HEF4952B

8-channel analog multiplexer/demultiplexer

Rev. 01 — 20 March 2006 Product data sheet

1. General description

The HEF4952B is a small signal switch providing a dual 5-channel analog multiplexer/demultiplexer with common select logic. Each multiplexer has four independent inputs/outputs (pins nY0 to nY3) and a common input/output (pin nZ). Via one channel, channel nY2 and nY3 can be connected to V_{SS}.

V_{SS} and V_{DD} are the supply voltage pins for the digital control inputs (pins A0 to A2).

2. Features

- Schmitt-trigger action at control inputs
- Small signal switch
- Specified from –40 °C to +85 °C

3. Applications

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

4. Ordering information

Table 1. Ordering information

Type number	Package			
	Temperature range	Name	Description	Version
HEF4952BT	–40 °C to +85 °C	SO16	plastic small outline package; 16 leads; body width 3.9 mm	SOT109-1

PHILIPS

5. Functional diagram

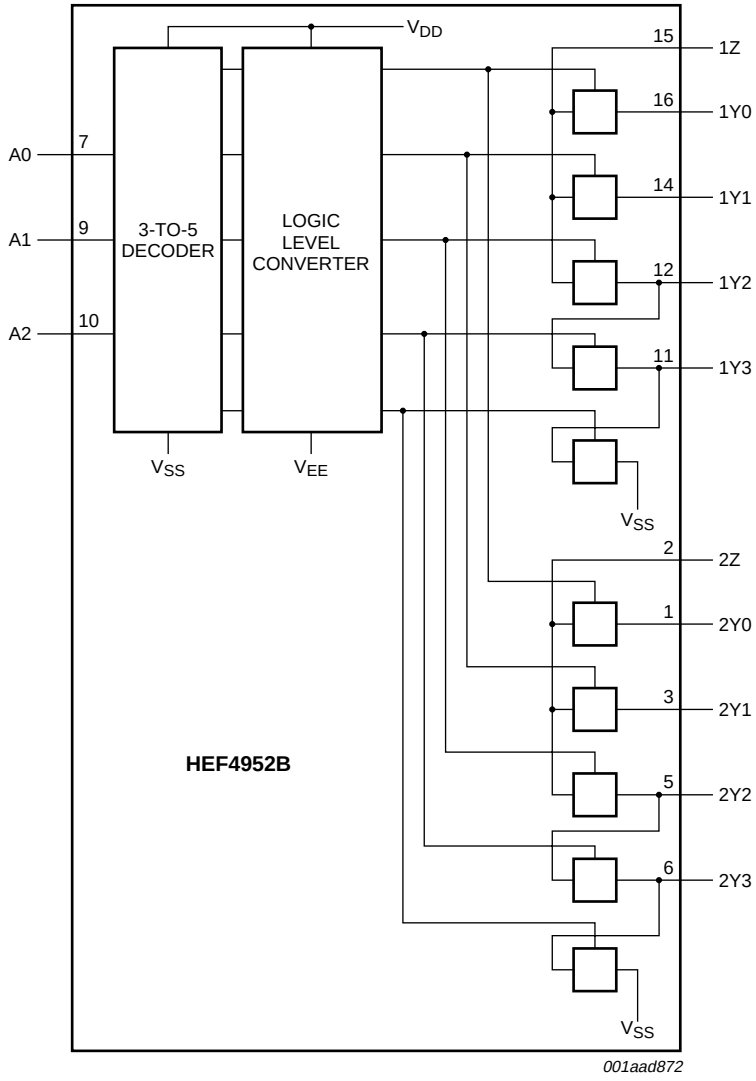


Fig 1. Functional diagram

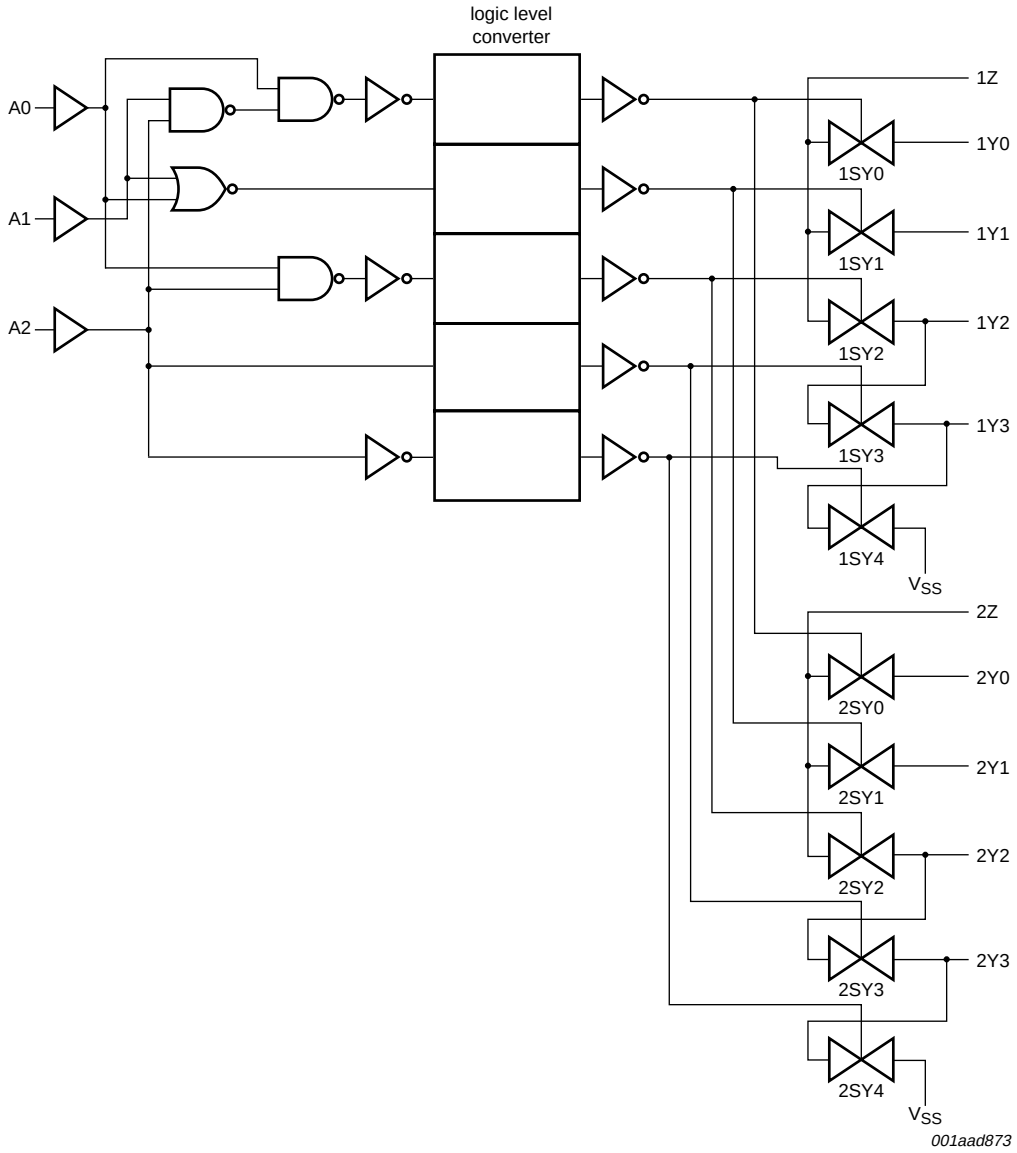


Fig 2. Logic diagram

6. Pinning information

6.1 Pinning

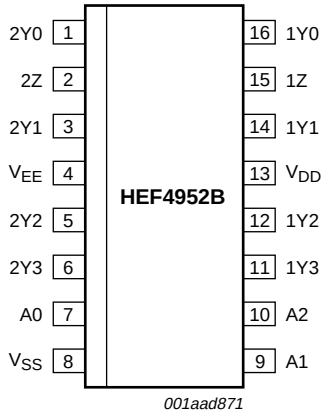


Fig 3. Pin configuration

6.2 Pin description

Table 2: Pin description

Symbol	Pin	Description
2Y0	1	channel 2 independent input 0 or output 0
2Z	2	channel 2 common input or output
2Y1	3	channel 2 independent input 1 or output 1
V_{EE}	4	supply voltage of switches
2Y2	5	channel 2 independent input 2 or output 2
2Y3	6	channel 2 independent input 3 or output 3
A0	7	address input 0
V_{SS}	8	ground
A1	9	address input 1
A2	10	address input 2
1Y3	11	channel 1 independent input 3 or output 3
1Y2	12	channel 1 independent input 2 or output 2
V_{DD}	13	supply voltage
1Y1	14	channel 1 independent input 1 or output 1
1Z	15	channel 1 common input or output
1Y0	16	channel 1 independent input 0 or output 0

7. Functional description

7.1 Function table

Table 3: Function table

Input			Switch				
A2	A1	A0	nSY0	nSY1	nSY2	nSY3	nSY4
L	L	L	off	on	off	off	on
L	L	H	on	off	off	off	on
L	H	L	off	off	on	off	on
L	H	H	on	off	on	off	on
H	L	L	off	on	off	on	off
H	L	H	on	off	off	on	off
H	H	L	off	off	on	on	off
H	H	H	off	off	off	on	off

8. Limiting values

Table 4: Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{DD}	quiescent supply voltage		[1]	–0.5	+18	V
V_{EE}	supply voltage	referenced to V_{DD}	[1]	–18	+0.5	V
V_I	input voltage			–0.5	V_{DD} + 0.5	V
I_I	input current			-	±10	mA
T_{stg}	storage temperature			–65	+150	°C
T_{amb}	ambient temperature			–40	+85	°C
P_{tot}	total power dissipation	T_{amb} = –40 °C to +85 °C	[2]	-	500	mW
P_o	power dissipation per output			-	100	mW

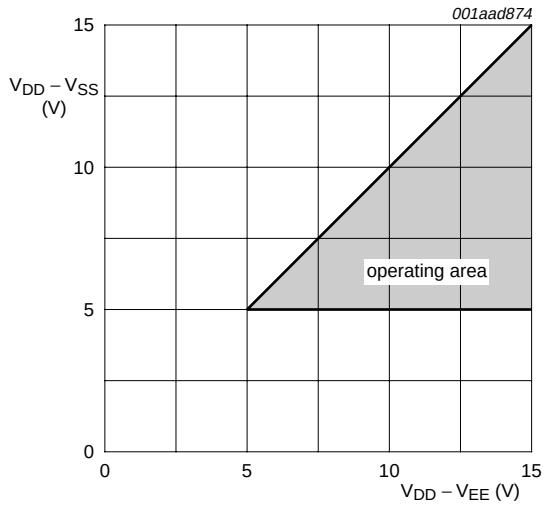
[1] To avoid drawing V_{DD} current out of terminal Z, when switch current flows into terminals Y, the voltage drop across the bidirectional switch must not exceed 0.4 V. If the switch current flows into terminal Z, no V_{DD} current will flow out of terminals Y; in this case there is no limit for the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

[2] P_{tot} derates linearly with 8 mW/K above 70 °C.

9. Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DD}	supply voltage	see Figure 4	5	-	15	V
V_{EE}	supply voltage	see Figure 4	0	-	–15	V



$V_{EE} \leq V_{SS}$

Fig 4. Operating area as a function of the supply voltages

10. Static characteristics

Table 6: Static characteristics

Voltages are referenced to V_{SS} (V_{SS} = 0 V); unless otherwise specified.

Symbol	Parameter	Conditions	T_{amb} = –40 °C		T_{amb} = 25 °C		T_{amb} = 85 °C		Unit
			Min	Max	Min	Max	Min	Max	
I_{DD}	quiescent supply current	all valid input combinations; $V_I = V_{SS}$ or V_{DD}; I_O = 0 A							
		V_{DD} = 5 V	-	20	-	20	-	150	µA
		V_{DD} = 10 V	-	40	-	40	-	300	µA
		V_{DD} = 15 V	-	80	-	80	-	600	µA
I_{LI}	input leakage current	V_I = 0 V or 15 V; V_{DD} = 15 V	-	0.3	-	0.3	-	1.0	µA
$I_{L(OZ)}$	3-state output leakage current	V_{DD} = 15 V							
		output returned to V_{DD}	-	1.6	-	1.6	-	12.0	µA
		output returned to V_{SS}	-	–1.6	-	–1.6	-	–12.0	µA
C_i	input capacitance	digital inputs	-	-	-	7.5	-	-	pF

Table 7: Control input characteristics

Voltages are referenced to V_{SS} (V_{SS} = 0 V); unless otherwise specified.

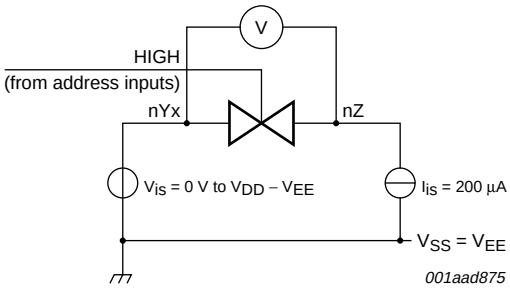
Symbol	Parameter	Conditions	T_{amb} = 25 °C		T_{amb} = −40 °C to +85 °C		Unit
			Min	Max	Min	Max	
V_{T+}	positive-going threshold	V_{DD} = 5 V	-	2.90	-	3.00	V
		V_{DD} = 10 V	-	4.37	-	4.50	V
V_{T-}	negative-going threshold	V_{DD} = 5 V	1.03	-	1.00	-	V
		V_{DD} = 10 V	2.10	-	2.00	-	V
V_H	hysteresis ($V_{T+} - V_{T-}$)	V_{DD} = 5 V	0.16	-	0.10	-	V
		V_{DD} = 10 V	0.11	-	0.10	-	V

Table 8. R_{ON} switch characteristics

T_{amb} = 25 °C; for test conditions see Figure 5.

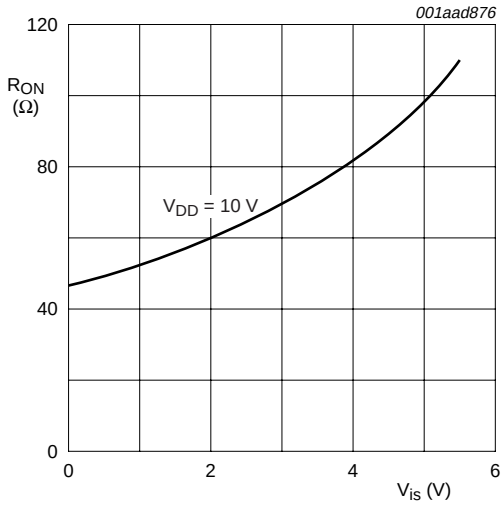
V_{is} is the input voltage at a Y or Z terminal, whichever is assigned as input.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R_{ON}	ON resistance	$V_{DD} - V_{EE}$ = 10 V; see Figure 6				
		V_{is} = 0 V	-	45	150	Ω
		V_{is} = 2.5 V	-	65	170	Ω
		V_{is} = 5.0 V	-	110	360	Ω
ΔR_{ON}	ON resistance mismatch between channels	V_{is} = 2.5 V; $V_{DD} - V_{EE}$ = 10 V	-	10	-	Ω
$I_{L(OFF)}$	OFF-state leakage current	$V_{DD} - V_{EE}$ = 15 V	-	-	200	nA



$$R_{ON} = \frac{V}{I_{is}}$$

Fig 5. Test set-up for measuring ON resistance



I_{is} = 200 µA; V_{SS} = V_{EE} = 0 V

Fig 6. Typical ON resistance as a function of the input voltage

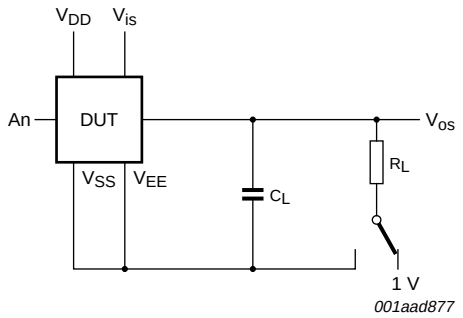
11. Dynamic characteristics

Table 9. Dynamic characteristics

V_{EE} = V_{SS} = 0 V; T_{amb} = 25 °C; input transition times ≤ 20 ns; test circuit see Figure 7.
V_{is} is the input voltage at a Y or Z terminal, whichever is assigned as input. V_{os} is the output voltage at a Y or Z terminal, whichever is assigned as output.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t_{PHL}	HIGH-to-LOW propagation delay V_{is} to V_{os}	V_{is} = 1.0 V (square-wave)				
		V_{DD} = 5 V	-	5	-	ns
		V_{DD} = 10 V	-	3	6	ns
		V_{DD} = 15 V	-	2	-	ns
t_{PLH}	LOW-to-HIGH propagation delay V_{is} to V_{os}	V_{is} = 1.0 V (square-wave)				
		V_{DD} = 5 V	-	5	-	ns
		V_{DD} = 10 V	-	3	6	ns
		V_{DD} = 15 V	-	2	-	ns
t_{PZL}	3-state output enable time to LOW-state An to V_{os}	V_{An} = V_{DD} (square-wave); V_{is} = V_{EE}				
		V_{DD} = 5 V	-	125	-	ns
		V_{DD} = 10 V	-	50	100	ns
		V_{DD} = 15 V	-	35	-	ns
t_{PZH}	3-state output enable time to HIGH-state An to V_{os}	V_{An} = V_{DD} (square-wave); V_{is} = 1 V				
		V_{DD} = 5 V	-	125	-	ns
		V_{DD} = 10 V	-	50	100	ns
		V_{DD} = 15 V	-	35	-	ns
P_D	dynamic power dissipation	[1]	-	-	-	

[1] Dynamic power dissipation P_D can be calculated with the following formula (P_D in μW).
$P_D = P \times f_i + \Sigma (f_o \times C_L) \times V_{DD}^2$
Where:
P = 1300 for V_{DD} = 5 V; P = 6100 for V_{DD} = 10 V; P = 15600 for V_{DD} = 15 V;
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.



Test data is given in Table 10.

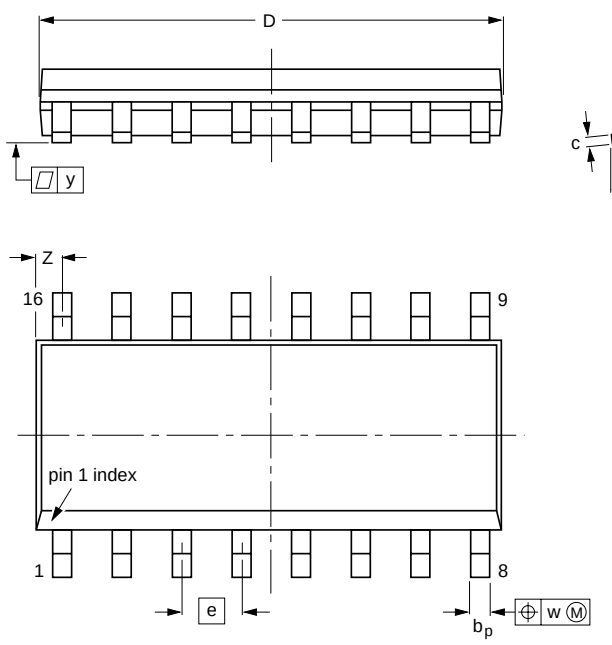
Fig 7. Load circuitry for switching times

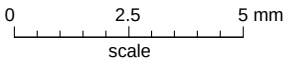
Table 10. Test data

Test	Input		Load		Switch position
	An	V_{is}	C_L	R_L	
t_{PHL}	-	1.0 V	50 pF	10 kΩ	V_{EE}, V_{SS}
t_{PLH}	-	1.0 V	50 pF	10 kΩ	V_{EE}, V_{SS}
t_{PZL}	V_{DD}	V_{EE}	50 pF	10 kΩ	1 V
t_{PZH}	V_{DD}	1.0 V	50 pF	10 kΩ	V_{EE}, V_{SS}

12. Package outline

SO16: plastic small outline package; 16 leads; body width 3.9 mm **SOT109-1**





DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	10.0 9.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8^o 0^o
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.39 0.38	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.020	0.01	0.01	0.004	0.028 0.012	

Note

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT109-1	076E07	MS-012				~~99-12-27~~ 03-02-19

Fig 8. Package outline SOT109-1 (SO16)

13. Revision history

Table 11: Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
HEF4952B_1	20060320	Product data sheet	-	-

14. Legal information

14.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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