74AVC9112

1-to-4 fan-out buffer

Rev. 1 — 23 April 2018 Product data sheet

1 General description

The 74AVC9112 is a 1-to-4 fan-out buffer suitable for use in clock distribution. It has a data input (A), four data outputs (Yn) and an output enable input ($\overline{OE}$). V_{CC} can be supplied at any voltage between 0.8 V and 3.6 V. A HIGH on $\overline{OE}$ causes all outputs to be pulled LOW via pull-down resistors, a LOW on $\overline{OE}$ disconnects the pull-down resistors and enables all outputs.

Schmitt trigger action at all inputs makes the circuit tolerant for slower input rise and fall time.

The I_{OFF} circuitry disables the output, preventing any damaging backflow current through the device when it is powered down.

2 Features and benefits

- Wide supply voltage range:
  - V_{CC}: 0.8 V to 3.6 V
- Complies with JEDEC standards:
  - JESD8-12 (0.8 V to 1.3 V)
  - JESD8-11 (0.9 V to 1.65 V)
  - JESD8-7 (1.2 V to 1.95 V)
  - JESD8-5 (1.8 V to 2.7 V)
  - JESD8-B (2.7 V to 3.6 V)
- ESD protection:
  - HBM ANSI/ESDA/JEDEC JS-001 Class 3B exceeds 8 kV
  - CDM JESD22-C101 exceeds 1000 V
- Maximum data rates:
  - 380 Mbit/s (3.3 V)
  - 200 Mbit/s (2.5 V)
  - 200 Mbit/s (1.8 V)
  - 150 Mbit/s (1.5 V)
  - 100 Mbit/s (1.2 V)
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Inputs accept voltages up to 3.6 V
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

3 Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AVC9112DC	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74AVC9112GT	-40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body 1 x 1.95 x 0.5 mm	SOT833-1

4 Marking

Table 2. Marking codes

Type number	Marking code
74AVC9112DC	Bb
74AVC9112GT	Bb

5 Functional diagram

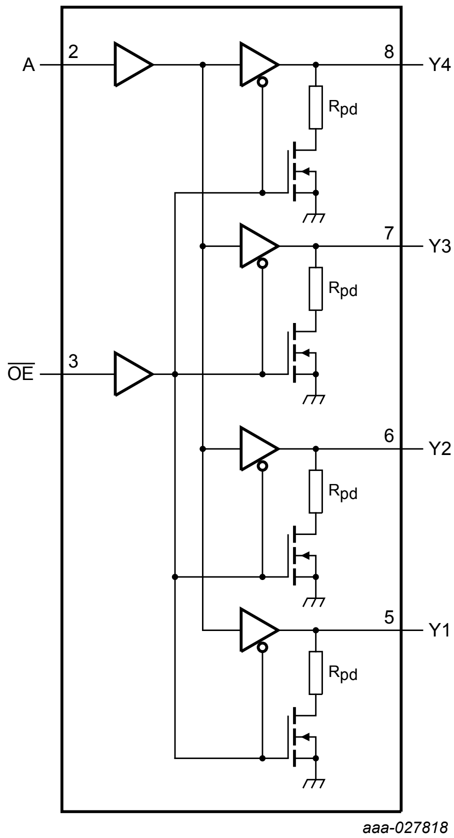


Figure 1. Logic symbol

6 Pinning information

6.1 Pinning

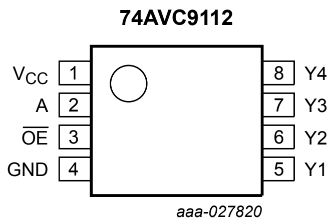
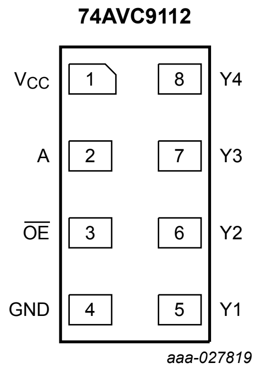


Figure 2. Pin configuration SOT765-1 (VSSOP8)



Transparent top view

Figure 3. Pin configuration SOT833-1 (XSON8)

6.2 Pin description

Table 3. Pin description

Symbol	Pin	Description
V_{CC}	1	supply voltage
A	2	data input
$\overline{OE}$	3	output enable input (active LOW)
GND	4	ground (0 V)
Y1, Y2, Y3, Y4	5, 6, 7, 8	data outputs

7 Functional description

Table 4. Function table [1]

Inputs		Output
$\overline{OE}$	A	Yn
L	L	L
L	H	H
H	X	L

[1] H = HIGH voltage level;
L = LOW voltage level;
X = don't care.

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	+4.6	V
V_I	input voltage		[1]	-0.5	+4.6	V
V_O	output voltage	$\overline{OE}$ = LOW	[1] [2]	-0.5	V_{CC} + 0.5	V
		$\overline{OE}$ = HIGH	[1]	-0.5	+4.6	V
I_{IK}	input clamping current	V_I < 0 V		-50	-	mA
I_{OK}	output clamping current	V_O < 0 V		-50	-	mA
I_O	output current	V_O = 0 V to V_{CC}		-	±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 +125 °C				
		SOT765-1 package	[3]	-	250	mW
		SOT833-1 package	[4]	-	250	mW

[1] The minimum input voltage ratings and output voltage ratings may be exceeded if the input and output current ratings are observed.
[2] V_{CC} + 0.5 V should not exceed 4.6 V.
[3] For SOT765-1 package: above 99 °C, the value of P_{tot} derates linearly with 4.9 mW/K.
[4] For SOT833-1 package: above 68 °C, the value of P_{tot} derates linearly with 3.1 mW/K.

9 Recommended operating conditions

Table 6. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		0.8	3.6	V
V_I	input voltage		0	3.6	V
V_O	output voltage	$\overline{OE}$ = LOW	0	V_{CC}	V
		$\overline{OE}$ = HIGH	0	3.6	V
T_{amb}	ambient temperature		-40	+125	°C
Δt/ΔV	input transition rise and fall rate	V_{CC} = 0.8 V to 3.6 V	0	200	ns/V

10 Static characteristics

Table 7. Static characteristics

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

Symbol	Parameter	Conditions	T_{amb} = 25 °C			Unit
			Min	Typ	Max	
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = -1.5 mA; V_{CC} = 0.8 V	-	0.69	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = 1.5 mA; V_{CC} = 0.8 V	-	0.07	-	V
I_I	input leakage current	A, $\overline{OE}$ input; V_I = 0 V or 3.6 V; V_{CC} = 0.8 V to 3.6 V	-	±0.025	±0.25	μA
I_{OFF}	power-off leakage current	V_I or V_O = 0 V to 3.6 V; V_{CC} = 0 V	-	±0.1	±1	μA
R_{pd}	pull-down resistance		-	50	-	kΩ
C_I	input capacitance	A, $\overline{OE}$ input; V_I = 0 V or 3.3 V; V_{CC} = 3.3 V	-	1.2	-	pF
C_O	output capacitance	Yn; V_O = 3.3 V or 0 V; V_{CC} = 3.3 V	-	4.7	-	pF

Table 8. Static characteristics

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

Symbol	Parameter	Conditions	T_{amb} = -40 °C to +85 °C		T_{amb} = -40 °C to +125 °C		Unit
			Min	Max	Min	Max	
V_{IH}	HIGH-level input voltage	A, $\overline{OE}$ input					
		V_{CC} = 0.8 V	$0.70V_{CC}$	-	$0.70V_{CC}$	-	V
		V_{CC} = 1.1 V to 1.95 V	$0.65V_{CC}$	-	$0.65V_{CC}$	-	V
		V_{CC} = 2.3 V to 2.7 V	1.6	-	1.6	-	V
		V_{CC} = 3.0 V to 3.6 V	2	-	2	-	V
V_{IL}	LOW-level input voltage	A, $\overline{OE}$ input					
		V_{CC} = 0.8 V	-	$0.30V_{CC}$	-	$0.30V_{CC}$	V
		V_{CC} = 1.1 V to 1.95 V	-	$0.35V_{CC}$	-	$0.35V_{CC}$	V
		V_{CC} = 2.3 V to 2.7 V	-	0.7	-	0.7	V
		V_{CC} = 3.0 V to 3.6 V	-	0.8	-	0.8	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}					
		I_O = -100 μA; V_{CC} = 0.8 V to 3.6 V	V_{CC} - 0.1	-	V_{CC} - 0.1	-	V
		I_O = -3 mA; V_{CC} = 1.1 V	0.85	-	0.85	-	V
		I_O = -6 mA; V_{CC} = 1.4 V	1.05	-	1.05	-	V
		I_O = -8 mA; V_{CC} = 1.65 V	1.2	-	1.2	-	V
		I_O = -9 mA; V_{CC} = 2.3 V	1.75	-	1.75	-	V
		I_O = -12 mA; V_{CC} = 3.0 V	2.3	-	2.3	-	V

Symbol	Parameter	Conditions	T_{amb} = -40 °C to +85 °C		T_{amb} = -40 °C to +125 °C		Unit
			Min	Max	Min	Max	
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}					
		I_O = 100 μA; V_{CC} = 0.8 V to 3.6 V	-	0.1	-	0.1	V
		I_O = 3 mA; V_{CC} = 1.1 V	-	0.25	-	0.25	V
		I_O = 6 mA; V_{CC} = 1.4 V	-	0.35	-	0.35	V
		I_O = 8 mA; V_{CC} = 1.65 V	-	0.45	-	0.45	V
		I_O = 9 mA; V_{CC} = 2.3 V	-	0.55	-	0.55	V
		I_O = 12 mA; V_{CC} = 3.0 V	-	0.7	-	0.7	V
I_I	input leakage current	A, $\overline{OE}$ input; V_I = 0 V or 3.6 V; V_{CC} = 0.8 V to 3.6 V	-	±1	-	±5	μA
I_{OFF}	power-off leakage current	V_I or V_O = 0 V to 3.6 V; V_{CC} = 0 V	-	±5	-	±30	μA
I_{CC}	supply current	V_I = 0 V or V_{CC}; I_O = 0 A; V_{CC} = 0.8 V to 3.6 V	-	8	-	50	μA

11 Dynamic characteristics

Table 9. Typical dynamic characteristics [1]

Voltages are referenced to GND (ground = 0 V); for test circuit, see Figure 6; for waveforms, see Figure 4 and Figure 5.

Symbol	Parameter	Conditions	T_{amb} = 25 °C; V_{CC} = 0.8 V	Unit
t_{pd}	propagation delay	A to Yn	31	ns
t_{dis}	disable time	$\overline{OE}$ to Yn	25	ns
t_{en}	enable time	$\overline{OE}$ to Yn	36	ns

[1] t_{pd} is the same as t_{PLH} and t_{PHL};
t_{dis} is the same as t_{PLZ} and t_{PHZ};
t_{en} is the same as t_{PZL} and t_{PZH}.

Table 10. Dynamic characteristics [1]

Voltages are referenced to GND (ground = 0 V); for test circuit, see Figure 6; for waveforms, see Figure 4 and Figure 5.

Symbol	Parameter	Conditions	V_{CC}										Unit
			1.2 V±0.1 V		1.5 V±0.1 V		1.8 V±0.15 V		2.5 V±0.2 V		3.3 V±0.3 V		
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
T_{amb} = -40 °C to +85 °C													
t_{pd}	propagation delay	A to Yn	0.9	14.7	0.7	9.5	0.6	7.6	0.5	5.4	0.4	4.4	ns
t_{dis}	disable time	$\overline{OE}$ to Yn	1.0	14.7	0.8	9.7	0.8	8.8	0.6	6.5	0.7	6.9	ns
t_{en}	enable time	$\overline{OE}$ to Yn	1.0	15.8	0.7	9.9	0.6	7.9	0.5	5.5	0.5	4.5	ns
$t_{sk(o)}$	output skew time	between any output	-	0.7	-	0.4	-	0.3	-	0.2	-	0.2	ns
T_{amb} = -40 °C to +125 °C													
t_{pd}	propagation delay	A to Yn	0.9	15.7	0.7	10.4	0.6	8.3	0.5	5.9	0.4	4.9	ns
t_{dis}	disable time	$\overline{OE}$ to Yn	1.0	16.5	0.8	11.0	0.8	10.0	0.6	7.5	0.7	7.7	ns
t_{en}	enable time	$\overline{OE}$ to Yn	1.0	16.9	0.7	10.9	0.6	8.7	0.6	6.1	0.5	4.9	ns
$t_{sk(o)}$	output skew time	between any output	-	0.9	-	0.5	-	0.4	-	0.3	-	0.2	ns

[1] t_{pd} is the same as t_{PLH} and t_{PHL};
t_{dis} is the same as t_{PLZ} and t_{PHZ};
t_{en} is the same as t_{PZL} and t_{PZH}.

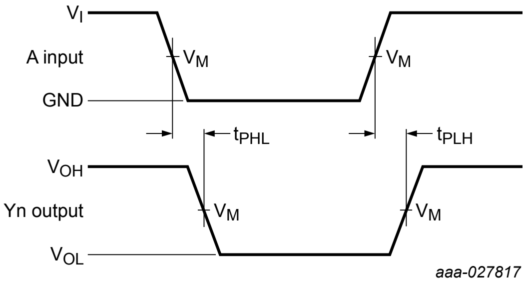
Table 11. Typical power dissipation capacitance at T_{amb} = 25 °C [1] [2]

Symbol	Parameter	Conditions	V_{CC}						Unit
			0.8 V	1.2 V	1.5 V	1.8 V	2.5 V	3.3 V	
C_{PD}	power dissipation capacitance	Yn; outputs enabled	35	35	36	37	40	45	pF
		Yn; outputs disabled	2.0	2.2	2.3	2.4	2.6	2.7	pF

[1] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i + \Sigma(C_L \times V_{CC}^2 \times f_o)$ where:
f_i = input frequency in MHz;
f_o = output frequency in MHz;
C_L = load capacitance in pF;
V_{CC} = supply voltage in V;
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

[2] f_i = 10 MHz;
V_I = GND to V_{CC};
$t_r = t_f$ = 1 ns;
C_L = 0 pF;
$R_L = \infty\ \Omega$.

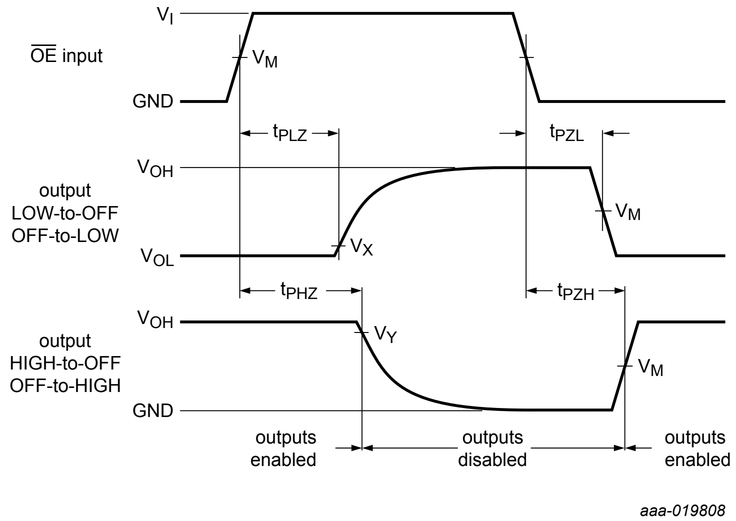
11.1 Waveforms and test circuit



Measurement points are given in Table 12.

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

Figure 4. The data input (A) to output (Yn) propagation delay times



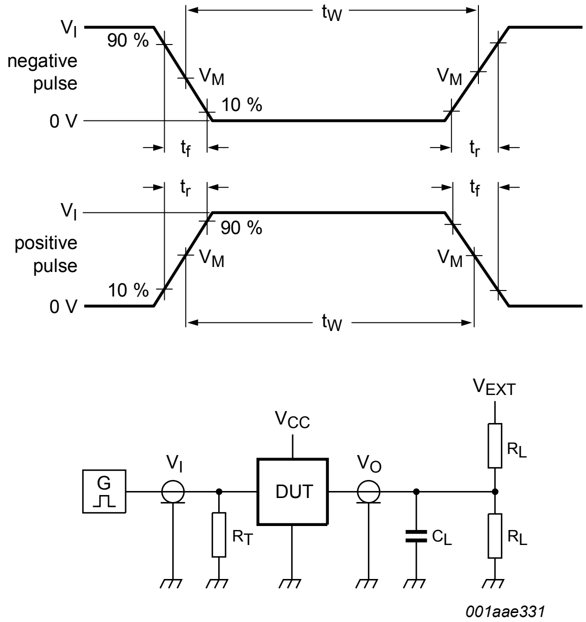
Measurement points are given in Table 12.

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

Figure 5. Enable and disable times

Table 12. Measurement points

Supply voltage	Input	Output		
V_{CC}	V_M	V_M	V_X	V_Y
0.8 V to 1.6 V	$0.5V_{CC}$	$0.5V_{CC}$	V_{OL} + 0.1 V	V_{OH} - 0.1 V
1.65 V to 2.7 V	$0.5V_{CC}$	$0.5V_{CC}$	V_{OL} + 0.15 V	V_{OH} - 0.15 V
3.0 V to 3.6 V	$0.5V_{CC}$	$0.5V_{CC}$	V_{OL} + 0.3 V	V_{OH} - 0.3 V



Test data is given in Table 13

R_L = Load resistance.

C_L = Load capacitance including jig and probe capacitance.

R_T = Termination resistance.

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

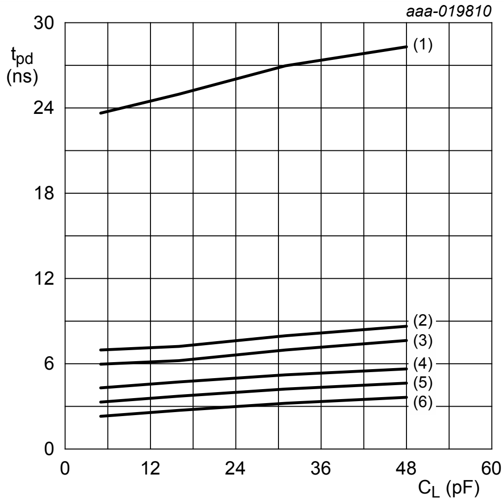
Figure 6. Test circuit for measuring switching times

Table 13. Test data

Supply voltage	Input		Load		V_{EXT}		
V_{CC}	V_I	$\Delta t/\Delta V$[1]	C_L	R_L	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
0.8 V to 1.6 V	V_{CC}	≤ 1.0 ns/V	15 pF	2 kΩ	open	GND	$2V_{CC}$
1.65 V to 2.7 V	V_{CC}	≤ 1.0 ns/V	15 pF	2 kΩ	open	GND	$2V_{CC}$
3.0 V to 3.6 V	V_{CC}	≤ 1.0 ns/V	15 pF	2 kΩ	open	GND	$2V_{CC}$

[1] dV/dt ≥ 1.0 V/ns

11.2 Typical propagation delay characteristics

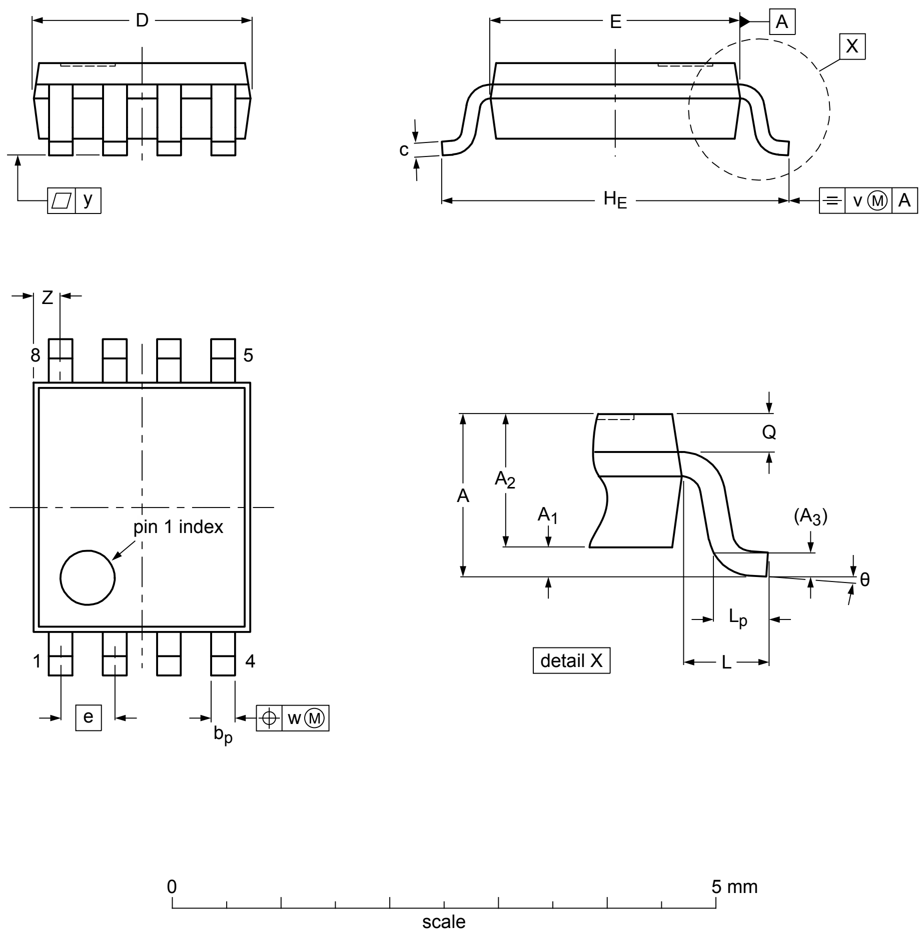


(1) V_{CC} = 0.8 V
(2) V_{CC} = 1.2 V
(3) V_{CC} = 1.5 V
(4) V_{CC} = 1.8 V
(5) V_{CC} = 2.5 V
(6) V_{CC} = 3.3 V

Figure 7. Typical propagation delay versus load capacitance; T_{amb} = 25 °C

12 Package outline

VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm **SOT765-1**



Dimensions (mm are the original dimensions)

Unit		A max.	A_1	A_2	A_3	b_p	c	D(1)	E(2)	e	H_E	L	L_p	Q	v	w	y	Z(1)	θ
mm	max		0.15	0.85		0.27	0.23	2.1	2.4		3.2		0.40	0.21				0.4	8°
	nom	1			0.12					0.5		0.4			0.2	0.08	0.1		
	min		0.00	0.60		0.17	0.08	1.9	2.2		3.0		0.15	0.19				0.1	0°

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

sot765-1_po

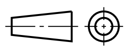
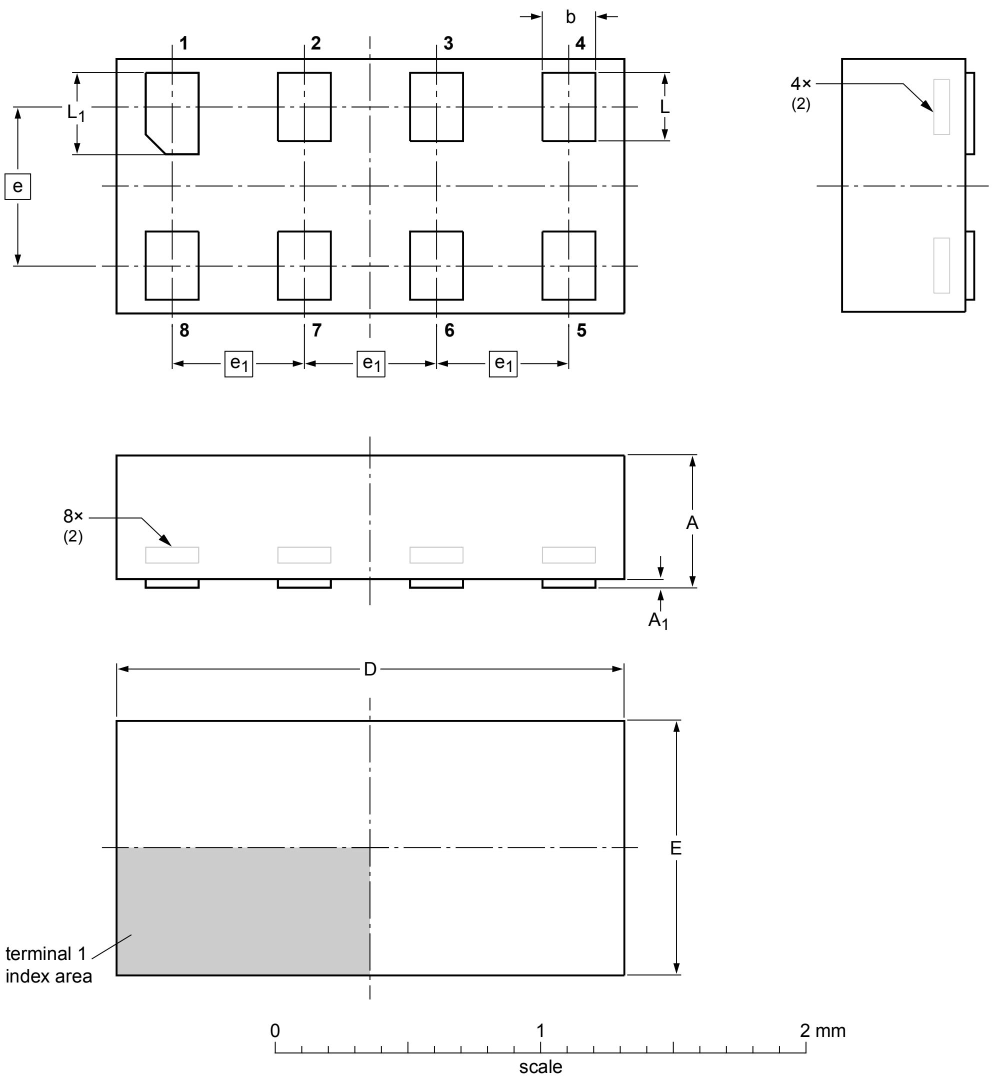
Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT765-1		MO-187				~~07-06-02~~ 16-05-31

Figure 8. Package outline SOT765-1 (VSSOP8)

XSON8: plastic extremely thin small outline package; no leads; 8 terminals; body 1 x 1.95 x 0.5 mm **SOT833-1**



DIMENSIONS (mm are the original dimensions)

UNIT	$A^{(1)}$ max	A_1 max	b	D	E	e	e_1	L	L_1
mm	0.5	0.04	0.25 0.17	2.0 1.9	1.05 0.95	0.6	0.5	0.35 0.27	0.40 0.32

Notes

1. Including plating thickness.
2. Can be visible in some manufacturing processes.

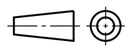
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT833-1	- - -	MO-252	- - -			~~07-11-14~~ 07-12-07

Figure 9. Package outline SOT833-1 (XSON8)

13 Abbreviations

Table 14. Abbreviations

Acronym	Description
CDM	Charged Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model

14 Revision history

Table 15. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AVC9112 v.1	20180423	Product data sheet	-	-

15 Legal information

15.1 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".
[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.nexperia.com.

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Date of release: 23 April 2018
Document identifier: 74AVC9112