

74AUP1G79

Low-power D-type flip-flop; positive-edge trigger

Rev. 01 — 12 September 2005

Product data sheet

1. General description

The 74AUP1G79 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 74AUP1G79 provides the single positive-edge triggered D-type flip-flop. Information on the data input is transferred to the Q output on the LOW-to-HIGH transition of the clock pulse. The D input must be stable one set-up time prior to the LOW-to-HIGH clock transition for predictable operation.

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 CP to Q	$C_L = 5\text{ pF}$; $R_L = 1\text{ M}\Omega$				
		$V_{CC} = 0.8\text{ V}$	-	19.7	-	ns
		$V_{CC} = 1.1\text{ V to }1.3\text{ V}$	2.6	5.5	11.0	ns
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	2.0	3.8	7.0	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	1.7	3.1	5.4	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.4	2.3	4.0	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.2	2.0	3.4	ns
$f_{clk(max)}$	maximum clock frequency	$C_L = 30\text{ pF}$; $V_{CC} = 3.0\text{ V to }3.6\text{ V}$	-	309	-	MHz
C_i	input capacitance		-	0.8	-	pF
C_{PD}	power dissipation capacitance	$f = 10\text{ MHz}$; $V_I = GND\text{ to }V_{CC}$				
		$V_{CC} = 1.8\text{ V}$	-	2.3	-	pF
		$V_{CC} = 3.3\text{ V}$	-	3.0	-	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.

4. Ordering information

Table 2: Ordering information

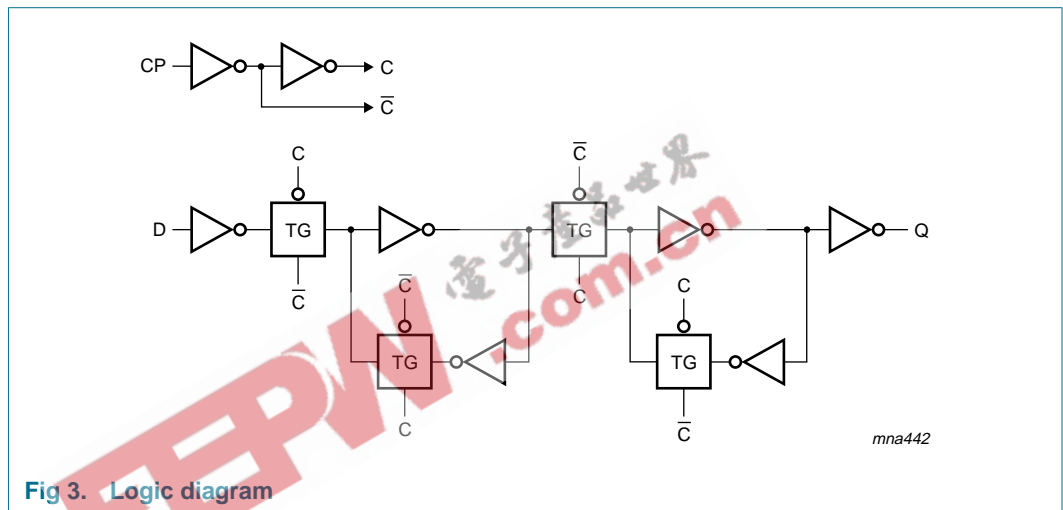
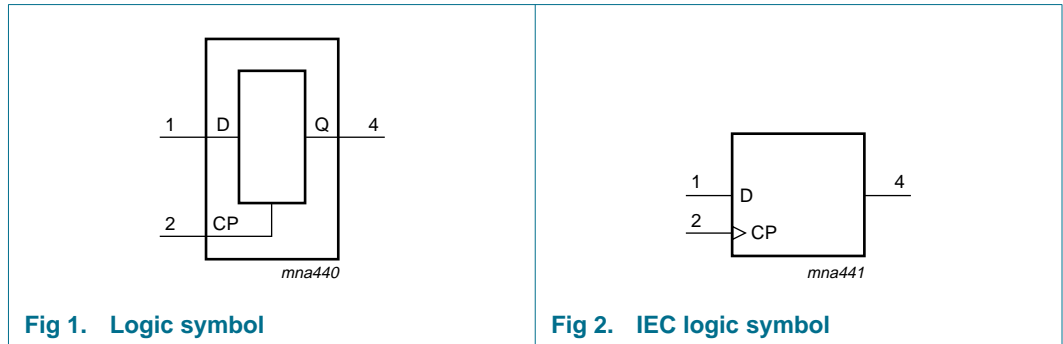
Type number	Package			Version
	Temperature range	Name	Description	
74AUP1G79GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74AUP1G79GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886

5. Marking

Table 3: Marking

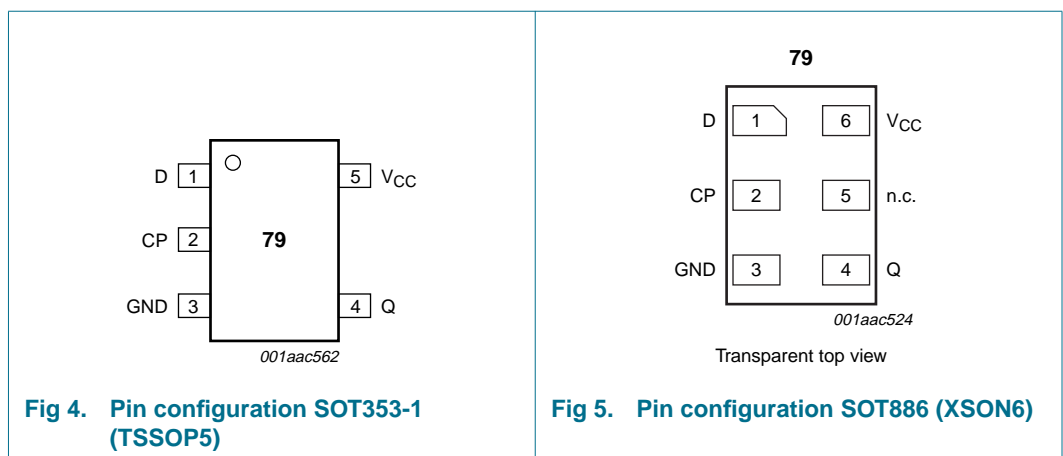
Type number	Marking code
74AUP1G79GW	pP
74AUP1G79GM	pP

6. Functional diagram



7. Pinning information

7.1 Pinning



7.2 Pin description

Table 4: Pin description

Symbol	Pin		Description
	TSSOP5	XSON6	
D	1	1	data input D
CP	2	2	clock pulse input CP
GND	3	3	ground (0 V)
Q	4	4	data output Q
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
CP	D	Q
↑	L	L
↑	H	H
L	X	q

- [1] H = HIGH voltage level;
 L = LOW voltage level;
 ↑ = LOW-to-HIGH CP transition;
 X = don't care;
 q = lower case letter indicates the state of referenced input, one set-up time prior to the LOW-to-HIGH CP transition.

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

Table 6: Limiting values ...continued

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Max	Unit
I_{GND}	ground current		-	-50	mA
T_{stg}	storage temperature		-65	+150	°C
P_{tot}	total power dissipation	$T_{amb} = -40\text{ °C to }+125\text{ °C}$ [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; $V_{CC} = 0\text{ V}$	0	3.6	V
T_{amb}	ambient temperature		-40	+125	°C
t_r, t_f	input rise and fall times	$V_{CC} = 0.8\text{ V to }3.6\text{ V}$	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
$T_{amb} = 25\text{ °C}$						
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

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 _{OH}	HIGH-state output voltage	V _I = V _{IH} or V _{IL}				
		I _O = -20 μA; 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 × 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 μA; V _{CC} = 0.8 V to 3.6 V	-	-	0.1	V
		I _O = 1.1 mA; V _{CC} = 1.1 V	-	-	0.3 × 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	μA
		I _{OFF}	power-off leakage current	V _I or V _O = 0 V to 3.6 V; V _{CC} = 0 V	-	-
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	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	-	-	0.5	μA
ΔI _{CC}	additional quiescent supply current (per pin)	V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 3.3 V	[1]	-	40	μA
C _i	input capacitance	V _{CC} = 0 V to 3.6 V; V _I = GND or V _{CC}	-	0.8	-	pF
C _o	output capacitance	V _O = GND; V _{CC} = 0 V	-	1.7	-	pF
T_{amb} = -40 °C to +85 °C						
V _{IH}	HIGH-state input voltage	V _{CC} = 0.8 V	0.70 × V _{CC}	-	-	V
		V _{CC} = 0.9 V to 1.95 V	0.65 × 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 × V _{CC}	V
		V _{CC} = 0.9 V to 1.95 V	-	-	0.35 × 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

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 _{OH}	HIGH-state output voltage	V _I = V _{IH} or V _{IL}				
		I _O = -20 μA; V _{CC} = 0.8 V to 3.6 V	V _{CC} - 0.1	-	-	V
		I _O = -1.1 mA; V _{CC} = 1.1 V	0.7 × V _{CC}	-	-	V
		I _O = -1.7 mA; V _{CC} = 1.4 V	1.03	-	-	V
		I _O = -1.9 mA; V _{CC} = 1.65 V	1.30	-	-	V
		I _O = -2.3 mA; V _{CC} = 2.3 V	1.97	-	-	V
		I _O = -3.1 mA; V _{CC} = 2.3 V	1.85	-	-	V
		I _O = -2.7 mA; V _{CC} = 3.0 V	2.67	-	-	V
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	-	-	0.1	V
		I _O = 1.1 mA; V _{CC} = 1.1 V	-	-	0.3 × V _{CC}	V
		I _O = 1.7 mA; V _{CC} = 1.4 V	-	-	0.37	V
		I _O = 1.9 mA; V _{CC} = 1.65 V	-	-	0.35	V
		I _O = 2.3 mA; V _{CC} = 2.3 V	-	-	0.33	V
		I _O = 3.1 mA; V _{CC} = 2.3 V	-	-	0.45	V
		I _O = 2.7 mA; V _{CC} = 3.0 V	-	-	0.33	V
I _{LI}	input leakage current	V _I = GND to 3.6 V; V _{CC} = 0 V to 3.6 V	-	-	±0.5	μA
I _{OFF}	power-off leakage current	V _I or V _O = 0 V to 3.6 V; V _{CC} = 0 V	-	-	±0.5	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	-	-	±0.6	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	-	-	0.9	μA
ΔI _{CC}	additional quiescent supply current (per pin)	V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 3.3 V	[1]	-	50	μA
T_{amb} = -40 °C to +125 °C						
V _{IH}	HIGH-state input voltage	V _{CC} = 0.8 V	0.75 × V _{CC}	-	-	V
		V _{CC} = 0.9 V to 1.95 V	0.70 × 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	-	-	0.25 × V _{CC}	V
		V _{CC} = 0.9 V to 1.95 V	-	-	0.30 × 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

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 _{OH}	HIGH-state output voltage	V _I = V _{IH} or V _{IL}				
		I _O = -20 μA; V _{CC} = 0.8 V to 3.6 V	V _{CC} - 0.11	-	-	V
		I _O = -1.1 mA; V _{CC} = 1.1 V	0.6 × V _{CC}	-	-	V
		I _O = -1.7 mA; V _{CC} = 1.4 V	0.93	-	-	V
		I _O = -1.9 mA; V _{CC} = 1.65 V	1.17	-	-	V
		I _O = -2.3 mA; V _{CC} = 2.3 V	1.77	-	-	V
		I _O = -3.1 mA; V _{CC} = 2.3 V	1.67	-	-	V
		I _O = -2.7 mA; V _{CC} = 3.0 V	2.40	-	-	V
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 _{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	-	-
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 (per pin)	V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 3.3 V	[1]	-	75	μA

[1] One input at V_{CC} - 0.6 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 °C; C_L = 5 pF						
t _{PHL} , t _{PLH}	propagation delay CP to Q	see Figure 6				
		V _{CC} = 0.8 V	-	19.7	-	ns
		V _{CC} = 1.1 V to 1.3 V	2.6	5.5	11.0	ns
		V _{CC} = 1.4 V to 1.6 V	2.0	3.8	7.0	ns
		V _{CC} = 1.65 V to 1.95 V	1.7	3.1	5.4	ns
		V _{CC} = 2.3 V to 2.7 V	1.4	2.3	4.0	ns
		V _{CC} = 3.0 V to 3.6 V	1.2	2.0	3.4	ns

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

Symbol	Parameter	Conditions	Min	Typ ^[1]	Max	Unit
$f_{\text{clk(max)}}$	maximum clock frequency	see Figure 6				
		$V_{\text{CC}} = 0.8 \text{ V}$	-	53	-	MHz
		$V_{\text{CC}} = 1.1 \text{ V to } 1.3 \text{ V}$	-	203	-	MHz
		$V_{\text{CC}} = 1.4 \text{ V to } 1.6 \text{ V}$	-	347	-	MHz
		$V_{\text{CC}} = 1.65 \text{ V to } 1.95 \text{ V}$	-	435	-	MHz
		$V_{\text{CC}} = 2.3 \text{ V to } 2.7 \text{ V}$	-	550	-	MHz
		$V_{\text{CC}} = 3.0 \text{ V to } 3.6 \text{ V}$	-	619	-	MHz
$T_{\text{amb}} = 25 \text{ }^\circ\text{C}$; $C_{\text{L}} = 10 \text{ pF}$						
$t_{\text{PHL}}, t_{\text{PLH}}$	propagation delay CP to Q	see Figure 6				
		$V_{\text{CC}} = 0.8 \text{ V}$	-	23.1	-	ns
		$V_{\text{CC}} = 1.1 \text{ V to } 1.3 \text{ V}$	3.1	6.3	12.3	ns
		$V_{\text{CC}} = 1.4 \text{ V to } 1.6 \text{ V}$	2.5	4.4	8.1	ns
		$V_{\text{CC}} = 1.65 \text{ V to } 1.95 \text{ V}$	2.1	3.6	6.3	ns
		$V_{\text{CC}} = 2.3 \text{ V to } 2.7 \text{ V}$	1.8	2.8	4.7	ns
		$V_{\text{CC}} = 3.0 \text{ V to } 3.6 \text{ V}$	1.7	2.5	4.1	ns
$f_{\text{clk(max)}}$	maximum clock frequency	see Figure 6				
		$V_{\text{CC}} = 0.8 \text{ V}$	-	52	-	MHz
		$V_{\text{CC}} = 1.1 \text{ V to } 1.3 \text{ V}$	-	192	-	MHz
		$V_{\text{CC}} = 1.4 \text{ V to } 1.6 \text{ V}$	-	324	-	MHz
		$V_{\text{CC}} = 1.65 \text{ V to } 1.95 \text{ V}$	-	421	-	MHz
		$V_{\text{CC}} = 2.3 \text{ V to } 2.7 \text{ V}$	-	486	-	MHz
		$V_{\text{CC}} = 3.0 \text{ V to } 3.6 \text{ V}$	-	550	-	MHz
$T_{\text{amb}} = 25 \text{ }^\circ\text{C}$; $C_{\text{L}} = 15 \text{ pF}$						
$t_{\text{PHL}}, t_{\text{PLH}}$	propagation delay CP to Q	see Figure 6				
		$V_{\text{CC}} = 0.8 \text{ V}$	-	26.6	-	ns
		$V_{\text{CC}} = 1.1 \text{ V to } 1.3 \text{ V}$	3.5	7.1	13.6	ns
		$V_{\text{CC}} = 1.4 \text{ V to } 1.6 \text{ V}$	2.8	5.0	9.2	ns
		$V_{\text{CC}} = 1.65 \text{ V to } 1.95 \text{ V}$	2.4	4.1	7.1	ns
		$V_{\text{CC}} = 2.3 \text{ V to } 2.7 \text{ V}$	2.2	3.2	5.4	ns
		$V_{\text{CC}} = 3.0 \text{ V to } 3.6 \text{ V}$	2.0	2.9	4.5	ns
$f_{\text{clk(max)}}$	maximum clock frequency	see Figure 6				
		$V_{\text{CC}} = 0.8 \text{ V}$	-	50	-	MHz
		$V_{\text{CC}} = 1.1 \text{ V to } 1.3 \text{ V}$	-	181	-	MHz
		$V_{\text{CC}} = 1.4 \text{ V to } 1.6 \text{ V}$	-	301	-	MHz
		$V_{\text{CC}} = 1.65 \text{ V to } 1.95 \text{ V}$	-	407	-	MHz
		$V_{\text{CC}} = 2.3 \text{ V to } 2.7 \text{ V}$	-	422	-	MHz
		$V_{\text{CC}} = 3.0 \text{ V to } 3.6 \text{ V}$	-	481	-	MHz

Table 9: Dynamic characteristics ...continuedVoltages 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 = 30 pF						
t _{PHL} , t _{PLH}	propagation delay CP to Q	see Figure 6				
		V _{CC} = 0.8 V	-	36.8	-	ns
		V _{CC} = 1.1 V to 1.3 V	4.7	9.3	17.3	ns
		V _{CC} = 1.4 V to 1.6 V	3.8	6.4	11.8	ns
		V _{CC} = 1.65 V to 1.95 V	3.3	5.3	9.4	ns
		V _{CC} = 2.3 V to 2.7 V	3.0	4.3	7.0	ns
		V _{CC} = 3.0 V to 3.6 V	2.8	3.9	5.8	ns
f _{clk(max)}	maximum clock frequency	see Figure 6				
		V _{CC} = 0.8 V	-	28	-	MHz
		V _{CC} = 1.1 V to 1.3 V	-	128	-	MHz
		V _{CC} = 1.4 V to 1.6 V	-	206	-	MHz
		V _{CC} = 1.65 V to 1.95 V	-	262	-	MHz
		V _{CC} = 2.3 V to 2.7 V	-	269	-	MHz
		V _{CC} = 3.0 V to 3.6 V	-	309	-	MHz
T_{amb} = 25 °C						
t _{su(H)}	set-up time HIGH D to CP	see Figure 6				
		V _{CC} = 0.8 V	-	3.4	-	ns
		V _{CC} = 1.1 V to 1.3 V	-	0.8	-	ns
		V _{CC} = 1.4 V to 1.6 V	-	0.5	-	ns
		V _{CC} = 1.65 V to 1.95 V	-	0.5	-	ns
		V _{CC} = 2.3 V to 2.7 V	-	0.4	-	ns
		V _{CC} = 3.0 V to 3.6 V	-	0.4	-	ns
t _{su(L)}	set-up time LOW D to CP	see Figure 6				
		V _{CC} = 0.8 V	-	3.0	-	ns
		V _{CC} = 1.1 V to 1.3 V	-	0.9	-	ns
		V _{CC} = 1.4 V to 1.6 V	-	0.6	-	ns
		V _{CC} = 1.65 V to 1.95 V	-	0.5	-	ns
		V _{CC} = 2.3 V to 2.7 V	-	0.5	-	ns
		V _{CC} = 3.0 V to 3.6 V	-	0.7	-	ns
t _h	hold time D to CP	see Figure 6				
		V _{CC} = 0.8 V	-	-1.9	-	ns
		V _{CC} = 1.1 V to 1.3 V	-	-0.6	-	ns
		V _{CC} = 1.4 V to 1.6 V	-	-0.4	-	ns
		V _{CC} = 1.65 V to 1.95 V	-	-0.4	-	ns
		V _{CC} = 2.3 V to 2.7 V	-	-0.4	-	ns
		V _{CC} = 3.0 V to 3.6 V	-	-0.3	-	ns

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

Symbol	Parameter	Conditions	Min	Typ ^[1]	Max	Unit
t _W	CP pulse width HIGH or LOW	see Figure 6				
		V _{CC} = 0.8 V	-	-	-	ns
		V _{CC} = 1.1 V to 1.3 V	-	2.4	-	ns
		V _{CC} = 1.4 V to 1.6 V	-	1.3	-	ns
		V _{CC} = 1.65 V to 1.95 V	-	0.9	-	ns
		V _{CC} = 2.3 V to 2.7 V	-	0.7	-	ns
		V _{CC} = 3.0 V to 3.6 V	-	0.6	-	ns
C _{PD}	power dissipation capacitance	f = 10 MHz ^{[2] [3]}				
		V _{CC} = 0.8 V	-	2.2	-	pF
		V _{CC} = 1.1 V to 1.3 V	-	2.2	-	pF
		V _{CC} = 1.4 V to 1.6 V	-	2.2	-	pF
		V _{CC} = 1.65 V to 1.95 V	-	2.3	-	pF
		V _{CC} = 2.3 V to 2.7 V	-	2.6	-	pF
		V _{CC} = 3.0 V to 3.6 V	-	3.0	-	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} × V_{CC}² × f_i × N + Σ(C_L × V_{CC}² × 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 CP to Q	see Figure 6					
		V _{CC} = 1.1 V to 1.3 V	2.4	12.9	2.4	14.2	ns
		V _{CC} = 1.4 V to 1.6 V	1.8	8.1	1.8	9.0	ns
		V _{CC} = 1.65 V to 1.95 V	1.5	6.4	1.5	7.1	ns
		V _{CC} = 2.3 V to 2.7 V	1.1	4.7	1.1	5.2	ns
		V _{CC} = 3.0 V to 3.6 V	0.9	4.0	0.9	4.4	ns
f _{clk(max)}	maximum clock frequency	see Figure 6					
		V _{CC} = 1.1 V to 1.3 V	170	-	170	-	MHz
		V _{CC} = 1.4 V to 1.6 V	310	-	300	-	MHz
		V _{CC} = 1.65 V to 1.95 V	400	-	390	-	MHz
		V _{CC} = 2.3 V to 2.7 V	490	-	480	-	MHz
		V _{CC} = 3.0 V to 3.6 V	550	-	510	-	MHz
C_L = 10 pF							
t _{PHL} , t _{PLH}	propagation delay CP to Q	see Figure 6					
		V _{CC} = 1.1 V to 1.3 V	2.8	14.4	2.8	15.9	ns
		V _{CC} = 1.4 V to 1.6 V	2.2	9.5	2.2	10.5	ns
		V _{CC} = 1.65 V to 1.95 V	1.9	7.5	1.9	8.3	ns
		V _{CC} = 2.3 V to 2.7 V	1.5	5.6	1.5	6.2	ns
		V _{CC} = 3.0 V to 3.6 V	1.3	4.5	1.3	5.0	ns
f _{clk(max)}	maximum clock frequency	see Figure 6					
		V _{CC} = 1.1 V to 1.3 V	150	-	150	-	MHz
		V _{CC} = 1.4 V to 1.6 V	280	-	230	-	MHz
		V _{CC} = 1.65 V to 1.95 V	310	-	250	-	MHz
		V _{CC} = 2.3 V to 2.7 V	370	-	360	-	MHz
		V _{CC} = 3.0 V to 3.6 V	410	-	360	-	MHz
C_L = 15 pF							
t _{PHL} , t _{PLH}	propagation delay CP to Q	see Figure 6					
		V _{CC} = 1.1 V to 1.3 V	3.2	15.6	3.2	17.2	ns
		V _{CC} = 1.4 V to 1.6 V	2.5	10.7	2.5	11.8	ns
		V _{CC} = 1.65 V to 1.95 V	2.2	8.5	2.2	9.4	ns
		V _{CC} = 2.3 V to 2.7 V	1.9	6.3	1.9	7.0	ns
		V _{CC} = 3.0 V to 3.6 V	1.6	5.0	1.6	5.5	ns
f _{clk(max)}	maximum clock frequency	see Figure 6					
		V _{CC} = 1.1 V to 1.3 V	120	-	120	-	MHz
		V _{CC} = 1.4 V to 1.6 V	190	-	160	-	MHz
		V _{CC} = 1.65 V to 1.95 V	240	-	190	-	MHz
		V _{CC} = 2.3 V to 2.7 V	300	-	270	-	MHz
		V _{CC} = 3.0 V to 3.6 V	320	-	300	-	MHz

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 = 30 pF							
t _{PHL} , t _{PLH}	propagation delay CP to Q	see Figure 6					
		V _{CC} = 1.1 V to 1.3 V	4.2	23.3	4.2	25.6	ns
		V _{CC} = 1.4 V to 1.6 V	3.3	14.3	3.3	15.7	ns
		V _{CC} = 1.65 V to 1.95 V	3.0	11.3	3.0	12.4	ns
		V _{CC} = 2.3 V to 2.7 V	2.7	8.5	2.7	9.4	ns
		V _{CC} = 3.0 V to 3.6 V	2.6	7.2	2.6	7.9	ns
f _{clk(max)}	maximum clock frequency	see Figure 6					
		V _{CC} = 1.1 V to 1.3 V	70	-	70	-	MHz
		V _{CC} = 1.4 V to 1.6 V	120	-	110	-	MHz
		V _{CC} = 1.65 V to 1.95 V	150	-	120	-	MHz
		V _{CC} = 2.3 V to 2.7 V	190	-	170	-	MHz
		V _{CC} = 3.0 V to 3.6 V	200	-	190	-	MHz
C_L = 5 pF, 10 pF, 15 pF and 30 pF							
t _{su(H)}	set-up time HIGH D to CP	see Figure 6					
		V _{CC} = 1.1 V to 1.3 V	1.6	-	1.6	-	ns
		V _{CC} = 1.4 V to 1.6 V	1.0	-	1.0	-	ns
		V _{CC} = 1.65 V to 1.95 V	0.9	-	0.9	-	ns
		V _{CC} = 2.3 V to 2.7 V	0.7	-	0.7	-	ns
		V _{CC} = 3.0 V to 3.6 V	0.6	-	0.6	-	ns
t _{su(L)}	set-up time LOW D to CP	see Figure 6					
		V _{CC} = 1.1 V to 1.3 V	1.6	-	1.6	-	ns
		V _{CC} = 1.4 V to 1.6 V	1.0	-	1.0	-	ns
		V _{CC} = 1.65 V to 1.95 V	0.9	-	0.9	-	ns
		V _{CC} = 2.3 V to 2.7 V	0.8	-	0.8	-	ns
		V _{CC} = 3.0 V to 3.6 V	1.0	-	1.0	-	ns
t _h	hold time D to CP	see Figure 6					
		V _{CC} = 1.1 V to 1.3 V	0	-	0	-	ns
		V _{CC} = 1.4 V to 1.6 V	0	-	0	-	ns
		V _{CC} = 1.65 V to 1.95 V	0	-	0	-	ns
		V _{CC} = 2.3 V to 2.7 V	0	-	0	-	ns
		V _{CC} = 3.0 V to 3.6 V	0	-	0	-	ns
t _w	CP pulse width HIGH or LOW	see Figure 6					
		V _{CC} = 1.1 V to 1.3 V	3.5	-	3.5	-	ns
		V _{CC} = 1.4 V to 1.6 V	2.0	-	2.0	-	ns
		V _{CC} = 1.65 V to 1.95 V	1.9	-	1.9	-	ns
		V _{CC} = 2.3 V to 2.7 V	2.0	-	2.0	-	ns
		V _{CC} = 3.0 V to 3.6 V	2.2	-	2.2	-	ns

13. Waveforms

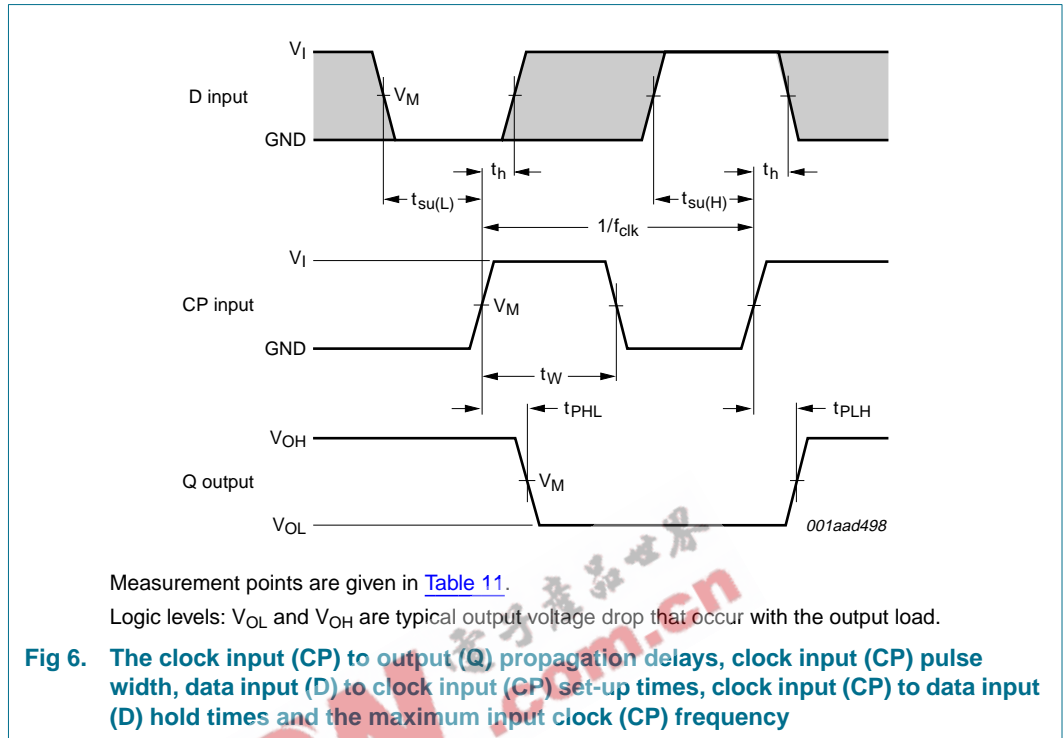


Table 11: Measurement points

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}	≤ 3.0 ns

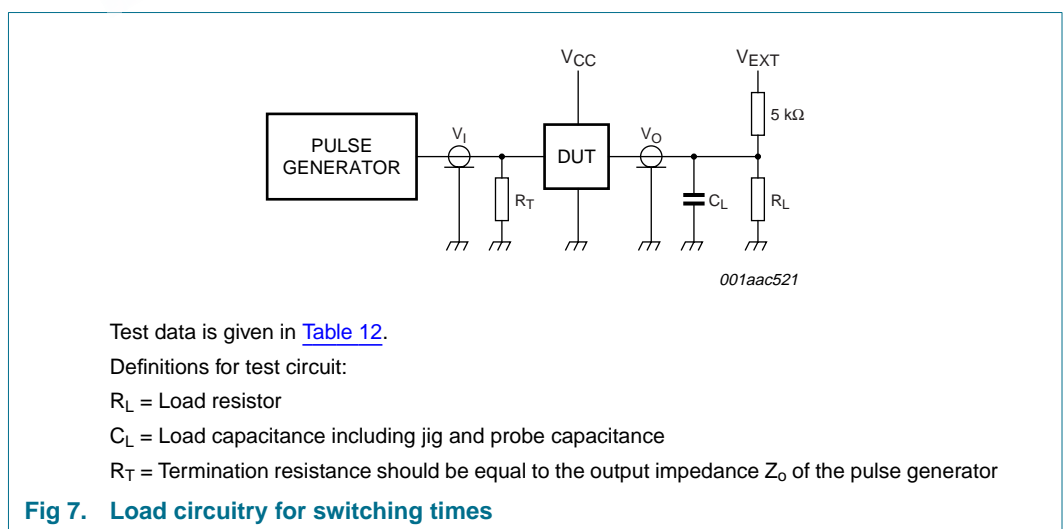


Table 12: Test data

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 k Ω or 1 M Ω	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 $R_L = 1 \text{ M}\Omega$.

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14. Package outline

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

SOT353-1

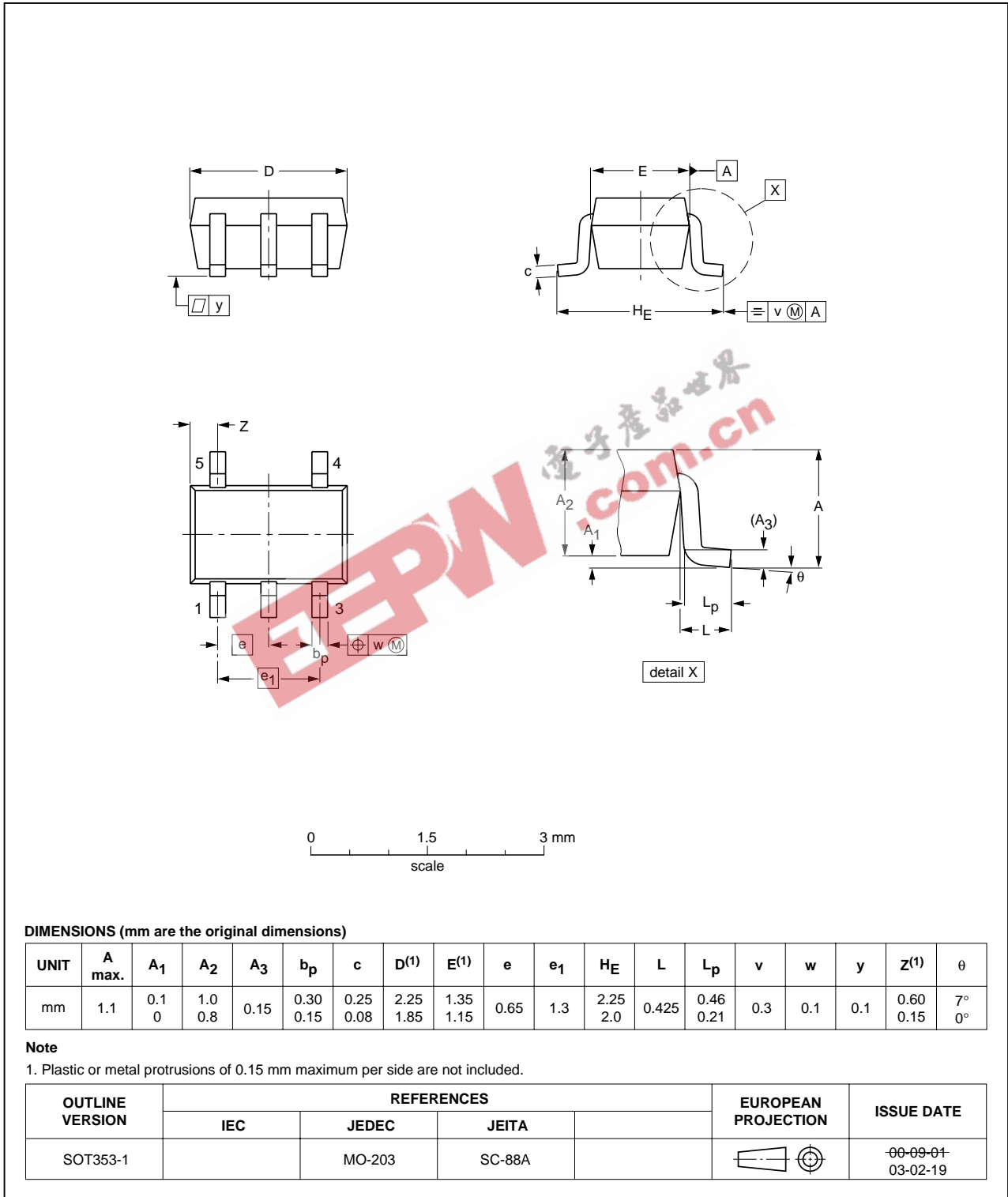


Fig 8. Package outline SOT353-1 (TSSOP5)

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

SOT886

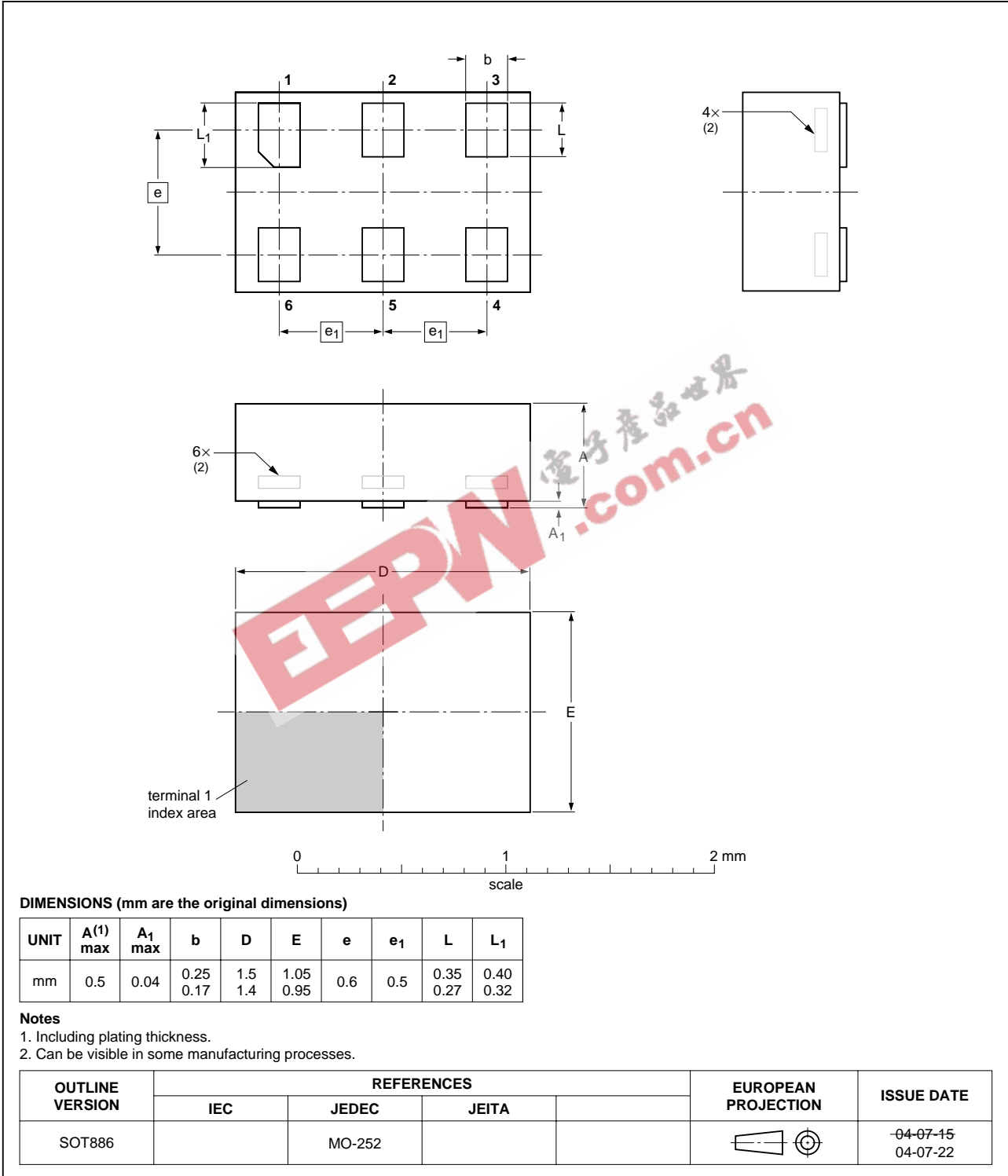


Fig 9. Package outline SOT886 (XSON6)

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
74AUP1G79_1	20050912	Product data sheet	-	9397 750 14682	-

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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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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	4
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	14
14	Package outline	16
15	Abbreviations	18
16	Revision history	18
17	Data sheet status	19
18	Definitions	19
19	Disclaimers	19
20	Trademarks	19
21	Contact information	19



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