

1. Description

PSC2925 combines a highly integrated switch-mode charger, to minimize single-cell Lithium-ion (Li-ion) charging time from a USB power source, and a boost regulator to power a USB peripheral from the battery.

Its low impedance power path optimizes switch-mode operation efficiency, reduces battery charge time and extends battery life during discharging phase. The I2C serial interface with charging and system settings makes the device a truly flexible solution. The device supports 3.5-10.5V input voltage sources, including standard USB host port and USB charging port with 6.5V over-voltage protection. The device also supports USB On-the-Go operation by providing on the VBUS with an accurate current limit.

The power path management regulates the system slightly above battery voltage but does not drop below 3.6V minimum system voltage (programmable). With this feature, the system keeps operating even when the battery is completely depleted or removed. When the input source current or voltage limit is reached, the power path management automatically reduces the charge current to zero and then starts discharges the battery until the system power requirement is met. This supplement mode operation keeps the input source from getting overloaded.

The device initiates and completes a charging cycle when host control is not available. It automatically charges the battery in three phases: pre-conditioning, constant current, and constant voltage. In the end, the charger automatically terminates when the charge current is below a preset limit in the constant voltage phase. Later on, when the battery voltage falls below the recharge threshold, the charger automatically starts another charging cycle.

The charge device provides various safety features for battery charging and system operation, including charging safety timer, and over-voltage/over-current protections.

The STAT output reports the charging status. The INT output can be used to notify the host when a fault occurs.

The PSC2925 is available in a 24-pin, 4mm x 4mm x 0.55mm QFN package.

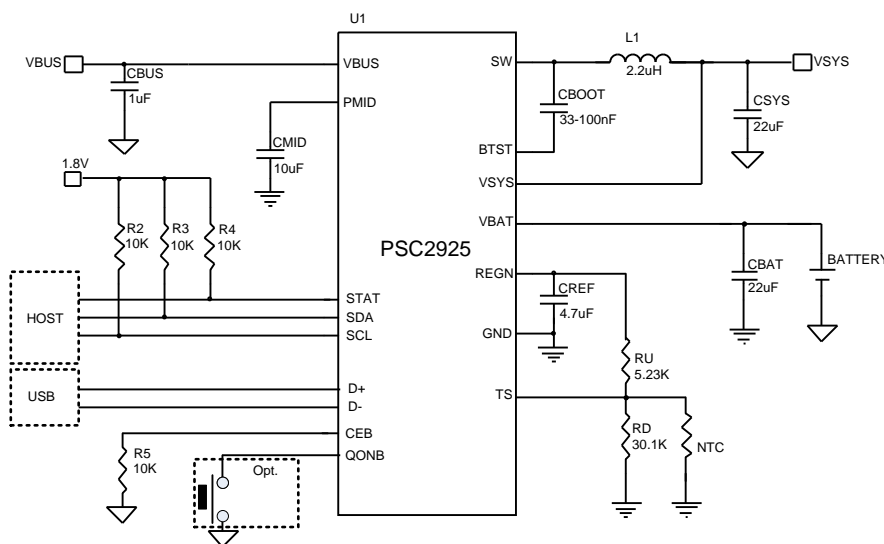


Figure 1.1: Typical Application

2. Features

- Fully Integrated, High-Efficiency Switching Mode 3A Charger.
 - ◆ - Charge Voltage Accuracy: $\pm 0.5\%$ 25°C
 - ◆ - $\pm 7.5\%$ Charge Current Regulation Accuracy
 - ◆ - Input Current Limit: 100mA, 500mA, 1A, 1.5A, 1.9A, 2.5A
 - ◆ - 20V Absolute Maximum Input Voltage
 - ◆ - 10.5V Maximum Input Operating Voltage
 - ◆ - Weak Input Sources Accommodated by Reducing Charging Current to Maintain Minimum VBUS Voltage
- Power Path Management
 - ◆ - Instant system on with NO battery or deeply discharged battery
 - ◆ - Battery can be completely turned off after Charging Done
 - ◆ - Supports Ultra low leakage ship mode
 - ◆ - Supports system reset function by key
- Programmable through I2C Interface:
 - ◆ - Input Current limit
 - ◆ - Fast-Charge/Termination Current
 - ◆ - Charger Voltage
 - ◆ - Termination Enable
- Small Footprint 1-2.2 μ H External Inductor
- Supports DCP detection per USB Battery Charging Specification, Rev 1.2
- Low Reverse Leakage to Prevent Battery Drain to VBUS
- High Battery Discharge Efficiency With 20-m Ω Battery Discharge MOSFET
- High Integration Includes All MOSFETs, Current Sensing and Loop Compensation
- 6- μ A Low Battery Leakage Current to Support Ship Mode
- 12-uA Low Battery Leakage Current in standby Mode
- 5V, 2A Boost Mode for USB OTG for 3.0 to 4.5V Battery Input.
 - ◆ - 90% efficiency at 5V/500mA
 - ◆ - Fast response to loading
- QFN24L-4x4mm² package

3. Applications

- Cellular Phones, Smart Phones, PDAs
- Tablet, Portable Media Players

| Key Components | Recommended specification |
|-------------------|----------------------------------------------------------------------------------------------------------------------|
| L1 | Inductor, 1.0-2.2 μ H, $\pm 20\%$, Isat>4A |
| C _{MID} | 5V/1A Boost: Capacitor, 10-22 μ F, $\pm 10\%$, >16V 5V/2A Boost: Capacitor, 22 μ F x2, $\pm 10\%$, >16V |
| C _{REF} | Capacitor, 4.7 μ F, $\pm 10\%$, >6V |
| C _{BUS} | Capacitor, 1.0 μ F, $\pm 10\%$, >16V |
| C _{BOOT} | Capacitor, 100nF, $\pm 10\%$, >10V |

4. Pin Configuration and Descriptions

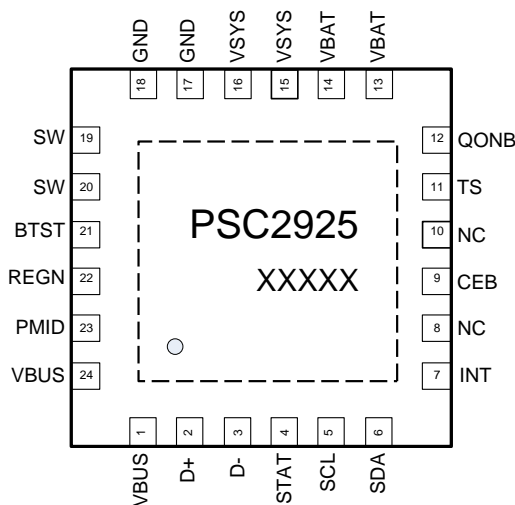


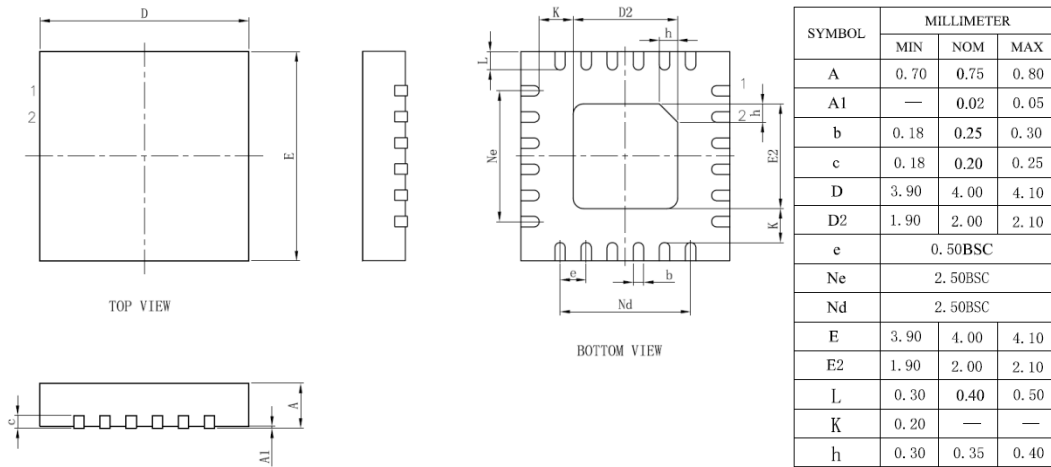
Figure 4.1: QFN4X4-24L TOP view

Pin functions


| Name | Pin # | Type | Description |
|------|-------|------|------------------------------------------------------------------------------------------------------------------------------|
| VBUS | 1,24 | P | Charger Input Voltage. Place a 1- μ F ceramic capacitor from VBUS to GND and place it <u>as close as possible</u> to IC. |
| DP | 2 | IO | Positive data-port for USB transceiver. |
| DM | 3 | IO | Negative data-port for USB transceiver. |
| STAT | 4 | O | Open drain charge status output to indicate charger status. HIGH indicates charge disabled. |
| SCL | 5 | I | I ² C Interface clock. Connect SCL to the logic rail through a 10-k Ω resistor. |
| SDA | 6 | I/O | I ² C Interface data. Connect SDA to the logic rail through a 10-k Ω resistor. |
| INT | 7 | | Open-drain interrupt Output. The INT pin sends a pulse to host to report charger device status and fault. |
| - | 8 | - | NC. |
| CEB | 9 | I | Charge Enable pin. Battery charging is enabled when this pin is driven low. |

| Name | Pin # | Type | Description |
|-------------|-------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| - | 10 | - | NC. |
| TS | 11 | A | Temperature qualification voltage input. Connect a negative temperature coefficient thermistor between TS and GND. 103AT-2 thermistor is preferred. |
| QONB | 12 | IO | BATFET enable/reset control input. The pin contains internal pull-up so it could be floating if it is not used. Pull down QONB for about 350ms will turn on BATFET and exit ship mode. When VBUS is not valid, a logic low of minimum 5s duration cuts VSYS from VBAT for 650ms and then re-enables BATFET to provide full system power reset. |
| VBAT | 13,14 | P | Battery connection point to the positive pin of the battery pack. The internal Q4 is connected between VBAT and VSYS. Connect 22 μ F x2 closely to the VBAT pin. |
| VSYS | 15,16 | P | System power supply. Connect 22 μ F x2 closely to the VBAT pin. |
| GND | 17,18 | G | Power ground connection for high-current power converter node. On PCB layout, connect directly to ground connection of input and output capacitors of the charger. A single point connection is recommended between power PGND and the analog GND near the IC PGND pin. |
| SW | 19,20 | O | Switching node connecting to output inductor. Internally SW is connected to the source of the High-side NMOS and the drain of the low-side NMOS. |
| BTST | 21 | P | PWM high side driver positive supply. Internally, the BTST is connected to the anode of the boost-strap diode. |
| REGN | 22 | P | PWM low side driver positive supply output. Internally, REGN is connected to the cathode of the boost- strap diode. |
| PMID | 23 | O | Power input to the charge regulator. Connect a 10uF ceramic capacitor from PMID to analog GND. For 5V/2A Boost, choose 22uF x2 capacitor in stead; |
| Thermal PAD | Thermal PAD | P | Exposed pad for heat dissipation. Always solder thermal pad to the board, and have via on the thermal pad plane star-connecting to GND. |

8. Package Information




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