

## Description

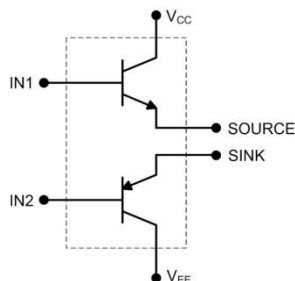
The ZXGD3004E6Q is a high-speed, non-inverting single gate driver designed for switching MOSFETs or IGBTs. It can transfer up to 8A peak source/source current into the gate for effective charging and discharging of the capacitive gate load.

This gate driver ensures rapid switching of the MOSFET to minimize power losses and distortion in high current switching applications. It can typically drive 1.9A into the low gate impedance with just 10mA input from a controller. The turn-on and turn-off switching behaviour of the MOSFET can be individually tailored to suit an application. By defining the switching characteristics appropriately, EMI and cross conduction can be reduced.

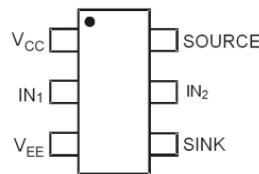
## Applications

Gate Driving Power MOSFET and IGBTs in:

- AC-DC Power Supplies (SMPS)
- DC-DC Converters
- DC-AC Inverters (i.e. Solar)
- 1, 2 and 3-Phase Motor Control Circuits
- Amplifier Output Stages



Top View



Top View Pin-Out

## Features

- High-Gain Buffer with Typically 1.9A Output from 10mA Input
- 8 Amps Peak Output Current
- 40V Supply for +20V to -18V Gate Driving to Prevent dV/dt Induced False Triggering and Minimize On-Losses
- Emitter-Follower that is Rugged to Latch-Up/Shoot-Through
- Fast Switching Emitter-Follower Configuration
  - 1ns Propagation Delay Time
  - 14ns Rise/Fall Time, 1500pF Load
- Optimized Pin-Out to Simplify PCB Layout and Reduce Parasitic Trace Inductances
- Near-Zero Quiescent Supply Current
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

## Mechanical Data

- Case: SOT26
- Case 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)

Pin Name	Pin Function
V <sub>CC</sub>	Driver Supply High
IN <sub>1</sub> & IN <sub>2</sub>	Driver Input *
V <sub>EE</sub>	Supply Voltage Low
SOURCE	Source Current Output **
SINK	Sink Current Output **

\* Typically connect IN1 & IN2 together

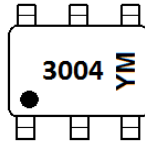
\*\* Typically connect SOURCE & SINK together

## Ordering Information (Notes 4 & 5)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZXGD3004E6QTA	Automotive	3004	7	8	3,000

- 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 [http://www.diodes.com/quality/lead\\_free/](http://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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
  5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

**Marking Information**

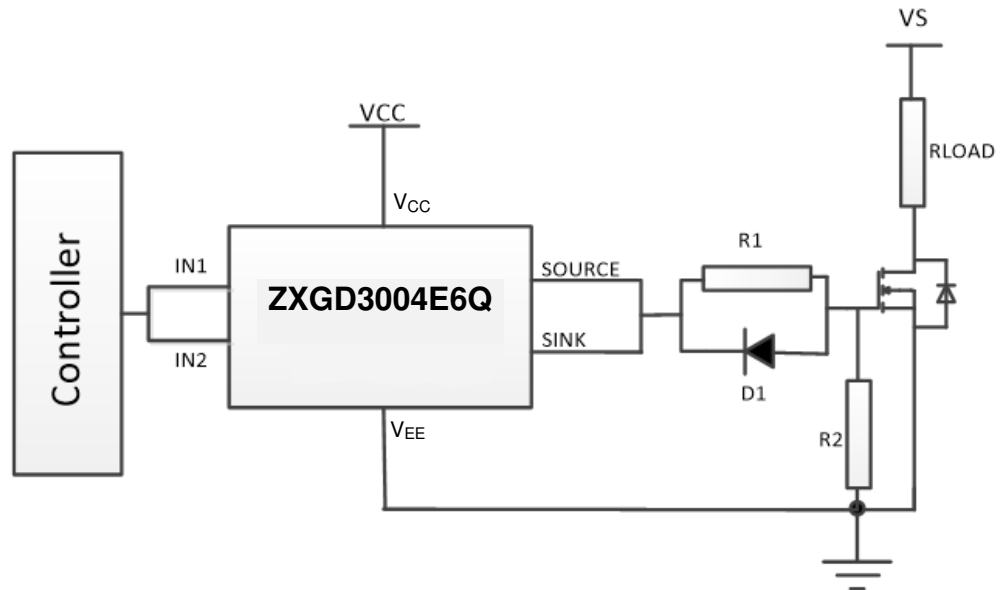


3004 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: F = 2018)  
 M = Month (ex: 9 = September)

Date Code Key

<b>Year</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>				
<b>Code</b>	F	G	H	I	J	K	L	M				
<b>Month</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
<b>Code</b>	1	2	3	4	5	6	7	8	9	O	N	D

**Typical Application Circuit**



R1, D1 combination can be used for variable turn on and turn off times.

**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Supply Voltage, with Respect to V <sub>EE</sub>	V <sub>CC</sub>	40	V
Input Voltage, with Respect to V <sub>EE</sub>	V <sub>IN</sub>	40	V
Output Difference Voltage (Source – Sink)	ΔV <sub>(source-sink)</sub>	±7	V
Peak Pulsed Output Current (Source – Sink)	I <sub>OM</sub>	±8	A
Peak Pulsed Input Current	I <sub>IN1</sub> , I <sub>IN2</sub>	±1	A

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Notes 6 & 7)	P <sub>D</sub>	1.1	W
Linear Derating Factor		8.8	mW/°C
Thermal Resistance, Junction to Ambient (Notes 6 & 7)	R <sub>θJA</sub>	113	°C/W
Thermal Resistance, Junction to Lead (Note 8)	R <sub>θJL</sub>	105	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

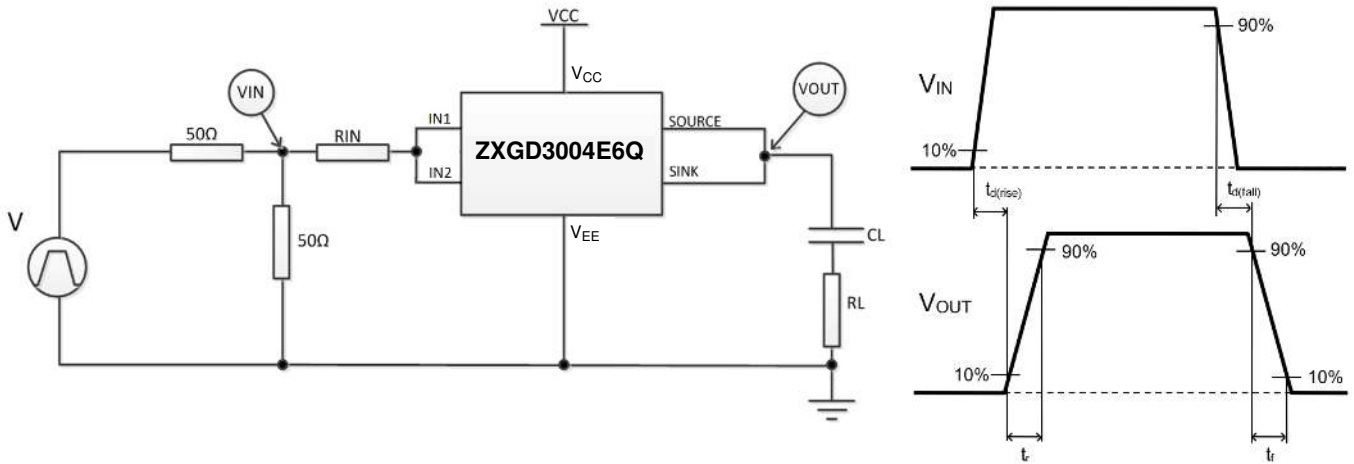
**ESD Ratings** (Note 9)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C
Electrostatic Discharge – Charged Device Model	ESD CDM	1,000	V	IV

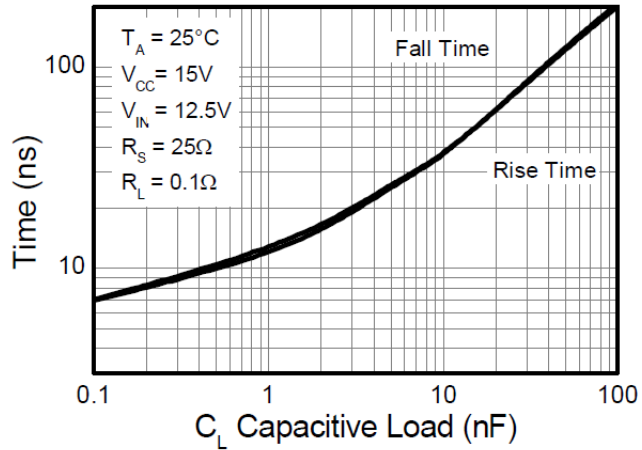
- Notes:
6. For a device mounted on 25mm x 25mm 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state. The heatsink is split in half with the pin 1 (V<sub>CC</sub>) and pin 3 (V<sub>EE</sub>) connected separately to each half.
  7. For device with two active die running at equal power.
  8. Thermal resistance from junction to solder-point at the end of each lead on pin 1 (V<sub>CC</sub>) and pin 3 (V<sub>EE</sub>).
  9. Refer to JEDEC specification JESD22-A114, JESD22-A115 and JESD22-C101.

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

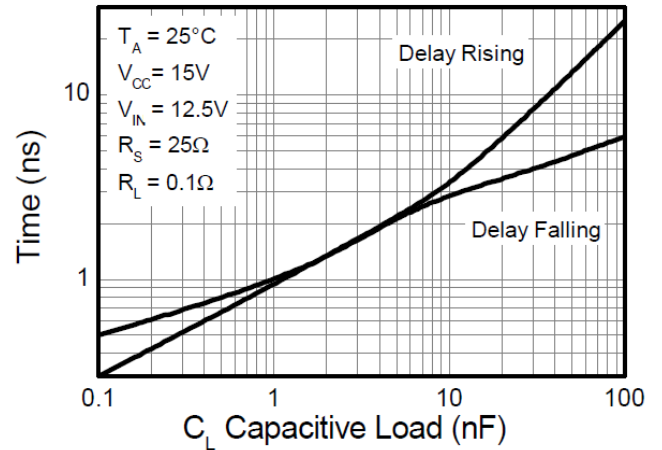
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Output Voltage, High	V <sub>OUT(hi)</sub>	—	V <sub>IN1</sub> - 0.4	—	V	I <sub>source</sub> = 1μA
Output Voltage, Low	V <sub>OUT(low)</sub>	—	V <sub>IN1</sub> + 0.4	—		I <sub>sink</sub> = 1μA
Source Output Leakage Current	I <sub>L(source)</sub>	—	—	1	μA	V <sub>CC</sub> = 40V, V <sub>IN1</sub> = V <sub>IN2</sub> = 0V
Sink Output Leakage Current	I <sub>L(sink)</sub>	—	—	1	μA	V <sub>CC</sub> = 40V, V <sub>IN1</sub> = V <sub>IN2</sub> = V <sub>CC</sub>
Quiescent Supply Current	I <sub>Q</sub>	—	—	50	nA	V <sub>CC</sub> = 32V, V <sub>IN1</sub> = V <sub>IN2</sub> = 0V
Peak Pulsed Source Output Current	I <sub>(source)M</sub>	1.2	1.9	—	A	I <sub>IN1</sub> + I <sub>IN2</sub> = 10mA
Peak Pulsed Sink Output Current	I <sub>(sink)M</sub>	1.2	1.9	—	A	I <sub>IN1</sub> + I <sub>IN2</sub> = -10mA
Peak Pulsed Source Output Current	I <sub>(source)M</sub>	—	8	—	A	I <sub>IN1</sub> + I <sub>IN2</sub> = 1A
Peak Pulsed Sink Output Current	I <sub>(sink)M</sub>	—	8	—	A	I <sub>IN1</sub> + I <sub>IN2</sub> = -1A
Gate Driver Switching Times	t <sub>d(rise)</sub>	—	1.1	—	ns	V <sub>CC</sub> = 15V, V <sub>EE</sub> = 0V, V <sub>IN</sub> = 0 to 12.5V, C <sub>L</sub> = 1.5nF, R <sub>L</sub> = 0.1Ω, R <sub>IN</sub> = 25Ω
	t <sub>r</sub>		13.4			
	t <sub>d(fall)</sub>		0.95			
	t <sub>f</sub>		12.4			
Gate Driver Switching Times	t <sub>d(rise)</sub>	—	3.2	—	ns	V <sub>CC</sub> = 15V, V <sub>EE</sub> = 0V, V <sub>IN</sub> = 0 to 12.5V, C <sub>L</sub> = 1.5nF, R <sub>L</sub> = 0.1Ω, R <sub>IN</sub> = 1kΩ
	t <sub>r</sub>		77.9			
	t <sub>d(fall)</sub>		3.6			
	t <sub>f</sub>		82			

**Switching Test Circuit and Timing Diagram**


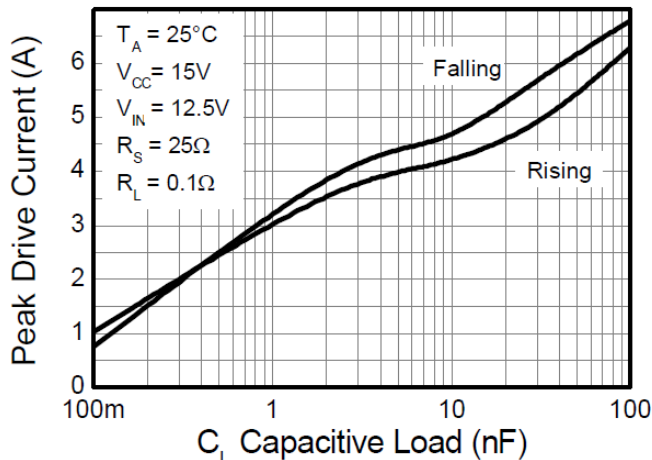
**Typical Gate Driver Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



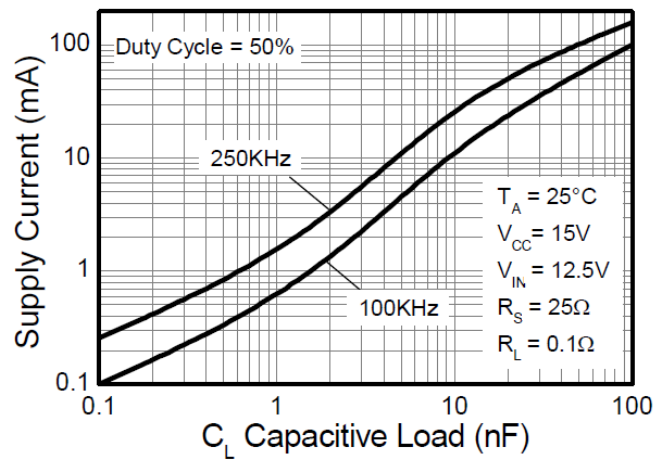
**Rise and Fall Time**



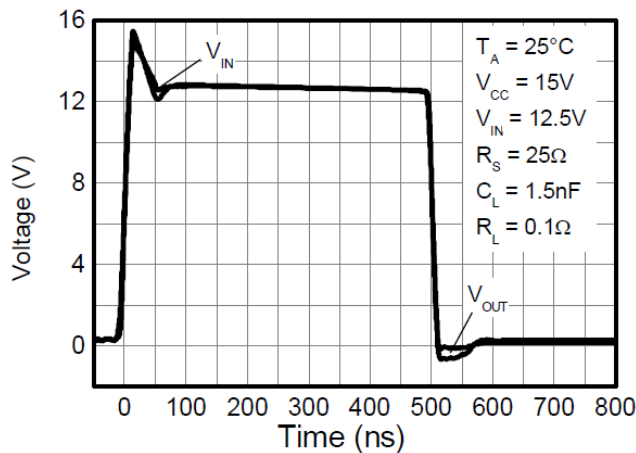
**Propagation Delay**



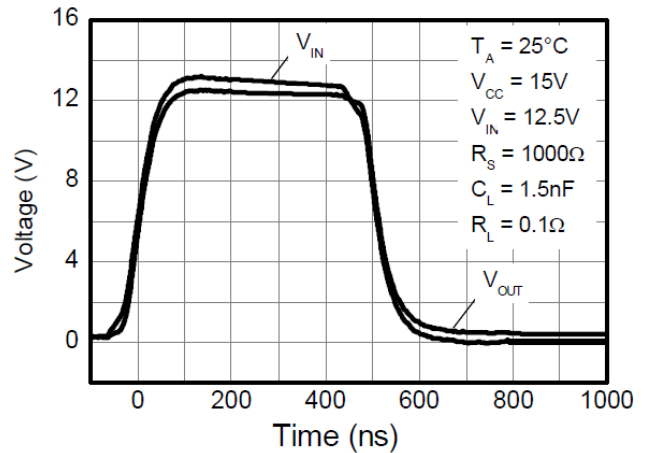
**Peak Drive Current**



**Supply Current**

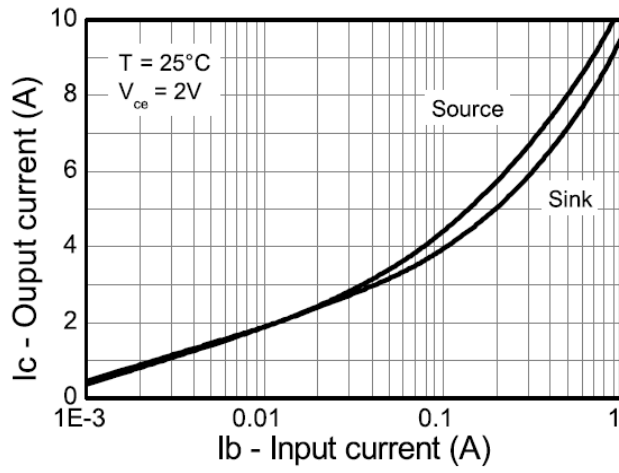


**Switching Speed**



**Switching Speed**

**Typical Gate Driver Characteristics (Cont.)**

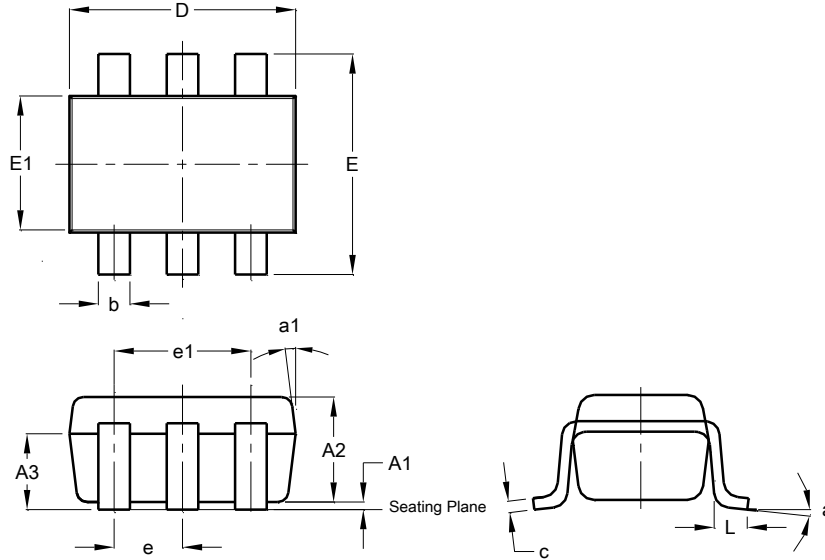


**Output current Vs Input current**

**Package Outline Dimensions**

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

**SOT26**

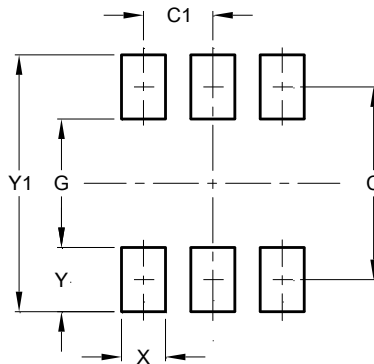


SOT26			
Dim	Min	Max	Typ
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
All Dimensions in mm			

**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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