74AUP2G07

Low-power dual buffer with open-drain output

Rev. 9 — 3 November 2021

Product data sheet

1. General description

The 74AUP2G07 is a dual buffer with open-drain outputs. Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times. This device ensures very low static and dynamic power consumption across the entire V_{CC} range from 0.8 V to 3.6 V. 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 0.8 V to 3.6 V
- CMOS low power dissipation
- · High noise immunity
- · Overvoltage tolerant inputs to 3.6 V
- Low noise overshoot and undershoot < 10 % of V_{CC}
- I_{OFF} circuitry provides partial Power-down mode operation
- Latch-up performance exceeds 100 mA per JESD 78 Class II Level B
- Low static-power consumption; I_{CC} = 0.9 μA (maximum)
- Complies with JEDEC standards:
 - JESD8-12 (0.8 V to 1.3 V)
 - JESD8-11 (0.9 V to 1.65 V)
 - JESD8-7 (1.65 V to 1.95 V)
 - JESD8-5 (2.3 V to 2.7 V)
 - JESD8C (2.7 V to 3.6 V)
- ESD protection:
 - HBM JESD22-A114F Class 3A exceeds 5000 V
 - MM JESD22-A115-A exceeds 200 V
 - CDM JESD22-C101E exceeds 1000 V
- Multiple package options
- Specified from -40 °C to +85 °C and -40 °C to +125 °C



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3. Ordering information

Table 1. Ordering information

Type number	Package	Package								
	Temperature range	Name	Description	Version						
74AUP2G07GW	-40 °C to +125 °C	SC-88	plastic surface-mounted package; 6 leads	SOT363						
74AUP2G07GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886						
74AUP2G07GN	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm	SOT1115						
74AUP2G07GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm	SOT1202						
74AUP2G07GX	-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						

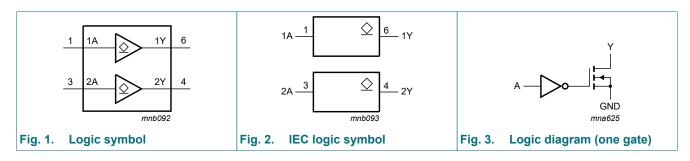
4. Marking

Table 2. Marking

Type number	Marking code[1]
74AUP2G07GW	p7
74AUP2G07GM	p7
74AUP2G07GN	p7
74AUP2G07GS	p7
74AUP2G07GX	p7

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

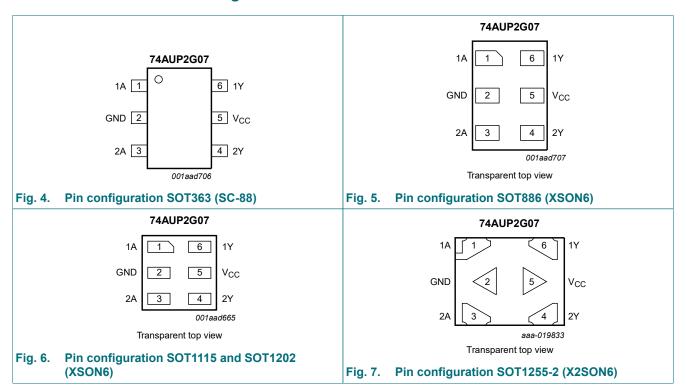
5. Functional diagram



Low-power dual buffer with open-drain output

6. Pinning information

6.1. Pinning



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

 $H = HIGH \text{ voltage level}; L = LOW \text{ voltage level}; Z = high-impedance OFF state.}$

Input	Output
nA	nY
L	L
Н	Z

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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
I _{IK}	input clamping current	V _I < 0 V	-50	-	mA
VI	input voltage	[1]	-0.5	+4.6	V
lok	output clamping current	V _O < 0 V	-50	-	mA
Vo	output voltage	Active mode and Power-down mode [1]	-0.5	+4.6	V
Io	output current	V _O = 0 V to V _{CC}	-	20	mA
I _{CC}	supply current		-	50	mA
I _{GND}	ground current		-50	-	mA
T _{stg}	storage temperature		-65	+150	°C
P _{tot}	total power dissipation	$T_{amb} = -40 ^{\circ}\text{C} \text{ to } +125 ^{\circ}\text{C}$ [2]	-	250	mW

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

9. Recommended operating conditions

Table 6. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	supply voltage		8.0	3.6	V
VI	input voltage		0	3.6	V
Vo	output voltage	Active mode and Power-down mode	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	Min	Тур	Max	Unit		
T _{amb} = 25 °C								
V_{IH}	HIGH-level input voltage	V _{CC} = 0.8 V	0.70 × V _{CC}	-	-	V		
		V _{CC} = 0.9 V to 1.95 V	0.65 × V _{CC}	-	-	V		
		V _{CC} = 2.3 V to 2.7 V	1.6	-	-	V		
		V _{CC} = 3.0 V to 3.6 V	2.0	-	-	V		
V_{IL}	LOW-level input voltage	V _{CC} = 0.8 V	-	-	0.30 × V _{CC}	V		
		V _{CC} = 0.9 V to 1.95 V	-	-	0.35 × V _{CC}	V		
		V _{CC} = 2.3 V to 2.7 V	-	-	0.7	V		
		V _{CC} = 3.0 V to 3.6 V	-	-	0.9	V		

^[2] For SOT363 (SC-88) package: Ptot derates linearly with 3.7 mW/K above 83 °C.

For SOT886 (XSON6) package: Ptot derates linearly with 3.3 mW/K above 74 °C.

For SOT1115 (XSON6) package: Ptot derates linearly with 3.2 mW/K above 71 °C.

For SOT1202 (XSON6) package: Ptot derates linearly with 3.3 mW/K above 74 °C.

For SOT1255-2 (X2SON6) package: Ptot derates linearly with 3.3 mW/K above 75 °C.

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V _{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
VoL		I _O = 20 μA; V _{CC} = 0.8 V to 3.6 V	-	-	0.1	V
		I _O = 1.1 mA; V _{CC} = 1.1 V	-	-	0.3 × V _{CC}	V
		I _O = 1.7 mA; V _{CC} = 1.4 V	-	-	0.31	V
		I _O = 1.9 mA; V _{CC} = 1.65 V	-	-	0.31	V
		I _O = 2.3 mA; V _{CC} = 2.3 V	-	-	0.31	V
		I _O = 3.1 mA; V _{CC} = 2.3 V	-	-	0.44	V
		I _O = 2.7 mA; V _{CC} = 3.0 V	-	-	0.31	V
		I _O = 4.0 mA; V _{CC} = 3.0 V	-	-	0.44	V
l _l	input leakage current	V_I = GND to 3.6 V; V_{CC} = 0 V to 3.6 V	-	-	±0.1	μΑ
l _{OZ}	OFF-state output current	V _I = V _{IH} ; V _O = 0 V to 3.6 V; V _{CC} = 0 V to 3.6 V	-	-	±0.1	μΑ
I _{OFF}	power-off leakage current V_1 or $V_0 = 0$ V to 3.6 V; $V_{CC} = 0$ V		-	-	±0.2	μΑ
ΔI_{OFF}	additional power-off leakage current	V_1 or $V_0 = 0 \text{ V}$ to 3.6 V; $V_{CC} = 0 \text{ V}$ to 0.2 V	-	-	±0.2	μΑ
I _{CC}	supply current	V_I = GND or V_{CC} ; I_O = 0 A; V_{CC} = 0.8 V to 3.6 V	-	-	0.5	μΑ
ΔI _{CC}	additional supply current	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$	-	-	40	μΑ
Cı	input capacitance	$V_{CC} = 0 \text{ V to } 3.6 \text{ V; } V_{I} = \text{GND or } V_{CC}$	-	0.7	-	pF
Co	output capacitance	$V_O = GND; V_{CC} = 0 V$	-	0.9	-	pF
T _{amb} = -4	40 °C to +85 °C					
V _{IH}	HIGH-level input voltage	V _{CC} = 0.8 V	0.70 × V _{CC}	-	-	V
		V _{CC} = 0.9 V to 1.95 V	0.65 × V _{CC}	-	-	V
		V _{CC} = 2.3 V to 2.7 V	1.6	-	-	V
		V _{CC} = 3.0 V to 3.6 V	2.0	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 0.8 V	-	-	0.30 × V _{CC}	V
		V _{CC} = 0.9 V to 1.95 V	-	-	0.35 × V _{CC}	V
		V _{CC} = 2.3 V to 2.7 V	-	-	0.7	V
		V _{CC} = 3.0 V to 3.6 V	-	-	0.9	V
V _{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = 20 \mu A; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	0.1	V
		I _O = 1.1 mA; V _{CC} = 1.1 V	-	-	0.3 × V _{CC}	V
		I _O = 1.7 mA; V _{CC} = 1.4 V	-	-	0.37	V
		I _O = 1.9 mA; V _{CC} = 1.65 V	-	-	0.35	V
		I _O = 2.3 mA; V _{CC} = 2.3 V	-	-	0.33	V
		I _O = 3.1 mA; V _{CC} = 2.3 V	-	-	0.45	V
		I _O = 2.7 mA; V _{CC} = 3.0 V	-	-	0.33	V
		$I_O = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.45	V

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
l _l	input leakage current	V _I = GND to 3.6 V; V _{CC} = 0 V to 3.6 V	-	-	±0.5	μΑ
l _{OZ}	OFF-state output current	V _I = V _{IH} ; V _O = 0 V to 3.6 V; V _{CC} = 0 V to 3.6 V	-	-	±0.5	μA
I _{OFF}	power-off leakage current	V_{I} or $V_{O} = 0 V$ to 3.6 V; $V_{CC} = 0 V$	-	-	±0.5	μΑ
ΔI_{OFF}	additional power-off V_I or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V to 0.2 V leakage current		-	-	±0.6	μA
I _{CC}	supply current	V _I = GND or V _{CC} ; I _O = 0 A; V _{CC} = 0.8 V to 3.6 V		-	0.9	μA
ΔI_{CC}	additional supply current	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$	-	-	50	μΑ
T _{amb} = -4	40 °C to +125 °C			'		<u>'</u>
V _{IH}	HIGH-level input voltage	V _{CC} = 0.8 V	0.75 × V _{CC}	-	-	V
""		V _{CC} = 0.9 V to 1.95 V	0.70 × V _{CC}	-	-	V
		V _{CC} = 2.3 V to 2.7 V	1.6	-	-	V
		V _{CC} = 3.0 V to 3.6 V	2.0	-	-	V
V_{IL}	LOW-level input voltage	V _{CC} = 0.8 V	-	-	0.25 × V _{CC}	V
		V _{CC} = 0.9 V to 1.95 V	-	-	0.30 × V _{CC}	V
		V _{CC} = 2.3 V to 2.7 V	-	-	0.7	V
		V _{CC} = 3.0 V to 3.6 V	-	-	0.9	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		I _O = 20 μA; V _{CC} = 0.8 V to 3.6 V	-	-	0.11	V
		I _O = 1.1 mA; V _{CC} = 1.1 V	-	-	0.33 × V _{CC}	V
		I _O = 1.7 mA; V _{CC} = 1.4 V	-	-	0.41	V
		I _O = 1.9 mA; V _{CC} = 1.65 V	-	-	0.39	V
		I _O = 2.3 mA; V _{CC} = 2.3 V	-	-	0.36	V
		I _O = 3.1 mA; V _{CC} = 2.3 V	-	-	0.50	V
		I _O = 2.7 mA; V _{CC} = 3.0 V	-	-	0.36	V
		I _O = 4.0 mA; V _{CC} = 3.0 V	-	-	0.50	V
I _I	input leakage current	V _I = GND to 3.6 V; V _{CC} = 0 V to 3.6 V	-	-	±0.75	μΑ
I _{OZ}	OFF-state output current	V _I = V _{IH} ; V _O = 0 V to 3.6 V; V _{CC} = 0 V to 3.6 V	-	-	±0.75	μA
I _{OFF}	power-off leakage current	V _I or V _O = 0 V to 3.6 V; V _{CC} = 0 V	-	-	±0.75	μΑ
Δl _{OFF}	additional power-off leakage current	V_1 or $V_0 = 0 V$ to 3.6 V; $V_{CC} = 0 V$ to 0.2 V	-	-	±0.75	μA
I _{CC}	supply current	V_I = GND or V_{CC} ; I_O = 0 A; V_{CC} = 0.8 V to 3.6 V	-	-	1.4	μΑ
ΔI_{CC}	additional supply current	$V_1 = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$	-	-	75	μΑ

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11. Dynamic characteristics

Table 8. Dynamic characteristics

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

Symbol	Parameter	Conditions		25 °C			°C to 5 °C		°C to 5 °C	Unit
			Min	Typ [1]	Max	Min	Max	Min	Max	
C _L = 5 p	F				•		•			
t _{pd}	propagation	nA to nY; see Fig. 8 [2]								
	delay	V _{CC} = 0.8 V	-	11.6	-	-	-	-	-	ns
		V _{CC} = 1.1 V to 1.3 V	2.1	4.1	7.5	1.7	9.1	1.7	10.0	ns
		V _{CC} = 1.4 V to 1.6 V	1.6	3.0	5.1	1.3	6.1	1.3	6.7	ns
		V _{CC} = 1.65 V to 1.95 V	1.6	2.7	4.0	1.2	5.0	1.2	5.5	ns
		V _{CC} = 2.3 V to 2.7 V	1.1	2.1	3.2	0.9	4.0	0.9	4.4	ns
		V _{CC} = 3.0 V to 3.6 V	1.4	2.2	2.8	1.1	3.3	1.1	3.6	ns
C _L = 10	pF				•					
t _{pd}	propagation	nA to nY; see Fig. 8 [2]								
	delay	V _{CC} = 0.8 V	-	14.7	-	-	-	-	-	ns
		V _{CC} = 1.1 V to 1.3 V	3.0	5.1	9.0	2.4	11.2	2.4	12.3	ns
		V _{CC} = 1.4 V to 1.6 V	2.3	3.8	6.1	2.0	7.4	2.0	8.1	ns
		V _{CC} = 1.65 V to 1.95 V	2.4	3.6	4.8	1.8	6.1	1.8	6.7	ns
		V _{CC} = 2.3 V to 2.7 V	1.7	2.8	3.8	1.3	4.8	1.3	5.3	ns
		V _{CC} = 3.0 V to 3.6 V	2.2	3.1	4.2	1.6	4.5	1.6	5.0	ns
C _L = 15	pF								•	
t _{pd}	propagation	nA to nY; see Fig. 8 [2]								
	delay	V _{CC} = 0.8 V	-	17.7	-	-	-	-	-	ns
		V _{CC} = 1.1 V to 1.3 V	3.5	6.1	10.4	3.2	13.1	3.2	14.5	ns
		V _{CC} = 1.4 V to 1.6 V	3.0	4.5	6.8	2.6	8.6	2.6	9.4	ns
		V _{CC} = 1.65 V to 1.95 V	2.8	4.4	6.7	2.2	7.8	2.2	8.6	ns
		V _{CC} = 2.3 V to 2.7 V	2.4	3.4	4.5	1.9	5.3	1.9	5.8	ns
		V _{CC} = 3.0 V to 3.6 V	2.2	4.0	5.7	1.9	6.1	1.9	6.7	ns
C _L = 30	pF				'		•			
t _{pd}	propagation	nA to nY; see Fig. 8 [2]								
	delay	V _{CC} = 0.8 V	-	26.7	-	-	-	-	-	ns
		V _{CC} = 1.1 V to 1.3 V	4.8	9.0	15.6	4.3	18.8	4.3	20.7	ns
		V _{CC} = 1.4 V to 1.6 V	4.1	6.7	9.4	3.7	11.8	3.7	13.0	ns
		V _{CC} = 1.65 V to 1.95 V	3.8	6.8	9.7	3.2	11.0	3.2	12.1	ns
		V _{CC} = 2.3 V to 2.7 V	3.7	5.2	6.7	3.0	7.1	3.0	7.8	ns
		V _{CC} = 3.0 V to 3.6 V	3.6	6.4	9.7	2.8	10.4	2.8	11.4	ns

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Symbol	Parameter	Conditions	25 °C		-40 °C to +85 °C		-40 °C to +125 °C		Unit	
			Min	Typ [1]	Max	Min	Max	Min	Max	
C _L = 5 p	F, 10 pF, 15 pF	and 30 pF				•				
C _{PD}	power	$f_i = 1 \text{ MHz}; V_I = \text{GND to } V_{CC}$ [3] [4]								
	dissipation capacitance	V _{CC} = 0.8 V	-	0.5	-	-	-	-	-	pF
	Capacitarioc	V _{CC} = 1.1 V to 1.3 V	-	0.6	-	-	-	-	-	pF
		V _{CC} = 1.4 V to 1.6 V	-	0.6	-	-	-	-	-	pF
		V _{CC} = 1.65 V to 1.95 V	-	0.7	-	-	-	-	-	pF
		V _{CC} = 2.3 V to 2.7 V	-	0.9	-	-	-	-	-	pF
		V _{CC} = 3.0 V to 3.6 V	-	1.2	-	-	-	-	-	pF

- All typical values are measured at nominal V_{CC}.
- t_{pd} is the same as t_{PZL} and t_{PLZ} .
- All specified values are the average typical values over all stated loads. C_{PD} is used to determine the dynamic power dissipation (P_D in μ W). $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N$ where:

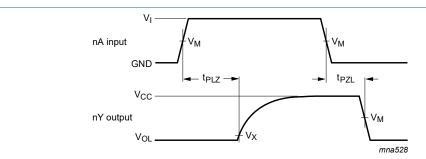
f_i = input frequency in MHz;

 V_{CC} = supply voltage in V;

N = number of inputs switching.

Low-power dual buffer with open-drain output

11.1. Waveforms and test circuit



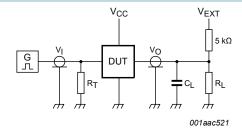
Measurement points are given in Table 9.

Logic level: V_{OL} is the typical output voltage level that occurs with the output load.

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

Table 9. Measurement points

Supply voltage	Input			pply voltage Input			Output	
V _{CC}	V _M	VI	$t_r = t_f$	V _M	V _X			
0.8 V to 1.6 V	0.5 × V _{CC}	V _{CC}	≤ 3.0 ns	0.5 × V _{CC}	V _{OL} + 0.1 V			
1.65 V to 2.7 V	0.5 × V _{CC}	V _{CC}	≤ 3.0 ns	0.5 × V _{CC}	V _{OL} + 0.15 V			
3.0 V to 3.6 V	0.5 × V _{CC}	V _{CC}	≤ 3.0 ns	0.5 × 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	Load		V _{EXT}		
V _{CC}	CL	R _L [1]	t _{PLH} , t _{PHL}	t _{PZH} , t _{PHZ}	t _{PZL} , t _{PLZ}
0.8 V to 3.6 V	5 pF, 10 pF, 15 pF and 30 pF	5 k Ω or 1 M Ω	open	GND	2 × V _{CC}

[1] For measuring enable and disable times R_L = 5 k Ω . For measuring propagation delays, set-up and hold times and pulse width R_L = 1 M Ω .

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Low-power dual buffer with open-drain output

12. Package outline

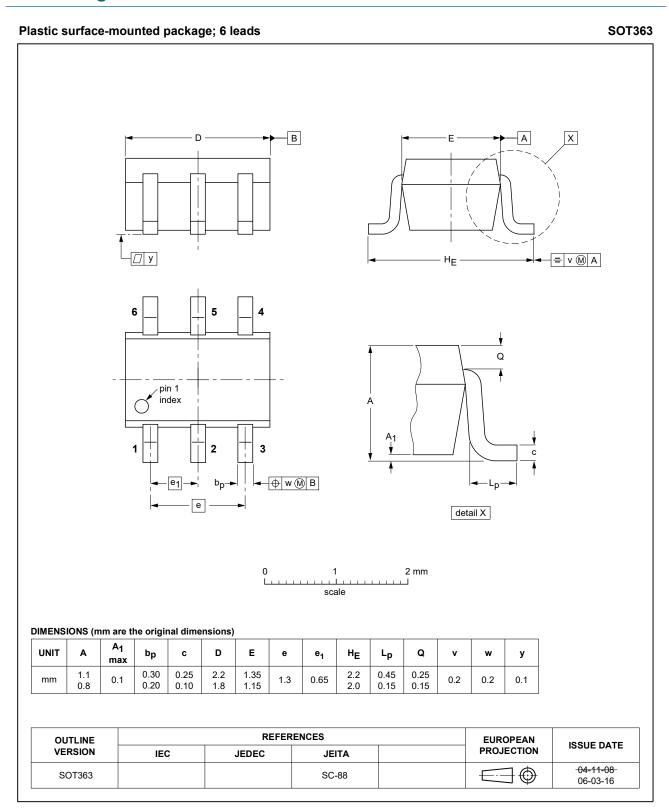


Fig. 10. Package outline SOT363 (SC-88)

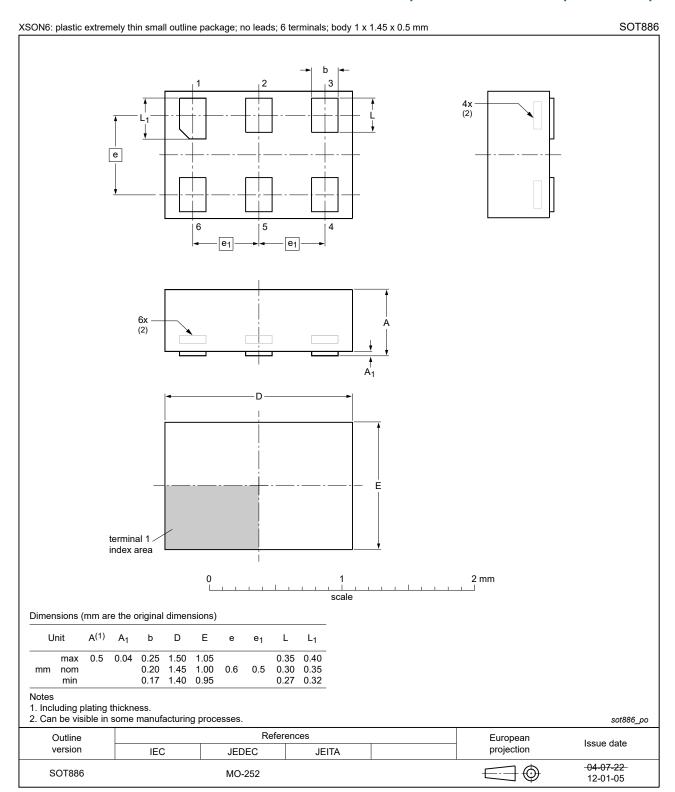


Fig. 11. Package outline SOT886 (XSON6)

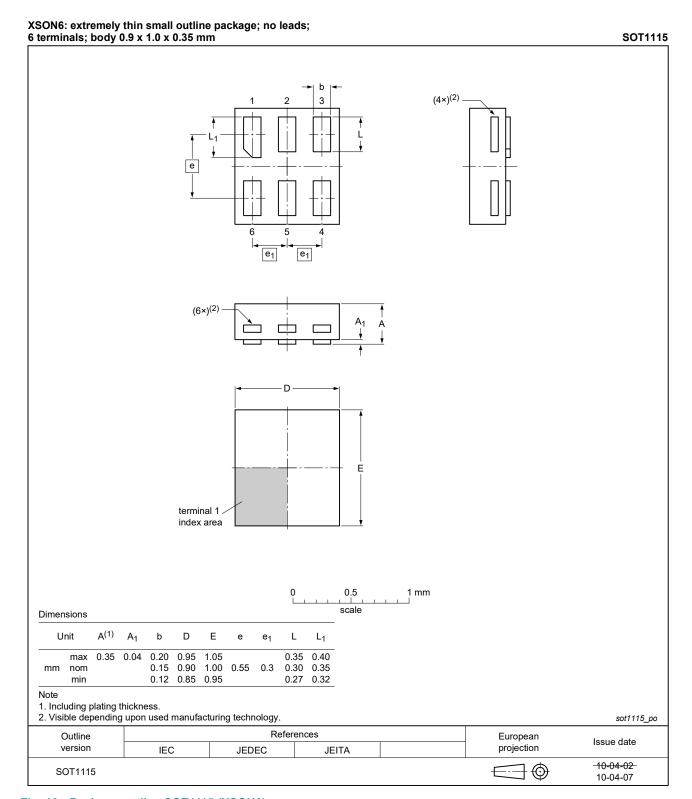


Fig. 12. Package outline SOT1115 (XSON6)

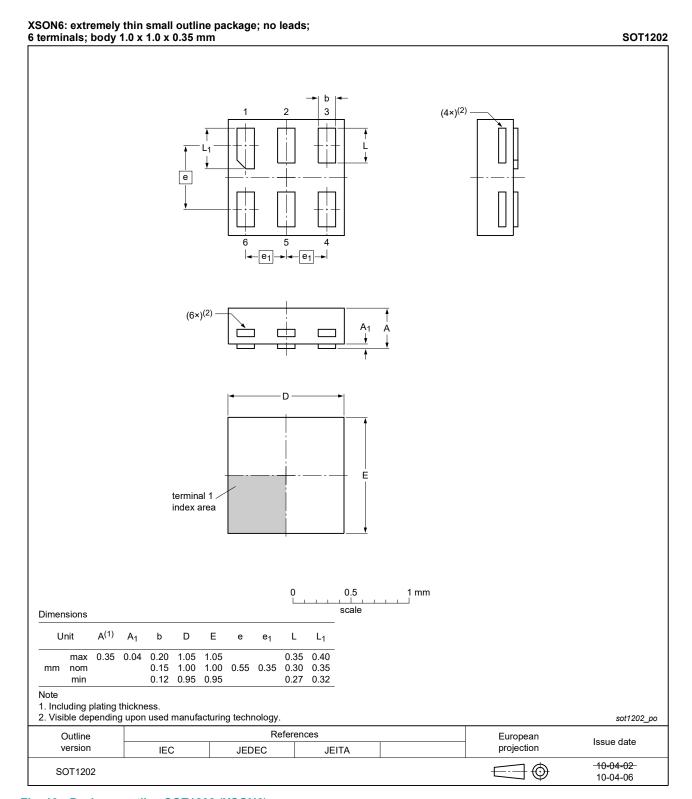


Fig. 13. Package outline SOT1202 (XSON6)

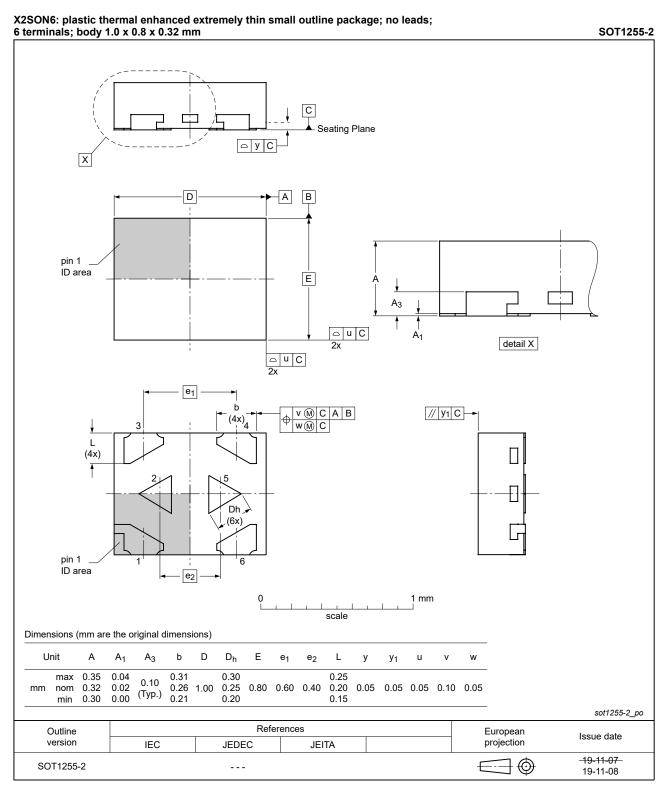


Fig. 14. Package outline SOT1255-2 (X2SON6)

Low-power dual buffer with open-drain output

13. Abbreviations

Table 11. Abbreviations

Acronym	Description
CDM	Charged Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
НВМ	Human Body Model
MM	Machine Model

14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP2G07 v.9	20211103	Product data sheet	-	74AUP2G07 v.8
Modifications:	guidelines of Legal texts Section 1 a Type number SOT1255 (2)	of this data sheet has been of Nexperia. have been adapted to the nd Section 2 updated. er 74AUP2G07GF (SOT89 X2SON6) package change erating values for Ptot total p	new company nar 01/XSON6) remov d to SOT1255-2 (me where appropriate. ed. X2SON6) package.
74AUP2G07 v.8	20150917	Product data sheet	-	74AUP2G07 v.7
Modifications:	Added type	number 74AUP2G07GX (SOT1255/X2SON	6).
74AUP2G07 v.7	20121129	Product data sheet	-	74AUP2G07 v.6
Modifications:	• Package ou	utline drawing of SOT886 (Fig. 11) modified.	
74AUP2G07 v.6	20111202	Product data sheet	-	74AUP2G07 v.5
74AUP2G07 v.5	20100909	Product data sheet	-	74AUP2G07 v.4
74AUP2G07 v.4	20090611	Product data sheet	-	74AUP2G07 v.3
74AUP2G07 v.3	20071016	Product data sheet	-	74AUP2G07 v.2
74AUP2G07 v.2	20070612	Product data sheet	-	74AUP2G07 v.1
74AUP2G07 v.1	20061121	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.
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