GLF76431
Integrated Load Switch with Configurable Power Reset Timer

DESCRIPTION

The GLF76431 is an 6A load switch with an configurable reset timer for portable devices.

The /SRO pin offers a true reset function enabling the load switch to completely disconnect the load from the input battery after a reasonable long delay time. After the reset period, the main switch of the GLF76431 reconnects the output load to the input battery for normal operation. The programmable delay time to the power reset mode by an external resistor on the REXT pin provides designers with system design flexibility.

The OFF input pin allows the GLF76431 to achieve complete shutdown with total downstream standby current of 360 nA typical. With the switch placed between a battery and system, this switch can help to significantly extend system battery life in mobile devices during shipping or periods of extended off time.

The GLF76431 helps to reduce power consumption with the best in class R_{ON} and a breakthrough on state I_Q of only 420 nA typical when the switch is on.

The GLF76431 integrated 1ms slew rate control can also enhance system reliability by mitigating bus voltage swings during switching events. Where uncontrolled switching can generate high inrush currents that result in voltage droop and/or bus reset events, the GLF76431 slew rate control specifically limits inrush currents during turn-on to minimize voltage droop. The output discharge function makes output voltage off quickly during the reset period.

FEATURES

- Ultra-Low I_{SD}: 360 nA Typ at 3.6 V_{BAT}
- Ultra-Low I_Q: 420 nA Typ at 3.6 V_{BAT}
- Low R_{ON} : 34 mΩ Typ at 3.6 V_{BAT}
- I_{OUT} Max : 6 A
- Supply Voltage Range: 1.8 V to 5.5 V
  6 Vabs max
- Power Reset Mode by /SRO Pin Disconnect the downstream system from the Battery Source
- Programmable Delay Time (Hold Time) to Power Reset by /SRO Pin, 7.5 s at R_{EXT}=150 KΩ
- Programmable Turn-Off Delay Time by OFF Pin, 7.5 s at R_{EXT}=150 KΩ
- Programmable Power Reset Duration Time , 470 ms at R_{EXT}=150 KΩ
- Integrated Output Discharge During Reset Period
- Controlled Output Rise Time: 1ms at 3.6 V_{BAT}
- Operating Temperature Range: -40 °C to 85 °C
- HBM: 6 kV, CDM: 2 kV

PRODUCT TABLE

Eval Board Ordering Info	Part Number	Top Mark	R_{ON} (Typ.) at 3.6 V_{BAT}	/SRO Hold Time	OFF Delay Time	Output Discharge
EV022-GLF76431	GLF76431	AG	34 mΩ	Programmable		95 Ω

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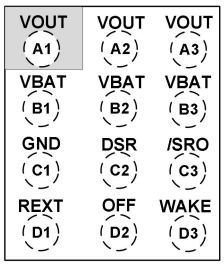
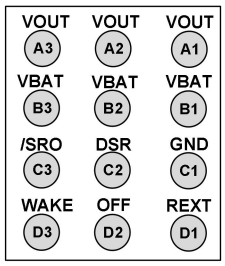
EVALUATION BOARD

PIN CONFIGURATION AND DEFINITION



TOP VIEW



BOTTOM VIEW

Pin #	Name	Description
A1, A2, A3	VOUT	Switch Output.
B1, B2, B3	VBAT	Switch Input. VBAT pin is connected to the positive input of an external battery.
C1	GND	Ground
C2	DSR	Delay Selection Input, connected to GPIO with 100 KΩ pull-up or to VBAT directly without pull-up resistor
C3	/SRO	Reset Input or Power-On. Active Low. It needs an external pull-up resistor. It is typically connected to the center between an external pull-up resistor which is directly tied with the battery and a mechanical key button on a device.
D1	REXT	With an external resistor, the REXT pin preset the delay time to turn off the main switch to enter the deep sleep mode by both the /SRO and OFF pins.
D2	OFF	Main Switch Off Input. It is triggered by the rising edge signal to change the main switch from on to off-state. It has an internal pull-down resistance, 10 MΩ Typ. to keep the OFF pin grounded. No need an external pull-down resistor.
C1	WAKE	System Wake Input. It is triggered by the rising edge signal to change the main switch from off to on-state. It has an internal pull-down resistance, 10 MΩ Typ. to keep the WAKE pin grounded. No need an external pull-down resistor.

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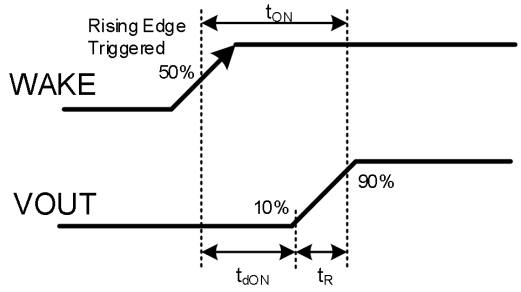
QUICK START GUIDE

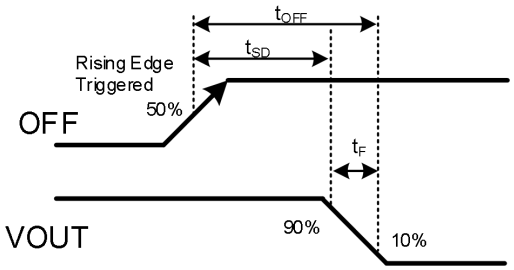
The evaluation board EV022 is easy to set up to evaluate the performance of GLF76431.

1. Preset the input power supply to the desired operating voltage before applying to the VBAT Pin. Connect the positive and negative terminals of the input power supply or a Li-Ion battery pack to VBAT and GND respectively.
2. Connect J2 with jumper to enable DSR=High. Connecting pins #1 and #2 of J4 with a jumper will enable R3 (R_{EXT}=1 KΩ), or connecting pins #2 and #3 of J4 with a jumper will enable R4 (R_{EXT}=150 KΩ).
3. Use a jumper to connect J1 or press and hold the /SRO switch for less than 1 s to turn on VOUT.
4. The load resistor, RL=150 Ω, has been populated on the PCB board. Short the J3 to use the RL. To increase the output current, connect an electronic load to VOUT and GND. The output current for GLF76431 is rated for 6 A maximum output continuous current. Please ensure this absolute maximum is not exceeded.
5. When the /SRO switch is long pressed and the /SRO is low, it can be observed that VOUT will be turned off after a delay of $t_{Reset-Dly}$, and VOUT will be turned on again after the t_{Reset} time.
6. Short press the OFF switch or use an external signal to trigger, use OFF=High, it can be observed that after a delay of t_{SD} time, VOUT will be turned off.
7. If you want to turn on VOUT again, follow procedure 3.

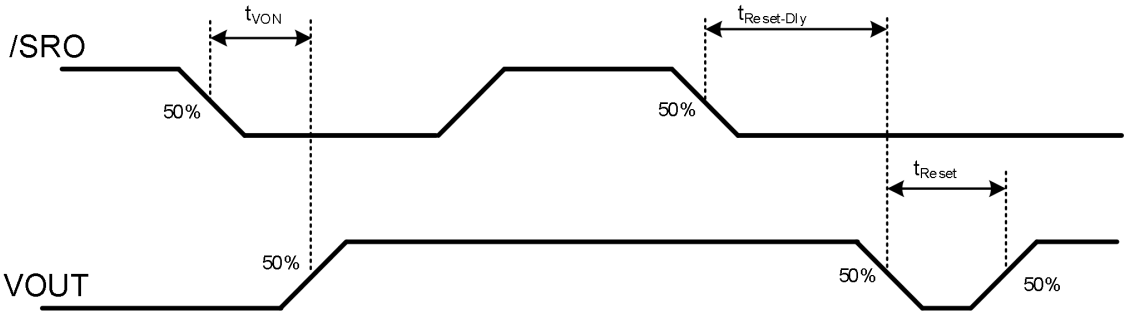
TIMING DIAGRAM AND FUNCTION TABLE



Power-On by WAKE Pin



Power-Off by OFF Pin



Power-On and Reset by /SRO Pin

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Table 1. Pin Default State With Input Power Source

Pin Name	/SRO	WAKE	OFF	VOUT
Default State	1	0	0	GND

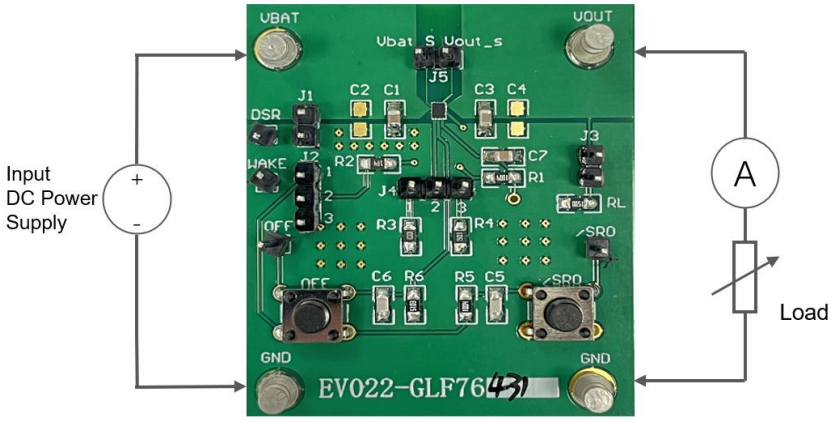
Note: 1=Logic High, 0=Logic Low, The VOUT=GND means the internal load switch is off.

Table 2. Input Conditions and VOUT

Function	/SRO	WAKE	OFF	DSR	Delay Time (Hold time)	VOUT Action
Power-On	High to Low & Hold to Ground	X	X	Low	t_{VON}<4 ms	VOUT=VBAT
	High to Low & Hold to Ground	X	X	High	t_{VON}=0.75 s at R_{EXT}=150 KΩ	VOUT=VBAT
	High	Low to High Rising Edge Triggered	X	High	t_{dON}=0.8 ms (2)	VOUT=VBAT
Power Reset	High to Low & Hold to Ground	X	X	Low	$t_{Reset-Dly<1mS}$ t_{Reset} =470 ms	VOUT to GND to VOUT
	High to Low & Hold to Ground	X	X	High	Programmable (3) R_{EXT}=150 kΩ, $t_{Reset-Dly}$=7.5 s t_{Reset}=470 ms	VOUT to GND to VOUT
Power Off	High	Low	Low to High Rising Edge Triggered	Low	t_{SD}<1 ms	VOUT to GND
	High	Low	Low to High Rising Edge Triggered	High	Programmable (3) t_{SD}= 7.5 s with R_{EXT}=150 kΩ	VOUT to GND

Notes: 1. X = Don't Care
2. The t_{dON} can be longer with an external capacitor on the WAKE pin due to a RC time-constant to the trig ger level of rising edge.

TEST SETUP



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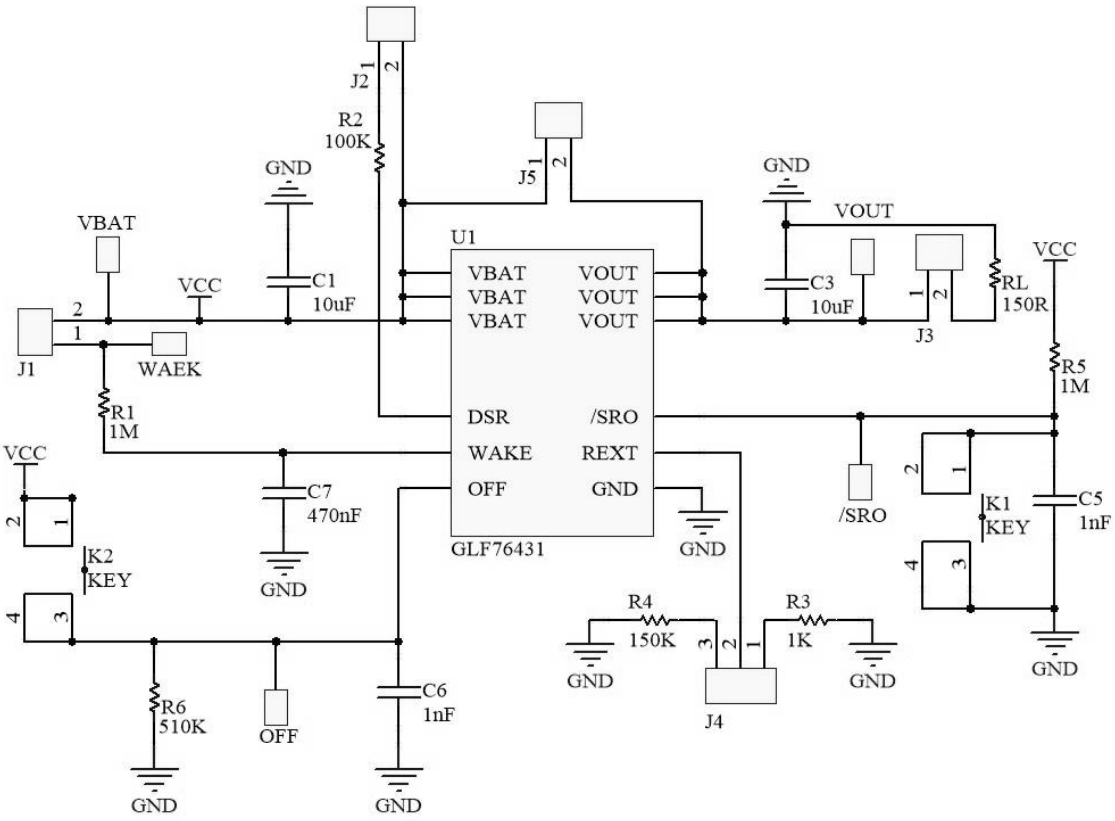
SCHEMATIC



BILL OF MATERIALS

Qty	Reference	Value	Part Description	Manufacturer/Part Number
1	U1	GLF76431	GLF76431, WLCSP	GLF Integrated Power
2	C1,C3	10 μF	Cap., X5R, 25V, 10% 0805	YAGEO CC0805KKX5R8BB106
2	C5,C6	1 nF	Cap., X7R, 16V, 5% 0805	AVX # 0805YA103JAT2A
1	C7	470 nF	Cap., X7R, 50V, 10% 0805	YAGEO CC0805KKX7R9BB474
2	R1, R5	1 M	Res.	YAGEO RC0805FR071ML
1	R2	100 K	Res.	YAGEO RT0805BRD07100KL
1	R3	1 K	Res.	YAGEO RT0805FRE071KL
1	R4	150 K	Res.	YAGEO RT0805FRD07150KL
1	R6	510 K	Res.	YAGEO RC0805FR07510KL
1	RL	150 K	Res.	YAGEO RC0805FR07150R
2	SW1, SW2	PB-SW	Tactile Switch	E-Switch / TL1105FF160Q
5	J1,J2,J3,J4,J5	Jumper	Jumper	

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PRINTED CIRCUIT BOARD LAYOUT

Fig 1. Top Layer

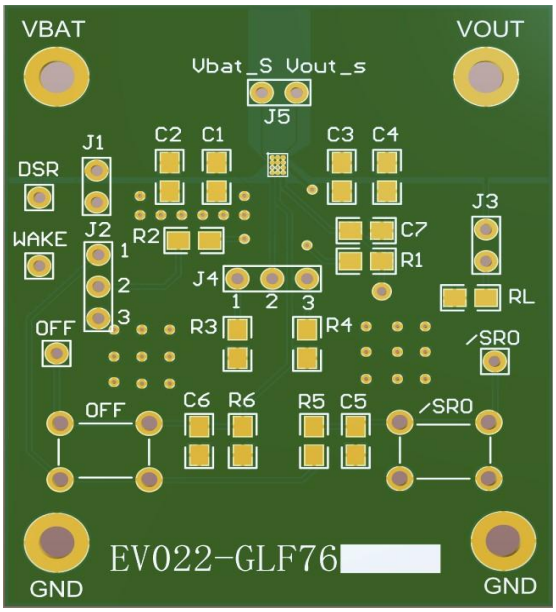
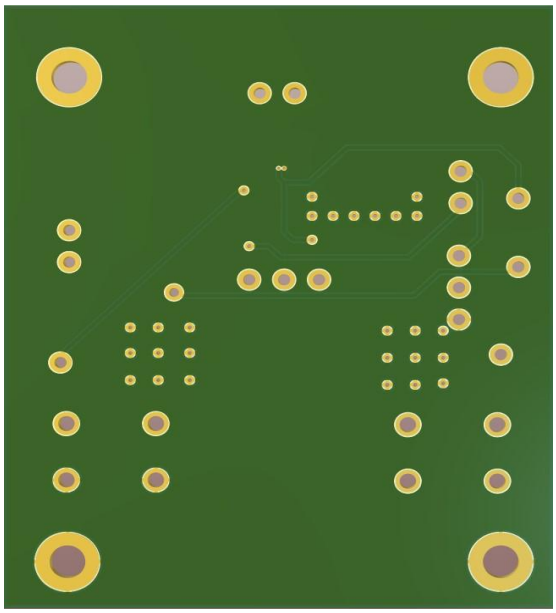


Fig 2. Bottom Layer



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