

DATA SHEET

74LVC1G79

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

Product specification
Supersedes data of 2004 Mar 17

2004 Sep 10

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

74LVC1G79

FEATURES

- 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).
- ± 24 mA output drive ($V_{CC} = 3.0$ V)
- ESD protection:
 - HBM EIA/JESD22-A114-B exceeds 2000 V
 - MM EIA/JESD22-A115-A exceeds 200 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.

DESCRIPTION

The 74LVC1G79 is a high-performance, low-power, low-voltage, Si-gate CMOS device, superior to most advanced CMOS compatible TTL families.

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.

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.

QUICK REFERENCE DATA

$GND = 0$ V; $T_{amb} = 25$ °C; $t_r = t_f \leq 2.5$ ns.

SYMBOL	PARAMETER	CONDITIONS	TYPICAL	UNIT
t_{PHL}/t_{PLH}	propagation delay CP to Q	$V_{CC} = 1.8$ V; $C_L = 30$ pF; $R_L = 1$ k Ω	3.6	ns
		$V_{CC} = 2.5$ V; $C_L = 30$ pF; $R_L = 500$ Ω	2.3	ns
		$V_{CC} = 2.7$ V; $C_L = 50$ pF; $R_L = 500$ Ω	2.6	ns
		$V_{CC} = 3.3$ V; $C_L = 50$ pF; $R_L = 500$ Ω	2.2	ns
		$V_{CC} = 5.0$ V; $C_L = 50$ pF; $R_L = 500$ Ω	1.7	ns
f_{max}	maximum frequency	$V_{CC} = 3.3$ V; $C_L = 50$ pF; $R_L = 500$ Ω	450	MHz
C_I	input capacitance		5	pF
C_{PD}	power dissipation capacitance per buffer	$V_{CC} = 3.3$ V; notes 1 and 2	17	pF

Notes

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

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

f_i = input frequency in MHz;

f_o = output frequency in MHz;

C_L = output load capacitance in pF;

V_{CC} = supply voltage in Volts;

N = total load switching outputs;

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

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

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

74LVC1G79

FUNCTION TABLE

See note 1.

INPUT		OUTPUT
CP	D	Q
↑	L	L
↑	H	H
L	X	q

Note

1. H = HIGH voltage level;

L = LOW voltage level;

↑ = 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.

ORDERING INFORMATION

TYPE NUMBER	PACKAGE					
	TEMPERATURE RANGE	PINS	PACKAGE	MATERIAL	CODE	MARKING
74LVC1G79GW	-40 °C to +125 °C	5	SC-88A	plastic	SOT353	VP
74LVC1G79GV	-40 °C to +125 °C	5	SC-74A	plastic	SOT753	V79
74LVC1G79GM	-40 °C to +125 °C	6	XSON6	plastic	SOT886	VP

PINNING

PIN SC-88A; SC-74A	PIN XSON6	SYMBOL	DESCRIPTION
1	1	D	data input D
2	2	CP	clock pulse input CP
3	3	GND	ground (0 V)
4	4	Q	data output Q
-	5	n.c.	not connected
5	6	V _{CC}	supply voltage

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

74LVC1G79

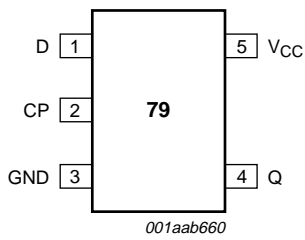


Fig.1 Pin configuration TSSOP5 and VSSOP5.

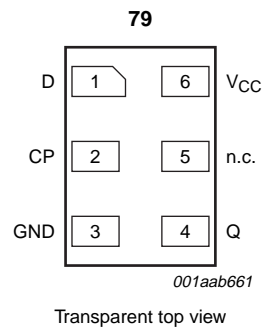


Fig.2 Pin configuration XSON6.

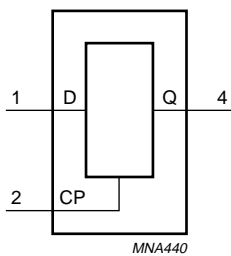


Fig.3 Logic symbol.

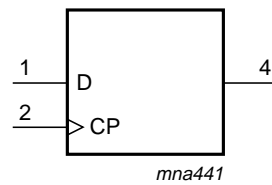
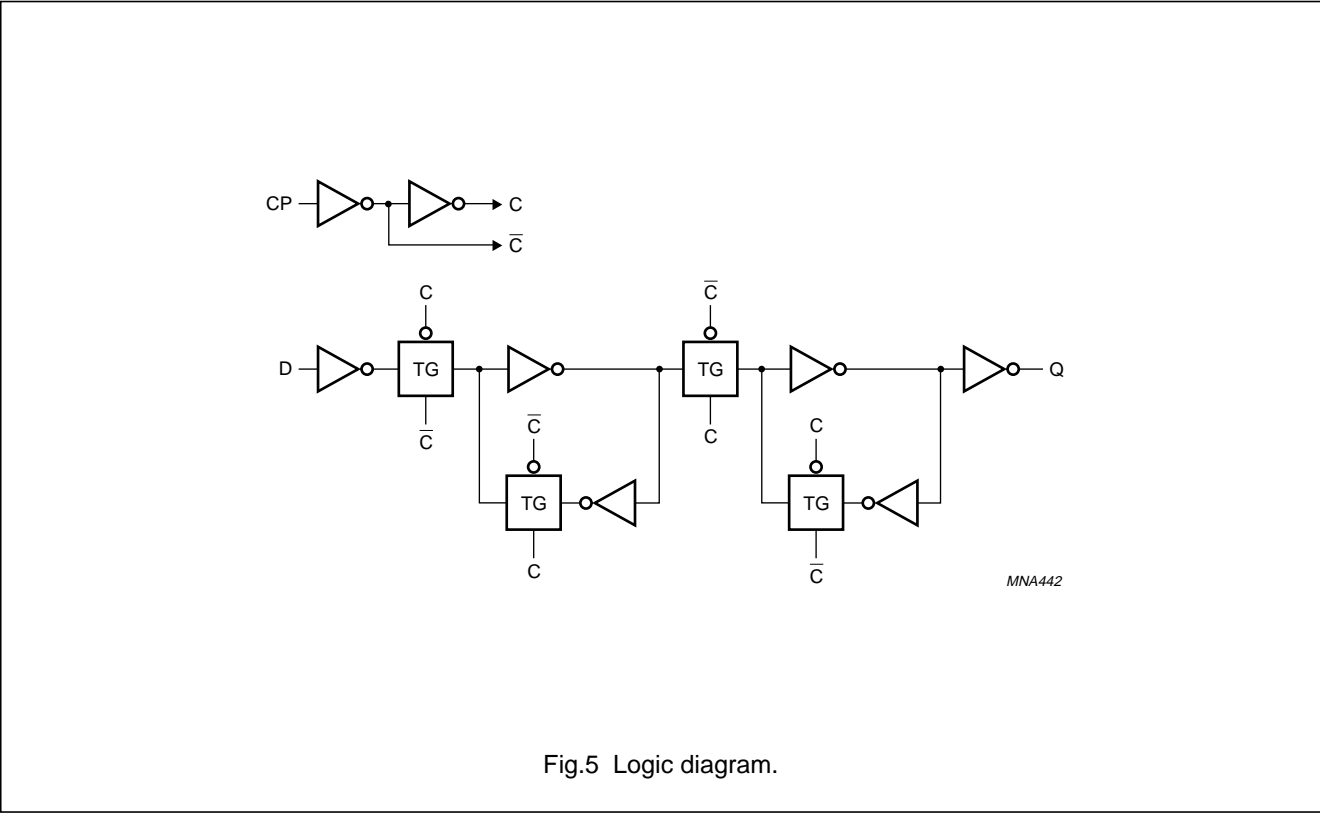


Fig.4 IEE/IEC logic symbol.

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

74LVC1G79



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

74LVC1G79

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CC}	supply voltage		1.65	5.5	V
V_I	input voltage		0	5.5	V
V_O	output voltage	active mode	0	V_{CC}	V
		$V_{CC} = 0$ V; Power-down mode	0	5.5	V
T_{amb}	operating ambient temperature		-40	+125	°C
t_r, t_f	input rise and fall times	$V_{CC} = 1.65$ V to 2.7 V	0	20	ns/V
		$V_{CC} = 2.7$ V to 5.5 V	0	10	ns/V

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 diode current	$V_I < 0$ V	-	-50	mA
V_I	input voltage	note 1	-0.5	+6.5	V
I_{OK}	output diode current	$V_O > V_{CC}$ or $V_O < 0$ V	-	±50	mA
V_O	output voltage	active mode; note 1	-0.5	$V_{CC} + 0.5$	V
		Power-down mode; note 1	-0.5	+6.5	V
I_O	output source or sink current	$V_O = 0$ V to V_{CC}	-	±50	mA
I_{CC}, I_{GND}	V_{CC} or GND current		-	±100	mA
T_{stg}	storage temperature		-65	+150	°C
P_{tot}	power dissipation	$T_{amb} = -40$ °C to +125 °C	-	250	mW

Note

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

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

74LVC1G79

DC CHARACTERISTICS

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

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V _{CC} (V)				
T _{amb} = -40 °C to +85 °C; note 1							
V _{IH}	HIGH-level input voltage		1.65 to 1.95	0.65 × V _{CC}	–	–	V
			2.3 to 2.7	1.7	–	–	V
			2.7 to 3.6	2.0	–	–	V
			4.5 to 5.5	0.7 × V _{CC}	–	–	V
V _{IL}	LOW-level input voltage		1.65 to 1.95	–	–	0.35 × V _{CC}	V
			2.3 to 2.7	–	–	0.7	V
			2.7 to 3.6	–	–	0.8	V
			4.5 to 5.5	–	–	0.3 × V _{CC}	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL} I _O = 100 μA	1.65 to 5.5	–	–	0.1	V
		I _O = 4 mA	1.65	–	–	0.45	V
		I _O = 8 mA	2.3	–	–	0.3	V
		I _O = 12 mA	2.7	–	–	0.4	V
		I _O = 24 mA	3.0	–	–	0.55	V
		I _O = 32 mA	4.5	–	–	0.55	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL} I _O = -100 μA	1.65 to 5.5	V _{CC} - 0.1	–	–	V
		I _O = -4 mA	1.65	1.2	–	–	V
		I _O = -8 mA	2.3	1.9	–	–	V
		I _O = -12 mA	2.7	2.2	–	–	V
		I _O = -24 mA	3.0	2.3	–	–	V
		I _O = -32 mA	4.5	3.8	–	–	V
I _{LI}	input leakage current	V _I = 5.5 V or GND	5.5	–	±0.1	±5	μA
I _{off}	power OFF leakage current	V _I or V _O = 5.5 V	0	–	±0.1	±10	μA
I _{CC}	quiescent supply current	V _I = V _{CC} or GND; I _O = 0 A	5.5	–	0.1	10	μA
ΔI _{CC}	additional quiescent supply current per input pin	V _I = V _{CC} - 0.6 V; I _O = 0 A	2.3 to 5.5	–	5	500	μA

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

74LVC1G79

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V _{CC} (V)				
T_{amb} = -40 °C to +125 °C							
V _{IH}	HIGH-level input voltage		1.65 to 1.95	0.65 × V _{CC}	–	–	V
			2.3 to 2.7	1.7	–	–	V
			2.7 to 3.6	2.0	–	–	V
			4.5 to 5.5	0.7 × V _{CC}	–	–	V
V _{IL}	LOW-level input voltage		1.65 to 1.95	–	–	0.35 × V _{CC}	V
			2.3 to 2.7	–	–	0.7	V
			2.7 to 3.6	–	–	0.8	V
			4.5 to 5.5	–	–	0.3 × V _{CC}	V
V _{OL}	LOW-level output voltage	V _I = V _{IH} or V _{IL} I _O = 100 μA	1.65 to 5.5	–	–	0.1	V
		I _O = 4 mA	1.65	–	–	0.70	V
		I _O = 8 mA	2.3	–	–	0.45	V
		I _O = 12 mA	2.7	–	–	0.60	V
		I _O = 24 mA	3.0	–	–	0.80	V
		I _O = 32 mA	4.5	–	–	0.80	V
V _{OH}	HIGH-level output voltage	V _I = V _{IH} or V _{IL} I _O = -100 μA	1.65 to 5.5	V _{CC} - 0.1	–	–	V
		I _O = -4 mA	1.65	0.95	–	–	V
		I _O = -8 mA	2.3	1.7	–	–	V
		I _O = -12 mA	2.7	1.9	–	–	V
		I _O = -24 mA	3.0	2.0	–	–	V
		I _O = -32 mA	4.5	3.4	–	–	V
I _{LI}	input leakage current	V _I = 5.5 V or GND	5.5	–	–	±100	μA
I _{off}	power OFF leakage current	V _I or V _O = 5.5 V	0	–	–	±200	μA
I _{CC}	quiescent supply current	V _I = V _{CC} or GND; I _O = 0 A	5.5	–	–	200	μA
ΔI _{CC}	additional quiescent supply current per input pin	V _I = V _{CC} - 0.6 V; I _O = 0 A	2.3 to 5.5	–	–	5000	μA

Note

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

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

74LVC1G79

AC CHARACTERISTICS

GND = 0 V.

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	V _{CC} (V)				
T_{amb} = -40 °C to +85 °C; note 1							
t _{PHL} /t _{PLH}	propagation delay CP to Q	see Figs 6 and 8	1.65 to 1.95	1.0	3.6	9.9	ns
			2.3 to 2.7	0.5	2.3	7.0	ns
			2.7	0.5	2.6	6.0	ns
			3.0 to 3.6	0.5	2.2	5.0	ns
			4.5 to 5.5	0.5	1.7	3.8	ns
t _{su}	set-up time D to CP	see Figs 7 and 8	1.65 to 1.95	2.5	1.4	–	ns
			2.3 to 2.7	1.7	0.9	–	ns
			2.7	1.7	0.9	–	ns
			3.0 to 3.6	1.3	0.6	–	ns
			4.5 to 5.5	1.2	0.6	–	ns
t _h	hold time D to CP	see Figs 7 and 8	1.65 to 1.95	0	-0.7	–	ns
			2.3 to 2.7	0	-0.4	–	ns
			2.7	+0.5	-0.3	–	ns
			3.0 to 3.6	+0.5	-0.3	–	ns
			4.5 to 5.5	+0.5	-0.2	–	ns
t _w	clock pulse width HIGH or LOW	see Figs 7 and 8	1.65 to 1.95	3.0	1.1	–	ns
			2.3 to 2.7	2.5	0.7	–	ns
			2.7	2.5	0.6	–	ns
			3.0 to 3.6	2.5	0.6	–	ns
			4.5 to 5.5	2.0	0.5	–	ns
f _{max}	maximum clock pulse frequency	see Figs 7 and 8	1.65 to 1.95	160	250	–	MHz
			2.3 to 2.7	160	300	–	MHz
			2.7	160	350	–	MHz
			3.0 to 3.6	160	450	–	MHz
			4.5 to 5.5	200	500	–	MHz

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

74LVC1G79

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	V _{CC} (V)				
T_{amb} = -40 °C to +125 °C							
t _{PHL} /t _{PLH}	propagation delay CP to Q	see Figs 6 and 8	1.65 to 1.95	1.0	–	12.5	ns
			2.3 to 2.7	0.5	–	9.0	ns
			2.7	0.5	–	8.0	ns
			3.0 to 3.6	0.5	–	6.5	ns
			4.5 to 5.5	0.5	–	5.0	ns
t _{su}	set-up time D to CP	see Figs 7 and 8	1.65 to 1.95	2.5	–	–	ns
			2.3 to 2.7	1.7	–	–	ns
			2.7	1.7	–	–	ns
			3.0 to 3.6	1.2	–	–	ns
			4.5 to 5.5	1.2	–	–	ns
t _h	hold time D to CP	see Figs 7 and 8	1.65 to 1.95	0	–	–	ns
			2.3 to 2.7	0	–	–	ns
			2.7	0.5	–	–	ns
			3.0 to 3.6	0.5	–	–	ns
			4.5 to 5.5	0.5	–	–	ns
t _w	clock pulse width HIGH or LOW	see Figs 7 and 8	1.65 to 1.95	3.0	–	–	ns
			2.3 to 2.7	2.5	–	–	ns
			2.7	2.5	–	–	ns
			3.0 to 3.6	2.5	–	–	ns
			4.5 to 5.5	2.0	–	–	ns
f _{max}	maximum clock pulse frequency	see Figs 7 and 8	1.65 to 1.95	160	–	–	MHz
			2.3 to 2.7	160	–	–	MHz
			2.7	160	–	–	MHz
			3.0 to 3.6	160	–	–	MHz
			4.5 to 5.5	200	–	–	MHz

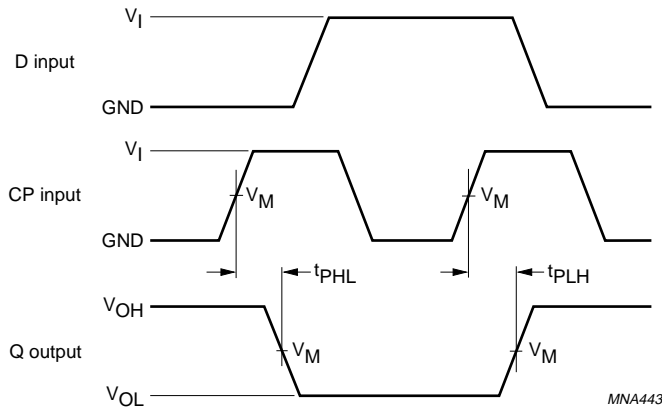
Note

1. All typical values are measured at T_{amb} = 25 °C.

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

74LVC1G79

AC WAVEFORMS



MNA443

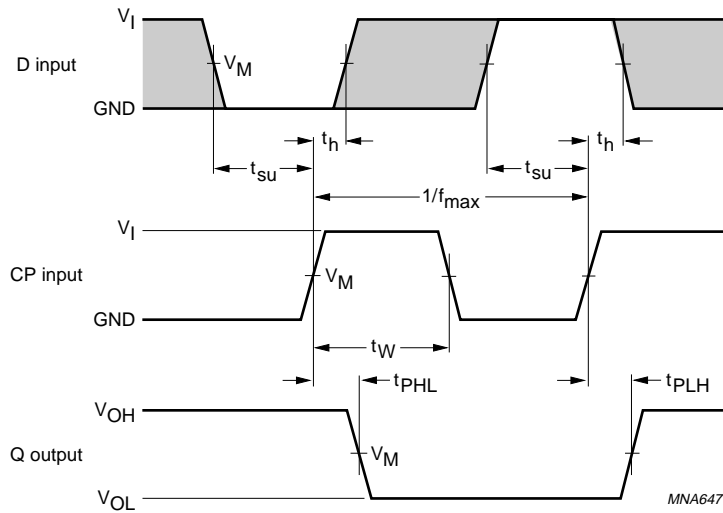
V _{CC}	V _M	INPUT	
		V _I	t _r = t _f
1.65 V to 1.95 V	0.5 × V _{CC}	V _{CC}	≤ 2.0 ns
2.3 V to 2.7 V	0.5 × V _{CC}	V _{CC}	≤ 2.0 ns
2.7 V	1.5 V	2.7 V	≤ 2.5 ns
3.0 V to 3.6 V	1.5 V	2.7 V	≤ 2.5 ns
4.5 V to 5.5 V	0.5 × V _{CC}	V _{CC}	≤ 2.5 ns

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

Fig.6 Clock (CP) to output (Q) propagation delay times.

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

74LVC1G79



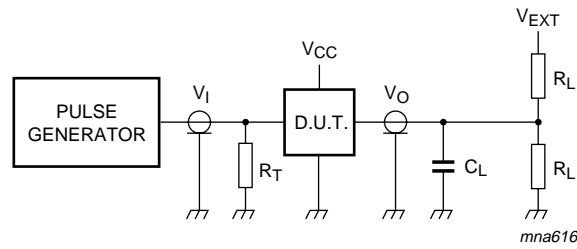
V_{CC}	V_M	INPUT	
		V_I	$t_r = t_f$
1.65 V to 1.95 V	$0.5 \times V_{CC}$	V_{CC}	≤ 2.0 ns
2.3 V to 2.7 V	$0.5 \times V_{CC}$	V_{CC}	≤ 2.0 ns
2.7 V	1.5 V	2.7 V	≤ 2.5 ns
3.0 V to 3.6 V	1.5 V	2.7 V	≤ 2.5 ns
4.5 V to 5.5 V	$0.5 \times V_{CC}$	V_{CC}	≤ 2.5 ns

The shaded areas indicate when the input is permitted to change for predictable output performance. V_{OL} and V_{OH} are typical output voltage drop that occur with the output load.

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

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

74LVC1G79



V _{CC}	V _I	C _L	R _L	V _{EXT}		
				t _{PLH} /t _{PHL}	t _{PZH} /t _{PHZ}	t _{PZL} /t _{PLZ}
1.65 V to 1.95 V	V _{CC}	30 pF	1 kΩ	open	GND	2 × V _{CC}
2.3 V to 2.7 V	V _{CC}	30 pF	500 Ω	open	GND	2 × V _{CC}
2.7 V	2.7 V	50 pF	500 Ω	open	GND	6 V
3.0 V to 3.6 V	2.7 V	50 pF	500 Ω	open	GND	6 V
4.5 V to 5.5 V	V _{CC}	50 pF	500 Ω	open	GND	2 × V _{CC}

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.

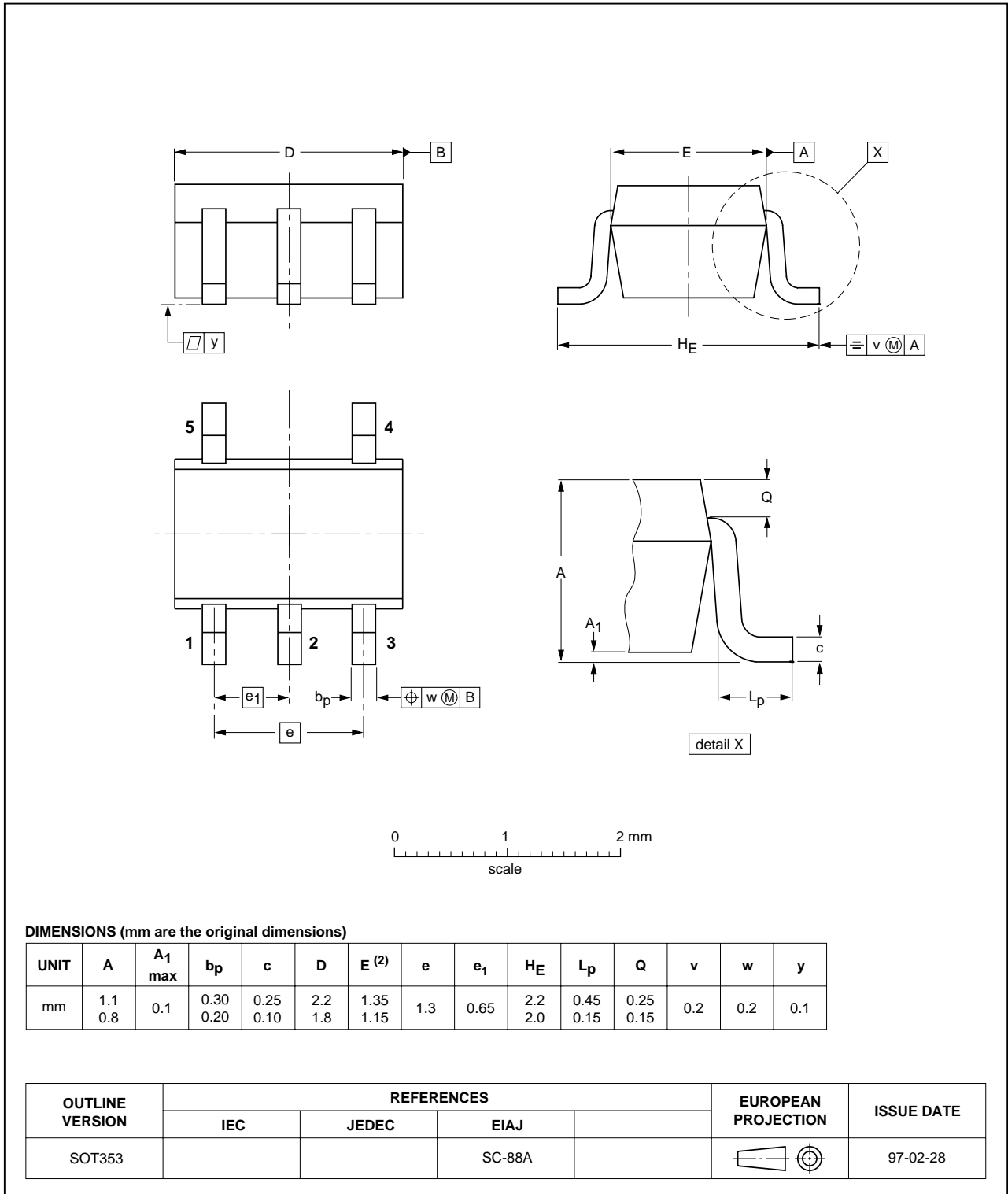
Single D-type flip-flop; positive-edge trigger

74LVC1G79

PACKAGE OUTLINES

Plastic surface mounted package; 5 leads

SOT353

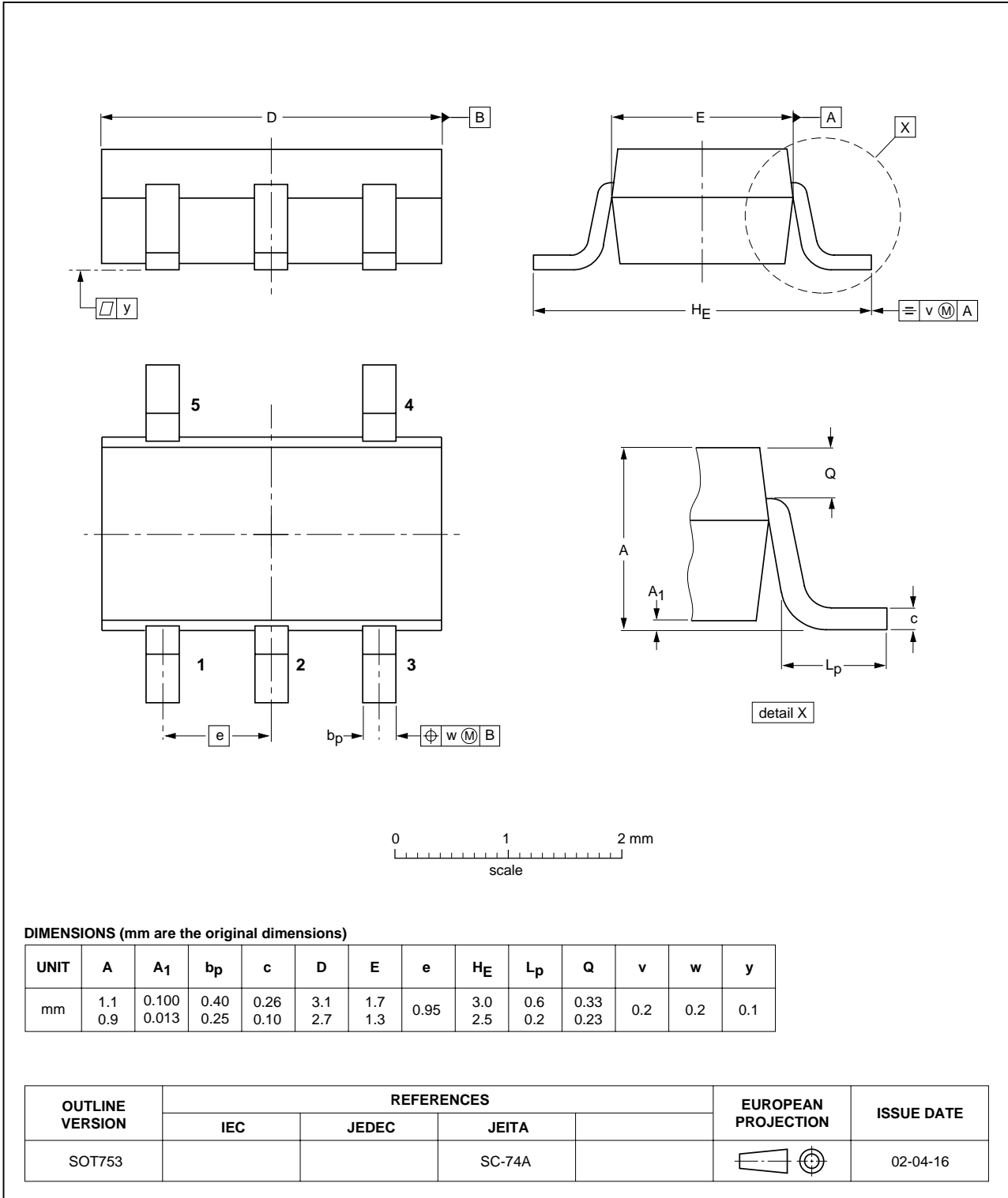


Single D-type flip-flop; positive-edge trigger

74LVC1G79

Plastic surface mounted package; 5 leads

SOT753

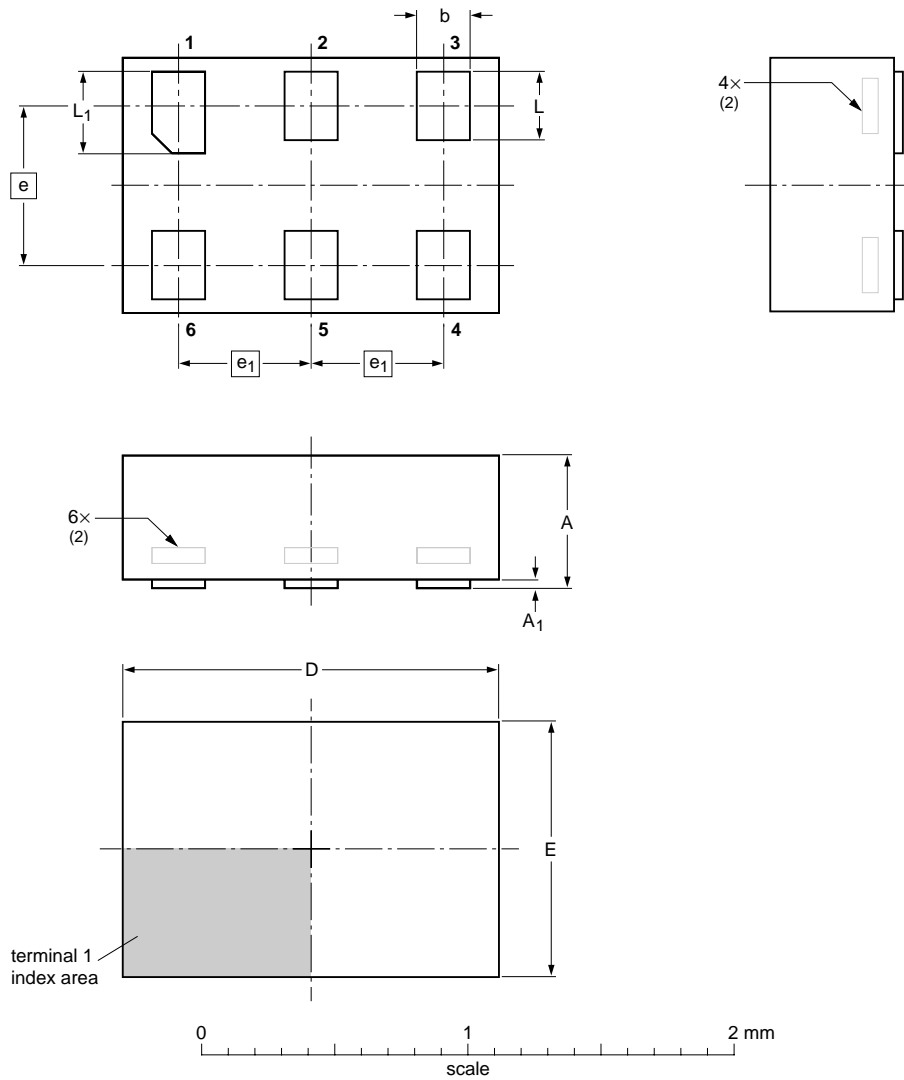


Single D-type flip-flop; positive-edge trigger

74LVC1G79

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

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

74LVC1G79

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).

Notes

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.

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.

DISCLAIMERS

Life support applications — 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 licence 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.

Philips Semiconductors – a worldwide company

Contact information

For additional information please visit <http://www.semiconductors.philips.com>. Fax: +31 40 27 24825

For sales offices addresses send e-mail to: sales.addresses@www.semiconductors.philips.com.

© Koninklijke Philips Electronics N.V. 2004

SCA76

All rights are reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner.

The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.

Printed in The Netherlands

R20/05/pp18

Date of release: 2004 Sep 10

Document order number: 9397 750 13766

Let's make things better.

**Philips
Semiconductors**



PHILIPS