74AHC244; 74AHCT244

Octal buffer/line driver; 3-state
Rev. 7 — 20 September 2023

Product data sheet

1. General description

The 74AHC244; 74AHCT244 is an 8-bit buffer/line driver with 3-state outputs. The device can be used as two 4-bit buffers or one 8-bit buffer. The device features two output enables ($1\overline{OE}$ and $2\overline{OE}$), each controlling four of the 3-state outputs. A HIGH on $n\overline{OE}$ causes the outputs to assume a high-impedance OFF-state. Inputs are overvoltage tolerant. This feature allows the use of these devices as translators in mixed voltage environments.

2. Features and benefits

- Wide supply voltage range from 2.0 V to 5.5 V
- · Balanced propagation delays
- All inputs have Schmitt-trigger action
- Overvoltage tolerant inputs to 5.5 V
- · High noise immunity
- CMOS low power dissipation
- Input levels:
 - For 74AHC244: CMOS level
 - For 74AHCT244: TTL level
- ESD protection:
 - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
 - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- · Latch-up performance exceeds 100 mA per JESD 78 Class II Level A
- Multiple package options
- Specified from -40 °C to +85 °C and from -40 °C to +125 °C

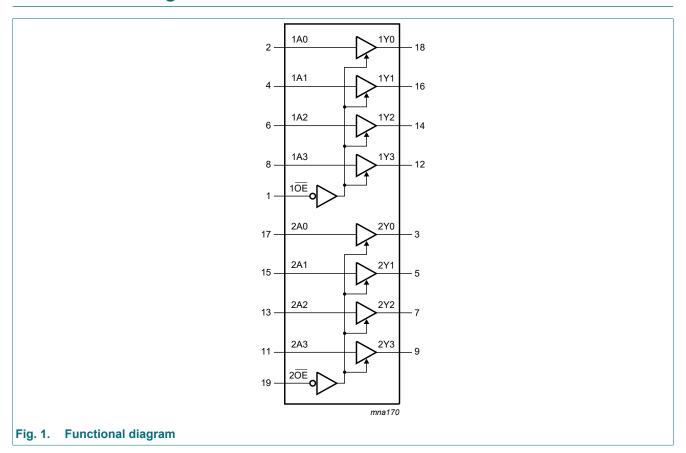
3. Ordering information

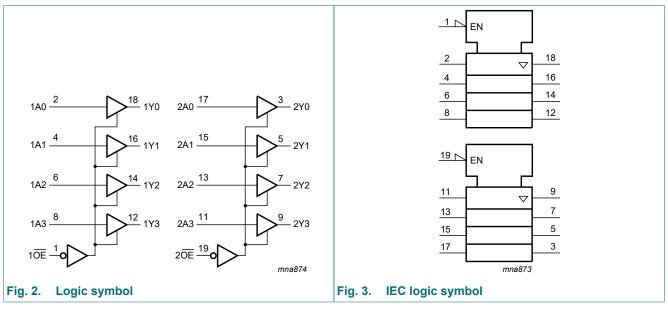
Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AHC244D 74AHCT244D	-40 °C to +125 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74AHC244PW 74AHCT244PW	-40 °C to +125 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
74AHC244BQ 74AHCT244BQ	-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



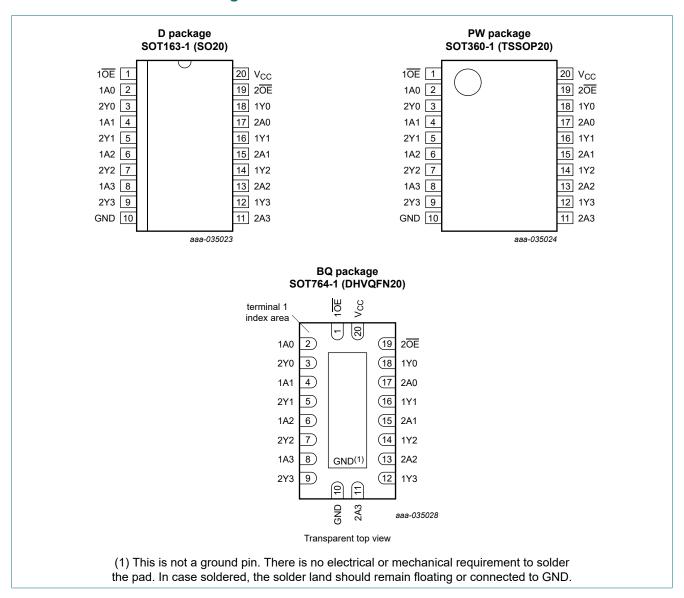
4. Functional diagram





5. Pinning information

5.1. Pinning



5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
1 OE , 2 OE	1, 19	output enable input (active LOW)
1A0, 1A1, 1A2, 1A3	2, 4, 6, 8	data input
2A0, 2A1, 2A2, 2A3	17, 15, 13, 11	data input
1Y0, 1Y1, 1Y2, 1Y3	18, 16, 14, 12	data output
2Y0, 2Y1, 2Y2, 2Y3	3, 5, 7, 9	data output
GND	10	ground (0 V)
Vcc	20	supply voltage

6. Functional description

Table 3. Function table

 $H = HIGH \text{ voltage level}; L = LOW \text{ voltage level}; X = don't care; Z = high-impedance OFF-state.}$

	Input	Output
nŌE	nAn	nYn
L	L	L
	Н	Н
Н	X	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 _{CC}	supply voltage			-0.5	+7.0	V
VI	input voltage			-0.5	+7.0	V
I _{IK}	input clamping current	V _I < -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]	-	±20	mA
Io	output current	$V_{O} = -0.5 \text{ V to } V_{CC} + 0.5 \text{ V}$		-	±25	mA
I _{CC}	supply current			-	75	mA
I _{GND}	ground current			-75	-	mA
T _{stg}	storage temperature			-65	+150	°C
P _{tot}	total power dissipation	T _{amb} = -40 °C to +125 °C	[2]	-	500	mW

^[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

For SOT360-1 (TSSOP20) package: Ptot derates linearly with 10.0 mW/K above 100 °C.

For SOT764-1 (DHVQFN20) package: Ptot derates linearly with 12.9 mW/K above 111 °C.

8. Recommended operating conditions

Table 5. Recommended operating conditions

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

Symbol	Parameter	Conditions	7	4AHC24	4	7.	4AHCT24	14	Unit
			Min	Тур	Max	Min	Тур	Max	
V _{CC}	supply voltage		2.0	5.0	5.5	4.5	5.0	5.5	V
VI	input voltage		0	-	5.5	0	-	5.5	V
Vo	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	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$	-	-	100	-	-	-	ns/V
	fall rate	$V_{CC} = 5.0 \text{ V} \pm 0.5 \text{ V}$	-	-	20	-	-	20	ns/V

^[2] For SOT163-1 (SO20) package: Ptot derates linearly with 12.3 mW/K above 109 °C.

9. Static characteristics

Table 6. Static characteristics

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

Symbol	Parameter	Conditions		25 °C		-40 °C to	o +85 °C	-40 °C to	+125 °C	Unit
	HIGH-level input voltage		Min	Тур	Max	Min	Max	Min	Max	
74AHC2	44								'	
V _{IH}		V _{CC} = 2.0 V	1.5	-	-	1.5	-	1.5	-	V
	input voltage	V _{CC} = 3.0 V	2.1	-	-	2.1	-	2.1	-	V
		V _{CC} = 5.5 V	3.85	-	-	3.85	-	3.85	-	V
V _{IL}	_	V _{CC} = 2.0 V	-	-	0.5	-	0.5	-	0.5	V
	input voltage	V _{CC} = 3.0 V	-	-	0.9	-	0.9	-	0.9	V
		V _{CC} = 5.5 V	-	-	1.65	-	1.65	-	1.65	V
V _{OH}		V _I = V _{IH} or V _{IL}								
	output voltage	I _O = -50 μA; V _{CC} = 2.0 V	1.9	2.0	-	1.9	-	1.9	-	V
		I _O = -50 μA; V _{CC} = 3.0 V	2.9	3.0	-	2.9	-	2.9	-	V
		I _O = -50 μA; V _{CC} = 4.5 V	4.4	4.5	-	4.4	-	4.4	-	V
		I_{O} = -4.0 mA; V_{CC} = 3.0 V	2.58	-	-	2.48	-	2.40	-	V
		I_{O} = -8.0 mA; V_{CC} = 4.5 V	3.94	-	-	3.8	-	3.70	-	V
V _{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL}								
	output voltage	I _O = 50 μA; V _{CC} = 2.0 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 50 μA; V _{CC} = 3.0 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 50 μA; V _{CC} = 4.5 V	-	0	0.1	-	0.1	-	0.1	V
		I _O = 4.0 mA; V _{CC} = 3.0 V	-	-	0.36	-	0.44	-	0.55	V
		I _O = 8.0 mA; V _{CC} = 4.5 V	-	-	0.36	-	0.44	-	0.55	V
l _{OZ}	_	$V_I = V_{IH}$ or V_{IL} ; $V_O = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	±0.25	-	±2.5	-	±10.0	μΑ
l _l		V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	-	-	0.1	-	1.0	-	2.0	μΑ
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	4.0	-	40	-	80	μΑ
C _I	input capacitance		-	3.0	10	-	10	-	10	pF
Co	output capacitance		-	4.0	-	-	-	-	-	pF

Symbol	Parameter	Conditions		25 °C		-40 °C to	-40 °C to +85 °C		+125 °C	Unit
			Min	Тур	Max	Min	Max	Min	Max	
74AHCT	244								<u>'</u>	
V _{IH}	HIGH-level input voltage	V _{CC} = 4.5 V to 5.5 V	2.0	-	-	2.0	-	2.0	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 4.5 V to 5.5 V	-	-	0.8	-	0.8	-	0.8	V
V _{OH}	HIGH-level	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5 \text{ V}$								
	output voltage	Ι _Ο = -50 μΑ	4.4	4.5	-	4.4	-	4.4	-	V
		I _O = -8.0 mA	3.94	-	-	3.8	-	3.70	-	V
V _{OL}	LOW-level	$V_I = V_{IH}$ or V_{IL} ; $V_{CC} = 4.5 \text{ V}$								
	output voltage	I _O = 50 μA	-	0	0.1	-	0.1	-	0.1	V
		I _O = 8.0 mA	-	-	0.36	-	0.44	-	0.55	V
l _{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL} ; $V_O = V_{CC}$ or GND; $V_{CC} = 5.5$ V	-	-	±0.25	-	±2.5	-	±10.0	μΑ
I _I	input leakage current	V _I = 5.5 V or GND; V _{CC} = 0 V to 5.5 V	-	-	0.1	-	1.0	-	2.0	μΑ
I _{CC}	supply current	$V_I = V_{CC}$ or GND; $I_O = 0$ A; $V_{CC} = 5.5 \text{ V}$	-	-	4.0	-	40	-	80	μΑ
ΔI _{CC}	additional supply current	per input pin; $V_I = V_{CC} - 2.1 \text{ V}; I_O = 0 \text{ A};$ other pins at V_{CC} or GND; $V_{CC} = 4.5 \text{ V}$ to 5.5 V	-	-	1.35	-	1.5	-	1.5	mA
C _I	input capacitance		-	3	10	-	10	-	10	pF
Co	output capacitance		-	4.0	-	-	-	-	-	pF

10. Dynamic characteristics

Table 7. Dynamic characteristics

GND = 0 V. For test circuit see Fig. 6.

Symbol	Parameter	Conditions		25 °C		-40 °C	to +85 °C	-40 °C t	o +125 °C	Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
74AHC2	44			'				'	'	
t _{pd}	propagation	nAn to nYn; see Fig. 4	2]							
	delay	V _{CC} = 3.0 V to 3.6 V								
		C _L = 15 pF	-	5.0	8.4	1.0	10.0	1.0	10.5	ns
		C _L = 50 pF	-	7.0	11.9	1.0	13.5	1.0	15.0	ns
		V _{CC} = 4.5 V to 5.5 V								
		C _L = 15 pF	-	3.4	5.5	1.0	6.5	1.0	7.0	ns
		C _L = 50 pF		5.0	7.5	1.0	8.5	1.0	9.5	ns
t _{en}	enable time	nOE to nYn; see Fig. 5	2]							
		V _{CC} = 3.0 V to 3.6 V								
		C _L = 15 pF	-	6.5	10.6	1.0	12.5	1.0	13.5	ns
		C _L = 50 pF	-	7.5	14.1	1.0	16.0	1.0	18.0	ns
		V _{CC} = 4.5 V to 5.5 V								
		C _L = 15 pF	-	4.0	7.3	1.0	8.5	1.0	9.5	ns
		C _L = 50 pF	-	5.5	9.3	1.0	10.5	1.0	12.0	ns
t _{dis}	disable time	nOE to nYn; see Fig. 5	2]							
		V _{CC} = 3.0 V to 3.6 V								
		C _L = 15 pF	-	5.5	9.7	1.0	11.0	1.0	12.5	ns
		C _L = 50 pF	-	10.0	14.0	1.0	16.0	1.0	17.5	ns
		V _{CC} = 4.5 V to 5.5 V								
		C _L = 15 pF	-	4.8	7.2	1.0	8.5	1.0	9.0	ns
		C _L = 50 pF	-	7.0	9.2	1.0	10.5	1.0	11.5	ns
C _{PD}	power dissipation capacitance	C_L = 50 pF; f_i = 1 MHz; [V _I = GND to V _{CC}]	3] -	10	-	-	-	-	-	pF

Symbol	Parameter	Conditions		25 °C		-40 °C	to +85 °C	-40 °C t	o +125 °C	Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
74AHCT	244		•					,	,	
t _{pd}	propagation	nAn to nYn; see Fig. 4 [2]								
	delay	V _{CC} = 4.5 V to 5.5 V								
		C _L = 15 pF	-	3.5	7.4	1.0	8.5	1.0	9.5	ns
		C _L = 50 pF	-	5.0	8.4	1.0	9.5	1.0	10.5	ns
t _{en}	enable time	nOE to nYn; see Fig. 5								
		V _{CC} = 4.5 V to 5.5 V								
		C _L = 15 pF	-	3.5	10.4	1.0	12.0	1.0	13.0	ns
		C _L = 50 pF	-	5.5	11.4	1.0	13.0	1.0	14.5	ns
t _{dis}	disable time	nOE to nYn; see Fig. 5 [2]								
		V _{CC} = 4.5 V to 5.5 V								
		C _L = 15 pF	-	5.0	9.4	1.0	10.0	1.0	12.0	ns
		C _L = 50 pF	-	7.0	11.4	1.0	13.0	1.0	14.5	ns
C _{PD}	power dissipation capacitance	C_L = 50 pF; f_i = 1 MHz; [3] V_I = GND to V_{CC}	-	12	-	-	-	-	-	pF

Typical values are measured at nominal supply voltage (V_{CC} = 3.3 V and V_{CC} = 5.0 V).

 t_{en} is the same as t_{PZL} and t_{PZH} .

 t_{dis} is the same as t_{PLZ} and t_{PHZ} .

[3] C_{PD} is used to determine the dynamic power dissipation P_D (µW). $P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o)$ where:

f_i = input frequency in MHz;

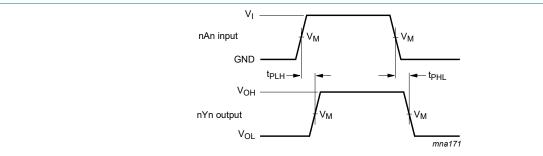
f_o = output frequency in MHz;

C_L = output load capacitance in pF;

V_{CC} = supply voltage in Volts.

t_{pd} is the same as t_{PLH} and t_{PHL}.

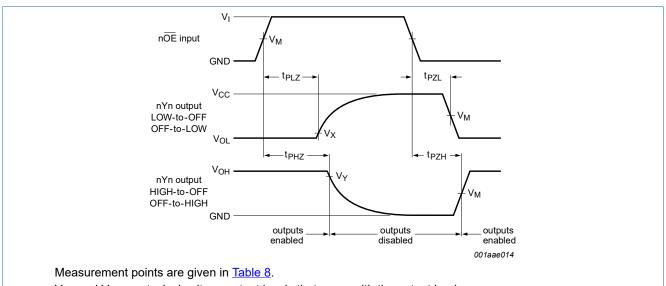
10.1. Waveforms and test circuit



Measurement points are given in <u>Table 8</u>.

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

Fig. 4. Propagation delay input (nAn) to output (nYn)

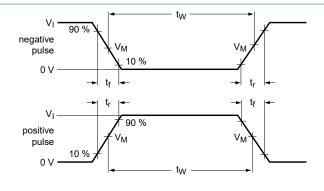


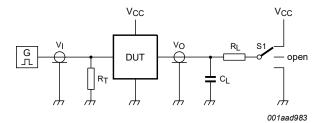
 V_{OL} and V_{OH} are typical voltage output levels that occur with the output load.

Fig. 5. Enable and disable times

Table 8. Measurement points

Туре	Input	Output		
	V _M	V _M	V _X	V _Y
74AHC244	0.5V _{CC}	0.5V _{CC}	V _{OL} + 0.3 V	V _{OH} - 0.3 V
74AHCT244	1.5 V	0.5V _{CC}	V _{OL} + 0.3 V	V _{OH} - 0.3 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. 6. Test circuit for measuring switching times

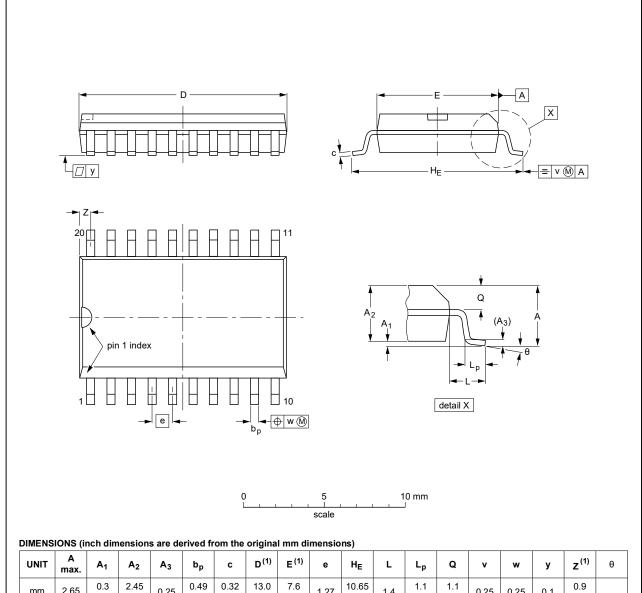
Table 9. Test data

Туре	Input		Load		S1 position			
	V _I	t _r , t _f	CL	R_L	t _{PHL} , t _{PLH}	t _{PZH} , t _{PHZ}	t_{PZL}, t_{PLZ}	
74AHC244	V _{CC}	3.0 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}	
74AHCT244	3.0 V	3.0 ns	15 pF, 50 pF	1 kΩ	open	GND	V _{CC}	

11. Package outline

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

SOT163-1



UNIT	A max.	A ₁	A ₂	A ₃	bp	С	D ⁽¹⁾	E ⁽¹⁾	е	HE	L	Lp	Q	v	w	у	z ⁽¹⁾	θ
mm	2.65	0.3 0.1	2.45 2.25	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°
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	0°

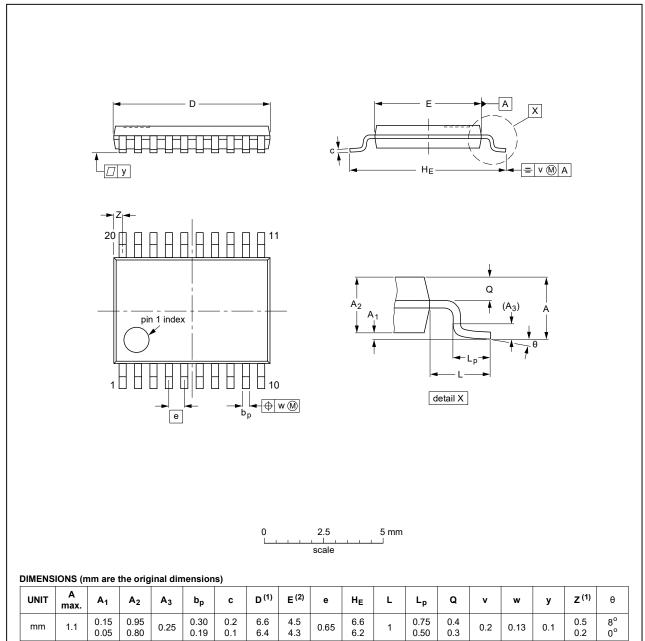
1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

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

Fig. 7. Package outline SOT163-1 (SO20)

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

SOT360-1



Notes

- 1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
- 2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN	ISSUE DATE
	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT360-1		MO-153				99-12-27 03-02-19

Fig. 8. Package outline SOT360-1 (TSSOP20)

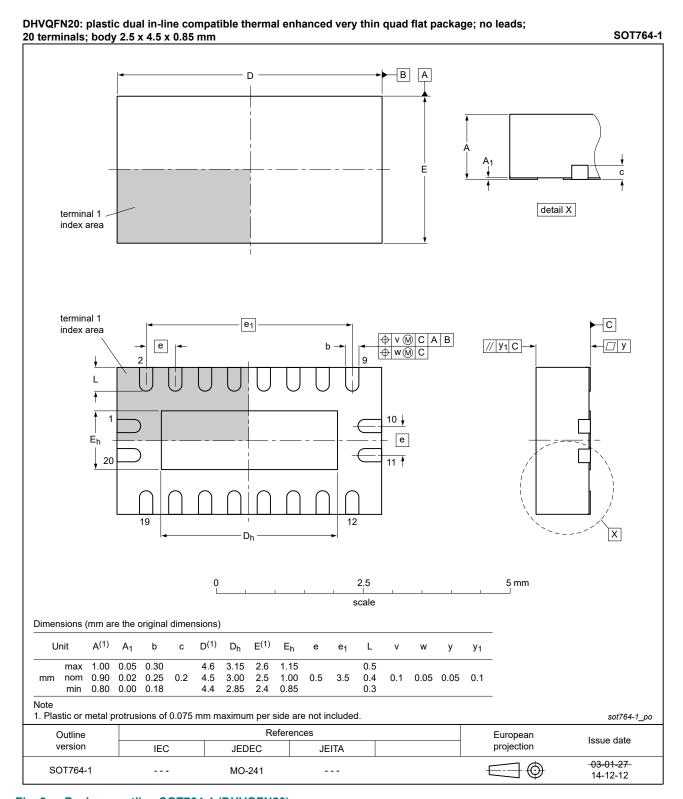


Fig. 9. Package outline SOT764-1 (DHVQFN20)

12. Abbreviations

Table 10. Abbreviations

Acronym	Description
CDM	Charge Device Model
CMOS	Complementary Metal Oxide Semiconductor
DUT	Device Under Test
ESD	ElectroStatic Discharge
НВМ	Human Body Model
TTL	Transistor-Transistor Logic

13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AHC_AHCT244 v.7	20230920	Product data sheet	-	74AHC_AHCT244 v.6
Modifications:	Section 2: E	SD specification updated	according to the la	atest JEDEC standard.
74AHC_AHCT244 v.6	20200702	Product data sheet	-	74AHC_AHCT244 v.5
Modifications:	guidelines of Legal texts Section 1 a Table 4: De Table 6: Co	 The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. Section 1 and Section 2 updated. Table 4: Derating values for P_{tot} total power dissipation have been updated. Table 6: Conditions for I_{OZ} corrected. Package outline drawing of SOT764-1 (Fig. 9) updated. 		
74AHC_AHCT244 v.5	20071220	Product data sheet	-	74AHC_AHCT244 v.4
Modifications:	guidelines of Legal texts Section 3: [Section 7: of Sect	of this data sheet has been of NXP Semiconductors. have been adapted to the DHVQFN20 package added for learating values added for outline drawing added for	new company nar ed. DHVQFN20 packa	ge.
74AHC_AHCT244 v.4	20060210	Product data sheet	-	74AHC_AHCT244 v.3
74AHC_AHCT244 v.3	19990928	Product specification	-	74AHC_AHCT244 v.2
74AHC_AHCT244 v.2	19990224	Product specification	-	74AHC_AHCT244 v.1
-				

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.

- Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
- 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 https://www.nexperia.com.

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