74LVC1G99

Ultra-configurable multiple function gate; 3-state

Rev. 13 — 12 August 2024 Product data sheet

1. General description

The 74LVC1G99 provides a low voltage, ultra-configurable, multiple function gate with 3-state output. The device can be configured as one of several logic functions including, AND, OR, NAND, NOR, XOR, XNOR, inverter, buffer and MUX. No external components are required to configure the device as all inputs can be connected directly to V_{CC} or GND. The 3-state output is controlled by the output enable input ($\overline{OE}$). A HIGH level at $\overline{OE}$ causes the output (Y) to assume a high-impedance OFF-state. When $\overline{OE}$ is LOW, the output state is determined by the signals applied to the Schmitt trigger inputs (A, B, C and D).

Due to the use of Schmitt trigger inputs the device is tolerant of slowly changing input signals, transforming them into sharply defined, jitter free output signals. By eliminating leakage current paths to V_{CC} and GND, the inputs and disabled output are also over-voltage tolerant, making the device suitable for mixed-voltage applications.

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

The 74LVC1G99 is fully specified over the supply range from 1.65 V to 5.5 V.

2. Features and benefits

- Wide supply voltage range from 1.65 V to 5.5 V
- 5 V tolerant inputs for interfacing with 5 V logic
- High noise immunity
- ±24 mA output drive (V_{CC} = 3.0 V)
- CMOS low power consumption
- Latch-up performance exceeds 250 mA
- Direct interface with TTL levels
- Inputs accept voltages up to 5 V
- Complies with JEDEC standard:
  - JESD8-7 (1.65 V to 1.95 V)
  - JESD8-5 (2.3 V to 2.7 V)
  - JESD8-B/JESD36 (2.7 V to 3.6 V)
- 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 -40 °C to +125 °C.

3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74LVC1G99DP	-40 °C to +125 °C	TSSOP8	plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm	SOT505-2
74LVC1G99GT	-40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body 1 × 1.95 × 0.5 mm	SOT833-1
74LVC1G99GN	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.2 × 1.0 × 0.35 mm	SOT1116
74LVC1G99GS	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1.0 × 0.35 mm	SOT1203

4. Marking

Table 2. Marking codes

Type number	Marking code [1]
74LVC1G99DP	V99
74LVC1G99GT	V99
74LVC1G99GN	YF
74LVC1G99GS	YF

[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

5. Functional diagram

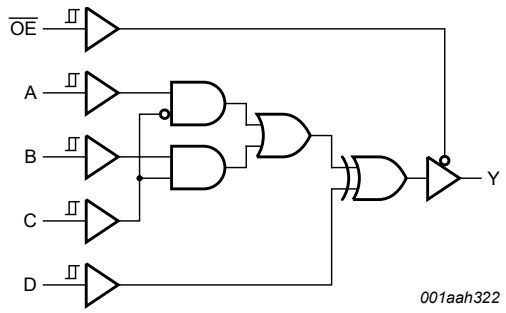
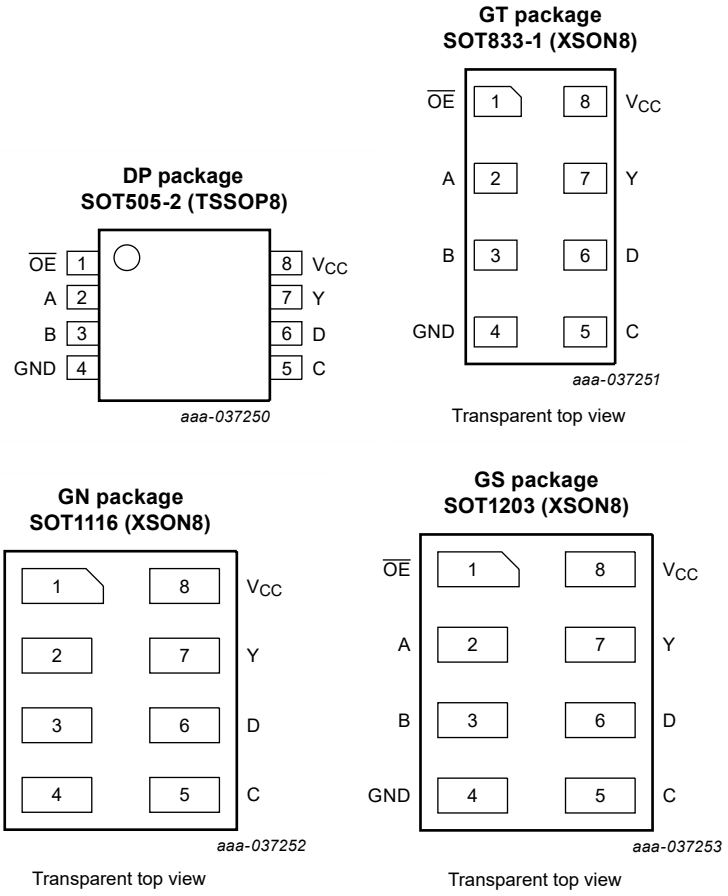


Fig. 1. Logic symbol

6. Pinning information

6.1. Pinning



6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
$\overline{OE}$	1	output enable input $\overline{OE}$ (active LOW)
A	2	data input
B	3	data input
GND	4	ground (0 V)
C	5	data input
D	6	data input
Y	7	data output
V_{CC}	8	supply voltage

7. Functional description

Table 4. Function table

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

Input					Output
$\overline{OE}$	D	C	B	A	Y
L	L	L	L	L	L
L	L	L	L	H	H
L	L	L	H	L	L
L	L	L	H	H	H
L	L	H	L	L	L
L	L	H	L	H	L
L	L	H	H	L	H
L	L	H	H	H	H
L	H	L	L	L	H
L	H	L	L	H	L
L	H	L	H	L	H
L	H	L	H	H	L
L	H	H	L	L	H
L	H	H	L	H	H
L	H	H	H	L	L
L	H	H	H	H	L
H	X	X	X	X	Z

7.1. Logic configurations

Table 5. Function selection table

Primary function	Complementary function
3-state buffer	
3-state inverter	
3-state 2-input multiplexer	
3-state 2-input multiplexer with inverting output	
3-state 2-input AND	3-state 2-input NOR with two inverting inputs
3-state 2-input AND with one inverting input	3-state 2-input NOR with one inverting input
3-state 2-input AND with two inverting inputs	3-state 2-input NOR
3-state 2-input NAND	3-state 2-input OR with two inverting inputs
3-state 2-input NAND with one inverting input	3-state 2-input OR with one inverting input
3-state 2-input NAND with two inverting inputs	3-state 2-input OR
3-state 2-input XOR	
3-state 2-input XNOR	3-state 2-input XOR with one inverting input

7.2. 3-state buffer functions available

Table 6. Function table

H = HIGH voltage level; L = LOW voltage level; See Fig. 2.

Function	Input				
	$\overline{OE}$	A	B	C	D
3-state buffer	L	input	H or L	L	L
	L	H or L	input	H	L
	L	L	H	input	L
	L	H	L	input	H
	L	H	H or L	L	input
	L	H or L	L	H	input
	L	L	L	H or L	input

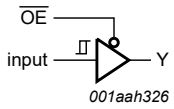


Fig. 2. 3-state buffer function

7.3. 3-state inverter functions available

Table 7. Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care. See Fig. 3.

Function	Input				
	$\overline{OE}$	A	B	C	D
3-state inverter	L	input	H or L	L	H
	L	X	input	H	H
	L	L	H	input	H
	L	H	L	input	L
	L	H	H or L	L	input
	L	H or L	H	H	input
	L	H	H	H or L	input

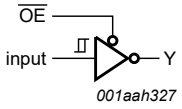


Fig. 3. 3-state inverter function

7.4. 3-state multiplexer functions available

Table 8. Function table

H = HIGH voltage level; L = LOW voltage level. See Fig. 4.

Function	Input				
	$\overline{OE}$	A	B	C	D
3-state 2-input multiplexer	L	input 1	input 2	$\overline{\text{input 1}}$ or input 2	L
	L	input 2	input 1	$\overline{\text{input 2}}$ or input 1	L
	L	input 1	input 2	$\overline{\text{input 1}}$ or input 2	H
	L	input 2	input 1	$\overline{\text{input 2}}$ or input 1	H

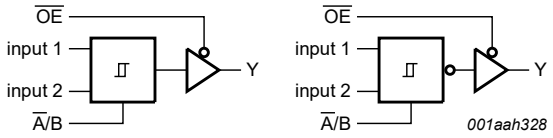


Fig. 4. 3-state 2-input multiplexer function

7.5. 3-state AND/NOR functions available

Table 9. Function table

H = HIGH voltage level; L = LOW voltage level. See Fig. 5.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{OE}$	A	B	C	D
2	3-state AND	3-state NOR	L	L	input 1	input 2	L
2	3-state AND	3-state NOR	L	L	input 2	input 1	L

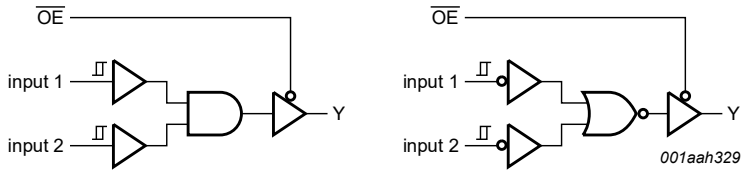


Fig. 5. 3-state AND/NOR function

Table 10. Function table

H = HIGH voltage level; L = LOW voltage level. See Fig. 6.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{OE}$	A	B	C	D
2	3-state AND	3-state NOR	L	input 2	L	input 1	L
2	3-state AND	3-state NOR	L	H	input 1	input 2	H

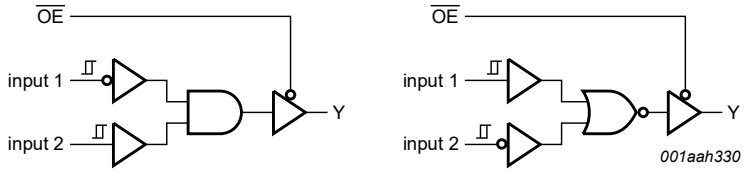


Fig. 6. 3-state AND/NOR function

Table 11. Function table

H = HIGH voltage level; L = LOW voltage level. See Fig. 7.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{OE}$	A	B	C	D
2	3-state AND	3-state NOR	L	input 1	L	input 2	L
2	3-state AND	3-state NOR	L	H	input 2	input 1	H

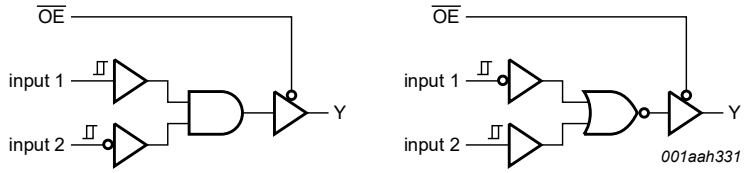


Fig. 7. 3-state AND/NOR function

Table 12. Function table

H = HIGH voltage level; L = LOW voltage level. See Fig. 8.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{OE}$	A	B	C	D
2	3-state AND	3-state NOR	L	input 1	H	input 2	H
2	3-state AND	3-state NOR	L	input 2	H	input 1	H

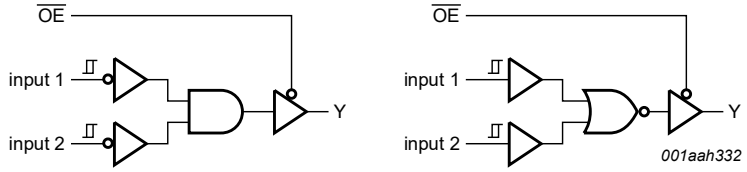


Fig. 8. 3-state AND/NOR function

7.6. 3-state NAND/OR functions available

Table 13. Function table

H = HIGH voltage level; L = LOW voltage level. See Fig. 9.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{OE}$	A	B	C	D
2	3-state NAND	3-state OR	L	L	input 1	input 2	H
2	3-state NAND	3-state OR	L	L	input 2	input 1	H

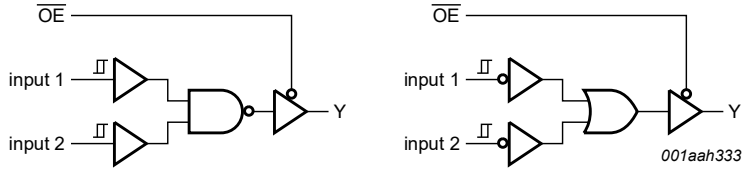


Fig. 9. 3-state NAND/OR function

Table 14. Function table

H = HIGH voltage level; L = LOW voltage level. See Fig. 10.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{OE}$	A	B	C	D
2	3-state NAND	3-state OR	L	input 2	L	input 1	H
2	3-state NAND	3-state OR	L	H	input 1	input 2	L

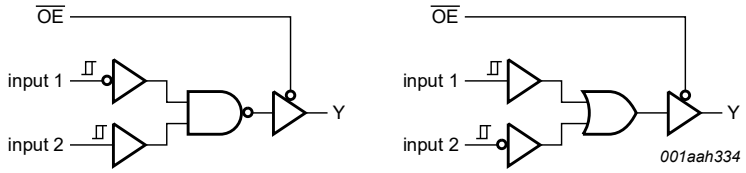


Fig. 10. 3-state NAND/OR function

Table 15. Function table

H = HIGH voltage level; L = LOW voltage level. See Fig. 11.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{OE}$	A	B	C	D
2	3-state NAND	3-state OR	L	input 1	L	input 2	H
2	3-state NAND	3-state OR	L	H	input 2	input 1	L

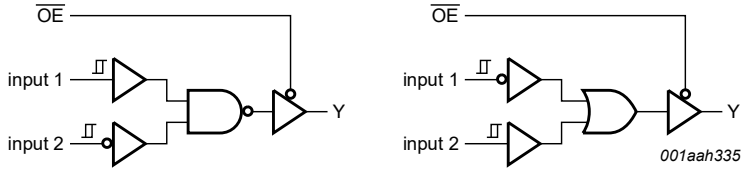


Fig. 11. 3-state AND/NOR function

Table 16. Function table

H = HIGH voltage level; L = LOW voltage level. See Fig. 12.

Number of inputs	Function		Input				
	AND/NAND	OR/NOR	$\overline{OE}$	A	B	C	D
2	3-state NAND	3-state OR	L	input 1	H	input 2	L
2	3-state NAND	3-state OR	L	input 2	H	input 1	L

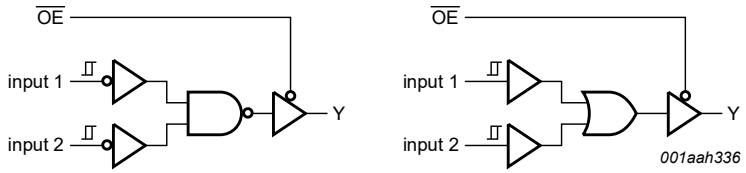


Fig. 12. 3-state AND/NOR function

7.7. 3-state XOR/XNOR functions available

Table 17. Function table

H = HIGH voltage level; L = LOW voltage level. See Fig. 13.

Function	Input				
	$\overline{OE}$	A	B	C	D
3-state XOR	L	input 1	H or L	L	input 2
	L	input 2	H or L	L	input 1
	L	H or L	input 1	H	input 2
	L	H or L	input 2	H	input 1
	L	L	H	input 1	input 2
	L	L	H	input 2	input 1

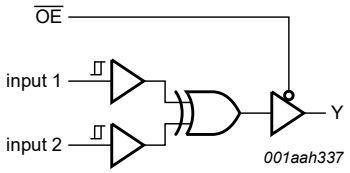


Fig. 13. 3-state XOR function

Table 18. Function table

H = HIGH voltage level; L = LOW voltage level. See Fig. 14.

Function	Input				
	$\overline{OE}$	A	B	C	D
3-state XOR	L	H	L	input 1	input 2

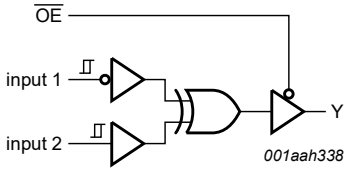


Fig. 14. 3-state XOR function

Table 19. Function table

H = HIGH voltage level; L = LOW voltage level. See Fig. 15.

Function	Input				
	$\overline{OE}$	A	B	C	D
3-state XOR	L	H	L	input 1	input 2

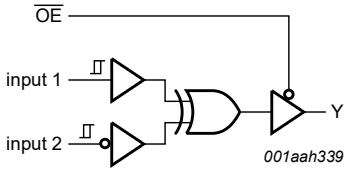


Fig. 15. 3-state XOR function

Table 20. Function table

H = HIGH voltage level; L = LOW voltage level. See Fig. 16.

Function	Input				
	$\overline{OE}$	A	B	C	D
3-state XNOR	L	H	L	input 1	input 2
	L	H	L	input 2	input 1

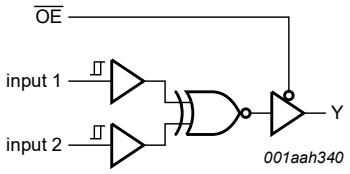


Fig. 16. 3-state XNOR function

8. Limiting values

Table 21. 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	+6.5	V
I_{IK}	input clamping current	$V_I < 0$ V		-50	-	mA
V_I	input voltage		[1]	-0.5	+6.5	V
I_{OK}	output clamping current	$V_O > V_{CC}$ or $V_O < 0$ V		-	±50	mA
V_O	output voltage	Active mode	[1]	-0.5	V_{CC} + 0.5	V
		Power-down mode; V_{CC} = 0 V	[1]	-0.5	+6.5	V
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
P_{tot}	total power dissipation	T_{amb} = -40 °C to +125 °C	[2]	-	250	mW
T_{stg}	storage temperature			-65	+150	°C

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
[2] For SOT505-2 (TSSOP8) package: P_{tot} derates linearly with 4.6 mW/K above 96 °C.
For SOT833-1 (XSON8) package: P_{tot} derates linearly with 3.1 mW/K above 68 °C.
For SOT1116 (XSON8) package: P_{tot} derates linearly with 4.2 mW/K above 90 °C.
For SOT1203 (XSON8) package: P_{tot} derates linearly with 3.6 mW/K above 81 °C.

9. Recommended operating conditions

Table 22. Operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		1.65	5.5	V
V_I	input voltage		0	5.5	V
V_O	output voltage	Active mode	0	V_{CC}	V
		Power-down mode; V_{CC} = 0 V	0	5.5	V
T_{amb}	ambient temperature		-40	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	V_{CC} = 1.65 V to 2.7 V	-	20	ns/V
		V_{CC} = 2.7 V to 4.5 V	-	10	ns/V
		V_{CC} = 4.5 V to 5.5 V	-	5	ns/V

10. Static characteristics

Table 23. Static characteristics

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

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	
V_{OH}	HIGH-level output voltage	V_I = V_{T+} or V_{T-}						
		I_O = -100 µA; V_{CC} = 1.65 V to 5.5 V	V_{CC} - 0.1	-	-	V_{CC} - 0.1	-	V
		I_O = -4 mA; V_{CC} = 1.65 V	1.2	-	-	0.95	-	V
		I_O = -8 mA; V_{CC} = 2.3 V	1.9	-	-	1.7	-	V
		I_O = -12 mA; V_{CC} = 2.7 V	2.2	-	-	1.9	-	V
		I_O = -24 mA; V_{CC} = 3.0 V	2.3	-	-	2.0	-	V
		I_O = -32 mA; V_{CC} = 4.5 V	3.8	-	-	3.4	-	V
V_{OL}	LOW-level output voltage	V_I = V_{T+} or V_{T-}						
		I_O = 100 µA; V_{CC} = 1.65 V to 5.5 V	-	-	0.1	-	0.1	V
		I_O = 4 mA; V_{CC} = 1.65 V	-	-	0.45	-	0.70	V
		I_O = 8 mA; V_{CC} = 2.3 V	-	-	0.3	-	0.45	V
		I_O = 12 mA; V_{CC} = 2.7 V	-	-	0.4	-	0.60	V
		I_O = 24 mA; V_{CC} = 3.0 V	-	-	0.55	-	0.80	V
		I_O = 32 mA; V_{CC} = 4.5 V	-	-	0.55	-	0.80	V
I_I	input leakage current	V_{CC} = 0 V to 5.5 V; V_I = 5.5 V or GND	-	±0.1	±1	-	±1	µA
I_{OZ}	OFF-state output current	V_{CC} = 3.6 V; V_I = V_{IH} or V_{IL}; V_O = 5.5 V or GND	-	±0.1	±2	-	±2	µA
I_{OFF}	power-off leakage current	V_{CC} = 0 V; V_I or V_O = 5.5 V	-	±0.1	±2	-	±2	µA

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	
I_{CC}	supply current	V_{CC} = 1.65 V to 5.5 V; V_I = 5.5 V or GND; I_O = 0 A	-	0.1	4	-	4	µA
ΔI_{CC}	additional supply current	per pin; V_{CC} = 2.3 V to 5.5 V; V_I = V_{CC} - 0.6 V; I_O = 0 A	-	5	500	-	500	µA
C_I	input capacitance	V_{CC} = 3.3 V; V_I = GND to V_{CC}	-	2.5	-	-	-	pF

[1] All typical values are measured at V_{CC} = 3.3 V and T_{amb} = 25 °C.

10.1. Transfer characteristics

Table 24. Transfer characteristics

Voltages are referenced to GND (ground = 0 V; for test circuit see Fig. 24

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	
V_{T+}	positive-going threshold voltage	see Fig. 17, Fig. 18, Fig. 19, Fig. 20 and Fig. 21						
		V_{CC} = 1.8 V	0.70	1.02	1.20	0.67	1.20	V
		V_{CC} = 2.3 V	1.11	1.42	1.60	1.08	1.60	V
		V_{CC} = 3.0 V	1.50	1.79	2.00	1.47	2.00	V
		V_{CC} = 4.5 V	2.16	2.52	2.74	2.13	2.74	V
		V_{CC} = 5.5 V	2.61	2.99	3.33	2.58	3.33	V
V_{T-}	negative-going threshold voltage	see Fig. 17, Fig. 18, Fig. 19, Fig. 20 and Fig. 21						
		V_{CC} = 1.8 V	0.30	0.53	0.72	0.30	0.75	V
		V_{CC} = 2.3 V	0.58	0.77	1.00	0.58	1.03	V
		V_{CC} = 3.0 V	0.80	1.04	1.30	0.80	1.33	V
		V_{CC} = 4.5 V	1.21	1.55	1.90	1.21	1.93	V
		V_{CC} = 5.5 V	1.45	1.86	2.29	1.45	2.32	V
V_H	hysteresis voltage	(V_{T+} - V_{T-}); see Fig. 17, Fig. 18, Fig. 19, Fig. 20 and Fig. 21						
		V_{CC} = 1.8 V	0.30	0.48	0.62	0.23	0.62	V
		V_{CC} = 2.3 V	0.40	0.64	0.80	0.34	0.80	V
		V_{CC} = 3.0 V	0.50	0.75	1.00	0.44	1.00	V
		V_{CC} = 4.5 V	0.71	0.97	1.20	0.65	1.20	V
		V_{CC} = 5.5 V	0.71	1.13	1.40	0.65	1.40	V

[1] All typical values are measured at T_{amb} = 25 °C

10.2. Waveforms transfer characteristics

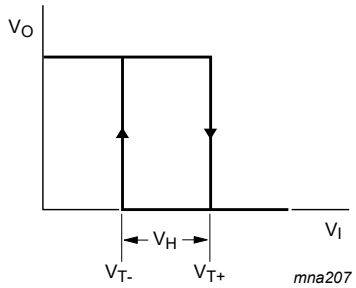


Fig. 17. Transfer characteristic

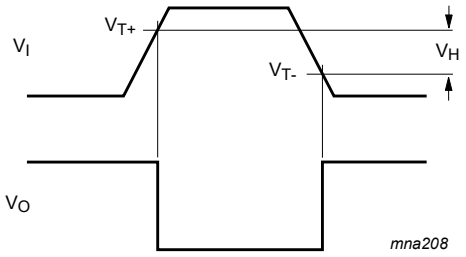


Fig. 18. Definition of V_{T+}, V_{T-} and V_H

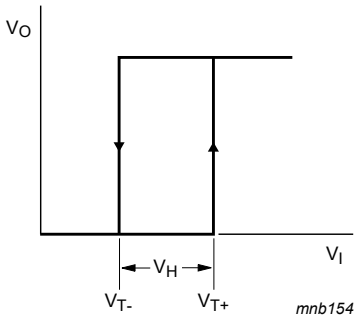


Fig. 19. Transfer characteristic

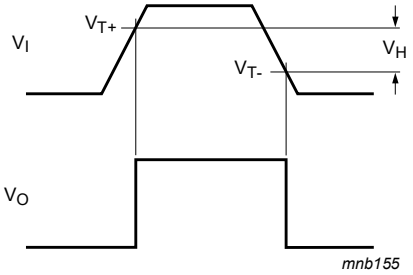


Fig. 20. Definition of V_{T+}, V_{T-} and V_H

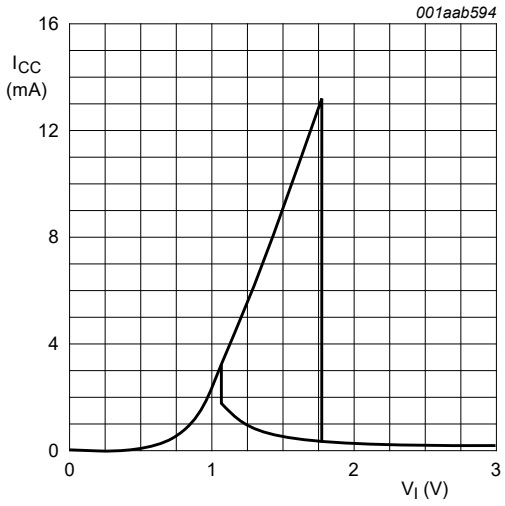


Fig. 21. Typical 74LVC1G99 transfer characteristic; V_{CC} = 3.0 V

11. Dynamic characteristics

Table 25. Dynamic characteristics

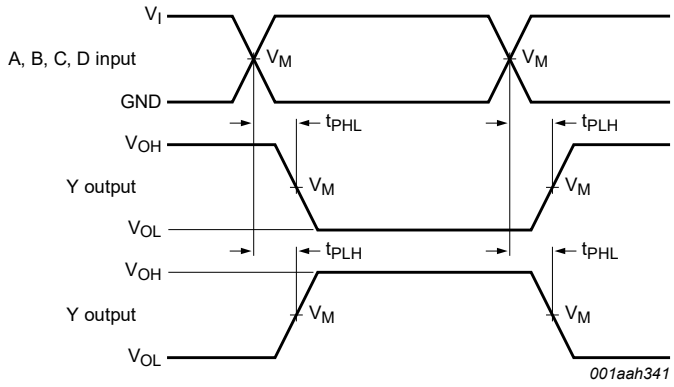
Voltages are referenced to GND (ground = 0 V; for test circuit see Fig. 24.

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	
t_{pd}	propagation delay	A to Y; see Fig. 22 [2]						
		V_{CC} = 1.65 V to 1.95 V	2.8	7.5	30.8	2.8	38.5	ns
		V_{CC} = 2.3 V to 2.7 V	2.0	5.0	11.7	2.0	14.6	ns
		V_{CC} = 2.7 V	2.0	5.4	9.0	2.0	11.3	ns
		V_{CC} = 3.0 V to 3.6 V	1.8	4.5	8.4	1.8	10.5	ns
		V_{CC} = 4.5 V to 5.5 V	1.8	3.8	5.5	1.8	6.9	ns
		B to Y; see Fig. 22 [2]						
		V_{CC} = 1.65 V to 1.95 V	2.8	7.5	28.9	2.8	36.2	ns
		V_{CC} = 2.3 V to 2.7 V	2.0	5.0	11.3	2.0	14.2	ns
		V_{CC} = 2.7 V	2.0	5.4	9.0	2.0	11.3	ns
		V_{CC} = 3.0 V to 3.6 V	1.8	4.5	8.2	1.8	10.3	ns
		V_{CC} = 4.5 V to 5.5 V	1.8	3.8	5.4	1.8	6.8	ns
		C to Y; see Fig. 22 [2]						
		V_{CC} = 1.65 V to 1.95 V	3.2	7.8	29.8	3.2	37.3	ns
		V_{CC} = 2.3 V to 2.7 V	2.3	5.2	12.3	2.3	15.4	ns
		V_{CC} = 2.7 V	2.3	5.3	9.6	2.3	12.0	ns
		V_{CC} = 3.0 V to 3.6 V	2.3	4.6	8.6	2.3	10.8	ns
		V_{CC} = 4.5 V to 5.5 V	1.8	3.8	5.7	1.8	7.2	ns
		D to Y; see Fig. 22 [2]						
		V_{CC} = 1.65 V to 1.95 V	2.8	7.0	25.7	2.8	32.2	ns
		V_{CC} = 2.3 V to 2.7 V	2.0	4.6	10.7	2.0	13.4	ns
		V_{CC} = 2.7 V	2.0	4.8	9.2	2.0	11.5	ns
		V_{CC} = 3.0 V to 3.6 V	1.8	4.1	7.6	1.8	9.5	ns
		V_{CC} = 4.5 V to 5.5 V	1.6	3.4	5.2	1.6	6.5	ns

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	
t_{en}	enable time	$\overline{OE}$ to Y; see Fig. 23 [3]						
		V_{CC} = 1.65 V to 1.95 V	2.0	5.7	25.2	2.0	32.0	ns
		V_{CC} = 2.3 V to 2.7 V	1.4	3.8	11.3	1.4	14.0	ns
		V_{CC} = 2.7 V	1.4	4.2	8.6	1.4	11.0	ns
		V_{CC} = 3.0 V to 3.6 V	1.4	3.5	7.0	1.4	9.0	ns
		V_{CC} = 4.5 V to 5.5 V	1.4	2.7	4.7	1.4	6.0	ns
t_{dis}	disable time	$\overline{OE}$ to Y; see Fig. 23 [4]						
		V_{CC} = 1.65 V to 1.95 V	3.0	5.7	15.0	3.0	19.0	ns
		V_{CC} = 2.3 V to 2.7 V	2.0	3.6	5.8	2.0	7.3	ns
		V_{CC} = 2.7 V	2.0	4.5	6.6	2.0	8.2	ns
		V_{CC} = 3.0 V to 3.6 V	2.1	4.5	5.9	2.1	7.4	ns
		V_{CC} = 4.5 V to 5.5 V	1.0	3.4	4.5	1.0	5.6	ns
C_{PD}	power dissipation capacitance	per buffer (output enabled); f_i = 10 MHz; C_L = 50 pF; V_I = GND to V_{CC} [5]						
		V_{CC} = 1.65 V to 1.95 V	-	14	-	-	-	pF
		V_{CC} = 2.3 V to 2.7 V	-	16	-	-	-	pF
		V_{CC} = 2.7 V	-	18	-	-	-	pF
		V_{CC} = 3.0 V to 3.6 V	-	25	-	-	-	pF
		V_{CC} = 4.5 V to 5.5 V	-	30	-	-	-	pF

[1] All typical values are measured at nominal V_{CC} and T_{amb} = 25 °C.
[2] t_{pd} is the same as t_{PLH} and t_{PHL}.
[3] t_{en} is the same as t_{PZH} and t_{PZL}.
[4] t_{dis} is the same as t_{PHZ} and t_{PLZ}.
[5] C_{PD} is used to determine the dynamic power dissipation (P_D in µW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ where:
f_i = input frequency in MHz;
f_o = output frequency in MHz;
C_L = output load capacitance in pF;
V_{CC} = supply voltage in V;
N = number of inputs switching;
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

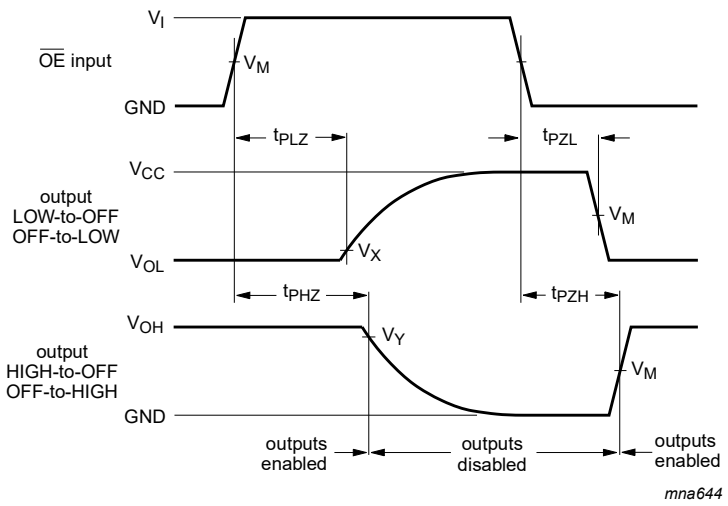
11.1. Waveforms and test circuit



Measurement points are given in Table 26.

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

Fig. 22. The data input (A, B, C, D) to output (Y) propagation delays



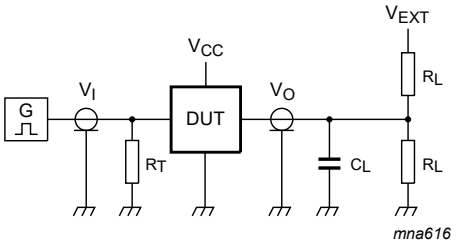
Measurement points are given in Table 26.

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

Fig. 23. 3-state enable and disable times

Table 26. Measurement points

Supply voltage	Input	Output		
V_{CC}	V_M	V_M	V_X	V_Y
1.65 V to 1.95 V	0.5 × V_{CC}	0.5 × V_{CC}	V_{OL} + 0.15 V	V_{OH} - 0.15 V
2.3 V to 2.7 V	0.5 × V_{CC}	0.5 × V_{CC}	V_{OL} + 0.15 V	V_{OH} - 0.15 V
2.7 V	1.5 V	1.5 V	V_{OL} + 0.3 V	V_{OH} - 0.3 V
3.0 V to 3.6 V	1.5 V	1.5 V	V_{OL} + 0.3 V	V_{OH} - 0.3 V
4.5 V to 5.5 V	0.5 × V_{CC}	0.5 × V_{CC}	V_{OL} + 0.3 V	V_{OH} - 0.3 V



Test data is given in Table 27.

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 the output impedance Z_o of the pulse generator;

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

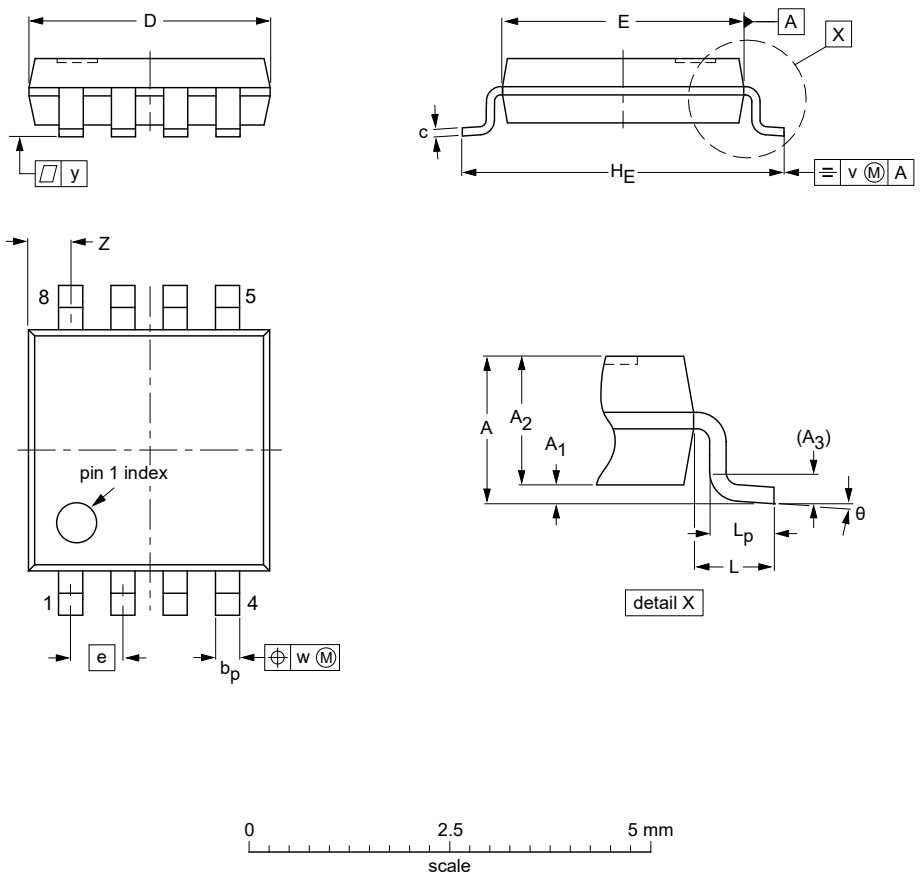
Fig. 24. Test circuit for measuring switching times

Table 27. Test data

Supply voltage	Input		Load		V_{EXT}		
	V_I	$t_r = t_f$	C_L	R_L	t_{PLH}, t_{PHL}	t_{PZH}, t_{PHZ}	t_{PZL}, t_{PLZ}
1.65 V to 1.95 V	V_{CC}	≤ 2.0 ns	30 pF	1 kΩ	open	GND	2 × V_{CC}
2.3 V to 2.7 V	V_{CC}	≤ 2.0 ns	30 pF	500 Ω	open	GND	2 × V_{CC}
2.7 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open	GND	6 V
3.0 V to 3.6 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open	GND	6 V
4.5 V to 5.5 V	V_{CC}	≤ 2.5 ns	50 pF	500 Ω	open	GND	2 × V_{CC}

12. Package outline

TSSOP8: plastic thin shrink small outline package; 8 leads; body width 3 mm; lead length 0.5 mm SOT505-2



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	v	w	y	$Z^{(1)}$	θ
mm	1.1	0.15 0.00	0.95 0.75	0.25	0.38 0.22	0.18 0.08	3.1 2.9	3.1 2.9	0.65	4.1 3.9	0.5	0.47 0.33	0.2	0.13	0.1	0.70 0.35	8° 0°

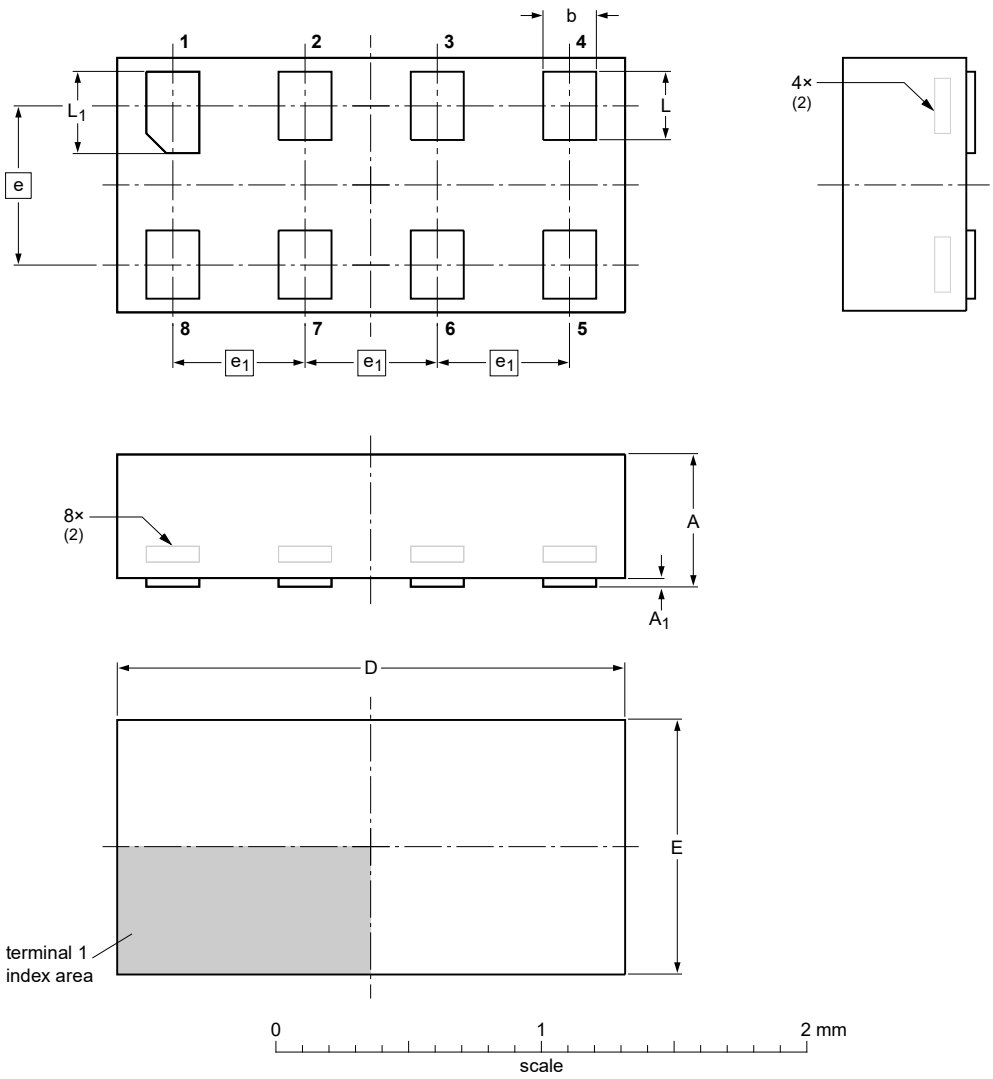
Note

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

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT505-2		- - -				02-01-16

Fig. 25. Package outline SOT505-2 (TSSOP8)

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

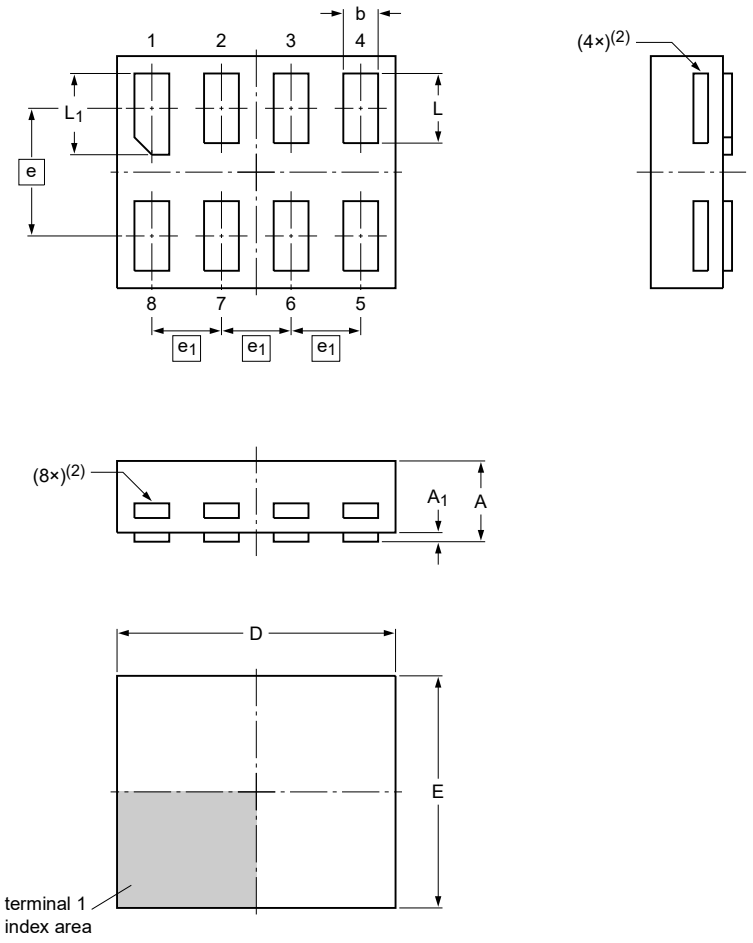
Notes

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

Fig. 26. Package outline SOT833-1 (XSON8)

XSON8: extremely thin small outline package; no leads;
8 terminals; body 1.2 x 1.0 x 0.35 mm **SOT1116**



Dimensions

Unit		A(1)	A_1	b	D	E	e	e_1	L	L_1
mm	max	0.35	0.04	0.20	1.25	1.05			0.35	0.40
	nom			0.15	1.20	1.00	0.55	0.3	0.30	0.35
	min			0.12	1.15	0.95			0.27	0.32

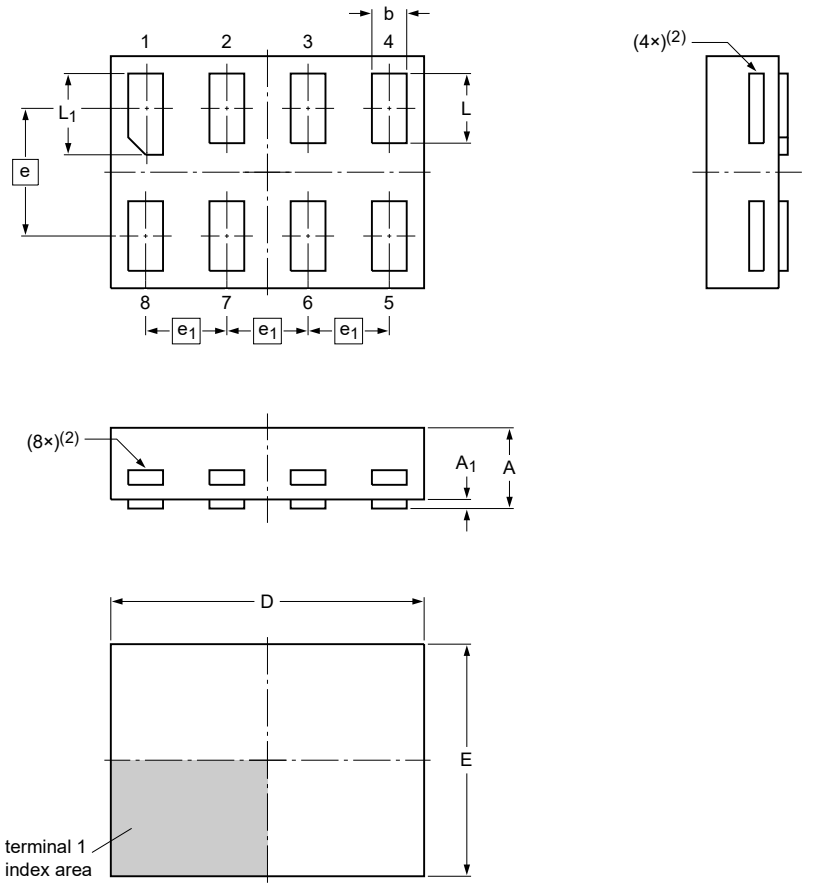
Note
1. Including plating thickness.
2. Visible depending upon used manufacturing technology.

sot1116_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1116						~~10-04-02~~ 10-04-07

Fig. 27. Package outline SOT1116 (XSON8)

XSON8: extremely thin small outline package; no leads;
8 terminals; body 1.35 x 1.0 x 0.35 mm **SOT1203**



Dimensions

Unit		$A^{(1)}$	A_1	b	D	E	e	e_1	L	L_1
mm	max	0.35	0.04	0.20	1.40	1.05			0.35	0.40
	nom			0.15	1.35	1.00	0.55	0.35	0.30	0.35
	min			0.12	1.30	0.95			0.27	0.32

Note
1. Including plating thickness.
2. Visible depending upon used manufacturing technology.

sot1203_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1203						~~10-04-02~~ 10-04-06

Fig. 28. Package outline SOT1203 (XSON8)

13. Abbreviations

Table 28. 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

14. Revision history

Table 29. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC1G99 v.13	20240812	Product data sheet	-	74LVC1G99 v.12
Modifications:	• Type number 74LVC1G99GF (SOT1089/XSON8) removed.			
74LVC1G99 v.12	20230802	Product data sheet	-	74LVC1G99 v.11
Modifications:	• Section 2: ESD specification updated according to the latest JEDEC standard.			
74LVC1G99 v.11	20190725	Product data sheet	-	74LVC1G99 v.10.1
Modifications:	• Type number 74LVC1G99GM (SOT902-2) removed. • Table 21: Derating values for P_{tot} total power dissipation updated.			
74LVC1G99 v.10.1	20181022	Product data sheet	-	74LVC1G99 v.10
Modifications:	• Table 12: input D logic level changed to HIGH.			
74LVC1G99 v.10	20180927	Product data sheet	-	74LVC1G99 v.9
Modifications:	• 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. • Type number 74LVC1G99GD (SOT996-2) removed.			
74LVC1G99 v.9	20161212	Product data sheet	-	74LVC1G99 v.8
Modifications:	• Table 23: The maximum limits for leakage current and supply current have changed.			
74LVC1G99 v.8	20130405	Product data sheet	-	74LVC1G99 v.7
Modifications:	• For type number 74LVC1G99GD XSON8U has changed to XSON8.			
74LVC1G99 v.7	20120622	Product data sheet	-	74LVC1G99 v.6
Modifications:	• For type number 74LVC1G99GM the SOT code has changed to SOT902-2.			
74LVC1G99 v.6	20111201	Product data sheet	-	74LVC1G99 v.5
Modifications:	• Legal pages updated.			
74LVC1G99 v.5	20101021	Product data sheet	-	74LVC1G99 v.4
74LVC1G99 v.4	20100416	Product data sheet	-	74LVC1G99 v.3
74LVC1G99 v.3	20091203	Product data sheet	-	74LVC1G99 v.2
74LVC1G99 v.2	20080208	Product data sheet	-	74LVC1G99 v.1

15. 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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