

# DATA SHEET

**74F08**

Quad two-input AND gate

Product specification

1995 Apr 19

IC15 Data Handbook

Philips Semiconductors

**PHILIPS**



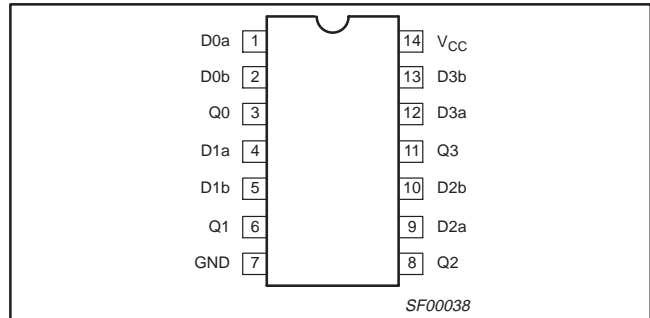
# Quad 2-input AND gate

# 74F08

- 74F08 Available for industrial range (−40°C to +85°C)

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F08	4.1ns	7.1mA

### PIN CONFIGURATION



### ORDERING INFORMATION

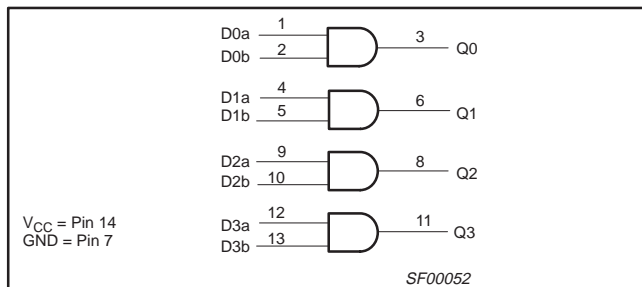
DESCRIPTION	COMMERCIAL RANGE $V_{CC} = 5.0V \pm 10\%$ , $T_{amb} = 0^{\circ}C$ to $+70^{\circ}C$	INDUSTRIAL RANGE $V_{CC} = 5.0V \pm 10\%$ , $T_{amb} = -40^{\circ}C$ to $+85^{\circ}C$	PKG DWG #
14-pin plastic DIP	N74F08N	I74F08N	SOT27-1
14-pin plastic SO	N74F08D	I74F08D	SOT108-1

### INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
Dna, Dnb	Data inputs	1.0/1.0	20µA/0.6mA
Qn	Data output	50/33	1.0mA/20mA

**NOTE:** One (1.0) FAST unit load is defined as: 20µA in the High state and 0.6mA in the Low state.

### LOGIC DIAGRAM



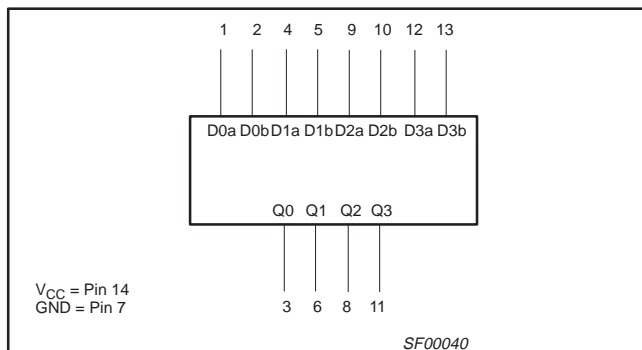
### FUNCTION TABLE

INPUTS		OUTPUT
Dna	Dnb	Qn
L	L	L
L	H	L
H	L	L
H	H	H

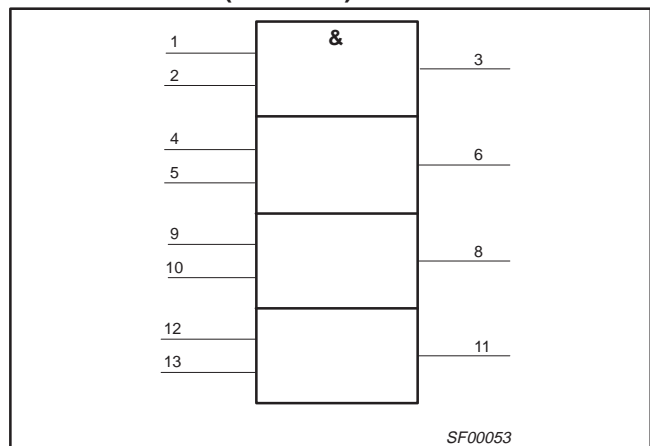
**NOTES:**

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

### LOGIC SYMBOL



### LOGIC SYMBOL (IEEE/IEC)



## Quad 2-input AND gate

74F08

**ABSOLUTE MAXIMUM RATINGS**

(Operation beyond the limits 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 $V_{CC}$	V	
$I_{OUT}$	Current applied to output in Low output state		40	mA	
$T_{amb}$	Operating free-air temperature range		Commercial range	0 to +70	°C
			Industrial range	-40 to +85	°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	
$I_{OH}$	High-level output current			-1	mA	
$I_{OL}$	Low-level output current			20	mA	
$T_{amb}$	Operating free-air temperature range		Commercial range	0	+70	°C
			Industrial range	-40	+85	°C

**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	
$V_{OH}$	High-level output voltage	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}$ $V_{IH} = \text{MIN}, I_{OH} = \text{MAX}$	$\pm 10\%V_{CC}$	2.5			V
			$\pm 5\%V_{CC}$	2.7	3.4		V
$V_{OL}$	Low-level output voltage	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}$ $V_{IH} = \text{MIN}, I_{OI} = \text{MAX}$	$\pm 10\%V_{CC}$		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	$V_{CC} = \text{MAX}, V_I = 7.0V$				100	$\mu\text{A}$
$I_{IH}$	High-level input current	$V_{CC} = \text{MAX}, V_I = 2.7V$				20	$\mu\text{A}$
$I_{IL}$	Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.5V$				-0.6	mA
$I_{OS}$	Short-circuit output current <sup>3</sup>	$V_{CC} = \text{MAX}$		-60		-150	mA
$I_{CC}$	Supply current (total)	$I_{CCH}$	$V_{CC} = \text{MAX}$	$V_{IN} = 4.5V$	5.5	8.3	mA
		$I_{CCL}$	$V_{CC} = \text{MAX}$	$V_{IN} = \text{GND}$	8.6	12.9	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  $V_{CC} = 5V, T_{amb} = 25^\circ\text{C}$ .
- 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.

# Quad 2-input AND gate

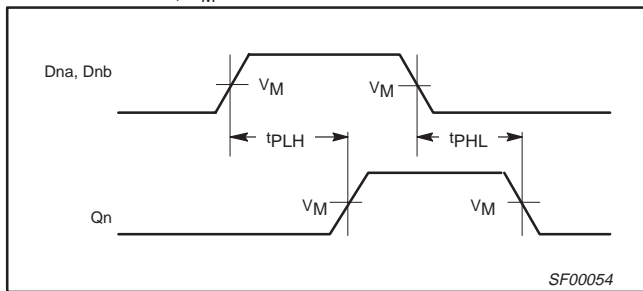
74F08

## AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITION	LIMITS						UNIT	
			$T_{amb} = +25^{\circ}\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{pF}$ $R_L = 500\Omega$			$T_{amb} = 0^{\circ}\text{C to } +70^{\circ}\text{C}$ $V_{CC} = +5.0\text{V} \pm 10\%$ $C_L = 50\text{pF}$ $R_L = 500\Omega$		$T_{amb} = -40^{\circ}\text{C to } +85^{\circ}\text{C}$ $V_{CC} = +5.0\text{V} \pm 10\%$ $C_L = 50\text{pF}$ $R_L = 500\Omega$		
			MIN	TYP	MAX	MIN	MAX	MIN		MAX
$t_{PLH}$ $t_{PHL}$	Propagation delay Dna, Dnb to Qn	Waveform 1	3.0 2.5	4.2 4.0	5.6 5.3	3.0 2.5	6.6 6.3	2.5 2.5	6.6 6.3	ns

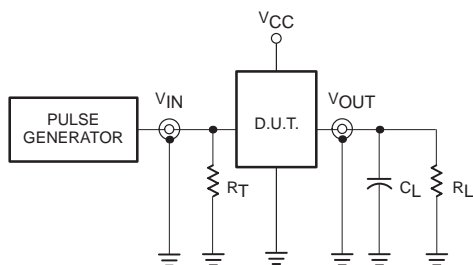
## AC WAVEFORMS

For all waveforms,  $V_M = 1.5\text{V}$ .

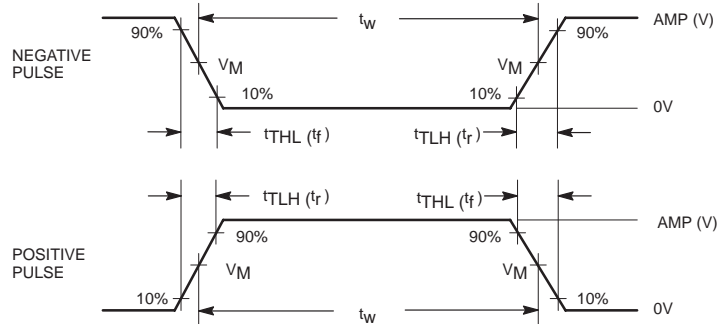


Waveform 1. Propagation Delay for Non-Inverting Outputs

## TEST CIRCUIT AND WAVEFORM



Test Circuit for Totem-Pole Outputs



Input Pulse Definition

### 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.

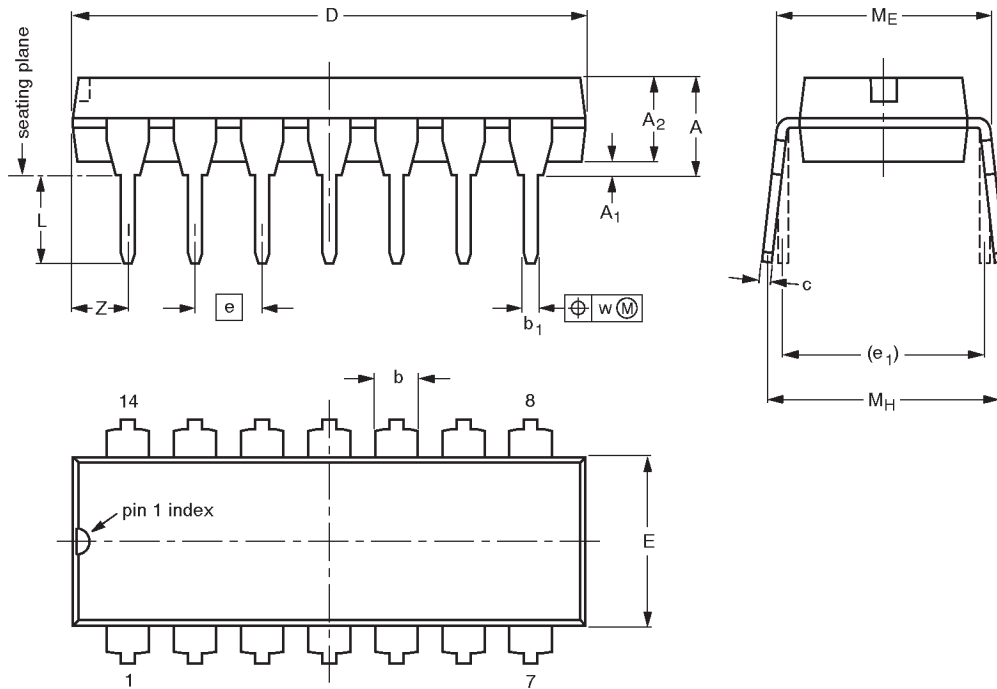
family	INPUT PULSE REQUIREMENTS					
	amplitude	$V_M$	rep. rate	$t_w$	$t_{TLH}$	$t_{THL}$
74F	3.0V	1.5V	1MHz	500ns	2.5ns	2.5ns

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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.	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.

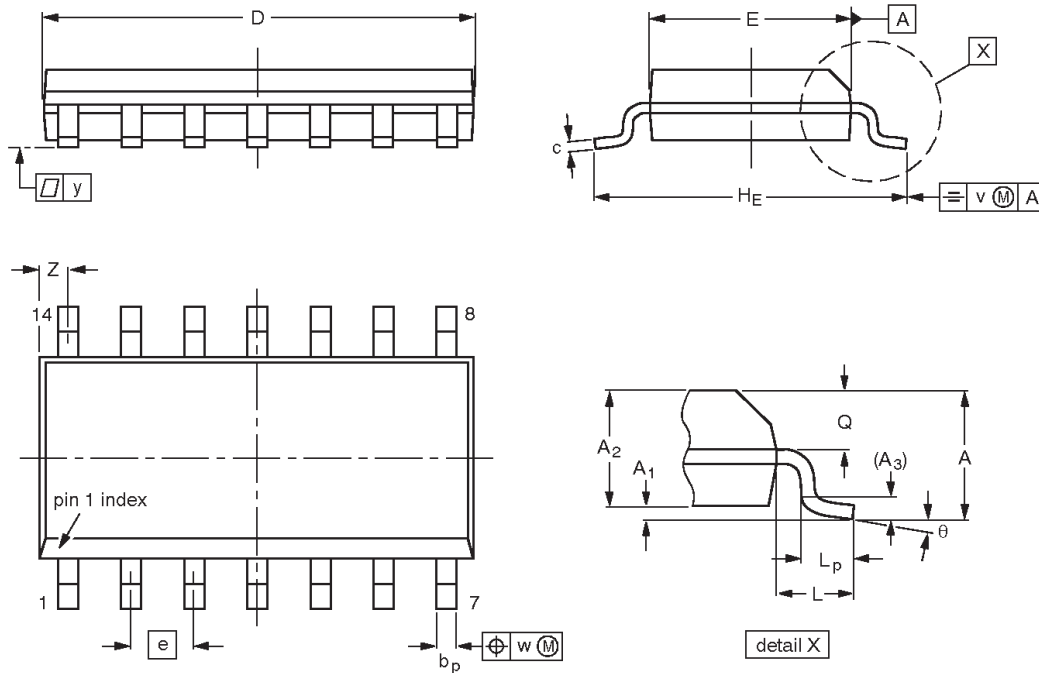
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT27-1	050G04	MO-001AA				92-11-17 95-03-11

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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	0.050	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

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**NOTES**

## Quad 2-input AND gate

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## Data sheet status

Data sheet status	Product status	Definition <sup>[1]</sup>
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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