74AUP2G240

Low-power dual inverting buffer/line driver; 3-state

Rev. 04 — 30 June 2009 **Product data sheet**

1. General description

The 74AUP2G240 provides the dual inverting buffer/line driver with 3-state output. The 3-state output is controlled by the output enable input ($n\overline{OE}$). A HIGH level at pin $n\overline{OE}$ causes the output to assume a high-impedance OFF-state.

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.

This device has the input-disable feature, which allows floating input signals. The inputs are disabled when the output enable input $n\overline{OE}$ is HIGH.

2. Features

- 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-A114E 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 μA (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}
- Input-disable feature allows floating input conditions
- 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

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3. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AUP2G240DC	–40 °C to +125 °C	VSSOP8	plastic very thin shrink small outline package; 8 leads; body width 2.3 mm	SOT765-1
74AUP2G240GT	–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
74AUP2G240GD	–40 °C to +125 °C	XSON8U	plastic extremely thin small outline package; no leads; 8 terminals; UTLP based; body 3 × 2 × 0.5 mm	SOT996-2
74AUP2G240GM	–40 °C to +125 °C	XQFN8U	plastic extremely thin quad flat package; no leads; 8 terminals; UTLP based; body 1.6 × 1.6 × 0.5 mm	SOT902-1

4. Marking

Table 2. Marking codes

Type number	Marking code[1]
74AUP2G240DC	p40
74AUP2G240GT	p40
74AUP2G240GD	p40
74AUP2G240GM	p40

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

5. Functional diagram

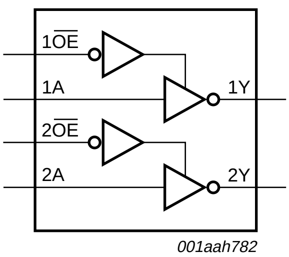


Fig 1. Logic symbol

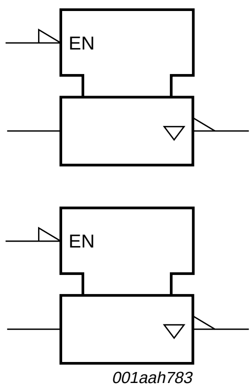


Fig 2. IEC logic symbol

6. Pinning information

6.1 Pinning

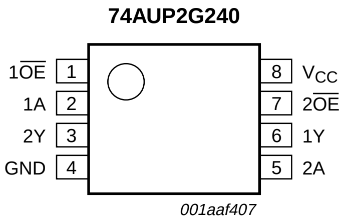


Fig 3. Pin configuration SOT765-1 (VSSOP8)

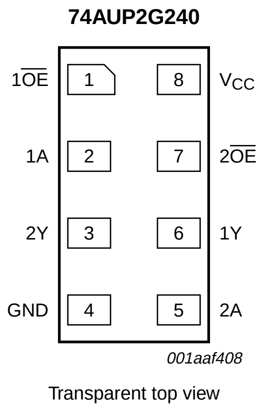


Fig 4. Pin configuration SOT833-1 (XSON8)

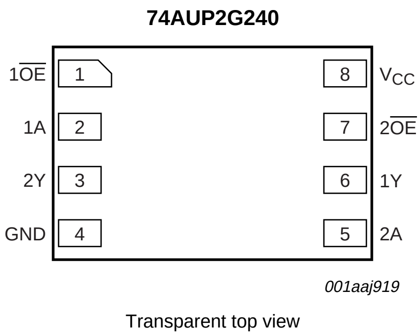


Fig 5. Pin configuration SOT996-2 (XSON8U)

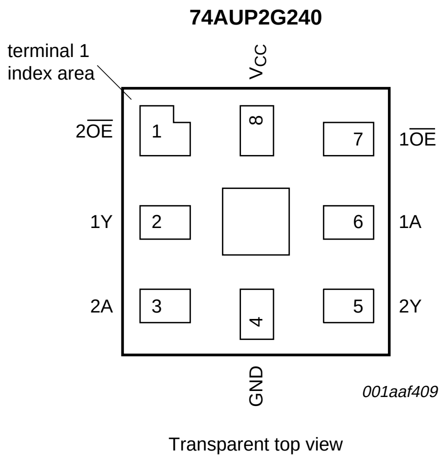


Fig 6. Pin configuration SOT902-1 (XQFN8U)

6.2 Pin description

Table 3. Pin description

Symbol	Pin		Description
	SOT765-1, SOT833-1 and SOT996-2	SOT902-1	
$1\overline{OE}$, $2\overline{OE}$	1, 7	7, 1	output enable input (active LOW)
1A, 2A	2, 5	6, 3	data input
GND	4	4	ground (0 V)
1Y, 2Y	6, 3	2, 5	data output
V_{CC}	8	8	supply voltage

7. Functional description

Table 4. Function table[1]

Input		Output
n$\overline{OE}$	nA	nY
L	L	H
L	H	L
H	X	Z

[1] H = HIGH voltage level;
L = LOW voltage level;
X = don't care;
Z = high-impedance OFF-state.

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 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	[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, XSON8U and XQFN8U packages: above 118 °C the value of P_{tot} derates linearly with 7.8 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
$\Delta t/\Delta V$	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
T_{amb} = 25 °C						
V_{IH}	HIGH-level input voltage	V_{CC} = 0.8 V	0.70 × V_{CC}	-	-	V
		V_{CC} = 0.9 V to 1.95 V	0.65 × 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-level input voltage	V_{CC} = 0.8 V	-	-	0.30 × V_{CC}	V
		V_{CC} = 0.9 V to 1.95 V	-	-	0.35 × 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-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	0.75 × 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
		I_O = −4.0 mA; V_{CC} = 3.0 V	2.6	-	-	V
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	-	-	0.3 × 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
I_I	input leakage current	V_I = GND to 3.6 V; V_{CC} = 0 V to 3.6 V	-	-	±0.1	μA
I_{OZ}	OFF-state output current	V_I = V_{IH} or V_{IL}; V_O = 0 V 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

Table 7. Static characteristics *...continued*
At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
ΔI_{CC}	additional supply current	data input; $V_I = V_{CC} - 0.6$ V; $I_O = 0$ A; $V_{CC} = 3.3$ V	[1]	-	-	40	µA
		$n\overline{OE}$ input; $V_I = V_{CC} - 0.6$ V; $I_O = 0$ A; $V_{CC} = 3.3$ V	[1]	-	-	110	µA
		disabled inputs; V_I = GND to 3.6 V; $n\overline{OE} = V_{CC}$; V_{CC} = 0.8 V to 3.6 V		-	-	1	µA
C_I	input capacitance	V_{CC} = 0 V to 3.6 V; V_I = GND or V_{CC}		-	0.6	-	pF
C_O	output capacitance	output enabled; V_O = GND; V_{CC} = 0 V		-	1.7	-	pF
		output disabled; V_{CC} = 0 V to 3.6 V; V_O = GND or V_{CC}		-	1.5	-	pF
T_{amb} = −40 °C to +85 °C							
V_{IH}	HIGH-level 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-level 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-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		$0.7 \times V_{CC}$	-	-	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
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		-	-	$0.3 \times V_{CC}$	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_{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL}; V_O = 0 V 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

Table 7. Static characteristics *...continued*

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
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	data input; $V_I = V_{CC} - 0.6$ V; I_O = 0 A; V_{CC} = 3.3 V	[1]	-	-	50	μA
		n$\overline{OE}$ input; $V_I = V_{CC} - 0.6$ V; I_O = 0 A; V_{CC} = 3.3 V	[1]	-	-	120	μA
		disabled inputs; V_I = GND to 3.6 V; n$\overline{OE}$ = V_{CC}; V_{CC} = 0.8 V to 3.6 V		-	-	1	μA
T_{amb} = −40 °C to +125 °C							
V_{IH}	HIGH-level input voltage	V_{CC} = 0.8 V		0.75 × V_{CC}	-	-	V
		V_{CC} = 0.9 V to 1.95 V		0.70 × 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-level input voltage	V_{CC} = 0.8 V		-	-	0.25 × V_{CC}	V
		V_{CC} = 0.9 V to 1.95 V		-	-	0.30 × 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-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		0.6 × V_{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
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		-	-	0.33 × V_{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_{OZ}	OFF-state output current	$V_I = V_{IH}$ or V_{IL}; V_O = 0 V 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

Table 7. Static characteristics *...continued*

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
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	data input; $V_I = V_{CC} - 0.6$ V; I_O = 0 A; V_{CC} = 3.3 V	[1]	-	-	75	μA
		$n\overline{OE}$ input; $V_I = V_{CC} - 0.6$ V; I_O = 0 A; V_{CC} = 3.3 V	[1]	-	-	180	μA
		disabled inputs; V_I = GND to 3.6 V; $n\overline{OE} = V_{CC}$; V_{CC} = 0.8 V to 3.6 V		-	-	1	μA

[1] One input at $V_{CC} - 0.6$ V, other input 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		25 °C			−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 to nY; see Figure 7	[2]							
		V_{CC} = 0.8 V		-	22.3	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V		3.0	5.8	12.6	2.8	14.1	15.5	ns
		V_{CC} = 1.4 V to 1.6 V		2.3	4.0	7.3	2.1	8.5	9.4	ns
		V_{CC} = 1.65 V to 1.95 V		2.0	3.2	5.5	1.9	6.7	7.4	ns
		V_{CC} = 2.3 V to 2.7 V		1.8	2.6	4.1	1.5	4.8	5.3	ns
		V_{CC} = 3.0 V to 3.6 V		1.4	2.3	3.6	1.3	4.1	4.6	ns
t_{en}	enable time	$n\overline{OE}$ to nY; see Figure 8	[3]							
		V_{CC} = 0.8 V		-	70.2	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V		3.1	6.4	14.3	2.8	15.9	17.5	ns
		V_{CC} = 1.4 V to 1.6 V		2.5	4.4	8.1	2.2	9.5	10.5	ns
		V_{CC} = 1.65 V to 1.95 V		2.1	3.6	6.2	1.9	7.4	8.2	ns
		V_{CC} = 2.3 V to 2.7 V		1.8	2.8	4.6	1.7	5.4	6.0	ns
		V_{CC} = 3.0 V to 3.6 V		1.7	2.5	4.0	1.7	4.7	5.3	ns
t_{dis}	disable time	$n\overline{OE}$ to nY; see Figure 8	[4]							
		V_{CC} = 0.8 V		-	14.8	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V		2.0	4.3	7.4	2.3	8.3	9.2	ns
		V_{CC} = 1.4 V to 1.6 V		1.6	3.2	5.2	1.7	5.9	6.5	ns
		V_{CC} = 1.65 V to 1.95 V		1.5	3.0	4.8	1.5	5.5	6.1	ns
		V_{CC} = 2.3 V to 2.7 V		1.1	2.2	3.5	1.4	4.0	4.5	ns
		V_{CC} = 3.0 V to 3.6 V		1.3	2.5	3.9	1.4	4.5	5.0	ns

Table 8. Dynamic characteristics *...continued*

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

Symbol	Parameter	Conditions		25 °C			−40 °C to +125 °C			Unit
				Min	Typ[1]	Max	Min	Max (85 °C)	Max (125 °C)	
C_L = 10 pF										
t_{pd}	propagation delay	nA to nY; see Figure 7	[2]							
		V_{CC} = 0.8 V		-	25.7	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V		3.5	6.6	14.5	3.2	16.3	18.0	ns
		V_{CC} = 1.4 V to 1.6 V		2.2	4.6	8.4	2.0	9.9	10.9	ns
		V_{CC} = 1.65 V to 1.95 V		2.0	3.8	6.4	1.8	7.7	8.6	ns
		V_{CC} = 2.3 V to 2.7 V		1.8	3.1	4.8	1.7	5.7	6.4	ns
		V_{CC} = 3.0 V to 3.6 V		1.7	2.8	4.3	1.7	5.0	5.5	ns
t_{en}	enable time	n$\overline{OE}$ to nY; see Figure 8	[3]							
		V_{CC} = 0.8 V		-	74.0	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V		3.6	7.4	16.3	3.2	18.2	20.1	ns
		V_{CC} = 1.4 V to 1.6 V		2.3	5.1	9.2	2.1	10.9	12.0	ns
		V_{CC} = 1.65 V to 1.95 V		2.0	4.1	7.1	1.8	8.5	9.4	ns
		V_{CC} = 2.3 V to 2.7 V		1.8	3.4	5.4	1.7	6.4	7.1	ns
		V_{CC} = 3.0 V to 3.6 V		1.8	3.1	4.8	1.7	5.7	6.3	ns
t_{dis}	disable time	n$\overline{OE}$ to nY; see Figure 8	[4]							
		V_{CC} = 0.8 V		-	33.7	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V		3.4	5.4	9.0	3.2	10.0	11.0	ns
		V_{CC} = 1.4 V to 1.6 V		2.1	4.1	6.3	2.1	7.1	7.9	ns
		V_{CC} = 1.65 V to 1.95 V		2.3	4.2	6.3	1.8	7.1	7.9	ns
		V_{CC} = 2.3 V to 2.7 V		1.6	3.0	4.6	1.7	5.2	5.7	ns
		V_{CC} = 3.0 V to 3.6 V		2.1	3.8	5.7	1.7	6.4	7.1	ns
C_L = 15 pF										
t_{pd}	propagation delay	nA to nY; see Figure 7	[2]							
		V_{CC} = 0.8 V		-	29.0	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V		3.9	7.4	16.3	3.6	18.4	20.2	ns
		V_{CC} = 1.4 V to 1.6 V		3.0	5.1	9.4	2.5	11.1	12.3	ns
		V_{CC} = 1.65 V to 1.95 V		2.2	4.2	7.2	2.1	8.7	9.6	ns
		V_{CC} = 2.3 V to 2.7 V		2.0	3.5	5.4	1.9	6.5	7.2	ns
		V_{CC} = 3.0 V to 3.6 V		2.0	3.3	4.9	1.9	5.7	6.4	ns
t_{en}	enable time	n$\overline{OE}$ to nY; see Figure 8	[3]							
		V_{CC} = 0.8 V		-	77.8	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V		4.0	8.2	18.2	3.6	20.4	22.5	ns
		V_{CC} = 1.4 V to 1.6 V		3.0	5.6	10.3	2.5	12.2	13.4	ns
		V_{CC} = 1.65 V to 1.95 V		2.3	4.6	7.9	2.1	9.5	10.5	ns
		V_{CC} = 2.3 V to 2.7 V		2.1	3.9	6.0	2.0	7.2	7.9	ns
		V_{CC} = 3.0 V to 3.6 V		2.1	3.6	5.5	1.9	6.4	7.1	ns

Table 8. Dynamic characteristics *...continued*

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

Symbol	Parameter	Conditions		25 °C			−40 °C to +125 °C			Unit
				Min	Typ[1]	Max	Min	Max (85 °C)	Max (125 °C)	
t_{dis}	disable time	$n\overline{OE}$ to nY; see Figure 8	[4]							
		V_{CC} = 0.8 V		-	62.5	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V		4.3	6.6	10.4	3.6	11.6	12.8	ns
		V_{CC} = 1.4 V to 1.6 V		3.0	5.0	7.4	2.5	8.4	9.3	ns
		V_{CC} = 1.65 V to 1.95 V		3.0	5.3	7.8	2.1	8.7	9.7	ns
		V_{CC} = 2.3 V to 2.7 V		2.1	3.8	5.7	2.0	6.4	7.1	ns
		V_{CC} = 3.0 V to 3.6 V		2.9	5.0	7.4	1.9	8.3	9.1	ns
C_L = 30 pF										
t_{pd}	propagation delay	nA to nY; see Figure 7	[2]							
		V_{CC} = 0.8 V		-	39.1	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V		5.0	9.7	21.6	4.6	24.3	26.8	ns
		V_{CC} = 1.4 V to 1.6 V		4.0	6.7	12.3	3.0	14.6	16.1	ns
		V_{CC} = 1.65 V to 1.95 V		2.9	5.5	9.5	2.7	11.5	12.6	ns
		V_{CC} = 2.3 V to 2.7 V		2.7	4.6	7.1	2.5	8.6	9.5	ns
		V_{CC} = 3.0 V to 3.6 V		2.6	4.3	6.4	2.5	7.7	8.5	ns
t_{en}	enable time	$n\overline{OE}$ to nY; see Figure 8	[3]							
		V_{CC} = 0.8 V		-	89.4	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V		5.2	10.6	23.8	4.6	26.7	29.5	ns
		V_{CC} = 1.4 V to 1.6 V		4.0	7.3	13.2	3.0	15.7	17.4	ns
		V_{CC} = 1.65 V to 1.95 V		3.0	6.0	10.2	2.7	12.3	13.6	ns
		V_{CC} = 2.3 V to 2.7 V		2.8	5.0	7.8	2.6	9.3	10.3	ns
		V_{CC} = 3.0 V to 3.6 V		2.8	4.8	7.1	2.6	8.4	9.3	ns
t_{dis}	disable time	$n\overline{OE}$ to nY; see Figure 8	[4]							
		V_{CC} = 0.8 V		-	68.9	-	-	-	-	ns
		V_{CC} = 1.1 V to 1.3 V		6.0	9.3	15.0	4.6	16.5	18.2	ns
		V_{CC} = 1.4 V to 1.6 V		4.4	7.7	11.0	3.0	12.2	13.4	ns
		V_{CC} = 1.65 V to 1.95 V		5.1	8.8	12.4	2.7	13.7	15.1	ns
		V_{CC} = 2.3 V to 2.7 V		3.6	6.2	9.0	2.6	10.0	11.0	ns
		V_{CC} = 3.0 V to 3.6 V		5.2	8.8	12.7	2.6	14.0	15.4	ns

Table 8. Dynamic characteristics *...continued*

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

Symbol	Parameter	Conditions	25 °C			–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 = 1 MHz; V_I = GND to V_{CC} [5]							
		V_{CC} = 0.8 V	-	2.7	-	-	-	-	pF
		V_{CC} = 1.1 V to 1.3 V	-	2.9	-	-	-	-	pF
		V_{CC} = 1.4 V to 1.6 V	-	3.0	-	-	-	-	pF
		V_{CC} = 1.65 V to 1.95 V	-	3.2	-	-	-	-	pF
		V_{CC} = 2.3 V to 2.7 V	-	3.7	-	-	-	-	pF
		V_{CC} = 3.0 V to 3.6 V	-	4.2	-	-	-	-	pF

[1] All typical values are measured at nominal V_{CC}.

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

[3] t_{en} is the same as t_{PZH} and t_{PZL}.

[4] t_{dis} is the same as t_{PHZ} and t_{PLZ}.

[5] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).

$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ where:

f_i = input frequency in MHz;

f_o = output frequency in MHz;

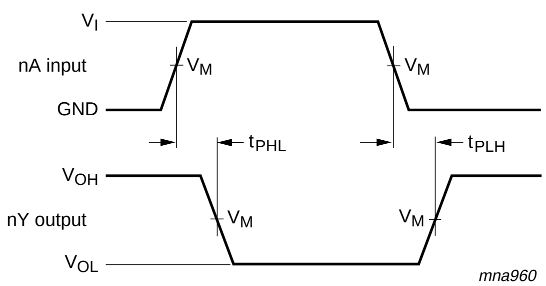
C_L = output load capacitance in pF;

V_{CC} = supply voltage in V;

N = number of inputs switching;

$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

12. Waveforms



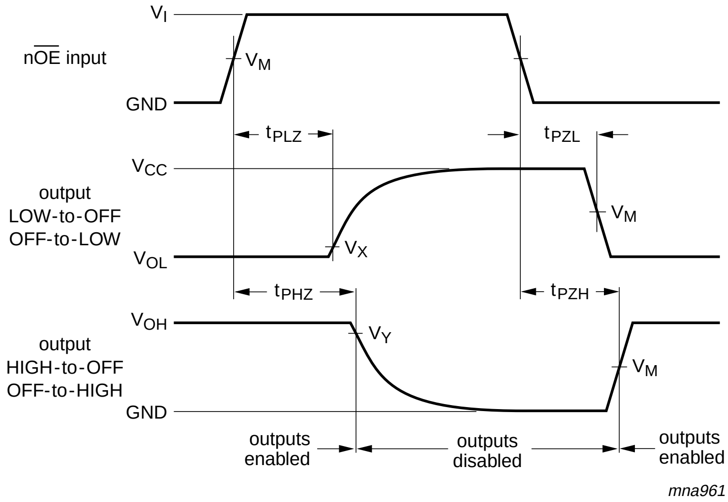
Measurement points are given in Table 9.

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

Fig 7. The data input (nA) 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	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	V_{CC}	≤ 3.0 ns



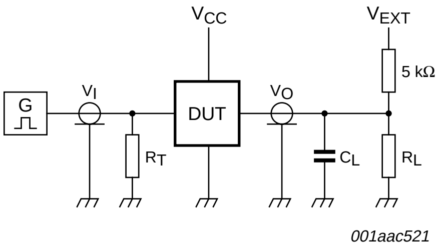
Measurement points are given in Table 10.

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

Fig 8. 3-state enable and disable times

Table 10. Measurement points

Supply voltage	Input	Output		
V_{CC}	V_M	V_M	V_X	V_Y
0.8 V to 1.6 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	V_{OL} + 0.1 V	V_{OH} – 0.1 V
1.65 V to 2.7 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	V_{OL} + 0.15 V	V_{OH} – 0.15 V
3.0 V to 3.6 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	V_{OL} + 0.3 V	V_{OH} – 0.3 V



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 9. Load circuitry for switching times

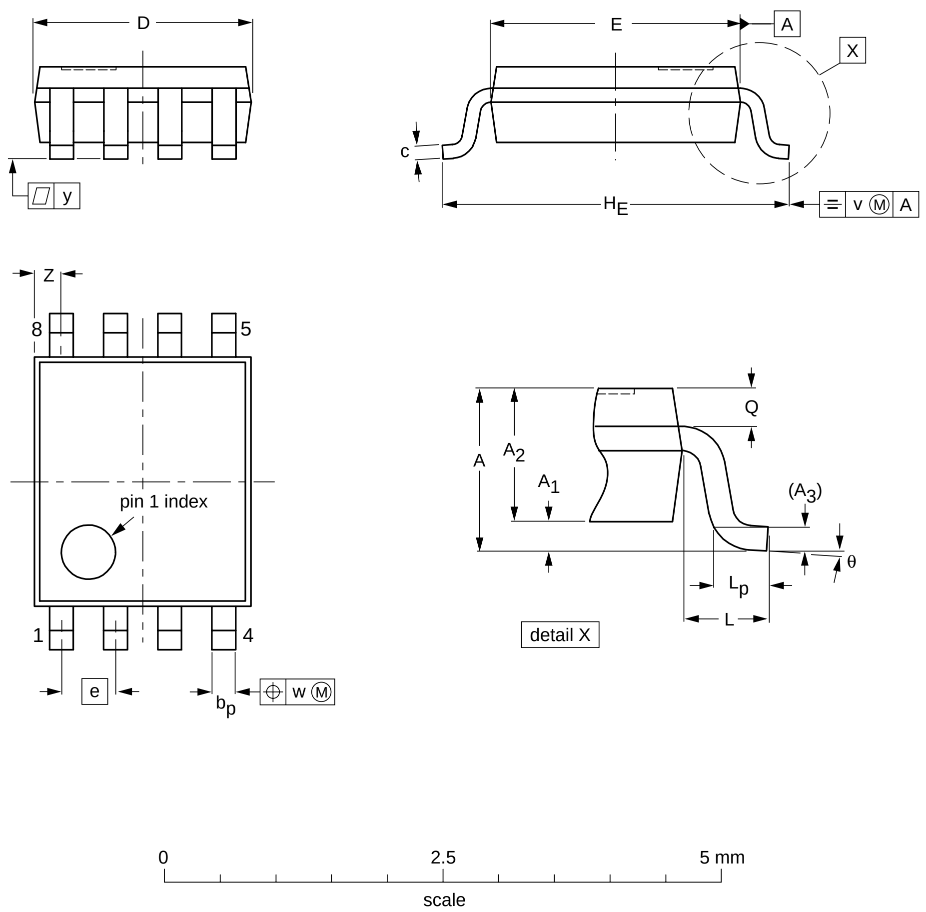
Table 11. Test data

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 × 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.

13. Package outline

VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm **SOT765-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(2)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1	0.15 0.00	0.85 0.60	0.12	0.27 0.17	0.23 0.08	2.1 1.9	2.4 2.2	0.5	3.2 3.0	0.4	0.40 0.15	0.21 0.19	0.2	0.13	0.1	0.4 0.1	8° 0°

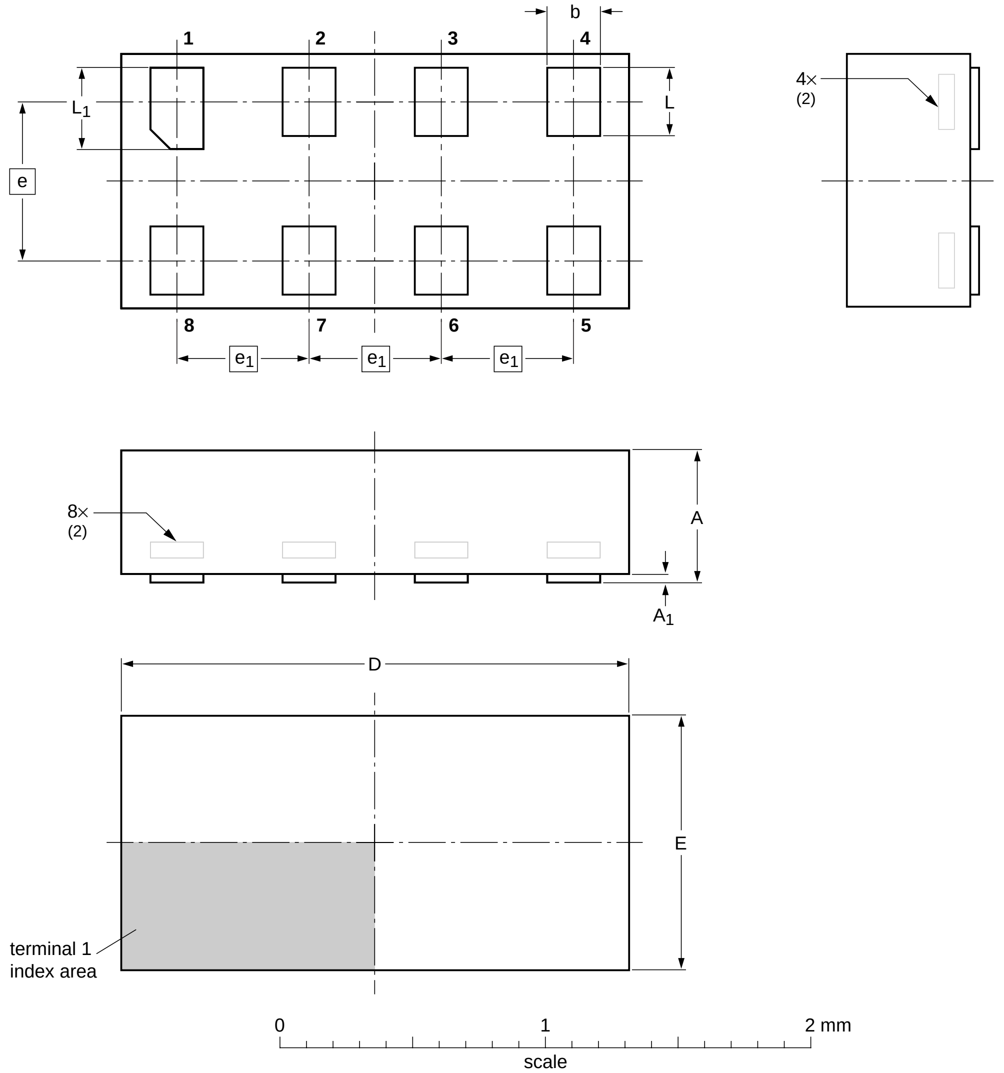
Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT765-1		MO-187				02-06-07

Fig 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

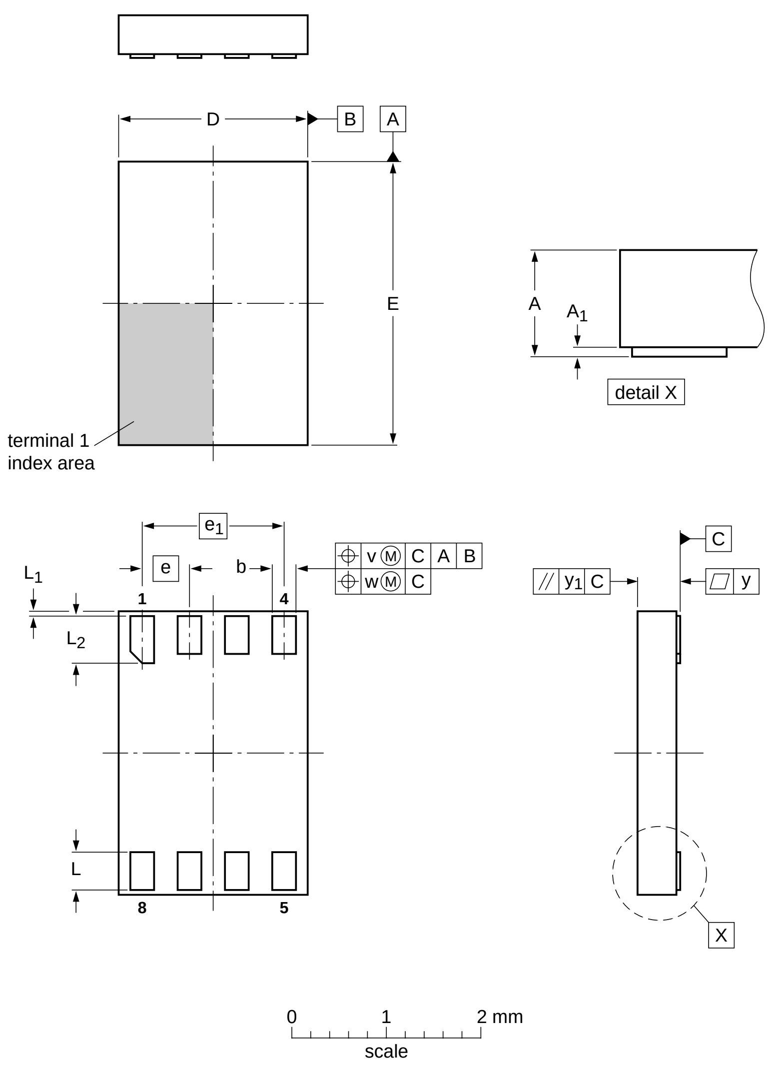
Notes

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

Fig 11. Package outline SOT833-1 (XSON8)

XSON8U: plastic extremely thin small outline package; no leads; 8 terminals; UTLP based; body 3 x 2 x 0.5 mm **SOT996-2**



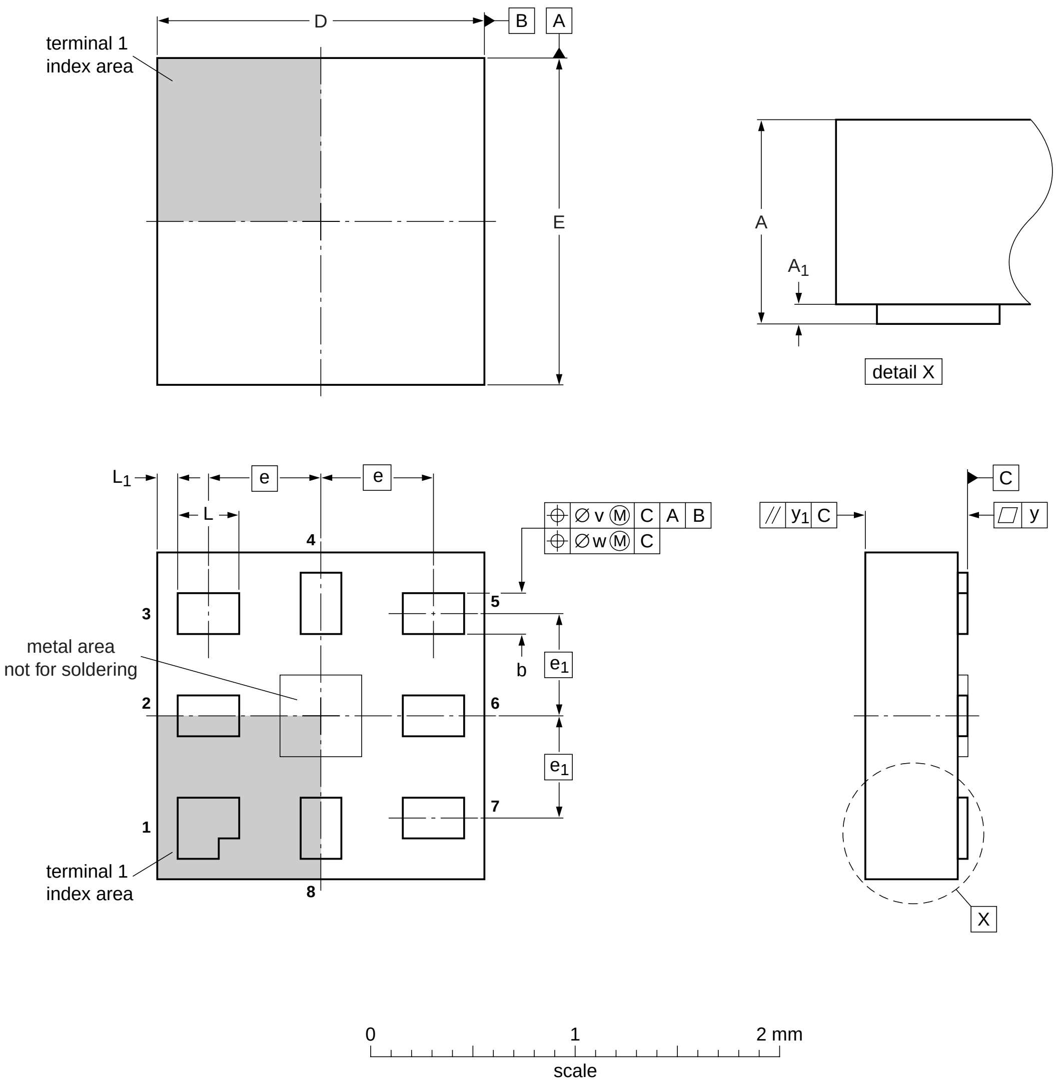
DIMENSIONS (mm are the original dimensions)

UNIT	A max	A_1	b	D	E	e	e_1	L	L_1	L_2	v	w	y	y_1
mm	0.5	0.05 0.00	0.35 0.15	2.1 1.9	3.1 2.9	0.5	1.5	0.5 0.3	0.15 0.05	0.6 0.4	0.1	0.05	0.05	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT996-2	- - -		- - -			~~07-12-18~~ 07-12-21

Fig 12. Package outline SOT996-2 (XSON8U)

XQFN8U: plastic extremely thin quad flat package; no leads; 8 terminals; UTLP based; body 1.6 x 1.6 x 0.5 mm **SOT902-1**



DIMENSIONS (mm are the original dimensions)

UNIT	A max	A_1	b	D	E	e	e_1	L	L_1	v	w	y	y_1
mm	0.5	0.05 0.00	0.25 0.15	1.65 1.55	1.65 1.55	0.55	0.5	0.35 0.25	0.15 0.05	0.1	0.05	0.05	0.05

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT902-1	- - -	MO-255	- - -			~~05-11-25~~ 07-11-14

Fig 13. Package outline SOT902-1 (XQFN8U)

14. Abbreviations

Table 12. Abbreviations

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

15. Revision history

Table 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP2G240_4	20090630	Product data sheet	-	74AUP2G240_3
Modifications:	• Table 5: Derating factor of XSON8, XSON8U and XQFN8U packages has been changed.			
74AUP2G240_3	20090407	Product data sheet	-	74AUP2G240_2
74AUP2G240_2	20080222	Product data sheet	-	74AUP2G240_1
74AUP2G240_1	20061006	Product data sheet	-	-

16. Legal information

16.1 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.nxp.com.

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18. Contents

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