

# 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

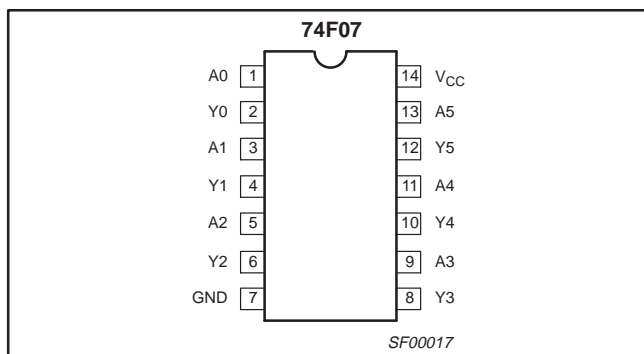
- Open Collector output drive 64mA
- High speed
- 12V output termination voltage

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

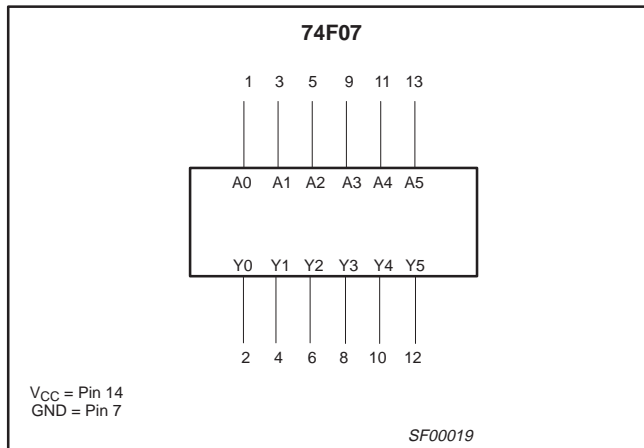
## ORDERING INFORMATION

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



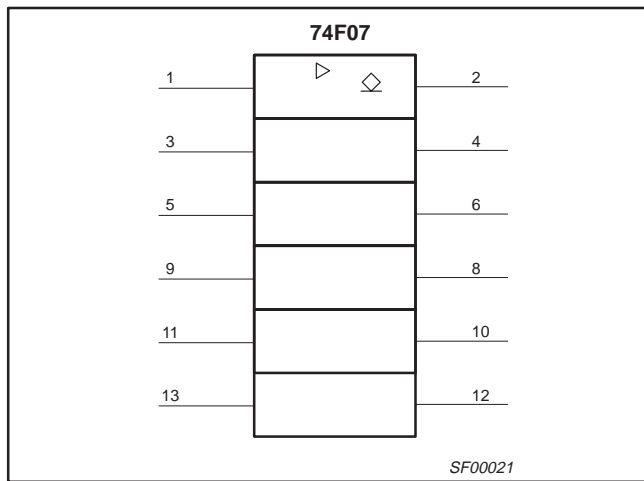
## LOGIC SYMBOLS



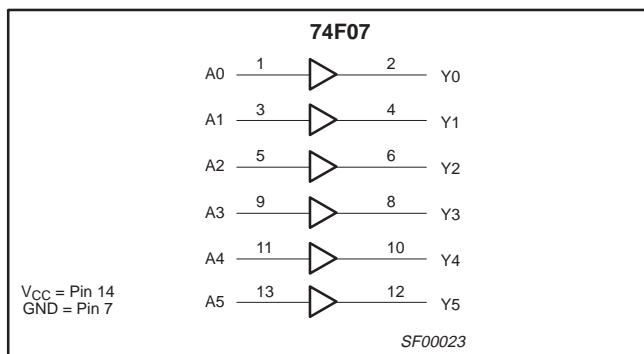
# Hex inverter/buffer drivers (open-collector)

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## IEC/IEEE SYMBOLS



## LOGIC DIAGRAMS



## INPUT AND OUTPUT LOADING AND FAN OUT TABLE

PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
$A_n$	Data inputs	1.0/1.0	20 $\mu$ A/0.6mA
$Y_n$	Data outputs	OC/106.7	OC/64mA

### NOTES:

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

## FUNCTION TABLE

INPUTS	OUTPUTS
$A_n$	$Y_n$
L	L
H	H

### NOTES:

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

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**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

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**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	$V_{CC} = \text{MIN},$ $V_{IL} = \text{MAX},$ $V_{IH} = \text{MIN}$	$I_{OL} = \text{MAX}$	$\pm 10\% V_{CC}$	0.30	0.50	V
				$\pm 5\% V_{CC}$	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)	$V_{CC} = \text{MAX}$	$I_{CCH}$		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.

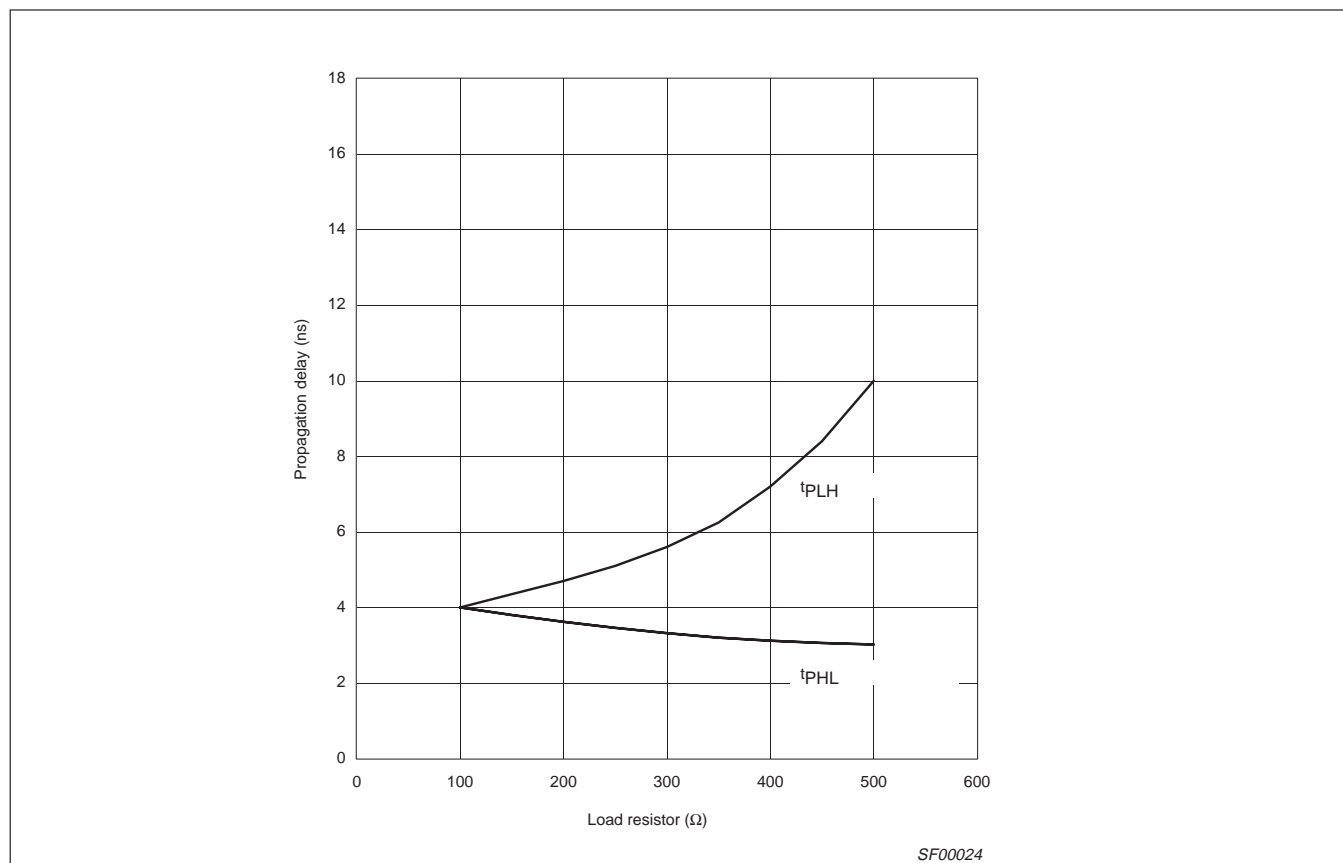
**AC ELECTRICAL CHARACTERISTICS**

SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			$V_{CC} = +5.0\text{V}$ $T_{\text{amb}} = +25^\circ\text{C}$ $C_L = 50\text{pF}, R_L = 100\Omega$			$V_{CC} = +5.0\text{V} \pm 10\%$ $T_{\text{amb}} = 0^\circ\text{C to } +70^\circ\text{C}$ $C_L = 50\text{pF}, R_L = 100\Omega$		
			Min	Typ	Max	Min	Max	
$t_{PLH}$ $t_{PHL}$	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

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## TYPICAL PROPAGATION DELAYS VERSUS LOAD FOR OPEN COLLECTOR OUTPUTS



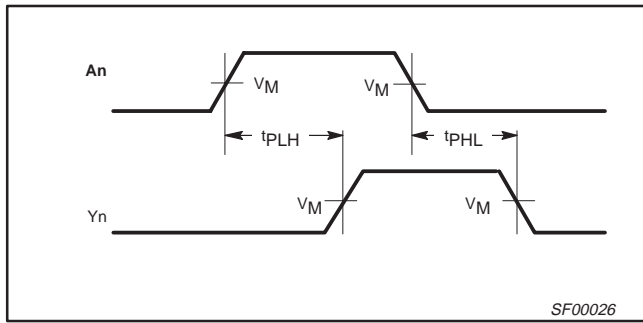
**NOTE:**

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

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## AC WAVEFORMS

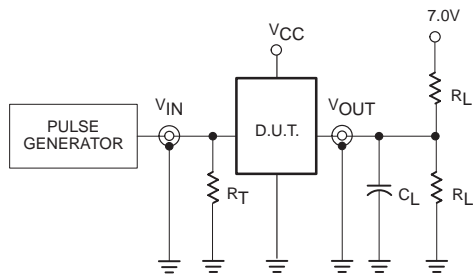


**Waveform 1. Propagation delay for non-inverting outputs**

**NOTE:**

For all waveforms,  $V_M = 1.5V$ .

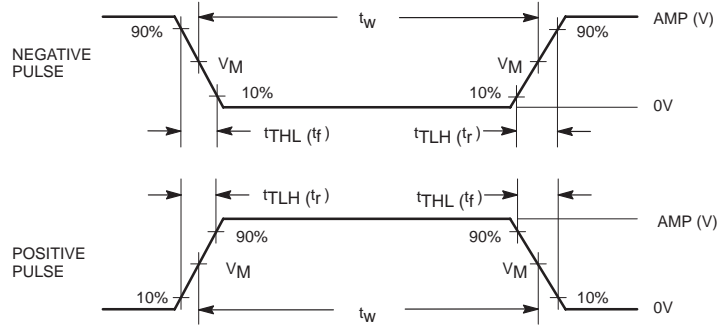
## TEST CIRCUIT AND WAVEFORMS



**Test Circuit for Open Collector Outputs**

**DEFINITIONS:**

- $R_L$  = Load resistor; see AC electrical characteristics for value.
- $C_L$  = Load capacitance includes jig and probe capacitance; see AC electrical characteristics for value.
- $R_T$  = Termination resistance should be equal to  $Z_{OUT}$  of pulse generators.



**Input Pulse Definition**

family	INPUT PULSE REQUIREMENTS					
	amplitude	$V_M$	rep. rate	$t_w$	$t_{TLH}$	$t_{THL}$
74F	3.0V	1.5V	1MHz	500ns	2.5ns	2.5ns

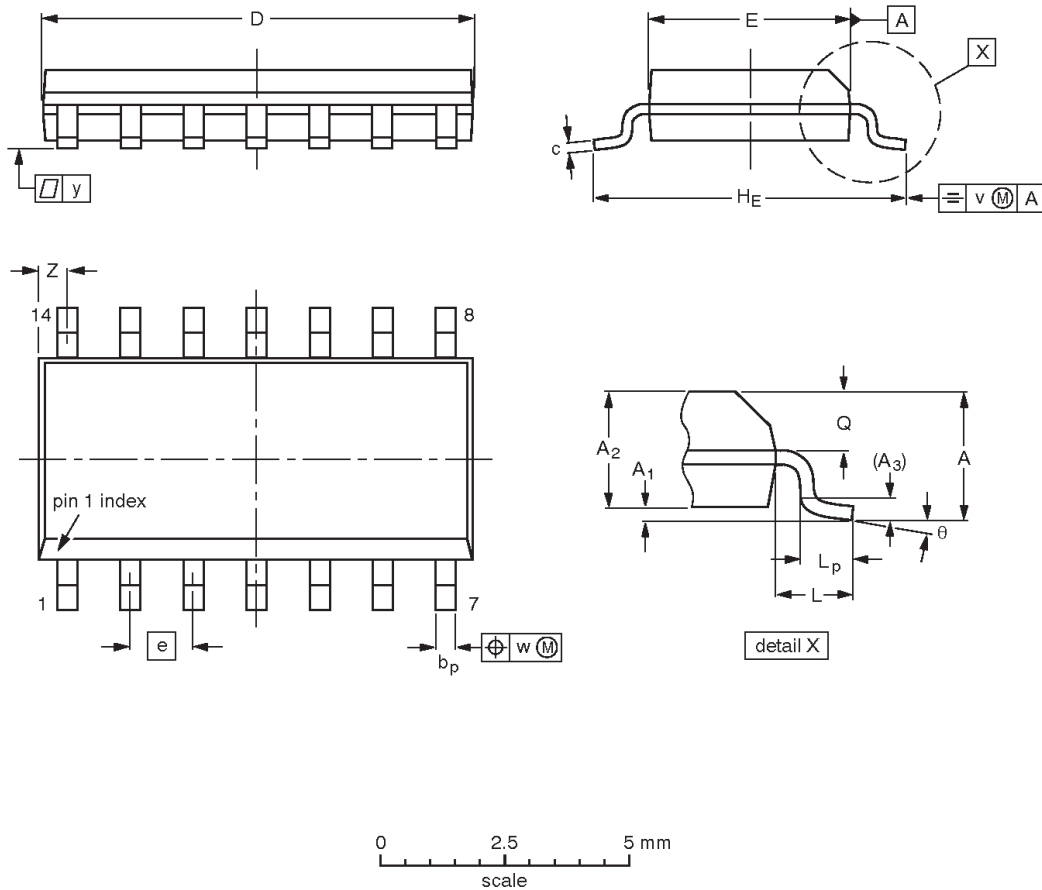
SF00027

# Hex inverter/buffer drivers (open-collector)

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

SOT108-1



**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

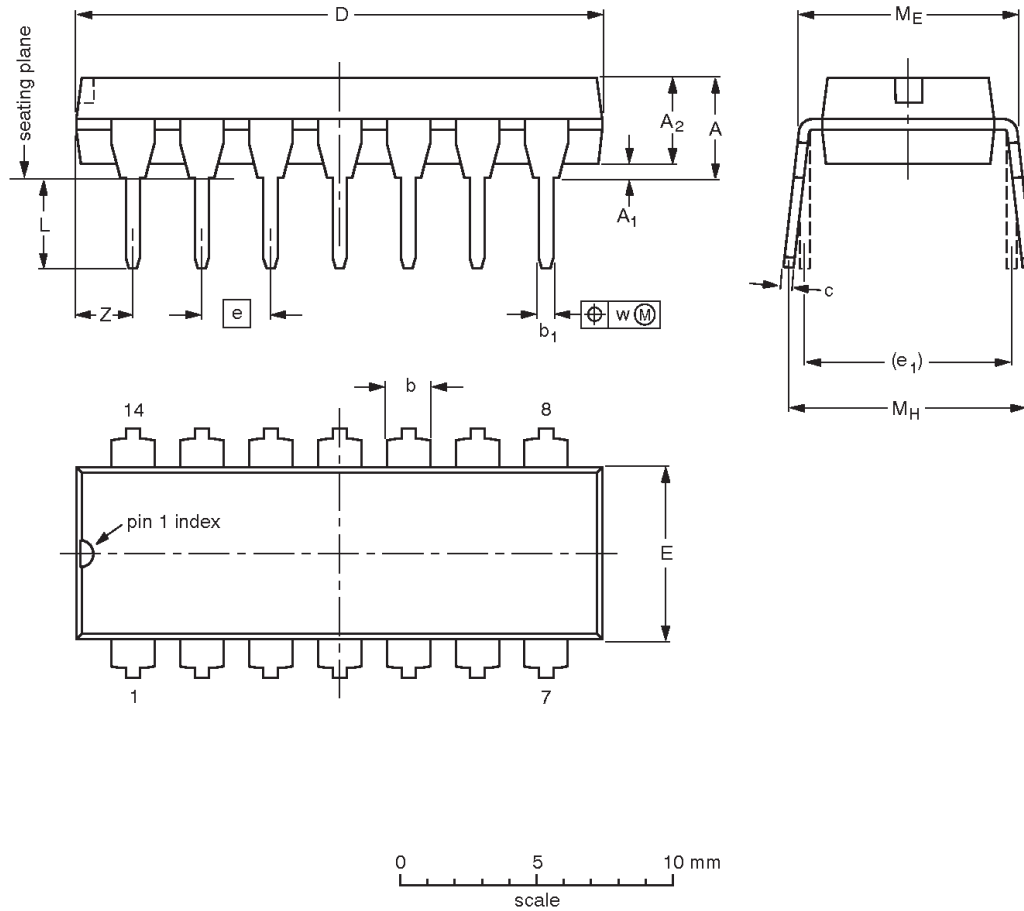


# Hex inverter/buffer drivers (open-collector)

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

SOT27-1



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

UNIT	A max.	A1 min.	A2 max.	b	b1	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	e1	L	ME	MH	w	Z <sup>(1)</sup> max.
mm	4.2	0.51	3.2	1.73 1.13	0.53 0.38	0.36 0.23	19.50 18.55	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.2
inches	0.17	0.02	0.13	0.068 0.044	0.021 0.015	0.014 0.009	0.77 0.73	0.26 0.24	0.1	0.3	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.087

**Note**

1. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT27-1	050G04	MO-001	SC-501-14			99-12-27 03-02-13

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

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**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)

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## Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2] [3]</sup>	Definitions
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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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