



# UM10065

ISP1562 Eval Board

Rev. 03 — 6 July 2006

User manual

## Document information

Info	Content
<b>Keywords</b>	isp1562, usb, universal serial bus, host controller
<b>Abstract</b>	The ISP1562 eval board is a standard implementation of the ISP1562 in a complete configuration that allows you to exercise all signals and main features.

**Revision history**

Rev	Date	Description
03	20060706	Third release. Updated <a href="#">Section 7</a> .
02	20051028	Second release. Updated <a href="#">Section 1</a> , <a href="#">Section 3</a> and <a href="#">Section 4.2</a> .
01	20050909	First release.

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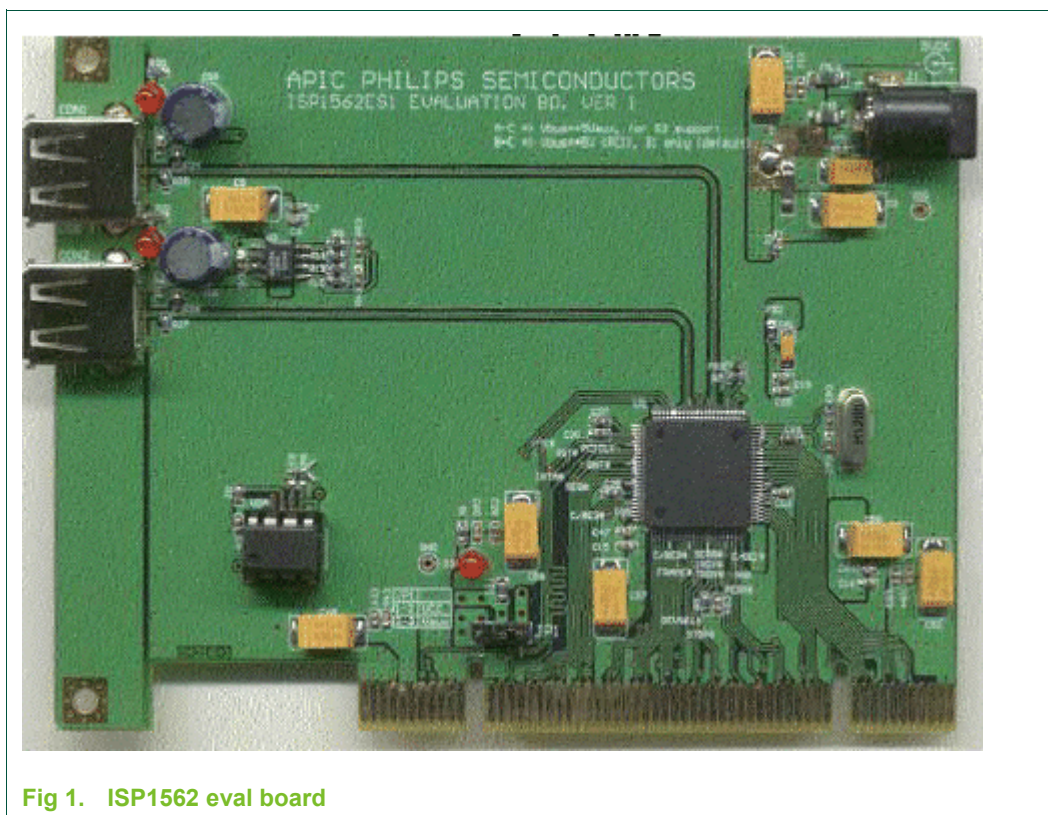
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## 1. Introduction

The ISP1562 evaluation (eval) board is a standard implementation of the ISP1562 in a complete configuration that allows you to exercise all signals and main features. [Fig 1](#) shows the ISP1562 eval board.

Some of the features that are implemented in the ISP1562 eval board are:

- Selection between PCI  $V_{AUX}$  and PCI  $V_{CC}$  power supply, with voltage presence indicator. This feature in combination with the auxiliary +5 V input on J1 allows you to test the system wake-up from power management states, such as  $S3_{cold}$ , in which PCI  $V_{CC}$  is not present. This is intended mainly for testing the ISP1562 in motherboard or notebook designs.
- Simple and reliable overcurrent protection scheme that allows testing of the  $OCn\_N$  and  $PWEn\_N$  signals. Alternative solutions, resettable circuit protection devices, can be adopted.
- Port power LEDs that may be omitted in a standard commercial implementation but are considered useful on the eval board for easier understanding of functionality and debugging.



## 2. ISP1562 pin configuration

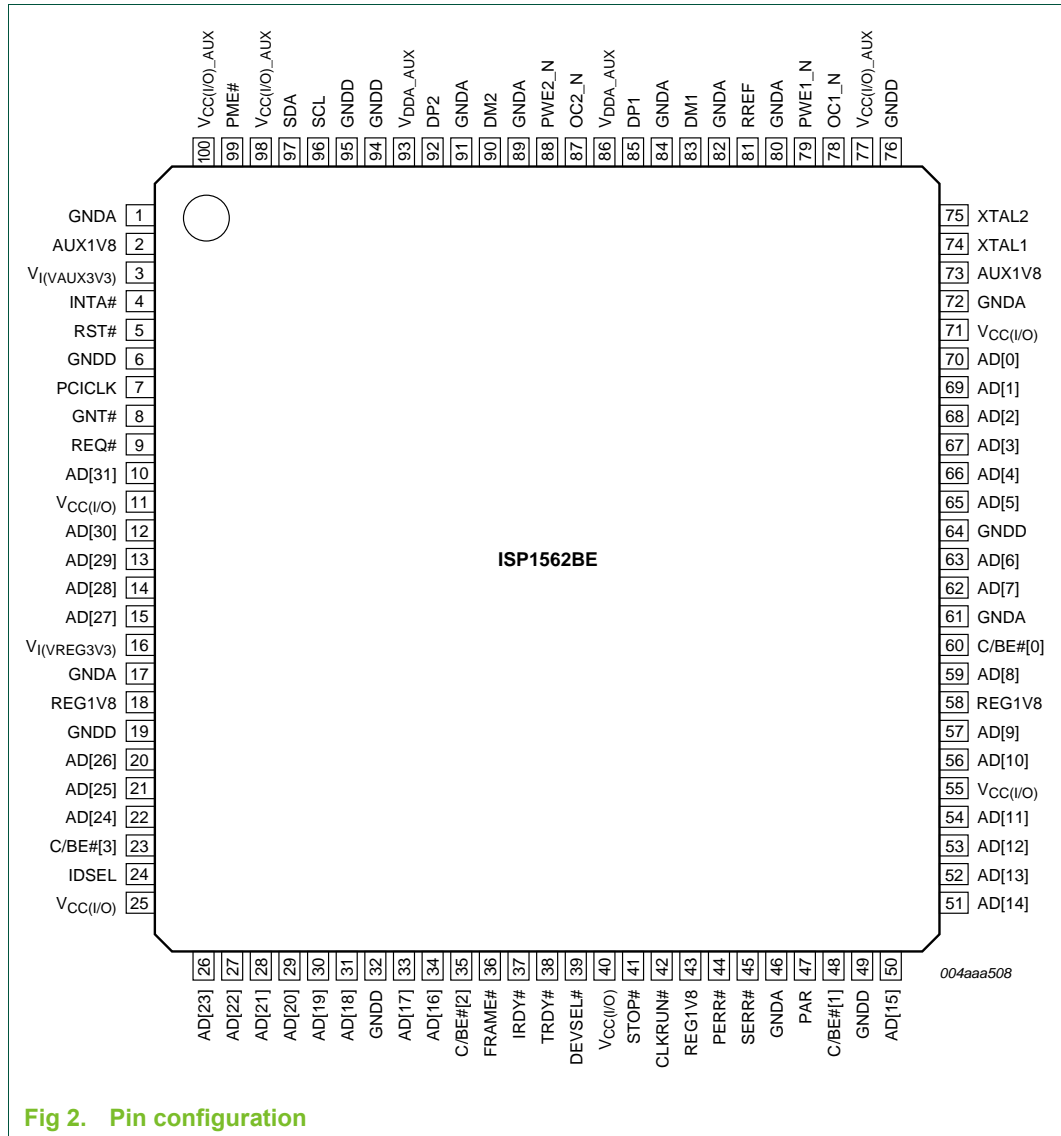


Fig 2. Pin configuration

## 3. System requirements

- Intel PII400 MHz processor and above, or equivalent in speed from AMD, Cyrix and VIA, is recommended.

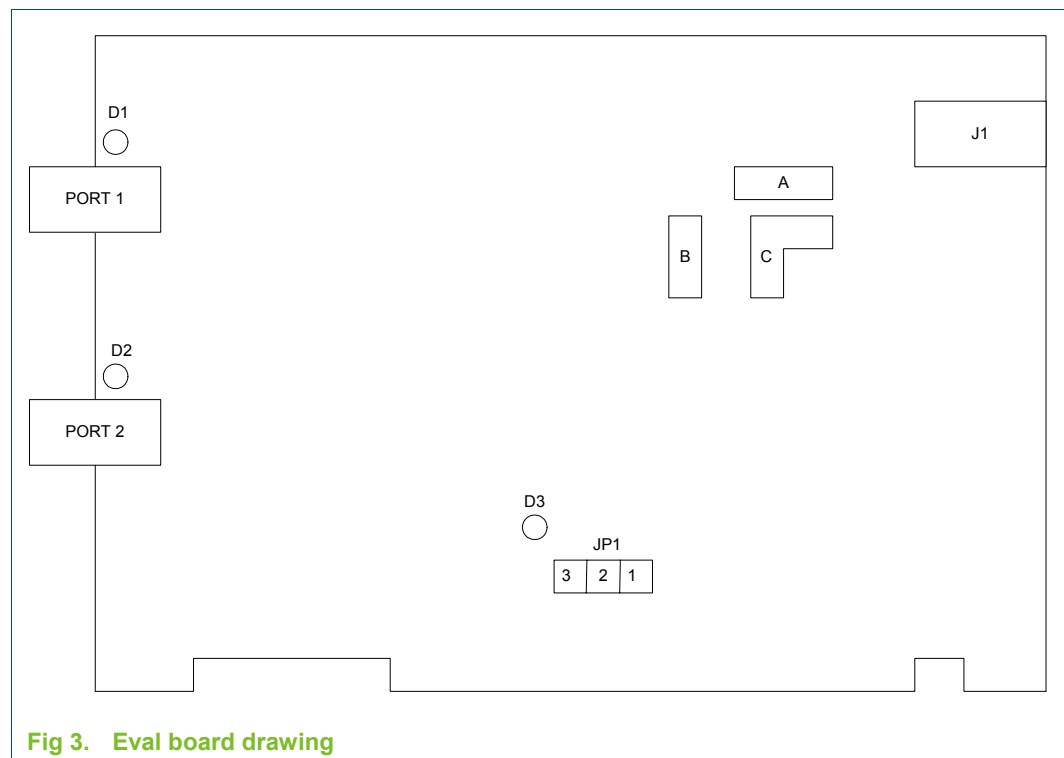
**Remark:** Only motherboards with 3.3 V PCI interface can be used with the ISP1563 eval board.

Generally, the processor usage indicator will vary according to the type and number of applications launched to exercise the attached USB devices. For example, running data transfer tests on two high-speed Hard Disk Drives (HDDs) on a P4 at 1.7 GHz, 128 MB DDRAM, Microsoft Windows 2000 will determine a processor usage of 30 % to 40 %. Adding two Original USB cameras and an application playing an MP3 song through Original USB speakers may increase the average processor usage up to 70 % to 80 %. Also, a Hi-Speed USB camera and an Original USB camera running simultaneously will increase the processor usage up to 100 %, depending on resolution settings.

- Motherboard with PCI slots that are compatible with *PCI Local Bus Specification Rev. 2.2*; supporting at least S1 and S3 power management modes for power management features testing.
- Memory: Minimum amount as indicated by the operating system and applications requirements. Only a small amount of memory is occupied by the installation of the device drivers itself, or the OHCI or EHCI functionality.
- HDD space: Mainly determined by the operating system and applications requirements because specific drivers need very little space.
- Graphics cards and other adapter cards: No special requirements.
- Operating systems supported: Windows 98 Second Edition (SE), Windows 2000, Windows XP and Windows Millennium Edition (Me).

## 4. ISP1562 eval board

[Fig 3](#) shows the eval board drawing.



**Fig 3. Eval board drawing**

### 4.1 Port powered LEDs

LEDs D1 and D2 indicate the power status of USB ports. If a port is powered, the respective LED is turned on. It is turned off during system boot-up until OHCI or EHCI drivers are loaded, or it is switched off whenever an overcurrent condition occurs.

### 4.2 PCI $V_{AUX}$ power supply

If the motherboard used is PCI 2.2 compliant, jumper JP1 position 2-3 can be shorted, allowing S3<sub>cold</sub> suspend and resume testing (PCI  $V_{AUX}$  = 3.3 V is used and an external +5 V is necessary). If the motherboard used is PCI 2.1 or older version compliant, jumper JP1 position 1-2 must be shorted (PCI  $V_{CC}$  = 3.3 V is used because PCI  $V_{AUX}$  is not

present). Note that in both these situations, LED D3 must be turned on, indicating that the ISP1562 is powered.

**Important:** If LED D3 is not lit, when JP1 is in 2-3 position, it indicates that the ISP1562 does not have the PCI  $V_{AUX}$  supply; PCI  $V_{AUX}$  is not supplied in the PCI connector. Therefore, your computer will stop responding or 'hang' when the operating system is loading OHCI or EHCI drivers. Switch JP1 to position 1-2 to connect to PCI  $V_{CC} = 3.3$  V, present under normal conditions, except some system power management modes. For example,  $S3_{cold}$  and  $S4$ .

### 4.3 External 5 V power source and $S3$ wake-up capability

Jack J1 is used to connect an external +5 V standby power supply to test the system wake-up from  $S3_{cold}$  and maintain connected USB devices powered to avoid re-enumeration.

When the system is in the  $S3_{cold}$  power management state, the +5 V main power at PCI connectors disappears. Therefore, all downstream ports will not be powered because  $V_{BUS}$  is derived from the PCI +5 V power supply. In this situation, downstream bus-powered devices, such as mouse and keyboard, are not functional and cannot wake up the system.

If you want to use the external +5 V supply, pads A and C on the eval board must be soldered together as represented in the eval board drawing. Similarly, if you intend to use PCI +5 V as only the  $V_{BUS}$  power source (no testing of the system wake-up from  $S3_{cold}$  and no external +5 V connected), then pads B and C must be soldered together. Pads A, B and C are copper areas on the upper-right corner of the eval board. This solution, using three copper pads, is adopted to avoid using a jumper because only the default configuration, that is, pads B and C connected together, will be used most of the time.

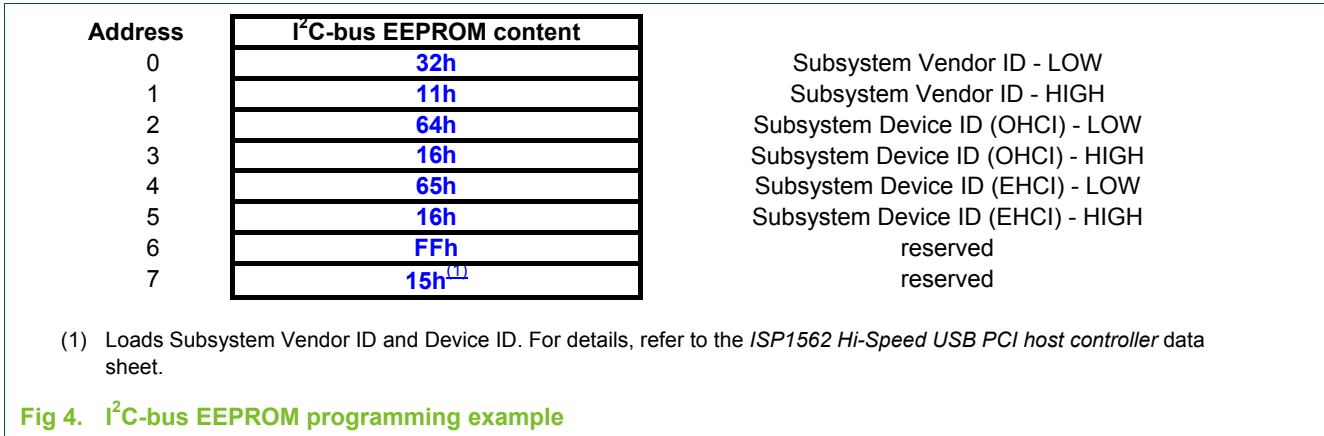
### 4.4 Loading the subsystem ID and vendor ID from external EEPROM

Expansion board vendors can use the Subsystem Vendor ID and the Subsystem ID to identify the board and to load the correct drivers by the operating system. The PCI-SIG assigns the Subsystem Vendor ID and the vendor determines the Subsystem ID.

The Subsystem Vendor ID and the Subsystem ID can be optionally loaded at power-on from the external serial I<sup>2</sup>C-bus EEPROM present on the ISP1562 eval board. A 3.3 V serial EEPROM of any size can be used because only a few locations will be used for data loading.

The serial I<sup>2</sup>C-bus EEPROM present on the ISP1562 eval board cannot be programmed onboard. It must be preprogrammed using a standard serial EEPROM programmer. A socket is provided on the ISP1562 eval board for repetitive reprogramming of the EEPROM.

An example on the I<sup>2</sup>C-bus EEPROM programming is given in [Fig 4](#). In the example, it is assumed that the Subsystem Vendor ID is 1132h, the Subsystem Device ID for OHCI is 1664h, and the Subsystem Device ID for EHCI is 1665h.



**Remark:** Do not load any other values in reserved fields, otherwise, functionality of the ISP1562 is not guaranteed.

## 5. Hi-Speed USB (EHCI) drivers

For Windows 2000 Service Pack 4 or later, and Windows XP Service Pack 1 or later, the standard Microsoft EHCI drivers can be used. You can download the latest Service Pack corresponding to the specific operating system from the Microsoft website.

## 6. Loading ISP1562 drivers

This section provides an example to load device drivers after an ISP1562 add-on card is plugged into a computer running Windows 98. Loading of OHCI drivers, supplied by the operating system, and Hi-Speed USB EHCI drivers provided by Philips is shown in a step-by-step process.

**Remark:** In the case of Windows 2000 and Windows XP, OHCI drivers are automatically installed by the operating system, without any user intervention.

### 6.1 Loading OHCI drivers

The following wizard appears when an ISP1562 add-in card is plugged on a computer running Windows 98, enabling you to install OHCI drivers.



Fig 5. Add New Hardware Wizard – 1



Fig 6. Add New Hardware Wizard – 2



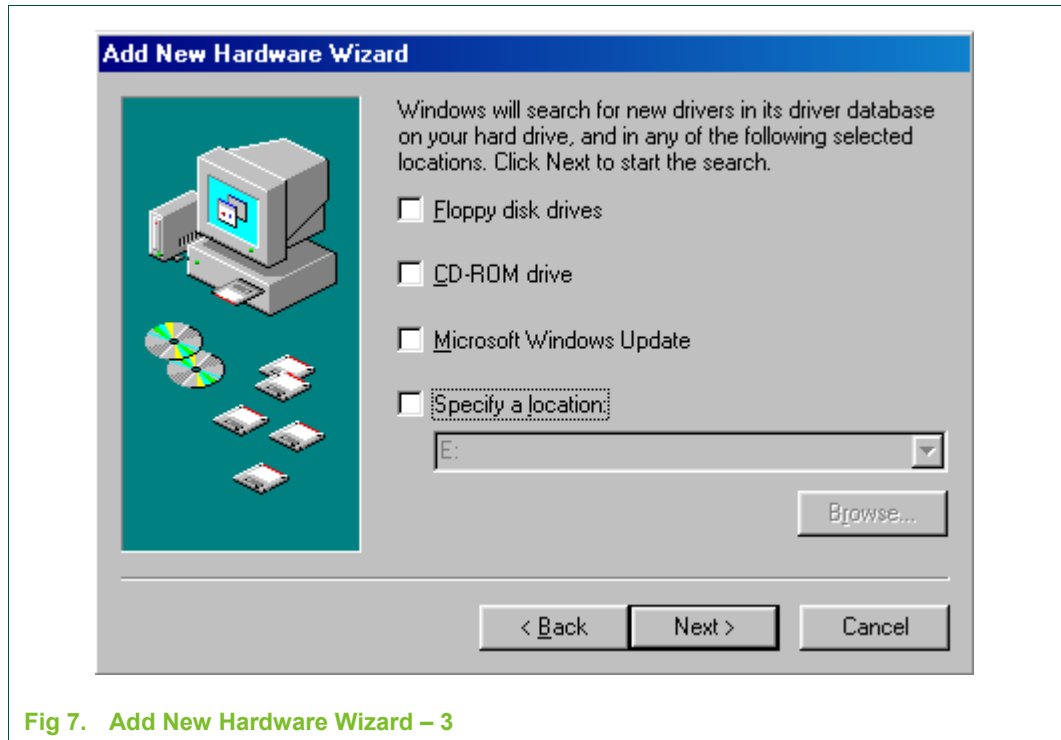


Fig 7. Add New Hardware Wizard – 3

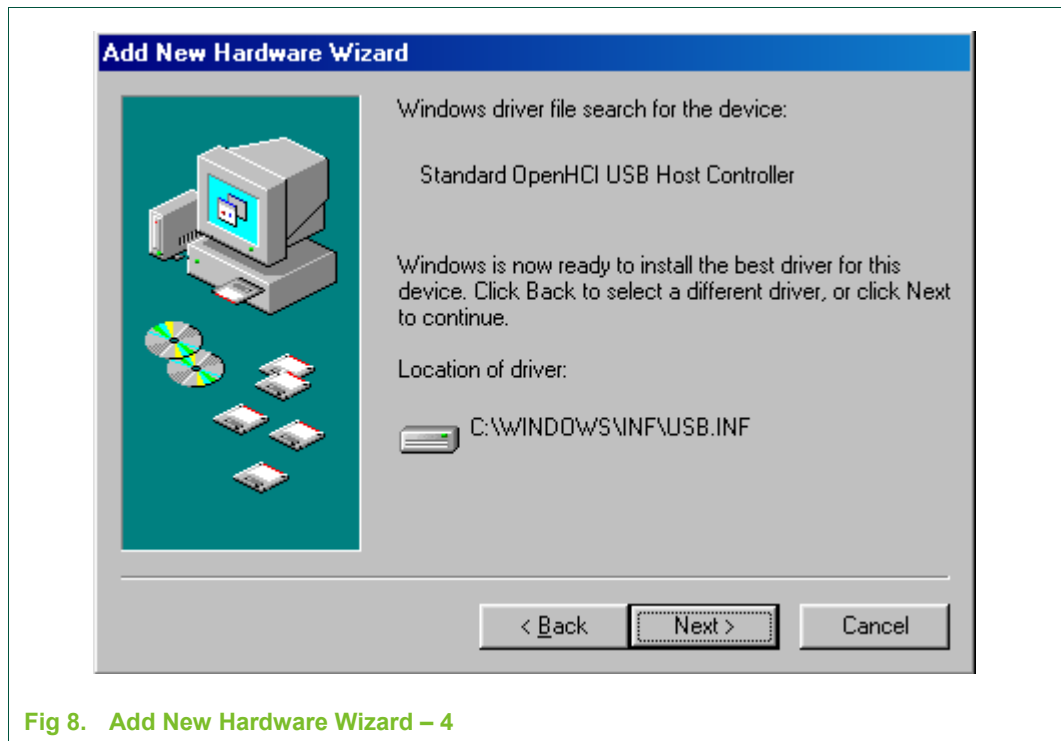


Fig 8. Add New Hardware Wizard – 4

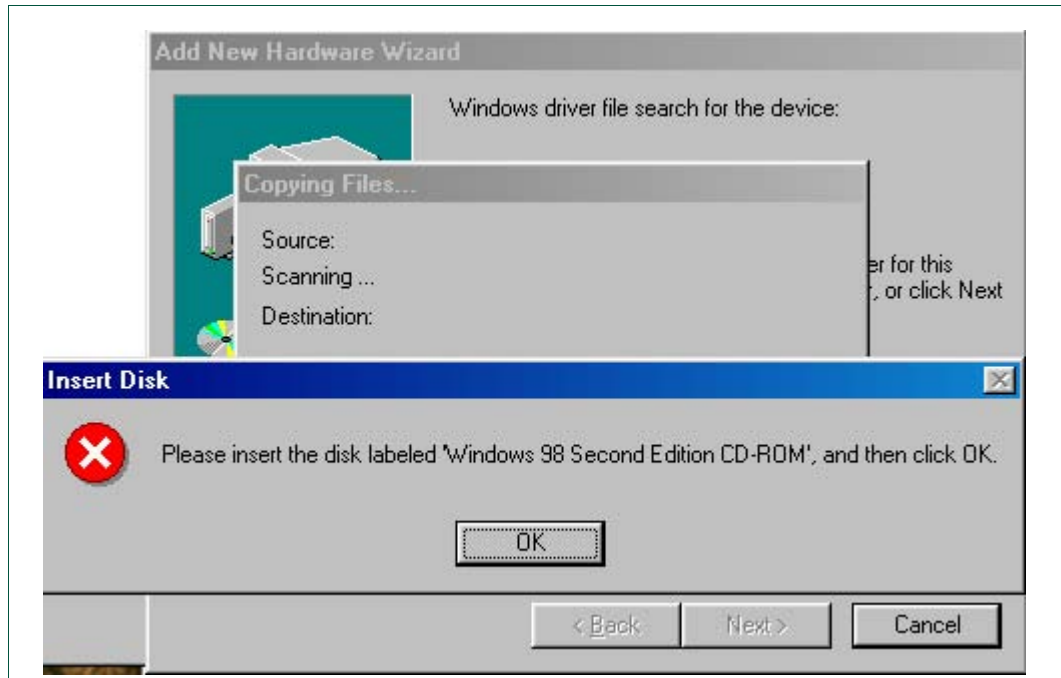


Fig 9. Insert Disk dialog box

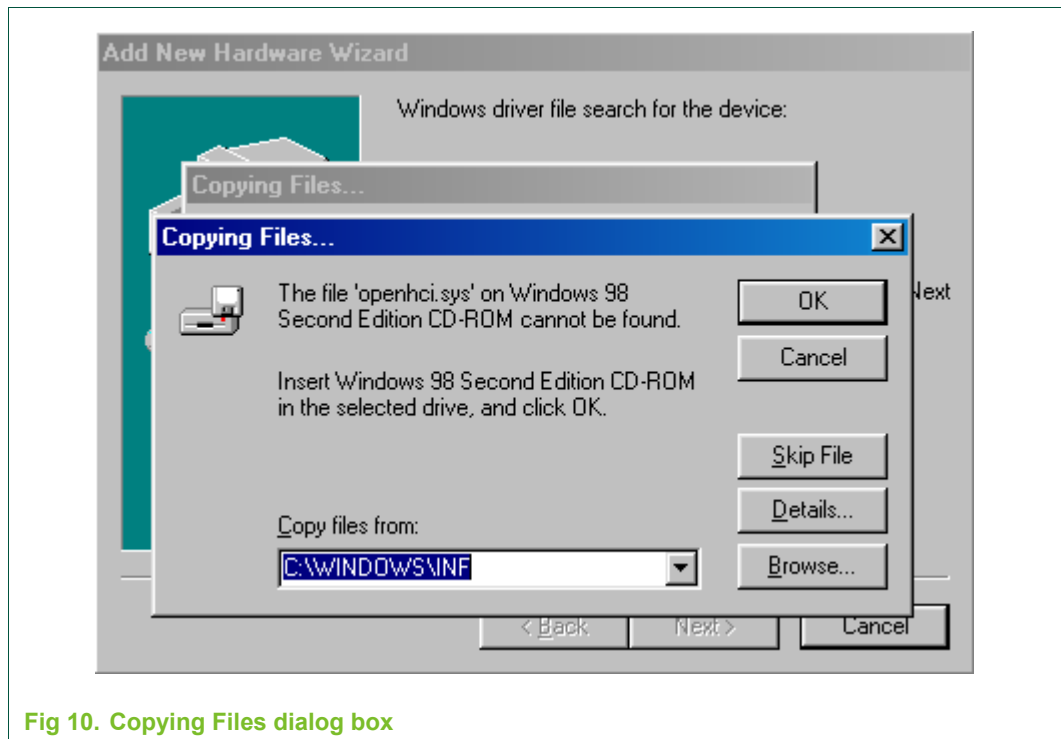


Fig 10. Copying Files dialog box

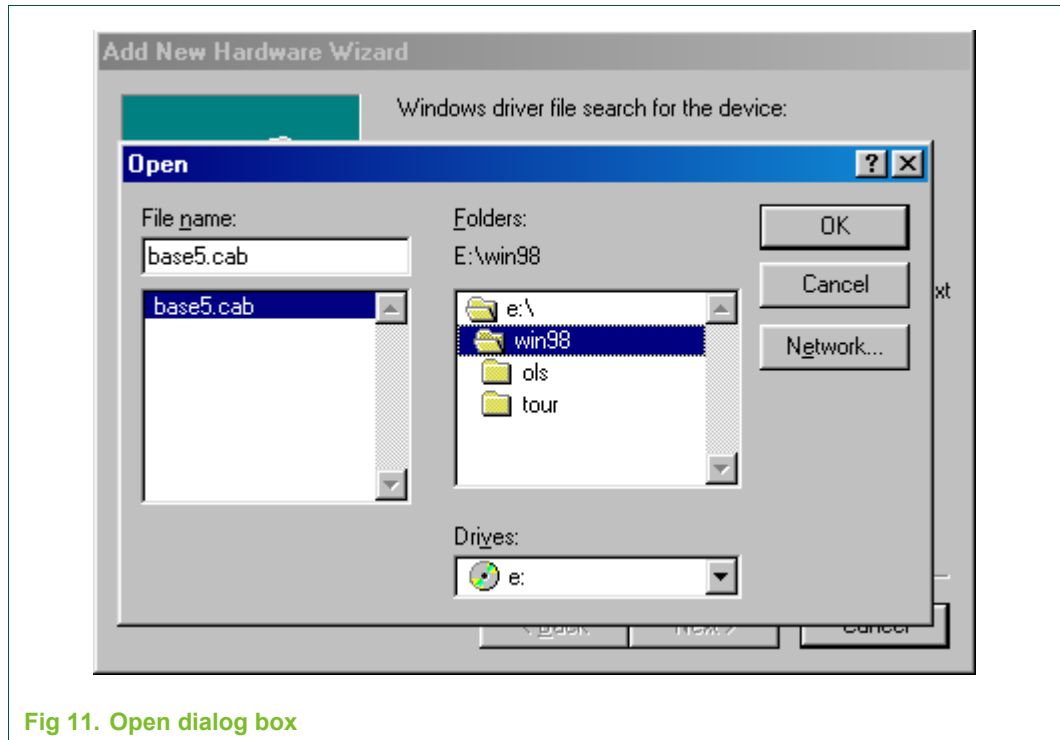


Fig 11. Open dialog box

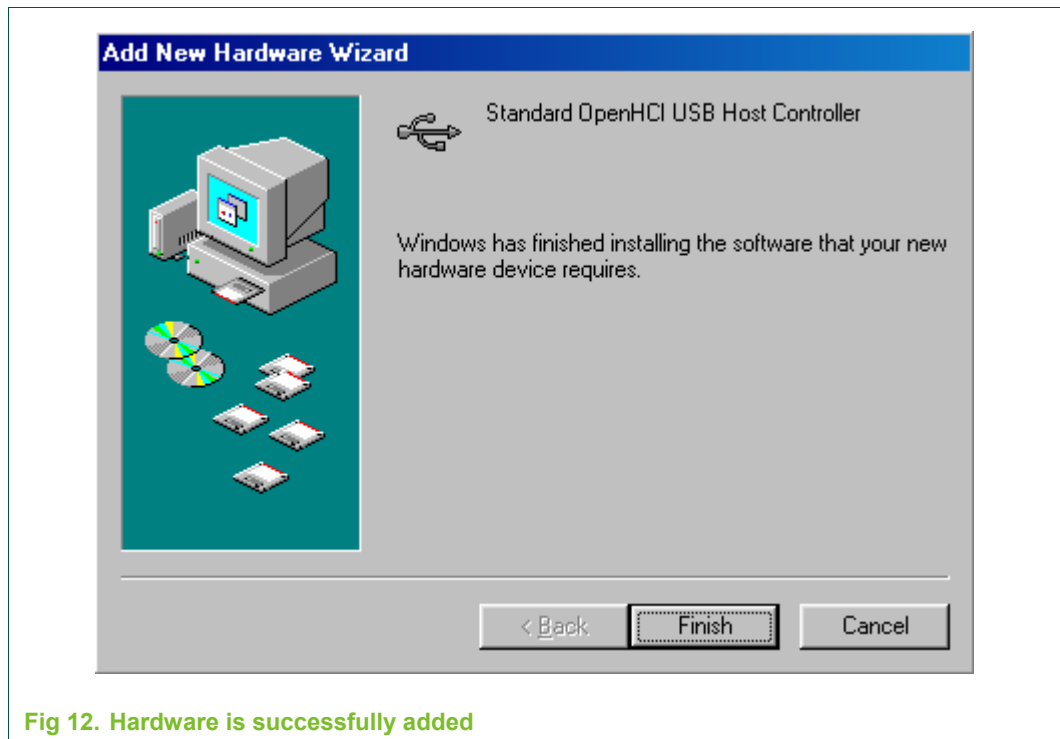


Fig 12. Hardware is successfully added

**Remark:** The preceding steps will be repeated two times to load drivers for the two OHCI: OHCI1 and OHCI2.

## 6.2 Loading EHCI drivers

After drivers are loaded for OHCI1 and OHCI2, the following wizard appears, when an ISP1562 add-on card is plugged on a computer running Windows 98, enabling you to install the Hi-Speed USB EHCI drivers.

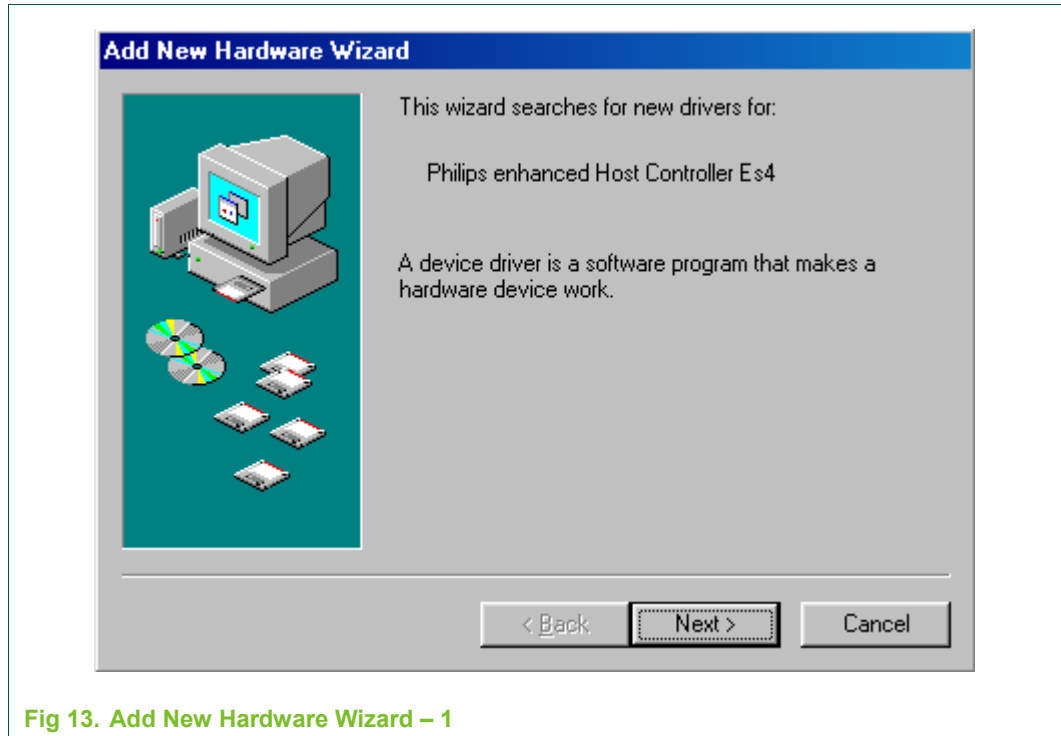


Fig 13. Add New Hardware Wizard – 1

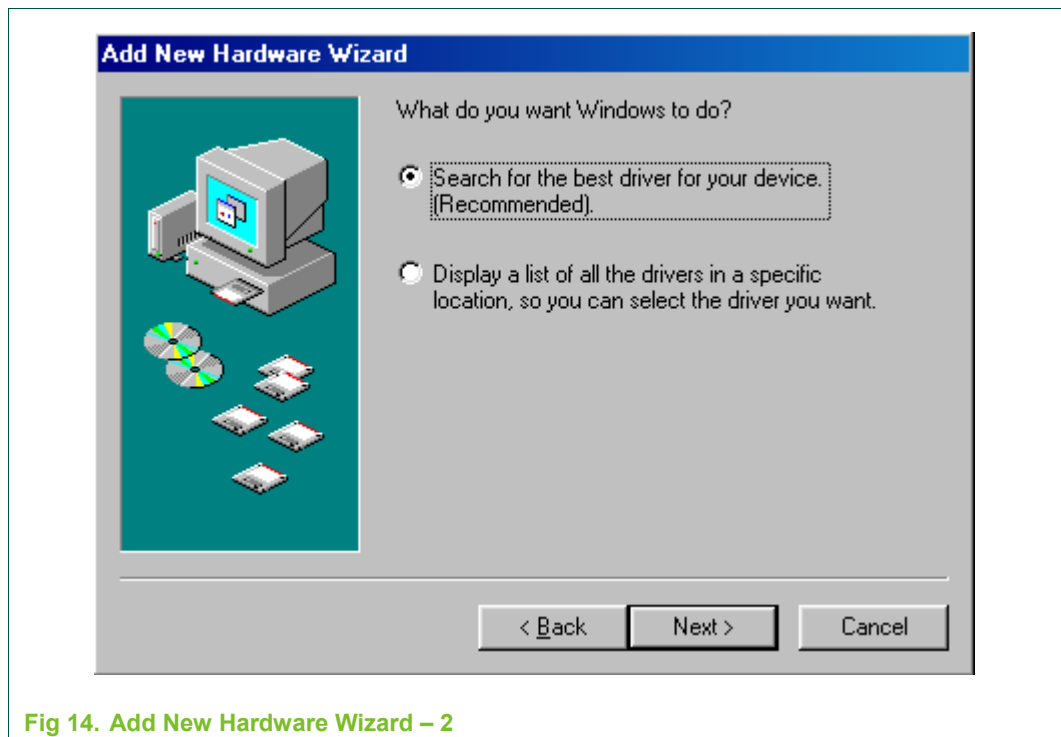


Fig 14. Add New Hardware Wizard – 2

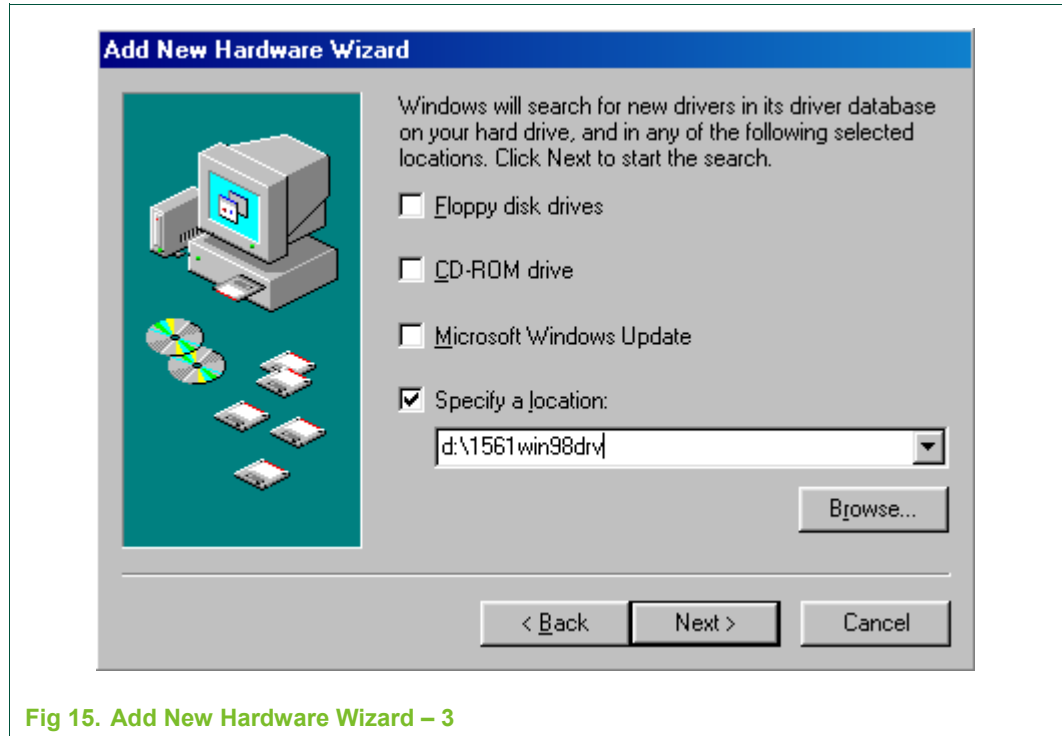


Fig 15. Add New Hardware Wizard – 3

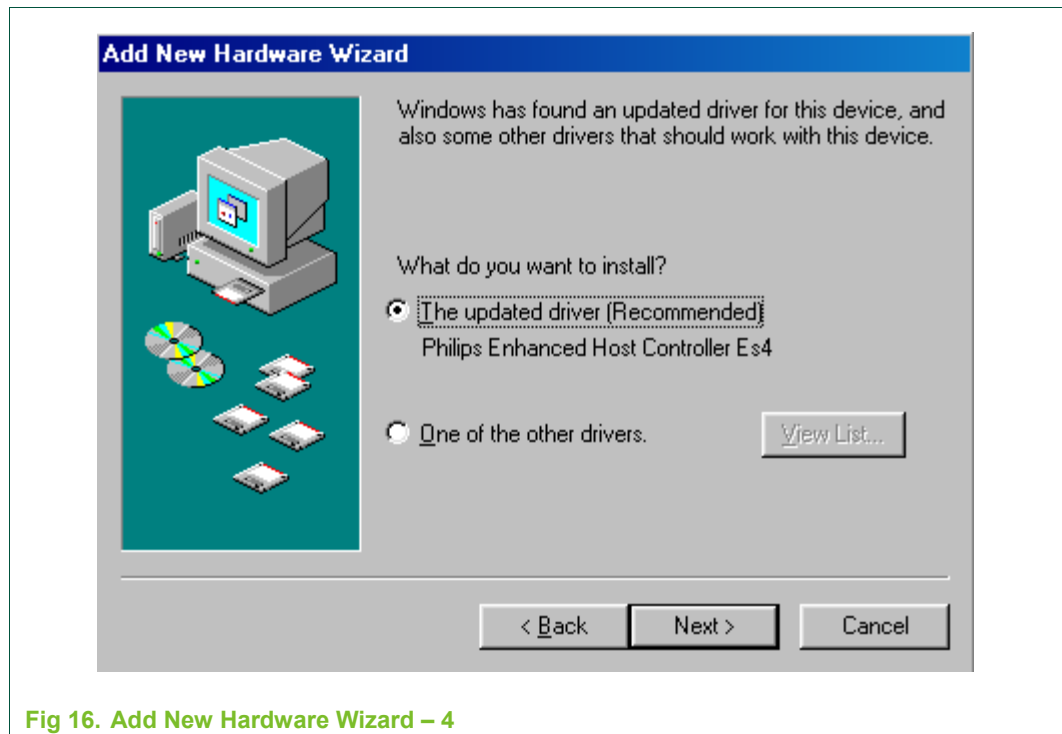


Fig 16. Add New Hardware Wizard – 4

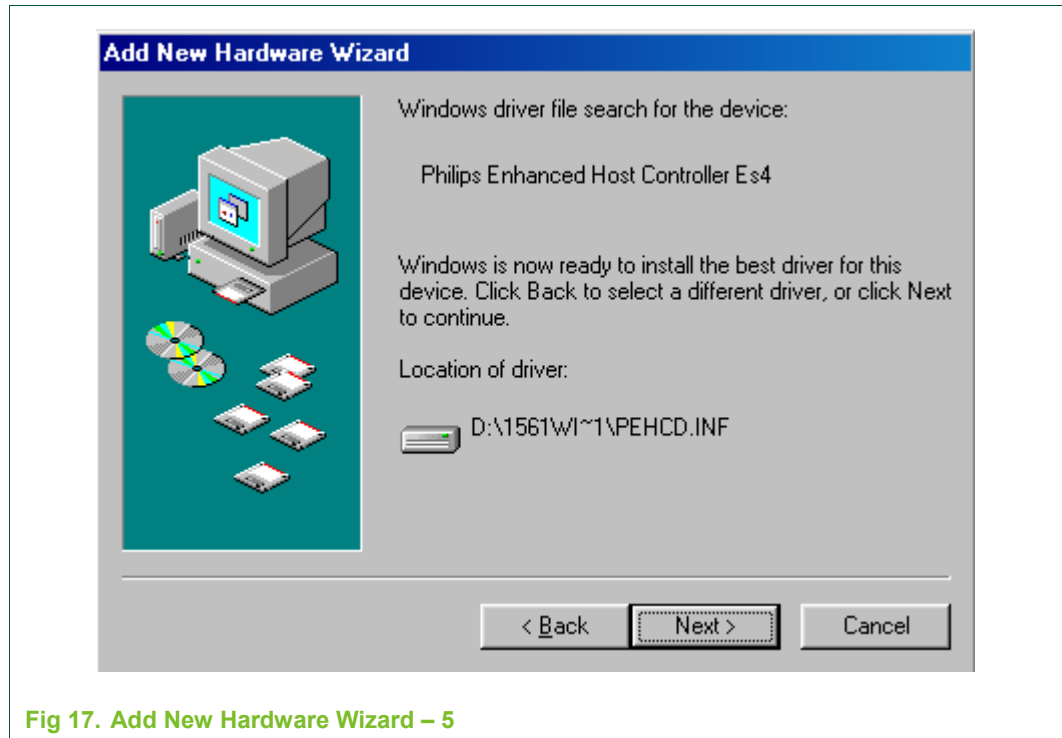


Fig 17. Add New Hardware Wizard – 5

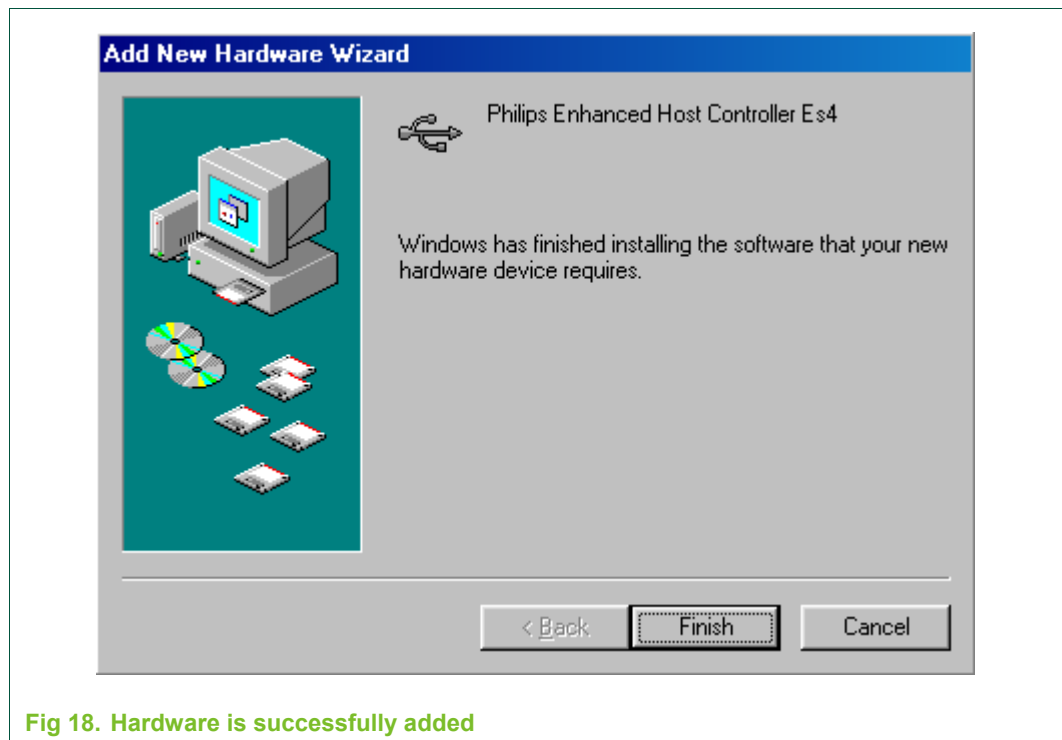


Fig 18. Hardware is successfully added

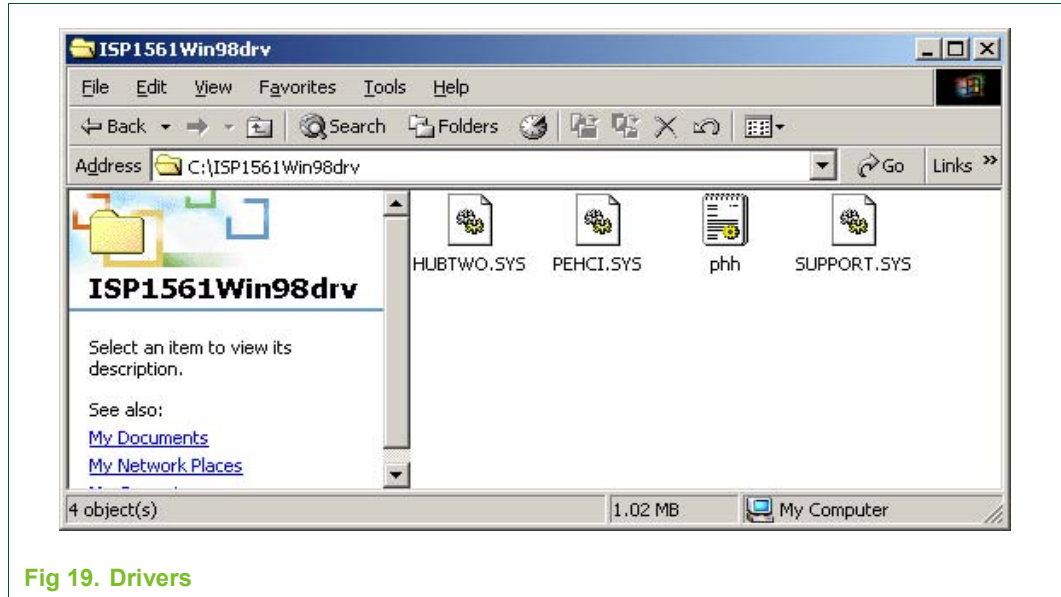


Fig 19. Drivers

## 7. Schematics

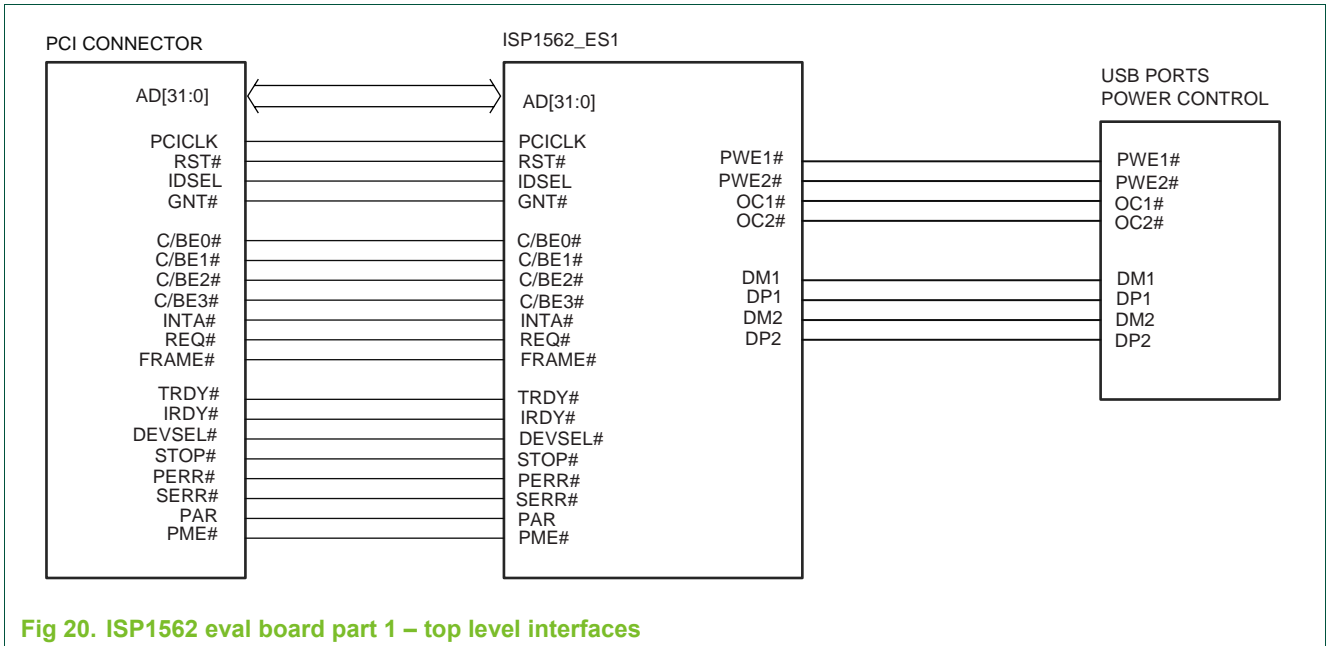


Fig 20. ISP1562 eval board part 1 – top level interfaces





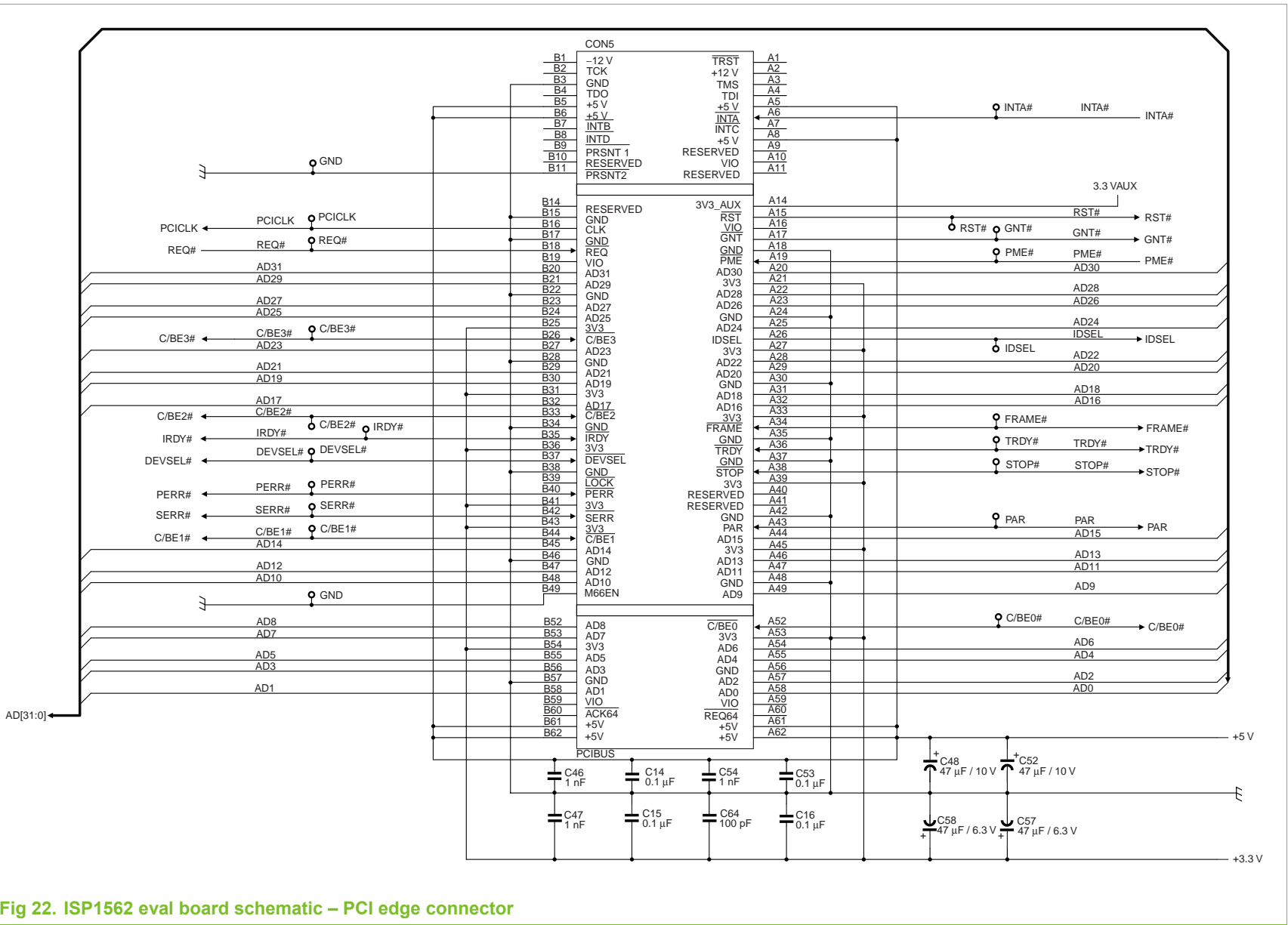


Fig 22. ISP1562 eval board schematic – PCI edge connector

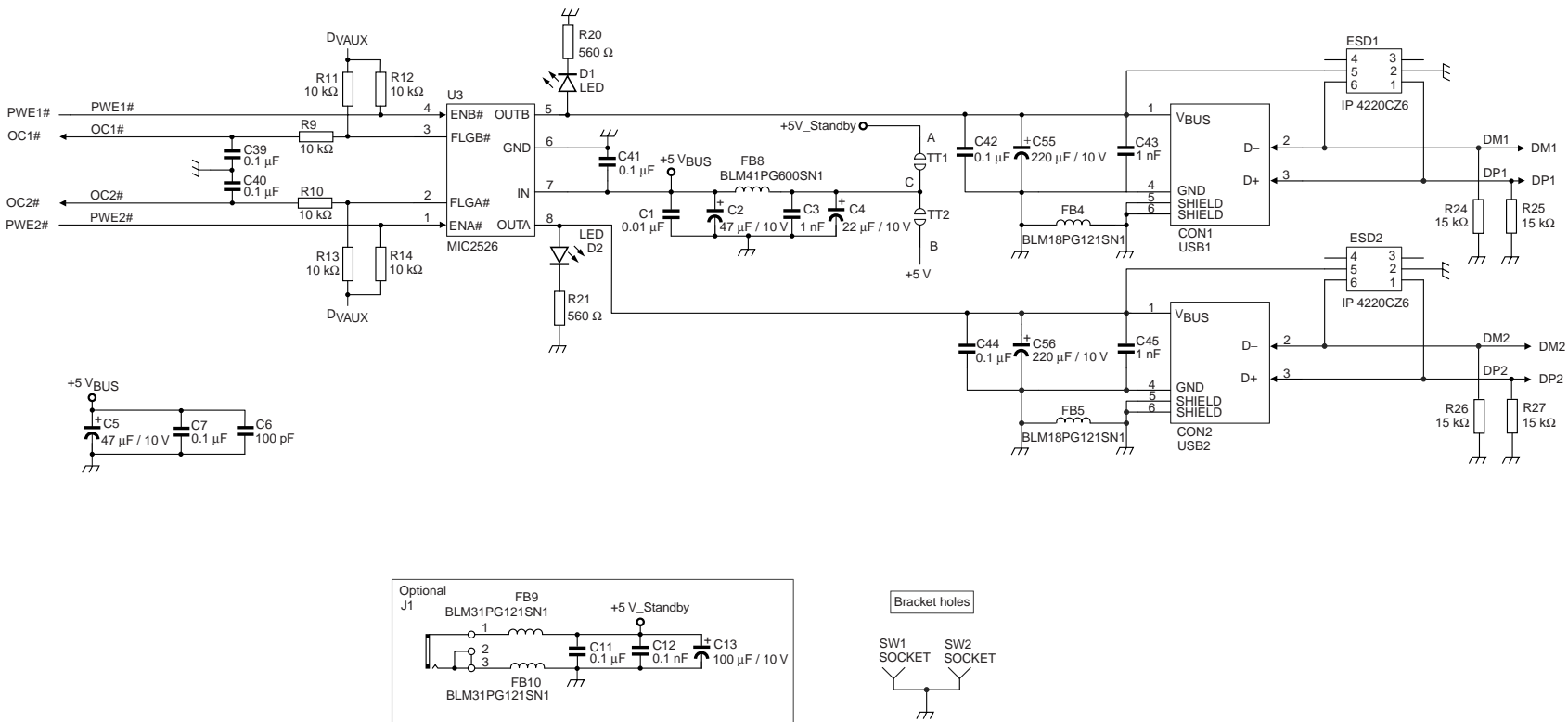


Fig 23. ISP1562 eval board schematic – port power control and ESD protection

## 8. Bill of materials

Table 1. Bill of materials

Designator	Footprint	Part type
TT1 TT2	SOLDERPAD-4	-
R2 R3 R6	0603R	0 $\Omega$
C17 C18	0603C	0.001 $\mu$ F
C1	0603C	0.01 $\mu$ F
C29 C31 C20 C36 C38 C39 C40 C41 C42 C32 C7 C28 C27 C44 C34 C26 C21 C22 C33 C23 C24 C11 C25 C9	0603C	0.1 $\mu$ F
R8	0603R	1 k $\Omega$
C19 C37 C43 C35 C12 C3 C45 C49 C50 C51	0603C	1 nF
R4 R5	0603R	4.7 k $\Omega$
C10 C30	CASE-A	4.7 $\mu$ F
C61	CASE-A	4.7 $\mu$ F / 6.3 V
R10 R13 R12 R11 R14 R9	0603R	10 k $\Omega$
R7	0603R	12 k $\Omega$ / 1 %
OSC1	XTAL1	12 MHz
R27 R24 R25 R26	0603R	15 k $\Omega$
C63 C62	0603C	22 pF
C4	CASE-C	22 $\mu$ F / 10 V
C59	CASE-D	47 $\mu$ F / 6.3 V
C2 C5	CASE-D	47 $\mu$ F / 10 V
C6	0603C	100 pF
C13	CASE-D	100 $\mu$ F / 10 V
C55 C56	REC15/3	220 $\mu$ F / 10 V
R1	0603R	330 $\Omega$
C60	0603C	470 pF
R20 R21	0603R	560 $\Omega$
U2	DIP8	AT24C01A-2.7
U2A	SO8	AT24C01A-2.7
FB3 FB4 FB2 FB5	0603G	BLM18PG121SN1
FB1	0805G	BLM21PG221SN1
FB9 FB10	1206	BLM31PG121SN1
FB8	1206Cust	BLM41PG600SN1
JP1	SIP3	HEADER 3
ESD1 ESD2	SO6CUST	IP4220CZ6
U1	LQFP-100	ISP1562ESP
J1	DC JACK2	JACK

Designator	Footprint	Part type
D1 D2 D3	LED3	LED
U3	SO-8	MIC2526
SW1 SW2	M-HOLE2	SOCKET
CON1	USB-TYPEA	USB 1
CON2	USB-TYPEA	USB 2

## 9. References

- ISP1562 Hi-Speed USB PCI host controller data sheet
- Designing a USB 2.0 Host PCI Adapter Using ISP1562 application note
- Universal Serial Bus System Architecture, First and Second Editions from MindShare
- Universal Serial Bus Specification Rev. 2.0
- PCI Local Bus Specification, Rev. 2.2
- PCI Bus Power Management Interface Specification, Rev. 1.1
- PCI System Architecture, Fourth Edition from MindShare.

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## 11. Contents

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<b>1.</b>	<b>Introduction .....</b>	<b>3</b>
<b>2.</b>	<b>ISP1562 pin configuration .....</b>	<b>4</b>
<b>3.</b>	<b>System requirements .....</b>	<b>4</b>
<b>4.</b>	<b>ISP1562 eval board .....</b>	<b>5</b>
4.1	Port powered LEDs .....	5
4.2	PCI V <sub>AUX</sub> power supply .....	5
4.3	External 5 V power source and S3 wake-up capability .....	6
4.4	Loading the subsystem ID and vendor ID from external EEPROM .....	6
<b>5.</b>	<b>Hi-Speed USB (EHCI) drivers .....</b>	<b>7</b>
<b>6.</b>	<b>Loading ISP1562 drivers .....</b>	<b>7</b>
6.1	Loading OHCI drivers .....	7
6.2	Loading EHCI drivers .....	12
<b>7.</b>	<b>Schematics .....</b>	<b>15</b>
<b>8.</b>	<b>Bill of materials .....</b>	<b>19</b>
<b>9.</b>	<b>References .....</b>	<b>20</b>
<b>10.</b>	<b>Legal information .....</b>	<b>21</b>
10.1	Definitions .....	21
10.2	Disclaimers .....	21
10.3	Trademarks .....	21
<b>11.</b>	<b>Contents .....</b>	<b>22</b>

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