

# 74AUP1G885

Low-power dual function gate

Rev. 01.00 — 26 January 2006

Preliminary data sheet

## 1. General description

The 74AUP1G885 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 74AUP1G885 provides two functions in one device. The output state of the outputs (1Y, 2Y) is determined by the inputs (A, B and C). The output 1Y provides the boolean function:  $1Y = A \times C$ . The output 2Y provides the boolean function:  $2Y = \bar{A} \times B + A \times \bar{C}$

## 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 Class 3A exceeds 4000 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  $+125 \text{ }^\circ\text{C}$

**PHILIPS**

### 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	
$t_{PHL}$ , $t_{PLH}$	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 0.8\text{ V}$	-	17.3	-	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.1\text{ V to }1.3\text{ V}$	1.1	5.2	9.7	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.4\text{ V to }1.6\text{ V}$	1.2	3.7	5.9	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.65\text{ V to }1.95\text{ V}$	1.1	3.0	4.8	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.1	2.4	3.6	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.1	2.1	3.1	ns	
$t_{PHL}$ , $t_{PLH}$	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B to 2Y	$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 0.8\text{ V}$	-	21.5	-	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.1\text{ V to }1.3\text{ V}$	1.7	6.0	12.7	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.4\text{ V to }1.6\text{ V}$	1.7	4.2	7.2	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.65\text{ V to }1.95\text{ V}$	1.4	3.3	5.8	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	4.1	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.1	2.3	3.5	ns	
$C_I$	input capacitance		-	0.8	-	pF	
$C_{PD}$	power dissipation capacitance	$V_{CC} = 1.8\text{ V}$ ; $f = 1\text{ MHz}$	[1][2]	-	3.1	-	pF
		$V_{CC} = 3.3\text{ V}$ ; $f = 1\text{ MHz}$	[1][2]	-	4.1	-	pF

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

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

$f_i$  = 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

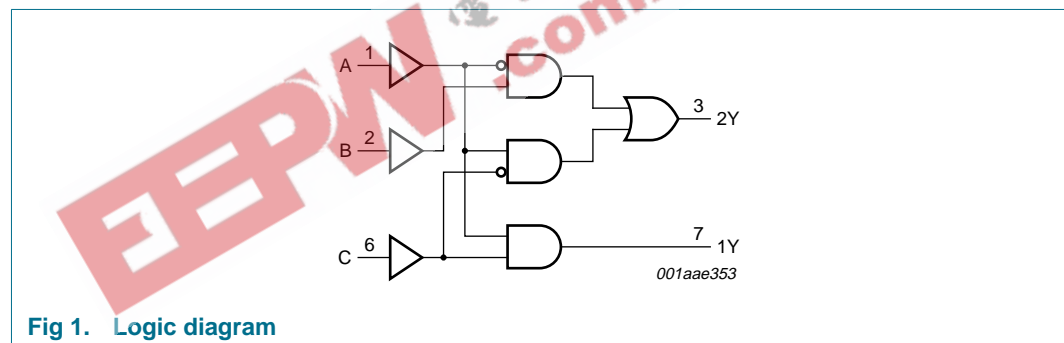
Type number	Package			Version
	Temperature range	Name	Description	
74AUP1G885DC	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74AUP1G885GT	-40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body 1 × 1.95 × 0.5 mm	SOT833-1

## 5. Marking

Table 3: Marking

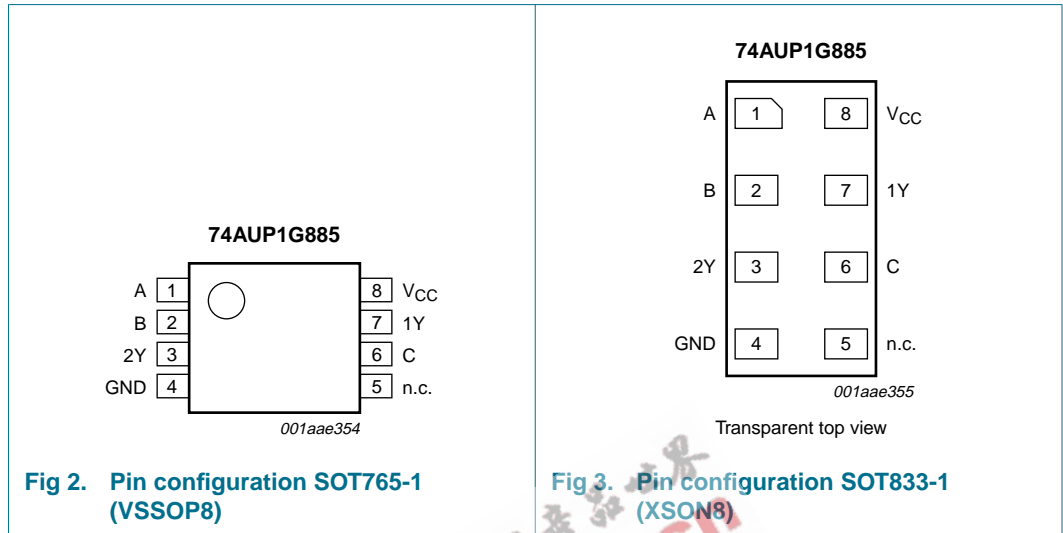
Type number	Marking code
74AUP1G885DC	pS8
74AUP1G885GT	pS8

## 6. Functional diagram



## 7. Pinning information

### 7.1 Pinning



### 7.2 Pin description

Table 4: Pin description

Symbol	Pin	Description
A	1	data input A
B	2	data input B
2Y	3	data output 2Y
GND	4	ground (0 V)
n.c.	5	not connected
C	6	data input C
1Y	7	data output 1Y
V <sub>CC</sub>	8	supply voltage

## 8. Functional description

### 8.1 Function table

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

Input			Output	
A	B	C	1Y	2Y
L	L	L	L	L
H	L	L	L	H
L	H	L	L	H
H	H	L	L	H
L	L	H	L	L
H	L	H	H	L
L	H	H	L	H
H	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		<sup>[1]</sup> -0.5	+4.6	V
$I_{OK}$	output clamping current	$V_O < 0$ 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> -	300	mW

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

[2] For VSSOP8 packages: above 110 °C the value of  $P_{tot}$  derates linearly with 8.0 mW/K.  
For XSON8 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
$\Delta t/\Delta V$	input transition rise and fall rate	$V_{CC} = 0.8$ V to 3.6 V	0	200	ns/V

## 11. Static characteristics

**Table 8: Static characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b><math>T_{amb} = 25</math> °C</b>						
$V_{IH}$	HIGH-state input voltage	$V_{CC} = 0.8$ V	$0.70 \times V_{CC}$	-	-	V
		$V_{CC} = 0.9$ V to 1.95 V	$0.65 \times V_{CC}$	-	-	V
		$V_{CC} = 2.3$ V to 2.7 V	1.6	-	-	V
		$V_{CC} = 3.0$ V to 3.6 V	2.0	-	-	V
$V_{IL}$	LOW-state input voltage	$V_{CC} = 0.8$ V	-	-	$0.30 \times V_{CC}$	V
		$V_{CC} = 0.9$ V to 1.95 V	-	-	$0.35 \times V_{CC}$	V
		$V_{CC} = 2.3$ V to 2.7 V	-	-	0.7	V
		$V_{CC} = 3.0$ V to 3.6 V	-	-	0.9	V
$V_{OH}$	HIGH-state output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = -20$ $\mu$ A; $V_{CC} = 0.8$ V to 3.6 V	$V_{CC} - 0.1$	-	-	V
		$I_O = -1.1$ mA; $V_{CC} = 1.1$ V	$0.75 \times V_{CC}$	-	-	V
		$I_O = -1.7$ mA; $V_{CC} = 1.4$ V	1.11	-	-	V
		$I_O = -1.9$ mA; $V_{CC} = 1.65$ V	1.32	-	-	V
		$I_O = -2.3$ mA; $V_{CC} = 2.3$ V	2.05	-	-	V
		$I_O = -3.1$ mA; $V_{CC} = 2.3$ V	1.9	-	-	V
		$I_O = -2.7$ mA; $V_{CC} = 3.0$ V	2.72	-	-	V
$I_O = -4.0$ mA; $V_{CC} = 3.0$ V	2.6	-	-	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 $V_{IL}$				
		$I_O = 20 \mu\text{A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	0.1	V
		$I_O = 1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	-	-	$0.3 \times V_{CC}$	V
		$I_O = 1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	-	-	0.31	V
		$I_O = 1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$	-	-	0.31	V
		$I_O = 2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.31	V
		$I_O = 3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.44	V
		$I_O = 2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.31	V
		$I_O = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.44	V
$I_I$	input leakage current	$V_I = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	$\pm 0.1$	$\mu\text{A}$
$I_{OFF}$	power-off leakage current	$V_I$ or $V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$	-	-	$\pm 0.2$	$\mu\text{A}$
$\Delta I_{OFF}$	additional power-off leakage current	$V_I$ or $V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	$\pm 0.2$	$\mu\text{A}$
$I_{CC}$	quiescent supply current	$V_I = \text{GND or } V_{CC}; I_O = 0 \text{ A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	0.5	$\mu\text{A}$
$\Delta I_{CC}$	additional quiescent supply current	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$	-	-	40	$\mu\text{A}$
$C_I$	input capacitance	$V_{CC} = 0 \text{ V to } 3.6 \text{ V}; V_I = \text{GND or } V_{CC}$	-	0.8	-	pF
$C_O$	output capacitance	$V_O = \text{GND}; V_{CC} = 0 \text{ V}$	-	1.7	-	pF
<b><math>T_{amb} = -40 \text{ }^\circ\text{C to } +85 \text{ }^\circ\text{C}</math></b>						
$V_{IH}$	HIGH-state input voltage	$V_{CC} = 0.8 \text{ V}$	$0.70 \times V_{CC}$	-	-	V
		$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$	$0.65 \times V_{CC}$	-	-	V
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.6	-	-	V
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	2.0	-	-	V
$V_{IL}$	LOW-state input voltage	$V_{CC} = 0.8 \text{ V}$	-	-	$0.30 \times V_{CC}$	V
		$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$	-	-	$0.35 \times V_{CC}$	V
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	-	-	0.7	V
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	-	-	0.9	V
$V_{OH}$	HIGH-state output voltage	$V_I = V_{IH}$ 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
		$I_O = -4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.55	-	-	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 <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>I</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
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>IH</sub>	HIGH-state input voltage	V <sub>CC</sub> = 0.8 V	0.75 × V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	0.70 × V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	-	-	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	-	-	V
V <sub>IL</sub>	LOW-state input voltage	V <sub>CC</sub> = 0.8 V	-	-	0.25 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	0.30 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-	0.9	V
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		



**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 <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>I</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

[1] One input at V<sub>CC</sub> - 0.6 V, other input at V<sub>CC</sub> or GND.

## 12. Dynamic characteristics

**Table 9: Dynamic characteristics**Voltages are referenced to GND (ground = 0 V; for test circuit see [Figure 5](#))

Symbol	Parameter	Conditions	Min	Typ [1]	Max	Unit
<b>T<sub>amb</sub> = 25 °C; C<sub>L</sub> = 5 pF</b>						
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	see <a href="#">Figure 4</a>				
		V <sub>CC</sub> = 0.8 V	-	17.3	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.1	5.2	9.7	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.2	3.7	5.9	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.1	3.0	4.8	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.1	2.4	3.6	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.1	2.1	3.1	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B to 2Y	see <a href="#">Figure 4</a>				
		V <sub>CC</sub> = 0.8 V	-	21.5	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.7	6.0	12.7	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.7	4.2	7.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.4	3.3	5.8	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.2	2.6	4.1	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.1	2.3	3.5	ns

**Table 9: Dynamic characteristics ...continued**Voltages are referenced to GND (ground = 0 V; for test circuit see [Figure 5](#))

Symbol	Parameter	Conditions	Min	Typ <sup>[1]</sup>	Max	Unit
<b>T<sub>amb</sub> = 25 °C; C<sub>L</sub> = 10 pF</b>						
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	see <a href="#">Figure 4</a>				
		V <sub>CC</sub> = 0.8 V	-	20.8	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.2	6.1	11.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.4	4.3	7.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.4	3.6	5.7	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.4	2.9	4.2	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B to 2Y	see <a href="#">Figure 4</a>				
		V <sub>CC</sub> = 0.8 V	-	25.0	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.8	6.9	14.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.9	4.8	8.5	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.9	3.9	6.6	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.5	3.1	4.7	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	see <a href="#">Figure 4</a>				
		V <sub>CC</sub> = 0.8 V	-	24.3	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.3	6.9	13.0	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.7	4.9	8.0	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.5	4.1	6.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7	3.4	5.0	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B to 2Y	see <a href="#">Figure 4</a>				
		V <sub>CC</sub> = 0.8 V	-	28.5	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.1	7.7	16.0	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.2	5.4	9.4	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.0	4.4	7.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.8	3.6	5.5	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	see <a href="#">Figure 4</a>				
		V <sub>CC</sub> = 0.8 V	-	34.7	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.4	9.2	17.7	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.5	6.5	10.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.5	5.4	8.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.6	4.5	6.4	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	see <a href="#">Figure 4</a>				
		V <sub>CC</sub> = 0.8 V	-	34.7	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.4	9.2	17.7	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.5	6.5	10.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.5	5.4	8.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.6	4.5	6.4	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	see <a href="#">Figure 4</a>				
		V <sub>CC</sub> = 0.8 V	-	34.7	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.4	9.2	17.7	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.5	6.5	10.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.5	5.4	8.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.6	4.5	6.4	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	see <a href="#">Figure 4</a>				
		V <sub>CC</sub> = 0.8 V	-	34.7	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.4	9.2	17.7	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.5	6.5	10.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.5	5.4	8.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.6	4.5	6.4	ns

**Table 9: Dynamic characteristics ...continued**Voltages are referenced to GND (ground = 0 V; for test circuit see [Figure 5](#))

Symbol	Parameter	Conditions	Min	Typ [1]	Max	Unit
$t_{PHL}$ , $t_{PLH}$	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B to 2Y	see <a href="#">Figure 4</a>				
		$V_{CC} = 0.8 \text{ V}$	-	38.9	-	ns
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$	2.6	10.0	20.5	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$	2.6	6.9	11.9	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	2.7	5.7	9.5	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	2.5	4.7	6.9	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	2.4	4.4	6.1	ns
<b><math>T_{amb} = 25 \text{ }^\circ\text{C}</math></b>						
$C_{PD}$	power dissipation capacitance	$f = 1 \text{ MHz}$				
			[2] [3]			
		$V_{CC} = 0.8 \text{ V}$	-	2.7	-	pF
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$	-	2.9	-	pF
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$	-	3.0	-	pF
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	-	3.1	-	pF
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	-	3.5	-	pF
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	-	4.1	-	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  $\mu\text{W}$ ). $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$  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.[3] The condition is  $V_I = \text{GND to } V_{CC}$ .

**Table 10: Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V; for test circuit see [Figure 5](#))

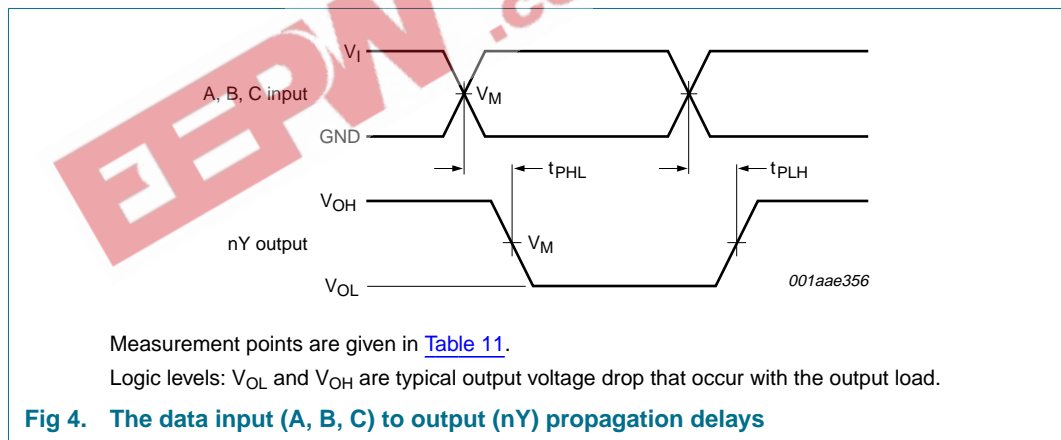
Symbol	Parameter	Conditions	-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Max	Min	Max	
<b>C<sub>L</sub> = 5 pF</b>							
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	see <a href="#">Figure 4</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	0.9	12.8	0.9	14.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.0	7.8	1.0	8.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	0.9	6.2	0.9	6.9	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.0	4.1	1.0	4.5	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B to 2Y	see <a href="#">Figure 4</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.4	12.8	1.4	14.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.4	7.8	1.4	8.7	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.2	6.5	1.2	7.2	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.0	4.7	1.0	5.2	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B to 2Y	see <a href="#">Figure 4</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.7	14.6	1.7	16.1	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.5	9.1	1.5	10.1	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.7	7.2	1.7	8.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.3	5.4	1.3	5.9	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	see <a href="#">Figure 4</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.2	16.2	1.2	17.9	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.4	9.7	1.4	10.8	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.4	7.6	1.4	8.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	5.4	1.6	6.0	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B to 2Y	see <a href="#">Figure 4</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.9	16.3	1.9	18.0	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.4	10.3	2.4	11.4	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.8	8.2	1.8	9.1	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	6.0	1.6	6.7	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	see <a href="#">Figure 4</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.2	14.6	1.2	16.1	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.2	8.7	1.2	9.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.3	6.8	1.3	7.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.2	4.8	1.2	5.4	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B to 2Y	see <a href="#">Figure 4</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.3	4.1	1.3	4.6	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.3	4.6	1.3	5.1	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.7	7.2	1.7	8.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.3	5.4	1.3	5.9	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	see <a href="#">Figure 4</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.2	14.6	1.2	16.1	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.2	8.7	1.2	9.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.3	6.8	1.3	7.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.2	4.8	1.2	5.4	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B to 2Y	see <a href="#">Figure 4</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.7	14.6	1.7	16.1	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.5	9.1	1.5	10.1	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.7	7.2	1.7	8.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.3	5.4	1.3	5.9	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	see <a href="#">Figure 4</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.2	16.2	1.2	17.9	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.4	9.7	1.4	10.8	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.4	7.6	1.4	8.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	5.4	1.6	6.0	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B to 2Y	see <a href="#">Figure 4</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.9	16.3	1.9	18.0	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.4	10.3	2.4	11.4	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.8	8.2	1.8	9.1	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	6.0	1.6	6.7	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	see <a href="#">Figure 4</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.2	14.6	1.2	16.1	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.2	8.7	1.2	9.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.3	6.8	1.3	7.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.2	4.8	1.2	5.4	ns
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B to 2Y	see <a href="#">Figure 4</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.7	14.6	1.7	16.1	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.5	9.1	1.5	10.1	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.7	7.2	1.7	8.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.3	5.4	1.3	5.9	ns

**Table 10: Dynamic characteristics ...continued**

Voltages are referenced to GND (ground = 0 V; for test circuit see [Figure 5](#))

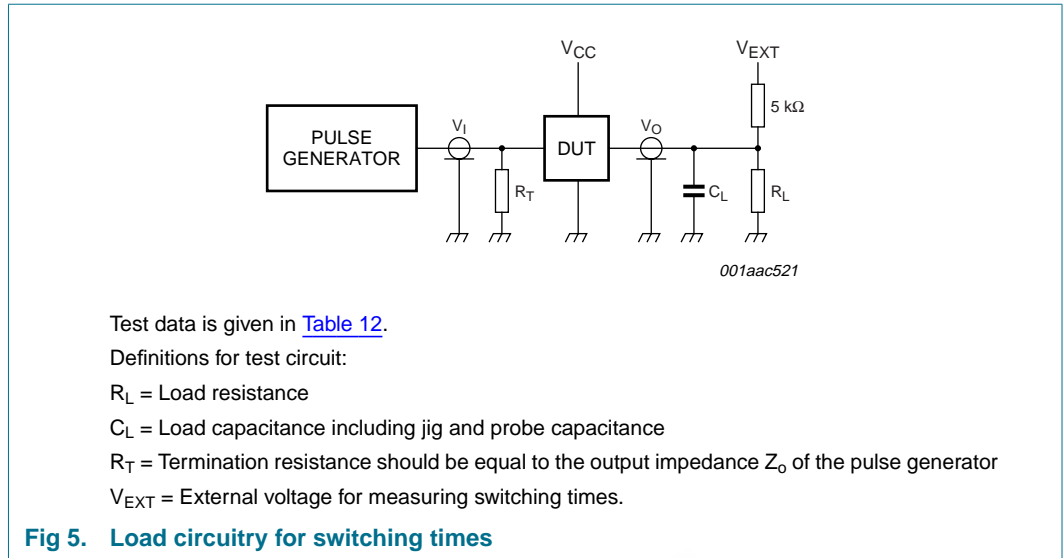
Symbol	Parameter	Conditions	-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Max	Min	Max	
<b><math>C_L = 30</math> pF</b>							
$t_{PHL}, t_{PLH}$	HIGH-to-LOW and LOW-to-HIGH propagation delay A, C to 1Y	see <a href="#">Figure 4</a>					
		$V_{CC} = 1.1$ V to 1.3 V	2.3	20.9	2.3	23.0	ns
		$V_{CC} = 1.4$ V to 1.6 V	2.5	12.2	2.5	13.5	ns
		$V_{CC} = 1.65$ V to 1.95 V	2.4	9.4	2.4	10.4	ns
		$V_{CC} = 2.3$ V to 2.7 V	2.4	7.0	2.4	7.7	ns
		$V_{CC} = 3.0$ V to 3.6 V	2.3	6.6	2.3	7.3	ns
$t_{PHL}, t_{PLH}$	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B to 2Y	see <a href="#">Figure 4</a>					
		$V_{CC} = 1.1$ V to 1.3 V	2.6	21.5	2.6	23.7	ns
		$V_{CC} = 1.4$ V to 1.6 V	2.6	13.2	2.6	14.5	ns
		$V_{CC} = 1.65$ V to 1.95 V	2.7	10.5	2.7	11.6	ns
		$V_{CC} = 2.3$ V to 2.7 V	2.5	7.6	2.5	8.4	ns
		$V_{CC} = 3.0$ V to 3.6 V	2.4	7.1	2.4	7.9	ns

### 13. Waveforms



**Table 11: Measurement points**

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



**Fig 5. Load circuitry for switching times**

**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

VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm

SOT765-1

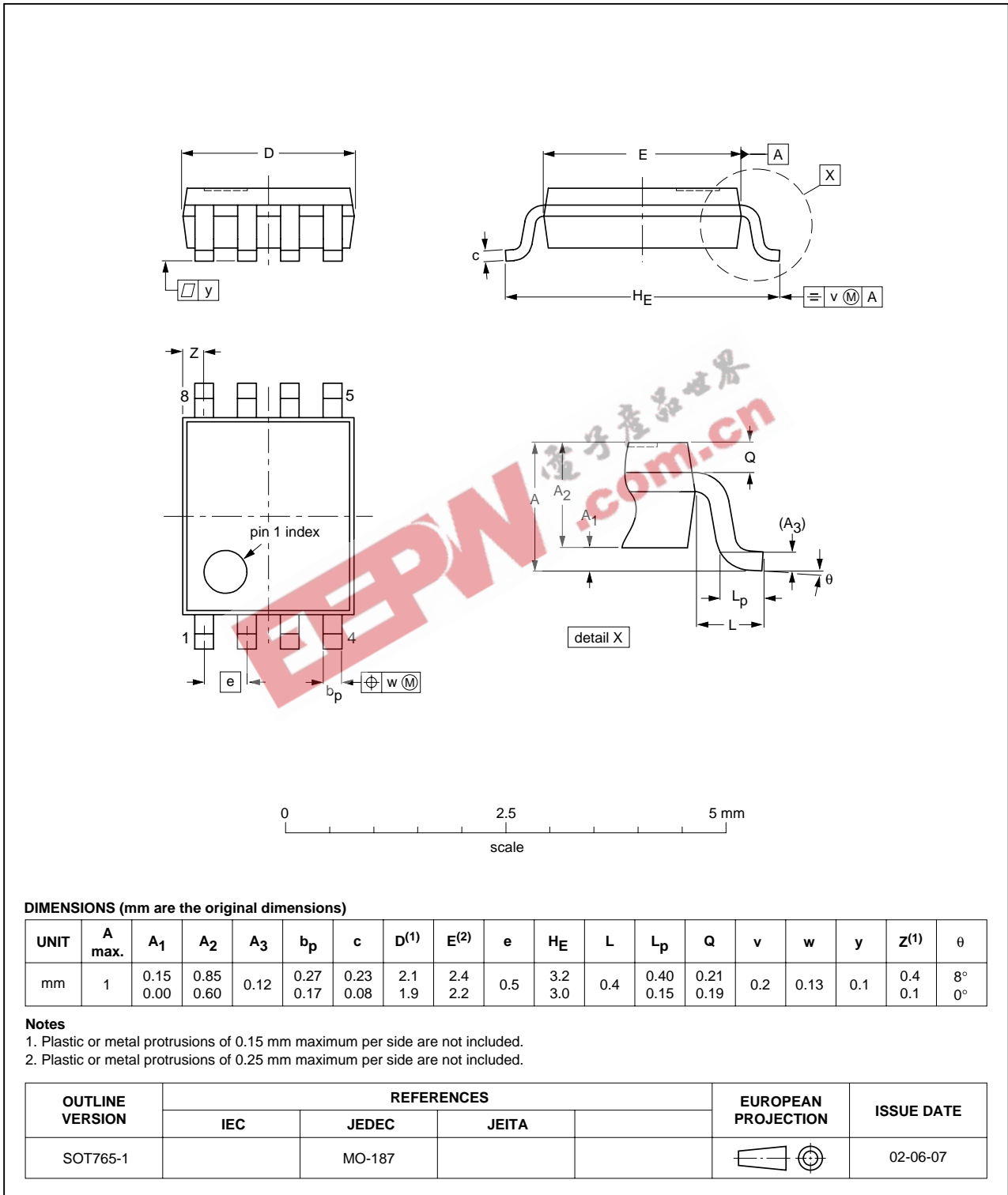


Fig 6. Package outline SOT765-1 (VSSOP8)

XSON8: plastic extremely thin small outline package; no leads; 8 terminals; body 1 x 1.95 x 0.5 mm

SOT833-1

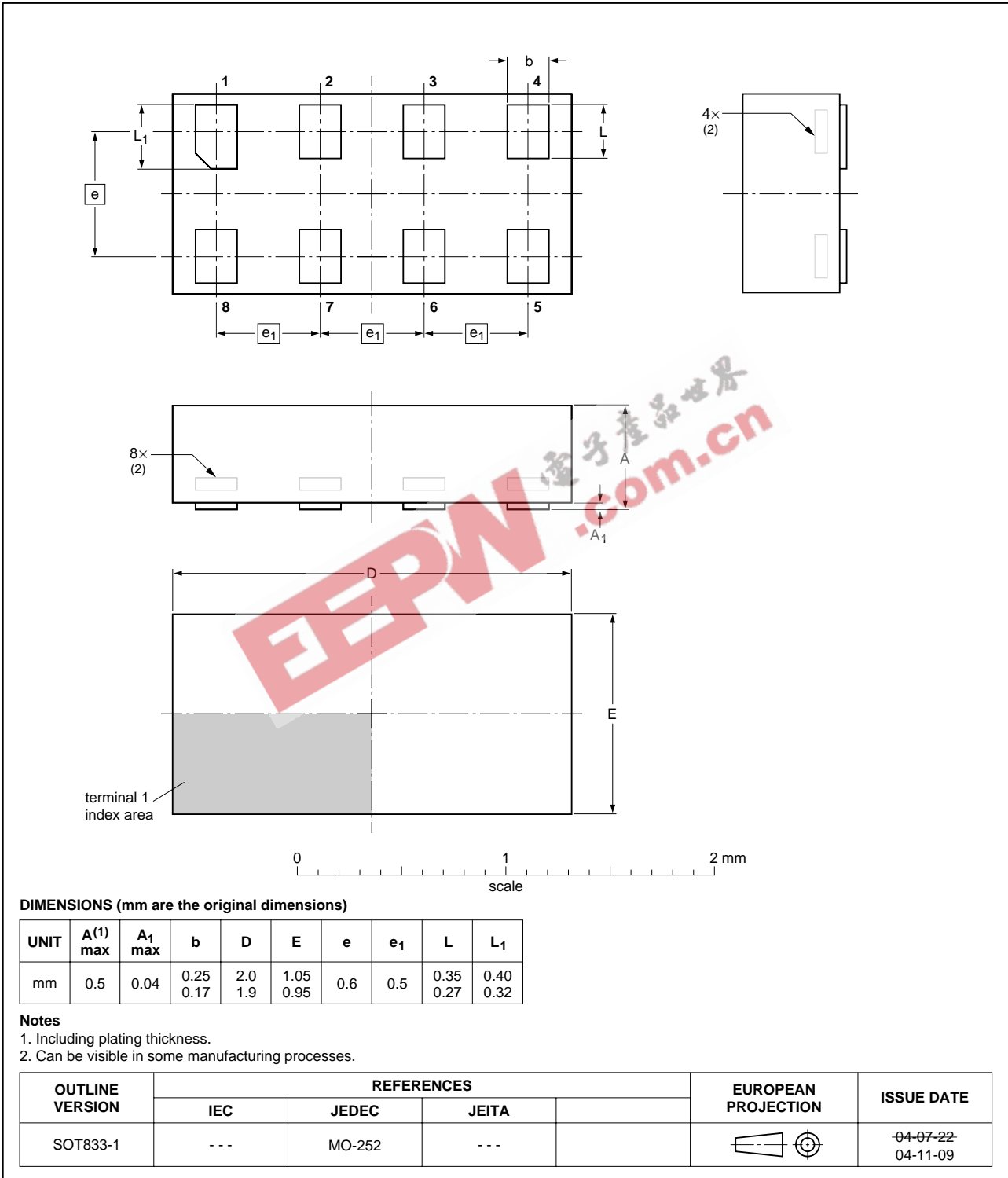


Fig 7. Package outline SOT833-1 (XSON8)



## 15. Abbreviations

**Table 13: Abbreviations**

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

## 16. Revision history

**Table 14: Revision history**

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
74AUP1G885_1	<tbd>	Preliminary data sheet	-	-	-

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## 17. Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2] [3]</sup>	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.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[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.

## 18. Definitions

**Short-form specification** — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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## 22. Contents

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

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