

Description

ZXGD3002E6 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 2A 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 MOSFETs 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 2A Output from 10mA Input
- 9A Peak Output Current
- 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 Pinout 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)**
- **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/>**

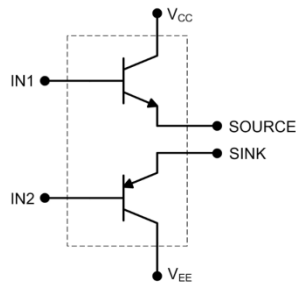
Mechanical Data

- Case: SOT26 (SC74R)
- 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
- Weight: 0.018 grams (Approximate)

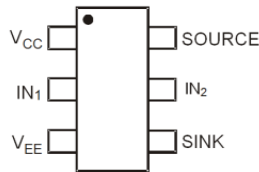
SOT26 (SC74R)



Top View



Internal Device Schematic



Top View Pinout

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**

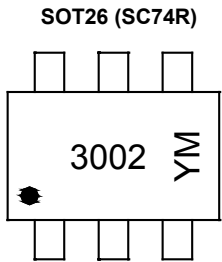
* Typically connect IN₁ & IN₂ together
 ** Typically connect SOURCE & SINK together

Ordering Information (Note 4)

Product	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZXGD3002E6TA	AEC-Q101	3002	7	8	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/products/packages.html>.

Marking Information

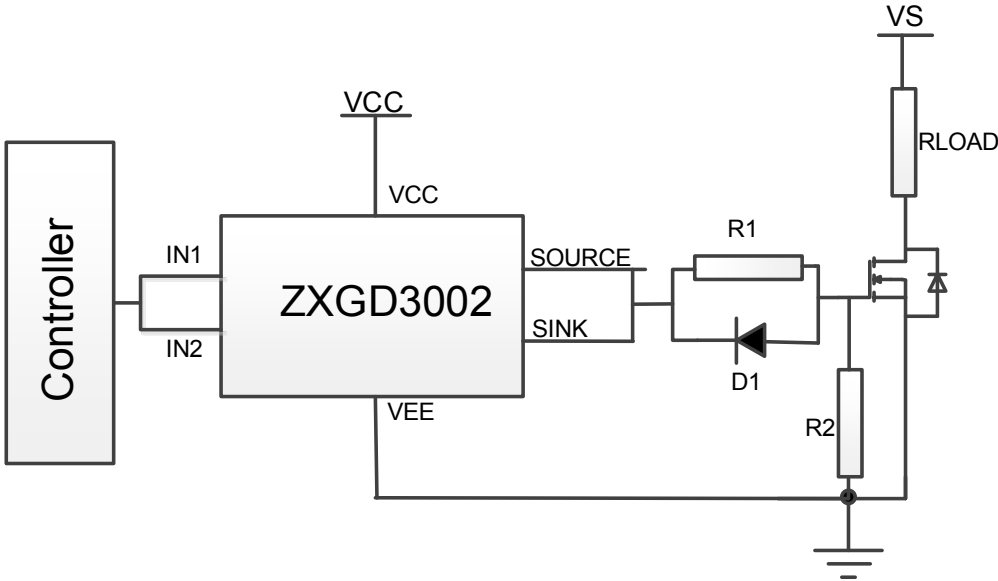


3002 = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: H = 2020)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
Code	F	G	H	I	J	K	L	M	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	V _{CC}	20	V
Input Voltage	V _{IN}	20	V
Output Difference Voltage (Source – Sink)	ΔV _(source-sink)	±7	V
Peak Pulsed Output Current (Source & Sink)	I _{OM}	±9	V
Peak Pulsed Input current	I _{IN1} , I _{IN2}	±1	A

Thermal Characteristics

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

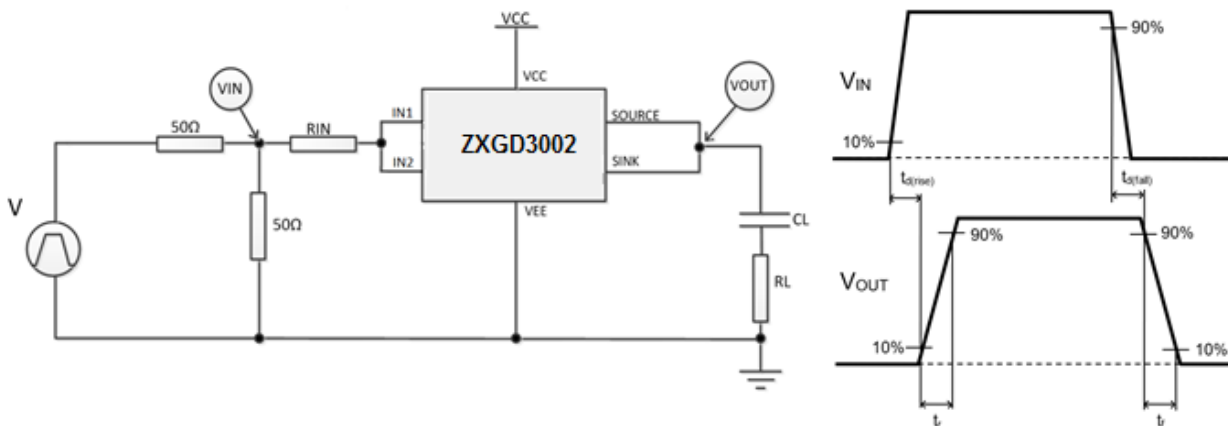
ESD Ratings (Note 8)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C
Electrostatic Discharge – Charged Device Model	ESD CDM	1000	V	IV

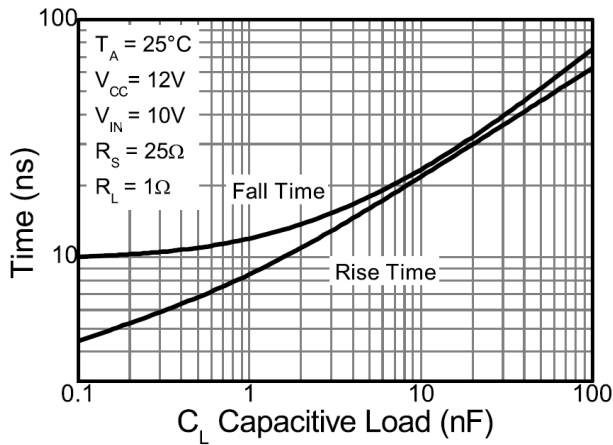
- Notes:
5. For a device mounted on 25mm × 25mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions while operating in a steady-state. The heatsink is split in half with the pin 1 (V_{CC}) and pin 3 (V_{EE}) connected separately to each half.
 6. For device 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 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

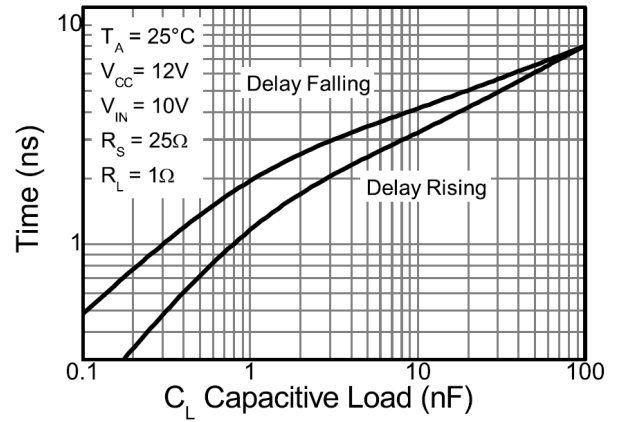
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Output Voltage, High	$V_{OUT(hi)}$	—	$V_{CC} - 0.4$	—	V	$I_{SOURCE} = 1\mu\text{A}$
Output Voltage, Low	$V_{OUT(low)}$	—	$V_{EE} + 0.4$	—	V	$I_{SINK} = 1\mu\text{A}$
Source Output Leakage Current	$I_{L(SOURCE)}$	—	—	1	μA	$V_{CC} = 20\text{V}$, $V_{IN1} = V_{IN2} = 0\text{V}$
Sink Output Leakage Current	$I_{L(SINK)}$	—	—	1	μA	$V_{CC} = 20\text{V}$, $V_{IN1} = V_{IN2} = V_{CC}$
Quiescent Current	I_Q	—	—	50	nA	$V_{CC} = 16\text{V}$, $V_{IN1} = V_{IN2} = 0\text{V}$
Peak Pulsed Source Output Current	$I_{(SOURCE)M}$	1.6	2.2	—	A	$I_{IN1} + I_{IN2} = 10\text{mA}$
Peak Pulsed Sink Output Current	$I_{(SINK)M}$	1.4	2	—	A	$I_{IN1} + I_{IN2} = -10\text{mA}$
Peak Pulsed Source Output Current	$I_{(SOURCE)M}$	—	9	—	A	$I_{IN1} + I_{IN2} = 1\text{A}$
Peak Pulsed Sink Output Current	$I_{(SINK)M}$	—	9	—	A	$I_{IN1} + I_{IN2} = -1\text{A}$
Gate Driver Switching Times	$t_{D(RISE)}$	—	1.25	—	nS	$V_{CC} = 12\text{V}$, $V_{EE} = 0\text{V}$, $V_{IN} = 0$ to 10V , $C_L = 1\text{nF}$, $R_L = 1\Omega$, $R_{IN} = 25\Omega$
	t_R	—	8.3	—		
	$t_{D(FALL)}$	—	1.6	—		
	t_F	—	10.8	—		
Gate Driver Switching Times	$t_{D(RISE)}$	—	3.6	—	nS	$V_{CC} = 12\text{V}$, $V_{EE} = 0\text{V}$, $V_{IN} = 0$ to 10V , $C_L = 1\text{nF}$, $R_L = 1\Omega$, $R_{IN} = 1\text{k}\Omega$
	t_R	—	105	—		
	$t_{D(FALL)}$	—	6.9	—		
	t_F	—	115	—		

Switching Test Circuit and Timing Diagram


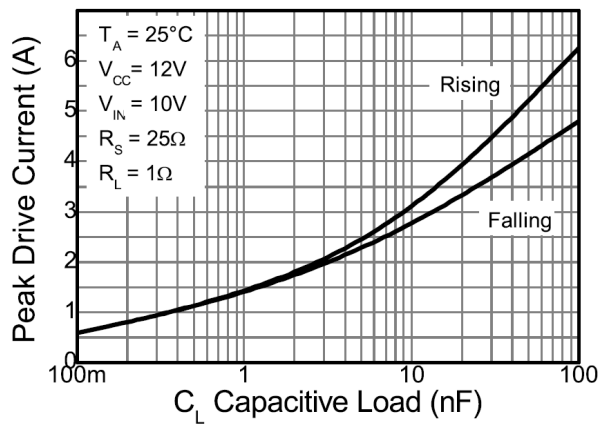
Typical Switching Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



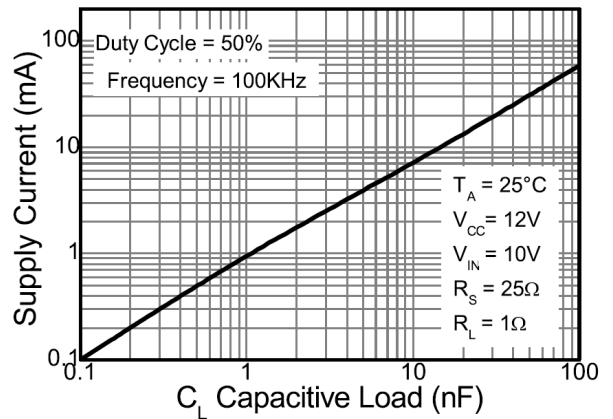
Rise and Fall Time



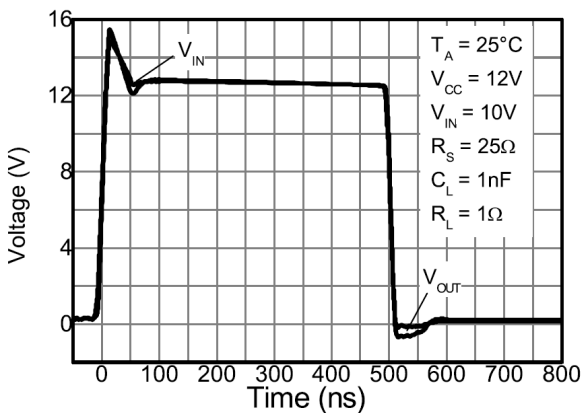
Propagation Delay



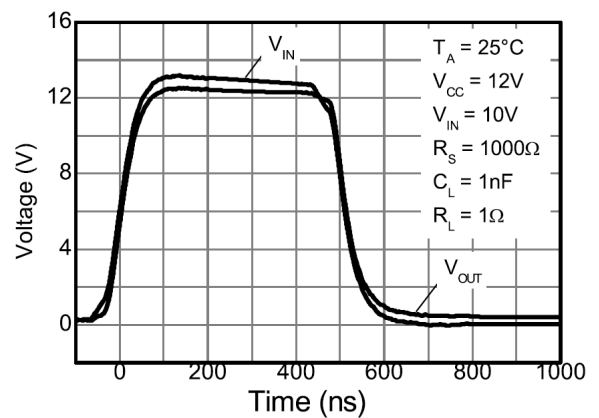
Peak Drive Current



Supply Current

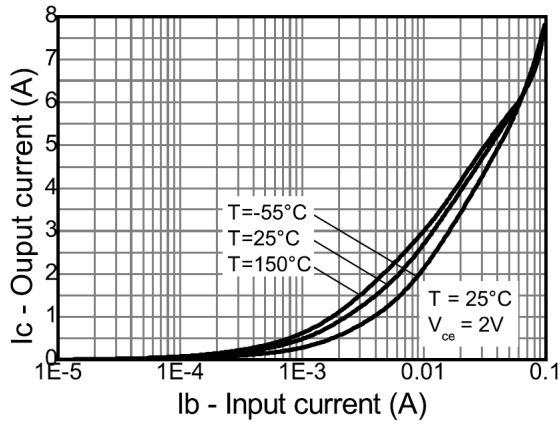


Switching Speed

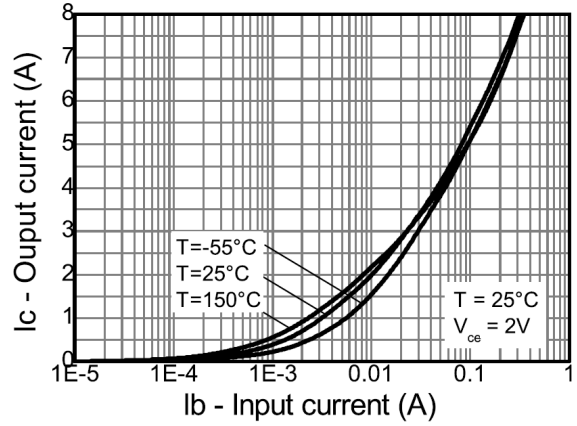


Switching Speed

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



Source Current Vs Input Current

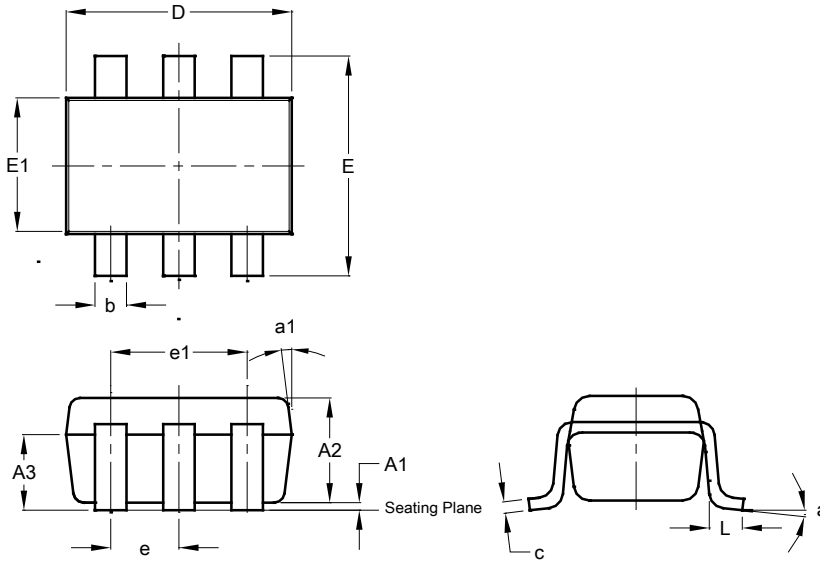


Sink Current Vs Input Current

Package Outline Dimensions

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

SOT26 (SC74R)



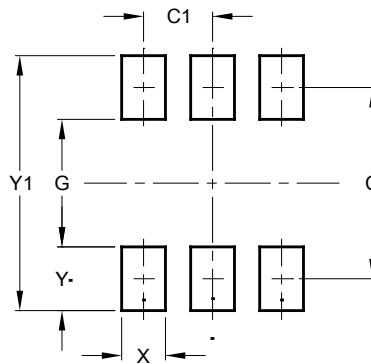
SOT26 (SC74R)			
Dim	Min	Max	Typ
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°

All Dimensions in mm

Suggested Pad Layout

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

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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