

# 74HC573; 74HCT573

Octal D-type transparent latch; 3-state

Rev. 5 — 15 August 2012

Product data sheet

## 1. General description

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The 74HC573; 74HCT573 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 74HC573; 74HCT573 has octal D-type transparent latches featuring separate D-type inputs for each latch and 3-state true outputs for bus-oriented applications. A latch enable (LE) input and an output enable ( $\overline{OE}$ ) input are common to all latches.

When LE is HIGH, data at the Dn inputs enter the latches. In this condition, the latches are transparent, i.e. a latch output changes state each time its corresponding D input changes.

When LE is LOW the latches store the information that was present at the D-inputs a set-up time preceding the HIGH-to-LOW transition of LE. When  $\overline{OE}$  is LOW, the contents of the 8 latches are available at the outputs. When  $\overline{OE}$  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 74HC573; 74HCT573 is functionally identical to:

- 74HC563; 74HCT563, but inverted outputs
- 74HC373; 74HCT373, but different pin arrangement

## 2. Features and benefits

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- Input levels:
  - ◆ For 74HC573: CMOS level
  - ◆ For 74HCT573: TTL level
- Inputs and outputs on opposite sides of package allowing easy interface with microprocessors
- Useful as input or output port for microprocessors and microcomputers
- 3-state non-inverting outputs for bus-oriented applications
- Common 3-state output enable input
- Multiple package options
- ESD protection:
  - ◆ HBM JESD22-A114F exceeds 2 000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
- 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			
	Temperature range	Name	Description	Version
74HC573N 74HCT534N	-40 °C to +125 °C	DIP20	plastic dual in-line package; 20 leads (300 mil)	SOT146-1
74HC573D 74HCT573D	-40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74HC573DB 74HCT573DB	-40 °C to +125 °C	SSOP20	plastic shrink small outline package; 20 leads; body width 5.3 mm	SOT339-1
74HC573PW 74HCT573PW	-40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
74HC573BQ 74HCT573BQ	-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

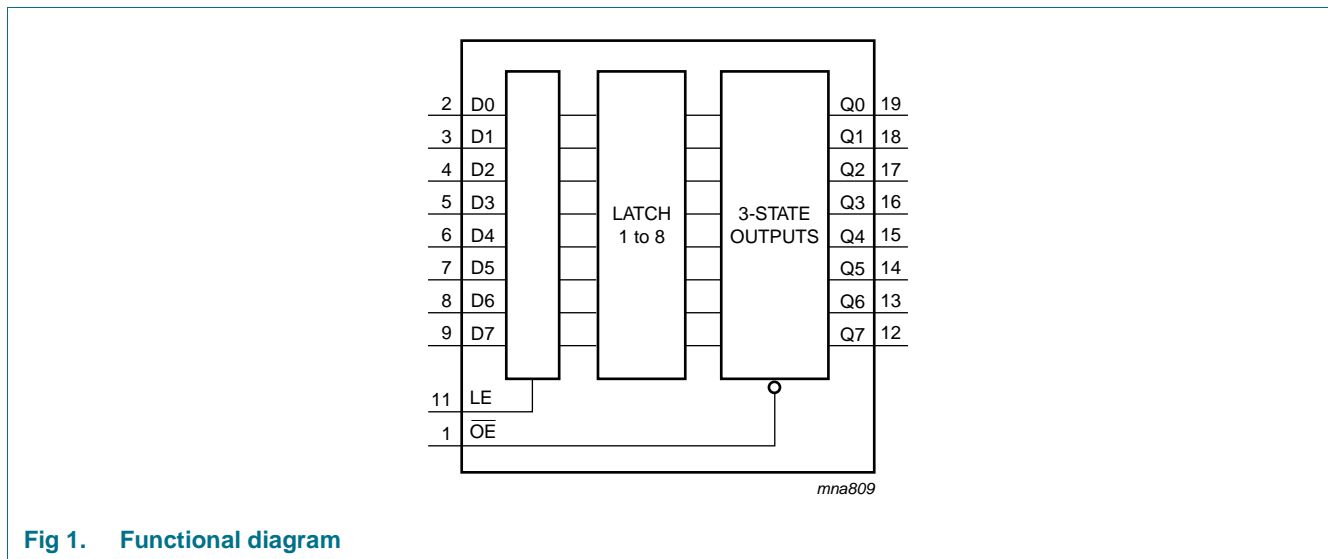


Fig 1. Functional diagram

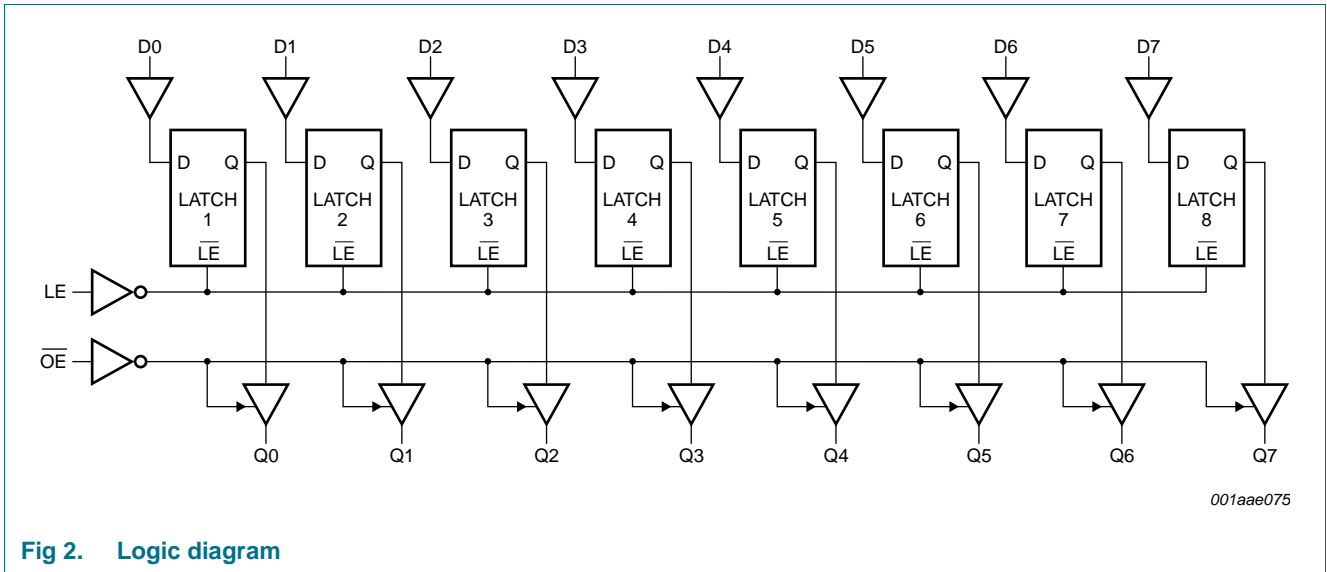


Fig 2. Logic diagram

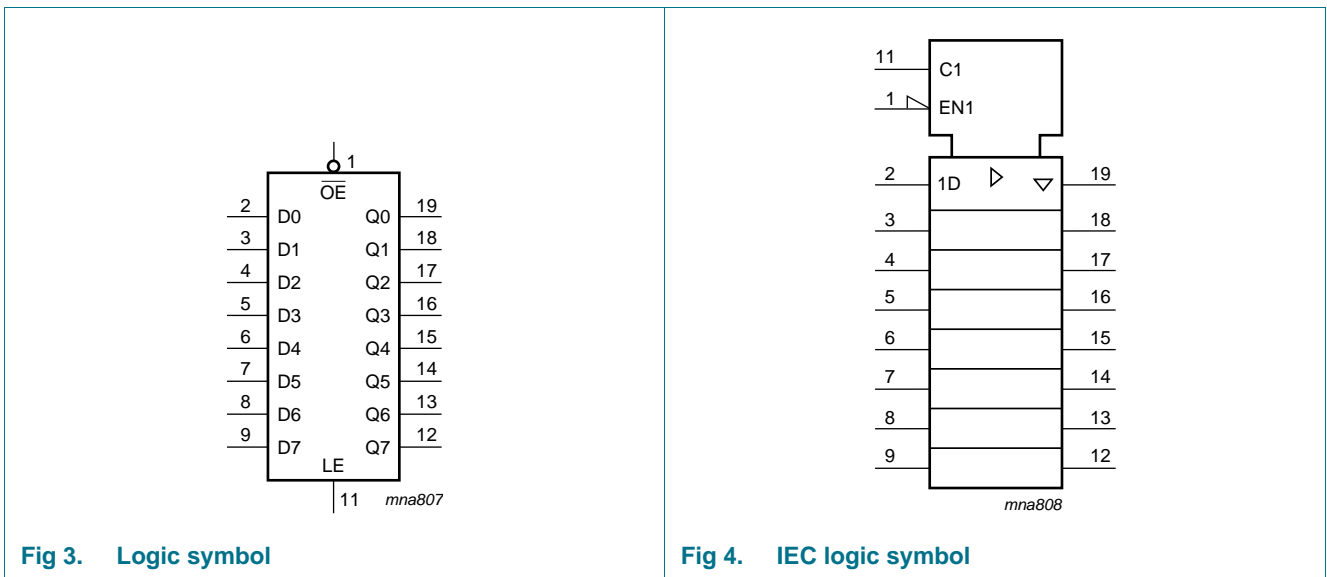
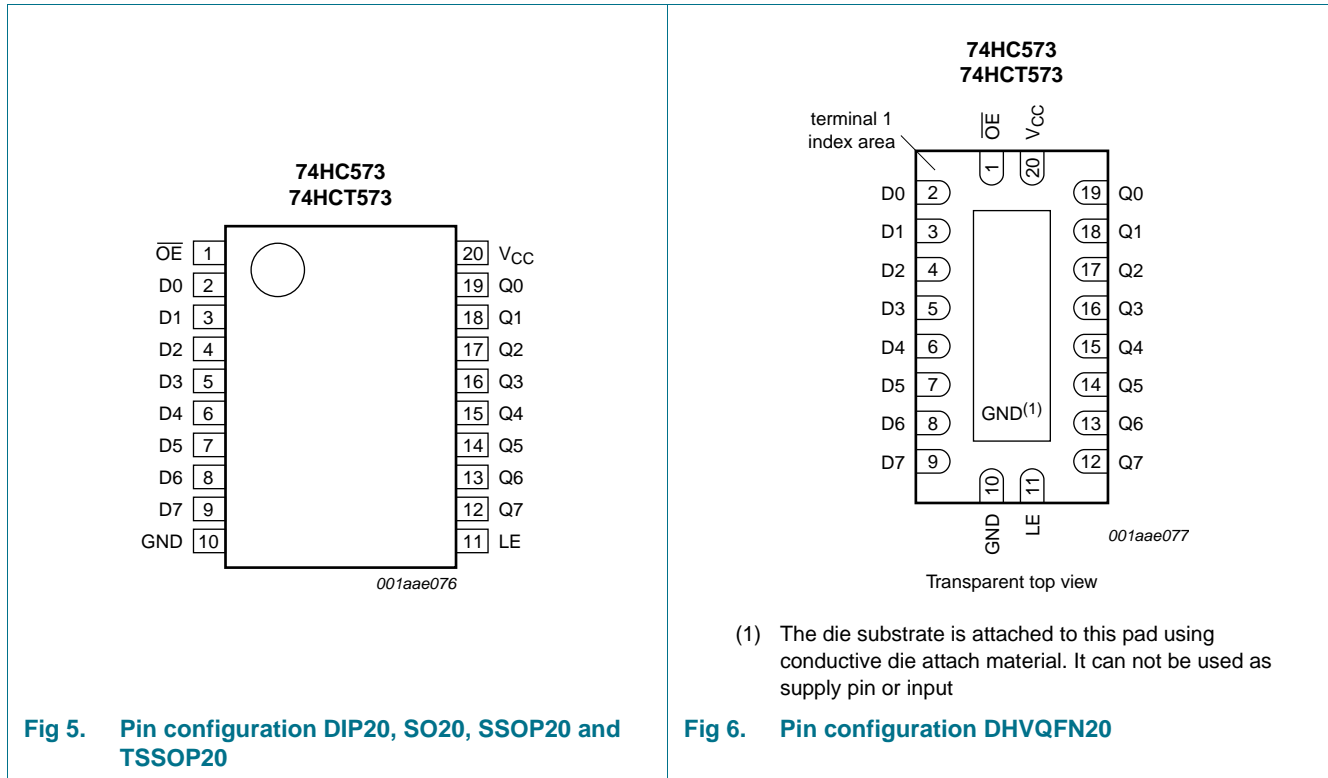


Fig 3. Logic symbol

Fig 4. IEC logic symbol

## 5. Pinning information

### 5.1 Pinning



### 5.2 Pin description

**Table 2. Pin description**

Symbol	Pin	Description
OE	1	3-state output enable input (active LOW)
D[0:7]	2, 3, 4, 5, 6, 7, 8, 9	data input
GND	10	ground (0 V)
LE	11	latch enable input (active HIGH)
Q[0:7]	19, 18, 17, 16, 15, 14, 13, 12	3-state latch output
V <sub>CC</sub>	20	supply voltage

## 6. Functional description

Table 3. Function table<sup>[1]</sup>

Operating mode	Control		Input	Internal latches	Output
	OE	LE	Dn		Qn
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	V
$I_{IK}$	input clamping current	$V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$	-	$\pm 20$	mA
$I_{OK}$	output clamping current	$V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$	-	$\pm 20$	mA
$I_O$	output current	$V_O = -0.5\text{ V}$ to $(V_{CC} + 0.5\text{ V})$	-	$\pm 35$	mA
$I_{CC}$	supply current		-	+70	mA
$I_{GND}$	ground current		-	-70	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation	DIP20 package	<sup>[1]</sup> -	750	mW
		SO20, SSOP20, TSSOP20 and DHVQFN20 packages	<sup>[2]</sup> -	500	mW

- [1] For DIP20 package:  $P_{tot}$  derates linearly with 12 mW/K above 70 °C.  
 [2] For SO20:  $P_{tot}$  derates linearly with 8 mW/K above 70 °C.  
 For SSOP20 and TSSOP20 packages:  $P_{tot}$  derates linearly with 5.5 mW/K above 60 °C.  
 For DHVQFN20 package:  $P_{tot}$  derates linearly with 4.5 mW/K above 60 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

Voltages are referenced to GND (ground = 0 V)

Symbol	Parameter	Conditions	74HC573			74HCT573			Unit
			Min	Typ	Max	Min	Typ	Max	
V <sub>CC</sub>	supply voltage		2.0	5.0	6.0	4.5	5.0	5.5	V
V <sub>I</sub>	input voltage		0	-	V <sub>CC</sub>	0	-	V <sub>CC</sub>	V
V <sub>O</sub>	output voltage		0	-	V <sub>CC</sub>	0	-	V <sub>CC</sub>	V
T <sub>amb</sub>	ambient temperature		-40	+25	+125	-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	V <sub>CC</sub> = 2.0 V	-	-	625	-	-	-	ns/V
		V <sub>CC</sub> = 4.5 V	-	1.67	139	-	1.67	139	ns/V
		V <sub>CC</sub> = 6.0 V	-	-	83	-	-	-	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	Max	
<b>74HC573</b>										
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	1.2	-	1.5	-	1.5	-	V
		V <sub>CC</sub> = 4.5 V	3.15	2.4	-	3.15	-	3.15	-	V
		V <sub>CC</sub> = 6.0 V	4.2	3.2	-	4.2	-	4.2	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	0.8	0.5	-	0.5	-	0.5	V
		V <sub>CC</sub> = 4.5 V	-	2.1	1.35	-	1.35	-	1.35	V
		V <sub>CC</sub> = 6.0 V	-	2.8	1.8	-	1.8	-	1.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>								
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 6.0 V	5.9	6.0	-	5.9	-	5.9	-	V
		I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V	3.98	4.32	-	3.84	-	3.7	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>								
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 6.0 V	-	0	0.1	-	0.1	-	0.1	V
		I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V	-	0.15	0.26	-	0.33	-	0.4	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V	-	-	±0.1	-	±1.0	-	±1.0	μA
		V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V	-	-	±0.5	-	±5.0	-	±10.0	μA

**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	Max	
$I_{CC}$	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 6.0$ V	-	-	8.0	-	80	-	160	$\mu$ A
$C_I$	input capacitance		-	3.5	-					pF
<b>74HCT573</b>										
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	2.0	1.6	-	2.0	-	2.0	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	-	1.2	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								
		$I_O = -20$ $\mu$ A	4.4	4.5	-	4.4	-	4.4	-	V
		$I_O = -6$ mA	3.98	4.32	-	3.84	-	3.7	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 4.5$ V								
		$I_O = 20$ $\mu$ A	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 6.0$ mA	-	0.16	0.26	-	0.33	-	0.4	V
$I_I$	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	$\pm 0.1$	-	$\pm 1.0$	-	$\pm 1.0$	$\mu$ A
$I_{OZ}$	OFF-state output current	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 5.5$ V; $V_O = V_{CC}$ or GND per input pin; other inputs at $V_{CC}$ or GND; $I_O = 0$ A	-	-	$\pm 0.5$	-	$\pm 5.0$	-	$\pm 10$	$\mu$ A
$I_{CC}$	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	8.0	-	80	-	160	$\mu$ A
$\Delta I_{CC}$	additional supply current	$V_I = V_{CC} - 2.1$ V; other inputs at $V_{CC}$ or GND; $V_{CC} = 4.5$ V to 5.5 V; $I_O = 0$ A								
		per input pin; Dn inputs	-	35	126	-	158	-	172	$\mu$ A
		per input pin; LE input	-	65	234	-	293	-	319	$\mu$ A
		per input pin; $\overline{OE}$ input	-	125	450	-	563	-	613	$\mu$ A
$C_I$	input capacitance		-	3.5	-					pF

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit see [Figure 11](#).

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
<b>For type 74HC573</b>										
$t_{pd}$	propagation delay	Dn to Qn; see <a href="#">Figure 7</a> <a href="#">[1]</a>								
		$V_{CC} = 2.0$ V	-	47	150	-	190	-	225	ns
		$V_{CC} = 4.5$ V	-	17	30	-	38	-	45	ns
		$V_{CC} = 5$ V; $C_L = 15$ pF	-	14	-	-	-	-	-	ns
		$V_{CC} = 6.0$ V	-	14	26	-	33	-	38	ns
$t_{pd}$	propagation delay	LE to Qn; see <a href="#">Figure 8</a> <a href="#">[1]</a>								
		$V_{CC} = 2.0$ V	-	50	150	-	190	-	225	ns
		$V_{CC} = 4.5$ V	-	18	30	-	38	-	45	ns
		$V_{CC} = 5$ V; $C_L = 15$ pF	-	15	-	-	-	-	-	ns
		$V_{CC} = 6.0$ V	-	14	26	-	33	-	38	ns
$t_{en}$	enable time	$\overline{OE}$ to Qn; see <a href="#">Figure 9</a> <a href="#">[2]</a>								
		$V_{CC} = 2.0$ V	-	44	140	-	175	-	210	ns
		$V_{CC} = 4.5$ V	-	16	28	-	35	-	42	ns
		$V_{CC} = 6.0$ V	-	13	24	-	30	-	36	ns
$t_{dis}$	disable time	$\overline{OE}$ to Qn; see <a href="#">Figure 9</a> <a href="#">[3]</a>								
		$V_{CC} = 2.0$ V	-	55	150	-	190	-	225	ns
		$V_{CC} = 4.5$ V	-	20	30	-	38	-	45	ns
		$V_{CC} = 6.0$ V	-	16	26	-	33	-	38	ns
$t_t$	transition time	Qn; see <a href="#">Figure 7</a> <a href="#">[4]</a>								
		$V_{CC} = 2.0$ V	-	14	60	-	75	-	90	ns
		$V_{CC} = 4.5$ V	-	5	12	-	15	-	18	ns
		$V_{CC} = 6.0$ V	-	4	10	-	13	-	15	ns
$t_W$	pulse width	LE HIGH; see <a href="#">Figure 8</a>								
		$V_{CC} = 2.0$ V	80	14	-	100	-	120	-	ns
		$V_{CC} = 4.5$ V	16	5	-	20	-	24	-	ns
		$V_{CC} = 6.0$ V	14	4	-	17	-	20	-	ns
$t_{su}$	set-up time	Dn to LE; see <a href="#">Figure 10</a>								
		$V_{CC} = 2.0$ V	50	11	-	65	-	75	-	ns
		$V_{CC} = 4.5$ V	10	4	-	13	-	15	-	ns
		$V_{CC} = 6.0$ V	9	3	-	11	-	13	-	ns
$t_h$	hold time	Dn to LE; see <a href="#">Figure 10</a>								
		$V_{CC} = 2.0$ V	5	3	-	5	-	5	-	ns
		$V_{CC} = 4.5$ V	5	1	-	5	-	5	-	ns
		$V_{CC} = 6.0$ V	5	1	-	5	-	5	-	ns
$C_{PD}$	power dissipation capacitance	$C_L = 50$ pF; $f = 1$ MHz; $V_1 = \text{GND to } V_{CC}$ <a href="#">[5]</a>	-	26	-	-	-	-	-	pF



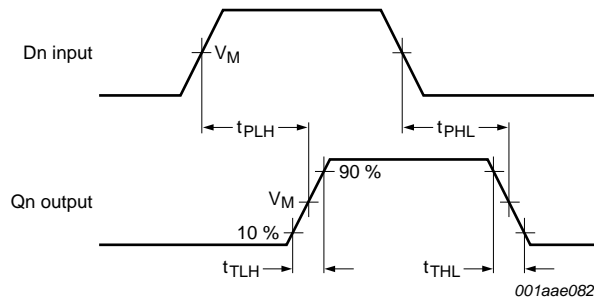
**Table 7. Dynamic characteristics ...continued**

Voltages are referenced to GND (ground = 0 V);  $C_L = 50$  pF unless otherwise specified; for test circuit see [Figure 11](#).

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
<b>For type 74HCT573</b>										
$t_{pd}$	propagation delay	Dn to Qn; see <a href="#">Figure 7</a> [1]								
		$V_{CC} = 4.5$ V	-	20	35	-	44	-	53	ns
		$V_{CC} = 5$ V; $C_L = 15$ pF	-	17	-	-	-	-	-	ns
$t_{pd}$	propagation delay	LE to Qn; see <a href="#">Figure 8</a> [1]								
		$V_{CC} = 4.5$ V	-	18	35	-	44	-	53	ns
		$V_{CC} = 5$ V; $C_L = 15$ pF	-	15	-	-	-	-	-	ns
$t_{en}$	enable time	$\overline{OE}$ to Qn; see <a href="#">Figure 9</a> [2]								
		$V_{CC} = 4.5$ V	-	17	30	-	38	-	45	ns
$t_{dis}$	disable time	$\overline{OE}$ to Qn; see <a href="#">Figure 9</a> [3]								
		$V_{CC} = 4.5$ V	-	18	30	-	38	-	45	ns
$t_t$	transition time	Qn; see <a href="#">Figure 7</a> [4]								
		$V_{CC} = 4.5$ V	-	5	12	-	15	-	18	ns
$t_W$	pulse width	LE HIGH; see <a href="#">Figure 8</a>								
		$V_{CC} = 4.5$ V	16	5	-	20	-	24	-	ns
$t_{su}$	set-up time	Dn to LE; see <a href="#">Figure 10</a>								
		$V_{CC} = 4.5$ V	13	7	-	16	-	20	-	ns
$t_h$	hold time	Dn to LE; see <a href="#">Figure 10</a>								
		$V_{CC} = 4.5$ V	9	4	-	11	-	15	-	ns
$C_{PD}$	power dissipation capacitance	$C_L = 50$ pF; $f = 1$ MHz; $V_1 = GND$ to $V_{CC}$	[5]	-	26	-	-	-	-	pF

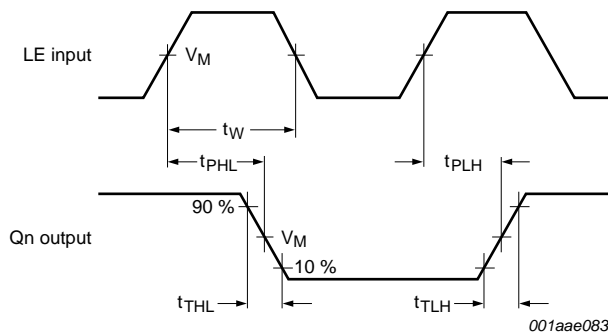
- [1]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .
- [2]  $t_{en}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .
- [3]  $t_{dis}$  is the same as  $t_{PLZ}$  and  $t_{PHZ}$ .
- [4]  $t_t$  is the same as  $t_{THL}$  and  $t_{TLH}$ .
- [5]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu W$ ).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o)$  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;  
 $\sum(C_L \times V_{CC}^2 \times f_o)$  = sum of outputs.

11. Waveforms



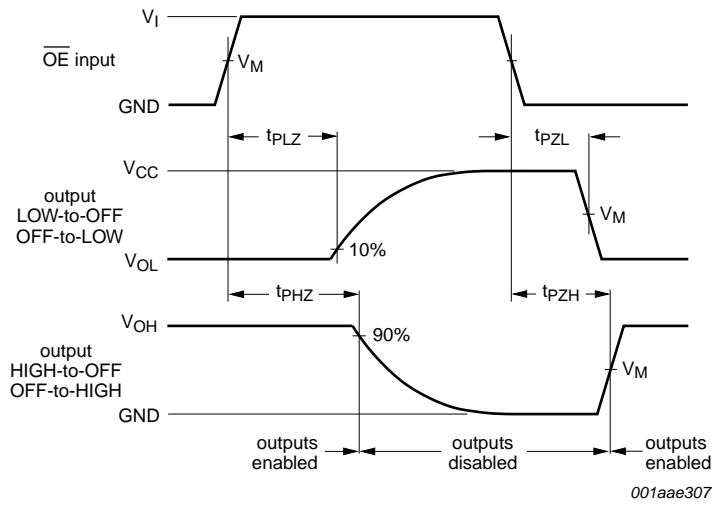
Measurement points are given in [Table 8](#).

**Fig 7. Propagation delay data input (Dn) to output (Qn) and output transition time**



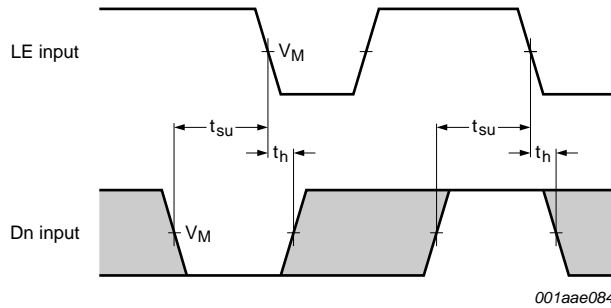
Measurement points are given in [Table 8](#).

**Fig 8. Pulse width latch enable input (LE), propagation delay latch enable input (LE) to output (Qn) and output transition time**



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**

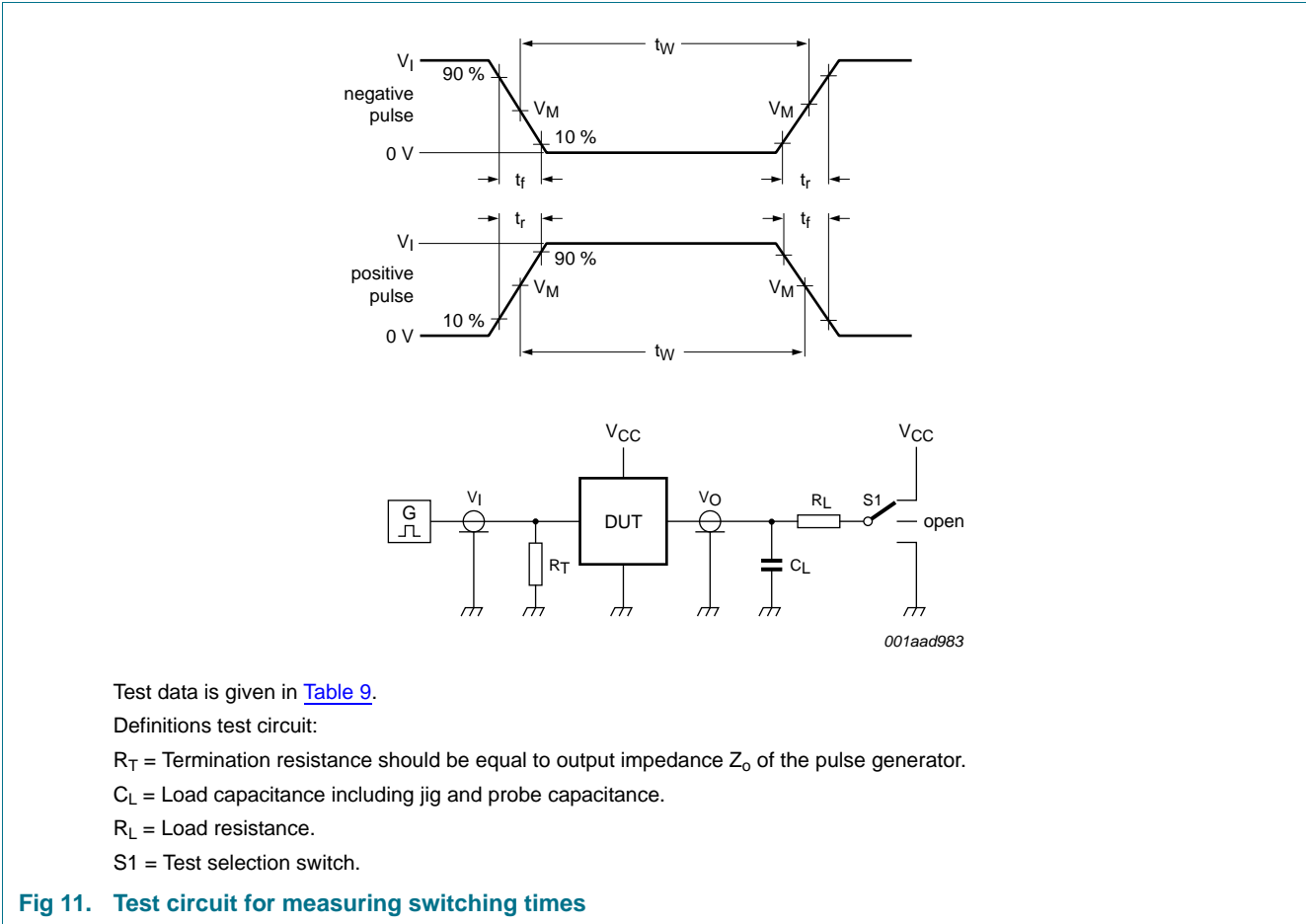


Measurement points are given in [Table 8](#).  
 The shaded areas indicate when the input is permitted to change for predictable output performance.

**Fig 10. Set-up and hold times for data input (Dn) to latch input (LE)**

**Table 8. Measurement points**

Type	Input	Output
	$V_M$	$V_M$
74HC573	$0.5V_{CC}$	$0.5V_{CC}$
74HCT573	1.3 V	1.3 V



**Table 9. Test data**

Type	Input		Load		S1 position		
	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
74HC573	$V_{CC}$	6 ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$
74HCT573	3 V	6 ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$

12. Package outline

DIP20: plastic dual in-line package; 20 leads (300 mil)

SOT146-1

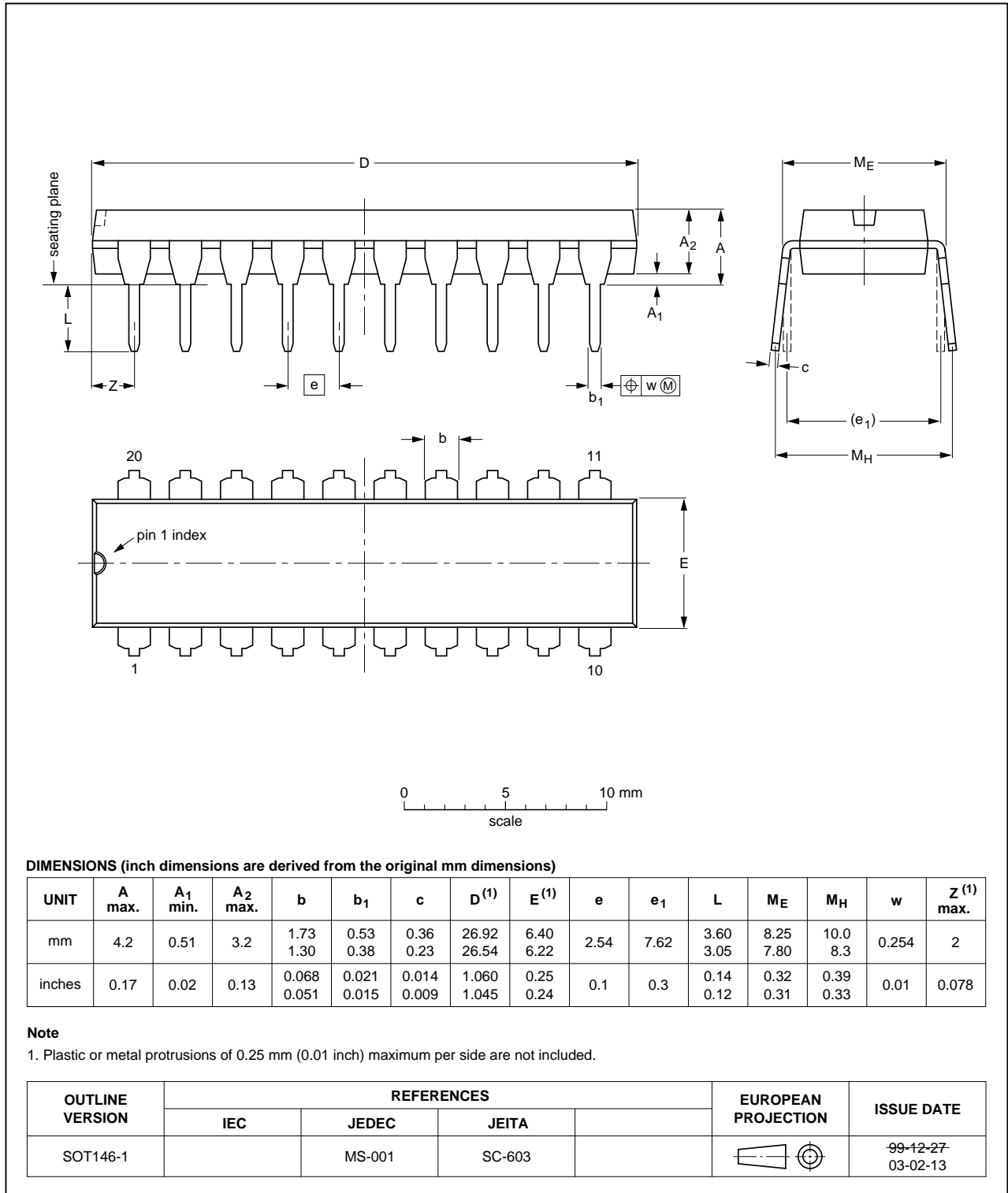


Fig 12. Package outline SOT146-1 (DIP20)

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

SOT163-1

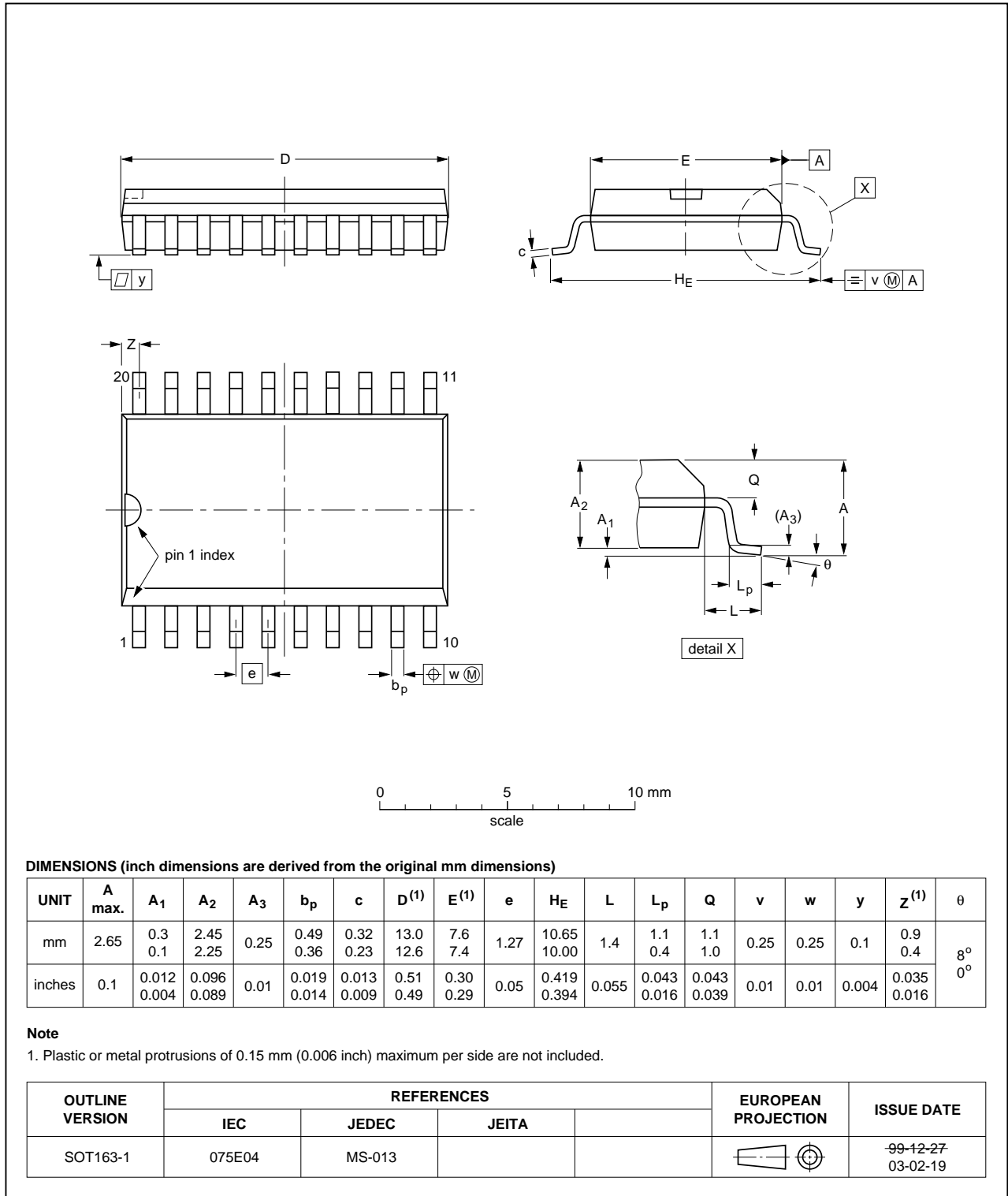


Fig 13. Package outline SOT163-1 (SO20)

SSOP20: plastic shrink small outline package; 20 leads; body width 5.3 mm

SOT339-1

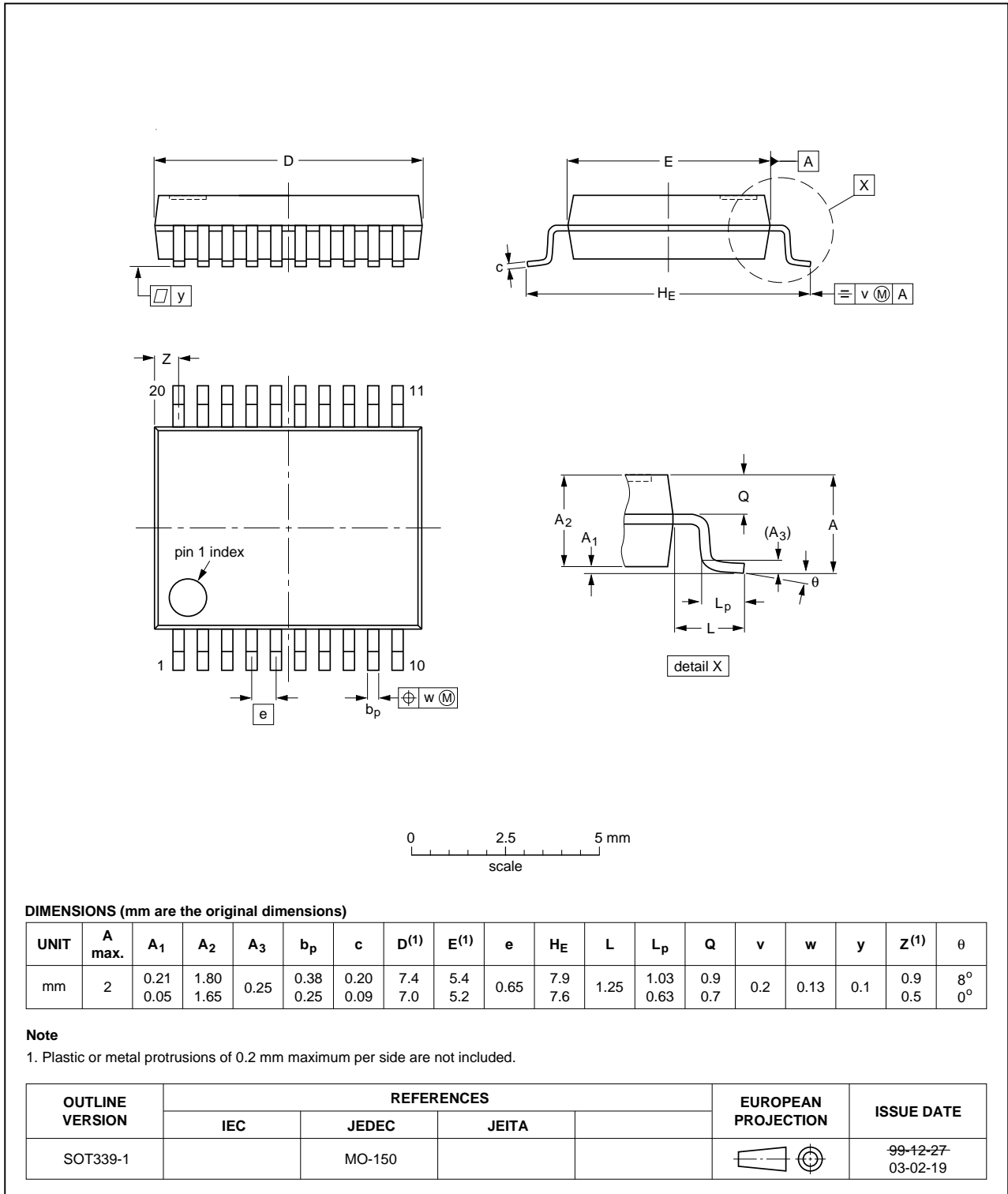


Fig 14. Package outline SOT339-1 (SSOP20)

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

SOT360-1

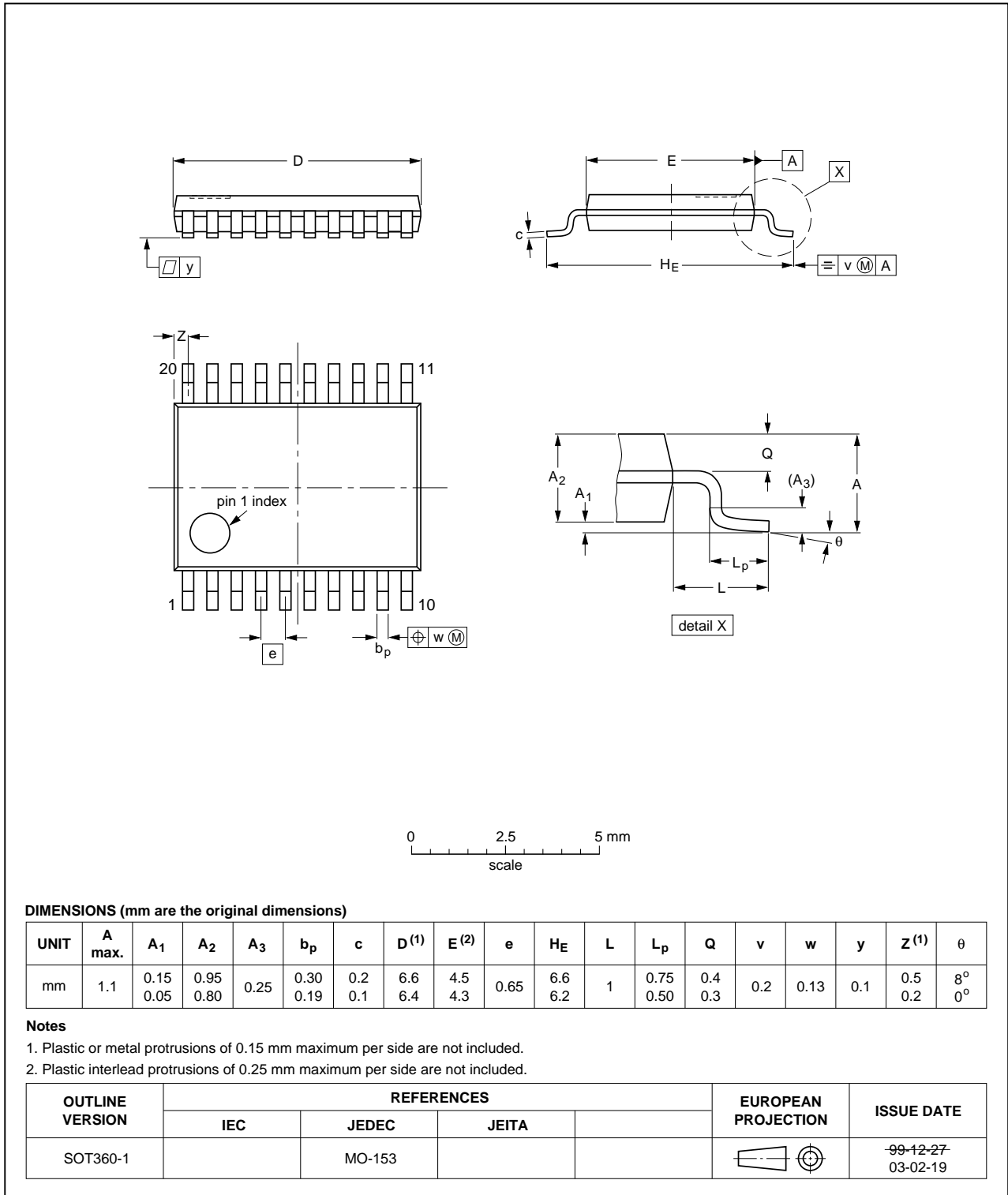


Fig 15. Package outline SOT360-1 (TSSOP20)



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

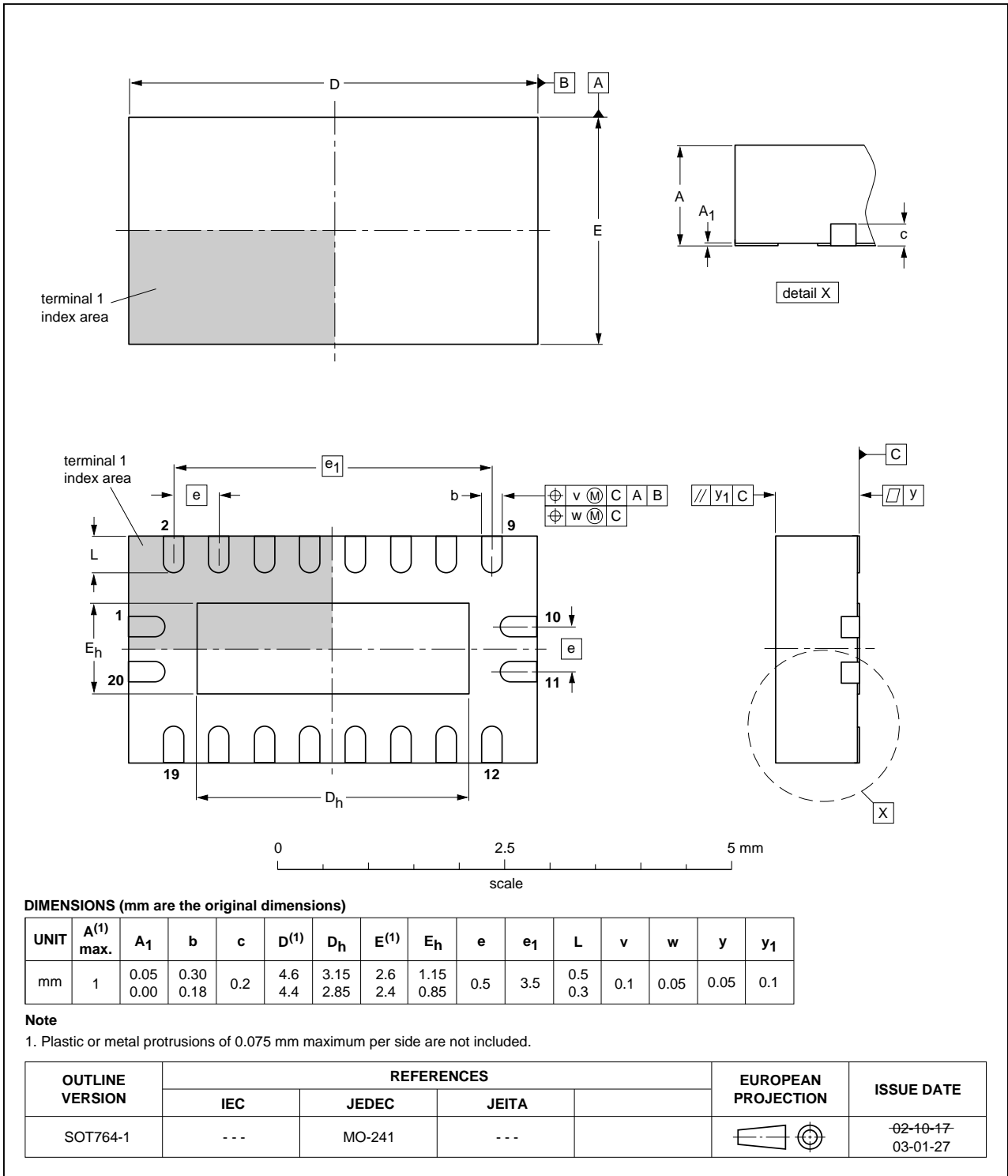


Fig 16. Package outline SOT764-1 (DHVQFN20)

## 13. Abbreviations

Table 10. Abbreviations

Acronym	Description
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
74HC_HCT573 v.5	20120815	Product data sheet	-	74HC_HCT573 v.3
Modifications:	<ul style="list-style-type: none"> <li>Alternative descriptive title corrected (errata).</li> </ul>			
74HC_HCT573 v.4	20120806	Product data sheet	-	74HC_HCT573 v.3
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> </ul>			
74HC_HCT573 v.3	20060117	Product data sheet	-	74HC_HCT573_CNV v.2
74HC_HCT573_CNV v.2	19901201	Product specification	-	-

## 15. Legal information

### 15.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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".

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