SLM2001S

200V Half Bridge Driver

PRODUCT SUMMARY

- **V_{OFFSET}** 200 V max.
- **I_O+/- (min)** 130 mA/270 mA
- **V_{OUT}** 10 V - 20 V
- **$t_{on/off}$ (typ.)** 160 ns/220 ns
- **Delay Matching (typ.)** 60 ns

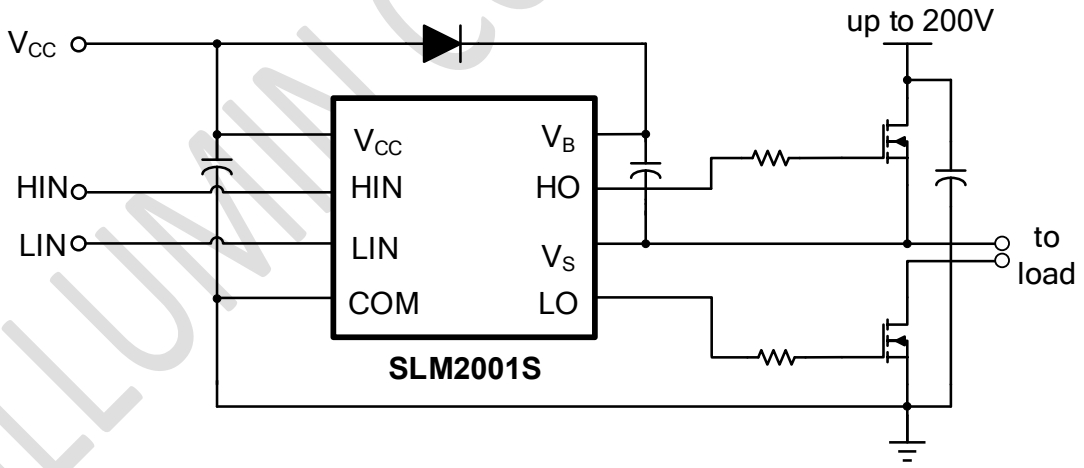
FEATURES

- Floating channel designed for bootstrap operation
- Fully operational to +200 V
- Tolerant to negative transient voltage, dV/dt immune
- Gate drive supply range from 10 V to 20 V
- Undervoltage lockout
- 3.3 V, 5 V, and 15 V logic compatible
- Cross-conduction prevention logic
- Matched propagation delay for both channels
- Outputs in phase with inputs
- RoHS compliant
- SOIC-8 and DIP 8 package

GENERAL DESCRIPTION

The SLM2101S is a high voltage, high speed power MOSFET and IGBT drivers. 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.

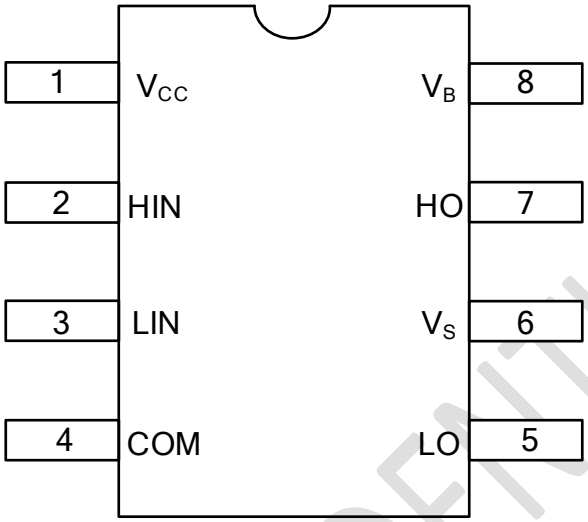
TYPICAL APPLICATION CIRCUIT



(Refer to Lead Assignments for correct configuration). This diagram shows electrical connections only. Please refer to our Application Notes and DesignTips for proper circuit board layout.

Typical Application Circuit

PIN CONFIGURATION

Package	Pin Configuration (Top View)
SOIC-8 and PDIP-8	

PIN DESCRIPTION

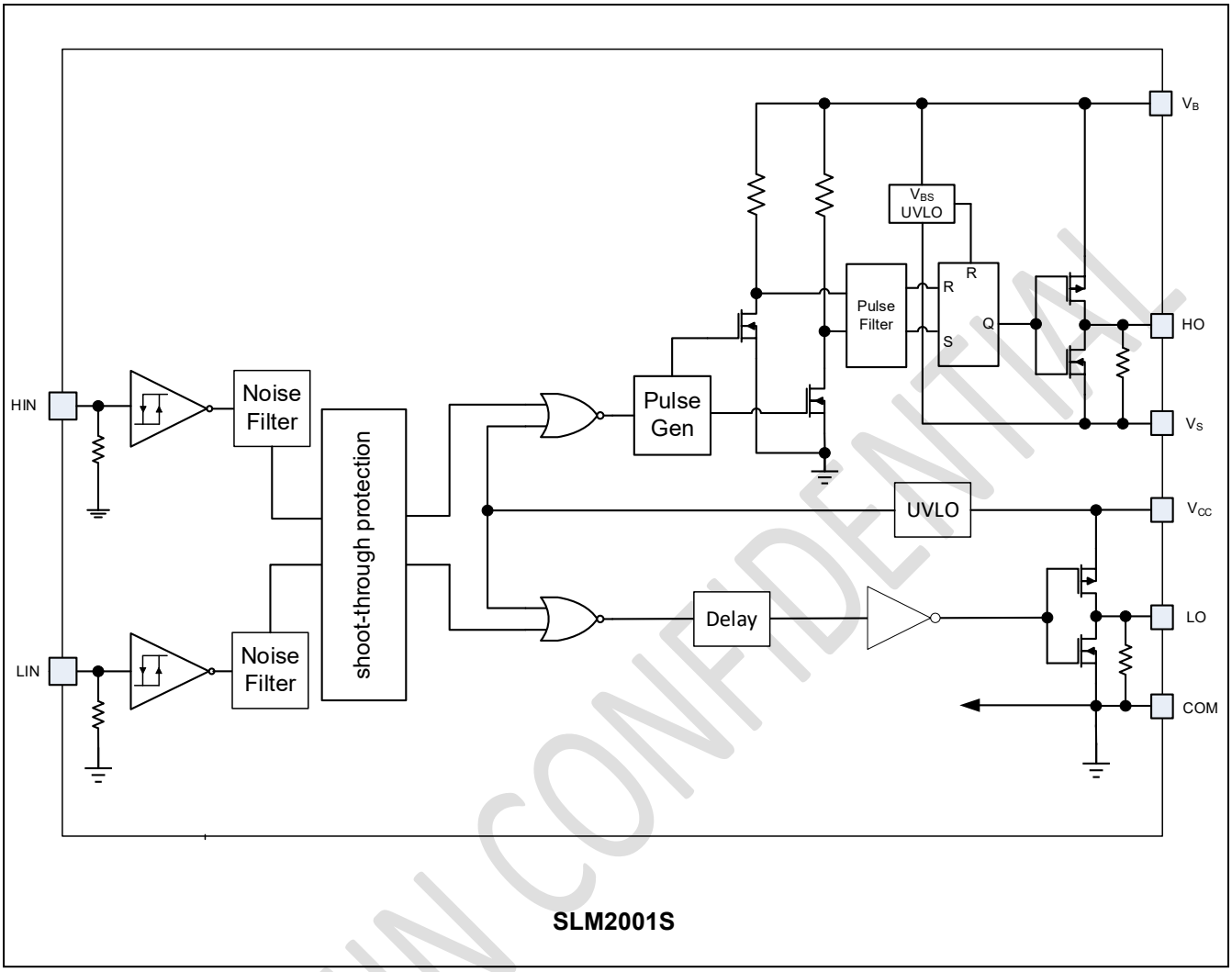
No.	Pin	Description
1	V_{CC}	Low-side and logic fixed supply
2	HIN	Logic input for high-side gate driver output (HO), in phase
3	LIN	Logic input for low-side gate driver output (LO), in phase
4	COM	Low-side return
5	LO	Low-side gate drive output
6	V_S	High-side floating supply return
7	HO	High-side gate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

ORDERING INFORMATION

Industrial Range: -40°C to +125°C

Order Part No.	Package	QTY
SLM2001SCA-13GTR	SOIC8, Pb-Free	2500/Reel
SLM2001SCA-GT	SOIC8, Pb-Free	100/Tube
SLM2001SDA-GT	PDIP8, Pb-Free	100/Tube

FUNCTIONAL BLOCK DIAGRAM



SLM2001S

ABSOLUTE MAXIMUM RATINGS

Symbol	Definition		Min.	Max.	Units
V_B	High-side floating absolute voltage		-0.3	225	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 @ $T_A \leqslant +25°C$	PDIP-8	---	1.0	W
		SOIC-8	---	0.625	
Rth_{JA}	Thermal resistance, junction to ambient	PDIP-8	---	125	°C/W
		SOIC-8	---	200	
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 OPERATIONG 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	Note 1	200	
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:
The input/output logic timing diagram is shown in Fig. 1. 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 V, C_L = 1000 pF and T_A = 25°C unless otherwise specified.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
t_{on}	Turn-on propagation delay	V_S = 0 V	---	160	220	ns
t_{off}	Turn-off propagation delay	V_S = 0 V	---	220	280	
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 V and T_A = 25°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 V to 20V	2.5	---	---	V
V_{IL}	Logic “0” input voltage		---	---	0.8	
V_{OH}	High level output voltage, V_{BIAS} - V_O	I_O = 20 mA	---	0.4	0.6	
V_{OL}	Low level output voltage, V_O		---	0.1	0.2	
I_{LK}	Offset supply leakage current	V_B = V_S = 600 V	---	---	50	μA
I_{QBS}	Quiescent V_{BS} supply current	V_{IN} = 0 V	---	60	78	
I_{QCC}	Quiescent V_{CC} supply current		---	200	305	
I_{IN+}	Logic “1” input bias current	V_{IN} = 5V	---	8	15	
I_{IN-}	Logic “0” input bias current	V_{IN} = 0V	---	---	5	
V_{CCUV+} V_{BSUV+}	V_{CC} & V_{BS} supply undervoltage positive going threshold		8	8.9	9.8	V
V_{CCUV-} V_{BSUV-}	V_{CC} & V_{BS} supply undervoltage negative going threshold		7.4	8.2	9	
I_{O+}	Output high short circuit pulsed current	V_O = 15 V V_{IN} = Logic “1” PW ⩽ 10 μs	130	290		mA
I_{O-}	Output low short circuit pulsed current	V_O = 0 V V_{IN} = Logic “0” PW ⩽ 10 μs	270	600		

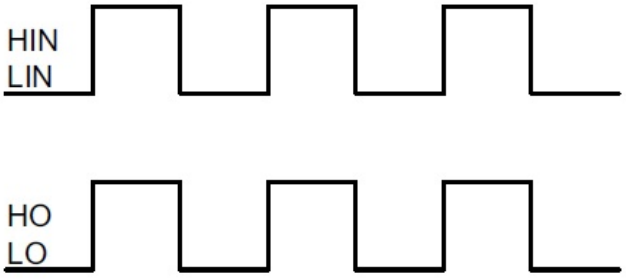


Figure 1. Input/Output Timing Diagram

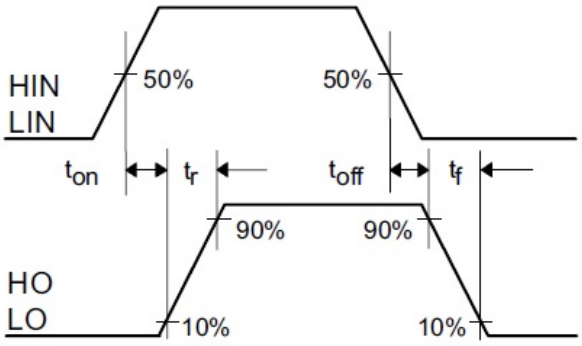


Figure 2. Switching Time Waveform Definitions

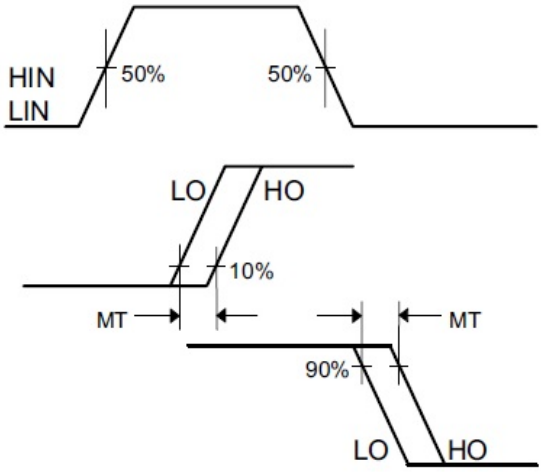
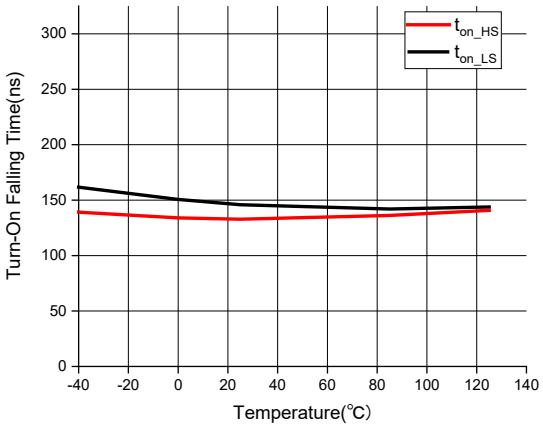
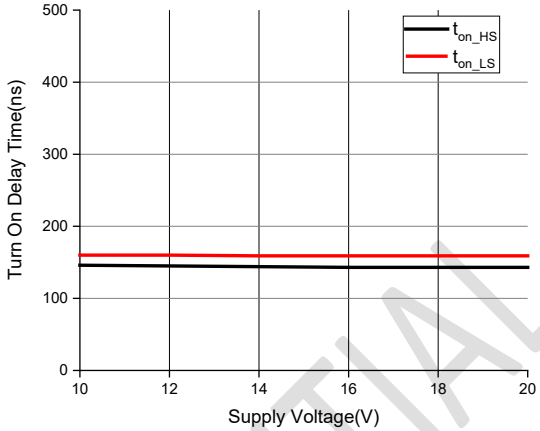


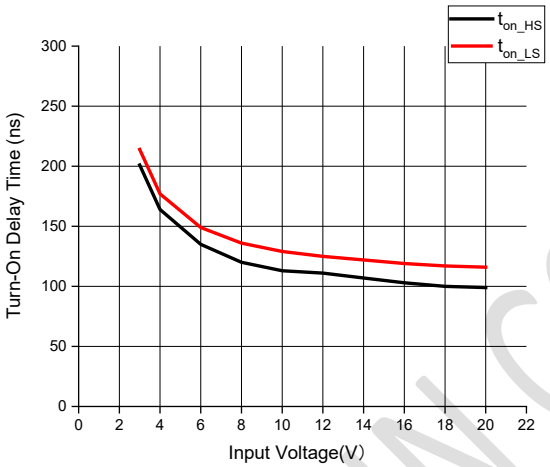
Figure 3. Delay Matching Waveform Definitions



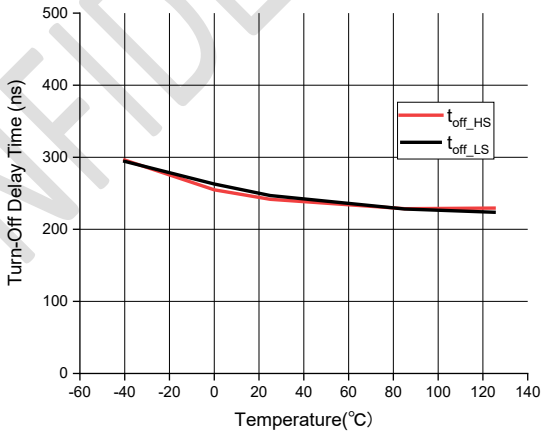
Turn-On Delay Time vs Temperature



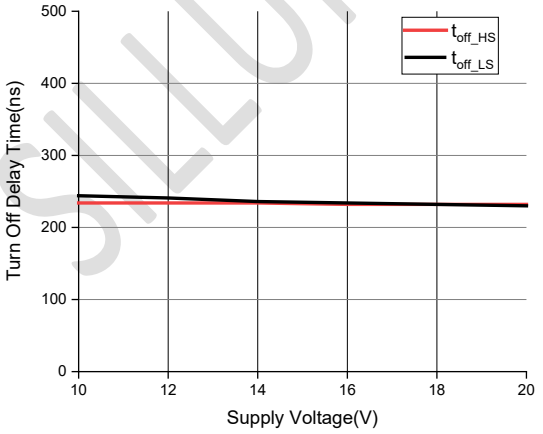
Turn-On Delay Time vs Supply Voltage



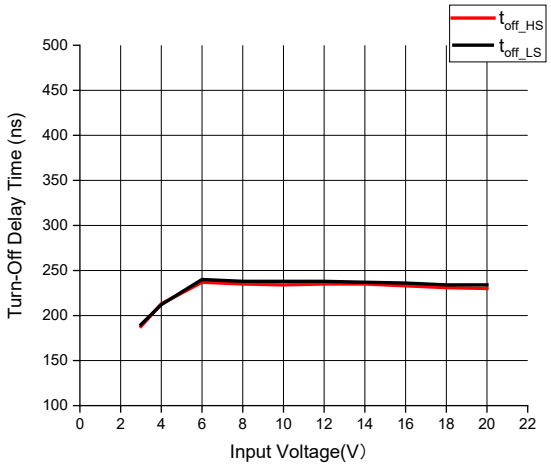
Turn-On Delay Time vs Input Voltage



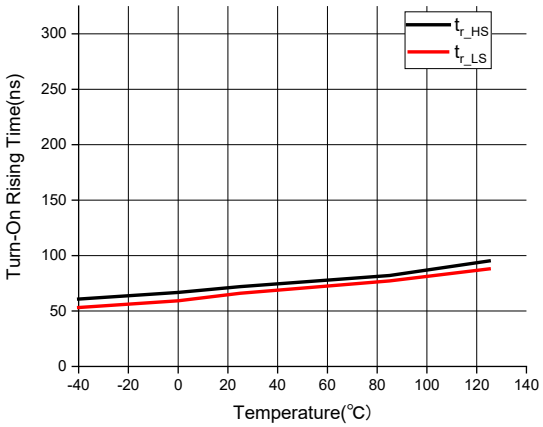
Turn-Off Delay Time vs Temperature



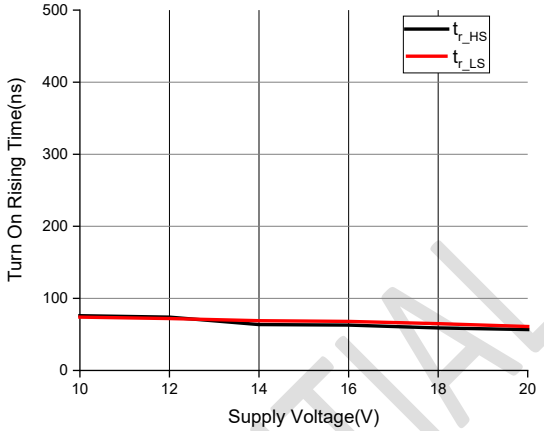
Turn-Off Delay Time vs Supply Voltage



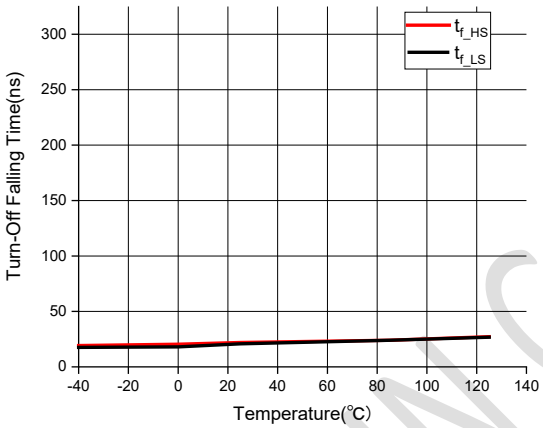
Turn-Off Delay Time vs Input Voltage



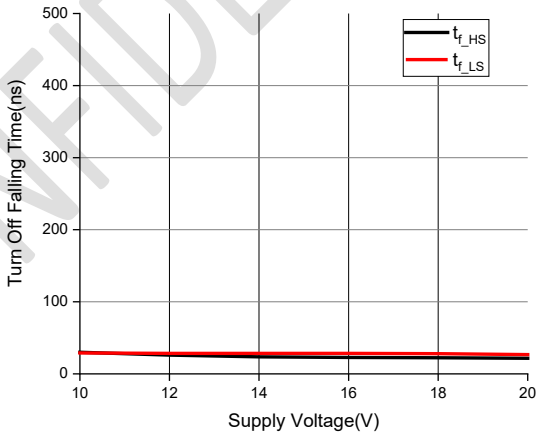
Turn-On Rising Time Vs Temperature



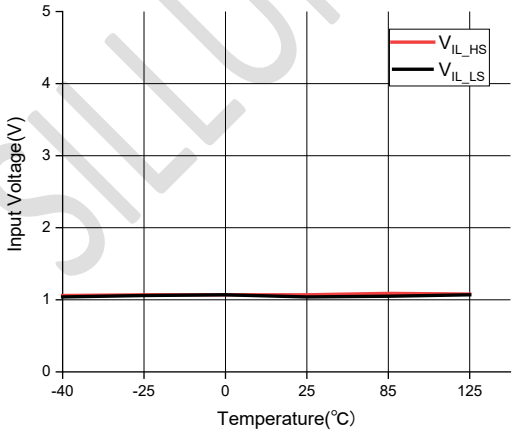
Turn-On Rising Time vs Supply Voltage



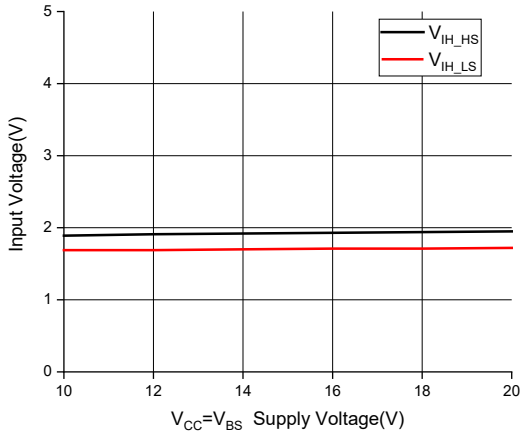
Turn-Off Falling Time Vs Temperature



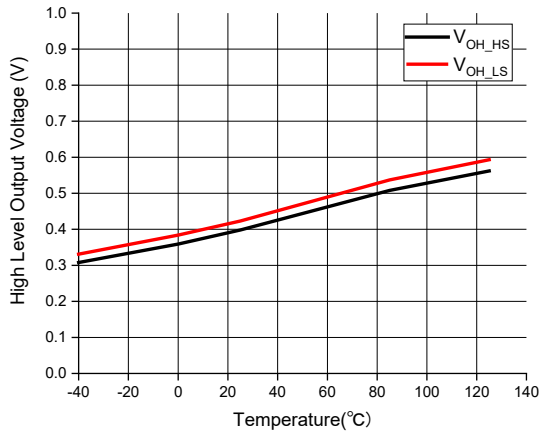
Turn-Off Falling Time Vs Supply Voltage



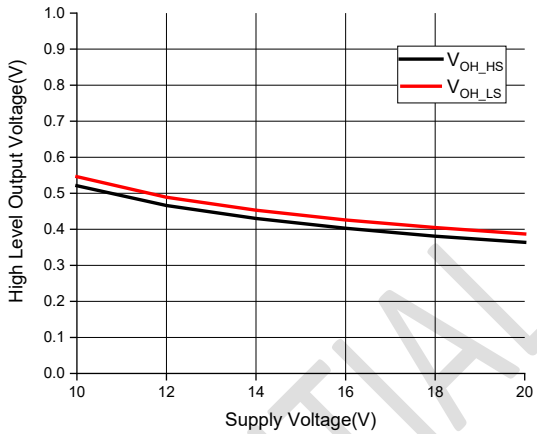
Logic “1” Input Voltage Vs Temperature



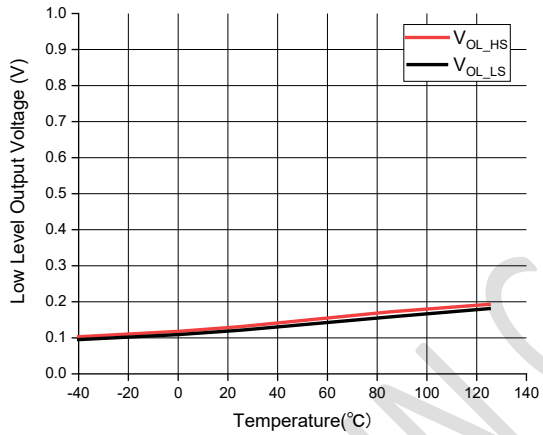
Logic “1” Input Voltage Vs Supply Voltage



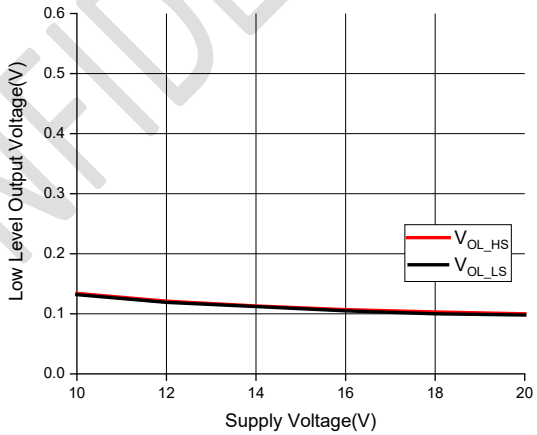
High Level Output Voltage Vs Temperature



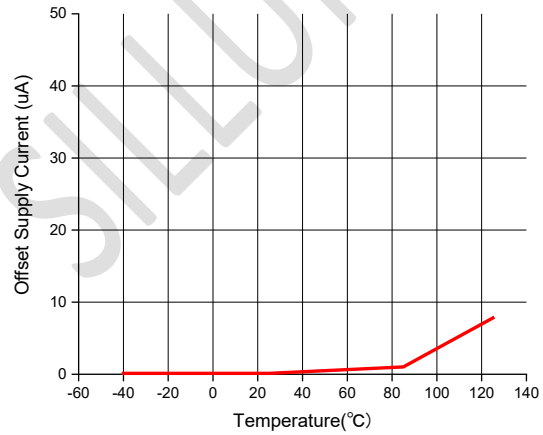
High Level Output Voltage Vs Supply Voltage



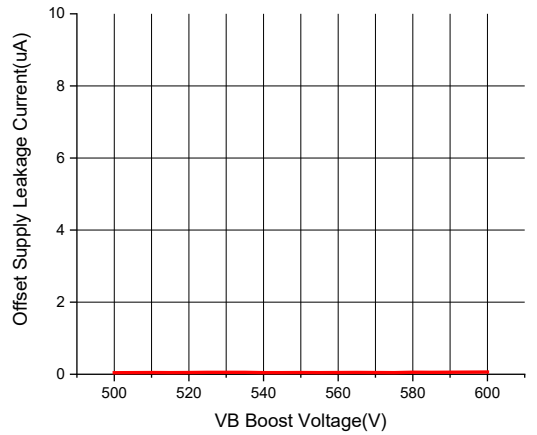
Low Level Output Voltage Vs Temperature



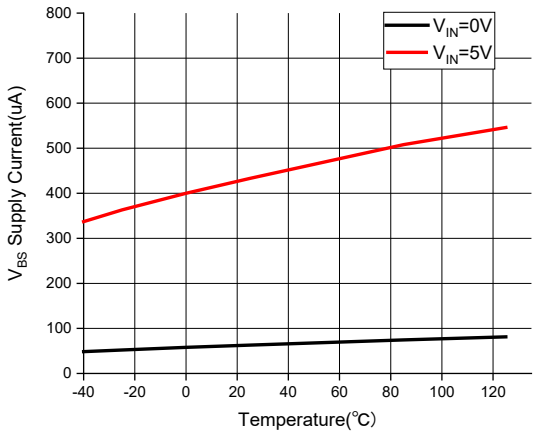
Low Level Output Voltage Vs Supply Voltage



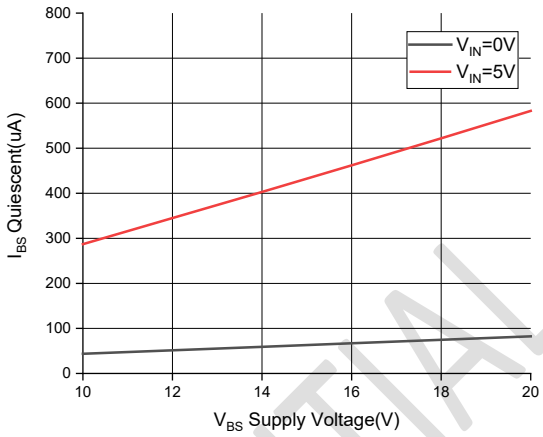
Offset Supply Current Vs Temperature



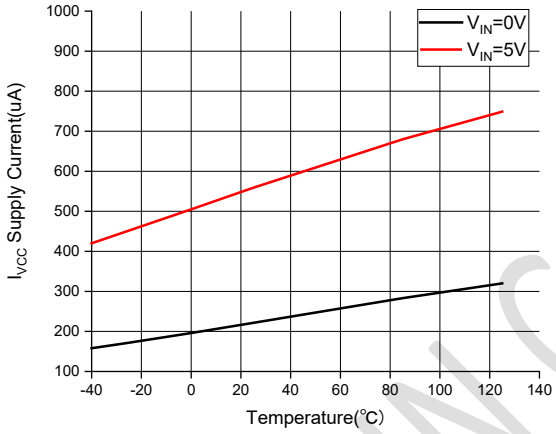
Offset Supply Current Vs Voltage



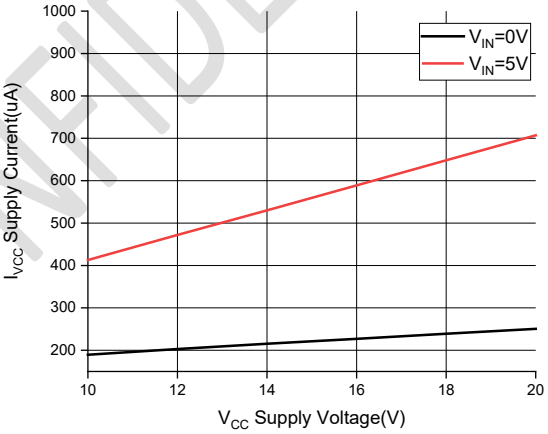
V_{BS} Supply Current Vs Temperature



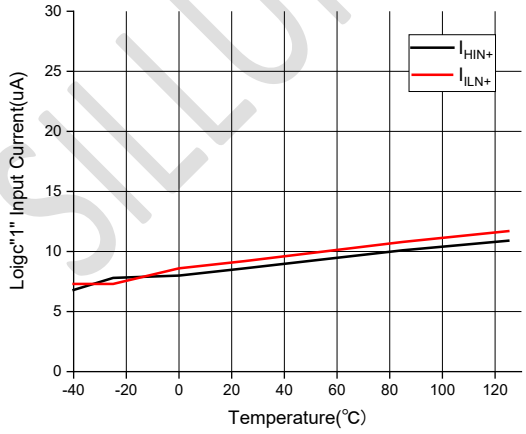
V_{BS} Supply Current Vs Voltage



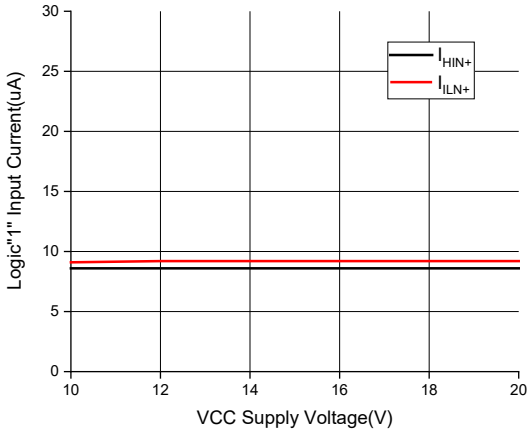
V_{CC} Supply Current Vs Temperature



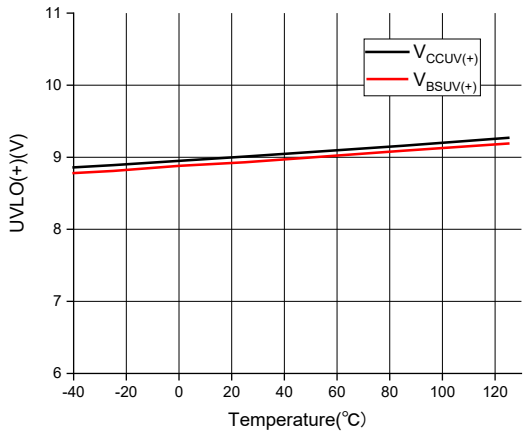
V_{CC} Supply Current Vs Voltage



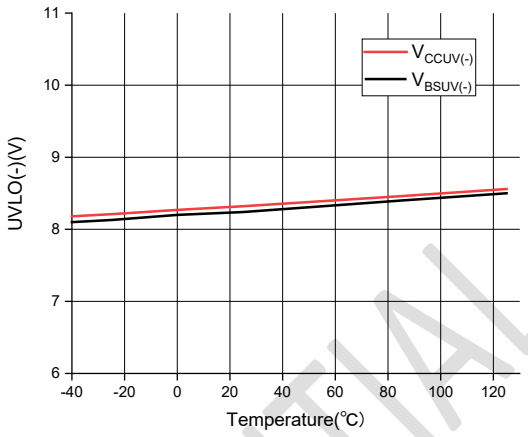
Logic “1” Input Current Vs Temperature



Logic “1” Input Current Vs Voltage

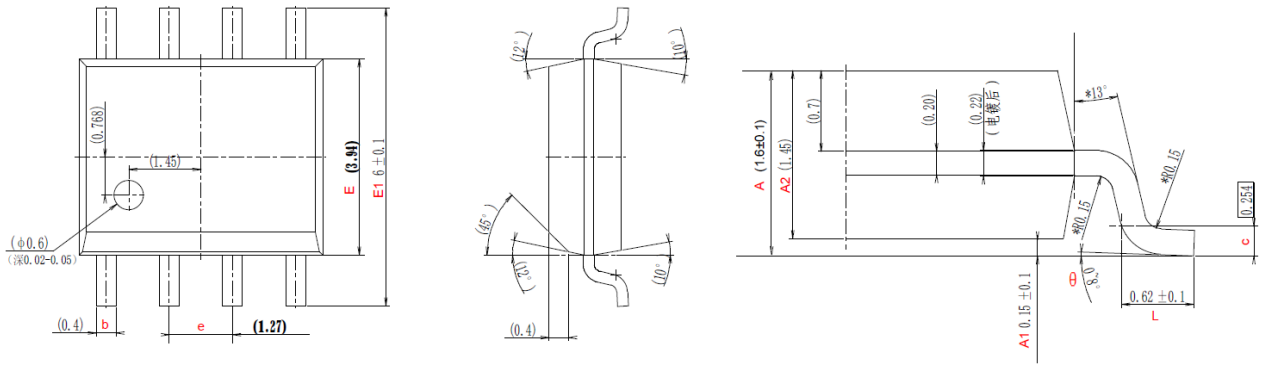


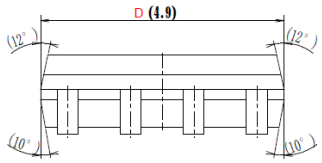
V_{CC} & V_{BS} UVLO (+) Vs Temperature



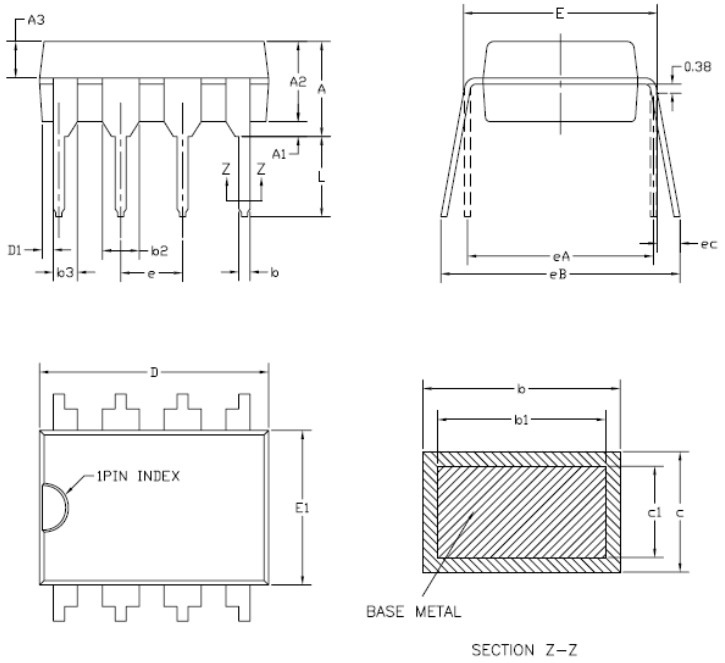
V_{CC} & V_{BS} UVLO (-) Vs Temperature

PACKAGE CASE OUTLINES





字符	Dimension millimeters		
	Min	Standard	Max
A	1.500	1.600	1.700
A1	0.050	0.165	0.250
A2	1.350	1.450	1.550
b	0.300	0.400	0.500
c	0.220	0.254	0.280
D	4.800	4.900	5.000
E	3.840	3.940	4.040
E1	5.900	6.000	6.100
e		1.27(BSC)	
L	0.520	0.620	0.720
θ	0°		8°



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	–	–	4.80
A1	0.50	–	–
A2	3.10	3.30	3.50
A3	1.40	1.50	1.60
b	0.38	–	0.55
b1	0.38	0.46	0.51
b2	1.47	1.52	1.57
b3	0.89	0.99	1.09
c	0.21	–	0.35
c1	0.20	0.25	0.30
D	9.10	9.20	9.30
D1	0.13	–	–
E	7.62	7.87	8.25
E1	6.25	6.35	6.45
e	2.54BSC		
eA	7.62BSC		
eB	7.62	8.80	10.90
ec	0	–	1.52
L	2.92	3.30	3.81

NOTES:
ALL DIMENSIONS MEET JEDEC STANDARD MS-001 BA
DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

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, 2019-8-29	
Whole document	new company logo released
Page 1	Removed “Fig 1. ”
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, 2020-5-15	
Page 5	I_{QBS} and I_{QCC} change
Rev 1.3 datasheet, 2020-8-23	
Page 5	V_{OH} and V_{OL} test condition change
	I_{IN+} change