

## High and Low Side Driver

### General Description

The PN7103 is a high voltage, high speed power MOSFET and IGBT driver based on P\_SUB P\_EPI process. The floating channel driver can be used to drive two N-channel power MOSFET or IGBT in a half-bridge configuration which operates up to 600 V. Logic inputs are compatible with standard CMOS or LSTTL output, down to 3.3V logic. The output drivers feature a high pulse current buffer stage designed for minimum driver cross-conduction. Propagation delays are matched to simplify use in high frequency applications.

### Applications

- Small and medium- power motor driver
- Power MOSFET or IGBT driver
- Half-Bridge Power Converters
- Full-Bridge Power Converters

### Features

- Fully operational to +600 V
- 3.3 V logic compatible
- dV/dt Immunity  $\pm 50$  V/ns
- Floating channel designed for bootstrap operation
- Gate drive supply range from 10 V to 20 V
- UVLO for low side channel
- Output Source / Sink Current Capability 300 mA / 600mA
- Independent Logic Inputs to Accommodate All Topologies
- -5V negative Vs ability
- Matched propagation delay for both channels
- Pin-to-Pin Compatible with Industry Standards
- 8-Lead PDIP or 8-Lead SOIC package

### Pin Assignment & Typical Connection Circuit

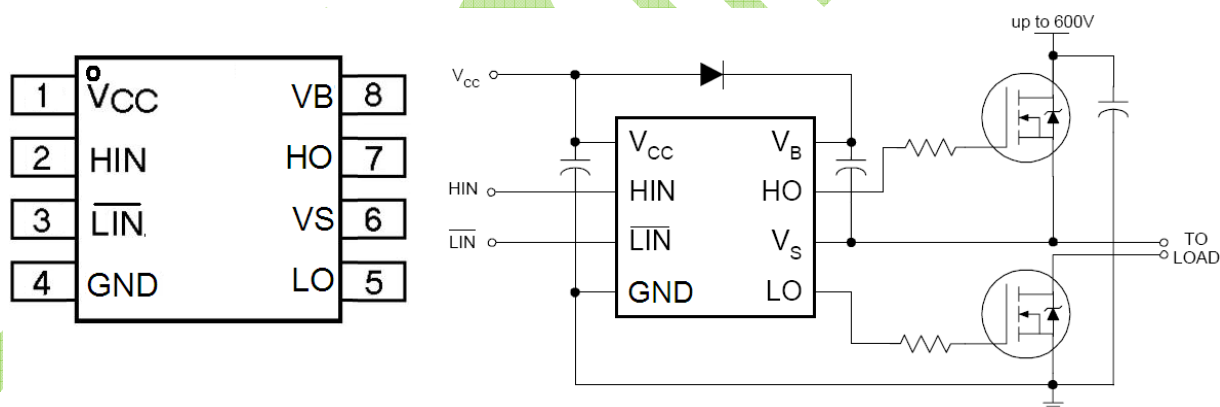


Figure1. Typical Connection Circuit

### Pin Description

PIN NO.	PIN NAME	PIN FUNCTION
1	VCC	Low side and main power 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), out of phase
4	GND	Ground
5	LO	Low side gate drive output, out of phase with LIN
6	VS	High side floating supply return or bootstrap return
7	HO	High side gate drive output, in phase with HIN
8	VB	High side floating supply

## Functional Block Diagram

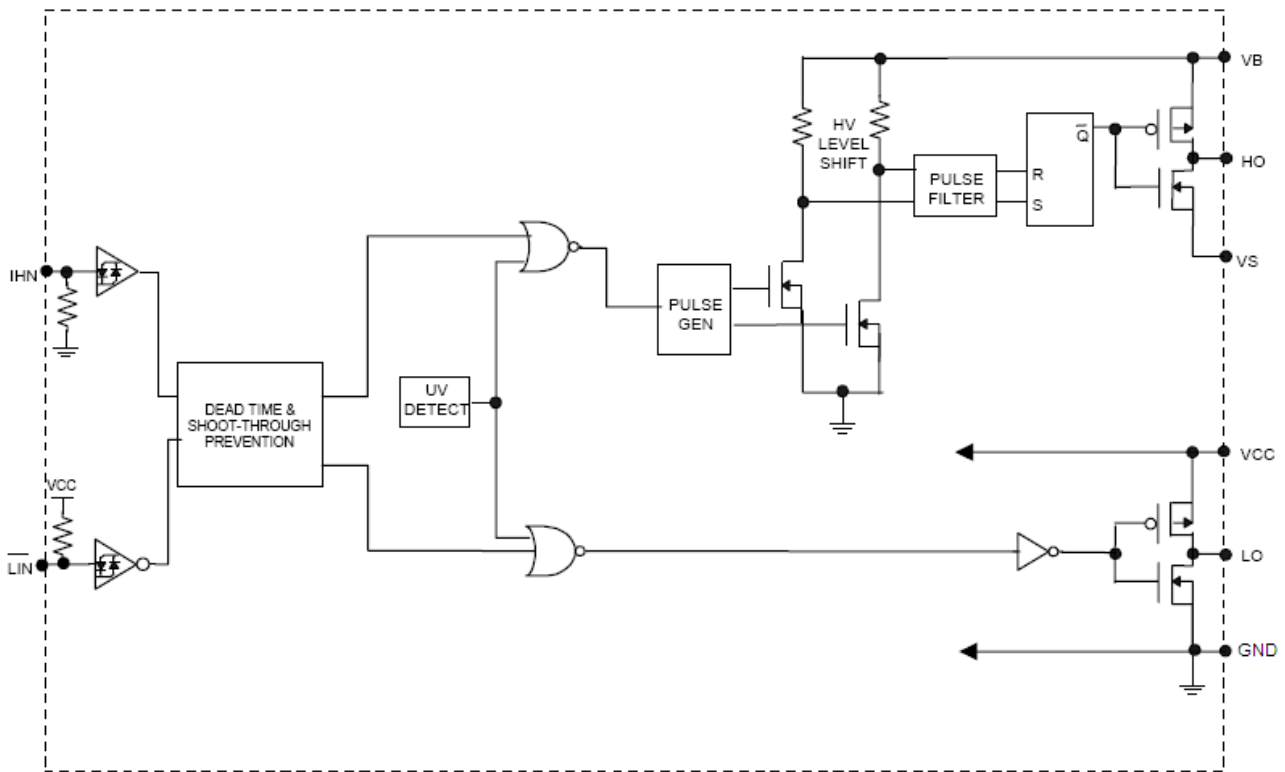


Figure2. Detailed Block Diagram

## Absolute Maximum Ratings <sup>[Note1]</sup>

Symbol	Definition	MIN.	MAX.	Units	
VB	High side floating supply	-0.3	600	V	
VS	High side floating supply return	VB - 25	VB + 0.3		
VHO	High side gate drive output	Vs - 0.3	VB + 0.3		
VCC	Low side and main power supply	-0.3	25		
VLO	Low side gate drive output	-0.3	VCC + 0.3		
VIN	Logic input of HIN & LIN	-0.3	VCC + 0.3		
dVs/dt	Allowable Offset Supply Voltage Transient	--	50	V/ns	
ESD	HMB Model	2.5		kV	
	Machine Model	200		V	
P <sub>D</sub>	Package Power Dissipation @ TA ≤ 25°C	8 Lead DIP	--	1.0	W
		8 Lead SOIC	--	0.625	
R <sub>qJA</sub>	Thermal Resistance Junction to Ambient	8 Lead DIP	--	125	°C
		8 Lead SOIC	--	200	/W
T <sub>J</sub>	Junction Temperature	--	150	°C	
T <sub>S</sub>	Storage Temperature	-55	150		
T <sub>L</sub>	Lead Temperature (Soldering, 10 seconds)	--	300		

**Note 1:** Exceeding these ratings may damage the device.

## Recommended Operating Conditions

Symbol	Definition	MIN.	MAX.	Units
VB	High side floating supply	VS +10	VS +20	V
VS	High side floating supply return	-	600	
VHO	High side gate drive output voltage	VS	VB	
VCC	Low side supply	10	20	
VLO	Low side gate drive output voltage	0	VCC	
VIN	Logic input voltage(HIN & LIN)	0	VCC	
TA	Ambient temperature	-40	125	°C

## Dynamic Electrical Characteristics

VBIAS (VCC, VBS) = 15V, CL = 1000 pF and TA = 25°C unless otherwise specified.

Symbol	Definition	TYP.	MAX.	Units
ton <sub>H</sub>	High side turn-on propagation delay	660	680	ns
toff <sub>H</sub>	High side turn-off propagation delay	192	200	
ton <sub>L</sub>	Low side turn-on propagation delay	640	660	
toff <sub>L</sub>	Low side turn-off propagation delay	165	175	
MT	Delay matching	27	30	
DT	Dead time	480	510	
Tr	Turn-on rise time	60	70	
Tf	Turn-off fall time	35	40	

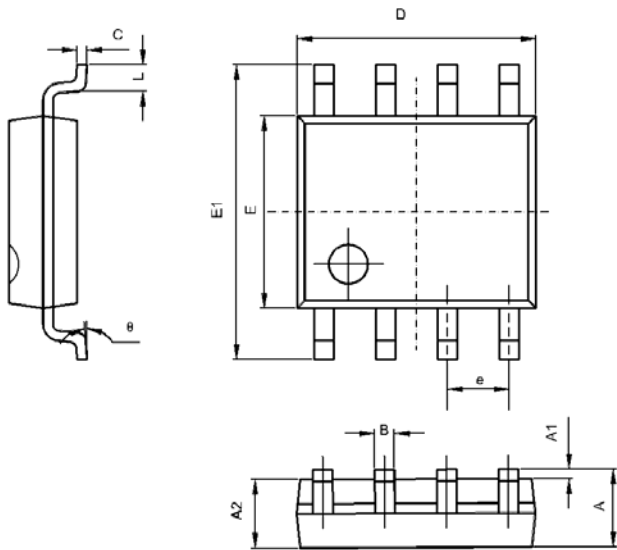
## Static Electrical Characteristics

VBIAS (VCC, VBoot) = 15V, CL = 1000 pF and TA = 25°C unless otherwise specified.

Symbol	Definition	MIN.	TYP.	MAX.	Units
V <sub>IH</sub>	Logic "1"(HIN) & Logic "0"(LIN) input voltage	2.4	-	-	V
V <sub>IL</sub>	Logic "0" (HIN)& Logic "1"(LIN) input voltage	-	-	1.0	
V <sub>OH</sub>	High level output voltage, V <sub>BIAS</sub> - V <sub>O</sub>	-	-	0.3	
V <sub>OL</sub>	Low level output voltage, V <sub>O</sub>	-	-	0.3	
I <sub>QCC</sub>	Quiescent VCC supply current	-	220	240	uA
I <sub>QBS</sub>	Quiescent VB supply current	-	75	80	
I <sub>LK</sub>	Leakage current from VS(600V) to GND	-	0.12	0.2	
I <sub>IN+</sub>	Logic "1" input bias current	-	6.2	10	
I <sub>IN-</sub>	Logic "0" input bias current	-	0.00	0.1	
V <sub>CCU+</sub> V <sub>CCU-</sub>	VCC supply UVLO threshold	- -	8.7 8.1	- -	
I <sub>O+</sub>	Output high short circuit pulsed current [Note2]	-	300	-	mA
I <sub>O-</sub>	Output low short circuit pulsed current [Note2]	-	600	-	

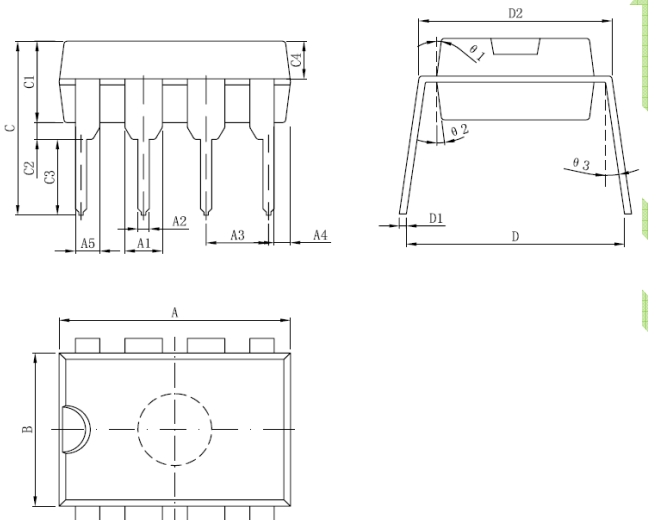
## Package Information

### SOP-8 PACKAGE OUTLINE AND DIMENSIONS



SYMBOL	DIMENSION IN MILIMETERS		DIMENSION IN INCHES	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A	0.100	0.250		0.010
A	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.0	0.188	0.197
E	3.800	4.000	0.150	0.157
E	5.800	6.300	0.228	0.248
e	1.270 TYP		0.050 TYP	
L	0.400	1.270	0.016	0.050
$\theta$	0	8	0	8

### DIP8 PACKAGE OUTLINE AND DIMENSIONS



Size symbol	Min(mm)		Max(min)		Size symbol	Min(mm)		Max(min)	
A	9.30		9.50		C2	0.50			
A1	1.524				C3	3.3			
A2	0.39		0.53		C4	1.57TYP			
A3	2.54				D	8.2		8.8	
A4	0.66TYP				D1	0.2		0.35	
A5	0.99TYP				D2	7.62		7.87	
B	6.3		6.5		$\theta_1$	8°TYP			
C	7.2				$\theta_2$	8°TYP			
C1	3.3		3.5		$\theta_3$	5°TYP			

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