优尚

YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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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.

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

Applications

Power MOSFET and IGBT Gate Driving in

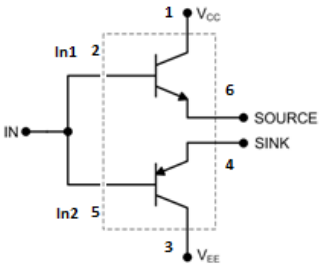
- Synchronous Switch-Mode Power Supplies
- Secondary Side Synchronous Rectification
- Plasma Display Panel Power Modules
- 1, 2, and 3-phase Motor Control Circuits
- Audio Switching Amplifier Power Output Stages

Mechanical Data

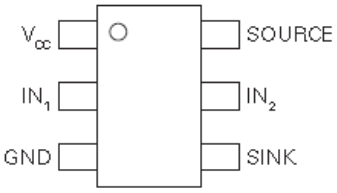
- Case: SOT26
- Case Material: Molded Plastic. “Green” Molding Compound; UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208
- Weight: 0.018 grams (Approximate)

SOT26

Top View



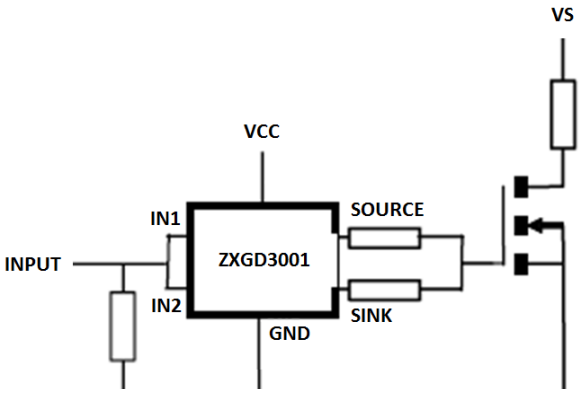
Internal Device Schematic



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

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)

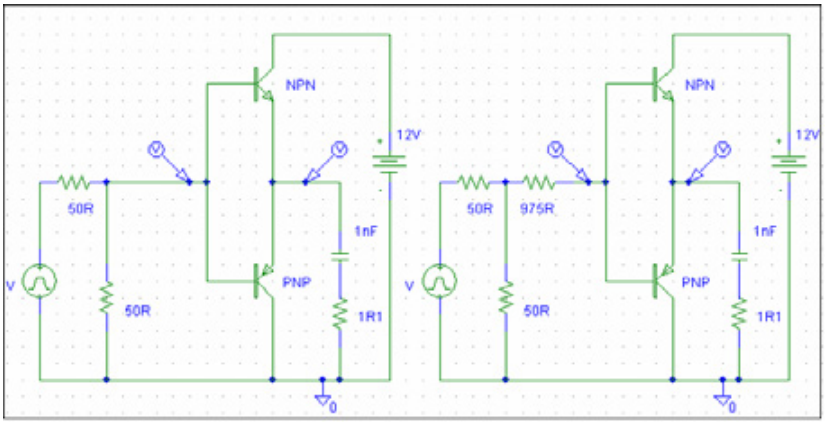
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	1500	V	1C
Electrostatic Discharge – Charged Device Model	ESD CDM	1000	V	IV

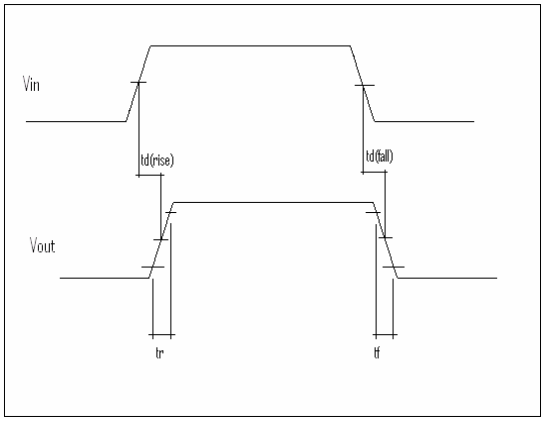
Notes:
5. For a device mounted on 25mm × 25mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state. The heatsink is split in half with the pin 1 (V_{CC}) and pin 3 (V_{EE}) connected separately to each half.
6. For device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

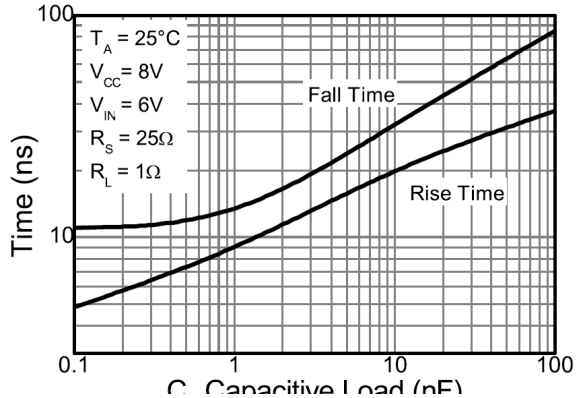
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Output Voltage, High	V_{OH}	—	V_{CC} – 0.4	—	V	I_{SOURCE} = 1μA
Output Voltage, Low	V_{OL}	—	0.4	—	V	I_{SINK} = 1μA
Source Output Leakage Current	$I_{L(source)}$	—	—	1	μA	V_{CC} = 12V, V_{IN1} = V_{IN2} = 0V
Sink Output Leakage Current	$I_{L(sink)}$	—	—	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

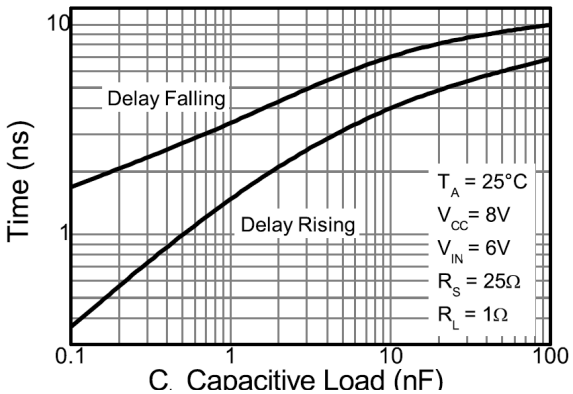
Switching Test Circuit and Timing Diagram

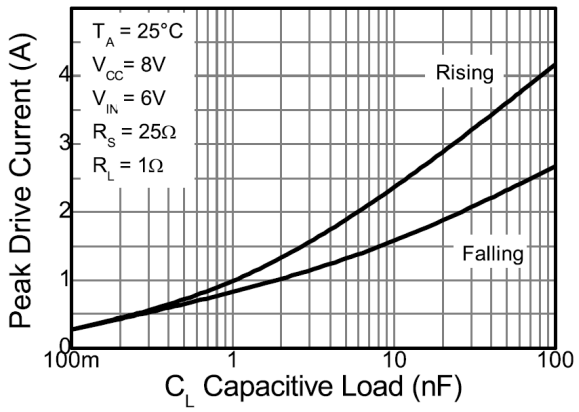


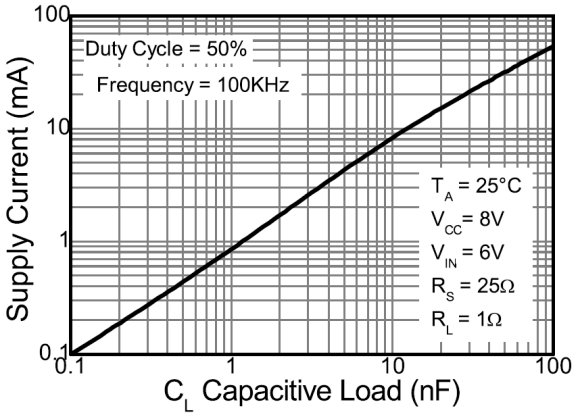


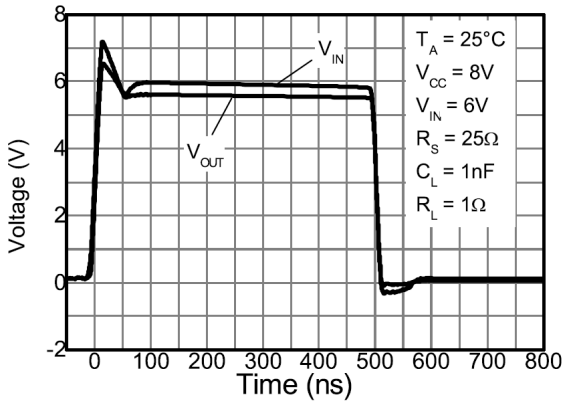
Typical Switching Characteristics (@T_A = +25°C, unless otherwise specified.)



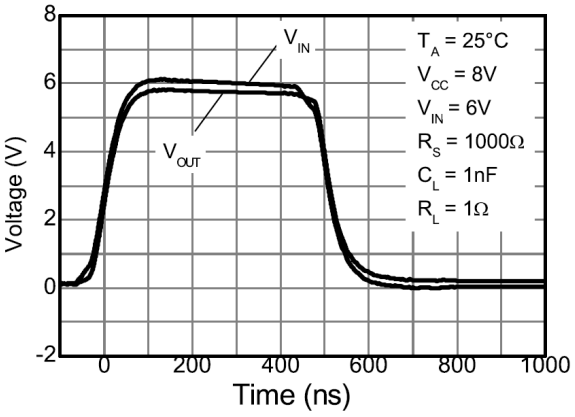






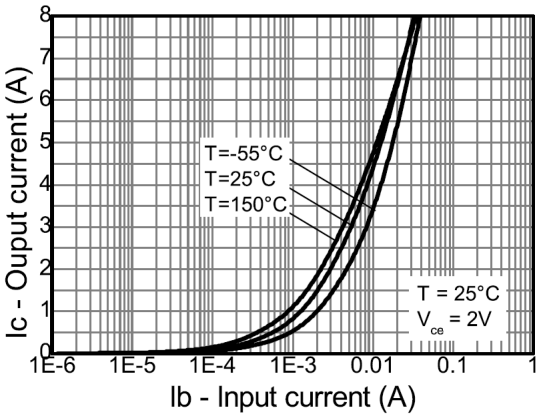


Switching Speed

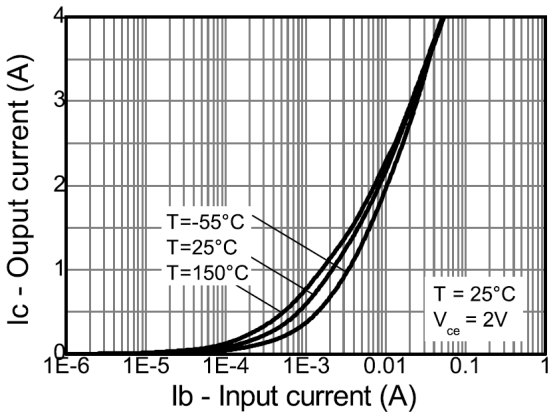


Switching Speed

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



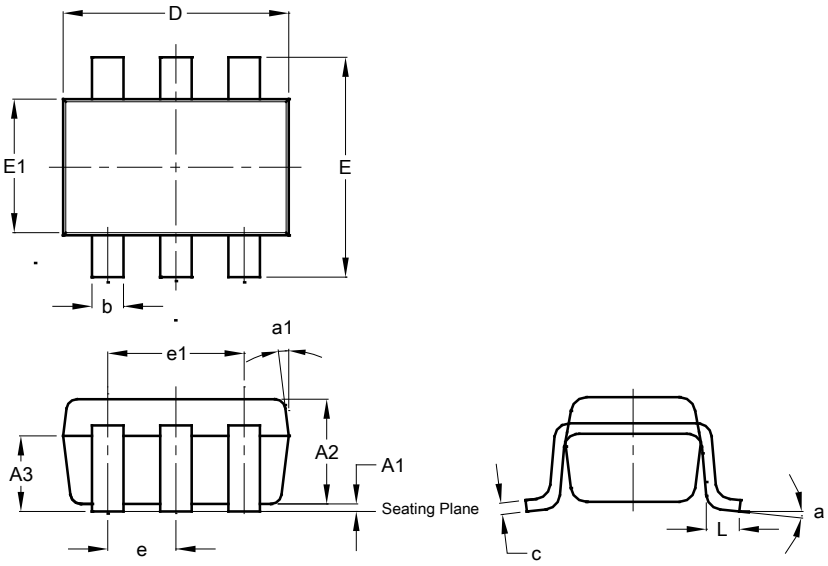
Source Current Vs Input Current



Sink Current Vs Input Current

Package Outline Dimensions

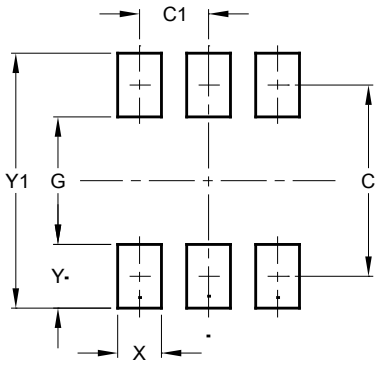
SOT26 (SC74R)



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

SOT26 (SC74R)



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