

# 74AUP1G17

## Low-power Schmitt-trigger buffer

Rev. 01 — 26 July 2005

Product data sheet

## 1. General description

The 74AUP1G17 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 74AUP1G17 provides the single Schmitt-trigger buffer. It is capable of transforming slowly changing input signals into sharply defined, jitter-free output signals.

## 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 to Y	$C_L = 5\text{ pF}; R_L = 1\text{ M}\Omega;$ $V_{CC} = 0.8\text{ V}$	-	19.0	-	ns
		$C_L = 5\text{ pF}; R_L = 1\text{ M}\Omega;$ $V_{CC} = 1.1\text{ V to }1.3\text{ V}$	2.9	5.7	11.7	ns
		$C_L = 5\text{ pF}; R_L = 1\text{ M}\Omega;$ $V_{CC} = 1.4\text{ V to }1.6\text{ V}$	2.5	4.2	7.2	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	3.6	5.9	ns
		$C_L = 5\text{ pF}; R_L = 1\text{ M}\Omega;$ $V_{CC} = 2.3\text{ V to }2.7\text{ V}$	2.0	3.0	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	4.3	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]	4.5	-	pF
		$V_{CC} = 3.3\text{ V}; f = 10\text{ MHz}$	[1][2]	6.0	-	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  $V_i = GND$  to  $V_{CC}$ .

### 4. Ordering information

**Table 2: Ordering information**

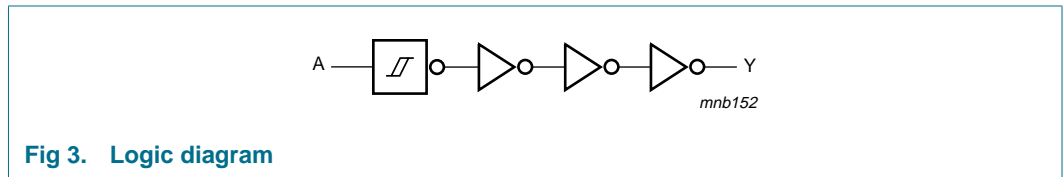
Type number	Package			Version
	Temperature range	Name	Description	
74AUP1G17GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74AUP1G17GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886

### 5. Marking

**Table 3: Marking**

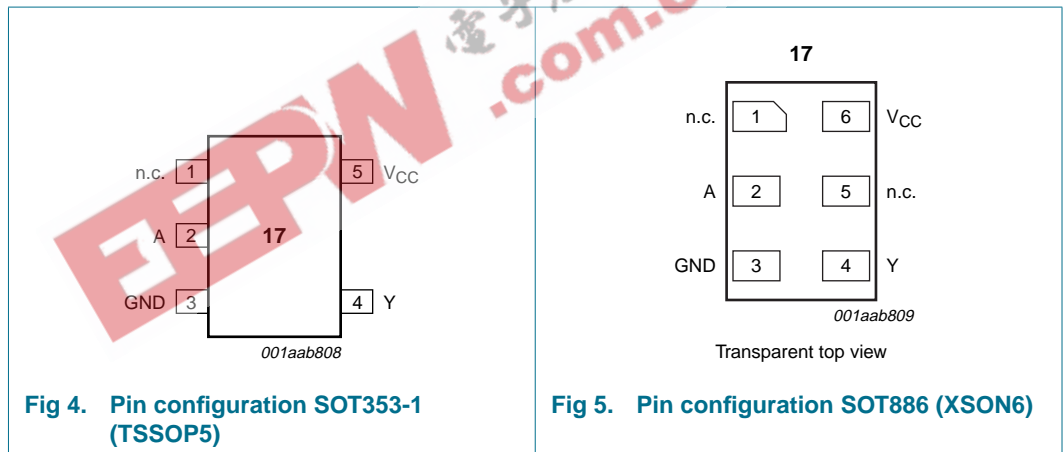
Type number	Marking code
74AUP1G17GW	pJ
74AUP1G17GM	pJ

## 6. Functional diagram



## 7. Pinning information

### 7.1 Pinning



### 7.2 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 <sub>CC</sub>	5	6	supply voltage

## 8. Functional description

### 8.1 Function table

Table 5: Function table <sup>[1]</sup>

Input	Output
A	Y
L	L
H	H

[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		<sup>[1]</sup> -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	<sup>[1]</sup> -0.5	$V_{CC} + 0.5$	V
		Power-down mode	<sup>[1]</sup> -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 <sup>[2]</sup>	-	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

## 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>T<sub>amb</sub> = 25 °C</b>						
V <sub>OH</sub>	HIGH-state output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.1	-	-	V
		I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V	0.75 × V <sub>CC</sub>	-	-	V
		I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V	1.11	-	-	V
		I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V	1.32	-	-	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	2.05	-	-	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.9	-	-	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.72	-	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.6	-	-	V
V <sub>OL</sub>	LOW-state output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 0.8 V to 3.6 V		-	0.1	V
		I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V		-	0.3 × V <sub>CC</sub>	V
		I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V		-	0.31	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V		-	0.31	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V		-	0.31	V
		I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V		-	0.44	V
		I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V		-	0.31	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V		-	0.44	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	-	-	±0.1	µA
I <sub>OFF</sub>	power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V	-	-	±0.2	µA
ΔI <sub>OFF</sub>	additional power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V	-	-	±0.2	µA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.5	µA
ΔI <sub>CC</sub>	additional quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V	-	-	40	µA
C <sub>i</sub>	input capacitance	V <sub>I</sub> = GND or V <sub>CC</sub> ; V <sub>CC</sub> = 0 V to 3.6 V	-	0.8	-	pF
C <sub>o</sub>	output capacitance	V <sub>O</sub> = GND; V <sub>CC</sub> = 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
<b>T<sub>amb</sub> = -40 °C to +85 °C</b>						
V <sub>OH</sub>	HIGH-state output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = -20 µA; V <sub>CC</sub> = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.1	-	-	V
		I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V	0.7 × V <sub>CC</sub>	-	-	V
		I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V	1.03	-	-	V
		I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V	1.30	-	-	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	1.97	-	-	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.85	-	-	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.67	-	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.55	-	-	V
V <sub>OL</sub>	LOW-state output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = 20 µA; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.1	V
		I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	0.3 × V <sub>CC</sub>	V
		I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V	-	-	0.37	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V	-	-	0.35	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V	-	-	0.33	V
		I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V	-	-	0.45	V
		I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V	-	-	0.33	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.45	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	-	-	±0.5	µA
I <sub>OFF</sub>	power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V	-	-	±0.5	µA
ΔI <sub>OFF</sub>	additional power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V	-	-	±0.6	µA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.9	µA
ΔI <sub>CC</sub>	additional quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V	-	-	50	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
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>OH</sub>	HIGH-state output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.11	-	-	V
		I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V	0.6 × V <sub>CC</sub>	-	-	V
		I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V	0.93	-	-	V
		I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V	1.17	-	-	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	1.77	-	-	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.67	-	-	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.40	-	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.30	-	-	V
V <sub>OL</sub>	LOW-state output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.11	V
		I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	0.33 × V <sub>CC</sub>	V
		I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V	-	-	0.41	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V	-	-	0.39	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V	-	-	0.36	V
		I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V	-	-	0.50	V
		I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V	-	-	0.36	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.50	V
I <sub>LI</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	-	-	±0.75	μA
I <sub>OFF</sub>	power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V	-	-	±0.75	μA
ΔI <sub>OFF</sub>	additional power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V	-	-	±0.75	μA
I <sub>CC</sub>	quiescent supply current	V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	1.4	μA
ΔI <sub>CC</sub>	additional quiescent supply current	V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V	-	-	75	μA

## 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><math>T_{amb} = 25\text{ }^{\circ}\text{C}; C_L = 5\text{ pF}</math></b>						
$t_{PHL}, t_{PLH}$	propagation delay A to Y	see <a href="#">Figure 6</a>				
		$V_{CC} = 0.8\text{ V}$	-	19.0	-	ns
		$V_{CC} = 1.1\text{ V to }1.3\text{ V}$	2.9	5.7	11.7	ns
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	2.5	4.2	7.2	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	2.2	3.6	5.9	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	2.0	3.0	4.8	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.9	2.8	4.3	ns
<b><math>T_{amb} = 25\text{ }^{\circ}\text{C}; C_L = 10\text{ pF}</math></b>						
$t_{PHL}, t_{PLH}$	propagation delay A to Y	see <a href="#">Figure 6</a>				
		$V_{CC} = 0.8\text{ V}$	-	22.9	-	ns
		$V_{CC} = 1.1\text{ V to }1.3\text{ V}$	3.4	6.6	13.5	ns
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	2.9	4.9	8.3	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	2.6	4.2	6.7	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	2.4	3.6	5.5	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	2.3	3.3	4.9	ns
<b><math>T_{amb} = 25\text{ }^{\circ}\text{C}; C_L = 15\text{ pF}</math></b>						
$t_{PHL}, t_{PLH}$	propagation delay A to Y	see <a href="#">Figure 6</a>				
		$V_{CC} = 0.8\text{ V}$	-	26.4	-	ns
		$V_{CC} = 1.1\text{ V to }1.3\text{ V}$	3.8	7.4	14.8	ns
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	3.3	5.4	9.3	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	3.0	4.7	7.5	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	2.8	4.0	6.1	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	2.7	3.8	5.4	ns
<b><math>T_{amb} = 25\text{ }^{\circ}\text{C}; C_L = 30\text{ pF}</math></b>						
$t_{PHL}, t_{PLH}$	propagation delay A to Y	see <a href="#">Figure 6</a>				
		$V_{CC} = 0.8\text{ V}$	-	36.7	-	ns
		$V_{CC} = 1.1\text{ V to }1.3\text{ V}$	5.0	9.6	18.1	ns
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	4.2	7.0	12.2	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	3.9	6.0	9.7	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	3.6	5.1	7.8	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	3.5	4.8	6.7	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	[2] [3]			
		V <sub>CC</sub> = 0.8 V	-	3.4	-	pF
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	3.9	-	pF
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	4.2	-	pF
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	4.5	-	pF
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	5.4	-	pF
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	6.0	-	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).  
 $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$  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>.

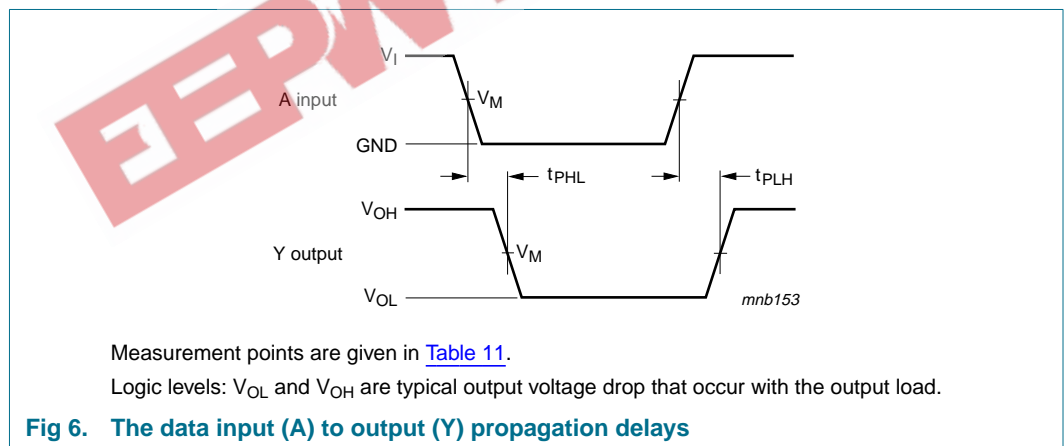
**Table 10: Dynamic characteristics**  
 Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#)

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 to Y	see <a href="#">Figure 6</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.7	13.0	2.7	14.3	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.3	8.4	2.3	9.3	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.0	7.0	2.0	7.7	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.8	5.6	1.8	6.2	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.7	5.0	1.7	5.5	ns
<b>C<sub>L</sub> = 10 pF</b>							
t <sub>PHL</sub> , t <sub>PLH</sub>	propagation delay A to Y	see <a href="#">Figure 6</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.1	14.9	3.1	16.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.6	9.6	2.6	10.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.4	7.9	2.4	8.7	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.2	6.4	2.2	7.1	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.2	5.7	2.2	6.3	ns

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

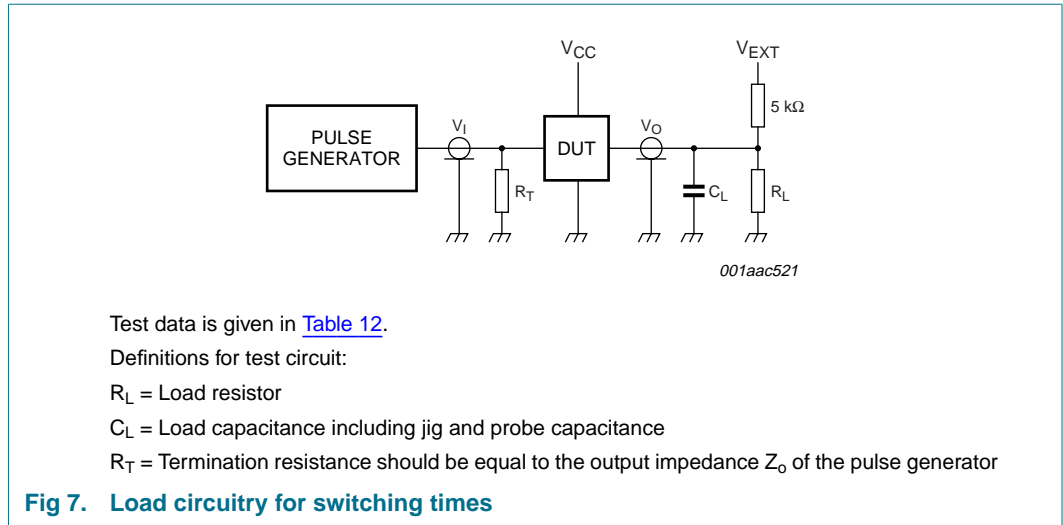
Symbol	Parameter	Conditions	-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Max	Min	Max	
<b><math>C_L = 15 \text{ pF}</math></b>							
$t_{PHL}, t_{PLH}$	propagation delay A to Y	see <a href="#">Figure 6</a>					
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$	3.5	16.7	3.5	18.4	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$	2.9	10.9	2.9	12.0	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	2.7	8.8	2.7	9.7	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	2.5	7.2	2.5	8.0	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	2.5	6.2	2.5	6.9	ns
<b><math>C_L = 30 \text{ pF}</math></b>							
$t_{PHL}, t_{PLH}$	propagation delay A to Y	see <a href="#">Figure 6</a>					
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$	4.5	19.8	4.5	21.8	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$	3.8	14.4	3.8	15.9	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	3.5	11.6	3.5	12.8	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	3.3	9.3	3.3	10.3	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	3.3	7.7	3.3	8.5	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		$V_{EXT}$	$t_{PLH}$ , $t_{PHL}$	$t_{PZH}$ , $t_{PHZ}$	$t_{PZL}$ , $t_{PLZ}$
$V_{CC}$	$C_L$	$R_L$ [1]				
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. Transfer characteristics

**Table 13: Transfer characteristics**

Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = 25 \text{ }^\circ\text{C}</math></b>						
$V_{(th)LH}$	positive-going threshold voltage	see <a href="#">Figure 8</a> and <a href="#">Figure 9</a>				
		$V_{CC} = 0.8 \text{ V}$	0.30	-	0.60	V
		$V_{CC} = 1.1 \text{ V}$	0.53	-	0.90	V
		$V_{CC} = 1.4 \text{ V}$	0.74	-	1.11	V
		$V_{CC} = 1.65 \text{ V}$	0.91	-	1.29	V
		$V_{CC} = 2.3 \text{ V}$	1.37	-	1.77	V
$V_{(th)HL}$	negative-going threshold voltage	see <a href="#">Figure 8</a> and <a href="#">Figure 9</a>				
		$V_{CC} = 0.8 \text{ V}$	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

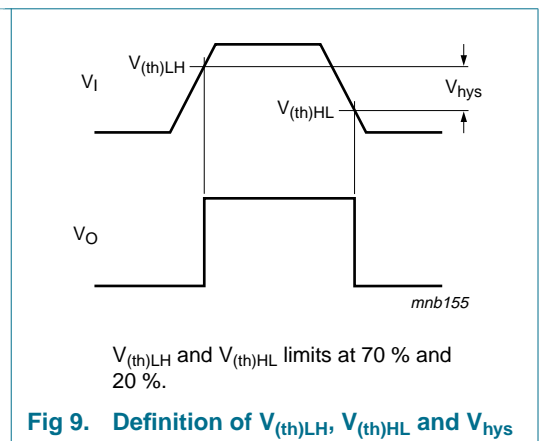
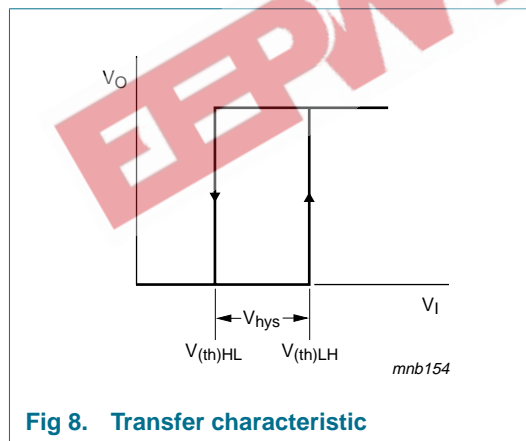
**Table 13: Transfer characteristics ...continued**  
 Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{\text{hys}}$	hysteresis voltage ( $V_{(\text{th})\text{LH}} - V_{(\text{th})\text{HL}}$ )	see <a href="#">Figure 8</a> , <a href="#">Figure 9</a> , <a href="#">Figure 10</a> and <a href="#">Figure 11</a>				
		$V_{\text{CC}} = 0.8 \text{ V}$	0.07	-	0.50	V
		$V_{\text{CC}} = 1.1 \text{ V}$	0.08	-	0.46	V
		$V_{\text{CC}} = 1.4 \text{ V}$	0.18	-	0.56	V
		$V_{\text{CC}} = 1.65 \text{ V}$	0.27	-	0.66	V
		$V_{\text{CC}} = 2.3 \text{ V}$	0.53	-	0.92	V
		$V_{\text{CC}} = 3.0 \text{ V}$	0.79	-	1.31	V
<b><math>T_{\text{amb}} = -40 \text{ }^{\circ}\text{C to } +85 \text{ }^{\circ}\text{C}</math></b>						
$V_{(\text{th})\text{LH}}$	positive-going threshold voltage	see <a href="#">Figure 8</a> and <a href="#">Figure 9</a>				
		$V_{\text{CC}} = 0.8 \text{ V}$	0.30	-	0.60	V
		$V_{\text{CC}} = 1.1 \text{ V}$	0.53	-	0.90	V
		$V_{\text{CC}} = 1.4 \text{ V}$	0.74	-	1.11	V
		$V_{\text{CC}} = 1.65 \text{ V}$	0.91	-	1.29	V
		$V_{\text{CC}} = 2.3 \text{ V}$	1.37	-	1.77	V
		$V_{\text{CC}} = 3.0 \text{ V}$	1.88	-	2.29	V
$V_{(\text{th})\text{HL}}$	negative-going threshold voltage	see <a href="#">Figure 8</a> and <a href="#">Figure 9</a>				
		$V_{\text{CC}} = 0.8 \text{ V}$	0.10	-	0.60	V
		$V_{\text{CC}} = 1.1 \text{ V}$	0.26	-	0.65	V
		$V_{\text{CC}} = 1.4 \text{ V}$	0.39	-	0.75	V
		$V_{\text{CC}} = 1.65 \text{ V}$	0.47	-	0.84	V
		$V_{\text{CC}} = 2.3 \text{ V}$	0.69	-	1.04	V
		$V_{\text{CC}} = 3.0 \text{ V}$	0.88	-	1.24	V
$V_{\text{hys}}$	hysteresis voltage ( $V_{(\text{th})\text{LH}} - V_{(\text{th})\text{HL}}$ )	see <a href="#">Figure 8</a> , <a href="#">Figure 9</a> , <a href="#">Figure 10</a> and <a href="#">Figure 11</a>				
		$V_{\text{CC}} = 0.8 \text{ V}$	0.07	-	0.50	V
		$V_{\text{CC}} = 1.1 \text{ V}$	0.08	-	0.46	V
		$V_{\text{CC}} = 1.4 \text{ V}$	0.18	-	0.56	V
		$V_{\text{CC}} = 1.65 \text{ V}$	0.27	-	0.66	V
		$V_{\text{CC}} = 2.3 \text{ V}$	0.53	-	0.92	V
		$V_{\text{CC}} = 3.0 \text{ V}$	0.79	-	1.31	V
<b><math>T_{\text{amb}} = -40 \text{ }^{\circ}\text{C to } +125 \text{ }^{\circ}\text{C}</math></b>						
$V_{(\text{th})\text{LH}}$	positive-going threshold voltage	see <a href="#">Figure 8</a> and <a href="#">Figure 9</a>				
		$V_{\text{CC}} = 0.8 \text{ V}$	0.30	-	0.62	V
		$V_{\text{CC}} = 1.1 \text{ V}$	0.53	-	0.92	V
		$V_{\text{CC}} = 1.4 \text{ V}$	0.74	-	1.13	V
		$V_{\text{CC}} = 1.65 \text{ V}$	0.91	-	1.31	V
		$V_{\text{CC}} = 2.3 \text{ V}$	1.37	-	1.80	V
		$V_{\text{CC}} = 3.0 \text{ V}$	1.88	-	2.32	V

**Table 13: Transfer characteristics ...continued**  
 Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(th)HL}$	negative-going threshold voltage	see <a href="#">Figure 8</a> and <a href="#">Figure 9</a>				
		$V_{CC} = 0.8\text{ V}$	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 <a href="#">Figure 8</a> , <a href="#">Figure 9</a> , <a href="#">Figure 10</a> and <a href="#">Figure 11</a>				
		$V_{CC} = 0.8\text{ V}$	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

15. Waveforms transfer characteristics



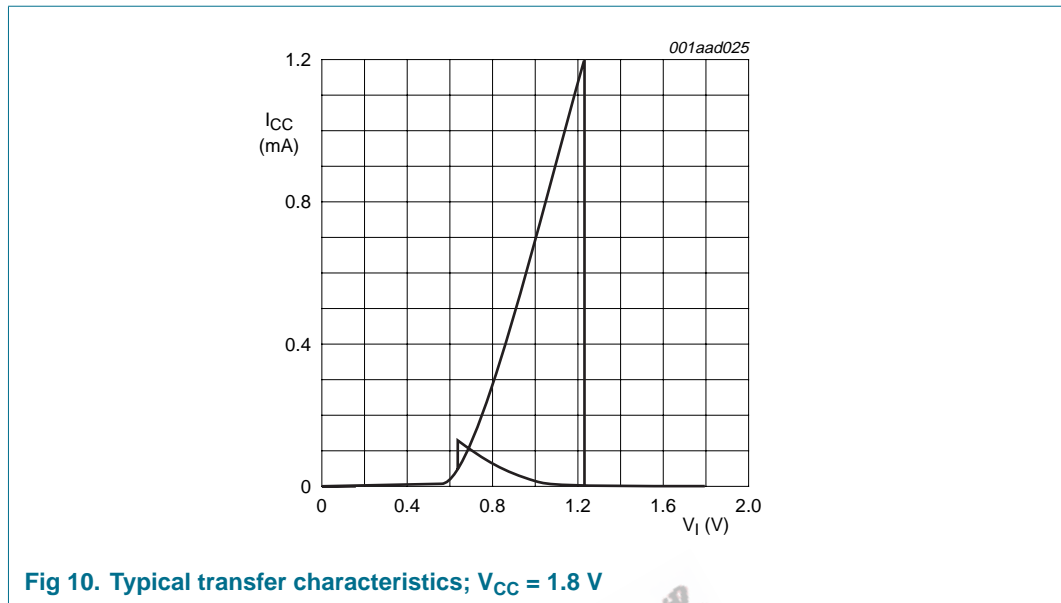


Fig 10. Typical transfer characteristics;  $V_{CC} = 1.8\text{ V}$

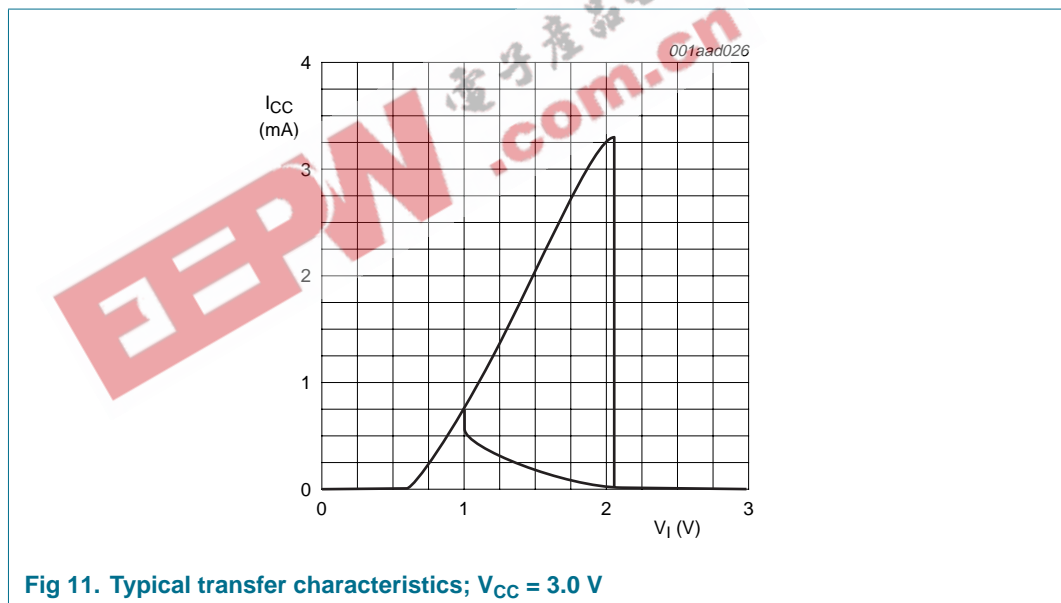


Fig 11. Typical transfer characteristics;  $V_{CC} = 3.0\text{ V}$

## 16. Application information

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

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

$P_{ad}$  = additional power dissipation ( $\mu W$ );

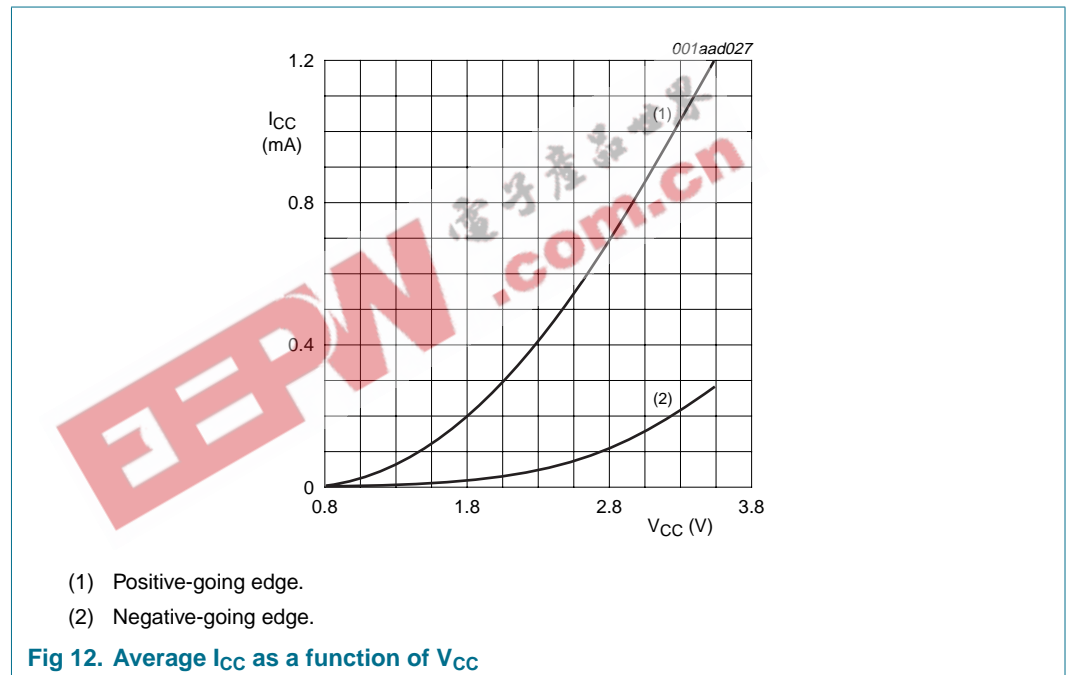
$f_i$  = input frequency (MHz);

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

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

$I_{CC(AV)}$  = average additional supply current ( $\mu A$ ).

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



17. Package outline

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

SOT353-1

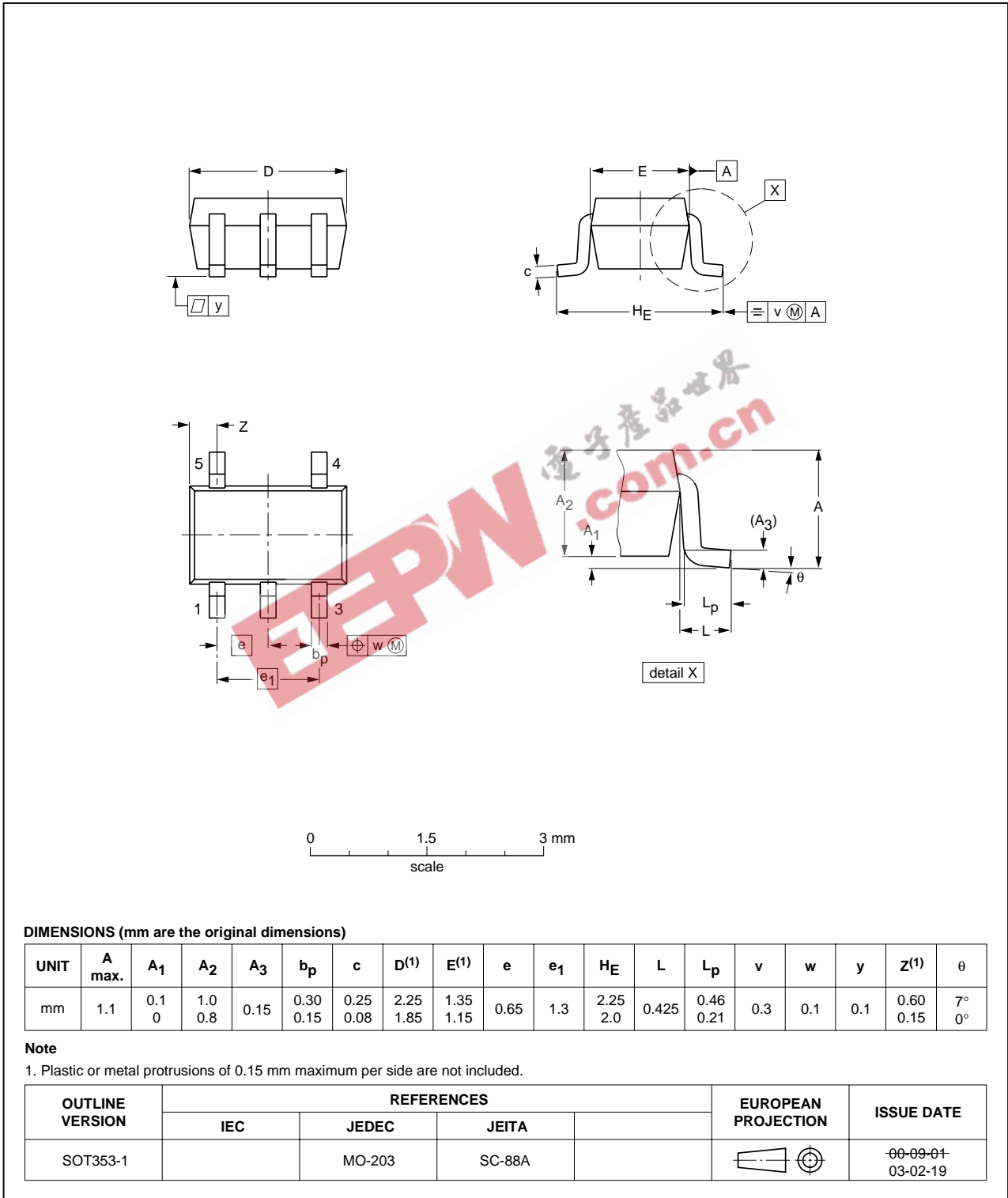


Fig 13. Package outline SOT353-1 (TSSOP5)



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

SOT886

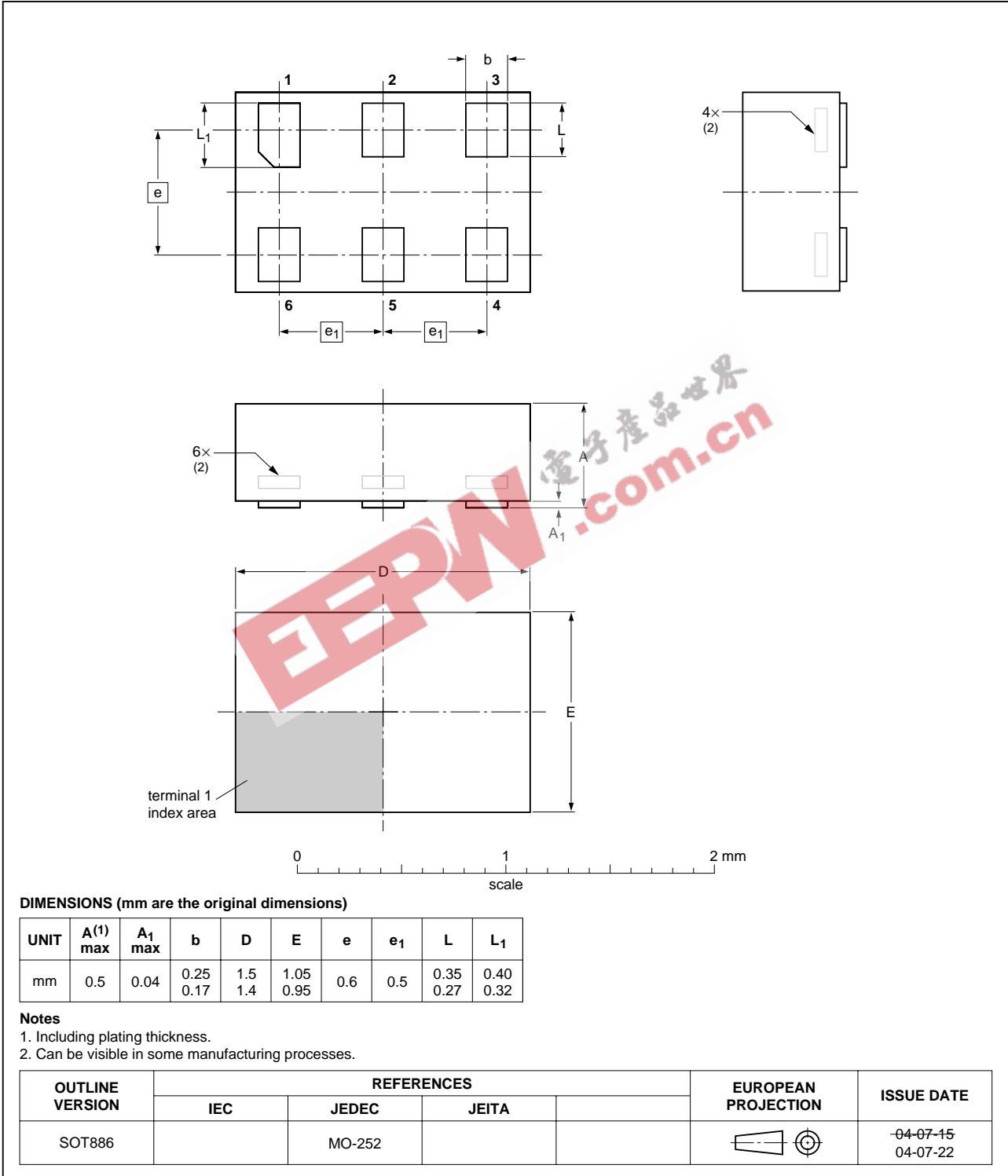


Fig 14. Package outline SOT886 (XSON6)

## 18. Abbreviations

Table 14: 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

## 19. Revision history

Table 15: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
74AUP1G17_1	20050726	Product data sheet	-	9397 750 14677	-

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Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2]</sup> <sup>[3]</sup>	Definition
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