

# HEF4053B

## Triple single-pole double-throw analog switch

Rev. 12 — 25 March 2016

Product data sheet

### 1. General description

The HEF4053B is a triple single-pole double-throw (SPDT) analog switch, suitable for use as an analog or digital multiplexer/demultiplexer. Each switch has a digital select input ( $S_n$ ), two independent inputs/outputs ( $nY_0$  and  $nY_1$ ) and a common input/output ( $nZ$ ). All three switches share an enable input ( $\bar{E}$ ). A HIGH on  $\bar{E}$  causes all switches into the high-impedance OFF-state, independent of  $S_n$ .

$V_{DD}$  and  $V_{SS}$  are the supply voltage connections for the digital control inputs ( $S_n$  and  $\bar{E}$ ). The  $V_{DD}$  to  $V_{SS}$  range is 3 V to 15 V. The analog inputs/outputs ( $nY_0$ ,  $nY_1$  and  $nZ$ ) 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

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

### 3. Applications

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

### 4. Ordering information

Table 1. Ordering information

All types operate from  $-40\text{ }^{\circ}\text{C}$  to  $+125\text{ }^{\circ}\text{C}$ .

Type number	Package		Version
	Name	Description	
HEF4053BT	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1
HEF4053BTT	TSSOP16	plastic thin shrink small outline package; 16 leads; body width 4.4 mm	SOT403-1

### 5. Functional diagram

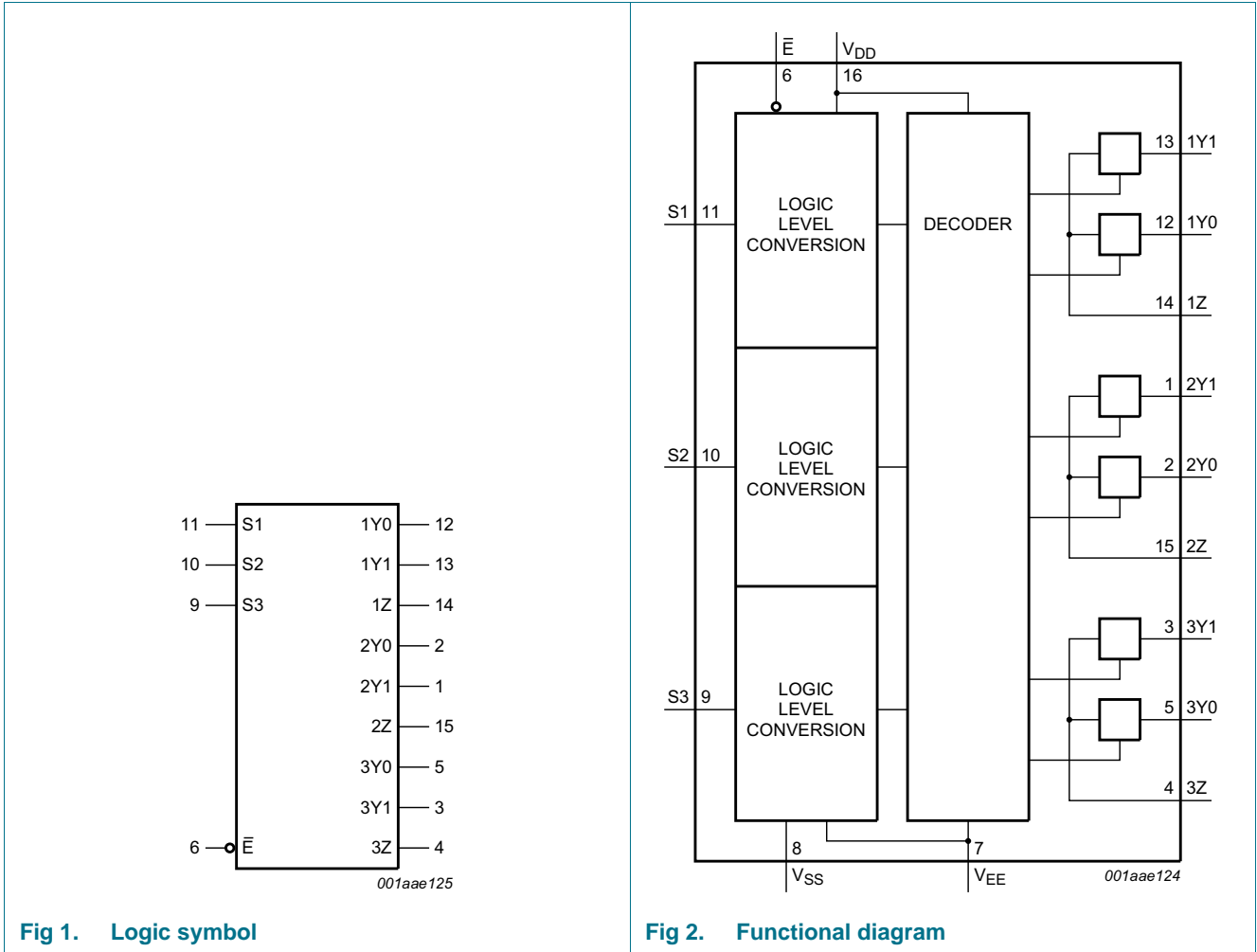


Fig 1. Logic symbol

Fig 2. Functional diagram

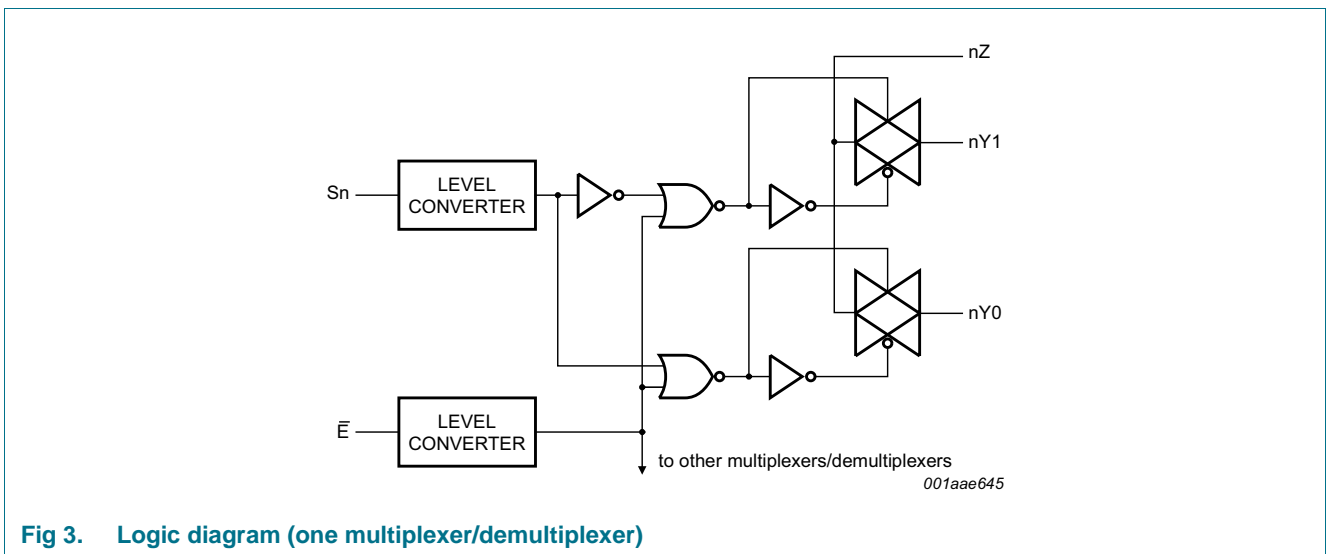


Fig 3. Logic diagram (one multiplexer/demultiplexer)

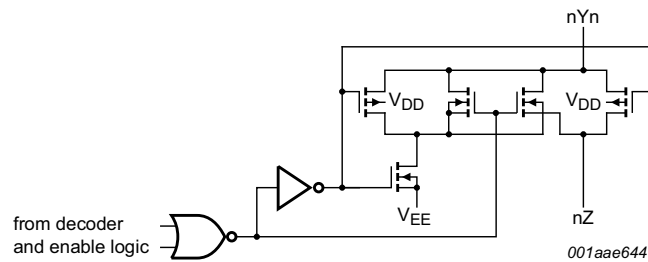


Fig 4. Schematic diagram (one switch)

## 6. Pinning information

### 6.1 Pinning

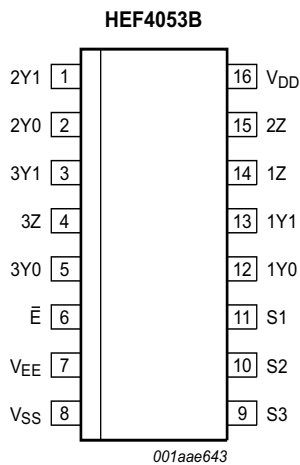


Fig 5. Pin configuration for SOT109-1 (SO16)

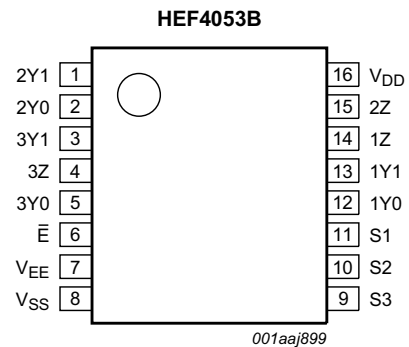


Fig 6. Pin configuration for SOT403-1 (TSSOP16)

### 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
1Y0, 2Y0, 3Y0	12, 2, 5	independent input or output
1Y1, 2Y1, 3Y1	13, 1, 3	independent input or output
1Z, 2Z, 3Z	14, 15, 4	independent output or input
$V_{DD}$	16	supply voltage

## 7. Functional description

Table 3. Function table [1]

Inputs		Channel on
$\bar{E}$	Sn	
L	L	nY0 to nZ
L	H	nY1 to nZ
H	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 $V_{DD}$ [1]	-18	+0.5	V
$I_{IK}$	input clamping current	pins Sn and $\bar{E}$ ; $V_I < -0.5$ 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			
		SO16 package [2]	-	500	mW
		TSSOP16 package [2]	-	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 TSSOP16 package:  $P_{tot}$  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	$V_{DD} = 5$ V	-	-	3.75	$\mu$ s/V
		$V_{DD} = 10$ V	-	-	0.5	$\mu$ s/V
		$V_{DD} = 15$ V	-	-	0.08	$\mu$ s/V

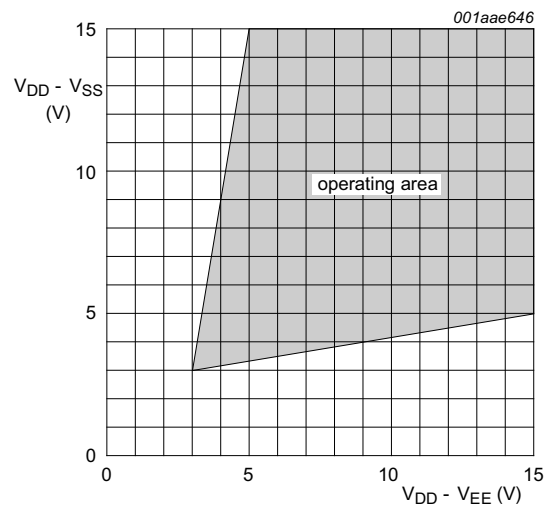


Fig 7. Operating area as a function of the supply voltages

## 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	-	$\pm 0.1$	-	$\pm 0.1$	-	$\pm 1.0$	-	$\pm 1.0$	$\mu\text{A}$
$I_{S(OFF)}$	OFF-state leakage current	Z port; all channels OFF; see <a href="#">Figure 8</a>	15 V	-	-	-	1000	-	-	-	-	nA
		Y port; per channel; see <a href="#">Figure 9</a>	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

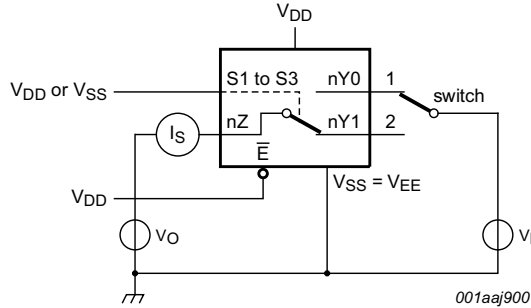


Fig 8. Test circuit for measuring OFF-state leakage current Z port

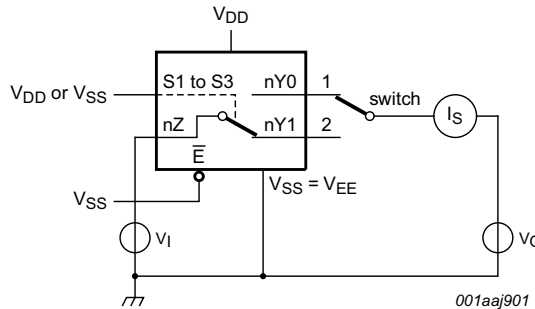


Fig 9. Test circuit for measuring OFF-state leakage current nYn port

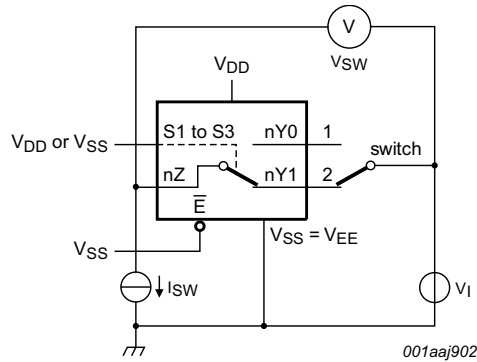
10.2 ON resistance

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  $R_{ON}$

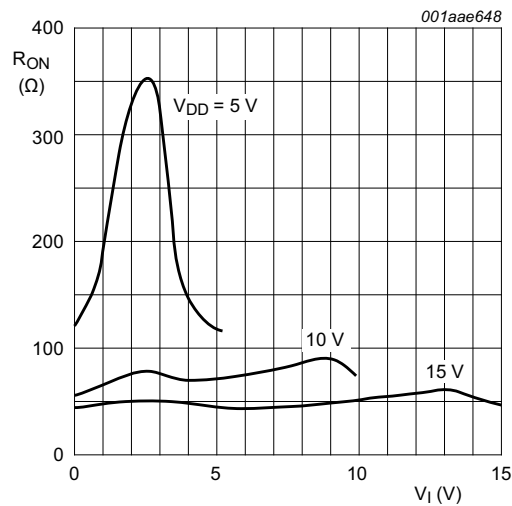


Fig 11. Typical  $R_{ON}$  as a function of input voltage

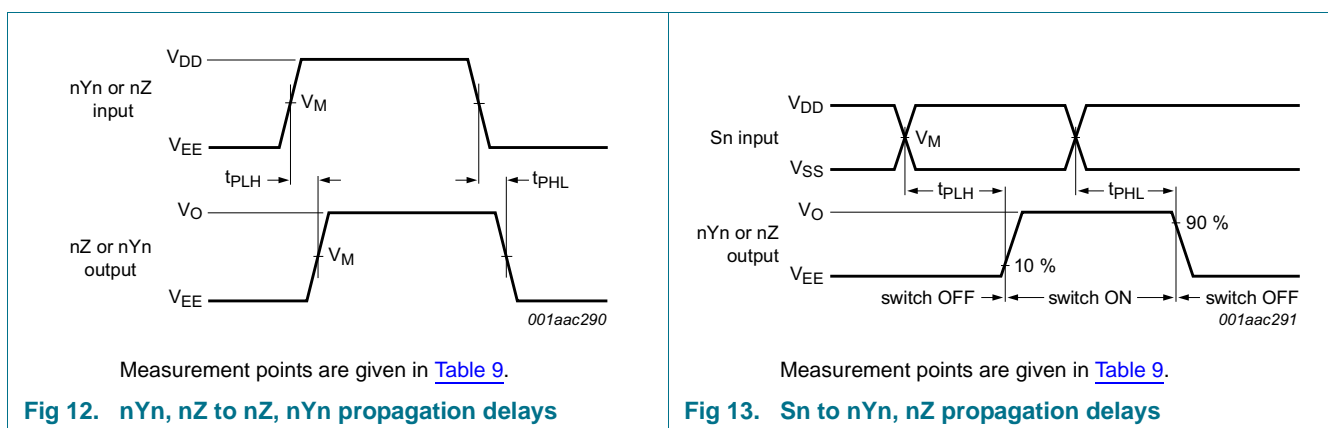
## 11. Dynamic characteristics

**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	nYn, nZ to nZ, nYn; see <a href="#">Figure 12</a>	5 V	10	20	ns
			10 V	5	10	ns
			15 V	5	10	ns
		Sn to nYn, nZ; see <a href="#">Figure 13</a>	5 V	200	400	ns
			10 V	85	170	ns
			15 V	65	130	ns
$t_{PLH}$	LOW to HIGH propagation delay	nYn, nZ to nZ, nYn; see <a href="#">Figure 12</a>	5 V	15	30	ns
			10 V	5	10	ns
			15 V	5	10	ns
		Sn to nYn, nZ; see <a href="#">Figure 13</a>	5 V	275	555	ns
			10 V	100	200	ns
			15 V	65	130	ns
$t_{PHZ}$	HIGH to OFF-state propagation delay	$\bar{E}$ to nYn, nZ; see <a href="#">Figure 14</a>	5 V	200	400	ns
			10 V	115	230	ns
			15 V	110	220	ns
$t_{PZH}$	OFF-state to HIGH propagation delay	$\bar{E}$ to nYn, nZ; see <a href="#">Figure 14</a>	5 V	260	525	ns
			10 V	95	190	ns
			15 V	65	130	ns
$t_{PLZ}$	LOW to OFF-state propagation delay	$\bar{E}$ to nYn, nZ; see <a href="#">Figure 14</a>	5 V	200	400	ns
			10 V	120	245	ns
			15 V	110	215	ns
$t_{PZL}$	OFF-state to LOW propagation delay	$\bar{E}$ to nYn, nZ; see <a href="#">Figure 14</a>	5 V	280	565	ns
			10 V	105	205	ns
			15 V	70	140	ns

### 11.1 Waveforms and test circuit





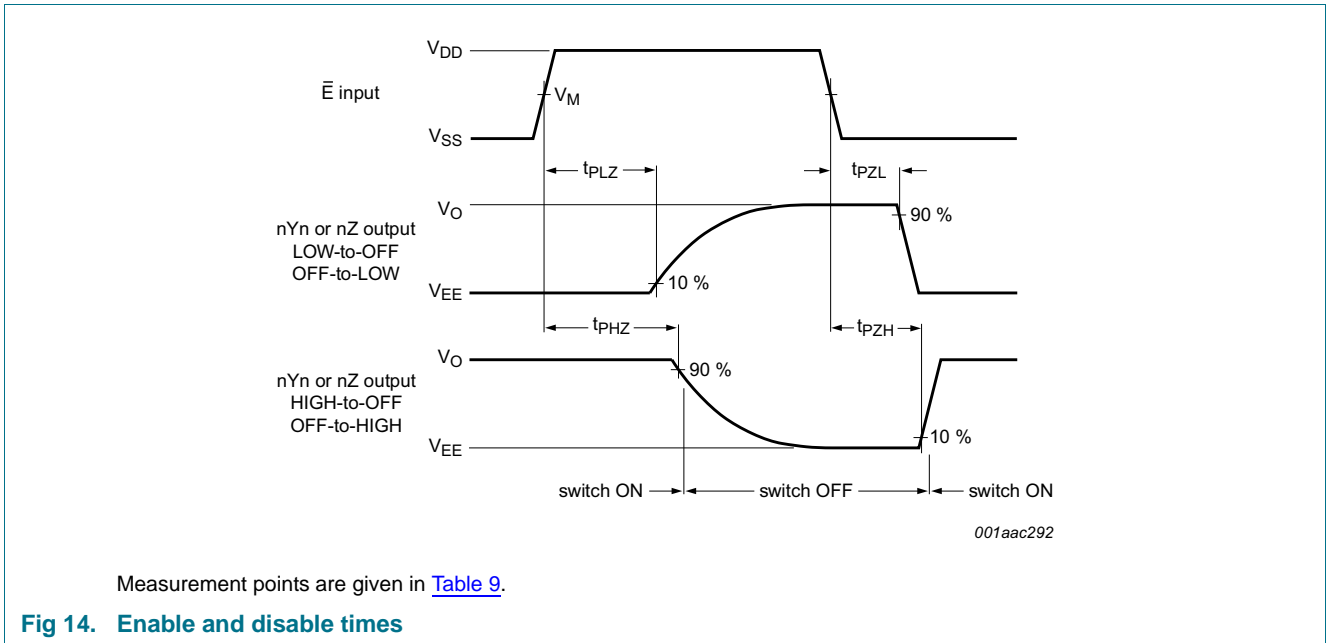
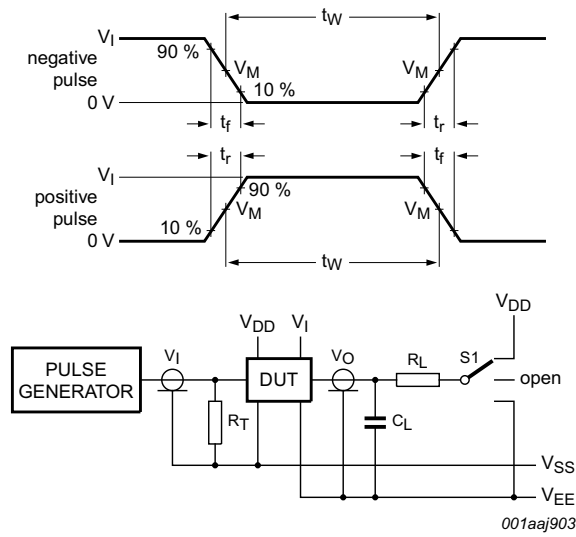


Table 9. Measurement points

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					
nYn, nZ	Sn and $\bar{E}$	$t_r, t_f$	$V_M$	$C_L$	$R_L$	$t_{PHL}$ [1]	$t_{PLH}$	$t_{PZH}, t_{PHZ}$	$t_{PZL}, t_{PLZ}$	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 nYn to nZ or nZ to nYn propagation delays use  $V_{EE}$ . For Sn to nYn or nZ 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; $R_L = 10\text{ k}\Omega$ ; $C_L = 15\text{ pF}$ ; channel ON; $V_I = 0.5V_{DD}$ (p-p); $f_i = 1\text{ kHz}$	5 V [1]	0.25	-	%
			10 V [1]	0.04	-	%
			15 V [1]	0.04	-	%
$f_{(-3dB)}$	-3 dB frequency response	see Figure 17; $R_L = 1\text{ k}\Omega$ ; $C_L = 5\text{ pF}$ ; channel ON; $V_I = 0.5V_{DD}$ (p-p)	5 V [1]	13	-	MHz
			10 V [1]	40	-	MHz
			15 V [1]	70	-	MHz
$\alpha_{iso}$	isolation (OFF-state)	see Figure 18; $f_i = 1\text{ MHz}$ ; $R_L = 1\text{ k}\Omega$ ; $C_L = 5\text{ pF}$ ; channel OFF; $V_I = 0.5V_{DD}$ (p-p)	10 V [1]	-50	-	dB
$V_{ct}$	crosstalk voltage	digital inputs to switch; see Figure 19; $R_L = 10\text{ k}\Omega$ ; $C_L = 15\text{ pF}$ ; $\bar{E}$ or $S_n = V_{DD}$ (square-wave)	10 V	50	-	mV
Xtalk	crosstalk	between switches; see Figure 20; $f_i = 1\text{ MHz}$ ; $R_L = 1\text{ k}\Omega$ ; $V_I = 0.5V_{DD}$ (p-p)	10 V [1]	-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;  $V_{EE} = V_{SS} = 0\text{ V}$ ;  $t_r = t_f \leq 20\text{ ns}$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$ .

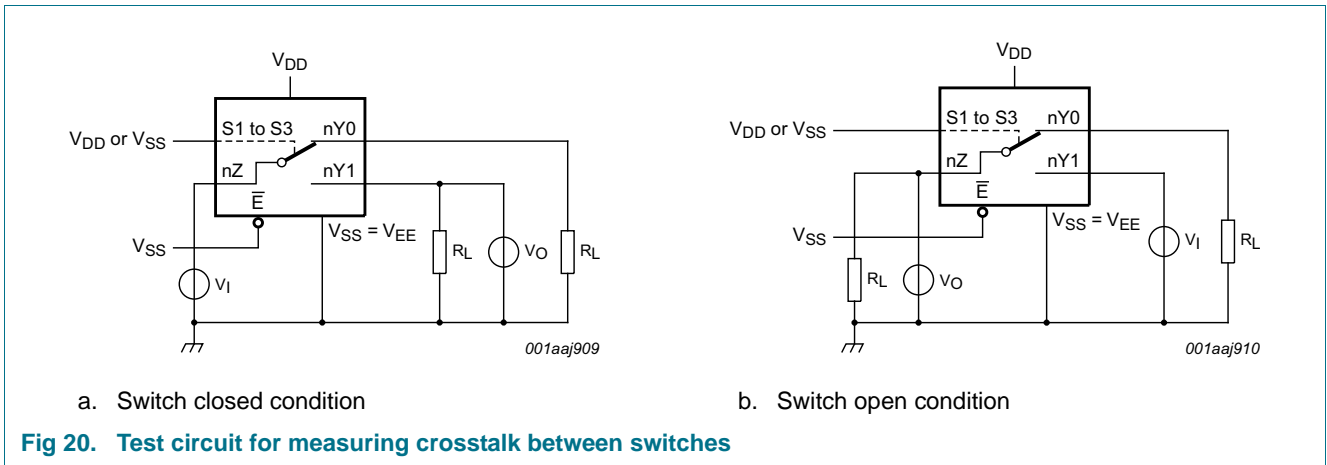
Symbol	Parameter	$V_{DD}$	Typical formula for $P_D$ ( $\mu\text{W}$ )	where:
$P_D$	dynamic power dissipation	5 V	$P_D = 2500 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2$	$f_i$ = input frequency in MHz; $f_o$ = output frequency in MHz; $C_L$ = output load capacitance in pF; $V_{DD}$ = supply voltage in V; $\Sigma(C_L \times f_o)$ = sum of the outputs.
		10 V	$P_D = 11500 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2$	
		15 V	$P_D = 29000 \times f_i + \Sigma(f_o \times C_L) \times V_{DD}^2$	

11.2.1 Test circuits

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

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





12. Package outline

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

SOT109-1

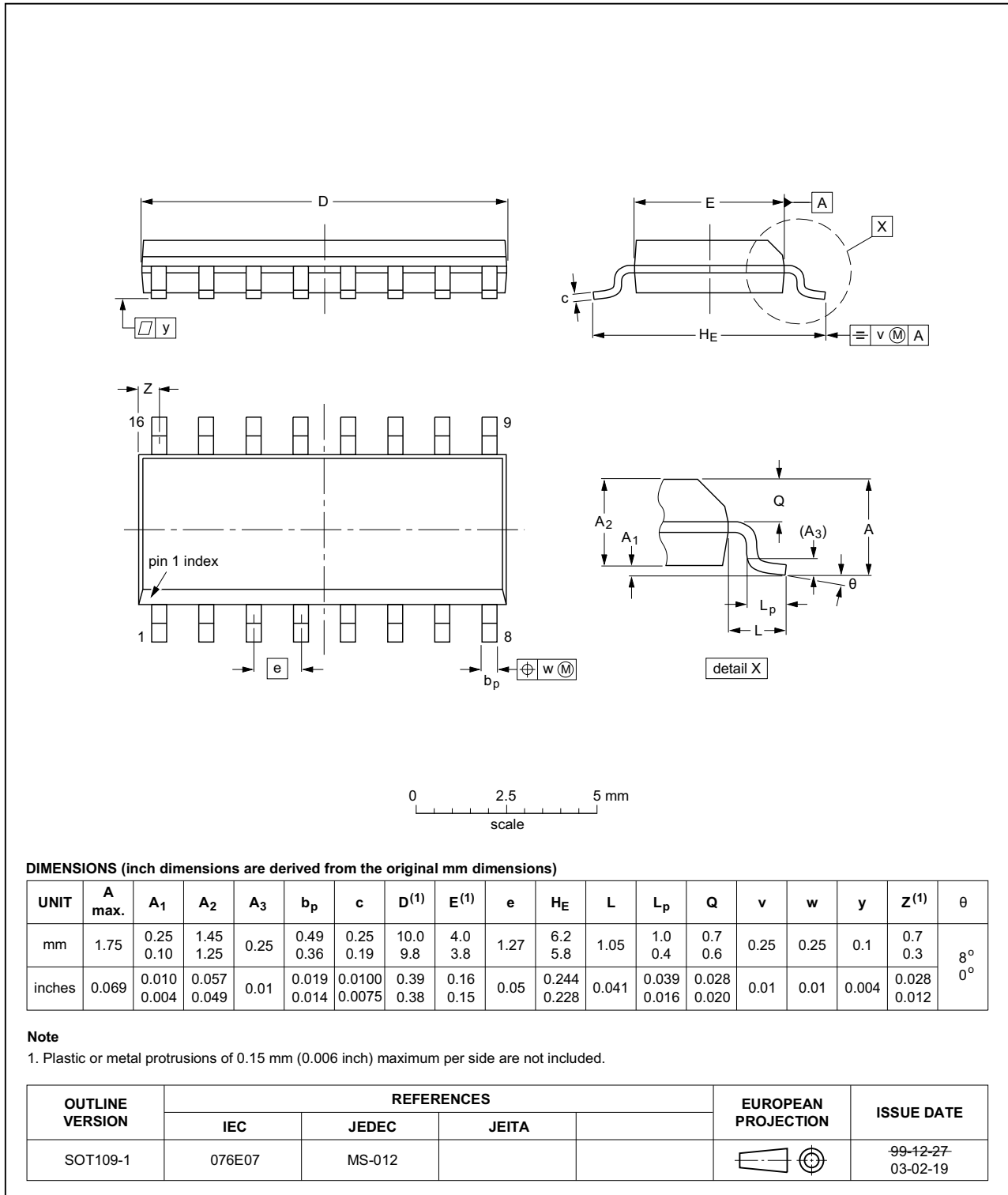


Fig 21. Package outline SOT109-1 (SO16)

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

SOT403-1

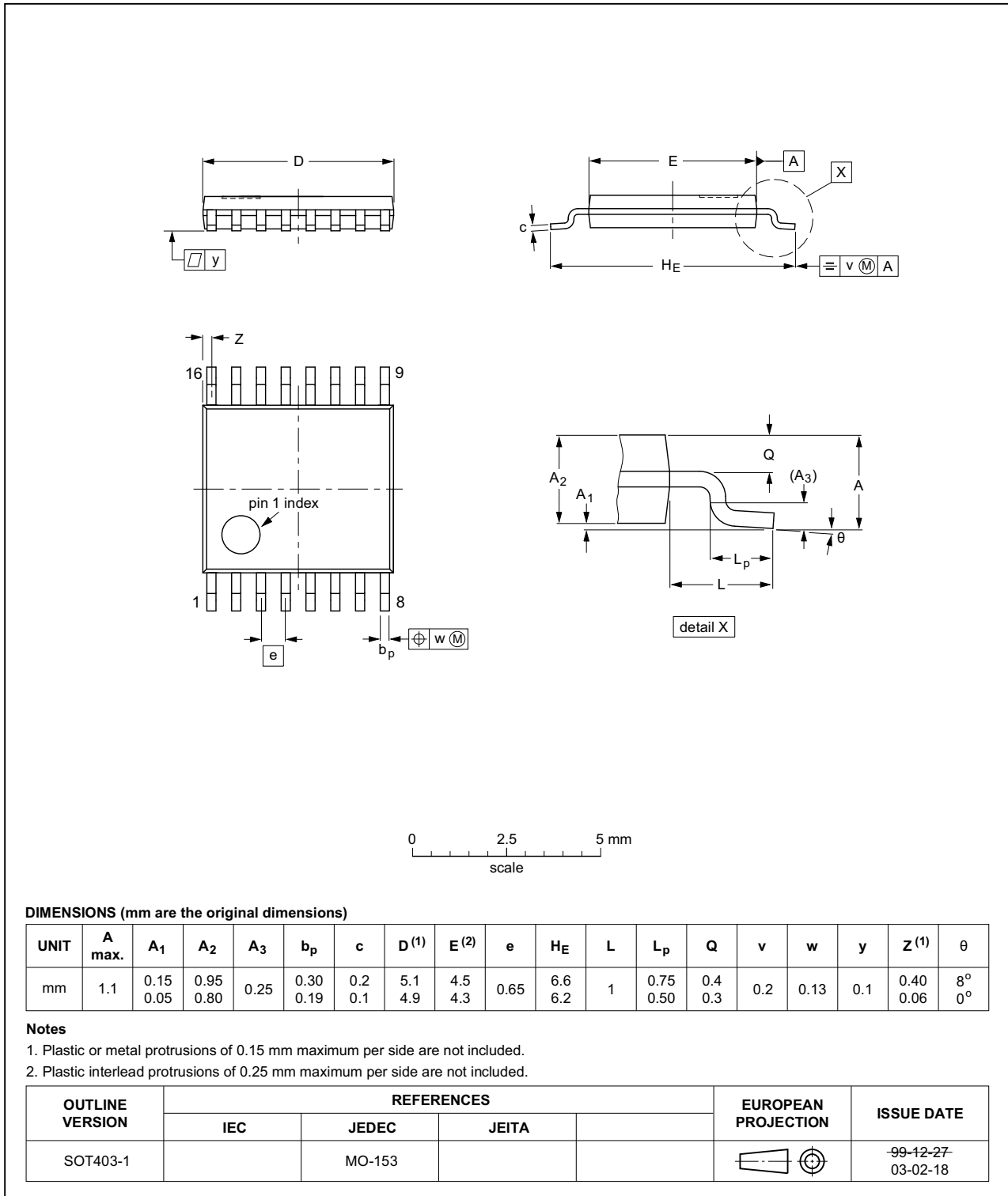


Fig 22. Package outline SOT403-1 (TSSOP16)

## 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
HEF4053B v.12	20160325	Product data sheet	-	HEF4053B v.11
Modifications:	<ul style="list-style-type: none"> <li>Type number HEF4053BP (SOT38-4) removed.</li> </ul>			
HEF4053B v.11	20140911	Product data sheet	-	HEF4053B v.10
Modifications:	<ul style="list-style-type: none"> <li><a href="#">Figure 19</a>: Test circuit modified</li> </ul>			
HEF4053B v.10	20111117	Product data sheet	-	HEF4053B 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>			
HEF4053B v.9	20100325	Product data sheet	-	HEF4053B v.8
HEF4053B v.8	20100224	Product data sheet	-	HEF4053B v.7
HEF4053B v.7	20091127	Product data sheet	-	HEF4053B v.6
HEF4053B v.6	20090924	Product data sheet	-	HEF4053B v.5
HEF4053B v.5	20090825	Product data sheet	-	HEF4053B v.4
HEF4053B v.4	20090713	Product data sheet	-	HEF4053B_CNV v.3
HEF4053B_CNV v.3	19950101	Product specification	-	HEF4053B_CNV v.2
HEF4053B_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>.

### 15.2 Definitions

**Draft** — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Nexperia does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet** — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local Nexperia sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

**Product specification** — The information and data provided in a Product data sheet shall define the specification of the product as agreed between Nexperia and its customer, unless Nexperia and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the Nexperia product is deemed to offer functions and qualities beyond those described in the Product data sheet.

### 15.3 Disclaimers

**Limited warranty and liability** — Information in this document is believed to be accurate and reliable. However, Nexperia does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. Nexperia takes no responsibility for the content in this document if provided by an information source outside of Nexperia.

In no event shall Nexperia be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, Nexperia's aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of Nexperia.

**Right to make changes** — Nexperia reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use** — Nexperia products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of a Nexperia product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Nexperia and its suppliers accept no liability for inclusion and/or use of Nexperia products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. Nexperia makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using Nexperia products, and Nexperia accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the Nexperia product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

Nexperia does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using Nexperia products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). Nexperia does not accept any liability in this respect.

**Limiting values** — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

**Terms and conditions of commercial sale** — Nexperia products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nexperia.com/profile/terms>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. Nexperia hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of Nexperia products by customer.

**No offer to sell or license** — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

**Export control** — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

**Non-automotive qualified products** — Unless this data sheet expressly states that this specific Nexperia product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. Nexperia accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without Nexperia's warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond

Nexperia's specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies Nexperia for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond Nexperia's standard warranty and Nexperia's product specifications.

**Translations** — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

## 15.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## 16. Contact information

For more information, please visit: <http://www.nexperia.com>

For sales office addresses, please send an email to: [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)

## 17. Contents

<b>1</b>	<b>General description</b> .....	<b>1</b>
<b>2</b>	<b>Features and benefits</b> .....	<b>1</b>
<b>3</b>	<b>Applications</b> .....	<b>1</b>
<b>4</b>	<b>Ordering information</b> .....	<b>1</b>
<b>5</b>	<b>Functional diagram</b> .....	<b>2</b>
<b>6</b>	<b>Pinning information</b> .....	<b>3</b>
6.1	Pinning .....	3
6.2	Pin description .....	3
<b>7</b>	<b>Functional description</b> .....	<b>4</b>
<b>8</b>	<b>Limiting values</b> .....	<b>4</b>
<b>9</b>	<b>Recommended operating conditions</b> .....	<b>4</b>
<b>10</b>	<b>Static characteristics</b> .....	<b>5</b>
10.1	Test circuits .....	6
10.2	ON resistance .....	6
10.2.1	ON resistance waveform and test circuit .....	7
<b>11</b>	<b>Dynamic characteristics</b> .....	<b>8</b>
11.1	Waveforms and test circuit .....	8
11.2	Additional dynamic parameters .....	11
11.2.1	Test circuits .....	11
<b>12</b>	<b>Package outline</b> .....	<b>14</b>
<b>13</b>	<b>Abbreviations</b> .....	<b>16</b>
<b>14</b>	<b>Revision history</b> .....	<b>16</b>
<b>15</b>	<b>Legal information</b> .....	<b>17</b>
15.1	Data sheet status .....	17
15.2	Definitions .....	17
15.3	Disclaimers .....	17
15.4	Trademarks .....	18
<b>16</b>	<b>Contact information</b> .....	<b>18</b>
<b>17</b>	<b>Contents</b> .....	<b>19</b>

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Nexperia:](#)

[HEF4053BT,652](#) [HEF4053BT,653](#) [HEF4053BTT,112](#) [HEF4053BTT,118](#) [HEF4053BT/AUJ](#)