74AUP2G07

Low-power dual buffer with open-drain output

Rev. 8 — 17 September 2015

Product data sheet

1. General description

The 74AUP2G07 provides two non-inverting buffers with open-drain output. The output of the device is an open drain and can be connected to other open-drain outputs to implement active-LOW wired-OR or active-HIGH wired-AND functions.

Schmitt-trigger action at all inputs makes the circuit tolerant to slower input rise and fall times across the entire V_{CC} range from 0.8 V to 3.6 V.

This device ensures a 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 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
- High noise immunity
- 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 JESD22-A114F Class 3A exceeds 5000 V
 - ♦ MM JESD22-A115-A exceeds 200 V
 - ◆ CDM JESD22-C101E exceeds 1000 V
- Low static-power consumption; $I_{CC} = 0.9 \mu A$ (maximum)
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Inputs accept voltages up to 3.6 V
- Low noise overshoot and undershoot < 10 % of V_{CC}
- I_{OFF} circuitry provides partial power-down mode operation
- 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			
	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 \times 1.45 \times 0.5 mm	SOT886
74AUP2G07GF	–40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 \times 1 \times 0.5 mm	SOT891
74AUP2G07GN	–40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body $0.9 \times 1.0 \times 0.35$ mm	SOT1115
74AUP2G07GS	–40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 \times 1.0 \times 0.35 mm	SOT1202
74AUP2G07GX	–40 °C to +125 °C	X2SON6	plastic thermal extremely thin small outline package; no leads; 6 terminals; body 1 \times 0.8 \times 0.35 mm	SOT1255

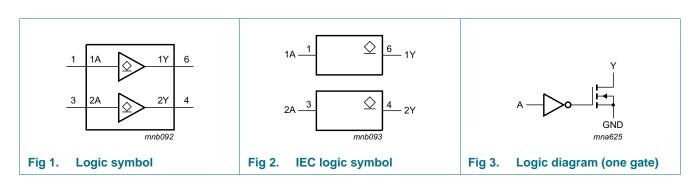
4. Marking

Table 2. Marking

_	
Type number	Marking code ^[1]
74AUP2G07GW	p7
74AUP2G07GM	р7
74AUP2G07GF	р7
74AUP2G07GN	р7
74AUP2G07GS	р7
74AUP2G07GX	р7

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

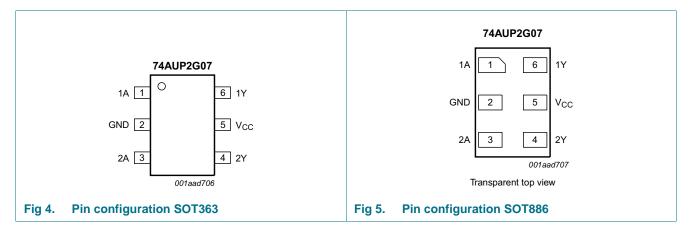
5. Functional diagram



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

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7. Functional description

Table 4. Function table[1]

Input	Output
nA	nY
L	L
Н	Z

^[1] H = HIGH voltage level; L = LOW voltage level; Z = high-impedance OFF state.

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
I _{OK}	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	$V_O = 0 V \text{ to } V_{CC}$	-	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	$T_{amb} = -40 ^{\circ}\text{C} \text{ to } +125 ^{\circ}\text{C}$	-	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		0.8	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

^[2] For SC-88 package: above 87.5 $^{\circ}$ C the value of P_{tot} derates linearly with 4.0 mW/K. For X2SON6 and XSON6 packages: above 118 $^{\circ}$ C the value of P_{tot} derates linearly with 7.8 mW/K.

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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} = 2	5 °C					
V _{IH}	HIGH-level input voltage	V _{CC} = 0.8 V	$0.70 \times V_{CC}$	-	-	V
		V _{CC} = 0.9 V to 1.95 V	$0.65 \times V_{CC}$	-	-	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	-	-	$0.30 \times V_{CC}$	V
		V _{CC} = 0.9 V to 1.95 V	-	-	$0.35 \times V_{CC}$	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 μ A; V_{CC} = 0.8 V to 3.6 V	-	-	0.1	V
		I _O = 1.1 mA; V _{CC} = 1.1 V	-	-	$0.3 \times V_{CC}$	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
		$I_{O} = 2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.31	V
		$I_{O} = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.44	V
I _I	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_{I} or $V_{O} = 0 \text{ V}$ to 3.6 V; $V_{CC} = 0 \text{ V}$	-	-	±0.2	μА
ΔI_{OFF}	additional power-off leakage current	V_{I} or $V_{O} = 0$ V to 3.6 V; $V_{CC} = 0$ V to 0.2 V	-	-	±0.2	μΑ
I _{CC}	supply current	$V_I = GND \text{ or } V_{CC}; I_O = 0 \text{ A};$ $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	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} = -	40 °C to +85 °C	-				1
V _{IH}	HIGH-level input voltage	V _{CC} = 0.8 V	$0.70 \times V_{CC}$	-	-	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

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 Table 7.
 Static characteristics ...continued

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

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
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	-	-	$0.3 \times V_{CC}$	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
		$I_{O} = 3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.45	V
		$I_{O} = 2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.33	V
		$I_{O} = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.45	V
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	$V_I = V_{IH}$; $V_O = 0 \text{ V to } 3.6 \text{ V}$; $V_{CC} = 0 \text{ V}$ to 3.6 V	-	-	±0.5	μΑ
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 leakage current	V _I or V _O = 0 V to 3.6 V; V _{CC} = 0 V to 0.2 V	-	-	±0.6	μΑ
I _{CC}	supply current	$V_{I} = GND \text{ or } V_{CC}; I_{O} = 0 \text{ A};$ $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	0.9	μΑ
ΔI_{CC}	additional supply current	$V_1 = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$	-	-	50	μΑ
T _{amb} = -	40 °C to +125 °C					
V _{IH}	HIGH-level input voltage	V _{CC} = 0.8 V	$0.75 \times V_{CC}$	-	-	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}				
		$I_O = 20 \mu A$; $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	0.11	V
		I _O = 1.1 mA; V _{CC} = 1.1 V	-	-	$0.33 \times V_{CC}$	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
l _{OZ}	OFF-state output current	$V_{I} = V_{IH}$; $V_{O} = 0 \text{ V to } 3.6 \text{ V}$; $V_{CC} = 0 \text{ V}$ to 3.6 V	-	-	±0.75	μΑ
I _{OFF}	power-off leakage current	V_1 or $V_0 = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	-	±0.75	μА

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 Table 7.
 Static characteristics ...continued

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

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
ΔI_{OFF}	additional power-off leakage current	$V_1 \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V};$ $V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	±0.75	μА
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	μА
ΔI_{CC}	additional supply current	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$	-	-	75	μΑ

11. Dynamic characteristics

Table 8. Dynamic characteristics

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

Symbol	Parameter	Conditions	25 °C			-40 °C to +125 °C			Unit
			Min	Typ[1]	Max	Min	Max (85 °C)	Max (125 °C)	
C _L = 5 pl	F								
t _{pd}	propagation delay	nA to nY; see Figure 8							
		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	10.0	ns
		V _{CC} = 1.4 V to 1.6 V	1.6	3.0	5.1	1.3	6.1	6.7	ns
		V _{CC} = 1.65 V to 1.95 V	1.6	2.7	4.0	1.2	5.0	5.5	ns
		V _{CC} = 2.3 V to 2.7 V	1.1	2.1	3.2	0.9	4.0	4.4	ns
		V _{CC} = 3.0 V to 3.6 V	1.4	2.2	2.8	1.1	3.3	3.6	ns
C _L = 10	pF								1
t _{pd}	propagation delay	nA to nY; see Figure 8							
		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	12.3	ns
		V _{CC} = 1.4 V to 1.6 V	2.3	3.8	6.1	2.0	7.4	8.1	ns
		V _{CC} = 1.65 V to 1.95 V	2.4	3.6	4.8	1.8	6.1	6.7	ns
		V _{CC} = 2.3 V to 2.7 V	1.7	2.8	3.8	1.3	4.8	5.3	ns
		V _{CC} = 3.0 V to 3.6 V	2.2	3.1	4.2	1.6	4.5	5.0	ns
C _L = 15	pF	1		1					
t _{pd}	propagation delay	nA to nY; see Figure 8							
		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	14.5	ns
		V _{CC} = 1.4 V to 1.6 V	3.0	4.5	6.8	2.6	8.6	9.4	ns
		V _{CC} = 1.65 V to 1.95 V	2.8	4.4	6.7	2.2	7.8	8.6	ns
		V _{CC} = 2.3 V to 2.7 V	2.4	3.4	4.5	1.9	5.3	5.8	ns
		V _{CC} = 3.0 V to 3.6 V	2.2	4.0	5.7	1.9	6.1	6.7	ns

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 Table 8.
 Dynamic characteristics ...continued

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

Symbol	Parameter	Conditions		25 °C		-4	0 °C to +	125 °C	Unit
			Min	Typ[1]	Max	Min	Max (85 °C)	Max (125 °C)	
C _L = 30 p	o F						-		
t _{pd}	propagation delay	nA to nY; see Figure 8 [2]							
		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	20.7	ns
		V _{CC} = 1.4 V to 1.6 V	4.1	6.7	9.4	3.7	11.8	13.0	ns
		V _{CC} = 1.65 V to 1.95 V	3.8	6.8	9.7	3.2	11.0	12.1	ns
		V _{CC} = 2.3 V to 2.7 V	3.7	5.2	6.7	3.0	7.1	7.8	ns
		V _{CC} = 3.0 V to 3.6 V	3.6	6.4	9.7	2.8	10.4	11.4	ns
C _L = 5 pl	F, 10 pF, 15 pF and	30 pF							
C _{PD}	power dissipation	$f_i = 1 \text{ MHz}; V_I = \text{GND to } V_{CC}$ [3][4]							
	capacitance	V _{CC} = 0.8 V	-	0.5	-	-	-	-	pF
		V _{CC} = 1.1 V to 1.3 V	-	0.6	-	-	-	-	рF
		V _{CC} = 1.4 V to 1.6 V	-	0.6	-	-	-	-	рF
		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	-	-	-	-	рF

- [1] All typical values are measured at nominal V_{CC}.
- [2] $\;\;t_{pd}$ is the same as t_{PZL} and $t_{PLZ}.$
- [3] All specified values are the average typical values over all stated loads.
- [4] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N$ where:

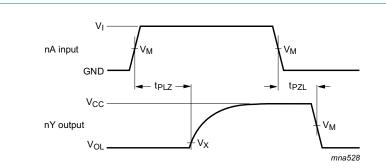
 f_i = input frequency in MHz;

V_{CC} = supply voltage in V;

N = number of inputs switching.

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12. Waveforms



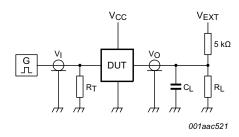
Measurement points are given in Table 9.

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	Output		
V _{cc}	V _M	V _M	V _X	
0.8 V to 1.6 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	V _{OL} + 0.1 V	
1.65 V to 2.7 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	V _{OL} + 0.15 V	
3.0 V to 3.6 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	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_0 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}	VI	t _r , t _f	CL	R _L [1]	t _{PLH} , t _{PHL}	t _{PZH} , t _{PHZ}	t_{PZL}, t_{PLZ}
0.8 V to 3.6 V	V _{CC}	≤ 3 ns	5 pF, 10 pF, 15 pF and 30 pF	5 k Ω or 1 M Ω	open	GND	$2 \times V_{CC}$

^[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 .

74AUP2G07

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13. Package outline

SOT363 Plastic surface-mounted package; 6 leads Α X = v (M) A ΗE ⊕ w M B е detail X scale **DIMENSIONS (mm are the original dimensions)** Α1 UNIT D Q Α С Ε ٧ е e₁ H_{E} $L_{\mathbf{p}}$ w у max 0.30 0.25 0.10 1.35 1.15 2.2 2.0 0.45 0.25 1.1 2.2 0.1 0.8 0.20 1.8 0.15 0.15 REFERENCES EUROPEAN OUTLINE ISSUE DATE VERSION JEDEC **PROJECTION** IEC **JEITA** 04-11-08 SOT363 SC-88 \bigcirc 06-03-16

Fig 10. Package outline SOT363 (SC-88)

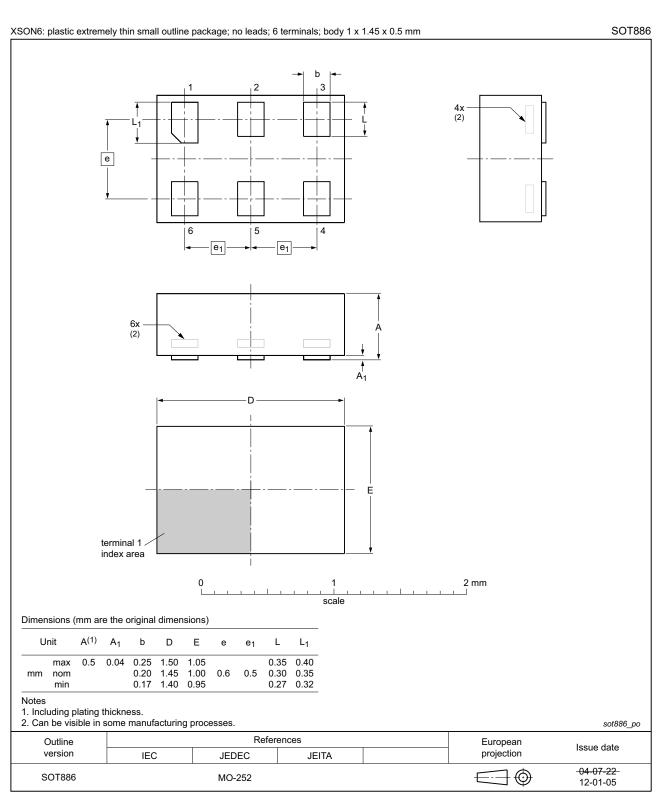


Fig 11. Package outline SOT886 (XSON6)

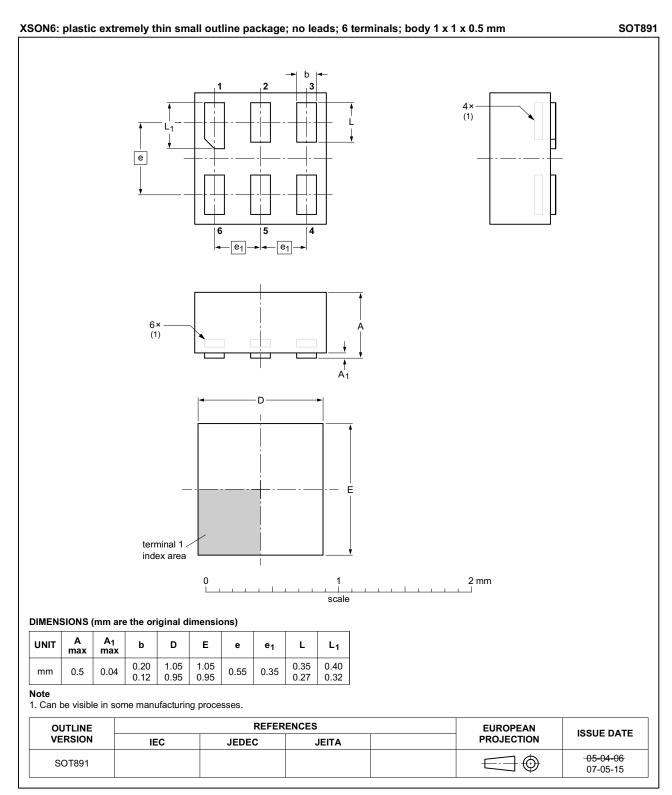


Fig 12. Package outline SOT891 (XSON6)

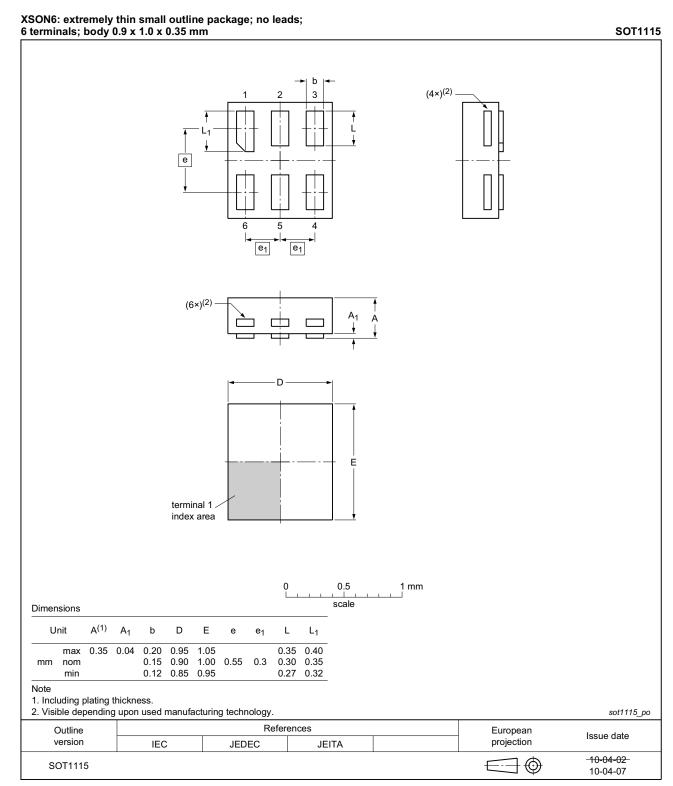


Fig 13. Package outline SOT1115 (XSON6)

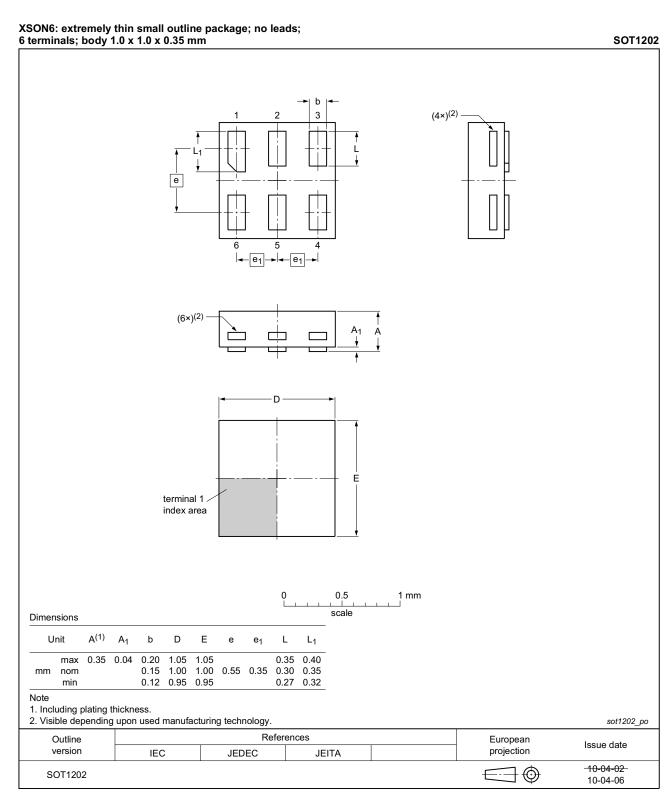


Fig 14. Package outline SOT1202 (XSON6)

74AUP2G07

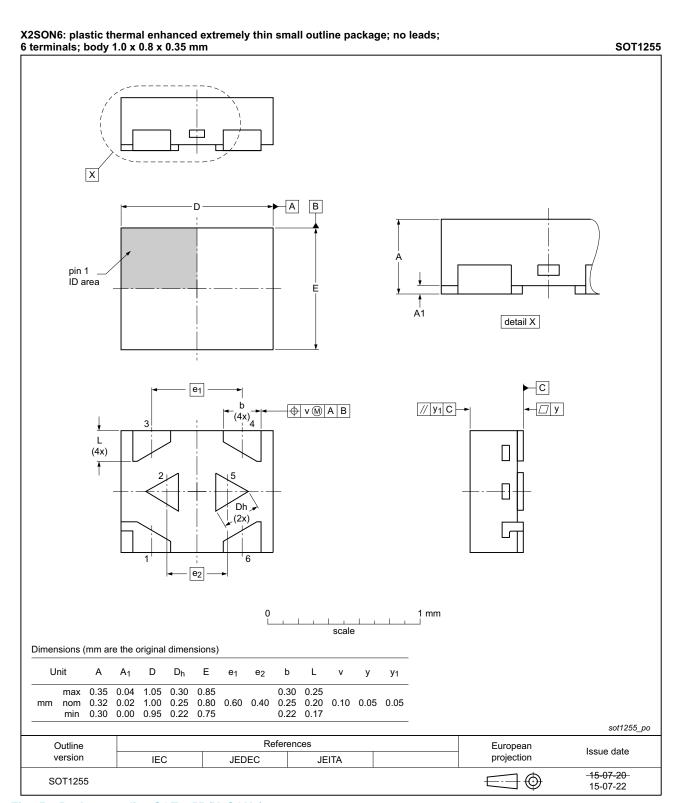


Fig 15. Package outline SOT1255 (X2SON6)

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14. Abbreviations

Table 11. Abbreviations

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

15. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP2G07 v.8	20150917	Product data sheet	-	74AUP2G07 v.7
Modifications:	Added type nu	umber 74AUP2G07GX (SOT1	255/X2SON6).	
74AUP2G07 v.7	20121129	Product data sheet	-	74AUP2G07 v.6
Modifications:	Package outling	ne drawing of SOT886 (Figure	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	-	-

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16. Legal information

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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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