GLF2363A

Programmable High Precision Current Limit Power Switch

Product Specification

DESCRIPTION

The GLF2363A is an advanced technology fully integrated power switch for applications that required precision output current limitation. The GLF2363A also features a variety of protection functions, including under voltage lockout, reverse current blocking (RCB), short circuit protection, and thermal shutdown.

The GLF2363A provides a built-in output voltage slew rate control to eliminate the inrush current and voltage surge. The FLGB output pin can be used to send a fault event signal to the system controller. The integrated thermal shutdown (TSD) insures complete protection for the switch during output current limit and short circuit conditions. The GLF2363A is an ideal switch for any USB power supply.

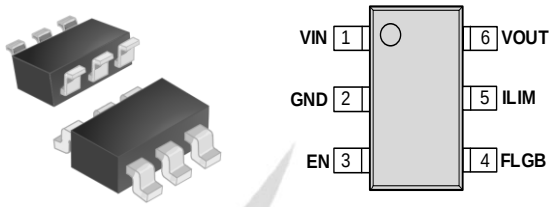
FEATURES

- Input Range: 2.5 V to 5.5 V
- Programmable Output Constant Current Limit:
  - Range: 100 mA to 4 A
- Low R_{ON}: 24 mΩ Typ. at 5.0 V_{IN}
- Ultra-Low I_Q: 26 μA Typ. at 5.0 V_{IN}
- Ultra-Low I_{SD}: 50 nA Typ. at 5.0 V_{IN}
- Under Voltage Lockout Protection
- Output Voltage Slew Rate Controlled
- Reverse Current Blocking Protection
- Short Circuit Protection
- Deglitched Fault Flag Indication
- Integrated Output Discharge Switch
- Thermal Shutdown Protection
- IEC 62368-1: 2018 CB Certification
  No. SG SGS-00506

APPLICATIONS

- Notebooks and Tablets
- Wireless LAN and Broadband Access Devices
- Storage and Peripherals
- Smart Mobile Devices

PACKAGE



Thin TSOT23-6L

DEVICE ORDERING INFORMATION

Part Number	Top Mark	Current Limit I_{LIM}	Output Discharge	Fault Flag FLGB	EN Activity	Package
GLF2363A-T2G7	GM	Programmable Output Current Limit Up to 4 A	98 Ω	Yes	High	TSOT23-6L

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APPLICATION DIAGRAM

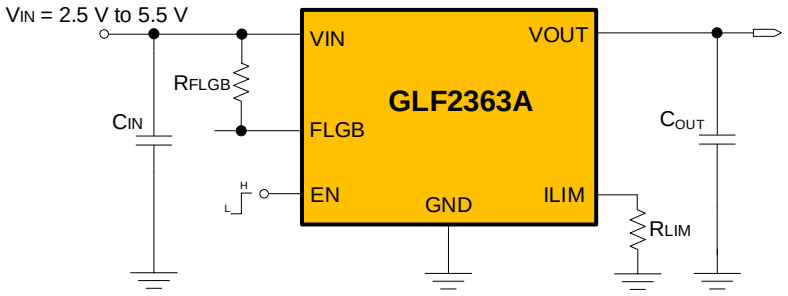

Figure 1. Typical Application

FUNCTIONAL BLOCK DIAGRAM

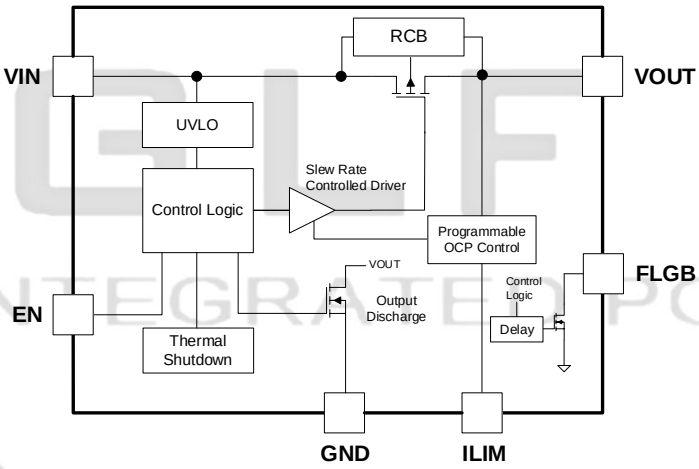

Figure 2. Functional Block Diagram

PIN CONFIGURATION

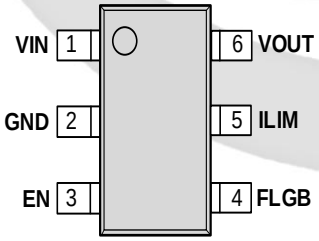

Figure 3. Package and Pin configuration

PIN DEFINITION

Pin #	Name	Description
1	VIN	Switch Input. Supply voltage for IC
2	GND	Ground
3	EN	Active high switch output enables to control the switch
4	FLGB	FLGB pin goes low to indicate OCP, SC, RCB and TSD fault conditions
5	ILIM	Programmable current limit, Do not leave this pin floating
6	VOUT	Switch output

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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 and 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}	VIN, VOUT, EN to GND		- 0.3	6	V
I_{OUT}	DC Continuous Current at T_A= 25 °C			4	A
T_{STG}	Storage Temperature		- 65	150	°C
T_J	Maximum Junction Temperature			150	°C
T_A	Operating Ambient Temperature		- 40	85	°C
θ_{JA}	Thermal Resistance, Junction to Ambient			100	°C/W
ESD	Electrostatic Discharge Capability	Human Body Model, JESD22-A114	± 8		kV
		Charged Device Model, JESD22-C101	± 0.5		

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min.	Max.	Unit
V_{IN}	Supply Voltage	2.5	5.5	V
T_A	Operating Ambient Temperature	- 40	+ 85	°C

ELECTRICAL CHARACTERISTICS

Values are at V_{IN} = 5.0 V and T_A = 25 °C. Unless otherwise noted

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Units
Basic Operation							
I_Q	Quiescent Current	EN = Enable, I_{OUT} = 0 mA			26	32	μA
I_{SD}	Shutdown Current	EN = Disable, I_{OUT} = 0 mA			50	100	nA
R_{ON}	On-Resistance	V_{IN} = 5.0 V, I_{OUT} = 500 mA	T_A = 25 °C		24	30	mΩ
			T_A = 85 °C (1)		28		
		V_{IN} = 3.3 V, I_{OUT} = 500 mA	T_A = 25 °C		30	35	
			T_A = 85 °C (1)		34		
R_{DSC}	Output Discharge Resistance	EN = Disable , I_{FORCE} = 10 mA			98		Ω
V_{IH}	EN Input Logic High Voltage	V_{IN} = 2.5 V to 5.5 V		1.2			V
V_{IL}	EN Input Logic Low Voltage	V_{IN} = 2.5 V to 5.5 V				0.6	V
V_{FLGB}	FLGB Output Low Voltage	I_{FLGB} = 0.5 mA				180	mV
I_{FLGB}	FLGB Output High Leakage	V_{FLGB} = 5.5 V			6		nA
t_{FLGB}	FLGB Output Delay Time (1)	Delay Time for Assertion at Over - Current			8		ms
		Delay Time for Assertion at Short Circuit and Thermal Shutdown Conditions			120		μs

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ELECTRICAL CHARACTERISTICS (CONTINUED)

Values are at V_{IN} = 5.0 V and T_A = 25 °C. Unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
Protection						
V_{UVLO}	Under Voltage Lockout Voltage	Input Rising		2.4		V
		Input Falling		2.2		V
I_{LIM}	Over Current Limit	R_{LIM} = 3.3 kΩ	3.60	3.75	3.90	A
V_{RCB_TH}	Reverse Current Blocking Protection Trip Voltage	V_{OUT} - V_{IN}		23		mV
V_{RCB_RL}	Reverse Current Blocking Protection Release Voltage	V_{IN} - V_{OUT}		23		
I_{RCB}	Reverse Current Blocking Protection Leakage	V_{OUT} - V_{IN} > V_{RCB}			1	µA
TSD	Thermal Shutdown (1)			140		°C
	Thermal Shutdown Hysteresis (1)			20		
Switching Characteristics (2)						
t_{dON}	Turn-On Delay	R_{OUT} = 150 Ω, C_{OUT} = 1.0 µF		100		µs
t_R	V_{OUT} Rise Time			420		
t_{dOFF}	Turn-Off Delay (1)			13		
t_F	V_{OUT} Fall Time			130		

Notes: 1. By design; characterized; not production tested.
2. Switching Timing Diagram.

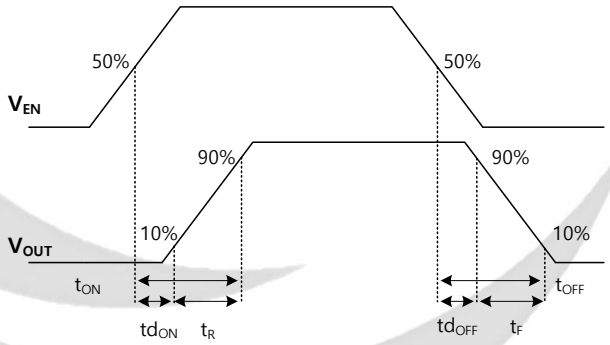

Figure 4. Switching Timing Diagram

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TYPICAL PERFORMANCE CHARACTERISTICS

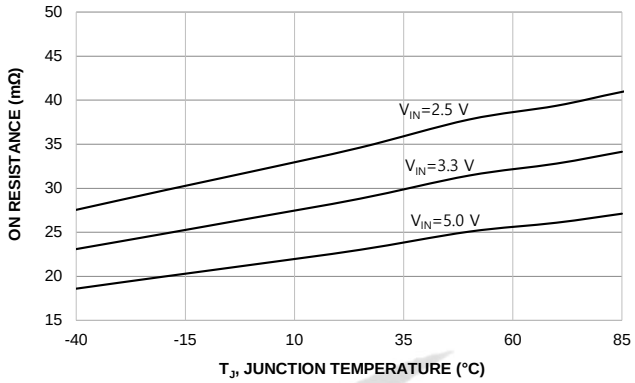

Figure 5. On-Resistance vs. Temperature

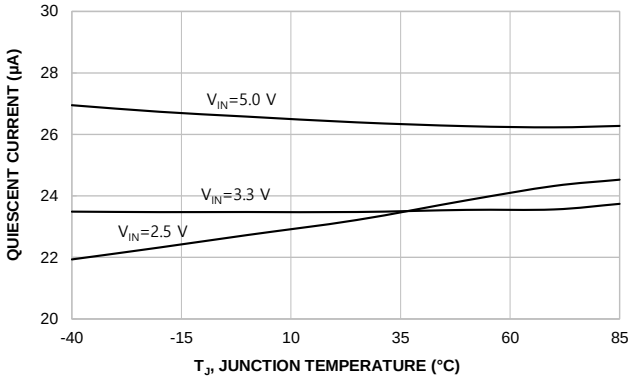

Figure 6. Quiescent Current vs. Temperature

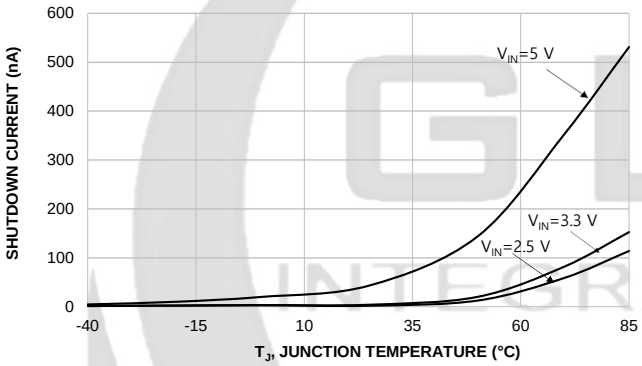

Figure 7. Shutdown Current vs. Temperature

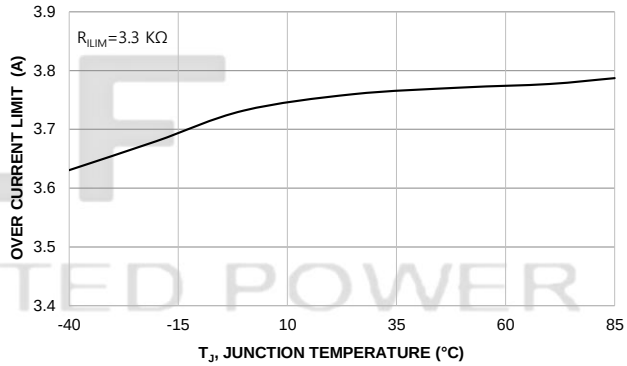

Figure 8. Over Current Limit vs. Temperature

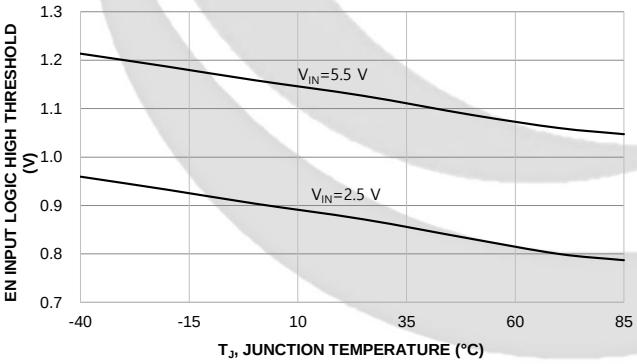

Figure 9. EN Input Logic High Threshold

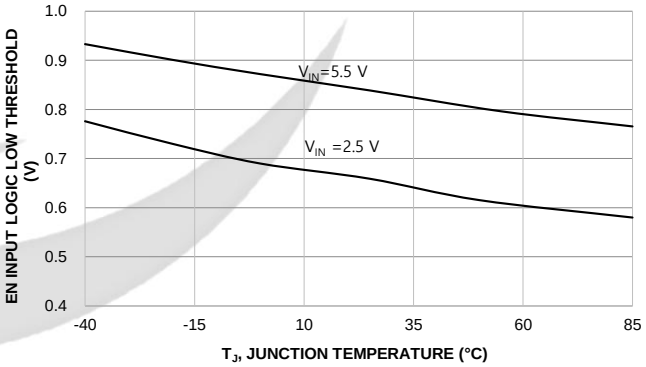

Figure 10. EN Input Logic Low Threshold

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TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

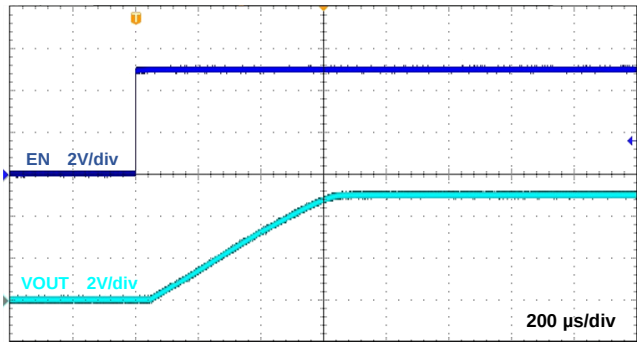

Figure 11. Turn-On Response
V_{IN}=5.0 V, C_{IN}=1.0 µF, C_{OUT}=1.0 µF, R_L=150 Ω

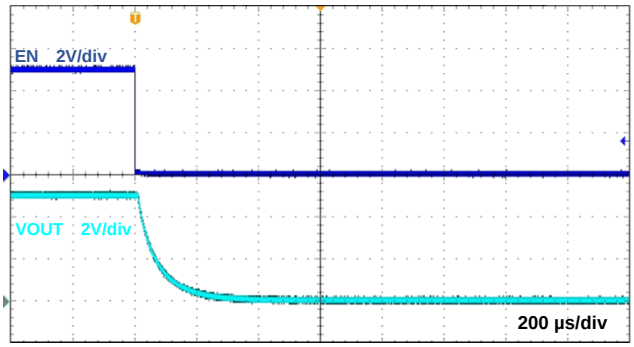

Figure 12. Turn-Off Response
V_{IN}=5.0 V, C_{IN}=1.0 µF, C_{OUT}=1.0 µF, R_L=150 Ω

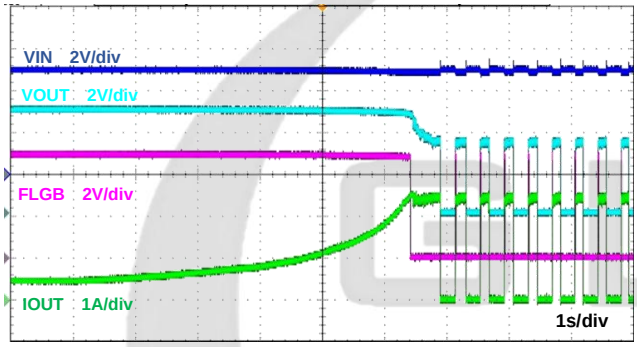

Figure 13. Current Limit Response
V_{IN}=5.0 V, C_{IN}=1.0 µF, C_{OUT}=1.0 µF

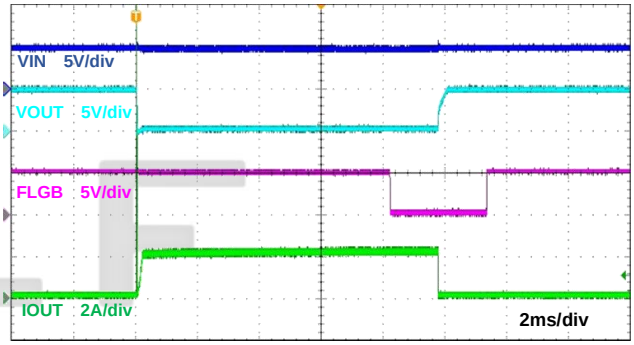

Figure 14. Short Circuit Response
V_{IN}=5.0 V, C_{IN}=1.0 µF, C_{OUT}=1.0 µF, R_L=0 Ω

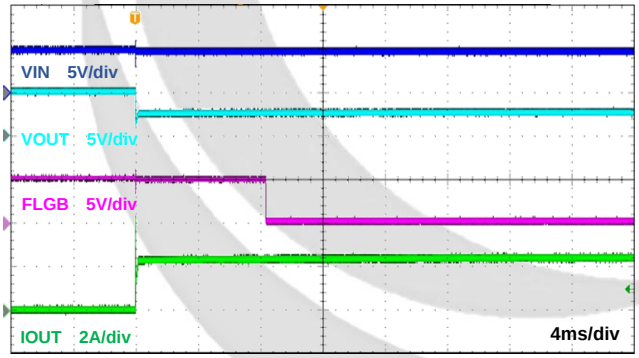

Figure 15. FLGB Response
V_{IN}=5.0 V, C_{IN}=1.0 µF, C_{OUT}=1.0 µF

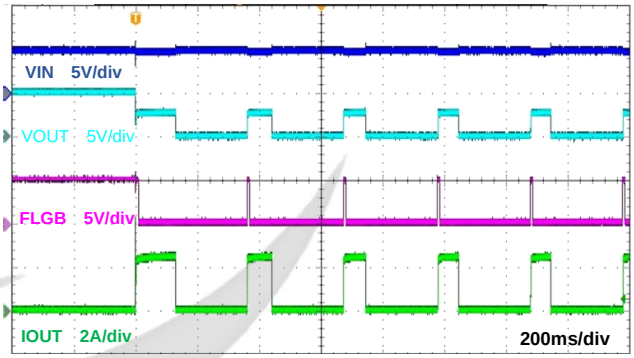

Figure 16. OTP Response
V_{IN}=5.0 V, C_{IN}=1.0 µF, C_{OUT}=1.0 µF

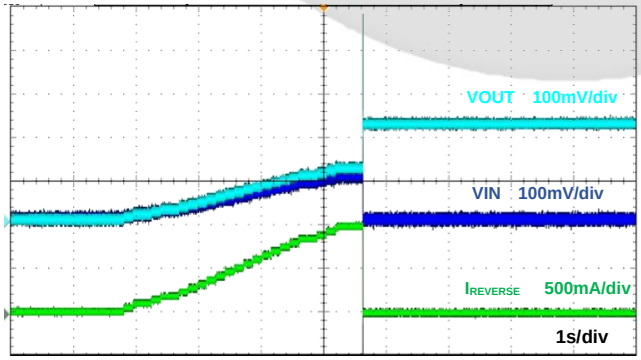

Figure 17. Reverse Current Blocking Threshold
V_{IN}= 5 V, V_{OUT}=Up to 5.1 V, C_{IN}=1.0 µF, C_{OUT}=1.0 µF

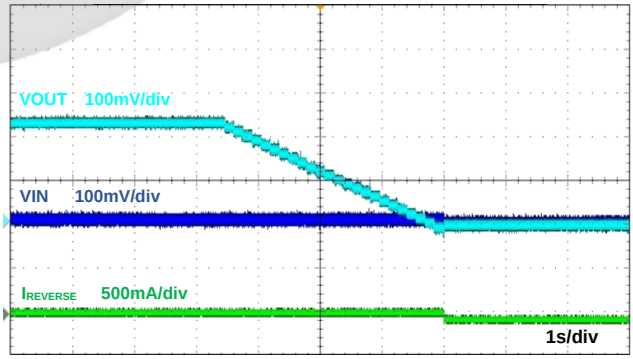

Figure 18. Reverse Current Blocking Release
V_{IN}=5 V, V_{OUT}=Up to 5.1 V, C_{IN}=1.0 µF, C_{OUT}=1.0 µF

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APPLICATION INFORMATION

The GLF2363A is an advanced fully integrated power switch for applications that required precision output current limitation. It also features various protection functions, such as under voltage lockout, reverse current blocking (RCB), short circuit protection, and thermal shutdown.

Current Limiting and Short Circuit Protection

When the GLF2363A is enabled by an active high V_{EN} voltage, the current-limit circuit starts monitoring the output current. When the load current reaches up to the over current protection threshold, the device clamps the output current to a preset constant current limit level which setup by an external resistor (RLIM) between ILIM and GND pins. The 1% precision resistors are recommended. The RLIM resistor traces should be as short as possible to reduce parasitic effects on the current-limit accuracy. Refer to the Figure 19 and table 1 to find the resistor values corresponding to different current limit levels. When the current limit condition triggered and the junction temperature exceeds the OTP (Over Temperature Protection) threshold, 140 °C, the GLF2363A is turned off immediately. After the junction temperature cools down below the OTP hysteresis, the GLF2363A resumes normal operation. The short circuit protection will take action immediately to shut down the device when a short circuit on the output node is detected and the V_{OUT} falls lower than [0.45 x V_{IN}]. After the short circuit protection is triggered, the device will turn off and check if the short condition remains. The output current is limited to a preset current limit value if the VOUT short condition still exists.

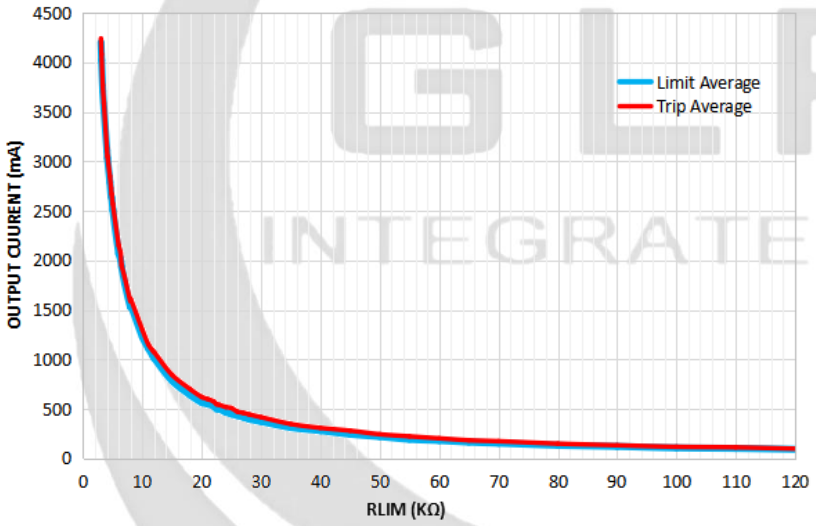

Figure 19. Current Trip and Limit vs. R_{LIM}

RLIM (kΩ)	Current Limit Trip (mA) Typ.	Current Limit Limit (mA) Typ.
3.1	4080	4000
3.3	3770	3750
3.5	3590	3500
4.1	3050	3000
5	2570	2500
6.3	2080	2000
7.95	1590	1500
12	1070	1000
15	843	783
22.5	548	500
28	444	400
30	416	372
45	280	244
50	244	220
80	150	130
100	117	106
110	112	100

Table 1. Current Limit Level by R_{LIM}

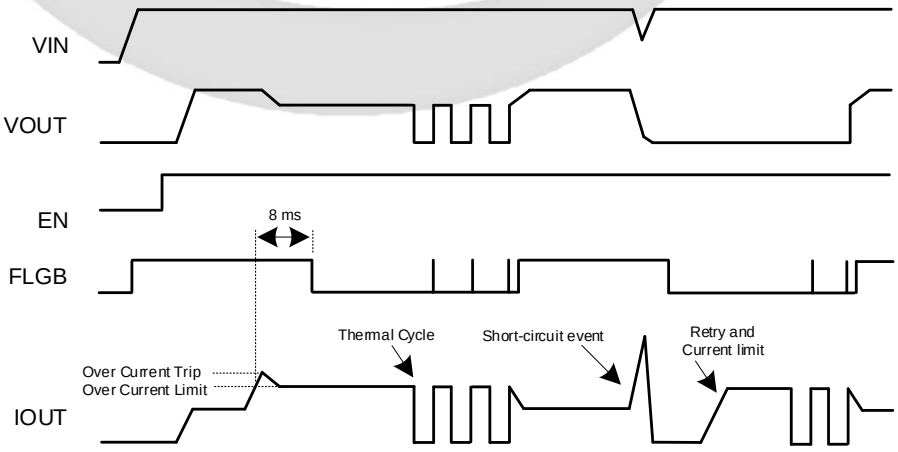

Figure 20. Over Current and Short Circuit Protection

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Fault Flag Response

The output of the open drain FLGB pin will pull down to GND during any of the following fault conditions: output current limit, output short circuit, reverse current blocking, or thermal shutdown. The GLF2363A uses an internal 8 millisecond fading delay for current limit conditions and a 120 microsecond delay for short circuit and thermal conditions to avoid false FLGB reporting. The FLGB output remains low until the overcurrent or overtemperature condition is removed.

Reverse Current Blocking

The GLF2363A 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}).

Input and Output Capacitor

A capacitor is recommended to be placed close to the VIN 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. An 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 COUT capacitor should be placed close to the VOUT and GND pins.

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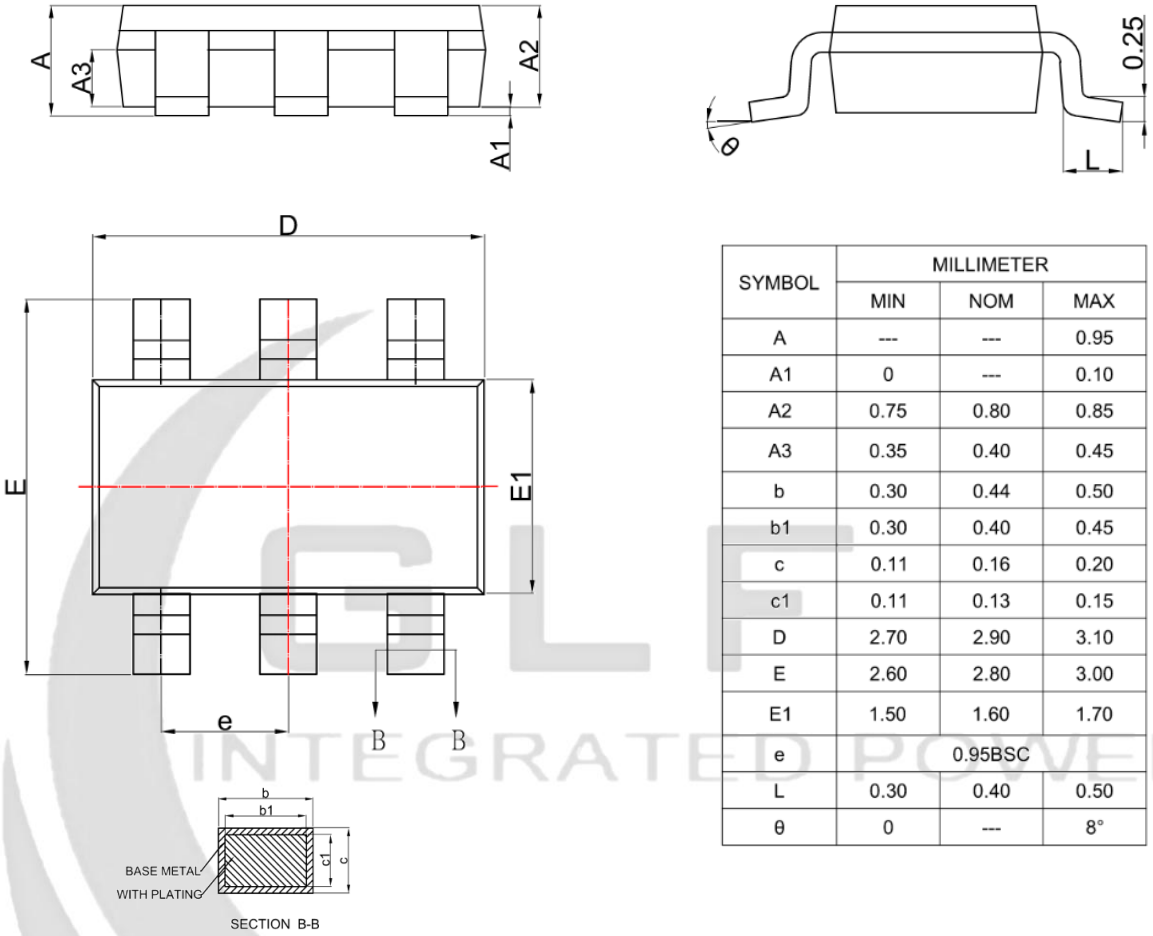
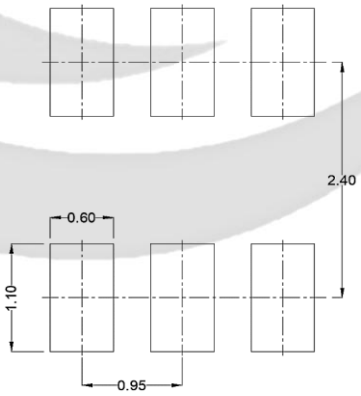
PACKAGE OUTLINE



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	---	---	0.95
A1	0	---	0.10
A2	0.75	0.80	0.85
A3	0.35	0.40	0.45
b	0.30	0.44	0.50
b1	0.30	0.40	0.45
c	0.11	0.16	0.20
c1	0.11	0.13	0.15
D	2.70	2.90	3.10
E	2.60	2.80	3.00
E1	1.50	1.60	1.70
e	0.95BSC		
L	0.30	0.40	0.50
θ	0	---	8°

Recommended Footprint



PACKAGING INFORMATION

Part Number	Package	Pins	Pitch	Top Mark	Moisture Sensitivity Level	Environmental Information
GLF2363A-T2G7	TSOT23-6L	6	0.95mm	GM	MSL3	ROHS+HF

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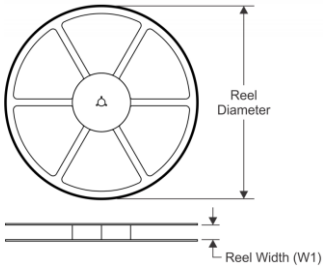
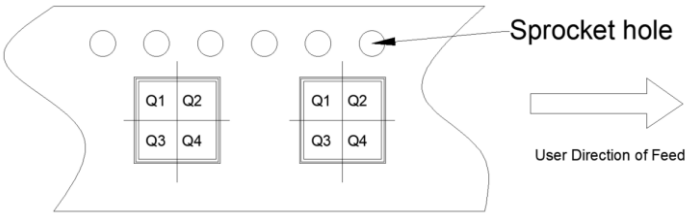
TAPE AND REEL INFORMATION

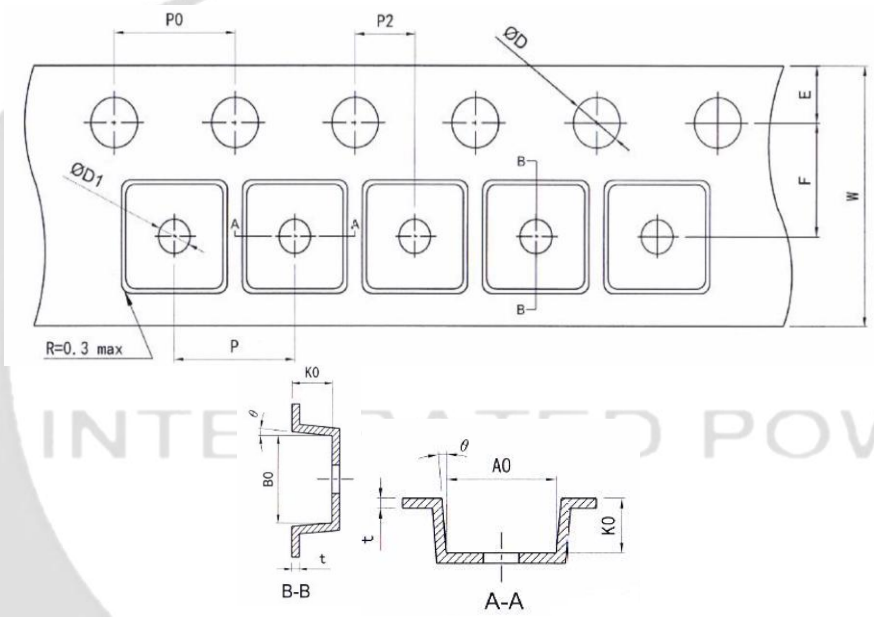
REEL DIMENSIONS



QUADRANT ASSIGNMENTS PIN 1 ORIENTATION TAPE



TAPE DIMENSIONS



Device	Package	Pins	SPQ	Reel Diameter (mm)	Reel Width W1	A0	B0	K0	P	W	Pin1
GLF2363A-T2G7	TSOT23-6L	6	3000	178	9	3.26	3.23	1.05	4	8	Q3

Remark:

A0: Dimension designed to accommodate the component width

B0: Dimension designed to accommodate the component length

K0: Dimension designed to accommodate the component thickness

W: Overall width of the carrier tape

P1: Pitch between successive cavity centers

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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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