

600V Half Bridge Driver

PRODUCT SUMMARY

- V_{OFFSET} 600 V max.
- $I_{\text{O+/-}}$ 130 mA/270 mA
- V_{OUT} 10 V - 20 V
- $t_{\text{on/off (typ.)}}$ 160 ns/230 ns
- **Delay Matching (typ.)** 60 ns

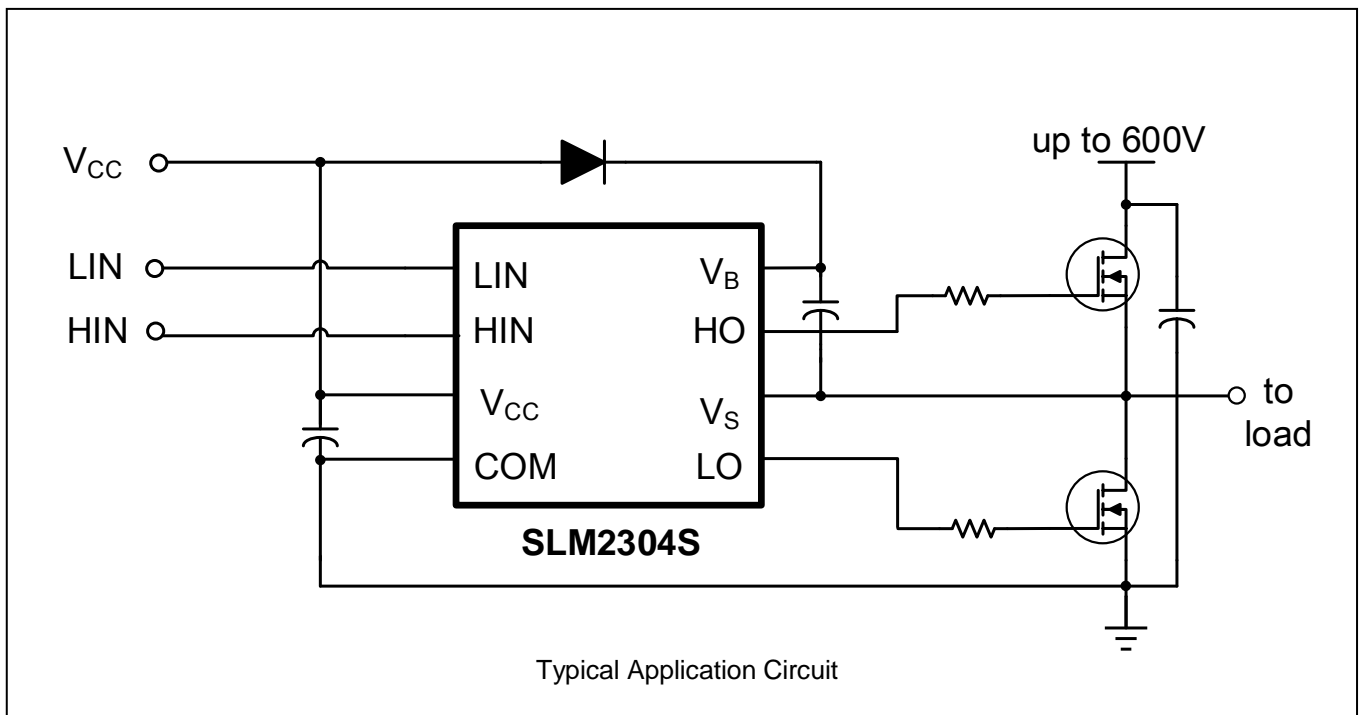
GENERAL DESCRIPTION

The SLM2304S is a high voltage, high speed power MOSFET and IGBT drivers with dependent high- and low-side referenced output channels. Proprietary HVIC and latch immune CMOS technologies enable ruggedized monolithic construction. The logic input is compatible with standard CMOS or LSTTL output, down to 3.3 V logic. The output drivers feature a high pulse current buffer stage designed for minimum driver cross conduction. The floating channel can be used to drive an N-channel power MOSFET or IGBT in the high-side configuration which operates up to 600 V.

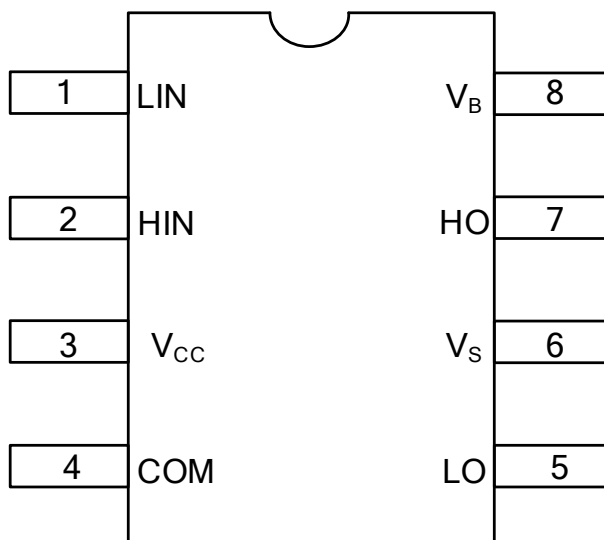
FEATURES

- Floating channel designed for bootstrap operation
- Fully operational to +600 V
- Tolerant to negative transient voltage, dV/dt immune
- Gate drive supply range from 10 V to 20 V
- 3.3 V, 5 V, and 15 V logic compatible
- Cross-conduction prevention logic
- Matched propagation delay for both channels
- UVLO for both high-side and low-side drivers
- Outputs in phase with inputs
- RoHS compliant
- SOP8 package

TYPICAL APPLICATION CIRCUIT



PIN CONFIGURATION

Package	Pin Configuration (Top View)
SOP8	 <p>The diagram shows a top view of the SOP8 package. It is an 8-pin package with a notch at the top. The pins are numbered 1 through 8. Pin 1 is LIN, Pin 2 is HIN, Pin 3 is V_{CC}, Pin 4 is COM, Pin 5 is LO, Pin 6 is V_S, Pin 7 is HO, and Pin 8 is V_B.</p>

PIN DESCRIPTION

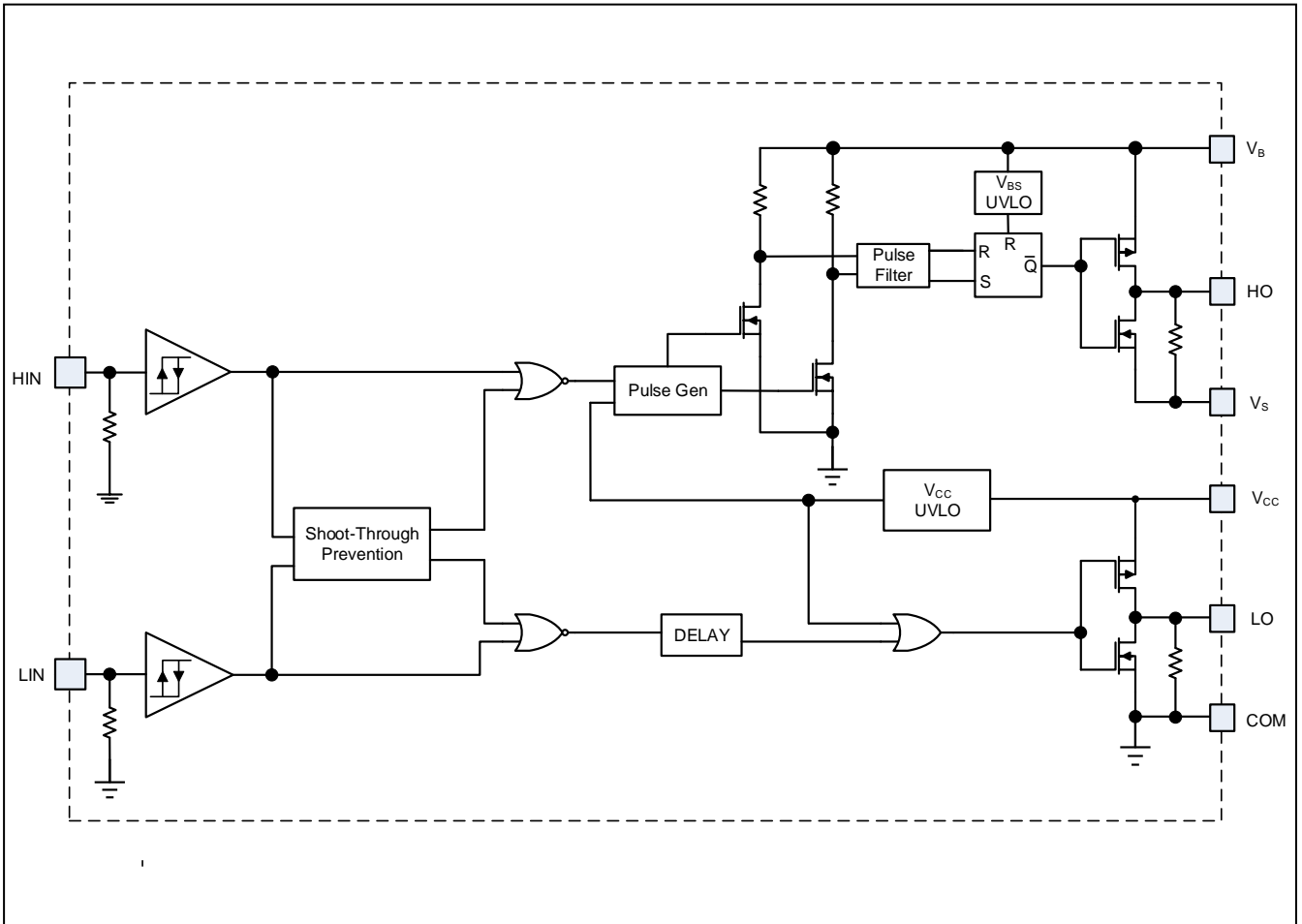
No.	Pin	Description
1	LIN	Logic input for low-side gate driver output (LO), in phase
2	HIN	Logic input for high-side gate driver output (HO), in phase
3	V _{CC}	Low-side and logic fixed supply
4	COM	Low-side return
5	LO	Low-side gate drive output
6	V _S	High-side floating supply return
7	HO	High-side gate drive output
8	V _B	High-side floating supply

ORDERING INFORMATION

Industrial Range: -40°C to +125°C

Order Part No.	Package	QTY
SLM2304SCA-13GTR	SOP8, Pb-Free	2500/Reel

FUNCTIONAL BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Definition	Min.	Max.	Units
V _B	High-side floating absolute voltage	-0.3	625	V
V _S	High-side floating supply offset voltage	V _B - 25	V _B + 0.3	
V _{HO}	High-side floating output voltage	V _S - 0.3	V _B + 0.3	
V _{CC}	Low-side and logic fixed supply voltage	-0.3	25	
V _{LO}	Low-side output voltage	-0.3	V _{CC} + 0.3	
V _{IN}	Logic input voltage (HIN & LIN)	-0.3	V _{CC} + 0.3	
dV _S /dt	Allowable offset supply voltage transient	---	50	V/ns
P _D	Package power dissipation @ T _A ≤ +25°C	---	0.625	W
R _{thJA}	Thermal resistance, junction to ambient	---	200	°C/W
T _J	Junction temperature	---	150	°C
T _S	Storage temperature	-55	150	
T _L	Lead temperature (soldering, 10 seconds)	---	300	

Note:

Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to COM. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

RECOMMENDED OPERATING CONDITIONS

Symbol	Definition	Min.	Max.	Units
V _B	High-side floating absolute voltage	V _S + 10	V _S + 20	V
V _S	High-side floating supply offset voltage		600	
V _{HO}	High-side floating output voltage	V _S	V _B	
V _{CC}	Low-side and logic fixed supply voltage	10	20	
V _{LO}	Low-side output voltage	0	V _{CC}	
V _{IN}	Logic input voltage (HIN & LIN)	0	V _{CC}	
T _A	Ambient temperature	- 40	125	°C

Note:

For proper operation the device should be used within the recommended conditions. The V_S offset rating is tested with all supplies biased at a 15 V differential.

DYNAMIC ELECTRICAL CHARACTERISTICS

$V_{BIAS} (V_{CC}, V_{BS}) = 15\text{ V}$, $C_L = 1000\text{ pF}$ and $T_A = 25^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
t_{on}	Turn-on propagation delay	$V_S = 0\text{ V}$	---	160	220	ns
t_{off}	Turn-off propagation delay	$V_S = 600\text{ V}$	---	230	300	
t_r	Turn-on rise time		---	70	170	
t_f	Turn-off fall time		---	35	90	
MT	Delay matching, HS & LS turn-on/off		---	---	60	

STATIC ELECTRICAL CHARACTERISTICS

$V_{BIAS} (V_{CC}, V_{BS}) = 15\text{ V}$ and $T_A = 25^\circ\text{C}$ unless otherwise specified. The V_{IN} , V_{TH} , and I_{IN} parameters are referenced to COM. The V_O and I_O parameters are referenced to COM and are applicable to the respective output leads: HO or LO.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V_{IH}	Logic "1" input voltage	$V_{CC} = 10\text{ V to }20\text{ V}$	2.5	---	---	V
V_{IL}	Logic "0" input voltage		---	---	0.8	
V_{OH}	High level output voltage, $V_{BIAS} - V_O$	$I_O = 2\text{ mA}$	---	0.05	0.2	
V_{OL}	Low level output voltage, V_O		---	0.02	0.1	
I_{LK}	Offset supply leakage current	$V_B = V_S = 600\text{ V}$	---	---	50	μA
I_{QBS}	Quiescent V_{BS} supply current	$V_{IN} = 0\text{ V}$	---	60	75	
I_{QCC}	Quiescent V_{CC} supply current		---	230	300	
I_{IN+}	Logic "1" input bias current		$V_{IN} = 5\text{ V}$	---	8	
I_{IN-}	Logic "0" input bias current	$V_{IN} = 0\text{ V}$	---	---	5	
V_{CCUV+}	V_{CC} supply undervoltage positive going threshold		8	8.9	9.8	V
V_{CCUV-}	V_{CC} supply undervoltage negative going threshold		7.4	8.2	9	
V_{BSUV+}	V_{BS} supply undervoltage positive going threshold		8	8.9	9.8	
V_{BSUV-}	V_{BS} supply undervoltage negative going threshold		7.4	8.2	9	

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
I_{O+}	Output high short circuit pulsed current	$V_O = 0V, V_{IN} = \text{Logic "1"}, PW \leq 10 \mu s$	130	290		mA
I_{O-}	Output low short circuit pulsed current	$V_O = 15V, V_{IN} = \text{Logic "0"}, PW \leq 10 \mu s$	270	600		

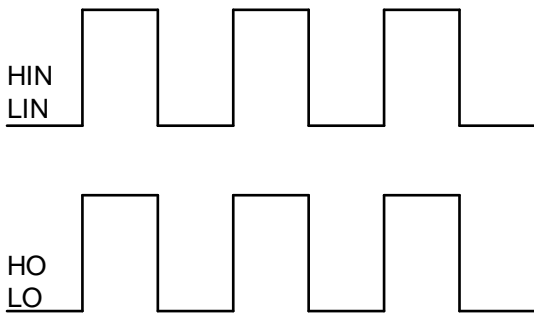


Figure 1. Input/Output Timing Diagram

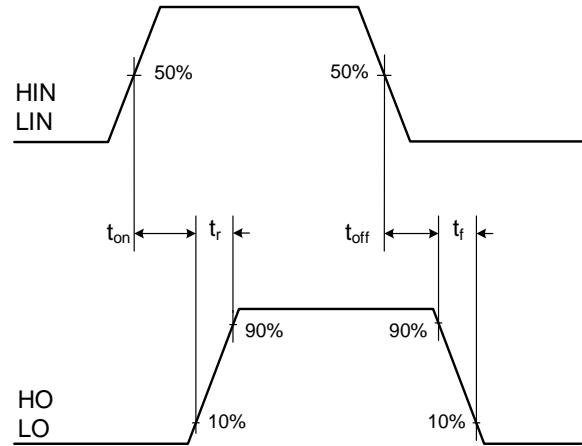


Figure 2. Switching Time Waveform

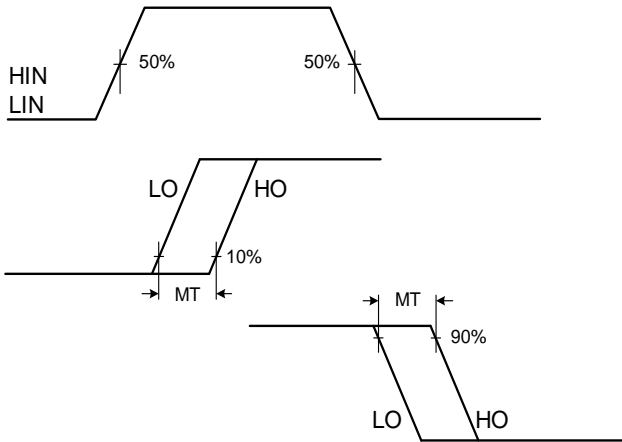


Figure 3. Delay Matching Waveform

PACKAGE CASE OUTLINES

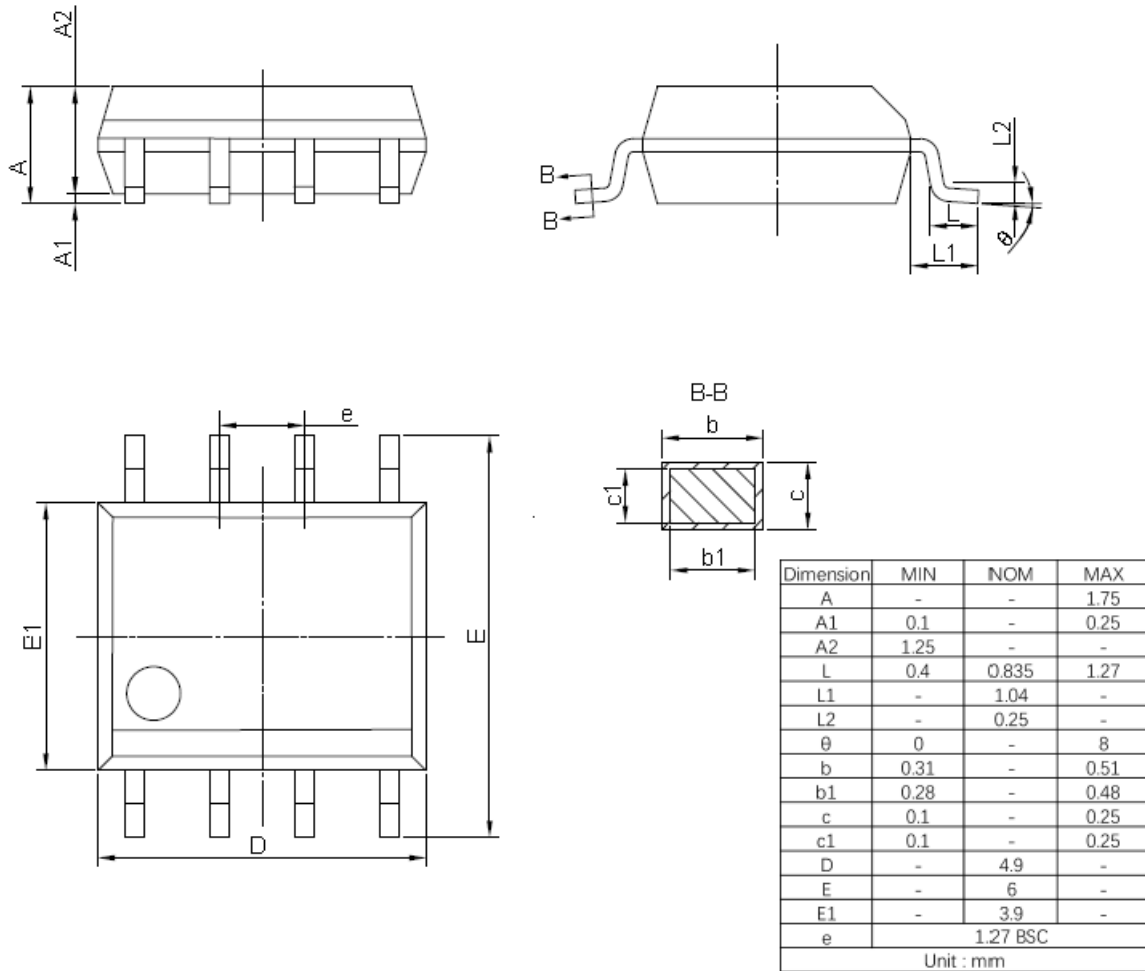


Figure 4. SOP8 Outline Dimensions

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, 2019-8-27	
Whole document	New company logo released
Page 1	Remove "Figure 1. "and "June 2019"
Rev 1.1 Datasheet, 2019-10-21	
Page 1	Change "high side and low side driver" to "half bridge driver"
Page 1	Change "independent" to "dependent"
Rev 1.2 Datasheet, 2021-7-2	
Whole document	Format and Logo change
Page 2	Remove SLM2304SCA-GT and SLM2304SDA-GT in the ordering information
Page 3	Updated the function block
Page 5	Change the IQVCC value in the Static Electrical Characteristics
Page 5	Change the condition of the I _{QCC} and I _{QBS} : remove V _{IN} =5V
Page 5	Change the I _{IN+} value in the Static Electrical Characteristics
Page1, Page 7	Remove 8-Lead PDIP package
Page 7	Remove Tape & Reel 8-Lead SOIC
Rev 1.3 Datasheet, 2021-9-24	
Page 5	Change the t _{off} value in the Dynamic Electrical Characteristics
Rev 1.4 Datasheet, 2022-9-28	
Whole datasheet	Change package name from SOIC-8 to SOP8
Page 7	Update the package case outlines.