

DESCRIPTION

The GLF4028 is an integrated power multiplexer switch with dual independent power switches connected to a single output pin to enable seamless transition between two input sources.

The GLF4028 provides a manual selection mode by the combination of the logic input pins of EN and SEL. The EN input pin is used along with the select (SEL) input pin to select VIN1 only, select VIN2 only, or turn both switches off.

The GLF4028 features an ultra-efficient I_{QSmart}^{TM} technology that offers quiescent current (I_Q) and shutdown current (I_{SD}) in the industry. Low R_{ON} reduces conduction losses while low I_Q and I_{SD} solutions help designers to reduce parasitic leakage current, improve system efficiency, and increase battery lifetime.

The GLF4028 blocks any cross-conduction current between two input power sources. When the switch is disabled, the GLF4028 prevents the reverse current to the input source from the output at any higher V_{OUT} than V_{IN} condition.

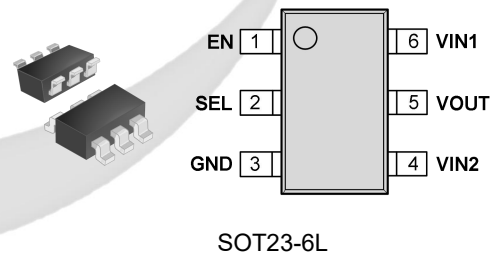
APPLICATIONS

- Smart Devices
- Smart Home Electronics

FEATURES

- Two-Input and Single-Output Power Multiplexer Switch
- Supply Voltage Range: 2.5 V to 5.5 V
- R_{ON} : 97 m Ω Typ. at 5.5 V_{IN1} or V_{IN2}
105 m Ω Typ. at 4.5 V_{IN1} or V_{IN2}
- 2 A Continuous Output Current Capability Per Channel
- Ultra-Low Supply Current at Operation
 I_Q : 3 μ A Typ at 5.5 V_{IN}
- Ultra-Low Stand-by Current
 I_{SD} : 5 nA Typ at 5.5 V_{IN}
- Smart Control Pins
 I_{EN} and I_{SEL} : 3 nA Typ at V_{EN} or $V_{SEL} > V_{IH}$
 R_{EN} and R_{SEL} : 500 k Ω Typ
- No Cross Conduction Between Two Inputs
- Reverse Current Blocking when Disabled
- Operating Temperature Range: -40 °C to 85 °C
- HBM: 6 kV, CDM: 2 kV

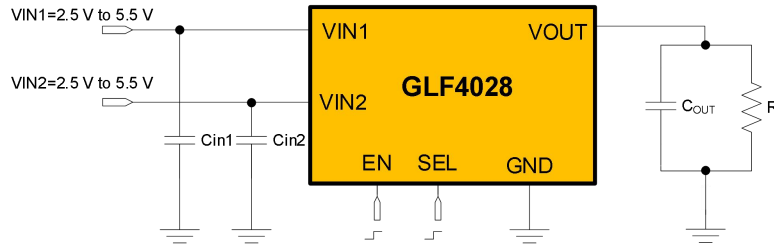
PACKAGE



DEVICE ORDERING INFORMATION

Part Number	Top Mark	R_{ON} at 5.5 V_{IN}	Output Current, I_{OUT}	Ultra-low I_Q at 5.5 V_{IN}
GLF4028-T2G7	EP	97 m Ω	2 A	3 μ A

APPLICATION DIAGRAM



FUNCTIONAL BLOCK DIAGRAM

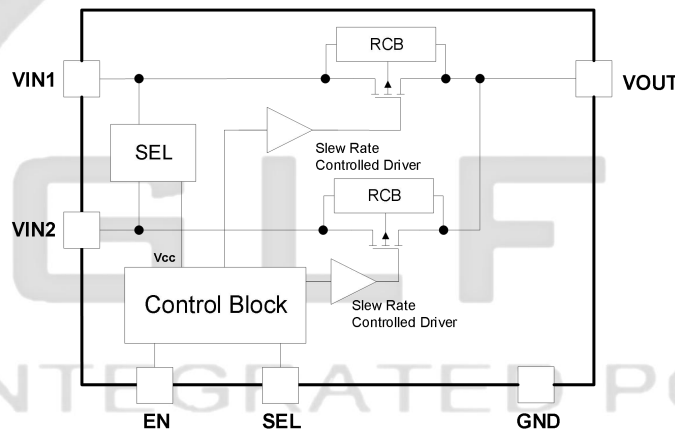


Figure 1. Functional Block Diagram

PIN CONFIGURATION

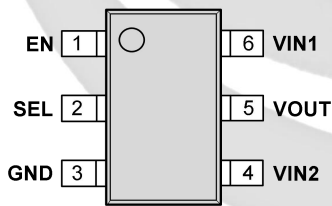


Figure 2. SOT23-6L

PIN DEFINITION

Pin #	Name	Description
1	EN	Enable to control the switch. Do not leave the EN pin floating.
2	SEL	Input Source Selection. Do not leave the SEL pin floating.
3	GND	Ground
4	VIN2	Switch Input 2
5	VOUT	Switch Output
6	VIN1	Switch Input 1

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
VIN1, VIN2 VOUT, EN	Each Pin Voltage Range to GND	-0.3	6.5	V
I _{OUT}	Maximum Continuous Switch Current		2.0	A
P _D	Power Dissipation at T _A = 25°C		1.0	W
T _{STG}	Storage Junction Temperature	-65	150	°C
T _A	Operating Temperature Range	-40	85	°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	6	kV
		Charged Device Model, JESD22-C101	2	

Notes: 1. The thermal resistance depends on the PCB layout and heat dissipation.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min.	Max.	Unit
VIN1, VIN2	Supply Voltage	2.5	5.5	V
T _A	Ambient Operating Temperature	-40	+85	°C

ELECTRICAL CHARACTERISTICS

$V_{IN1} = V_{IN2} = 2.5\text{ V to }5.5\text{ V}$ and $T_A = 25^\circ\text{C}$. Unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ	Max	Unit	
Basic Operation							
I_{Q1}, I_{Q2}	Quiescent Current	$V_{IN1} = 5.5\text{ V}, V_{IN2} < V_{IN1}, I_{OUT} = 0\text{ mA},$ $EN = 0\text{ V}, SEL = V_{IN1}, V_{OUT} = V_{IN1}$ or $V_{IN2} = 5.5\text{ V}, V_{IN1} < V_{IN2}, I_{OUT} = 0\text{ mA},$ $EN = SEL = V_{IN2}, V_{OUT} = V_{IN2}$ As above, $T_A = 85^\circ\text{C}^{(1)}$		3	4.5	μA	
I_{SD1}, I_{SD2}	Shutdown Current	$V_{IN1,2} = 5.5\text{ V}, V_{OUT} = \text{GND}, EN = SEL = 0\text{ V}$ $V_{IN1,2} = 5.5\text{ V}, V_{OUT} = \text{GND}, EN = SEL = 0\text{ V},$ $T_A = 85^\circ\text{C}^{(1)}$		5	20	nA	
R_{ON}	On-Resistance	V_{IN1} or $V_{IN2} = 5.5\text{ V}, I_{OUT} = 500\text{ mA}$	$T_A = 25^\circ\text{C}$	97	107	m Ω	
			$T_A = 85^\circ\text{C}^{(1)}$	115			
		V_{IN1} or $V_{IN2} = 4.5\text{ V}, I_{OUT} = 500\text{ mA}$	$T_A = 25^\circ\text{C}$	105	118		
			$T_A = 85^\circ\text{C}^{(1)}$	125			
		V_{IN1} or $V_{IN2} = 3.3\text{ V}, I_{OUT} = 300\text{ mA}$		120	135		
V_{IN1} or $V_{IN2} = 2.5\text{ V}, I_{OUT} = 100\text{ mA}$		145	162				
V_{IH}	EN, SEL Input Logic High Voltage		1.2			V	
V_{IL}	EN, SEL Input Logic Low Voltage				0.4	V	
I_{EN}, I_{SEL}	EN, SEL Current	V_{EN} or $V_{SEL} > V_{IH}$, Enabled		3	20	nA	
R_{EN}, R_{SEL}	EN, SEL Pulldown Resistance ⁽¹⁾	V_{EN} or $V_{SEL} < V_{IL}$, Disabled		500		k Ω	
I_{RVS}	Reverse Current ⁽¹⁾	$V_{IN1} = V_{IN2} = 0\text{ V}, V_{OUT} = 5.5\text{ V}, EN = SEL = 0\text{ V}$		2.5		μA	
Switching Characteristics ⁽²⁾							
t_{dON}	Turn-On Delay	$V_{IN1} = 5\text{ V}, V_{IN2} = 3.3\text{ V}$ $R_L = 150\ \Omega, C_{OUT} = 1.0\ \mu\text{F}$		250		μs	
t_R	VOUT Rise Time			340			
T_{dHL}	High-low Delay ⁽¹⁾			3			
T_{fHL}	High-low Fall Time ⁽¹⁾			6			
Vdroop	Voltage Droop ⁽¹⁾				120		mV
T_{dLH}	Low-high Delay ⁽¹⁾				7		μs
T_{rLH}	Low-high Rise Time ⁽¹⁾				4		
t_{dOFF}	Turn-Off Delay ⁽¹⁾				13		
t_F	VOUT Fall Time ⁽¹⁾				350		

Notes: 1. By design; characterized, not production tested.

2. $t_{ON} = t_{dON} + t_R, t_{OFF} = t_{dOFF} + t_F$

TIMING DIAGRAM AND TRUTH TABLE

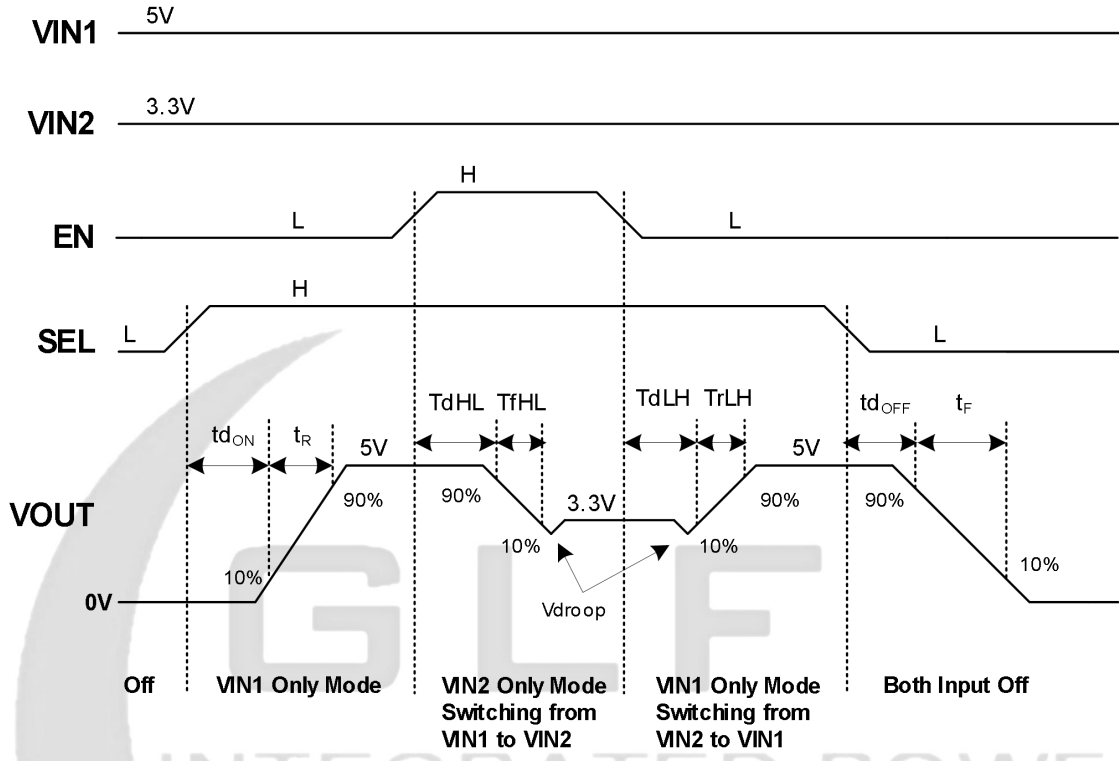


Figure 3. Timing Diagram

SEL	EN	Function	VOUT
0	0	Both switches are off	High-Z
1	0	Only VIN1 is selected	VIN1
1	1	Only VIN2 is selected	VIN2

Table 1. Truth Table of Input Source Selection

TYPICAL PERFORMANCE CHARACTERISTICS

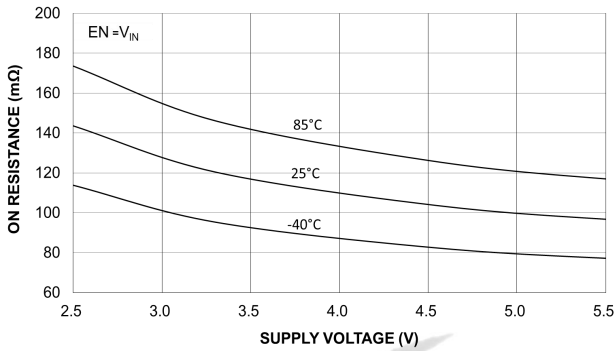


Figure 4. On-Resistance vs. Supply Voltage

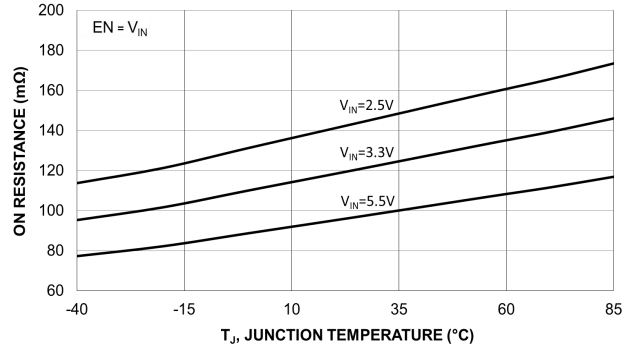


Figure 5. On-Resistance vs. Temperature

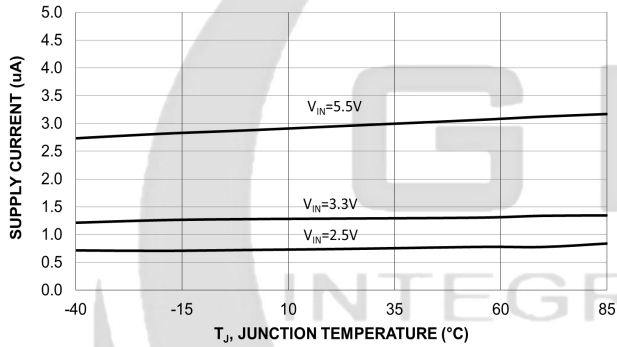


Figure 6. Quiescent Current vs. Temperature

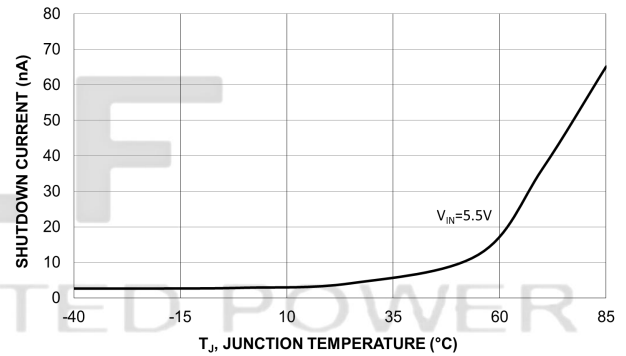


Figure 7. Shutdown Current vs. Temperature

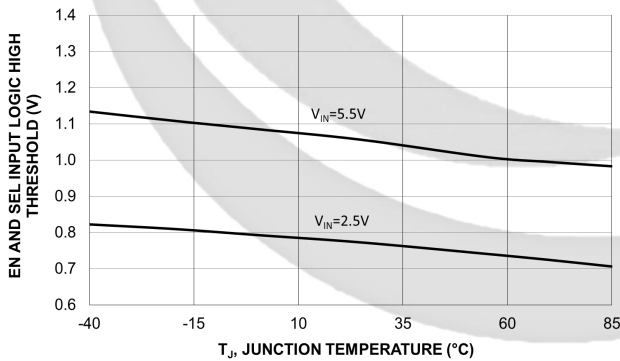


Figure 8. EN and SEL Input Logic High Threshold vs. Temperature

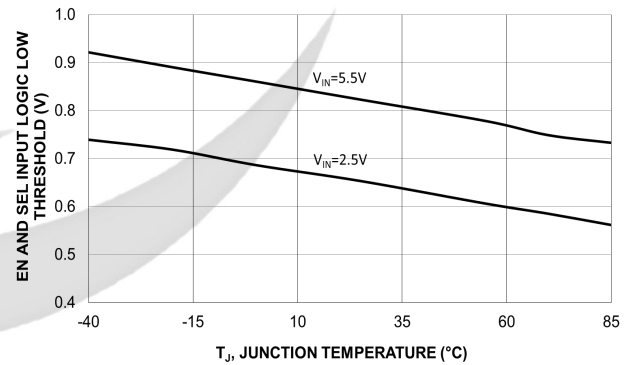


Figure 9. EN and SEL Input Logic Low Threshold vs. Temperature

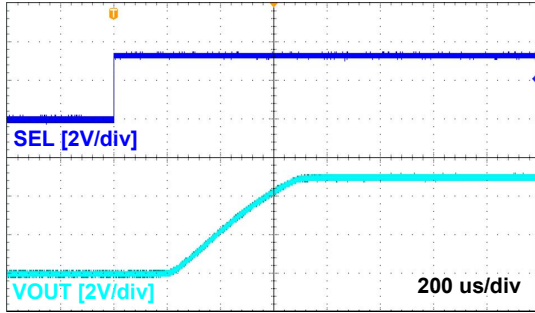


Figure 10. Turn-On Response
 $V_{IN1}=5\text{ V}$, $C_{IN}=0.1\ \mu\text{F}$, $C_{OUT}=1.0\ \mu\text{F}$, $R_L=150\ \Omega$

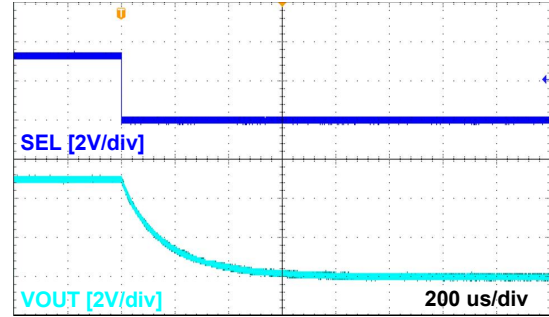


Figure 11. Turn-Off Response
 $V_{IN1}=5\text{ V}$, $C_{IN}=0.1\ \mu\text{F}$, $C_{OUT}=1.0\ \mu\text{F}$, $R_L=150\ \Omega$

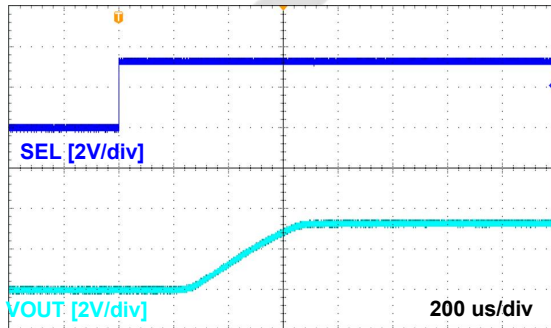


Figure 12. Turn-On Response
 $V_{IN1}=3.3\text{ V}$, $C_{IN}=0.1\ \mu\text{F}$, $C_{OUT}=1.0\ \mu\text{F}$, $R_L=150\ \Omega$

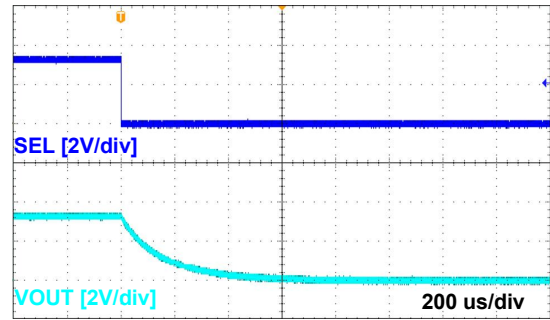


Figure 13. Turn-Off Response
 $V_{IN1}=3.3\text{ V}$, $C_{IN}=0.1\ \mu\text{F}$, $C_{OUT}=1.0\ \mu\text{F}$, $R_L=150\ \Omega$

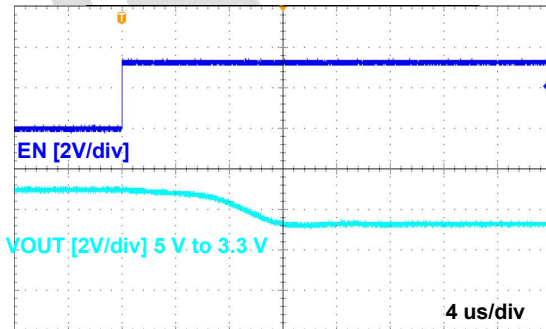


Figure 14. V_{OUT} Switchover from 5 V to 3.3 V
 $V_{IN1}=5\text{ V}$, $V_{IN2}=3.3\text{ V}$ $C_{IN}=C_{OUT}=1.0\ \mu\text{F}$, $R_L=150\ \Omega$

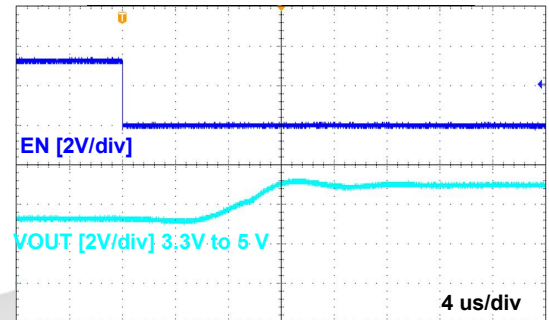


Figure 15. V_{OUT} Switchover from 3.3 V to 5 V
 $V_{IN1}=5\text{ V}$, $V_{IN2}=3.3\text{ V}$ $C_{IN}=C_{OUT}=1.0\ \mu\text{F}$, $R_L=150\ \Omega$

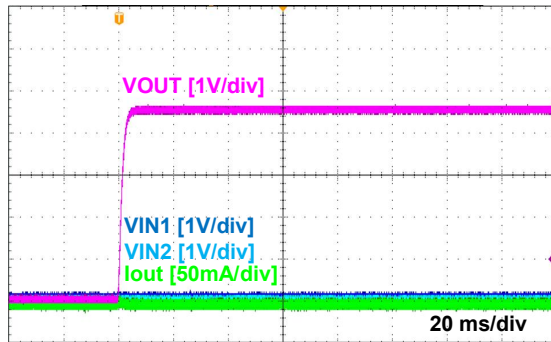


Figure 16. Reverse Current Blocking When Disabled
 $V_{IN1} = V_{IN2} = 0\text{ V}$, $V_{OUT} = 0\text{ V to } 4.5\text{ V}$, $C_{IN} = C_{OUT} = 1.0\text{ }\mu\text{F}$,
 $EN = SEL = 0\text{ V}$

APPLICATION INFORMATION

The GLF4028 is a fully integrated 2 A Power Mux with a fixed slew rate control to limit the inrush current during device turn on. The GLF4028 also has a wide voltage operating range from 2.5 V to 5.5 V. In the off state, the GLF4028 consumes very low leakage current to avoid unwanted power drain from limited input power supplies.

Input Source Selection

By changing the state of the SEL and EN pins, the GLF4028 offers a manual input selection mode. In each mode, the VOUT connects to one input source.

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 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 VOUT and GND pins.

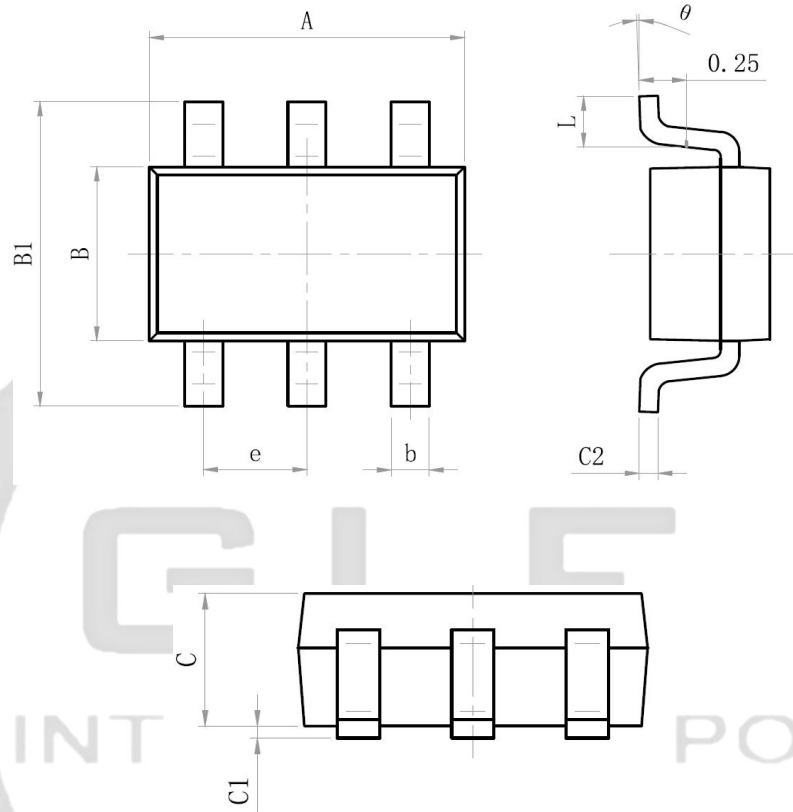
Reverse Current Blocking

The GLF4028 also prevents the reverse current from the output voltage when both switches are turned off at $EN = SEL = 0\text{ V}$.

Board Layout

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

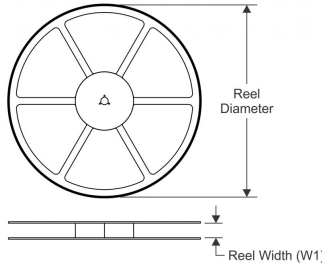
PACKAGE OUTLINE



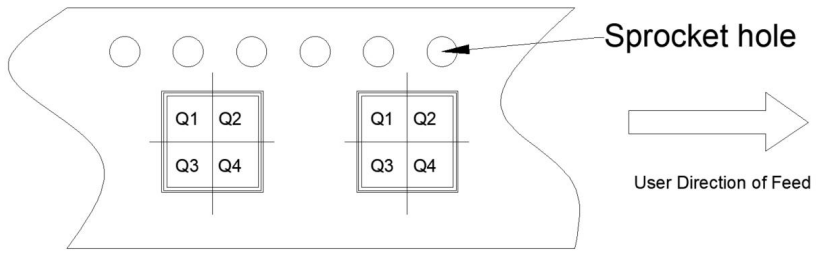
Size Mark	Min (mm)	Max (mm)	Size Mark	Min (mm)	Max (mm)
A	2.82	3.02	C	1.05	1.15
e	0.95 (BSC)		C1	0.03	0.15
b	0.28	0.45	C2	0.12	0.23
B	1.50	1.70	L	0.35	0.55
B1	2.60	3.00	theta	0°	8°

TAPE AND REEL INFORMATION

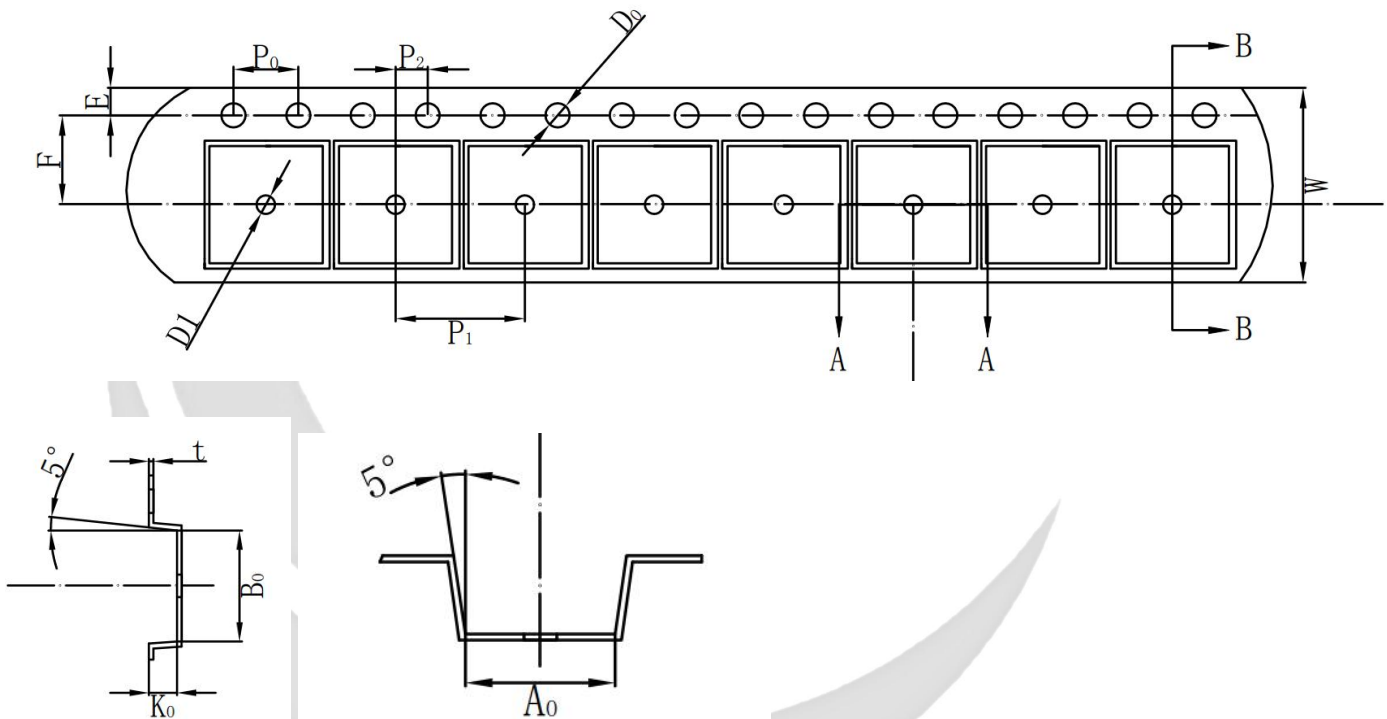
REEL DIMENSIONS



QUADRANT ASSIGNMENTS PIN 1 ORIENTATION TAPE



TAPE DIMENSIONS



Device	Package	Pins	SPQ	Reel Diameter (mm)	Reel Width W1	A0	B0	K0	P1	W	Pin1
GLF4028-T2G7	SOT23-6	6	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. Spec limits including typical, minimum, and maximum values are desired, or target, limits. GLF reserves the right to change limits at any time without warning or notification. A target specification in no way guarantees future production of the device in question.	Design / Development
Preliminary Specification	This is a draft version of a product specification. The specification is still 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 in no way guarantees future production of the device in question.	Qualification
Product Specification	This document represents the anticipated production performance characteristics of the device.	Production

DISCLAIMERS

Information in this document is believed to be accurate and reliable, however GLF assumes no liability for errors or omissions. Device performance may be impacted by testing methods and application use cases. Users are responsible to independently evaluate the applicability, usability, and suitability of GLF devices in their application. In no case will GLF be liable for incidental, indirect, or consequential damages associated with the use, misuse, or sale of its product. Customers are wholly responsible to assure GLF devices meet their system level and end product requirements. GLF retains the right to change the information provided in this data sheet without notice.