



Expertise Applied | Answers Delivered

Power Train



Passenger Vehicle

Users must independently evaluate the suitability of and test each product selected for their own specific applications. It is the User's sole responsibility to determine fitness for a particular system or use based on their own performance criteria, conditions, specific application, compatibility with other parts, and environmental conditions. Users must independently provide appropriate design and operating safeguards to minimize any risks associated with their applications and products. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at littelfuse.com/disclaimer-electronics.

Envisioning a sustainable, interconnected, and safe approach to mobility

Energy Storage and Propulsion

- Battery Charging
- Battery Electric
- Battery Management
- DC-DC Converter
- Fuel Cell Electric
- Hybrid Electric
- On-Board Charger
- Power/Battery Distribution Unit
- Traction Inverter

Advanced Driver Assistance Systems

- Adaptive Cruise Control
- Adaptive Front Light
- Automatic Emergency Braking
- Autonomous Driving
- Blind Spot Detection
- Exterior Camera
- View Park Assist
- Interior Camera
- Lane Departure Warning
- Night Vision
- Pedestrian Avoidance
- Radar/LiDAR/Ultrasonic
- Side Impact Assist
- V2V Communication

Communication and Infotainment

- Audio System
- Digital Cluster
- eCall
- GPS Module
- Head Unit
- LTE/WiFi/Bluetooth
- Navigation System
- Smart Cockpit
- Telematics Box



Network Systems and Body

- Bluetooth*
- BroadR-Reach®
- CAN/LIN/Ethernet
- MOST*/FlexRay*
- Central Body Module
- Climate Control
- Dashboard
- Keyless Entry
- Lighting
- Park Assistance
- Power Window
- Retracting Mirror
- Safe-By-Wire*
- Seat Control
- Wiper

* BroadR-Reach®, FlexRay, MOST, Bluetooth, and Safe-By-Wire are trademarks of their respective owners.

Combustion Engine Systems

- Cooling
- Electronic Fuel Injection
- Engine Control Unit
- Exhaust
- Ignition
- On-Board Diagnostics
- Transmission Control Unit
- Turbo Charger

Chassis and Safety Systems

- Active Suspension
- Air Bag
- Battery Disconnect
- Brake Control (ABS)
- DC Power Supply
- Electric Power Steering
- Electronic Stability Ctrl
- Pre-Collision System
- Seat Belt Pretensioner
- Tire Pressure Monitoring

xEV market key takeaways

Market trends

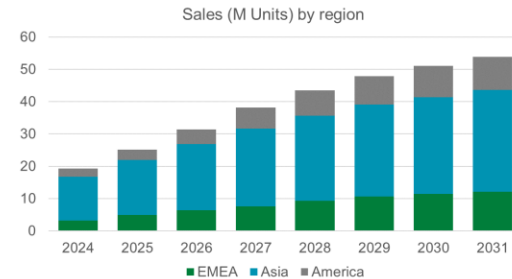
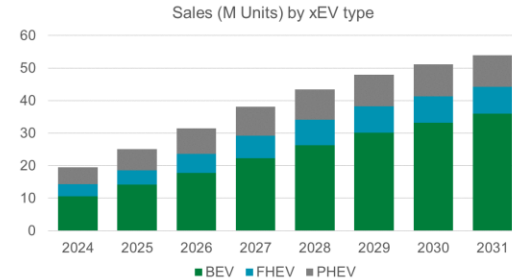
While global sales of passenger cars contracted in 2024, electric vehicles experienced double digit growth rates. Global EV sales are expected to top 50 million units by 2030, crossing the 50% market share threshold versus traditional ICE engines.

To support the growing number of EVs, there will be a substantial increase in the installation of public and private charging stations. Governments and private companies are expected to invest heavily in fast-charging networks.

Continuous improvements in battery technology has led to increased energy density, faster charging times, and longer driving ranges. Innovations in solid-state batteries, wireless charging, and vehicle-to-grid technology are enhancing the overall appeal and functionality of EVs.

Policies continue to support electric vehicle deployment and are evolving to a more holistic policy portfolio. Environmental and sustainability objectives drive electric vehicle policy support at all governance levels.

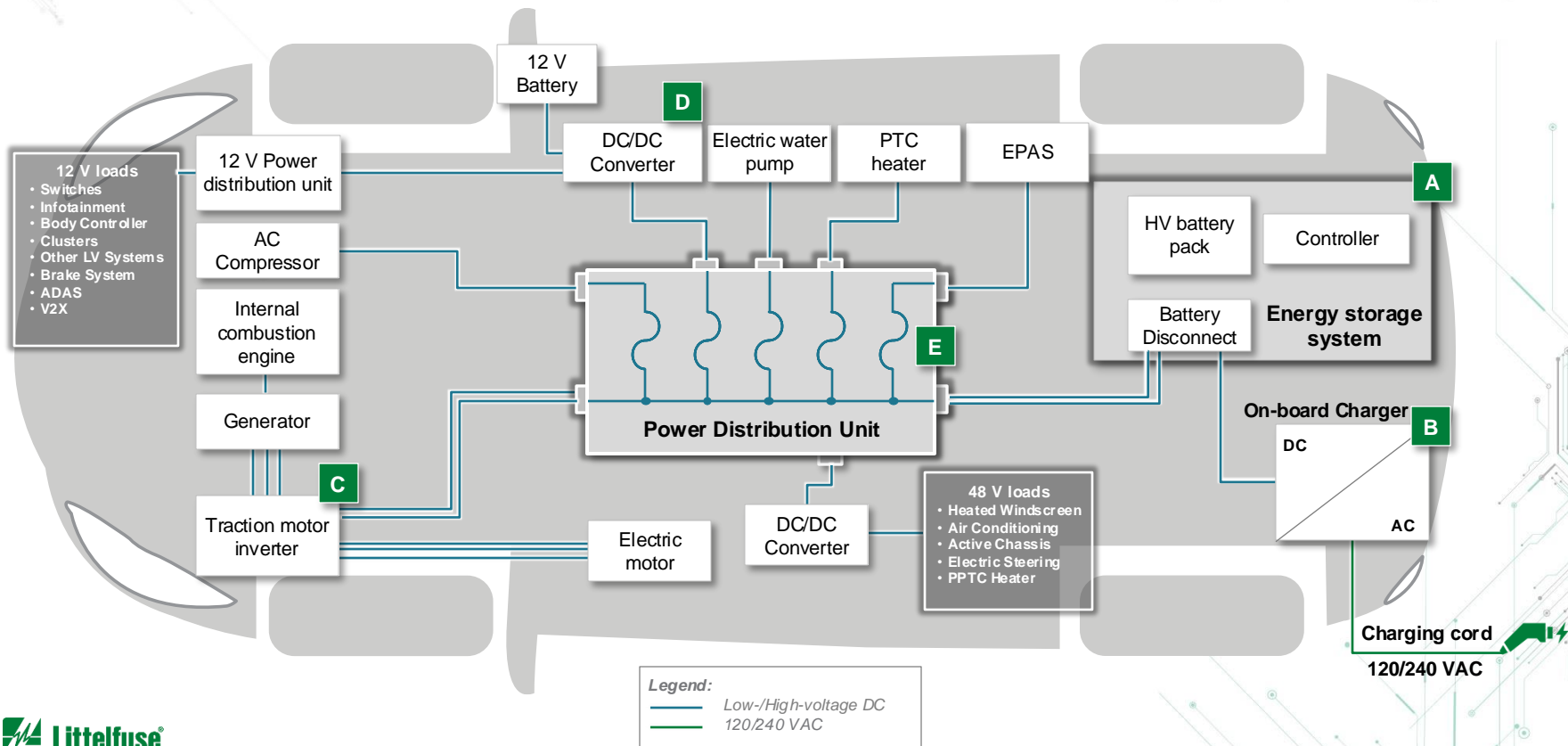
Sales (M Units) by xEV type and region



Source: Littelfuse Estimates

Government regulations, environmental concerns, and performance drive shift to EV.

Overview of the power train for electric vehicles



Passenger and commercial EVs share many functional blocks including common power train architectures

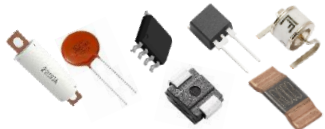
A Battery Management System

Fuse, TVS Diode, Gate Driver, Diode Array, TTape™, Switch



B On-board Charger

Fuse, MOV, Gate Driver, GDT, SIDACtor®, TVS Diode, Shunt Resistor



C Traction Motor Inverter

Fuse, TVS Diode, Diode Array, Current Sensor, Gate Driver, Thermal Protector



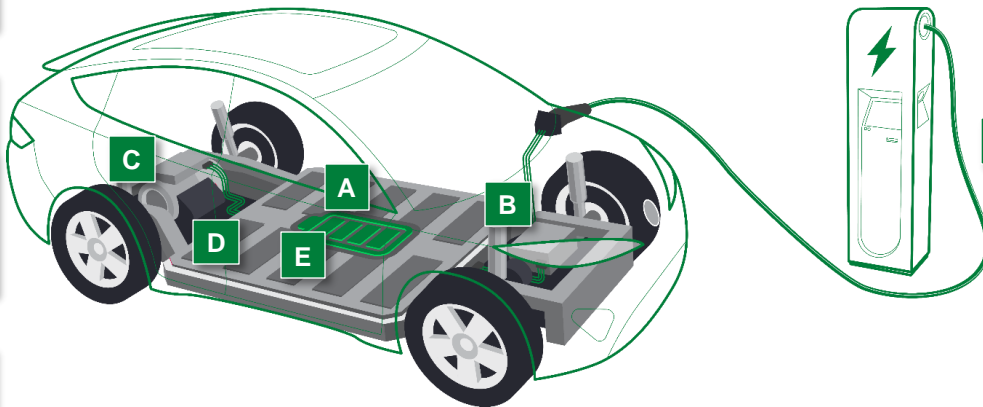
D DC-DC Converter

Fuse, TVS Diode, Diode Array, Gate Driver, Shunt Resistor



E Battery Disconnect Unit

Contactors, Current Sensor, High Voltage Fuse, TVS Diode





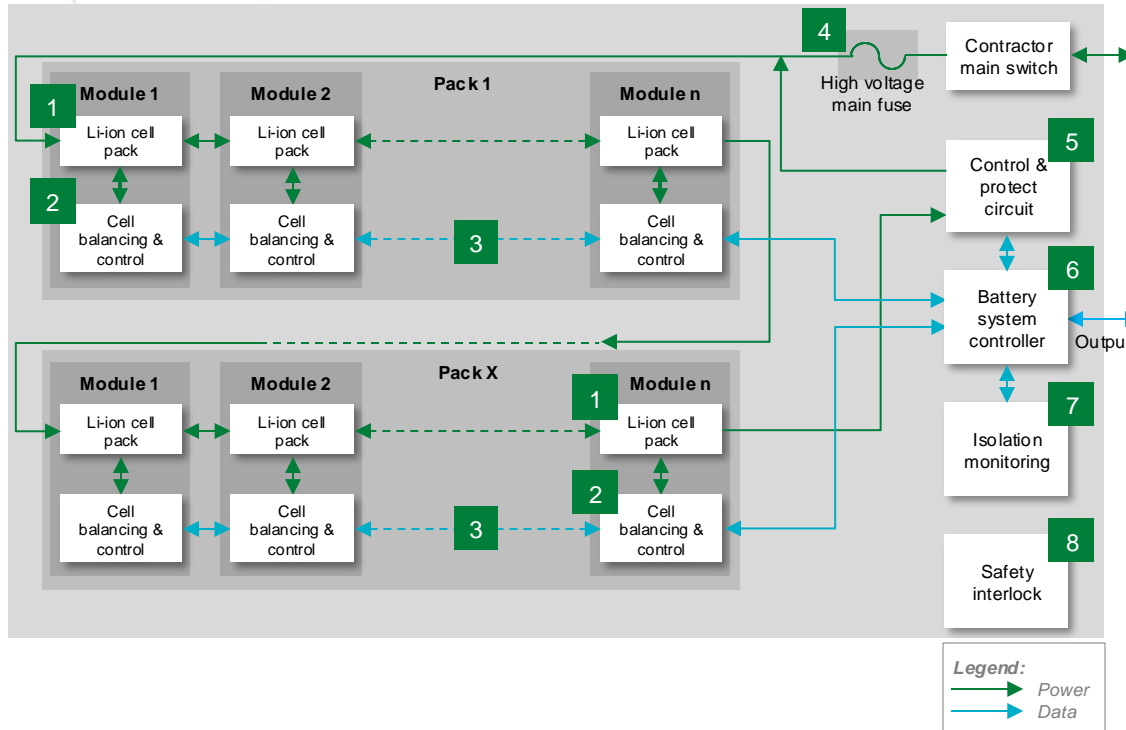
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Energy storage system



Click the product series in the table below for more info

Energy storage system block diagram



	Technology	Product Series
1	Fuse	501A, 881
	TVS Diode	TPSMC, TPSMD, TPSMB, TP5.0SMDJ
2	TTape™ Platform	TTP
	SMD or In-Line Fuse	438A, 441A, 521, 483A
3	TVS Diode	TPSMB, SZ1SMB, SZP6SMB
	TVS Diode	AQ05C / AQ1205
4	High-Voltage Fuse	30EV1K, 25EV1K
5	TVS Diode Array	TPSMA6L, SZ1SMA
6	Gate Driver	IXD_6xxSJ, IX4340NE
	TVS Diode Array	AQ24COM-02
7	Fuse	885
	TVS Diode	TPSMB, TPSMC
7	TVS Diode	TPSMB
8	Switch	SSW

Potential Littelfuse products for cell/module level protection



Click the product series in the table below for more info

	Technology	Function in application	Product series	Benefits	Features
1	Fuse	Protects cells and downstream BMS components from high fault currents due to external shorts	501A, 881	Excellent temperature stability and performance reliability; compact design; ceramic substrate ensures compatibility with high-temperature environment	Tested to new AEC-Q specification; fast response to fault current; surface mount device
	TVS Diode	Transient voltage suppression	TPSMC, TPSMD, TPSMB, TP5.0SMDJ	Excellent clamping capability; meets automotive industry standards; fast response time	AEC-Q101 qualified; meets IEC standards for ESD protection and ISO standards for in-vehicle transient surges
2	TTape™ Platform	Overtemperature monitoring of many cells or large area with single MCU input	TTP	Helps the MCU to wake from sleep mode at overtemperature events; <1 s response for temperature monitoring; extremely thin device suitable for conformal installation	Simple integration with existing BMS solutions complementing NTCs; no calibration or temperature look-up tables needed; pressure sensitive adhesive for simple and quick installation
	SMD or In-Line Fuse	Protects cells and BMS components from overcurrent	438A, 441A, 521, 483A	Excellent temperature stability and performance reliability; ceramic substrate ensures compatibility with high-temperature environment	Tested to new AEC-Q specification; fast response to fault current; surface mount device
3	TVS Diode	Transient voltage suppression	TPSMB, SZ1SMB, SZP6SMB	Excellent clamping capability; meets automotive industry standards; fast response time	AEC-Q101 qualified; meets IEC standards for ESD protection and ISO standards for in-vehicle transient surges
	TVS Diode	Transient voltage suppression	AQ05C / AQ1205	Excellent clamping capability; meets automotive industry standards; fast response time	AEC-Q101 qualified; meets IEC standards for ESD protection and ISO standards for in-vehicle transient surges
4	High-Voltage Fuse	Short circuit protection; overload circuit protection	30EV1K, 25EV1K	Provides safety protection in high-voltage environments; full range fuse	Bolt-down form factor; high breaking capacity; ISO 8820 qualified
5	TVS Diode Array	Protects sensitive electronic ICs from ESD, EFT, and voltage transient	TPSMA6L, SZ1SMA	Ensures reliability of the equipment without performance degradation	AEC-Q101 qualified; meets ESD protection levels specified under IEC 61000-4-2, ISO 10605; low-leakage current and clamping voltage

Potential Littelfuse products for cell/module level protection

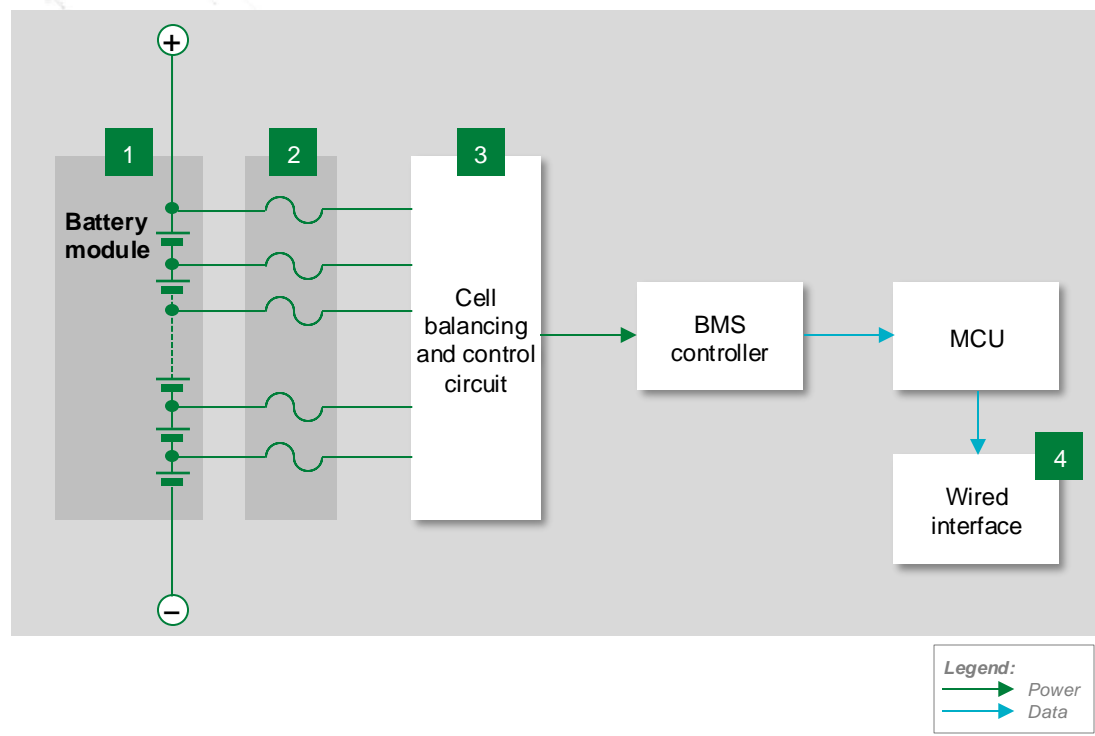


Click the product series in the table below for more info

	Technology	Function in application	Product series	Benefits	Features
6	Gate Driver	Controls the switching MOSFETs	IXD_6xxSI , IX4340NE	Dual outputs provide space-efficient design; high immunity to latch-up; rise/fall times less than 10 ns	Tight tolerance; small form factor; fast thermal response
	TVS Diode Array	Protects CAN bus from ESD, EFT, and voltage transient	AQ24COM-02	Ensures reliability of the equipment without performance degradation	AEC-Q101 qualified; meets ESD protection levels specified under IEC 61000-4-2 and ISO10605; low-leakage current and clamping voltage
	SMD Fuse	Protects cells and BMS components from overcurrent	885	High-voltage SMD form-factor allows compact design; ceramic body ensures compatibility with high-temperature environment	Tested to new AEC-Q specification; fast response to fault current; surface mount device
	TVS Diode	Transient voltage suppression	TPSMB , TPSMC	Excellent clamping capability; meets automotive industry standards; fast response time	AEC-Q101 qualified; meets IEC standards for ESD protection and ISO standards for in-vehicle transient surges
7	TVS Diode	Protects Solid State Relays from voltage transients	TPSMB	Excellent clamping capability; meets automotive industry standards; fast response time	AEC-Q101 qualified; meets IEC standards for ESD protection and ISO standards for in-vehicle transient surges
8	Switch	Lid disconnection; detects an opening of the battery pack	SSW	Surface mount terminations; IP67	Products suitable for automotive applications; designed for ASIL-related applications

 Click the product series in the table below for more info

Battery module block diagram



	Technology	Product series
1	TTape™ Platform	ITP
	TVS Diode	TPSMB
2	Fuse	440A , 437A , 438A
3	TVS Diode	TPSMB , SZ1SMB , SZSMF4L
4	TVS Diode Array	AQ24COM-02



Click the product series in the table below for more info

Protection and sensing solutions for battery packs

	Technology	Function in application	Product series	Benefits	Features
1	TTape™ Platform	Protects battery pack module and cable from overcurrent	ITP	Helps the MCU to wake from sleep mode at overtemperature events; <1 s response for temperature monitoring; extremely thin device suitable for conformal installation	Simple integration with existing BMS solutions complementing NTCs; no calibration or temperature look-up tables needed; pressure sensitive adhesive for simple and quick installation
	TVS Diode	Overtemperature monitoring of many cells or large area with single MCU input	TPSMB	Improves system reliability by protecting downstream components from transients on power lines	AEC-Q101 qualified; meets IEC standards for ESD protection and ISO standards for in-vehicle transient surges
2	Fuse	Analog front-end protection of user and environment in case of external short, overload between power-sense line	440A , 437A , 438A	AEC-Q compliant based on inhouse test, reduces customer qualification time by complying with third-party safety standards such as UL/IEC; SMD form-factor allows for compact design	Surface mountable; compatible with lead-free solder process per IEC standards; high reliability
3	TVS Diode	Protects sensitive electronic components from voltage transients	TPSMB , SZ1SMB , SZSMF4L	Improves system reliability by protecting downstream components from transients on power lines	400 W / 600 W peak pulse capability; compatible with lead-free solder reflow temperature profile
4	TVS Diode Array	Protects CAN bus sensitive electronic ICs from ESD, EFT, and voltage transient	AQ24COM-02	Smaller form-factor and multi-line protection enables ease of design	AEC-Q101 qualified; low capacitance; low-leakage current



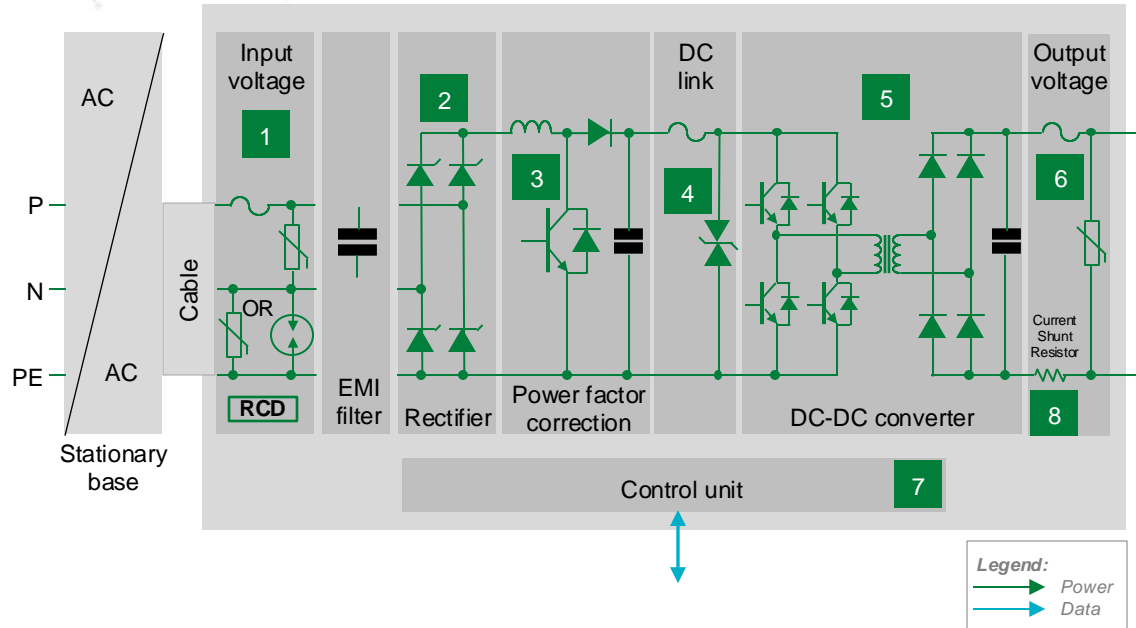
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On-board charger



Click the product series in the table below for more info

On-board charger block diagram



	Technology	Product series
1	Fuse	526, 527, 10EV, 20EV
	MOV	AUMOV, SM10
	GDT	CG2, CG3
	SIDActo [®]	Pxxx0FNL, Pxxx0S3N-A (6 kV / 3 kA), Pxxx0S3G-A (4 kV / 2 kA)
	Residual Current Monitor	CF3P03xC*
2	Thyristor	S8016xA
3	Gate Driver	IXD_6xxSI, IX4340NE
4	TVS Diode	TPSMB, SZ1SMB, SZP6SMB
	Gate Driver	IXD_6xxSI, IX4340NE
5	TVS Diode	TPSMB, SZ1SMB, SZP6SMB, TPSMBASY
	TVS Diode Array	AQ4022
6	Fuse	526, 527, 10EV, 20EV, 30EV1K, 25EV1K, 828, 38EV
	MOV	AUMOV
	TVS Diode	TPSMB, SZ1SMB, SZP6SMB
7	TVS Diode Array	AQ24COM-02
8	Current Shunt Resistor	SSA

* Contact Littelfuse Sales for more details



Click the product series in the table below for more info

Benefits of Littelfuse products in on-board charger

	Technology	Function in application	Product series	Benefits	Features
1	Fuse	Short circuit protection; overload circuit protection	526 , 527 , 10EV , 20EV	Provides safety protection in high-voltage environments; full range fuse	AEC-Q200 qualified, high voltage; ceramic body ensures compatibility with high-temperature environment
	MOV	Protects from lightning and system transient surges	AUMOV , SM10	Clamps transient surge to ensure the reliable performance of the circuitry	Wide range of surge current ratings; disk sizes and lead options; surface mount available
	GDT	Ensures electrical isolation between line, neutral, and ground	CG2 , CG3	Provides safety to the system with high-resistance isolation	Rugged, high surge current based on ceramic tube design; low-leakage current
	SIDACtor®	Lightning and system transient surges	Pxxx0FNL , Pxxx0S3N-A (6 kV / 3 kA), Pxxx0S3G-A (4 kV / 2 kA)	Used in combination with MOV; provides lower clamping voltage for sensitive circuitry	Surface mount form factor; semiconductor-based design does not wear out; used in combination with MOV; provides lower clamping voltage for sensitive circuitry.
	Residual Current Monitor	Residual current detection	CF3P03xC*	Personal protection against AC and DC leakage currents according to IEC 62752 / UL 2231	Modular design, allowing customized configuration for PCBs
2	Thyristor	Rectification	S8016xA	Reduces the in-rush current during rectification that can damage expensive DC link capacitor	Compact TO-220AQ and surface mount TO-263 form factors, V_{DRM} of 800 V, IT or 25 $A_{(RMS)}$
3	Gate Driver	Controls the switching IGBTs	IXD_6xxSI , IX4340NE	Dual outputs provide space-efficient design; high immunity to latch-up; rise/fall times less than 10ns	Tight tolerance; small form factor; fast thermal response
4	TVS Diode	Active clamping	TPSMB , SZ1SMB , SZP6SMB	Clamps the transient that is created when the MOSFET device switches; ensures reliability	Small form factor DO214-AA package; low clamping voltage; products are available with voltage ratings from 150 V~650 V. For more information on 'Active Clamp', see here
5	Gate Driver	Controls the switching IGBTs	IXD_6xxSI , IX4340NE	Dual outputs provide space-efficient design; high immunity to latch-up; rise/fall times less than 10ns	Tight tolerance; small form factor; fast thermal response
	TVS Diode	Active clamping	TPSMB , SZ1SMB , SZP6SMB , TPSMBASY	Clamps the transient that is created when the MOSFET device switches; ensures reliability	Small form factor DO214-AA package; low clamping voltage; products are available with voltage ratings from 150 V~650 V. For more information on 'Active Clamp', see here
	TVS Diode Array	ESD protection of the gate input	AQ4022	Ensures reliability of the equipment without performance degradation	AEC-Q101 qualified; meets ESD protection levels specified under IEC 61000-4-2 and ISO10605; low leakage current and clamping voltage





Click the product series in the table below for more info

Benefits of Littelfuse products in on-board charger

	Technology	Function in application	Product series	Benefits	Features
6	Fuse	Short circuit protection; overload circuit protection	526 , 527 , 10EV , 20EV , 30EV1K , 25EV1K , 828 , 38EV	Provides safety protection in high-voltage environments; full range fuse	AEC-Q200 and ISO 8820 qualified; high voltage; high breaking capacity; bolt-down form factor available; ceramic body ensures compatibility with high-temperature environment
	MOV	Transient voltage suppression	AUMOV	Clamps transient surge to ensure the reliable performance of the circuitry	Wide range of surge current ratings; disk sizes and lead options; surface mount available
	TVS Diode	Transient voltage suppression	TPSMB , SZ1SMB , SZP6SMB	Excellent clamping capability; meets automotive industry standards; fast response time	AEC-Q101 qualified; meets IEC standards for ESD protection and ISO standards for in-vehicle transient surges
7	TVS Diode Array	Protects CAN bus from ESD, EFT, and voltage transient	AQ24COM-02	Ensures reliability of the equipment without performance degradation	AEC-Q101 qualified; meets ESD protection levels specified under IEC 61000-4-2 and ISO10605; low leakage current and clamping voltage
8	Current Shunt Resistor	Measures the overall output current	SSA	High sensing accuracy; low thermal offset drift; low thermal sensitivity drift	Isolated from HV network; no additional power loss due to shunt resistor



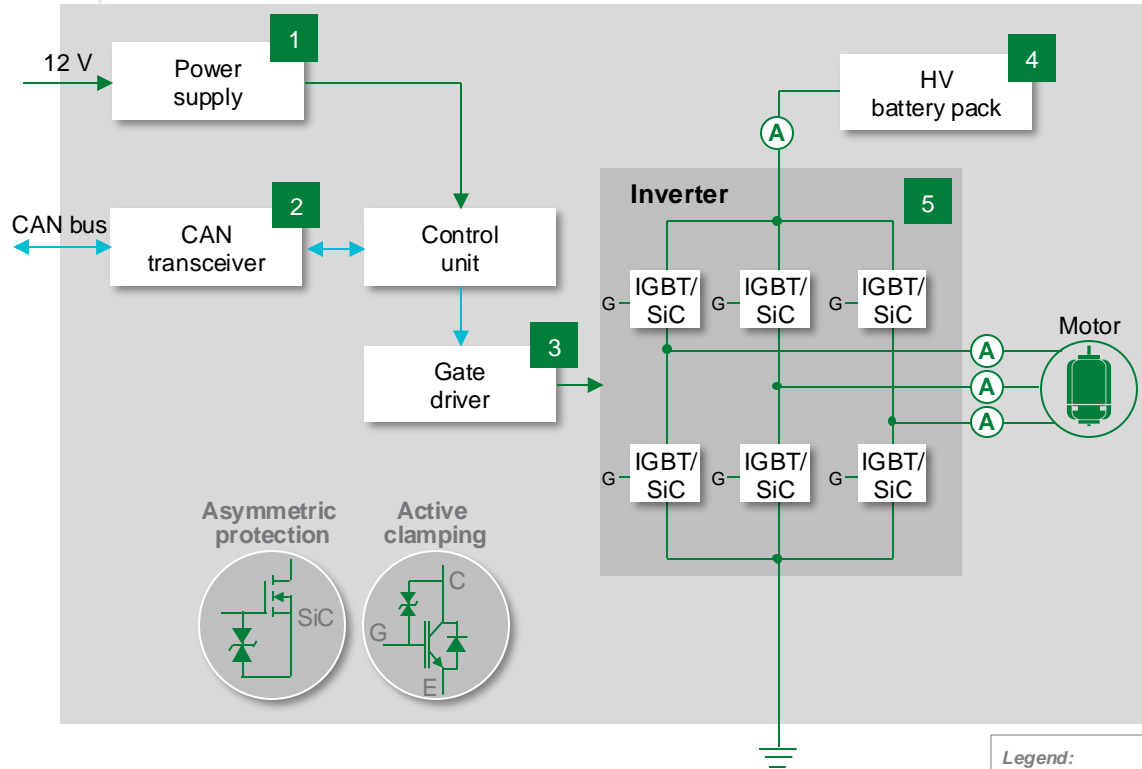
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Traction motor inverter



Click the product series in the table below for more info

Traction motor inverter block diagram



	Technology	Product series
1	TVS Diode	TPSMB , TPSMA6L , SZ1SMB , SZP6SMB , SZ1SMA , SZSMF4L
	SMD Fuse	441A
2	TVS Diode Array	AQ24COM-02
	TVS Diode Array	AQ4022
3	TVS Diode	TPSMB , SZ1SMB , SZP6SMB , TPSMB ASYMMETRIC
	Gate Driver	IXD_6xxSI , IX4340NE
4	Fuse	526 , 828 , 30EV1K , 25EV1K
	TVS Diode	TPSMB , SZ1SMB , SZP6SMB , TPSMB ASYMMETRIC
5	Current Sensor	CH1B02xM , CH1P01xM
	Thermal Protection	HCRTP-mini

Benefits of Littelfuse products in traction motor inverter

 Click the product series in the table below for more info

	Technology	Function in application	Product series	Benefits	Features
1	TVS Diode	Transient voltage suppression	TPSMB , TPSMA6L , SZ1SMB , SZP6SMB , SZ1SMA , SZSMF4L	Excellent clamping capability; meets automotive industry standards; fast response time; compact design	AEC-Q101 qualified; meets IEC standards for ESD protection and ISO standards for in-vehicle transient surges
	SMD Fuse	Short circuit protection; overload circuit protection	441A	Excellent temperature stability and performance reliability; compact design; ceramic substrate ensures compatibility with high-temperature environment	Tested to new AEC-Q specification; fast response to fault current; surface mount device
2	TVS Diode Array	Protect CAN bus from ESD, EFT, and voltage transient	AQ24COM-02	Ensures reliability of the equipment without performance degradation	AEC-Q101 qualified; meets ESD protection levels specified under IEC 61000-4-2 and ISO10605; low leakage current and clamping voltage
3	TVS Diode Array	ESD protection of the gate input	AQ4022	Ensures reliability of the equipment without performance degradation	AEC-Q101 qualified; meets ESD protection levels specified under IEC 61000-4-2 and ISO10605; low leakage current and clamping voltage
	TVS Diode	Active clamping and gate driver protection	TPSMB , SZ1SMB , SZP6SMB , TPSMB , ASYMMETRIC	Excellent clamping capability; meets automotive industry standards; fast response time; compact design	Small form factor DO214-AA package; low clamping voltage; products are available with voltage ratings from 150 V~650 V. For more information on 'Active Clamp', see here
	Gate Driver	Controls the switching IGBTs	IXD_6xxSI , IX4340NE	Dual outputs provide space-efficient design; high immunity to latch-up; rise/fall times less than 10 ns	Tight tolerance; small form factor; fast thermal response
4	Fuse	Short circuit protection	526 , 828 , 30EV1K , 25EV1K	Provides safety protection from short circuit conditions	High voltage; ceramic body ensures compatibility with high-temperature environment
5	TVS Diode	Active clamping for IGBT; gate protect for SiC MOSFET	TPSMB , SZ1SMB , SZP6SMB , TPSMB , ASYMMETRIC	Clamps the transient that is created when the MOSFET device switches; ensures reliability	Clamps the transient that is created when the MOSFET switches; ensures reliability; asymmetric diodes to protect the gate of SiC transistors. For more information on 'Active Clamp', see here
	Current Sensor	Measures current on each phase of the inverter/motor and/or the DC link current	CH1B02xM , CH1P01xM	High sensing accuracy; low thermal offset drift; low thermal sensitivity drift	Up to 2000 A with analog or CAN output; functional safety ratings from ASIL QM to ASIL C available
	Thermal Protection	Thermal protection for MOSFETs	HCRTP-mini	Responds to over-temperature conditions caused by catastrophic failure of the MOSFET device	Responds to overtemperature conditions caused by catastrophic failure of the MOSFET device

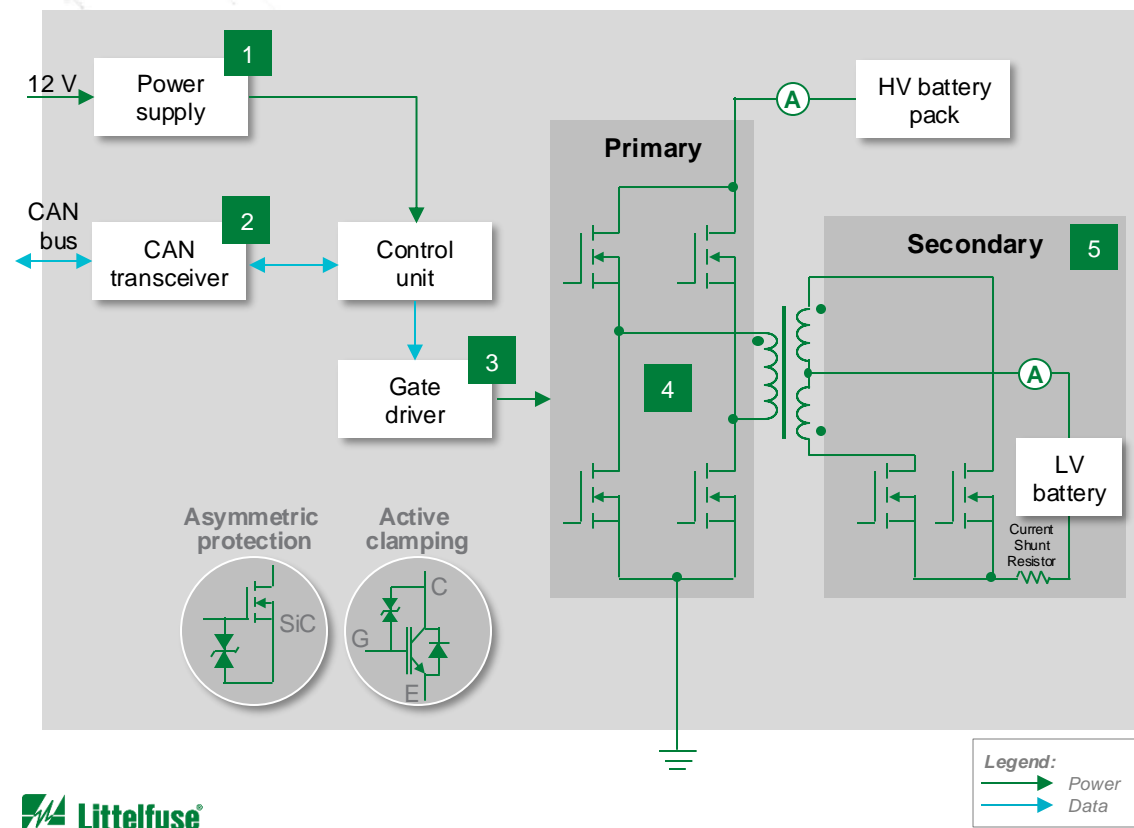




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DC-DC converter

 Click the product series in the table below for more info

DC-DC converter block diagram



Legend:
 Power
 Data

	Technology	Product series
1	TVS Diode	TPSMB , TPSMA6L , SZ1SMB , SZP6SMB , SZ1SMA , SZSMF4L
	Fuse	441A
2	TVS Diode Array	AQ24COM-02
	TVS Diode Array	AQ4022
3	TVS Diode	TPSMF4L
	Gate Driver	IXD_6xxSI , IX4340NE
4	TVS Diode	TPSMB , SZ1SMB , SZP6SMB , TP5.0SMDJ , TPSMBASY
	Fuse	526 , 527 , 30EV1K , 25EV1K , 828
5	Thermal Protection	HCRTP-mini
	TVS Diode	TPSMD , TP5.0SMDJ
	Current Shunt Resistor	SSA



Click the product series in the table below for more info

Benefits of Littelfuse products in DC-DC converter

	Technology	Function in application	Product series	Benefits	Features
1	TVS Diode	Transient voltage suppression	TPSMB , TPSMA6L , SZ1SMB , SZP6SMB , SZ1SMA , SZSMF4L	Excellent clamping capability; meets automotive industry standards; fast response time; compact design	AEC-Q101 qualified; meets IEC standards for ESD protection and ISO standards for in-vehicle transient surges
	Fuse	Short circuit and overload circuit protection	441A	Excellent temperature stability and performance reliability; ceramic substrate ensures compatibility with high-temperature environment	Tested to new AEC-Q specification; fast response to fault current; surface mount device
2	TVS Diode Array	Protects CAN bus from ESD, EFT, and voltage transient	AQ24COM-02	Ensures reliability of the equipment without performance degradation	AEC-Q101 qualified; meets ESD protection levels specified under IEC 61000-4-2 and ISO10605; low leakage current and clamping voltage
3	TVS Diode Array	ESD protection of the gate input	AQ4022	Ensures reliability of the equipment without performance degradation	AEC-Q101 qualified; meets ESD protection levels specified under IEC 61000-4-2 and ISO10605; low leakage current and clamping voltage
	TVS Diode	Transient voltage suppression	TPSMF4L	Excellent clamping capability; meets automotive industry standards; fast response time	AEC-Q101 qualified; meets IEC standards for ESD protection and ISO standards for in-vehicle transient surges
	Gate Driver	Controls the switching MOSFETs	IXD_6xxSI , IX4340NE	Dual outputs provide space-efficient design; high immunity to latch-up; rise/fall times less than 10 ns	Tight tolerance; small form factor; fast thermal response



Benefits of Littelfuse products in DC–DC converter

	Technology	Function in application	Product series	Benefits	Features
4	TVS Diode	Active clamping for IGBT; gate protect for SiC MOSFET	TPSMB , SZ1SMB , SZP6SMB , TP5.0SMDJ , TPSMBASY	Clamps the transient that is created when the MOSFET device switches; ensuring reliability	Clamps the transient that is created when the MOSFET device switches; ensures reliability; asymmetric diodes to protect the gate of SiC transistors. For more information on 'Active Clamp', see here
5	Fuse	Short circuit protection	526 , 527 , 30EV1K , 25EV1K , 828	Provides safety protection from short circuit conditions	High voltage; ceramic body ensures compatibility with high-temperature environment
	Thermal Protection	Thermal protection for MOSFETs	HCRTP-mini	Responds to over-temperature conditions caused by catastrophic failure of the MOSFET device	Surface mountable form factor; compatible with standard reflow process; breaks current flow during overtemperature condition
	TVS Diode	Transient voltage suppression	TPSMD , TP5.0SMDJ	Excellent clamping capability; meets automotive industry standards; fast response time	Small form factor DO214-AA package; low clamping voltage
	Current Shunt Resistor	Current sensing resistor	SSA	High sensing accuracy; low thermal offset drift; low thermal sensitivity drift	Isolated from HV network; no additional power loss due to shunt resistor



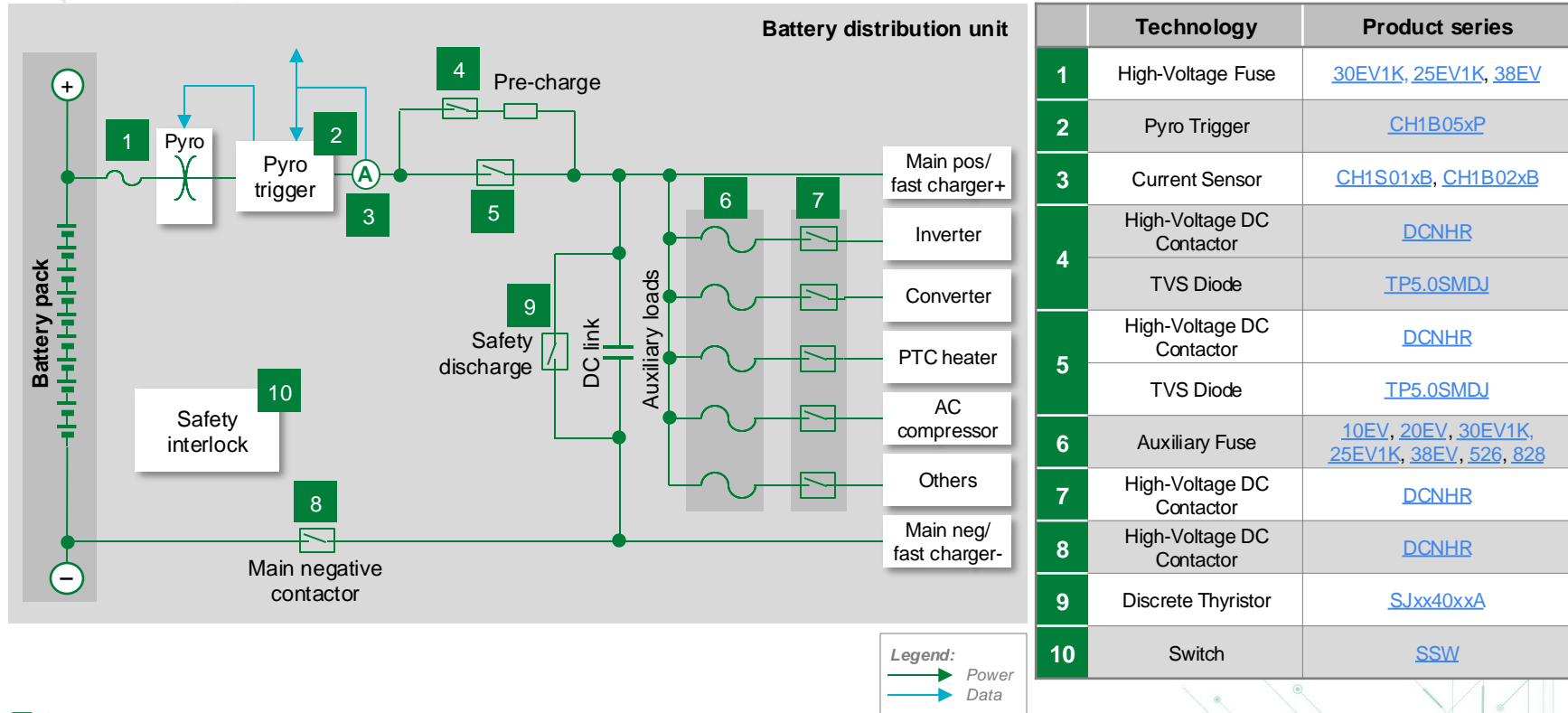
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Battery distribution unit



Click the product series in the table below for more info

Battery disconnect unit block diagram



Benefits of Littelfuse products in battery disconnect unit



Click the product series in the table below for more info

	Technology	Function in application	Product series	Benefits	Features
1	High-Voltage Fuse	Short circuit and overload circuit protection	30EV1K , 25EV1K , 38EV	Provides safety protection in high-voltage environments; full range fuse; can protect the entire pack's voltage and short circuit current	Bolt down form factor; high breaking capacity; ISO 8820 qualified
2	Pyro Trigger	Trigger the pyro-fuse in case of overcurrent	CH1 B05xP	Fast and reliable circuit protection solution; customizable trigger labels; active protection solution; low power consumption; compact lightweight design	Very fast overcurrent detection, triggering, and interruption (cut-off time <1 ms): significantly reduce peak current; additional input for activation of trigger using external signal; variants with accurate current measurement available
3	Current Sensor	Measure the overall current in the system	CH1 S01xB , CH1 B02xB	High sensing accuracy; low thermal offset drift; low thermal sensitivity drift	Up to 2000 A with analog or CAN output; functional safety ratings from ASIL QM to ASIL C available
4	High-Voltage DC Contactor	Protects main contactors from excess inrush current; a pre-charge contactor is used together with a pre-charge resistor to charge the capacitors of the power inverter to a level of typically 90–98% of the battery voltage	DCNHR	Allows a low voltage signal to switch the contacts for a high-voltage signal	Wide amperage rating 30–100 A; gas-filled contact chamber and magnetic blowouts for arc suppression; available direct switched auxiliary circuit for status indication
	TVS Diode	Transient voltage suppression	TP5.0SMDJ	Excellent clamping capability; meets automotive industry standards; fast response time	AEC-Q101 qualified; meets IEC standards for ESD protection and ISO standards for in-vehicle transient surges
5	High-Voltage DC Contactor	The main contactors connect and disconnect the traction battery from the entire electric drivetrain in the vehicle	DCNHR	Allows a low-voltage signal to switch the contacts for a high-voltage signal	Wide amperage rating; gas-filled contact chamber and magnetic blowouts for arc suppression; integrated coil economizer included in many models; available direct switched auxiliary circuit for status indication
	TVS Diode	Transient voltage suppression	TP5.0SMDJ	Excellent clamping capability; meets automotive industry standards; fast response time	AEC-Q101 qualified; meets IEC standards for ESD protection and ISO standards for in-vehicle transient surges

Benefits of Littelfuse products in battery distribution unit



Click the product series in the table below for more info

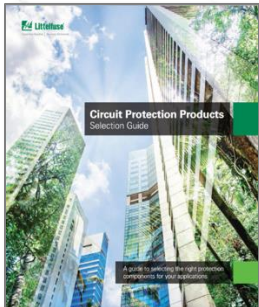
	Technology	Function in application	Product series	Benefits	Features
6	Auxiliary Fuse	Short circuit protection; overload circuit protection	10EV , 20EV , 30EV1K , 25EV1K , 38EV , 526 , 828	Provides safety protection in high-voltage environments, full range fuse; can protect the entire pack's voltage and short circuit current	High voltage; ceramic body ensures compatibility with high-temperature environment
7	High-Voltage DC Contactor	Controls other electrical loads in the vehicle operated by the HV battery (for example, electric heater, blower, AC compressor, power steering pump, and so on)	DCNHR	Allows a low-voltage signal to switch the contacts for a high-voltage signal	Wide amperage rating; gas-filled contact chamber and magnetic blowouts for arc suppression; integrated coil economizer included in many models; available direct switched auxiliary circuit for status indication
8	High-Voltage DC Contactor	The main contactors connect and disconnect the traction battery from the entire electric drivetrain in the vehicle	DCNHR	Allows a low voltage signal to switch the contacts for a high-voltage signal	Wide amperage rating; gas-filled contact chamber and magnetic blowouts for arc suppression; integrated coil economizer included in many models; available direct switched auxiliary circuit for status indication
9	Discrete Thyristor	Fast discharge of the DC link for safety reason	SJxx40xxA	High surge capability; offers low gate current trigger levels of 15 mA or 40 mA at approximately 1.5 V	High-temperature Thyristor with low gate current; available in a TO-220AB and surface mount TO-263 form factors; AEC-Q101 qualified
10	Switch	Lid disconnection; detects an opening of the battery distribution unit	SSW	Surface mount terminations; IP67	Products suitable for automotive applications; designed for ASIL-related applications

Select standards for automotive applications

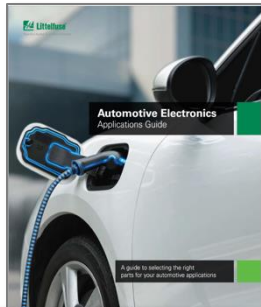
Standard	Title	General scope	Littelfuse technology	Region
ISO 7637-2	Road vehicles – Electrical disturbances from conduction and coupling – Part 2: Electrical transient conduction along supply lines only	Specifies test methods and procedures to ensure the compatibility to conducted electrical transients of equipment installed on passenger cars and commercial vehicles fitted with 12 V or 24 V electrical systems. It describes bench tests for both the injection and measurement of transients. It is applicable to all types of road vehicles independent of the propulsion system (For example, spark ignition, or diesel engine, and electric motor).	TVS Diode	Global
ISO 16750-2	Road vehicles – Environmental conditions and testing for electrical and electronic equipment – Part 2: Electrical loads	This standard applies to electric and electronic systems/components for road vehicles. It describes the potential environmental stresses and specifies tests and requirements recommended for the specific mounting location on/in the road vehicle.	TVS Diode	Global
ISO 10605:2008	Road vehicles – Test methods for electrical disturbances from electrostatic discharge	This standard specifies the electrostatic discharge (ESD) test methods necessary to evaluate electronic modules intended for vehicle use. It includes these sources of ESD: in assembly, by service staff, and by vehicle occupants.	Diode Array PulseGuard (AXGD) Multilayer Varistor	Global

Additional information can be found at [Littelfuse.com](https://www.littelfuse.com)

Explore the world of Littelfuse products and applications with ecatalogs (ecatalogs.littelfuse.com)



Circuit Protection Products Selection Guide



Automotive Electronics Application Guide



Integrated Circuit Selection Guide



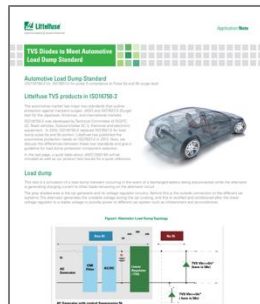
C&K Switches Selection Guide



Automotive Power Relays Selection Guide



Transportation Product Catalog



Automotive Load Dump Standards With TVS



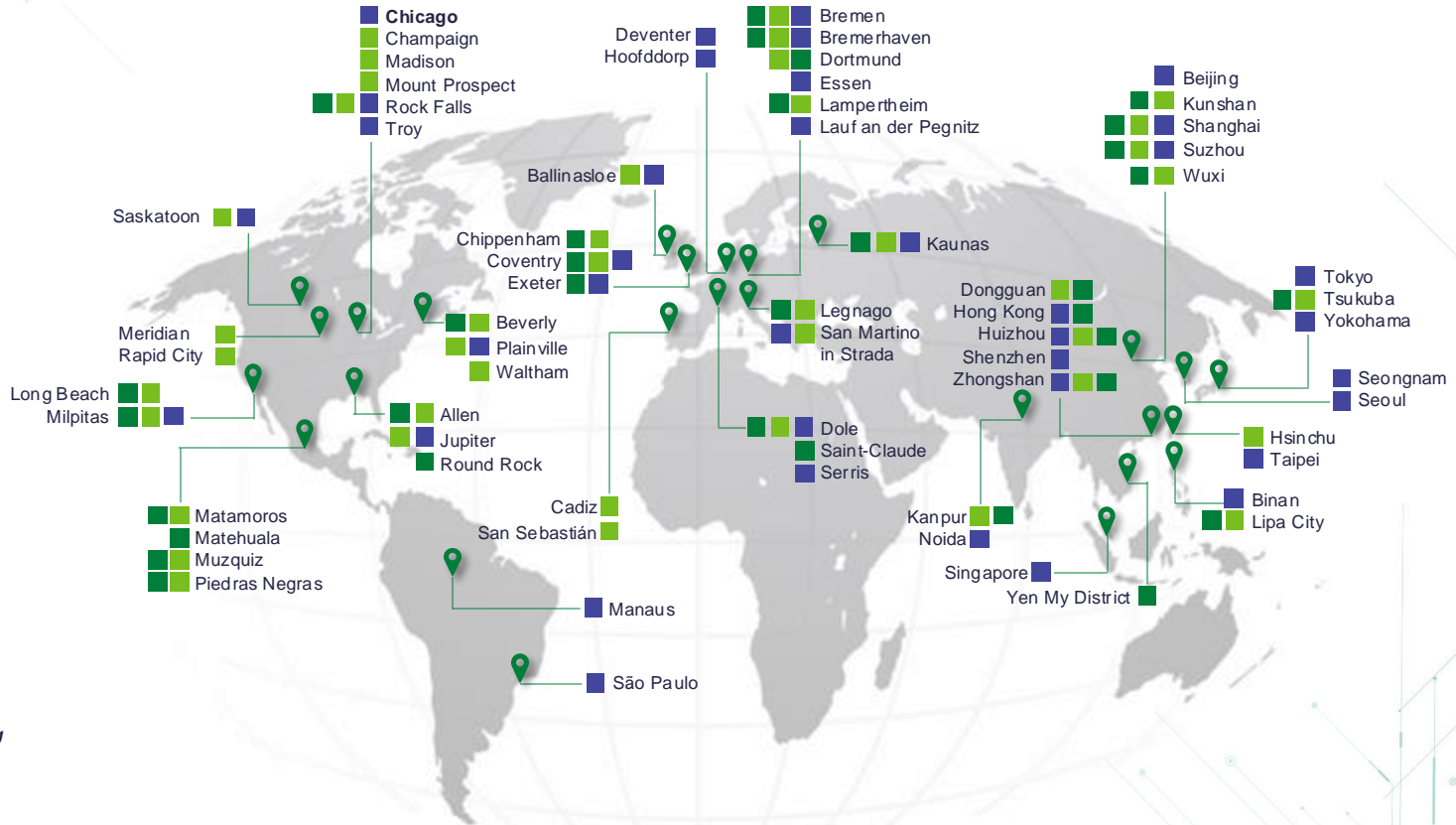
Automotive Circuit Protection With TVS



AEC-Q200 Specification Spotlight



Local resources supporting our global customers



Legend

- Sales
- R&D
- Manufacturing

Partner for tomorrow's electrical & electronic systems

Broad Product Portfolio

We are an industrial technology manufacturing company empowering a sustainable, connected, and safer world.

Testing Capabilities

We help customers get products to market faster, and we offer certification testing to global regulatory standards.

Application Expertise

Our engineers partner directly with customers to help speed up product design and meet their unique needs.

Compliance and Regulatory

We help customers during the design process to consider requirements set by global regulatory authorities.

Global Customer Service

Our global customer service team is with you to anticipate your needs and ensure a seamless experience.

Global Manufacturing

High-volume manufacturing committed to the highest quality standards.



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