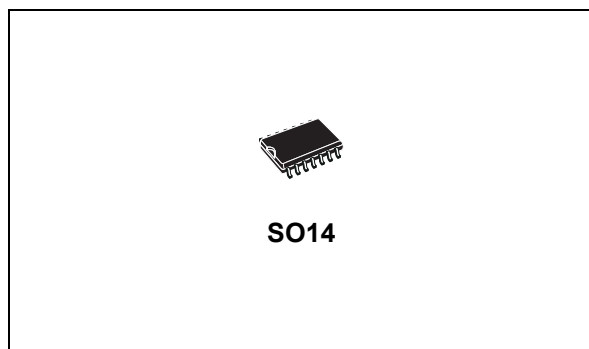




- ESD performance
 - HBM: 1 kV
 - MM: 200 V
 - CDM: 1 kV

Applications

- Automotive
- Industrial
- Computer
- Consumer

Features

- Medium-speed operation
 $t_{PD} = 30 \text{ ns}$ (typ.) at 10 V
- Standardized symmetrical output characteristics
- Quiescent current specified up to 20 V
- 5 V, 10 V, and 15 V parametric ratings
- Input leakage current $I_I = 100 \text{ nA}$ (max.) at $V_{DD} = 18 \text{ V}$ and $T_A = 25^\circ \text{C}$
- 100 % tested for quiescent current

Description

The HCF4069U is a monolithic integrated circuit fabricated in metal oxide semiconductor technology available in the SO14 package. The HCF4069U consists of six COS/MOS inverter circuits. This device is intended for all general purpose inverter applications where the medium power TTL-drive and logic level conversion capabilities of circuits such as HCF4049 hex inverter/buffers are not required.

Table 1. Device summary table

Order code	Temperature range	Package	Packing	Marking
HCF4069UM013TR	-55 ° C to +125 ° C	SO14	Tape and reel	HCF4069U
HCF4069YUM013TR (1)	-40 ° C to +125 ° C	SO14 (automotive grade) ⁽¹⁾		HCF4069Y

1. Qualification and characterization according to AEC Q100 and Q003 or equivalent, advanced screening according to AEC Q001 & Q002 or equivalent.

Contents

1 **Pin information** 3

2 **Functional description** 4

3 **Electrical characteristics** 5

4 **Package information** 8

 4.1 SO14 package information 9

5 **Ordering information** 10

6 **Revision history** 10



1 Pin information

Figure 1. Pin connections (top view)

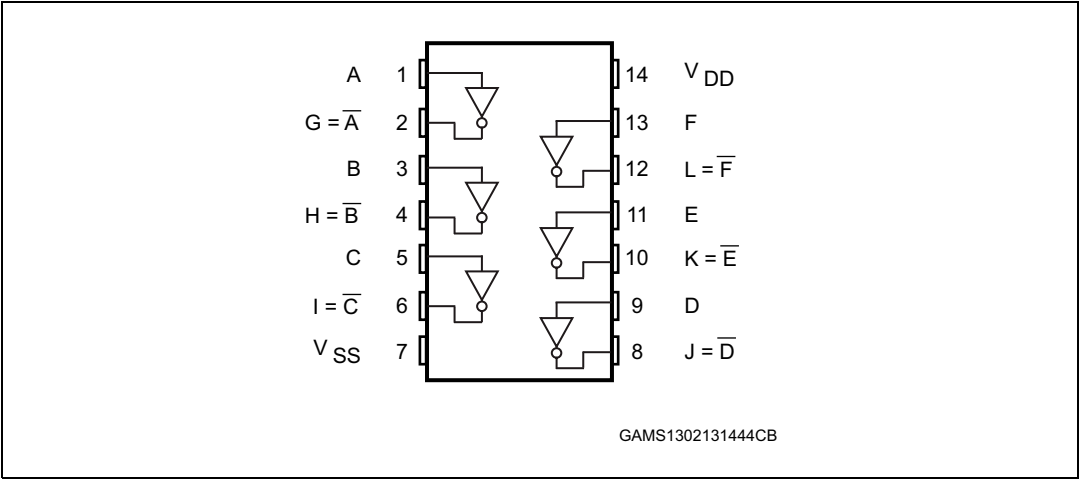


Table 2. Pin description

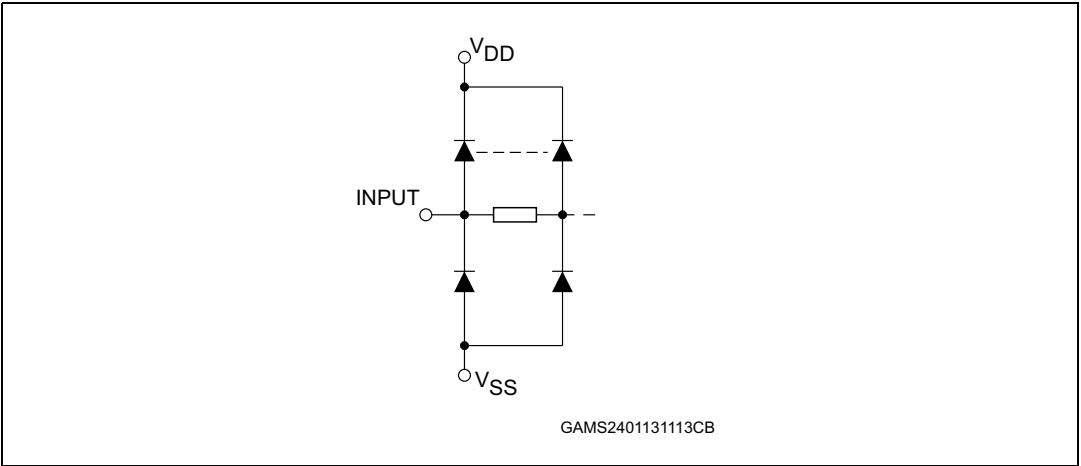
Pin no	Symbol	Name and function
1, 3, 5, 9, 11, 13	A, B, C, D, E, F	Data inputs
2, 4, 6, 8, 10, 12	G, H, I, J, K, L	Data outputs
7	V_{SS}	Negative supply voltage
14	V_{DD}	Positive supply voltage

2 Functional description

Table 3. Truth table

Inputs	Outputs
A, B, C, D, E, F	G, H, I, J, K, L
L	H
H	L

Figure 2. Input equivalent circuit



3 Electrical characteristics

Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. All voltage values are referred to V_{SS} pin voltage.

Table 4. Absolute maximum ratings (AMR)

Symbol	Parameter	Value	Unit
V_{DD}	Supply voltage	-0.5 to +22	V
V_I	DC input voltage	-0.5 to $V_{DD} + 0.5$	
I_I	DC input current	± 10	mA
P_D	Power dissipation per package	200	mW
	Power dissipation per output transistor	100	
T_{op}	Operating temperature	-55 to +125	°C
T_{stg}	Storage temperature	-65 to +150	

Table 5. Recommended operating conditions

Symbol	Parameter	Value	Unit
V_{DD}	Supply voltage	3 to 20	V
V_I	Input voltage	0 to V_{DD}	
T_{op}	Operating temperature	-55 to 125	°C

Table 6. DC specifications⁽¹⁾

Sym.	Parameter	Test condition				Value								Unit
		V _I (V)	V _O (V)	I _O (μA)	V _{DD} (V)	T _A = 25 °C			-40 to 85 °C		-55 to 125 °C			
						Min.	Typ.	Max.	Min.	Max.	Min.	Max.		
I _L	Quiescent current	0/5			5		0.01	0.25		7.5		7.5	μA	
		0/10			10			0.5		15		15		
		0/15			15			1		30		30		
		0/20			20		0.02	5		150		150		
V _{OH}	High level output voltage	0/5	<1	5	4.95			4.95		4.95		V		
		0/10		10	9.95		9.95		9.95					
		0/15		15	14.95		14.95		14.95					
V _{OL}	Low level output voltage	5/0	<1	5		0.05			0.05		0.05			
		10/0		10										
		15/0		15										
V _{IH}	High level input voltage		<1	5	4			4		4				
				10	8		8		8					
				15	12.5		12.5		12.5					
V _{IL}	Low level input voltage		<1	5			1		1		1			
				10		2		2		2				
				15		2.5		2.5		2.5				
I _{OH}	Output drive current	0/5	2.5	<1	5	-1.36	-3.2		-1.15		-1.1			
			4.6			-0.44	-1		-0.36		-0.36			
		0/10	9.5		10	-1.1	-2.6		-0.9		-0.9			
		0/15	13.5		15	-3.0	-6.8		-2.4		-2.4			
I _{OL}	Output sink current	0/5	0.4	<1	5	0.44	1		0.36		0.36			
		0/10	0.5		10	1.1	2.6		0.9		0.9			
		0/15	1.5		15	3.0	6.8		2.4		2.4			
I _I	Input leakage current	0/18	Any input		18		±10 ⁻⁵	±0.1		±1		±1	μA	
C _I	Input capacitance		Any input				5	7.5					pF	

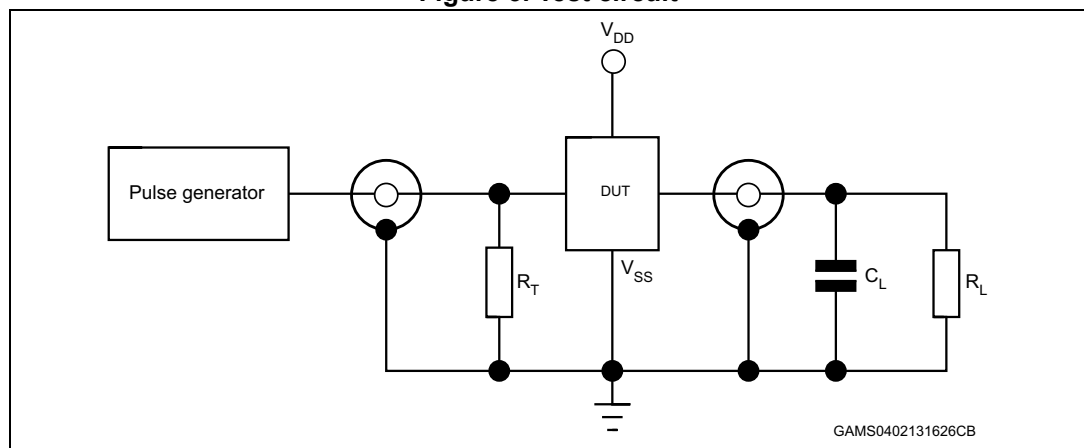
1. The noise margin for both level "1" and "0" is: 1 V min. with V_{DD} = 5 V, 2 V min. with V_{DD} = 10 V, and 2.5 V min. with V_{DD} = 15 V.

Table 7. Dynamic electrical characteristics
 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, $C_L = 50\text{ pF}$, $R_L = 200\text{ k}\Omega$, $t_r = t_f = 20\text{ ns}$)

Symbol	Parameter	Test condition	Value ⁽¹⁾		Unit
		V_{DD} (V)	Typ.	Max.	
t_{PLH} , t_{PHL}	Propagation delay time	5	55	110	ns
		10	30	60	
		15	25	50	
t_{TLH} , t_{THL}	Output transition time	5	100	200	
		10	50	100	
		15	40	80	

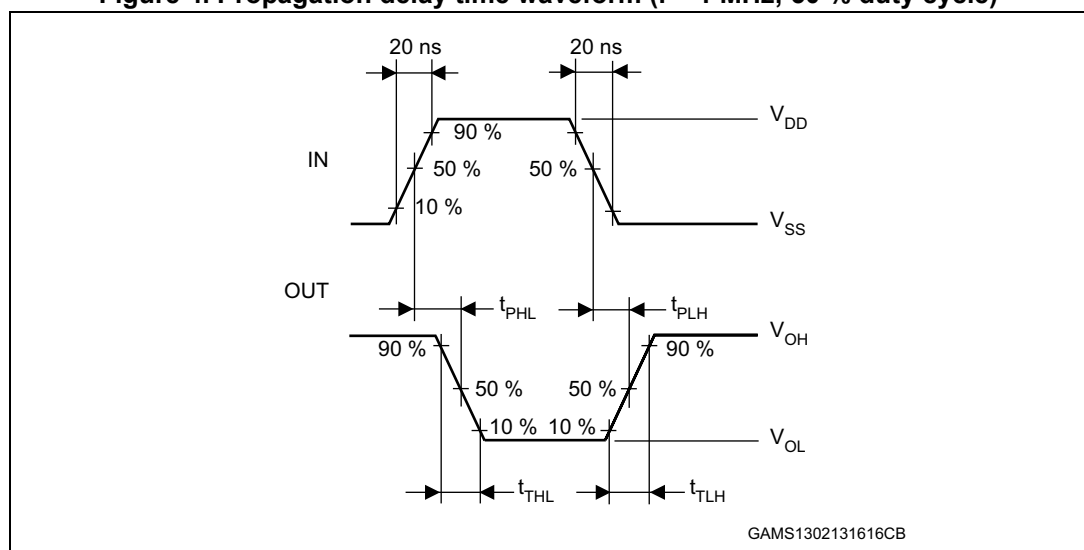
1. The typical temperature coefficient for all V_{DD} values is 0.3 %/°C.

Figure 3. Test circuit



1. Legend: $C_L = 50\text{ pF}$ or equivalent (includes jig and probe capacitance), $R_L = 200\text{ k}\Omega$, $R_T = Z_{OUT}$ of pulse generator (typically $50\text{ }\Omega$)

Figure 4. Propagation delay time waveform ($f = 1\text{ MHz}$; 50 % duty cycle)



4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: www.st.com. ECOPACK[®] is an ST trademark.

4.1 SO14 package information

Figure 5. SO14 package mechanical drawing

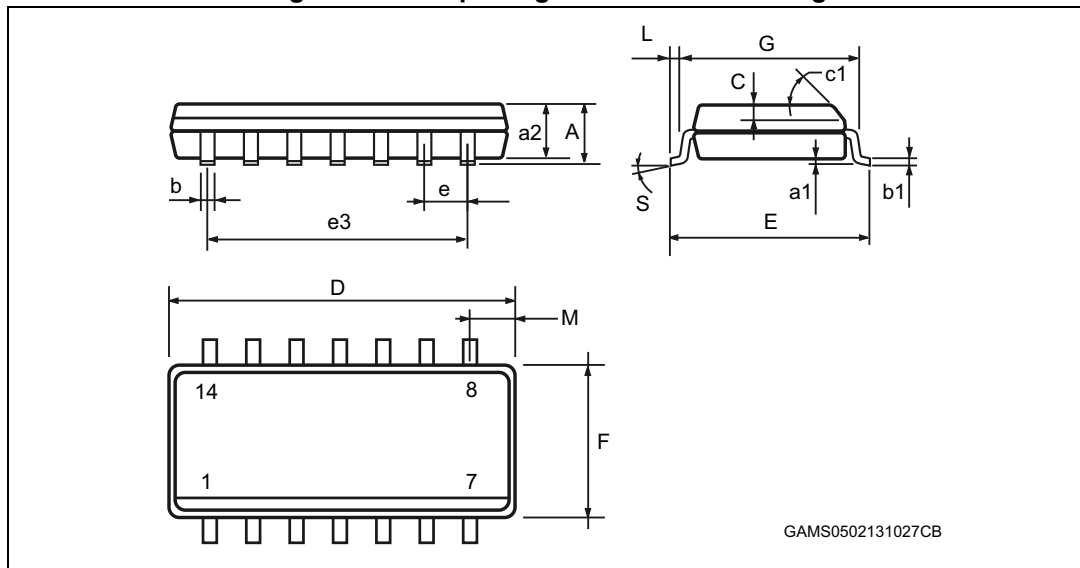


Table 8. SO14 package mechanical data

Ref	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.068
a1	0.1		0.2	0.003		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1		45 °			45 °	
D	8.55		8.75	0.336		0.344
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.68			0.026
S			8 °			8 °

5 Ordering information

Table 9. Order codes

Order code	Temp. range	Package	Packing	Marking
HCF4069UM013TR	-55 ° C to +125 ° C	SO14	Tape and reel	HCF4069U
HCF4069YUM013TR (1)	-40 ° C to +125 ° C	SO14 (automotive grade) ⁽¹⁾		HCF4069Y

1. Qualification and characterization according to AEC Q100 and Q003 or equivalent, advanced screening according to AEC Q001 & Q002 or equivalent.

6 Revision history

Table 10. Document revision history

Date	Revision	Changes
18-Feb-2013	4	Document template and layout updated Removed "B" from part number. Updated package names (PDIP-14 and SO14 instead of DIP-14 and SOP-14). Added Applications . Added Device summary table . Added Section 5: Ordering information .
22-Mar-2013	5	Updated Table 1: Device summary table and Table 9: Order codes .
10-Jan-2014	6	Removed PDIP-14 package Added ESD data to Features Table 1: Device summary table : updated footnote 1. Table 9: Order codes : updated footnote 1.

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

ST PRODUCTS ARE NOT DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE ST PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER'S SOLE RISK, EVEN IF ST HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY ST AS BEING INTENDED FOR "AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL" INDUSTRY DOMAINS ACCORDING TO ST PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2014 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

