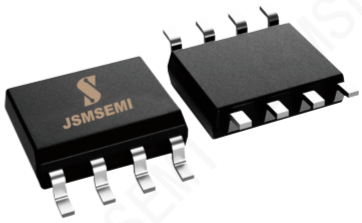
1 Description

L6388ED is a high voltage, high speed power MOSFET driver 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 floating channel can be used to drive an N-channel power MOSFET in the high-side configuration which operates up to 600V。



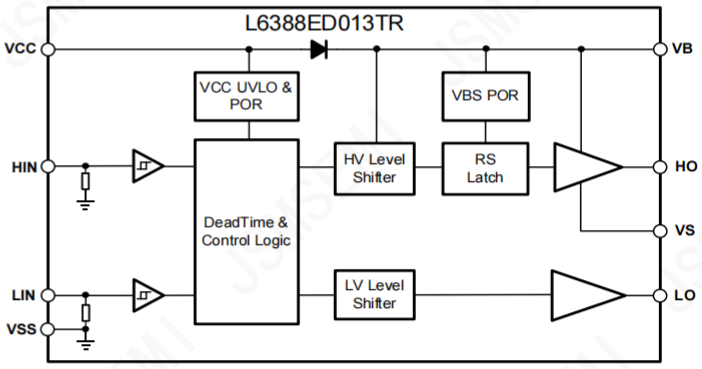
2 Features and Benefits

- Floating channel designed for bootstrap operation
- Fully operational to +650 V
- 3.3V, 5V and 15V input logic compatible
- Tolerant to negative transient voltage dV/dt immune
- Allowable negative Vs capability: -9V
- Undervoltage lockout for both channels
  -- VCC UVLO 8.7V/7.7V
  -- VBS UVLO 8.2V/7.3V
- Turn-on/Turn-off propagation delay
  -- Ton/Toff =250ns/150ns
  -- propagation delay matching time < 50ns
- Shoot through prevention
  -- dead time 130ns
- Typically output Source/Sink current capability: 0.6A / 1A
- Wide temperature range of -40°C to 125°C
- Compliant with RoHS standards

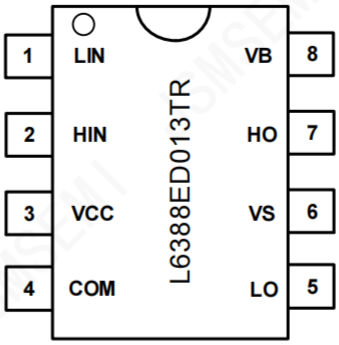
3 Application

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

Functional Block Diagram



4 Function Pin Description



Lead Definitions

Number	Symbol	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	VCC	Low side and logic fixed supply
4	VSS	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

5 Product Specifications

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	650	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	
dV_S/dt	Vs dV/dt noise Immunity	—	50	V/ns

ESD Rating

Symbol	Definition	MIN.	MAX.	Units
ESD	HBM Model	1500	—	V
	Machine Model	500	—	V

Rated Power

Symbol	Definition	MIN.	MAX.	Units
PD1	Package Power Dissipation（TA≤25°C）	—	625	mW

Thermal Information

Symbol	Definition	MIN.	MAX.	Units
Rth_{JA}	Thermal Resistance, Junction to Ambient	--	200	°C/W
T_J	Junction Temperature	—	150	
T_S	Storage Temperature	-55	150	°C
T_L	Lead Temperature (Soldering, 10 seconds)	—	300	°C/W

Recommended Operating Conditions

For proper operation, the device should be used under the following recommended conditions. The bias ratings of VS and VSS are measured at a supply voltage of 15V, and unless otherwise specified, the ratings of all voltage parameters are referenced to VSS 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	600	
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°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	—	250	200	ns	V_S=0V
t_{OFF}	Turn-off propagation delay	—	150	200	ns	V_S=600V
t_R	Turn-on rise time	—	70	130	ns	
t_F	Turn-off fall time	—	35	70	ns	
DT	Dead time	—	130	220	ns	
MT	Matched propagation time delay	—	—	50	ns	

Static electrical characteristics

Symbol	Definition	MIN.	TYP.	MAX.	Units	Test Condition
V_{CCUV+}	VCC supply UVLO threshold	7.7	8.7	9.7	V	
V_{CCUV-}		6.7	7.7	8.7	V	
$V_{CCUVHYS}$	hysteresis of V_{CC} UVLO	—	1	—	V	
V_{BSUV+}	VBS supply UVLO threshold	7.2	8.2	9.2	V	
V_{BSUV-}		6.3	7.3	8.3	V	
$V_{BSUVHYS}$	hysteresis of V_{BS} UVLO	—	0.9	—	V	
I_{LK}	High-side floating supply leakage current	—	—	50	μA	V_B=V_S=600V
I_{QBS}	Quiescent VB supply current	—	35	100	μA	LIN/HIN Floating
I_{QCC}	Quiescent VCC supply current	—	60	150	μA	LIN/HIN Floating
V_{IH}	Logic “1” input voltage	2.5	—	—	V	VCC=10Vto 20V
V_{IL}	Logic “0” input voltage	—	—	0.8	V	VCC=10Vto 20V
V_{OH}	High level output voltage, VBIAS - VO	—	—	0.2	V	I_O=0A
V_{OL}	Low level output voltage, VO	—	—	0.2	V	I_O=0A
I_{IN+}	Logic “1” Input bias current	—	25	60	μA	HIN=5V, LIN=5V
I_{IN-}	Logic “0” Input bias current	—	—	5	μA	HIN=0V, LIN=0V
I_{O+}	Output high short circuit pulse current	0.27	0.6	—	A	V_O=0V PW≤10us
I_{O-}	Output low short circuit pulse current	0.4	1	—	A	V_O=15V PW≤10us
$R_{DS(ON)}$	Bootstrap diode on-state equivalent resistance	—	100	—	Ω	

6 Function Description

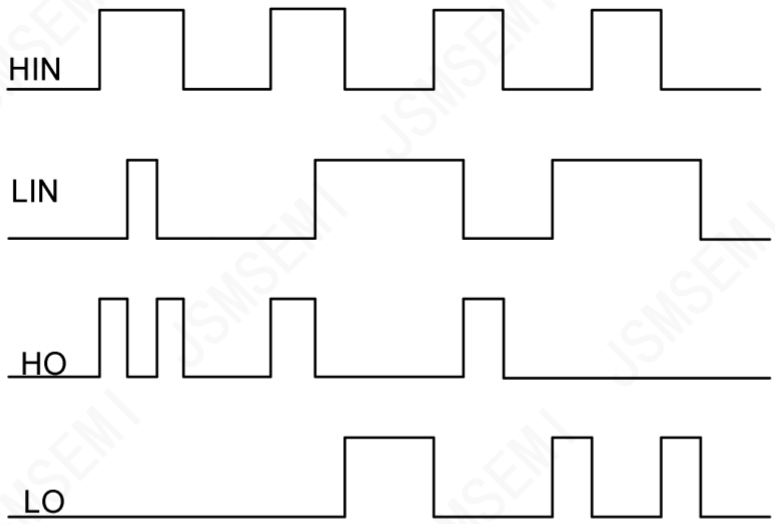


Figure6-1 L6388ED Input and output timing waveform

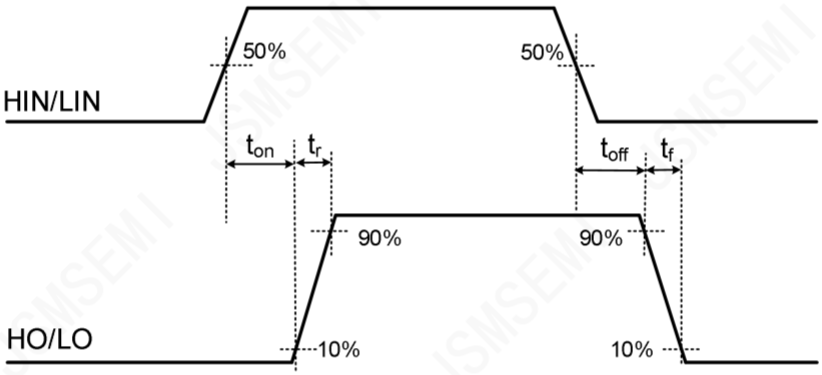


Figure6-2 Propagation time waveform definition

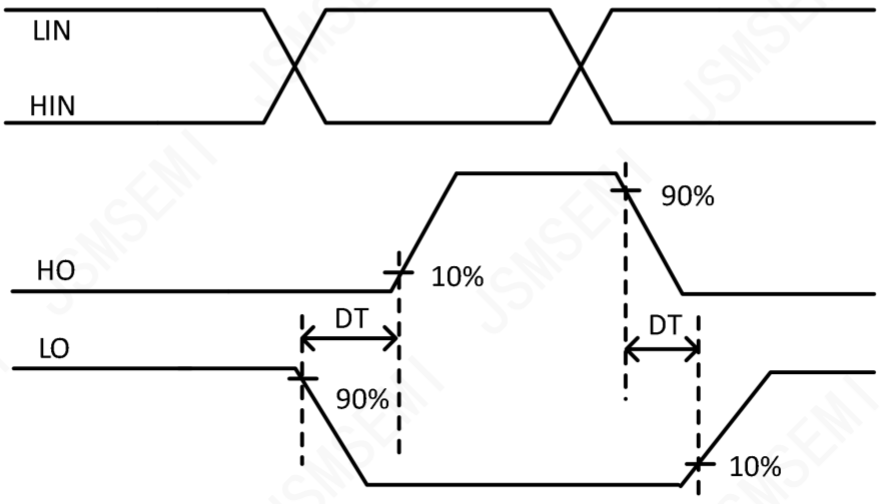


Figure6-3 Shoot through prevention delay waveform definition

7 L6388ED Description

Function Block Diagram

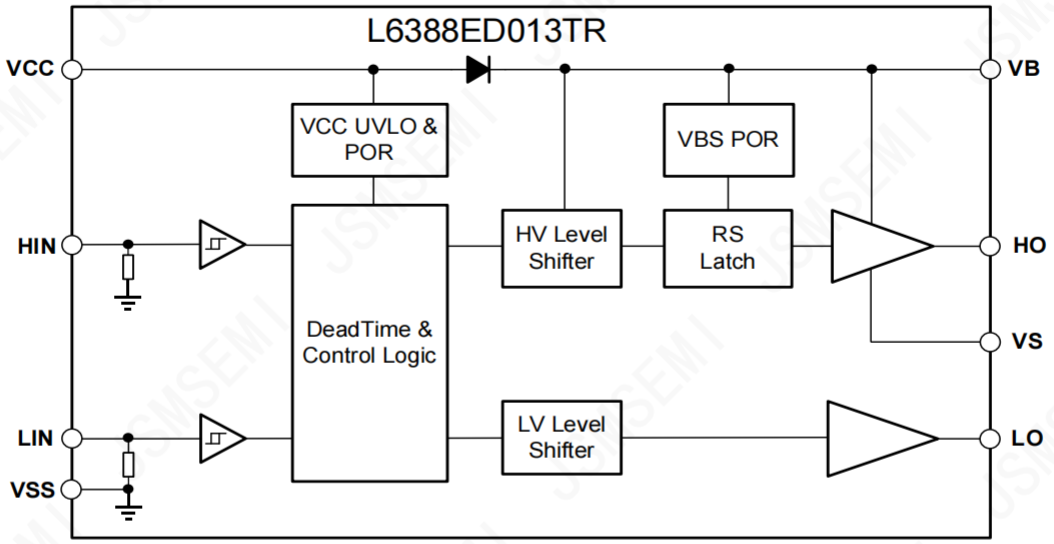


Figure7-1 Function Block Diagram of L6388ED

Application Diagram

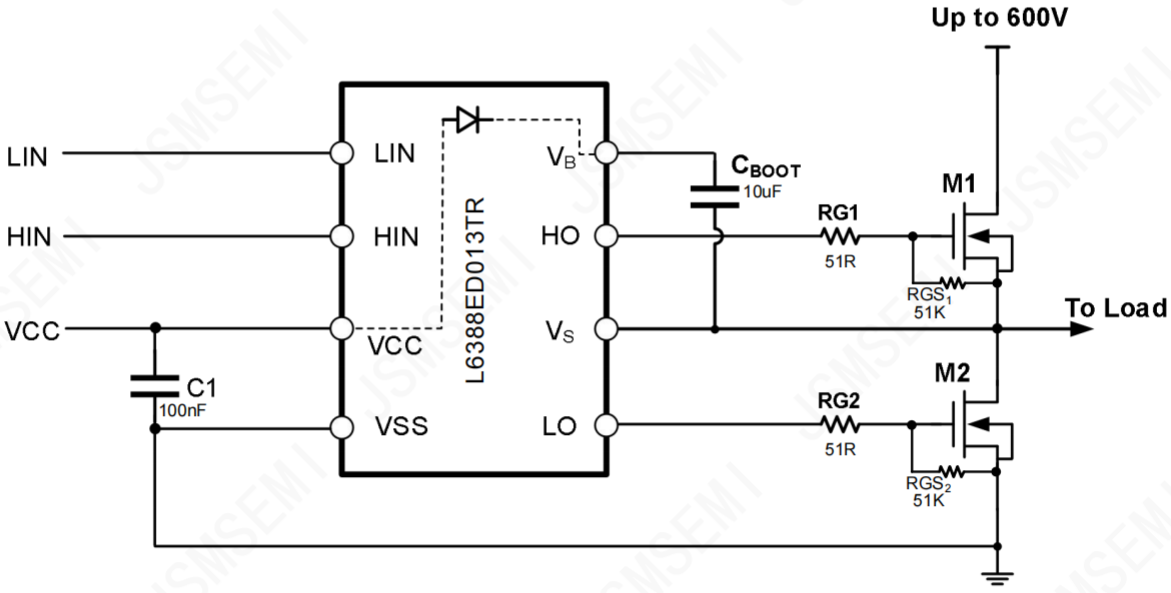
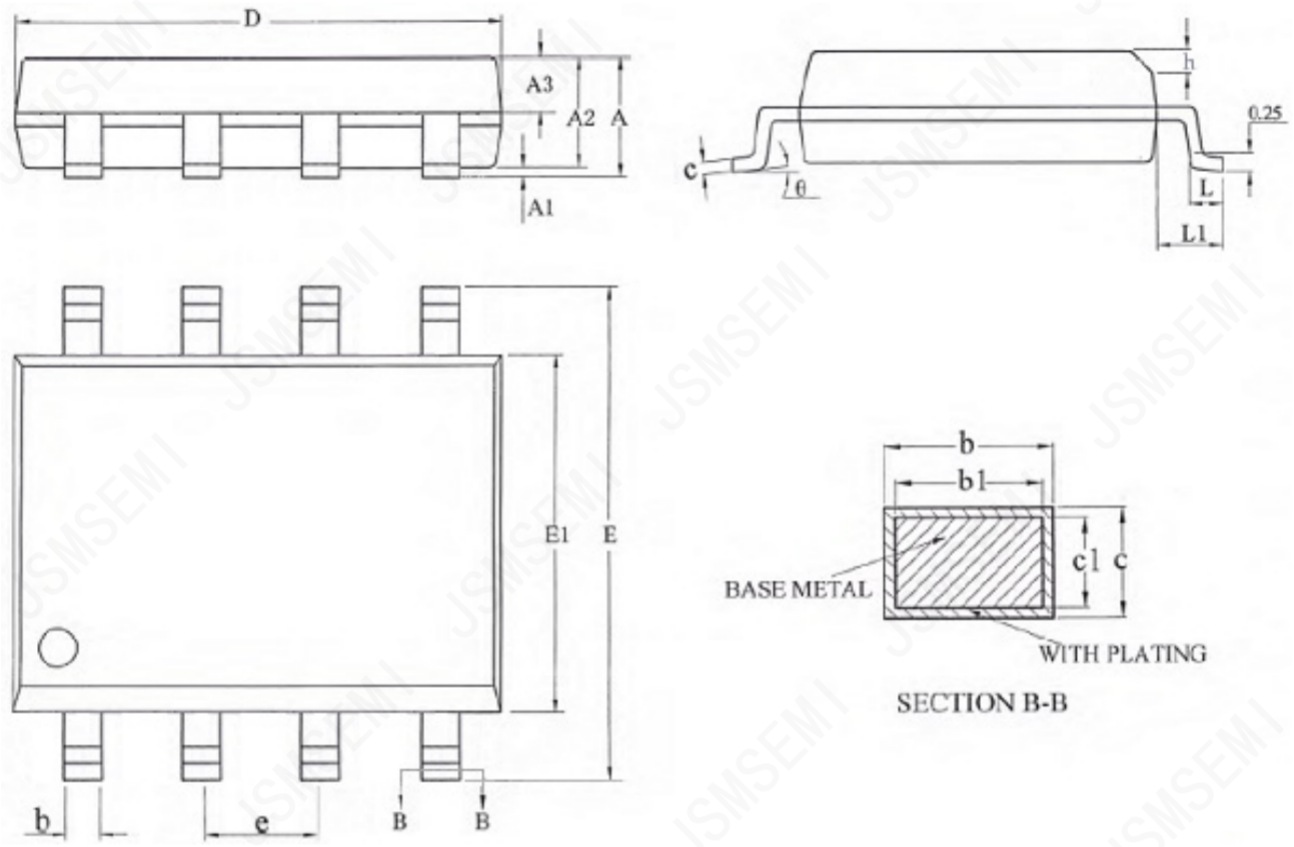


Figure7-2 Typical application circuit of L6388ED

8 Package Information

SOIC-8 Package Outlines



SOIC-8 Package Dimensions

Size / Symbol	MIN(mm)	TYP(mm)	MAX(mm)	Size / Symbol	MIN(mm)	TYP(mm)	MAX(mm)
A	-	-	1.75	D	4.70	4.90	5.10
A1	0.10	-	0.225	E	5.80	6.00	6.20
A2	1.30	1.40	1.50	E1	3.70	3.90	4.10
A3	0.60	0.65	0.70	e		1.27BSC	
b	0.39	-	0.48	h	0.25	-	0.50
b1	0.38	0.41	0.43	L		0.50	
c	0.21	-	0.26	L1	1.05BSC		
c1	0.19	0.20	0.21	θ	0	-	8°

Revision History

Rev.	Change	Date
1.0	First release, final datasheet	9/22/2020
1.1	Application notes update	06/22/2021

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