



**Is Now Part of**



**ON Semiconductor®**

**To learn more about ON Semiconductor, please visit our website at**  
**[www.onsemi.com](http://www.onsemi.com)**

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (\_), the underscore (\_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (\_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at [www.onsemi.com](http://www.onsemi.com). Please email any questions regarding the system integration to [Fairchild\\_questions@onsemi.com](mailto:Fairchild_questions@onsemi.com).

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

# 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 <sup>(1)</sup>	8-SOP	-40°C ~ 125°C	RoHS	Tube
FAN7361MX <sup>(1)</sup>				Tape & Reel
FAN7362M <sup>(1)</sup>				Tube
FAN7362MX <sup>(1)</sup>				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](http://www.fairchildsemi.com/company/green/rohs_green.html).

## Typical Application Circuit

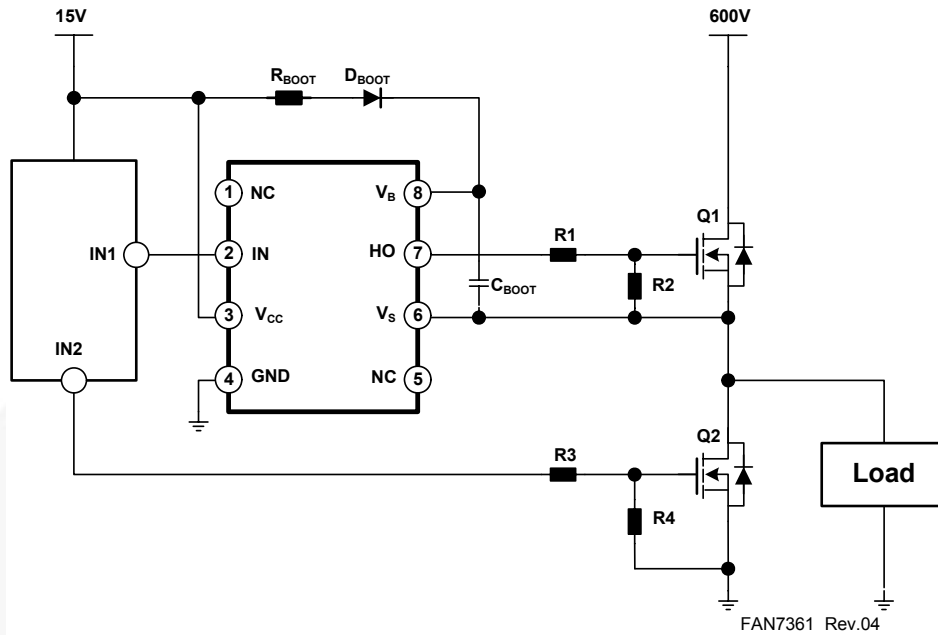


Figure 1. Typical Application Circuit

## Internal Block Diagram

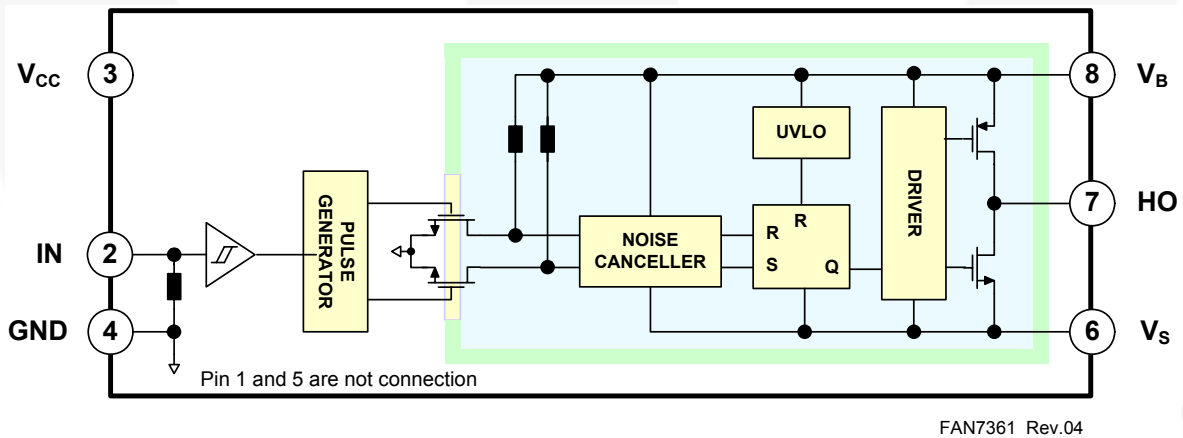
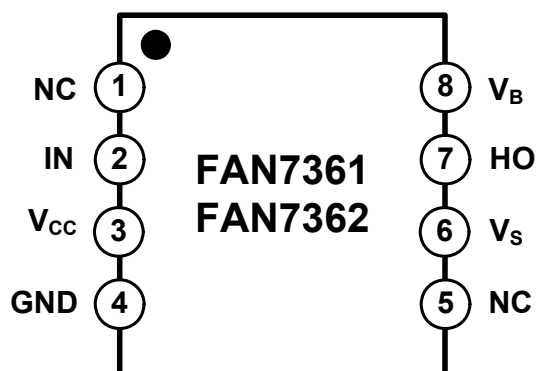


Figure 2. Functional Block Diagram

## 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 <sub>CC</sub>	Supply Voltage
4	GND	Logic Ground
5	NC	No Connection
6	V <sub>S</sub>	High-Voltage Floating Supply Return
7	HO	High-Side Driver Output
8	V <sub>B</sub>	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		$\pm 50$	V/ns
$P_D^{(2)(3)(4)}$	Power Dissipation		0.625	W
$\theta_{JA}$	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	$\mu A$
$I_{QBS}$	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	$\mu A$
$I_{IN-}$	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 <sup>(5)</sup>	$V_S=0V$ 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

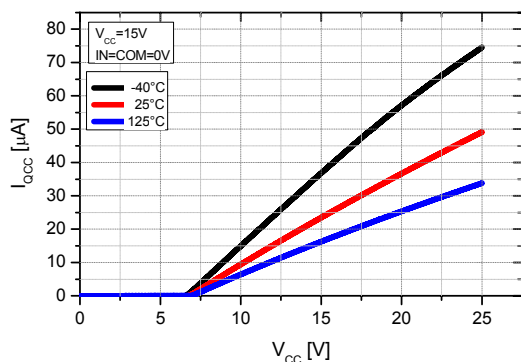


Figure 4.  $I_{QCC}$  vs. Supply Voltage

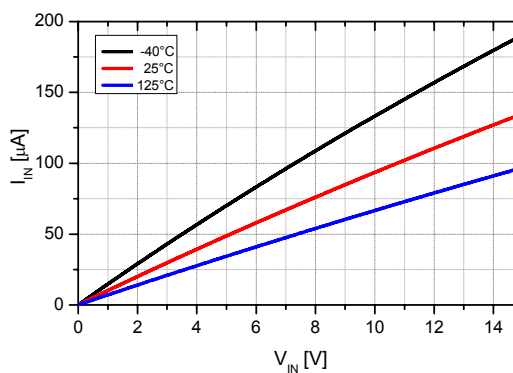


Figure 5. Input Bias Current vs. Input Voltage

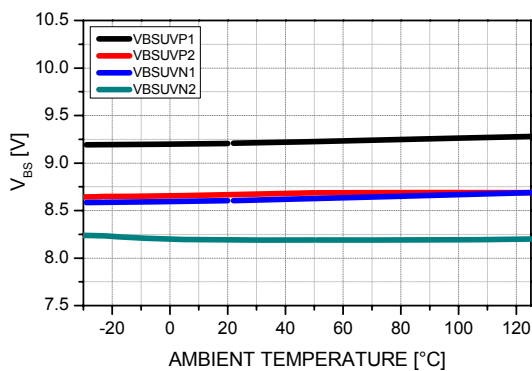


Figure 6.  $V_{BS}$  UVLO vs. Temp.

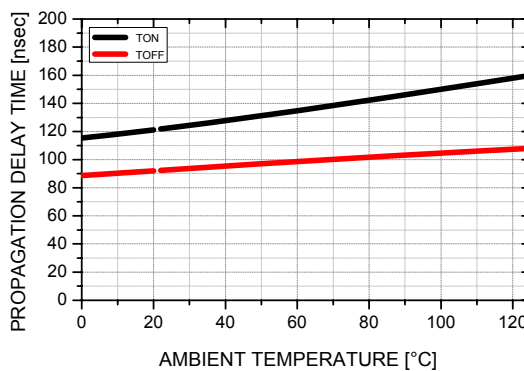


Figure 7. Turn On/Off Propagation Time vs. Temp.

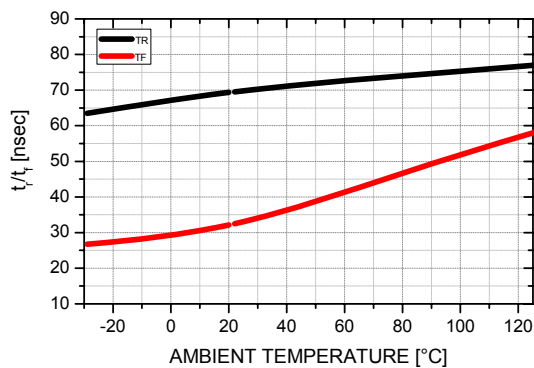


Figure 8. Rising/Falling Time vs. Temp.

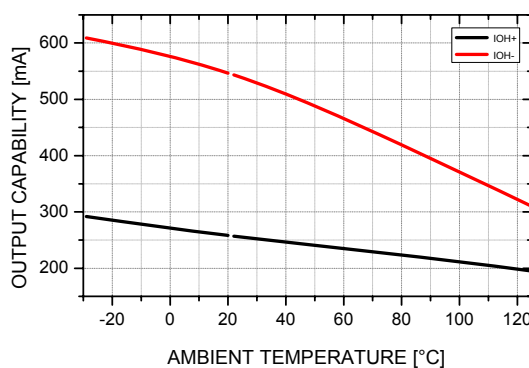
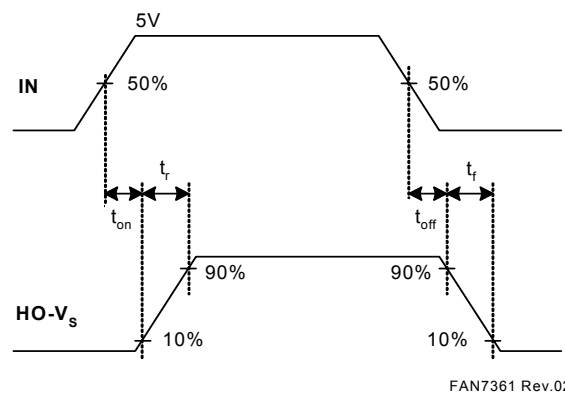


Figure 9. Output Sinking/Sourcing Current vs. Temp.









ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada

**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910

**Japan Customer Focus Center**  
Phone: 81-3-5817-1050

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)

**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local  
Sales Representative