

74AUP1G14

Low-power Schmitt-trigger inverter

Rev. 01 — 20 July 2005

Product data sheet

1. General description

The 74AUP1G14 is a high-performance, low-power, low-voltage, Si-gate CMOS device, superior to most advanced CMOS compatible TTL families.

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 74AUP1G14 provides a single inverting Schmitt-trigger which accepts standard input signals. It is capable of transforming slowly changing input signals into sharply defined, jitter-free output signals.

The inputs switch at different points for positive and negative-going signals. The difference between the positive voltage $V_{(th)LH}$ and the negative voltage $V_{(th)HL}$ is defined as the input hysteresis voltage V_{hys} .

2. Features

- Wide supply voltage range from 0.8 V to 3.6 V
- High noise immunity
- 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 $+125\text{ }^{\circ}\text{C}$

3. Applications

- Wave and pulse shaper
- Astable multivibrator
- Monostable multivibrator

PHILIPS

4. 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 to Y	$C_L = 5\text{ pF}$; $R_L = 1\text{ M}\Omega$; $V_{CC} = 0.8\text{ V}$	-	20.3	-	ns	
		$C_L = 5\text{ pF}$; $R_L = 1\text{ M}\Omega$; $V_{CC} = 1.1\text{ V to }1.3\text{ V}$	3.0	5.9	11.7	ns	
		$C_L = 5\text{ pF}$; $R_L = 1\text{ M}\Omega$; $V_{CC} = 1.4\text{ V to }1.6\text{ V}$	2.6	4.3	7.6	ns	
		$C_L = 5\text{ pF}$; $R_L = 1\text{ M}\Omega$; $V_{CC} = 1.65\text{ V to }1.95\text{ V}$	2.2	3.7	6.2	ns	
		$C_L = 5\text{ pF}$; $R_L = 1\text{ M}\Omega$; $V_{CC} = 2.3\text{ V to }2.7\text{ V}$	2.0	3.1	4.8	ns	
		$C_L = 5\text{ pF}$; $R_L = 1\text{ M}\Omega$; $V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.9	2.8	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]	-	4.6	-	pF
		$V_{CC} = 3.3\text{ V}$; $f = 10\text{ MHz}$	[1][2]	-	6.1	-	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} .

5. Ordering information

Table 2: Ordering information

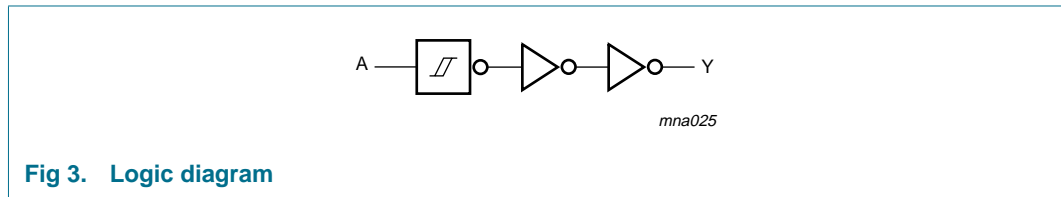
Type number	Package			Version
	Temperature range	Name	Description	
74AUP1G14GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74AUP1G14GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886

6. Marking

Table 3: Marking

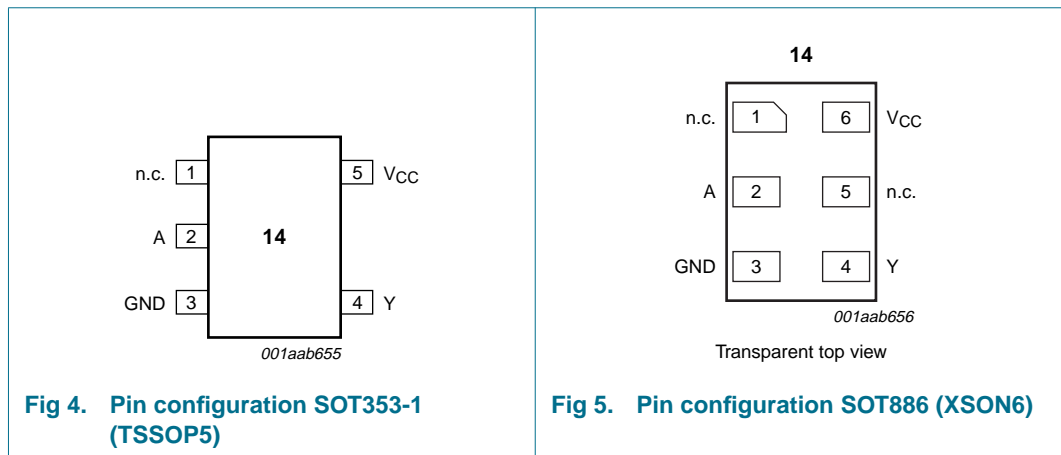
Type number	Marking code
74AUP1G14GW	pF
74AUP1G14GM	pF

7. Functional diagram



8. Pinning information

8.1 Pinning



8.2 Pin description

Table 4: Pin description

Symbol	Pin		Description
	TSSOP5	XSON6	
n.c.	1	1	not connected
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

9. Functional description

9.1 Function table

Table 5: Function table ^[1]

Input	Output
A	Y
L	H
H	L

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

10. 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.

11. 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

12. 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_{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_{LI}	input leakage current	$V_I = GND$ to 3.6 V; $V_{CC} = 0$ V to 3.6 V	-	-	± 0.1	μ A
		V_I or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	-	± 0.2	μ A
I_{OFF}	power-off leakage current	V_I or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	-	± 0.2	μ A
ΔI_{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	μ A
I_{CC}	quiescent supply current	$V_I = GND$ or V_{CC} ; $I_O = 0$ A; $V_{CC} = 0.8$ V to 3.6 V	-	-	0.5	μ A
ΔI_{CC}	additional quiescent supply current	$V_I = V_{CC} - 0.6$ V; $I_O = 0$ A; $V_{CC} = 3.3$ V	-	-	40	μ A
C_i	input capacitance	$V_I = GND$ or V_{CC} ; $V_{CC} = 0$ V to 3.6 V	-	0.8	-	pF
C_o	output capacitance	$V_O = GND$; $V_{CC} = 0$ V	-	1.7	-	pF

Table 8: Static characteristics ...continued

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$T_{amb} = -40\text{ °C to }+85\text{ °C}$						
V_{OH}	HIGH-state output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = -20\text{ }\mu\text{A}$; $V_{CC} = 0.8\text{ V to }3.6\text{ V}$	$V_{CC} - 0.1$	-	-	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
		$I_O = -4.0\text{ mA}$; $V_{CC} = 3.0\text{ V}$	2.55	-	-	V
V_{OL}	LOW-state output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = 20\text{ }\mu\text{A}$; $V_{CC} = 0.8\text{ V to }3.6\text{ V}$	-	-	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
		$I_O = 4.0\text{ mA}$; $V_{CC} = 3.0\text{ V}$	-	-	0.45	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
I_{OFF}	power-off leakage current	V_I or $V_O = 0\text{ V to }3.6\text{ V}$; $V_{CC} = 0\text{ V}$	-	-	± 0.5	μA
ΔI_{OFF}	additional power-off leakage current	V_I or $V_O = 0\text{ V to }3.6\text{ V}$; $V_{CC} = 0\text{ V to }0.2\text{ V}$	-	-	± 0.6	μA
I_{CC}	quiescent supply current	$V_I = \text{GND or }V_{CC}$; $I_O = 0\text{ A}$; $V_{CC} = 0.8\text{ V to }3.6\text{ V}$	-	-	0.9	μA
ΔI_{CC}	additional quiescent supply current	$V_I = V_{CC} - 0.6\text{ V}$; $I_O = 0\text{ A}$; $V_{CC} = 3.3\text{ V}$	-	-	50	μA
$T_{amb} = -40\text{ °C to }+125\text{ °C}$						
V_{OH}	HIGH-state output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = -20\text{ }\mu\text{A}$; $V_{CC} = 0.8\text{ V to }3.6\text{ V}$	$V_{CC} - 0.11$	-	-	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
		$I_O = -4.0\text{ mA}$; $V_{CC} = 3.0\text{ V}$	2.30	-	-	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
V _{OL}	LOW-state output voltage	V _I = V _{IH} or V _{IL}				
		I _O = 20 μA; V _{CC} = 0.8 V to 3.6 V	-	-	0.11	V
		I _O = 1.1 mA; V _{CC} = 1.1 V	-	-	0.33 × V _{CC}	V
		I _O = 1.7 mA; V _{CC} = 1.4 V	-	-	0.41	V
		I _O = 1.9 mA; V _{CC} = 1.65 V	-	-	0.39	V
		I _O = 2.3 mA; V _{CC} = 2.3 V	-	-	0.36	V
		I _O = 3.1 mA; V _{CC} = 2.3 V	-	-	0.50	V
		I _O = 2.7 mA; V _{CC} = 3.0 V	-	-	0.36	V
		I _O = 4.0 mA; V _{CC} = 3.0 V	-	-	0.50	V
I _{LI}	input leakage current	V _I = GND to 3.6 V; V _{CC} = 0 V to 3.6 V	-	-	±0.75	μA
I _{OFF}	power-off leakage current	V _I or V _O = 0 V to 3.6 V; V _{CC} = 0 V	-	-	±0.75	μA
ΔI _{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	-	-	±0.75	μA
I _{CC}	quiescent supply current	V _I = GND or V _{CC} ; I _O = 0 A; V _{CC} = 0.8 V to 3.6 V	-	-	1.4	μA
ΔI _{CC}	additional quiescent supply current	V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 3.3 V	-	-	75	μA

13. 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 °C; C_L = 5 pF						
t _{PHL} , t _{PLH}	propagation delay A to Y	see Figure 6				
		V _{CC} = 0.8 V	-	20.3	-	ns
		V _{CC} = 1.1 V to 1.3 V	3.0	5.9	11.7	ns
		V _{CC} = 1.4 V to 1.6 V	2.6	4.3	7.6	ns
		V _{CC} = 1.65 V to 1.95 V	2.2	3.7	6.2	ns
		V _{CC} = 2.3 V to 2.7 V	2.0	3.1	4.8	ns
		V _{CC} = 3.0 V to 3.6 V	1.9	2.8	4.0	ns
T_{amb} = 25 °C; C_L = 10 pF						
t _{PHL} , t _{PLH}	propagation delay A to Y	see Figure 6				
		V _{CC} = 0.8 V	-	23.9	-	ns
		V _{CC} = 1.1 V to 1.3 V	3.5	6.7	13.4	ns
		V _{CC} = 1.4 V to 1.6 V	3.0	5.0	8.7	ns
		V _{CC} = 1.65 V to 1.95 V	2.7	4.3	7.0	ns
		V _{CC} = 2.3 V to 2.7 V	2.4	3.6	5.5	ns
		V _{CC} = 3.0 V to 3.6 V	2.4	3.4	4.6	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_L = 15 pF						
t _{PHL} , t _{PLH}	propagation delay A to Y	see Figure 6				
		V _{CC} = 0.8 V	-	27.3	-	ns
		V _{CC} = 1.1 V to 1.3 V	3.9	7.5	14.0	ns
		V _{CC} = 1.4 V to 1.6 V	3.3	5.5	9.7	ns
		V _{CC} = 1.65 V to 1.95 V	3.0	4.7	7.9	ns
		V _{CC} = 2.3 V to 2.7 V	2.8	4.1	5.9	ns
		V _{CC} = 3.0 V to 3.6 V	2.7	3.8	5.0	ns
T_{amb} = 25 °C; C_L = 30 pF						
t _{PHL} , t _{PLH}	propagation delay A to Y	see Figure 6				
		V _{CC} = 0.8 V	-	37.7	-	ns
		V _{CC} = 1.1 V to 1.3 V	5.1	9.8	17.8	ns
		V _{CC} = 1.4 V to 1.6 V	4.3	7.1	12.3	ns
		V _{CC} = 1.65 V to 1.95 V	3.9	6.0	10.1	ns
		V _{CC} = 2.3 V to 2.7 V	3.6	5.2	7.4	ns
		V _{CC} = 3.0 V to 3.6 V	3.5	4.9	6.3	ns
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	-	3.9	-	pF
		V _{CC} = 1.4 V to 1.6 V	-	4.2	-	pF
		V _{CC} = 1.65 V to 1.95 V	-	4.6	-	pF
		V _{CC} = 2.3 V to 2.7 V	-	5.4	-	pF
		V _{CC} = 3.0 V to 3.6 V	-	6.1	-	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;
 $\Sigma(C_L \times V_{CC}^2 \times f_o)$ = 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	
$C_L = 5 \text{ pF}$							
t_{PHL} , t_{PLH}	propagation delay A to Y	see Figure 6					
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$	2.2	13.6	2.2	15.0	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$	1.8	8.9	1.8	9.8	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	1.9	7.3	1.9	8.1	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.7	5.9	1.7	6.5	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	1.7	4.9	1.7	5.4	ns
$C_L = 10 \text{ pF}$							
t_{PHL} , t_{PLH}	propagation delay A to Y	see Figure 6					
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$	2.5	15.8	2.5	17.4	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$	2.2	10.3	2.2	11.4	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	2.3	8.4	2.3	9.3	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	2.1	6.8	2.1	7.5	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	2.1	5.6	2.1	6.2	ns
$C_L = 15 \text{ pF}$							
t_{PHL} , t_{PLH}	propagation delay A to Y	see Figure 6					
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$	2.8	17.3	2.8	19.1	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$	2.9	11.5	2.9	12.7	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	2.6	9.4	2.6	10.4	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	2.5	7.4	2.5	8.2	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	2.4	6.1	2.4	6.8	ns
$C_L = 30 \text{ pF}$							
t_{PHL} , t_{PLH}	propagation delay A to Y	see Figure 6					
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$	4.5	20.5	4.5	22.6	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$	3.8	14.7	3.8	16.2	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	3.4	12.0	3.4	13.2	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	3.3	8.8	3.3	9.7	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	3.2	7.3	3.2	8.1	ns

14. Waveforms

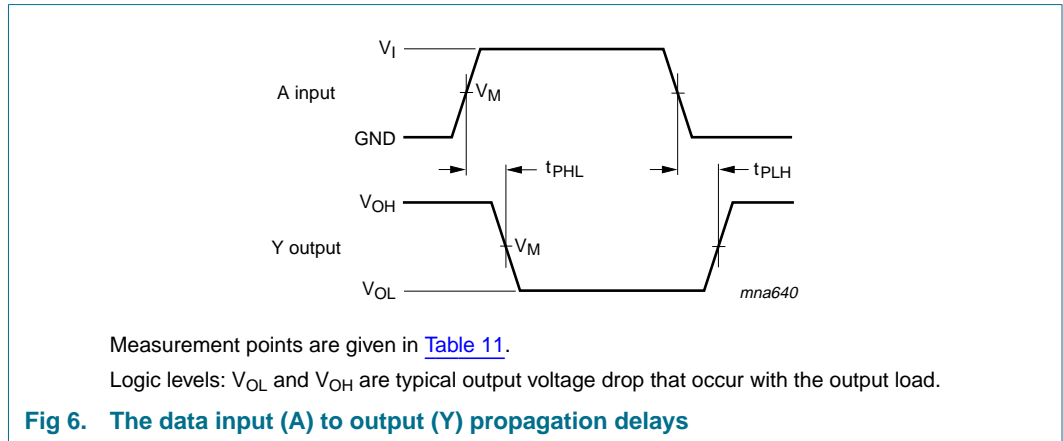


Table 11: Measurement points

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}	≤ 3.0 ns

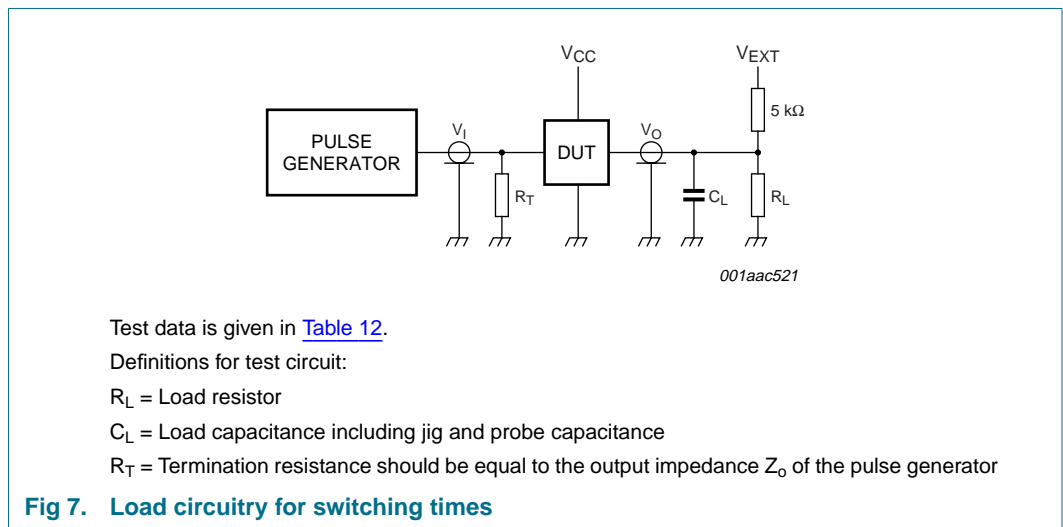


Table 12: Test data

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 $R_L = 5$ kΩ, for measuring propagation delays, setup and hold times and pulse width $R_L = 1$ MΩ.

15. Transfer characteristics

Table 13: Transfer characteristicsVoltages are referenced to GND (ground = 0 V; for test circuit see [Figure 7](#))

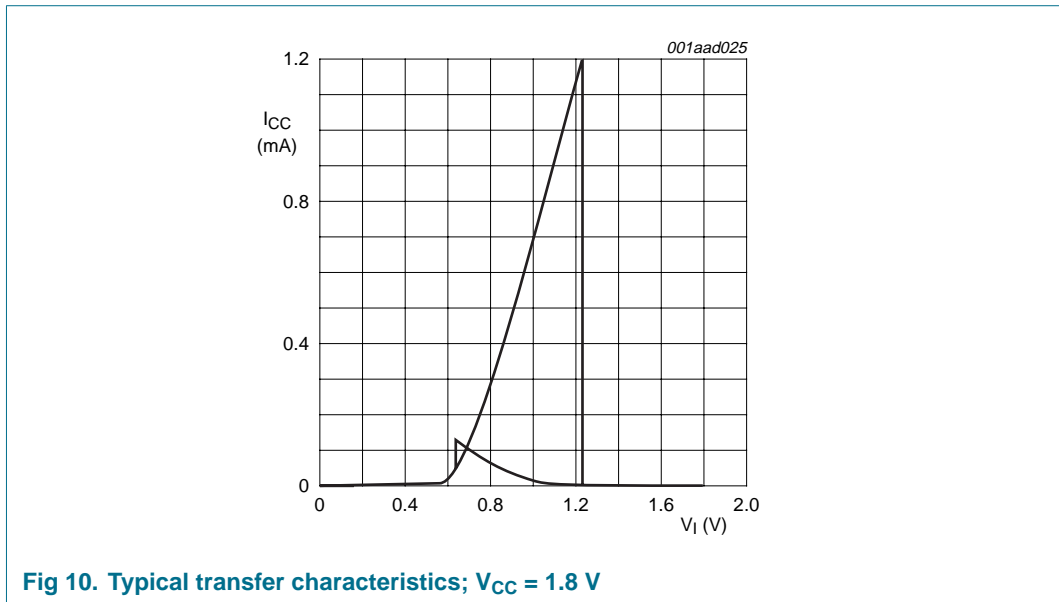
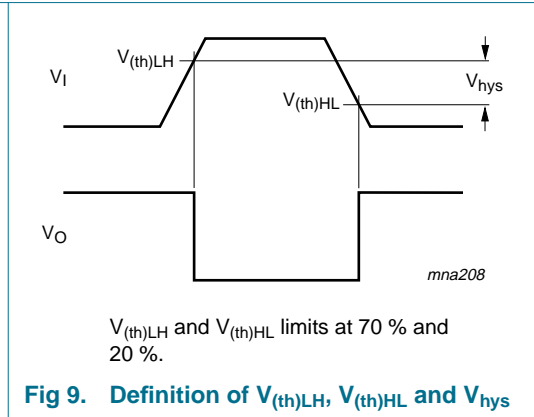
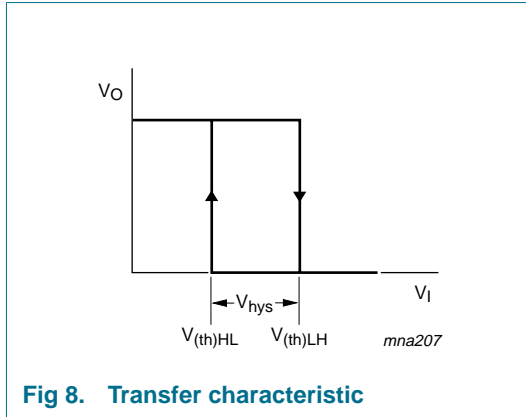
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
T_{amb} = 25 °C						
V _{(th)LH}	positive-going threshold voltage	see Figure 8 and Figure 9				
		V _{CC} = 0.8 V	0.30	-	0.60	V
		V _{CC} = 1.1 V	0.53	-	0.90	V
		V _{CC} = 1.4 V	0.74	-	1.11	V
		V _{CC} = 1.65 V	0.91	-	1.29	V
		V _{CC} = 2.3 V	1.37	-	1.77	V
		V _{CC} = 3.0 V	1.88	-	2.29	V
V _{(th)HL}	negative-going threshold voltage	see Figure 8 and Figure 9				
		V _{CC} = 0.8 V	0.10	-	0.60	V
		V _{CC} = 1.1 V	0.26	-	0.65	V
		V _{CC} = 1.4 V	0.39	-	0.75	V
		V _{CC} = 1.65 V	0.47	-	0.84	V
		V _{CC} = 2.3 V	0.69	-	1.04	V
		V _{CC} = 3.0 V	0.88	-	1.24	V
V _{hys}	hysteresis voltage (V _{(th)LH} - V _{(th)HL})	see Figure 8 , Figure 9 , Figure 10 and Figure 11				
		V _{CC} = 0.8 V	0.07	-	0.50	V
		V _{CC} = 1.1 V	0.08	-	0.46	V
		V _{CC} = 1.4 V	0.18	-	0.56	V
		V _{CC} = 1.65 V	0.27	-	0.66	V
		V _{CC} = 2.3 V	0.53	-	0.92	V
		V _{CC} = 3.0 V	0.79	-	1.31	V
T_{amb} = -40 °C to +85 °C						
V _{(th)LH}	positive-going threshold voltage	see Figure 8 and Figure 9				
		V _{CC} = 0.8 V	0.30	-	0.60	V
		V _{CC} = 1.1 V	0.53	-	0.90	V
		V _{CC} = 1.4 V	0.74	-	1.11	V
		V _{CC} = 1.65 V	0.91	-	1.29	V
		V _{CC} = 2.3 V	1.37	-	1.77	V
		V _{CC} = 3.0 V	1.88	-	2.29	V
V _{(th)HL}	negative-going threshold voltage	see Figure 8 and Figure 9				
		V _{CC} = 0.8 V	0.10	-	0.60	V
		V _{CC} = 1.1 V	0.26	-	0.65	V
		V _{CC} = 1.4 V	0.39	-	0.75	V
		V _{CC} = 1.65 V	0.47	-	0.84	V
		V _{CC} = 2.3 V	0.69	-	1.04	V
		V _{CC} = 3.0 V	0.88	-	1.24	V

Table 13: Transfer characteristics ...continued

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{hys}	hysteresis voltage ($V_{(th)LH} - V_{(th)HL}$)	see Figure 8 , Figure 9 , Figure 10 and Figure 11				
		$V_{CC} = 0.8\text{ V}$	0.07	-	0.50	V
		$V_{CC} = 1.1\text{ V}$	0.08	-	0.46	V
		$V_{CC} = 1.4\text{ V}$	0.18	-	0.56	V
		$V_{CC} = 1.65\text{ V}$	0.27	-	0.66	V
		$V_{CC} = 2.3\text{ V}$	0.53	-	0.92	V
		$V_{CC} = 3.0\text{ V}$	0.79	-	1.31	V
$T_{amb} = -40\text{ °C to }+125\text{ °C}$						
$V_{(th)LH}$	positive-going threshold voltage	see Figure 8 and Figure 9				
		$V_{CC} = 0.8\text{ V}$	0.30	-	0.62	V
		$V_{CC} = 1.1\text{ V}$	0.53	-	0.92	V
		$V_{CC} = 1.4\text{ V}$	0.74	-	1.13	V
		$V_{CC} = 1.65\text{ V}$	0.91	-	1.31	V
		$V_{CC} = 2.3\text{ V}$	1.37	-	1.80	V
		$V_{CC} = 3.0\text{ V}$	1.88	-	2.32	V
$V_{(th)HL}$	negative-going threshold voltage	see Figure 8 and Figure 9				
		$V_{CC} = 0.8\text{ V}$	0.10	-	0.60	V
		$V_{CC} = 1.1\text{ V}$	0.26	-	0.65	V
		$V_{CC} = 1.4\text{ V}$	0.39	-	0.75	V
		$V_{CC} = 1.65\text{ V}$	0.47	-	0.84	V
		$V_{CC} = 2.3\text{ V}$	0.69	-	1.04	V
		$V_{CC} = 3.0\text{ V}$	0.88	-	1.24	V
V_{hys}	hysteresis voltage ($V_{(th)LH} - V_{(th)HL}$)	see Figure 8 , Figure 9 , Figure 10 and Figure 11				
		$V_{CC} = 0.8\text{ V}$	0.07	-	0.50	V
		$V_{CC} = 1.1\text{ V}$	0.08	-	0.46	V
		$V_{CC} = 1.4\text{ V}$	0.18	-	0.56	V
		$V_{CC} = 1.65\text{ V}$	0.27	-	0.66	V
		$V_{CC} = 2.3\text{ V}$	0.53	-	0.92	V
		$V_{CC} = 3.0\text{ V}$	0.79	-	1.31	V

16. Waveforms transfer characteristics



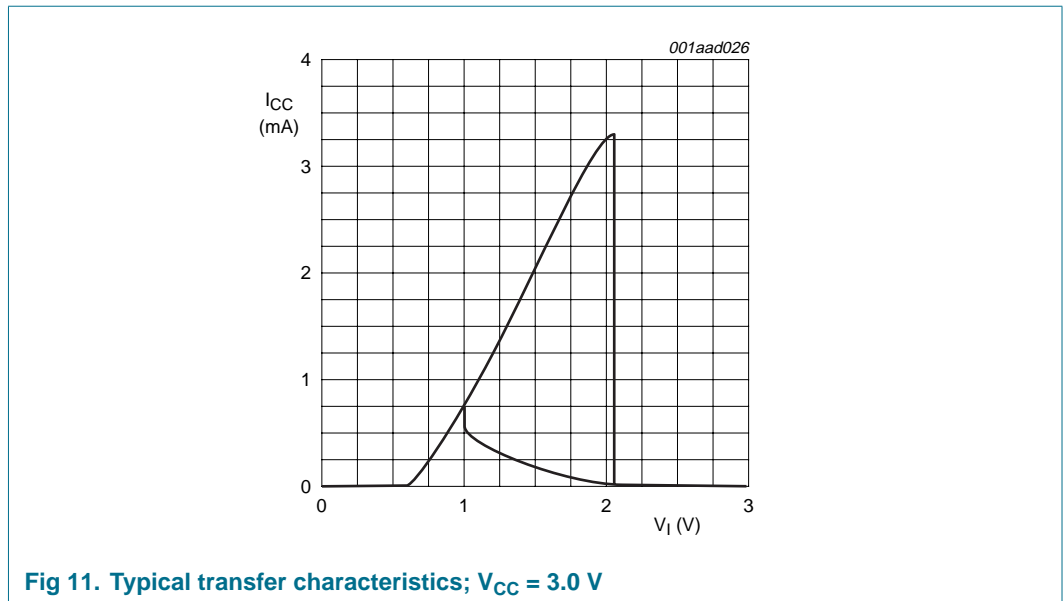


Fig 11. Typical transfer characteristics; $V_{CC} = 3.0\text{ V}$

17. Application information

The slow input rise and fall times cause additional power dissipation, this can be calculated using the following formula:

$$P_{ad} = f_i \times (t_r \times I_{CC(AV)} + t_f \times I_{CC(AV)}) \times V_{CC} \text{ where:}$$

P_{ad} = additional power dissipation (μW);

f_i = input frequency (MHz);

t_r = input rise time (ns); 10 % to 90 %;

t_f = input fall time (ns); 90 % to 10 %;

$I_{CC(AV)}$ = average additional supply current (μA).

Average I_{CC} differs with positive or negative input transitions, as shown in [Figure 12](#).

An example of a relaxation circuit using the 74AUP1G14 is shown in [Figure 13](#).

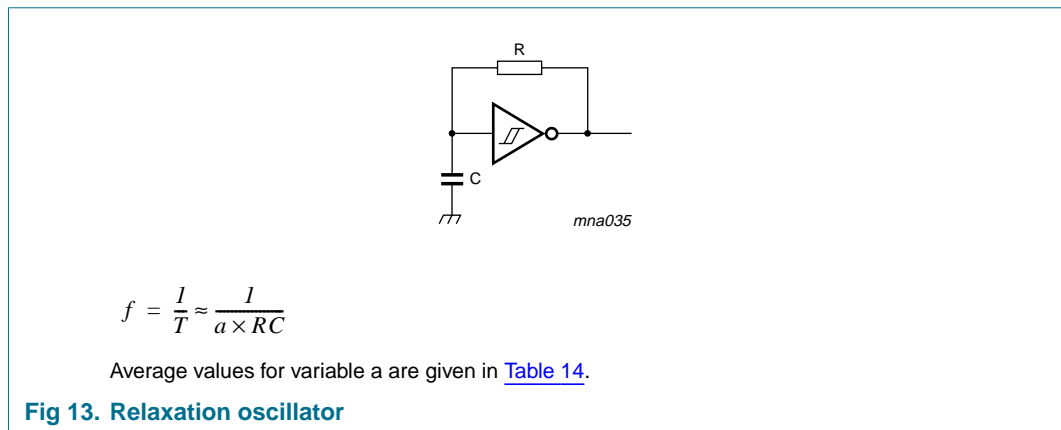
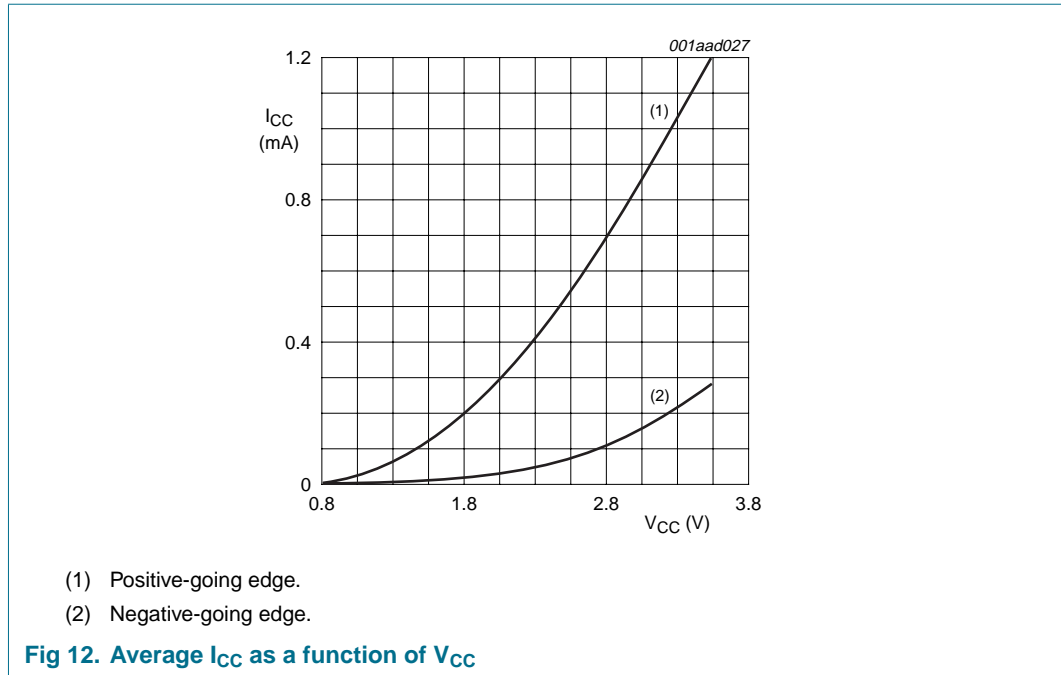


Table 14: Variable values

Supply voltage	Variable a
1.1 V	1.28
1.5 V	1.22
1.8 V	1.24
2.8 V	1.34
3.3 V	1.45

18. Package outline

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

SOT353-1

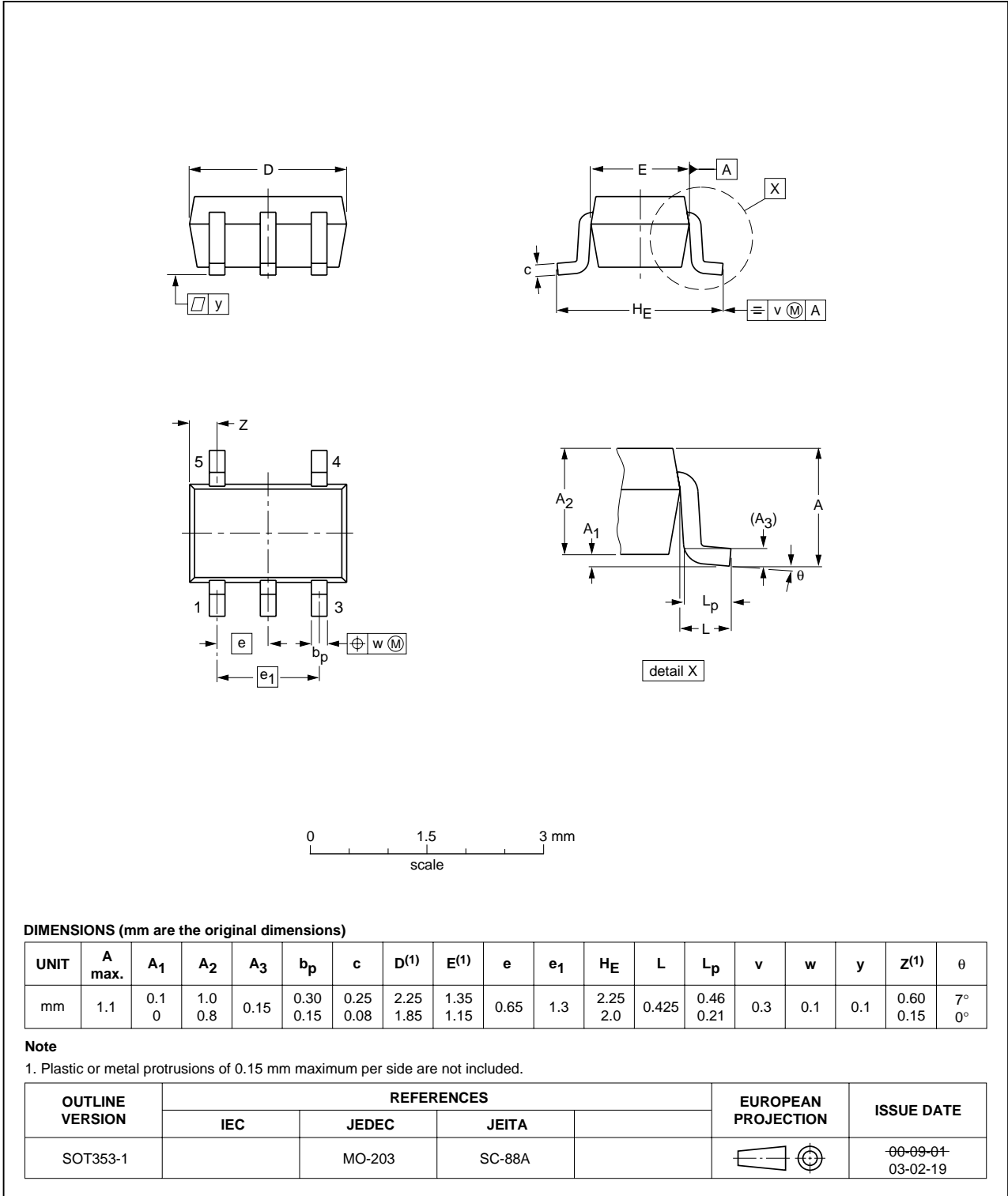


Fig 14. Package outline SOT353-1 (TSSOP5)

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

SOT886

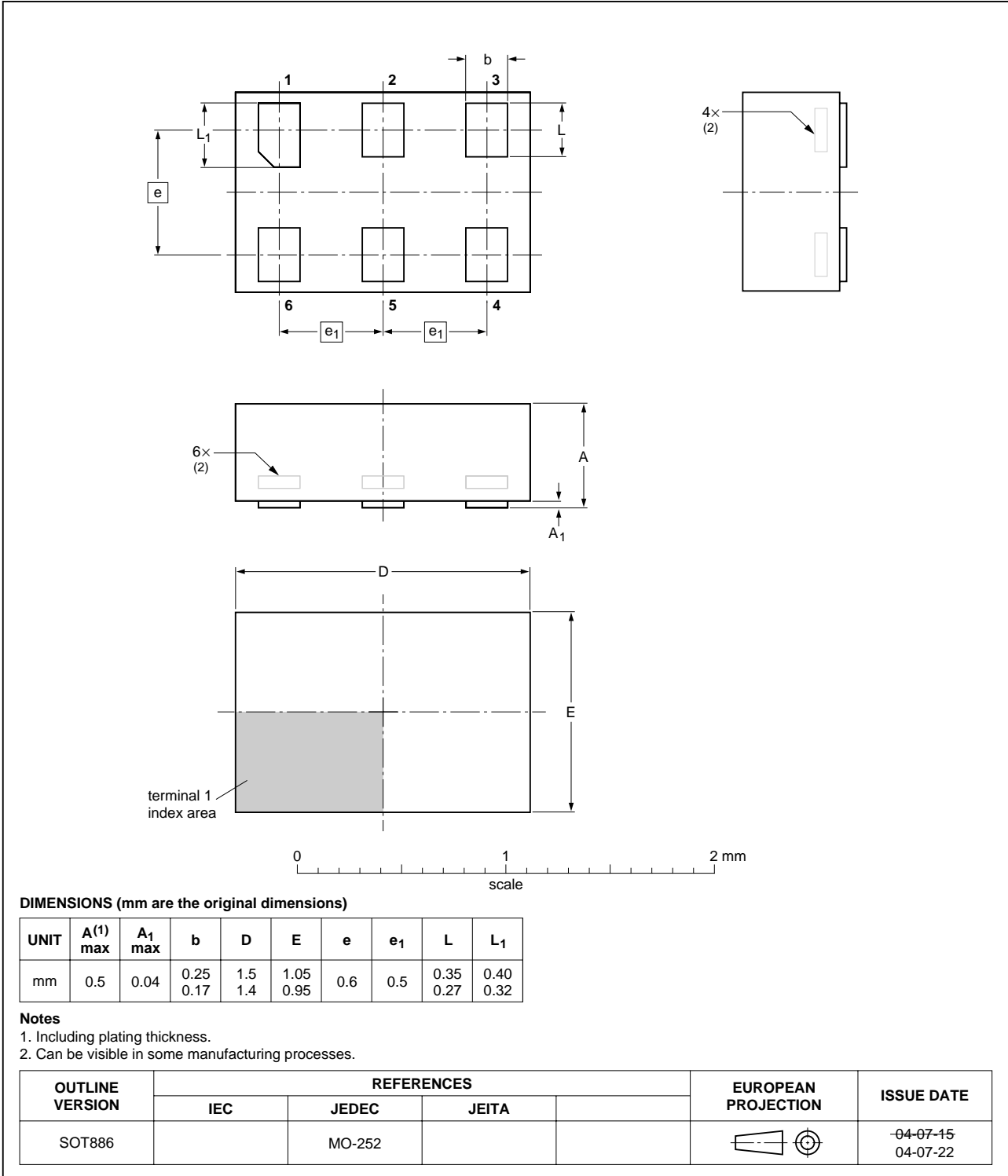


Fig 15. Package outline SOT886 (XSON6)

19. Abbreviations

Table 15: 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

20. Revision history

Table 16: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
74AUP1G14_1	20050720	Product data sheet	-	9397 750 14676	-

21. 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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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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