# MYD-Y6ULX-HMI
# Product Manual

Version 1.0

2018.11.5

Version History

| Version | Description | DATE |
|---|---|---|
| V1.0 | Initial version | 2018.11.5 |
| | | |

# Table of Contents

# 1.Product Abstract

This document is hardware product manual for the MYD-Y6ULX-HMI development board based on the NXP Semiconductor i.MX 6UL/6ULL application processor.

MYD-Y6ULX-HMI development board are consists of a CPU module MYC-Y6ULX ,a base board MYB-Y6ULX-HMI. In addition, some accessories include Expansion Board,Camera Board,TP and LCD screen will be supported by the MYD-Y6ULX-HMI.

MYIR provides four development kits as follows:

- MYD-Y6ULY2-256N256D-50-C-HMI

  The development kit includes MYC module and base board.

  It's Working temperature is in a range form 0 to 70 celsius.

- MYD-Y6ULY2-256N256D-50-I-HMI

  The development kit includes MYC module and base board.

  It's Working temperature is in a range form -40 to 85 celsius.

- MYD-Y6ULY2-256N256D-50-C-CHMI

  The development kit includes MYC module,base board and 7 inch LCD with capacitive touch function.

  The PCBA's Working temperature is in a range form 0 to 70 celsius, but the LCD can work at temperature form -10 to 60 celsius. So the whole kit can work at temperature form 0 to 60 celsius.

- MYB-Y6ULX-HMI-4GEXP

  This kit includes a expansion board. The most significant function of expansion board is that wireless communication can be supported . Please be noted that it can't work without a base board.

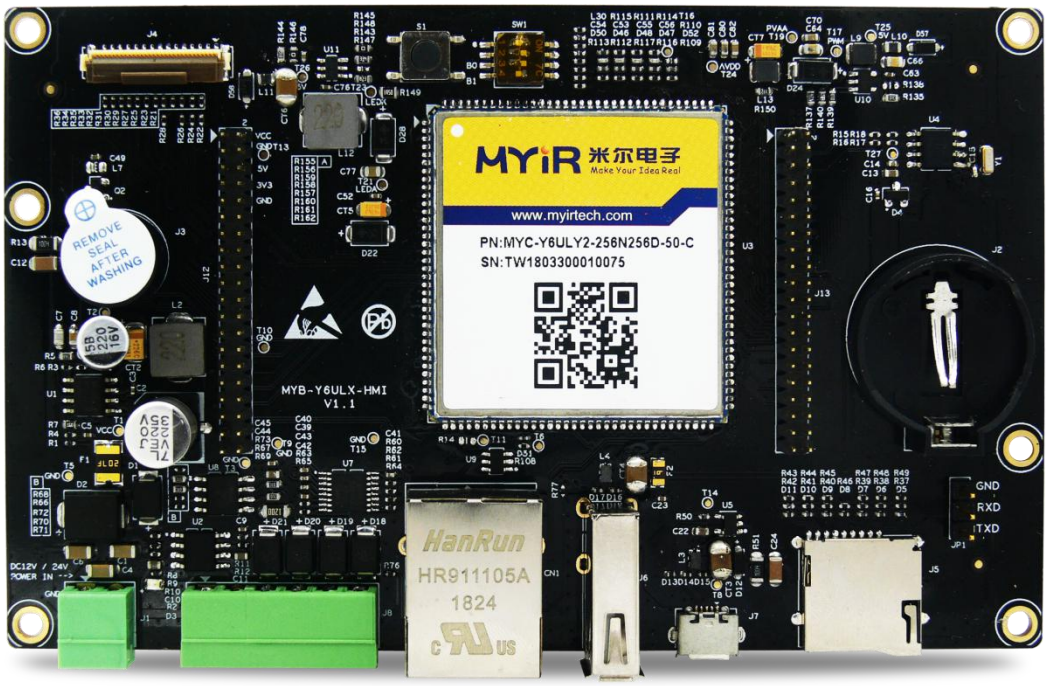


Figure 1.1 MYD-Y6ULX-HMI

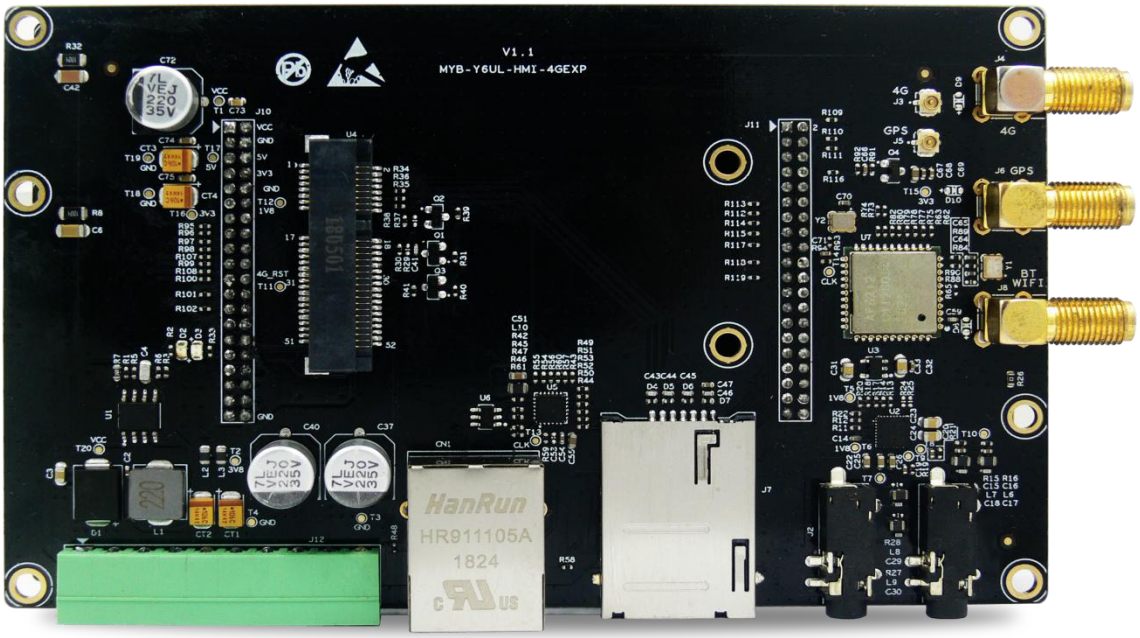


Figure 1.2 MYB-Y6ULX-HMI-4GEXP

Figure 1.3 MYD-Y6ULX-HMI & MYB-Y6ULX-HMI-4GEXP

- MYC-Y6ULX, the module which equips with imx6ul/6ull processor , DDR3 , Flash, and one ethernet PHY chip.
- MYB-Y6ULX-HMI, as a base board (mother board) for MYC-Y6ULX. It provides RS232,RS485, Ethernet,USB, Micro SD,LCD and so on.
- MYB-Y6ULX-HMI-4GEXP, as an expansion board for the MYB-Y6ULX-HMI. Expansion board provides Ethernet, LTE,WIFI,Bluetooth,Audio and so on.

MYIR provides rich software resources and detailed documents with the board including user manuals, schematic of the base board, peripheral drivers, BSP source packages, development tools and other related information.

MYIR choose MCIMX6G2CVM05AB and MCIMX6Y2DVM05AA chip with 14 x 14mm, 0.8 mm ball pitch, 289 MAPBGA package on the MYC-Y6ULX by default.

The i.MX6ULL/6UL application processor on the MYC-Y6ULX board provides multiple compatible options of Y0, Y1, Y2, G0, G1, G2 and G3 sub families.MYIR provides the following four part numbers by default.

| Part | MYC-Y6ULY2-256N256D-50-I | MYC-Y6ULY2-256N256D-50-C | MYC-Y6ULY2-4E512D-50-C | MYC-Y6ULY2-4E512D-50-I |
|---|---|---|---|---|
| MPU | MCIMX6Y2CVM05AA | MCIMX6Y2DVM05AA | MCIMX6Y2DVM05AA | MCIMX6Y2CVM05AA |
| RAM | 256MB DDR3 | 256MB DDR3 | 512MB DDR3 | 512MB DDR3 |
| Flash | 256MB Nand Flash | 256MB Nand Flash | 4GB eMMC | 4GB eMMC |
| WiFi | Support | Support | Reused SDIO with eMMC | Reused SDIO with eMMC |
| Working Temp. | -40 to +85 Celsius | 0 to +70 Celsius | 0 to +70 Celsius | -40 to +85 Celsius |

Table 1.1 Part Numbers of MYC-6ULX (default configurations)

*MYIR offers customization on optional CPU and memory size configuration in bulk orders.*

The differences between these chips are as follows,

| Feature | MCIMX6G0 | MCIMX6G1 | MCIMX6G2 | MCIMX6G3 |
|---|---|---|---|---|
| **Speed** | 528 MHz | 528 MHz, 700 MHz | 528 MHz, 700 MHz | 528 MHz |
| **Cache** | 32 KB-I, 32 KB-D | 32 KB-I, 32 KB-D<br>128 KB L2 | 32 KB-I, 32 KB-D<br>128 KB L2 | 32 KB-I, 32 KB-D<br>128 KB L2 |
| **OCRAM** | 128 KB | 128 KB | 128 KB | 128 KB |
| **DRAM** | 16-bit LP-DDR2, DDR3/DDR3L | 16-bit LP-DDR2, DDR3/DDR4L | 16-bit LP-DDR2, DDR3/DDR5L | 16-bit LP-DDR2, DDR3/DDR6L |
| **eFuse** | 512-bit | 1024-bit | 1536-bit | 2048-bit |
| **NAND (BCH40)** | Yes | Yes | Yes | Yes |
| **EBI** | Yes | Yes | Yes | Yes |
| **Ethernet** | 10/100-Mbit/s x 1 | 10/100-Mbit/s x 1 | 10/100-Mbit/s x 2 | 10/100-Mbit/s x 2 |
| **USB** | OTG, HS/FS x 1 | OTG, HS/FS x 2 | OTG, HS/FS x 2 | OTG, HS/FS x 2 |
| **CAN** | 0 | 1 | 2 | 2 |

| | | | | |
|---|---|---|---|---|
| **Security** | Basic | TRNG, Crypto Engine (AES/TDES/SHA), Secure Boot | TRNG, Crypto Engine (AES/TDES/SHA), Secure Boot | TRNG, Crypto Engine (AES with DPA/TDES/SHA/RSA), Secure Boot, tamper monitor, PCI4.0 pre-certification, OTF DRAM encryption |
| **Graphic** | None | None | PxP | PxP |
| **CSI** | None | None | 24-bit Parallel CSI | 24-bit Parallel CSI |
| **LCD** | None | None | 24-bit Parallel LCD | 24-bit Parallel LCD |
| **Quad SPI** | 1 | 1 | 1 | 1 |
| **SDIO** | 2 | 2 | 2 | 2 |
| **UART** | 4 | 8 | 8 | 8 |
| **I2C** | 2 | 4 | 4 | 4 |
| **SPI** | 2 | 4 | 4 | 4 |
| **I2S/SAI** | 1 | 3 | 3 | 3 |
| **S/PDIF** | 1 | 1 | 1 | 1 |
| **Timer/PWM** | Timer x 2, PWM x 4 | Timer x 4, PWM x 8 | Timer x 4, PWM x 8 | Timer x 4, PWM x 8 |
| **12-bit ADC** | 1 x 10-ch. | 1 x 10-ch. | 2 x 10-ch. | 2 x 10-ch. |

Table 1.2 i.MX6UL Processor Resource Comparison

| Feature | MCIMX6Y0 | MCIMX6Y1 | MCIMX6Y2 |
|---|---|---|---|
| **Core** | ARM® Cortex-A7 | ARM® Cortex-A7 | ARM® Cortex-A7 |
| **Speed** | 500 MHz | 500 MHz | 500/800/900 MHz |
| **Cache** | 32 KB-I, 32 KB-D | 32 KB-I, 32 KB-D 128 KB L2 | 32 KB-I, 32 KB-D 128 KB L2 |
| **OCRAM** | 128 KB | 128 KB | 128 KB |
| **DRAM** | 16-bit LP-DDR2, DDR3/DDR3L | 16-bit LP-DDR2, DDR3/DDR4L | 16-bit LP-DDR2, DDR3/DDR5L |

| | | | |
|---|---|---|---|
| **eFuse** | 256-bit | 256-bit | 256-bit |
| **NAND (BCH40)** | Yes | Yes | Yes |
| **EBI** | Yes | Yes | Yes |
| **Ethernet** | 10/100-Mbit/s x 1 | 10/100-Mbit/s x 1 | 10/100-Mbit/s x 2 |
| **USB** | OTG, HS/FS x 1 | OTG, HS/FS x 2 | OTG, HS/FS x 2 |
| **CAN** | 0 | 1 | 2 |
| **Graphic** | None | None | PxP |
| **CSI** | None | None | 16-bit Parallel CSI |
| **LCD** | None | None | 24-bit Parallel LCD |
| **Quad SPI** | 1 | 1 | 1 |
| **SDIO** | 2 | 2 | 2 |
| **UART** | 4 | 8 | 8 |
| **I2C** | 2 | 4 | 4 |
| **SPI** | 2 | 4 | 4 |
| **I2S/SAI** | 1 | 3 | 3 |
| **ESAI** | 1 | 1 | 1 |
| **S/PDIF** | 1 | 1 | 1 |
| **Timer/PWM** | Timer x 2, PWM x 4 | Timer x 4, PWM x 8 | Timer x 4, PWM x 8 |
| **12-bit ADC** | 1 x 10-ch. | 1 x 10-ch. | 2 x 10-ch. |
| **Security** | None | AES-128, HAB | AES-128, HAB |
| **Temperature** | -40°C to 105°C (Tj) | -40°C to 105°C (Tj) | -40°C to 105°C (Tj) |

Table 1.3 i.MX6ULL Processor Resource Comparison

# 2. Hardware Characteristics

## 2.1 CPU Module Resource

MYC-Y6ULX CPU module is compatible with i.MX 6UL and i.MX 6ULL series processors. The board with high-speed circuit board design, which integrates processor, DDR, NAND Flash, eMMC, Ethernet PHY and power management circuit on the PCB size of 37 x 39 mm. Please refer to the below Figure 2.1 for detail.

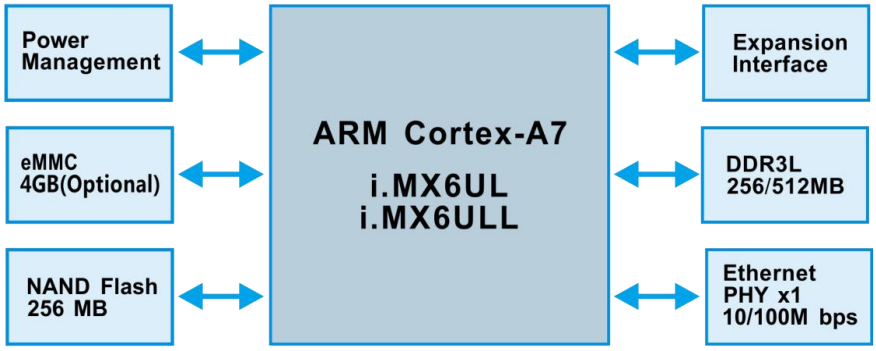


Figure 2.1 Function Block Diagram of MYC-Y6ULX

- **Processor**
  - MCIMX6G2CVM05AB/MCIMX6Y2DVM05AA
- **Memory**
  - 256MB/512MB DDR3L
  - 4GB eMMC Flash (Reuse with NAND Flash)
  - 256MB NAND Flash (Reuse with eMMC)
- **Peripherals**
  - 10/100 Ethernet PHY
  - Expansion connector (Up to 97 x GPIOs)

## 2.2 Base Board Resources

The MYB-Y6ULX-HMI base board (which perhaps called mother board) can not work without MYC-Y6ULX. The power supply for the board can be DC 12V or 24V . The features of the base board are shown in Figure 2.2 .

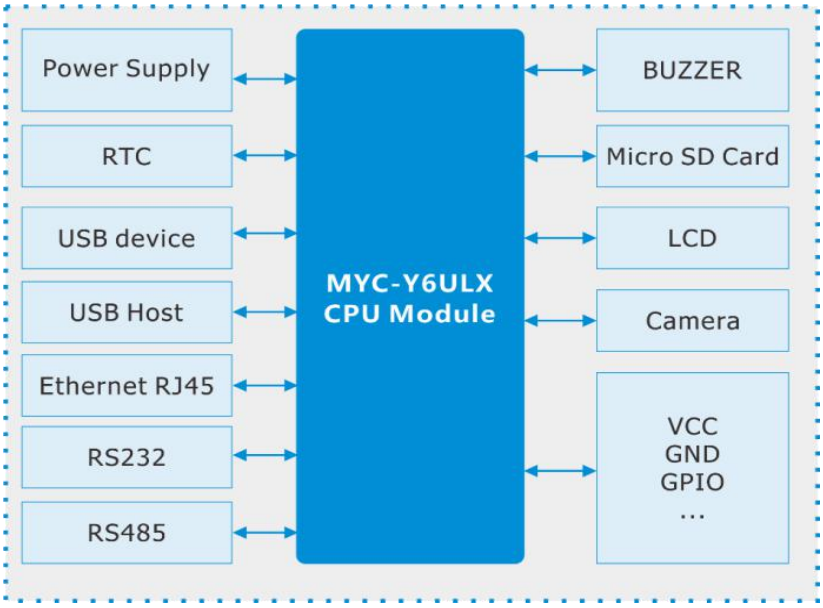


Figure 2.2 MYB-Y6ULX-HMI Base Board

- Serial ports
  - 1 x Debug serial port (TTL)
  - 1 x RS485 serial port
  - 1 x 3-wire RS232 serial port
- USB
  - 1x USB2.0 Host ports
  - 1 x Micro USB2.0 OTG ports
- 1 x 10/100 Mbps Ethernet interfaces
- 1 x Camera interface
- 1 x Micro SD card slot
- 1 x LCD interface
- 1 x RTC IC (PCF8563) with battery holder
- 1 x Reset Button
- 1 x LED (for power indicator)
- 2 x male connectors, and each connector has two rows with 20 pin in one row. The pin pitch is 2.0mm.

## 2.3 Expansion Board Resources

The MYB-Y6ULX-HMI-4GEXP Expansion board can be assembled on the base board through the expansion connector . Figure 2.3 shows the resource of Expansion board.

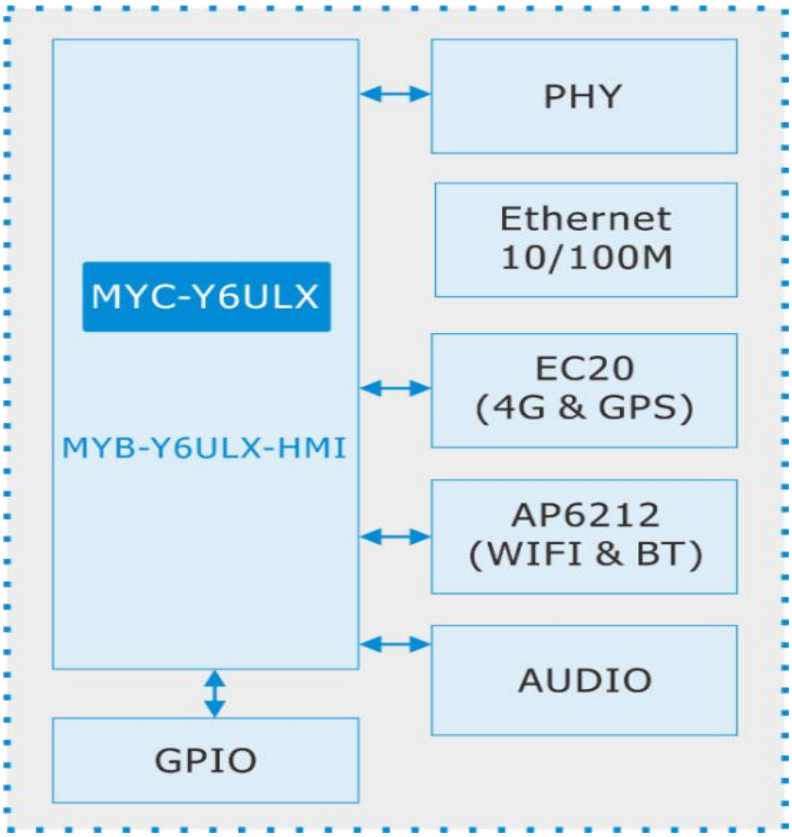


Figure 2.3 Resource of Expansion Board

- 1 x Mini PCI-E USB LTE module interface (external SMA antenna)
- 1 x SIM card socket
- 1 x AP6212 module ( include WIFI and Bluetooth with external SMA antenna)
- 1 x 10/100 Mbps Ethernet interface
- Audio input/output port (3.5mm jack)
- 1 x LED ( power indicator LED)
- 2 x Female connectors, and each connector has two rows with 20 pin in one row. The pin pitch is 2.0mm.

# 3. Interfaces

## 3.1 Interface of CPU Module Board

The MYC-Y6ULX CPU module is connected to the base board by 1.0mm pitch 140-pin surface mount pads. Please refer to the pin assignment as below.

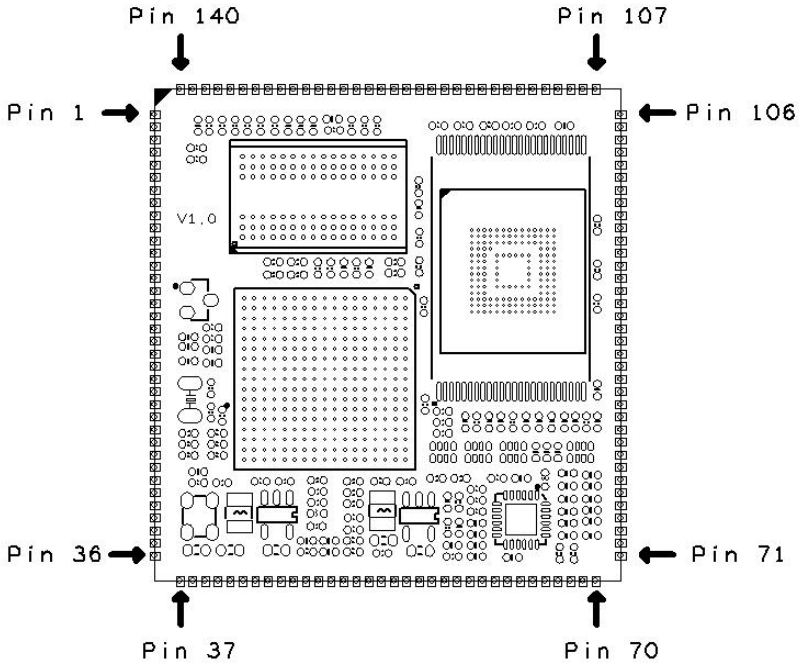


Figure 3.1 MYC-Y6ULX Pin Assignment

## 3.2 PIN List

Please refer to the PIN-Out description document *MYC-Y6ULX Pin-List*, which is provided in the CD-ROM of the development kit.

## 3.3 Peripheral Interfaces of Base Board

MYD-Y6ULX-HMI provides many kinds of interfaces that are showed as figure 3.2.

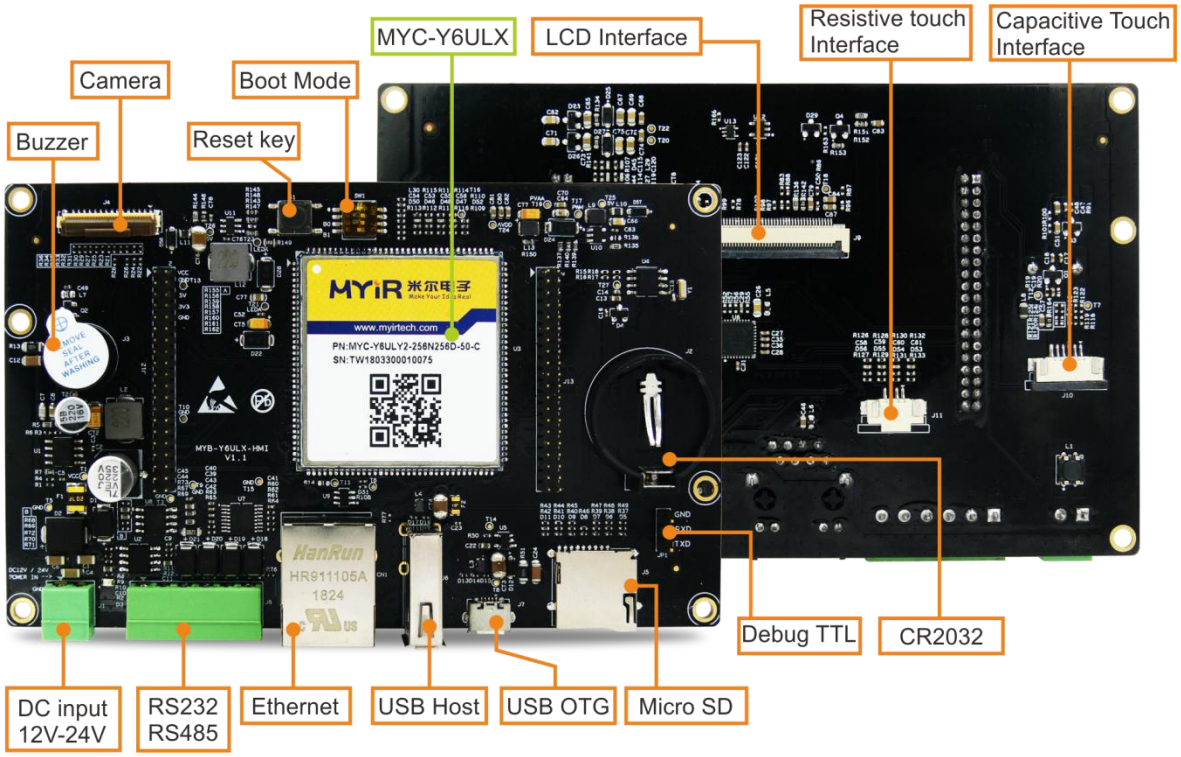


Figure 3.2 MYD-Y6ULX-HMI

Please refer to the interface list as below.

| Interface | Designator | Description |
|---|---|---|
| CPU Module | U3 | MYC-Y6ULX CPU module |
| Power Supply Input | J1 | 12V or 24 DC power input, 3.81mm pin pitch connector |
| Camera | J4 | 8 Bit Camera interface |
| RS232 / RS485 | J8 | RS232,RS485. 3.81mm x 6 PIN connector |
| Ethernet1 | CN1 | 10/100Mbps ethernet interface |
| Debug UART | JP1 | Debug serial port, 3.3V level |
| USB OTG | J7 | Micro USB OTG interface |

| | | |
|---|---|---|
| USB Host | J6 | USB host interface |
| Micro SD Card | J5 | 4 bit micro SD Card interface |
| Battery | J2 | RTC battery holder |
| LCD | J9 | 16-bit true color |
| Reset button | S1 | Reset button |
| LED | D3 | Power LED |
| Expansion Header | J12,J13 | Expansion IO header,2.0mm pitch |

Figure 3.1 List of MYD-Y6ULX-HMI Resources

## 3.4 Peripheral Interfaces of Expansion Board

Expansion board can be easily mounted on or divided from the base board due to the double row connectors. Expansion board provides the resource as follows.

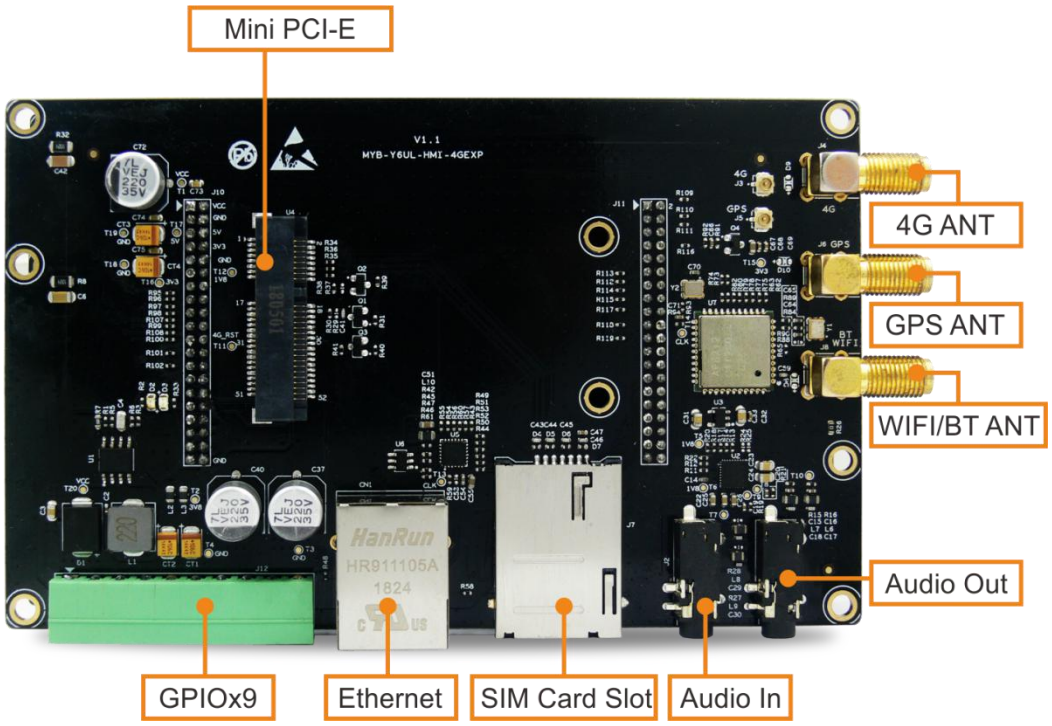


Figure 3.3 MYB-Y6ULX-HMI-4GEXP

Please refer to the interface list as below.

| Interface | Designator | Description |
|---|---|---|
| 10 Pin Connector | J12 | 3.81mm pin pitch.<br>9 GPIO can be provided |
| Ethernet 2 | CN1 | 10/100Mbps ethernet interface |
| Audio | J1 | 3.5mm stereo audio output port for headphone |
| | J2 | 3.5mm audio line in input |
| LED | D2 | Power LED |
| 4G Module | U4 | Mini PCI-E USB LTE module interface |
| SIM Card | J7 | SIM Card interface |
| 4G Antenna | J4 | SMA antenna interface for LTE |
| GPS Antenna | J6 | SMA antenna interface for GPS |
| WiFi Antenna | J8 | SMA antenna interface for WiFi & Bluetooth |
| Expansion Header | J10,J11 | Female connector. |

Figure 3.2 List of MYB-Y6ULX-HMI-4GEXP Resources

# 4. Hardware Design

## 4.1 Hardware Design of CPU Module board

Please refer to the document *MYC-Y6ULX Product Manual* for detail information.

## 4.2 Hardware Design of MYB-Y6ULX-HMI

### 4.2.1 Power supply

The power input for MYB-Y6ULX-HMI can be 12V or 24V which can supply whole board power.Please refer to Figure 4.1 for detail.

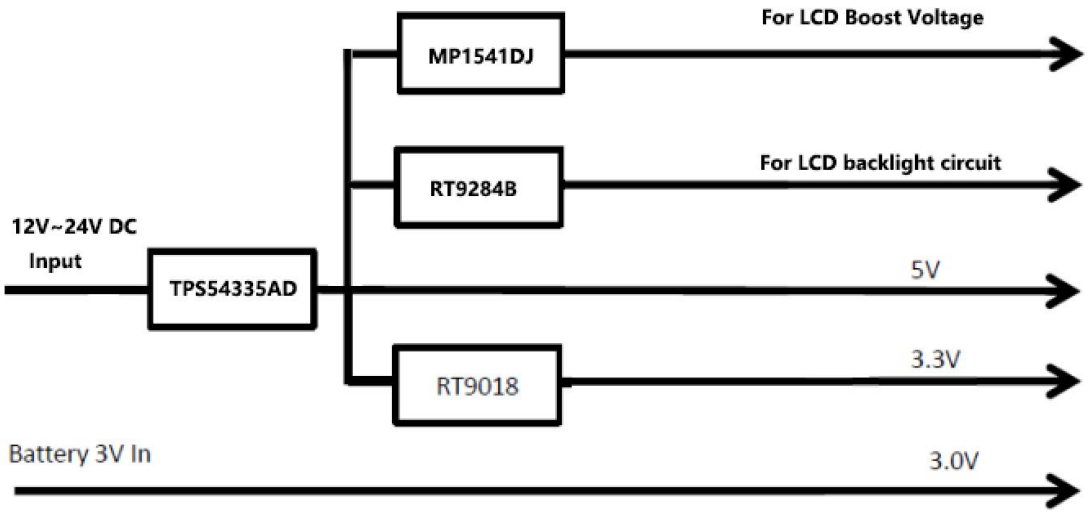


Figure 4.1 MYB-Y6ULX-HMI Power Tree

DCDC provides higher efficiency of power conversion and reduce the power consumption of the board. LDO regulator with part number RT9018 is used for 5V to 3.3V. LDO can provide smaller power ripple than the DCDC converter. The RTC battery is for RTC function when the external DC power is not exist.

### 4.2.2 Boot configure switch

The boot process begins at the Power-On Reset (POR) where the hardware reset logic

forces the ARM core to begin the execution starting from the on-chip boot ROM. The boot ROM code uses the state of the internal register BOOT_MODE[1:0] as well as the state of various eFUSEs and/or GPIO settings to determine the boot flow behavior of the device. MYD-Y6ULX-HMI is equipped with a 4 bit switch to change the boot device.

Please refer to the schematic for the boot state as below,

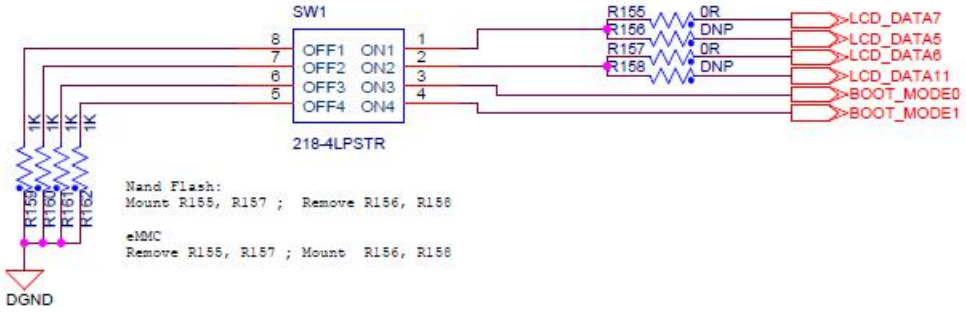


Figure 4.2 Boot Configure Switch

There are some differences between the NAND Flash version and the eMMC version in the boot configure and the hardware.

For NAND Flash version, remove R156 and R158, mount R155 and R157.

For eMMC version, remove R155 and R157, mount R156 and R158.

Bit1 and Bit2 are used to select boot device. Please refer NAND Flash version setting as below.

| Switch | BIT1 | BIT2 |
|---|---|---|
| SD Card | ON | OFF |
| NAND Flash | OFF | ON |

Table 4.1 NAND Flash Version Boot Configure

Please refer eMMC version setting as below,

| Switch | BIT1 | BIT2 |
|---|---|---|
| SD Card | ON | ON |
| eMMC | OFF | OFF |

Table 4.2 eMMC Version Boot Configure

Bit3 and Bit4 are used to select boot type, please refer the setting as below,

| Switch | | Boot TYPE |
|---|---|---|
| BIT4 | BIT3 | |

| | | |
|---|---|---|
| ON | ON | Boot From Fuses |
| ON | OFF | Serial Downloader |
| OFF | ON | Internal Boot |
| OFF | OFF | Reserved |

Table 4.3 Boot Type Configure

### 4.2.3 Ethernet

MYB-Y6ULX-HMI is equipped with one ethernet operating at 10/100 Mbps, which offering standard RJ45 connector (With voltage transformer inside the socket). MYC-Y6ULX has Integrated a PHY chip (LAN8720A). The ethernet 1 circuit on base board has been greatly simplified by using the PHY. Proper protection circuit can be added when customer developing your own base board.

Please refer to the SCH of the ethernet 1 of base board as below.

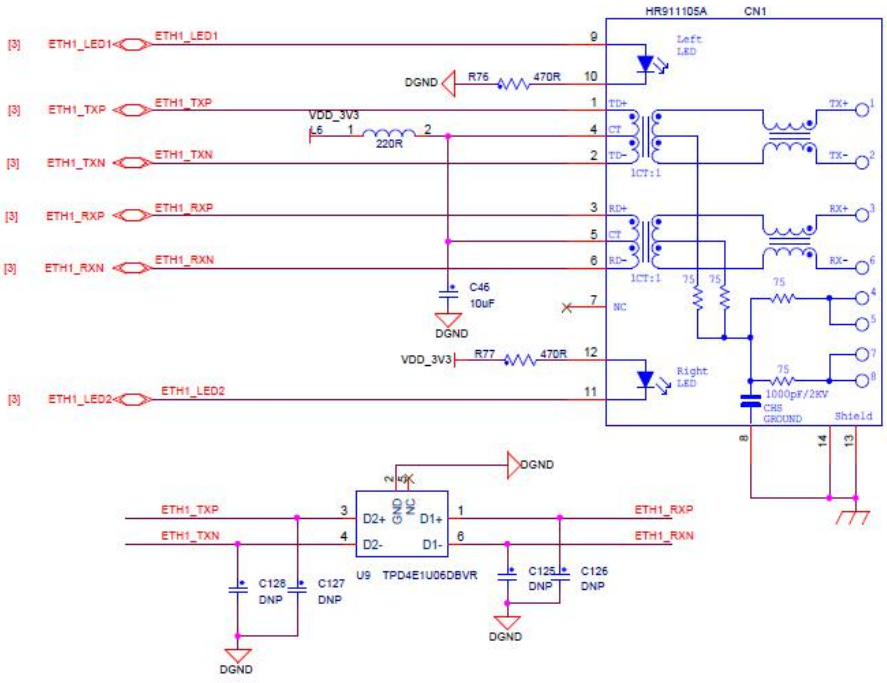


Figure 4.3 Ethernet Circuit

## 4.2.4 USB

i.MX6UL/6ULL processor provides two high speed (HS) USB 2.0 OTG (Up to 480 Mbps) , with integrated high speed USB PHY.OTG1 port is connected to a standard micro USB Device connector (Micro USB), which can be used as slave and host. OTG2 is connected to a USB Hub chip (USB2514/MJ from Microchip), which is used to expand four USB host controller.

MYIR design a power switch circuit on the board, and the power can be automatically switched according to the access device.Please refer to the schematic of the USB OTG of the board as below.

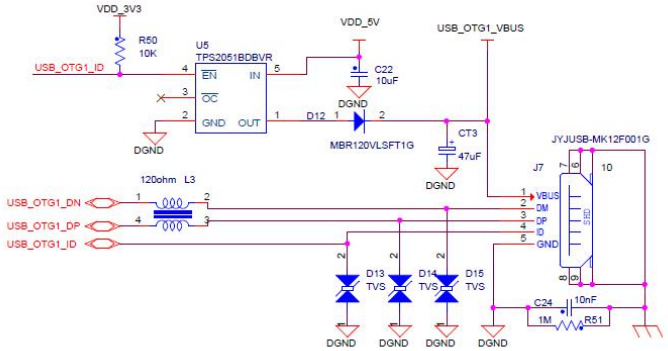


Figure 4.4 USB OTG

The schematic of the USB hub shows as follows.

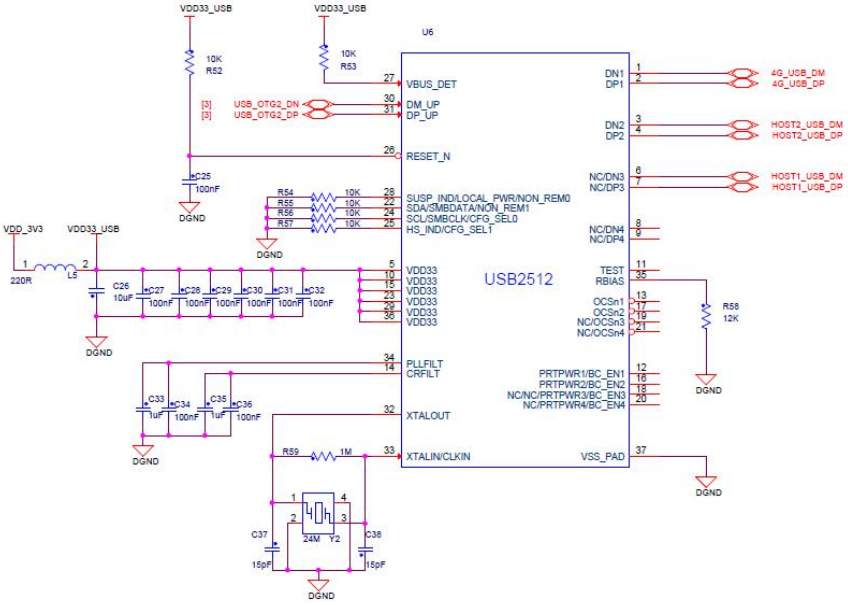


Figure 4.5 USB Hub

The base board provide one USB Host port. It shows in Figure 4.6.

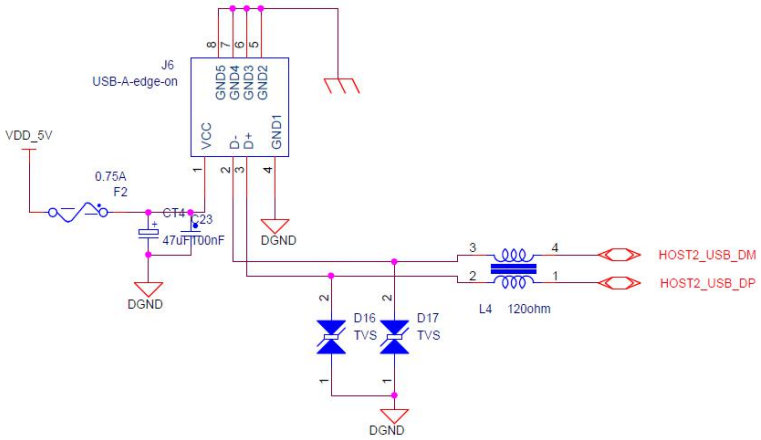


Figure 4.6 USB HOST

## 4.2.5 Camera Interface

MYB-Y6ULX-HMI is equipped with a parallel camera interface which can support 8bit parallel camera interface. The connector is a 0.5mm pitch FPC connector. Users can use MY-CAM011B camera module to evaluate this function. For a detailed description of the MY-CAM011B camera module, please refer to the user manual or visit the following website http://www.myirtech.com/list.asp?id=534

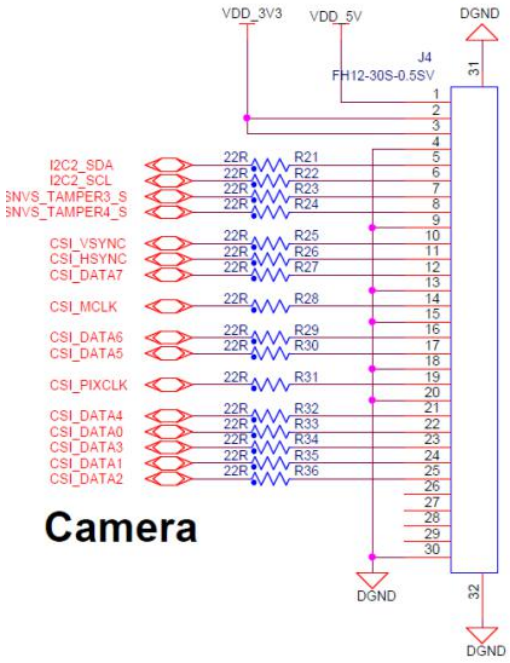


Figure 4.7 Camera Interface

## 4.2.6 LCD and TP

The i.MX6ULL / 6UL processor provides one parallel display port, support max 85 MHz display clock and up to WXGA (1366 x 768) at 60 Hz. A 50 pins FPC connector has been used for the display port on the MYB-Y6ULX-HMI. The board supports both resistive touch and capacitive touch function.

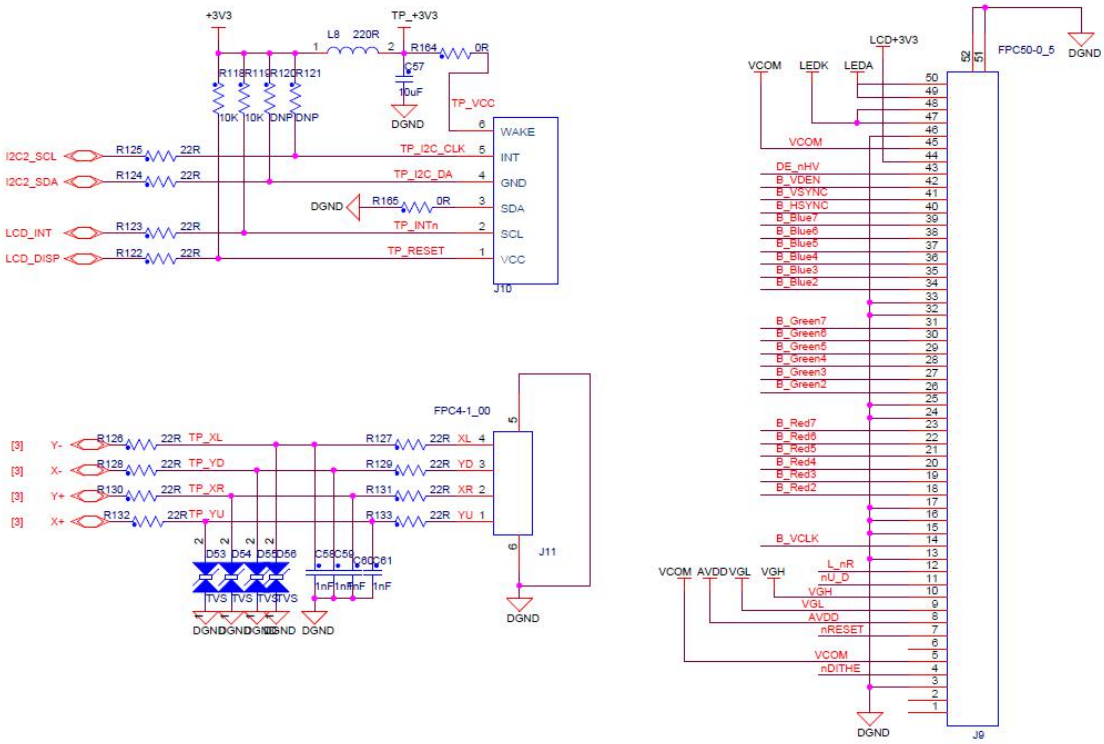


Figure 4.8 LCD and Touch Screen Interface

## 4.2.7 UART

The i.MX 6UL / 6ULL series processor supports up to 8 serial ports but with reuse on PIN signals.Below serial ports are designed on base board MYB-Y6ULX-HMI:

- One unit of RS232 communication port
- One unit of TTL debug port
- One unit of RS485 communication port

MYB-Y6ULX-HMI provides one debug serial port, can be used as a Linux terminal, debugging system. The 3 pins header with 2.54mm pitch and 3.3V LVTTL level standard

is used on the MYB-Y6ULX-HMI. Users can use USB to UART cable to connect the board and computer. MYIR provides an optional module MY-UART012U, for more information, please visit the following Web site http://www.myirtech.com/list.asp?id=537

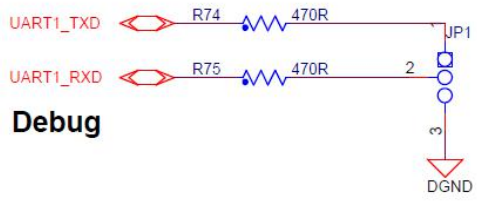


Figure 4.9 Debug Port

MYB-Y6ULX-HMI is equipped with an RS232 interface. This function is connected to the UART2 controller on the processor. The chip of the transceiver is SP3232EEY-L from EXAR. Please refer to the schematic of the RS232 below for detail.

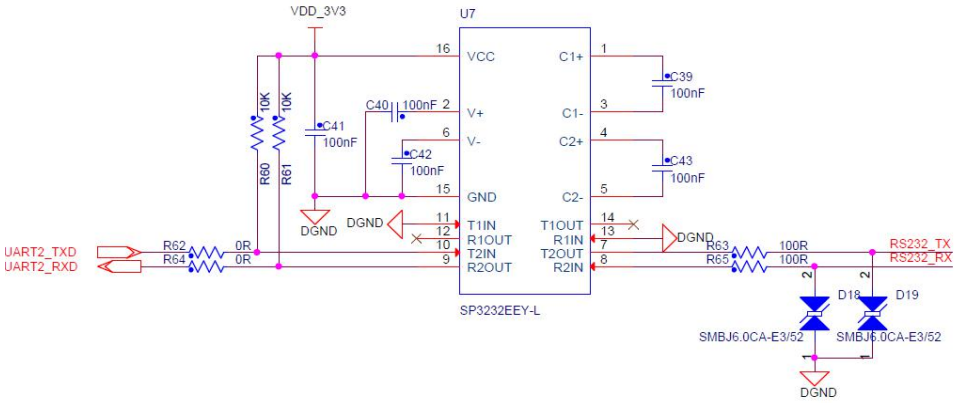


Figure 4.10 RS232 Port

The schematic of the RS485 shows in Figure 4.11.

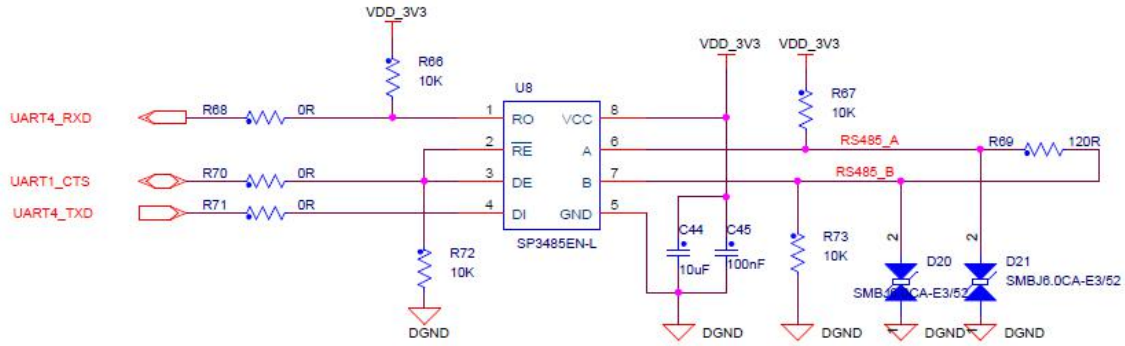


Figure 4.11 RS485 Port

## 4.2.8 RTC

MYB-Y6ULX-HMI supports both internal RTC and external RTC function. The power consumption of external RTC IC (PCF8563) is much less than the internal RTC function of i.MX 6UL/6ULL series processor. This feature is very important in some cases. In addition,a CR2032 battery holder is designed on the board.

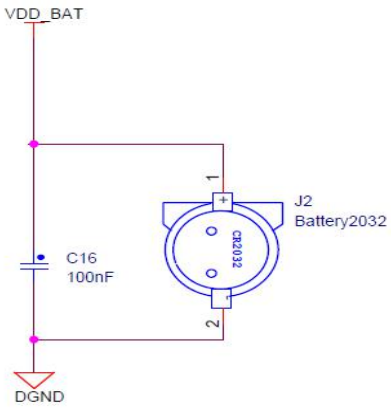


Figure 4.12 RTC Battery Holder Circuit

## 4.2.9 Micro SD Card

The i.MX6UL/6ULL processor provides two MMC/SD/SDIO card ports. SD1 is connected to a micro SD card connector (4 bit mode) on the MYB-Y6ULX-HMI. It can be used to store system booting code and other information using a micro SD card memory.

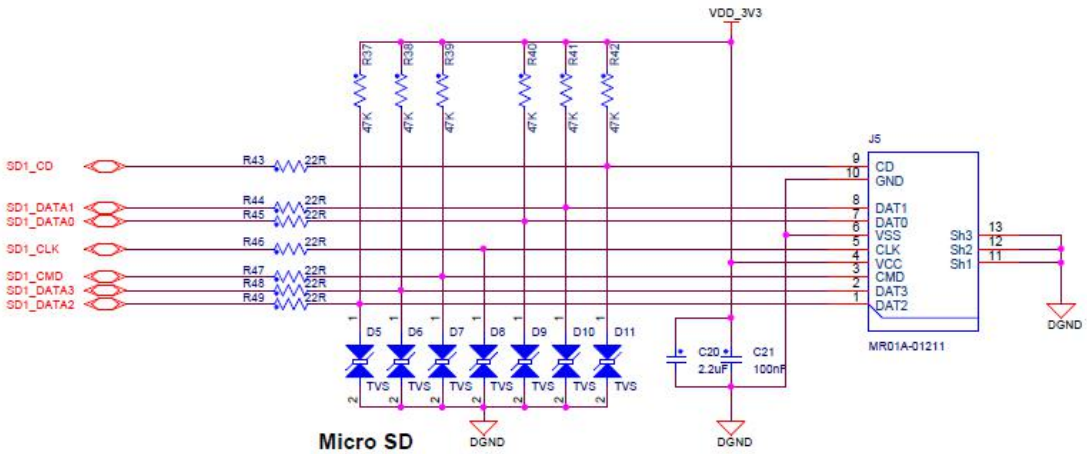


Figure 4.13 Micro SD Card

## 4.2.10 Reset

The external watchdog IC can keep the system working normally in severe EMC environment. In addition,a reset button is useful for some use case.

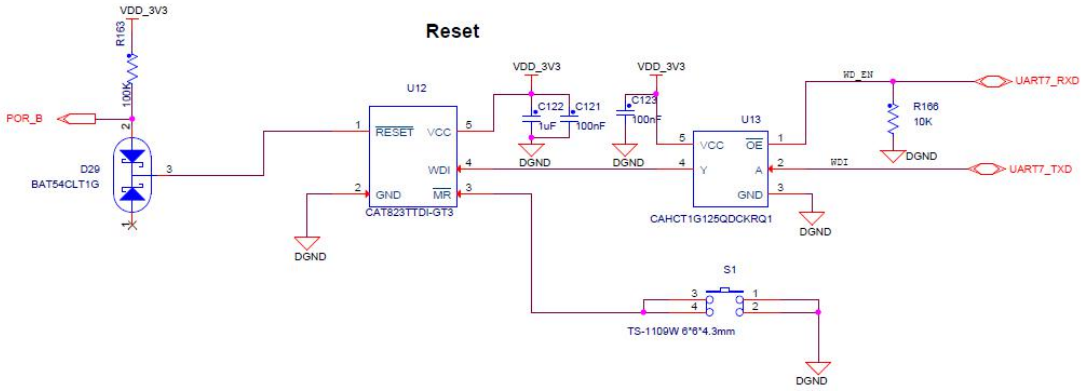


Figure 4.14 Reset circuit

## 4.2.11 Buzzer

The buzzer circuit shows in Figure 4.15.

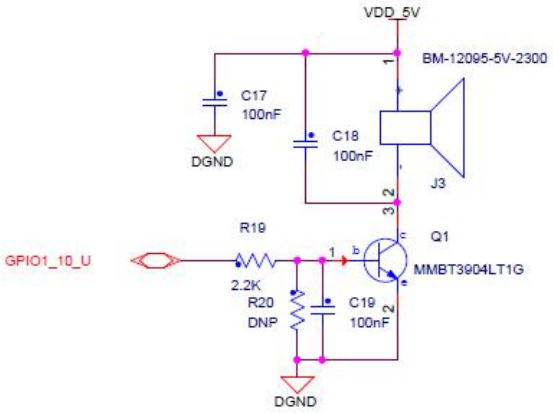


Figure 4.15 Buzzer circuit

## 4.2.12 Expansion Connector

Two male connector is equipped on board. Each connector have 2 rows with 20pin on each row. So the board will be much more flexible for extension function.

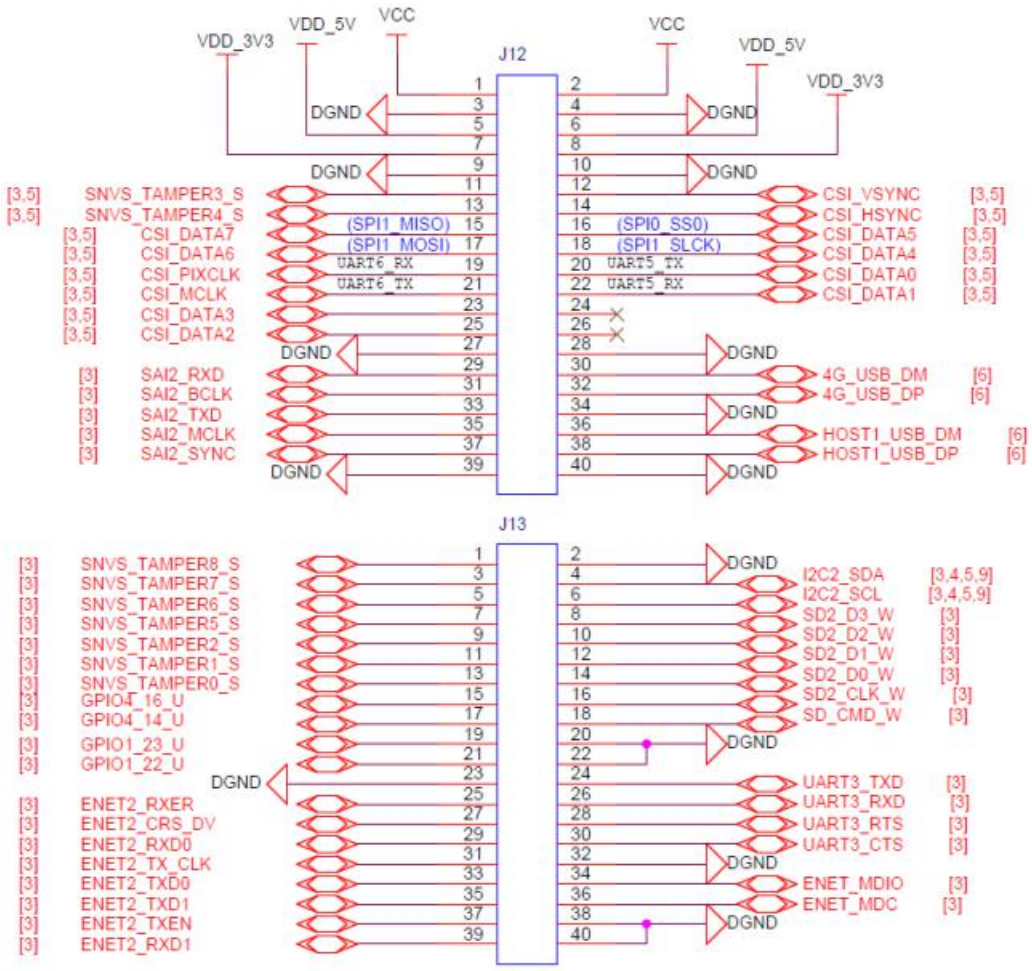


Figure 4.16 Expansion Connector

# 4.3 Hardware Design of MYB-Y6ULX-HMI-4GEXP

## 4.3.1 Ethernet

MYB-Y6ULX-HMI-4GEXP is equipped with one ethernet operating at 10/100 Mbps, which offering standard RJ45 connector (With voltage transformer inside the socket). Please refer to the SCH of the Ethernet of base board as below.

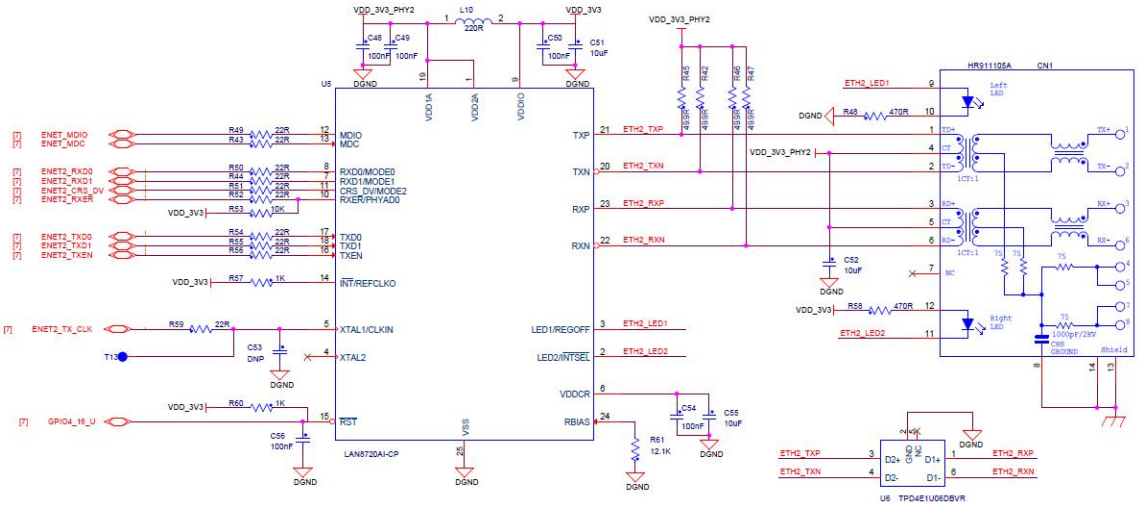

Figure 4.17 Ethernet Circuit

## 4.3.2 LTE Module

MYB-Y6ULX-HMI-4GEXP is equipped with a LTE module interface, which can support many general mini PCI-E LTE modules. The part number of the mini PCIE connector is AAA-PCI-047 from LOTES.

Refer to the schematic of LTE module interface as below.

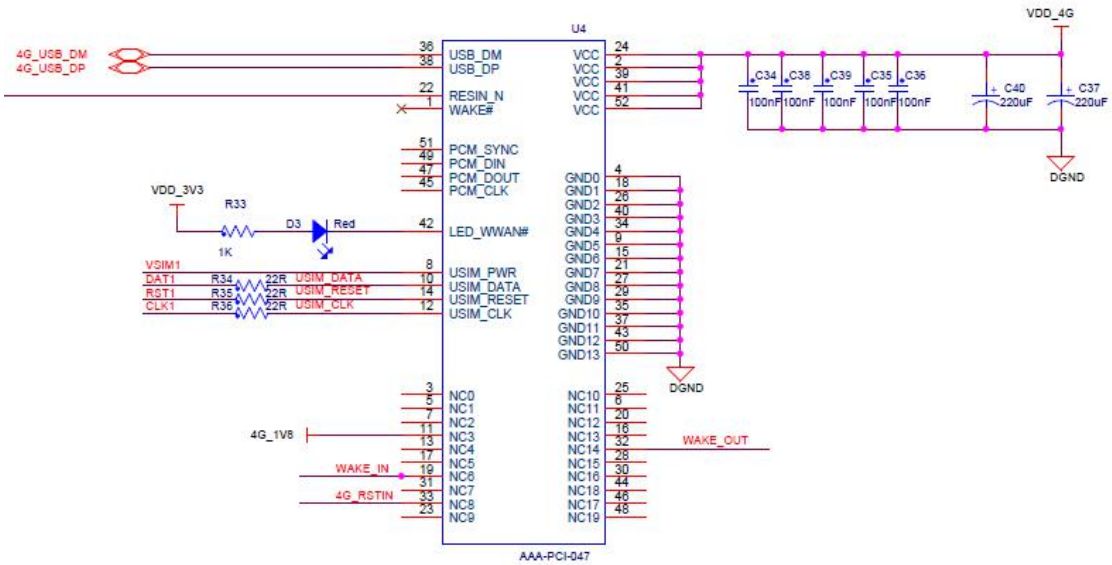

Figure 4.18 LTE Module

Using the LTE module, user also needs a SIM card. A side insert type SIM card connector is laid on the expansion board. Please refer to the schematic of as below.

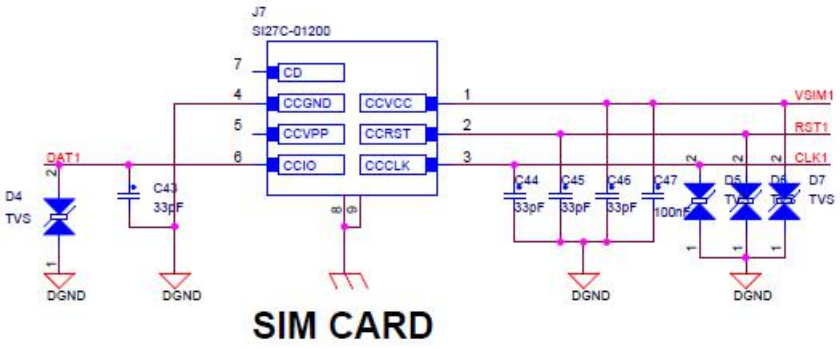


Figure 4.19 SIM Card

## 4.3.3 Audio CODEC

WM8904 Audio CODEC silicon from Wolfson is equipped on MYB-Y6ULX-HMI-4GEXP. It provides high quality audio performance. The Interface has one unit of 3.5mm headphone line out and one unit of audio line in.

I2S signal of WM8904 is connected to the SAI2 controller of the CPU and I2C of WM8904 is connected to I2C2. Please refer to the schematic below for detail.

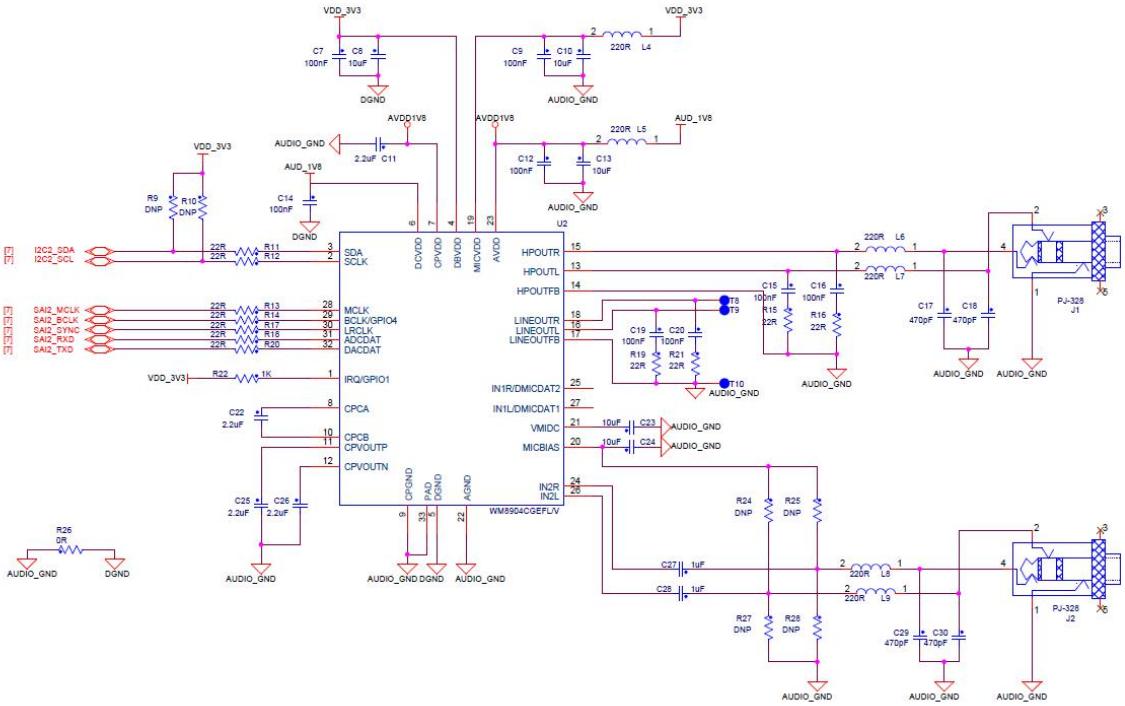


Figure 4.20 Audio Circuit

### 4.3.4 AP6212

AP6212 offers WIFI and Bluetooth. MYB-Y6ULX-HMI-4GEXP is equipped with a AP6212 module with offering SMA antenna connector. The WiFi supports 802.11b/g/n. The SDIO port of the module has been connected to the SD2 controller of the processor. So care must be took that the eMMC version of the CPU module does not support this feature. In addition, The SDIO pins are pulled down 47K to ground on the CPU module and multiplexed with the boot configuration pins. User should pay attention to the initial state on those pins, to avoid causing the boot failure, on base board design. Refer to the Figure 4.22 is right for your own design.

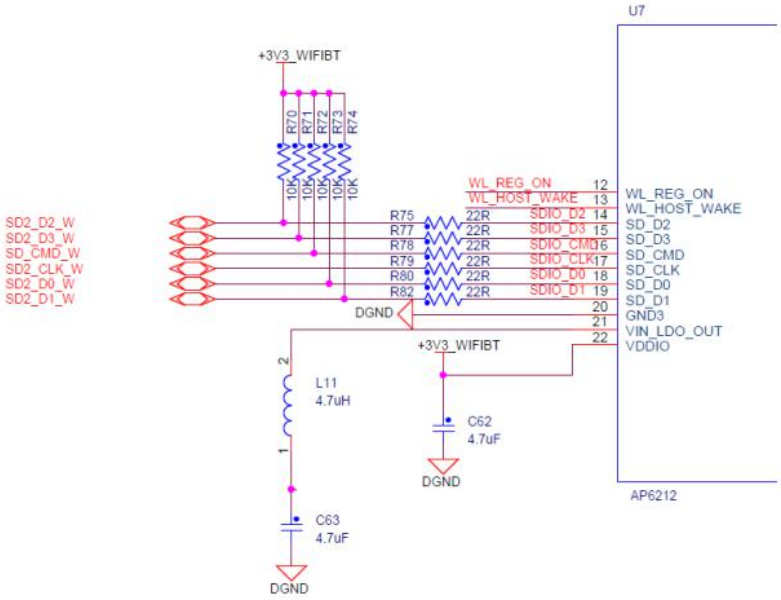


Figure 4.21 AP6212 (WIFI SDIO)

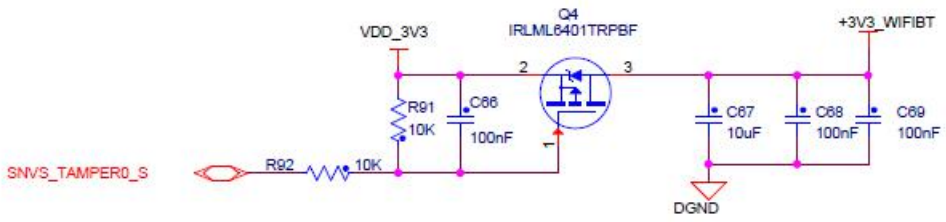


Figure 4.22 Power for WIFI IO

### 4.3.5 GPIO

MYB-Y6ULX-HMI-4GEXP has a connector of which wired 9 GPIOs.These GPIOs can be reused for other functions. such as uart data line, camera data or clock line and so on. For more reuse application,please refer to the *PIN LIST* file.

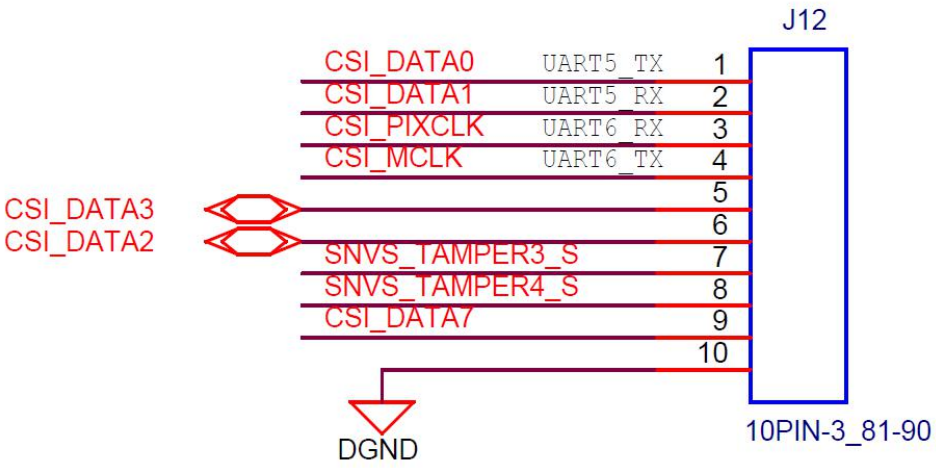


Figure 4.23 Expansion Interface

# 5. Electronic Characteristics

## 5.1 Operating temperature

| Application Scenarios | Parameter | | | | Des. |
|---|---|---|---|---|---|
| | MIN | Nor. | Max | Unit | |
| Commercial Level | 0 | — | +70 | ℃ | — |
| Industrial Level | -40 | — | +85 | ℃ | — |

Table 5-1 Operating Temperate

Please be noted some modules have limitation as follows:

1. WIFI & BT can work at -30℃ ~ 85℃
2. TP & LCD can work at -10℃~60℃

## 5.2 Power Supply

| Item | Label | Parameter | | | | Description |
|---|---|---|---|---|---|---|
| | | MIN | Normal | MAX | Unit | |
| System Voltage | +12V | 12 | 12V/24V | 28 | V | Power IN |
| System Current<br>MYC Module & Base Board | $I_{V12}$ | --- | 0.26 | --- | A | Measured at 12V Power IN |
| System Current<br>Base Board & Expansion Board | $I_{V12}$ | --- | 0.38 | --- | A | Measured at 12V Power IN |
| RTC Voltage | VDD_BAT | 2.4 | -- | 3.6 | V | RTC Power In |
| RTC Current | $I_{VDD\_BAT}$ | | 220 | | uA | |
| RTC Current<br>(for external RTC) | $I_{E\_VDD\_BAT}$ | --- | 0.4 | --- | uA | |

Table 5-2 Power Supply Characteristics

## 5.3 GPIO DC Characteristics

| Item | Label | Parameter | | | | Description |
|---|---|---|---|---|---|---|
| | | MIN | Normal | MAX | Unit | |
| Input High Voltage | $V_{IH}$ | 2.3 | -- | 3.3 | V | -- |
| Input Low Voltage | $V_{IL}$ | 0 | -- | 0.99 | V | -- |
| Output high Voltage | $V_{OH}$ | 3.15 | --- | -- | V | -- |
| Output Low Voltage | $V_{OL}$ | -- | -- | 0.15 | V | -- |

Table 5-3 GPIO DC Characteristics

# 6. Mechanical Characteristics

- PCB Layers
  - CPU Module

    8 Layers PCB, Immersion Gold Process, Lead-Free
  - Base Board

    6 Layers PCB, Immersion Gold Process, Lead-Free
  - Expansion Board

    4 Layers PCB, Immersion Gold Process, Lead-Free
- Mechanical
  - CPU Module: 37 x 39mm
  - Base Board: 130*80mm
  - Expansion Board: 130*80mm

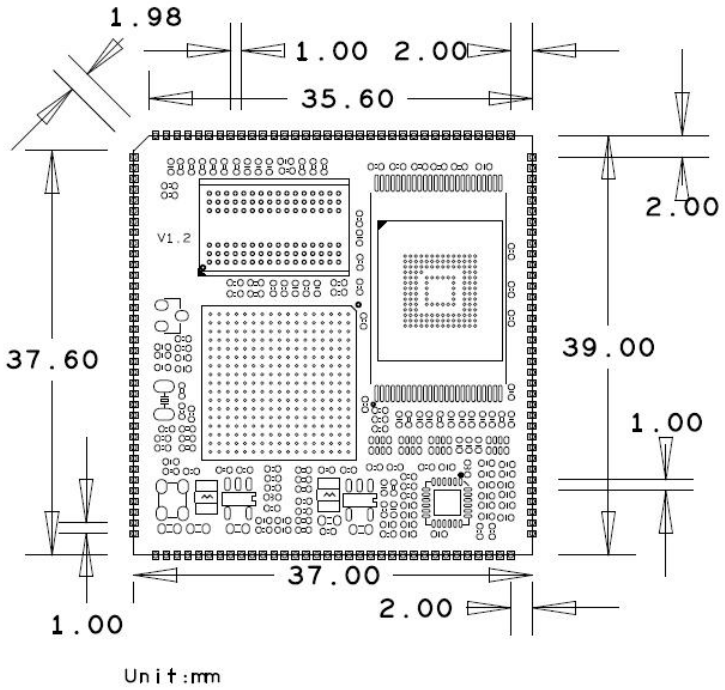


Figure 6.1 Mechanical Information of MYC-Y6ULX

The mechanical of MYB-Y6ULX-HMI board shows in Figure 6.2.

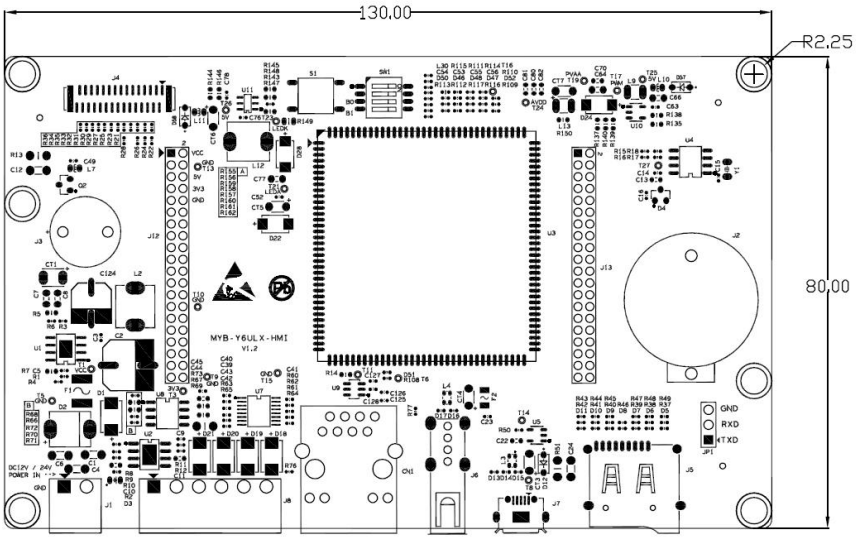


Figure 6.2 Mechanical Information of MYB-Y6ULX-HMI

The mechanical of MYB-Y6ULX-HMI-4GEXP board shows in Figure 6.3.

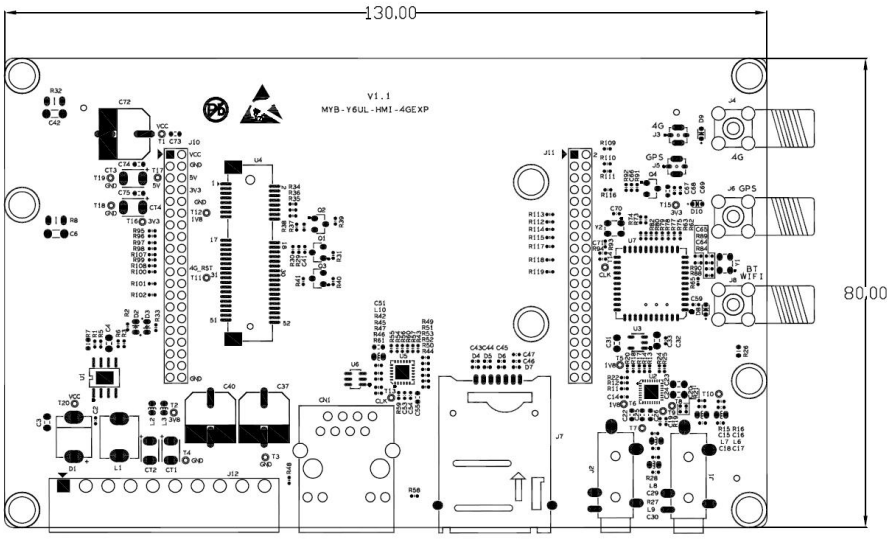


Figure 6.3 Mechanical Information of MYB-Y6ULX-HMI-4GEXP

# Appendix 1 Warranty & Technical Support Services

**MYIR Tech Limited** is a global provider of ARM hardware and software tools, design solutions for embedded applications. We support our customers in a wide range of services to accelerate your time to market.

MYIR is an ARM Connected Community Member and work closely with ARM and many semiconductor vendors. We sell products ranging from board level products such as development boards, single board computers and CPU modules to help with your evaluation, prototype, and system integration or creating your own applications. Our products are used widely in industrial control, medical devices, consumer electronic, telecommunication systems, Human Machine Interface (HMI) and more other embedded applications. MYIR has an experienced team and provides custom design services based on ARM processors to help customers make your idea a reality.

The contents below introduce to customers the warranty and technical support services provided by MYIR as well as the matters needing attention in using MYIR's products.

**Service Guarantee**

MYIR regards the product quality as the life of an enterprise. We strictly check and control the core board design, the procurement of components, production control, product testing, packaging, shipping and other aspects and strive to provide products with best quality to customers. We believe that only quality products and excellent services can ensure the long-term cooperation and mutual benefit.

**Price**

MYIR insists on providing customers with the most valuable products. We do not pursue excess profits which we think only for short-time cooperation. Instead, we hope to establish long-term cooperation and win-win business with customers. So we will offer reasonable prices in the hope of making the business greater with the customers together hand in hand.

**Delivery Time**

MYIR will always keep a certain stock for its regular products. If your order quantity is less than the amount of inventory, the delivery time would be within three days; if your order quantity is greater than the number of inventory, the delivery time would be always four to six weeks. If for any urgent delivery, we can negotiate with customer and try to supply the goods in advance.

**Technical Support**

MYIR has a professional technical support team. Customer can contact us by email (support@myirtech.com), we will try to reply you within 48 hours. For mass production and customized products, we will specify person to follow the case and ensure the smooth production.

**After-sale Service**

MYIR offers one year free technical support and after-sales maintenance service from the purchase date. The service covers:

1. Technical support service

a) MYIR offers technical support for the hardware and software materials which have provided to customers;
b) To help customers compile and run the source code we offer;
c) To help customers solve problems occurred during operations if users follow the user manual documents;
d) To judge whether the failure exists;
e) To provide free software upgrading service.

However, the following situations are not included in the scope of our free technical support service:

a) Hardware or software problems occurred during customers' own development;
b) Problems occurred when customers compile or run the OS which is tailored by themselves;
c) Problems occurred during customers' own applications development;
d) Problems occurred during the modification of MYIR's software source code.

## 2. After-sales maintenance service

The products except LCD, which are not used properly, will take the twelve months free maintenance service since the purchase date. But following situations are not included in the scope of our free maintenance service:

a) The warranty period is expired;
b) The customer cannot provide proof-of-purchase or the product has no serial number;
c) The customer has not followed the instruction of the manual which has caused the damage the product;
d) Due to the natural disasters (unexpected matters), or natural attrition of the components, or unexpected matters leads the defects of appearance/function;

e) Due to the power supply, bump, leaking of the roof, pets, moist, impurities into the boards, all those reasons which have caused the damage of the products or defects of appearance;
f) Due to unauthorized weld or dismantle parts or repair the products which has caused the damage of the products or defects of appearance;
g) Due to unauthorized installation of the software, system or incorrect configuration or computer virus which has caused the damage of products.

Warm tips:

1) MYIR does not supply maintenance service to LCD. We suggest the customer first check the LCD when receiving the goods. In case the LCD cannot run or no display, customer should contact MYIR within 7 business days from the moment get the goods.
2) Please do not use finger nails or hard sharp object to touch the surface of the LCD.
3) MYIR suggests user purchasing a piece of special wiper to wipe the LCD after long time use, please avoid clean the surface with fingers or hands to leave fingerprint.
4) Do not clean the surface of the screen with chemicals.
5) Please read through the product user manual before you using MYIR's products.
6) For any maintenance service, customers should communicate with MYIR to confirm the issue first. MYIR's support team will judge the failure to see if the goods need to be returned for repair service, we will issue you RMA number for return maintenance service after confirmation.

3. Maintenance period and charges

a) MYIR will test the products within three days after receipt of the returned goods and inform customer the testing result. Then we will arrange shipment within one week for the repaired goods to the customer. For any special failure, we will negotiate with customers to confirm the maintenance period.
b) For products within warranty period and caused by quality problem, MYIR offers free maintenance service; for products within warranty period but out of free maintenance service scope, MYIR provides maintenance service but shall charge some basic material cost; for products out of warranty period, MYIR provides maintenance service but shall charge some basic material cost and handling fee.

4. Shipping cost

During the warranty period, the shipping cost which delivered to MYIR should be responsible by user; MYIR will pay for the return shipping cost to users when the product is repaired. If the warranty period is expired, all the shipping cost will be responsible by users.

5. Products Life Cycle

MYIR will always select mainstream chips for our design, thus to ensure at least ten years continuous supply; if meeting some main chip stopping production, we will inform customers in time and assist customers with products updating and upgrading.

**Value-added Services**

1. MYIR provides services of driver development base on MYIR's products, like serial port, USB, Ethernet, LCD, etc.
2. MYIR provides the services of OS porting, BSP drivers' development, API software development, etc.
3. MYIR provides other products supporting services like power adapter, LCD panel, etc.
4. ODM/OEM services.

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