

# HEF4521B

## 24-stage frequency divider and oscillator

Rev. 7 — 30 March 2016

Product data sheet

### 1. General description

The HEF4521B consists of a chain of 24 toggle flip-flops with an overriding asynchronous master reset input (MR), and an input circuit that allows three modes of operation. The single inverting stage (A2 to Y2) functions as: a crystal oscillator, an input buffer for an external oscillator or in combination with A1 as an RC oscillator. The crystal oscillator operates in Low-power mode when pins  $V_{SS1}$  and  $V_{DD1}$  are supplied via external resistors.

Each flip-flop divides the frequency of the previous flip-flop by two, consequently the HEF4521B counts up to  $2^{24} = 16777216$ . The counting advances on the HIGH-to-LOW transition of the clock (A2). The outputs from each of the last seven stages ( $2^{18}$  to  $2^{24}$ ) are available for additional flexibility.

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

- Low power crystal oscillator operation
- Fully static operation
- 5 V, 10 V, and 15 V parametric ratings
- Standardized symmetrical output characteristics
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$
- Complies with JEDEC standard JESD 13-B

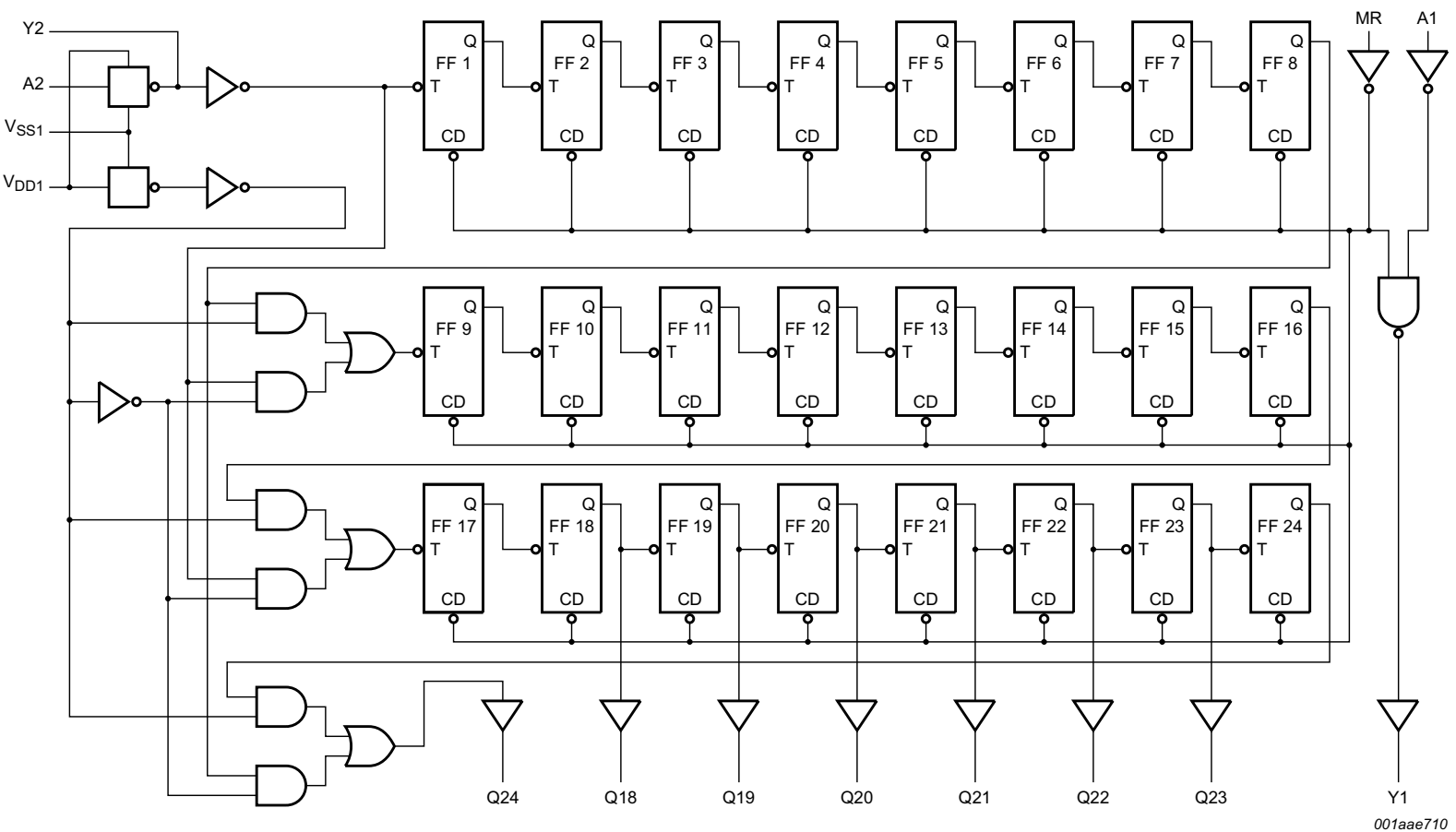
### 3. Ordering information

**Table 1.** Ordering information

All types operate from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$ .

| Type number | Package |                                                            |          |
|-------------|---------|------------------------------------------------------------|----------|
|             | Name    | Description                                                | Version  |
| HEF4521BT   | SO16    | plastic small outline package; 16 leads; body width 3.9 mm | SOT109-1 |



**Fig 3. Logic diagram**

5. Pinning information

5.1 Pinning

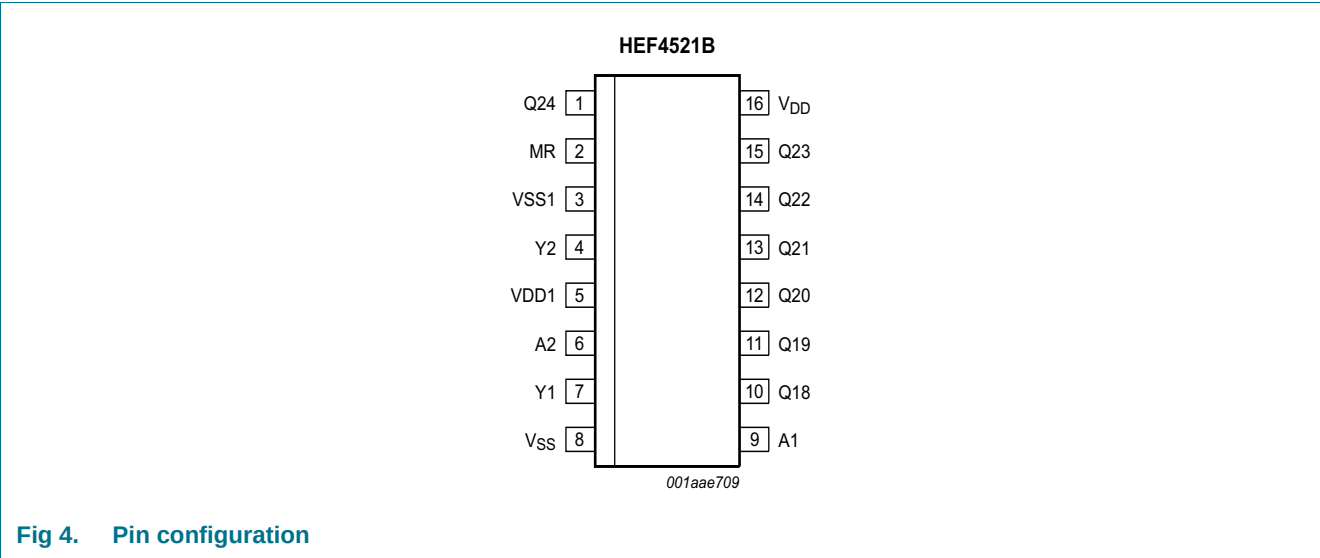


Fig 4. Pin configuration

5.2 Pin description

Table 2. Pin description

| Symbol           | Pin                       | Description                    |
|------------------|---------------------------|--------------------------------|
| MR               | 2                         | master reset input             |
| V <sub>SS1</sub> | 3                         | ground supply voltage 1        |
| V <sub>DD1</sub> | 5                         | supply voltage 1               |
| Y1, Y2           | 7, 4                      | external oscillator connection |
| V <sub>SS</sub>  | 8                         | ground supply voltage          |
| A1, A2           | 9, 6                      | external oscillator connection |
| Q18 to Q24       | 10, 11, 12, 13, 14, 15, 1 | output                         |
| V <sub>DD</sub>  | 16                        | supply voltage                 |

6. Count capacity

Table 3. Count capacity

| Output | Count capacity               |
|--------|------------------------------|
| Q18    | 2 <sup>18</sup> = 262 144    |
| Q19    | 2 <sup>19</sup> = 524 288    |
| Q20    | 2 <sup>20</sup> = 1 048 576  |
| Q21    | 2 <sup>21</sup> = 2 097 152  |
| Q22    | 2 <sup>22</sup> = 4 194 304  |
| Q23    | 2 <sup>23</sup> = 8 388 608  |
| Q24    | 2 <sup>24</sup> = 16 777 216 |

## 7. Functional test

A test function has been included to reduce the test time required to test all 24 counter stages. This test function divides the counter into three 8-stage sections by connecting  $V_{SS1}$  to  $V_{DD}$  and  $V_{DD1}$  to  $V_{SS}$ . 255 counts are loaded into each of the 8-stage sections in parallel via A2 (connected to Y2). All flip-flops are now at a HIGH level. The counter is now returned to the normal 24-stage in series configuration by connecting  $V_{SS1}$  to  $V_{SS}$  and  $V_{DD1}$  to  $V_{DD}$ . Entering one more pulse into input A2 causes the counter to ripple from an all HIGH state to an all LOW state.

**Table 4.** Functional test sequence<sup>[1]</sup>

| Inputs |                | Control terminals |           |           | Outputs    | Remarks                                                                                                                            |
|--------|----------------|-------------------|-----------|-----------|------------|------------------------------------------------------------------------------------------------------------------------------------|
| MR     | A2             | Y2                | $V_{SS1}$ | $V_{DD1}$ | Q18 to Q24 |                                                                                                                                    |
| H      | L              | L                 | $V_{DD}$  | $V_{SS}$  | L          | counter is in three 8-stage sections in parallel mode; A2 and Y2 are interconnected (Y2 is now input); counter is reset by MR.     |
| L      | <sup>[2]</sup> | <sup>[2]</sup>    | $V_{DD}$  | $V_{SS}$  | H          |                                                                                                                                    |
| L      | L              | L                 | $V_{SS}$  | $V_{SS}$  | H          | $V_{SS1}$ is connected to $V_{SS}$ .                                                                                               |
| L      | H              | L                 | $V_{SS}$  | $V_{SS}$  | H          | the input A2 is made HIGH.                                                                                                         |
| L      | H              | L                 | $V_{SS}$  | $V_{DD}$  | H          | $V_{DD1}$ is connected to $V_{DD}$ ; Y2 is now made floating and becomes an output; the device is now in the 2 <sup>24</sup> mode. |
| L      | ↓              |                   | $V_{SS}$  | $V_{DD}$  | L          | counter ripples from an all HIGH state to an all LOW state.                                                                        |

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

[2] 255 pulses are clocked into A2, Y2. The counter advances on the LOW to HIGH transition.

## 8. Limiting values

**Table 5.** Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| 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 $V_I > V_{DD} + 0.5\text{ V}$ | -    | ±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 $V_O > V_{DD} + 0.5\text{ V}$ | -    | ±10            | mA   |
| $I_{I/O}$ | input/output current    |                                                        | -    | ±10            | mA   |
| $I_{DD}$  | supply current          | to any supply terminal                                 | -    | ±100           | mA   |
| $T_{stg}$ | storage temperature     |                                                        | −65  | +150           | °C   |
| $T_{amb}$ | ambient temperature     |                                                        | −40  | +85            | °C   |
| $P_{tot}$ | total power dissipation | SO16 package <sup>[1]</sup>                            | -    | 500            | mW   |
| P         | power dissipation       | per output                                             | -    | 100            | mW   |

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

## 9. Recommended operating conditions

**Table 6.** 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 | -   | +85      | °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     | $\mu\text{s/V}$ |

## 10. Static characteristics

**Table 7.** Static characteristics

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

| Symbol   | Parameter                 | Conditions                     | $V_{DD}$ | $T_{amb} = -40\text{ °C}$ |           | $T_{amb} = 25\text{ °C}$ |           | $T_{amb} = 85\text{ °C}$ |           | Unit          |
|----------|---------------------------|--------------------------------|----------|---------------------------|-----------|--------------------------|-----------|--------------------------|-----------|---------------|
|          |                           |                                |          | 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                      | -         | V             |
|          |                           |                                | 10 V     | 7.0                       | -         | 7.0                      | -         | 7.0                      | -         | V             |
|          |                           |                                | 15 V     | 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       | V             |
|          |                           |                                | 10 V     | -                         | 3.0       | -                        | 3.0       | -                        | 3.0       | V             |
|          |                           |                                | 15 V     | -                         | 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                     | -         | V             |
|          |                           |                                | 10 V     | 9.95                      | -         | 9.95                     | -         | 9.95                     | -         | V             |
|          |                           |                                | 15 V     | 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      | V             |
|          |                           |                                | 10 V     | -                         | 0.05      | -                        | 0.05      | -                        | 0.05      | V             |
|          |                           |                                | 15 V     | -                         | 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      | mA            |
|          |                           | $V_O = 4.6\text{ V}$           | 5 V      | -                         | -0.52     | -                        | -0.44     | -                        | -0.36     | mA            |
|          |                           | $V_O = 9.5\text{ V}$           | 10 V     | -                         | -1.3      | -                        | -1.1      | -                        | -0.9      | mA            |
|          |                           | $V_O = 13.5\text{ V}$          | 15 V     | -                         | -3.6      | -                        | -3.0      | -                        | -2.4      | mA            |
| $I_{OL}$ | LOW-level output current  | $V_O = 0.4\text{ V}$           | 5 V      | 0.52                      | -         | 0.44                     | -         | 0.36                     | -         | mA            |
|          |                           | $V_O = 0.5\text{ V}$           | 10 V     | 1.3                       | -         | 1.1                      | -         | 0.9                      | -         | mA            |
|          |                           | $V_O = 1.5\text{ V}$           | 15 V     | 3.6                       | -         | 3.0                      | -         | 2.4                      | -         | mA            |
| $I_I$    | input leakage current     |                                | 15 V     | -                         | $\pm 0.3$ | -                        | $\pm 0.3$ | -                        | $\pm 1.0$ | $\mu\text{A}$ |
| $I_{DD}$ | supply current            | $I_O = 0\text{ A}$             | 5 V      | -                         | 20        | -                        | 20        | -                        | 150       | $\mu\text{A}$ |
|          |                           |                                | 10 V     | -                         | 40        | -                        | 40        | -                        | 300       | $\mu\text{A}$ |
|          |                           |                                | 15 V     | -                         | 80        | -                        | 80        | -                        | 600       | $\mu\text{A}$ |
| $C_I$    | input capacitance         |                                | -        | -                         | -         | -                        | 7.5       | -                        | -         | pF            |

## 11. Dynamic characteristics

**Table 8. Dynamic characteristics**

$V_{SS} = 0\text{ V}$ ;  $T_{amb} = 25\text{ °C}$ ; for test circuits see [Figure 6](#); unless otherwise specified.

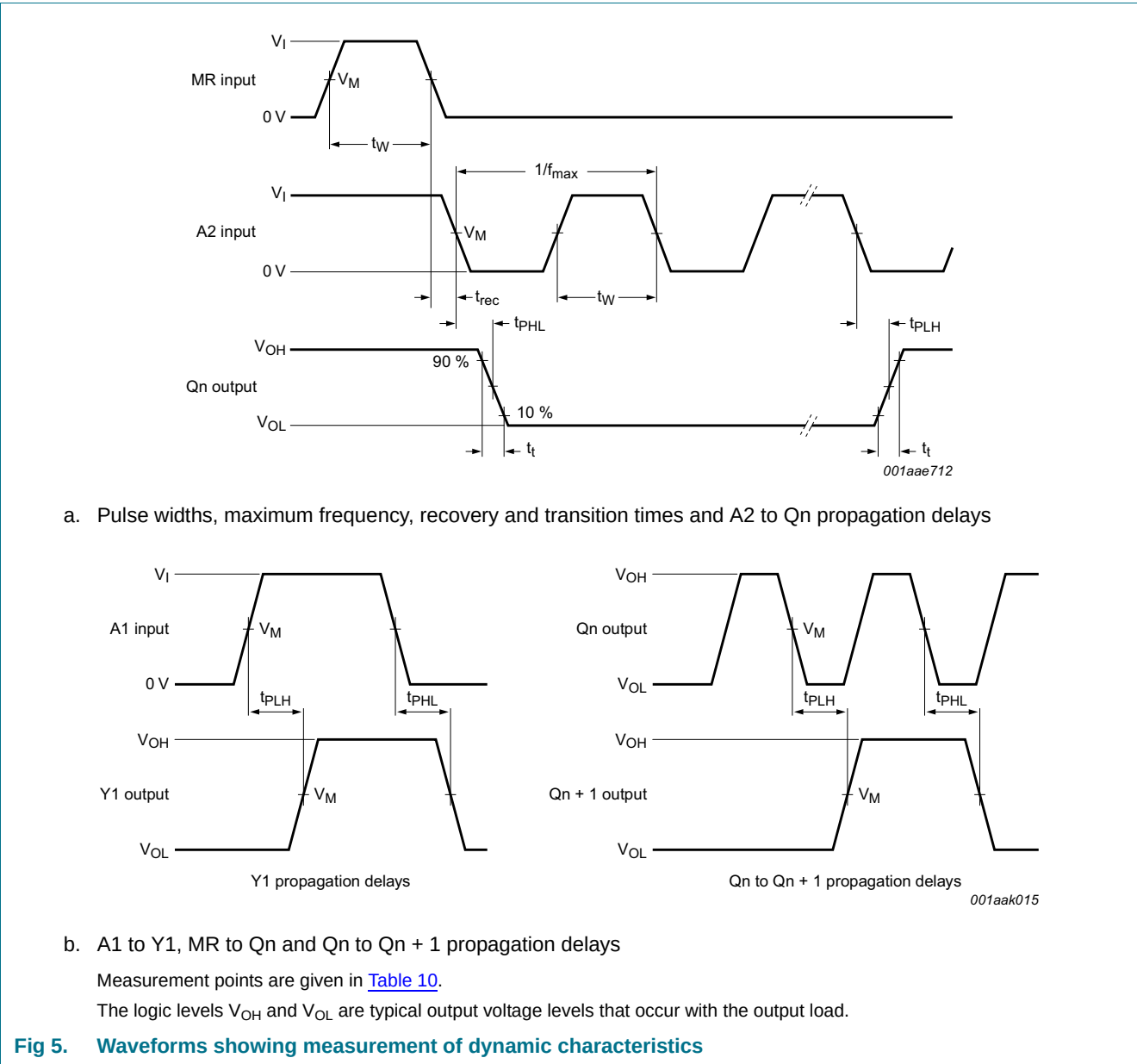
| Symbol    | Parameter                     | Conditions                                           | $V_{DD}$ | Extrapolation formula                    | Min | Typ | Max  | Unit |
|-----------|-------------------------------|------------------------------------------------------|----------|------------------------------------------|-----|-----|------|------|
| $t_{PHL}$ | HIGH to LOW propagation delay | A2 to Q18; see <a href="#">Figure 5</a>              | 5 V      | $923\text{ ns} + (0.55\text{ ns/pF})C_L$ | -   | 950 | 1900 | ns   |
|           |                               |                                                      | 10 V     | $339\text{ ns} + (0.23\text{ ns/pF})C_L$ | -   | 350 | 700  | ns   |
|           |                               |                                                      | 15 V     | $212\text{ ns} + (0.16\text{ ns/pF})C_L$ | -   | 220 | 440  | ns   |
|           |                               | Qn to Qn + 1; see <a href="#">Figure 5</a>           | 5 V      | $13\text{ ns} + (0.55\text{ ns/pF})C_L$  | -   | 40  | 80   | ns   |
|           |                               |                                                      | 10 V     | $4\text{ ns} + (0.23\text{ ns/pF})C_L$   | -   | 15  | 30   | ns   |
|           |                               |                                                      | 15 V     | $2\text{ ns} + (0.16\text{ ns/pF})C_L$   | -   | 10  | 20   | ns   |
|           |                               | MR to Qn                                             | 5 V      | $93\text{ ns} + (0.55\text{ ns/pF})C_L$  | -   | 120 | 240  | 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   |
|           |                               | A1 to Y1; see <a href="#">Figure 5</a>               | 5 V      | $63\text{ ns} + (0.55\text{ ns/pF})C_L$  | -   | 90  | 180  | ns   |
|           |                               |                                                      | 10 V     | $24\text{ ns} + (0.23\text{ ns/pF})C_L$  | -   | 35  | 70   | ns   |
|           |                               |                                                      | 15 V     | $17\text{ ns} + (0.16\text{ ns/pF})C_L$  | -   | 25  | 50   | ns   |
| $t_{PLH}$ | LOW to HIGH propagation delay | A2 to Q18; see <a href="#">Figure 5</a>              | 5 V      | $923\text{ ns} + (0.55\text{ ns/pF})C_L$ | -   | 950 | 1900 | ns   |
|           |                               |                                                      | 10 V     | $339\text{ ns} + (0.23\text{ ns/pF})C_L$ | -   | 350 | 700  | ns   |
|           |                               |                                                      | 15 V     | $212\text{ ns} + (0.16\text{ ns/pF})C_L$ | -   | 220 | 440  | ns   |
|           |                               | Qn to Qn + 1; see <a href="#">Figure 5</a>           | 5 V      | $13\text{ ns} + (0.55\text{ ns/pF})C_L$  | -   | 40  | 80   | ns   |
|           |                               |                                                      | 10 V     | $4\text{ ns} + (0.23\text{ ns/pF})C_L$   | -   | 15  | 30   | ns   |
|           |                               |                                                      | 15 V     | $2\text{ ns} + (0.16\text{ ns/pF})C_L$   | -   | 10  | 20   | ns   |
|           |                               | A1 to Y1; see <a href="#">Figure 5</a>               | 5 V      | $33\text{ ns} + (0.55\text{ ns/pF})C_L$  | -   | 60  | 120  | ns   |
|           |                               |                                                      | 10 V     | $19\text{ ns} + (0.23\text{ ns/pF})C_L$  | -   | 30  | 60   | ns   |
|           |                               |                                                      | 15 V     | $12\text{ ns} + (0.16\text{ ns/pF})C_L$  | -   | 20  | 40   | ns   |
| $t_t$     | transition time               | Qn; see <a href="#">Figure 5</a>                     | 5 V      | $10\text{ ns} + (1.00\text{ ns/pF})C_L$  | -   | 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   |
| $t_w$     | pulse width                   | A2 HIGH; minimum width; see <a href="#">Figure 5</a> | 5 V      |                                          | 80  | 40  | -    | ns   |
|           |                               |                                                      | 10 V     |                                          | 40  | 20  | -    | ns   |
|           |                               |                                                      | 15 V     |                                          | 30  | 15  | -    | ns   |
|           |                               | MR HIGH; minimum width; see <a href="#">Figure 5</a> | 5 V      |                                          | 70  | 35  | -    | ns   |
|           |                               |                                                      | 10 V     |                                          | 40  | 20  | -    | ns   |
|           |                               |                                                      | 15 V     |                                          | 30  | 15  | -    | ns   |
| $t_{rec}$ | recovery time                 | MR; see <a href="#">Figure 5</a>                     | 5 V      |                                          | +20 | -10 | -    | ns   |
|           |                               |                                                      | 10 V     |                                          | +15 | -5  | -    | ns   |
|           |                               |                                                      | 15 V     |                                          | 15  | 0   | -    | ns   |
| $f_{max}$ | maximum frequency             | A1; see <a href="#">Figure 5</a>                     | 5 V      |                                          | 6   | 12  | -    | MHz  |
|           |                               |                                                      | 10 V     |                                          | 12  | 25  | -    | MHz  |
|           |                               |                                                      | 15 V     |                                          | 17  | 35  | -    | MHz  |

[1] The typical values of the propagation delay and transition times are calculated from the extrapolation formulas shown ( $C_L$  in pF).

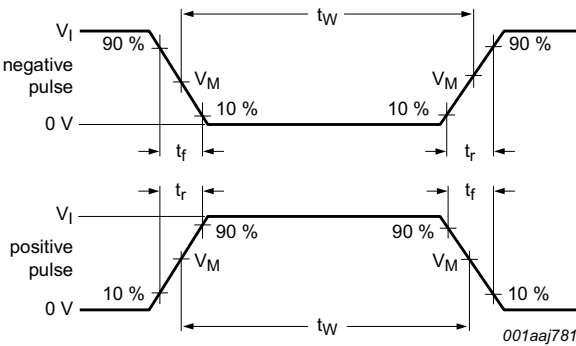
**Table 9. Dynamic power dissipation  $P_D$**   
 $P_D$  can be calculated from the formulas shown.  $V_{SS} = 0\text{ V}$ ;  $t_r = t_f \leq 20\text{ ns}$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$ .

| Symbol | Parameter                 | $V_{DD}$ | Typical formula for $P_D$ ( $\mu\text{W}$ )                       | where:                                                                                                                                                                                             |
|--------|---------------------------|----------|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $P_D$  | dynamic power dissipation | 5 V      | $P_D = 1200 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2$  | $f_i$ = input frequency in MHz,<br>$f_o$ = output frequency in MHz,<br>$C_L$ = output load capacitance in pF,<br>$V_{DD}$ = supply voltage in V,<br>$\Sigma(C_L \times f_o)$ = sum of the outputs. |
|        |                           | 10 V     | $P_D = 5100 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2$  |                                                                                                                                                                                                    |
|        |                           | 15 V     | $P_D = 13050 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2$ |                                                                                                                                                                                                    |

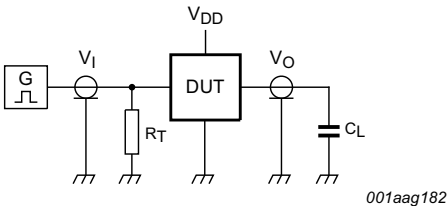
12. Waveforms







a. Input waveforms



b. Test circuit

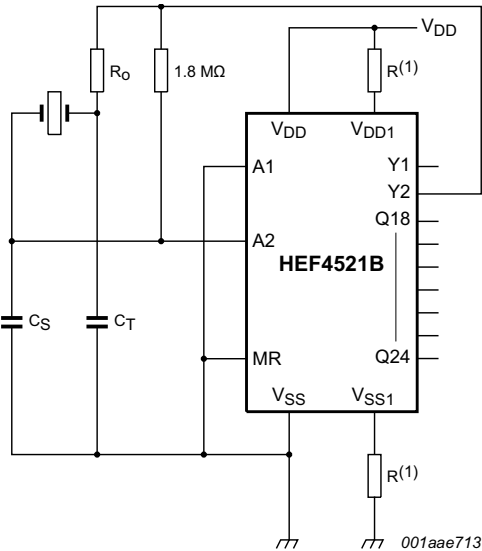
Test data is given in [Table 10](#).  
Definitions for test circuit:  
Device Under Test (DUT);  
 $C_L$  = Load capacitance including jig and probe capacitance;  
 $R_T$  = Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator.

Fig 6. Test circuit for measuring switching times

Table 10. Measurement points and test data

| Supply voltage | Input    |          |              | Load  |
|----------------|----------|----------|--------------|-------|
| $V_{DD}$       | $V_I$    | $V_M$    | $t_r, t_f$   | $C_L$ |
| 5 V to 15 V    | $V_{DD}$ | $0.5V_I$ | $\leq 20$ ns | 50 pF |

13. Application information



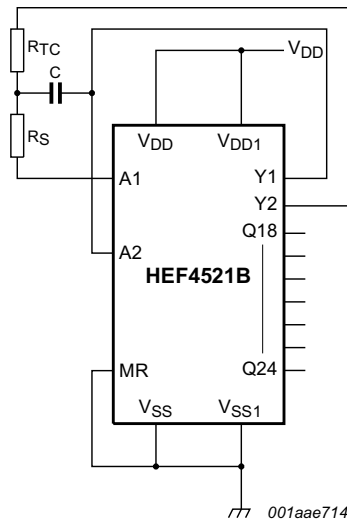
(1) Optional for low power operation.

Fig 7. Crystal oscillator circuit

Table 11. Typical characteristics for crystal oscillator

See [Figure 7](#).

| Parameter                          |                           | 500 kHz circuit | 50 kHz circuit | Unit |
|------------------------------------|---------------------------|-----------------|----------------|------|
| Crystal characteristics            |                           |                 |                |      |
|                                    | Resonance frequency       | 500             | 50             | kHz  |
|                                    | Crystal cut               | S               | N              | -    |
|                                    | Equivalent resistance; RS | 1               | 6.2            | kΩ   |
| External resistor/capacitor values |                           |                 |                |      |
|                                    | RO                        | 47              | 750            | kΩ   |
|                                    | CT                        | 82              | 82             | pF   |
|                                    | CS                        | 20              | 20             | pF   |



$$f \approx \frac{1}{2.3 \times R_{TC} \times C} ; R_S \geq 2R_{TC}, \text{ where:}$$

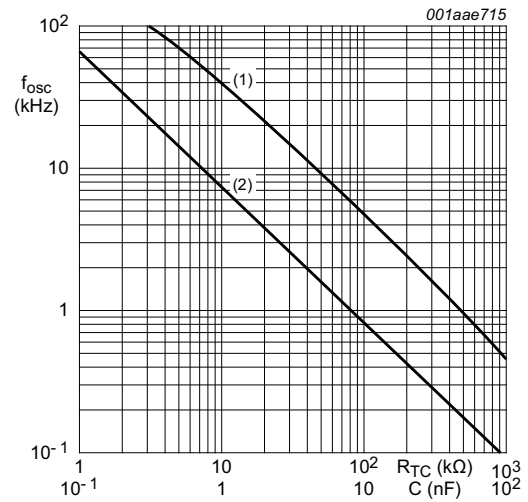
$f$  is in Hz,  $R$  is in  $\Omega$ , and  $C$  is in F.

$$R_S + R_{TC} < \frac{V_{IL(max)}}{I_I}, \text{ where:}$$

$V_{IL(max)}$  = maximum input voltage LOW; and

$I_l$  = input leakage current.

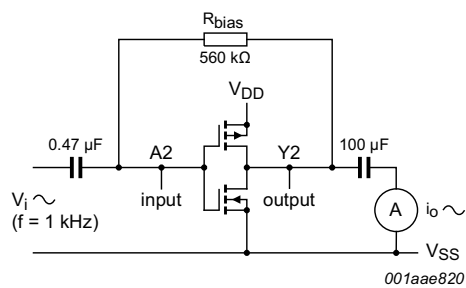
**Fig 8. RC oscillator circuit**



$V_{DD} = 10\text{ V}$ ; The test circuit is shown in [Figure 8](#).

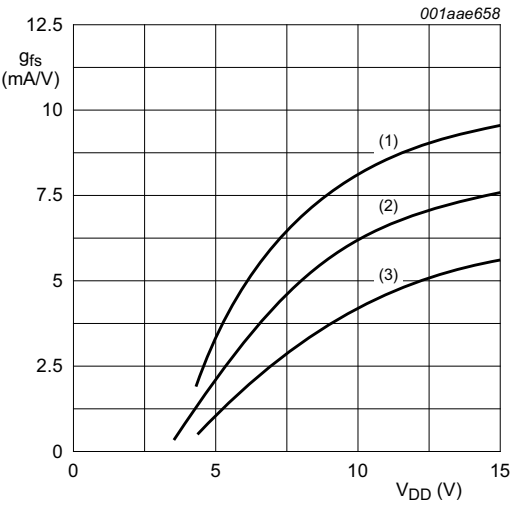
- (1)  $R_{TC}$ ;  $C = 1 \text{ nF}$ ;  $R_S \approx 2 R_{TC}$ .
- (2)  $C$ ;  $R_{TC} = 56 \text{ k}\Omega$ ;  $R_S = 120 \text{ k}\Omega$ .

**Fig 9. Oscillator frequency as a function of  $R_{TC}$  and C**



$g_{fs} = d_{i_o}/d_{v_i}$  with  $v_o$  constant (see [Figure 11](#)).

Fig 10. Test setup for measuring forward transconductance



- (1) Average + 2s.
  - (2) Average.
  - (3) Average – 2s.
- Where 's' is the observed standard deviation.

Fig 11. Typical forward transconductance  $g_{fs}$  as a function of the supply voltage at  $T_{amb} = 25\text{ °C}$

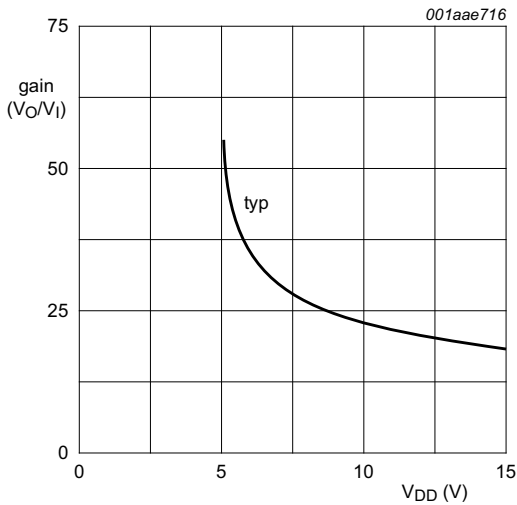


Fig 12. Voltage gain  $V_o/V_i$  as a function of supply voltage

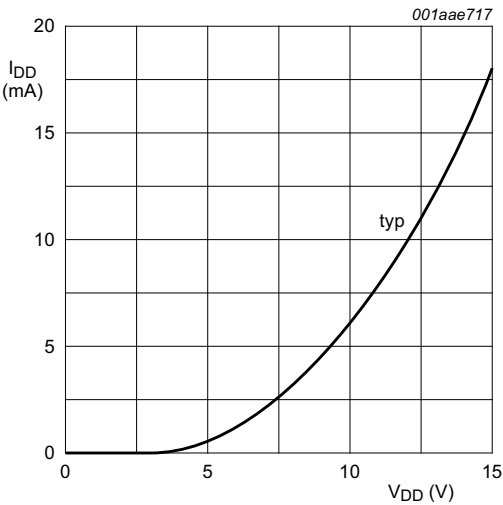


Fig 13. Supply current as a function of supply voltage

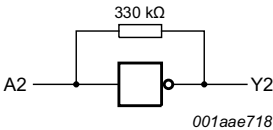


Fig 14. Test setup for measuring the [Figure 12](#) and [Figure 13](#) graphs

14. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mm

SOT109-1

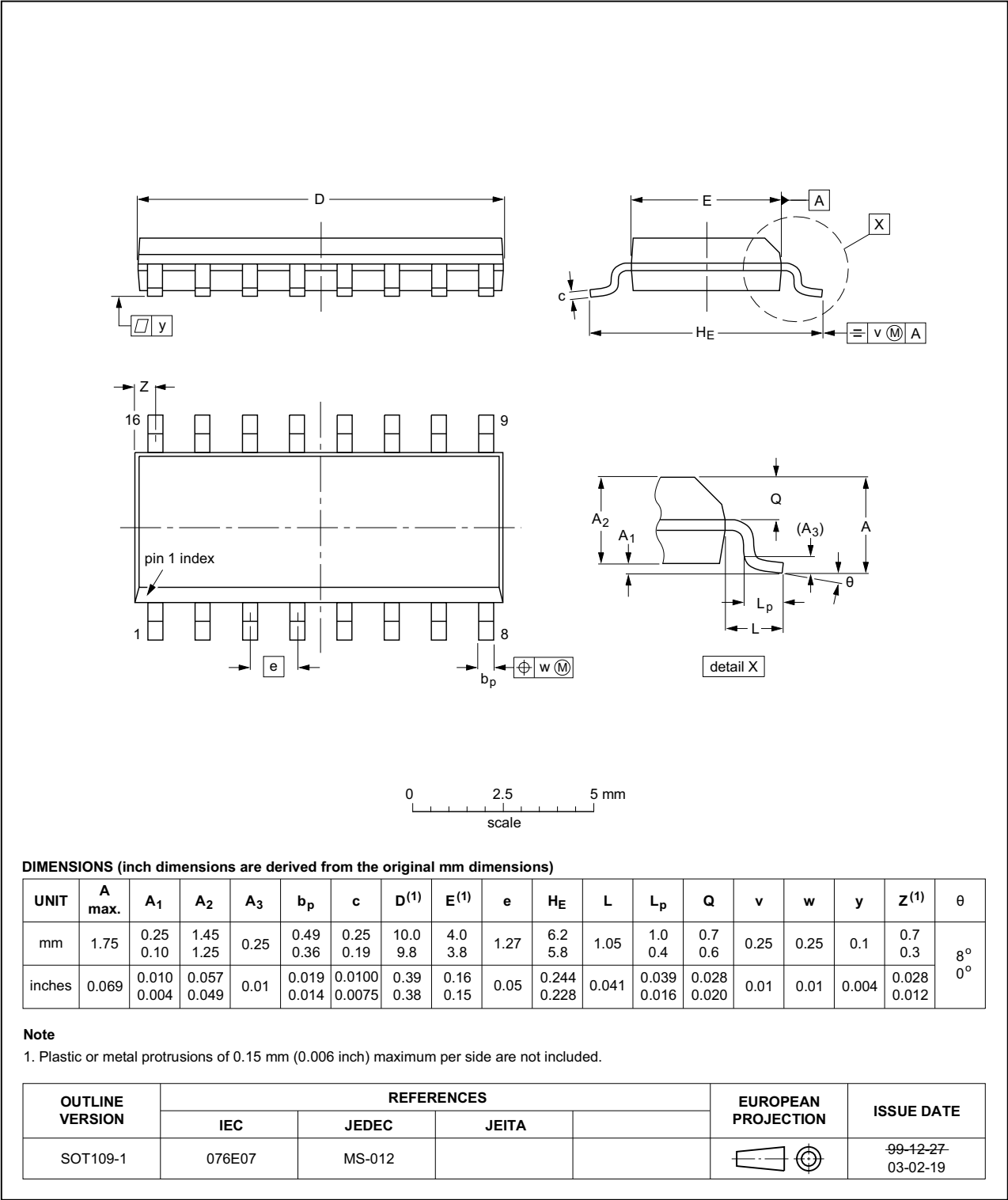


Fig 15. Package outline SOT109-1 (SO16)

## 15. Revision history

**Table 12.** Revision history

| Document ID      | Release date                                                                                                                                                                                                                                                                                                                                                                                                                              | Data sheet status     | Change notice | Supersedes       |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|------------------|
| HEF4521B v.7     | 20160330                                                                                                                                                                                                                                                                                                                                                                                                                                  | Product data sheet    | -             | HEF4521B v.6     |
| Modifications:   | <ul style="list-style-type: none"> <li>Type number HEF4521BP (SOT38-4) removed.</li> </ul>                                                                                                                                                                                                                                                                                                                                                |                       |               |                  |
| HEF4521B v.6     | 20111121                                                                                                                                                                                                                                                                                                                                                                                                                                  | Product data sheet    | -             | HEF4521B v.5     |
| Modifications:   | <ul style="list-style-type: none"> <li>Section Applications removed</li> <li><a href="#">Table 4</a>: added references to <a href="#">Table note [1]</a> and <a href="#">Table note [2]</a></li> <li><a href="#">Table 7</a>: <math>I_{OH}</math> minimum values changed to maximum</li> <li><a href="#">Figure 11</a>, <a href="#">Figure note [1]</a> and <a href="#">Figure note [3]</a>: space between '2' and 's' removed</li> </ul> |                       |               |                  |
| HEF4521B v.5     | 20091105                                                                                                                                                                                                                                                                                                                                                                                                                                  | Product data sheet    | -             | HEF4521B v.4     |
| HEF4521B v.4     | 20090421                                                                                                                                                                                                                                                                                                                                                                                                                                  | Product data sheet    | -             | HEF4521B_CNV v.3 |
| HEF4521B_CNV v.3 | 19950101                                                                                                                                                                                                                                                                                                                                                                                                                                  | Product specification | -             | HEF4521B_CNV v.2 |
| HEF4521B_CNV v.2 | 19950101                                                                                                                                                                                                                                                                                                                                                                                                                                  | Product specification | -             | -                |

## 16. Legal information

### 16.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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.nexperia.com>.

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