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

Description

PSC5415E is a switch-mode charging IC with maximum 1.75A current for lithium battery and lithium polymer battery. The PSC5415E has 5V, 700mA OTG function, and I2C function. The charging parameter such as charging current, full charging voltage and input current can be precisely configured by I2C function. The package type is WLCSP (1.901mmx1.501mm) with 20 pins.

The PSC5415E is designed with standard four-stage charging process: active, pre-charging, constant current, constant voltage and perfect protection mechanism for over current, over voltage, under voltage and over temperature. It is integrated with synchronous PWM control, high power MOSFET, and high voltage OVP circuits. The PSC5415E has high charging efficiency (94%), low internal resistance (45mΩ), and high DC withstand voltage (29V).

Feature

- Fully Integrated, High-Efficiency Charger for Single-Cell Li-Ion and Li-Polymer Battery Packs
- Charge Voltage Accuracy: ±0.5% 25℃
- ±5% Charge Current Regulation Accuracy
- 29V Absolute Maximum Input Voltage
- 6V Maximum Input Operating Voltage
- 1.75A Maximum Charge Rate
- 5V, 700mA Boost Mode for USB OTG for 3.0 to 4.5V Battery Input
- 1.901 mm x 1.501mm 20-Pin WCSP Package
- Programmable through I^2C Interface:
  -Input Current
  -Fast-Charge/Termination Current
  -Charger Voltage
  -Termination Enable
- Synchronous Buck PWM Controller with Wide Duty Cycle Range
- Small Footprint 1μH External Inductor
- Perfect protection mechanism:
  -OVP, OCP, OTP

Application

- Cellular Phones, Smart Phones, PDAs
- Tablet, Portable Media Players
- Gaming Device, Digital Cameras

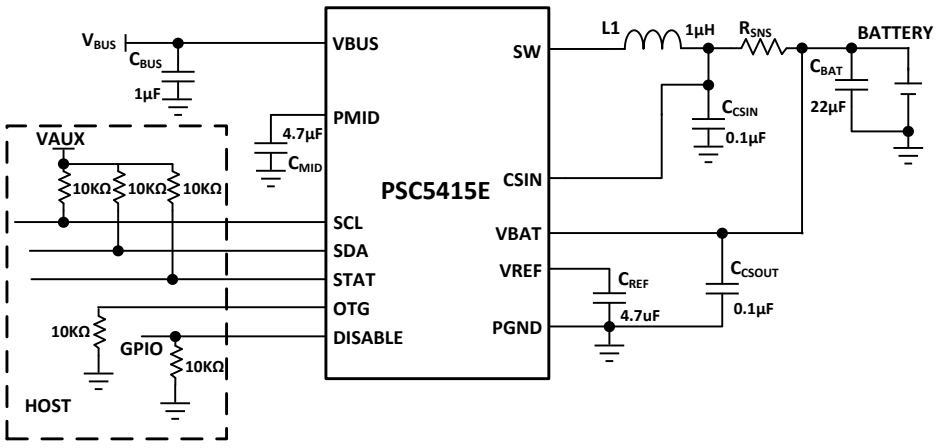


Figure 1: Typical Application

Recommended External Components

Key Components	Recommended specification
L1	Inductor, 1.0-2.2uH, +-20%, Isat>3A
C_{MID}	Capacitor, 4.7μF, +-10%, >6V
C_{REF}	Capacitor, 2.2μF, +-10%, >10V ,0402 or Capacitor, 4.7μF, +-10%, >6V,0402
C_{BUS}	Capacitor, 1μF, +-10%, >25V

Block Diagram

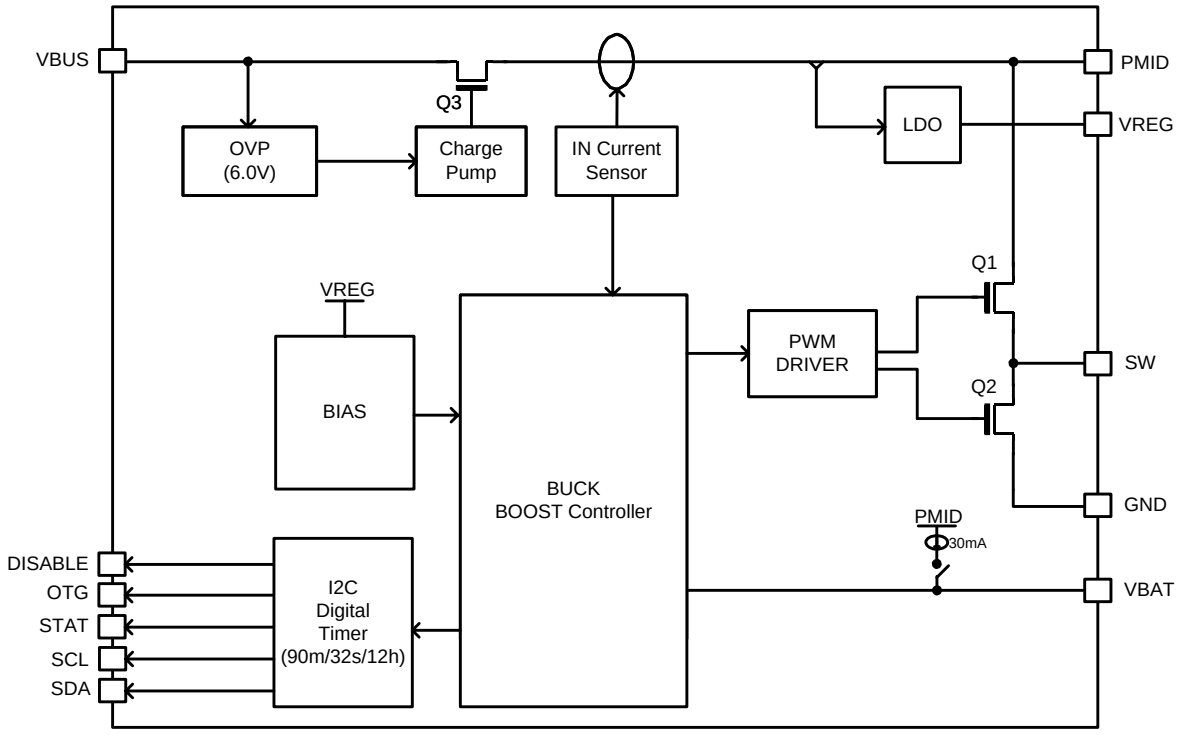
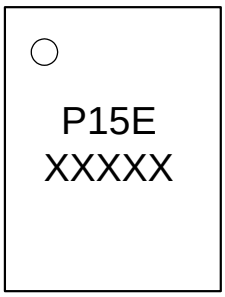


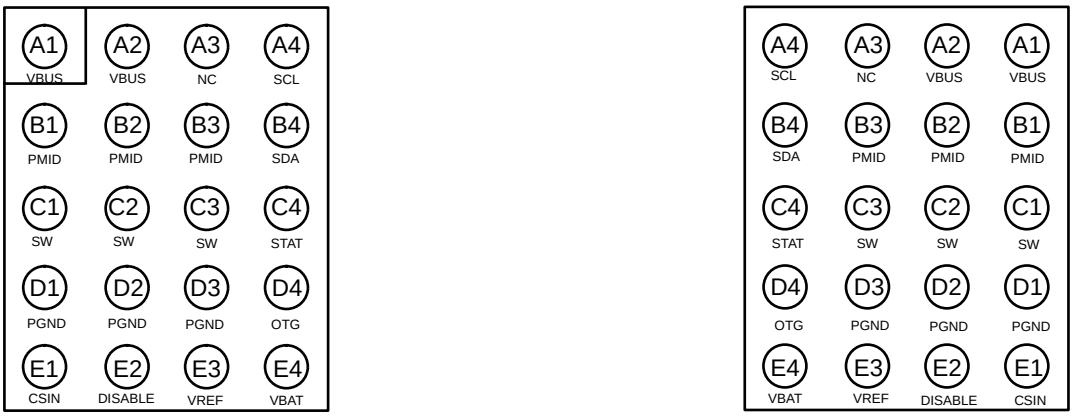
Figure 2: IC and System Block Diagram

Marking Information



P15E:PSC5415E
XXXXX: Production Tracing Code

Pin Configuration



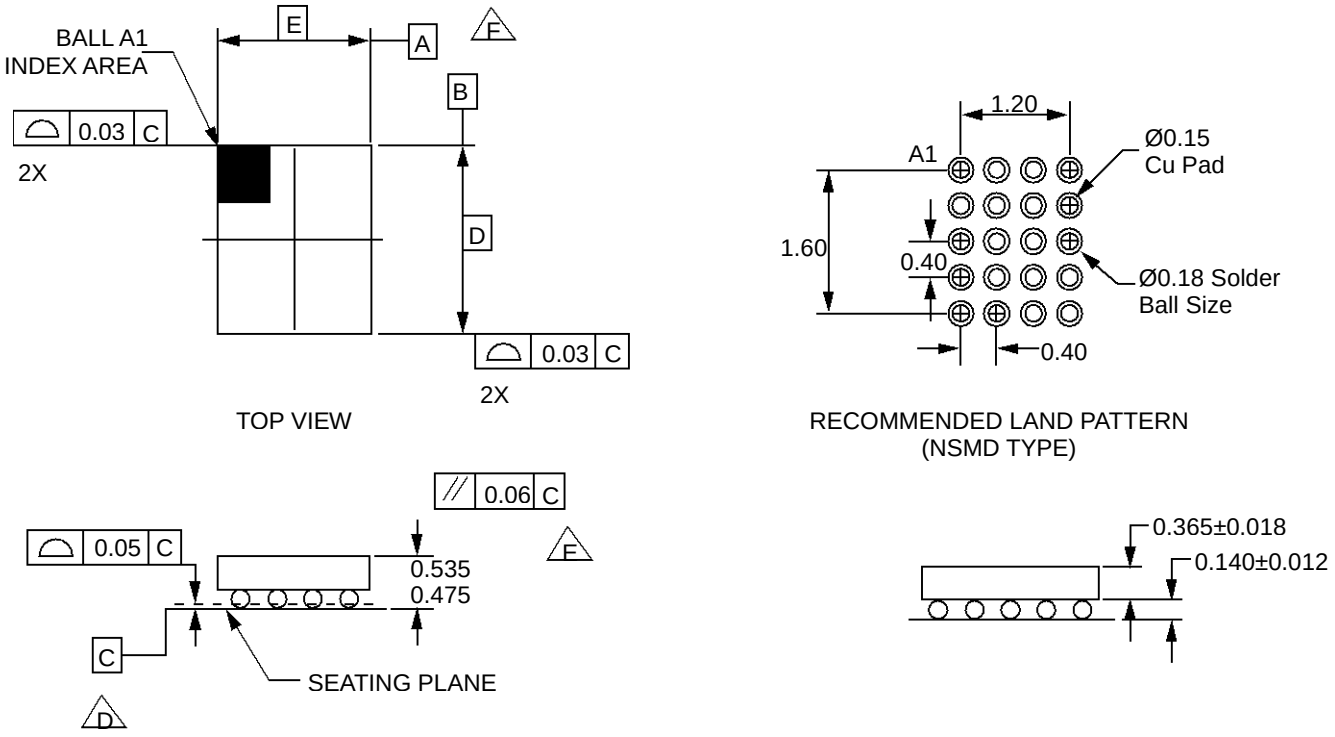
Top View　　Bottom View

Figure 3: WLCSP-20 Pin Assignments

Pin Definitions

Pin#	Name	Description
A1,A2	VBUS	**Charger Input Voltage** and USB-OTG output voltage. Bypass with 1μF capacitor to PGND
A3	NC	**NC.**
A4	SCL	**I²C Interface Serial Clock.** This pin should not be left floating.
B1-B3	PMID	**Power Input Voltage.** Power input to the charger regulator, bypass point for the input current sense, and high-voltage input switch. Bypass with a minimum of 4.7μF, 10V capacitor to PGND.
B4	SDA	**I²C Interface Serial Data.** This pin should not be left floating.
C1-C3	SW	**Switching Node.** Connect to output inductor.
C4	STAT	**Status.** Open-drain output indicating charge status. The IC pulls this pin LOW when charge is in process.
D1-D3	PGND	**Power Ground.** Power return for gate drive and power transistors. The connection from this pin to the bottom of C_{MID} should be as short as possible.
D4	OTG	**On-The-Go.** Enables boost regulator in conjunction with OTG_EN and OTG_PL bits
E1	CSIN	**Current-Sense Input.** Connect to the sense resistor in series with the battery. The IC uses this node to sense current into the battery. Bypass this pin with a 0.1μF capacitor to PGND.
E2	DISABLE	**Charge Disable.** If this pin is “1”, charging is disabled. When LOW, charging is controlled by I2C registers.
E3	VREF	**Bias voltage.** Connect to a **4.7uF** capacitor to PGND. The output voltage is PMID, which is limited to 6.5V. Any resistor loading to VREF is **NOT** recommended.
E4	VBAT	**Battery Voltage.** Connect to the positive (+) terminal of the battery pack. Bypass with a 0.1μF capacitor to PGND if the battery is connected through long leads.

Product dimension



NOTES:

A.NO JEDEC REGISTRATION APPLIES.

B.DIMENSIONS ARE IN MILLIMETERS.

C.DIMENSIONS AND TOLERANCE PER ASMER14.5M,1994.

D.DATUM C IS DEFINED BY THE SPHERICAL CROWNS OF THE BALLS.

E.PACKAGE NOMINAL HEIGHT IS 586 MICRONS ±39 MICRONS(547-625 MICRONS).

F.FOR DIMENSIONS D,E,X,AND Y SEE PRODUCT DATASHEET.

G.DRAWING FILNAME:MKT-UC020AArev2.

Figure 41. 20-Ball WLCSP, 4x5 Array, 0.4mm Pitch, 150μm Ball

Product-Specific Dimensions (mm)

Product	D	E	X	Y	Φ
PSC5415E	1.901±0.030	1.501±0.030	0.150	0.150	0.150±0.020

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