

# 74AUP2G157

## Low-power 2-input multiplexer

Rev. 03 — 2 July 2008

Product data sheet

## 1. General description

The 74AUP2G157 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 74AUP2G157 is a single 2-input multiplexer which select data from two data inputs (I0 and I1) under control of a common data select input (S). The state of the common data select input determines the particular register from which the data comes. The output (Y,  $\bar{Y}$ ) presents the selected data in the true (non-inverted) and complement form. The enable input ( $\bar{E}$ ) is active LOW. When  $\bar{E}$  is HIGH, the output Y is forced LOW and the output  $\bar{Y}$  is forced HIGH regardless of all other input conditions.

## 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-C101C 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  $+125 \text{ }^\circ\text{C}$

### 3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74AUP2G157DC	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74AUP2G157GT	-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
74AUP2G157GD	-40 °C to +125 °C	XSON8U	plastic extremely thin small outline package; no leads; 8 terminals; UTLP based; body 3 × 2 × 0.5 mm	SOT996-2
74AUP2G157GM	-40 °C to +125 °C	XQFN8U	plastic extremely thin quad flat package; no leads; 8 terminals; UTLP based; body 1.6 × 1.6 × 0.5 mm	SOT902-1

### 4. Marking

Table 2. Marking codes

Type number	Marking code
74AUP2G157DC	a2P
74AUP2G157GT	a2P
74AUP2G157GD	a2P
74AUP2G157GM	a2P

### 5. Functional diagram

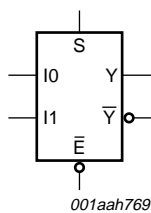


Fig 1. Logic symbol

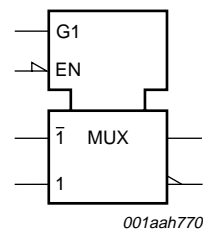


Fig 2. IEC logic symbol

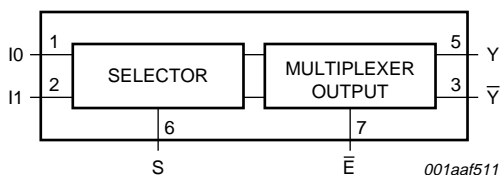


Fig 3. Logic diagram

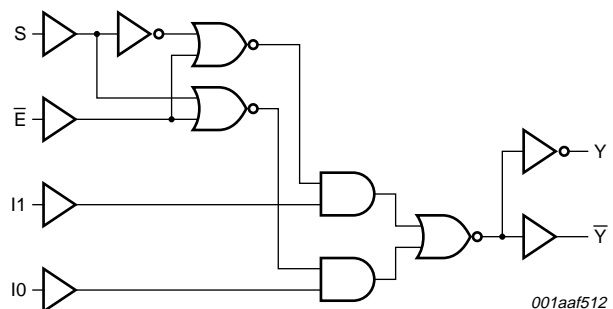
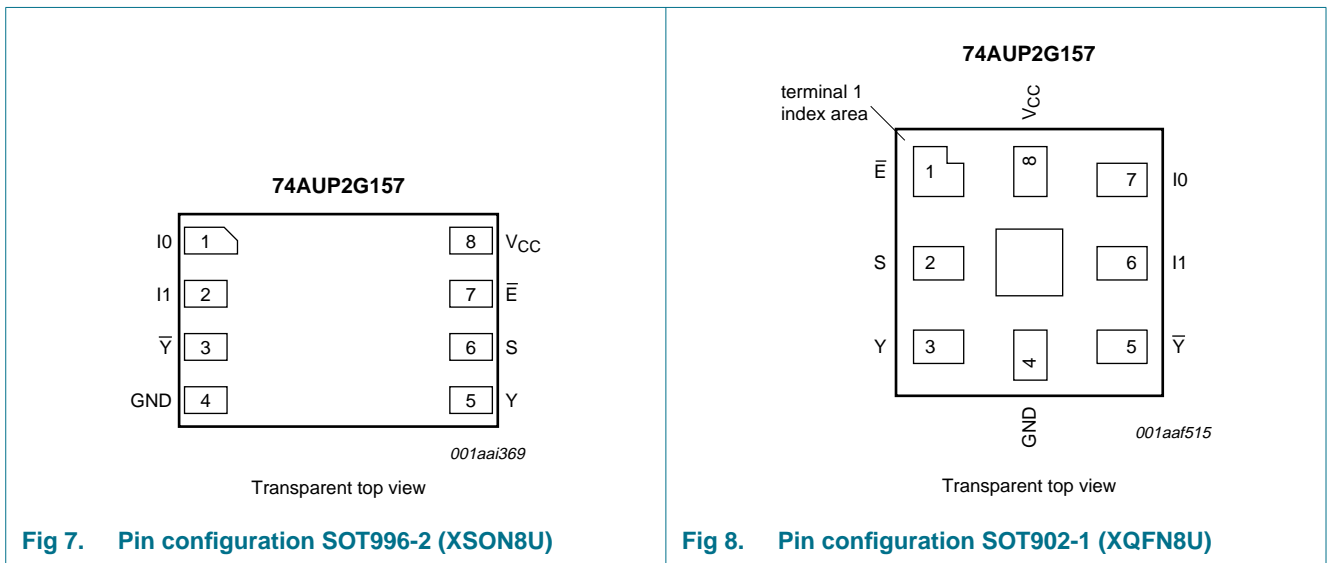
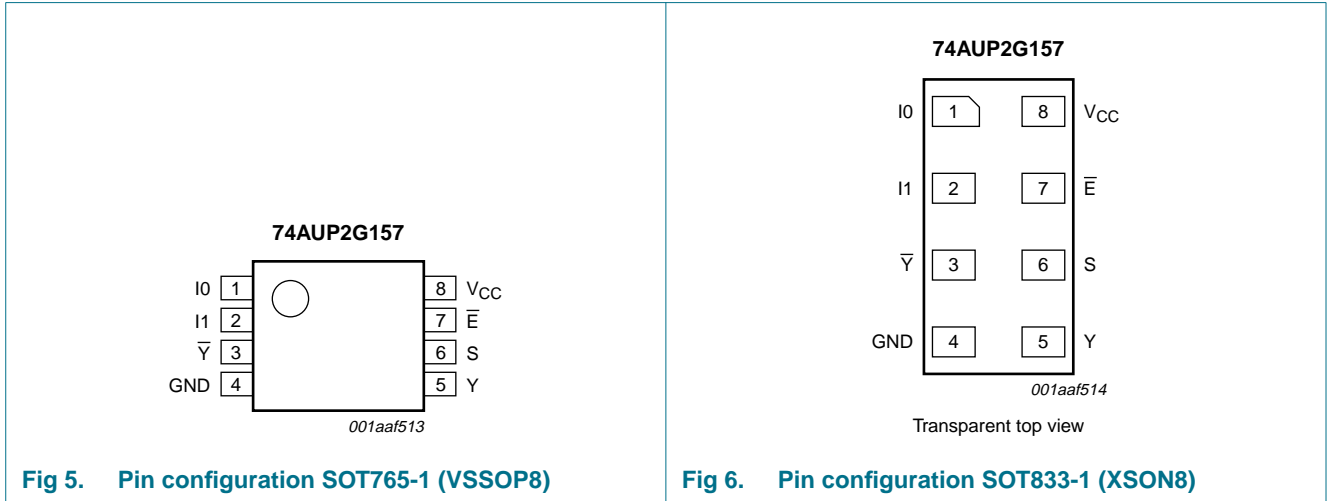


Fig 4. Functional diagram

**6. Pinning information**

**6.1 Pinning**



**6.2 Pin description**

**Table 3. Pin description**

Symbol	Pin		Description
	SOT765-1, SOT833-1 and SOT996-2	SOT902-1	
I0	1	7	data input from source 0
I1	2	6	data input from source 1
$\bar{Y}$	3	5	complement multiplexer output
GND	4	4	ground (0 V)
Y	5	3	true multiplexer output

Table 3. Pin description ...continued

Symbol	Pin		Description
	SOT765-1, SOT833-1 and SOT996-2	SOT902-1	
S	6	2	data select input
$\bar{E}$	7	1	enable input (active LOW)
V <sub>CC</sub>	8	8	supply voltage

## 7. Functional description

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

Input				Output	
$\bar{E}$	S	I0	I1	Y	$\bar{Y}$
H	X	X	X	L	H
L	L	L	X	L	H
L	L	H	X	H	L
L	H	X	L	L	H
L	H	X	H	H	L

[1] H = HIGH voltage level; L = LOW voltage level; X = don't care.

## 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		<sup>[1]</sup> -0.5	+4.6	V
I <sub>OK</sub>	output clamping current	V <sub>O</sub> < 0 V	-50	-	mA
V <sub>O</sub>	output voltage	Active mode and Power-down mode	<sup>[1]</sup> -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	<sup>[2]</sup> -	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, XSON8U 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
$V_{CC}$	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

## 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><math>T_{amb} = 25</math> °C</b>						
$V_{IH}$	HIGH-level 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-level 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-level 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
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH}$ or $V_{IL}$				
		$I_O = 20$ $\mu$ A; $V_{CC} = 0.8$ V to 3.6 V	-	-	0.1	V
		$I_O = 1.1$ mA; $V_{CC} = 1.1$ V	-	-	$0.3 \times V_{CC}$	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	

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

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_I$	input leakage current	$V_I = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	$\pm 0.1$	$\mu\text{A}$
$I_{\text{OFF}}$	power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$	-	-	$\pm 0.2$	$\mu\text{A}$
$\Delta I_{\text{OFF}}$	additional power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	$\pm 0.2$	$\mu\text{A}$
$I_{CC}$	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 supply current	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$	[1]	-	40	$\mu\text{A}$
$C_I$	input capacitance	$V_{CC} = 0 \text{ V to } 3.6 \text{ V}; V_I = \text{GND or } V_{CC}$	-	0.6	-	pF
$C_O$	output capacitance	$V_O = \text{GND}; V_{CC} = 0 \text{ V}$	-	1.3	-	pF
<b><math>T_{\text{amb}} = -40 \text{ }^\circ\text{C to } +85 \text{ }^\circ\text{C}</math></b>						
$V_{IH}$	HIGH-level 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-level 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-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}$				
		$I_O = -20 \mu\text{A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	$V_{CC} - 0.1$	-	-	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		
$V_{OL}$	LOW-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}$				
		$I_O = 20 \mu\text{A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	0.1	V
		$I_O = 1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	-	-	$0.3 \times V_{CC}$	V
		$I_O = 1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	-	-	0.37	V
		$I_O = 1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$	-	-	0.35	V
		$I_O = 2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.33	V
		$I_O = 3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.45	V
		$I_O = 2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.33	V
$I_O = 4.0 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.45	V		
$I_I$	input leakage current	$V_I = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	$\pm 0.5$	$\mu\text{A}$
$I_{\text{OFF}}$	power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$	-	-	$\pm 0.5$	$\mu\text{A}$
$\Delta I_{\text{OFF}}$	additional power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	$\pm 0.6$	$\mu\text{A}$

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

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
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	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
<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	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 11](#).

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			T <sub>amb</sub> = -40 °C to +125 °C			Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max (85 °C)	Max (125 °C)	
<b>C<sub>L</sub> = 5 pF</b>									
t <sub>pd</sub>	propagation delay	I0, I1 to Y, $\bar{Y}$ ; see <a href="#">Figure 9</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	21.2	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.5	6.1	13.3	2.2	13.8	13.9	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.9	4.2	7.8	2.0	8.4	8.8	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.7	3.4	6.2	1.6	6.9	7.3	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.5	2.7	4.3	1.2	4.9	5.2	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.3	2.4	3.7	1.0	4.0	4.2	ns
		S to Y, $\bar{Y}$ ; see <a href="#">Figure 9</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	23.6	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.6	6.6	13.8	2.2	14.3	14.5	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.9	4.5	8.0	2.1	8.7	9.1	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.7	3.6	6.3	1.6	7.0	7.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	2.8	4.4	1.2	5.0	5.3	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.3	2.5	3.7	1.0	4.0	4.2	ns
		$\bar{E}$ to Y, $\bar{Y}$ ; see <a href="#">Figure 10</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	22.6	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.7	6.4	13.7	2.5	14.3	14.5	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.1	4.4	8.0	2.1	8.7	9.1	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.8	3.6	6.3	1.6	7.0	7.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	2.8	4.2	1.4	4.8	5.1	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.4	2.5	3.6	1.1	3.9	4.2	ns



**Table 8. Dynamic characteristics ...continued**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 11](#).

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			T <sub>amb</sub> = -40 °C to +125 °C			Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max (85 °C)	Max (125 °C)	
<b>C<sub>L</sub> = 10 pF</b>									
t <sub>pd</sub>	propagation delay	I0, I1 to Y, $\bar{Y}$ ; see <a href="#">Figure 9</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	24.5	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.9	6.9	15.1	2.5	15.6	15.8	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.2	4.8	8.9	2.4	9.6	10.0	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.1	4.0	7.1	1.9	7.9	8.3	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.9	3.2	5.0	1.6	5.7	6.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.7	2.9	4.4	1.3	4.7	5.0	ns
		S to Y, $\bar{Y}$ ; see <a href="#">Figure 9</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	27.2	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.0	7.4	15.5	2.6	16.1	16.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.3	5.1	9.0	2.4	9.8	10.3	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.1	4.2	7.2	1.9	8.0	8.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.9	3.4	5.1	1.6	5.7	6.1	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.7	3.0	4.4	1.4	4.7	5.0	ns
		$\bar{E}$ to Y, $\bar{Y}$ ; see <a href="#">Figure 10</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	25.9	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.1	7.2	15.5	2.8	16.1	16.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.5	5.0	9.0	2.4	9.8	10.3	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.2	4.1	7.1	1.9	8.0	8.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.9	3.3	4.9	1.7	5.5	5.9	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.7	3.0	4.2	1.5	4.6	4.8	ns

**Table 8. Dynamic characteristics ...continued**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 11](#).

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			T <sub>amb</sub> = -40 °C to +125 °C			Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max (85 °C)	Max (125 °C)	
<b>C<sub>L</sub> = 15 pF</b>									
t <sub>pd</sub>	propagation delay	I0, I1 to Y, $\bar{Y}$ ; see <a href="#">Figure 9</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	27.8	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.3	7.7	16.8	2.8	17.4	17.6	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.5	5.4	9.8	2.7	10.6	11.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.4	4.4	7.8	2.2	8.7	9.2	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.2	3.7	5.6	1.9	6.4	6.7	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	3.4	4.9	1.6	5.3	5.6	ns
		S to Y, $\bar{Y}$ ; see <a href="#">Figure 9</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	30.7	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.3	8.2	17.2	2.9	17.9	18.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.6	5.7	10.0	2.7	10.9	11.4	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.4	4.7	7.9	2.2	8.9	9.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.2	3.8	5.7	1.9	6.5	6.8	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	3.5	5.0	1.6	5.4	5.7	ns
		$\bar{E}$ to Y, $\bar{Y}$ ; see <a href="#">Figure 10</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	29.1	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.5	8.0	17.2	3.1	17.9	18.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.8	5.6	9.9	2.7	10.9	11.4	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.4	4.6	7.9	2.2	8.9	9.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.2	3.8	5.5	2.0	6.2	6.6	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	3.4	4.7	1.8	5.1	5.4	ns

**Table 8. Dynamic characteristics ...continued**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 11](#).

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			T <sub>amb</sub> = -40 °C to +125 °C			Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max (85 °C)	Max (125 °C)	
<b>C<sub>L</sub> = 30 pF</b>									
t <sub>pd</sub>	propagation delay	I0, I1 to Y, $\bar{Y}$ ; see <a href="#">Figure 9</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	35.4	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.3	9.8	21.6	3.7	22.5	22.8	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.3	6.9	12.4	3.4	13.6	14.4	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.1	5.7	10.0	2.8	11.3	11.9	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.9	4.8	7.2	2.6	8.2	8.7	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.8	4.4	6.4	2.3	6.9	7.3	ns
		S to Y, $\bar{Y}$ ; see <a href="#">Figure 9</a> <sup>[2]</sup>							
		V <sub>CC</sub> = 0.8 V	-	38.8	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.4	10.5	22.0	3.7	23.0	23.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.3	7.2	12.6	3.5	13.9	14.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.1	5.9	10.1	2.8	11.4	12.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.9	4.9	7.3	2.6	8.3	8.7	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.7	4.5	6.4	2.3	6.9	7.3	ns
		$\bar{E}$ to Y, $\bar{Y}$ ; see <a href="#">Figure 10</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	4.4	10.1	22.1	3.9	23.0	23.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.6	7.1	12.6	3.5	13.8	14.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.1	5.8	10.0	2.8	11.3	12.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.9	4.9	7.1	2.7	8.0	8.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.7	4.5	6.2	2.4	6.7	7.0	ns

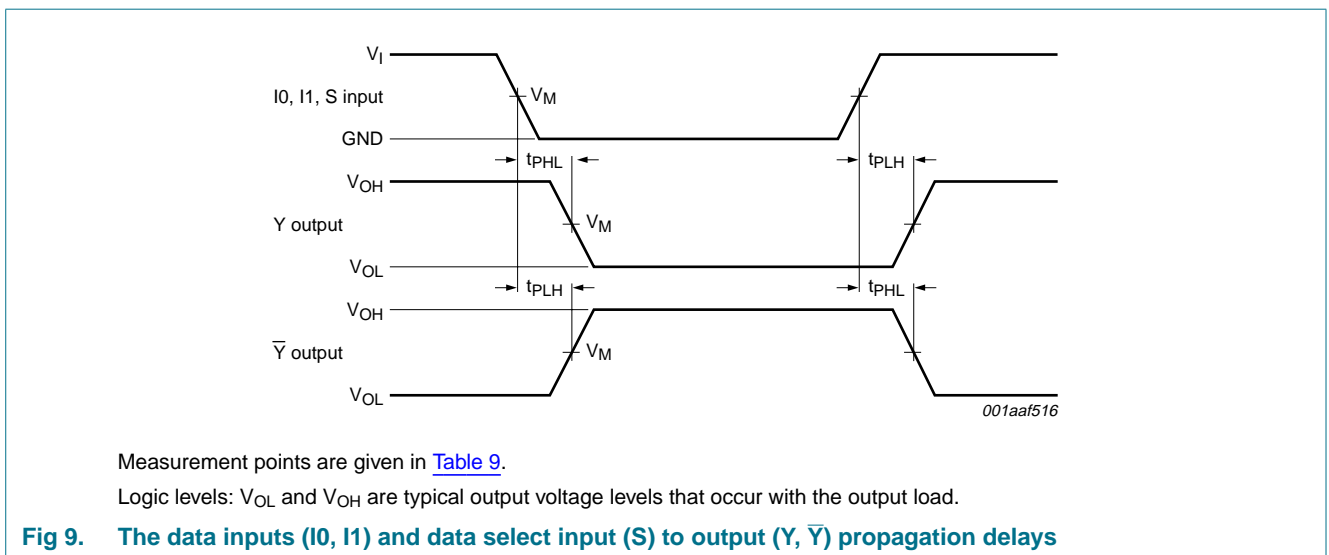
**Table 8. Dynamic characteristics ...continued**

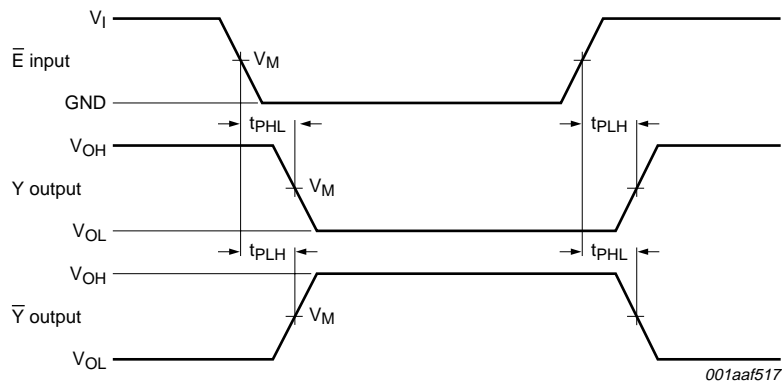
Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 11](#).

Symbol	Parameter	Conditions	T <sub>amb</sub> = 25 °C			T <sub>amb</sub> = -40 °C to +125 °C			Unit
			Min	Typ <sup>[1]</sup>	Max	Min	Max (85 °C)	Max (125 °C)	
<b>C<sub>L</sub> = 5 pF, 10 pF, 15 pF and 30 pF</b>									
C <sub>PD</sub>	power dissipation capacitance	f <sub>i</sub> = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub>		[3]					
		V <sub>CC</sub> = 0.8 V	-	5.2	-	-	-	-	pF
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	5.5	-	-	-	-	pF
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	5.7	-	-	-	-	pF
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	6.0	-	-	-	-	pF
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	6.9	-	-	-	-	pF
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	7.9	-	-	-	-	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



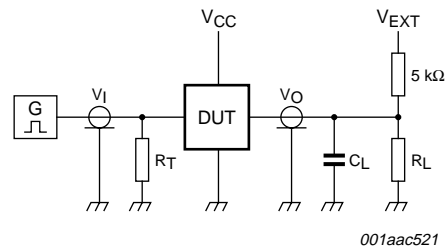


Measurement points are given in [Table 9](#).  
 Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage drop that occur with the output load.

**Fig 10. The enable input ( $\bar{E}$ ) to output ( $Y, \bar{Y}$ ) propagation delays**

**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 11. 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  $R_L = 5$  kΩ, for measuring propagation delays, setup and hold times and pulse width  $R_L = 1$  MΩ.

13. Package outline

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

SOT765-1

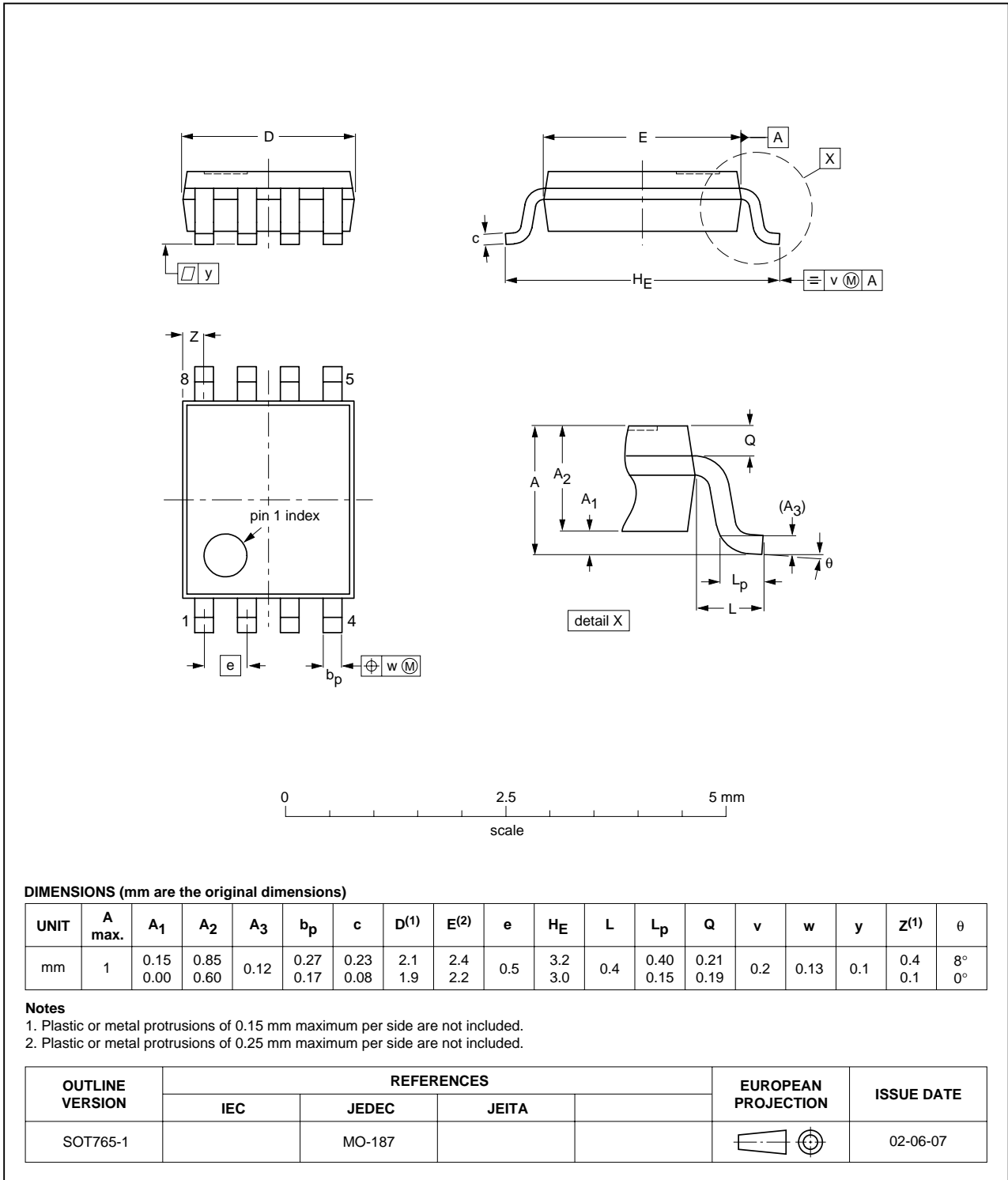


Fig 12. Package outline SOT765-1 (VSSOP8)

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

SOT833-1

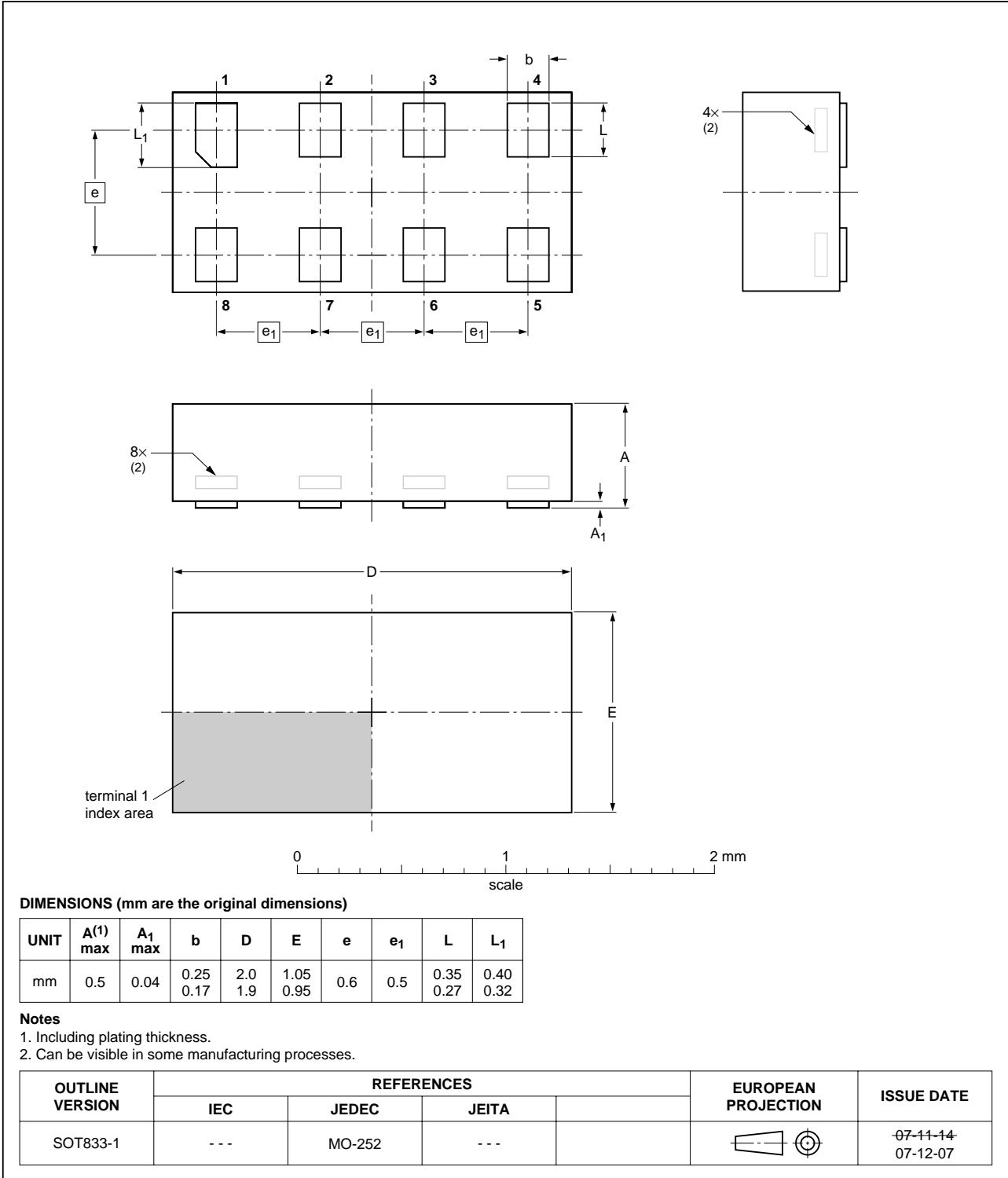


Fig 13. Package outline SOT833-1 (XSON8)

XSON8U: plastic extremely thin small outline package; no leads;  
8 terminals; UTLP based; body 3 x 2 x 0.5 mm

SOT996-2

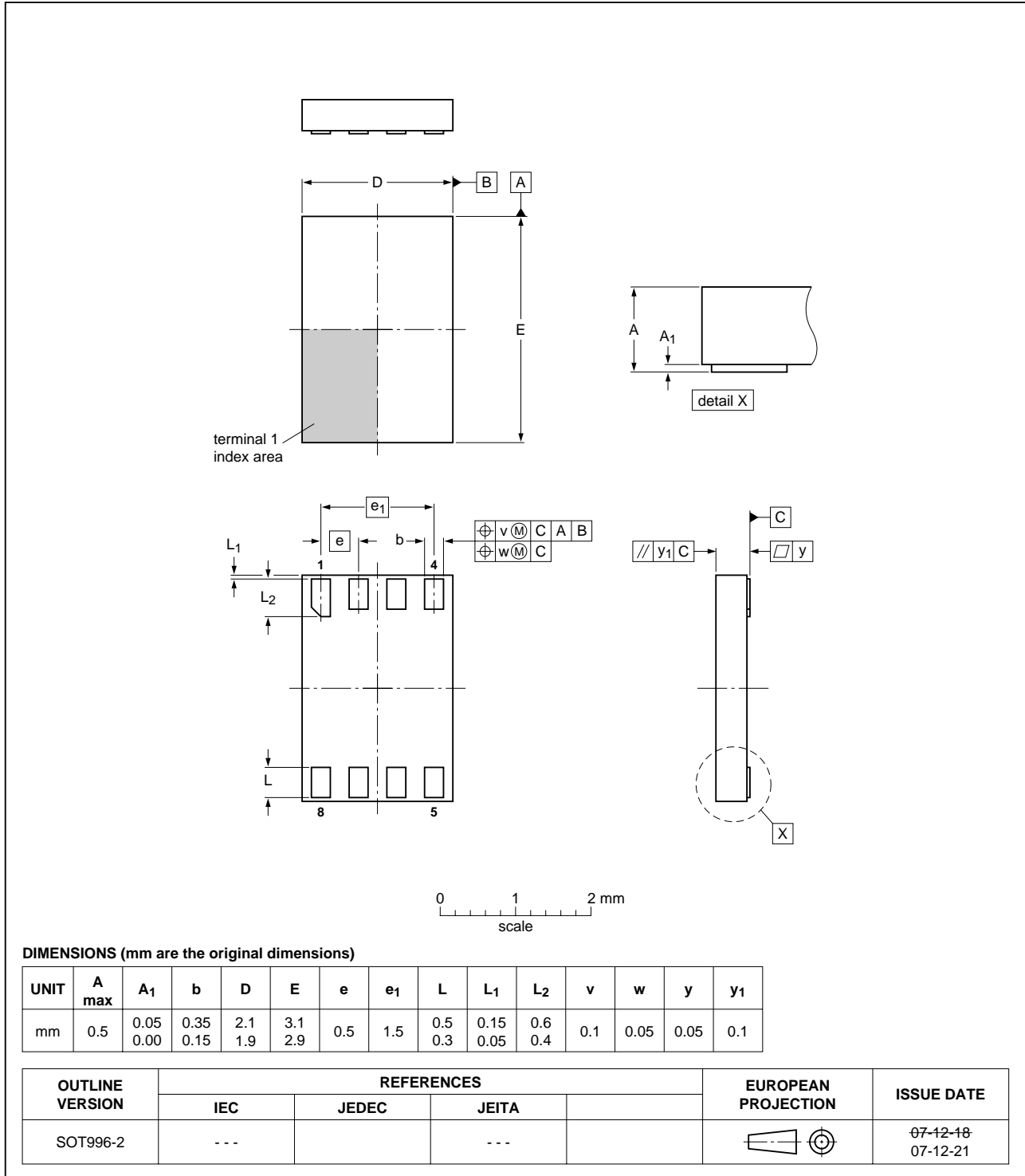


Fig 14. Package outline SOT996-2 (XSON8U)



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

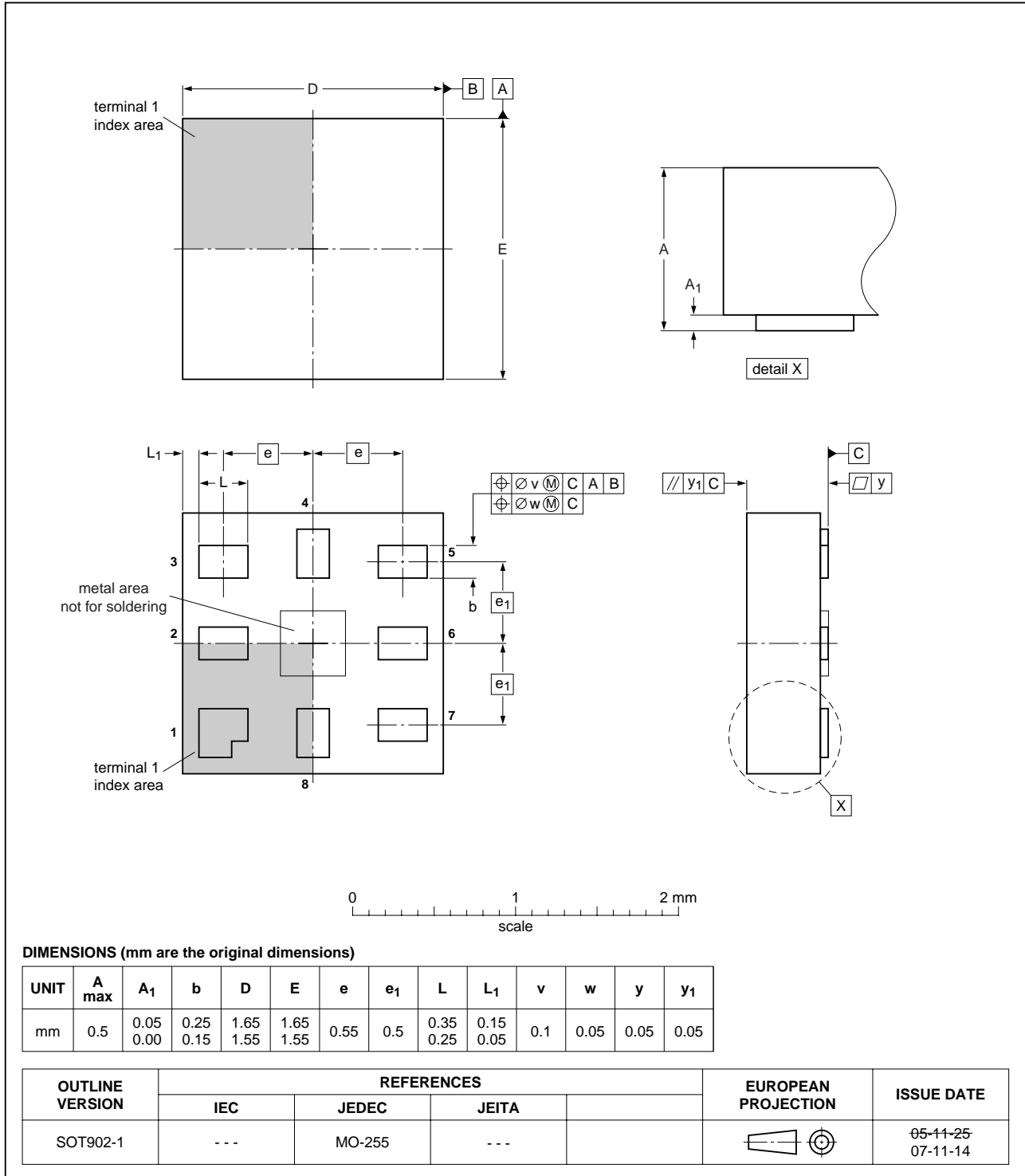


Fig 15. Package outline SOT902-1 (XQFN8U)

## 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
74AUP2G157_3	20080702	Product data sheet	-	74AUP2G157_2
Modifications:	• Added type number 74AUP2G157GD (XSON8U package)			
74AUP2G157_2	20080219	Product data sheet	-	74AUP2G157_1
74AUP2G157_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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