74LVC2G07

Buffers with open-drain outputs

Rev. 12 — 24 January 2022 Product data sheet

1. General description

The 74LVC2G07 is a dual buffer with open-drain outputs. Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of these devices as translators in mixed 3.3 V and 5 V environments. Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times. 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 5.5 V
- Overvoltage tolerant inputs to 5.5 V
- High noise immunity
- -24 mA output drive (V_{CC} = 3.0 V)
- CMOS low power dissipation
- Direct interface with TTL levels
- I_{OFF} circuitry provides partial Power-down mode operation
- Latch-up performance exceeds 250 mA
- Complies with JEDEC standard:
  - JESD8-7 (1.65 V to 1.95 V)
  - JESD8-5 (2.3 V to 2.7 V)
  - JESD8C (2.7 V to 3.6 V)
  - JESD36 (4.5 V to 5.5 V)
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 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
74LVC2G07GW	-40 °C to +125 °C	TSSOP6	plastic thin shrink small outline package; 6 leads; body width 1.25 mm	SOT363-2
74LVC2G07GV	-40 °C to +125 °C	SC-74; TSOP6	plastic surface-mounted package; 6 leads	SOT457
74LVC2G07GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886
74LVC2G07GN	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm	SOT1115
74LVC2G07GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm	SOT1202
74LVC2G07GX	-40 °C to +125 °C	X2SON6	plastic thermal enhanced extremely thin small outline package; no leads; 6 terminals; body 1.0 × 0.8 × 0.32 mm	SOT1255-2

4. Marking

Table 2. Marking

Type number	Marking code[1]
74LVC2G07GW	V7
74LVC2G07GV	V07
74LVC2G07GM	V7
74LVC2G07GN	V7
74LVC2G07GS	V7
74LVC2G07GX	V7

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

5. Functional diagram

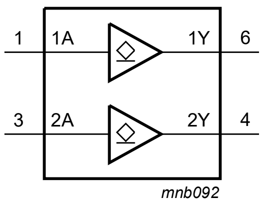


Fig. 1. Logic symbol

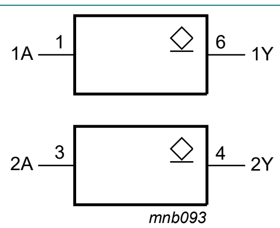


Fig. 2. IEC logic symbol

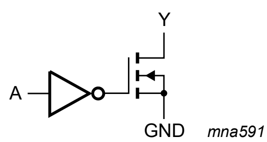


Fig. 3. Logic diagram (one driver)

6. Pinning information

6.1. Pinning

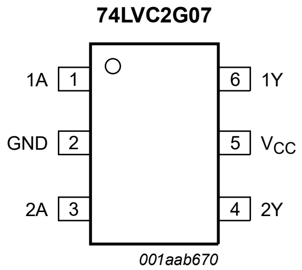


Fig. 4. Pin configuration SOT363-2 (TSSOP6) and SOT457 (SC-74; TSOP6)

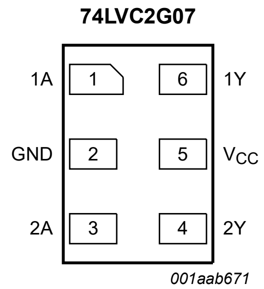


Fig. 5. Pin configuration SOT886 (XSON6)

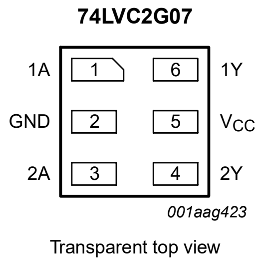


Fig. 6. Pin configuration SOT1115 and SOT1202 (XSON6)

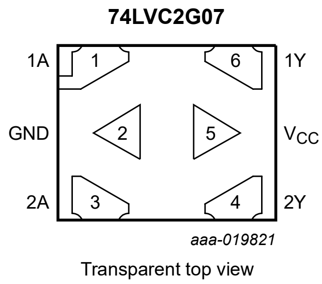


Fig. 7. Pin configuration SOT1255-2 (X2SON6)

6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
1A	1	data input
GND	2	ground (0 V)
2A	3	data input
2Y	4	data output
V_{CC}	5	supply voltage
1Y	6	data output

7. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level; Z = high-impedance OFF-state.

Input nA	Output nY
L	L
H	Z

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	+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	$V_O < 0$ V	-50	-	mA
V_O	output voltage	Active mode [1]	-0.5	+6.5	V
		Power-down mode; $V_{CC} = 0$ V [1]	-0.5	+6.5	V
I_O	output current	$V_O = 0$ V to 6.5 V	-	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 [2]	-	250	mW

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

[2] For SOT363-2 (TSSOP6) package: P_{tot} derates linearly with 3.7 mW/K above 83 °C.
For SOT457 (SC-74; TSOP6) package: P_{tot} derates linearly with 4.1 mW/K above 89 °C.
For SOT886 (XSON6) package: P_{tot} derates linearly with 3.3 mW/K above 74 °C.
For SOT1115 (XSON6) package: P_{tot} derates linearly with 3.2 mW/K above 71 °C.
For SOT1202 (XSON6) package: P_{tot} derates linearly with 3.3 mW/K above 74 °C.
For SOT1255-2 (X2SON6) package: P_{tot} derates linearly with 3.3 mW/K above 75 °C.

9. Recommended operating conditions

Table 6. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	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	-	5.5	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 5.5 V	-	-	10	ns/V

10. Static characteristics

Table 7. Static characteristics

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

Symbol	Parameter	Conditions		Min	Typ[1]	Max	Unit
T_{amb} = -40 °C to +85 °C							
V_{IH}	HIGH-level input voltage	V_{CC} = 1.65 V to 1.95 V		0.65 x V_{CC}	-	-	V
		V_{CC} = 2.3 V to 2.7 V		1.7	-	-	V
		V_{CC} = 2.7 V to 3.6 V		2.0	-	-	V
		V_{CC} = 4.5 V to 5.5 V		0.7 x V_{CC}	-	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 1.65 V to 1.95 V		-	-	0.35 x V_{CC}	V
		V_{CC} = 2.3 V to 2.7 V		-	-	0.7	V
		V_{CC} = 2.7 V to 3.6 V		-	-	0.8	V
		V_{CC} = 4.5 V to 5.5 V		-	-	0.3 x V_{CC}	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}					
		I_O = 100 μA; V_{CC} = 1.65 V to 5.5 V		-	-	0.10	V
		I_O = 4 mA; V_{CC} = 1.65 V		-	-	0.45	V
		I_O = 8 mA; V_{CC} = 2.3 V		-	-	0.30	V
		I_O = 12 mA; V_{CC} = 2.7 V		-	-	0.40	V
		I_O = 24 mA; V_{CC} = 3.0 V		-	-	0.55	V
		I_O = 32 mA; V_{CC} = 4.5 V		-	-	0.55	V
I_I	input leakage current	V_I = 5.5 V or GND; V_{CC} = 0 V to 5.5 V	[2]	-	±0.1	±1	μA
I_{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL}; $V_O = V_{CC}$ or GND; V_{CC} = 5.5 V		-	±0.1	±2	μA
I_{OFF}	power-off leakage current	V_I or V_O = 5.5 V; V_{CC} = 0 V		-	±0.1	±2	μA
I_{CC}	supply current	V_I = 5.5 V or GND; I_O = 0 A; V_{CC} = 1.65 V to 5.5 V		-	0.1	4	μA
ΔI_{CC}	additional supply current	per pin; $V_I = V_{CC}$ - 0.6 V; I_O = 0 A; V_{CC} = 2.3 V to 5.5 V	[2]	-	5	500	μA
C_I	input capacitance			-	2.5	-	pF

Symbol	Parameter	Conditions	Min	Typ[1]	Max	Unit
T_{amb} = -40 °C to +125 °C						
V_{IH}	HIGH-level input voltage	V_{CC} = 1.65 V to 1.95 V	0.65 x V_{CC}	-	-	V
		V_{CC} = 2.3 V to 2.7 V	1.7	-	-	V
		V_{CC} = 2.7 V to 3.6 V	2.0	-	-	V
		V_{CC} = 4.5 V to 5.5 V	0.7 x V_{CC}	-	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 1.65 V to 1.95 V	-	-	0.35 x V_{CC}	V
		V_{CC} = 2.3 V to 2.7 V	-	-	0.7	V
		V_{CC} = 2.7 V to 3.6 V	-	-	0.8	V
		V_{CC} = 4.5 V to 5.5 V	-	-	0.3 x V_{CC}	V
V_{OL}	LOW-level output voltage	V_I = V_{IH} or V_{IL}				
		I_O = 100 μA; V_{CC} = 1.65 V to 5.5 V	-	-	0.10	V
		I_O = 4 mA; V_{CC} = 1.65 V	-	-	0.70	V
		I_O = 8 mA; V_{CC} = 2.3 V	-	-	0.45	V
		I_O = 12 mA; V_{CC} = 2.7 V	-	-	0.60	V
		I_O = 24 mA; V_{CC} = 3.0 V	-	-	0.80	V
		I_O = 32 mA; V_{CC} = 4.5 V	-	-	0.80	V
I_I	input leakage current	V_I = 5.5 V or GND; V_{CC} = 0 V to 5.5 V	-	-	±1	μA
I_{OZ}	OFF-state output current	V_I = V_{IH} or V_{IL}; V_O = V_{CC} or GND; V_{CC} = 5.5 V	-	-	±2	μA
I_{OFF}	power-off leakage current	V_I or V_O = 5.5 V; V_{CC} = 0 V	-	-	±2	μA
I_{CC}	supply current	V_I = 5.5 V or GND; I_O = 0 A; V_{CC} = 1.65 V to 5.5 V	-	-	4	μA
ΔI_{CC}	additional supply current	per pin; V_I = V_{CC} - 0.6 V; I_O = 0 A; V_{CC} = 2.3 V to 5.5 V	-	-	500	μA

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

11. Dynamic characteristics

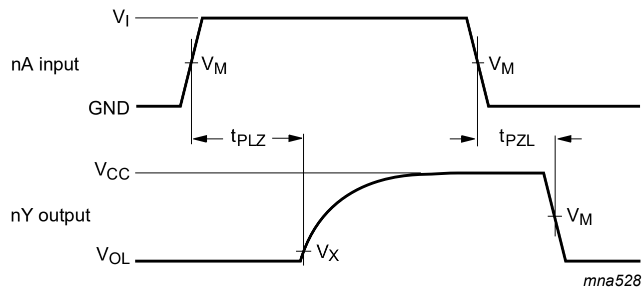
Table 8. Dynamic characteristics

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

Symbol	Parameter	Conditions	-40 °C to +85 °C			-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	
t_{pd}	propagation delay	nA to nY; see Fig. 8 [2]						
		V_{CC} = 1.65 V to 1.95 V	1.0	3.5	6.7	1.0	8.4	ns
		V_{CC} = 2.3 V to 2.7 V	0.5	2.4	4.3	0.5	5.5	ns
		V_{CC} = 2.7 V	1.0	2.3	4.2	1.0	5.3	ns
		V_{CC} = 3.0 V to 3.6 V	0.5	2.6	3.7	0.5	4.7	ns
		V_{CC} = 4.5 V to 5.5 V	0.5	1.5	2.9	0.5	3.7	ns
C_{PD}	power dissipation capacitance	V_I = GND to V_{CC}; V_{CC} = 3.3 V [3]	-	6.5	-	-	-	pF

[1] Typical values are measured at T_{amb} = 25 °C and V_{CC} = 1.8 V, 2.5 V, 2.7 V, 3.3 V and 5.0 V respectively.
[2] t_{pd} is the same as t_{PLZ} and t_{PZL}.
[3] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).
$P_D = C_{PD} \times V_{CC}{}^2 \times f_i \times N + \sum(C_L \times V_{CC}{}^2 \times f_o)$ 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.

11.1. Waveform and test circuit

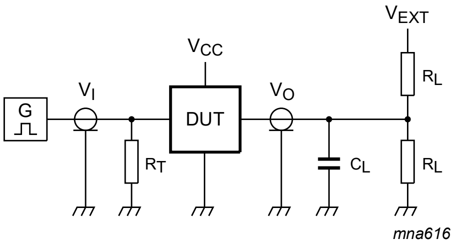


Measurement points are given in Table 9.
V_{OL} is the typical output voltage level that occur with the output load.

Fig. 8. The input (nA) to output (nY) propagation delays

Table 9. Measurement points

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



Test data is given in Table 10.

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.

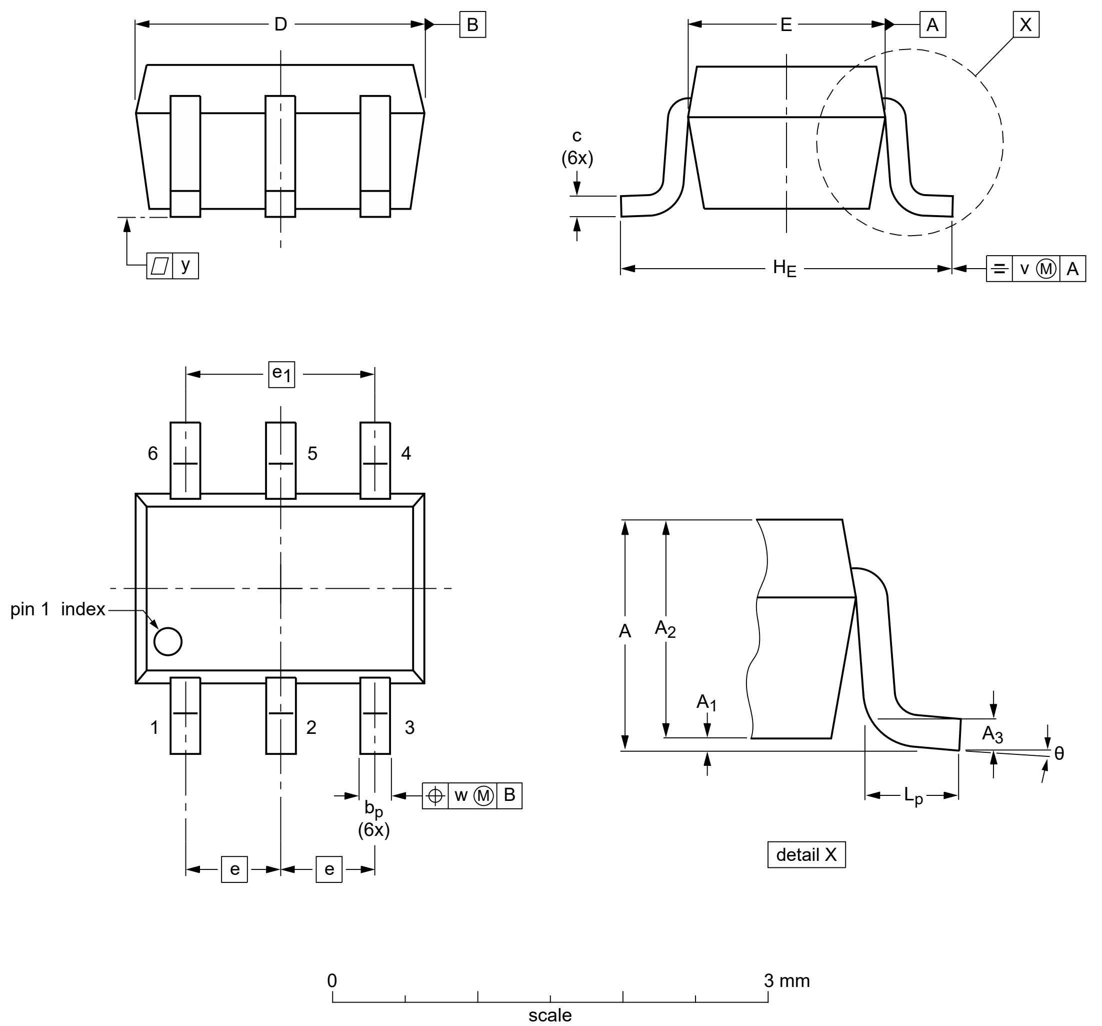
Fig. 9. Test circuit for measuring switching times

Table 10. Test data

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

12. Package outline

TSSOP6: plastic thin shrink small outline package; 6 leads; body width 1.25 mm **SOT363-2**



Dimensions (mm are the original dimensions)

Unit		A	A_1	A_2	A_3	b_p	c	D[1]	E[1]	e	e_1	H_E	L_p	v	w	y	θ
mm	max	1.1	0.1	1.0	0.15	0.30	0.25	2.2	1.35	0.65	1.3	2.4	0.46	0.3	0.1	0.1	8°
	min	0.8	0	0.8		0.15	0.08	1.8	1.15			1.8	0.26				0°

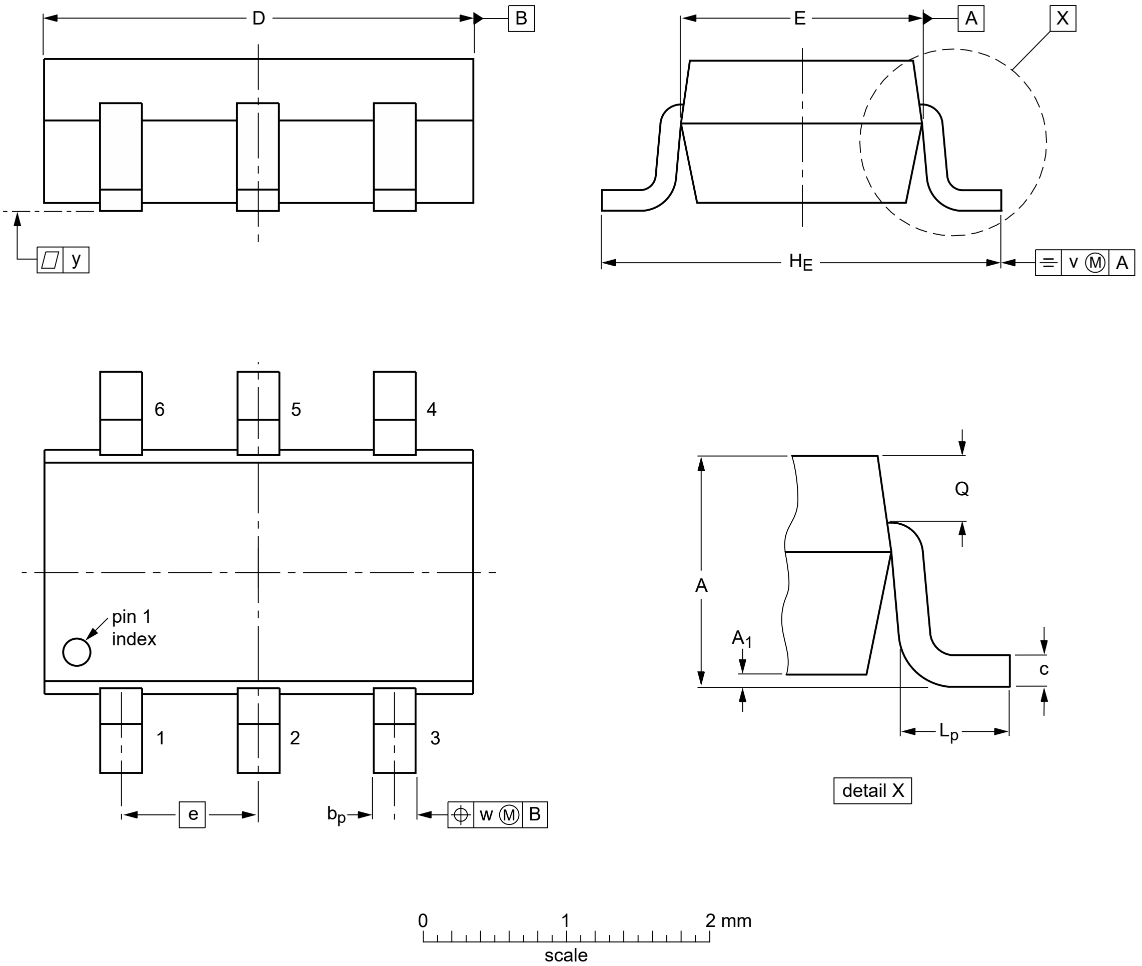
Note
1. Plastic or metal protrusions of 0.2 mm maximum per side are not included.

sot363-2_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT363-2		MO-203	SC-88A			~~21-12-15~~ 21-12-16

Fig. 10. Package outline SOT363-2 (TSSOP6)

Plastic, surface-mounted package (SC-74; TSOP6); 6 leads **SOT457**



Dimensions (mm are the original dimensions)

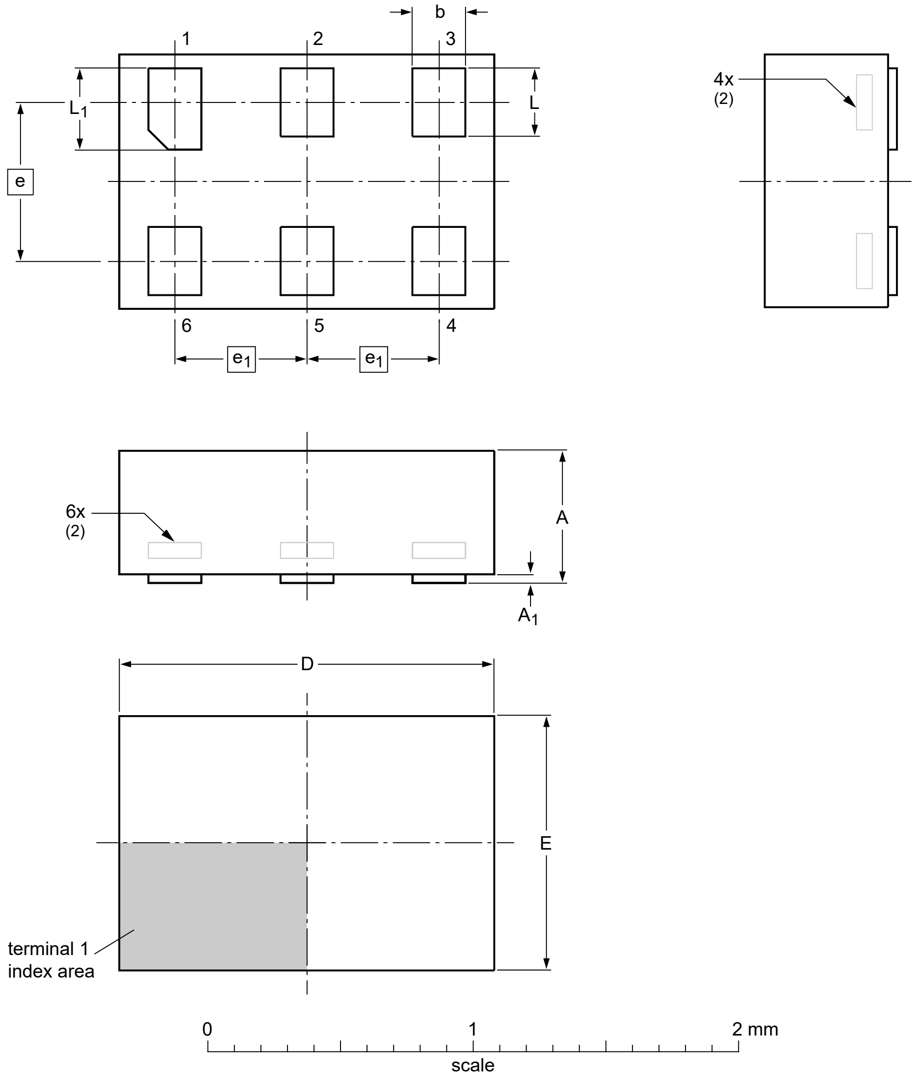
Unit		A	A_1	b_p	c	D	E	e	H_E	L_p	Q	v	w	y
mm	max	1.1	0.1	0.40	0.26	3.1	1.7		3.0	0.6	0.33			
	nom							0.95				0.2	0.2	0.1
	min	0.9	0.013	0.25	0.10	2.7	1.3		2.5	0.2	0.23			

sot457_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT457			SC-74			~~06-03-16~~ 18-11-27

Fig. 11. Package outline SOT457 (SC-74; TSOP6)

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm SOT886



Dimensions (mm are the original dimensions)

Unit		A(1)	A_1	b	D	E	e	e_1	L	L_1
	max	0.5	0.04	0.25	1.50	1.05			0.35	0.40
mm	nom			0.20	1.45	1.00	0.6	0.5	0.30	0.35
	min			0.17	1.40	0.95			0.27	0.32

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

sot886_po

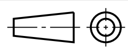
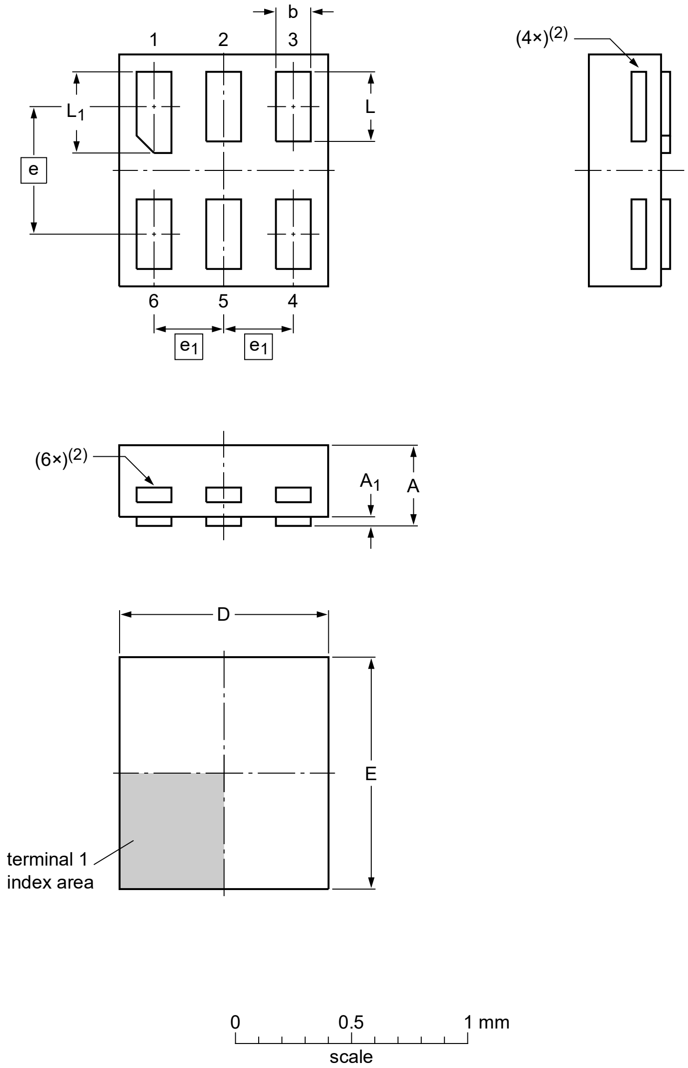
Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT886		MO-252				~~04-07-22~~ 12-01-05

Fig. 12. Package outline SOT886 (XSON6)

XSON6: extremely thin small outline package; no leads;
6 terminals; body 0.9 x 1.0 x 0.35 mm **SOT1115**



Dimensions

Unit		$A^{(1)}$	A_1	b	D	E	e	e_1	L	L_1
	max	0.35	0.04	0.20	0.95	1.05			0.35	0.40
mm	nom			0.15	0.90	1.00	0.55	0.3	0.30	0.35
	min			0.12	0.85	0.95			0.27	0.32

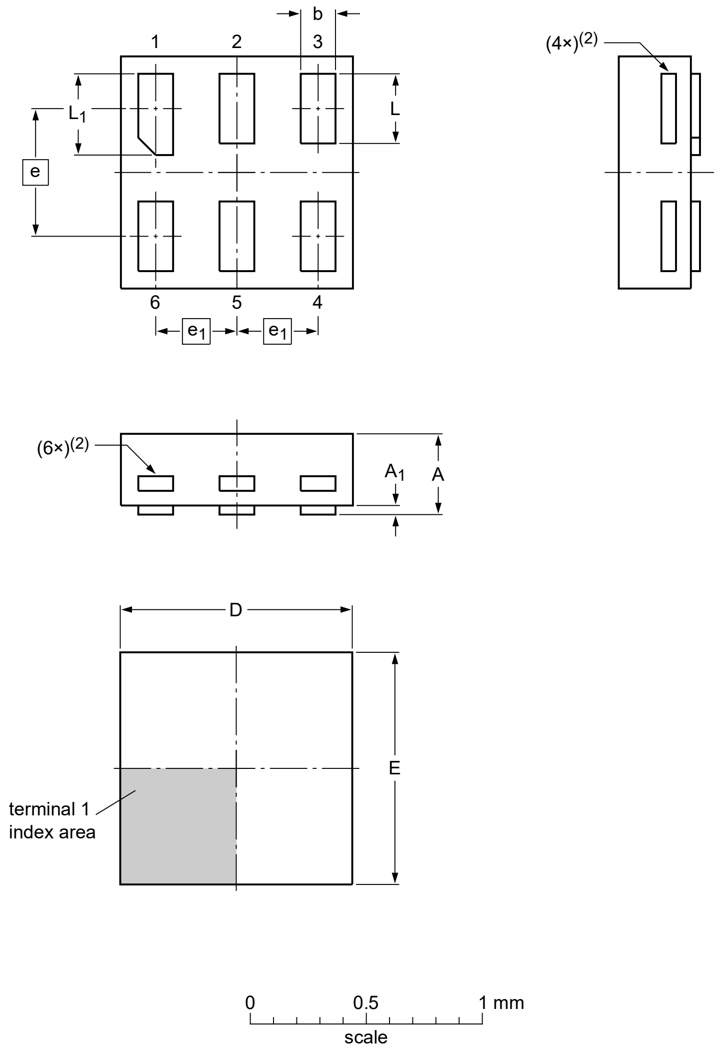
Note
1. Including plating thickness.
2. Visible depending upon used manufacturing technology.

sot1115_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1115						~~10-04-02~~ 10-04-07

Fig. 13. Package outline SOT1115 (XSON6)

XSON6: extremely thin small outline package; no leads;
6 terminals; body 1.0 x 1.0 x 0.35 mm **SOT1202**



Dimensions

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

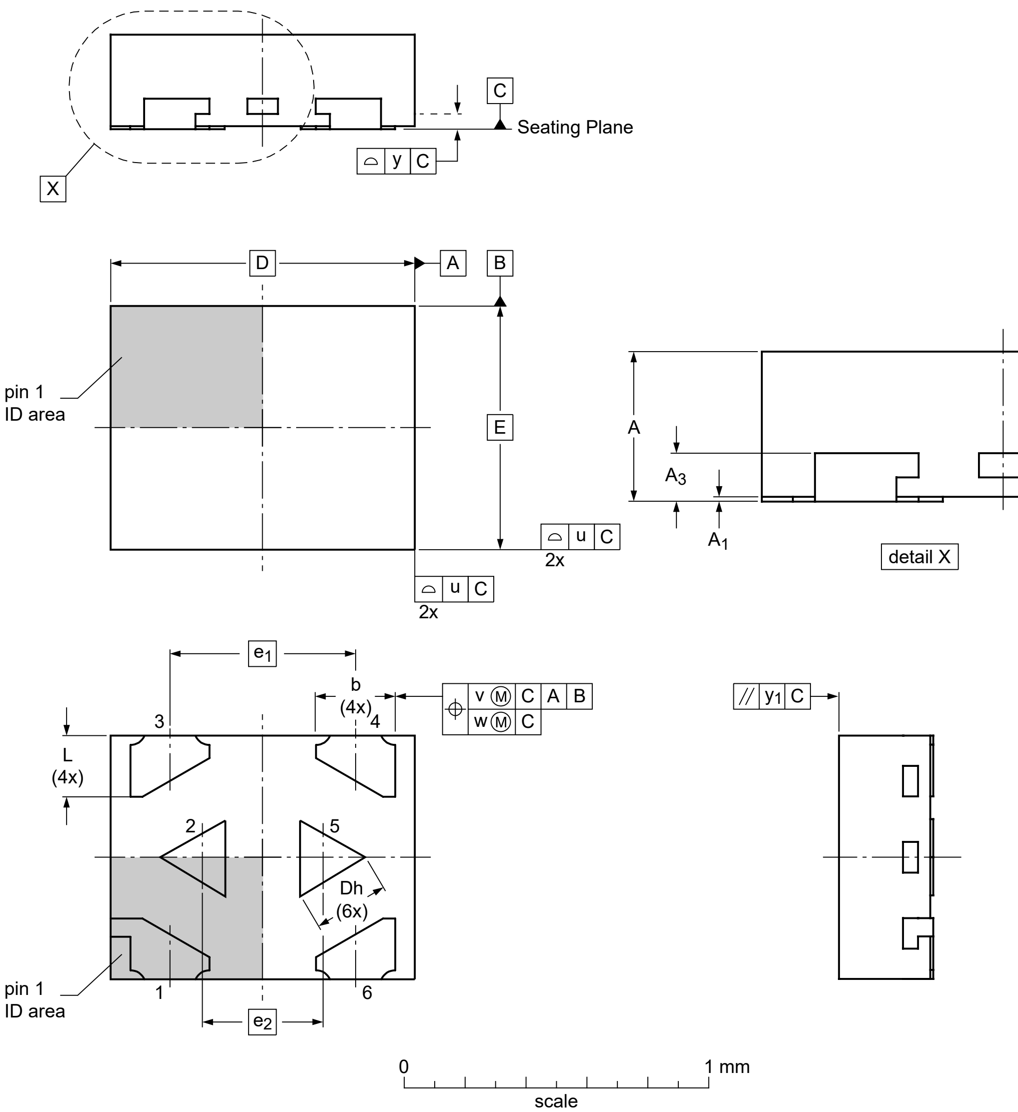
Note
1. Including plating thickness.
2. Visible depending upon used manufacturing technology.

sot1202_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1202						~~10-04-02~~ 10-04-06

Fig. 14. Package outline SOT1202 (XSON6)

X2SON6: plastic thermal enhanced extremely thin small outline package; no leads; 6 terminals; body 1.0 x 0.8 x 0.32 mm **SOT1255-2**



Dimensions (mm are the original dimensions)

Unit		A	A_1	A_3	b	D	D_h	E	e_1	e_2	L	y	y_1	u	v	w
mm	max	0.35	0.04	0.10 (Typ.)	0.31	1.00	0.30	0.80	0.60	0.40	0.25	0.05	0.05	0.05	0.10	0.05
	nom	0.32	0.02		0.26		0.25				0.20					
	min	0.30	0.00		0.21		0.20				0.15					

sot1255-2_po

Outline version	References: IEC	JEDEC	JEITA		European projection	Issue date
SOT1255-2		- - -				~~19-11-07~~ 19-11-08

Fig. 15. Package outline SOT1255-2 (X2SON6)

13. Abbreviations

Table 11. 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

14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC2G07 v.12	20220124	Product data sheet	-	74LVC2G07 v.11
Modifications:	• Package SOT363 (SC-88) changed to SOT363-2 (SC-88).			
74LVC2G07 v.11	20210929	Product data sheet	-	74LVC2G07 v.10
Modifications:	• Type number 74LVC2G07GF (SOT891/XSON6) removed. • SOT1255 (X2SON6) package changed to SOT1255-2 (X2SON6) package. • Table 5: Derating values for P_{tot} total power dissipation updated. • Fig. 11: Package outline drawing SOT457 updated. • Section 1 and Section 2 updated.			
74LVC2G07 v.10	20170821	Product data sheet	-	74LVC2G07 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.			
74LVC2G07 v.9	20161212	Product data sheet	-	74LVC2G07 v.8
Modifications:	• Table 7: The maximum limits for leakage current and supply current have changed.			
74LVC2G07 v.8	20150923	Product data sheet	-	74LVC2G07 v.7
Modifications:	• Added type number 74LVC2G07GX (SOT1255/X2SON6).			
74LVC2G07 v.7	20120704	Product data sheet	-	74LVC2G07 v.6
Modifications:	• Package outline drawing of SOT886 (Fig. 12) modified.			
74LVC2G07 v.6	20111130	Product data sheet	-	74LVC2G07 v.5
Modifications:	• Legal pages updated.			
74LVC2G07 v.5	20100806	Product data sheet	-	74LVC2G07 v.4
74LVC2G07 v.4	20070521	Product data sheet	-	74LVC2G07 v.3
74LVC2G07 v.3	20040908	Product data sheet	-	74LVC2G07 v.2
74LVC2G07 v.2	20040319	Product data sheet	-	74LVC2G07 v.1
74LVC2G07 v.1	20030825	Product data sheet	-	-

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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