ZXGD3005E6

10A (PEAK) GATE DRIVER IN SOT26

Description and Applications

The ZXGD3005E6 is a high-speed non-inverting single gate driver capable of driving up to 10A into a MOSFET or IGBT gate capacitive load from supply voltages up to 25V. With propagation delay times down to <10ns and correspondingly rise/fall times of <20ns.

This gate driver ensures rapid switching of the MOSFET or IGBT to minimize power losses and distortion in high current switching applications. It is ideally suited to act as a voltage buffer between the typically high output impedances of a controller IC and the effectively low impedance on the gate of a power MOSFET or IGBT during switching. Its low input voltage requirement and high current gain allows high current driving from low voltage controller ICs.

The ZXGD3005E6 has separate source and sink outputs that enables the turn-on and turn-off times of the MOSFET or IGBT to be independently controlled. In addition, the wide supply voltage range allows full enhancement of the MOSFET or IGBT to minimize on-state losses and permits +15V to -5V gate drive voltage to prevent dV/dt induced false triggering of IGBTs. The ZXGD3005E6 has been designed to be inherently rugged to latch-up and shoot-through issues. The optimized pin-out SOT26 package eases board layout, enabling reduced parasitic inductance of traces.

Power MOSFET and IGBT Gate Driving in:

- Synchronous switch-mode power supplies
- Power Factor Correction (PFC) in 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
- Solar inverters

Features and Benefits

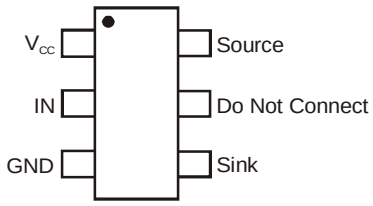
- Emitter-follower configuration for ultra-fast switching
  - <10ns propagation delay time
  - <20ns rise/fall time
- Non-inverting voltage buffer stage
- Wide supply voltage up to 25V to minimize on-losses
- 10A peak current drive into capacitive loads
- Low input current of 1mA to deliver 4A output current
- Separate source and sink outputs for independent control of rise and fall time
- Optimized pin-out to ease board layout and minimize parasitic inductance of traces
- Rugged design that avoids latch-up or shoot-through issues
- Near - Zero quiescent and output leakage current
- **"Lead-Free", RoHS Compliant (Note 1)**
- **"Green" Devices (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

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: Matte Tin Finish
- Weight: 0.018 grams (approximate)

SOT26

Top View



Top View
Pin-Out

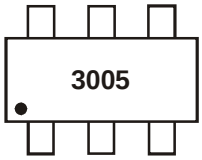
Pin Name	Pin Function
V_{CC}	Driver supply
IN	Driver input pin
GND	Ground
SOURCE	Source current output
SINK	Sink current output

Ordering Information (Note 3)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXGD3005E6TA	3005	7	8	3000

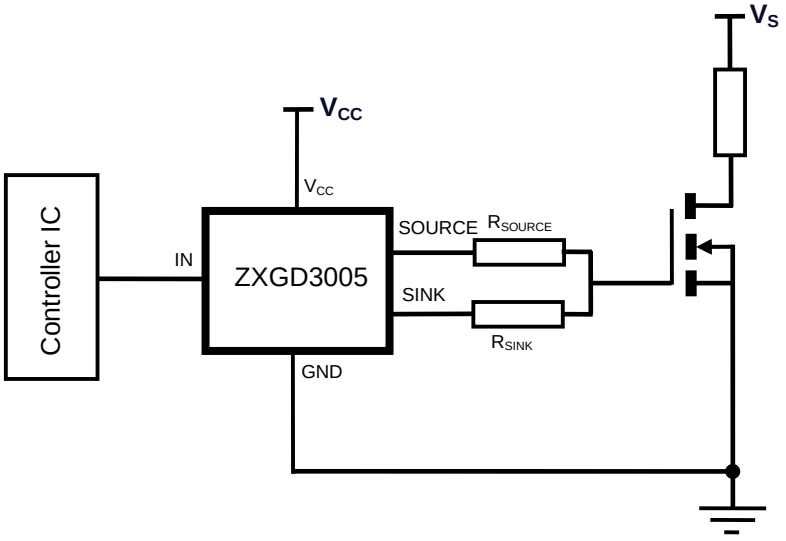
Notes: 1. No purposefully added lead
2. "Green" devices, Halogen and Antimony Free, Diodes Inc's "Green" Policy can be found on our website at http://www.diodes.com
3. For packaging details, go to our website at http://www.diodes.com

Marking Information



3005 = Product Type Marking Code

Typical Application Circuit



Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Supply voltage	V_{CC}	25	V
Input voltage	V_{IN}	25	V
Peak output current	I_{PK}	±10	A
Input current	I_{IN}	±100	mA

Thermal Characteristics @T_A = 25°C unless otherwise specified

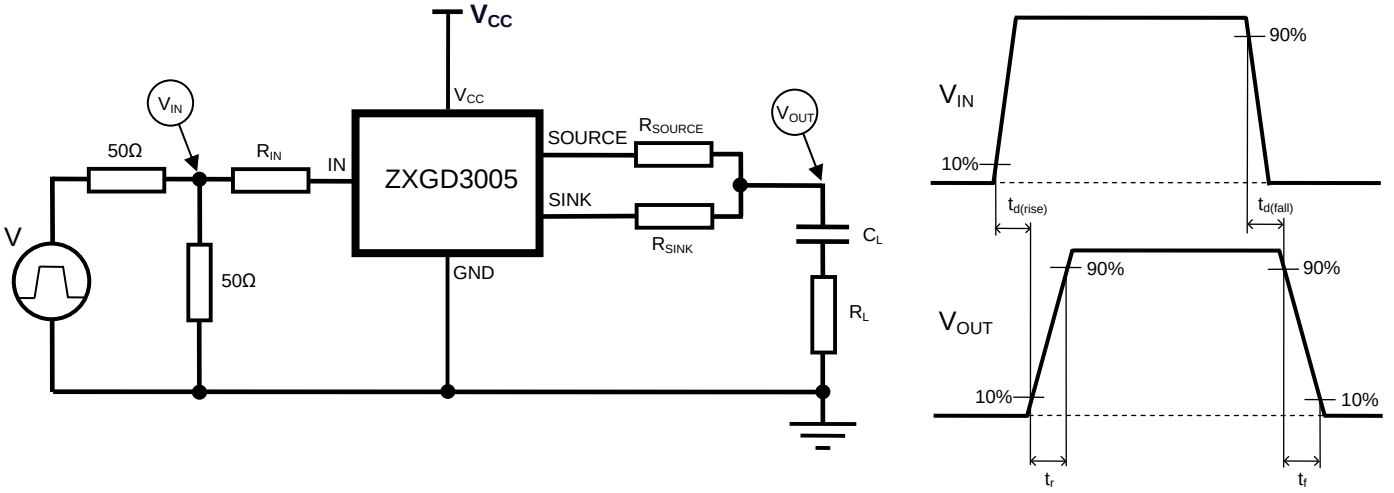
Characteristic	Symbol	Value	Unit
Power Dissipation (Notes 4 & 5) Linear derating factor	P_D	1.1 8.8	W mW/°C
Thermal Resistance, Junction to Ambient (Notes 4 & 5)	$R_{\theta JA}$	113	°C/W
Thermal Resistance, Junction to Lead (Note 6)	$R_{\theta JL}$	105	
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes:
4. For a device surface mounted on 25mm x 25mm x 0.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition. The heatsink is split in half with the pin 1 (V_{CC}) and pin 3 (GND) connected separately to each half.
5. For device with two active die running at equal power.
6. Thermal resistance from junction to solder-point at the end of each lead on pin 1 (V_{CC}) and pin 3 (GND).

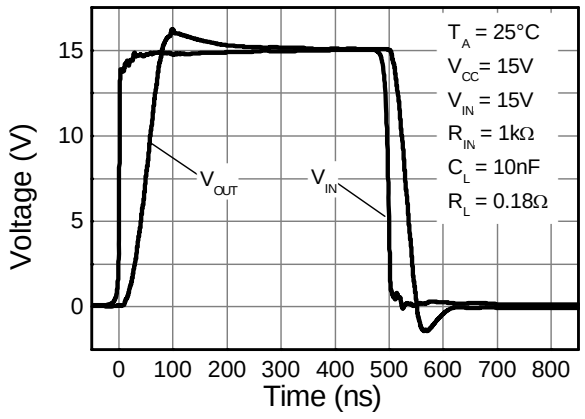
Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Output voltage, high	BV_{OH}	-	V_{CC} - 0.79	-	V	I_{SOURCE} = 1µA
Output voltage, low	BV_{OL}	-	0.78	-		I_{SINK} = 1µA
Source output leakage current (Quiescent supply)	$I_{L(source)}$	-	-	50	nA	V_{CC}= 25V, V_{IN} = 0V
Sink output leakage current	$I_{L(sink)}$	-	-	50		V_{CC}= 25V,V_{IN} = V_{CC}
Source current	$I_{(source)}$	-	4.0	-	A	V_{CC}= 5V, I_{IN}= 1mA, V_{OUT}= 0V
Sink current	$I_{(sink)}$	-	3.8	-		V_{CC}= 5V, I_{IN}=-1mA, V_{OUT}= 5V
Source current with varying input resistances	$I_{(source)}$	-	6.4 5.5 3.9 2.2 0.44	-	A	R_{IN} = 200Ω R_{IN} = 1kΩ R_{IN} = 10 kΩ R_{IN} = 100 kΩ R_{IN} = 1000 kΩ C_L = 100nF R_L = 0.18Ω V_{CC} = 15V V_{IN} = 15V R_{SOURCE} = 0 Ω R_{SINK} = 0 Ω
Sink current with varying input resistances	$I_{(sink)}$	-	7.7 6.5 4.4 2.3 0.46	-	A	R_{IN} = 200Ω R_{IN} = 1 kΩ R_{IN} = 10 kΩ R_{IN} = 100 kΩ R_{IN} = 1000 kΩ C_L = 100nF R_L = 0.18Ω V_{CC} = 15V V_{IN} = 15V R_{SOURCE} = 0 Ω R_{SINK} = 0 Ω
Switching times with low input resistance	$t_{d(rise)}$ t_r $t_{d(fall)}$ t_f	-	8 48 16 35	-	ns	R_{IN} = 1kΩ, C_L = 10nF R_L = 0.18Ω, V_{CC} = 15V V_{IN} = 15V, R_{SOURCE} = 0 Ω, R_{SINK} = 0 Ω
Switching times with high input resistance	$t_{d(rise)}$ t_r $t_{d(fall)}$ t_f	-	46 419 47 467	-	ns	R_{IN} = 1kΩ, C_L = 100nF R_L = 0.18Ω, V_{CC} = 15V V_{IN} = 15V, R_{SOURCE} = 0 Ω, R_{SINK} = 0 Ω
Switching times with asymmetric source and sink resistance	$t_{d(rise)}$ t_r $t_{d(fall)}$ t_f		24 133 16 37		ns	R_{IN}= 1kΩ C_L = 10nF R_L = 0.18Ω, V_{CC} = 15V V_{EE} = -5V, V_{IN} =-5V to 15V R_{SOURCE}=4.7Ω, R_{SINK}=0Ω

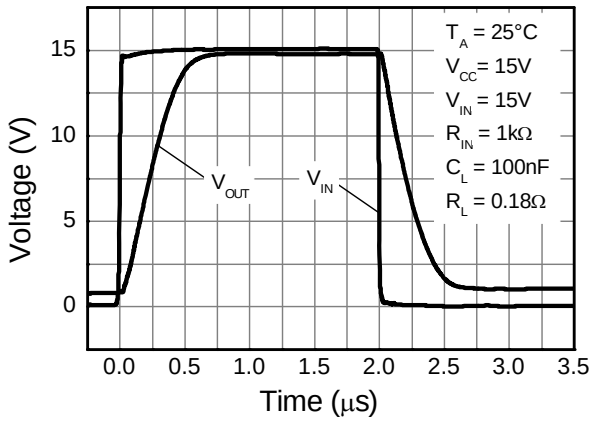
Switching Test Circuit and Timing Diagram



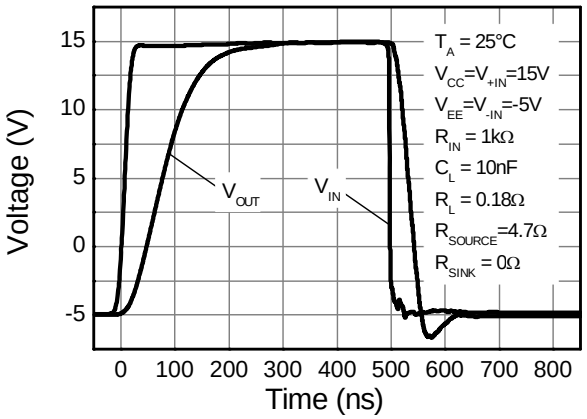
Typical Gate Driver Switching Characteristics



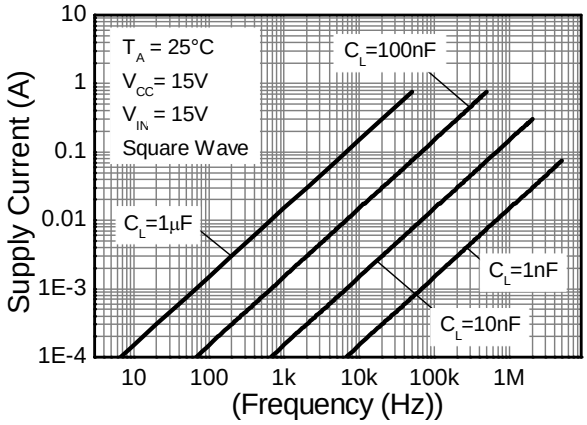
Switching Speed



Switching Speed

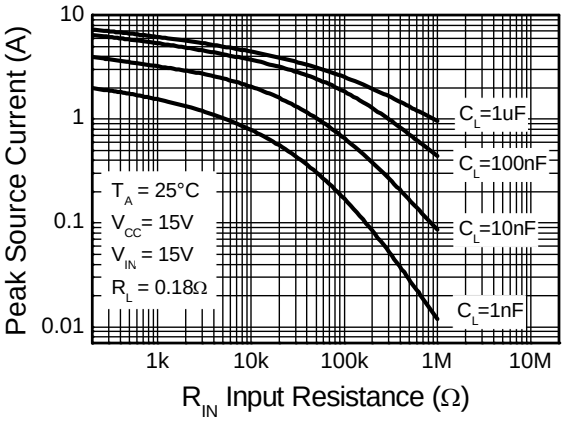


Switching Speed
Asymmetric Source and Sink Resistance

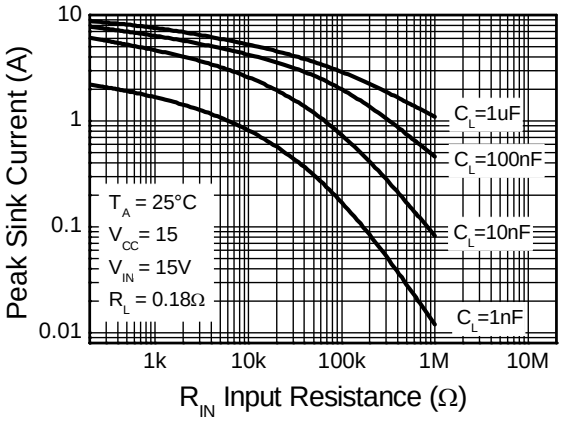


Supply Current

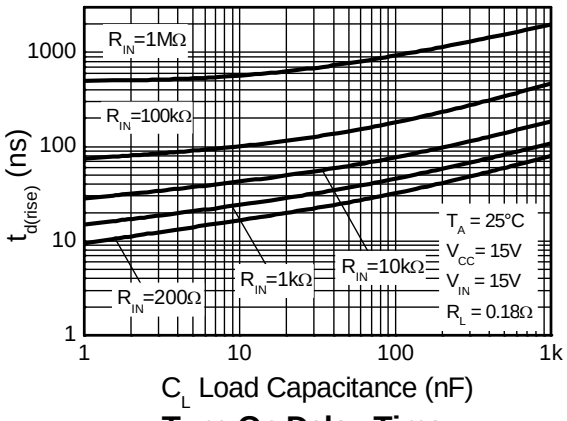
Typical Gate Driver Switching Characteristics



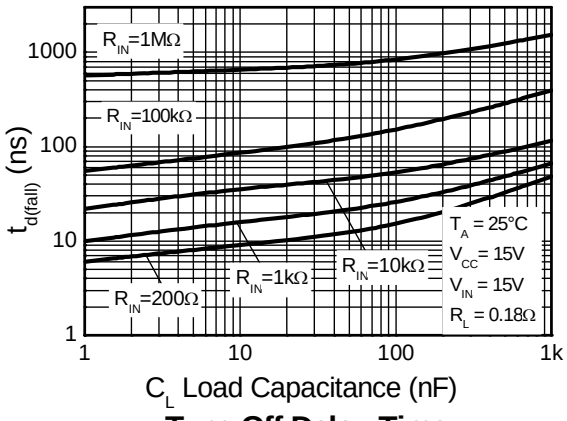
Source Current vs. Input Resistance



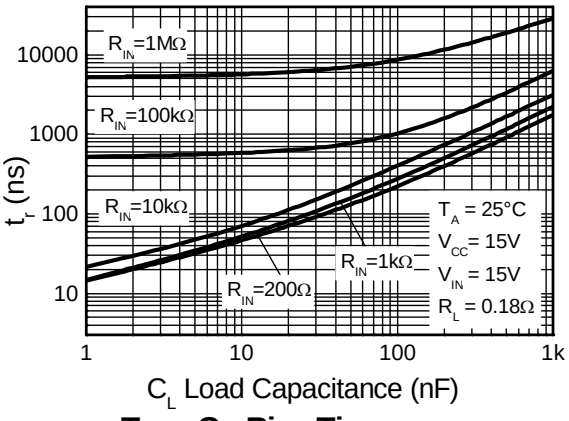
Sink Current vs. Input Resistance



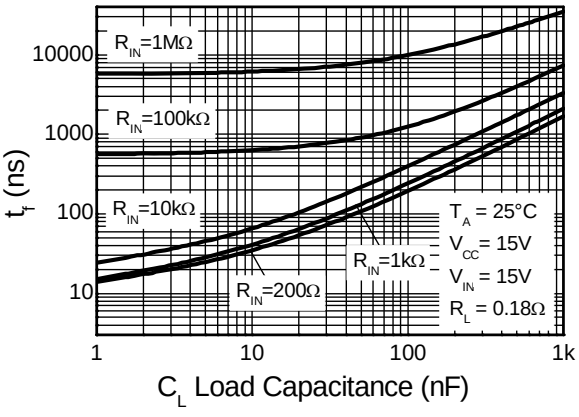
Turn-On Delay Time



Turn-Off Delay Time

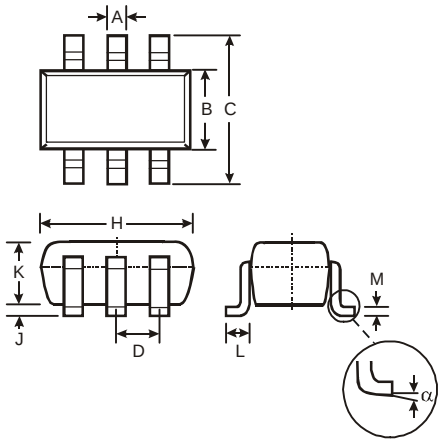


Turn-On Rise Time



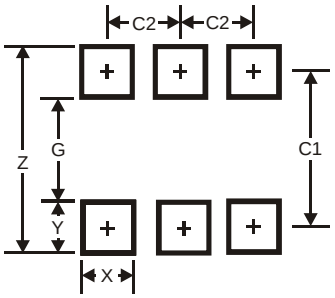
Turn-Off Fall Time

Package Outline Dimensions



SOT26			
Dim	**Min**	**Max**	**Typ**
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	—	—	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
α	0°	8°	—
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

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