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ZXGD3002E6

9A(peak) Gate driver in SOT23-6

General description

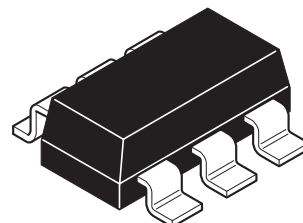
The ZXGD3002E6 is a high-speed non-inverting single MOSFET gate driver capable of driving up to 9A into a MOSFET or IGBT gate capacitive load from supply voltages up to 20V. With typical propagation delay times down to 2ns and rise/fall times down to 11ns this device ensures rapid switching of the power MOSFET or IGBT to minimize power losses and distortion in high current fast switching applications.

The ZXGD3002E6 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.

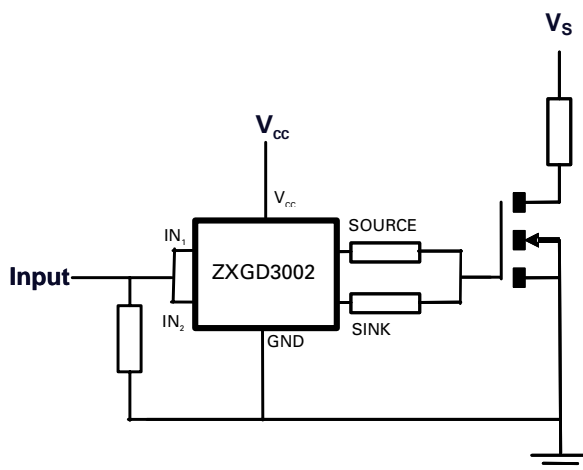
Its low input voltage requirement and high current gain allows high current driving from low voltage controller ICs, and the optimized pin-out SOT23-6 package with separate source and sink pins eases board layout, enabling reduced parasitic inductance and independent control of rise and fall slew rates.

Features

- 20V operating voltage range
- 9 Amps peak output current
- Fast switching emitter-follower configuration
 - 2ns propagation delay time
 - 11ns rise/fall time, 1000pF load
- Low input current requirement
 - 2.2A(source)/2.0A(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



ZXGD3002E6

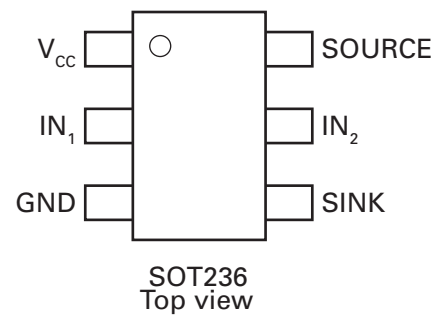
Applications

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 (inches)	Tape width (mm)	Quantity per reel
ZXGD3002E6TA	7	8 embossed	3000

Device marking

3002

ZXGD3002E6

Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Supply voltage	V_{CC}	20	V
Input voltage	V_{IN}	20	V
Peak sink current ^(c)	$I_{(sink)PK}$	9	A
Source current @ $I_{IN1} + I_{IN2} = 10mA^{(a)}$	$I_{(source)}$	2.2	A
Sink current @ $I_{IN1} + I_{IN2} = 10mA^{(a)}$	$I_{(sink)}$	2	A
Input current ^(c)	I_{IN1}, I_{IN2}	1	A
Power dissipation at $T_A = 25^{\circ}C^{(a)(b)}$	P_D	1.1	W
Linear derating factor		8.8	mW/ $^{\circ}C$
Operating and storage temperature range	T_j, T_{stg}	-55 to +150	$^{\circ}C$

Thermal resistance

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

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.

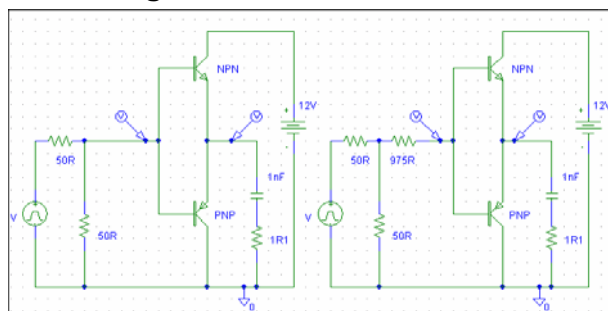
(c) Pulse width $\leq 300\mu s$ limit repetition rate to comply with maximum junction temperature.

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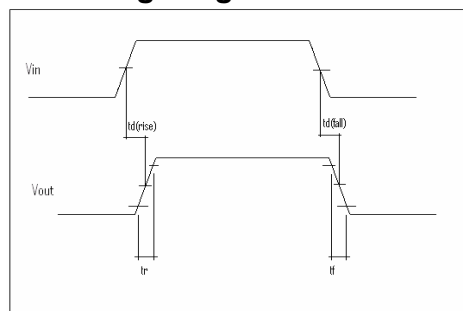
Electrical characteristics (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Output voltage, high	V_{OH}		$V_{CC} - 0.4$		V	$I_{SOURCE} = 1\mu\text{A}$
Output voltage, low	V_{OL}		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	$V_{CC} = 16\text{V}$, $V_{IN1} = V_{IN2} = 0\text{V}$
Source output current	$I_{(source)}$	1.6	2.2		A	$I_{IN1} + I_{IN2} = 10\text{mA}$
Sink output current	$I_{(sink)}$	1.4	2.0		A	$I_{IN1} + I_{IN2} = 10\text{mA}$
Source output current	$I_{(source)PK}$		9		A	$I_{IN1} + I_{IN2} = 1\text{A}$
Sink output current	$I_{(sink)PK}$		9		A	$I_{IN1} + I_{IN2} = 1\text{A}$
Gate driver switching times	$t_{d(rise)}$		1.25		ns	$C_L = 1\text{nF}$, $R_L = 1\Omega$, $V_{CC} = 12\text{V}$, $V_{IN} = 10\text{V}$, $R_S = 25\Omega$
	t_r		8.3		ns	
	$t_{d(fall)}$		1.6		ns	
	t_f		10.8		ns	
Gate driver switching times	$t_{d(rise)}$		3.6		ns	$C_L = 1\text{nF}$, $R_L = 1\Omega$, $V_{CC} = 12\text{V}$, $V_{IN} = 10\text{V}$, $R_S = 1\text{k}\Omega$
	t_r		105		ns	
	$t_{d(fall)}$		6.9		ns	
	t_f		115		ns	

Switching Time Test Circuits

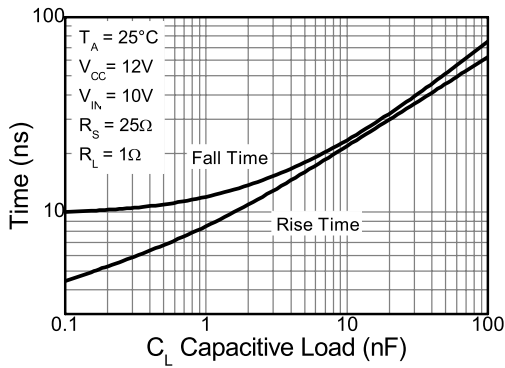


Timing Diagram

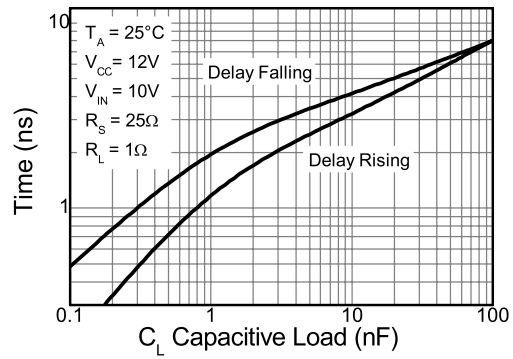


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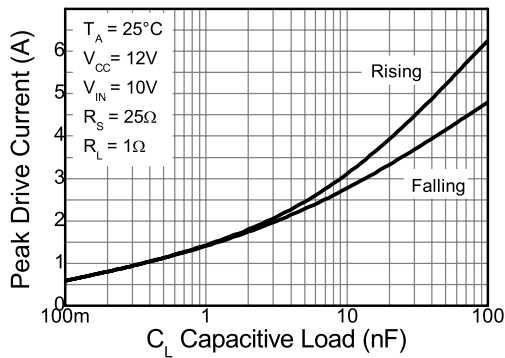
Typical gate driver characteristics



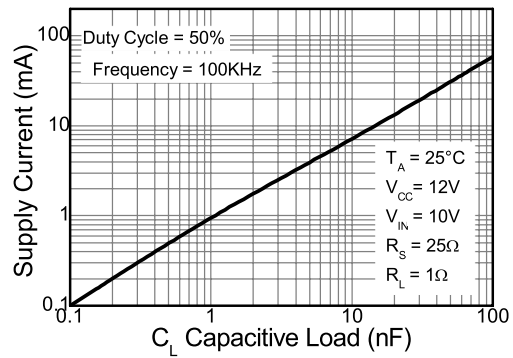
Rise and Fall Time



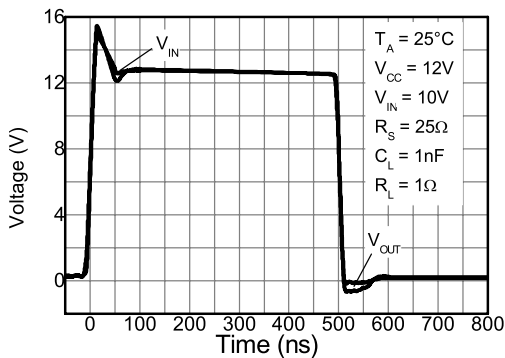
Propagation Delay



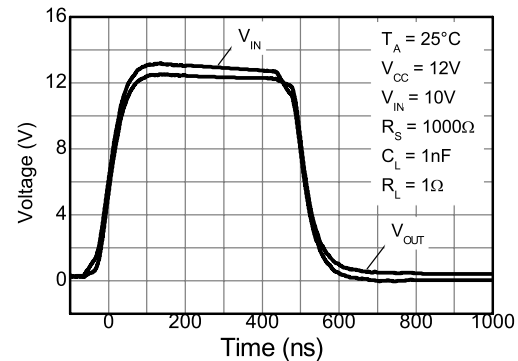
Peak Drive Current



Supply Current

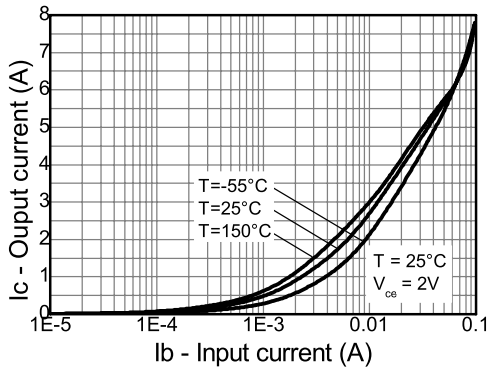


Switching Speed

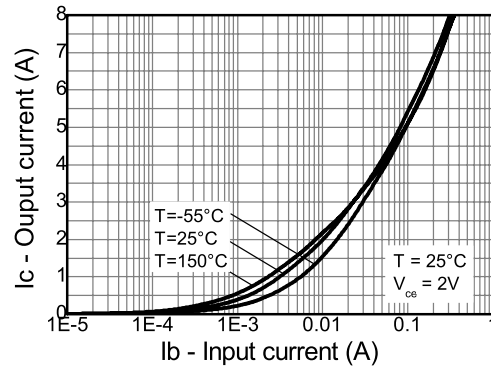


Switching Speed

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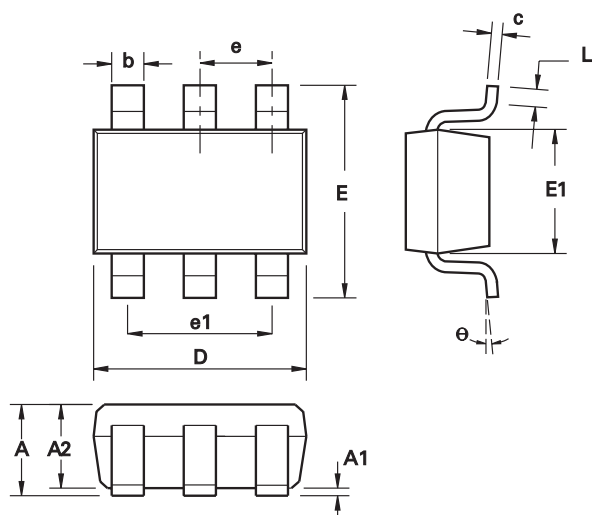
Source Current Vs Input Current



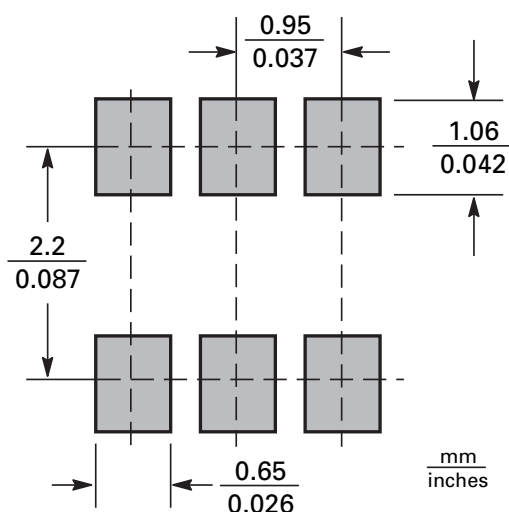
Sink Current Vs Input Current

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SOT23-6 Package outline



Pad layout 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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