# 74AUP1G240

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

Rev. 8 — 18 July 2023

**Product data sheet** 

## 1. General description

The 74AUP1G240 is a 1-bit inverting buffer/line driver with 3-state outputs. The device features an output enable ( $\overline{OE}$ ). A HIGH on  $\overline{OE}$  causes the output to assume a high-impedance OFF-state. Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times. 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

- 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)
- Low static power consumption; I<sub>CC</sub> = 0.9 μA (maximum)
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Overvoltage tolerant inputs to 3.6 V
- Low noise overshoot and undershoot < 10 % of V<sub>CC</sub>
- Input-disable feature allows floating input conditions
- I<sub>OFF</sub> circuitry provides partial Power-down mode operation
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 3A exceeds 5000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- · 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
74AUP1G240GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74AUP1G240GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	<u>SOT886</u>
74AUP1G240GN	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm	SOT1115
74AUP1G240GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm	SOT1202
74AUP1G240GX	-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

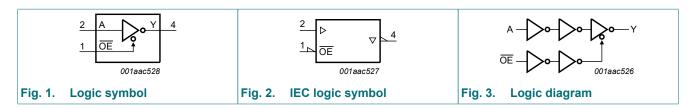
# 4. Marking

#### Table 2. Marking

Marking code[1]
p2

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

# 5. Functional diagram



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## 6. Pinning information

### 6.1. Pinning





### 6.2. Pin description

Table 3. Pin description

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

# 7. Functional description

#### **Table 4. Function table**

 $H = HIGH \ voltage \ level; \ L = LOW \ voltage \ level; \ X = Don't \ care; \ Z = high-impedance \ OFF-state.$ 

Input OE		Output
ŌE	A	Υ
L	L	Н
L	Н	L
Н	X	Z

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## 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 <sub>CC</sub>	supply voltage		-0.5	+4.6	V
I <sub>IK</sub>	input clamping current	V <sub>I</sub> < 0 V	-50	-	mA
VI	input voltage	[1]	-0.5	+4.6	V
lok	output clamping current	V <sub>O</sub> < 0 V	-50	-	mA
Vo	output voltage	Active mode and Power-down mode [1]	-0.5	+4.6	V
Io	output current	V <sub>O</sub> = 0 V to V <sub>CC</sub>	-	±20	mA
I <sub>CC</sub>	supply current		-	50	mA
I <sub>GND</sub>	ground current		-50	-	mA
T <sub>stg</sub>	storage temperature		-65	+150	°C
P <sub>tot</sub>	total power dissipation	$T_{amb} = -40  ^{\circ}\text{C} \text{ to } +125  ^{\circ}\text{C}$ [2]	-	250	mW

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

For SOT886 (XSON6) package: Ptot derates linearly with 3.3 mW/K above 74 °C.

For SOT1115 (XSON6) package: Ptot 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: Ptot derates linearly with 3.0 mW/K above 67 °C.

## 9. Recommended operating conditions

Table 6. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		0.8	3.6	V
VI	input voltage		0	3.6	V
Vo	output voltage	Active mode	0	V <sub>CC</sub>	V
		Power-down mode; V <sub>CC</sub> = 0 V	0	3.6	V
T <sub>amb</sub>	ambient temperature		-40	+125	°C
Δt/ΔV	input transition rise and fall rate	V <sub>CC</sub> = 0.8 V to 3.6 V	0	200	ns/V

<sup>[2]</sup> For SOT353-1 (TSSOP5) package: Ptot derates linearly with 3.3 mW/K above 74 °C.

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## 10. Static characteristics

#### **Table 7. Static characteristics**

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

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
T <sub>amb</sub> = 2	5 °C		•		•	
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 0.8 V	0.70 × V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	0.65 × V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	-	-	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 0.8 V	-	-	0.30 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	0.35 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-	0.9	V
V <sub>OH</sub>	HIGH-level output	$V_I = V_{IH}$ or $V_{IL}$				
	voltage	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	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
	voltage	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
l <sub>l</sub>	input leakage current	$V_I$ = GND to 3.6 V; $V_{CC}$ = 0 V to 3.6 V	-	-	±0.1	μΑ
l <sub>OZ</sub>	OFF-state output current	$V_I = V_{IH} \text{ or } V_{IL}; V_O = 0 \text{ V to } 3.6 \text{ V};$ $V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	±0.1	μΑ
I <sub>OFF</sub>	power-off leakage current	$V_1 \text{ or } V_0 = 0 \text{ V to } 3.6 \text{ V}; V_{CC} = 0 \text{ V}$	-	-	±0.2	μΑ
Δl <sub>OFF</sub>	additional power-off leakage current	$V_1$ or $V_0 = 0$ V to 3.6 V; $V_{CC} = 0$ V to 0.2 V	-	-	±0.2	μΑ
I <sub>CC</sub>	supply current	$V_I$ = GND or $V_{CC}$ ; $I_O$ = 0 A; $V_{CC}$ = 0.8 V to 3.6 V	-	-	0.5	μΑ
ΔI <sub>CC</sub>	additional supply current	data input; $V_I = V_{CC}$ - 0.6 V; $I_O = 0$ A; $V_{CC} = 3.3$ V	[1] -	-	40	μΑ
		OE input; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V	[1] -	-	110	μΑ
		all inputs; $V_I$ = GND to 3.6 V; $\overline{OE}$ = $V_{CC}$ ; $V_{CC}$ = 0.8 V to 3.6 V	[2] -	-	1	μΑ

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Cı	input capacitance	$V_{CC}$ = 0 V to 3.6 V; $V_I$ = GND or $V_{CC}$	-	0.8	-	pF
Co	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 <sub>amb</sub> = -4	40 °C to +85 °C					
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 0.8 V	0.70 × V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	0.65 × V <sub>CC</sub>	-	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	-	-	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 0.8 V	-	-	0.30 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	0.35 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-	0.9	V
V <sub>OH</sub>	HIGH-level output	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
	voltage	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
V <sub>OL</sub>	LOW-level output	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
	voltage	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
l <sub>l</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>OZ</sub>	OFF-state output current	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> ; V <sub>O</sub> = 0 V 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	$V_1$ or $V_0 = 0 \text{ V}$ to 3.6 V; $V_{CC} = 0 \text{ V}$	-	-	±0.5	μΑ
ΔI <sub>OFF</sub>	additional power-off leakage current	$V_1$ or $V_0 = 0$ V to 3.6 V; $V_{CC} = 0$ V to 0.2 V	-	-	±0.6	μΑ
I <sub>CC</sub>	supply current	$V_I$ = GND or $V_{CC}$ ; $I_O$ = 0 A; $V_{CC}$ = 0.8 V to 3.6 V	-	-	0.9	μΑ
ΔI <sub>CC</sub>	additional supply current	data input; $V_I = V_{CC}$ - 0.6 V; $I_O = 0$ A; $V_{CC} = 3.3$ V	[1] -	-	50	μΑ
		$\overline{OE}$ input; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V	[1] -	-	-	μΑ
		all inputs; $V_I$ = GND to 3.6 V; $\overline{OE}$ = $V_{CC}$ ; $V_{CC}$ = 0.8 V to 3.6 V	[2] -	-	1	μΑ

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
T <sub>amb</sub> = -	40 °C to +125 °C					
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 0.8 V	0.75 × V <sub>C</sub>	; -	-	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	0.70 × V <sub>CC</sub>	; -	-	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	-	-	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	-	-	V
V <sub>IL</sub>	LOW-level input voltage	V <sub>CC</sub> = 0.8 V	-	-	0.25 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 0.9 V to 1.95 V	-	-	0.30 × V <sub>CC</sub>	V
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-	0.7	V
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-	0.9	V
V <sub>OH</sub>	HIGH-level output	$V_I = V_{IH}$ or $V_{IL}$				
	voltage	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	$V_I = V_{IH}$ or $V_{IL}$				
	voltage	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	-	-	- 0.33 × V <sub>CC</sub> V - 0.41 V - 0.39 V	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V	-	-		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	μΑ
l <sub>OZ</sub>	OFF-state output current	$V_I = V_{IH} \text{ or } V_{IL}; V_O = 0 \text{ V to } 3.6 \text{ V};$ $V_{CC} = 0 \text{ V to } 3.6 \text{ V}$	-	-	±0.75	μΑ
I <sub>OFF</sub>	power-off leakage current	$V_1$ or $V_0 = 0$ V to 3.6 V; $V_{CC} = 0$ V	-	-	±0.75	μΑ
ΔI <sub>OFF</sub>	additional power-off leakage current	$V_1$ or $V_0 = 0$ V to 3.6 V; $V_{CC} = 0$ V to 0.2 V	-	-	±0.75	μΑ
I <sub>CC</sub>	supply current	$V_{I}$ = GND or $V_{CC}$ ; $I_{O}$ = 0 A; $V_{CC}$ = 0.8 V to 3.6 V	-	-	1.4	μΑ
ΔI <sub>CC</sub>	additional supply current	data input; $V_I = V_{CC} - 0.6 \text{ V}$ ; $I_O = 0 \text{ A}$ ; $V_{CC} = 3.3 \text{ V}$	[1] -	-	75	μΑ
		$\overline{\text{OE}}$ input; V <sub>I</sub> = V <sub>CC</sub> - 0.6 V; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 3.3 V	[1] -	-	180	μΑ
		all inputs; $V_I$ = GND to 3.6 V; $\overline{OE}$ = $V_{CC}$ ; $V_{CC}$ = 0.8 V to 3.6 V	[2] -	-	1	μΑ

One input at  $V_{CC}$  - 0.6 V, other input at  $V_{CC}$  or GND. To show  $I_{CC}$  remains very low when the input-disable feature is enabled.

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# 11. Dynamic characteristics

#### **Table 8. Dynamic characteristics**

Voltages are referenced to GND (ground = 0 V); for test circuit see Fig. 10

Symbol	Parameter	Conditions		25 °C			°C to 5 °C		°C to :5 °C	Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
C <sub>L</sub> = 5 p	F									
t <sub>pd</sub>	propagation	A to Y; see Fig. 8	2]							
	delay	V <sub>CC</sub> = 0.8 V	-	22.3	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.0	5.8	12.6	2.8	14.1	2.8	15.5	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.3	4.0	7.3	2.1	8.5	2.1	9.5	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.0	3.2	5.5	1.9	6.7	1.9	7.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.8	2.6	4.1	1.5	4.8	1.5	5.3	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.4	2.3	3.6	1.3	4.1	1.3	4.6	ns
t <sub>en</sub>	enable time	OE to Y; see Fig. 9	3]							
		V <sub>CC</sub> = 0.8 V	-	70.2	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.1	6.4	14.3	2.8	15.9	2.8	17.5	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.5	4.4	8.1	2.2	9.5	2.2	10.5	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.1	3.6	6.2	1.9	7.4	1.9	8.2	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.8	2.8	4.6	1.7	5.4	1.7	6.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.7	2.5	4.0	1.7	4.7	1.7	5.3	ns
t <sub>dis</sub>	disable time	OE to Y; see Fig. 9	4]							
		V <sub>CC</sub> = 0.8 V	-	14.8	-	-	-	-	- ns 9.2 ns	
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.0	4.3	7.4	2.3	8.3	2.3	9.2	5.3 ns - ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	1.6	3.2	5.2	1.7	5.9	1.7	6.5	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.5	3.0	4.8	1.5	5.5	1.5	6.1	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.1	2.2	3.5	1.4	4.0	1.4	4.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.3	2.5	3.9	1.4	4.5	1.4	5.0	ns
C <sub>L</sub> = 10	pF	'	<b>'</b>	'						
t <sub>pd</sub>	propagation	A to Y; see Fig. 8	2]							
	delay	V <sub>CC</sub> = 0.8 V	-	25.7	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.5	6.6	14.5	3.2	16.3	3.2	18.0	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.2	4.6	8.4	2.0	9.9	2.0	10.9	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.0	3.8	6.4	1.8	7.7	1.8	8.6	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.8	3.1	4.8	1.7	5.7	1.7	6.4	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.7	2.8	4.3	1.7	5.0	1.7	5.5	ns
t <sub>en</sub>	enable time	OE to Y; see Fig. 9	3]							
		V <sub>CC</sub> = 0.8 V	-	74.0	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.6	7.4	16.3	3.2	18.2	3.2	20.1	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.3	5.1	9.2	2.1	10.9	2.1	12.0	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.0	4.1	7.1	1.8	8.5	1.8	9.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.8	3.4	5.4	1.7	6.4	1.7	7.1	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.8	3.1	4.8	1.7	5.7	1.7	6.3	ns

Symbol	Parameter	Conditions		25 °C			°C to 5 °C		°C to 5 °C	Unit
			Min	Typ[1]	Max	Min	Max	Min	Max	
t <sub>dis</sub>	disable time	OE to Y; see Fig. 9 [4]								
		V <sub>CC</sub> = 0.8 V	-	33.7	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.4	5.4	9.0	3.2	10.0	3.2	11.0	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.1	4.1	6.3	2.1	7.1	2.1	7.9	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.3	4.2	6.3	1.8	7.1	1.8	7.9	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	3.0	4.6	1.7	5.2	1.7	5.7	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.1	3.8	5.7	1.7	6.4	1.7	7.1	ns
C <sub>L</sub> = 15	pF				•					
t <sub>pd</sub>	propagation	A to Y; see <u>Fig. 8</u> [2]								
	delay	V <sub>CC</sub> = 0.8 V	-	29.0	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.9	7.4	16.3	3.6	18.4	3.6	20.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.0	5.1	9.4	2.5	11.1	2.5	12.3	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.2	4.2	7.2	2.1	8.7	2.1	9.6	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.0	3.5	5.4	1.9	6.5	1.9	7.2	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	3.3	4.9	1.9	5.7	1.9	6.4	ns
t <sub>en</sub>	enable time	OE to Y; see Fig. 9 [3]								
		V <sub>CC</sub> = 0.8 V	-	77.8	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.0	8.2	18.2	3.6	20.4	3.6	22.5	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.0	5.6	10.3	2.5	12.2	2.5	13.4	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.3	4.6	7.9	2.1	9.5	2.1	10.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.1	3.9	6.0	2.0	7.2	2.0	7.9	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.1	3.6	5.5	1.9	6.4	1.9	7.1	ns
t <sub>dis</sub>	disable time	OE to Y; see Fig. 9 [4]								
		V <sub>CC</sub> = 0.8 V	-	62.5	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.3	6.6	10.4	3.6	11.6	3.6	12.8	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.0	5.0	7.4	2.5	8.4	2.5	9.3	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.0	5.3	7.8	2.1	8.7	2.1	9.7	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.1	3.8	5.7	2.0	6.4	2.0	7.1	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.9	5.0	7.4	1.9	8.3	1.9	9.1	ns
C <sub>L</sub> = 30	pF									
t <sub>pd</sub>	propagation	A to Y; see <u>Fig. 8</u> [2]								
	delay	V <sub>CC</sub> = 0.8 V	-	39.1	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	5.0	9.7	21.6	4.6	24.3	4.6	26.8	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	4.0	6.7	12.3	3.0	14.6	3.0	16.1	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.9	5.5	9.5	2.7	11.5	2.7	12.6	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.7	4.6	7.1	2.5	8.6	2.5	9.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.6	4.3	6.4	2.5	7.7	2.5	8.5	ns

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Symbol	Parameter	meter Conditions 25 °C				°C to 5 °C	-40 °C to +125 °C		Unit	
			Min	Typ[1]	Max	Min	Max	Min	Max	
t <sub>en</sub>	enable time	OE to Y; see Fig. 9 [3								
		V <sub>CC</sub> = 0.8 V	-	89.4	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	5.2	10.6	23.8	4.6	26.7	4.6	29.5	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	4.0	7.3	13.2	3.0	15.7	3.0	17.4	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.0	6.0	10.2	2.7	12.3	2.7	13.6	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.8	5.0	7.8	2.6	9.3	2.6	10.3	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.8	4.8	7.1	2.6	8.4	2.6	9.3	ns
t <sub>dis</sub>	disable time	OE to Y; see Fig. 9 [4								
		V <sub>CC</sub> = 0.8 V	-	68.9	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	6.0	9.3	15.0	4.6	16.5	4.6	18.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	4.4	7.7	11.0	3.0	12.2	3.0	13.4	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	5.1	8.8	12.4	2.7	13.7	2.7	15.1	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	3.6	6.2	9.0	2.6	10.0	2.6	11.0	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	5.2	8.8	12.7	2.6	14.0	2.6	15.4	ns
C <sub>L</sub> = 5 p	F, 10 pF, 15 pF a	and 30 pF	•				•	•		
C <sub>PD</sub>	power	$f_i = 1 \text{ MHz}; V_I = \text{GND to } V_{CC}$ [5								
	dissipation capacitance	V <sub>CC</sub> = 0.8 V	-	2.7	-	-	-	-	-	pF
	capacitance	V <sub>CC</sub> = 1.1 V to 1.3 V	-	2.9	-	-	-	-	-	pF
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	3.0	-	-	-	-	-	pF
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	3.2	-	-	-	-	-	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	-	4.2	-	-	-	-	-	pF

- All typical values are measured at nominal V<sub>CC</sub>.
- [2] [3]
- [4]
- All typical values are measured at nominal  $v_{CC}$ .  $t_{pd}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .  $t_{en}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .  $t_{dis}$  is the same as  $t_{PZH}$  and  $t_{PZL}$ .  $c_{PD}$  is used to determine the dynamic power dissipation ( $P_D$  in  $\mu$ W).  $P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma (C_L \times V_{CC}^2 \times f_o)$  where:  $f_i = \text{input frequency in MHz}$

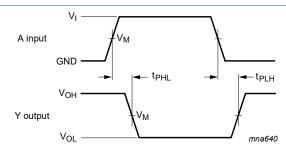
 $f_o$  = output frequency in MHz;

C<sub>L</sub> = output load capacitance in pF; V<sub>CC</sub> = supply voltage in V;

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

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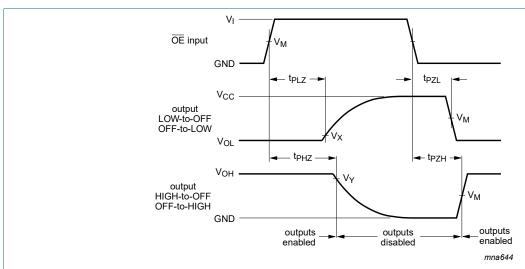
#### 11.1. Waveforms and test circuit



Measurement points are given in Table 9.

Logic levels: V<sub>OL</sub> and V<sub>OH</sub> are typical output voltage drop that occur with the output load.

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



Measurement points are given in <u>Table 9</u>.

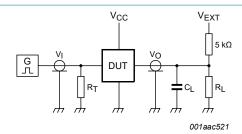
Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage drop that occur with the output load.

Fig. 9. Enable and disable time

**Table 9. Measurement points** 

Supply voltage	Input			Output		
V <sub>CC</sub>	V <sub>M</sub>	V <sub>I</sub>	$t_r = t_f$	V <sub>M</sub>	V <sub>X</sub>	V <sub>Y</sub>
0.8 V to 1.6 V	0.5 × V <sub>CC</sub>	V <sub>CC</sub>	≤ 3.0 ns	0.5 × V <sub>CC</sub>	V <sub>OL</sub> + 0.1 V	V <sub>OH</sub> - 0.1 V
1.65 V to 2.7 V	0.5 × V <sub>CC</sub>	V <sub>CC</sub>	≤ 3.0 ns	0.5 × V <sub>CC</sub>	V <sub>OL</sub> + 0.15 V	V <sub>OH</sub> - 0.15 V
3.0 V to 3.6 V	0.5 × V <sub>CC</sub>	V <sub>CC</sub>	≤ 3.0 ns	0.5 × V <sub>CC</sub>	V <sub>OL</sub> + 0.3 V	V <sub>OH</sub> - 0.3 V

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Test data is given in Table 10.

Definitions for test circuit:

R<sub>L</sub> = Load resistance;

C<sub>L</sub> = Load capacitance including jig and probe capacitance;

 $R_T$  = Termination resistance should be equal to the output impedance  $Z_o$  of the pulse generator;

 $V_{\text{EXT}}$  = External voltage for measuring switching times.

#### Fig. 10. Test circuit for measuring switching times

#### Table 10. Test data

Supply voltage	Load	V <sub>EXT</sub>			
V <sub>CC</sub>	CL	R <sub>L</sub> [1]	t <sub>PLH</sub> , t <sub>PHL</sub>	t <sub>PZH</sub> , t <sub>PHZ</sub>	t <sub>PZL</sub> , t <sub>PLZ</sub>
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 <sub>CC</sub>

[1] For measuring enable and disable times  $R_L$  = 5 k $\Omega$ . For measuring propagation delays, setup and hold times and pulse width  $R_L$  = 1 M $\Omega$ .

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# 12. Package outline

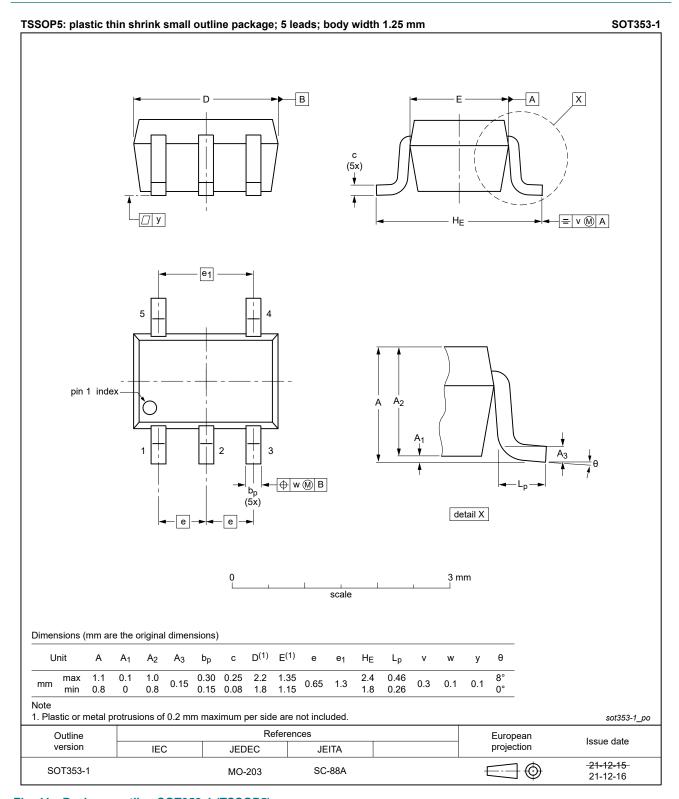


Fig. 11. Package outline SOT353-1 (TSSOP5)

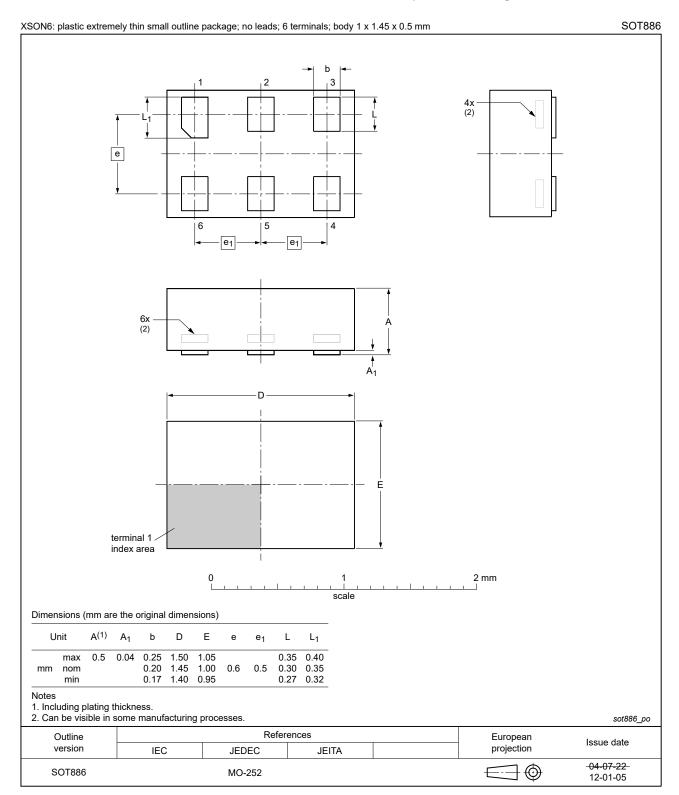


Fig. 12. Package outline SOT886 (XSON6)

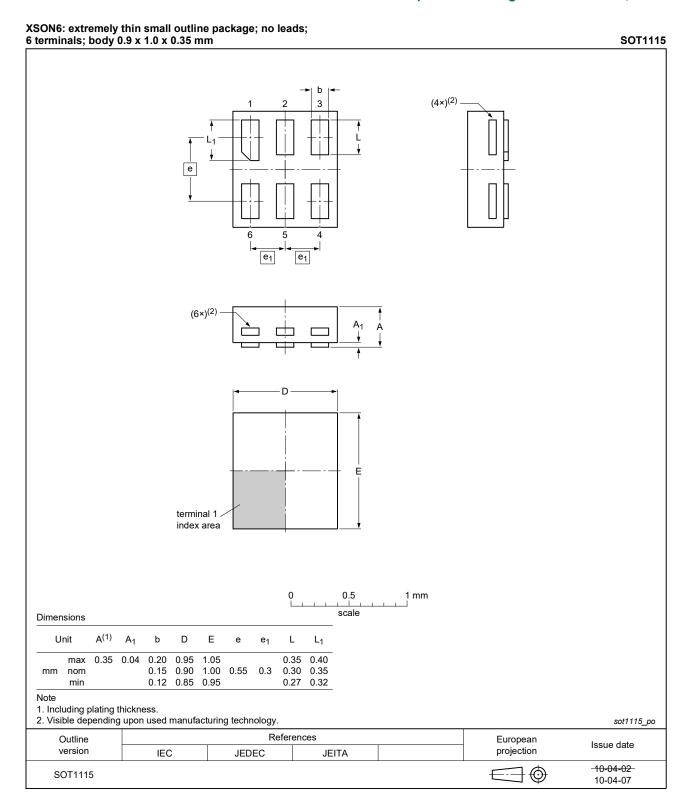


Fig. 13. Package outline SOT1115 (XSON6)

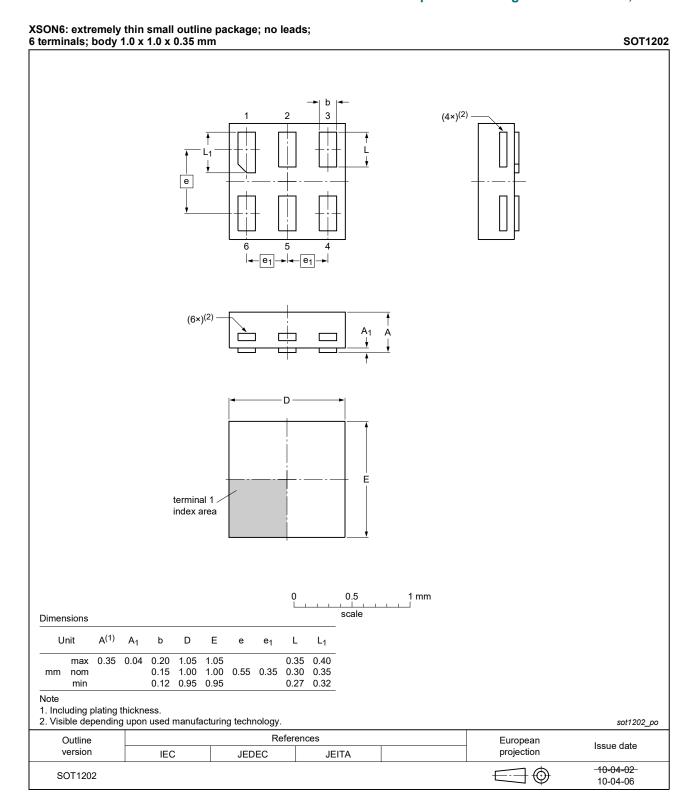


Fig. 14. Package outline SOT1202 (XSON6)

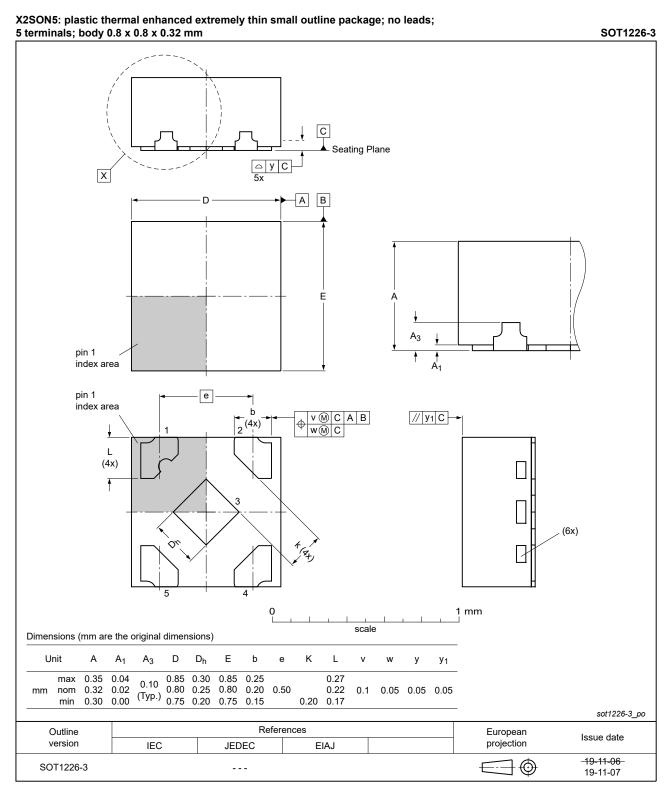


Fig. 15. Package outline SOT1226-3 (X2SON5)

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## 13. Abbreviations

#### **Table 11. Abbreviations**

Acronym	Description
CDM	Charged Device Model
DUT	Device Under Test
ESD	ElectroStatic Discharge
НВМ	Human Body Model

# 14. Revision history

### **Table 12. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes		
74AUP1G240 v.8	20230718	Product data sheet	-	74AUP1G240 v.7		
Modifications:	Section 2: E	<u>Section 2</u> : ESD specification updated according to the latest JEDEC standard.				
74AUP1G240 v.7	20220120	20220120 Product data sheet - 74AUP1G240 v.6				
Modifications:	• <u>Fig. 11</u> : Pac	Fig. 11: Package outline drawing for SOT353-1 (TSSOP5) has changed.				
74AUP1G240 v.6	20210608	Product data sheet	-	74AUP1G240 v.5		
Modifications:	<ul><li>Type number</li><li>Section 1 u</li></ul>	<ul> <li>Type number 74AUP1G240GF (SOT891) removed.</li> </ul>				
74AUP1G240 v.5	20190315	Product data sheet	-	74AUP1G240 v.4		
Modifications:	guidelines o	<ul> <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> </ul>				
74AUP1G240 v.4	20120629	Product data sheet	-	74AUP1G240 v.3		
Modifications:		<ul> <li>Added type number 74AUP1G240GX (SOT1226)</li> <li>Package outline drawing of SOT886 (<u>Fig. 12</u>) modified.</li> </ul>				
74AUP1G240 v.3	20111124	Product data sheet	-	74AUP1G240 v.2		
Modifications:	Legal pages	Legal pages updated.				
74AUP1G240 v.2	20100913	Product data sheet	-	74AUP1G240 v.1		
74AUP1G240 v.1	20061106	Product data sheet	-	-		

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### 15. Legal information

#### 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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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