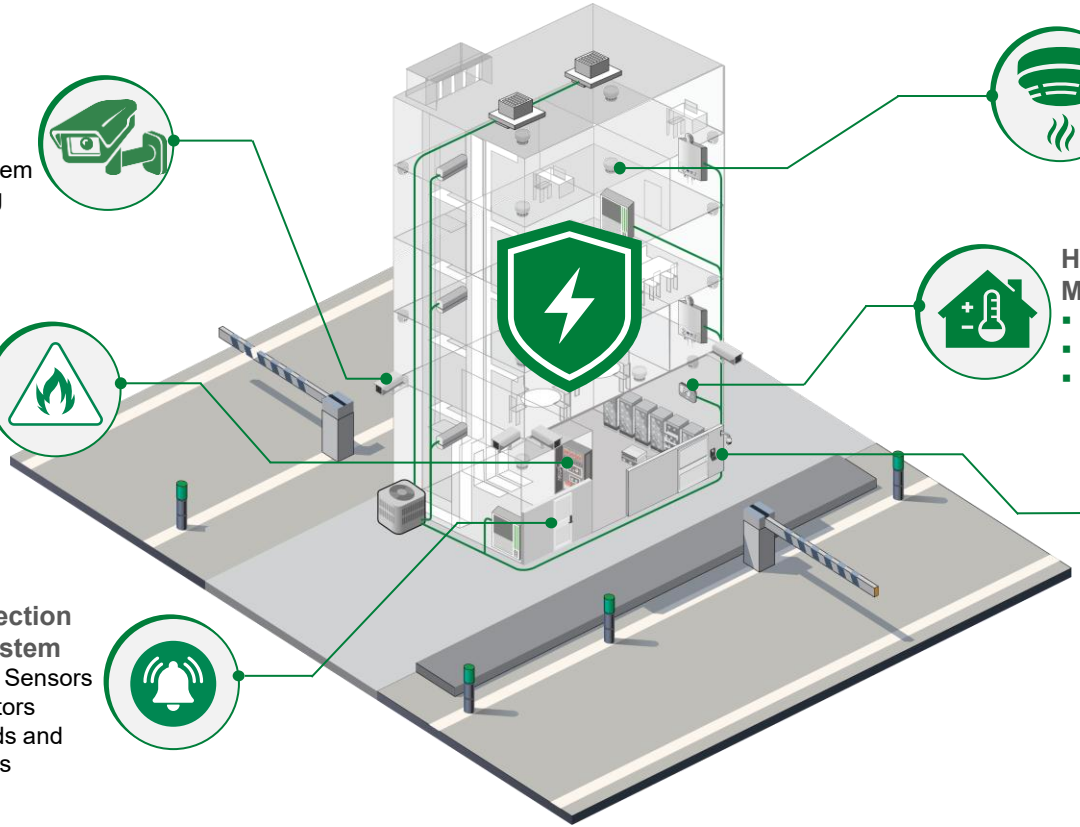
Building Safety, Security & Control Solutions

Building Controls



Integrated building safety, security, and power systems

Protecting critical systems across the entire building infrastructure



Security and Surveillance
- Cameras
- Monitoring System
- Alarm Signaling

Fire Detection and Life Safety
- Smoke and Heat Alarm
- CO/Gas Sensor
- Control Panel

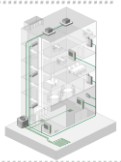
Electrical Panel and Meter Room
- Panels and Breakers
- Surge Protection
- Smart Meters

HVAC and Building Management
- Smart Thermostat
- Sensors and Controllers
- Energy Management

Access Control
- Card Readers
- Smart Locks
- Video Doorbells

Intrusion Detection and Alarm System
- Door/Window Sensors
- Motion Detectors
- Alarm Keypads and Control Panels

Building solutions



Littelfuse
Expertise Applied | Answers Delivered

Building safety and security: challenges and solutions

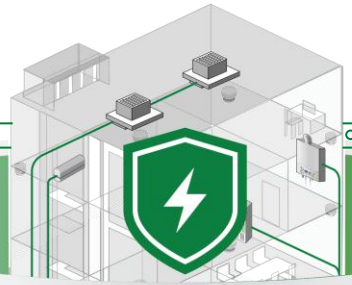
Managing fire, power, access, and reliability risks through layered protection

Fire & Life Safety

- Early detection & zero-failure tolerance
- Must operate during power disturbances

Electrical Stress & Power Events

- Surges, transients, overloads
- AC mains expose sensitive systems



Protects Power (AC Main)

- Overcurrent & surge protection
- Mitigate lightning & switching events
- Prevent cascading system failures

Access & Intrusion Protection

- More entry points = higher risk
- Tamper detection required 24/7

System Reliability & Uptime

- Continuous operation required
- Electrical faults drive downtime

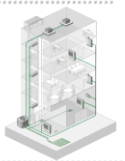
Protects Control & Signal
(ESD & Transients)

- ESD protection for sensitive electronics
- Transient suppression on signal & data lines
- Maintain logic & communication integrity

Protects System Operation
(Detection & Actuation)

- Reliable safety & user actuation
- Detect system state & tamper events
- Enable fail-safe system behavior

Building solutions .....



New products for building security & control systems

TMR Switches



LF21173/ LF21177 LF21112

- 1.8 V to 5.5 V operating range
- LGA4/SOT23-3 package
- Ultra-low-power consumption
- High sensitivity and reliability
- Operates with smaller magnets for cost reduction
- Excellent thermal stability

C&K® Switches



KMR

- Gold-plated contacts that ensure high reliability and corrosion resistance
- Compact footprint (4.6 x 2.8 mm)
- low-profile actuator (1.9 mm or 2.5 mm height)
- IP67 sealing for protection against dust, moisture, etc.

Reed Sensor



59150 59143

- Flange-mount type
- 59150: 28.57 mm x 19.05 mm x 6.25 mm
- 59143: 23.00 mm x 14.00 mm x 6.00 mm
- Capable of switching 140 Vac/ 200 Vdc and 265 Vac / 300 Vdc at 10 W
- Hermetically sealed (IP67)

TRIAC



LX5

- 600 V / 0.5 A rated TRIAC robust enough to handle 24 V AC
- Enable space and cost savings in PCB assembly
- Surge current capability up to 9.5 A at 60 Hz
- SOT-23 package

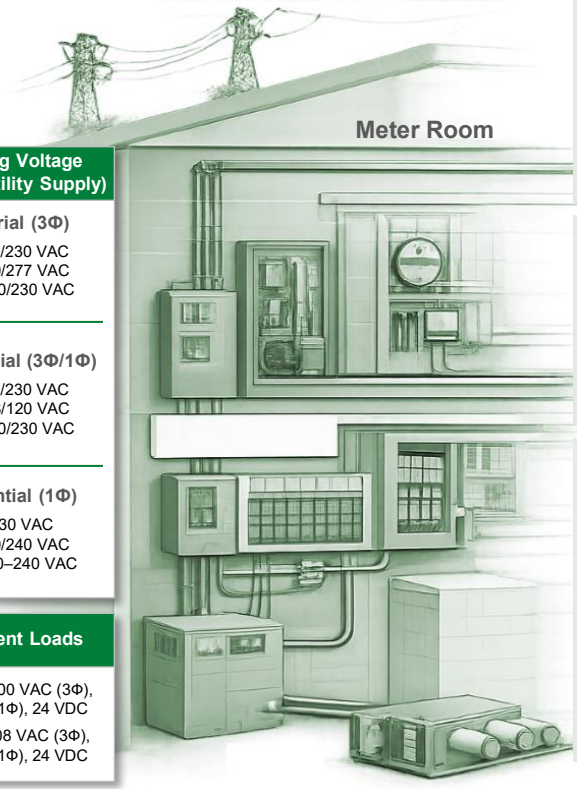


Electric Panel and Meter

Critical point of entry
for all safety and security systems

Protecting AC mains–electrical panels and meter room

Critical point of entry for all safety, security, and control systems



Incoming Voltage (Service/Utility Supply)

Industrial (3Φ)

EU: 400/230 VAC
NA: 480/277 VAC
Asia: 400/230 VAC

Commercial (3Φ/1Φ)

EU: 400/230 VAC
NA: 208/120 VAC
Asia: 400/230 VAC

Residential (1Φ)

EU: 230 VAC
NA: 120/240 VAC
Asia: 220–240 VAC

Equipment Loads

EU/Asia: 400 VAC (3Φ), 230 VAC (1Φ), 24 VDC

NA: 480/208 VAC (3Φ), 120 VAC (1Φ), 24 VDC

Utility incoming AC mains (Service entrance/meter room)

- High-interrupt AC fuses
- Circuit Breakers
- MOVs/TMOV® Devices

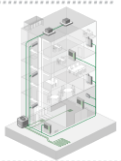
Distribution & branch circuits (Inside electrical panels)

- Branch circuit fuses (UL/IEC)
- Circuit Breakers
- Fuseholders & distribution blocks

AC–DC power supplies (Interface between panel & electronics)

- Input fuses (equipment level)
- MOVs/TVS Diodes (on AC input)

Building solutions .....

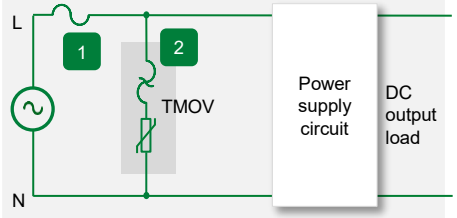


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Click on the product series in the table below for more info

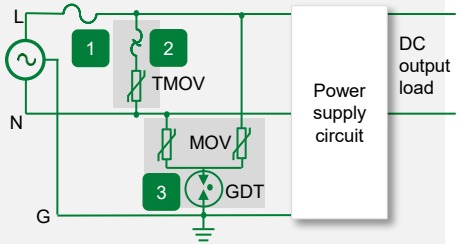
AC mains protection topologies

Differential mode protection
120/240 VAC & 208/120 VAC AC inputs



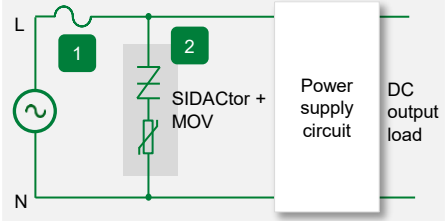
- Smart meters
- Smoke alarms
- Cameras/doorbells
- AC–DC power supplies

Differential & common mode protection
120/240 VAC, 208/120 VAC (harsh environment)



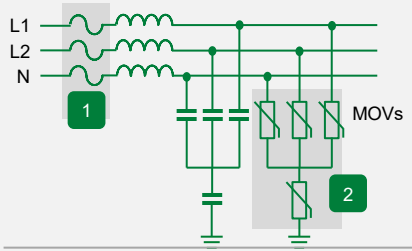
- Commercial/ industrial buildings
- Outdoor or noisy EMI environments

SIDACtor® + MOV
20/240 VAC & 208/120 VAC (sensitive electronics)



- Smart meters
- Smoke alarms
- Control panel
- Front-end PSUs

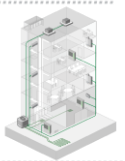
Three-phase input protection
480/277 VAC and 208 VAC three-phase systems



- Electrical panels
- PSUs, HVAC, & VFDs
- Industrial/commercial equipment

	Technology	Function in Application	Series
1	Fuse	Protects the power stage from overcurrent events	2153.15
		AC line fuses for overcurrent or short circuit protection	JTD, CCMR, KLKD 606, 504, 505
	Fuseholder	Supports fuse protection	LPSC, LPSM
2	TMOV or MOV	Protects the power supply unit from voltage transients and lightning	TMOV14RP300E, V10E420P
	SIDACtor® + MOV		P2300 + V10E300P
	TVS Diode		AK3-380C-Y
3	MOV + GDT	Protects the power supply unit from voltage transients and lightning	V10E300P + CG3 3.3

Building solutions



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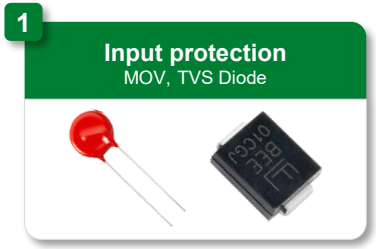
Littelfuse solutions for GFCI/AFCI receptacle & breaker

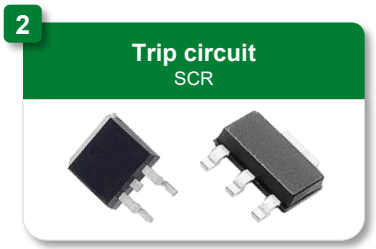


GFCI/AFCI Receptacle



Breaker





Functions:

- ***GFCI outlet****, ground fault circuit interrupter, is a circuit breaker that shuts off the internal circuit breaker when it senses an imbalance between the outgoing and incoming circuit. The main purpose is to protect people from electrical shock. The US National Electric Code defines when it is required.*
- ***AFCI outlet****, arc fault circuit interrupter, is a circuit breaker that detects electrical arcs and protects against electrical fires. In the US, over 40,000 fires are attributed to home electric wiring, resulting in 350 deaths and 14,000 injuries each year according to the US Product Safety Commission.*
- ***Conventional circuit breakers*** *only respond to overloads and short circuits.*

GFCI/AFCI breaker protection

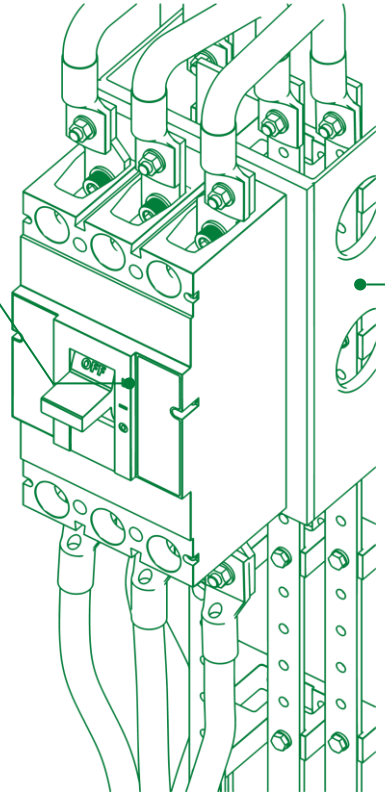
A critical safety interface between utility power and branch circuits

AC mains protection	
120/240 VAC 277/480 VAC	▪ Measurement accuracy ▪ Surge and fault exposure ▪ Long service lifetime (10 to 20 years) ▪ Directly exposed to utility disturbances



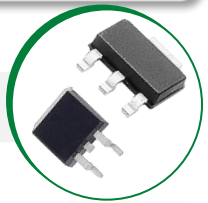
AC mains protection

MOV/ TMOV	▪ 150 to 320 VAC MCOV ▪ Up to 20 kA surge (8/20 µs) ▪ Thermally protected ▪ UL1449 compliant
TVS Diode	▪ 1,000 W peak pulse power capability ▪ Low-profile package ▪ Excellent clamping capability ▪ Fast response time



Trip circuit	
Trip circuit	▪ Triggers contact opening on fault ▪ Safely disconnects power

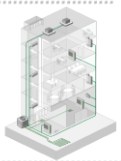
Electronic switch to energize the trip coil



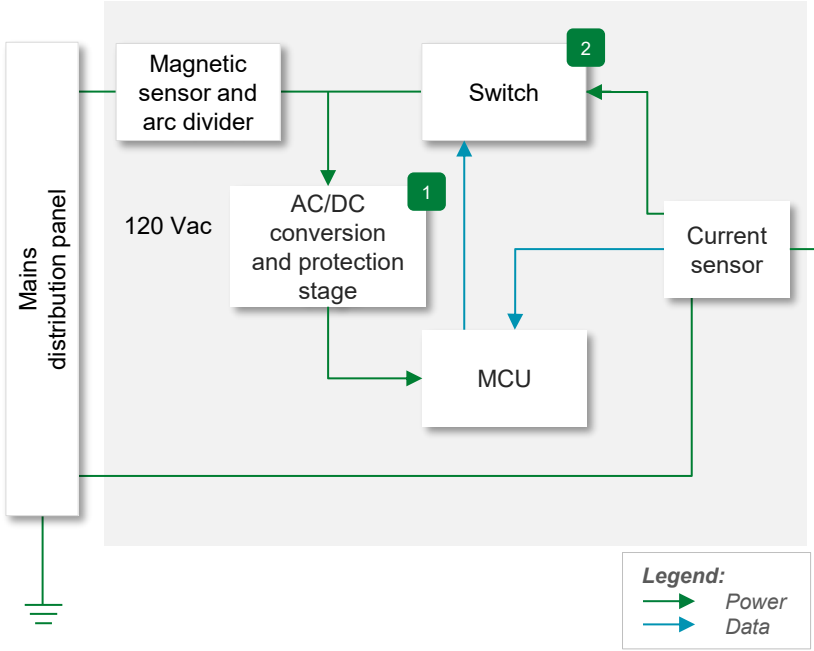
SCR	▪ Surge capability > 15 Amps ▪ Blocking voltage (V_{DRM}/V_{RRM}) capability−up to 600 V ▪ High dv/dt noise immunity; improved turn-off time (Tq) < 35 µsec

Littelfuse
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Building solutions .....



GFCI/AFCI breaker block diagram



	Technology	Function in Application	Product series
1	MOV	Protects power unit from voltage surges such as lighting and transients	UltraMOV
1	TVS Diode	Protects sensitive electronic components from voltage transients	1KSMB
2	SCR	Triggers electro-mechanical relay to disengage electrical contacts during fault	SCR up to 1200 V



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Littelfuse solutions for smart electricity meters



1 Anti-tamper
Reed Switch, TMR, Detect Switch



2 Metrology System Unit
MOV, Fuse, TVS Diode, eFuse, SiC MOSFET, PPTC, NTC



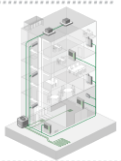
3 Communication Interface
TVS Diode Array, SIDACtor®, Optocoupler



4 I/O Protection and Control
Fuse, TVS Diode, MOV, Tactile Switch



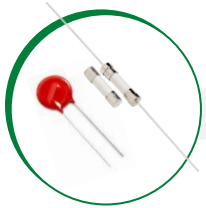
Building solutions .....



Smart meter protection: power, signal, and detection

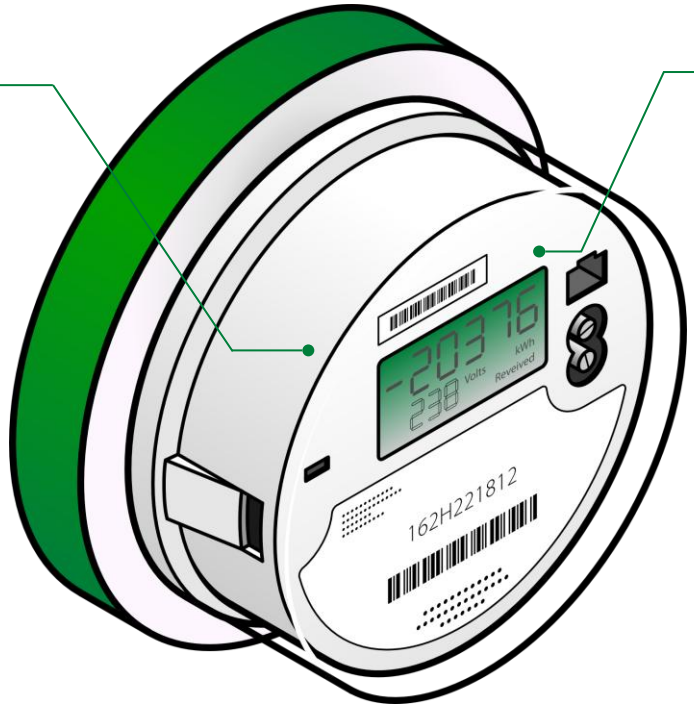
A critical interface between utility power and building security systems

Power input & metering interface	
120/240 VAC	▪ Measurement accuracy ▪ Surge and fault exposure ▪ Long service lifetime (10 to 20 years) ▪ Directly exposed to utility disturbances
277/480 VAC	



AC mains protection

Fuses	▪ Voltage rating: 250–600 VAC ▪ Current rating: 0.5 to 20 A ▪ Interrupt rating: >10 kA ▪ Temperature: –40 to 125 ºC
MOV/ TMOV	▪ 150 to 320 VAC MCOV ▪ Up to 20 kA surge (8/20 µs) ▪ Thermally protected ▪ UL1449 compliant



Metrology unit	
DC Voltage Rails	▪ Short circuit & ESD ▪ Sensitive electronics (ASIC/MCU, sensors, etc.)

Protection of LV DC rails in metrology unit



PPTC	▪ Resettable overcurrent protection ▪ 6 to 60 VDC rails ▪ 50 mA to 1 A hold current ▪ –40 to +85 / 105 ºC
TVS Diode	▪ ESD and transient protection ▪ 5 to 24 VDC rails ▪ 400–1500 V peak pulse power ▪ Unidirectional

Building solutions



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Smart meter protection: power, signal, and detection

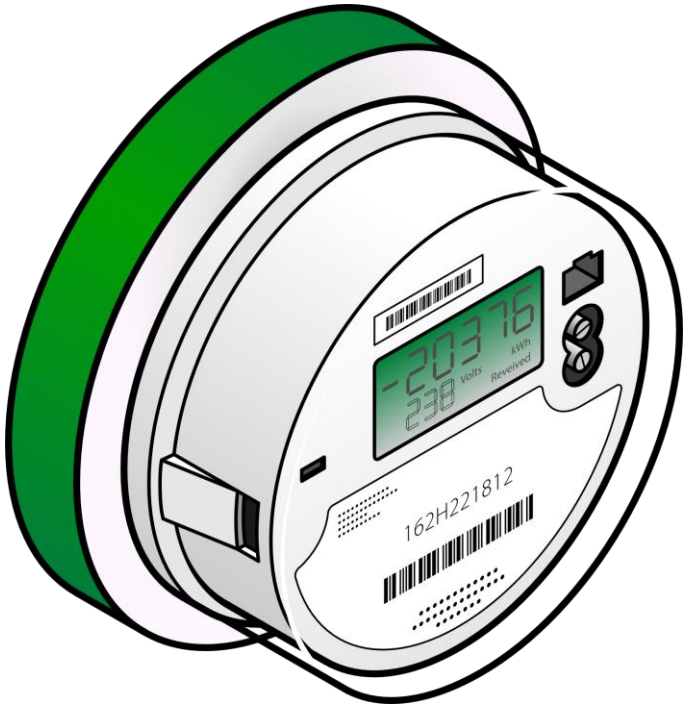
A critical interface between utility power and building security system

Anti-tamper and physical security



Mechanical/magnetic sensing

C&K® Switch	▪ Detect or Tactile Switch ▪ Physical tamper ▪ High reliability ▪ Defined actuation point
Reed Sensor	▪ Cover-open detection ▪ Zero standby power ▪ Proven long life
TMR Sensor	▪ Magnetic attack detection ▪ Detects strong external fields ▪ Supports advanced anti-fraud detection



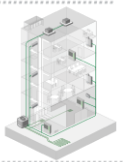
Load switching and signal interfaces



Enabling safe switching and reliable signal interfaces

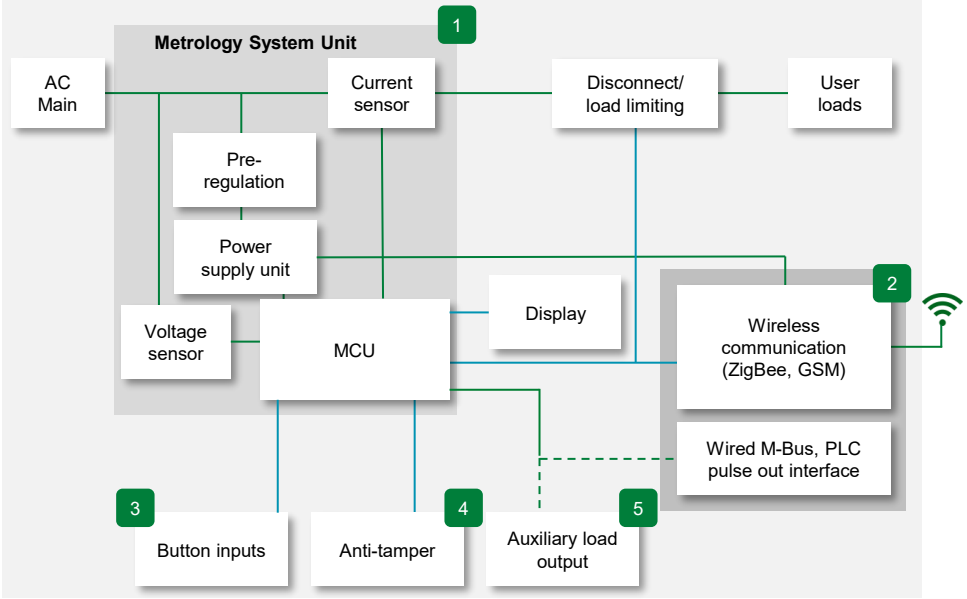
TVS Diode Array	▪ ESD protection ▪ I/O protection ▪ ±5 to ±15 V signal line ▪ 400–1500 V peak pulse power

Building solutions

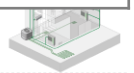


Click the product series in the table below for more info

Electricity meter system block diagram



	Technology	Function in Application	Product series
1	MOV	Protects power units from transients and lightning	Ultra MOV, CIII, TMOV
	Fuse	Protects power stage from overcurrent	215, 514, 835
	TVS Diode	Protects sensitive electronic components from voltage transients	SMAJ, SMBJ
	NTC	Senses the temperature of power semiconductor devices	End-banded Chip
	MOSFET	Provides high-frequency load switching	Polar™, X2-Class
	PolySwitch® Resettable Device	Protects the power stage from overcurrent events	TRF600-150
	Protection IC (eFuse)	Helps protect the supercapacitor system and provides charge/discharge control circuitry	LS0502SCD33, LS2406ERQ23
	MOSFET	Provides a switching function in pre-regulation circuit for charging capacitor	X2-Class
2	TVS Diode Array	Protects wired communication interface from user- induced ESD events	SC1205, SC1210
	SIDACtor®	Protects sensitive electronic components from damage due to lightning surges	SEP0xx
3	Tactile Switch	Switch for triggering display, resetting, etc.	KSC, KSE, PTS
4	Reed Sensor/TMR	Prevents magnetically induced tampering	59177, MDSR-10/TMR
	Detect Switch	Detects tampering of the meter casing	SDS, DDS
5	TVS Diode/MOV	Protects auxiliary I/O from voltage transients due to overload	SMCJ/SM7



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Fire Detection & Life Safety

Protection for systems
where failure is not an option

Littelfuse solutions for smoke and heat detectors



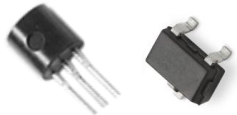
1 Power supply & DC−DC converter
Fuse, MOV, TVS Diode



3 Temperature sensor
NTC



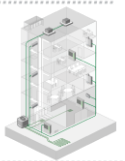
2 Alarm
TRIAC, SCR



4 Test and reset buttons
Tactile Switch



Building solutions .....



Smoke and heat detector–power and alarm reliability

Ensuring continuous operation, robust protection, and dependable alarm signaling

Power input & system continuity

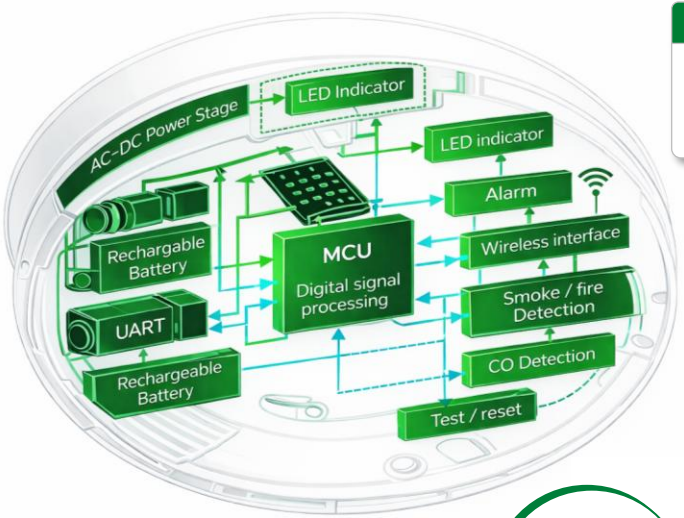
- Powered from AC mains
- Must remain operational during:
  - Surges
  - Faults
  - Brownouts

Power disturbances must not disable life-safety systems.



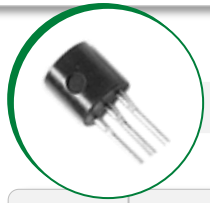
AC mains protection

Fuses	▪ Voltage rating: 250–600 VAC ▪ Current rating: 0.5 to 20 A ▪ Interrupt rating: >10 kA ▪ Temperature:–40 to 125 ºC
MOV/ TMOV	▪ 150 to 320 VAC MCOV ▪ Up to 20 kA surge (8/20 µs) ▪ Thermally protected ▪ UL1449 compliant



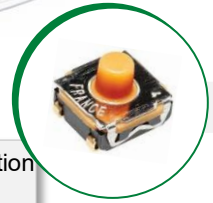
Alarm Signaling & Load Control

- Drives alarm loads (horn/piezo sounder)
- Must activate reliably during emergency



Alarm switching

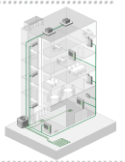
TRIAC/ SCR	▪ Designed for low-power AC loads ▪ Voltage rating: 600 V ▪ RMS on-state current: 1 A ▪ Low gate trigger current (direct control from MCU)



Test & Reset

C&K® Tactile Switch	▪ Ultra-low current consumption ▪ Operating life (1M cycles) ▪ IEC 60068-2-42 qualified ▪ Rugged sealing & resistance to corrosion

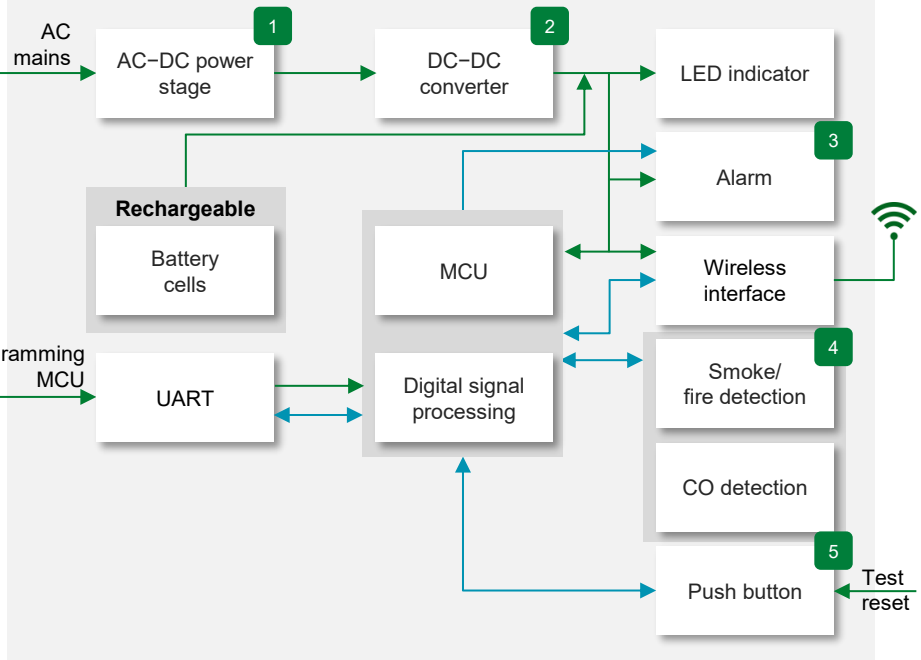
Building solutions .....



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Click the product series in the table below for more info

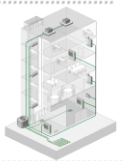
Smoke and heat alarm functional block diagram



	Technology	Function in Application	Series
1	Fuse	Protects power stage from overcurrent events	875, 263, 373, 392
	MOV	Helps protect power unit from voltage surges and lightning events on AC lines	LA, Xtreme
2	TVS Diode	Protects sensitive electronic components from voltage transients	SMCJ
3	TRIAC/SCR	Triggers the output alarm	EC103M, LX5
4	NTC	Senses temperature	KW, KT, USUG1000
5	Tactile Switch	Tests and resets the device	KSC, KMT0

Legend:
Power
Data

Building solutions



Littelfuse solutions for fire alarm control panel



1 Power Module
Fuse, MOV, TVS Diode, SIDACtor® + MOV



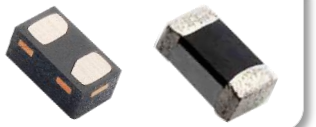
2 I/O Module
TVS Diode



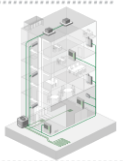
3 C&K® Switches
Tactile, DIP, Slide



4 Communication Module
TVS Diode Array, PESD



Building solutions .....



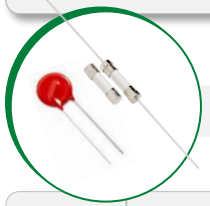
Fire alarm control panel

Ensuring reliable operation under electrical stress

Power input and system continuity

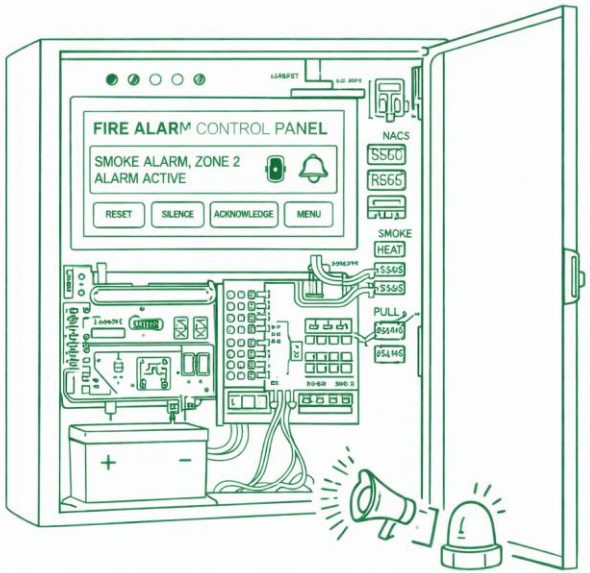
- Powered from AC mains
- Must remain operational during:
  - Surges
  - Faults
  - Brownouts

Power disturbances must not disable life-safety systems.

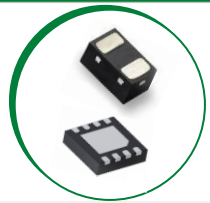


AC mains protection

Fuses	▪ Voltage rating: 250–600 VAC ▪ Current rating: 0.5 to 20 A ▪ Interrupt rating: >10 kA ▪ Temperature: –40 to 125 ºC
MOV/ TMOV	▪ 150 to 320 VAC MCOV ▪ Up to 20 kA surge (8/20 µs) ▪ Thermally protected ▪ UL1449 compliant



Load switching and signal interfaces

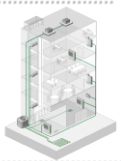


Enabling safe switching and reliable signal interfaces

TVS Diode Array	▪ ESD protection ▪ I/O protection ▪ ±5–±15 V signal line ▪ 400-1500 V peak pulse power

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Expertise Applied | Answers Delivered

Building solutions .....

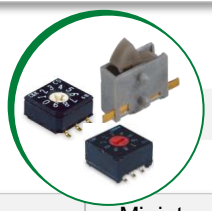


Fire alarm control panel

Ensuring reliable operation under electrical stress

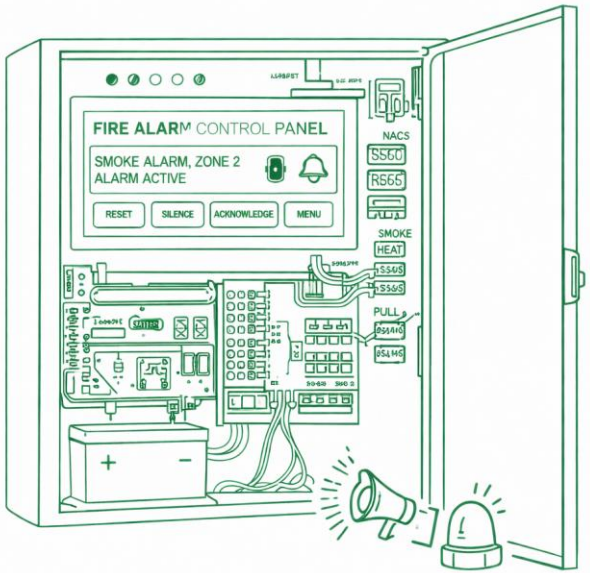
User interface

- Parameter configuration
- Communication options
- Mode selection
- Power control



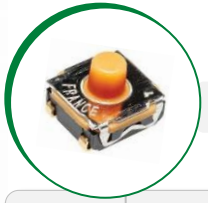
User interface

C&K® DIP Switch	▪ Miniature switches with robust metal casing ▪ Configurable ▪ Thru-hole & SMD versions ▪ IP54
C&K® Slide Switch	▪ Thru-hole & SMD versions ▪ Variety of actuators & terminations ▪ Epoxy terminal-seal compatible ▪ Customizable



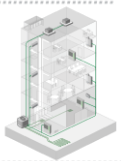
Test & Reset button

- High mechanical life
- Reliable actuation over years



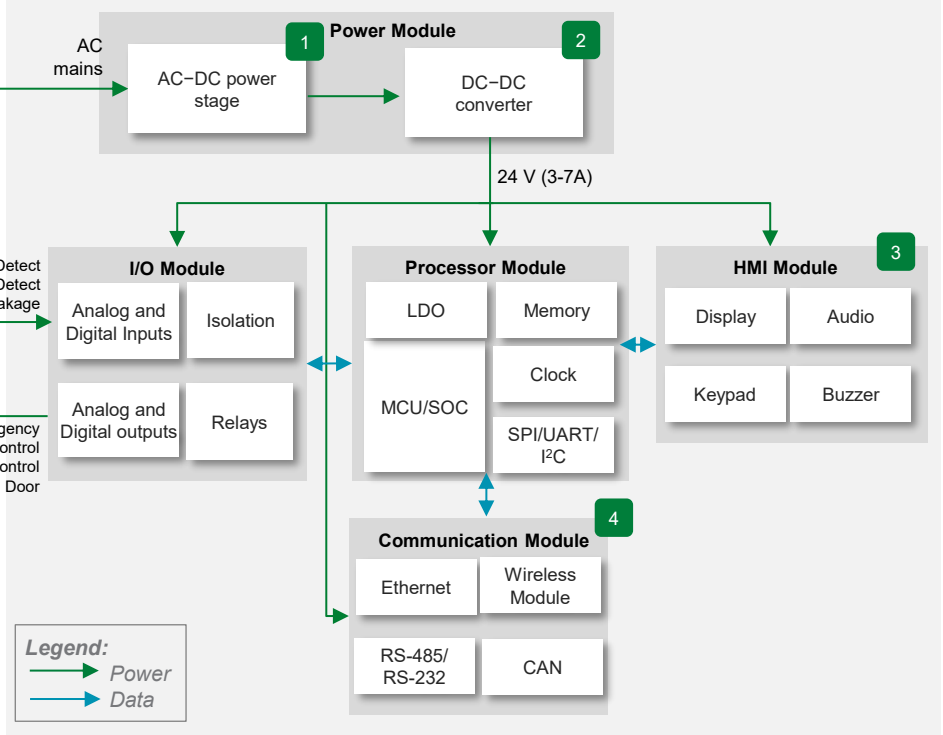
Test & Reset

C&K® Tactile Switch	▪ Ultra-low current consumption ▪ Operating life (1M cycles) ▪ IEC 60068-2-42 qualified ▪ Rugged sealing & resistance to corrosion



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Fire alarm control panel functional block diagram



	Technology	Function in Application	Series
1	Fuse	AC mains input protection (overcurrent + surge)	875, 807, 373
	MOV		Ultra MOV, C-III, TMOV
	SIDACtor® + MOV		Pxxx0ME + V10E300P
2	TVS Diode	Protects 24 V distribution and downstream rails from transients, inductive kick, hot-plug spikes	SMCJ, SMDJ, SMF
3	C&K Switch	Various functions (Keypad, Reset, power, and alarm silence)	KSC, KMT0 SDA, TDA, RTE, JS, 1000,L
4	TVS Diode Array	Protects ICs from ESD	SP3213
		USB2.0/3.0	SP3400, SP0201B
		Ethernet/PROFINET	SP2525NUTG, SP3025-04HTG
		RS232/RS485	SM15/SP712



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Security cameras and video doorbells

Littelfuse solutions for wired security cameras



1 Memory
TVS Diode Array



3 Power over Ethernet
Fuse, PPTC, TVS Diode Array



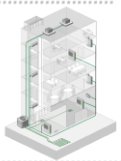
2 DC power input
Fuse, PPTC, TVS Diode



4 Power adapter
Fuse, MOV, TVS Diode



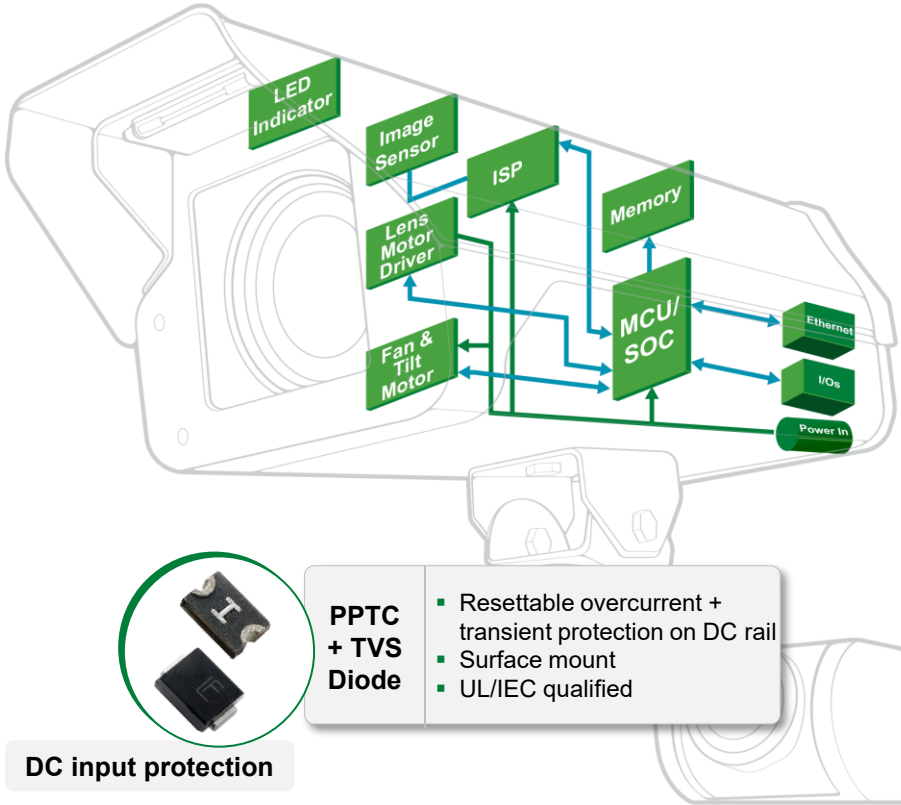
Building solutions .....



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Security cameras: power, signal, and motor protection

Ensuring continuous operation, image integrity, and reliable control under electrical stress



Key system functions	Critical electrical risks
▪ Image capture and processing ▪ Motor control (tilt/zoom) ▪ PoE/Ethernet or DC power input ▪ High-speed data ▪ Memory and storage	▪ ESD on high-speed interfaces ▪ DC rail faults affecting image sensors and MCUs ▪ Inductive stress from motors ▪ System resets due to signal integrity issues

PPTC + TVS Diode

- Resettable overcurrent + transient protection on DC rail
- Surface mount
- UL/IEC qualified

DC input protection

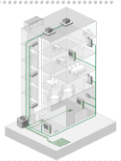


TVS Diode Array

- ESD/transient protection
- Multiple rail-to-rail protections
- Low capacitance
- Small footprint (0201)
- Low leakage current

Signal and data protection

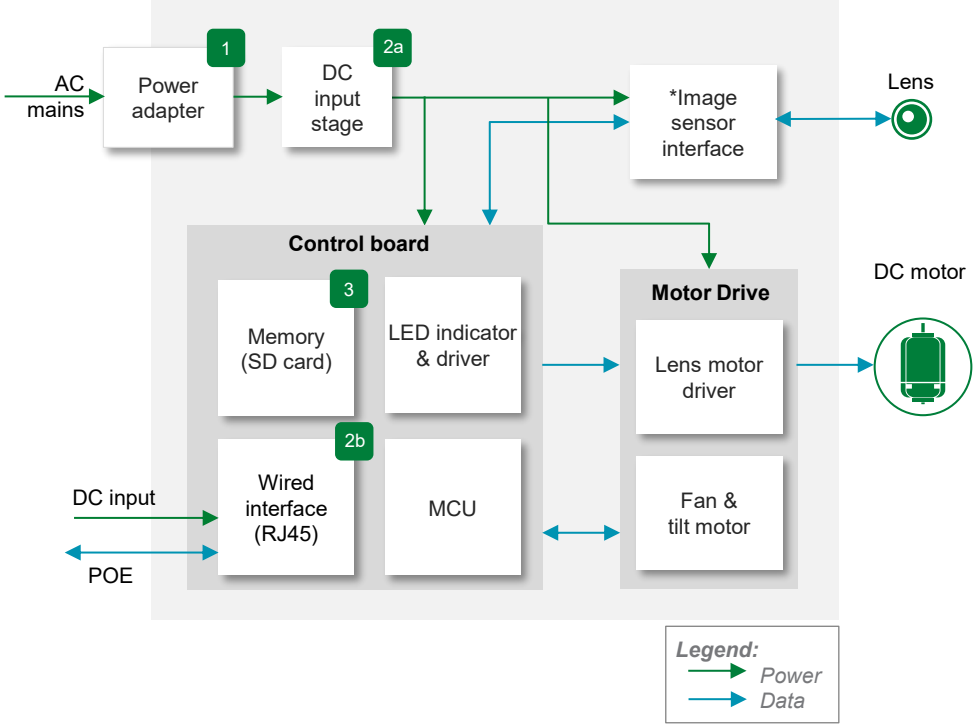
Building solutions .....



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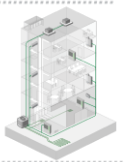
Click on the product series in the table below for more info

Wired security camera functional block diagram



	Technology	Function in Application	Series
1	Fuse	Protects the power stage from overcurrent events	875, 807, 373
	MOV	Protects power units from voltage transients and lightning	TMOV*, LA, UltraMOV
	TVS Diode	Protects power units from voltage transients	P6KE, P6SMB
2a	Fuse, PolySwitch® Resettable Device	Protects the power stage from overcurrent events	461, 449, picoSMD
	TVS Diode	Protects sensitive electronic parts in the power stage from voltage transients	5.0SMDJ/ 5.0SMDJ-FB
2b	Fuse, PolySwitch® Resettable Device	Protects the power stage from overcurrent events	461, 449, picoSMD
	TVS Diode Array	Protects sensitive electronic parts from voltage transients	SRV05-4HTG, SP0504SHTG
3	TVS Diode Array	Protects memory cards from user-induced ESD event	SP1006

* *TMOV is the recommended solution to comply with the new IEC 62368-1 standard*



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Littelfuse solutions for wired doorbell cameras



1 Memory
TVS Diode Array



2 Wireless interface
Polymer ESD Suppression



3 User interface
TVS Diode Array



4 Power supply unit
Fuse, TVS Diode



5 Charging port
Fuse, PPTC, TVS Diode, MLV, NTC



Building solutions .....



Wired doorbell camera: system overview

Input power protection, signal integrity, & reliable chime control



Key system functions	Critical electrical risks
▪ Battery management & charging ▪ Wireless communication ▪ Doorbell chime activation ▪ User interaction (pushbutton/audio)	▪ Battery charging (USB protection) ▪ ESD on pushbutton, microphone, & antenna ▪ Chime switching reliability under load



PPTC + TVS Diode

- Protects from high discharge currents & voltage transients
- SMD package
- IEC compliant

Battery protection



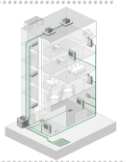
TVS Diode Array + Polymer ESD

- Protects memory, Wi-Fi chipset against ESD events
- Low profile (0201)
- Low leakage current
- Ultra-low capacitance

Signal & interface protection

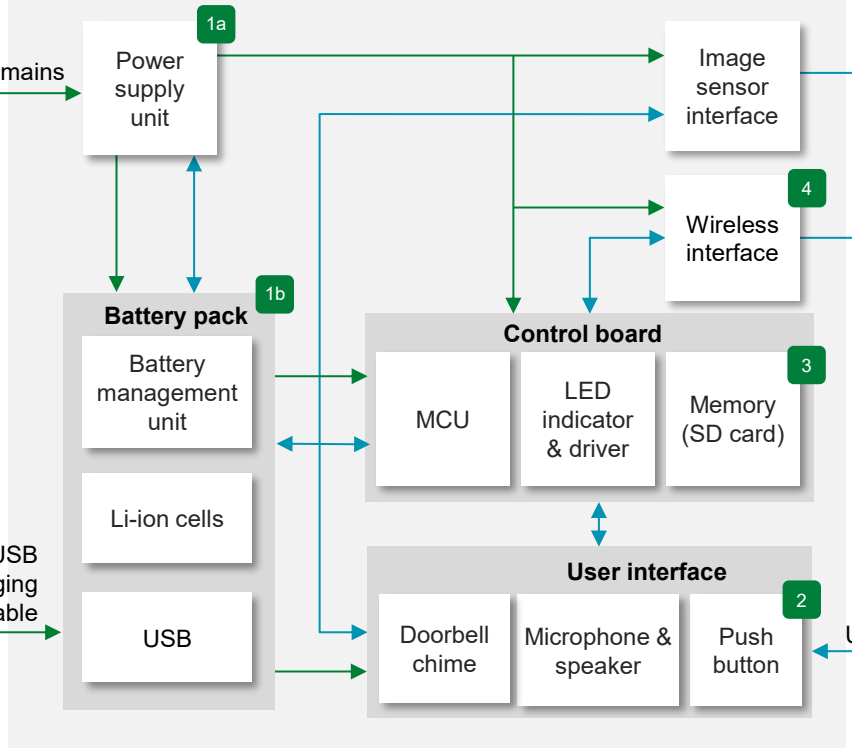
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Building solutions .....



Click on the product series in the table below for more info

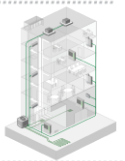
Wired doorbell camera functional block diagram



	Technology	Function in Application	Series
1a	Fuse	Protects the power stage from overcurrent events	443, 449
	TVS Diode	Protects sensitive electronic parts from voltage transients	4.0SMDJ24A
1b*	Fuse, PolySwitch® Resettable Device	Protects from high discharge currents due to external shorts	469, 449, 1206L450SL
	TVS Diode	Protects sensitive electronic parts from voltage transients	SMBJ
	MLV	ESD protection for data lines	MLA
	NTC	Temperature monitoring of battery packs during charging & discharging cycles	KC
2	TVS Diode Array	Protects memory card from user-induced ESD events	SP1006
4	TVS Diode Array	Protects memory cards from user-induced ESD events	SP1006
5	Polymer ESD Suppressor	Protects the Wi-Fi chipset from user-induced ESD events	PGB10603, PGB10402

* *In some applications, a micro-USB port is provided for charging removable Li-Ion batteries. The rechargeable battery is built in and gets power from the main power stage*

Building solutions

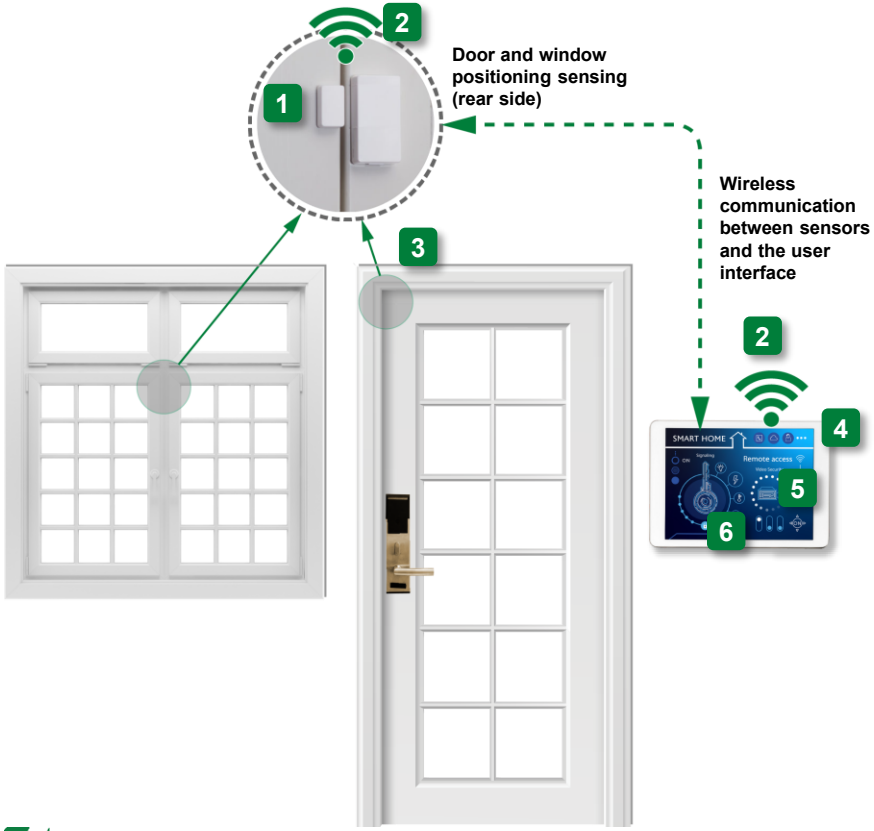




Smart Access Control

Smart Locks + Door/Window Sensors

Littelfuse solutions for wireless door/window sensors with a control panel



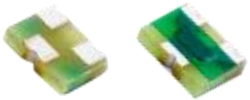
1 Position sensing
Reed Switch, Magnetic Actuator, TMR



4 Button input
Tactile Switch



2 Wireless communication
Polymer ESD Suppressor



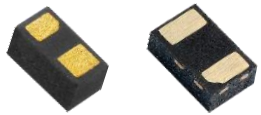
5 Input protection
Protection IC (eFuse), TVS Diode



3 Tamper detection
Detect Switch



6 User interface
TVS Diode Array



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Silent, reliable switching for smart access control

Smart Locks

- User authentication
- Motorized locking mechanism
- Wireless communication

Littelfuse enables:

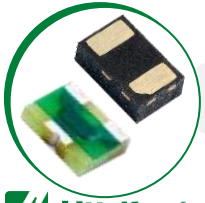
- ESD protection
- Switches for reset/user authentication
- Protection for motor drive interface



Reed Switches
(Simple open/close detection)



TMR Switch
(Position sensing)



TVS Diode & Polymer ESD
(ESD protection)

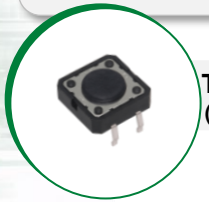


Door/Window Sensors

- Open/close detection
- Forced entry detection
- Tamper detection

Littelfuse enables:

- Stable magnetic sensing over product lifetime for accurate detection
- Detects cover removal or forced separation
- Mechanical tamper sensing



Tactile switch
(User interface)



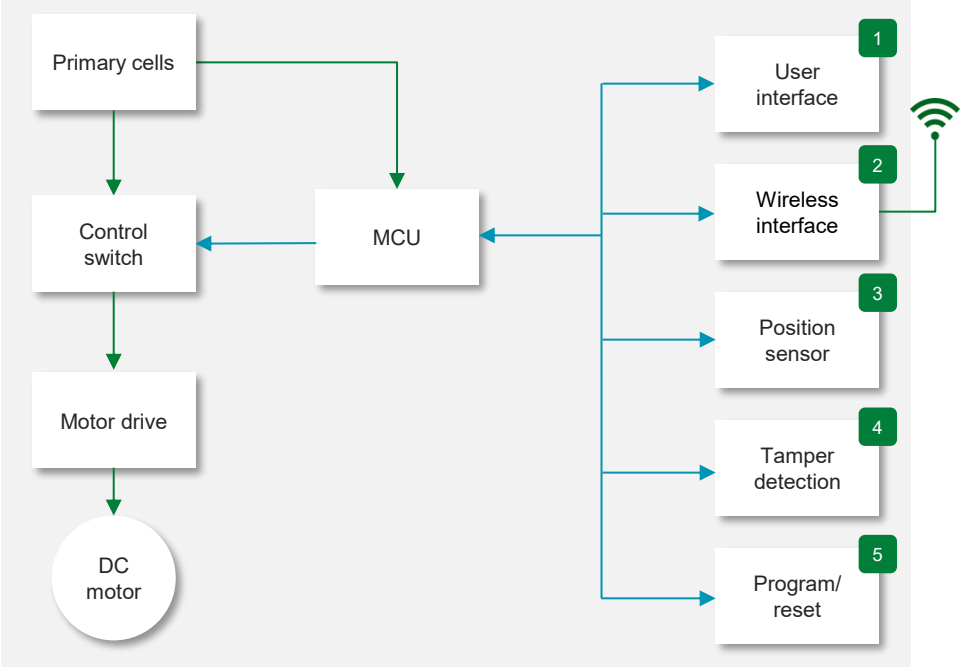
Detect Switch
(Mechanical tampering)



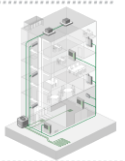
Building solutions .....

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Smart lock block diagram



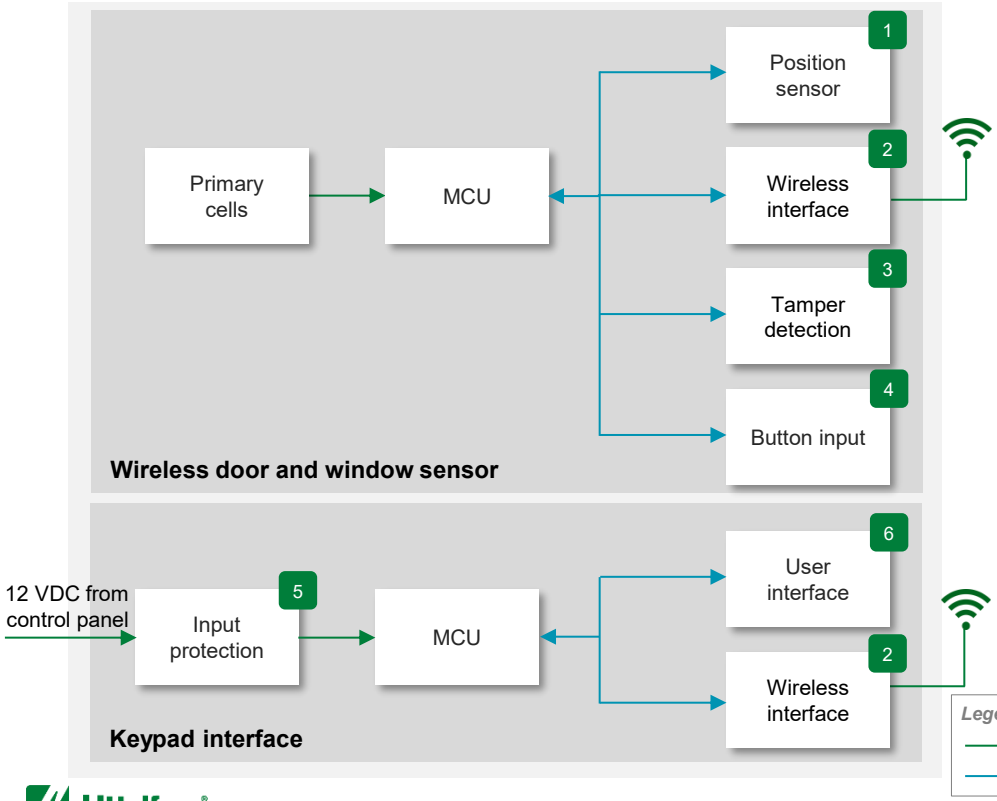
	Technology	Function in Application	Product series
1	TVS Diode Array	Protects touchscreen ICs from user-induced ESD events	SC1205-01UTG, SP1233
2*	Polymer ESD Suppressor	Protects the Wi-Fi chipset from user-induced ESD events	PGB10603, PGB10402
3	Reed Switch, Magnetic Actuator	Detects door closure prior to engaging the deadbolt	MDSM-10, MITI-7, H-36
	TMR	Detects the position of the door handle	LF32115TMR
4	Reed Switch	Detects magnetic tampering	59166
	Detect Switch	Detects physical tampering of lock housing	ZMA, FDSD
5	Tactile or Slide Switch	Button input for programming and reset	KSC, PTS, KMR2, JS



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Click the product series in the table below for more info

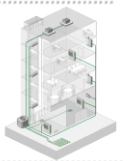
Wireless door/window sensors with keypad



	Technology	Function in Application	Product series
1	Reed Sensor, Magnetic Actuator	Open/closed proximity detection of the window or door	MDSM-10, MITI-7, 59177, 59170, H-36
	TMR		LF21215TMR
2*	Polymer ESD Suppressor	Protects the Wi-Fi chipset from user-induced ESD events	PGB10603, PGB10402
3	Detect Switch	Detects physical tampering of sensor housing	ATS, FDSD
4	Tactile Switch	Button input for programming or reset	KSC, PTS
5	Protection IC (eFuse)	Provides both overcurrent and overvoltage protection	LS1205EVD33
	TVS Diode	Protects sensitive electronic parts in the power stage from voltage transients	SMDJ
6	TVS Diode Array	Protects touchscreen ICs from user-induced ESD events	SC1205-01UTG, SP1233

* *Recommended for compact designs, where clearance between the antenna and the casing is < 2 mm*

Building solutions



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Smart Thermostat

Protection, sensing, and
connectivity for intelligent HVAC control

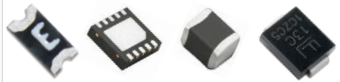
Littelfuse solutions for smart thermostats



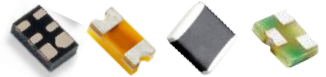
1 24 V input protection
Fuse, PPTC, TVS Diode



2 Battery protection
PPTC, Protection IC,
MLV, TVS Diode



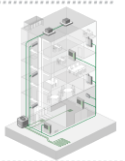
3 Communication interfaces
TVS Diode Array, Polymer ESD,
MLV, TVS Diode



4 Sensors and switches
Tactile Switch, Slide Switch,
NTC, PIR Sensor



Building solutions .....



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Smart thermostat systems

Protection, sensing, and connectivity for intelligent HVAC control

24 V HVAC input protection

- Protects against surge and miswiring
- Handles electric stress from HVAC systems



24 VAC Input Protection

Fuse OR PPTC	▪ Overcurrent protection ▪ SMD form factor ▪ UL/IEC qualified ▪ Resettable option available (PPTC)
TVS Diode	▪ Voltage transient protection ▪ Compact form factor ▪ Excellent clamping capability



Battery Protection

- Prevents overcurrent and fault conditions
- Transient protection



Battery Protection

eFuse	▪ Integrated solution with – current limit protection – thermal shutdown – internal soft start ▪ 2.7 ~ 24 V, 5 A ▪ Low power dissipation



Smart thermostat systems

Protection, sensing, & connectivity for intelligent HVAC control

User interface

- Temperature selection
- Mode selection
- Reset, on/off



User interface

C&K® Tactile Switch	▪ SMD version ▪ Rugged sealing ▪ Waterproof and dust proof ▪ IP67 ▪ Operating life (10M cycles)
C&K® Slide Switch	▪ Temperature adjustments ▪ Low profile ▪ SMD/Thru-hole versions ▪ Long life cycle ▪ Up to DP3T



ESD Protection

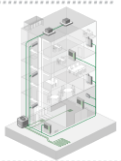
- Wi-Fi radios
- Bluetooth™
- Touch screen/user interface/display
- RF antenna



Enabling safe switching and reliable signal interfaces

TVS Diode Array	▪ ESD protection ▪ I/O protection ▪ ±5 to ±15 V signal line ▪ 400–1500V peak pulse power

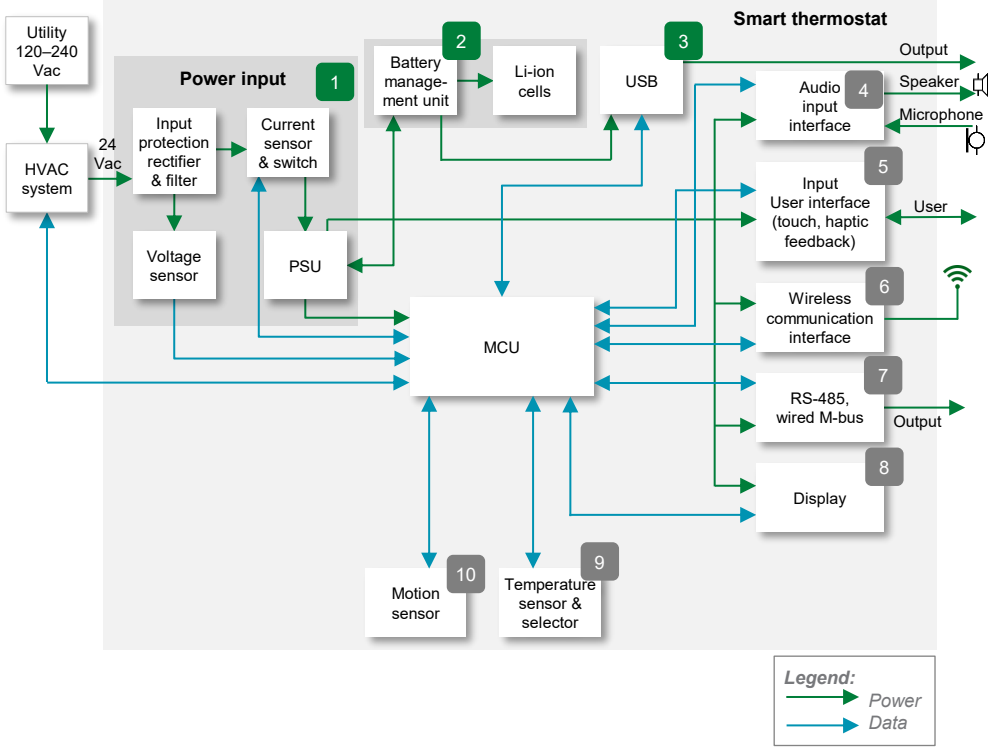
Building solutions



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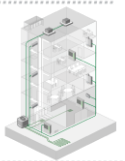
Click the product series in the table below for more info

Smart thermostat system

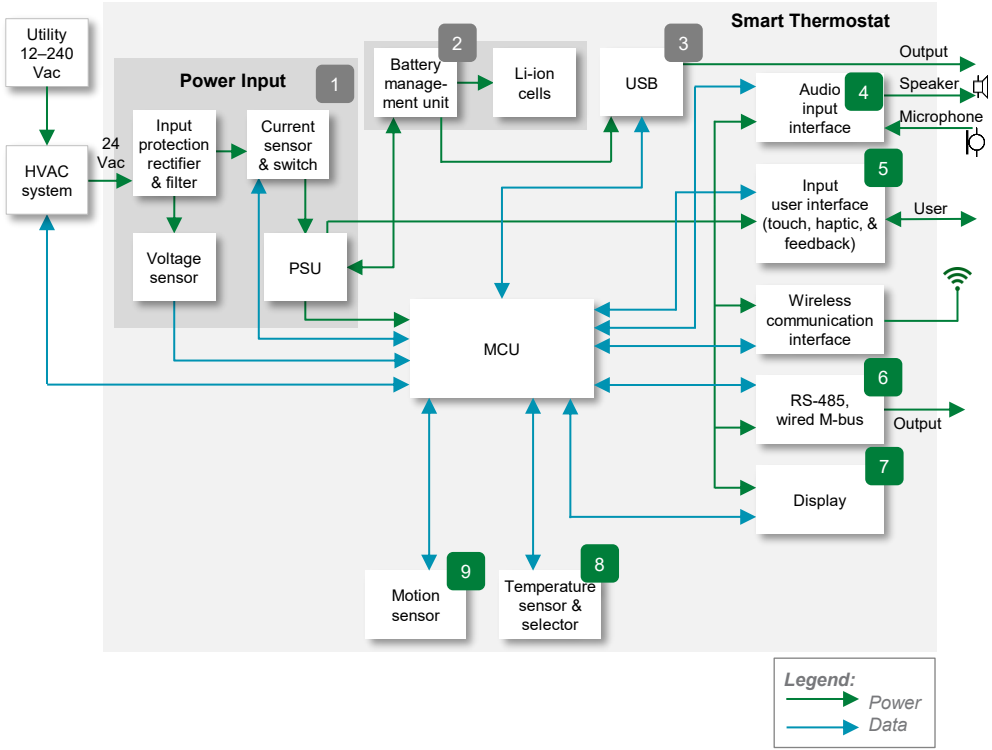


Technology		Function in Application	Series
1	Fuse	Protects the battery and downstream components from inrush current	437, 468
	PolySwitch® Resettable Device	Protects the system from overtemperature and overcurrent events; prevents nuisance opening of the fuse	2920L
	TVS Diode	Protects sensitive electronic component from voltage transients	SACB, SMAJ, SMF3.3
2	MLV, TVS Diode	Protects sensitive electronic component from voltage transients	MLA, SMF
	PolySwitch® Resettable Device	Protects battery from overcurrent and overtemperature events	1812L
	Protection IC (eFuse)	Provides reverse current blocking for power mux	LS2405IDD23
3	TVS Diode Array	Protects against ESD on high-speed data lines	SP0201U, SP0201B
	PolySwitch® Resettable Device	Protects downstream components from overcurrent and overtemperature events	0402L
	Protection IC (eFuse)	Provides overcurrent, overvoltage, and overtemperature protection	LS0505EVD22, LS0504EVT233

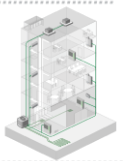
Building solutions



Smart thermostat system

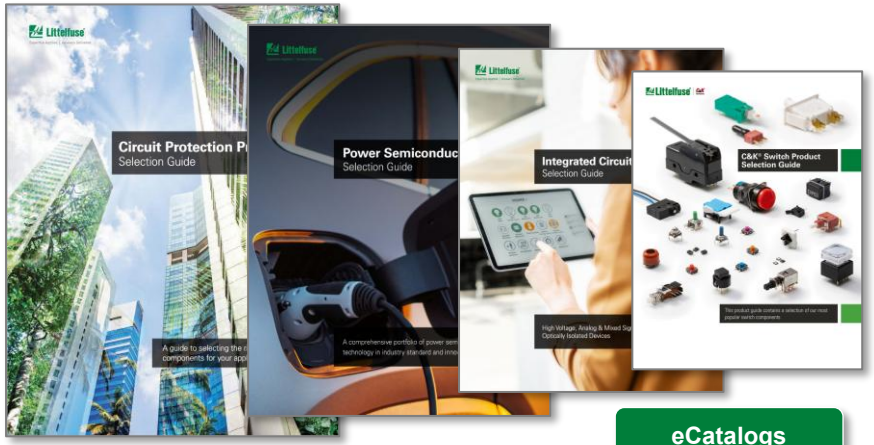


	Technology	Function in Application	Series
4	TVS Diode	Protects sensitive electronic component from voltage transients	SACB, SMAJ, SMBJ
5	TVS Diode Array	Protects downstream ICs from ESD events	SP0402U, SP0402B
	Polymer ESD	Protects downstream ICs from ESD events	PESD
	Tactile Switch	Button inputs for selecting settings	KSC
6	TVS Diode Array	Protects sensitive electronic components from voltage transients	SP712
7	MLV, TVS Diode	Protects sensitive electronic components from voltage transients	MLA, SMF
8	NTC	Detects ambient temperature	RB, DO-35
	Slide Switch	User-selected temperature adjustment	JS



Additional information can be found at Littelfuse.com

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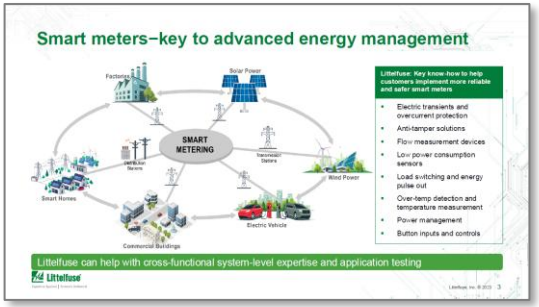
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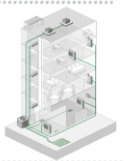


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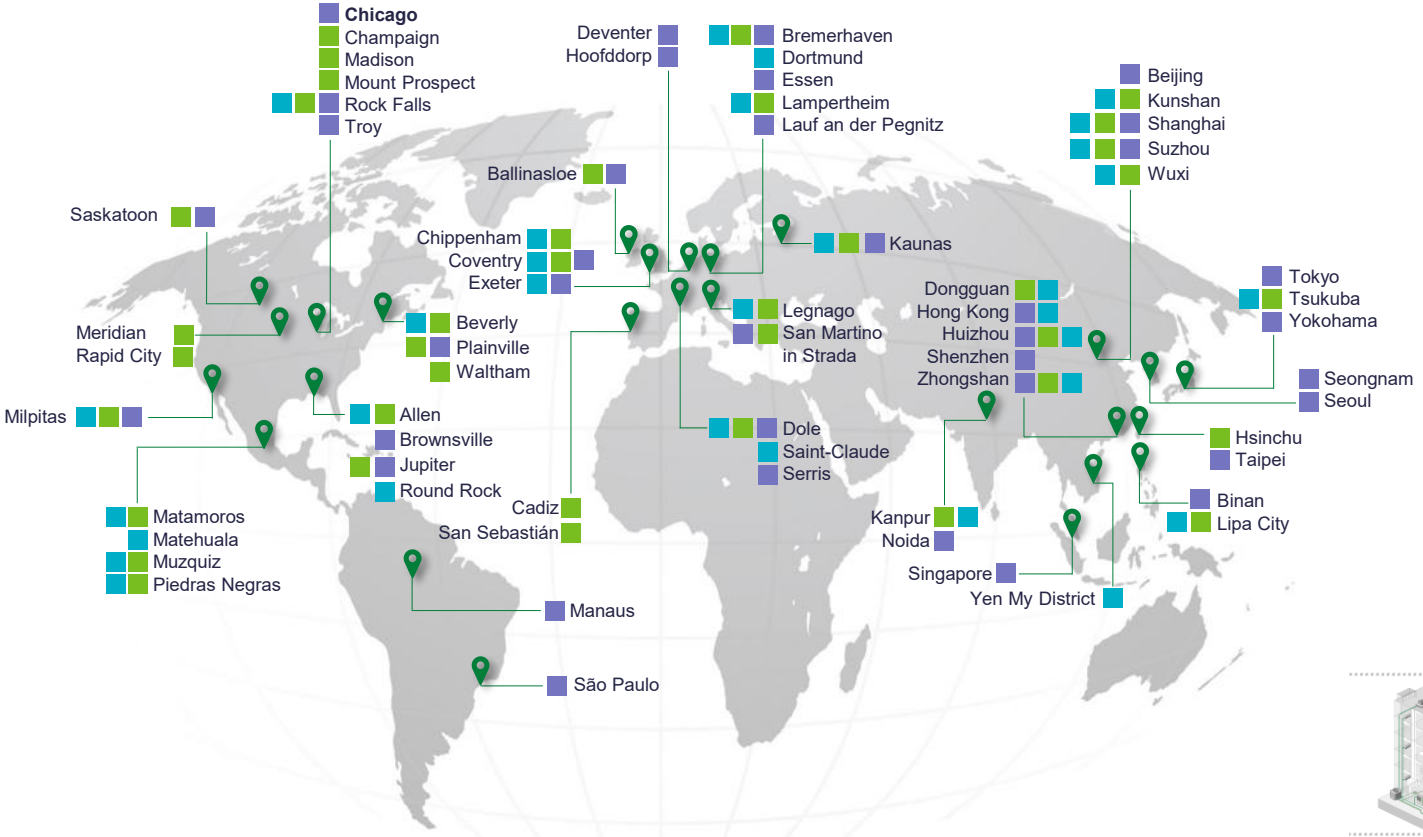


Building solutions .....



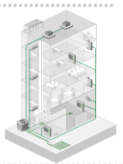
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Local resources supporting our global customers



Legend

- ***Sales***
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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

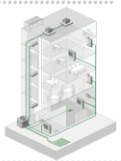
We help customers account for requirements set by global regulatory authorities in the design process.

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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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