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

GENERAL DESCRIPTION

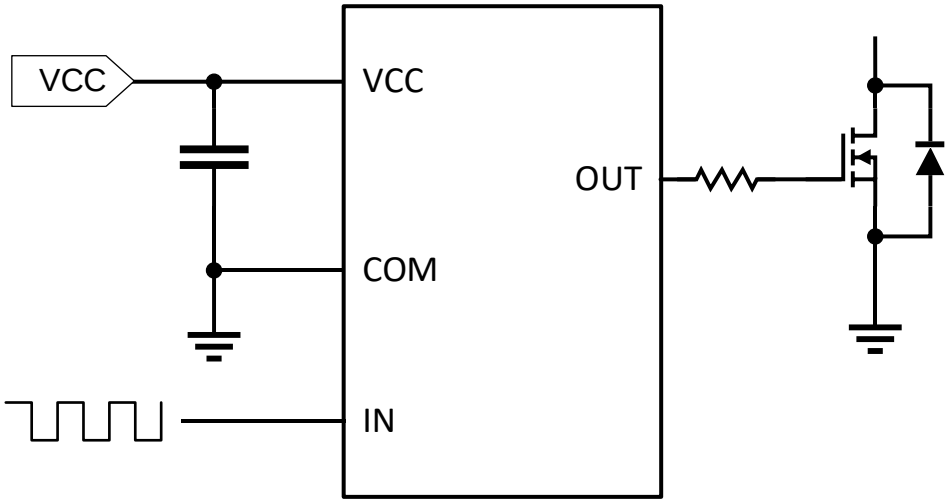
The SiLM27273 is a single-channel, high-speed, low-side gate driver device which can effectively drive MOSFET and IGBT power switches. Using a design that inherently minimizes shoot-through current, SiLM27273 can source and sink high peak-current pulses into capacitive loads offering rail-to-rail drive capability and extremely small propagation delay, typically 18ns.

The SiLM27273 can provide 4 A source, 5 A sink peak-drive current capability at 12 V VDD 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 (18 ns typical)
- Fast rise and fall time (7 ns typical)
- 4.5 to 20V single supply range
- Under-voltage lockout
- TTL and CMOS compatible input logic threshold
- Output held low when input pins are floating
- Operating temperature range of -40℃ to 140℃
- SOT23-5 package

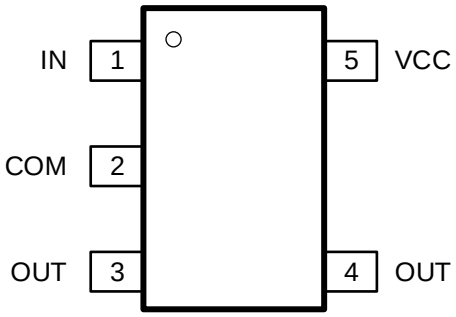
TYPICAL APPLICATION CIRCUIT



Typical Application Circuit

Table of Contents

PIN CONFIGURATION

Package	Pin Configuration (Top View)
SOT23-5	

PIN DESCRIPTION

No.	Name	Function Description
1	IN	Logic input for gate driver output.
2	COM	IC ground. All signals referenced to this pin.
3, 4	OUT	Driver output.
5	VCC	Bias supply input.

ORDERING INFORMATION

Order Part No.	Package	QTY
SiLM27273AD-7G	SOT23-5	3000/Reel

FUNCTIONAL BLOCK DIAGRAM

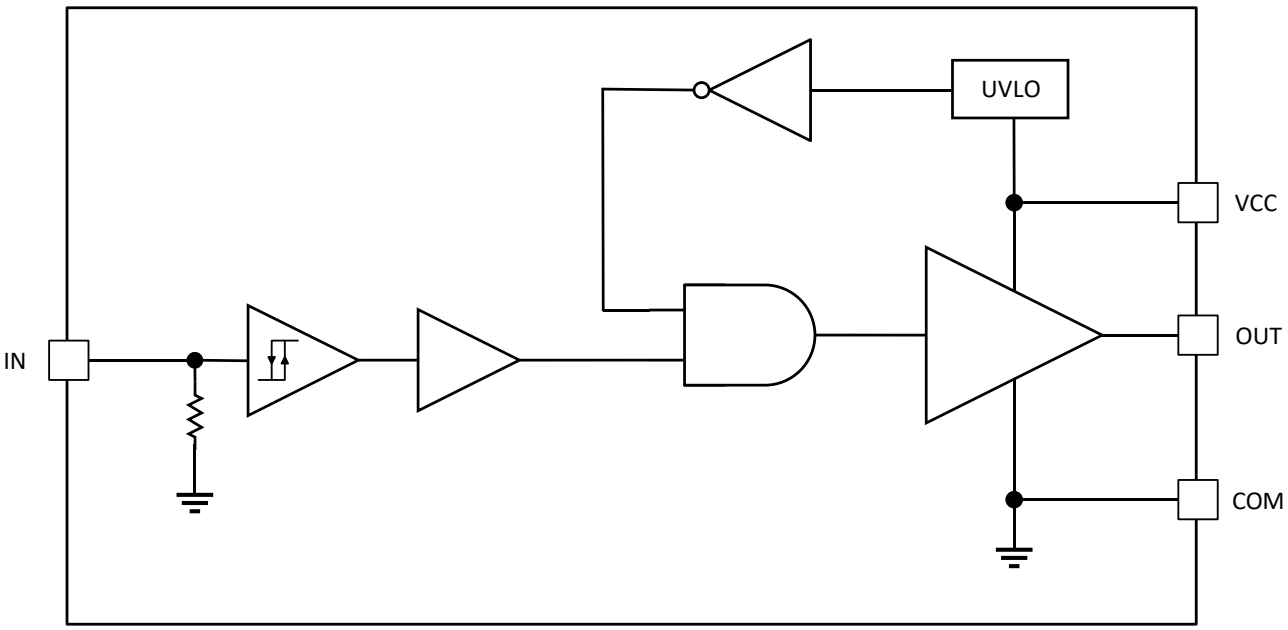


Figure 1. SiLM27273 Function Block

ABSOLUTE MAXIMUM RATINGS[1,2,3]

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

Symbol	Description	Min	Max	Unit
V_{CC}	Supply Voltage	-0.3	25	V
V_O	Continuous voltage on OUT	0.3	V_{CC}+0.3	
	Repetitive pulse less than 200ns[4]	-2	V_{CC}+0.3	
I_O	Source Continuous Current on OUT		0.3	A
	Source Pulsed Current on OUT (0.5 μs)[4]		-4.5	
	Sink Pulsed Current on OUT (0.5 μs)[4]		5.7	
IN	Voltage on IN[5]	-6	25	V
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 COM 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 pin 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_{CC}	Supply voltage range	4.5	20	V
IN	Input voltage	-5	20	
T_J	Operation junction temperature range	-40	140	°C

DYNAMIC ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
t_{on}	IN to output turn on propagation delay	V_{CC}=12V, 5V input pulse, C_{LOAD}=1.8nF		18	28	ns
		V_{CC}=4.5V, 5V input pulse, C_{LOAD}=1.8nF		21	36	
t_{off}	IN to output turn off propagation delay	V_{CC}=12V, 5V input pulse, C_{LOAD}=1.8nF		18	28	
		V_{CC}=4.5V, 5V input pulse, C_{LOAD}=1.8nF		21	36	
t_R	Turn-on rise time	V_{CC}=12V, C_{LOAD}=1.8nF		7	10	
		V_{CC}=4.5V, C_{LOAD}=1.8nF		6	11	
t_F	Turn-off fall time	V_{CC}=12V, C_{LOAD}=1.8nF		5	8	
		V_{CC}=4.5V, C_{LOAD}=1.8nF		5	12	

STATIC ELECTRICAL CHARACTERISTICS

V_{CC}= 12 V,10uF capacitor from VCC to COM. T_A = 25°C unless otherwise specified.

Symbol	Parameter	Condition		Min.	Typ.	Max.	Unit
V_{IH}	Logic “1” input voltage	Output high for IN pin			2	2.2	V
V_{IL}	Logic “0” input voltage	Output low for IN pin		1.07	1.3		
V_{OH}	High level output voltage, V_{CC} - V_O	V_{CC}=12V I_O = -10 mA			8.7	12	mV
		V_{CC}=4.5V I_O = -10 mA			9.8	14.6	
V_{OL}	Low level output voltage, V_O	V_{CC}=12V I_O = 10 mA			4.8	7.4	
		V_{CC}=4.5V I_O = 10 mA			5.2	9.4	
$I_{CC(off)}$	Startup current	V_{CC} =3.4V	IN = V_{CC}	45	75	120	uA
			IN = COM	35	60	120	
V_{CCUV+}	Undervoltage positive going threshold			4.03	4.2	4.45	V
V_{CCUV-}	Undervoltage negative going threshold			3.7	3.8	4.12	
V_{CC_H}	Supply voltage hysteresis				0.4		
I_O	Output high short circuit pulsed current	V_O = 0 V, V_{IN} = Logic “1”, PW ⩽ 10 µs			-4		A
	Output low short circuit pulsed current	V_O = 12 V, V_{IN} = Logic “0”, PW ⩽ 10 µs			5		

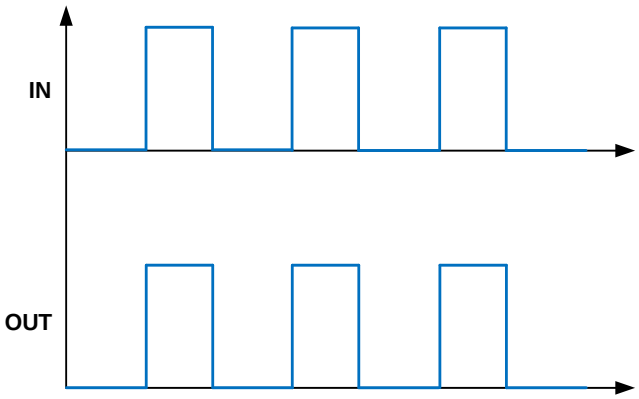


Figure 2. Input and Output Timing

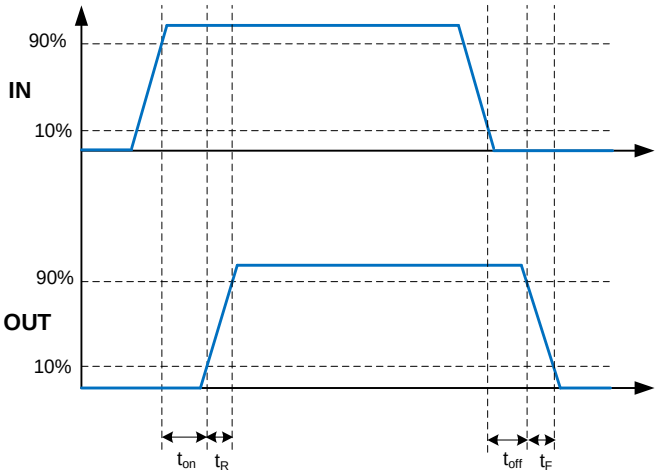
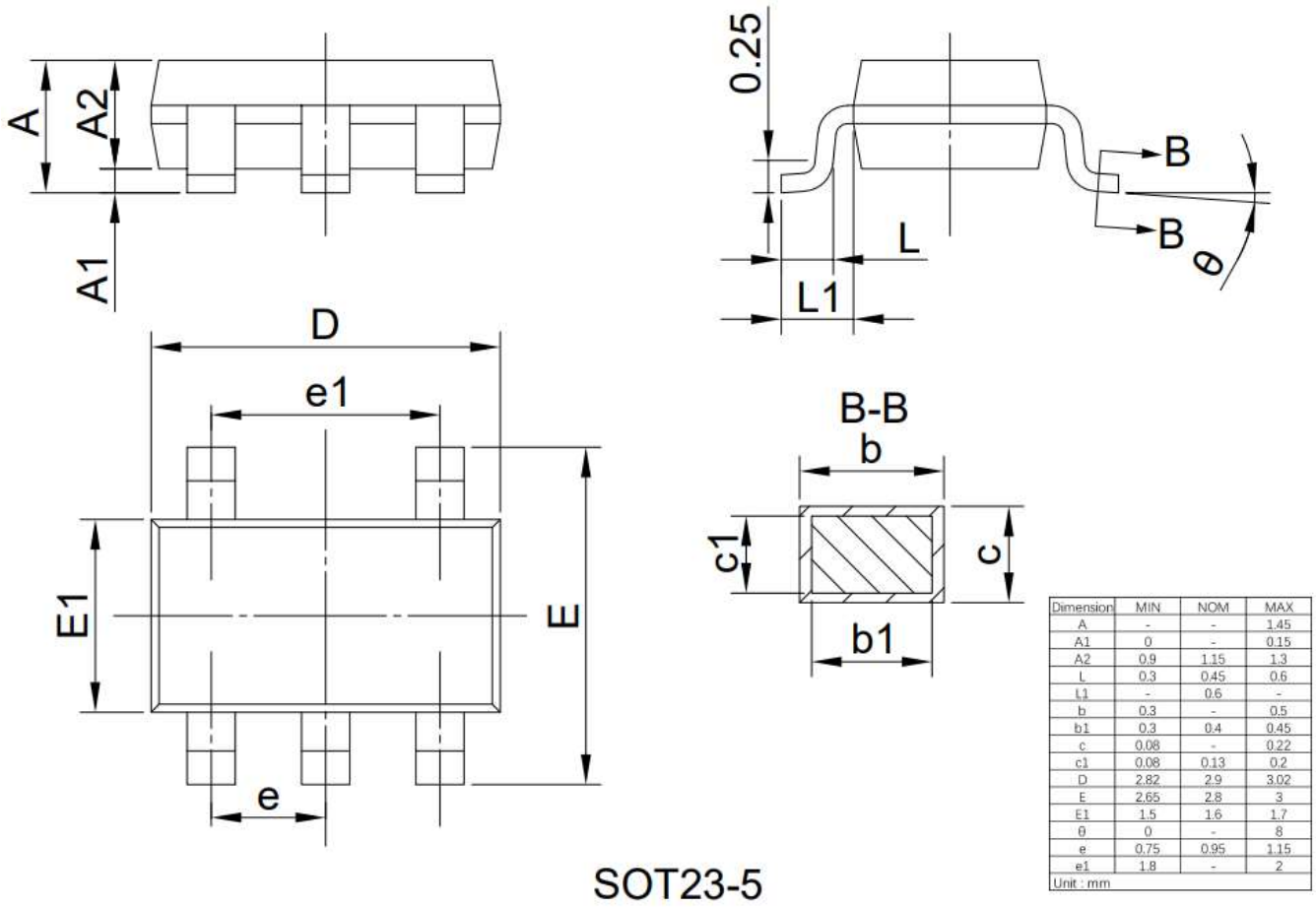


Figure 3. Switching Timing Waveform

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	2.82	2.9	3.02
E	2.65	2.8	3
E1	1.5	1.6	1.7
θ	0	-	8
e	0.75	0.95	1.15
e1	1.8	-	2
Unit : mm			

Figure 4. SOT23-5 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, 2024-7-23	
Whole document	Initial released