

# 74AUP1GU04

Low-power unbuffered inverter

Rev. 01 — 10 August 2005

Product data sheet

## 1. General description

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The 74AUP1GU04 is a high-performance, low-power, low-voltage, Si-gate CMOS device, superior to most advanced CMOS compatible 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.

The 74AUP1GU04 provides the single unbuffered inverting gate.

## 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 exceeds 2000 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
- 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. 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	
$t_{PHL}$ , $t_{PLH}$	propagation delay A to Y	$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 0.8\text{ V}$	-	6.2	-	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.1\text{ V to }1.3\text{ V}$	0.9	2.3	4.4	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.4\text{ V to }1.6\text{ V}$	0.7	1.7	3.1	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 1.65\text{ V to }1.95\text{ V}$	0.5	1.4	2.6	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 2.3\text{ V to }2.7\text{ V}$	0.4	1.1	2.0	ns	
		$C_L = 5\text{ pF}$ ; $R_L = 1\text{ M}\Omega$ ; $V_{CC} = 3.0\text{ V to }3.6\text{ V}$	0.3	1.0	1.8	ns	
$C_i$	input capacitance		-	1.5	-	pF	
$C_{PD}$	power dissipation capacitance	$V_{CC} = 1.8\text{ V}$ ; $f = 10\text{ MHz}$	[1][2]	-	1.8	-	pF
		$V_{CC} = 3.3\text{ V}$ ; $f = 10\text{ MHz}$	[1][2]	-	5.3	-	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	
74AUP1GU04GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74AUP1GU04GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886

### 5. Marking

**Table 3: Marking**

Type number	Marking code
74AUP1GU04GW	pD
74AUP1GU04GM	pD

## 6. Functional diagram

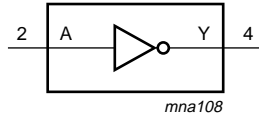


Fig 1. Logic symbol



Fig 2. IEC logic symbol

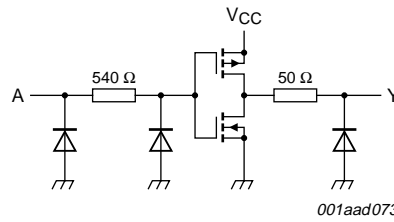


Fig 3. Logic diagram

## 7. Pinning information

### 7.1 Pinning

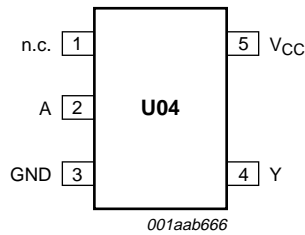


Fig 4. Pin configuration SOT353-1 (TSSOP5)

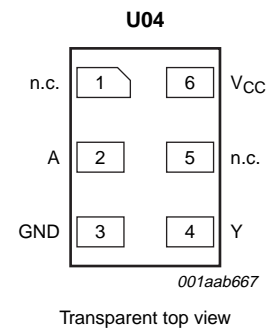


Fig 5. Pin configuration SOT886 (XSON6)

## 7.2 Pin description

Table 4: Pin description

Symbol	Pin		Description
	TSSOP5	XSON6	
n.c.	1	1	not connected
A	2	2	data input A
GND	3	3	ground (0 V)
Y	4	4	data output Y
n.c.	-	5	not connected
V <sub>CC</sub>	5	6	supply voltage

## 8. Functional description

### 8.1 Function table

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

Input	Output
A	Y
L	H
H	L

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

## 9. Limiting values

**Table 6: Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		-0.5	+4.6	V
$I_{IK}$	input clamping current	$V_I < 0$ V	-	-50	mA
$V_I$	input voltage		[1] -0.5	+4.6	V
$I_{OK}$	output clamping current	$V_O > V_{CC}$ or $V_O < 0$ V	-	±50	mA
$V_O$	output voltage		[1] -0.5	$V_{CC} + 0.5$	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 input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For TSSOP5 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 7: Recommended operating conditions**

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		0.8	3.6	V
$V_I$	input voltage		0	3.6	V
$V_O$	output voltage		0	$V_{CC}$	V
$T_{amb}$	ambient temperature		-40	+125	°C
$t_r, t_f$	input rise and fall times	$V_{CC} = 0.8$ V to 3.6 V	0	200	ns/V

## 11. Static characteristics

**Table 8: Static characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = 25 °C</b>						
V <sub>IH</sub>	HIGH-state input voltage	V <sub>CC</sub> = 0.8 V to 3.6 V	0.75 × V <sub>CC</sub>	-	-	V
V <sub>IL</sub>	LOW-state input voltage	V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.25 × V <sub>CC</sub>	V
V <sub>OH</sub>	HIGH-state output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.1	-	-	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-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>LI</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>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
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>	-	1.5	-	pF
C <sub>o</sub>	output capacitance	V <sub>O</sub> = GND; V <sub>CC</sub> = 0 V	-	1.8	-	pF
<b>T<sub>amb</sub> = -40 °C to +85 °C</b>						
V <sub>IH</sub>	HIGH-state input voltage	V <sub>CC</sub> = 0.8 V to 3.6 V	0.75 × V <sub>CC</sub>	-	-	V
V <sub>IL</sub>	LOW-state input voltage	V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.25 × V <sub>CC</sub>	V
V <sub>OH</sub>	HIGH-state output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.1	-	-	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 8: Static characteristics ...continued**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>OL</sub>	LOW-state output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = 20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.1	V
		I <sub>O</sub> = 1.1 mA; V <sub>CC</sub> = 1.1 V	-	-	0.3 × V <sub>CC</sub>	V
		I <sub>O</sub> = 1.7 mA; V <sub>CC</sub> = 1.4 V	-	-	0.37	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V	-	-	0.35	V
		I <sub>O</sub> = 2.3 mA; V <sub>CC</sub> = 2.3 V	-	-	0.33	V
		I <sub>O</sub> = 3.1 mA; V <sub>CC</sub> = 2.3 V	-	-	0.45	V
		I <sub>O</sub> = 2.7 mA; V <sub>CC</sub> = 3.0 V	-	-	0.33	V
		I <sub>O</sub> = 4.0 mA; V <sub>CC</sub> = 3.0 V	-	-	0.45	V
I <sub>LI</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>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
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>IH</sub>	HIGH-state input voltage	V <sub>CC</sub> = 0.8 V to 3.6 V	0.75 × V <sub>CC</sub>	-	-	V
V <sub>IL</sub>	LOW-state input voltage	V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.25 × V <sub>CC</sub>	V
V <sub>OH</sub>	HIGH-state output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		I <sub>O</sub> = -20 μA; V <sub>CC</sub> = 0.8 V to 3.6 V	V <sub>CC</sub> - 0.11	-	-	V
		I <sub>O</sub> = -1.1 mA; V <sub>CC</sub> = 1.1 V	0.6 × V <sub>CC</sub>	-	-	V
		I <sub>O</sub> = -1.7 mA; V <sub>CC</sub> = 1.4 V	0.93	-	-	V
		I <sub>O</sub> = -1.9 mA; V <sub>CC</sub> = 1.65 V	1.17	-	-	V
		I <sub>O</sub> = -2.3 mA; V <sub>CC</sub> = 2.3 V	1.77	-	-	V
		I <sub>O</sub> = -3.1 mA; V <sub>CC</sub> = 2.3 V	1.67	-	-	V
		I <sub>O</sub> = -2.7 mA; V <sub>CC</sub> = 3.0 V	2.40	-	-	V
		I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.30	-	-	V
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>LI</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>CC</sub>	quiescent supply current	V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	1.4	μA

## 12. Dynamic characteristics

**Table 9: Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#)

Symbol	Parameter	Conditions	Min	Typ <sup>[1]</sup>	Max	Unit
<b><math>T_{amb} = 25\text{ }^{\circ}\text{C}</math>; <math>C_L = 5\text{ pF}</math></b>						
$t_{PHL}$ , $t_{PLH}$	propagation delay A to Y	see <a href="#">Figure 6</a>				
		$V_{CC} = 0.8\text{ V}$	-	6.2	-	ns
		$V_{CC} = 1.1\text{ V to }1.3\text{ V}$	0.9	2.3	4.4	ns
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	0.7	1.7	3.1	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	0.5	1.4	2.6	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	0.4	1.1	2.0	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	0.3	1.0	1.8	ns
<b><math>T_{amb} = 25\text{ }^{\circ}\text{C}</math>; <math>C_L = 10\text{ pF}</math></b>						
$t_{PHL}$ , $t_{PLH}$	propagation delay A to Y	see <a href="#">Figure 6</a>				
		$V_{CC} = 0.8\text{ V}$	-	9.6	-	ns
		$V_{CC} = 1.1\text{ V to }1.3\text{ V}$	1.2	3.1	6.1	ns
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	1.0	2.3	4.0	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	0.8	1.9	3.3	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	0.6	1.5	2.7	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	0.5	1.3	2.4	ns
<b><math>T_{amb} = 25\text{ }^{\circ}\text{C}</math>; <math>C_L = 15\text{ pF}</math></b>						
$t_{PHL}$ , $t_{PLH}$	propagation delay A to Y	see <a href="#">Figure 6</a>				
		$V_{CC} = 0.8\text{ V}$	-	13.0	-	ns
		$V_{CC} = 1.1\text{ V to }1.3\text{ V}$	1.6	3.8	7.9	ns
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	1.3	2.8	4.9	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	1.0	2.3	4.0	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	0.8	1.9	3.2	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	0.7	1.6	2.9	ns
<b><math>T_{amb} = 25\text{ }^{\circ}\text{C}</math>; <math>C_L = 30\text{ pF}</math></b>						
$t_{PHL}$ , $t_{PLH}$	propagation delay A to Y	see <a href="#">Figure 6</a>				
		$V_{CC} = 0.8\text{ V}$	-	23.2	-	ns
		$V_{CC} = 1.1\text{ V to }1.3\text{ V}$	2.4	6.0	13.1	ns
		$V_{CC} = 1.4\text{ V to }1.6\text{ V}$	2.0	4.2	7.6	ns
		$V_{CC} = 1.65\text{ V to }1.95\text{ V}$	1.7	3.6	6.1	ns
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.4	2.9	4.8	ns
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	1.2	2.5	4.3	ns



**Table 9: Dynamic characteristics ...continued**  
 Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#)

Symbol	Parameter	Conditions	Min	Typ [1]	Max	Unit
<b>T<sub>amb</sub> = 25 °C</b>						
C <sub>PD</sub>	power dissipation capacitance	f = 10 MHz	[2] [3]			
		V <sub>CC</sub> = 0.8 V	-	1.7	-	pF
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	1.6	-	pF
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	1.6	-	pF
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	1.8	-	pF
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	3.3	-	pF
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	5.3	-	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 10: Dynamic characteristics**  
 Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#)

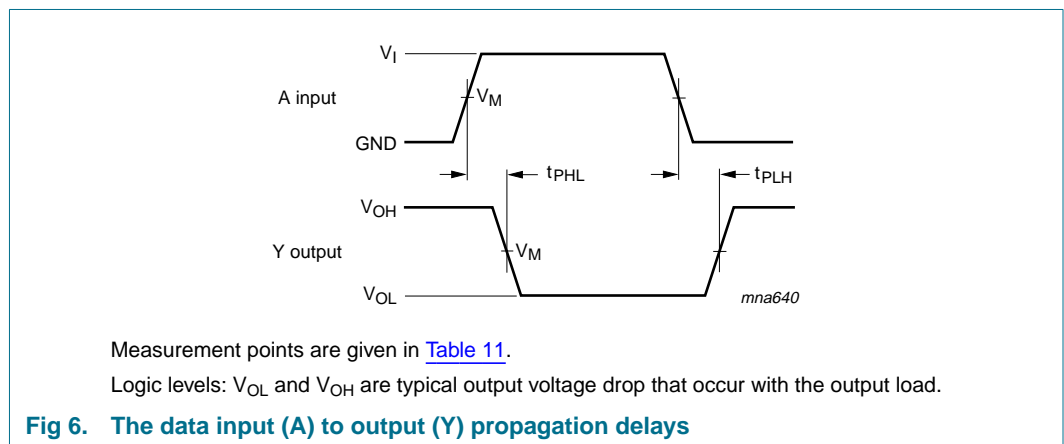
Symbol	Parameter	Conditions	-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Max	Min	Max	
<b>C<sub>L</sub> = 5 pF</b>							
t <sub>PHL</sub> , t <sub>PLH</sub>	propagation delay A to Y	see <a href="#">Figure 6</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	0.9	4.8	0.9	5.3	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	0.6	3.4	0.6	3.8	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	0.5	2.9	0.5	3.2	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	0.4	2.3	0.4	2.6	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.3	2.1	0.3	2.4	ns
<b>C<sub>L</sub> = 10 pF</b>							
t <sub>PHL</sub> , t <sub>PLH</sub>	propagation delay A to Y	see <a href="#">Figure 6</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	1.2	6.8	1.2	7.5	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	0.9	4.6	0.9	5.1	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	0.7	3.8	0.7	4.2	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	0.6	3.1	0.6	3.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	0.5	2.7	0.5	3.0	ns

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

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 7](#)

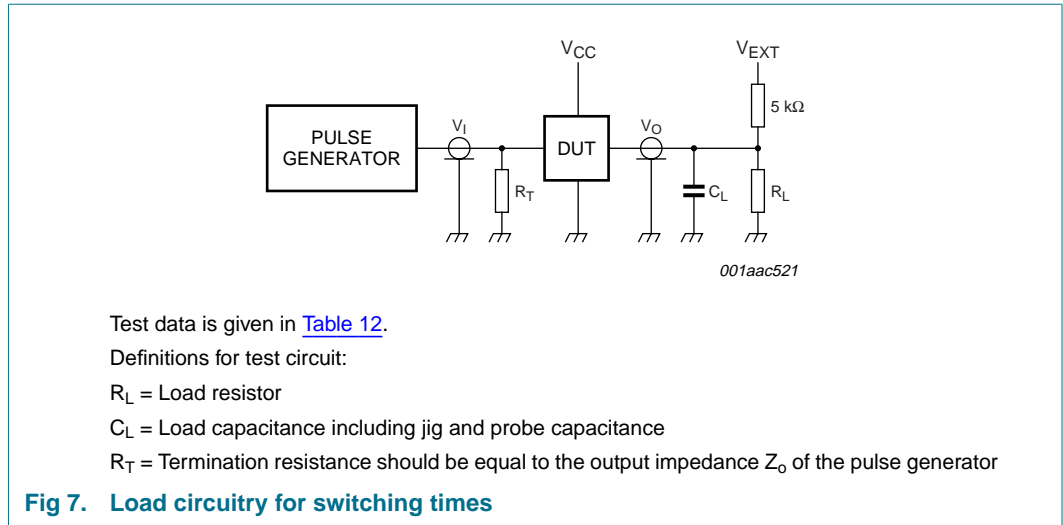
Symbol	Parameter	Conditions	-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Max	Min	Max	
<b><math>C_L = 15 \text{ pF}</math></b>							
$t_{PHL}, t_{PLH}$	propagation delay A to Y	see <a href="#">Figure 6</a>					
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$	1.4	8.8	1.4	9.7	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$	1.1	5.7	1.1	6.3	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	0.9	4.7	0.9	5.2	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	0.8	3.7	0.8	4.1	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	0.7	3.3	0.7	3.7	ns
<b><math>C_L = 30 \text{ pF}</math></b>							
$t_{PHL}, t_{PLH}$	propagation delay A to Y	see <a href="#">Figure 6</a>					
		$V_{CC} = 1.1 \text{ V to } 1.3 \text{ V}$	2.2	14.8	2.2	16.3	ns
		$V_{CC} = 1.4 \text{ V to } 1.6 \text{ V}$	1.8	9.0	1.8	9.9	ns
		$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	1.5	7.2	1.5	8.0	ns
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.3	5.7	1.3	6.3	ns
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	1.1	5.1	1.1	5.7	ns

### 13. Waveforms



**Table 11: Measurement points**

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

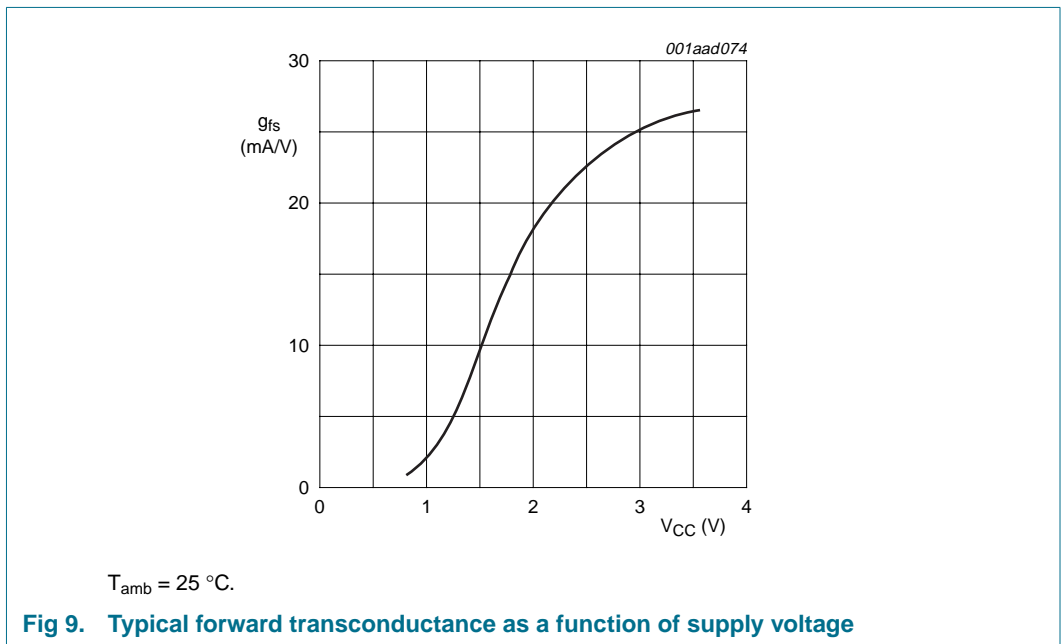
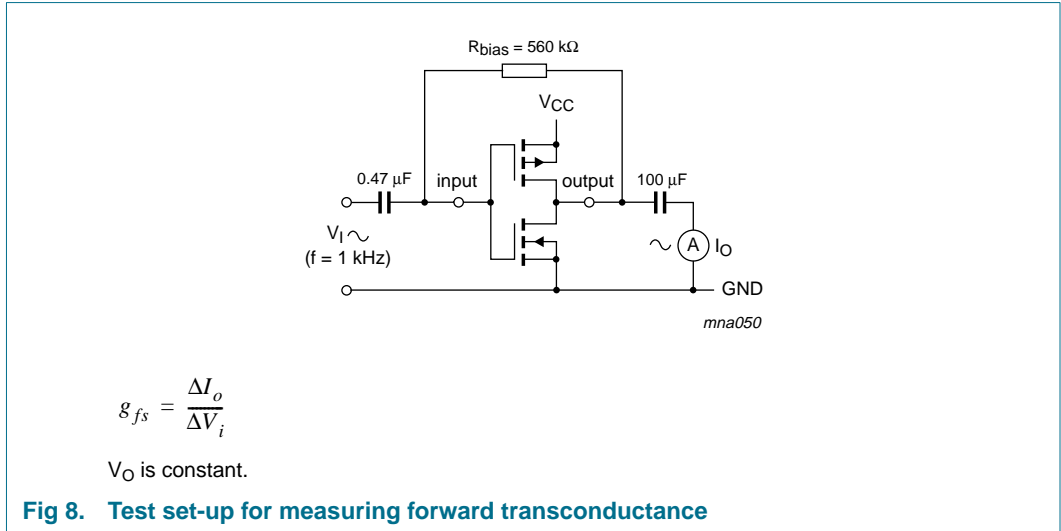


**Table 12: Test data**

Supply voltage	Load		$V_{EXT}$		
$V_{CC}$	$C_L$	$R_L$ [1]	$t_{PLH}$ , $t_{PHL}$	$t_{PZH}$ , $t_{PHZ}$	$t_{PZL}$ , $t_{PLZ}$
0.8 V to 3.6 V	5 pF, 10 pF, 15 pF and 30 pF	5 kΩ or 1 MΩ	open	GND	$2 \times V_{CC}$

[1] For measuring enable and disable times  $R_L = 5 \text{ k}\Omega$ , for measuring propagation delays, setup and hold times and pulse width  $R_L = 1 \text{ M}\Omega$ .

14. Additional characteristics

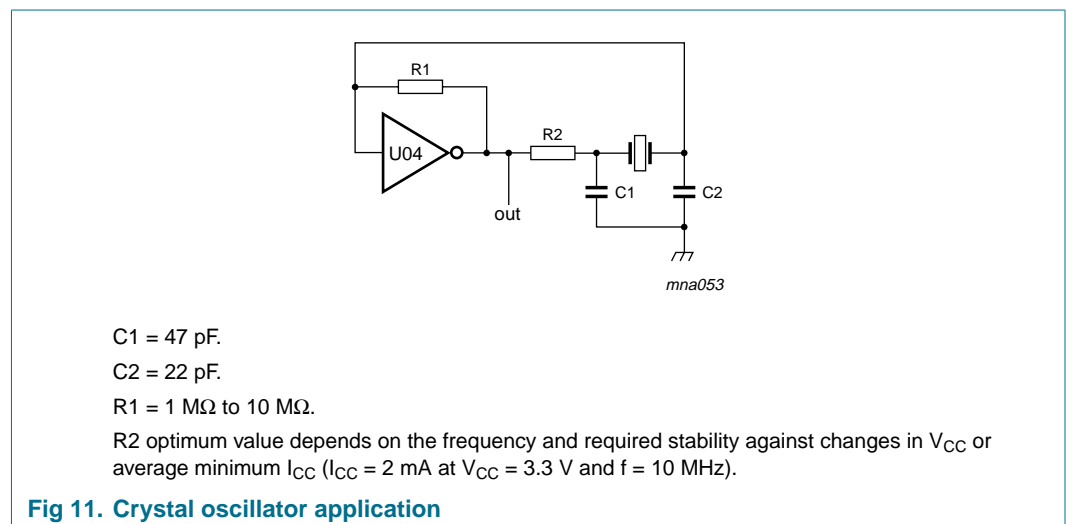
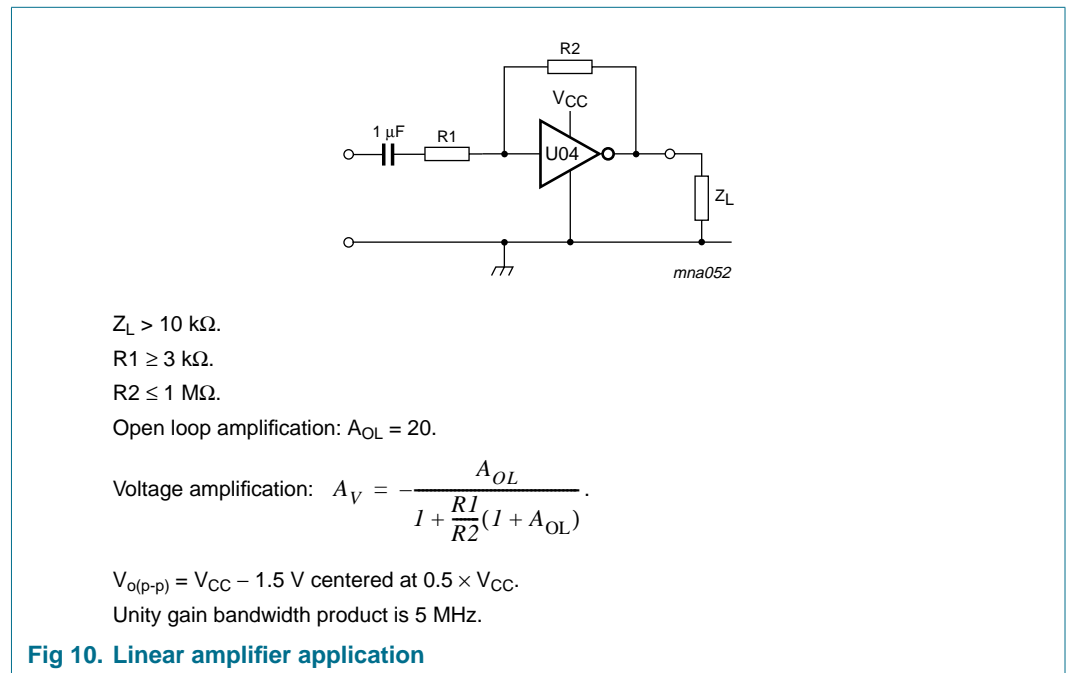


## 15. Application information

Some applications for the 74AUP1GU04 are:

- Linear amplifier (see [Figure 10](#))
- Crystal oscillator (see [Figure 11](#)).

**Remark:** All values given are typical values unless otherwise specified.



16. Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm

SOT353-1

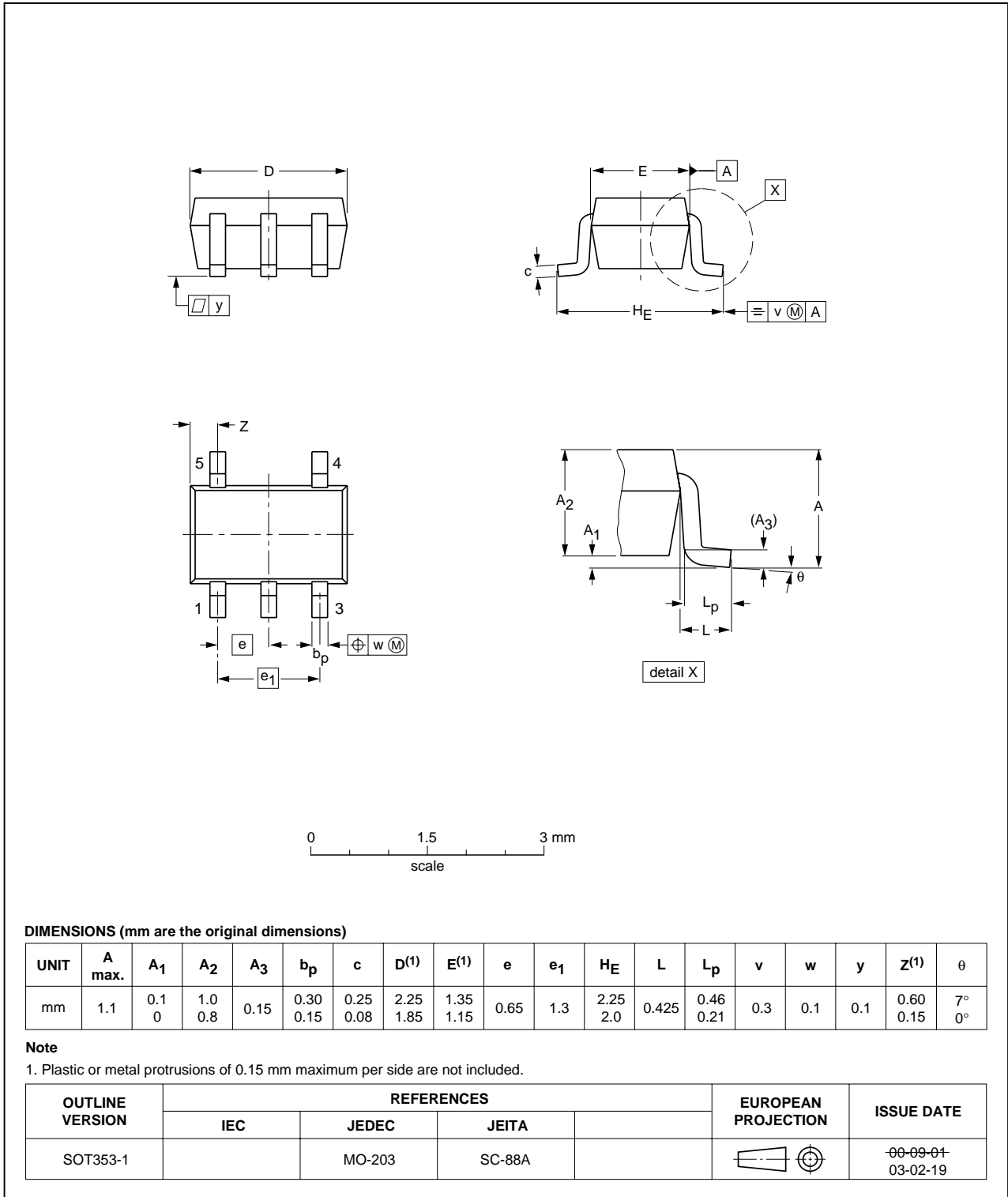


Fig 12. Package outline SOT353-1 (TSSOP5)

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

SOT886

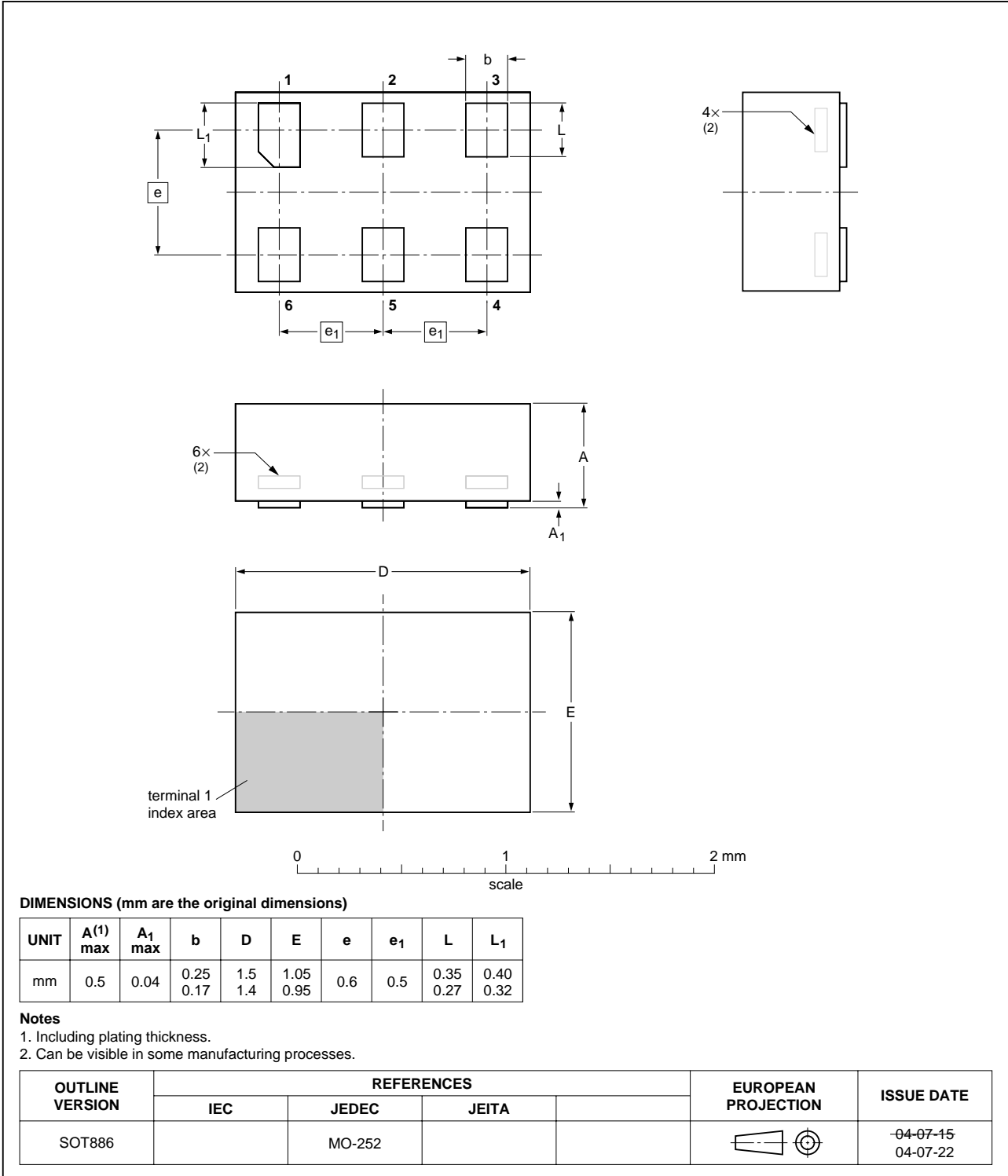


Fig 13. Package outline SOT886 (XSON6)

## 17. Abbreviations

**Table 13: Abbreviations**

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

## 18. Revision history

**Table 14: Revision history**

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
74AUP1GU04_1	20050810	Product data sheet	-	9397 750 14689	-



## 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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