

Description

The ZXGD3001E6Q is a high-speed non-inverting single MOSFET gate driver capable of driving up to 9A into a MOSFET or IGBT gate capacitive load from supply voltages up to 12V with typical propagation delay times down to 3ns and rise/fall times down to 11ns. This device ensures rapid switching of the power MOSFET or IGBT to minimize power losses and distortion in high-current fast-switching applications.

The ZXGD3001E6Q is inherently rugged to latchup and shoot-through. Its wide supply voltage range allows full enhancement to minimize on-losses of the power MOSFET or IGBT.

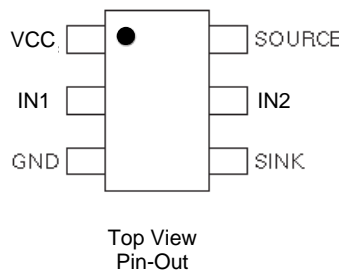
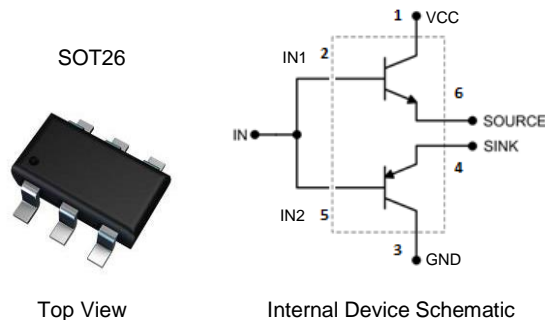
Its low-input voltage requirement and high current gain allows high current driving from low voltage controller ICs.

The optimized pinout SOT26 package with separate source and sink pins eases board layout, enabling reduced parasitic inductance and independent control of rise and fall slew rates.

Applications

Power MOSFET and IGBT gate driving in

- Synchronous switch-mode power supplies
- Secondary side synchronous rectification
- Plasma display panel power modules
- 1, 2, and 3-phase motor control circuits
- Audio switching amplifier power output stages



Pin Name	Pin Function
VCC	Driver Supply
IN1/IN2	Driver inputs are normally connected together by circuit tracks
GND	Ground
SOURCE	Source Current Output
SINK	Sink Current Output

Features

- 12V Operating Voltage Range
- 9A Peak Output Current
- Fast-Switching Emitter-Follower Configuration
 - 3ns Propagation Delay Time
 - 11ns Rise/Fall Time, 1000pF Load
- Low-Input Current Requirement
 - 4.2A (Source)/2.2A (Sink) Output Current from 10mA Input
- SOT26 Package
- Separate Source and Sink Outputs for Independent Control of Rise and Fall Time
- Optimized Pinout to Ease Board Layout and Minimize Trace Inductance
- No Latchup
- No Shoot-Through
- Near-Zero Quiescent and Output Leakage Current
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The ZXGD3001E6Q is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

Mechanical Data

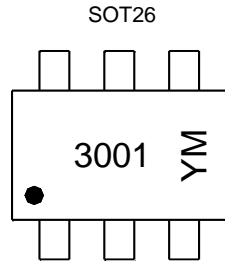
- Package: SOT26
- Package Material: Molded Plastic. "Green" Molding Compound; UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.018 grams (Approximate)

Ordering Information (Notes 4)

Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
ZXGD3001E6QTA	SOT26	3001	7	8 embossed	3000	Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <http://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information

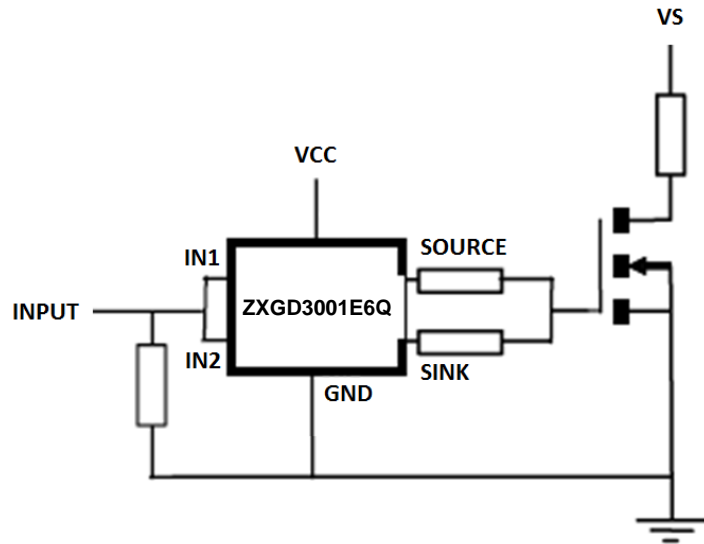


3001 = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: L = 2024)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Code	L	M	N	P	R	S	T	U	V	W	X	Y
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

Typical Application Circuit



Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Supply Voltage	V _{CC}	12	V
Input Voltage	V _{IN}	12	V
Peak Sink Current	I _{(sink)PK}	9	V
Source Current @ I _{IN1} + I _{IN2} = 10mA	I _(source)	4.2	A
Sink Current @ I _{IN1} + I _{IN2} = 10mA	I _(sink)	2.2	A
Input Current (c)	I _{IN1} , I _{IN2}	1	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Notes 5 & 6)	P _D	1.1	W
Linear Derating Factor		8.8	mW/°C
Thermal Resistance, Junction to Ambient (Notes 5 & 6)	R _{θJA}	113	°C/W
Thermal Resistance, Junction to Lead (Note 7)	R _{θJL}	105	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

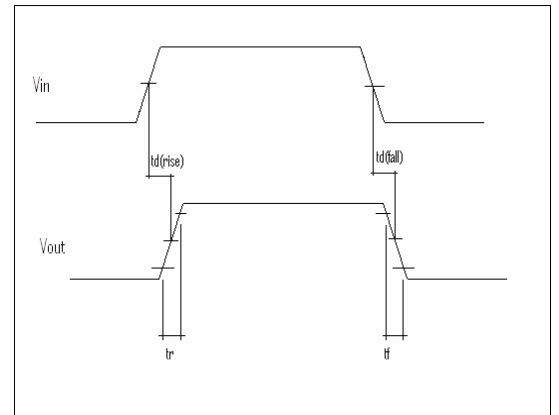
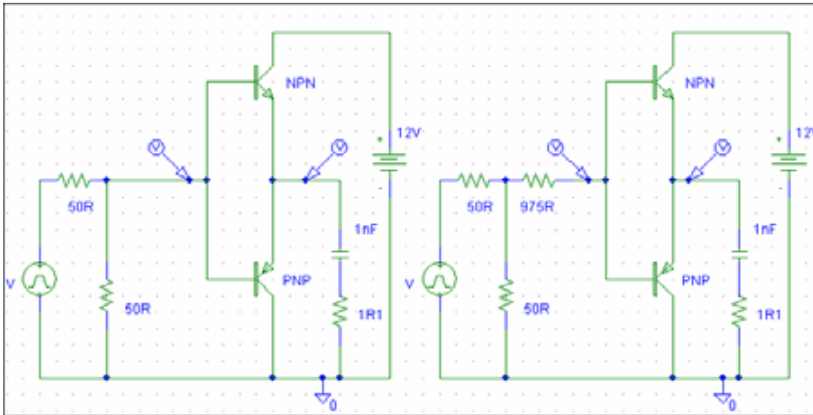
ESD Ratings (Note 8)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	1500	V	1C
Electrostatic Discharge – Charged Device Model	ESD CDM	1000	V	IV

- Notes:
5. For a device mounted on 25mm x 25mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state. The heatsink is split in half with the pin 1 (VCC) and pin 3 (GND) connected separately to each half.
 6. For device with two active dies running at equal power.
 7. Thermal resistance from junction to solder-point at the end of each lead on pin 1 (VCC) and pin 3 (GND).
 8. Refer to JEDEC specification JESD22-A114, JESD22-A115, and JESD22-C101.

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Output Voltage, High	V _{OH}	—	V _{CC} 0.4	—	V	I _{SOURCE} = 1μA
Output Voltage, Low	V _{OL}	—	0.4	—	V	I _{SINK} = 1μA
Source Output Leakage Current	I _{L(source)}	—	—	1	μA	V _{CC} = 12V V _{IN1} = V _{IN2} = 0V
Sink Output Leakage Current	I _{L(sink)}	—	—	1	μA	V _{CC} = 12V V _{IN1} = V _{IN2} = V _{CC}
Quiescent Current	I _Q	—	—	50	nA	V _{CC} = 9.6V V _{IN1} = V _{IN2} = 0V
Source Output Current	I _(source)	1	1.7	—	A	I _{IN1} + I _{IN2} = 2.5mA
Sink Output Current	I _(sink)	0.7	1.1	—	A	I _{IN1} + I _{IN2} = 2.5mA
Source Output Current	I _(source)	2.7	4.2	—	A	I _{IN1} + I _{IN2} = 10mA
Sink Output Current	I _(sink)	1.5	2.2	—	A	I _{IN1} + I _{IN2} = 10mA
Source Output Current	I _{(source)PK}	—	9	—	A	I _{IN1} + I _{IN2} = 1A
Sink Output Current	I _{(sink)PK}	—	9	—	A	I _{IN1} + I _{IN2} = 1A
Gate Driver Switching Times	t _{d(rise)}	—	1.3	—	ns	C _L = 1nF, R _L = 1Ω, V _{CC} = 8V V _{IN} = 6V, R _S = 25Ω
	t _r	—	7.3	—		
	t _{d(fall)}	—	3	—		
	t _f	—	11	—		
Gate Driver Switching Times	t _{d(rise)}	—	9	—	ns	C _L = 1nF, R _L = 1Ω, V _{CC} = 8V V _{IN} = 6V, R _S = 1kΩ
	t _r	—	141.5	—		
	t _{d(fall)}	—	14	—		
	t _f	—	151	—		

Switching Test Circuit and Timing Diagram


Typical Switching Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

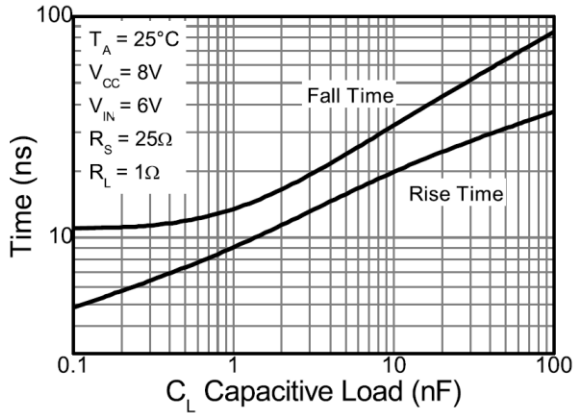


Figure 1. Rise and Fall Time

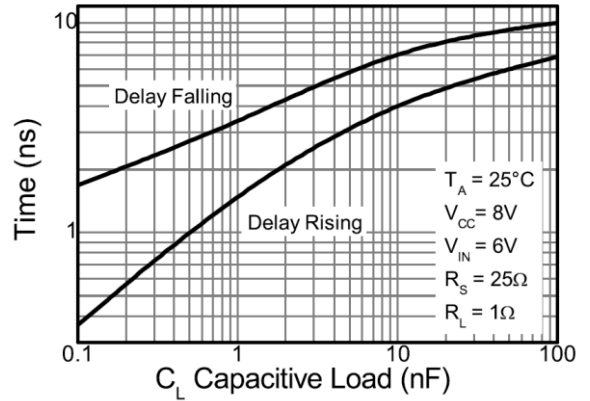


Figure 2. Propagation Delay

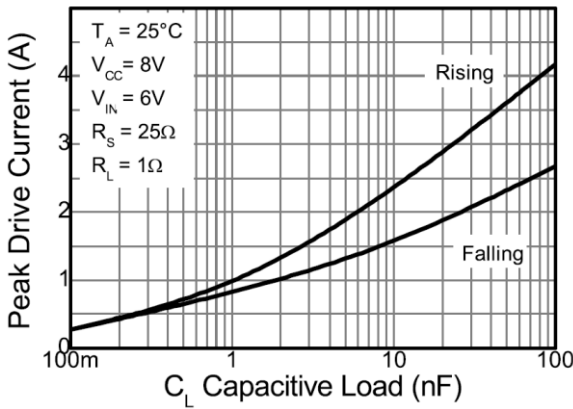


Figure 3. Peak Drive Current

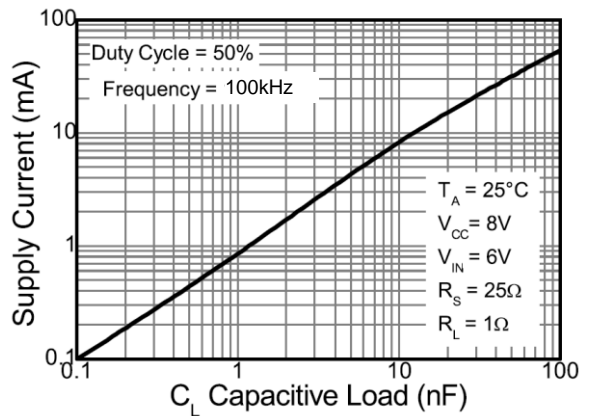


Figure 4. Supply Current

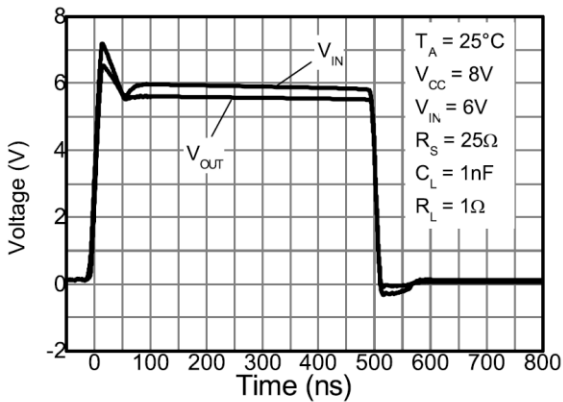


Figure 5. Switching Speed

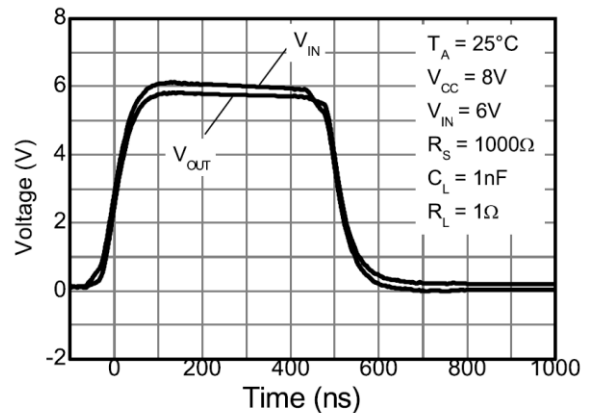


Figure 6. Switching Speed

Typical Switching Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.) (continued)

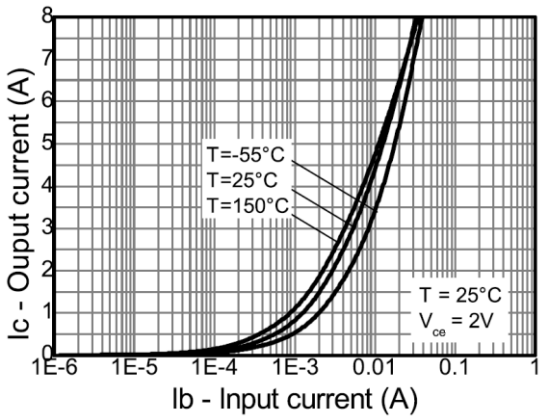


Figure 7. Source Current vs. Input Current

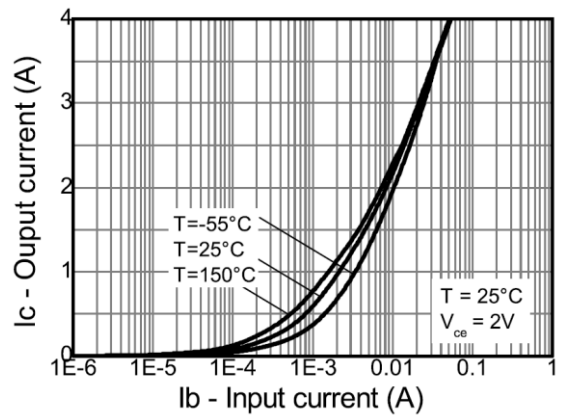
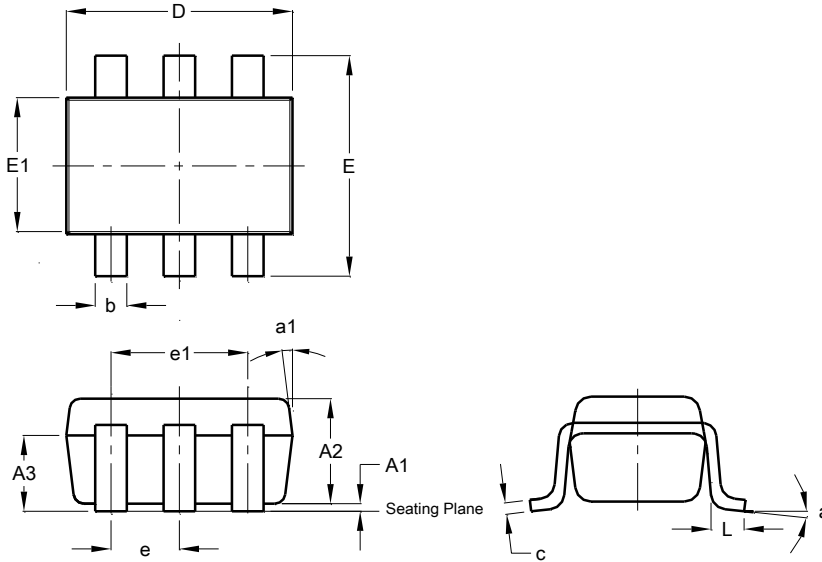


Figure 8. Sink Current vs. Input Current

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT26

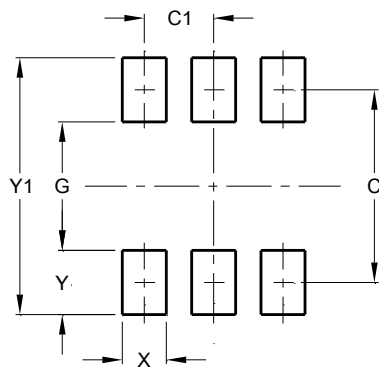


SOT26			
Dim	Min	Max	Typ
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT26



Dimensions	Value (in mm)
C	2.40
C1	0.95
G	1.60
X	0.55
Y	0.80
Y1	3.20

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