Description

The ZXGD3003E6 is a high-speed, non-inverting single gate driver designed for switching MOSFETs or IGBTS. It can transfer up to 5A 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 1.5A 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:

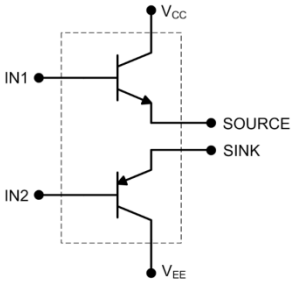
- AC-DC Power Supplies (SMPS)
- DC-DC Converters
- DC-AC Inverters (i.e. Solar)
- 1, 2 and 3-Phase Motor Control Circuits
- Amplifier Output Stages

Features

- High-Gain Buffer with Typically 1.5A Output from 10mA Input
- 5 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-Though
- Fast Switching Emitter-Follower Configuration:
  - 2ns Propagation Delay Time
  - 9ns Rise/Fall Time, 1000pF 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**
- **An Automotive-Compliant Part is Available Under Separate Datasheet (ZXGD3003E6Q)**

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)



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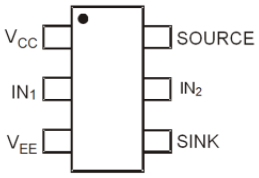
Top View



Top View
Pin-Out

Pin Name	Pin Function
V_{CC}	Supply Voltage High
IN_1 & IN_2	Driver Input *
V_{EE}	Supply Voltage Low
SOURCE	Source Current Output **
SINK	Sink Current Output **

* Typically connect IN1 & IN2 together
** Typically connect SOURCE & SINK together

Ordering Information (Note 4)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZXGD3003E6TA	AEC-Q101	3003	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/ 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 https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

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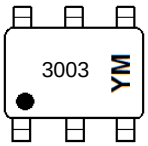


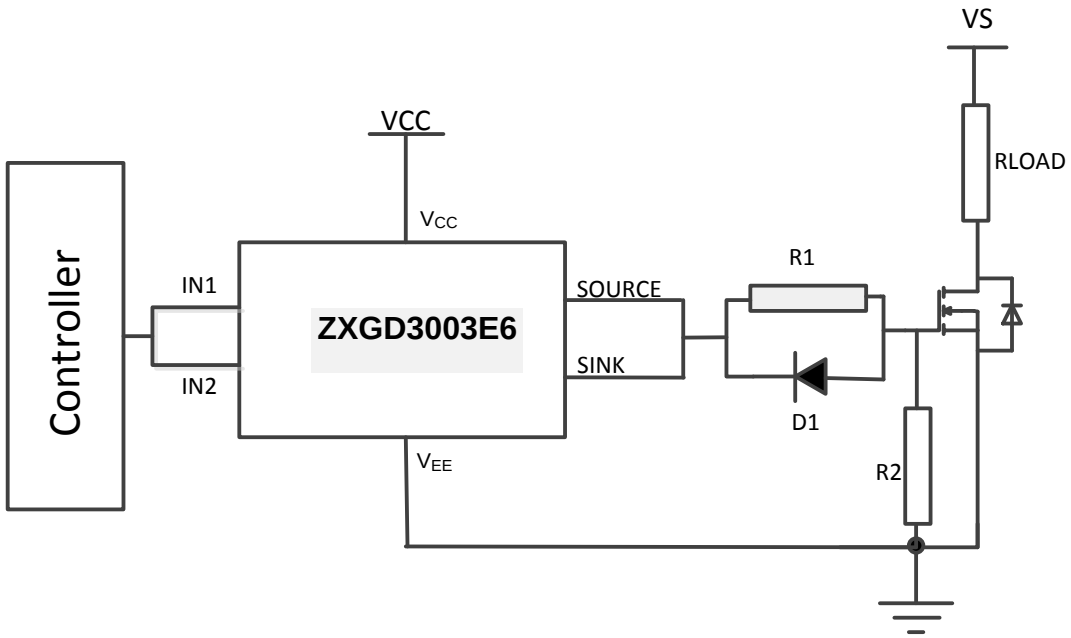
3003 = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: F = 2018)
M or $\overline{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2018	2019	2020	2021	2022	2023	2024	2025
Code	F	G	H	I	J	K	L	M

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



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

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

Characteristic	Symbol	Value	Unit
Supply Voltage, with Respect to V_{EE}	V_{CC}	40	V
Input Voltage, with Respect to V_{EE}	V_{IN}	40	V
Output Difference Voltage (Source – Sink)	$\Delta V_{(source-sink)}$	±7	V
Peak Pulsed Output Current (Source – Sink)	I_{OM}	±5	A
Peak Pulsed Input Current	I_{IN1}, I_{IN2}	±1	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Notes 5 & 6) Linear Derating Factor	P_D	1.1 8.8	W mW/°C
Thermal Resistance, Junction to Ambient (Notes 5 & 6)	$R_{\theta JA}$	113	°C/W
Thermal Resistance, Junction to Lead (Note 7)	$R_{\theta JL}$	105	
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 8)

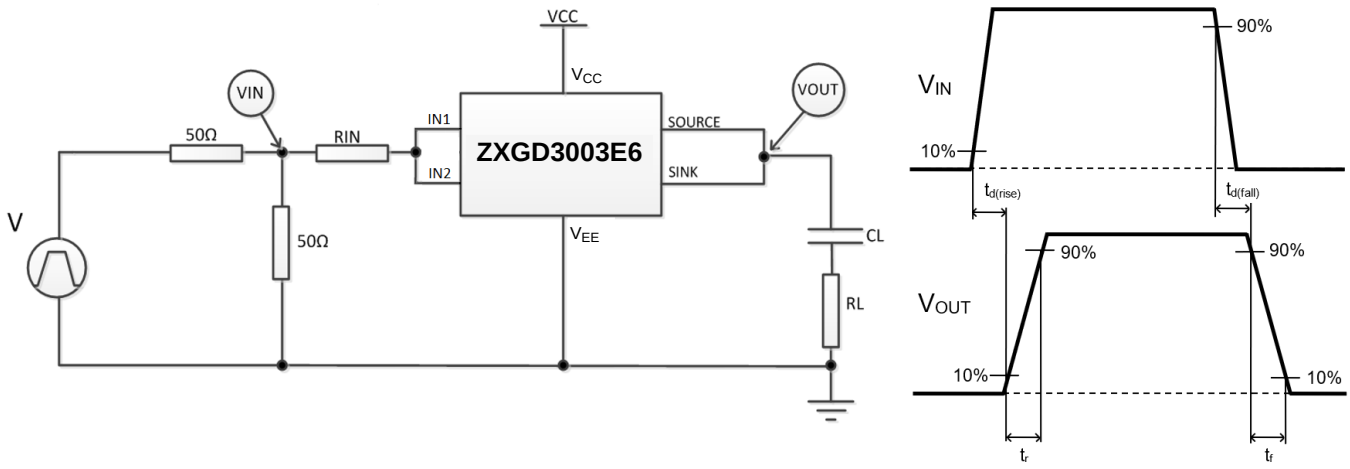
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C
Electrostatic Discharge – Charged Device Model	ESD CDM	1,000	V	IV

Notes:
5. 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_{CC}) and pin 3 (V_{EE}) connected separately to each half.
6. For device with two active die running at equal power.
7. Thermal resistance from junction to solder-point at the end of each lead on pin 1 (V_{CC}) and pin 3 (V_{EE}).
8. Refer to JEDEC specification JESD22-A114, JESD22-A115 and JESD22-C101.

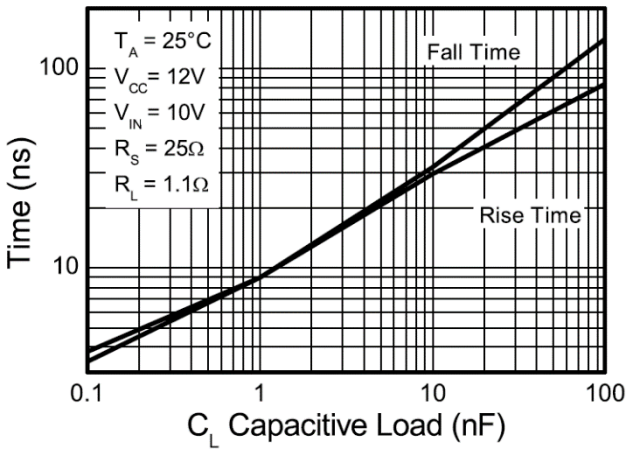
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Output Voltage, High	$V_{OUT(hi)}$	—	V_{IN1} - 0.4	—	V	I_{source} = 1µA
Output Voltage, Low	$V_{OUT(low)}$	—	V_{IN1} + 0.4	—		I_{sink} = 1µA
Source Output Leakage Current	$I_{L(source)}$	—	—	1	V	V_{CC} = 40V, V_{IN1} = V_{IN2} = 0V
Sink Output Leakage Current	$I_{L(sink)}$	—	—	1	V	V_{CC} = 40V, V_{IN1} = V_{IN2} = V_{CC}
Quiescent Supply Current	I_Q	—	—	20	nA	V_{CC} = 32V, V_{IN1} = V_{IN2} = 0V
Peak Pulsed Source Output Current	$I_{(source)M}$	1	1.6	—	A	I_{IN1} + I_{IN2} = 10mA
Peak Pulsed Sink Output Current	$I_{(sink)M}$	1	1.4	—	A	I_{IN1} + I_{IN2} = -10mA
Peak Pulsed Source Output Current	$I_{(source)M}$	—	5	—	A	I_{IN1} + I_{IN2} = 500mA
Peak Pulsed Sink Output Current	$I_{(sink)M}$	—	5	—	A	I_{IN1} + I_{IN2} = -500mA
Gate Driver Switching Times	$t_{d(rise)}$ t_r $t_{d(fall)}$ t_f	—	1.8 8.9 1.7 8.9	—	ns	V_{CC} = 12V, V_{EE} = 0V, V_{IN} = 0 to 10V, C_L = 1nF, R_L = 1Ω, R_{IN} = 25Ω
Gate Driver Switching Times	$t_{d(rise)}$ t_r $t_{d(fall)}$ t_f	—	4 77 4 85	—	ns	V_{CC} = 12V, V_{EE} = 0V, V_{IN} = 0 to 10V, C_L = 1nF, R_L = 1Ω, R_{IN} = 1kΩ

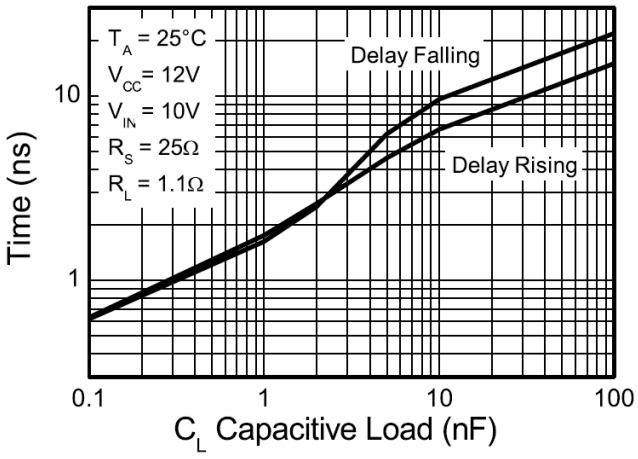
Switching Test Circuit and Timing Diagram



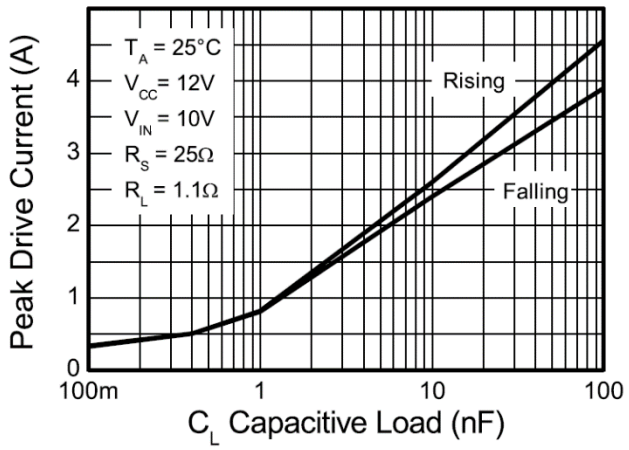
Typical Gate Driver Characteristics (@T_A = +25°C, unless otherwise specified.)



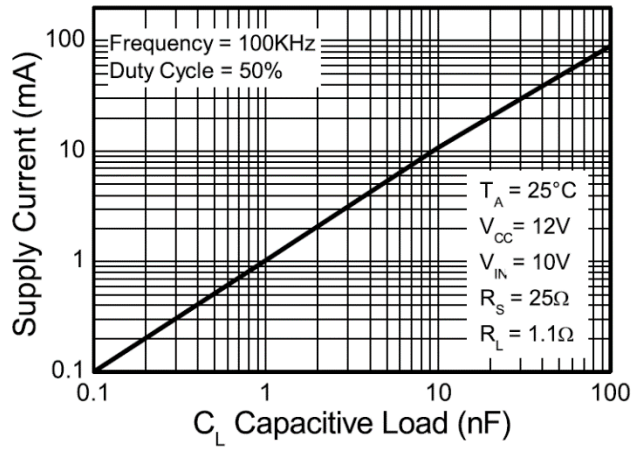
Rise and Fall Time



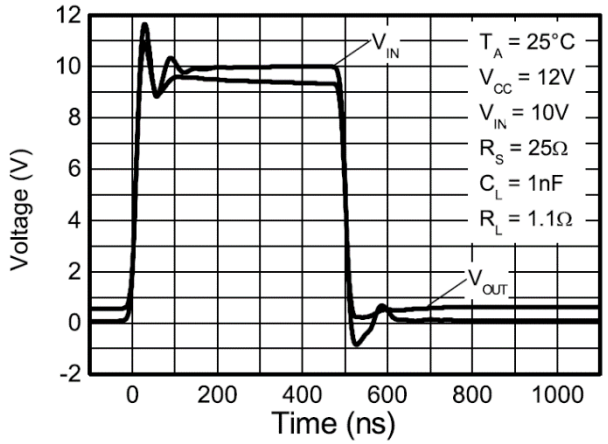
Propagation Delay



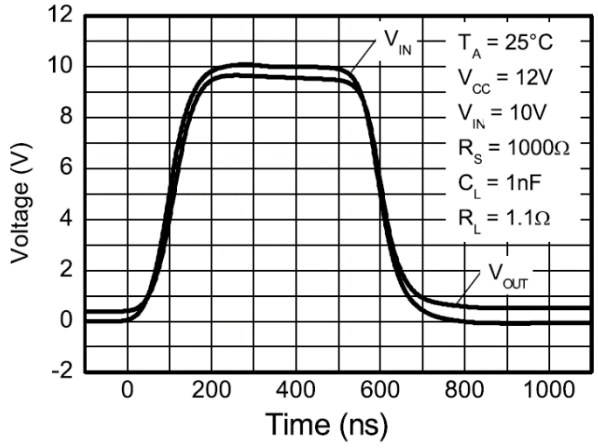
Peak Drive Current



Supply Current

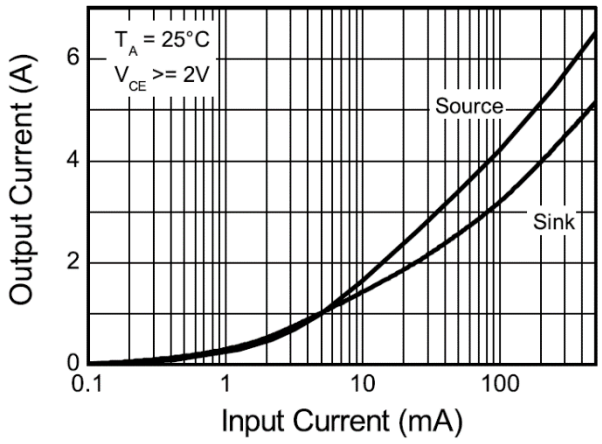


Switching Speed



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.

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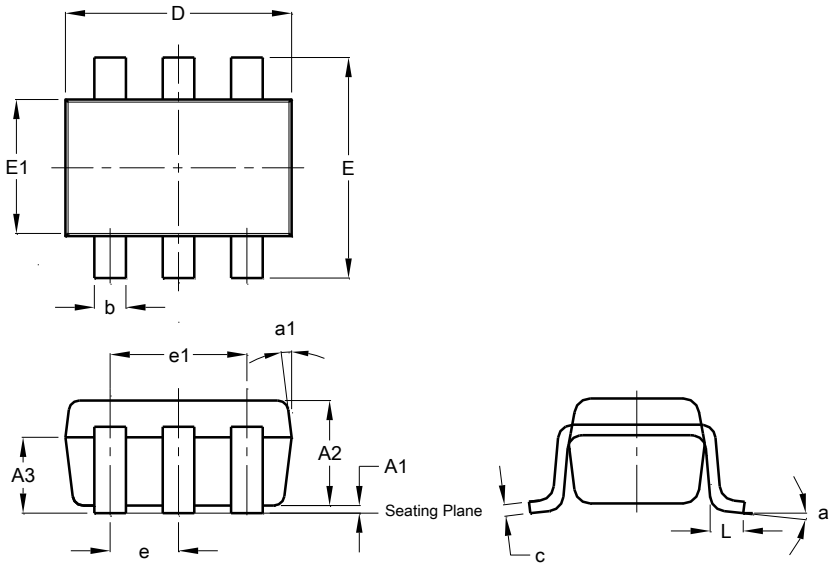

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Dim	**Min**	**Max**	**Typ**
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
All Dimensions in mm			

Suggested Pad Layout

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

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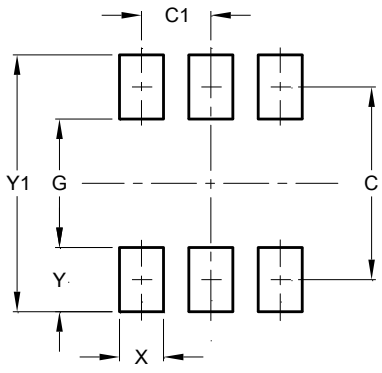

Dimensions	Value (in mm)
C	2.40
C1	0.95
G	1.60
X	0.55
Y	0.80
Y1	3.20

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