

Important notice

Dear Customer,

On 7 February 2017 the former NXP Standard Product business became a new company with the tradename **Nexperia**. Nexperia is an industry leading supplier of Discrete, Logic and PowerMOS semiconductors with its focus on the automotive, industrial, computing, consumer and wearable application markets

In data sheets and application notes which still contain NXP or Philips Semiconductors references, use the references to Nexperia, as shown below.

Instead of <http://www.nxp.com>, <http://www.philips.com/> or <http://www.semiconductors.philips.com/>, use **<http://www.nexperia.com>**

Instead of sales.addresses@www.nxp.com or sales.addresses@www.semiconductors.philips.com, use **salesaddresses@nexperia.com** (email)

Replace the copyright notice at the bottom of each page or elsewhere in the document, depending on the version, as shown below:

- © NXP N.V. (year). All rights reserved or © Koninklijke Philips Electronics N.V. (year). All rights reserved

Should be replaced with:

- © **Nexperia B.V. (year). All rights reserved.**

If you have any questions related to the data sheet, please contact our nearest sales office via e-mail or telephone (details via **salesaddresses@nexperia.com**). Thank you for your cooperation and understanding,

Kind regards,

Team Nexperia

DATA SHEET

74ABT16273 16-bit D-type flip-flop

Product data
Replaces data sheet 74ABT/H16273 of 1998 Feb 27

2004 Feb 12

16-bit D-type flip-flop

74ABT16273

FEATURES

- 16-bit D-type edge triggered flip-flops
- Output capability: +64 mA/–32 mA
- TTL input and output switching levels
- Live insertion/extraction permitted
- Power-up reset
- Latch-up protection exceeds 500mA per JEDEC Std 17
- ESD protection exceeds 2000V per MIL STD 883 Method 3015 and 200 V per Machine Model

DESCRIPTION

The 74ABT16273 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

This part is a 16-bit edge triggered D-type flip-flop with non-inverting high drive outputs. This device can be used as two 8-bit flip-flops or one 16-bit flip-flop. When the clock (CP) goes High, the data on the D inputs is stored and the Q outputs display the stored data.

This device also features a master reset ($\overline{MR}$) that resets all flip-flops to the Low state when $\overline{MR}$ is set to the Low state.

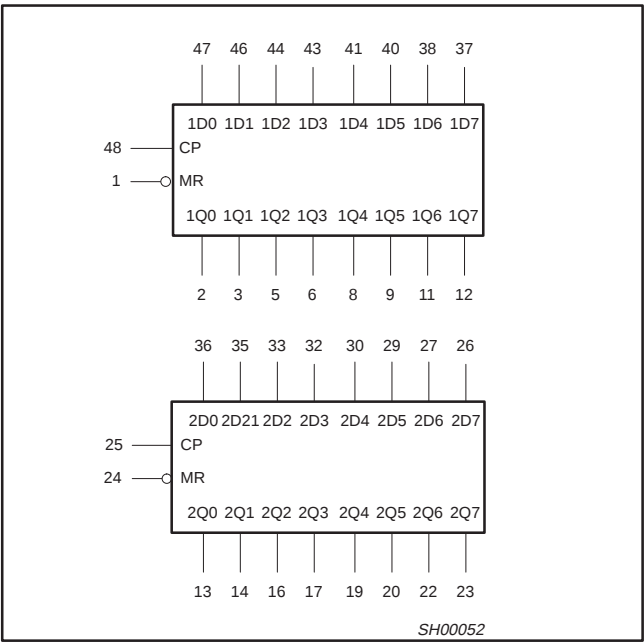
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS $T_{amb} = 25^{\circ}\text{C}$; $GND = 0V$	TYPICAL	UNIT
t_{PLH} t_{PHL}	Propagation delay An to Bn or Bn to An	$C_L = 50\text{pF}$; $V_{CC} = 5.0V$	2.5 2.0	ns
C_{IN}	Input capacitance	$V_I = 0V$ or V_{CC}	4	pF
I_{CCH}	Quiescent supply current	Outputs High; $V_{CC} = 5.5V$	200	μA
I_{CCL}		Outputs low; $V_{CC} = 5.5V$	8	mA

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	DWG NUMBER
48-Pin Plastic SSOP Type III	–40°C to +85°C	74ABT16273 DL	SOT370-1
48-Pin Plastic TSSOP Type II	–40°C to +85°C	74ABT16273 DGG	SOT362-1

LOGIC SYMBOL



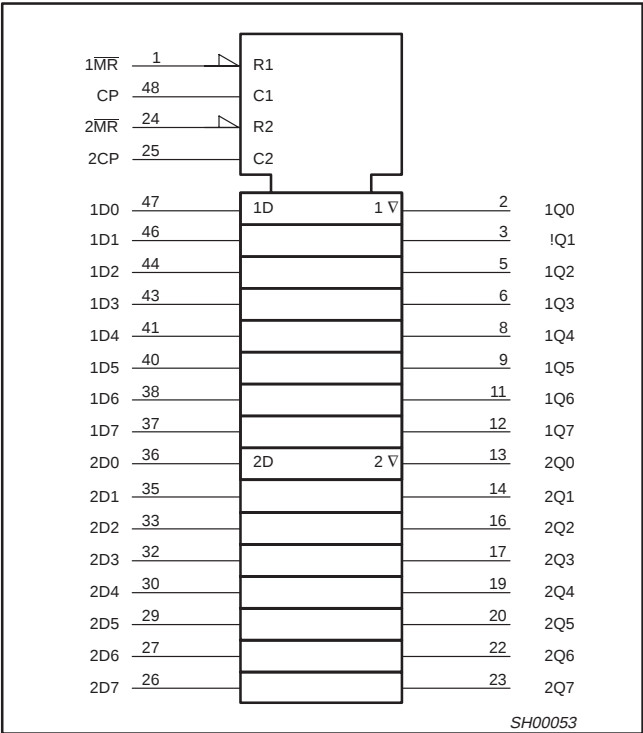
PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
1, 24	$1\overline{MR}$, $2\overline{MR}$	Master reset input (active-Low)
2, 3, 5, 6, 8, 9, 11, 12, 13, 14, 16, 17, 19, 20, 22, 23	$1Q0-1Q7$ $2Q0-2Q7$	Data outputs
47, 46, 44, 43, 41, 40, 38, 37, 36, 35, 33, 32, 30, 29, 27, 26	$1D0-1D7$ $2D0-2D7$	Data inputs
25, 48	$1CP$, $2CP$	Clock pulse input (active rising edge)
4, 10, 15, 21, 28, 34, 39, 45	GND	Ground (0V)
7, 18, 31, 42	V_{CC}	Positive supply voltage

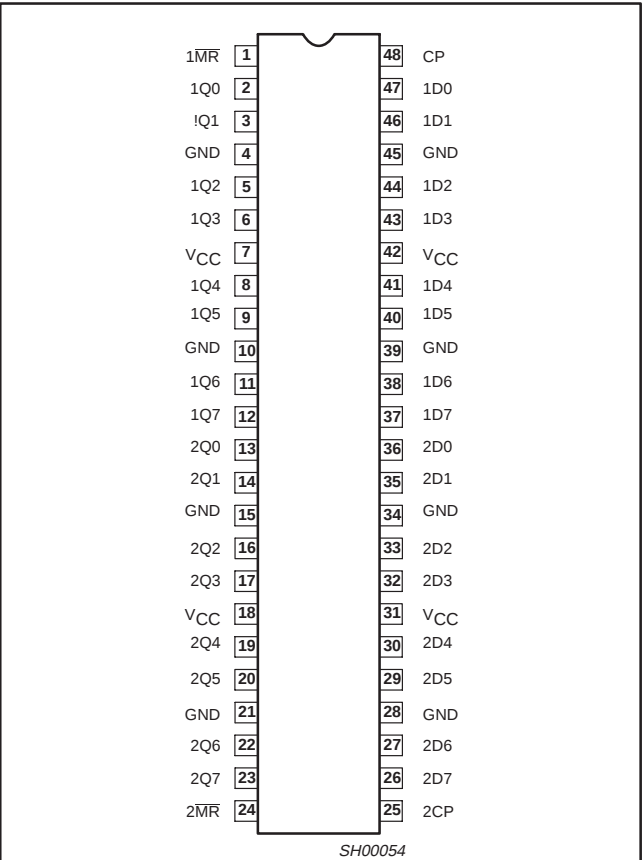
16-bit D-type flip-flop

74ABT16273

LOGIC SYMBOL (IEEE/IEC)



PIN CONFIGURATION



FUNCTION TABLE

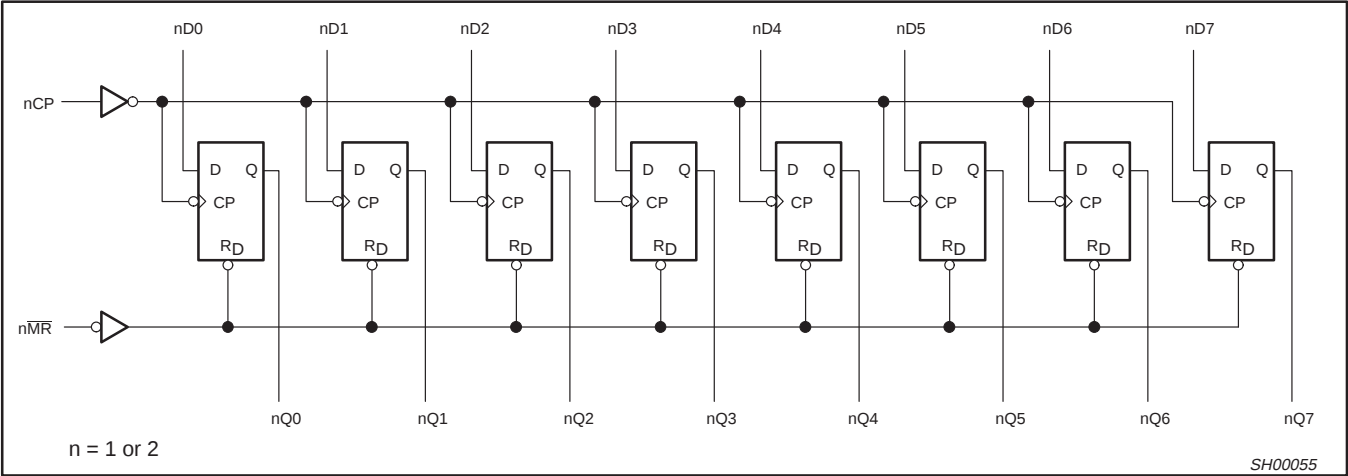
Inputs			Output	operating mode
nMR	nCP	nDX	nQ0-nQ7	
L	X	X	L	Reset (clear)
H	↑	h	H	Load "1"
H	↑	l	L	Load "0"
H	L	X	Q ₀	Retain state

H = High voltage level
h = high voltage level one set-up time prior to the Low-to-High clock transition
L = Low voltage level
l = Low voltage level one set-up time prior to the Low-to-High clock transition
X = Don't care
↑ = Low-to-High clock transition
Q₀ = Output as it was

16-bit D-type flip-flop

74ABT16273

LOGIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS^{1, 2}

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V _{CC}	DC supply voltage		−0.5 to −7.0	V
I _{IK}	DC input diode current	V _I < 0	−18	mA
V _I	DC input voltage ³		−1.2 to +7.0	V
I _{OK}	DC output diode current	V _O < 0	−50	mA
V _{OUT}	DC output voltage ³	Output in Off or High state	−0.5 to +5.5	V
I _{OUT}	DC output current	Output in Low state	128	mA
		Output in High state	−64	
T _{stg}	Storage temperature range		−65 to +150	°C

NOTES:

- Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150°C.
- The input and output negative voltage ratings may be exceeded if the input and output clamp current ratings are observed.

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS		UNIT
		MIN	MAX	
V _{CC}	DC supply voltage	4.5	5.5	V
V _I	Input voltage	0	V _{CC}	V
V _{IH}	High-level input voltage	2.0		V
V _{IL}	Input voltage		0.8	V
I _{OH}	High-level output current		−32	mA
I _{OL}	Low-level output current		64	mA
Δt/Δv	Input transition rise or fall rate; Outputs enabled	0	10	ns/V
T _{amb}	Operating free-air temperature range	−40	+85	°C

16-bit D-type flip-flop

74ABT16273

DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS					UNIT
			Temp = +25°C			Temp = -40°C to +85°C		
			MIN	TYP	MAX	MIN	MAX	
V _{IK}	Input clamp voltage	V _{CC} = 4.5V; I _{IK} = −18mA		0.9	−1.2		−1.2	V
V _{OH}	High-level output voltage	V _{CC} = 4.5V; I _{OH} = −3mA; V _I = V _{IL} or V _{IH}	2.5	2.9		2.5		V
		V _{CC} = 5.0V; I _{OH} = −3mA; V _I = V _{IL} or V _{IH}	3.0	3.4		3.0		
		V _{CC} = 4.5V; I _{OH} = −32mA; V _{IL} or V _{IH}	2.0	2.4		2.0		
V _{OL}	Low-level output voltage	V _{CC} = 4.5V; I _{OL} = 64mA; V _I = V _{IL} or V _{IH}		0.42	0.55		0.55	
V _{RST}	Power-up output voltage ³	V _{CC} = 5.5V; I _O = 1mA; V _I = GND or V _{CC}		0.13	0.55		0.55	V
I _I	Input leakage current	V _{CC} = 5.5V; V _I = V _{CC} or GND		±0.1	±1		±1	μA
I _{OFF}	Power-off leakage current	V _{CC} = 0.0V; V _O or V _I < 4.5V		±5.0	±100		±100	μA
I _O	output current ¹	V _{CC} = 5.5V; V _O = 2.5V	−50	−70	−180	−50	−180	mA
I _{CEX}	Output High leakage current	V _{CC} = 5.5V; V _O = 5.5V; V _I = GND or V _{CC}		5.0	50		50	μA
I _{CCH}	Quiescent supply current	V _{CC} = 5.5V; Outputs High, V _I = GND or V _{CC}		0.2	1		1	mA
I _{CCL}		V _{CC} = 5.5V; Outputs Low, V _I = GND or V _{CC}		8	19		19	
ΔI _{CC}	Additional supply current per input pin ²	V _{CC} = 5.5V; One input at 3.4V. Other inputs at V _{CC} or GND		5	100		100	μA

NOTES:

- Not more than one output should be tested at a time, and the duration of the test should not exceed one second.
- This is the increase in supply current for each input at 3.4V.
- For valid test results, data must not be loaded into the flip-flops (or latches) after applying the power.

AC CHARACTERISTICS

GND = 0V; $t_R = t_F = 2.5ns$; $C_L = 50pF$; $R_L = 500\Omega$;

SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			T _{amb} = +25°C V _{CC} = +5.0V			T _{amb} = -40 to +85 °C V _{CC} = +5.0V ±0.5V		
			MIN	TYP	MAX	MIN	MAX	
t _{PLH} t _{PHL}	Propagation delay nCP to nQx	1	1.5 1.2	2.5 2.0	3.4 2.7	1.5 1.2	4.0 3.0	ns
t _{PHL}	Propagation delay nMR to nQx	2	1.9	3.7	4.3	1.9	5.3	ns
f _{MAX}	Maximum clock frequency	1	150	240		150		MHz

16-bit D-type flip-flop

74ABT16273

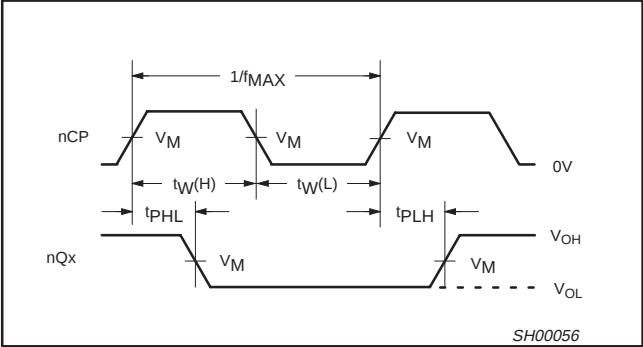
AC SETUP REQUIREMENTS

GND = 0V; $t_R = t_F = 2.5\text{ns}$; $C_L = 50\text{pF}$; $R_L = 500\Omega$

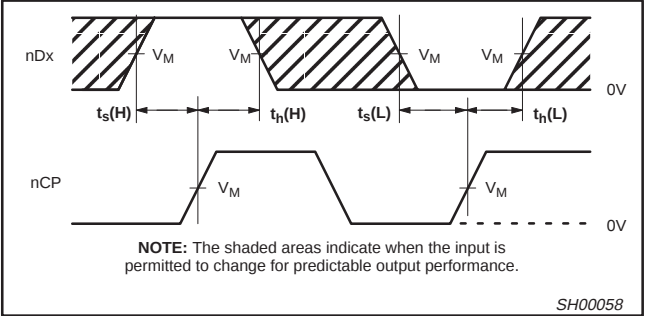
SYMBOL	PARAMETER	WAVEFORM	LIMITS			UNIT
			$T_{\text{amb}} = +25^{\circ}\text{C}$ $V_{\text{CC}} = +5.0\text{V}$		$T_{\text{amb}} = -40 \text{ to } +85^{\circ}\text{C}$ $V_{\text{CC}} = +5.0\text{V} \pm 0.5\text{V}$	
			MIN	TYP	MIN	
$t_{\text{S}}(\text{H})$ $t_{\text{S}}(\text{L})$	Setup time, High or Low nDx to nCP	3	2.0 2.0	1.0 1.0	2.0 2.0	ns
$t_{\text{H}}(\text{H})$ $t_{\text{H}}(\text{L})$	Hold time, High or Low nDx to nCP	3	0 0	-0.6 -0.6	0 0	ns
$t_{\text{W}}(\text{H})$ $t_{\text{W}}(\text{L})$	Clock pulse width High or Low	1	3.3 3.3	1.2 1.0	3.3 3.3	ns
$t_{\text{W}}(\text{L})$	Master Reset pulse width, Low	2	3.3	1.1	3.3	ns
t_{REC}	Recovery time $\text{nMR} + \text{nCP}$	2	2.0	0.0	2.0	ns

AC WAVEFORMS

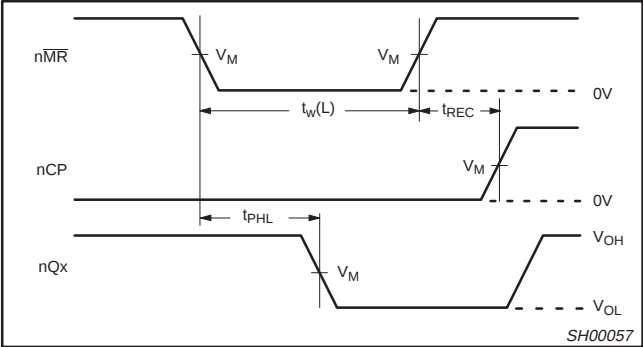
$V_M = 1.5\text{V}$, $V_{\text{IN}} = \text{GND to } 2.7\text{V}$



Waveform 1. Propagation Delay, Clock Input to Output, Clock Pulse Width, and Maximum Clock Frequency



Waveform 3. Data Setup and Hold Times

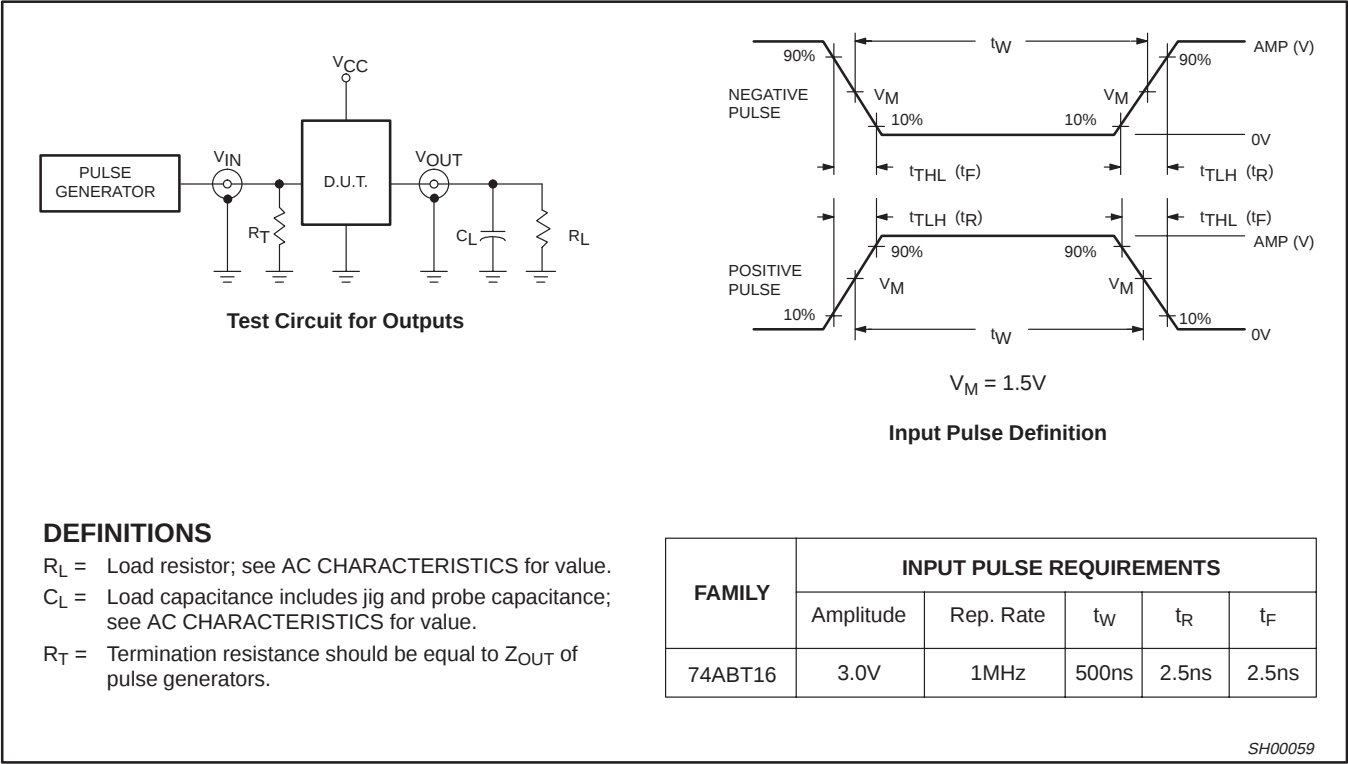


Waveform 2. Master Reset Pulse Width, Master Reset to Output Delay and Master Reset to Clock Recovery Time

16-bit D-type flip-flop

74ABT16273

TEST CIRCUIT AND WAVEFORM

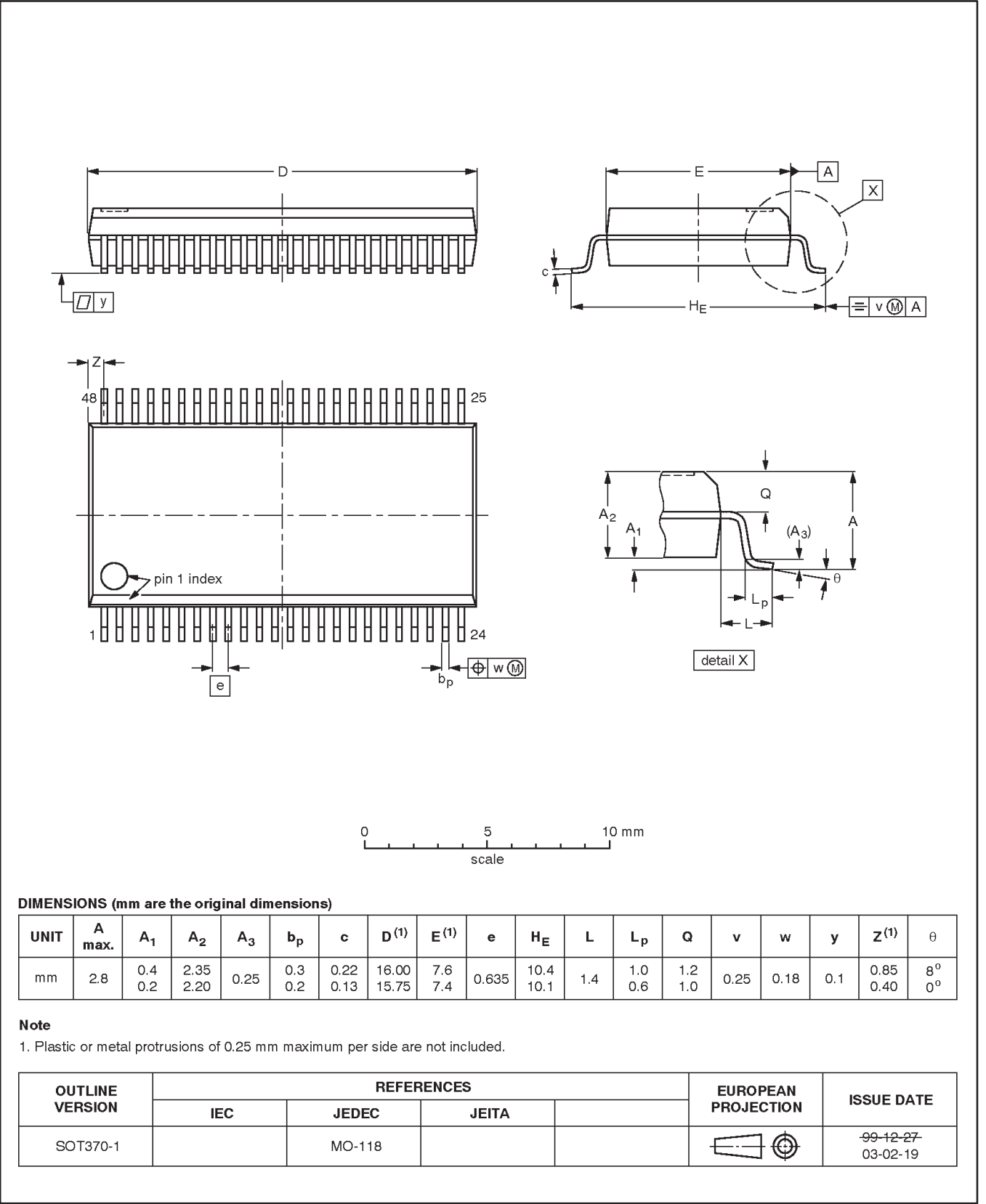


16-bit D-type flip-flop

74ABT16273

SSOP48: plastic shrink small outline package; 48 leads; body width 7.5 mm

SOT370-1

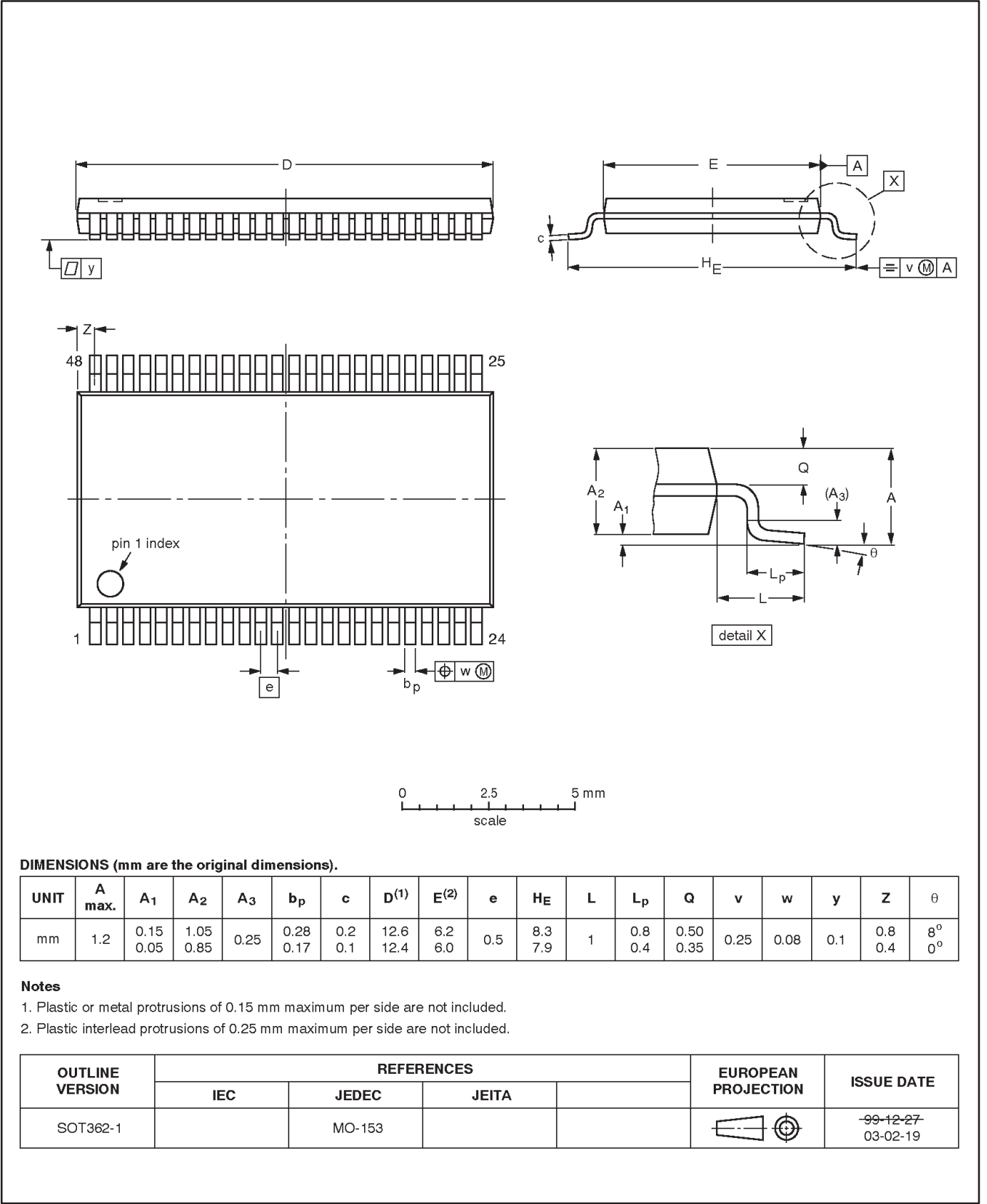


16-bit D-type flip-flop

74ABT16273

TSSOP48: plastic thin shrink small outline package; 48 leads; body width 6.1 mm

SOT362-1



16-bit D-type flip-flop

74ABT16273**REVISION HISTORY**

Rev	Date	Description
_3	20040212	Product data (9397 750 12892); 853-1793 ECN 01-A15421 of 26 January 2004. Replaces data sheet 74ABT_H16273_2 of 1998 Feb 27 (9397 750 03489). Modifications: • Delete all references to 74ABTH16273 (product discontinued).
_2	19980227	Product data (9397 750 03489); ECN 853-1793 19027 of 27 February 1998. Supersedes initial version.

16-bit D-type flip-flop

74ABT16273

Data sheet status

Level	Data sheet status ^[1]	Product status ^{[2] [3]}	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: 02-04

For sales offices addresses send e-mail to:
sales.addresses@www.semiconductors.philips.com.

Document order number: 9397 750 12892

Let's make things better.