

DATA SHEET

74LVC1G19

1-of-2 decoder/demultiplexer

Product specification
Supersedes data of 2003 Sep 01

2004 Oct 18

1-of-2 decoder/demultiplexer

74LVC1G19

FEATURES

- Wide supply voltage range from 1.65 V to 5.5 V
- 5 V tolerant inputs for interfacing with 5 V logic
- 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 EIA/JESD22-A114-B 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
- Multiple package options
- Specified from -40 °C to $+85$ °C and -40 °C to $+125$ °C.

DESCRIPTION

The 74LVC1G19 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 V or 5 V devices. These features allow the use of these devices 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 74LVC1G19 is a 1-of-2 decoder/demultiplexer with a common output enable. The 74LVC1G19 buffers the data on input pin E and passes it either to output pin 1Y or 2Y, depending on whether the state of the select input pin A is LOW or HIGH, respectively.

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 | 4.0 | ns |
| | | $V_{CC} = 2.5$ V; $C_L = 30$ pF; $R_L = 500$ Ω | 2.5 | ns |
| | | $V_{CC} = 2.7$ V; $C_L = 50$ pF; $R_L = 500$ Ω | 2.8 | ns |
| | | $V_{CC} = 3.3$ V; $C_L = 50$ pF; $R_L = 500$ Ω | 2.5 | ns |
| | | $V_{CC} = 5.0$ V; $C_L = 50$ pF; $R_L = 500$ Ω | 1.8 | ns |
| C_I | input capacitance | | 2.5 | pF |
| C_{PD} | power dissipation capacitance | $V_{CC} = 3.3$ V; notes 1 and 2 | 18.9 | 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 = number of inputs switching;

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

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

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FUNCTION TABLE

See note 1.

| INPUT | | OUTPUT | |
|-------|---|--------|----|
| E | A | 1Y | 2Y |
| L | L | L | H |
| L | H | H | L |
| H | L | H | H |
| H | H | H | H |

Note

1. H = HIGH voltage level;
L = LOW voltage level.

ORDERING INFORMATION

| TYPE NUMBER | PACKAGE | | | | | |
|-------------|-------------------|------|---------|----------|--------|---------|
| | TEMPERATURE RANGE | PINS | PACKAGE | MATERIAL | CODE | MARKING |
| 74LVC1G19GW | -40 °C to +125 °C | 6 | SC-88 | plastic | SOT363 | VY |
| 74LVC1G19GV | -40 °C to +125 °C | 6 | SC-74 | plastic | SOT457 | V19 |
| 74LVC1G19GM | -40 °C to +125 °C | 6 | XSON6 | plastic | SOT886 | VY |

PINNING

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

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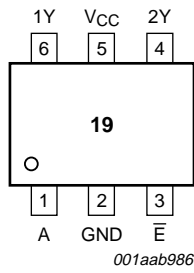


Fig.1 Pin configuration SC-88 and SC-74.

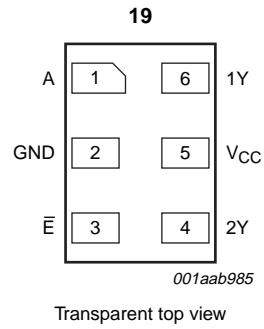


Fig.2 Pin configuration XSON6.

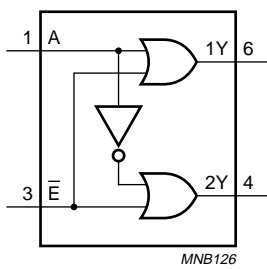


Fig.3 Logic symbol.

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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 |
| | | Power-down mode; $V_{CC} = 0$ V | 0 | 5.5 | V |
| T_{amb} | 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; 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 | $V_O = 0$ 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 | - | 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.

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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 | – | 0.07 | 0.45 | V |
| | | I _O = 8 mA | 2.3 | – | 0.12 | 0.3 | V |
| | | I _O = 12 mA | 2.7 | – | 0.17 | 0.4 | V |
| | | I _O = 24 mA | 3.0 | – | 0.33 | 0.55 | V |
| | | I _O = 32 mA | 4.5 | – | 0.39 | 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 | 1.54 | – | V |
| | | I _O = -8 mA | 2.3 | 1.9 | 2.15 | – | V |
| | | I _O = -12 mA | 2.7 | 2.2 | 2.50 | – | V |
| | | I _O = -24 mA | 3.0 | 2.3 | 2.62 | – | V |
| | | I _O = -32 mA | 4.5 | 3.8 | 4.11 | – | 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 pin | V _I = V _{CC} - 0.6 V; I _O = 0 A | 2.3 to 5.5 | – | 5 | 500 | μA |

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| 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 | – | – | ±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 A | 5.5 | – | – | 40 | μA |
| ΔI _{CC} | additional quiescent supply current per 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.

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AC CHARACTERISTICS

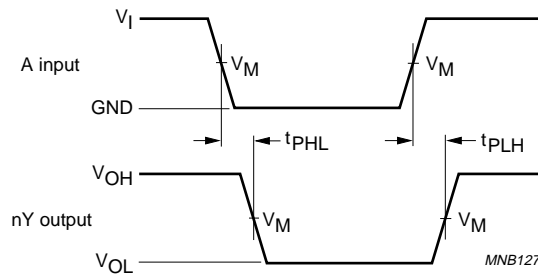
GND = 0 V.

| 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 input A to output nY | see Figs 4 and 5 | 1.65 to 1.95 | 1.0 | 4.0 | 10.5 | ns |
| | | | 2.3 to 2.7 | 0.5 | 2.5 | 6.2 | ns |
| | | | 2.7 | 1.0 | 2.8 | 6.5 | ns |
| | | | 3.0 to 3.6 | 0.5 | 2.5 | 5.2 | ns |
| | | | 4.5 to 5.5 | 0.5 | 1.8 | 3.9 | ns |
| T_{amb} = -40 °C to +125 °C | | | | | | | |
| t _{PHL} /t _{PLH} | propagation delay input A to output nY | see Figs 4 and 5 | 1.65 to 1.95 | 1.0 | – | 13.1 | ns |
| | | | 2.3 to 2.7 | 0.5 | – | 7.7 | ns |
| | | | 2.7 | 0.5 | – | 8.1 | ns |
| | | | 3.0 to 3.6 | 0.5 | – | 6.0 | ns |
| | | | 4.5 to 5.5 | 0.5 | – | 5.0 | ns |

Note

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

AC WAVEFORMS



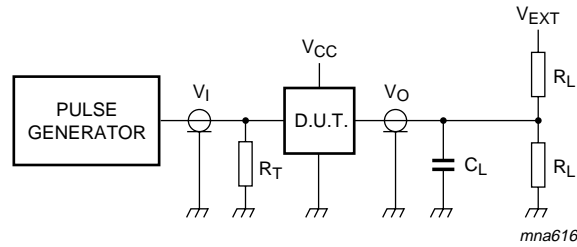
| V _{CC} | V _M | INPUT | |
|------------------|-----------------------|-----------------|---------------------------------|
| | | V _I | t _r = t _f |
| 1.65 V to 1.95 V | 0.5 × V _{CC} | V _{CC} | ≤ 2.0 ns |
| 2.3 V to 2.7 V | 0.5 × V _{CC} | V _{CC} | ≤ 2.0 ns |
| 2.7 V | 1.5 V | 2.7 V | ≤ 2.5 ns |
| 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.4 The input A to output nY propagation delays.

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| 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.5 Load circuitry for switching times.

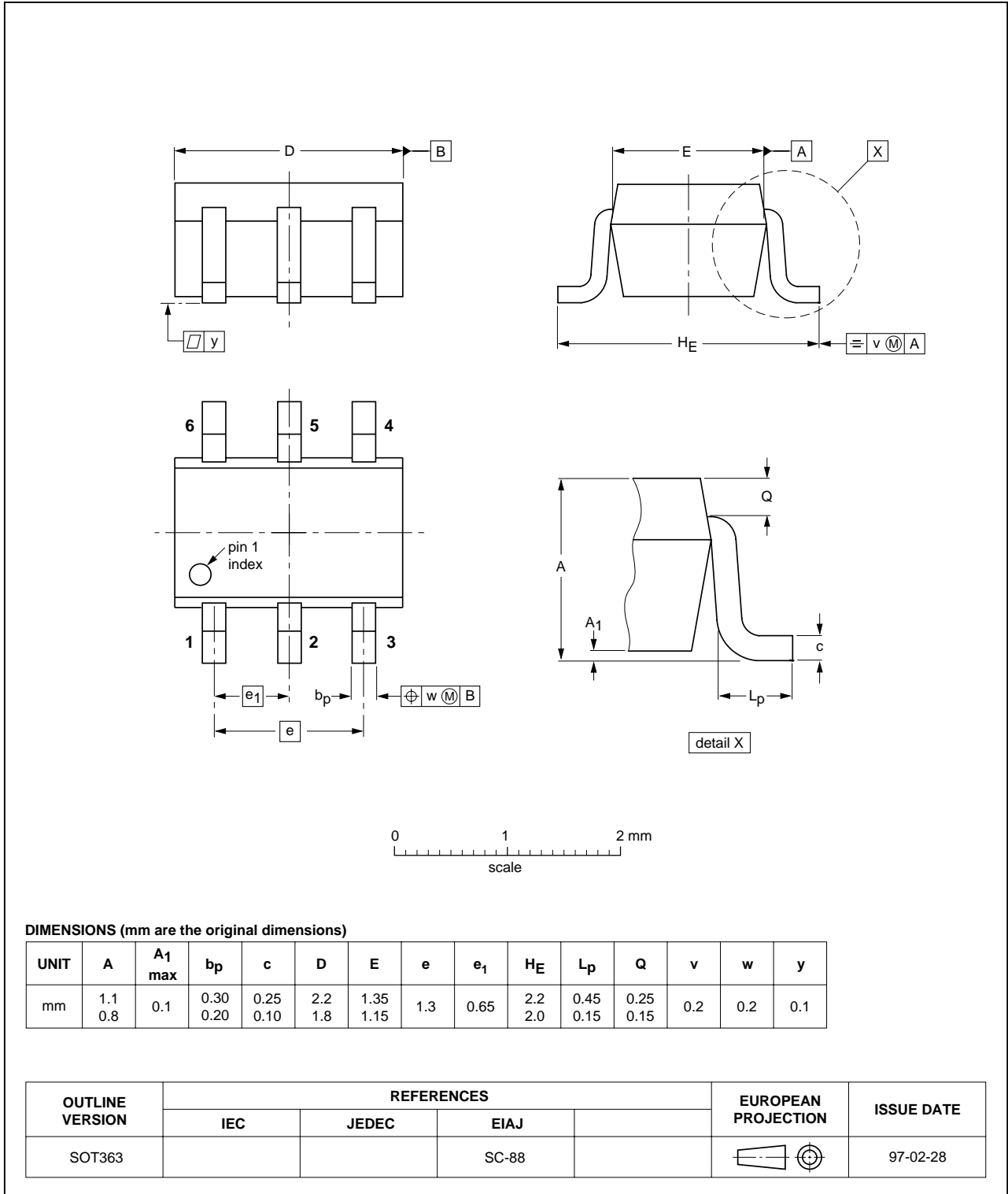
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PACKAGE OUTLINES

Plastic surface mounted package; 6 leads

SOT363

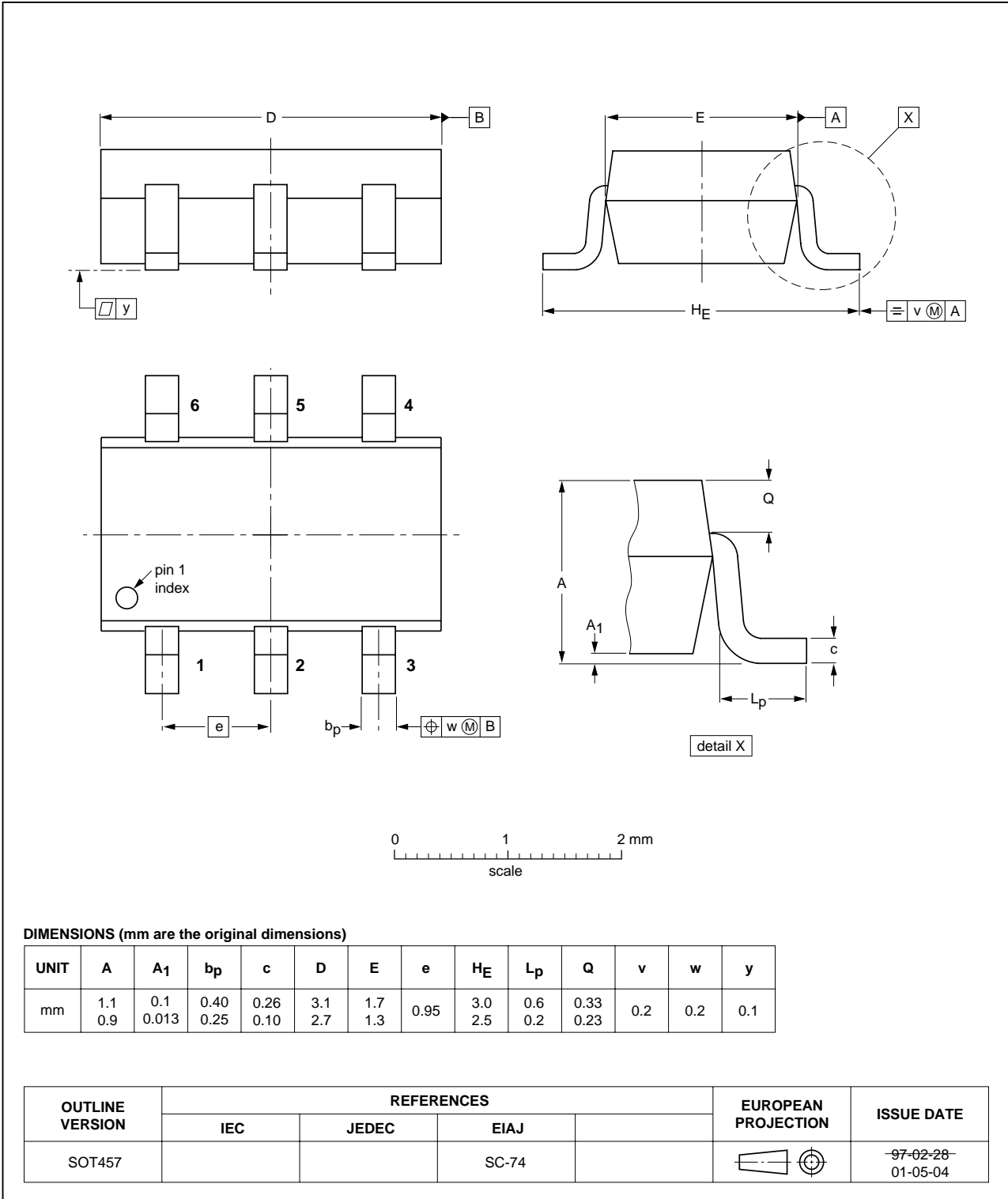


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Plastic surface mounted package; 6 leads

SOT457

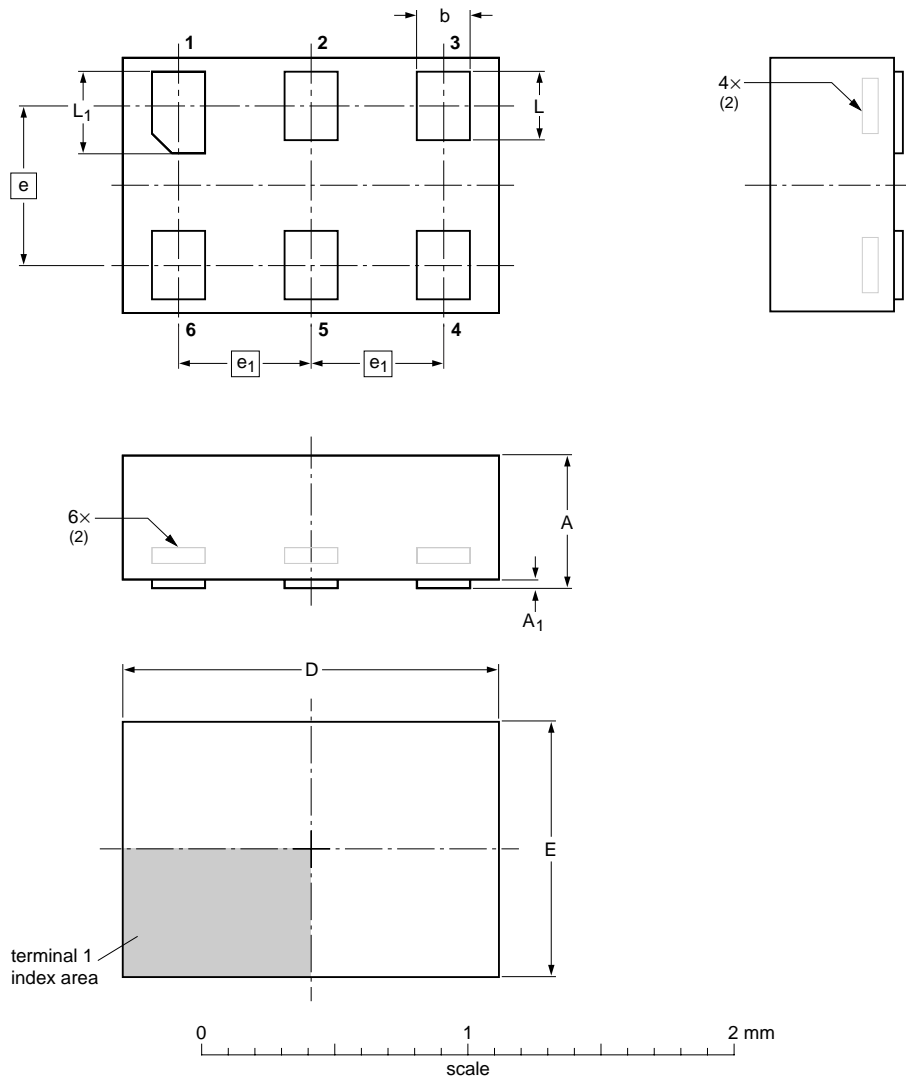


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XSON6: plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm

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 |

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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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