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**آترین الکترونیک**

تخصص، تنوع و کیفیت

02166766957 - 02166766927



[info@atrinelec.com](mailto:info@atrinelec.com)



تهران پاساژ امجد طبقه 1 واحد 16



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# 74HC245; 74HCT245

Octal bus transceiver; 3-state

Rev. 03 — 31 January 2005

Product data sheet

## 1. General description

The 74HC245; 74HCT245 is a high-speed Si-gate CMOS device and is pin compatible with Low-Power Schottky TTL (LSTTL).

The 74HC245; 74HCT245 is an octal transceiver featuring non-inverting 3-state bus compatible outputs in both send and receive directions. The 74HC245; 74HCT245 features an output enable input ( $\overline{OE}$ ) for easy cascading and a send/receive input (DIR) for direction control.  $\overline{OE}$  controls the outputs so that the buses are effectively isolated.

The 74HC245; 74HCT245 is similar to the 74HC640; 74HCT640 but has true (non-inverting) outputs.

## 2. Features

- Octal bidirectional bus interface
- Non-inverting 3-state outputs
- Multiple package options
- Complies with JEDEC standard no. 7A
- ESD protection:
  - ◆ HBM EIA/JESD22-A114-B exceeds 2000 V
  - ◆ MM EIA/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. Quick reference data

**Table 1: Quick reference data**  
 $GND = 0\text{ V}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $t_r = t_f = 6\text{ ns}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Type 74HC245</b>						
$t_{PHL}$ , $t_{PLH}$	propagation delay An to Bn or Bn to An	$C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$	-	7	-	ns
$C_I$	input capacitance		-	3.5	-	pF
$C_{I/O}$	input/output capacitance		-	10	-	pF
$C_{PD}$	power dissipation capacitance per transceiver	$V_I = GND\text{ to }V_{CC}$	<a href="#">1</a> -	30	-	pF
<b>Type 74HCT245</b>						
$t_{PHL}$ , $t_{PLH}$	propagation delay An to Bn or Bn to An	$C_L = 15\text{ pF}$ ; $V_{CC} = 5\text{ V}$	-	10	-	ns

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**Table 1: Quick reference data ...continued** $GND = 0\text{ V}$ ;  $T_{amb} = 25\text{ °C}$ ;  $t_r = t_f = 6\text{ ns}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$C_I$	input capacitance		-	3.5	-	pF
$C_{I/O}$	input/output capacitance		-	10	-	pF
$C_{PD}$	power dissipation capacitance per transceiver	$V_I = GND$ to $V_{CC} - 1.5\text{ V}$	[1]	-	30	pF

[1]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ):

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

$f_i$  = 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.

## 4. Ordering information

**Table 2: Ordering information**

Type number	Package			
	Temperature range	Name	Description	Version
74HC245N	-40 °C to +125 °C	DIP20	plastic dual in-line package; 20 leads (300 mil)	SOT146-1
74HC245D	-40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74HC245PW	-40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
74HC245DB	-40 °C to +125 °C	SSOP20	plastic shrink small outline package; 20 leads; body width 5.3 mm	SOT339-1
74HC245BQ	-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
74HCT245N	-40 °C to +125 °C	DIP20	plastic dual in-line package; 20 leads (300 mil)	SOT146-1
74HCT245D	-40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74HCT245PW	-40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
74HCT245DB	-40 °C to +125 °C	SSOP20	plastic shrink small outline package; 20 leads; body width 5.3 mm	SOT339-1
74HCT245BQ	-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

5. Functional diagram

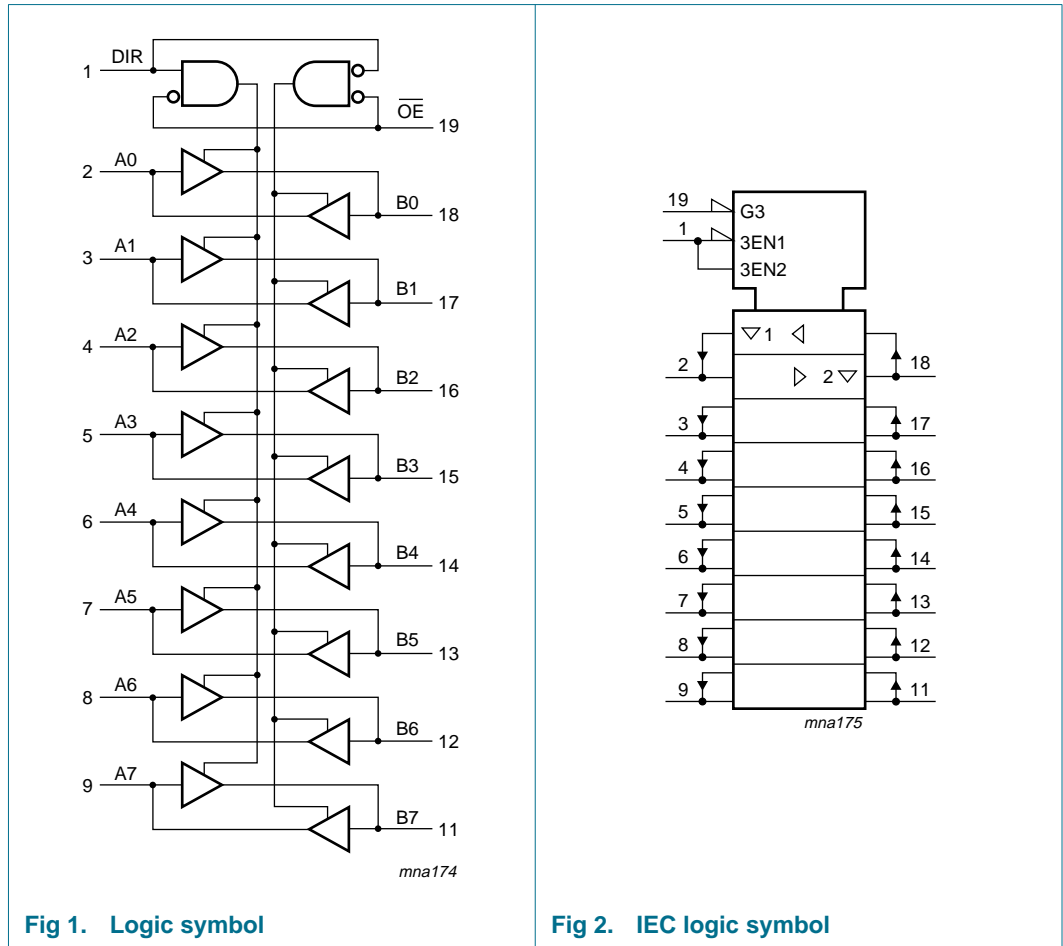
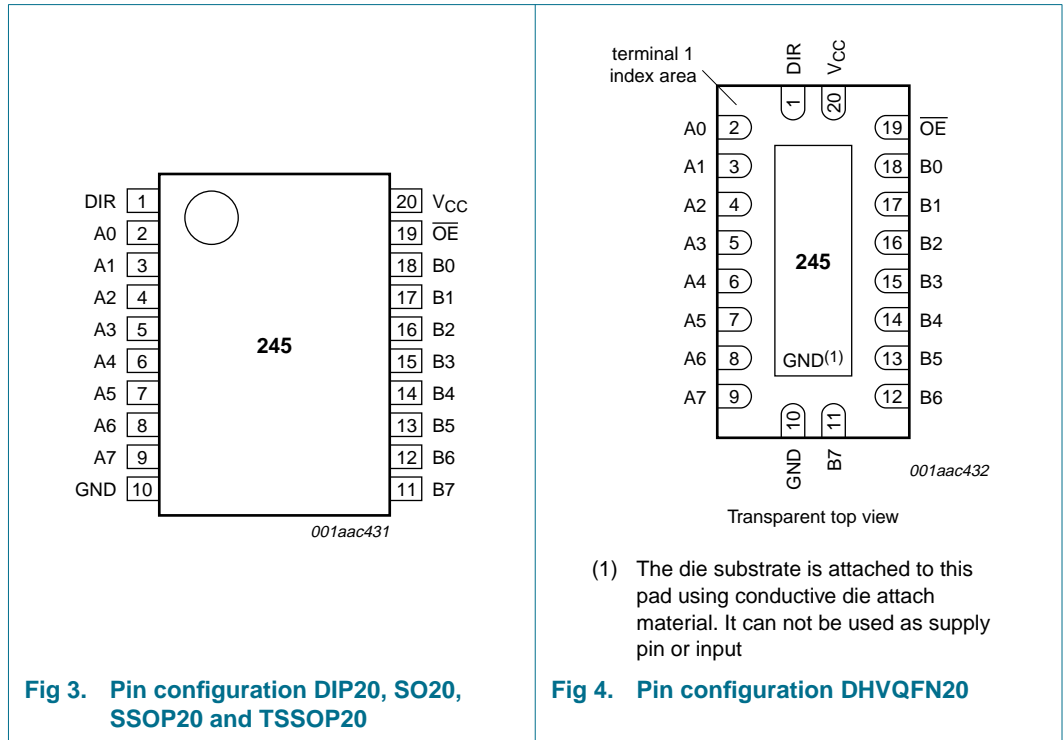


Fig 1. Logic symbol

Fig 2. IEC logic symbol

## 6. Pinning information

### 6.1 Pinning



### 6.2 Pin description

Table 3: Pin description

Symbol	Pin	Description
DIR	1	direction control
A0	2	data input/output
A1	3	data input/output
A2	4	data input/output
A3	5	data input/output
A4	6	data input/output
A5	7	data input/output
A6	8	data input/output
A7	9	data input/output
GND	10	ground (0 V)
B7	11	data input/output
B6	12	data input/output
B5	13	data input/output
B4	14	data input/output
B3	15	data input/output
B2	16	data input/output

Table 3: Pin description ...continued

Symbol	Pin	Description
B1	17	data input/output
B0	18	data input/output
$\overline{OE}$	19	output enable input (active LOW)
$V_{CC}$	20	supply voltage

## 7. Functional description

### 7.1 Function table

Table 4: Function table [1]

Input		Input/output	
$\overline{OE}$	DIR	An	Bn
L	L	A = B	input
L	H	input	B = A
H	X	Z	Z

- [1] H = HIGH voltage level;  
L = LOW voltage level;  
X = don't care;  
Z = high-impedance OFF-state.

## 8. 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	+7	V
$I_{IK}$	input diode current	$V_I < -0.5\text{ V}$ or $V_I > V_{CC} + 0.5\text{ V}$	-	$\pm 20$	mA
$I_{OK}$	output diode current	$V_O < -0.5\text{ V}$ or $V_O > V_{CC} + 0.5\text{ V}$	-	$\pm 20$	mA
$I_O$	output source or sink current	$V_O = -0.5\text{ V}$ to $V_{CC} + 0.5\text{ V}$	-	$\pm 35$	mA
$I_{CC}, I_{GND}$	$V_{CC}$ or GND current		-	$\pm 70$	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation		[1]		
	DIP20 package		-	750	mW
	SO20, SSOP20, TSSOP20 and DHSVFN20 packages		-	500	mW

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

## 9. Recommended operating conditions

**Table 6: Recommended operating conditions**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Type 74HC245</b>						
$V_{CC}$	supply voltage		2.0	5.0	6.0	V
$V_I$	input voltage		0	-	$V_{CC}$	V
$V_O$	output voltage		0	-	$V_{CC}$	V
$t_r, t_f$	input rise and fall times	$V_{CC} = 2.0\text{ V}$	-	-	1000	ns
		$V_{CC} = 4.5\text{ V}$	-	6.0	500	ns
		$V_{CC} = 6.0\text{ V}$	-	-	400	ns
$T_{amb}$	ambient temperature		-40	-	+125	°C
<b>Type 74HCT245</b>						
$V_{CC}$	supply voltage		4.5	5.0	5.5	V
$V_I$	input voltage		0	-	$V_{CC}$	V
$V_O$	output voltage		0	-	$V_{CC}$	V
$t_r, t_f$	input rise and fall times	$V_{CC} = 4.5\text{ V}$	-	6.0	500	ns
$T_{amb}$	ambient temperature		-40	-	+125	°C

## 10. Static characteristics

**Table 7: Static characteristics type 74HC245**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = 25\text{ °C}</math></b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 2.0\text{ V}$	1.5	1.2	-	V
		$V_{CC} = 4.5\text{ V}$	3.15	2.4	-	V
		$V_{CC} = 6.0\text{ V}$	4.2	3.2	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 2.0\text{ V}$	-	0.8	0.5	V
		$V_{CC} = 4.5\text{ V}$	-	2.1	1.35	V
		$V_{CC} = 6.0\text{ V}$	-	2.8	1.8	V
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = -20\text{ }\mu\text{A}; V_{CC} = 2.0\text{ V}$	1.9	2.0	-	V
		$I_O = -20\text{ }\mu\text{A}; V_{CC} = 4.5\text{ V}$	4.4	4.5	-	V
		$I_O = -20\text{ }\mu\text{A}; V_{CC} = 6.0\text{ V}$	5.9	6.0	-	V
		$I_O = -6.0\text{ mA}; V_{CC} = 4.5\text{ V}$	3.98	4.32	-	V
		$I_O = -7.8\text{ mA}; V_{CC} = 6.0\text{ V}$	5.48	5.81	-	V

**Table 7: Static characteristics type 74HC245 ...continued**  
 At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
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	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 4.5 V	-	0	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 6.0 V	-	0	0.1	V
		I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V	-	0.15	0.26	V
		I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V	-	0.16	0.26	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V	-	-	±0.1	μA
I <sub>OZ</sub>	OFF-state output current	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	μA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 6.0 V	-	-	8.0	μA
C <sub>I</sub>	input capacitance		-	3.5	-	pF
C <sub>I/O</sub>	input/output capacitance		-	10	-	pF
<b>T<sub>amb</sub> = -40 °C to +85 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	-	-	V
		V <sub>CC</sub> = 4.5 V	3.15	-	-	V
		V <sub>CC</sub> = 6.0 V	4.2	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	-	0.5	V
		V <sub>CC</sub> = 4.5 V	-	-	1.35	V
		V <sub>CC</sub> = 6.0 V	-	-	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	-	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 4.5 V	4.4	-	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 6.0 V	5.9	-	-	V
		I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V	3.84	-	-	V
		I <sub>O</sub> = -7.8 mA; V <sub>CC</sub> = 6.0 V	5.34	-	-	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	-	-	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 4.5 V	-	-	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 6.0 V	-	-	0.1	V
		I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V	-	-	0.33	V
		I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V	-	-	0.33	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V	-	-	±1.0	μA
I <sub>OZ</sub>	OFF-state output current	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	-	-	±5.0	μA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 6.0 V	-	-	80	μA
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 2.0 V	1.5	-	-	V
		V <sub>CC</sub> = 4.5 V	3.15	-	-	V
		V <sub>CC</sub> = 6.0 V	4.2	-	-	V



**Table 7: Static characteristics type 74HC245 ...continued**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 2.0 V	-	-	0.5	V
		V <sub>CC</sub> = 4.5 V	-	-	1.35	V
		V <sub>CC</sub> = 6.0 V	-	-	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	-	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 4.5 V	4.4	-	-	V
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 6.0 V	5.9	-	-	V
		I <sub>O</sub> = -6.0 mA; V <sub>CC</sub> = 4.5 V	3.7	-	-	V
		I <sub>O</sub> = -7.8 mA; V <sub>CC</sub> = 6.0 V	5.2	-	-	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	-	-	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 4.5 V	-	-	0.1	V
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 6.0 V	-	-	0.1	V
		I <sub>O</sub> = 6.0 mA; V <sub>CC</sub> = 4.5 V	-	-	0.4	V
		I <sub>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V	-	-	0.4	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 6.0 V	-	-	±1.0	μA
I <sub>OZ</sub>	OFF-state output current	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	-	-	±10.0	μA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 6.0 V	-	-	160	μA

**Table 8: Static characteristics type 74HCT245**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = 25 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	2.0	1.6	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 4.5 V to 5.5 V	-	1.2	0.8	V
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V	-	-	-	-
		I <sub>O</sub> = -20 μA	4.4	4.5	-	V
		I <sub>O</sub> = -6 mA	3.98	4.32	-	V
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 4.5 V	-	-	-	-
		I <sub>O</sub> = 20 μA	-	0	0.1	V
		I <sub>O</sub> = 6.0 mA	-	0.15	0.26	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V	-	-	±0.1	μA
I <sub>OZ</sub>	OFF-state output current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>CC</sub> = 5.5 V; V <sub>O</sub> = V <sub>CC</sub> or GND per input pin; other inputs at V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A	-	-	±0.5	μA
I <sub>CC</sub>	quiescent 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	-	-	8.0	μA

**Table 8: Static characteristics type 74HCT245 ...continued**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$\Delta I_{CC}$	additional quiescent supply current per input pin	$V_I = V_{CC} - 2.1$ V; other inputs at $V_I = V_{CC}$ or GND; $V_{CC} = 4.5$ V to 5.5 V; $I_O = 0$ A				
	An or Bn inputs		-	40	144	$\mu$ A
	$\overline{OE}$ input		-	150	540	$\mu$ A
	DIR input		-	90	324	$\mu$ A
$C_I$	input capacitance		-	3.5	-	pF
$C_{I/O}$	input/output capacitance		-	10	-	pF
<b><math>T_{amb} = -40</math> °C to <math>+85</math> °C</b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	2.0	-	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	-	-	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	-	-	V
		$I_O = -6$ mA	3.84	-	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$ ; $V_{CC} = 4.5$ V				
		$I_O = 20$ $\mu$ A	-	-	0.1	V
		$I_O = 6.0$ mA	-	-	0.33	V
$I_{LI}$	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	$\pm 1.0$	$\mu$ 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	-	-	$\pm 5.0$	$\mu$ A
$I_{CC}$	quiescent supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	80	$\mu$ A
$\Delta I_{CC}$	additional quiescent supply current per input pin	$V_I = V_{CC} - 2.1$ V; other inputs at $V_I = V_{CC}$ or GND; $V_{CC} = 4.5$ V to 5.5 V; $I_O = 0$ A				
	An or Bn inputs		-	-	180	$\mu$ A
	$\overline{OE}$ input		-	-	675	$\mu$ A
	DIR input		-	-	405	$\mu$ A
<b><math>T_{amb} = -40</math> °C to <math>+125</math> °C</b>						
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	2.0	-	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5$ V to 5.5 V	-	-	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	-	-	V
		$I_O = -6$ mA	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	-	-	0.1	V
		$I_O = 6.0$ mA	-	-	0.4	V
$I_{LI}$	input leakage current	$V_I = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	$\pm 1.0$	$\mu$ 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	-	-	$\pm 10$	$\mu$ A

**Table 8:** Static characteristics type 74HCT245 ...continued

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CC}$	quiescent supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5$ V	-	-	160	$\mu$ A
$\Delta I_{CC}$	additional quiescent supply current per input pin	$V_I = V_{CC} - 2.1$ V; other inputs at $V_I = V_{CC}$ or GND; $V_{CC} = 4.5$ V to 5.5 V; $I_O = 0$ A				
	An or Bn inputs		-	-	196	$\mu$ A
	$\overline{OE}$ input		-	-	735	$\mu$ A
	DIR input		-	-	441	$\mu$ A

## 11. Dynamic characteristics

**Table 9:** Dynamic characteristics type 74HC245GND = 0 V; test circuit see [Figure 7](#).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = 25</math> °C</b>						
$t_{PHL}$ , $t_{PLH}$	propagation delay An to Bn or Bn to An	see <a href="#">Figure 5</a> $V_{CC} = 2.0$ V $V_{CC} = 4.5$ V $V_{CC} = 5.0$ V; $C_L = 15$ pF $V_{CC} = 6.0$ V	-	25 9 7 7	90 18 -	ns ns ns ns
$t_{PZH}$ , $t_{PZL}$	3-state output enable time $\overline{OE}$ to An or $\overline{OE}$ to Bn	see <a href="#">Figure 6</a> $V_{CC} = 2.0$ V $V_{CC} = 4.5$ V $V_{CC} = 6.0$ V	-	30 11 9	150 30 26	ns ns ns
$t_{PHZ}$ , $t_{PLZ}$	3-state output disable time $\overline{OE}$ to An or $\overline{OE}$ to Bn	see <a href="#">Figure 6</a> $V_{CC} = 2.0$ V $V_{CC} = 4.5$ V $V_{CC} = 6.0$ V	-	41 15 12	150 30 26	ns ns ns
$t_{THL}$ , $t_{TLH}$	output transition time	see <a href="#">Figure 5</a> $V_{CC} = 2.0$ V $V_{CC} = 4.5$ V $V_{CC} = 6.0$ V	-	14 5 4	60 12 10	ns ns ns
$C_{PD}$	power dissipation capacitance per transceiver	$V_I = GND$ to $V_{CC}$	[1] -	30	-	pF
<b><math>T_{amb} = -40</math> °C to <math>+85</math> °C</b>						
$t_{PHL}$ , $t_{PLH}$	propagation delay An to Bn or Bn to An	see <a href="#">Figure 5</a> $V_{CC} = 2.0$ V $V_{CC} = 4.5$ V $V_{CC} = 6.0$ V	-	- - -	115 23 20	ns ns ns

**Table 9: Dynamic characteristics type 74HC245 ...continued**  
*GND = 0 V; test circuit see Figure 7.*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$t_{PZH}, t_{PZL}$	3-state output enable time $\overline{OE}$ to An or $\overline{OE}$ to Bn	see <a href="#">Figure 6</a>				
		$V_{CC} = 2.0\text{ V}$	-	-	190	ns
		$V_{CC} = 4.5\text{ V}$	-	-	38	ns
		$V_{CC} = 6.0\text{ V}$	-	-	33	ns
$t_{PHZ}, t_{PLZ}$	3-state output disable time $\overline{OE}$ to An or $\overline{OE}$ to Bn	see <a href="#">Figure 6</a>				
		$V_{CC} = 2.0\text{ V}$	-	-	190	ns
		$V_{CC} = 4.5\text{ V}$	-	-	38	ns
		$V_{CC} = 6.0\text{ V}$	-	-	33	ns
$t_{THL}, t_{TLH}$	output transition time	see <a href="#">Figure 5</a>				
		$V_{CC} = 2.0\text{ V}$	-	-	75	ns
		$V_{CC} = 4.5\text{ V}$	-	-	15	ns
		$V_{CC} = 6.0\text{ V}$	-	-	13	ns
<b><math>T_{amb} = -40\text{ }^{\circ}\text{C to }+125\text{ }^{\circ}\text{C}</math></b>						
$t_{PHL}, t_{PLH}$	propagation delay An to Bn or Bn to An	see <a href="#">Figure 5</a>				
		$V_{CC} = 2.0\text{ V}$	-	-	135	ns
		$V_{CC} = 4.5\text{ V}$	-	-	27	ns
		$V_{CC} = 6.0\text{ V}$	-	-	23	ns
$t_{PZH}, t_{PZL}$	3-state output enable time $\overline{OE}$ to An or $\overline{OE}$ to Bn	see <a href="#">Figure 6</a>				
		$V_{CC} = 2.0\text{ V}$	-	-	225	ns
		$V_{CC} = 4.5\text{ V}$	-	-	45	ns
		$V_{CC} = 6.0\text{ V}$	-	-	38	ns
$t_{PHZ}, t_{PLZ}$	3-state output disable time $\overline{OE}$ to An or $\overline{OE}$ to Bn	see <a href="#">Figure 6</a>				
		$V_{CC} = 2.0\text{ V}$	-	-	225	ns
		$V_{CC} = 4.5\text{ V}$	-	-	45	ns
		$V_{CC} = 6.0\text{ V}$	-	-	38	ns
$t_{THL}, t_{TLH}$	output transition time	see <a href="#">Figure 5</a>				
		$V_{CC} = 2.0\text{ V}$	-	-	90	ns
		$V_{CC} = 4.5\text{ V}$	-	-	18	ns
		$V_{CC} = 6.0\text{ V}$	-	-	15	ns

[1]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ):

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

$f_i$  = 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.

Table 10: Dynamic characteristics type 74HCT245

GND = 0 V; test circuit see [Figure 7](#).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = 25 °C</b>						
t <sub>PHL</sub> , t <sub>PLH</sub>	propagation delay An to Bn or Bn to An	see <a href="#">Figure 5</a> V <sub>CC</sub> = 4.5 V	-	12	22	ns
		V <sub>CC</sub> = 5.0 V; C <sub>L</sub> = 15 pF	-	10	-	ns
t <sub>PZH</sub> , t <sub>PZL</sub>	3-state output enable time $\overline{OE}$ to An or $\overline{OE}$ to Bn	V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 6</a>	-	16	30	ns
t <sub>PHZ</sub> , t <sub>PLZ</sub>	3-state output disable time $\overline{OE}$ to An or OE to Bn	V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 6</a>	-	16	30	ns
t <sub>THL</sub> , t <sub>TLH</sub>	output transition time	V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 5</a>	-	5	12	ns
C <sub>PD</sub>	power dissipation capacitance per transceiver	V <sub>I</sub> = GND to V <sub>CC</sub> - 1.5 V	[1]	30	-	pF
<b>T<sub>amb</sub> = -40 °C to +85 °C</b>						
t <sub>PHL</sub> , t <sub>PLH</sub>	propagation delay An to Bn or Bn to An	V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 5</a>	-	-	28	ns
t <sub>PZH</sub> , t <sub>PZL</sub>	3-state output enable time $\overline{OE}$ to An or $\overline{OE}$ to Bn	V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 6</a>	-	-	38	ns
t <sub>PHZ</sub> , t <sub>PLZ</sub>	3-state output disable time $\overline{OE}$ to An or $\overline{OE}$ to Bn	V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 6</a>	-	-	38	ns
t <sub>THL</sub> , t <sub>TLH</sub>	output transition time	V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 5</a>	-	-	15	ns
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
t <sub>PHL</sub> , t <sub>PLH</sub>	propagation delay An to Bn or Bn to An	V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 5</a>	-	-	33	ns
t <sub>PZH</sub> , t <sub>PZL</sub>	3-state output enable time $\overline{OE}$ to An or $\overline{OE}$ to Bn	V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 6</a>	-	-	45	ns
t <sub>PHZ</sub> , t <sub>PLZ</sub>	3-state output disable time $\overline{OE}$ to An or $\overline{OE}$ to Bn	V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 6</a>	-	-	45	ns
t <sub>THL</sub> , t <sub>TLH</sub>	output transition time	V <sub>CC</sub> = 4.5 V; see <a href="#">Figure 5</a>	-	-	18	ns

[1] 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.

12. Waveforms

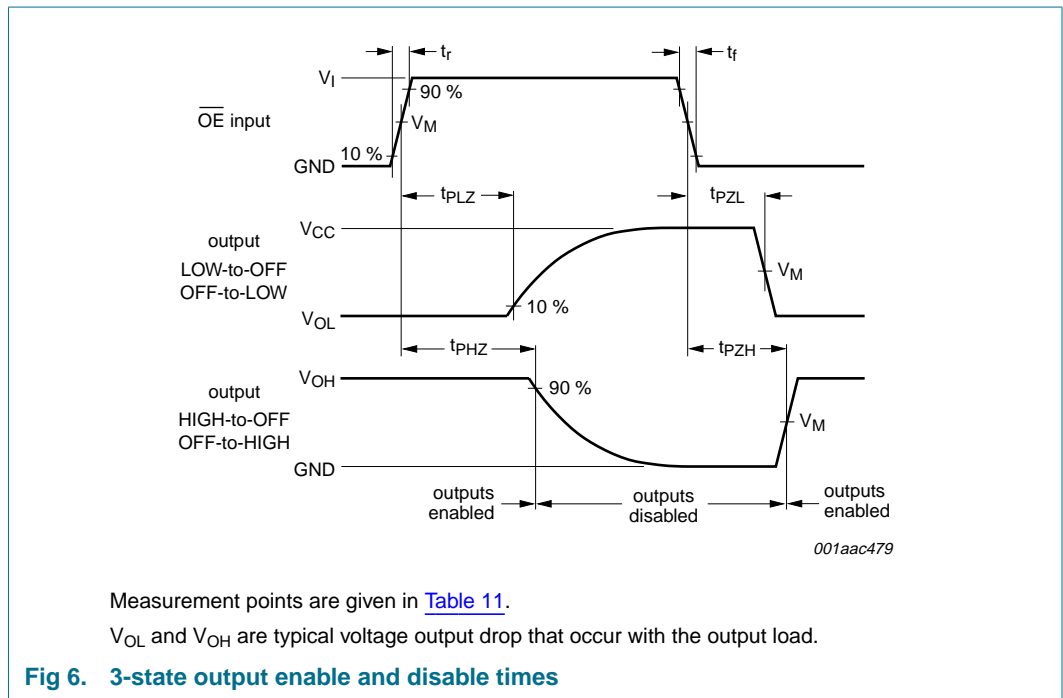
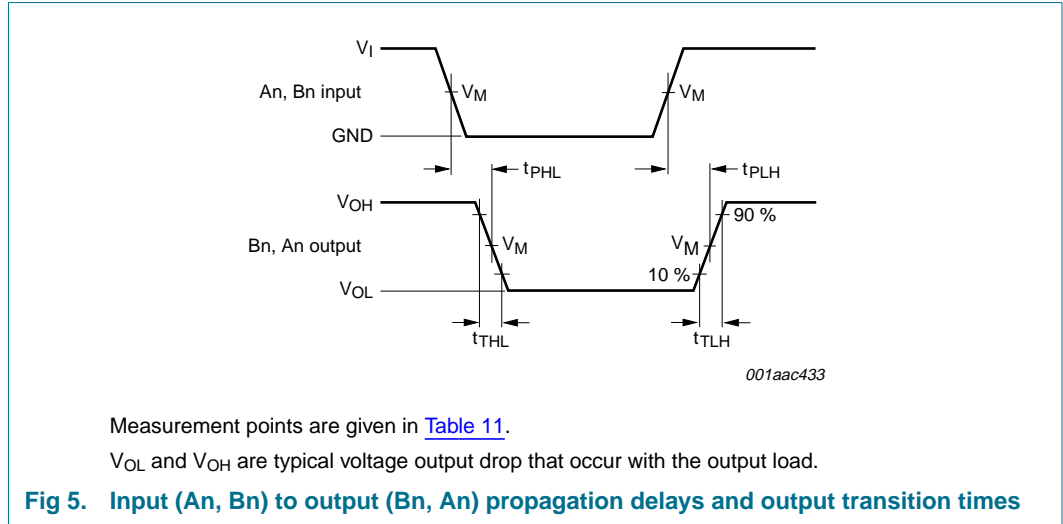
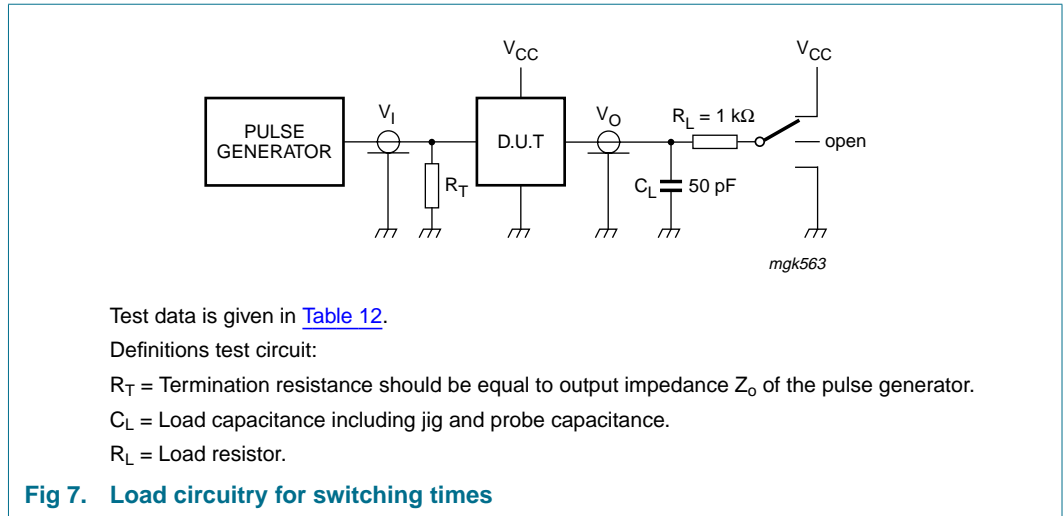


Table 11: Measurement points

Type	Input	Output
	$V_M$	$V_M$
74HC245	$0.5V_{CC}$	$0.5V_{CC}$
74HCT245	1.3 V	1.3 V



**Table 12: Test data**

Type	Input		Test		
	$V_I$	$t_r, t_f$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
74HC245	$V_{CC}$	6 ns	open	GND	$V_{CC}$
74HCT245	3 V	6 ns	open	GND	$V_{CC}$

13. Package outline

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

SOT146-1

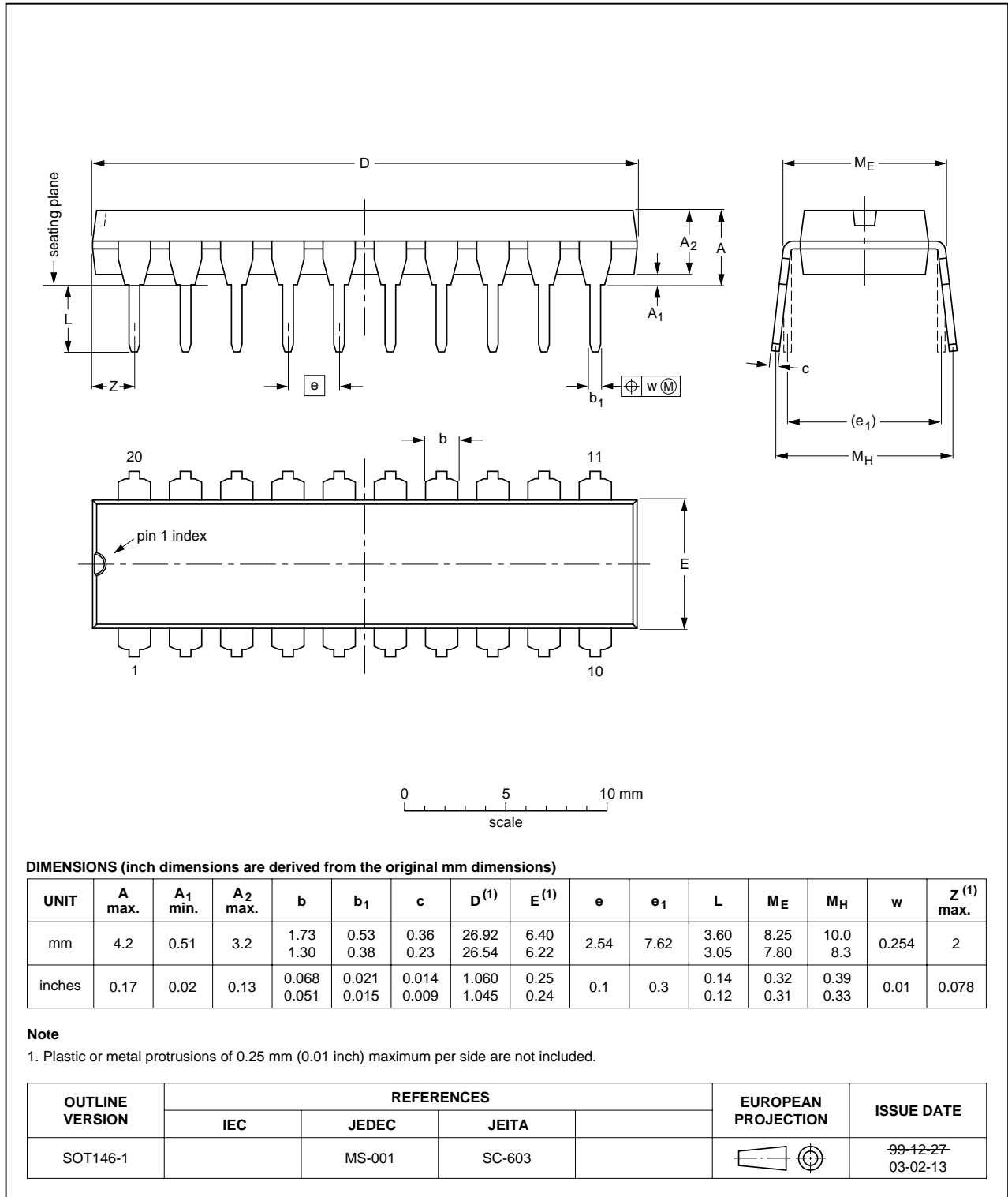


Fig 8. Package outline SOT146-1 (DIP20)



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

SOT163-1

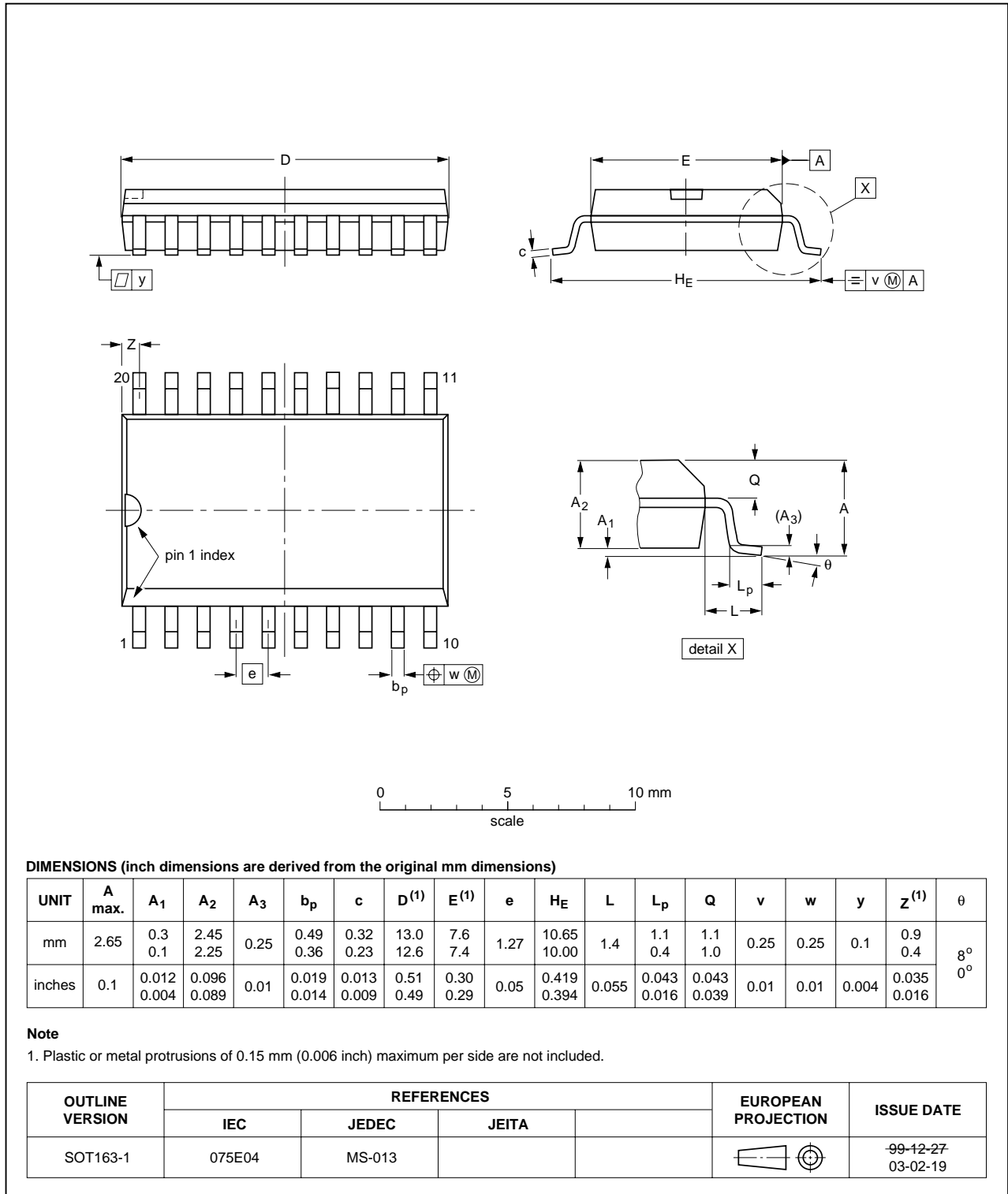


Fig 9. Package outline SOT163-1 (SO20)

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

SOT339-1

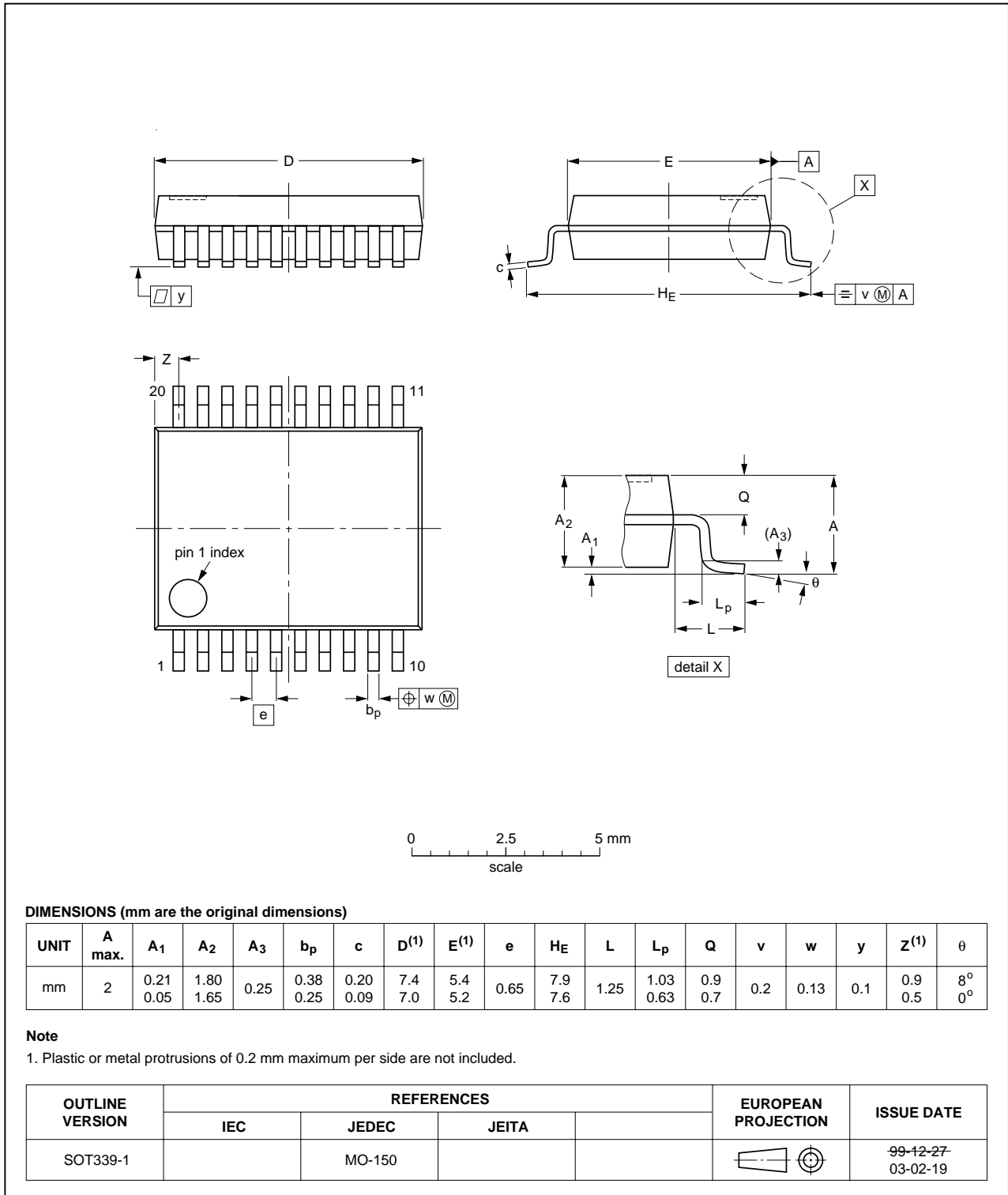


Fig 10. Package outline SOT339-1 (SSOP20)

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

SOT360-1

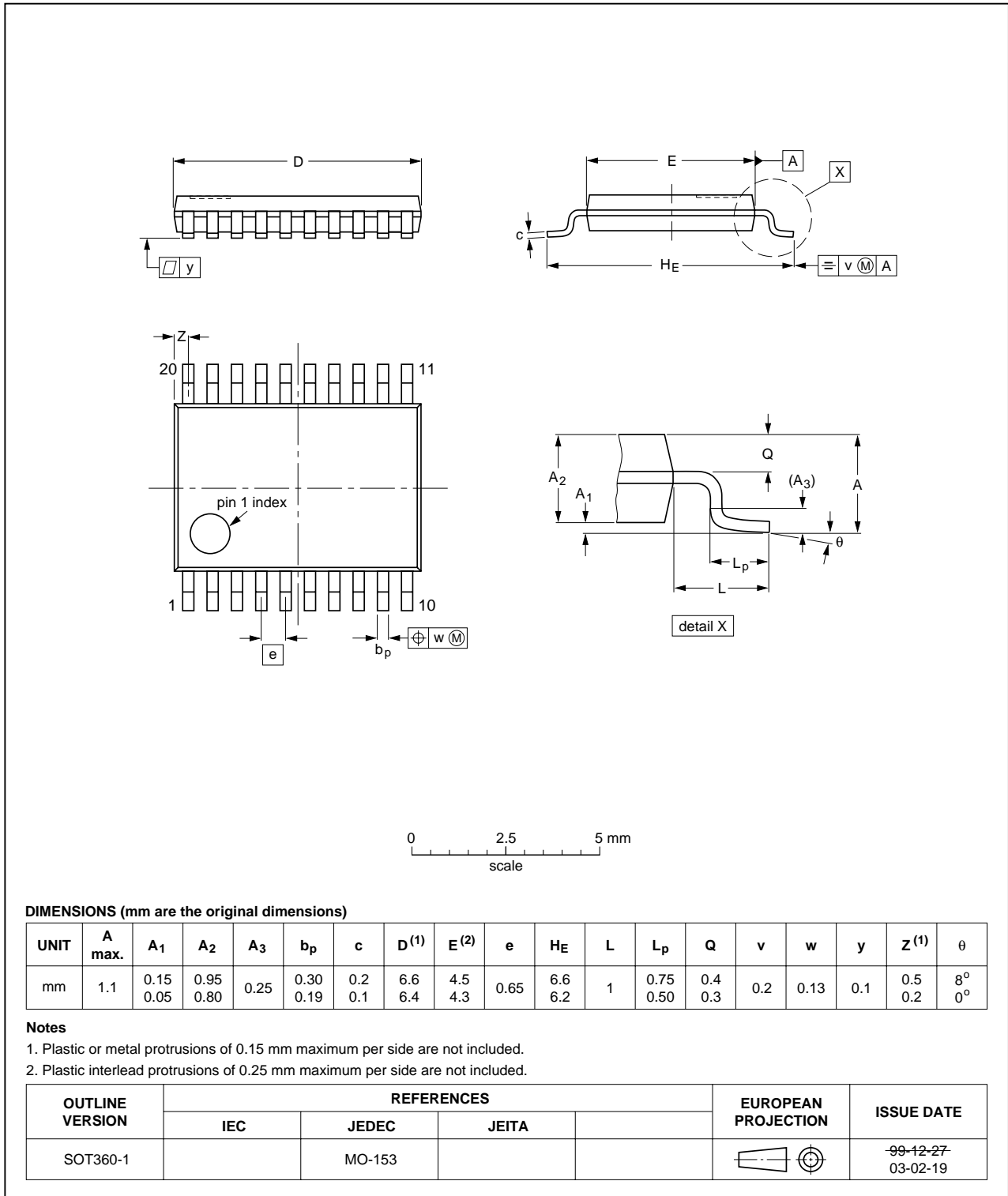


Fig 11. Package outline SOT360-1 (TSSOP20)

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

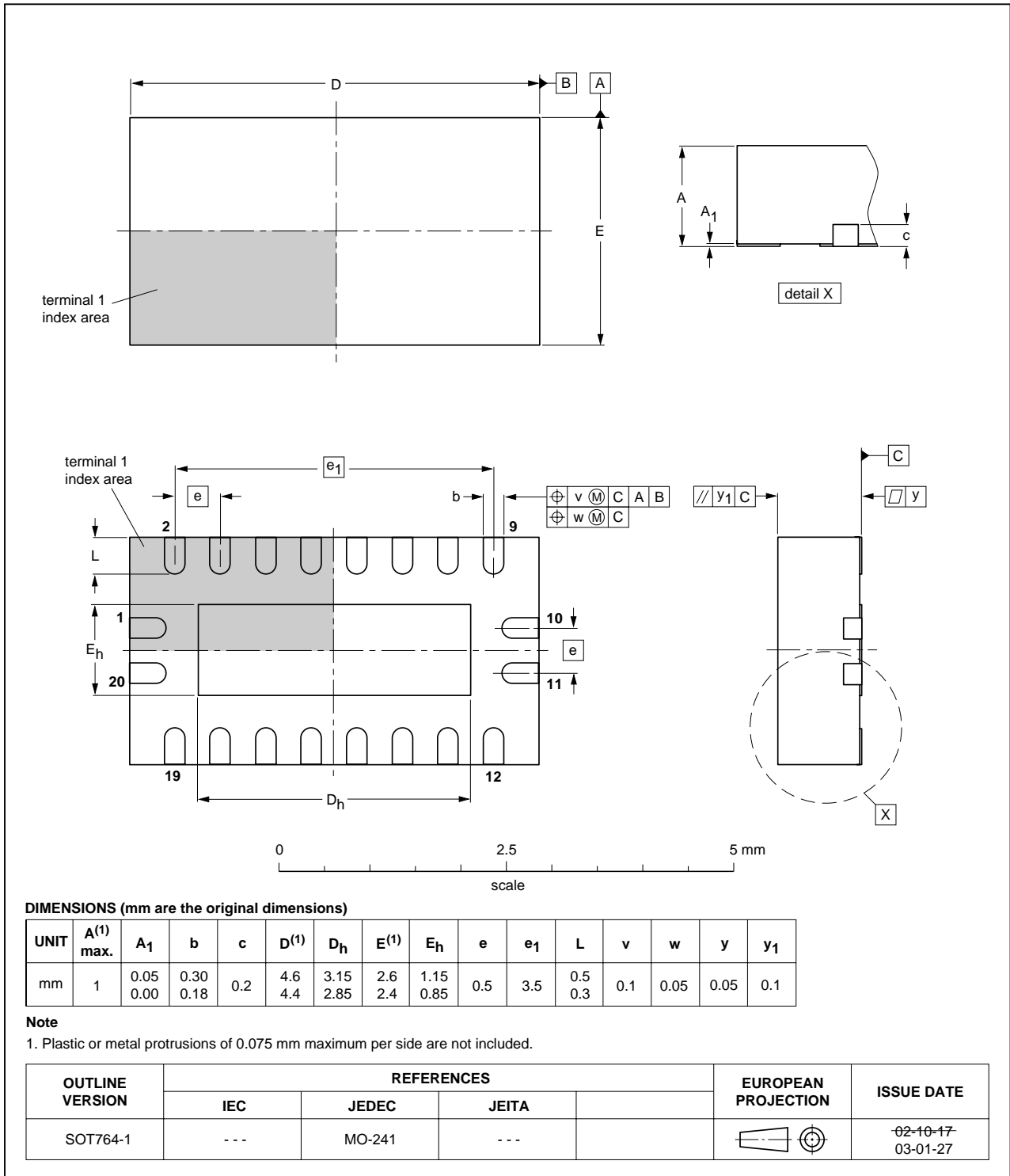


Fig 12. Package outline SOT764-1 (DHVQFN20)

## 14. Revision history

**Table 13: Revision history**

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
74HC_HCT245_3	20050131	Product data sheet	-	9397 750 14502	74HC_HCT245_CNV_2
Modifications:	<ul style="list-style-type: none"><li>• The format of this data sheet is redesigned to comply with the new presentation and information standard of Philips Semiconductors</li><li>• <a href="#">Section 4 “Ordering information”</a>, <a href="#">Section 6 “Pinning information”</a> and <a href="#">Section 13 “Package outline”</a> are modified to include the DHVQFN20 package.</li></ul>				
74HC_HCT245_CNV_2	19930930	Product specification	-	-	-

## 15. Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2]</sup> <sup>[3]</sup>	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

## 16. Definitions

**Short-form specification** — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

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For sales office addresses, send an email to: [sales.addresses@www.semiconductors.philips.com](mailto:sales.addresses@www.semiconductors.philips.com)

## 19. Contents

1	General description . . . . .	1
2	Features . . . . .	1
3	Quick reference data . . . . .	1
4	Ordering information . . . . .	2
5	Functional diagram . . . . .	3
6	Pinning information . . . . .	4
6.1	Pinning . . . . .	4
6.2	Pin description . . . . .	4
7	Functional description . . . . .	5
7.1	Function table . . . . .	5
8	Limiting values . . . . .	5
9	Recommended operating conditions . . . . .	6
10	Static characteristics . . . . .	6
11	Dynamic characteristics . . . . .	10
12	Waveforms . . . . .	13
13	Package outline . . . . .	15
14	Revision history . . . . .	20
15	Data sheet status . . . . .	21
16	Definitions . . . . .	21
17	Disclaimers . . . . .	21
18	Contact information . . . . .	21



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