

# 74AUP1G86

Low-power 2-input EXCLUSIVE-OR gate

Rev. 01 — 9 August 2004

Product data sheet

## 1. General description

The 74AUP1G86 is a high-performance, low-power, low-voltage, Si-gate CMOS device, superior to most advanced CMOS compatible TTL families.

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.

The 74AUP1G86 provides the single 2-input EXCLUSIVE-OR function.

## 2. Features

- 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-A114-C exceeds 2000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM JESD22-C101-C exceeds 1000 V
- Low static power consumption;  $I_{CC} = 0.9 \mu\text{A}$  (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  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$

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### 3. Quick reference data

**Table 1: Quick reference data**
 $GND = 0\text{ V}$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$ ;  $t_r = t_f \leq 3\text{ ns}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$t_{PHL}$ , $t_{PLH}$	propagation delay A or B to Y	$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 0.8\text{ V}$	-	21.2	-	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.1\text{ V to }1.3\text{ V}$	2.3	5.9	13.1	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.4\text{ V to }1.6\text{ V}$	1.8	4.1	7.7	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.65\text{ V to }1.95\text{ V}$	1.5	3.3	5.9	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.2	2.6	4.4	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.0	2.3	4.0	ns	
$C_i$	input capacitance		-	0.8	-	pF	
$C_{PD}$	power dissipation capacitance	$V_{CC} = 1.8\text{ V}$ ; $f = 10\text{ MHz}$	[1] [2]	-	3.7	-	pF
		$V_{CC} = 3.3\text{ V}$ ; $f = 10\text{ MHz}$	[1] [2]	-	4.5	-	pF

[1]  $C_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu\text{W}$ ).

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

 $f_i$  = input frequency in MHz;

 $f_o$  = output frequency in MHz;

 $C_L$  = output 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.

[2] The condition is  $V_1 = GND$  to  $V_{CC}$ .

### 4. Ordering information

**Table 2: Ordering information**

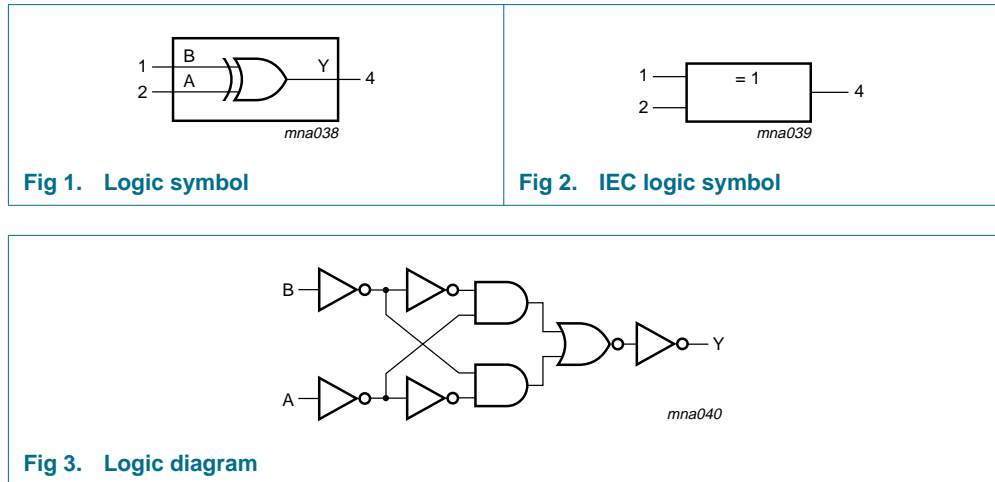
Type number	Package			Version
	Temperature range	Name	Description	
74AUP1G86GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74AUP1G86GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886

### 5. Marking

**Table 3: Marking**

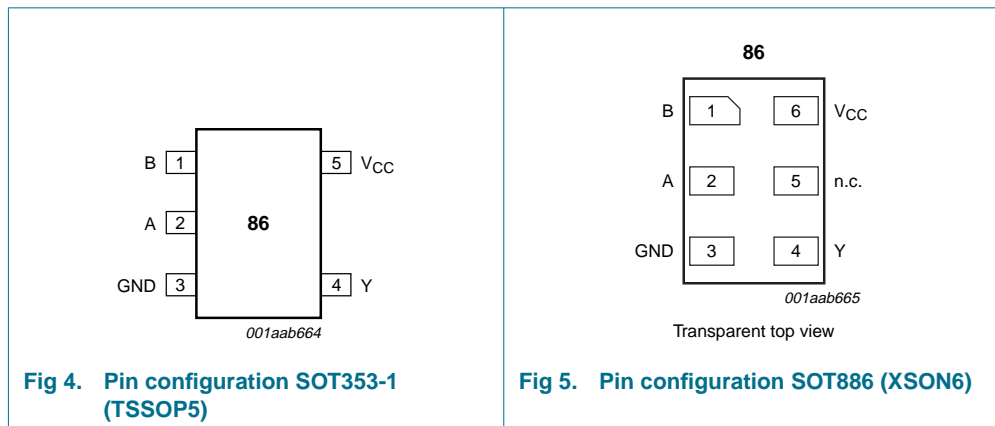
Type number	Marking code
74AUP1G86GW	pH
74AUP1G86GM	pH

## 6. Functional diagram



## 7. Pinning information

### 7.1 Pinning



### 7.2 Pin description

Table 4: Pin description

Symbol	Pin		Description
	TSSOP5	XSON6	
B	1	1	data input B
A	2	2	data input A
GND	3	3	ground (0 V)
Y	4	4	data output Y
n.c.	-	5	not connected
V <sub>CC</sub>	5	6	supply voltage

## 8. Functional description

### 8.1 Function table

Table 5: Function table [1]

Input		Output
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

[1] H = HIGH voltage level;  
L = LOW voltage level.

## 9. Limiting values

Table 6: 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
$V_I$	input voltage		[1] -0.5	+4.6	V
$I_{OK}$	output clamping current	$V_O > V_{CC}$ or $V_O < 0$ V	-	$\pm 50$	mA
$V_O$	output voltage	active mode	[1] -0.5	$V_{CC} + 0.5$	V
		Power-down mode	[1] -0.5	+4.6	V
$I_O$	output current	$V_O = 0$ V to $V_{CC}$	-	$\pm 20$	mA
$I_{CC}$	quiescent supply current		-	+50	mA
$I_{GND}$	ground current		-	-50	mA
$T_{stg}$	storage temperature		-65	+150	°C
$P_{tot}$	total power dissipation	$T_{amb} = -40$ °C to +125 °C	[2] -	250	mW

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For TSSOP5 packages: above 87.5 °C the value of  $P_{tot}$  derates linearly with 4.0 mW/K.  
For XSON6 packages: above 45 °C the value of  $P_{tot}$  derates linearly with 2.4 mW/K.

## 10. Recommended operating conditions

**Table 7: Recommended operating conditions**

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		0.8	3.6	V
$V_I$	input voltage		0	3.6	V
$V_O$	output voltage	active mode	0	$V_{CC}$	V
		Power-down mode; $V_{CC} = 0$ V	0	3.6	V
$T_{amb}$	ambient temperature		-40	+125	°C
$t_r, t_f$	input rise and fall times	$V_{CC} = 0.8$ V to 3.6 V	0	200	ns/V

## 11. Static characteristics

**Table 8: Static characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = 25</math> °C</b>						
$V_{IH}$	HIGH-state 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-state 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
$V_{OH}$	HIGH-state 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
		$I_O = -1.1$ mA; $V_{CC} = 1.1$ V	$0.75 \times V_{CC}$	-	-	V
		$I_O = -1.7$ mA; $V_{CC} = 1.4$ V	1.11	-	-	V
		$I_O = -1.9$ mA; $V_{CC} = 1.65$ V	1.32	-	-	V
		$I_O = -2.3$ mA; $V_{CC} = 2.3$ V	2.05	-	-	V
		$I_O = -3.1$ mA; $V_{CC} = 2.3$ V	1.9	-	-	V
		$I_O = -2.7$ mA; $V_{CC} = 3.0$ V	2.72	-	-	V
$V_{OL}$	LOW-state 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
		$I_O = 1.1$ 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
		$I_O = 2.7$ mA; $V_{CC} = 3.0$ V	-	-	0.31	V
	$I_O = 4.0$ mA; $V_{CC} = 3.0$ V	-	-	0.44	V	

**Table 8: Static characteristics ...continued**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{LI}$	input leakage current	$V_I = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	$\pm 0.1$	$\mu\text{A}$
$I_{OFF}$	power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$	-	-	$\pm 0.2$	$\mu\text{A}$
$\Delta I_{OFF}$	additional power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	$\pm 0.2$	$\mu\text{A}$
$I_{CC}$	quiescent supply current	$V_I = \text{GND or } V_{CC}; I_O = 0 \text{ A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	0.5	$\mu\text{A}$
$\Delta I_{CC}$	additional quiescent supply current	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$	[1] -	-	40	$\mu\text{A}$
$C_i$	input capacitance	$V_{CC} = 0 \text{ V to } 3.6 \text{ V}; V_I = \text{GND or } V_{CC}$	-	0.8	-	pF
$C_o$	output capacitance	$V_O = \text{GND}; V_{CC} = 0 \text{ V}$	-	1.7	-	pF
<b><math>T_{amb} = -40 \text{ }^\circ\text{C to } +85 \text{ }^\circ\text{C}</math></b>						
$V_{IH}$	HIGH-state input voltage	$V_{CC} = 0.8 \text{ V}$	$0.70 \times V_{CC}$	-	-	V
		$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$	$0.65 \times V_{CC}$	-	-	V
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.6	-	-	V
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	2.0	-	-	V
$V_{IL}$	LOW-state input voltage	$V_{CC} = 0.8 \text{ V}$	-	-	$0.30 \times V_{CC}$	V
		$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$	-	-	$0.35 \times V_{CC}$	V
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	-	-	0.7	V
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	-	-	0.9	V
$V_{OH}$	HIGH-state output voltage	$V_I = V_{IH} \text{ or } V_{IL}$				
		$I_O = -20 \mu\text{A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	$V_{CC} - 0.1$	-	-	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
$V_{OL}$	LOW-state output voltage	$V_I = V_{IH} \text{ or } V_{IL}$				
		$I_O = 20 \mu\text{A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	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
$I_{LI}$	input leakage current	$V_I = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	$\pm 0.5$	$\mu\text{A}$
		$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$	-	-	$\pm 0.5$	$\mu\text{A}$
$\Delta I_{OFF}$	additional power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	$\pm 0.6$	$\mu\text{A}$

**Table 8: Static characteristics ...continued**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CC}$	quiescent supply current	$V_I = \text{GND or } V_{CC}; I_O = 0 \text{ A};$ $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	0.9	$\mu\text{A}$
$\Delta I_{CC}$	additional quiescent supply current	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A};$ $V_{CC} = 3.3 \text{ V}$	[1] -	-	50	$\mu\text{A}$
<b><math>T_{\text{amb}} = -40 \text{ }^\circ\text{C to } +125 \text{ }^\circ\text{C}</math></b>						
$V_{IH}$	HIGH-state input voltage	$V_{CC} = 0.8 \text{ V}$	$0.75 \times V_{CC}$	-	-	V
		$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$	$0.70 \times V_{CC}$	-	-	V
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.6	-	-	V
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	2.0	-	-	V
$V_{IL}$	LOW-state input voltage	$V_{CC} = 0.8 \text{ V}$	-	-	$0.25 \times V_{CC}$	V
		$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$	-	-	$0.30 \times V_{CC}$	V
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	-	-	0.7	V
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	-	-	0.9	V
$V_{OH}$	HIGH-state output voltage	$V_I = V_{IH} \text{ or } V_{IL}$				
		$I_O = -20 \mu\text{A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	$V_{CC} - 0.11$	-	-	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
$V_{OL}$	LOW-state output voltage	$V_I = V_{IH} \text{ or } V_{IL}$				
		$I_O = 20 \mu\text{A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	0.11	V
		$I_O = 1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	-	-	$0.33 \times V_{CC}$	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	V
		$I_O = 2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.36	V
		$I_O = 3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.50	V
		$I_O = 2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.36	V
$I_{LI}$	input leakage current	$V_I = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	$\pm 0.75$	$\mu\text{A}$
		$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$	-	-	$\pm 0.75$	$\mu\text{A}$
$I_{OFF}$	power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V};$ $V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	$\pm 0.75$	$\mu\text{A}$
$\Delta I_{OFF}$	additional power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V};$ $V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	$\pm 0.75$	$\mu\text{A}$
$I_{CC}$	quiescent supply current	$V_I = \text{GND or } V_{CC}; I_O = 0 \text{ A};$ $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	1.4	$\mu\text{A}$
$\Delta I_{CC}$	additional quiescent supply current	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A};$ $V_{CC} = 3.3 \text{ V}$	[1] -	-	75	$\mu\text{A}$

[1] One input at  $V_{CC} - 0.6 \text{ V}$ , other input at  $V_{CC}$  or GND.

## 12. Dynamic characteristics

**Table 9: Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#)

Symbol	Parameter	Conditions	Min	Typ <sup>[1]</sup>	Max	Unit
<b>T<sub>amb</sub> = 25 °C; C<sub>L</sub> = 5 pF</b>						
t <sub>PHL</sub> , t <sub>PLH</sub>	propagation delay A or B to Y	see <a href="#">Figure 6</a>				
		V <sub>CC</sub> = 0.8 V	-	21.2	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.3	5.9	13.1	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.8	4.1	7.7	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.5	3.3	5.9	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.2	2.6	4.4	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.0	2.3	4.0	ns
<b>T<sub>amb</sub> = 25 °C; C<sub>L</sub> = 10 pF</b>						
t <sub>PHL</sub> , t <sub>PLH</sub>	propagation delay A or B to Y	see <a href="#">Figure 6</a>				
		V <sub>CC</sub> = 0.8 V	-	24.7	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.6	6.8	14.8	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.2	4.8	8.7	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.8	3.9	6.7	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.5	3.1	5.2	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.3	2.9	4.8	ns
<b>T<sub>amb</sub> = 25 °C; C<sub>L</sub> = 15 pF</b>						
t <sub>PHL</sub> , t <sub>PLH</sub>	propagation delay A or B to Y	see <a href="#">Figure 6</a>				
		V <sub>CC</sub> = 0.8 V	-	28.2	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.0	7.6	16.5	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.4	5.3	9.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.1	4.4	7.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.8	3.6	5.9	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.6	3.3	5.4	ns
<b>T<sub>amb</sub> = 25 °C; C<sub>L</sub> = 30 pF</b>						
t <sub>PHL</sub> , t <sub>PLH</sub>	propagation delay A or B to Y	see <a href="#">Figure 6</a>				
		V <sub>CC</sub> = 0.8 V	-	38.5	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.9	9.9	21.5	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.2	6.9	12.5	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.8	5.7	9.8	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.4	4.7	7.6	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.2	4.4	7.1	ns



**Table 9: Dynamic characteristics ...continued**Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#)

Symbol	Parameter	Conditions	Min	Typ [1]	Max	Unit
<b>T<sub>amb</sub> = 25 °C</b>						
C <sub>PD</sub>	power dissipation capacitance	f = 10 MHz	<a href="#">[2]</a> <a href="#">[3]</a>			
		V <sub>CC</sub> = 0.8 V	-	3.4	-	pF
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	3.5	-	pF
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	3.6	-	pF
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	3.7	-	pF
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	4.1	-	pF
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	4.5	-	pF

[1] All typical values are measured at nominal V<sub>CC</sub>.[2] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> in μW).P<sub>D</sub> = C<sub>PD</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>i</sub> × N + Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) where:f<sub>i</sub> = 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;

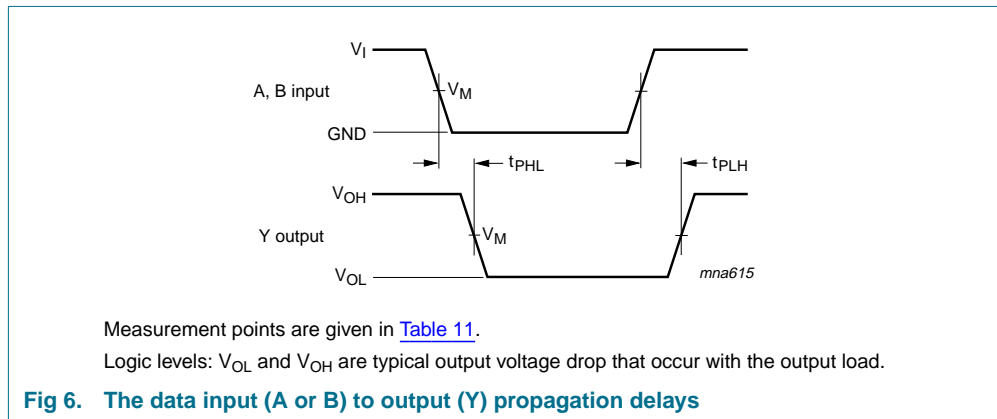
Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of the outputs.[3] The condition is V<sub>I</sub> = GND to V<sub>CC</sub>.**Table 10: Dynamic characteristics**Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#)

Symbol	Parameter	Conditions	-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Max	Min	Max	
<b>C<sub>L</sub> = 5 pF</b>							
t <sub>PHL</sub> , t <sub>PLH</sub>	propagation delay A or B to Y	see <a href="#">Figure 6</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.1	14.3	2.1	15.8	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.6	8.8	1.6	9.7	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.4	6.9	1.4	7.6	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.1	5.3	1.1	5.9	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.9	4.7	0.9	5.2	ns
<b>C<sub>L</sub> = 10 pF</b>							
t <sub>PHL</sub> , t <sub>PLH</sub>	propagation delay A or B to Y	see <a href="#">Figure 6</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.4	16.2	2.4	17.9	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.9	10.0	1.9	11.0	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.7	8.0	1.7	8.8	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.4	6.2	1.4	6.9	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.3	5.6	1.3	6.2	ns

**Table 10: Dynamic characteristics ...continued**  
 Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#)

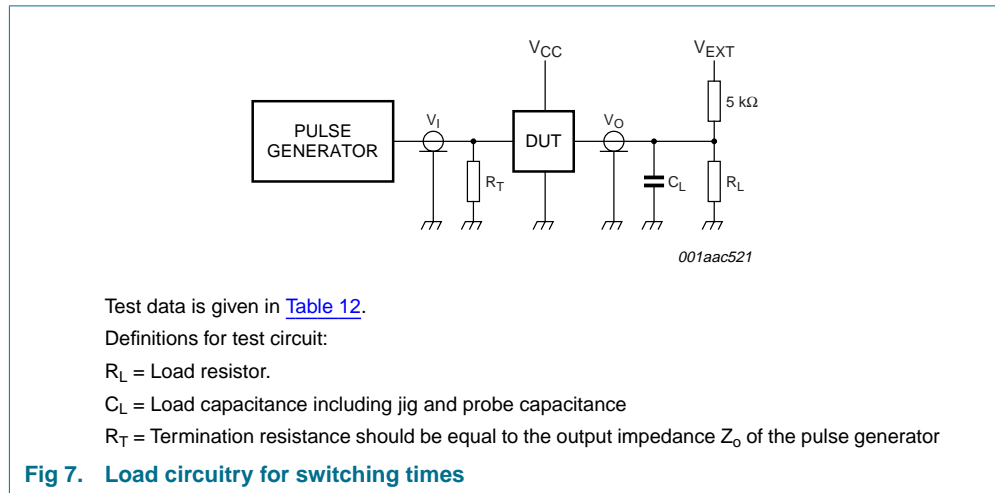
Symbol	Parameter	Conditions	-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Max	Min	Max	
<b><math>C_L = 15</math> pF</b>							
$t_{PHL}, t_{PLH}$	propagation delay A or B to Y	see <a href="#">Figure 6</a>					
		$V_{CC} = 1.1$ V to 1.3 V	2.7	18.1	2.7	20.0	ns
		$V_{CC} = 1.4$ V to 1.6 V	2.2	11.3	2.2	12.5	ns
		$V_{CC} = 1.65$ V to 1.95 V	1.9	9.0	1.9	9.9	ns
		$V_{CC} = 2.3$ V to 2.7 V	1.6	7.0	1.6	7.7	ns
		$V_{CC} = 3.0$ V to 3.6 V	1.5	6.4	1.5	7.1	ns
<b><math>C_L = 30</math> pF</b>							
$t_{PHL}, t_{PLH}$	propagation delay A or B to Y	see <a href="#">Figure 6</a>					
		$V_{CC} = 1.1$ V to 1.3 V	3.5	24.1	3.5	26.6	ns
		$V_{CC} = 1.4$ V to 1.6 V	2.8	14.8	2.8	16.3	ns
		$V_{CC} = 1.65$ V to 1.95 V	2.5	11.7	2.5	12.9	ns
		$V_{CC} = 2.3$ V to 2.7 V	2.2	9.1	2.2	10.1	ns
		$V_{CC} = 3.0$ V to 3.6 V	2.1	8.3	2.1	9.2	ns

### 13. Waveforms



**Table 11: Measurement points**

Supply voltage	Output	Input		
$V_{CC}$	$V_M$	$V_M$	$V_I$	$t_r = t_f$
0.8 V to 3.6 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	$V_{CC}$	$\leq 3.0$ ns



**Table 12: Test data**

Supply voltage	Load		$V_{EXT}$		
$V_{CC}$	$C_L$	$R_L$ [1]	$t_{PLH}$ , $t_{PHL}$	$t_{PZH}$ , $t_{PHZ}$	$t_{PZL}$ , $t_{PLZ}$
0.8 V to 3.6 V	5 pF, 10 pF, 15 pF and 30 pF	5 kΩ or 1 MΩ	open	GND	$2 \times V_{CC}$

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

14. Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm

SOT353-1

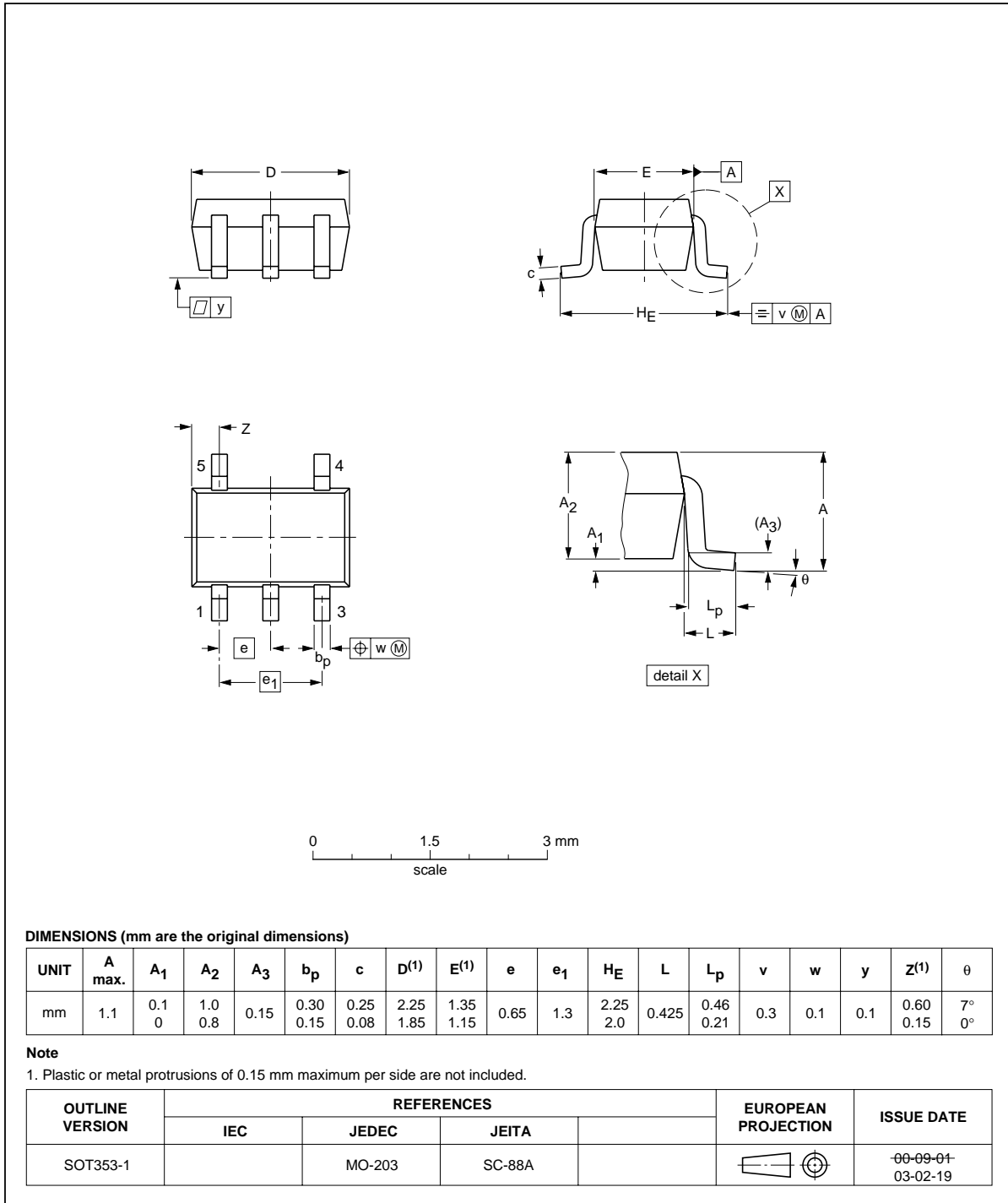


Fig 8. Package outline SOT353-1 (TSSOP5)

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm

SOT886

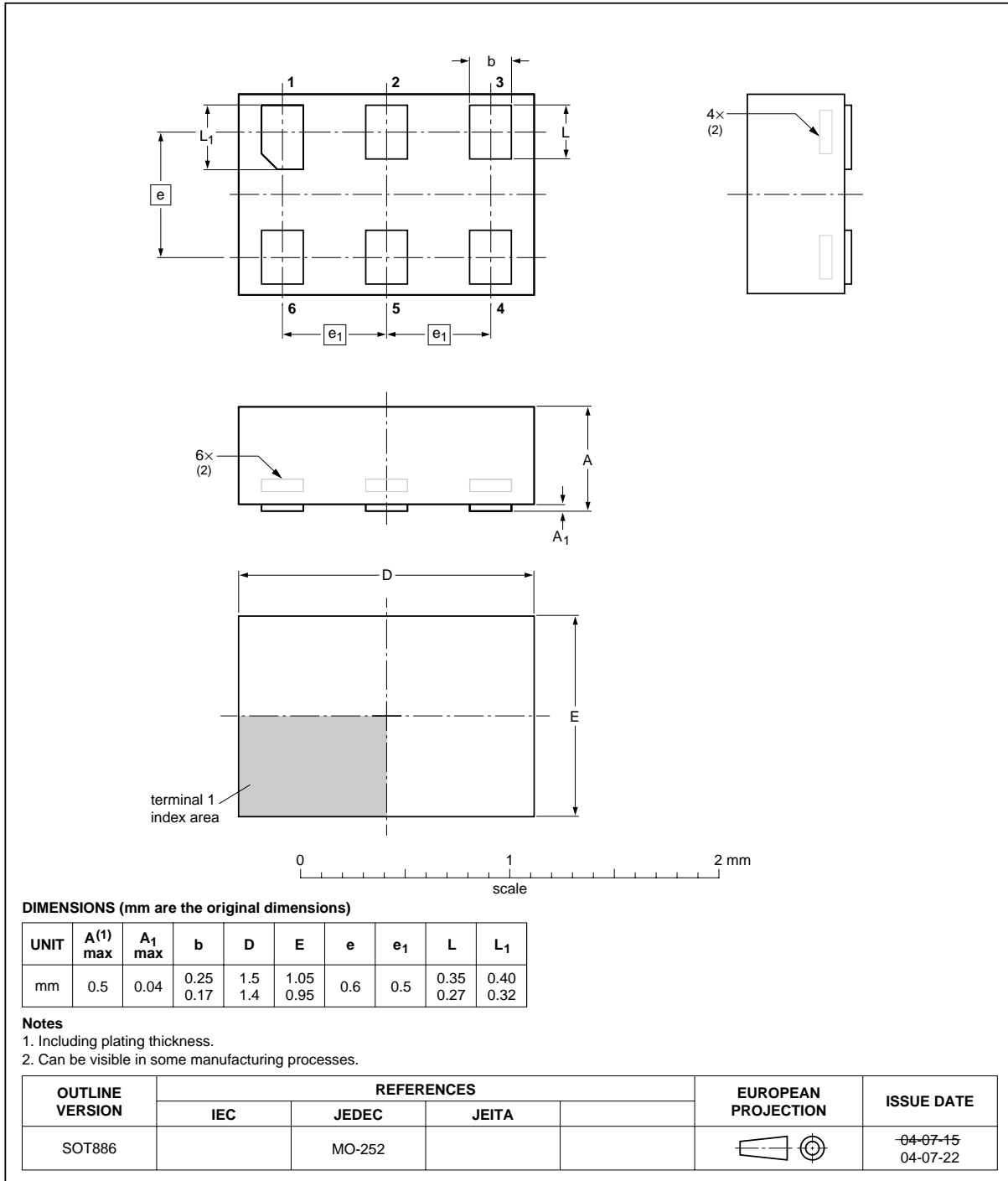


Fig 9. Package outline SOT886 (XSON6)



## 15. Abbreviations

Table 13: Abbreviations

Acronym	Description
CMOS	Complementary Metal Oxide Semiconductor
TTL	Transistor Transistor Logic
HBM	Human Body Model
ESD	ElectroStatic Discharge
MM	Machine Model
CDM	Charged Device Model

## 16. Revision history

Table 14: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
74AUP1G86_1	20050809	Product data sheet	-	9397 750 14684	-

## 17. Data sheet status

Level	Data sheet status [1]	Product status [2][3]	Definition
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