



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

 Consumer electronics

 **Littelfuse®**
Expertise Applied | Answers Delivered

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



Point-of-Sale (POS) terminal

Portable consumer electronics



Tablets



Smartphones

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%.¹

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%.¹

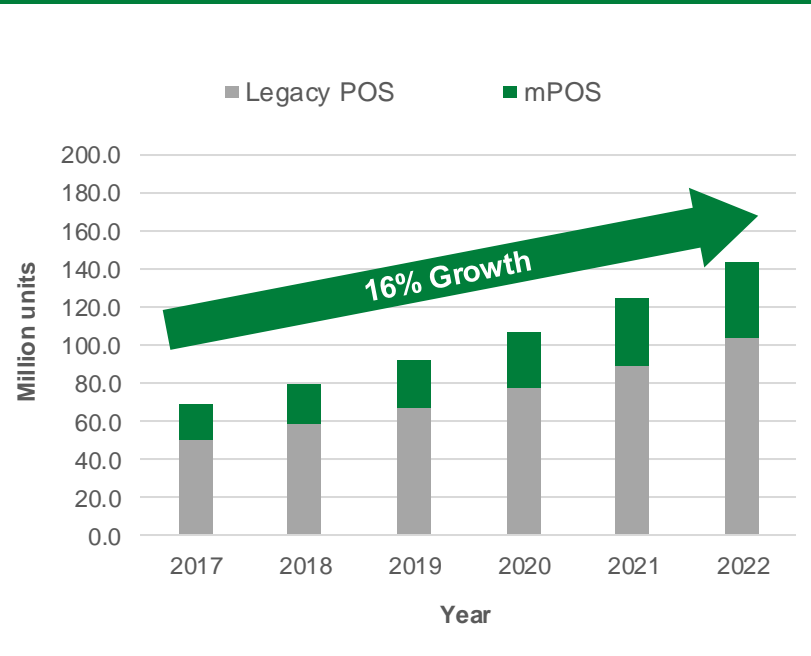
POS terminals are rapidly adopting cellular connectivity; 26M units (38%) of global POS terminals were shipped with option of cellular connection in 2017.²

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.³

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 touchscreens and other features such as camera for scanning, cellular connectivity, Wi-Fi, Bluetooth, etc.

POS terminal growth strong at ~16% CAGR



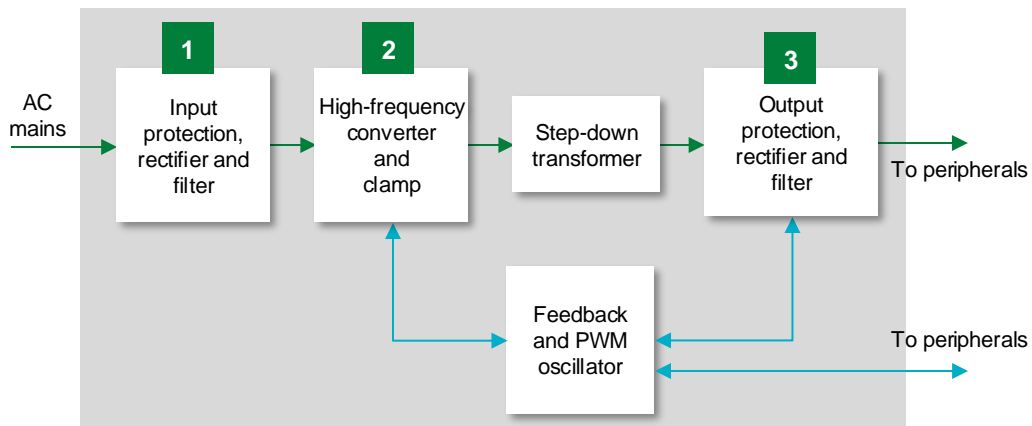
Source: 1. [POS terminal unit shipment](#) (Statista, Nov. 2018)
2. [POS terminals and wireless M2M](#) (Berg insight, July 2018)
3. [APAC and N.A. POS terminal growth rate](#) (Bloomberg, April 2019)

Component recommendations for mPOS terminals

- 1 Display and Communication**
TVS Diode Array, TVS Diode
- 2 Battery**
PPTC, Battery Protector
- 3 Main Board**
Fuse, Temperature Indicator, TVS Diode Array, Polymer ESD
- 4 Power Adapter**
Fuse, TVS Diode, Temperature Indicator, Diode



Component recommendations for the power adapter



Legend:

- Power
- Signal

	Technology	Product series
1	Fuse	875 , 215 , 373
2	TVS diode	P6KE , P6SMB
3	Schottky diode	MBR , DST
	setP™ ¹	SETP0805-100-CC

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



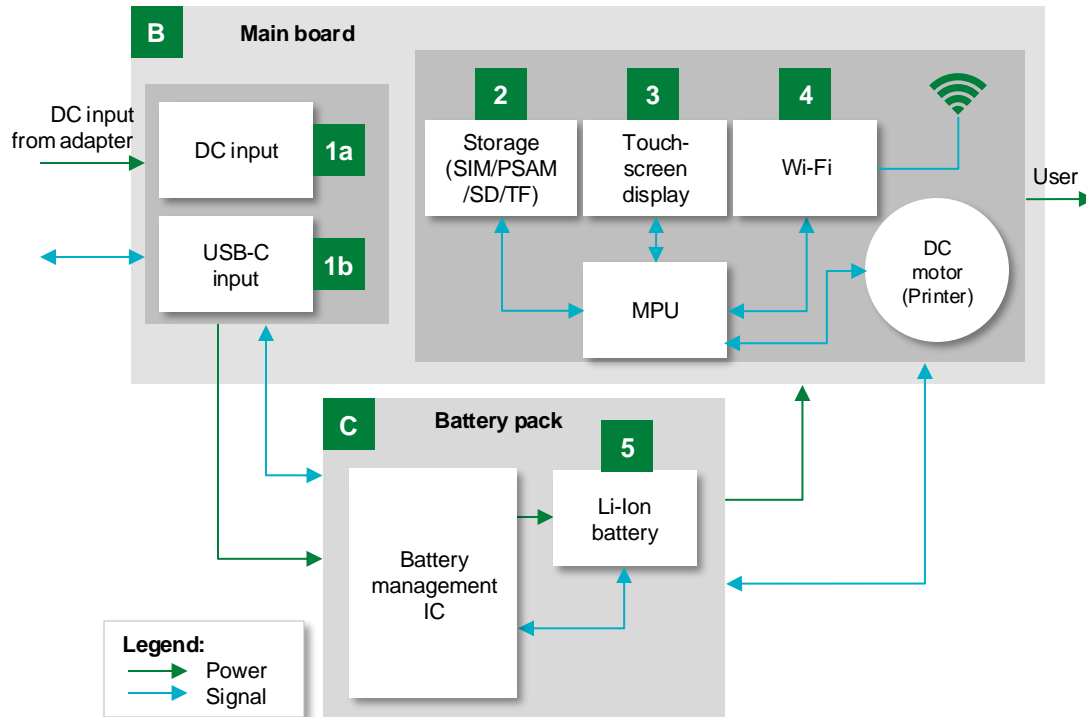
USB POWER ADAPTOR TYPE C

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	875 , 215 , 373	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	P6KE , P6SMB	Improves system reliability by protecting components from transients on power lines	600W peak pulse capability; fast response time (<1ps); compatible with the high reflow temperature profile (260°C, 40s)
3	Schottky diode	Provides rectification and blocking in power supply units	MBR , DST	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	SETP0805-100-CC	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	435 , 438GT , 0402SFF
	TVS diode	SMCJ , SME , SMBJ
1b	setP™	SETP0805-100-CC
	TVS diode array	SESD1004Q 4UG , SP3522 , SPHVxx
2	TVS diode	SMAJ , SMF
3	TVS diode array	SP1012
4	PESD	PGB10603
5	PPTC	Low Rho SMD , LR4
	Battery protectors	ITV

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

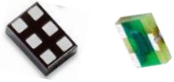
	Technology	Function in application	Product series	Benefits	Features
1a	Fuse	Protects the power stage from overcurrent events	435 , 438GT , 0402SFF	Reduces customer qualification time by complying with UL/IEC; compact design	Surface mountable; compatible with the lead-free solder process, per IEC standards
	TVS Diode	Protects sensitive electronic components from voltage transients	SMCJ , SME , SMBJ	Improves system reliability by clamping the voltage at safe levels during transients	1500 W 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	SETP0805-100-CC	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 100 W or higher power rating
	TVS diode array	Protects the USB-C chipset from ESD events on data lines	SESD1004Q 4UG	Compact design; reduces assembly time	Low capacitance; complies with IEC standards; small form factor
Helps protect equipment from user-induced ESD on the power line		SP3522 , SPHVxx	Improves system reliability by clamping the voltage at safe levels during transients on power lines	Low clamping voltage; low leakage current; bidirectional	
2	TVS Diode	Protects sensitive electronic components from voltage transients	SMAJ , SMF	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	SP1012	Helps comply with IEC standards (61000-4-2: ±15 kV contact, ±3 kV air; 61000-4-4: 40A (5/50 ns); enables compact design	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	PGB10603	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	Low Rho SMD , LR4	Low resistance improves efficiency, increases safety by protecting the battery, and reduces customer qualification time	Ultra-low resistance; compact design with a wide range of form factors; compatible with high-volume electronics assembly
	Battery protectors	Dual overcurrent and overvoltage protection	ITV	Compact design; increases assemble efficiency	Surface mountable; low internal resistance UL and TUV certified

Component recommendations for the POS printer

1

Display & Communication

TVS Diode Array, Polymer ESD



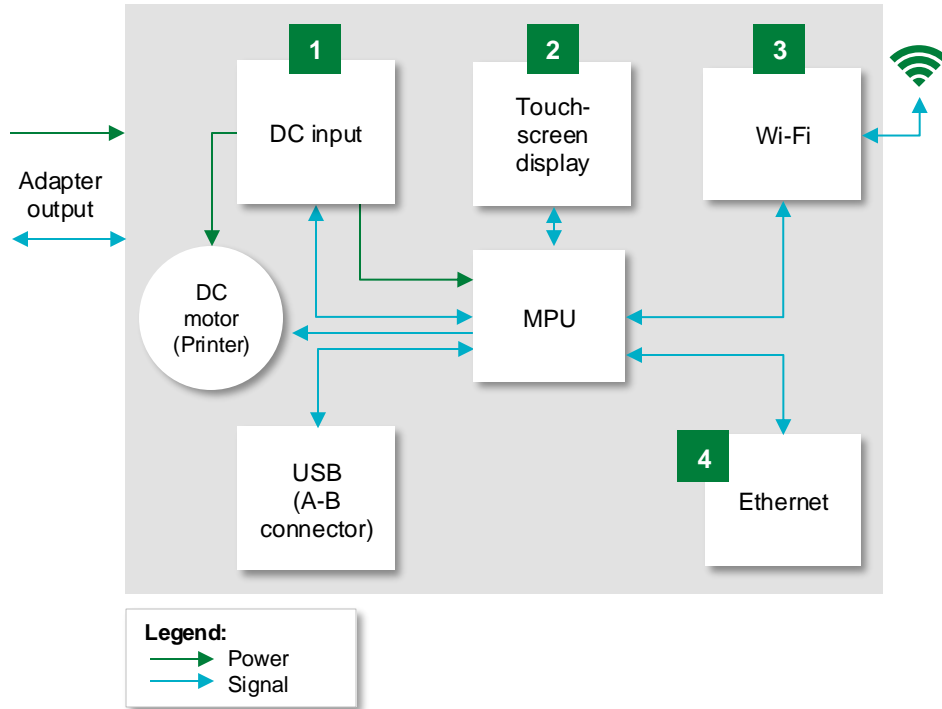
2

Main Board

Fuse, TVS Diode



Component recommendations for the POS printer's motherboard



	Technology	Product series
1	Fuse	435, 438GT, 0402SFF
	TVS Diode	SMCJ
2	TVS diode array	SP1012
3	PESD	PGB10603
4	TVS diode Array	SP2555NUTG

POS printer motherboard: component benefits and features

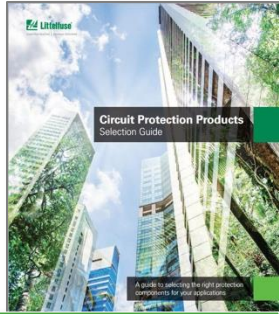
	Technology	Function in application	Product series	Benefits	Features
1	Fuse	Protects the power stage from overcurrent events	435, 438GT, 0402SFF	Reduces customer qualification time by complying with third-party safety standards, such as UL/IEC; SMD form factor allows for a compact design	Surface mountable; compatible with the lead-free solder process, per IEC standards
	TVS Diode	Protects the sensitive electronic component from voltage transients	SMCJ	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	SP1012	Helps comply with IEC standards (61000-4-2: $\pm 15\text{kV}$ contact, $\pm 30\text{kV}$ 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	PGB10603	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	SP2555NUTG	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

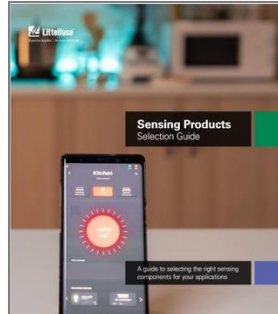
Standard	Title	General Scope	Region
USB-IF	Universal Serial Bus specification	Supports advancement and adoption of Universal Serial Bus technology	Global
IEC/UL 60950-1*	Information technology equipment – Safety	Applicable to mains-powered or battery-powered information technology equipment, with a rated 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

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

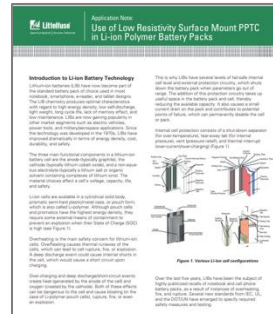
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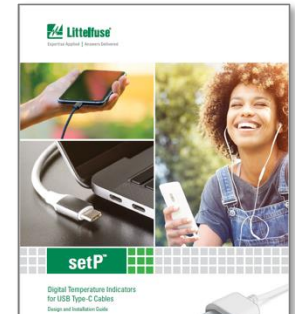
Circuit Protection Selection Guide



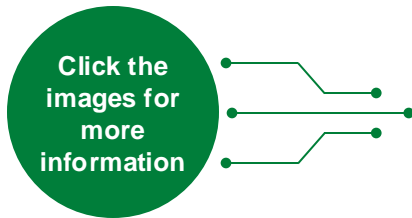
Sensing Products Selection Guide



Li-Ion Battery Pack Protection with PPTC



setP™ Design Guide

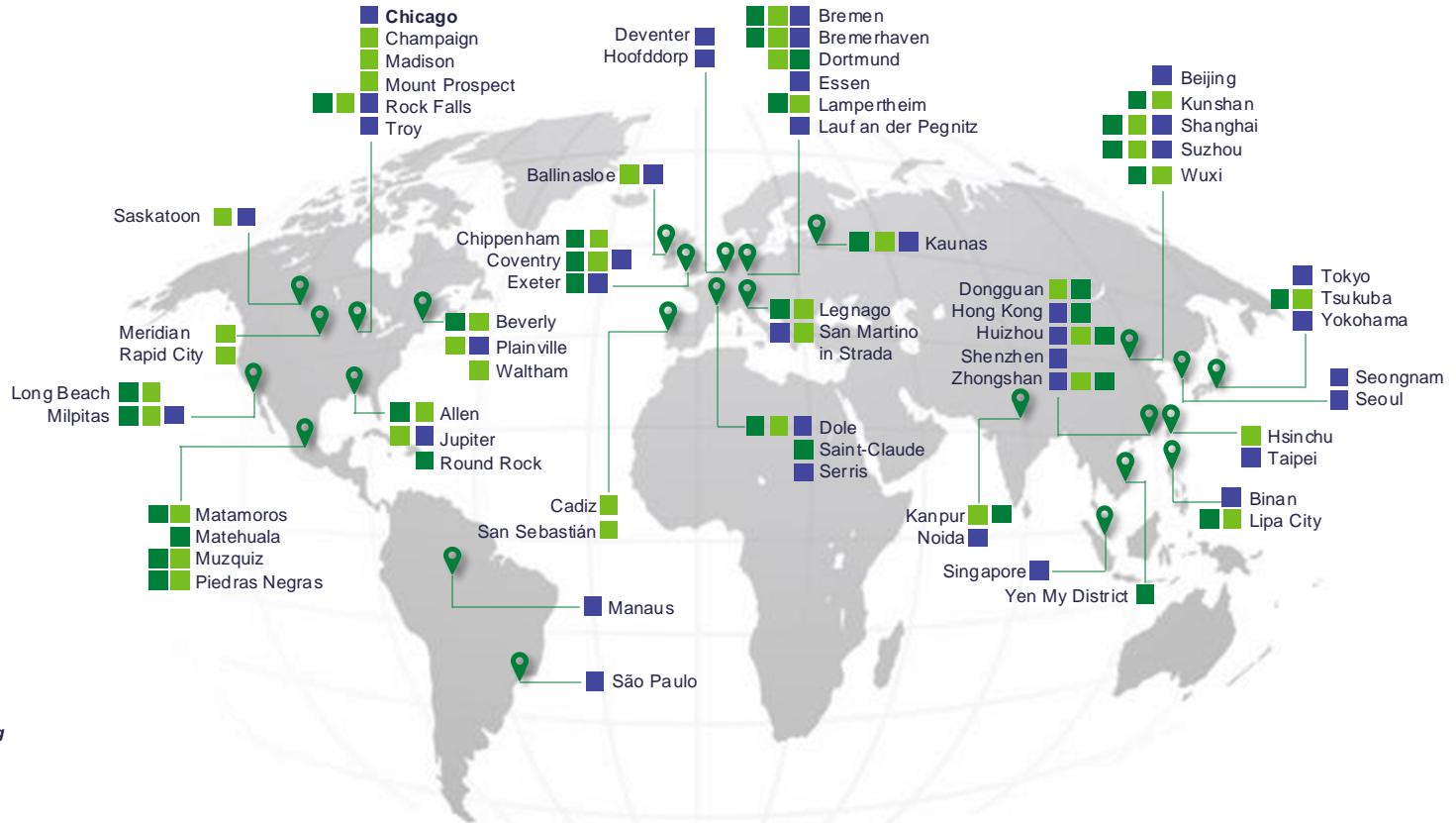


ESD Protection Design Guide



ESD Suppression Design Guide

Local resources supporting our global customers



Legend

- Sales
- R&D
- Manufacturing

Partner for tomorrow's electronic systems

Broad Product Portfolio

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

Testing Capabilities

We help customers get products to market faster, 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 & 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

High-volume manufacturing that is committed to the highest quality standards





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Supplementary slides


SQUARE® mPOS Terminal

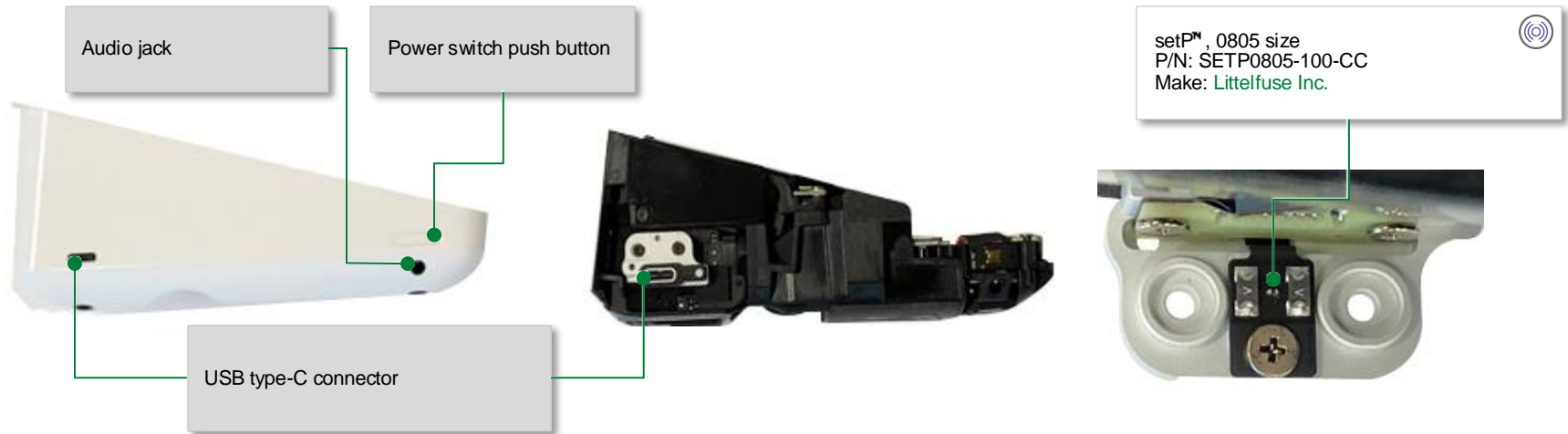


SQUARE® mPOS Terminal

Model number & specification	
Name	SQUARE® mPOS Terminal
Model Number	NA
Description	Point of Sale device
Specifications	Display: 6.1" Liquid HD Retina display Chip: A13 Bionic chip Battery capacity: 3.83 V, 3.11 A _{hr}
Other manufacturers of similar products	Ingenico, Verizon, Diebold Nixdorf, Panasonic, NCR, VeriFone, PAX Technology, Fujian Newland, Revel System, Oracle, ShopKeep, Shopify, iZettle

Square terminal: setP™ protecting USB type C connector

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

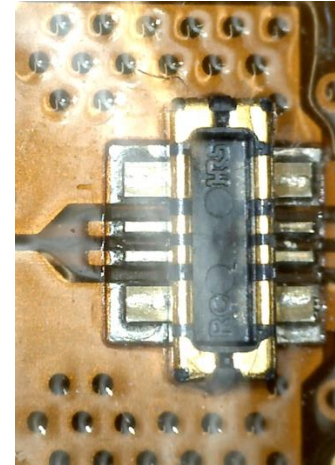


Technology	Function in application	Littelfuse Series	Benefits	Features
setP™	Thermal indicator to protect USB-C plugs and receptacles from overheating	SETP0805-100-CC	Helps improve reliability and user experience by reducing the risk of thermal damage; simple integration into existing USB-C systems	Fast response to thermal events; small form factor; zero IR loss contribution; protects systems with a 100W or higher power rating

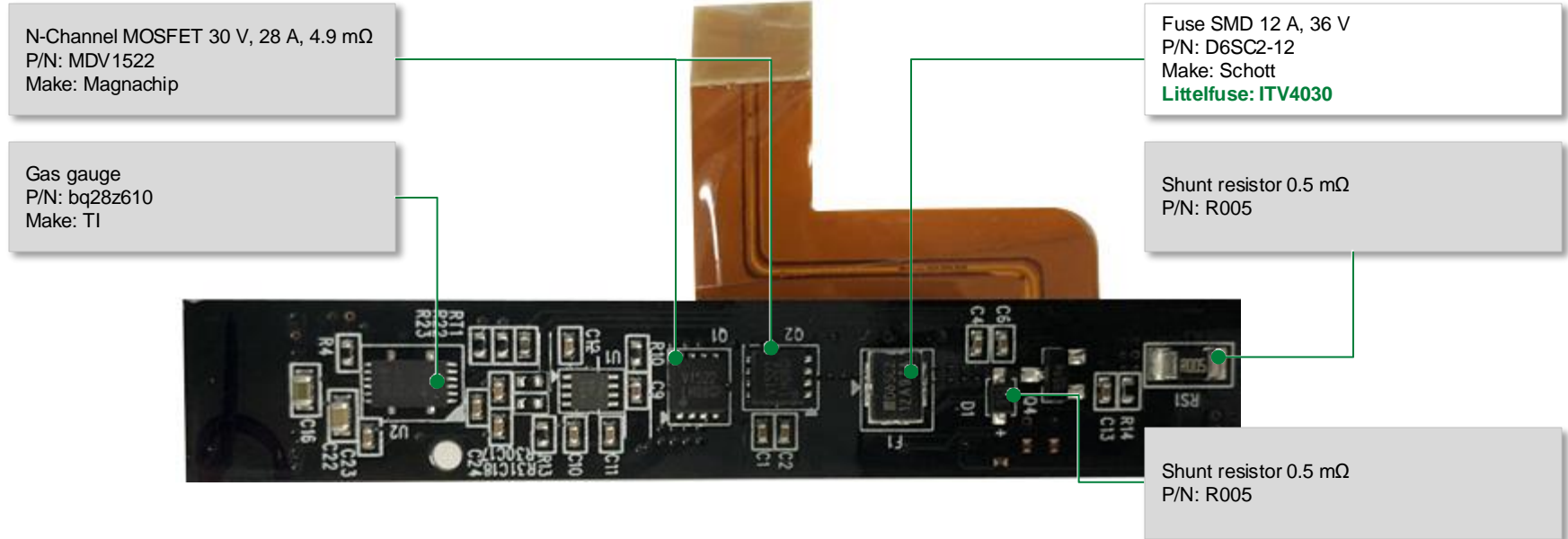
Square terminal: Rechargeable Li-ion battery

Rechargeable Li-ion battery, 7.2V, 3.13 A (22.57 Whr)
Configuration: 2S1P
P/N: A-BAT-0066
Make: Getac technology

Connector pin
P/N:
Make:



Li-ion battery: BMS components



Technology	Function in application	Littelfuse Series	Benefits	Features
Battery protectors	Dual overcurrent and overvoltage protection	ITV4030	Compact design; Increases assemble efficiency	Surface mountable; low internal resistance UL and TUV certified

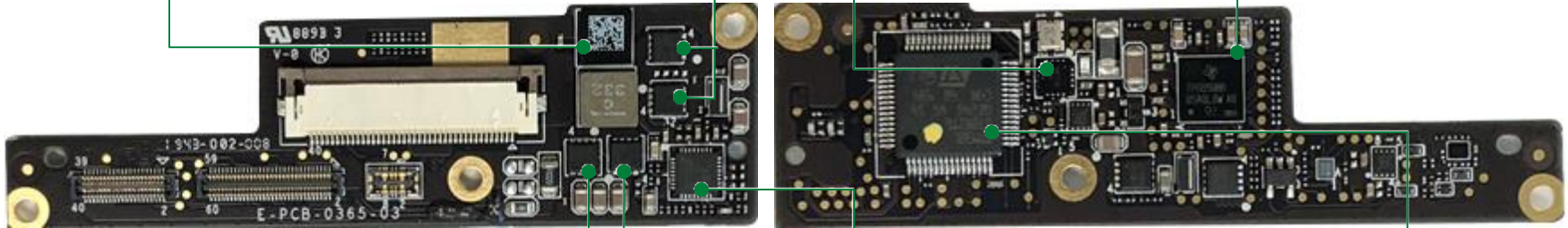
Square terminal: power module

Inductor 3.3 μ H
P/N: 332
Make: Coilcraft

N-channel Power MOSFET
30 V, 11.8 m Ω , 39 A
P/N: 17579
Make: TI

Dual H-bridge motor driver
P/N: V8716
Make: ON semiconductor

USB type C controller and power switch
P/N: TPS65986
Make: TI

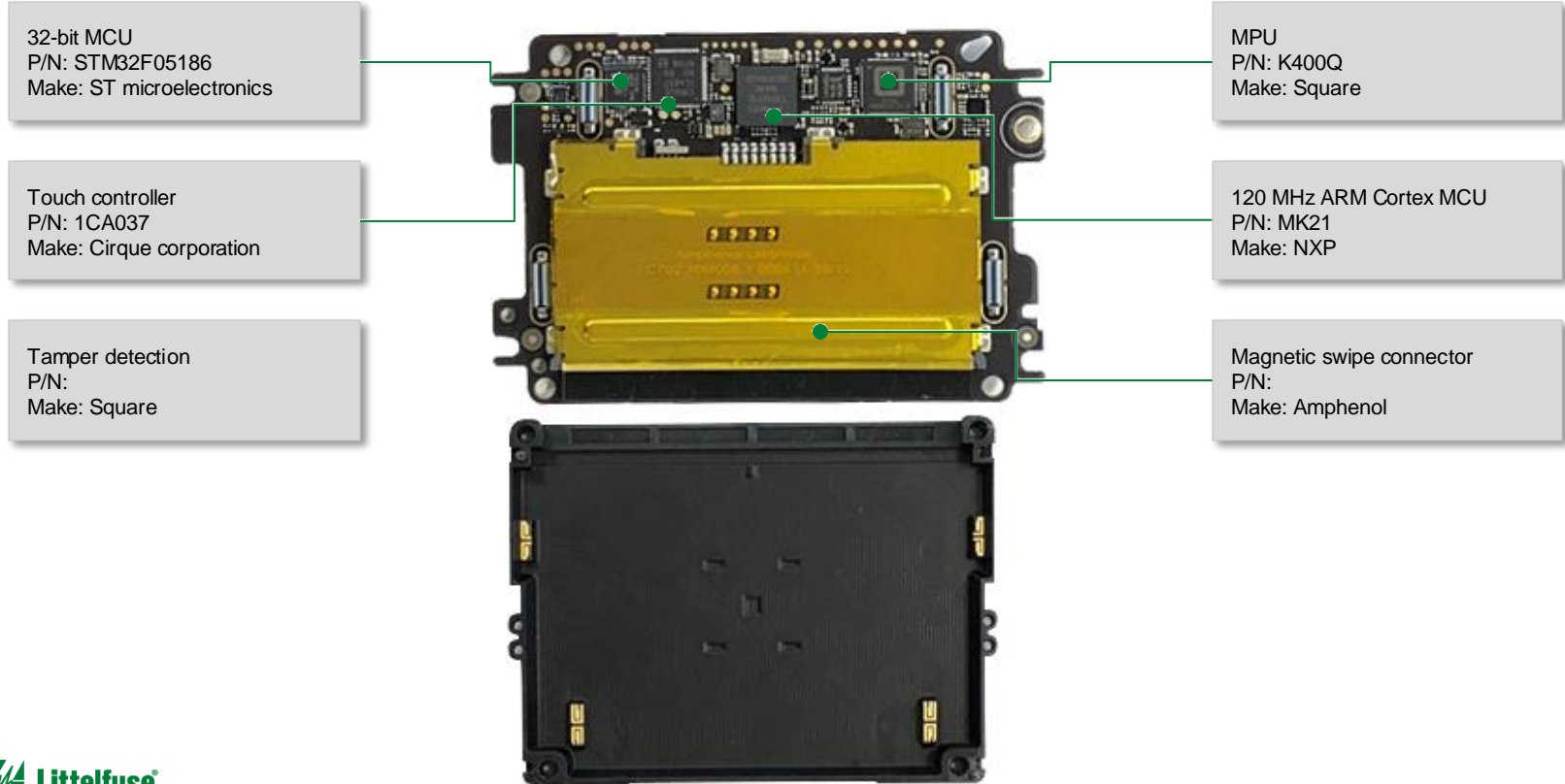


N-channel Power MOSFET
30 V, 11.8 m Ω , 39 A
P/N: 17579
Make: TI

Battery charge controller
P/N: BQ25703A
Make: TI

32-bit MCU
P/N: STM32L072
Make: ST microelectronics

Square terminal: main control board





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