

# 74AUP1G14

## Low-power Schmitt trigger inverter

Rev. 10 — 14 January 2022

Product data sheet

### 1. General description

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The 74AUP1G14 is a single inverter with Schmitt-trigger input. This device ensures 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 potentially damaging backflow current through the device when it is powered down.

### 2. Features and benefits

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- Wide supply voltage range from 0.8 V to 3.6 V
- CMOS low power dissipation
- High noise immunity
- Overvoltage tolerant inputs to 3.6 V
- Low static power consumption;  $I_{CC} = 0.9 \mu\text{A}$  (maximum)
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Low noise overshoot and undershoot < 10 % of  $V_{CC}$
- $I_{OFF}$  circuitry provides partial Power-down mode operation
- Complies with JEDEC standards:
  - JESD8-12 (0.8 V to 1.3 V)
  - JESD8-11 (0.9 V to 1.65 V)
  - JESD8-7 (1.65 V to 1.95 V)
  - JESD8-5 (2.3 V to 2.7 V)
  - JESD8C (2.7 V to 3.6 V)
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 Class 3A exceeds 5000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 Class C3 exceeds 1000 V
  - MM: JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

### 3. Applications

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- Wave and pulse shaper
- Astable multivibrator
- Monostable multivibrator

## 4. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AUP1G14GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74AUP1G14GV	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753
74AUP1G14GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886
74AUP1G14GN	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm	SOT1115
74AUP1G14GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm	SOT1202
74AUP1G14GX	-40 °C to +125 °C	X2SON5	plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 × 0.8 × 0.32 mm	SOT1226-3
74AUP1G14GX4	-40 °C to +125 °C	X2SON4	plastic thermal enhanced extremely thin small outline package; no leads; 4 terminals; body 0.6 × 0.6 × 0.32 mm	SOT1269-2

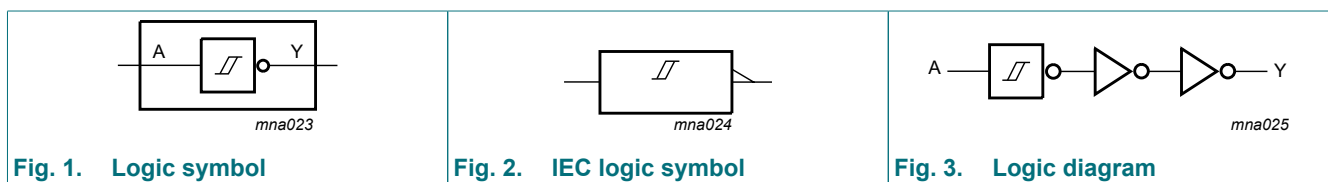
## 5. Marking

Table 2. Marking

Type number	Marking code <sup>[1]</sup>
74AUP1G14GW	pF
74AUP1G14GV	pF
74AUP1G14GM	pF
74AUP1G14GN	pF
74AUP1G14GS	pF
74AUP1G14GX	pF
74AUP1G14GX4	pF

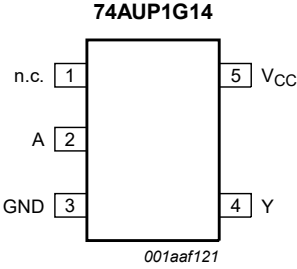
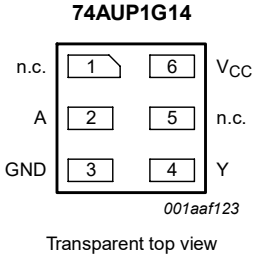
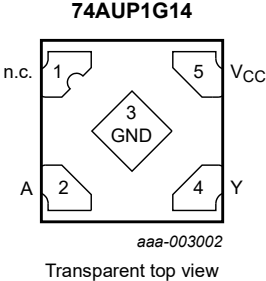
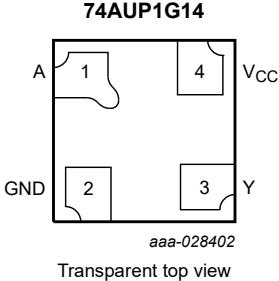
[1] The pin 1 indicator is located on the lower left corner of the device, below the marking code.

## 6. Functional diagram



## 7. Pinning information

### 7.1. Pinning

 <p><b>74AUP1G14</b></p> <p>n.c. 1 5 V<sub>CC</sub></p> <p>A 2</p> <p>GND 3 4 Y</p> <p>001aaf121</p> <p><b>Fig. 4. Pin configuration SOT353-1 (TSSOP5) and SOT753 (SC-74A)</b></p>	 <p><b>74AUP1G14</b></p> <p>n.c. 1 6 V<sub>CC</sub></p> <p>A 2 5 n.c.</p> <p>GND 3 4 Y</p> <p>001aaf123</p> <p>Transparent top view</p> <p><b>Fig. 5. Pin configuration SOT886, SOT1115 and SOT1202 (XSON6)</b></p>
 <p><b>74AUP1G14</b></p> <p>n.c. 1 5 V<sub>CC</sub></p> <p>A 2</p> <p>3 GND</p> <p>4 Y</p> <p>aaa-003002</p> <p>Transparent top view</p> <p><b>Fig. 6. Pin configuration SOT1226-3 (X2SON5)</b></p>	 <p><b>74AUP1G14</b></p> <p>A 1 4 V<sub>CC</sub></p> <p>GND 2 3 Y</p> <p>aaa-028402</p> <p>Transparent top view</p> <p><b>Fig. 7. Pin configuration SOT1269-2 (X2SON4)</b></p>

### 7.2. Pin description

Table 3. Pin description

Symbol	Pin			Description
	TSSOP5, SC-74A and X2SON5	XSON6	X2SON4	
n.c.	1	1, 5	-	not connected
A	2	2	1	data input
GND	3	3	2	ground (0 V)
Y	4	4	3	data output
V <sub>CC</sub>	5	6	4	supply voltage

## 8. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level.

Input	Output
A	Y
L	H
H	L

## 9. 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 and Power-down mode	[1] -0.5	+4.6	V
$I_O$	output current	$V_O = 0$ V to $V_{CC}$	-	±20	mA
$I_{CC}$	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			
		TSSOP5, SC-74A, XSON6 and X2SON5 package	[2] -	250	mW
		X2SON4 package	[3] -	150	mW

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For SOT353-1 (TSSOP5) package:  $P_{tot}$  derates linearly with 3.3 mW/K above 74 °C.

For SOT753 (SC-74A) package:  $P_{tot}$  derates linearly with 3.8 mW/K above 85 °C.

For SOT886 (XSON6) package:  $P_{tot}$  derates linearly with 3.3 mW/K above 74 °C.

For SOT1115 (XSON6) package:  $P_{tot}$  derates linearly with 3.2 mW/K above 71 °C.

For SOT1202 (XSON6) package:  $P_{tot}$  derates linearly with 3.3 mW/K above 74 °C.

For SOT1226-3 (X2SON5) package:  $P_{tot}$  derates linearly with 3.0 mW/K above 67 °C.

[3] For SOT1269-2 (X2SON4) package:  $P_{tot}$  derates linearly with 1.7 mW/K above 57 °C.

## 10. 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

## 11. 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>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</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
	I <sub>O</sub> = -4.0 mA; V <sub>CC</sub> = 3.0 V	2.6	-	-	V	
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</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>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
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	-	-	±0.2	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	V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V	-	-	40	µA
C <sub>I</sub>	input capacitance	V <sub>I</sub> = GND or V <sub>CC</sub> ; V <sub>CC</sub> = 0 V to 3.6 V	-	1.1	-	pF
C <sub>O</sub>	output capacitance	V <sub>O</sub> = GND; V <sub>CC</sub> = 0 V	-	1.7	-	pF
<b>T<sub>amb</sub> = -40 °C to +85 °C</b>						
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</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	

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</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>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	V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V	-	-	50	µA
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>OH</sub>	HIGH-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</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-level output voltage	V <sub>I</sub> = V <sub>T+</sub> or V <sub>T-</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>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	-	-	75	µA

## 12. Dynamic characteristics

**Table 8. Dynamic characteristics**

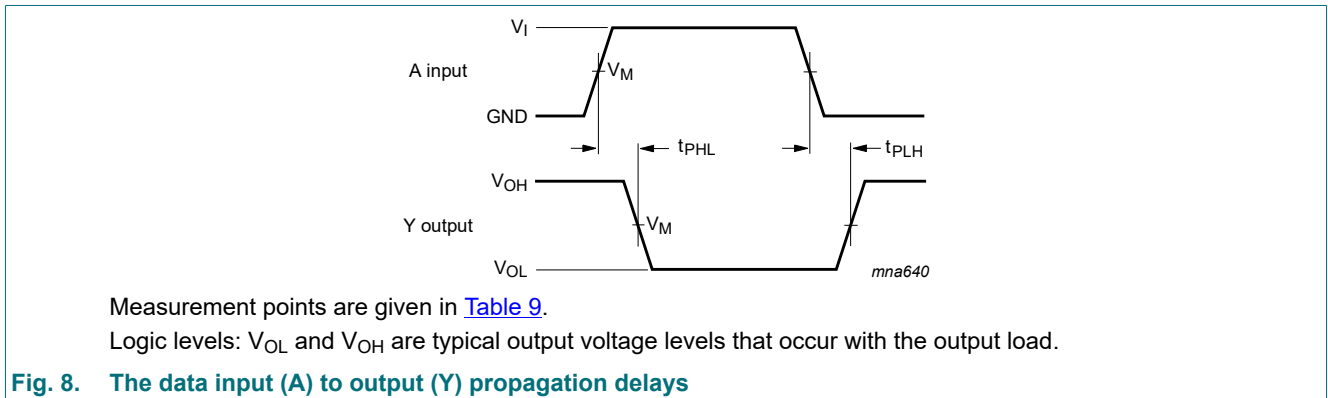
Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 9.

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
<b>C<sub>L</sub> = 5 pF</b>										
t <sub>pd</sub>	propagation delay	A to Y; see Fig. 8 [2]								
		V <sub>CC</sub> = 0.8 V	-	19.9	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.7	5.9	11.0	2.4	11.1	2.4	11.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.6	4.3	6.6	2.4	7.1	2.4	7.4	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.1	3.7	5.4	2.0	6.0	2.0	6.2	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.0	3.0	4.1	1.7	4.5	1.7	4.7	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.9	2.8	3.6	1.5	3.9	1.5	4.0	ns
<b>C<sub>L</sub> = 10 pF</b>										
t <sub>pd</sub>	propagation delay	A to Y; see Fig. 8 [2]								
		V <sub>CC</sub> = 0.8 V	-	23.4	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.9	6.8	12.7	2.8	12.8	2.8	12.9	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.8	5.0	7.7	2.6	8.2	2.6	8.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.7	4.2	6.2	2.5	6.7	2.5	7.1	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.3	3.6	4.8	2.1	5.2	2.1	5.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.1	3.3	4.3	2.0	4.5	2.0	4.7	ns
<b>C<sub>L</sub> = 15 pF</b>										
t <sub>pd</sub>	propagation delay	A to Y; see Fig. 8 [2]								
		V <sub>CC</sub> = 0.8 V	-	26.9	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.3	7.6	14.3	3.0	14.5	3.0	14.7	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.3	5.5	8.6	2.9	9.4	2.9	9.8	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.8	4.7	7.0	2.8	7.7	2.8	8.1	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.7	4.0	5.5	2.4	5.9	2.4	6.2	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.6	3.8	4.8	2.2	5.2	2.2	5.4	ns
<b>C<sub>L</sub> = 30 pF</b>										
t <sub>pd</sub>	propagation delay	A to Y; see Fig. 8 [2]								
		V <sub>CC</sub> = 0.8 V	-	37.3	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.0	9.8	18.7	3.9	19.6	3.9	20.0	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.7	7.1	11.2	3.8	12.3	3.8	12.9	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.6	6.0	9.1	3.6	10.0	3.6	10.6	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	3.5	5.2	6.9	3.2	7.5	3.2	7.9	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	3.3	4.8	6.1	3.1	7.1	3.1	7.4	ns

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
<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	-	2.6	-	-	-	-	-	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	-	2.9	-	-	-	-	-	pF
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	3.1	-	-	-	-	-	pF
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	3.7	-	-	-	-	-	pF
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	4.3	-	-	-	-	-	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.

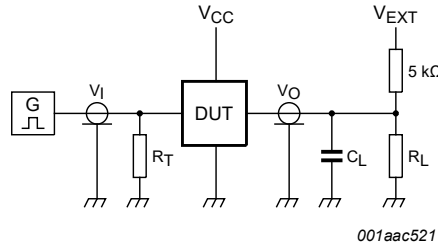
### 12.1. Waveform and test circuit



**Table 9. 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 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. Test circuit for measuring 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, setup and hold times and pulse width  $R_L = 1 \text{ M}\Omega$ .

## 12.2. Transfer characteristics

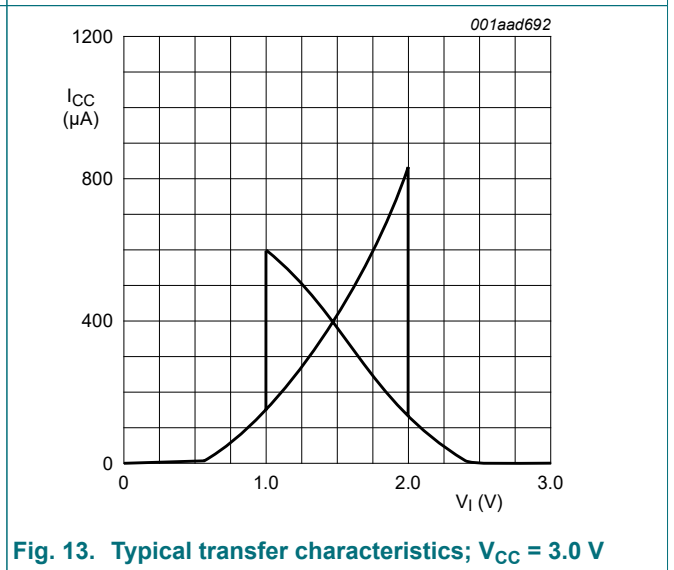
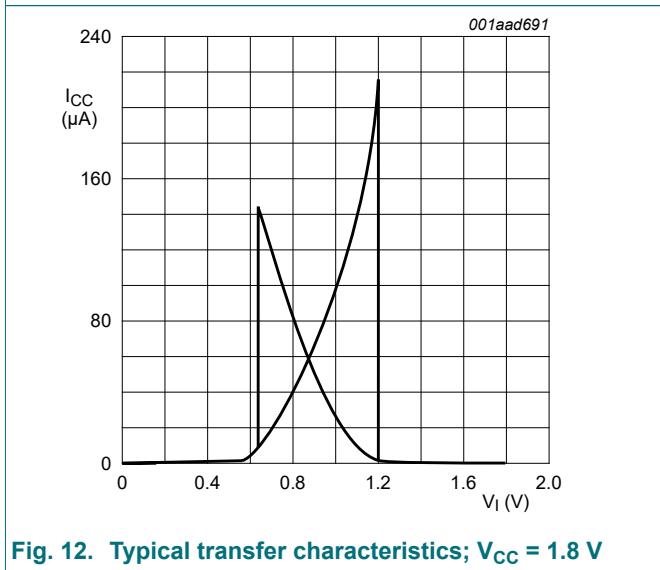
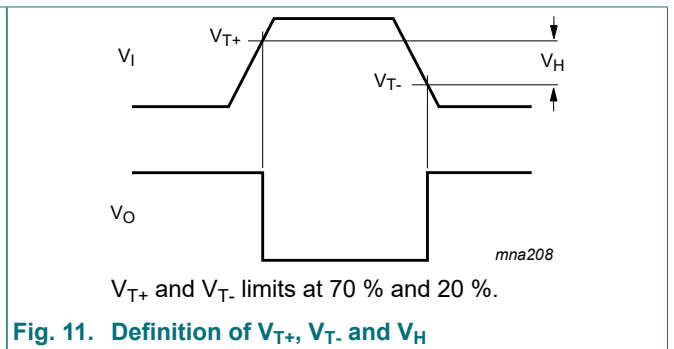
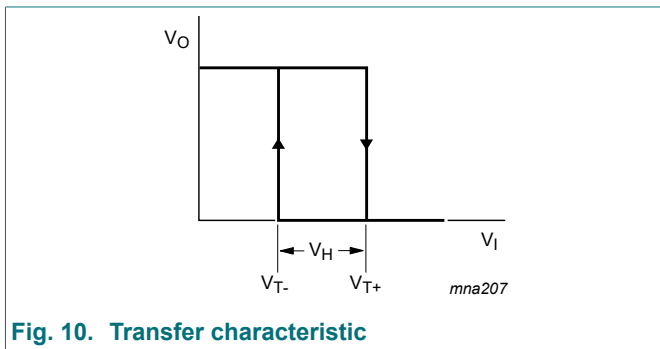
**Table 11. Transfer characteristics**

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

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
$V_{T+}$	positive-going threshold voltage	see <a href="#">Fig. 10</a> and <a href="#">Fig. 11</a>								
		$V_{CC} = 0.8 \text{ V}$	0.30	-	0.60	0.30	0.60	0.30	0.62	V
		$V_{CC} = 1.1 \text{ V}$	0.53	-	0.90	0.53	0.90	0.53	0.92	V
		$V_{CC} = 1.4 \text{ V}$	0.74	-	1.11	0.74	1.11	0.74	1.13	V
		$V_{CC} = 1.65 \text{ V}$	0.91	-	1.29	0.91	1.29	0.91	1.31	V
		$V_{CC} = 2.3 \text{ V}$	1.37	-	1.77	1.37	1.77	1.37	1.80	V
$V_{T-}$	negative-going threshold voltage	see <a href="#">Fig. 10</a> and <a href="#">Fig. 11</a>								
		$V_{CC} = 0.8 \text{ V}$	0.10	-	0.60	0.10	0.60	0.10	0.60	V
		$V_{CC} = 1.1 \text{ V}$	0.26	-	0.65	0.26	0.65	0.26	0.65	V
		$V_{CC} = 1.4 \text{ V}$	0.39	-	0.75	0.39	0.75	0.39	0.75	V
		$V_{CC} = 1.65 \text{ V}$	0.47	-	0.84	0.47	0.84	0.47	0.84	V
		$V_{CC} = 2.3 \text{ V}$	0.69	-	1.04	0.69	1.04	0.69	1.04	V
		$V_{CC} = 3.0 \text{ V}$	0.88	-	1.24	0.88	1.24	0.88	1.24	V

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ	Max	Min	Max	Min	Max	
V <sub>H</sub>	hysteresis voltage	see Fig. 10, Fig. 11, Fig. 12 and Fig. 13								
		V <sub>CC</sub> = 0.8 V	0.07	-	0.50	0.07	0.50	0.07	0.50	V
		V <sub>CC</sub> = 1.1 V	0.08	-	0.46	0.08	0.46	0.08	0.46	V
		V <sub>CC</sub> = 1.4 V	0.18	-	0.56	0.18	0.56	0.18	0.56	V
		V <sub>CC</sub> = 1.65 V	0.27	-	0.66	0.27	0.66	0.27	0.66	V
		V <sub>CC</sub> = 2.3 V	0.53	-	0.92	0.53	0.92	0.53	0.92	V
V <sub>CC</sub> = 3.0 V	0.79	-	1.31	0.79	1.31	0.79	1.31	V		

12.3. Waveforms transfer characteristics



### 13. Application information

The slow input rise and fall times cause additional power dissipation, this can be calculated using the following formula:

$$P_{ad} = f_i \times (t_r \times I_{CC(AV)} + t_f \times I_{CC(AV)}) \times V_{CC}$$

where:

- $P_{ad}$  = additional power dissipation ( $\mu W$ );
- $f_i$  = input frequency (MHz);
- $t_r$  = input rise time (ns); 10 % to 90 %;
- $t_f$  = input fall time (ns); 90 % to 10 %;
- $I_{CC(AV)}$  = average additional supply current ( $\mu A$ ).

Average  $I_{CC}$  differs with positive or negative input transitions, as shown in Fig. 14.

An example of a relaxation circuit using the 74AUP1G14 is shown in Fig. 15.

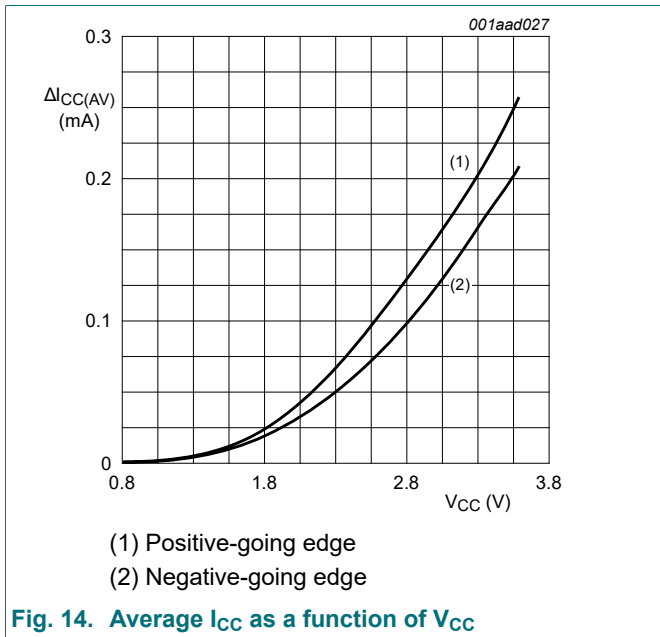


Fig. 14. Average  $I_{CC}$  as a function of  $V_{CC}$

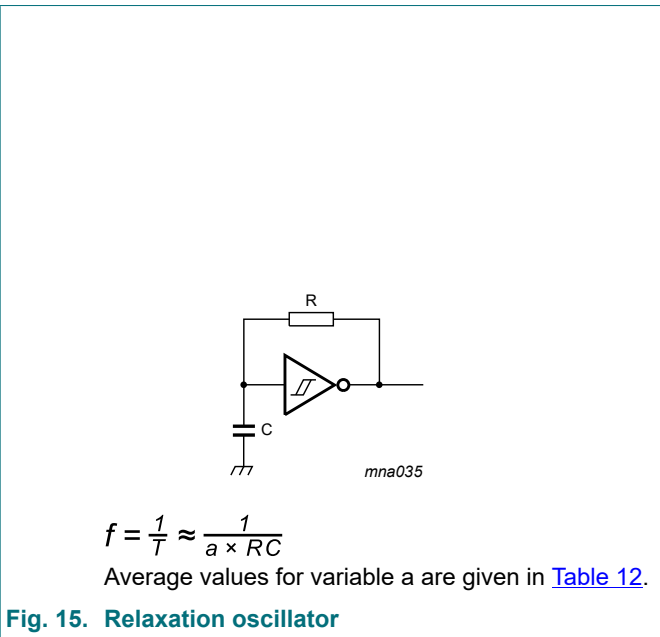


Fig. 15. Relaxation oscillator

Table 12. Variable values

Supply voltage	Variable a
1.1 V	1.28
1.5 V	1.22
1.8 V	1.24
2.8 V	1.34
3.3 V	1.45

14. Package outline

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

SOT353-1

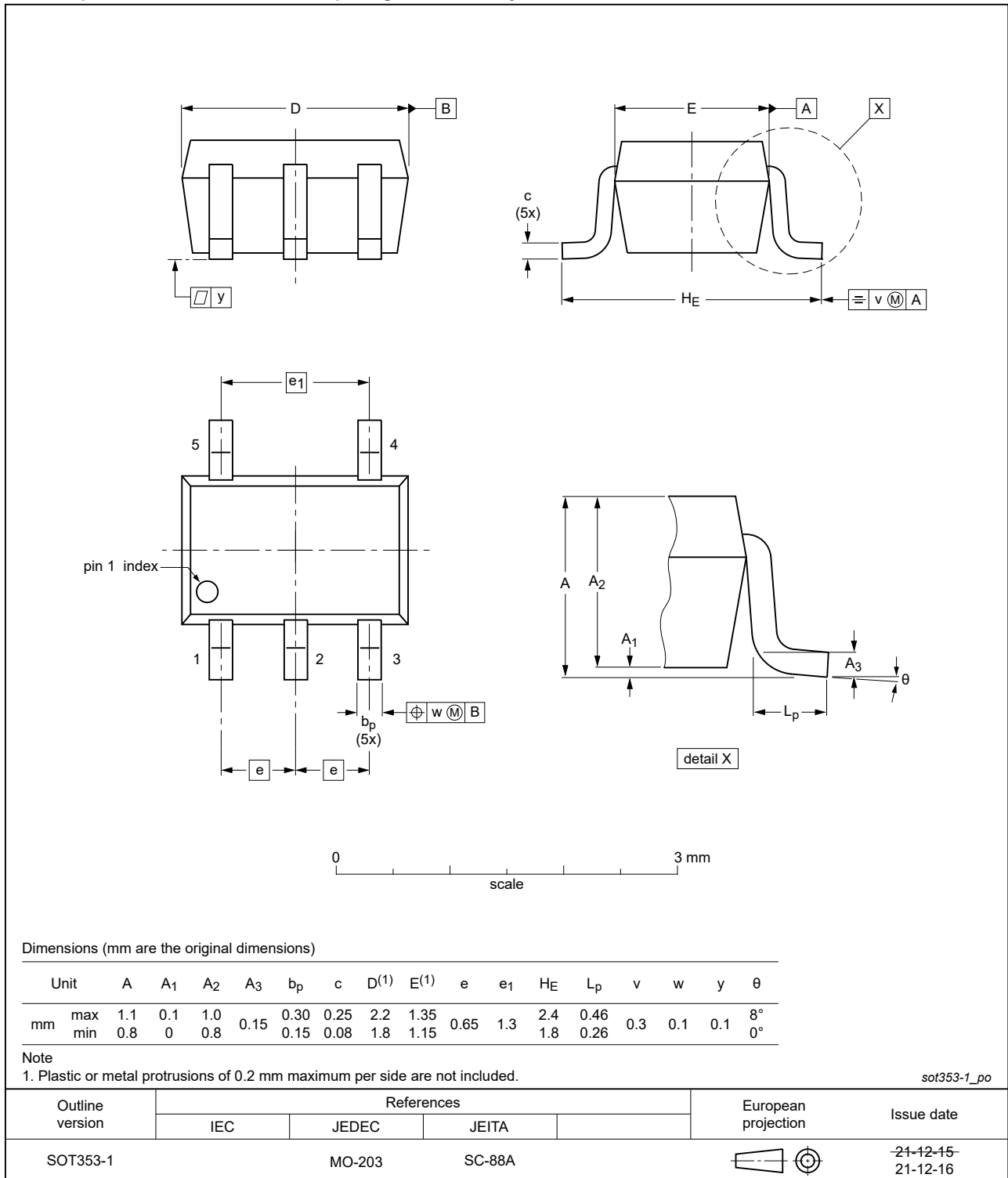


Fig. 16. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads

SOT753

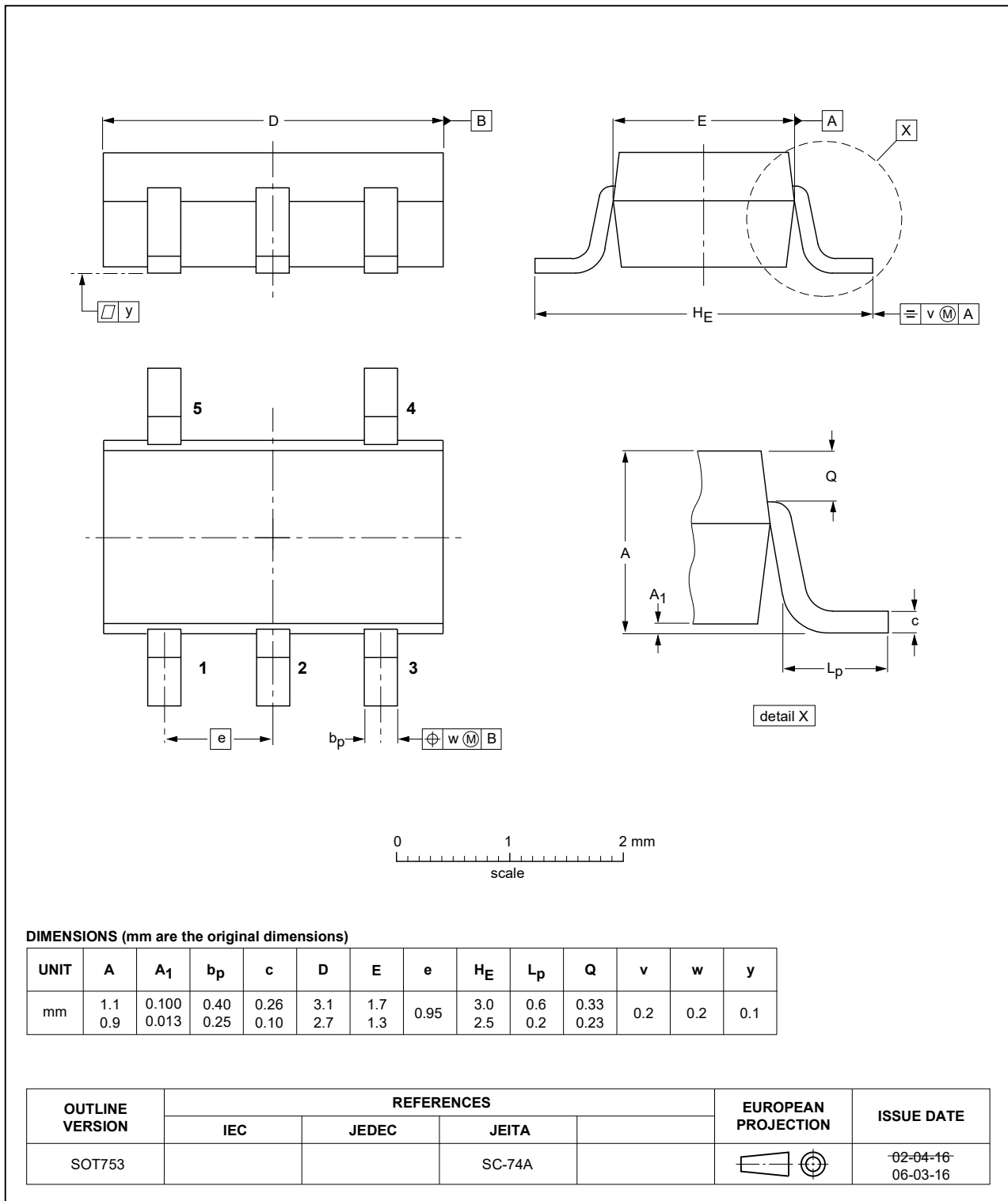


Fig. 17. Package outline SOT753 (SC-74A)

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

SOT886

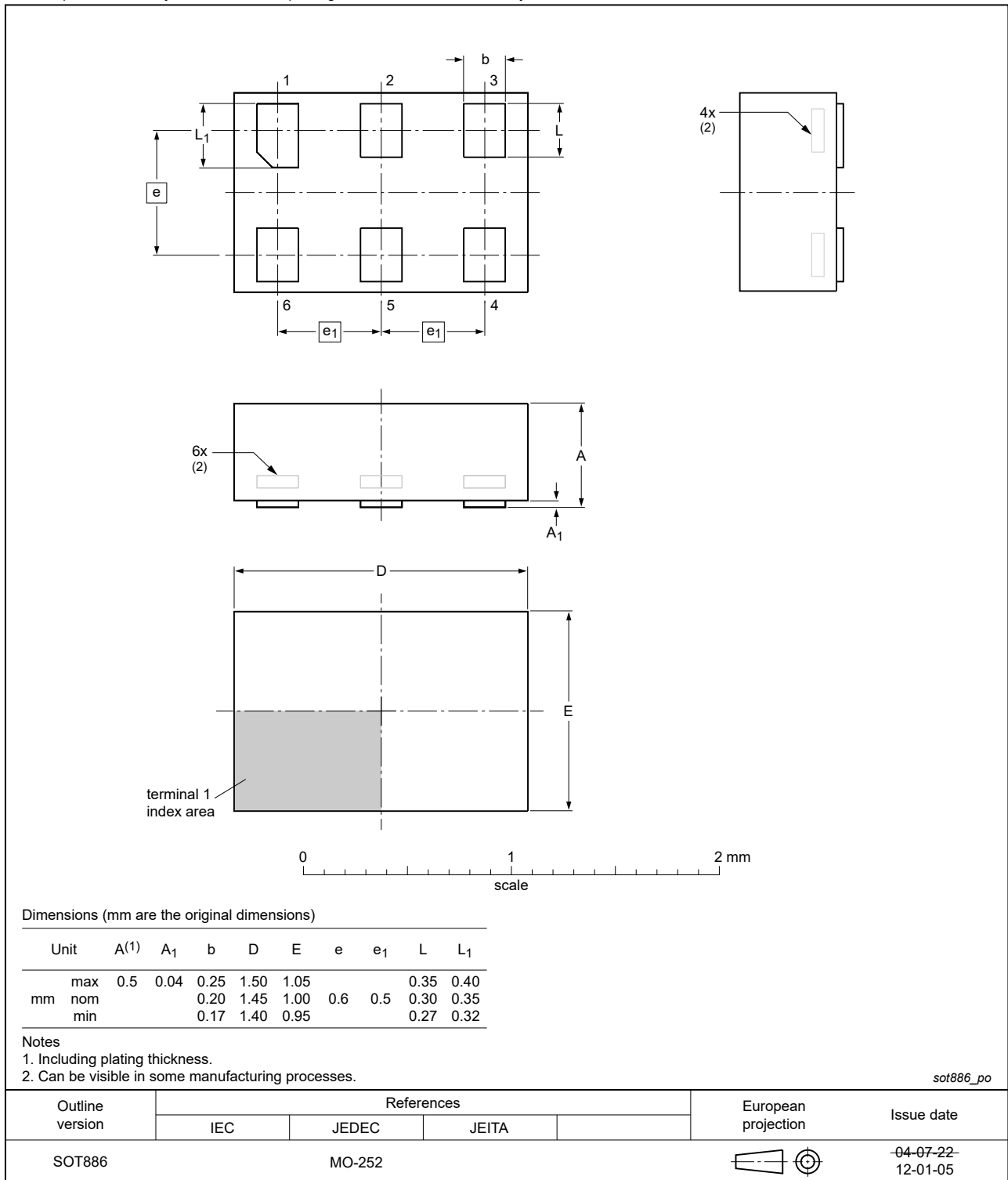


Fig. 18. Package outline SOT886 (XSON6)

XSON6: extremely thin small outline package; no leads;  
6 terminals; body 0.9 x 1.0 x 0.35 mm

SOT1115



Fig. 19. Package outline SOT1115 (XSON6)

XSON6: extremely thin small outline package; no leads;  
6 terminals; body 1.0 x 1.0 x 0.35 mm

SOT1202



Fig. 20. Package outline SOT1202 (XSON6)



X2SON5: plastic thermal enhanced extremely thin small outline package; no leads;  
5 terminals; body 0.8 x 0.8 x 0.32 mm

SOT1226-3

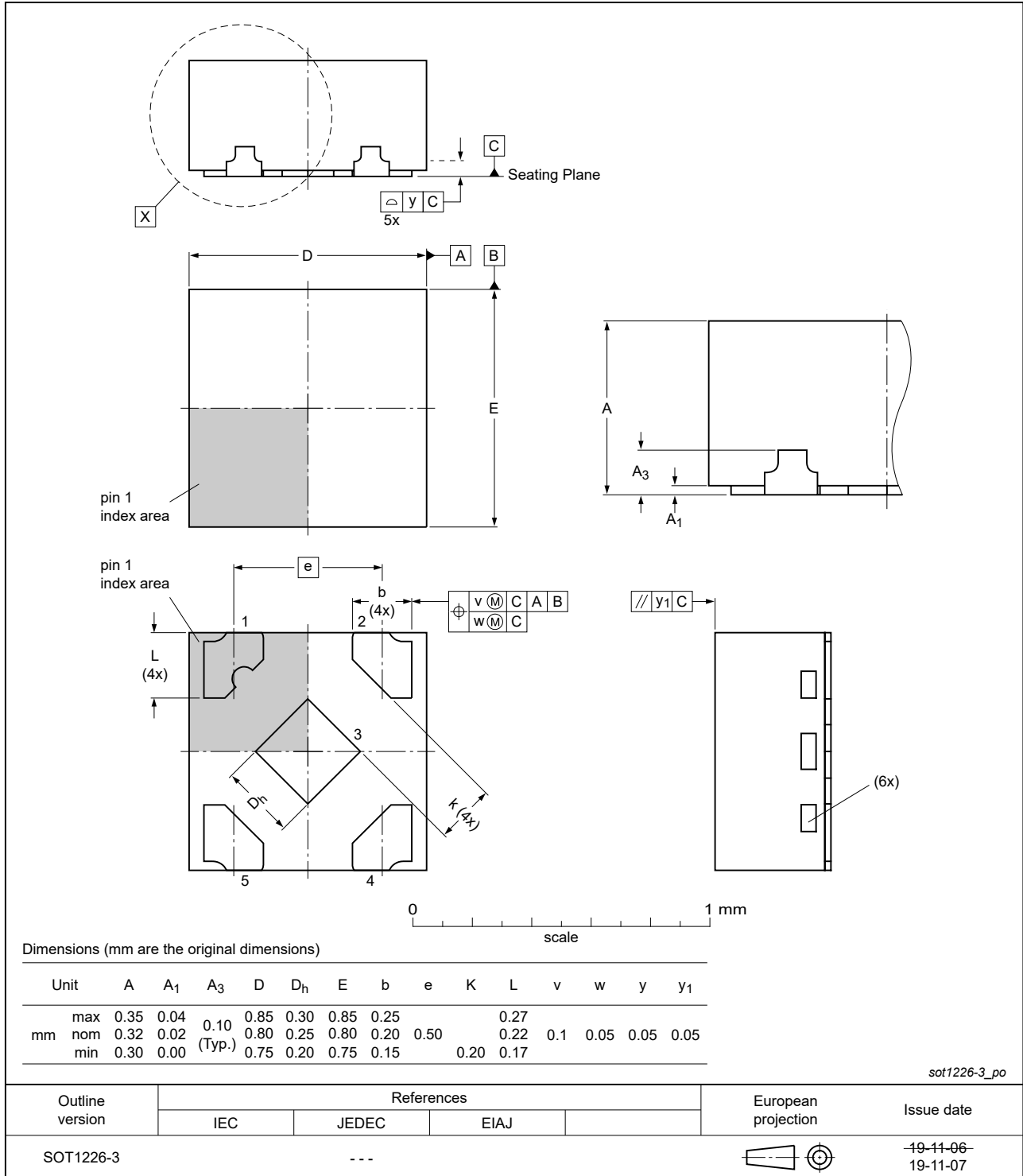


Fig. 21. Package outline SOT1226-3 (X2SON5)

X2SON4: plastic thermal enhanced extremely thin small outline package; no leads; 4 terminals; body 0.6 x 0.6 x 0.32 mm

SOT1269-2

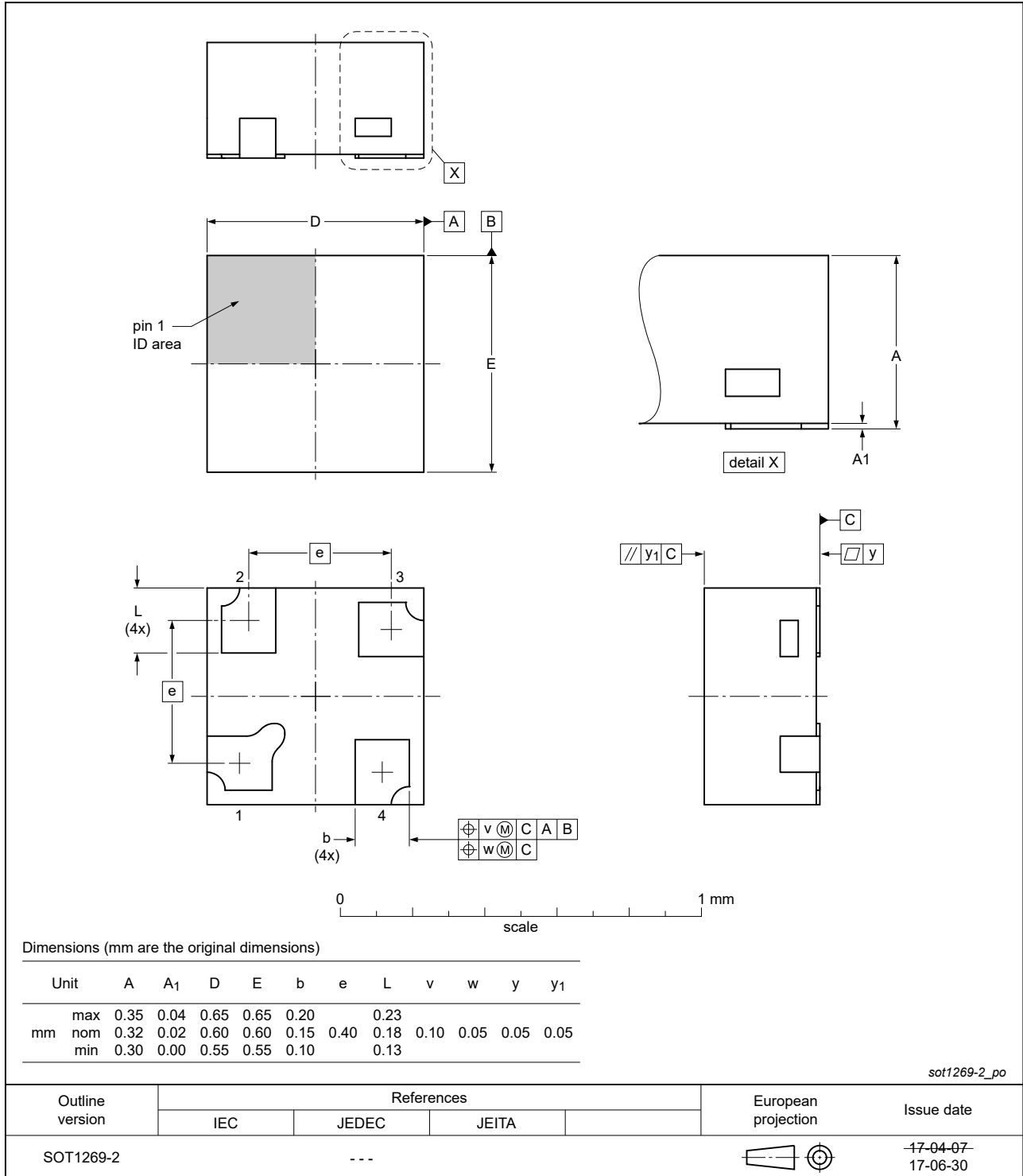


Fig. 22. Package outline SOT1269-2 (X2SON4)

## 15. Abbreviations

Table 13. Abbreviations

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

## 16. Revision history

Table 14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP1G14 v.10	20220114	Product data sheet	-	74AUP1G14 v.9
Modifications:	<ul style="list-style-type: none"> <li>• <a href="#">Section 2</a> updated.</li> <li>• <a href="#">Fig. 16</a>: Package outline drawing for SOT353-1 (TSSOP5) has changed.</li> </ul>			
74AUP1G14 v.9	20210713	Product data sheet	-	74AUP1G14 v.8
Modifications:	<ul style="list-style-type: none"> <li>• SOT1226 (X2SON5) package changed to SOT1226-3 (X2SON5) package.</li> <li>• Type number 74AUP1G14GF (SOT891 / XSON6) removed.</li> <li>• <a href="#">Table 5</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li> </ul>			
74AUP1G14 v.8	20180608	Product data sheet	-	74AUP1G14 v.7
Modifications:	<ul style="list-style-type: none"> <li>• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> <li>• Added type number 74AUP1G14GX4 (SOT1269-2)</li> </ul>			
74AUP1G14 v.7	20161104	Product data sheet	-	74AUP1G14 v.6
Modifications:	<ul style="list-style-type: none"> <li>• Added type number 74AUP1G14GV (SOT753)</li> </ul>			
74AUP1G14 v.6	20120628	Product data sheet	-	74AUP1G14 v.5
Modifications:	<ul style="list-style-type: none"> <li>• Added type number 74AUP1G14GX (SOT1226)</li> <li>• Package outline drawing of SOT886 (<a href="#">Fig. 18</a>) modified.</li> </ul>			
74AUP1G14 v.5	20111128	Product data sheet	-	74AUP1G14 v.4
Modifications:	<ul style="list-style-type: none"> <li>• Legal pages updated.</li> </ul>			
74AUP1G14 v.4	20100713	Product data sheet	-	74AUP1G14 v.3
74AUP1G14 v.3	20090708	Product data sheet	-	74AUP1G14 v.2
74AUP1G14 v.2	20060828	Product data sheet	-	74AUP1G14 v.1
74AUP1G14 v.1	20050718	Product data sheet	-	-

## 17. Legal information

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Document status [1][2]	Product status [3]	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 <https://www.nexperia.com>.

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