

74AHC573; 74AHCT573

Octal D-type transparent latch; 3-state

Rev. 6 — 25 November 2010

Product data sheet

1. General description

The 74AHC573; 74AHCT573 is a high-speed Si-gate CMOS device and is pin compatible with Low-power Schottky TTL (LSTTL). It is specified in compliance with JEDEC standard No. 7A.

The 74AHC573; 74AHCT573 consists of eight D-type transparent latches featuring separate D-type inputs for each latch and 3-state true outputs for bus oriented applications. A latch enable input (LE) and an output enable input (\overline{OE}) are common to all latches.

When pin LE is HIGH, data at the Dn inputs enters the latches. In this condition the latches are transparent, i.e. a latch output will change state each time its corresponding Dn input changes. When pin LE is LOW, the latches store the information that is present at the Dn inputs, after a set-up time preceding the HIGH-to-LOW transition of LE.

When pin \overline{OE} is LOW, the contents of the 8 latches are available at the outputs. When pin \overline{OE} is HIGH, the outputs go to the high-impedance OFF-state. Operation of the \overline{OE} input does not affect the state of the latches.

The 74AHC573; 74AHCT573 is functionally identical to the 74AHC373; 74AHCT373, but has a different pin arrangement.

2. Features and benefits

- Balanced propagation delays
- All inputs have a Schmitt trigger action
- Common 3-state output enable input
- Functionally identical to the 74AHC373; 74AHCT373
- Inputs accept voltages higher than V_{CC}
- Input levels:
 - ◆ For 74AHC573: CMOS input level
 - ◆ For 74AHCT573: TTL input level
- ESD protection:
 - ◆ HBM EIA/JESD22-A114E exceeds 2000 V
 - ◆ MM EIA/JESD22-A115-A exceeds 200 V
 - ◆ CDM EIA/JESD22-C101C exceeds 1000 V
- Multiple package options
- Specified from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ and from $-40\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$



3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74AHC573				
74AHC573D	-40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74AHC573PW	-40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
74AHC573BQ	-40 °C to +125 °C	DHVQFN20	plastic dual in-line compatible thermal enhanced very thin quad flat package no leads; 20 terminals; body 2.5 × 4.5 × 0.85 mm	SOT764-1
74AHCT573				
74AHCT573D	-40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74AHCT573PW	-40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
74AHCT573BQ	-40 °C to +125 °C	DHVQFN20	plastic dual in-line compatible thermal enhanced very thin quad flat package no leads; 20 terminals; body 2.5 × 4.5 × 0.85 mm	SOT764-1

4. Functional diagram

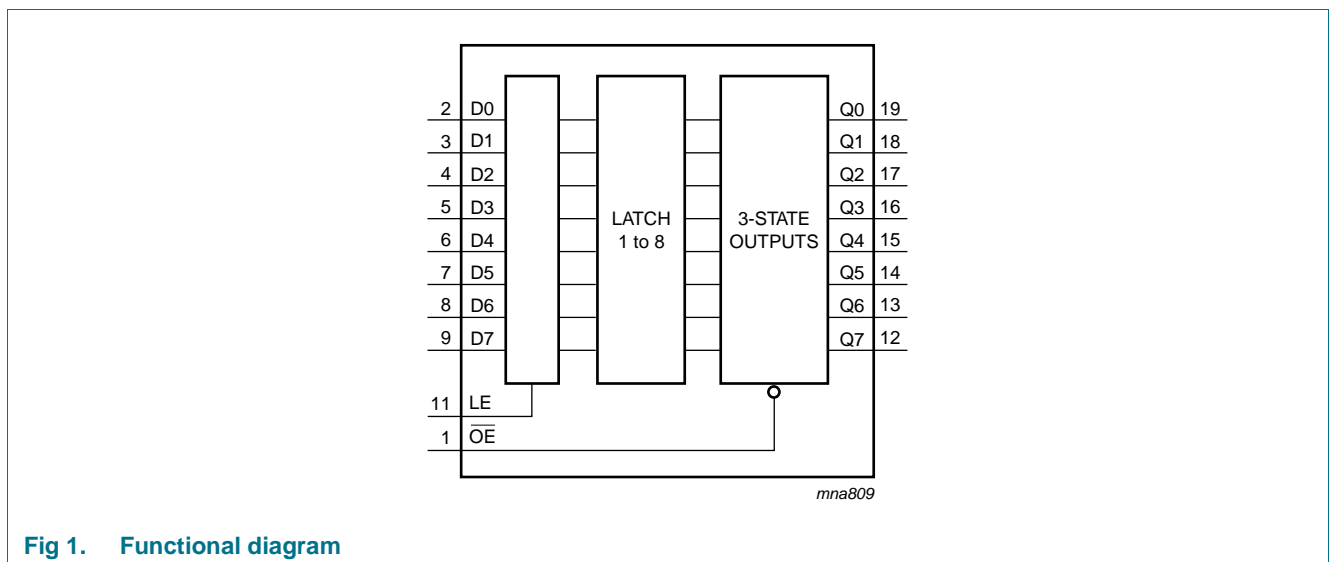


Fig 1. Functional diagram

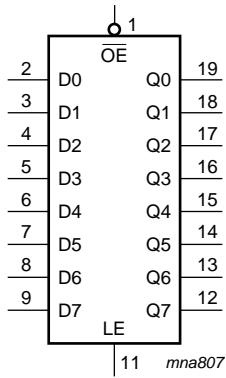


Fig 2. Logic symbol

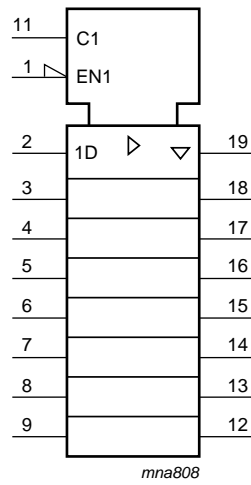


Fig 3. IEC logic symbol

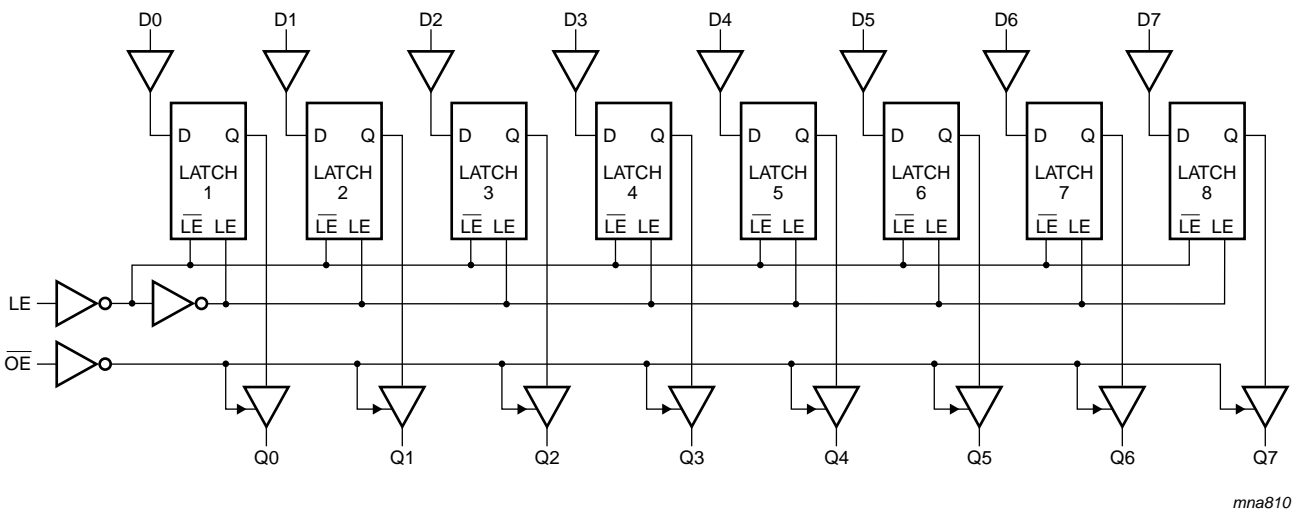
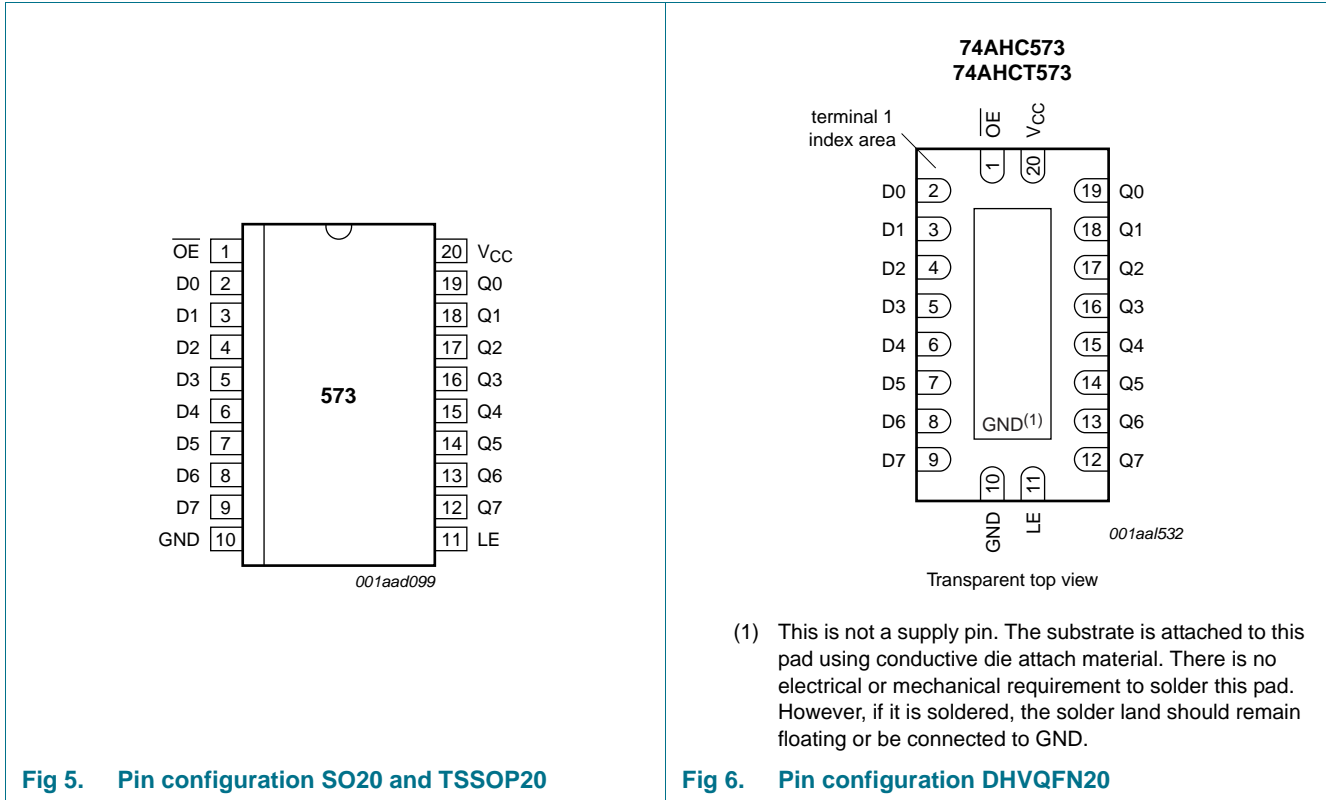


Fig 4. Logic diagram

5. Pinning information

5.1 Pinning



5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
\overline{OE}	1	output enable input (active LOW)
D0 to D7	2, 3, 4, 5, 6, 7, 8, 9	data input
GND	10	ground (0 V)
LE	11	latch enable (active HIGH)
Q0 to Q7	19, 18, 17, 16, 15, 14, 13, 12	data output
V _{CC}	20	supply voltage

6. Functional description

Table 3. Function table^[1]

Operating mode	Input			Internal latch	Output Qn
	OE	LE	Dn		
Enable and read register (transparent mode)	L	H	L	L	L
			H	H	H
Latch and read register	L	L	l	L	L
			h	H	H
Latch register and disable outputs	H	L	l	L	Z
			h	H	Z

- [1] H = HIGH voltage level;
 h = HIGH voltage level one set-up time prior to the HIGH-to-LOW LE transition;
 L = LOW voltage level;
 l = LOW voltage level one set-up time prior to the HIGH-to-LOW LE transition;
 Z = high-impedance OFF-state.

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		-0.5	+7.0	V
V_I	input voltage		-0.5	+7.0	V
I_{IK}	input clamping current	$V_I < -0.5$ V	^[1] -20	-	mA
I_{OK}	output clamping current	$V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V	^[1] -20	+20	mA
I_O	output current	$V_O = -0.5$ V to $(V_{CC} + 0.5)$ V	-25	+25	mA
I_{CC}	supply current		-	+75	mA
I_{GND}	ground current		-75	-	mA
T_{stg}	storage temperature		-65	+150	°C
P_{tot}	total power dissipation	$T_{amb} = -40$ °C to $+125$ °C	^[2] -	500	mW

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

- [2] For SO20 packages: above 70 °C the value of P_{tot} derates linearly at 8 mW/K.
 For TSSOP20 packages: above 60 °C the value of P_{tot} derates linearly at 5.5 mW/K.
 For DHVQFN20 packages: above 60 °C the value of P_{tot} derates linearly with 4.5 mW/K.

8. Recommended operating conditions

Table 5. Operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
74AHC573						
V_{CC}	supply voltage		2.0	5.0	5.5	V
V_I	input voltage		0	-	5.5	V
V_O	output voltage		0	-	V_{CC}	V
T_{amb}	ambient temperature		-40	+25	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	-	-	100	ns/V
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	20	ns/V
74AHCT573						
V_{CC}	supply voltage		4.5	5.0	5.5	V
V_I	input voltage		0	-	5.5	V
V_O	output voltage		0	-	V_{CC}	V
T_{amb}	ambient temperature		-40	+25	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-	-	20	ns/V

9. Static characteristics

Table 6. Static characteristics

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C			Unit
			Min	Typ	Max	Min	Max	Min	Typ	Max	
74AHC573											
V_{IH}	HIGH-level input voltage	$V_{CC} = 2.0\text{ V}$	1.5	-	-	1.5	-	1.5	-	-	V
		$V_{CC} = 3.0\text{ V}$	2.1	-	-	2.1	-	2.1	-	-	V
		$V_{CC} = 5.5\text{ V}$	3.85	-	-	3.85	-	3.85	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 2.0\text{ V}$	-	-	0.5	-	0.5	-	-	0.5	V
		$V_{CC} = 3.0\text{ V}$	-	-	0.9	-	0.9	-	-	0.9	V
		$V_{CC} = 5.5\text{ V}$	-	-	1.65	-	1.65	-	-	1.65	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}									
		$I_O = -50\ \mu\text{A}; V_{CC} = 2.0\text{ V}$	1.9	2.0	-	1.9	-	1.9	-	-	V
		$I_O = -50\ \mu\text{A}; V_{CC} = 3.0\text{ V}$	2.9	3.0	-	2.9	-	2.9	-	-	V
		$I_O = -50\ \mu\text{A}; V_{CC} = 4.5\text{ V}$	4.4	4.5	-	4.4	-	4.4	-	-	V
		$I_O = -4.0\text{ mA}; V_{CC} = 3.0\text{ V}$	2.58	-	-	2.48	-	2.40	-	-	V
	$I_O = -8.0\text{ mA}; V_{CC} = 4.5\text{ V}$	3.94	-	-	3.80	-	3.70	-	-	V	
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}									
		$I_O = 50\ \mu\text{A}; V_{CC} = 2.0\text{ V}$	-	0	0.1	-	0.1	-	-	0.1	V
		$I_O = 50\ \mu\text{A}; V_{CC} = 3.0\text{ V}$	-	0	0.1	-	0.1	-	-	0.1	V
		$I_O = 50\ \mu\text{A}; V_{CC} = 4.5\text{ V}$	-	0	0.1	-	0.1	-	-	0.1	V
		$I_O = 4.0\text{ mA}; V_{CC} = 3.0\text{ V}$	-	-	0.36	-	0.44	-	-	0.55	V
	$I_O = 8.0\text{ mA}; V_{CC} = 4.5\text{ V}$	-	-	0.36	-	0.44	-	-	0.55	V	

Table 6. Static characteristics ...continued

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C			Unit
			Min	Typ	Max	Min	Max	Min	Typ	Max	
I _{OZ}	OFF-state output current	V _I = V _{IH} or V _{IL} ; V _O = V _{CC} or GND; V _{CC} = 5.5 V	-	-	±0.25	-	±2.5	-	-	±10.0	μA
I _I	input leakage current	V _I = V _{CC} or GND; V _{CC} = 0 V to 5.5 V	-	-	0.1	-	1.0	-	-	2.0	μA
I _{CC}	supply current	V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V	-	-	4.0	-	40	-	-	80	μA
C _I	input capacitance	V _I = V _{CC} or GND	-	3	10	-	10	-	-	10	pF
C _O	output capacitance		-	4	-	-	-	-	-	10	pF

74AHCT573

V _{IH}	HIGH-level input voltage	V _{CC} = 4.5 V to 5.5 V	2.0	-	-	2.0	-	2.0	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 4.5 V to 5.5 V	-	-	0.8	-	0.8	-	-	0.8	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL} ; V _{CC} = 4.5 V									
		I _O = -50 μA	4.4	4.5	-	4.4	-	4.4	-	-	V
		I _O = -8.0 mA	3.94	-	-	3.80	-	3.70	-	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL} ; V _{CC} = 4.5 V									
		I _O = 50 μA	-	0	0.1	-	0.1	-	-	0.1	V
		I _O = 8.0 mA	-	-	0.36	-	0.44	-	-	0.55	V
I _{OZ}	OFF-state output current	V _I = V _{IH} or V _{IL} ; V _O = V _{CC} or GND per input pin; other inputs at V _{CC} or GND; I _O = 0 A	-	-	±0.25	-	±2.5	-	-	±10.0	μA
I _I	input leakage current	V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	-	-	0.1	-	1.0	-	-	2.0	μA
I _{CC}	supply current	V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V	-	-	4.0	-	40	-	-	80	μA
ΔI _{CC}	additional supply current	per input pin; V _I = V _{CC} - 2.1 V; I _O = 0 A; other pins at V _{CC} or GND; V _{CC} = 4.5 V to 5.5 V	-	-	1.35	-	1.5	-	-	1.5	mA
C _I	input capacitance	V _I = V _{CC} or GND	-	3	10	-	10	-	-	10	pF
C _O	output capacitance		-	4	-	-	-	-	-	10	pF

10. Dynamic characteristics

Table 7. Dynamic characteristics

 Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 11](#).

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ ^[1]	Max	Min	Max	Min	Max	
74AHC573										
t _{pd}	propagation delay	Dn to Qn; see Figure 7 ^[2]								
		V _{CC} = 3.0 V to 3.6 V								
		C _L = 15 pF	-	5.5	11.0	1.0	13.0	1.0	14.0	ns
		C _L = 50 pF	-	7.8	14.5	1.0	16.5	1.0	18.5	ns
		V _{CC} = 4.5 V to 5.5 V								
		C _L = 15 pF	-	3.9	6.8	1.0	8.0	1.0	8.5	ns
	C _L = 50 pF	-	5.5	8.8	1.0	10.0	1.0	11.0	ns	
	LE to Qn; see Figure 8 ^[2]	V _{CC} = 3.0 V to 3.6 V								
		C _L = 15 pF	-	5.8	11.9	1.0	14.0	1.0	15.0	ns
		C _L = 50 pF	-	8.3	15.4	1.0	17.5	1.0	19.5	ns
		V _{CC} = 4.5 V to 5.5 V								
		C _L = 15 pF	-	4.2	7.7	1.0	9.0	1.0	10.0	ns
C _L = 50 pF		-	5.9	9.7	1.0	11.0	1.0	12.5	ns	
t _{en}	enable time	OE to Qn; see Figure 9 ^[3]								
		V _{CC} = 3.0 V to 3.6 V								
		C _L = 15 pF	-	5.8	11.5	1.0	13.5	1.0	14.5	ns
		C _L = 50 pF	-	8.3	15.0	1.0	17.0	1.0	19.0	ns
		V _{CC} = 4.5 V to 5.5 V								
		C _L = 15 pF	-	4.4	7.7	1.0	9.0	1.0	10.0	ns
C _L = 50 pF	-	6.3	9.7	1.0	11.0	1.0	12.5	ns		
t _{dis}	disable time	OE to Qn; see Figure 9 ^[4]								
		V _{CC} = 3.0 V to 3.6 V								
		C _L = 15 pF	-	6.8	11.0	1.0	13.0	1.0	14.0	ns
		C _L = 50 pF	-	9.7	14.5	1.0	16.5	1.0	18.5	ns
		V _{CC} = 4.5 V to 5.5 V								
		C _L = 15 pF	-	4.6	7.7	1.0	9.0	1.0	10.0	ns
C _L = 50 pF	-	7.4	9.7	1.0	11.0	1.0	12.5	ns		
t _w	pulse width	LE HIGH; see Figure 8								
		V _{CC} = 3.0 V to 3.6 V	5.0	-	-	5.0	-	5.0	-	ns
		V _{CC} = 4.5 V to 5.5 V	5.0	-	-	5.0	-	5.0	-	ns
t _{su}	set-up time	Dn to LE; see Figure 10								
		V _{CC} = 3.0 V to 3.6 V	3.5	-	-	3.5	-	3.5	-	ns
		V _{CC} = 4.5 V to 5.5 V	3.5	-	-	3.5	-	3.5	-	ns

Table 7. Dynamic characteristics ...continued

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 11](#).

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ ^[1]	Max	Min	Max	Min	Max	
t _h	hold time	Dn to LE; see Figure 10								
		V _{CC} = 3.0 V to 3.6 V	1.5	-	-	1.5	-	1.5	-	ns
		V _{CC} = 4.5 V to 5.5 V	1.5	-	-	1.5	-	1.5	-	ns
C _{PD}	power dissipation capacitance	f _i = 1 MHz; V _i = GND to V _{CC}	^[5]	-	12	-	-	-	-	pF
74AHCT573; V_{CC} = 4.5 V to 5.5 V										
t _{pd}	propagation delay	Dn to Qn; see Figure 7	^[2]							
		C _L = 15 pF	-	3.5	5.5	1	6.5	1	7.0	ns
		C _L = 50 pF	-	4.9	7.5	1	8.5	1	9.5	ns
		LE to Qn; see Figure 8	^[2]							
		C _L = 15 pF	-	3.9	6.0	1	7.0	1	7.5	ns
		C _L = 50 pF	-	5.5	8.5	1	9.5	1	11.0	ns
t _{en}	enable time	OE to Qn; see Figure 9	^[3]							
		C _L = 15 pF	-	4.1	6.5	1	7.5	1	8.5	ns
		C _L = 50 pF	-	5.9	8.5	1	10.0	1	11.0	ns
t _{dis}	disable time	OE to Qn; see Figure 9	^[4]							
		C _L = 15 pF	-	4.5	6.5	1	7.5	1	8.5	ns
		C _L = 50 pF	-	6.4	9.0	1	10.0	1	11.5	ns
t _W	pulse width	LE HIGH; see Figure 8	5.0	-	-	5.0	-	5.0	-	ns
t _{su}	set-up time	Dn to LE; see Figure 10	3.5	-	-	3.5	-	3.5	-	ns
t _h	hold time	Dn to LE; see Figure 10	1.5	-	-	1.5	-	1.5	-	ns
C _{PD}	power dissipation capacitance	f _i = 1 MHz; V _i = GND to V _{CC}	^[5]	-	18	-	-	-	-	pF

[1] Typical values are measured at nominal supply voltage (V_{CC} = 3.3 V and V_{CC} = 5.0 V).

[2] t_{pd} is the same as t_{PHL} and t_{PLH}.

[3] t_{en} is the same as t_{PZH} and t_{PZL}.

[4] t_{dis} is the same as t_{PHZ} and t_{PLZ}.

[5] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f_i = input frequency in MHz;

f_o = output frequency in MHz;

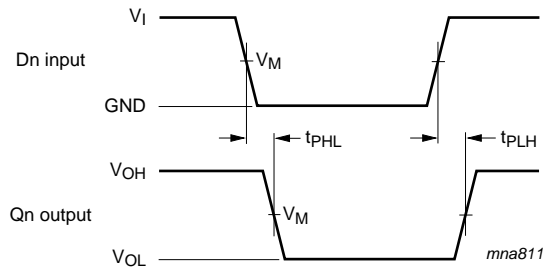
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

∑(C_L × V_{CC}² × f_o) = sum of the outputs.

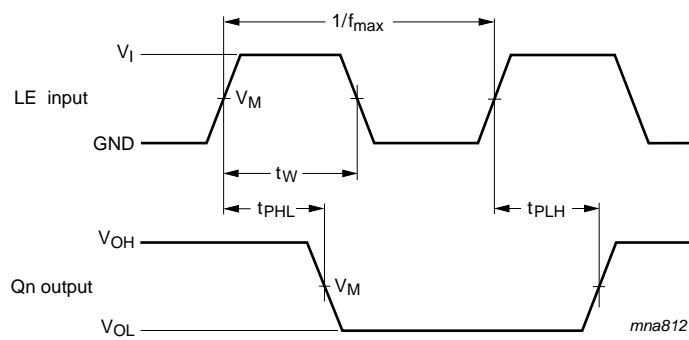
11. Waveforms



Measurement points are given in [Table 8](#).

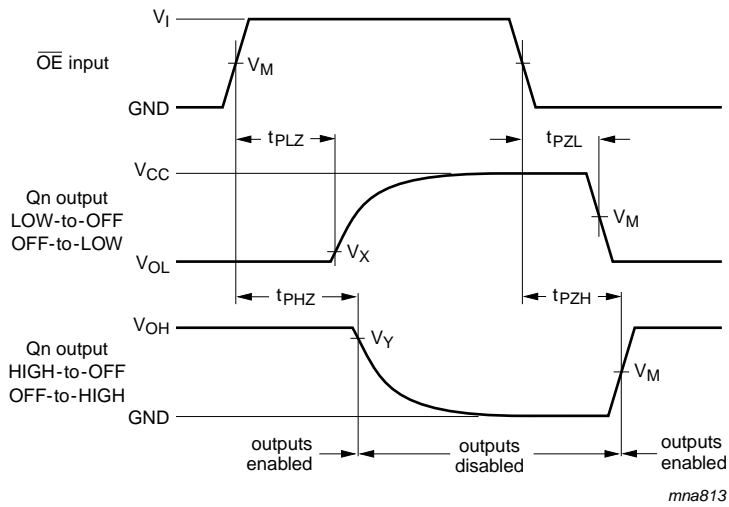
V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Fig 7. Data input to output propagation delays



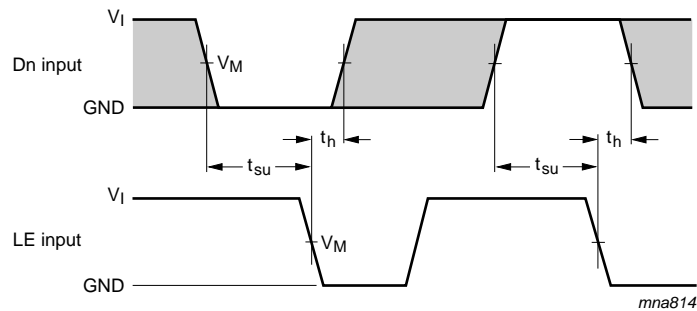
V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Fig 8. Latch enable input to output propagation delays



Measurement points are given in [Table 8](#).
 V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Fig 9. Enable and disable times

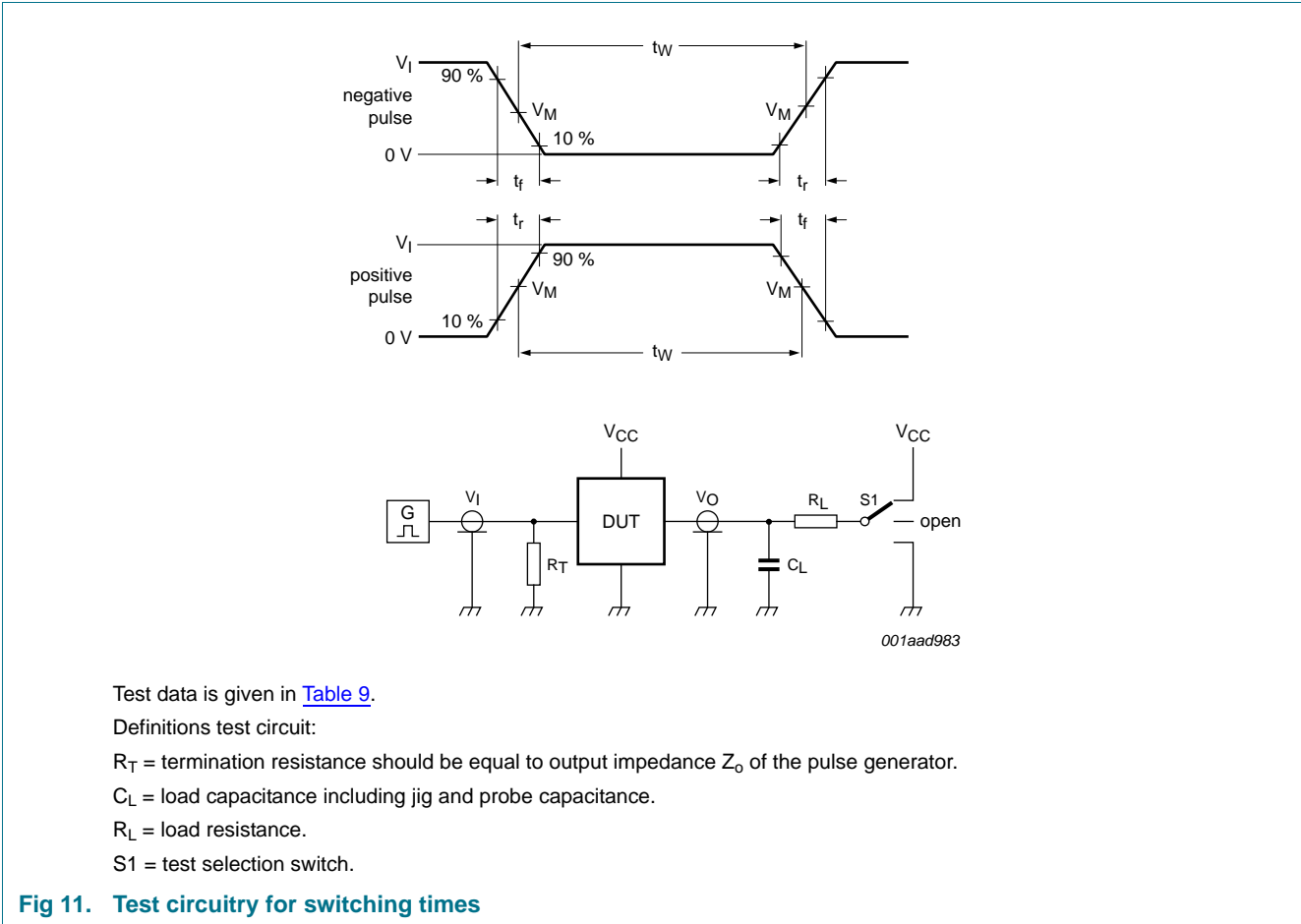


Measurement points are given in [Table 8](#).
 V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.
 The shaded areas indicate when the input is permitted to change for predicable output performance.

Fig 10. Data set-up and hold times

Table 8. Measurement points

Type	Input	Output		
	V_M	V_M	V_X	V_Y
74AHC573	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$
74AHCT573	1.5 V	$0.5 \times V_{CC}$	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$



Test data is given in [Table 9](#).

Definitions test circuit:

R_T = termination resistance should be equal to output impedance Z_o of the pulse generator.

C_L = load capacitance including jig and probe capacitance.

R_L = load resistance.

S1 = test selection switch.

Fig 11. Test circuitry for switching times

Table 9. Test data

Type	Input		Load		S1 position		
	V_I	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
74AHC573	V_{CC}	≤ 3.0 ns	15 pF, 50 pF	1 k Ω	open	GND	V_{CC}
74AHCT573	3.0 V	≤ 3.0 ns	15 pF, 50 pF	1 k Ω	open	GND	V_{CC}

12. Package outline

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1

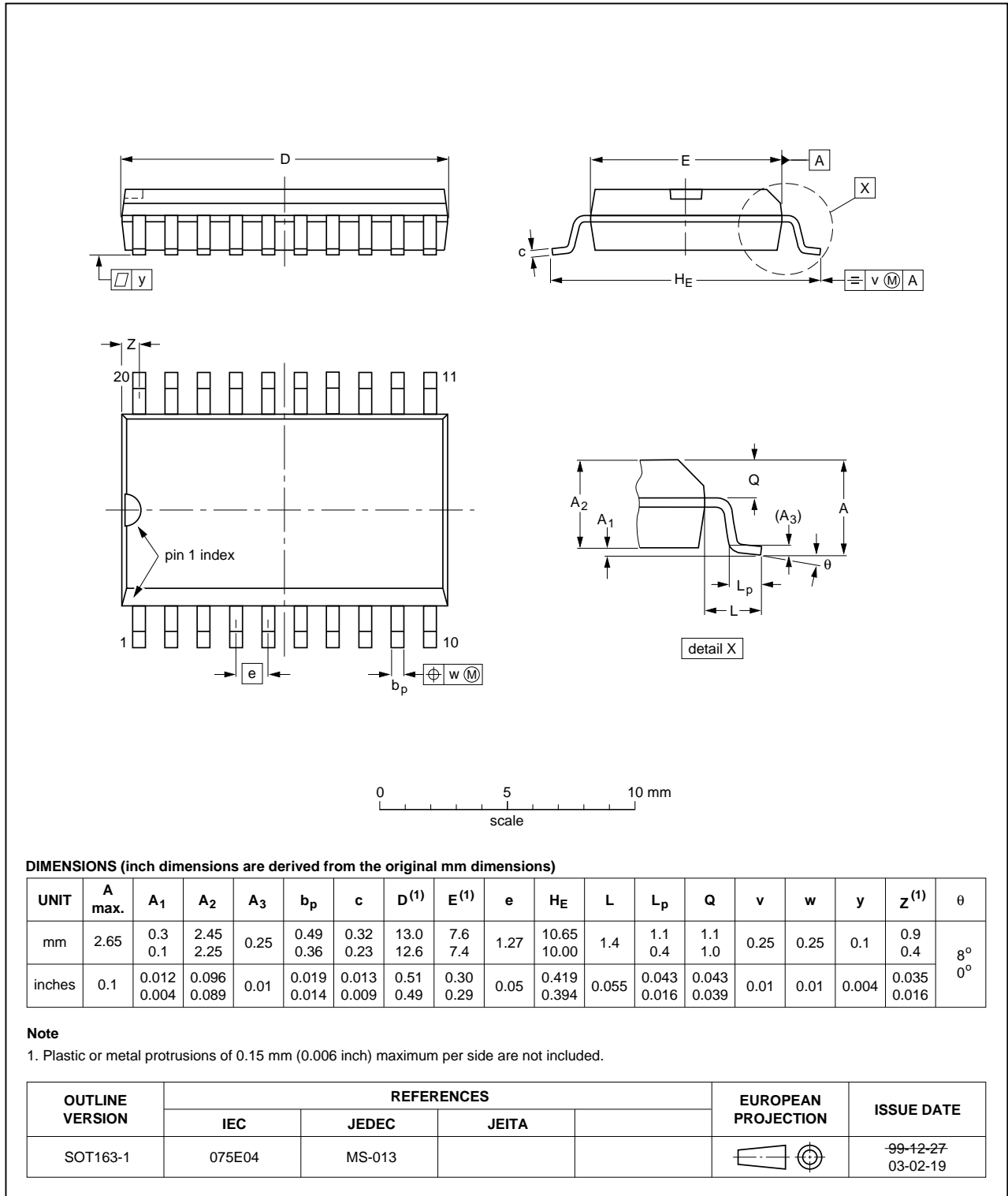


Fig 12. Package outline SOT163-1 (SO20)

TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm

SOT360-1

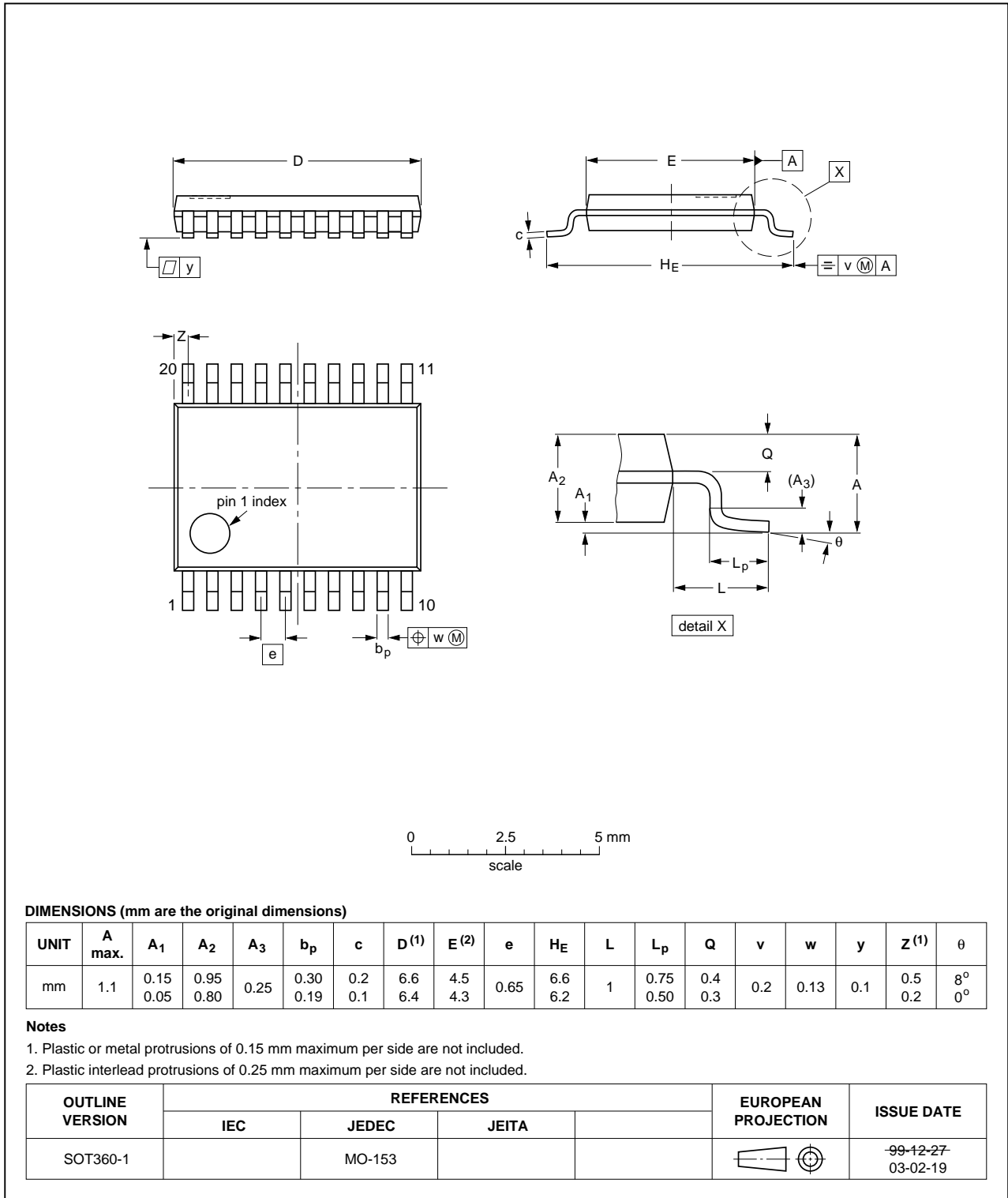


Fig 13. Package outline SOT360-1 (TSSOP20)

DHVQFN20: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 20 terminals; body 2.5 x 4.5 x 0.85 mm

SOT764-1

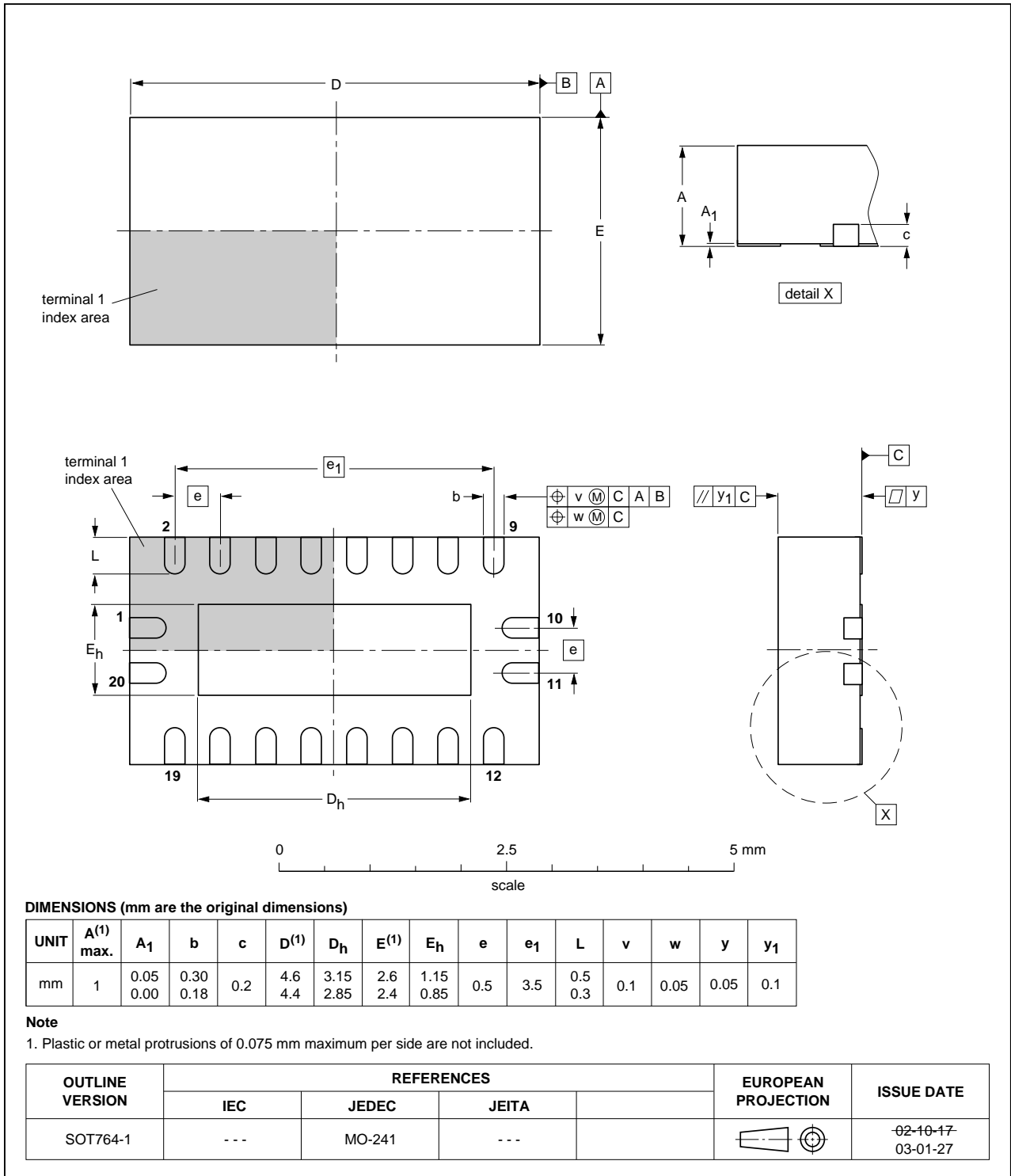


Fig 14. Package outline SOT764-1 (DHVQFN20)

13. Abbreviations

Table 10. Abbreviations

Acronym	Description
CDM	Charged Device Model
CMOS	Complementary Metal-Oxide Semiconductor
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model
TTL	Transistor-Transistor Logic

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHC_AHCT573 v.6	20101125	Product data sheet	-	74AHC_AHCT573 v.5
Modifications:	<ul style="list-style-type: none"> • Figure note [1] of Figure 6: added. 			
74AHC_AHCT573 v.5	20100325	Product data sheet	-	74AHC_AHCT573 v.4
74AHC_AHCT573 v.4	20100303	Product data sheet	-	74AHC_AHCT573 v.3
74AHC_AHCT573 v.3	20080424	Product data sheet	-	74AHC_AHCT573 v.2
74AHC_AHCT573 v.2	20031208	Product specification	-	74AHC_AHCT573 v.1
74AHC_AHCT573 v.1	19990927	Product specification	-	-

15. Legal information

15.1 Data sheet status

Document status ^{[1][2]}	Product status ^[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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17. Contents

1	General description	1
2	Features and benefits	1
3	Ordering information	2
4	Functional diagram	2
5	Pinning information	4
5.1	Pinning	4
5.2	Pin description	4
6	Functional description	5
7	Limiting values	5
8	Recommended operating conditions	6
9	Static characteristics	6
10	Dynamic characteristics	8
11	Waveforms	10
12	Package outline	13
13	Abbreviations	16
14	Revision history	16
15	Legal information	17
15.1	Data sheet status	17
15.2	Definitions	17
15.3	Disclaimers	17
15.4	Trademarks	18
16	Contact information	18
17	Contents	19

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