

# 74AUP1G04

## Low-power inverter

Rev. 03 — 5 November 2009

Product data sheet

## 1. General description

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The 74AUP1G04 provides the single inverting buffer.

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.

## 2. Features

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- 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-A114F Class 3A exceeds 5000 V
  - ◆ MM JESD22-A115-A exceeds 200 V
  - ◆ CDM JESD22-C101C exceeds 1000 V
- Low static power consumption;  $I_{CC} = 0.9 \mu A$  (maximum)
- Latch-up performance exceeds 100 mA per JESD 78B 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  $-40\text{ }^{\circ}C$  to  $+85\text{ }^{\circ}C$  and  $-40\text{ }^{\circ}C$  to  $+125\text{ }^{\circ}C$

### 3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AUP1G04GV	−40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753
74AUP1G04GW	−40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74AUP1G04GM	−40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886
74AUP1G04GF	−40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1 × 0.5 mm	SOT891

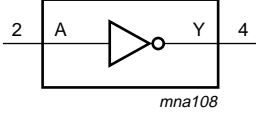
### 4. Marking

Table 2. Marking

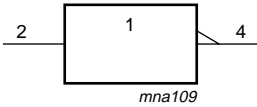
Type number	Marking code <sup>[1]</sup>
74AUP1G04GV	p04
74AUP1G04GW	pC
74AUP1G04GM	pC
74AUP1G04GF	pC

[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

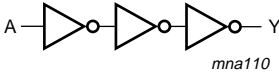
### 5. Functional diagram



**Fig 1. Logic symbol**



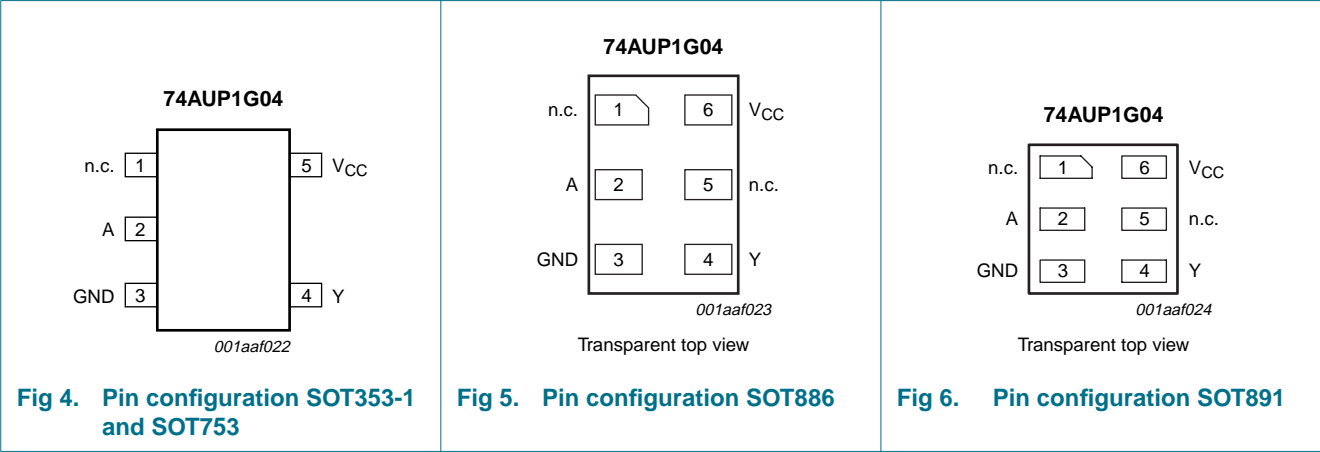
**Fig 2. IEC logic symbol**



**Fig 3. Logic diagram**

6. Pinning information

6.1 Pinning



6.2 Pin description

Table 3. Pin description

Symbol	Pin		Description
	SOT353-1/SOT753	SOT886/SOT891	
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

7. Functional description

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

Input	Output
A	Y
L	H
H	L

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

## 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
$V_{CC}$	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	[1] -0.5	$V_{CC} + 0.5$	V
		power-down mode	[1] -0.5	+4.6	V
$I_O$	output current	$V_O = 0$ V to $V_{CC}$	-	$\pm 20$	mA
$I_{CC}$	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 TSSOP5 and SC-74A packages: above 87.5 °C the value of  $P_{tot}$  derates linearly with 4.0 mW/K.

For XSON6 packages: above 118 °C the value of  $P_{tot}$  derates linearly with 7.8 mW/K.

## 9. Recommended operating conditions

**Table 6. 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
$\Delta t/\Delta V$	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-state 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-state 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-state 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-state 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	$V_I = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	$\pm 0.1$	$\mu\text{A}$
$I_{OFF}$	power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$	-	-	$\pm 0.2$	$\mu\text{A}$
$\Delta I_{OFF}$	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	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}; V_{CC} = 3.3 \text{ V}$	-	-	40	$\mu\text{A}$
$C_I$	input capacitance	$V_{CC} = 0 \text{ V to } 3.6 \text{ V}; V_I = \text{GND or } V_{CC}$	-	0.8	-	pF
$C_O$	output capacitance	$V_O = \text{GND}; V_{CC} = 0 \text{ V}$	-	1.7	-	pF
<b><math>T_{amb} = -40^\circ\text{C to } +85^\circ\text{C}</math></b>						
$V_{IH}$	HIGH-state 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-state 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-state 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
$V_{OL}$	LOW-state 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
$I_I$	input leakage current	$V_I = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	$\pm 0.5$	$\mu\text{A}$
		$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$	-	-	$\pm 0.5$	$\mu\text{A}$
		$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	$\pm 0.6$	$\mu\text{A}$

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

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CC}$	supply current	$V_I = \text{GND or } V_{CC}; I_O = 0 \text{ A};$ $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	0.9	$\mu\text{A}$
$\Delta I_{CC}$	additional supply current	$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A};$ $V_{CC} = 3.3 \text{ V}$	-	-	50	$\mu\text{A}$
<b><math>T_{\text{amb}} = -40^\circ\text{C to } +125^\circ\text{C}</math></b>						
$V_{IH}$	HIGH-state input voltage	$V_{CC} = 0.8 \text{ V}$	$0.75 \times V_{CC}$	-	-	V
		$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$	$0.70 \times V_{CC}$	-	-	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-state input voltage	$V_{CC} = 0.8 \text{ V}$	-	-	$0.25 \times V_{CC}$	V
		$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$	-	-	$0.30 \times V_{CC}$	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-state output voltage	$V_I = V_{IH} \text{ or } V_{IL}$				
		$I_O = -20 \mu\text{A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	$V_{CC} - 0.11$	-	-	V
		$I_O = -1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	$0.6 \times V_{CC}$	-	-	V
		$I_O = -1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	0.93	-	-	V
		$I_O = -1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$	1.17	-	-	V
		$I_O = -2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.77	-	-	V
		$I_O = -3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.67	-	-	V
		$I_O = -2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.40	-	-	V
$V_{OL}$	LOW-state output voltage	$V_I = V_{IH} \text{ or } V_{IL}$				
		$I_O = 20 \mu\text{A}; V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	0.11	V
		$I_O = 1.1 \text{ mA}; V_{CC} = 1.1 \text{ V}$	-	-	$0.33 \times V_{CC}$	V
		$I_O = 1.7 \text{ mA}; V_{CC} = 1.4 \text{ V}$	-	-	0.41	V
		$I_O = 1.9 \text{ mA}; V_{CC} = 1.65 \text{ V}$	-	-	0.39	V
		$I_O = 2.3 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.36	V
		$I_O = 3.1 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.50	V
		$I_O = 2.7 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.36	V
$I_I$	input leakage current	$V_I = \text{GND to } 3.6 \text{ V}; V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	$\pm 0.75$	$\mu\text{A}$
		$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$	-	-	$\pm 0.75$	$\mu\text{A}$
		$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V};$ $V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	$\pm 0.75$	$\mu\text{A}$
		$V_I = \text{GND or } V_{CC}; I_O = 0 \text{ A};$ $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	1.4	$\mu\text{A}$
		$V_I = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A};$ $V_{CC} = 3.3 \text{ V}$	-	-	75	$\mu\text{A}$

## 11. Dynamic characteristics

**Table 8. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 8](#)

Symbol	Parameter	Conditions	Min	Typ <a href="#">[1]</a>	Max	Unit
T <sub>amb</sub> = 25 °C; C <sub>L</sub> = 5 pF						
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A to Y	see <a href="#">Figure 7</a>				
		V <sub>CC</sub> = 0.8 V	-	16.0	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.4	5.0	10.3	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.8	3.6	6.4	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.5	2.9	5.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.2	2.4	3.9	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.1	2.1	3.2	ns
T <sub>amb</sub> = 25 °C; C <sub>L</sub> = 10 pF						
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A to Y	see <a href="#">Figure 7</a>				
		V <sub>CC</sub> = 0.8 V	-	19.8	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.8	5.9	12.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.3	4.2	7.5	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.0	3.5	5.9	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.7	2.9	4.6	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.6	2.7	3.8	ns
T <sub>amb</sub> = 25 °C; C <sub>L</sub> = 15 pF						
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A to Y	see <a href="#">Figure 7</a>				
		V <sub>CC</sub> = 0.8 V	-	23.3	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.2	6.7	13.0	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.6	4.7	8.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.3	4.0	6.7	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.1	3.3	5.1	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	3.1	4.2	ns
T <sub>amb</sub> = 25 °C; C <sub>L</sub> = 30 pF						
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A to Y	see <a href="#">Figure 7</a>				
		V <sub>CC</sub> = 0.8 V	-	33.6	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.4	8.9	16.0	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.6	6.3	10.8	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.2	5.3	9.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.9	4.5	6.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.9	4.2	5.4	ns



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

Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 8](#)

Symbol	Parameter	Conditions	Min	Typ <sup>[1]</sup>	Max	Unit
<b>T<sub>amb</sub> = 25 °C</b>						
C <sub>PD</sub>	power dissipation capacitance	f = 1 MHz; V <sub>I</sub> = GND to V <sub>CC</sub> <sup>[2]</sup>				
		V <sub>CC</sub> = 0.8 V	-	2.5	-	pF
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	2.7	-	pF
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	2.8	-	pF
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	3.0	-	pF
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	3.5	-	pF
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	4.0	-	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.

**Table 9. Dynamic characteristics**

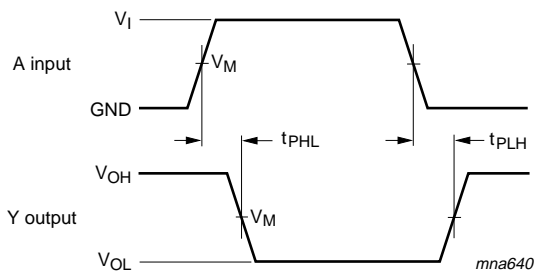
Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 8](#)

Symbol	Parameter	Conditions	-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Max	Min	Max	
C <sub>L</sub> = 5 pF							
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A to Y	see <a href="#">Figure 7</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.1	11.4	2.1	12.6	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.6	7.4	1.6	8.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.4	5.9	1.4	6.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.1	4.5	1.1	5.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.0	3.9	1.0	4.3	ns
C <sub>L</sub> = 10 pF							
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A to Y	see <a href="#">Figure 7</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.6	13.7	2.6	15.1	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.1	8.7	2.1	9.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.8	7.0	1.8	7.7	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.5	5.4	1.5	6.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.4	4.5	1.4	5.0	ns

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

Symbol	Parameter	Conditions	−40 °C to +85 °C		−40 °C to +125 °C		Unit
			Min	Max	Min	Max	
C <sub>L</sub> = 15 pF							
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A to Y	see <a href="#">Figure 7</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.0	15.8	3.0	17.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.4	10.0	2.4	11.0	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.1	8.0	2.1	8.8	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.8	6.1	1.8	6.8	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.8	5.0	1.8	5.5	ns
C <sub>L</sub> = 30 pF							
t <sub>PHL</sub> , t <sub>PLH</sub>	HIGH-to-LOW and LOW-to-HIGH propagation delay A to Y	see <a href="#">Figure 7</a>					
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.0	19.0	4.0	20.9	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.2	12.9	3.2	14.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.9	10.5	2.9	11.6	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.6	7.6	2.6	8.4	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.6	6.2	2.6	6.9	ns

12. Waveforms

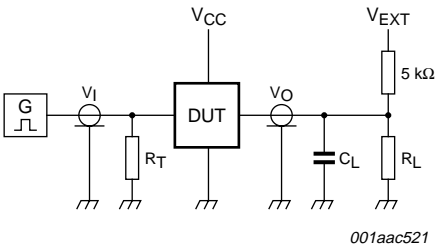


Measurement points are given in Table 10.  
Logic levels: V<sub>OL</sub> and V<sub>OH</sub> are typical output voltage drop that occur with the output load.

Fig 7. The data input (A) to output (Y) propagation delays

Table 10. Measurement points

Supply voltage	Output	Input		
V <sub>CC</sub>	V <sub>M</sub>	V <sub>M</sub>	V <sub>I</sub>	t <sub>r</sub> = t <sub>f</sub>
0.8 V to 3.6 V	0.5 × V <sub>CC</sub>	0.5 × V <sub>CC</sub>	V <sub>CC</sub>	≤ 3.0 ns



Test data is given in [Table 11](#).  
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 8. Load circuitry for switching times

Table 11. 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  $R_L = 1\text{ M}\Omega$ .

13. Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mmSOT353-1

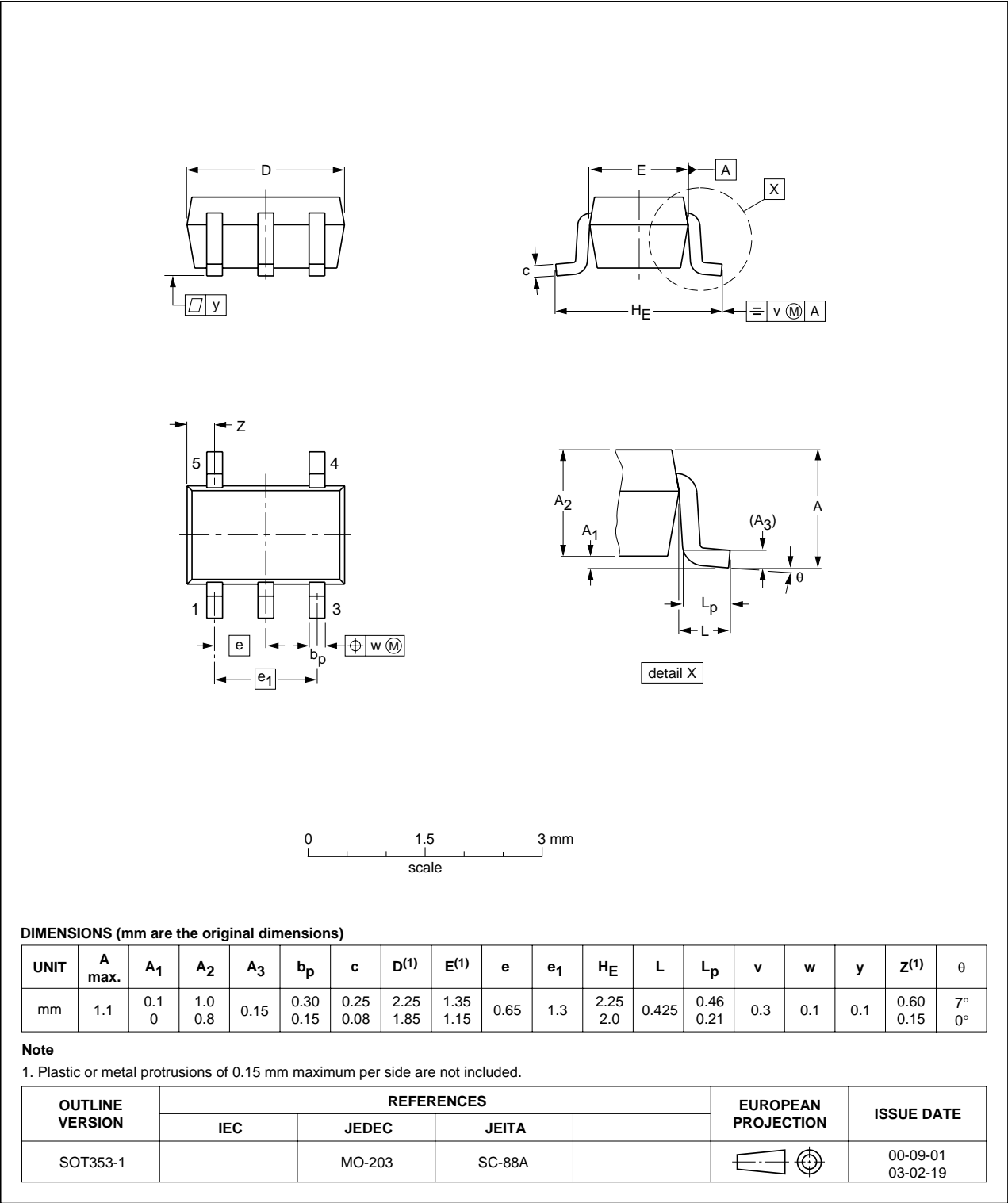


Fig 9. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753

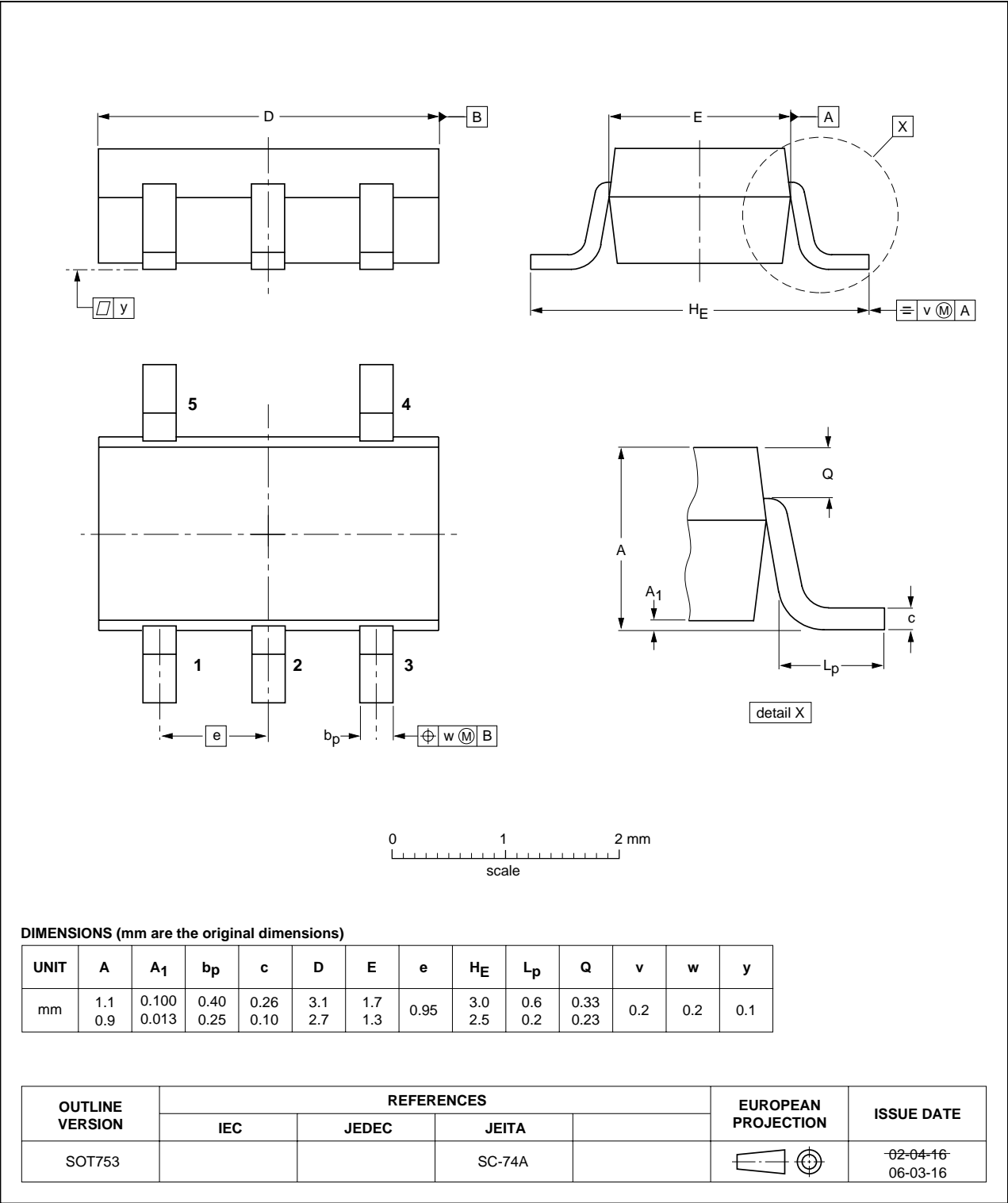


Fig 10. Package outline SOT753 (SC-74A)

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

SOT886

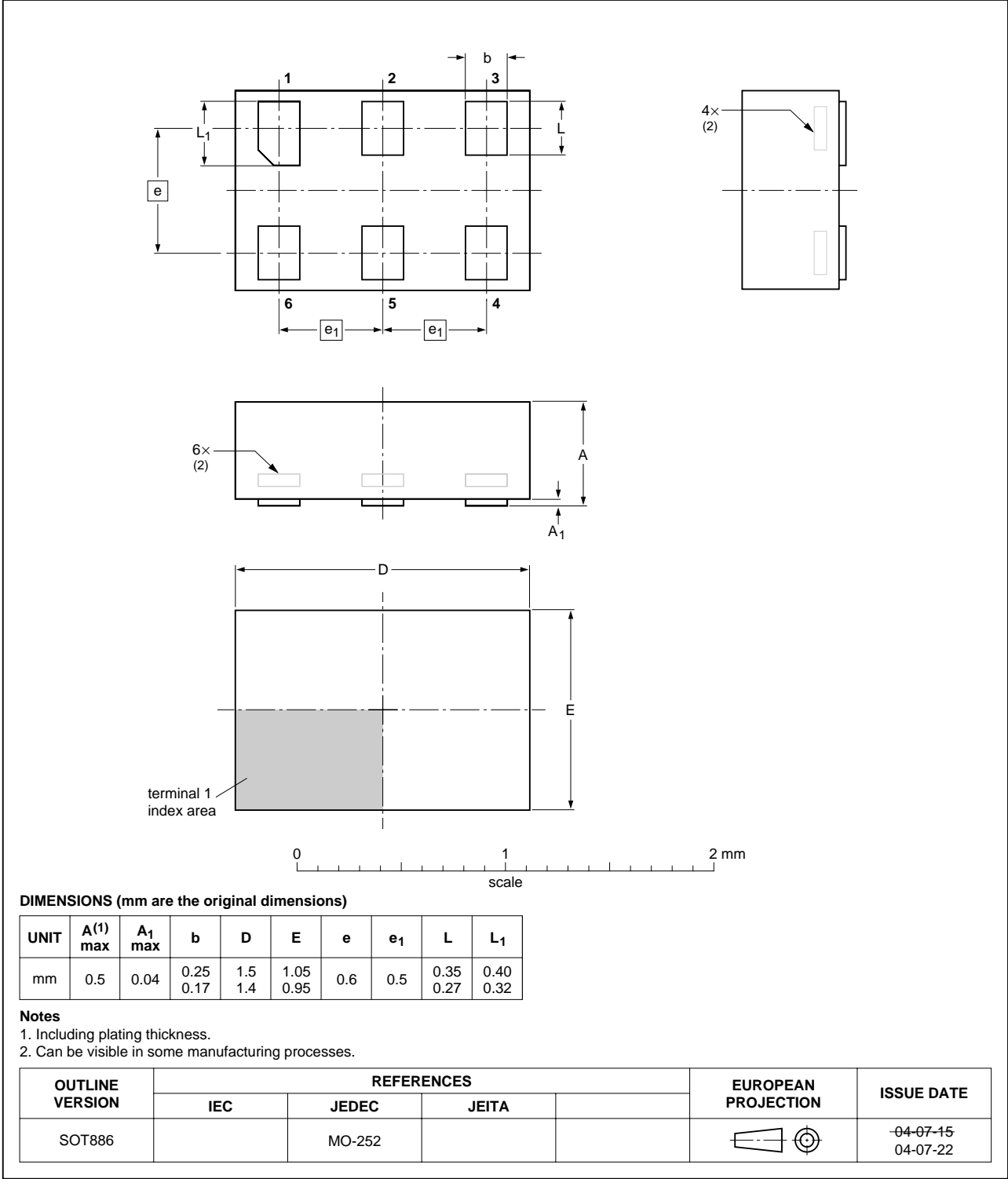


Fig 11. Package outline SOT886 (XSON6)

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

SOT891

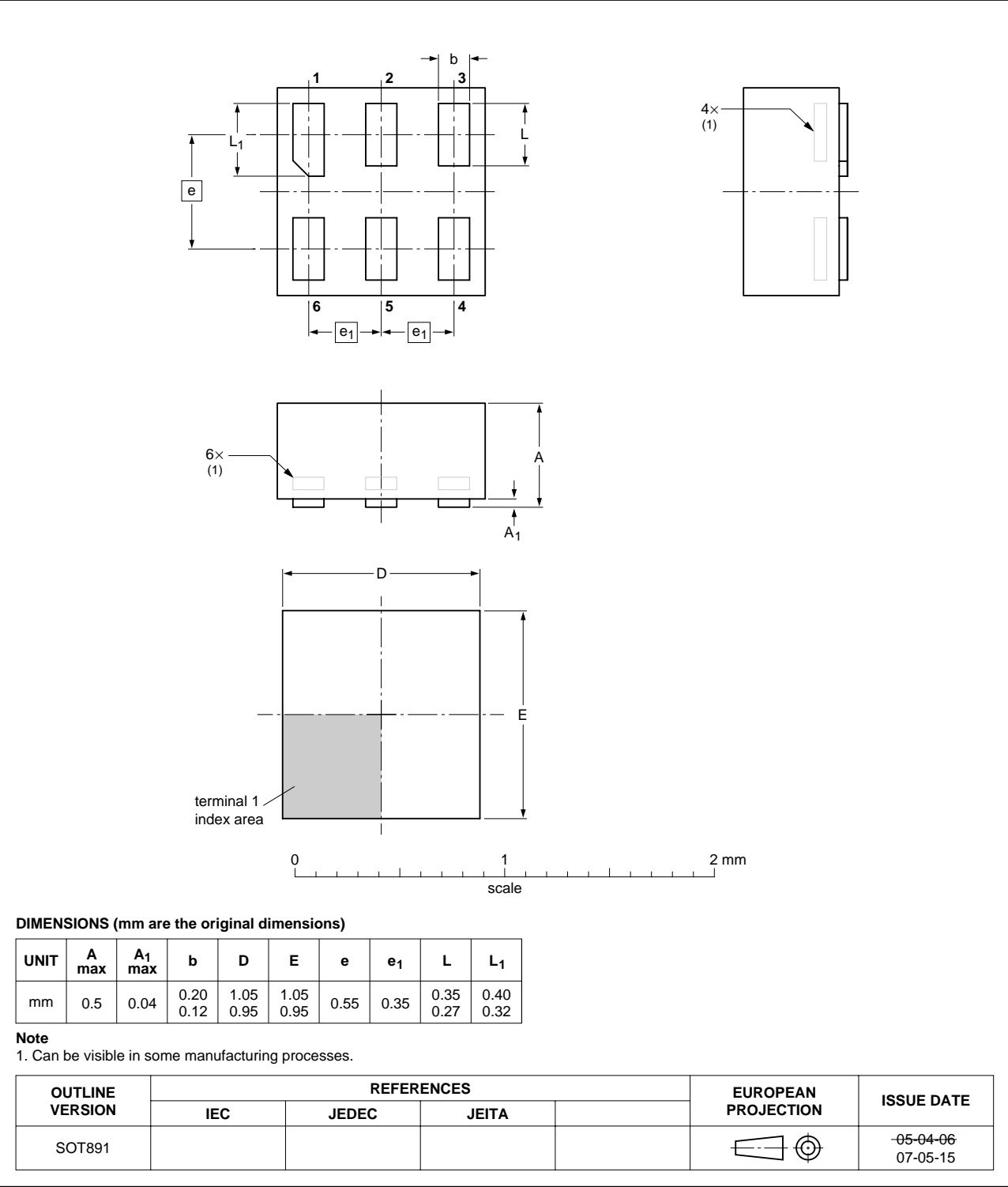


Fig 12. Package outline SOT891 (XSON6)

## 14. Abbreviations

Table 12. Abbreviations

Acronym	Description
CDM	Charged Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
HBM	Human Body Model
MM	Machine Model

## 15. Revision history

Table 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP1G04_3	20091105	Product data sheet	-	74AUP1G04_2
Modifications:	<ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li><li>• Added type number 74AUP1G04GV (SC-74A) package.</li></ul>			
74AUP1G04_2	20060628	Product data sheet	-	74AUP1G04_1
74AUP1G04_1	20050718	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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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