FAIRCHILD SEMICONDUCTOR®

September 2005

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_S=-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.

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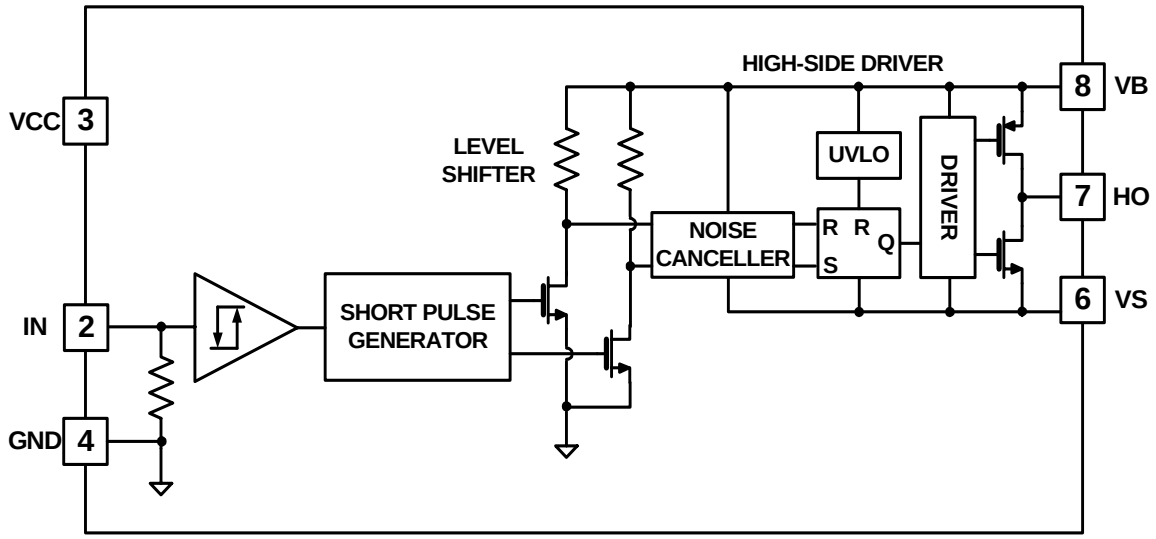
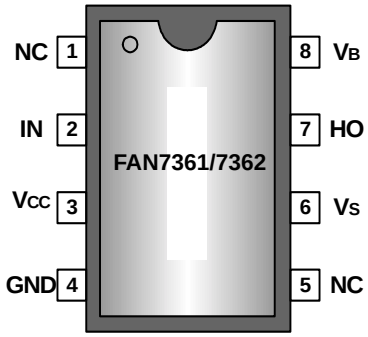
Block Diagrams



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
Highg 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	Vcc+0.3	
Allowable offset voltage slew rate	dVs/dt	-	± 50	V/ns
Power dissipation	P_D	-	0.625	W
Thermal resistance, junction to ambient	Rthja	-	200	°C/W
Junction temperature	T_J	-	150	°C
Storage temperature	T_S	-	150	°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-Vcc	600	
High side (HO) output voltage	V_{HO}	V_S	V_B	
Logic input voltage (IN)	V_{IN}	GND	Vcc	
Logic supply voltage	V_{CC}	10	20	
Ambient Temperature	T_A	-40	125	°C

ESD Level

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

Electrical Characteristics

(V_{BIAS}(V_{CC}, V_{BS})=15.0V, T_A = 25°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	µA
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, VB-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	µA
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 ≤ 10us	200	250	-	mA
Output low short circuit pulsed current	I_{O-}	V_{HO}=15V, V_{IN}=0V, PW ≤ 10us	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°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

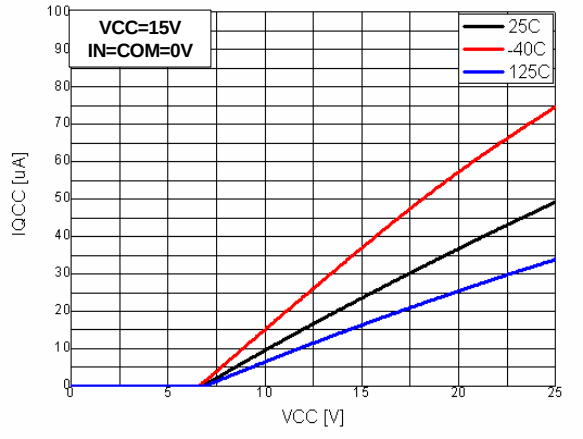


Fig. 1 IQCC vs. Supply Voltage

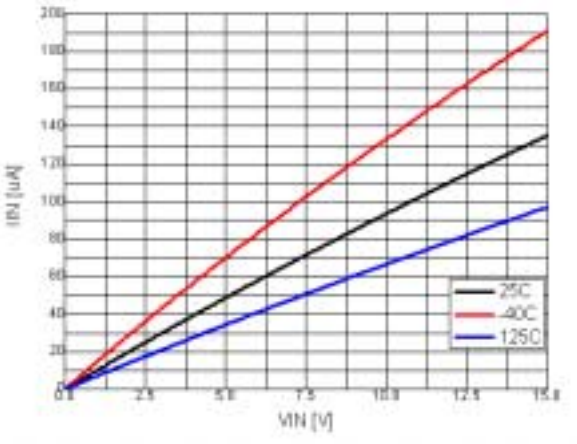


Fig. 2 Input Bias Current vs. Supply Voltage

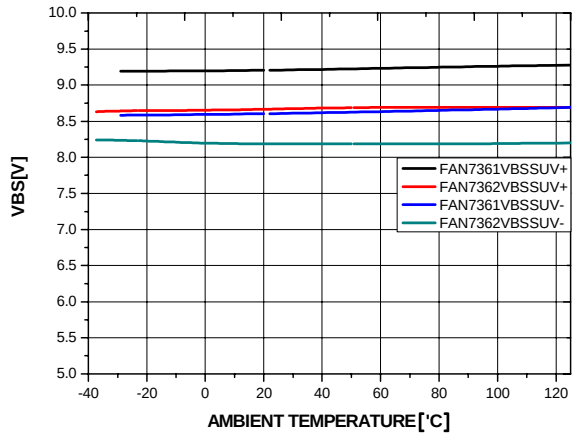


Fig. 3 VBS UVLO vs. Temperature

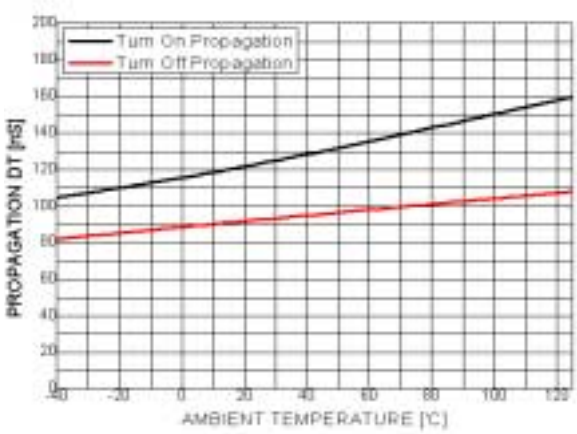


Fig. 4 Turn On/Off Propagation Time vs. Temperature

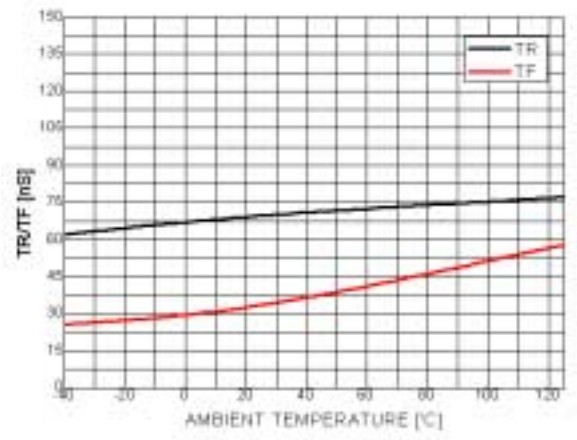


Fig. 5 Rising/Falling Time vs. Temperature

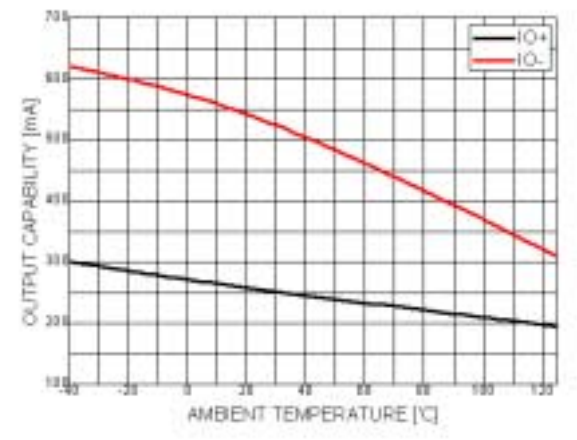


Fig. 6 Output Sinking/Sourcing Current vs. Temperature

Switching Time Definitions

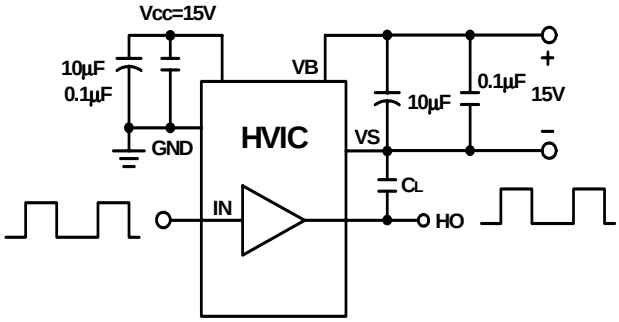


Fig. 7 Switching Time Test Circuit

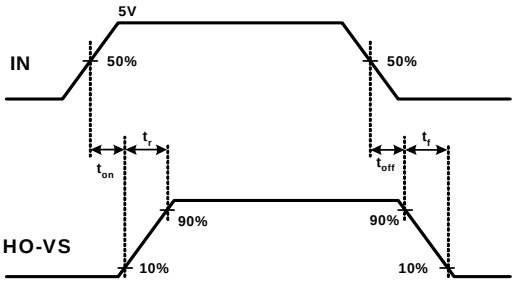
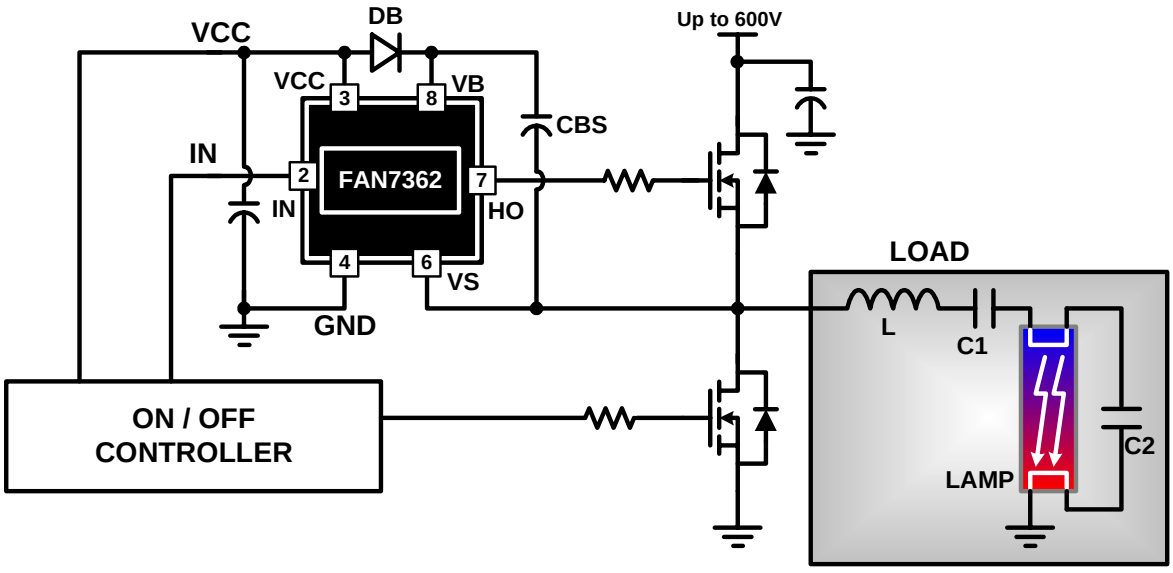


Fig. 8 Input/Output Timing Diagram

Typical Application Circuit



Mechanical Dimensions

Package

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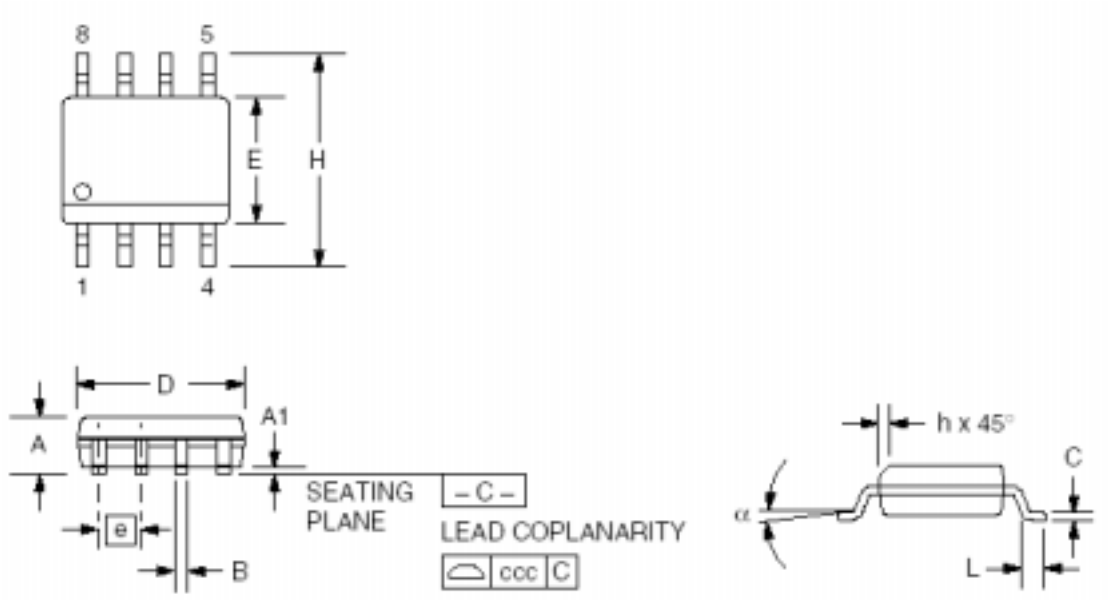

Symbol	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
A	.053	.069	1.35	1.75	
A1	.004	.010	0.10	0.25	
B	.013	.020	0.33	0.51	
C	.0075	.010	0.20	0.25	5
D	.189	.197	4.80	5.00	2
E	.150	.158	3.81	4.01	2
e	.050 BSC		1.27 BSC		
H	.228	.244	5.79	6.20	
h	.010	.020	0.25	0.50	
L	.016	.050	0.40	1.27	3
N	8		8		6
α	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™	QS™	SyncFET™
DOME™	GlobalOptoisolator™	MICROWIRE™	QT Optoelectronics™	TinyLogic®
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