

# 74ALVC244

Octal buffer/line driver; 3-state

Rev. 5 — 30 April 2021

Product data sheet

## 1. General description

The 74ALVC244 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.

This device is fully specified for partial power down applications using  $I_{OFF}$ . The  $I_{OFF}$  circuitry disables the output, preventing the potentially damaging backflow current through the device when it is powered down.

## 2. Features and benefits

- Wide supply voltage range from 1.65 V to 3.6 V
- 3.6 V tolerant inputs/outputs
- CMOS low power consumption
- Direct interface with TTL levels (2.7 V to 3.6 V)
- Power-down mode
- Latch-up performance exceeds 250 mA
- Complies with JEDEC standards:
  - JESD8-7 (1.65 V to 1.95 V)
  - JESD8-5 (2.3 V to 2.7 V)
  - JESD8B (2.7 V to 3.6 V)
- 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

## 3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74ALVC244D	-40 °C to +85 °C	SO20	plastic small outline package; 20 leads; body width 7.5 mm	SOT163-1
74ALVC244PW	-40 °C to +85 °C	TSSOP20	plastic thin shrink small outline package; 20 leads; body width 4.4 mm	SOT360-1
74ALVC244BQ	-40 °C to +85 °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

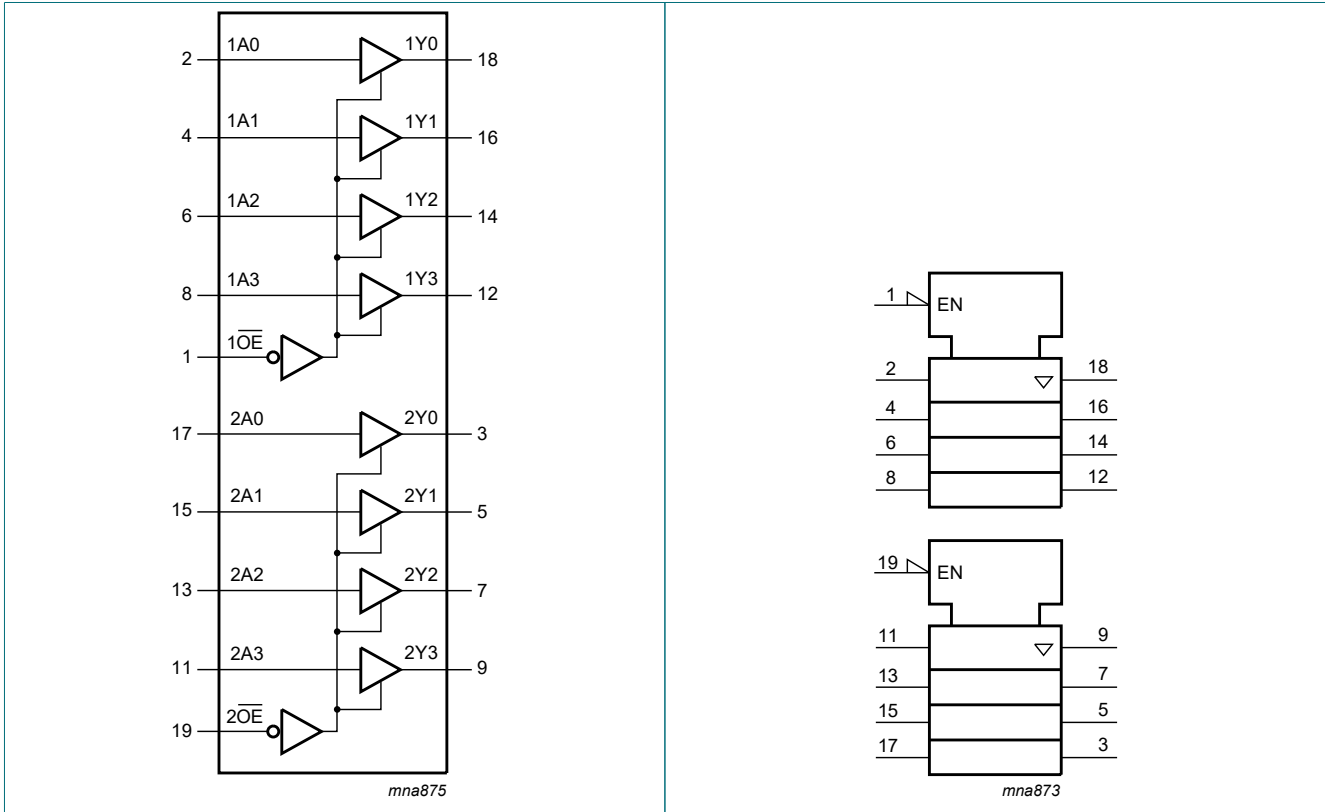


Fig. 1. Functional diagram

Fig. 2. IEC logic symbol

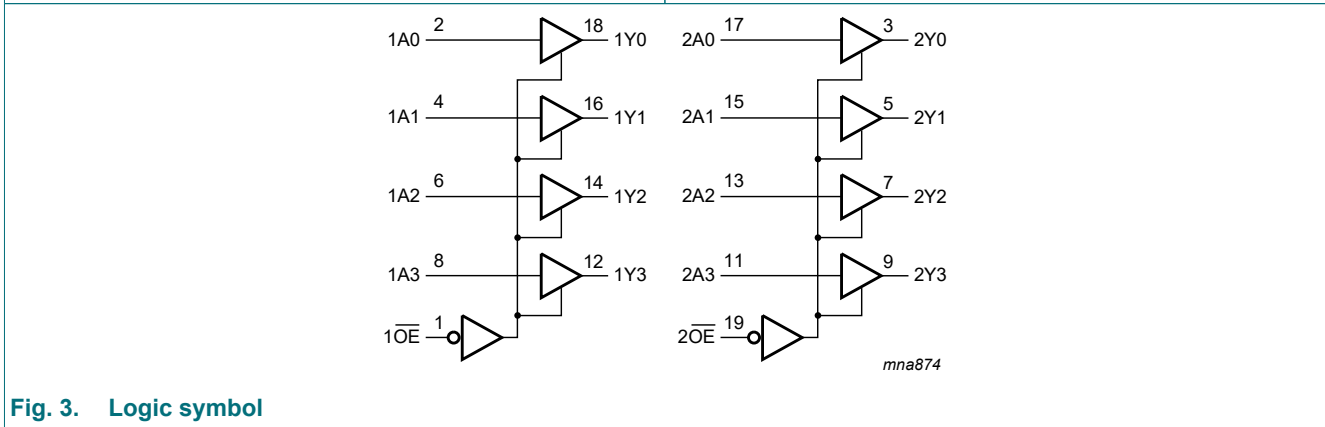


Fig. 3. Logic symbol

## 5. Pinning information

### 5.1. Pinning

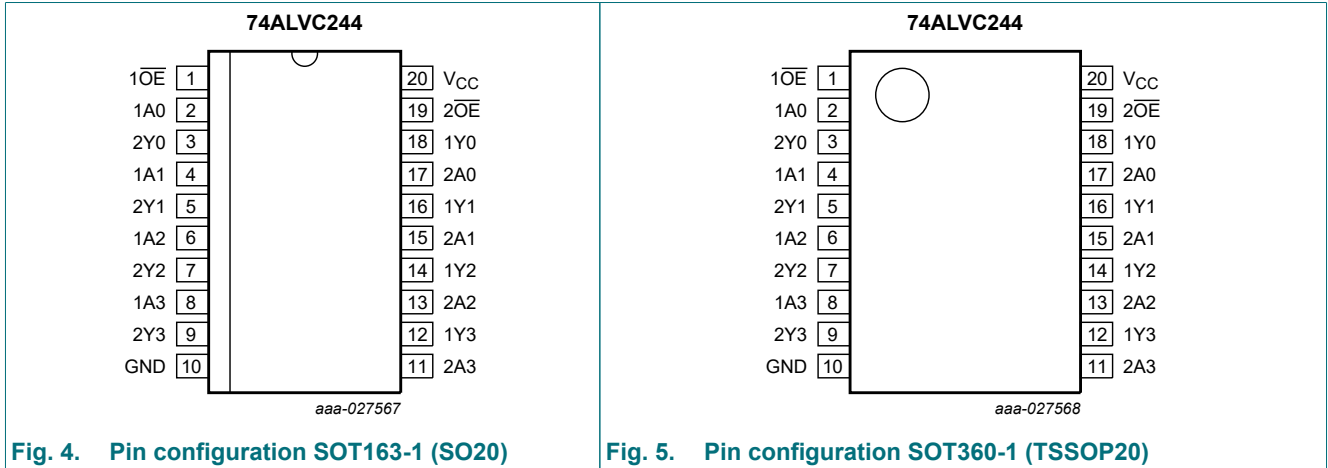


Fig. 4. Pin configuration SOT163-1 (SO20)

Fig. 5. Pin configuration SOT360-1 (TSSOP20)

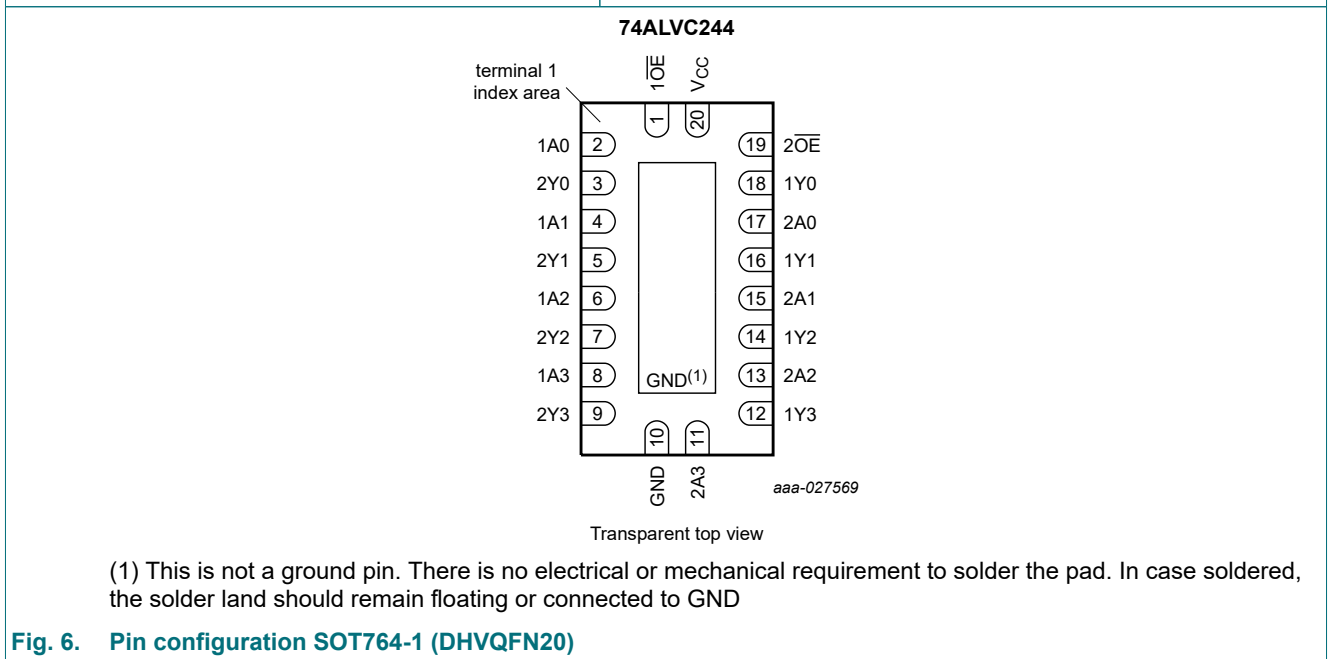


Fig. 6. Pin configuration SOT764-1 (DHVQFN20)

### 5.2. Pin description

Table 2. Pin description

Symbol	Pin	Description
1OE, 2OE	1, 19	output enable input (active LOW)
1A0, 1A1, 1A2, 1A3	2, 4, 6, 8	data input
2Y0, 2Y1, 2Y2, 2Y3	3, 5, 7, 9	bus output
GND	10	ground (0 V)
2A0, 2A1, 2A2, 2A3	17, 15, 13, 11	data input
1Y0, 1Y1, 1Y2, 1Y3	18, 16, 14, 12	bus output
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		Output
nOE	nAn	nYn
L	L	L
L	H	H
H	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	+4.6	V	
$V_I$	input voltage	[1]	-0.5	+4.6	V	
$V_O$	output voltage	output HIGH or LOW state	[1]	-0.5	$V_{CC} + 0.5$	V
		output OFF-state		-0.5	+4.6	V
		power-down mode; $V_{CC} = 0$ V		-0.5	+4.6	V
$I_{IK}$	input clamping current	$V_I < 0$ V	-	-50	mA	
$I_{OK}$	output clamping current	$V_O > V_{CC}$ or $V_O < 0$ V	-	$\pm 50$	mA	
$I_O$	output current	$V_O = 0$ V to $V_{CC}$	-	$\pm 50$	mA	
$I_{CC}$	supply current		-	100	mA	
$I_{GND}$	ground current		-100	-	mA	
$T_{stg}$	storage temperature		-65	+150	°C	
$P_{tot}$	total power dissipation	$T_{amb} = -40$ °C to +85 °C	-	500	mW	

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

## 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		1.65	3.6	V
$V_I$	input voltage		0	3.6	V
$V_O$	output voltage	$V_{CC} = 1.65$ to $3.6$ V; output HIGH or LOW state	0	$V_{CC}$	V
		$V_{CC} = 1.65$ to $3.6$ V; output OFF-state	0	3.6	V
		$V_{CC} = 0$ V; power-down mode	0	3.6	V
$T_{amb}$	ambient temperature	in free air	-40	+85	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 1.65$ V to $2.7$ V	0	20	ns/V
		$V_{CC} = 2.7$ V to $3.6$ V	0	10	ns/V

## 9. Static characteristics

**Table 6. Static characteristics**

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

Symbol	Parameter	Conditions	T <sub>amb</sub> = -40 °C to +85 °C			Unit
			Min	Typ [1]	Max	
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	0.65 × V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7	-	-	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 1.65 V to 1.95 V	-	-	0.35 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	V
		V <sub>CC</sub> = 2.7 V to 3.6 V	-	-	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> = 1.65 V to 3.6 V	V <sub>CC</sub> - 0.2	-	-	V
		I <sub>O</sub> = -6 mA; V <sub>CC</sub> = 1.65 V	1.25	-	-	V
		I <sub>O</sub> = -12 mA; V <sub>CC</sub> = 2.3 V	1.8	-	-	V
		I <sub>O</sub> = -18 mA; V <sub>CC</sub> = 2.3 V	1.7	-	-	V
		I <sub>O</sub> = -12 mA; V <sub>CC</sub> = 2.7 V	2.2	-	-	V
		I <sub>O</sub> = -18 mA; V <sub>CC</sub> = 3.0 V	2.4	-	-	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> = 1.65 V to 3.6 V	-	-	0.2	V
		I <sub>O</sub> = 6 mA; V <sub>CC</sub> = 1.65 V	-	-	0.3	V
		I <sub>O</sub> = 12 mA; V <sub>CC</sub> = 2.3 V	-	-	0.4	V
		I <sub>O</sub> = 18 mA; V <sub>CC</sub> = 2.3 V	-	-	0.6	V
		I <sub>O</sub> = 12 mA; V <sub>CC</sub> = 2.7 V	-	-	0.4	V
		I <sub>O</sub> = 18 mA; V <sub>CC</sub> = 3.0 V	-	-	0.4	V
I <sub>I</sub>	input leakage current	V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = 3.6 V or GND	-	±0.1	±5	μA
		V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = 3.6 V or GND	-	0.1	±10	μA
I <sub>OFF</sub>	power-off leakage current	V <sub>CC</sub> = 0 V; V <sub>I</sub> or V <sub>O</sub> = 3.6 V	-	±0.1	±10	μA
I <sub>CC</sub>	supply current	V <sub>CC</sub> = 3.6 V; V <sub>I</sub> = V <sub>CC</sub> or GND; I <sub>O</sub> = 0 A	-	0.2	20	μA
ΔI <sub>CC</sub>	additional supply current	per input pin; V <sub>CC</sub> = 3.0 V to 3.6 V; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A	-	5	750	μA
C <sub>I</sub>	input capacitance		-	3.5	-	pF

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

## 10. Dynamic characteristics

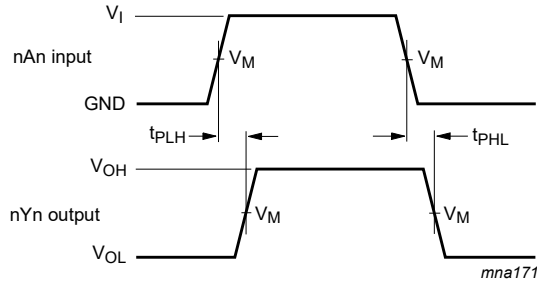
**Table 7. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V). For test circuit, see Fig. 9.

Symbol	Parameter	Conditions	T <sub>amb</sub> = -40 °C to +85 °C			Unit
			Min	Typ [1]	Max	
t <sub>pd</sub>	propagation delay	nAn to nYn; see Fig. 7 [2]				
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.0	2.7	4.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.0	2.0	3.1	ns
		V <sub>CC</sub> = 2.7 V	1.0	2.3	3.1	ns
t <sub>en</sub>	enable time	n $\overline{O}E$ to nYn; see Fig. 8 [3]				
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.0	3.4	6.9	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.0	2.6	5.4	ns
		V <sub>CC</sub> = 2.7 V	1.0	3.2	5.3	ns
t <sub>dis</sub>	disable time	n $\overline{O}E$ to nYn; see Fig. 8 [4]				
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.0	3.8	5.9	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.0	2.2	4.1	ns
		V <sub>CC</sub> = 2.7 V	1.0	3.0	4.4	ns
C <sub>PD</sub>	power dissipation capacitance	per buffer; V <sub>I</sub> = GND to V <sub>CC</sub> ; V <sub>CC</sub> = 3.3 V [5]	-	20	-	pF

- [1] Typical values are measured at T<sub>amb</sub> = 25 °C  
 Typical values for V<sub>CC</sub> = 1.65 V to 1.95 V are measured at V<sub>CC</sub> = 1.8 V  
 Typical values for V<sub>CC</sub> = 2.3 V to 2.7 V are measured at V<sub>CC</sub> = 2.5 V  
 Typical values for V<sub>CC</sub> = 3.0 V to 3.6 V are measured at V<sub>CC</sub> = 3.3 V
- [2] t<sub>pd</sub> is the same as t<sub>PHL</sub> and t<sub>PLH</sub>.
- [3] t<sub>en</sub> is the same as t<sub>PZH</sub> and t<sub>PZL</sub>.
- [4] t<sub>dis</sub> is the same as t<sub>PHZ</sub> and t<sub>PLZ</sub>.
- [5] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$  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 Volt  
 N = number of inputs switching  
 $\Sigma(C_L \times V_{CC}^2 \times f_o)$  = sum of the outputs

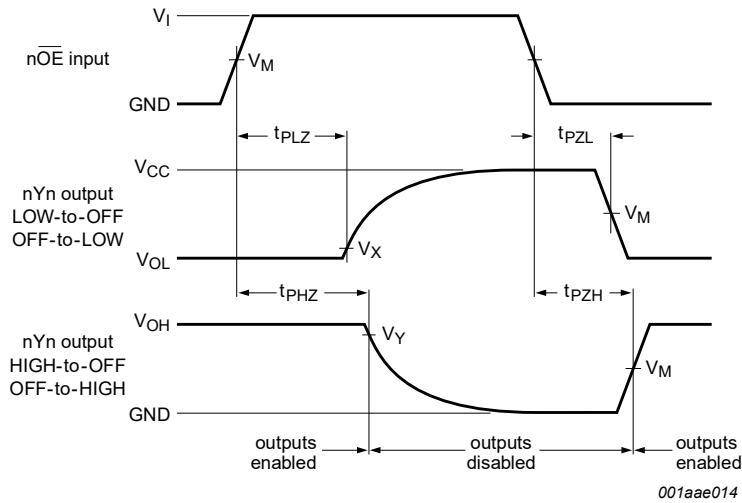
10.1. Waveforms and test circuit



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. Inputs nAn to output nYn propagation delays



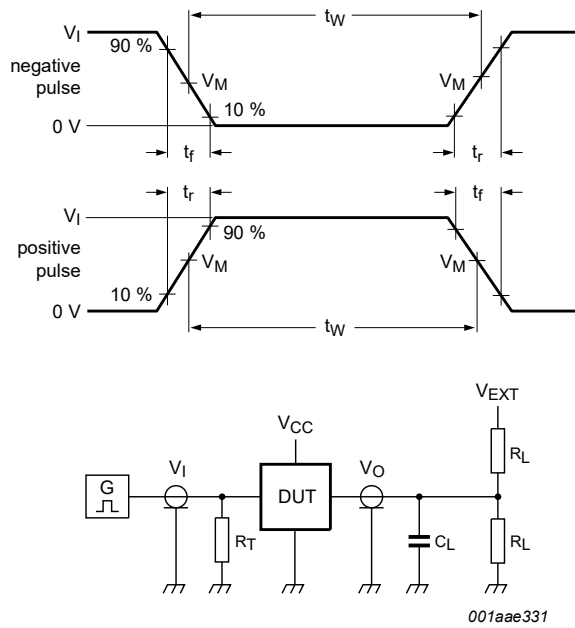
Measurement points are given in [Table 8](#).

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

Fig. 8. 3-state enable and disable times

Table 8. Measurement points

Supply voltage	Input		Output		
$V_{CC}$	$V_I$	$V_M$	$V_M$	$V_X$	$V_Y$
1.65 V to 1.95 V	$V_{CC}$	$0.5 \times V_{CC}$	$0.5V_{CC}$	$V_{OL} + 0.15 \text{ V}$	$V_{OH} - 0.15 \text{ V}$
2.3 V to 2.7 V	$V_{CC}$	$0.5 \times V_{CC}$	$0.5V_{CC}$	$V_{OL} + 0.15 \text{ V}$	$V_{OH} - 0.15 \text{ V}$
2.7 V	2.7 V	1.5 V	1.5 V	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$
3.0 V to 3.6 V	2.7 V	1.5 V	1.5 V	$V_{OL} + 0.3 \text{ V}$	$V_{OH} - 0.3 \text{ V}$



Test data is given in [Table 9](#).

Definitions for test circuit:

$R_L$  = Load resistance.

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

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

$V_{EXT}$  = External voltage for measuring switching times.

**Fig. 9. Test circuit for measuring switching times**

**Table 9. Test data**

Supply voltage	Input		Load		$V_{EXT}$		
	$V_I$	$t_r, t_f$	$C_L$	$R_L$	$t_{PLH}, t_{PHL}$	$t_{PLZ}, t_{PZL}$	$t_{PHZ}, t_{PZH}$
1.65 V to 1.95 V	$V_{CC}$	$\leq 2.0$ ns	30 pF	1 k $\Omega$	open	$2 \times V_{CC}$	GND
2.3 V to 2.7 V	$V_{CC}$	$\leq 2.0$ ns	30 pF	500 $\Omega$	open	$2 \times V_{CC}$	GND
2.7 V	2.7 V	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	6 V	GND
3.0 V to 3.6 V	2.7 V	$\leq 2.5$ ns	50 pF	500 $\Omega$	open	6 V	GND



11. Package outline

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

SOT163-1

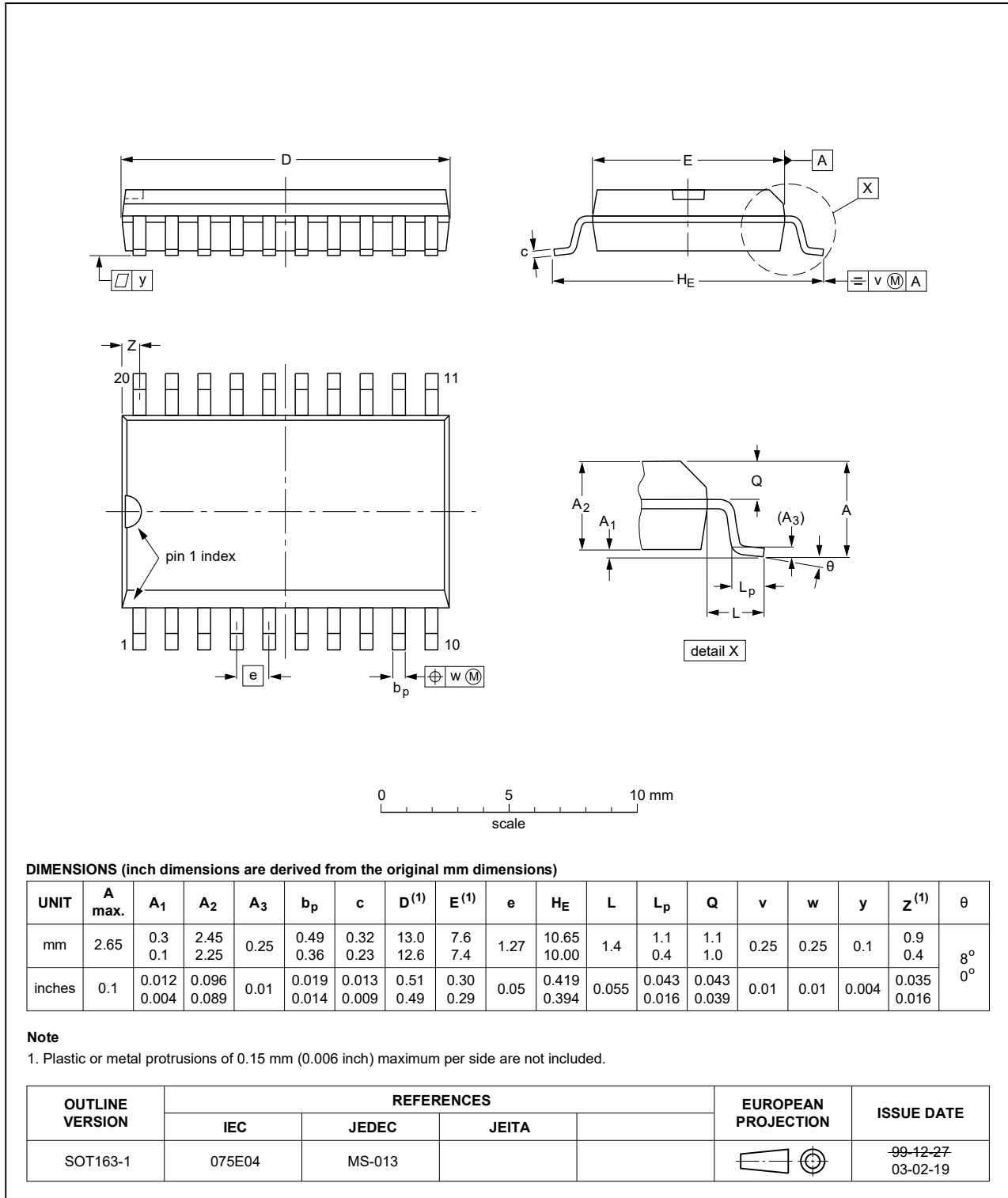


Fig. 10. Package outline SOT163-1 (SO20)

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

SOT360-1

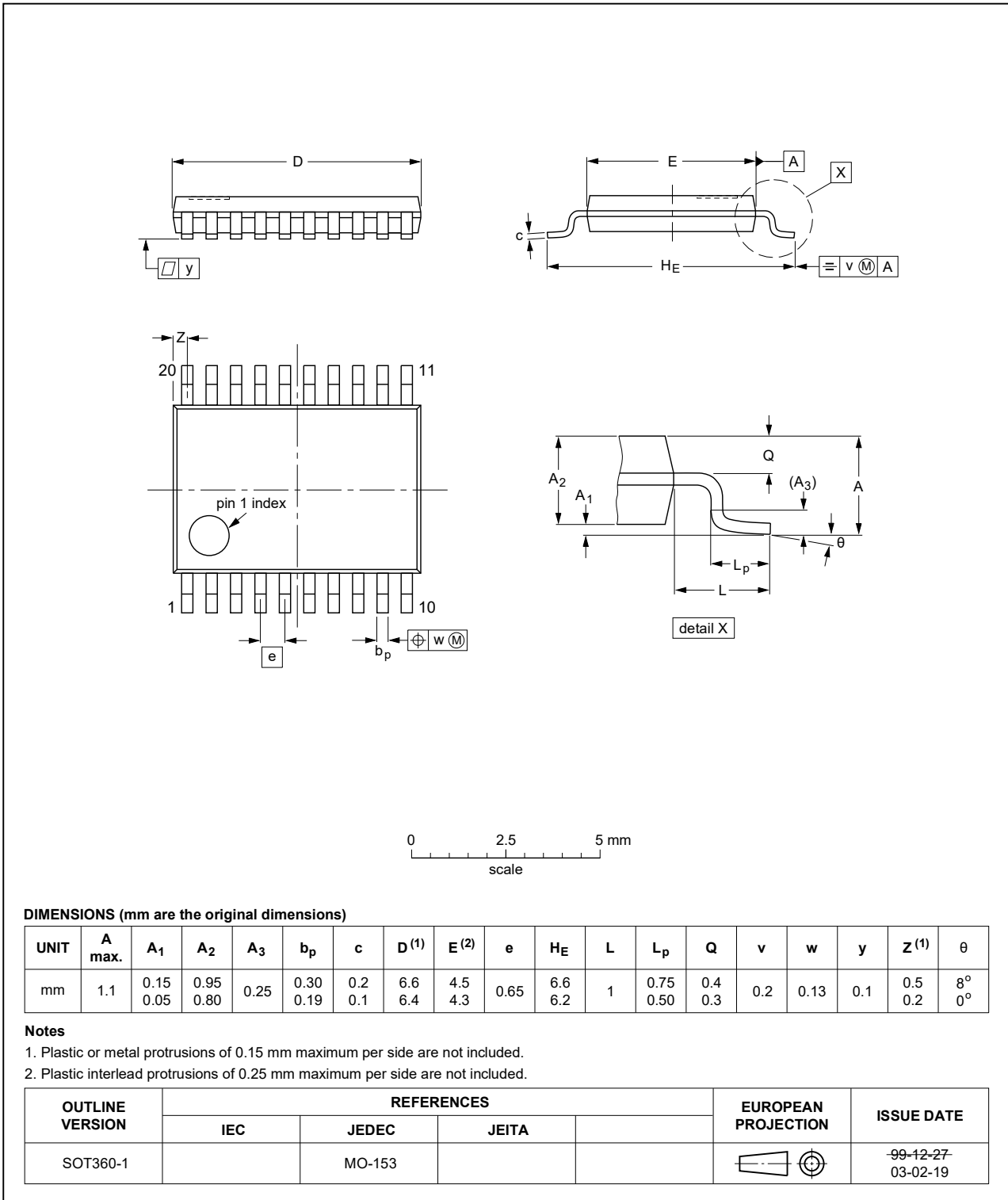


Fig. 11. Package outline SOT360-1 (TSSOP20)

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

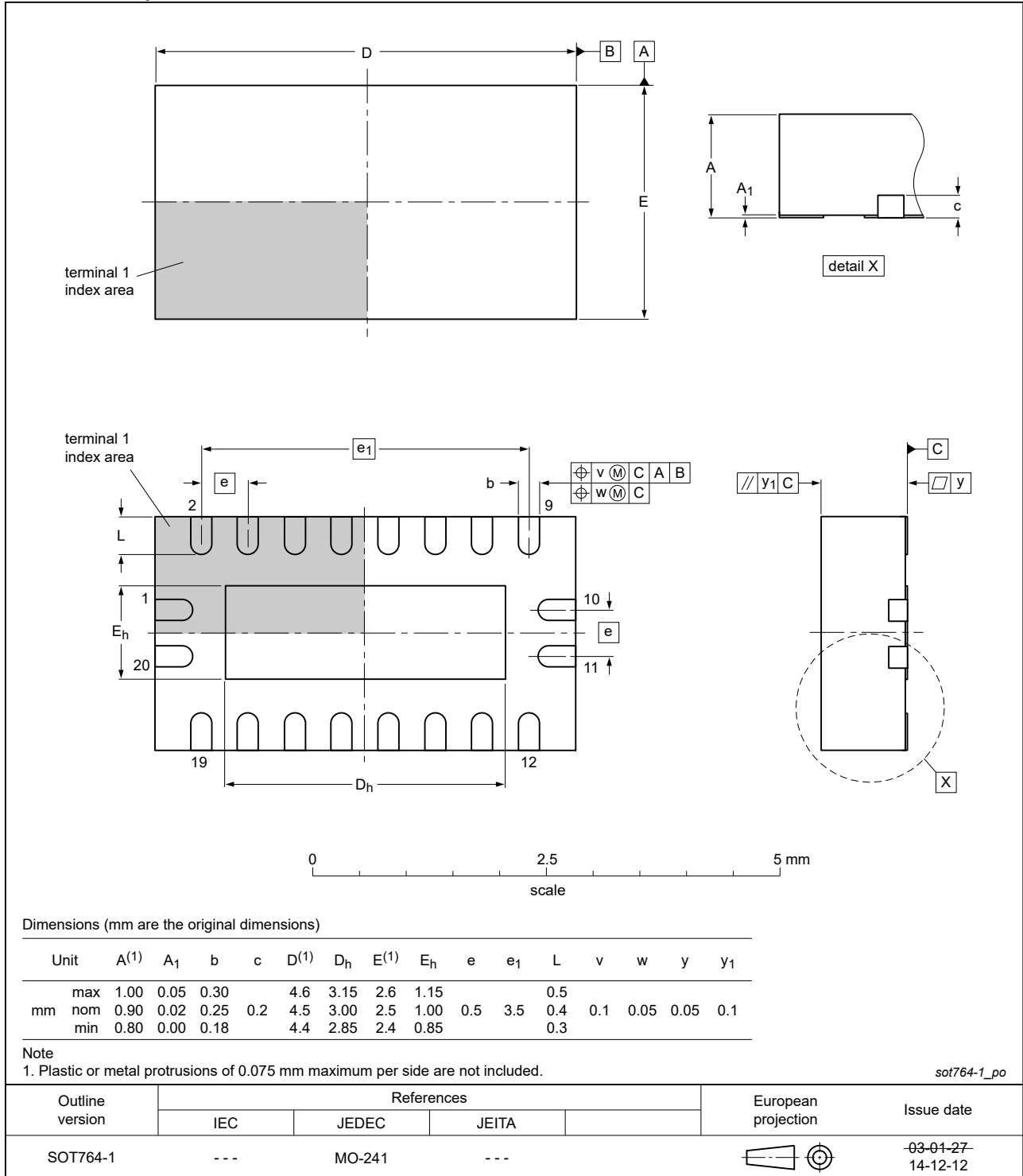


Fig. 12. Package outline SOT764-1 (DHVQFN20)

## 12. Abbreviations

Table 10. 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

## 13. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74ALVC244 v.5	20210430	Product data sheet	-	74ALVC244 v.4
Modifications:	<ul style="list-style-type: none"> <li>• <a href="#">Section 1</a> updated.</li> <li>• <a href="#">Section 2</a>: Reference to JESD36 removed.</li> <li>• <a href="#">Section 7</a>: Derating values for <math>P_{tot}</math> total power dissipation removed (errata).</li> </ul>			
74ALVC244 v.4	20171010	Product data sheet	-	74ALVC244 v.3
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> </ul>			
74ALVC244 v.3	20030908	Product specification	-	74ALVC244 v.2
74ALVC244 v.2	20030811	Product specification	-	74ALVC244 v.1
74ALVC244 v.1	20011030	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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