

# PIC32-MX460LCD development board \_\_\_\_\_ Users Manual



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## INTRODUCTION

**PIC32-MX460LCD** is low cost development board with the new high-performance 80MHz MIPS-Based 32-bit Flash microcontroller PIC32MX460F512L – 100 pin general purpose and USB. This powerful microcontroller supports various serial interfaces such as USB OTG, UART, SPI. In addition you will find also LCD, three UEXT connectors, mini SD/MMC, JTAG and ICSP connectors, EXT\_PWR connector and accelerometer. All this allows you to build a diversity of powerful applications to be used in a wide range of situations.

## BOARD FEATURES

- PIC32MX460F512L microcontroller
- TFT LCD 320x240 pixels with touch screen
- ICSP/ICD connector for programming and debugging with PIC-ICD2, PIC-ICD2-TINY and PIC-ICD2-POCKET.
- JTAG connector
- EXT\_PWR connector
- Voltage regulator +3.3V - VR2(3.3V)
- Voltage regulator +5V - VR1(5V)
- SD/MMC mini connector
- Accelerometer
- USB OTG connector
- two UEXT connectors 2x5 pins
- UEXT40 connector 2x20 pins
- Power plug-in connector for 7-9V DC power supply
- PCB: FR-4, 1.5 mm (0,062"), solder mask, silkscreen component print
- Dimensions 79.2x57.7 mm (3.12x2.27")

## ELECTROSTATIC WARNING

The PIC32-MX460LCD board is shipped in protective anti-static packaging. The board must not be subject to high electrostatic potentials. General practice for working with static sensitive devices should be applied when working with this board.

## BOARD USE REQUIREMENTS

**Cables:** Depends on the used programming/debugging tool. It could be 1.8 meter USB A-B cable to connect [PIC-ICD2](#) or [PIC-ICD2-POCKET](#) to USB host on PC or RS232 cable in case of [PIC-ICD2-TINY](#) or other programming/debugging tools. You will also need a USB OTG cable.

**Hardware:** Programmer/Debugger – most of Olimex programmers are applicable, for example [PIC-ICD2](#), [PIC-ICD2-POCKET](#), [PIC-ICD2-TINY](#) or other compatible programming/debugging tool.

**!!!Warning!!!** When you want to program this microcontroller with PIC-ICD2, PIC-ICD2-POCKET or PIC-ICD2-TINY, before connecting the programmer to your target board, you should first connect the programmer to your computer and open MPLAB. There, first from menu Configure – Select Device – choose the microcontroller you are about to program, then from menu Programmer – Select Programmer – choose MPLAB ICD 2, wait while MPLAB is downloading operation system, and after ICD2 is connected – check in menu Programmer – Settings – Power – there is option – Power target circuit from MPLAB ICD 2 – this option should be forbidden, you could not select it. Now it is safe to connect the programmer to your target board.

## **PROCESSOR FEATURES**

**PIC32-MX460LCD** board use High-Performance 32-bit RISC microcontroller PIC32MX460F512L from Microchip Technology Inc with these features:

- Operating Voltage Range of 2.3V to 3.6V
- 512K Flash Memory (plus an additional 12KB of Boot Flash)
- 32K SRAM Memory
- Pin-Compatible with Most PIC24/ dsPIC® Devices
- Multiple Power Management Modes
- Multiple Interrupt Vectors with Individually Programmable Priority
- Fail-Safe Clock Monitor Mode
- Configurable Watchdog Timer with On-Chip Low-Power RC Oscillator for Reliable Operation

### **Peripheral Features:**

- Atomic SET, CLEAR and INVERT Operation on Select Peripheral Registers
- Up to 4-Channel Hardware DMA with Automatic Data Size Detection
- USB 2.0 Compliant Full Speed Device and On-The-Go (OTG) Controller
- USB has a Dedicated DMA Channel
- 40 MHz Crystal Oscillator
- Internal 8 MHz and 32 kHz Oscillators
- Separate PLLs for CPU and USB Clocks
- Two I2C™ Modules
- Two UART Modules with:
  - RS-232, RS-485 and LIN 1.2 support
  - IrDA® with On-Chip Hardware Encoder and Decoder
- Parallel Master and Slave Port (PMP/PSP) with 8-bit and 16-bit Data and Up to 16 Address Lines
- Hardware Real-Time Clock/Calendar (RTCC)
- Five 16-bit Timers/Counters (two 16-bit pairs combine to create two 32-bit timers)
- Five Capture Inputs
- Five Compare/PWM Outputs

- Five External Interrupt Pins
- High-Speed I/O Pins Capable of Toggling at 80 MHz
- High-Current Sink/Source (18 mA/18 mA) on All I/O Pins
- Configurable Open-Drain Output on Digital I/O Pins

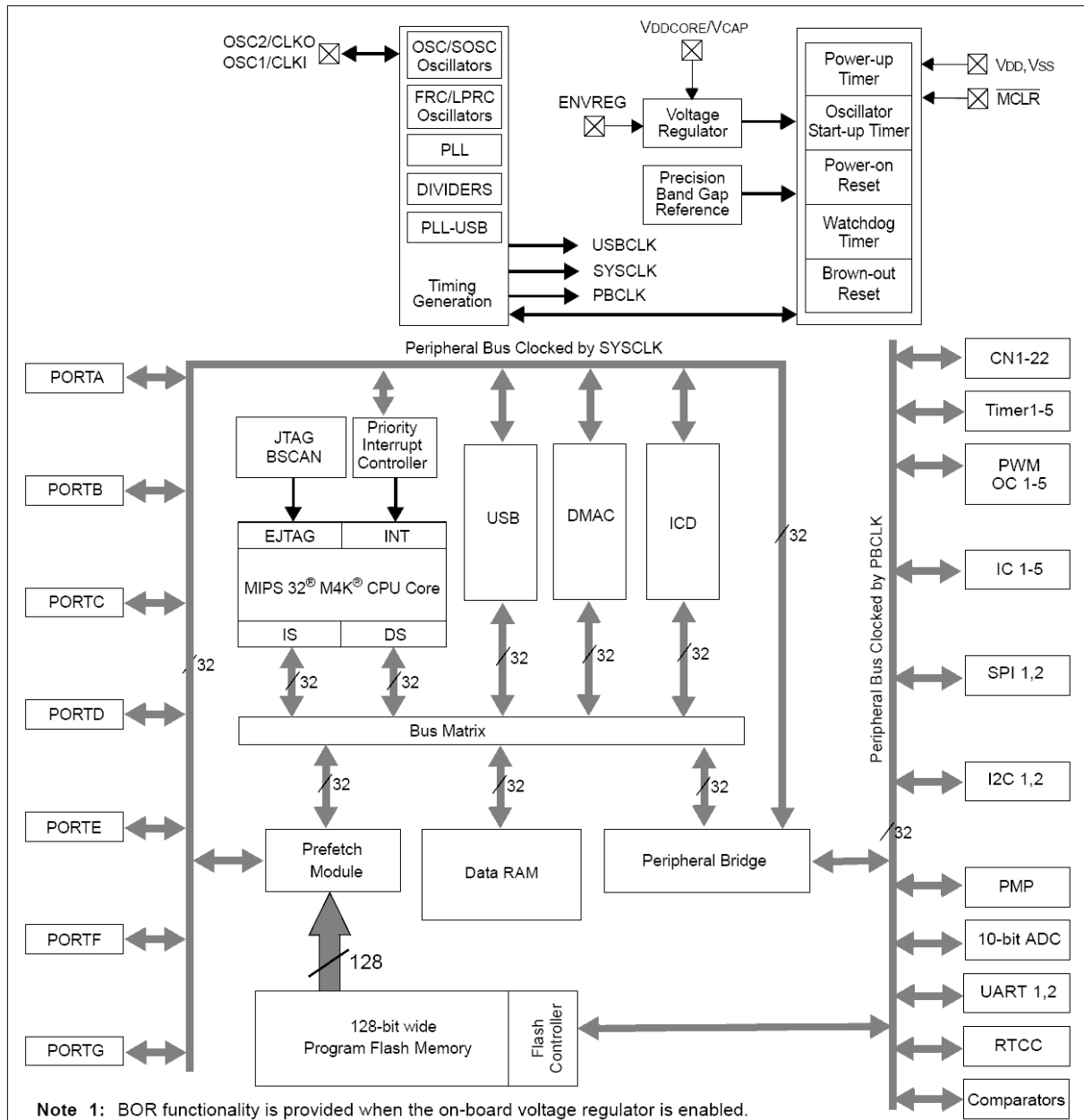
**Debug Features:**

- Two Programming and Debugging Interfaces:
  - 2-Wire Interface with Unintrusive Access and Real-time Data Exchange with Application
  - 4-wire MIPS® Standard Enhanced JTAG interface
- Unintrusive Hardware-Based Instruction Trace
- IEEE Std 1149.2 Compatible (JTAG) Boundary Scan

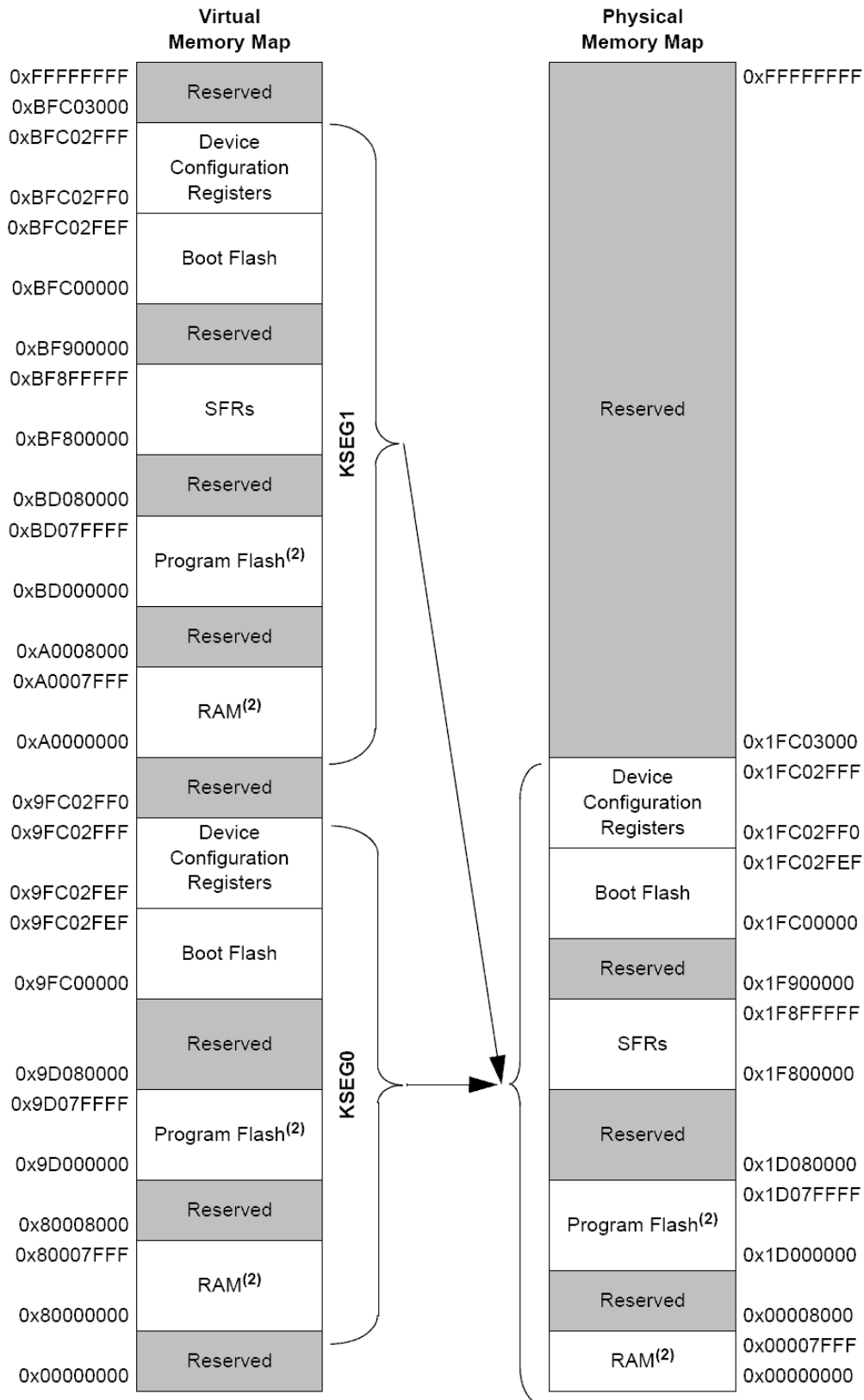
**Analog Features:**

- 16-Channel 10-bit Analog-to-Digital Converter:
  - 1000 ksps Conversion Rate
  - Conversion Available During Sleep, Idle
- Two Analog Comparators
- 5V Tolerant Input Pins (digital pins only)

# BLOCK DIAGRAM



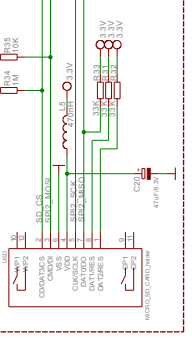
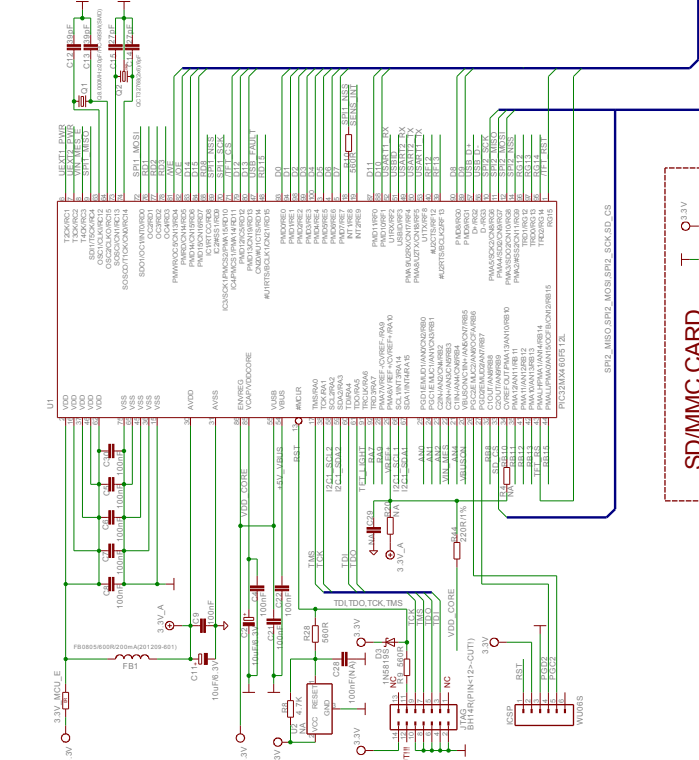
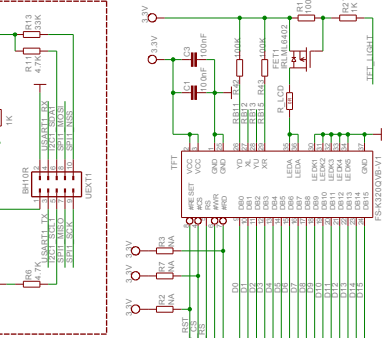
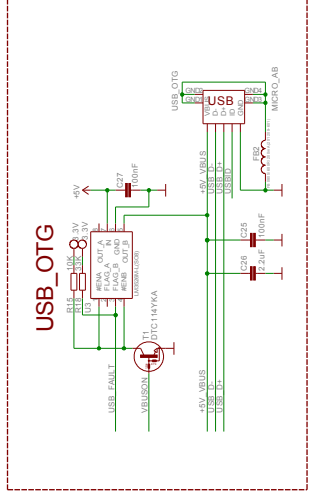
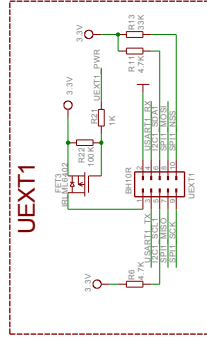
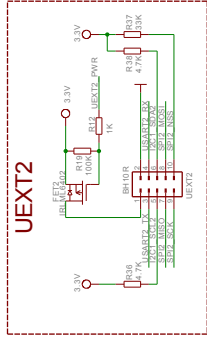
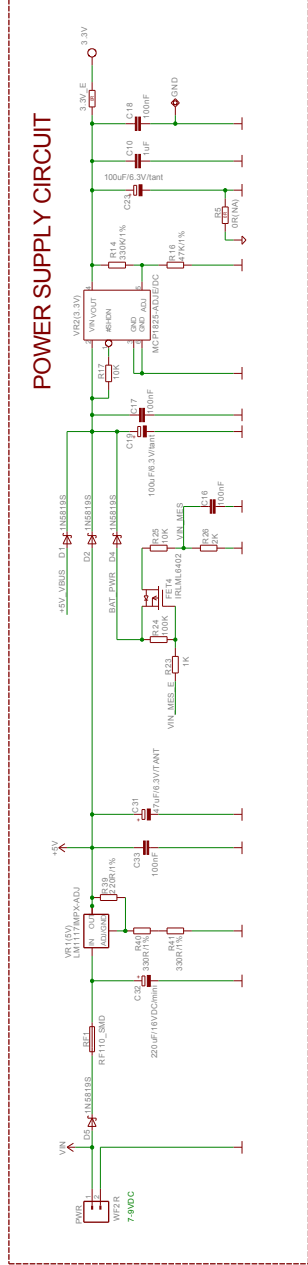
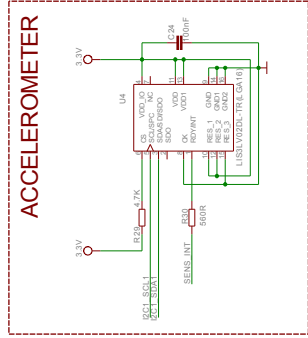
# MEMORY MAP



**Note 1:** Memory areas are not shown to scale.

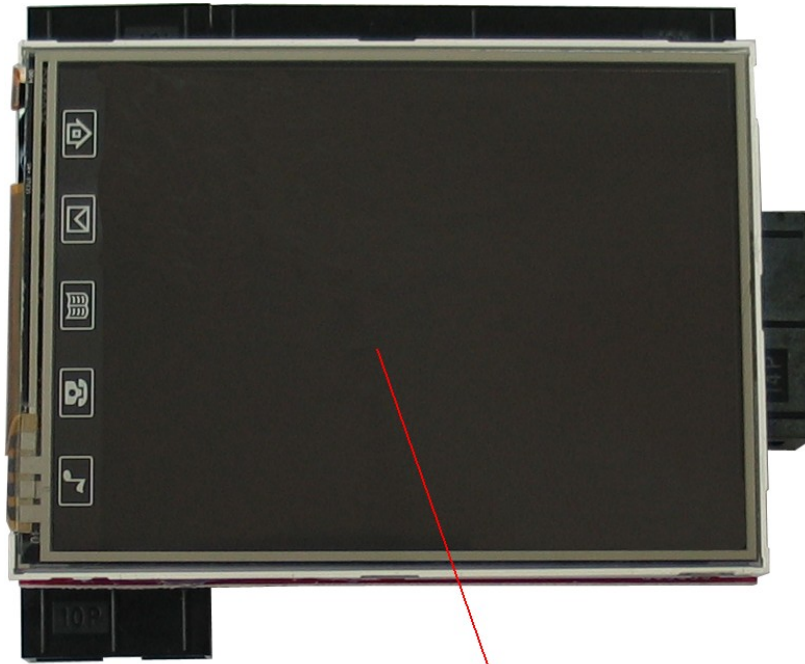
**2:** The size of this memory region is programmable and can be changed by initialization code provided by end-user development tools (refer to the specific development tool documentation for information).

# SCHEMATIC

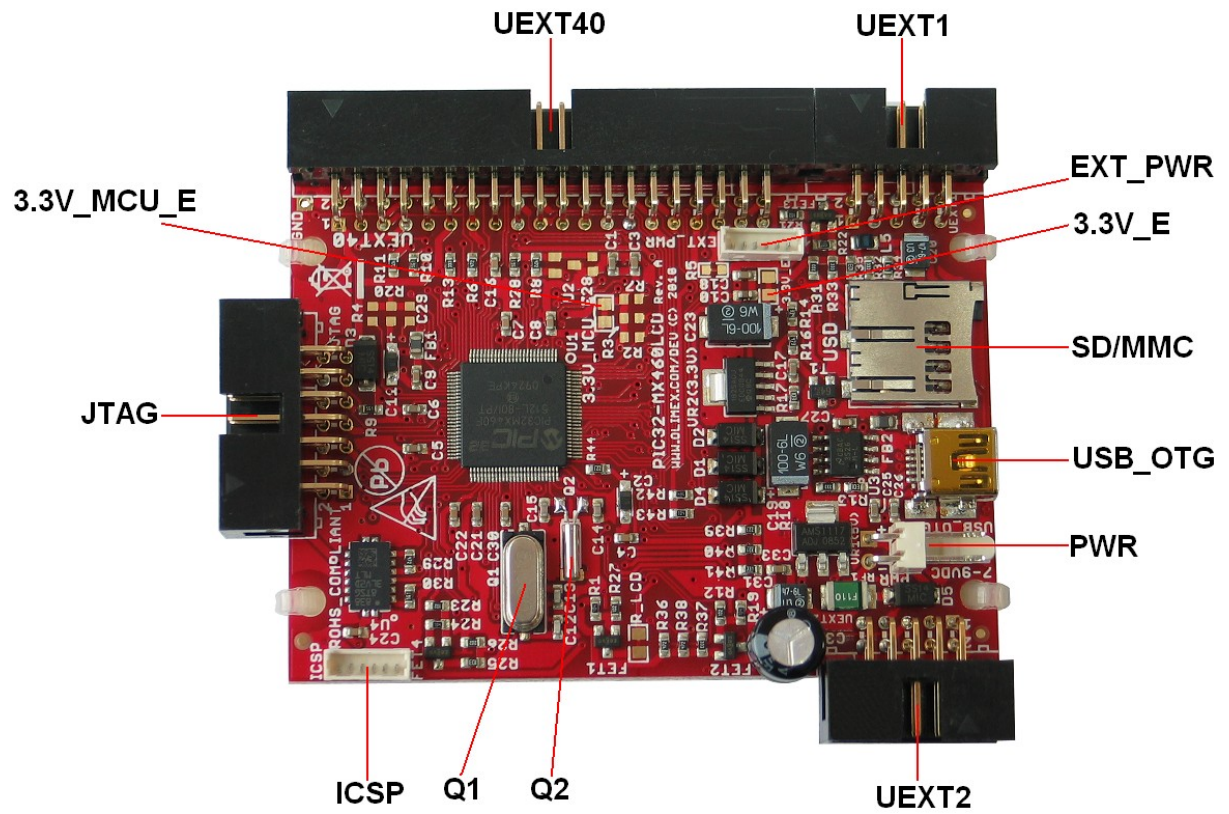


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# BOARD LAYOUT



LCD





## POWER SUPPLY CIRCUIT

PIC32-MX460LCD can take power from three sources:

- PWR connector where (7-9) V DC is applied by external power source.
- +5V\_VBS from USB OTG.
- EXT\_PWR pin 3 (BAT\_PWR), where power can be applied by the GSM battery of our module – MOD\_GSM, when it is connected to the board

The board power consumption is: about 20 mA with all peripherals and MCU running at full speed.

## RESET CIRCUIT

PIC32-MX460LCD reset circuit includes PIC32MX460F512L pin 13 (#MCLR), ICSP pin 1, through resistor 560 – JTAG pin 11 and UEXT40 pin 32.

## CLOCK CIRCUIT

Quartz crystal 8 MHz is connected to PIC32MX460F512L pin 63 (OSC1/CLKI/RC12) and pin 64 (OSC2/CLKO/RC15) .

Quartz crystal 32.768 KHz is connected to PIC32MX460F512L pin 73 (SOSCI/CN1/RC13) and pin 74 (SOSCO/TICK/CN0/RC14).

## JUMPER DESCRIPTION

### 3.3V\_E



Enable 3.3V board power supply.  
Default state is closed.

### 3.3V\_MCU\_E



Enable PIC32MX460F512L 3.3V power supply.  
Default state is closed.

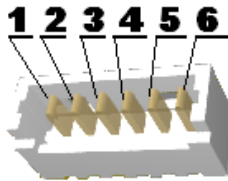
## INPUT/OUTPUT

TFT LCD 320x240 with touch screen

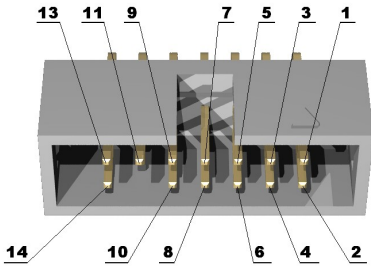
# EXTERNAL CONNECTORS DESCRIPTION

## ICSP

#Pin	Signal Name
1	RST
2	3.3V
3	GND
4	PGD2
5	PGC2
6	NC



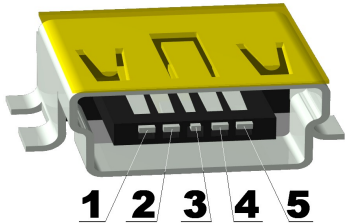
## JTAG



#Pin	Signal Name	#Pin	Signal Name
1	NC	2	GND
3	TDI	4	GND
5	TDO	6	GND
7	TMS	8	GND
9	TCK	10	GND
11	via R9 to RST	12	Removed
13	NC	14	3.3V

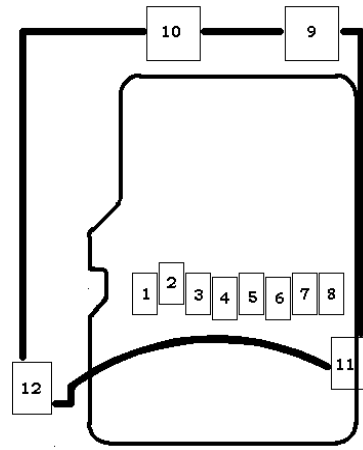
## USB OTG

Pin #	Signal Name
1	GND
2	USBID
3	USB_D+
4	USB_D-
5	+5V_VBUS



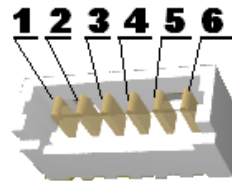
## SD/MMC

Pin #	Signal Name
1	Pull-up
2	SD_CS
3	SPI2_MOSI
4	VDD (power supply)
5	SPI2_SCK
6	GND
7	SPI2_MISO
8	Pull-up
9	Not connected
10	Not connected
11	Not connected
12	Not connected



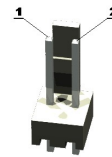
### EXT PWR

#Pin	Signal Name
1	+5V_VBUS
2	GND
3	BAT_PWR
4	NC
5	NC
6	NC



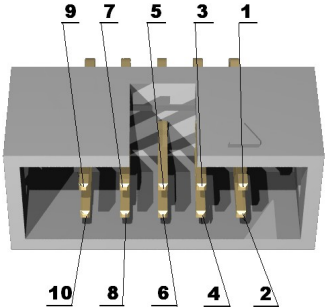
### PWR

Pin #	Signal Name
1	VIN
2	GND



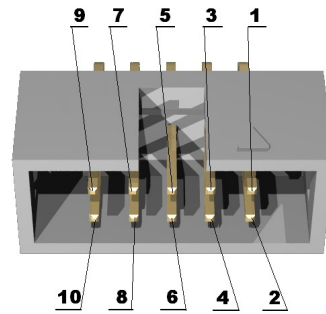
# UEXT1

Pin #	Signal Name
1	UEXT1_PWR
2	GND
3	USART1_TX
4	USART1_RX
5	I2C1_SCL1
6	I2C1_SDA1
7	SPI1_MISO
8	SPI1_MOSI
9	SPI1_SCK
10	SPI1_NSS

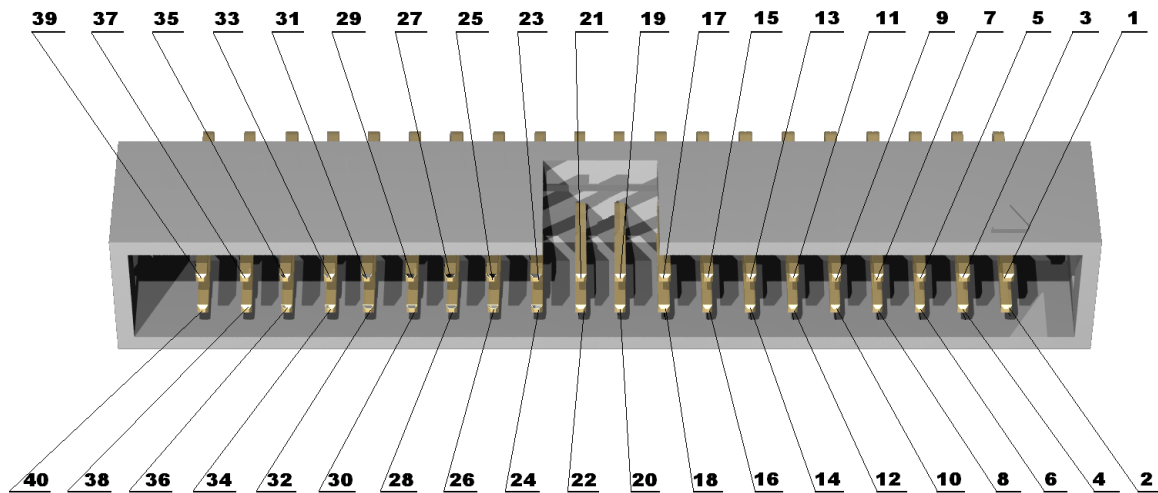


## UEXT2

Pin #	Signal Name
1	UEXT2_PWR
2	GND
3	USART2_TX
4	USART2_RX
5	I2C1_SCL2
6	I2C1_SDA2
7	SPI2_MISO
8	SPI2_MOSI
9	SPI2_SCK
10	SPI2_NSS



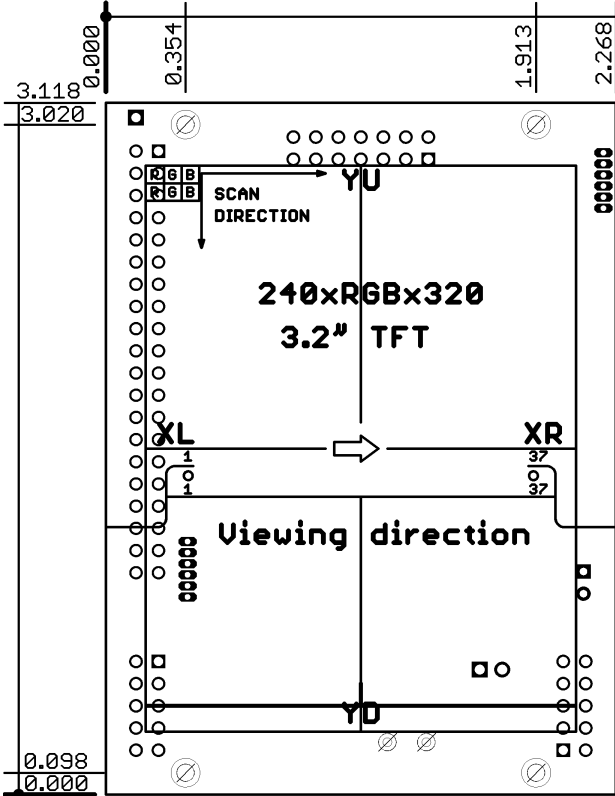
## UEXT40



Pin #	Signal Name	Pin #	Signal Name
1	3,3V	2	GND
3	USART1_TX	4	USART1_RX
5	I2C1_SCL1	6	I2C1_SDA1
7	SPI1_MISO	8	SPI1_MOSI
9	SPI1_SCK	10	SPI1_NSS
11	3,3V	12	GND
13	+5V	14	VIN

15	RA9	16	RA7
17	RD8	18	RD3
19	RD2	20	RD1
21	RD15	22	RF13
23	RF12	24	RG14
25	RG13	26	RG12
27	RB15	28	RB13
29	RB12	30	RB11
31	3.3V_A	32	RST
33	AGND	34	AN0
35	VREF+	36	AN1
37	RB8	38	AN2
39	RB10	40	AN4

# MECHANICAL DIMENSIONS



All measures are in Inches.

## AVAILABLE DEMO SOFTWARE

- PIC32-MX460LCD demo.zip



## ORDER CODE

**PIC32-MX460LCD - completely assembled and tested.**

**How to order?**

**You can order to us directly or by any of our distributors.**

**Check our web [www.olimex.com/dev](http://www.olimex.com/dev) for more info.**

### Revision history:

REV. A - create December 2009

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