

74HC573-Q100; 74HCT573-Q100

Octal D-type transparent latch; 3-state

Rev. 3 — 5 March 2013

Product data sheet

1. General description

The 74HC573-Q100; 74HCT573-Q100 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-Q100; 74HCT573-Q100 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 (\bar{OE}) input are common to all latches.

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

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
 - ◆ Specified from -40°C to $+85^{\circ}\text{C}$ and from -40°C to $+125^{\circ}\text{C}$
- Input levels:
 - ◆ For 74HC573-Q100: CMOS level
 - ◆ For 74HCT573-Q100: 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:
 - ◆ MIL-STD-883, method 3015 exceeds 2000 V
 - ◆ HBM JESD22-A114F exceeds 2000 V
 - ◆ MM JESD22-A115-A exceeds 200 V ($C = 200 \text{ pF}$, $R = 0 \Omega$)



3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74HC573D-Q100	−40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74HCT573D-Q100				
74HC573DB-Q100	−40 °C to +125 °C	SSOP20	plastic shrink small outline package; 20 leads; body width 5.3 mm	SOT339-1
74HCT573DB-Q100				
74HC573PW-Q100	−40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
74HCT573PW-Q100				
74HC573BQ-Q100	−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
74HCT573BQ-Q100				

4. Functional diagram

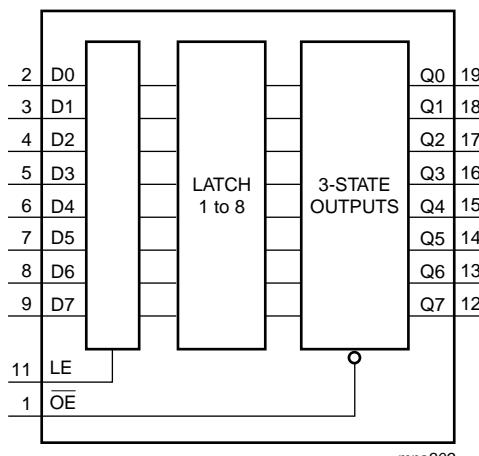
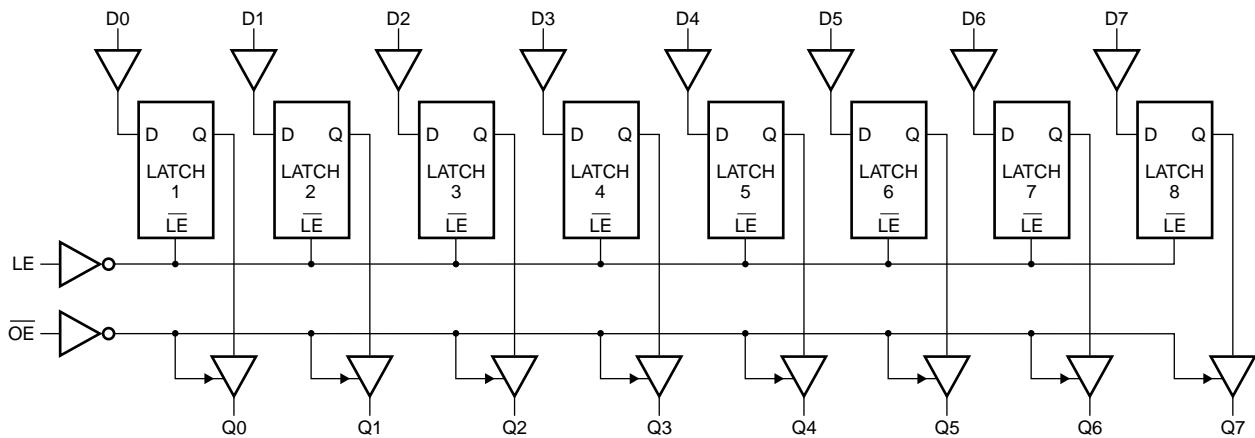


Fig 1. Functional diagram



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Fig 2. Logic diagram

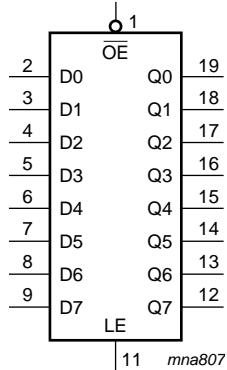


Fig 3. Logic symbol

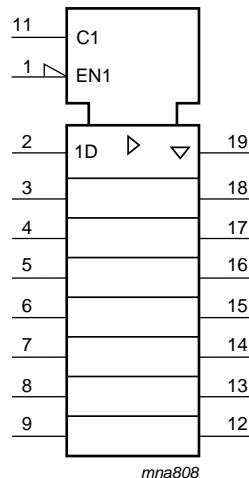


Fig 4. IEC logic symbol

5. Pinning information

5.1 Pinning

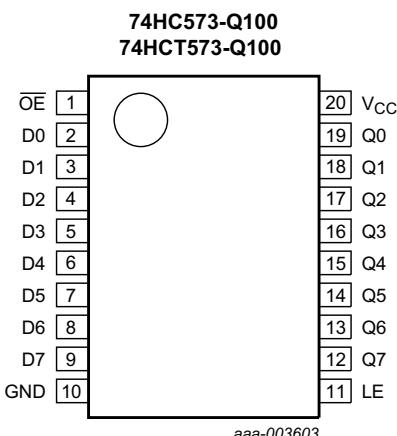


Fig 5. Pin configuration SO20, SSOP20 and TSSOP20

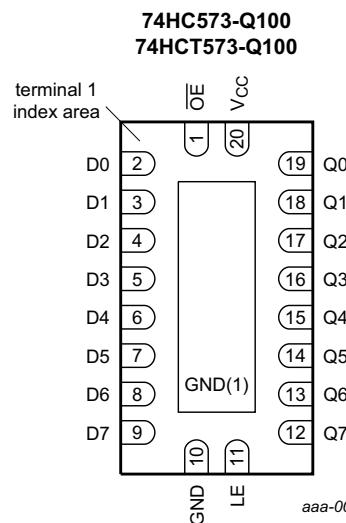


Fig 6. Pin configuration DHVQFN20

(1) This is not a supply pin. The substrate is attached to this pad using conductive die attach material. There is no electrical or mechanical requirement to solder this pad. However, if it is soldered, the solder land should remain floating or be connected to GND.

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
VCC	20	supply voltage

6. Functional description

Table 3. Function table^[1]

Operating mode	Control		Input Dn	Internal latches	Output Qn
	OE	LE			
Enable and read register (transparent mode)	L	H	L	L	L
Latch and read register	L	L	I	L	L
			h	H	H
Latch register and disable outputs	H	L	I	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;
 I = 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 V or V _I > V _{CC} + 0.5 V	-	±20	mA
I _{OK}	output clamping current	V _O < -0.5 V or V _O > V _{CC} + 0.5 V	-	±20	mA
I _O	output current	V _O = -0.5 V to (V _{CC} + 0.5 V)	-	±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		[1]	-	500 mW

[1] 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-Q100			74HCT573-Q100			Unit
			Min	Typ	Max	Min	Typ	Max	
V _{CC}	supply voltage		2.0	5.0	6.0	4.5	5.0	5.5	V
V _I	input voltage		0	-	V _{CC}	0	-	V _{CC}	V
V _O	output voltage		0	-	V _{CC}	0	-	V _{CC}	V
T _{amb}	ambient temperature		-40	+25	+125	-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	V _{CC} = 2.0 V	-	-	625	-	-	-	ns/V
		V _{CC} = 4.5 V	-	1.67	139	-	1.67	139	ns/V
		V _{CC} = 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	
74HC573-Q100										
V _{IH}	HIGH-level input voltage	V _{CC} = 2.0 V	1.5	1.2	-	1.5	-	1.5	-	V
		V _{CC} = 4.5 V	3.15	2.4	-	3.15	-	3.15	-	V
		V _{CC} = 6.0 V	4.2	3.2	-	4.2	-	4.2	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 2.0 V	-	0.8	0.5	-	0.5	-	0.5	V
		V _{CC} = 4.5 V	-	2.1	1.35	-	1.35	-	1.35	V
		V _{CC} = 6.0 V	-	2.8	1.8	-	1.8	-	1.8	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL}								
		I _O = −20 μA; V _{CC} = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		I _O = −20 μA; V _{CC} = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I _O = −20 μA; V _{CC} = 6.0 V	5.9	6.0	-	5.9	-	5.9	-	V
		I _O = −6.0 mA; V _{CC} = 4.5 V	3.98	4.32	-	3.84	-	3.7	-	V
		I _O = −7.8 mA; V _{CC} = 6.0 V	5.48	5.81	-	5.34	-	5.2	-	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}								
		I _O = 20 μA; V _{CC} = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 20 μA; V _{CC} = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 20 μA; V _{CC} = 6.0 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 6.0 mA; V _{CC} = 4.5 V	-	0.15	0.26	-	0.33	-	0.4	V
		I _O = 7.8 mA; V _{CC} = 6.0 V	-	0.16	0.26	-	0.33	-	0.4	V
I _I	input leakage current	V _I = V _{CC} or GND; V _{CC} = 6.0 V	-	-	±0.1	-	±1.0	-	±1.0	μA
I _{oz}	OFF-state output current	V _I = V _{IH} or V _{IL} ; V _O = V _{CC} or GND; V _{CC} = 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	μA
C _I	input capacitance		-	3.5	-					pF
74HCT573-Q100										
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 μA	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 μA	-	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	-	-	±0.1	-	±1.0	-	±1.0	μA
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	-	-	±0.5	-	±5.0	-	±10	μA
I _{CC}	supply current	V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V	-	-	8.0	-	80	-	160	μA
ΔI _{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; D _n inputs	-	35	126	-	158	-	172	μA
		per input pin; LE input	-	65	234	-	293	-	319	μA
		per input pin; \overline{OE} input	-	125	450	-	563	-	613	μA
C _I	input capacitance		-	3.5	-					pF

10. Dynamic characteristics

Table 7. Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); $C_L = 50 \text{ pF}$ 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		
For type 74HC573-Q100											
t_{pd}	propagation delay	Dn to Qn; see Figure 7	[1]								
		$V_{CC} = 2.0 \text{ V}$	-	47	150	-	190	-	225	ns	
		$V_{CC} = 4.5 \text{ V}$	-	17	30	-	38	-	45	ns	
		$V_{CC} = 5 \text{ V}; C_L = 15 \text{ pF}$	-	14	-	-	-	-	-	ns	
t_{pd}	propagation delay	LE to Qn; see Figure 8	[1]								
		$V_{CC} = 2.0 \text{ V}$	-	50	150	-	190	-	225	ns	
		$V_{CC} = 4.5 \text{ V}$	-	18	30	-	38	-	45	ns	
		$V_{CC} = 5 \text{ V}; C_L = 15 \text{ pF}$	-	15	-	-	-	-	-	ns	
t_{en}	enable time	\overline{OE} to Qn; see Figure 9	[2]								
		$V_{CC} = 2.0 \text{ V}$	-	44	140	-	175	-	210	ns	
		$V_{CC} = 4.5 \text{ V}$	-	16	28	-	35	-	42	ns	
		$V_{CC} = 6.0 \text{ V}$	-	13	24	-	30	-	36	ns	
t_{dis}	disable time	\overline{OE} to Qn; see Figure 9	[3]								
		$V_{CC} = 2.0 \text{ V}$	-	55	150	-	190	-	225	ns	
		$V_{CC} = 4.5 \text{ V}$	-	20	30	-	38	-	45	ns	
		$V_{CC} = 6.0 \text{ V}$	-	16	26	-	33	-	38	ns	
t_t	transition time	Qn; see Figure 7	[4]								
		$V_{CC} = 2.0 \text{ V}$	-	14	60	-	75	-	90	ns	
		$V_{CC} = 4.5 \text{ V}$	-	5	12	-	15	-	18	ns	
		$V_{CC} = 6.0 \text{ V}$	-	4	10	-	13	-	15	ns	
t_w	pulse width	LE HIGH; see Figure 8									
		$V_{CC} = 2.0 \text{ V}$	80	14	-	100	-	120	-	ns	
		$V_{CC} = 4.5 \text{ V}$	16	5	-	20	-	24	-	ns	
		$V_{CC} = 6.0 \text{ V}$	14	4	-	17	-	20	-	ns	
t_{su}	set-up time	Dn to LE; see Figure 10									
		$V_{CC} = 2.0 \text{ V}$	50	11	-	65	-	75	-	ns	
		$V_{CC} = 4.5 \text{ V}$	10	4	-	13	-	15	-	ns	
		$V_{CC} = 6.0 \text{ V}$	9	3	-	11	-	13	-	ns	
t_h	hold time	Dn to LE; see Figure 10									
		$V_{CC} = 2.0 \text{ V}$	5	3	-	5	-	5	-	ns	
		$V_{CC} = 4.5 \text{ V}$	5	1	-	5	-	5	-	ns	
		$V_{CC} = 6.0 \text{ V}$	5	1	-	5	-	5	-	ns	
C_{PD}	power dissipation capacitance	$C_L = 50 \text{ pF}; f = 1 \text{ MHz}; V_I = \text{GND to } V_{CC}$	[5]			-	26	-	-	pF	

Table 7. Dynamic characteristics ...continued

Voltages are referenced to GND (ground = 0 V); $C_L = 50 \text{ pF}$ 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	
For type 74HCT573-Q100										
t_{pd}	propagation delay	Dn to Qn; see Figure 7	[1]							
		$V_{CC} = 4.5 \text{ V}$	-	20	35	-	44	-	53	ns
		$V_{CC} = 5 \text{ V}; C_L = 15 \text{ pF}$	-	17	-	-	-	-	-	ns
t_{pd}	propagation delay	LE to Qn; see Figure 8	[1]							
		$V_{CC} = 4.5 \text{ V}$	-	18	35	-	44	-	53	ns
		$V_{CC} = 5 \text{ V}; C_L = 15 \text{ pF}$	-	15	-	-	-	-	-	ns
t_{en}	enable time	\overline{OE} to Qn; see Figure 9	[2]							
		$V_{CC} = 4.5 \text{ V}$	-	17	30	-	38	-	45	ns
t_{dis}	disable time	\overline{OE} to Qn; see Figure 9	[3]							
		$V_{CC} = 4.5 \text{ V}$	-	18	30	-	38	-	45	ns
t_t	transition time	Qn; see Figure 7	[4]							
		$V_{CC} = 4.5 \text{ V}$	-	5	12	-	15	-	18	ns
t_W	pulse width	LE HIGH; see Figure 8								
		$V_{CC} = 4.5 \text{ V}$	16	5	-	20	-	24	-	ns
t_{su}	set-up time	Dn to LE; see Figure 10								
		$V_{CC} = 4.5 \text{ V}$	13	7	-	16	-	20	-	ns
t_h	hold time	Dn to LE; see Figure 10								
		$V_{CC} = 4.5 \text{ V}$	9	4	-	11	-	15	-	ns
C_{PD}	power dissipation capacitance	$C_L = 50 \text{ pF}; f = 1 \text{ MHz}; V_I = \text{GND to } V_{CC}$	[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_{TBL} and t_{TLH} .[5] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

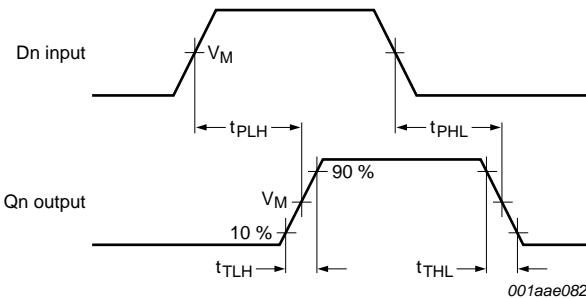
$$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

 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;

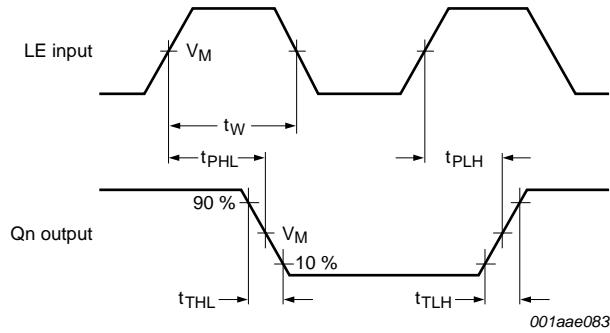
 $\sum(C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

11. Waveforms



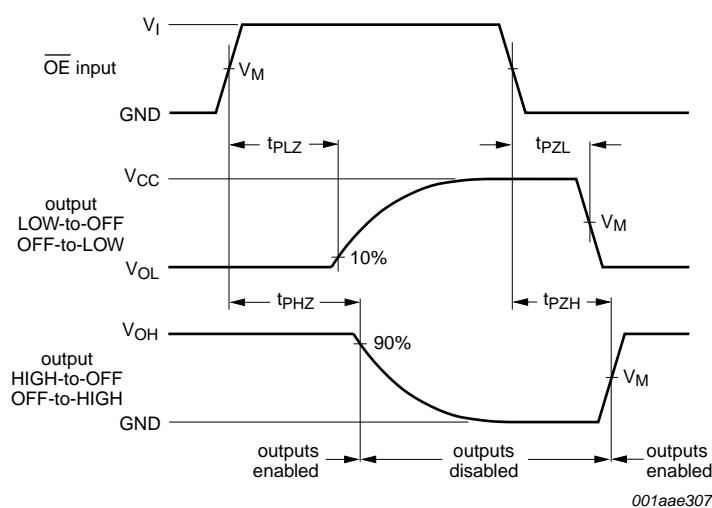
Measurement points are given in [Table 8](#).

Fig 7. Propagation delay data input (D_n) to output (Q_n) and output transition time



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

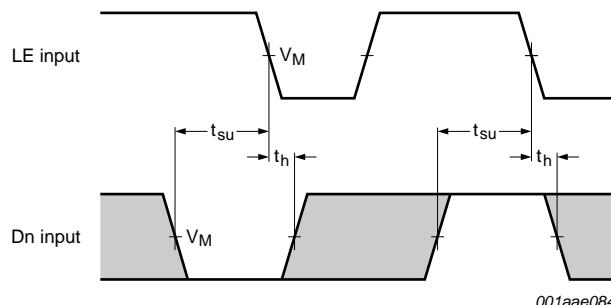
Fig 8. Pulse width latch enable input (LE), propagation delay latch enable input (LE) to output (Q_n) and output transition time



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



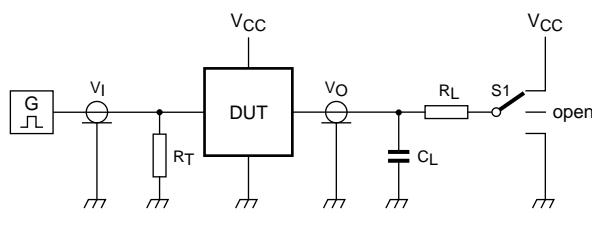
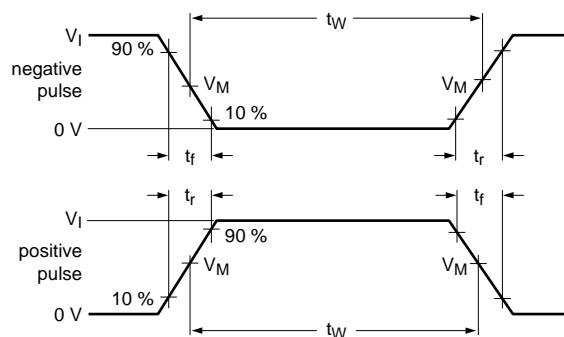
Measurement points are given in [Table 8](#).

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-Q100	0.5V _{CC}	0.5V _{CC}
74HCT573-Q100	1.3 V	1.3 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 circuit for measuring switching times

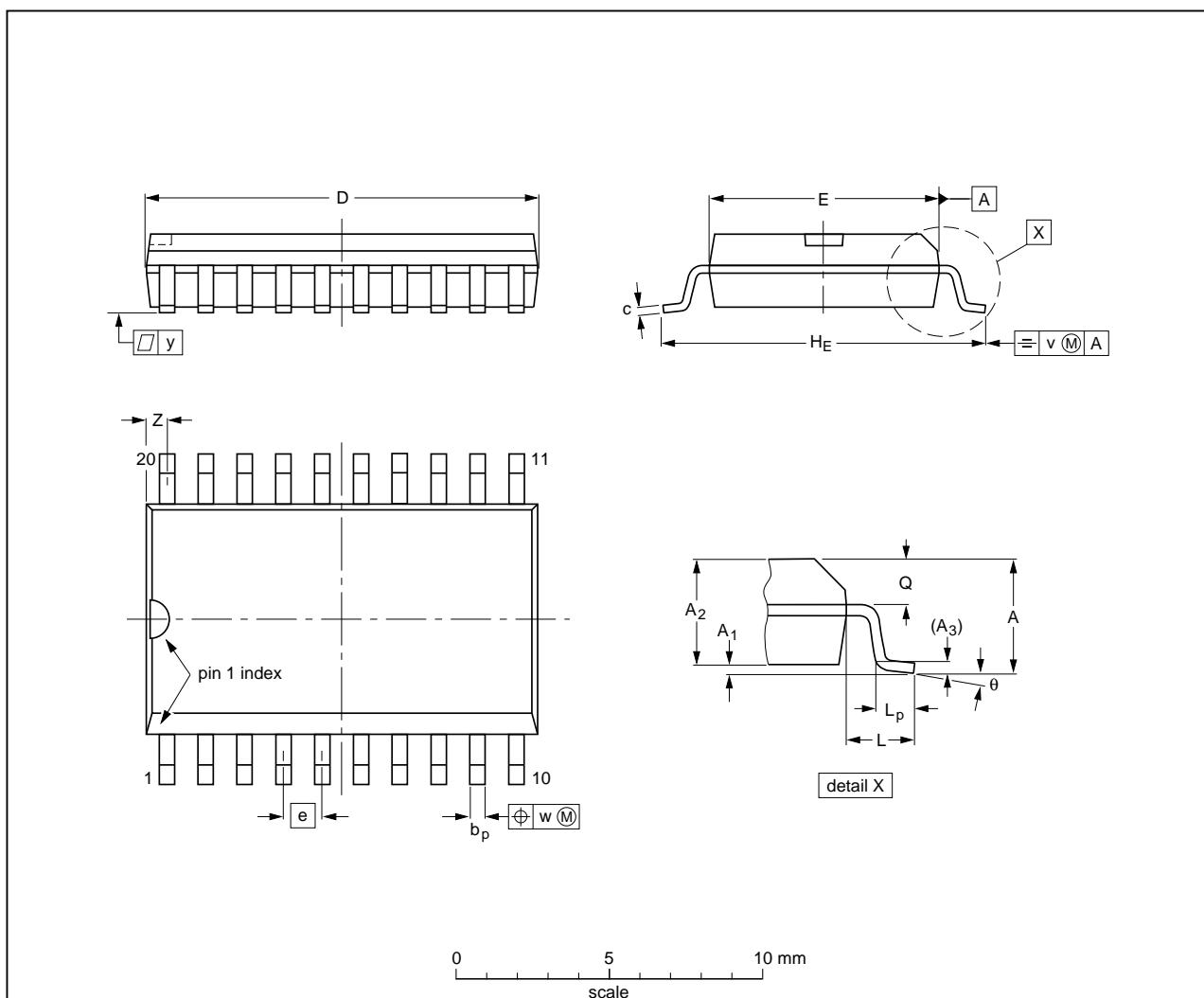
Table 9. Test data

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}
74HC573-Q100	V_{CC}	6 ns	15 pF, 50 pF	1 k Ω	open	GND	V_{CC}
74HCT573-Q100	3 V	6 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



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	b _p	c	D ⁽¹⁾	E ⁽¹⁾	e	H _E	L	L _p	Q	v	w	y	z ⁽¹⁾	θ
mm	2.65 0.1	0.3 2.25	2.45	0.25	0.49 0.36	0.32 0.23	13.0 12.6	7.6 7.4	1.27	10.65 10.00	1.4	1.1 0.4	1.1 1.0	0.25	0.25	0.1	0.9 0.4	8° 0°
inches	0.1	0.012 0.004	0.096 0.089	0.01	0.019 0.014	0.013 0.009	0.51 0.49	0.30 0.29	0.05	0.419 0.394	0.055	0.043 0.016	0.043 0.039	0.01	0.01	0.004	0.035 0.016	8° 0°

Note

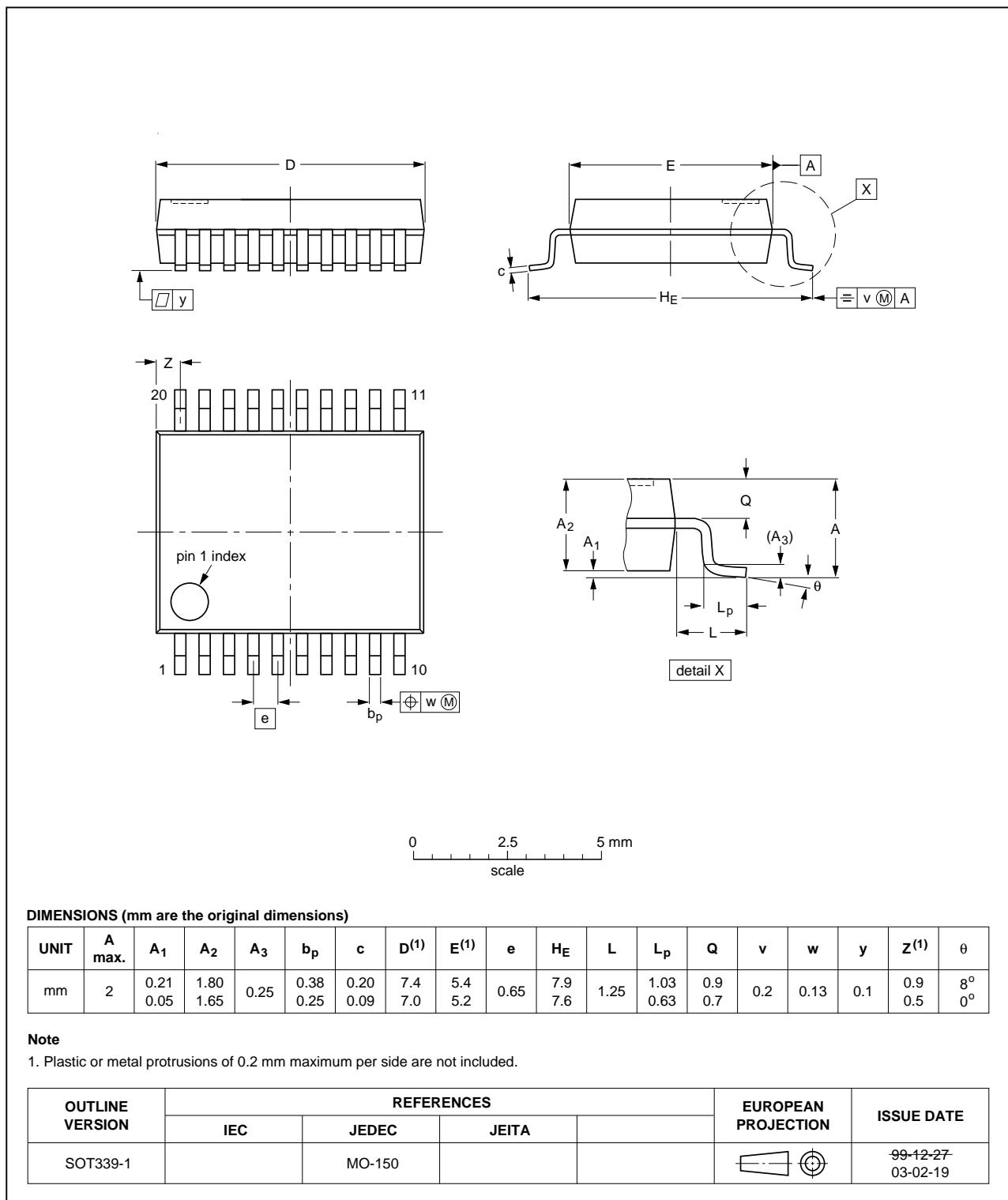
1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT163-1	075E04	MS-013				99-12-27 03-02-19

Fig 12. Package outline SOT163-1 (SO20)

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

SOT339-1



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A ₁	A ₂	A ₃	b _P	c	D ⁽¹⁾	E ⁽¹⁾	e	H _E	L	L _p	Q	v	w	y	Z ⁽¹⁾	θ
mm	2 0.05	0.21 1.65	1.80	0.25	0.38 0.25	0.20 0.09	7.4 7.0	5.4 5.2	0.65	7.9 7.6	1.25	1.03 0.63	0.9 0.7	0.2	0.13	0.1	0.9 0.5	8° 0°

Note

1. Plastic or metal protrusions of 0.2 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT339-1		MO-150				99-12-27 03-02-19

Fig 13. Package outline SOT339-1 (SSOP20)

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

SOT360-1

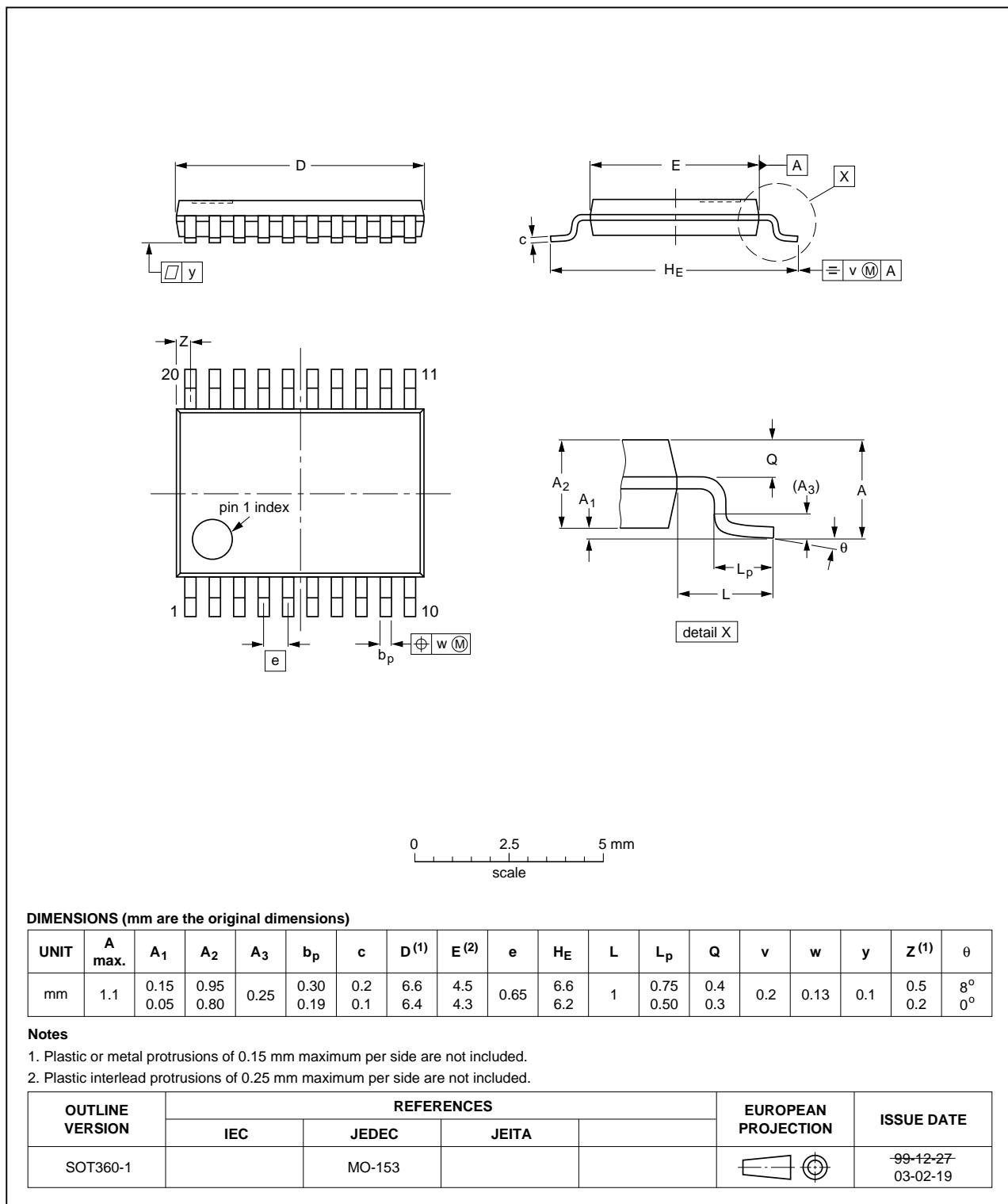


Fig 14. Package outline SOT360-1 (TSSOP20)

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

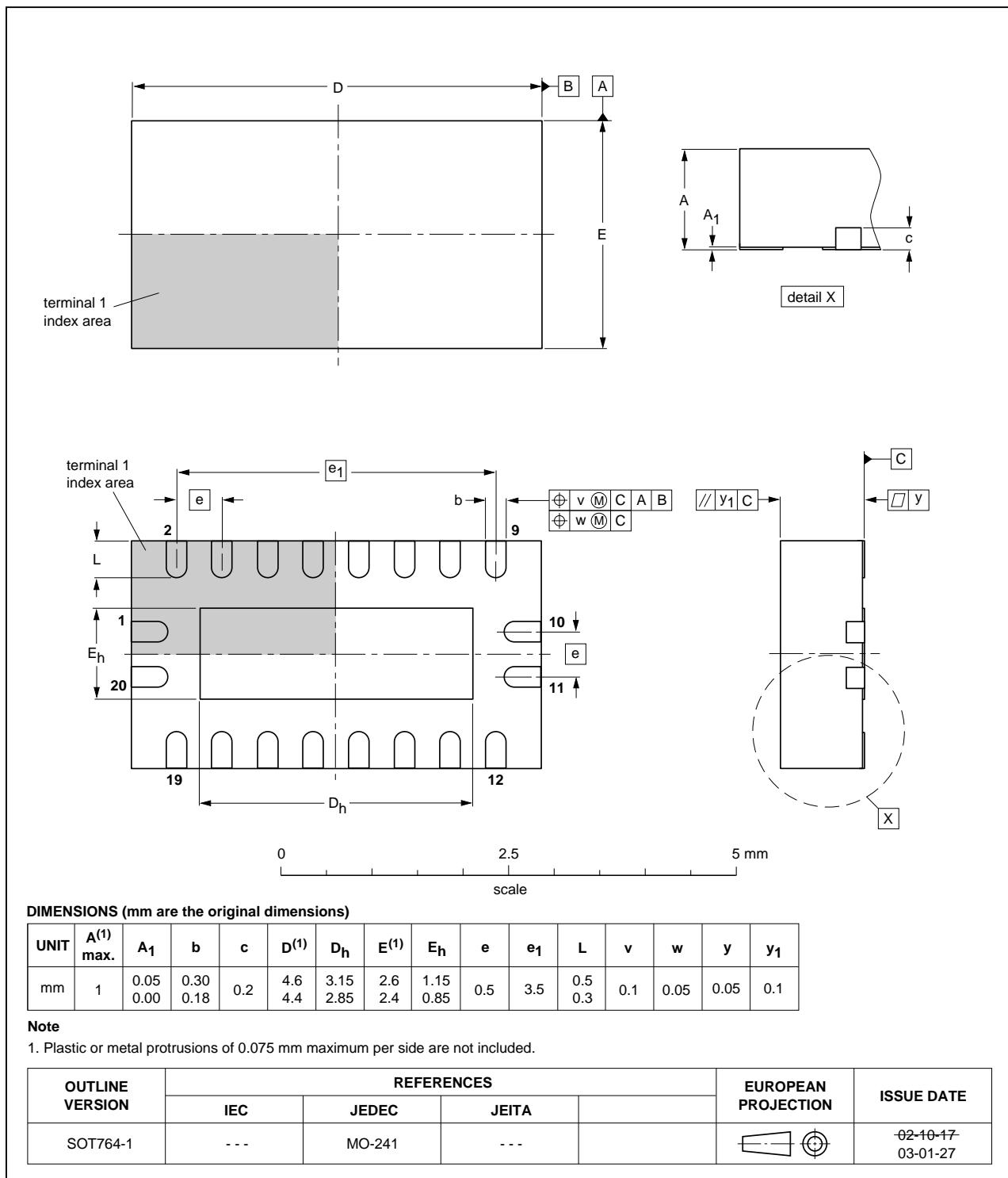


Fig 15. Package outline SOT764-1 (DHVQFN20)

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
MIL	Military

14. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT573_Q100 v.3	20130305	Product data sheet	-	74HC_HCT573_Q100 v.2
Modifications:	• 74HC573DB-Q100 and 74HCT573DB-Q100 added.			
74HC_HCT573_Q100 v.2	20120816	Product data sheet	-	74HC_HCT573_Q100 v.1
74HC_HCT573_Q100 v.1	20120802	Product data sheet	-	-

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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