

# 74LV259

## 8-bit addressable latch

Rev. 03 — 2 January 2008

Product data sheet

## 1. General description

The 74LV259 is a low-voltage Si-gate CMOS device that is pin and function compatible with 74HC259 and 74HCT259. The 74LV259 is a high-speed 8-bit addressable latch designed for general purpose storage applications in digital systems. The 74LV259 is multifunctional device capable of storing single-line data in eight addressable latches, and also 3-to-8 decoder and demultiplexer, with active HIGH outputs (Q0 to Q7), functions are available. The 74LV259 also incorporates an active LOW common reset ( $\overline{MR}$ ) for resetting all latches, as well as, an active LOW enable input ( $\overline{LE}$ ).

The 74LV259 has four modes of operation as shown in the mode select table. In the addressable latch mode, data on the data line (D) is written into the addressed latch. The addressed latch will follow the data input with all non-addressed latches remaining in their previous states. In the memory mode, all latches remain in their previous states and are unaffected by the data or address inputs. In the 3-to-8 decoding or demultiplexing mode, the addressed output follows the state of the (D) input with all other outputs in the LOW state. In the reset mode all outputs are LOW and unaffected by the address (A0 to A2) and data (D) input. When operating the 74LV259 as an address latch, changing more than one bit of address could impose a transient-wrong address. Therefore, this should only be done while in the memory mode.

## 2. Features

- 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
- Combines demultiplexer and 8-bit latch
- Serial-to-parallel capability
- Output from each storage bit available
- Random (addressable) data entry
- Easily expandable
- Common reset input
- Useful as a 3-to-8 active HIGH decoder
- 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			Version
	Temperature range	Name	Description	
74LV259N	-40 °C to +125 °C	DIP16	plastic dual in-line package; 16 leads (300 mil)	SOT38-4
74LV259D	-40 °C to +125 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
74LV259DB	-40 °C to +125 °C	SSOP16	plastic shrink small outline package; 16 leads; body width 5.3 mm	SOT338-1
74LV259PW	-40 °C to +125 °C	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1
74LV259BQ	-40 °C to +125 °C	DHVQFN16	plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 16 terminals; body 2.5 × 3.5 × 0.85 mm	SOT763-1

### 4. Functional diagram

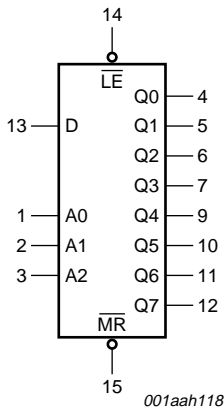


Fig 1. Logic symbol

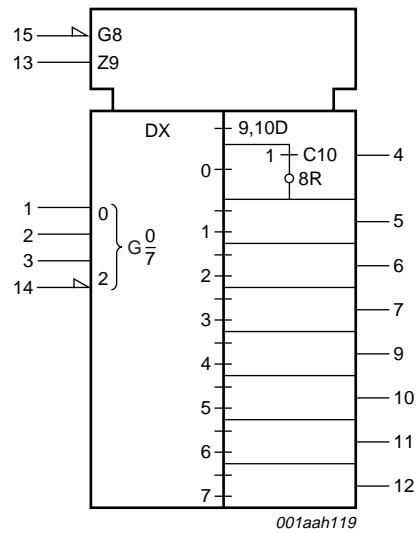


Fig 2. IEC logic symbol

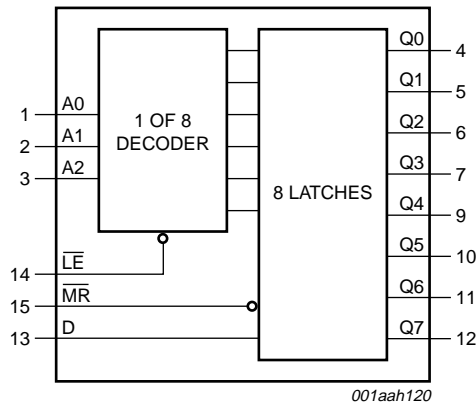


Fig 3. Functional diagram

## 5. Pinning information

### 5.1 Pinning

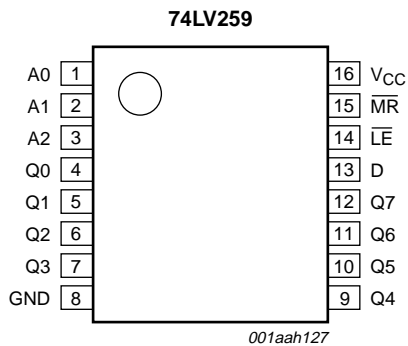
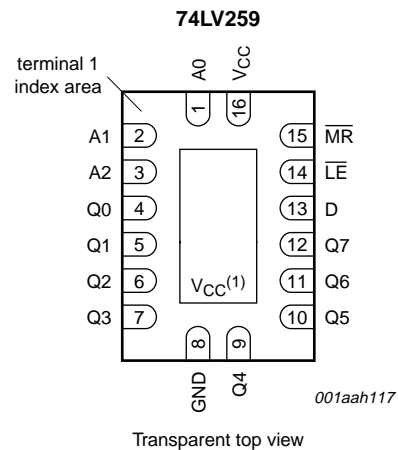


Fig 4. Pin configuration DIP16, SO16 and (T)SSOP16



(1) The die substrate is attached to this pad using conductive die attach material. It can not be used as a supply pin or input.

Fig 5. Pin configuration DHVQFN16

### 5.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
A0	1	address input
A1	2	address input
A2	3	address input
GND	8	ground (0 V)
Q[0:7]	4, 5, 6, 7, 9, 10, 11, 12	latch output

**Table 2. Pin description ...continued**

Symbol	Pin	Description
D	13	data input
$\overline{LE}$	14	latch enable input (active LOW)
$\overline{MR}$	15	conditional reset input (active LOW)
V <sub>CC</sub>	16	supply voltage

## 6. Functional description

**Table 3. Mode select table**

H = HIGH voltage level; L = LOW voltage level

$\overline{LE}$	$\overline{MR}$	Mode
L	H	addressable latch
H	H	memory
L	L	active HIGH 8-channel demultiplexer
H	L	reset

**Table 4. Function table**

H = HIGH voltage level; L = LOW voltage level; X = don't care; d = High or LOW data one set-up time prior to the LOW-to-HIGH  $\overline{LE}$  transition; q<n> = state of the output established during the last cycle in which it was addressed or cleared

Operating modes	Input						Output							
	$\overline{MR}$	$\overline{LE}$	D	A0	A1	A2	Q0	Q1	Q2	Q3	Q4	Q5	Q6	Q7
master reset	L	H	X	X	X	X	L	L	L	L	L	L	L	L
demultiplex (active HIGH) decoder (when D = H)	L	L	d	L	L	L	Q = d	L	L	L	L	L	L	L
	L	L	d	H	L	L	L	Q = d	L	L	L	L	L	L
	L	L	d	L	H	L	L	L	Q = d	L	L	L	L	L
	L	L	d	H	H	L	L	L	L	Q = d	L	L	L	L
	L	L	d	L	L	H	L	L	L	L	Q = d	L	L	L
	L	L	d	H	L	H	L	L	L	L	L	Q = d	L	L
	L	L	d	L	H	H	L	L	L	L	L	L	Q = d	L
	L	L	d	H	H	H	L	L	L	L	L	L	L	Q = d
store (do nothing)	H	H	X	X	X	X	q0	q1	q2	q3	q4	q5	q6	q7
addressable latch	H	L	d	L	L	L	Q = d	q1	q2	q3	q4	q5	q6	q7
	H	L	d	H	L	L	q0	Q = d	q2	q3	q4	q5	q6	q7
	H	L	d	L	H	L	q0	q1	Q = d	q3	q4	q5	q6	q7
	H	L	d	H	H	L	q0	q1	q2	Q = d	q4	q5	q6	q7
	H	L	d	L	L	H	q0	q1	q2	q3	Q = d	q5	q6	q7
	H	L	d	H	L	H	q0	q1	q2	q3	q4	Q = d	q6	q7
	H	L	d	L	H	H	q0	q1	q2	q3	q4	q5	Q = d	q7
	H	L	H	H	H	H	q0	q1	q2	q3	q4	q5	q6	Q = d

## 7. Limiting values

**Table 5. 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	+4.6	V
$I_{IK}$	input clamping current	$V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$	[1] -	±20	mA
$I_{OK}$	output clamping current	$V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$	[1] -	±50	mA
$I_O$	output current	$V_O = -0.5\text{ V}$ to $(V_{CC} + 0.5\text{ V})$	-	±25	mA
$I_{CC}$	supply current		-	50	mA
$I_{GND}$	ground current		-50	-	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation	$T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$			
		DIP16 package	[2] -	750	mW
		SO16 package	[3] -	500	mW
		(T)SSOP16 package	[4] -	500	mW
		DHVQFN16 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 6. 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	3.6	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
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 1.0\text{ V}$ to $2.0\text{ V}$	-	-	500	ns/V
		$V_{CC} = 2.0\text{ V}$ to $2.7\text{ V}$	-	-	200	ns/V
		$V_{CC} = 2.7\text{ V}$ to $3.6\text{ V}$	-	-	100	ns/V

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

## 9. Static characteristics

**Table 7. 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 <sup>[1]</sup>	Max	Min	Max	
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 1.2 V	0.9	-	-	0.9	-	V
		V <sub>CC</sub> = 2.0 V	1.4	-	-	1.4	-	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	2.0	-	-	2.0	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 1.2 V	-	-	0.3	-	0.3	V
		V <sub>CC</sub> = 2.0 V	-	-	0.6	-	0.6	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	-	-	0.8	-	0.8	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> = -100 μA; V <sub>CC</sub> = 1.2 V	-	1.2	-	-	-	V
		I <sub>O</sub> = -100 μA; V <sub>CC</sub> = 2.0 V	1.8	2.0	-	1.8	-	V
		I <sub>O</sub> = -100 μA; V <sub>CC</sub> = 2.7 V	2.5	2.7	-	2.5	-	V
		I <sub>O</sub> = -100 μA; V <sub>CC</sub> = 3.0 V	2.8	3.0	-	2.8	-	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> = 100 μA; V <sub>CC</sub> = 1.2 V	-	0	-	-	-	V
		I <sub>O</sub> = 100 μA; V <sub>CC</sub> = 2.0 V	-	0	0.2	-	0.2	V
		I <sub>O</sub> = 100 μA; V <sub>CC</sub> = 2.7 V	-	0	0.2	-	0.2	V
		I <sub>O</sub> = 100 μA; V <sub>CC</sub> = 3.0 V	-	0	0.2	-	0.2	V
I <sub>I</sub>	input leakage current	I <sub>O</sub> = 6 mA; V <sub>CC</sub> = 3.0 V	-	0.25	0.40	-	0.50	V
		V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V	-	-	1.0	-	1.0	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 5.5 V	-	-	20.0	-	160	μA
ΔI <sub>CC</sub>	additional supply current	per input; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; V <sub>CC</sub> = 2.7 V to 3.6 V	-	-	500	-	850	μA
C <sub>I</sub>	input capacitance		-	3.5	-	-	-	pF

[1] Typical values are measured at T<sub>amb</sub> = 25 °C.

## 10. Dynamic characteristics

**Table 8. Dynamic characteristics**  
*GND = 0 V; For test circuit see Figure 12.*

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
t <sub>pd</sub>	propagation delay	D to Qn; see <a href="#">Figure 8</a> <sup>[2]</sup>						
		V <sub>CC</sub> = 1.2 V	-	105	-	-	-	ns
		V <sub>CC</sub> = 2.0 V	-	36	49	-	61	ns
		V <sub>CC</sub> = 2.7 V	-	26	36	-	45	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 15 pF <sup>[3]</sup>	-	17	-	-	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V <sup>[3]</sup>	-	20	29	-	36	ns
t <sub>pd</sub>	propagation delay	An to Qn; see <a href="#">Figure 7</a> <sup>[2]</sup>						
		V <sub>CC</sub> = 1.2 V	-	105	-	-	-	ns
		V <sub>CC</sub> = 2.0 V	-	36	49	-	61	ns
		V <sub>CC</sub> = 2.7 V	-	26	36	-	45	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 15 pF <sup>[3]</sup>	-	17	-	-	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V <sup>[3]</sup>	-	20	29	-	36	ns
t <sub>pd</sub>	propagation delay	$\overline{LE}$ to Qn; <a href="#">Figure 6</a> <sup>[2]</sup>						
		V <sub>CC</sub> = 1.2 V	-	100	-	-	-	ns
		V <sub>CC</sub> = 2.0 V	-	34	48	-	60	ns
		V <sub>CC</sub> = 2.7 V	-	25	35	-	44	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 15 pF <sup>[3]</sup>	-	16	-	-	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V <sup>[3]</sup>	-	19	28	-	35	ns
t <sub>PHL</sub>	HIGH to LOW propagation delay	$\overline{MR}$ to Qn; <a href="#">Figure 9</a>						
		V <sub>CC</sub> = 1.2 V	-	90	-	-	-	ns
		V <sub>CC</sub> = 2.0 V	-	31	43	-	53	ns
		V <sub>CC</sub> = 2.7 V	-	23	31	-	39	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V; C <sub>L</sub> = 15 pF <sup>[3]</sup>	-	14	-	-	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V <sup>[3]</sup>	-	17	25	-	31	ns
t <sub>w</sub>	pulse width	$\overline{LE}$ , HIGH or LOW; see <a href="#">Figure 6</a>						
		V <sub>CC</sub> = 2.0 V	34	10	-	41	-	ns
		V <sub>CC</sub> = 2.7 V	25	8	-	30	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V <sup>[3]</sup>	20	6	-	24	-	ns
t <sub>w</sub>	pulse width	$\overline{MR}$ , LOW; see <a href="#">Figure 9</a>						
		V <sub>CC</sub> = 2.0 V	34	10	-	41	-	ns
		V <sub>CC</sub> = 2.7 V	25	8	-	30	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V <sup>[3]</sup>	20	6	-	24	-	ns

**Table 8. Dynamic characteristics ...continued**

GND = 0 V; For test circuit see [Figure 12](#).

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	
t <sub>su</sub>	set-up time	D, An to $\overline{LE}$ ; see <a href="#">Figure 10</a> and <a href="#">Figure 11</a>						
		V <sub>CC</sub> = 1.2 V	-	35	-	-	-	ns
		V <sub>CC</sub> = 2.0 V	24	12	-	29	-	ns
		V <sub>CC</sub> = 2.7 V	18	9	-	21	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V <sup>[3]</sup>	14	7	-	17	-	ns
t <sub>h</sub>	hold time	D to $\overline{LE}$ ; see <a href="#">Figure 10</a>						
		V <sub>CC</sub> = 1.2 V	-	-30	-	-	-	ns
		V <sub>CC</sub> = 2.0 V	5	-10	-	5	-	ns
		V <sub>CC</sub> = 2.7 V	5	-8	-	5	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V <sup>[3]</sup>	5	-6	-	5	-	ns
t <sub>h</sub>	hold time	An to $\overline{LE}$ ; see <a href="#">Figure 11</a>						
		V <sub>CC</sub> = 1.2 V	-	-20	-	-	-	ns
		V <sub>CC</sub> = 2.0 V	5	-7	-	5	-	ns
		V <sub>CC</sub> = 2.7 V	5	-5	-	5	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V <sup>[3]</sup>	5	-4	-	5	-	ns
C <sub>PD</sub>	power dissipation capacitance	C <sub>L</sub> = 50 pF; f <sub>i</sub> = 1 MHz; V <sub>i</sub> = GND to V <sub>CC</sub> <sup>[4]</sup>		19				pF

[1] Typical values are measured at T<sub>amb</sub> = 25 °C.

[2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.

[3] Typical value measured at V<sub>CC</sub> = 3.3 V.

[4] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> 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<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

C<sub>L</sub> = output load capacitance in pF;

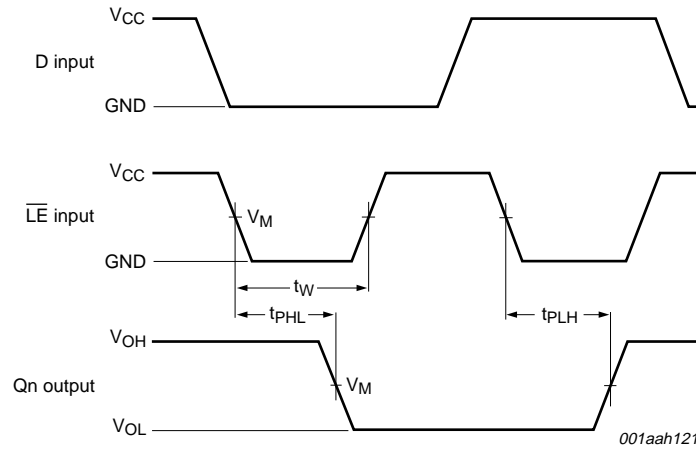
V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching;

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



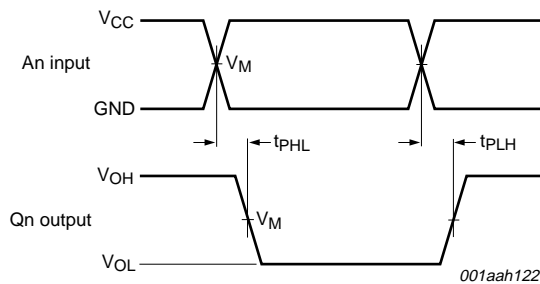
11. Waveforms



Measurement points are given in [Table 9](#).

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

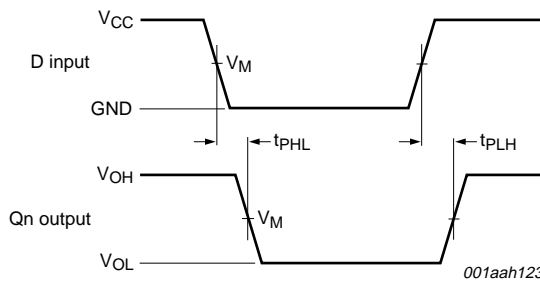
**Fig 6. The enable input ( $\overline{LE}$ ) to output ( $Q_n$ ) propagation delays and the enable input pulse width**



Measurement points are given in [Table 9](#).

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

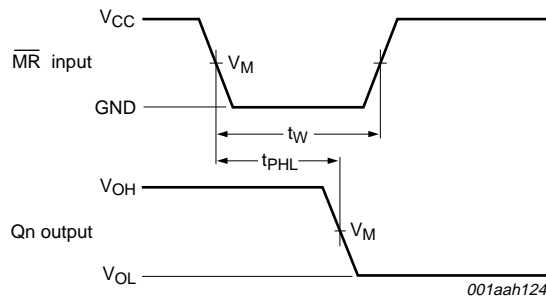
**Fig 7. The address input ( $A_n$ ) to output ( $Q_n$ ) propagation delays**



Measurement points are given in [Table 9](#).

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

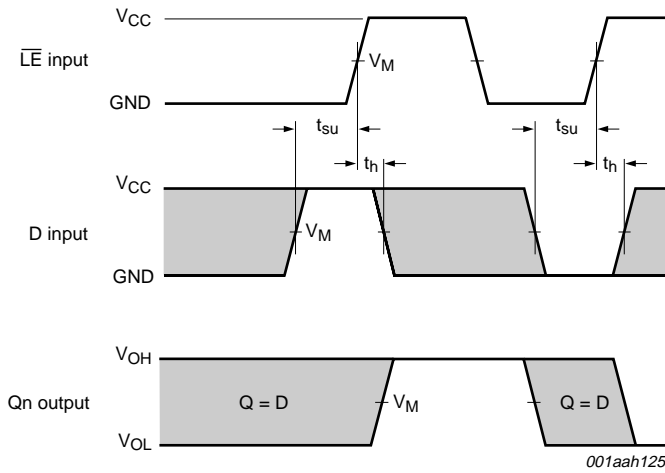
**Fig 8. The data input ( $D$ ) to output ( $Q_n$ ) propagation delays**



Measurement points are given in [Table 9](#).

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

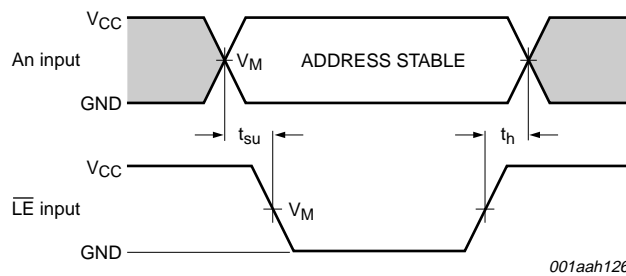
**Fig 9. The conditional reset input ( $\overline{MR}$ ) to output ( $Q_n$ ) propagation delays**



Measurement points are given in [Table 9](#).

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

**Fig 10. The data set-up and hold times for the D input to the  $\overline{LE}$  input**



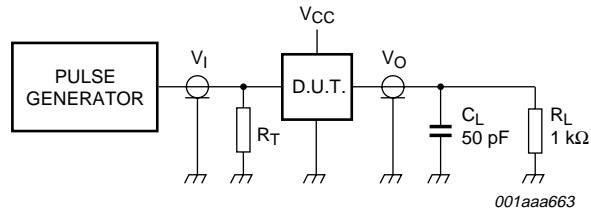
Measurement points are given in [Table 9](#).

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

**Fig 11. The address input set-up and hold times for the  $A_n$  inputs to the  $\overline{LE}$  input**

Table 9. Measurement points

Supply voltage	Input	Output
$V_{CC}$	$V_M$	$V_M$
< 2.7 V	$0.5V_{CC}$	$0.5V_{CC}$
2.7 V to 3.6 V	1.5 V	1.5 V



Test data is given in [Table 10](#).

Definitions test circuit:

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

$R_L$  = Load resistance.

$C_L$  = Load capacitance including jig and probe capacitance.

Fig 12. Load circuit for switching times

Table 10. Test data

Supply voltage	Input	$t_r, t_f$
$V_{CC}$	$V_I$	
< 2.7 V	$V_{CC}$	$\leq 2.5$ ns
2.7 V to 3.6 V	2.7 V	$\leq 2.5$ ns

12. Package outline

DIP16: plastic dual in-line package; 16 leads (300 mil)

SOT38-4

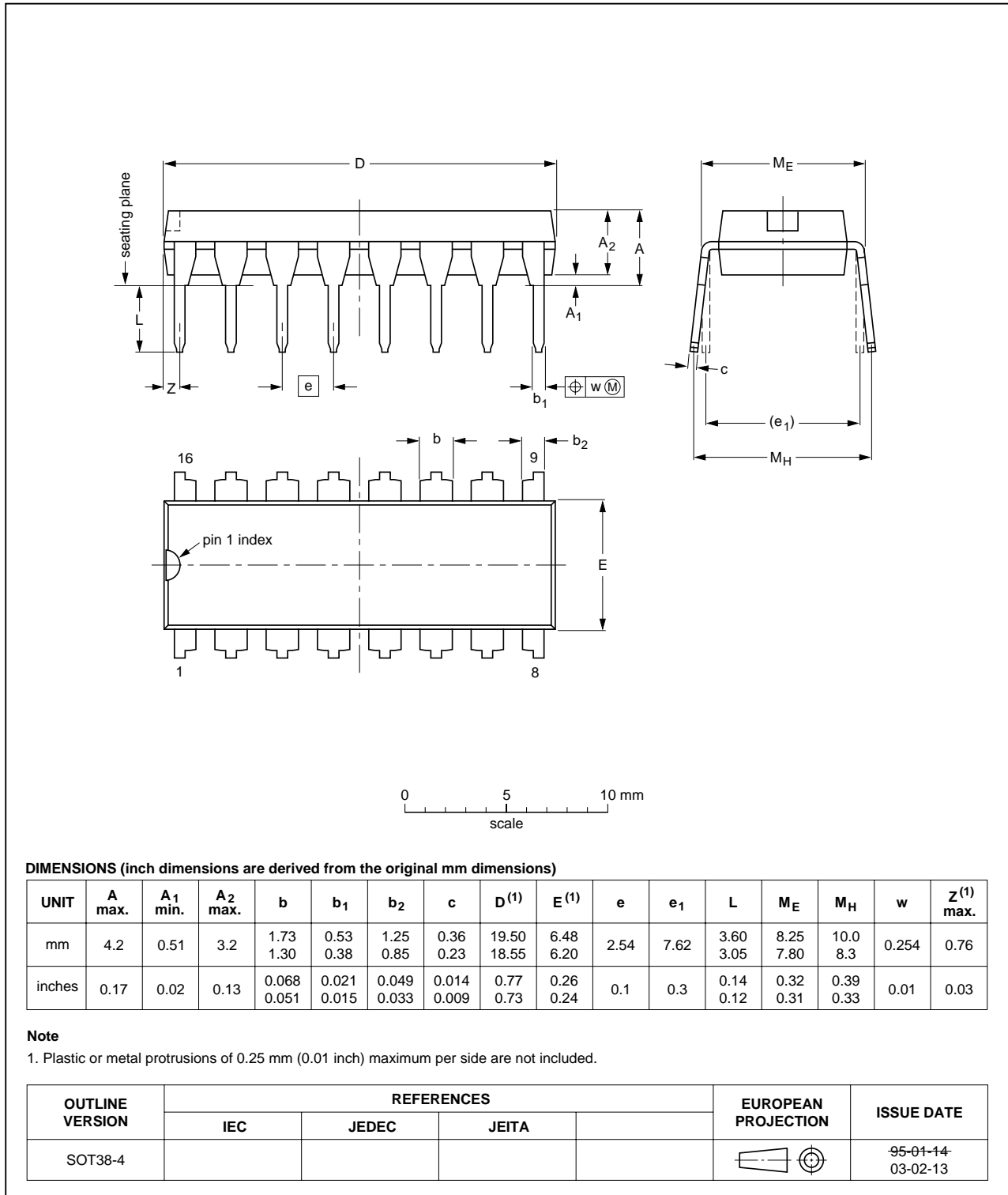


Fig 13. Package outline SOT38-4 (DIP16)

SO16: plastic small outline package; 16 leads; body width 3.9 mm

SOT109-1

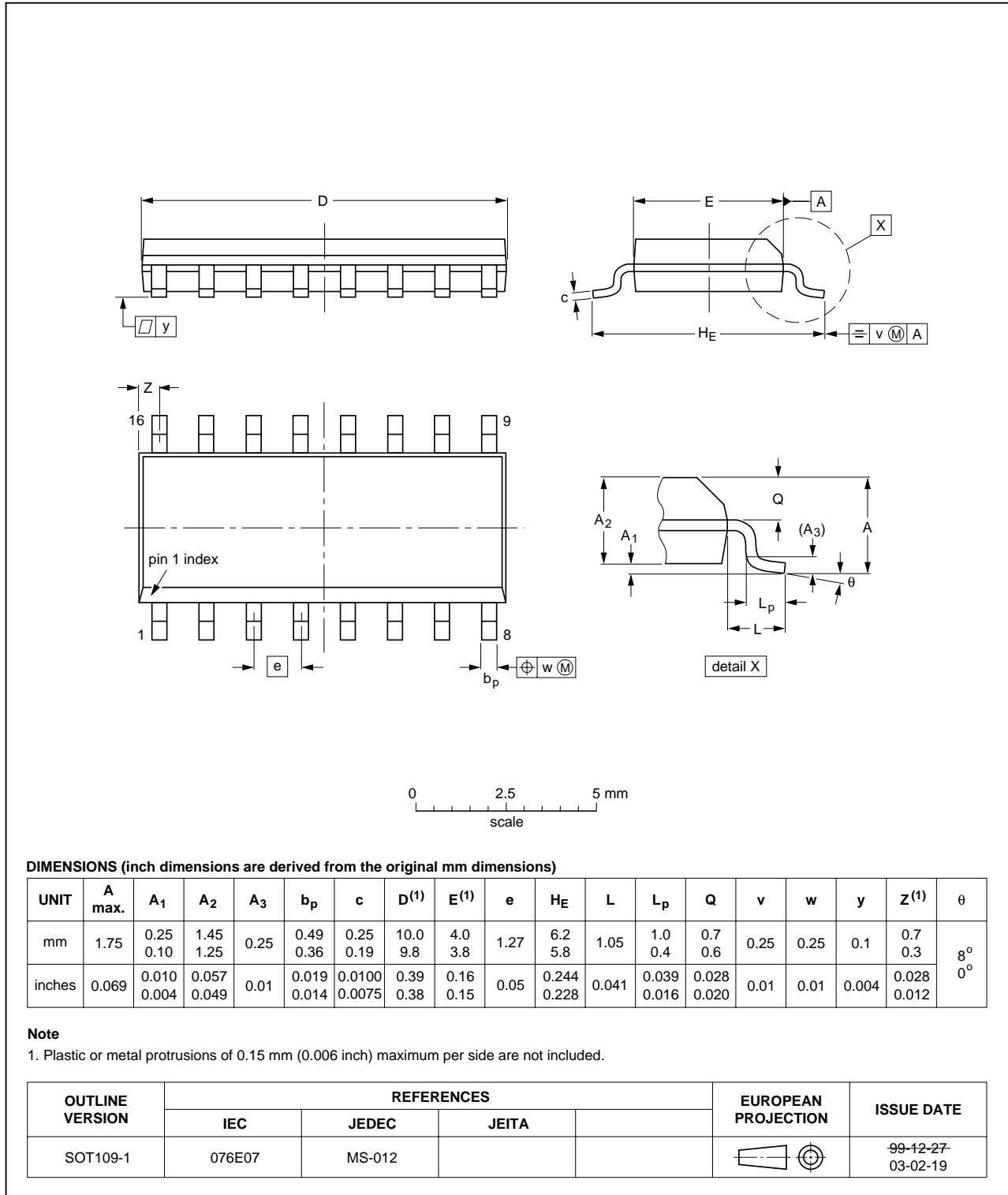


Fig 14. Package outline SOT109-1 (SO16)

SSOP16: plastic shrink small outline package; 16 leads; body width 5.3 mm

SOT338-1

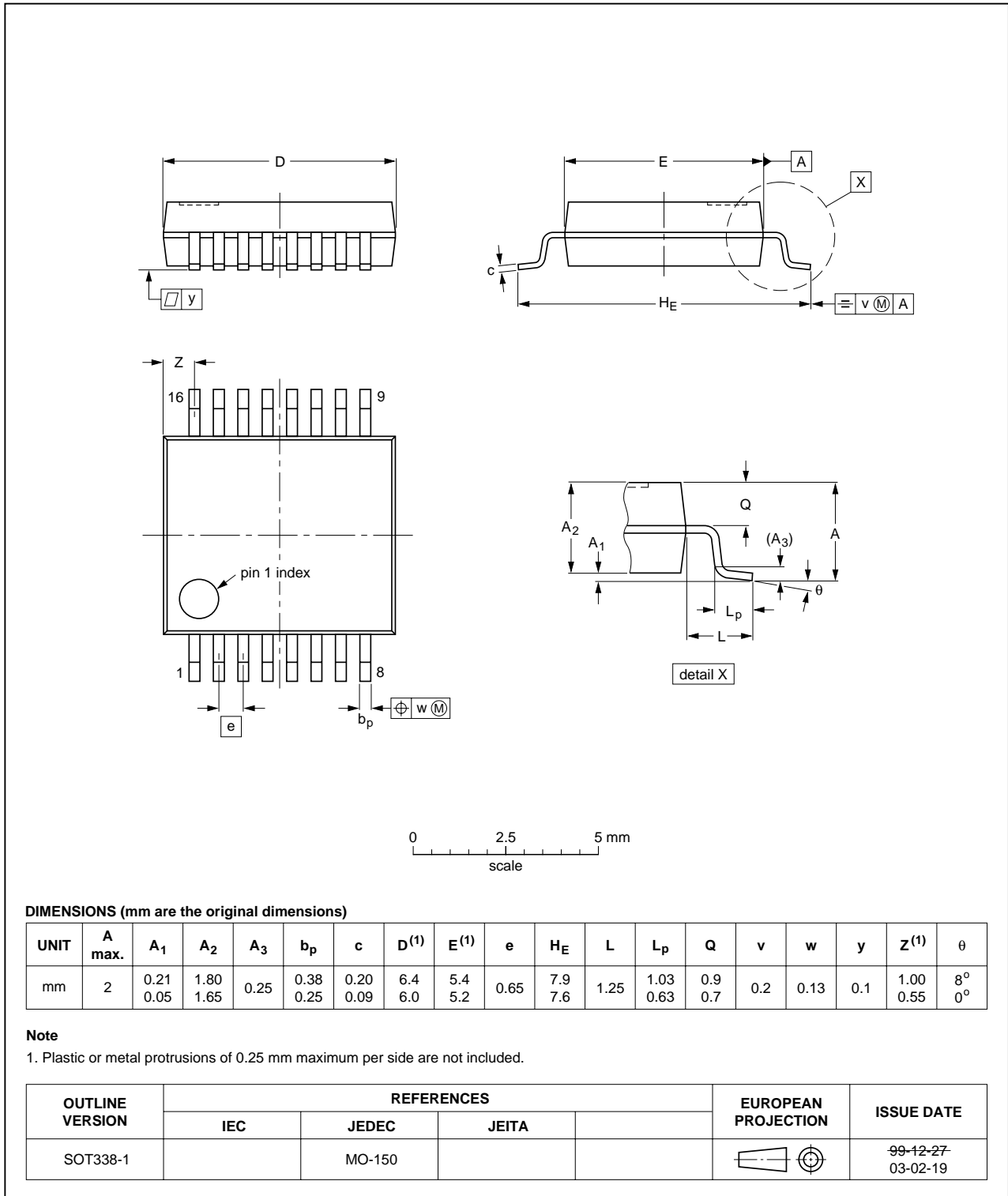


Fig 15. Package outline SOT338-1 (SSOP16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

SOT403-1

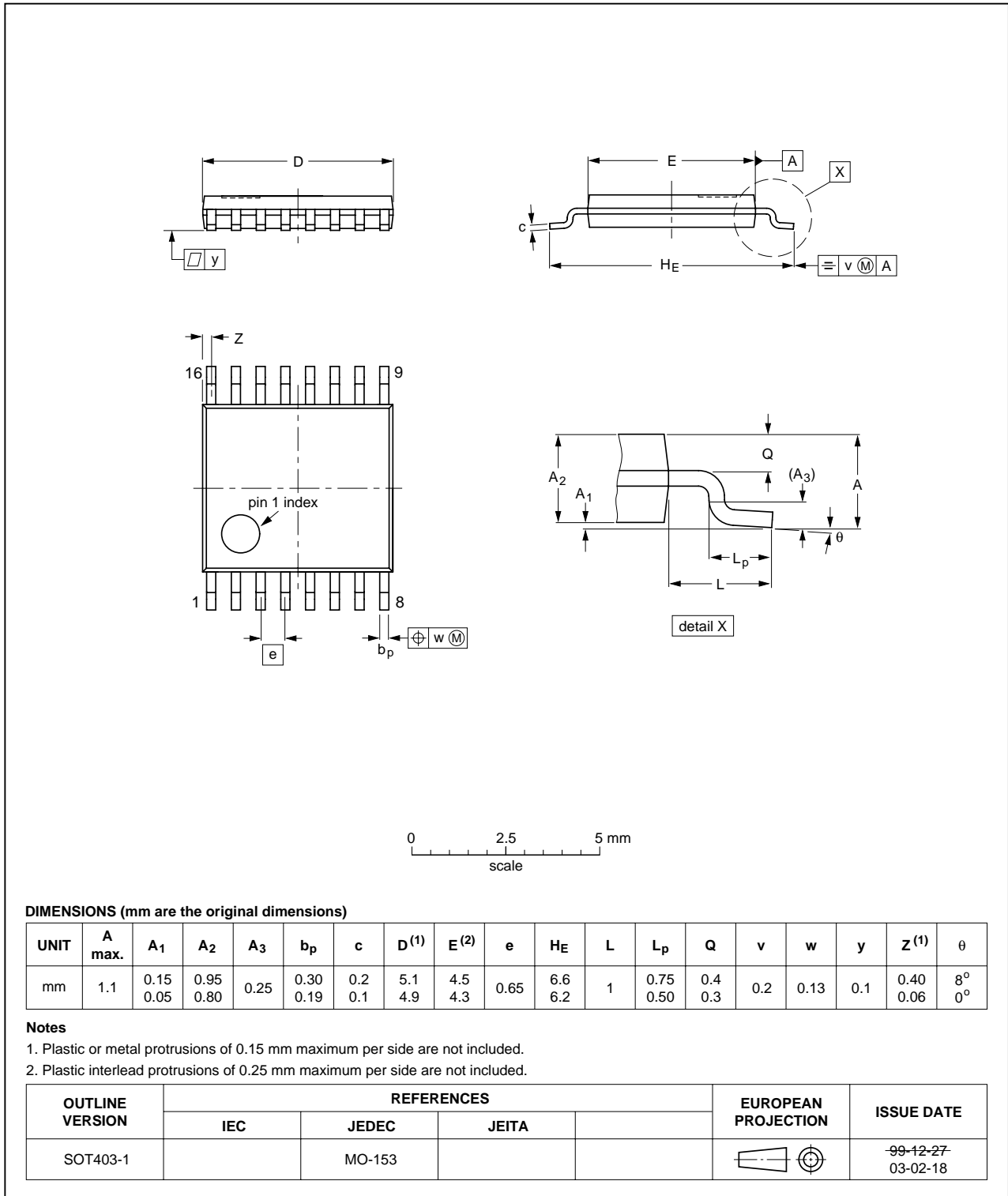


Fig 16. Package outline SOT403-1 (TSSOP16)

DHVQFN16: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 16 terminals; body 2.5 x 3.5 x 0.85 mm

SOT763-1

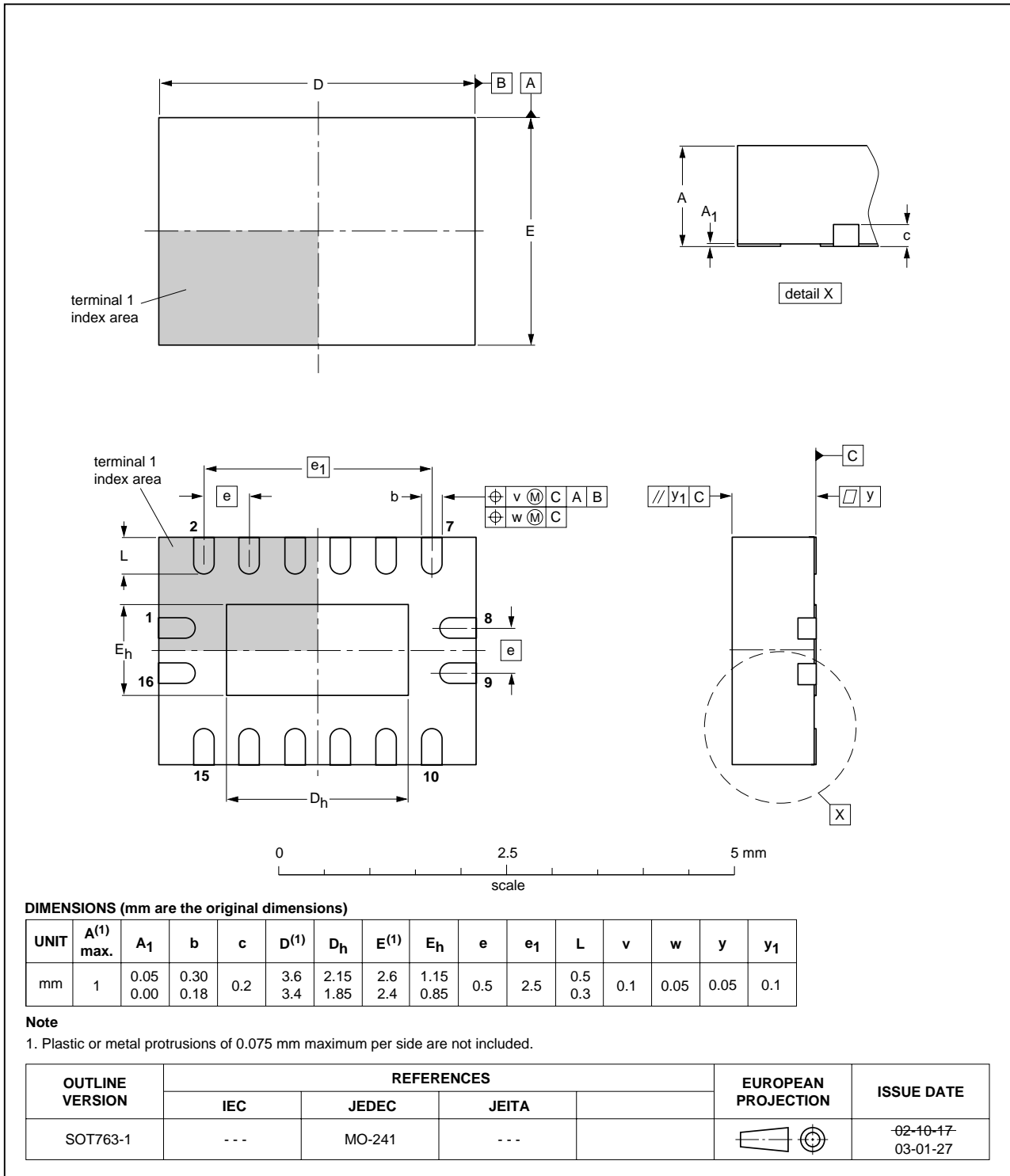


Fig 17. Package outline SOT763-1 (DHVQFN16)



## 13. Abbreviations

Table 11. Abbreviations

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

## 14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LV259_3	20080102	Product data sheet	-	74LV259_2
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> <li><a href="#">Section 3</a>: DHVQFN16 package added.</li> <li><a href="#">Section 7</a>: derating values added for DHVQFN16 package.</li> <li><a href="#">Section 12</a>: outline drawing added for DHVQFN16 package.</li> </ul>			
74LV259_2	19980520	Product specification	-	74LV259_1
74LV259_1	19970606	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".

[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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