

# HEF4538B

## Dual precision monostable multivibrator

Rev. 11 — 19 October 2018

Product data sheet

### 1. General description

The HEF4538B is a dual retriggerable-resettable monostable multivibrator. Each multivibrator has an active LOW trigger/retrigger input ( $\overline{nA}$ ), an active HIGH trigger/retrigger input ( $nB$ ), an overriding active LOW direct reset input ( $\overline{nCD}$ ), an output ( $nQ$ ) and its complement ( $\overline{nQ}$ ), and two pins ( $\overline{nREXT}/C_{EXT}$ , and  $nCEXT$ , always connected to ground) for connecting the external timing components  $C_{EXT}$  and  $R_{EXT}$ . Typical pulse width variation over the specified temperature range is  $\pm 0.2\%$ .

The multivibrator may be triggered by either the positive or the negative edges of the input pulse and will produce an accurate output pulse with a pulse width range of 10  $\mu$ s to infinity. The duration and accuracy of the output pulse are determined by the external timing components  $C_{EXT}$  and  $R_{EXT}$ . The output pulse width ( $t_W$ ) is equal to  $R_{EXT} \times C_{EXT}$ . The linear design techniques in LOC MOS (Local Oxide CMOS) guarantee precise control of the output pulse width. A LOW level at  $\overline{nCD}$  terminates the output pulse immediately. The trigger inputs' Schmitt trigger action makes the circuit highly tolerant of slower rise and fall times.

It operates over a recommended  $V_{DD}$  power supply range of 3 V to 15 V referenced to  $V_{SS}$  (usually ground). Unused inputs must be connected to  $V_{DD}$ ,  $V_{SS}$ , or another input.

### 2. Features and benefits

- Tolerant of slow trigger rise and fall times
- Fully static operation
- 5 V, 10 V, and 15 V parametric ratings
- Standardized symmetrical output characteristics
- Specified from -40 °C to +85 °C and -40 °C to +125 °C
- Complies with JEDEC standard JESD 13-B

### 3. Ordering information

Table 1. Ordering information

| Type number | Package           |      |                                                            |          |
|-------------|-------------------|------|------------------------------------------------------------|----------|
|             | Temperature range | Name | Description                                                | Version  |
| HEF4538BT   | -40 °C to +125 °C | SO16 | plastic small outline package; 16 leads; body width 3.9 mm | SOT109-1 |

4. Functional diagram

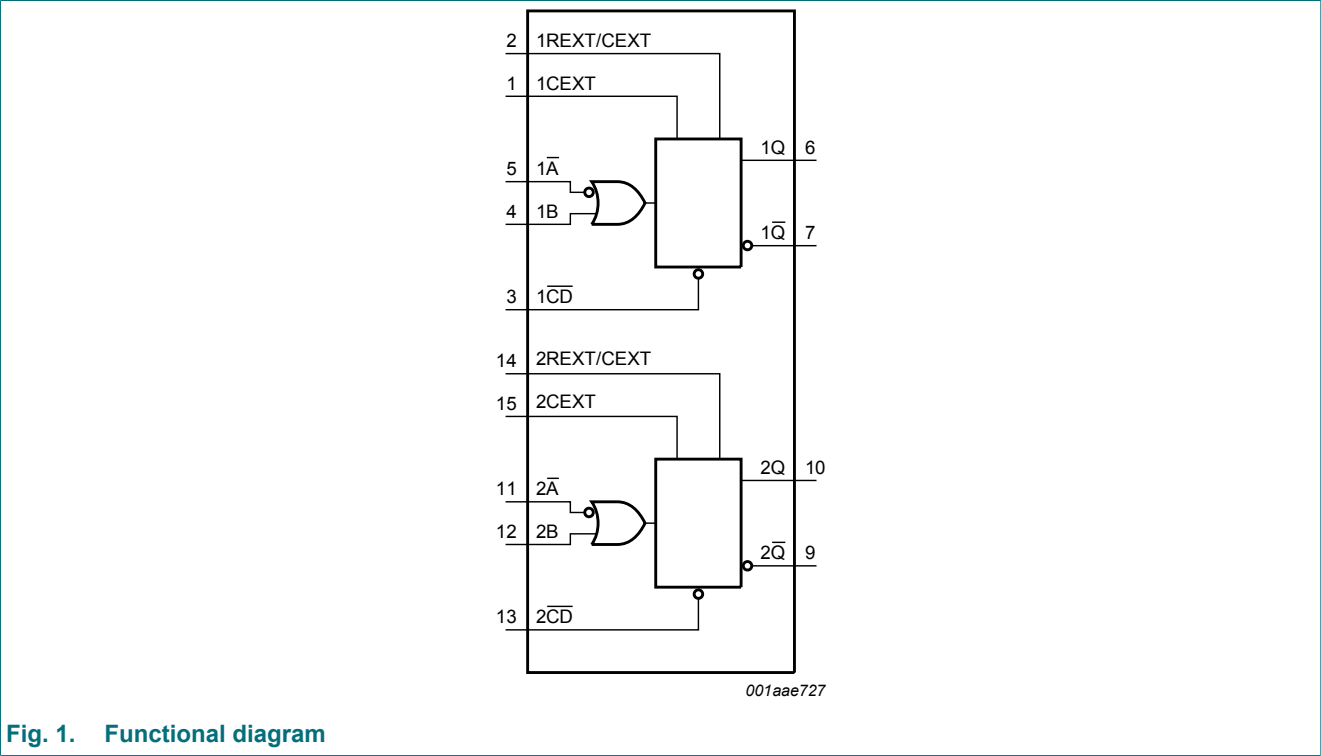


Fig. 1. Functional diagram

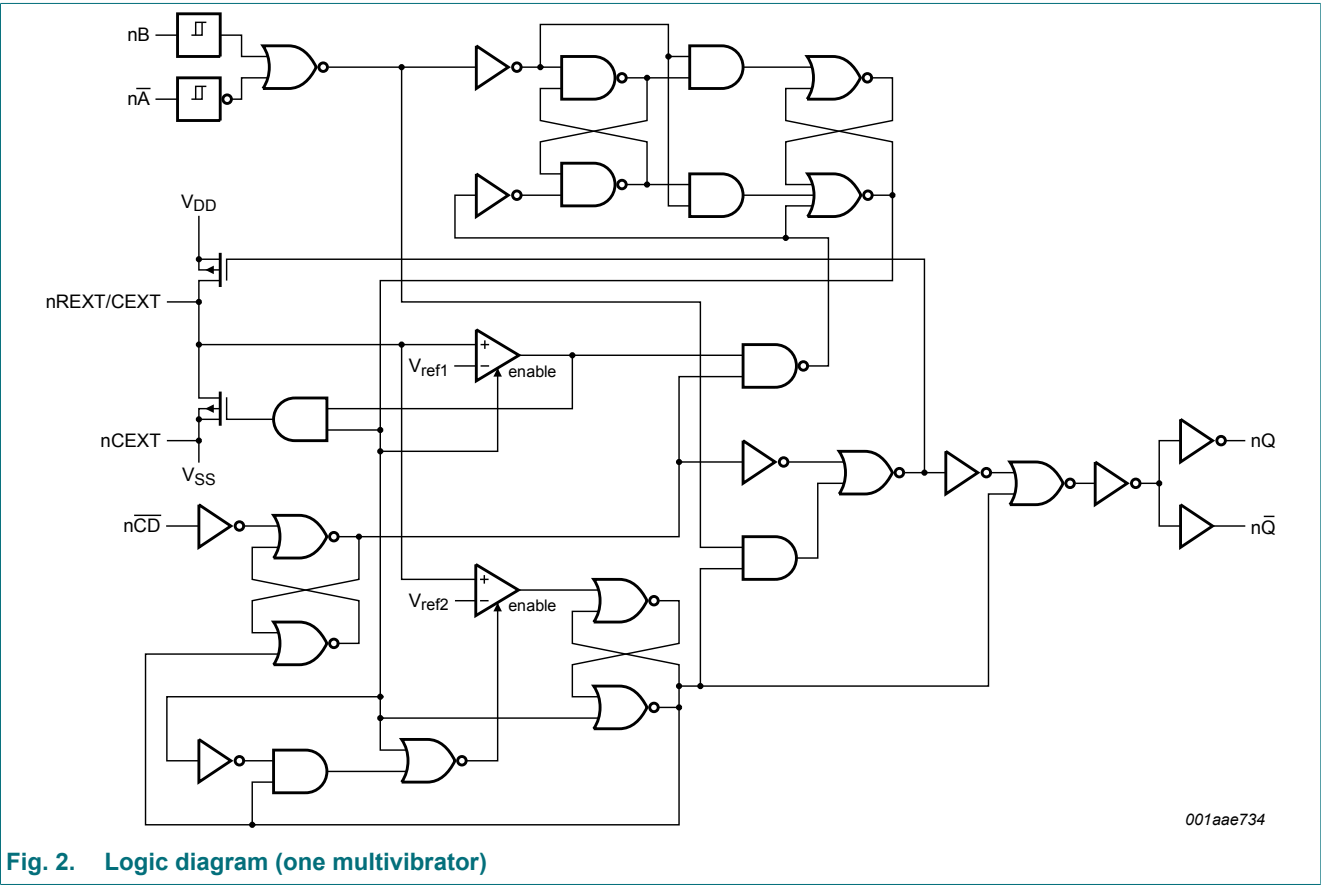


Fig. 2. Logic diagram (one multivibrator)

5. Pinning information

5.1. Pinning

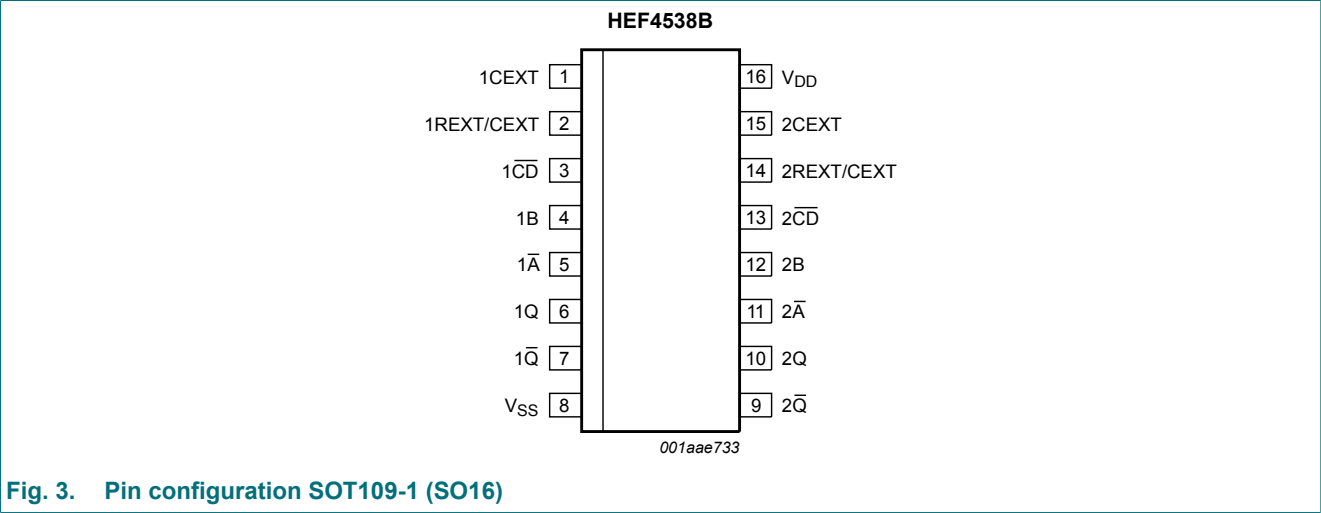


Fig. 3. Pin configuration SOT109-1 (SO16)

5.2. Pin description

Table 2. Pin description

| Symbol                 | Pin   | Description                                                |
|------------------------|-------|------------------------------------------------------------|
| 1CEXT, 2CEXT           | 1, 15 | external capacitor connection (always connected to ground) |
| 1REXT/CEXT, 2REXT/CEXT | 2, 14 | external capacitor/resistor connection                     |
| 1CD, 2CD               | 3, 13 | direct reset input (active LOW)                            |
| 1B, 2B                 | 4, 12 | input (LOW-to-HIGH triggered)                              |
| 1A, 2A                 | 5, 11 | input (HIGH-to-LOW triggered)                              |
| 1Q, 2Q                 | 6, 10 | output                                                     |
| 1Q, 2Q                 | 7, 9  | complementary output (active LOW)                          |
| VSS                    | 8     | ground supply voltage                                      |
| VDD                    | 16    | supply voltage                                             |

6. Functional description

Table 3. Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care; ↑ = positive-going transition; ↓ = negative-going transition;

⎓ = one HIGH level output pulse, with the pulse width determined by C<sub>EXT</sub> and R<sub>EXT</sub>;

⎓ = one LOW level output pulse, with the pulse width determined by C<sub>EXT</sub> and R<sub>EXT</sub>.

| Inputs |    |     | Outputs |    |
|--------|----|-----|---------|----|
| nA     | nB | nCD | nQ      | nQ |
| ↓      | L  | H   | ⎓       | ⎓  |
| H      | ↑  | H   | ⎓       | ⎓  |
| X      | X  | L   | L       | H  |

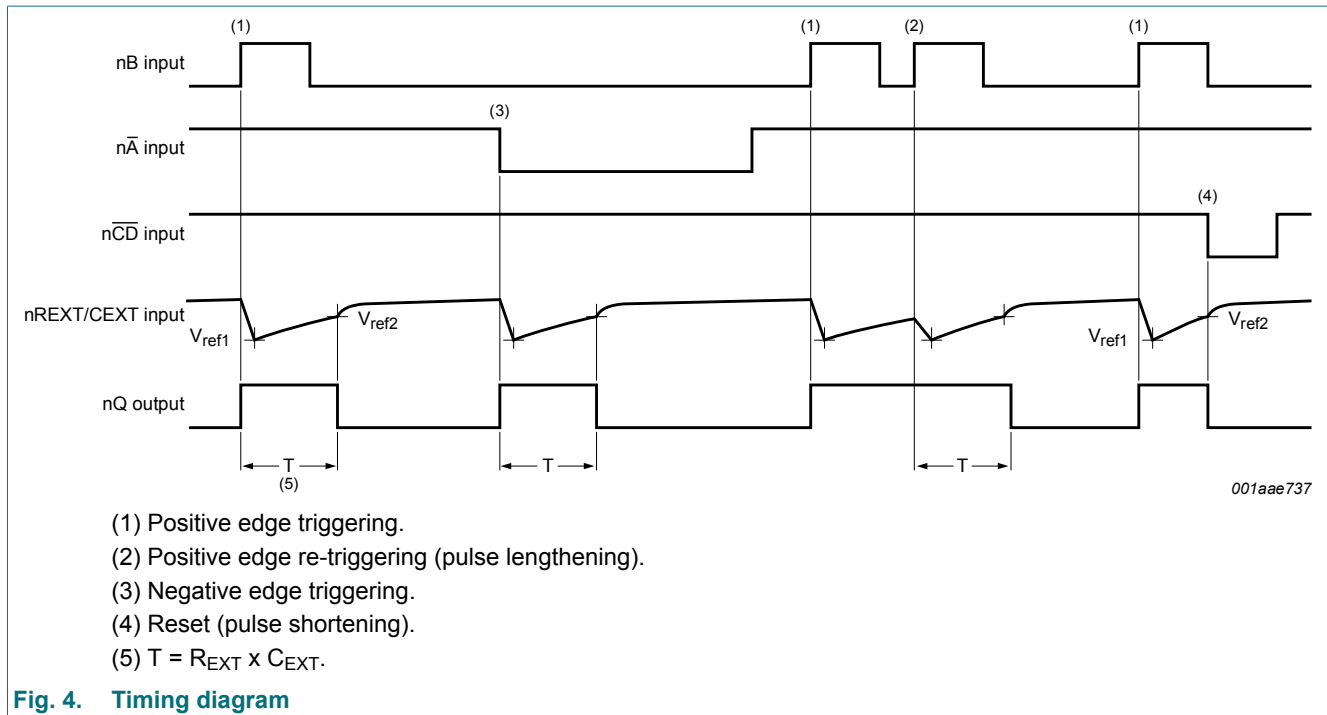
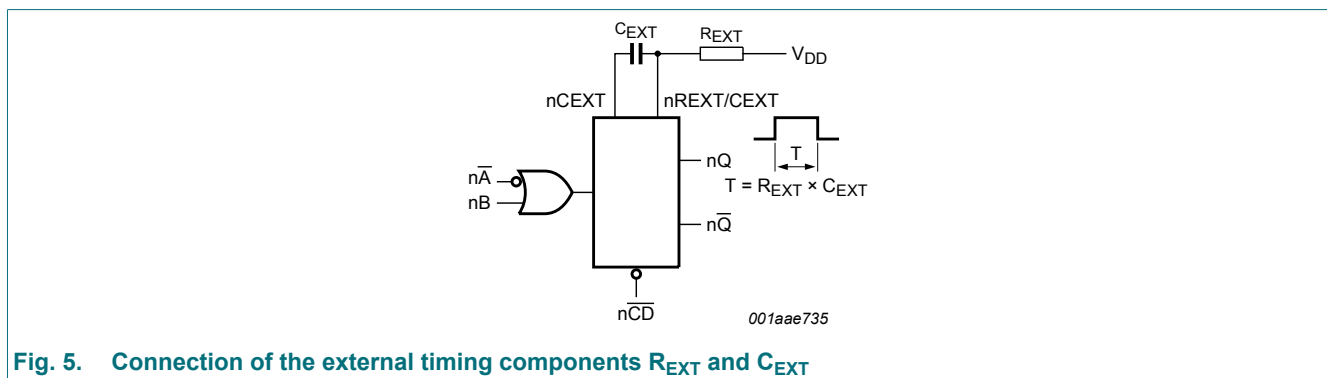


Fig. 4. Timing diagram

Fig. 5. Connection of the external timing components  $R_{EXT}$  and  $C_{EXT}$ 

## 7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to  $V_{SS} = 0$  V (ground)

| Symbol    | Parameter               | Conditions                               | Min  | Max            | Unit |
|-----------|-------------------------|------------------------------------------|------|----------------|------|
| $V_{DD}$  | supply voltage          |                                          | -0.5 | +18            | V    |
| $I_{IK}$  | input clamping current  | $V_I < -0.5$ V or $V_I > V_{DD} + 0.5$ V | -    | ±10            | mA   |
| $V_I$     | input voltage           |                                          | -0.5 | $V_{DD} + 0.5$ | V    |
| $I_{OK}$  | output clamping current | $V_I < -0.5$ V or $V_I > V_{DD} + 0.5$ V | -    | ±10            | mA   |
| $I_{I/O}$ | input/output current    |                                          | -    | ±10            | mA   |
| $I_{DD}$  | supply current          |                                          | -    | 50             | mA   |
| $T_{stg}$ | storage temperature     |                                          | -65  | +150           | °C   |
| $T_{amb}$ | ambient temperature     |                                          | -40  | +125           | °C   |
| $P_{tot}$ | total power dissipation | $T_{amb} = -40$ °C to +125 °C [1]        | -    | 500            | mW   |
| $P$       | power dissipation       | per output                               | -    | 100            | mW   |

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

## 8. Recommended operating conditions

Table 5. Recommended operating conditions

| Symbol              | Parameter                           | Conditions             | Min | Typ | Max      | Unit            |
|---------------------|-------------------------------------|------------------------|-----|-----|----------|-----------------|
| $V_{DD}$            | supply voltage                      |                        | 3   | -   | 15       | V               |
| $V_I$               | input voltage                       |                        | 0   | -   | $V_{DD}$ | V               |
| $T_{amb}$           | ambient temperature                 | in free air            | -40 | -   | +125     | °C              |
| $\Delta t/\Delta V$ | input transition rise and fall rate | $V_{DD} = 5\text{ V}$  | -   | -   | 3.75     | $\mu\text{s/V}$ |
|                     |                                     | $V_{DD} = 10\text{ V}$ | -   | -   | 0.5      | $\mu\text{s/V}$ |
|                     |                                     | $V_{DD} = 15\text{ V}$ | -   | -   | 0.08     | $\mu\text{s/V}$ |

## 9. Static characteristics

Table 6. Static characteristics

$V_{SS} = 0\text{ V}$ ;  $V_I = V_{SS}$  or  $V_{DD}$  unless otherwise specified.

| Symbol   | Parameter                 | Conditions                     | $V_{DD}$ | $T_{amb} = -40\text{ °C}$ |           | $T_{amb} = 25\text{ °C}$ |           | $T_{amb} = 85\text{ °C}$ |           | $T_{amb} = 125\text{ °C}$ |           | Unit          |
|----------|---------------------------|--------------------------------|----------|---------------------------|-----------|--------------------------|-----------|--------------------------|-----------|---------------------------|-----------|---------------|
|          |                           |                                |          | Min                       | Max       | Min                      | Max       | Min                      | Max       | Min                       | Max       |               |
| $V_{IH}$ | HIGH-level input voltage  | $ I_O  < 1\text{ }\mu\text{A}$ | 5 V      | 3.5                       | -         | 3.5                      | -         | 3.5                      | -         | 3.5                       | -         | V             |
|          |                           |                                | 10 V     | 7.0                       | -         | 7.0                      | -         | 7.0                      | -         | 7.0                       | -         | V             |
|          |                           |                                | 15 V     | 11.0                      | -         | 11.0                     | -         | 11.0                     | -         | 11.0                      | -         | V             |
| $V_{IL}$ | LOW-level input voltage   | $ I_O  < 1\text{ }\mu\text{A}$ | 5 V      | -                         | 1.5       | -                        | 1.5       | -                        | 1.5       | -                         | 1.5       | V             |
|          |                           |                                | 10 V     | -                         | 3.0       | -                        | 3.0       | -                        | 3.0       | -                         | 3.0       | V             |
|          |                           |                                | 15 V     | -                         | 4.0       | -                        | 4.0       | -                        | 4.0       | -                         | 4.0       | V             |
| $V_{OH}$ | HIGH-level output voltage | $ I_O  < 1\text{ }\mu\text{A}$ | 5 V      | 4.95                      | -         | 4.95                     | -         | 4.95                     | -         | 4.95                      | -         | V             |
|          |                           |                                | 10 V     | 9.95                      | -         | 9.95                     | -         | 9.95                     | -         | 9.95                      | -         | V             |
|          |                           |                                | 15 V     | 14.95                     | -         | 14.95                    | -         | 14.95                    | -         | 14.95                     | -         | V             |
| $V_{OL}$ | LOW-level output voltage  | $ I_O  < 1\text{ }\mu\text{A}$ | 5 V      | -                         | 0.05      | -                        | 0.05      | -                        | 0.05      | -                         | 0.05      | V             |
|          |                           |                                | 10 V     | -                         | 0.05      | -                        | 0.05      | -                        | 0.05      | -                         | 0.05      | V             |
|          |                           |                                | 15 V     | -                         | 0.05      | -                        | 0.05      | -                        | 0.05      | -                         | 0.05      | V             |
| $I_{OH}$ | HIGH-level output current | $V_O = 2.5\text{ V}$           | 5 V      | -                         | -1.7      | -                        | -1.4      | -                        | -1.1      | -                         | -1.1      | mA            |
|          |                           | $V_O = 4.6\text{ V}$           | 5 V      | -                         | -0.64     | -                        | -0.5      | -                        | -0.36     | -                         | -0.36     | mA            |
|          |                           | $V_O = 9.5\text{ V}$           | 10 V     | -                         | -1.6      | -                        | -1.3      | -                        | -0.9      | -                         | -0.9      | mA            |
|          |                           | $V_O = 13.5\text{ V}$          | 15 V     | -                         | -4.2      | -                        | -3.4      | -                        | -2.4      | -                         | -2.4      | mA            |
| $I_{OL}$ | LOW-level output current  | $V_O = 0.4\text{ V}$           | 5 V      | 0.64                      | -         | 0.5                      | -         | 0.36                     | -         | 0.36                      | -         | mA            |
|          |                           | $V_O = 0.5\text{ V}$           | 10 V     | 1.6                       | -         | 1.3                      | -         | 0.9                      | -         | 0.9                       | -         | mA            |
|          |                           | $V_O = 1.5\text{ V}$           | 15 V     | 4.2                       | -         | 3.4                      | -         | 2.4                      | -         | 2.4                       | -         | mA            |
| $I_I$    | input leakage current     | nA, nB                         | 15 V     | -                         | $\pm 0.1$ | -                        | $\pm 0.1$ | -                        | $\pm 1.0$ | -                         | $\pm 1.0$ | $\mu\text{A}$ |
|          |                           | nREXT/CEXT                     | 15 V     | -                         | $\pm 0.3$ | -                        | $\pm 0.1$ | -                        | $\pm 1.0$ | -                         | $\pm 1.0$ | $\mu\text{A}$ |
| $C_I$    | input capacitance         |                                | -        | -                         | -         | -                        | 7.5       | -                        | -         | -                         | -         | pF            |

**Table 7. Typical static characteristics** $V_{SS} = 0\text{ V}$ ;  $V_I = V_{SS}$  or  $V_{DD}$ ;  $T_{amb} = +25\text{ }^{\circ}\text{C}$ .

| Symbol   | Parameter         | Conditions   | $V_{DD}$ | Typ | Unit          |
|----------|-------------------|--------------|----------|-----|---------------|
| $I_{DD}$ | supply current    | active state | 5 V [1]  | 55  | $\mu\text{A}$ |
|          |                   |              | 10 V     | 150 | $\mu\text{A}$ |
|          |                   |              | 15 V     | 220 | $\mu\text{A}$ |
| $C_I$    | input capacitance | nREXT/CEXT   | -        | 15  | pF            |

[1] Only one monostable is switching: for the specified current during the output pulse (output nQ is HIGH).

## 10. Dynamic characteristics

**Table 8. Dynamic characteristics** $V_{SS} = 0\text{ V}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ ; for test circuit see Fig. 11.

| Symbol      | Parameter                     | Conditions                                      | $V_{DD}$ | Extrapolation formula[1]                  | Min | Typ | Max | Unit |
|-------------|-------------------------------|-------------------------------------------------|----------|-------------------------------------------|-----|-----|-----|------|
| $t_{PHL}$   | HIGH to LOW propagation delay | n $\bar{A}$ , nB to n $\bar{Q}$ ; see Fig. 6    | 5 V      | $193\text{ ns} + (0.55\text{ ns/pF}) C_L$ | -   | 220 | 440 | ns   |
|             |                               |                                                 | 10 V     | $74\text{ ns} + (0.23\text{ ns/pF}) C_L$  | -   | 85  | 190 | ns   |
|             |                               |                                                 | 15 V     | $52\text{ ns} + (0.16\text{ ns/pF}) C_L$  | -   | 60  | 120 | ns   |
|             |                               | n $\bar{CD}$ to nQ; see Fig. 6                  | 5 V      | $98\text{ ns} + (0.55\text{ ns/pF}) C_L$  | -   | 125 | 250 | ns   |
|             |                               |                                                 | 10 V     | $44\text{ ns} + (0.23\text{ ns/pF}) C_L$  | -   | 55  | 110 | ns   |
|             |                               |                                                 | 15 V     | $32\text{ ns} + (0.16\text{ ns/pF}) C_L$  | -   | 40  | 80  | ns   |
| $t_{PLH}$   | LOW to HIGH propagation delay | n $\bar{A}$ , nB to nQ; see Fig. 6              | 5 V      | $173\text{ ns} + (0.55\text{ ns/pF}) C_L$ | -   | 200 | 460 | ns   |
|             |                               |                                                 | 10 V     | $79\text{ ns} + (0.23\text{ ns/pF}) C_L$  | -   | 90  | 180 | ns   |
|             |                               |                                                 | 15 V     | $52\text{ ns} + (0.16\text{ ns/pF}) C_L$  | -   | 60  | 120 | ns   |
|             |                               | n $\bar{CD}$ to n $\bar{Q}$ ; see Fig. 6        | 5 V      | $98\text{ ns} + (0.55\text{ ns/pF}) C_L$  | -   | 125 | 250 | ns   |
|             |                               |                                                 | 10 V     | $44\text{ ns} + (0.23\text{ ns/pF}) C_L$  | -   | 55  | 110 | ns   |
|             |                               |                                                 | 15 V     | $32\text{ ns} + (0.16\text{ ns/pF}) C_L$  | -   | 40  | 80  | ns   |
| $t_t$       | transition time               | see Fig. 6                                      | 5 V [2]  | $10\text{ ns} + (1.00\text{ ns/pF}) C_L$  | -   | 60  | 120 | ns   |
|             |                               |                                                 | 10 V     | $9\text{ ns} + (0.42\text{ ns/pF}) C_L$   | -   | 30  | 60  | ns   |
|             |                               |                                                 | 15 V     | $6\text{ ns} + (0.28\text{ ns/pF}) C_L$   | -   | 20  | 40  | ns   |
| $t_{rec}$   | recovery time                 | n $\bar{CD}$ to n $\bar{A}$ , nB; see Fig. 7    | 5 V      |                                           | -   | 20  | 40  | ns   |
|             |                               |                                                 | 10 V     |                                           | -   | 10  | 20  | ns   |
|             |                               |                                                 | 15 V     |                                           | -   | 5   | 10  | ns   |
| $t_{rtrig}$ | retrigger time                | nQ, n $\bar{Q}$ to n $\bar{A}$ , nB; see Fig. 7 | 5 V      |                                           | 0   | -   | -   | ns   |
|             |                               |                                                 | 10 V     |                                           | 0   | -   | -   | ns   |
|             |                               |                                                 | 15 V     |                                           | 0   | -   | -   | ns   |

## Dual precision monostable multivibrator

| Symbol           | Parameter                 | Conditions                                                                                                              | V <sub>DD</sub> | Extrapolation formula[1] | Min  | Typ  | Max       | Unit |
|------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------|------|------|-----------|------|
| t <sub>W</sub>   | pulse width               | nĀ LOW; minimum width; see Fig. 7                                                                                       | 5 V             |                          | 90   | 45   | -         | ns   |
|                  |                           |                                                                                                                         | 10 V            |                          | 30   | 15   | -         | ns   |
|                  |                           |                                                                                                                         | 15 V            |                          | 24   | 12   | -         | ns   |
|                  |                           | nB HIGH;minimum width; see Fig. 7                                                                                       | 5 V             |                          | 50   | 25   | -         | ns   |
|                  |                           |                                                                                                                         | 10 V            |                          | 24   | 12   | -         | ns   |
|                  |                           |                                                                                                                         | 15 V            |                          | 20   | 10   | -         | ns   |
|                  |                           | nĈD LOW; minimum width; see Fig. 7                                                                                      | 5 V             |                          | 55   | 25   | -         | ns   |
|                  |                           |                                                                                                                         | 10 V            |                          | 25   | 12   | -         | ns   |
|                  |                           |                                                                                                                         | 15 V            |                          | 20   | 10   | -         | ns   |
|                  |                           | nQ or nQ̄; R <sub>EXT</sub> = 100 kΩ; C <sub>EXT</sub> =2.0 nF; see Fig. 7                                              | 5 V             |                          | 218  | 230  | 242       | μs   |
|                  |                           |                                                                                                                         | 10 V            |                          | 213  | 224  | 235       | μs   |
|                  |                           |                                                                                                                         | 15 V            |                          | 211  | 223  | 234       | μs   |
|                  |                           | nQ or nQ̄ ; R <sub>EXT</sub> = 100 kΩ; C <sub>EXT</sub> = 0.1 μF; see Fig. 7                                            | 5 V             |                          | 10.3 | 10.8 | 11.3      | ms   |
|                  |                           |                                                                                                                         | 10 V            |                          | 10.2 | 10.7 | 11.2      | ms   |
|                  |                           |                                                                                                                         | 15 V            |                          | 10.1 | 10.6 | 11.1      | ms   |
|                  |                           | nQ or nQ̄; R <sub>EXT</sub> = 100 kΩ; C <sub>EXT</sub> = 10 μF; see Fig. 7                                              | 5 V             |                          | 1.01 | 1.09 | 1.11      | s    |
|                  |                           |                                                                                                                         | 10 V            |                          | 0.99 | 1.04 | 1.09      | s    |
|                  |                           |                                                                                                                         | 15 V            |                          | 0.99 | 1.04 | 1.09      | s    |
| Δt <sub>W</sub>  | pulse width variation     | nQ or nQ̄ variation over temperature range; see Fig. 8                                                                  | 5 V             |                          | -    | ±0.2 | -         | %    |
|                  |                           |                                                                                                                         | 10 V            |                          | -    | ±0.2 | -         | %    |
|                  |                           |                                                                                                                         | 15 V            |                          | -    | ±0.2 | -         | %    |
|                  |                           | nQ or nQ̄ variation over V <sub>DD</sub> voltage range 5 V to 15 V; see Fig. 9                                          |                 |                          | -    | ±1.5 | -         | %    |
|                  |                           |                                                                                                                         |                 |                          |      |      |           |      |
|                  |                           | nQ or nQ̄ variation between monostables in the same device; R <sub>EXT</sub> = 100 kΩ; C <sub>EXT</sub> = 2 nF to 10 μF | 5 V             |                          | -    | ±1   | -         | %    |
|                  |                           |                                                                                                                         | 10 V            |                          | -    | ±1   | -         | %    |
|                  | 15 V                      |                                                                                                                         | -               | ±1                       | -    | %    |           |      |
| R <sub>EXT</sub> | external timing resistor  |                                                                                                                         |                 |                          | 5    | -    | [3]       | kΩ   |
| C <sub>EXT</sub> | external timing capacitor |                                                                                                                         |                 |                          | 2000 | -    | no limits | pF   |

[1] The typical values of the propagation delay and transition times are calculated from the extrapolation formulas shown (C<sub>L</sub> in pF).

[2] t<sub>t</sub> is the same as t<sub>THL</sub> and t<sub>TLH</sub>.

[3] The maximum permissible resistance R<sub>EXT</sub>, which holds the specified accuracy of t<sub>W</sub> (nQ, nQ̄ output), depends on the leakage current of the capacitor C<sub>EXT</sub> and the leakage current of the HEF4538B.

10.1. Waveforms and test circuit

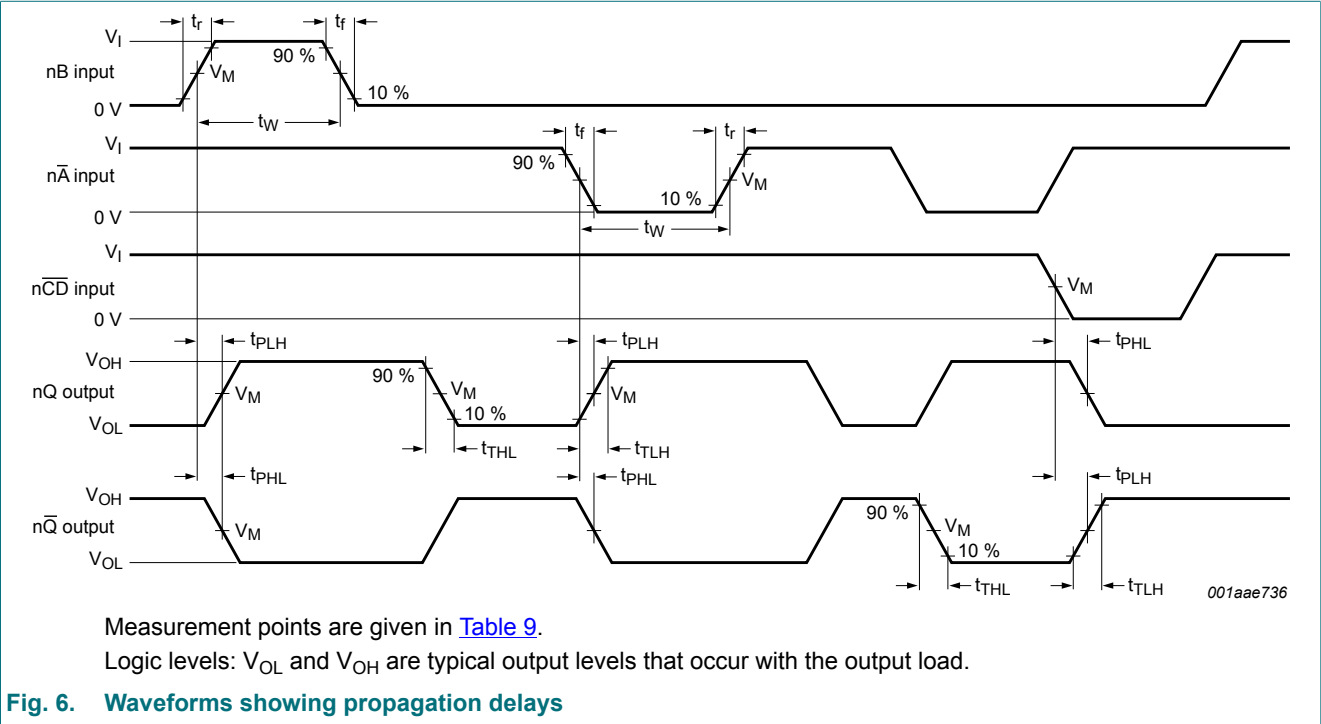
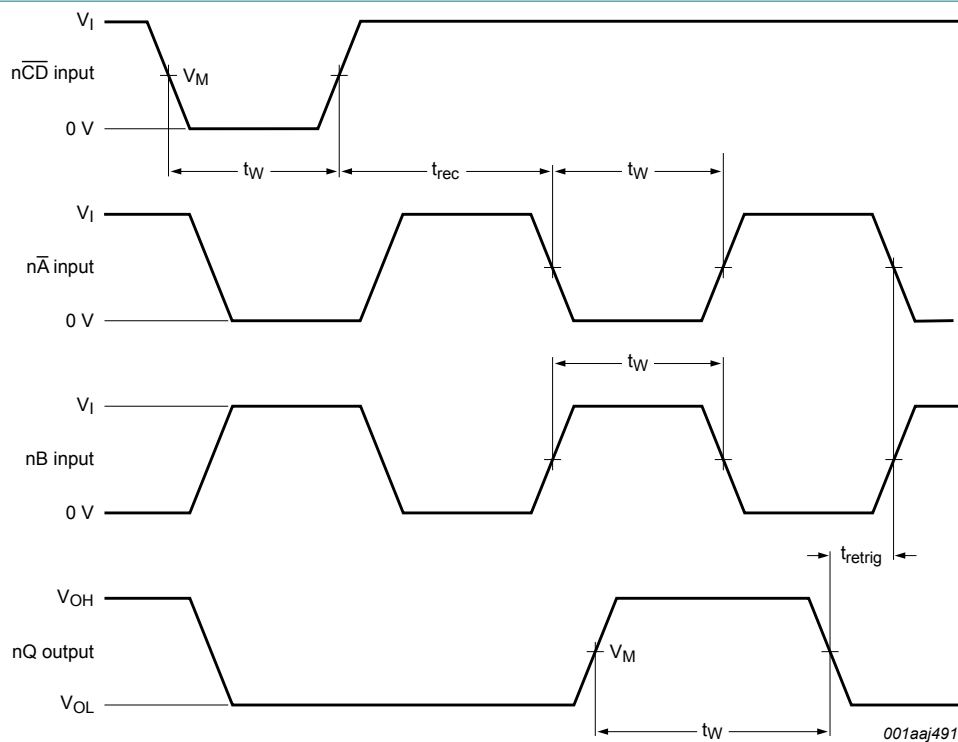


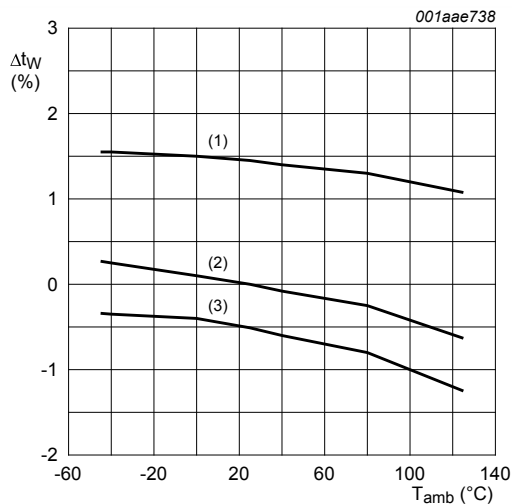
Table 9. Measurement points

| Supply voltage | Input       | Output      |
|----------------|-------------|-------------|
| $V_{DD}$       | $V_M$       | $V_M$       |
| 5 V to 15 V    | $0.5V_{DD}$ | $0.5V_{DD}$ |

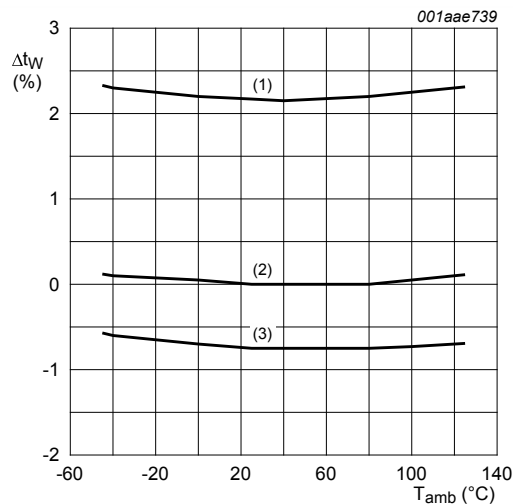


Measurement points are given in [Table 9](#).  
Recovery times are shown as positive values but may be specified as negative values.  
Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output levels that occur with the output load.

**Fig. 7.** Waveforms showing minimum  $\overline{nCD}$ ,  $\overline{nA}$ ,  $nB$ , and  $nQ$  pulse widths, recovery and retrigger times



a.  $R_{EXT} = 100 \text{ k}\Omega$ ;  $C_{EXT} = 100 \text{ nF}$   
(1)  $V_{DD} = 5 \text{ V}$   
(2)  $V_{DD} = 10 \text{ V}$   
(3)  $V_{DD} = 15 \text{ V}$   
 $\Delta t_W = 0 \%$  at  $V_{DD} = 10 \text{ V}$  and  $T_{amb} = 25 \text{ }^\circ\text{C}$



b.  $R_{EXT} = 100 \text{ k}\Omega$ ;  $C_{EXT} = 2 \text{ nF}$   
(1)  $V_{DD} = 5 \text{ V}$   
(2)  $V_{DD} = 10 \text{ V}$   
(3)  $V_{DD} = 15 \text{ V}$   
 $\Delta t_W = 0 \%$  at  $V_{DD} = 10 \text{ V}$  and  $T_{amb} = 25 \text{ }^\circ\text{C}$

**Fig. 8.** Typical normalized change in output pulse width as a function of ambient temperature

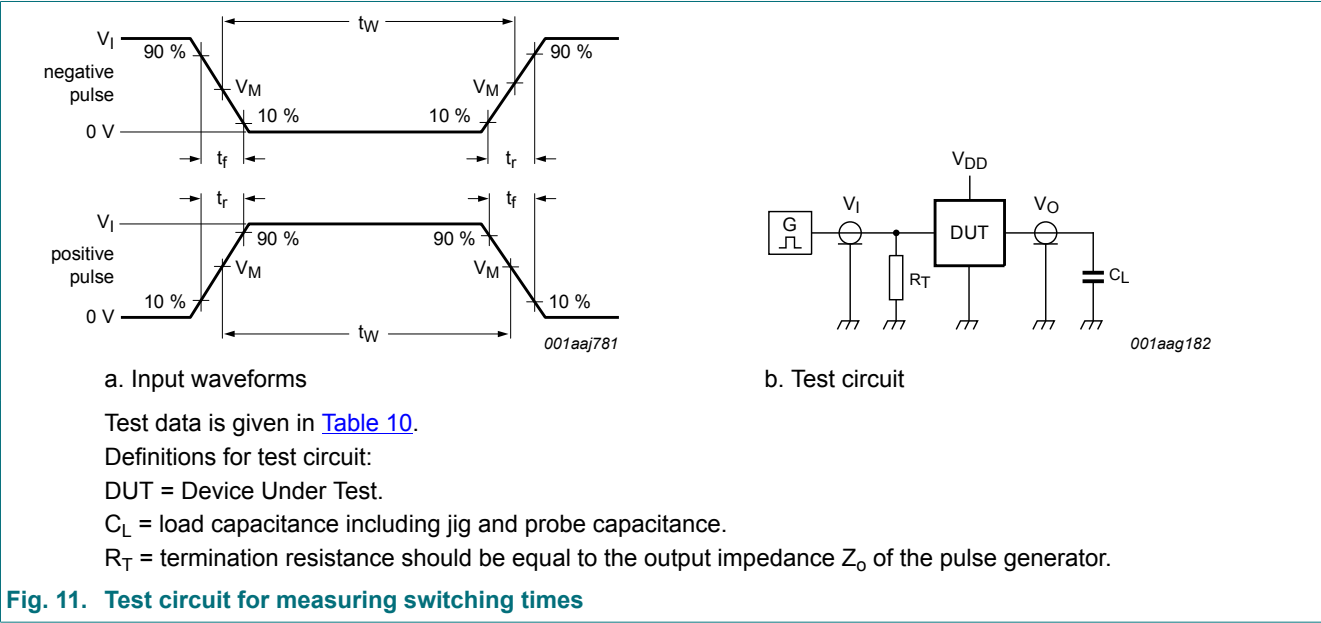
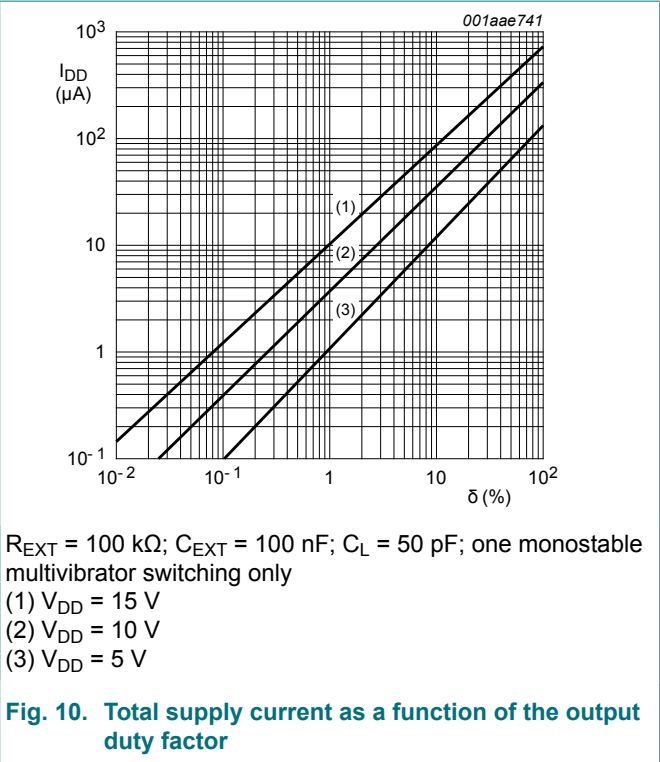
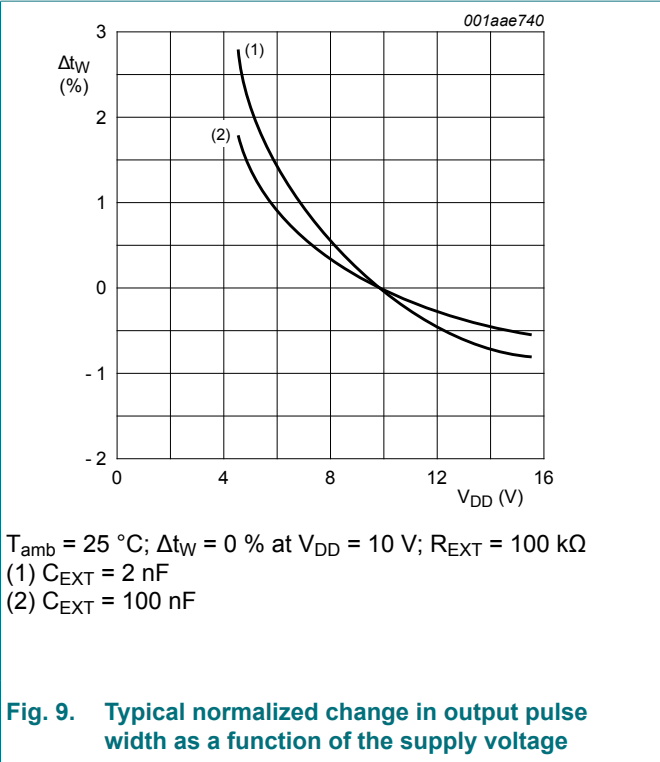


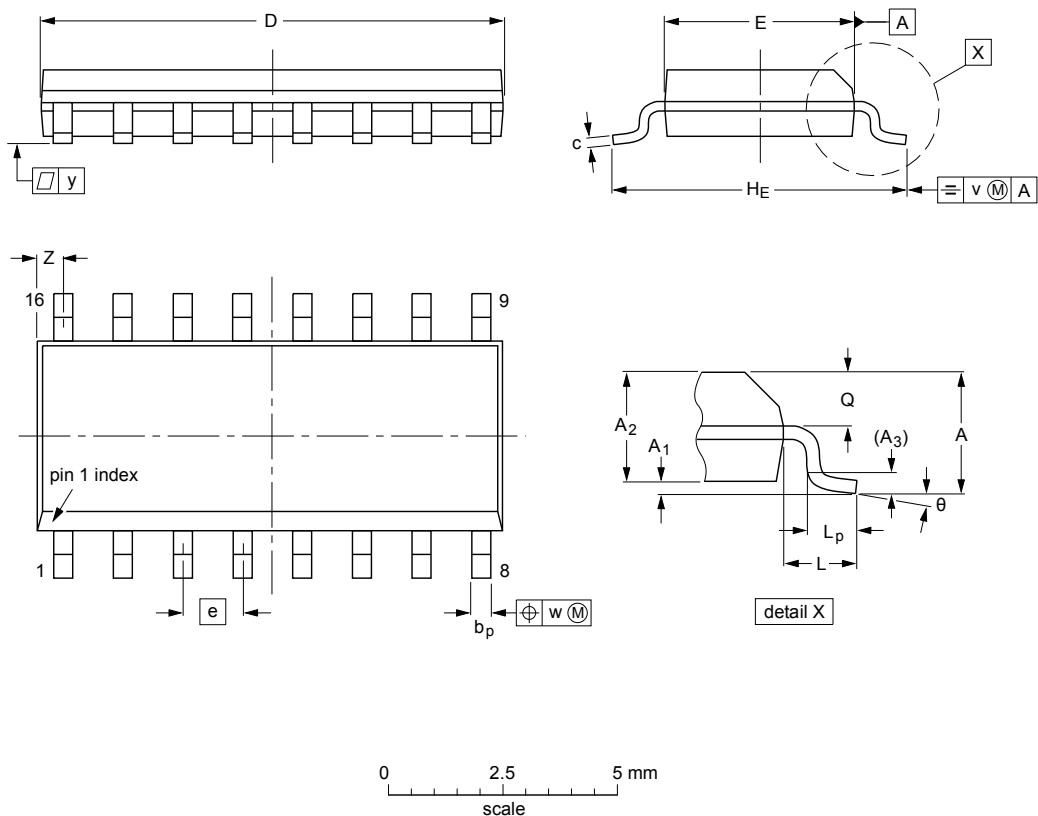
Table 10. Test data

| Supply voltage | Input                |                     | Load  |
|----------------|----------------------|---------------------|-------|
| $V_{DD}$       | $V_I$                | $t_r, t_f$          | $C_L$ |
| 5 V to 15 V    | $V_{SS}$ or $V_{DD}$ | $\leq 20\text{ ns}$ | 50 pF |

11. 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<br>max. | A <sub>1</sub> | A <sub>2</sub> | A <sub>3</sub> | b <sub>p</sub> | c                | D <sup>(1)</sup> | E <sup>(1)</sup> | e    | H <sub>E</sub> | L     | L <sub>p</sub> | Q              | v    | w    | y     | Z <sup>(1)</sup> | 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°<br>0° |
| 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<br>VERSION | REFERENCES |        |       |  | EUROPEAN<br>PROJECTION | ISSUE DATE           |
|--------------------|------------|--------|-------|--|------------------------|----------------------|
|                    | IEC        | JEDEC  | JEITA |  |                        |                      |
| SOT109-1           | 076E07     | MS-012 |       |  |                        | 99-12-27<br>03-02-19 |

Fig. 12. Package outline SOT109-1 (SO16)

## 12. Abbreviations

Table 11. Abbreviations

| Acronym | Description                             |
|---------|-----------------------------------------|
| CMOS    | Complementary Metal-Oxide Semiconductor |
| DUT     | Device Under Test                       |

## 13. Revision history

Table 12. Revision history

| Document ID      | Release date                                                                                                                                                                                                                              | Data sheet status     | Change notice | Supersedes       |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|------------------|
| HEF4538B v.11    | 20181019                                                                                                                                                                                                                                  | Product data sheet    | -             | HEF4538B v.10    |
| Modifications:   | <ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> </ul> |                       |               |                  |
| HEF4538B v.10    | 20160401                                                                                                                                                                                                                                  | Product data sheet    | -             | HEF4538B v.9     |
| Modifications:   | <ul style="list-style-type: none"> <li>Type number HEF4538BP (SOT38-4) removed.</li> </ul>                                                                                                                                                |                       |               |                  |
| HEF4538B v.9     | 20131210                                                                                                                                                                                                                                  | Product data sheet    | -             | HEF4538B v.8     |
| Modifications:   | <ul style="list-style-type: none"> <li><a href="#">Fig. 8</a> and <a href="#">Fig. 9</a> updated to show output pulse width over full temperature range.</li> </ul>                                                                       |                       |               |                  |
| HEF4538B v.8     | 20111116                                                                                                                                                                                                                                  | Product data sheet    | -             | HEF4538B v.7     |
| HEF4538B v.7     | 20110217                                                                                                                                                                                                                                  | Product data sheet    | -             | HEF4538B v.6     |
| HEF4538B v.6     | 20091102                                                                                                                                                                                                                                  | Product data sheet    | -             | HEF4538B v.5     |
| HEF4538B v.5     | 20090304                                                                                                                                                                                                                                  | Product data sheet    | -             | HEF4538B v.4     |
| HEF4538B v.4     | 20090206                                                                                                                                                                                                                                  | Product data sheet    | -             | HEF4538B_CNV v.3 |
| HEF4538B_CNV v.3 | 19950101                                                                                                                                                                                                                                  | Product specification | -             | HEF4538B_CNV v.2 |
| HEF4538B_CNV v.2 | 19950101                                                                                                                                                                                                                                  | Product specification | -             | -                |

## 14. Legal information

### Data sheet status

| Document status<br>[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".
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## Contents

|                                          |    |
|------------------------------------------|----|
| 1. General description.....              | 1  |
| 2. Features and benefits.....            | 1  |
| 3. Ordering information.....             | 1  |
| 4. Functional diagram.....               | 2  |
| 5. Pinning information.....              | 3  |
| 5.1. Pinning.....                        | 3  |
| 5.2. Pin description.....                | 3  |
| 6. Functional description.....           | 3  |
| 7. Limiting values.....                  | 4  |
| 8. Recommended operating conditions..... | 5  |
| 9. Static characteristics.....           | 5  |
| 10. Dynamic characteristics.....         | 6  |
| 10.1. Waveforms and test circuit.....    | 8  |
| 11. Package outline.....                 | 11 |
| 12. Abbreviations.....                   | 12 |
| 13. Revision history.....                | 12 |
| 14. Legal information.....               | 13 |

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