USER'S MANUAL

PICEBS1

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1 INTRODUCTION

The laboratory has developed a simple Microchip development board. This board is called PICEBS1.

The PICEBS1 board was developed to have a more powerful (and in fact a little more complex) board to be up to date with current processors and interfaces.

Figure 1 The PICEBS1 v.1.0 board

This document intends to explain in details the functionalities of this board.

1.1 FEATURES

- PIC18LF6680 @ 25MHz, 3.3V (32kWord instruction, 3328 bytes RAM, 1024 bytes EEPROM)
- 12 A/D 10 bits
- SPI/I2C
- UART
- 4 Timers
- Enhanced CAN
- Connectivity
  - 1 x Serial RS-232
  - 2 x CAN (1.2, 2.0A, 2.0B compatible)
  - 1 x SD/MMC memory card slot
  - 1 x Nunchuck (Nintendo) slot
  - 5 x Buttons and 4 x user LEDs
  - 2 x Extension (17 - IO individually connectable (quasi any CPU pin))

2 HARDWARE

2.1 The power supply

Figure 2 Power supply

Power supply input must be 5V. Current of 50mA will be sufficient for operation without extension and without SD card. To use an SD card, refer to card manufacturer.

The maximal current available on the both extension connectors is about 1 ampere.

2.2 The ICD2 debug connection

To communicate with this board, we use the MPLAB-ICD2 debugger connection. This feature offers the ability to interact directly between the microcontroller and the PC through the ICD2 debugger.

Figure 3 the ICD2 connector is near the CPU

ICD2 debugger pinout (RJ-12)			
Pin number	*Descripton*	*Pin number*	*Description*
1	nMCLR	2	Vcc (3.3V)
3	GND	4	PGD
5	PGC	6	n.c.

Table 1 ICD2 pinout

2.3 The reset button

On the left of the PICEBS1 board is a reset button. A reset is automatically asserted at power on or when the output of the power supply is too low.

Figure 4 Reset button

2.4 The LCD screen

On the top of the PICEBS1 board is a graphical LCD screen with a resolution of 128x64 pixels. This is the model BATRON BTHQ128064AVD. This screen can be used in parallel or in serial interface mode. By default, the SMD jumper on the bottom left corner is placed in parallel mode.

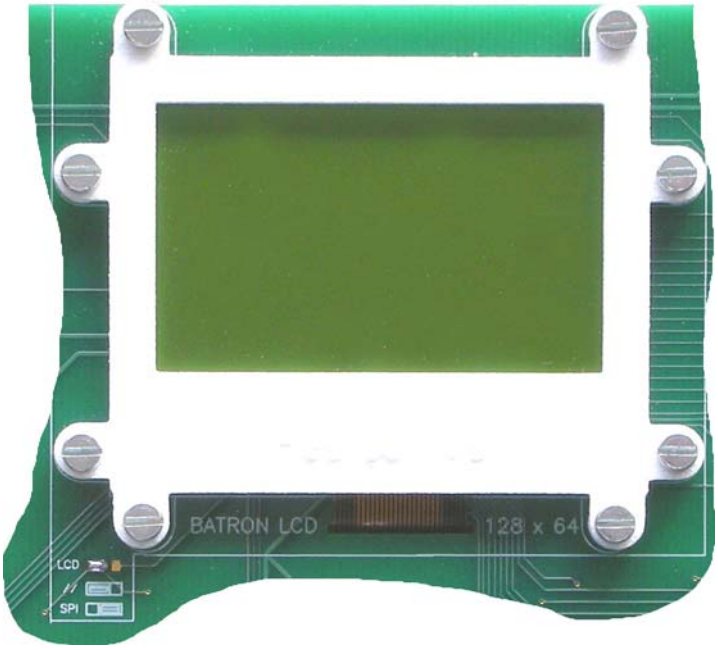

Figure 5 LCD screen

To use this screen, you can directly use the existing libraries (or implement yours based on the LCD datasheet).

Batron LCD connections			
LCD pin	*Processor pin*	*LCD pin*	*Processor pin*
D0-D7	RD0-RD7	/RD	RE0
/WR	RE1	D/C	RE2

/CS	RE3	/RST	RE7

Table 2 LCD pinout

2.5 The Buttons and the LEDs

On the bottom center of the PICEBS1 board are the user I/O parts.

Figure 6 User I/O

Five buttons called LEFT, RIGHT, UP, DOWN and OK are available. They are connected to the processor GPIO printed on the board as seen in picture above. These buttons are active low.

Four LED are placed next to each direction button. There connections are printed on the board next to each LED. These LED are active high.

2.6 The CAN bus

On the left of the PICEBS1 board are two CAN connectors. They are totally similar and not “CAN terminate”.

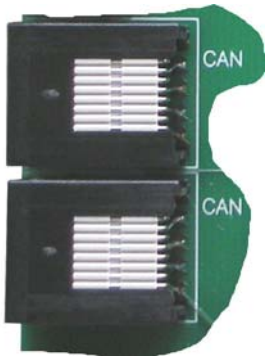

Figure 7 LCD screen

The connection used on these plugs is a Hes-so//Valais standard. They can be seen in the schematic.

2.7 The RS-232 interface

On the left of the PICEBS1 board is an UART DB-9 female connector. This connector can be directly connected with a PC (DCE equipment).

Figure 8 RS-232 connector

Serial port	
Pin number	*Signal description*
1	nc
2	TX
3	RX
4	nc
5	GND
6	nc
7	nc
8	nc
9	nc

Table 3 Serial port 0 pinning

The connections used on this interface are RX, TX and GND. There is no hardware handshake implemented.

2.8 The SD-card connector

On the bottom of the PICEBS1 board is an SD-card connector. This connector is placed to receive any SD or MMC card. It is connected to the SPI part of the processor.

Figure 9 SD-card connector

SD/MMC pinout		
SD/MMC pin	*Description*	*Processor pin*
1	/CS	RE4
2	SDO	RC4 (SDI)
3	GND	
4	3.3V	
5	SCK	RC3
6	GND	
7	SDI	RC5 (SDO)
8	-	RF6
9	-	RF7
nRO	not read-only	RG1
nDETECT	not detected	RG3

The usage of these cards is not trivial. The user has to know about SD protocol and FAT systems to correctly implement the software.

2.9 The Nunchuck connector

On the bottom of the PICEBS1 board is a Nunchuck (Nintendo – Wii) connector. This interface is connected to the I2C part of the processor.

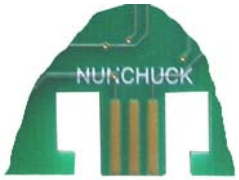

Figure 10 Nunchuck connector

The user has to plug the Nintendo-Nunchuck directly on this connector to use it.

Caution: The connector can be turned. The big plastic connector of the Nunchuck has to be on the upper side of this connector for the system to work.

2.10 The Extension connectors

On the right of the PICEBS1 board are two extension connectors. These are useful to integrate any new system on this board and to use the already existing extension modules.

Figure 11 Extension connector

The user can bind any I/O extension pin with most of the microcontroller pin. The table below describes the extension pinout. Some of the extension pin are fixed by the Hes-so//Valais standard.

Extension pinout			
Pin number	*Descripton*	*Pin number*	*Description*
1	P1	2	P2
3	P3	4	P4
5	P5	6	P6
7	P7	8	P8
9	P9	10	GND
11	P11	12	GND
13	P13	14	GND
15	P15	16	GND
17	P17	18	GND
19	P19	20	GND
21	P21	22	GND

23	P23	24	GND
25	P25	26	VCC (3.3V)

Table 4 Extension connector pinout

The table below describes the binding array corresponding to the extension connector (right row of binding array) and the processor available I/O (left and center rows of binding array).

Binding array pinout			
Pin number	*Row left (CPU)*	*Row center (CPU)*	*Row right (extension)*
1	RC2/PWMA	RD0	P1
2	RC5/SDO	RD1	P2
3	RC3/SCK	RD2	P3
4	RC4/DSI	RD3	P4
5	n.c.	RD4	P5
6	RB2/INT2	RD5	P6
7	RG1	RD6	P7
8	RE6/PWMB	RD7	P8
9	RG3	RB3/INT3	P9
10	RA5/AN4	RE5/PWMC	P11
11	RF7/SS	RA0/AN0	P13
12	RF6/AN11	RA1/AN1	P15
13	RF5/AN10	RA2/AN2/REF-	P17
14	RF4/AN9	RA3/AN3/REF+	P19
15	RF3/AN8	RA4/T0CKI	P21
16	RF2/AN7	3.3V	P23
17	RF1/AN6	RG4/PWMD	P25
18	RF0/AN5	5V	GND

Table 5 Binding array pinout