

74AUP2G08

Low-power dual 2-input AND gate

Rev. 9 — 3 July 2017

Product data sheet

1 General description

The 74AUP2G08 provides the dual 2-input AND function.

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 a 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 JESD22-A114F Class 3A exceeds 5000 V
 - MM JESD22-A115-A exceeds 200 V
 - CDM JESD22-C101E exceeds 1000 V
- Low static power consumption; $I_{CC} = 0.9 \mu\text{A}$ (maximum)
- Latch-up performance exceeds 100 mA per JESD78 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

3 Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
74AUP2G08DC	-40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74AUP2G08GT	-40 °C to +125 °C	XSON8	plastic extremely thin small outline package; no leads; 8 terminals; body 1 × 1.95 × 0.5 mm	SOT833-1
74AUP2G08GF	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1 × 0.5 mm	SOT1089
74AUP2G08GM	-40 °C to +125 °C	XQFN8	plastic, extremely thin quad flat package; no leads; 8 terminals; body 1.6 × 1.6 × 0.5 mm	SOT902-2
74AUP2G08GN	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.2 × 1.0 × 0.35 mm	SOT1116
74AUP2G08GS	-40 °C to +125 °C	XSON8	extremely thin small outline package; no leads; 8 terminals; body 1.35 × 1.0 × 0.35 mm	SOT1203
74AUP2G08GX	-40 °C to +125 °C	X2SON8	plastic thermal enhanced extremely thin small outline package; no leads; 8 terminals; body 1.35 × 0.8 × 0.35 mm	SOT1233

4 Marking

Table 2. Marking

Type number	Marking code ^[1]
74AUP2G08DC	p08
74AUP2G08GT	p08
74AUP2G08GF	pE
74AUP2G08GM	p08
74AUP2G08GN	pE
74AUP2G08GS	pE
74AUP2G08GX	pE

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

5 Functional diagram

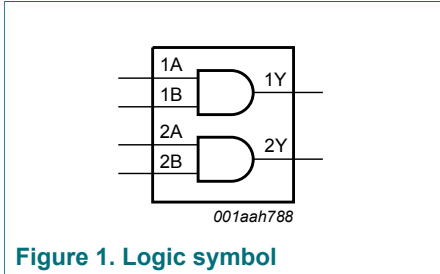


Figure 1. Logic symbol

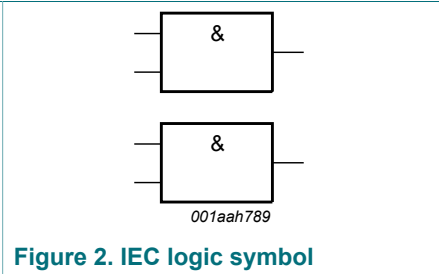


Figure 2. IEC logic symbol

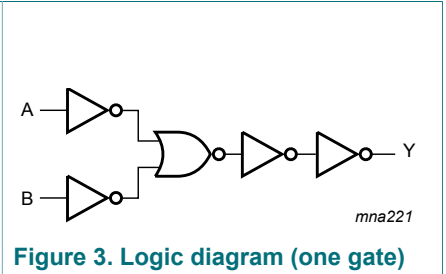


Figure 3. Logic diagram (one gate)

6 Pinning information

6.1 Pinning

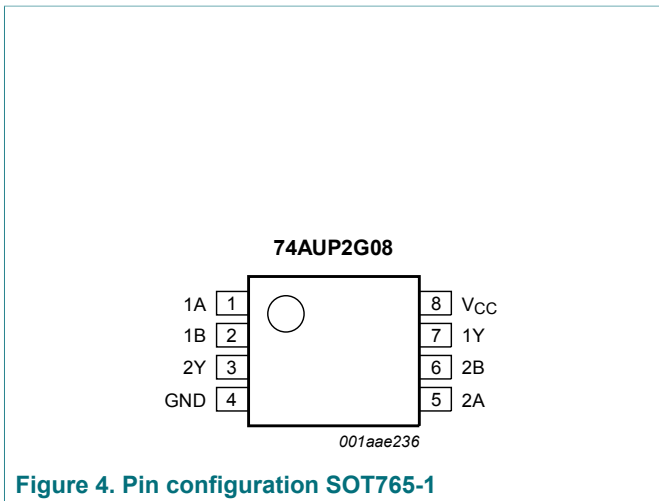


Figure 4. Pin configuration SOT765-1

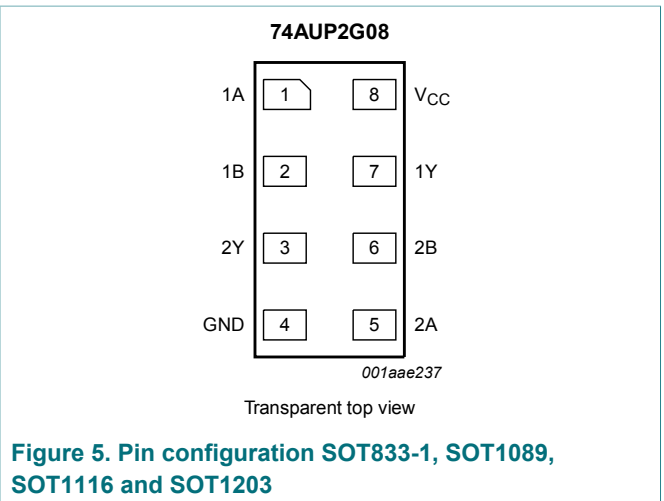
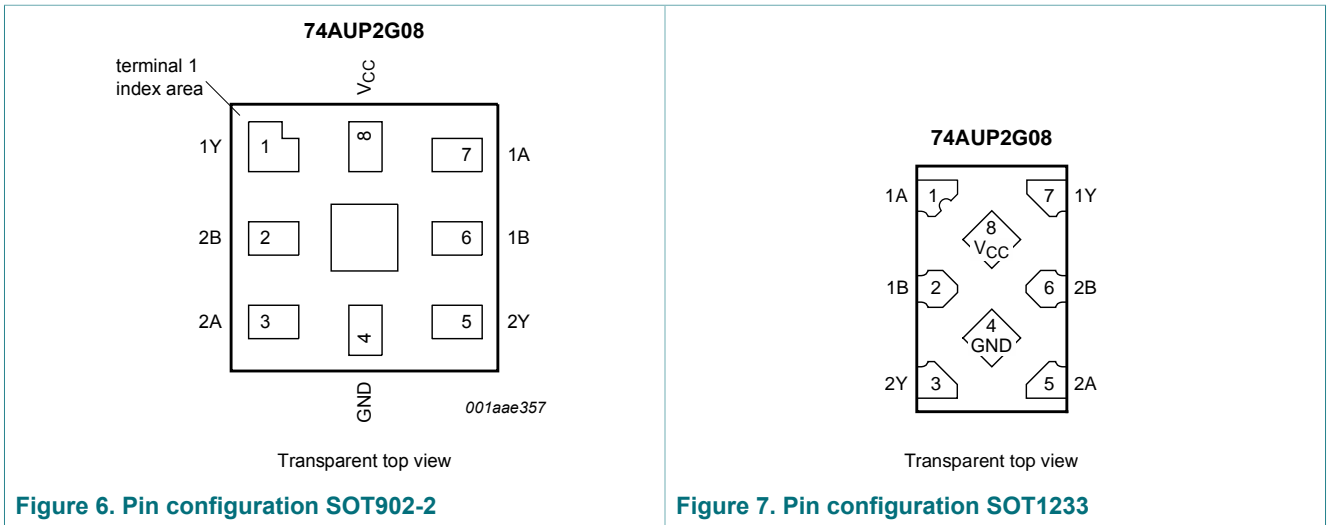


Figure 5. Pin configuration SOT833-1, SOT1089, SOT1116 and SOT1203



6.2 Pin description

Table 3. Pin description

Symbol	Pin		Description
	SOT765-1, SOT833-1, SOT1089, SOT1116, SOT1203 and SOT1233	SOT902-2	
1A, 2A	1, 5	7, 3	data input
1B, 2B	2, 6	6, 2	data input
GND	4	4	ground (0 V)
1Y, 2Y	7, 3	1, 5	data output
V _{CC}	8	8	supply voltage

7 Functional description

Table 4. Function table ^[1]

Input		Output
nA	nB	nY
L	L	L
L	H	L
H	L	L
H	H	H

[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
V _I	input voltage		^[1] -0.5	+4.6	V
V _O	output voltage	Active mode and Power-down mode	^[1] -0.5	+4.6	V
I _{IK}	input clamping current	V _I < 0 V	-50	-	mA
I _{OK}	output clamping current	V _O < 0 V	-50	-	mA
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	^[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 VSSOP8 packages: above 110 °C the value of P_{tot} derates linearly with 8.0 mW/K.

For XSON8 and XQFN8 packages: above 118 °C the value of P_{tot} derates linearly with 7.8 mW/K.

For X2SON8 package: above 118 °C the value of P_{tot} derates linearly with 7.7 mW/K.

9 Recommended operating conditions

Table 6. Operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage		0.8	3.6	V
V _I	input voltage		0	3.6	V
V _O	output voltage	Active mode	0	V _{CC}	V
		Power-down mode; V _{CC} = 0 V	0	3.6	V
T _{amb}	ambient temperature		-40	+125	°C
Δt/ΔV	input transition rise and fall rate	V _{CC} = 0.8 V to 3.6 V	-	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
$T_{amb} = 25\text{ }^{\circ}\text{C}$						
V_{IH}	HIGH-level input voltage	$V_{CC} = 0.8\text{ V}$	$0.70 \times V_{CC}$	-	-	V
		$V_{CC} = 0.9\text{ V to }1.95\text{ V}$	$0.65 \times V_{CC}$	-	-	V
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	1.6	-	-	V
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	2.0	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 0.8\text{ V}$	-	-	$0.30 \times V_{CC}$	V
		$V_{CC} = 0.9\text{ V to }1.95\text{ V}$	-	-	$0.35 \times V_{CC}$	V
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-	-	0.7	V
		$V_{CC} = 3.0\text{ V to }3.6\text{ V}$	-	-	0.9	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}\text{ or }V_{IL}$				
		$I_O = -20\text{ }\mu\text{A}; V_{CC} = 0.8\text{ V to }3.6\text{ V}$	$V_{CC} - 0.1$	-	-	V
		$I_O = -1.1\text{ mA}; V_{CC} = 1.1\text{ V}$	$0.75 \times V_{CC}$	-	-	V
		$I_O = -1.7\text{ mA}; V_{CC} = 1.4\text{ V}$	1.11	-	-	V
		$I_O = -1.9\text{ mA}; V_{CC} = 1.65\text{ V}$	1.32	-	-	V
		$I_O = -2.3\text{ mA}; V_{CC} = 2.3\text{ V}$	2.05	-	-	V
		$I_O = -3.1\text{ mA}; V_{CC} = 2.3\text{ V}$	1.9	-	-	V
		$I_O = -2.7\text{ mA}; V_{CC} = 3.0\text{ V}$	2.72	-	-	V
		$I_O = -4.0\text{ mA}; V_{CC} = 3.0\text{ V}$	2.6	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}\text{ or }V_{IL}$				
		$I_O = 20\text{ }\mu\text{A}; V_{CC} = 0.8\text{ V to }3.6\text{ V}$	-	-	0.1	V
		$I_O = 1.1\text{ mA}; V_{CC} = 1.1\text{ V}$	-	-	$0.3 \times V_{CC}$	V
		$I_O = 1.7\text{ mA}; V_{CC} = 1.4\text{ V}$	-	-	0.31	V
		$I_O = 1.9\text{ mA}; V_{CC} = 1.65\text{ V}$	-	-	0.31	V
		$I_O = 2.3\text{ mA}; V_{CC} = 2.3\text{ V}$	-	-	0.31	V
		$I_O = 3.1\text{ mA}; V_{CC} = 2.3\text{ V}$	-	-	0.44	V
		$I_O = 2.7\text{ mA}; V_{CC} = 3.0\text{ V}$	-	-	0.31	V
		$I_O = 4.0\text{ mA}; V_{CC} = 3.0\text{ V}$	-	-	0.44	V
I_I	input leakage current	$V_I = \text{GND to }3.6\text{ V}; V_{CC} = 0\text{ V to }3.6\text{ V}$	-	-	± 0.1	μA
I_{OFF}	power-off leakage current	$V_I\text{ or }V_O = 0\text{ V to }3.6\text{ V}; V_{CC} = 0\text{ V}$	-	-	± 0.2	μA
ΔI_{OFF}	additional power-off leakage current	$V_I\text{ or }V_O = 0\text{ V to }3.6\text{ V}; V_{CC} = 0\text{ V to }0.2\text{ V}$	-	-	± 0.2	μA
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	μA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
ΔI_{CC}	additional supply current	$V_I = V_{CC} - 0.6 \text{ V}$; $I_O = 0 \text{ A}$; $V_{CC} = 3.3 \text{ V}$; per pin ^[1]	-	-	40	μA
C_I	input capacitance	$V_{CC} = 0 \text{ V to } 3.6 \text{ V}$; $V_I = \text{GND or } V_{CC}$	-	0.6	-	pF
C_O	output capacitance	$V_O = \text{GND}$; $V_{CC} = 0 \text{ V}$	-	1.3	-	pF
$T_{\text{amb}} = -40 \text{ }^\circ\text{C to } +85 \text{ }^\circ\text{C}$						
V_{IH}	HIGH-level input voltage	$V_{CC} = 0.8 \text{ V}$	$0.70 \times V_{CC}$	-	-	V
		$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$	$0.65 \times V_{CC}$	-	-	V
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.6	-	-	V
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	2.0	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 0.8 \text{ V}$	-	-	$0.30 \times V_{CC}$	V
		$V_{CC} = 0.9 \text{ V to } 1.95 \text{ V}$	-	-	$0.35 \times V_{CC}$	V
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	-	-	0.7	V
		$V_{CC} = 3.0 \text{ V to } 3.6 \text{ V}$	-	-	0.9	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}$				
		$I_O = -20 \mu\text{A}$; $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	$V_{CC} - 0.1$	-	-	V
		$I_O = -1.1 \text{ mA}$; $V_{CC} = 1.1 \text{ V}$	$0.7 \times V_{CC}$	-	-	V
		$I_O = -1.7 \text{ mA}$; $V_{CC} = 1.4 \text{ V}$	1.03	-	-	V
		$I_O = -1.9 \text{ mA}$; $V_{CC} = 1.65 \text{ V}$	1.30	-	-	V
		$I_O = -2.3 \text{ mA}$; $V_{CC} = 2.3 \text{ V}$	1.97	-	-	V
		$I_O = -3.1 \text{ mA}$; $V_{CC} = 2.3 \text{ V}$	1.85	-	-	V
		$I_O = -2.7 \text{ mA}$; $V_{CC} = 3.0 \text{ V}$	2.67	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH} \text{ or } V_{IL}$				
		$I_O = 20 \mu\text{A}$; $V_{CC} = 0.8 \text{ V to } 3.6 \text{ V}$	-	-	0.1	V
		$I_O = 1.1 \text{ mA}$; $V_{CC} = 1.1 \text{ V}$	-	-	$0.3 \times V_{CC}$	V
		$I_O = 1.7 \text{ mA}$; $V_{CC} = 1.4 \text{ V}$	-	-	0.37	V
		$I_O = 1.9 \text{ mA}$; $V_{CC} = 1.65 \text{ V}$	-	-	0.35	V
		$I_O = 2.3 \text{ mA}$; $V_{CC} = 2.3 \text{ V}$	-	-	0.33	V
		$I_O = 3.1 \text{ mA}$; $V_{CC} = 2.3 \text{ V}$	-	-	0.45	V
		$I_O = 2.7 \text{ mA}$; $V_{CC} = 3.0 \text{ V}$	-	-	0.33	V
I_I	input leakage current	$V_I = \text{GND to } 3.6 \text{ V}$; $V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	± 0.5	μA
		$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}$; $V_{CC} = 0 \text{ V}$	-	-	± 0.5	μA
I_{OFF}	power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}$; $V_{CC} = 0 \text{ V}$	-	-	± 0.5	μA
ΔI_{OFF}	additional power-off leakage current	$V_I \text{ or } V_O = 0 \text{ V to } 3.6 \text{ V}$; $V_{CC} = 0 \text{ V to } 0.2 \text{ V}$	-	-	± 0.6	μA
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	μA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
ΔI_{CC}	additional supply current	$V_I = V_{CC} - 0.6 \text{ V}$; $I_O = 0 \text{ A}$; $V_{CC} = 3.3 \text{ V}$; per pin ^[1]	-	-	50	μA
$T_{\text{amb}} = -40 \text{ }^\circ\text{C}$ to $+125 \text{ }^\circ\text{C}$						
V_{IH}	HIGH-level input voltage	$V_{CC} = 0.8 \text{ V}$	$0.75 \times V_{CC}$	-	-	V
		$V_{CC} = 0.9 \text{ V}$ to 1.95 V	$0.70 \times V_{CC}$	-	-	V
		$V_{CC} = 2.3 \text{ V}$ to 2.7 V	1.6	-	-	V
		$V_{CC} = 3.0 \text{ V}$ to 3.6 V	2.0	-	-	V
V_{IL}	LOW-level input voltage	$V_{CC} = 0.8 \text{ V}$	-	-	$0.25 \times V_{CC}$	V
		$V_{CC} = 0.9 \text{ V}$ to 1.95 V	-	-	$0.30 \times V_{CC}$	V
		$V_{CC} = 2.3 \text{ V}$ to 2.7 V	-	-	0.7	V
		$V_{CC} = 3.0 \text{ V}$ to 3.6 V	-	-	0.9	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = -20 \mu\text{A}$; $V_{CC} = 0.8 \text{ V}$ to 3.6 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-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		$I_O = 20 \mu\text{A}$; $V_{CC} = 0.8 \text{ V}$ to 3.6 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 V ; $V_{CC} = 0 \text{ V}$ to 3.6 V	-	-	± 0.75	μA
		V_I or $V_O = 0 \text{ V}$ to 3.6 V ; $V_{CC} = 0 \text{ V}$	-	-	± 0.75	μA
I_{OFF}	power-off leakage current	V_I or $V_O = 0 \text{ V}$ to 3.6 V ; $V_{CC} = 0 \text{ V}$	-	-	± 0.75	μA
ΔI_{OFF}	additional power-off leakage current	V_I or $V_O = 0 \text{ V}$ to 3.6 V ; $V_{CC} = 0 \text{ V}$ to 0.2 V	-	-	± 0.75	μA
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 V	-	-	1.4	μA
ΔI_{CC}	additional supply current	$V_I = V_{CC} - 0.6 \text{ V}$; $I_O = 0 \text{ A}$; $V_{CC} = 3.3 \text{ V}$; per pin ^[1]	-	-	75	μA

[1] One input at $V_{CC} - 0.6 \text{ V}$, other inputs at V_{CC} or GND.

11 Dynamic characteristics

Table 8. Dynamic characteristics

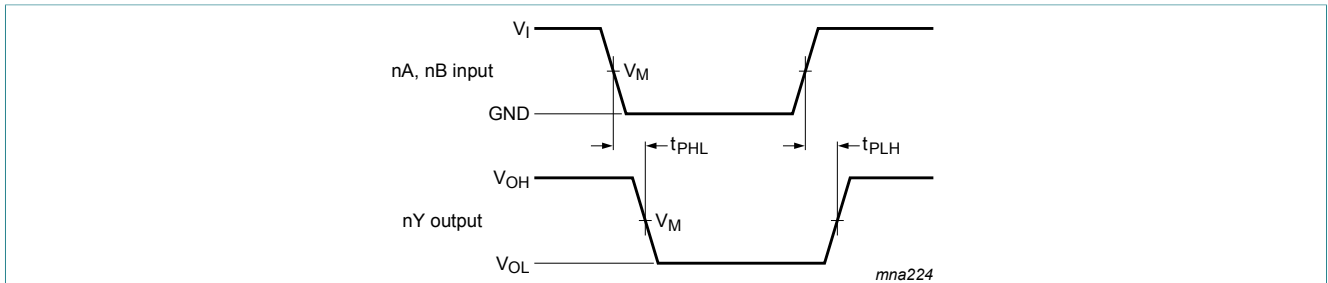
Voltages are referenced to GND (ground = 0 V); for test circuit see [Figure 9](#).

Symbol	Parameter	Conditions	T _{amb} = 25 °C			T _{amb} = -40 °C to +125 °C			Unit
			Min	Typ ^[1]	Max	Min	Max (85 °C)	Max (125 °C)	
C _L = 5 pF									
t _{pd}	propagation delay	nA, nB to nY; see Figure 8 ^[2]							
		V _{CC} = 0.8 V	-	17.0	-	-	-	-	ns
		V _{CC} = 1.1 V to 1.3 V	2.6	5.1	10.8	2.1	11.7	12.9	ns
		V _{CC} = 1.4 V to 1.6 V	1.6	3.7	6.5	1.5	7.5	8.3	ns
		V _{CC} = 1.65 V to 1.95 V	1.3	3.0	5.2	1.3	6.1	6.7	ns
		V _{CC} = 2.3 V to 2.7 V	1.1	2.4	4.0	1.0	4.8	5.3	ns
V _{CC} = 3.0 V to 3.6 V	1.0	2.2	3.5	0.9	4.3	4.8	ns		
C _L = 10 pF									
t _{pd}	propagation delay	nA, nB to nY; see Figure 8 ^[2]							
		V _{CC} = 0.8 V	-	20.6	-	-	-	-	ns
		V _{CC} = 1.1 V to 1.3 V	2.4	6.0	12.5	2.2	13.6	15.0	ns
		V _{CC} = 1.4 V to 1.6 V	2.0	4.3	7.6	1.8	8.9	9.8	ns
		V _{CC} = 1.65 V to 1.95 V	1.7	3.6	6.1	1.6	7.2	7.9	ns
		V _{CC} = 2.3 V to 2.7 V	1.4	2.9	4.8	1.3	5.7	6.3	ns
V _{CC} = 3.0 V to 3.6 V	1.3	2.7	4.2	1.2	4.7	5.2	ns		
C _L = 15 pF									
t _{pd}	propagation delay	nA, nB to nY; see Figure 8 ^[2]							
		V _{CC} = 0.8 V	-	24.1	-	-	-	-	ns
		V _{CC} = 1.1 V to 1.3 V	3.4	6.8	14.2	3.1	15.7	17.3	ns
		V _{CC} = 1.4 V to 1.6 V	2.3	4.9	8.6	2.1	10.1	11.2	ns
		V _{CC} = 1.65 V to 1.95 V	1.9	4.0	6.9	1.8	8.2	9.0	ns
		V _{CC} = 2.3 V to 2.7 V	1.7	3.4	5.5	1.6	6.5	7.2	ns
V _{CC} = 3.0 V to 3.6 V	1.5	3.1	4.8	1.5	5.9	6.5	ns		
C _L = 30 pF									
t _{pd}	propagation delay	nA, nB to nY; see Figure 8 ^[2]							
		V _{CC} = 0.8 V	-	34.4	-	-	-	-	ns
		V _{CC} = 1.1 V to 1.3 V	4.6	9.1	19.4	4.1	21.8	24.0	ns
		V _{CC} = 1.4 V to 1.6 V	3.4	6.4	11.5	2.9	13.6	15.0	ns
		V _{CC} = 1.65 V to 1.95 V	2.6	5.3	9.1	2.4	10.9	12.1	ns
		V _{CC} = 2.3 V to 2.7 V	2.3	4.5	7.2	2.2	8.6	9.5	ns
V _{CC} = 3.0 V to 3.6 V	2.2	4.2	6.2	2.1	7.5	8.3	ns		

Symbol	Parameter	Conditions	T _{amb} = 25 °C			T _{amb} = -40 °C to +125 °C			Unit
			Min	Typ ^[1]	Max	Min	Max (85 °C)	Max (125 °C)	
C _L = 5 pF, 10 pF, 15 pF and 30 pF									
C _{PD}	power dissipation capacitance	f _i = 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	-	2.6	-	-	-	-	pF
		V _{CC} = 1.4 V to 1.6 V	-	2.7	-	-	-	-	pF
		V _{CC} = 1.65 V to 1.95 V	-	2.8	-	-	-	-	pF
		V _{CC} = 2.3 V to 2.7 V	-	3.2	-	-	-	-	pF
		V _{CC} = 3.0 V to 3.6 V	-	3.7	-	-	-	-	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 outputs.

11.1 Waveforms and test circuit

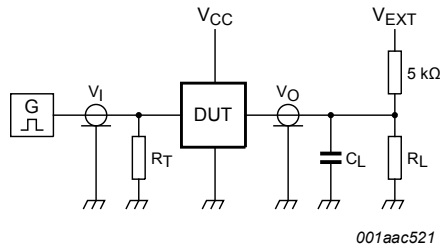


Measurement points are given in [Table 9](#).
 Logic levels: V_{OL} and V_{OH} are typical output voltage levels that occur with the output load.

Figure 8. The data input (nA or nB) to output (nY) propagation delays

Table 9. Measurement points

Supply voltage	Output	Input		
V _{CC}	V _M	V _M	V _I	t _r = t _f
0.8 V to 3.6 V	0.5 × V _{CC}	0.5 × V _{CC}	V _{CC}	≤ 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.

Figure 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 Package outline

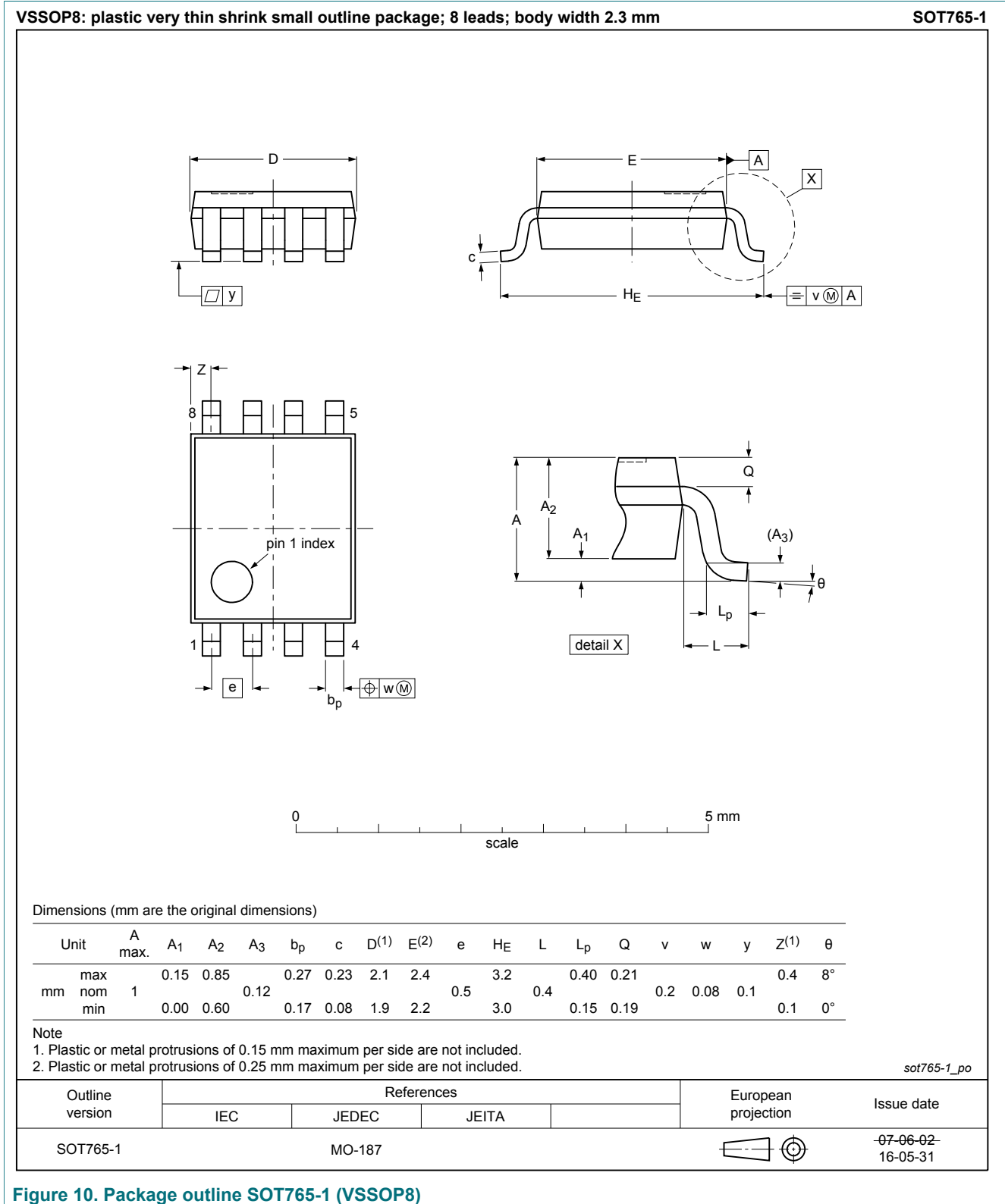
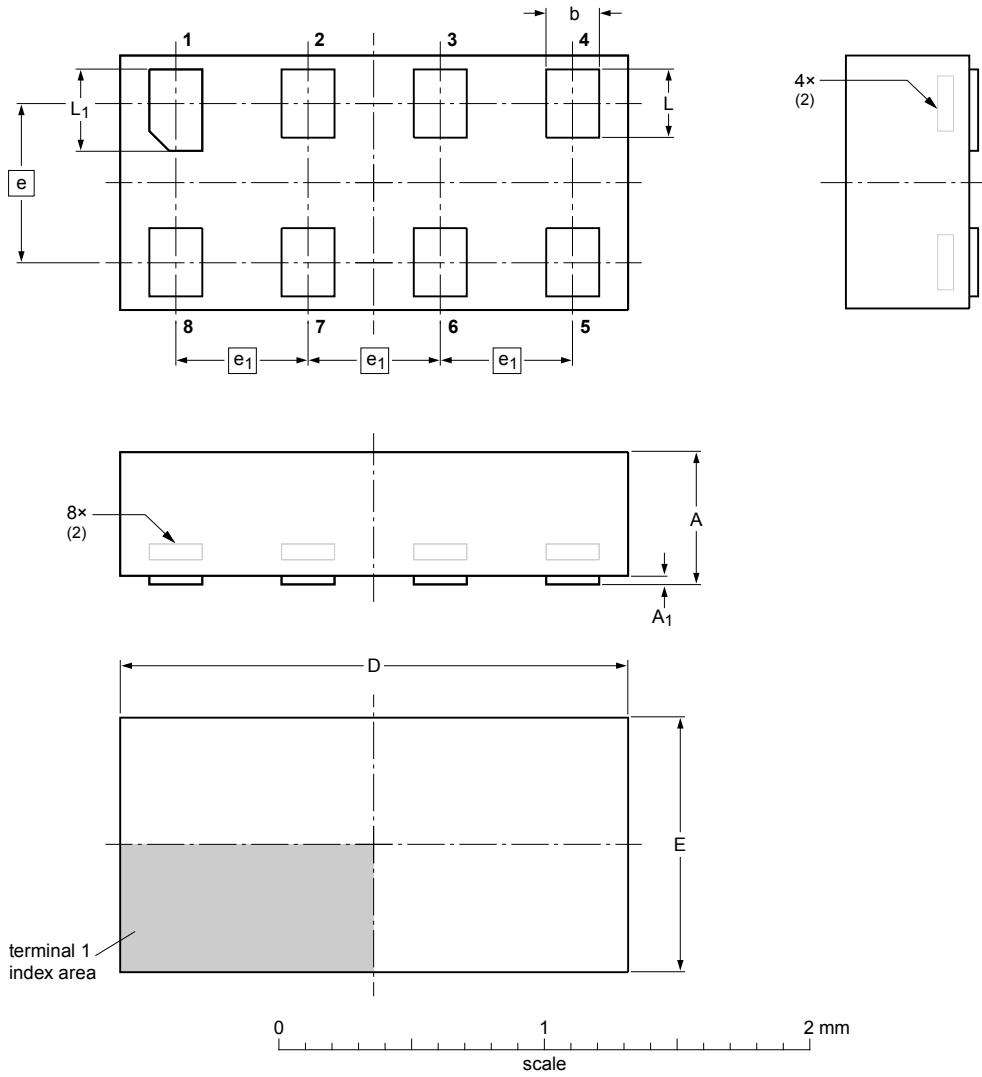


Figure 10. Package outline SOT765-1 (VSSOP8)

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

SOT833-1



DIMENSIONS (mm are the original dimensions)

UNIT	A ⁽¹⁾ max	A ₁ max	b	D	E	e	e ₁	L	L ₁
mm	0.5	0.04	0.25 0.17	2.0 1.9	1.05 0.95	0.6	0.5	0.35 0.27	0.40 0.32

Notes

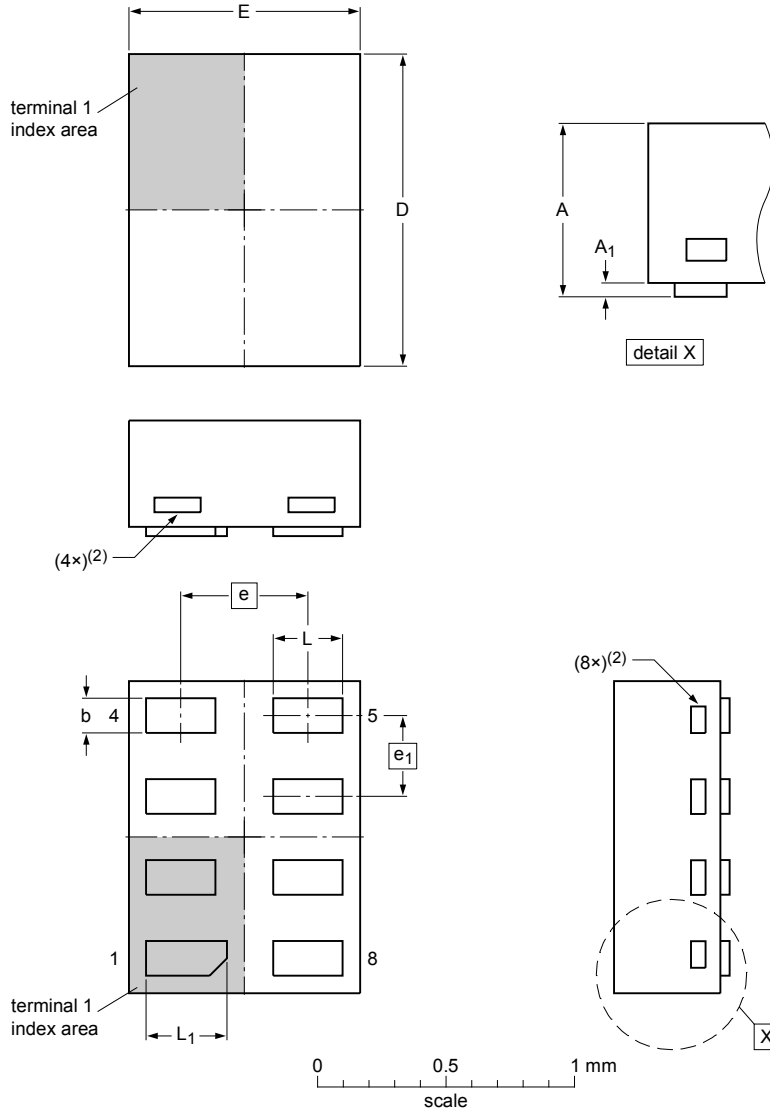
1. Including plating thickness.
2. Can be visible in some manufacturing processes.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT833-1	---	MO-252	---		07-11-14 07-12-07

Figure 11. Package outline SOT833-1 (XSON8)

XSON8: extremely thin small outline package; no leads;
8 terminals; body 1.35 x 1 x 0.5 mm

SOT1089



Dimensions

Unit	A ⁽¹⁾	A ₁	b	D	E	e	e ₁	L	L ₁
max	0.5	0.04	0.20	1.40	1.05			0.35	0.40
mm nom			0.15	1.35	1.00	0.55	0.35	0.30	0.35
min			0.12	1.30	0.95			0.27	0.32

Note

- Including plating thickness.
- Visible depending upon used manufacturing technology.

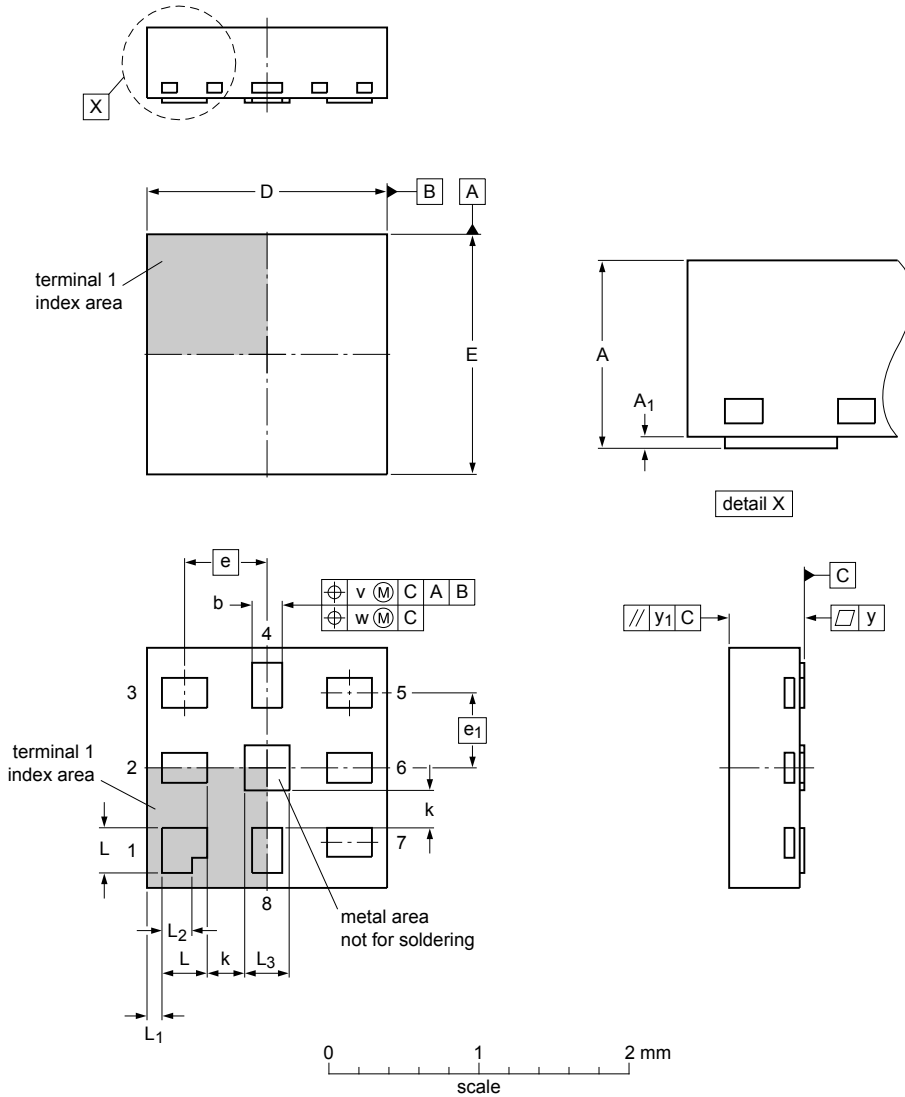
sot1089_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1089		MO-252				10-04-09 10-04-12

Figure 12. Package outline SOT1089 (XSON8)

XQFN8: plastic, extremely thin quad flat package; no leads;
8 terminals; body 1.6 x 1.6 x 0.5 mm

SOT902-2



Dimensions

Unit ⁽¹⁾	A	A ₁	b	D	E	e	e ₁	k	L	L ₁	L ₂	L ₃	v	w	y	y ₁
max	0.5	0.05	0.25	1.65	1.65				0.35	0.15	0.25	0.35				
mm	nom		0.20	1.60	1.60	0.55	0.5		0.30	0.10	0.20	0.30	0.1	0.05	0.05	0.05
	min	0.00	0.15	1.55	1.55			0.2	0.25	0.05	0.15	0.25				

Note

1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

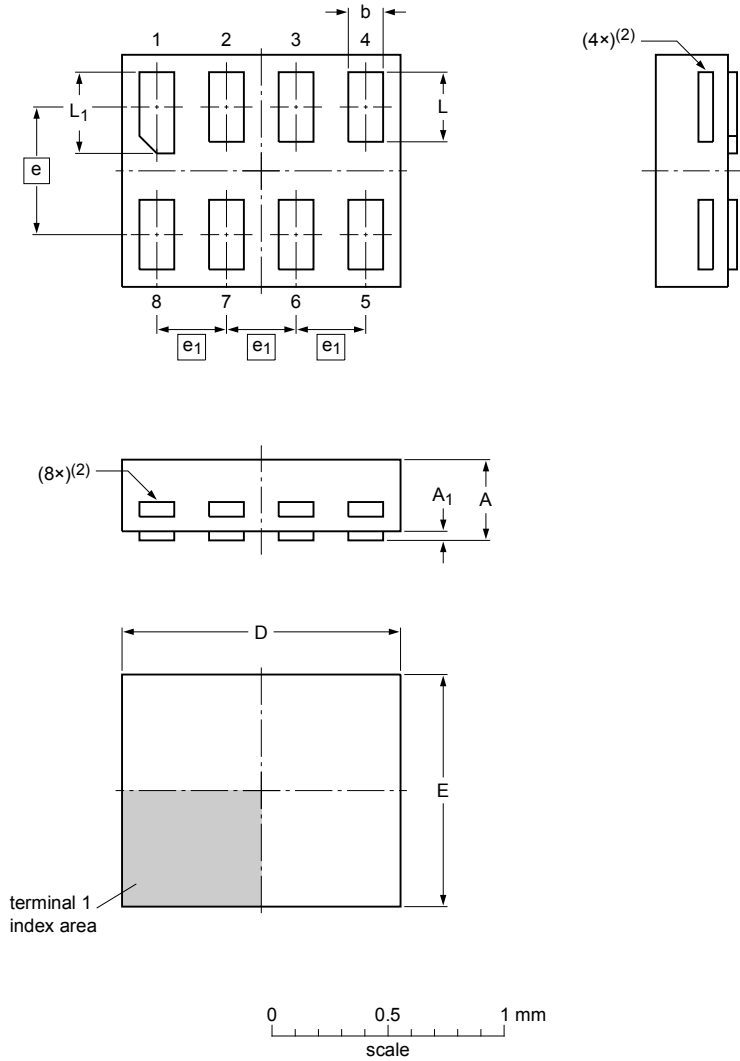
sot902-2_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT902-2	---	MO-255	---			16-07-14 16-11-08

Figure 13. Package outline SOT902-2 (XQFN8)

XSON8: extremely thin small outline package; no leads;
8 terminals; body 1.2 x 1.0 x 0.35 mm

SOT1116



Dimensions

Unit	A ⁽¹⁾	A ₁	b	D	E	e	e ₁	L	L ₁
max	0.35	0.04	0.20	1.25	1.05			0.35	0.40
nom			0.15	1.20	1.00	0.55	0.3	0.30	0.35
min			0.12	1.15	0.95			0.27	0.32

Note

- Including plating thickness.
- Visible depending upon used manufacturing technology.

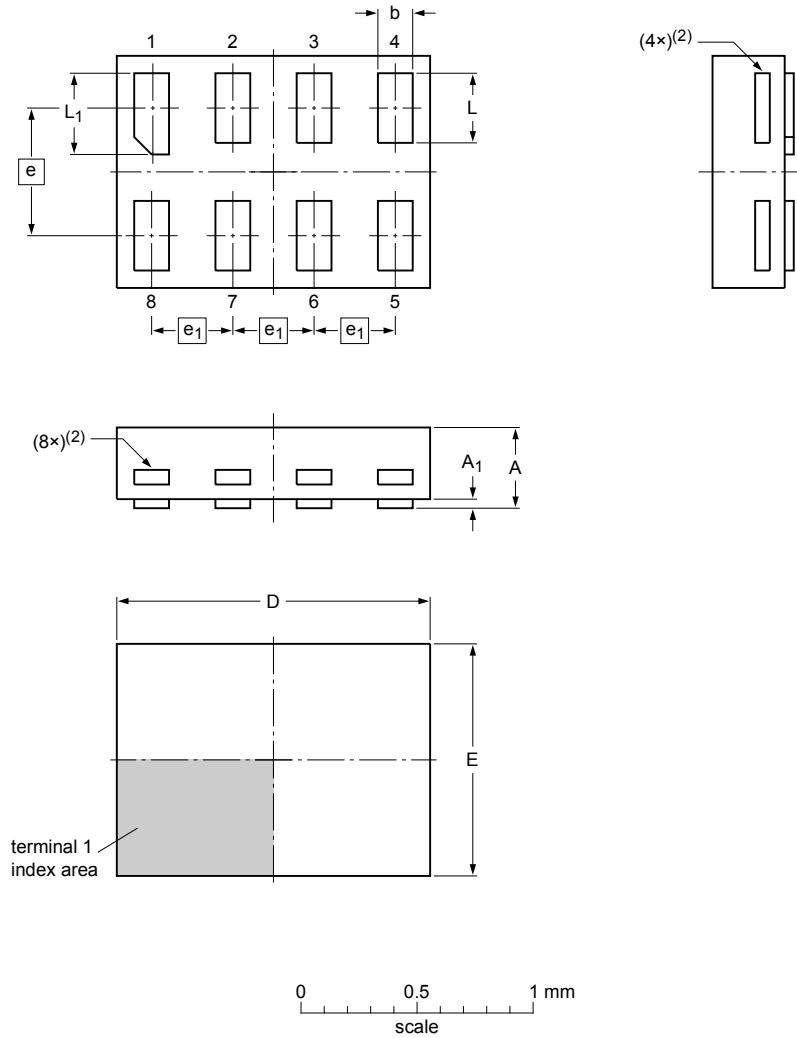
sot1116_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1116						-10-04-02- 10-04-07

Figure 14. Package outline SOT1116 (XSON8)

XSON8: extremely thin small outline package; no leads;
8 terminals; body 1.35 x 1.0 x 0.35 mm

SOT1203



Dimensions

Unit	A ⁽¹⁾	A ₁	b	D	E	e	e ₁	L	L ₁
max	0.35	0.04	0.20	1.40	1.05			0.35	0.40
mm nom			0.15	1.35	1.00	0.55	0.35	0.30	0.35
min			0.12	1.30	0.95			0.27	0.32

Note

- Including plating thickness.
- Visible depending upon used manufacturing technology.

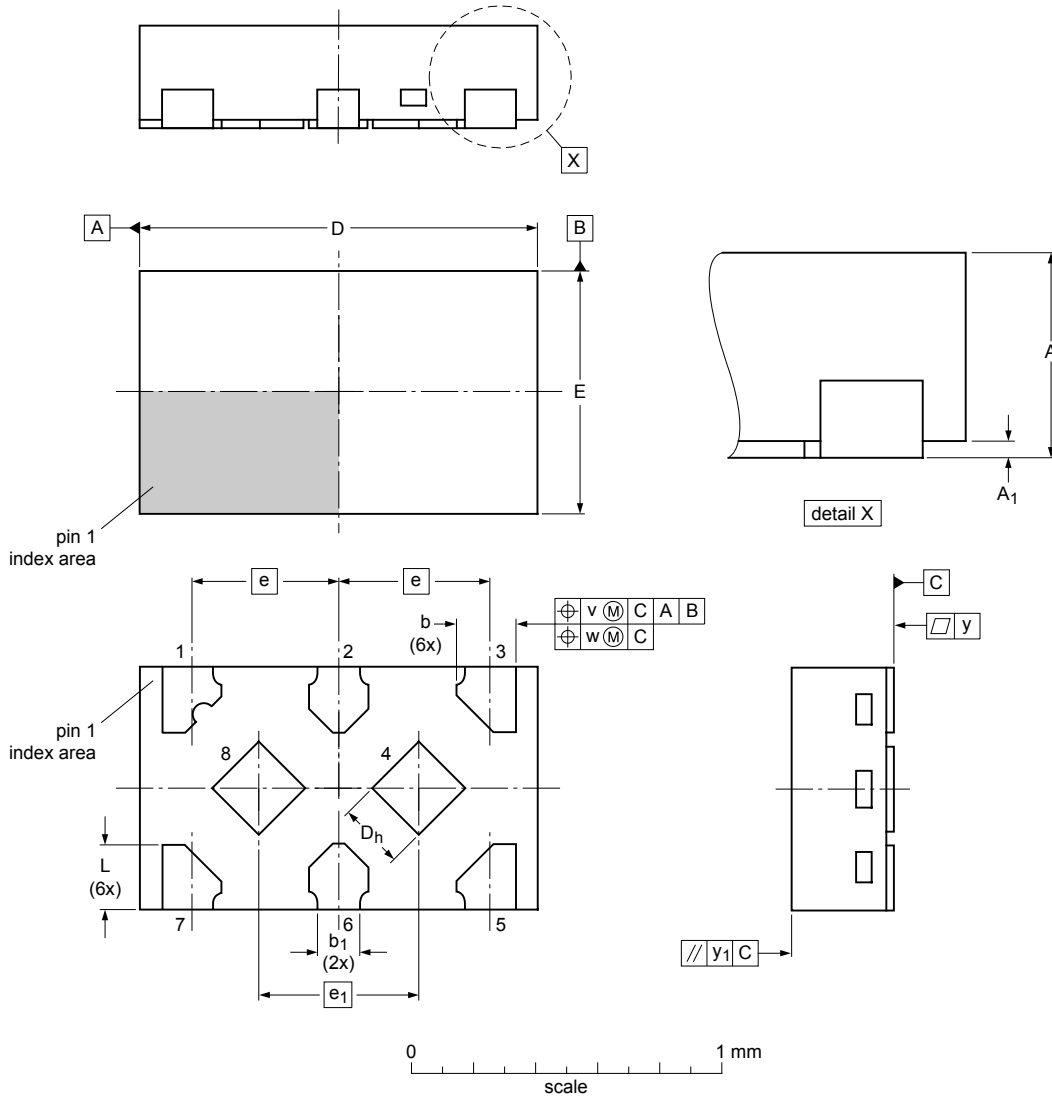
sot1203_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1203						-10-04-02- 10-04-06

Figure 15. Package outline SOT1203 (XSON8)

X2SON8: plastic thermal enhanced extremely thin small outline package; no leads; 8 terminals; body 1.35 x 0.8 x 0.35 mm

SOT1233



Dimensions (mm are the original dimensions)

Unit	A	A ₁	b	b ₁	D	D _h	E	e	e ₁	L	v	w	y	y ₁
max	0.35	0.04	0.25		1.40	0.27	0.85			0.27				
nom	0.32		0.20	0.15	1.35	0.22	0.80	0.5	0.54	0.22	0.1	0.05	0.05	0.05
min	0.30	0.00	0.15	(ref)	1.30	0.17	0.75			0.17				

sot1233_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1233		---				16-04-21 17-01-05

Figure 16. Package outline SOT1233 (X2SON8)

13 Abbreviations

Table 11. 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 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP2G08 v.9	20170703	Product data sheet	-	74AUP2G08 v.8
Modifications:	<ul style="list-style-type: none"> 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. Figure 7 and Figure 16 (drawings SOT1233/X2SON8) updated Type number 74AUP2G08GD removed. 			
74AUP2G08 v.8	20161028	Product data sheet	-	74AUP2G08 v.7
Modifications:	<ul style="list-style-type: none"> Added type number 74AUP2G08GX (SOT1233/X2SON8) 			
74AUP2G08 v.7	20130118	Product data sheet	-	74AUP2G08 v.6
Modifications:	<ul style="list-style-type: none"> For type number 74AUP2G08GD XSON8U has changed to XSON8. 			
74AUP2G08 v.6	20120607	Product data sheet	-	74AUP2G08 v.5
74AUP2G08 v.5	20111201	Product data sheet	-	74AUP2G08 v.4
74AUP2G08 v.4	20101109	Product data sheet	-	74AUP2G08 v.3
74AUP2G08 v.3	20080529	Product data sheet	-	74AUP2G08 v.2
74AUP2G08 v.2	20080407	Product data sheet	-	74AUP2G08 v.1
74AUP2G08 v.1	20061006	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".

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