# 74LVC1G3157

## 2-channel analog multiplexer/demultiplexer

Rev. 01 — 7 February 2005 Product data sheet

## 1. General description

The 74LVC1G3157 is a high-performance, low-power, low-voltage, Si-gate CMOS device that provides superior performance to most advanced CMOS compatible TTL families.

The 74LVC1G3157 provides one analog multiplexer/demultiplexer with one digital select input (S), two independent inputs/outputs (B1 and B2) and a common input/output (A).

## 2. Features

- Wide supply voltage range from 1.65 V to 5.5 V
- Very low ON-resistance:
  - 7.5 Ω (typical) at $V_{CC}$ = 2.7 V
  - 6.5 Ω (typical) at $V_{CC}$ = 3.3 V
  - 6 Ω (typical) at $V_{CC}$ = 5 V
- Break-before-make switching
- High noise immunity
- 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 meets requirements of JESD 78 Class I
- Direct interface with TTL levels
- Control input accepts voltages up to 5 V
- Multiple package options
- Specified from –40 °C to +85 °C and from –40 °C to +125 °C

## 3. Quick reference data

**Table 1: Quick reference data**

*GND = 0 V; $t_r = t_f \leq 2.5$ ns; minimum and maximum values at $T_{amb}$ = –40 °C to +85 °C; typical values at $T_{amb}$ = 25 °C.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $t_{PZH}$, $t_{PZL}$ | turn-on time S to Bn | $C_L$ = 50 pF; $R_L$ = 500 Ω | | | | |
| | | $V_{CC}$ = 3.3 V | 0.5 | 4.0 | 5.5 | ns |
| | | $V_{CC}$ = 5.0 V | 0.5 | 3.0 | 4.0 | ns |
| $t_{PHZ}$, $t_{PLZ}$ | turn-off time S to Bn | $C_L$ = 50 pF; $R_L$ = 500 Ω | | | | |
| | | $V_{CC}$ = 3.3 V | 0.5 | 3.6 | 4.5 | ns |
| | | $V_{CC}$ = 5.0 V | 0.8 | 2.9 | 3.5 | ns |

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**Table 1: Quick reference data** *...continued*

*GND = 0 V; $t_r = t_f \leq 2.5$ ns; minimum and maximum values at $T_{amb} = -40\,°C$ to $+85\,°C$; typical values at $T_{amb} = 25\,°C$.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $C_I$ | select input capacitance | | - | 2.5 | - | pF |
| $C_S$ | switch capacitance | OFF-state | - | 6.0 | - | pF |
| | | ON-state | - | 18 | - | pF |

## 4. Ordering information

**Table 2: Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74LVC1G3157GW | –40 °C to +125 °C | SC-88 | plastic surface mounted package; 6 leads | SOT363 |
| 74LVC1G3157GV | –40 °C to +125 °C | SC-74 | plastic surface mounted package; 6 leads | SOT457 |
| 74LVC1G3157GM | –40 °C to +125 °C | XSON6 | plastic extremely thin small outline package; no leads; 6 terminals; body 1 × 1.45 × 0.5 mm | SOT886 |

## 5. Marking

**Table 3: Marking**

| Type number | Marking code |
|---|---|
| 74LVC1G3157GW | YJ |
| 74LVC1G3157GV | YJ |
| 74LVC1G3157GM | YJ |

## 6. Functional diagram

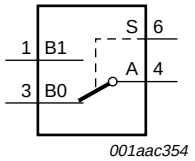



Fig 1. Logic symbol

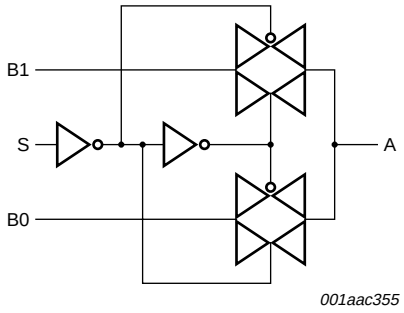



Fig 2. Logic diagram

# 7. Pinning information

## 7.1 Pinning

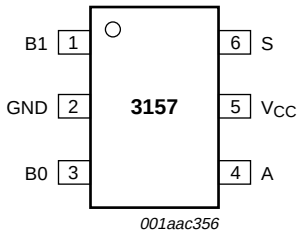



Fig 3. Pin configuration SC-88 and SC-74

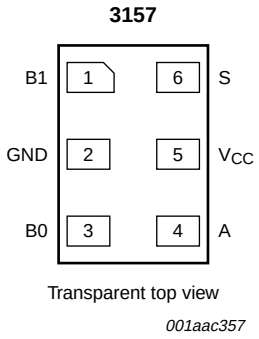



Fig 4. Pin configuration XSON6

## 7.2 Pin description

Table 4: Pin description

| Symbol | Pin | Description |
|---|---|---|
| B1 | 1 | independent B1 input or output |
| GND | 2 | ground (0 V) |
| B0 | 3 | independent B0 input or output |
| A | 4 | common A output or input |
| $V_{CC}$ | 5 | supply voltage |
| S | 6 | select input |

# 8. Functional description

## 8.1 Function table

Table 5: Function table [1]

| Input S | Channel on |
|---|---|
| L | B0 |
| H | B1 |

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

## 9. Limiting values

**Table 6: 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 |
| $V_I$ | input voltage | | [1] | –0.5 | +6.5 | V |
| $I_{IK}$ | input diode current | $V_I < –0.5$ V or $V_I > V_{CC} + 0.5$ | | - | –50 | mA |
| $I_{SK}$ | switch diode current | $V_I < –0.5$ V or $V_I > V_{CC} + 0.5$ | | - | ±50 | mA |
| $V_S$ | switch DC voltage | enable and disable mode | | –0.5 | $V_{CC} + 0.5$ | V |
| $I_S$ | switch source or sink current | $V_S > –0.5$ V or $V_S < V_{CC} + 0.5$ | | - | ±50 | mA |
| $I_{CC}$, $I_{GND}$ | $V_{CC}$ or GND current | | | - | ±100 | mA |
| $T_{stg}$ | storage temperature | | | –65 | +150 | °C |
| $P_{tot}$ | total power dissipation | $T_{amb}$ = –40 °C to +125 °C | | - | 300 | mW |

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

## 10. Recommended operating conditions

**Table 7: Recommended operating conditions**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | | | 1.65 | - | 5.5 | V |
| $V_I$ | input voltage | | | 0 | - | 5.5 | V |
| $V_S$ | switch DC voltage | enable and disable mode | [1] | 0 | - | $V_{CC}$ | 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 | [2] | 0 | - | 20 | ns/V |
| | | $V_{CC}$ = 2.7 V to 5.5 V | [2] | 0 | - | 10 | ns/V |

[1] To avoid drawing $V_{CC}$ current out of terminal A when switch current flows in terminal Bn, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal A, no $V_{CC}$ current will flow out of terminal Bn. In this case, there is no limit for the voltage drop across the switch.

[2] Applies to control signal levels.

## 11. Static characteristics

**Table 8: Static characteristics**

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

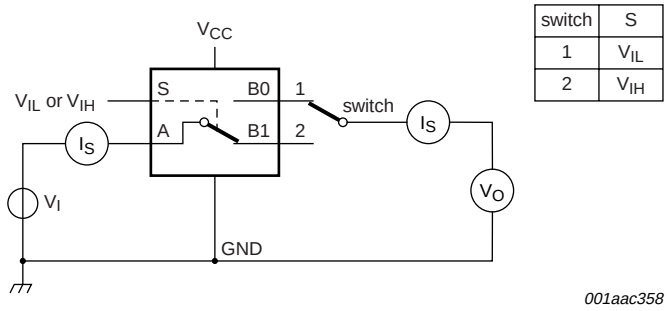
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **$T_{amb}$ = –40 °C to +85 °C** [1] | | | | | | |
| $V_{IH}$ | HIGH-level input voltage | $V_{CC}$ = 1.65 V to 1.95 V | $0.65V_{CC}$ | - | - | V |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 1.7 | - | - | V |
| | | $V_{CC}$ = 3 V to 3.6 V | 2.0 | - | - | V |
| | | $V_{CC}$ = 4.5 V to 5.5 V | $0.7V_{CC}$ | - | - | V |

**Table 8: Static characteristics** *…continued*

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{IL}$ | 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 |
| | | $V_{CC}$ = 3 V to 3.6 V | - | - | 0.8 | V |
| | | $V_{CC}$ = 4.5 V to 5.5 V | - | - | 0.3$V_{CC}$ | V |
| $I_{LI}$ | input leakage current on pin S | $V_I$ = 5.5 V or GND; $V_{CC}$ = 5.5 V | - | ±0.1 | ±2 | µA |
| $I_{S(OFF)}$ | analog switch OFF-state current per channel | $V_I$ = $V_{IH}$ or $V_{IL}$; $\|V_S\|$ = $V_{CC}$ – GND; $V_{CC}$ = 5.5 V; see Figure 5 | - | ±0.1 | ±5 | µA |
| $I_{S(ON)}$ | analog switch ON-state current per channel | $V_I$ = $V_{IH}$ or $V_{IL}$; $\|V_S\|$ = $V_{CC}$ – GND; $V_{CC}$ = 5.5 V; see Figure 6 | - | ±0.1 | ±5 | µA |
| $I_{CC}$ | quiescent supply current | $V_I$ = $V_{CC}$ or GND; $V_S$ = GND or $V_{CC}$; $I_O$ = 0 A; $V_{CC}$ = 5.5 V | - | 0.1 | 10 | µA |
| $\Delta I_{CC}$ | additional quiescent supply current pin S | $V_I$ = $V_{CC}$ – 0.6 V; $V_S$ = GND or $V_{CC}$; $I_O$ = 0 A; $V_{CC}$ = 5.5 V | - | 5 | 500 | µA |
| $C_I$ | input capacitance | | - | 2.5 | - | pF |
| $C_S$ | switch capacitance | OFF-state | - | 6.0 | - | pF |
| | | ON-state | - | 18 | - | pF |
| **$T_{amb}$ = –40 °C to +125 °C** | | | | | | |
| $V_{IH}$ | 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 |
| | | $V_{CC}$ = 3 V to 3.6 V | 2.0 | - | - | V |
| | | $V_{CC}$ = 4.5 V to 5.5 V | 0.7$V_{CC}$ | - | - | |
| $V_{IL}$ | 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 |
| | | $V_{CC}$ = 3 V to 3.6 V | - | - | 0.8 | V |
| | | $V_{CC}$ = 4.5 V to 5.5 V | | - | 0.3$V_{CC}$ | V |
| $I_{LI}$ | input leakage current on pin S | $V_I$ = 5.5 V or GND; $V_{CC}$ = 5.5 V | - | - | ±10 | µA |
| $I_{S(OFF)}$ | analog switch OFF-state current per channel | $V_I$ = $V_{IH}$ or $V_{IL}$; $\|V_S\|$ = $V_{CC}$ – GND; $V_{CC}$ = 5.5 V; see Figure 5 | - | - | ±20 | µA |
| $I_{S(ON)}$ | analog switch ON-state current per channel | $V_I$ = $V_{IH}$ or $V_{IL}$; $\|V_S\|$ = $V_{CC}$ – GND; $V_{CC}$ = 5.5 V; see Figure 6 | - | - | ±20 | µA |
| $I_{CC}$ | quiescent supply current | $V_I$ = $V_{CC}$ or GND; $V_S$ = GND or $V_{CC}$; $I_O$ = 0 A; $V_{CC}$ = 5.5 V | - | - | 40 | µA |
| $\Delta I_{CC}$ | additional quiescent supply current pin S | $V_I$ = $V_{CC}$ – 0.6 V; $V_S$ = GND or $V_{CC}$; $I_O$ = 0 A; $V_{CC}$ = 5.5 V | - | - | 5000 | µA |

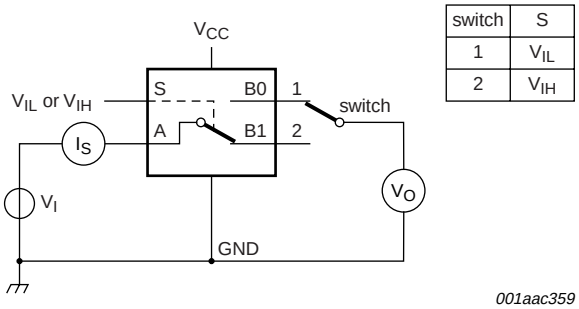
[1] Typical values are measured at $T_{amb}$ = 25 °C.




| switch | S |
|---|---|
| 1 | $V_{IL}$ |
| 2 | $V_{IH}$ |

$V_I = V_{CC}$ or GND and $V_O$ = GND or $V_{CC}$.

**Fig 5. Test circuit for measuring switch OFF-state current**




| switch | S |
|---|---|
| 1 | $V_{IL}$ |
| 2 | $V_{IH}$ |

$V_I = V_{CC}$ or GND and $V_O$ = open circuit.

**Fig 6. Test circuit for measuring switch ON-state current**

**Table 9: Resistance $R_{ON}$**

*At recommended operating conditions; voltages are referenced to GND (ground = 0 V); see test circuit Figure 7.*

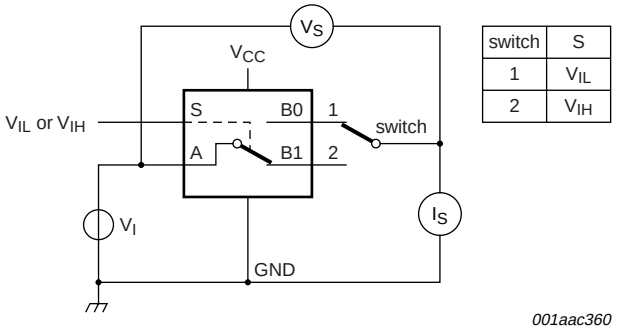
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **$T_{amb}$ = −40 °C to +85 °C [1]** | | | | | | |
| $R_{ON(rail)}$ | switch ON-state resistance (rail) | $V_S$ = GND; $V_I = V_{IH}$ | | | | |
| | | $I_S$ = 4 mA; $V_{CC}$ = 1.65 V to 1.95 V | - | 8.7 | 18 | Ω |
| | | $I_S$ = 8 mA; $V_{CC}$ = 2.3 V to 2.7 V | - | 7.2 | 16 | Ω |
| | | $I_S$ = 12 mA; $V_{CC}$ = 2.7 V | - | 7.0 | 14 | Ω |
| | | $I_S$ = 24 mA; $V_{CC}$ = 3 V to 3.6 V | - | 6.5 | 12 | Ω |
| | | $I_S$ = 32 mA; $V_{CC}$ = 4.5 V to 5.5 V | - | 5.9 | 10 | Ω |
| | | $V_S = V_{CC}$; $V_I = V_{IH}$ | | | | |
| | | $I_S$ = 4 mA; $V_{CC}$ = 1.65 V to 1.95 V | - | 12 | 30 | Ω |
| | | $I_S$ = 8 mA; $V_{CC}$ = 2.3 V to 2.7 V | - | 8.3 | 20 | Ω |
| | | $I_S$ = 12 mA; $V_{CC}$ = 2.7 V | - | 7.8 | 18 | Ω |
| | | $I_S$ = 24 mA; $V_{CC}$ = 3 V to 3.6 V | - | 6.7 | 15 | Ω |
| | | $I_S$ = 32 mA; $V_{CC}$ = 4.5 V to 5.5 V | - | 5.2 | 10 | Ω |

**Table 9: Resistance $R_{ON}$** *…continued*

*At recommended operating conditions; voltages are referenced to GND (ground = 0 V); see test circuit Figure 7.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $R_{ON(peak)}$ | switch ON-state resistance (peak) | $V_S$ = GND to $V_{CC}$; $V_I = V_{IH}$ | | | | |
| | | $I_S$ = 4 mA; $V_{CC}$ = 1.65 V to 1.95 V | - | 57 | 140 | Ω |
| | | $I_S$ = 8 mA; $V_{CC}$ = 2.3 V to 2.7 V | - | 15 | 40 | Ω |
| | | $I_S$ = 12 mA; $V_{CC}$ = 2.7 V | - | 13 | 25 | Ω |
| | | $I_S$ = 24 mA; $V_{CC}$ = 3 V to 3.6 V | - | 9.0 | 20 | Ω |
| | | $I_S$ = 32 mA; $V_{CC}$ = 4.5 V to 5.5 V | - | 6.0 | 15 | Ω |
| $R_{ON(flatness)}$ | switch ON-resistance (flatness) | $V_S$ = GND to $V_{CC}$; $V_I = V_{IH}$; see Figure 9 | | | | |
| | | $I_S$ = 4 mA; $V_{CC}$ = 1.65 V to 1.95 V | - | 100 | - | Ω |
| | | $I_S$ = 8 mA; $V_{CC}$ = 2.3 V to 2.7 V | - | 17 | - | Ω |
| | | $I_S$ = 12 mA; $V_{CC}$ = 2.7 V | - | 10 | - | Ω |
| | | $I_S$ = 24 mA; $V_{CC}$ = 3 V to 3.6 V | - | 5 | - | Ω |
| | | $I_S$ = 32 mA; $V_{CC}$ = 4.5 V to 5.5 V | - | 3 | - | Ω |
| **$T_{amb}$ = −40 °C to +125 °C** | | | | | | |
| $R_{ON(rail)}$ | switch ON-state resistance (rail) | $V_S$ = GND; $V_I = V_{IH}$ | | | | |
| | | $I_S$ = 4 mA; $V_{CC}$ = 1.65 V to 1.95 V | - | - | 27 | Ω |
| | | $I_S$ = 8 mA; $V_{CC}$ = 2.3 V to 2.7 V | - | - | 24 | Ω |
| | | $I_S$ = 12 mA; $V_{CC}$ = 2.7 V | - | - | 21 | Ω |
| | | $I_S$ = 24 mA; $V_{CC}$ = 3 V to 3.6 V | - | - | 18 | Ω |
| | | $I_S$ = 32 mA; $V_{CC}$ = 4.5 V to 5.5 V | - | - | 15 | Ω |
| | | $V_S = V_{CC}$; $V_I = V_{IH}$ | | | | |
| | | $I_S$ = 4 mA; $V_{CC}$ = 1.65 V to 1.95 V | - | - | 45 | Ω |
| | | $I_S$ = 8 mA; $V_{CC}$ = 2.3 V to 2.7 V | - | - | 30 | Ω |
| | | $I_S$ = 12 mA; $V_{CC}$ = 2.7 V | - | - | 27 | Ω |
| | | $I_S$ = 24 mA; $V_{CC}$ = 3 V to 3.6 V | - | - | 23 | Ω |
| | | $I_S$ = 32 mA; $V_{CC}$ = 4.5 V to 5.5 V | - | - | 15 | Ω |
| $R_{ON(peak)}$ | switch ON-state resistance (peak) | $V_S$ = GND to $V_{CC}$; $V_I = V_{IH}$ | | | | |
| | | $I_S$ = 4 mA; $V_{CC}$ = 1.65 V to 1.95 V | - | - | 140 | Ω |
| | | $I_S$ = 8 mA; $V_{CC}$ = 2.3 V to 2.7 V | - | - | 60 | Ω |
| | | $I_S$ = 12 mA; $V_{CC}$ = 2.7 V | - | - | 38 | Ω |
| | | $I_S$ = 24 mA; $V_{CC}$ = 3 V to 3.6 V | - | - | 30 | Ω |
| | | $I_S$ = 32 mA; $V_{CC}$ = 4.5 V to 5.5 V | - | - | 23 | Ω |

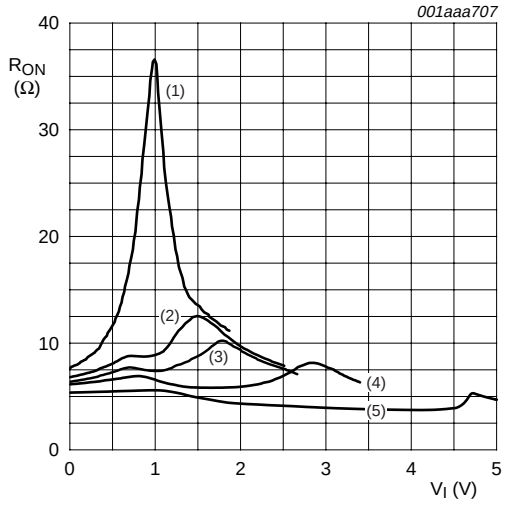
[1] Typical values are measured at $T_{amb}$ = 25 °C and nominal $V_{CC}$.




| switch | S |
|---|---|
| 1 | $V_{IL}$ |
| 2 | $V_{IH}$ |

$V_I$ = GND to $V_{CC}$; $R_{ON} = V_S/I_S$.

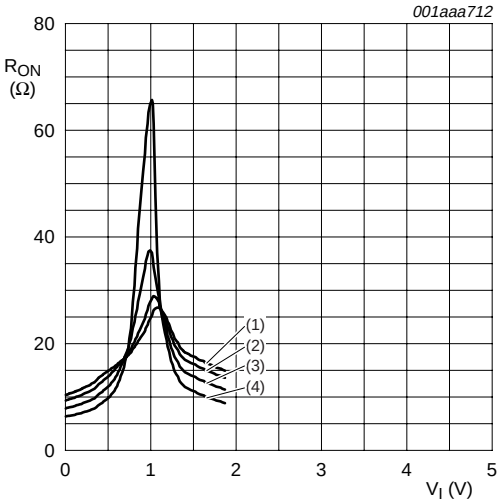
**Fig 7. Test circuit for measuring switch ON-resistance**




(1) $V_{CC}$ = 1.8 V
(2) $V_{CC}$ = 2.5 V
(3) $V_{CC}$ = 2.7 V
(4) $V_{CC}$ = 3.3 V
(5) $V_{CC}$ = 5.0 V

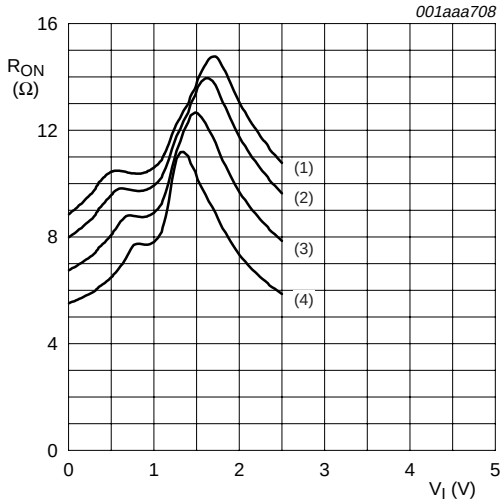
$V_S$ = GND to $V_{CC}$; $T_{amb}$ = 25 °C.

**Fig 8. Typical switch ON-resistance as a function of input voltage**



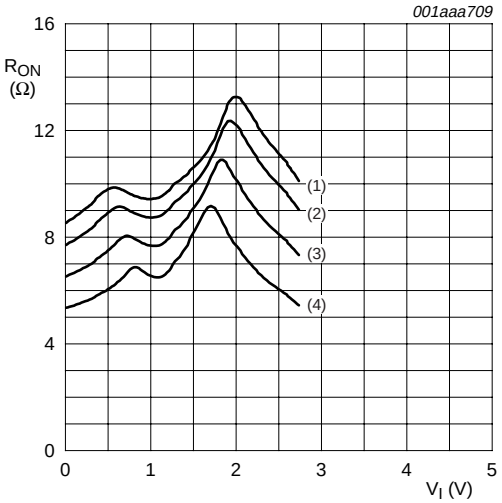

(1) $T_{amb}$ = 125 °C
(2) $T_{amb}$ = 85 °C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = –40 °C

a. $V_{CC}$ = 1.8 V



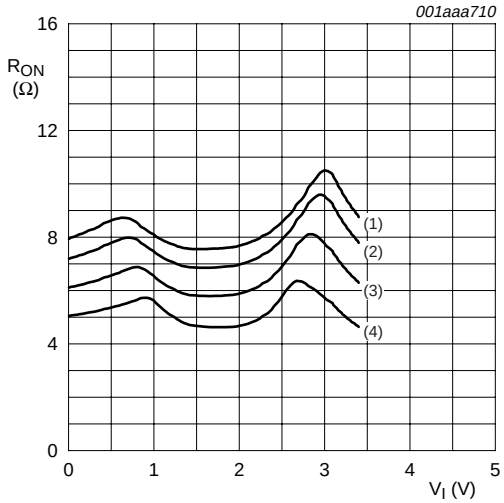

(1) $T_{amb}$ = 125 °C
(2) $T_{amb}$ = 85 °C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = –40 °C

b. $V_{CC}$ = 2.5 V




(1) $T_{amb}$ = 125 °C
(2) $T_{amb}$ = 85 °C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = –40 °C

c. $V_{CC}$ = 2.7 V




(1) $T_{amb}$ = 125 °C
(2) $T_{amb}$ = 85 °C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = –40 °C

d. $V_{CC}$ = 3.3 V

**Fig 9. Switch ON-resistance as a function of input voltage**

## 12. Dynamic characteristics

**Table 10: Dynamic characteristics**

*At recommended operating conditions; voltages are referenced to GND (ground = 0 V); test circuit Figure 13.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **$T_{amb}$ = −40 °C to +85 °C** [1] | | | | | | |
| $t_{PHL}$, $t_{PLH}$ | propagation delay A to Bn or Bn to A | see Figure 10 | | | | |
| | | $V_{CC}$ = 1.65 V to 1.95 V | - | - | 2 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | - | - | 1.2 | ns |
| | | $V_{CC}$ = 2.7 V | - | - | 1.0 | ns |
| | | $V_{CC}$ = 3 V to 3.6 V | - | - | 0.8 | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V | - | - | 0.6 | ns |
| $t_{PZH}$, $t_{PZL}$ | turn-on time S to Bn | see Figure 11 | | | | |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 1.0 | 8.7 | 14 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 1.0 | 5.3 | 7.5 | ns |
| | | $V_{CC}$ = 2.7 V | 1.0 | 4.9 | 6.0 | ns |
| | | $V_{CC}$ = 3 V to 3.6 V | 0.5 | 4.0 | 5.5 | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V | 0.5 | 3.0 | 4.0 | ns |
| $t_{PHZ}$, $t_{PLZ}$ | turn-off time S to Bn | see Figure 11 | | | | |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 2.5 | 6.0 | 8.5 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 2.0 | 4.4 | 6.0 | ns |
| | | $V_{CC}$ = 2.7 V | 1.5 | 4.2 | 5.0 | ns |
| | | $V_{CC}$ = 3 V to 3.6 V | 1.5 | 3.6 | 4.5 | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V | 0.8 | 2.9 | 3.5 | ns |
| $t_D$ | break-before-make time | see Figure 12 [2] | | | | |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 0.5 | - | - | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 0.5 | - | - | ns |
| | | $V_{CC}$ = 2.7 V | 0.5 | - | - | ns |
| | | $V_{CC}$ = 3 V to 3.6 V | 0.5 | - | - | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V | 0.5 | - | - | ns |
| **$T_{amb}$ = −40 °C to +125 °C** | | | | | | |
| $t_{PHL}$, $t_{PLH}$ | propagation delay A to Bn or Bn to A | see Figure 10 | | | | |
| | | $V_{CC}$ = 1.65 V to 1.95 V | - | - | 3.0 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | - | - | 2.0 | ns |
| | | $V_{CC}$ = 2.7 V | - | - | 1.5 | ns |
| | | $V_{CC}$ = 3 V to 3.6 V | - | - | 1.5 | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V | - | - | 1.0 | ns |

**Table 10: Dynamic characteristics** *...continued*

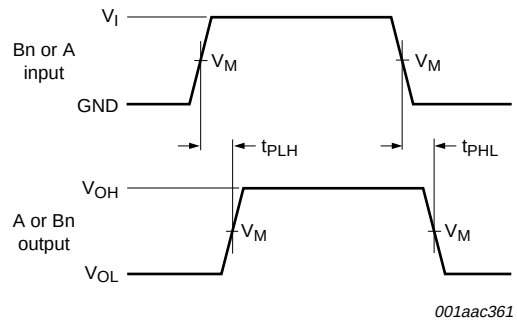
*At recommended operating conditions; voltages are referenced to GND (ground = 0 V); test circuit Figure 13.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $t_{PZH}$, $t_{PZL}$ | turn-on time S to Bn | see Figure 11 | | | | |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 1.0 | - | 14.0 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 1.0 | - | 7.5 | ns |
| | | $V_{CC}$ = 2.7 V | 1.0 | - | 6.0 | ns |
| | | $V_{CC}$ = 3 V to 3.6 V | 0.5 | - | 5.5 | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V | 0.5 | | 4.0 | ns |
| $t_{PHZ}$, $t_{PLZ}$ | turn-off time S to Bn | see Figure 11 | | | | |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 2.5 | - | 8.5 | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 2.0 | - | 6.0 | ns |
| | | $V_{CC}$ = 2.7 V | 1.5 | - | 5.0 | ns |
| | | $V_{CC}$ = 3 V to 3.6 V | 1.5 | - | 4.5 | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V | 0.8 | - | 3.5 | ns |
| $t_D$ | break-before-make time | see Figure 12 [2] | | | | |
| | | $V_{CC}$ = 1.65 V to 1.95 V | 0.5 | - | - | ns |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 0.5 | - | - | ns |
| | | $V_{CC}$ = 2.7 V | 0.5 | - | - | ns |
| | | $V_{CC}$ = 3 V to 3.6 V | 0.5 | - | - | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V | 0.5 | - | - | ns |

[1] Typical values are measured at $T_{amb}$ = 25 °C and nominal $V_{CC}$.

[2] Break-before-make specified by design.

## 13. Waveforms



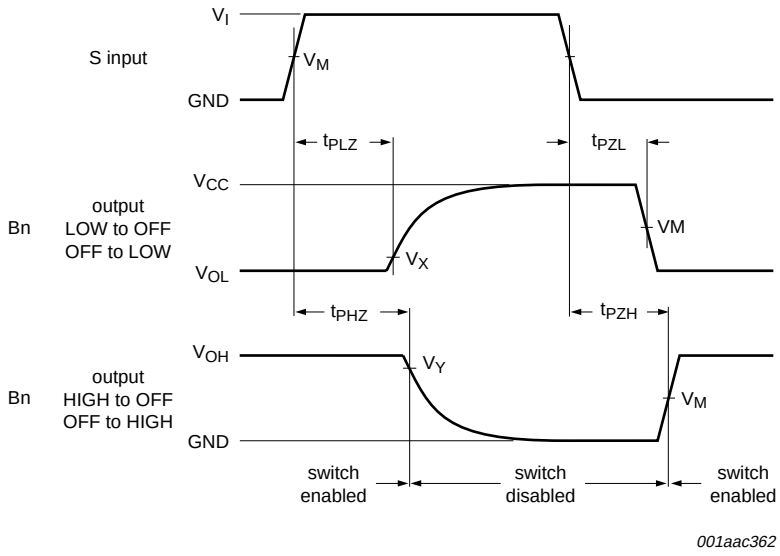

Measurement points are given in Table 11.

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

**Fig 10. Input (Bn or A) to output (A or Bn) propagation delays**

**Table 11: Measurement points**

| Supply voltage | Input | Output |
|---|---|---|
| $V_{CC}$ | $V_M$ | $V_M$ |
| 1.65 V to 5.5 V | $0.5V_{CC}$ | $0.5V_{CC}$ |




Measurement points are given in Table 12.

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

**Fig 11. Turn-on and turn-off times**

**Table 12: Measurement points**

| Supply voltage | Input | Output | | |
|---|---|---|---|---|
| $V_{CC}$ | $V_M$ | $V_M$ | $V_X$ | $V_Y$ |
| 1.65 V to 5.5 V | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL}$ + 0.3 V | $V_{OH}$ − 0.3 V |

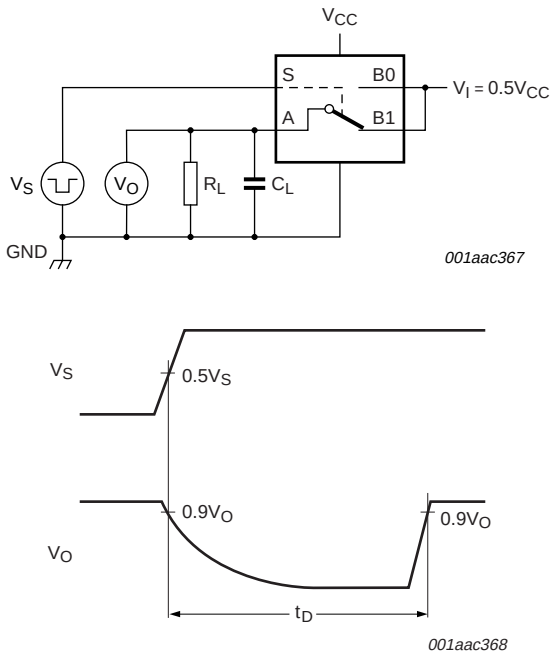
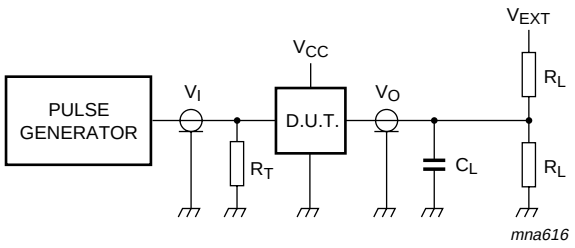



**Fig 12. Test circuit for measuring break-before-make timing**




Test data is given in Table 13.

Definitions test circuit:

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

$C_L$ = Load capacitance including jig and probe capacitance.

$R_L$ = Load resistance.

$V_{EXT}$ = Test voltage for switching times.

**Fig 13. Load circuitry for switching times**

**Table 13: Test data**

| Supply voltage | Input | | Load | | $V_{EXT}$ | | |
|---|---|---|---|---|---|---|---|
| $V_{CC}$ | $V_I$ | $t_r$, $t_f$ | $C_L$ | $R_L$ | $t_{PLH}$, $t_{PHL}$ | $t_{PZH}$, $t_{PHZ}$ | $t_{PZL}$, $t_{PLZ}$ |
| 1.65 V to 1.95 V | $V_{CC}$ | ≤ 2.0 ns | 50 pF | 500 Ω | open | GND | $2V_{CC}$ |
| 2.3 V to 2.7 V | $V_{CC}$ | ≤ 2.0 ns | 50 pF | 500 Ω | open | GND | $2V_{CC}$ |
| 2.7 V | $V_{CC}$ | ≤ 2.5 ns | 50 pF | 500 Ω | open | GND | $2V_{CC}$ |
| 3 V to 3.6 V | $V_{CC}$ | ≤ 2.5 ns | 50 pF | 500 Ω | open | GND | $2V_{CC}$ |
| 4.5 V to 5.5 V | $V_{CC}$ | ≤ 2.5 ns | 50 pF | 500 Ω | open | GND | $2V_{CC}$ |

## 14. Additional dynamic characteristics

**Table 14: Additional dynamic characteristics**

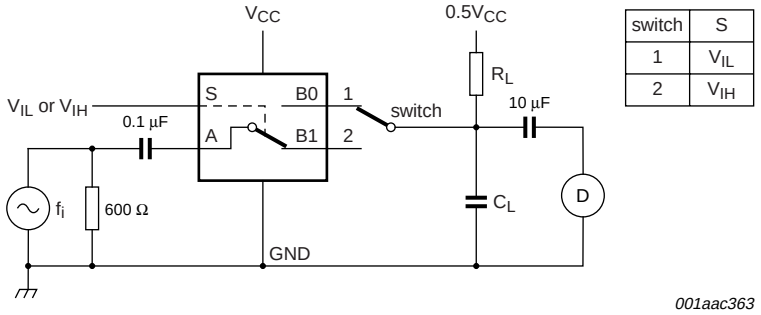
*At recommended operating conditions; typical values measured at $T_{amb}$ = 25 °C.*

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $d_{sin}$ | sine-wave distortion | $f_i$ = 600 Hz to 20 kHz; $R_L$ = 600 Ω; $C_L$ = 50 pF; $V_I$ = 0.5 V (p-p); see Figure 14 | | | | | |
| | | $V_{CC}$ = 1.65 V | | - | 0.260 | - | % |
| | | $V_{CC}$ = 2.3 V | | - | 0.078 | - | % |
| | | $V_{CC}$ = 3.0 V | | - | 0.078 | - | % |
| | | $V_{CC}$ = 4.5 V | | - | 0.078 | - | % |
| $f_{(-3dB)}$ | switch ON-state signal frequency response | $R_L$ = 50 Ω; $C_L$ = 5 pF; see Figure 15 | [1] | | | | |
| | | $V_{CC}$ = 1.65 V | | - | 200 | - | MHz |
| | | $V_{CC}$ = 2.3 V | | - | 300 | - | MHz |
| | | $V_{CC}$ = 3.0 V | | - | 300 | - | MHz |
| | | $V_{CC}$ = 4.5 V | | - | 300 | - | MHz |
| $\alpha_{OFF(ft)}$ | switch OFF-state signal feed-through attenuation | $R_L$ = 50 Ω; $C_L$ = 5 pF; $f_i$ = 10 MHz; see Figure 16 | [2] | | | | |
| | | $V_{CC}$ = 1.65 V | | - | –42 | - | dB |
| | | $V_{CC}$ = 2.3 V | | - | –42 | - | dB |
| | | $V_{CC}$ = 3.0 V | | - | –40 | - | dB |
| | | $V_{CC}$ = 4.5 V | | - | –40 | - | dB |
| $V_{ct(sw-sw)}$ | crosstalk between switches | $R_L$ = 50 Ω; $C_L$ = 5 pF; $f_i$ = 10 MHz; see Figure 17 | | | | | |
| | | $V_{CC}$ = 1.65 V | | - | –68 | - | dB |
| | | $V_{CC}$ = 2.3 V | | - | –70 | - | dB |
| | | $V_{CC}$ = 3.0 V | | - | –70 | - | dB |
| | | $V_{CC}$ = 4.5 V | | - | –70 | - | dB |
| Q | charge injection | $C_L$ = 0.1 nF; $V_{gen}$ = 0 V; $R_{gen}$ = 0 Ω; f = 1 MHz; $R_L$ = 1 MΩ; see Figure 18 | [3] | | | | |
| | | $V_{CC}$ = 1.8 V | | - | < 0.003 | - | pC |
| | | $V_{CC}$ = 2.5 V | | - | 0.004 | - | pC |
| | | $V_{CC}$ = 3.3 V | | - | 0.0045 | - | pC |
| | | $V_{CC}$ = 4.5 V | | - | 0.0045 | - | pC |
| | | $V_{CC}$ = 5.5 V | | - | 0.0045 | - | pC |

[1] Adjust $f_i$ voltage to obtain 0 dBm level at output. Increase $f_i$ frequency until dB meter reads –3 dB.

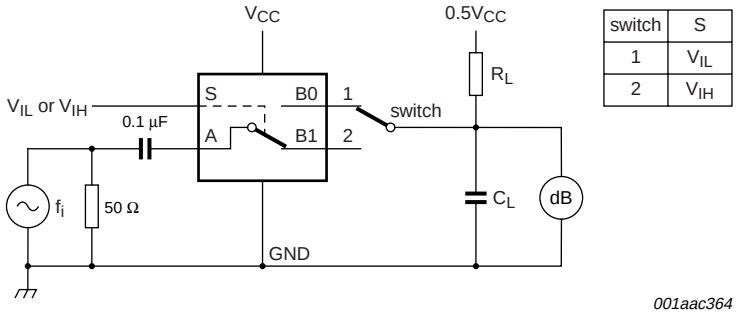
[2] Adjust $f_i$ voltage to obtain 0 dBm level at input.

[3] Definition: $Q = \Delta V_O \times C_L$. Guaranteed by design.



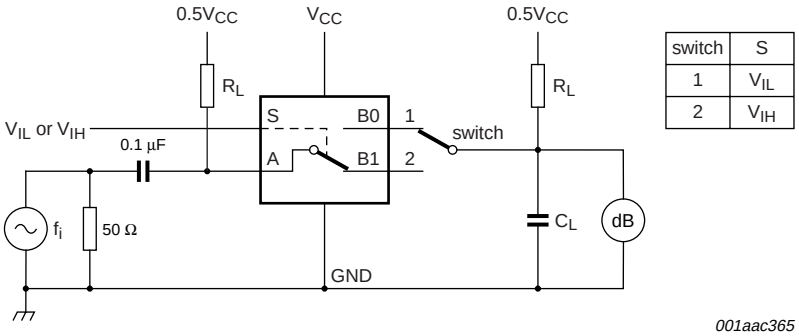

| switch | S |
|---|---|
| 1 | $V_{IL}$ |
| 2 | $V_{IH}$ |

**Fig 14. Test circuit for measuring sine-wave distortion**



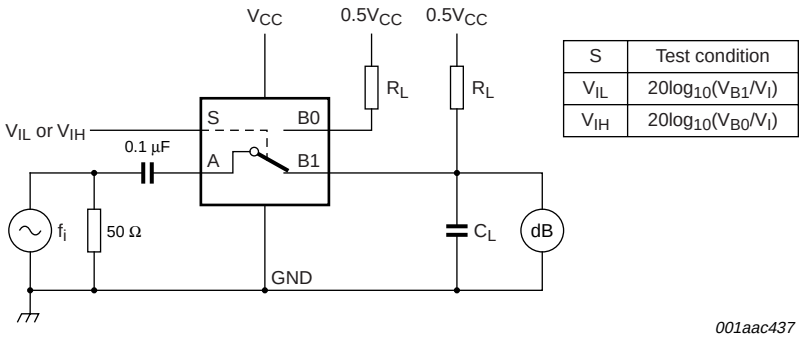

| switch | S |
|---|---|
| 1 | $V_{IL}$ |
| 2 | $V_{IH}$ |

**Fig 15. Test circuit for measuring the frequency response when switch is in ON-state**




| switch | S |
|---|---|
| 1 | $V_{IL}$ |
| 2 | $V_{IH}$ |

**Fig 16. Test circuit for measuring feed-through attenuation when switch is in OFF-state**




| S | Test condition |
|---|---|
| $V_{IL}$ | $20\log_{10}(V_{B1}/V_I)$ |
| $V_{IH}$ | $20\log_{10}(V_{B0}/V_I)$ |

**Fig 17. Test circuit for measuring crosstalk between switches**

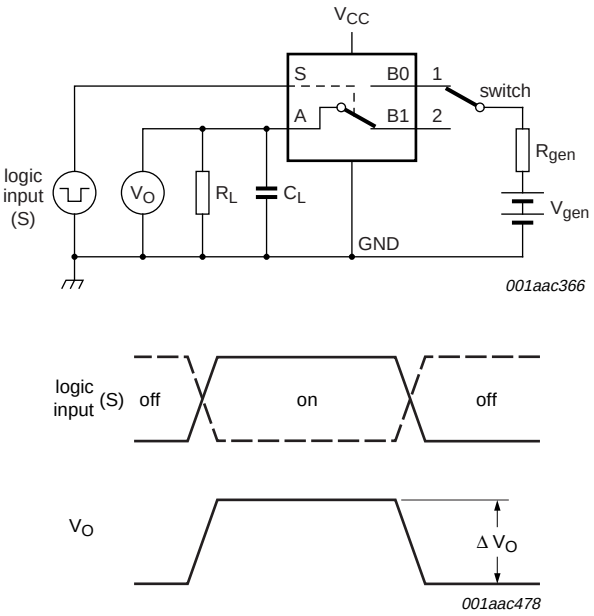
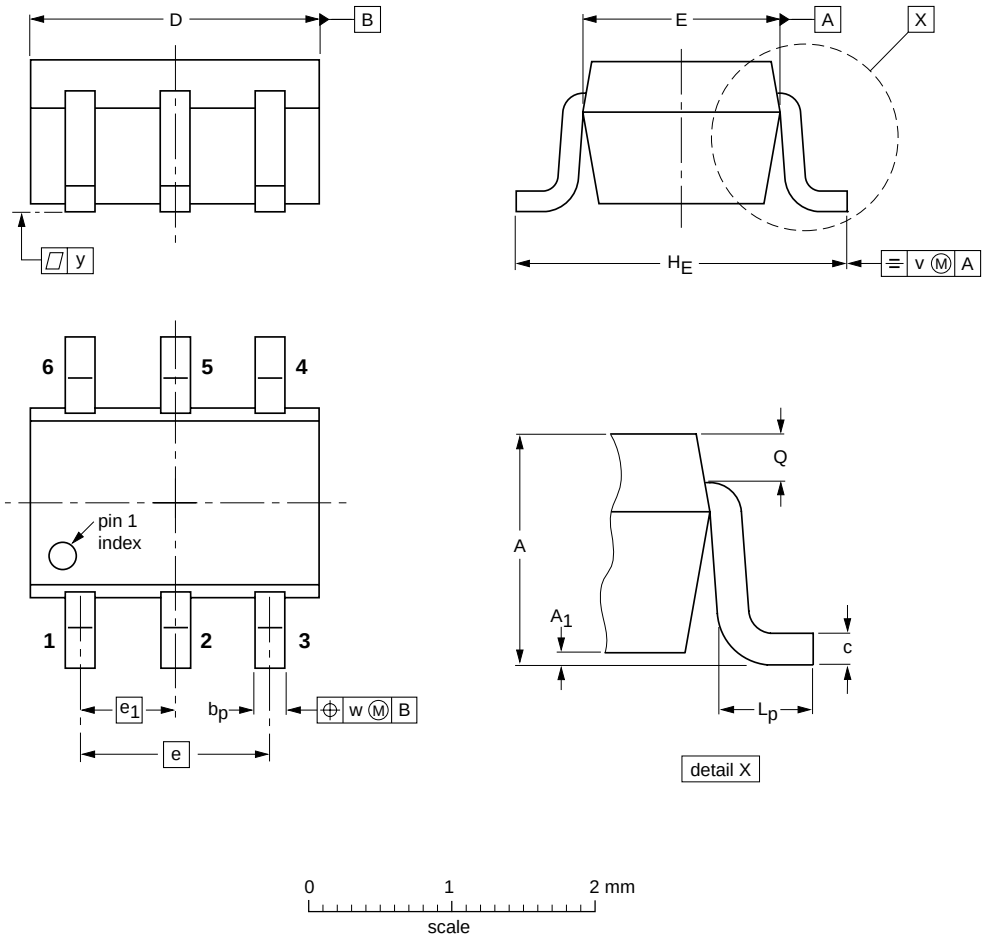



**Fig 18. Test circuit for measuring charge injection**

## 15. Package outline

**Plastic surface mounted package; 6 leads** **SOT363**



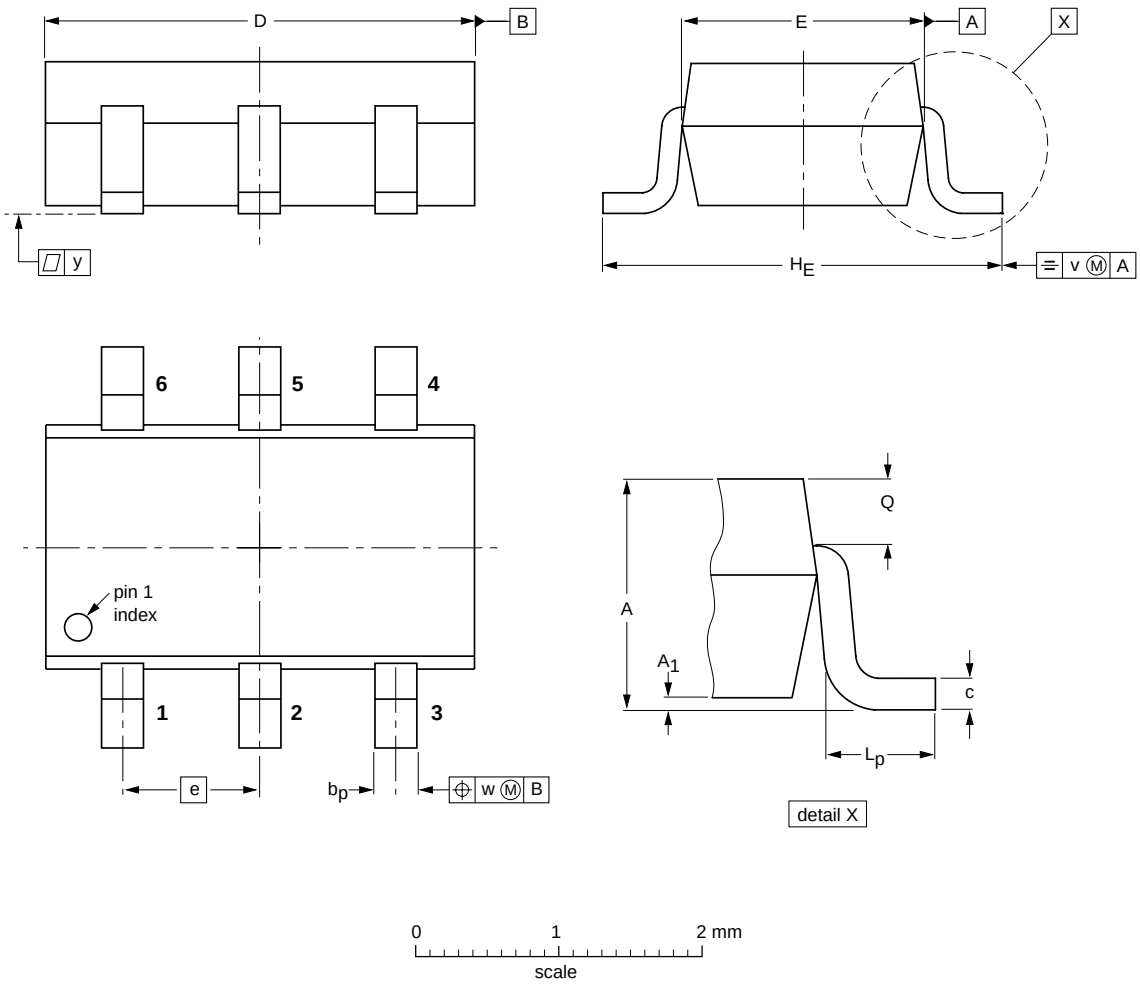

**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ max | $b_p$ | c | D | E | e | $e_1$ | $H_E$ | $L_p$ | Q | v | w | y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1<br>0.8 | 0.1 | 0.30<br>0.20 | 0.25<br>0.10 | 2.2<br>1.8 | 1.35<br>1.15 | 1.3 | 0.65 | 2.2<br>2.0 | 0.45<br>0.15 | 0.25<br>0.15 | 0.2 | 0.2 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT363 | | | SC-88 | | | ~~97-02-28~~<br>04-11-08 |

**Fig 19. Package outline SOT363 (SC-88)**

**Plastic surface mounted package; 6 leads** **SOT457**



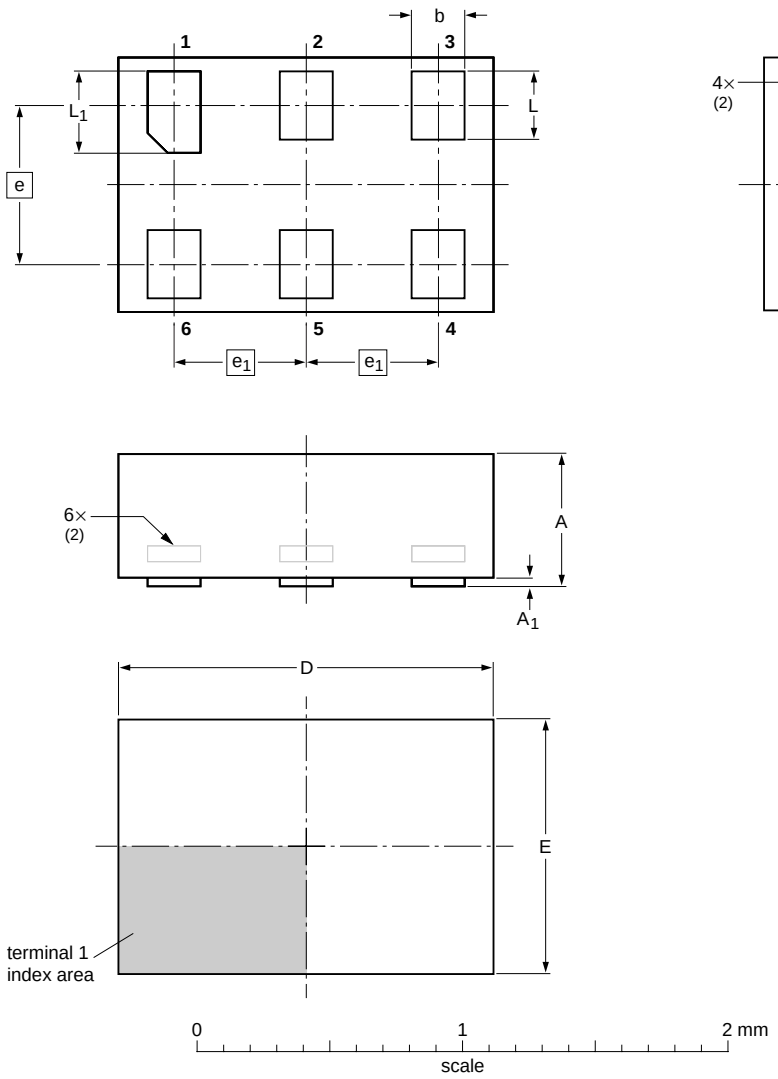

**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_1$ | $b_p$ | c | D | E | e | $H_E$ | $L_p$ | Q | v | w | y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1<br>0.9 | 0.1<br>0.013 | 0.40<br>0.25 | 0.26<br>0.10 | 3.1<br>2.7 | 1.7<br>1.3 | 0.95 | 3.0<br>2.5 | 0.6<br>0.2 | 0.33<br>0.23 | 0.2 | 0.2 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT457 | | | SC-74 | | | ~~01-05-04~~<br>04-11-08 |

**Fig 20. Package outline SOT457 (SC-74)**

**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 | A1 max | b | D | E | e | e1 | L | L1 |
|---|---|---|---|---|---|---|---|---|---|
| mm | 0.5 | 0.04 | 0.25<br>0.17 | 1.5<br>1.4 | 1.05<br>0.95 | 0.6 | 0.5 | 0.35<br>0.27 | 0.40<br>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~~<br>04-07-22 |

**Fig 21. Package outline SOT886 (XSON6)**

## 16. Revision history

**Table 15: Revision history**

| Document ID | Release date | Data sheet status | Change notice | Doc. number | Supersedes |
|---|---|---|---|---|---|
| 74LVC1G3157_1 | 20050207 | Product data sheet | - | 9397 750 14524 | - |

## 17. 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). |

[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.

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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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## 21. Contents





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