

DESCRIPTION

The GLF1200H / GLF1201H is an advanced technology fully integrated I_QSmart™ load switch device with reverse current blocking (RCB) protection and slew rate control of the output voltage.

The GLF1200H / GLF1201H offers industry leading reverse current blocking (RCB) protection performance, featuring an ultra-low threshold voltage. The GLF1200H / GLF1201H minimizes reverse current flow in the event that the V_{OUT} voltage exceeds the V_{IN} voltage.

An integrated slew rate control can also enhance system reliability by mitigating bus voltage swings during switching events. Where uncontrolled switches can generate high inrush currents that result in voltage droop and/or bus reset events, the GLF slew rate control specifically limits inrush currents during turn-on to minimize voltage droop.

The GLF1200H / GLF1201H load switch device supports an industry leading wide input voltage range that helps to improve system operating life and overall performance. One GLF120x device can be used in multiple voltage rail applications which helps mitigate inventory management and reduces BOM cost.

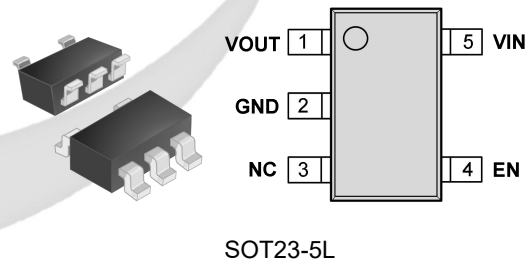
FEATURES

- Wide Input Range: 1.5 V to 5.5 V
6 V abs max
- Ultra-Low I_Q: 0.47 μA Typ at 5.5 V_{IN}
- Ultra-Low I_{SD}: 26 nA Typ at 5.5 V_{IN}
- Low R_{ON}: 54 mΩ Typ at 5.5 V_{IN}
- I_{OUT} Max: 2 A
- Reverse Current Blocking Protection
- Controlled Rise Time: 600 μs at 3.3 V_{IN}
- Internal EN Pull-Down Resistor on
- Integrated Output Discharge Switch: GLF1201H
- Wide Operating Temperature Range: -40 °C ~ 105 °C
- HBM: 4 kV, CDM: 2 kV

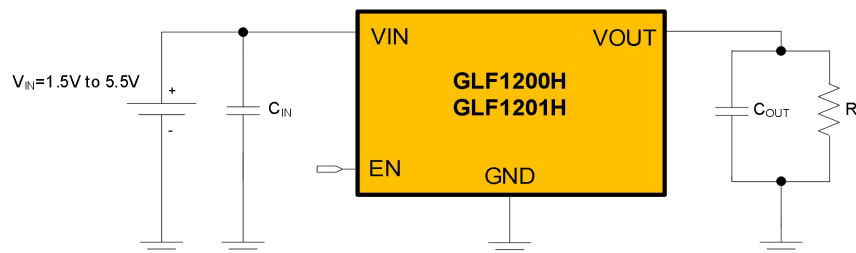
APPLICATIONS

- Smart IoT Devices
- Portable Industrial Devices
- Low Power Subsystems
- Wearable Devices

PACKAGE



APPLICATION DIAGRAM



ALTERNATE DEVICE OPTIONS

Part Number	Top Mark	R _{ON} (Typ) at 5.5 V _{IN}	Reverse Current Blocking	Output Discharge	EN Activity
GLF1200H-T1G7	DMH	54 mΩ	Yes	NA	High
GLF1201H-T1G7	DNH	54 mΩ		85 Ω	High

FUNCTIONAL BLOCK DIAGRAM

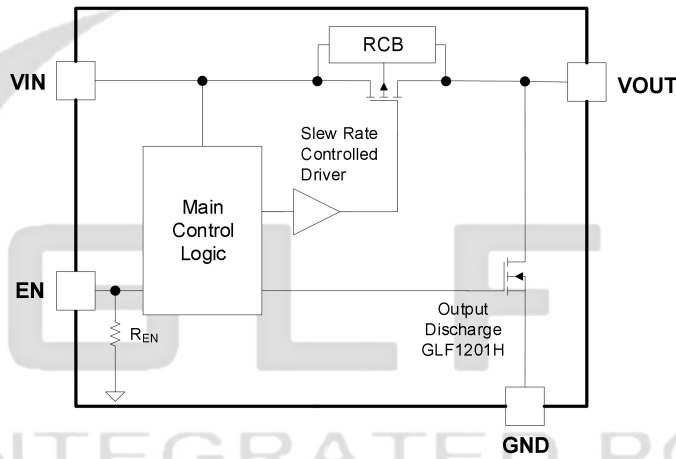


Figure 1. Functional Block Diagram

PIN CONFIGURATION

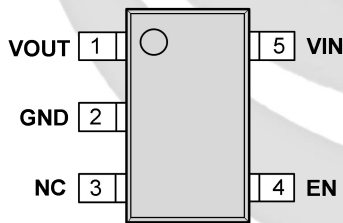


Figure 2. SOT23-5L

PIN DEFINITION

Pin #	Name	Description
1	VOUT	Switch Output
2	GND	Ground
3	NC	No connection
4	EN	Enable to control the switch
5	VIN	Switch Input. Supply Voltage for IC

ABSOLUTE MAXIMUM RATINGS

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions; extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Min.	Max.	Unit
V _{IN} , V _{OUT} , V _{EN}	V _{IN} , V _{OUT} , V _{EN} to GND	- 0.3	6	V
I _{OUT}	Maximum Continuous Switch Current		2	A
T _{STG}	Storage Junction Temperature	- 65	150	°C
θ _{JC}	Thermal Resistance, Junction to Case		90	°C/W
θ _{JA}	Thermal Resistance, Junction to Ambient		180	°C/W
ESD	Electrostatic Discharge Capability	Human Body Model, JESD22-A114	± 4	kV
		Charged Device Model, JESD22-C101	± 2	

Note. The θ_{JA} is measured at T_A = 25°C on a high effective thermal conductivity four-layer test board per JEDEC 51-7.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min.	Max.	Unit
V _{IN}	Supply Voltage	1.5	5.5	V
T _A	Ambient Operating Temperature	- 40	+ 105	°C

ELECTRICAL CHARACTERISTICS

Values are at V_{IN} = 3.3 V and T_A = 25 °C unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Basic Operation						
I _Q	Quiescent Current ⁽¹⁾	V _{IN} = V _{EN} = 5.5 V, I _{OUT} = 0 mA		0.47		μA
		V _{IN} = V _{EN} = 5.5 V, I _{OUT} = 0 mA, T _A = 85 °C ⁽⁴⁾		0.52		
		V _{IN} = V _{EN} = 5.5 V, I _{OUT} = 0 mA, T _A = 105 °C ⁽⁴⁾		0.54		
I _{SD}	Shut Down Current	V _{EN} = 0 V, V _{IN} = 1.5 V I _{OUT} = 0 mA		2.0		nA
		V _{EN} = 0 V, V _{IN} = 3.3 V I _{OUT} = 0 mA		3.0		
		V _{EN} = 0 V, V _{IN} = 4.2 V I _{OUT} = 0 mA		10		
		V _{EN} = 0 V, V _{IN} = 5.5 V I _{OUT} = 0 mA		26		
		V _{EN} = 0 V, V _{IN} = 5.5 V, I _{OUT} = 0 mA, T _A = 85 °C ⁽⁴⁾		365		
		V _{EN} = 0 V, V _{IN} = 5.5 V, I _{OUT} = 0 mA, T _A = 105 °C ⁽⁴⁾		1020		
R _{ON}	On-Resistance	V _{IN} = 5.5 V, I _{OUT} = 500 mA	T _A = 25 °C	54		mΩ
			T _A = 85 °C ⁽⁴⁾	63		
			T _A = 105 °C ⁽⁴⁾	68		
		V _{IN} = 3.3 V, I _{OUT} = 500 mA	T _A = 25 °C	64		
			T _A = 85 °C ⁽⁴⁾	75		
			T _A = 105 °C ⁽⁴⁾	81		
		V _{IN} = 1.8 V, I _{OUT} = 300 mA	T _A = 25 °C ⁽⁴⁾	105		
V _{IN} = 1.5 V, I _{OUT} = 100 mA	T _A = 25 °C	116				
R _{DSC}	Output Discharge Resistance	V _{EN} = LOW, I _{FORCE} = 10 mA, GLF1201H		85		Ω
V _{IH}	EN Input Logic High Voltage	V _{IN} = 1.5 V to 5.5 V	1.2			V

V _{IL}	EN Input Logic Low Voltage	V _{IN} = 1.5 V to 5.5 V			0.4	V
R _{EN}	EN Internal Resistance	Internal Pull-down Resistance			10	MΩ
I _{EN}	EN Current	V _{EN} = 5.5 V			0.5	μA
V _{RCB_TH}	RCB Protection Threshold Voltage	V _{OUT} – V _{IN}			35	mV
V _{RCB_RL}	RCB Protection Release Voltage	V _{IN} – V _{OUT}			30	mV
Switching Characteristics ^(2, 3)						
t _{dON}	Turn-On Delay	R _L = 150 Ω, C _{OUT} = 0.1 μF			450	μs
t _R	V _{OUT} Rise Time				600	
t _{dOFF}	Turn-Off Delay ⁽⁴⁾	R _L = 150 Ω, C _{OUT} = 0.1 μF, GLF1200H			17	
t _F	V _{OUT} Fall Time ⁽⁴⁾				27	
t _{dOFF}	Turn-Off Delay ⁽⁴⁾	R _L = 150 Ω, C _{OUT} = 0.1 μF, GLF1201H			17	
t _F	V _{OUT} Fall Time ^{(3), (4)}				12	

- Notes:
- I_Q does not include the enable pull down current (I_{EN}) through the pull-down resistor R_{EN}.
 - t_{ON} = t_{dON} + t_R, t_{OFF} = t_{dOFF} + t_F
 - Output discharge path is enabled during off.
 - By design; characterized, not production tested.

TIMING DIAGRAM

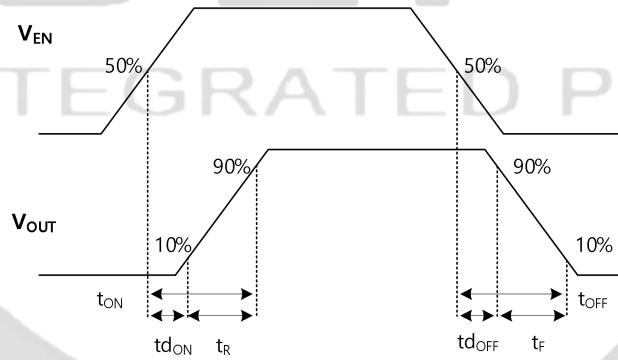


Figure 3. Timing Diagram

TYPICAL PERFORMANCE CHARACTERISTICS

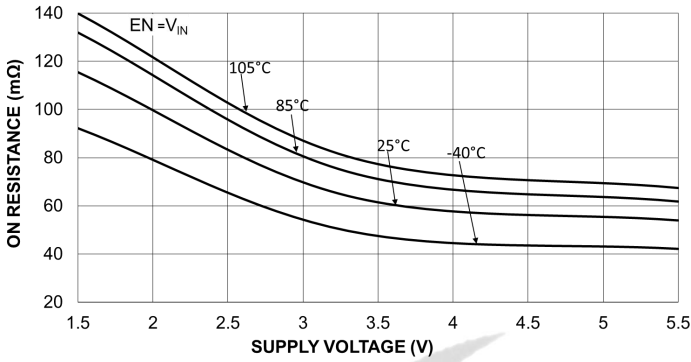


Figure 4. On-Resistance vs. Supply Voltage

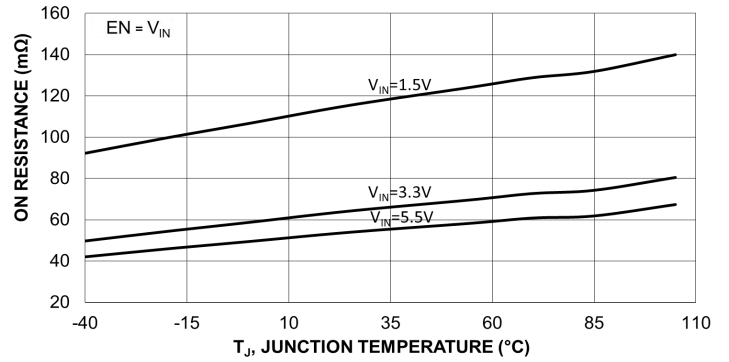


Figure 5. On-Resistance vs. Temperature

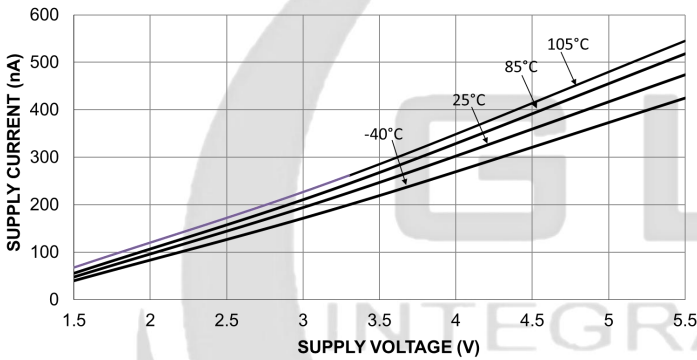


Figure 6. Quiescent Current vs. Supply Voltage

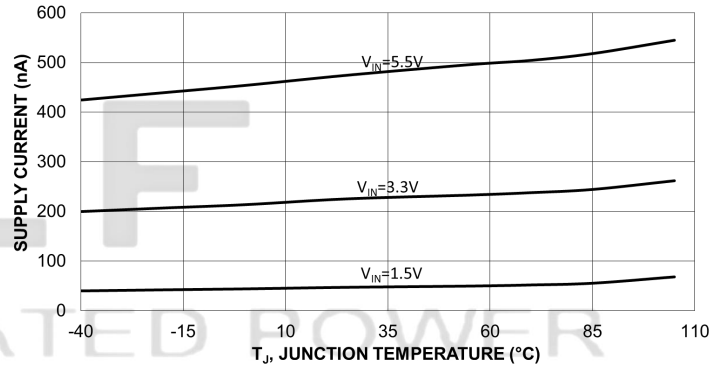


Figure 7. Quiescent Current vs. Temperature

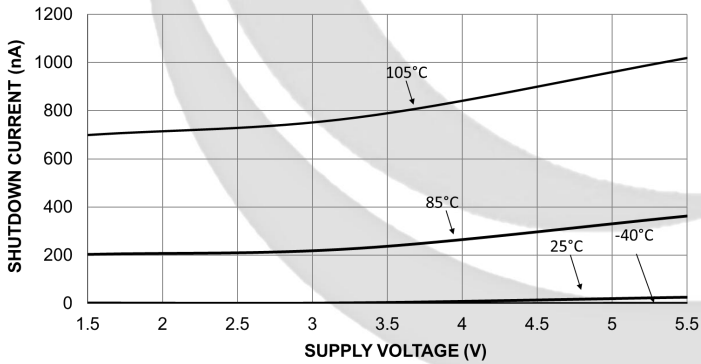


Figure 8. Shutdown Current vs. Supply Voltage

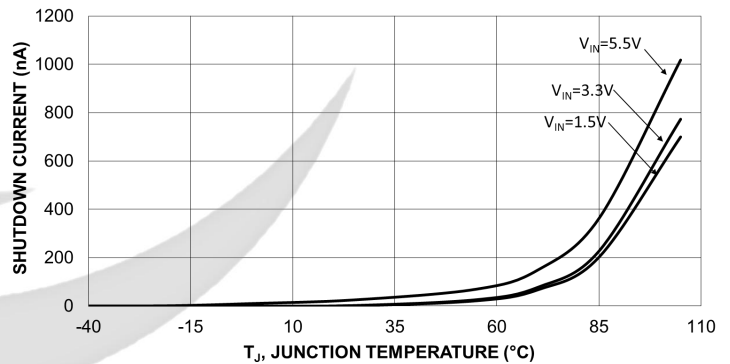


Figure 9. Shutdown Current vs. Temperature

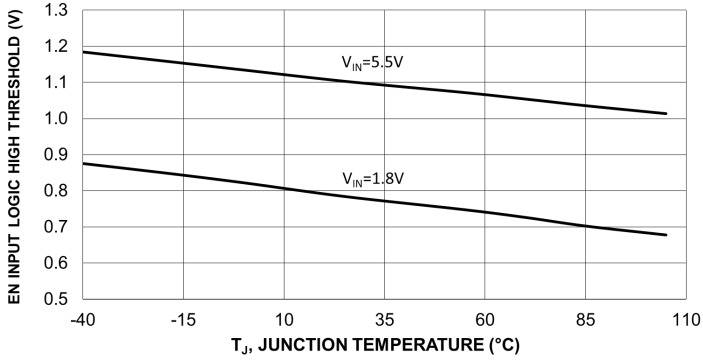


Figure 10. EN Input Logic High Threshold Vs. Temperature

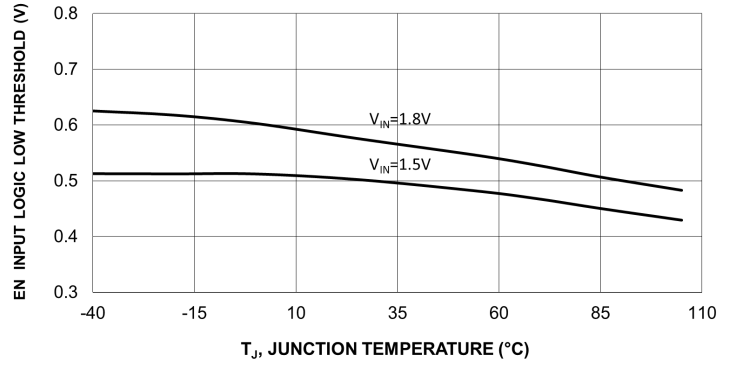


Figure 11. EN Input Logic Low Threshold Vs. Temperature

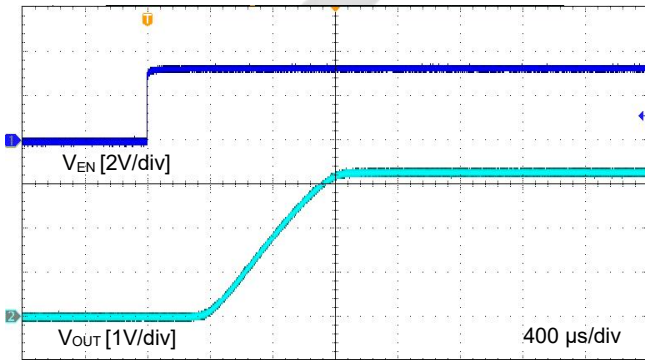


Figure 12. Turn-On Response, GLF1200H

V_{IN}=3.3 V, C_{IN}=0.1 μF, C_{OUT}=0.1 μF, R_L=150 Ω

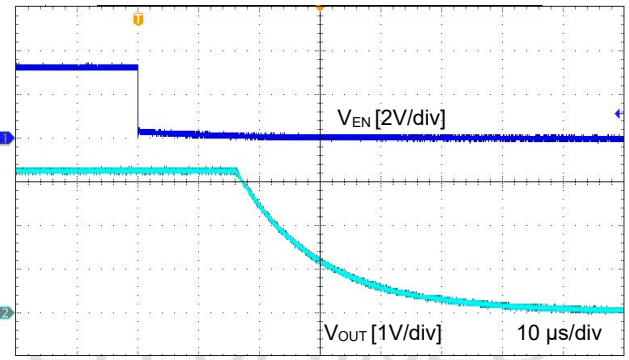


Figure 13. Turn-Off Response, GLF1200H

V_{IN}=3.3 V, C_{IN}=0.1 μF, C_{OUT}=0.1 μF, R_L=150 Ω

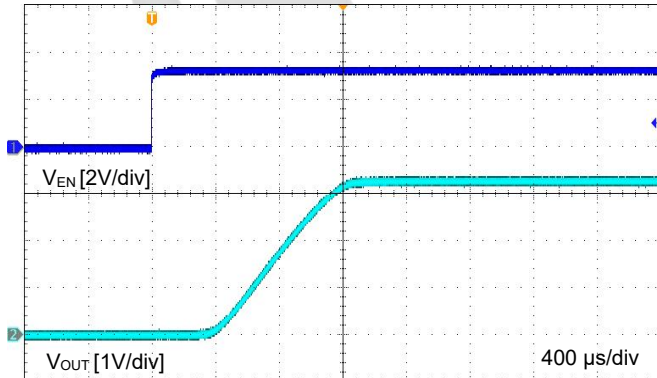


Figure 14. Turn-On Response, GLF1201H

V_{IN}=3.3 V, C_{IN}=0.1 μF, C_{OUT}=0.1 μF, R_L=150 Ω

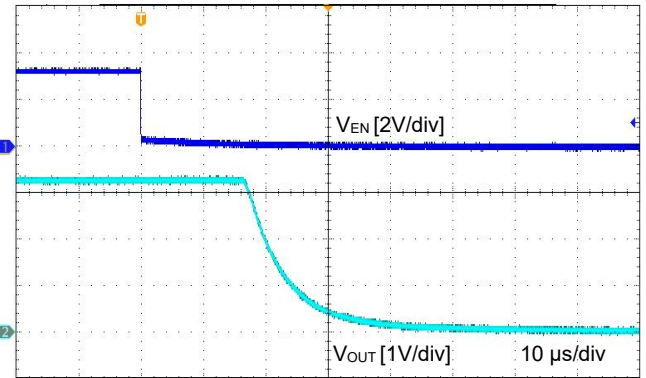


Figure 15. Turn-Off Response, GLF1201H

V_{IN}=3.3 V, C_{IN}=0.1 μF, C_{OUT}=0.1 μF, R_L=150 Ω

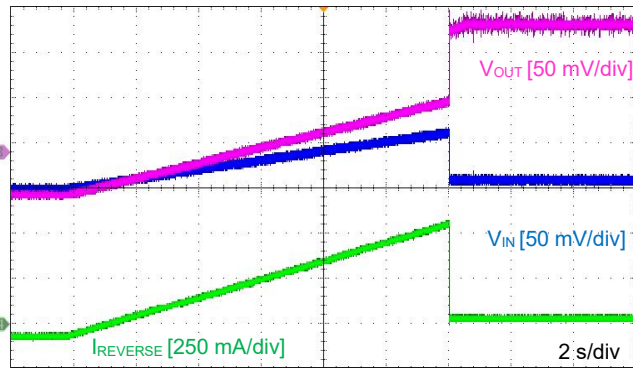


Figure 16. Reverse Current Blocking Threshold

V_{IN}=3.3 V, V_{OUT} =Up to 3.4 V, C_{IN}=0.1 μF, C_{OUT}=0.1 μF, R_L=150 Ω

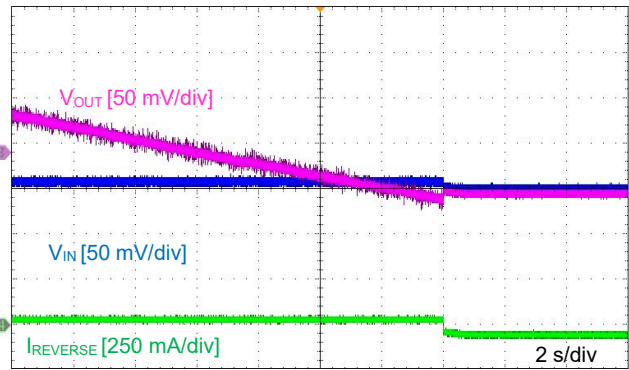


Figure 17. Reverse Current Blocking Release

V_{IN}=3.3 V, V_{OUT}=Down to 3.2 V, C_{IN}=0.1 μF, C_{OUT}=0.1 μF, R_L=150 Ω

APPLICATION INFORMATION

The GLF1200H / GLF1201H is an integrated 2 A, ultra-low leakage I_QSmart™ load switch devices with a fixed slew rate control to limit the inrush current during turn on. Each device is capable of operating over a wide input voltage range from 1.5 V to 5.5 V with very low on-resistance to reduce conduction loss. In the off state, these devices consume very low leakage current to avoid unwanted standby current and save limited input power. The GLF1200H / GLF1201H is characterized for operation in the temperature range from -40 °C to 105 °C.

Input and Output Capacitor

A minimum 0.1 μF input capacitor is recommended to be placed close to the V_{IN} pin to reduce the voltage drop on the input power rail caused by transient inrush current at start-up. A higher input capacitor value can be used to further attenuate the input voltage drop. Also, a minimum 0.1 μF output capacitor is recommended to minimize voltage undershoot on the output pin during the transition when the switch is turned off. Undershoot can be caused by parasitic inductance from board traces or intentional load inductances. If load inductances do exist, use of an output capacitor can improve output voltage stability and system reliability. The C_{OUT} capacitor should be placed close to the V_{OUT} and GND pins.

EN Pin

The GLF1200H / GLF1201H can be activated by forcing EN pin high level. Note that the EN pin has an internal pull-down resistor to help pull the main switch to a known “off state” when no EN signal is applied from an external controller.

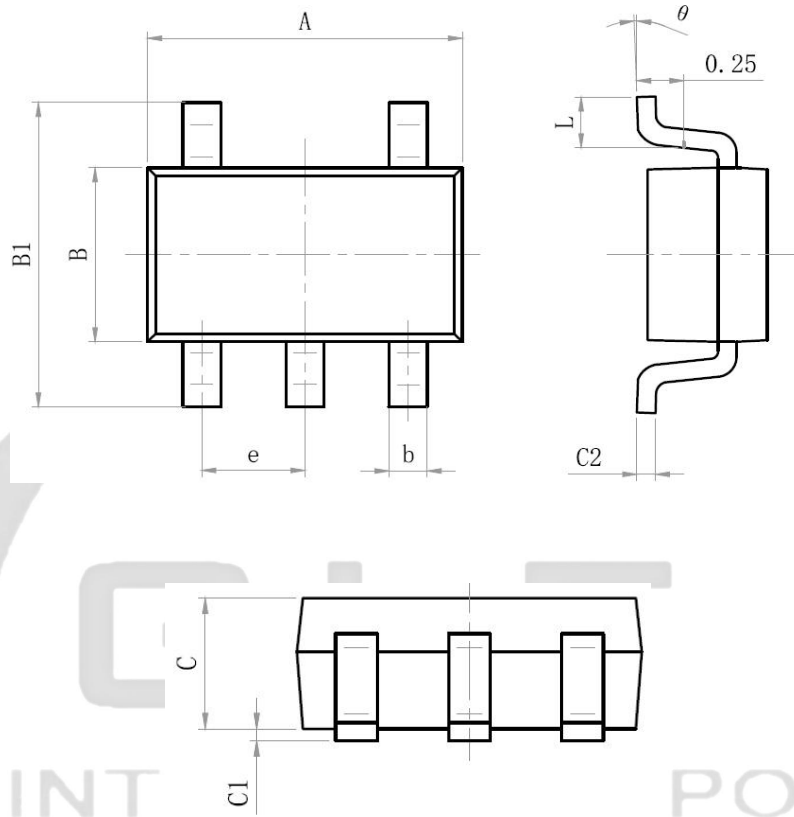
Reverse Current Blocking

The GLF1200H / GLF1201H has a built-in reverse current blocking protection which always monitors the output voltage level regardless of the status of EN pin to check if it is greater than the input voltage. When the output voltage goes beyond the input voltage by the reverse current blocking protection threshold voltage (V_{RCB_TH}), the reverse current blocking function block turns off the switch. Note that some reverse current can occur until the V_{RCB_TH} is triggered. The main switch will resume normal operation when the output voltage drops below the input source by the reverse current blocking protection release voltage (V_{RCB_RL}).

Output Discharge Function

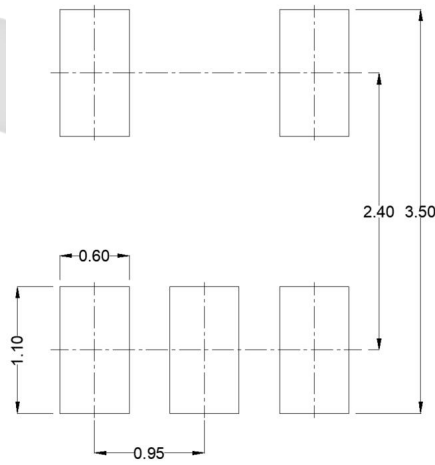
The GLF1201H has an internal discharge N-channel FET switch on the V_{OUT} pin. When EN signal turns the main power FET to an off state, the N-channel switch turns on to discharge an output capacitor quickly.

PACKAGE OUTLINE



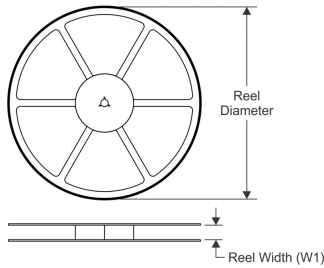
Size Mark	Min (mm)	Max (mm)	Size Mark	Min (mm)	Max (mm)
A	2.82	3.02	C	1.05	1.15
e	0.95 (BSC)		C1	0.03	0.15
b	0.28	0.45	C2	0.12	0.23
B	1.50	1.70	L	0.35	0.55
B1	2.60	3.00	theta	0°	8°

Recommended Footprint

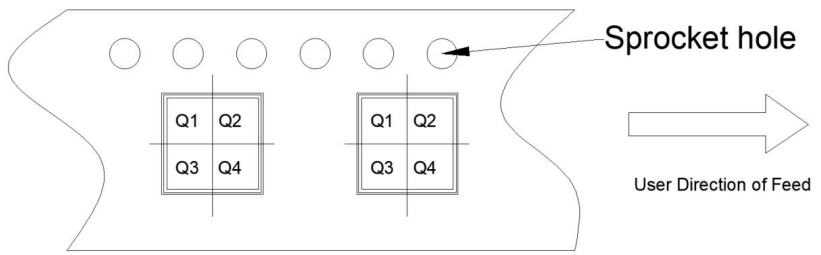


TAPE AND REEL INFORMATION

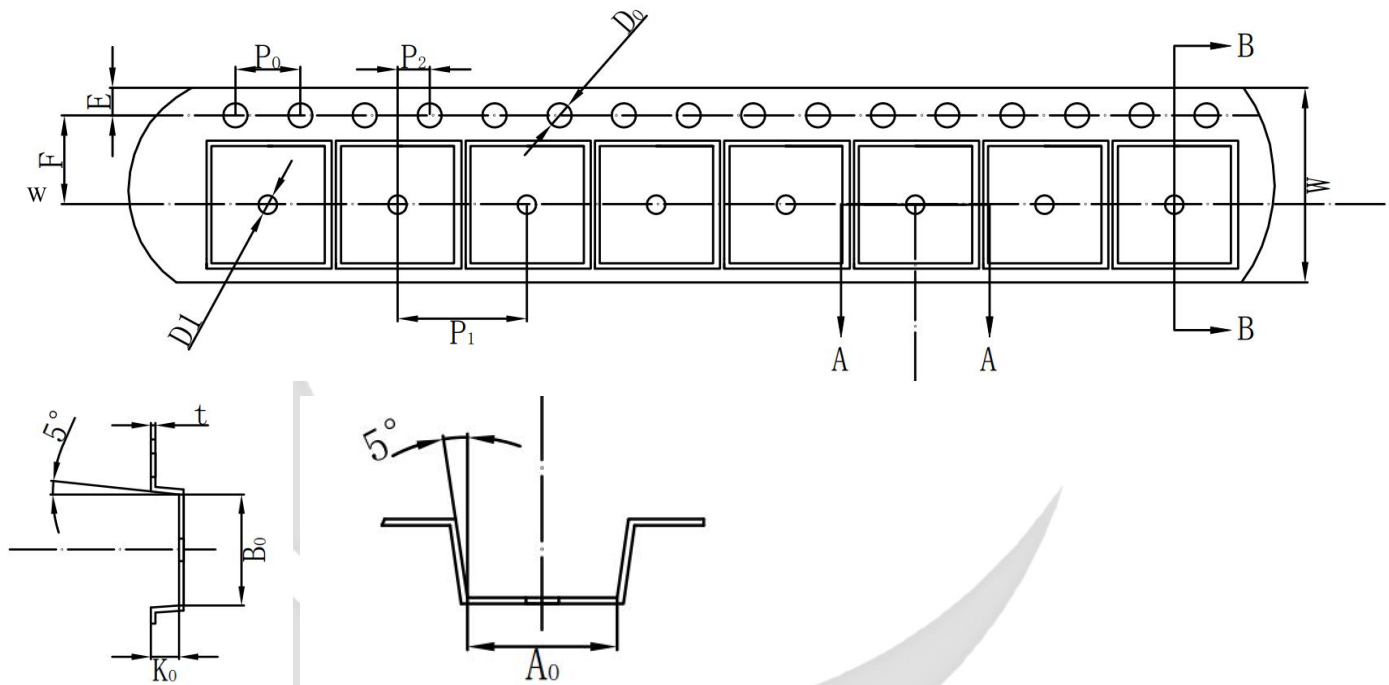
REEL DIMENSIONS



QUADRANT ASSIGNMENTS PIN 1 ORIENTATION TAPE



TAPE DIMENSIONS



Device	Package	Pins	SPQ	Reel Diameter (mm)	Reel Width W1	A0	B0	K0	P1	W	Pin1
GLF1200H-T1G7	SOT23-5	5	3000	178	9	3.25	3.30	1.38	4	8	Q3
GLF1201H-T1G7	SOT23-5	5	3000	178	9	3.25	3.30	1.38	4	8	Q3

Remark:

A0: Dimension designed to accommodate the component width

B0: Dimension designed to accommodate the component length

C0: Dimension designed to accommodate the component thickness

W: Overall width of the carrier tape

P1: Pitch between successive cavity centers

SPECIFICATION DEFINITIONS

Document Type	Meaning	Product Status
Target Specification	This is a target specification intended to support exploration and discussion of critical needs for a proposed or target device. Parameters including the typical, minimum, and maximum values are desired, or target. GLF reserves the right to change contents at any time without warning or notification. A target specification will not guarantee the future production of the device.	Design / Development
Preliminary Specification	This is a draft version of a product specification which is under internal review and subject to change. GLF reserves the right to change the specification at any time without warning or notification. A preliminary specification will not guarantee the future production of the device.	Qualification
Product Specification	This document represents the characteristics of the device.	Production

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