



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-ZXGD3002E6 is a high-speed, non-inverting single gate driver designed for switching MOSFETs or IGBTs. It can transfer up to 5A peak source/source current into the gate for effective charging and discharging of the capacitive gate load.

This gate driver ensures rapid switching of the MOSFET to minimize power losses and distortion in high current switching applications. It can typically drive 2A into the low gate impedance with just 10mA input from a controller. The turn-on and turn-off switching behaviour of the MOSFET can be individually tailored to suit an application. By defining the switching characteristics appropriately, EMI and cross conduction can be reduced.

Applications

Gate Driving Power MOSFETs in:

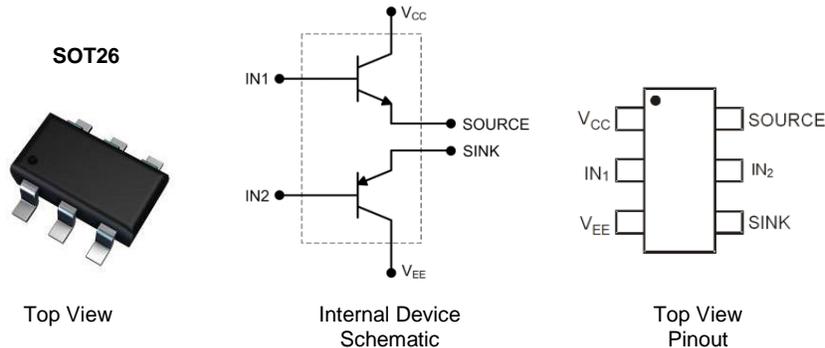
- AC-DC Power Supplies (SMPS)
- DC-DC Converters
- DC-AC Inverters (i.e. Solar)
- 1-, 2-, and 3-Phase Motor Control Circuits
- Amplifier Output Stages

Features

- High-Gain Buffer with Typically 2A Output from 10mA Input
- 9A Peak Output Current
- Emitter-Follower that is Rugged to Latch-Up/Shoot-Though
- Fast Switching Emitter-Follower Configuration:
- 2ns Propagation Delay Time
- 9ns Rise/Fall Time, 1000pF Load
- Optimized Pinout to Simplify PCB Layout and Reduce Parasitic Trace Inductances
- Near-Zero Quiescent Supply Current

Mechanical Data

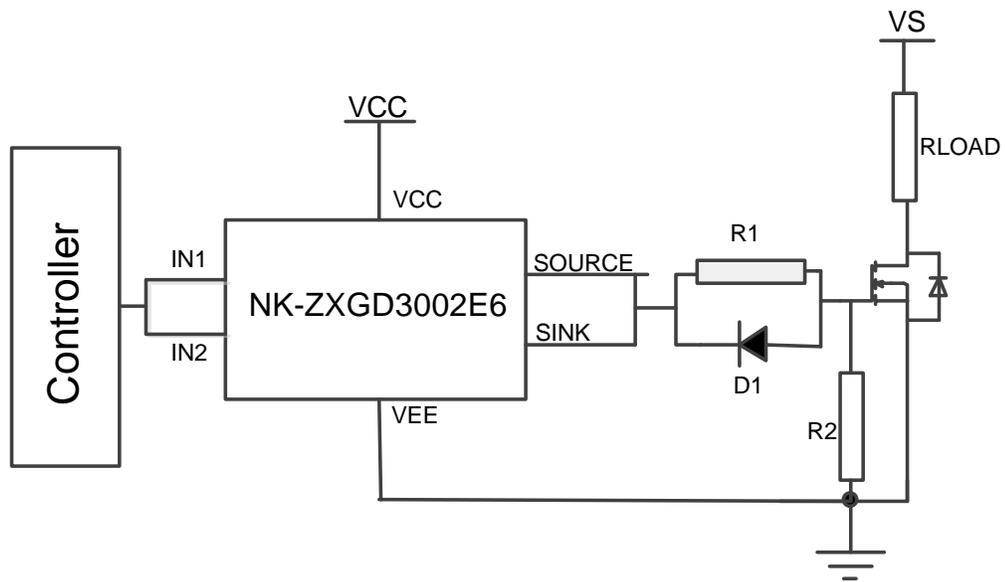
- Case: SOT26
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208③
- Weight: 0.018 grams (Approximate)



Pin Name	Pin Function
V _{CC}	Supply Voltage High
IN ₁ & IN ₂	Driver Input*
V _{EE}	Supply Voltage Low
SOURCE	Source Current Output**
SINK	Sink Current Output**

* Typically connect IN₁ & IN₂ together
 ** Typically connect SOURCE & SINK together

Typical Application Circuit



R1, D1 combination can be used for variable turn on and turn off times.

Absolute Maximum Ratings

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

Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	20	V
Input Voltage	V_{IN}	20	V
Output Difference Voltage (Source – Sink)	$\Delta V_{(source-sink)}$	± 7	V
Peak Pulsed Output Current (Source & Sink)	I_{OM}	± 9	A
Peak Pulsed Input current	I_{IN1}, I_{IN2}	± 1	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Notes 5 & 6)	P_D	1.1	W
Linear Derating Factor		8.8	mW/ $^{\circ}\text{C}$
Thermal Resistance, Junction to Ambient (Notes 5 & 6)	$R_{\theta JA}$	113	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction to Lead (Note 7)	$R_{\theta JL}$	105	$^{\circ}\text{C}/\text{W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^{\circ}\text{C}$

ESD Ratings

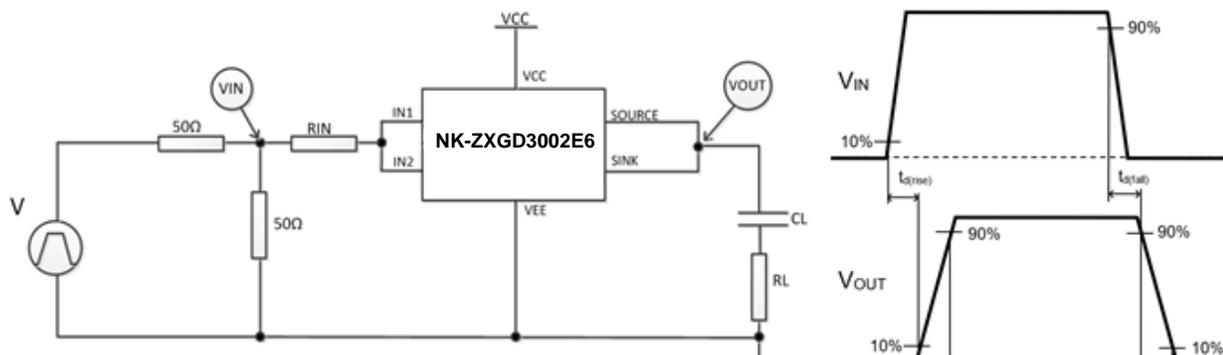
 (Note 8)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C
Electrostatic Discharge – Charged Device Model	ESD CDM	1000	V	IV

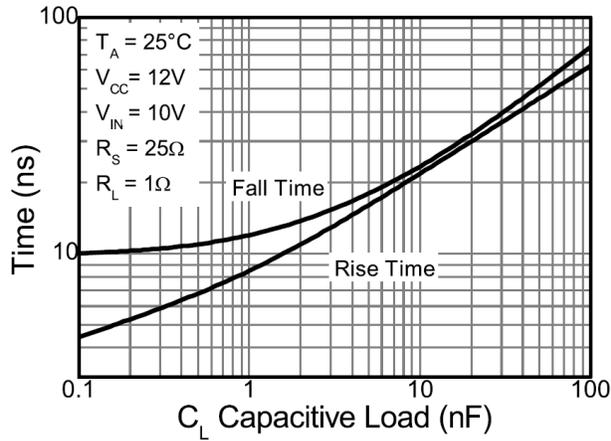
- Notes:
- For a device mounted on 25mm x 25mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions while operating in a steady-state. The heatsink is split in half with the pin 1 (V_{CC}) and pin 3 (V_{EE}) connected separately to each half.
 - For device with two active die running at equal power.
 - Thermal resistance from junction to solder-point at the end of each lead on pin 1 (V_{CC}) and pin 3 (V_{EE}).
 - Refer to JEDEC specification JESD22-A114, JESD22-A115, and JESD22-C101.

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

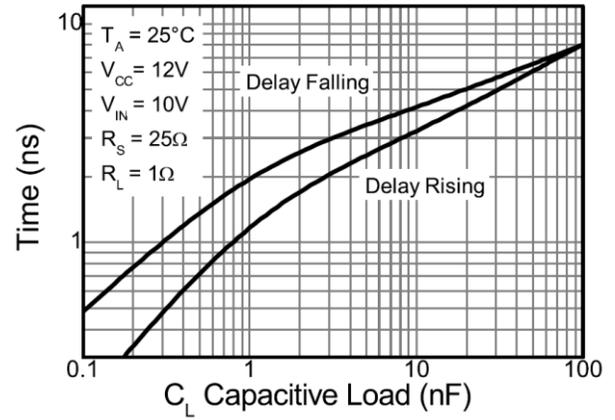
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Output Voltage, High	V _{OUT(hi)}	—	V _{CC} - 0.4	—	V	I _{SOURCE} = 1μA
Output Voltage, Low	V _{OUT(low)}	—	V _{EE} + 0.4	—	V	I _{SINK} = 1μA
Source Output Leakage Current	I _{L(SOURCE)}	—	—	1	μA	V _{CC} = 20V, V _{IN1} = V _{IN2} = 0V
Sink Output Leakage Current	I _{L(SINK)}	—	—	1	μA	V _{CC} = 20V, V _{IN1} = V _{IN2} = V _{CC}
Quiescent Current	I _Q	—	—	50	nA	V _{CC} = 16V, V _{IN1} = V _{IN2} = 0V
Peak Pulsed Source Output Current	I _{(SOURCE)M}	1.6	2.2	—	A	I _{IN1} + I _{IN2} = 10mA
Peak Pulsed Sink Output Current	I _{(SINK)M}	1.4	2	—	A	I _{IN1} + I _{IN2} = -10mA
Peak Pulsed Source Output Current	I _{(SOURCE)M}	—	9	—	A	I _{IN1} + I _{IN2} = 1A
Peak Pulsed Sink Output Current	I _{(SINK)M}	—	9	—	A	I _{IN1} + I _{IN2} = -1A
Gate Driver Switching Times	t _{D(RISE)}	—	1.25	—	ns	V _{CC} = 12V, V _{EE} = 0V, V _{IN} = 0 to 10V, C _L = 1nF, R _L = 1Ω, R _{IN} = 25Ω
	t _R		8.3			
	t _{D(FALL)}		1.6			
	t _F		10.8			
Gate Driver Switching Times	t _{D(RISE)}	—	3.6	—	ns	V _{CC} = 12V, V _{EE} = 0V, V _{IN} = 0 to 10V, C _L = 1nF, R _L = 1Ω, R _{IN} = 1kΩ
	t _R		105			
	t _{D(FALL)}		6.9			
	t _F		115			

Switching Test Circuit and Timing Diagram


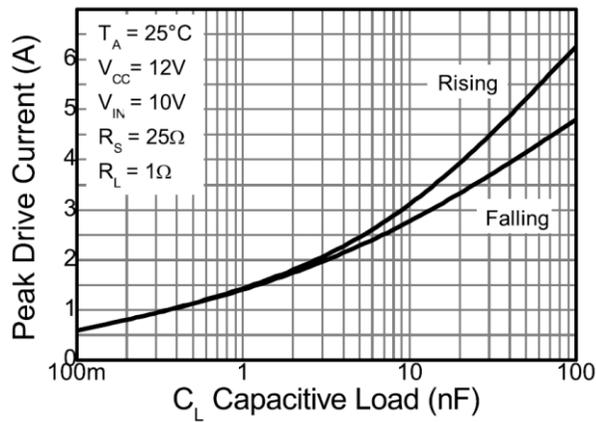
Typical Switching Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



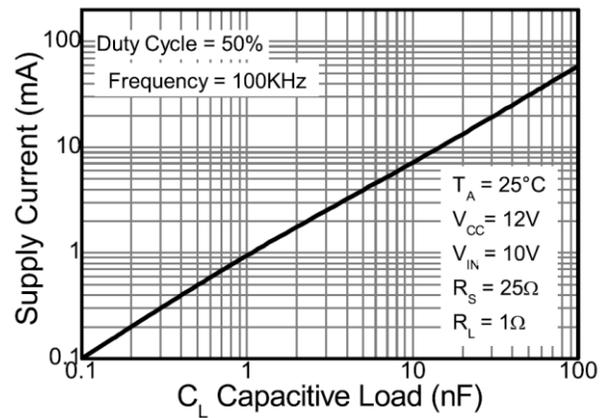
Rise and Fall Time



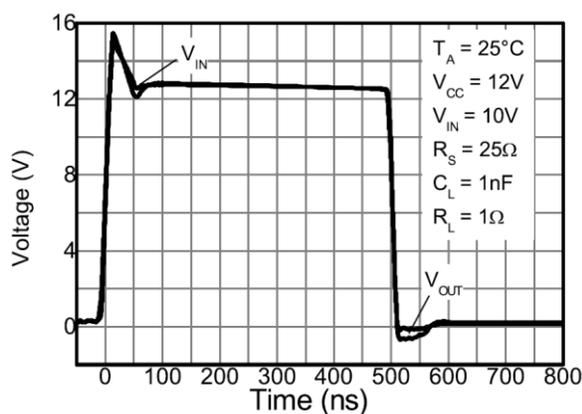
Propagation Delay



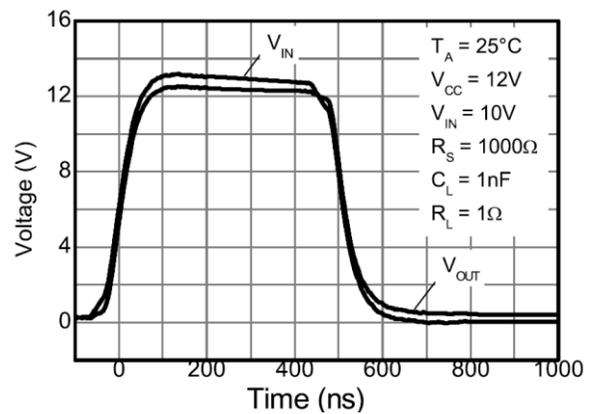
Peak Drive Current



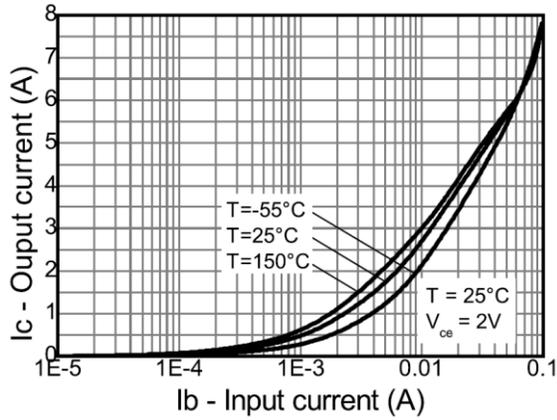
Supply Current



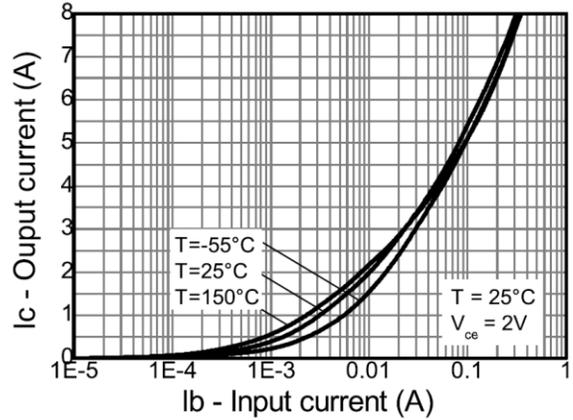
Switching Speed



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



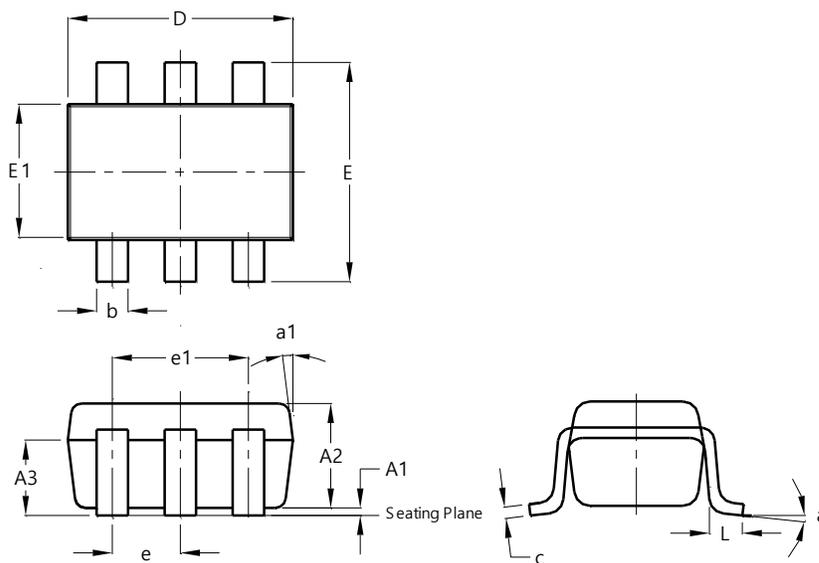
Source Current Vs Input Current



Sink Current Vs Input Current

Package Outline Dimensions

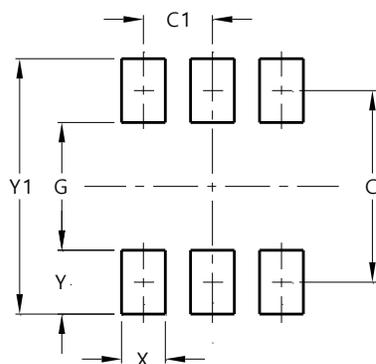
SOT26



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