Description

The ZXGD3001E6 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 ZXGD3001E6 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 SOT23-6 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

Features

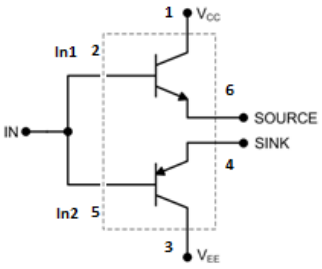
- 12V Operating Voltage Range
- 9A Peak Output Current
- Fast-Switching Emitter-Follower Configuration
  - 3ns Propagation Delay Time
  - 11ns Rise/Fall Time, 1000pF Load
- Low-Input Current Requirement
  - 4.2A (source)/2.2A (sink) Output Current from 10mA Input
- SOT23-6 Package
- Separate Source and 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)**
- **For automotive applications requiring specific change control (i.e.: parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please refer to the related automotive grade (Q-suffix) part. A listing can be found at https://www.diodes.com/products/automotive/automotive-products/.**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability. https://www.diodes.com/quality/product-definitions/**

Mechanical Data

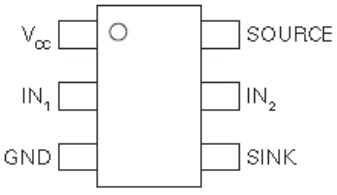
- Case: SOT26
- Case Material: Molded Plastic. "Green" Molding Compound; UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.018 grams (Approximate)

SOT26

Top View



Internal Device Schematic



Top View Pin-Out

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

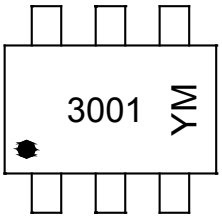
Ordering Information (Notes 4)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZXGD3001E6TA	AEC-Q101	3001	7	8 embossed	3000

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/pakaging/diodes-packaging/.

Marking Information

SOT26



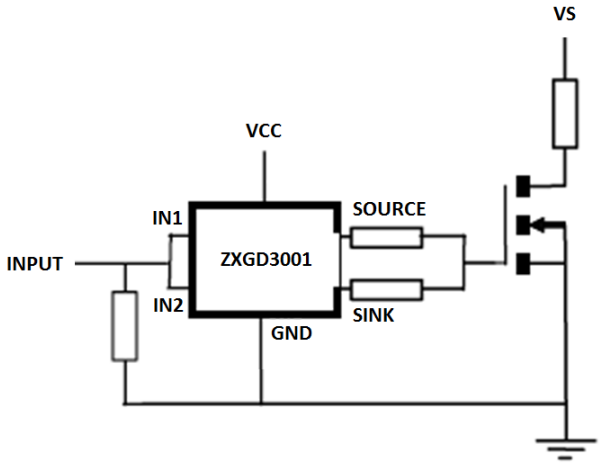
3001 = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: H = 2020)
M or $\overline{M}$ = Month (ex: 9 = September)

Date Code Key

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Code	H	I	J	K	L	M	N	O	P	R	S

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 (6)	$I_{(source)}$	4.2	A
Sink Current @ I_{IN1} + I_{IN2} =10mA (6)	$I_{(sink)}$	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) 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	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 8)

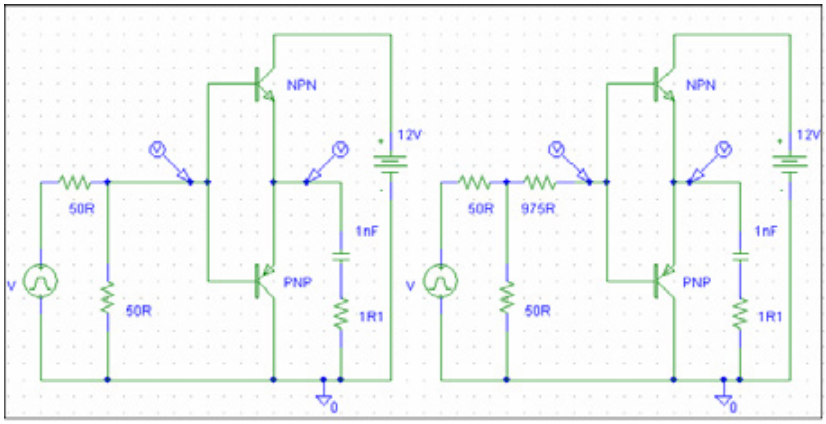
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	1500	V	1C
Electrostatic Discharge – Charged Device Model	ESD CDM	1000	V	IV

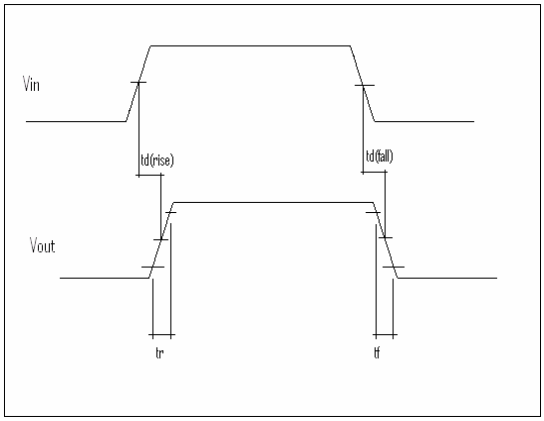
Notes:
5. For a device mounted on 25mm × 25mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state. The heatsink is split in half with the pin 1 (V_{CC}) and pin 3 (V_{EE}) connected separately to each half.
6. For device 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.)

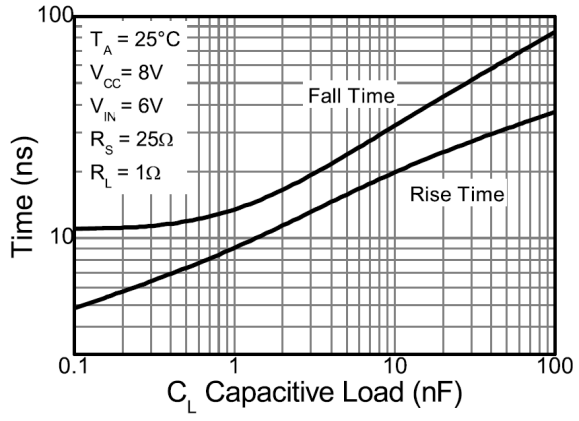
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Output Voltage, High	V_{OH}	—	V_{CC} – 0.4	—	V	I_{SOURCE} = 1µA
Output Voltage, Low	V_{OL}	—	0.4	—	V	I_{SINK} = 1µA
Source Output Leakage Current	$I_{L(source)}$	—	—	1	µA	V_{CC} = 12V, V_{IN1} = V_{IN2} = 0V
Sink Output Leakage Current	$I_{L(sink)}$	—	—	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	$t_{d(rise)}$ t_r $t_{d(fall)}$ t_f	— — — —	1.3 7.3 3 11	— — — —	nS	C_L=1nF, R_L=1Ω, V_{CC}=8V, V_{IN}=6V, R_S=25Ω
Gate Driver Switching Times	$t_{d(rise)}$ t_r $t_{d(fall)}$ t_f	— — — —	9 141.5 14 151	— — — —	nS	C_L=1nF, R_L=1Ω, V_{CC}=8V, V_{IN}=6V, R_S=1kΩ

Switching Test Circuit and Timing Diagram

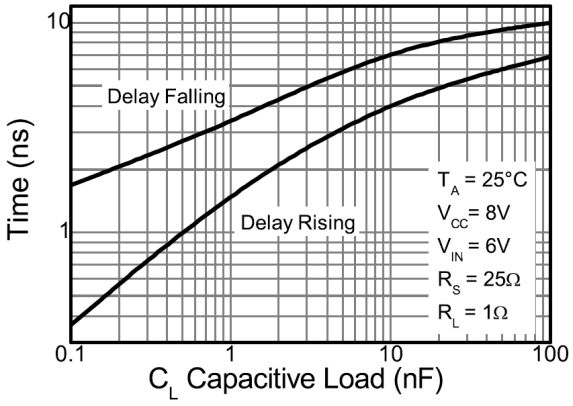




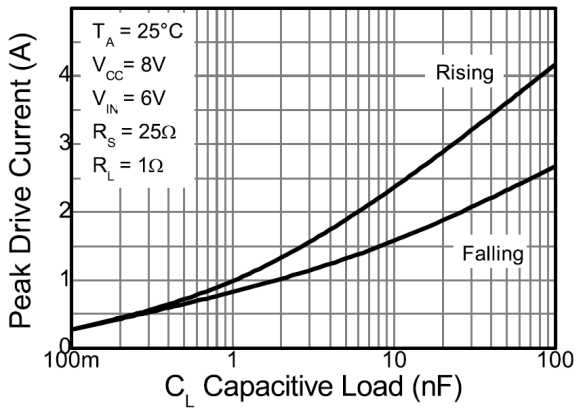
Typical Switching Characteristics (@T_A = +25°C, unless otherwise specified.)



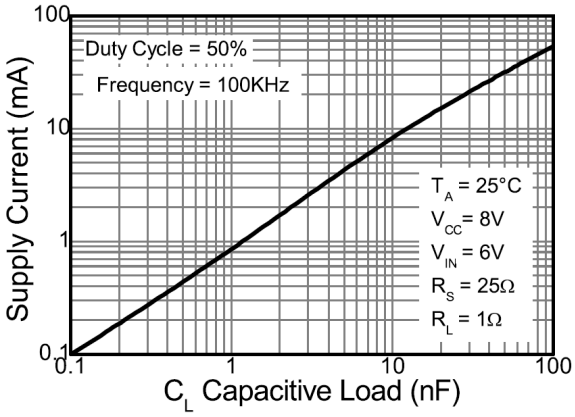
Rise and Fall Time



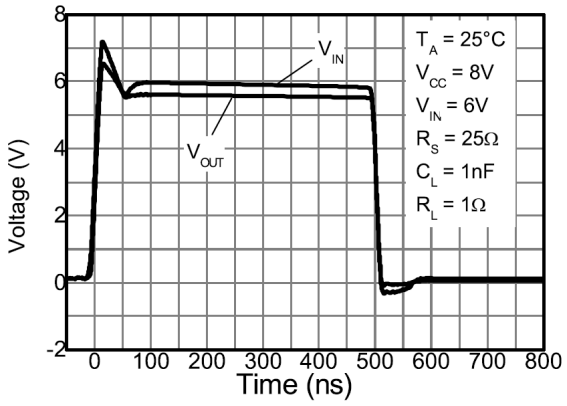
Propagation Delay



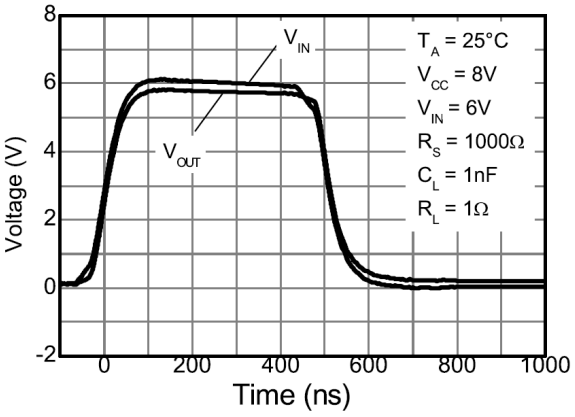
Peak Drive Current



Supply Current

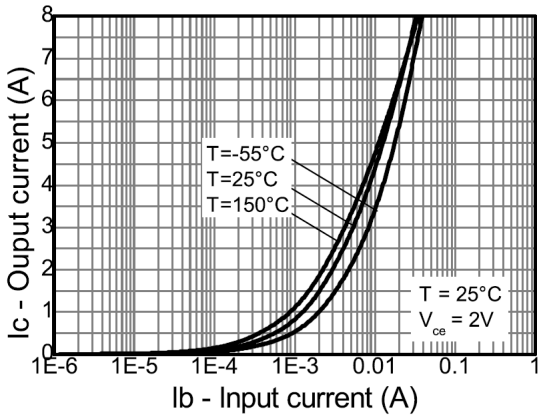


Switching Speed

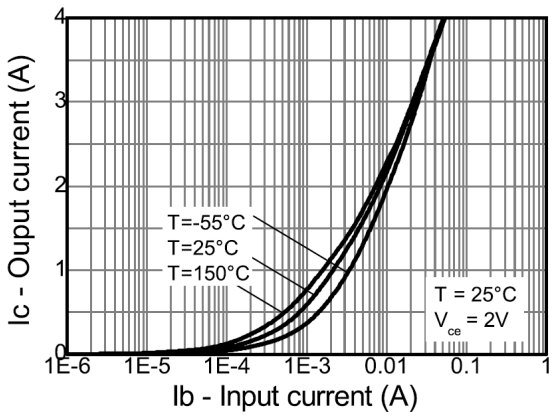


Switching Speed

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



Source Current Vs Input Current

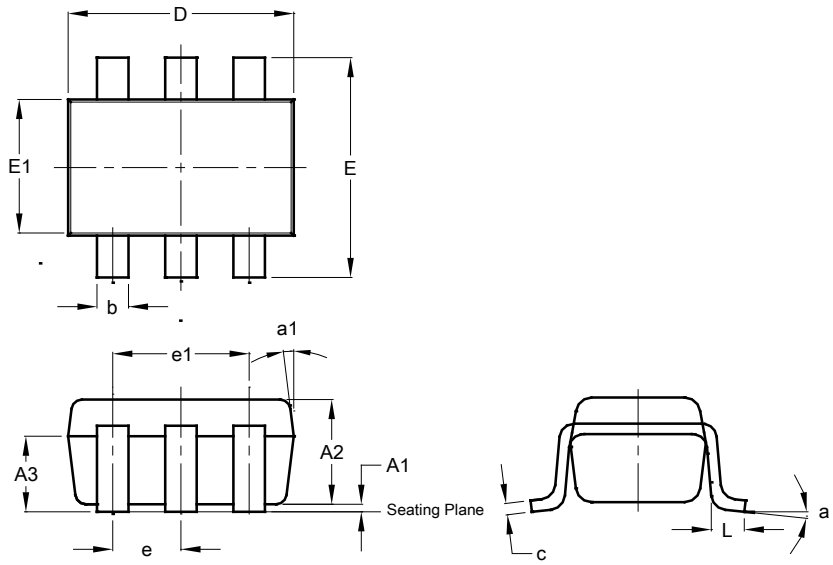


Sink Current Vs Input Current

Package Outline Dimensions

For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

SOT26 (SC74R)

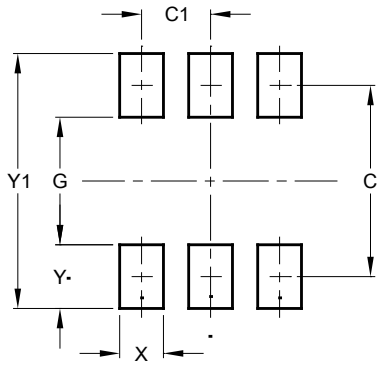


SOT26 (SC74R)			
Dim	**Min**	**Max**	**Typ**
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
All Dimensions in mm			

Suggested Pad Layout

For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

SOT26 (SC74R)



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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