

DATA SHEET

74LVC1G18

1-of-2 non-inverting demultiplexer
with 3-state deselected output

Product specification

2003 Jul 25

1-of-2 non-inverting demultiplexer with 3-state deselected output

74LVC1G18

FEATURES

- Wide supply voltage range from 1.65 to 5.5 V
- 5 V tolerant input/output for interfacing with 5 V logic
- High noise immunity
- Complies with JEDEC standard:
 - JESD8-7 (1.65 to 1.95 V)
 - JESD8-5 (2.3 to 2.7 V)
 - JESD8B/JESD36 (2.7 to 3.6 V).
- ESD protection:
 - HBM EIA/JESD22-A114-A exceeds 2000 V
 - MM EIA/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
- SOT363 and SOT457 package
- Specified from -40 to $+85$ °C and -40 to $+125$ °C.

DESCRIPTION

The 74LVC1G18 is a high-performance, low-power, low-voltage, Si-gate CMOS device, superior to most advanced CMOS compatible TTL families.

Input can be driven from either 3.3 or 5 V devices. These features allow the use of these devices in a mixed 3.3 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 74LVC1G18 is a 1-of-2 non-inverting demultiplexer with a 3-state output. The 74LVC1G18 buffers the data on input pin A and passes it either to output 1Y or 2Y, depending on whether the state of the select input (pin S) is LOW or HIGH.

QUICK REFERENCE DATA

GND = 0 V; $T_{amb} = 25$ °C.

SYMBOL	PARAMETER	CONDITIONS	TYPICAL	UNIT
t_{PHL}/t_{PLH}	propagation delay input A to output nY	$V_{CC} = 1.8$ V; $C_L = 30$ pF; $R_L = 1$ k Ω	5.1	ns
		$V_{CC} = 2.5$ V; $C_L = 30$ pF; $R_L = 500$ Ω	3.2	ns
		$V_{CC} = 2.7$ V; $C_L = 50$ pF; $R_L = 500$ Ω	3.2	ns
		$V_{CC} = 3.3$ V; $C_L = 50$ pF; $R_L = 500$ Ω	3.0	ns
		$V_{CC} = 5.0$ V; $C_L = 50$ pF; $R_L = 500$ Ω	2.3	ns
C_I	input capacitance		2.5	pF
C_{PD}	power dissipation capacitance per gate	$V_{CC} = 3.3$ V; notes 1 and 2	28.8	pF

Notes

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

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

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;

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

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

1-of-2 non-inverting demultiplexer with
3-state deselected output

74LVC1G18

FUNCTION TABLE

See note 1.

INPUT		OUTPUT	
S	A	1Y	2Y
L	L	L	Z
L	H	H	Z
H	L	Z	L
H	H	Z	H

Note

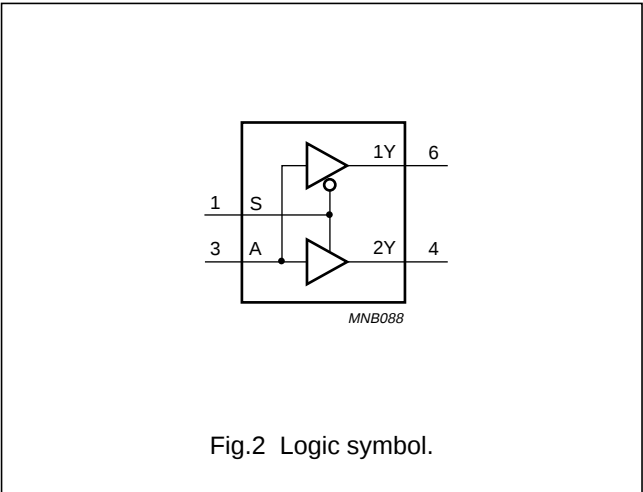
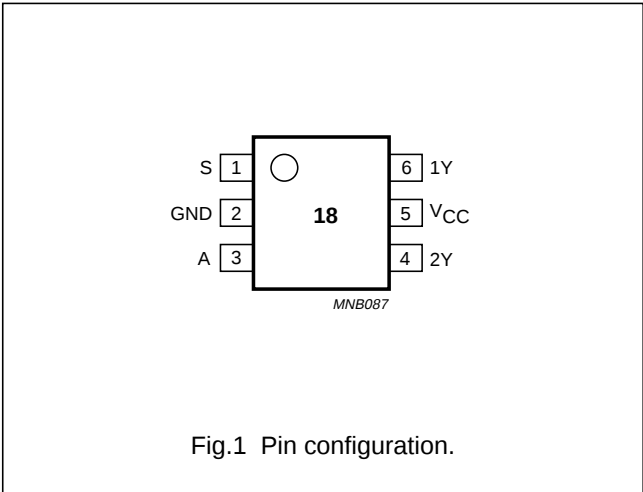
1. H = HIGH voltage level;
- L = LOW voltage level;
- Z = high-impedance OFF-state.

ORDERING INFORMATION

TYPE NUMBER	PACKAGE					
	TEMPERATURE RANGE	PINS	PACKAGE	MATERIAL	CODE	MARKING
74LVC1G18GW	−40 to +125 °C	6	SC-88	plastic	SOT363	VW
74LVC1G18GV	−40 to +125 °C	6	SC-74	plastic	SOT457	V18

PINNING

PIN	SYMBOL	DESCRIPTION
1	S	data select
2	GND	ground (0 V)
3	A	data input
4	2Y	data output
5	V _{CC}	supply voltage
6	1Y	data output



1-of-2 non-inverting demultiplexer with 3-state deselected output

74LVC1G18

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 or high-impedance state	0	5.5	V
T_{amb}	operating ambient temperature		-40	+125	°C
t_r, t_f	input rise and fall times	$V_{CC} = 1.65$ to 2.7 V	0	20	ns/V
		$V_{CC} = 2.7$ 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	$V_I < 0$	-	-50	mA
V_I	input voltage	note 1	-0.5	+6.5	V
I_{OK}	output diode current	$V_O > V_{CC}$ or $V_O < 0$	-	±50	mA
V_O	output voltage	active mode; notes 1 and 2	-0.5	$V_{CC} + 0.5$	V
		Power-down mode; notes 1 and 2	-0.5	+6.5	V
I_O	output source or sink current	$V_O = 0$ to V_{CC}	-	±50	mA
I_{CC}, I_{GND}	V_{CC} or GND current		-	±100	mA
T_{stg}	storage temperature		-65	+150	°C
P_D	power dissipation	$T_{amb} = -40$ to $+125$ °C	-	300	mW

Notes

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.

1-of-2 non-inverting demultiplexer with 3-state deselected output

74LVC1G18

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 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 _{OZ}	3-state output OFF-state current	V _I = V _{IH} or V _{IL} ; V _O = V _{CC} or GND	5.5	−	±0.1	±10	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	5.5	−	0.1	10	μA
ΔI _{CC}	additional quiescent supply current per pin	V _I = V _{CC} − 0.6 V; I _O = 0	2.3 to 5.5	−	5	500	μA

1-of-2 non-inverting demultiplexer with 3-state deselected output

74LVC1G18

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		OTHER	V _{CC} (V)				
T _{amb} = –40 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	–	–	±20	μA
I _{OZ}	3-state output OFF-state current	V _I = V _{IH} or V _{IL} ; V _O = V _{CC} or GND	5.5	–	–	±20	μA
I _{off}	power OFF leakage current	V _I or V _O = 5.5 V	0	–	–	±20	μA
I _{CC}	quiescent supply current	V _I = V _{CC} or GND; I _O = 0	5.5	–	–	40	μA
ΔI _{CC}	additional quiescent supply current per pin	V _I = V _{CC} – 0.6 V; I _O = 0	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.

1-of-2 non-inverting demultiplexer with 3-state deselected output

74LVC1G18

AC CHARACTERISTICS

GND = 0 V.

SYMBOL	PARAMETER	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
		WAVEFORMS	V _{CC} (V)				
T _{amb} = −40 to +85 °C; note 1							
t _{PHL} /t _{PLH}	propagation delay input A to output nY	see Figs 3 and 5	1.65 to 1.95	1.0	5.1	10.0	ns
			2.3 to 2.7	1.0	3.2	5.5	ns
			2.7	1.0	3.2	5.4	ns
			3.0 to 3.6	1.0	3.0	5.0	ns
			4.5 to 5.5	1.0	2.3	3.8	ns
t _{PZH} /t _{PZL}	3-state output enable time input S to output nY	see Figs 4 and 5	1.65 to 1.95	1.0	5.8	11.0	ns
			2.3 to 2.7	1.0	3.6	6.2	ns
			2.7	1.0	3.6	6.0	ns
			3.0 to 3.6	1.0	3.1	5.2	ns
			4.5 to 5.5	1.0	2.4	3.6	ns
t _{PHZ} /t _{PLZ}	3-state output disable time input S to output nY	see Figs 4 and 5	1.65 to 1.95	1.0	4.8	9.0	ns
			2.3 to 2.7	1.0	2.7	5.3	ns
			2.7	1.0	3.5	5.2	ns
			3.0 to 3.6	1.0	3.3	4.9	ns
			4.5 to 5.5	0.5	2.2	3.3	ns
T _{amb} = −40 to +125 °C							
t _{PHL} /t _{PLH}	propagation delay input A to output nY	see Figs 3 and 5	1.65 to 1.95	1.0	–	12.5	ns
			2.3 to 2.7	0.5	–	6.9	ns
			2.7	0.5	–	6.8	ns
			3.0 to 3.6	0.5	–	6.3	ns
			4.5 to 5.5	0.5	–	4.8	ns
t _{PZH} /t _{PZL}	3-state output enable time input S to output nY	see Figs 4 and 5	1.65 to 1.95	1.0	–	13.8	ns
			2.3 to 2.7	0.5	–	7.8	ns
			2.7	0.5	–	7.5	ns
			3.0 to 3.6	0.5	–	6.5	ns
			4.5 to 5.5	0.5	–	4.5	ns
t _{PHZ} /t _{PLZ}	3-state output disable time input S to output nY	see Figs 4 and 5	1.65 to 1.95	1.0	–	11.3	ns
			2.3 to 2.7	0.5	–	6.6	ns
			2.7	0.5	–	6.5	ns
			3.0 to 3.6	0.5	–	6.1	ns
			4.5 to 5.5	0.5	–	4.1	ns

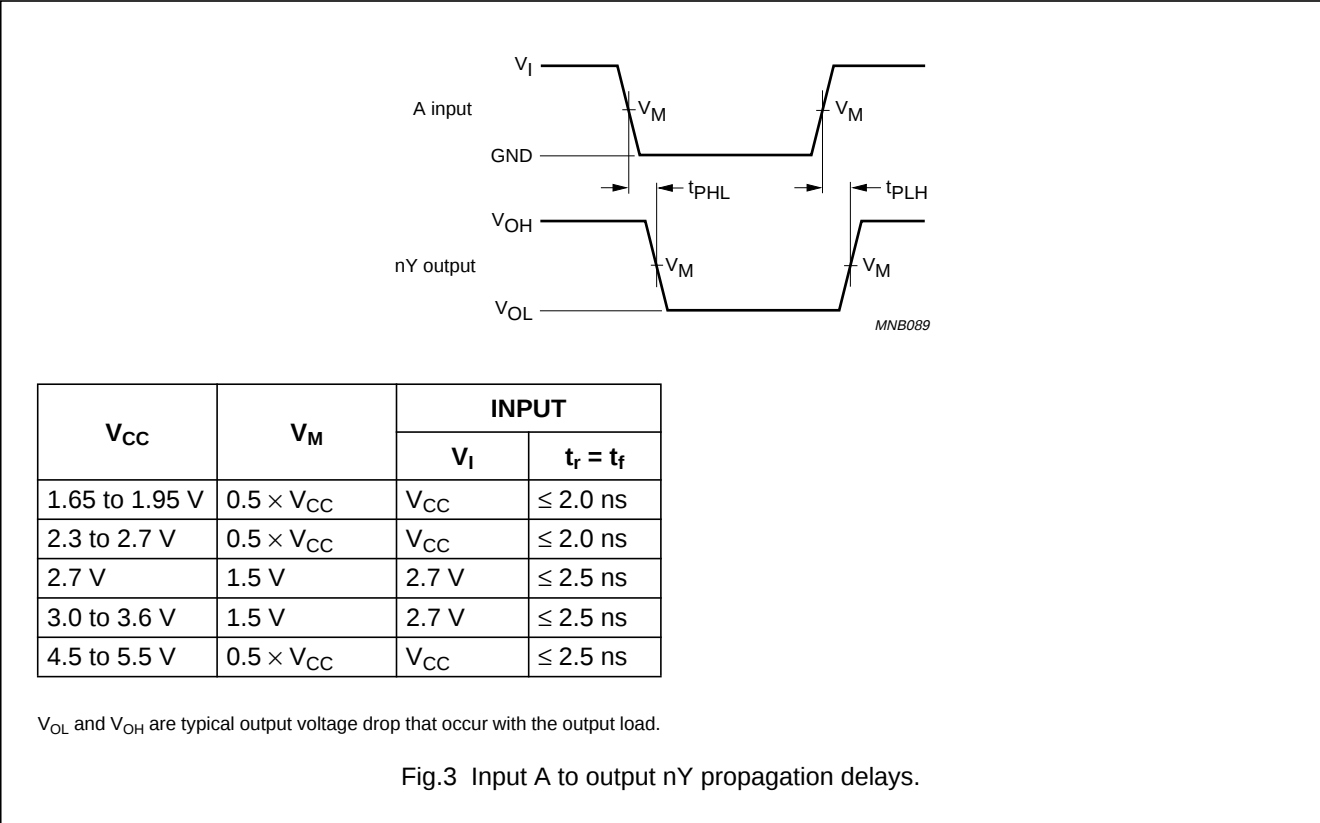
Note

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

1-of-2 non-inverting demultiplexer with
3-state deselected output

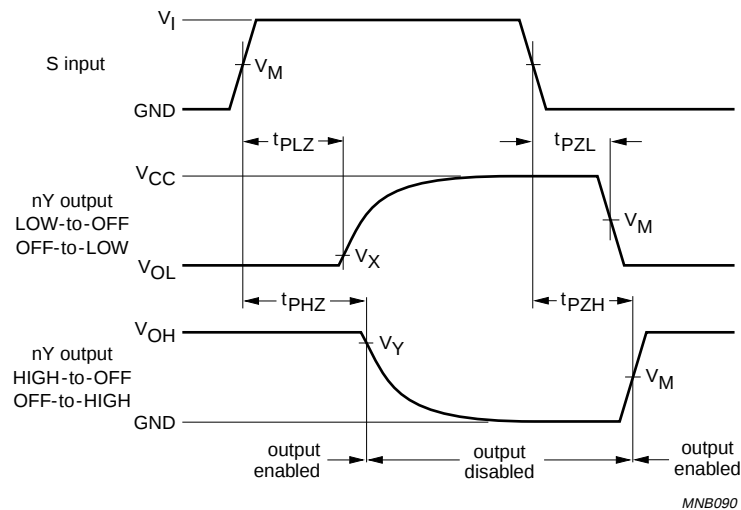
74LVC1G18

AC WAVEFORMS



1-of-2 non-inverting demultiplexer with
3-state deselected output

74LVC1G18



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

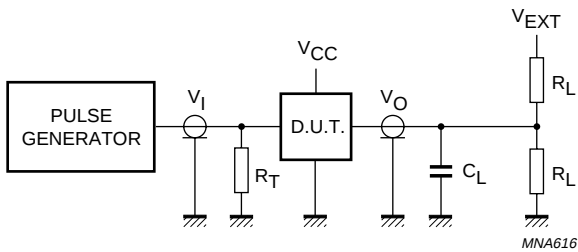
$V_X = V_{OL} + 0.3$ V at $V_{CC} \geq 2.7$ V;
 $V_X = V_{OL} + 0.15$ V at $V_{CC} < 2.7$ V;
 $V_Y = V_{OH} - 0.3$ V at $V_{CC} \geq 2.7$ V;
 $V_Y = V_{OH} - 0.15$ V at $V_{CC} < 2.7$ V.

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

Fig.4 3-state enable and disable times S to nY.

1-of-2 non-inverting demultiplexer with
3-state deselected output

74LVC1G18



V _{CC}	V _I	C _L	R _L	V _{EXT}		
				t _{PLH} /t _{PHL}	t _{PZH} /t _{PHZ}	t _{PZL} /t _{PLZ}
1.65 to 1.95 V	V _{CC}	30 pF	1 kΩ	open	GND	2 × V _{CC}
2.3 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 to 3.6 V	2.7 V	50 pF	500 Ω	open	GND	6 V
4.5 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.5 Load circuitry for switching times.

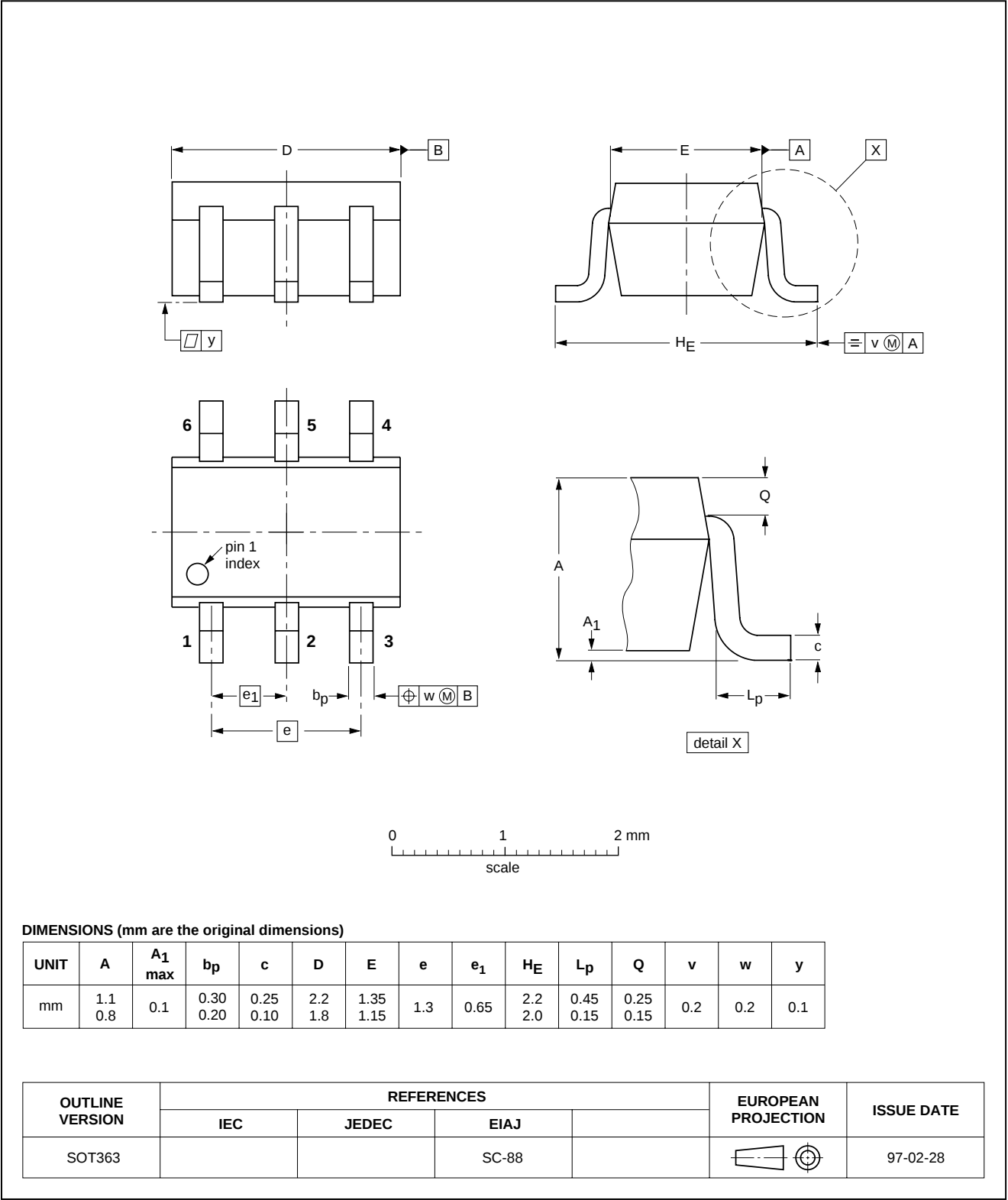
1-of-2 non-inverting demultiplexer with
3-state deselected output

74LVC1G18

PACKAGE OUTLINES

Plastic surface mounted package; 6 leads

SOT363

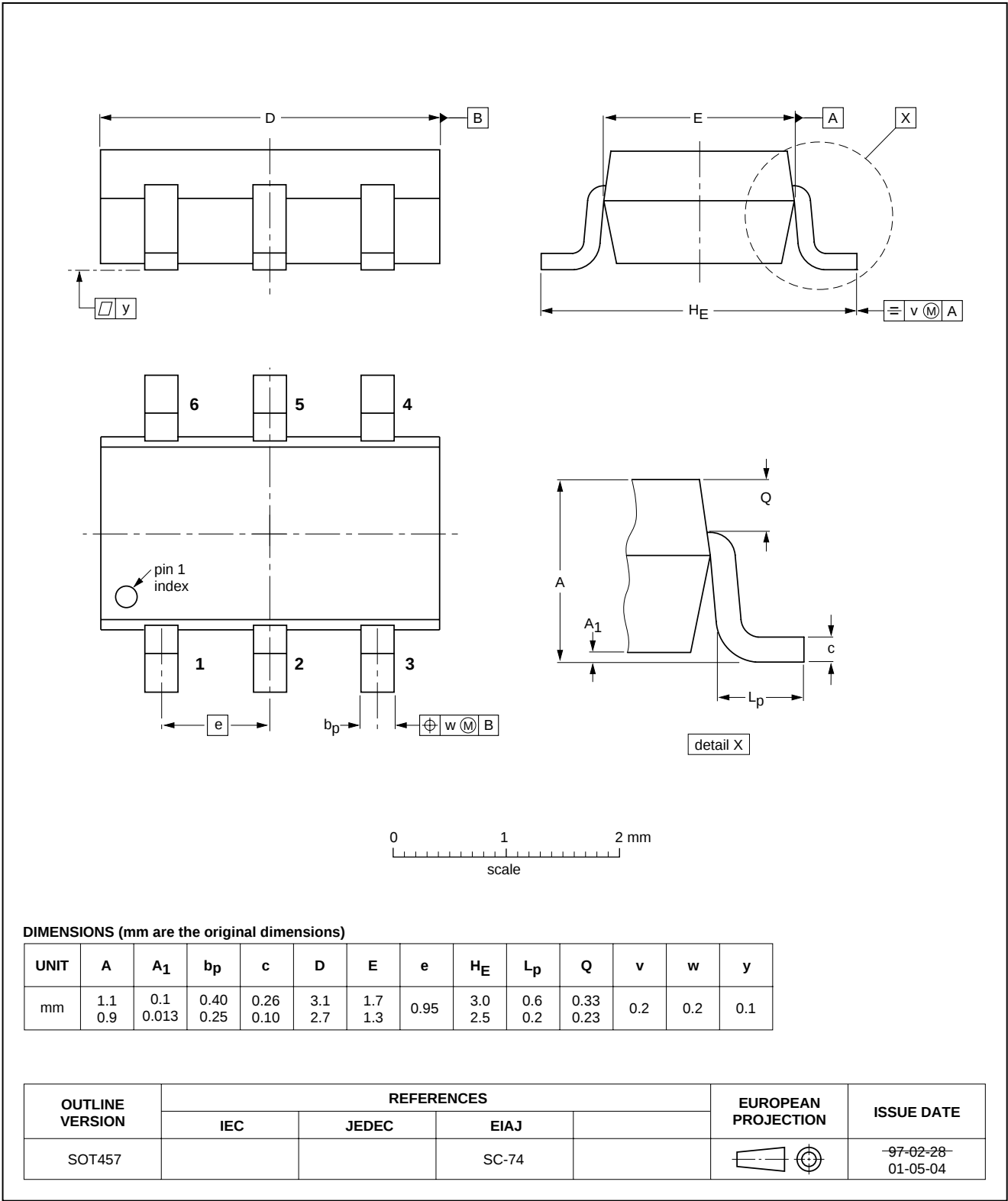


1-of-2 non-inverting demultiplexer with
3-state deselected output

74LVC1G18

Plastic surface mounted package; 6 leads

SOT457



1-of-2 non-inverting demultiplexer with 3-state deselected output

74LVC1G18

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

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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.

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