

# DATA SHEET

**74F07**

Inverter/buffer drivers

Product data  
Supersedes data of 1992 Jul 24

2004 Mar 12

Hex inverter/buffer drivers (open-collector)

74F07

FEATURES

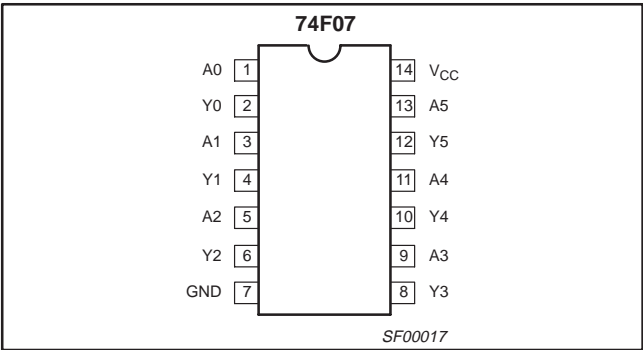
- Open Collector output drive 64mA
- High speed
- 12V output termination voltage

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F07	4.5ns	32mA

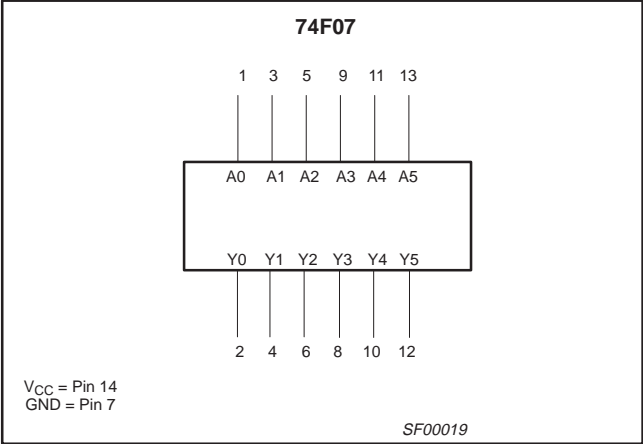
ORDERING INFORMATION

DESCRIPTION	TYPE NUMBER	PKG DWG #
14-pin plastic small outline package	N74F07D	SOT108-1
14-pin plastic dual in-line package	N74F07N	SOT27-1

PIN CONFIGURATIONS



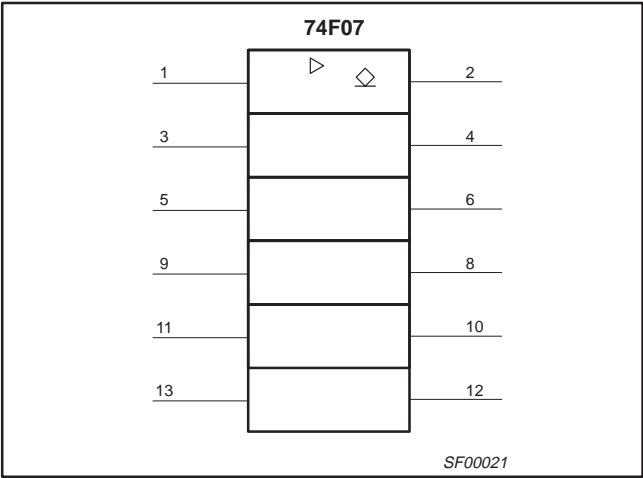
LOGIC SYMBOLS



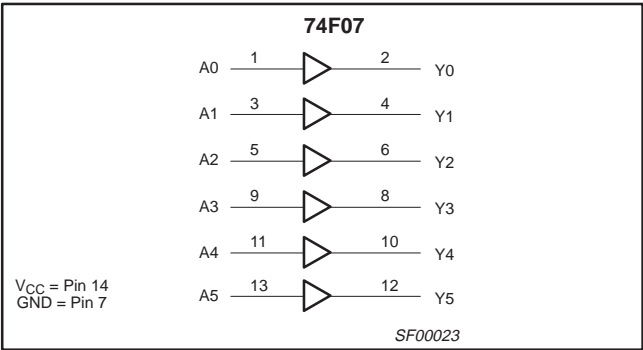
Hex inverter/buffer drivers (open-collector)

74F07

IEC/IEEE SYMBOLS



LOGIC DIAGRAMS



INPUT AND OUTPUT LOADING AND FAN OUT TABLE

PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
A <sub>n</sub>	Data inputs	1.0/1.0	20μA/0.6mA
Y <sub>n</sub>	Data outputs	OC/106.7	OC/64mA

- NOTES:
- One (1.0) FAST unit load is defined as: 20μA in the High state and 0.6mA in the Low state.
  - OC = Open Collector

FUNCTION TABLE

INPUTS	OUTPUTS
A <sub>n</sub>	Y <sub>n</sub>
L	L
H	H

- NOTES:
- H = High voltage level
  - L = Low voltage level

## Hex inverter/buffer drivers (open-collector)

74F07

**ABSOLUTE MAXIMUM RATINGS**

(Operation beyond the limit set forth in this table may impair the useful life of the device.

Unless otherwise noted these limits are over the operating free air temperature range.)

SYMBOL	PARAMETER	RATING	UNIT
$V_{CC}$	Supply voltage	−0.5 to +7.0	V
$V_{IN}$	Input voltage	−0.5 to +7.0	V
$I_{IN}$	Input current	−30 to +5	mA
$V_{OUT}$	Voltage applied to output in High output state	−0.5 to 12	V
$I_{OUT}$	Current applied to output in Low output state	128	mA
$T_{amb}$	Operating free air temperature range	0 to +70	°C
$T_{stg}$	Storage temperature range	−65 to +150	°C

**RECOMMENDED OPERATING CONDITIONS**

SYMBOL	PARAMETER	LIMITS			UNIT
		MIN	NOM	MAX	
$V_{CC}$	Supply voltage	4.5	5.0	5.5	V
$V_{IH}$	High-level input voltage	2.0			V
$V_{IL}$	Low-level input voltage			0.8	V
$I_{IK}$	Input clamp current			−18	mA
$V_{OH}$	High-level output voltage			12	V
$I_{OL}$	Low-level output current			64	mA
$T_{amb}$	Operating free air temperature range	0		+70	°C

## Hex inverter/buffer drivers (open-collector)

74F07

**DC ELECTRICAL CHARACTERISTICS**

(Over recommended operating free-air temperature range unless otherwise noted.)

SYMBOL	PARAMETER	TEST CONDITIONS <sup>1</sup>	LIMITS			UNIT
			MIN	TYP <sup>2</sup>	MAX	
$I_{OH}$	High-level output current	$V_{CC} = \text{MIN}$ , $V_{IL} = \text{MAX}$ , $V_{OH} = \text{MAX}$ , $V_{IH} = \text{MIN}$			250	$\mu\text{A}$
$V_{OL}$	Low-level output voltage	$V_{CC} = \text{MIN}$ , $V_{IL} = \text{MAX}$ , $V_{IH} = \text{MIN}$		0.30	0.50	V
		$I_{OL} = \text{MAX}$ $\pm 5\% V_{CC}$		0.30	0.50	V
$V_{IK}$	Input clamp voltage	$V_{CC} = \text{MIN}$ , $I_I = I_{IK}$		-0.73	-1.2	V
$I_I$	Input current at maximum input voltage	$V_{CC} = \text{MAX}$ , $V_I = 7.0\text{V}$			100	$\mu\text{A}$
$I_{IH}$	High-level input current	$V_{CC} = \text{MAX}$ , $V_I = 2.7\text{V}$			20	$\mu\text{A}$
$I_{IL}$	Low-level input current	$V_{CC} = \text{MAX}$ , $V_I = 0.5\text{V}$			-0.6	mA
$I_{CC}$	Supply current (total)	$I_{CCH}$ $V_{CC} = \text{MAX}$		10	14	mA
		$I_{CCL}$		32	45	mA

**NOTES:**

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at  $V_{CC} = 5\text{V}$ ,  $T_{\text{amb}} = 25^\circ\text{C}$ .
- Not more than one output should be shorted at a time. For testing  $I_{OS}$ , the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a High output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests,  $I_{OS}$  tests should be performed last.

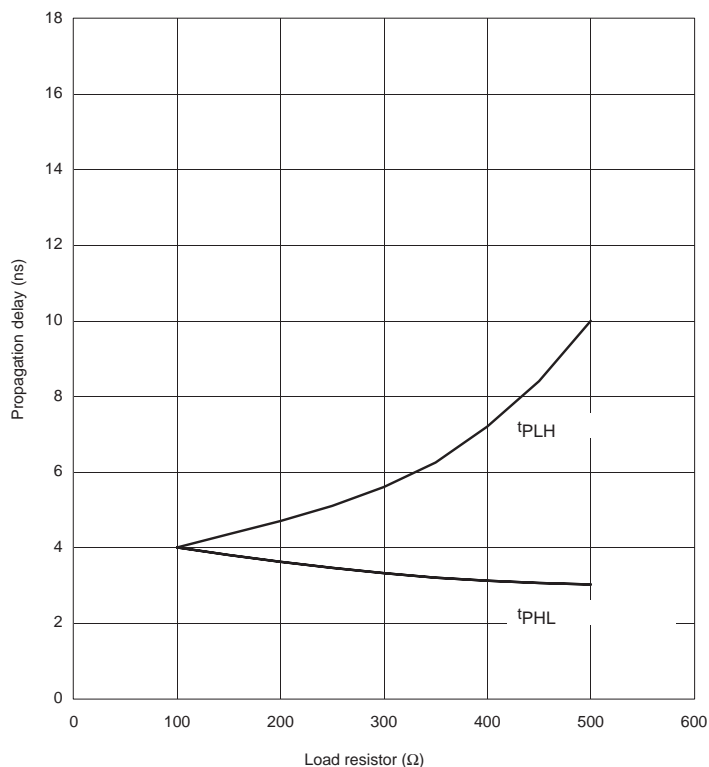
**AC ELECTRICAL CHARACTERISTICS**

SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			V <sub>CC</sub> = +5.0V T <sub>amb</sub> = +25°C C <sub>L</sub> = 50pF, R <sub>L</sub> = 100Ω			V <sub>CC</sub> = +5.0V ± 10% T <sub>amb</sub> = 0°C to +70°C C <sub>L</sub> = 50pF, R <sub>L</sub> = 100Ω		
			Min	Typ	Max	Min	Max	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay An to Yn	Waveform 1	2.0 3.0	4.0 5.0	6.0 7.0	2.0 2.5	6.5 7.5	ns

## Hex inverter/buffer drivers (open-collector)

74F07

## TYPICAL PROPAGATION DELAYS VERSUS LOAD FOR OPEN COLLECTOR OUTPUTS



SF00024

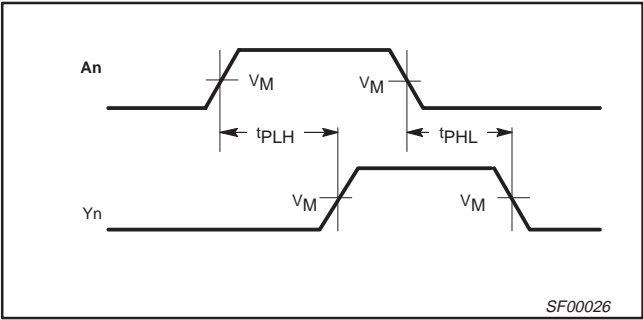
**NOTE:**

When using Open-Collector parts, the value of the pull-up resistor greatly affects the value of the  $t_{PLH}$ . For example, changing the specified pull-up resistor value from 500Ω to 100Ω will improve the  $t_{PLH}$  up to 50% with only a slight increase in the  $t_{PHL}$ . However, if the value of the pull-up resistor is changed, the user must make certain that the total  $I_{OL}$  current through the resistor and the total  $I_{IL}$ 's of the receivers does not exceed the  $I_{OL}$  maximum specification.

Hex inverter/buffer drivers (open-collector)

74F07

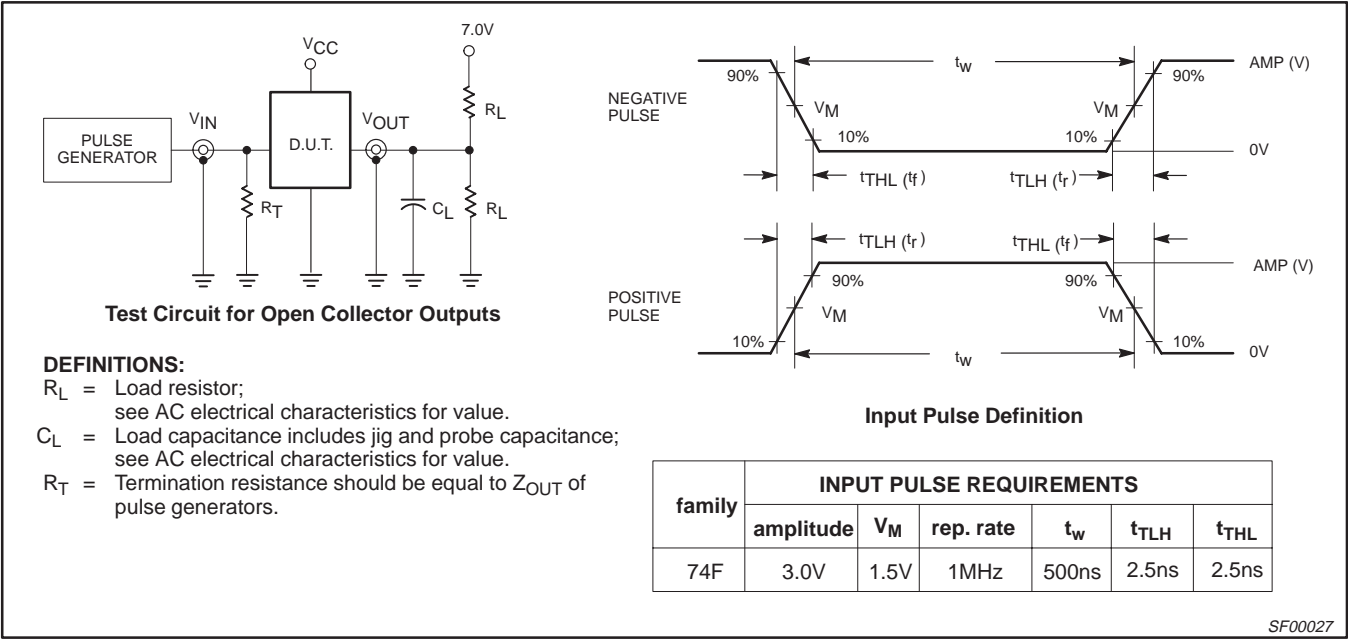
AC WAVEFORMS



Waveform 1. Propagation delay for non-inverting outputs

**NOTE:**  
For all waveforms,  $V_M = 1.5V$ .

TEST CIRCUIT AND WAVEFORMS



Hex inverter/buffer drivers (open-collector)

74F07

SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1

Technical drawing of the SOT108-1 package showing top, side, and end views with dimensions D, E, A, X, H<sub>E</sub>, v, M, A, Z, 14, 8, pin 1 index, 1, 7, e, b<sub>p</sub>, w, M, detail X, and a scale bar from 0 to 5 mm.

**DIMENSIONS (inch dimensions are derived from the original mm dimensions)**

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	8.75 8.55	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.35 0.34	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

**Note**  
1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT108-1	076E06	MS-012				99-12-27 03-02-19

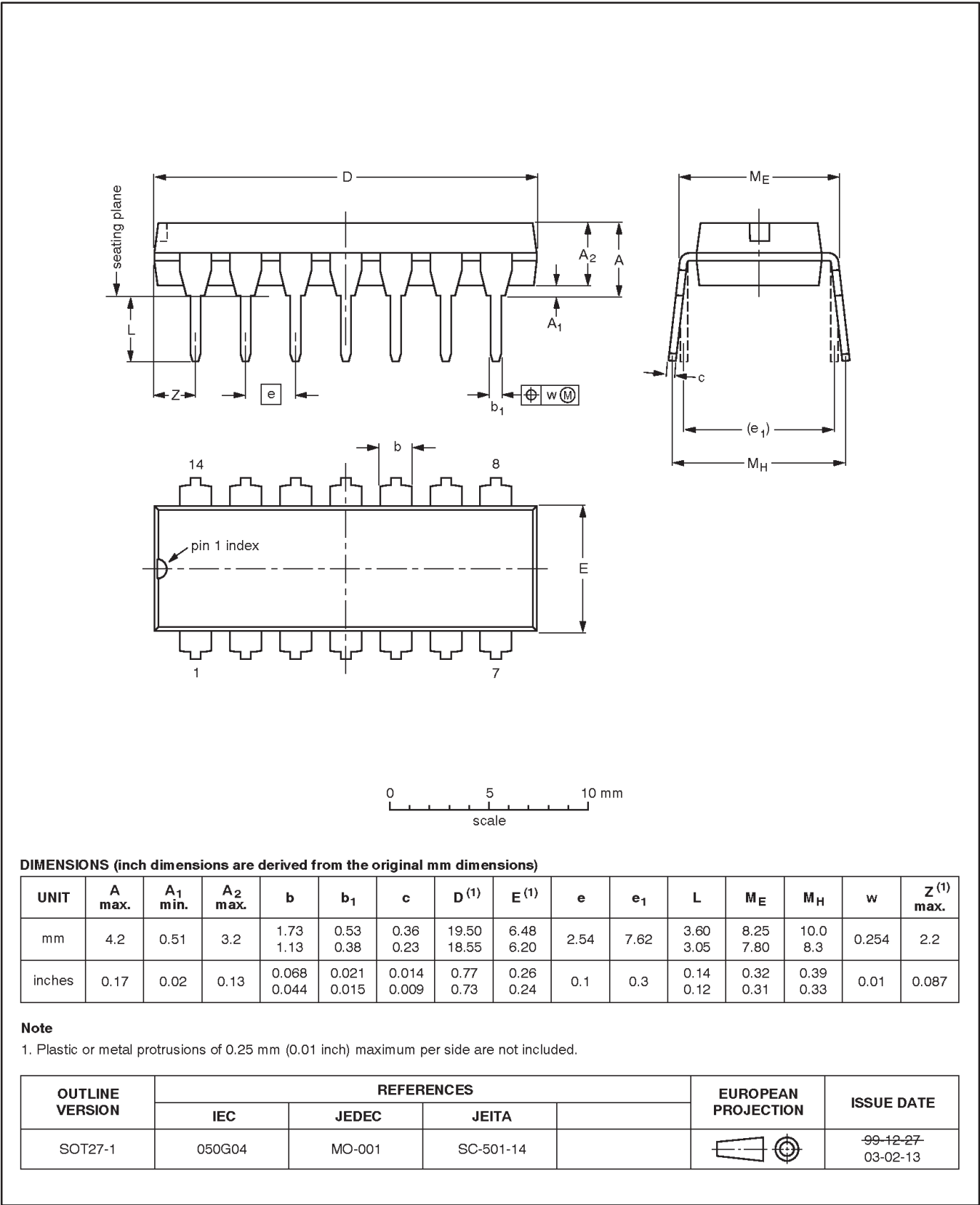


Hex inverter/buffer drivers (open-collector)

74F07

DIP14: plastic dual in-line package; 14 leads (300 mil)

SOT27-1



## Hex inverter/buffer drivers (open-collector)

74F07

## REVISION HISTORY

Rev	Date	Description
_3	20040312	<b>Product data (9397 750 13033); supersedes data sheet 74F06_A_7_A_2 of 1992 Jul 24 (9397 750 05054).</b> Modifications: <ul style="list-style-type: none"><li>• Delete all references to 74F06A and 74F07A (product discontinued).</li><li>• Separate 74F06 and 74F07 into standalone data sheets.</li></ul>
_2	19920724	<b>Product data (9397 750 05054); supersedes previous version.</b>

## Hex inverter/buffer drivers (open-collector)

74F07

## Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2] [3]</sup>	Definitions
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

## Definitions

**Short-form specification** — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

**Application information** — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

## Disclaimers

**Life support** — These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

**Right to make changes** — Philips Semiconductors reserves the right to make changes in the products—including circuits, standard cells, and/or software—described or contained herein in order to improve design and/or performance. When the product is in full production (status 'Production'), relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no license or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.

## Contact information

For additional information please visit  
<http://www.semiconductors.philips.com>. Fax: +31 40 27 24825

© Koninklijke Philips Electronics N.V. 2004  
 All rights reserved. Printed in U.S.A.

Date of release: 03-04

For sales offices addresses send e-mail to:  
[sales.addresses@www.semiconductors.philips.com](mailto:sales.addresses@www.semiconductors.philips.com)

Document order number: 9397 750 13033

*Let's make things better.*