GLF73612T

Ultra-Efficient I_QSmart™ Battery Protection IC with Full Protections

DESCRIPTION

The GLF73612T is a family of I_QSmart™ ultra-efficient ICs, with full battery protections which are accurate over charge/discharge voltage protection, over charge/discharge current protection and short circuit protection.

The over charge and discharge voltage protections are capable of keeping a rechargeable battery working within the desired safe operating condition. When the battery is charged above the over voltage detection level, the GLF73612T charging switches off in a preset delay time. As the battery voltage decreases lower than the over discharge detection voltage, the GLF73612T discharging switch is turned off immediately. In the off state, GLF73612T consumes an ultra-low leakage current (I_{SD}) to save the battery power. In addition, when the load current is higher than the ISC short circuit protection current level, the GLF73612T is turned off and will maintain the off state to avoid any serious damage to system. The short circuit delay time can avoid any false trigger which might turn on the switch.

The GLF73612T provides a shipping mode to prevent smart devices which has a non-removable battery from discharging during the shipping period. When a charged battery cell is connected to the GLF73612T, and GLF73612T remains in the off state, the smart devices consume an ultra-low leakage current (I_{SD}). Note that the only way to active the GLF73612T is applying a charger output V_{ON} voltage to VOUT pin.

FEATURES

- Over charge Detection Voltage, V_{OC}
  - GLF73612T detects VOUT to release V_{OC}
  - V_{OC} high accuracy :4.575 V ±1 %
- Overdischarge Detection, V_{OD}: 2.9 V
  - GLF73612T detects VOUT to release V_{OD}
- Overcharge Current Detection, I_{OC} : 320 mA
- Overdischarge Current Detection, I_{OD} : 465 mA
- Short Circuit Protection
- Activated by Applying V_{ON} to the VOUT Pin from Charger
- Shipping Mode Implementation
- Low R_{ON} : 60 mΩ Typ. at 3.6 V_{BAT}
- Low Quiescent Current, I_Q : 1.6 µA Typ at 3.6 V_{BAT}
- Shutdown Current:
  - I_{SD} =15 nA Typ. @ V_{BAT} < V_{OD}
  - I_{SD} = 21 nA Typ. @ V_{BAT}=3.6 V, Shipping Mode
  - I_{SD} = 26 nA Typ. @ V_{BAT}=4.2 V, Shipping Mode
- Latch-off at Overdischarge Detection and Short Circuit Protection.
- 0 V Battery Charge Inhibition.
- Patent Pending Circuit Architecture.
- 0.97 mm x 0.97 mm x 0.35 mm, 4 Bump Wafer Level Chip Scale Package.

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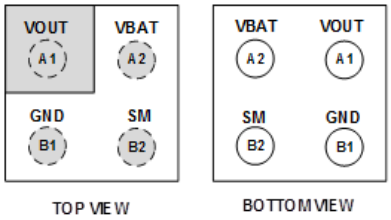
PRODUCT TABLE

Part Number	Top Mark	R_{ON} (Typ.) at 3.6 V V_{BAT}	Over charge Detection V_{OC}	Over discharge Detection V_{OD}	Over charge Current I_{OC}	Over discharge Current I_{OD}	Short Circuit Current I_{SC}
GLF73612T-S2G7	DU	60 mΩ	4.575 V	2.90 V	320 mA	465 mA	1.25 mA

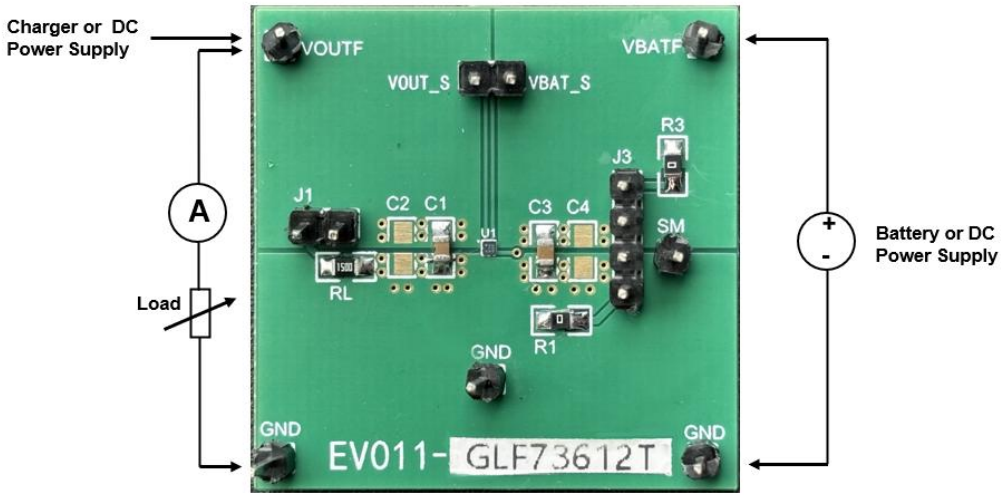
DEVICE PACKAGE AND PINOUT



0.97 mm x 0.97 mm x 0.35 mm

Pin #	Name	Description
A1	VOUT	VOUT pin is connected to the charger output and system load. If the switch is in the off state, applying the appropriate voltage (V_{ON}) to VOUT turn the switch on.
A2	VBAT	VBAT pin is connected to the positive terminal of a battery pack to monitor the battery voltage.
B1	GND	Ground
B2	SM	Shipping Mode Control. Active high.

TEST SETUP



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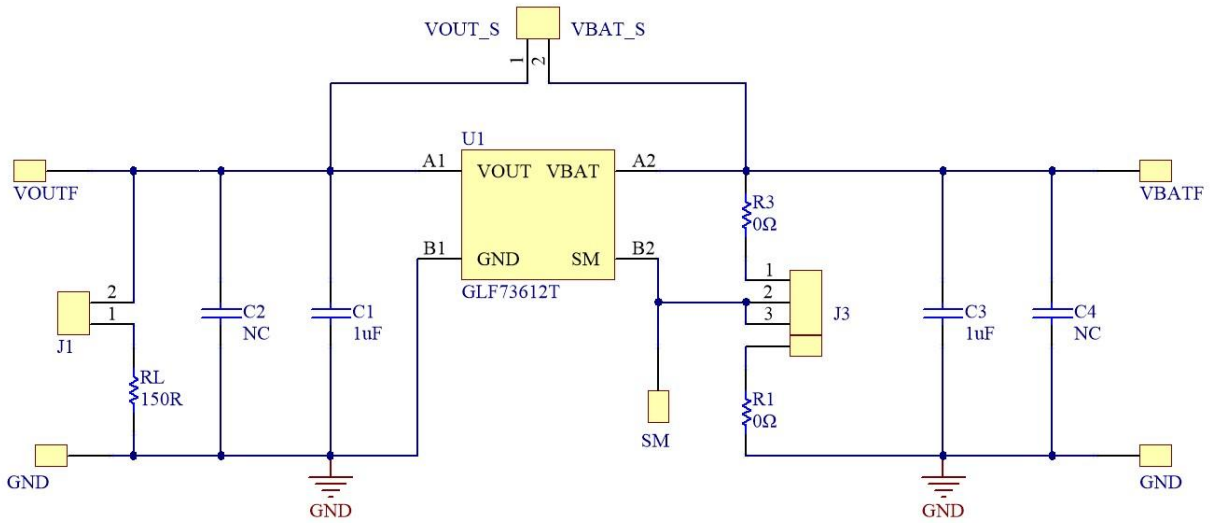
QUICK START GUIDE

1. Connect the Input Power Supply or a Li-battery pack higher than 3 V to VBAT and GND respectively. The VBAT_Sense and VOUT_Sense can be used for measurement points. Make sure there is no high peak voltage generated when a VBAT input source is hot-plugged in.
2. Use a jumper to connect the #3 pin and #4 pin of J3 so that the SM is pulled down to GND by resistor R1.
3. Use an enabled charger or a DC power supply that has finished setting the current limit and the output voltage exceeds V_{ON} is connected to VOUT, GLF73612T internal switch will be turned on.
4. The load resistor RL=150 Ω, has been populated on the PCB board. Short the J1 to use the RL. To increase the output current, connect an electronic load to VOUT and GND.
5. When the VBAT voltage decreases to the V_{OD}, the GLF73612T is latched-off. In order to wake up the latched-off GLF73612T, the on voltage (V_{ON}) need to be applied to VOUT connector from a charger or a DC Power Supply.
6. When the VBAT voltage reaches the V_{OC}, the GLF73612T switch is turned off to stop charging and get back to the on state as the VBAT voltage decreases by 160 mV (V_{OC_HYS}) below V_{OC}.
7. When the IOUT current exceeds I_{OD}, GLF73612T will be latched off after a delay of 9.5 ms (typical). When IOUT current exceeds I_{SC}, GLF73612T will be latched off immediately. In order to restart, set GLF73612T within the operating voltage and current range, and V_{ON} need to be applied to the VOUT.
8. When the GLF73612T switch is turn on, applying a voltage higher than 1.2 V to SM at least t_{SM}= 25 ms or use a jumper to connect the #2 pin and #1 pin of J3 so that the SM is pulled up to VBAT by resistor R3, the GLF73612T will turn off after t_{dSM}=1.2s delay. It could save battery energy during transportation and storage.

SCHEMATIC



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BILL OF MATERIALS

Qty	Reference	Value	Part Description	Note
1	U1	GLF73612T	GLF73612T	GLF Integrated Power
2	C1, C3	1.0 μF	Cap., X7R, 50 V, 10 % 0805	YAGEO, CC0805KKX7R9BB105
1	RL	150 Ω	Resistor, 1 % 0805	YAGEO RC0805FR-07150RL
2	R1, R3	0 Ω	Resistor, 1 % 0805	YAGEO RC0805FR-070RL
2	J1, J3	Jumper	Jumper	
2	C2, C4	-	-	DNP (Do Not Place)

PRINTED CIRCUIT BOARD LAYOUT

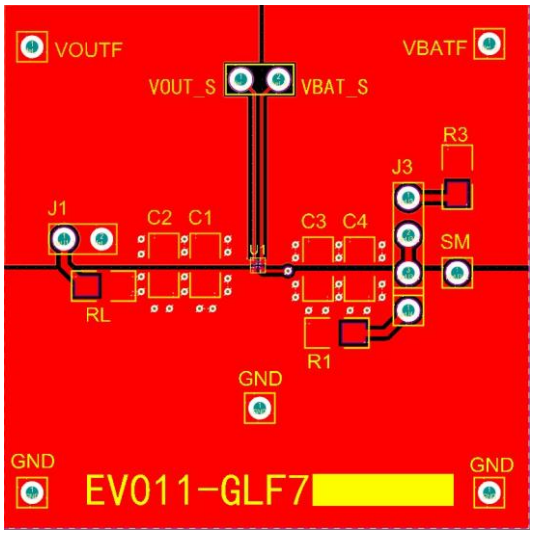

Fig 1. Top Layer

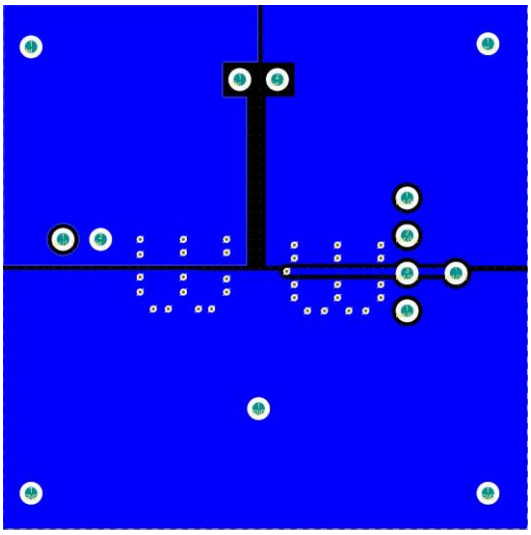

Fig 2. Bottom Layer

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