# **74AUP2G04**

# Low-power dual inverter

Rev. 8 — 31 January 2022

**Product data sheet** 

### 1. General description

The 74AUP2G04 is a dual inverter. 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
- · 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



Low-power dual inverter

## 3. Ordering information

**Table 1. Ordering information** 

Type number	Package			
	Temperature range	Name	Description	Version
74AUP2G04GW	-40 °C to +125 °C	TSSOP6	plastic thin shrink small outline package; 6 leads; body width 1.25 mm	SOT363-2
74AUP2G04GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886
74AUP2G04GN	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm	SOT1115
74AUP2G04GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm	SOT1202
74AUP2G04GX	-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

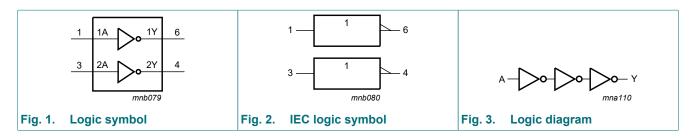
## 4. Marking

Table 2. Marking

Type number	Marking code[1]					
74AUP2G04GW	p4					
74AUP2G04GM	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.

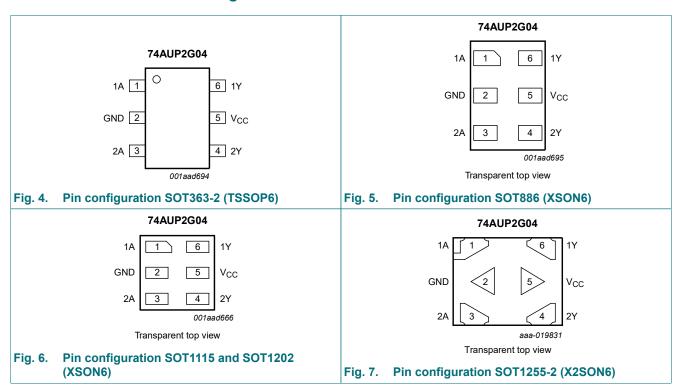
## 5. Functional diagram



Low-power dual inverter

## 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**

 $H = HIGH \ voltage \ level; \ L = LOW \ voltage \ level.$ 

Input	Output
nA	nY
L	Н
Н	L

**Product data sheet** 

Low-power dual inverter

## 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
lok	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 <sub>amb</sub> = -40 °C to +125 °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.

For SOT886 (XSON6) package: P<sub>tot</sub> 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:  $P_{tot}$  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.

### 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	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 SOT363-2 (TSSOP6) package: Ptot derates linearly with 3.7 mW/K above 83 °C.

Low-power dual inverter

## 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	25 °C					
V <sub>IH</sub>	HIGH-level input	V <sub>CC</sub> = 0.8 V	0.70 × V <sub>CC</sub>	-	-	V
	voltage	V <sub>CC</sub> = 0.9 V to 1.95 V	0.65 × 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>	LOW-level input	V <sub>CC</sub> = 0.8 V	-	-	0.30 × V <sub>CC</sub>	V
	voltage	V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	0.35 × V <sub>CC</sub>	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
$V_{OH}$	HIGH-level output	$V_I = V_{IH}$ or $V_{IL}$				
	voltage	$I_{O}$ = -20 $\mu$ A; $V_{CC}$ = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.1	-	-	V
		I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V	0.75 × V <sub>CC</sub>	-	-	V
		I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V	1.11	-	-	V
		I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V	1.32	-	-	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	2.05	-	-	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.9	-	-	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.72	-	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.6	-	-	V
V <sub>OL</sub>	LOW-level output	$V_I = V_{IH}$ or $V_{IL}$				
	voltage	I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.1	V
		I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	0.3 × V <sub>CC</sub>	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 <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V	-	-	0.44	V
		I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 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	$V_1$ = GND to 3.6 V; $V_{CC}$ = 0 V to 3.6 V	-	-	±0.1	μΑ
l <sub>OFF</sub>	power-off leakage current	$V_1$ or $V_0 = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	-	±0.2	μΑ
Δl <sub>OFF</sub>	additional power-off leakage current	$V_1$ or $V_0 = 0 V$ to 3.6 V; $V_{CC} = 0 V$ to 0.2 V	-	-	±0.2	μΑ
I <sub>CC</sub>	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 <sub>CC</sub>	additional supply current			-	40	μΑ
Cı	input capacitance	$V_{CC}$ = 0 V to 3.6 V; $V_I$ = GND or $V_{CC}$	-	0.8	-	pF
Co	output capacitance	$V_O = GND; V_{CC} = 0 V$	-	1.7	-	pF

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
T <sub>amb</sub> = -4	40 °C to +85 °C					
V <sub>IH</sub>	HIGH-level input	V <sub>CC</sub> = 0.8 V	0.70 × V <sub>CC</sub>	-	-	V
	voltage	V <sub>CC</sub> = 0.9 V to 1.95 V	0.65 × 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>	LOW-level input	V <sub>CC</sub> = 0.8 V	-	-	0.30 × V <sub>CC</sub>	V
	voltage	V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	0.35 × V <sub>CC</sub>	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	$V_I = V_{IH}$ or $V_{IL}$				
	voltage	I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.1	-	-	V
		I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V	0.7 × V <sub>CC</sub>	-	-	V
		I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V	1.03	-	-	V
		I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V	1.30	-	-	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	1.97	-	-	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.85	-	-	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.67	-	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.55	-	-	V
V <sub>OL</sub>	LOW-level output	$V_I = V_{IH}$ or $V_{IL}$				
	voltage	I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.1	V
		I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	0.3 × V <sub>CC</sub>	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
l <sub>l</sub>	input leakage current	$V_{I}$ = GND to 3.6 V; $V_{CC}$ = 0 V to 3.6 V	-	-	±0.5	μΑ
I <sub>OFF</sub>	power-off leakage $V_1$ or $V_0 = 0$ V to 3.6 V; $V_{CC} = 0$ V current		-	-	±0.5	μΑ
ΔI <sub>OFF</sub>	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	-	-	±0.6	μΑ
I <sub>CC</sub>	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 <sub>CC</sub>	additional supply current	$V_1 = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$	-	-	50	μΑ

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
T <sub>amb</sub> = -4	40 °C to +125 °C					
V <sub>IH</sub>	HIGH-level input	V <sub>CC</sub> = 0.8 V	0.75 × V <sub>CC</sub>	-	-	V
	voltage	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>	LOW-level input	V <sub>CC</sub> = 0.8 V	-	-	0.25 × V <sub>CC</sub>	V
	voltage	V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	0.30 × V <sub>CC</sub>	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	$V_I = V_{IH}$ or $V_{IL}$				
	voltage	I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.11	-	-	V
		I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V	0.6 × V <sub>CC</sub>	-	-	V
		I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V	0.93	-	-	V
		I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V	1.17	-	-	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	1.77	-	-	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.67	-	-	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.40	-	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.30	-	-	V
V <sub>OL</sub>	LOW-level output	$V_I = V_{IH}$ or $V_{IL}$				
	voltage	$I_{O}$ = 20 $\mu$ A; $V_{CC}$ = 0.8 V to 3.6 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 <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V	-	-	0.36	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.50	V
l <sub>l</sub>	input leakage current	$V_{I}$ = GND to 3.6 V; $V_{CC}$ = 0 V to 3.6 V	-	-	±0.75	μΑ
I <sub>OFF</sub>	power-off leakage v <sub>I</sub> or $V_O = 0 \text{ V}$ to 3.6 V; $V_{CC} = 0 \text{ V}$ current		-	-	±0.75	μΑ
ΔI <sub>OFF</sub>	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	-	-	±0.75	μΑ
I <sub>CC</sub>	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 <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

Low-power dual inverter

## 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 <sub>L</sub> = 5 p	F									
t <sub>pd</sub>	propagation	nA to nY; see Fig. 8 [2]								
	delay	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	2.1	12.6	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.8	3.6	6.4	1.6	7.4	1.6	8.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.5	2.9	5.0	1.4	5.9	1.4	6.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.2	2.4	3.9	1.1	4.5	1.1	5.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.1	2.1	3.2	1.0	3.9	1.0	4.3	ns
C <sub>L</sub> = 10	pF									
t <sub>pd</sub>	propagation	nA to nY; see Fig. 8 [2]								
	delay	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	2.6	15.1	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.3	4.2	7.5	2.1	8.7	2.1	9.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.0	3.5	5.9	1.8	7.0	1.8	7.7	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7	2.9	4.6	1.5	5.4	1.5	6.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.6	2.7	3.8	1.4	4.5	1.4	5.0	ns
C <sub>L</sub> = 15	pF									
t <sub>pd</sub>	propagation	nA to nY; see Fig. 8 [2]								
	delay	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	3.0	17.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.6	4.7	8.6	2.4	10.0	2.4	11.0	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.3	4.0	6.7	2.1	8.0	2.1	8.8	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.1	3.3	5.1	1.8	6.1	1.8	6.8	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	3.1	4.2	1.8	5.0	1.8	5.5	ns
C <sub>L</sub> = 30	pF									
t <sub>pd</sub>	propagation	nA to nY; see Fig. 8 [2]								
	delay	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	4.0	20.9	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.6	6.3	10.8	3.2	12.9	3.2	14.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.2	5.3	9.0	2.9	10.5	2.9	11.6	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.9	4.5	6.5	2.6	7.6	2.6	8.4	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.9	4.2	5.4	2.6	6.2	2.6	6.9	ns

#### Low-power dual inverter

Symbol	ol Parameter Conditions		25 °C		-40 °C to +85 °C		-40 °C to +125 °C		Unit		
				Min	Typ [1]	Max	Min	Max	Min	Max	
C <sub>L</sub> = 5 p	F, 10 pF, 15 pF	and 30 pF									
C <sub>PD</sub>	power	$f_i$ = 1 MHz; $V_I$ = GND to $V_{CC}$	[3][4]								
	dissipation capacitance	V <sub>CC</sub> = 0.8 V		-	2.5	-	-	-	-	-	pF
	capacitarioc	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

- All typical values are measured at nominal V<sub>CC</sub>.
- $t_{\text{pd}}$  is the same as  $t_{\text{PLH}}$  and  $t_{\text{PHL}}$ . [2]
- 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  $\mu$ 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:

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

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

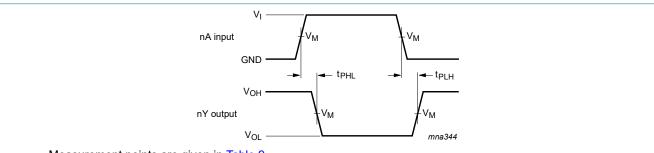
fo = output frequency in MHz;

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

V<sub>CC</sub> = supply voltage in V;

N = number of inputs switching;  $\Sigma (C_L \times V_{CC}^{\ 2} \times f_o) = \text{sum of the outputs}.$ 

#### 11.1. Waveforms and test circuit



Measurement points are given in <u>Table 9</u>.

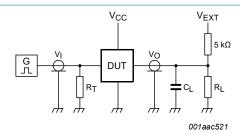
Logic levels: V<sub>OL</sub> and V<sub>OH</sub> are typical output voltage levels that occur with the output load.

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>	$V_{M}$ $V_{I}$ $t_{r} = t_{f}$					
0.8 V to 3.6 V	0.5 × V <sub>CC</sub>	0.5 × V <sub>CC</sub>	V <sub>CC</sub>	≤ 3.0 ns			

#### Low-power dual inverter



Test data is given in Table 10.

Definitions for test circuit:

R<sub>L</sub> = Load resistance;

C<sub>L</sub> = 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>	CL	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 kΩ or 1 MΩ	open	GND	2 × V <sub>CC</sub>

[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,  $R_L = 1 \text{ M}\Omega$ .

Low-power dual inverter

## 12. Package outline

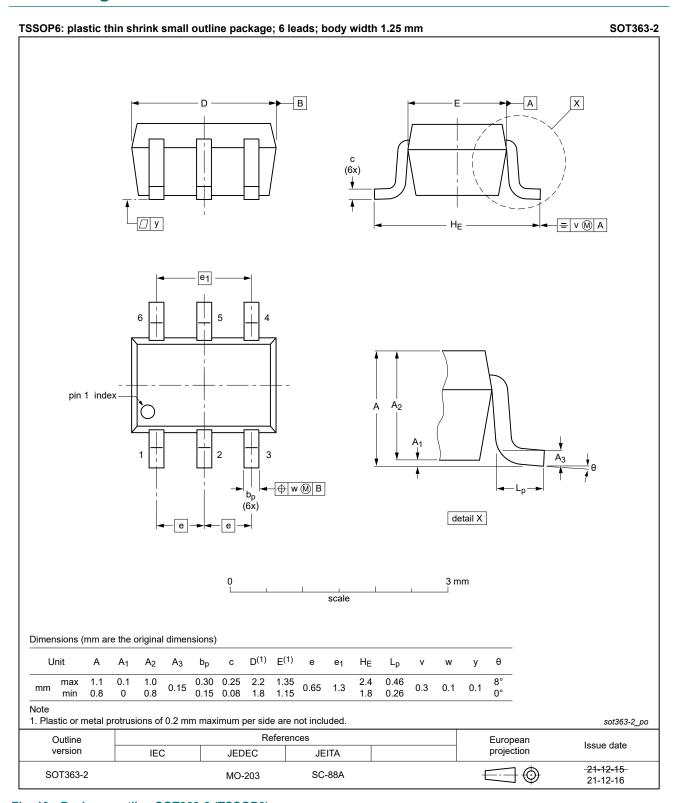


Fig. 10. Package outline SOT363-2 (TSSOP6)

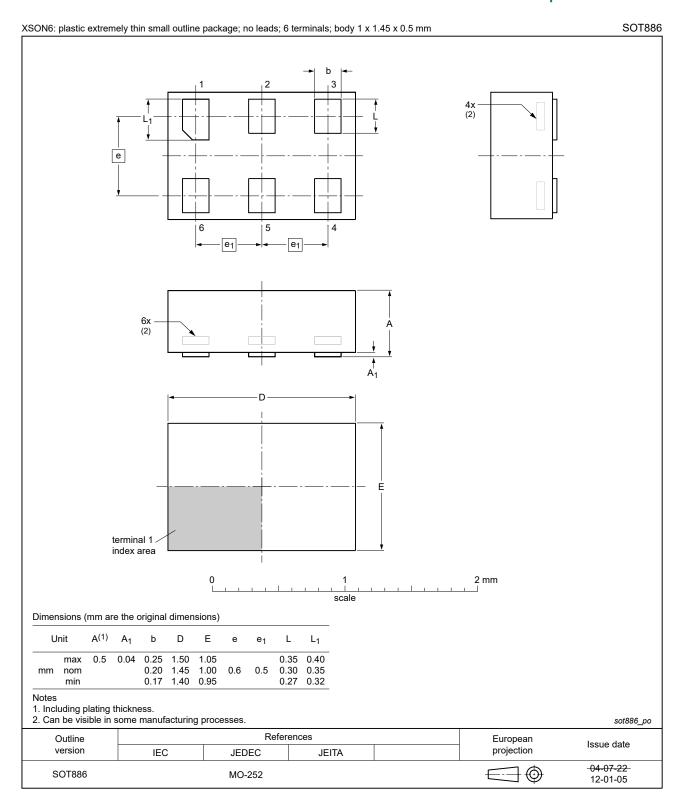


Fig. 11. Package outline SOT886 (XSON6)

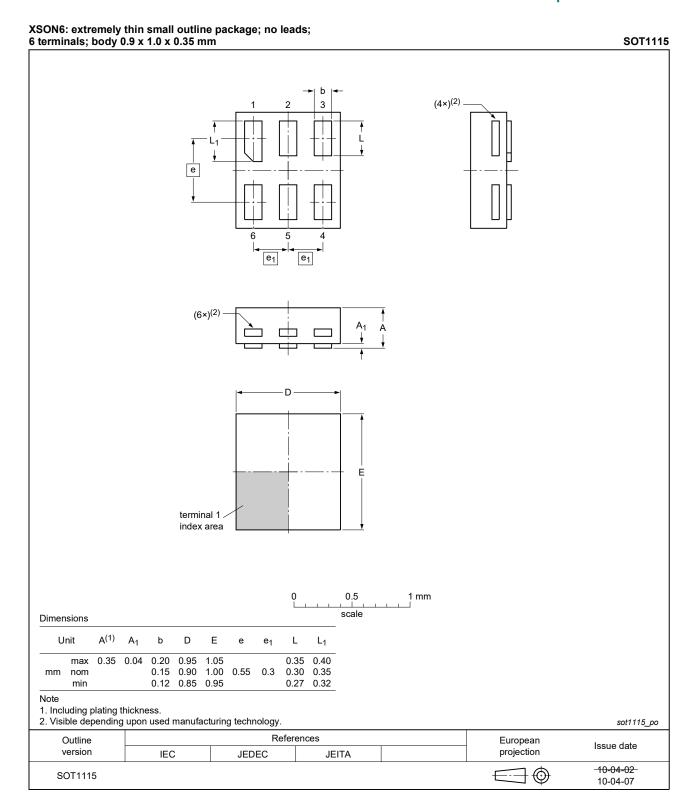


Fig. 12. Package outline SOT1115 (XSON6)

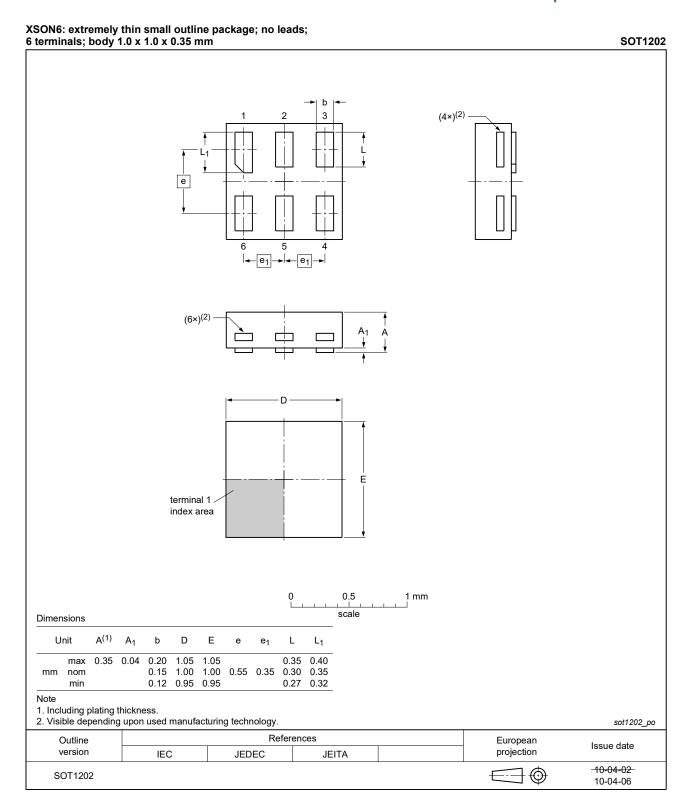


Fig. 13. Package outline SOT1202 (XSON6)

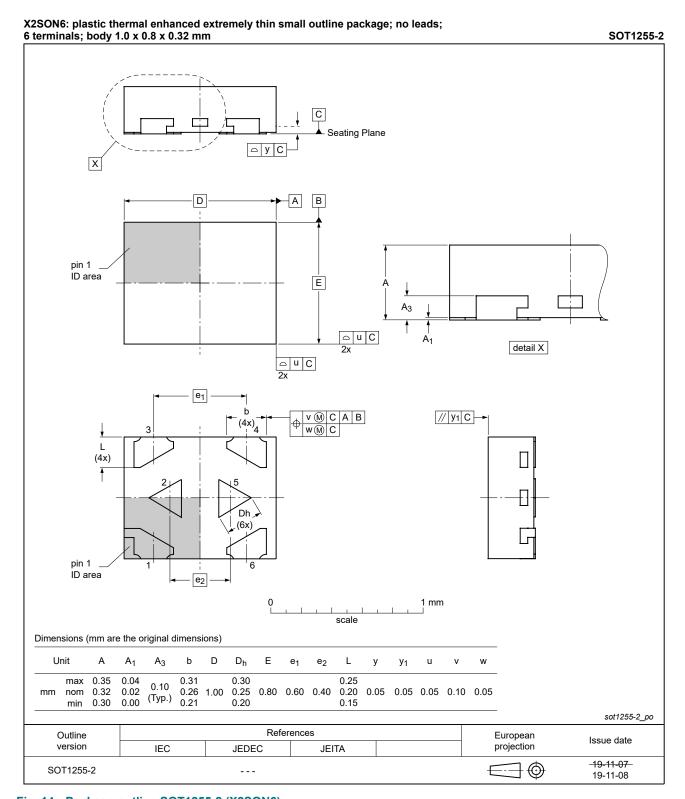


Fig. 14. Package outline SOT1255-2 (X2SON6)

Low-power dual inverter

### 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		
74AUP2G04 v.8	20220131	Product data sheet	-	74AUP2G04 v.7		
Modifications:	Package S	Package SOT363 (SC-88) changed to SOT363-2 (TSSOP6).				
74AUP2G04 v.7	20211104	Product data sheet	-	74AUP2G04 v.6		
Modifications:	guidelines Legal texts Section 1 u Type numb SOT1255 (	<ul> <li>Section 1 updated.</li> <li>Type number 74AUP2G04GF (SOT891/XSON6) removed.</li> <li>SOT1255 (X2SON6) package changed to SOT1255-2 (X2SON6) package.</li> </ul>				
74AUP2G04 v.6	20150917	Product data sheet	-	74AUP2G04 v.5		
Modifications:	Added type	Added type number 74AUP2G04GX (SOT1255/X2SON6).				
74AUP2G04 v.5	20120305	Product data sheet	-	74AUP2G04 v.4		
Modifications:	Package of	Package outline drawing of SOT886 (Fig. 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	-	-		

#### Low-power dual inverter

### 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.

- 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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