

# FAN7361, FAN7362 High-Side Gate Driver

## Features

- Floating Channel Designed for Bootstrap Operation to +600V.
- Typically 250mA/500mA Sourcing/Sinking Current Driving Capability
- Common-Mode dv/dt Noise Canceling Circuit
- VCC & VBS Supply Range from 10V to 20V
- UVLO Function
- Output In-phase with Input

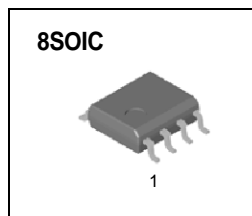
## Typical Applications

- Fluorescent Lamp Ballast
- PDP Scan Driver
- Motor Control

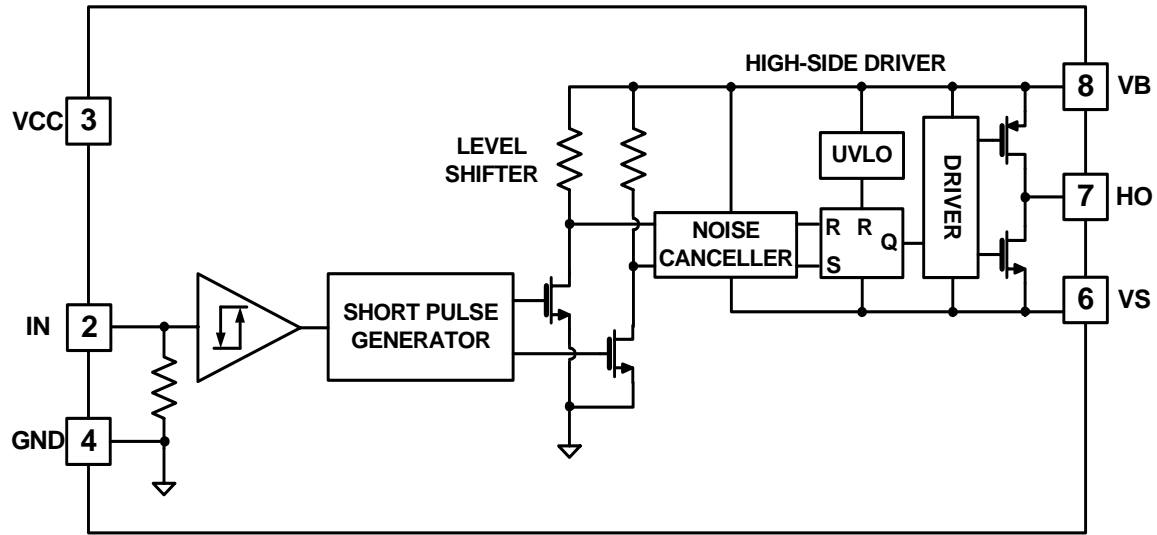
## Description

The FAN7361/2, a monolithic high-side gate driver IC, can drive MOSFETs and IGBTs which operate up to +600V. Fairchild's high voltage process and common-mode noise canceling technique provides stable operation of the high-side driver under high dv/dt noise circumstances. An advanced level short circuit allows high-side gate driver operation up to  $V_{DS} = -9.8V$  (typ.) for  $V_{BS} = 15V$ .

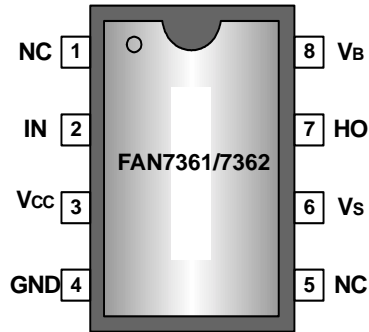
The UVLO circuit prevents malfunction when  $V_{BS}$  is lower than the specified threshold voltage. Output drivers typically source/sink 250mA/500mA, respectively, which is suitable for fluorescent lamp ballast, PDP scan driver, motor control, and so on.



### Block Diagrams



### Pin Assignments



### Pin Definitions

Pine Number	Pin Name	I/O	Pin Function Description
1	NC	-	No Connection
2	IN	I	Logic Input for High Side Gate Driver Output
3	Vcc	I	Supply Voltage
4	GND	I	Logic Ground
5	NC	-	No Connection
6	VS	I	High Voltage Floating Supply Return
7	HO	O	High Side Driver Output
8	VB	I	High Side Floating Supply

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
High side offset voltage	$V_S$	$V_B-25$	$V_B+0.3$	V
High side floating supply voltage	$V_B$	-0.3	625	
High side floating output voltage HO	$V_{HO}$	$V_S-0.3$	$V_B+0.3$	
Logic fixed supply voltage	$V_{CC}$	-0.3	25	
Logic input voltage (IN)	$V_{IN}$	-0.3	$V_{CC}+0.3$	
Allowable offset voltage slew rate	$dV_S/dt$	-	$\pm 50$	V/ns
Power dissipation	$P_D$	-	0.625	W
Thermal resistance, junction to ambient	$R_{thja}$	-	200	$^{\circ}C/W$
Junction temperature	$T_J$	-	150	$^{\circ}C$
Storage temperature	$T_S$	-	150	$^{\circ}C$

#### Notes:

1. Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltage referenced to GND, all currents are defined positive into any lead.

### Recommended Operating Ratings

Parameter	Symbol	Min.	Max.	Unit
High side floating supply voltage	$V_B$	$V_S+10$	$V_S+20$	V
High side floating supply offset voltage	$V_S$	$6-V_{CC}$	600	
High side (HO) output voltage	$V_{HO}$	$V_S$	$V_B$	
Logic input voltage (IN)	$V_{IN}$	GND	$V_{CC}$	
Logic supply voltage	$V_{CC}$	10	20	
Ambient Temperature	$T_A$	-40	125	$^{\circ}C$

### ESD Level

Parameter	Pins	Conditions	Level	Unit
Human Body Model (HBM)	IN, VCC, COM, VB, HO	$R=1.5k\Omega$ , $C=100pF$	$\pm 1500$	V
	VS		$\pm 1000$	
Machine Model (MM)	All Pins	$C=200pF$	$\pm 300$	
Charged Device Model (CDM)	All Pins		$\pm 500$	

## Electrical Characteristics

( $V_{BIAS}(V_{CC}, V_{BS})=15.0V$ ,  $T_A = 25^\circ C$ , unless otherwise specified. The  $V_{IN}$  and  $I_{IN}$  parameters are referenced to GND. The  $V_O$  and  $I_O$  parameters are referenced to  $V_S$ .

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
VBS supply under voltage positive becoming threshold	VBSUV+(FAN7361)	$V_{IN}=0V$	8.2	9.2	10.2	V
	VBSUV+(FAN7362)		7.6	8.6	9.6	
VBS supply under voltage negative becoming threshold	VBSUV-(FAN7361)	$V_{IN}=0V$	7.4	8.6	9.2	
	VBSUV-(FAN7362)		7.2	8.2	9.2	
VBS supply under voltage lockout hysteresis	VBSHYS(FAN7361)	$V_{IN}=0V$	-	0.5	-	
	VBSHYS(FAN7362)		-	0.4	-	
Offset supply leakage current	$I_{LK}$	$V_B=V_S=HO=600V$	-	-	10	$\mu A$
Quiescent VBS supply current	$I_{QBS}$	$V_{IN}=0V$ or $5V$	-	50	80	
Quiescent VCC supply current	$I_{QCC}$	$V_{IN}=0V$	-	30	75	
Operating VBS supply current	$I_{PBS}$	$C_L=1nF$ , $f=10kHz$	-	420	550	
Logic "1" input voltage	$V_{IH}(FAN7361)$	-	3.6	-	-	V
	$V_{IH}(FAN7362)$	-	3.3	-	-	
Logic "0" input voltage	$V_{IL}(FAN7361)$	-	-	-	1.0	
	$V_{IL}(FAN7362)$	-	-	-	0.8	
High level output voltage, $V_B-V_{HO}$	$V_{OH}$	No load	-	-	0.1	
Low level output voltage, $V_{HO}$	$V_{OL}$	No load	-	-	0.1	
Logic "1" input bias current	$I_{IN+}$	$V_{IN}=5V$	-	50	90	$\mu A$
Logic "0" input bias current	$I_{IN-}$	$V_{IN}=0V$	-	1.0	2.0	
Output high short circuit pulse current	$I_{O+}$	$V_{HO}=0V$ , $V_{IN}=5V$ , $PW \leq 10\mu s$	200	250	-	mA
Output low short circuit pulsed current	$I_{O-}$	$V_{HO}=15V$ , $V_{IN}=0V$ , $PW \leq 10\mu s$	400	500	-	
Allowable negative VS pin voltage for IN signal propagation to HO	VS	-	-	-9.8	-7	V

## Dynamic Electrical Characteristics

( $V_{BIAS}(V_{CC}, V_{BS}) = 15.0V$ ,  $V_S=GND$ ,  $C_L=1000pF$  and  $T_A = 25^\circ C$ , unless otherwise specified.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-on propagation delay	$t_{on}$	$V_S=0V$	-	120	200	ns
Turn-off propagation delay	$t_{off}$	$V_S=0V$ or $600V$	-	90	180	
Turn-on rise time	$t_r$	-	-	70	160	
Turn-off fall time	$t_f$	-	-	30	100	

Typical Characteristics

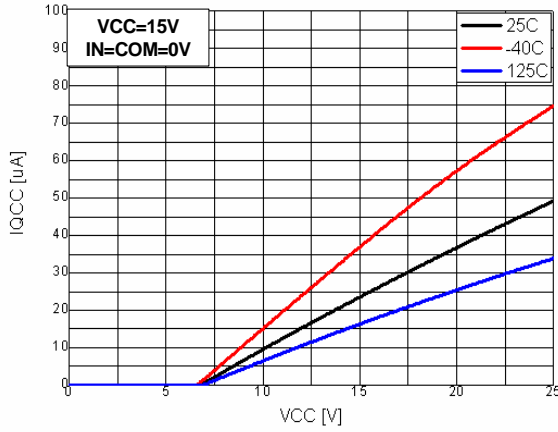


Fig. 1 IQCC vs. Supply Voltage

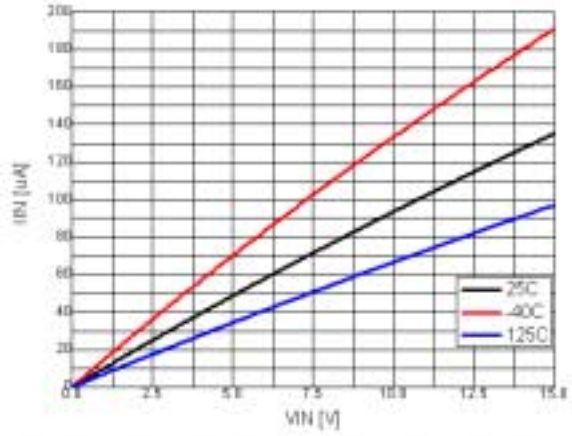


Fig. 2 Input Bias Current vs. Supply Voltage

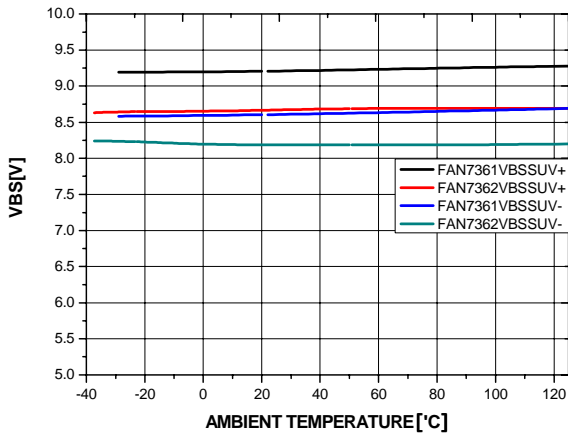


Fig. 3 VBS UVLO vs. Temperature

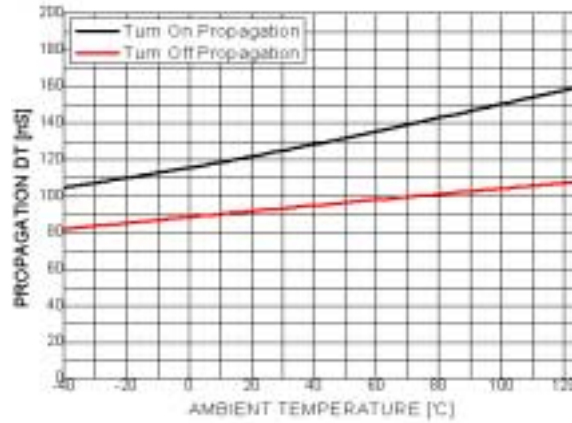


Fig. 4 Turn On/Off Propagation Time vs. Temperature

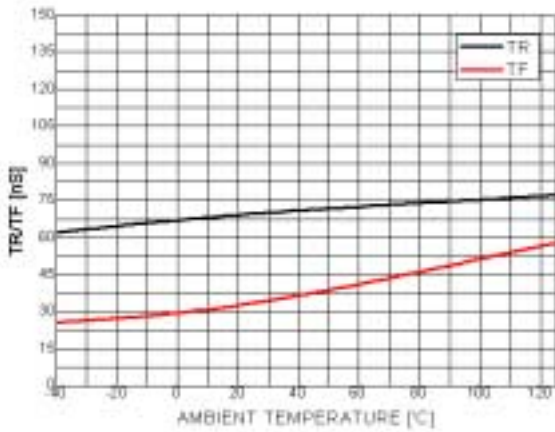


Fig. 5 Rising/Falling Time vs. Temperature

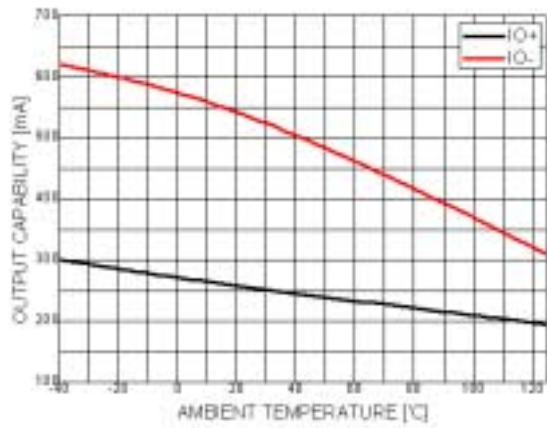


Fig. 6 Output Sinking/Sourcing Current vs. Temperature

### Switching Time Definitions

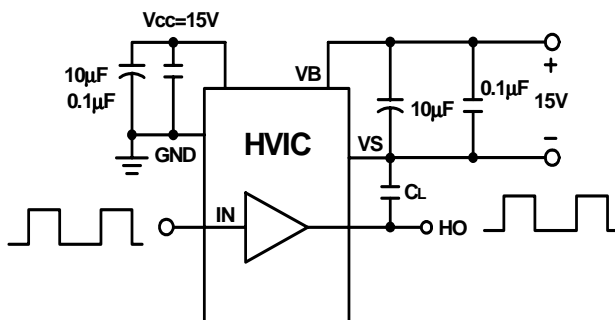


Fig. 7 Switching Time Test Circuit

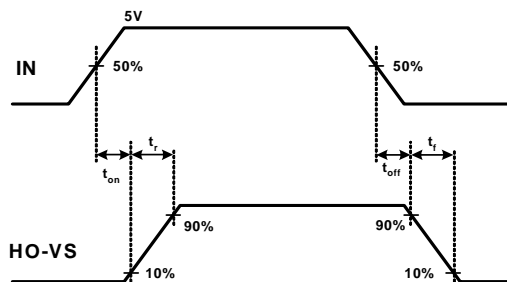
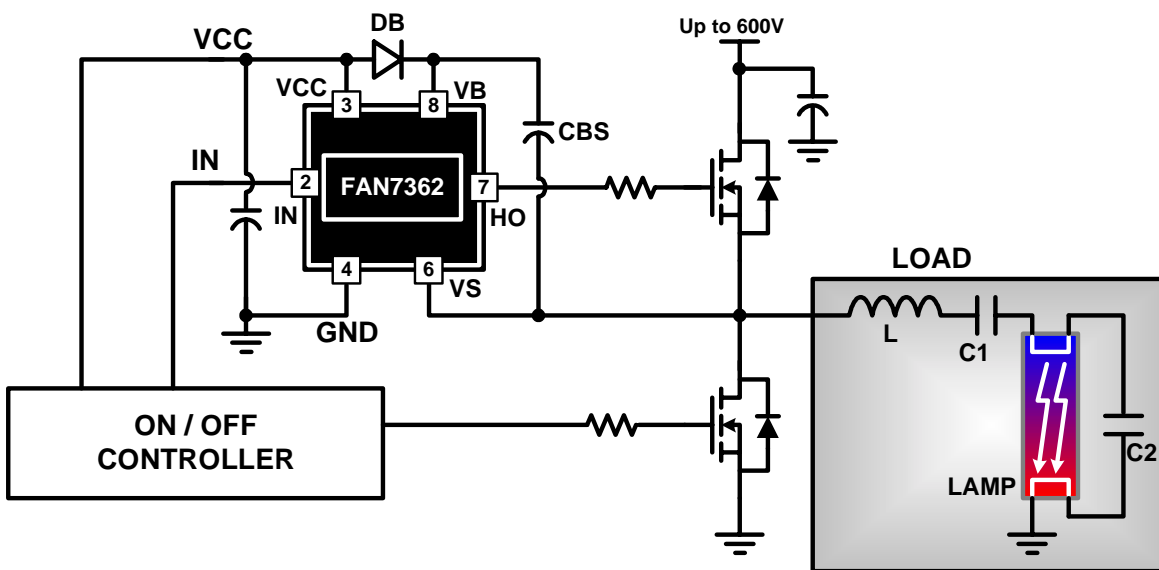


Fig. 8 Input/Output Timing Diagram

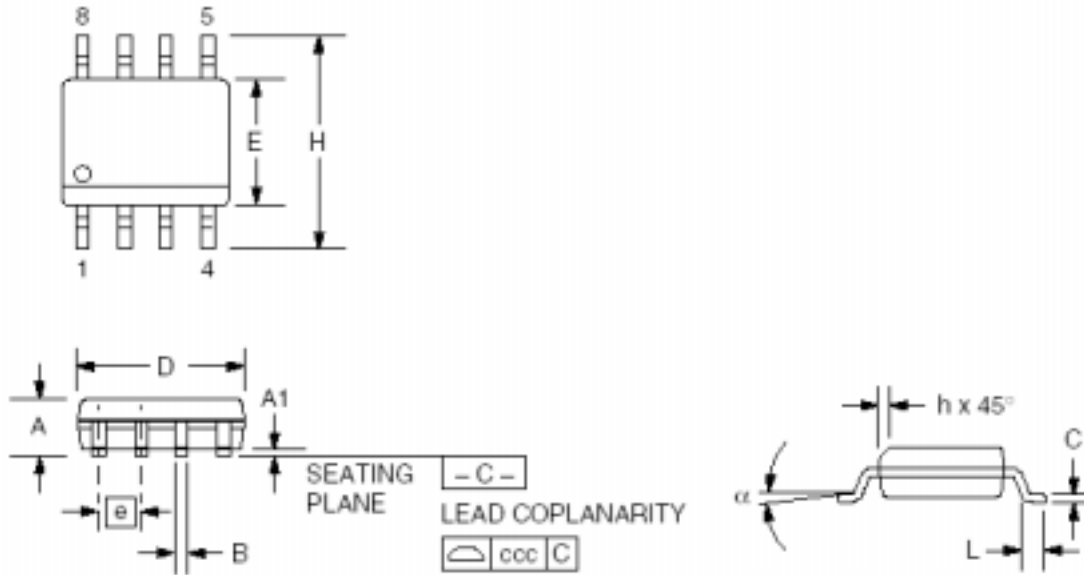
### Typical Application Circuit



## Mechanical Dimensions

### Package

# 8SOP



Symbol	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
A	.053	.069	1.35	1.75	
A1	.004	.010	0.10	0.25	
B	.013	.020	0.33	0.51	
C	.0075	.010	0.20	0.25	5
D	.189	.197	4.80	5.00	2
E	.150	.158	3.81	4.01	2
e	.050 BSC		1.27 BSC		
H	.228	.244	5.79	6.20	
h	.010	.020	0.25	0.50	
L	.016	.050	0.40	1.27	3
N	8		8		6
$\alpha$	0°	8°	0°	8°	
ccc	—	.004	—	0.10	

**Notes:**

1. Dimensioning and tolerancing per ANSI Y14.5M-1982.
2. "D" and "E" do not include mold flash. Mold flash or protrusions shall not exceed .010 inch (0.25mm).
3. "L" is the length of terminal for soldering to a substrate.
4. Terminal numbers are shown for reference only.
5. "C" dimension does not include solder finish thickness.
6. Symbol "N" is the maximum number of terminals.

**Ordering Information**

Device	Package	Operating Temperature	Packing
FAN7361M	8SOIC	-40°C ~ +125°C	Tube
FAN7361MX			Tape & Reel
FAN7362M			Tube
FAN7362MX			Tape & Reel



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CROSSVOLT™	FRFET™	MicroPak™	QST™	SyncFET™
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