

Description

The IRS2181STR is a high voltage, high speed power MOSFET 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 in the high-side configuration which operates up to 700 V.

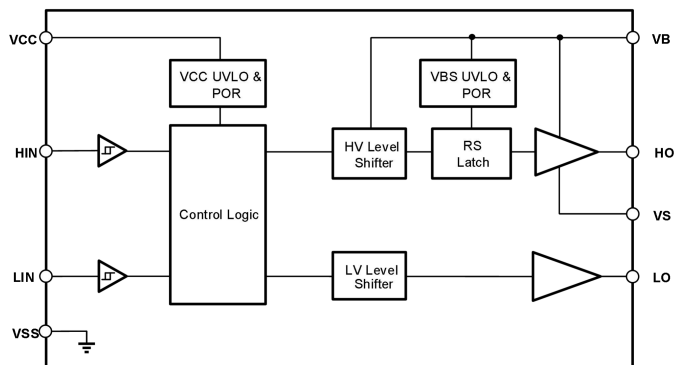
Application

- Motor Control
- Air Conditioners/ Washing Machines
- General Purpose Inverters
- Micro/Mini Inverter Drives

Features and Benefits

- Floating channel designed for bootstrap operation
- Fully operational to +700 V
- 3.3V, 5V and 15V input logic compatible
- dV/dt noise Immunity ± 50 V/nsec
- Allowable negative Vs capability: -9V
- Gate drive supply range from 10V to 20V
- Undervoltage lockout for both channels
 - UVLO forward 8.9V
 - UVLO reverse 8.2V
- Turn-on/Turn-off propagation delay -
 - Ton/Toff =130ns/130ns
- Matched propagation delay for both channels
- Typically output Source/Sink current capability: 4A/4A

Functional Block Diagram



Function Pin Description

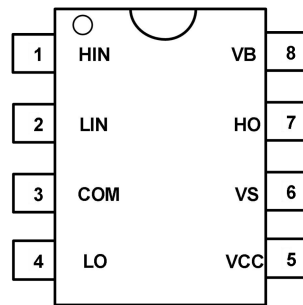


Figure7-1 8-Pin SOIC8 Top view

Table7-1 Lead Definitions

Number	Symbol	Description
1	HIN	Logic input for high side gate driver output (HO), in phase
2	LIN	Logic input for low side gate driver output (LO), in phase
3	COM	Low side return
4	LO	Low side gate drive output
5	VCC	Low side and logic fixed supply
6	VS	High side floating supply return
7	HO	High side gate drive output
8	VB	High side floating supply

Absolute Maximum Ratings

Exceeding the limit maximum rating may cause permanent damage to the device. All voltage parameters are rated with reference to COM and an ambient temperature of 25°C.

Symbol	Definition	MIN	MAX	Units
V _B	High side floating supply	-0.3	725	V
V _S	High side floating supply return	V _B - 25	V _B + 0.3	
V _{HO}	High side gate drive output	V _S - 0.3	V _B + 0.3	
V _{CC}	Low side and main power supply	-0.3	25	
V _{LO}	Low side gate drive output	-0.3	V _{CC} + 0.3	
V _{IN}	Logic input (HIN, LIN)	-0.3	V _{CC} + 0.3	
ESD	HBM Model	1.5		kV
	Machine Model	500		V
P _D	Package Power Dissipation @ TA ≤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	

Recommended Operating Conditions

For proper operation, the device should be used under the following recommended conditions. The bias ratings of VS and COM are measured at a supply voltage of 15V, and unless otherwise specified, the ratings of all voltage parameters are referenced to COM and the ambient temperature is 25°C.

Symbol	Definition	MIN.	MAX.	Units
V _B	High side floating supply	V _S + 10	V _S + 20	V
V _S	High side floating supply return	-9	700	
V _{HO}	High side gate drive output	V _S	V _B	
V _{CC}	Low side and main power supply	10	20	
V _{LO}	Low side gate drive output	0	V _{CC}	
V _{IN}	Logic input of HIN & LIN	0	V _{CC}	
T _A	Ambient temperature	-40	125	°C

Electrical Characteristics

 Valid for temperature range at $T_A = 25^\circ\text{C}$, $V_{CC} = V_B = 15\text{V}$, $C_L = 1\text{nF}$, unless otherwise specified

Symbol	Definition	MIN.	TYP.	MAX.	Units	Test Condition	
t_{ON}	Turn-on propagation delay		130	250	ns	$V_S = 0$	
t_{OFF}	Turn-off propagation delay		130	250		$V_S = 0\text{V}$ or 700V	
t_R	Turn-on rise time		15	20		$V_S = 0\text{V}$	
t_F	Turn-off fall time		10	15			
MT	Matched propagation time delay			50			
V_{CCUV+}	VCC supply UVLO threshold	8	8.9	9.8	V		
V_{CCUV-}		7.4	8.2	9.0			
$V_{CCUVHYS}$	hysteresis of V_{CC} UVLO		0.7				
V_{BSUV+}	VBS supply UVLO threshold	8	8.9	9.8			
V_{BSUV-}		7.4	8.2	9.0			
$V_{BSUVHYS}$	hysteresis of V_{BS} UVLO		0.7				
I_{LK}	High-side floating supply leakage current			50	μA	$V_B = V_S = 700\text{V}$	
I_{QBS}	Quiescent VB supply current		50	100		$V_{IN} = 0\text{V}$ or 5V	
I_{QCC}	Quiescent VCC supply current		150	240			
V_{IH}	Logic "1" input voltage	2.5			V	$V_{CC} = 10 \sim 20\text{V}$	
V_{IL}	Logic "0" input voltage			0.8			
V_{OH}	High level output voltage, $V_{BIAS} - V_O$			1.4			$I_O = 0\text{A}$
V_{OL}	Low level output voltage, V_O			0.1			$I_O = 20\text{mA}$
I_{IN+}	Logic "1" Input bias current		25	60	μA	$V_O = 5\text{V}$,	
I_{IN-}	Logic "0" Input bias current			2		$V_O = 0\text{V}$,	
I_{O+}	Output high short circuit pulsed current	3.0	4.0		A	$V_O = 0\text{V}$ $PW \leq 10\mu\text{s}$	
I_{O-}	Output low short circuit pulsed current	3.0	4.0			$V_O = 15\text{V}$ $PW \leq 10\mu\text{s}$	

Function Description

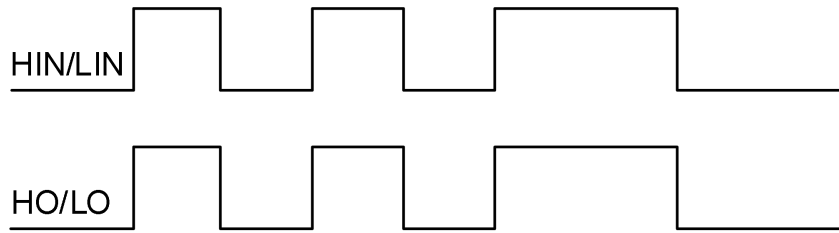


Figure 9-1 IRS2181STR Input and output timing waveform

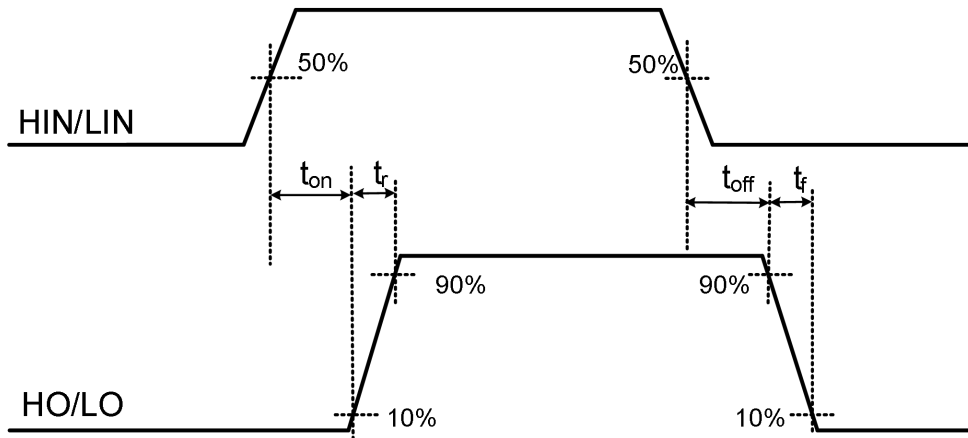


Figure 9-2 Propagation Time Waveform Definition

Function Block Diagram

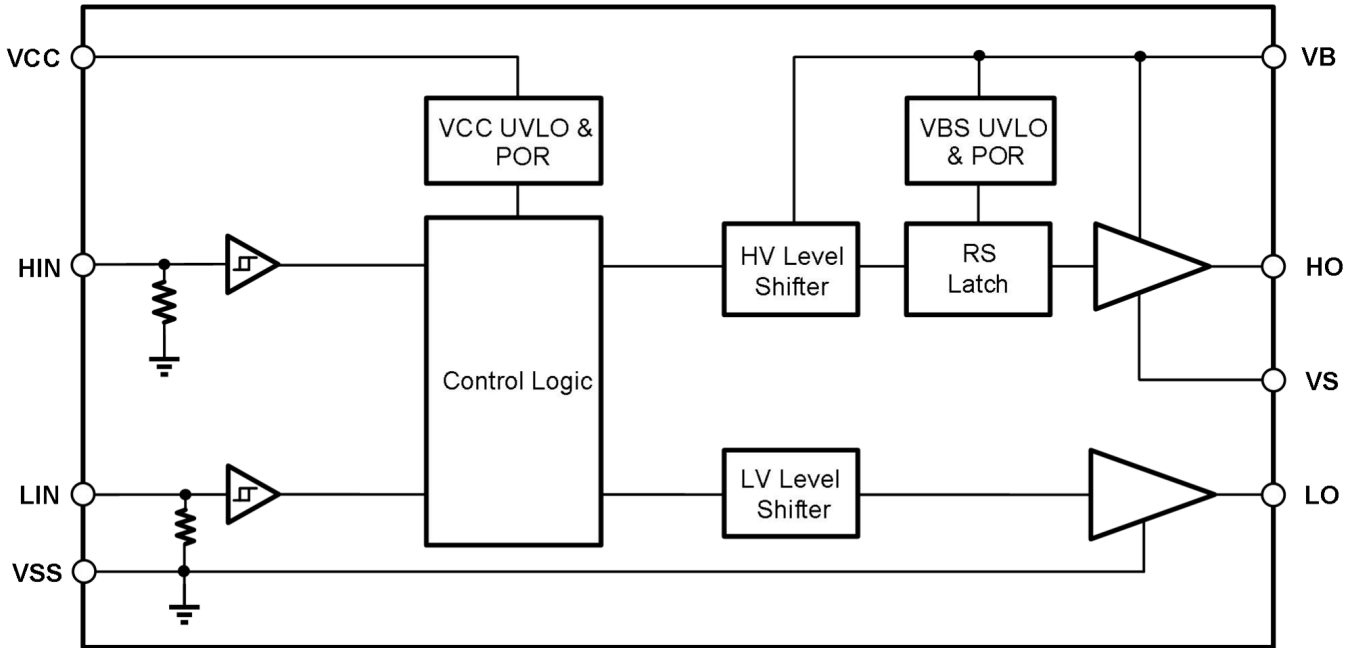


Figure 10-1 Function Block Diagram of IRS2181STR

Application message

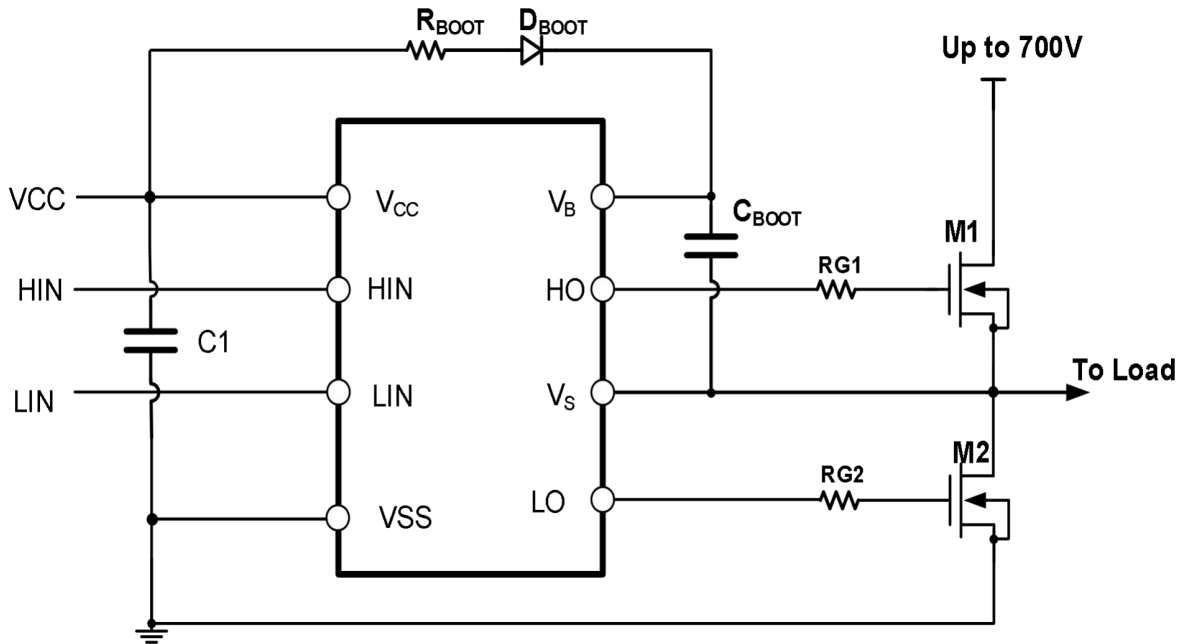
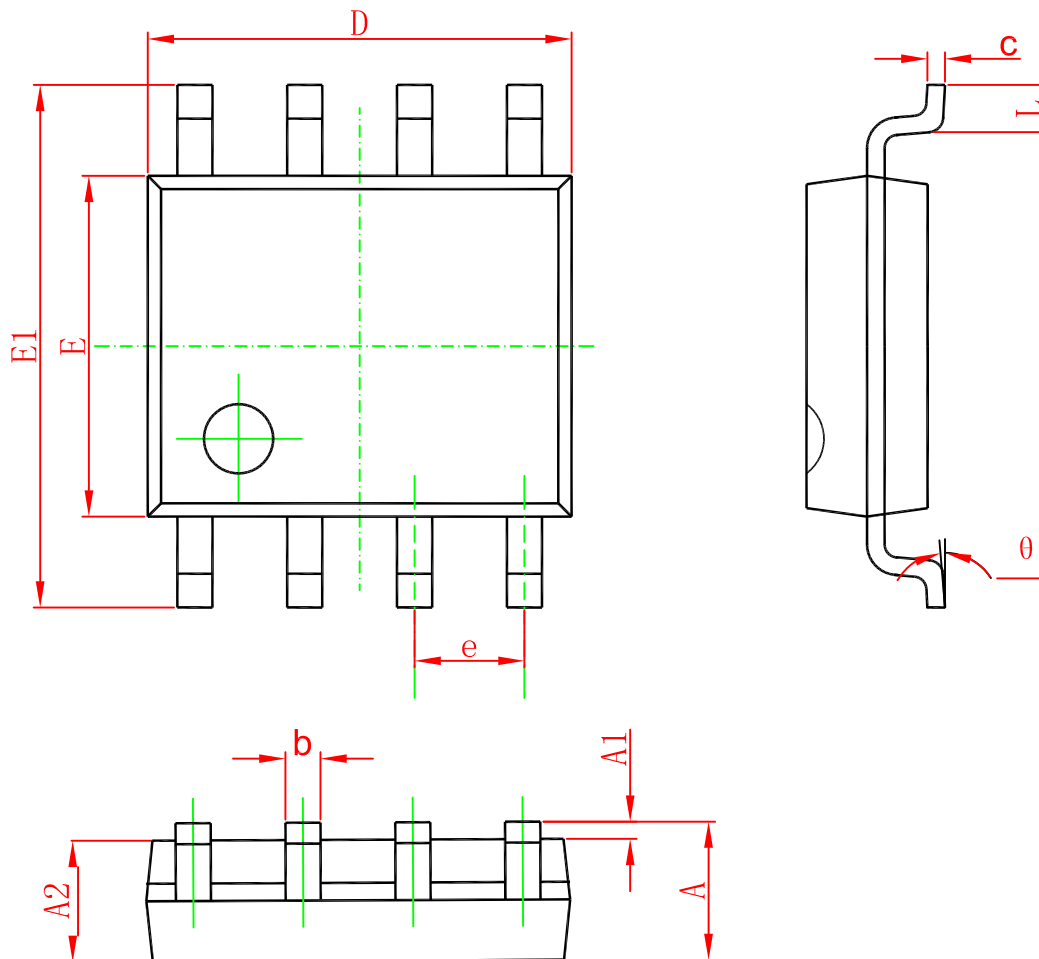


Figure10-2 Typical application circuit of IRS2181STR

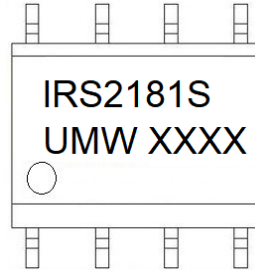
PACKAGING INFORMATION

SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IRS2181STR	SOP-8	2500	Tape and reel