ZXGD3001E6
9A(peak) Gate driver in SOT23-6

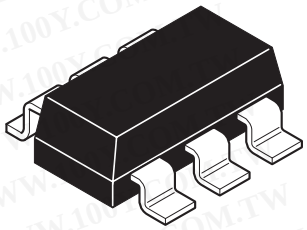
General description

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 latch-up and shoot-through, and its wide supply voltage range allows full enhancement to minimize on-losses of the power MOSFET or IGBT.

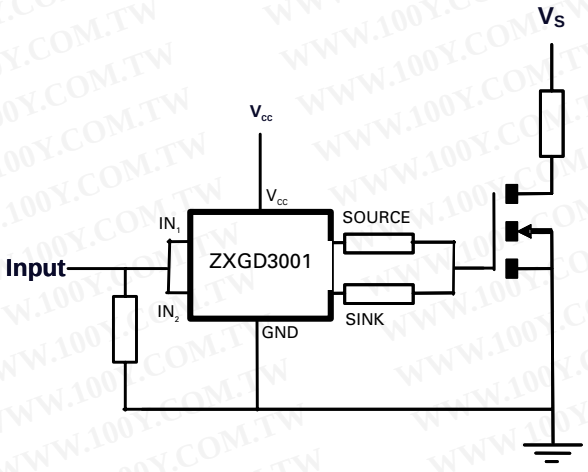
Its low input voltage requirement and high current gain allows high current driving from low voltage controller ICs, and the optimized pin-out SOT23-6 package with separate source and sink pins eases board layout, enabling reduced parasitic inductance and independent control of rise and fall slew rates.

Features



- 12V operating voltage range
- 9 Amps 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 pin-out to ease board layout and minimize trace inductance
- No Latch Up
- No shoot through
- Near - Zero quiescent and output leakage current

Typical application circuit



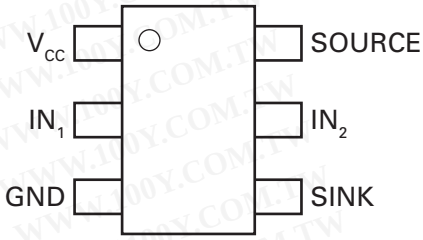
Applications

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

Pin configuration

Pin Name	Pin Function
V_{CC}	Driver supply
IN_1 / IN_2	Driver input pins. These are normally connected together by circuit tracks.
GND	Ground
SOURCE	Source current output.
SINK	Sink current output.



SOT236
Top view

Ordering information

DEVICE	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXGD3001E6TA	7	8 embossed	3000

Device marking

3001

Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Supply voltage	V_{CC}	12	V
Input voltage	V_{IN}	12	V
Peak sink current(c)	$I_{(sink)PK}$	9	A
Source current @ $I_{IN1} + I_{IN2}$ =10mA(a)	$I_{(source)}$	4.2	A
Sink current @ $I_{IN1} + I_{IN2}$ =10mA(a)	$I_{(sink)}$	2.2	A
Input current(c)	I_{IN1}, I_{IN2}	1	A
Power dissipation at T_A =25°C(a)(b) Linear derating factor	P_D	1.1 8.8	W mW/°C
Operating and storage temperature range	T_j, T_{stg}	-55 to +150	°C

Thermal resistance

Parameter	Symbol	Value	Unit
Junction to ambient(a)(b)	$R_{\theta JA}$	113	°C/W

NOTES:

(a) 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.

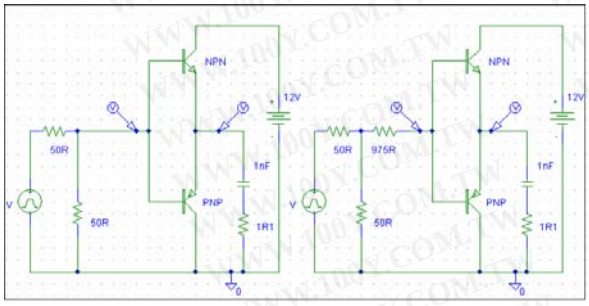
(b) For device with two active dice running at equal power.

(c) Pulse width <=300μs limit repetition rate to comply with maximum junction temperature.

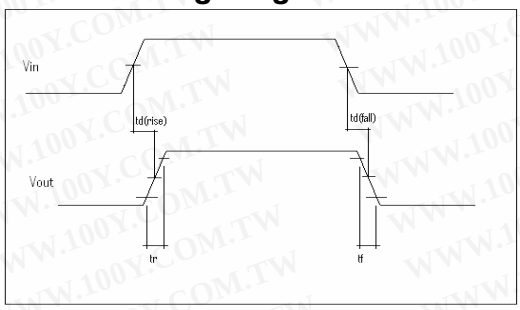
Electrical characteristics (at T_{amb} = 25°C unless otherwise stated).

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 ns ns 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 ns ns ns	C_L=1nF, R_L=1Ω, V_{CC}=8V, V_{IN}=6V, R_S=1kΩ

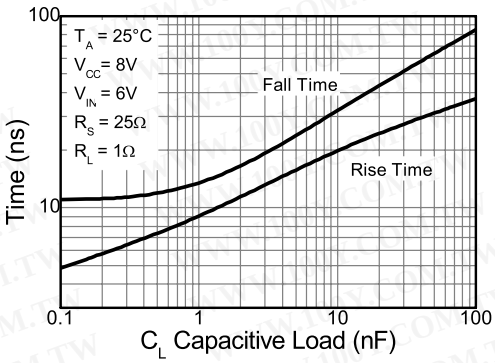
Switching Time Test Circuits



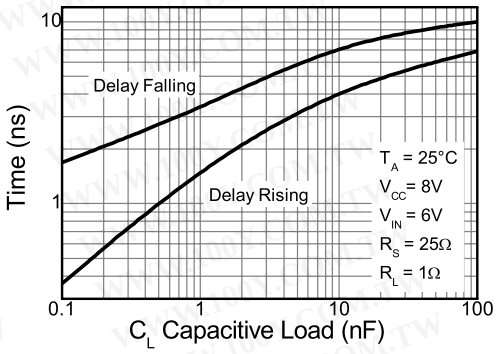
Timing Diagram



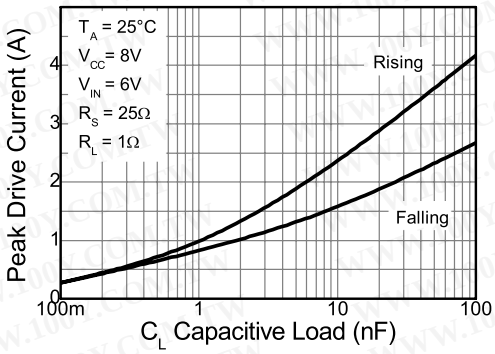
Typical gate driver characteristics



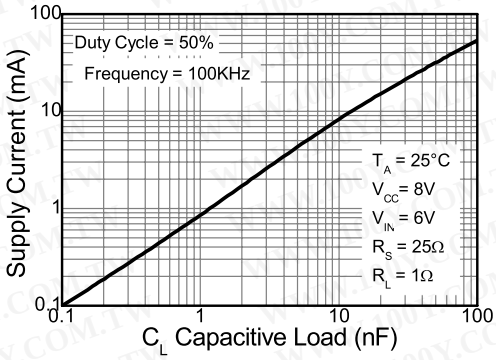
Rise and Fall Time



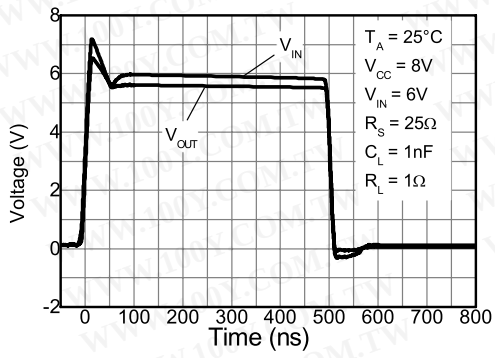
Propagation Delay



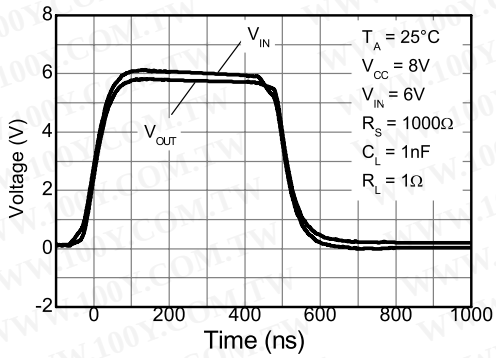
Peak Drive Current



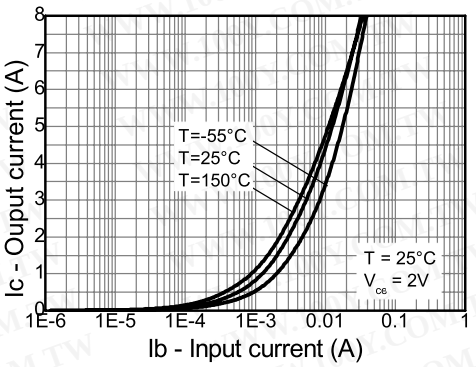
Supply Current



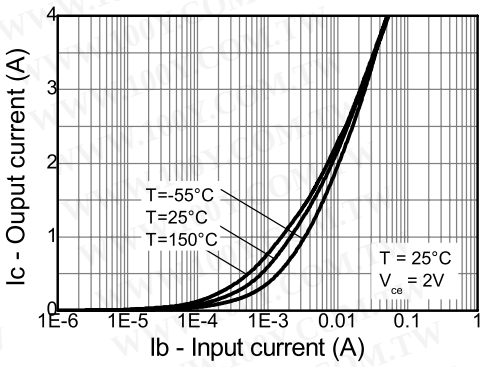
Switching Speed



Switching Speed

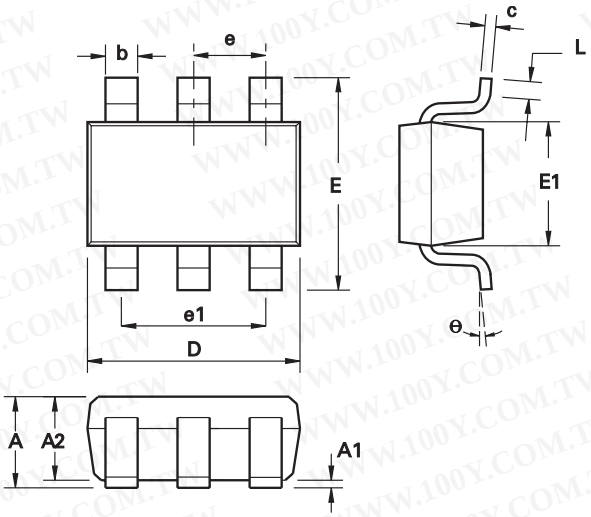


Source Current Vs Input Current

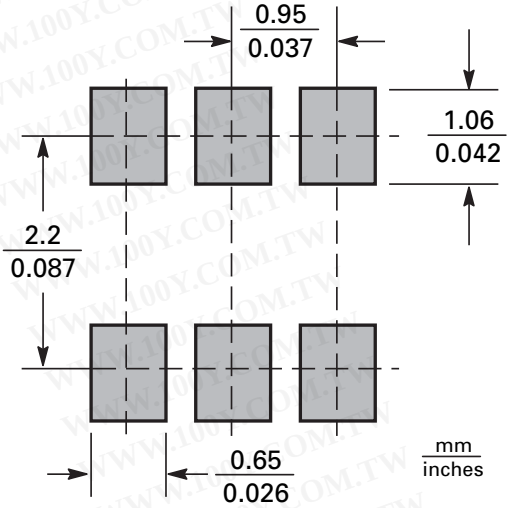


Sink Current Vs Input Current

SOT23-6 Package outline



Pad latout details



DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.90	1.45	0.0354	0.0570
A1	0.00	0.15	0.00	0.0059
A2	0.90	1.30	0.0354	0.0511
b	0.35	0.50	0.0078	0.0196
C	0.09	0.26	0.0035	0.0102
D	2.70	3.10	0.1062	0.1220
E	2.20	3.20	0.0866	0.1181
E1	1.30	1.80	0.0511	0.0708
L	0.10	0.60	0.0039	0.0236
e	0.95 REF		0.0374 REF	
e1	1.90 REF		0.0748 REF	
L	0°	30°	0°	30°

Note: Controlling dimensions are in millimeters. Approximate dimensions are provided in inches

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Zetex sales offices

Europe	Americas	Asia Pacific	Corporate Headquarters
Zetex GmbH Kustermann-park Balanstraße 59 D-81541 München Germany Telefon: (49) 89 45 49 49 0 Fax: (49) 89 45 49 49 49 europe.sales@zetex.com	Zetex Inc 700 Veterans Memorial Highway Hauppauge, NY 11788 USA Telephone: (1) 631 360 2222 Fax: (1) 631 360 8222 usa.sales@zetex.com	Zetex (Asia Ltd) 3701-04 Metroplaza Tower 1 Hing Fong Road, Kwai Fong Hong Kong Telephone: (852) 26100 611 Fax: (852) 24250 494 asia.sales@zetex.com	Zetex Semiconductors plc Zetex Technology Park, Chadderton Oldham, OL9 9LL United Kingdom Telephone: (44) 161 622 4444 Fax: (44) 161 622 4446 hq@zetex.com