

# HEF4051B

## 8-channel analog multiplexer/demultiplexer

Rev. 12 — 25 March 2016

Product data sheet

### 1. General description

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The HEF4051B is an 8-channel analog multiplexer/demultiplexer with three address inputs (S1 to S3), an active LOW enable input ( $\overline{E}$ ), eight independent inputs/outputs (Y0 to Y7) and a common input/output (Z). The device contains eight bidirectional analog switches, each with one side connected to an independent input/output (Y0 to Y7) and the other side connected to a common input/output (Z). With  $\overline{E}$  LOW, one of the eight switches is selected (low-impedance ON-state) by S1 to S3. With  $\overline{E}$  HIGH, all switches are in the high-impedance OFF-state, independent of S1 to S3. If break before make is needed, then it is necessary to use the enable input.

$V_{DD}$  and  $V_{SS}$  are the supply voltage connections for the digital control inputs (S1 to S3, and  $\overline{E}$ ). The  $V_{DD}$  to  $V_{SS}$  range is 3 V to 15 V. The analog inputs/outputs (Y0 to Y7, and Z) can swing between  $V_{DD}$  as a positive limit and  $V_{EE}$  as a negative limit.  $V_{DD} - V_{EE}$  may not exceed 15 V. Unused inputs must be connected to  $V_{DD}$ ,  $V_{SS}$ , or another input. For operation as a digital multiplexer/demultiplexer,  $V_{EE}$  is connected to  $V_{SS}$  (typically ground).  $V_{EE}$  and  $V_{SS}$  are the supply voltage connections for the switches.

### 2. Features and benefits

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- Fully static operation
- 5 V, 10 V, and 15 V parametric ratings
- Standardized symmetrical output characteristics
- Specified from  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  and  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$
- Complies with JEDEC standard JESD 13-B

### 3. Applications

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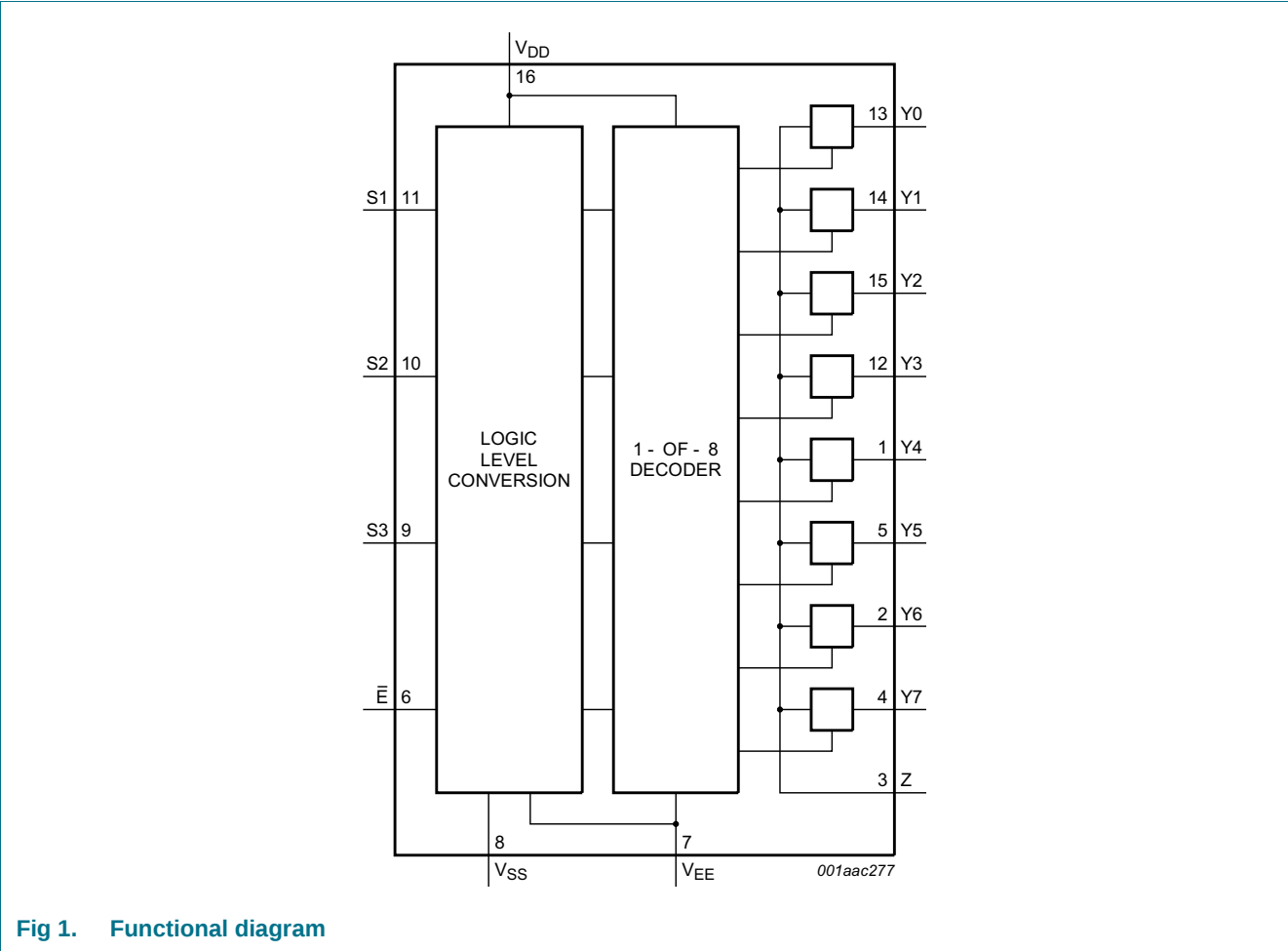
- Analog multiplexing and demultiplexing
- Digital multiplexing and demultiplexing
- Signal gating

4. Ordering information

Table 1. Ordering information  
All types operate from -40 °C to +125 °C.

| Type number | Package |                                                                        |          |
|-------------|---------|------------------------------------------------------------------------|----------|
|             | Name    | Description                                                            | Version  |
| HEF4051BT   | SO16    | plastic small outline package; 16 leads; body width 3.9 mm             | SOT109-1 |
| HEF4051BTS  | SSOP16  | plastic shrink small outline package; 16 leads; body width 5.3 mm      | SOT338-1 |
| HEF4051BTT  | TSSOP16 | plastic thin shrink small outline package; 16 leads; body width 4.4 mm | SOT403-1 |

5. Functional diagram



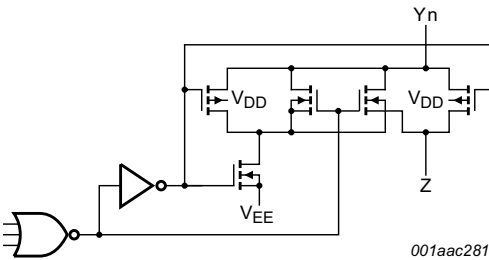


Fig 2. Schematic diagram (one switch)

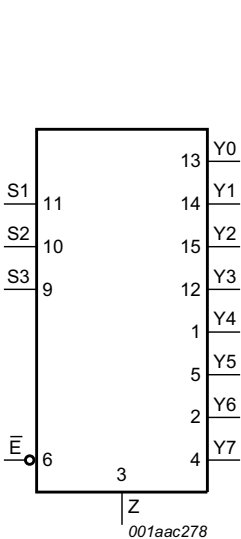


Fig 3. Logic symbol

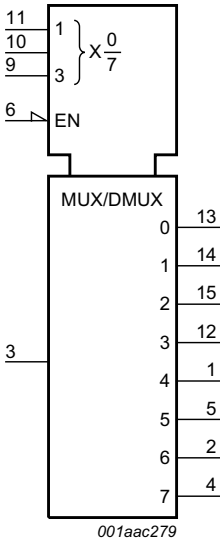


Fig 4. IEC logic symbol

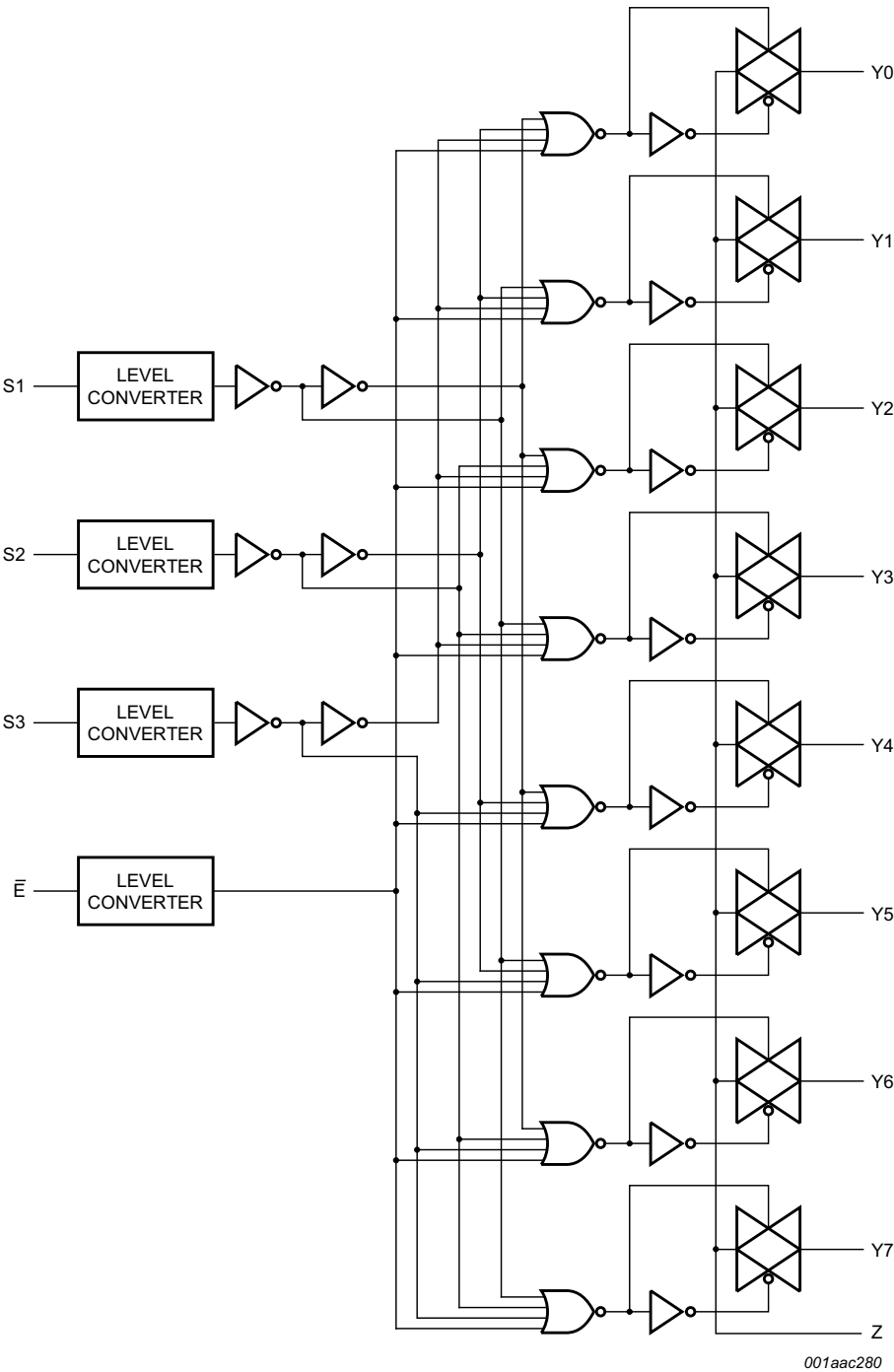


Fig 5. Logic diagram

6. Pinning information

6.1 Pinning

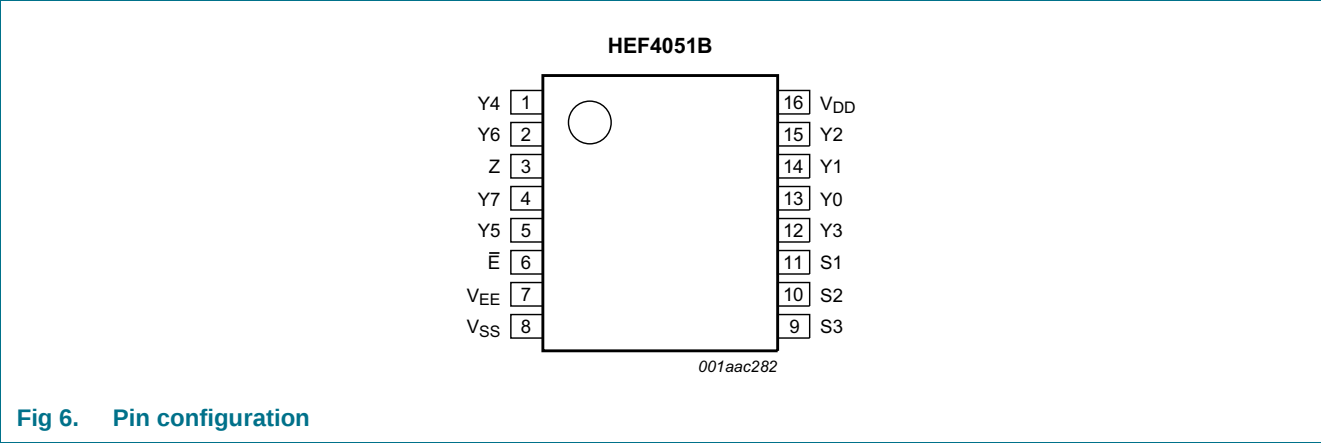


Fig 6. Pin configuration

6.2 Pin description

Table 2. Pin description

| Symbol                         | Pin                        | Description                 |
|--------------------------------|----------------------------|-----------------------------|
| $\bar{E}$                      | 6                          | enable input (active LOW)   |
| $V_{EE}$                       | 7                          | supply voltage              |
| $V_{SS}$                       | 8                          | ground supply voltage       |
| S1, S2, S3                     | 11, 10, 9                  | select input                |
| Y0, Y1, Y2, Y3, Y4, Y5, Y6, Y7 | 13, 14, 15, 12, 1, 5, 2, 4 | independent input or output |
| Z                              | 3                          | common output or input      |
| $V_{DD}$                       | 16                         | supply voltage              |

## 7. Functional description

### 7.1 Function table

Table 3. Function table<sup>[1]</sup>

| Input          |    |    |    | Channel ON   |
|----------------|----|----|----|--------------|
| $\overline{E}$ | S3 | S2 | S1 |              |
| L              | L  | L  | L  | Y0 to Z      |
| L              | L  | L  | H  | Y1 to Z      |
| L              | L  | H  | L  | Y2 to Z      |
| L              | L  | H  | H  | Y3 to Z      |
| L              | H  | L  | L  | Y4 to Z      |
| L              | H  | L  | H  | Y5 to Z      |
| L              | H  | H  | L  | Y6 to Z      |
| L              | H  | H  | H  | Y7 to Z      |
| H              | X  | X  | X  | switches off |

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

## 8. 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    |
| $V_{EE}$  | supply voltage          | referenced to $V_{DD}$ <sup>[1]</sup>                                    | -18  | +0.5           | V    |
| $I_{IK}$  | input clamping current  | pins Sn and $\overline{E}$ ;<br>$V_I < -0.5$ V or $V_I > V_{DD} + 0.5$ V | -    | $\pm 10$       | mA   |
| $V_I$     | input voltage           |                                                                          | -0.5 | $V_{DD} + 0.5$ | V    |
| $I_{I/O}$ | 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 | $T_{amb} = -40$ °C to +125 °C <sup>[2]</sup>                             |      |                |      |
|           |                         | SO16 package                                                             | -    | 500            | mW   |
|           |                         | SSOP16 package                                                           | -    | 500            | mW   |
|           |                         | TSSOP16 package                                                          | -    | 500            | mW   |
| P         | power dissipation       | per output                                                               | -    | 100            | mW   |

[1] To avoid drawing  $V_{DD}$  current out of terminal Z, when switch current flows into terminals Y, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal Z, no  $V_{DD}$  current will flow out of terminals Y, and in this case there is no limit for the voltage drop across the switch, but the voltages at Y and Z may not exceed  $V_{DD}$  or  $V_{EE}$ .

[2] For SO16 package:  $P_{tot}$  derates linearly with 8 mW/K above 70 °C.  
For SSOP16 and TSSOP16 packages:  $P_{tot}$  derates linearly with 5.5 mW/K above 60 °C.

## 9. Recommended operating conditions

Table 5. Recommended operating conditions

| Symbol              | Parameter                           | Conditions                   | Min | Typ | Max      | Unit            |
|---------------------|-------------------------------------|------------------------------|-----|-----|----------|-----------------|
| $V_{DD}$            | supply voltage                      | see <a href="#">Figure 7</a> | 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     | $\mu\text{s/V}$ |

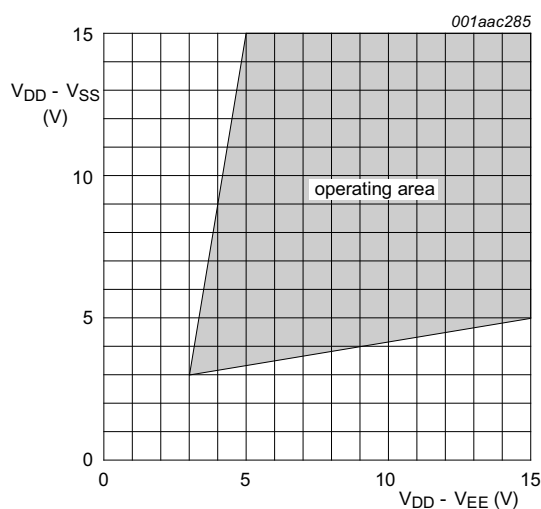


Fig 7. Operating area as a function of the supply voltages

## 10. Static characteristics

Table 6. Static characteristics

$V_{SS} = V_{EE} = 0\text{ V}$ ;  $V_I = V_{SS}$  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             |
| $I_I$    | input leakage current    |                                | 15 V     | -                         | $\pm 0.1$ | -                        | $\pm 0.1$ | -                        | $\pm 1.0$ | -                         | $\pm 1.0$ | $\mu\text{A}$ |

Table 6. Static characteristics ...continued  
 $V_{SS} = V_{EE} = 0\text{ V}$ ;  $V_I = V_{SS}$  or  $V_{DD}$  unless otherwise specified.

| Symbol              | Parameter                 | Conditions                             | $V_{DD}$ | $T_{\text{amb}} = -40\text{ }^{\circ}\text{C}$ |     | $T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$ |      | $T_{\text{amb}} = 85\text{ }^{\circ}\text{C}$ |     | $T_{\text{amb}} = 125\text{ }^{\circ}\text{C}$ |     | Unit          |
|---------------------|---------------------------|----------------------------------------|----------|------------------------------------------------|-----|-----------------------------------------------|------|-----------------------------------------------|-----|------------------------------------------------|-----|---------------|
|                     |                           |                                        |          | Min                                            | Max | Min                                           | Max  | Min                                           | Max | Min                                            | Max |               |
| $I_{S(\text{OFF})}$ | OFF-state leakage current | Z port; all channels OFF; see Figure 8 | 15 V     | -                                              | -   | -                                             | 1000 | -                                             | -   | -                                              | -   | nA            |
|                     |                           | Y port; per channel; see Figure 9      | 15 V     | -                                              | -   | -                                             | 200  | -                                             | -   | -                                              | -   | nA            |
| $I_{DD}$            | supply current            | $I_O = 0\text{ A}$                     | 5 V      | -                                              | 5   | -                                             | 5    | -                                             | 150 | -                                              | 150 | $\mu\text{A}$ |
|                     |                           |                                        | 10 V     | -                                              | 10  | -                                             | 10   | -                                             | 300 | -                                              | 300 | $\mu\text{A}$ |
|                     |                           |                                        | 15 V     | -                                              | 20  | -                                             | 20   | -                                             | 600 | -                                              | 600 | $\mu\text{A}$ |
| $C_I$               | input capacitance         | $S_n, \bar{E}$ inputs                  | -        | -                                              | -   | -                                             | 7.5  | -                                             | -   | -                                              | -   | pF            |

10.1 Test circuits

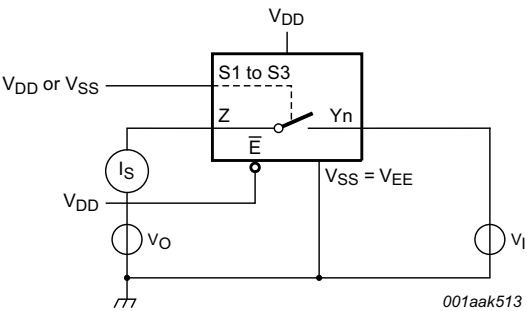


Fig 8. Test circuit for measuring OFF-state leakage current Z port

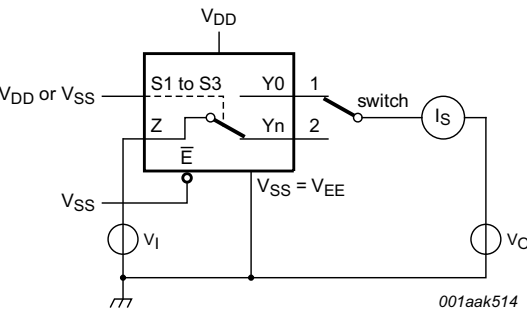


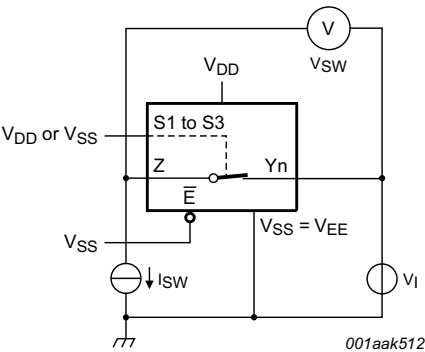
Fig 9. Test circuit for measuring OFF-state leakage current Yn port

10.2 ON resistance

Table 7. ON resistance  
 $T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $I_{SW} = 200\text{ }\mu\text{A}$ ;  $V_{SS} = V_{EE} = 0\text{ V}$ .

| Symbol          | Parameter                               | Conditions                                                                                          | $V_{DD} - V_{EE}$ | Typ | Max  | Unit     |
|-----------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------|-----|------|----------|
| $R_{ON(peak)}$  | ON resistance (peak)                    | $V_I = 0\text{ V to }V_{DD} - V_{EE}$ ; see <a href="#">Figure 10</a> and <a href="#">Figure 11</a> | 5 V               | 350 | 2500 | $\Omega$ |
|                 |                                         |                                                                                                     | 10 V              | 80  | 245  | $\Omega$ |
|                 |                                         |                                                                                                     | 15 V              | 60  | 175  | $\Omega$ |
| $R_{ON(rail)}$  | ON resistance (rail)                    | $V_I = 0\text{ V}$ ; see <a href="#">Figure 10</a> and <a href="#">Figure 11</a>                    | 5 V               | 115 | 340  | $\Omega$ |
|                 |                                         |                                                                                                     | 10 V              | 50  | 160  | $\Omega$ |
|                 |                                         |                                                                                                     | 15 V              | 40  | 115  | $\Omega$ |
|                 |                                         | $V_I = V_{DD} - V_{EE}$ ; see <a href="#">Figure 10</a> and <a href="#">Figure 11</a>               | 5 V               | 120 | 365  | $\Omega$ |
|                 |                                         |                                                                                                     | 10 V              | 65  | 200  | $\Omega$ |
|                 |                                         |                                                                                                     | 15 V              | 50  | 155  | $\Omega$ |
| $\Delta R_{ON}$ | ON resistance mismatch between channels | $V_I = 0\text{ V to }V_{DD} - V_{EE}$ ; see <a href="#">Figure 10</a>                               | 5 V               | 25  | -    | $\Omega$ |
|                 |                                         |                                                                                                     | 10 V              | 10  | -    | $\Omega$ |
|                 |                                         |                                                                                                     | 15 V              | 5   | -    | $\Omega$ |

10.2.1 ON resistance waveform and test circuit



$R_{ON} = V_{SW} / I_{SW}$ .

Fig 10. Test circuit for measuring  $R_{ON}$

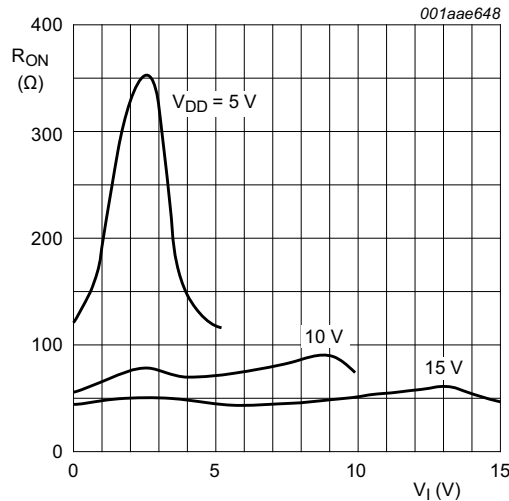


Fig 11. Typical  $R_{ON}$  as a function of input voltage

11. Dynamic characteristics

Table 8. Dynamic characteristics  
 $T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $V_{SS} = V_{EE} = 0\text{ V}$ ; for test circuit see [Figure 15](#).

| Symbol    | Parameter                           | Conditions                                                 | $V_{DD}$ | Typ | Max | Unit |
|-----------|-------------------------------------|------------------------------------------------------------|----------|-----|-----|------|
| $t_{PHL}$ | HIGH to LOW propagation delay       | $Y_n, Z$ to $Z, Y_n$ ; see <a href="#">Figure 12</a>       | 5 V      | 15  | 30  | ns   |
|           |                                     |                                                            | 10 V     | 5   | 10  | ns   |
|           |                                     |                                                            | 15 V     | 5   | 10  | ns   |
|           |                                     | $S_n$ to $Y_n, Z$ ; see <a href="#">Figure 13</a>          | 5 V      | 150 | 300 | ns   |
|           |                                     |                                                            | 10 V     | 60  | 120 | ns   |
|           |                                     |                                                            | 15 V     | 45  | 90  | ns   |
| $t_{PLH}$ | LOW to HIGH propagation delay       | $Y_n, Z$ to $Z, Y_n$ ; see <a href="#">Figure 12</a>       | 5 V      | 15  | 30  | ns   |
|           |                                     |                                                            | 10 V     | 5   | 10  | ns   |
|           |                                     |                                                            | 15 V     | 5   | 10  | ns   |
|           |                                     | $S_n$ to $Y_n, Z$ ; see <a href="#">Figure 13</a>          | 5 V      | 150 | 300 | ns   |
|           |                                     |                                                            | 10 V     | 65  | 130 | ns   |
|           |                                     |                                                            | 15 V     | 45  | 90  | ns   |
| $t_{PHZ}$ | HIGH to OFF-state propagation delay | $\overline{E}$ to $Y_n, Z$ ; see <a href="#">Figure 14</a> | 5 V      | 120 | 240 | ns   |
|           |                                     |                                                            | 10 V     | 90  | 180 | ns   |
|           |                                     |                                                            | 15 V     | 85  | 170 | ns   |
| $t_{PZH}$ | OFF-state to HIGH propagation delay | $\overline{E}$ to $Y_n, Z$ ; see <a href="#">Figure 14</a> | 5 V      | 140 | 280 | ns   |
|           |                                     |                                                            | 10 V     | 55  | 110 | ns   |
|           |                                     |                                                            | 15 V     | 40  | 80  | ns   |
| $t_{PLZ}$ | LOW to OFF-state propagation delay  | $\overline{E}$ to $Y_n, Z$ ; see <a href="#">Figure 14</a> | 5 V      | 145 | 290 | ns   |
|           |                                     |                                                            | 10 V     | 120 | 240 | ns   |
|           |                                     |                                                            | 15 V     | 115 | 230 | ns   |

Table 8. Dynamic characteristics ...continued  
 $T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $V_{SS} = V_{EE} = 0\text{ V}$ ; for test circuit see Figure 15.

| Symbol    | Parameter                          | Conditions                               | $V_{DD}$ | Typ | Max | Unit |
|-----------|------------------------------------|------------------------------------------|----------|-----|-----|------|
| $t_{PZL}$ | OFF-state to LOW propagation delay | $\bar{E}$ to $Y_n$ , $Z$ ; see Figure 14 | 5 V      | 140 | 280 | ns   |
|           |                                    |                                          | 10 V     | 55  | 110 | ns   |
|           |                                    |                                          | 15 V     | 40  | 80  | ns   |

11.1 Waveforms and test circuit

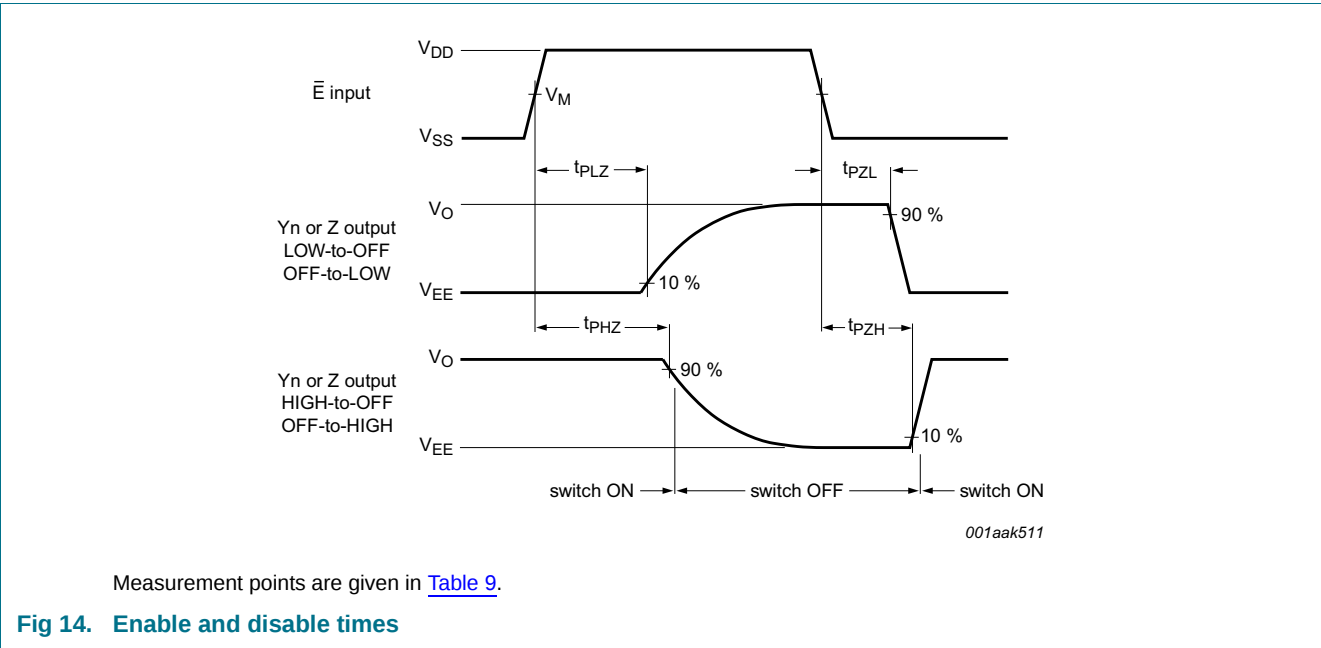
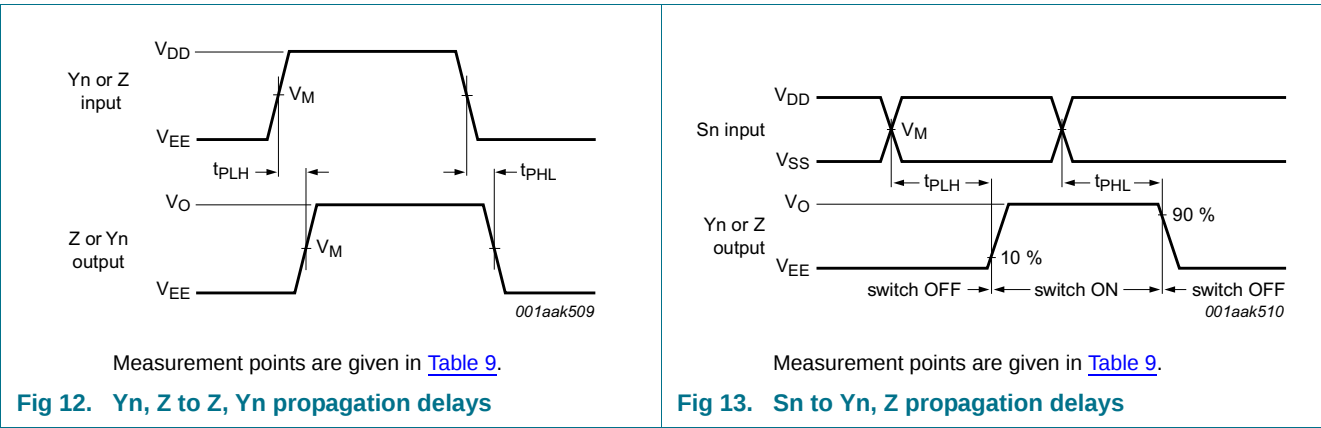
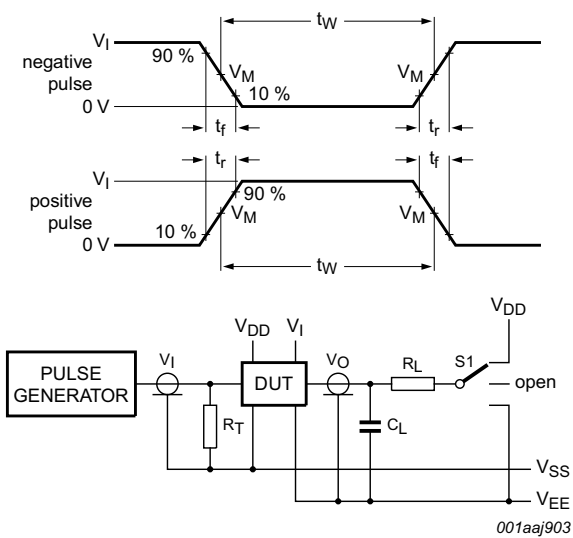


Table 9. Measurement points

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



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

Definitions:

DUT = Device Under Test.

$R_T$  = Termination resistance should be equal to output impedance  $Z_o$  of the pulse generator.

$C_L$  = Load capacitance including test jig and probe.

$R_L$  = Load resistance.

Fig 15. Test circuit for measuring switching times

Table 10. Test data

| Input                |                      |              |             | Load  |               | S1 position              |           |                    |                    |          |
|----------------------|----------------------|--------------|-------------|-------|---------------|--------------------------|-----------|--------------------|--------------------|----------|
| Yn, Z                | Sn and $\bar{E}$     | $t_r, t_f$   | $V_M$       | $C_L$ | $R_L$         | $t_{PHL}$ <sup>[1]</sup> | $t_{PLH}$ | $t_{PZH}, t_{PHZ}$ | $t_{PZL}, t_{PLZ}$ | other    |
| $V_{DD}$ or $V_{EE}$ | $V_{DD}$ or $V_{SS}$ | $\leq 20$ ns | $0.5V_{DD}$ | 50 pF | 10 k $\Omega$ | $V_{DD}$ or $V_{EE}$     | $V_{EE}$  | $V_{EE}$           | $V_{DD}$           | $V_{EE}$ |

[1] For Yn to Z or Z to Yn propagation delays use  $V_{EE}$ . For Sn to Yn or Z propagation delays use  $V_{DD}$ .

11.2 Additional dynamic parameters

Table 11. Additional dynamic characteristics

$V_{SS} = V_{EE} = 0\text{ V}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

| Symbol              | Parameter                 | Conditions                                                                                                                            | $V_{DD}$ | Typ  | Max | Unit |
|---------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----------|------|-----|------|
| THD                 | total harmonic distortion | see Figure 16; $R_L = 10\text{ k}\Omega$ ; $C_L = 15\text{ pF}$ ;<br>channel ON; $V_I = 0.5V_{DD}$ (p-p);<br>$f_i = 1\text{ kHz}$     | 5 V      | 0.25 | -   | %    |
|                     |                           |                                                                                                                                       | 10 V     | 0.04 | -   | %    |
|                     |                           |                                                                                                                                       | 15 V     | 0.04 | -   | %    |
| $f_{(-3\text{dB})}$ | -3 dB frequency response  | see Figure 17; $R_L = 1\text{ k}\Omega$ ; $C_L = 5\text{ pF}$ ;<br>channel ON; $V_I = 0.5V_{DD}$ (p-p)                                | 5 V      | 13   | -   | MHz  |
|                     |                           |                                                                                                                                       | 10 V     | 40   | -   | MHz  |
|                     |                           |                                                                                                                                       | 15 V     | 70   | -   | MHz  |
| $\alpha_{iso}$      | isolation (OFF-state)     | see Figure 18; $f_i = 1\text{ MHz}$ ; $R_L = 1\text{ k}\Omega$ ;<br>$C_L = 5\text{ pF}$ ; channel OFF;<br>$V_I = 0.5V_{DD}$ (p-p)     | 10 V     | -50  | -   | dB   |
| $V_{ct}$            | crosstalk voltage         | digital inputs to switch; see Figure 19;<br>$R_L = 10\text{ k}\Omega$ ; $C_L = 15\text{ pF}$ ;<br>$E$ or $S_n = V_{DD}$ (square-wave) | 10 V     | 50   | -   | mV   |
| Xtalk               | crosstalk                 | between switches; see Figure 20;<br>$f_i = 1\text{ MHz}$ ; $R_L = 1\text{ k}\Omega$ ;<br>$V_I = 0.5V_{DD}$ (p-p)                      | 10 V     | -50  | -   | dB   |

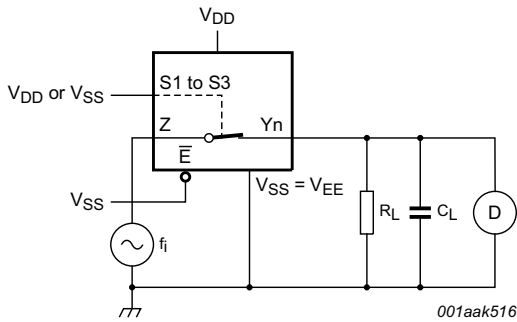
[1]  $f_i$  is biased at  $0.5 V_{DD}$ ;  $V_I = 0.5V_{DD}$  (p-p).

Table 12. Dynamic power dissipation  $P_D$

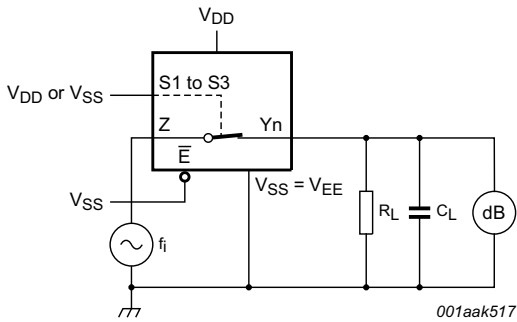
$P_D$  can be calculated from the formulas shown;  $V_{EE} = V_{SS} = 0\text{ V}$ ;  $t_r = t_f \leq 20\text{ ns}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

| Symbol | Parameter                 | $V_{DD}$ | Typical formula for $P_D$ ( $\mu\text{W}$ )                       | where:                                                                                                                                                                                             |
|--------|---------------------------|----------|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $P_D$  | dynamic power dissipation | 5 V      | $P_D = 1000 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2$  | $f_i$ = 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     | $P_D = 5500 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2$  |                                                                                                                                                                                                    |
|        |                           | 15 V     | $P_D = 15000 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2$ |                                                                                                                                                                                                    |

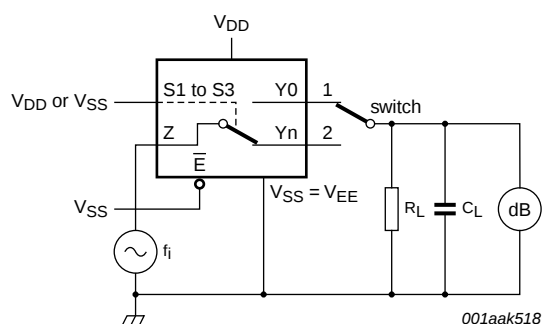
11.2.1 Test circuits



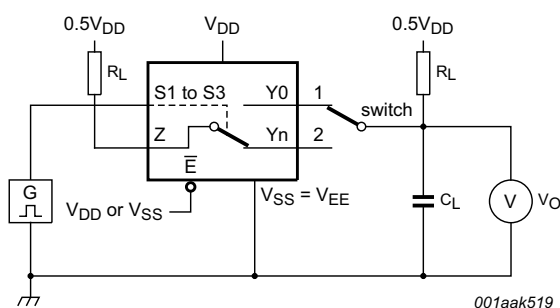
**Fig 16. Test circuit for measuring total harmonic distortion**



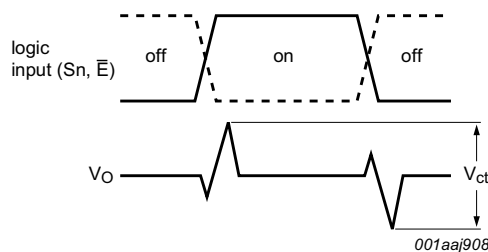
**Fig 17. Test circuit for measuring frequency response**



**Fig 18. Test circuit for measuring isolation (OFF-state)**

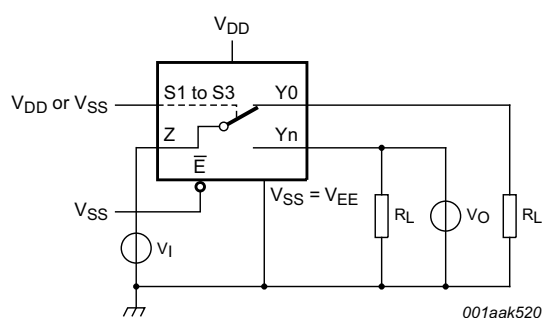


a. Test circuit

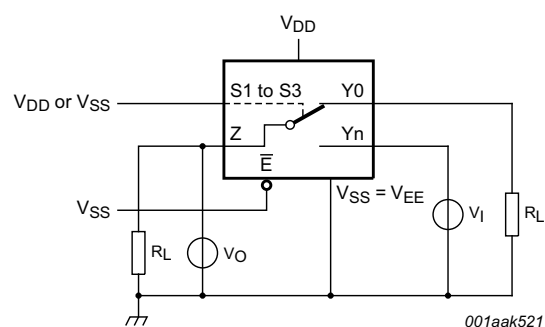


### b. Input and output pulse definitions

**Fig 19. Test circuit for measuring crosstalk voltage between digital inputs and switch**



a. Switch closed condition



b. Switch open condition

**Fig 20. Test circuit for measuring crosstalk between switches**

12. Package outline

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

SOT109-1



Fig 21. Package outline SOT109-1 (SO16)

SSOP16: plastic shrink small outline package; 16 leads; body width 5.3 mm

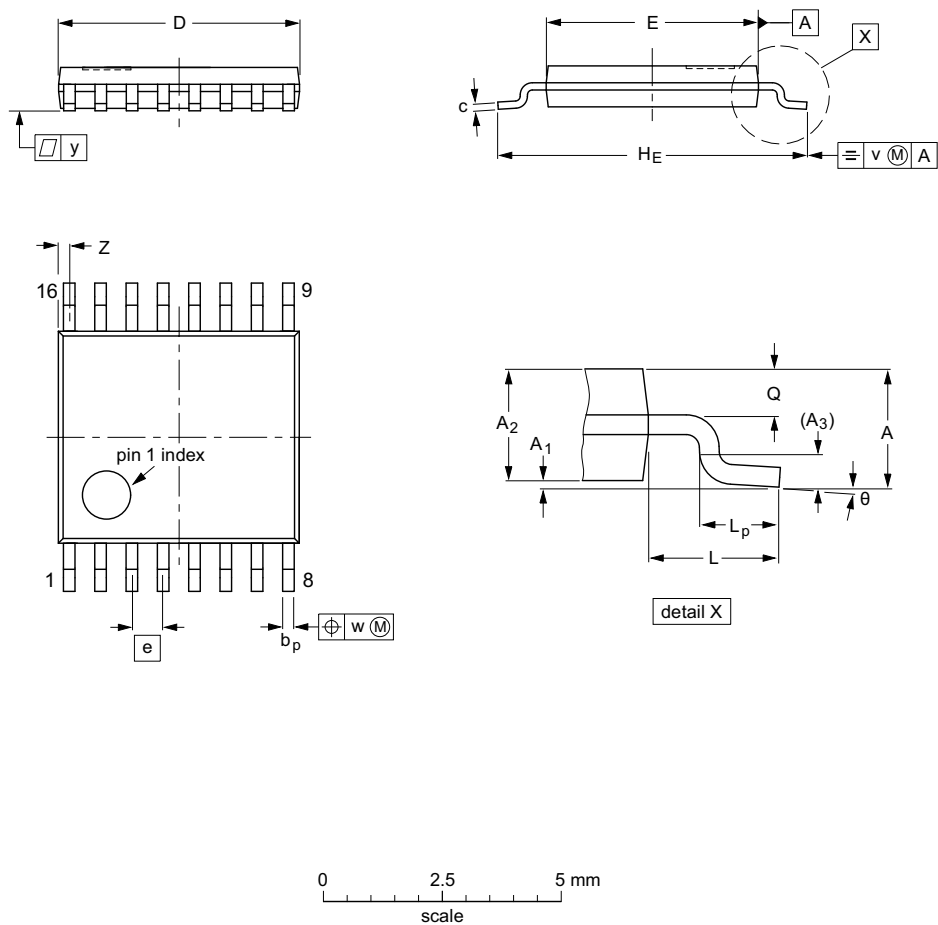
SOT338-1



Fig 22. Package outline SOT338-1 (SSOP16)

TSSOP16: plastic thin shrink small outline package; 16 leads; body width 4.4 mm

SOT403-1



DIMENSIONS (mm are the original 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>(2)</sup> | e    | H <sub>E</sub> | L | L <sub>p</sub> | Q          | v   | w    | y   | Z <sup>(1)</sup> | θ        |
|------|-----------|----------------|----------------|----------------|----------------|------------|------------------|------------------|------|----------------|---|----------------|------------|-----|------|-----|------------------|----------|
| mm   | 1.1       | 0.15<br>0.05   | 0.95<br>0.80   | 0.25           | 0.30<br>0.19   | 0.2<br>0.1 | 5.1<br>4.9       | 4.5<br>4.3       | 0.65 | 6.6<br>6.2     | 1 | 0.75<br>0.50   | 0.4<br>0.3 | 0.2 | 0.13 | 0.1 | 0.40<br>0.06     | 8°<br>0° |

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

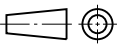
| OUTLINE<br>VERSION | REFERENCES |        |       |  | EUROPEAN<br>PROJECTION                                                                | ISSUE DATE             |
|--------------------|------------|--------|-------|--|---------------------------------------------------------------------------------------|------------------------|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

Fig 23. Package outline SOT403-1 (TSSOP16)

## 13. Abbreviations

Table 13. Abbreviations

| Acronym | Description       |
|---------|-------------------|
| DUT     | Device Under Test |

## 14. Revision history

Table 14. Revision history

| Document ID      | Release date                                                                                                                                                  | Data sheet status     | Change notice | Supersedes       |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|------------------|
| HEF4051B v.12    | 20160325                                                                                                                                                      | Product data sheet    | -             | HEF4051B v.11    |
| Modifications:   | <ul style="list-style-type: none"> <li>Type number HEF4051BP (SOT38-4) removed.</li> </ul>                                                                    |                       |               |                  |
| HEF4051B v.11    | 20140911                                                                                                                                                      | Product data sheet    | -             | HEF4051B v.10    |
| Modifications:   | <ul style="list-style-type: none"> <li><a href="#">Figure 19</a>: Test circuit modified</li> </ul>                                                            |                       |               |                  |
| HEF4051B v.10    | 20111117                                                                                                                                                      | Product data sheet    | -             | HEF4051B v.9     |
| Modifications:   | <ul style="list-style-type: none"> <li>Legal pages updated.</li> <li>Changes in “General description”, “Features and benefits” and “Applications”.</li> </ul> |                       |               |                  |
| HEF4051B v.9     | 20100325                                                                                                                                                      | Product data sheet    | -             | HEF4051B v.8     |
| HEF4051B v.8     | 20100301                                                                                                                                                      | Product data sheet    | -             | HEF4051B v.7     |
| HEF4051B v.7     | 20091127                                                                                                                                                      | Product data sheet    | -             | HEF4051B v.6     |
| HEF4051B v.6     | 20090924                                                                                                                                                      | Product data sheet    | -             | HEF4051B v.5     |
| HEF4051B v.5     | 20090826                                                                                                                                                      | Product data sheet    | -             | HEF4051B v.4     |
| HEF4051B v.4     | 20050112                                                                                                                                                      | Product data sheet    | -             | HEF4051B_CNV v.3 |
| HEF4051B_CNV v.3 | 19950101                                                                                                                                                      | Product specification | -             | HEF4051B_CNV v.2 |
| HEF4051B_CNV v.2 | 19950101                                                                                                                                                      | Product specification | -             | -                |

## 15. Legal information

### 15.1 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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