

74LV573

Octal D-type transparent latch; 3-state

Rev. 03 — 28 September 2007

Product data sheet

1. General description

The 74LV573 is a low-voltage Si-gate CMOS device that is pin and function compatible with 74HC573 and 74HCT573.

The 74LV573 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 (LE) input and an output enable ($\overline{OE}$) input are common to all internal latches.

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

When $\overline{OE}$ is LOW, the contents of the eight 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 74LV573 is functionally identical to the 74LV373, but has a different pin arrangement.

2. Features

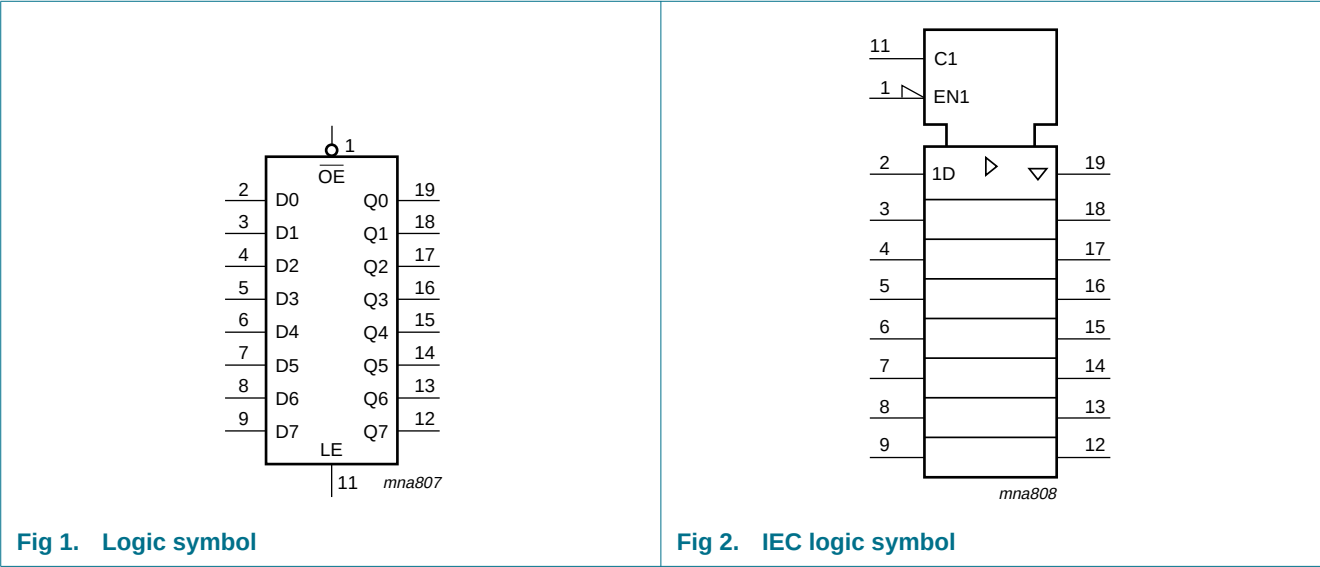
- Wide operating voltage: 1.0 V to 5.5 V
- Optimized for low voltage applications: 1.0 V to 3.6 V
- Accepts TTL input levels between $V_{CC} = 2.7$ V and $V_{CC} = 3.6$ V
- Typical output ground bounce < 0.8 V at $V_{CC} = 3.3$ V and $T_{amb} = 25$ °C
- Typical HIGH-level output voltage (V_{OH}) undershoot: > 2 V at $V_{CC} = 3.3$ V and $T_{amb} = 25$ °C
- Inputs and outputs on opposite sides of package allowing easy interface with microprocessors
- Useful as input or output port for microprocessors
- Common 3-state output enable input
- ESD protection:
 - ◆ HBM JESD22-A114E exceeds 2000 V
 - ◆ MM JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from -40 °C to $+85$ °C and from -40 °C to $+125$ °C

3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74LV573N	−40 °C to +125 °C	DIP20	plastic dual in-line package; 20 leads (300 mil)	SOT146-1
74LV573D	−40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74LV573DB	−40 °C to +125 °C	SSOP20	plastic shrink small outline package; 20 leads; body width 5.3 mm	SOT339-1
74LV573PW	−40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
74LV573BQ	−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



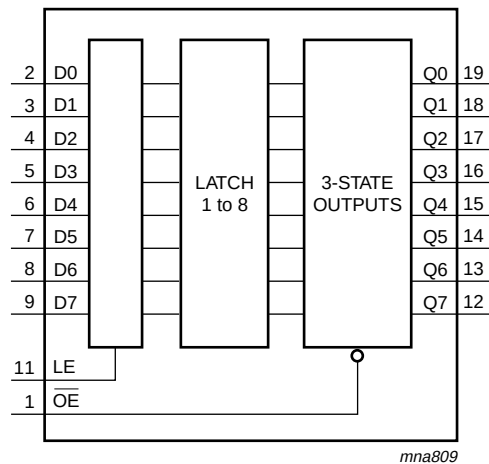


Fig 3. Functional diagram

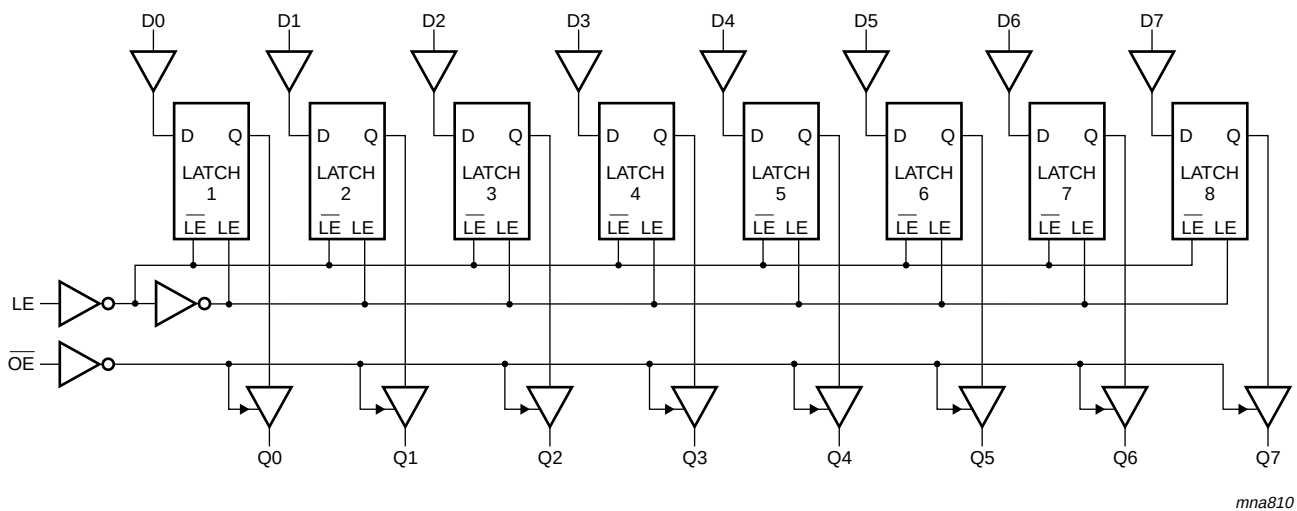
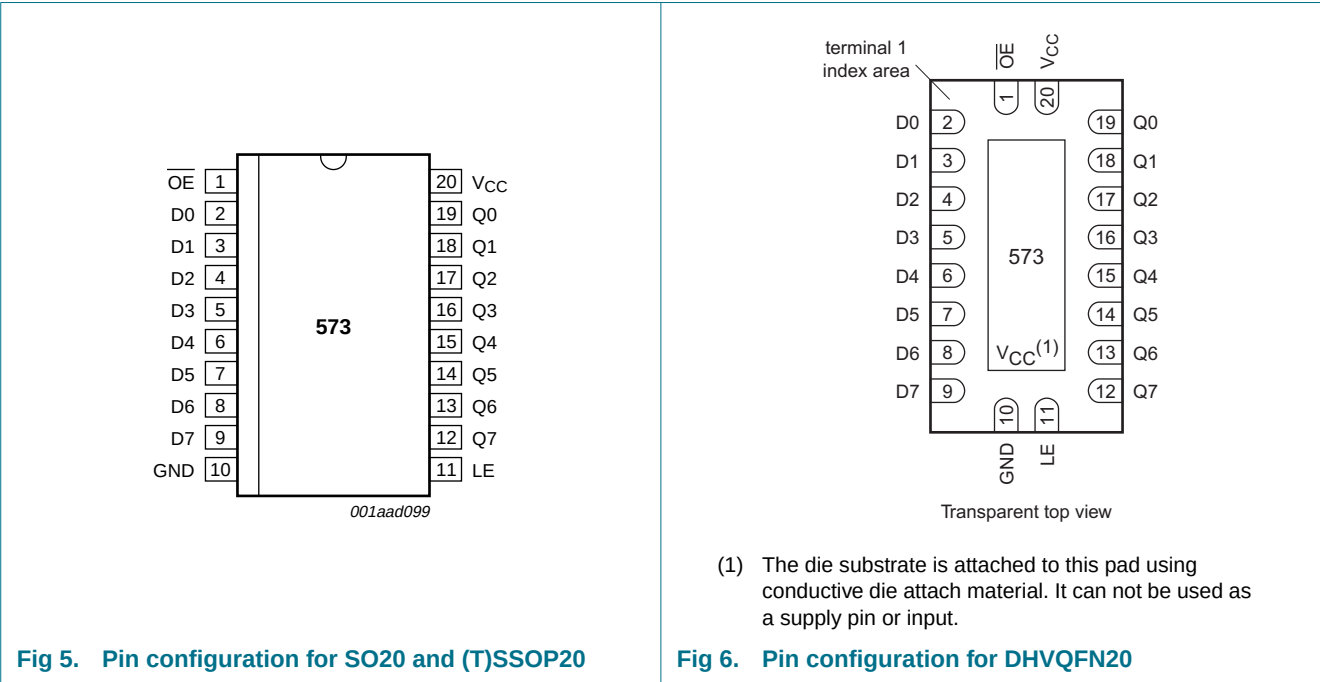


Fig 4. Logic diagram

5. Pinning information

5.1 Pinning



5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
OE	1	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	data output
V _{CC}	20	supply voltage

6. Functional description

Table 3. Functional table^[1]

Operating modes	Input			Internal latch	Output
	OE	LE	Dn		Qn
Enable and read register (transparent mode)	L	H	L	L	L
	L	H	H	H	H
Latch and read register	L	L	l	L	L
	L	L	h	H	H
Latch register and disable outputs	H	L	l	L	Z
	H	L	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
I _{IK}	input clamping current	V _I < −0.5 V or V _I > V _{CC} + 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] -	±50	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	T _{amb} = −40 °C to +125 °C			
	DIP20 package		^[2] -	750	mW
	SO20 package		^[3] -	500	mW
	(T)SSOP20 package		^[4] -	500	mW
	DHVQFN20 package		^[5] -	500	mW

- [1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
 [2] P_{tot} derates linearly with 12 mW/K above 70 °C.
 [3] P_{tot} derates linearly with 8 mW/K above 70 °C.
 [4] P_{tot} derates linearly with 5.5 mW/K above 60 °C.
 [5] 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	Min	Typ	Max	Unit
V _{CC}	supply voltage ^[1]		1.0	3.3	5.5	V
V _I	input voltage		0	-	V _{CC}	V
V _O	output voltage		0	-	V _{CC}	V
T _{amb}	ambient temperature		-40	+25	+125	°C
Δt/ΔV	input transition rise and fall rate	V _{CC} = 1.0 V to 2.0 V	-	-	500	ns/V
		V _{CC} = 2.0 V to 2.7 V	-	-	200	ns/V
		V _{CC} = 2.7 V to 3.6 V	-	-	100	ns/V
		V _{CC} = 3.6 V to 5.5 V	-	-	50	ns/V

- [1] The static characteristics are guaranteed from V_{CC} = 1.2 V to V_{CC} = 5.5 V, but LV devices are guaranteed to function down to V_{CC} = 1.0 V (with input levels GND or V_{CC}).

9. Static characteristics

Table 6. Static characteristics

Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ ^[1]	Max	Min	Max	
V _{IH}	HIGH-level input voltage	V _{CC} = 1.2 V	0.9	-	-	0.9	-	V
		V _{CC} = 2.0 V	1.4	-	-	1.4	-	V
		V _{CC} = 2.7 V to 3.6 V	2.0	-	-	2.0	-	V
		V _{CC} = 4.5 V to 5.5 V	0.7V _{CC}	-	-	0.7V _{CC}	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 1.2 V	-	-	0.3	-	0.3	V
		V _{CC} = 2.0 V	-	-	0.6	-	0.6	V
		V _{CC} = 2.7 V to 3.6 V	-	-	0.8	-	0.8	V
		V _{CC} = 4.5 V to 5.5 V	-	-	0.3V _{CC}	-	0.3V _{CC}	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL}						
		I _O = -100 μA; V _{CC} = 1.2 V	-	1.2	-	-	-	V
		I _O = -100 μA; V _{CC} = 2.0 V	1.8	2.0	-	1.8	-	V
		I _O = -100 μA; V _{CC} = 2.7 V	2.5	2.7	-	2.5	-	V
		I _O = -100 μA; V _{CC} = 3.0 V	2.8	3.0	-	2.8	-	V
		I _O = -100 μA; V _{CC} = 4.5 V	4.3	4.5	-	4.3	-	V
		I _O = -8 mA; V _{CC} = 3.0 V	2.4	2.82	-	2.2	-	V
		I _O = -16 mA; V _{CC} = 4.5 V	3.6	4.2	-	3.5	-	V

Table 6. Static characteristics ...continued
 Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	–40 °C to +85 °C			–40 °C to +125 °C		Unit
			Min	Typ ^[1]	Max	Min	Max	
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL}						
		I _O = 100 µA; V _{CC} = 1.2 V	-	0	-	-	-	V
		I _O = 100 µA; V _{CC} = 2.0 V	-	0	0.2	-	0.2	V
		I _O = 100 µA; V _{CC} = 2.7 V	-	0	0.2	-	0.2	V
		I _O = 100 µA; V _{CC} = 3.0 V	-	0	0.2	-	0.2	V
		I _O = 100 µA; V _{CC} = 4.5 V	-	0	0.2	-	0.2	V
		I _O = 8 mA; V _{CC} = 3.0 V	-	0.20	0.40	-	0.50	V
		I _O = 16 mA; V _{CC} = 4.5 V	-	0.35	0.55	-	0.65	V
I _I	input leakage current	V _I = V _{CC} or GND; V _{CC} = 5.5 V	-	-	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} = 5.5 V	-	-	5	-	10	µA
I _{CC}	supply current	V _I = V _{CC} or GND; I _O = 0 A; V _{CC} = 5.5 V	-	-	20	-	160	µA
ΔI _{CC}	additional supply current	per input; V _I = V _{CC} – 0.6 V; V _{CC} = 2.7 V to 3.6 V	-	-	500	-	850	µA
C _I	input capacitance		-	3.5	-	-	-	pF

[1] Typical values are measured at T_{amb} = 25 °C.

10. Dynamic characteristics

Table 7. Dynamic characteristics
 GND = 0 V; For test circuit see [Figure 11](#).

Symbol	Parameter	Conditions	–40 °C to +85 °C			–40 °C to +125 °C		Unit
			Min	Typ ^[1]	Max	Min	Max	
t _{pd}	propagation delay	Dn to Qn; see Figure 7 ^[2]						
		V _{CC} = 1.2 V	-	75	-	-	-	ns
		V _{CC} = 2.0 V	-	26	39	-	49	ns
		V _{CC} = 2.7 V	-	19	29	-	36	ns
		V _{CC} = 3.0 V to 3.6 V; C _L = 15 pF ^[3]	-	12	-	-	-	ns
		V _{CC} = 3.0 V to 3.6 V ^[3]	-	14	23	-	29	ns
		V _{CC} = 4.5 V to 5.5 V	-	-	19	-	24	ns
		LE to Qn; see Figure 8 ^[2]						
		V _{CC} = 1.2 V	-	80	-	-	-	ns
		V _{CC} = 2.0 V	-	27	43	-	53	ns
		V _{CC} = 2.7 V	-	20	31	-	34	ns
		V _{CC} = 3.0 V to 3.6 V; C _L = 15 pF ^[3]	-	13	-	-	-	ns
		V _{CC} = 3.0 V to 3.6 V ^[3]	-	15	25	-	31	ns
		V _{CC} = 4.5 V to 5.5 V	-	-	21	-	26	ns

Table 7. Dynamic characteristics ...continuedGND = 0 V; For test circuit see [Figure 11](#).

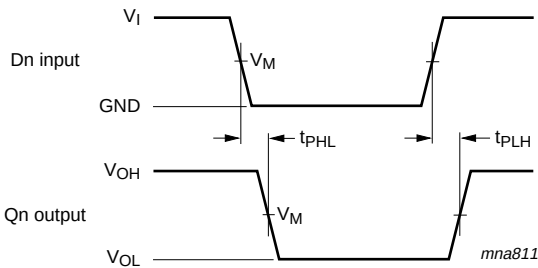
Symbol	Parameter	Conditions	–40 °C to +85 °C			–40 °C to +125 °C		Unit
			Min	Typ ^[1]	Max	Min	Max	
t _{en}	enable time	OE to Qn; see Figure 9 ^[2]						
		V _{CC} = 1.2 V	-	70	-	-	-	ns
		V _{CC} = 2.0 V	-	24	37	-	48	ns
		V _{CC} = 2.7 V	-	18	28	-	35	ns
		V _{CC} = 3.0 V to 3.6 V ^[3]	-	13	22	-	28	ns
		V _{CC} = 4.5 V to 5.5 V	-	-	18	-	23	ns
t _{dis}	disable time	OE to Qn; see Figure 9 ^[2]						
		V _{CC} = 1.2 V	-	80	-	-	-	ns
		V _{CC} = 2.0 V	-	29	39	-	48	ns
		V _{CC} = 2.7 V	-	22	29	-	36	ns
		V _{CC} = 3.0 V to 3.6 V ^[3]	-	17	24	-	29	ns
		V _{CC} = 4.5 V to 5.5 V	-	-	20	-	24	ns
t _w	pulse width	LE HIGH; see Figure 8						
		V _{CC} = 2.0 V	34	9	-	41	-	ns
		V _{CC} = 2.7 V	25	6	-	30	-	ns
		V _{CC} = 3.0 V to 3.6 V ^[3]	20	5	-	24	-	ns
t _{su}	set-up time	nD to nCP; see Figure 10						
		V _{CC} = 1.2 V	-	25	-	-	-	ns
		V _{CC} = 2.0 V	17	9	-	-	20	ns
		V _{CC} = 2.7 V	13	6	-	-	15	ns
		V _{CC} = 3.0 V to 3.6 V ^[3]	10	5	-	-	12	ns
t _h	hold time	Dn to LE; see Figure 10						
		V _{CC} = 1.2 V	-	5	-	-	-	ns
		V _{CC} = 2.0 V	8	2	-	8	-	ns
		V _{CC} = 2.7 V	8	2	-	8	-	ns
		V _{CC} = 3.0 V to 3.6 V ^[3]	8	1	-	8	-	ns
C _{PD}	power dissipation capacitance	C _L = 50 pF; f _i = 1 MHz; V _I = GND to V _{CC} ^[4]	-	26	-	-	-	pF

[1] All typical values are measured at T_{amb} = 25 °C.[2] t_{pd} is the same as t_{PLH} and t_{PHL}.t_{en} is the same as t_{PZL} and t_{PZH}.t_{dis} is the same as t_{PLZ} and t_{PHZ}.[3] Typical values are measured at nominal supply voltage (V_{CC} = 3.3 V).[4] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).P_D = C_{PD} × V_{CC}² × f_i × N + Σ(C_L × V_{CC}² × f_o) where:f_i = input frequency in MHz, f_o = output frequency in MHzC_L = output load capacitance in pFV_{CC} = supply voltage in Volts

N = number of inputs switching

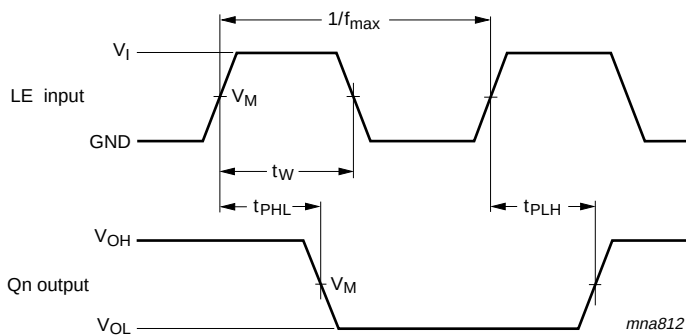
Σ(C_L × V_{CC}² × f_o) = sum of the outputs.

11. Waveforms



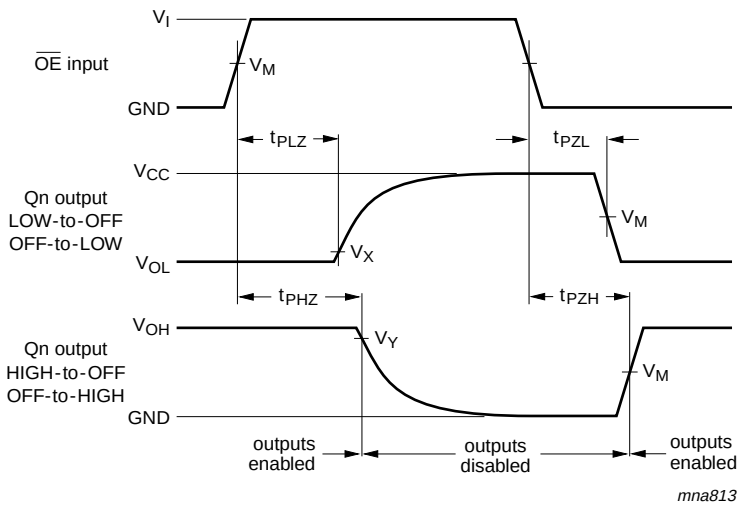
Measurement points are given in [Table 8](#).
 V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Fig 7. Input (Dn) to output (Qn) propagation delays



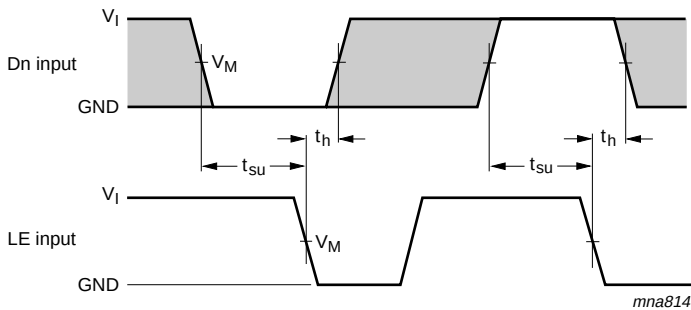
Measurement points are given in [Table 8](#).
 V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Fig 8. Latch Enable input (LE) pulse width, the latch enable input to output (Qn) 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

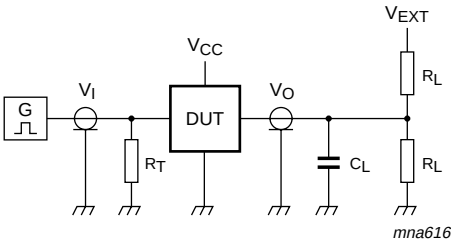


Measurement points are given in [Table 8](#).
 V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Fig 10. Data set-up and hold times for the Dn input to the LE input

Table 8. Measurement points

Supply voltage	Input	Output		
V_{CC}	V_M	V_M	V_X	V_Y
< 2.7 V	$0.5V_{CC}$	$0.5V_{CC}$	$V_{OL} + 0.1V_{CC}$	$V_{OH} - 0.1V_{CC}$
2.7 V to 3.6 V	1.5 V	1.5 V	$V_{OL} + 0.3 V$	$V_{OH} - 0.3 V$
$\geq 4.5 V$	$0.5V_{CC}$	$0.5V_{CC}$	$V_{OL} + 0.1V_{CC}$	$V_{OH} - 0.1V_{CC}$



Test data is given in [Table 9](#).
Definitions test circuit:
 R_L = Load resistance.
 C_L = Load capacitance including jig and probe capacitance.
 R_T = Termination resistance should be equal to the output impedance Z_o of the pulse generator.
 V_{EXT} = External voltage for measuring switching times.

Fig 11. Load circuit for switching times

Table 9: Test data

Supply voltage	Input		Load		V_{EXT}		
V_{CC}	V_I	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
< 2.7 V	V_{CC}	$\leq 2.5\text{ ns}$	50 pF	1 k Ω	open	GND	$2V_{CC}$
2.7 V to 3.6 V	2.7 V	$\leq 2.5\text{ ns}$	15 pF, 50 pF	1 k Ω	open	GND	$2V_{CC}$
$\geq 4.5\text{ V}$	V_{CC}	$\leq 2.5\text{ ns}$	50 pF	1 k Ω	open	GND	$2V_{CC}$

12. Package outline

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

SOT146-1

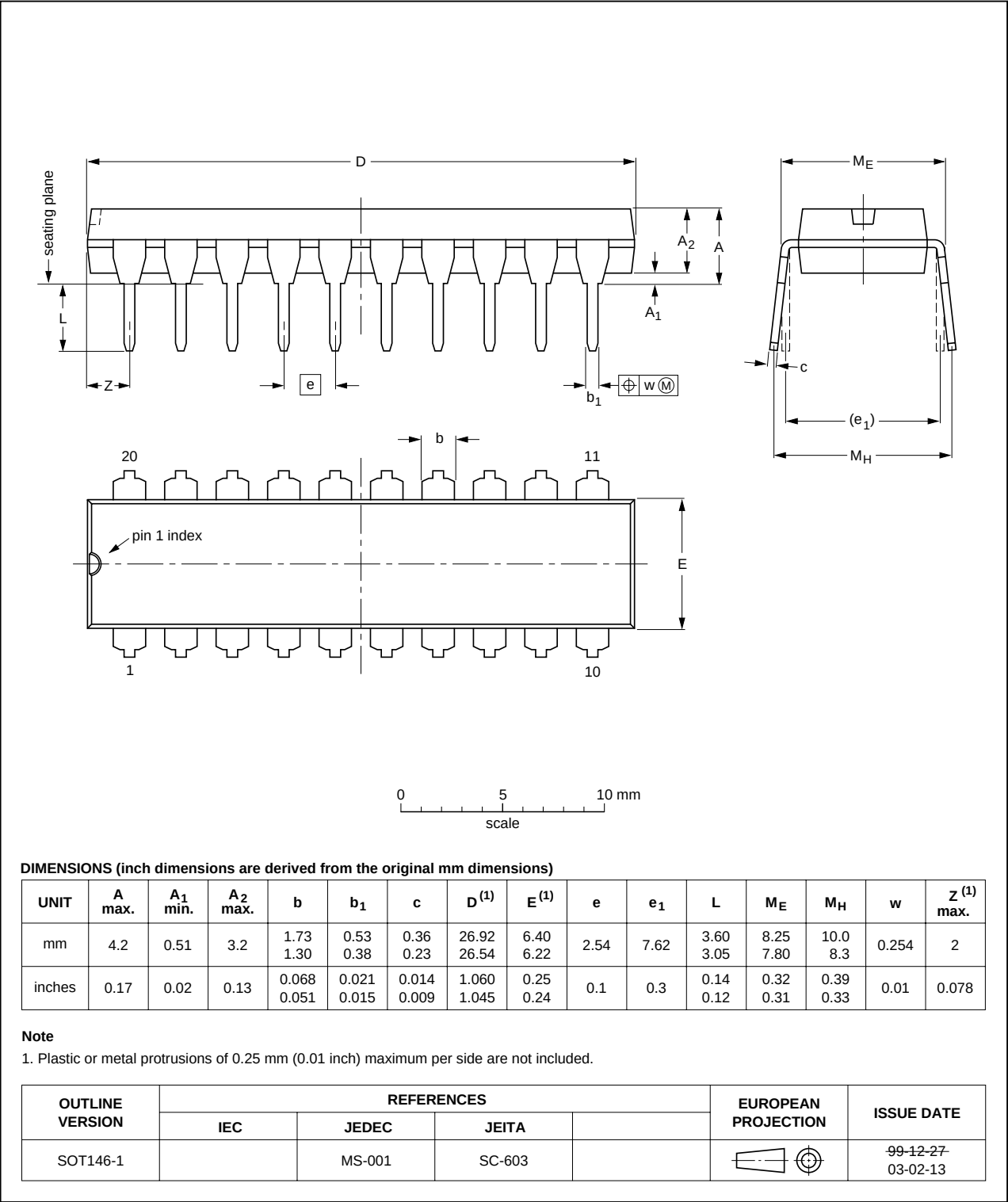


Fig 12. Package outline SOT146-1 (DIP20)

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

SOT163-1

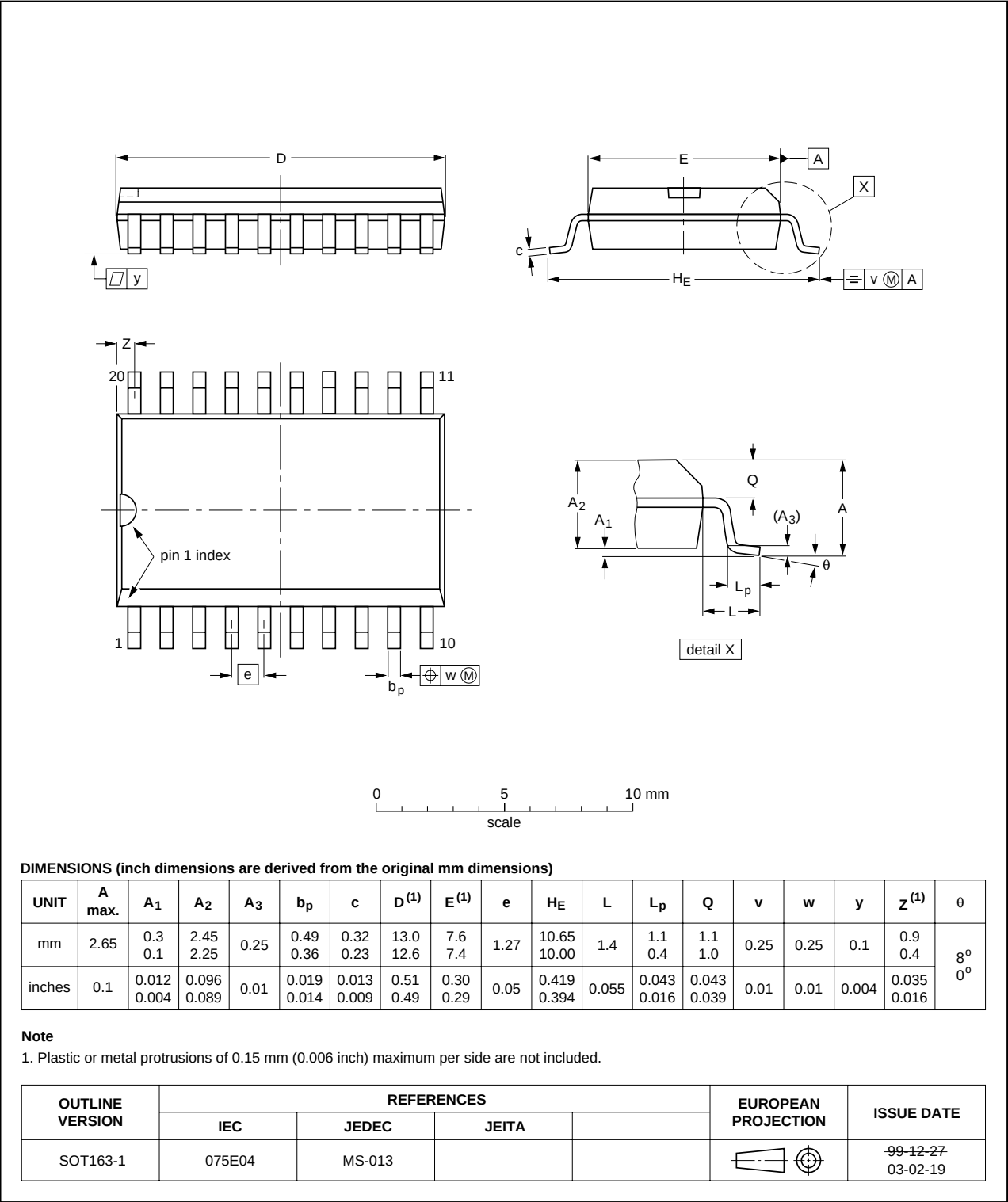


Fig 13. Package outline SOT163-1 (SO20)

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

SOT339-1

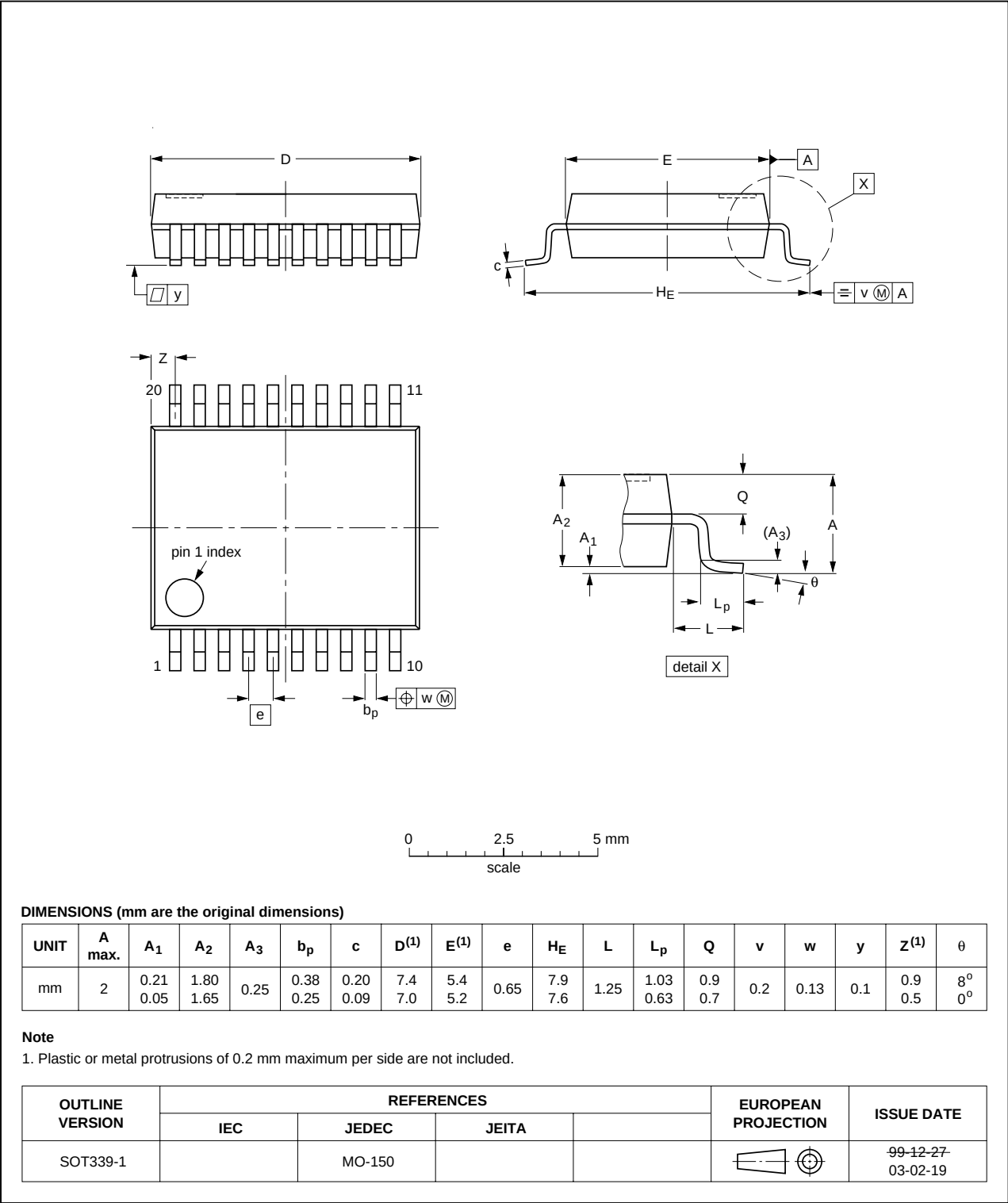


Fig 14. Package outline SOT339-1 (SSOP20)

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

SOT360-1

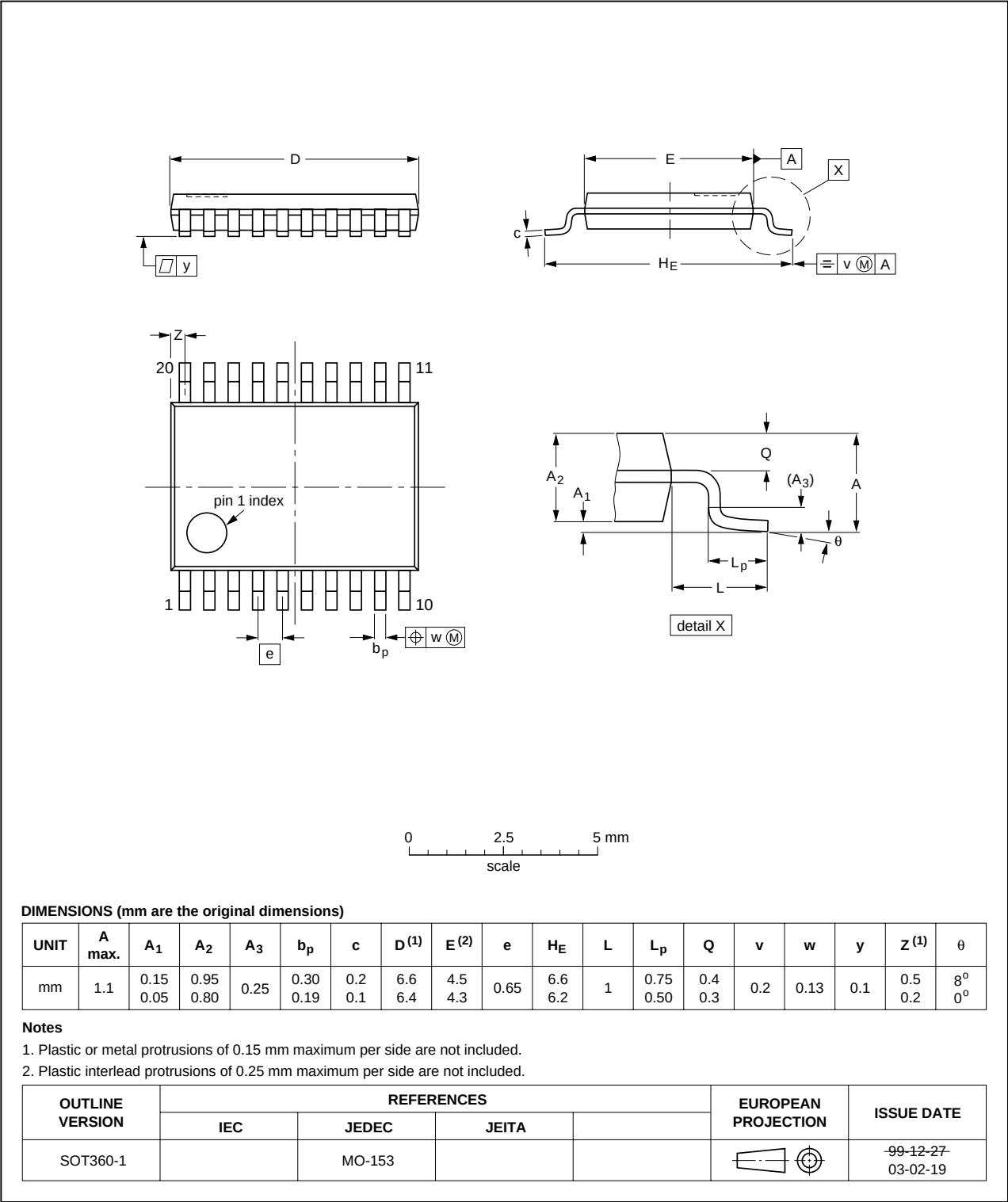


Fig 15. Package outline SOT360-1 (TSSOP20)

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

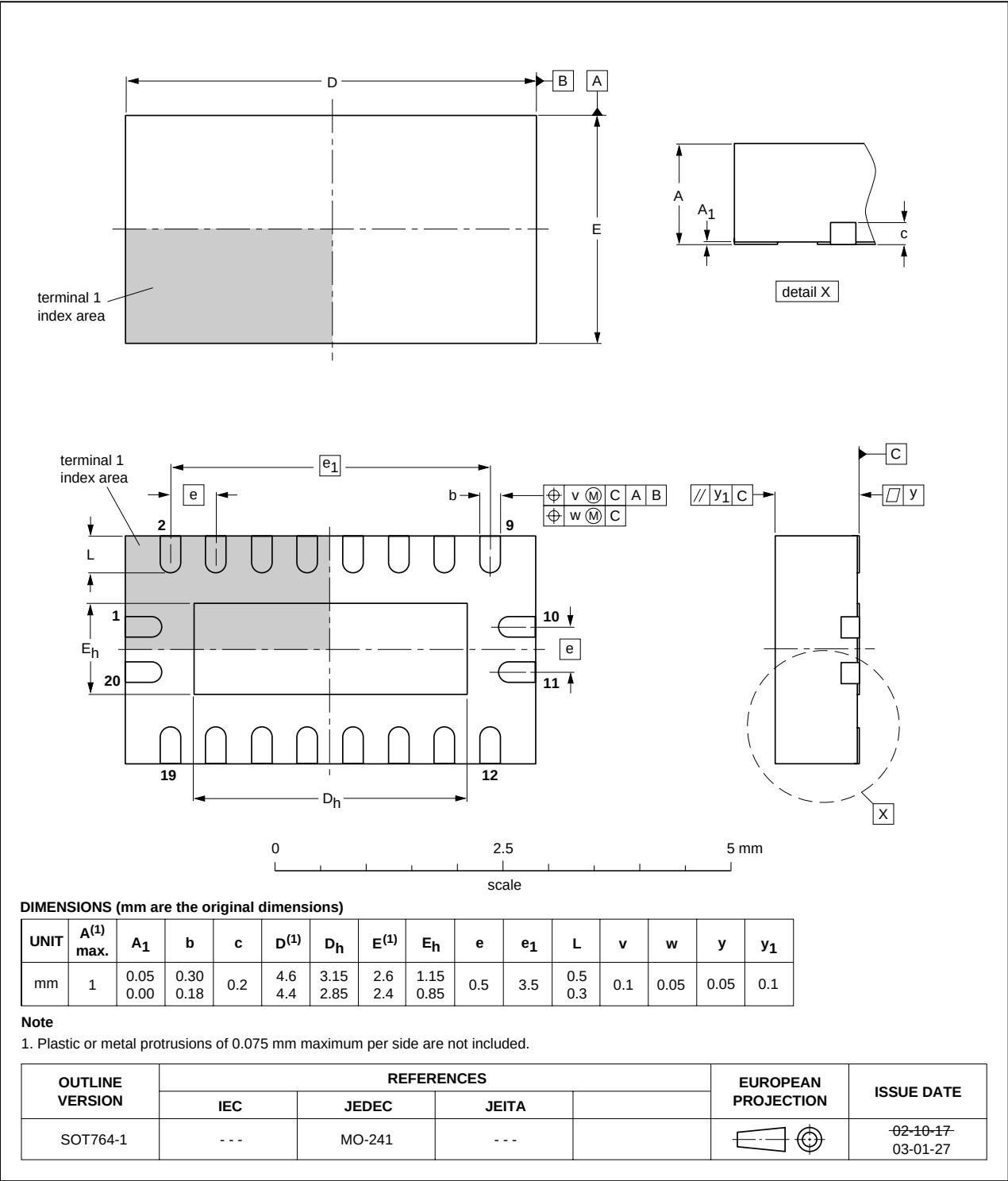


Fig 16. Package outline SOT764-1 (DHVQFN20)

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
74LV573_3	20070928	Product data sheet	-	74LV573_2
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name when appropriate. • Section 3: DHVQFN20 package added. • Section 8: derating values added for DHVQFN20 package. • Section 12: outline drawing added for DHVQFN20 package.			
74LV573_2	19980610	Product specification	-	74LV573_1
74LV573_1	19970606	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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For additional information, please visit: <http://www.nxp.com>

For sales office addresses, send an email to: salesaddresses@nxp.com

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