



2.5A Li-ion Battery Switching Charger with OTG Boost Integrated

Features

- ◆ Full Automatic and Efficient Charge Management for Large Capacity Lithium Battery
 - Automatic Conditioning, CC/ CV Charge Control, Termination and Recharge
 - 20V Input Voltage Tolerance,
 - 5.9V Max Operating Voltage
 - 550-2500mA Programmable Charge Current
 - 1.5MHz Synchronous PWM, 1 μ H Low Profile Inductor
 - Input Current Regulation Accuracy: $\pm 5\%$ (100mA and 500mA)
 - Charge Voltage Regulation Accuracy: $\pm 1\%$
 - Input Voltage Based Dynamic Power Management(VIN DPM)
 - Power Up without Battery
- ◆ Automatic Adaptor Fault Detection
- ◆ High Impedance Mode with Low Power Consumption
- ◆ Comprehensive Protection
 - Reverse Battery Leakage Protection
 - Thermal Regulation and Shut-down
 - Input & Output Over-Voltage Protection
- ◆ Built-in Input Current and Input Voltage Limit
- ◆ Integrated Power MOSFET with Max 2.5A Charge Current
- ◆ Automatic Charge and USB Compliant Start Sequence
- ◆ Full Range Programmable Charge Parameter through I²C Compatible Interface
 - Input Current Limit Threshold
 - Input Voltage DPM Threshold
 - Charge Termination Current
 - Charge Termination Voltage
 - Safety Timer with Reset Control (32s/30mins)
 - Charge Termination Enable
 - Support 3.4MHz I²C HS Mode
- ◆ USB OTG Boost
 - Input Voltage Range from Battery: 2.5 V~4.5 V
 - 5.0 V/ 1000 mA (Vbat \geq 3.0V)
- ◆ 20-Pin WLCSP Package
- ◆ Pin compatible with HL7005D

Applications

- Smart phone
- MP3 player
- Tablet PC



Order Information

Part Number	HL7007
Default Charge Termination Voltage	4.2V
Maximum Charge Current	2.5A
OTG Mode Maximum Output Current	1A
I ² C Address	6AH
30min Safety Timer and 32s Watch-Dog Timer	Yes
Package	WLCSP
Packing Method	Tape and Reel
Marking Information	HL7007

Typical Application Diagram

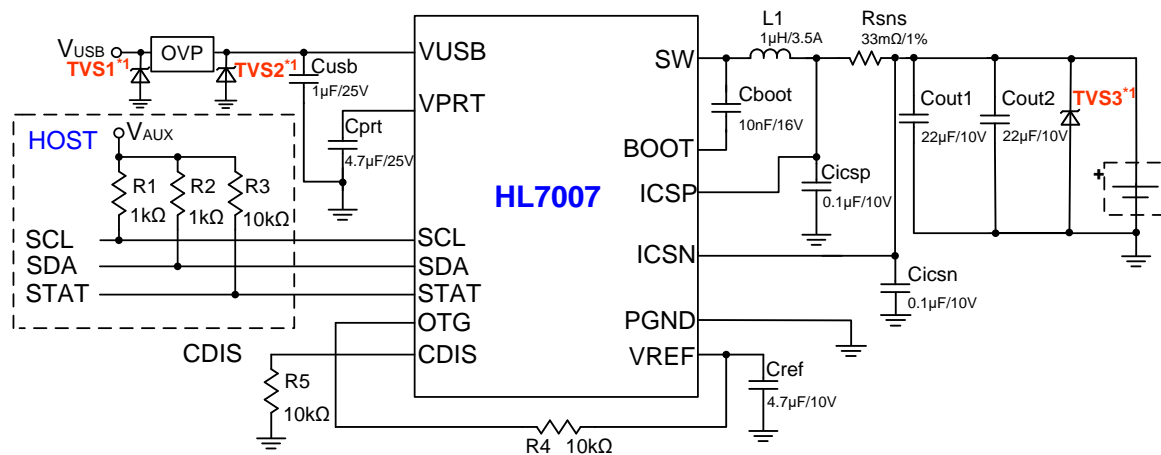


Figure 1. HL7007 Typical Application Diagram

Notice

*1. Careful board level surge protection using TVS diode and OVP device on VIN pin, and TVS diode on VBAT pin, is essential to withstand high voltage spikes that may appear in PCB manufacturing process or end user applications. Without such protection, the IC is prone to electrical over-stress damage.

Component	Part Number	Value	Size	Vendor
L1	WPN252010H1R0MT	1uH/3.5A	2016	Sunlord
Cicsp, Cicsn	C1005X5R1A104K	0.1µF /10V	0402	TDK
Cboot	C2012X5R1E103K	10nF /16V	0805	TDK
Cusb	C2012X5R1E105K	1uF/25V	0805	TDK
Cprt	C2012X5R1E475K	4.7µF/25V	0805	TDK
Cref	GRM185R61A475KE11D	4.7µF/10V	0603	Murata
Cout1,Cout2	GRM319R61A226ME15D	22uF/10V	1206	Murata

Rsns	-	33mΩ/1%	1206	-
R1, R2	-	1kΩ	-	-
R3, R4, R5	-	10kΩ	-	-
TVS1/TVS2/TVS3	See Table2	-	-	Will SEMI
OVP	See Table3	-	-	Will SEMI

Table 1 Recommended Component list

Component	Package	P _{PK} (W) tp=8/20 μs	Part Number	V _{RWM} (V)	V _F (V) I _F =20Ma		I _R (μA)	V _{BR} (V)		
					Max	Min		Max	Max	Min
TVS1	DFN2x2-3L	4000	ESD564 1D12	12.0	0.45	1.25	0.1	13.0	15.0	17.0
TVS2	DFN2x2-3L	4000	ESD564 1D07	7.5	0.45	1.25	1.0	8.0	9.0	10.0
TVS3	DFN2x2-3L	3500	ESD5616 1D04	4.5	0.50	1.10	8.0	5.1	5.7	6.3

Table 2 Recommended TVS

Component	Part Number	V _{IN} (MAX)	R _{ON}	Package	Component Dimensions(mm)		
					L	W	H
OVP	WS3210C68	30V	45mΩ	WLCSP-9B	1.400	1.400	0.586

Table 3 Recommended OVP

Description

HL7007 is a compact, flexible, high-efficiency, USB compliant switch-mode charge management device for single cell Li-ion and Li-polymer battery used in a wide range of portable applications. The charge parameters can be programmed through I²C interface. HL7007 integrates a synchronous PWM controller, power MOSFET, input current sensing, high-accuracy current and voltage regulation, and charge termination function into a tiny CSP package.

HL7007 provides a complete automatic three-phase battery charging control: trickle charge, constant-current charge (CC) and constant voltage charge (CV) until the battery reaches the charge termination voltage. The input current is automatically limited to the value set by the host. Charging is terminated based on the battery voltage and a

user selectable minimum current level. A safety timer with reset control provides a safety backup for I²C interface. During normal operation, the IC automatically restarts the charge cycle if the battery voltage falls below an internal threshold and automatically enters sleep mode or high impedance mode when the input supply is not correctly connected. The charge status can be reported to the host through the I²C interface.

During the charging process, the IC monitors its junction temperature (T_J) and reduces the charge current once T_J increases to about 120°C. To support USB OTG device, HL7007 can provide VBUS (5.0V) by boosting the battery voltage.

HL7007 is available in a 20-pin WLCSP package.