

Data Center Solutions

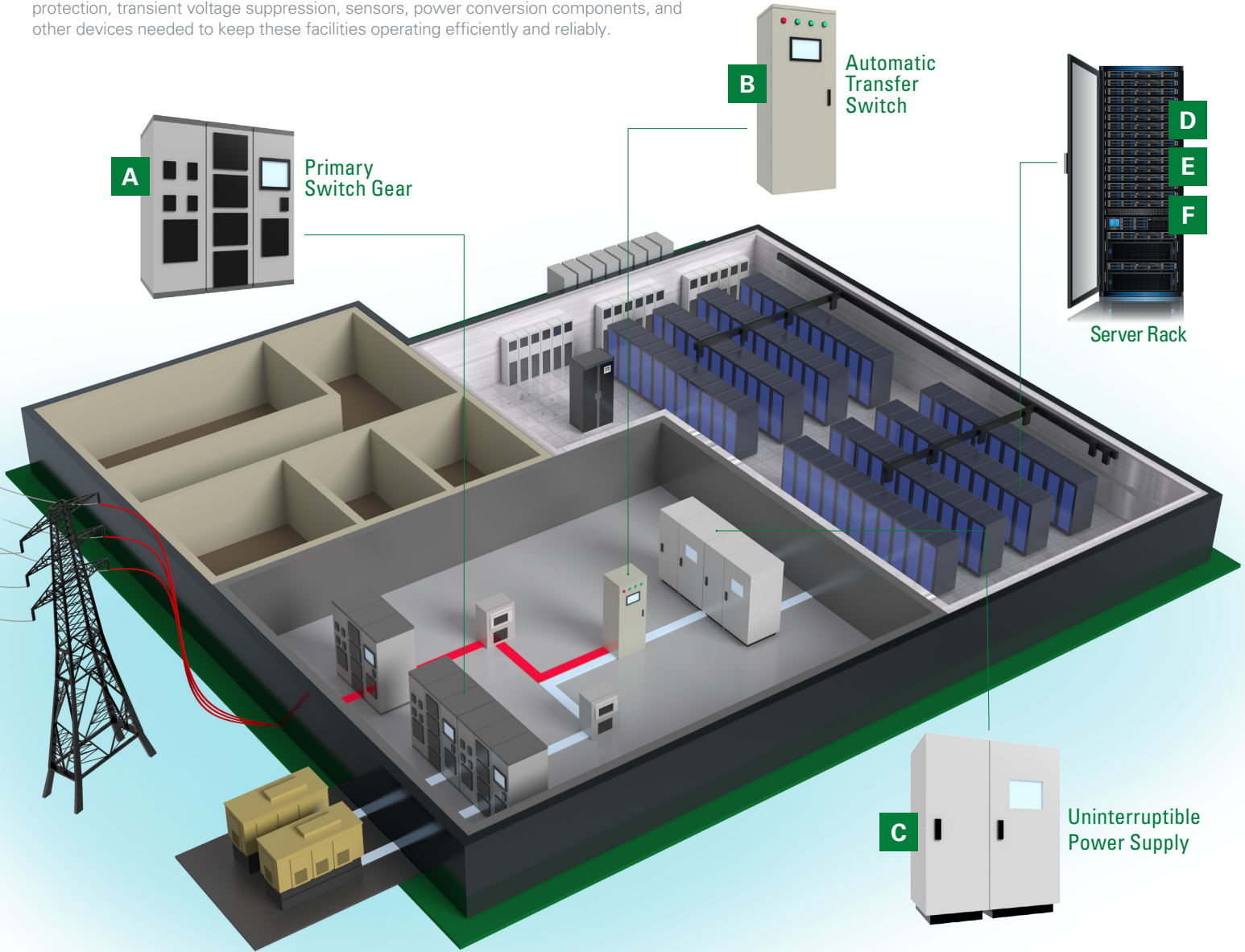
Selection Guide



Helping Make the Data Center Reliable, Energy Efficient, and Safe

Today's data centers must handle extremely high volumes of data from millions of mobile devices and other objects that make up the Internet of Things (IoT). To keep these critical facilities running properly, data center operators need advanced circuit protection, sensing, and power management components.

Littelfuse is committed to supplying data center developers and managers with overcurrent protection, transient voltage suppression, sensors, power conversion components, and other devices needed to keep these facilities operating efficiently and reliably.



A	B	C	D	E	F
Silicon Protection	Fast Acting Fuse	IGBT Module	Reed Sensor	SMD Fuse	PolySwitch PPTC
					

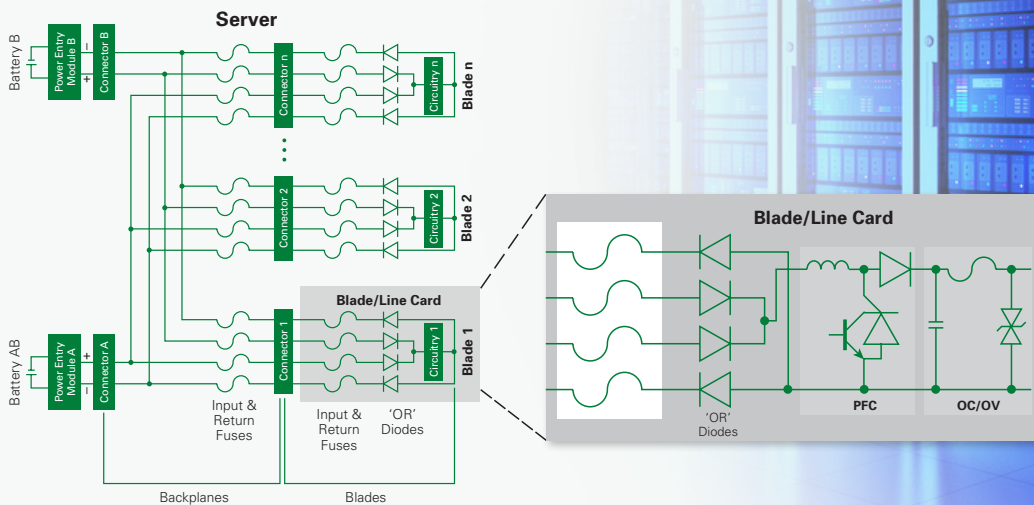
* The devices illustrated here address only a few of the data center areas for which Littelfuse can deliver industry-leading solutions. For a more complete view of Littelfuse solutions by application, consult the selection matrix included in this document.

Enabling the Highway to the Cloud

Type of Faults	Possible Effect of Unprotected Faults	Protection Solutions
Electrostatic Discharge (ESD)	Faulty circuit operation, latent defects, and even catastrophic failure of sensitive data center equipment	Polymer ESD, Multilayer Varistors, TVS Diode Arrays
Load Switching Transients in Power Electronics Circuits	Equipment failure or faulty operation, leading to downtime or corrupt data	Metal Oxide Varistors, Gas Discharge Tubes, TVS Diodes
Induced Surges (Lightning)	Equipment failure leading to downtime	Metal Oxide Varistors, Gas Discharge Tubes, Protection Thyristors, TVS Diodes
Overload / Short Circuit Current	Excessive current can result in complete circuit destruction and possible fire, electrocution or explosion. Short circuits can cause arcs, shock, and fire hazards.	Fuses, Resettable PTCs

881 SMD Fuse

The 881 Series High-Current SMD Fuse provides a single-fuse solution for applications up to 75Vdc. Current ratings from 60A to 100A, eliminate the need to parallel multiple lower-rated fuses or over-spec industrial-type fuses.



Protect

Product Matrix

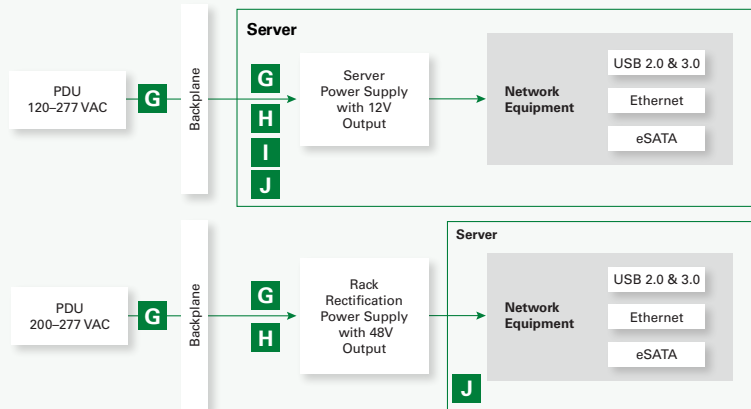
Littelfuse Product Series	Product Function Level		Computer and Networking Equipment					Uninterruptible Power Supply			Communication Equipment				Indoor Power Distribution & Controls								
			USB	Ethernet	RS-232 / RS-485	eSATA / SATA	Power Supply	Fans	AC Power Supply	Converter & Inverter	Battery bank	Modem	ADSL splitters, Channel / Data Service Uni	Repeaters, Mux, WAN	VoIP, LAN	Switchgear Panel	Automatic Transfer Switch	Power Distribution Unit	Busway	Panelboard	Backup Generator	HVAC	
Overcurrent Protection	Resettable PPTCs	Max I_{HOLD}	Max Voltage																				
	Low Resistance	5 A	12 Vdc	-	-	-	-	-	-	-	-	•	-	-	-	-	-	-	-	-	-	-	
	Surface Mount	5 A	60 Vdc	•	•	-	-	•	•	-	•	•	•	•	•	-	-	-	-	-	-	•	
	Radial Leaded	9 A	72 Vdc	-	-	-	-	•	•	•	•	-	•	•	•	-	-	-	-	-	-	•	
	Telecom	2.5 A	600 Vint / 60 Vop	-	•	•	-	-	-	-	-	-	•	•	•	-	-	-	-	-	-	-	
	Fuses	Max Current Rating	Max Voltage																				
	Surface Mount	100 A	250 Vac	-	•	-	-	•	•	•	•	•	-	-	-	-	•	•	-	-	-	•	•
	Cartridge	100 A	600 Vac	-	-	-	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Holders, Blocks, and Clips	100 A	600 Vac	-	-	-	-	•	•	•	-	•	-	-	-	-	•	•	•	•	•	•	•
	Semiconductor	1500 A	1300 Vac	-	-	-	-	-	-	-	•	-	-	-	-	-	-	-	-	-	-	-	-
Industrial Power & UL Class Fuses	3000 A	600 Vac	-	-	-	-	-	-	•	•	•	-	-	-	-	•	•	•	•	•	•	•	
Medium Voltage (E-Rated, R-Rated)	400 A	38000 Vac	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	
Overvoltage Protection	Polymer ESD Suppressors	Max Surge Rating	Vmax																				
	PESD discrete and array	ESD Contact 8 kV	24 Vdc	•	•	•	•	-	-	-	-	-	•	•	•	•	-	-	-	-	-	-	-
	XTREME-GUARD™	ESD Contact 30 kV	32 Vdc	•	•	•	•	-	-	-	-	-	•	•	•	•	-	-	-	-	-	-	-
	TVS Diodes	Max Power	Max V_R																				
	Surface Mount	5000 W	400 Vdc	•	•	•	•	•	•	•	•	•	•	•	•	•	-	-	-	-	-	-	-
	Leaded	30000 W	400 Vdc	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	High Power	1pp (8/20us) at 15 kA	430 Vdc	-	-	-	-	•	-	-	•	-	-	-	-	-	-	-	•	•	•	•	-
	TVS Diode Array	Max Surge Rating	Max V_R																				
	General Purpose	ESD Contact 30 kV	6 Vdc	-	-	-	-	-	-	-	-	-	•	•	•	•	-	-	-	-	-	-	-
	Low Capacitance	ESD Contact 20 kV	6 Vdc	•	•	•	•	-	-	-	-	-	•	•	•	•	-	-	-	-	-	-	-
	Lightning Surge	1pp (8/20us) 40A	70 Vdc	•	•	-	-	-	-	-	-	-	•	•	•	•	-	-	-	-	-	-	-
	Varistors (MOV/MLV)	Max Surge Rating	Vmax																				
	Radial Leaded	1 Pulse (8/20us) 10,000 A	1000 Vac	-	-	-	-	•	•	•	•	-	-	-	-	-	•	•	•	•	•	•	-
	Surface Mount	1 Pulse (8/20us) 250 A	275 Vac	-	-	-	-	•	•	•	•	•	-	-	-	-	-	-	-	-	-	-	-
	Thermally Protected	1 Pulse (8/20us) 10,000 A	750 Vac	-	-	-	-	•	•	•	•	-	-	-	-	-	•	•	•	•	•	•	•
	Industrial High Energy	1 Pulse (8/20us) 40,000 A	750 Vac	-	-	-	-	•	-	•	•	-	-	-	-	-	•	•	•	•	•	•	•
	Multilayer Varistors	1 Pulse (8/20us) 125 A, ESD Contact at 8 kV	120 Vdc	•	•	•	•	-	-	-	-	-	•	•	•	•	-	-	-	-	-	-	-
Gas Discharge Tube (GDT)	Max Surge Rating	Max V_{NORM}																					
High Voltage	10 shots at 5000 A	3000 Vdc	-	-	-	-	•	-	•	-	-	•	•	-	-	•	•	•	•	•	•	-	
Squared	10 shots at 2000 A	600 Vdc	-	-	-	-	-	-	-	-	-	•	•	•	•	-	-	-	-	-	-	-	
Medium Surge	10 shots at 5000 A	600 Vdc	-	•	•	-	-	-	-	-	-	•	•	•	•	-	-	-	-	-	-	-	
Protection Thyristor	Max Surge Rating	Max V_{DRM}																					
SIDACtor®	1pp (8/20us) 400A	530Vdc	-	•	•	-	-	-	-	-	-	•	•	•	•	-	-	-	-	-	-	-	

Control and Sense

Product Matrix

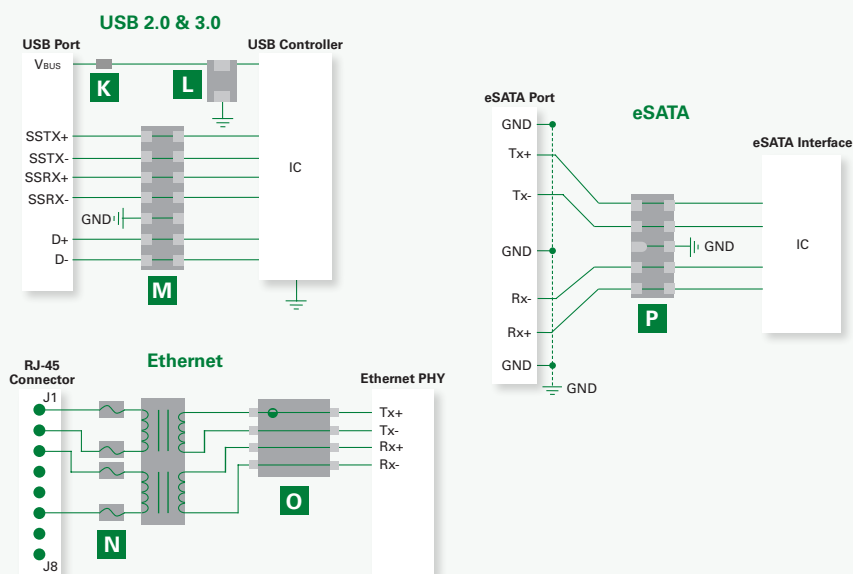
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			USB	Ethernet	RS-232 / RS-485	eSATA / SATA	Power Supply	Fans	AC Power Supply	Converter & Inverter	Battery bank	Modem	ADSL splitters, Channel /Data Service Uni	Repeaters, Mux, WAN	VoIP, LAN	Switchgear Panel	Automatic Transfer Switch	Power Distribution Unit	Busway	Panelboard	Backup Generator	HVAC
Diodes	Max I_{T(RMS)}	Max V_{DRM}																				
Rectifier Diode	30 A	1800 V	-	-	-	-	•	-	•	•	•	-	-	-	-	•	•	•	•	-	•	•
Fast Recovery Diode	582 A	1200 V	-	-	-	-	•	-	•	•	•	-	-	-	-	•	•	•	•	-	•	•
Schottky Diode	300 A	200 V	-	-	-	-	•	-	•	•	•	-	-	-	-	•	•	•	•	-	•	•
Phase Control Thyristor	40 A	1000 V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thyristor/Diode Module	700 A	3600 V	-	-	-	-	•	-	•	•	•	-	-	-	-	•	•	•	•	-	•	•
Rectifier Module	23 A	24000 V	-	-	-	-	•	-	•	•	•	-	-	-	-	•	•	•	•	-	•	•
IGBT	Max Current Rating	Max Voltage																				
Discrete IGBT	600 A	1200 Vdc	-	-	-	-	•	-	•	•	•	-	-	-	-	•	•	•	•	-	•	•
IGBT Module	780 A	1700 Vdc	-	-	-	-	•	-	•	•	•	-	-	-	-	•	•	•	•	-	•	•
SMPD IGBT	400 A	3000 Vdc	-	-	-	-	•	-	•	•	•	-	-	-	-	•	•	•	•	-	•	•
Power MOSFET	Max I_{D25}	Max V_{DSS}																				
Discrete MOSFET	660 A	4500 Vdc	-	-	-	-	•	-	•	•	•	-	-	-	-	•	•	•	•	-	•	•
MOSFET Module	1245 A	1000 Vdc	-	-	-	-	•	-	•	•	•	-	-	-	-	•	•	•	•	-	•	•
SMPD MOSFET	600 A	1700 Vdc	-	-	-	-	•	-	•	•	•	-	-	-	-	•	•	•	•	-	•	•
Solid-State Relays	Max Load Current	Max Blocking Voltage																				
Normally Open and Normally Closed Relays	1000 mA	600 V	-	-	-	-	-	-	-	-	-	•	•	•	•	•	•	•	•	-	-	-
Power Relays	6.75 A	1000 V	-	-	-	-	-	-	•	•	•	•	•	•	•	•	•	•	•	-	-	-
Isolated High-Voltage Analog Switches	110 dB isolation at 5 kHz	600 V switch voltage	-	-	-	-	-	-	-	-	-	•	•	•	•	•	•	•	•	-	-	-
AC Power Switches	5 A	800 V	-	-	-	-	-	-	-	-	-	-	-	-	-	•	•	•	•	-	-	-
Line Card Access Switches	110 mA hold current	up to 10 switches	-	-	-	-	-	-	-	-	-	-	-	-	-	•	•	•	•	-	-	-
Current-Limited Solid State Relays	600 mAdc	300 V	-	-	-	-	•	-	-	-	-	•	-	-	-	•	•	•	•	-	-	-
Optocouplers	Galvanic Isolation																					
High Speed Optocouplers	44500	I _{PC} Clock Freq ≥ 500 kHz	•	•	•	•	•	-	•	•	•	•	•	•	•	-	-	-	-	-	-	-
Linear Optocouplers	3750 V	2 mA Input control	-	-	-	-	•	-	•	•	•	-	-	-	-	-	-	-	-	-	-	-
Isolation Amplifiers	3750 V	± 1.5% Voltage reference	-	-	-	-	-	-	•	•	•	-	-	-	-	-	-	-	-	-	-	-
Single & Dual Optocouplers	5000 V	up to 8500% current transfer ratio	-	-	-	-	-	-	-	-	-	•	•	•	•	•	•	•	•	-	-	-
Drivers	I_{PEAK}	Max Voltage																				
MOSFET & IGBT Gate Drivers	30 A	35 V	-	-	-	-	•	-	•	•	•	-	-	-	-	-	-	-	-	-	-	-
High Voltage Gate Drivers	2 A	700 V	-	-	-	-	•	-	•	•	•	-	-	-	-	-	-	-	-	-	-	-
Optically Isolated Gate Drivers	5 mA	12 V	-	-	-	-	•	-	•	•	•	-	-	-	-	-	-	-	-	-	-	-
Magnetic Sensors & Reed Switches	Max Switching Current	Max Voltage																				
Reed Sensors	Current 0.5 A	300 Vdc	-	-	-	-	•	-	•	-	-	-	-	-	-	•	•	•	•	-	•	-
Reed Switches	Current 0.5 A	1000 Vdc	-	-	-	-	•	-	•	-	-	-	-	-	-	•	•	•	•	-	•	-
Temperature Sensors	Typical R @ 25°C	Beta Values 0 to 25°C																				
Thermistor Probes & Assemblies	10000 Ω	3892 K	-	-	-	-	•	-	-	-	-	-	-	-	-	-	-	-	-	•	-	-
Surface Mount Thermistor	10000 Ω	3892 K	-	-	-	-	•	•	•	•	-	•	-	•	-	-	-	-	-	-	-	-
Glass-Encapsulated Thermistor	10000 Ω	3892 K	-	-	-	-	•	•	•	•	-	•	-	•	-	-	-	-	-	-	-	-

Computing Equipment Solutions



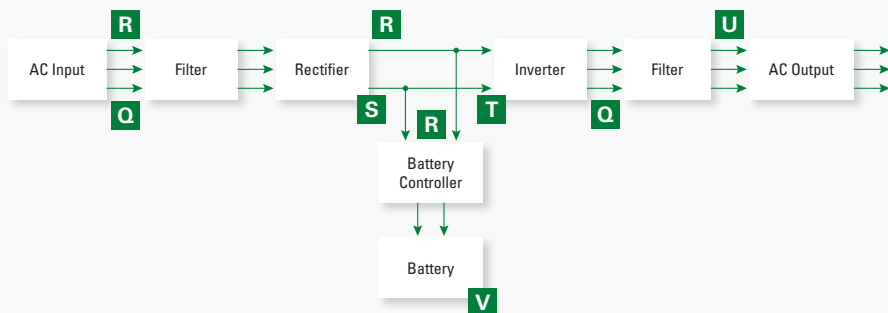
	Problem	Solution
G	Overcurrent Protection	NANO ² Fuse – 881 Series High Current SMD Fuse
H	Surge Protection	UltraMOV [®] Series
I	ESD Protection	TVS Diode
J	Enclosure Open/Close Status	Reed Sensor

Networking and Data Port Solutions



	Problem	Solution
K	Overcurrent and Over Temperature Protection	Surface Mount PTC: 1206L150SLYR
L	ESD Protection on Vbus	TVS Diode Array: SP1003
M	ESD Protection on Data Lines	TVS Diode Array: SP3012
N	Overcurrent Protection	461 Series TeleLink Surge Tolerant Surface Mount Fuse
O	ESD and Surge Protection	TVS Diode Array: SLVU2.8-4
P	ESD and Surge Protection	TVS Diode Array: SP0524P

Uninterruptible Power Supply Solutions



	Problem	Solution
Q	Surge Protection	High Energy Industrial Varistors – BA or BB Series
R	Overcurrent Protection	Semiconductor Fuse – L70QS Series (500-700, AC & DC) Cartridge Fuse – 505 Series
S	Convert Rectify: AC → DC	Rectifier Diode Modules or Active Front-End IGBT
T	Inverter: DC → AC	IGBT Modules or SiC MOSFETs/Diodes
U	Overcurrent Protection	Full-range, Branch Circuit Fuses – JTD Series (600Vac) Cartridge Fuse – 505 Series
V	Temperature Monitoring	Temperature Probe Assembly

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Global Lab Capabilities



You need to be certain that your products live up to the highest standards for performance, reliability, safety, and regulatory compliance. Working with Littelfuse, you have access to dedicated application engineers who partner with you to provide expert design consultation, perform comprehensive tests simulating the harshest environments, and confidentially evaluate the results in consultation with you.

TESTING CAPABILITIES

Environmental

- Autoclave
- Dust
- H3TRB
- HAST
- High & Low Temperature Storage
- High Temperature Loading
- Ingress Protection (IP)
- HTGB
- HTRB
- Temperature & Humidity
- Temperature Cycling
- Thermal Shock
- Salt Fog

Physical-Mechanical Characteristics

- Acceleration
- Die Shear
- Leak Detection
- Mechanical Shock
- Resistance to Soldering Heat (Dip, Reflow, Wave)
- Resistance to Solvents
- Solderability
- Terminal Strength (Push, Pull, Bend)
- Vibration
- Wetting Balance
- Wire Pull

Electrical

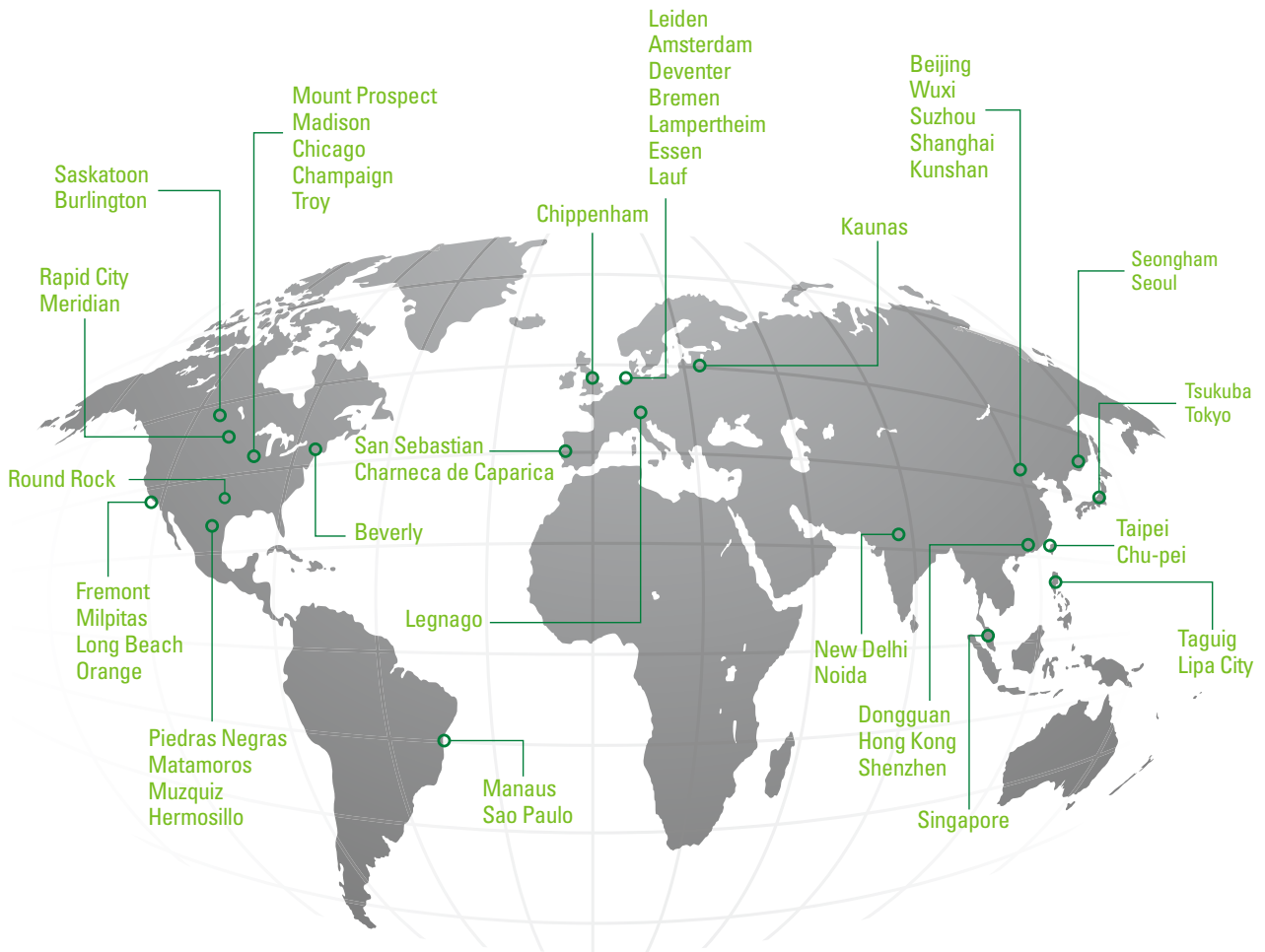
- BCI
- Capacitance
- EFT
- ESD
- Impedance
- Insulation Resistance
- I-V
- Life
- Lightning Surge
- Overload
- Parametric Tests
- Power-Cross
- Power Cycling
- Ring Wave
- R-T
- S-Parameter Measurements (Insertion Loss, Isolation, Reflection)
- Short Circuit
- Step Current
- Surface Resistivity
- Surge
- TDR (Eye Diagram)
- Telecom
- Thermal Cut-Off
- Time-to-Trip
- TLP
- Transient
- Trip Cycle
- Trip Endurance
- Voltage Drop



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LOCAL RESOURCES FOR A GLOBAL MARKET



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Expertise Applied | Answers Delivered