

# UM10050

ISP1183 Microcontroller Eval Kit

Rev. 03 — 21 October 2004

User manual

## Document information

Info	Content
<b>Keywords</b>	isp1183, usb, peripheral, universal serial bus
<b>Abstract</b>	This document explains the ISP1183 microcontroller eval kit.

### Revision history

Rev	Date	Description
03	20041021	Third release; updated the schematics.
2.0	20041018	Second release; updated <a href="#">Table 1:</a> .
1.0	20030926	First release.

## Contact information

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## 1. Introduction

The ISP1183 is a low-power, cost- and feature-optimized USB peripheral. It is typically used in any microcontroller or microprocessor-based system. The ISP1183 is a full-speed USB Peripheral Controller with up to 14 configurable endpoints. It has a fast general-purpose parallel interface for communication with many types of microcontrollers or microprocessors.

The ISP1183 has 2462 bytes of internal FIFO memory, which is shared among the enabled USB endpoints. The type and FIFO size of each endpoint can be individually configured, depending on the required packet size. For increased data throughput, isochronous and bulk endpoints are double-buffered.

To a microcontroller, the ISP1183 appears as a memory device with an 8-bit data bus and a 1-bit address bus. The ISP1183 only supports nonmultiplexed address and data buses.

Evaluation of ISP1183's features, and development of its firmware and product prototype can be easily done with this setup. [Fig 1](#) shows the ISP1183 evaluation (eval) board.

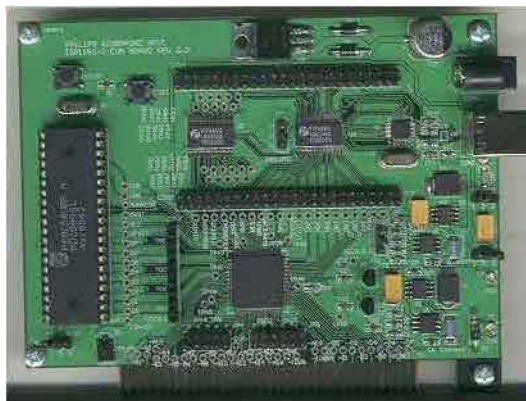


Fig 1. ISP1183 eval board.

## 2. System requirements

### For the host PC:

- PC with USB motherboard or add-on card.
- Microsoft® Windows® 98 and Windows 2000.

### For the peripheral:

- 12 V DC power supply (for self-powered mode).
- ISP1183 eval board (see [Fig 1](#)).

### For the firmware development:

- Keil C cross compiler\*.
- ISP1183 eval diskette.

\*—Denotes that the item will not be included in the eval kit.

## 3. Jumper settings on the ISP1183 eval board

Jumper JP1 enables and disables the level-shift module.

**Table 1: JP1**

Isolate data bus	Disable	Enable (default)
Short pins	1–2	2–3

JP2 sets the I/O power supply of the ISP1183 eval board. Default setting is 1.8 V.

**Table 2: JP2**

I/O voltage select	1.8 V (default)	3.3 V
Short pins	1–2	2–3

JP4 sets the IRQ number for the ISP1183 eval board. Default setting is IRQ5 as shown in [Table 3](#). Short Intx\_IRQ and pin 5.

**Table 3: JP4**

IRQ number	IRQ5 (default)	IRQ3	IRQ4	IRQ6	IRQ7
Short pins	5–Intx_IRQ	3–Intx_IRQ	4–Intx_IRQ	6–Intx_IRQ	7–Intx_IRQ

Jumper JP5 is reserved (left open).

**Table 4: S2**

MCU power supply	5 V (default)	3.3 V
Short pins	1–2	2–3

**Table 5: S4**

Board power supply	Bus-powered	Self-powered (default)
Short pins	1–2	2–3

**Table 6: S5**

V <sub>BUS</sub> power supply	Bus-powered (default)	Self-powered
Short pins	1–2	2–3

## 4. I/O mapping

The ISP1183 eval board occupies eight I/O locations. The base address is 0.

**Table 7: I/O mapping**

Offset	Usage
0	ISP1183 data register, read or write
1	Write command register, read data bus state
2	Board control and read chip I/O state
3	Reserved
4 to 7	Reserved for expansion board

## 5. Installation of hardware, firmware, INF and driver

To install hardware, firmware, INF and driver:

1. If S4 is in the self-powered mode, connect the DC power supply connector to CON6 and switch on the power supply.

2. Using a USB cable, connect the eval board to the host PC.

If it is the first time that the eval board is connected to the host PC, the host OS Device Manager will prompt for the installation of INF and drivers.

3. Select the location of D13TEST.INF and D13TEST.SYS from the ISP1183 evaluation diskette, and complete the installation procedure.

## 6. Using the host applet

The test applet, D13TEST.EXE, exercises all ISP1183 endpoints as shown in [Fig 2](#).

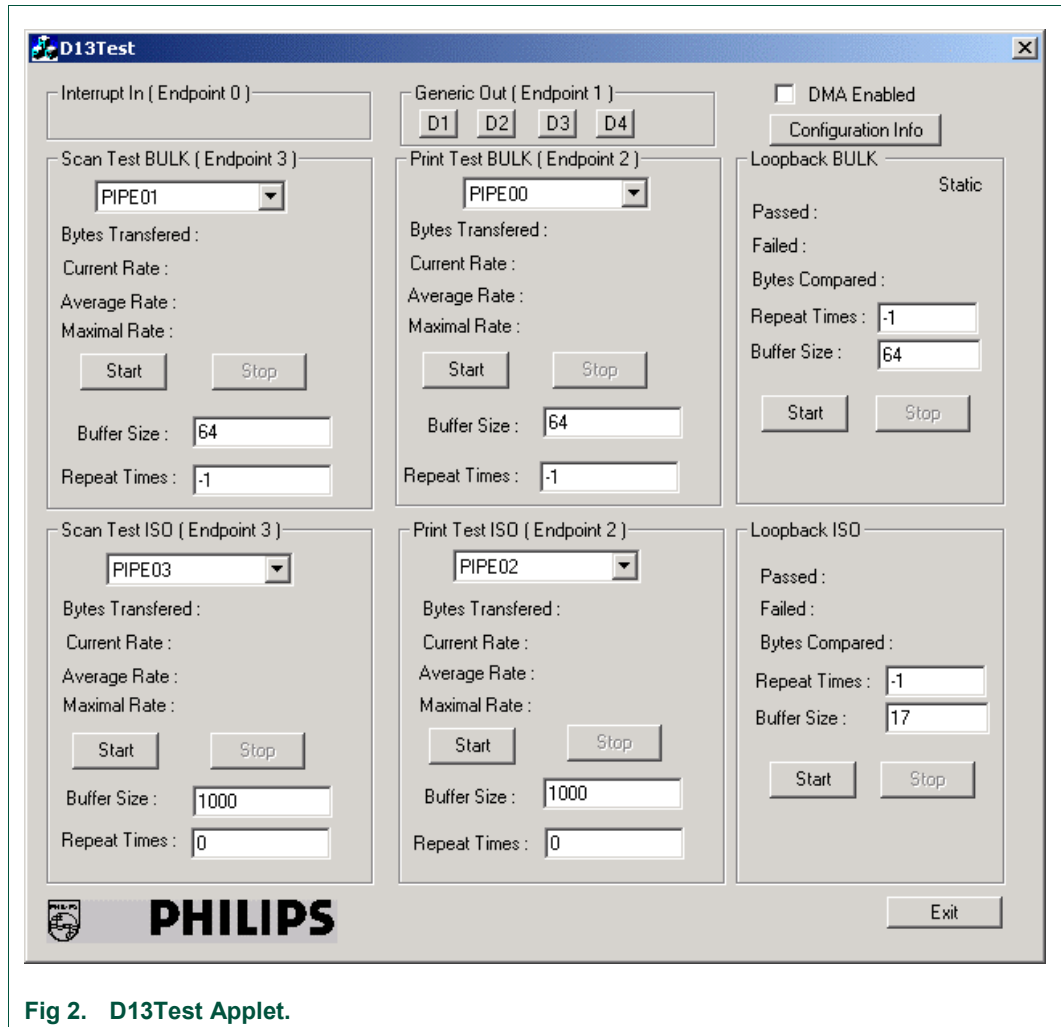


Fig 2. D13Test Applet.

[Table 8](#): shows the description of endpoints operation on the ISP1183 eval board.

### Table 8: Description of endpoints operation

The test applet and the ISP1183 eval board support three test modes: loopback, print and scan. The firmware uses I/O accesses on this endpoint.

Endpoint number	Endpoint type	Operations
5	ISO-OUT	This pipe is defined as isochronous OUT pipe.
6	ISO-IN	This pipe is defined as isochronous IN pipe.
3	Bulk-OUT	This pipe is defined as bulk OUT pipe.

Endpoint number	Endpoint type	Operations
4	Bulk-IN	This pipe is defined as bulk IN pipe.

Three test modes:

- **Scan mode:** In this mode, the ISP1183 eval board acts like a scanner. It sends data packets to the host PC as fast as possible. Use this mode to evaluate the isochronous IN and bulk IN transfer rates.
- **Print mode:** In this mode, the ISP1183 eval board acts like a printer. It receives data packets from the host PC as fast as possible. Use this mode to evaluate the isochronous OUT and bulk OUT transfer rates.
- **Loopback mode:** In this mode, the ISP1183 eval board receives data packets on the isochronous OUT (or bulk OUT) endpoint and sends them back to the host PC on isochronous IN (or bulk IN) endpoint. Use this mode to test the data integrity of transfers.

The Buffer Size setting on the test applet is determined by the firmware and hardware ability of the eval board. For the ISA mode, the maximum size is limited to 64000 bytes for the bulk transfer and 256 bytes for the ISO transfer. For the ISO scan mode, if you need to change the buffer size, print a buffer of the same size data first. By default, Buffer Size is set to 64000 when the test applet is launched. Change Buffer Size to 64 before starting the test.

The Repeat Times setting for the loopback test controls the numbers of iterations of loopback, which is useful for debugging. By default, Repeat Times is set to 0 when the test applet is launched. To run the test infinite times, set Repeat Times to -1.

## 7. Testing control endpoints using standard USB compliance tool

To test control endpoints using the standard USB compliance tool:

1. Run the USB compliance tool.

The *USB Compliance Tool*<sup>[1]</sup> window appears. See [Fig 3](#).

2. Connect a USB peripheral.

<sup>1</sup> In this document, the names of windows and dialog boxes are indicated in *italic*.

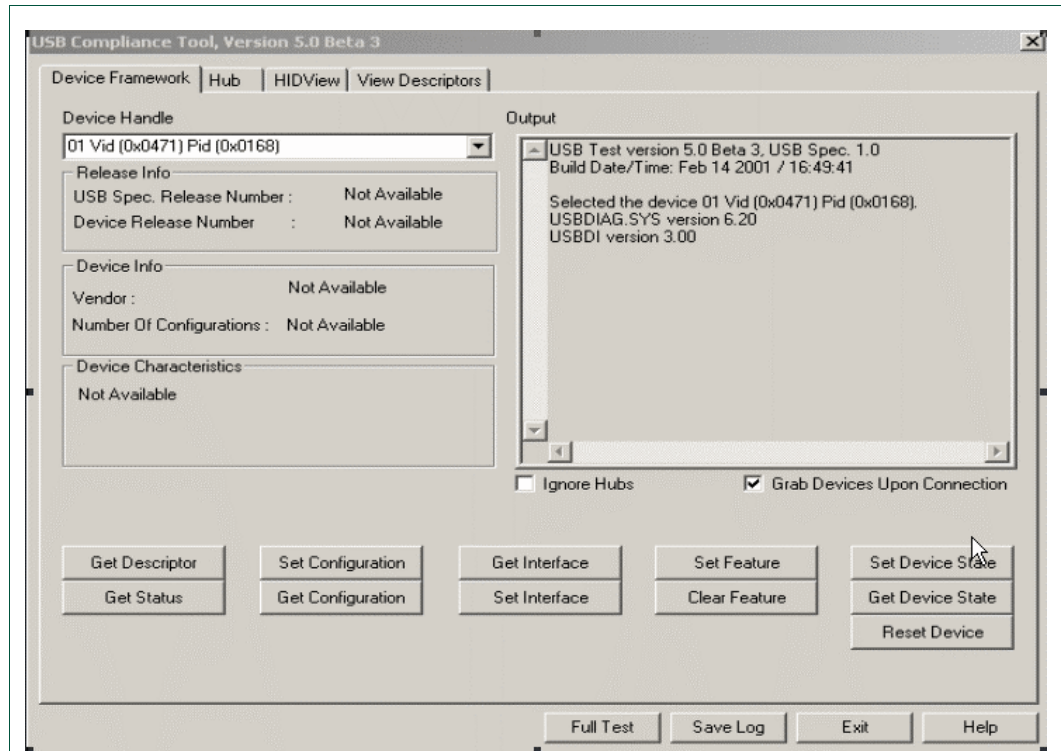


Fig 3. USB Compliance Tool window.

3. In the *USB Compliance Tool* window, click the **Full Test**<sup>[2]</sup> button.

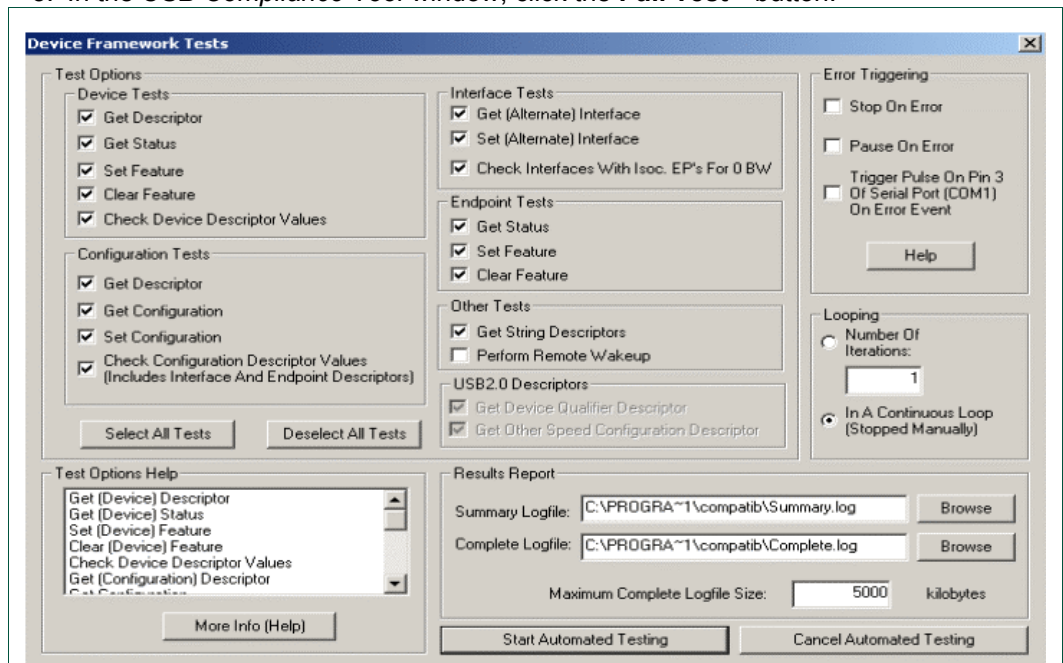


Fig 4. Device Framework Tests dialog box.

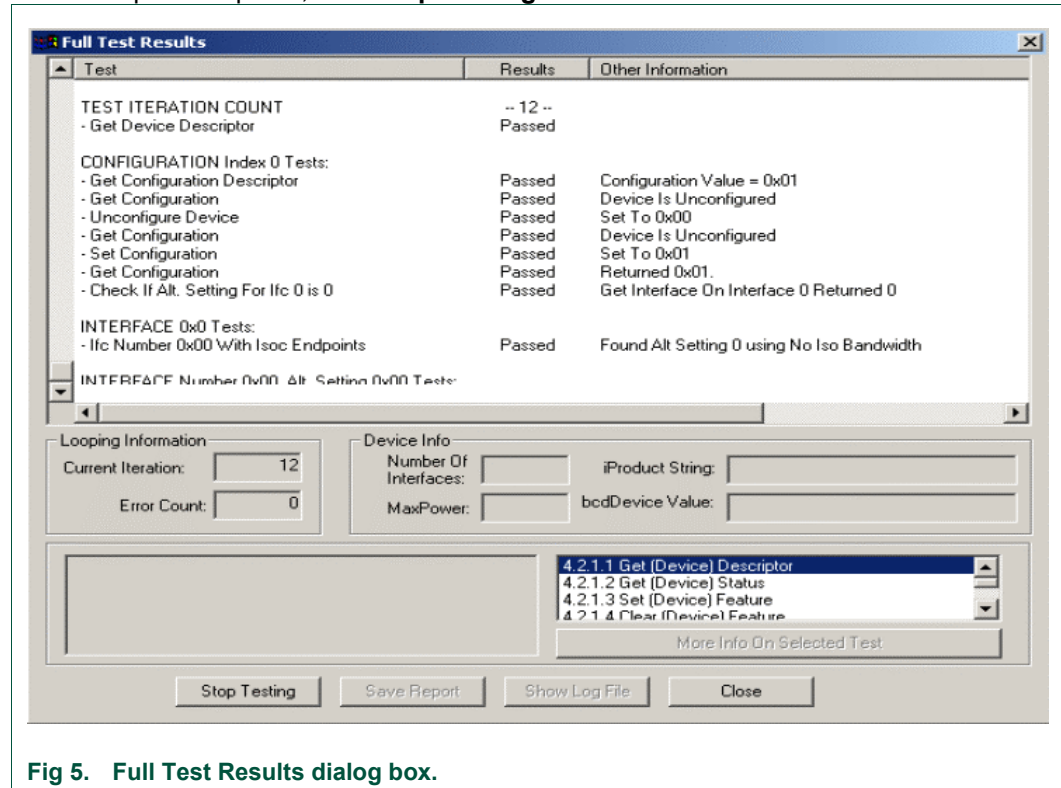
The *Device Framework Tests* dialog box appears. See [Fig 4](#).

<sup>2</sup> In this document, items that you click or type are indicated in **bold**.

4. In dialog box *Device Framework Tests*, deselect **Perform Remote Wakeup** and select **In A Continuous Loop**.
5. Click the **Start Automated Testing** button.

The *Full Test Results* dialog box as given in [Fig 5](#) appears.

6. To stop the loop test, click **Stop Testing**.

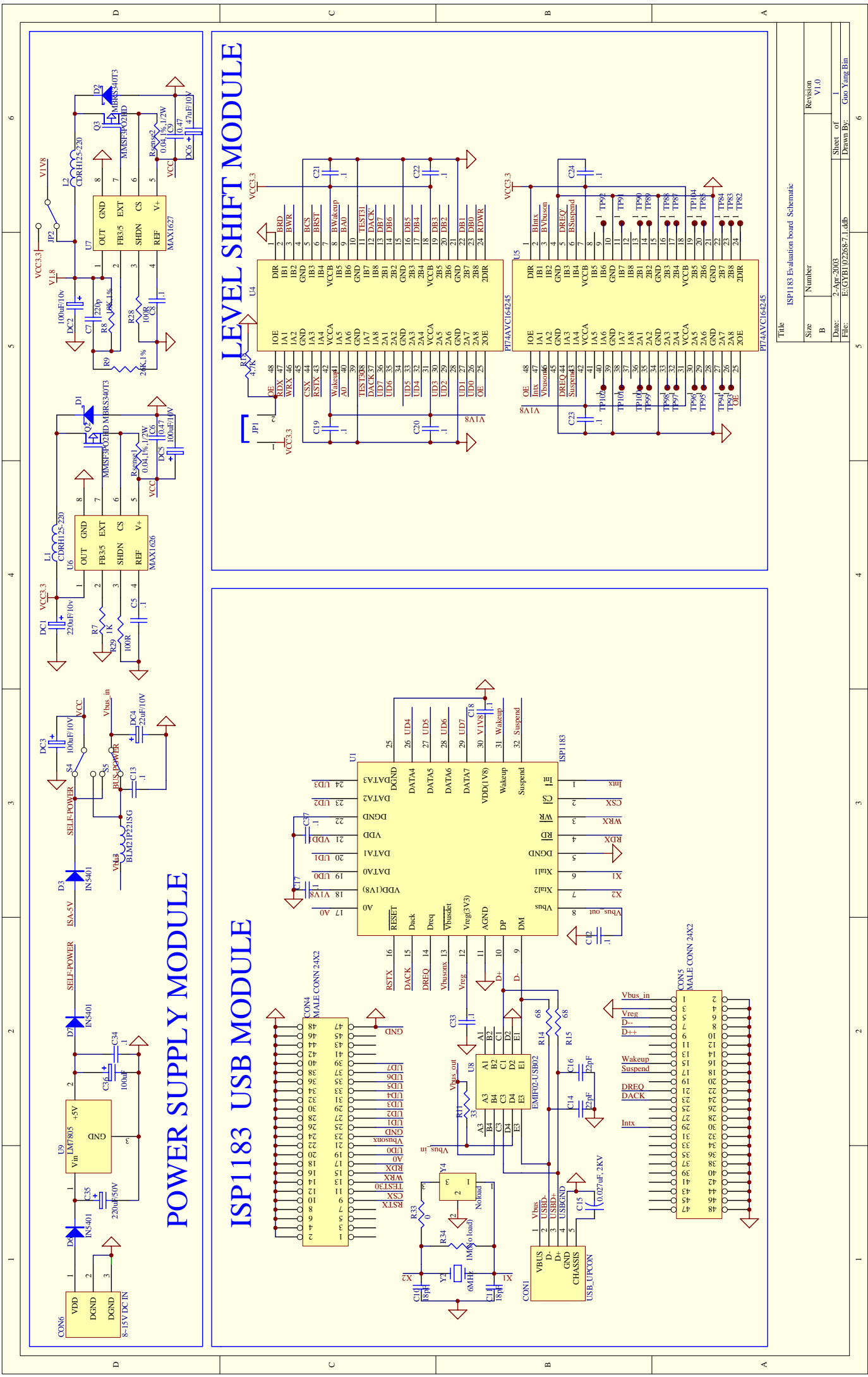


**Fig 5. Full Test Results dialog box.**

The USBCV testing tool can be downloaded from the [www.usb.org](http://www.usb.org) website. Check the website for the latest version of the tool.

## 8. Schematics





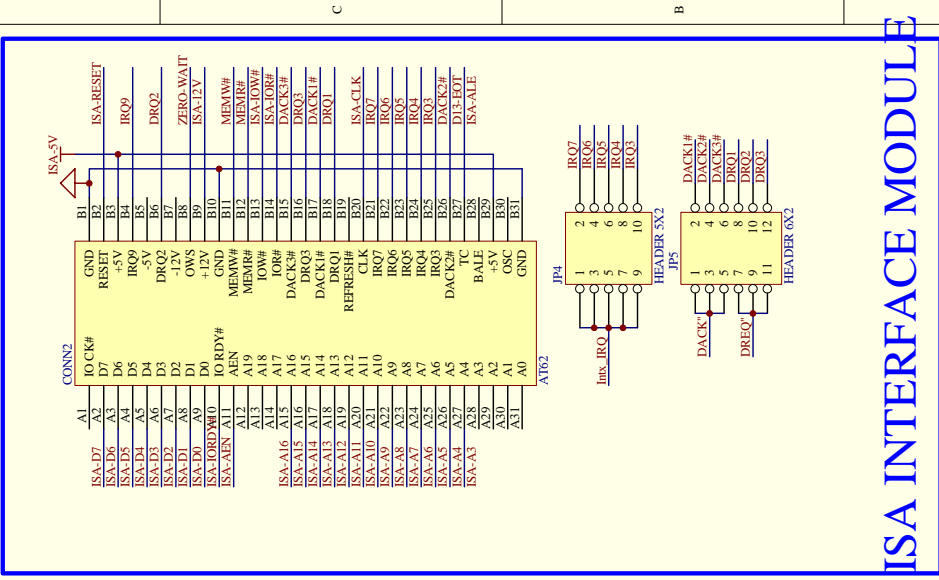
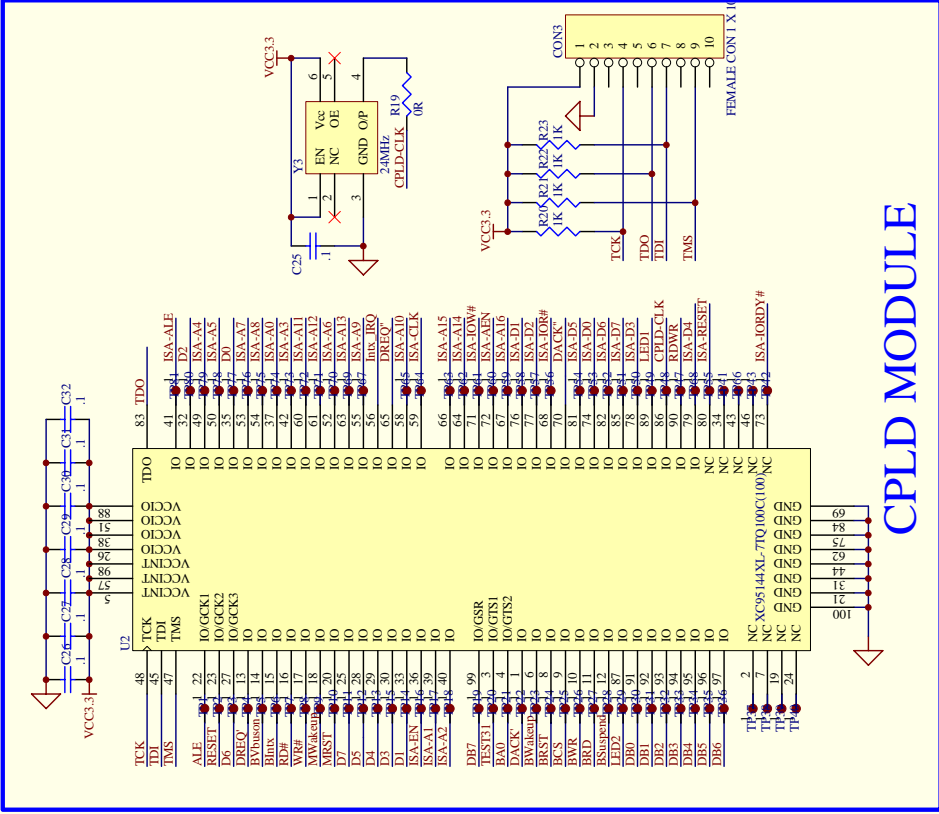
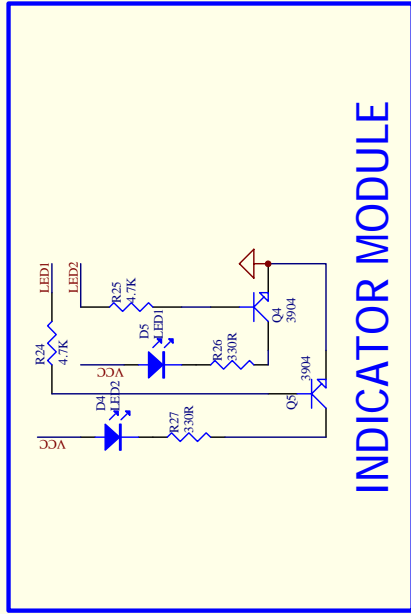
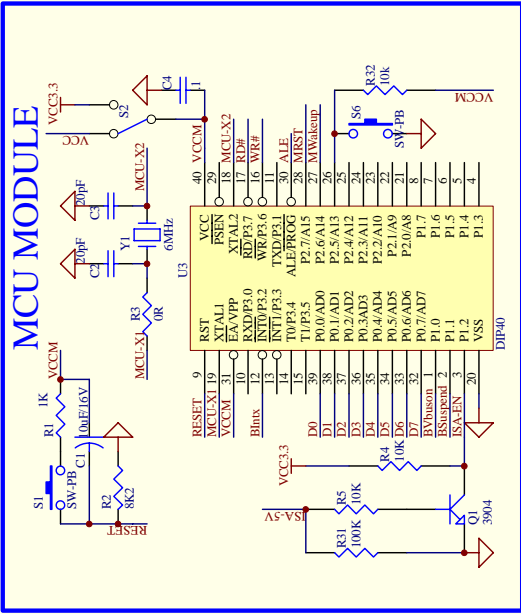
### POWER SUPPLY MODULE

### ISPI183 USB MODULE

### LEVEL SHIFT MODULE

Title: ISPI183 Evaluation board Schematic

Size:	Revision:
B	V1.0
Date:	2-Apr-2003
File:	E:\CYBI\02262671.ddb
Sheet of:	6
Drawn By:	Gao Yang Bin



Title: ISP1183 Evaluation board. Schematic

Size: B

Number: 1

Revision: V1.0

Date: 2-Apr-2003

File: E:\CYBI\02266571.dbb

Sheet of: 2

Drawn By: Guo Yang Bin

Size: B

Number: 1

Revision: V1.0

Date: 2-Apr-2003

File: E:\CYBI\02266571.dbb

Sheet of: 2

Drawn By: Guo Yang Bin

Size: B

Number: 1

Revision: V1.0

Date: 2-Apr-2003

File: E:\CYBI\02266571.dbb

Sheet of: 2

Drawn By: Guo Yang Bin

## 9. Bill of materials

Table 9: Bill of materials

Used	Part Type	Designator	Footprint	Description
5		JP1 JP2 S2 S4 S5		Jumper
99		TP1 TP10 TP100 TP101 TP102 TP104 TP11 TP12 TP13 TP14 TP15 TP16 TP17 TP18 TP19 TP2 TP20 TP21 TP22 TP23 TP24 TP25 TP26 TP27 TP28 TP29 TP3 TP30 TP31 TP32 TP33 TP34 TP35 TP36 TP37 TP38 TP39 TP4 TP40 TP41 TP42 TP43 TP47 TP48 TP49 TP5 TP50 TP51 TP52 TP53 TP54 TP55 TP56 TP57 TP58 TP59 TP6 TP60 TP61 TP62 TP63 TP64 TP65 TP66 TP67 TP68 TP69 TP7 TP70 TP71 TP72 TP73 TP74 TP75 TP76 TP77 TP78 TP79 TP8 TP80 TP81 TP82 TP83 TP84 TP85 TP87 TP88 TP89 TP9 TP90 TP91 TP92 TP93 TP94 TP95 TP96 TP97 TP98 TP99		Test Pad
24	0.1uF	C12 C13 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C30 C31 C32 C33 C34 C37 C4 C5 C8	0805	Capacitor
1	0R	R33		Resister
1	0.027uF, 2KV	C15	1206	Capacitor Polar
2	0.04,1%, 1/2W	Rsense1 Rsense2		
2	0.47uF	C6 C9	0805	Capacitor
2	0R	R19 R3	0805	Resister
1	100K	R31	0805	Resister
3	100R	R28 R30 R29	0805	Resister
1	100uF	C36		Electrolytic Capacitor
3	100uF/10v	DC2 DC3 DC5		Electrolytic Capacitor
3	10K	R32 R4 R5	0805	Resister
1	10K, 1%	R8	0805	Resister
1	10uF/16V	C1	CASE_C	Capacitor Polar
2	18pF	C10 C11	0805	Capacitor
6	1K	R1 R20 R21 R22 R23 R7	0805	Resister
1	1M (No load)	R34	0805	Resister (No load)
2	20pF	C2 C3	0805	Capacitor
1	220p	C7	0805	Capacitor
1	220uF/10v	DC1		Electrolytic Capacitor
1	220uF/50V	C35		Electrolytic Capacitor
2	22pF	C14 C16	0805	Capacitor
1	22uF/10V	DC4		Electrolytic Capacitor

Used	Part Type	Designator	Footprint	Description
1	24MHz	Y3	CSX-750	
1	26K, 1%	R9	0805	Resister
1	33R	R11	0805	Resister
2	330R	R26 R27	0805	Resister
3	3904	Q1 Q4 Q5		NPN Transistor
3	4.7K	R18 R24 R25	0805	Resister
1	47uF/10V	DC6		Electrolytic Capacitor
2	68R	R14 R15	0805	Resister
2	6MHz	Y1 Y2		Crystal
1	8~15V DC IN	CON6		DC-JACK
1	8K2	R2	0805	Resister
1	AT62	CONN2		Gold Finger
1	BLM21P221SG	L3	1206	Inductor
2	CDRH125-220	L1 L2		Inductor
1	DIP40	U3	CDIP40	Microcontroller
1	EMIF02-USB02	U8	EMIF02-USB02	
1	FEMALE CON1X 10	CON3		Connector
1	HEADER 5X2	JP4		Connector
1	HEADER 6X2	JP5		Connector
3	IN5401	D3 D6 D7		Diode
1	ISP1183	U1		ISP1183
1	LED1	D5	LED	LED
1	LED2	D4	LED	LED
1	LM7805	U9	TO-3	
2	MALE CONN 24X2	CON4 CON5		Connector
1	MAX1626	U6	SO8	CMOS Step-Up Switching Regulators
1	MAX1627	U7	SO8	CMOS Step-Up Switching Regulators
2	MBRS340T3	D1 D2		Schottky Diode
2	MMSF3PO2HD	Q2 Q3		
1	No load	Y4	CN	
2	PI74AVC164245	U4 U5	TSSOP48	Level shift
2	SW-PB	S1 S6		Push-Button
1	USB_UPCON	CON1	USB_UPCON	USB Upstream Connector

Used	Part Type	Designator	Footprint	Description
1	XC95144XL	U2	SQFP14X14-100 (N)	CPLD

## 10. References

- *ISP1183 Low-power Universal Serial Bus interface device with DMA data sheet*
- *Universal Serial Bus Specification Rev. 2.0.*

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