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## Point-of-Sale and Mobile Point-of-Sale equipment solutions

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Consumer electronics



Mobile and wearables

# Point-of-sale (POS) terminals are starting to mimic other commercial & consumer portable battery-powered devices

## Portable medical devices



Blood pressure monitor



Insulin pump

## Portable communication equipment



Military radio



Two-way Radio

## Portable consumer electronics



Tablets



Smartphones



Point-of-Sale (POS) terminal

## Logistics equipment



Hand-held computer



Wireless barcode, Q-R code scanner

# Global POS terminal shipments show strong growth

## Market trends and drivers

Global POS terminal unit shipments are expected to increase from ~69M units in 2017 to ~144M units in 2022 at a CAGR of 16%.<sup>1</sup>

Mobile point-of-sale (mPOS) terminal unit shipments are expected to increase from 18.3M units in 2017 to 40.7M units by 2022 at a CAGR of 17.3%.<sup>1</sup>

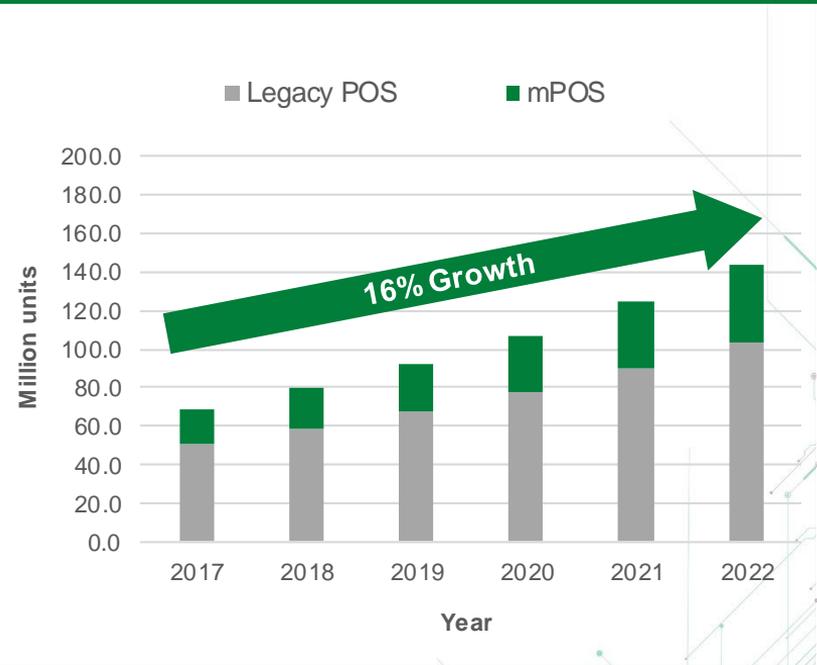
POS terminals are rapidly adopting cellular connectivity; 26M units (38%) of global POS terminals were shipped with option of cellular connection in 2017.<sup>2</sup>

The APAC is experiencing its highest POS terminal growth rate at 7.7% (2018–2024), with China leading. The North American market is expected to grow steadily at ~5% (2018–2024), replacing traditional POS terminals with mPOS terminals that use the latest features, such as Bluetooth, USB-C, NFC, and QR code readers.<sup>3</sup>

mPOS terminals have increasingly adopted USB-C ports for fast charging and data synchronization. Thermal protection is recommended.

mPOS terminals are utilizing Li-ion batteries with increasing capacity (similar to mobile consumer devices) due to larger touch screens and other features such as camera for scanning, cellular connectivity, Wi-Fi, Bluetooth, etc.

## POS terminal growth strong at ~16% CAGR



- Source: 1. [POS terminal unit shipment](#) (Statista, Nov. 2018)  
2. [POS terminals and wireless M2M](#) (Berg insight, July 2018)  
3. [APAC and N.A. POS terminal growth rate](#) (Bloomberg, April 2019)

# Component recommendations for mPOS terminals

## Display and Communication:



- TVS diode array
- TVS diode

## Battery and Charging:



- Fuse
- TVS diode
- setP™\*
- TVS diode array
- PPTC

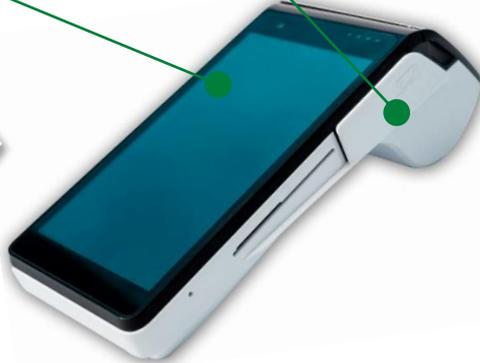
## Power adapter:



- Fuse
- TVS diode
- setP™\*
- TVS diode array
- Rectifier diode



Legacy  
POS



Protect



Control



Sense

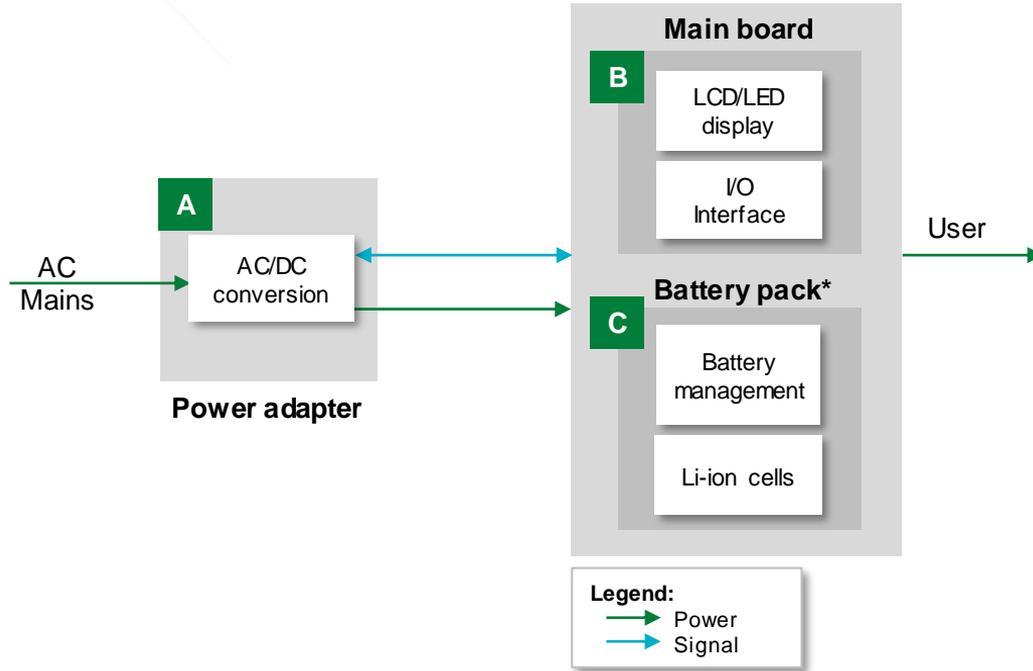
### Acronyms:

PPTC: polymeric positive temperature coefficient

TVS: transient voltage suppressor

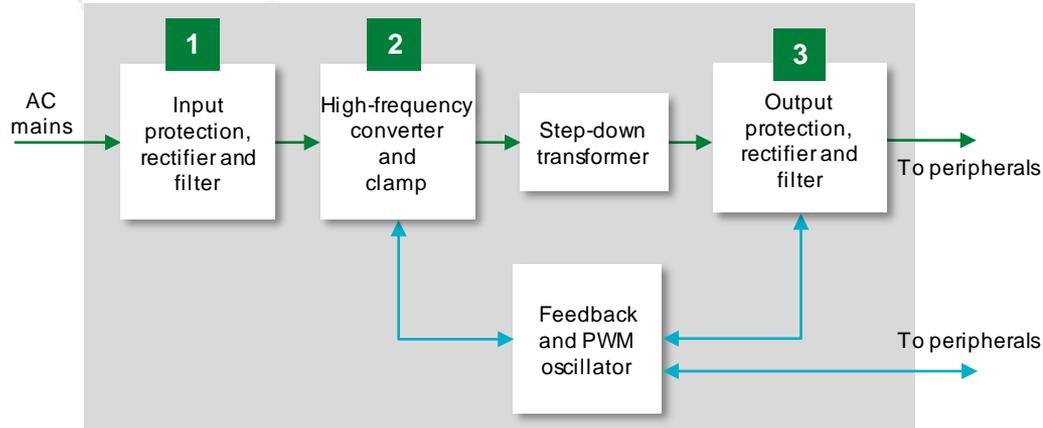
\*For use with a USB type-C adapter

# mPOS terminal system architecture



*\*Some POS terminals have a detachable/replaceable battery pack.*

# Component recommendations for the power adapter



## Legend:

- Power
- Signal



USB POWER ADAPTOR TYPE C

	Technology	Product series
1	Fuse	<a href="#">875, 215, 373</a>
2	TVS diode	<a href="#">P6KE, P6SMB</a>
3	Schottky diode	<a href="#">MBR, DST</a>
	setP™ <sup>1</sup>	<a href="#">SETP0805-100-CC</a>

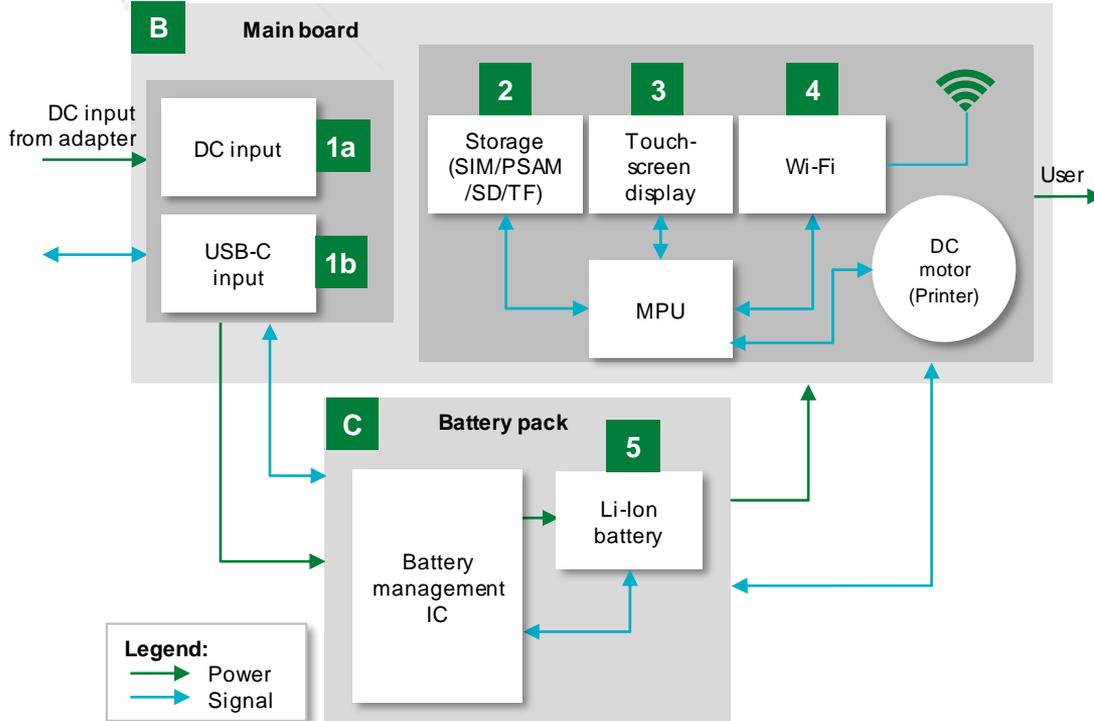
<sup>1</sup>The setP™ solution is recommended for USB type C port protection.

# Power adapter: the benefits and features of Littelfuse components

	Technology	Function in application	Product series	Benefits	Features
1	Fuse	Protects the power stage from overcurrent events	<a href="#">875</a> , <a href="#">215</a> , <a href="#">373</a>	Reduces customer qualification time by complying with regulatory safety standards, such as UL/IEC	Compliant with UL/IEC standards; low internal resistance; shock safe; vibration resistant
2	TVS diode	Protects the power unit from voltage transients that are induced by lightning and voltage transient events	<a href="#">P6KE</a> , <a href="#">P6SMB</a>	Improves system reliability by protecting components from transients on power lines	600W peak pulse capability; fast response time (<1 ps); compatible with the high reflow temperature profile (260°C, 40s)
3	Schottky diode	Provides rectification and blocking in power supply units	<a href="#">MBR</a> , <a href="#">DST</a>	Improves power supply efficiency	Low forward voltage drop; high-frequency operation; high junction temperature capability
	setP™1	Provides an indication signal to help protect USB-C plugs and receptacles from overheating	<a href="#">SETP0805-100-CC</a>	Helps improve reliability and user experience by reducing the risk of thermal damage; simple integration into existing USB-C systems	Fast response to thermal events; small form factor; zero IR loss contribution; protects systems with a 100W or higher power rating

1. The setP™ solution is recommended for USB type C port protection.

# B Component recommendations for motherboard C and battery pack of mPOS or POS equipment



	Technology	Product series
1a	Fuse	<a href="#">435</a> , <a href="#">438GT</a> , <a href="#">0402SFF</a>
	TVS diode	<a href="#">SMCJ</a> , <a href="#">SME</a> , <a href="#">SMBJ</a>
1b	setP™	<a href="#">SETP0805-100-CC</a>
	TVS diode array	<a href="#">SESD1004Q 4UG</a> , <a href="#">SP3522</a> , <a href="#">SPHVxx</a>
2	TVS diode	<a href="#">SMAJ</a> , <a href="#">SMF</a>
3	TVS diode array	<a href="#">SP1012</a>
4	PESD	<a href="#">PGB10603</a>
5	PPTC	<a href="#">LoRho SMD</a> , <a href="#">MGP</a> , <a href="#">LR4</a>

### Acronyms:

PPTC: polymeric positive temperature coefficient

TVS: transient voltage suppressor

MPU: microprocessor unit

PESD: polymeric electrostatic discharge suppressor

### Notes:

1a: DC jack

1b: The USB-C port; setP™ solution is suitable for USB type C port protection (generally, only one DC-input option is implemented in a given unit).

# Battery pack: component benefits and features

	Technology	Function in application	Product series	Benefits	Features
1a	Fuse	Protects the power stage from overcurrent events	<a href="#">435</a> , <a href="#">438GT</a> , <a href="#">0402SFF</a>	Reduces customer qualification time by complying with UL/IEC; compact design	Surface mountable; compatible with the lead-free solder process, per IEC standards
	TVS Diode	Protects sensitive electronic components from voltage transients	<a href="#">SMF</a> , <a href="#">SMBJ</a> or <a href="#">SMCJ</a>	Improves system reliability by clamping the voltage at safe levels during transients	1500W peak pulse capability; compatible with the lead-free solder reflow temperature profile
1b	setP™	Thermal indicator to protect USB-C plugs and receptacles from overheating	<a href="#">SETP0805-100-CC</a>	Helps improve reliability and user experience by reducing the risk of thermal damage; simple integration into existing USB-C systems	Fast response to thermal events; small form factor; zero IR loss contribution; protects systems with a 100W or higher power rating
	TVS diode array	Protects the USB-C chipset from ESD events on data lines  Helps protect equipment from user-induced ESD on the power line	<a href="#">SESD1004Q 4UG</a> , <a href="#">SP3522</a>  <a href="#">SPHVxx</a>	Compact design; reduces assembly time  Improves system reliability by clamping the voltage at safe levels during transients on power lines	Low capacitance; complies with IEC standards; small form factor  Low clamping voltage; low leakage current; bidirectional
2	TVS Diode	Protects sensitive electronic components from voltage transients	<a href="#">SMAJ</a> , <a href="#">SMF</a>	Enables compact design; improves system reliability by protecting downstream components via clamping the voltage at safe levels during transients on power lines	400W peak pulse capability; compatible with the lead-free solder reflow temperature profile
3	TVS diode array	Protects touchscreen ICs from user-induced ESD events	<a href="#">SP1012</a>	Helps comply with IEC standards (61000-4-2: ±15kV contact, ±3kV air; 61000-4-4: 40A (5/50ns); enables compact design; retains high signal integrity	Low dynamic resistance; five-channel protection in a small 0402 footprint; maintains high signal integrity
4	PESD	Protects the Wi-Fi chipset from user-induced ESD events	<a href="#">PGB10603</a>	Retains RF signal integrity; enables compact design; improves system reliability by quickly clamping the voltage to safe levels during ESD	Ultra-low capacitance; compact form factor; low leakage current; fast response time
5	PPTC	Protects the Li-ion battery from overcurrent events	<a href="#">LoRho SMD</a> , <a href="#">MGE</a> , <a href="#">LR4</a>	Low resistance improves efficiency, increases safety by protecting the battery, and reduces customer qualification time by complying with UL/IEC	Ultra-low resistance; compact design with a wide range of form factors; compatible with high-volume electronics assembly

# Component recommendations for the POS printer

## Display and Communication:

- TVS diode array
- TVS diode
- PESD

## Power supply:

- Fuse
- MOV
- TVS diode
- Rectifier diode

### Acronyms:

MOV: *metal oxide varistor*

TVS: *transient voltage suppressor*

PESD: *polymeric electrostatic discharge*



Protect

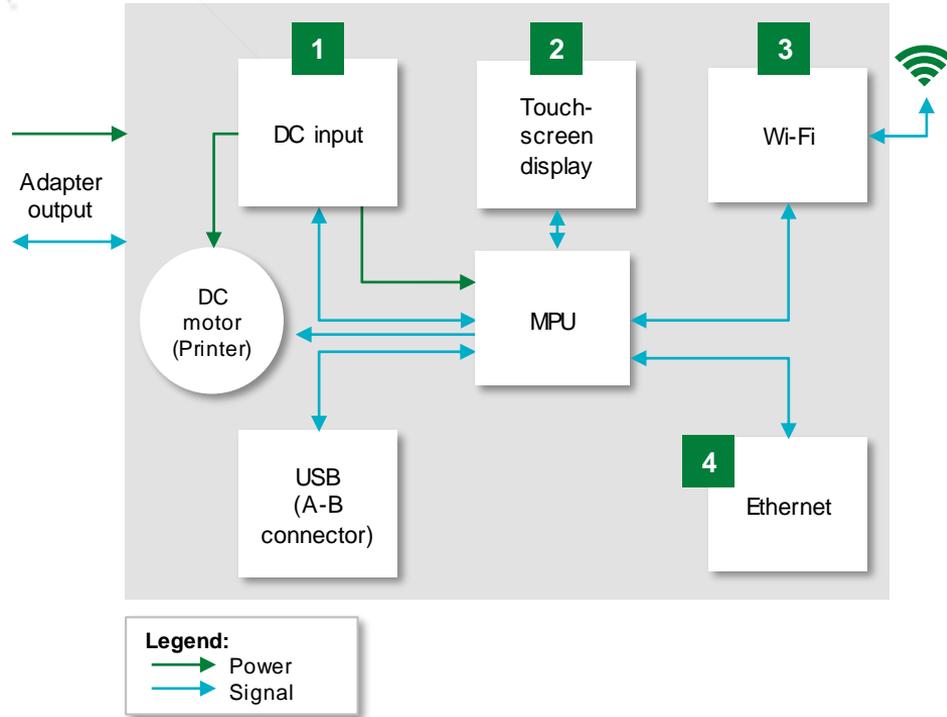


Control



Sense

# Component recommendations for the POS printer's motherboard



	Technology	Product series
1	Fuse	<a href="#">435, 438GT, 0402SFF</a>
	TVS Diode	<a href="#">SMCJ</a>
2	TVS diode array	<a href="#">SP1012</a>
3	PESD	<a href="#">PGB10603</a>
4	TVS diode Array	<a href="#">SP2555NUTG</a>

**Acronyms:**

TVS: transient voltage suppressor

PESD: polymeric electrostatic discharge

# POS printer motherboard: component benefits and features

	Technology	Function in application	Product series	Benefits	Features
1	Fuse	Protects the power stage from overcurrent events	<a href="#">435, 438GT, 0402SFF</a>	Reduces customer qualification time by complying with third-party safety standards, such as UL/IEC; SMD form factor allows for a compact design	Surface mountable; compatible with the lead-free solder process, per IEC standards
	TVS Diode	Protects the sensitive electronic component from voltage transients	<a href="#">SMCJ</a>	Improves system reliability by protecting downstream components through clamping the voltage at safe levels during transients on power lines	1500 W peak pulse capability; compatible with the lead-free solder reflow temperature profile
2	TVS diode array	Protects touchscreen ICs from user-induced ESD events	<a href="#">SP1012</a>	Helps comply with IEC standards (61000-4-2: ±15kV contact, ±30kV air; 61000-4-4: 40A (5/50nS); enables a compact design; retains high signal integrity	Low dynamic resistance; five-channel protection in a small 0402 footprint; maintains high signal integrity
3	PESD	Protects the Wi-Fi chipset from user-induced ESD events	<a href="#">PGB10603</a>	Retains RF signal integrity; enables a compact design; improves system reliability by quickly clamping the voltage at safe levels during ESD	Ultra-low capacitance; compact form factor; low leakage current; fast response time
4	TVS diode array	Provides a high level of protection to sensitive electronics from ESD and EFT events	<a href="#">SP2555NUTG</a>	Enables a compact design; reduces assembly time; retains high signal integrity	Complies with IEC standards; low capacitance of 2pF per I/O; maintains high signal integrity

# Compliance and standards for POS terminals

Standard	Title	General Scope	Region
USB-IF	Universal Serial Bus specification	Supports advancement and adoption of Universal Serial Bus technology	Global
IEC/UL 60950-1*	Information technology equipment – Safety	Applicable to mains-powered or battery-powered information technology equipment, with a rated voltage not to exceed 600V	Global
IEC/UL 62368-1	Audio/video, information, and communication technology equipment – Part 1: Safety requirements	Safety of equipment within the field of audio, video, information, and communication technology (rated voltage not to exceed 600V)	Global
IEC 61000-4-2	Testing – Electrostatic Discharge (ESD)	Checks the capability of the equipment to survive repetitive electrical fast transients and bursts	Global
IEC 61000-4-4	Electrical fast transient/burst immunity test	Evaluates the immunity of equipment when subjected to electrical fast transient/bursts on supply, signal, control, and earth ports	Global
IEC/UL 62133-2	Safety requirements for portable sealed secondary lithium cells	Evaluates protection during various battery fault scenarios	Global
UL 1642 UL 2054	Lithium batteries Household and Commercial Batteries	Evaluates protection during various battery fault scenarios	North America
UL 1310 UL 1012	Class II Power Units Power Units other than Class II	Can be used in lieu of IEC/UL 62368-1	North America

\*IEC 62368-1 will replace this standard in Dec. 2020.

# Additional information can be found on [Littelfuse.com](http://Littelfuse.com)

## Circuit Protection Solutions



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## Sensor Solutions



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## setP™ Flyer



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## setP™ Design Guide



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## ESD Protection Design Guide



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## ESD Suppression Design Guide



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## Mobile Battery Solutions



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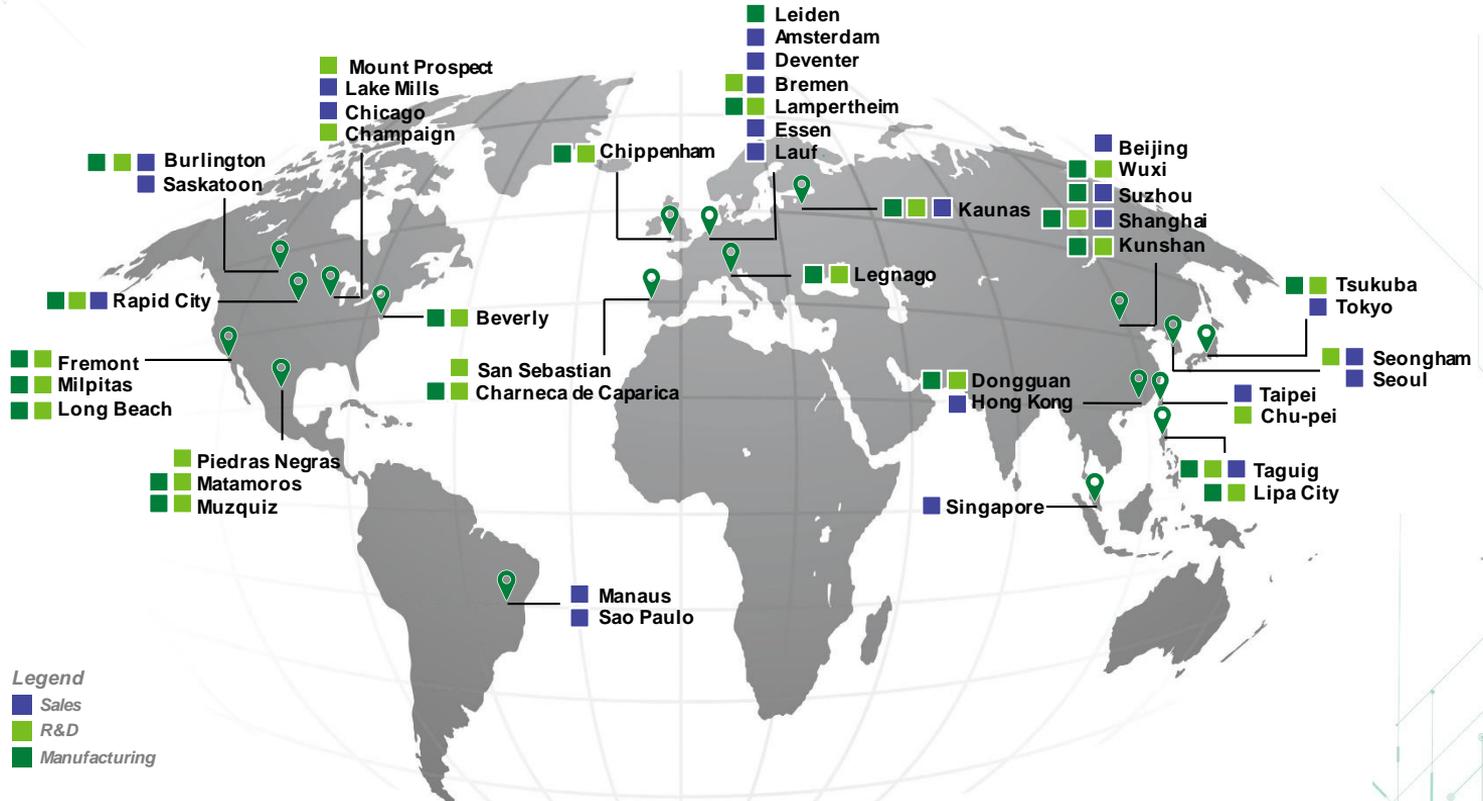
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# Why choose Littelfuse?

- A global leader with a broad product portfolio, covering every aspect of protection, sensing, and control
- Application expertise combined with product designed guidelines to help you determine the best component for your application
- Testing capabilities and assistance to support confirmation of your product selection
- Standards compliance expertise, including product compliance to many standards and approval support
- High-volume manufacturing that is committed to the highest quality standards
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*Legend*

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- R&D
- Manufacturing



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