

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.

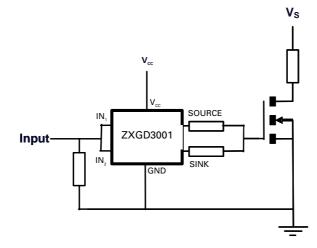
The ZXGD3001E6 is inherently rugged to latch-up and shoot-through, and its wide supply voltage range allows full enhancement to minimize on-losses of the power MOSFET or IGBT.

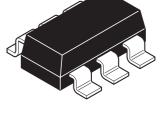
Its low input voltage requirement and high current gain allows high current driving from low voltage controller ICs, and the optimized pin-out SOT23-6 package with separate source and sink pins eases board layout, enabling reduced parasitic inductance and independent control of rise and fall slew rates.

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





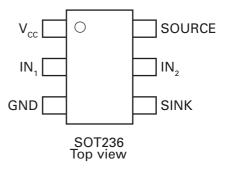
Applications

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.



Ordering information

DEVICE Reel size		Tape width	Quantity
(inches)		(mm)	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)	l _(sink) PK	9	А
Source current @ I _{IN1} + I _{IN2} =10mA ^(a)	I _(source)	4.2	А
Sink current @ $I_{IN1} + I_{IN2} = 10 \text{ mA}^{(a)}$	I _(sink)	2.2	А
Input current ^(c)	I _{IN1} , I _{IN2}	1	А
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)}	$R_{ heta JA}$	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.

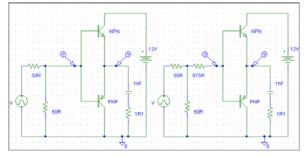
(b) For device with two active dice running at equal power.

(c) Pulse width <= $300 \mu s$ limit repetition rate to comply with maximum junction temperature.

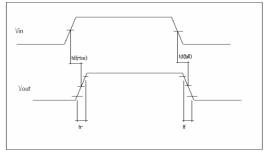
Parameter	Symbol	Min.	Тур.	Max.	Unit	Conditions
Output voltage, high	V _{OH}		V _{CC} – 0.4		V	I _{SOURCE} = 1μA
Output voltage, low	V _{OL}		0.4		V	I _{SINK} = 1μA
Source output leakage current	I _{L(source)}			1	μΑ	$V_{CC} = 12V,$ $V_{IN1} = V_{IN2} = 0V$
Sink output leakage current	I _{L(sink)}			1	μΑ	$V_{CC} = 12V,$ $V_{IN1} = V_{IN2} = V_{CC}$
Quiescent current	۱ _۵			50	nA	V _{CC} = 9.6V, V _{IN1} = V _{IN2} = 0V
Source output current	I _(source)	1	1.7		А	I _{IN1} + I _{IN2} = 2.5mA
Sink output current	I _(sink)	0.7	1.1		А	I _{IN1} + I _{IN2} = 2.5mA
Source output current	I _(source)	2.7	4.2		А	I_{IN1} + I_{IN2} = 10mA
Sink output current	l _(sink)	1.5	2.2		Α	I_{IN1} + I_{IN2} = 10mA
Source output current	I _{(source)PK}		9		А	$I_{\rm IN1} + I_{\rm IN2} = 1A$
Sink output current	I _{(sink)PK}		9		Α	$I_{\rm IN1} + I_{\rm IN2} = 1A$
Gate driver switching times	t _{d(rise)} t _r t _{d(fall)} t _f		1.3 7.3 3 11		ns ns ns ns	$C_L=1$ nF, $R_L=1\Omega$, $V_{CC}=8V$, $V_{IN}=6V$, $R_S=25\Omega$
Gate driver switching times	t _{d(rise)} t _r t _{d(fall)} t _f		9 141.5 14 151		ns ns ns ns	$C_L=1$ nF, $R_L=1\Omega$, $V_{CC}=8V$, $V_{IN}=6V$, $R_S=1$ k Ω

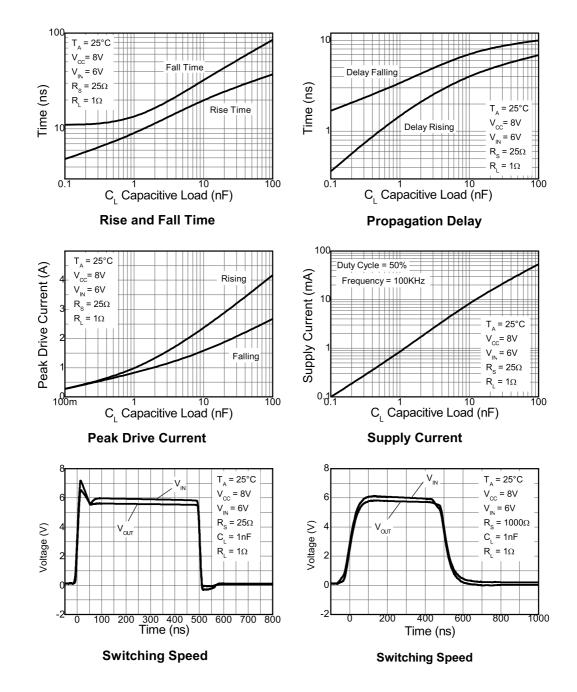
Electrical characteristics (at $T_{amb} = 25^{\circ}C$ unless otherwise stated).

Switching Time Test Circuits



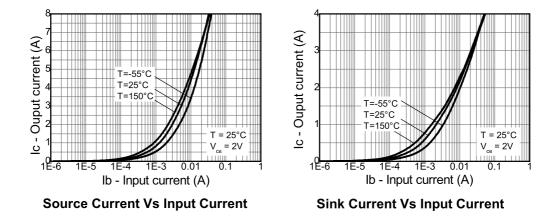
Timing Diagram



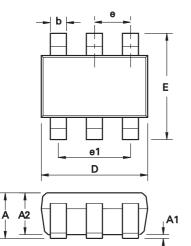


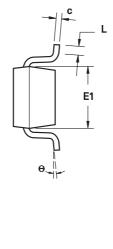
Typical gate driver characteristics

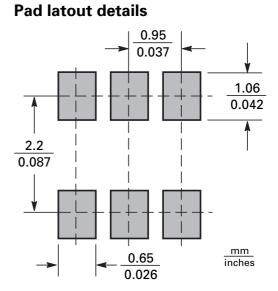
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SOT23-6 Package outline







DIM	Millin	neters	Inches		
	Min.	Max.	Min.	Max.	
А	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	
С	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	
е	0.95	0.95 REF		4 REF	
e1	1.90	1.90 REF		8 REF	
L	0°	30°	0°	30°	

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

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