

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

GENERAL DESCRIPTION

The SiLM27511HCJ-AQ 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, SiLM27511HCJ-AQ 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 17ns.

The SiLM27511HCJ-AQ can provide 4 A source, 5 A sink peak-drive current capability at 15 V VCC supply.

FEATURES

- Low-cost gate-driver device offering superior replacement of NPN and PNP discrete solutions
- 4 A peak source and 5 A peak sink current
- Fast propagation delay (17 ns typical)
- Fast rise time (9 ns typical)
- Fast fall time (6 ns typical)
- 13.5V to 20V 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°C to 125°C
- SOP14, package
- AEC-Q 100 qualified for automotive

TYPICAL APPLICATION CIRCUIT

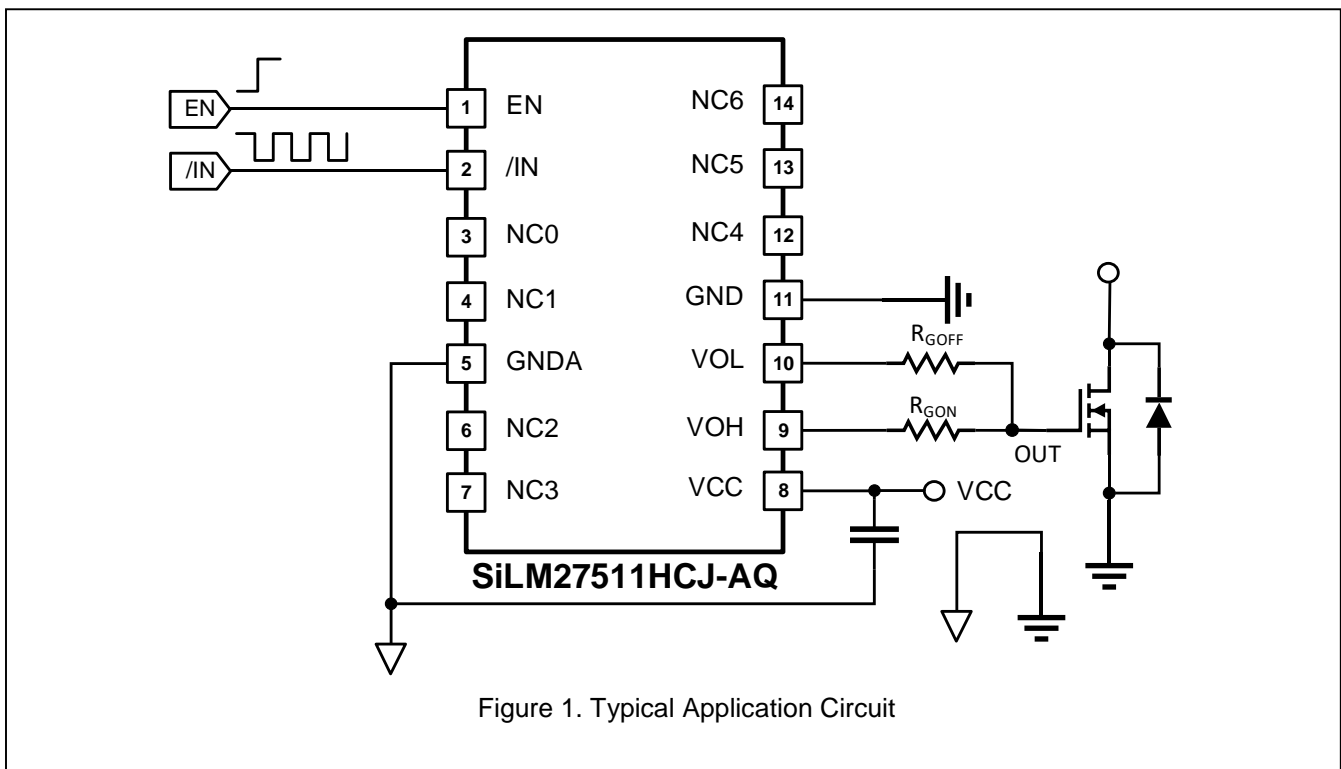
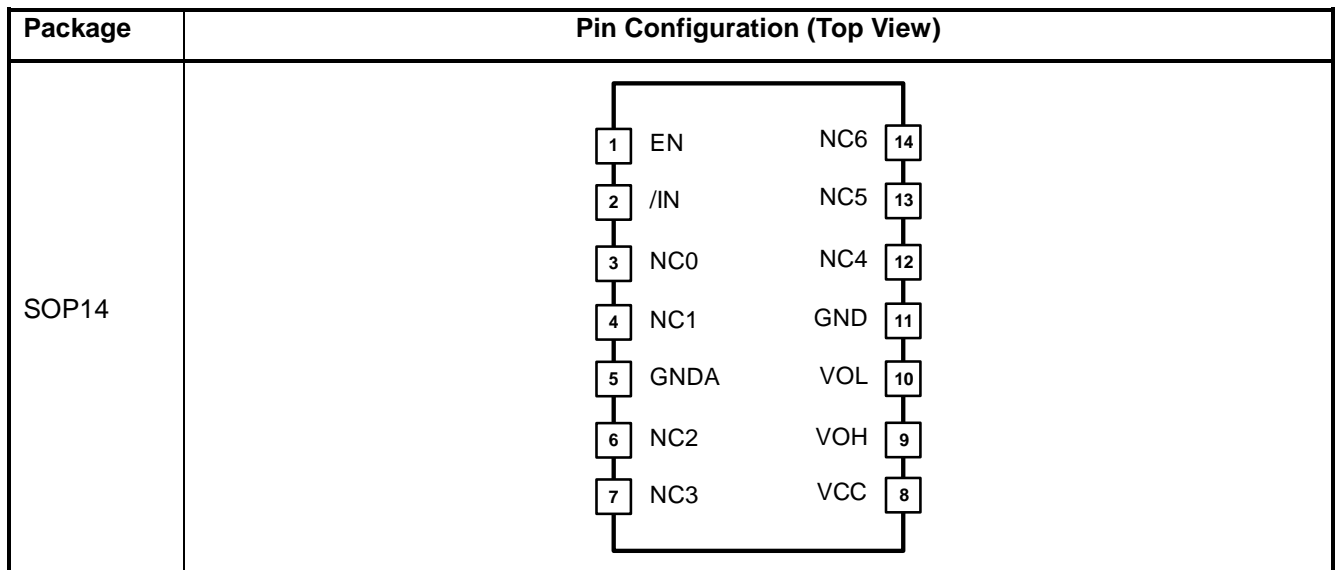


Table of Contents

General Description	1
Features.....	1
Typical Application Circuit	1
Pin Configuration.....	3
Pin Description.....	3
Functional Block Diagram	4
Absolute Maximum Ratings	5
Recommended Operation Conditions	5
Dynamic Electrical Characteristics	6
Static Electrical Characteristics	6
Package Case Outlines	8
Revision History	9

PIN CONFIGURATION

PIN DESCRIPTION

No.	Name	Function Description
1	EN	Enable pin. Connect this pin to VCC in order to enable output.
2	/IN	Inverting Input: When the driver is used in noninverting configuration, connect this pin to GND in order to enable output.
3, 4, 6, 7, 12, 13, 14	NCx	No connect.
5	GNDA	Analog ground.
8	VCC	Bias supply input.
9	VOH	Sourcing current output of driver. Connect resistor between this pin and Gate of power-switching device to adjust turn on speed.
10	VOL	Sinking current output of driver. Connect resistor between this pin and Gate of power-switching device to adjust turn off speed.
11	GND	Power ground.

ORDERING INFORMATION

Order Part No.	Package	QTY
SiLM27511HCJ-AQ	SOP14	2500/Reel

FUNCTIONAL BLOCK DIAGRAM

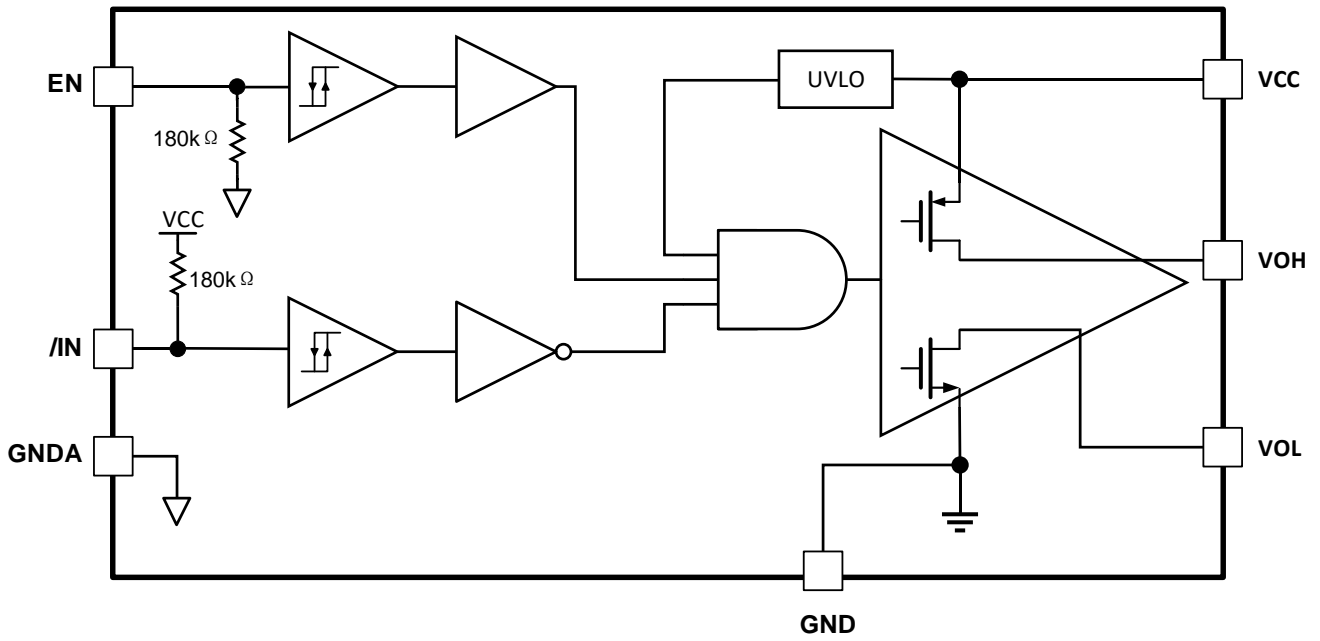


Figure 2. Function Block Diagram

ABSOLUTE MAXIMUM RATINGS^{1,2,3}

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

Symbol	Description	Min	Max	Unit
V_{VCC}	Supply Voltage	-0.3	25	V
V_{VOH}, V_{VOL}	Continuous voltage on VOH, VOL	0.3	VCC+0.3	
	Repetitive pulse less than 200ns ⁴	-2	VCC+0.3	
I_O	Source Continuous Current on VOH		0.3	A
	Source Pulsed Current on VOH (0.5 μ s) ⁴		-4.5	
	Sink Pulsed Current on VOL (0.5 μ s) ⁴		5.7	
/IN, EN	Voltage on the EN, /IN, EN ⁵	-6	25	V
T_J	Junction temperature	-40	150	°C
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 VCC pin.

RECOMMENDED OPERATION CONDITIONS

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

Symbol	Definition	Min	Max	Unit
V_{VCC}	Supply voltage range	13.5	20	V
EN, /IN	Input voltage	-5	20	
T_A	Operation temperature range	-40	125	°C

DYNAMIC ELECTRICAL CHARACTERISTICS

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

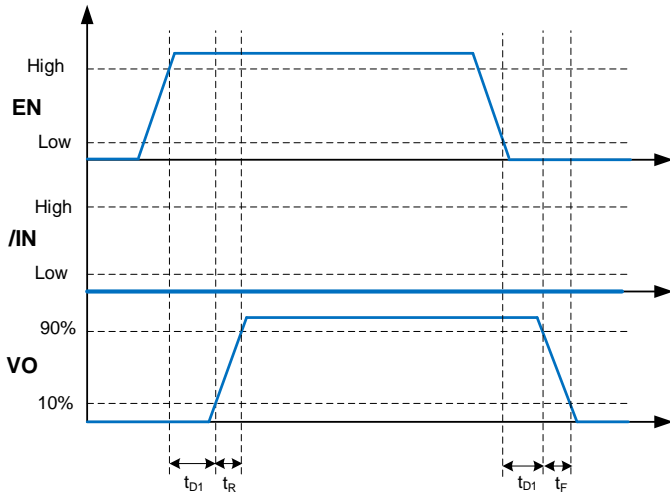
Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
t_{D1}	/IN turn high to output propagation delay	$V_{VCC}=15V$, 5V input pulse, $C_{LOAD}=1.8nF$		18	28	ns
t_{D2}	/IN turn low to output propagation delay	$V_{VCC}=15V$, 5V input pulse, $C_{LOAD}=1.8nF$		18	28	
$t_R^{(1)}$	Turn-on rise time	$V_{VCC}=15V$, $C_{LOAD}=1.8nF$		9	12	
$t_F^{(1)}$	Turn-off fall time	$V_{VCC}=15V$, $C_{LOAD}=1.8nF$		6	10	

STATIC ELECTRICAL CHARACTERISTICS

$V_{VCC} = 15V$, 10 μF capacitor from VCC to GND. $T_A = T_J = -40^{\circ}C \sim 125^{\circ}C$ unless otherwise specified.

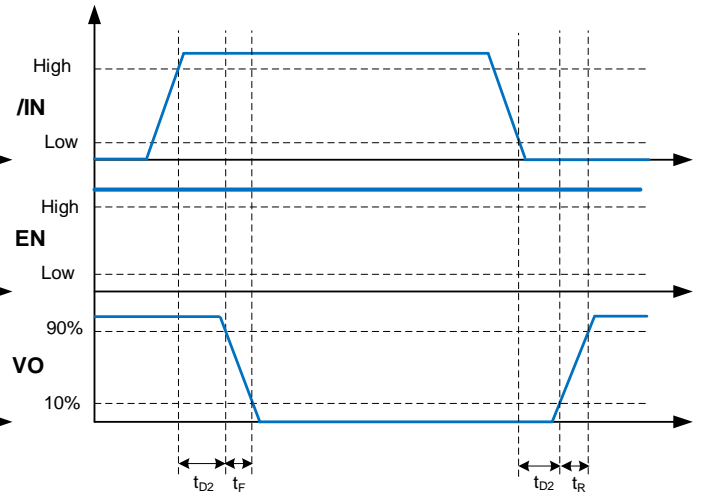
Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V_{INH}	Logic "1" input voltage threshold	Output high for /IN pin		2	2.2	V
V_{INL}	Logic "0" input voltage threshold	Output low for /IN pin	1.07	1.3		
V_{ENH}	Logic "1" input voltage threshold	Output high for EN pin		2	2.2	V
V_{ENL}	Logic "0" input voltage threshold	Output low for EN pin	1.07	1.3		
V_{OH}	High level output voltage, $V_{VCC} - V_o$	$V_{VCC}=15V$ $I_o = -10$ mA		9	12	mV
V_{OL}	Low level output voltage, V_o	$V_{VCC}=15V$ $I_o = 10$ mA		4.8	7.4	
$I_{DD(off)}$	Startup current	$V_{VCC} = 3.4V$, EN = VCC, /IN = 0V	45	75	120	uA
		EN = 0V	35	60	120	
V_{VCCUV+}	Undervoltage positive going threshold		11.5	12.5	13.5	V
V_{VCCUV-}	Undervoltage negative going threshold		10.5	11.5	12.5	
V_{VCC_H}	Supply voltage hysteresis			1		
I_o	Output high short circuit pulsed current ¹	$V_o = 0V$, $V_{IN} = \text{Logic "1"}$ $PW \leq 10 \mu s$		-4		A
	Output low short circuit pulsed current ¹	$V_o = 15V$, $V_{IN} = \text{Logic "0"}$ $PW \leq 10 \mu s$		5		

1) only bench test.



(PWM input to EN pin, /IN pin tied to GND)

Figure 3. EN pin Configuration



(PWM input to /IN pin, EN pin tied to VCC)

Figure 4. /IN pin Configuration

PACKAGE CASE OUTLINES

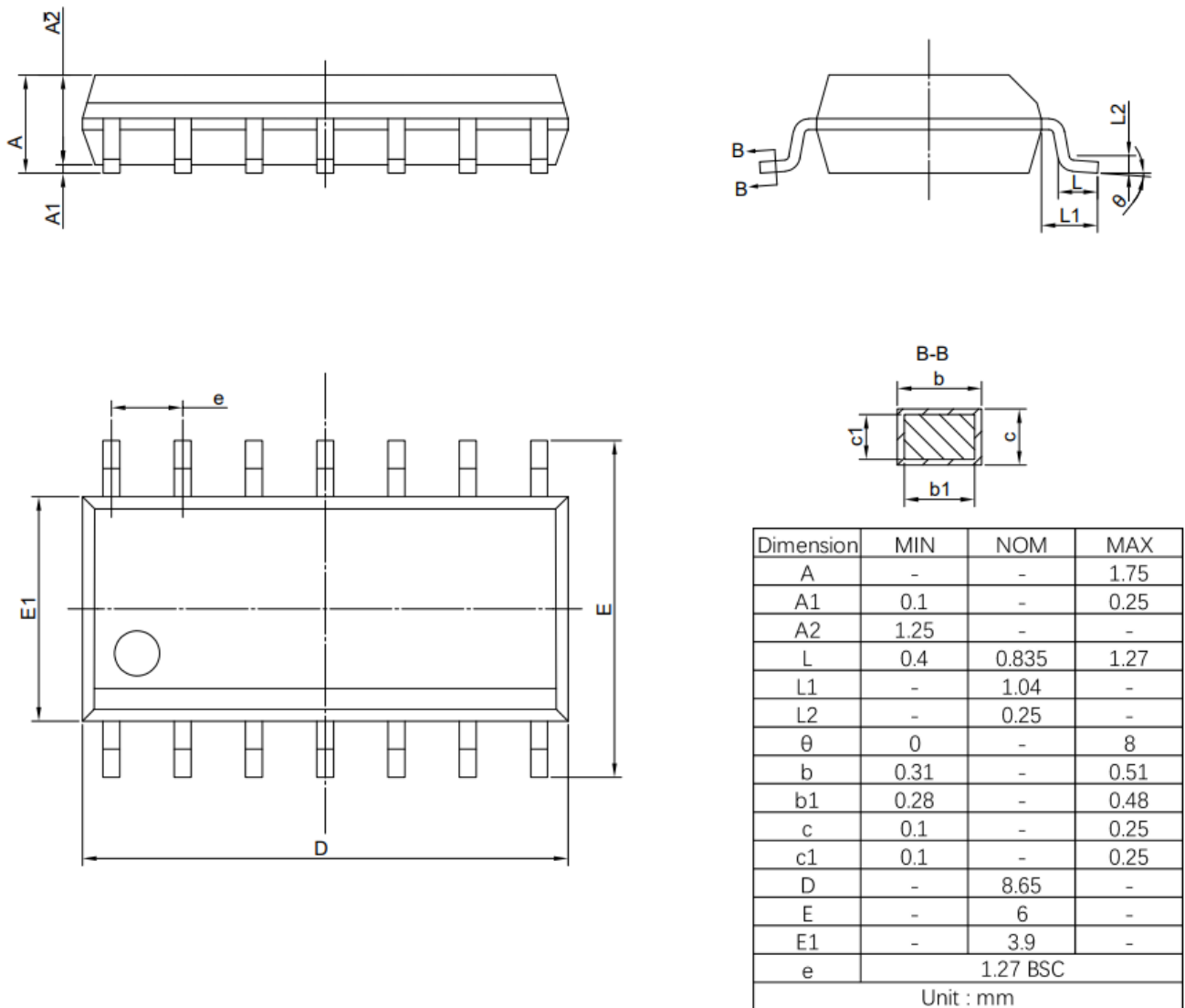


Figure 5. SOP14 Outline Dimensions

REVISION HISTORY

Note: page numbers for previous revisions may differ from page numbers in current version

Page or Item	Subjects (major changes since previous revision)
Rev 1.0 Datasheet, 2023-09-13	
Whole document	Initial datasheet Released