700V Half Bridge MOSFET/IGBT Gate Driver

Description

The IRS21867S 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.

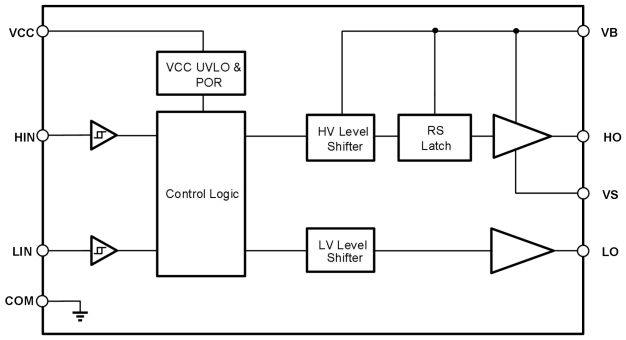
Application

- 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 6.8V to 20V
- Undervoltage lockout for both channels
  --UVLO forward 5.5V
  --UVLO reverse 5.0V
- Turn-on/Turn-off propagation delay
  -- Ton/Toff =150ns/150ns
- Matched propagation delay for both channels
- Typically output Source/Sink current capability: 4A/4A

Functional Block Diagram



Function Pin Description

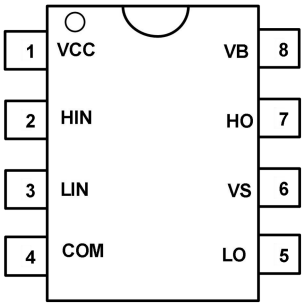


Figure7-1 8-Pin SOP8 Top view

Table7-1 Lead Definitions

Number	Symbol	Description
1	VCC	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	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 rating

Symbol	Definition	MIN.	MAX.	Units
ESD	HBM Model	1.5	—	kV
	Machine Model	500	—	V

Rated power

Symbol	Definition	MIN	MAX	Units
P_D	Package Power Dissipation @ TA ≤25°C	—	0.625	W

Thermal information

Symbol	Definition	MIN.	MAX.	Units
Rth_{JA}	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	VS + 10	VS + 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	6.8	20	
V_{LO}	Low side gate drive output	0	VCC	
V_{IN}	Logic input of HIN & LIN	0	VCC	
T_A	Ambient temperature	-40	125	°C

Electrical Characteristics

Valid for temperature range at T_A= 25°C, V_{CC}=V_B= 15V, C_L=1nF, unless otherwise specified

Dynamical electrical characteristics

Symbol	Definition	MIN.	TYP.	MAX.	Units	Test Condition
t_{ON}	Turn-on propagation delay	—	150	250	ns	VS=0
t_{OFF}	Turn-off propagation delay	—	150	250		VS=0V or 700V
t_R	Turn-on rise time	—	10	15		VS=0V
t_F	Turn-off fall time	—	6	9		
MT	Matched propagation time delay	—	—	35		

Static electrical characteristics

Symbol	Definition	MIN.	TYP.	MAX.	Units	Test Condition
V_{CCUV+}	VCC supply UVLO threshold	4.5	5.5	6.5	V	
V_{CCUV-}		4	5	6		
$V_{CCUVHYS}$	hysteresis of V_{CC} UVLO		0.5			
V_{BSUV+}	VBS supply UVLO threshold	4.5	5.5	6.5		
V_{BSUV-}		4	5	6		
$V_{BSUVHYS}$	hysteresis of V_{BS} UVLO		0.5			
I_{LK}	High-side floating supply leakage current			50	μA	VB=VS=700V
I_{QBS}	Quiescent VB supply current		50	100		VIN=0V or 5V
I_{QCC}	Quiescent VCC supply current		100	150		
V_{IH}	Logic “1” input voltage	2.5			V	VCC=10~20V
V_{IL}	Logic “0” input voltage			0.8		
V_{OH}	High level output voltage, VBIAS - VO			1.4		IO=0A
V_{OL}	Low level output voltage, VO			0.1		IO=20mA
I_{IN+}	Logic “1” Input bias current		25	50	μA	LIN=5V,
I_{IN-}	Logic “0” Input bias current			1		LIN=0V,
I_{O+}	Output high short circuit pulsed current	3.0	4.0		A	Vo=0V PW≤10μs
I_{O-}	Output low short circuit pulsed current	3.0	4.0			Vo=15V PW≤10μs

Function Description

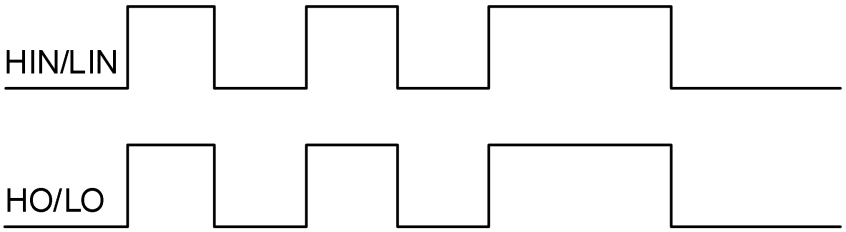


Figure 9-1 IRS21867S Input and output timing waveform

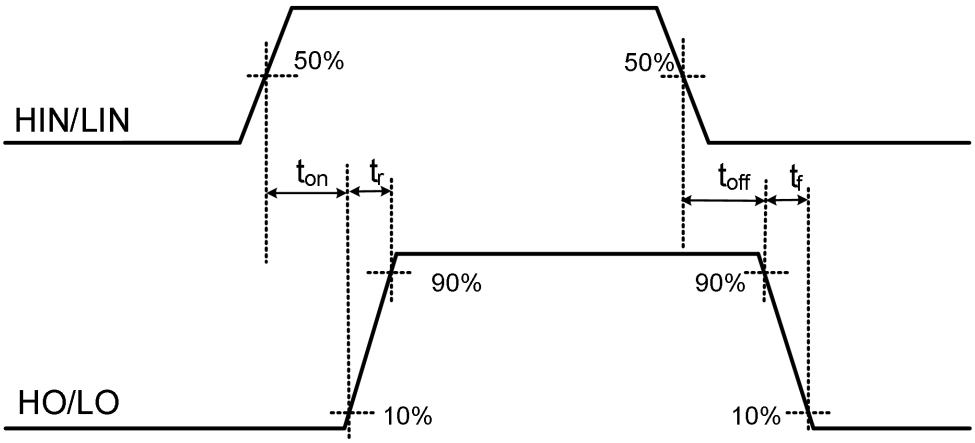


Figure 9-2 Propagation Time Waveform Definition

Function Block Diagram

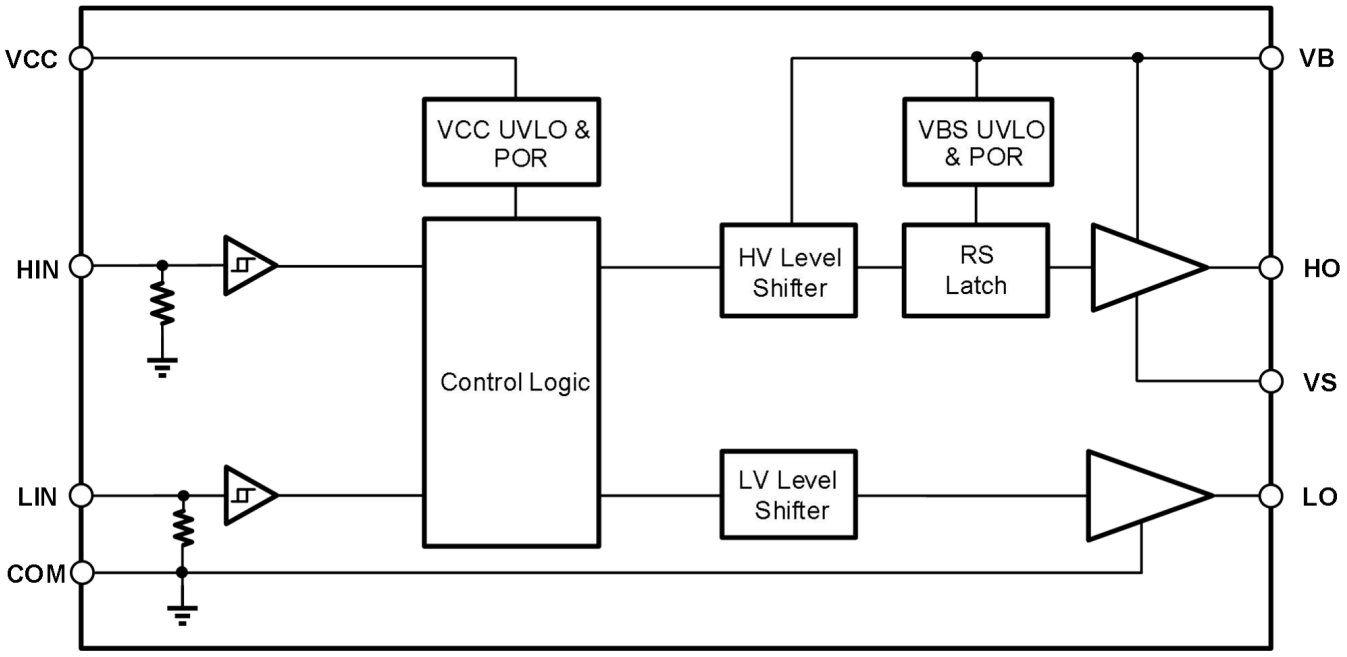


Figure 10-1 Function Block Diagram of IRS21867S

Application message

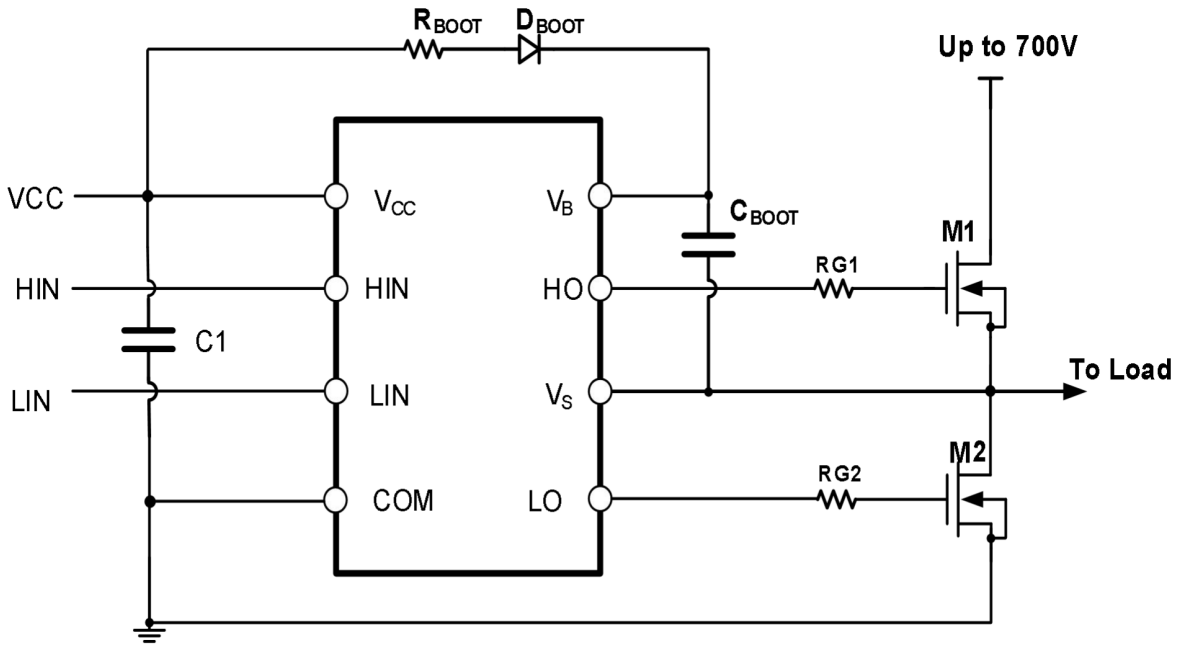
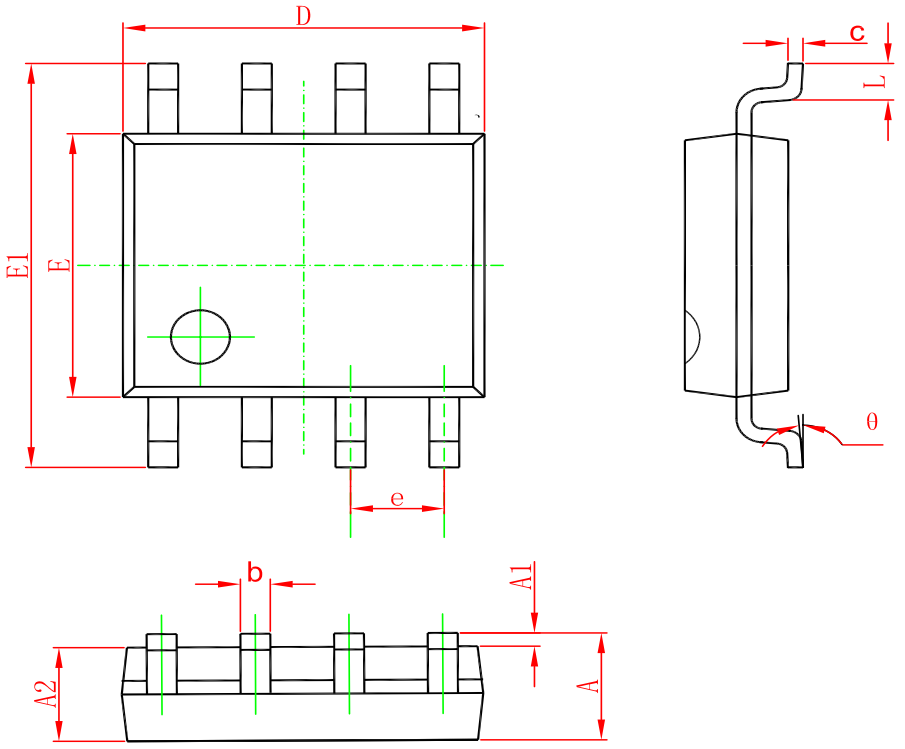


Figure10-2 Typical application circuit of IRS21867S

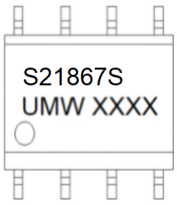
PACKAGE OUTLINE DIMENSIONS

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 IRS21867STR	SOP-8	2500	Tape and reel

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