# 74LV164-Q100

## 8-bit serial-in/parallel-out shift register

Rev. 4 — 31 January 2024 Product data sheet

## 1. General description

The 74LV164-Q100 is an 8-bit edge-triggered shift register with serial data entry and an output from each of the eight stages. Data is entered serially through one of two inputs (DSA or DSB) and either input can be used as an active HIGH enable for data entry through the other input. Both inputs must be connected together or an unused input must be tied HIGH.

Data shifts one place to the right on each LOW-to-HIGH transition of the clock input (CP) and enters into Q0, which is the logical AND-function of the two data inputs (DSA and DSB) that existed one set-up time prior to the rising clock edge.

A LOW on the master reset input (MR) overrides all other inputs and clears the register asynchronously, forcing all outputs LOW.

This product has been qualified to the Automotive Electronics Council (AEC) standard Q100 (Grade 1) and is suitable for use in automotive applications.

## 2. Features and benefits

- Automotive product qualification in accordance with AEC-Q100 (Grade 1)
  - Specified from -40 °C to +85 °C and from -40 °C to +125 °C
- Wide operating voltage: 1.0 V to 5.5 V
- Optimized for low-voltage applications: 1.0 V to 3.6 V
- Accepts TTL input levels between $V_{CC}$ = 2.7 V and $V_{CC}$ = 3.6 V
- Typical $V_{OLP}$ (output ground bounce): < 0.8 V at $V_{CC}$ = 3.3 V and $T_{amb}$ = 25 °C
- Typical $V_{OHV}$ (output $V_{OH}$ undershoot): > 2 V at $V_{CC}$ = 3.3 V and $T_{amb}$ = 25 °C
- Gated serial data inputs
- Asynchronous master reset
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- DHVQFN package with Side-Wettable Flanks enabling Automatic Optical Inspection (AOI) of solder joints

## 3. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74LV164D-Q100 | -40 °C to +125 °C | SO14 | plastic small outline package; 14 leads; body width 3.9 mm | SOT108-1 |
| 74LV164PW-Q100 | -40 °C to +125 °C | TSSOP14 | plastic thin shrink small outline package; 14 leads; body width 4.4 mm | SOT402-1 |
| 74LV164BQ-Q100 | -40 °C to +125 °C | DHVQFN14 | plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 × 3 × 0.85 mm | SOT762-1 |

# 4. Functional diagram

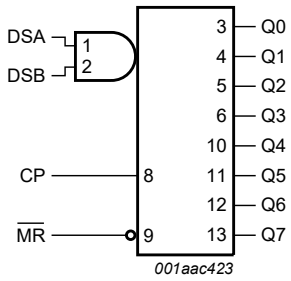



Fig. 1. Logic symbol

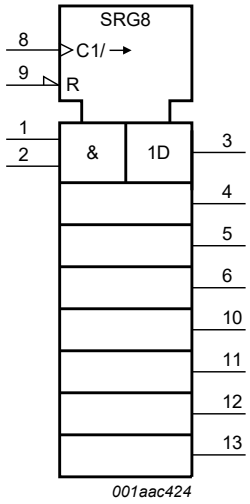



Fig. 2. IEC logic symbol

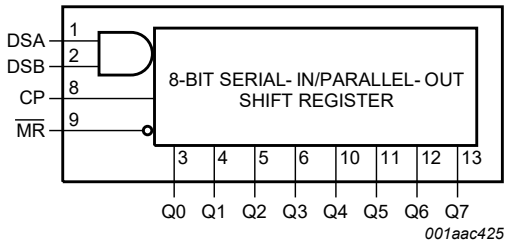
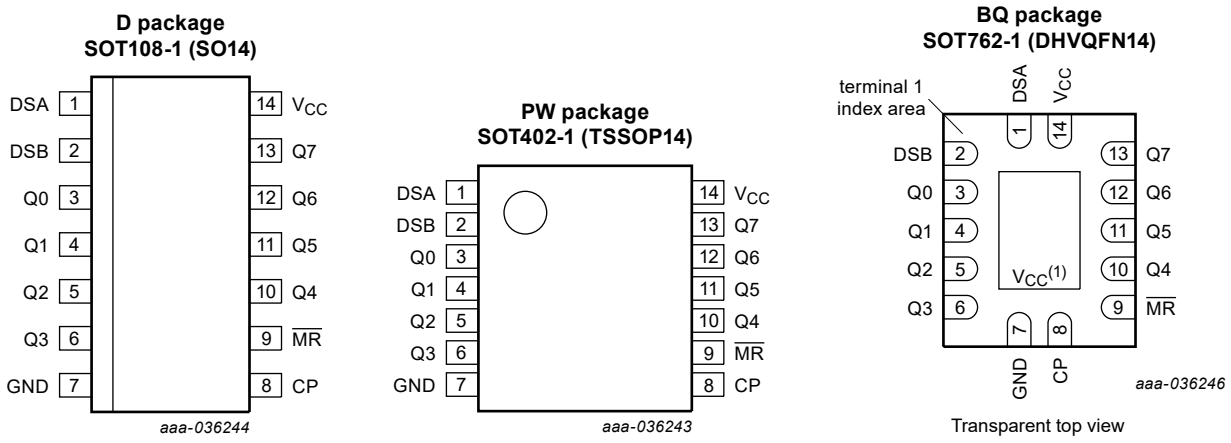



Fig. 3. Functional diagram

# 5. Pinning information

## 5.1. Pinning




(1) This is not a supply pin. There is no electrical or mechanical requirement to solder the pad. In case soldered, the solder land should remain floating or connected to $V_{CC}$.

### 5.2. Pin description

**Table 2. Pin description**

| Symbol | Pin | Description |
|---|---|---|
| DSA | 1 | data input SA |
| DSB | 2 | data input SB |
| Q0 | 3 | output 0 |
| Q1 | 4 | output 1 |
| Q2 | 5 | output 2 |
| Q3 | 6 | output 3 |
| GND | 7 | ground (0 V) |
| CP | 8 | clock input (edge triggered LOW-to-HIGH) |
| $\overline{MR}$ | 9 | master reset input (active LOW) |
| Q4 | 10 | output 4 |
| Q5 | 11 | output 5 |
| Q6 | 12 | output 6 |
| Q7 | 13 | output 7 |
| $V_{CC}$ | 14 | supply voltage |

## 6. Functional description

**Table 3. Function table**

*H = HIGH voltage level; h = HIGH voltage level one set-up time prior to the LOW-to-HIGH CP transition;*
*L = LOW voltage level; l = LOW voltage level one set-up time prior to the LOW-to-HIGH CP transition;*
*q = lower case letter indicates the state of referenced input one set-up time prior to the LOW-to-HIGH CP transition;*
*↑ = LOW-to-HIGH clock transition.*

| Operating mode | Input | | | | Output | |
|---|---|---|---|---|---|---|
| | $\overline{MR}$ | CP | DSA | DSB | Q0 | Q1 to Q7 |
| Reset (clear) | L | X | X | X | L | L to L |
| Shift | H | ↑ | l | l | L | q0 to q6 |
| | H | ↑ | l | h | L | q0 to q6 |
| | H | ↑ | h | l | L | q0 to q6 |
| | H | ↑ | h | h | H | q0 to q6 |

# 7. Limiting values

**Table 4. 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 | +7.0 | V |
| $I_{IK}$ | input clamping current | $V_I$ < -0.5 V or $V_I$ > $V_{CC}$ + 0.5 V | [1] | - | ±20 | mA |
| $I_{OK}$ | output clamping current | $V_O$ < -0.5 V or $V_O$ > $V_{CC}$ + 0.5 V | [1] | - | ±50 | mA |
| $I_O$ | output current | $V_O$ = -0.5 V to ($V_{CC}$ + 0.5 V) | | - | ±25 | mA |
| $I_{CC}$ | supply current | | | - | 50 | mA |
| $I_{GND}$ | ground current | | | -50 | - | mA |
| $T_{stg}$ | storage temperature | | | -65 | +150 | °C |
| $P_{tot}$ | total power dissipation | $T_{amb}$ = -40 °C to +125 °C | [2] | - | 500 | mW |

[1] The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
[2] For SOT108-1 (SO14) package: $P_{tot}$ derates linearly with 10.1 mW/K above 100 °C.
For SOT402-1 (TSSOP14) package: $P_{tot}$ derates linearly with 7.3 mW/K above 81 °C.
For SOT762-1 (DHVQFN14) package: $P_{tot}$ derates linearly with 9.6 mW/K above 98 °C.

# 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

*Voltages are referenced to GND (ground = 0 V).*

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | | [1] | 1.0 | 3.3 | 5.5 | V |
| $V_I$ | input voltage | | | 0 | - | $V_{CC}$ | V |
| $V_O$ | output voltage | | | 0 | - | $V_{CC}$ | V |
| $T_{amb}$ | ambient temperature | | | -40 | +25 | +125 | °C |
| Δt/ΔV | input transition rise and fall rate | $V_{CC}$ = 1.0 V to 2.0 V | | - | - | 500 | ns/V |
| | | $V_{CC}$ = 2.0 V to 2.7 V | | - | - | 200 | ns/V |
| | | $V_{CC}$ = 2.7 V to 3.6 V | | - | - | 100 | ns/V |
| | | $V_{CC}$ = 3.6 V to 5.5 V | | - | - | 50 | ns/V |

[1] The static characteristics are guaranteed from $V_{CC}$ = 1.2 V to $V_{CC}$ = 5.5 V, but LV devices are guaranteed to function down to $V_{CC}$ = 1.0 V (with input levels GND or $V_{CC}$).

# 9. Static characteristics

**Table 6. Static characteristics**

*Voltages are referenced to GND (ground = 0 V).*

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max | |
| $V_{IH}$ | HIGH-level input voltage | $V_{CC}$ = 1.2 V | 0.9 | - | - | 0.9 | - | V |
| | | $V_{CC}$ = 2.0 V | 1.4 | - | - | 1.4 | - | V |
| | | $V_{CC}$ = 2.7 V to 3.6 V | 2.0 | - | - | 2.0 | - | V |
| | | $V_{CC}$ = 4.5 V to 5.5 V | $0.7V_{CC}$ | - | - | $0.7V_{CC}$ | - | V |
| $V_{IL}$ | LOW-level input voltage | $V_{CC}$ = 1.2 V | - | - | 0.3 | - | 0.3 | V |
| | | $V_{CC}$ = 2.0 V | - | - | 0.6 | - | 0.6 | V |
| | | $V_{CC}$ = 2.7 V to 3.6 V | - | - | 0.8 | - | 0.8 | V |
| | | $V_{CC}$ = 4.5 V to 5.5 V | - | - | $0.3V_{CC}$ | - | $0.3V_{CC}$ | V |
| $V_{OH}$ | HIGH-level output voltage | $V_I = V_{IH}$ or $V_{IL}$ | | | | | | |
| | | $I_O$ = -100 µA; $V_{CC}$ = 1.2 V | - | 1.2 | - | - | - | V |
| | | $I_O$ = -100 µA; $V_{CC}$ = 2.0 V | 1.8 | 2.0 | - | 1.8 | - | V |
| | | $I_O$ = -100 µA; $V_{CC}$ = 2.7 V | 2.5 | 2.7 | - | 2.5 | - | V |
| | | $I_O$ = -100 µA; $V_{CC}$ = 3.0 V | 2.8 | 3.0 | - | 2.8 | - | V |
| | | $I_O$ = -100 µA; $V_{CC}$ = 4.5 V | 4.3 | 4.5 | - | 4.3 | - | V |
| | | $I_O$ = -6 mA; $V_{CC}$ = 3.0 V | 2.4 | 2.82 | - | 2.2 | - | V |
| | | $I_O$ = -12 mA; $V_{CC}$ = 4.5 V | 3.6 | 4.2 | - | 3.5 | - | V |
| $V_{OL}$ | LOW-level output voltage | $V_I = V_{IH}$ or $V_{IL}$ | | | | | | |
| | | $I_O$ = 100 µA; $V_{CC}$ = 1.2 V | - | 0 | - | - | - | V |
| | | $I_O$ = 100 µA; $V_{CC}$ = 2.0 V | - | 0 | 0.2 | - | 0.2 | V |
| | | $I_O$ = 100 µA; $V_{CC}$ = 2.7 V | - | 0 | 0.2 | - | 0.2 | V |
| | | $I_O$ = 100 µA; $V_{CC}$ = 3.0 V | - | 0 | 0.2 | - | 0.2 | V |
| | | $I_O$ = 100 µA; $V_{CC}$ = 4.5 V | - | 0 | 0.2 | - | 0.2 | V |
| | | $I_O$ = 6 mA; $V_{CC}$ = 3.0 V | - | 0.25 | 0.40 | - | 0.50 | V |
| | | $I_O$ = 12 mA; $V_{CC}$ = 4.5 V | - | 0.35 | 0.55 | - | 0.65 | V |
| $I_I$ | input leakage current | $V_I = V_{CC}$ or GND; $V_{CC}$ = 5.5 V | - | - | 1.0 | - | 1.0 | µA |
| $I_{CC}$ | supply current | $V_I = V_{CC}$ or GND; $I_O$ = 0 A; $V_{CC}$ = 5.5 V | - | - | 20.0 | - | 160 | µA |
| $\Delta I_{CC}$ | additional supply current | per input; $V_I = V_{CC}$ - 0.6 V; $V_{CC}$ = 2.7 V to 3.6 V | - | - | 500 | - | 850 | µA |
| $C_I$ | input capacitance | | - | 3.5 | - | - | - | pF |

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

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

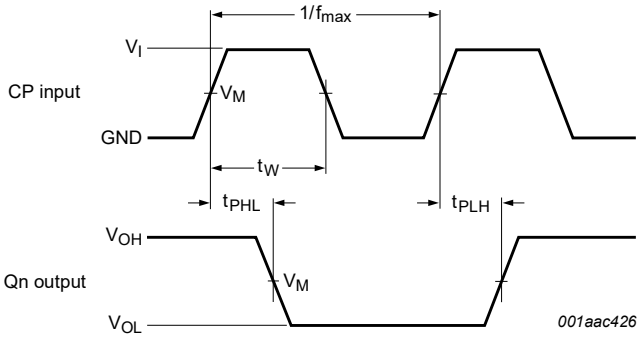
*GND = 0 V; For test circuit see Fig. 7.*

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max | |
| $t_{pd}$ | propagation delay | CP to Qn; see Fig. 4 [2] | | | | | | |
| | | $V_{CC}$ = 1.2 V | - | 75 | - | - | - | ns |
| | | $V_{CC}$ = 2.0 V | - | 26 | 39 | - | 49 | ns |
| | | $V_{CC}$ = 2.7 V | - | 19 | 29 | - | 36 | ns |
| | | $V_{CC}$ = 3.3 V; $C_L$ = 15 pF | - | 12 | - | - | - | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V [3] | - | 14 | 23 | - | 29 | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V [3] | - | 12 | 19 | - | 24 | ns |
| $t_{PHL}$ | HIGH to LOW propagation delay | $\overline{MR}$ to Qn; see Fig. 5 | | | | | | |
| | | $V_{CC}$ = 1.2 V | - | 75 | - | - | - | ns |
| | | $V_{CC}$ = 2.0 V | - | 26 | 39 | - | 49 | ns |
| | | $V_{CC}$ = 2.7 V | - | 19 | 29 | - | 36 | ns |
| | | $V_{CC}$ = 3.3 V; $C_L$ = 15 pF | - | 12 | - | - | - | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V [3] | - | 14 | 23 | - | 29 | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V [3] | - | 12 | 19 | - | 24 | ns |
| $t_W$ | pulse width | CP; see Fig. 4 | | | | | | |
| | | $V_{CC}$ = 2.0 V | 34 | 9 | - | 41 | - | ns |
| | | $V_{CC}$ = 2.7 V | 25 | 6 | - | 30 | - | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V [3] | 20 | 5 | - | 24 | - | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V [3] | 13 | 4 | - | 16 | - | ns |
| | | $\overline{MR}$; Fig. 5 | | | | | | |
| | | $V_{CC}$ = 2.0 V | 34 | 10 | - | 41 | - | ns |
| | | $V_{CC}$ = 2.7 V | 25 | 8 | - | 30 | - | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V [3] | 20 | 6 | - | 24 | - | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V [3] | 13 | 5 | - | 16 | - | ns |
| $t_{rec}$ | recovery time | $\overline{MR}$ to CP; see Fig. 5 | | | | | | |
| | | $V_{CC}$ = 1.2 V | - | 30 | - | - | - | ns |
| | | $V_{CC}$ = 2.0 V | 19 | 10 | - | 24 | - | ns |
| | | $V_{CC}$ = 2.7 V | 14 | 8 | - | 18 | - | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V [3] | 11 | 6 | - | 14 | - | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V [3] | 8 | 5 | - | 10 | - | ns |
| $t_{su}$ | set-up time | Dn to CP; see Fig. 6 | | | | | | |
| | | $V_{CC}$ = 1.2 V | - | 15 | - | - | - | ns |
| | | $V_{CC}$ = 2.0 V | 22 | 5 | - | 26 | - | ns |
| | | $V_{CC}$ = 2.7 V | 16 | 4 | - | 19 | - | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V [3] | 13 | 3 | - | 15 | - | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V [3] | 9 | 2 | - | 10 | - | ns |

| Symbol | Parameter | Conditions | -40 °C to +85 °C | | | -40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ[1] | Max | Min | Max | |
| $t_h$ | hold time | Dn to CP; see Fig. 6 | | | | | | |
| | | $V_{CC}$ = 1.2 V | - | -10 | - | - | - | ns |
| | | $V_{CC}$ = 2.0 V | 5 | -3 | - | 5 | - | ns |
| | | $V_{CC}$ = 2.7 V | 5 | -2 | - | 5 | - | ns |
| | | $V_{CC}$ = 3.0 V to 3.6 V [3] | 5 | -2 | - | 5 | - | ns |
| | | $V_{CC}$ = 4.5 V to 5.5 V [3] | 5 | -1 | - | 5 | - | ns |
| $f_{max}$ | maximum frequency | see Fig. 4 | | | | | | |
| | | $V_{CC}$ = 2.0 V | 14 | 40 | - | 12 | - | MHz |
| | | $V_{CC}$ = 2.7 V | 19 | 58 | - | 16 | - | MHz |
| | | $V_{CC}$ = 3.3 V; $C_L$ = 15 pF | - | 78 | - | - | - | MHz |
| | | $V_{CC}$ = 3.0 V to 3.6 V [3] | 24 | 70 | - | 20 | - | MHz |
| | | $V_{CC}$ = 4.5 V to 5.5 V [3] | 36 | 100 | - | 30 | - | MHz |
| $C_{PD}$ | power dissipation capacitance | $V_{CC}$ = 3.3 V; $C_L$ = 50 pF; $f_i$ = 1 MHz; $V_I$ = GND to $V_{CC}$ [4] | - | 40 | - | - | - | pF |

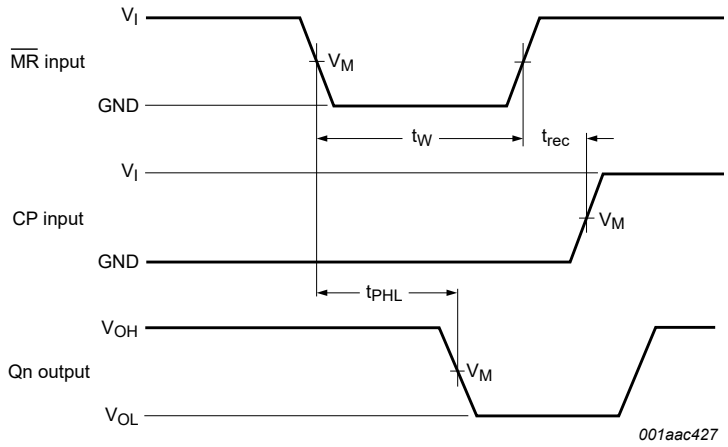
[1] All typical values are measured at $T_{amb}$ = 25 °C.
[2] $t_{pd}$ is the same as $t_{PLH}$ and $t_{PHL}$.
[3] Typical values are measured at nominal supply voltage ($V_{CC}$ = 3.3 V and $V_{CC}$ = 5.0 V).
[4] $C_{PD}$ is used to determine the dynamic power dissipation ($P_D$ in µW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ 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
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

## 10.1. Waveforms and test circuit




Measurement points are given in Table 8.
$V_{OL}$ and $V_{OH}$ are typical output voltage levels that occur with the output load.

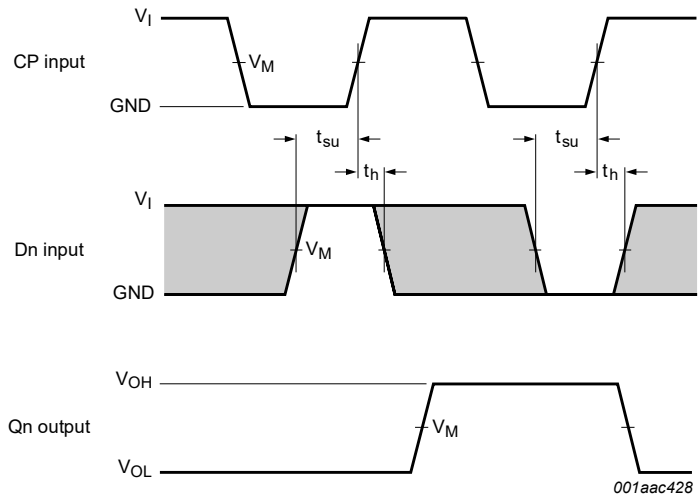
**Fig. 4. Propagation delay clock (CP) to output (Qn), clock pulse width and maximum clock frequency**




Measurement points are given in Table 8.

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

**Fig. 5. Pulse width master reset ($\overline{MR}$), propagation delay master reset ($\overline{MR}$) to output (Qn) and the master reset ($\overline{MR}$) to clock (CP) recovery time**




Measurement points are given in Table 8.

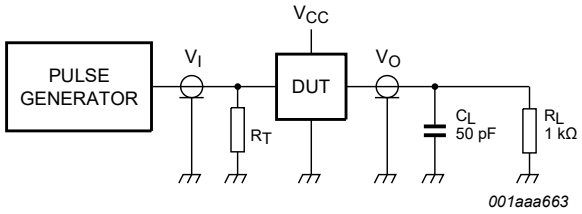
$V_{OL}$ and $V_{OH}$ are typical output voltage levels that occur with the output load.

The shaded areas indicate when the input is permitted to change for predictable output performance.

**Fig. 6. Data set-up and hold times inputs (Dn) to clock (CP)**

**Table 8. Measurement points**

| Supply voltage | Input | Output |
|---|---|---|
| $V_{CC}$ | $V_M$ | $V_M$ |
| 1.2 V | 0.5 × $V_{CC}$ | 0.5 × $V_{CC}$ |
| 2.0 V | 0.5 × $V_{CC}$ | 0.5 × $V_{CC}$ |
| 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 × $V_{CC}$ | 0.5 × $V_{CC}$ |




Test data is given in Table 9.

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 output impedance $Z_o$ of the pulse generator.

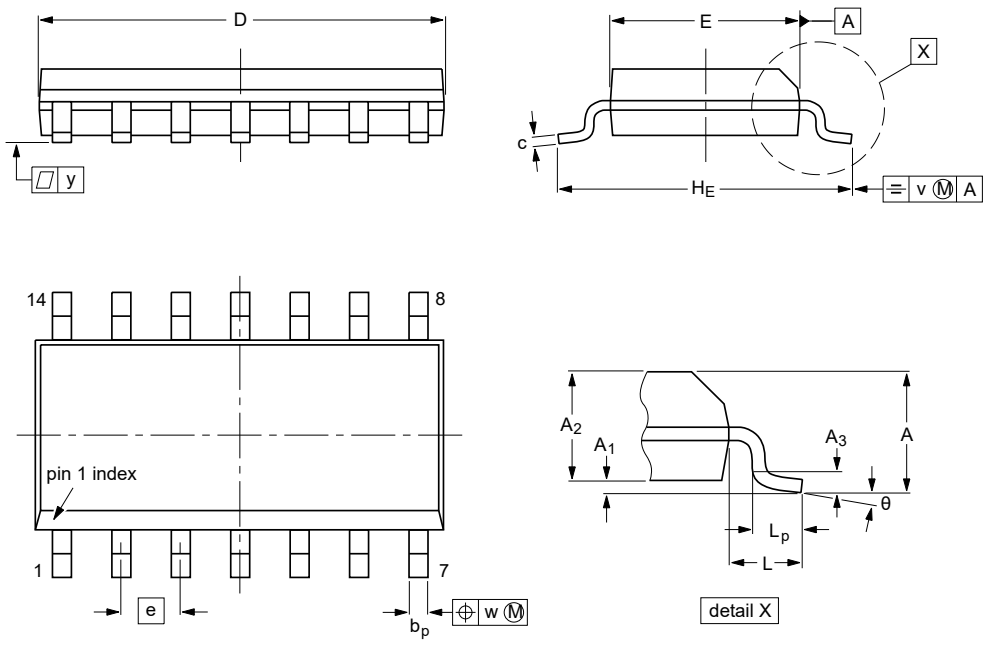
**Fig. 7. Test circuit for measuring switching times**

**Table 9. Test data**

| Supply voltage | Input | | Load | | Test |
|---|---|---|---|---|---|
| $V_{CC}$ | $V_I$ | $t_r$ , $t_f$ | $C_L$ | $R_L$ | |
| 1.2 V | $V_{CC}$ | ≤ 2.5 ns | 50 pF | 1 kΩ | $t_{PHL}$, $t_{PLH}$ |
| 2.0 V | $V_{CC}$ | ≤ 2.5 ns | 50 pF | 1 kΩ | $t_{PHL}$, $t_{PLH}$ |
| 2.7 V | 2.7 V | ≤ 2.5 ns | 50 pF | 1 kΩ | $t_{PHL}$, $t_{PLH}$ |
| 3.0 V to 3.6 V | 2.7 V | ≤ 2.5 ns | 50 pF, 15 pF | 1 kΩ | $t_{PHL}$, $t_{PLH}$ |
| 4.5 V to 5.5 V | $V_{CC}$ | ≤ 2.5 ns | 50 pF | 1 kΩ | $t_{PHL}$, $t_{PLH}$ |

# 11. Package outline

**SO14: plastic small outline package; 14 leads; body width 3.9 mm** **SOT108-1**




Dimensions (inch dimensions are derived from the original mm dimensions)

| Unit | | A | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | $D^{(1)}$ | $E^{(1)}$ | e | $H_E$ | L | $L_p$ | v | w | y | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 1.75 | 0.25 | | | 0.51 | 0.25 | 8.75 | 4.0 | | 6.2 | | 1.27 | | | | 8° |
| | nom | | | | 0.25 | | | | | 1.27 | | 1.05 | | 0.2 | 0.25 | 0.1 | |
| | min | | 0.10 | 1.25 | | 0.31 | 0.10 | 8.55 | 3.8 | | 5.8 | | 0.4 | | | | 0° |
| inches | max | 0.069 | 0.010 | | | 0.020 | 0.010 | 0.344 | 0.16 | | 0.244 | | 0.05 | | | | 8° |
| | nom | | | | 0.01 | | | | | 0.05 | | 0.041 | | 0.008 | 0.01 | 0.004 | |
| | min | | 0.004 | 0.049 | | 0.012 | 0.004 | 0.337 | 0.15 | | 0.228 | | 0.016 | | | | 0° |

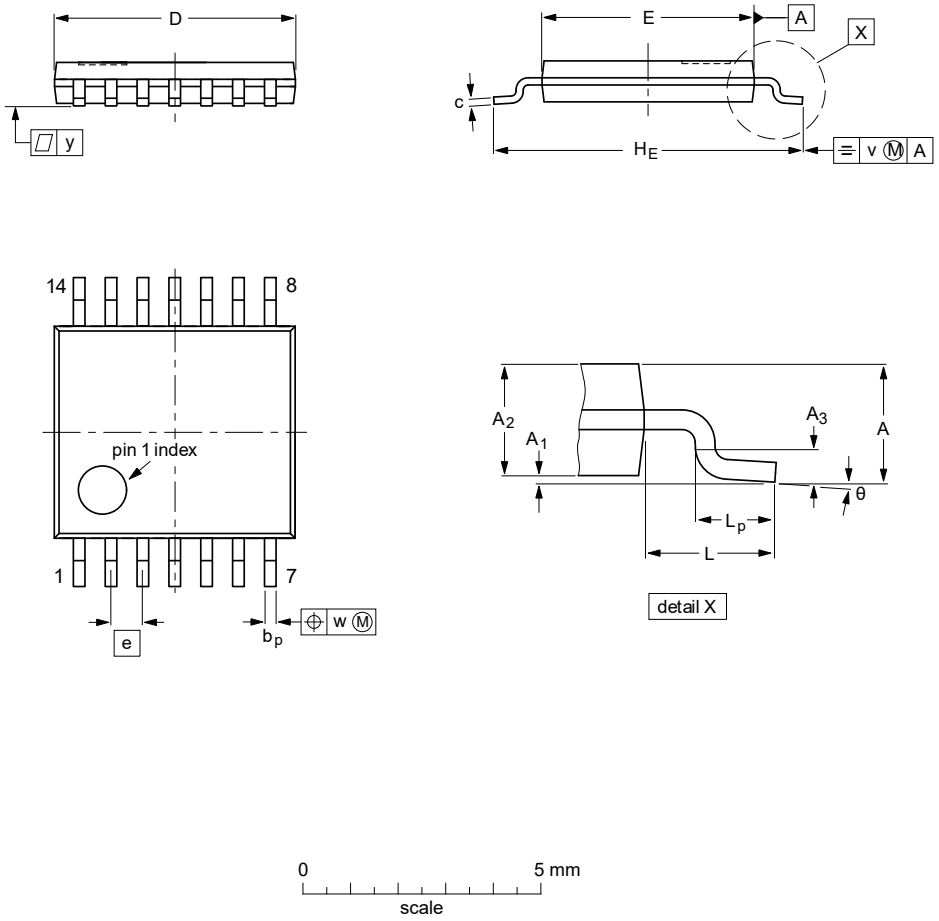
Note
1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

*sot108-1_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT108-1 | | MS-012 | | | | ~~03-02-19~~ 23-10-27 |

**Fig. 8. Package outline SOT108-1 (SO14)**

**TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm** **SOT402-1**




Dimensions (mm are the original dimensions)

| Unit | | A | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | $D^{(1)}$ | $E^{(2)}$ | e | $H_E$ | L | $L_p$ | v | w | y | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 1.20 | 0.15 | 1.05 | | 0.30 | 0.2 | 5.1 | 4.5 | | 6.6 | | 0.75 | | | | 8° |
| | nom | | | | 0.25 | | | | | 0.65 | | 1 | | 0.2 | 0.1 | 0.1 | |
| | min | | 0.05 | 0.80 | | 0.19 | 0.09 | 4.9 | 4.3 | | 6.2 | | 0.45 | | | | 0° |

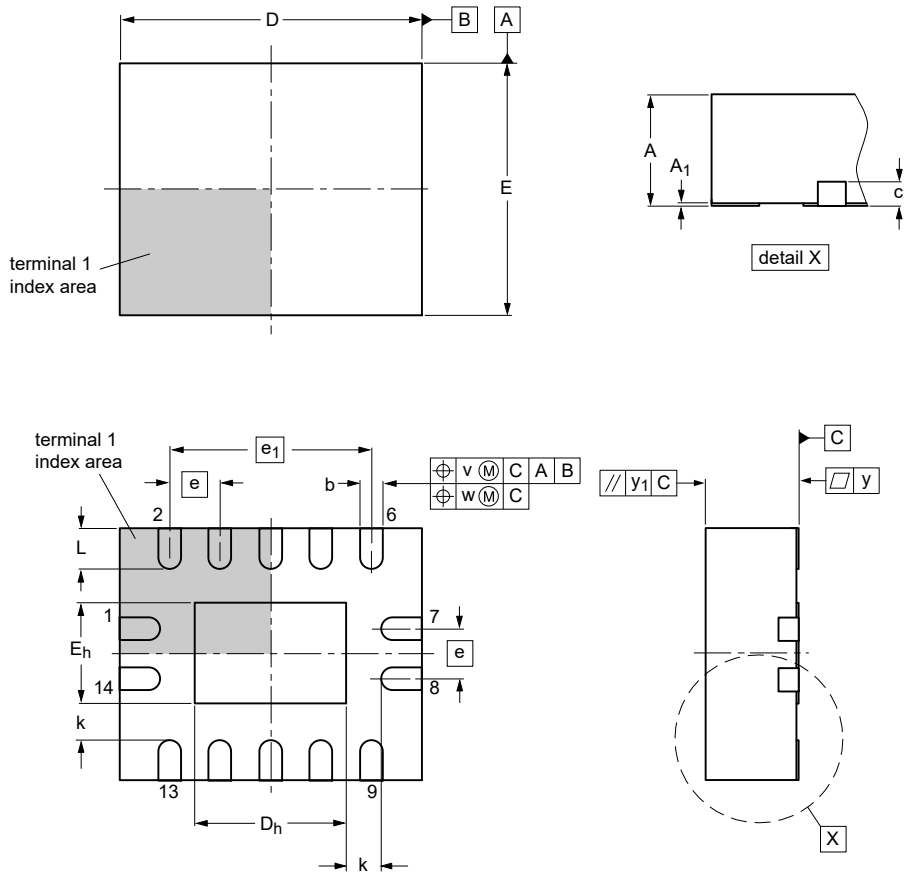
Note
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

*sot402-1_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT402-1 | | MO-153 | | | | ~~03-02-18~~ 23-10-27 |

**Fig. 9. Package outline SOT402-1 (TSSOP14)**

**DHVQFN14: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 14 terminals; body 2.5 x 3 x 0.85 mm** **SOT762-1**




Dimensions (mm are the original dimensions)

| Unit | | $A^{(1)}$ | $A_1$ | b | c | $D^{(1)}$ | $D_h$ | $E^{(1)}$ | $E_h$ | e | $e_1$ | k | L | v | w | y | $y_1$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | max | 1 | 0.05 | 0.30 | | 3.1 | 1.65 | 2.6 | 1.15 | | | | 0.5 | | | | |
| mm | nom | | 0.02 | 0.25 | 0.2 | 3.0 | 1.50 | 2.5 | 1.00 | 0.5 | 2 | | 0.4 | 0.1 | 0.05 | 0.05 | 0.1 |
| | min | | 0.00 | 0.18 | | 2.9 | 1.35 | 2.4 | 0.85 | | | 0.2 | 0.3 | | | | |

Note

1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

*sot762-1_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT762-1 | | MO-241 | | | | ~~15-04-10~~ 15-05-05 |

**Fig. 10. Package outline SOT762-1 (DHVQFN14)**

## 12. Abbreviations

**Table 10. Abbreviations**

| Acronym | Description |
|---|---|
| CDM | Charged Device Model |
| CMOS | Complementary Metal Oxide Semiconductor |
| DUT | Device Under Test |
| ESD | ElectroStatic Discharge |
| HBM | Human Body Model |
| TTL | Transistor-Transistor Logic |

## 13. Revision history

**Table 11. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| 74LV164_Q100 v.4 | 20240131 | Product data sheet | - | 74LV164_Q100 v.3 |
| Modifications: | • Section 2: ESD specification updated according to the latest JEDEC standard.<br>• Fig. 8, Fig. 9: Aligned SO and TSSOP package outline drawings to JEDEC MS-012 and MO-153 | | | |
| 74LV164_Q100 v.3 | 20200915 | Product data sheet | - | 74LV164_Q100 v.2 |
| Modifications: | • The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.<br>• Legal texts have been adapted to the new company name where appropriate.<br>• Section 2 updated.<br>• Table 4: Derating values for $P_{tot}$ total power dissipation have been updated.<br>• Package outline drawing of SOT762-1 (Fig. 10) updated. | | | |
| 74LV164_Q100 v.2 | 20140918 | Product data sheet | - | 74LV164_Q100 v.1 |
| Modifications: | • Section 2: ESD protection: MIL-STD-833 changed to MIL-STD883 | | | |
| 74LV164_Q100 v.1 | 20130626 | Product data sheet | - | - |

# 14. Legal information

## 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".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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