74AUP1G04

Low-power inverter

Rev. 9 — 8 June 2018 Product data sheet

1 General description

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 and benefits

- 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: 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
- Low static power consumption; I_{CC} = 0.9 µA (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 ° C to +85 ° C and -40 ° C to +125 ° C

nexperia

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 x 1.45 x 0.5 mm	SOT886
74AUP1G04GF	-40 ° C to +125 ° C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1 x 0.5 mm	SOT891
74AUP1G04GN	-40 ° C to +125 ° C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 x 1.0 x 0.35 mm	SOT1115
74AUP1G04GS	-40 ° C to +125 ° C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 x 1.0 x 0.35 mm	SOT1202
74AUP1G04GX	-40 ° C to +125 ° C	X2SON5	plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 x 0.8 x 0.35 mm	SOT1226
74AUP1G04GX4	-40 °C to +125 °C	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

4 Marking

Table 2. Marking

Type number	Marking code [1]
74AUP1G04GV	p04
74AUP1G04GW	pC
74AUP1G04GM	pC
74AUP1G04GF	pC
74AUP1G04GN	pC
74AUP1G04GS	pC
74AUP1G04GX	pC
74AUP1G04GX4	pC

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

5 Functional diagram

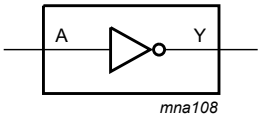


Figure 1. Logic symbol

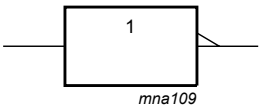


Figure 2. IEC logic symbol

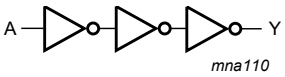


Figure 3. Logic diagram

6 Pinning information

6.1 Pinning

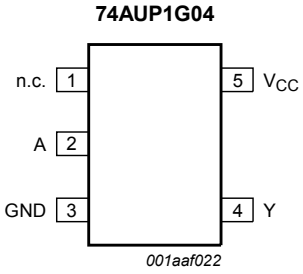
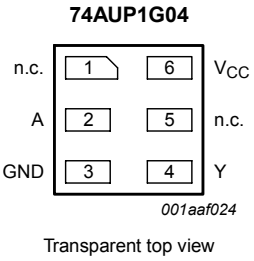
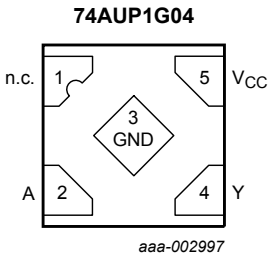


Figure 4. Pin configuration SOT353-1 and SOT753



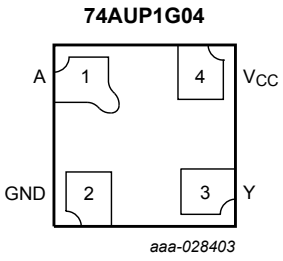
Transparent top view

Figure 5. Pin configuration SOT886, SOT891, SOT1115 and SOT1202 (XSON6)



Transparent top view

Figure 6. Pin configuration SOT1226 (X2SON5)



Transparent top view

Figure 7. Pin configuration SOT1269-2 (X2SON4)

6.2 Pin description

Table 3. Pin description

Symbol	Pin			Description
	SC-74A, TSSOP5 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_{CC}	5	6	4	supply voltage

7 Functional description

Table 4. Function table [1]

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}		-	± 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 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 and X2SON5 packages: above 118 ° C the value of P_{tot} derates linearly with 7.8 mW/K.
[3] For X2SON4 packages: above 57 °C the value of P_{tot} derates linearly with 1.7 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
Δt/ΔV	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
T_{amb} = 25 ° C						
V_{IH}	HIGH-level input voltage	V_{CC} = 0.8 V	0.70V_{CC}	-	-	V
		V_{CC} = 0.9 V to 1.95 V	0.65V_{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	-	-	0.30V_{CC}	V
		V_{CC} = 0.9 V to 1.95 V	-	-	0.35V_{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 μA; V_{CC} = 0.8 V to 3.6 V	V_{CC} - 0.1	-	-	V
		I_O = -1.1 mA; V_{CC} = 1.1 V	0.75V_{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
		I_O = -4.0 mA; V_{CC} = 3.0 V	2.6	-	-	V

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = 20 µA; V_{CC} = 0.8 V to 3.6 V	-	-	0.1	V
		I_O = 1.1 mA; V_{CC} = 1.1 V	-	-	$0.3V_{CC}$	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
I_I	input leakage current	V_I = GND to 3.6 V; V_{CC} = 0 V to 3.6 V	-	-	± 0.1	µA
I_{OFF}	power-off leakage current	V_I or V_O = 0 V to 3.6 V; V_{CC} = 0 V	-	-	± 0.2	µA
ΔI_{OFF}	additional power-off leakage current	V_I or V_O = 0 V to 3.6 V; V_{CC} = 0 V to 0.2 V	-	-	± 0.2	µA
I_{CC}	supply current	V_I = GND or V_{CC}; I_O = 0 A; V_{CC} = 0.8 V to 3.6 V	-	-	0.5	µA
ΔI_{CC}	additional supply current	$V_I = V_{CC}$ - 0.6 V; I_O = 0 A; V_{CC} = 3.3 V	-	-	40	µA
C_I	input capacitance	V_{CC} = 0 V to 3.6 V; V_I = GND or V_{CC}	-	0.8	-	pF
C_O	output capacitance	V_O = GND; V_{CC} = 0 V	-	1.7	-	pF
T_{amb} = -40 ° C to +85 ° C						
V_{IH}	HIGH-level input voltage	V_{CC} = 0.8 V	$0.70V_{CC}$	-	-	V
		V_{CC} = 0.9 V to 1.95 V	$0.65V_{CC}$	-	-	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	-	-	$0.30V_{CC}$	V
		V_{CC} = 0.9 V to 1.95 V	-	-	$0.35V_{CC}$	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 µA; V_{CC} = 0.8 V to 3.6 V	V_{CC} - 0.1	-	-	V
		I_O = -1.1 mA; V_{CC} = 1.1 V	$0.7V_{CC}$	-	-	V
		I_O = -1.7 mA; V_{CC} = 1.4 V	1.03	-	-	V
		I_O = -1.9 mA; V_{CC} = 1.65 V	1.30	-	-	V
		I_O = -2.3 mA; V_{CC} = 2.3 V	1.97	-	-	V
		I_O = -3.1 mA; V_{CC} = 2.3 V	1.85	-	-	V
		I_O = -2.7 mA; V_{CC} = 3.0 V	2.67	-	-	V
		I_O = -4.0 mA; V_{CC} = 3.0 V	2.55	-	-	V

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = 20 µA; V_{CC} = 0.8 V to 3.6 V	-	-	0.1	V
		I_O = 1.1 mA; V_{CC} = 1.1 V	-	-	$0.3V_{CC}$	V
		I_O = 1.7 mA; V_{CC} = 1.4 V	-	-	0.37	V
		I_O = 1.9 mA; V_{CC} = 1.65 V	-	-	0.35	V
		I_O = 2.3 mA; V_{CC} = 2.3 V	-	-	0.33	V
		I_O = 3.1 mA; V_{CC} = 2.3 V	-	-	0.45	V
		I_O = 2.7 mA; V_{CC} = 3.0 V	-	-	0.33	V
		I_O = 4.0 mA; V_{CC} = 3.0 V	-	-	0.45	V
I_I	input leakage current	V_I = GND to 3.6 V; V_{CC} = 0 V to 3.6 V	-	-	± 0.5	µA
I_{OFF}	power-off leakage current	V_I or V_O = 0 V to 3.6 V; V_{CC} = 0 V	-	-	± 0.5	µA
ΔI_{OFF}	additional power-off leakage current	V_I or V_O = 0 V to 3.6 V; V_{CC} = 0 V to 0.2 V	-	-	± 0.6	µA
I_{CC}	supply current	V_I = GND or V_{CC}; I_O = 0 A; V_{CC} = 0.8 V to 3.6 V	-	-	0.9	µA
ΔI_{CC}	additional supply current	$V_I = V_{CC}$ - 0.6 V; I_O = 0 A; V_{CC} = 3.3 V	-	-	50	µA
T_{amb} = -40 ° C to +125 ° C						
V_{IH}	HIGH-level input voltage	V_{CC} = 0.8 V	$0.75V_{CC}$	-	-	V
		V_{CC} = 0.9 V to 1.95 V	$0.70V_{CC}$	-	-	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	-	-	$0.25V_{CC}$	V
		V_{CC} = 0.9 V to 1.95 V	-	-	$0.30V_{CC}$	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 µA; V_{CC} = 0.8 V to 3.6 V	V_{CC} - 0.11	-	-	V
		I_O = -1.1 mA; V_{CC} = 1.1 V	$0.6V_{CC}$	-	-	V
		I_O = -1.7 mA; V_{CC} = 1.4 V	0.93	-	-	V
		I_O = -1.9 mA; V_{CC} = 1.65 V	1.17	-	-	V
		I_O = -2.3 mA; V_{CC} = 2.3 V	1.77	-	-	V
		I_O = -3.1 mA; V_{CC} = 2.3 V	1.67	-	-	V
		I_O = -2.7 mA; V_{CC} = 3.0 V	2.40	-	-	V
		I_O = -4.0 mA; V_{CC} = 3.0 V	2.30	-	-	V

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		I_O = 20 µA; V_{CC} = 0.8 V to 3.6 V	-	-	0.11	V
		I_O = 1.1 mA; V_{CC} = 1.1 V	-	-	0.33V_{CC}	V
		I_O = 1.7 mA; V_{CC} = 1.4 V	-	-	0.41	V
		I_O = 1.9 mA; V_{CC} = 1.65 V	-	-	0.39	V
		I_O = 2.3 mA; V_{CC} = 2.3 V	-	-	0.36	V
		I_O = 3.1 mA; V_{CC} = 2.3 V	-	-	0.50	V
		I_O = 2.7 mA; V_{CC} = 3.0 V	-	-	0.36	V
		I_O = 4.0 mA; V_{CC} = 3.0 V	-	-	0.50	V
I_I	input leakage current	V_I = GND to 3.6 V; V_{CC} = 0 V to 3.6 V	-	-	± 0.75	µA
I_{OFF}	power-off leakage current	V_I or V_O = 0 V to 3.6 V; V_{CC} = 0 V	-	-	± 0.75	µA
ΔI_{OFF}	additional power-off leakage current	V_I or V_O = 0 V to 3.6 V; V_{CC} = 0 V to 0.2 V	-	-	± 0.75	µA
I_{CC}	supply current	V_I = GND or V_{CC}; I_O = 0 A; V_{CC} = 0.8 V to 3.6 V	-	-	1.4	µA
ΔI_{CC}	additional supply current	$V_I = V_{CC}$ - 0.6 V; I_O = 0 A; V_{CC} = 3.3 V	-	-	75	µA

11 Dynamic characteristics

Table 8. Dynamic characteristics

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

Symbol	Parameter	Conditions	Min	Typ[1]	Max	Unit
T_{amb} = 25 ° C; C_L = 5 pF						
t_{pd}	propagation delay	A to Y; see Figure 8 [2]				
		V_{CC} = 0.8 V	-	16.0	-	ns
		V_{CC} = 1.1 V to 1.3 V	2.4	5.0	10.3	ns
		V_{CC} = 1.4 V to 1.6 V	1.8	3.6	6.4	ns
		V_{CC} = 1.65 V to 1.95 V	1.5	2.9	5.0	ns
		V_{CC} = 2.3 V to 2.7 V	1.2	2.4	3.9	ns
		V_{CC} = 3.0 V to 3.6 V	1.1	2.1	3.2	ns
T_{amb} = 25 ° C; C_L = 10 pF						
t_{pd}	propagation delay	A to Y; see Figure 8 [2]				
		V_{CC} = 0.8 V	-	19.8	-	ns
		V_{CC} = 1.1 V to 1.3 V	2.8	5.9	12.2	ns
		V_{CC} = 1.4 V to 1.6 V	2.3	4.2	7.5	ns
		V_{CC} = 1.65 V to 1.95 V	2.0	3.5	5.9	ns
		V_{CC} = 2.3 V to 2.7 V	1.7	2.9	4.6	ns
		V_{CC} = 3.0 V to 3.6 V	1.6	2.7	3.8	ns

Symbol	Parameter	Conditions	Min	Typ[1]	Max	Unit
T_{amb} = 25 °C; C_L = 15 pF						
t_{pd}	propagation delay	A to Y; see Figure 8 [2]				
		V_{CC} = 0.8 V	-	23.3	-	ns
		V_{CC} = 1.1 V to 1.3 V	3.2	6.7	13.0	ns
		V_{CC} = 1.4 V to 1.6 V	2.6	4.7	8.6	ns
		V_{CC} = 1.65 V to 1.95 V	2.3	4.0	6.7	ns
		V_{CC} = 2.3 V to 2.7 V	2.1	3.3	5.1	ns
		V_{CC} = 3.0 V to 3.6 V	2.0	3.1	4.2	ns
T_{amb} = 25 °C; C_L = 30 pF						
t_{pd}	propagation delay	A to Y; see Figure 8 [2]				
		V_{CC} = 0.8 V	-	33.6	-	ns
		V_{CC} = 1.1 V to 1.3 V	4.4	8.9	16.0	ns
		V_{CC} = 1.4 V to 1.6 V	3.6	6.3	10.8	ns
		V_{CC} = 1.65 V to 1.95 V	3.2	5.3	9.0	ns
		V_{CC} = 2.3 V to 2.7 V	2.9	4.5	6.5	ns
		V_{CC} = 3.0 V to 3.6 V	2.9	4.2	5.4	ns
T_{amb} = 25 °C						
C_{PD}	power dissipation capacitance	f = 1 MHz; V_I = GND to V_{CC} [3]				
		V_{CC} = 0.8 V	-	2.5	-	pF
		V_{CC} = 1.1 V to 1.3 V	-	2.7	-	pF
		V_{CC} = 1.4 V to 1.6 V	-	2.8	-	pF
		V_{CC} = 1.65 V to 1.95 V	-	3.0	-	pF
		V_{CC} = 2.3 V to 2.7 V	-	3.5	-	pF
		V_{CC} = 3.0 V to 3.6 V	-	4.0	-	pF

[1] All typical values are measured at nominal V_{CC}.
[2] t_{pd} is the same as t_{PLH} and t_{PHL}.
[3] C_{PD} is used to determine the dynamic power dissipation (P_D in µW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \sum(C_L \times V_{CC}^2 \times f_o)$ 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;
$\sum(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

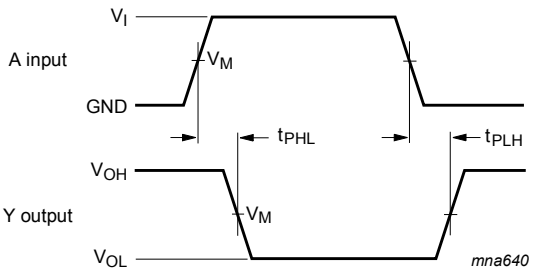
Table 9. Dynamic characteristics

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

Symbol	Parameter	Conditions	-40 ° C to +85 ° C		-40 ° C to +125 ° C		Unit
			Min	Max	Min	Max	
C_L = 5 pF							
t_{pd}	propagation delay	A to Y; see Figure 8 [1]					
		V_{CC} = 1.1 V to 1.3 V	2.1	11.4	2.1	12.6	ns
		V_{CC} = 1.4 V to 1.6 V	1.6	7.4	1.6	8.2	ns
		V_{CC} = 1.65 V to 1.95 V	1.4	5.9	1.4	6.5	ns
		V_{CC} = 2.3 V to 2.7 V	1.1	4.5	1.1	5.0	ns
		V_{CC} = 3.0 V to 3.6 V	1.0	3.9	1.0	4.3	ns
C_L = 10 pF							
t_{pd}	propagation delay	A to Y; see Figure 8 [1]					
		V_{CC} = 1.1 V to 1.3 V	2.6	13.7	2.6	15.1	ns
		V_{CC} = 1.4 V to 1.6 V	2.1	8.7	2.1	9.6	ns
		V_{CC} = 1.65 V to 1.95 V	1.8	7.0	1.8	7.7	ns
		V_{CC} = 2.3 V to 2.7 V	1.5	5.4	1.5	6.0	ns
		V_{CC} = 3.0 V to 3.6 V	1.4	4.5	1.4	5.0	ns
C_L = 15 pF							
t_{pd}	propagation delay	A to Y; see Figure 8 [1]					
		V_{CC} = 1.1 V to 1.3 V	3.0	15.8	3.0	17.4	ns
		V_{CC} = 1.4 V to 1.6 V	2.4	10.0	2.4	11.0	ns
		V_{CC} = 1.65 V to 1.95 V	2.1	8.0	2.1	8.8	ns
		V_{CC} = 2.3 V to 2.7 V	1.8	6.1	1.8	6.8	ns
		V_{CC} = 3.0 V to 3.6 V	1.8	5.0	1.8	5.5	ns
C_L = 30 pF							
t_{pd}	propagation delay	A to Y; see Figure 8 [1]					
		V_{CC} = 1.1 V to 1.3 V	4.0	19.0	4.0	20.9	ns
		V_{CC} = 1.4 V to 1.6 V	3.2	12.9	3.2	14.2	ns
		V_{CC} = 1.65 V to 1.95 V	2.9	10.5	2.9	11.6	ns
		V_{CC} = 2.3 V to 2.7 V	2.6	7.6	2.6	8.4	ns
		V_{CC} = 3.0 V to 3.6 V	2.6	6.2	2.6	6.9	ns

[1] t_{pd} is the same as t_{PLH} and t_{PHL}.

11.1 Waveform and test circuit



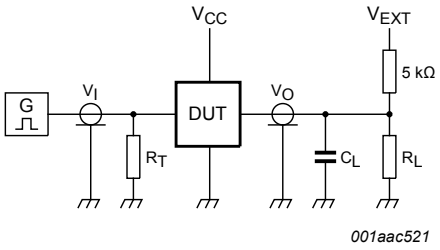
Measurement points are given in Table 10.

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

Figure 8. The data input (A) to output (Y) propagation delays

Table 10. 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 x V_{CC}	0.5 x V_{CC}	V_{CC}	≤ 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.

Figure 9. Test circuit for measuring switching times

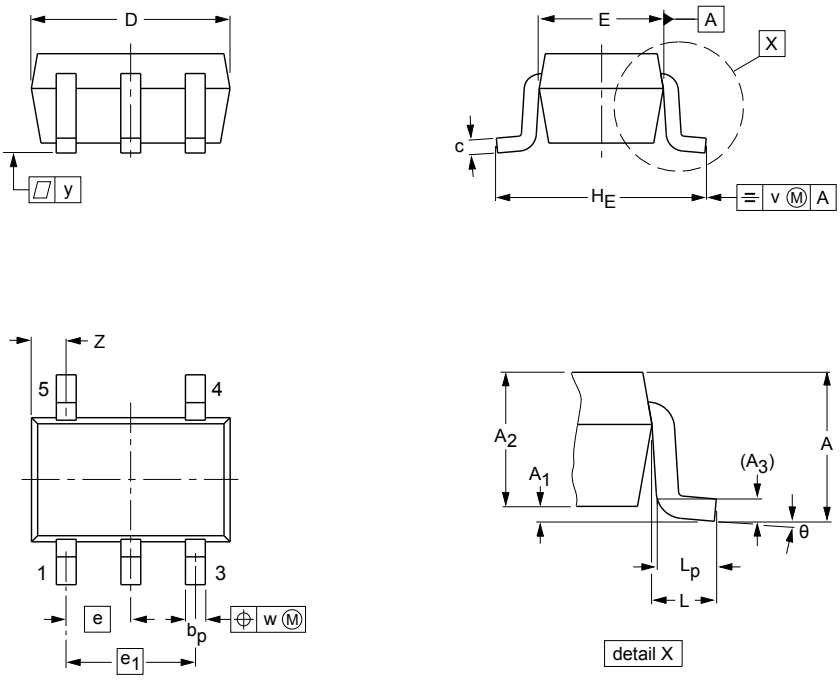
Table 11. Test data

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 x 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.

12 Package outline

TSSOP5: plastic thin shrink small outline package; 5 leads; body width 1.25 mm **SOT353-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	e_1	H_E	L	L_p	v	w	y	$Z^{(1)}$	θ
mm	1.1	0.1 0	1.0 0.8	0.15	0.30 0.15	0.25 0.08	2.25 1.85	1.35 1.15	0.65	1.3	2.25 2.0	0.425	0.46 0.21	0.3	0.1	0.1	0.60 0.15	7° 0°

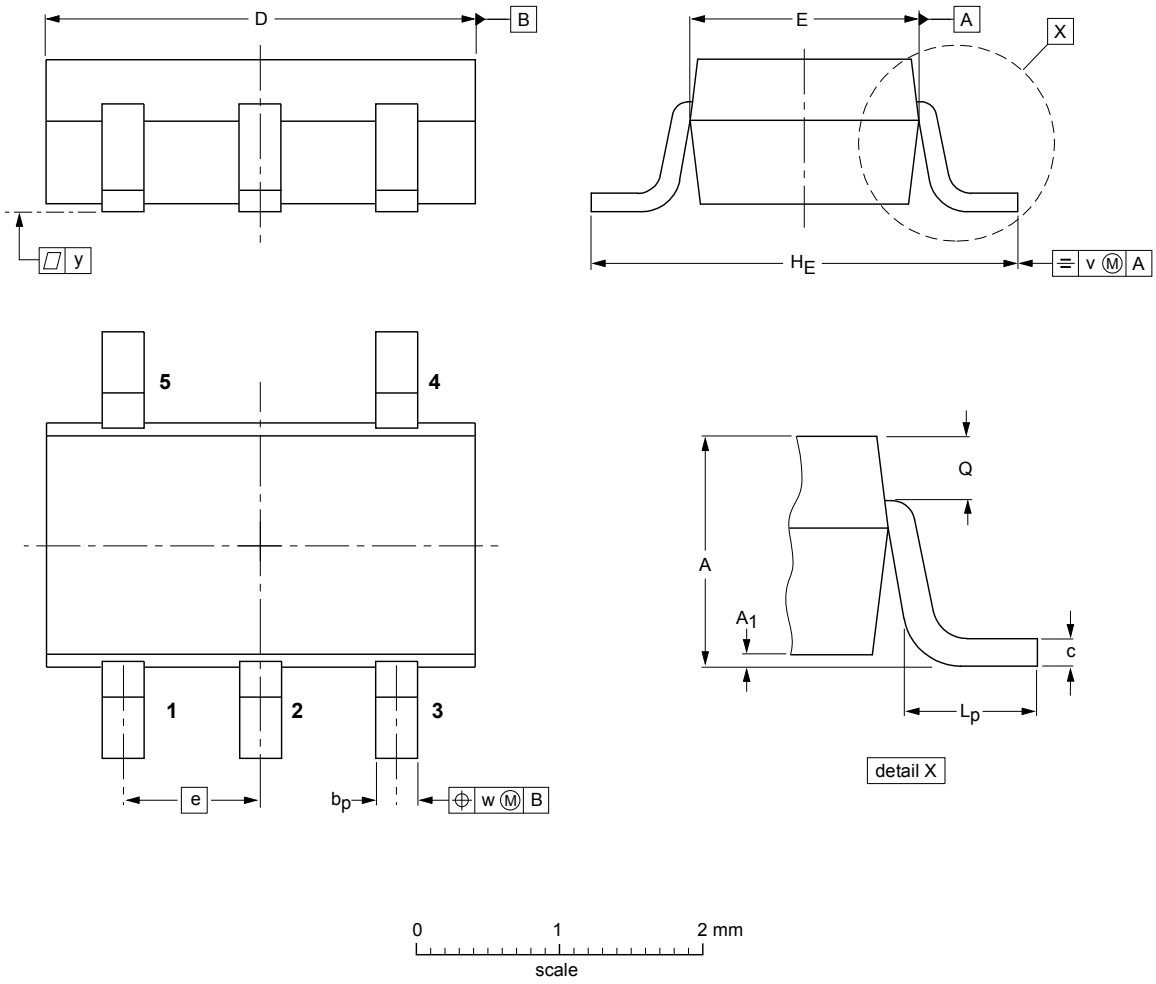
Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT353-1		MO-203	SC-88A			~~00-09-01~~ 03-02-19

Figure 10. Package outline SOT353-1 (TSSOP5)

Plastic surface-mounted package; 5 leads **SOT753**



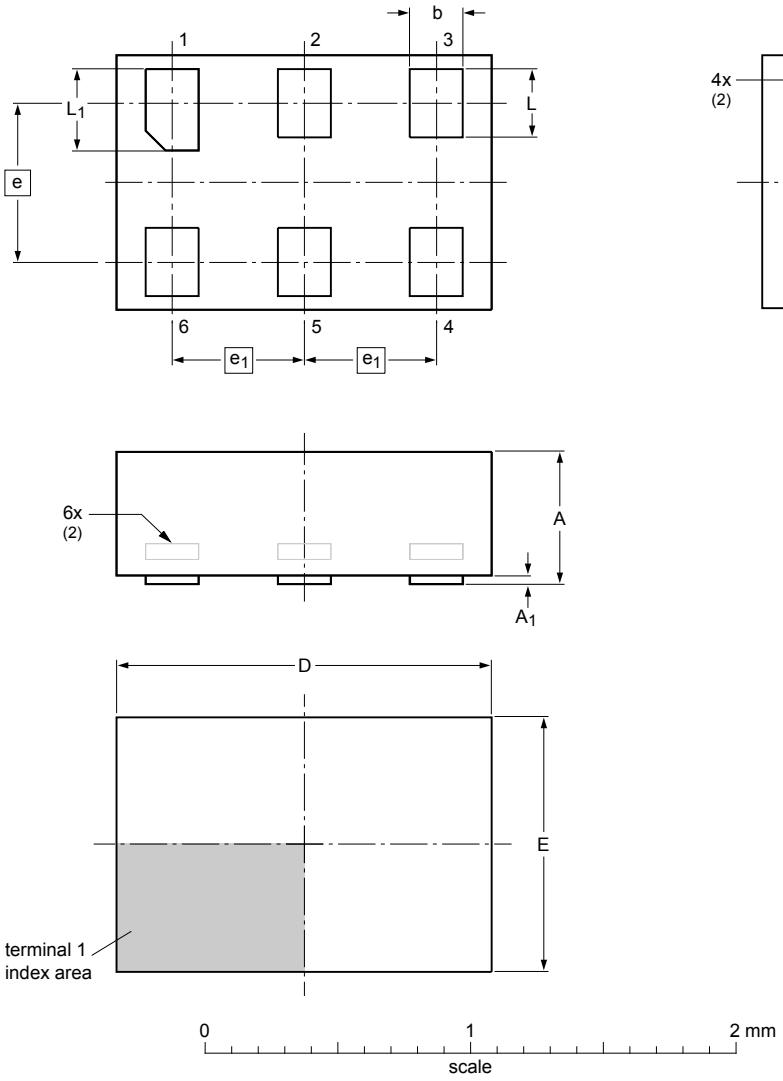
DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b_p	c	D	E	e	H_E	L_p	Q	v	w	y
mm	1.1 0.9	0.100 0.013	0.40 0.25	0.26 0.10	3.1 2.7	1.7 1.3	0.95	3.0 2.5	0.6 0.2	0.33 0.23	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT753			SC-74A			~~02-04-16~~ 06-03-16

Figure 11. 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



Dimensions (mm are the original dimensions)

Unit		A(1)	A1	b	D	E	e	e1	L	L1
mm	max	0.5	0.04	0.25	1.50	1.05			0.35	0.40
	nom			0.20	1.45	1.00	0.6	0.5	0.30	0.35
	min			0.17	1.40	0.95			0.27	0.32

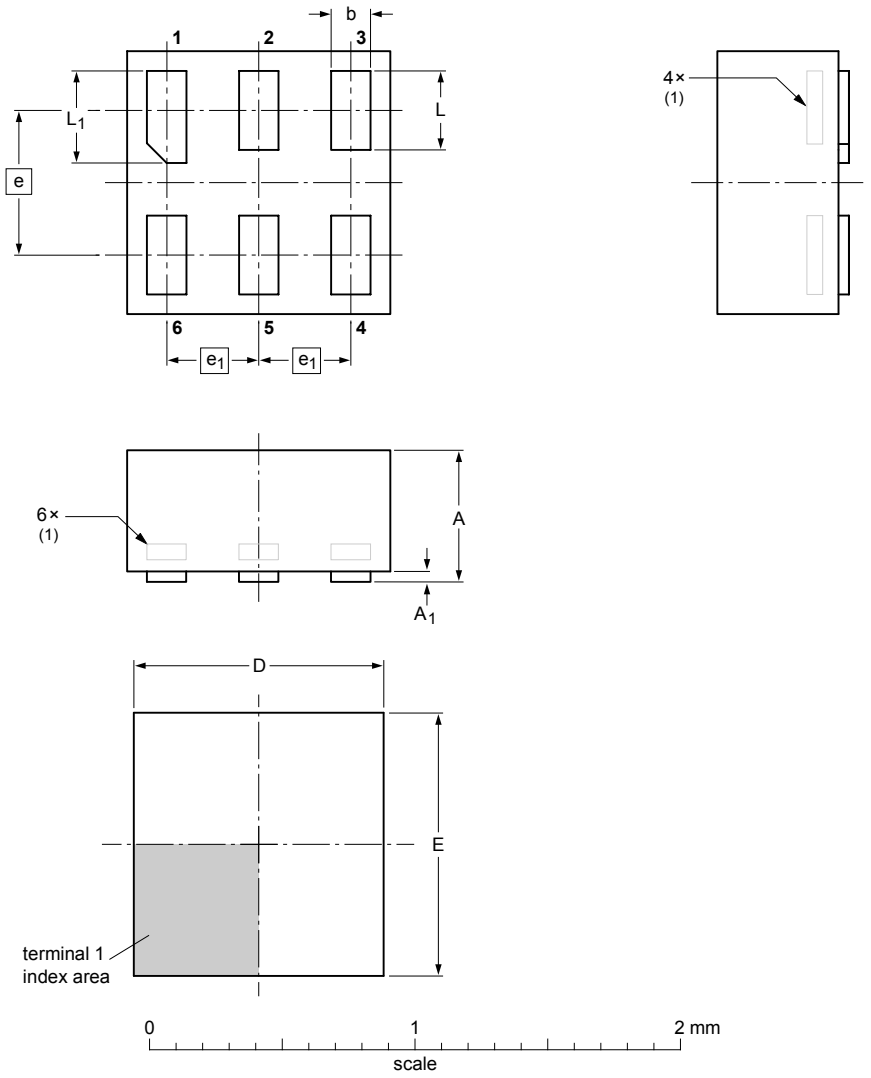
Notes
1. Including plating thickness.
2. Can be visible in some manufacturing processes.

sot886_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT886		MO-252				~~04-07-22~~ 12-01-05

Figure 12. Package outline SOT886 (XSON6)

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1 x 0.5 mm **SOT891**



DIMENSIONS (mm are the original dimensions)

UNIT	A max	A_1 max	b	D	E	e	e_1	L	L_1
mm	0.5	0.04	0.20 0.12	1.05 0.95	1.05 0.95	0.55	0.35	0.35 0.27	0.40 0.32

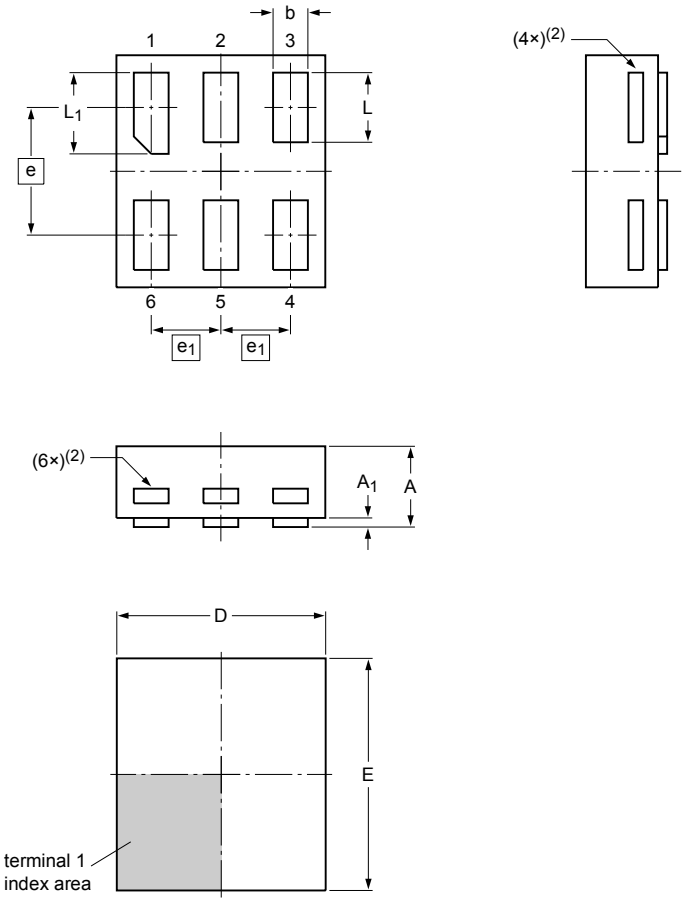
Note

1. Can be visible in some manufacturing processes.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT891						~~05-04-06~~ 07-05-15

Figure 13. Package outline SOT891 (XSON6)

XSON6: extremely thin small outline package; no leads; 6 terminals; body 0.9 x 1.0 x 0.35 mm **SOT1115**



Dimensions

Unit		$A^{(1)}$	A_1	b	D	E	e	e_1	L	L_1
mm	max	0.35	0.04	0.20	0.95	1.05			0.35	0.40
	nom			0.15	0.90	1.00	0.55	0.3	0.30	0.35
	min			0.12	0.85	0.95			0.27	0.32

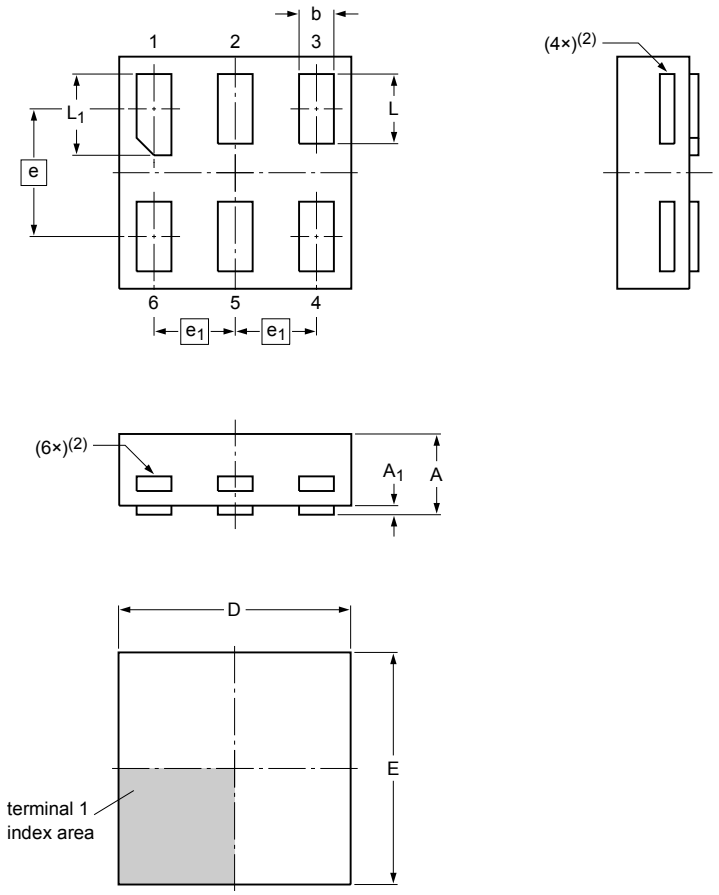
Note
1. Including plating thickness.
2. Visible depending upon used manufacturing technology.

sot1115_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1115						~~10-04-02~~ 10-04-07

Figure 14. 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**



Dimensions

Unit		$A^{(1)}$	A_1	b	D	E	e	e_1	L	L_1
mm	max	0.35	0.04	0.20	1.05	1.05			0.35	0.40
	nom			0.15	1.00	1.00	0.55	0.35	0.30	0.35
	min			0.12	0.95	0.95			0.27	0.32

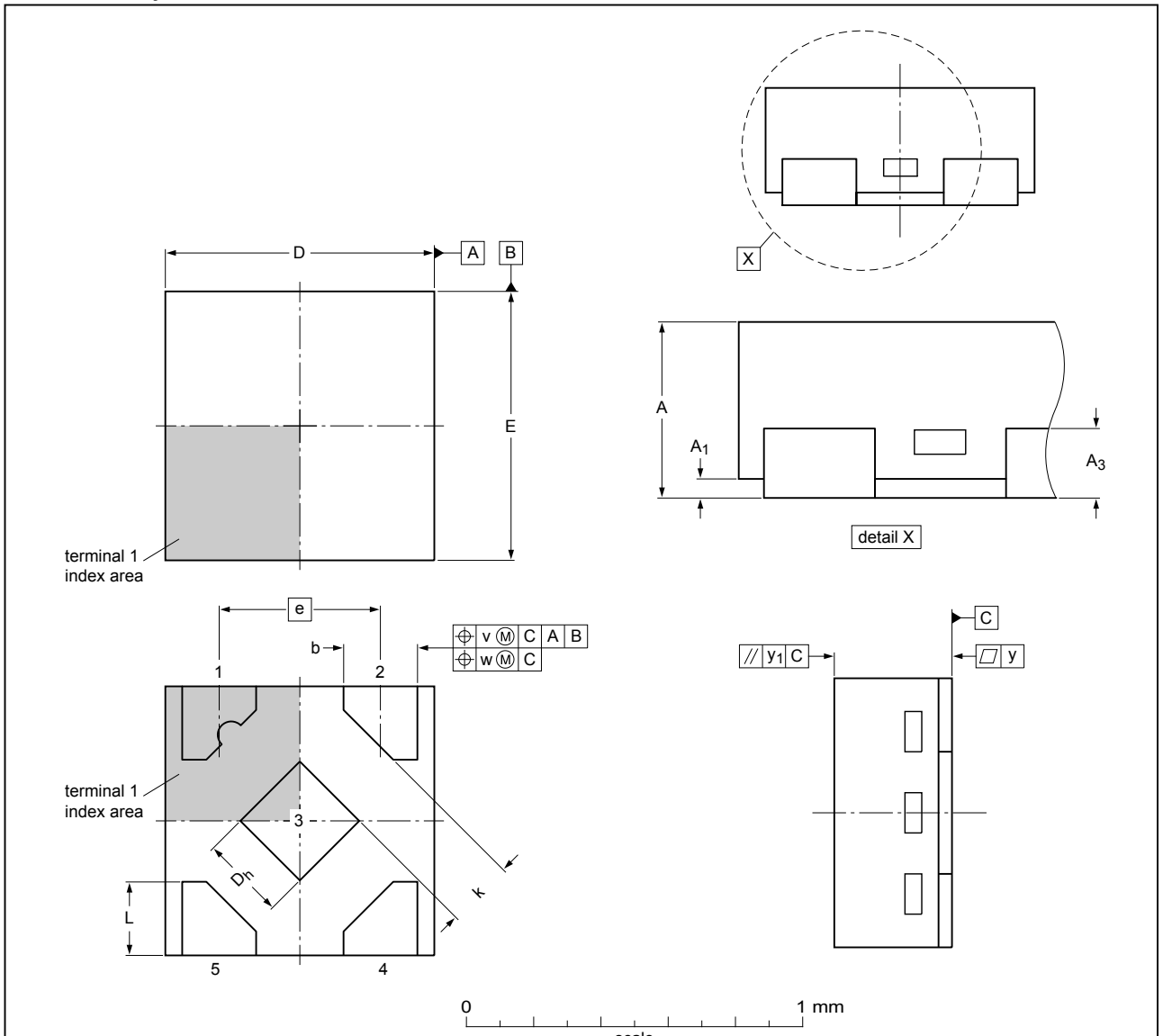
Note
1. Including plating thickness.
2. Visible depending upon used manufacturing technology.

sot1202_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1202						~~10-04-02~~ 10-04-06

Figure 15. Package outline SOT1202 (XSON6)

X2SON5: plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body 0.8 x 0.8 x 0.35 mm **SOT1226**



Dimensions

Unit		$A^{(1)}$	A_1	A_3	D	D_h	E	b	e	k	L	v	w	y	y_1
mm	max	0.35	0.04	0.128	0.85	0.30	0.85	0.27			0.27				
	nom				0.80	0.25	0.80	0.22	0.48		0.22	0.1	0.05	0.05	0.05
	min			0.040	0.75	0.20	0.75	0.17		0.20	0.17				

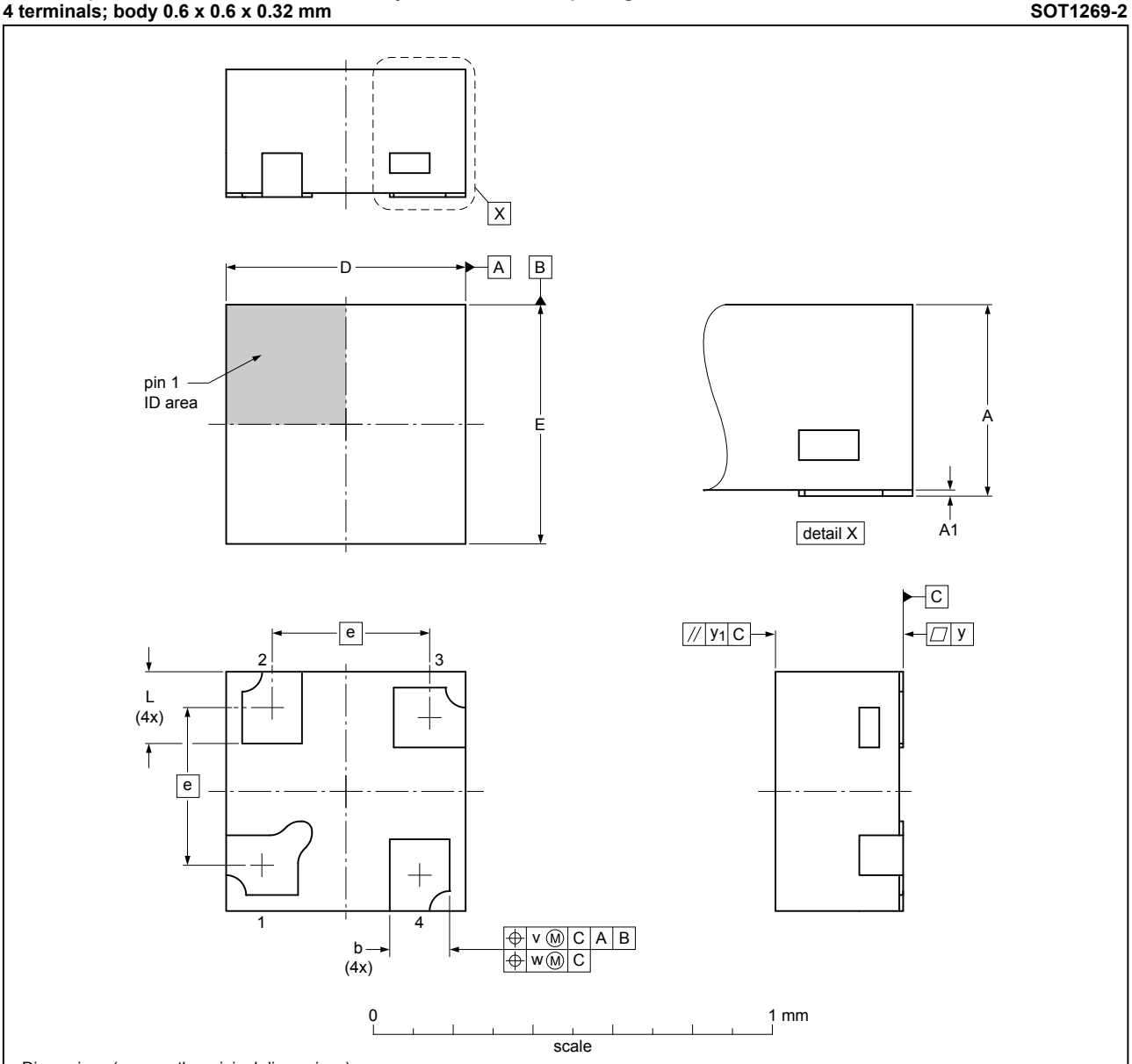
Note
1. Dimension A is including plating thickness.
2. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

sot1226_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	EIAJ			
SOT1226						~~12-04-10~~ 12-04-25

Figure 16. Package outline SOT1226 (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**



Dimensions (mm are the original dimensions)

Unit		A	A_1	D	E	b	e	L	v	w	y	y_1
mm	max	0.35	0.04	0.65	0.65	0.20		0.23				
	nom	0.32	0.02	0.60	0.60	0.15	0.40	0.18	0.10	0.05	0.05	0.05
	min	0.30	0.00	0.55	0.55	0.10		0.13				

sot1269-2_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1269-2		- - -				~~17-04-07~~ 17-06-30

Figure 17. Package outline SOT1269-2 (X2SON4)

13 Abbreviations

Table 12. Abbreviations

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

14 Revision history

Table 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP1G04 v.9	20180608	Product data sheet	-	74AUP1G04 v.8
Modifications:	• Added type number 74AUP1G04GX4 (SOT1269-2/X2SON4)			
74AUP1G04 v.8	20171107	Product data sheet	-	74AUP1G04 v.7
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate.			
74AUP1G04 v.7	20120627	Product data sheet	-	74AUP1G04 v.6
Modifications:	• Added type number 74AUP1G04GX (SOT1226)			
74AUP1G04 v.6	20120214	Product data sheet	-	74AUP1G04 v.5
Modifications:	• Package outline drawing of SOT886 (Figure 12) modified.			
74AUP1G04 v.5	20111205	Product data sheet	-	74AUP1G04 v.4
Modifications:	• Legal pages updated.			
74AUP1G04 v.4	20100630	Product data sheet	-	74AUP1G04 v.3
74AUP1G04 v.3	20091105	Product data sheet	-	74AUP1G04 v.2
74AUP1G04 v.2	20060628	Product data sheet	-	74AUP1G04 v.1
74AUP1G04 v.1	20050718	Product data sheet	-	-

15 Legal information

15.1 Data sheet status

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 URL http://www.nexperia.com.

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