

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

$GND = 0\text{ V}$; $T_{amb} = 25\text{ °C}$; $t_r = t_f \leq 3\text{ ns}$.

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 μW).

$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ 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 $V_i = GND$ to V_{CC} .

4. Ordering information

Table 2: Ordering information

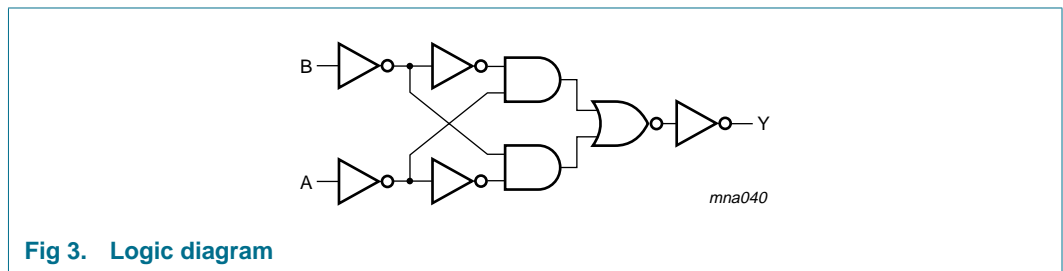
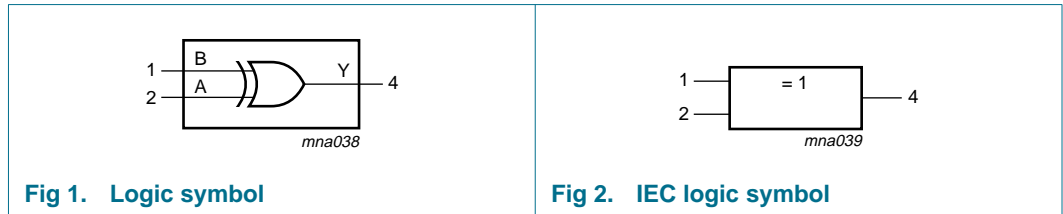
Type number	Package			Version
	Temperature range	Name	Description	
74AUP1G86GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74AUP1G86GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45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

5. Marking

Table 3: Marking

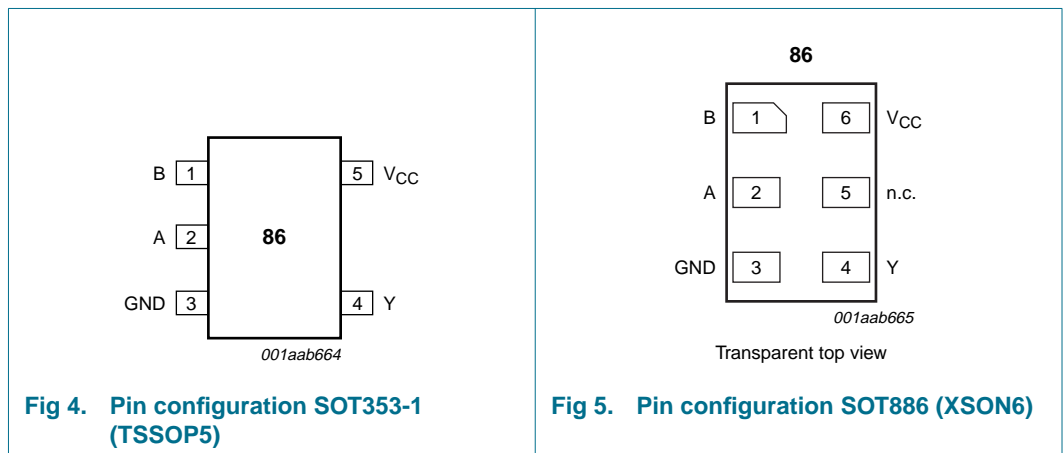
Type number	Marking code
74AUP1G86GW	pH
74AUP1G86GM	pH

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 _{CC}	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	-	±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}	-	±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
$T_{amb} = 25$ °C						
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}				
		$I_O = -20$ μ 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}				
		$I_O = 20$ μ 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	$V_I = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	± 0.1	μA
I_{OFF}	power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$	-	-	± 0.2	μA
ΔI_{OFF}	additional power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	± 0.2	μA
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	μA
ΔI_{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	μA
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
$T_{amb} = -40 \text{ }^\circ\text{C to } +85 \text{ }^\circ\text{C}$						
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	$V_I = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	± 0.5	μA
		$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$	-	-	± 0.5	μA
		$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	± 0.6	μA

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	μA
ΔI_{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	μA
$T_{\text{amb}} = -40 \text{ }^\circ\text{C to } +125 \text{ }^\circ\text{C}$						
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	$V_I = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	± 0.75	μA
		$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$	-	-	± 0.75	μA
I_{OFF}	power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V};$ $V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	± 0.75	μA
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	μA
ΔI_{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	μA

[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 ^[1]	Max	Unit
$T_{amb} = 25\text{ }^{\circ}\text{C}$; $C_L = 5\text{ pF}$						
t_{PHL} , t_{PLH}	propagation delay A or B to Y	see Figure 6				
		$V_{CC} = 0.8\text{ V}$	-	21.2	-	ns
		$V_{CC} = 1.1\text{ V to }1.3\text{ V}$	2.3	5.9	13.1	ns
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	1.8	4.1	7.7	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	1.5	3.3	5.9	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.2	2.6	4.4	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.0	2.3	4.0	ns
$T_{amb} = 25\text{ }^{\circ}\text{C}$; $C_L = 10\text{ pF}$						
t_{PHL} , t_{PLH}	propagation delay A or B to Y	see Figure 6				
		$V_{CC} = 0.8\text{ V}$	-	24.7	-	ns
		$V_{CC} = 1.1\text{ V to }1.3\text{ V}$	2.6	6.8	14.8	ns
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	2.2	4.8	8.7	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	1.8	3.9	6.7	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.5	3.1	5.2	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.3	2.9	4.8	ns
$T_{amb} = 25\text{ }^{\circ}\text{C}$; $C_L = 15\text{ pF}$						
t_{PHL} , t_{PLH}	propagation delay A or B to Y	see Figure 6				
		$V_{CC} = 0.8\text{ V}$	-	28.2	-	ns
		$V_{CC} = 1.1\text{ V to }1.3\text{ V}$	3.0	7.6	16.5	ns
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	2.4	5.3	9.6	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	2.1	4.4	7.5	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.8	3.6	5.9	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.6	3.3	5.4	ns
$T_{amb} = 25\text{ }^{\circ}\text{C}$; $C_L = 30\text{ pF}$						
t_{PHL} , t_{PLH}	propagation delay A or B to Y	see Figure 6				
		$V_{CC} = 0.8\text{ V}$	-	38.5	-	ns
		$V_{CC} = 1.1\text{ V to }1.3\text{ V}$	3.9	9.9	21.5	ns
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	3.2	6.9	12.5	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	2.8	5.7	9.8	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	2.4	4.7	7.6	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	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
T_{amb} = 25 °C						
C _{PD}	power dissipation capacitance	f = 10 MHz	[2] [3]			
		V _{CC} = 0.8 V	-	3.4	-	pF
		V _{CC} = 1.1 V to 1.3 V	-	3.5	-	pF
		V _{CC} = 1.4 V to 1.6 V	-	3.6	-	pF
		V _{CC} = 1.65 V to 1.95 V	-	3.7	-	pF
		V _{CC} = 2.3 V to 2.7 V	-	4.1	-	pF
		V _{CC} = 3.0 V to 3.6 V	-	4.5	-	pF

- [1] All typical values are measured at nominal V_{CC}.
- [2] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ 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;
 Σ(C_L × V_{CC}² × f_o) = sum of the outputs.
- [3] The condition is V_I = GND to V_{CC}.

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	
C_L = 5 pF							
t _{PHL} , t _{PLH}	propagation delay A or B to Y	see Figure 6					
		V _{CC} = 1.1 V to 1.3 V	2.1	14.3	2.1	15.8	ns
		V _{CC} = 1.4 V to 1.6 V	1.6	8.8	1.6	9.7	ns
		V _{CC} = 1.65 V to 1.95 V	1.4	6.9	1.4	7.6	ns
		V _{CC} = 2.3 V to 2.7 V	1.1	5.3	1.1	5.9	ns
		V _{CC} = 3.0 V to 3.6 V	0.9	4.7	0.9	5.2	ns
C_L = 10 pF							
t _{PHL} , t _{PLH}	propagation delay A or B to Y	see Figure 6					
		V _{CC} = 1.1 V to 1.3 V	2.4	16.2	2.4	17.9	ns
		V _{CC} = 1.4 V to 1.6 V	1.9	10.0	1.9	11.0	ns
		V _{CC} = 1.65 V to 1.95 V	1.7	8.0	1.7	8.8	ns
		V _{CC} = 2.3 V to 2.7 V	1.4	6.2	1.4	6.9	ns
		V _{CC} = 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	
$C_L = 15 \text{ pF}$							
t_{PHL}, t_{PLH}	propagation delay A or B to Y	see Figure 6					
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$	2.7	18.1	2.7	20.0	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$	2.2	11.3	2.2	12.5	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	1.9	9.0	1.9	9.9	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.6	7.0	1.6	7.7	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	1.5	6.4	1.5	7.1	ns
$C_L = 30 \text{ pF}$							
t_{PHL}, t_{PLH}	propagation delay A or B to Y	see Figure 6					
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$	3.5	24.1	3.5	26.6	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$	2.8	14.8	2.8	16.3	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	2.5	11.7	2.5	12.9	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	2.2	9.1	2.2	10.1	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	2.1	8.3	2.1	9.2	ns

13. Waveforms

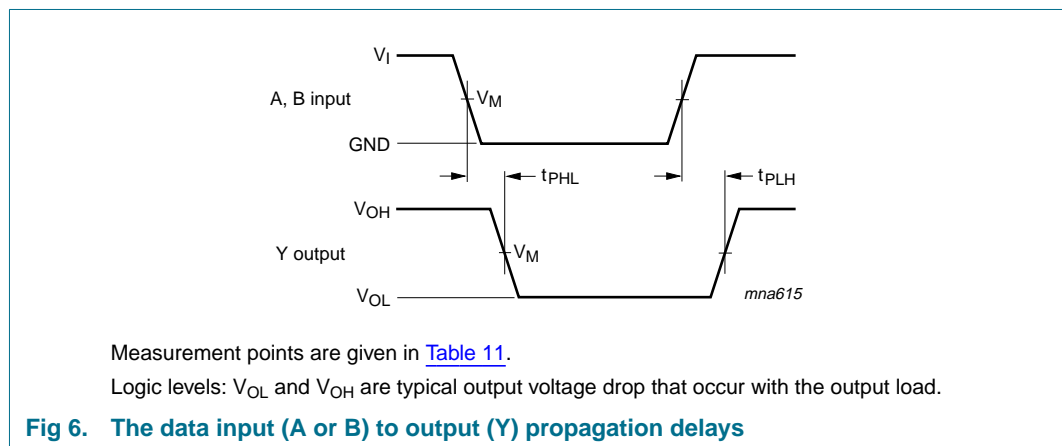


Table 11: Measurement points

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}	$\leq 3.0 \text{ ns}$

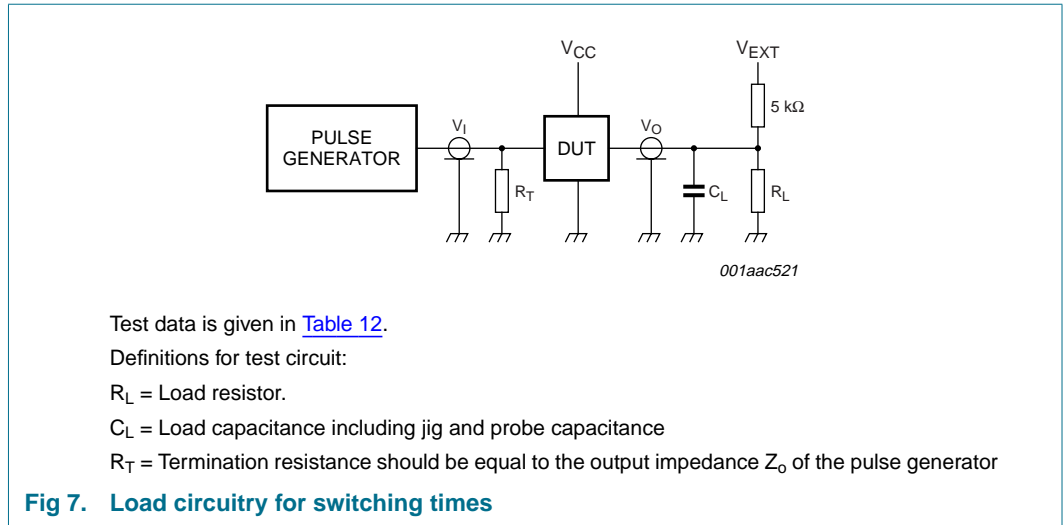


Table 12: Test data

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

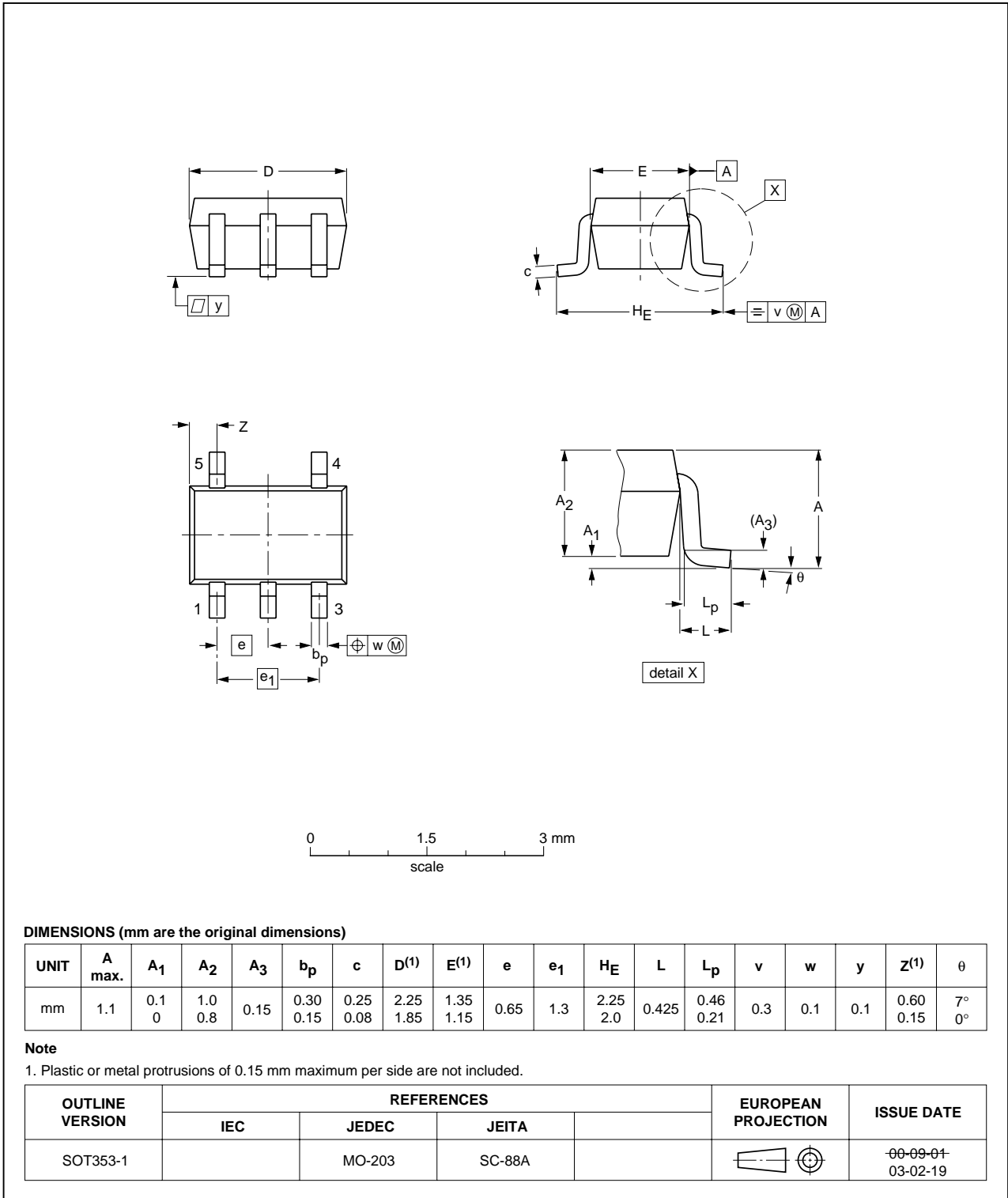


Fig 8. Package outline SOT353-1 (TSSOP5)

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
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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22. Contents

1	General description	1
2	Features	1
3	Quick reference data	2
4	Ordering information	2
5	Marking	2
6	Functional diagram	3
7	Pinning information	3
7.1	Pinning	3
7.2	Pin description	3
8	Functional description	4
8.1	Function table	4
9	Limiting values	4
10	Recommended operating conditions	5
11	Static characteristics	5
12	Dynamic characteristics	8
13	Waveforms	10
14	Package outline	12
15	Abbreviations	14
16	Revision history	14
17	Data sheet status	15
18	Definitions	15
19	Disclaimers	15
20	Trademarks	15
21	Contact information	15



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Date of release: 9 August 2004
Document number: 9397 750 14684

Published in The Netherlands