

# 74AUP2G79

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

Rev. 02 — 19 March 2008

Product data sheet

## 1. General description

The 74AUP2G79 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 a damaging backflow current through the device when it is powered down.

The 74AUP2G79 provides the dual positive-edge triggered D-type flip-flop. Information on the data input (nD) is transferred to the nQ output on the LOW-to-HIGH transition of the clock pulse (nCP). The nD 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-A114E 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 JESD78 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  $+125 \text{ }^\circ\text{C}$

### 3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74AUP2G79DC	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74AUP2G79GT	-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
74AUP2G79GM	-40 °C to +125 °C	XQFN8U	plastic extremely thin quad flat package; no leads; 8 terminals; UTLF based; body 1.6 × 1.6 × 0.5 mm	SOT902-1

### 4. Marking

Table 2. Marking codes

Type number	Marking code
74AUP2G79DC	p79
74AUP2G79GT	p79
74AUP2G79GM	p79

### 5. Functional diagram

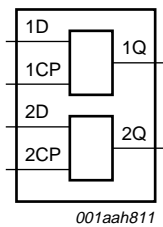


Fig 1. Logic symbol

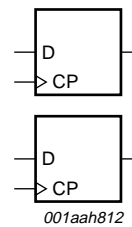


Fig 2. IEC logic symbol

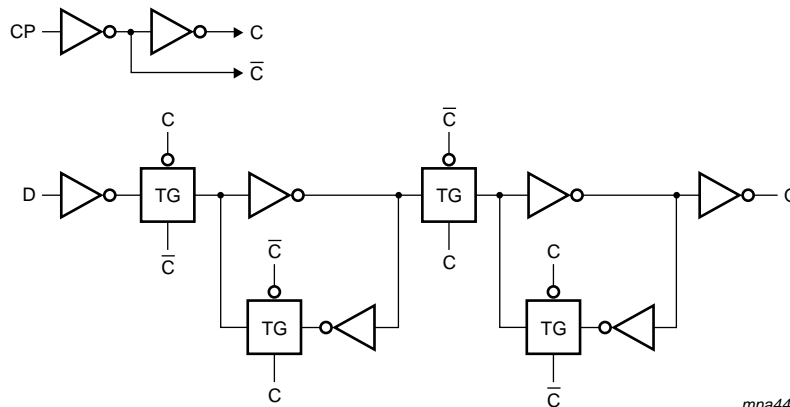
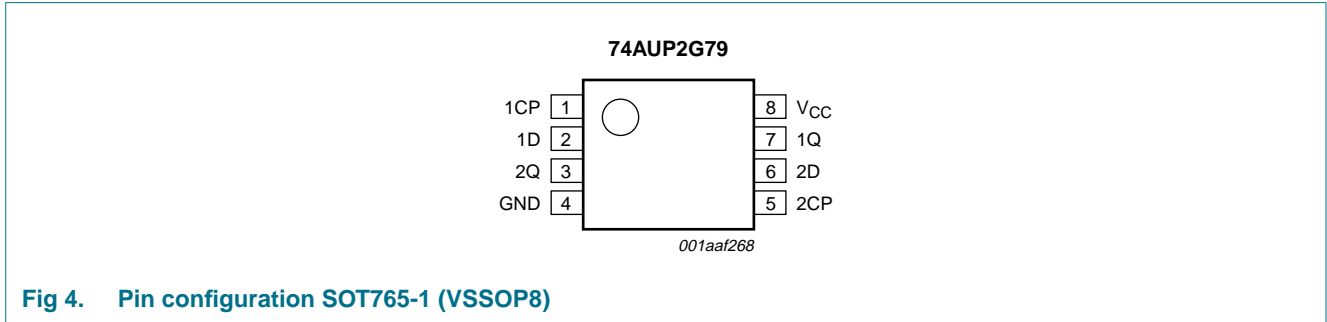


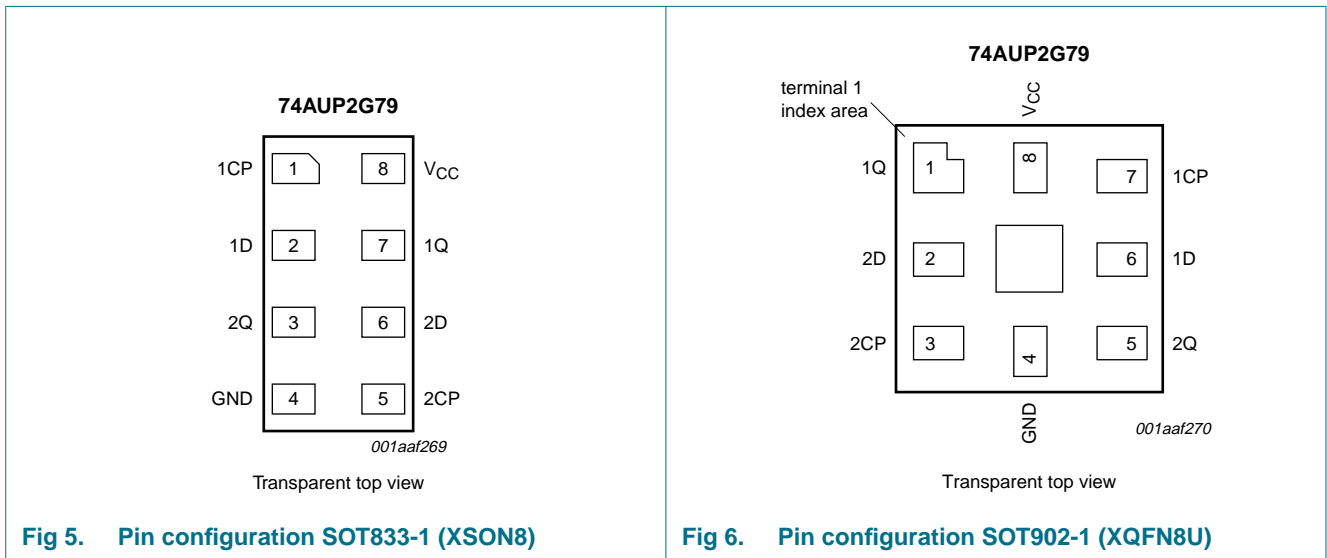
Fig 3. Logic diagram (one flip-flop)

## 6. Pinning information

### 6.1 Pinning



**Fig 4. Pin configuration SOT765-1 (VSSOP8)**



**Fig 5. Pin configuration SOT833-1 (XSON8)**

**Fig 6. Pin configuration SOT902-1 (XQFN8U)**

### 6.2 Pin description

**Table 3. Pin description**

Symbol	Pin		Description
	SOT765-1 and SOT833-1	SOT902-1	
1CP	1	7	clock pulse input 1
1D	2	6	data input 1
2Q	3	5	data output 2
GND	4	4	ground (0 V)
2CP	5	3	clock pulse input 2
2D	6	2	data input 2
1Q	7	1	data output 1
V <sub>CC</sub>	8	8	supply voltage

## 7. Functional description

Table 4. Function table<sup>[1]</sup>

Input		Output
nCP	nD	nQ
↑	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.

## 8. Limiting values

Table 5. 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 <sub>CC</sub>	supply voltage		-0.5	+4.6	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < 0 V	-	-50	mA
V <sub>I</sub>	input voltage		[1] -0.5	+4.6	V
I <sub>OK</sub>	output clamping current	V <sub>O</sub> > V <sub>CC</sub> or V <sub>O</sub> < 0 V	-	±50	mA
V <sub>O</sub>	output voltage	Active mode and Power-down mode	[1] -0.5	+4.6	V
I <sub>O</sub>	output current	V <sub>O</sub> = 0 V to V <sub>CC</sub>	-	±20	mA
I <sub>CC</sub>	supply current		-	50	mA
I <sub>GND</sub>	ground current		-	-50	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> = -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 VSSOP8 packages: above 110 °C the value of P<sub>tot</sub> derates linearly with 8.0 mW/K.  
 For XSON8 and XQFN8U packages: above 45 °C the value of P<sub>tot</sub> derates linearly with 2.4 mW/K.

## 9. Recommended operating conditions

Table 6. Operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>CC</sub>	supply voltage		0.8	3.6	V
V <sub>I</sub>	input voltage		0	3.6	V
V <sub>O</sub>	output voltage	Active mode	0	V <sub>CC</sub>	V
		Power-down mode; V <sub>CC</sub> = 0 V	0	3.6	V
T <sub>amb</sub>	ambient temperature		-40	+125	°C
Δt/ΔV	input transition rise and fall rate	V <sub>CC</sub> = 0.8 V to 3.6 V	0	200	ns/V

## 10. Static characteristics

**Table 7. 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>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 0.8 V	0.70 × V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	0.65 × 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-level input voltage	V <sub>CC</sub> = 0.8 V	-	-	0.30 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	0.35 × 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-level 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
V <sub>OL</sub>	LOW-level 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>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
		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>	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 supply current	per pin; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V	<a href="#">[1]</a> -	-	40	μA
C <sub>I</sub>	input capacitance	V <sub>CC</sub> = 0 V to 3.6 V; V <sub>I</sub> = GND or V <sub>CC</sub>	-	0.6	-	pF
C <sub>O</sub>	output capacitance	V <sub>O</sub> = GND; V <sub>CC</sub> = 0 V	-	1.3	-	pF

**Table 7. Static characteristics ...continued**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = -40 °C to +85 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 0.8 V	0.70 × V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	0.65 × 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-level input voltage	V <sub>CC</sub> = 0.8 V	-	-	0.30 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	0.35 × 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-level 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
V <sub>OL</sub>	LOW-level 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>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>	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 supply current	per pin; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V	[1] -	-	50	μA

**Table 7. Static characteristics ...continued**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>IH</sub>	HIGH-level 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-level 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-level 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
V <sub>OL</sub>	LOW-level 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>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>	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 supply current	per pin; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V	[1]	-	75	μA

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

## 11. Dynamic characteristics

**Table 8. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 9](#).

Symbol	Parameter	Conditions	25 °C			–40 °C to +85 °C		–40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	Min	Max	
<b>C<sub>L</sub> = 5 pF</b>										
t <sub>pd</sub>	propagation delay	nCP to nQ; see <a href="#">Figure 7</a> <sup>[2]</sup>								
		V <sub>CC</sub> = 0.8 V	-	19.7	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.6	5.5	11.0	2.4	12.9	2.4	14.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.0	3.8	7.0	1.8	8.1	1.8	9.0	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.7	3.1	5.4	1.5	6.4	1.5	7.1	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.4	2.3	4.0	1.1	4.7	1.1	5.2	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.2	2.0	3.4	0.9	4.0	0.9	4.4	ns
f <sub>max</sub>	maximum frequency	nCP; see <a href="#">Figure 8</a>								
		V <sub>CC</sub> = 0.8 V	-	53	-	-	-	-	-	MHz
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	203	-	170	-	170	-	MHz
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	347	-	310	-	300	-	MHz
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	435	-	400	-	390	-	MHz
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	550	-	490	-	480	-	MHz
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	619	-	550	-	510	-	MHz
<b>C<sub>L</sub> = 10 pF</b>										
t <sub>pd</sub>	propagation delay	nCP to nQ; see <a href="#">Figure 7</a> <sup>[2]</sup>								
		V <sub>CC</sub> = 0.8 V	-	23.1	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.1	6.3	12.3	2.8	14.4	2.8	15.9	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.5	4.4	8.1	2.2	9.5	2.2	10.5	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.1	3.6	6.3	1.9	7.5	1.9	8.3	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.8	2.8	4.7	1.5	5.6	1.5	6.2	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.7	2.5	4.1	1.3	4.5	1.3	5.0	ns
f <sub>max</sub>	maximum frequency	nCP; see <a href="#">Figure 8</a>								
		V <sub>CC</sub> = 0.8 V	-	52	-	-	-	-	-	MHz
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	192	-	150	-	150	-	MHz
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	324	-	280	-	230	-	MHz
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	421	-	310	-	250	-	MHz
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	486	-	370	-	360	-	MHz
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	550	-	410	-	360	-	MHz



**Table 8. Dynamic characteristics ...continued**  
 Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 9](#).

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	Min	Max	
<b>C<sub>L</sub> = 15 pF</b>										
t <sub>pd</sub>	propagation delay	nCP to nQ; see <a href="#">Figure 7</a> <sup>[2]</sup>								
		V <sub>CC</sub> = 0.8 V	-	26.6	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.5	7.1	13.6	3.2	15.6	3.2	17.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.8	5.0	9.2	2.5	10.7	2.5	11.8	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.4	4.1	7.1	2.2	8.5	2.2	9.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.2	3.2	5.4	1.9	6.3	1.9	7.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	2.9	4.5	1.6	5.0	1.6	5.5	ns
f <sub>max</sub>	maximum frequency	nCP; see <a href="#">Figure 8</a>								
		V <sub>CC</sub> = 0.8 V	-	50	-	-	-	-	-	MHz
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	181	-	120	-	120	-	MHz
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	301	-	190	-	160	-	MHz
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	407	-	240	-	190	-	MHz
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	422	-	300	-	270	-	MHz
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	481	-	320	-	300	-	MHz
<b>C<sub>L</sub> = 30 pF</b>										
t <sub>pd</sub>	propagation delay	nCP to nQ; see <a href="#">Figure 7</a> <sup>[2]</sup>								
		V <sub>CC</sub> = 0.8 V	-	36.8	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.7	9.3	17.3	4.2	23.3	4.2	25.6	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.8	6.4	11.8	3.3	14.3	3.3	15.7	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.3	5.3	9.4	3.0	11.3	3.0	12.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	3.0	4.3	7.0	2.7	8.5	2.7	9.4	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.8	3.9	5.8	2.6	7.2	2.6	7.9	ns
f <sub>max</sub>	maximum frequency	nCP; see <a href="#">Figure 8</a>								
		V <sub>CC</sub> = 0.8 V	-	28	-	-	-	-	-	MHz
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	128	-	70	-	70	-	MHz
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	206	-	120	-	110	-	MHz
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	262	-	150	-	120	-	MHz
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	269	-	190	-	170	-	MHz
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	309	-	200	-	190	-	MHz

**Table 8. Dynamic characteristics ...continued**  
 Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 9](#).

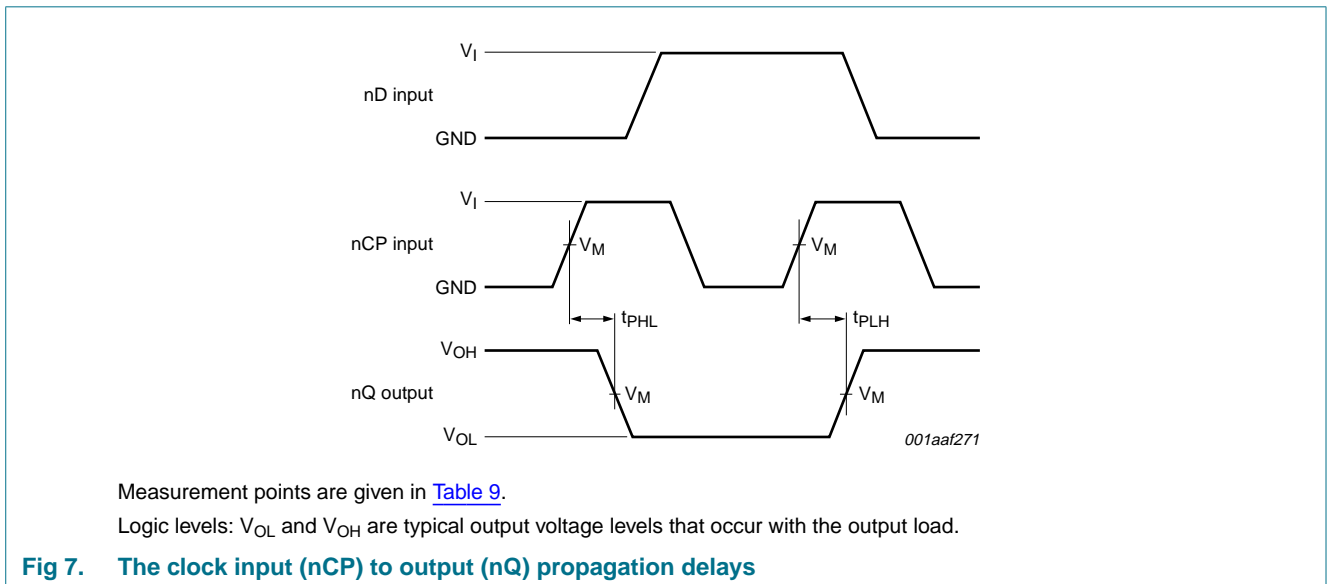
Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	Min	Max	
<b>C<sub>L</sub> = 5 pF, 10 pF, 15 pF and 30 pF</b>										
t <sub>su</sub>	set-up time	HIGH; nD to nCP; see <a href="#">Figure 8</a>								
		V <sub>CC</sub> = 0.8 V	-	3.4	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	0.8	-	1.5	-	1.5	-	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	0.5	-	1.0	-	1.0	-	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	0.5	-	0.9	-	0.9	-	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	0.4	-	0.7	-	0.7	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	0.4	-	0.6	-	0.6	-	ns
		LOW; nD to nCP; see <a href="#">Figure 8</a>								
		V <sub>CC</sub> = 0.8 V	-	3.0	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	0.9	-	1.6	-	1.6	-	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	0.6	-	1.0	-	1.0	-	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	0.5	-	0.9	-	0.9	-	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	0.5	-	0.9	-	0.9	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	0.7	-	1.0	-	1.0	-	ns
t <sub>h</sub>	hold time	nD to nCP; see <a href="#">Figure 8</a>								
		V <sub>CC</sub> = 0.8 V	-	-1.9	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	-0.6	-	0	-	0	-	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	-0.4	-	0	-	0	-	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	-0.4	-	0	-	0	-	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-0.4	-	0	-	0	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-0.3	-	0	-	0	-	ns
t <sub>w</sub>	pulse width	HIGH or LOW; nCP; see <a href="#">Figure 8</a>								
		V <sub>CC</sub> = 0.8 V	-	5.6	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	2.4	-	3.5	-	3.5	-	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	1.3	-	2.0	-	2.0	-	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	0.9	-	1.9	-	1.9	-	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	0.7	-	2.0	-	2.0	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	0.6	-	2.2	-	2.2	-	ns

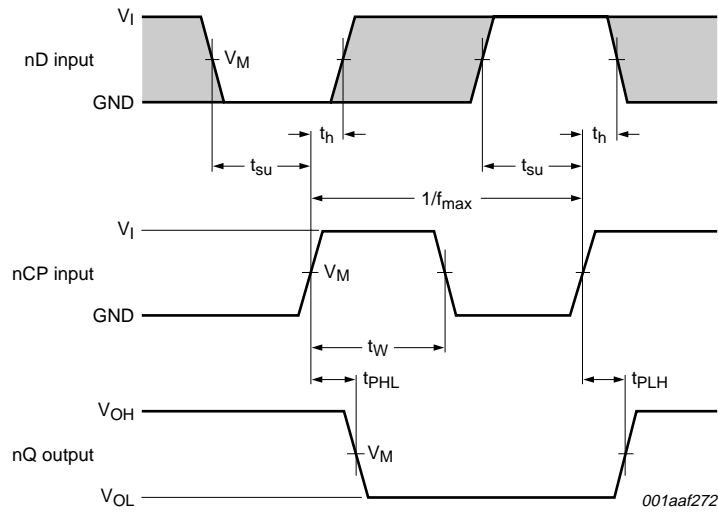
**Table 8. Dynamic characteristics ...continued**  
 Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 9](#).

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max	Min	Max	
C <sub>PD</sub>	power dissipation capacitance	f = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub>								
		V <sub>CC</sub> = 0.8 V	-	1.6	-	-	-	-	-	pF
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	1.7	-	-	-	-	-	pF
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	1.8	-	-	-	-	-	pF
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	1.9	-	-	-	-	-	pF
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	2.3	-	-	-	-	-	pF
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	2.7	-	-	-	-	pF	

- [1] All typical values are measured at nominal V<sub>CC</sub>.
- [2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.
- [3] 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.

## 12. Waveforms





Measurement points are given in [Table 9](#).

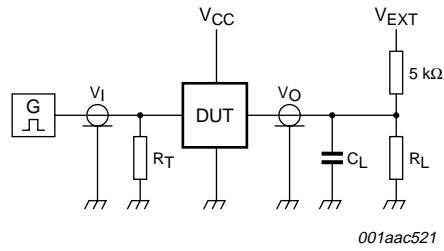
Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage drop that occur with the output load.

The shaded areas indicate when the input is permitted to change for predictable output performance.

**Fig 8.** The clock input (nCP) to output (nQ) propagation delays, nCP clock pulse width, nD to nCP set-up times, nCP to nD hold times and the nCP maximum frequency

**Table 9.** 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



Test data is given in [Table 10](#).

Definitions for test circuit:

$R_L$  = Load resistance.

$C_L$  = Load capacitance including jig and probe capacitance.

$R_T$  = Termination resistance should be equal to the output impedance  $Z_o$  of the pulse generator.

$V_{EXT}$  = External voltage for measuring switching times.

**Fig 9. Load circuitry for switching times**

**Table 10. 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, set-up times, hold times and pulse width,  $R_L = 1 \text{ M}\Omega$ .

13. Package outline

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

SOT765-1

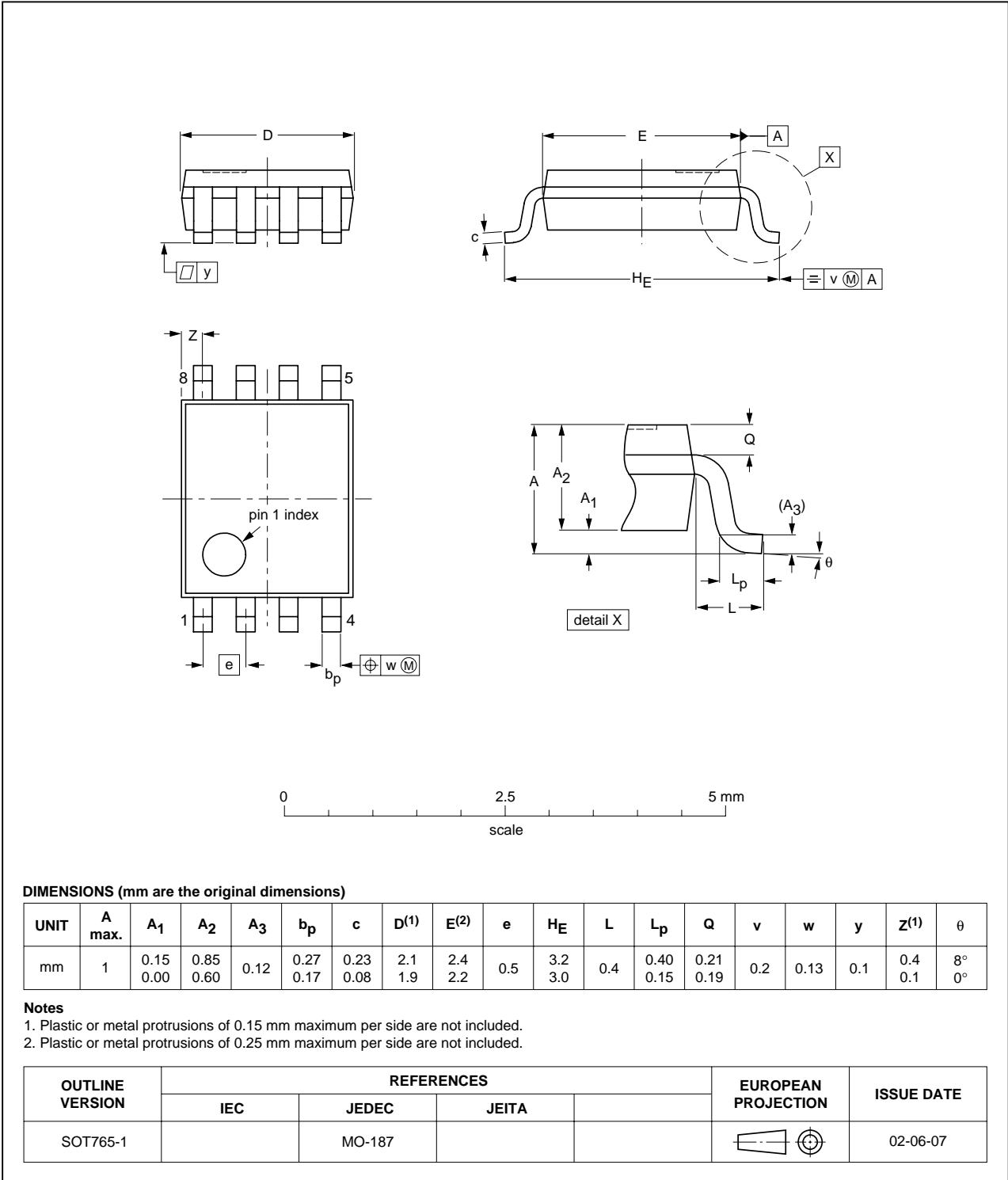


Fig 10. Package outline SOT765-1 (VSSOP8)

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

SOT833-1

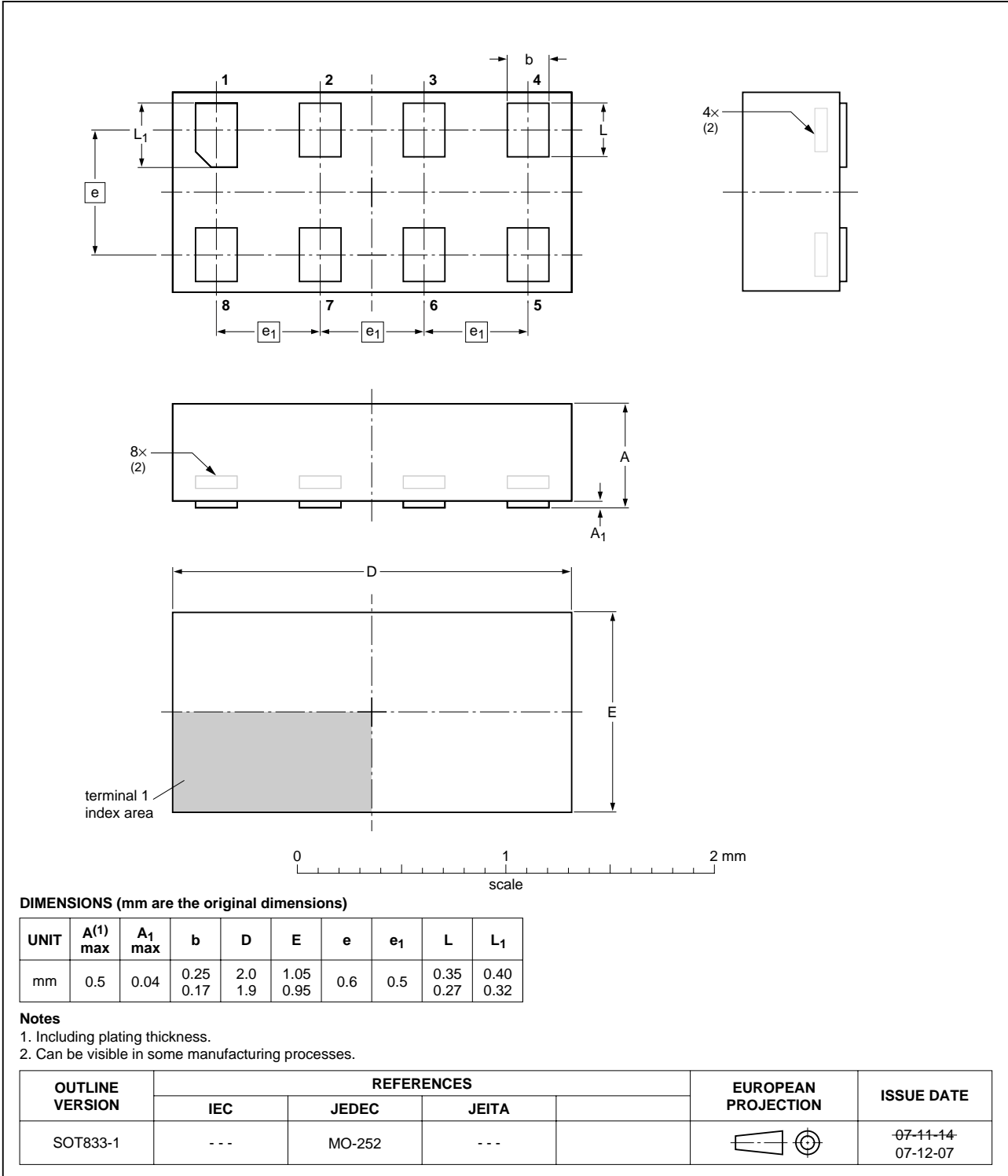
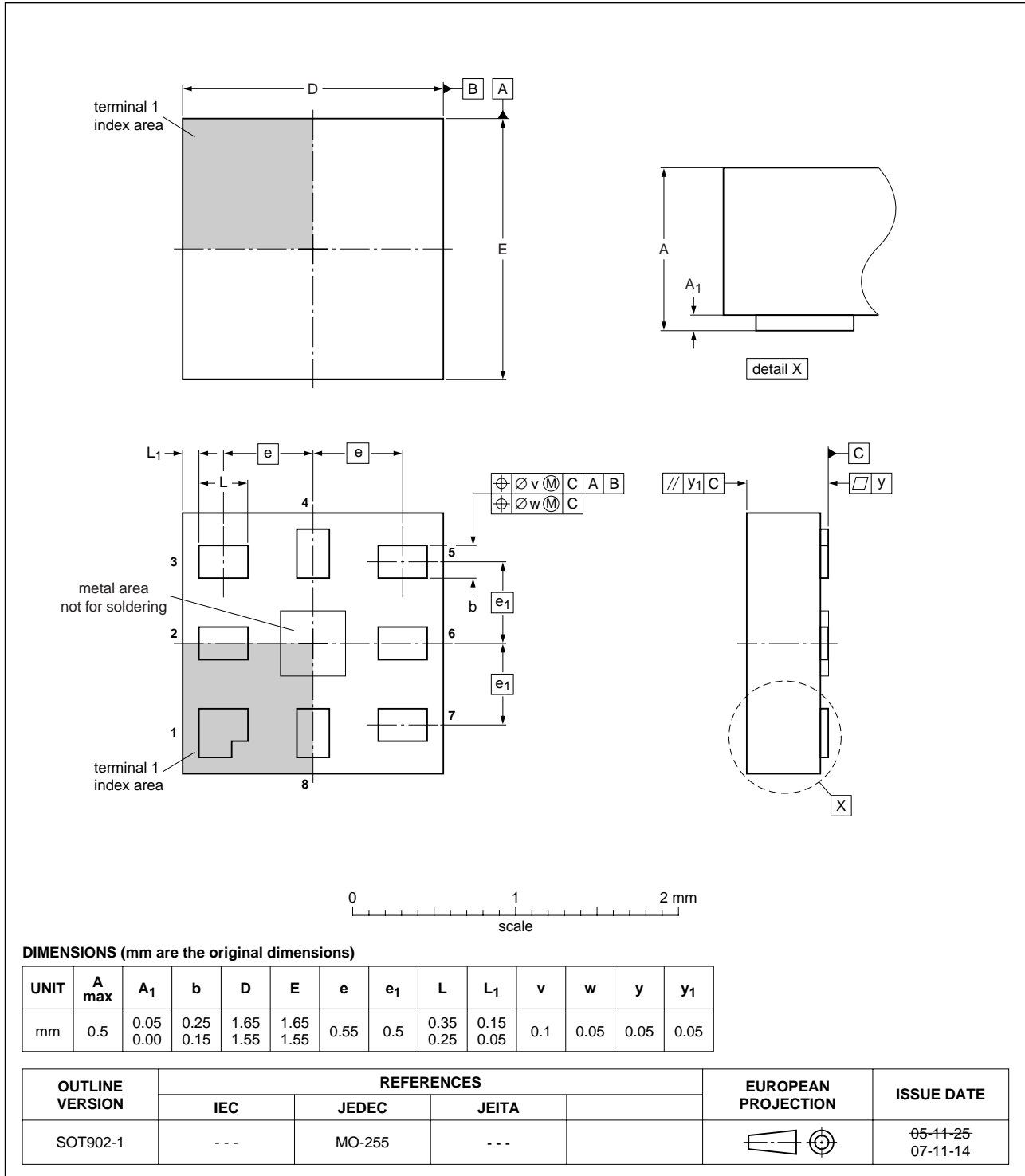


Fig 11. Package outline SOT833-1 (XSON8)

**XQFN8U: plastic extremely thin quad flat package; no leads; 8 terminals; UTLP based; body 1.6 x 1.6 x 0.5 mm**

**SOT902-1**



**Fig 12. Package outline SOT902-1 (XQFN8U)**



## 14. Abbreviations

Table 11. 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

## 15. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP2G79_2	20080319	Product data sheet	-	74AUP2G79_1
Modifications:				
74AUP2G79_1	20061006	Product data sheet	-	-

## 16. Legal information

### 16.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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

[2] The term 'short data sheet' is explained in section "Definitions".

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**18. Contents**

1 **General description** . . . . . 1

2 **Features** . . . . . 1

3 **Ordering information** . . . . . 2

4 **Marking** . . . . . 2

5 **Functional diagram** . . . . . 2

6 **Pinning information** . . . . . 3

6.1 Pinning . . . . . 3

6.2 Pin description . . . . . 3

7 **Functional description** . . . . . 4

8 **Limiting values** . . . . . 4

9 **Recommended operating conditions** . . . . . 4

10 **Static characteristics** . . . . . 5

11 **Dynamic characteristics** . . . . . 8

12 **Waveforms** . . . . . 11

13 **Package outline** . . . . . 14

14 **Abbreviations** . . . . . 17

15 **Revision history** . . . . . 17

16 **Legal information** . . . . . 18

16.1 Data sheet status . . . . . 18

16.2 Definitions . . . . . 18

16.3 Disclaimers . . . . . 18

16.4 Trademarks . . . . . 18

17 **Contact information** . . . . . 18

18 **Contents** . . . . . 19

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