



# HEF4013B-Q100

Dual D-type flip-flop

Rev. 6 — 24 July 2024

Product data sheet

## 1. General description

The HEF4013B-Q100 is a dual D-type flip-flop with set and reset; positive-edge trigger. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of  $V_{DD}$ . Schmitt-trigger action on the clock input makes the circuit highly tolerant of slower clock rise and fall times.

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 supply voltage range from 3.0 V to 15.0 V
- CMOS low power dissipation
- High noise immunity
- Tolerant of slow clock rise and fall times
- Fully static operation
- 5 V, 10 V, and 15 V parametric ratings
- Standardized symmetrical output characteristics
- Complies with JEDEC standard JESD 13-B
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 2 exceeds 2000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V

## 3. Applications

- Counters and dividers
- Registers
- Toggle flip-flops

## 4. Ordering information

Table 1. Ordering information

| Type number                     | Package           |         |                                                                        |                          |
|---------------------------------|-------------------|---------|------------------------------------------------------------------------|--------------------------|
|                                 | Temperature range | Name    | Description                                                            | Version                  |
| <a href="#">HEF4013BT-Q100</a>  | -40 °C to +125 °C | SO14    | plastic small outline package; 14 leads; body width 3.9 mm             | <a href="#">SOT108-1</a> |
| <a href="#">HEF4013BTT-Q100</a> | -40 °C to +125 °C | TSSOP14 | plastic thin shrink small outline package; 14 leads; body width 4.4 mm | <a href="#">SOT402-1</a> |

5. Functional diagram

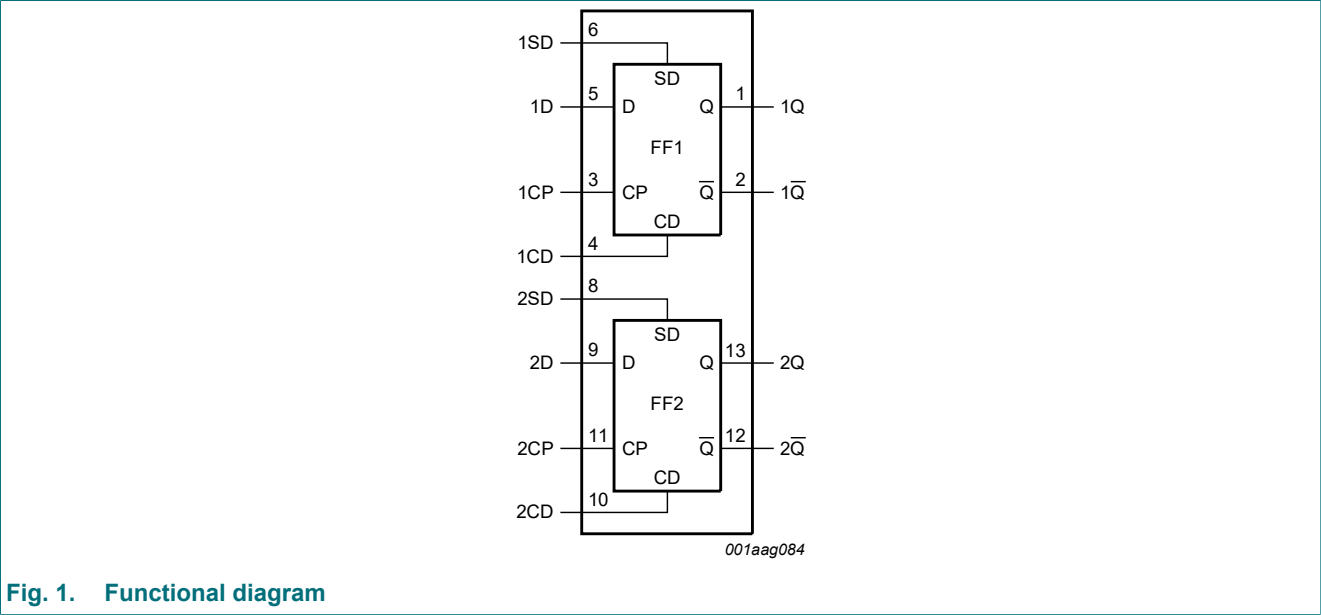


Fig. 1. Functional diagram

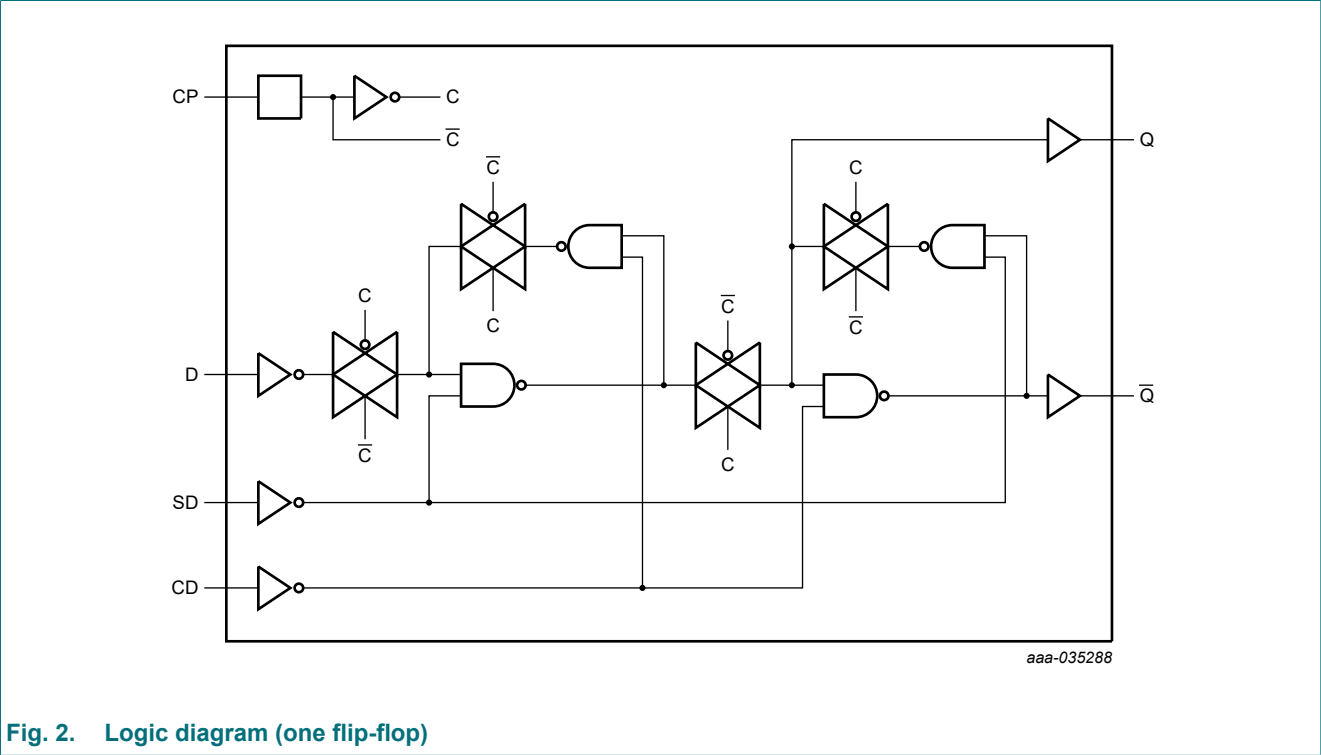
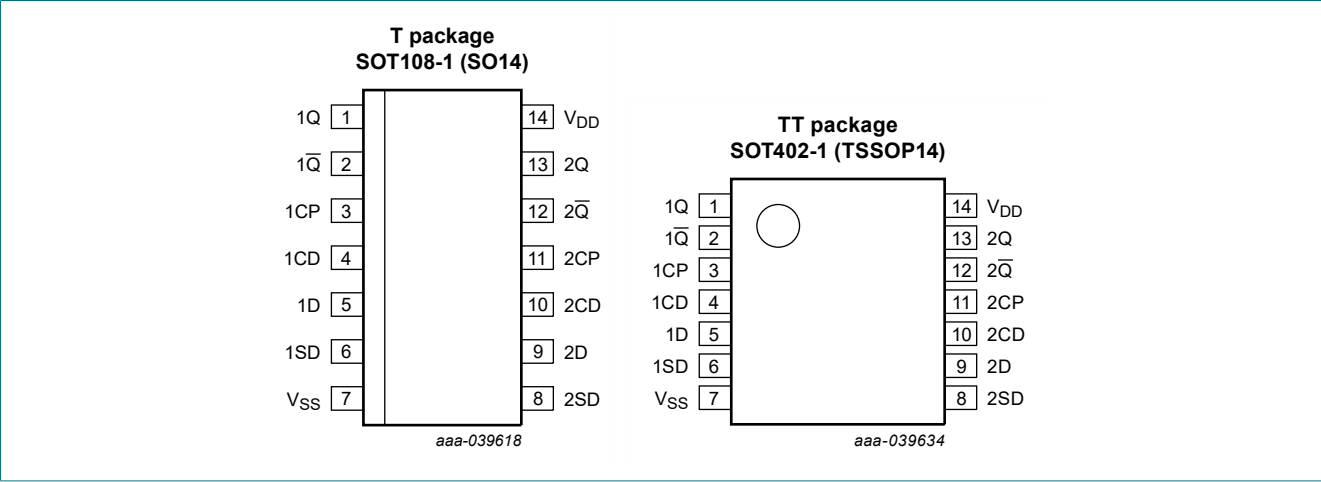


Fig. 2. Logic diagram (one flip-flop)

6. Pinning information

6.1. Pinning



6.2. Pin description

Table 2. Pin description

| Symbol          | Pin   | Description                                   |
|-----------------|-------|-----------------------------------------------|
| 1Q, 2Q          | 1, 13 | true output                                   |
| 1Q̄, 2Q̄        | 2, 12 | complement output                             |
| 1CP, 2CP        | 3, 11 | clock input (LOW to HIGH edge-triggered)      |
| 1CD, 2CD        | 4, 10 | asynchronous clear-direct input (active HIGH) |
| 1D, 2D          | 5, 9  | data input                                    |
| 1SD, 2SD        | 6, 8  | asynchronous set-direct input (active HIGH)   |
| V <sub>SS</sub> | 7     | ground (0 V)                                  |
| V <sub>DD</sub> | 14    | supply voltage                                |

7. Functional description

Table 3. Function table

H = HIGH voltage level; L = LOW voltage level; X = don't care; ↑ = LOW-to-HIGH clock transition.

| Control |     |     | Input | Output |     |
|---------|-----|-----|-------|--------|-----|
| nSD     | nCD | nCP | nD    | nQ     | nQ̄ |
| H       | L   | X   | X     | H      | L   |
| L       | H   | X   | X     | L      | H   |
| H       | H   | X   | X     | H      | H   |
| L       | L   | ↑   | L     | L      | H   |
| L       | L   | ↑   | H     | H      | L   |

8. Limiting values

Table 4. Limiting values  
In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to  $V_{SS} = 0\text{ V}$  (ground).

| Symbol    | Parameter               | Conditions                                             | Min  | Max            | Unit |
|-----------|-------------------------|--------------------------------------------------------|------|----------------|------|
| $V_{DD}$  | supply voltage          |                                                        | -0.5 | +18            | V    |
| $I_{IK}$  | input clamping current  | $V_I < -0.5\text{ V}$ or $V_I > V_{DD} + 0.5\text{ V}$ | -    | $\pm 10$       | mA   |
| $V_I$     | input voltage           |                                                        | -0.5 | $V_{DD} + 0.5$ | V    |
| $I_{OK}$  | output clamping current | $V_O < -0.5\text{ V}$ or $V_O > V_{DD} + 0.5\text{ V}$ | -    | $\pm 10$       | mA   |
| $I_{I/O}$ | input/output current    |                                                        | -    | $\pm 10$       | 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 | $T_{amb} = -40\text{ °C}$ to $+125\text{ °C}$ [1]      | -    | 500            | mW   |
| $P$       | power dissipation       | per output                                             | -    | 100            | mW   |

[1] 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.

9. Recommended operating conditions

Table 5. Recommended operating conditions

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

10. Static characteristics

Table 6. Static characteristics

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

| Symbol   | Parameter                 | Conditions                                            | $V_{DD}$ | $T_{amb} = -40\text{ }^{\circ}\text{C}$ |           | $T_{amb} = +25\text{ }^{\circ}\text{C}$ |           | $T_{amb} = +85\text{ }^{\circ}\text{C}$ |           | $T_{amb} = +125\text{ }^{\circ}\text{C}$ |           | 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     |                                                       | 15 V     | -                                       | $\pm 0.1$ | -                                       | $\pm 0.1$ | -                                       | $\pm 1.0$ | -                                        | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{DD}$ | supply current            | all valid input combinations;<br>$ I_O  = 0\text{ A}$ | 5 V      | -                                       | 1.0       | -                                       | 1.0       | -                                       | 30        | -                                        | 30        | $\mu\text{A}$ |
|          |                           |                                                       | 10 V     | -                                       | 2.0       | -                                       | 2.0       | -                                       | 60        | -                                        | 60        | $\mu\text{A}$ |
|          |                           |                                                       | 15 V     | -                                       | 4.0       | -                                       | 4.0       | -                                       | 120       | -                                        | 120       | $\mu\text{A}$ |
| $C_I$    | input capacitance         |                                                       | -        | -                                       | -         | -                                       | 7.5       | -                                       | -         | -                                        | -         | pF            |

11. Dynamic characteristics

Table 7. Dynamic characteristics  
*T<sub>amb</sub> = 25 °C, unless otherwise specified. For test circuit see Fig. 5.*

| Symbol           | Parameter                     | Conditions                    | V <sub>DD</sub> | Extrapolation formula          | Min | Typ | Max | Unit |
|------------------|-------------------------------|-------------------------------|-----------------|--------------------------------|-----|-----|-----|------|
| t <sub>PHL</sub> | HIGH to LOW propagation delay | nCP to nQ, nQ̄;<br>see Fig. 3 | 5 V             | [1] 83 + 0.55 × C <sub>L</sub> | -   | 110 | 220 | ns   |
|                  |                               |                               | 10 V            | 34 + 0.23 × C <sub>L</sub>     | -   | 45  | 90  | ns   |
|                  |                               |                               | 15 V            | 22 + 0.16 × C <sub>L</sub>     | -   | 30  | 60  | ns   |
|                  |                               | nSD to nQ̄                    | 5 V             | [1] 73 + 0.55 × C <sub>L</sub> | -   | 100 | 200 | ns   |
|                  |                               |                               | 10 V            | 29 + 0.23 × C <sub>L</sub>     | -   | 40  | 80  | ns   |
|                  |                               |                               | 15 V            | 22 + 0.16 × C <sub>L</sub>     | -   | 30  | 60  | ns   |
|                  |                               | nCD to nQ                     | 5 V             | [1] 73 + 0.55 × C <sub>L</sub> | -   | 100 | 200 | ns   |
|                  |                               |                               | 10 V            | 29 + 0.23 × C <sub>L</sub>     | -   | 40  | 80  | ns   |
|                  |                               |                               | 15 V            | 22 + 0.16 × C <sub>L</sub>     | -   | 30  | 60  | ns   |
| t <sub>PLH</sub> | LOW to HIGH propagation delay | nCP to nQ, nQ̄;<br>see Fig. 3 | 5 V             | [1] 68 + 0.55 × C <sub>L</sub> | -   | 95  | 190 | ns   |
|                  |                               |                               | 10 V            | 29 + 0.23 × C <sub>L</sub>     | -   | 40  | 80  | ns   |
|                  |                               |                               | 15 V            | 22 + 0.16 × C <sub>L</sub>     | -   | 30  | 60  | ns   |
|                  |                               | nSD to nQ                     | 5 V             | [1] 48 + 0.55 × C <sub>L</sub> | -   | 75  | 150 | ns   |
|                  |                               |                               | 10 V            | 24 + 0.23 × C <sub>L</sub>     | -   | 35  | 70  | ns   |
|                  |                               |                               | 15 V            | 17 + 0.16 × C <sub>L</sub>     | -   | 25  | 50  | ns   |
|                  |                               | nCD to nQ̄                    | 5 V             | [1] 33 + 0.55 × C <sub>L</sub> | -   | 60  | 120 | ns   |
|                  |                               |                               | 10 V            | 19 + 0.23 × C <sub>L</sub>     | -   | 30  | 60  | ns   |
|                  |                               |                               | 15 V            | 12 + 0.16 × C <sub>L</sub>     | -   | 20  | 40  | ns   |
| t <sub>t</sub>   | transition time               | see Fig. 3                    | 5 V             | [1] 10 + 1.00 × C <sub>L</sub> | -   | 60  | 120 | ns   |
|                  |                               |                               | 10 V            | 9 + 0.42 × C <sub>L</sub>      | -   | 30  | 60  | ns   |
|                  |                               |                               | 15 V            | 6 + 0.28 × C <sub>L</sub>      | -   | 20  | 40  | ns   |
| t <sub>su</sub>  | set-up time                   | nD to nCP; see Fig. 3         | 5 V             |                                | 40  | 20  | -   | ns   |
|                  |                               |                               | 10 V            |                                | 25  | 10  | -   | ns   |
|                  |                               |                               | 15 V            |                                | 15  | 5   | -   | ns   |
| t <sub>h</sub>   | hold time                     | nD to nCP; see Fig. 3         | 5 V             |                                | 20  | 0   | -   | ns   |
|                  |                               |                               | 10 V            |                                | 20  | 0   | -   | ns   |
|                  |                               |                               | 15 V            |                                | 15  | 0   | -   | ns   |
| t <sub>w</sub>   | pulse width                   | nCP input LOW;<br>see Fig. 3  | 5 V             |                                | 60  | 30  | -   | ns   |
|                  |                               |                               | 10 V            |                                | 30  | 15  | -   | ns   |
|                  |                               |                               | 15 V            |                                | 20  | 10  | -   | ns   |
|                  |                               | nSD input HIGH;<br>see Fig. 4 | 5 V             |                                | 50  | 25  | -   | ns   |
|                  |                               |                               | 10 V            |                                | 24  | 12  | -   | ns   |
|                  |                               |                               | 15 V            |                                | 20  | 10  | -   | ns   |
|                  |                               | nCD input HIGH;<br>see Fig. 4 | 5 V             |                                | 50  | 25  | -   | ns   |
|                  |                               |                               | 10 V            |                                | 24  | 12  | -   | ns   |
|                  |                               |                               | 15 V            |                                | 20  | 10  | -   | ns   |

| Symbol                | Parameter               | Conditions            | V <sub>DD</sub> | Extrapolation formula | Min | Typ | Max | Unit |
|-----------------------|-------------------------|-----------------------|-----------------|-----------------------|-----|-----|-----|------|
| t <sub>rec</sub>      | recovery time           | nSD input; see Fig. 4 | 5 V             |                       | +15 | -5  | -   | ns   |
|                       |                         |                       | 10 V            |                       | 15  | 0   | -   | ns   |
|                       |                         |                       | 15 V            |                       | 15  | 0   | -   | ns   |
|                       |                         | nCD input; see Fig. 4 | 5 V             |                       | 40  | 25  | -   | ns   |
|                       |                         |                       | 10 V            |                       | 25  | 10  | -   | ns   |
|                       |                         |                       | 15 V            |                       | 25  | 10  | -   | ns   |
| f <sub>clk(max)</sub> | maximum clock frequency | see Fig. 3            | 5 V             |                       | 7   | 14  | -   | MHz  |
|                       |                         |                       | 10 V            |                       | 14  | 28  | -   | MHz  |
|                       |                         |                       | 15 V            |                       | 20  | 40  | -   | MHz  |

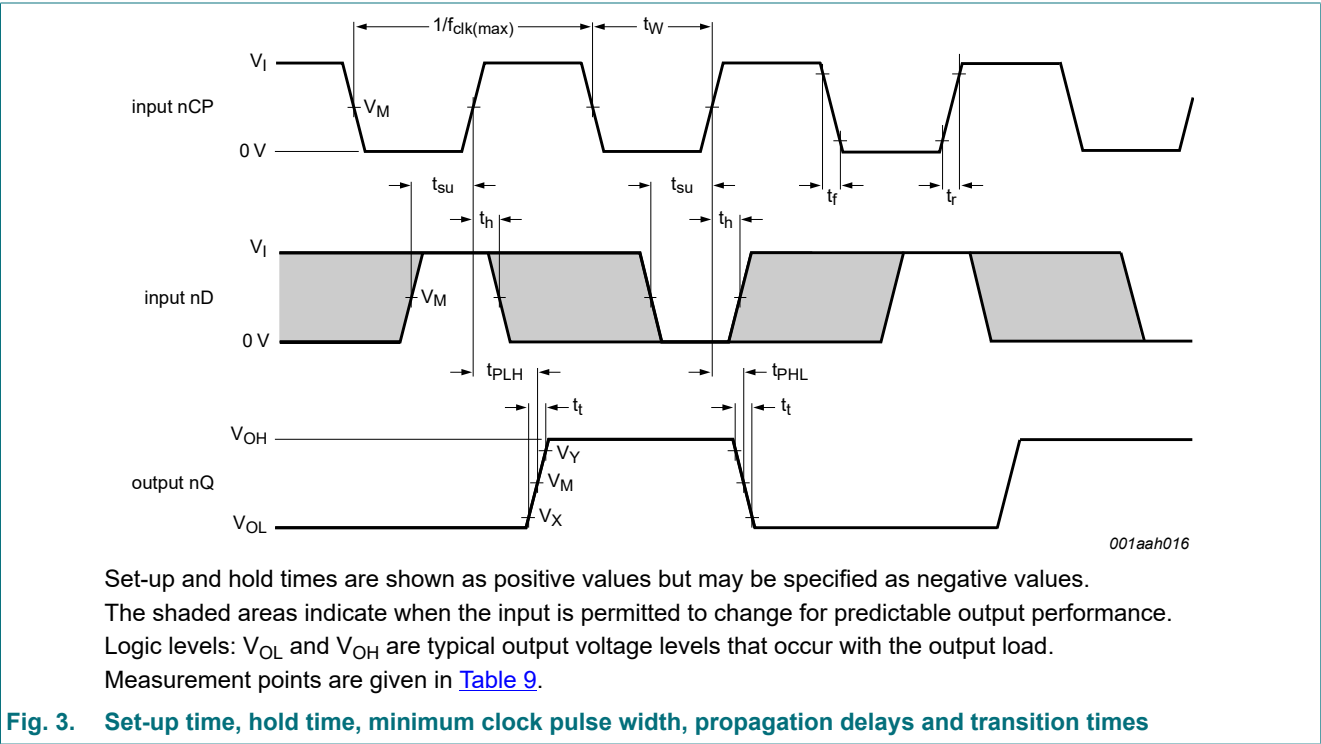
[1] Typical values of the propagation delays and output transition times can be calculated with the extrapolation formulas (C<sub>L</sub> in pF).

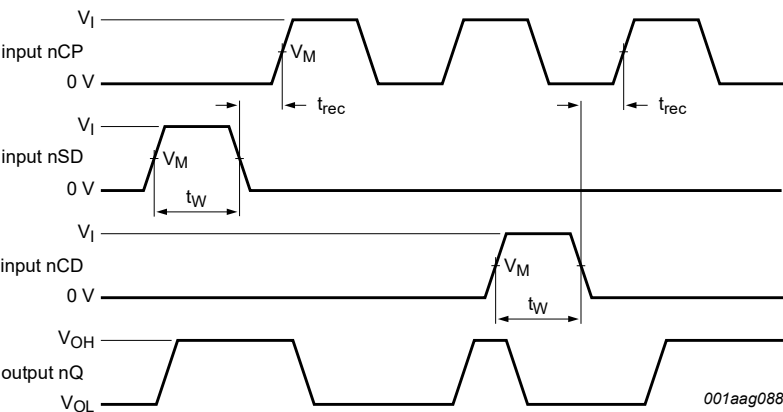
Table 8. Dynamic power dissipation

V<sub>SS</sub> = 0 V; t<sub>r</sub> = t<sub>f</sub> ≤ 20 ns; T<sub>amb</sub> = 25 °C.

| Symbol         | Parameter                 | V <sub>DD</sub> | Typical formula                                                        | Where                                                                                                                                                                                                                                           |
|----------------|---------------------------|-----------------|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| P <sub>D</sub> | dynamic power dissipation | 5 V             | $P_D = 850 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2 \mu W$  | f <sub>i</sub> = input frequency in MHz;<br>f <sub>o</sub> = output frequency in MHz;<br>C <sub>L</sub> = output load capacitance in pF;<br>Σ(f <sub>o</sub> × C <sub>L</sub> ) = sum of the outputs;<br>V <sub>DD</sub> = supply voltage in V. |
|                |                           | 10 V            | $P_D = 3600 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2 \mu W$ |                                                                                                                                                                                                                                                 |
|                |                           | 15 V            | $P_D = 9000 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2 \mu W$ |                                                                                                                                                                                                                                                 |

11.1. Waveforms and test circuit



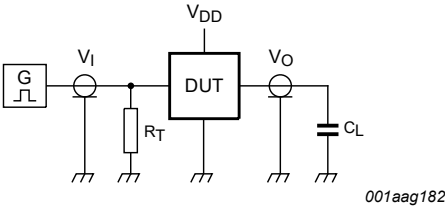


Recovery times are shown as positive values but may be specified as negative values.  
Logic levels:  $V_{OL}$  and  $V_{OH}$  are typical output voltage levels that occur with the output load.  
Measurement points are given in [Table 9](#).

Fig. 4. nSD, nCD recovery time and pulse width

Table 9. Measurement points

| Supply voltage | Input       | Output      |             |             |
|----------------|-------------|-------------|-------------|-------------|
| $V_{DD}$       | $V_M$       | $V_M$       | $V_X$       | $V_Y$       |
| 5 V to 15 V    | $0.5V_{DD}$ | $0.5V_{DD}$ | $0.1V_{DD}$ | $0.9V_{DD}$ |



Test and measurement data is given in [Table 10](#);  
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.

Fig. 5. Test circuit for measuring switching times

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 $V_{DD}$ | $\leq 20$ ns | 50 pF |

12. Application information

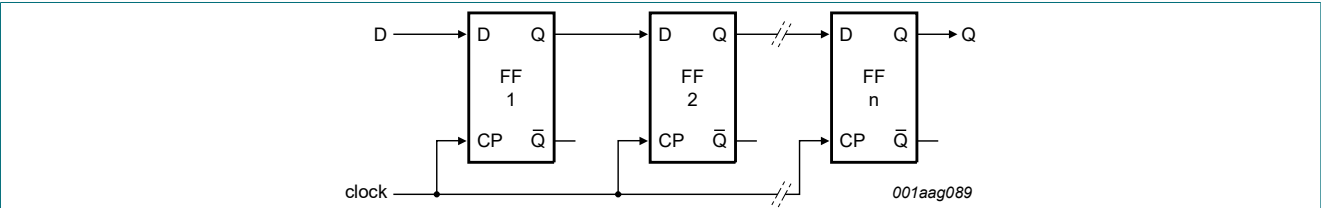


Fig. 6. N-stage shift register

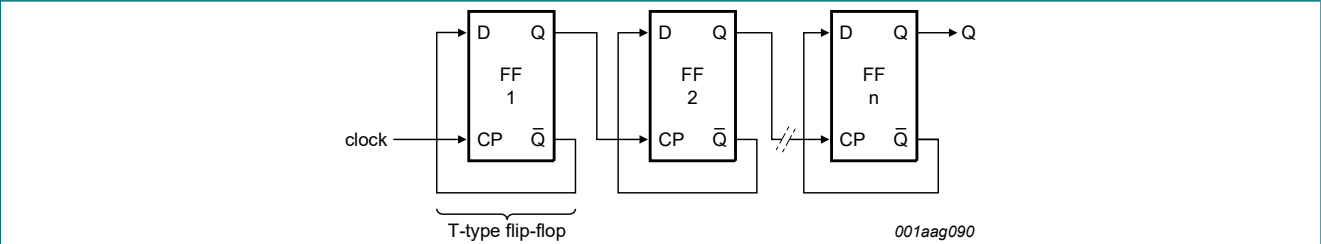


Fig. 7. Binary ripple up-counter; divide-by- $2^n$

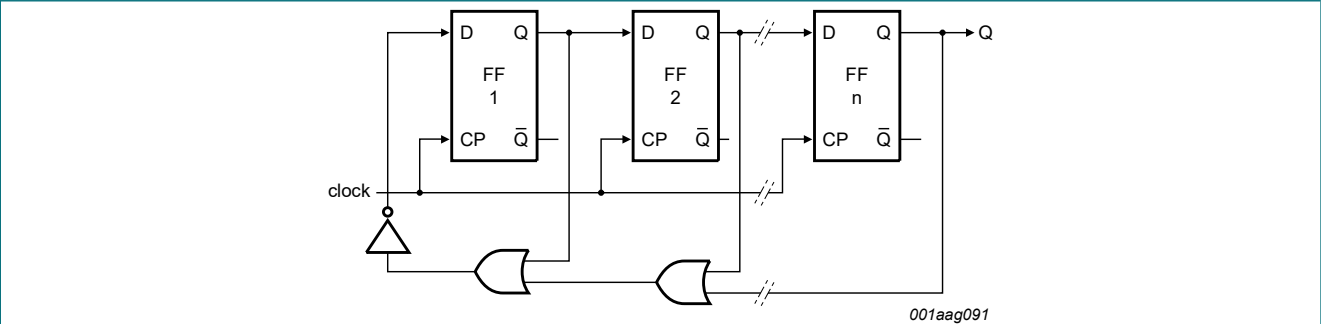


Fig. 8. Modified ring counter; divide-by-(n + 1)

13. Package outline

SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1

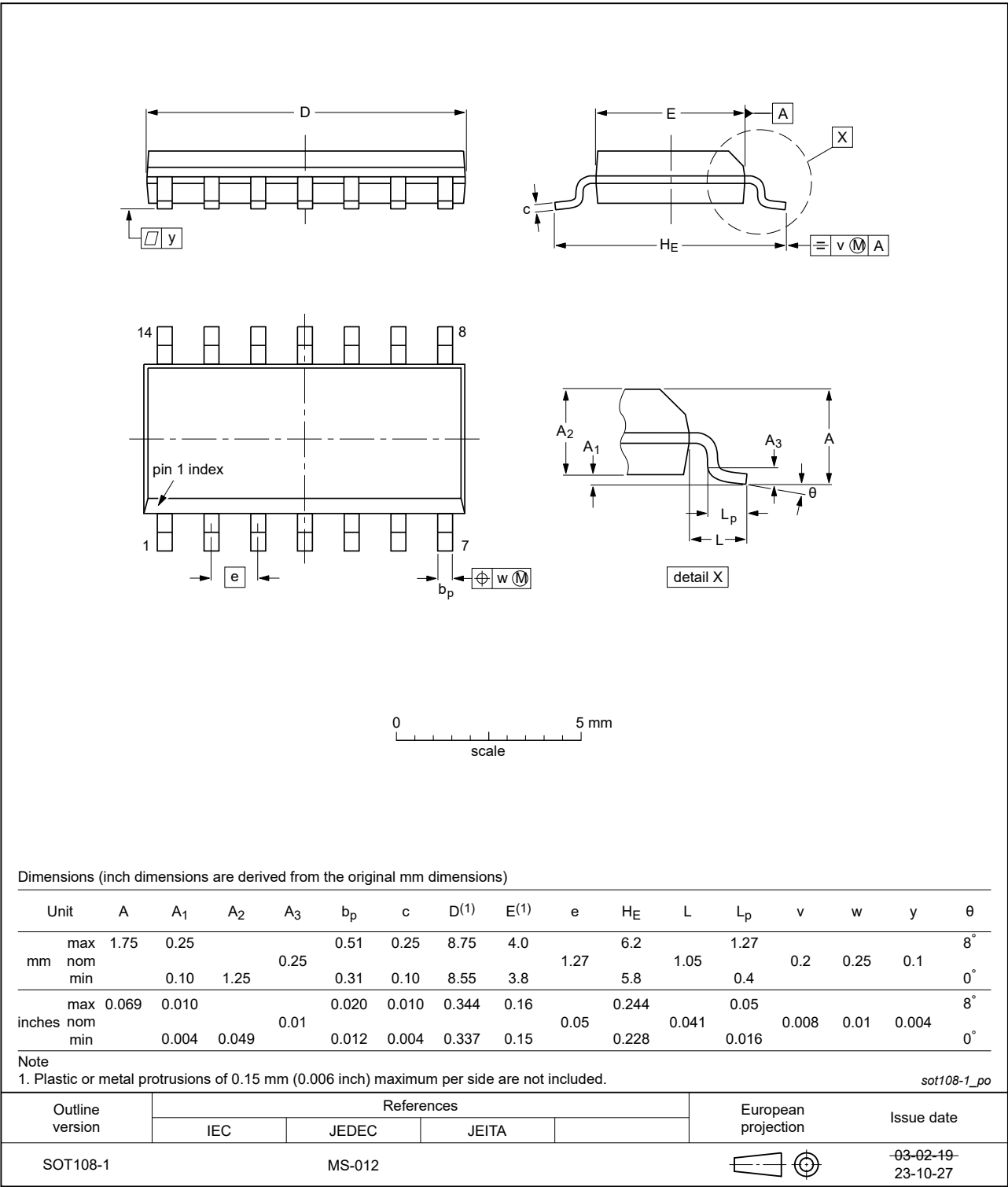


Fig. 9. Package outline SOT108-1 (SO14)

TSSOP14: plastic thin shrink small outline package; 14 leads; body width 4.4 mm

SOT402-1

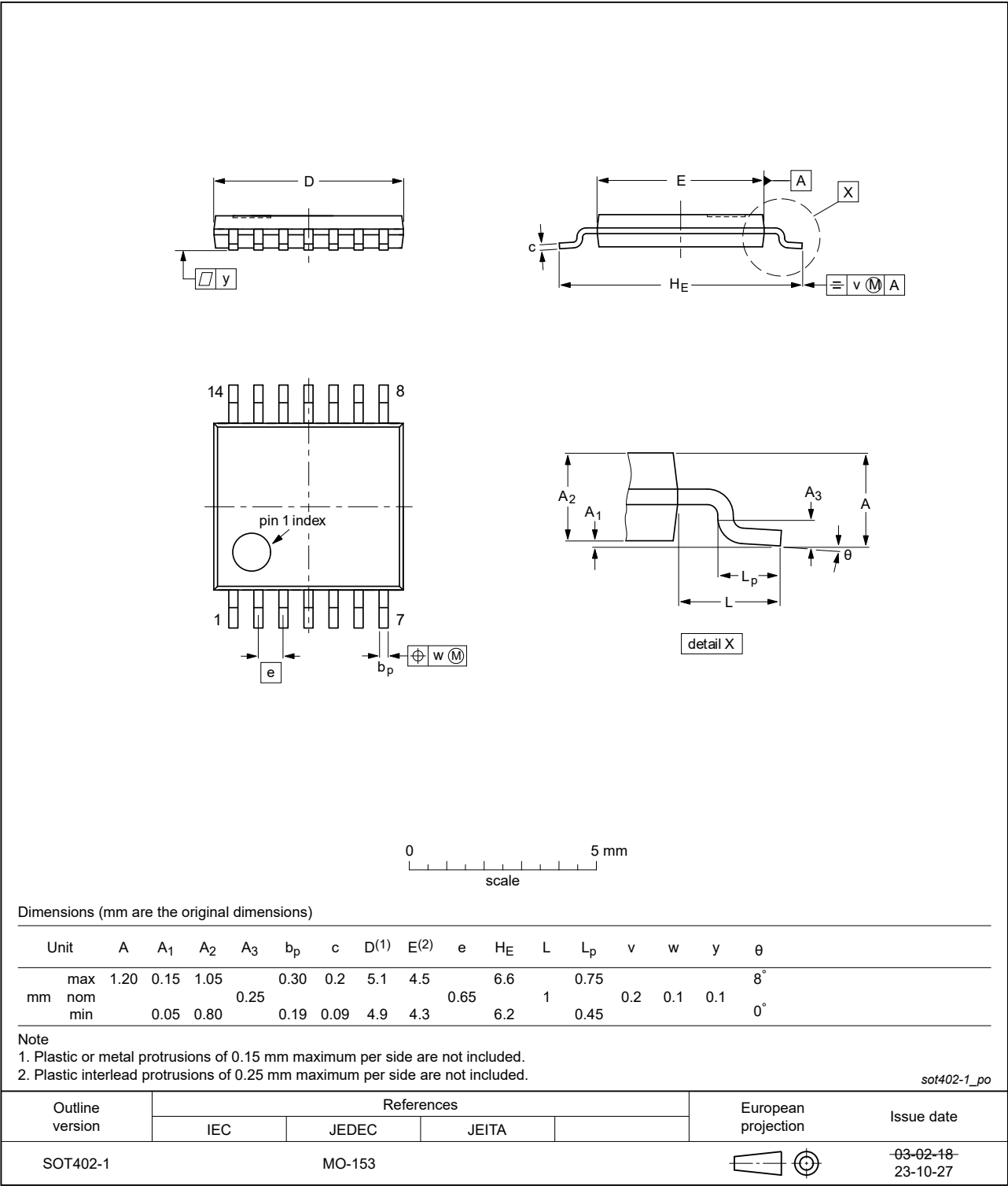


Fig. 10. Package outline SOT402-1 (TSSOP14)

14. Abbreviations

Table 11. Abbreviations

| Acronym | Description                               |
|---------|-------------------------------------------|
| ANSI    | American National Standards Institute     |
| CDM     | Charged Device Model                      |
| CMOS    | Complementary Metal-Oxide Semiconductor   |
| DUT     | Device Under Test                         |
| ESD     | ElectroStatic Discharge                   |
| ESDA    | ElectroStatic Discharge Association       |
| HBM     | Human Body Model                          |
| JEDEC   | Joint Electron Device Engineering Council |

15. Revision history

Table 12. Revision history

| Document ID       | Release date                                                                                                                                                                                                                                                                                                                                                          | Data sheet status  | Change notice | Supersedes        |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------|-------------------|
| HEF4013B_Q100 v.6 | 20240724                                                                                                                                                                                                                                                                                                                                                              | Product data sheet | -             | HEF4013B_Q100 v.5 |
| Modifications:    | <ul style="list-style-type: none"><li>Section 2: ESD specification updated according to the latest JEDEC standard.</li><li>Fig. 9, Fig. 10: Aligned SO and TSSOP package outline drawings to JEDEC MS-012 and MO-153</li></ul>                                                                                                                                        |                    |               |                   |
| HEF4013B_Q100 v.5 | 20230309                                                                                                                                                                                                                                                                                                                                                              | Product data sheet | -             | HEF4013B_Q100 v.4 |
| Modifications:    | <ul style="list-style-type: none"><li>Section 1 updated.</li><li>Fig. 2: Schmitt-trigger symbol removed (errata).</li></ul>                                                                                                                                                                                                                                           |                    |               |                   |
| HEF4013B_Q100 v.4 | 20211123                                                                                                                                                                                                                                                                                                                                                              | Product data sheet | -             | HEF4013B_Q100 v.3 |
| 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><li>Section 1 and Section 2 updated.</li><li>Table 4: Derating values for P<sub>tot</sub> total power dissipation updated.</li></ul> |                    |               |                   |
| HEF4013B_Q100 v.3 | 20151215                                                                                                                                                                                                                                                                                                                                                              | Product data sheet | -             | HEF4013B_Q100 v.2 |
| Modifications:    | <ul style="list-style-type: none"><li>Type number HEF4013BP-Q100 (SOT27-1) removed.</li></ul>                                                                                                                                                                                                                                                                         |                    |               |                   |
| HEF4013B_Q100 v.2 | 20130220                                                                                                                                                                                                                                                                                                                                                              | Product data sheet | -             | HEF4013B_Q100 v.1 |
| Modifications:    | <ul style="list-style-type: none"><li>HEF4013BP-Q100 (DIP14) added.</li></ul>                                                                                                                                                                                                                                                                                         |                    |               |                   |
| HEF4013B_Q100 v.1 | 20120807                                                                                                                                                                                                                                                                                                                                                              | Product data sheet | -             | -                 |

## 16. 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".
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Date of release: 24 July 2024