

GLF73611**Ultra-Efficient I_QSmart™ Battery Protection IC with Full Protections****DESCRIPTION**

The GLF73611 is a family of I_QSmart™ ultra-efficient ICs, with full battery protections which are accurate overcharge/over discharge voltage protection, overcharge/over discharge current protection and short circuit protection.

The overcharge and discharge voltage protections are the functions to keep rechargeable battery working within the desired safe operating condition. When the battery is charged above the over voltage detection level, the GLF73611 charging switches off in a preset delay time. As the battery voltage decreases lower than the over discharge detection voltage, the GLF73611 discharging switch is turned off immediately. In the off state, GLF73611 consumes an ultra-low leakage current (I_{SD}) to save battery power. In addition, when the load current is higher than the I_{SC} short circuit protection current level, the GLF73611 is turned off and will maintain the off state to avoid any serious damage to the system. The short circuit delay time can avoid any false trigger which might turn on the switch.

The GLF73611 provides a shipping mode to prevent the device which has non-removable battery keep discharging during the shipping period. When a charged battery cell is connected to the GLF73611, and GLF73611 remains in the off state, the smart devices consume an ultra-low leakage current (I_{SD}). Note that the only way to activate the GLF73611 is applying a charger output V_{ON} voltage to VOUT pin.

The GLF73611 also has the 0V battery charge inhibition function. The battery is not allowed to charge when the battery voltage is lower than the 0V battery charge inhibition voltage (V_{BCI}).

FEATURES

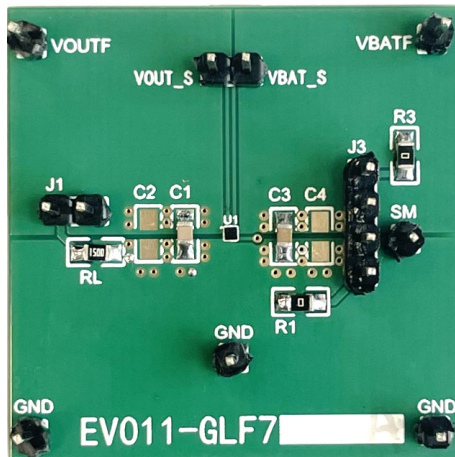
- Overcharge Detection Voltage, V_{OC}
 - GLF73611A detects VOUT to release V_{OC}
 - GLF73611B detects VBAT to release V_{OC}
- Overdischarge Detection, V_{OD}
 - GLF73611A detects 2.90 V_{OUT}
 - GLF73611B detects 2.80 V_{BAT}
- Overcharge Current Detection, I_{OC} : 330 mA
 - Overdischarge Current Detection, I_{OD} : 215 mA
- Short Circuit Protection
- Activated by Applying V_{ON} to the VOUT Pin from Charger
- Shipping Mode Implementation
- Low R_{ON} : 60 m Ω Typ. at 3.6 V_{BAT}
- Low Quiescent Current, I_Q : 1.6 μ A Typ at 3.6 V_{BAT}
- Shutdown Current:
 - $I_{SD} = 15$ nA Typ. @ $V_{BAT} < V_{OD}$
 - $I_{SD} = 21$ nA Typ. @ $V_{BAT} = 3.7$ 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.
- HBM: 8 kV, CDM: 2 kV.
- 0.97 mm x 0.97 mm x 0.55 mm, 4 Bumps Wafer Level Chip Scale Package.

PRODUCT TABLE

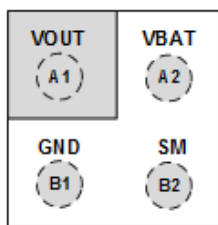
Eval Board Ordering Info: EV011-GLF73611

Part Number	Top Mark	R_{ON} (Typ.) at 3.6 V V_{BAT}	Over charge Detection V_{OC}	Over discharge Detection V_{OD}	Overcharge Current I_{OC}	Over discharge Current I_{OD}	Short Circuit Current I_{SC}
GLF73611A -S2G7	EI	60 m Ω	4.475 V	2.90 V	330 mA	215 mA	500 mA
GLF73611B -S2G7	FI			2.80 V			

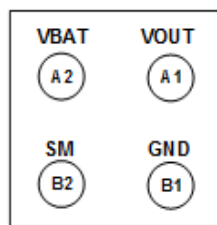
EVALUATION BOARD



DEVICE PACKAGE AND PINOUT



TOP VIEW



BOTTOM VIEW

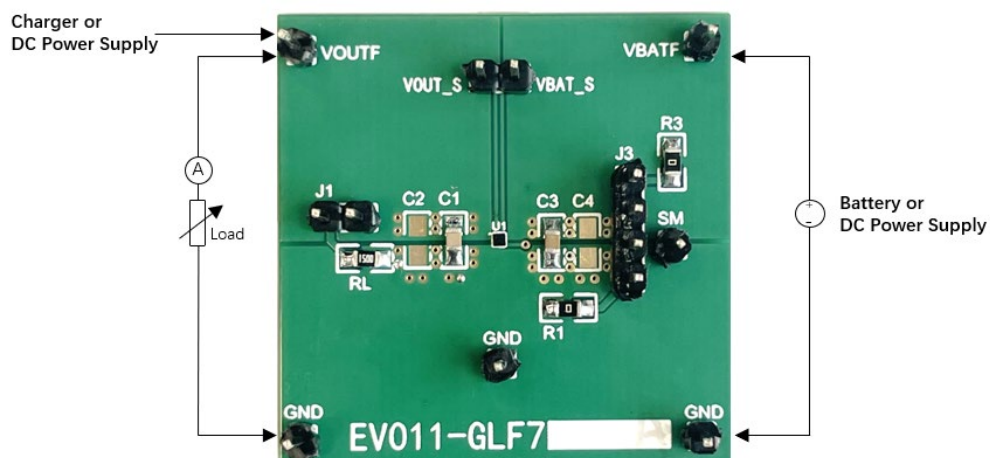
Pin #	Name	Description
A1	VOUT	VOUT pin is connected to the charger output and system load. If the switch is in the off state, applying the appropriate voltage (V_{ON}) to VOUT turn the switch on.
A2	VBAT	VBAT pin is connected to the positive terminal of a battery pack to monitor the battery voltage.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

QUICK START GUIDE

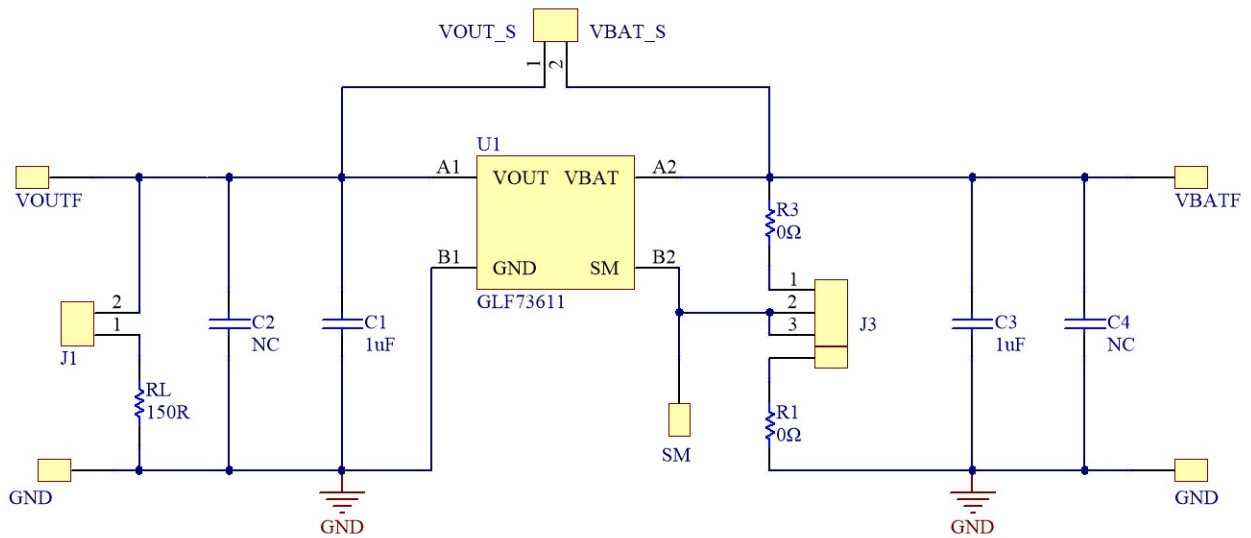
The evaluation board EV011-GLF73611 is easy to set up to evaluate the performance of GLF73611.

1. Connect the positive and negative terminals of 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, GLF73611 internal switch will be turned on.
4. The load resistor $R_L = 150\ \Omega$, has been populated on the PCB board. Short the J1 to use the R_L . To increase the output current, connect an electronic load to VOUT and GND.
5. When the VBAT voltage decreases to the V_{OD} , the GLF73611 is latched-off. In order to wake up the latched-off GLF73611, the on voltage (V_{ON}) needs to be applied to VOUT connector from a charger or a DC Power Supply.
6. When the VBAT voltage reaches the V_{OC} , the GLF73611 switch is turned off to stop charging and get back to the on state as the VBAT voltage decreases by 150 mV (V_{OC_HYS}) below V_{OC} .
7. When the IOUT current exceeds I_{OD} , GLF73611 will be latched off after a delay of 9.5 ms (Typ.). When IOUT current exceeds I_{SC} , GLF73611 will be latched off immediately. In order to restart, set GLF73611 within the operating voltage and current range, and V_{ON} needs to be applied to the VOUT.
8. When the GLF73611 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 GLF73611 will turn off after $t_{dSM} = 1.2s$ delay. It could save battery energy during transportation and storage.

TEST SETUP



SCHEMATIC



BILL OF MATERIALS

Qty	Reference	Value	Part Description	Note
1	U1	GLF73611	GLF73611	GLF Integrated Power
2	C1, C3	1.0 μ F	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

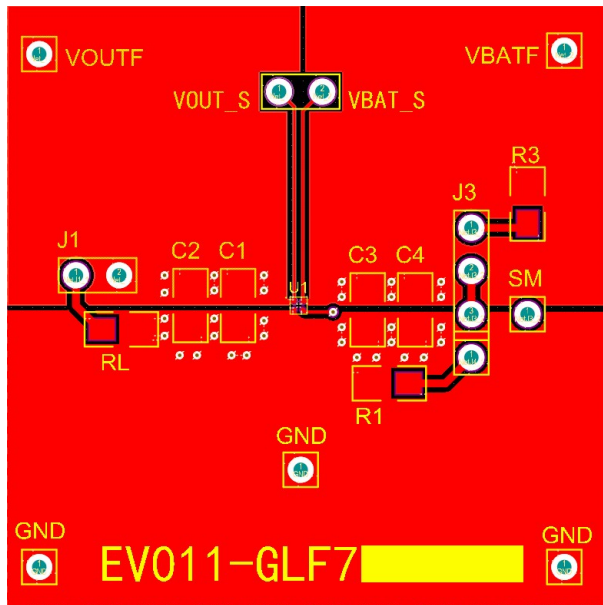


Fig 1. Top Layer

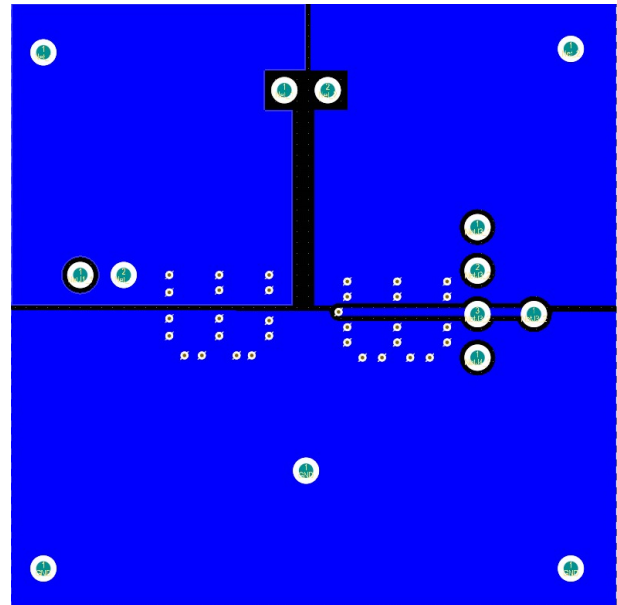


Fig 2. Bottom Layer

NOTICE: The evaluation board provided by GLF Integrated Power is intended for use for ENGINEERING DEVELOPMENT, OR EVALUATION PURPOSES ONLY and is not for any commercial use. The user assumes all responsibility and liability for proper and safe handling of the goods.