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Single D-type flip-flop; positive-edge trigger Rev. 12 — 5 December 2016

Product data sheet

General description 1.

The 74LVC1G79 provides a single positive-edge triggered D-type flip-flop.

Information on the data input is transferred to the Q-output on the LOW-to-HIGH transition of the clock pulse. The D-input must be stable one set-up time prior to the LOW-to-HIGH clock transition for predictable operation.

Inputs can be driven from either 3.3 V or 5 V devices. This feature allows the use of this device in a mixed 3.3 V and 5 V environment.

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.

Features and benefits 2.

- Wide supply voltage range from 1.65 V to 5.5 V
- High noise immunity
- Complies with JEDEC standard:
 - JESD8-7 (1.65 V to 1.95 V)
 - JESD8-5 (2.3 V to 2.7 V)
 - JESD8B/JESD36 (2.7 V to 3.6 V)
- ESD protection:
 - HBM JESD22-A114F exceeds 2000 V
 - MM JESD22-A115-A exceeds 200 V
- ± 24 mA output drive (V_{CC} = 3.0 V)
- CMOS low power consumption
- Latch-up performance exceeds 250 mA
- Direct interface with TTL levels
- Inputs accept voltages up to 5 V
- Multiple package options
- Specified from -40 °C to +85 °C and -40 °C to +125 °C.

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3. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
74LVC1G79GW	–40 °C to +125 °C	TSSOP5	plastic thin shrink small outline package; 5 leads; body width 1.25 mm	SOT353-1
74LVC1G79GV	–40 °C to +125 °C	SC-74A	plastic surface-mounted package; 5 leads	SOT753
74LVC1G79GM	–40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body $1 \times 1.45 \times 0.5$ mm	SOT886
74LVC1G79GF	–40 °C to +125 °C	XSON6	plastic extremely thin small outline package; no leads; 6 terminals; body $1 \times 1 \times 0.5$ mm	SOT891
74LVC1G79GN	–40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body $0.9 \times 1.0 \times 0.35$ mm	SOT1115
74LVC1G79GS	-40 °C to +125 °C	XSON6	extremely thin small outline package; no leads; 6 terminals; body $1.0 \times 1.0 \times 0.35$ mm	SOT1202
74LVC1G79GX	-40 °C to +125 °C	X2SON5	X2SON5: plastic thermal enhanced extremely thin small outline package; no leads; 5 terminals; body $0.8 \times 0.8 \times 0.35$ mm	SOT1226

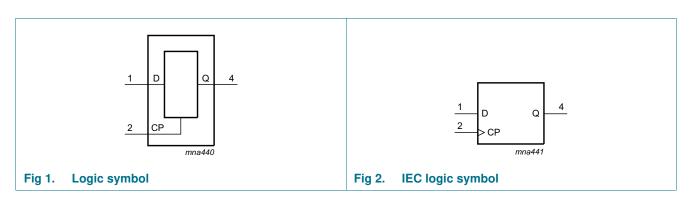
4. Marking

Table 2. Marking codes

Type number	Marking ^[1]
Type humber	
74LVC1G79GW	VP
74LVC1G79GV	V79
74LVC1G79GM	VP
74LVC1G79GF	VP
74LVC1G79GN	VP
74LVC1G79GS	VP
74LVC1G79GX	VP

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

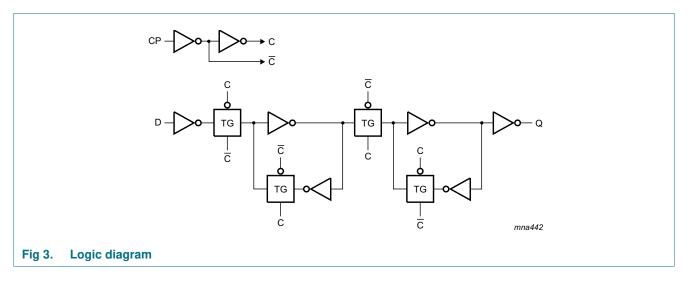
5. Functional diagram



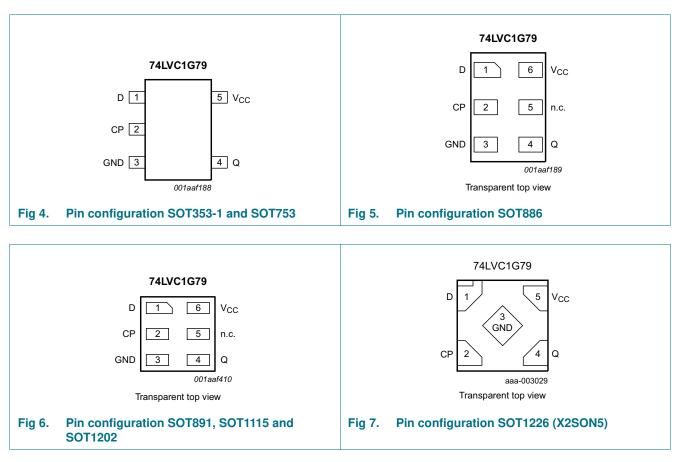
74LVC1G79

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



6. Pinning information



6.1 Pinning

6.2 Pin description

Symbol	Pin	Description	
	TSSOP5 and X2SON5	XSON6	
D	1	1	data input
СР	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^[1]

Input		Output
СР	D	Q
\uparrow	L	L
\uparrow	Н	Н
L	X	q

[1] H = HIGH voltage level;

L = LOW voltage level;

 \uparrow = LOW-to-HIGH CP transition;

X = don't care;

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

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

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 _I < 0 V		-50	-	mA
VI	input voltage		[1]	-0.5	+6.5	V
l _{ок}	output clamping current	$V_{\rm O}$ > $V_{\rm CC}$ or $V_{\rm O}$ < 0 V		-	±50	mA
Vo	output voltage	Active mode	<u>[1][2]</u>	-0.5	$V_{CC} + 0.5$	V
		Power-down mode	<u>[1][2]</u>	-0.5	+6.5	V
lo	output current	$V_{O} = 0 V$ to V_{CC}		-	±50	mA
I _{CC}	supply current			-	100	mA
I _{GND}	ground current			-100	-	mA
P _{tot}	total power dissipation	$T_{amb} = -40 \text{ °C to } +125 \text{ °C}$	<u>[3]</u>	-	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] When V_{CC} = 0 V (Power-down mode), the output voltage can be 5.5 V in normal operation.

[3] For TSSOP5 and SC-74A packages: above 87.5 °C the value of P_{tot} derates linearly with 4.0 mW/K. For XSON6 and X2SON5 packages: above 118 °C the value of P_{tot} derates linearly with 7.8 mW/K.

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
		$V_{CC} = 0$ V; Power-down mode	0	-	5.5	V
T _{amb}	ambient temperature		-40	-	+125	°C
$\Delta t / \Delta V$	input transition rise and fall rate	$V_{CC} = 1.65 \text{ V to } 2.7 \text{ V}$	-	-	20	ns/V
		$V_{CC} = 2.7 \text{ V to } 5.5 \text{ V}$	-	-	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 <mark>[1]</mark>	Max	Unit
T _{amb} = -	40 °C to +85 °C					
V _{IH}	HIGH-level input voltage	V _{CC} = 1.65 V to 1.95 V	$0.65 \times V_{CC}$	-	-	V
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.7	-	-	V
		V _{CC} = 2.7 V to 3.6 V	2.0	-	-	V
		$V_{CC} = 4.5 \text{ V} \text{ to } 5.5 \text{ V}$	$0.7\times V_{CC}$	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 1.65 V to 1.95 V	-	-	$0.35 \times V_{CC}$	V
		$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	-	-	0.7	V
		V _{CC} = 2.7 V to 3.6 V	-	-	0.8	V
		$V_{CC} = 4.5 \text{ V} \text{ to } 5.5 \text{ V}$	-	-	$0.3 \times V_{CC}$	V
V _{OH}	HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		I_{O} = $-100~\mu\text{A};$ V_{CC} = 1.65 V to 5.5 V	$V_{CC}-0.1$	-	-	V
		$I_{O} = -4 \text{ mA}; V_{CC} = 1.65 \text{ V}$	1.2	-	-	V
		$I_{O} = -8 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.9	-	-	V
		$I_{O} = -12 \text{ mA}; V_{CC} = 2.7 \text{ V}$	2.2	-	-	V
		$I_{O} = -24 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.3	-	-	V
		$I_{O} = -32 \text{ mA}; V_{CC} = 4.5 \text{ V}$	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
		$I_{O} = 8 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.3	V
		$I_{O} = 12 \text{ mA}; V_{CC} = 2.7 \text{ V}$	-	-	0.4	V
		$I_{O} = 24 \text{ mA}; V_{CC} = 3.0 \text{ V}$	-	-	0.55	V
		$I_{O} = 32 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	-	0.55	V
l _l	input leakage current	$V_{I} = 5.5 \text{ V or GND}; V_{CC} = 0 \text{ V to } 5.5 \text{ V}$	-	±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	$V_{I} = 5.5 V \text{ or GND};$ $V_{CC} = 1.65 V \text{ to } 5.5 V; I_{O} = 0 A$	-	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
CI	input capacitance	V_{CC} = 3.3 V; V_{I} = GND to V_{CC}	-	5	-	pF
T _{amb} = -	40 °C to +125 °C		I.			
VIH	HIGH-level input voltage	V _{CC} = 1.65 V to 1.95 V	$0.65 imes V_{CC}$	-	-	V
		$V_{CC} = 2.3 \text{ V} \text{ to } 2.7 \text{ V}$	1.7	-	-	V
		V _{CC} = 2.7 V to 3.6 V	2.0	-	-	V
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	$0.7 \times V_{CC}$	-	-	V
V _{IL}	LOW-level input voltage	V _{CC} = 1.65 V to 1.95 V	-	-	$0.35 \times V_{CC}$	V
		V _{CC} = 2.3 V to 2.7 V	-	-	0.7	V
		$V_{CC} = 2.7 \text{ V to } 3.6 \text{ V}$	-	-	0.8	V
		$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$	-	-	$0.3 \times V_{CC}$	V

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

Symbol	Parameter	Conditions	Min	Typ[1]	Max	Unit
V _{OH}	HIGH-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		I_{O} = $-100~\mu A;$ V_{CC} = 1.65 V to 5.5 V	$V_{CC}-0.1$	-	-	V
		$I_{O} = -4 \text{ mA}; V_{CC} = 1.65 \text{ V}$	0.95	-	-	V
		$I_{O} = -8 \text{ mA}; V_{CC} = 2.3 \text{ V}$	1.7	-	-	V
		$I_{O} = -12 \text{ mA}; V_{CC} = 2.7 \text{ V}$	1.9	-	-	V
		$I_{O} = -24 \text{ mA}; V_{CC} = 3.0 \text{ V}$	2.0	-	-	V
		$I_{O} = -32 \text{ mA}; V_{CC} = 4.5 \text{ V}$	3.4	-	-	V
V _{OL}	LOW-level output voltage	$V_{I} = V_{IH} \text{ or } V_{IL}$				
		I_{O} = 100 $\mu A; V_{CC}$ = 1.65 V to 5.5 V	-	-	0.1	V
		$I_{O} = 4 \text{ mA}; V_{CC} = 1.65 \text{ V}$	-	-	0.70	V
		$I_{O} = 8 \text{ mA}; V_{CC} = 2.3 \text{ V}$	-	-	0.45	V
		$I_{O} = 12 \text{ mA}; V_{CC} = 2.7 \text{ V}$	-	-	0.60	V
		I _O = 24 mA; V _{CC} = 3.0 V	-	-	0.80	V
		$I_{O} = 32 \text{ mA}; V_{CC} = 4.5 \text{ V}$	-	-	0.80	V
I _I	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	$V_{CC} = 0 \text{ V}; \text{ V}_{I} \text{ or } \text{ V}_{O} = 5.5 \text{ V}$	-	-	±2	μA
I _{CC}	supply current	$V_{I} = 5.5 \text{ V or GND};$ $V_{CC} = 1.65 \text{ V to } 5.5 \text{ V}; I_{O} = 0 \text{ A}$	-	-	4	μA
ΔI_{CC}	additional supply current	per pin; $V_{CC} = 2.3 \text{ V to } 5.5 \text{ V};$ $V_1 = V_{CC} - 0.6 \text{ V}; I_O = 0 \text{ A}$	-	-	500	μA

Table 7. Static characteristics ...continued

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

[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 Figure 10.

Symbol	Parameter	Conditions	-40	°C to +85	°C	–40 °C to	o +125 ℃	Unit
		-	Min	Typ <mark>[1]</mark>	Max	Min	Max	
t _{pd}	propagation delay	CP to Q; see Figure 8 [2]						
		V _{CC} = 1.65 V to 1.95 V	1.0	3.6	9.9	1.0	12.5	ns
		$V_{CC} = 2.3 \text{ V} \text{ to } 2.7 \text{ V}$	0.5	2.3	7.0	0.5	9.0	ns
		$V_{CC} = 2.7 V$	0.5	2.6	6.0	0.5	8.0	ns
		$V_{CC} = 3.0 \text{ V} \text{ to } 3.6 \text{ V}$	0.5	2.2	5.0	0.5	6.5	ns
		$V_{CC} = 4.5 \text{ V} \text{ to } 5.5 \text{ V}$	0.5	1.7	3.8	0.5	5.0	ns
t _{su}	set-up time	D to CP; see Figure 9						
		V _{CC} = 1.65 V to 1.95 V	2.5	1.4	-	2.5	-	ns
		$V_{CC} = 2.3 \text{ V} \text{ to } 2.7 \text{ V}$	1.7	0.9	-	1.7	-	ns
		V _{CC} = 2.7 V	1.7	0.9	-	1.7	-	ns
		V _{CC} = 3.0 V to 3.6 V	1.3	0.6	-	1.2	-	ns
		$V_{CC} = 4.5 V \text{ to } 5.5 V$	1.2	0.6	-	1.2	-	ns

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

Symbol	Parameter	Conditions	-40	0 °C to +85	S°C	-40 °C to	o +125 ℃	Unit
			Min	Typ <mark>[1]</mark>	Max	Min	Max	
t _h	hold time	D to CP; see Figure 9						
		V _{CC} = 1.65 V to 1.95 V	0	-0.7	-	0	-	ns
		V _{CC} = 2.3 V to 2.7 V	0	-0.4	-	0	-	ns
		V _{CC} = 2.7 V	+0.5	-0.3	-	0.5	-	ns
		V _{CC} = 3.0 V to 3.6 V	+0.5	-0.3	-	0.5	-	ns
		V _{CC} = 4.5 V to 5.5 V	+0.5	-0.2	-	0.5	-	ns
t _W	pulse width	CP HIGH or LOW; see <u>Figure 9</u>						
		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 Figure 9						
	frequency	V _{CC} = 1.65 V to 1.95 V	160	250	-	160	-	MHz
		V _{CC} = 2.3 V to 2.7 V	160	300	-	160	-	MHz
		V _{CC} = 2.7 V	160	350	-	160	-	MHz
		V _{CC} = 3.0 V to 3.6 V	160	450	-	160	-	MHz
		V _{CC} = 4.5 V to 5.5 V	200	500	-	200	-	MHz
C _{PD}	power dissipation capacitance		-	17	-	-	-	pF

Table 8. Dynamic characteristics ... continued

Voltages are referenced to GND (ground = 0 V). For test circuit see <u>Figure 10</u>.

[1] 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.

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

[3] C_{PD} is used to determine the dynamic power dissipation (P_D in μ W).

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

 $f_i = input frequency in MHz;$

 $f_o = output frequency in MHz;$

 C_L = output load capacitance in pF;

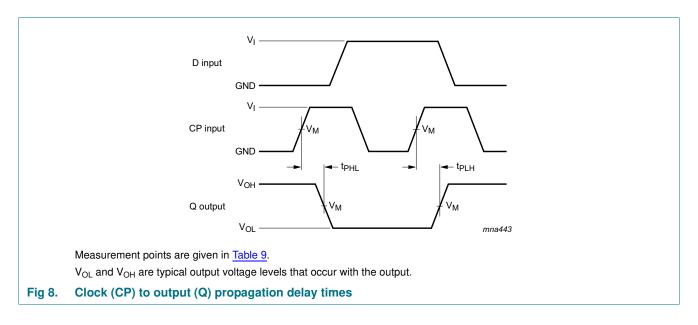
V_{CC} = supply voltage in V;

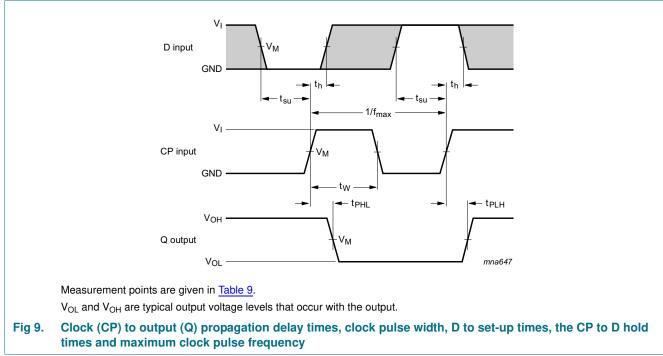
N = number of inputs switching;

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

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

12. Waveforms





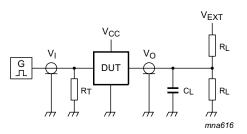
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Single D-type flip-flop; positive-edge trigger

Supply voltage	Input	Output
V _{cc}	V _M	V _M
1.65 V to 1.95 V	$0.5 \times V_{CC}$	$0.5 imes V_{CC}$
2.3 V to 2.7 V	$0.5 imes V_{CC}$	$0.5 imes V_{CC}$
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	$0.5 \times V_{CC}$	$0.5 \times V_{CC}$

Table 9.Measurement points



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

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

13. Package outline

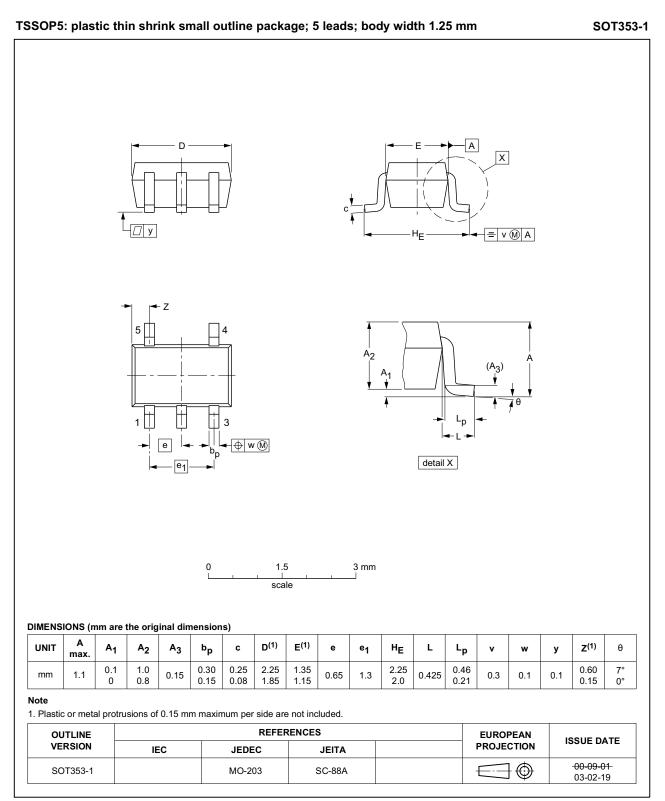


Fig 11. Package outline SOT353-1 (TSSOP5)

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

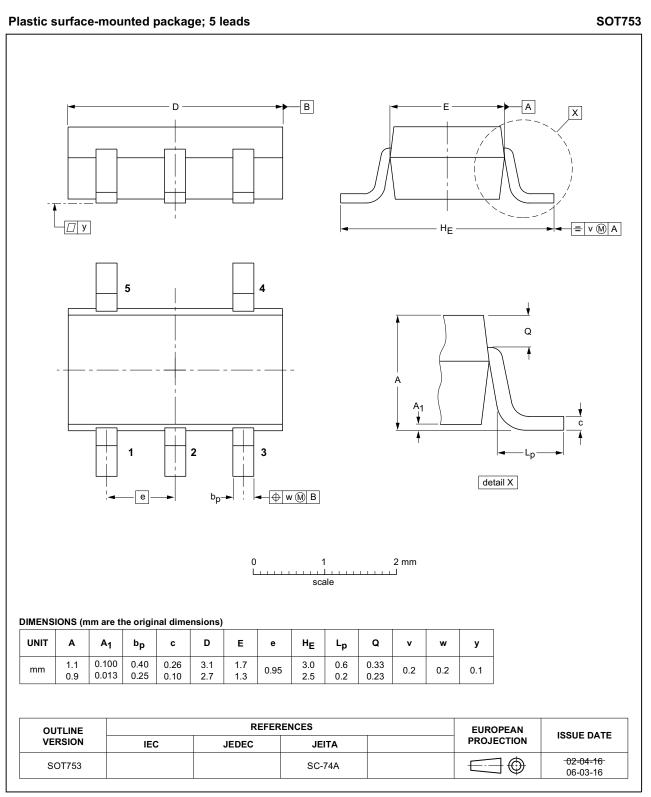


Fig 12. Package outline SOT753 (SC-74A)

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

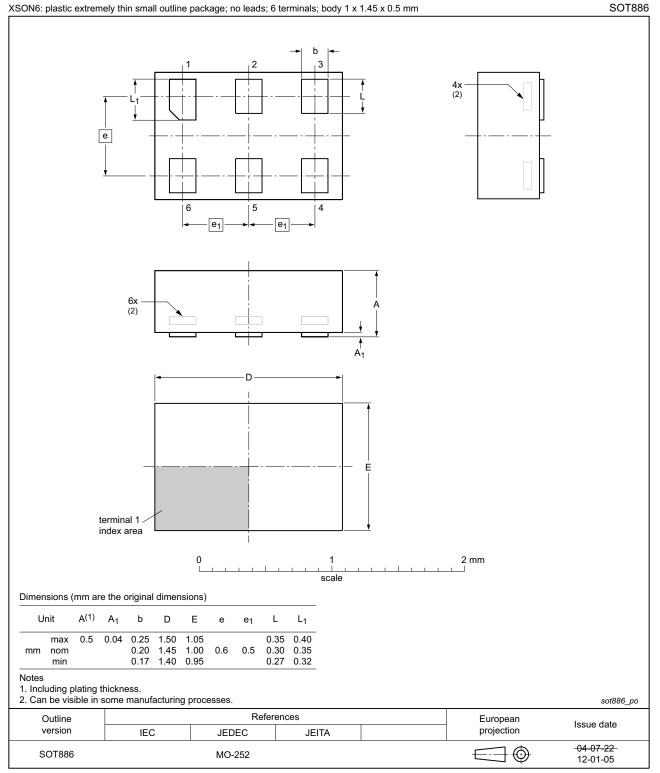


Fig 13. Package outline SOT886 (XSON6)

74LVC1G79 Product data sheet

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

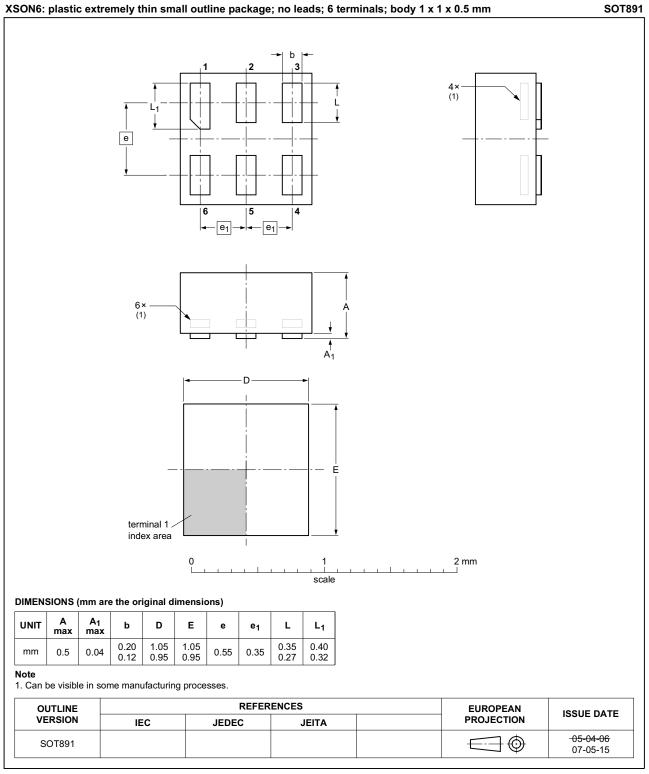
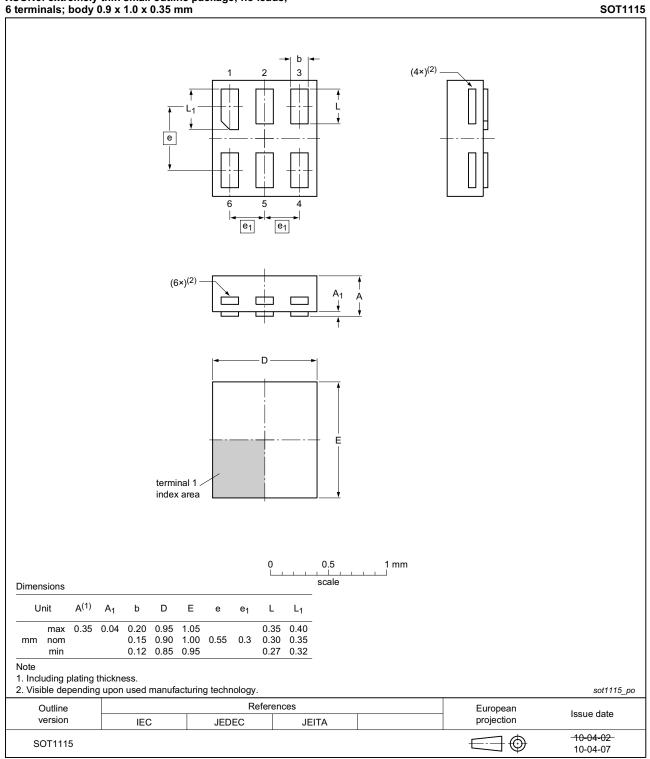


Fig 14. Package outline SOT891 (XSON6)

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

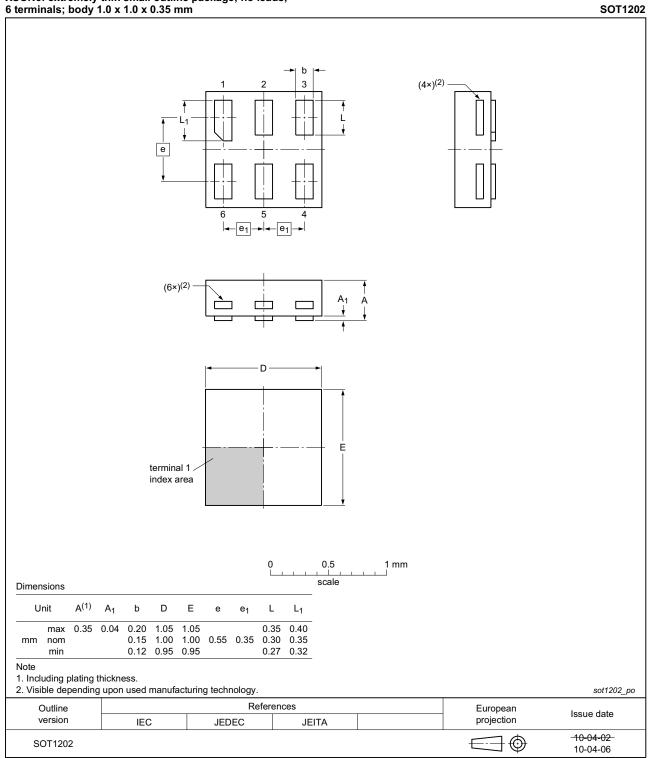


XSON6: extremely thin small outline package; no leads; 6 terminals; body 0.9 x 1.0 x 0.35 mm

Fig 15. Package outline SOT1115 (XSON6)

74LVC1G79 **Product data sheet**

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

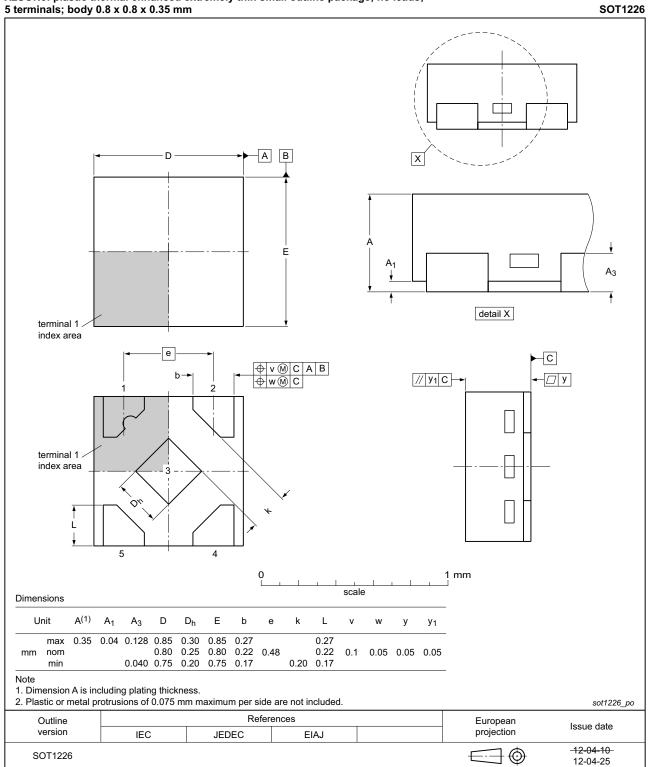


XSON6: extremely thin small outline package; no leads; 6 terminals; body 1.0 x 1.0 x 0.35 mm

Fig 16. Package outline SOT1202 (XSON6)

74LVC1G79 **Product data sheet**

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



X2SON5: plastic thermal enhanced extremely thin small outline package; no leads;

Fig 17. Package outline SOT1226 (X2SON5)

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14. Abbreviations

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

15. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
74LVC1G79 v.12	20161205	Product data sheet	-	74LVC1G79 v.11
Modifications:	• <u>Table 7</u> : The	e maximum limits for leakage	e current and supply cu	irrent have changed.
74LVC1G79 v.11	20120702	Product data sheet	-	74LVC1G79 v.10
Modifications:	Added type	number 74LVC1G79GX (SC	DT1226)	
74LVC1G79 v.10	20120402	Product data sheet	-	74LVC1G79 v.9
Modifications:	Errata in tab	el 3 corrected (description (CP input).	
74LVC1G79 v.9	20111202	Product data sheet	-	74LVC1G79 v.8
Modifications:	Legal pages	updated.	·	
74LVC1G79 v.8	20100930	Product data sheet	-	74LVC1G79 v.7
74LVC1G79 v.7	20070829	Product data sheet	-	74LVC1G79 v.6
74LVC1G79 v.6	20061009	Product data sheet	-	74LVC1G79 v.5
74LVC1G79 v.5	20040910	Product specification	-	74LVC1G79 v.4
74LVC1G79 v.4	20040317	Product specification	-	74LVC1G79 v.3
74LVC1G79 v.3	20030516	Product specification	-	74LVC1G79 v.2
74LVC1G79 v.2	20030130	Product specification	-	74LVC1G79 v.1
74LVC1G79 v.1	20010404	Product specification	-	-

16. Legal information

16.1 Data sheet status

Document status[1][2]	Product status ^[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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

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

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74LVC1G79

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

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

18. Contents

1	General description 1
2	Features and benefits 1
3	Ordering information 2
4	Marking 2
5	Functional diagram 2
6	Pinning information 3
6.1	Pinning 3
6.2	Pin description 4
7	Functional description 4
8	Limiting values 5
9	Recommended operating conditions 5
10	Static characteristics 6
11	Dynamic characteristics 7
12	Waveforms
13	Package outline 11
14	Abbreviations 18
15	Revision history 18
16	Legal information
16.1	Data sheet status 19
16.2	Definitions 19
16.3	Disclaimers
16.4	Trademarks 20
17	Contact information 20
18	Contents 21