

# DATA SHEET

## **74F06, 74F06A, 74F07, 74F07A** Inverter/buffer drivers

Product specification

1992 Jul 24

IC15 Data Handbook

# Hex inverter/buffer drivers (open-collector)

# 74F06, 74F06A, 74F07, 74F07A

### FEATURES OF 74F06, 74F07

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

### FEATURES OF 74F06A, 74F07A

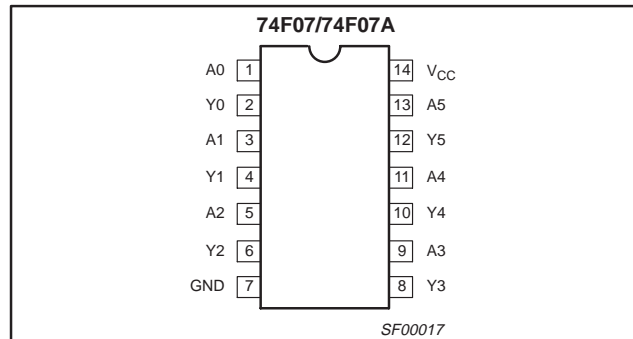
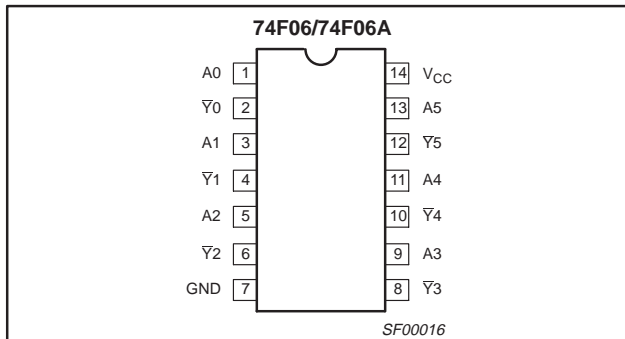
- Open Collector output drive 48mA
- High speed
- 30V output termination voltage
- Replaces 74F06 and 74F07
- Improved performance upgrade for 74F06 and 74F07
- Reduced I<sub>OH</sub> leakage @ 30V

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F06	3.5ns	30mA
74F06A	9.0ns	30mA
74F07	4.5ns	32mA
74F07A	10.0ns	32mA

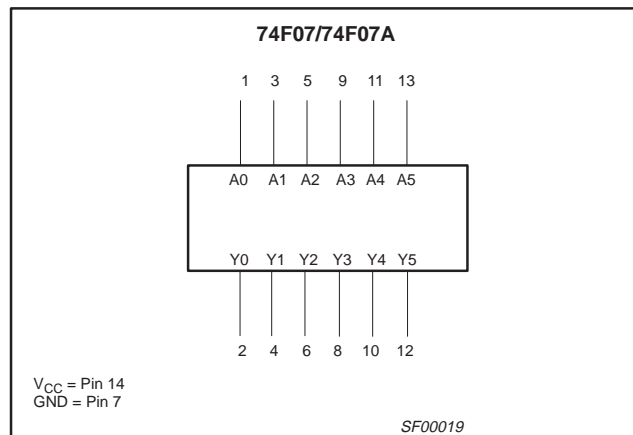
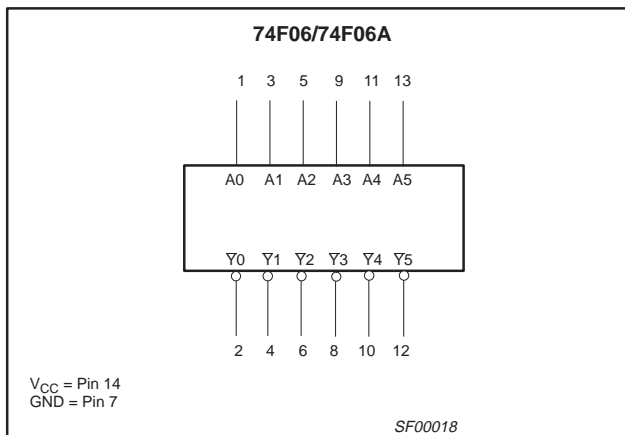
### ORDERING INFORMATION

DESCRIPTION	COMMERCIAL RANGE V <sub>CC</sub> = 5V ±10%, T <sub>amb</sub> = 0°C to +70°C	PKG DWG #
14-pin plastic Dual In-line Package	N74F06N, N74F06AN	SOT27-1
14-pin plastic Small Outline	N74F07D, N74F07AD	SOT108-1

### PIN CONFIGURATIONS



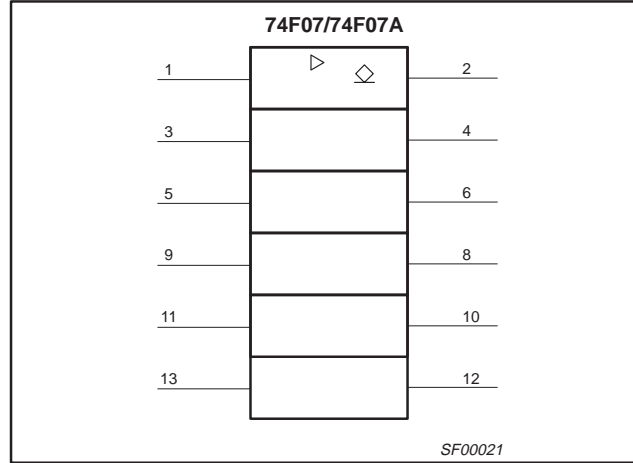
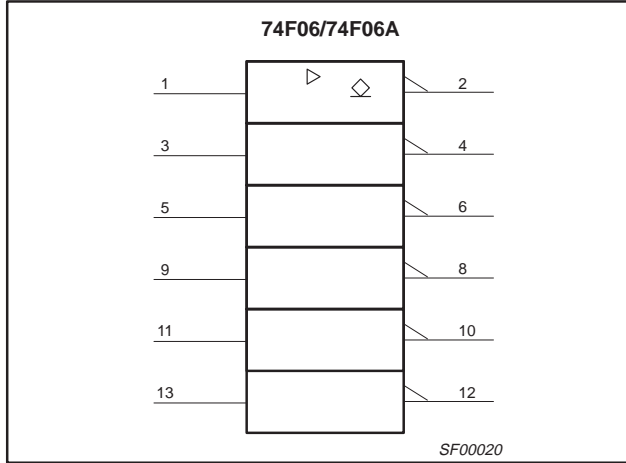
### LOGIC SYMBOLS



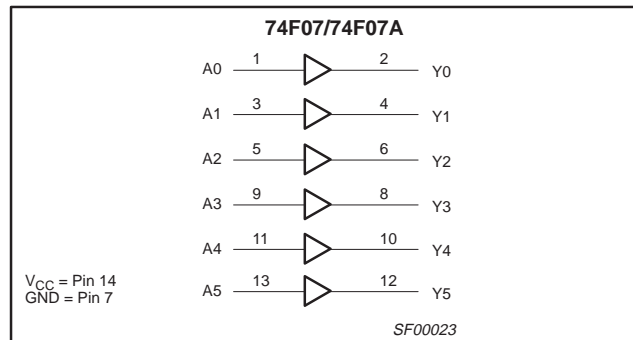
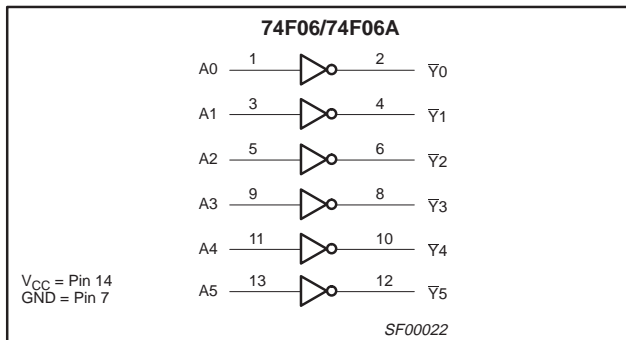
Hex inverter/buffer drivers (open-collector)

74F06, 74F06A,  
74F07, 74F07A

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 ('F06, 'F07)	1.0/1.0	20μA/0.6mA
A <sub>n</sub>	Data inputs ('F06A, 'F07A)	1.0/0.7	20μA/0.4mA
$\bar{Y}_n$	Data outputs ('F06)	OC/106.7	OC/64mA
$\bar{Y}_n$	Data outputs ('F06A)	OC/80	OC/48mA
Y <sub>n</sub>	Data outputs ('F07)	OC/106.7	OC/64mA
Y <sub>n</sub>	Data outputs ('F07A)	OC/80	OC/48mA

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	
	'F06, 'F06A	'F07, 'F07A
A <sub>n</sub>	$\bar{Y}_n$	Y <sub>n</sub>
L	H	L
H	L	H

NOTES:

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

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

74F06, 74F06A,  
74F07, 74F07A**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 <sub>CC</sub>	Supply voltage		-0.5 to +7.0	V
V <sub>IN</sub>	Input voltage		-0.5 to +7.0	V
I <sub>IN</sub>	Input current		-30 to +5	mA
V <sub>OUT</sub>	Voltage applied to output in High output state	'F06, 'F07	-0.5 to 12	V
		'F06A, 'F07A	-0.5 to 30	V
I <sub>OUT</sub>	Current applied to output in Low output state	'F06, 'F07	128	mA
		'F06A, 'F07A	96	mA
T <sub>amb</sub>	Operating free air temperature range		0 to +70	°C
T <sub>stg</sub>	Storage temperature range		-65 to +150	°C

**RECOMMENDED OPERATING CONDITIONS**

SYMBOL	PARAMETER	LIMITS			UNIT
		MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5.0	5.5	V
V <sub>IH</sub>	High-level input voltage	2.0			V
V <sub>IL</sub>	Low-level input voltage			0.8	V
I <sub>IK</sub>	Input clamp current			-18	mA
V <sub>OH</sub>	High-level output voltage	'F06, 'F07		12	V
		'F06A, 'F07A		30	V
I <sub>OL</sub>	Low-level output current	'F06, 'F07		64	mA
		'F06A, 'F07A		48	mA
T <sub>amb</sub>	Operating free air temperature range	0		+70	°C

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

74F06, 74F06A,  
74F07, 74F07A

## 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 <sub>OH</sub>	High-level output current	'F06, 'F07	V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, V <sub>OH</sub> = MAX, V <sub>IH</sub> = MIN					250	μA	
		'F06A, 'F07A						100	μA	
V <sub>OL</sub>	Low-level output voltage		V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, V <sub>IH</sub> = MIN	I <sub>OL</sub> = MAX	±10% V <sub>CC</sub>		0.30	0.50	V	
					±5% V <sub>CC</sub>		0.30	0.50	V	
V <sub>IK</sub>	Input clamp voltage		V <sub>CC</sub> = MIN, I <sub>I</sub> = I <sub>IK</sub>				-0.73	-1.2	V	
I <sub>I</sub>	Input current at maximum input voltage		V <sub>CC</sub> = MAX, V <sub>I</sub> = 7.0V					100	μA	
I <sub>IH</sub>	High-level input current		V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7V					20	μA	
I <sub>IL</sub>	Low-level input current	'F06, 'F07	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.5V					-0.6	mA	
		'F06A, 'F07A						-0.4	mA	
I <sub>CC</sub>	Supply current (total)	74F06, 74F06A	I <sub>CCH</sub>	V <sub>CC</sub> = MAX				5.0	8.0	mA
			I <sub>CCL</sub>					30	43	mA
		74F07, 74F07A	I <sub>CCH</sub>					10	14	mA
			I <sub>CCL</sub>					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<sub>CC</sub> = 5V, T<sub>amb</sub> = 25°C.
- Not more than one output should be shorted at a time. For testing I<sub>OS</sub>, 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<sub>OS</sub> tests should be performed last.

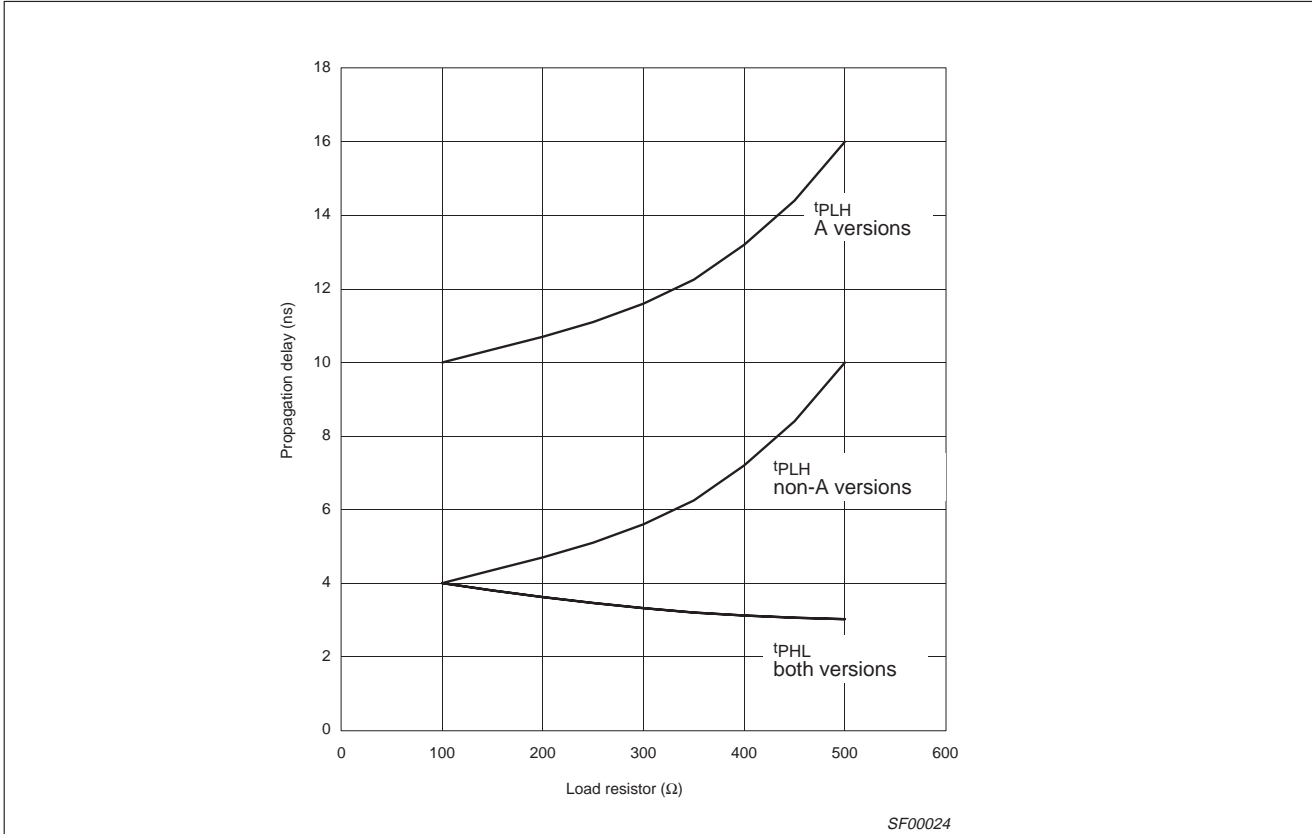
## AC ELECTRICAL CHARACTERISTICS

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	'F06	Waveform 1	2.0	3.5	6.0	1.5	6.5	ns
		'F06A		1.5	3.0	5.5	1.0	6.0	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay An to Yn	'F07	Waveform 2	5.0	9.0	11.0	4.0	15.0	ns
				2.0	4.0	6.0	2.0	8.0	
		'F07A		2.0	4.0	6.0	2.0	6.5	ns
				3.0	5.0	7.0	2.5	7.5	
				6.0	10.5	13.0	5.0	17.0	ns
				5.0	7.5	10.0	4.0	13.0	

Hex inverter/buffer drivers (open-collector)

74F06, 74F06A,  
74F07, 74F07A

TYPICAL PROPAGATION DELAYS VERSUS LOAD FOR OPEN COLLECTOR OUTPUTS



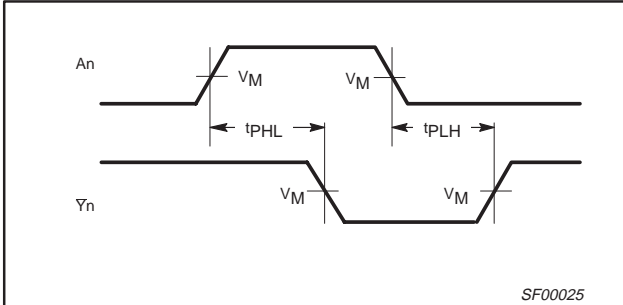
**NOTE:**

When using Open-Collector parts, the value of the pull-up resistor greatly affects the value of the  $t_{PLH}$ . 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.

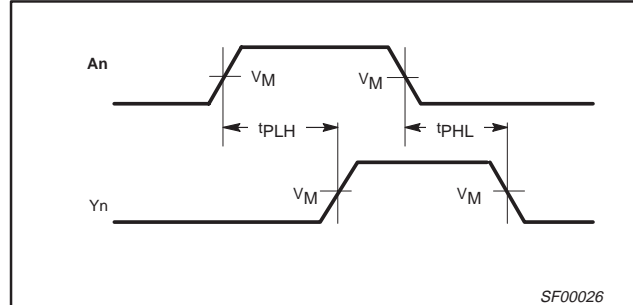
# Hex inverter/buffer drivers (open-collector)

74F06, 74F06A,  
74F07, 74F07A

## AC WAVEFORMS



Waveform 1. Propagation delay for inverting outputs

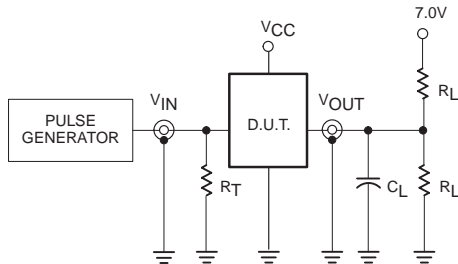


Waveform 2. Propagation delay for non-inverting outputs

**NOTE:**

For all waveforms,  $V_M = 1.5V$ .

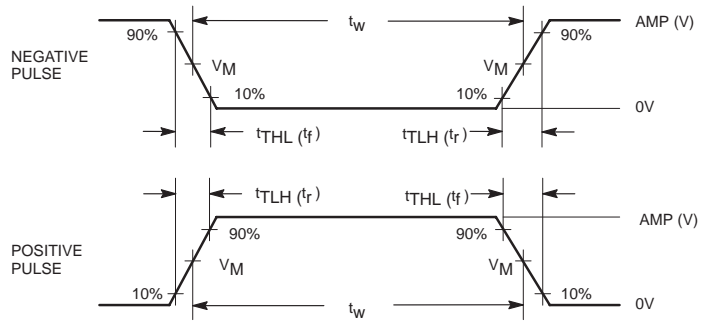
## TEST CIRCUIT AND WAVEFORMS



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

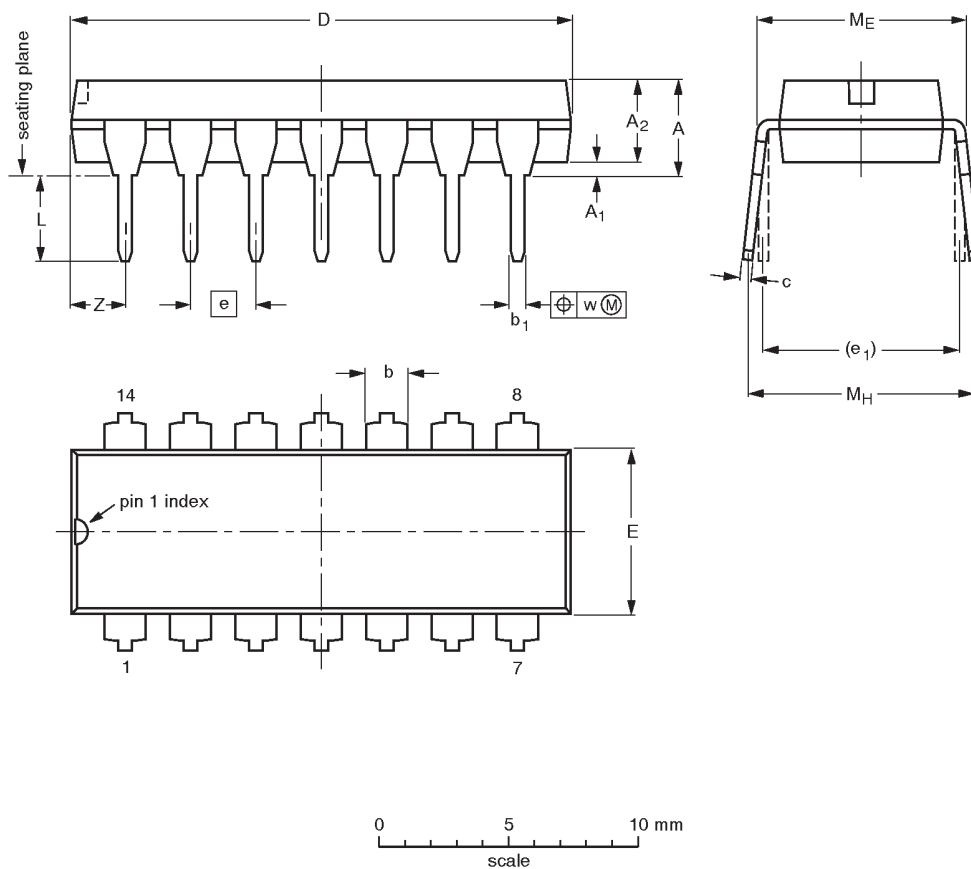
SF00027

Inverter/buffer drivers

74F06, 74F06A,  
74F07, 74F07A

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.	A <sub>1</sub> min.	A <sub>2</sub> max.	b	b <sub>1</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	e <sub>1</sub>	L	M <sub>E</sub>	M <sub>H</sub>	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	0.020	0.13	0.068 0.044	0.021 0.015	0.014 0.009	0.77 0.73	0.26 0.24	0.10	0.30	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 maximum per side are not included.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ		
SOT27-1	050G04	MO-001AA			92-11-17 95-03-11

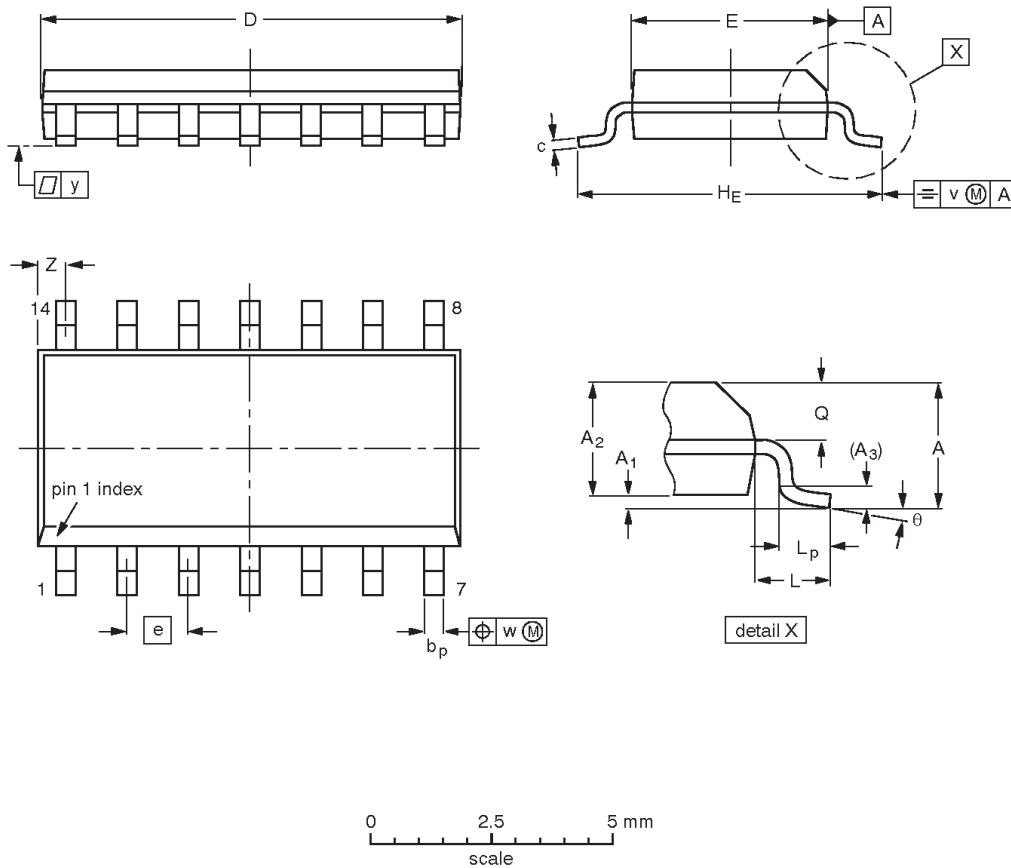


Inverter/buffer drivers

74F06, 74F06A,  
74F07, 74F07A

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	g° 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	0.050	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 maximum per side are not included.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ		
SOT108-1	076E06S	MS-012AB			95-01-23 97-05-22

## Inverter/buffer drivers

74F06, 74F06A,  
74F07, 74F07A

## Data sheet status

Data sheet status	Product status	Definition [1]
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
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[1] Please consult the most recently issued datasheet before initiating or completing a design.

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