



**THE DATASHEET OF  
74AUP1G374GM,132**



# 74AUP1G374

Low-power D-type flip-flop; positive-edge trigger; 3-state

Rev. 11 — 14 July 2023

Product data sheet

## 1. General description

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The 74AUP1G374 is a single D-type flip-flop; positive-edge trigger (3-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

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- Wide supply voltage range from 0.8 V to 3.6 V
- High noise immunity
- CMOS low power dissipation
- Complies with JEDEC standards:
  - JESD8-12 (0.8 V to 1.3 V)
  - JESD8-11 (0.9 V to 1.65 V)
  - JESD8-7 (1.65 V to 1.95 V)
  - JESD8-5 (2.3 V to 2.7 V)
  - JESD8C (2.7 V to 3.6 V)
- Low static power consumption;  $I_{CC} = 0.9 \mu\text{A}$  (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  $V_{CC}$
- $I_{OFF}$  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

### 3. Ordering information

Table 1. Ordering information

Type number	Package			Version
	Temperature range	Name	Description	
<a href="#">74AUP1G374GW</a>	-40 °C to +125 °C	TSSOP6	plastic thin shrink small outline package; 6 leads; body width 1.25 mm	<a href="#">SOT363-2</a>
<a href="#">74AUP1G374GM</a>	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	<a href="#">SOT886</a>
<a href="#">74AUP1G374GN</a>	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm	<a href="#">SOT1115</a>
<a href="#">74AUP1G374GS</a>	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm	<a href="#">SOT1202</a>

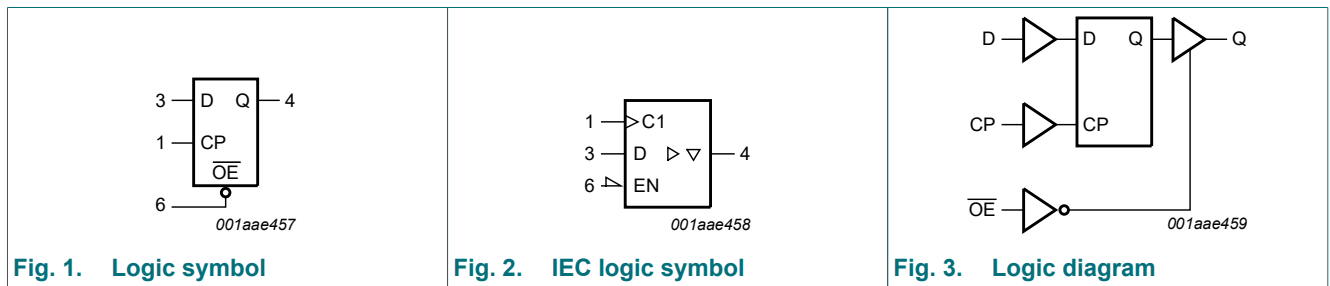
### 4. Marking

Table 2. Marking

Type number	Marking code [1]
74AUP1G374GW	aX
74AUP1G374GM	aX
74AUP1G374GN	aX
74AUP1G374GS	aX

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

### 5. Functional diagram



## 6. Pinning information

### 6.1. Pinning

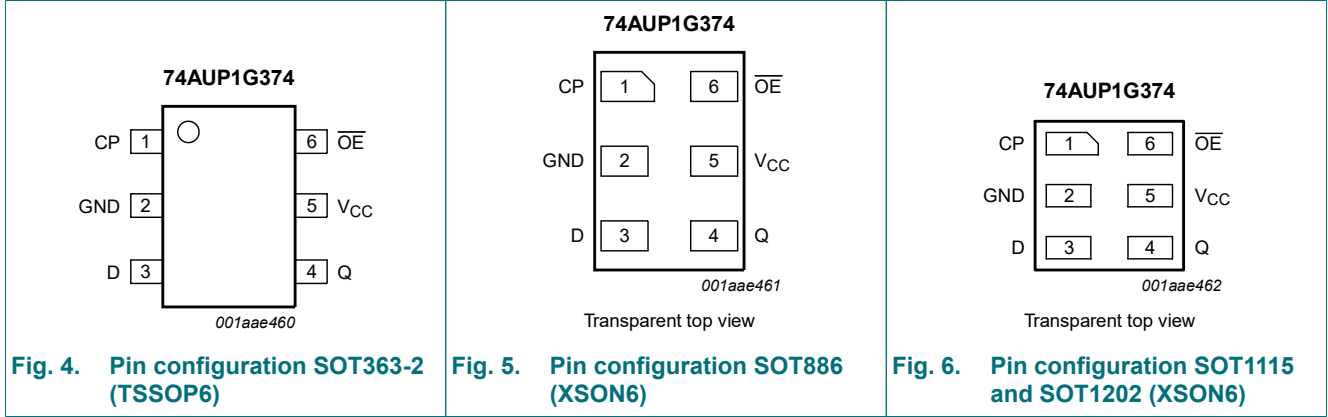


Fig. 4. Pin configuration SOT363-2 (TSSOP6)

Fig. 5. Pin configuration SOT886 (XSON6)

Fig. 6. Pin configuration SOT1115 and SOT1202 (XSON6)

### 6.2. Pin description

Table 3. Pin description

Symbol	Pin	Description
CP	1	clock input (LOW-to-HIGH, edge-triggered)
GND	2	ground (0 V)
D	3	data input
Q	4	3-state flip-flop output
V <sub>CC</sub>	5	supply voltage
$\overline{OE}$	6	output enable input (active LOW)

## 7. Functional description

Table 4. Function table

H = HIGH voltage level; h = HIGH voltage level one set-up time prior to the HIGH-to-LOW LE transition;

L = LOW voltage level; l = LOW voltage level one set-up time prior to the HIGH-to-LOW LE transition;

Z = high-impedance OFF-state;

↑ = LOW-to-HIGH clock transition.

Operating mode	Input			Internal flip-flop	Output Q
	$\overline{OE}$	CP	D		
Load and read register	L	↑	l	L	L
	L	↑	h	H	H
Load register and disable output	H	↑	l	L	Z
	H	↑	h	H	Z

## 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		-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	-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	-	250	mW

- [1] The minimum input and output voltage ratings may be exceeded if the input and output current ratings are observed.  
 [2] For SOT363-2 (TSSOP6) package:  $P_{tot}$  derates linearly with 3.7 mW/K above 83 °C.  
 For SOT886 (XSON6) package:  $P_{tot}$  derates linearly with 3.3 mW/K above 74 °C.  
 For SOT1115 (XSON6) package:  $P_{tot}$  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.

## 9. Recommended operating conditions

**Table 6. Recommended operating conditions**

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CC}$	supply voltage		0.8	3.6	V
$V_I$	input voltage		0	3.6	V
$V_O$	output voltage	Active mode	0	$V_{CC}$	V
		Power-down mode; $V_{CC} = 0$ V	0	3.6	V
$T_{amb}$	ambient temperature		-40	+125	°C
$\Delta t/\Delta V$	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
<b>T<sub>amb</sub> = 25 °C</b>						
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 voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		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
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		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>I</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	-	-	±0.1	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	-	-	±0.1	μA
I <sub>OFF</sub>	power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V	-	-	±0.2	μA
ΔI <sub>OFF</sub>	additional power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V	-	-	±0.2	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.5	μA
ΔI <sub>CC</sub>	additional supply current	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]	-	-	40	μA
C <sub>I</sub>	input capacitance	V <sub>CC</sub> = 0 V to 3.6 V; V <sub>I</sub> = GND or V <sub>CC</sub>	-	0.8	-	pF
C <sub>O</sub>	output capacitance	output enabled; V <sub>O</sub> = GND; V <sub>CC</sub> = 0 V	-	1.7	-	pF
		output disabled; V <sub>CC</sub> = 0 V to 3.6 V; V <sub>O</sub> = GND or V <sub>CC</sub>	-	1.5	-	pF

## Low-power D-type flip-flop; positive-edge trigger; 3-state

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = -40 °C to +85 °C</b>						
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 voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		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
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		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>I</sub>	input leakage current	V <sub>I</sub> = GND to 3.6 V; V <sub>CC</sub> = 0 V to 3.6 V	-	-	±0.5	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 <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V	-	-	±0.5	μA
ΔI <sub>OFF</sub>	additional power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V	-	-	±0.6	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	0.9	μA
ΔI <sub>CC</sub>	additional supply current	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]	-	50	μA

## Low-power D-type flip-flop; positive-edge trigger; 3-state

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>T<sub>amb</sub> = -40 °C to +125 °C</b>						
V <sub>IH</sub>	HIGH-level input voltage	V <sub>CC</sub> = 0.8 V	0.75 × V <sub>CC</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 voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		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
V <sub>OL</sub>	LOW-level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>				
		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	-	-	0.41	V
		I <sub>O</sub> = 1.9 mA; V <sub>CC</sub> = 1.65 V	-	-	0.39	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>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	μA
		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	-	-	±0.75	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	-	-	±0.75	μA
I <sub>OFF</sub>	power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V	-	-	±0.75	μA
ΔI <sub>OFF</sub>	additional power-off leakage current	V <sub>I</sub> or V <sub>O</sub> = 0 V to 3.6 V; V <sub>CC</sub> = 0 V to 0.2 V	-	-	±0.75	μA
I <sub>CC</sub>	supply current	V <sub>I</sub> = GND or V <sub>CC</sub> ; I <sub>O</sub> = 0 A; V <sub>CC</sub> = 0.8 V to 3.6 V	-	-	1.4	μA
ΔI <sub>CC</sub>	additional supply current	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]	-	-	75	μA

[1] One input at V<sub>CC</sub> - 0.6 V, other inputs at V<sub>CC</sub> or GND.

## 11. Dynamic characteristics

**Table 8. Dynamic characteristics**

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

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	Min	Max	
<b>C<sub>L</sub> = 5 pF</b>										
t <sub>pd</sub>	propagation delay	CP to Q; see Fig. 7 [2]								
		V <sub>CC</sub> = 0.8 V	-	23.6	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.4	6.3	13.1	2.3	13.3	2.3	13.4	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.1	4.3	7.4	1.8	8.0	1.8	8.2	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	1.6	3.4	5.8	1.4	6.4	1.4	6.7	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.4	2.5	3.8	1.1	4.3	1.1	4.5	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.2	2.1	3.0	1.0	3.4	1.0	3.6	ns
t <sub>en</sub>	enable time	OE to Q; see Fig. 8 [3]								
		V <sub>CC</sub> = 0.8 V	-	21.7	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.3	5.2	8.1	3.0	9.1	3.0	10.0	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.6	4.1	5.6	2.4	6.1	2.4	6.7	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.3	3.4	4.6	2.0	5.1	2.0	5.6	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.0	2.8	3.7	1.8	4.0	1.8	4.4	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.9	2.6	3.4	1.8	3.5	1.8	3.9	ns
t <sub>dis</sub>	disable time	OE to Q; see Fig. 8 [4]								
		V <sub>CC</sub> = 0.8 V	-	9.8	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.9	4.5	7.0	2.8	7.2	2.8	7.9	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.3	3.3	4.9	2.1	5.1	2.1	5.6	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.2	3.2	4.5	2.1	4.7	2.1	5.2	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.6	2.3	3.1	1.5	3.4	1.5	3.7	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	1.9	2.6	3.4	1.8	3.6	1.8	4.0	ns
f <sub>max</sub>	maximum frequency	CP; see Fig. 7								
		V <sub>CC</sub> = 0.8 V	-	53	-	-	-	-	-	MHz
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	203	-	170	-	170	-	MHz
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	347	-	310	-	300	-	MHz
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	435	-	400	-	390	-	MHz
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	550	-	490	-	480	-	MHz
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	619	-	550	-	510	-	MHz

## Low-power D-type flip-flop; positive-edge trigger; 3-state

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	Min	Max	
<b>C<sub>L</sub> = 10 pF</b>										
t <sub>pd</sub>	propagation delay	CP to Q; see Fig. 7 [2]	-	27.1	-	-	-	-	-	ns
		V <sub>CC</sub> = 0.8 V	-	27.1	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	2.7	7.2	14.7	2.5	15.0	2.5	15.1	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.3	4.9	8.6	2.0	9.1	2.0	9.4	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.1	4.0	6.5	1.9	7.0	1.9	7.3	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	1.8	3.1	4.4	1.5	4.9	1.5	5.1	ns
t <sub>en</sub>	enable time	OE to Q; see Fig. 8 [3]	-	25.1	-	-	-	-	-	ns
		V <sub>CC</sub> = 0.8 V	-	25.1	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.8	6.5	10.2	3.5	10.6	3.5	11.7	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.1	4.7	6.5	2.7	7.1	2.7	7.8	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.7	4.0	5.4	2.5	6.0	2.5	6.6	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.4	3.4	4.5	2.2	4.7	2.2	5.2	ns
t <sub>dis</sub>	disable time	OE to Q; see Fig. 8 [4]	-	11.7	-	-	-	-	-	ns
		V <sub>CC</sub> = 0.8 V	-	11.7	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.9	5.6	8.3	3.9	8.4	3.9	9.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.1	4.2	5.8	3.0	6.1	3.0	6.7	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.2	4.3	5.7	3.1	5.9	3.1	6.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.3	3.1	4.0	2.2	4.2	2.2	4.6	ns
f <sub>max</sub>	maximum frequency	CP; see Fig. 7	-	52	-	-	-	-	-	MHz
		V <sub>CC</sub> = 0.8 V	-	52	-	-	-	-	-	MHz
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	192	-	150	-	150	-	MHz
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	324	-	280	-	230	-	MHz
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	421	-	310	-	250	-	MHz
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	486	-	370	-	360	-	MHz
V <sub>CC</sub> = 3.0 V to 3.6 V	-	550	-	410	-	360	-	MHz		

## Low-power D-type flip-flop; positive-edge trigger; 3-state

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	Min	Max	
<b>C<sub>L</sub> = 15 pF</b>										
t <sub>pd</sub>	propagation delay	CP to Q; see Fig. 7 [2]								
		V <sub>CC</sub> = 0.8 V	-	30.6	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.0	8.0	16.2	2.8	16.5	2.8	16.6	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	2.8	5.5	9.3	2.4	10.1	2.4	10.4	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	2.3	4.5	7.2	2.1	7.9	2.1	8.2	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.1	3.5	5.0	1.9	5.5	1.9	5.7	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.0	3.1	4.3	1.7	4.7	1.7	5.0	ns
t <sub>en</sub>	enable time	OE to Q; see Fig. 8 [3]								
		V <sub>CC</sub> = 0.8 V	-	28.6	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	4.3	7.4	11.6	3.9	12.1	3.9	13.3	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.5	5.3	7.2	3.1	8.0	3.1	8.8	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.1	4.5	6.1	2.8	6.7	2.8	7.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	2.7	3.8	5.0	2.5	5.4	2.5	5.9	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.7	3.6	4.7	2.5	4.9	2.5	5.4	ns
t <sub>dis</sub>	disable time	OE to Q; see Fig. 8 [4]								
		V <sub>CC</sub> = 0.8 V	-	13.5	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	5.0	6.8	9.5	4.9	9.6	4.9	10.6	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.9	5.1	6.8	3.8	7.0	3.8	7.7	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	4.3	5.4	7.0	4.1	7.2	4.1	7.9	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	3.0	3.9	4.9	2.9	5.1	2.9	5.6	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	4.1	5.1	6.2	4.0	6.4	4.0	7.0	ns
f <sub>max</sub>	maximum frequency	CP; see Fig. 7								
		V <sub>CC</sub> = 0.8 V	-	50	-	-	-	-	-	MHz
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	181	-	120	-	120	-	MHz
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	301	-	190	-	160	-	MHz
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	407	-	240	-	190	-	MHz
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	422	-	300	-	270	-	MHz
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	481	-	320	-	300	-	MHz

Low-power D-type flip-flop; positive-edge trigger; 3-state

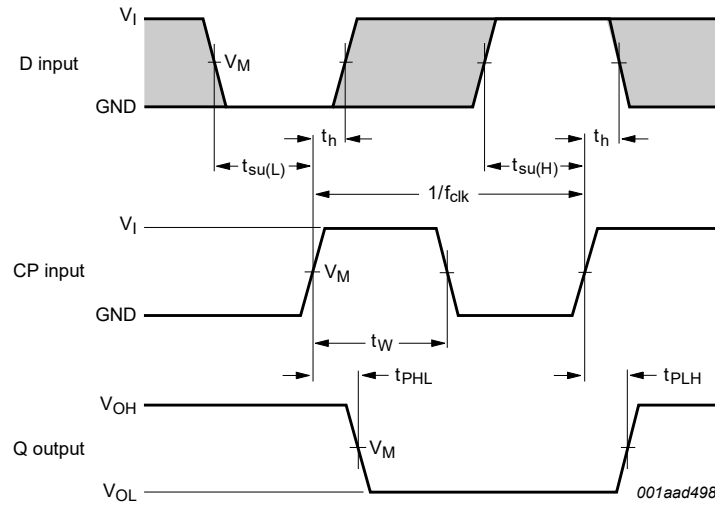
Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	Min	Max	
<b>C<sub>L</sub> = 30 pF</b>										
t <sub>pd</sub>	propagation delay	CP to Q; see Fig. 7 [2]								
		V <sub>CC</sub> = 0.8 V	-	40.8	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	3.7	10.3	20.5	3.5	21.2	3.5	21.6	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	3.3	7.0	11.6	3.2	12.6	3.2	13.3	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	3.2	5.8	9.1	2.9	9.8	2.9	10.4	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	3.0	4.7	6.5	2.6	7.0	2.6	7.4	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	2.9	4.2	5.8	2.5	6.6	2.5	6.9	ns
t <sub>en</sub>	enable time	OE to Q; see Fig. 8 [3]								
		V <sub>CC</sub> = 0.8 V	-	39.0	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	5.6	9.8	15.7	5.0	16.5	5.0	18.2	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	4.6	7.0	9.5	4.1	10.6	4.1	11.7	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	4.1	5.9	7.9	3.7	8.6	3.7	9.5	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	3.7	5.0	6.6	3.3	7.1	3.3	7.8	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	3.5	4.8	6.2	3.2	6.5	3.2	7.2	ns
t <sub>dis</sub>	disable time	OE to Q; see Fig. 8 [4]								
		V <sub>CC</sub> = 0.8 V	-	19.0	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	8.1	10.2	13.3	8.0	13.5	8.0	14.9	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	6.4	7.8	9.7	6.3	10.0	6.3	11.0	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	7.4	8.8	10.7	7.2	10.9	7.2	12.0	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	5.2	6.3	7.5	5.1	7.8	5.1	8.6	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	7.5	8.8	10.3	7.4	10.5	7.4	11.6	ns
f <sub>max</sub>	maximum frequency	CP; see Fig. 7								
		V <sub>CC</sub> = 0.8 V	-	28	-	-	-	-	-	MHz
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	128	-	70	-	70	-	MHz
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	206	-	120	-	110	-	MHz
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	262	-	150	-	120	-	MHz
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	269	-	190	-	170	-	MHz
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	309	-	200	-	190	-	MHz
<b>C<sub>L</sub> = 5 pF, 10 pF, 15 pF and 30 pF</b>										
t <sub>w</sub>	pulse width	CP; HIGH or LOW; see Fig. 7								
		V <sub>CC</sub> = 0.8 V	-	5.1	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	1.5	-	3.2	-	3.5	-	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	0.9	-	1.5	-	1.7	-	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	0.7	-	1.0	-	1.1	-	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	0.5	-	0.8	-	0.8	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	0.5	-	0.7	-	0.8	-	ns

Low-power D-type flip-flop; positive-edge trigger; 3-state

Symbol	Parameter	Conditions	25 °C			-40 °C to +85 °C		-40 °C to +125 °C		Unit
			Min	Typ [1]	Max	Min	Max	Min	Max	
t <sub>su(H)</sub>	set-up time HIGH	D to CP; see Fig. 7								
		V <sub>CC</sub> = 0.8 V	-	2.1	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	0.5	-	1.4	-	1.4	-	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	0.3	-	1.0	-	1.0	-	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	0.3	-	0.9	-	0.9	-	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	0.3	-	0.7	-	0.7	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	0.2	-	0.6	-	0.6	-	ns
t <sub>su(L)</sub>	set-up time LOW	D to CP; see Fig. 7								
		V <sub>CC</sub> = 0.8 V	-	3.5	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	0.8	-	1.8	-	1.8	-	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	0.6	-	1.2	-	1.2	-	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	0.5	-	1.1	-	1.1	-	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	0.4	-	1.0	-	1.0	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	0.5	-	1.0	-	1.0	-	ns
t <sub>h</sub>	hold time	D to CP; see Fig. 7								
		V <sub>CC</sub> = 0.8 V	-	-2.8	-	-	-	-	-	ns
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	-0.7	-	0	-	0	-	ns
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	-0.4	-	0	-	0	-	ns
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	-0.4	-	0	-	0	-	ns
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	-0.3	-	0	-	0	-	ns
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	-0.4	-	0	-	0	-	ns
C <sub>PD</sub>	power dissipation capacitance	V <sub>I</sub> = GND to V <sub>CC</sub> ; f <sub>i</sub> = 1 MHz; output enabled [5]								
		V <sub>CC</sub> = 0.8 V	-	1.7	-	-	-	-	-	pF
		V <sub>CC</sub> = 1.1 V to 1.3 V	-	1.8	-	-	-	-	-	pF
		V <sub>CC</sub> = 1.4 V to 1.6 V	-	1.8	-	-	-	-	-	pF
		V <sub>CC</sub> = 1.65 V to 1.95 V	-	2.0	-	-	-	-	-	pF
		V <sub>CC</sub> = 2.3 V to 2.7 V	-	2.3	-	-	-	-	-	pF
		V <sub>CC</sub> = 3.0 V to 3.6 V	-	2.8	-	-	-	-	-	pF

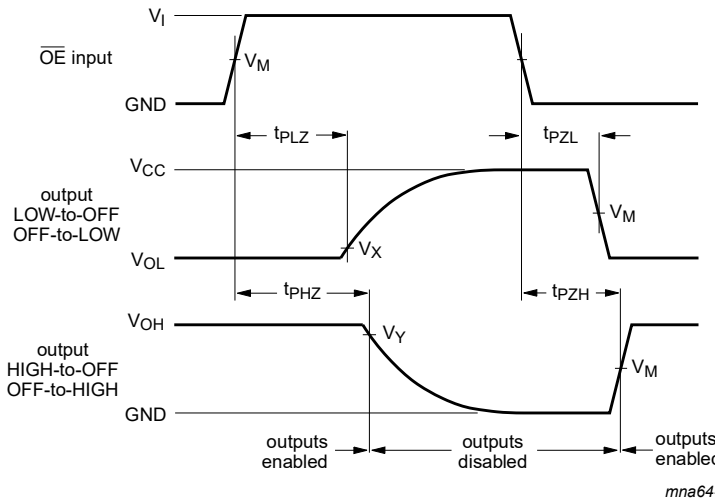
- [1] All typical values are measured at nominal V<sub>CC</sub>.
- [2] t<sub>pd</sub> is the same as t<sub>PLH</sub> and t<sub>PHL</sub>.
- [3] t<sub>en</sub> is the same as t<sub>PZH</sub> and t<sub>PZL</sub>.
- [4] t<sub>dis</sub> is the same as t<sub>PHZ</sub> and t<sub>PLZ</sub>.
- [5] C<sub>PD</sub> is used to determine the dynamic power dissipation (P<sub>D</sub> 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<sub>i</sub> = input frequency in MHz;  
 f<sub>o</sub> = output frequency in MHz;  
 C<sub>L</sub> = output load capacitance in pF;  
 V<sub>CC</sub> = supply voltage in V;  
 Σ(C<sub>L</sub> × V<sub>CC</sub><sup>2</sup> × f<sub>o</sub>) = sum of the outputs;  
 N = number of inputs switching.

11.1. Waveforms and test circuit



Measurement points are given in [Table 9](#).  
 The shaded areas indicate when the input is permitted to change for predictable output performance.  
 Logic levels: V<sub>OL</sub> and V<sub>OH</sub> are typical output voltage levels that occur with the output load.

**Fig. 7.** The clock input (CP) to output (Q) propagation delays, clock input (CP) pulse width, data input (D) to clock input (CP) set-up times, clock input (CP) to data input (D) hold times and the maximum frequency (CP)



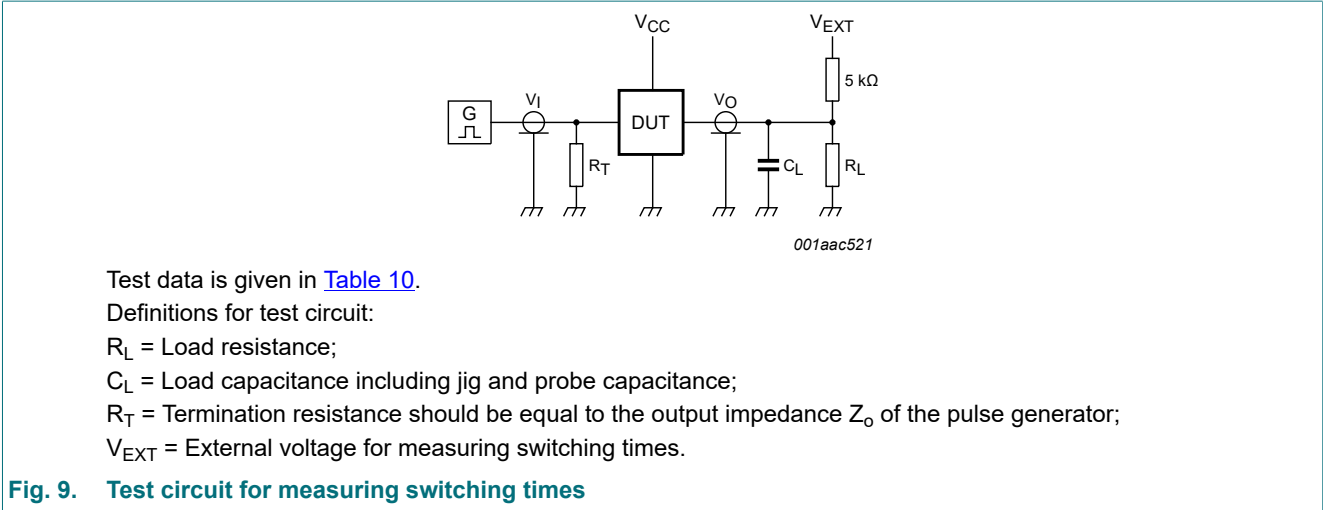
Measurement points are given in [Table 9](#).  
 Logic levels: V<sub>OL</sub> and V<sub>OH</sub> are typical output voltage levels that occur with the output load.

**Fig. 8.** Enable and disable times

**Table 9. Measurement points**

Supply voltage	Input			Output		
V <sub>CC</sub>	V <sub>M</sub>	V <sub>I</sub>	t <sub>r</sub> = t <sub>f</sub>	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

Low-power D-type flip-flop; positive-edge trigger; 3-state



**Fig. 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, set-up and hold times and pulse width  $R_L = 1 \text{ M}\Omega$ .

## 12. Package outline

TSSOP6: plastic thin shrink small outline package; 6 leads; body width 1.25 mm

SOT363-2

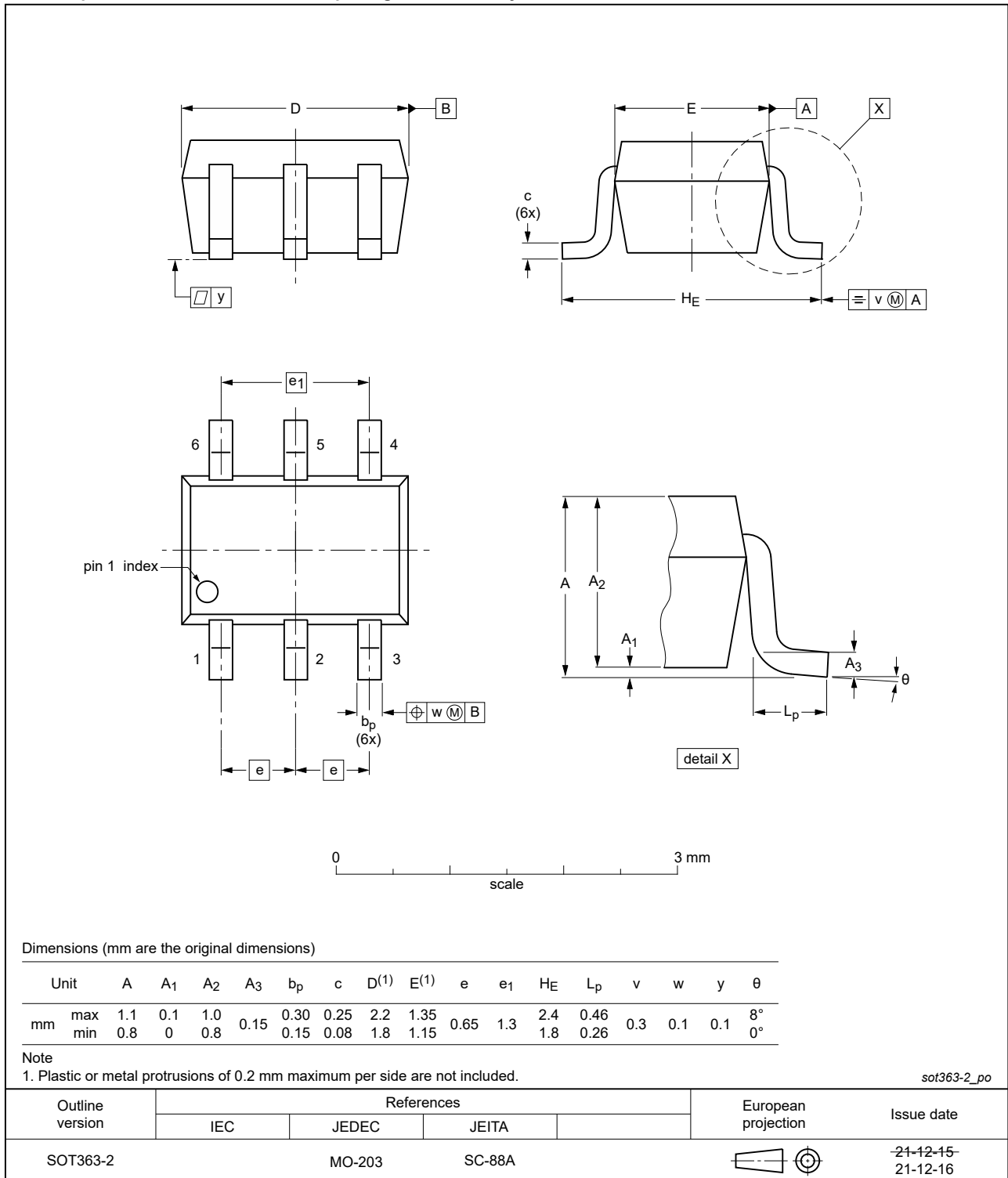


Fig. 10. Package outline SOT363-2 (TSSOP6)

XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm

SOT886

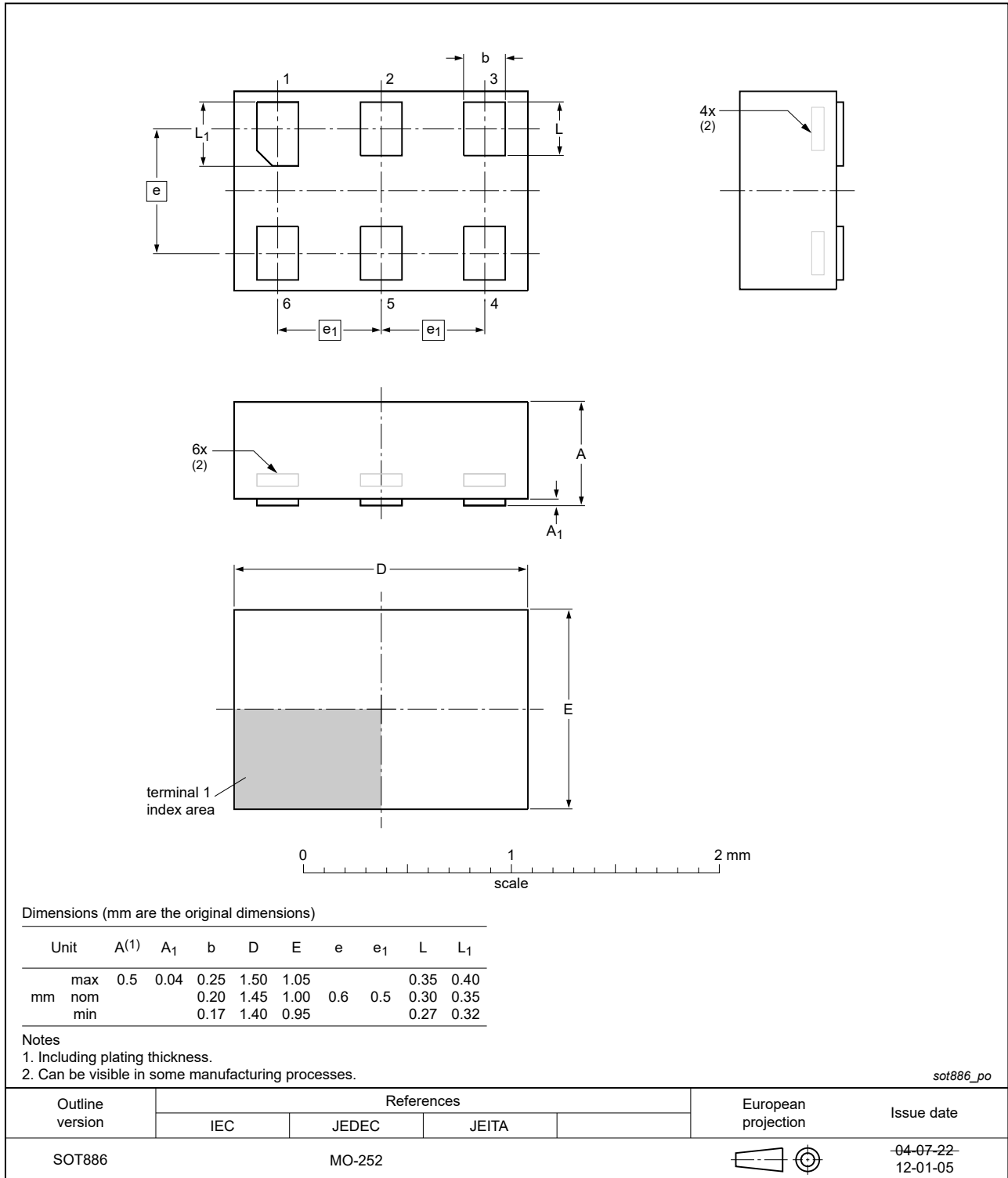


Fig. 11. Package outline SOT886 (XSON6)

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

SOT1115

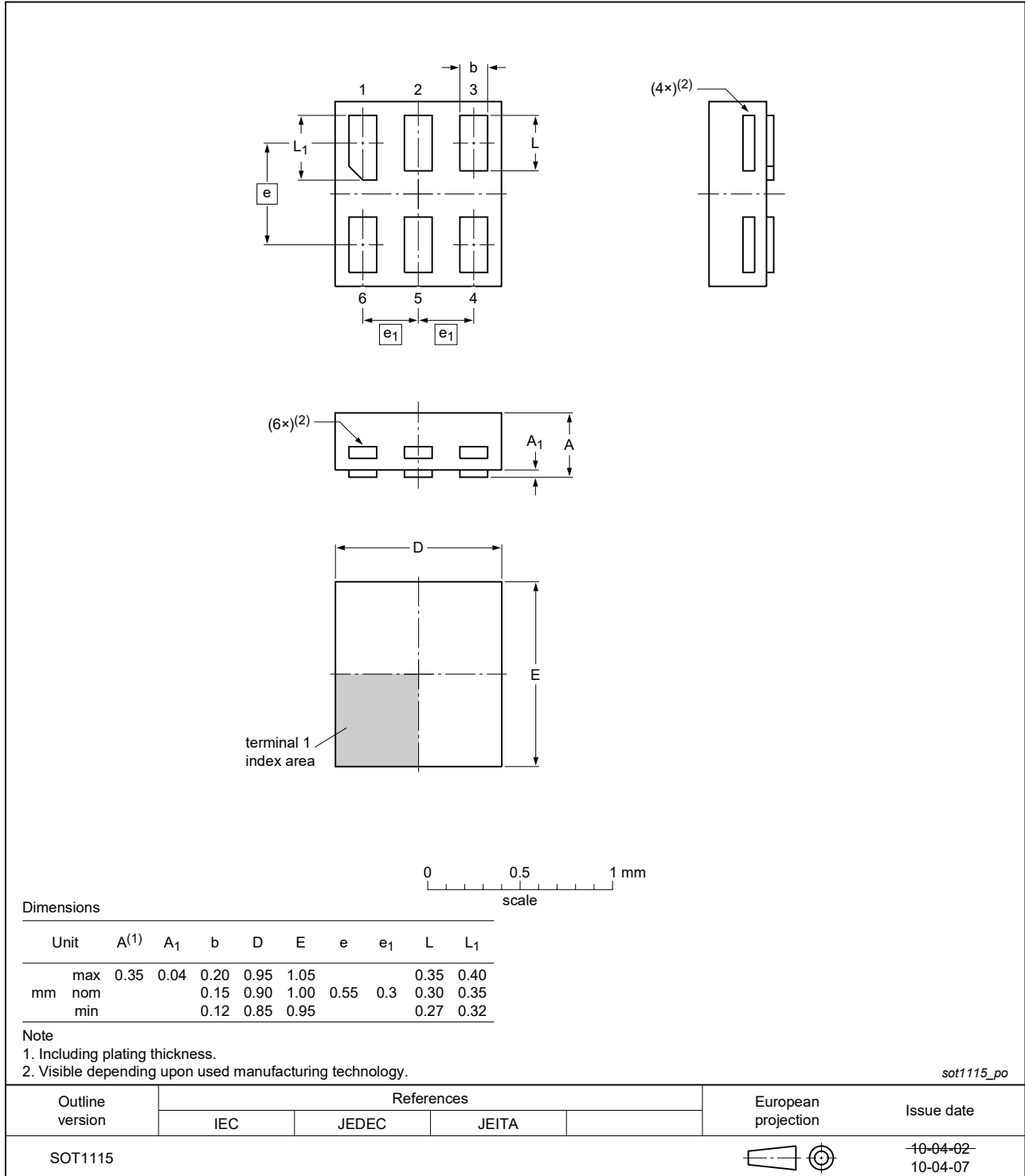


Fig. 12. Package outline SOT1115 (XSON6)

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

SOT1202

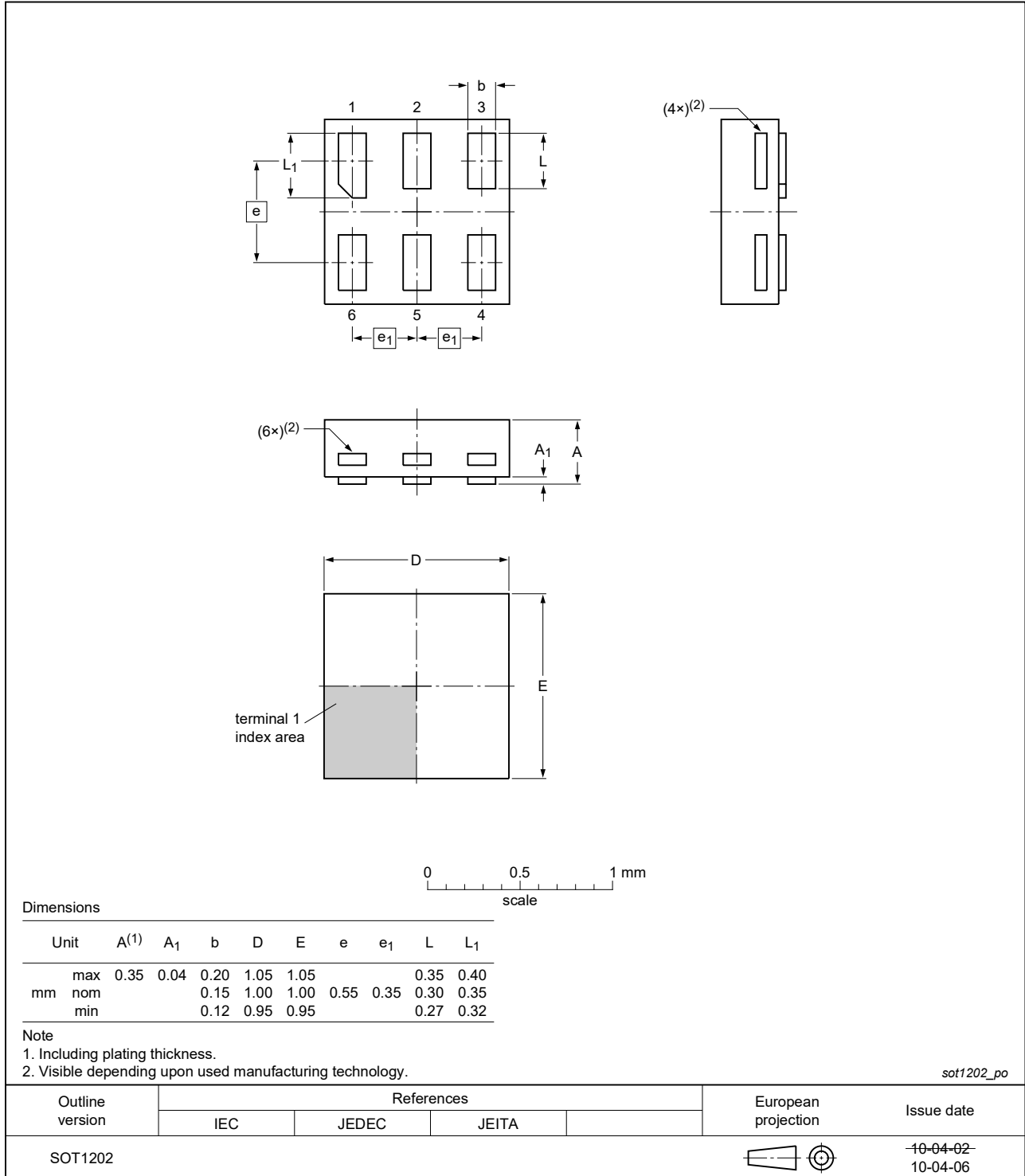


Fig. 13. Package outline SOT1202 (XSON6)

## 13. Abbreviations

Table 11. Abbreviations

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

## 14. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74AUP1G374 v.11	20230714	Product data sheet	-	74AUP1G374 v.10
Modifications:	<ul style="list-style-type: none"> <li>• <a href="#">Section 2</a>: ESD specification updated according to the latest JEDEC standard.</li> </ul>			
74AUP1G374 v.10	20220121	Product data sheet	-	74AUP1G374 v.9
Modifications:	<ul style="list-style-type: none"> <li>• <a href="#">Section 2</a> updated.</li> <li>• Package SOT363 (SC-88) changed to SOT363-2 (TSSOP6).</li> </ul>			
74AUP1G374 v.9	20201207	Product data sheet	-	74AUP1G374 v.8
Modifications:	<ul style="list-style-type: none"> <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> <li>• Type number 74AUP1G374GF (SOT891 / XSON6) removed.</li> <li>• <a href="#">Section 1</a> updated.</li> <li>• <a href="#">Table 5</a>: Derating values for <math>P_{tot}</math> total power dissipation updated.</li> </ul>			
74AUP1G374 v.8	20121129	Product data sheet	-	74AUP1G374 v.7
Modifications:	<ul style="list-style-type: none"> <li>• Class 3A added to ESD list item.</li> </ul>			
74AUP1G374 v.7	20120704	Product data sheet	-	74AUP1G374 v.6
Modifications:	<ul style="list-style-type: none"> <li>• Package outline drawing of SOT886 (<a href="#">Fig. 11</a>) modified.</li> </ul>			
74AUP1G374 v.6	20111205	Product data sheet	-	74AUP1G374 v.5
74AUP1G374 v.5	20100714	Product data sheet	-	74AUP1G374 v.4
74AUP1G374 v.4	20090626	Product data sheet	-	74AUP1G374 v.3
74AUP1G374 v.3	20090414	Product data sheet	-	74AUP1G374 v.2
74AUP1G374 v.2	20080523	Product data sheet	-	74AUP1G374 v.1
74AUP1G374 v.1	20061114	Product data sheet	-	-

## 15. Legal information

### Data sheet status

Document status [1][2]	Product status [3]	Definition
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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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