UM10066

ISP1563 Eval Board

Rev. 03 — 12 December 2006 **User manual**

Document information

Info	Content
Keywords	isp1563, usb, universal serial bus, host controller
Abstract	The ISP1563 eval board is a standard implementation of the ISP1563 in a complete configuration that allows you to exercise all signals and main features.

Revision history

Rev	Date	Description
03	20061212	Third release. Updated Fig 22.
02	20060707	Second release. Updated Section 7.
01	20051004	First release.

Contact information

For additional information, please visit: **http://www.nxp.com**

For sales office addresses, please send an email to: **salesaddresses@nxp.com**

1. Introduction

The ISP1563 evaluation (eval) board is a standard implementation of the ISP1563 in a complete configuration that allows you to exercise all signals and main features. Fig 1 shows the ISP1563 eval board.

Some of the features that are implemented in the ISP1563 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 ISP1563 in motherboard or notebook designs.
- Selection between a 12 MHz clock from a crystal and a 48 MHz clock from a 48 MHz oscillator input. By default, the 12 MHz crystal is implemented.
- 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.
- Connectors to test legacy signals in the case of an on-board solution design. Testing the legacy feature requires a motherboard with BIOS support for USB or legacy implementation on OHCI.
- Input for an external power supply (J1). This allows complete testing of power management on a standard main board, including the power management modes in which the PCI +5 V is cut off.

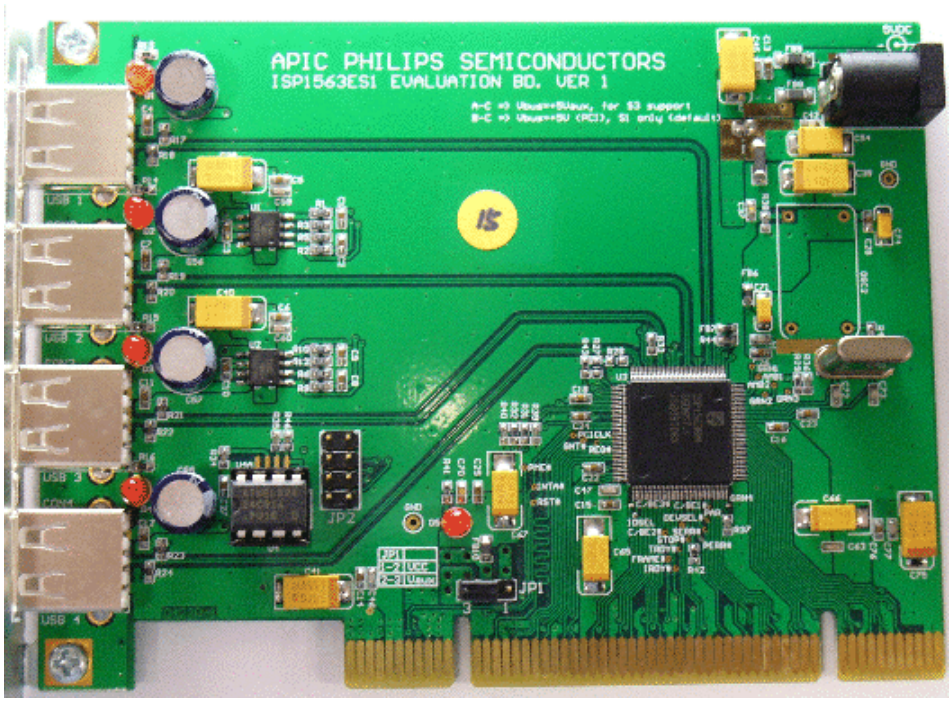

Fig 1. ISP1563 eval board

2. ISP1563 pin configuration

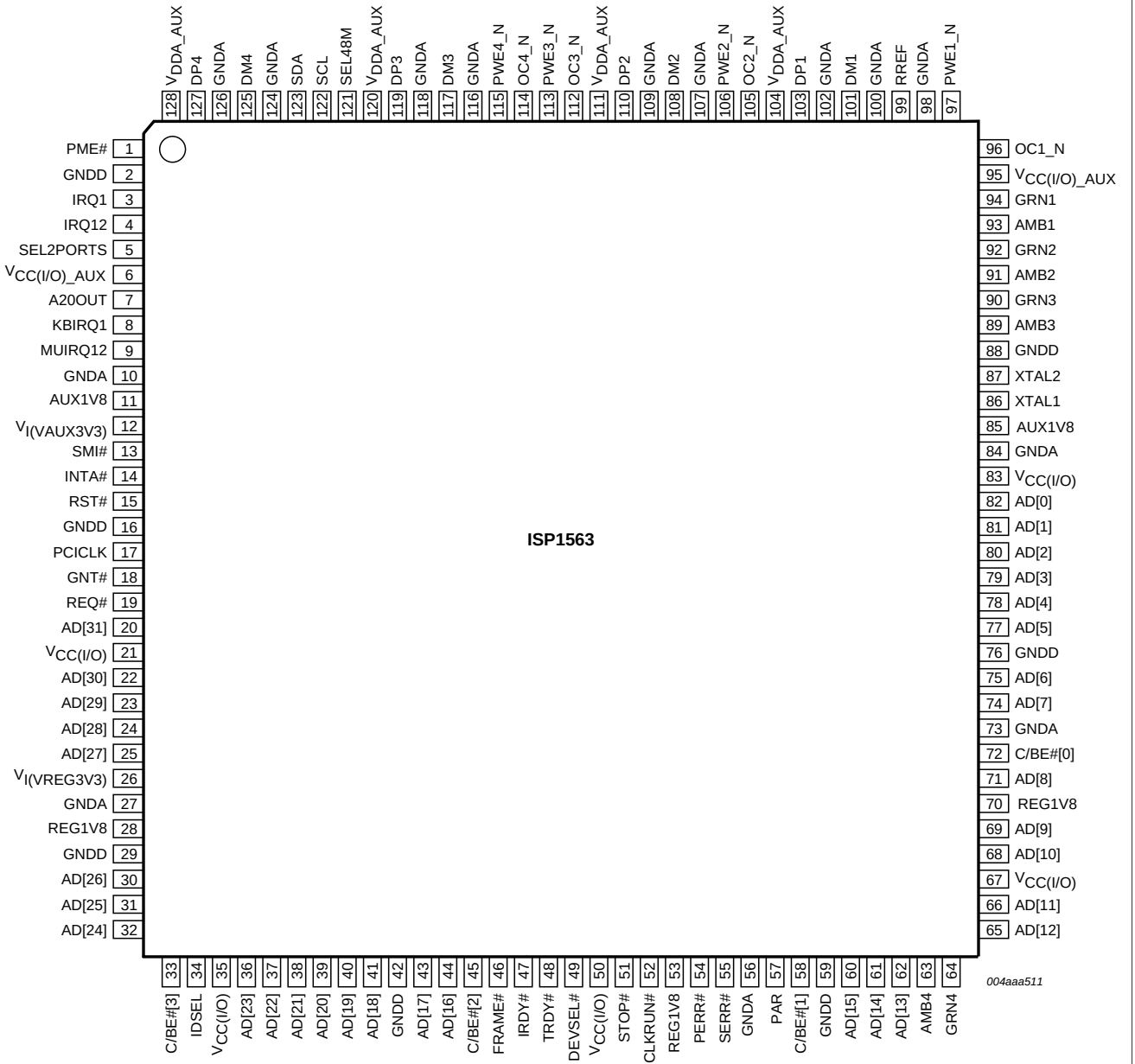

Fig 2. ISP1563 pin configuration

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 varies depending on the type and number of applications launched to exercise 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 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. ISP1563 eval board

Fig 3 shows the eval board drawing.

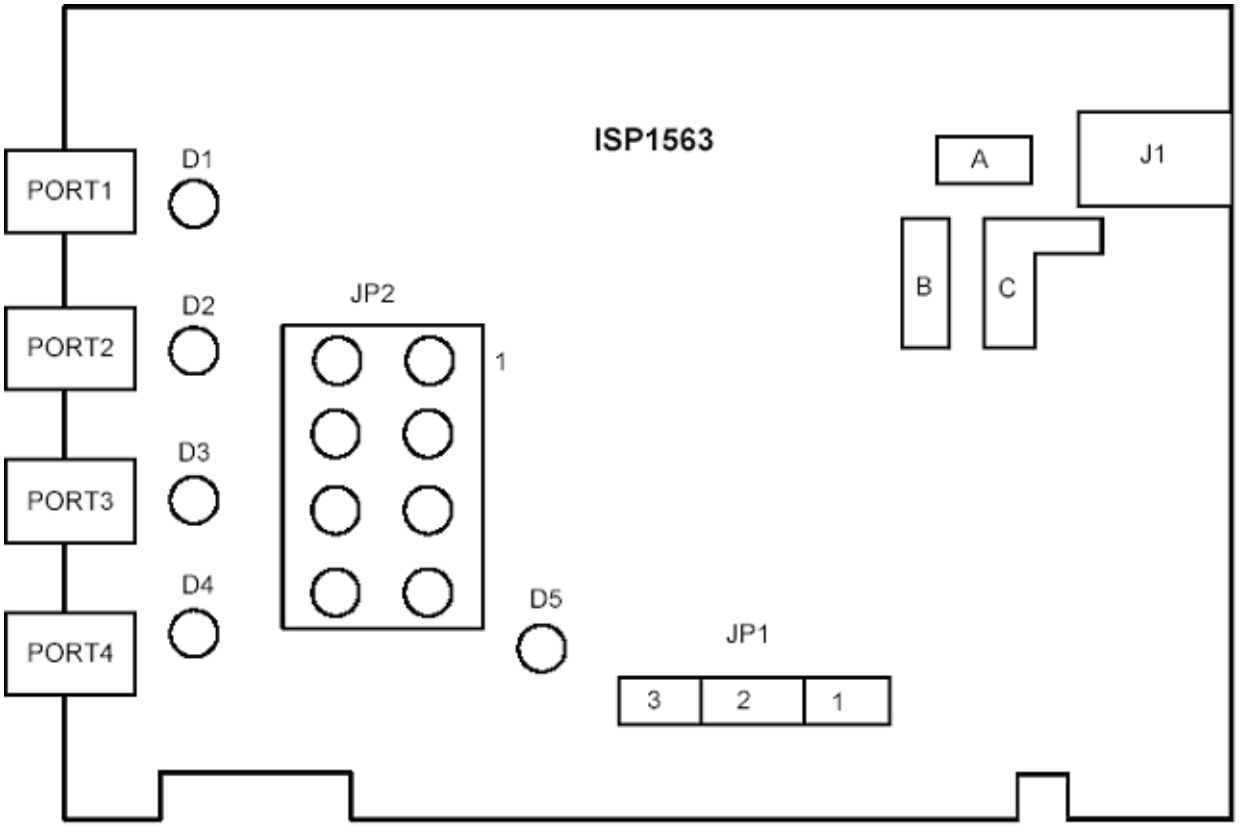

Fig 3. Eval board drawing

4.1 Port powered LEDs

LEDs D1, D2, D3 and D4 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 may be shorted, allowing $S3_{cold}$ 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 D5 must be turned on, indicating that the ISP1563 is powered.

Important*:* If LED D5 is not lit, it indicates that the ISP1563 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 the PCI V_{CC} = 3.3 V, present under normal conditions, except some system power management modes. For example, $S3_{cold}$ and S4.

4.3 Legacy support

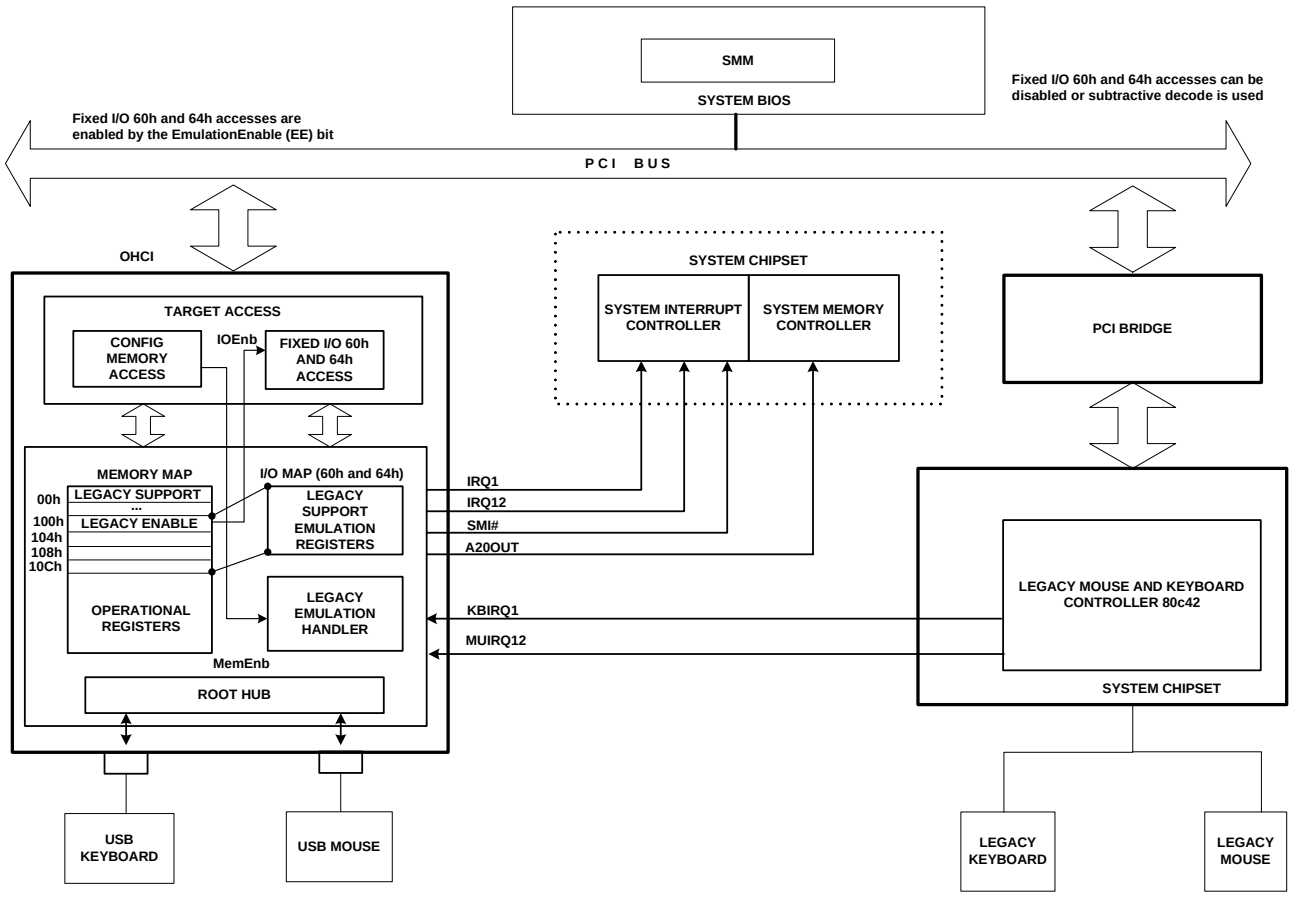

Fig 4. Legacy support and connection testing block diagram

Fig 4 shows the necessary connections to test the legacy support functionality. The necessary signals must be accessible on the motherboard used for legacy testing.

Table 1 shows the connection for legacy support functionality.

Table 1. Connections for legacy support functionality

Testing	R39	R40	R31	R32
Legacy support	-[1]	-[1]	10 kΩ	10 kΩ
Default setting (no legacy support)	0 Ω	0 Ω	10 kΩ	10 kΩ

[1] When testing the legacy support, resistors R39 and R40, or the pull-down resistors located at the bottom of the eval board, must be removed.

The JP2 connector is used to test the keyboard and mouse legacy support. For the pin allocation, see Table 2.

Table 2. Connector pin allocation for JP2

Pin number	Signal name
1	GND
2	GND
3	A20OUT
4	SMI#
5	KBIRQ1
6	IRQ12
7	MUIRQ12
8	IRQ1

4.4 Input clock

You can use either the 12 MHz crystal or the 48 MHz oscillator for the input clock. If the 12 MHz crystal is used, resistor R33 is soldered. If the 48 MHz oscillator is used, resistor R33 (0 Ω) must be removed and pin 1 must be pulled HIGH using R28. By default, the 12 MHz solution is implemented on the eval board.

4.5 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 the 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 the PCI +5 V only as the V_{BUS} power source (no testing of the system wake-up from $S3_{cold}$ and no external +5 V connected), 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 (see Fig 3). 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.

4.6 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 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 optionally be loaded at power-on from the external serial I^2C-bus EEPROM present on the ISP1563 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 I²C-bus EEPROM present on the ISP1563 eval board cannot be programmed onboard. It must be preprogrammed using a standard serial EEPROM programmer. A socket is provided on the ISP1563 eval board for repetitive reprogramming of the EEPROM.

An example on the I²C-bus EEPROM programming is given in Fig 5. 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.

Address	I²C-bus EEPROM content	
0	32h	Subsystem vendor ID - LOW
1	11h	Subsystem vendor ID - HIGH
2	64h	Subsystem device ID (OHCI) - LOW
3	16h	Subsystem device ID (OHCI) - HIGH
4	65h	Subsystem device ID (EHCI) - LOW
5	16h	Subsystem device ID (EHCI) - HIGH
6	FFh	reserved
7	15h(1)	reserved

(1) Loads subsystem vendor ID and device ID. For details, refer to the *ISP1563 Hi-Speed USB PCI host controller* data sheet.

Fig 5. I²C-bus EEPROM programming example

Remark: Do not load any other values in reserved fields, otherwise, functionality of the ISP1563 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 the ISP1563 drivers

This section provides an example to load device drivers after an ISP1563 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 NXP 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 ISP1563 add-in card is plugged on a computer running Windows 98, enabling you to install OHCI drivers.

Fig 6. Add New Hardware Wizard – 1

Fig 7. Add New Hardware Wizard – 2

Fig 8. Add New Hardware Wizard – 3

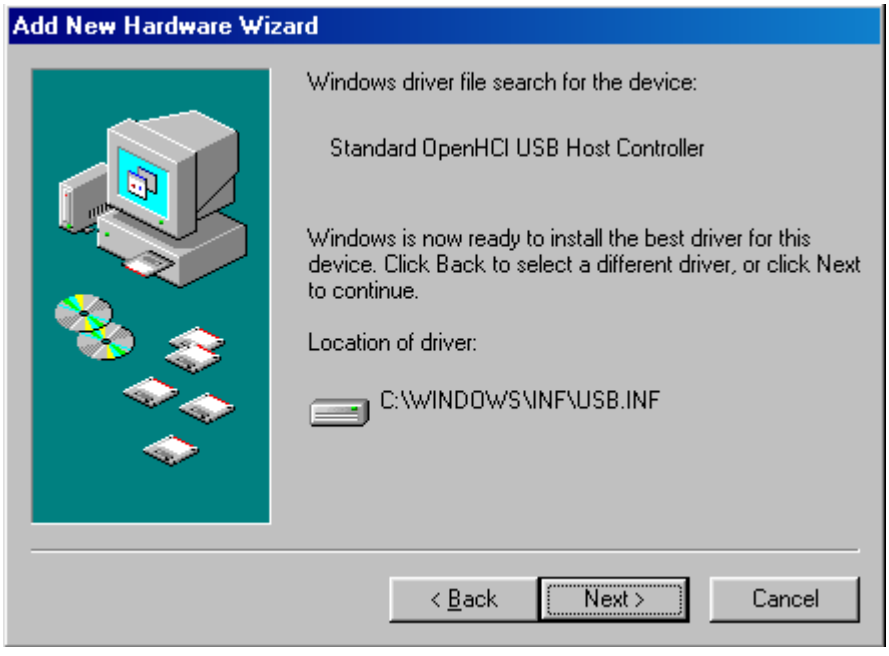

Fig 9. Add New Hardware Wizard – 4

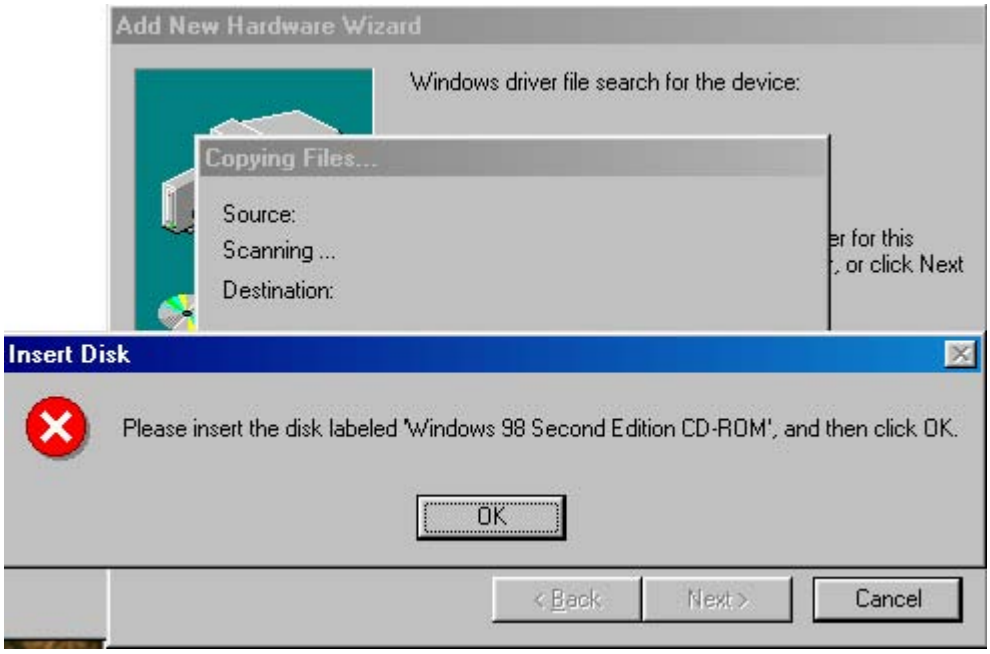

Fig 10. Insert Disk dialog box

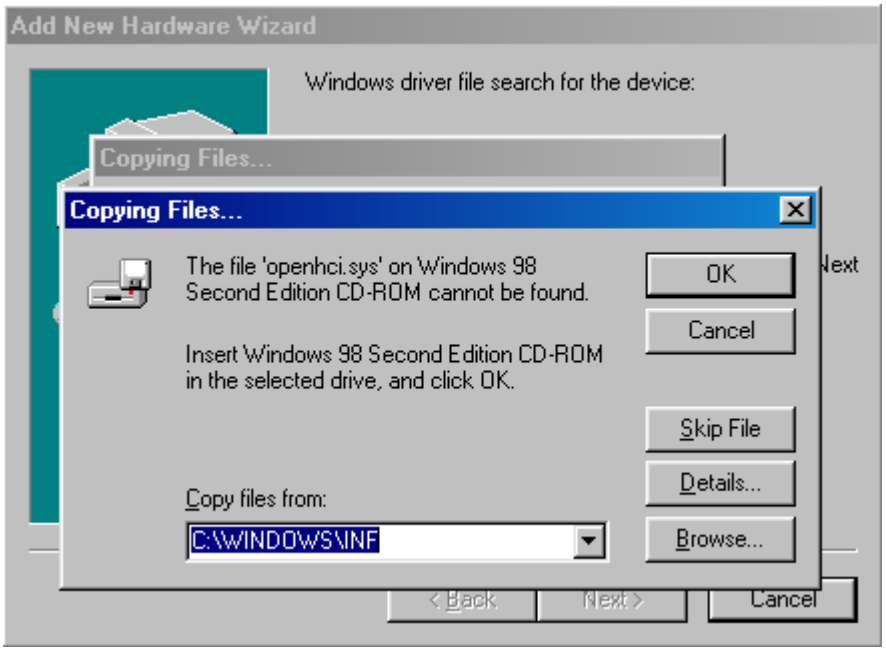

Fig 11. Copying Files dialog box

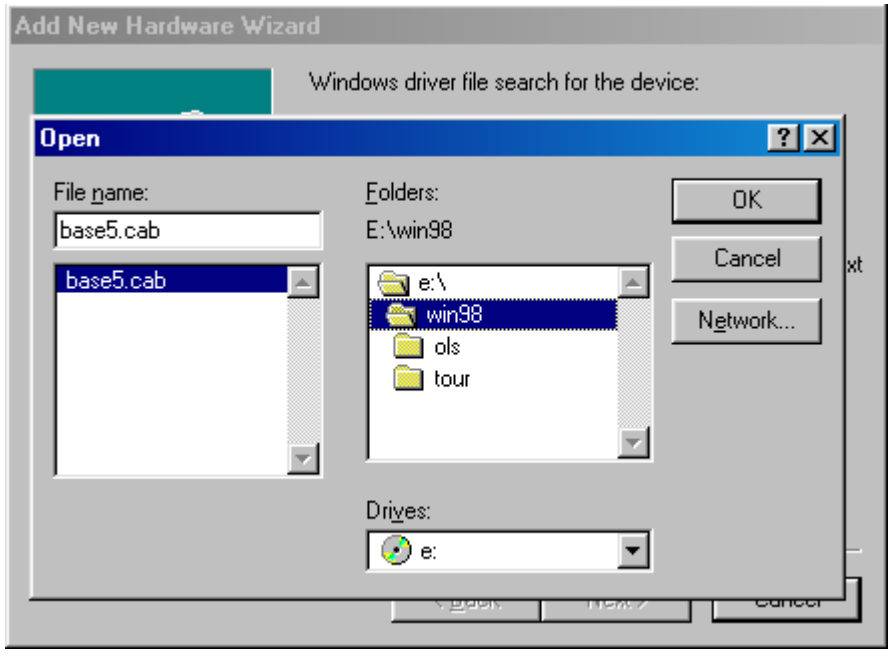

Fig 12. Open dialog box

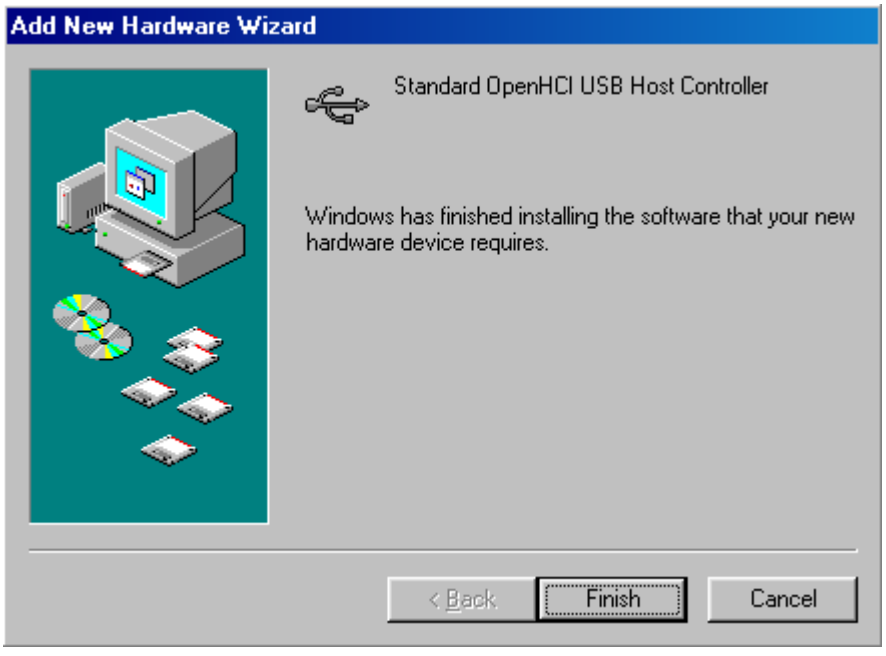

Fig 13. Hardware is successfully installed

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

6.2 Loading EHCI drivers

After drivers are loaded for OHCI1 and OHCI2, the following wizard appears, when an ISP1563 add-on card is plugged on a computer running Windows 98, enabling you to install the Hi-Speed USB EHCI drivers.

Fig 14. Add New Hardware Wizard – 1

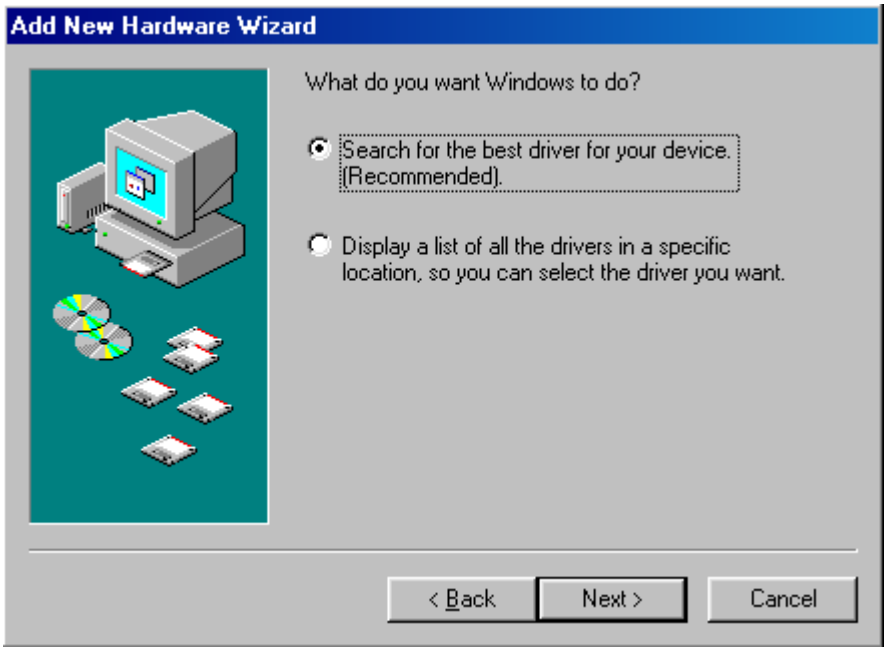

Fig 15. Add New Hardware Wizard – 2

Fig 16. Add New Hardware Wizard – 3

Fig 17. Add New Hardware Wizard – 4

Fig 18. Add New Hardware Wizard – 5

Fig 19. Hardware is successfully added

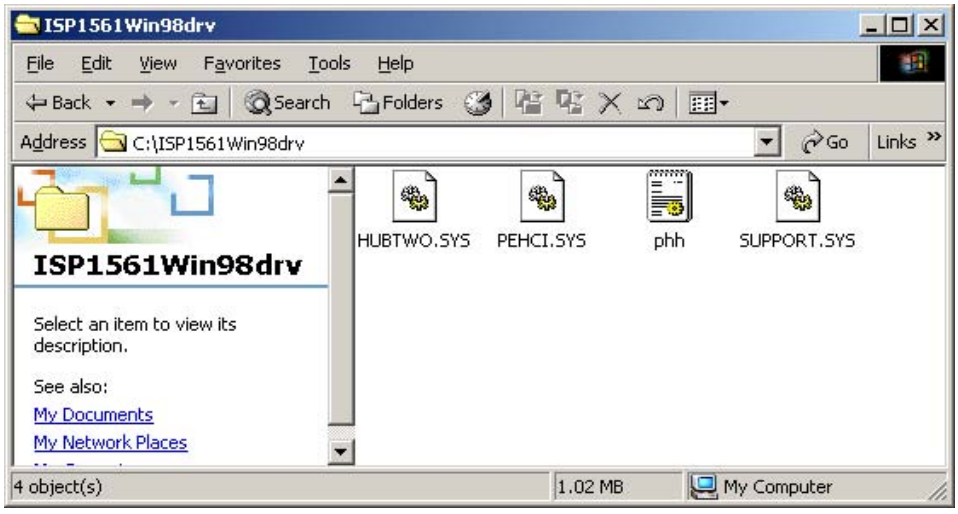

Fig 20. Drivers

7. Schematics

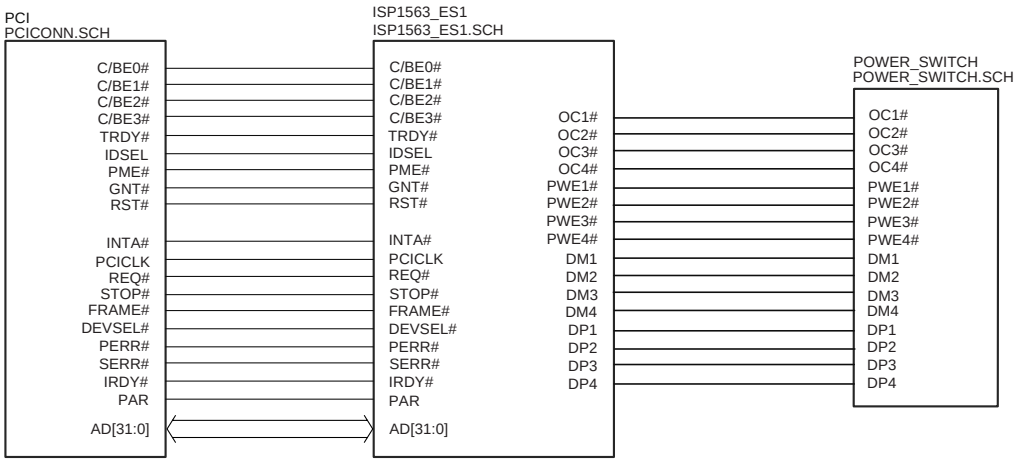

Fig 21. ISP1563 eval board – top level interfaces

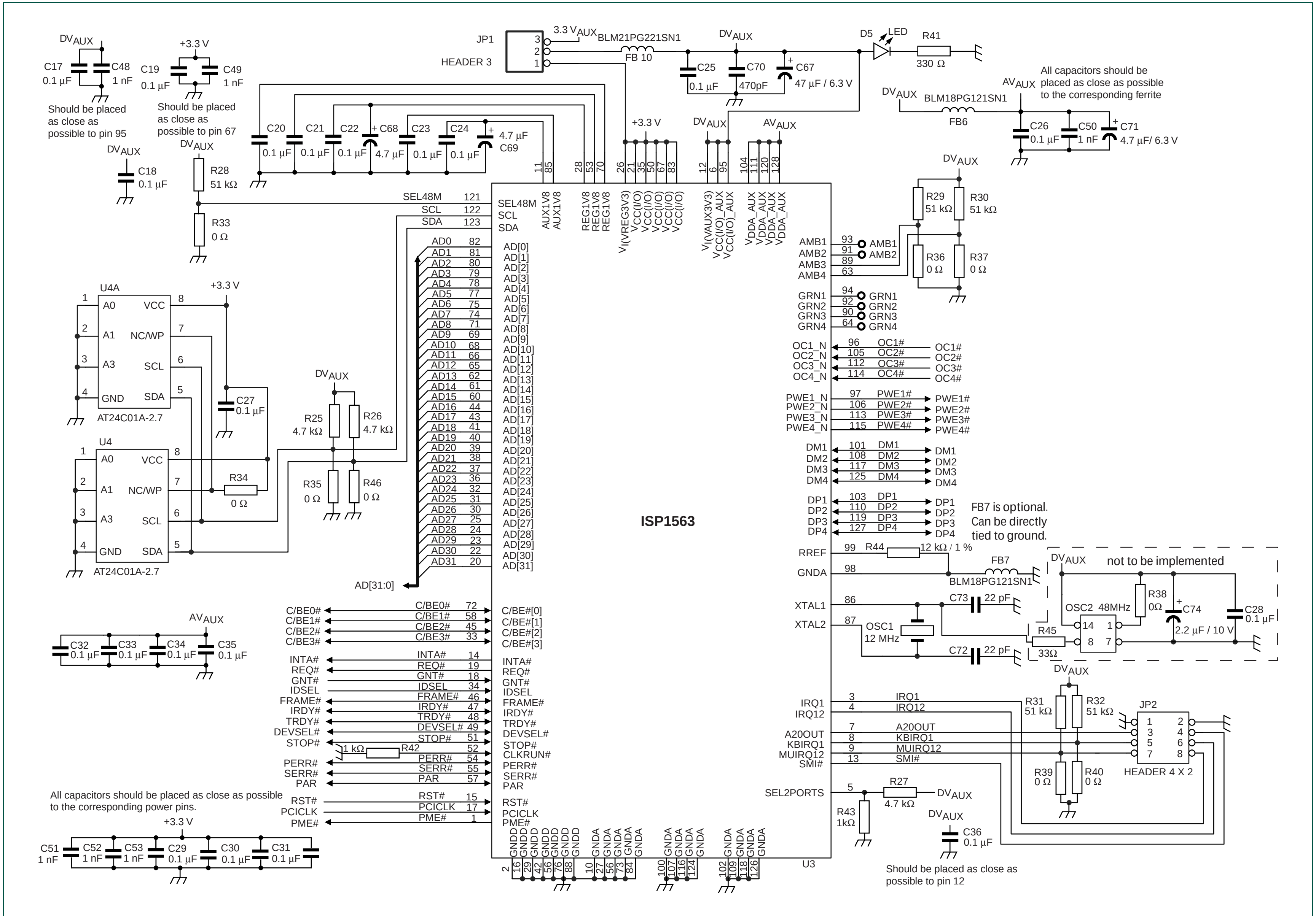

Fig 22. ISP1563 eval board – ISP1563

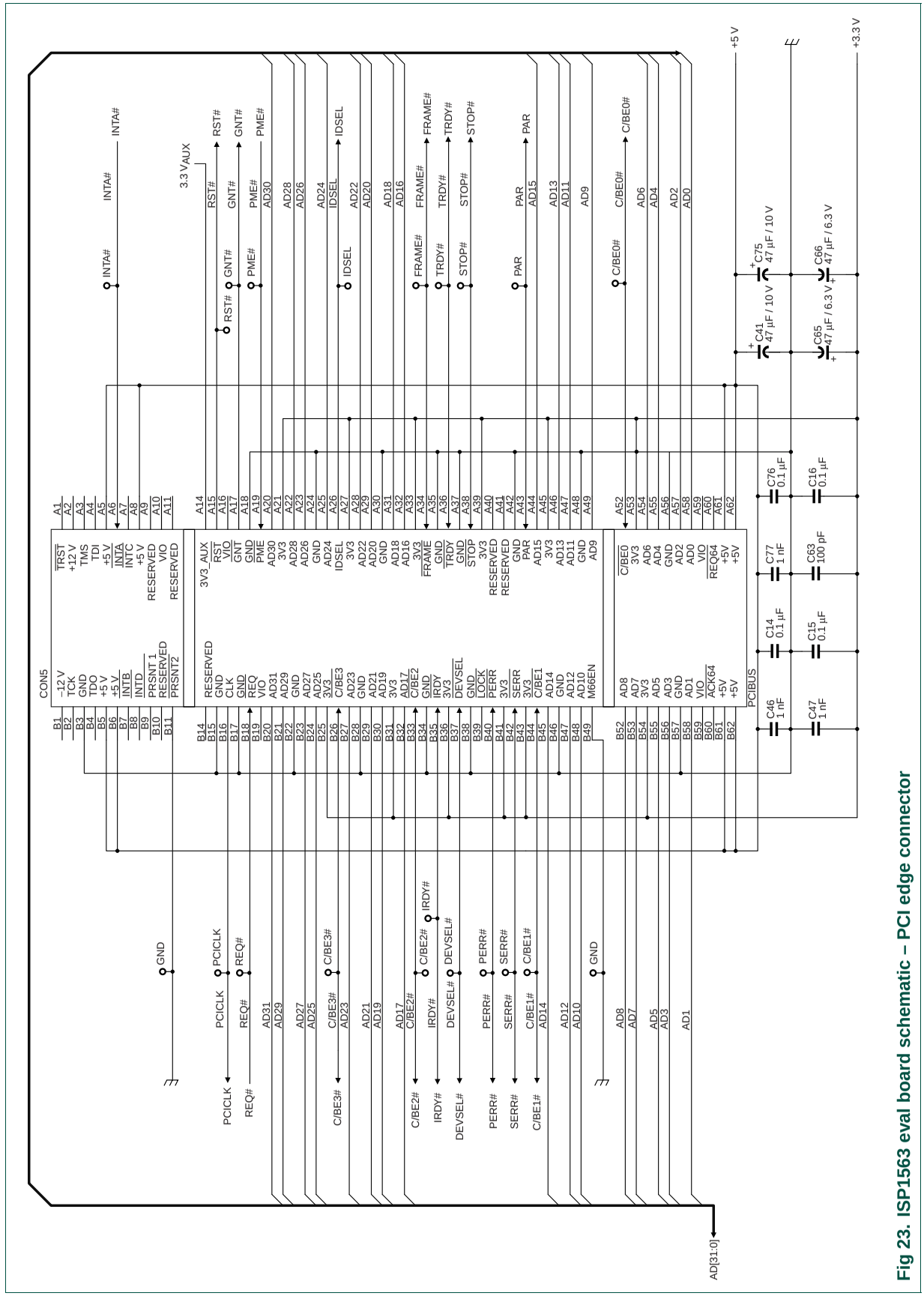

Fig 23. ISP1563 eval board schematic – PCI edge connector

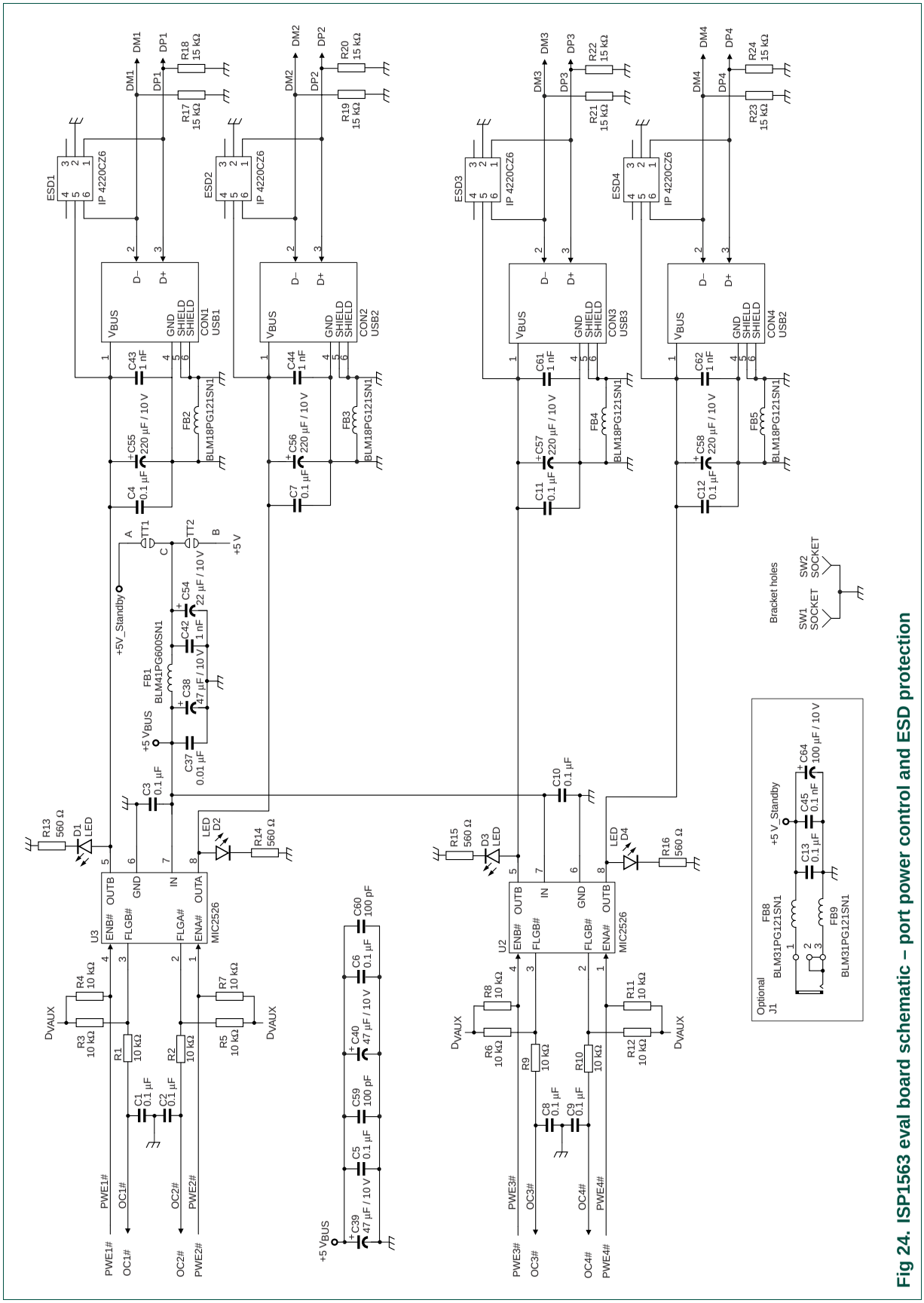

Fig 24. ISP1563 eval board schematic – port power control and ESD protection

8. Bill of Materials

Table 3. Bill of materials

Designator	Footprint	Part type
AMB1 AMB2 C/BE0# C/BE1# C/BE2# C/BE3# DEVSEL# FRAME# GNT# GRN1 GRN2 GRN3 GRN4 IDSEL INTA# IRDY# PAR PCICLK PERR# PME# REQ# RST# SERR# TRDY# STOP#	TPT	-
TT1 TT2	SOLDERPAD-4	-
R33 R34 R35 R36 R37 R38 R39 R40 R46	0603R	0 Ω
C37	0603C	0.01 µF
C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C29 C12 C13 C17 C14 C15 C16 C21 C18 C19 C20 C25 C22 C23 C24 C26 C27 C28 C30 C31 C32 C33 C34 C35 C36 C76	0603C	0.1 µF
R42 R43	0603R	1 kΩ
C42 C43 C44 C45 C46 C47 C48 C49 C50 C51 C52 C53 C61 C62 C77	0603C	1 nF
C74	CASE-A	2.2 µF/10 V
R25 R26 R27	0603R	4.7 kΩ
C68 C69	CASE-A	4.7 µF
C71	CASE-A	4.7 µF/6.3 V
R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12	0603R	10 kΩ
R44	0603R	12 kΩ/1 %
OSC1	XTAL1	12 MHz
R17 R18 R19 R20 R21 R22 R23 R24	0603R	15 kΩ
C72 C73	0603C	22 pF
C54	CASE-C	22 µF/10 V
R45	0603R	33 Ω
C65 C66 C67	CASE-D	47 µF/6.3 V
C38 C39 C40 C41 C75	CASE-D	47 µF/10 V
OSC2	XTAL3	48 MHz
R30 R28 R29 R31 R32	0603R	51 kΩ
C59 C60 C63	0603C	100 pF
C64	CASE-D	100 µF/10 V
C55 C56 C57 C58	REC15/3	220 µF/10 V

Designator	Footprint	Part type
R41	0603R	330 Ω
C70	0603C	470 pF
R15 R13 R14 R16	0603R	560 Ω
U4	DIP8	AT24C01A-2.7
U4A	SO8	AT24C01A-2.7
FB2 FB3 FB4 FB5 FB6 FB7	0603G	BLM18PG121SN1
FB10	0805G	BLM21PG221SN1
FB8 FB9	1206	BLM31PG121SN1
FB1	1206	BLM41PG600SN1
GND1 GND2	TP	GND
JP1	SIP3	HEADER 3
JP2	IDC8	HEADER 4X2
ESD1 ESD2 ESD3 ESD4	SO6CUST	IP4220CZ6
U3	LQFP-128	ISP1563
J1	DC JACK2	JACK
D1 D2 D3 D4 D5	LED3	LED
U2 U1	SO-8	MIC2526
CON5	PCIBus2	PCIBUS
SW1 SW2	M-HOLE2	SOCKET
CON1	USB-TYPEA	USB 1
CON2	USB-TYPEA	USB 2
CON3	USB-TYPEA	USB 3
CON4	USB-TYPEA	USB 4

9. References

- ISP1563 Hi-Speed USB PCI host controller data sheet
- 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

10. Legal information

10.1 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. NXP Semiconductors 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.

10.2 Disclaimers

General — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors 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.

Right to make changes — NXP Semiconductors 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 — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of a NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is for the customer's own risk.

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

10.3 Trademarks

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

I^2C-bus — logo is a trademark of NXP B.V.

11. Contents

For more information, please visit: http://www.nxp.com.
For sales office addresses, email to: salesaddresses@nxp.com.

Date of release: 12 December 2006
Document identifier: UM10066_3