FAIRCHILD SEMICONDUCTOR®

February 2007

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
- V_{CC} & V_{BS} Supply Range from 10V to 20V
- UVLO Function for V_{BS}
- Output In-phase with Input Signal
- 8-SOP

Applications

- PDP Scan Driver
- Motor Control
- SMPS
- Electronic Ballast

Description

The FAN7361/FAN7362, a monolithic high-side gate drive IC, can drive MOSFETs and IGBTs that operate up to +600V. Fairchild's high-voltage process and common-mode noise canceling techniques provide stable operation of the high-side driver under high dv/dt noise circumstances. An advanced level shift circuit offers 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.

8-SOP

Ordering Information

Part Number	Package	Pb-Free	Operating Temperature Range	Packing Method
FAN7361M(1)	8-SOP	Yes	-40°C ~ 125°C	TUBE
FAN7361MX(1)				TAPE & REEL
FAN7362M(1)				TUBE
FAN7362MX(1)				TAPE & REEL

Note:

1. These devices passed wave soldering test by JESD22A-111.

Typical Application Circuit

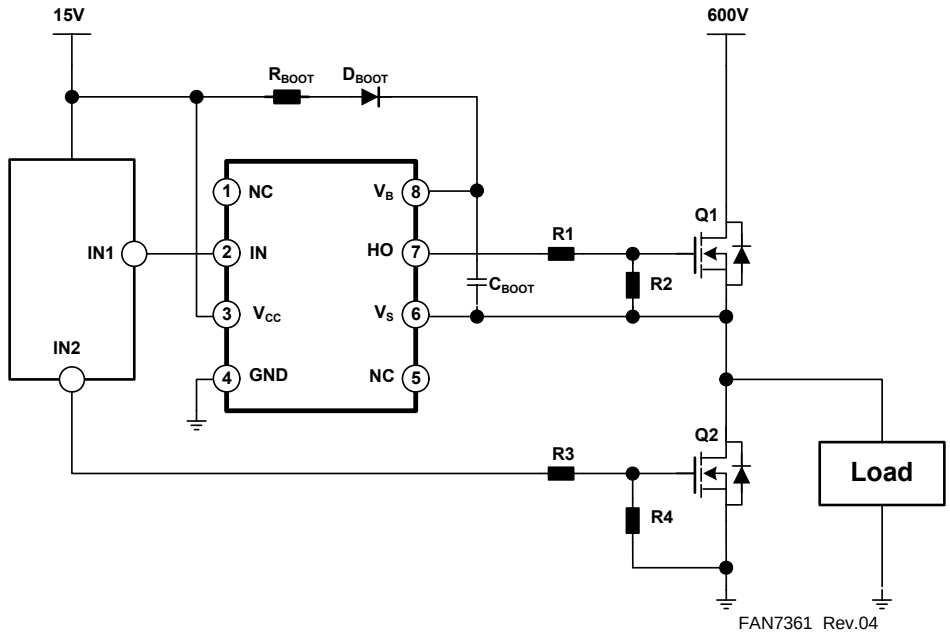

Figure 1. Typical Application Circuit

Internal Block Diagram

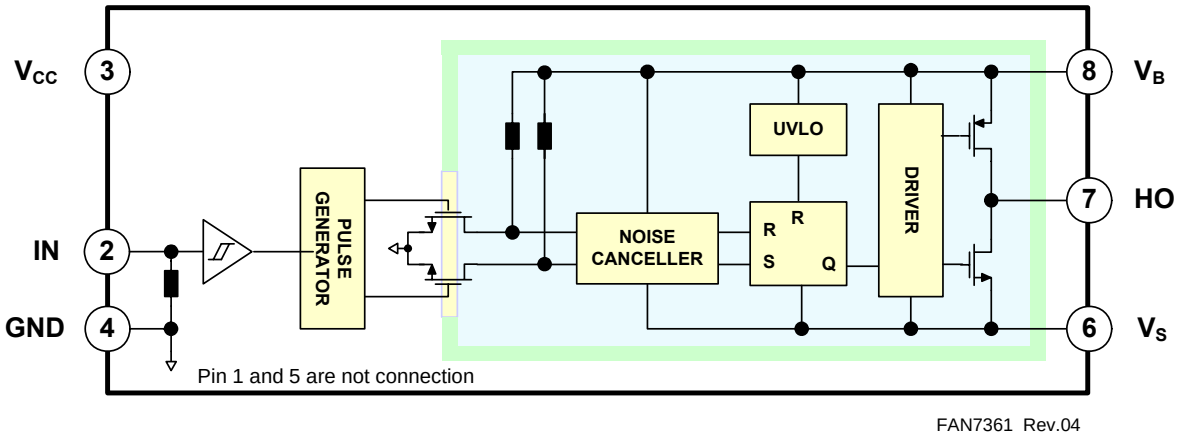

Figure 2. Functional Block Diagram

Pin Assignments

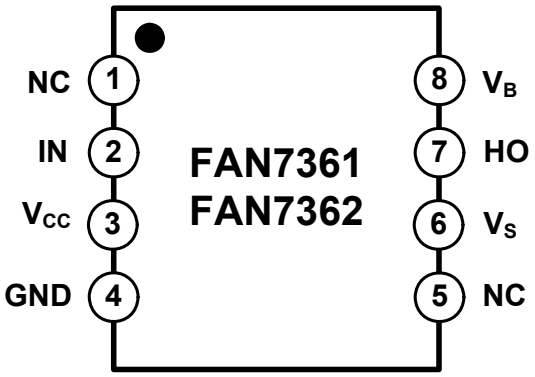

Figure 3. Pin Configuration (Top View)

Pin Definitions

Pin	Name	Function/ Description
1	N.C.	No Connection
2	IN	Logic Input for High-Side Gate Driver Output
3	V_{CC}	Supply Voltage
4	GND	Logic Ground
5	N.C.	No Connection
6	V_S	High-Voltage Floating Supply Return
7	HO	High-Side Driver Output
8	V_B	High-Side Floating Supply

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. T_A=25°C, unless otherwise specified.

Symbol	Characteristics	Min.	Max.	Unit
V_S	High-Side Offset Voltage	V_B-25	V_B+0.3	V
V_B	High-Side Floating Supply Voltage	-0.3	625	
V_{HO}	High-Side Floating Output Voltage	V_S-0.3	V_B+0.3	
V_{CC}	Logic Fixed Supply Voltage	-0.3	25	
V_{IN}	Logic Input Voltage	-0.3	V_{CC}+0.3	
dV_S/dt	Allowable Offset Voltage Slew Rate		± 50	V/ns
P_D[(2)(3)(4)]	Power Dissipation		0.625	W
θ_{JA}	Thermal Resistance, Junction-to-Ambient		200	°C/W
T_J	Junction Temperature		150	°C
T_S	Storage Temperature		150	°C

Notes:

2. Mounted on 76.2 x 114.3 x 1.6mm PCB (FR-4 glass epoxy material).
3. Refer to the following standards:
   JESD51-2: Integral circuits thermal test method environmental conditions - Natural convection
   JESD51-3: Low effective thermal conductivity test board for leaded surface mount packages
4. Do not exceed P_D under any circumstances.

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Min.	Max.	Unit
V_B	High-Side Floating Supply Voltage	V_S+10	V_S+20	V
V_S	High-Side Floating Supply Offset Voltage	6-V_{CC}	600	
V_{HO}	High-Side Output Voltage	V_S	V_B	
V_{IN}	Logic Input Voltage	GND	V_{CC}	
V_{CC}	Logic Supply Voltage	10	20	
T_A	Ambient Temperature	-40	125	°C

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 and are applicable to the respective output HO.

Symbol	Characteristics	Test Condition		Min.	Typ.	Max.	Unit
V_{BSUV+}	V_{BS} Supply Under-Voltage Positive Going Threshold	V_{IN}=0V	FAN7361	8.2	9.2	10.2	V
			FAN7362	7.6	8.6	9.6	
V_{BSUV-}	V_{BS} Supply Under-Voltage Negative Going Threshold	V_{IN}=0V	FAN7361	7.4	8.6	9.2	
			FAN7362	7.2	8.2	9.2	
V_{BSHYS}	V_{BS} Supply Under-Current Lockout Hysteresis	V_{IN}=0V	FAN7361		0.5		
			FAN7362		0.4		
I_{LK}	Offset Supply Leakage Current	V_B=V_S=600V				10	µA
I_{QBS}	Quiescent V_{BS} Supply Current	V_{IN}=0V or 5V			50	80	
I_{QCC}	Quiescent V_{CC} Supply Current	V_{IN}=0V			30	75	
I_{PBS}	Operating V_{BS} Supply Current	C_L=1nF, f=10kHz			420	550	
V_{IH}	Logic "1" Input Voltage		FAN7361	3.6			V
			FAN7362	2.9			
V_{IL}	Logic "0" Input Voltage		FAN7361			1.0	
			FAN7362			0.8	
V_{OH}	High Level Output Voltage, V_B-V_{HO}	No load				0.1	
V_{OL}	Low Level Output Voltage, V_{HO}	No load				0.1	
I_{IN+}	Logic "1" Input Bias Current	V_{IN}=5V			50	90	µA
I_{IN-}	Logic "0" Input Bias Current	V_{IN}=0V			1.0	2.0	
I_{O+}	Output High Short Circuit Pulse Current	V_{HO}=0V, V_{IN}=5V, PW ≤ 10µs		200	250		mA
I_{O-}	Output Low Short Circuit Pulse Current	V_{HO}=15V, V_{IN}=0V,PW ≤ 10µs		400	500		
V_S	Allowable Negative V_S Pin Voltage for IN Signal Propagation to HO				-9.8	-7.0	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.

Symbol	Characteristics	Test Condition	Min.	Typ.	Max.	Unit
t_{on}	Turn-on Propagation Delay	V_S=0V		120	200	ns
t_{off}	Turn-off Propagation Delay	V_S=0V or 600V(5)		90	180	
t_r	Turn-on Rise Time			70	160	
t_f	Turn-off Fall Time			30	100	

Note:

5. This parameter guaranteed by design.

Typical Characteristics

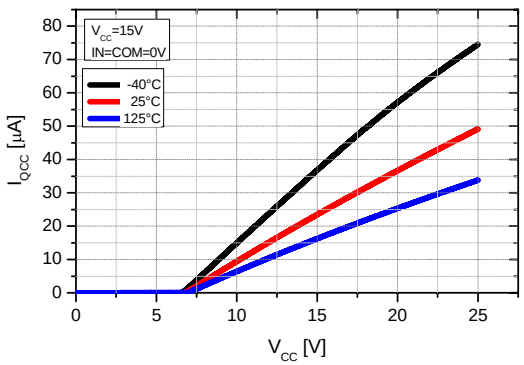

Figure 4. I_{QCC} vs. Supply Voltage

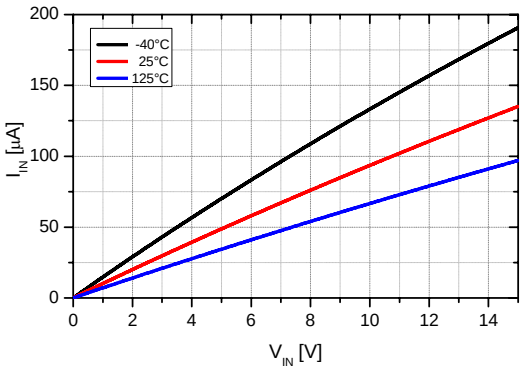

Figure 5. Input Bias Current vs. Input Voltage

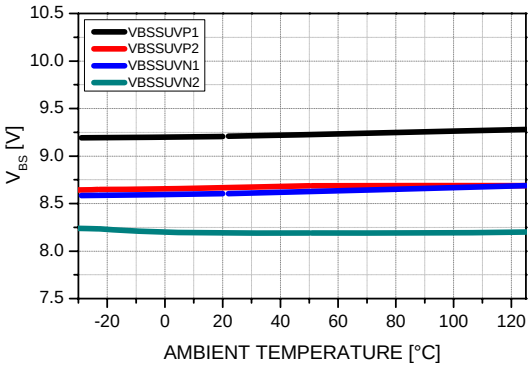

Figure 6. V_{BS} UVLO vs. Temp.

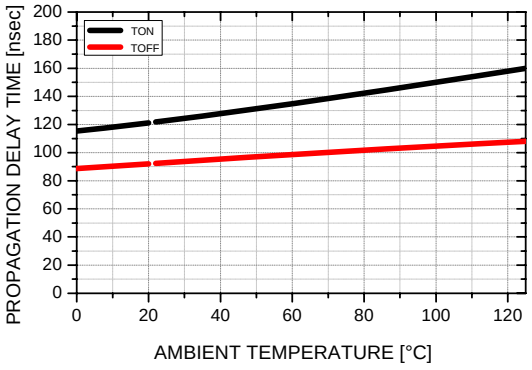

Figure 7. Turn On/Off Propagation Time vs. Temp.

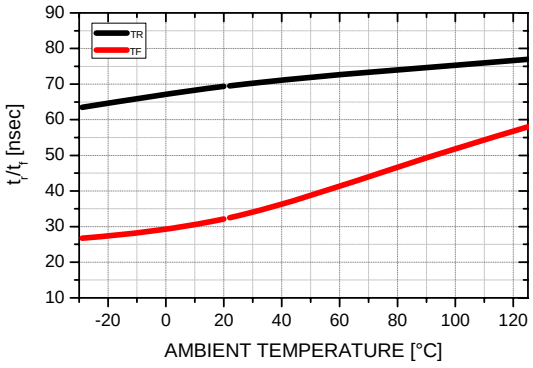

Figure 8. Rising/Falling Time vs. Temp.

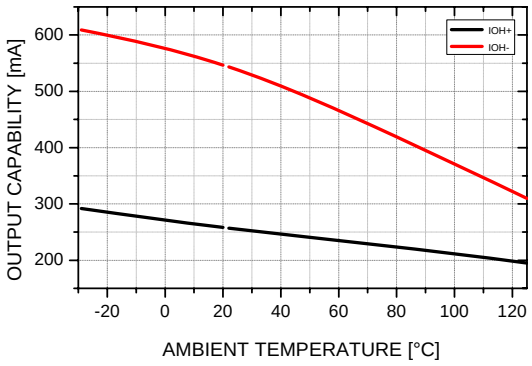

Figure 9. Output Sinking/Sourcing Current vs. Temp.

Switching Time Definition

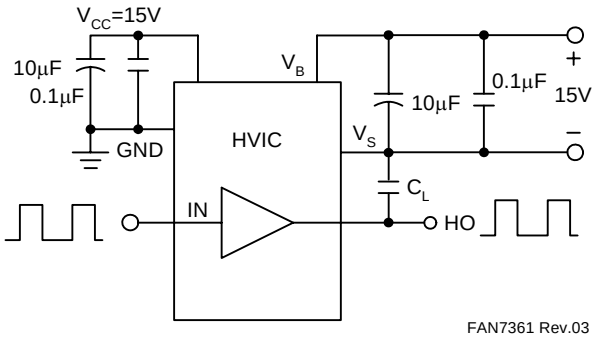

Figure 10. Switching Time Test Circuit

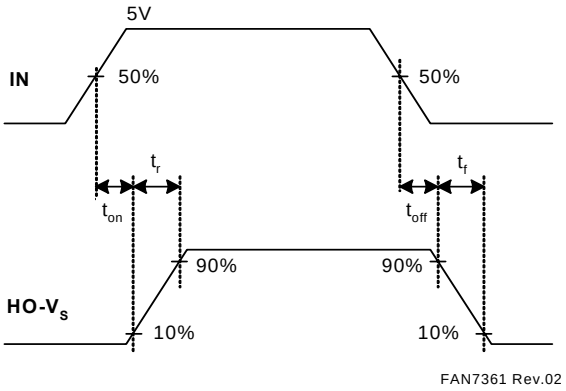

Figure 11. Input / Output Timing Diagram

Mechanical Dimensions

8-SOP

Dimensions are in millimeters (inches) unless otherwise noted.

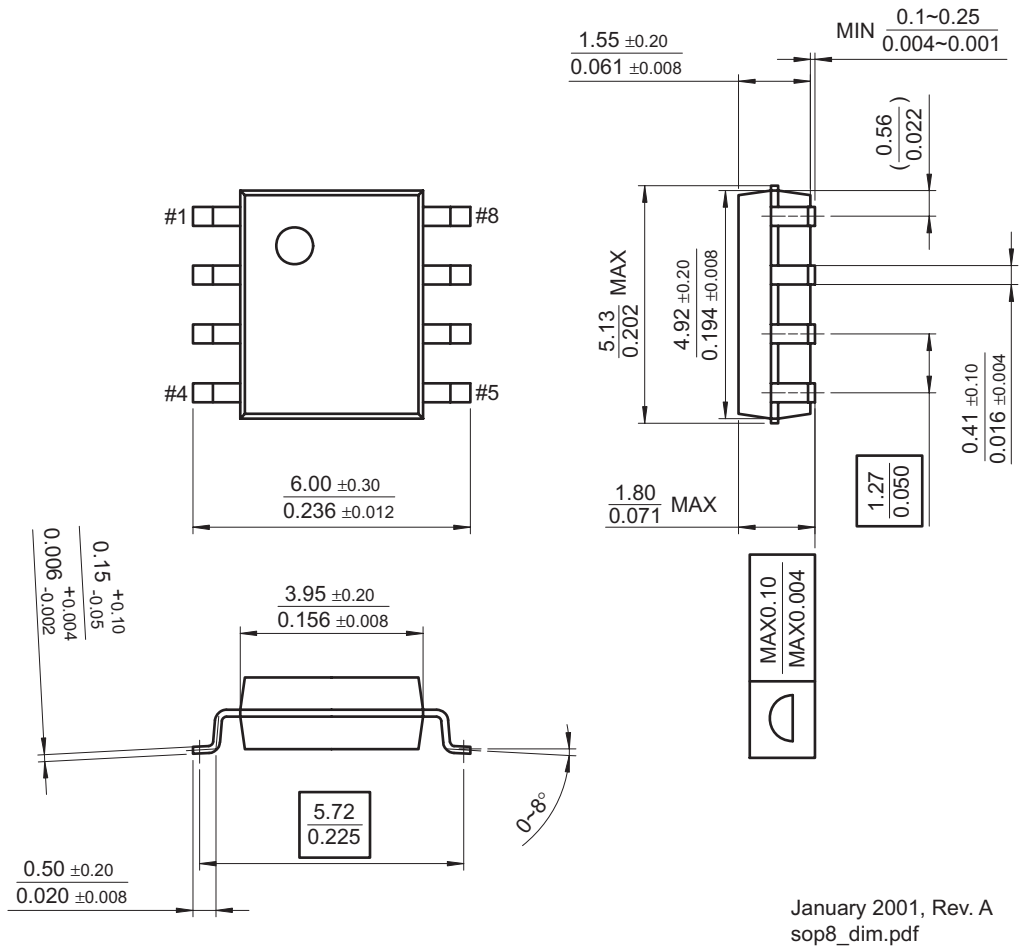

Figure 12. 8-Lead Small Outline Package (SOP)

FAIRCHILD SEMICONDUCTOR®

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACEx®
Across the board. Around the world.™
ActiveArray™
Bottomless™
Build it Now™
CoolFET™
CROSSVOLT™
CTL™
Current Transfer Logic™
DOME™
E^2CMOS™
EcoSPARK®
EnSigna™
FACT Quiet Series™
FACT®
FAST®
FASTr™
FPS™
FRFET®
GlobalOptoisolator™
GTO™
HiSeC™
i-Lo™
ImpliedDisconnect™
IntelliMAX™
ISOPLANAR™
MICROCOUPLER™
MicroPak™
MICROWIRE™
MSX™
MSXPro™
OCX™
OCXPro™
OPTOLOGIC®
OPTOPLANAR®
PACMAN™
POP™
Power220®
Power247®
PowerEdge™
PowerSaver™
PowerTrench®
Programmable Active Droop™
QFET®
QS™
QT Optoelectronics™
Quiet Series™
RapidConfigure™
RapidConnect™
ScalarPump™
SMART START™
SPM®
SuperFET™
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
TCM™
The Power Franchise®
™
TinyBoost™
TinyBuck™
TinyLogic®
TINYOPTO™
TinyPower™
TinyWire™
TruTranslation™
μSerDes™
UHC®
UniFET™
VCX™
Wire™

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild Semiconductor. The datasheet is printed for reference information only.

Rev. I23