74AUP1G126

Low-power buffer/line driver; 3-state

Rev. 01 — 25 July 2005 Product data sheet

1. General description

The 74AUP1G126 is a high-performance, low-power, low-voltage, Si-gate CMOS device, superior to most advanced CMOS compatible TTL families.

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.

The 74AUP1G126 provides the single non-inverting buffer/line driver with 3-state output. The 3-state output is controlled by the output enable input (OE). A LOW level at pin OE causes the output to assume a high-impedance OFF-state.

This device has the input-disable feature, which allows floating input signals. The inputs are disabled when the output enable input OE is LOW.

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-A114-C exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
  - CDM JESD22-C101-C exceeds 1000 V
- Low static power consumption; I_{CC} = 0.9 μA (maximum)
- Latch-up performance exceeds 100 mA per JESD 78 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

PHILIPS

- 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. Quick reference data

Table 1: Quick reference data

GND = 0 V; T_{amb} = 25 °C; $t_r = t_f \leq 3$ ns.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t_{PHL}, t_{PLH}	propagation delay A to Y	C_L = 5 pF; R_L = 1 MΩ; V_{CC} = 0.8 V	-	20.6	-	ns
		C_L = 5 pF; R_L = 1 MΩ; V_{CC} = 1.1 V to 1.3 V	2.8	5.5	11.8	ns
		C_L = 5 pF; R_L = 1 MΩ; V_{CC} = 1.4 V to 1.6 V	2.2	3.9	7.0	ns
		C_L = 5 pF; R_L = 1 MΩ; V_{CC} = 1.65 V to 1.95 V	1.9	3.2	5.5	ns
		C_L = 5 pF; R_L = 1 MΩ; V_{CC} = 2.3 V to 2.7 V	1.7	2.6	4.2	ns
		C_L = 5 pF; R_L = 1 MΩ; V_{CC} = 3.0 V to 3.6 V	1.7	2.4	3.7	ns
C_i	input capacitance		-	0.9	-	pF
C_{PD}	power dissipation capacitance	f = 10 MHz; output enabled [1] [2]				
		V_{CC} = 1.8 V	-	3.6	-	pF
		V_{CC} = 3.3 V	-	4.4	-	pF
		f = 10 MHz; output disabled [1] [2]				
		V_{CC} = 0.8 V to 3.6 V	-	0	-	pF

[1] 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.

[2] The condition is V_I = GND to V_{CC}.

4. Ordering information

Table 2: Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74AUP1G126GW	–40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74AUP1G126GM	–40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886

5. Marking

Table 3: Marking

Type number	Marking code
74AUP1G126GW	pN
74AUP1G126GM	pN

6. Functional diagram

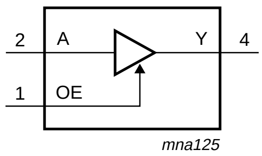


Fig 1. Logic symbol

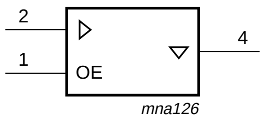


Fig 2. IEC logic symbol

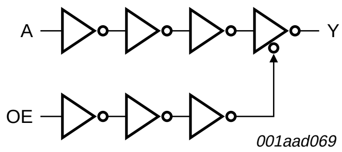


Fig 3. Logic diagram

7. Pinning information

7.1 Pinning

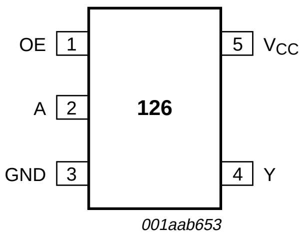


Fig 4. Pin configuration SOT353-1 (TSSOP5)

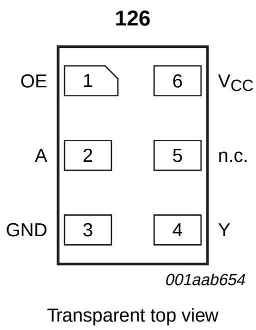


Fig 5. Pin configuration SOT886 (XSON6)

7.2 Pin description

Table 4: Pin description

Symbol	Pin		Description
	TSSOP5	XSON6	
OE	1	1	output enable input
A	2	2	data input A
GND	3	3	ground (0 V)
Y	4	4	data output Y
n.c.	-	5	not connected
V_{CC}	5	6	supply voltage

8. Functional description

8.1 Function table

Table 5: Function table [1]

Input		Output
OE	**A**	**Y**
H	L	L
H	H	H
L	X	Z

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

9. Limiting values

Table 6: 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	$V_O > V_{CC}$ or $V_O < 0$ 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}	quiescent supply current			-	+50	mA

Table 6: Limiting values *...continued*

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions		Min	Max	Unit
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 input and output voltage ratings may be exceeded if the input and output current ratings are observed.

[2] For TSSOP5 packages: above 87.5 °C the value of P_{tot} derates linearly with 4.0 mW/K.
For XSON6 packages: above 45 °C the value of P_{tot} derates linearly with 2.4 mW/K.

10. Recommended operating conditions

Table 7: 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
t_r, t_f	input rise and fall times	V_{CC} = 0.8 V to 3.6 V	0	200	ns/V

11. Static characteristics

Table 8: 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-state 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-state 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

Table 8: Static characteristics *...continued*

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{OH}	HIGH-state output voltage	$V_I = V_{IH}$ or V_{IL}					
		$I_O = -20\ \mu A$; $V_{CC} = 0.8$ V to 3.6 V		$V_{CC} - 0.1$	-	-	V
		$I_O = -1.1$ mA; $V_{CC} = 1.1$ V		$0.75 \times V_{CC}$	-	-	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-state output voltage	$V_I = V_{IH}$ or V_{IL}					
		$I_O = 20\ \mu A$; $V_{CC} = 0.8$ 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		-	-	0.31	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_{LI}	input leakage current	$V_I = $ GND to 3.6 V; $V_{CC} = 0$ V to 3.6 V		-	-	±0.1	μA
I_{OZ}	3-state output OFF-state 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}	quiescent 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 quiescent supply current	data input; $V_I = V_{CC} - 0.6$ V; $I_O = 0$ A; $V_{CC} = 3.3$ V	[1]	-	-	40	μA
		OE input; $V_I = V_{CC} - 0.6$ V; $I_O = 0$ A; $V_{CC} = 3.3$ V	[1]	-	-	110	μA
		all inputs; $V_I = $ GND to 3.6 V; OE = GND; $V_{CC} = 0.8$ V to 3.6 V	[2]	-	-	1	μA
C_i	input capacitance	$V_{CC} = 0$ V to 3.6 V; $V_I = $ GND or V_{CC}		-	0.9	-	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-state 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

Table 8: Static characteristics *...continued*

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{IL}	LOW-state 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-state 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 × 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-state 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		-	-	0.37	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_{LI}	input leakage current	V_I = GND to 3.6 V; V_{CC} = 0 V to 3.6 V		-	-	±0.5	µA
I_{OZ}	3-state output OFF-state 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
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}	quiescent 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 quiescent supply current	data input; V_I = V_{CC} – 0.6 V; I_O = 0 A; V_{CC} = 3.3 V	[1]	-	-	50	µA
		OE input; V_I = V_{CC} – 0.6 V; I_O = 0 A; V_{CC} = 3.3 V	[1]	-	-	120	µA
		all inputs; V_I = GND to 3.6 V; OE = GND; V_{CC} = 0.8 V to 3.6 V	[2]	-	-	1	µA
T_{amb} = –40 °C to +125 °C							
V_{IH}	HIGH-state 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

Table 8: Static characteristics *...continued*

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{IL}	LOW-state 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-state 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-state 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_{LI}	input leakage current	V_I = GND to 3.6 V; V_{CC} = 0 V to 3.6 V		-	-	±0.75	μA
I_{OZ}	3-state output OFF-state 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
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}	quiescent 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 quiescent supply current	data input; V_I = V_{CC} – 0.6 V; I_O = 0 A; V_{CC} = 3.3 V	[1]	-	-	75	μA
		OE input; V_I = V_{CC} – 0.6 V; I_O = 0 A; V_{CC} = 3.3 V	[1]	-	-	180	μA
		all inputs; V_I = GND to 3.6 V; OE = GND; V_{CC} = 0.8 V to 3.6 V	[2]	-	-	1	μA

[1] One input at V_{CC} – 0.6 V, other input at V_{CC} or GND.

[2] To show I_{CC} remains very low when the input-disable feature is enabled.

12. Dynamic characteristics

Table 9: Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 8

Symbol	Parameter	Conditions	Min	Typ [1]	Max	Unit
T_{amb} = 25 °C; C_L = 5 pF						
t_{PHL}, t_{PLH}	propagation delay A to Y	see Figure 6				
		V_{CC} = 0.8 V	-	20.6	-	ns
		V_{CC} = 1.1 V to 1.3 V	2.8	5.5	11.8	ns
		V_{CC} = 1.4 V to 1.6 V	2.2	3.9	7.0	ns
		V_{CC} = 1.65 V to 1.95 V	1.9	3.2	5.5	ns
		V_{CC} = 2.3 V to 2.7 V	1.7	2.6	4.2	ns
		V_{CC} = 3.0 V to 3.6 V	1.7	2.4	3.7	ns
t_{PZH}, t_{PZL}	3-state output enable time OE to Y	see Figure 7				
		V_{CC} = 0.8 V	-	71.6	-	ns
		V_{CC} = 1.1 V to 1.3 V	3.1	6.2	13.7	ns
		V_{CC} = 1.4 V to 1.6 V	2.3	4.2	7.7	ns
		V_{CC} = 1.65 V to 1.95 V	1.9	3.3	5.9	ns
		V_{CC} = 2.3 V to 2.7 V	1.5	2.4	4.1	ns
		V_{CC} = 3.0 V to 3.6 V	1.3	2.0	3.4	ns
t_{PHZ}, t_{PLZ}	3-state output disable time OE to Y	see Figure 7				
		V_{CC} = 0.8 V	-	10.3	-	ns
		V_{CC} = 1.1 V to 1.3 V	2.6	4.2	7.0	ns
		V_{CC} = 1.4 V to 1.6 V	2.1	3.2	5.0	ns
		V_{CC} = 1.65 V to 1.95 V	2.1	3.1	4.7	ns
		V_{CC} = 2.3 V to 2.7 V	1.7	2.4	3.6	ns
		V_{CC} = 3.0 V to 3.6 V	2.1	2.8	4.2	ns
T_{amb} = 25 °C; C_L = 10 pF						
t_{PHL}, t_{PLH}	propagation delay A to Y	see Figure 6				
		V_{CC} = 0.8 V	-	24.0	-	ns
		V_{CC} = 1.1 V to 1.3 V	3.2	6.4	13.7	ns
		V_{CC} = 1.4 V to 1.6 V	2.1	4.5	8.1	ns
		V_{CC} = 1.65 V to 1.95 V	1.9	3.8	6.3	ns
		V_{CC} = 2.3 V to 2.7 V	2.2	3.2	4.9	ns
		V_{CC} = 3.0 V to 3.6 V	2.1	3.0	4.5	ns
t_{PZH}, t_{PZL}	3-state output enable time OE to Y	see Figure 7				
		V_{CC} = 0.8 V	-	75.3	-	ns
		V_{CC} = 1.1 V to 1.3 V	3.5	7.1	15.5	ns
		V_{CC} = 1.4 V to 1.6 V	2.2	4.8	8.7	ns
		V_{CC} = 1.65 V to 1.95 V	1.8	3.9	6.7	ns
		V_{CC} = 2.3 V to 2.7 V	1.5	2.9	4.8	ns
		V_{CC} = 3.0 V to 3.6 V	1.4	2.6	4.1	ns

Table 9: Dynamic characteristics *...continued*

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 8

Symbol	Parameter	Conditions	Min	Typ [1]	Max	Unit
t_{PHZ}, t_{PLZ}	3-state output disable time OE to Y	see Figure 7				
		V_{CC} = 0.8 V	-	12.2	-	ns
		V_{CC} = 1.1 V to 1.3 V	3.5	5.3	8.5	ns
		V_{CC} = 1.4 V to 1.6 V	2.2	4.1	6.1	ns
		V_{CC} = 1.65 V to 1.95 V	2.4	4.2	6.2	ns
		V_{CC} = 2.3 V to 2.7 V	1.9	3.2	4.7	ns
		V_{CC} = 3.0 V to 3.6 V	2.4	4.1	5.9	ns
T_{amb} = 25 °C; C_L = 15 pF						
t_{PHL}, t_{PLH}	propagation delay A to Y	see Figure 6				
		V_{CC} = 0.8 V	-	27.4	-	ns
		V_{CC} = 1.1 V to 1.3 V	3.6	7.2	15.5	ns
		V_{CC} = 1.4 V to 1.6 V	3.0	5.1	9.1	ns
		V_{CC} = 1.65 V to 1.95 V	2.2	4.3	7.1	ns
		V_{CC} = 2.3 V to 2.7 V	2.0	3.7	5.6	ns
		V_{CC} = 3.0 V to 3.6 V	2.0	3.5	5.2	ns
t_{PZH}, t_{PZL}	3-state output enable time OE to Y	see Figure 7				
		V_{CC} = 0.8 V	-	79.2	-	ns
		V_{CC} = 1.1 V to 1.3 V	4.0	7.8	17.2	ns
		V_{CC} = 1.4 V to 1.6 V	3.0	5.4	9.7	ns
		V_{CC} = 1.65 V to 1.95 V	2.1	4.3	7.4	ns
		V_{CC} = 2.3 V to 2.7 V	1.8	3.4	5.4	ns
		V_{CC} = 3.0 V to 3.6 V	1.6	3.1	4.7	ns
t_{PHZ}, t_{PLZ}	3-state output disable time OE to Y	see Figure 7				
		V_{CC} = 0.8 V	-	14.9	-	ns
		V_{CC} = 1.1 V to 1.3 V	4.3	6.4	10.0	ns
		V_{CC} = 1.4 V to 1.6 V	3.0	5.0	7.2	ns
		V_{CC} = 1.65 V to 1.95 V	3.1	5.4	7.7	ns
		V_{CC} = 2.3 V to 2.7 V	2.4	4.0	5.8	ns
		V_{CC} = 3.0 V to 3.6 V	3.2	5.3	7.7	ns
T_{amb} = 25 °C; C_L = 30 pF						
t_{PHL}, t_{PLH}	propagation delay A to Y	see Figure 6				
		V_{CC} = 0.8 V	-	37.6	-	ns
		V_{CC} = 1.1 V to 1.3 V	4.8	9.6	20.8	ns
		V_{CC} = 1.4 V to 1.6 V	4.0	6.7	12.0	ns
		V_{CC} = 1.65 V to 1.95 V	2.9	5.6	9.4	ns
		V_{CC} = 2.3 V to 2.7 V	2.7	4.8	7.3	ns
		V_{CC} = 3.0 V to 3.6 V	2.7	4.6	6.4	ns

Table 9: Dynamic characteristics *...continued*

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 8

Symbol	Parameter	Conditions		Min	Typ [1]	Max	Unit
t_{PZH}, t_{PZL}	3-state output enable time OE to Y	see Figure 7					
		V_{CC} = 0.8 V		-	90.6	-	ns
		V_{CC} = 1.1 V to 1.3 V		5.1	10.0	22.1	ns
		V_{CC} = 1.4 V to 1.6 V		4.0	6.9	12.3	ns
		V_{CC} = 1.65 V to 1.95 V		2.8	5.6	9.4	ns
		V_{CC} = 2.3 V to 2.7 V		2.4	4.5	7.0	ns
		V_{CC} = 3.0 V to 3.6 V		2.4	4.2	6.4	ns
t_{PHZ}, t_{PLZ}	3-state output disable time OE to Y	see Figure 7					
		V_{CC} = 0.8 V		-	51.6	-	ns
		V_{CC} = 1.1 V to 1.3 V		6.0	9.8	14.9	ns
		V_{CC} = 1.4 V to 1.6 V		4.5	7.7	10.7	ns
		V_{CC} = 1.65 V to 1.95 V		5.2	8.8	12.2	ns
		V_{CC} = 2.3 V to 2.7 V		3.9	6.4	9.1	ns
		V_{CC} = 3.0 V to 3.6 V		5.5	9.0	12.9	ns
T_{amb} = 25 °C							
C_{PD}	power dissipation capacitance	f = 10 MHz	[2] [3]				
		output enabled					
		V_{CC} = 0.8 V		-	3.2	-	pF
		V_{CC} = 1.1 V to 1.3 V		-	3.4	-	pF
		V_{CC} = 1.4 V to 1.6 V		-	3.5	-	pF
		V_{CC} = 1.65 V to 1.95 V		-	3.6	-	pF
		V_{CC} = 2.3 V to 2.7 V		-	4.0	-	pF
		V_{CC} = 3.0 V to 3.6 V		-	4.4	-	pF
		output disabled					
		V_{CC} = 3.0 V to 3.6 V		-	0	-	pF

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

[2] 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.

[3] The condition is V_I = GND to V_{CC}.

Table 10: Dynamic characteristics

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 8

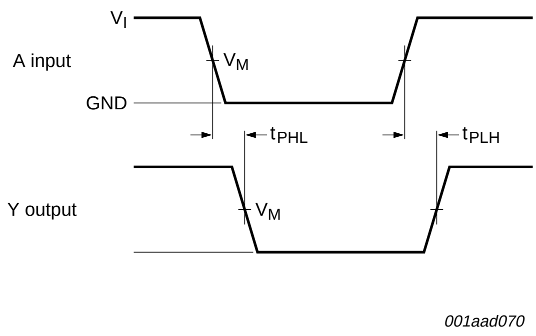
Symbol	Parameter	Conditions	–40 °C to +85 °C		–40 °C to +125 °C		Unit
			Min	Max	Min	Max	
C_L = 5 pF							
t_{PHL}, t_{PLH}	propagation delay A to Y	see Figure 6					
		V_{CC} = 1.1 V to 1.3 V	2.6	13.2	2.6	14.5	ns
		V_{CC} = 1.4 V to 1.6 V	2.0	8.2	2.0	9.0	ns
		V_{CC} = 1.65 V to 1.95 V	1.7	6.5	1.7	7.2	ns
		V_{CC} = 2.3 V to 2.7 V	1.5	5.0	1.5	5.5	ns
		V_{CC} = 3.0 V to 3.6 V	1.5	4.4	1.5	4.9	ns
t_{PZH}, t_{PZL}	3-state output enable time OE to Y	see Figure 7					
		V_{CC} = 1.1 V to 1.3 V	2.9	16.2	2.9	17.9	ns
		V_{CC} = 1.4 V to 1.6 V	2.2	8.9	2.2	9.8	ns
		V_{CC} = 1.65 V to 1.95 V	1.7	6.8	1.7	7.5	ns
		V_{CC} = 2.3 V to 2.7 V	1.4	4.8	1.4	5.3	ns
		V_{CC} = 3.0 V to 3.6 V	1.2	4.0	1.2	4.4	ns
t_{PHZ}, t_{PLZ}	3-state output disable time OE to Y	see Figure 7					
		V_{CC} = 1.1 V to 1.3 V	2.9	7.7	2.9	8.5	ns
		V_{CC} = 1.4 V to 1.6 V	2.2	5.6	2.2	6.2	ns
		V_{CC} = 1.65 V to 1.95 V	1.7	5.4	1.7	6.0	ns
		V_{CC} = 2.3 V to 2.7 V	1.4	4.2	1.4	4.7	ns
		V_{CC} = 3.0 V to 3.6 V	1.2	4.7	1.2	5.2	ns
C_L = 10 pF							
t_{PHL}, t_{PLH}	propagation delay A to Y	see Figure 6					
		V_{CC} = 1.1 V to 1.3 V	3.0	15.4	3.0	17.0	ns
		V_{CC} = 1.4 V to 1.6 V	1.9	9.5	1.9	10.5	ns
		V_{CC} = 1.65 V to 1.95 V	1.7	7.6	1.7	8.4	ns
		V_{CC} = 2.3 V to 2.7 V	1.6	5.9	1.6	6.5	ns
		V_{CC} = 3.0 V to 3.6 V	1.6	5.3	1.6	5.9	ns
t_{PZH}, t_{PZL}	3-state output enable time OE to Y	see Figure 7					
		V_{CC} = 1.1 V to 1.3 V	3.3	18.1	3.3	20.0	ns
		V_{CC} = 1.4 V to 1.6 V	2.1	10.0	2.1	11.0	ns
		V_{CC} = 1.65 V to 1.95 V	1.7	7.8	1.7	8.6	ns
		V_{CC} = 2.3 V to 2.7 V	1.4	5.6	1.4	6.2	ns
		V_{CC} = 3.0 V to 3.6 V	1.3	4.9	1.3	5.4	ns
t_{PHZ}, t_{PLZ}	3-state output disable time OE to Y	see Figure 7					
		V_{CC} = 1.1 V to 1.3 V	3.3	9.4	3.3	10.4	ns
		V_{CC} = 1.4 V to 1.6 V	2.1	6.9	2.1	7.6	ns
		V_{CC} = 1.65 V to 1.95 V	1.7	7.0	1.7	7.7	ns
		V_{CC} = 2.3 V to 2.7 V	1.4	5.3	1.4	5.9	ns
		V_{CC} = 3.0 V to 3.6 V	1.3	6.6	1.3	7.3	ns

Table 10: Dynamic characteristics *...continued*

Voltages are referenced to GND (ground = 0 V); for test circuit see Figure 8

Symbol	Parameter	Conditions	−40 °C to +85 °C		−40 °C to +125 °C		Unit
			Min	Max	Min	Max	
C_L = 15 pF							
t_{PHL}, t_{PLH}	propagation delay A to Y	see Figure 6					
		V_{CC} = 1.1 V to 1.3 V	3.4	17.5	3.4	19.3	ns
		V_{CC} = 1.4 V to 1.6 V	2.5	10.8	2.5	11.9	ns
		V_{CC} = 1.65 V to 1.95 V	2.0	8.6	2.0	9.5	ns
		V_{CC} = 2.3 V to 2.7 V	1.8	6.7	1.8	7.4	ns
		V_{CC} = 3.0 V to 3.6 V	1.8	6.1	1.8	6.8	ns
t_{PZH}, t_{PZL}	3-state output enable time OE to Y	see Figure 7					
		V_{CC} = 1.1 V to 1.3 V	3.7	19.9	3.7	21.9	ns
		V_{CC} = 1.4 V to 1.6 V	2.5	11.1	2.5	12.3	ns
		V_{CC} = 1.65 V to 1.95 V	2.0	8.6	2.0	9.5	ns
		V_{CC} = 2.3 V to 2.7 V	1.7	6.3	1.7	7.0	ns
		V_{CC} = 3.0 V to 3.6 V	1.5	5.6	1.5	6.2	ns
t_{PHZ}, t_{PLZ}	3-state output disable time OE to Y	see Figure 7					
		V_{CC} = 1.1 V to 1.3 V	3.7	11.0	3.7	12.1	ns
		V_{CC} = 1.4 V to 1.6 V	2.5	8.1	2.5	9.0	ns
		V_{CC} = 1.65 V to 1.95 V	2.0	8.6	2.0	9.5	ns
		V_{CC} = 2.3 V to 2.7 V	1.7	6.5	1.7	7.2	ns
		V_{CC} = 3.0 V to 3.6 V	1.5	8.5	1.5	9.4	ns
C_L = 30 pF							
t_{PHL}, t_{PLH}	propagation delay A to Y	see Figure 6					
		V_{CC} = 1.1 V to 1.3 V	4.4	23.5	4.4	25.9	ns
		V_{CC} = 1.4 V to 1.6 V	3.0	14.2	3.0	15.7	ns
		V_{CC} = 1.65 V to 1.95 V	2.6	11.3	2.6	12.5	ns
		V_{CC} = 2.3 V to 2.7 V	2.5	8.8	2.5	9.7	ns
		V_{CC} = 3.0 V to 3.6 V	2.5	8.1	2.5	9.0	ns
t_{PZH}, t_{PZL}	3-state output enable time OE to Y	see Figure 7					
		V_{CC} = 1.1 V to 1.3 V	4.7	25.2	4.7	27.8	ns
		V_{CC} = 1.4 V to 1.6 V	3.0	14.1	3.0	15.6	ns
		V_{CC} = 1.65 V to 1.95 V	2.6	11.0	2.6	12.1	ns
		V_{CC} = 2.3 V to 2.7 V	2.3	8.4	2.3	9.3	ns
		V_{CC} = 3.0 V to 3.6 V	2.2	7.6	2.2	8.4	ns
t_{PHZ}, t_{PLZ}	3-state output disable time OE to Y	see Figure 7					
		V_{CC} = 1.1 V to 1.3 V	4.7	16.5	4.7	18.2	ns
		V_{CC} = 1.4 V to 1.6 V	3.0	11.9	3.0	13.1	ns
		V_{CC} = 1.65 V to 1.95 V	2.6	13.5	2.6	14.9	ns
		V_{CC} = 2.3 V to 2.7 V	2.3	10.0	2.3	11.0	ns
		V_{CC} = 3.0 V to 3.6 V	2.2	14.1	2.2	15.6	ns

13. Waveforms



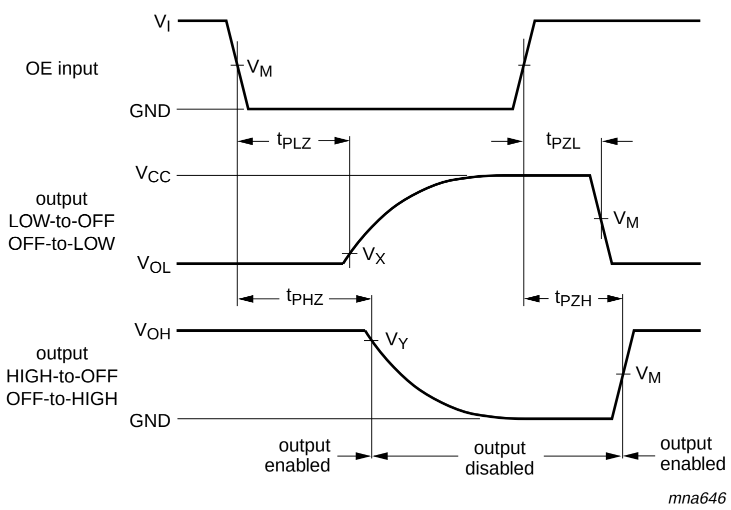
Measurement points are given in Table 11.

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

Fig 6. The data input (A) to output (Y) propagation delays

Table 11: 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}	$\leq$ 3.0 ns



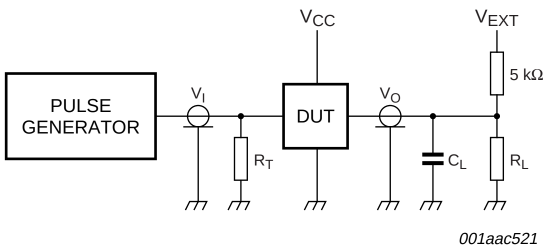
Measurement points are given in Table 12.

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

Fig 7. Turn-on and turn-off times

Table 12: 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 13.

Definitions for test circuit:

R_L = Load resistor

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

Fig 8. Load circuitry for switching times

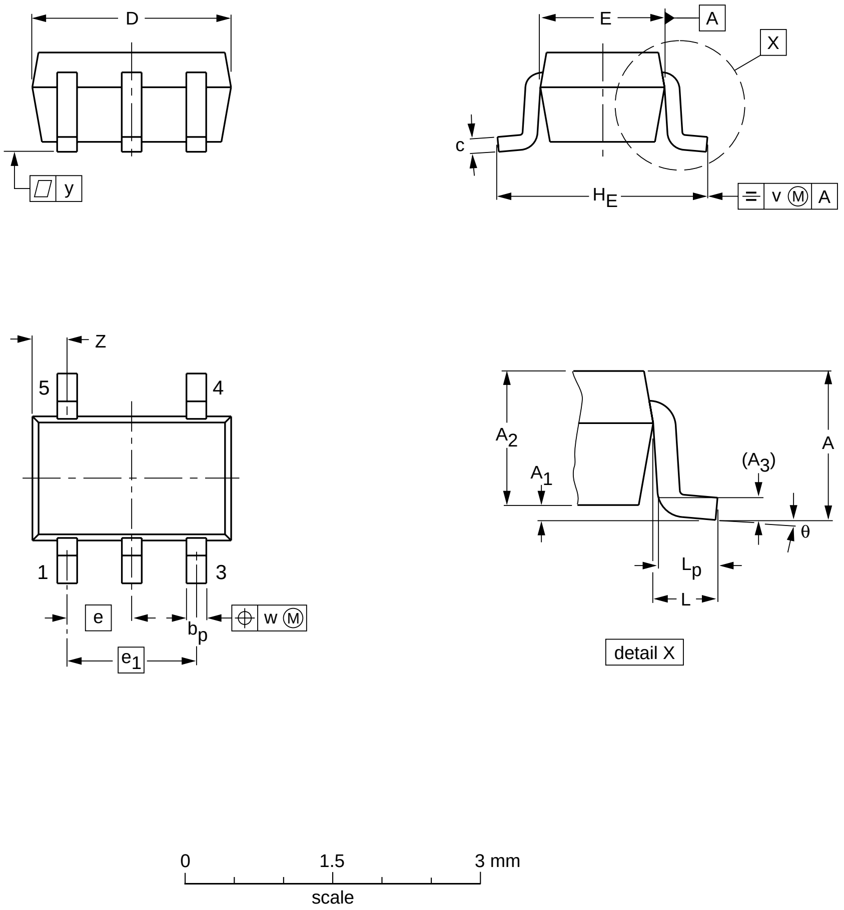
Table 13: Test data

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 kΩ, for measuring propagation delays, setup and hold times and pulse width R_L = 1 MΩ.

14. 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°

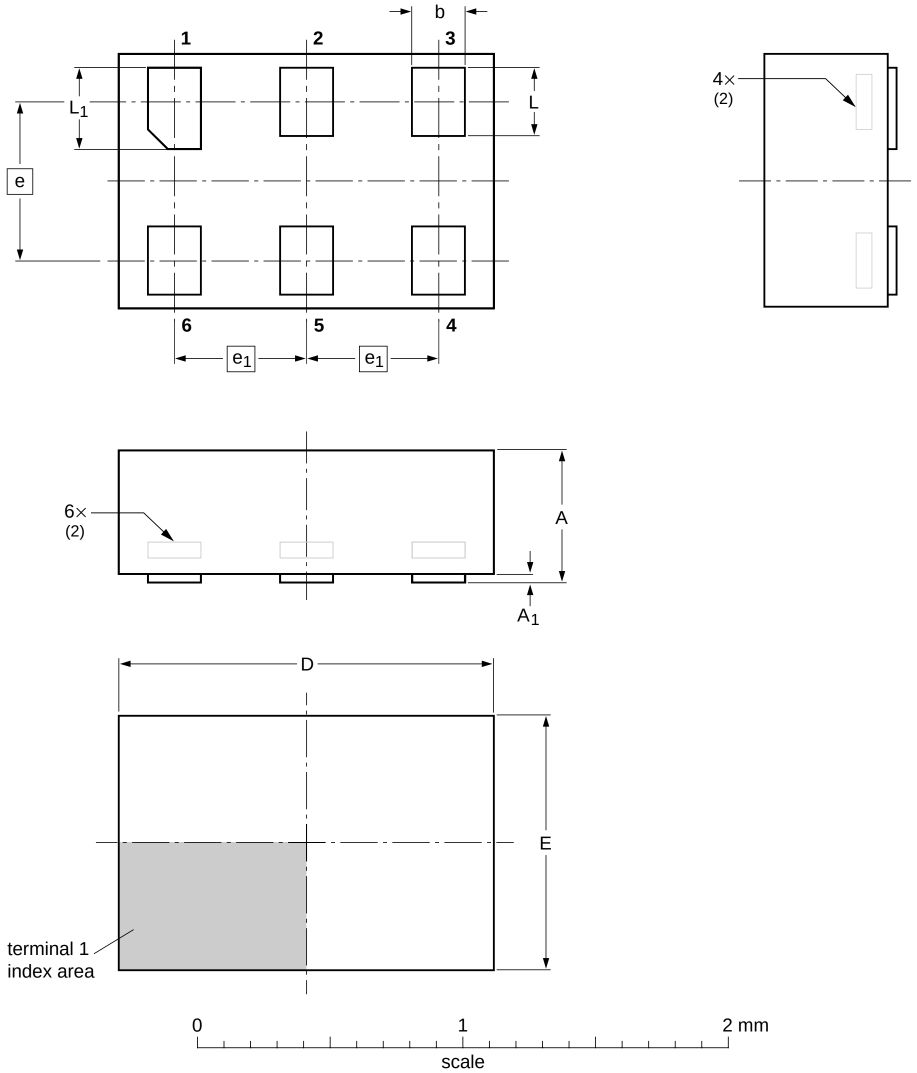
Note

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

Fig 9. Package outline SOT353-1 (TSSOP5)

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) max	A_1 max	b	D	E	e	e_1	L	L_1
mm	0.5	0.04	0.25 0.17	1.5 1.4	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			
SOT886		MO-252				~~04-07-15~~ 04-07-22

Fig 10. Package outline SOT886 (XSON6)

15. Abbreviations

Table 14: Abbreviations

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

16. Revision history

Table 15: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
74AUP1G126_1	20050725	Product data sheet	-	9397 750 14686	-

17. Data sheet status

Level	Data sheet status [1]	Product status [2] [3]	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

18. Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

19. Disclaimers

Life support — These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

Right to make changes — Philips Semiconductors reserves the right to make changes in the products - including circuits, standard cells, and/or software - described or contained herein in order to improve design and/or performance. When the product is in full production (status ‘Production’), relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no license or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.

20. Trademarks

Notice — All referenced brands, product names, service names and trademarks are the property of their respective owners.

21. Contact information

For additional information, please visit: **http://www.semiconductors.philips.com**

For sales office addresses, send an email to: **sales.addresses@www.semiconductors.philips.com**

22. Contents

Date of release: 25 July 2005
Document number: 9397 750 14686

Published in The Netherlands