Single-Channel, High-Speed, Low-Side Gate Driver

GENERAL DESCRIPTION

The SL27531 series single-channel, high-speed, low-side gate driver devices can effectively drive MOSFET and IGBT power switches. Using a design that inherently minimizes shoot-through current, SL27531 series products can source and sink high peak-current pulses into capacitive loads offering rail-to-rail drive capability and extremely small propagation delay, typically 21 ns.

The SL27531 can provide 5 A source, 5 A sink peak-drive current capability at 18 V VDD supply.

FEATURES

- Low-cost gate-driver device offering superior replacement of NPN and PNP discrete solutions
- 5 A peak source and 5 A peak sink current
- Fast propagation delay (21 ns typical)
- Fast rise time (9 ns typical)
- Fast fall time (8 ns typical)
- 13.5V to 30V single supply range
- Under-voltage lockout
- TTL and CMOS compatible input logic threshold
- Dual input design (choice of an inverting or non-inverting driver configuration)
- Output held low when input pins are floating
- Operating temperature range of -40℃ to 125℃
- SOT23-6, package

TYPICAL APPLICATION CIRCUIT

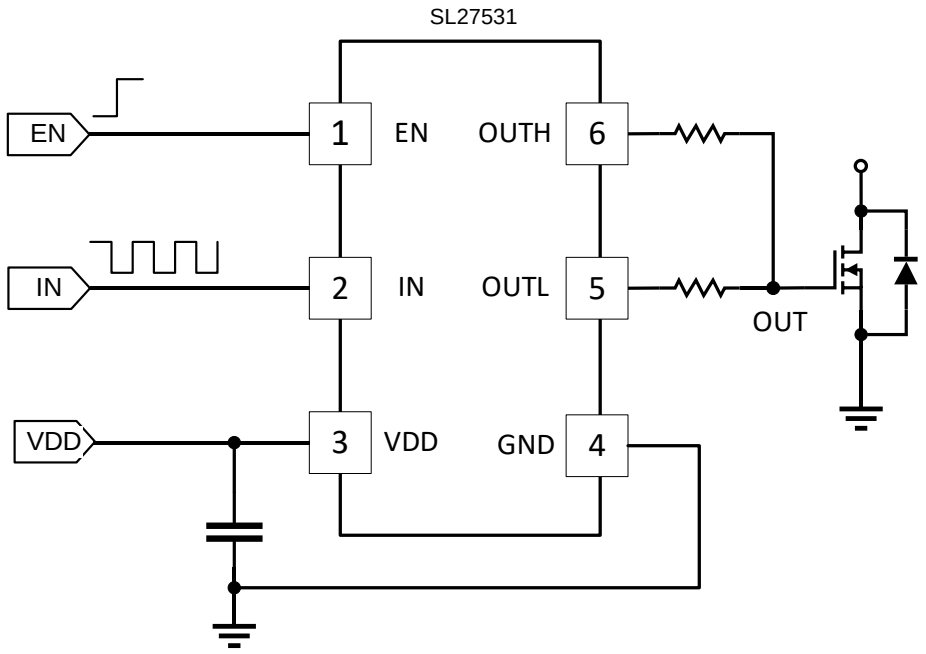
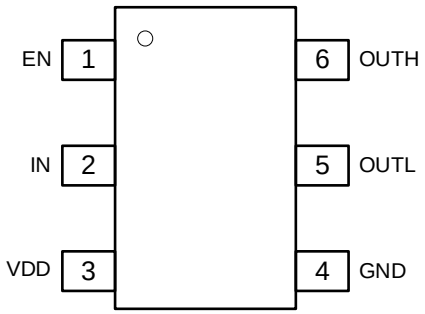


Figure 1. SL27531 Typical Application Circuit

PIN CONFIGURATION

Package	Pin Configuration (Top View)
SOT23-6	

PIN DESCRIPTION

No.	Name	Function Description
SiLM27531H-AQ		
1	EN	Enable pin. Connect this pin to VDD in order to enable output.
2	IN	Noninverting Input
3	VDD	Bias supply input.
4	GND	Ground.
5	OUTL	Sinking current output of driver. Connect resistor between OUTL and Gate of power-switching device to adjust turn off speed.
6	OUTH	Sourcing current output of driver. Connect resistor between OUTH and Gate of power-switching device to adjust turn on speed.

ORDERING INFORMATION

Order Part No.	UVLO	Package	QTY
SL27531	12.5V	SOT23-6	3000/Reel

FUNCTIONAL BLOCK DIAGRAM

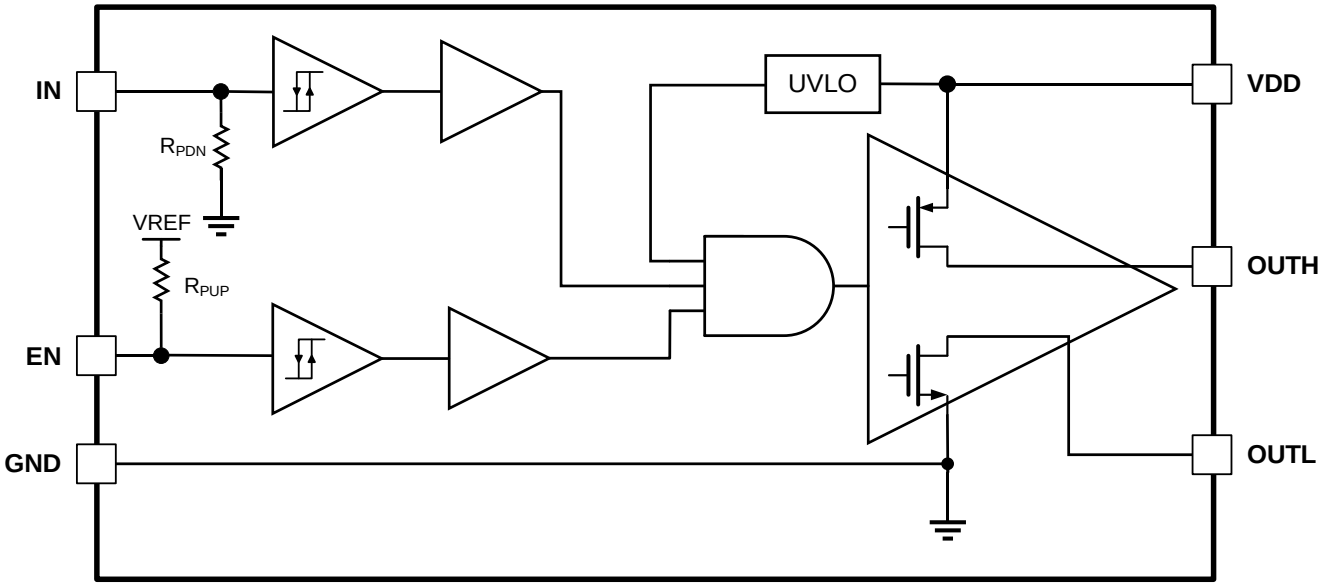


Figure 2. SL27531 Function Block Diagram

ABSOLUTE MAXIMUM RATINGS[1,2,3]

Over operating free-air temperature range (unless otherwise noted)

Symbol	Description	Min	Max	Unit
V_{DD}	Supply Voltage	-0.3	33	V
V_O	Continuous voltage on OUTH, OUTL	0.3	V_{DD}+0.3	
	Repetitive pulse less than 200ns[4]	-2	V_{DD}+0.3	
IN, EN	Voltage on the IN, EN[5]	-6	33	
T_J	Junction temperature	-40	150	℃
T_L	Lead temperature (soldering, 10 seconds)		300	
T_S	Storage temperature	-65	150	

1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

2) All voltages are with respect to GND unless otherwise noted. Currents are positive into, negative out of the specified terminal.

3) These devices are sensitive to electrostatic discharge; follow proper device-handling procedures.

4) Values are verified by characterization on bench.

5) Maximum voltage on input pins is not restricted by the voltage on the VDD pin.

RECOMMENDED OPERATION CONDITIONS

Over operating free-air temperature range (unless otherwise noted)

Symbol	Definition	Min	Max	Unit
V_{DD}	Supply voltage range	13.5	30	V
IN, EN	Input voltage	-5	30	
T_A	Operation temperature range	-40	125	°C

DYNAMIC ELECTRICAL CHARACTERISTICS

Over operating free-air temperature range (unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
t_{D1}	Input to output turn-on propagation delay	V_{DD}=18V, 5V input pulse, C_{LOAD}=1.8nF		21	28	ns
t_{D2}	Input to output turn-off propagation delay	V_{DD}=18V, 5V input pulse, C_{LOAD}=1.8nF		21	28	
t_R	Turn-on rise time	V_{DD}=18V, C_{LOAD}=1.8nF	7	9	13	
t_F	Turn-off fall time	V_{DD}=18V, C_{LOAD}=1.8nF	5	8	11	
t_{PW}	Minimum input pulse width that changes the output state			10	15	

STATIC ELECTRICAL CHARACTERISTICS

V_{DD}= 18 V,10uF capacitor from VDD to GND. T_A = -40°C to +125°C unless otherwise specified.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V_{IH}	Logic high input voltage threshold for IN, EN pin	Output high	1.8	2	2.2	V
V_{IL}	Logic low input voltage threshold for IN, EN pin	Output low	0.8	1	1.2	
V_{OH}	High level output voltage, V_{DD} - V_O	I_O = -10 mA		7	13	mV
V_{OL}	Low level output voltage, V_O	I_O = 10 mA		5	9	
$I_{DD(off)}$	Startup current	V_{DD} =7V	50	86	140	uA
V_{DDUV+}	Undervoltage positive going threshold	SL27531	11.5	12.5	13.5	V
V_{DDUV-}	Undervoltage negative going threshold	SL27531	10.5	11.5	12.5	V
I_O	Output high short circuit pulsed current	V_O = 0 V V_{IN} = Logic “1” PW ⩽ 10 µs		-5		A
	Output low short circuit pulsed current	V_O = 18 V V_{IN} = Logic “0” PW ⩽ 10 µs		5		

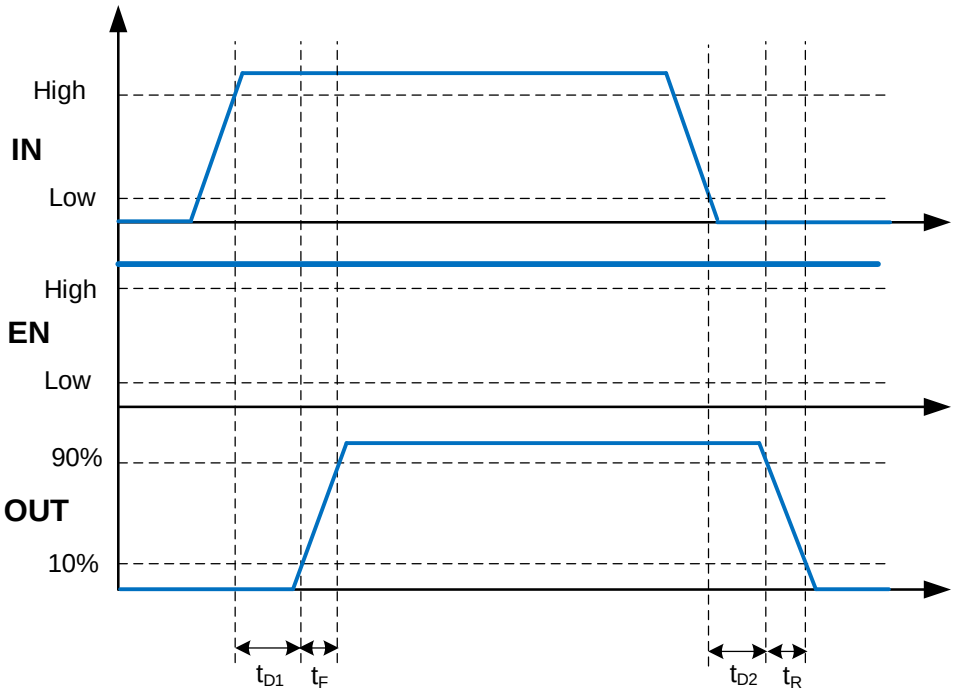
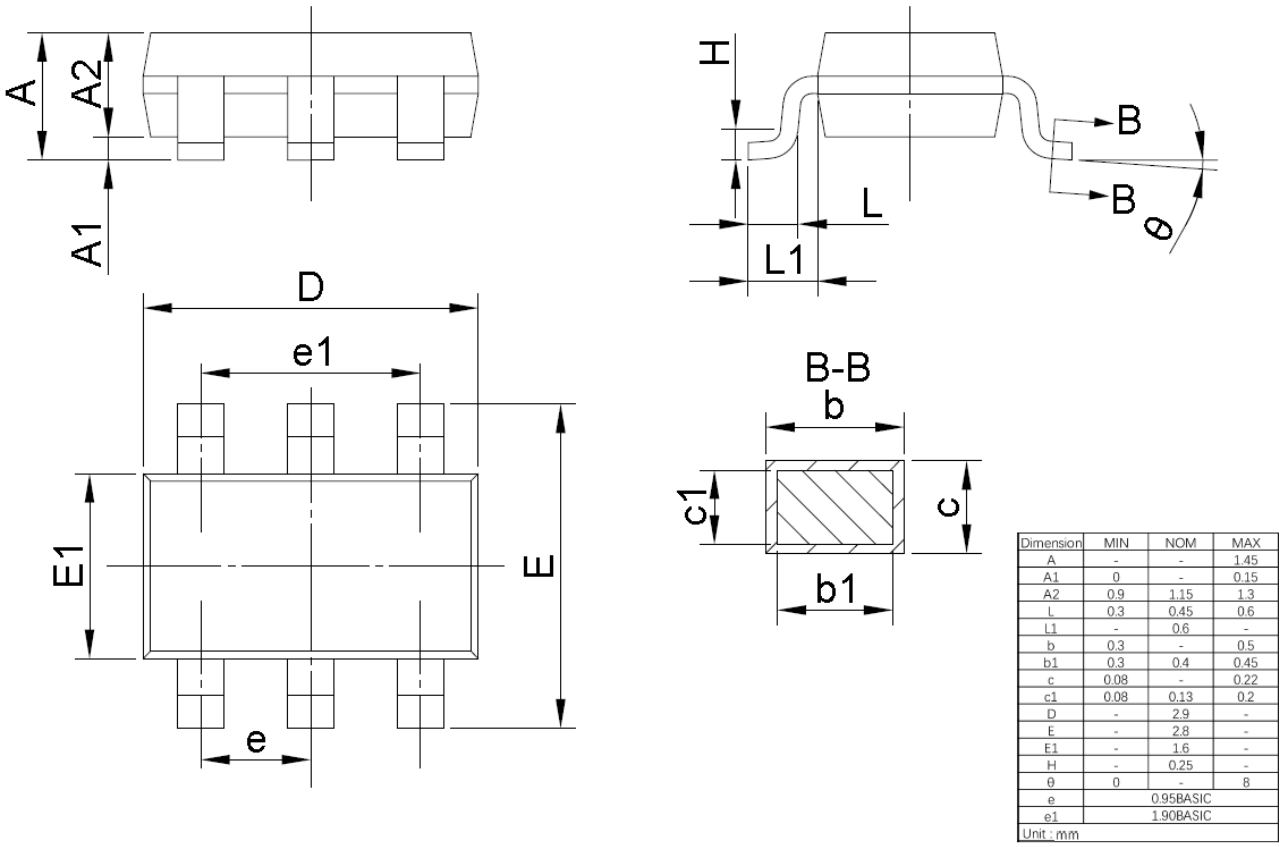


Figure 3. SL27531 (OUTH tied to OUTL) Enabled Output

PACKAGE CASE OUTLINES



Dimension	MIN	NOM	MAX
A	-	-	1.45
A1	0	-	0.15
A2	0.9	1.15	1.3
L	0.3	0.45	0.6
L1	-	0.6	-
b	0.3	-	0.5
b1	0.3	0.4	0.45
c	0.08	-	0.22
c1	0.08	0.13	0.2
D	-	2.9	-
E	-	2.8	-
E1	-	1.6	-
H	-	0.25	-
θ	0	-	8
e	0.95BASIC		
e1	1.90BASIC		
Unit : mm			

Figure 4. SOT23-6 Outline Dimensions