Single D-type flip-flop; positive-edge trigger Rev. 15 — 29 March 2022

Product data sheet

1. General description

The 74LVC1G80 is a single positive-edge triggered D-type flip-flop. Data at the D-input that meets the set-up and hold time requirements on the LOW-to-HIGH clock transition will be stored in the flip-flop and its complement will appear at the \overline{Q} output. Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of these devices as translators in mixed 3.3 V and 5 V environments.

Schmitt-trigger action at all inputs makes the circuit tolerant of slower input rise and fall times.

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 1.65 V to 5.5 V
- Overvoltage tolerant inputs to 5.5 V
- High noise immunity
- ±24 mA output drive (V_{CC} = 3.0 V)
- CMOS low power dissipation
- Direct interface with TTL levels
- I_{OFF} circuitry provides partial Power-down mode operation
- Latch-up performance exceeds 250 mA
- Complies with JEDEC standard:
 - 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)
 - JESD36 (4.5 V to 5.5 V)
- ESD protection:
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from -40 °C to +85 °C and -40 °C to +125 °C.



3. Ordering information

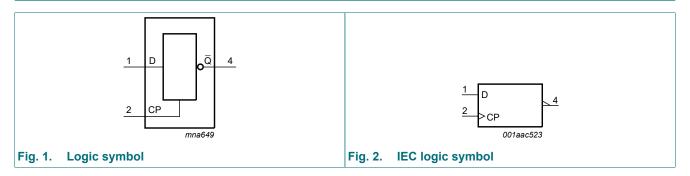
Type number	Package	Package											
	Temperature range	Name	Description	Version									
74LVC1G80GW	-40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1									
74LVC1G80GV	-40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753									
74LVC1G80GM	-40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm	SOT886									
74LVC1G80GN	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 0.9 × 1.0 × 0.35 mm	SOT1115									
74LVC1G80GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body 1.0 × 1.0 × 0.35 mm	SOT1202									
74LVC1G80GX	-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

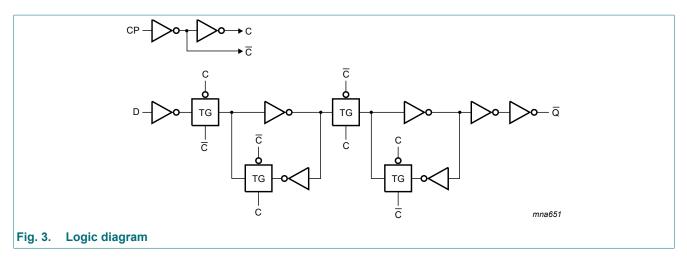
Table 2. Marking codes	
Type number	Marking[1]
74LVC1G80GW	VT
74LVC1G80GV	V80
74LVC1G80GM	VT
74LVC1G80GN	VT
74LVC1G80GS	VT
74LVC1G80GX	VT

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

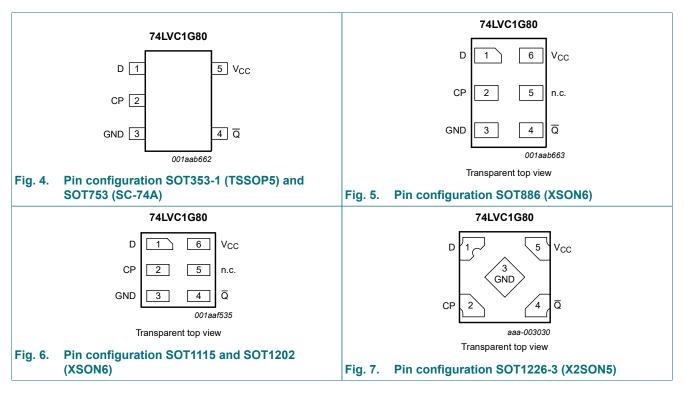
5. Functional diagram



Single D-type flip-flop; positive-edge trigger



6. Pinning information



6.1. Pinning

6.2. Pin description

Table 3. Pin des Symbol	Pin		Description
Gymbol	TSSOP5, SC-74A, and X2SON5	XSON6	
D	1	1	data input
CP	2	2	clock pulse input
GND	3	3	ground (0 V)
Q	4	4	data output
n.c.	-	5	not connected
V _{CC}	5	6	supply voltage

7. Functional description

Table 4. Function table

H = HIGH voltage level; L = LOW voltage level; $\uparrow = LOW$ -to-HIGH CP transition; X = don't care;

 \overline{q} = lower case letter indicates the state of referenced input, one set-up time prior to the LOW-to-HIGH CP transition.

Input	nput O						
СР	D	Q					
1	L	Н					
↑	Н	L					
L	X	q					

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	+6.5	V
I _{IK}	input clamping current	V ₁ < 0 V		-50	-	mA
VI	input voltage		[1]	-0.5	+6.5	V
I _{OK}	output clamping current	$V_{\rm O}$ > $V_{\rm CC}$ or $V_{\rm O}$ < 0 V		-	±50	mA
Vo	output voltage	Active mode	[1]	-0.5	V _{CC} + 0.5	V
		Power-down mode; V_{CC} = 0 V	[1]	-0.5	+6.5	V
I _O	output current	$V_{O} = 0 V \text{ to } V_{CC}$		-	±50	mA
I _{CC}	supply current			-	100	mA
I _{GND}	ground current			-100	-	mA
P _{tot}	total power dissipation	T _{amb} = -40 °C to +125 °C	[2]	-	250	mW
T _{stg}	storage temperature			-65	+150	°C

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

[2] For SOT353-1 (TSSOP5) package: P_{tot} derates linearly with 3.3 mW/K above 74 °C.

For SOT753 (SC-74A) package: P_{tot} derates linearly with 3.8 mW/K above 85 °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.

For SOT1226-3 (X2SON5) package: P_{tot} derates linearly with 3.0 mW/K above 67 $^\circ\text{C}.$

9. Recommended operating conditions

Table 6. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V _{CC}	supply voltage		1.65	-	5.5	V
VI	input voltage		0	-	5.5	V
Vo	output voltage	Active mode	0	-	V _{CC}	V
		Power-down mode; $V_{CC} = 0 V$	0	-	5.5	V
T _{amb}	ambient temperature		-40	-	+125	°C
Δt/ΔV	input transition rise and fall rate	V _{CC} = 1.65 V to 2.7 V	-	-	20	ns/V
		V _{CC} = 2.7 V to 5.5 V	-	-	10	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[1]	Max	Unit
T _{amb} = -	40 °C to +85 °C					1
V _{IH}	HIGH-level input voltage	V _{CC} = 1.65 V to 1.95 V	0.65 × V _{CC}	-	-	V
		V _{CC} = 2.3 V to 2.7 V	1.7	-	-	V
		V _{CC} = 2.7 V to 3.6 V	2.0	-	-	V
		V _{CC} = 4.5 V to 5.5 V	0.7 × V _{CC}	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 1.65 V to 1.95 V	-	-	0.35 × V _{CC}	V
		V _{CC} = 2.3 V to 2.7 V	-	-	0.7	V
		V _{CC} = 2.7 V to 3.6 V	-	-	0.8	V
		V _{CC} = 4.5 V to 5.5 V	-	-	0.3 × V _{CC}	V
V _{OH}	HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		I_{O} = -100 µA; V_{CC} = 1.65 V to 5.5 V	-	-	V	
		I _O = -4 mA; V _{CC} = 1.65 V	1.2	-	-	V
		I _O = -8 mA; V _{CC} = 2.3 V	1.9	-	-	V
		I _O = -12 mA; V _{CC} = 2.7 V	2.2	-	-	V
		I _O = -24 mA; V _{CC} = 3.0 V	2.3	-	-	V
		I _O = -32 mA; V _{CC} = 4.5 V	3.8	-	-	V
V _{OL}	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		I_{O} = 100 μ A; V_{CC} = 1.65 V to 5.5 V	-	-	0.1	V
		I _O = 4 mA; V _{CC} = 1.65 V	-	-	0.45	V
		I _O = 8 mA; V _{CC} = 2.3 V	-	-	0.3	V
		I _O = 12 mA; V _{CC} = 2.7 V	-	-	0.4	V
		I _O = 24 mA; V _{CC} = 3.0 V	-	-	0.55	V
		I _O = 32 mA; V _{CC} = 4.5 V	-	-	0.55	V
I	input leakage current	V_{I} = 5.5 V or GND; V_{CC} = 0 V to 5.5 V	-	±0.1	±1	μA
I _{OFF}	power-off leakage current	V_{CC} = 0 V; V _I or V _O = 5.5 V	-	±0.1	±2	μA
I _{CC}	supply current	$V_{I} = 5.5 V \text{ or GND};$ $V_{CC} = 1.65 V \text{ to } 5.5 V; I_{O} = 0 \text{ A}$	-	0.1	4	μA
ΔI _{CC}	additional supply current	per pin; V_{CC} = 2.3 V to 5.5 V; V _I = V _{CC} - 0.6 V; I _O = 0 A	-	5	500	μA
Cı	input capacitance	V_{CC} = 3.3 V; V_{I} = GND to V_{CC}	-	5	-	pF

Symbol	Parameter	Conditions	Min	Typ[1]	Max	Unit
T _{amb} = -4	40 °C to +125 °C					
VIH	HIGH-level input voltage	V _{CC} = 1.65 V to 1.95 V	0.65 × V _{CC}	-	-	V
		V _{CC} = 2.3 V to 2.7 V	1.7	-	-	V
		V _{CC} = 2.7 V to 3.6 V	2.0	-	-	V
		V_{CC} = 4.5 V to 5.5 V	0.7 × V _{CC}	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 1.65 V to 1.95 V	-	-	0.35 × V _{CC}	V
		V _{CC} = 2.3 V to 2.7 V	-	-	0.7	V
		V _{CC} = 2.7 V to 3.6 V	-	-	0.8	V
		V_{CC} = 4.5 V to 5.5 V	-	-	0.3 × V _{CC}	V
V _{OH}	HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		I_{O} = -100 µA; V_{CC} = 1.65 V to 5.5 V	V _{CC} - 0.1	-	-	V
		I _O = -4 mA; V _{CC} = 1.65 V	0.95	-	-	V
		I _O = -8 mA; V _{CC} = 2.3 V	1.7	-	-	V
		I _O = -12 mA; V _{CC} = 2.7 V	1.9	-	-	V
		I _O = -24 mA; V _{CC} = 3.0 V	2.0	-	-	V
		I _O = -32 mA; V _{CC} = 4.5 V	3.4	-	-	V
V _{OL}	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		I_{O} = 100 µA; V_{CC} = 1.65 V to 5.5 V	-	-	0.1	V
		I _O = 4 mA; V _{CC} = 1.65 V	-	-	0.70	V
		I _O = 8 mA; V _{CC} = 2.3 V	-	-	0.45	V
		I _O = 12 mA; V _{CC} = 2.7 V	-	-	0.60	V
		I _O = 24 mA; V _{CC} = 3.0 V	-	-	0.80	V
		I _O = 32 mA; V _{CC} = 4.5 V	-	-	0.80	V
li –	input leakage current	V_{I} = 5.5 V or GND; V_{CC} = 0 V to 5.5 V	-	-	±1	μA
I _{OFF}	power-off leakage current	V_{CC} = 0 V; V _I or V _O = 5.5 V	-	-	±2	μA
I _{CC}	supply current	V_{I} = 5.5 V or GND; V_{CC} = 1.65 V to 5.5 V; I_{O} = 0 A	-	-	4	μA
ΔI _{CC}	additional supply current	per pin; V_{CC} = 2.3 V to 5.5 V; V _I = V _{CC} - 0.6 V; I _O = 0 A	-	-	500	μA

[1] All typical values are measured at V_{CC} = 3.3 V and T_{amb} = 25 °C.

11. Dynamic characteristics

Table 8. Dynamic characteristics

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

Symbol	Parameter	Conditions	-40	0 °C to +85	°C	-40 °C to	o +125 °C	Unit
			Min	Typ[1]	Max	Min	Max	
t _{pd}	propagation	CP to \overline{Q} ; see Fig. 8 [2]						
	delay	V _{CC} = 1.65 V to 1.95 V	1.0	3.4	9.9	1.0	13.0	ns
		V _{CC} = 2.3 V to 2.7 V	0.5	2.3	7.0	0.5	9.0	ns
		V _{CC} = 2.7 V	0.5	2.5	6.0	0.5	8.0	ns
		V _{CC} = 3.0 V to 3.6 V	0.9	2.4	5.0	0.9	6.5	ns
		V _{CC} = 4.5 V to 5.5 V	0.5	1.8	4.5	0.5	6.0	ns
t _{su}	set-up time	HIGH or LOW; D to CP; see Fig. 9 [3]						
		V _{CC} = 1.65 V to 1.95 V	2.3	0.8	-	2.3	-	ns
		V _{CC} = 2.3 V to 2.7 V	1.5	0.6	-	1.5	-	ns
		V _{CC} = 2.7 V	1.5	0.5	-	1.5	-	ns
		V _{CC} = 3.0 V to 3.6 V	1.3	0.4	-	1.3	-	ns
	V _{CC} = 4.5 V to 5.5 V	1.1	0.5	-	1.1	-	ns	
t _h hold time	D to CP; see Fig. 9							
		V _{CC} = 1.65 V to 1.95 V	0	-0.6	-	0	-	ns
		V _{CC} = 2.3 V to 2.7 V	0	-0.4	-	0	-	ns
		V _{CC} = 2.7 V	+0.5	-0.2	-	0.5	-	ns
		V _{CC} = 3.0 V to 3.6 V	0.9	0.2	-	0.9	-	ns
		$V_{CC} = 4.5 V \text{ to } 5.5 V$	+0.5	-0.1	-	0.5	-	ns
t _W	pulse width	CP HIGH or LOW; see Fig. 9						
		V _{CC} = 1.65 V to 1.95 V	3.0	1.1	-	3.0	-	ns
		V _{CC} = 2.3 V to 2.7 V	2.5	0.7	-	2.5	-	ns
		V _{CC} = 2.7 V	2.5	0.6	-	2.5	-	ns
		V _{CC} = 3.0 V to 3.6 V	2.5	0.6	-	2.5	-	ns
		V _{CC} = 4.5 V to 5.5 V	2.0	0.5	-	2.0	-	ns
f _{max}	maximum	CP; see <u>Fig. 9</u>						
	frequency	V _{CC} = 1.65 V to 1.95 V	160	300	-	160	-	MHz
		V _{CC} = 2.3 V to 2.7 V	160	350	-	160	-	MHz
		V _{CC} = 2.7 V	160	350	-	160	-	MHz
		V _{CC} = 3.0 V to 3.6 V	160	350	-	160	-	MHz
		$V_{CC} = 4.5 V \text{ to } 5.5 V$	200	400	-	200	-	MHz
C _{PD}	power dissipation capacitance	$V_1 = GND \text{ to } V_{CC}; V_{CC} = 3.3 \text{ V}$ [4]	-	17	-	-	-	pF

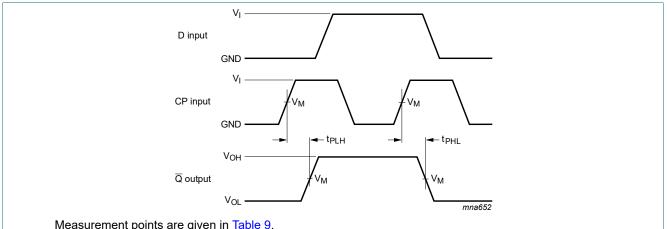
Typical values are measured at T_{amb} = 25 °C and V_{CC} = 1.8 V, 2.5 V, 2.7 V, 3.3 V and 5.0 V respectively. [1]

- t_{pd} is the same as t_{PLH} and $t_{\text{PHL}}.$ [2]
- [3]
- t_{su} is the same as $t_{su(H)}$ and $t_{su(L)}$. C_{PD} is used to determine the dynamic power dissipation (P_D in µW). [4]

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

 f_i = input frequency in MHz; f_o = output frequency in MHz; C_L = output load capacitance in pF;

 V_{CC} = supply voltage in V; N = number of inputs switching; $\sum (C_L \times V_{CC}^2 \times f_o)$ = sum of outputs.

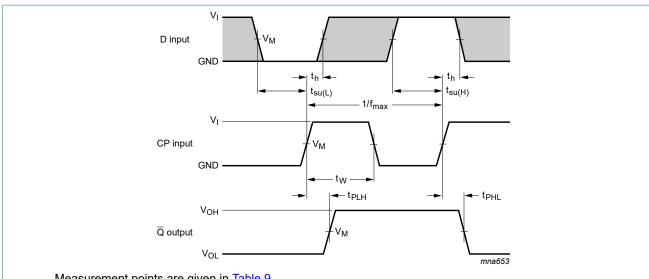


11.1. Waveforms and test circuit

Measurement points are given in Table 9.

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

Fig. 8. Clock (CP) to output $(\overline{\mathbf{Q}})$ propagation delay times



Measurement points are given in Table 9.

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

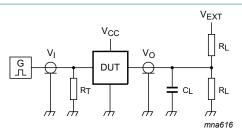
The shaded areas indicate when the input is permitted to change for predictable output performance.

Fig. 9. Clock (CP) to output (Q) propagation delay times, clock pulse width, D to set-up times, the CP to D hold times and maximum clock pulse frequency

Table 9. Weasurement points			
Supply voltage	Input	Output	
V _{cc}	V _M	V _M	
1.65 V to 1.95 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	
2.3 V to 2.7 V	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$	
2.7 V	1.5 V	1.5 V	
3.0 V to 3.6 V	1.5 V	1.5 V	
4.5 V to 5.5 V	$0.5 \times V_{CC}$	0.5 × V _{CC}	

Table 9. Measurement points

Single D-type flip-flop; positive-edge trigger



Test data is given in Table 10.

Definitions for test circuit:

R_L = Load resistance;

 C_L = Load capacitance including jig and probe capacitance;

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

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

Fig. 10. Test circuit for measuring switching times

Table 10. Test data

Supply voltage	Input		Load		V _{EXT}	
V _{cc}	VI	t _r = t _f	CL	RL	t _{PLH} , t _{PHL}	
1.65 V to 1.95 V	V _{CC}	≤ 2.0 ns	30 pF	1 kΩ	open	
2.3 V to 2.7 V	V _{CC}	≤ 2.0 ns	30 pF	500 Ω	open	
2.7 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open	
3.0 V to 3.6 V	2.7 V	≤ 2.5 ns	50 pF	500 Ω	open	
4.5 V to 5.5 V	V _{CC}	≤ 2.5 ns	50 pF	500 Ω	open	

12. Package outline

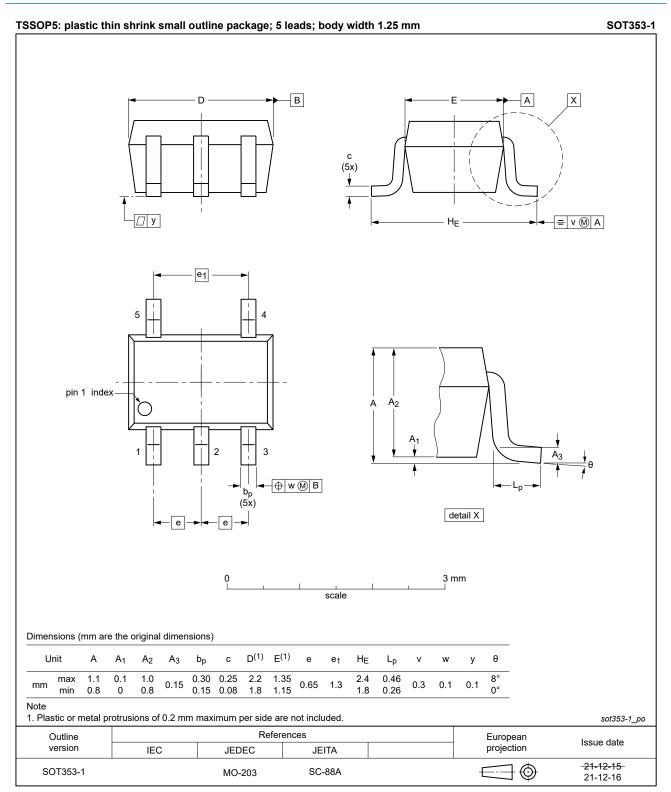


Fig. 11. Package outline SOT353-1 (TSSOP5)

Product data sheet

Single D-type flip-flop; positive-edge trigger

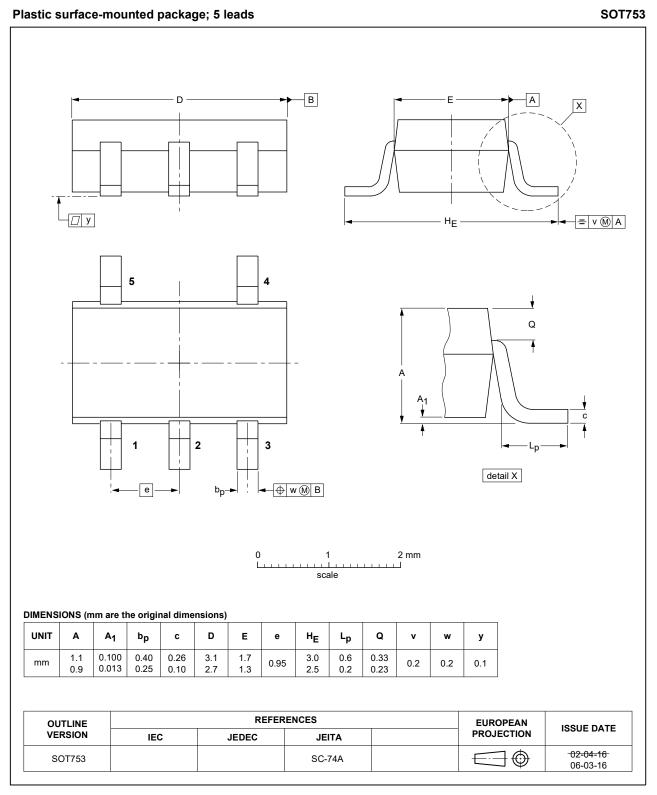


Fig. 12. Package outline SOT753 (SC-74A)

⁷⁴LVC1G80

Single D-type flip-flop; positive-edge trigger

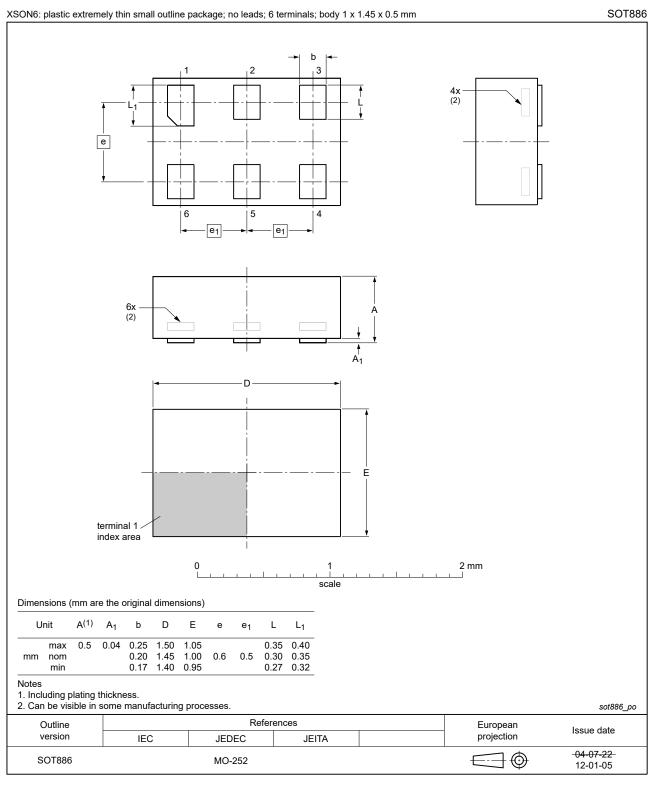


Fig. 13. Package outline SOT886 (XSON6)

Single D-type flip-flop; positive-edge trigger

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

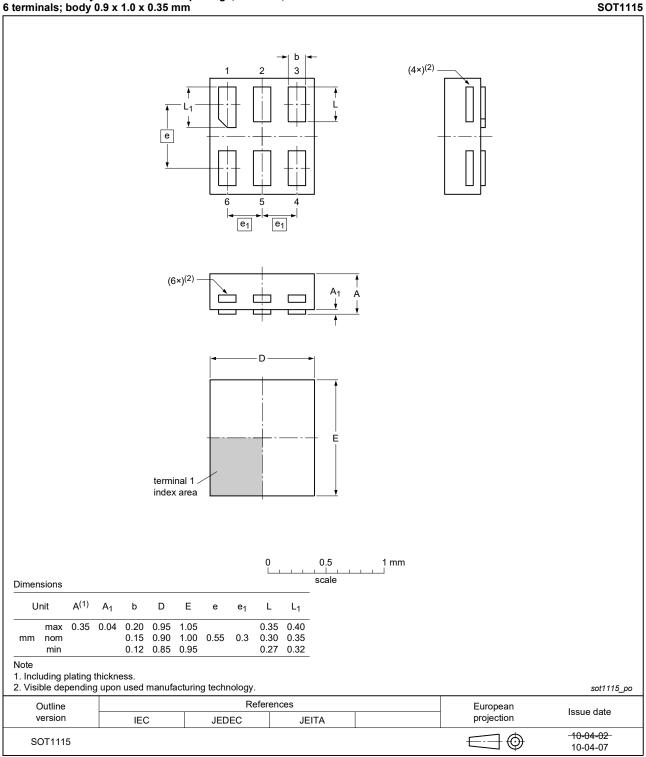


Fig. 14. Package outline SOT1115 (XSON6)

Single D-type flip-flop; positive-edge trigger

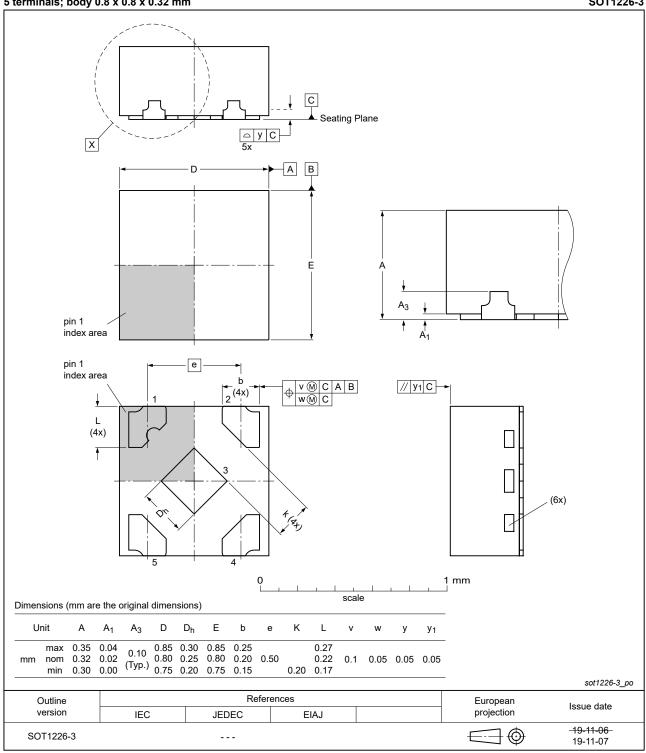
terminals; t	ody	1.0 x	1.0 x	0.35 n	nm											SOT12
				e v	↑ ∟1 ↓		-e ₁ -	2				(4×) ⁽²				
				(6×)(2) —] [+		A ₁ ↓	↑ A ↓					
				termina index a				- D		E						
Dimensions								0		0.5 scale	1 m 	im				
Unit	A ⁽¹⁾	A ₁	b	D	Е	е	e ₁	L	L ₁							
mm nom min	0.35	0.04	0.15	1.05 1.00 0.95	1.00	0.55	0.35	0.30	0.40 0.35 0.32							
Note 1. Including p 2. Visible dep	ating	thickne	ess.	manufa	oturin	n techr	nloav									sot1202_µ
Outline	chain		135U I	nanulo	Jotanni	9 10011		eferen	ces				Eu	opean		
version			IEC	;		JED			JEI	TA			pro	jection		e date
SOT1202														$\exists \odot$	-10-	04-02

Fig. 15. Package outline SOT1202 (XSON6)

Single D-type flip-flop; positive-edge trigger

X2SON5: plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body $0.8 \times 0.8 \times 0.32$ mm

SOT1226-3





Product data sheet

© Nexperia B.V. 2022. All rights reserved

13. Abbreviations

Table 11. Abbreviations			
Acronym	Description		
CMOS	Complementary Metal Oxide Semiconductor		
DUT	Device Under Test		
ESD	ElectroStatic Discharge		
HBM	Human Body Model		
MM	Machine Model		
TTL	Transistor-Transistor Logic		

14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes	
74LVC1G80 v.15	20220329	Product data sheet	-	74LVC1G80 v.14	
Modifications:	Package SOT1226 (X2SON5) changed to SOT1226-3 (X2SON5).				
74LVC1G80 v.14	20220131	Product data sheet	-	74LVC1G80 v.13	
Modifications:	guidelines of Legal texts Type numb <u>Section 1</u> a <u>Table 5</u> : De	 Type number 74LVC1G80GF (SOT891/XSON6) removed. <u>Section 1</u> and <u>Section 2</u> updated. <u>Table 5</u>: Derating values for P_{tot} total power dissipation updated. 			
74LVC1G80 v.13	20161205	Product data sheet	-	74LVC1G80 v.12	
Modifications:	• <u>Table 7</u> : The maximum limits for leakage current and supply current have changed.				
74LVC1G80 v.12	20120702	Product data sheet	-	74LVC1G80 v.11	
Modifications:	Added type number 74LVC1G80GX (SOT1226)				
74LVC1G80 v.11	20120402	Product data sheet	-	74LVC1G80 v.10	
Modifications:	Errata in <u>Table 3</u> corrected (description CP input).				
74LVC1G80 v.10	20111202	Product data sheet	-	74LVC1G80 v.9	
Modifications:	Legal pages updated.				
74LVC1G80 v.9	20100928	Product data sheet	-	74LVC1G80 v.8	
Modifications:	 Added type number 74LVC1G80GN (SOT1115/XSON6 package). Added type number 74LVC1G80GS (SOT1202/XSON6 package). 				
74LVC1G80 v.8	20070829	Product data sheet	-	74LVC1G80 v.7	
74LVC1G80 v.7	20061012	Product data sheet	-	74LVC1G80 v.6	
74LVC1G80 v.6	20040910	Product specification		74LVC1G80 v.5	
74LVC1G80 v.5	20040629	Product specification	-	74LVC1G80 v.4	
74LVC1G80 v.4	20040429	Product specification	-	74LVC1G80 v.3	
74LVC1G80 v.3	20030526	Product specification	-	74LVC1G80 v.2	
74LVC1G80 v.2	20030130	Product specification	-	74LVC1G80 v.1	
74LVC1G80 v.1	20010404	Product specification	-	-	

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.

 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 <u>https://www.nexperia.com</u>.

Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Nexperia does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local Nexperia sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

Product specification — The information and data provided in a Product data sheet shall define the specification of the product as agreed between Nexperia and its customer, unless Nexperia and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the Nexperia product is deemed to offer functions and qualities beyond those described in the Product data sheet.

Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, Nexperia does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. Nexperia takes no responsibility for the content in this document if provided by an information source outside of Nexperia.

In no event shall Nexperia be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, Nexperia's aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of Nexperia.

Right to make changes — Nexperia reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — Nexperia products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an Nexperia product can reasonably be expected to result in personal

Single D-type flip-flop; positive-edge trigger

injury, death or severe property or environmental damage. Nexperia and its suppliers accept no liability for inclusion and/or use of Nexperia products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Quick reference data — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

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

Customers are responsible for the design and operation of their applications and products using Nexperia products, and Nexperia accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the Nexperia product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

Nexperia does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using Nexperia products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). Nexperia does not accept any liability in this respect.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

Terms and conditions of commercial sale — Nexperia products are sold subject to the general terms and conditions of commercial sale, as published at <u>http://www.nexperia.com/profile/terms</u>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. Nexperia hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of Nexperia products by customer.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Non-automotive qualified products — Unless this data sheet expressly states that this specific Nexperia product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. Nexperia accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without Nexperia's warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond Nexperia's specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies Nexperia for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond Nexperia's standard warranty and Nexperia's product specifications.

Translations — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

Trademarks

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