

# 1. Description

PSC2945 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 3.5-12V input voltage sources, including standard USB host port and USB charging port with programmable 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 3.55V 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 VBUS insertion and withdrawal or a fault occurs.

The PSC2945 is available in a 24-pin, 4mm x 4mm x 0.55mm QFN package.

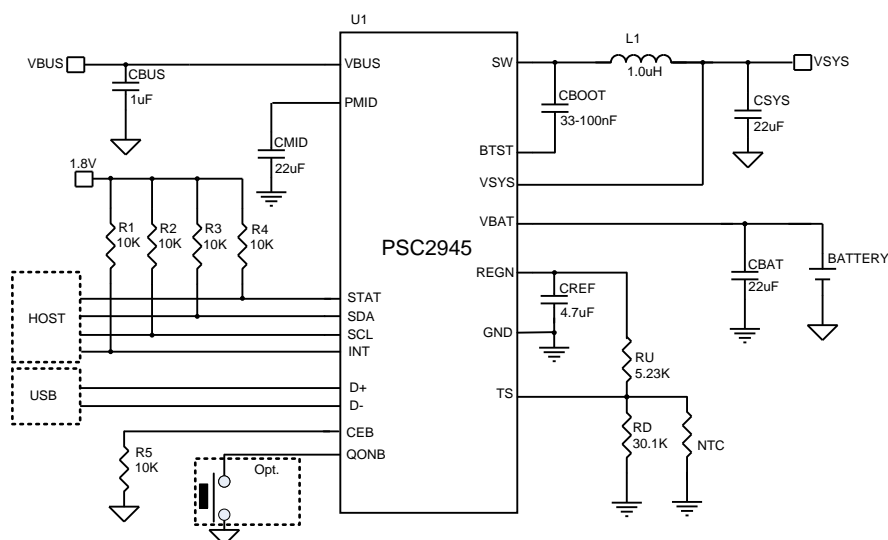


Figure 1.1: Typical Application

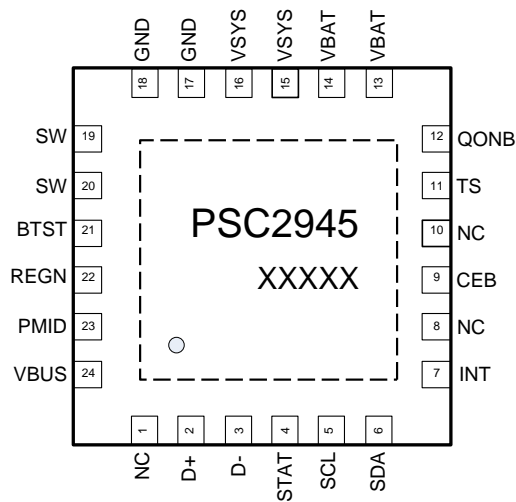
## 2. Features

- Fully Integrated, High-Efficiency Switching Mode 3A Charger.
  - ◆ Charge Voltage Accuracy:  $\pm 0.5\%$  25°C
  - ◆  $\pm 7.5\%$  Charge Current Regulation Accuracy
  - ◆ 20V Absolute Maximum Input Voltage
  - ◆ 13.9V 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
- Programmable through I2C Interface:
  - ◆ Input Current limit
  - ◆ Fast-Charge/Termination Current
  - ◆ Charger Voltage
  - ◆ Termination Enable
- Small Footprint 1-2.2 $\mu$ H External Inductor
- Low Reverse Leakage to Prevent Battery Drain to VBUS
- High Battery Discharge Efficiency With 25m $\Omega$  Battery Discharge MOSFET
- High Integration Includes All MOSFETs, Current Sensing and Loop Compensation
- 10 $\mu$ A Low Battery Leakage Current to Support Ship Mode
- 12 $\mu$ A Low Battery Leakage Current in standby Mode
- 5V, 2A Boost Mode for USB OTG: 90% efficiency at 5V/1A
- QFN24L4x4mm<sup>2</sup> package

## 3. Applications

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

## 4. Pin Configuration and Marking



PSC2945: Product ID  
XXXXX: Production Tracing Code

Figure 4.1: QFN4X4-24L TOP view

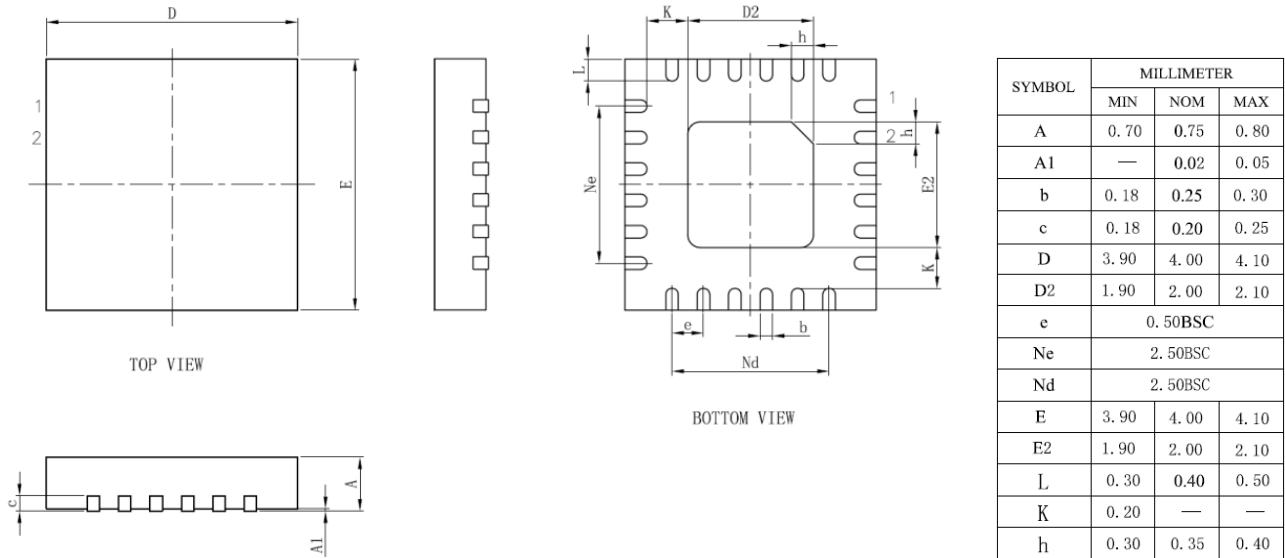
### Pin functions

Name	Pin #	Type	Description
VBUS	24	P	Charger Input Voltage. Place a 1- $\mu$ F ceramic capacitor from VBUS to GND and place it as close as possible to IC.
-	1,8,10	-	NC.
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 <sup>2</sup> C Interface clock. Connect SCL to the logic rail through a 10-k $\Omega$ resistor.
SDA	6	I/O	I <sup>2</sup> C Interface data. Connect SDA to the logic rail through a 10-k $\Omega$ resistor.
INT	7		Open-drain interrupt Output. The INT pin sends an pulse to host to report charger device status and fault.
CEB	9	I	Charge Enable pin. Battery charging is enabled when this pin is driven low. Battery charging (Excluding Ishort) and Vsys regulator are disable when CEB is high.

**Single-Cell Li-Ion Switching Charger with USB-OTG Boost Regulator**

Name	Pin #	Type	Description
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 430ms will turn on BATFET and exit ship mode. When VBUS is not valid, a logic low of typically 20s duration cuts VSYS from VBAT for 430ms 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 $\mu$ F x2 closely to the VBAT pin.
VSYS	15,16	P	System power supply. Connect 22 $\mu$ 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 22 $\mu$ F ceramic capacitor from PMID to analog GND.
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.


## 5. Package Information



### Ordering Information

Device	Package	Reel	Shipping
PSC2945	QFN4x4-24L (Pb-Free)	7"	3000 / Tape & Reel


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