

DATA SHEET

74F10 Triple 3-input NAND gate

74F11 Triple 3-input AND gate

Product specification

1989 Sep 20

IC15 Data Handbook

Gates

74F10, 74F11

74F10 Triple 3-input NAND gate
74F11 Triple 3-input AND gate

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F10	3.5ns	3.3mA
74F11	4.2ns	5.3mA

ORDERING INFORMATION

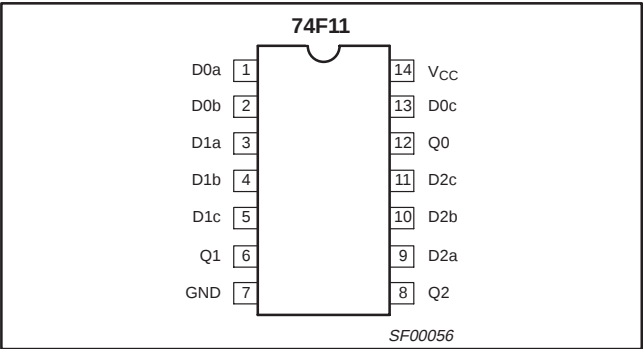
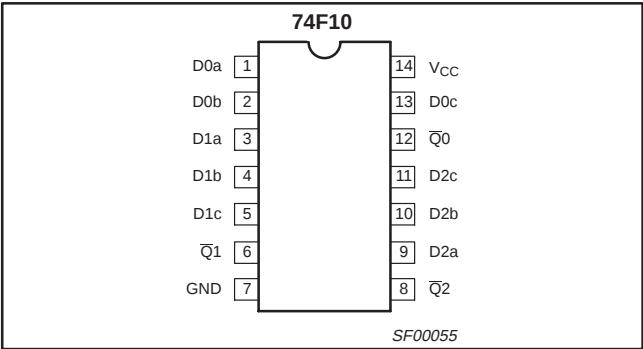
DESCRIPTION	COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$, $T_{amb} = 0^{\circ}C \text{ to } +70^{\circ}C$	PKG DWG #
14-pin plastic DIP	N74F10N, N74F11N	SOT27-1
14-pin plastic SO	N74F10D, N74F11D	SOT108-1

INPUT AND OUTPUT LOADING AND FAN OUT TABLE

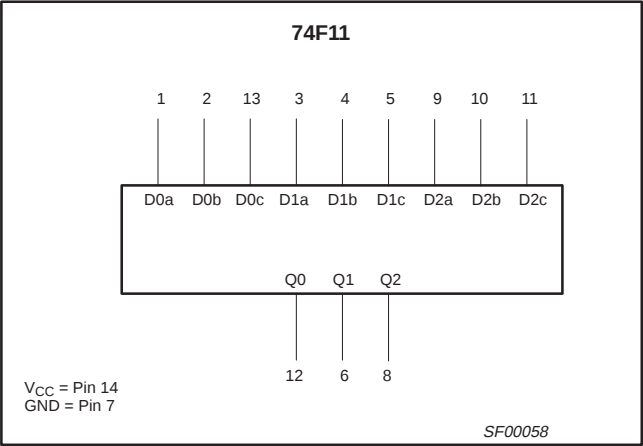
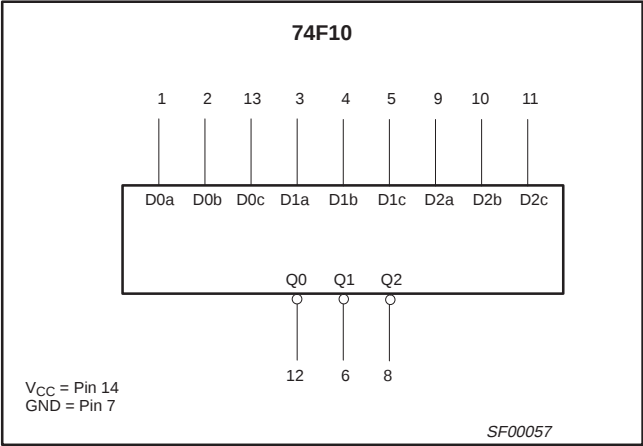
PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
Dna, Dnb, Dnc	Data inputs	1.0/1.0	20μA/0.6mA
$\overline{Q}n$	Data output (74F10)	50/33	1.0mA/20mA
Qn	Data output (74F11)	50/33	1.0mA/20mA

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

PIN CONFIGURATIONS



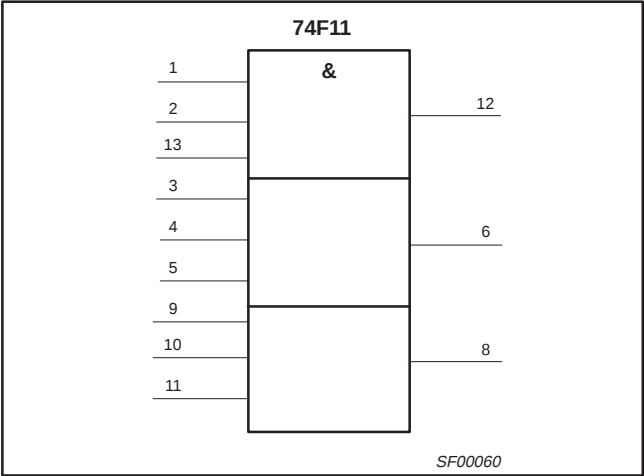
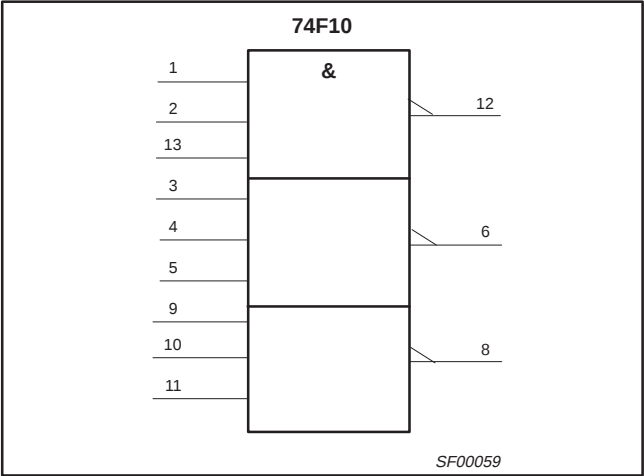
LOGIC SYMBOLS



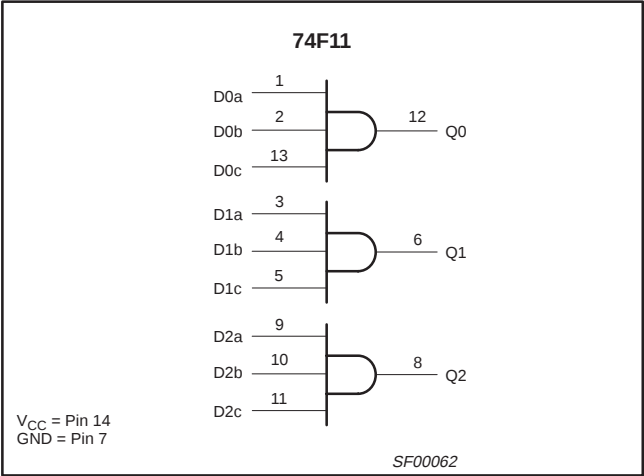
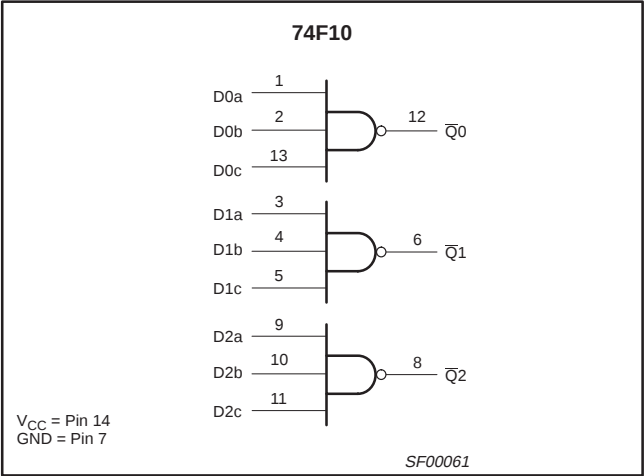
Gates

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IEC/IEEE SYMBOLS



LOGIC DIAGRAMS



FUNCTION TABLE

INPUTS			OUTPUTS	
			74F10	74F11
Dna	Dnb	Dnc	$\overline{Q_n}$	Q_n
L	L	L	H	L
L	L	H	H	L
L	H	L	H	L
L	H	H	H	L
H	L	L	H	L
H	L	H	H	L
H	H	L	H	L
H	H	H	L	H

NOTES:

1. H = High voltage level
2. 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 V_{CC}	V
I_{OUT}	Current applied to output in Low output state	40	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
I_{OH}	High-level output current			−1	mA
I_{OL}	Low-level output current			20	mA
T_{amb}	Operating free air temperature range	0		+70	°C

DC ELECTRICAL CHARACTERISTICS

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

SYMBOL	PARAMETER		TEST CONDITIONS ¹	LIMITS			UNIT
				MIN	TYP ²	MAX	
V_{OH}	High-level output voltage		$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}$	$\pm 10\%V_{CC}$	2.5		V
			$V_{IH} = \text{MIN}, I_{OH} = \text{MAX}$	$\pm 5\%V_{CC}$	2.7	3.4	
V_{OL}	Low-level output voltage		$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}$	$\pm 10\%V_{CC}$		0.35	V
			$V_{IH} = \text{MIN}, I_{OL} = \text{MAX}$	$\pm 5\%V_{CC}$		0.35	
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	μA
I_{IH}	High-level input current		$V_{CC} = \text{MAX}, V_I = 2.7\text{V}$			20	μA
I_{IL}	Low-level input current		$V_{CC} = \text{MAX}, V_I = 0.5\text{V}$			−0.6	mA
I_{OS}	Short-circuit output current ³		$V_{CC} = \text{MAX}$	−60		−150	mA
I_{CC}	Supply current (total)	74F10	I_{CCH} I_{CCL} $V_{CC} = \text{MAX}$	$V_{IN} = \text{GND}$		1.8	mA
				$V_{IN} = 4.5\text{V}$		6.0	
		74F11	I_{CCH} I_{CCL} $V_{CC} = \text{MAX}$	$V_{IN} = 4.5\text{V}$		4.7	mA
				$V_{IN} = \text{GND}$		7.2	

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 $V_{CC} = 5\text{V}$, $T_{amb} = 25^\circ\text{C}$.
- 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.

Gates

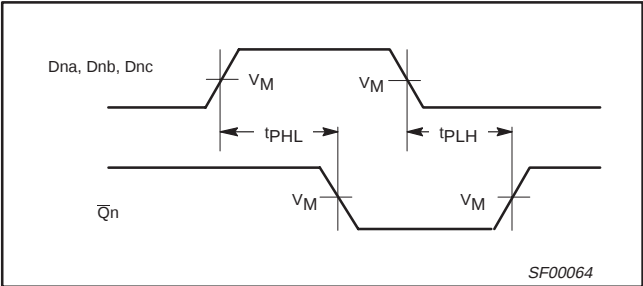
74F10, 74F11

AC ELECTRICAL CHARACTERISTICS

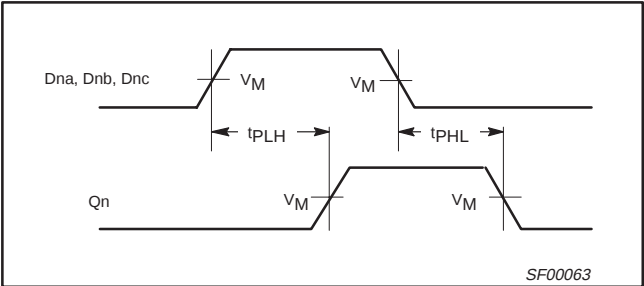
SYMBOL	PARAMETER		TEST CONDITION	LIMITS					UNIT
				V _{CC} = +5.0V T _{amb} = +25°C C _L = 50pF, R _L = 500Ω			V _{CC} = +5.0V ± 10% T _{amb} = 0°C to +70°C C _L = 50pF, R _L = 500Ω		
				MIN	TYP	MAX	MIN	MAX	
t _{PLH} t _{PHL}	Propagation delay Dna, Dnb, Dnc to Q̄n	74F10	Waveform 1	2.4 1.5	3.7 3.2	5.0 4.3	2.4 1.5	6.0 5.3	ns
t _{PLH} t _{PHL}	Propagation delay Dna, Dnb, Dnc to Qn	74F11	Waveform 2	3.0 2.5	4.2 4.1	5.6 5.5	3.0 2.5	6.6 6.5	ns

AC WAVEFORMS

For all waveforms, $V_M = 1.5V$.

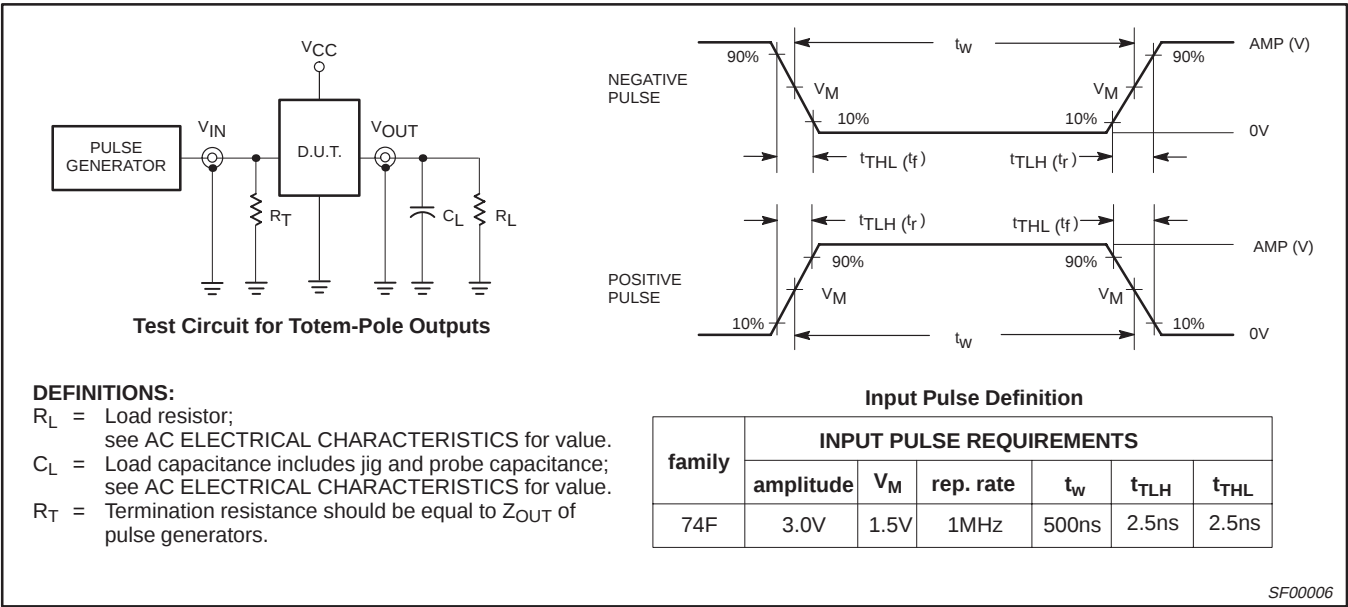


Waveform 1. Propagation Delay for Inverting Outputs (74F10)



Waveform 2. Propagation Delay for Non-Inverting Outputs (74F11)

TEST CIRCUIT AND WAVEFORM

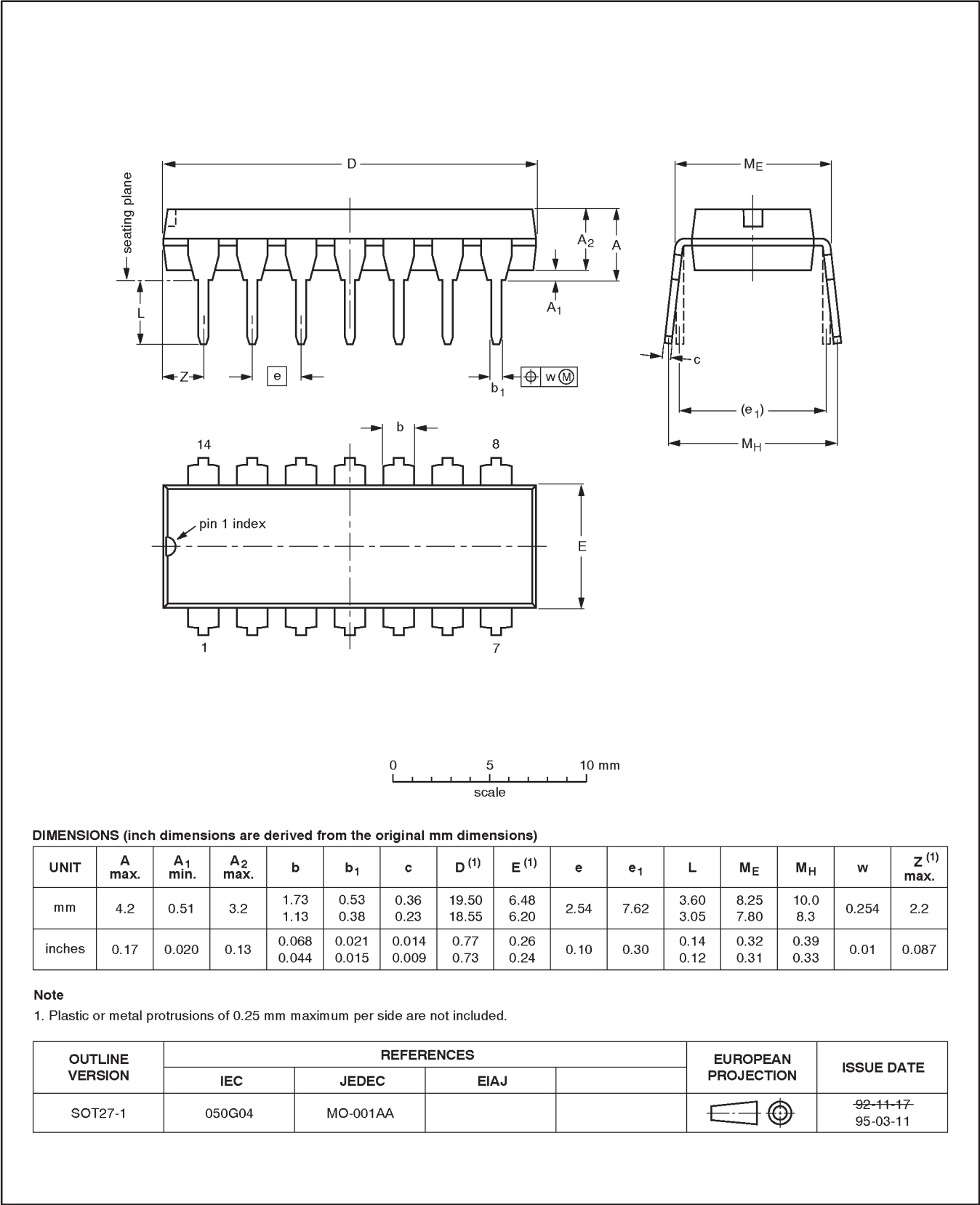


Gates

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

SOT27-1

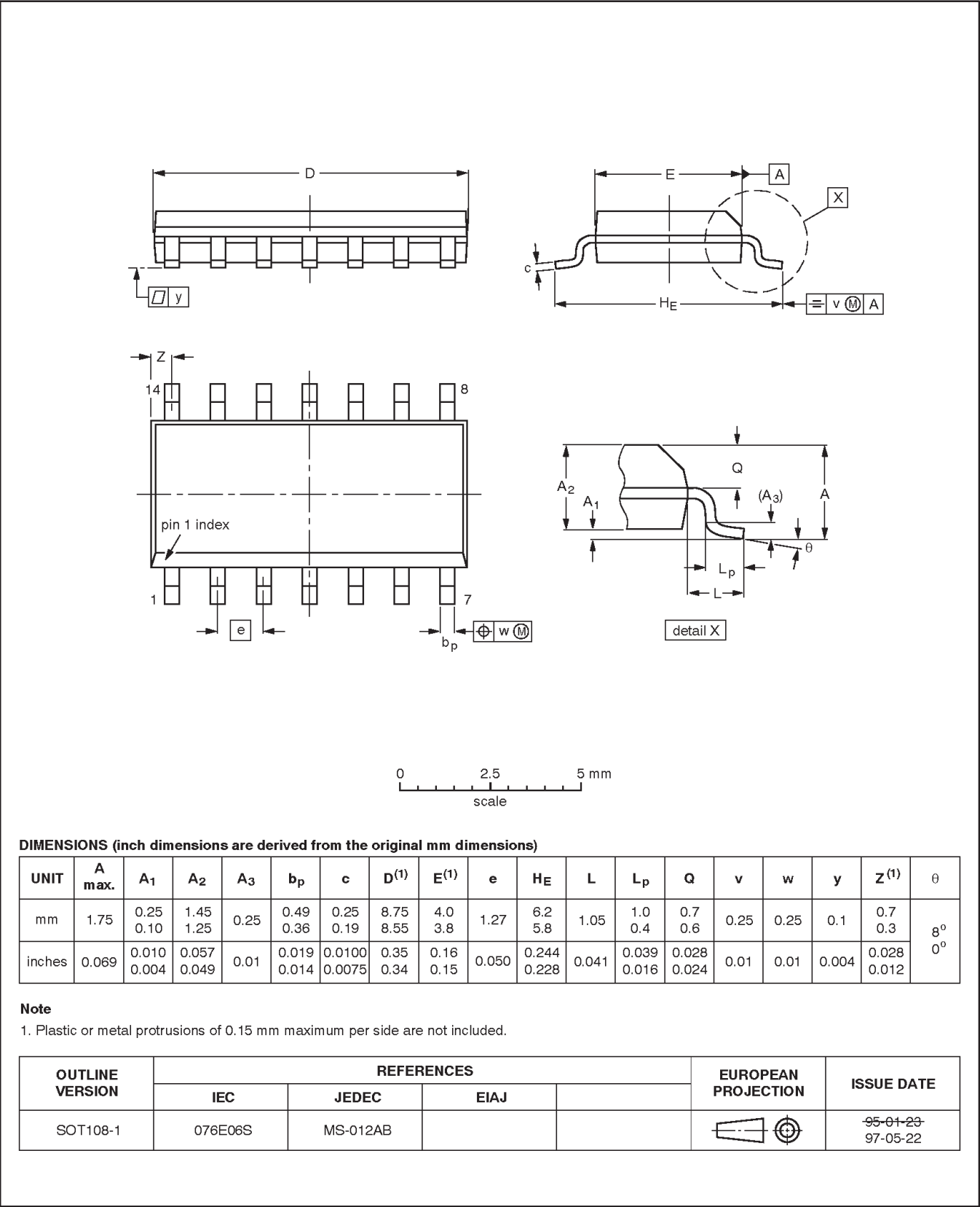


Gates

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

SOT108-1



Gates

74F10, 74F11

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.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
Product specification	Production	This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

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

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). 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.

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