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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	Operating Temperature Range	Eco Status	Packing Method
FAN7361M ⁽¹⁾	8-SOP	-40°C ~ 125°C	RoHS	Tube
FAN7361MX ⁽¹⁾				Tape & Reel
FAN7362M ⁽¹⁾				Tube
FAN7362MX ⁽¹⁾				Tape & Reel

Note:

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



For Fairchild's definition of Eco Status, please visit: http://www.fairchildsemi.com/company/green/rohs_green.html.

Typical Application Circuit

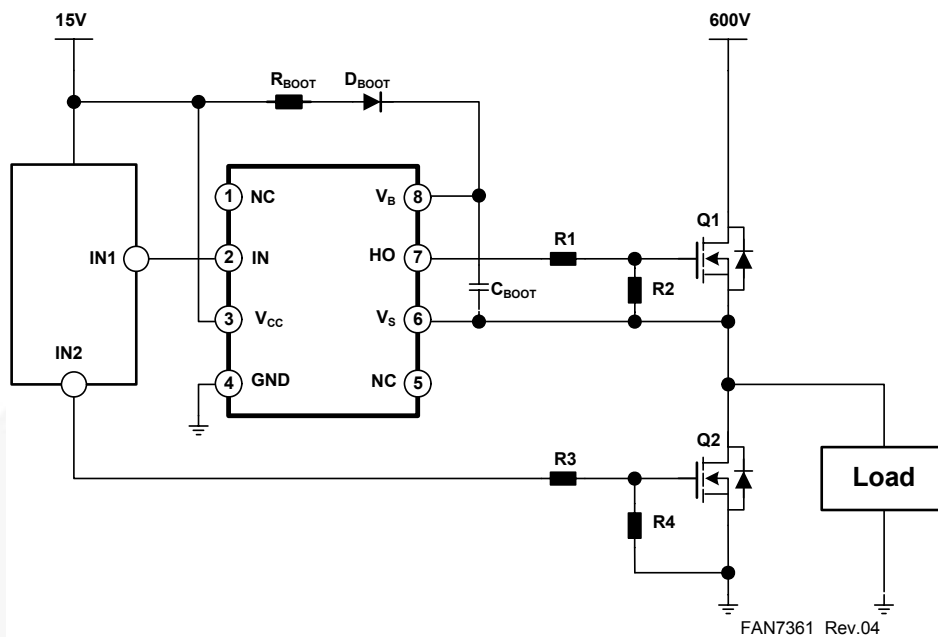


Figure 1. Typical Application Circuit

Internal Block Diagram

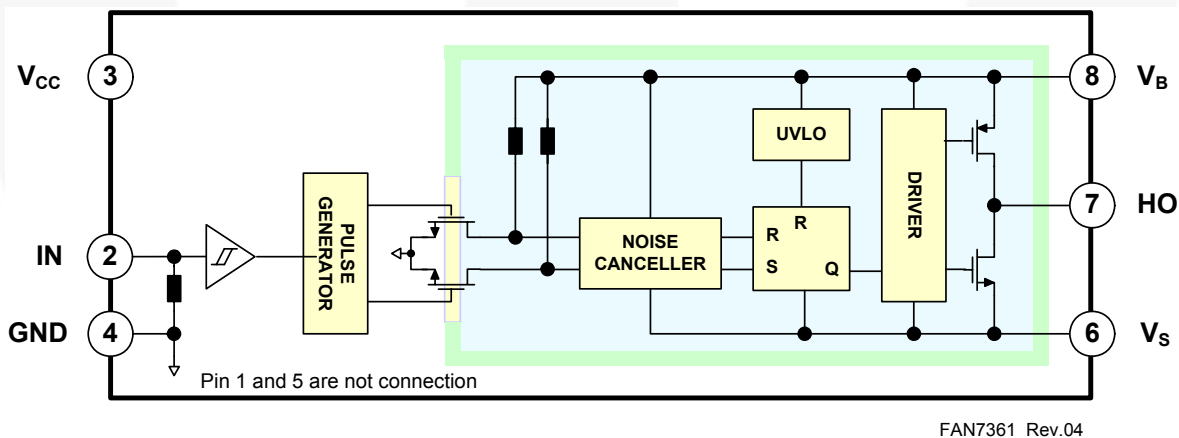
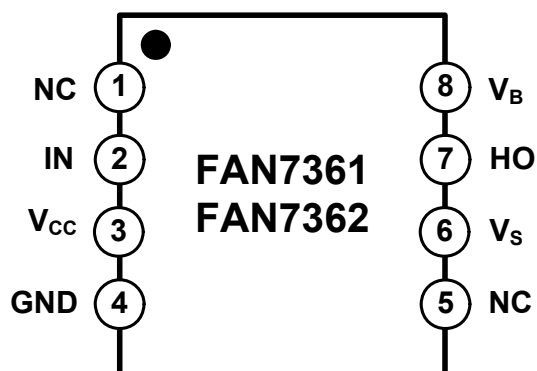


Figure 2. Functional Block Diagram

Pin Assignments



FAN7361 Rev.04

Figure 3. Pin Configuration (Top View)

Pin Definitions

Pin	Name	Function/ Description
1	NC	No Connection
2	IN	Logic Input for High-Side Gate Driver Output
3	V _{CC}	Supply Voltage
4	GND	Logic Ground
5	NC	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. $T_A=25^{\circ}\text{C}$, 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	$^{\circ}\text{C/W}$
T_J	Junction Temperature		+150	$^{\circ}\text{C}$
T_S	Storage Temperature		+150	$^{\circ}\text{C}$
T_A	Ambient Temperature	-40	+125	$^{\circ}\text{C}$

Notes:

- Mounted on 76.2 x 114.3 x 1.6mm PCB (FR-4 glass epoxy material).
- 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
- 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	

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 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	$V_{BS}=\text{Sweep}$	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	$V_{BS}=\text{Sweep}$	FAN7361	7.4	8.6	9.2	
			FAN7362	7.2	8.2	9.2	
V_{BSHYS}	V_{BS} Supply Under-Current Lockout Hysteresis	$V_{BS}=\text{Sweep}$	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	$V_{HO}=0V$, $V_{IN}=5V$, $PW \leq 10\mu s$		200	250		mA
I_{O-}	Output Low Short Circuit Pulse Current	$V_{HO}=15V$, $V_{IN}=0V$, $PW \leq 10\mu s$		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 $T_A = 25^\circ C$, 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 ⁽⁵⁾	$V_S=0V$ or $600V$		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

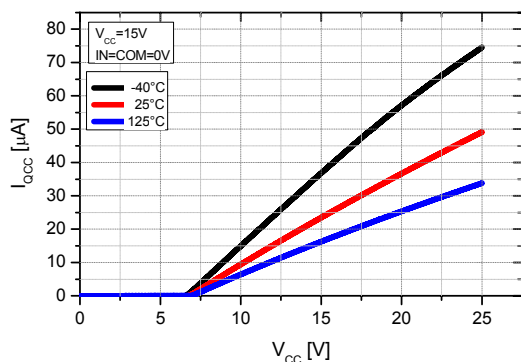


Figure 4. I_{QCC} vs. Supply Voltage

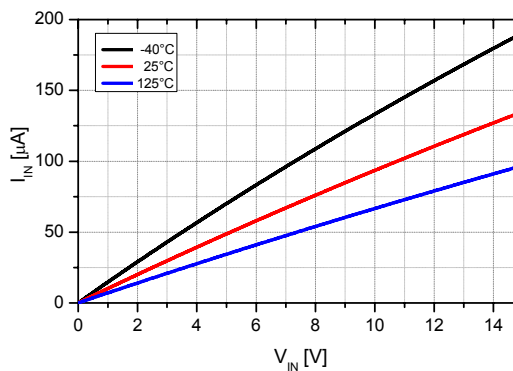


Figure 5. Input Bias Current vs. Input Voltage

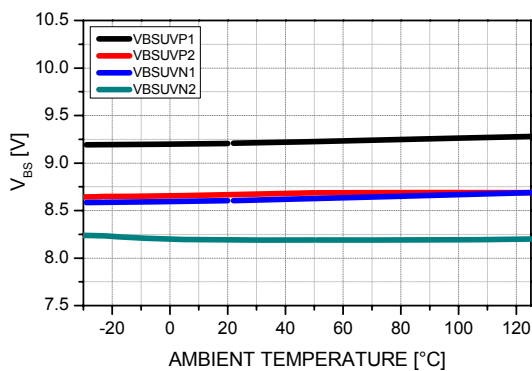


Figure 6. V_{BS} UVLO vs. Temp.

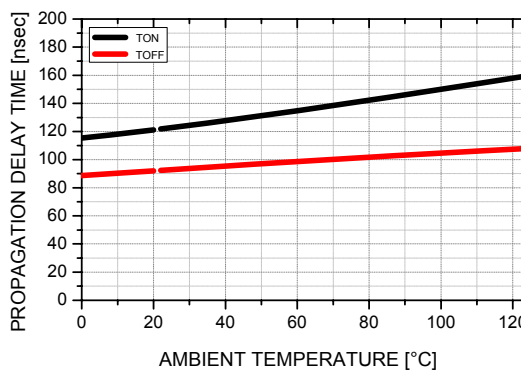


Figure 7. Turn On/Off Propagation Time vs. Temp.

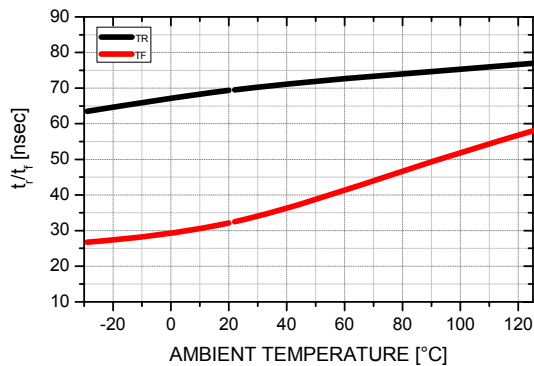


Figure 8. Rising/Falling Time vs. Temp.

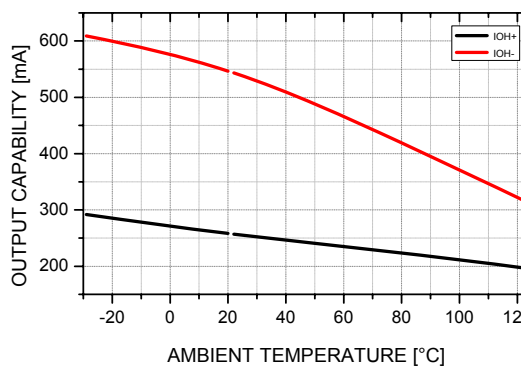
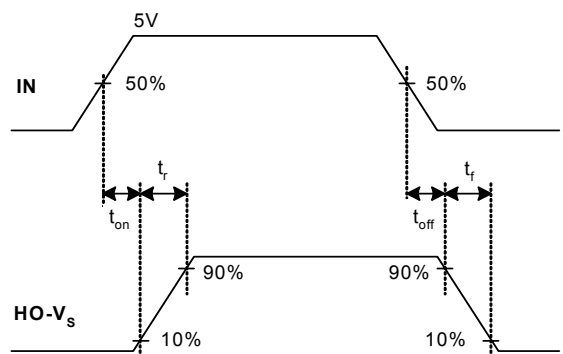


Figure 9. Output Sinking/Sourcing Current vs. Temp.

The schematic diagram shows an inverter circuit. The input **IN** is connected to a square wave source. The output **HO** is connected to a load capacitor C_L and a 15V source through a $0.1\mu\text{F}$ capacitor. The circuit includes a $10\mu\text{F}$ capacitor and a $0.1\mu\text{F}$ capacitor connected to $V_{CC}=15\text{V}$ and **GND**. The output voltage is labeled V_B and V_S .



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