# **74AUP2G04**

# Low-power dual inverter

Rev. 6 — 17 September 2015

**Product data sheet** 

### 1. General description

The 74AUP2G04 provides two inverting buffers.

Schmitt trigger action at all inputs makes the circuit tolerant of 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<sub>CC</sub> = 0.9 μA (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<sub>CC</sub>
- I<sub>OFF</sub> circuitry provides partial power-down mode operation
- 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					
74AUP2G04GW	-40 °C to +125 °C	SC-88	plastic surface-mounted package; 6 leads	SOT363					
74AUP2G04GM	–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					
74AUP2G04GF	–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					
74AUP2G04GN	–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					
74AUP2G04GS	-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					
74AUP2G04GX	–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					

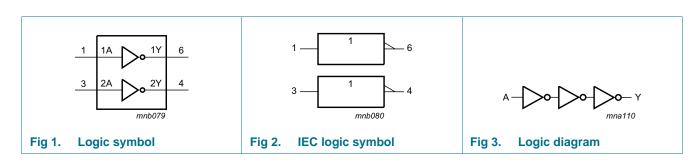
## 4. Marking

#### Table 2. Marking

Type number	Marking code <sup>[1]</sup>
74AUP2G04GW	p4
74AUP2G04GM	p4
74AUP2G04GF	p4
74AUP2G04GN	p4
74AUP2G04GS	p4
74AUP2G04GX	p4

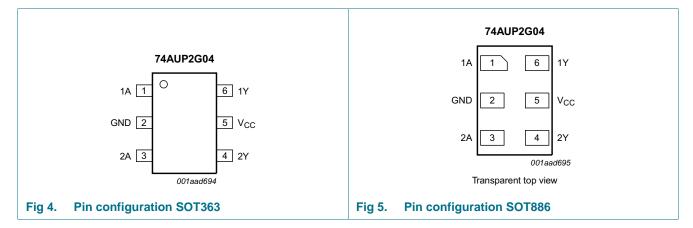
<sup>[1]</sup> The pin 1 indicator is located on the lower left corner of the device, below the marking code.

# 5. Functional diagram



## 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 <sub>CC</sub>	5	supply voltage
1Y	6	data output

## 7. Functional description

Table 4. Function table[1]

Input	Output
nA	nY
L	Н
Н	L

<sup>[1]</sup> H = HIGH voltage level; L = LOW voltage level.

## 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 <sub>CC</sub>	supply voltage			-0.5	+4.6	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < 0 V		-50	-	mA
VI	input voltage		[1]	-0.5	+4.6	V
I <sub>OK</sub>	output clamping current	V <sub>O</sub> < 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 <sub>CC</sub>	supply current			-	50	mA
I <sub>GND</sub>	ground current			-50	-	mA
T <sub>stg</sub>	storage temperature			-65	+150	°C
P <sub>tot</sub>	total power dissipation	$T_{amb} = -40  ^{\circ}\text{C} \text{ to } +125  ^{\circ}\text{C}$	[2]	-	250	mW

<sup>[1]</sup> 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 <sub>CC</sub>	supply voltage		0.8	3.6	V
VI	input voltage		0	3.6	V
Vo	output voltage	Active mode	0	V <sub>CC</sub>	V
		Power-down mode; V <sub>CC</sub> = 0 V	0	3.6	V
T <sub>amb</sub>	ambient temperature		-40	+125	°C
Δt/ΔV	input transition rise and fall rate	V <sub>CC</sub> = 0.8 V to 3.6 V	0	200	ns/V

<sup>[2]</sup> For SC-88 packages: above 87.5  $^{\circ}$ C the value of P<sub>tot</sub> derates linearly with 4.0 mW/K. For X2SON6 andXSON6 packages: above 118  $^{\circ}$ C the value of P<sub>tot</sub> derates linearly with 7.8 mW/K.

## 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 <sub>amb</sub> = 2	5 °C					
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 0.8 V	$0.70 \times V_{CC}$	-	-	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	$0.65 \times V_{CC}$	-	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	-	-	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	-	-	V
$V_{IL}$	LOW-level input voltage	V <sub>CC</sub> = 0.8 V	-	-	$0.30 \times V_{CC}$	V
- 12		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	$0.35 \times V_{CC}$	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-	0.9	V
V <sub>OH</sub> I	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_{O} = -20 \mu A$ ; $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	V <sub>CC</sub> - 0.1	-	-	V
		$I_{O} = -1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	0.75 × V <sub>CC</sub>	-	-	V
		$I_{O} = -1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	1.11	-	-	V
		$I_{O} = -1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$	1.32	-	-	V
		$I_{O} = -2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$	2.05	-	-	V
		$I_{O} = -3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.9	-	-	V
		$I_{O} = -2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.72	-	-	V
		$I_{O} = -4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.6	-	-	V
V <sub>OL</sub>	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 <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	$0.3 \times V_{CC}$	V
		I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V	-	-	0.31	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V	-	-	0.31	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V	-	-	0.31	V
		$I_{O} = 3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	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
l <sub>l</sub>	input leakage current	$V_I$ = GND to 3.6 V; $V_{CC}$ = 0 V to 3.6 V	-	-	±0.1	μΑ
l <sub>OFF</sub>	power-off leakage current	$V_I$ or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	-	±0.2	μΑ
Δl <sub>OFF</sub>	additional power-off leakage current	$V_1 \text{ or } V_0 = 0 \text{ V to } 3.6 \text{ V};$ $V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	±0.2	μΑ
Icc	supply current	$V_I$ = GND or $V_{CC}$ ; $I_O$ = 0 A; $V_{CC}$ = 0.8 V to 3.6 V	-	-	0.5	μΑ
Δl <sub>CC</sub>	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	$V_{CC} = 0 \text{ V to } 3.6 \text{ V}; V_I = \text{GND or } V_{CC}$	-	8.0	-	pF
Co	output capacitance	$V_O = GND; V_{CC} = 0 V$	-	1.7	-	pF

 Table 7.
 Static characteristics ...continued

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

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
T <sub>amb</sub> = -	40 °C to +85 °C					
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 0.8 V	$0.70 \times V_{CC}$	-	-	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	$0.65 \times V_{CC}$	-	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	-	-	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	$\begin{array}{c c} 0.70 \times V_{CC} & - \\ 0.65 \times V_{CC} & - \end{array}$	-	V	
$V_{IL}$	LOW-level input voltage	V <sub>CC</sub> = 0.8 V	-	-	$0.30 \times V_{CC}$	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	$0.35 \times V_{CC}$	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-	0.9	V
V <sub>OH</sub>						
		$I_{O} = -20 \mu A$ ; $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	V <sub>CC</sub> - 0.1	-	-	V
		$I_{O} = -1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	$0.7 \times V_{CC}$	-	-	V
VIL LI VOH H  VOL LI II in IOFF P  Aloff a		$I_{O} = -1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	1.03	-	-	V
		$I_{O} = -1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$	1.30	-	-	V
		$I_{O} = -2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.97	-	-	V
		$I_{O} = -3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.85	-	-	V
		$I_{O} = -2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.67	-	-	V
		$I_O = -4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.55	-	-	V
V <sub>OL</sub>	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 <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	$0.3 \times V_{CC}$	V
		I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V	-	-	0.37	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V	-	-	0.35	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V	-	-	0.33	V
		I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V	-	-	0.45	V
		I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V	-	-	0.33	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.45	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	-	-	±0.5	μΑ
	-		-	-	±0.5	μΑ
	additional power-off	$V_1$ or $V_0 = 0 \text{ V to } 3.6 \text{ V}$ ;	-	-	±0.6	μΑ
I <sub>CC</sub>	supply current		-	-	0.9	μΑ
Δl <sub>CC</sub>	additional supply current		-	-	50	μΑ

 Table 7.
 Static characteristics ...continued

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

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
T <sub>amb</sub> = -	40 °C to +125 °C					
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 0.8 V	$0.75 \times V_{CC}$	-	-	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	0.70 × V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	-	-	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	-	-	V
V <sub>IL</sub> I	LOW-level input voltage	V <sub>CC</sub> = 0.8 V	-	-	0.25 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	$0.30 \times V_{CC}$	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-	0.9	V
V <sub>OH</sub>	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_{O} = -20 \mu A$ ; $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	V <sub>CC</sub> - 0.11	-	-	V
		$I_{O} = -1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	$0.6 \times V_{CC}$	-	-	V
		$I_{O} = -1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	0.93	-	-	V
		$I_O = -1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$	1.17	-	-	V
		$I_{O} = -2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.77	-	-	V
		$I_{O} = -3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.67	-	-	V
		$I_{O} = -2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.40	-	-	V
		$I_O = -4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.30	-	-	V
V <sub>OL</sub>	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 <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	0.33 × V <sub>CC</sub>	V
		I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V	-	-	0.41	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V	-	-	0.39	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V	-	-	0.36	V
		I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V	-	-	0.50	V
		$I_O = 2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.36	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.50	V
I <sub>I</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	-	-	±0.75	μΑ
I <sub>OFF</sub>	power-off leakage current	$V_{I}$ or $V_{O} = 0 \text{ V}$ to 3.6 V; $V_{CC} = 0 \text{ V}$	-	-	±0.75	μΑ
$\Delta I_{OFF}$	additional power-off leakage current	$V_1 \text{ or } V_0 = 0 \text{ V to } 3.6 \text{ V};$ $V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	±0.75	μΑ
I <sub>CC</sub>	supply current	V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	1.4	μΑ
Δl <sub>CC</sub>	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
				Typ[1]	Max	Min	Max (85 °C)	Max (125 °C)	
C <sub>L</sub> = 5 pl	F								
t <sub>pd</sub>	propagation delay	nA to nY; see Figure 8							
		V <sub>CC</sub> = 0.8 V	-	16.0	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.4	5.0	10.3	2.1	11.4	12.6	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.8	3.6	6.4	1.6	7.4	8.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.5	2.9	5.0	1.4	5.9	6.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.2	2.4	3.9	1.1	4.5	5.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.1	2.1	3.2	1.0	3.9	4.3	ns
C <sub>L</sub> = 10 p	o <b>F</b>								
t <sub>pd</sub>	propagation delay	nA to nY; see Figure 8							
		V <sub>CC</sub> = 0.8 V	-	19.8	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.8	5.9	12.2	2.6	13.7	15.1	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.3	4.2	7.5	2.1	8.7	9.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.0	3.5	5.9	1.8	7.0	7.7	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7	2.9	4.6	1.5	5.4	6.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.6	2.7	3.8	1.4	4.5	5.0	ns
C <sub>L</sub> = 15 p	o <b>F</b>								
t <sub>pd</sub>	propagation delay	nA to nY; see Figure 8							
		V <sub>CC</sub> = 0.8 V	-	23.3	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.2	6.7	13.0	3.0	15.8	17.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.6	4.7	8.6	2.4	10.0	11.0	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.3	4.0	6.7	2.1	8.0	8.8	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	2.1	3.3	5.1	1.8	6.1	6.8	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	3.1	4.2	1.8	5.0	5.5	ns
C <sub>L</sub> = 30 p	o <b>F</b>								
t <sub>pd</sub>	propagation delay	nA to nY; see Figure 8							
		V <sub>CC</sub> = 0.8 V	-	33.6	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.4	8.9	16.0	4.0	19.0	20.9	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.6	6.3	10.8	3.2	12.9	14.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.2	5.3	9.0	2.9	10.5	11.6	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.9	4.5	6.5	2.6	7.6	8.4	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.9	4.2	5.4	2.6	6.2	6.9	ns

 Table 8.
 Dynamic characteristics ...continued

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

Symbol	Parameter	Conditions	25 °C		-40	) °C to +1	25 °C	Unit	
			Min	Typ[1]	Max	Min	Max (85 °C)	Max (125 °C)	
C <sub>L</sub> = 5 pl	F, 10 pF, 15 pF and	30 pF							
C <sub>PD</sub>	power dissipation	$f_i = 1 \text{ MHz}; V_I = \text{GND to } V_{CC}$ [3][4]							
	capacitance	V <sub>CC</sub> = 0.8 V	-	2.5	-	-	-	-	pF
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	2.7	-	-	-	-	pF
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	2.8	-	-	-	-	pF
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	3.0	-	-	-	-	pF
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	3.5	-	-	-	-	pF
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	4.0	-	-	-	-	pF

- [1] All typical values are measured at nominal  $V_{CC}$ .
- [2]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .
- [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  $\mu W$ ).

 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma (C_L \times V_{CC}^2 \times f_o)$  where:

f<sub>i</sub> = input frequency in MHz;

f<sub>o</sub> = output frequency in MHz;

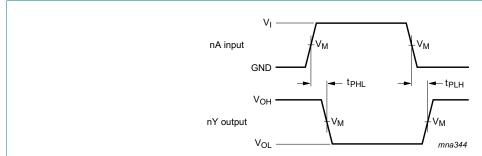
C<sub>L</sub> = load capacitance in pF;

 $V_{CC}$  = supply voltage in V;

N = number of inputs switching;

 $\Sigma(C_L \times V_{CC}^2 \times f_o)$  = sum of the outputs.

#### 12. Waveforms



Measurement points are given in Table 9.

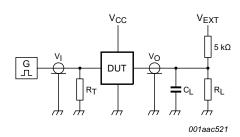
Logic levels:  $V_{\text{OL}}$  and  $V_{\text{OH}}$  are typical output voltage levels that occur with the output load.

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

Table 9. Measurement points

Supply voltage	Output	Input					
V <sub>CC</sub>	V <sub>M</sub>	V <sub>M</sub>	VI	$t_r = t_f$			
0.8 V to 3.6 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	V <sub>CC</sub>	≤ 3.0 ns			

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Test data is given in Table 10.

Definitions for test circuit:

R<sub>L</sub> = 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.

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

Fig 9. Test circuit for measuring switching times

#### Table 10. Test data

Supply voltage	Load		V <sub>EXT</sub>		
V <sub>CC</sub>	C <sub>L</sub>	R <sub>L</sub> [1]	t <sub>PLH</sub> , t <sub>PHL</sub>	t <sub>PZH</sub> , t <sub>PHZ</sub>	t <sub>PZL</sub> , t <sub>PLZ</sub>
0.8 V to 3.6 V	5 pF, 10 pF, 15 pF and 30 pF	$5$ k $\Omega$ or $1$ M $\Omega$	open	GND	$2 \times V_{CC}$

[1] For measuring enable and disable times,  $R_L = 5 \text{ k}\Omega$ . For measuring propagation delays, set-up and hold times, and pulse width,  $R_L = 1 \text{ M}\Omega$ .

## 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 e<sub>1</sub> $H_{\mathsf{E}}$ $L_{\mathbf{p}}$ w у max 0.25 0.30 0.25 0.10 1.35 1.15 2.2 2.0 0.45 1.1 2.2 0.65 0.1 0.8 0.20 1.8 0.15 0.15 REFERENCES **EUROPEAN** OUTLINE ISSUE DATE VERSION JEDEC **PROJECTION** IEC JEITA

Fig 10. Package outline SOT363 (SC-88)

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SC-88

04-11-08

06-03-16

 $\bigcirc$ 

SOT363

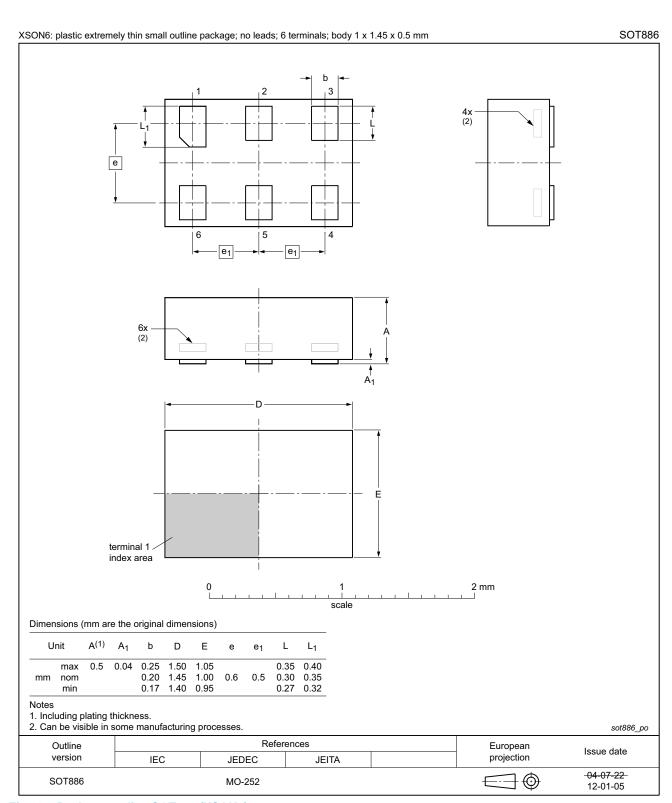


Fig 11. Package outline SOT886 (XSON6)

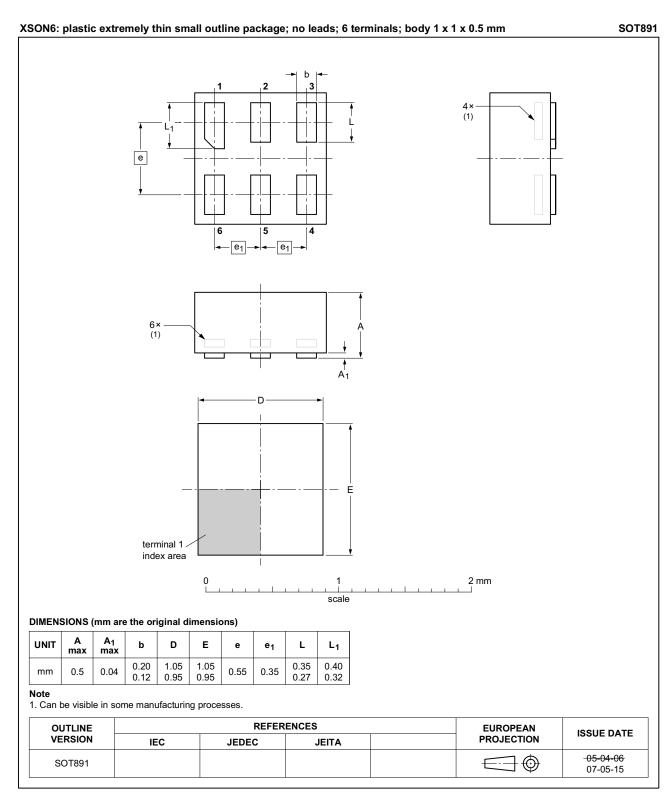


Fig 12. Package outline SOT891 (XSON6)

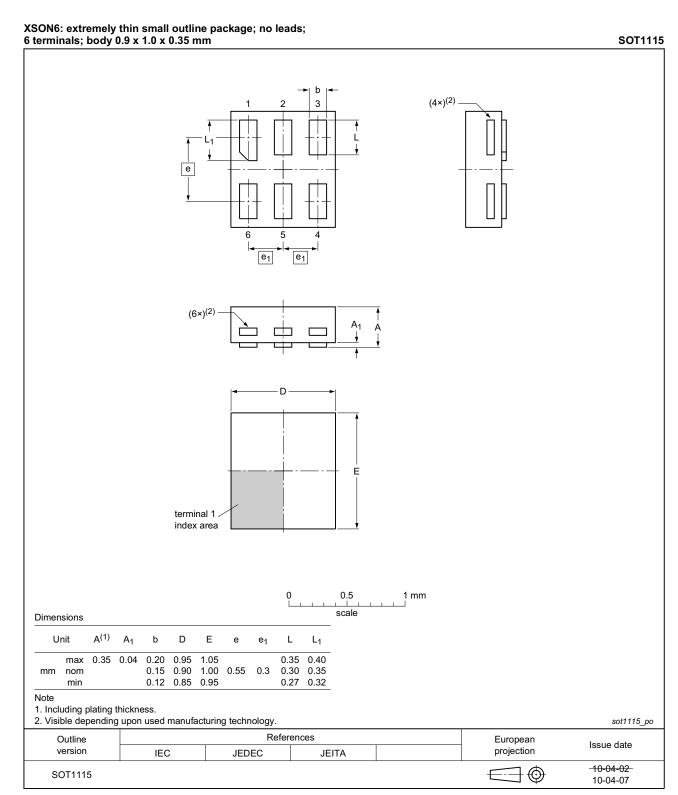


Fig 13. Package outline SOT1115 (XSON6)

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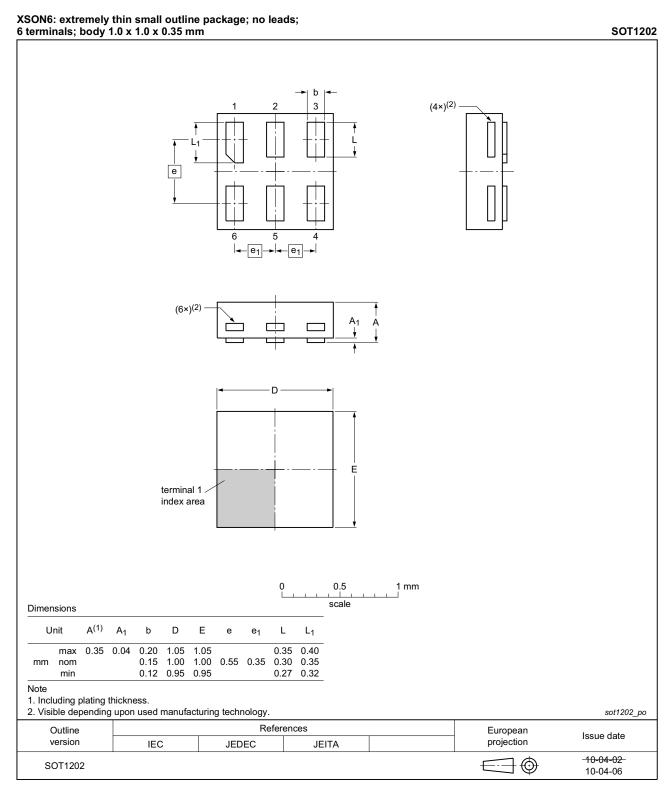


Fig 14. Package outline SOT1202 (XSON6)

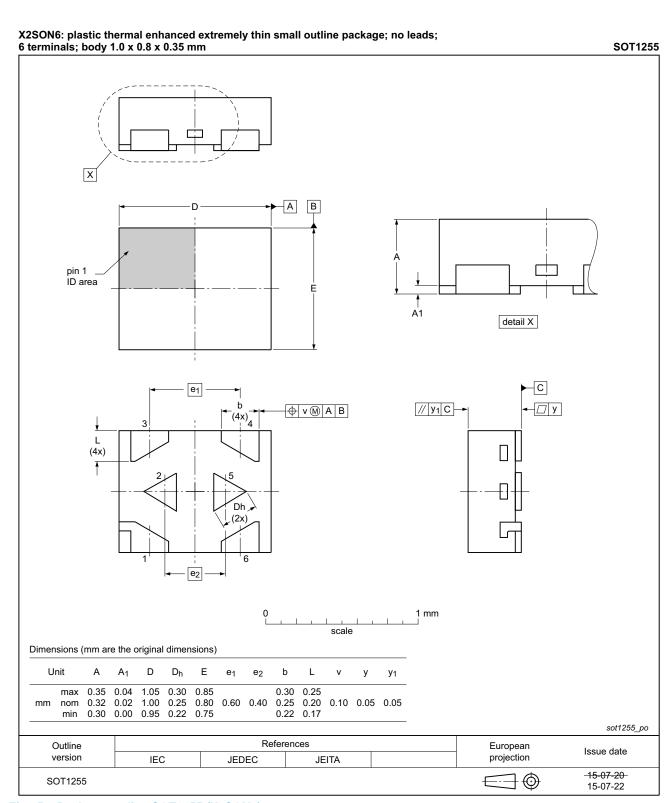


Fig 15. Package outline SOT1255 (X2SON6)

## 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	
74AUP2G04 v.6	20150917	Product data sheet	-	74AUP2G04 v.5	
Modifications:	Added type	e number 74AUP2G04GX (S	OT1255/X2SON6).		
74AUP2G04 v.5	20120305	Product data sheet	-	74AUP2G04 v.4	
Modifications:	Package o	Package outline drawing of SOT886 (Figure 11) modified.			
74AUP2G04 v.4	20111202	Product data sheet	-	74AUP2G04 v.3	
Modifications:	Legal page	Legal pages updated.			
74AUP2G04 v.3	20101101	Product data sheet	-	74AUP2G04 v.2	
74AUP2G04 v.2	20090707	Product data sheet	-	74AUP2G04 v.1	
74AUP2G04 v.1	20061122	Product data sheet	-	-	

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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.

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- [2] The term 'short data sheet' is explained in section "Definitions"
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# **74AUP2G04**

Low-power dual inverter

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