

### General Description

The PN7006 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 independently which operates up to 300 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. It has two versions PN7006A & PN7006B.

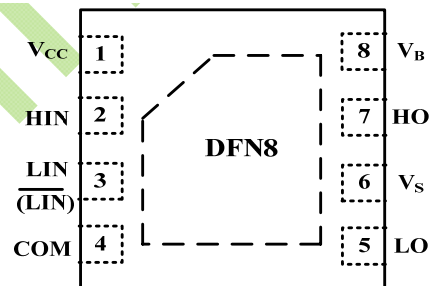
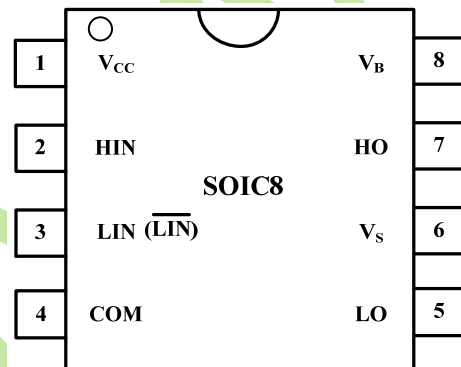
### Features

- Fully operational to +300 V
- 3.3 V logic compatible
- $dV/dt$  Immunity  $\pm 50$  V/nsec
- Floating channel designed for bootstrap operation
- Gate drive supply range from 7.0 V to 20 V
- UVLO for both channels
- Output Source / Sink Current Capability 450mA / 900mA (at  $V_{CC} = 15V$ )
- Independent Logic Inputs to Accommodate All Topologies
- -5V negative  $V_S$  ability
- Matched propagation delay for both channels

### Applications

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

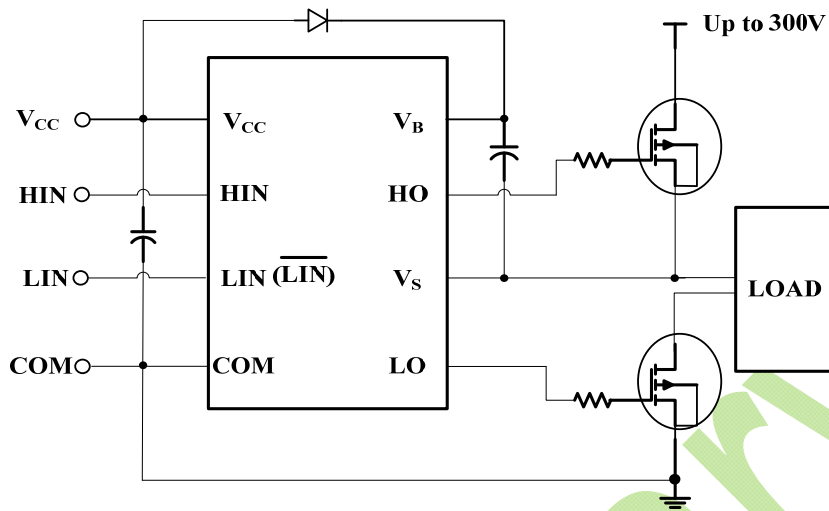
### Packages/Order information



(LIN: A version  $\overline{LIN}$ : B version)

Part number	Order Code	Package
PN7006A	PN7006ASEC-R1	SOIC8
	PN7006ADEC-R1	DFN8
PN7006B	PN7006BSEC-R1	SOIC8
	PN7006BDEC-R1	DFN8

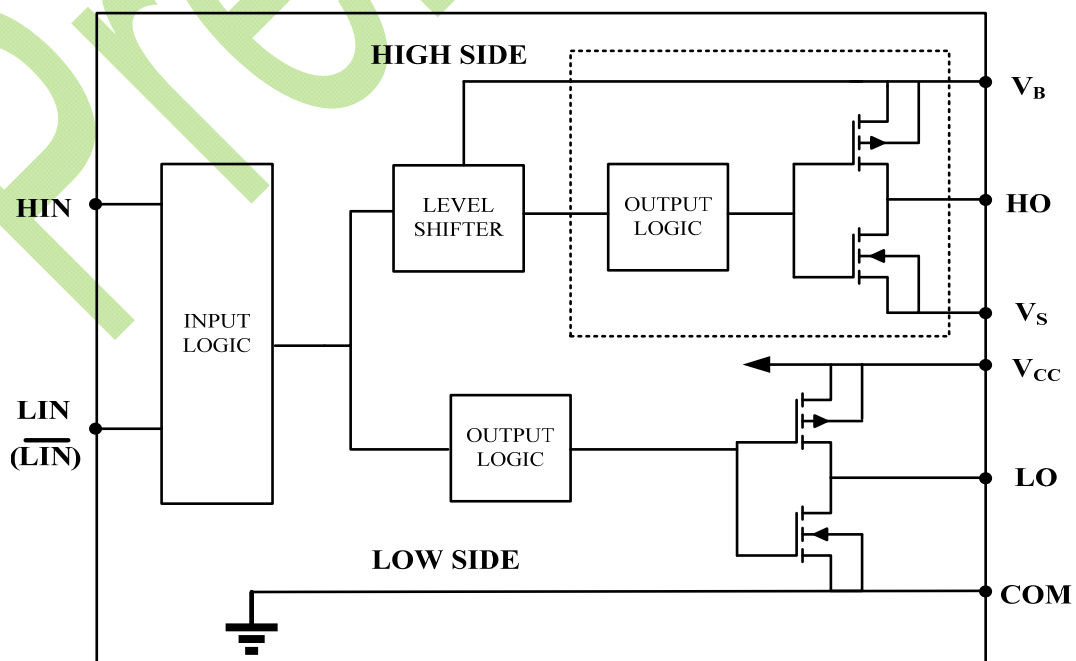
## Typical Application Circuit



## Pin Description

PIN NO.	PIN NAME	PIN FUNCTION
1	V <sub>CC</sub>	Low side and main power supply
2	HIN	Logic input for high side gate driver output (HO)
3	LIN( $\overline{\text{LIN}}$ )	Logic input for low side gate driver output (LO)
4	COM	Ground
5	LO	Low side gate drive output A version: in phase with LIN    B version: out of phase with LIN
6	V <sub>S</sub>	High side floating supply return or bootstrap return
7	HO	High side gate drive output, in phase with HIN
8	V <sub>B</sub>	High side floating supply

## Functional Block Diagram



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

Symbol	Definition	MIN.	MAX.	Units	
V <sub>B</sub>	High side floating supply	-0.3	322	V	
V <sub>S</sub>	High side floating supply return	V <sub>B</sub> - 22	V <sub>B</sub> + 0.3		
V <sub>HO</sub>	High side gate drive output	V <sub>S</sub> - 0.3	V <sub>B</sub> + 0.3		
V <sub>CC</sub>	Low side and main power supply	-0.3	22		
V <sub>LO</sub>	Low side gate drive output	-0.3	V <sub>CC</sub> + 0.3		
V <sub>IN</sub>	Logic input of HIN & LIN	-0.3	V <sub>CC</sub> + 0.3		
ESD	HBM Model	2.5		kV	
	Machine Model	200		V	
P <sub>D</sub>	Package Power Dissipation @ TA ≤ 25°C	8 Lead SOIC	--	0.625	W
R <sub>thJA</sub>	Thermal Resistance Junction to Ambient	8 Lead SOIC	--	200	°C / 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
V <sub>B</sub>	High side floating supply	V <sub>S</sub> + 7.0	V <sub>S</sub> + 20	V
V <sub>S</sub>	High side floating supply return	-	300	
V <sub>HO</sub>	High side gate drive output voltage	V <sub>S</sub>	V <sub>B</sub>	
V <sub>CC</sub>	Low side supply	7.0	20	
V <sub>LO</sub>	Low side gate drive output voltage	0	V <sub>CC</sub>	
V <sub>IN</sub>	Logic input voltage(HIN & LIN)	0	V <sub>CC</sub>	
T <sub>A</sub>	Ambient temperature	-40	125	°C

## Dynamic Electrical Characteristics

V<sub>BIAS</sub> (V<sub>CC</sub>, V<sub>BS</sub>) = 15V, C<sub>L</sub> = 1000 pF and T<sub>A</sub> = 25°C unless otherwise specified.

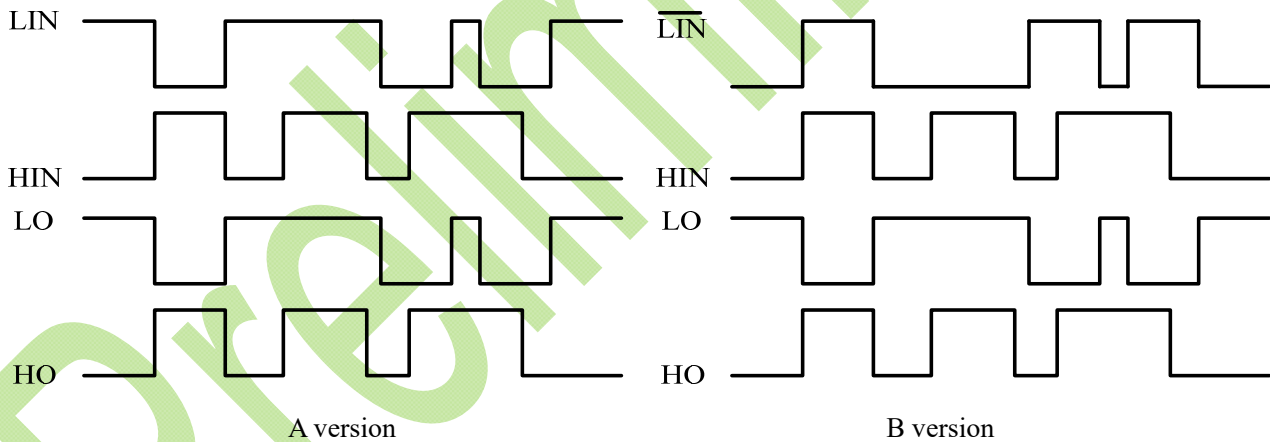
Symbol	Definition	TYP.	MAX.	Units
t <sub>onH</sub>	High side turn-on propagation delay	170	240	ns
t <sub>offH</sub>	High side turn-off propagation delay	170	240	
t <sub>onL</sub>	Low side turn-on propagation delay	170	240	
t <sub>offL</sub>	Low side turn-off propagation delay	170	240	
MT	Delay matching	-	50	
t <sub>r</sub>	Turn-on rise time	50	90	
t <sub>f</sub>	Turn-off fall time	30	80	

## Static Electrical Characteristics

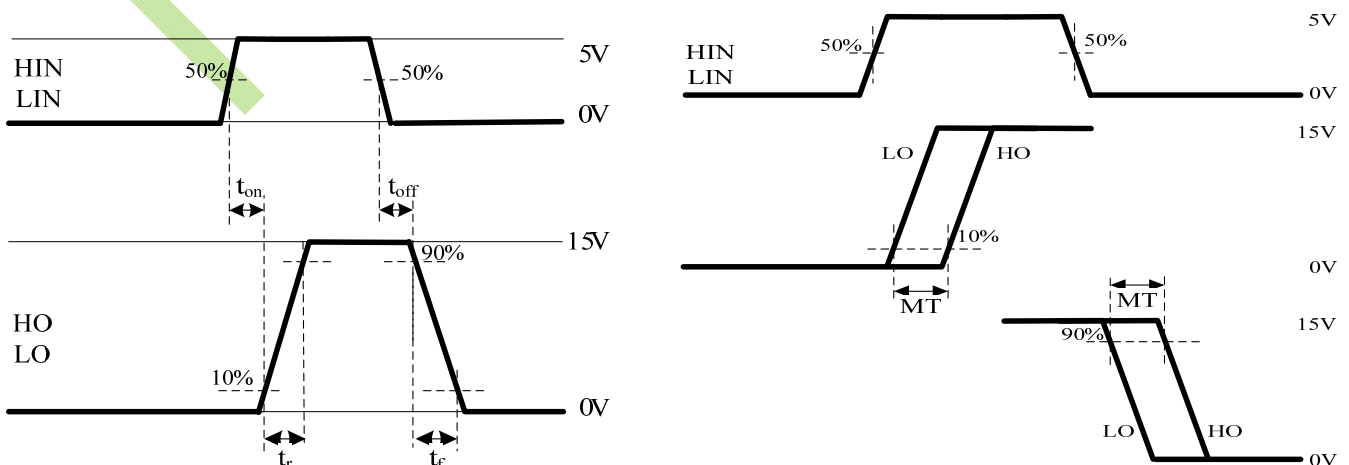
$V_{BIAS} (V_{CC}, V_{BS}) = 15V, C_L = 1000\text{ pF}$  and  $T_A = 25^\circ\text{C}$  unless otherwise specified.

Symbol	Definition	MIN.	TYP.	MAX.	Units
$V_{IH}$	Logic "1"(HIN & LIN) input voltage	2.5	-	-	V
$V_{IL}$	Logic "0" (HIN & LIN) input voltage	-	-	0.8	
$V_{OH}$	High level output voltage, $V_{BIAS} - V_o$	-	-	0.3	
$V_{OL}$	Low level output voltage, $V_o$	-	-	0.3	
$I_{QCC}$	Quiescent $V_{CC}$ supply current	-	160	220	$\mu\text{A}$
$I_{QB}$	Quiescent $V_B$ supply current	-	80	150	
$I_{LK}$	Leakage current from $V_S(600V)$ to GND	-	-	50	
$I_{IN+}$	Logic "1" input bias current	-	6	10	V
$I_{IN-}$	Logic "0" input bias current	-	1	2	
$V_{BSU+}$	$V_{BS}$ supply UVLO threshold	-	6.8	-	V
$V_{BSU-}$		-	6.5	-	
$V_{CCU+}$	$V_{CC}$ supply UVLO threshold	-	6.8	-	
$V_{CCU-}$		-	6.5	-	
$I_{O+}$	Output high short circuit pulsed current	-	450	-	mA
$I_{O-}$	Output low short circuit pulsed current	-	900	-	

## Logic Function



## Timing Spec

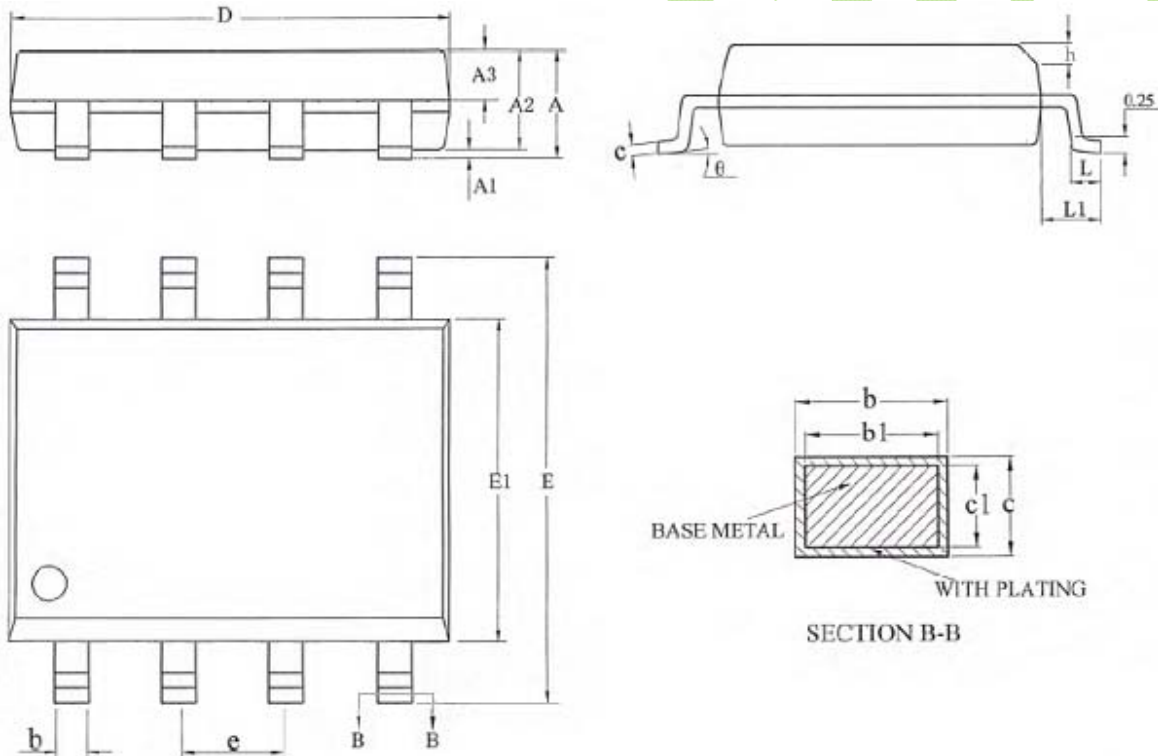


## Package Information

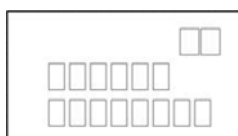
### SOIC8 Package Dimensions

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	-	0.80
c	0.21	-	0.26	L1	1.05BSC		
cl	0.19	0.20	0.21	$\theta$	0	-	8°

### Package Outlines



### SOIC8 Package Mark Information



TOP Mark
Logo
PN7006M <sup>Note1</sup>
YWWXXXXX <sup>Note2</sup>

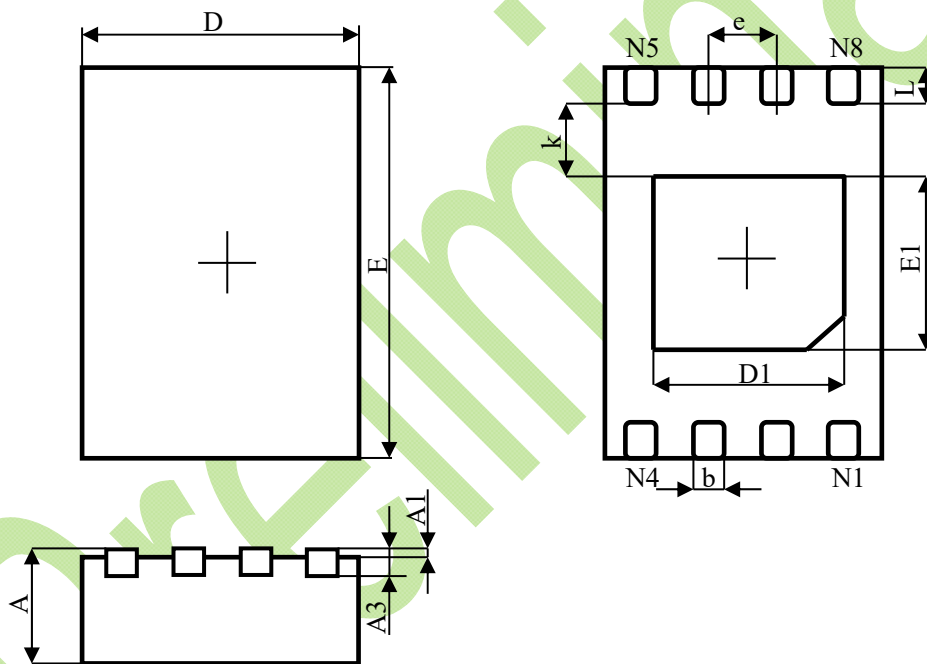
Note1: M: A or B;

Note2: Y: Year code, WW: Week codes, XXXXX: Package codes

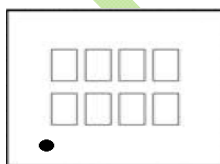
## DFN8 Package Dimensions

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	1.924	2.076	0.076	0.082
E	2.924	3.076	0.115	0.121
D1	1.400	1.600	0.055	0.063
E1	1.400	1.600	0.055	0.063
k	0.200MIN.		0.008MIN.	
b	0.200	0.300	0.008	0.012
e	0.500TYP.		0.020TYP.	
L	0.224	0.376	0.009	0.015

## Package Outlines



## DFN8 Package Mark Information



TOP Mark
7008
AYWX <sup>Note</sup>
Pin 1 indicator point

Note: A: Internal code, Y: Year code, W: Week codes, X: Package codes

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