

74AUP1G57

Low-power configurable multiple function gate

Rev. 01. — 16 January 2006

Preliminary data sheet

1. General description

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

- 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 $+125 \text{ }^\circ\text{C}$

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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}	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 μW).

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

[2] The condition is $V_I = GND$ to V_{CC} .

4. Ordering information

Table 2: Ordering information

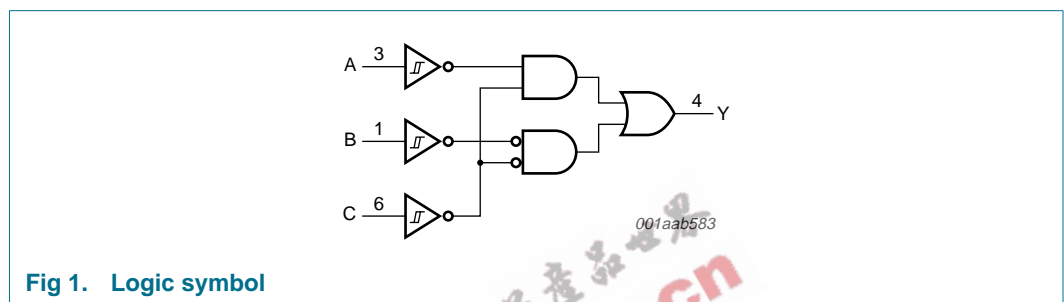
Type number	Package			Version
	Temperature range	Name	Description	
74AUP1G57GW	-40 °C to +125 °C	SC-88	plastic surface mounted package; 6 leads	SOT363
74AUP1G57GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body $1 \times 1.45 \times 0.5\text{ mm}$	SOT886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

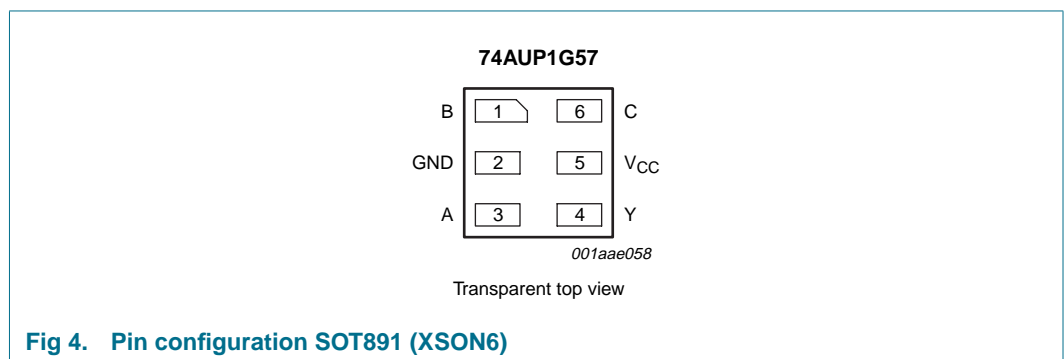
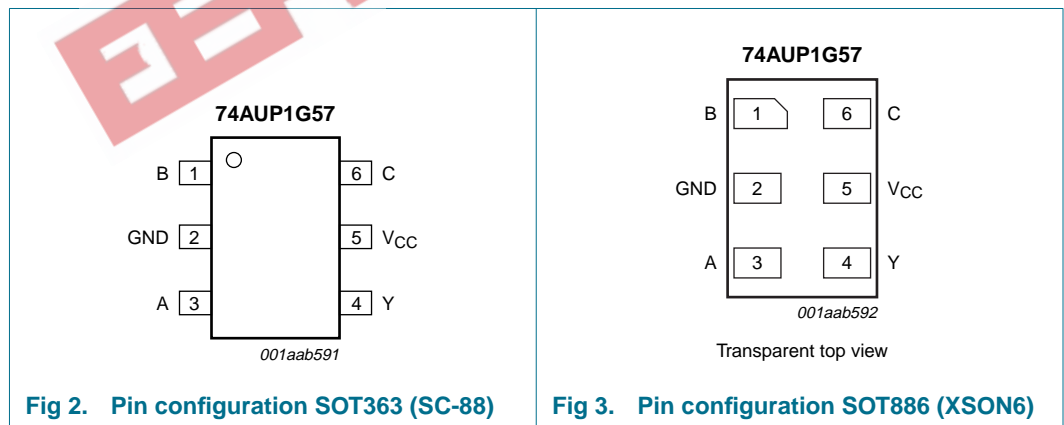
Type number	Marking code
74AUP1G57GW	aC
74AUP1G57GM	aC
74AUP1G57GF	aC

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 _{CC}	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 Figure 5
2-input AND with both inputs inverted	see Figure 8
2-input NAND with inverted input	see Figure 6 and 7
2-input OR with inverted input	see Figure 6 and 7
2-input NOR	see Figure 8
2-input NOR with both inputs inverted	see Figure 5
2-input XNOR	see Figure 9
Inverter	see Figure 10
Buffer	see Figure 11

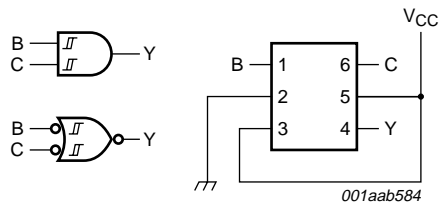


Fig 5. 2-input AND gate or 2-input NOR gate with both inputs inverted

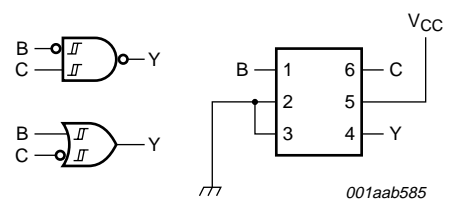


Fig 6. 2-input NAND gate with input B inverted or 2-input OR gate with inverted C input

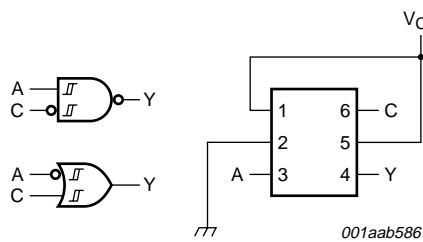


Fig 7. 2-input NAND gate with input C inverted or 2-input OR gate with inverted A input

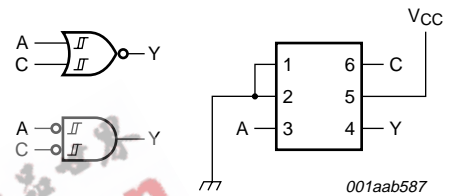


Fig 8. 2-input NOR gate or 2-input AND gate with both inputs inverted

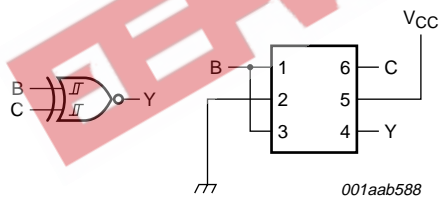


Fig 9. 2-input XNOR gate

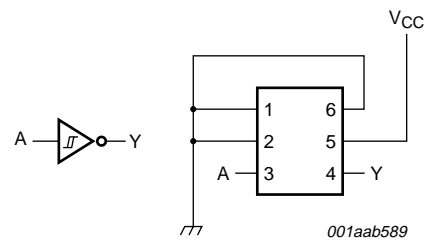


Fig 10. Inverter

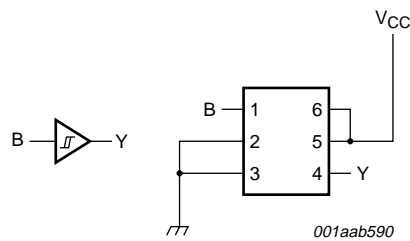


Fig 11. Buffer

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
T_{amb} = 25 °C						
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
		I _O = -4.0 mA; V _{CC} = 3.0 V	2.6	-	-	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 _O = 4.0 mA; V _{CC} = 3.0 V	-	-	0.44	V
I _I	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	-	-	±0.2	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	-	-	±0.2	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	V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 3.3 V	-	-	40	µA
C _I	input capacitance	V _I = GND or V _{CC} ; V _{CC} = 0 V to 3.6 V	-	1.1	-	pF
C _O	output capacitance	V _O = GND; V _{CC} = 0 V	-	1.7	-	pF
T_{amb} = -40 °C to +85 °C						
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
		I _O = -4.0 mA; V _{CC} = 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 _{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 _O = 4.0 mA; V _{CC} = 3.0 V	-	-	0.45	V		
I _I	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	V _I = V _{CC} - 0.6 V; I _O = 0 A; V _{CC} = 3.3 V	-	-	50	μA
T_{amb} = -40 °C to +125 °C						
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
I _O = -4.0 mA; V _{CC} = 3.0 V	2.30	-	-	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 _O = 4.0 mA; V _{CC} = 3.0 V	-	-	0.50	V		
I _I	input leakage current	V _I = GND to 3.6 V; V _{CC} = 0 V to 3.6 V	-	-	±0.75	μA
I _{OFF}	power-off leakage current	V _I or V _O = 0 V to 3.6 V; V _{CC} = 0 V	-	-	±0.75	μA

Table 9: Static characteristics ...continued

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
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	μ A
I_{CC}	quiescent supply current	$V_I = GND$ or V_{CC} ; $I_O = 0$ A; $V_{CC} = 0.8$ V to 3.6 V	-	-	1.4	μ A
ΔI_{CC}	additional quiescent supply current	$V_I = V_{CC} - 0.6$ V; $I_O = 0$ A; $V_{CC} = 3.3$ V	-	-	75	μ A

12. Dynamic characteristics

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

Symbol	Parameter	Conditions	Min	Typ ^[1]	Max	Unit
$T_{amb} = 25$ °C; $C_L = 5$ pF						
t_{PHL} , t_{PLH}	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B and C to Y	see Figure 12 $V_{CC} = 0.8$ 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
$T_{amb} = 25$ °C; $C_L = 10$ pF						
t_{PHL} , t_{PLH}	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B and C to Y	see Figure 12 $V_{CC} = 0.8$ 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
$T_{amb} = 25$ °C; $C_L = 15$ pF						
t_{PHL} , t_{PLH}	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B and C to Y	see Figure 12 $V_{CC} = 0.8$ 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 ...continuedVoltages are referenced to GND (ground = 0 V); for test circuit see [Figure 13](#)

Symbol	Parameter	Conditions	Min	Typ [1]	Max	Unit
T_{amb} = 25 °C; C_L = 30 pF						
t _{PHL} , t _{PLH}	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B and C to Y	see Figure 12				
		V _{CC} = 0.8 V	-	37.8	-	ns
		V _{CC} = 1.1 V to 1.3 V	4.6	10.4	20.9	ns
		V _{CC} = 1.4 V to 1.6 V	3.6	7.4	12.2	ns
		V _{CC} = 1.65 V to 1.95 V	3.5	6.2	9.9	ns
		V _{CC} = 2.3 V to 2.7 V	3.4	5.2	7.4	ns
		V _{CC} = 3.0 V to 3.6 V	3.2	4.9	6.6	ns
T_{amb} = 25 °C						
C _{PD}	power dissipation capacitance	f = 1 MHz		[2] [3]		
		V _{CC} = 0.8 V	-	2.9	-	pF
		V _{CC} = 1.1 V to 1.3 V	-	3.0	-	pF
		V _{CC} = 1.4 V to 1.6 V	-	3.2	-	pF
		V _{CC} = 1.65 V to 1.95 V	-	3.4	-	pF
		V _{CC} = 2.3 V to 2.7 V	-	3.9	-	pF
		V _{CC} = 3.0 V to 3.6 V	-	4.5	-	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 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	
C_L = 5 pF							
t _{PHL} , t _{PLH}	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B and C to Y	see Figure 12					
		V _{CC} = 1.1 V to 1.3 V	2.5	13.0	2.5	13.2	ns
		V _{CC} = 1.4 V to 1.6 V	2.5	8.2	2.5	8.6	ns
		V _{CC} = 1.65 V to 1.95 V	2.0	6.8	2.0	7.2	ns
		V _{CC} = 2.3 V to 2.7 V	1.8	5.1	1.8	5.3	ns
		V _{CC} = 3.0 V to 3.6 V	1.5	4.1	1.5	4.3	ns
C_L = 10 pF							
t _{PHL} , t _{PLH}	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B and C to Y	see Figure 12					
		V _{CC} = 1.1 V to 1.3 V	2.8	14.9	2.8	15.2	ns
		V _{CC} = 1.4 V to 1.6 V	2.8	9.3	2.8	9.8	ns
		V _{CC} = 1.65 V to 1.95 V	2.2	7.8	2.2	8.2	ns
		V _{CC} = 2.3 V to 2.7 V	2.1	5.9	2.1	6.2	ns
		V _{CC} = 3.0 V to 3.6 V	1.9	4.9	1.9	5.1	ns
C_L = 15 pF							
t _{PHL} , t _{PLH}	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B and C to Y	see Figure 12					
		V _{CC} = 1.1 V to 1.3 V	3.1	16.7	3.1	17.0	ns
		V _{CC} = 1.4 V to 1.6 V	3.1	10.4	3.1	10.9	ns
		V _{CC} = 1.65 V to 1.95 V	2.5	8.7	2.5	9.2	ns
		V _{CC} = 2.3 V to 2.7 V	2.4	6.5	2.4	6.9	ns
		V _{CC} = 3.0 V to 3.6 V	2.2	5.5	2.2	5.7	ns
C_L = 30 pF							
t _{PHL} , t _{PLH}	HIGH-to-LOW and LOW-to-HIGH propagation delay A, B and C to Y	see Figure 12					
		V _{CC} = 1.1 V to 1.3 V	3.9	21.8	3.9	22.3	ns
		V _{CC} = 1.4 V to 1.6 V	3.8	13.4	3.8	14.1	ns
		V _{CC} = 1.65 V to 1.95 V	3.1	11.1	3.1	11.8	ns
		V _{CC} = 2.3 V to 2.7 V	3.1	8.3	3.1	8.8	ns
		V _{CC} = 3.0 V to 3.6 V	2.8	7.0	2.8	7.4	ns

13. Waveforms

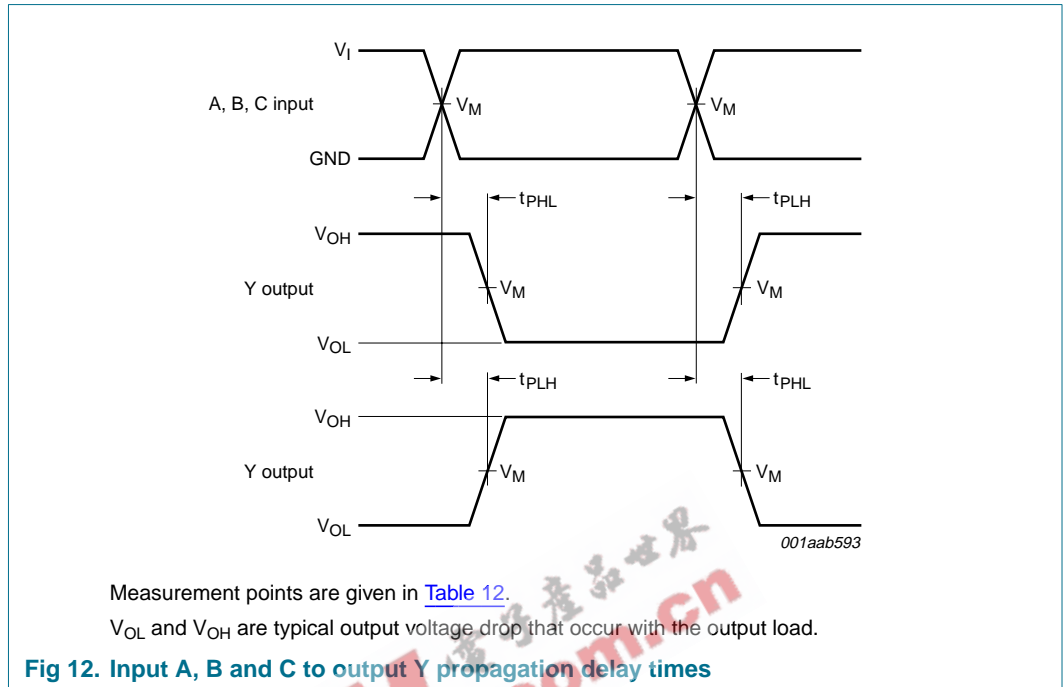


Table 12: Measurement points

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}	≤ 3.0 ns

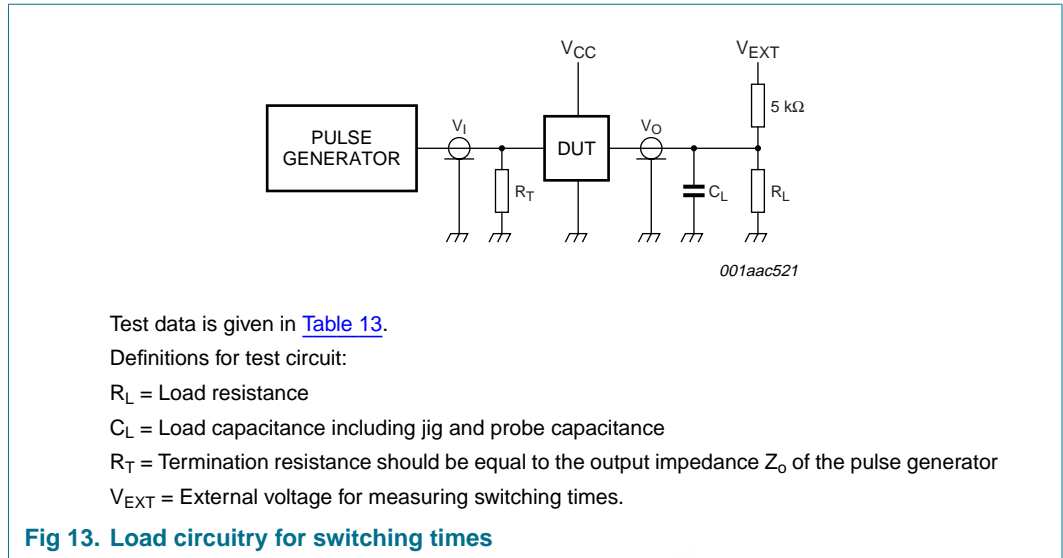


Fig 13. Load circuitry for switching times

Table 13: 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]	open	GND	$2 \times V_{CC}$	
0.8 V to 3.6 V	5 pF, 10 pF, 15 pF and 30 pF	5 kΩ or 1 MΩ				

[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 Figure 14 and Figure 15				
		$V_{CC} = 0.8 \text{ V}$	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

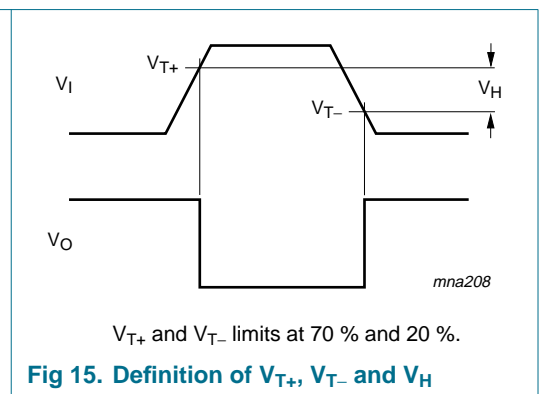
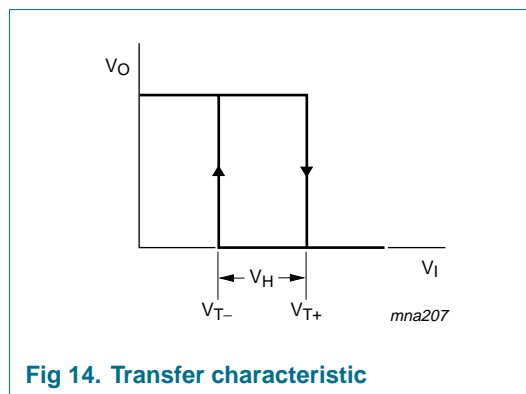
Table 14: Transfer characteristics ...continued
 Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{T-}	negative-going threshold voltage	see Figure 14 and Figure 15				
		$V_{CC} = 0.8\text{ V}$	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 Figure 14 , Figure 15 , Figure 16 and Figure 17				
		$V_{CC} = 0.8\text{ V}$	0.07	-	0.50	V
		$V_{CC} = 1.1\text{ V}$	0.08	-	0.46	V
		$V_{CC} = 1.4\text{ V}$	0.18	-	0.56	V
		$V_{CC} = 1.65\text{ V}$	0.27	-	0.66	V
		$V_{CC} = 2.3\text{ V}$	0.53	-	0.92	V
		$V_{CC} = 3.0\text{ V}$	0.79	-	1.31	V
$T_{amb} = -40\text{ °C to }+85\text{ °C}$						
V_{T+}	positive-going threshold voltage	see Figure 14 and Figure 15				
		$V_{CC} = 0.8\text{ V}$	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 Figure 14 and Figure 15				
		$V_{CC} = 0.8\text{ V}$	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 Figure 14 , Figure 15 , Figure 16 and Figure 17				
		$V_{CC} = 0.8\text{ V}$	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
$T_{amb} = -40\text{ }^{\circ}\text{C to }+125\text{ }^{\circ}\text{C}$						
V_{T+}	positive-going threshold voltage	see Figure 14 and Figure 15				
		$V_{CC} = 0.8\text{ V}$	0.30	-	0.62	V
		$V_{CC} = 1.1\text{ V}$	0.53	-	0.92	V
		$V_{CC} = 1.4\text{ V}$	0.74	-	1.13	V
		$V_{CC} = 1.65\text{ V}$	0.91	-	1.31	V
		$V_{CC} = 2.3\text{ V}$	1.37	-	1.80	V
		$V_{CC} = 3.0\text{ V}$	1.88	-	2.32	V
V_{T-}	negative-going threshold voltage	see Figure 14 and Figure 15				
		$V_{CC} = 0.8\text{ V}$	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 Figure 14 , Figure 15 , Figure 16 and Figure 17				
		$V_{CC} = 0.8\text{ V}$	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



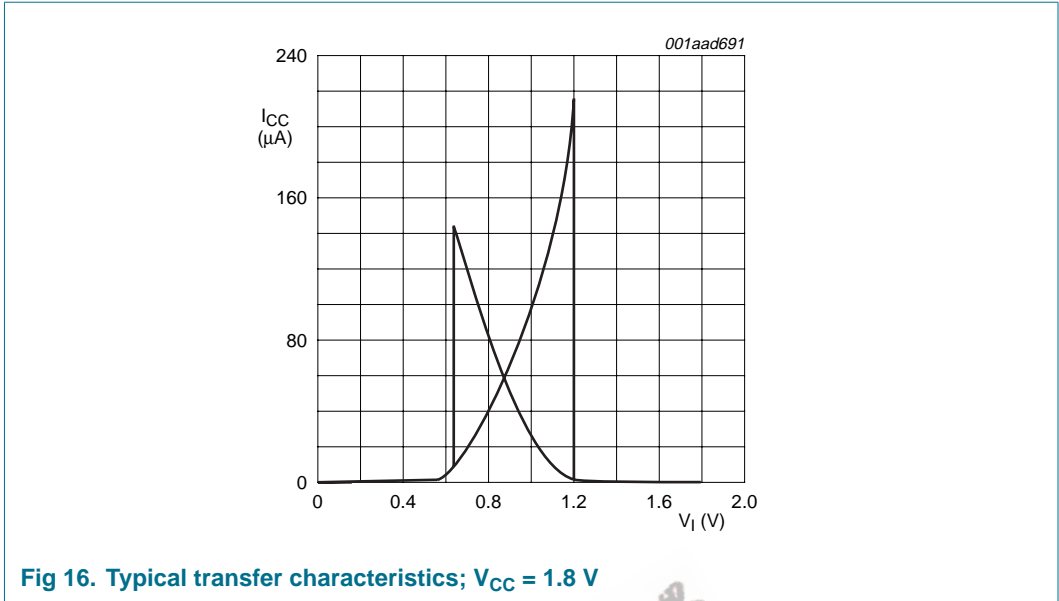


Fig 16. Typical transfer characteristics; $V_{CC} = 1.8\text{ V}$

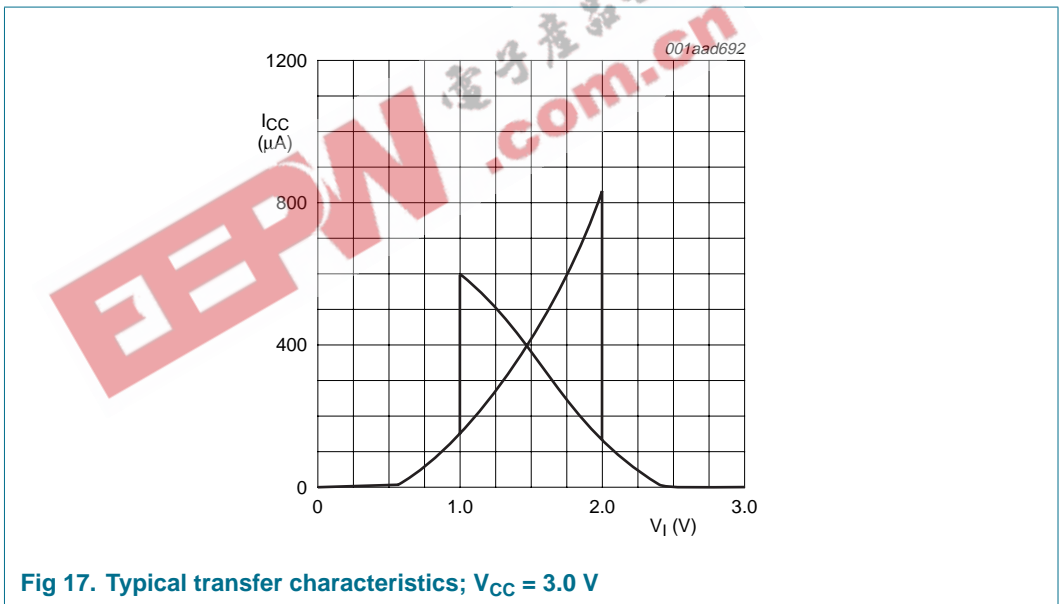


Fig 17. Typical transfer characteristics; $V_{CC} = 3.0\text{ V}$

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

SOT886

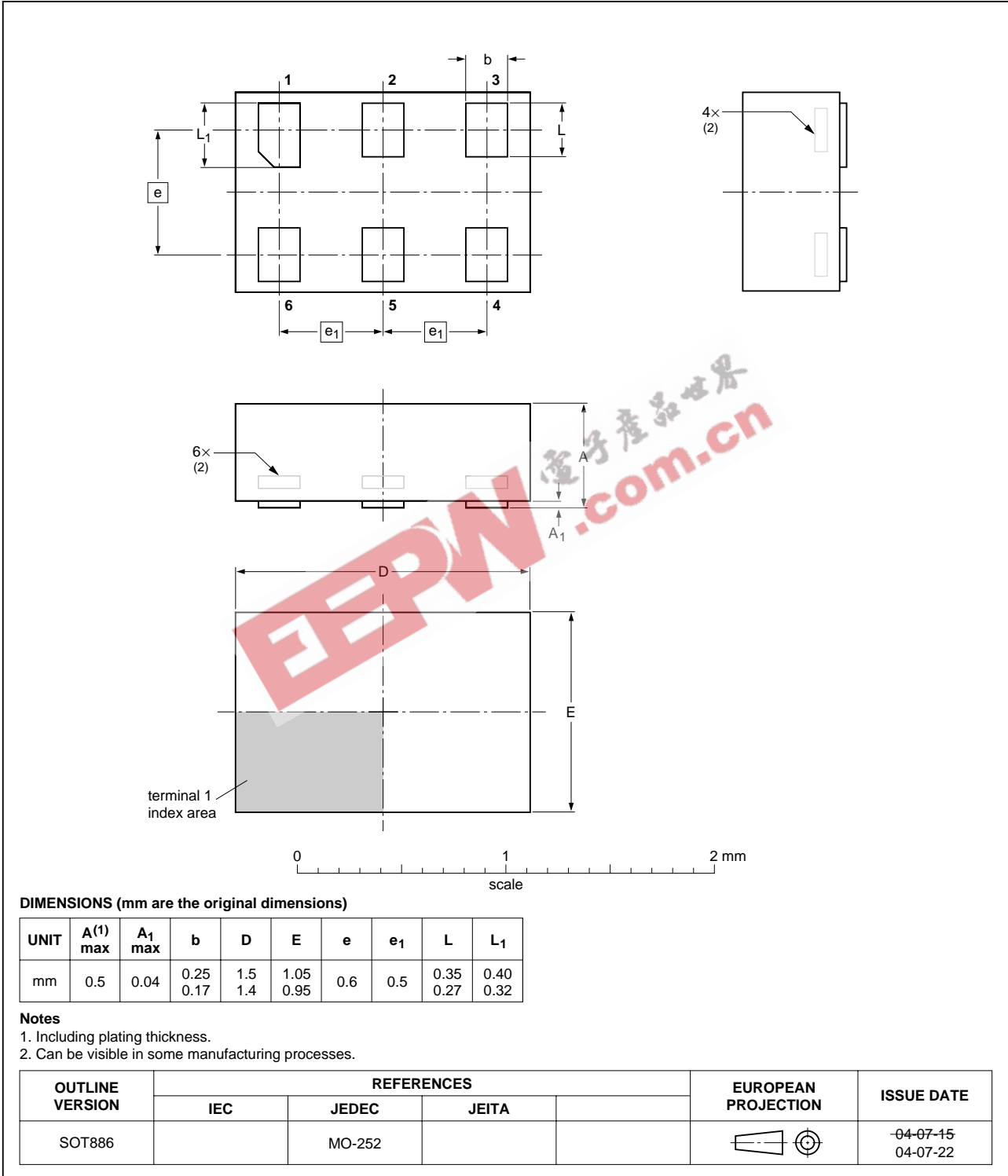


Fig 19. Package outline SOT886 (XSON6)

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

SOT891

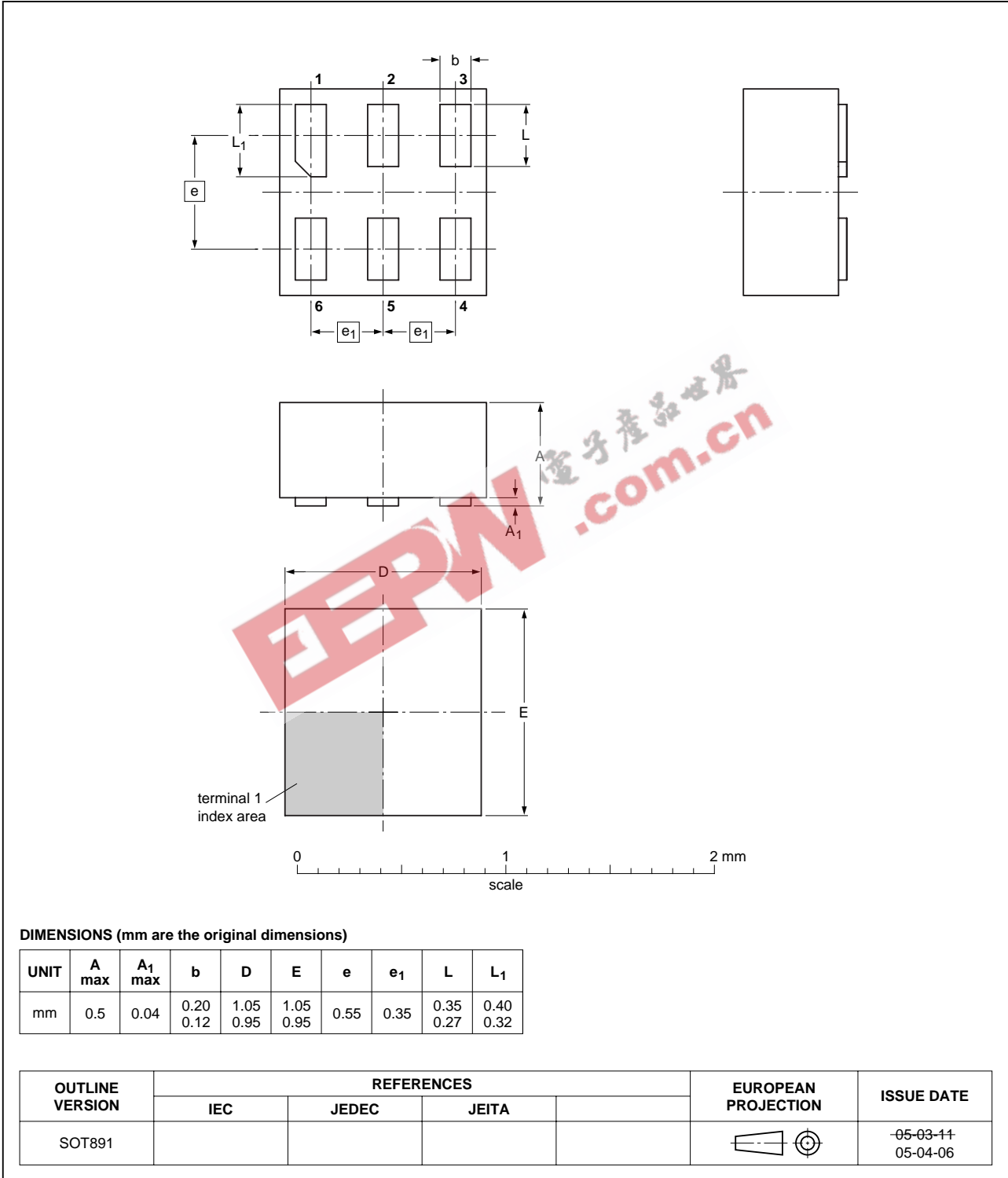


Fig 20. Package outline SOT891 (XSON6)

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	-	-	-

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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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