优尚

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-ZXGD3003E6 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 1.5A 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.

Features

- High-Gain Buffer with Typically 1.5A Output from 10mA Input
- 5 Amps Peak Output Current
- 40V Supply for +20V to -18V Gate Driving to Prevent dV/dt Induced False Triggering and Minimize On-Losses
- 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 Pin-Out to Simplify PCB Layout and Reduce Parasitic Trace Inductances
- Near-Zero Quiescent Supply Current

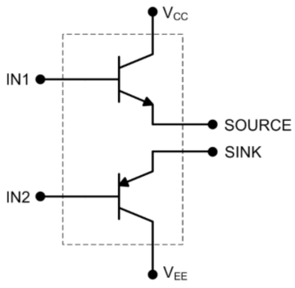
Applications

Gate Driving Power MOSFET and IGBTs 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

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 208 e3
- Weight: 0.018 grams (Approximate)



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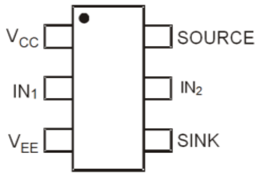
Top View

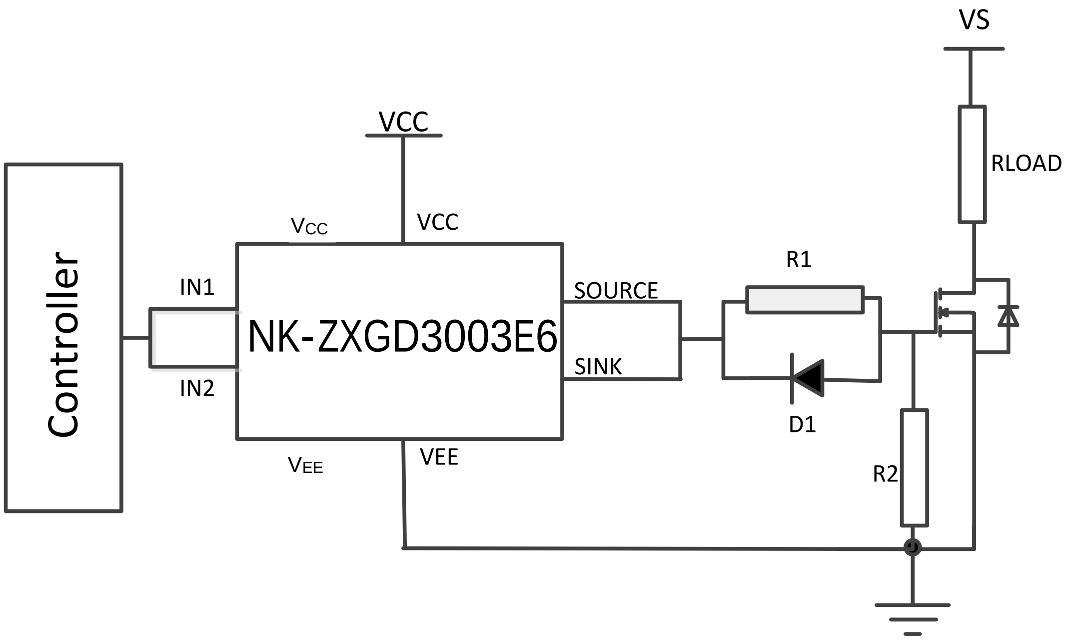


Top View
Pin-Out

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°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Supply Voltage, with Respect to V_{EE}	V_{CC}	40	V
Input Voltage, with Respect to V_{EE}	V_{IN}	40	V
Output Difference Voltage (Source – Sink)	$\Delta V_{(source-sink)}$	±7	V
Peak Pulsed Output Current (Source – Sink)	I_{OM}	±5	A
Peak Pulsed Input Current	I_{IN1}, I_{IN2}	±1	A

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

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

ESD Ratings (Note 8)

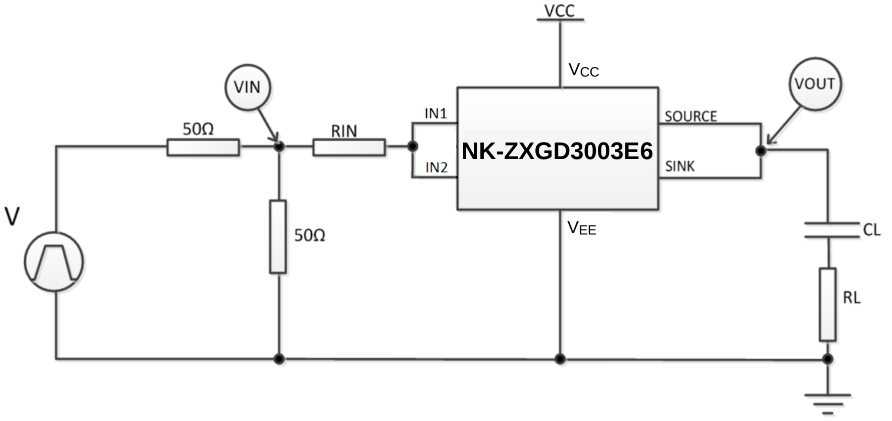
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C
Electrostatic Discharge – Charged Device Model	ESD CDM	1,000	V	IV

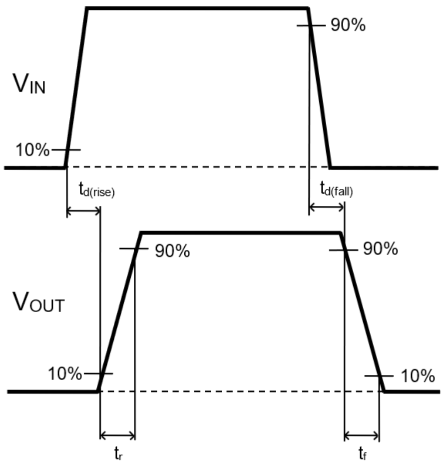
Notes:
5. For a device mounted on 25mm x 25mm 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state. The heatsink is split in half with the pin 1 (V_{CC}) and pin 3 (V_{EE}) connected separately to each half.
6. For device with two active die running at equal power.
7. Thermal resistance from junction to solder-point at the end of each lead on pin 1 (V_{CC}) and pin 3 (V_{EE}).
8. Refer to JEDEC specification JESD22-A114, JESD22-A115 and JESD22-C101.

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

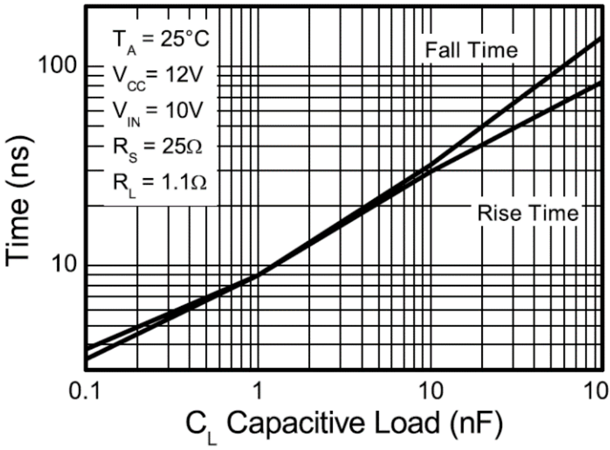
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Output Voltage, High	$V_{OUT(hi)}$	—	V_{IN1} - 0.4	—	V	I_{source} = 1µA
Output Voltage, Low	$V_{OUT(low)}$	—	V_{IN1} + 0.4	—		I_{sink} = 1µA
Source Output Leakage Current	$I_{L(source)}$	—	—	1	µA	V_{CC} = 40V, V_{IN1} = V_{IN2} = 0V
Sink Output Leakage Current	$I_{L(sink)}$	—	—	1	µA	V_{CC} = 40V, V_{IN1} = V_{IN2} = V_{CC}
Quiescent Supply Current	I_Q	—	—	20	nA	V_{CC} = 32V, V_{IN1} = V_{IN2} = 0V
Peak Pulsed Source Output Current	$I_{(source)M}$	1	1.6	—	A	I_{IN1} + I_{IN2} = 10mA
Peak Pulsed Sink Output Current	$I_{(sink)M}$	1	1.4	—	A	I_{IN1} + I_{IN2} = -10mA
Peak Pulsed Source Output Current	$I_{(source)M}$	—	5	—	A	I_{IN1} + I_{IN2} = 500mA
Peak Pulsed Sink Output Current	$I_{(sink)M}$	—	5	—	A	I_{IN1} + I_{IN2} = -500mA
Gate Driver Switching Times	$t_{d(rise)}$ t_r $t_{d(fall)}$ t_f	—	1.8 8.9 1.7 8.9	—	ns	V_{CC} = 12V, V_{EE} = 0V, V_{IN} = 0 to 10V, C_L = 1nF, R_L = 1Ω, R_{IN} = 25Ω
Gate Driver Switching Times	$t_{d(rise)}$ t_r $t_{d(fall)}$ t_f	—	4 77 4 85	—	ns	V_{CC} = 12V, V_{EE} = 0V, V_{IN} = 0 to 10V, C_L = 1nF, R_L = 1Ω, R_{IN} = 1kΩ

Switching Test Circuit and Timing Diagram

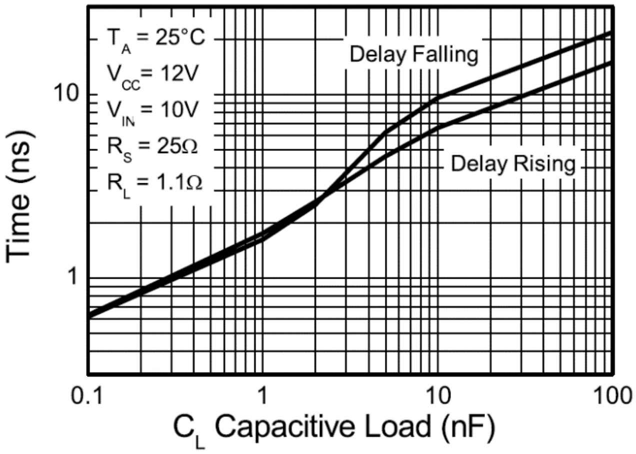




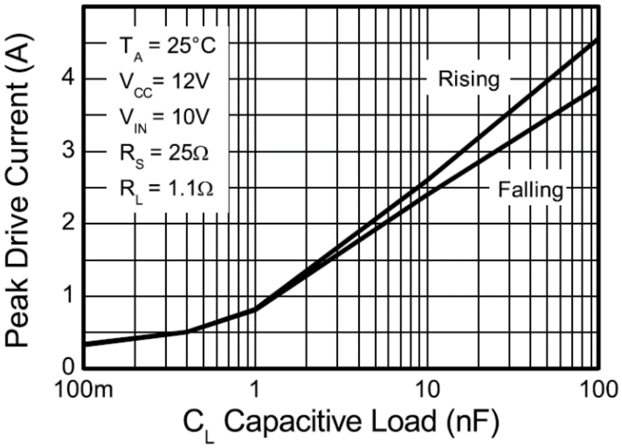
Typical Gate Driver Characteristics (@TA = +25°C, unless otherwise specified.)



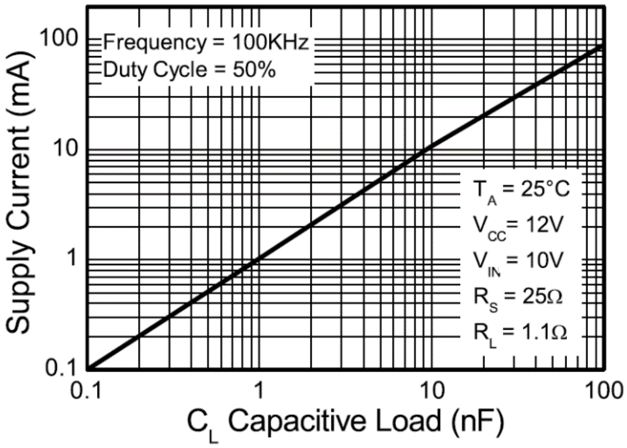
Rise and Fall Time



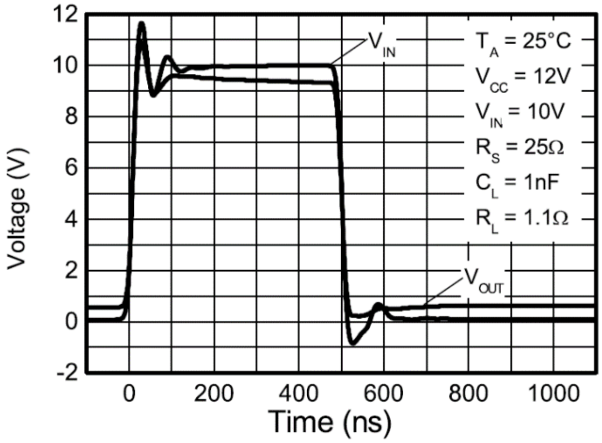
Propagation Delay



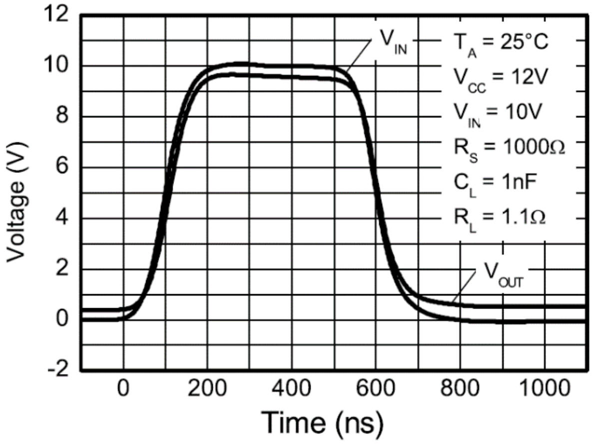
Peak Drive Current



Supply Current

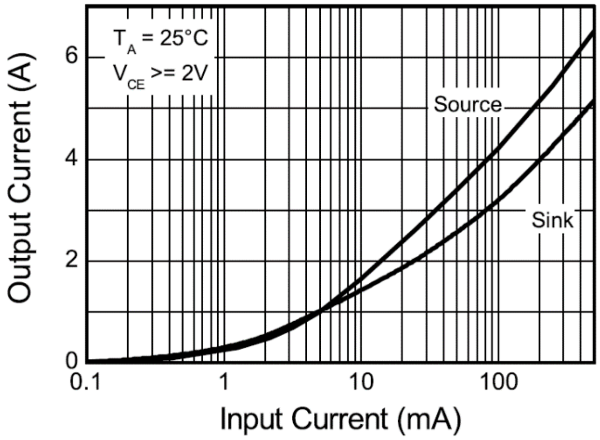


Switching Speed



Switching Speed

Typical Gate Driver Characteristics (continued)



Output Current vs Input Current

Package Outline Dimensions

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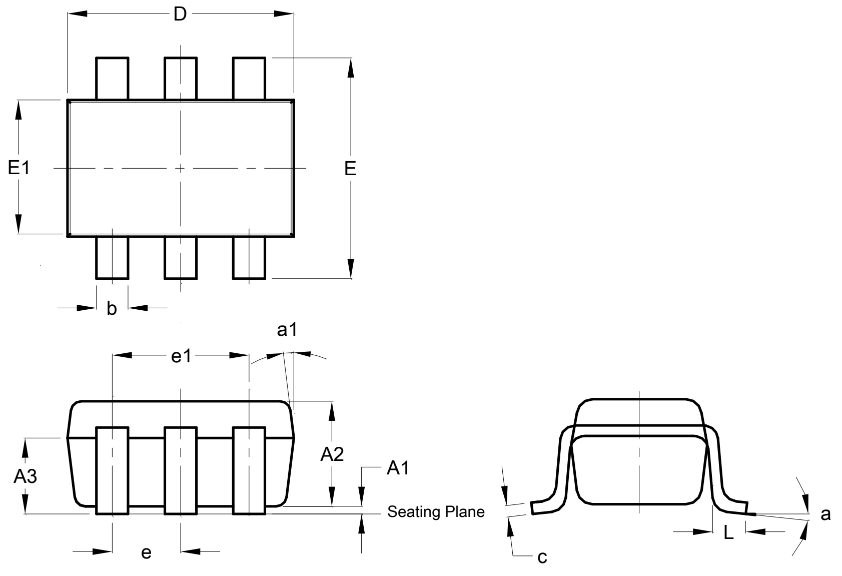

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Dim	**Min**	**Max**	**Typ**
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
All Dimensions in mm			

Suggested Pad Layout

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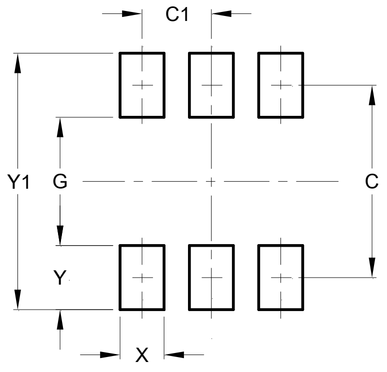

Dimensions	Value (in mm)
C	2.40
C1	0.95
G	1.60
X	0.55
Y	0.80
Y1	3.20