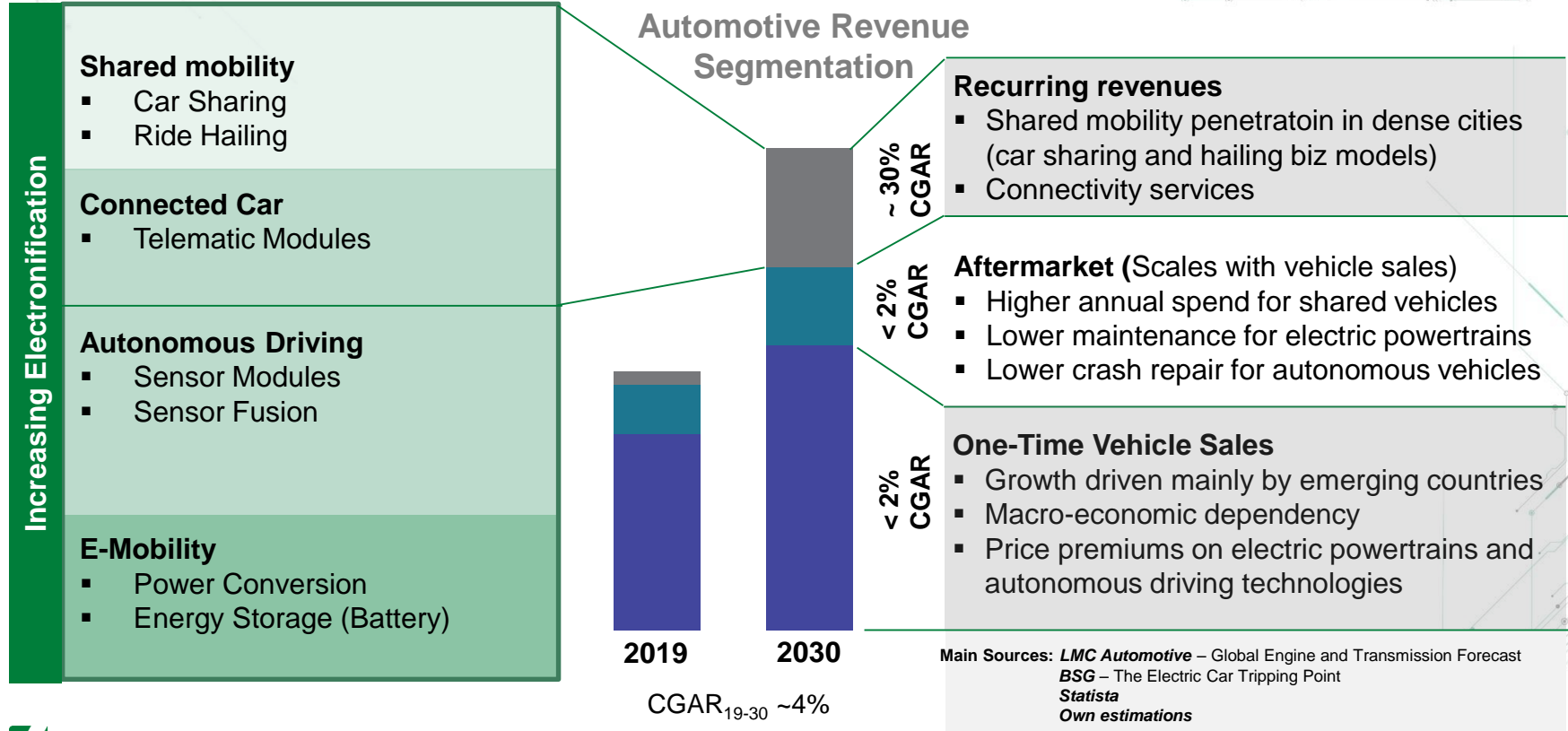


Expertise Applied | Answers Delivered

ESD Protection Solutions Connectivity and Autonomous Driving

Automotive mega trends and market drivers

- Connectivity is essential to Autonomous driving will change the driving experience radically



Automotive electronics system protection

- ESD Protection is mandatory to cover ISO 10605 system requirements

Multipurpose Camera: ■

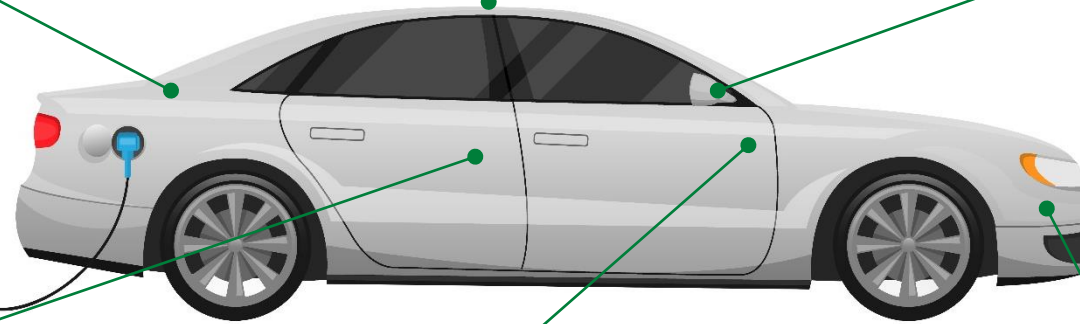
- High Speed ESD Protection
- ESD Diodes CAN Bus Protection
- Coil Overcurrent Protection
- Feedback-Loop Protection

Ecall: ■

- Antenna ESD Protection
- TVS Load dump Protection
- Backup Battery Overcurrent Protection
- Reverse Polarity Protection

Smart Infotainment: ■ ■

- ESD Diodes CAN Bus Protection
- Multi-Channel ESD Protection
- Resettable Overcurrent Protection
- DC/DC Converter Output Rectification



V2X Communication: ■

- Antenna ESD Protection
- TVS Load dump Protection
- Input Overcurrent Protection
- Reverse Polarity Protection

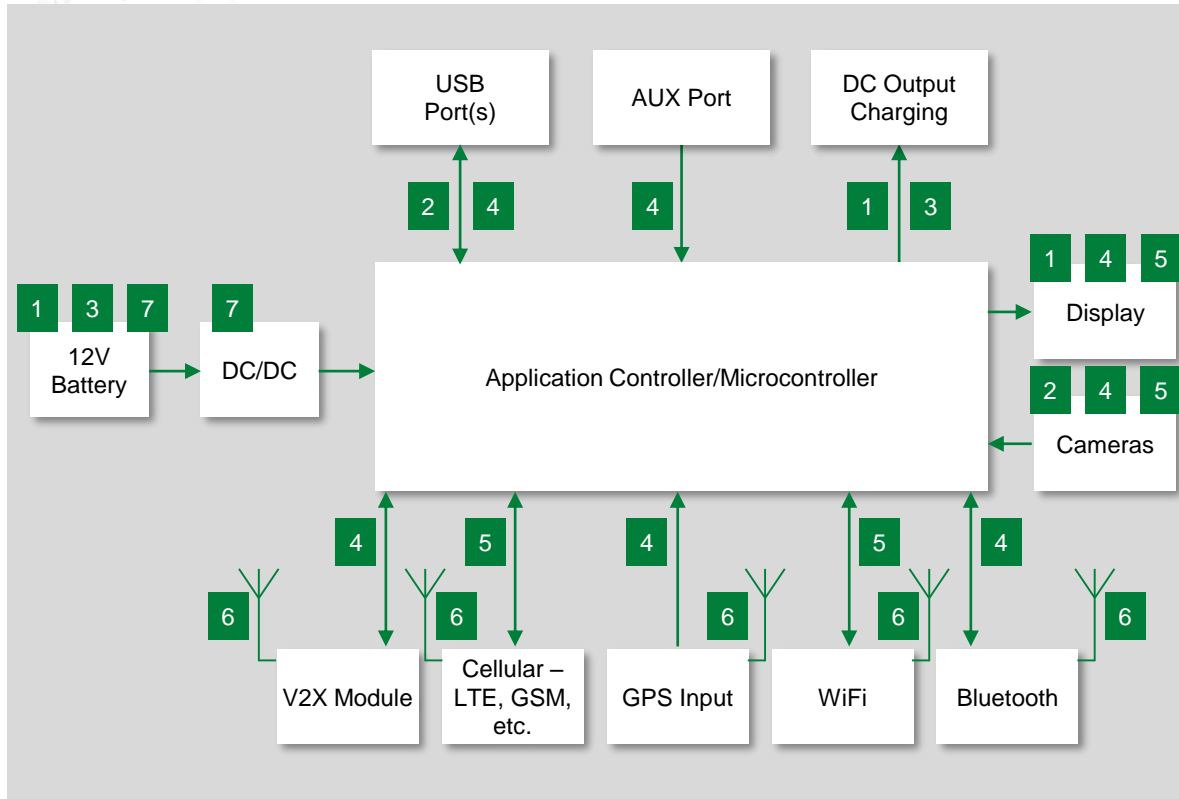
Sensor Fusion: ■

- Multi-Protocol ESD Protection
- TVS Load dump Protection
- Freewheeling Diode

Radar: ■

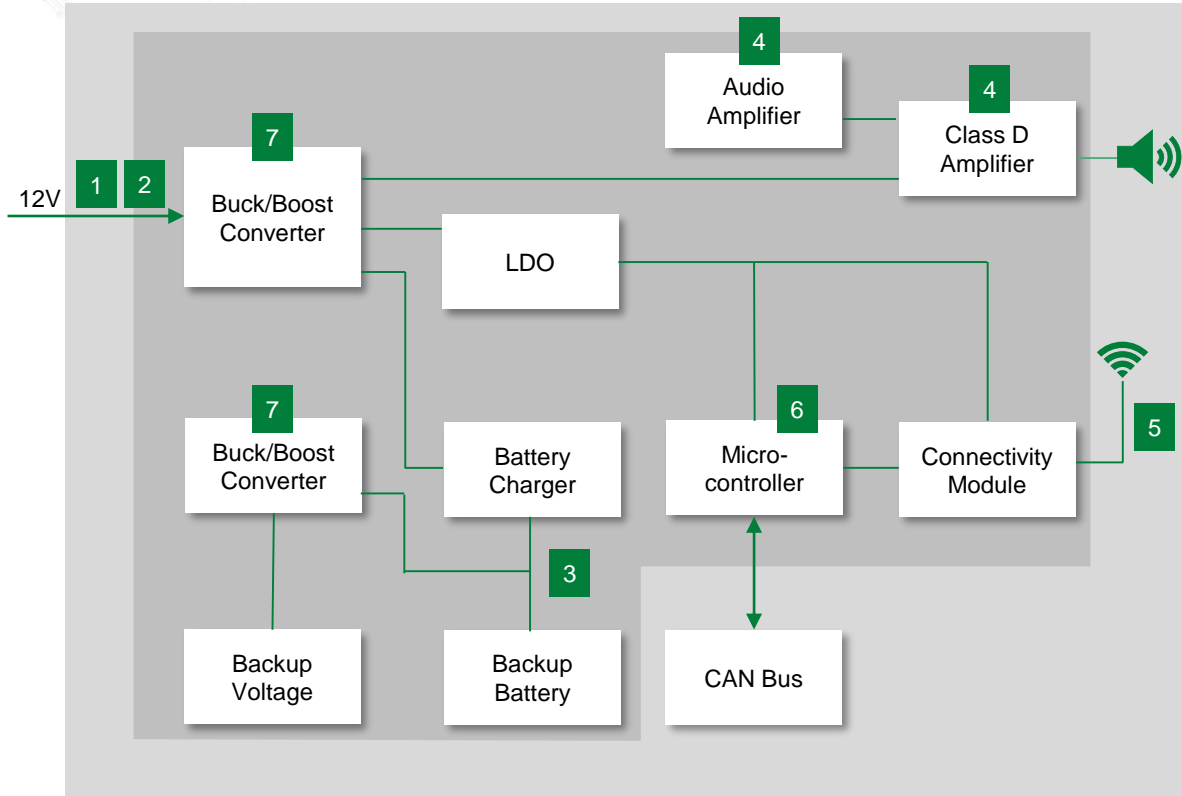
- Multi-Protocol ESD Protection
- TVS Load dump Protection
- Freewheeling Diode

Smart infotainment



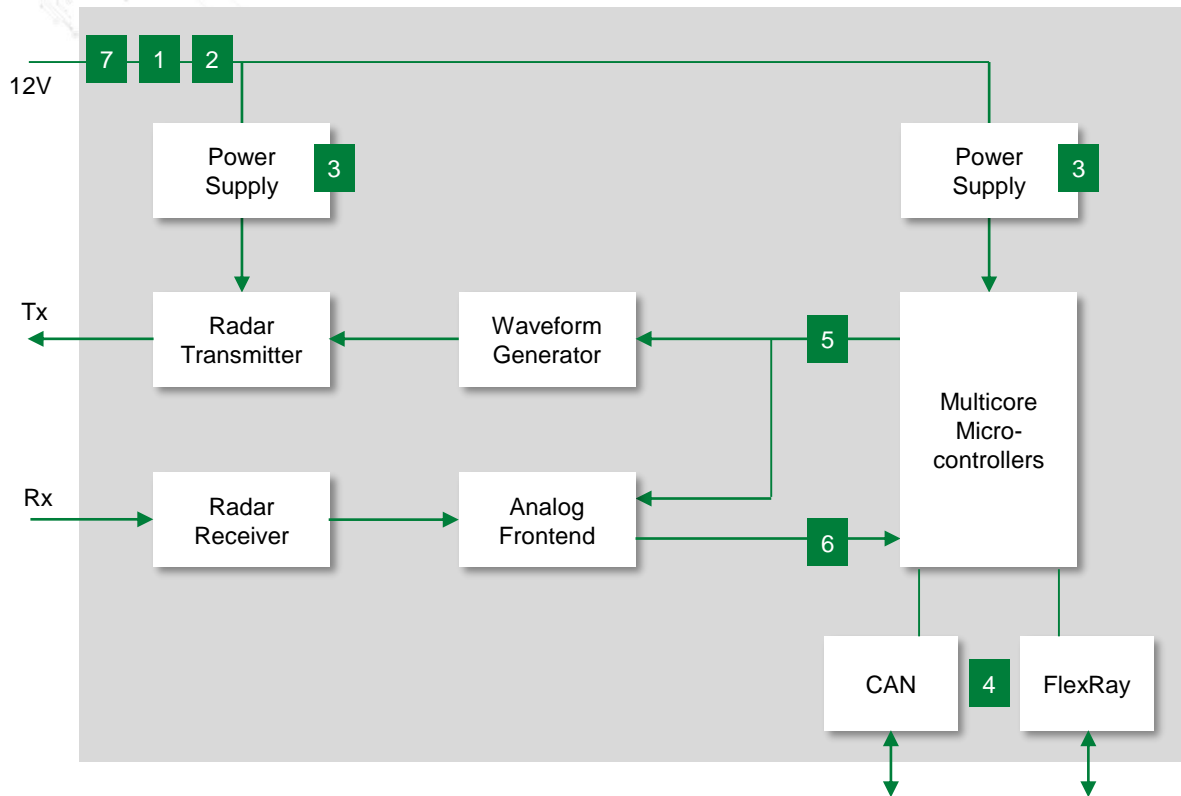
| | Technology | Series |
|---|-------------------------------|--|
| 1 | SMD Fuse | 437A , 440A , 441A |
| 2 | Resettable PTC | ASMD , miniASMD |
| 3 | TVS Diode | SZ1SMB , SLD8S |
| | Varistor | AUML , MLA Auto |
| 4 | Diode Arrays | AQ1005 |
| | Varistor | MLA Auto |
| 5 | Diode Arrays | AQ3045 |
| 6 | Polymer and Silicon ESD Diode | AXGD , AQ3130 , AQ3118 |
| 7 | Resettable PTC | ASMD , miniASMD |
| | Schottky Diode | DST |

eCall



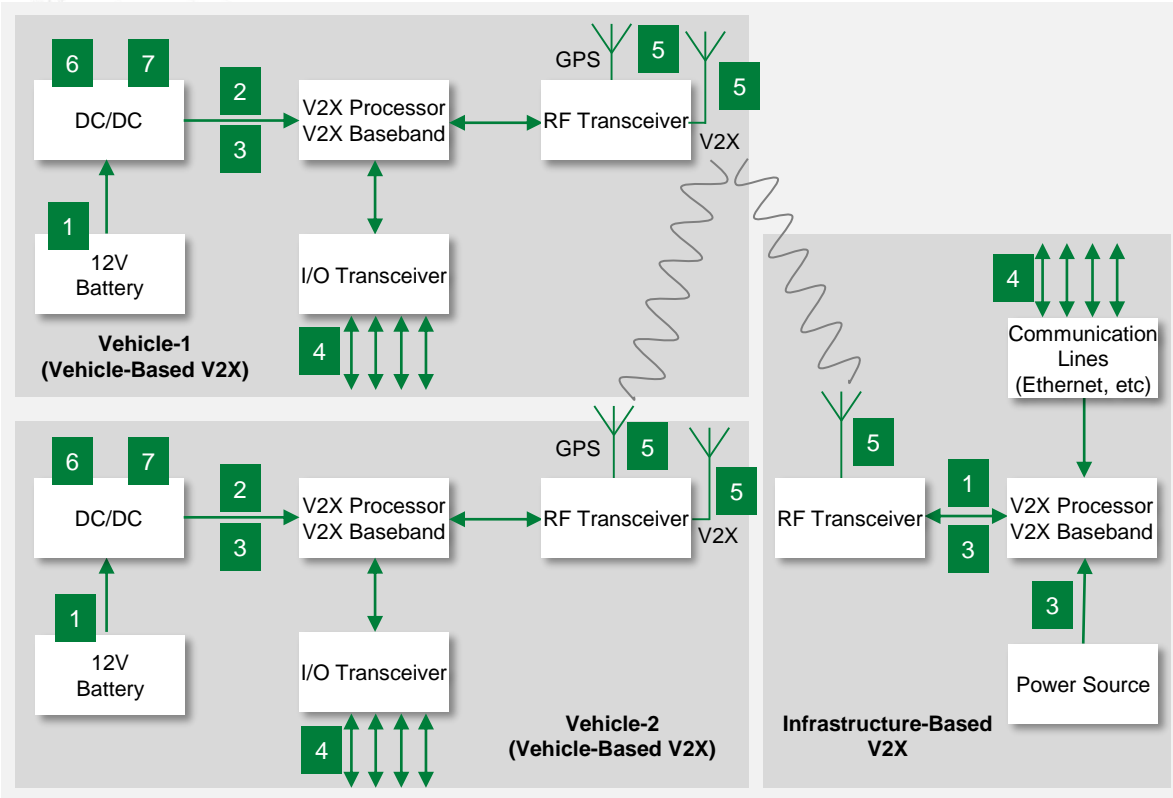
| | Technology | Series |
|---|-------------------------------|---|
| 1 | TVS Diode | SLD8S , SZ1SMA , SZ1SMB |
| | Varistor | AUML , MLA Auto |
| 2 | SMD Fuse | 437A , 438A , 440A |
| 3 | Resettable PTC | ASMD , miniASMD , Battery Strap |
| 4 | Diode Arrays | AQ1005 |
| 5 | Polymer and Silicon ESD Diode | AXGD , AQ3130 , AQ3118 |
| 6 | Diode Arrays | AQ24CANA , AQ24CANFD |
| 7 | Schottky Diode | DST |

Radar



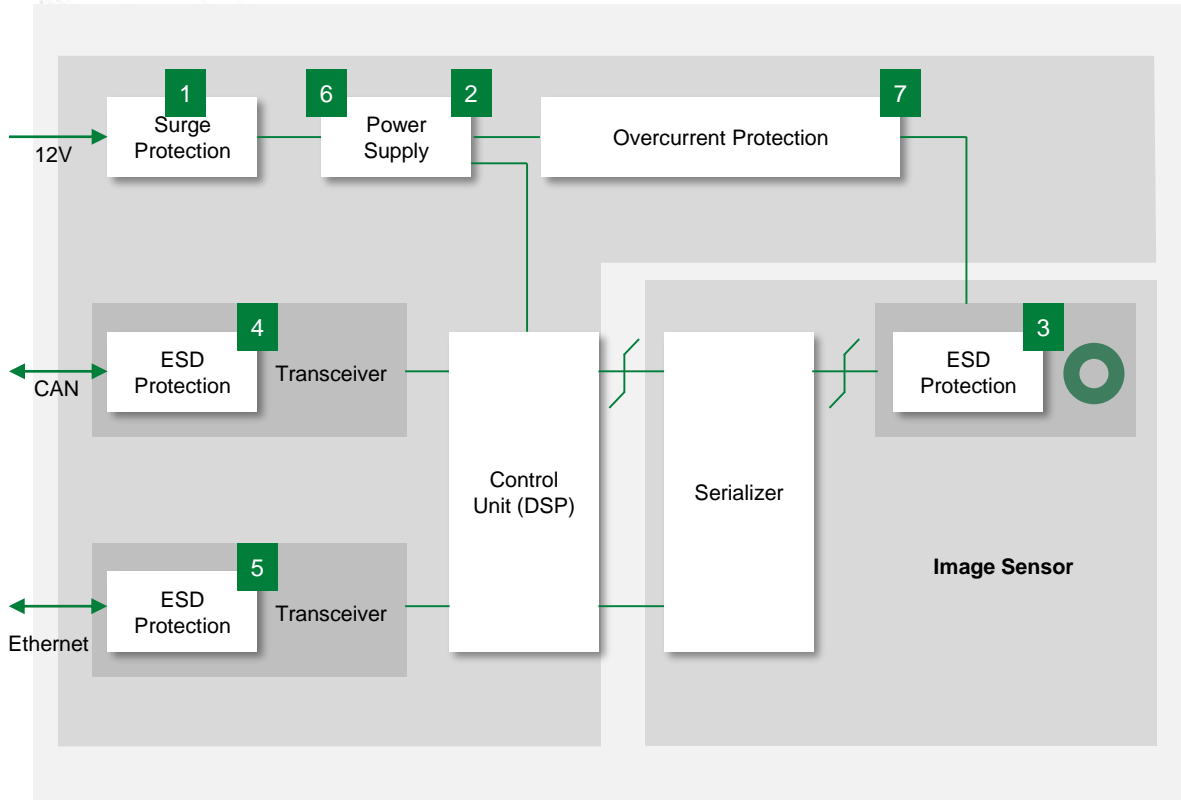
| | Technology | Series |
|---|-------------------------------|--|
| 1 | SMD Fuse | 437A , 440A , 441A |
| 2 | Resettable PTC | ASMD , miniASMD |
| 3 | TVS Diode | SZ1SMB , SLD8S |
| 4 | Diode Arrays | AQ24CANA , AQ24CANFD |
| 5 | Diode Arrays | AQ3045 |
| 6 | Polymer and Silicon ESD Diode | AXGD , SESD |
| 7 | Schottky Diode | DST |

V2X communication



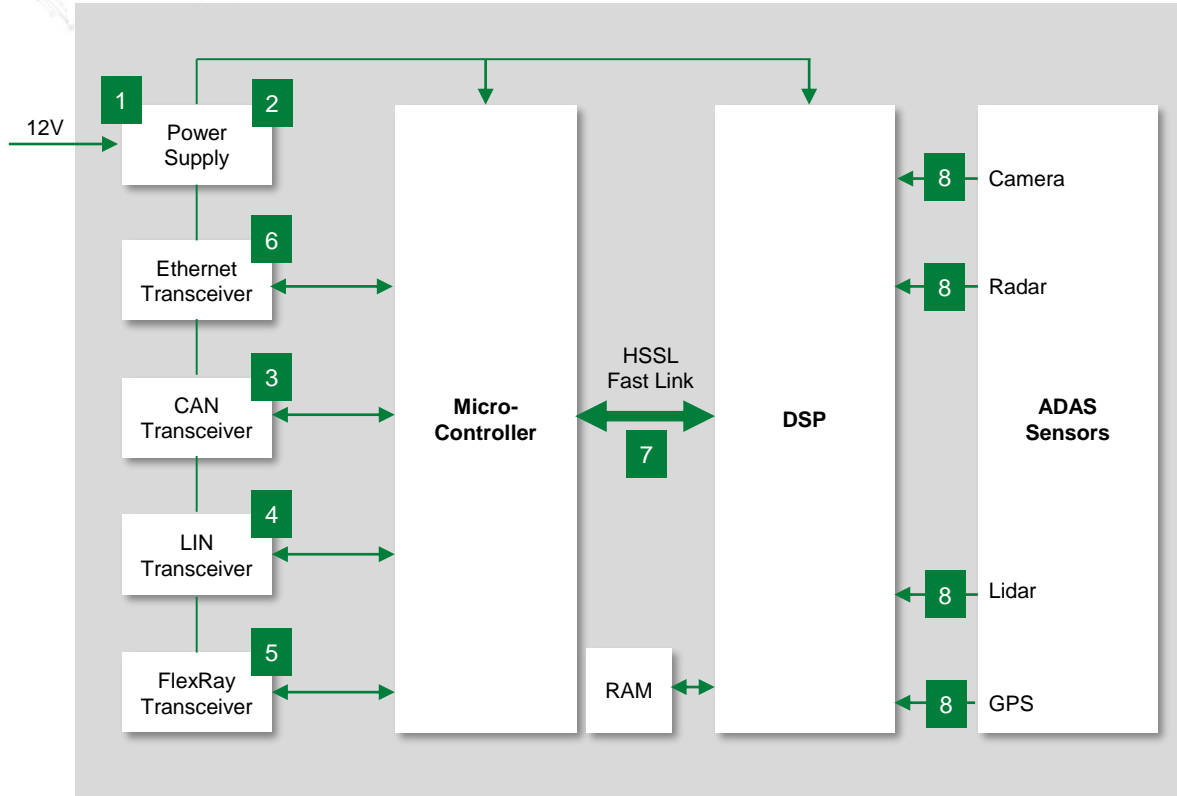
| | Technology | Series |
|---|----------------|----------------------------------|
| 1 | SMD Fuse | 437A, 438A, 440A |
| 2 | Resettable PTC | ASMD, miniASMD |
| 3 | TVS Diode | SZ1SMA, SZ1SMB |
| 4 | Diode Arrays | AQ3400, AQ2555 |
| 5 | Polymer ESD | AXGD |
| 6 | TVS Diode | SZ1SMB, SLD8S |
| 7 | SMD PTC | ASMD, miniASMD |
| | Schottky Diode | DST |

Multi-purpose camera



| | Technology | Series |
|---|-------------------------------|---|
| 1 | TVS Diode | SZ1SMB , SLD8S |
| | Varistor | AUML , MLA Auto |
| 2 | SMD Fuse | 437A , 438A , 440A |
| 3 | Diode Arrays | AQ3045 |
| 4 | Diode Arrays | AQ24CANA , AQ24CANFD |
| 5 | Polymer and Silicon ESD Diode | AXGD , AQ3400 , AQ2555 |
| 6 | Schottky Diode | DST |
| 7 | SMD PTC | ASMD , miniASMD |

Sensor fusion



| | Technology | Series |
|---|----------------|--|
| 1 | TVS Diode | SZ1SMB , SLD8S |
| 2 | Schottky Diode | DST |
| 3 | Diode Arrays | AQ24CANA |
| 4 | Diode Arrays | AQ24-01FTG |
| 5 | Diode Arrays | AQ24CANFD |
| 6 | Diode Arrays | AQ3400, AQ2555 |
| 7 | Diode Arrays | AQ3045 |
| 8 | Diode Arrays | AQ3400 |

Littelfuse solution for ESD protection

- Each communication interface has a unique set of requirements
 - Voltage Rating
 - ESD Rating
 - Number of channels
 - Polarity
 - Capacitance
- We can offer a large portfolio of automotive qualified ESD protection devices
- Our FAEs can help to find the best fit product for your application

| Protocol | Bit Rate/Frequency | Best Fit Product |
|---|--------------------------------------|----------------------------|
| LIN | <20 kbps | AQ24C-01FTG |
| Classic CAN | <1 Mbps | AQ24CANA-02HTG |
| CANFD | <10 Mbps | AQ24CANFD-02HTG |
| Automotive Audio Bus (A ² B) | 50 Mbps | AQ3045-01ETG, AQ3400-02UTG |
| Broad R-Reach | 100 Mbps | AQ3400-02UTG |
| Automotive Ethernet | 100 Mbps, 1 Gbps | AQ3045-01ETG, AQ3400-02UTG |
| Automotive HDBaseT | ~1 Gbps | AQ2555NUTG |
| USB 2.0 | Data-480 Mbps | AQ305-01ETG, AQ3400-02UTG |
| | V _{BUS} – DC Bus | AQ1003-01ETG |
| USD 3.2 Gen1 | Data -5 Gbps | SESD1004Q4UG-0020-090 |
| | V _{BUS} – DC Bus | AQ1003-01ETG |
| USB 3.2 Gen1 | V _{BUS} – 15W Options (5V) | AQ1003-01ETG |
| | V _{BUS} – 27W Options (9V) | AQH12-01ETG |
| | V _{BUS} – 45W Options (15V) | AQH15-01ETG |
| | V _{BUS} – 60W Options (20V) | AQH24-01ETG |
| Automotive AHD | 100 MHz | AQ3045-01ETG, AXGD10402 |
| GPS Antenna | 1.5 GHz | AQ3045-01ETG |
| Bluetooth | 2.4 GHz | AQ3045-01ETG |
| WiFi | 2.4 GHz – 5.0 GHz | AXGD10402 |
| 4G/LTE | 1.8 GHz – 8.0 GHz | AXGD10402 |

Key links

TVS Diode Catalog and Design Guide:

<https://www.digikey.com/en/pdf//littelfuse/littelfuse-tvs-diode-products-catalog>

TVS Diode Array Catalogue:

<https://www.digikey.com/en/pdf//littelfuse/littelfuse-tvs-diode-array>

Varistor Catalogue

<https://www.digikey.com/en/pdf//littelfuse/littelfuse-varistor-circuit-protection>

Automotive Electronics Application Guide:

<https://www.digikey.com/en/pdf//littelfuse/automotive-electronics>

ESD Suppression Design Guide:

https://www.littelfuse.com/~media/electronics/design_guides/esd/littelfuse_esd_suppression_design_guide.pdf.pdf

General

www.Littelfuse.com



Expertise Applied | Answers Delivered

[Littelfuse.com](https://www.littelfuse.com)

