Data Center
White Space Solutions
(Power and Compute Rack)

From AC-Powered to
Native DC-Powered Data Centers



Enabling safe and efficient energy transfer from grid to chip

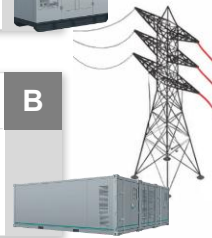
A Backup power/generator

- Fuses
- Circuit Breakers
- MOVs
- TVS Diodes
- Contactors
- Genset Controllers
- Voltage Regulators
- Protective Relays



B Onsite Power

- Fuses
- MOVs
- GDTs
- Genset Controllers
- Voltage Regulators
- Protective Relays



C Medium voltage switchgear and solid-state transformer

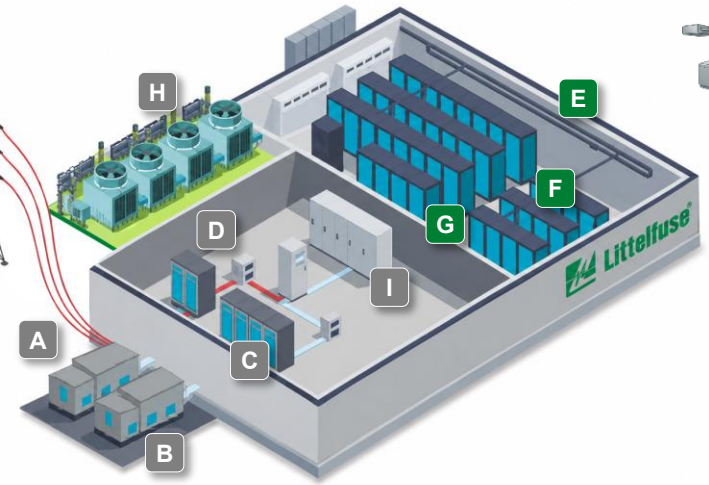
- MV Fuses
- UL Class Fuses
- Arc Flash Relays
- Ground Fault Relays
- Circuit Breakers



D Low-voltage switchgear

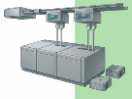
- UL Class Fuses
- Contactors
- Arc Flash Relays
- Ground Fault Relays





E Power busway/tap-off box

- Fuse
- Disconnect Switches
- RCMs
- Arc Flash Relays



F Server/storage/networking

- Fuses
- eFuses
- TVS Diode Arrays
- Switches
- PolySwitch® Resettable Devices



G Sidecar (1 MW+)

- Fuses
- SiC MOSFETs
- Gate Drivers
- TVS Diodes
- Contactor Relays



I UPS/BBU

- Fuses
- MOVs
- IGBTs
- Temperature Sensors
- TVS Diodes
- Arc Flash Relays
- Ground Fault Relays



H Thermal Management

- UL Class Fuses
- Temperature Sensors
- Fuseholders
- Power Distribution Blocks



Gray space *White space*

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Data Center power evolution driven by future trends

High Power • High Voltage • Higher Protection Demand → More Littelfuse Solutions

Future trends shaping Data Centers

AI and HPC growth
Increase compute density and rack power demand

Advance cooling and power integration
Liquid cooling, efficient heating system, and optimized power distribution

High-efficiency power distribution
AC–DC transition begins (400 VAC → ±400 VDC → 800 VDC)

Energy storage and power conditioning
Li-ion and supercapacitors are becoming crucial

Rising power needs and innovation
Push for efficiency, renewables, and grid-aware operation

Increasing voltage and power density



2020–2022
Embedded Power
(PSU 3.2–5.5 kW
from 12 V to 50 V)



2023–2025
Power Shelf
(Power shelf 33–108 kW
Up to 50 V)

2026–2030
Power Rack 1 MW+
(Power Sidecar)



HVDC

± 400 V
or 800 V



IT Rack

OR

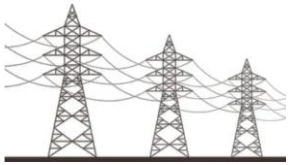
Solid State Transformer 4 MW+



Littelfuse solutions for Data Center power delivery

Comprehensive portfolio of protection, power semiconductor, and switching solutions

AC Front End	Power Conversion (AC–DC)	IT Rack/Server







Subsystems



MV/LV Switch Gears



Sold State Transformer



UPS and BESS



Power Rack (1 MW+)



Embedded Power (5.5–16 kW)



Power Shelf (33–72 kW)



DC PDU



Server tray

Littelfuse Solutions



UL Class Fuse



Hi-Speed Fuse



Circuit Breaker



Relays



SiC Diode



MOSFETs and IGBTs



Silicon Carbide



SMD Fuse



PolySwitch® Device



eFuse



TVS Diode Array



MOVs



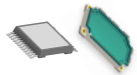
TVS Diode



Contactor



Protective Relay



SMPD and Power Modules



Gate Drivers



High Power Solutions



LV MOSFET

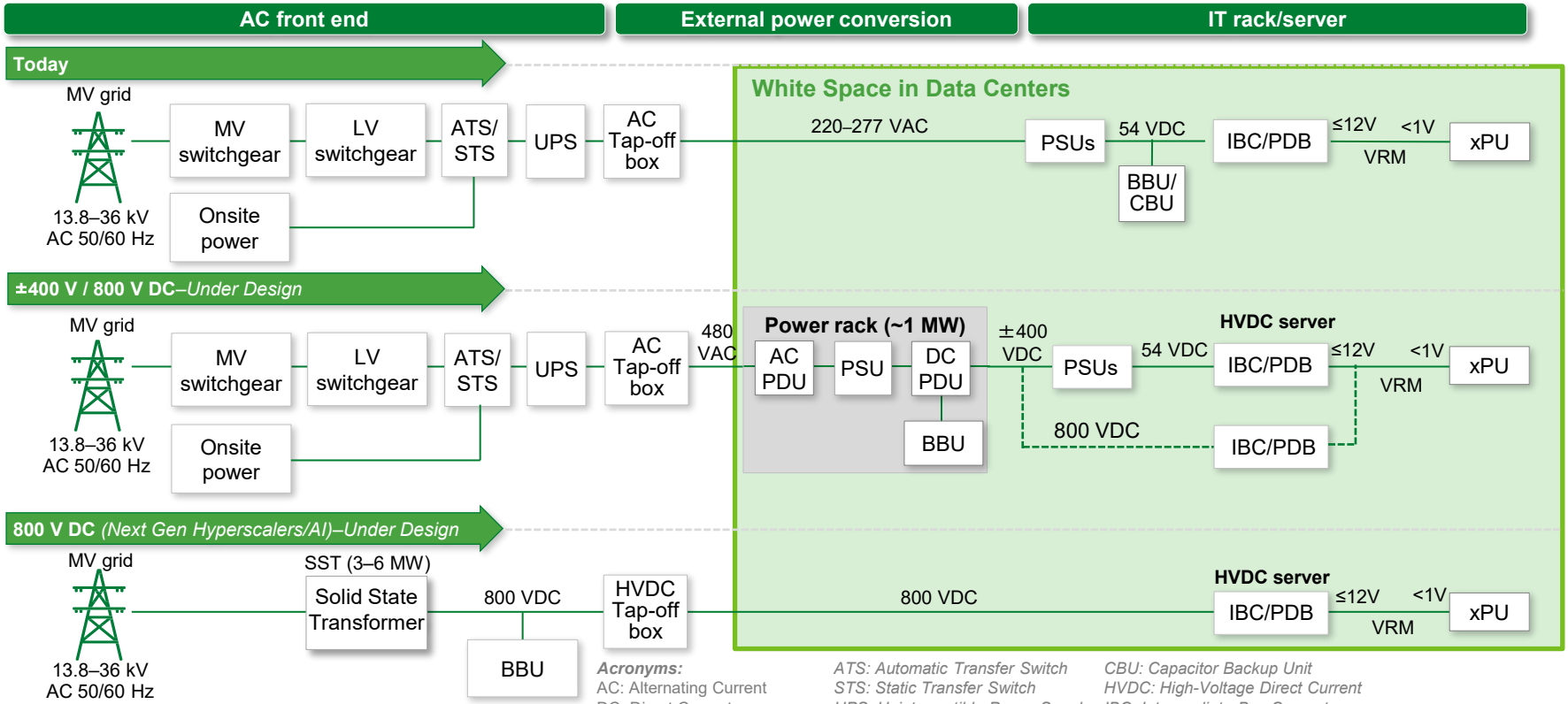


Reed Sensor



C&K® Switch

Empowering AC and DC Data Center architecture innovations



Acronyms:

AC: Alternating Current
DC: Direct Current
MV: Medium Voltage
LV: Low Voltage
SST: Solid-State Transformer

ATS: Automatic Transfer Switch
STS: Static Transfer Switch
UPS: Uninterruptible Power Supply
PDU: Power Distribution Unit
PSU: Power Supply Unit
BBU: Battery Backup Unit

CBU: Capacitor Backup Unit
HVDC: High-Voltage Direct Current
IBC: Intermediate Bus Converter
PDB: Power Delivery Board
VRM: Voltage Regulator Module
xPU: "x" Processing Unit

Littelfuse solutions for Power Rack (Sidecar)



AC PDU
Fuse, Circuit Breaker



DC PDU
Fuse, Current Sensor, Contactor Relay



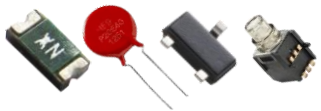
Power converters
SiC MOSFET, Gate Driver,
TVS Diode, SiC Schottky Diode



CBU/BBU
Fuse, Current Shunt Resistor,
TVS Diode, TVS Diode Array, Switch



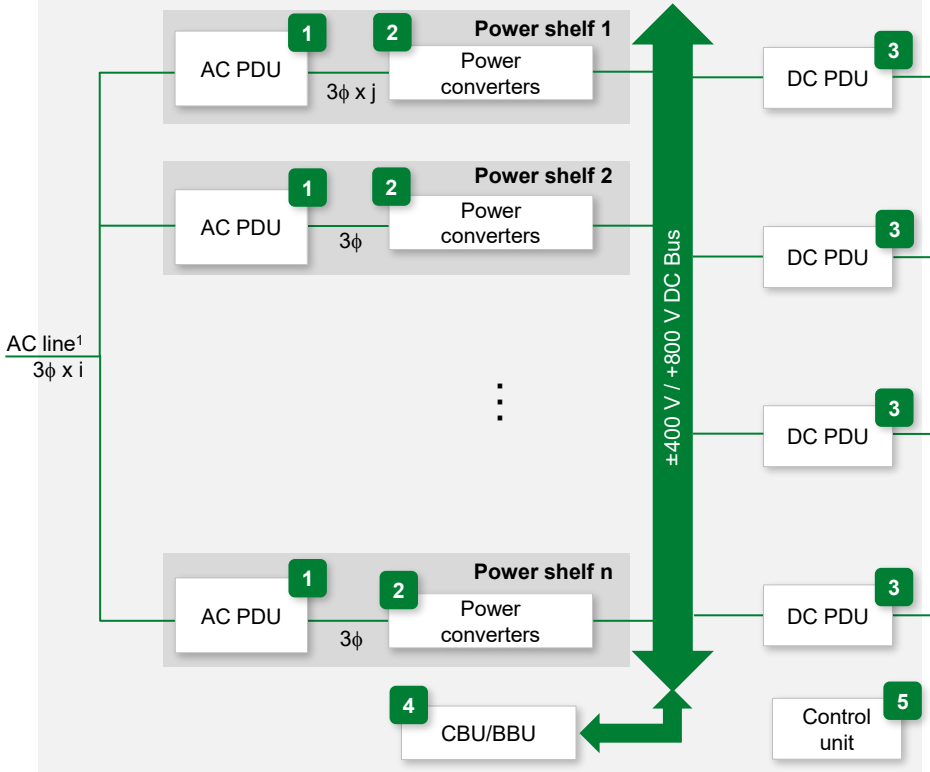
Control unit
PolySwitch® Resettable Device, MOV,
TVS Diode Array, Switch



AC–DC power supply architecture within Sidecar

Supporting ±400 V and 800 V DC bus systems for enterprise and AI-ready Data Centers

Click the product series for more info



[1]*AC line voltage: 400 – 480 Vac*
i- number of connections to tapbox
j- number of power converters in the power shelf

	Technology	Function in application	Product series
1	Fuse	Interrupts Input overcurrent/short-circuit	JLLS, JTD, CCMR
	Fused Disconnect Switch	Provides lockable isolation and overcurrent	LFBP*
	Circuit breaker	Protection against overload and short circuit	CX Series
2	Fuse	Isolation and converter AC protection	538*, 548*
	SiC MOSFET (750 V, 1200 V)	Used in AC-DC and DC-DC power conversion	IXSH, IXFH, IXSDQ*
	Gate Driver	Drives high power MOSFETs/SiC devices	Gate Driver ICs
	TVS Diode	Overvoltage protection for MOS FET gate and comm/ctrl electronics	SMF, SMFA Asymmetric, SMBJ
	SiC Schottky Diode (650 V, 1200 V)	Used in PFC/rectification	DCK
3	Fuses	Isolate faults DC harness to payload rack	SPFJ, DCD* DCM*
	Current sensor	Measure operating current	CC1Pxx, CF1Pxx, CH1Pxx
	Contactor Relay	High-voltage disconnect and pre-charge control.	DCNHS250*, DCNHE20PF60*
	Click here for more detailed schematics.		
4	Click for more details		
5	PolySwitch® Resettable Device	Various communication protection	nanoSMD, microSMD
	MOV	Input protection of auxiliary power supply	V275LA40AP
	TVS Diode Array (COM-bus)	Overvoltage protection in communication bus	AQ24COM-02, AQ24COM-01
	C&K® Switch	Enclosure open/close and HMI switches	K5V, EITS, ITS, KT

** Contact Littelfuse Sales for more information.*

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Power Rack (Sidecar) key solution comparison

	Technology	Function in application	Product series	Benefits and features
1	Fuse	Interrupts Input overcurrent/short-circuit	JLLS, JTD, CCMR	600 V UL branch-protection fuses; high interrupting rating; **JLLS:** 1200 A Class T (fast acting); **JTD:** 600 A Class J (fast acting); **CCMR:** 30 A Class CC (time delay)
	Fused Disconnect Switch	Provides lockable isolation and overcurrent	LFBP*	UL 98 listed, multi-pole configurable, blown-fuse indication Accepts Class J and CC fuses
	Circuit breaker	Protection against overload and short circuit	CX Series	Resettable; no fuse replacement; Hydraulic-magnetic technology
2	Fuse	Isolation and converter AC protection	538*, 548*	Compact auxiliary and control circuit protection **538**: high breaking; **548**: fast acting
	SiC MOSFET (750 V, 1200 V)	Used in AC-DC and DC-DC power conversion	IXSH, IXFH, IXSDQ*	Low switching loss, high efficiency; 750 V and 1200 V, TO-247 and D2PAK
	Gate Driver	Drives high power MOSFETs/SiC devices	Gate Driver ICs	Robust drive with high dv/dt immunity; Isolated and non-isolated options
	TVS Diode	OVP for MOSFET gate and comm/ ctrl electronics	SMF, SMFA Asymmetric, SMBJ	Various options for optimized integration on PCB SMF ultra-compact, low cap; **SMFA:** compact, asymmetric for SiC gate SMBJ- 600 W in case higher energy faults appear in the system
	SiC Schottky Diode (650 V, 1200 V)	Used in PFC/rectification	DCK	Zero reverse recovery, better PFC efficiency; 650 V and 1200 V, wide current range
3	Fuses	Isolate faults DC harness to payload rack	SPFJ, DCD* DCM*	DC full-range UL listed fuses; Contact Littelfuse Sales for new developments
	Current sensor	Measure operating current	CC1Pxx, CF1Pxx, CH1Pxx	Accurate current monitoring; Open- and closed-loop options
	Contactor Relay	High-voltage disconnect and pre-charge control.	DCNHS250*, DCNHE20PF60*	Reliable HV make/break and pre-charge, coordinated solution with fuses **DCNHS250:** main; **DCNHE20PF60:** pre-charge
	Click here for more detailed schematics.			
4	Click for more details			
5	PolySwitch® Resettable Device	Various communication protection	nanoSMD, microSMD	Resettable protection saves service calls; Nano and Micro board-level sizes
	MOV	Input protection of aux power supply	V275LA40AP	Absorbs surges on aux supply input; 275 VAC rating, 40 mm disc
	TVS Diode Array (COM-bus)	Overvoltage protection in comm bus	AQ24COM-02, AQ24COM-01	Meets IEC 61000-4 and ISO 10605 ESD; Low capacitance for high-speed buses
	C&K® Switch	Enclosure open/close and HMI switches	K5V, EITS, ITS, KT	Rugged interlock and user interface; Tactile, detect and rotary options

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Littelfuse solutions for IT Rack/Server Tray



AC PDUs
Fuse, Circuit Breaker



Hot Swap + IBC/PDB
Fuse, TVS Diode, MOSFET, SiC QDPAK, SiC Driver



AC PSUs
Fuse, MOV, SiC MOSFET, Si/SiC Schottky Diode, TVS Diode



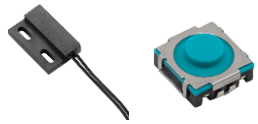
xPU/Networking/Storage
Fuse, PolySwitch® Resettable Device, eFuse, TVS Diode, TVS Diode Array



LV BBU/CBUs
Fuse, PolySwitch® Resettable Device, NTC, Current Shunt Resistor



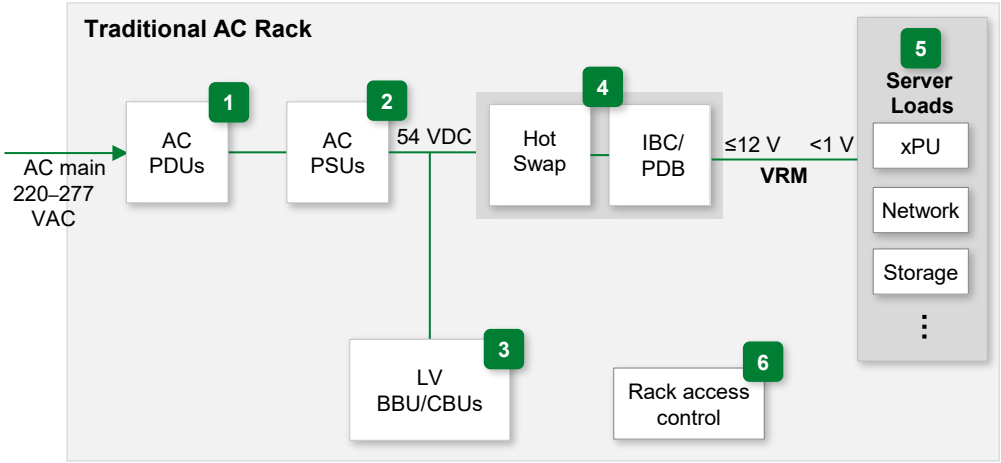
Rack assess control
Reed Sensor, Switch



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Optimizing dependable solutions for AC-powered enterprise, networking, and computing system

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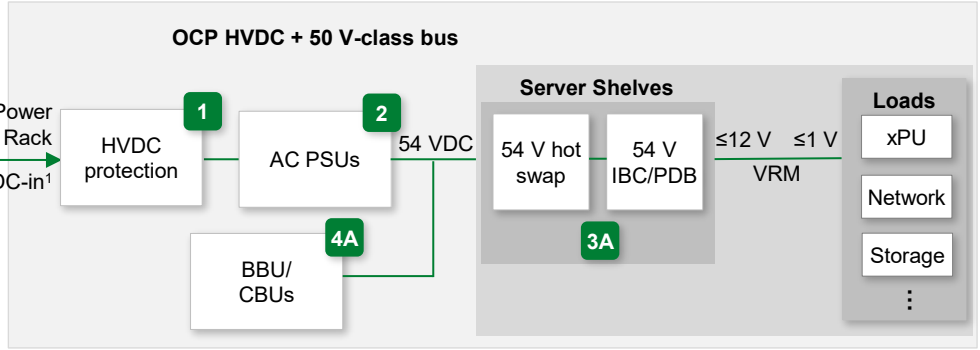
	Technology	Function	Product series
1	Fuse	High current AC fuse for power shelf overcurrent protection	CCMR, 538*
	Circuit Breaker	hydraulic-magnetic circuit breaker or mechanical switch for safe disconnection	J Series, N-Series
2	Fuse	Cartridge fuses offer PSU input overcurrent protection	606, 505, 607
	MOV	AC side overvoltage suppression	TMOV, Xtreme, SM10
	650 V SiC MOSFET	Main switch for PFC and LLC	IXSH, IXSA, IXSG
	SiC Schottky Diode	PFC diode	DCK
	TVS for Driver	Protect gate of driver IC from switching transients	SMF, SMFA Asymmetric
	Driver	Dual low side driver for PFC	IXD704
3	LV BBU/CBU	Click for more details	
4	Hot Swap + IBC/PDB	Click for more details	
5	PolySwitch® Resettable Device	Used in all power/signal ports like USB, RS485, CAN, etc. for overcurrent protection	nanoSMD, microSMD
	Protection IC (eFuse)	eFuse for accurate overcurrent and overvoltage protection	LS05-LS24
	Fuses	SOCAMM2, DDR5/6, SSD overcurrent and overvoltage protection	408, 435, 439*
	TVS Diode and TVS Diode Array		Ethernet/Serial I/O Port Protection
6	Reed Sensor, C&K® Switch	Magnetically-operated proximity sensor for rack door open detection	59150, 59020
		Tactile switches for various server trays	K5V, EITS, ITS, KT

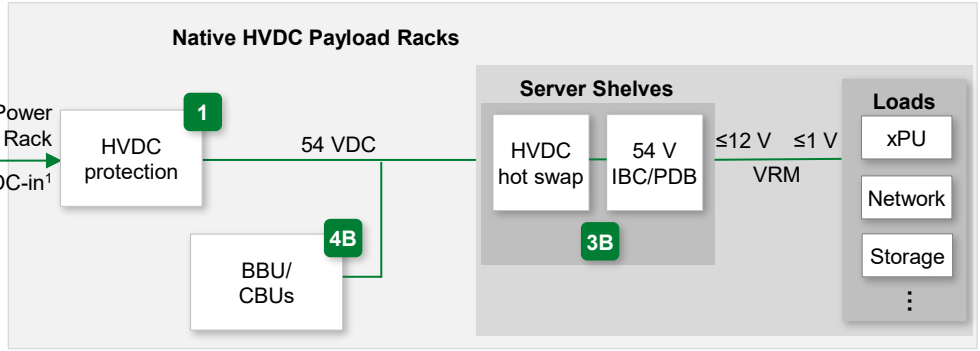
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Envisioning next-gen AI servers and OCP platforms





	Technology	Function	Product series
1	1 kV UL Fuse	High current fuse up to 600 A	DCD* DCM*
2	1 kV Cartridge Fuse	Fuses offer 800 VDC side overcurrent protection	788*, 828, 841*, 843*
	1200 V SiC FET	Main switch for LLC	IXSH, IXSA
	SiC Driver	Low side SiC drivers	SiC Drivers
3A 3B	Hot Swap + IBC/PDB	Click for more details	
4A	LV BBU/CBU	Click for more details	
4B	HV BBU/CBU	Click for more details	

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Server PDU/PSU/Payload key solution comparison

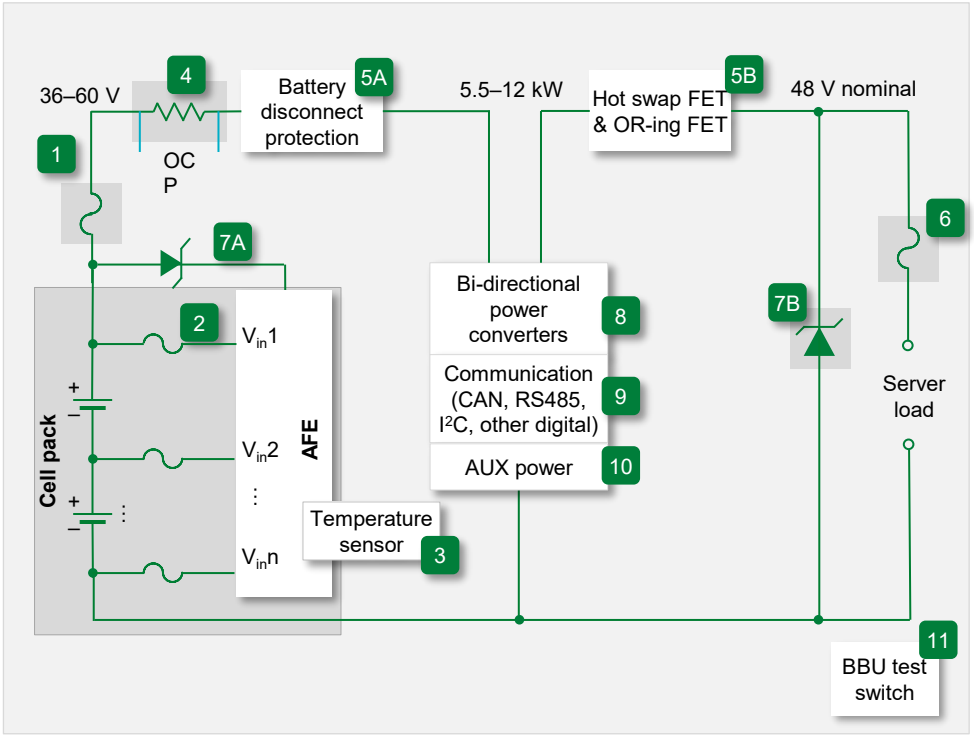
	Technology	Function in application	Product series	Benefits and features
1	Fuse	High current AC fuse for power shelf overcurrent protection	CCMR, 538*	Various AC fuses optimized for different server payload designs (PSU, BBU, in rack CDU, etc.) **CCMR:** Time delay, up to 600 VAC, 60 A; **538:** Cartridge type fuse, high current, contact sales
	Circuit Breaker	hydraulic-magnetic circuit breaker or mechanical switch for safe disconnection	J Series, N-Series	Various breakers up to 240 VAC 20 A (higher power breakers also available), or mechanical switch options; **J series:** Breaker; **N series:** Rocket Switch
	1 kV UL Fuse	High current fuse up to 600A	DCD*, DCM*	Fast acting, full range, UL qualified fuses customized for 800 V Data Center; Contact Littelfuse sales for details
2	Fuse	Cartridge fuses offer PSU input overcurrent protection	606, 505, 607	Up to 500 VAC, different ratings for HPRV2 and HPRV3 3.3 kW to 12 kW PSUs; **505:** 6.3*32mm, up to 30 A; **606,607:** 10*32 mm, up to 63 A, different breaking ratings
	MOV	AC side overvoltage suppression	TMOV, Xtreme, SM10	**TMOV:** Thermally protected; **Xtreme:** high surge absorption; **SM10:** Surface mount MOV
	650 V SiC MOSFET	Main switch for PFC and LLC	IXSH, IXSA, IXSG	650 V, down to 25 mOhm, in TO263, TO247, or TOLL
	SiC Schottky Diode	PFC diode	DCK	SiC Diode provides higher efficiency than Silicon Diode; from 600V 10A to 1200V 40A; TO220, TO247, TO263 options
	TVS for Driver	Protect gate of driver IC from switching transients	SMF, SMFA Asymmetric	Asymmetric TVS Diode customized for positive gate driving voltages
	Drivers	Single and dual low side SiC drivers	IXD704 SiC Drivers	Single and dual low side SiC drivers IXD704: Dual 4A driver in SO8 All drivers: up to 30A peak current for high power supplies
	1 kV Cartridge Fuse	Fuses offer 800 VDC side overcurrent protection	828, 788*, 841*, 843*	High current up to 60 A, high breaking current; Contact Littelfuse sales for details
	1200 V SiC FET	Main switch for LLC	IXSH, IXSA	1200 V, down to 13 mOhm, in TO247, TO263 options, other packages sampling; contact Littelfuse sales for details
3	Click for more details			
4	Click for more details			
5	PolySwitch® Resettable Device	PPTC used in all power/signal ports like USB, RS485, CAN, etc. for overcurrent protection	nanoSMD, microSMD	Simple overcurrent protection, popular for communication ports and USB protection, options include 6 to 24 V, 1 A to 18 A, 0402 to 2920 sizes
	Protection IC (eFuse)	eFuse for accurate overcurrent and overvoltage protection	LS05-LS24	eFuse for accurate overcurrent protection, usually for higher current protection, options from 5 V to 24 V, up to 6 A
	Fuses	SOCAMM2, DDR5/6, SSD overcurrent and overvoltage protection	408, 435, 439*	Complete Port Protection solutions
	TVS Diode and TVS Diode Array		Ethernet/Serial I/O Port Protection	
6	Reed Sensor, C&K® Switch	Magnetically-operated proximity sensor for rack door open detection	59150, 59020	Best options for security and access control, with a range of sensitivity, cable length and connector options
		Tactile switches for various server trays	K5V, EITS, ITS, KT	Over 30,000 SKUs, different shapes, functions, and materials, gold plated options for long endurance Data Center requirements

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LVDC (48 V) BBU solutions



	Technology	Function	Product series
1	Telecom Fuse, ClassT Fuse, Battery Fuse	Protect batteries during short circuit conditions	TLS, JLLN, MBB
	Battery Protector		ITV9550
2	Fuse	Inline safety fuse protects voltage or current monitoring wires	438A, 437A
	PolySwitch® Resettable Device		1812L
3	NTC	Over-temperature Protection	Leaded, Surface Mount
4	Current Shunt Resistor	Current sensing	WPA/WPB/WPC
5A/ 5B	100 V MOSFET	BBU safe disconnect/hot swap /OR-ing	IXFT320N10T2
6	80 V Fuses, 70–200 A	Offer server-side overcurrent protection	871, 881
7A/ 7B	58–80 V+ TVS Diode	Overvoltage protection	TPSMB-L, SMDJ58CA
8	100 V MOSFET	BBU power conversion	IXFT320N10T2
9	TVS Diode Array	ESD protection	AQ24COM-02, AQ24COM-01
	PolySwitch® Resettable Device	Resettable overcurrent protection	nanoSMD
10	SMT Fuse	Surface mount fuse for bias power supplies	451, 453
11	TC&K® Switch	For BBU testing purpose, per overcurrent protection standard	KSC, PTS815

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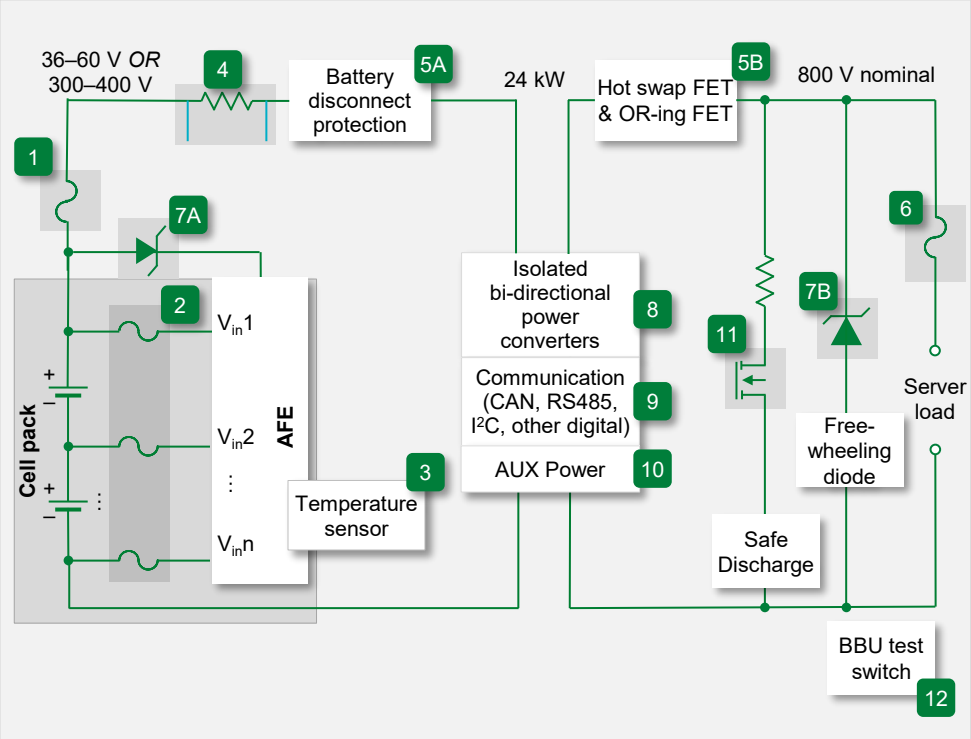
LVDC BBU key solution comparison

	Technology	Function in application	Product series	Benefits and features
1	Telecom Fuse, ClassT Fuse, Battery Fuse	Protect batteries during short circuit conditions	TLS, JLLN, MBB	Wide options from 50–1200 A; **TLS:** High breaking and I^2T for telecom batteries; **JLLN:** High power fuses for energy storage; **MBB:** Smaller, up to 125 V, 350 A / 500 A, good fit for OCP BBUs
	Battery Protector		ITV9550	Three-terminal fuse for battery protection; both overcurrent and over-temperature integrated within the fuse, up to 45 A; contact sales for roadmap
2	Fuse	Inline safety fuse protects voltage or current monitoring wires	438A, 437A	AEC-Q200 qualified SMT fuse; high reliability
	PolySwitch® Resettable Device		1812L	PolySwitch® Resettable Device (PPTC) offers resettable protections
3	NTC	Over temperature Protection	Leaded, Surface Mount	Superior long-term reliability; offers customization options like special encapsulants or probe housings
4	Current Shunt Resistor	Current sensing	WPA/WPB/WPC	Ceramic resistors; up to 3 W, 0.5% tolerance
5A/ 5B	100 V MOSFET	BBU safe disconnect/hot swap/OR-ing	IXFT320N10T2	3.5 mΩ; in TO247/D2PAK
6	80 V Fuse 70–200 A	Offer server-side overcurrent protection	871, 881	Small size; high current; **881:** 60–125 A; **871:** 150–200 A;
7A/ 7B	58–80 V+ TVS Diode	Overvoltage protection	TPSMB-L, SMDJ58CA	**TPSMB-L:** 80 V, 100 A; **SMDJ58CA:** 58 V, 300 A; other options available
8	100 V MOSFET	BBU power conversion	IXFT320N10T2	3.5 mΩ; in TO247/D2PAK
9	TVS Diode Array	ESD protection	AQ24COM-02, AQ24COM-01	**AQ24COM-01:** Single; **AQ24COM-02:** Dual; IEC610004-2.4-4,4-5, ISO10605
	PolySwitch® Resettable Device	Resettable overcurrent protection	nanoSMD, microSMD	Simple overcurrent protection, popular for communication ports and USB protection, options include 6 to 24 V, 1 A to 18 A; 0402 to 2920 sizes
10	SMT fuse	Surface mount fuse for bias power supplies	451, 453	Fast acting; small size; **451:** Gold plated; **453:** Silver plated
11	Tactile switch	For BBU testing purpose, per overcurrent protection standards	KSC, PTS815	**J Series** leads save board space; **KSC:** longer travel distance

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HVDC (800 V) BBU solutions



	Technology	Function	Product series
1	Battery Fuse	Protect batteries during short circuit conditions	30EV1K, 25EV1K DCD (new)*
2	Fuse	Inline safety fuse protects voltage or current monitoring wires	438A, 437A, 451, 453
	PolySwitch® Resettable Device		1812L
3	NTC	Over-temperature protection	Leaded, Surface Mount
4	Current Shunt, Down to 0.5 mΩ, 2512	Current Sensing	WPA/WPB/WPC
5A/ 5B	1.2 kV SiC QDPAK	BBU safe disconnect/ hot swap/OR-ing	IXSQD150N120L3*
6	1 kV Fuses, 30 A+	Hot swap protection	788*, 828
7A/ 7B	80 V, 100 A 58 V, 300 A	Battery-side overvoltage protection	TPSMB-L SMDJ58CA
	400 V + TVS Diode, 400 A+	Server-side overvoltage protection	DFNAK04* SMCJ400A
8	1.2 kV SiC QDPAK	BBU power conversion	IXSQD150N120L3*
	SiC Driver 9 A	Driver for SiC switch	IX4352NE
9	TVS Diode Array	ESD protection	AQ24COM-02, AQ24COM-01
	PolySwitch® Resettable Device	Resettable overcurrent protection	nanoASMD
10	1.2 kV 2.4 A FET in TO263	MOSFET for flyback converter	IXTY1R4N120PHV
	1 kV 1–2 A SMT Fuse	fuse for bias power supplies	823A
11	1–1.5 kV Depletion Mode, PFET and NFET	Safe discharge 800 V to <60 V safety voltage when tray is removed from server	Depletion Mode P-Channel MOSFET N-Channel MOSFETs
12	C&K® Switch	For BBU testing purpose, per OCP standard	KSC, PTS815

* *Contact Littelfuse Sales for more details.*

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HVDC BBU key solution comparison

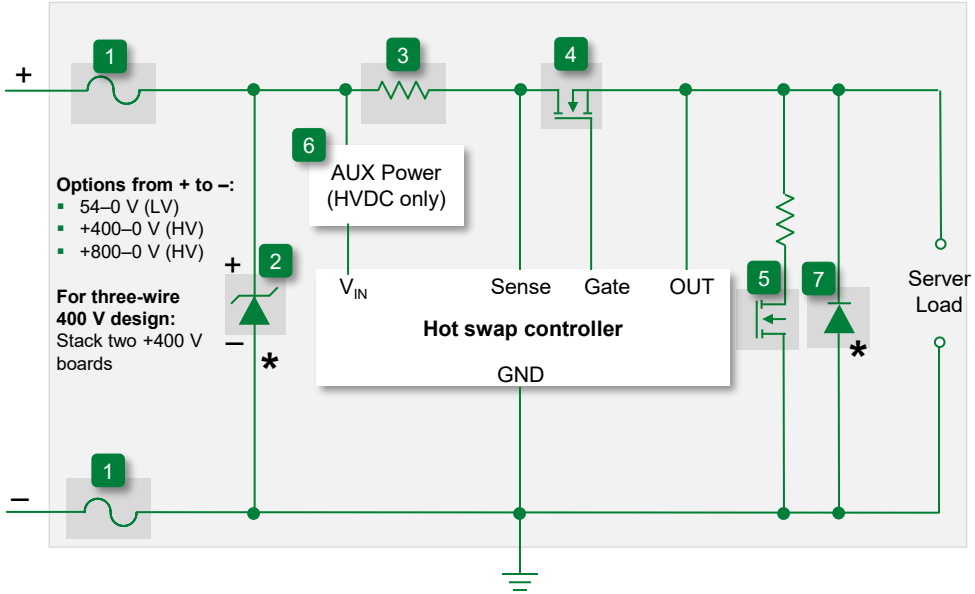
	Technology	Function in application	Product series	Benefits and features
1	Battery Fuse	Protect batteries during short circuit conditions	30EV1K, 25EV1K DCD (new)*	Designed and qualified for EV with high reliability; **25EV1K:** 70–125A; **30EV1K:** 150–225 A; **DCD:** up to 600 A
2	Fuse	Inline safety fuse protects voltage or current monitoring wires	438A, 437A, 451, 453	AEC-Q200 qualified SMT fuse with high reliability
	PolySwitch® Resettable Device		1812L	PolySwitch® Resettable Device (PPTC) offers resettable protections
3	NTC	Over-temperature protection	Leaded, Surface Mount	Superior long-term reliability, offer customization options like special encapsulants or probe housings
4	Current Shunt, Down to 0.5 mΩ, 2512	Current Sensing	WPA/WPB/WPC	Ceramic resistors. Up to 3W, 0.5% tolerance
5A/ 5B	1.2 kV SiC QDPAK	BBU safe disconnect/hot swap/OR-ing	IXSQD150N120L3*	13mΩ, QDPAK, contact sales for more details
6	1 kV Fuses, 30 A+	Hot swap protection	788*, 828	1 kV, high breaking capacity; **828:** 30–50 A; 788: SMT
7A/ 7B	80 V, 100 A 58 V, 300 A	Battery-side overvoltage protection	TPSMB-L, SMDJ58CA	**TPSMB-L:** 80 V, 100 A; **SMDJ58CA:** 58 V, 300 A; other options available
	400 V + TVS Diode, 400 A+	Server-side overvoltage protection	DFNAK04* SMCJ400A	High voltage, high power; contact Littelfuse sales for DFNAK04
8	1.2 kV SiC QDPAK	BBU power conversion	IXSQD150N120L3*	13mΩ, QDPAK; contact Littelfuse sales for more details
	SiC Driver 9 A	Driver for SiC switch	IX4352NE	Separate 9 A source/sink, integrated charge pump and DESAT
9	TVS Diode Array	ESD protection	AQ24COM-02, AQ24COM-01	**AQ24COM-01:** Single; **AQ24COM-02:** Dual; IEC610004-2.4-4,4-5, ISO10605
	PolySwitch® Resettable Device	Resettable overcurrent protection	nanoSMD, microSMD	Simple overcurrent protection, popular for communication ports and USB protection; options include 6 to 24 V, 1 A to 18 A; 0402 to 2920 sizes
10	1.2 kV 2.4 A FET in TO263	MOSFET for flyback converter	IXTY1R4N120PHV	MOSFETs from 1.2 kV to 4 kV+ available for 800–1500 V applications; various options in TO252 and TO263
	1 kV 1–2 A SMT Fuse	fuse for bias power supplies	823A	Fast acting; small size
11	1–1.5 kV Depletion Mode, PFET and NFET	Safe discharge 800 V to <60 V safety voltage when tray is removed from server	Depletion Mode, P-Channel MOSFET, N-Channel MOSFETs	**Depletion mode:** guaranteed discharge without external control; **NFET:** normal drive; **PFET:** easy drive
12	C&K® Switch	For BBU testing purpose, per overcurrent protection standard	KSC, PTS815	**J Series** leads save board space; **KSC:** longer travel distance

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Click the product series for more info

LVDC/HVDC Hot Swap solutions



*1: Stack two DFNAK TVS for +800V system

*2: Freewheeling diode is suggested where EMI and leakage inductance at PDB adds inductive impedance

	Technology	Function in application	Product series
1	80 V Fuses, 70 A to 200 A	Computing tray overload/ short circuit safety protection	871, 456, 456SDE, 881
	1 kV Fuses, 30 A to 50 A		828, SPF, 788*, 841*, 843*
2	LV TVS Diode, 58 V, 300 A	Protects from short-duration overvoltage events caused by capacitances	SMDJ58CA
	400 V+TVS Diode, 400 A+		DFNAK04* SMCJ400A
3	Current Shunt Resistor, Down to 0.5 mΩ, 2512	Current Sensing	WPA/WPB/WPC
4	100 V, 3.5 mΩ MOSFET	Hot swap main switch	IXFT320N10T2
	750 V, 9 mΩ SiC QDPAK		IXSQD240N75L3*
	1.2 kV SiC QDPAK, 13 mΩ		IXSQD150N120L3*
	SiC Driver 9 A	Driver for SiC switch	IX4352NE
5	500–1.5 kV Depletion Mode, PFET and NFET	Safe discharge 800 V to <60 V safety voltage when tray is removed from server	Depletion Mode, P-Channel MOSFET, N-Channel MOSFETs
6	1.2 kV 0.2 A in TO252	Provides bias power to the hot swap controller from 800 V supply	IXTH60N30P
	1.2 kV 2.4 A in TO263		IXTY1R4N120PHV
	1 kV 1–2 A SMT Fuse		823A
7	1.6 kV Diode in TO263	Clamp inductive kick due to various inductances in the system	DMA30IM1600PZ

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Hot Swap key solution comparison

	Technology	Function in application	Product series	Benefits and features
1	80 V Fuses, 70 A to 200 A	Computing tray overload/ short circuit safety protection	871, 456, 456SDE, 881	Small size; high current; **456:** 20–30 A, small; **456SDE:** 40–60 A; **881:** 60–125 A; **871:** 150–200 A;
	1 kV Fuses, 30 A to 50 A		828, SPF, 788*, 841*, 843*	1 kV; high breaking capacity; **828:** 30–50 A; **SPF:** up to 30 A; **788, 841, 843:** Contact Littelfuse sale
2	LV TVS Diode, 58 V, 300 A	Protects from short-duration overvoltage events caused by capacitances	SMDJ58CA	3 kW; small size
	400 V+TVS Diode, 400 A+		DFNAK04* SMCJ400A	High voltage; high power Contact Littelfuse sales for DFNAK04
3	Current Shunt Resistor, Down to 0.5 mΩ, 2512	Current Sensing	WPA/WPB/WPC	Ceramic resistors; up to 3 W, 0.5% tolerance
4	100 V, 3.5 mΩ MOSFET	Hot swap main switch	IXFT320N10T2	3.5 mΩ; in TO247/D2PAK
	750 V, 9 mΩ SiC QDPAK		IXSQD240N75L3*	contact sales for more details
	1.2 kV SiC QDPAK, 13 mΩ		IXSQD150N120L3*	contact sales for more details
	SiC Driver 9 A	Driver for SiC switch	IX4352NE	Separate 9 A source/sink; integrated charge pump and DESAT
5	500–1.5 kV Depletion Mode, PFET and NFET	Safe discharge 800 V to <60 V safety voltage when tray is removed from server	Depletion Mode P-Channel MOSFET N-Channel MOSFETs	**Depletion mode:** guaranteed discharge without external control; **NFET:** normal drive; **PFET:** easy drive
6	1.2 kV 0.2 A in TO252	Provides bias power to the hot swap controller from 800 V supply	IXTH60N30P	1.2 kV+ small FET; various options from <1 Ohm to 50+ Ohm
	1.2 kV 2.4 A in TO263		IXTY1R4N120PHV	
	1 kV 1–2 A SMT Fuse		823A	Fast acting, small size
7	1.6 kV Diode in TO263	Clamp inductive kick due to various inductances in the system	DMA30IM1600PZ	1.2 kV+ Diode options in TO252/263

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Coordinated protection for 800 VDC Sidecar PDU

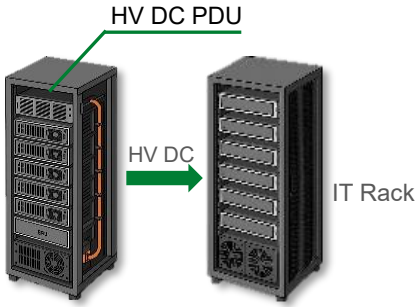
Controlled disconnection and system selectivity with contactor and fuse

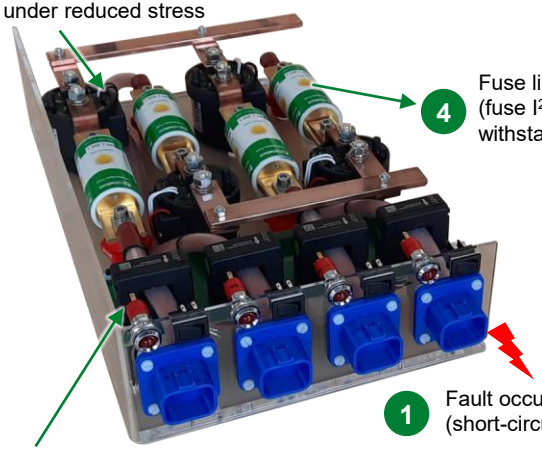
Contactor

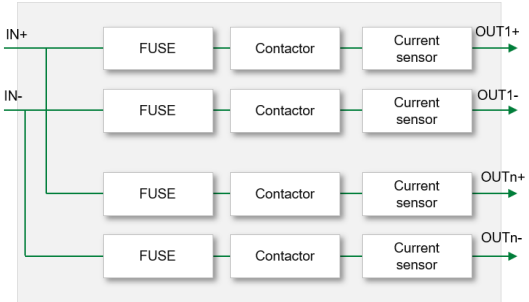


Air-gap switch and overcurrent disconnect

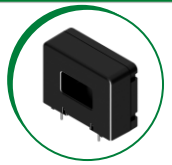
- 1000 VDC, 250 A operation
- Operates with 24 VDC coil voltage
- Includes coil economizer
- Includes auxiliary contacts







Current Sensor



Provides metrology and enables controlled opening of contactor

- Closed loop analog sensor, acc <1 %
- PCB through-hole mounting
- Single +5 V power supply
- Primary current: ±100 A to ±300 A

Fuse



Short-circuit and overcurrent protection

- High amperage (20 kAic) capacity
- Small footprint
- Full over-current protection capability
- Coordinates well with contactor

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System safety standards in Data Centers

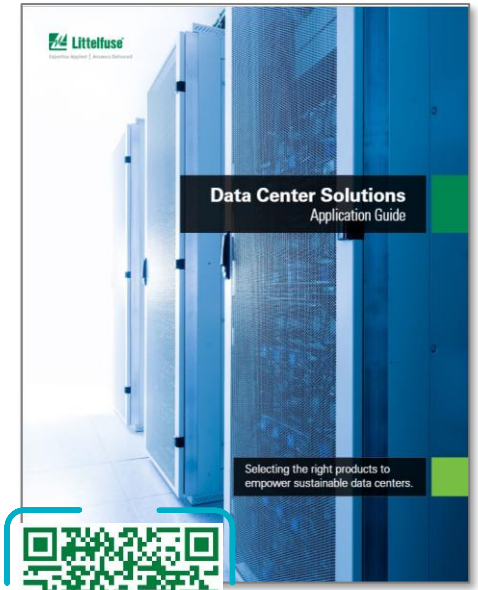
Standard	Title	General scope	Littelfuse product category	Relevance to standard
IEC62368-1	Audio/video, information and communication technology equipment– Part 1: Safety requirements	Applicable to the safety of electrical and electronic equipment within the field of audio, video, information and communication technology with a rated voltage not exceeding **600V.** **Covers products such as servers, GPUs, network switches, PSUs, as well as other Data Center subsystems**	Fuses (general and battery)	Fire prevention and fault energy limitation required by harzard-based safety engineering (HBSE) safeguards
			MOV/TMOV/iTMOV	AC mains surge protection; protection against transient overvoltage entering IT/CT equipment
			TVS/GDT/SIDACtor	Protection of power rails and DC buses against surge events
			PolySwitch® Resettable Device	USB and communication line overcurrent protection
			eFuses	Solid-state protection for overcurrent and overvoltage protection
			Current and Temperature Sensing	Functional safety support
IEC62477-1	Safety requirements for power electronic converter systems and equipment– Part 1: General	Applies to power electronic converter systems (PECS), any specified accessories, and their components for electronic power conversion and electronic power switching, with rated system voltages not exceeding **1000 VAC or 1500 VDC.** **Covers subsystems such as power rack HVDC converters, BBUs/CBUs, and CDUs**	Fuses (general and battery)	Overload and short-circuit protection
			SiC MOSFETs and SiC Diodes	Core converter building blocks
			Gate Drivers	Converter safety/control
			MOV/TMOV/iTMOV	AC mains surge protection; protection against transient overvoltages entering equipment
			TVS Diode/GDT/SIDACtor	Surge protection
			PolySwitch® Resettable Device	USB and communication line overcurrent protection
			Contactors and Relays	Isolation/disconnect
			S2PS*	Solid-state-Protection
			Current and Temperature Sensing	Functional safety support

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Additional information can be found on Littelfuse.com

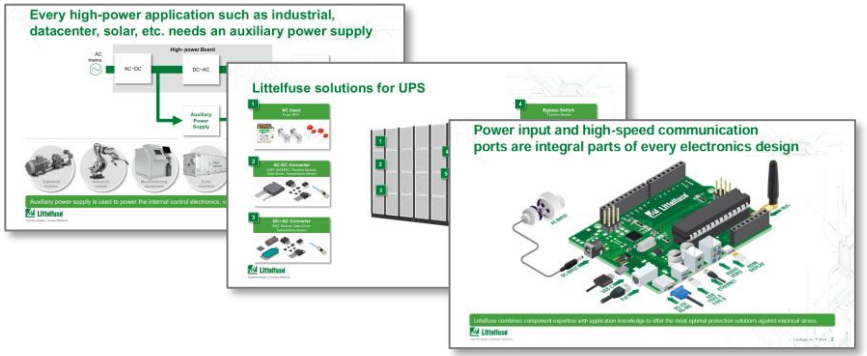
Explore the world of Littelfuse with the electronics eCatalogs (ecatalogs.littelfuse.com)



Data Center Guide



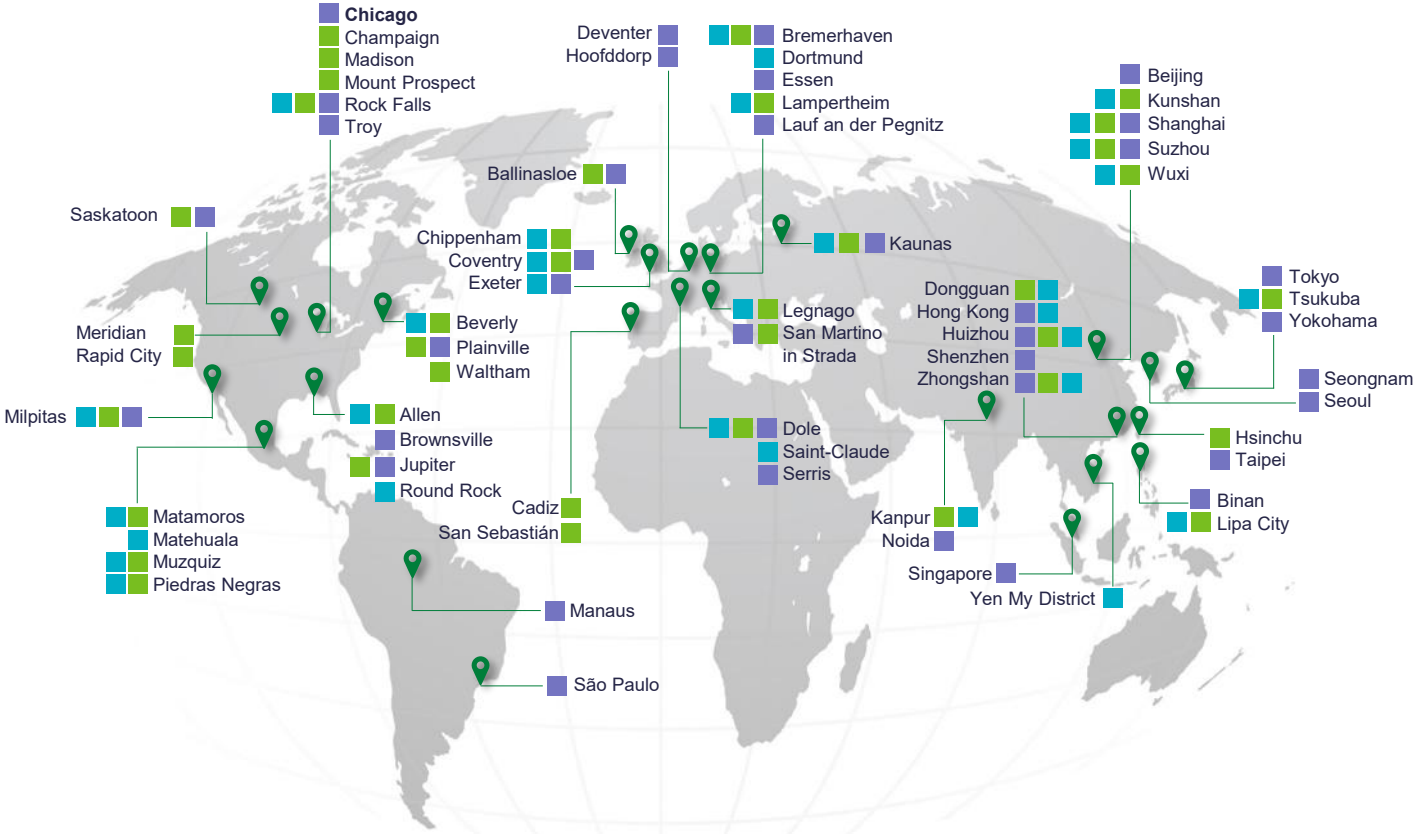
eCatalogs



Application Spotlights

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Local resources supporting our global customers



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Shaping solutions for the safe and efficient transfer of electrical energy



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 in the design process to account for 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

We offer high-volume manufacturing that is committed to the highest quality standards.

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TP7.0SMD24CA-XC Automotive-Grade TVS Diode

7000 W, Low Clamping Voltage, Surface Mount, Voltage Transient Protection Diode

Problem/Solution

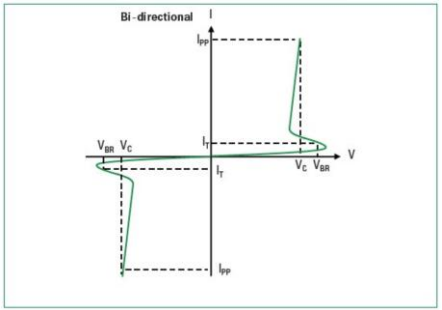
Lightning strikes and other transient voltage events can send damaging surges through sensitive circuits. The new TP7.0SMD24CA-XC TVS diode protects circuits with high peak pulse power dissipation, automotive-grade ruggedness, and a low, flat clamping response in a compact surface-mount package

Technical Resources

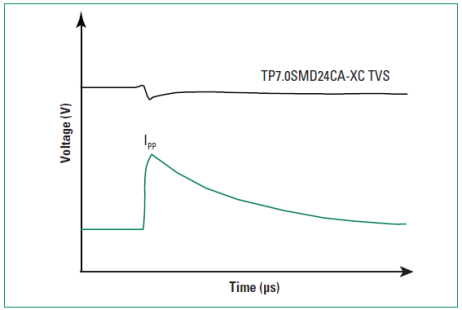
Series Page

Datasheet

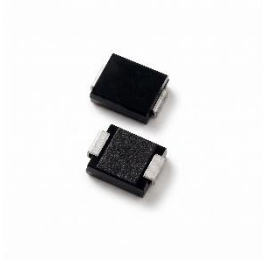
I-V Curve Characteristics



Transients Clamping Waveform



Benefits



- Avoids series TVS connections for reduced BOM costs
- Low clamping voltage allows selection of devices with lower withstand voltages
- Operates over a wide temperature range
- Automotive-grade ruggedness and reliability
- Compact, space-saving size

Features

- Up to 7kW surge capacity
- 24 V maximum clamping voltage with a unique foldback characteristic enabling a flat response
- Junction temperature range: -65 °C to 175 °C
- AEC-Q101-qualified and PPAP capable
- D0-214AB (SMC) surface mount package



Markets/Applications

- Automotive 12 V battery systems
- Zone control units (ZCU)
- Anti-reverse protection circuits
- Advanced driver-assistance systems (ADAS)
- I/O interface and VCC bus protection



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