# 74HC138-Q100; 74HCT138-Q100

## 3-to-8 line decoder/demultiplexer; inverting

Rev. 2 — 26 January 2015 Product data sheet

## 1. General description

The 74HC138-Q100; 74HCT138-Q100 decodes three binary weighted address inputs (A0, A1 and A2) to eight mutually exclusive outputs ($\overline{Y}0$ to $\overline{Y}7$). The device features three enable inputs ($\overline{E}1$, $\overline{E}2$ and E3). Every output will be HIGH unless $\overline{E}1$ and $\overline{E}2$ are LOW and E3 is HIGH. This multiple enable function allows easy parallel expansion to a 1-of-32 (5 to 32 lines) decoder with just four '138' ICs and one inverter. The '138' can be used as an eight output demultiplexer by using one of the active LOW enable inputs as the data input and the remaining enable inputs as strobes. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of $V_{CC}$.

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
- Complies with JEDEC standard no. 7A
- Input levels:
  - For 74HC138-Q100: CMOS level
  - For 74HCT138-Q100: TTL level
- Demultiplexing capability
- Multiple input enable for easy expansion
- Ideal for memory chip select decoding
- Active LOW mutually exclusive outputs
- ESD protection:
  - MIL-STD-883, method 3015 exceeds 2000 V
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V (C = 200 pF, R = 0 Ω)
- Multiple package options

## 3. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74HC138D-Q100 | −40 °C to +125 °C | SO16 | plastic small outline package; 16 leads; body width 3.9 mm | SOT109-1 |
| 74 HCT138D-Q100 | | | | |
| 74HC138PW-Q100 | −40 °C to +125 °C | TSSOP16 | plastic thin shrink small outline package; 16 leads; body width 4.4 mm | SOT403-1 |
| 74HCT138PW-Q100 | | | | |
| 74HC138BQ-Q100 | −40 °C to +125 °C | DHVQFN16 | plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 16 terminals; body 2.5 × 3.5 × 0.85 mm | SOT763-1 |
| 74HCT138BQ-Q100 | | | | |

## 4. Functional diagram

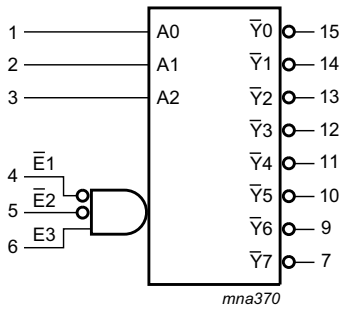



**Fig 1. Logic symbol**

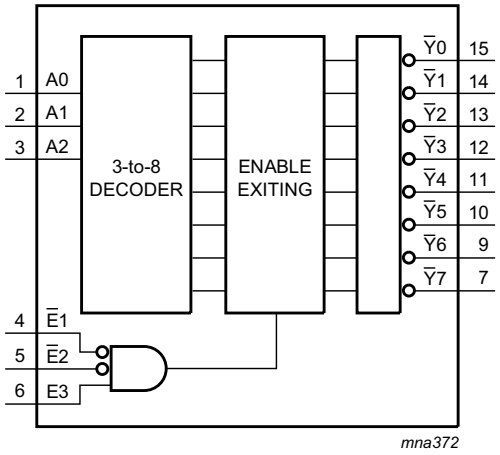



**Fig 2. Functional diagram**

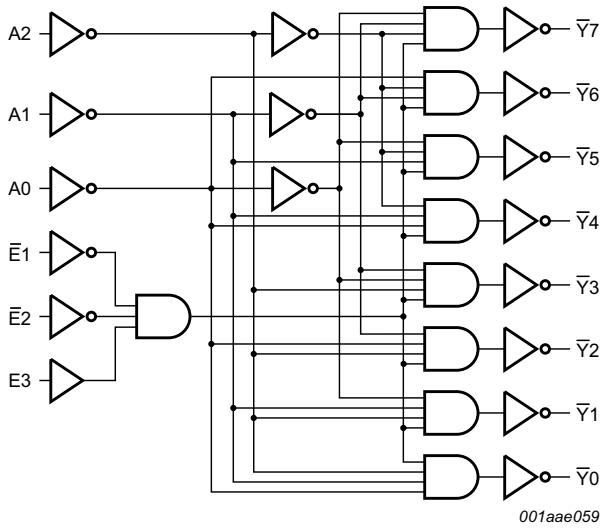



**Fig 3. Logic diagram**

# 5. Pinning information

## 5.1 Pinning

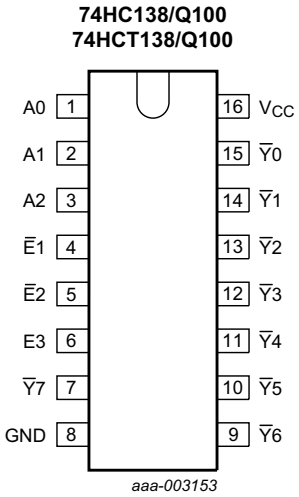
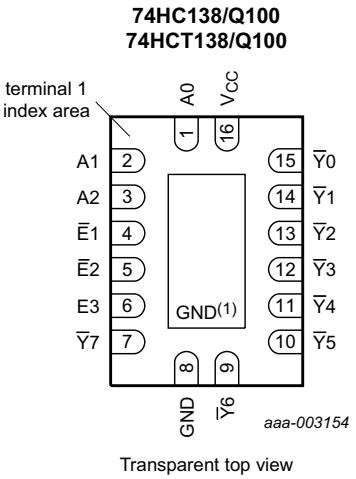



**Fig 4. Pin configuration SO16 and TSSOP16**




Transparent top view

(1) This is not a supply pin. The substrate is attached to this pad using conductive die attach material. There is no electrical or mechanical requirement to solder this pad. However, if it is soldered, the solder land should remain floating or be connected to GND.

**Fig 5. Pin configuration DHVQFN16**

### 5.2 Pin description

**Table 2. Pin description**

| Symbol | Pin | Description |
|---|---|---|
| A0, A1, A2 | 1, 2, 3 | address input A0, A1, A2 |
| $\overline{E}1$, $\overline{E}2$ | 4, 5 | enable input $\overline{E}1$, $\overline{E}2$ (active LOW) |
| E3 | 6 | enable input E3 (active HIGH) |
| $\overline{Y}0$, $\overline{Y}1$, $\overline{Y}2$, $\overline{Y}3$, $\overline{Y}4$, $\overline{Y}5$, $\overline{Y}6$, $\overline{Y}7$ | 15, 14, 13, 12, 11, 10, 9, 7 | output $\overline{Y}0$, $\overline{Y}1$, $\overline{Y}2$, $\overline{Y}3$, $\overline{Y}4$, $\overline{Y}5$, $\overline{Y}6$, $\overline{Y}7$ (active LOW) |
| GND | 8 | ground (0 V) |
| $V_{CC}$ | 16 | positive supply voltage |

## 6. Functional description

**Table 3. Function table[1]**

| Control | | | Input | | | Output | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $\overline{E}1$ | $\overline{E}2$ | E3 | A2 | A1 | A0 | $\overline{Y}7$ | $\overline{Y}6$ | $\overline{Y}5$ | $\overline{Y}4$ | $\overline{Y}3$ | $\overline{Y}2$ | $\overline{Y}1$ | $\overline{Y}0$ |
| H | X | X | X | X | X | H | H | H | H | H | H | H | H |
| X | H | X | | | | | | | | | | | |
| X | X | L | | | | | | | | | | | |
| L | L | H | L | L | L | H | H | H | H | H | H | H | L |
| | | | L | L | H | H | H | H | H | H | H | L | H |
| | | | L | H | L | H | H | H | H | H | L | H | H |
| | | | L | H | H | H | H | H | H | L | H | H | H |
| | | | H | L | L | H | H | H | L | H | H | H | H |
| | | | H | L | H | H | H | L | H | H | H | H | H |
| | | | H | H | L | H | L | H | H | H | H | H | H |
| | | | H | H | H | L | H | H | H | H | H | H | H |

[1] H = HIGH voltage level; L = LOW voltage level; X = don't care.

# 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 | V |
| $I_{IK}$ | input clamping current | $V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V | - | ±20 | mA |
| $I_{OK}$ | output clamping current | $V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V | - | ±20 | 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 | [1] | - | 500 | mW |

[1] For SO16 package: $P_{tot}$ derates linearly with 8 mW/K above 70 °C.
For TSSOP16 package: $P_{tot}$ derates linearly with 5.5 mW/K above 60 °C.
For DHVQFN16 package: $P_{tot}$ derates linearly with 4.5 mW/K above 60 °C.

# 8. Recommended operating conditions

**Table 5. Recommended operating conditions**

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

| Symbol | Parameter | Conditions | 74HC138-Q100 | | | 74HCT138-Q100 | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Typ | Max | |
| $V_{CC}$ | supply voltage | | 2.0 | 5.0 | 6.0 | 4.5 | 5.0 | 5.5 | V |
| $V_I$ | input voltage | | 0 | - | $V_{CC}$ | 0 | - | $V_{CC}$ | V |
| $V_O$ | output voltage | | 0 | - | $V_{CC}$ | 0 | - | $V_{CC}$ | V |
| $T_{amb}$ | ambient temperature | | −40 | +25 | +125 | −40 | +25 | +125 | °C |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{CC}$ = 2.0 V | - | - | 625 | - | - | - | ns/V |
| | | $V_{CC}$ = 4.5 V | - | 1.67 | 139 | - | 1.67 | 139 | ns/V |
| | | $V_{CC}$ = 6.0 V | - | - | 83 | - | - | - | ns/V |

## 9. Static characteristics

**Table 6. Static characteristics**

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

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = –40 °C to +85 °C | | $T_{amb}$ = –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| **74HC138-Q100** | | | | | | | | | | |
| $V_{IH}$ | HIGH-level input voltage | $V_{CC}$ = 2.0 V | 1.5 | 1.2 | - | 1.5 | - | 1.5 | - | V |
| | | $V_{CC}$ = 4.5 V | 3.15 | 2.4 | - | 3.15 | - | 3.15 | - | V |
| | | $V_{CC}$ = 6.0 V | 4.2 | 3.2 | - | 4.2 | - | 4.2 | - | V |
| $V_{IL}$ | LOW-level input voltage | $V_{CC}$ = 2.0 V | - | 0.8 | 0.5 | - | 0.5 | - | 0.5 | V |
| | | $V_{CC}$ = 4.5 V | - | 2.1 | 1.35 | - | 1.35 | - | 1.35 | V |
| | | $V_{CC}$ = 6.0 V | - | 2.8 | 1.8 | - | 1.8 | - | 1.8 | V |
| $V_{OH}$ | HIGH-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | | | | | |
| | | $I_O$ = –20 μA; $V_{CC}$ = 2.0 V | 1.9 | 2.0 | - | 1.9 | - | 1.9 | - | V |
| | | $I_O$ = –20 μA; $V_{CC}$ = 4.5 V | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | $I_O$ = –20 μA; $V_{CC}$ = 6.0 V | 5.9 | 6.0 | - | 5.9 | - | 5.9 | - | V |
| | | $I_O$ = –4.0 mA; $V_{CC}$ = 4.5 V | 3.98 | 4.32 | - | 3.84 | - | 3.7 | - | V |
| | | $I_O$ = –5.2 mA; $V_{CC}$ = 6.0 V | 5.48 | 5.81 | - | 5.34 | - | 5.2 | - | V |
| $V_{OL}$ | LOW-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | | | | | |
| | | $I_O$ = 20 μA; $V_{CC}$ = 2.0 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_O$ = 20 μA; $V_{CC}$ = 4.5 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_O$ = 20 μA; $V_{CC}$ = 6.0 V | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_O$ = 4.0 mA; $V_{CC}$ = 4.5 V | - | 0.15 | 0.26 | - | 0.33 | - | 0.4 | V |
| | | $I_O$ = 5.2 mA; $V_{CC}$ = 6.0 V | - | 0.16 | 0.26 | - | 0.33 | - | 0.4 | V |
| $I_I$ | input leakage current | $V_I$ = $V_{CC}$ or GND; $V_{CC}$ = 6.0 V | - | - | ±0.1 | - | ±1.0 | - | ±1.0 | μA |
| $I_{CC}$ | supply current | $V_I$ = $V_{CC}$ or GND; $I_O$ = 0 A; $V_{CC}$ = 6.0 V | - | - | 8.0 | - | 80 | - | 160 | μA |
| $C_I$ | input capacitance | | - | 3.5 | - | | | | | pF |
| **74HCT138-Q100** | | | | | | | | | | |
| $V_{IH}$ | HIGH-level input voltage | $V_{CC}$ = 4.5 V to 5.5 V | 2.0 | 1.6 | - | 2.0 | - | 2.0 | - | V |
| $V_{IL}$ | LOW-level input voltage | $V_{CC}$ = 4.5 V to 5.5 V | - | 1.2 | 0.8 | - | 0.8 | - | 0.8 | V |
| $V_{OH}$ | HIGH-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$; $V_{CC}$ = 4.5 V | | | | | | | | |
| | | $I_O$ = –20 μA | 4.4 | 4.5 | - | 4.4 | - | 4.4 | - | V |
| | | $I_O$ = –4 mA | 3.98 | 4.32 | - | 3.84 | - | 3.7 | - | V |
| $V_{OL}$ | LOW-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$; $V_{CC}$ = 4.5 V | | | | | | | | |
| | | $I_O$ = 20 μA | - | 0 | 0.1 | - | 0.1 | - | 0.1 | V |
| | | $I_O$ = 4.0 mA | - | 0.15 | 0.26 | - | 0.33 | - | 0.4 | V |
| $I_I$ | input leakage current | $V_I$ = $V_{CC}$ or GND; $V_{CC}$ = 5.5 V | - | - | ±0.1 | - | ±1.0 | - | ±1.0 | μA |

**Table 6. Static characteristics** *...continued*

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

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = –40 °C to +85 °C | | $T_{amb}$ = –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| $I_{CC}$ | supply current | $V_I = V_{CC}$ or GND; $I_O$ = 0 A; $V_{CC}$ = 5.5 V | - | - | 8.0 | - | 80 | - | 160 | µA |
| $\Delta I_{CC}$ | additional supply current | $V_I = V_{CC}$ – 2.1 V; other inputs at $V_{CC}$ or GND; $V_{CC}$ = 4.5 V to 5.5 V; $I_O$ = 0 A | | | | | | | | |
| | | per input pin; An inputs | - | 150 | 540 | - | 675 | - | 735 | µA |
| | | per input pin; $\overline{E}n$ inputs | - | 125 | 450 | - | 562.5 | - | 612.5 | µA |
| | | per input pin; E3 input | - | 100 | 360 | - | 450 | - | 490 | µA |
| $C_I$ | input capacitance | | - | 3.5 | - | | | | | pF |

## 10. Dynamic characteristics

**Table 7. Dynamic characteristics**

*Voltages are referenced to GND (ground = 0 V); $C_L$ = 50 pF unless otherwise specified; for test circuit see Figure 8.*

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = –40 °C to +85 °C | | $T_{amb}$ = –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| **74HC138-Q100** | | | | | | | | | | |
| $t_{pd}$ | propagation delay | An to $\overline{Y}n$; see Figure 6 [1] | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | - | 41 | 150 | - | 190 | - | 225 | ns |
| | | $V_{CC}$ = 4.5 V | - | 15 | 30 | - | 38 | - | 45 | ns |
| | | $V_{CC}$ = 5 V; $C_L$ = 15 pF | - | 12 | - | - | - | - | - | ns |
| | | $V_{CC}$ = 6.0 V | - | 12 | 26 | - | 33 | - | 38 | ns |
| | | E3 to $\overline{Y}n$; see Figure 6 [1] | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | - | 47 | 150 | - | 190 | - | 225 | ns |
| | | $V_{CC}$ = 4.5 V | - | 17 | 20 | - | 38 | - | 45 | ns |
| | | $V_{CC}$ = 5 V; $C_L$ = 15 pF | - | 14 | - | - | - | - | - | ns |
| | | $V_{CC}$ = 6.0 V | - | 14 | 26 | - | 33 | - | 38 | ns |
| | | $\overline{E}n$ to $\overline{Y}n$; see Figure 7 [1] | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | - | 47 | 150 | - | 190 | - | 225 | ns |
| | | $V_{CC}$ = 4.5 V | - | 17 | 20 | - | 38 | - | 45 | ns |
| | | $V_{CC}$ = 5 V; $C_L$ = 15 pF | - | 14 | - | - | - | - | - | ns |
| | | $V_{CC}$ = 6.0 V | - | 14 | 26 | - | 33 | - | 38 | ns |
| $t_t$ | transition time | $\overline{Y}n$; see Figure 6 and Figure 7 [2] | | | | | | | | |
| | | $V_{CC}$ = 2.0 V | - | 19 | 75 | - | 95 | - | 110 | ns |
| | | $V_{CC}$ = 4.5 V | - | 7 | 15 | - | 19 | - | 22 | ns |
| | | $V_{CC}$ = 6.0 V | - | 6 | 13 | - | 16 | - | 19 | ns |

**Table 7. Dynamic characteristics** *…continued*

*Voltages are referenced to GND (ground = 0 V); $C_L$ = 50 pF unless otherwise specified; for test circuit see Figure 8.*

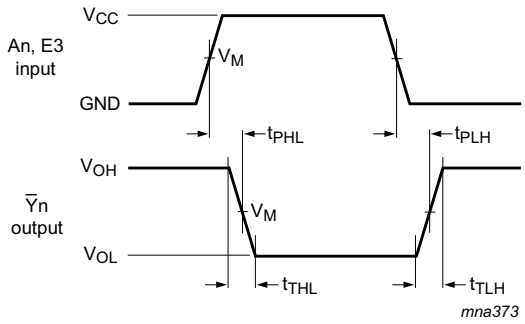
| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | $T_{amb}$ = –40 °C to +85 °C | | $T_{amb}$ = –40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | Min | Max | Min | Max | |
| $C_{PD}$ | power dissipation capacitance | $C_L$ = 50 pF; f = 1 MHz; $V_I$ = GND to $V_{CC}$ [3] | - | 67 | - | - | - | - | - | pF |
| **74HCT138-Q100** | | | | | | | | | | |
| $t_{pd}$ | propagation delay | An to $\overline{Y}$n; see Figure 6 [1] | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | - | 20 | 35 | - | 44 | - | 53 | ns |
| | | $V_{CC}$ = 5 V; $C_L$ = 15 pF | - | 17 | - | - | - | - | - | ns |
| | | E3 to $\overline{Y}$n; see Figure 6 [1] | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | - | 18 | 40 | - | 50 | - | 60 | ns |
| | | $V_{CC}$ = 5 V; $C_L$ = 15 pF | - | 19 | - | - | - | - | - | ns |
| | | $\overline{E}$n to $\overline{Y}$n; see Figure 7 [1] | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | - | 19 | 40 | - | 50 | - | 60 | ns |
| | | $V_{CC}$ = 5 V; $C_L$ = 15 pF | - | 19 | - | - | - | - | - | ns |
| $t_t$ | transition time | $\overline{Y}$n; see Figure 6 and Figure 7 [2] | | | | | | | | |
| | | $V_{CC}$ = 4.5 V | - | 7 | 15 | - | 19 | - | 22 | ns |
| $C_{PD}$ | power dissipation capacitance | $C_L$ = 50 pF; f = 1 MHz; $V_I$ = GND to $V_{CC}$ – 1.5 V [3] | - | 67 | - | - | - | - | - | pF |

[1] $t_{pd}$ is the same as $t_{PLH}$ and $t_{PHL}$.

[2] $t_t$ is the same as $t_{THL}$ and $t_{TLH}$.

[3] $C_{PD}$ 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 outputs.

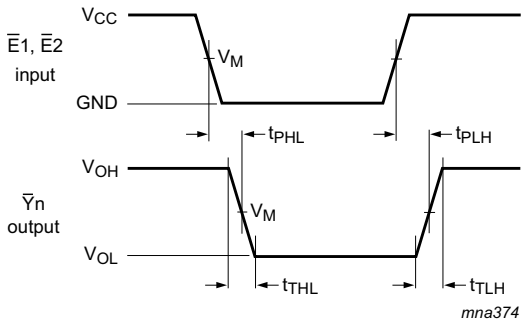
## 11. Waveforms




Measurement points are given in Table 8.

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

**Fig 6. Propagation delay input (An) and enable input (E3) to output ($\overline{Y}n$) and transition time output ($\overline{Y}n$)**



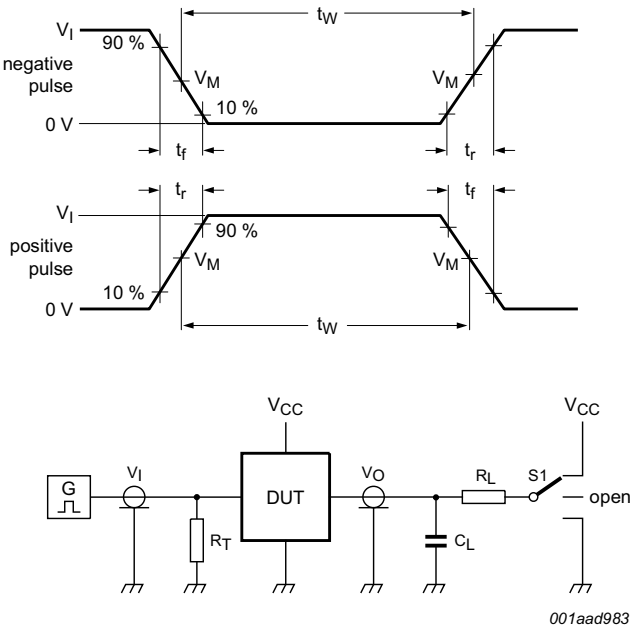

Measurement points are given in Table 8.

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

**Fig 7. Propagation delay enable input ($\overline{E}n$) to output ($\overline{Y}n$) and transition time output ($\overline{Y}n$)**

**Table 8. Measurement points**

| Type | Input | Output |
|---|---|---|
| | $V_M$ | $V_M$ |
| 74HC138-Q100 | $0.5V_{CC}$ | $0.5V_{CC}$ |
| 74HCT138-Q100 | 1.3 V | 1.3 V |




Test data is given in Table 9.

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.

S1 = Test selection switch.

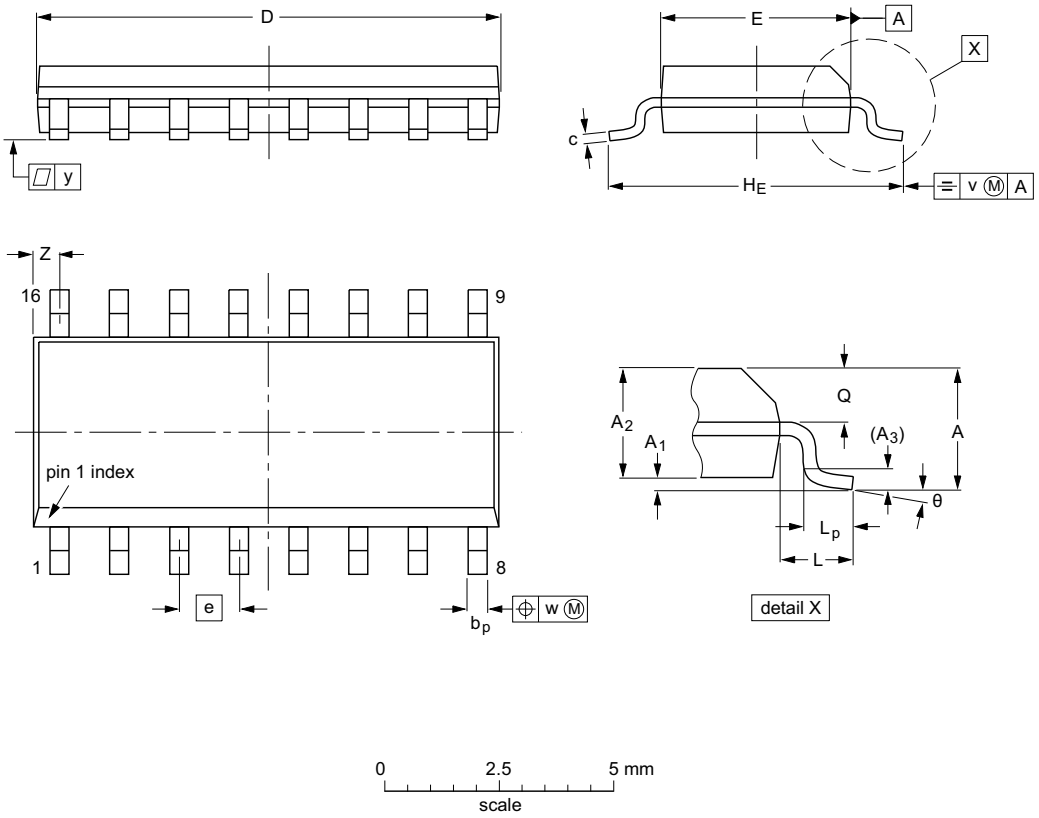
**Fig 8. Test circuit for measuring switching times**

**Table 9. Test data**

| Type | Input | | Load | | S1 position | | |
|---|---|---|---|---|---|---|---|
| | $V_I$ | $t_r$, $t_f$ | $C_L$ | $R_L$ | $t_{PHL}$, $t_{PLH}$ | $t_{PZH}$, $t_{PHZ}$ | $t_{PZL}$, $t_{PLZ}$ |
| 74HC138-Q100 | $V_{CC}$ | 6 ns | 15 pF, 50 pF | 1 kΩ | open | GND | $V_{CC}$ |
| 74HCT138-Q100 | 3 V | 6 ns | 15 pF, 50 pF | 1 kΩ | open | GND | $V_{CC}$ |

## 12. Package outline

**SO16: plastic small outline package; 16 leads; body width 3.9 mm** **SOT109-1**




**DIMENSIONS (inch dimensions are derived from the original mm dimensions)**

| UNIT | A max. | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | $D^{(1)}$ | $E^{(1)}$ | e | $H_E$ | L | $L_p$ | Q | v | w | y | $Z^{(1)}$ | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.75 | 0.25<br>0.10 | 1.45<br>1.25 | 0.25 | 0.49<br>0.36 | 0.25<br>0.19 | 10.0<br>9.8 | 4.0<br>3.8 | 1.27 | 6.2<br>5.8 | 1.05 | 1.0<br>0.4 | 0.7<br>0.6 | 0.25 | 0.25 | 0.1 | 0.7<br>0.3 | $8^o$<br>$0^o$ |
| inches | 0.069 | 0.010<br>0.004 | 0.057<br>0.049 | 0.01 | 0.019<br>0.014 | 0.0100<br>0.0075 | 0.39<br>0.38 | 0.16<br>0.15 | 0.05 | 0.244<br>0.228 | 0.041 | 0.039<br>0.016 | 0.028<br>0.020 | 0.01 | 0.01 | 0.004 | 0.028<br>0.012 | |

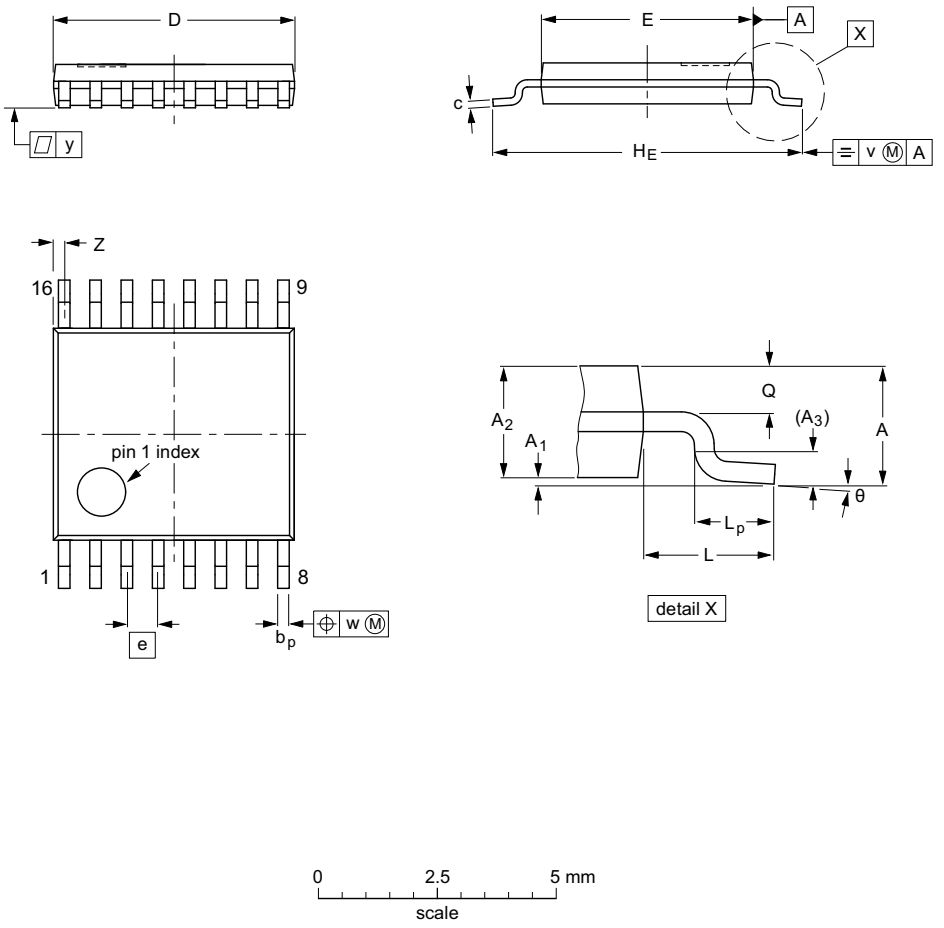
**Note**

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

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT109-1 | 076E07 | MS-012 | | | | ~~99-12-27~~<br>03-02-19 |

**Fig 9. Package outline SOT109-1 (SO16)**

**TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm** **SOT403-1**




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

| UNIT | A max. | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | D (1) | E (2) | e | $H_E$ | L | $L_p$ | Q | v | w | y | Z (1) | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1.1 | 0.15<br>0.05 | 0.95<br>0.80 | 0.25 | 0.30<br>0.19 | 0.2<br>0.1 | 5.1<br>4.9 | 4.5<br>4.3 | 0.65 | 6.6<br>6.2 | 1 | 0.75<br>0.50 | 0.4<br>0.3 | 0.2 | 0.13 | 0.1 | 0.40<br>0.06 | $8^o$<br>$0^o$ |

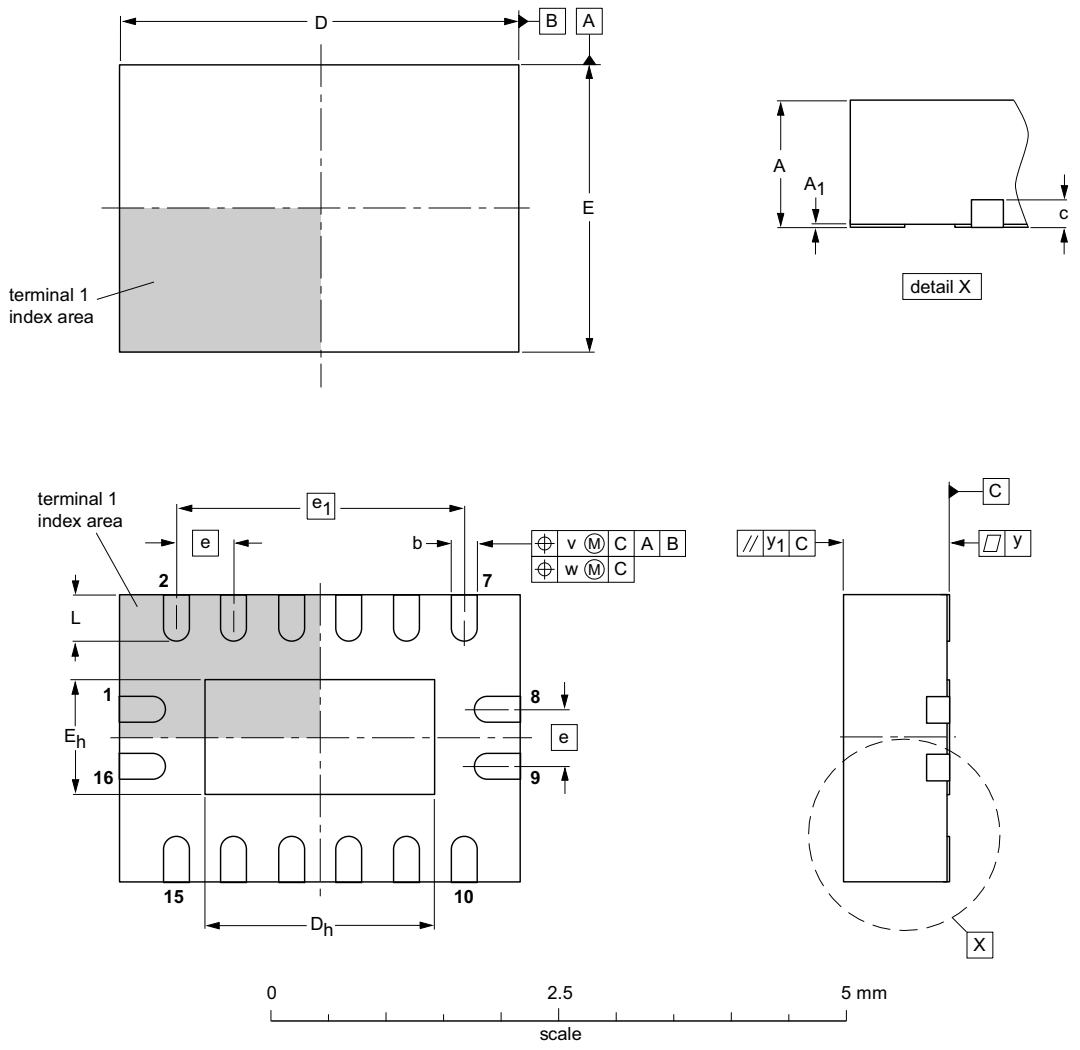
**Notes**

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.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT403-1 | | MO-153 | | | | ~~99-12-27~~<br>03-02-18 |

**Fig 10. Package outline SOT403-1 (TSSOP16)**

**DHVQFN16: plastic dual in-line compatible thermal enhanced very thin quad flat package; no leads; 16 terminals; body 2.5 x 3.5 x 0.85 mm** **SOT763-1**




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

| UNIT | $A^{(1)}$ max. | $A_1$ | b | c | $D^{(1)}$ | $D_h$ | $E^{(1)}$ | $E_h$ | e | $e_1$ | L | v | w | y | $y_1$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 1 | 0.05<br>0.00 | 0.30<br>0.18 | 0.2 | 3.6<br>3.4 | 2.15<br>1.85 | 2.6<br>2.4 | 1.15<br>0.85 | 0.5 | 2.5 | 0.5<br>0.3 | 0.1 | 0.05 | 0.05 | 0.1 |

**Note**

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

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT763-1 | - - - | MO-241 | - - - | | | ~~02-10-17~~<br>03-01-27 |

**Fig 11. Package outline SOT763-1 (DHVQFN16)**

## 13. Abbreviations

**Table 10. Abbreviations**

| Acronym | Description |
|---|---|
| CMOS | Complementary Metal Oxide Semiconductor |
| DUT | Device Under Test |
| ESD | ElectroStatic Discharge |
| HBM | Human Body Model |
| TTL | Transistor-Transistor Logic |
| MM | Machine Model |
| MIL | Military |

## 14. Revision history

**Table 11. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| 74HC_HCT138_Q100 v.2 | 20150126 | Product data sheet | - | 74HC_HCT138_Q100 v.1 |
| Modifications: | • Table 6: OFF-state output current removed because device has no 3-state outputs.<br>• Table 7: Power dissipation capacitance condition for 74HCT138-Q100 is corrected. | | | |
| 74HC_HCT138_Q100 v.1 | 20120716 | Product data sheet | - | - |

# 15. Legal information

## 15.1 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 URL http://www.nxp.com.

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## 17. Contents





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**Document identifier: 74HC_HCT138_Q100**