

# 74AUP1G57

Low-power configurable multiple function gate

Rev. 01. — 16 January 2006

Preliminary data sheet

## 1. General description

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The 74AUP1G57 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 74AUP1G57 provides configurable multiple functions. The output state is determined by eight patterns of 3-bit input. The user can choose the logic functions AND, OR, NAND, NOR, XNOR, inverter and buffer. All inputs can be connected to  $V_{CC}$  or GND.

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.

The inputs switch at different points for positive and negative-going signals. The difference between the positive voltage  $V_{T+}$  and the negative voltage  $V_{T-}$  is defined as the input hysteresis voltage  $V_H$ .

## 2. Features

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- Wide supply voltage range from 0.8 V to 3.6 V
- High noise immunity
- ESD protection:
  - ◆ HBM JESD22-A114-C Class 3A. Exceeds 5000 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, B and C to Y	$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 0.8\text{ V}$	-	22.6	-	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.1\text{ V to }1.3\text{ V}$	2.8	6.5	12.6	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.4\text{ V to }1.6\text{ V}$	2.2	4.6	7.6	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.65\text{ V to }1.95\text{ V}$	2.1	3.9	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	4.5	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.8	2.8	3.9	ns	
$C_I$	input capacitance		-	1.1	-	pF	
$C_{PD}$	power dissipation capacitance	$V_{CC} = 1.8\text{ V}$ ; $f = 1\text{ MHz}$	[1][2]	-	3.4	-	pF
		$V_{CC} = 3.3\text{ V}$ ; $f = 1\text{ MHz}$	[1][2]	-	4.5	-	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**

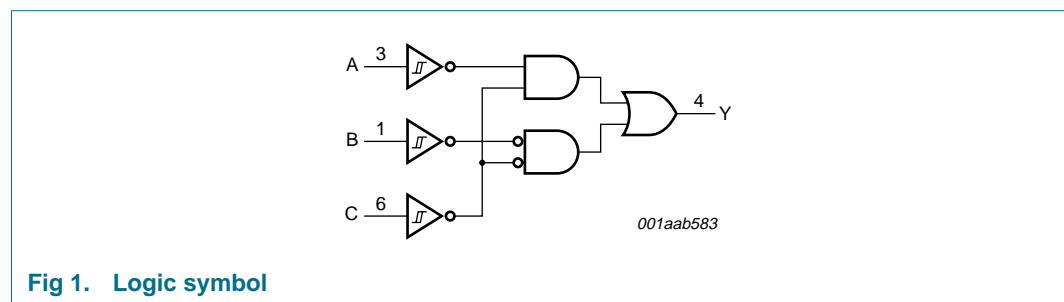
Type number	Package			Version
	Temperature range	Name	Description	
74AUP1G57GW	-40 °C to +125 °C	SC-88	plastic surface mounted package; 6 leads	SOT363
74AUP1G57GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body $1 \times 1.45 \times 0.5\text{ mm}$	SOT886
74AUP1G57GF	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body $1 \times 1 \times 0.5\text{ mm}$	SOT891

## 5. Marking

Table 3: Marking

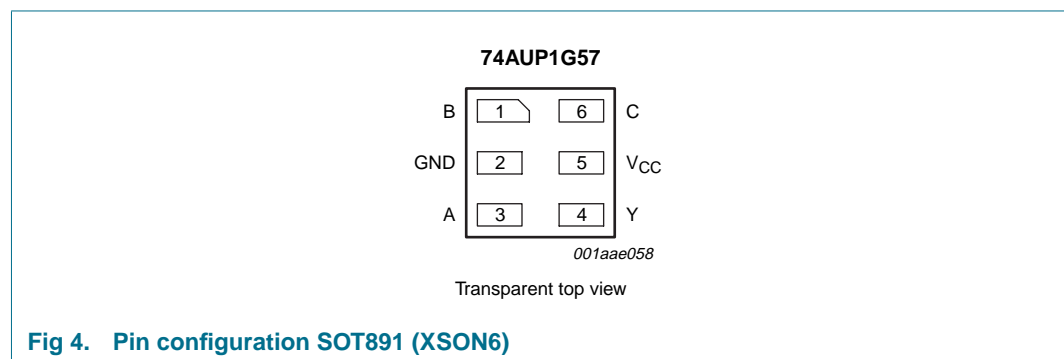
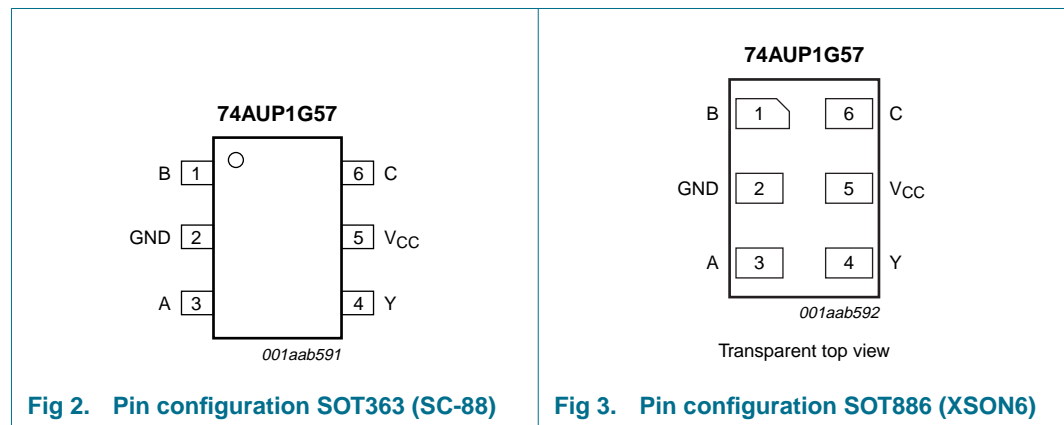
Type number	Marking code
74AUP1G57GW	aC
74AUP1G57GM	aC
74AUP1G57GF	aC

## 6. Functional diagram



## 7. Pinning information

### 7.1 Pinning



## 7.2 Pin description

Table 4: Pin description

Symbol	Pin	Description
B	1	data input B
GND	2	ground (0 V)
A	3	data input A
Y	4	data output Y
V <sub>CC</sub>	5	supply voltage
C	6	data input C

## 8. Functional description

### 8.1 Function table

Table 5: Function table [\[1\]](#)

Input			Output
C	B	A	Y
L	L	L	H
L	L	H	L
L	H	L	H
L	H	H	L
H	L	L	L
H	L	H	L
H	H	L	H
H	H	H	H

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

### 8.2 Logic configurations

Table 6: Function selection table

Logic function	Figure
2-input AND	see <a href="#">Figure 5</a>
2-input AND with both inputs inverted	see <a href="#">Figure 8</a>
2-input NAND with inverted input	see <a href="#">Figure 6</a> and <a href="#">7</a>
2-input OR with inverted input	see <a href="#">Figure 6</a> and <a href="#">7</a>
2-input NOR	see <a href="#">Figure 8</a>
2-input NOR with both inputs inverted	see <a href="#">Figure 5</a>
2-input XNOR	see <a href="#">Figure 9</a>
Inverter	see <a href="#">Figure 10</a>
Buffer	see <a href="#">Figure 11</a>

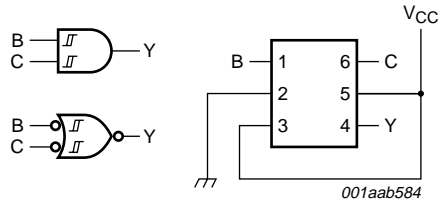


Fig 5. 2-input AND gate or 2-input NOR gate with both inputs inverted

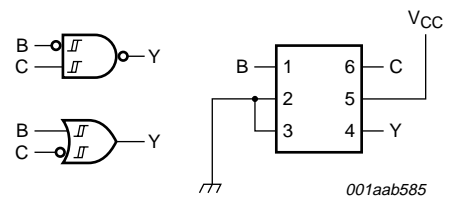


Fig 6. 2-input NAND gate with input B inverted or 2-input OR gate with inverted C input

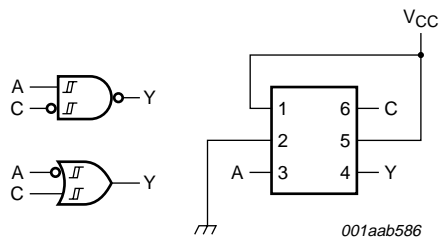


Fig 7. 2-input NAND gate with input C inverted or 2-input OR gate with inverted A input

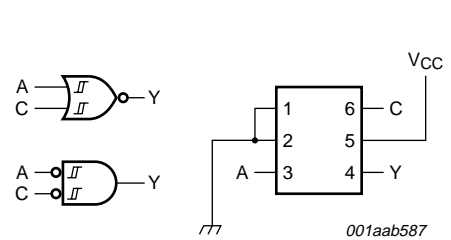


Fig 8. 2-input NOR gate or 2-input AND gate with both inputs inverted

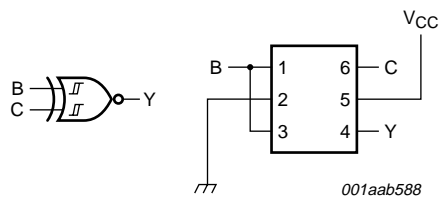


Fig 9. 2-input XNOR gate

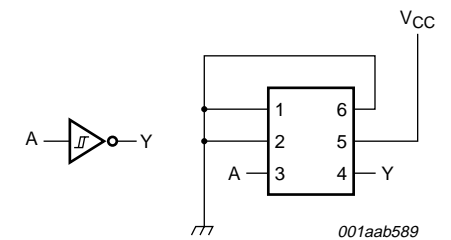


Fig 10. Inverter

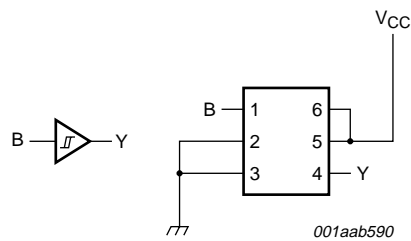


Fig 11. Buffer

## 9. Limiting values

**Table 7: 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	$V_O < 0$ V	-	-50	mA
$V_O$	output voltage	active mode and 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 minimum input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For SC-88 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 8: 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 9: 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>I</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	-	-	±0.1	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	-	1.1	-	pF
C <sub>O</sub>	output capacitance	V <sub>O</sub> = GND; V <sub>CC</sub> = 0 V	-	1.7	-	pF
<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

**Table 9: 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>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>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



**Table 9: Static characteristics ...continued**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$\Delta I_{OFF}$	additional power-off leakage current	$V_I$ or $V_O = 0$ V to 3.6 V; $V_{CC} = 0$ V to 0.2 V	-	-	$\pm 0.75$	$\mu$ 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	-	-	1.4	$\mu$ A
$\Delta I_{CC}$	additional quiescent supply current	$V_I = V_{CC} - 0.6$ V; $I_O = 0$ A; $V_{CC} = 3.3$ V	-	-	75	$\mu$ A

## 12. Dynamic characteristics

**Table 10: Dynamic characteristics**Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 13](#)

Symbol	Parameter	Conditions	Min	Typ <sup>[1]</sup>	Max	Unit
<b><math>T_{amb} = 25</math> °C; <math>C_L = 5</math> pF</b>						
$t_{PHL}$ , $t_{PLH}$	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B and C to Y	see <a href="#">Figure 12</a>				
		$V_{CC} = 0.8$ V	-	22.6	-	ns
		$V_{CC} = 1.1$ V to 1.3 V	2.8	6.5	12.6	ns
		$V_{CC} = 1.4$ V to 1.6 V	2.2	4.6	7.6	ns
		$V_{CC} = 1.65$ V to 1.95 V	2.1	3.9	6.2	ns
		$V_{CC} = 2.3$ V to 2.7 V	2.0	3.1	4.5	ns
	$V_{CC} = 3.0$ V to 3.6 V	1.8	2.8	3.9	ns	
<b><math>T_{amb} = 25</math> °C; <math>C_L = 10</math> pF</b>						
$t_{PHL}$ , $t_{PLH}$	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B and C to Y	see <a href="#">Figure 12</a>				
		$V_{CC} = 0.8$ V	-	26.1	-	ns
		$V_{CC} = 1.1$ V to 1.3 V	3.2	7.3	14.4	ns
		$V_{CC} = 1.4$ V to 1.6 V	2.6	5.2	8.7	ns
		$V_{CC} = 1.65$ V to 1.95 V	2.5	4.5	7.0	ns
		$V_{CC} = 2.3$ V to 2.7 V	2.4	3.7	5.2	ns
	$V_{CC} = 3.0$ V to 3.6 V	2.3	3.4	4.6	ns	
<b><math>T_{amb} = 25</math> °C; <math>C_L = 15</math> pF</b>						
$t_{PHL}$ , $t_{PLH}$	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B and C to Y	see <a href="#">Figure 12</a>				
		$V_{CC} = 0.8$ V	-	31.6	-	ns
		$V_{CC} = 1.1$ V to 1.3 V	3.4	8.0	15.7	ns
		$V_{CC} = 1.4$ V to 1.6 V	2.8	5.7	9.4	ns
		$V_{CC} = 1.65$ V to 1.95 V	2.6	4.9	7.7	ns
		$V_{CC} = 2.3$ V to 2.7 V	2.6	4.1	5.7	ns
	$V_{CC} = 3.0$ V to 3.6 V	2.5	3.8	5.0	ns	

**Table 10: Dynamic characteristics ...continued**Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 13](#)

Symbol	Parameter	Conditions	Min	Typ [1]	Max	Unit
<b>T<sub>amb</sub> = 25 °C; C<sub>L</sub> = 30 pF</b>						
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B and C to Y	see <a href="#">Figure 12</a>				
		V <sub>CC</sub> = 0.8 V	-	37.8	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.6	10.4	20.9	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.6	7.4	12.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.5	6.2	9.9	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	3.4	5.2	7.4	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	3.2	4.9	6.6	ns
<b>T<sub>amb</sub> = 25 °C</b>						
C <sub>PD</sub>	power dissipation capacitance	f = 1 MHz		[2] [3]		
		V <sub>CC</sub> = 0.8 V	-	2.9	-	pF
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	3.0	-	pF
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	3.2	-	pF
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	3.4	-	pF
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	3.9	-	pF
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	4.5	-	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 11: Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 13](#)

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, B and C to Y	see <a href="#">Figure 12</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.5	13.0	2.5	13.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.5	8.2	2.5	8.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.0	6.8	2.0	7.2	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.8	5.1	1.8	5.3	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.5	4.1	1.5	4.3	ns
<b>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, B and C to Y	see <a href="#">Figure 12</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.8	14.9	2.8	15.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.8	9.3	2.8	9.8	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.2	7.8	2.2	8.2	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.1	5.9	2.1	6.2	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.9	4.9	1.9	5.1	ns
<b>C<sub>L</sub> = 15 pF</b>							
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B and C to Y	see <a href="#">Figure 12</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.1	16.7	3.1	17.0	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.1	10.4	3.1	10.9	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.5	8.7	2.5	9.2	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.4	6.5	2.4	6.9	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.2	5.5	2.2	5.7	ns
<b>C<sub>L</sub> = 30 pF</b>							
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B and C to Y	see <a href="#">Figure 12</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.9	21.8	3.9	22.3	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.8	13.4	3.8	14.1	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.1	11.1	3.1	11.8	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	3.1	8.3	3.1	8.8	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.8	7.0	2.8	7.4	ns

13. Waveforms

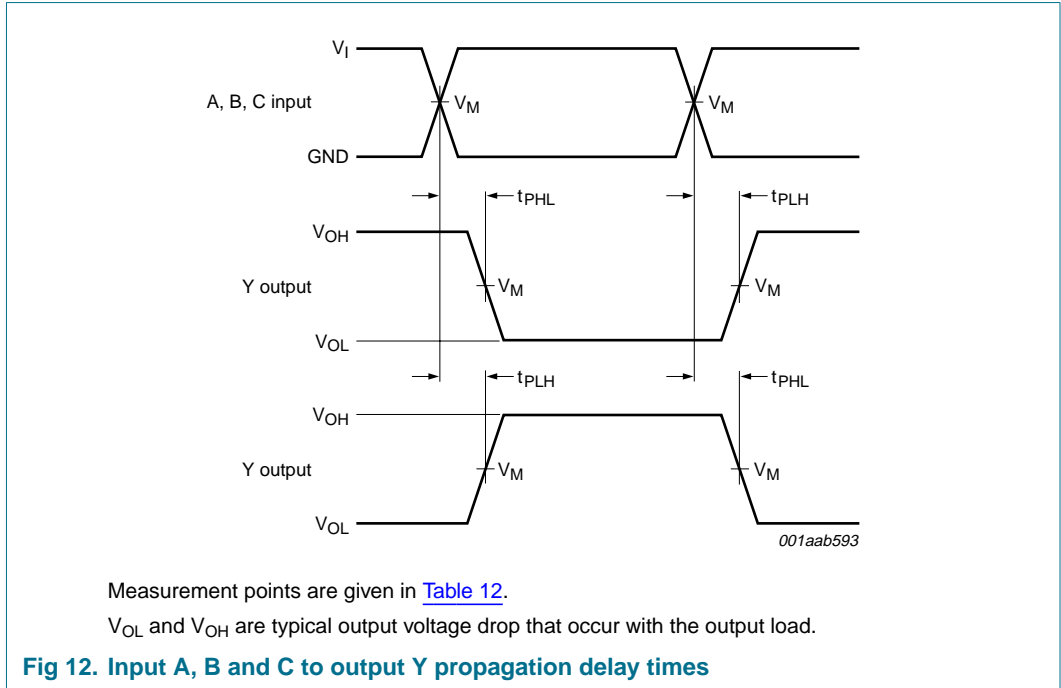


Table 12: Measurement points

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

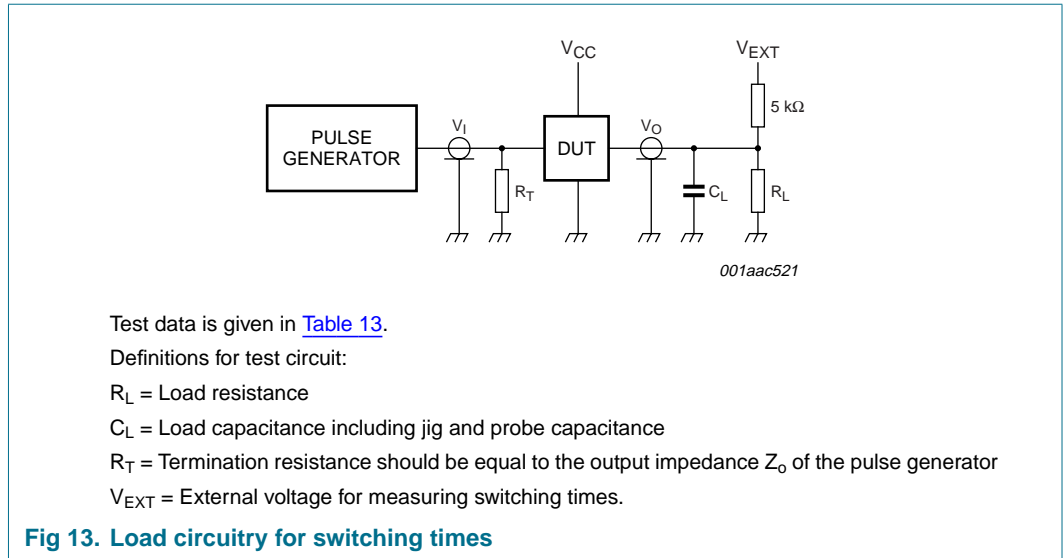


Fig 13. Load circuitry for switching times

Table 13: 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. Transfer characteristics

Table 14: Transfer characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$T_{amb} = 25 \text{ }^\circ\text{C}$						
$V_{T+}$	positive-going threshold voltage	see <a href="#">Figure 14</a> and <a href="#">Figure 15</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
		$V_{CC} = 3.0 \text{ V}$	1.88	-	2.29	V

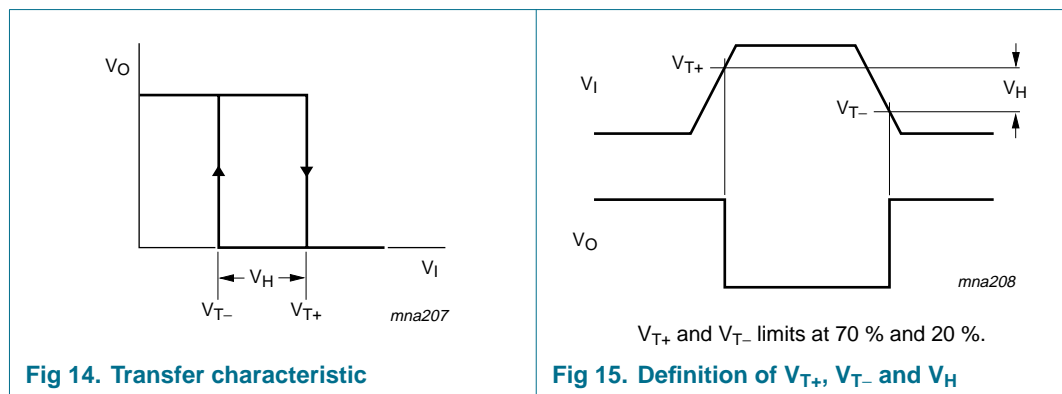
**Table 14: Transfer characteristics ...continued**  
 Voltages are referenced to GND (ground = 0 V).

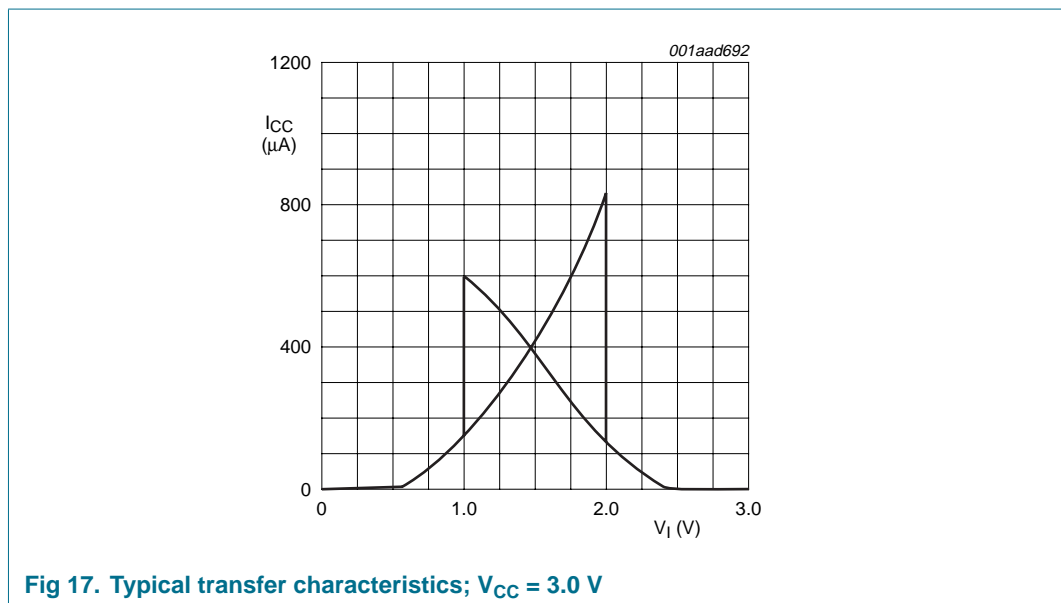
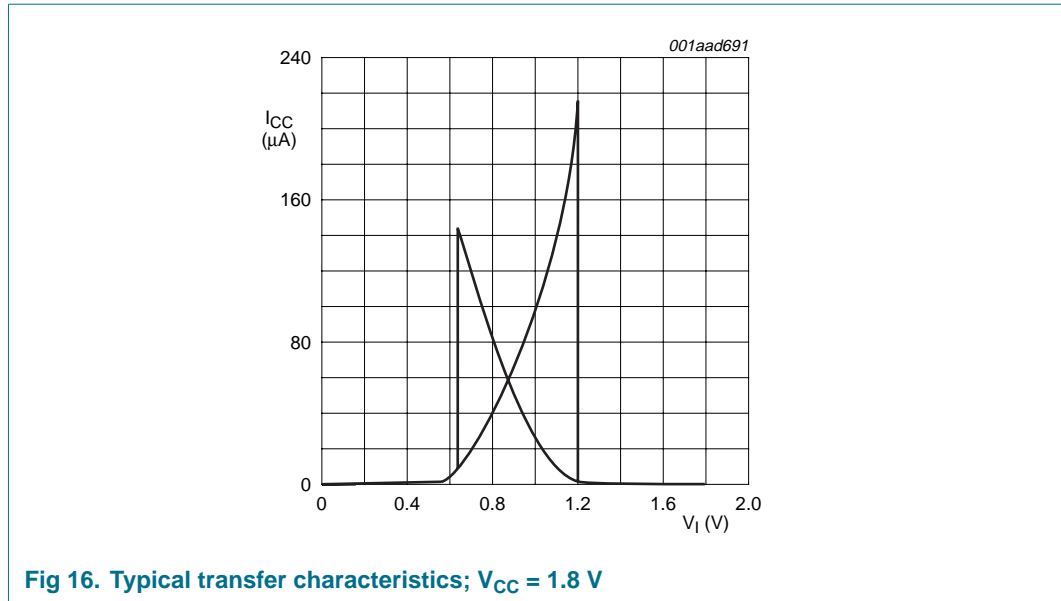
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{T-}$	negative-going threshold voltage	see <a href="#">Figure 14</a> and <a href="#">Figure 15</a>				
		$V_{CC} = 0.8\text{ V}$	0.10	-	0.60	V
		$V_{CC} = 1.1\text{ V}$	0.26	-	0.65	V
		$V_{CC} = 1.4\text{ V}$	0.39	-	0.75	V
		$V_{CC} = 1.65\text{ V}$	0.47	-	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
$V_H$	hysteresis voltage ( $V_{T+} - V_{T-}$ )	see <a href="#">Figure 14</a> , <a href="#">Figure 15</a> , <a href="#">Figure 16</a> and <a href="#">Figure 17</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
<b><math>T_{amb} = -40\text{ °C to }+85\text{ °C}</math></b>						
$V_{T+}$	positive-going threshold voltage	see <a href="#">Figure 14</a> and <a href="#">Figure 15</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
		$V_{CC} = 3.0\text{ V}$	1.88	-	2.29	V
$V_{T-}$	negative-going threshold voltage	see <a href="#">Figure 14</a> and <a href="#">Figure 15</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
$V_H$	hysteresis voltage ( $V_{T+} - V_{T-}$ )	see <a href="#">Figure 14</a> , <a href="#">Figure 15</a> , <a href="#">Figure 16</a> and <a href="#">Figure 17</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

**Table 14: Transfer characteristics ...continued**  
 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>T+</sub>	positive-going threshold voltage	see <a href="#">Figure 14</a> and <a href="#">Figure 15</a>				
		V <sub>CC</sub> = 0.8 V	0.30	-	0.62	V
		V <sub>CC</sub> = 1.1 V	0.53	-	0.92	V
		V <sub>CC</sub> = 1.4 V	0.74	-	1.13	V
		V <sub>CC</sub> = 1.65 V	0.91	-	1.31	V
		V <sub>CC</sub> = 2.3 V	1.37	-	1.80	V
		V <sub>CC</sub> = 3.0 V	1.88	-	2.32	V
V <sub>T-</sub>	negative-going threshold voltage	see <a href="#">Figure 14</a> and <a href="#">Figure 15</a>				
		V <sub>CC</sub> = 0.8 V	0.10	-	0.60	V
		V <sub>CC</sub> = 1.1 V	0.26	-	0.65	V
		V <sub>CC</sub> = 1.4 V	0.39	-	0.75	V
		V <sub>CC</sub> = 1.65 V	0.47	-	0.84	V
		V <sub>CC</sub> = 2.3 V	0.69	-	1.04	V
		V <sub>CC</sub> = 3.0 V	0.88	-	1.24	V
V <sub>H</sub>	hysteresis voltage (V <sub>T+</sub> - V <sub>T-</sub> )	see <a href="#">Figure 14</a> , <a href="#">Figure 15</a> , <a href="#">Figure 16</a> and <a href="#">Figure 17</a>				
		V <sub>CC</sub> = 0.8 V	0.07	-	0.50	V
		V <sub>CC</sub> = 1.1 V	0.08	-	0.46	V
		V <sub>CC</sub> = 1.4 V	0.18	-	0.56	V
		V <sub>CC</sub> = 1.65 V	0.27	-	0.66	V
		V <sub>CC</sub> = 2.3 V	0.53	-	0.92	V
		V <sub>CC</sub> = 3.0 V	0.79	-	1.31	V

## 15. Waveforms transfer characteristics







16. Package outline

Plastic surface mounted package; 6 leads

SOT363

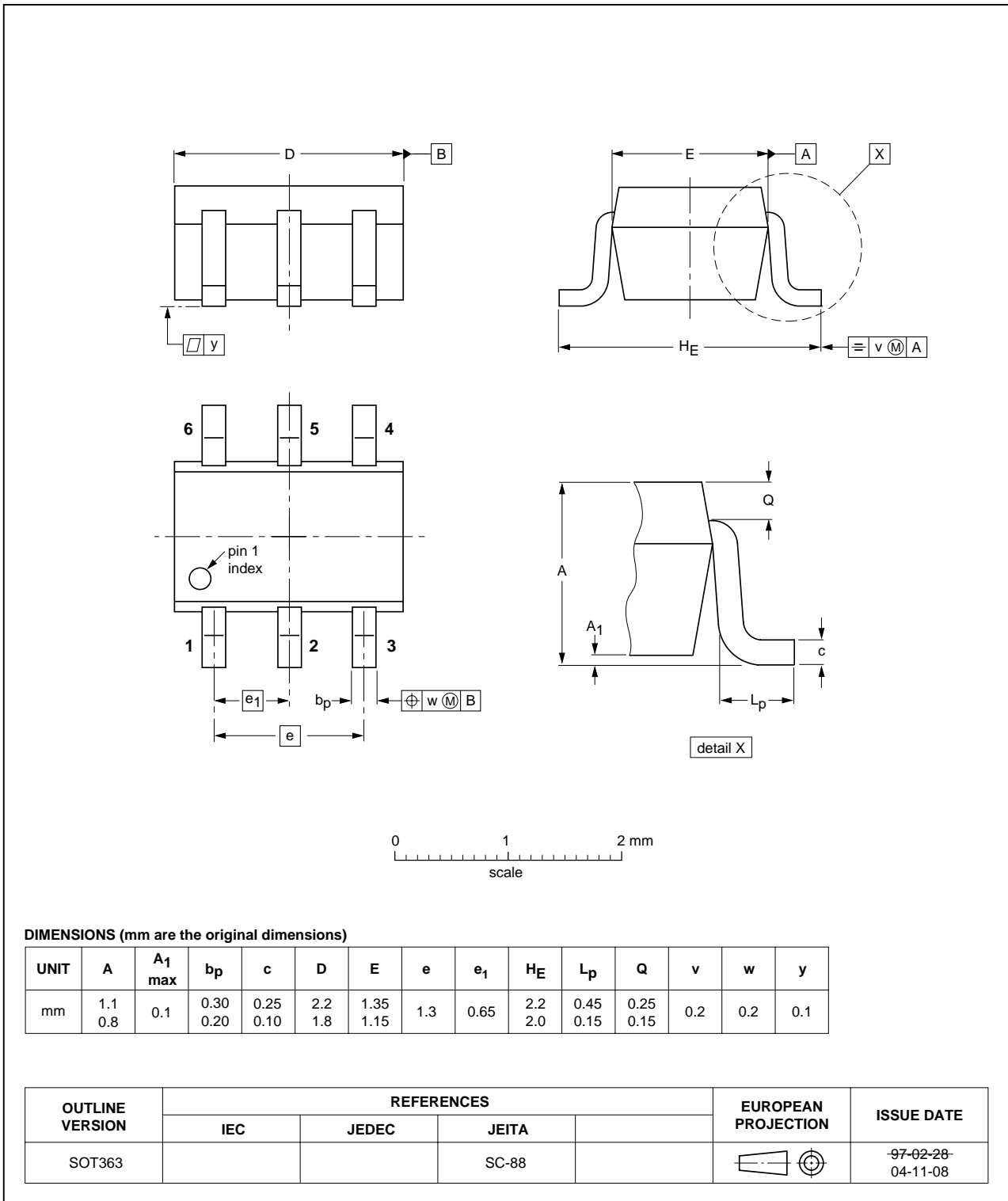


Fig 18. Package outline SOT363 (SC-88)

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

SOT886



Fig 19. Package outline SOT886 (XSON6)

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

SOT891

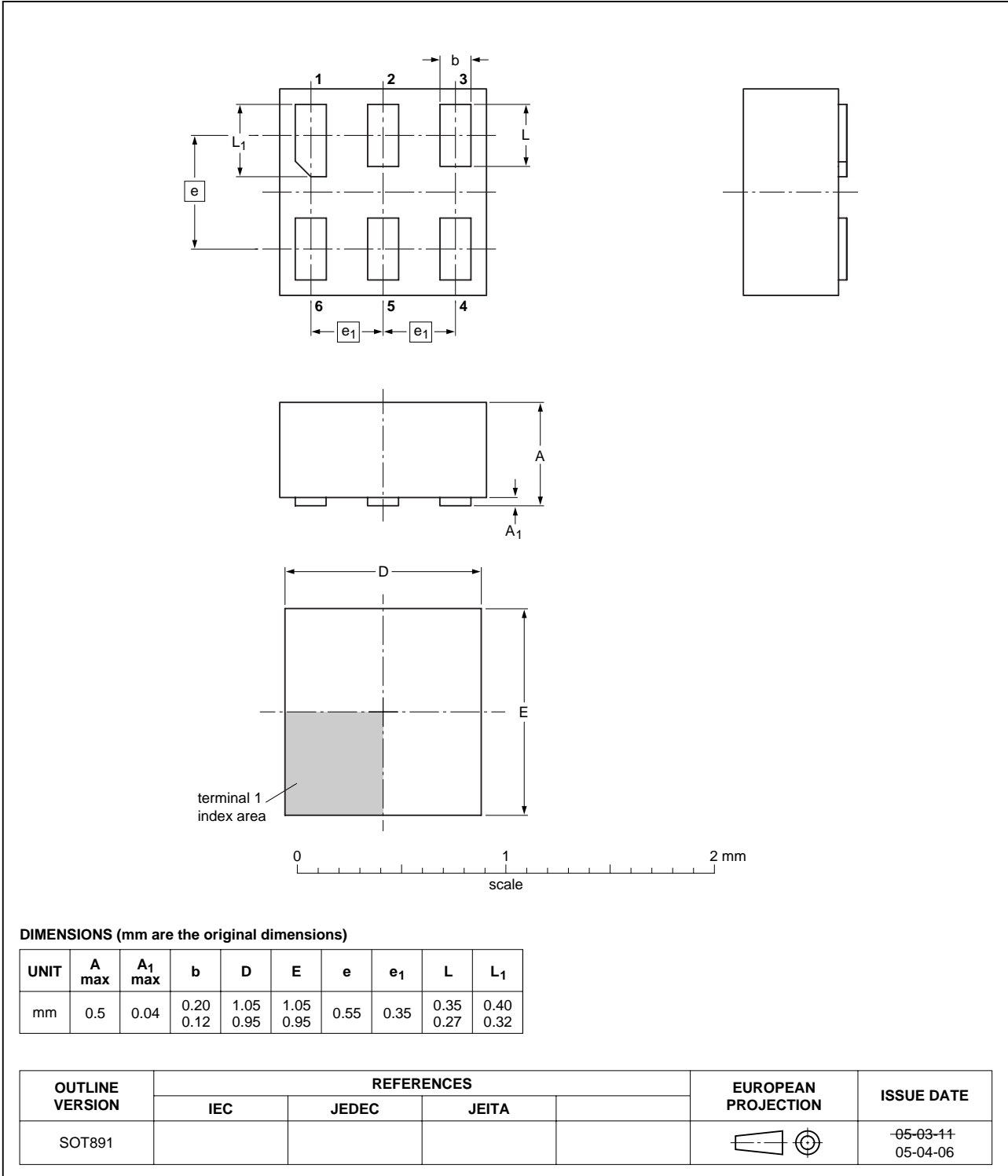


Fig 20. Package outline SOT891 (XSON6)

## 17. Abbreviations

Table 15: 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

## 18. Revision history

Table 16: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
74AUP1G57_1	<tbd>	Preliminary data sheet	-	-	-

## 19. 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.
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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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**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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## 24. Contents

1	General description . . . . .	1
2	Features . . . . .	1
3	Quick reference data . . . . .	2
4	Ordering information . . . . .	2
5	Marking . . . . .	3
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
8.2	Logic configurations . . . . .	4
9	Limiting values . . . . .	6
10	Recommended operating conditions . . . . .	6
11	Static characteristics . . . . .	7
12	Dynamic characteristics . . . . .	9
13	Waveforms . . . . .	12
14	Transfer characteristics . . . . .	13
15	Waveforms transfer characteristics . . . . .	15
16	Package outline . . . . .	17
17	Abbreviations . . . . .	20
18	Revision history . . . . .	20
19	Data sheet status . . . . .	21
20	Definitions . . . . .	21
21	Disclaimers . . . . .	21
22	Trademarks . . . . .	21
23	Contact information . . . . .	21



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