

# UM10050

ISP1183 Microcontroller Eval Kit

Rev. 04 — 6 February 2007

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
04	20070206	Fourth release; updated <a href="#">Section 8</a> .
03	20041021	Third release; updated the schematics.
02	20041018	Second release; updated Table 1.
01	20030926	First release.

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## 1. Introduction

The ISP1183 is a low-power, cost- and feature-optimized Universal Serial Bus (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 to communicate with many types of microcontrollers or microprocessors.

The ISP1183 has 2462 bytes of internal First In, First Out (FIFO) memory, which is shared among 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 a nonmultiplexed address and data buses.

With this set up, you can easily evaluate the features of the ISP1183, and develop firmware and product prototype. [Fig 1](#) shows the ISP1183 evaluation (eval) board.

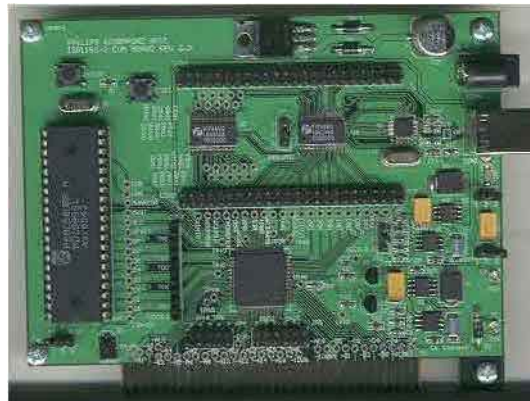


Fig 1. ISP1183 eval board

## 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**

Microcontroller 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

Offset	Usage
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 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

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

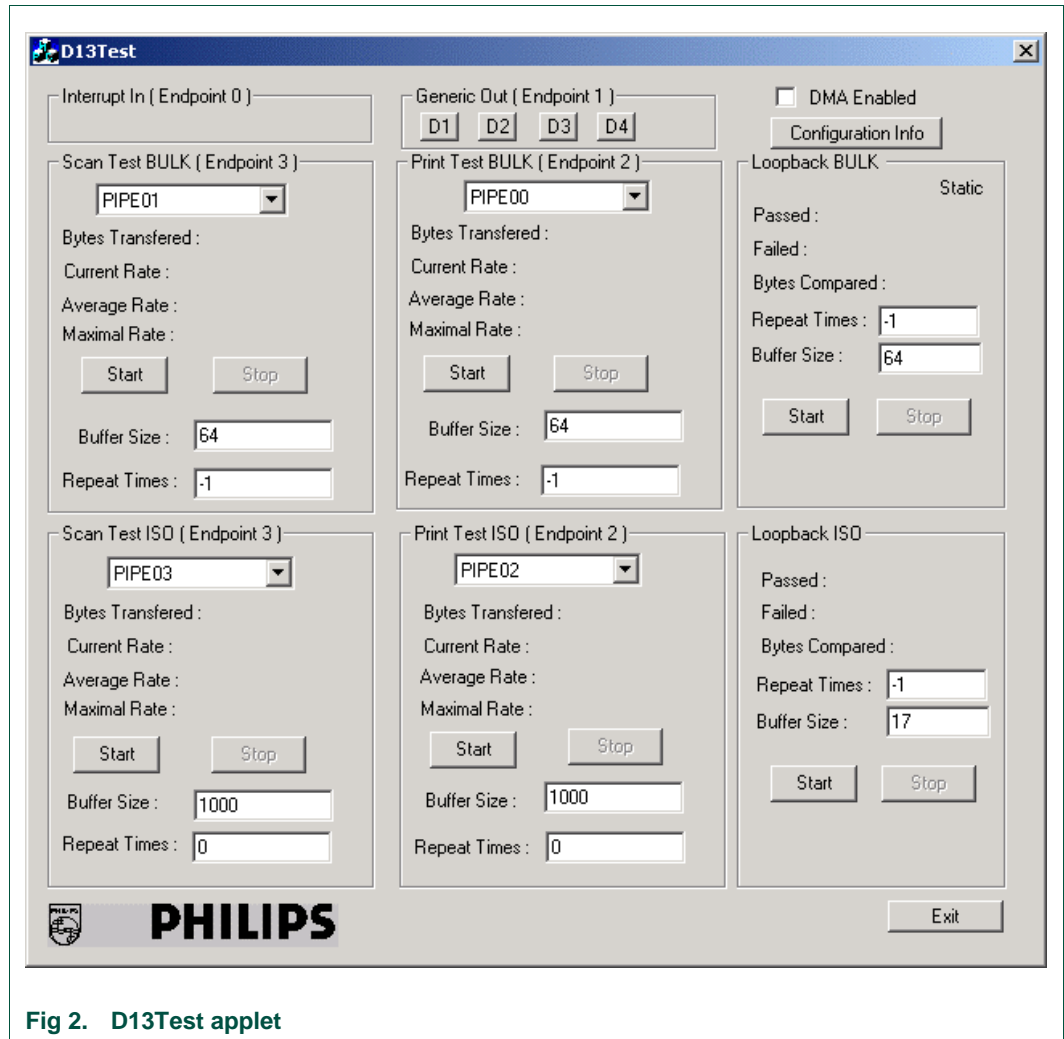


Fig 2. D13Test applet

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 an isochronous OUT pipe.
6	ISO-IN	This pipe is defined as an isochronous IN pipe.
3	Bulk-OUT	This pipe is defined as a bulk OUT pipe.
4	Bulk-IN	This pipe is defined as a 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 firmware and hardware ability of the eval board. For ISA mode, the maximum size is limited to 64000 bytes for the bulk transfer and 256 bytes for the ISO transfer. For 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.

Repeat Times 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.

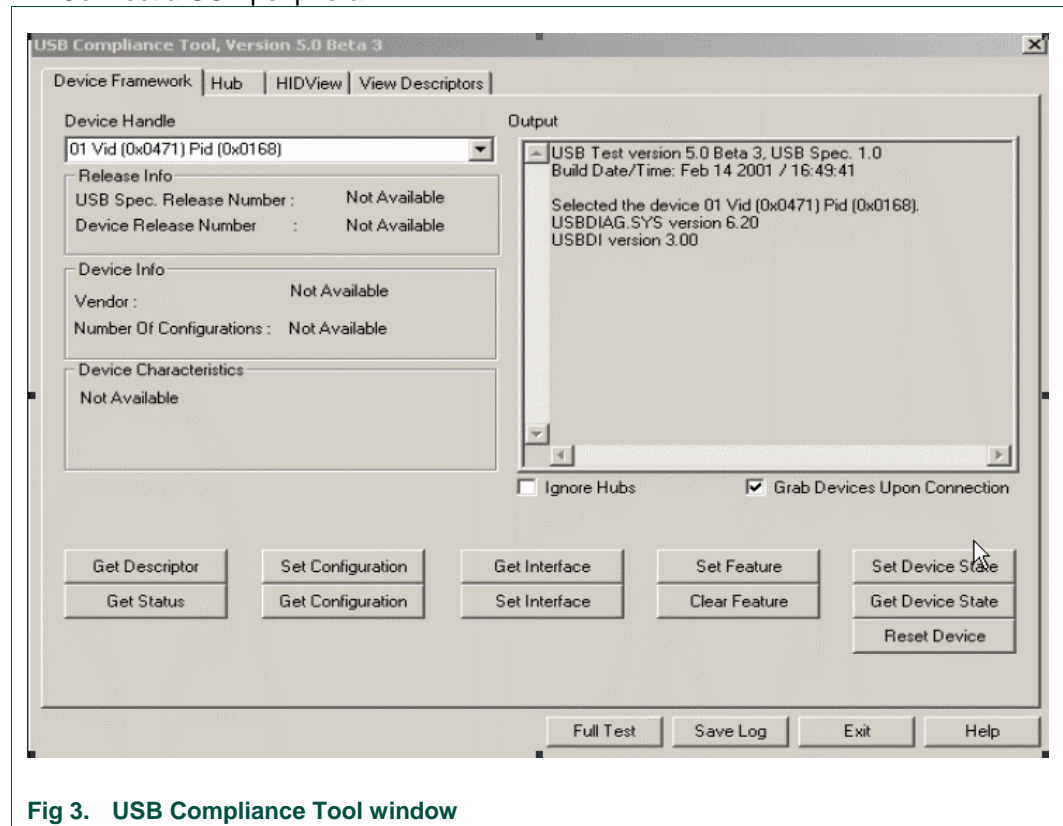
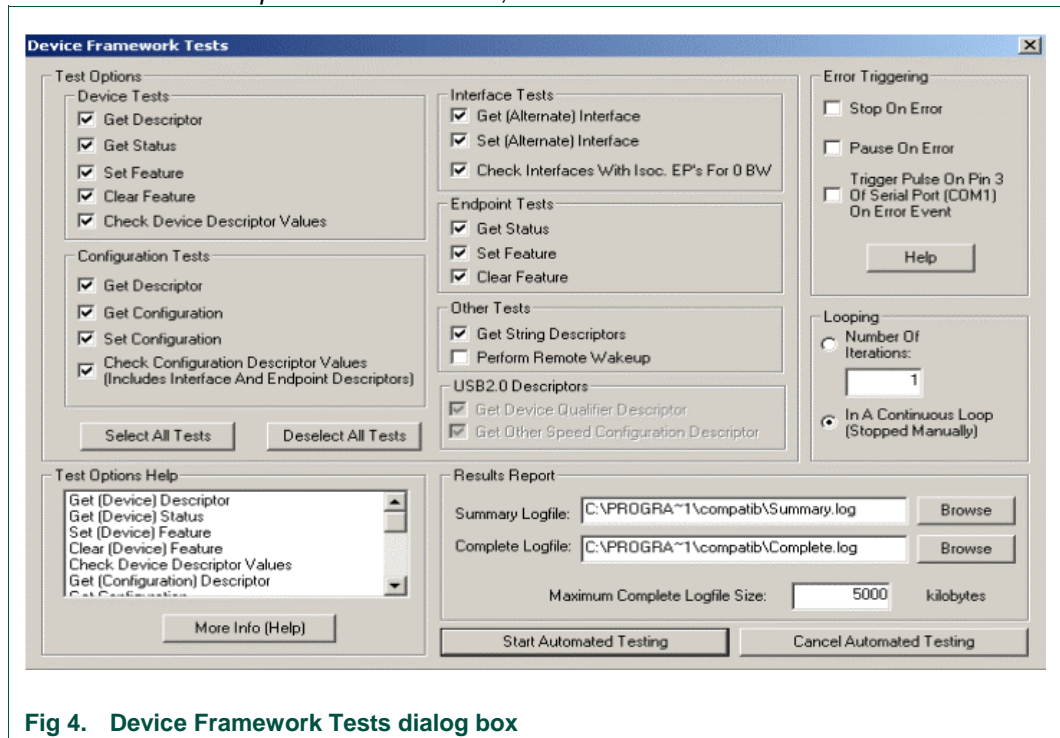


Fig 3. USB Compliance Tool window

1. In this document, names of windows and dialog boxes are indicated in *italic*.

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](#).

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**.

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



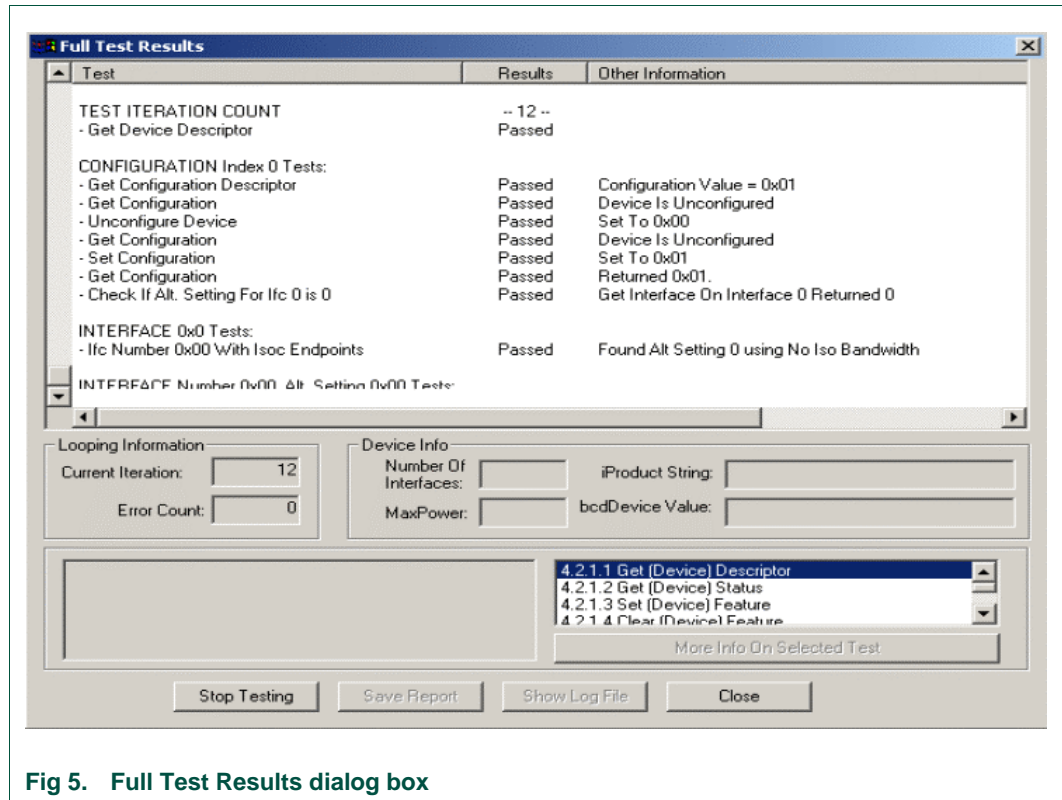


Fig 5. Full Test Results dialog box

The USBCV testing tool can be downloaded from the USB website. Check the website for the latest version of the tool.

8. Schematics

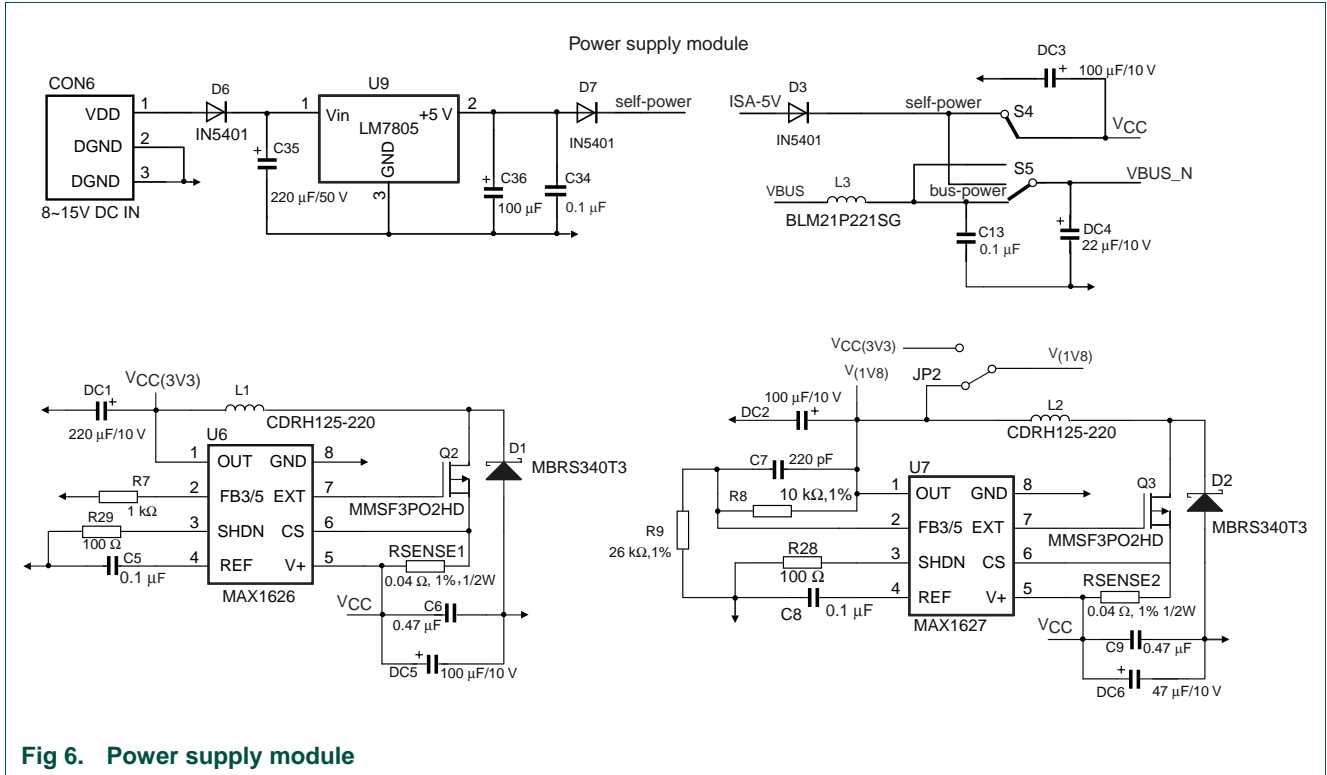


Fig 6. Power supply module

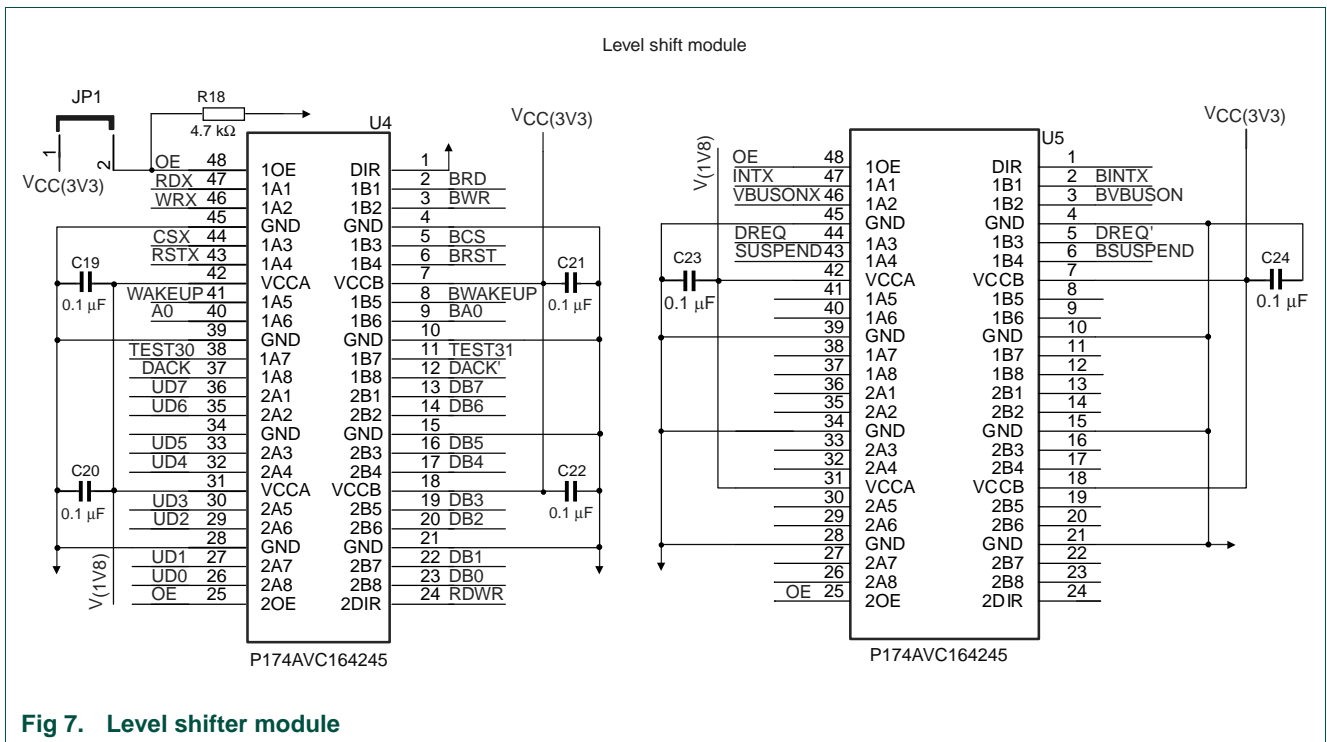


Fig 7. Level shifter module

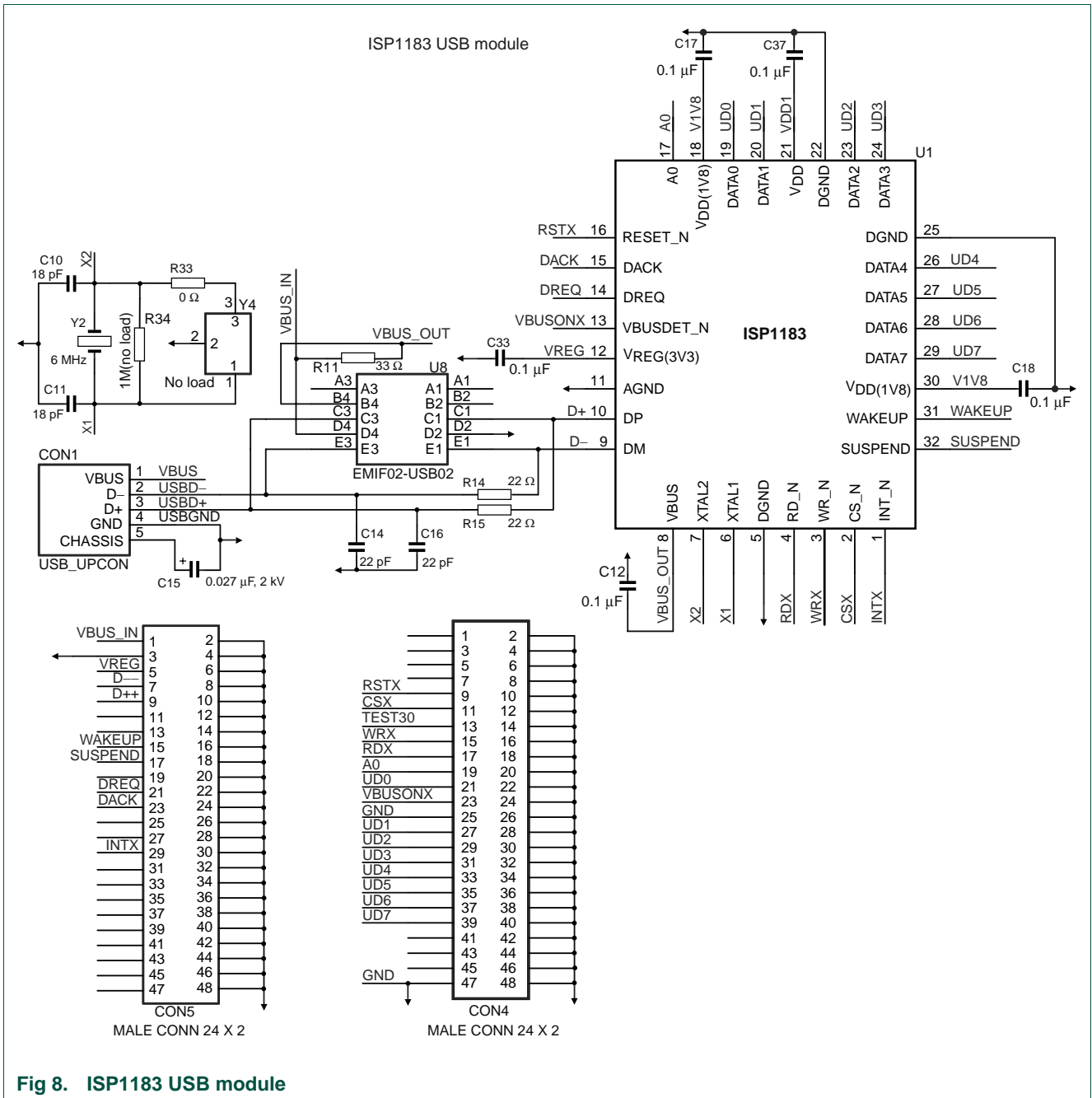


Fig 8. ISP1183 USB module

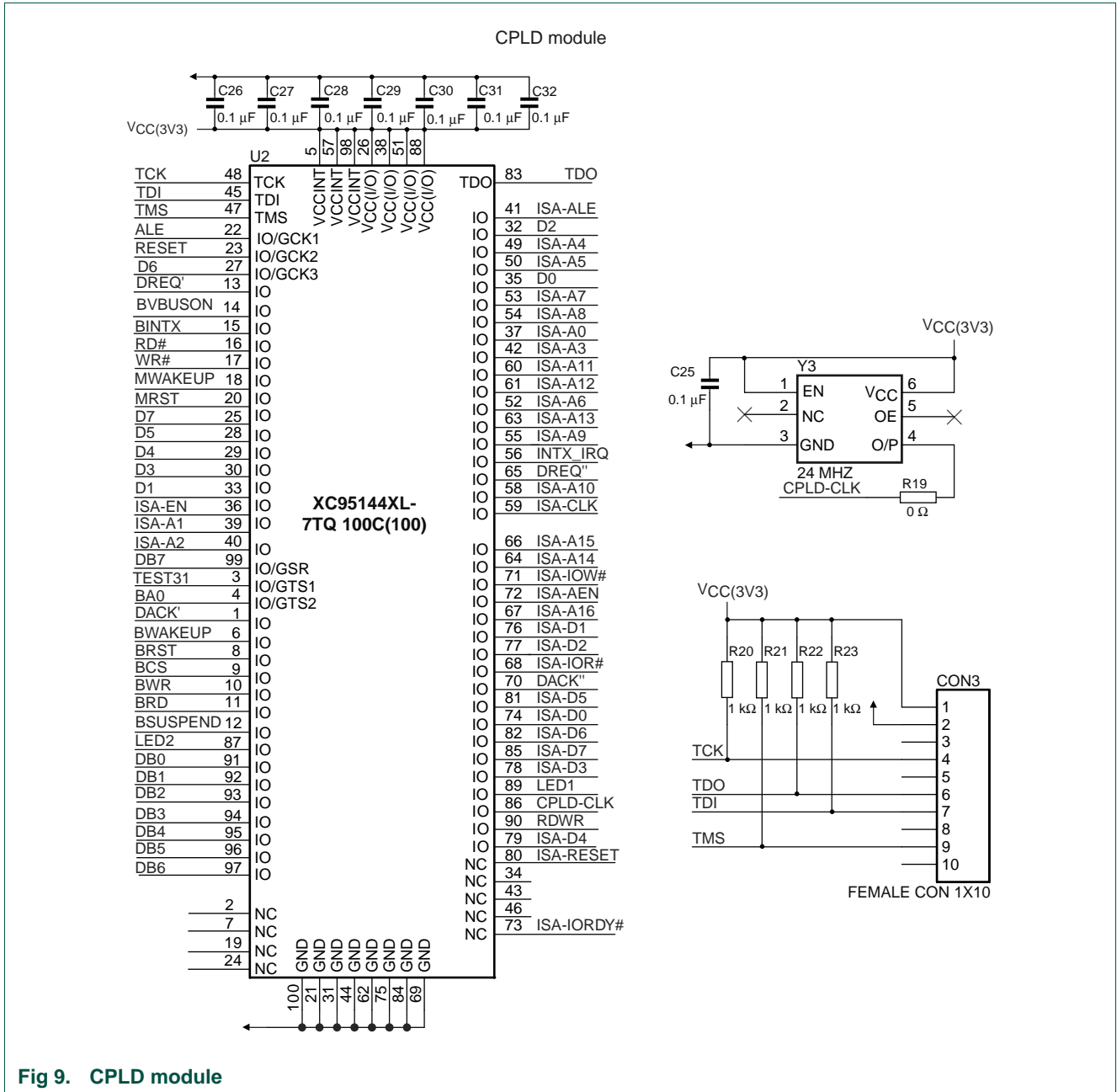


Fig 9. CPLD module

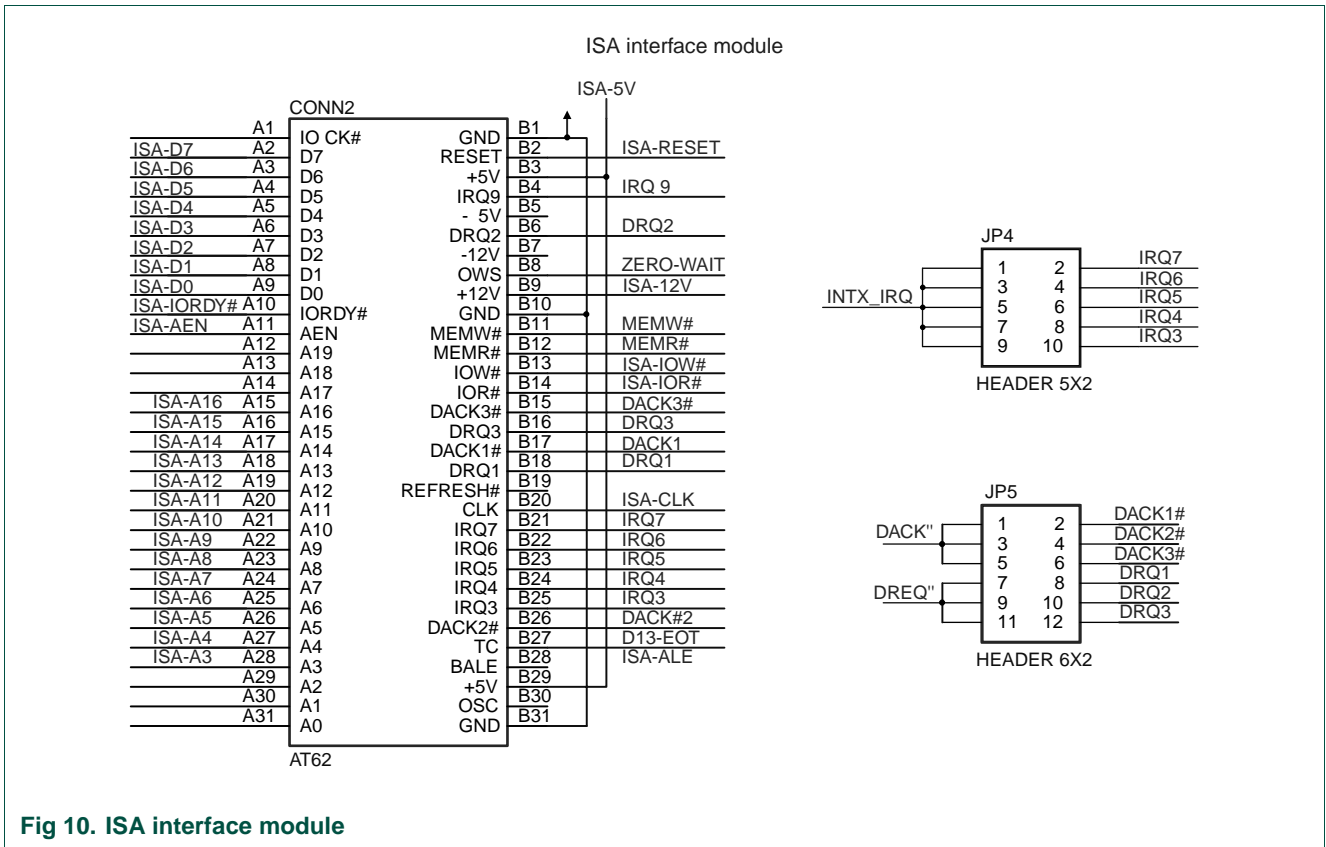


Fig 10. ISA interface module

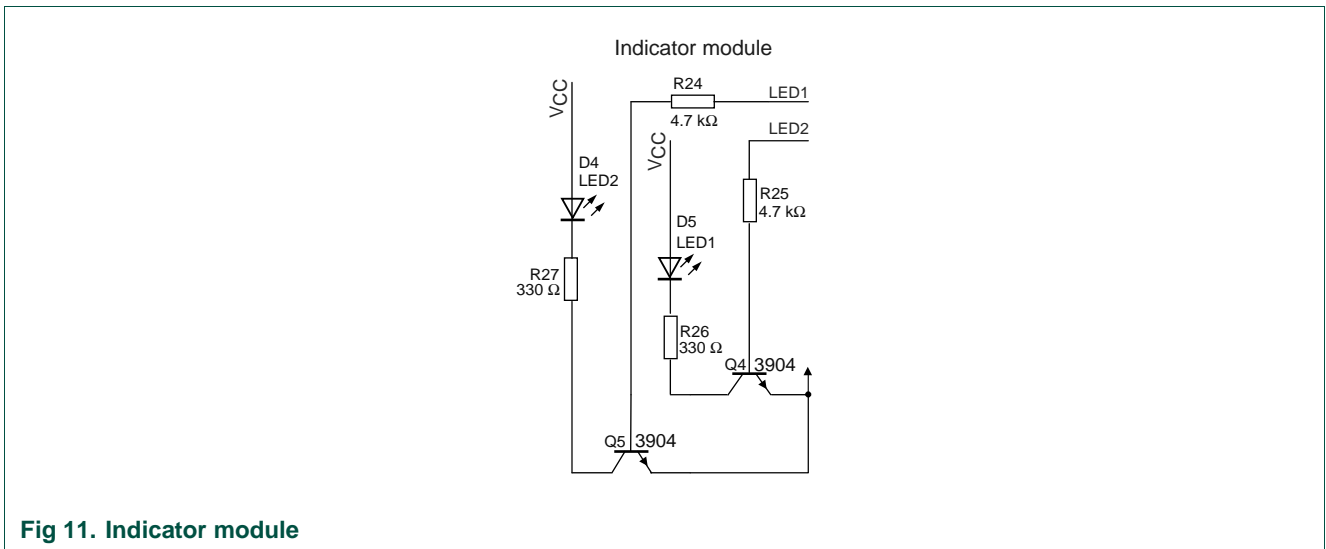


Fig 11. Indicator module

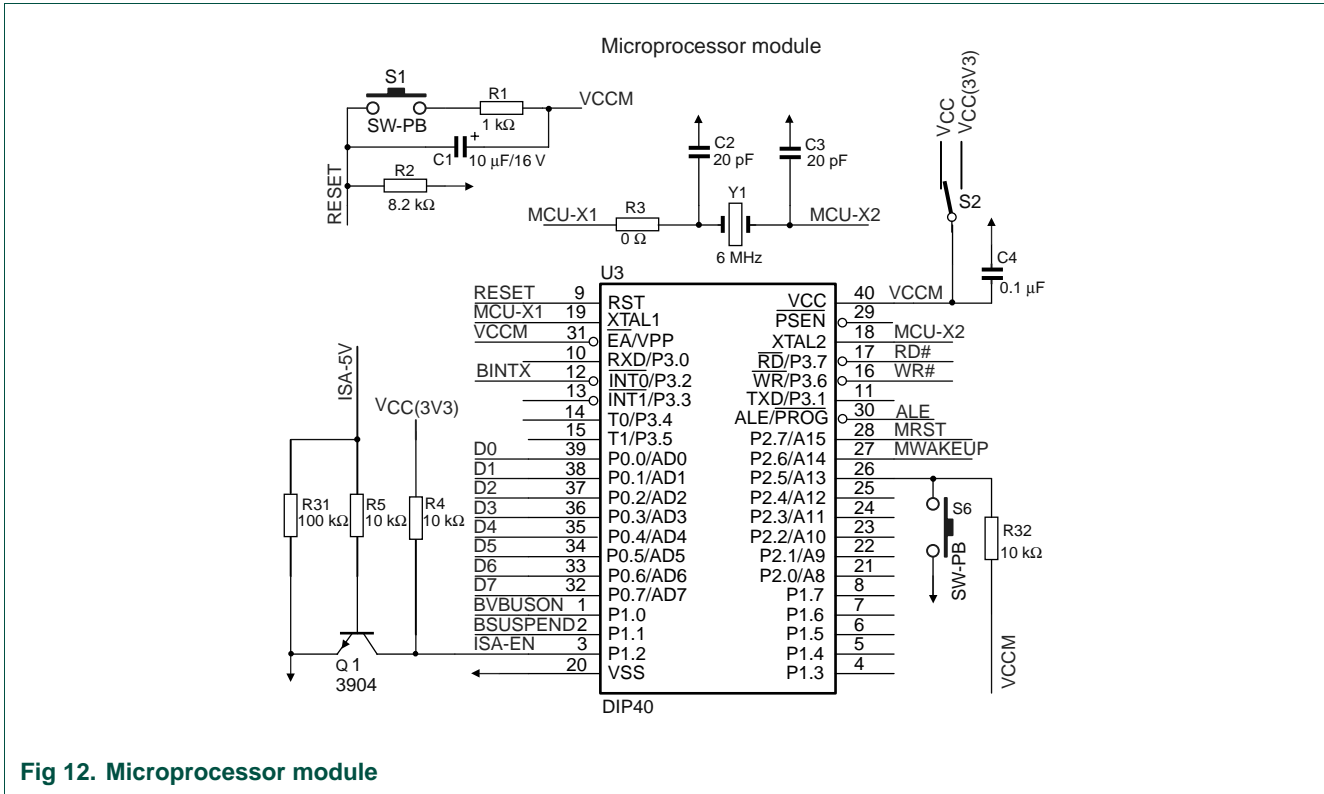


Fig 12. Microprocessor module

## 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	0.1 μF	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	0 Ω	R33	-	Resister
1	0.027 μF, 2 kV	C15	1206	Capacitor polar
2	0.04 Ω, 1 %, 1/2W	Rsense1 Rsense2	-	-
2	0.47 μF	C6 C9	0805	Capacitor

Used	Part Type	Designator	Footprint	Description
2	0 $\Omega$	R19 R3	0805	Resistor
1	100 k $\Omega$	R31	0805	Resistor
3	100 $\Omega$	R28 R30 R29	0805	Resistor
1	100 $\mu$ F	C36	-	Electrolytic capacitor
3	100 $\mu$ F/10v	DC2 DC3 DC5	-	Electrolytic capacitor
3	10 k $\Omega$	R32 R4 R5	0805	Resistor
1	10 k $\Omega$ , 1 %	R8	0805	Resistor
1	10 $\mu$ F/16 V	C1	CASE_C	Capacitor polar
2	18 pF	C10 C11	0805	Capacitor
6	1 k $\Omega$	R1 R20 R21 R22 R23 R7	0805	Resistor
1	1 M $\Omega$ (No load)	R34	0805	Resistor (no load)
2	20 pF	C2 C3	0805	Capacitor
1	220 pF	C7	0805	Capacitor
1	220 $\mu$ F/10 V	DC1	-	Electrolytic capacitor
1	220 $\mu$ F/50 V	C35	-	Electrolytic capacitor
2	22 pF	C14 C16	0805	Capacitor
1	22 $\mu$ F/10 V	DC4	-	Electrolytic capacitor
1	24 MHz	Y3	CSX-750	-
1	26 k $\Omega$ , 1 %	R9	0805	Resistor
1	33 $\Omega$	R11	0805	Resistor
2	330 $\Omega$	R26 R27	0805	Resistor
3	3904	Q1 Q4 Q5	-	NPN transistor
3	4.7 k $\Omega$	R18 R24 R25	0805	Resistor
1	47 $\mu$ F/10 V	DC6	-	Electrolytic capacitor
2	22 $\Omega$	R14 R15	0805	Resistor
2	6 MHz	Y1 Y2	-	Crystal
1	8~15V DC IN	CON6	-	DC-JACK
1	8.2 k $\Omega$	R2	0805	Resistor
1	AT62	CONN2		Gold finger
1	BLM21P221SG	L3	1206	Inductor

Used	Part Type	Designator	Footprint	Description
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 5 X 2	JP4	-	Connector
1	HEADER 6 X 2	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 24 X 2	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
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.



## 11. Legal information

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### 11.1 Definitions

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Date of release: 6 February 2007  
 Document identifier: UM10050\_4

