DESCRIPTION

The GLF1131HT and GLF1133HT are a highly efficient load switch, specifically designed for applications where low power consumption and high performance are crucial, such as in IoT (Internet of Things) devices, mobile electronics, and wearables.

The GLF1131HT and GLF1133HT are highly efficient components, leveraging I_QSmart™ technology to keep the quiescent current (I_Q) and shutdown current (I_{SD}) as low as possible. With low I_Q and I_{SD}, the device consumes less power in idle or shutdown states, meaning the system can operate for longer periods without draining the battery.

The GLF1131HT and GLF1133HT integrated slew rate control offers a significant advantage in improving system reliability by managing the voltage transitions more smoothly during switching events. By controlling the rate of voltage change during turn-on, the GLF1131HT and GLF1133HT effectively limit the inrush current, ensuring that the system remains stable and minimizing the risk of voltage dips. This protection mechanism helps maintain consistent performance and reduces the likelihood of unwanted resets or disruptions in the power supply.

The GLF1131HT and GLF1133HT are designed to offer a wide input voltage range, which is a significant advantage in terms of system flexibility and performance. It makes the device versatile enough to be used in multiple voltage rail applications. As a result, it can simplify inventory management and help reduce operating costs, as fewer devices are needed for various applications.

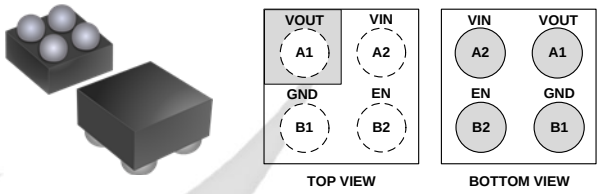
FEATURES

- Wide Input Range: 1.1 V to 5.5 V
  6 V_{ABS} max
- Ultra-Low I_Q: 2 nA Typ. at 5.5 V_{IN}
- Ultra-Low I_{SD}: 16 nA Typ. at 5.5 V_{IN}
- Low R_{ON} = 34 mΩ Typ. at 5.5 V_{IN}
- I_{OUT} Max = 2.0 A
- Controlled Rise Time:
  - 450 µs at 3.3V_{IN}: GLF1131HT
  - 2450 µs at 3.3V_{IN}: GLF1133HT
- Integrated Output Discharge Switch
- Compatible with lower enable voltage systems

APPLICATIONS

- Wearables
- Data Storage, SSD
- Mobile Devices
- Low Power Subsystems
- IoT Devices

PACKAGE



0.77 mm x 0.77 mm x 0.35 mm Thin WLCSP

APPLICATION DIAGRAM

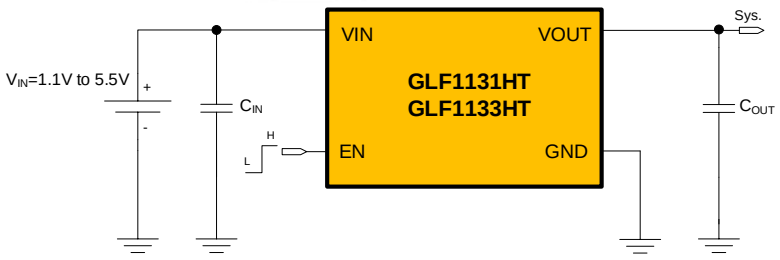


Figure 1. Application Diagram

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ALTERNATE DEVICE OPTIONS

Part Number	Top Mark	Vout Rise Time at 3.3Vin (Typ)	R_{ON} (Typ) at 5.5 V	Output Discharge	EN Activity	Package
GLF1131HT-S17	5	450 µs	34 mΩ	85 Ω	High	0.77 mm x 0.77 mm x 0.35 mm WLCSP
GLF1133HT-S17	7	2450 µs				

FUNCTIONAL BLOCK DIAGRAM

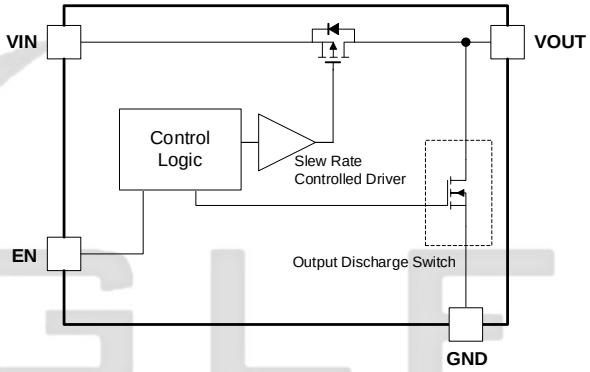

Figure 2. Functional Block Diagram

PIN CONFIGURATION

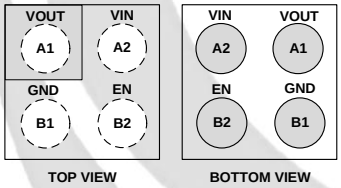

Figure 3. 0.77 mm x 0.77 mm x 0.35 mm Thin WLCSP

PIN DEFINITION

Pin #	Name	Description
A1	VOUT	Switch Output
A2	VIN	Switch Input. Supply Voltage for IC
B1	GND	Ground
B2	EN	Enable to control the switch. Do not leave the EN pin floating

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}	Each Pin Voltage Range to GND		- 0.3	6	V
I_{OUT}	Maximum Continuous Switch Current			2	A
P_D	Power Dissipation at T_A = 25 °C			1.0	W
T_j	Junction Temperature			150	°C
T_{STG}	Storage Temperature		- 65	150	°C
T_A	Ambient Operating Temperature		- 40	85	°C
θ_{JA}	Thermal Resistance, Junction to Ambient (board dependent)			110	°C/W
ESD	Electrostatic Discharge Capability	Human Body Model, JESD22-A114	4		kV
		Charged Device Model, JESD22-C101	2		

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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							
V_{IN}	Supply Voltage			1.1		5.5	V
I_Q	Quiescent Current	V_{IN} = V_{EN} = 5.5 V, I_{OUT} = 0 mA	T_A = 25 °C		2	30	nA
			T_A = 85 °C (1)		18		
I_{SD}	Shutdown Current	EN = Disable, I_{OUT} = 0 mA, V_{IN} = 1.1 V			2		
		EN = Disable, I_{OUT} = 0 mA, V_{IN} = 3.3 V			4		
		EN = Disable, I_{OUT} = 0 mA, V_{IN} = 5.5 V	T_A = 25 °C		16	50	
			T_A = 85 °C (1)		430		
R_{ON}	On-Resistance	V_{IN} = 5.5 V, I_{OUT} = 500 mA	T_A = 25 °C		34	40	mΩ
			T_A = 85 °C (1)		40		
		V_{IN} = 3.3 V, I_{OUT} = 500 mA	T_A = 25 °C		43	48	
			T_A = 85 °C (1)		52		
		V_{IN} = 1.8 V, I_{OUT} = 300 mA			68		
		V_{IN} = 1.5 V, I_{OUT} = 100 mA			87		
		V_{IN} = 1.1 V, I_{OUT} = 100 mA			160		
R_{DSC}	Output Discharge Resistance	EN = Disable , I_{FORCE} = 10 mA		70	85	100	Ω
V_{IH}	EN Input Logic High Voltage	V_{IN} = 1.1 V to 5.5 V		0.9			V
V_{IL}	EN Input Logic Low Voltage	V_{IN} = 1.1 V to 1.8 V				0.2	
		V_{IN} = 1.8 V to 5.5 V				0.4	
Switching Characteristics (2)							
t_{dON}	Turn-On Delay, GLF1131HT	R_L = 150 Ω, C_{OUT} = 0.1 µF			320		µs
	Turn-On Delay, GLF1133HT				1690		
t_R	V_{OUT} Rise Time, GLF1131HT			200	450	700	
	V_{OUT} Rise Time, GLF1133HT			2000	2450	3000	
t_{dOFF}	Turn - Off Delay				5		
t_F	V_{OUT} Fall Time				11		

Notes:
1. By design; characterized, not production tested.
2. t_{ON} = t_{dON} + t_R, t_{OFF} = t_{dOFF} + t_F

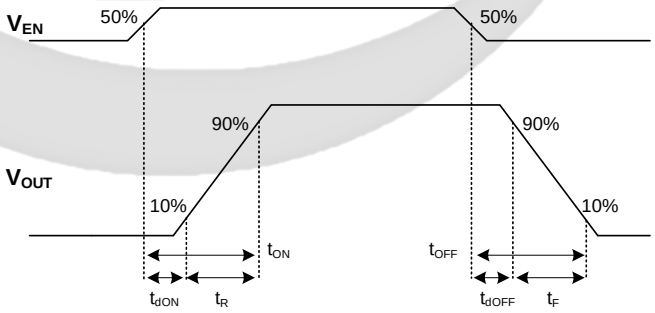

Figure 4. Timing Diagram

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TYPICAL PERFORMANCE CHARACTERISTICS

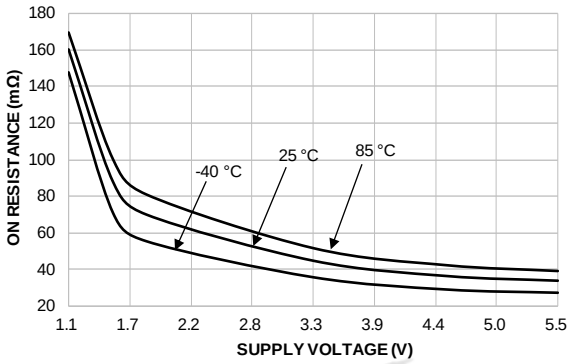

Figure 5. On-Resistance vs. Supply Voltage

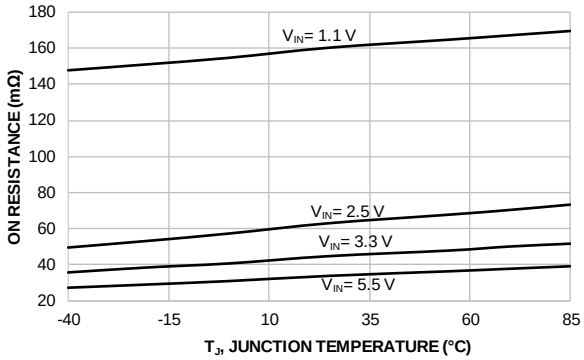

Figure 6. On-Resistance vs. Temperature

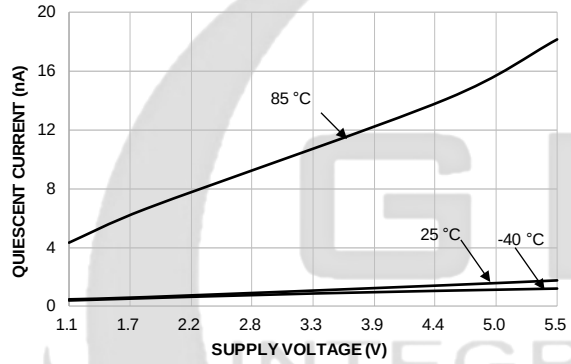

Figure 7. Quiescent Current vs. Supply Voltage

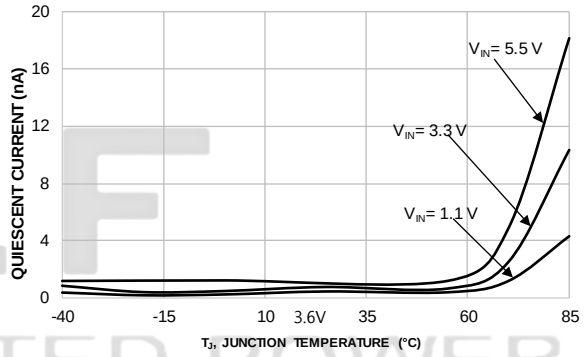

Figure 8. Quiescent Current vs. Temperature

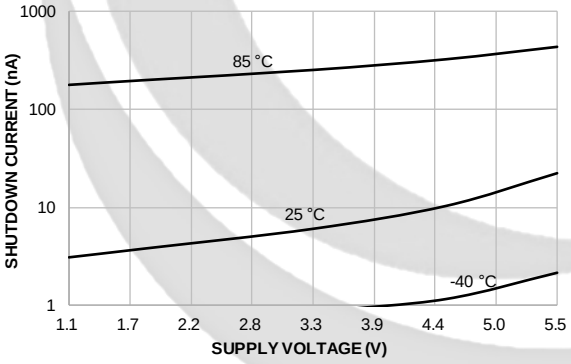

Figure 9. Shutdown Current vs. Supply Voltage

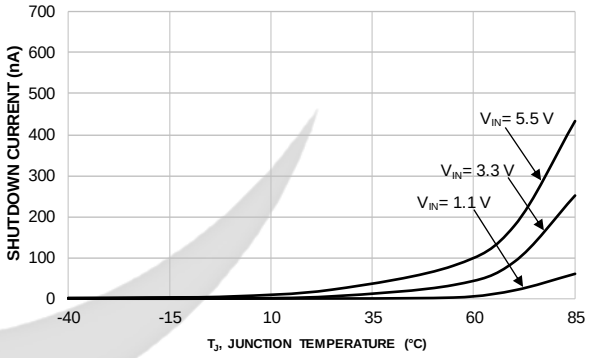

Figure 10. Shutdown Current vs. Temperature

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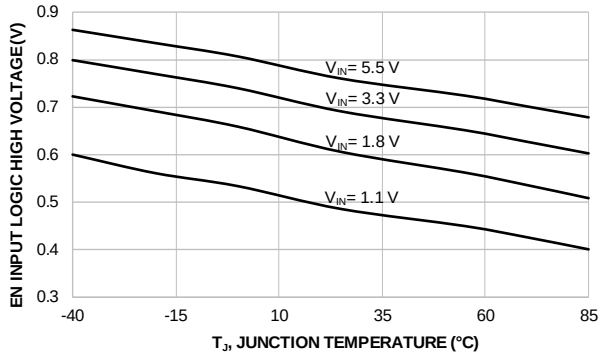

Figure 11. EN Input Logic High Threshold Vs. Temperature

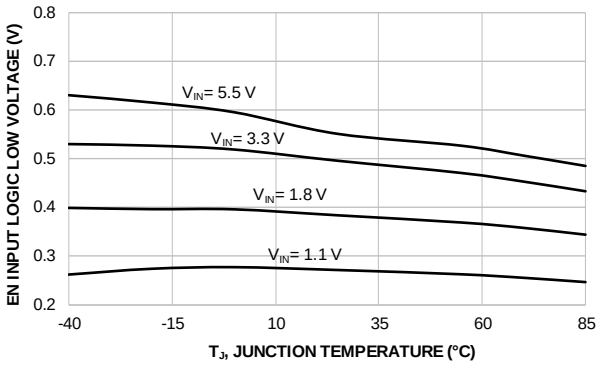

Figure 12. EN Input Logic Low Threshold Vs. Temperature

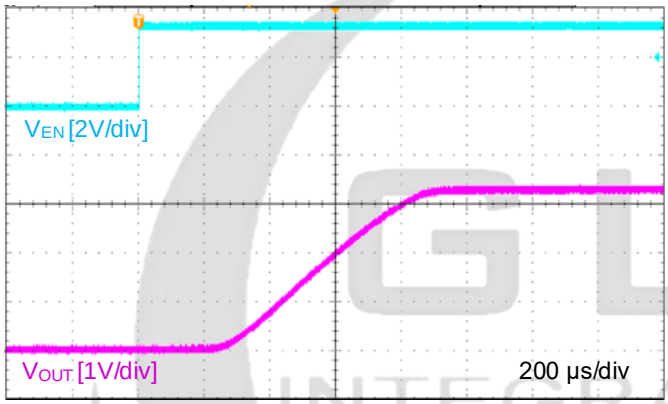

Figure 13. Turn-On Response (GLF1131HT)
V_{IN} = 3.3 V, C_{OUT} = 0.1 µF, R_L = 150 Ω

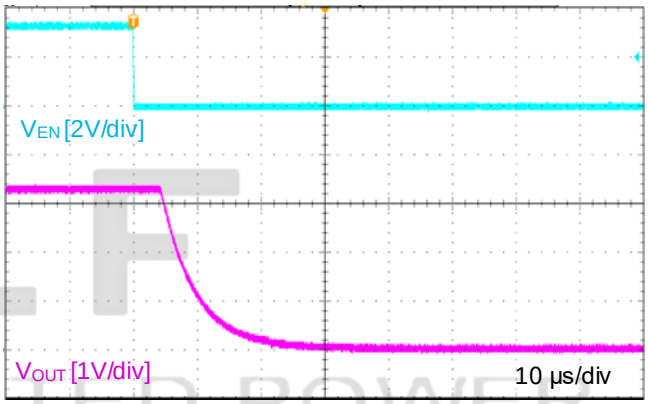

Figure 14. Turn-Off Response (GLF1131HT)
V_{IN} = 3.3 V, C_{OUT} = 0.1 µF, R_L = 150 Ω

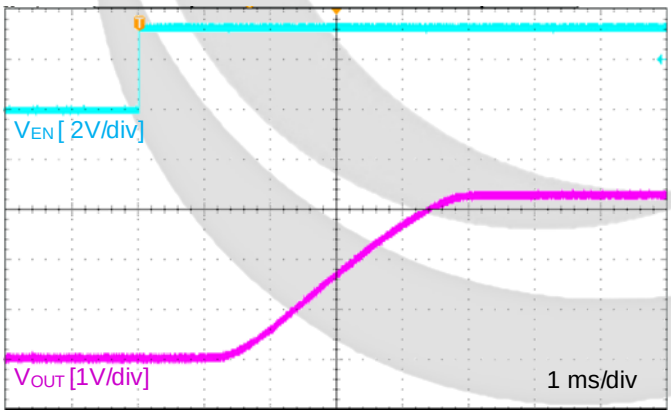

Figure 15. Turn-On Response (GLF1133HT)
V_{IN} = 3.3 V, C_{OUT} = 0.1 µF, R_L = 150 Ω

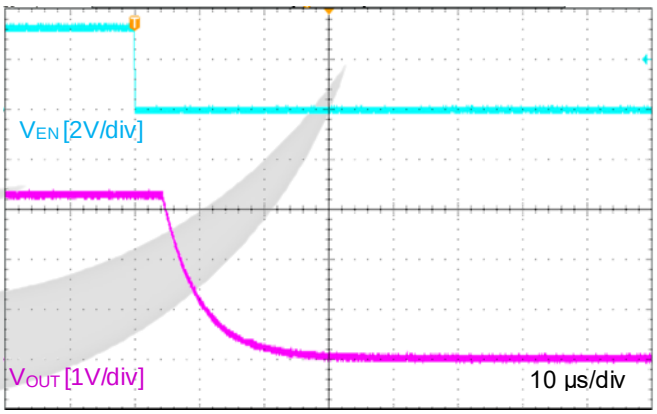

Figure 16. Turn-Off Response (GLF1133HT)
V_{IN} = 3.3 V, C_{OUT} = 0.1 µF, R_L = 150 Ω

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APPLICATION INFORMATION

The GLF1131HT and GLF1133HT devices are integrated 2.0 A, Ultra-Efficient 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 range from 1.1 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 package is a 0.77 mm x 0.77 mm x 0.35 mm wafer level chip scale package, saving space in compact applications. It is constructed using 4 bumps, with a 0.4 mm pitch for manufacturability.

Input Capacitor

A 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.

Output Capacitor

An output capacitor is recommended to mitigate voltage undershoot on the output pin the moment 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 VOUT and GND pins.

EN pin

The GLF1131HT and GLF1133HT can be activated by EN pin high level. The EN pin is compatible with LVCOMS logic threshold so it is suitable for a wide variety of low voltage applications such as IoT and wearable devices. Note that the EN Pin cannot be float.

Output Discharge Function

The GLF1131HT and GLF1133HT have an internal discharge N-channel FET switch on the VOUT 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.

Board Layout

All traces should be as short as possible to minimize parasitic inductance effects. Wide traces for VIN, VOUT and GND will help reduce voltage drop and parasitic effects during dynamic operation as well as improve the thermal performance at high load current.

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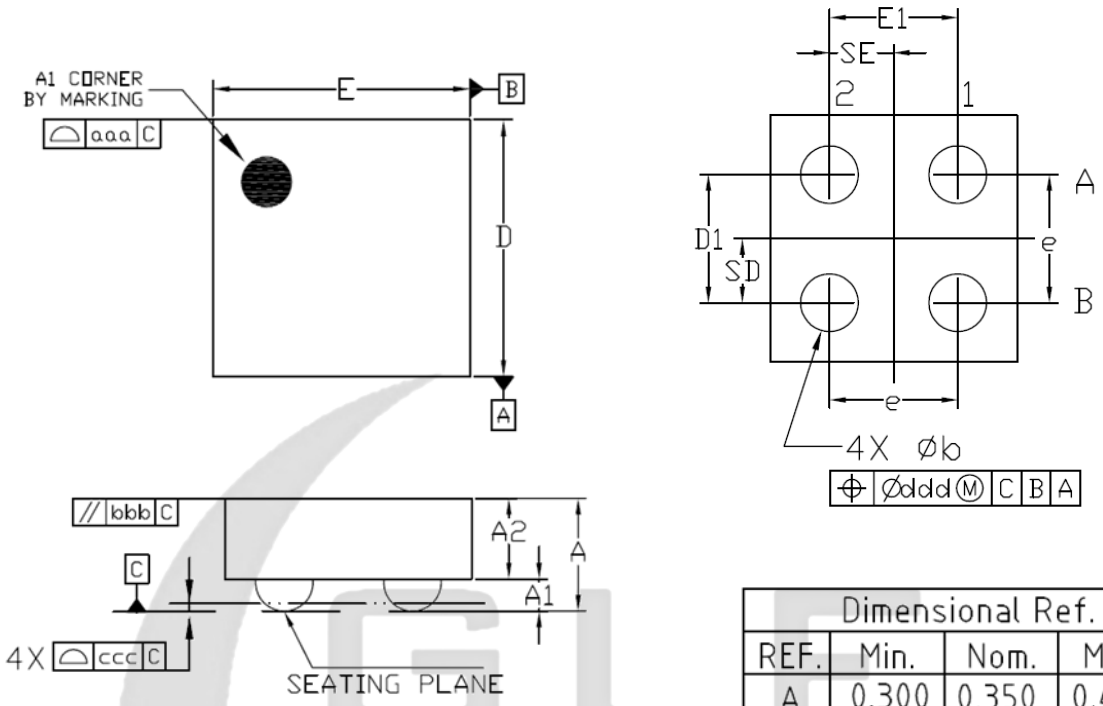
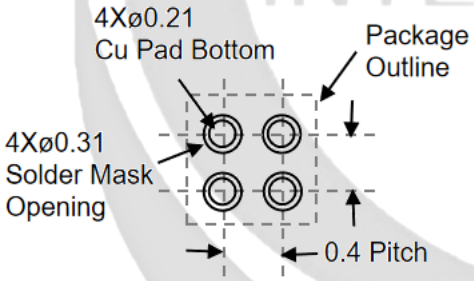
PACKAGE OUTLINE



Recommended Footprint



Dimensional Ref.			
REF.	Min.	Nom.	Max.
A	0.300	0.350	0.400
A1	0.075	0.100	0.125
A2	0.225	0.250	0.275
D	0.755	0.770	0.785
E	0.755	0.770	0.785
D1	0.350	0.400	0.450
E1	0.350	0.400	0.450
b	0.145	0.180	0.215
e	0.400 BSC		
SD	0.200 BSC		
SE	0.200 BSC		
Tol. of Form&Position			
aaa	0.10		
bbb	0.10		
ccc	0.05		
ddd	0.05		

Notes

1. ALL DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGRESS)
2. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1994.

PACKAGING INFORMATION

Part Number	Package	Pins	Pitch	Top Mark	Moisture Sensitivity Level	Environmental Information
GLF1131HT-S17	WLCSP	4	0.40mm	5	MSL1	ROHS+HF
GLF1133HT-S17	WLCSP	4	0.40mm	7	MSL1	ROHS+HF

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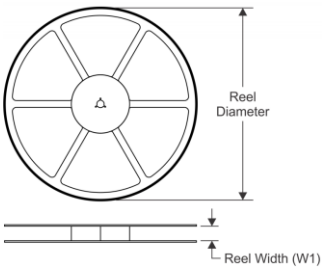
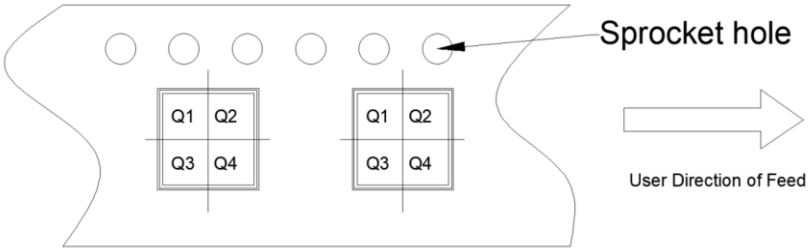
TAPE AND REEL INFORMATION

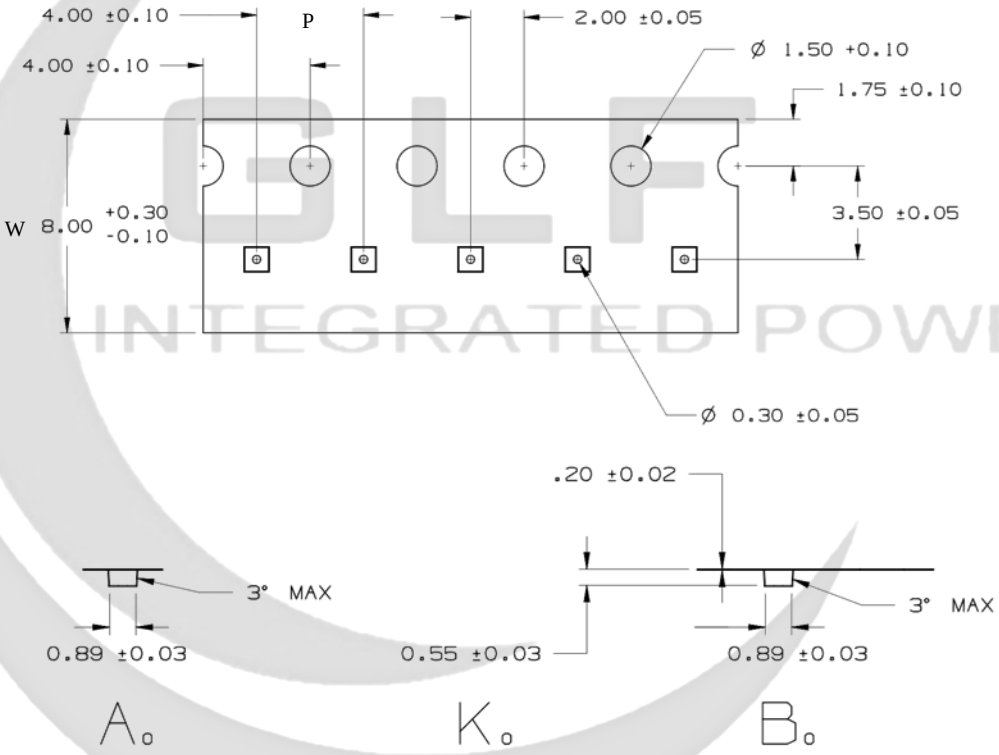
REEL DIMENSIONS



QUADRANT ASSIGNMENTS PIN 1 ORIENTATION TAPE



TAPE DIMENSIONS



Device	Package	Pins	SPQ	Reel Diameter (mm)	Reel Width W1	A0	B0	K0	P	W	Pin1
GLF1131HT-S17	WLCSP	4	4000	180	9	0.89	0.89	0.55	4	8	Q1
GLF1133HT-S17	WLCSP	4	4000	180	9	0.89	0.89	0.55	4	8	Q1

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

P: 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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