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# 74HC245; 74HCT245

Octal bus transceiver; 3-state

Rev. 9 — 9 May 2025

Product data sheet

## 1. General description

The 74HC245; 74HCT245 is an 8-bit transceiver with 3-state outputs. The device features an output enable ( $\bar{OE}$ ) and send/receive (DIR) for direction control. A HIGH on  $\bar{OE}$  causes the outputs to assume a high-impedance OFF-state. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of  $V_{CC}$ .

## 2. Features and benefits

- Wide supply voltage range from 2.0 V to 6.0 V
- CMOS low power dissipation
- High noise immunity
- Octal bidirectional bus interface
- Non-inverting 3-state outputs
- Input levels:
  - For 74HC245: CMOS level
  - For 74HCT245: TTL level
- Complies with JEDEC standards
  - JESD8C (2.7 V to 3.6 V)
  - JESD7A (2.0 V to 6.0 V)
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 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		
<a href="#">74HC245D</a> <a href="#">74HCT245D</a>	-40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm		<a href="#">SOT163-1</a>
<a href="#">74HC245PW</a> <a href="#">74HCT245PW</a>	-40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm		<a href="#">SOT360-1</a>
<a href="#">74HC245BQ</a> <a href="#">74HCT245BQ</a>	-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		<a href="#">SOT764-1</a>
<a href="#">74HC245BZ</a> <a href="#">74HCT245BZ</a>	-40 °C to +125 °C	DHXQFN20	plastic, leadless dual in-line compatible thermal enhanced extreme thin quad flat package; no leads; 20 terminals; 0.4 mm pitch; body 2 mm × 3.2 mm × 0.48 mm		<a href="#">SOT8020-1</a>

**nexperia**

## 4. Functional diagram

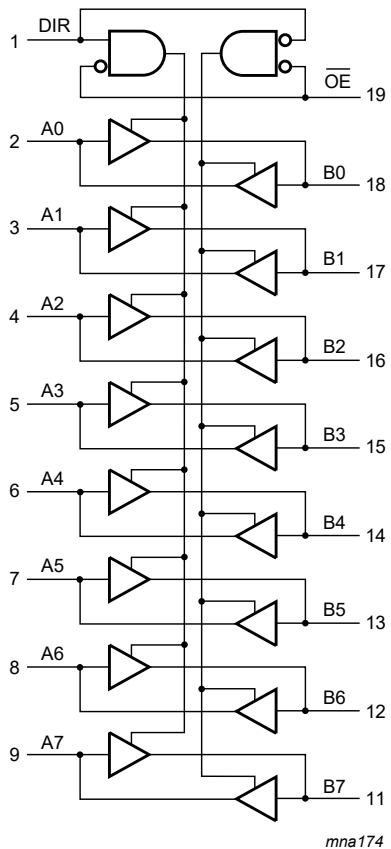


Fig. 1. Logic symbol

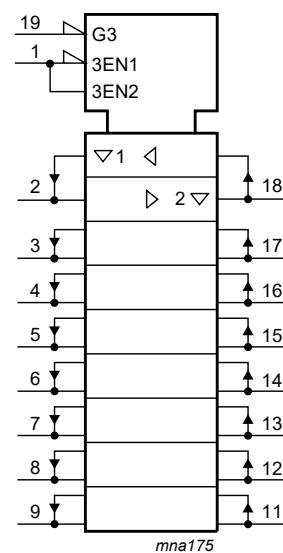
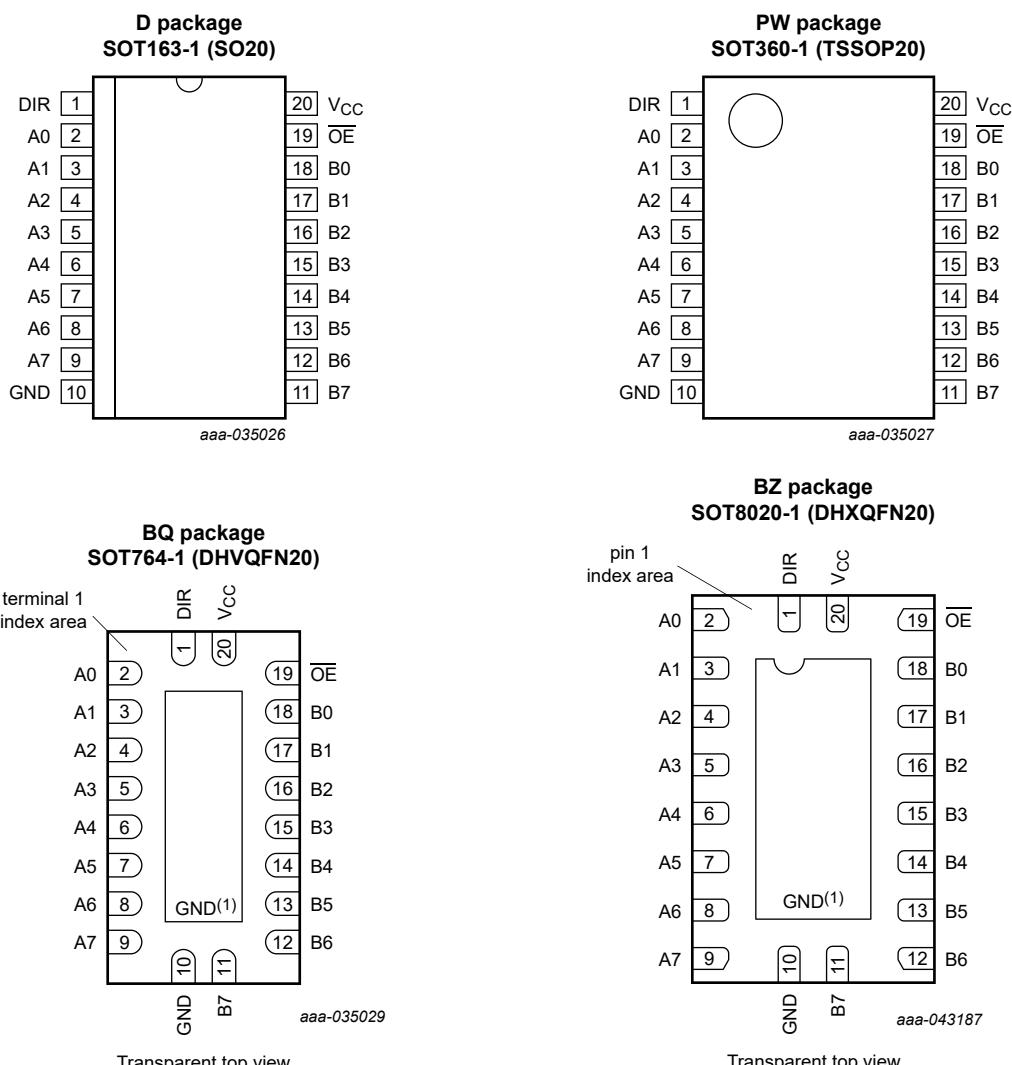


Fig. 2. IEC logic symbol

## 5. Pinning information

### 5.1. Pinning



### 5.2. Pin description

**Table 2. Pin description**

Symbol	Pin	Description
DIR	1	direction control
A0, A1, A2, A3, A4, A5, A6, A7	2, 3, 4, 5, 6, 7, 8, 9	data input/output
GND	10	ground (0 V)
B7, B6, B5, B4, B3, B2, B1, B0	11, 12, 13, 14, 15, 16, 17, 18	data input/output
OE	19	output enable input (active LOW)
V <sub>CC</sub>	20	supply voltage

## 6. Functional description

**Table 3. Function table**

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

Input		Input/output	
OE	DIR	An	Bn
L	L	A = B	input
L	H	input	B = A
H	X	Z	Z

## 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 <sub>CC</sub>	supply voltage		-0.5	+7	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < -0.5 V or V <sub>I</sub> > V <sub>CC</sub> + 0.5 V	-	±20	mA
I <sub>OK</sub>	output clamping current	V <sub>O</sub> < -0.5 V or V <sub>O</sub> > V <sub>CC</sub> + 0.5 V	-	±20	mA
I <sub>O</sub>	output current	-0.5 V < V <sub>O</sub> < V <sub>CC</sub> + 0.5 V	-	±35	mA
I <sub>CC</sub>	supply current		-	70	mA
I <sub>GND</sub>	ground current		-70	-	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = -40 °C to +125 °C			
		SOT163-1 (SO20) [1]	-	500	mW
		SOT360-1 (TSSOP20) [2]			
		SOT764-1 (DHVQFN20) [3]			
		SOT8020-1 (DHXQFN20)	-	250	mW

[1] For SOT163-1 (SO20) package: P<sub>tot</sub> derates linearly with 12.3 mW/K above 109 °C.

[2] For SOT360-1 (TSSOP20) package: P<sub>tot</sub> derates linearly with 10.0 mW/K above 100 °C.

[3] For SOT764-1 (DHVQFN20) package: P<sub>tot</sub> derates linearly with 12.9 mW/K above 111 °C.

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

Symbol	Parameter	Conditions	74HC245			74HCT245			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
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
T <sub>amb</sub>	ambient temperature		-40	+25	+125	-40	+25	+125	°C

## 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>74HC245</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
		I <sub>O</sub> = -7.8 mA; V <sub>CC</sub> = 6.0 V	5.48	5.81	-	5.34	-	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	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>O</sub> = 7.8 mA; V <sub>CC</sub> = 6.0 V	-	0.16	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
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> = 6.0 V; V <sub>O</sub> = V <sub>CC</sub> or GND	-	-	±0.5	-	±5.0	-	±10	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> = 6.0 V	-	-	8.0	-	80	-	160	µA
C <sub>I</sub>	input capacitance		-	3.5	-	-	-	-	-	pF
C <sub>I/O</sub>	input/output capacitance		-	10	-	-	-	-	-	pF

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
<b>74HCT245</b>										
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	2.0	1.6	-	2.0	-	2.0	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	1.2	0.8	-	0.8	-	0.8	V
$V_{OH}$	HIGH-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$								
		$I_O = -20 \mu\text{A}$	4.4	4.5	-	4.4	-	4.4	-	V
		$I_O = -6 \text{ mA}$	3.98	4.32	-	3.84	-	3.7	-	V
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}; V_{CC} = 4.5 \text{ V}$								
		$I_O = 20 \mu\text{A}$	-	0	0.1	-	0.1	-	0.1	V
		$I_O = 6.0 \text{ mA}$	-	0.15	0.26	-	0.33	-	0.4	V
$I_I$	input leakage current	$V_I = V_{CC} \text{ or GND}; V_{CC} = 5.5 \text{ V}$	-	-	$\pm 0.1$	-	$\pm 1.0$	-	$\pm 1.0$	$\mu\text{A}$
$I_{OZ}$	OFF-state output current	$V_I = V_{IH} \text{ or } V_{IL}; V_{CC} = 5.5 \text{ V}; V_O = V_{CC} \text{ or GND}$	-	-	$\pm 0.5$	-	$\pm 5.0$	-	$\pm 10$	$\mu\text{A}$
$I_{CC}$	supply current	$V_I = V_{CC} \text{ or GND}; V_{CC} = 5.5 \text{ V}; I_O = 0 \text{ A}$	-	-	8.0	-	80	-	160	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	$V_I = V_{CC} - 2.1 \text{ V}; \text{other inputs at } V_{CC} \text{ or GND}; V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}; I_O = 0 \text{ A}$								
		An or Bn inputs	-	40	144	-	180	-	196	$\mu\text{A}$
		$\overline{OE}$ input	-	150	540	-	675	-	735	$\mu\text{A}$
		DIR input	-	90	324	-	405	-	441	$\mu\text{A}$
$C_I$	input capacitance		-	3.5	-	-	-	-	-	pF
$C_{I/O}$	input/output capacitance		-	10	-	-	-	-	-	pF

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

*GND = 0 V; for test circuit see Fig. 5.*

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
<b>74HC245</b>										
$t_{pd}$	propagation delay	An to Bn or Bn to An; see Fig. 3 [1]								
		$V_{CC} = 2.0 \text{ V}$	-	25	90	-	115	-	135	ns
		$V_{CC} = 4.5 \text{ V}$	-	9	18	-	23	-	27	ns
		$V_{CC} = 5.0 \text{ V}; C_L = 15 \text{ pF}$	-	7	-	-	-	-	-	ns
		$V_{CC} = 6.0 \text{ V}$	-	7	15	-	20	-	23	ns
$t_{en}$	enable time	$\overline{OE}$ to An or Bn; see Fig. 4 [2]								
		$V_{CC} = 2.0 \text{ V}$	-	30	150	-	190	-	225	ns
		$V_{CC} = 4.5 \text{ V}$	-	11	30	-	38	-	45	ns
		$V_{CC} = 6.0 \text{ V}$	-	9	26	-	33	-	38	ns
$t_{dis}$	disable time	$\overline{OE}$ to An or Bn; see Fig. 4 [3]								
		$V_{CC} = 2.0 \text{ V}$	-	41	150	-	190	-	225	ns
		$V_{CC} = 4.5 \text{ V}$	-	15	30	-	38	-	45	ns
		$V_{CC} = 6.0 \text{ V}$	-	12	26	-	33	-	38	ns
$t_t$	transition time	see Fig. 3 [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
$C_{PD}$	power dissipation capacitance	per transceiver; $V_I = \text{GND to } V_{CC}$ [5]	-	30	-	-	-	-	-	pF
<b>74HCT245</b>										
$t_{pd}$	propagation delay	An to Bn or Bn to An; see Fig. 3 [1]								
		$V_{CC} = 4.5 \text{ V}$	-	12	22	-	28	-	33	ns
		$V_{CC} = 5.0 \text{ V}; C_L = 15 \text{ pF}$	-	10	-	-	-	-	-	ns
$t_{en}$	enable time	$\overline{OE}$ to An or Bn; see Fig. 4 [2]	-	16	30	-	38	-	45	ns
$t_{dis}$	disable time	$\overline{OE}$ to An or Bn; see Fig. 4 [3]	-	16	30	-	38	-	45	ns
$t_t$	transition time	$V_{CC} = 4.5 \text{ V};$ see Fig. 3 [4]	-	5	12	-	15	-	18	ns
$C_{PD}$	power dissipation capacitance	per transceiver; $V_I = \text{GND to } V_{CC} - 1.5 \text{ V}$ [5]	-	30	-	-	-	-	-	pF

[1]  $t_{pd}$  is the same as  $t_{PHL}$  and  $t_{PLH}$ .

[2]  $t_{en}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .

[3]  $t_{dis}$  is the same as  $t_{PHZ}$  and  $t_{PLZ}$ .

[4]  $t_t$  is the same as  $t_{TBL}$  and  $t_{TLB}$ .

[5]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ):  $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o)$  where:

$f_i$  = input frequency in MHz;  $f_o$  = output frequency in MHz;

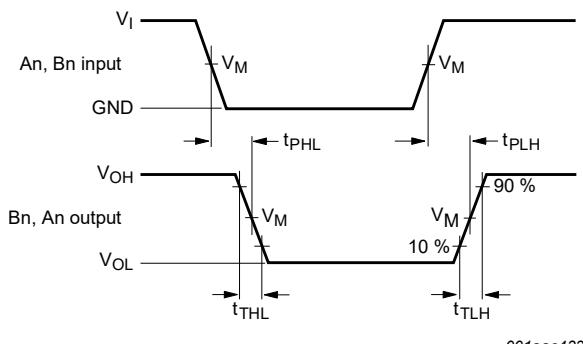
$C_L$  = output load capacitance in pF;

$V_{CC}$  = supply voltage in V;

$N$  = number of inputs switching;

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

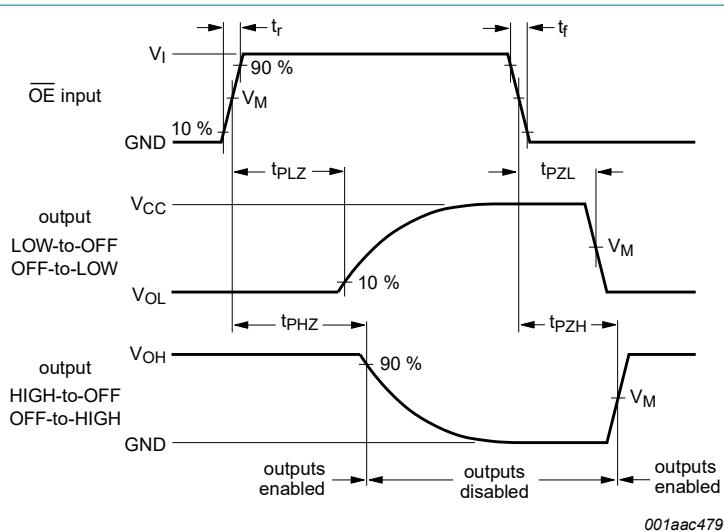
## 10.1. Waveforms and test circuit



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

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

**Fig. 3. Input (An, Bn) to output (Bn, An) propagation delays and output transition times**



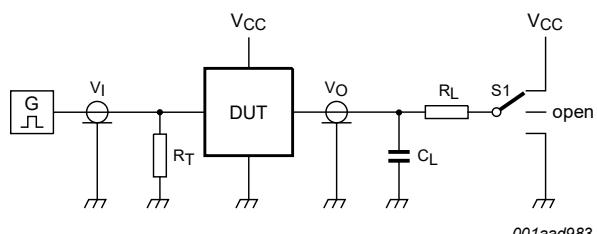
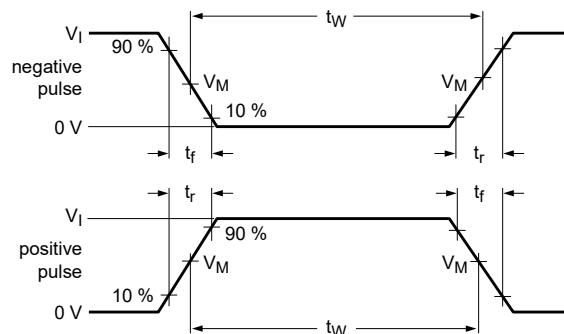
Measurement points are given in [Table 8](#).

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

**Fig. 4. 3-state output enable and disable times**

**Table 8. Measurement points**

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



001aad983

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. 5. Test circuit for measuring switching times**

**Table 9. Test data**

Type	Input		Load		S1 position		
	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PHL}, t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$
74HC245	$V_{CC}$	6 ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$
74HCT245	3 V	6 ns	15 pF, 50 pF	1 k $\Omega$	open	GND	$V_{CC}$

## 11. Package outline

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

SOT163-1

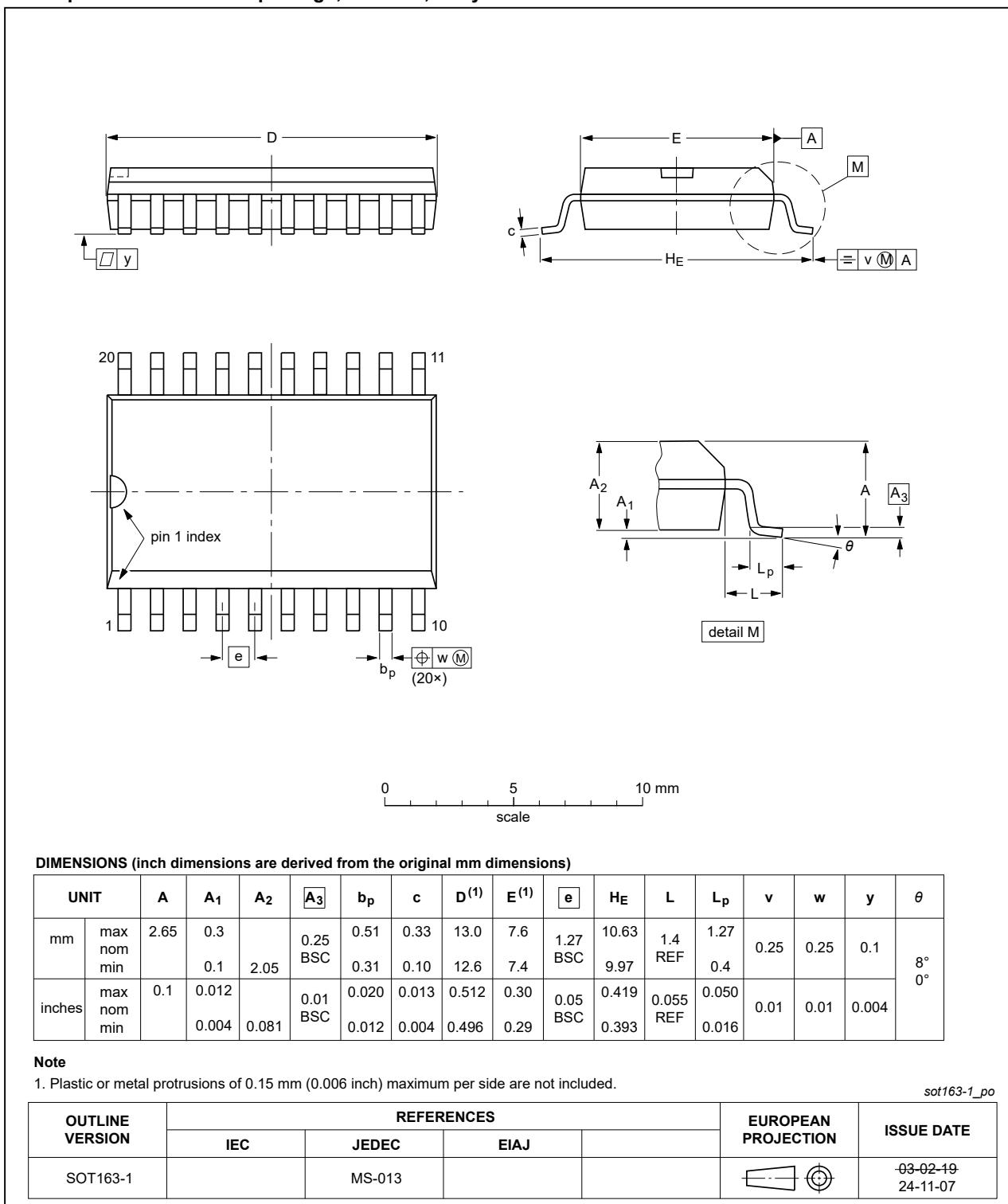


Fig. 6. Package outline SOT163-1 (SO20)

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

SOT360-1

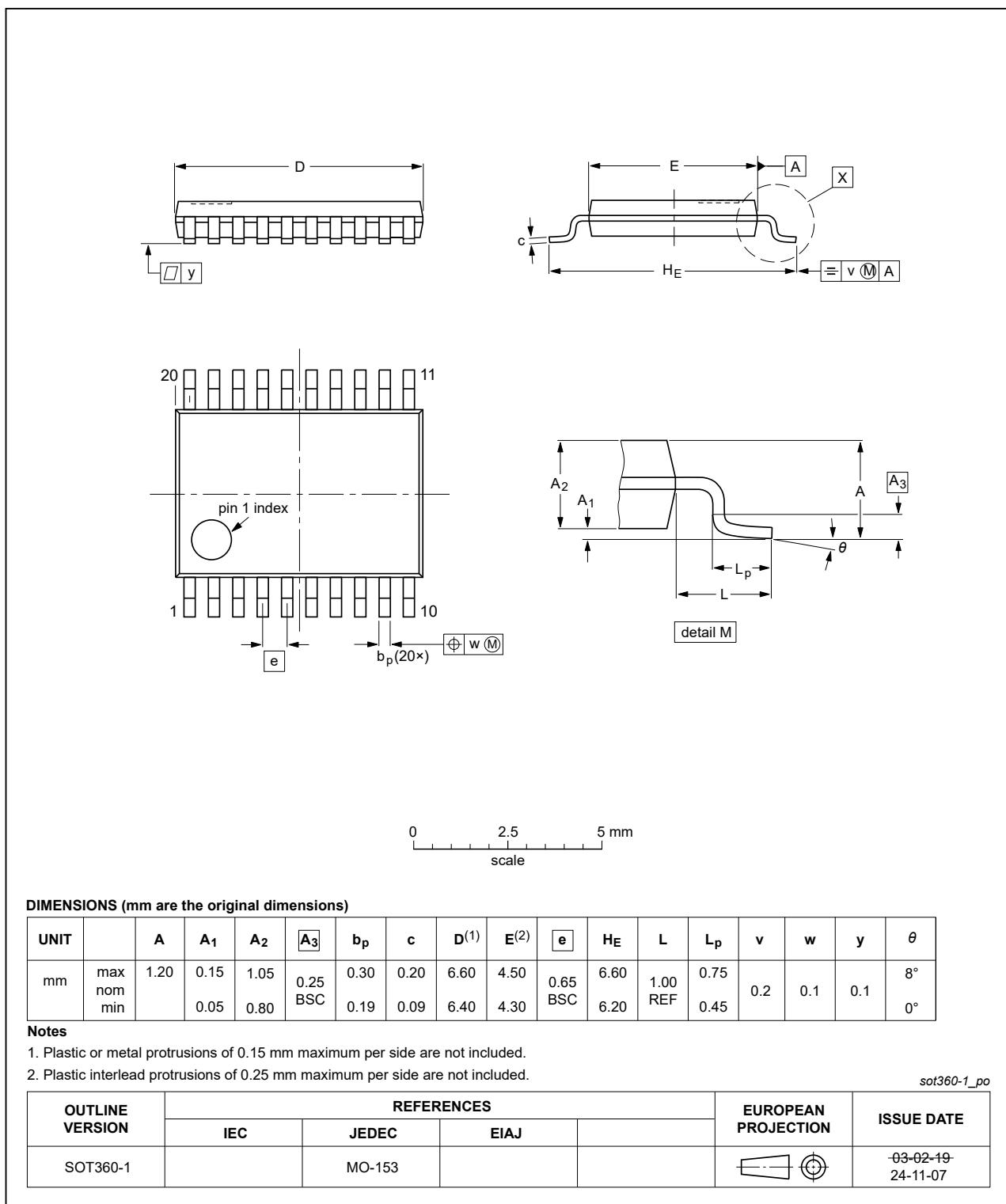


Fig. 7. Package outline SOT360-1 (TSSOP20)

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

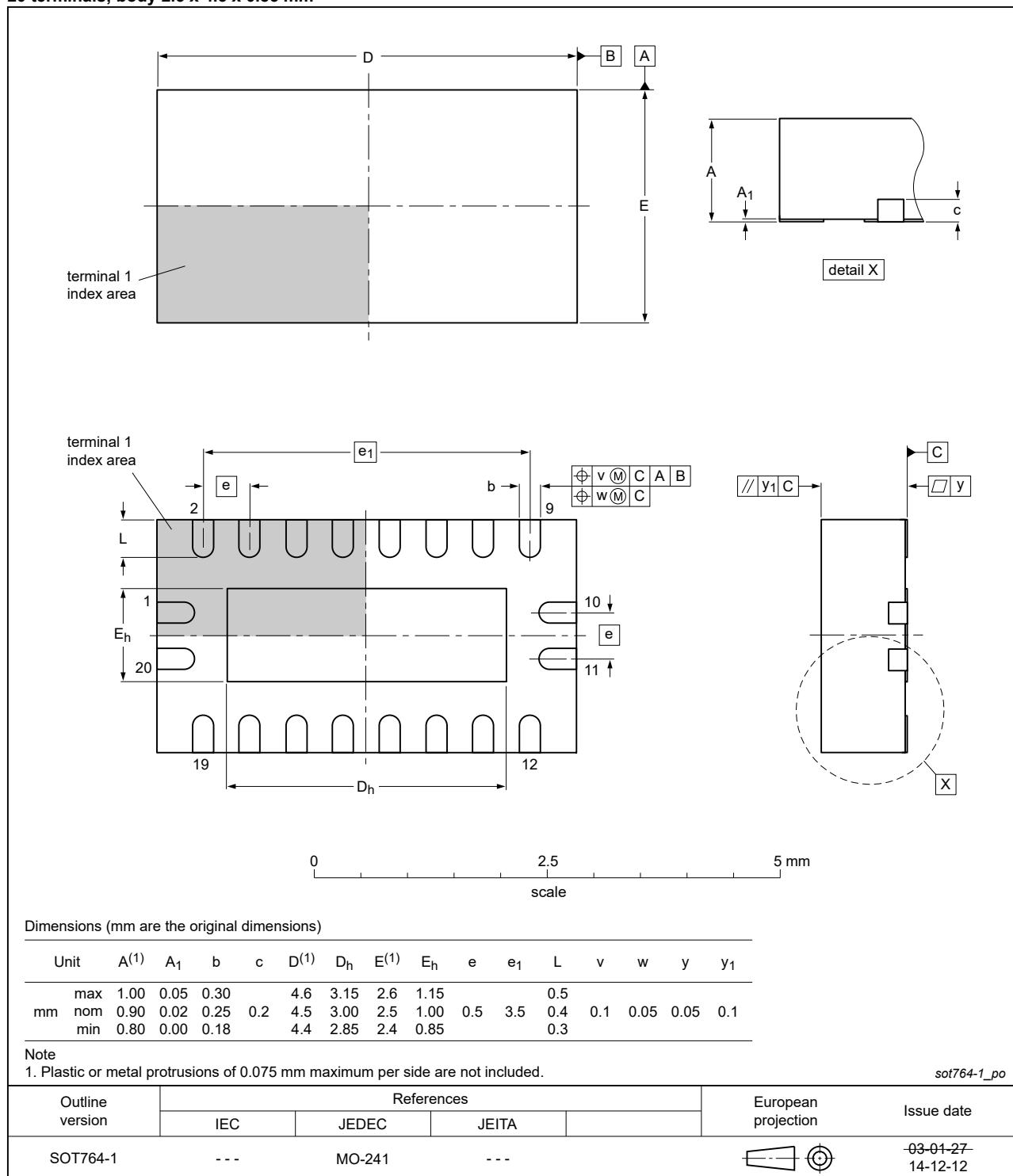


Fig. 8. Package outline SOT764-1 (DHVQFN20)

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

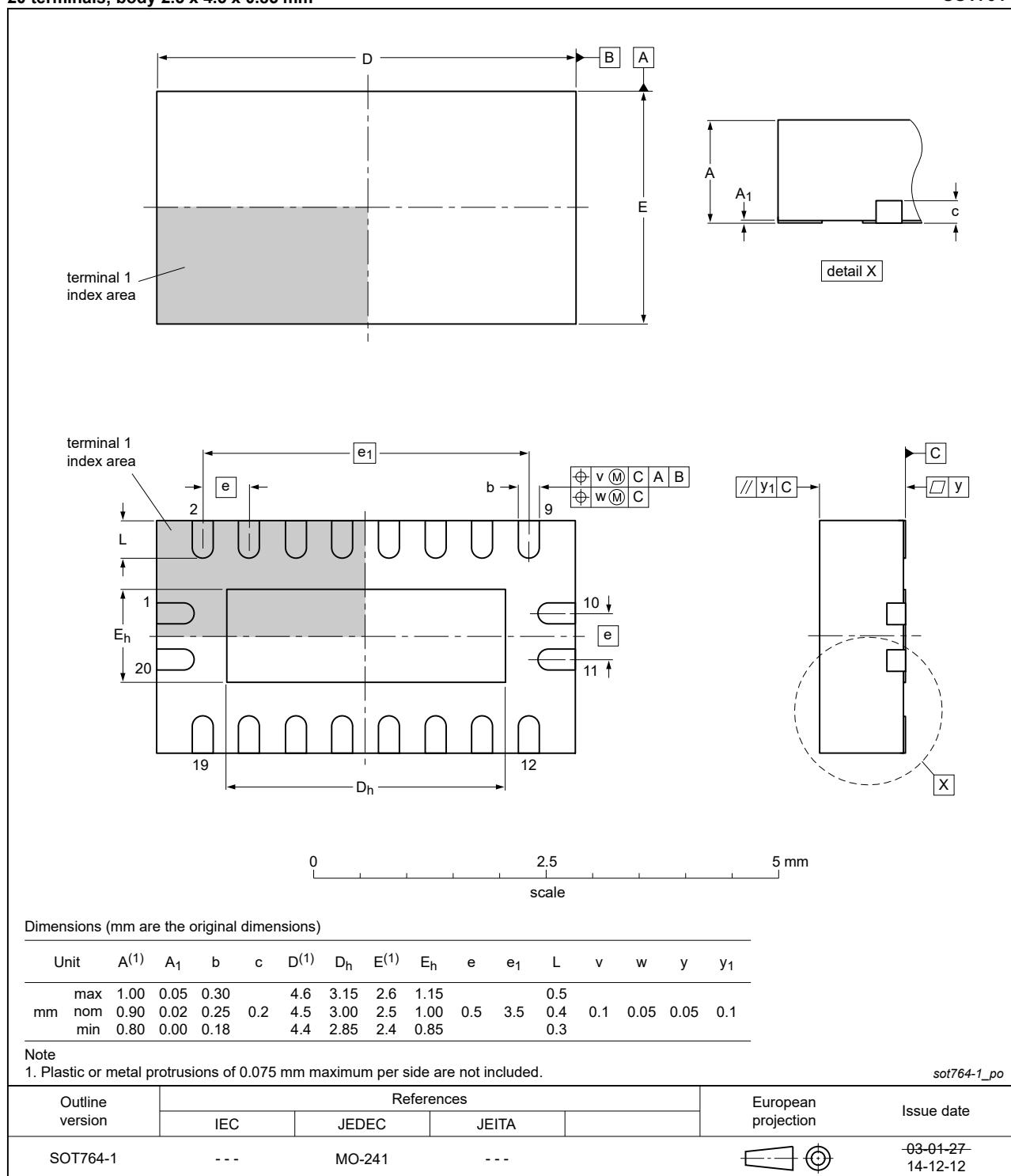


Fig. 9. Package outline SOT764-1 (DHVQFN20)

## 12. Abbreviations

**Table 10. Abbreviations**

Acronym	Description
ANSI	American National Standards Institute
CDM	Charged Device Model
CMOS	Complementary Metal Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
ESDA	ElectroStatic Discharge Association
HBM	Human Body Model
JEDEC	Joint Electron Device Engineering Council
TTL	Transistor-Transistor Logic

## 13. Revision history

**Table 11. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
74HC_HCT245 v.9	20250509	Product data sheet	-	74HC_HCT245 v.8
Modifications:				<ul style="list-style-type: none"> <li>Type numbers 74HC245BZ and 74HCT245BZ (SOT8020-1/DHXQFN20) added.</li> </ul>
74HC_HCT245 v.8	20241129	Product data sheet	-	74HC_HCT245 v.7
Modifications:				<ul style="list-style-type: none"> <li><a href="#">Fig. 6</a> and <a href="#">Fig. 7</a>: Aligned SO and TSSOP package outline drawings to JEDEC MS-013 and MO-153.</li> </ul>
74HC_HCT245 v.7	20240805	Product data sheet	-	74HC_HCT245 v.6
Modifications:				<ul style="list-style-type: none"> <li><a href="#">Section 2</a>: ESD specification updated according to the latest JEDEC standard.</li> </ul>
74HC_HCT245 v.6	20210906	Product data sheet	-	74HC_HCT245 v.5
Modifications:				<ul style="list-style-type: none"> <li>Types 74HC245DB and 74HCT245DB (SOT339-1) were removed.</li> <li><a href="#">Section 2</a> updated.</li> </ul>
74HC_HCT245 v.5	20200714	Product data sheet	-	74HC_HCT245 v.4
Modifications:				<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li><a href="#">Table 4</a>: Derating values for <math>P_{tot}</math> total power dissipation have been updated.</li> </ul>
74HC_HCT245 v.4	20160226	Product data sheet	-	74HC_HCT245 v.3
Modifications:				<ul style="list-style-type: none"> <li>Type numbers 74HC245N and 74HCT245N (SOT146-1) removed.</li> </ul>
74HC_HCT245 v.3	20050131	Product data sheet	-	74HC_HCT245_CNV v.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 3</a> "Ordering information", <a href="#">Section 5</a> "Pinning information" and <a href="#">Section 11</a> "Package outline" are modified to include the DHVQFN20 package.</li> </ul>
74HC_HCT245_CNV v.2	19930930	Product specification	-	-

## 14. Legal information

### 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".
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