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Team Nexperia

# **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

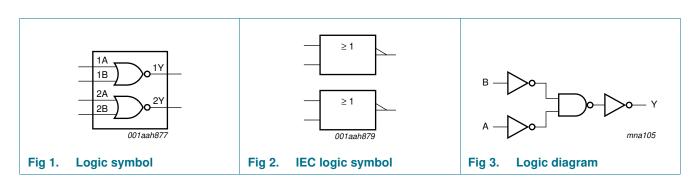
# 4. Marking

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

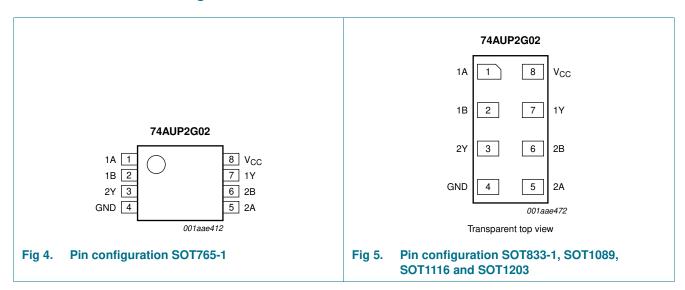


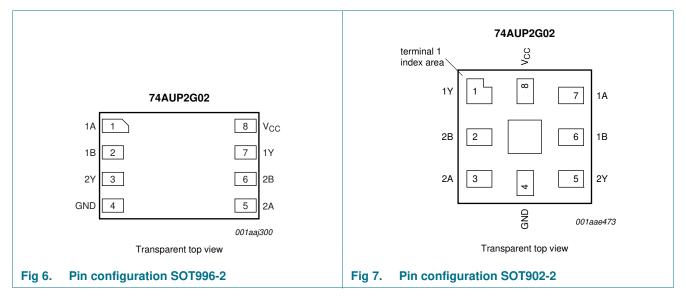
74AUP2G02

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# **Pinning information**

#### 6.1 Pinning





### 6.2 Pin description

Pin description Table 3.

Symbol	Pin	Description	
	SOT765-1, SOT833-1, SOT1089, SOT996-2, SOT1116 and SOT1203		
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
V <sub>I</sub>	input voltage		<u> 11</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> 11</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
$I_{GND}$	ground current		-50	-	mA
T <sub>stg</sub>	storage temperature		<b>–65</b>	+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		8.0	3.6	V
V <sub>I</sub>	input voltage		0	3.6	V
V <sub>O</sub>	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<sub>tot</sub> derates linearly with 8.0 mW/K.
For XSON8 and XQFN8 packages: above 118 °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).

Syllibol	Parameter	Conditions	Min	Тур	Max	Unit
T <sub>amb</sub> = 2	e5 °C					
$V_{IH}$	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 <sub>CC</sub> = 3.0 V to 3.6 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 <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 $V_{IL}$				
		$I_O = -20~\mu A;~V_{CC} = 0.8~V$ 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
$V_{OL}$	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
		$I_O = 1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	-	-	0.31	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 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	$V_{I}$ 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
Co	output capacitance	$V_{O} = GND; V_{CC} = 0 V$	-	1.7	-	pF

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

 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 +85 °C					
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 0.8 V	$0.70 \times V_{CC}$	-	-	٧
		$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$	$0.65 \times V_{CC}$	-	-	٧
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.6	-	-	٧
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	2.0	-	-	٧
/ <sub>IL</sub>	LOW-level input voltage	$V_{CC} = 0.8 \text{ V}$	-	-	$0.30 \times V_{CC}$	٧
		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	$0.35 \times V_{CC}$	٧
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	-	-	0.7	٧
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	-	-	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	$V_{CC}-0.1$	-	-	٧
		$I_{O} = -1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	$0.7 \times V_{CC}$	-	-	٧
		$I_{O} = -1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	1.03	-	-	٧
		$I_{O} = -1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$	1.30	-	-	٧
		$I_{O} = -2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.97	-	-	٧
		$I_{O} = -3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.85	-	-	٧
		$I_{O} = -2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.67	-	-	٧
		$I_{O} = -4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.55	-	-	٧
/ <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	٧
		I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	$0.3 \times V_{CC}$	٧
		$I_O = 1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	-	-	0.37	٧
		$I_O = 1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$	-	-	0.35	٧
		$I_{O} = 2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.33	٧
		$I_{O} = 3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.45	٧
		$I_O = 2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.33	٧
		$I_O = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.45	٧
I	input leakage current	$V_{I} = GND \text{ to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	±0.5	μΑ
OFF	power-off leakage current	$V_I$ or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	-	±0.5	μΑ
VI <sub>OFF</sub>	additional power-off leakage current	$V_1 \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V};$ $V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	±0.6	μΑ
CC	supply current	$V_I$ = GND or $V_{CC}$ ; $I_O$ = 0 A; $V_{CC}$ = 0.8 V to 3.6 V	-	-	0.9	μА
7l <sup>CC</sup>	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

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

 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 <sub>CC</sub> = 0.8 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	$V_{CC} = 0.8 \text{ V}$	-	-	$0.25 \times V_{CC}$	٧
		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	$0.30 \times V_{CC}$	٧
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	٧
		V <sub>CC</sub> = 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	$V_{CC}-0.11$	-	-	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	-	-	V
		$I_{O} = -4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	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
		$I_O = 1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	-	-	$0.33 \times V_{CC}$	V
		$I_O = 1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	-	-	0.41	V
		$I_O = 1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$	-	-	0.39	٧
		$I_O = 2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	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 $V_O = 0$ 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
7l <sup>CC</sup>	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>mb</sub> = 25	°C	T <sub>amb</sub> =	–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, 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	8.0	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]							
		$V_{CC} = 0.8 V$		-	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									
$t_{pd}$	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
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$		1.6	3.2	4.8	1.4	5.7	6.3	ns
$C_L = 30 \text{ p}$	o <b>F</b>									
$t_{pd}$	propagation delay		[2]							
		$V_{CC} = 0.8 \text{ V}$		-	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
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$		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				Ta	<sub>mb</sub> = 25	°C	T <sub>amb</sub> =	-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<sub>i</sub> = input frequency in MHz;

 $f_0$  = 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

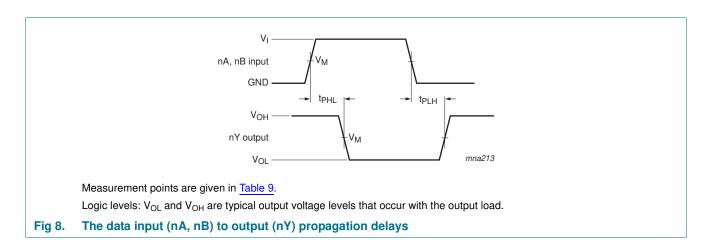
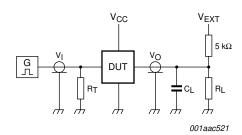


Table 9. Measurement points

Supply voltage	Output	Input						
V <sub>CC</sub>	V <sub>M</sub>	V <sub>M</sub>	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>	$t_{PZL}, t_{PLZ}$		
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	$2 \times V_{CC}$		

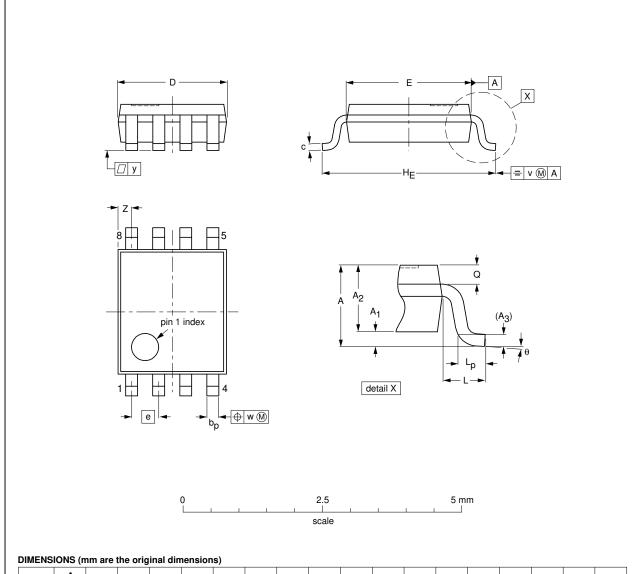
<sup>[1]</sup>  $R_L = 5 \text{ k}\Omega$  when measuring enable and disable times.

 $R_L$  = 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

- 1. 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)

74AUP2G02

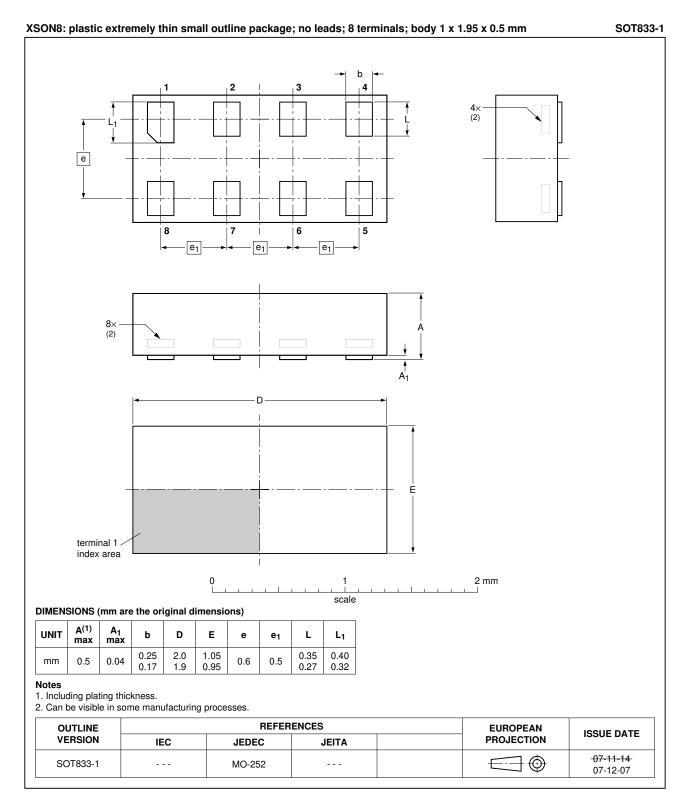


Fig 11. Package outline SOT833-1 (XSON8)

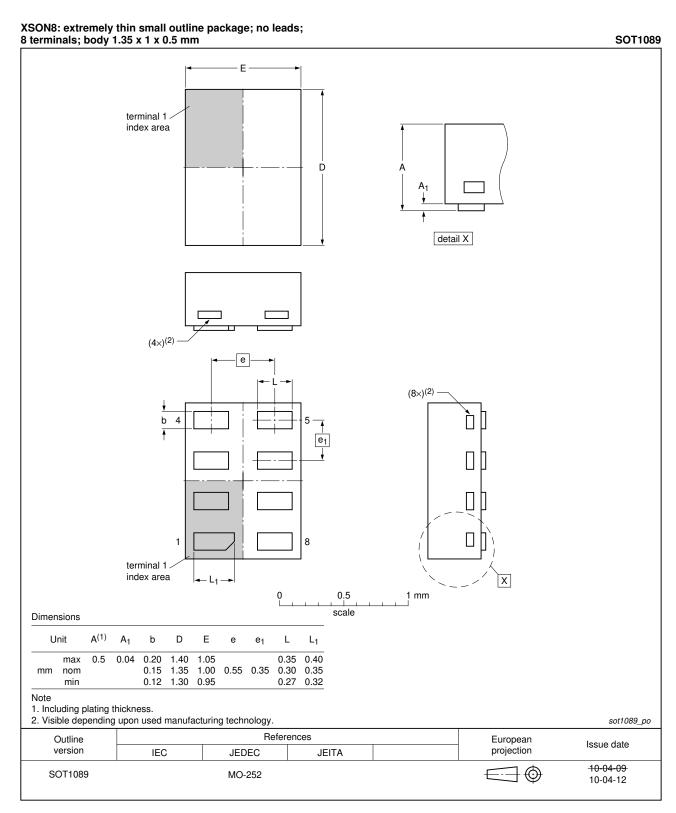


Fig 12. Package outline SOT1089 (XSON8)

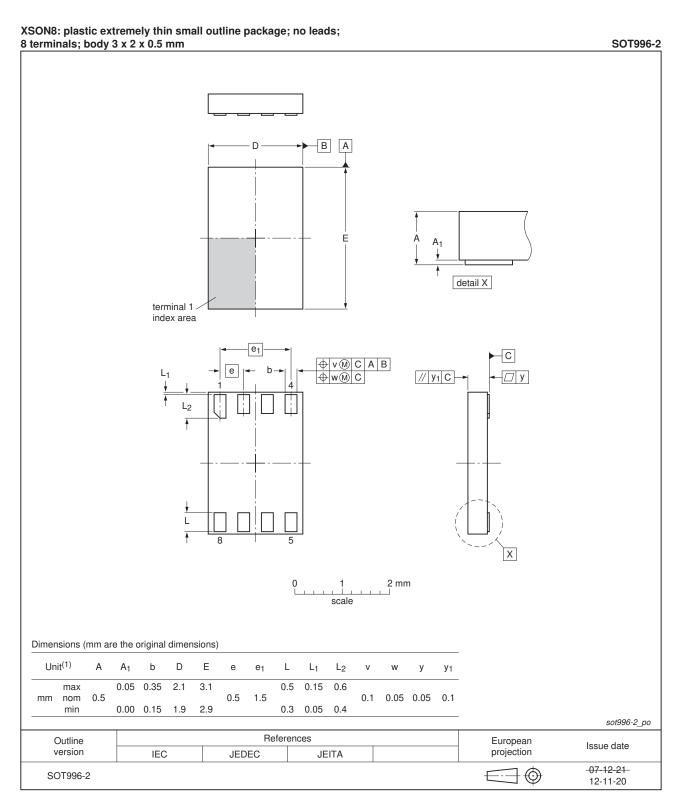


Fig 13. Package outline SOT996-2 (XSON8)

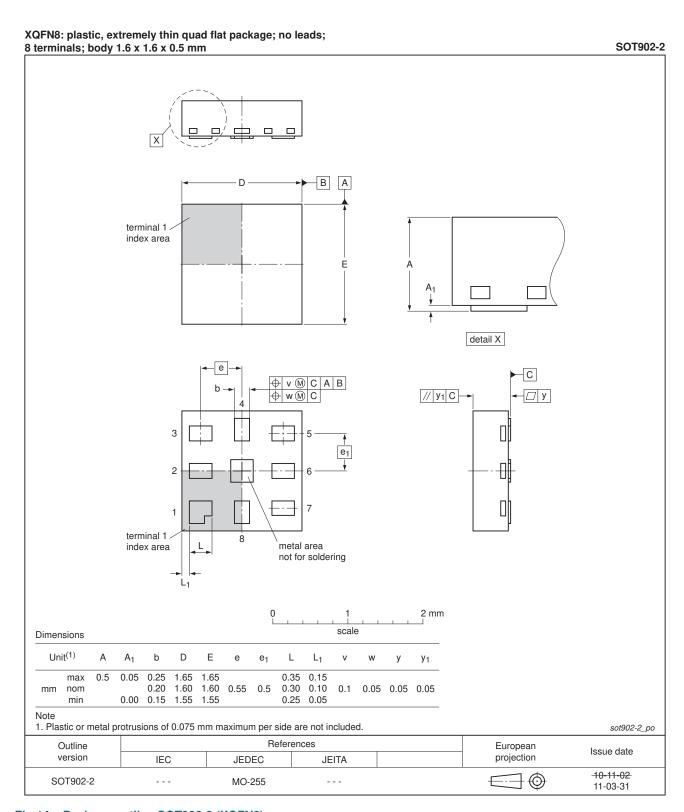


Fig 14. Package outline SOT902-2 (XQFN8)

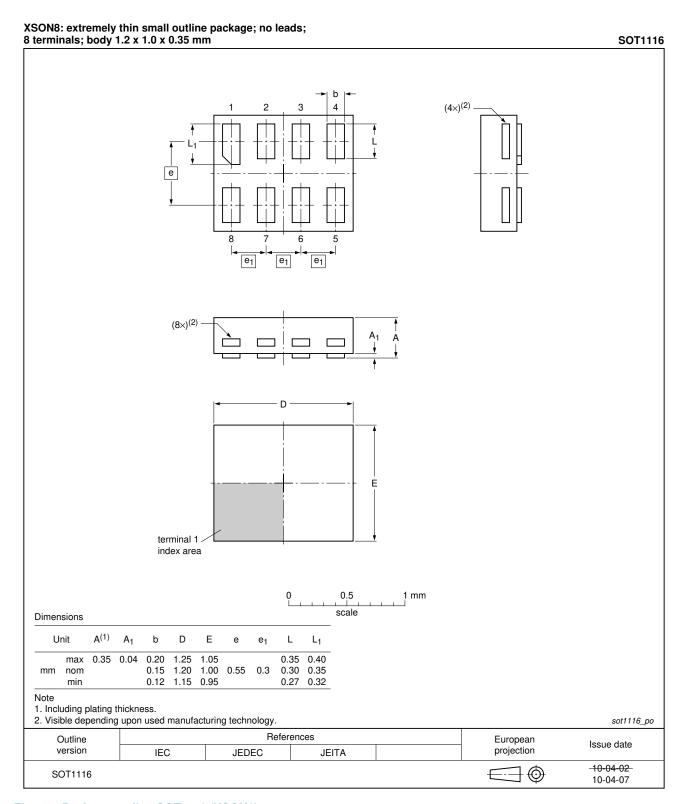


Fig 15. Package outline SOT1116 (XSON8)

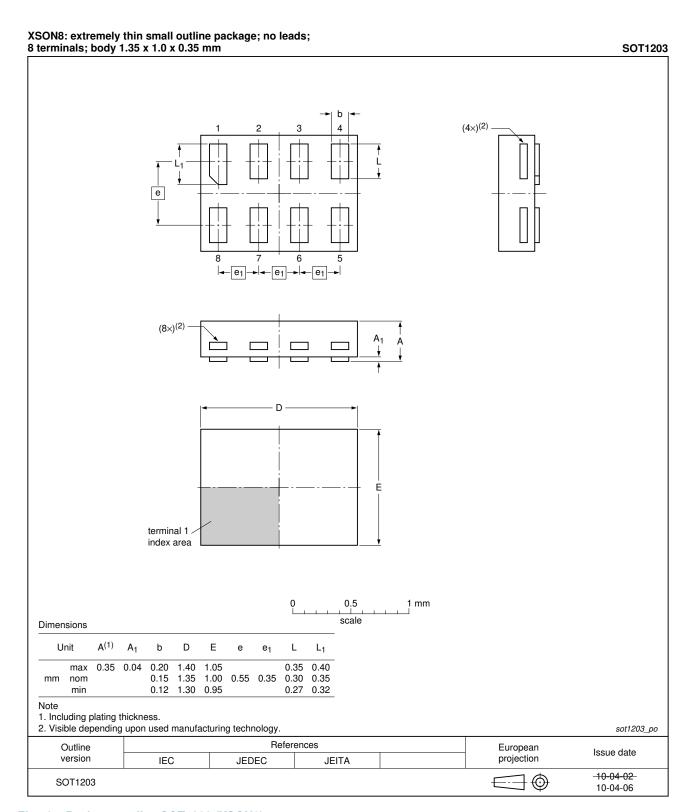


Fig 16. Package outline SOT1203 (XSON8)

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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
74AUP2G02 v.7	20130204	Product data sheet	-	74AUP2G02 v.6
Modifications:	<ul> <li>For type nu</li> </ul>	mber 74AUP2G02GD XSON	8U 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"
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#### Low-power dual 2-input NOR gate

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