# **74AUP2G02**

# Low-power dual 2-input NOR gate Rev. 7 — 4 February 2013

**Product data sheet** 

#### **General description** 1.

The 74AUP2G02 provides a dual 2-input NOR function.

Schmitt trigger action at all inputs makes the circuit tolerant to slower input rise and fall times across the entire V<sub>CC</sub> range from 0.8 V o 3.6 V.

This device ensures a very low static and dynamic power consumption across the entire V<sub>CC</sub> range from 0.8 V to 3.6 V.

This device is fully specified for partial power-down applications using I<sub>OFF</sub>. The I<sub>OFF</sub> circuitry disables the output, preventing a damaging backflow current through the device when it is powered down.

#### **Features and benefits** 2.

- 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 JESD78B 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
74AUP2G02DC	–40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74AUP2G02GT	–40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body 1 $\times$ 1.95 $\times$ 0.5 mm	SOT833-1
74AUP2G02GF	–40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body $1.35 \times 1 \times 0.5$ mm	SOT1089
74AUP2G02GD	–40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body 3 $\times$ 2 $\times$ 0.5 mm	SOT996-2
74AUP2G02GM	–40 °C to +125 °C	XQFN8	plastic, extremely thin quad flat package; no leads; 8 terminals; body 1.6 $\times$ 1.6 $\times$ 0.5 mm	SOT902-2
74AUP2G02GN	–40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.2 $\times$ 1.0 $\times$ 0.35 mm	SOT1116
74AUP2G02GS	–40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body $1.35 \times 1.0 \times 0.35$ mm	SOT1203

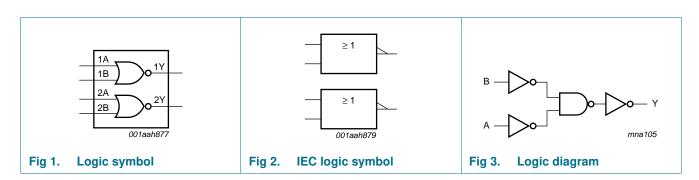
# 4. Marking

Table 2. Marking codes

Type number	Marking code <sup>[1]</sup>
74AUP2G02DC	p02
74AUP2G02GT	p02
74AUP2G02GF	рВ
74AUP2G02GD	p02
74AUP2G02GM	p02
74AUP2G02GN	рВ
74AUP2G02GS	рВ

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

# 5. Functional diagram

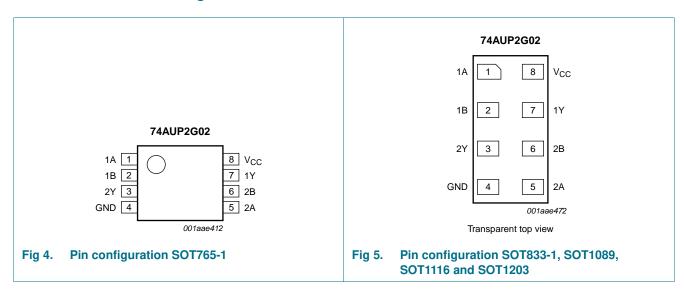


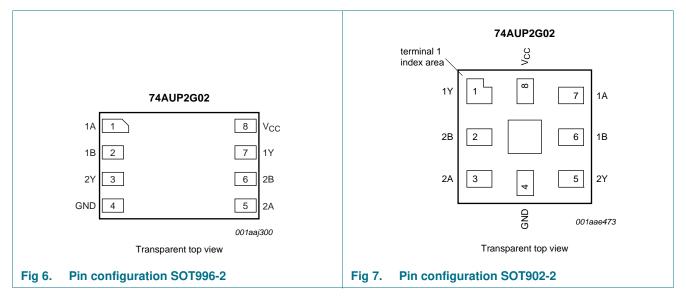
74AUP2G02

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# 6. Pinning information

#### 6.1 Pinning





### 6.2 Pin description

Table 3. Pin description

Symbol	Pin SOT765-1, SOT833-1, SOT1089, SOT996-2, SOT1116 and SOT1203		Description
1A, 2A	1, 5	7, 3	data input
1B, 2B	2, 6	6, 2	data input
GND	4	4	ground (0 V)
1Y, 2Y	7, 3	1, 5	data output
V <sub>CC</sub>	8	8	supply voltage

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# 7. Functional description

Table 4. Function table[1]

Input	Output	
nA	nB	nY
L	L	Н
L	Н	L
Н	L	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
$V_{CC}$	supply voltage		-0.5	+4.6	V
I <sub>IK</sub>	input clamping current	$V_I < 0 V$	-50	-	mA
VI	input voltage		<u>[1]</u> –0.5	+4.6	V
I <sub>OK</sub>	output clamping current	V <sub>O</sub> < 0 V	-50	-	mA
V <sub>O</sub>	output voltage	Active mode and Power-down mode	<u>[1]</u> –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 minimum input and output voltage ratings may be exceeded if the input and output current ratings are observed.

# 9. Recommended operating conditions

Table 6. 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	$V_{CC}$	V
		Power-down mode; V <sub>CC</sub> = 0 V	0	3.6	V
T <sub>amb</sub>	ambient temperature		-40	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	0	200	ns/V

<sup>[2]</sup> For VSSOP8 packages: above 110 °C the value of  $P_{tot}$  derates linearly with 8.0 mW/K. For XSON8 and XQFN8 packages: above 118 °C the value of  $P_{tot}$  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
$T_{amb} = 2$	5 ℃					
$V_{IH}$	HIGH-level input voltage	$V_{CC} = 0.8 \text{ V}$	$0.70 \times V_{CC}$	-	-	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
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	2.0	-	-	V
$V_{IL}$	LOW-level input voltage	$V_{CC} = 0.8 \text{ V}$	-	-	$0.30 \times V_{CC}$	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
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	-	-	0.9	V
V <sub>OH</sub>	HIGH-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = -20 \ \mu A; \ V_{CC} = 0.8 \ V \ to \ 3.6 \ V$	$V_{CC}-0.1$	-	-	V
		$I_{O} = -1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	$0.75 \times V_{CC}$	-	-	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 $V_{IL}$				
		$I_O = 20 \ \mu A; \ V_{CC} = 0.8 \ V \ to \ 3.6 \ V$	-	-	0.1	V
		$I_O = 1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	-	-	$0.3 \times V_{CC}$	V
		$I_O = 1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	-	-	0.31	V
		$I_O = 1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$	-	-	0.31	V
		$I_O = 2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	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
I <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
$\Delta I_{OFF}$	additional power-off leakage current	$V_1$ or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V to 0.2 V	-	-	±0.2	μΑ
I <sub>CC</sub>	supply current	$V_I = GND \text{ or } V_{CC}; I_O = 0 \text{ A};$ $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	0.5	μΑ
Δl <sub>CC</sub>	additional supply current	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$	[1] -	-	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
C <sub>O</sub>	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
$T_{amb} = -$	40 °C to +85 °C					
$V_{IH}$	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
		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
		$V_{CC}$ = 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 V	$V_{CC}-0.1$	-	-	V
		$I_{O} = -1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	$0.7 \times V_{CC}$	-	-	V
		$I_{O} = -1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	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
$V_{OL}$	LOW-level output voltage	$V_{I} = V_{IH}$ or $V_{IL}$				
		$I_O$ = 20 $\mu$ A; $V_{CC}$ = 0.8 V to 3.6 V	-	-	0.1	V
		$I_O = 1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	-	-	$0.3 \times V_{CC}$	V
		$I_O = 1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	-	-	0.37	V
		$I_{O} = 1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$	-	-	0.35	V
		$I_{O} = 2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	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
I <sub>I</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 current	$V_I$ or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	-	±0.5	μΑ
$\Delta I_{OFF}$	additional power-off leakage current	$V_1$ or $V_0 = 0$ V to 3.6 V; $V_{CC} = 0$ V to 0.2 V	-	-	±0.6	μА
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	-	-	0.9	μΑ
$\Delta I_{CC}$	additional supply current	$V_{I} = V_{CC} - 0.6 \text{ V}; I_{O} = 0 \text{ A};$ $V_{CC} = 3.3 \text{ V}$	[1] -	-	50	μА

 Table 7.
 Static characteristics ...continued

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

Symbol	Parameter	Conditions	Min	Тур	Max	Uni
T <sub>amb</sub> = -	40 °C to +125 °C					
V <sub>IH</sub>	HIGH-level input voltage	$V_{CC} = 0.8 \text{ V}$	$0.75 \times V_{CC}$	-	-	٧
		$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$	$0.70 \times V_{CC}$	-	-	٧
		$V_{CC}$ = 2.3 V to 2.7 V	1.6	-	-	٧
		$V_{CC}$ = 3.0 V to 3.6 V	2.0	-	-	٧
<b>V</b> IL	LOW-level input voltage	V <sub>CC</sub> = 0.8 V	-	-	$0.25 \times V_{CC}$	٧
		$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$	-	-	$0.30 \times V_{CC}$	٧
		$V_{CC}$ = 2.3 V to 2.7 V	-	-	0.7	٧
		$V_{CC}$ = 3.0 V to 3.6 V	-	-	0.9	٧
√ <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 V	V <sub>CC</sub> - 0.11	-	-	٧
		$I_{O} = -1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	$0.6 \times V_{CC}$	-	-	٧
		$I_{O} = -1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	0.93	-	-	٧
		$I_{O} = -1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$	1.17	-	-	٧
		$I_{O} = -2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.77	-	-	٧
		$I_{O} = -3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.67	-	-	٧
		$I_{O} = -2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.40	-	-	٧
		$I_{O} = -4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.30	-	-	٧
√ <sub>OL</sub>	LOW-level output voltage	$V_{I} = V_{IH}$ or $V_{IL}$				
		$I_O$ = 20 $\mu$ A; $V_{CC}$ = 0.8 V to 3.6 V	-	-	0.11	٧
		$I_O = 1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	-	-	$0.33 \times V_{CC}$	٧
		$I_O = 1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	-	-	0.41	٧
		$I_O = 1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$	-	-	0.39	٧
		$I_{O}$ = 2.3 mA; $V_{CC}$ = 2.3 V	-	-	0.36	٧
		$I_{O} = 3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.50	٧
		$I_{O} = 2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.36	٧
		$I_O = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.50	٧
I	input leakage current	$V_I$ = GND to 3.6 V; $V_{CC}$ = 0 V to 3.6 V	-	-	±0.75	μΑ
OFF	power-off leakage current	$V_I$ or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	-	±0.75	μΑ
VI <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	-	-	±0.75	μА
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
VI <sub>CC</sub>	additional supply current	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A};$ $V_{CC} = 3.3 \text{ V}$	[1] -	-	75	μΑ

<sup>[1]</sup> One input at  $V_{CC}$  – 0.6 V, other input at  $V_{CC}$  or GND.

# 11. Dynamic characteristics

Table 8. Dynamic characteristics

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

Symbol	Parameter	Conditions		Ta	<sub>imb</sub> = 25	°C	T <sub>amb</sub> =	-40 °C to	+125 °C	Unit
			M		Typ[1]	Max	Min	Max (85 °C)	Max (125 °C)	
C <sub>L</sub> = 5 pl	F									
$t_{pd}$	propagation delay	nA, nB to nY; see Figure 8	[2]							
		$V_{CC} = 0.8 V$		-	17.0	-	-	-	-	ns
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$		2.5	5.1	10.8	2.1	12.1	13.4	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$		1.6	3.7	6.7	1.4	7.8	8.6	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$		1.3	3.0	5.3	1.1	6.2	6.9	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$		1.0	2.4	3.9	0.9	4.6	5.1	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$		1.0	2.2	3.4	0.8	4.0	4.4	ns
C <sub>L</sub> = 10 p	oF									
t <sub>pd</sub>	propagation delay	nA, nB to nY; see Figure 8	[2]							
		$V_{CC} = 0.8 \text{ V}$		-	20.4	-	-	-	-	ns
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$		2.4	6.0	12.8	2.2	14.3	15.8	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$		1.9	4.3	7.9	1.7	9.2	10.2	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$		1.6	3.6	6.2	1.5	7.3	8.1	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$		1.4	3.0	4.7	1.2	5.6	6.2	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$		1.3	2.7	4.2	1.2	5.0	5.5	ns
C <sub>L</sub> = 15 p	oF									
t <sub>pd</sub>	propagation delay	nA, nB to nY; see Figure 8	[2]							
		$V_{CC} = 0.8 V$		-	23.9	-	-	-	-	ns
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$		3.4	6.8	14.6	3.1	16.4	18.1	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$		2.3	4.8	8.9	2.0	10.4	11.5	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$		1.9	4.0	7.0	1.7	8.3	9.2	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$		1.7	3.4	5.4	1.5	6.3	7.0	ns
		$V_{CC}$ = 3.0 V to 3.6 V		1.6	3.2	4.8	1.4	5.7	6.3	ns
C <sub>L</sub> = 30 p	ρF									
$t_{pd}$	propagation delay	nA, nB to nY; see Figure 8	[2]							
		$V_{CC} = 0.8 V$		-	34.2	-	-	-	-	ns
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$		4.6	9.0	19.9	4.1	22.4	24.7	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$		3.4	6.4	11.8	2.9	13.9	15.3	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$		2.6	5.3	9.3	2.3	11.1	12.3	ns
		$V_{CC}$ = 2.3 V to 2.7 V		2.4	4.5	7.1	2.1	8.5	9.4	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$		2.3	4.2	6.4	2.1	7.7	8.5	ns

 Table 8.
 Dynamic characteristics ...continued

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

Symbol	Parameter	Conditions		Ta	<sub>mb</sub> = 25	°C	$T_{amb} = -40$ °C to +125 °C			Unit
			Min	Typ[1]	Max	Min	Max (85 °C)	Max (125 °C)		
$C_L = 5 pF$	F, 10 pF, 15 pF and	30 pF								
$C_{PD}$	power dissipation capacitance	$f_i = 1 \text{ MHz};$ $V_I = \text{GND to } V_{CC}$	[3]							
		$V_{CC} = 0.8 \text{ V}$		-	2.6	-	-	-	-	pF
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$		-	2.7	-	-	-	-	pF
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$		-	2.8	-	-	-	-	pF
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$		-	2.9	-	-	-	-	pF
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$		-	3.3	-	-	-	-	pF
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$		-	3.8	-	-	-	-	pF

- [1] All typical values are measured at nominal  $V_{CC}$ .
- [2]  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .
- [3]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu W$ ).

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

 $f_i$  = input frequency in MHz;

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

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

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

N = number of inputs switching;

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

#### 12. Waveforms

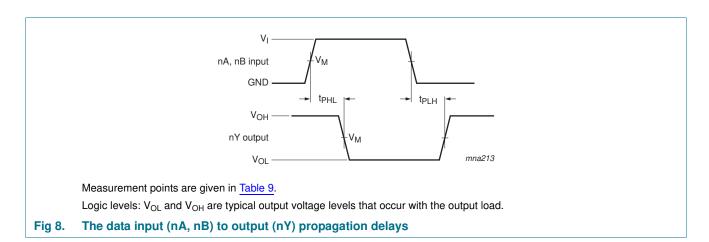
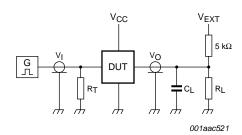


Table 9. Measurement points

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



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  $Z_0$  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>	$t_{PZL}, t_{PLZ}$		
0.8 V to 3.6 V	5 pF, 10 pF, 15 pF and 30 pF	$5~\text{k}\Omega$ or $1~\text{M}\Omega$	open	GND	$2 \times V_{CC}$		

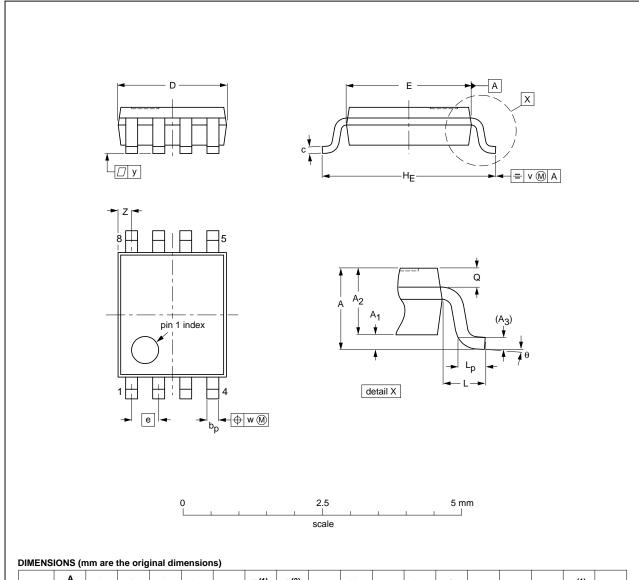
<sup>[1]</sup>  $R_L = 5 \text{ k}\Omega$  when measuring enable and disable times.

 $R_L$  = 1  $M\Omega$  when measuring propagation delays, set-up and hold times and pulse width.

# 13. Package outline

#### VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm

SOT765-1



UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	А3	bp	С	D <sup>(1)</sup>	E <sup>(2)</sup>	е	HE	L	Lp	Q	v	w	у	Z <sup>(1)</sup>	θ
mm	1	0.15 0.00	0.85 0.60	0.12	0.27 0.17	0.23 0.08	2.1 1.9	2.4 2.2	0.5	3.2 3.0	0.4	0.40 0.15	0.21 0.19	0.2	0.13	0.1	0.4 0.1	8° 0°

#### Notes

- Plastic or metal protrusions of 0.15 mm maximum per side are not included.
- 2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE		REFER	EUROPEAN	ISSUE DATE		
VERSION	IEC	JEDEC	JEITA		PROJECTION	ISSUE DATE
SOT765-1		MO-187				02-06-07

Fig 10. Package outline SOT765-1 (VSSOP8)

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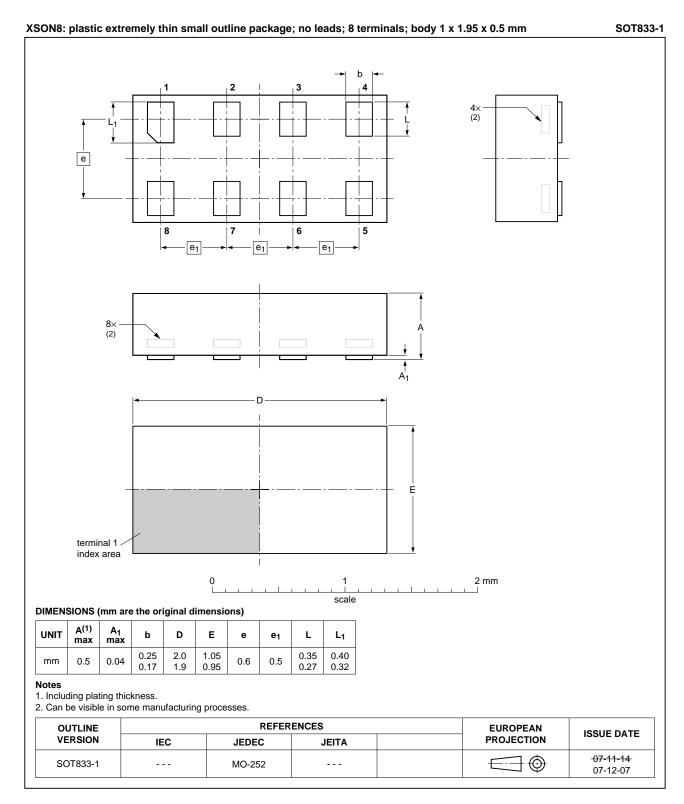


Fig 11. Package outline SOT833-1 (XSON8)

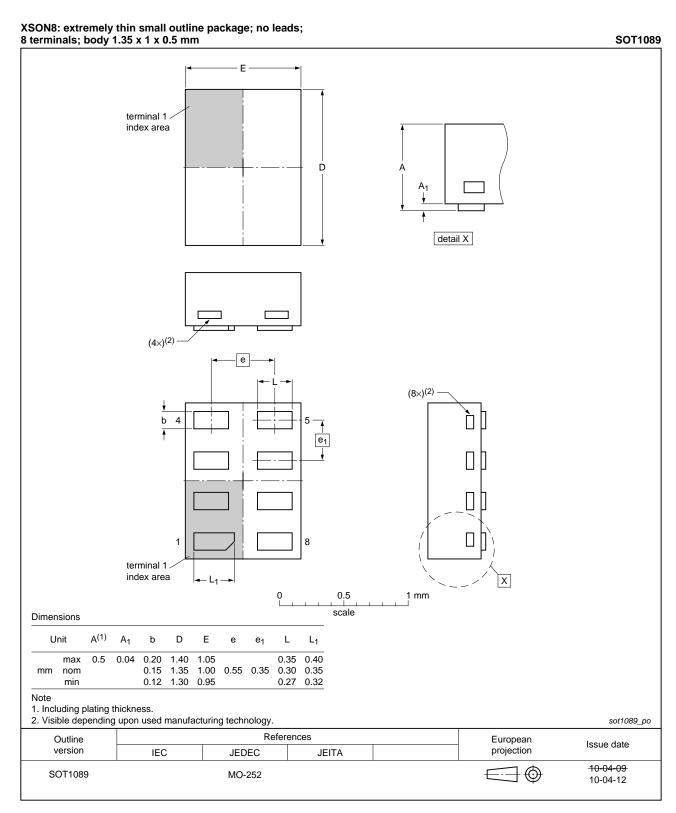


Fig 12. Package outline SOT1089 (XSON8)

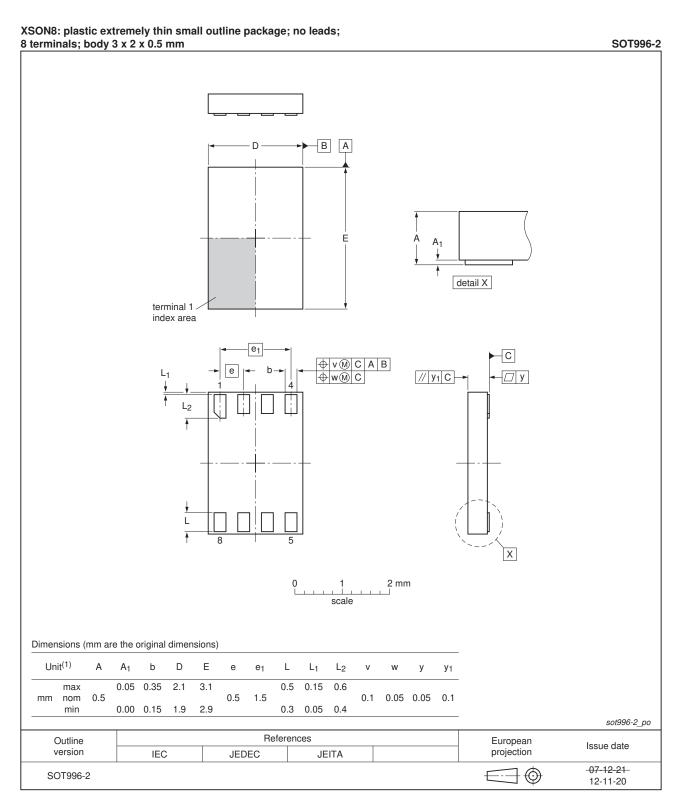


Fig 13. Package outline SOT996-2 (XSON8)

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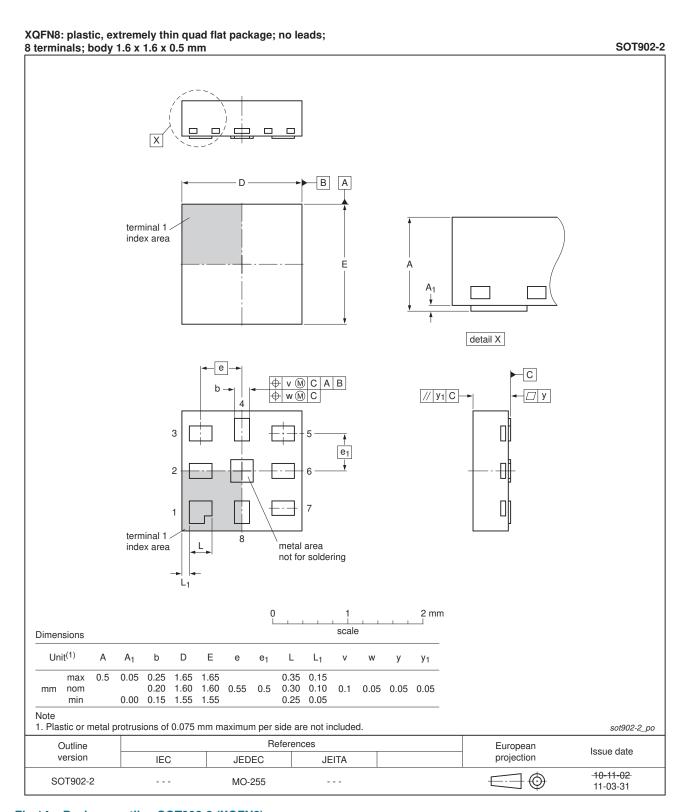


Fig 14. Package outline SOT902-2 (XQFN8)

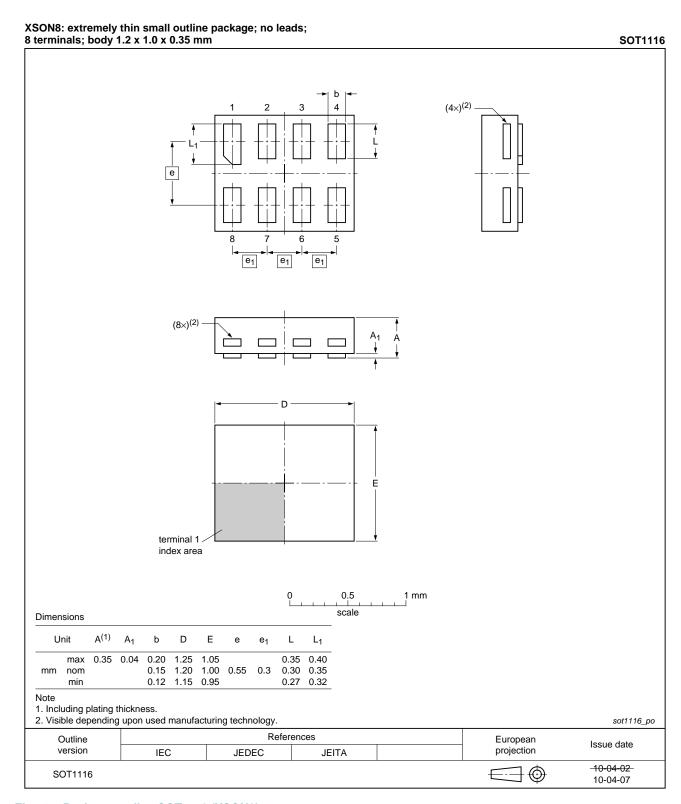


Fig 15. Package outline SOT1116 (XSON8)

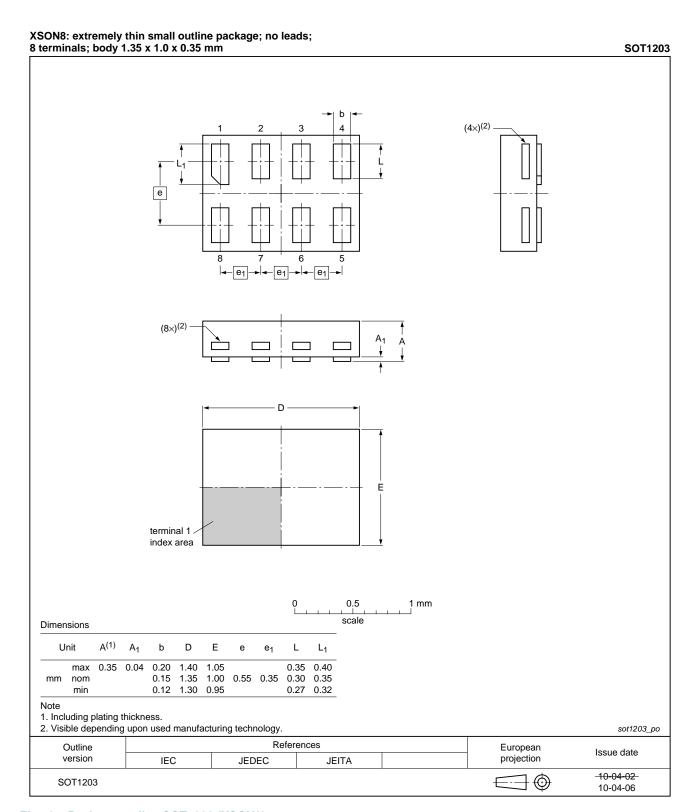


Fig 16. Package outline SOT1203 (XSON8)

# 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
74AUP2G02 v.7	20130204	Product data sheet	-	74AUP2G02 v.6
Modifications:	<ul> <li>For type nu</li> </ul>	mber 74AUP2G02GD XSOI	N8U has changed to XS	SON8.
74AUP2G02 v.6	20120803	Product data sheet	-	74AUP2G02 v.5
74AUP2G02 v.5	20111202	Product data sheet	-	74AUP2G02 v.4
74AUP2G02 v.4	20101109	Product data sheet	-	74AUP2G02 v.3
74AUP2G02 v.3	20081211	Product data sheet	-	74AUP2G02 v.2
74AUP2G02 v.2	20080319	Product data sheet	-	74AUP2G02 v.1
74AUP2G02 v.1	20060828	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.

- [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"
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <a href="http://www.nxp.com">http://www.nxp.com</a>.

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#### Low-power dual 2-input NOR gate

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### Low-power dual 2-input NOR gate

### 18. Contents

1	General description
2	Features and benefits
3	Ordering information
4	Marking 2
5	Functional diagram 2
6	Pinning information 3
6.1	Pinning
6.2	Pin description
7	Functional description
8	Limiting values 4
9	Recommended operating conditions 4
10	Static characteristics 5
11	Dynamic characteristics
12	Waveforms
13	Package outline
14	Abbreviations
15	Revision history
16	Legal information
16.1	Data sheet status
16.2	Definitions19
16.3	Disclaimers
16.4	Trademarks
17	Contact information
18	Contents 21

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