



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 NK-ZXGD3001E6Q 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 NK-ZXGD3001E6Q 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 SOT26 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
- SOT26 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

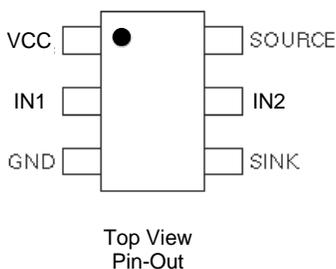
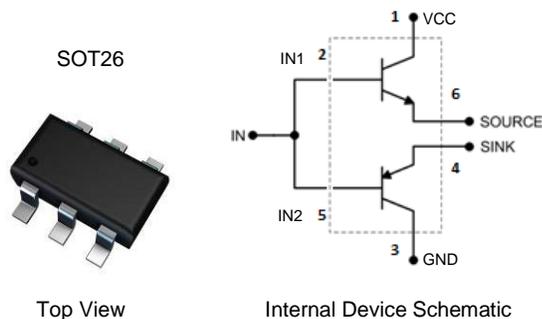
Applications

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

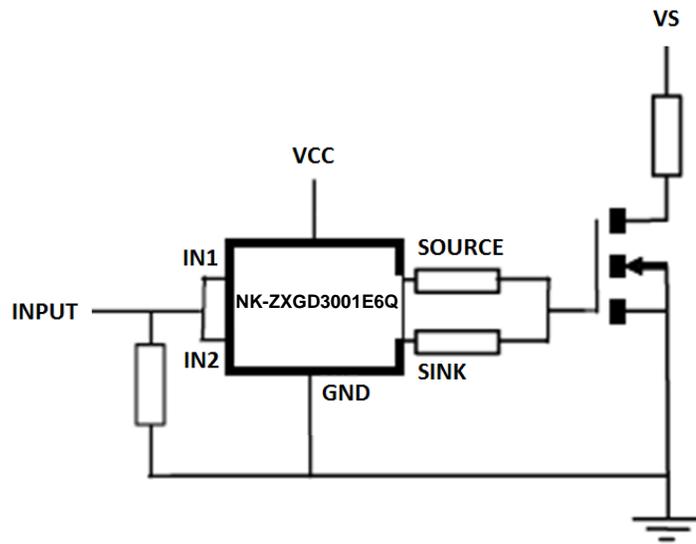
Mechanical Data

- Package: SOT26
- Package 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 (e3)
- Weight: 0.018 grams (Approximate)



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	I _(source)	4.2	A
Sink Current @ I _{IN1} + I _{IN2} = 10mA	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)	P _D	1.1	W
Linear Derating Factor		8.8	mW/°C
Thermal Resistance, Junction to Ambient (Notes 5 & 6)	R _{θJA}	113	°C/W
Thermal Resistance, Junction to Lead (Note 7)	R _{θJL}	105	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

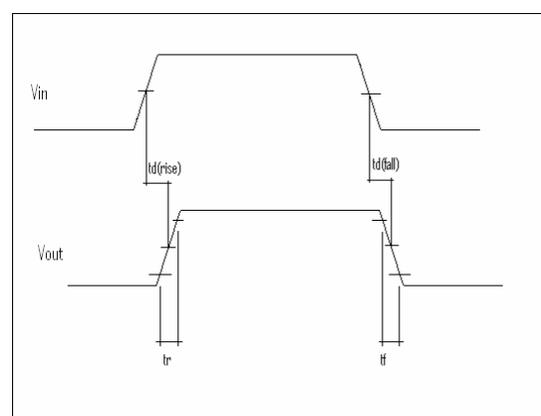
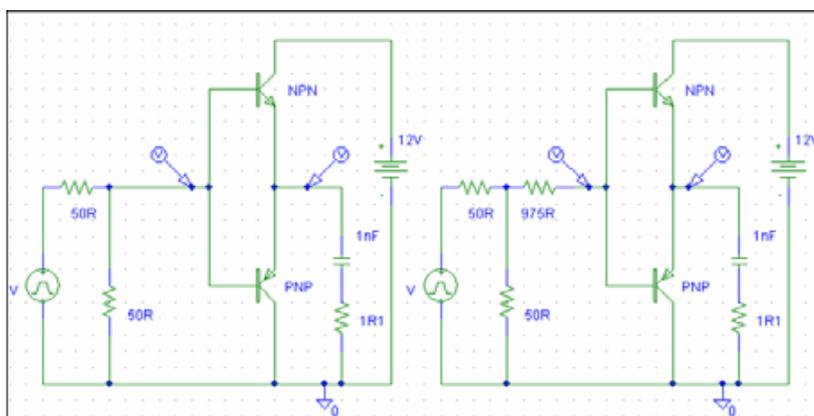
ESD Ratings (Note 8)

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 (VCC) and pin 3 (GND) connected separately to each half.
 6. For device with two active dies running at equal power.
 7. Thermal resistance from junction to solder-point at the end of each lead on pin 1 (VCC) and pin 3 (GND).
 8. Refer to JEDEC specification JESD22-A114, JESD22-A115, and JESD22-C101.

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

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	$V_{CC} = 12\text{V}$ $V_{IN1} = V_{IN2} = 0\text{V}$
Sink Output Leakage Current	$I_{L(sink)}$	—	—	1	μA	$V_{CC} = 12\text{V}$ $V_{IN1} = V_{IN2} = V_{CC}$
Quiescent Current	I_Q	—	—	50	nA	$V_{CC} = 9.6\text{V}$ $V_{IN1} = V_{IN2} = 0\text{V}$
Source Output Current	$I_{(source)}$	1	1.7	—	A	$I_{IN1} + I_{IN2} = 2.5\text{mA}$
Sink Output Current	$I_{(sink)}$	0.7	1.1	—	A	$I_{IN1} + I_{IN2} = 2.5\text{mA}$
Source Output Current	$I_{(source)}$	2.7	4.2	—	A	$I_{IN1} + I_{IN2} = 10\text{mA}$
Sink Output Current	$I_{(sink)}$	1.5	2.2	—	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	$t_d(\text{rise})$	—	1.3	—	ns	$C_L = 1\text{nF}$, $R_L = 1\Omega$, $V_{CC} = 8\text{V}$ $V_{IN} = 6\text{V}$, $R_S = 25\Omega$
	t_r	—	7.3	—		
	$t_d(\text{fall})$	—	3	—		
	t_f	—	11	—		
Gate Driver Switching Times	$t_d(\text{rise})$	—	9	—	ns	$C_L = 1\text{nF}$, $R_L = 1\Omega$, $V_{CC} = 8\text{V}$ $V_{IN} = 6\text{V}$, $R_S = 1\text{k}\Omega$
	t_r	—	141.5	—		
	$t_d(\text{fall})$	—	14	—		
	t_f	—	151	—		

Switching Test Circuit and Timing Diagram


Typical Switching Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

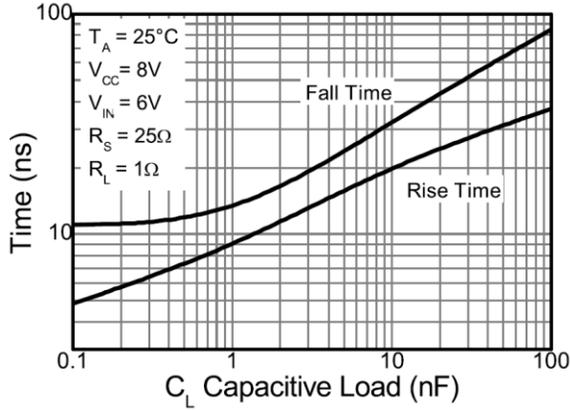


Figure 1. Rise and Fall Time

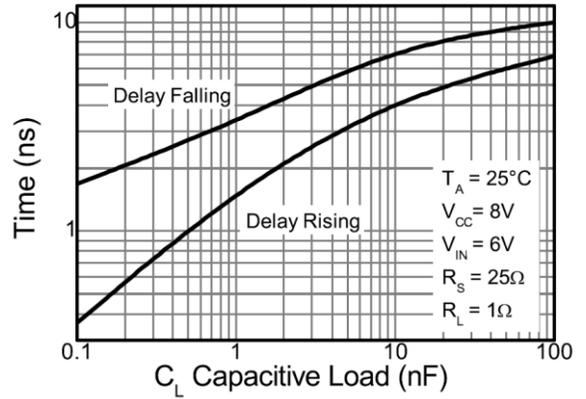


Figure 2. Propagation Delay

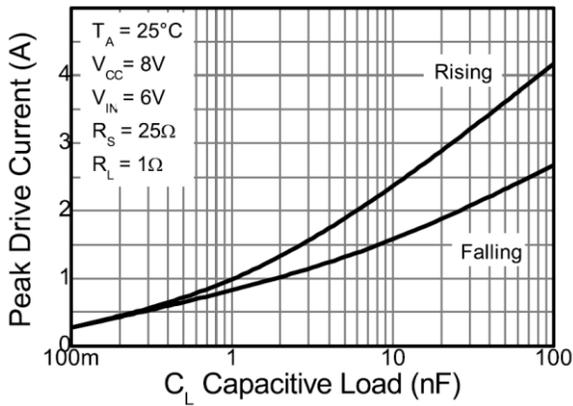


Figure 3. Peak Drive Current

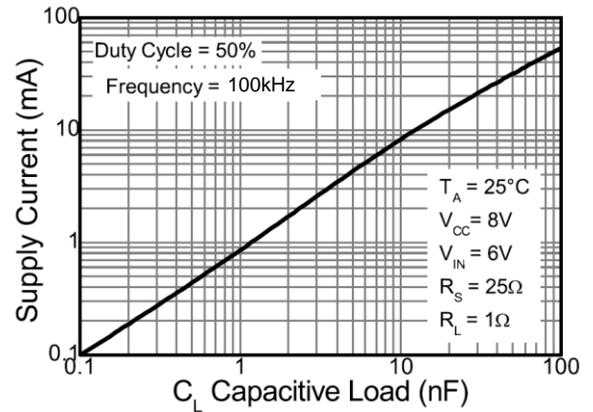


Figure 4. Supply Current

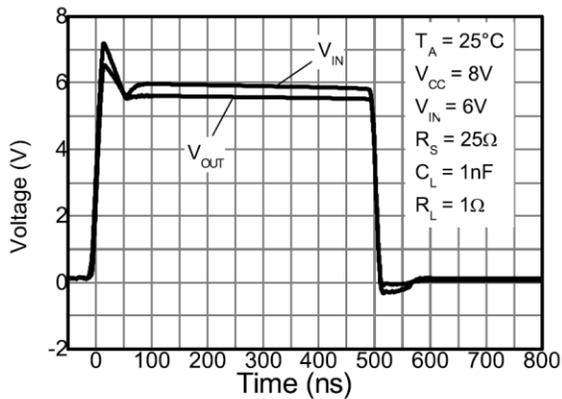


Figure 5. Switching Speed

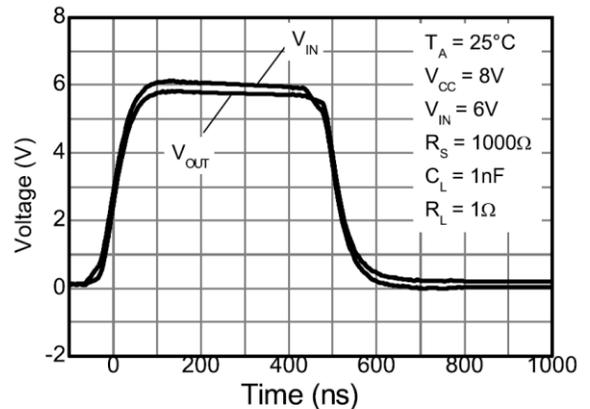


Figure 6. Switching Speed

Typical Switching Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.) (continued)

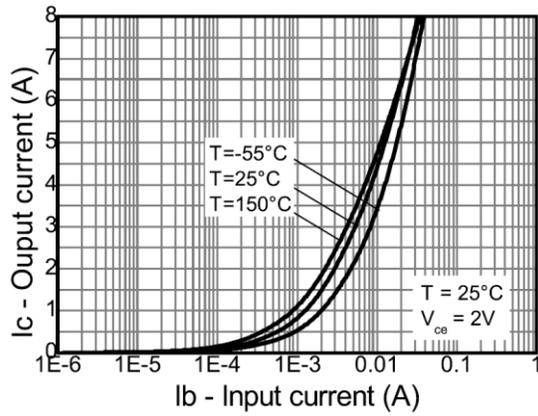


Figure 7. Source Current vs. Input Current

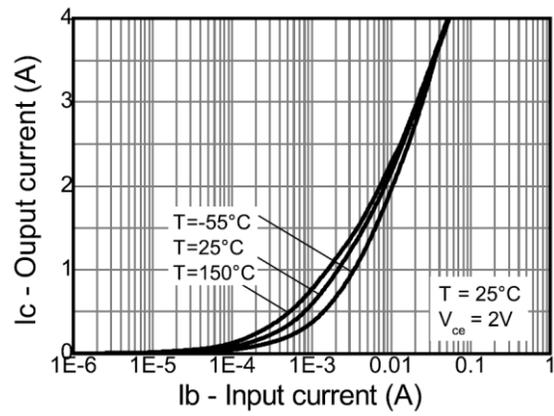
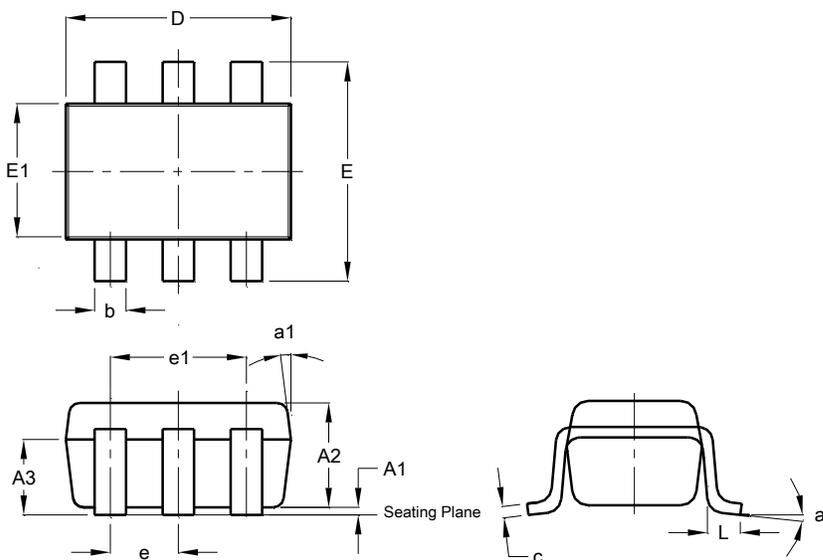


Figure 8. Sink Current vs. Input Current

Package Outline Dimensions

SOT26

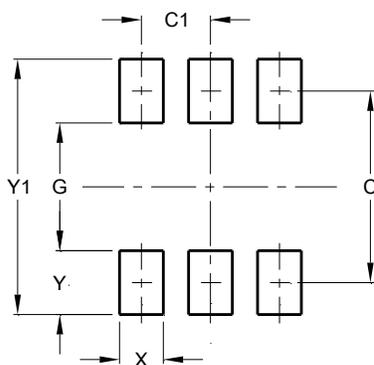


SOT26			
Dim	Min	Max	Typ
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°

All Dimensions in mm

Suggested Pad Layout

SOT26



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