MM32 eMiniBoard User Guide

Introduction

Insight™ MM32 eMiniBoard (hereinafter referred to as eMiniBoard) development board, with ARM Keil/IAR integrated development environment, MM32 Program programming software, MM32 FDS firmware development platform and embedded MM32-LINK-OB emulator, Form a complete development ecosystem of the MM32 Cortex-M0/M3 MCU.
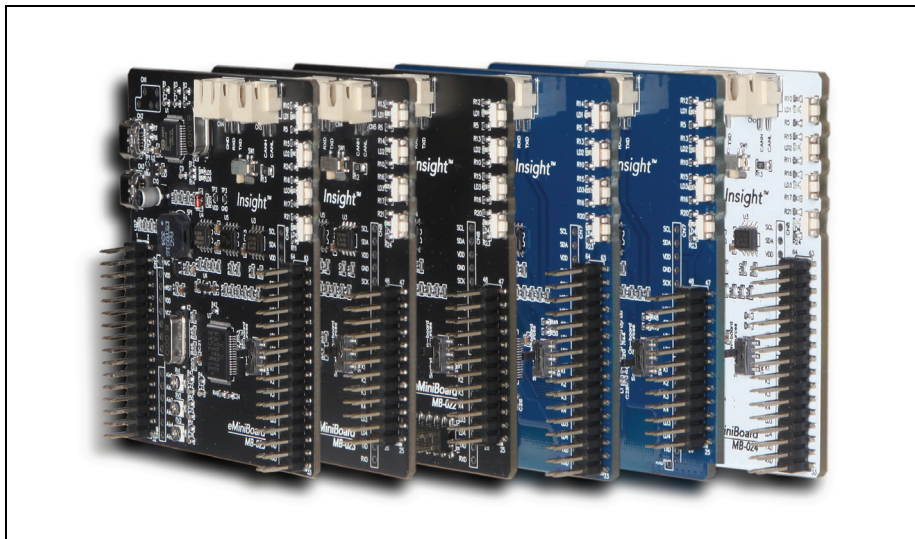

Figure 1. the eMiniBoard series development board

The eMiniBoard development board contains the following seven models:
- eMiniBoard MB-020 Based on Cortex-M0 Bluetooth development board, support MM32W051 MCU
- eMiniBoard MB-021 Based on Cortex-M3 Bluetooth development board, support MM32W373 MCU
- eMiniBoard MB-022 Based on Cortex-M0 Low Pin Count development board, support MM32F031/F003 MCU
- eMiniBoard MB-023 Based on Cortex-M0 Low Power development board, support MM32L073 MCU
- eMiniBoard MB-024 Based on Cortex-M3 General series development board, support MM32L373 MCU
- eMiniBoard MB-025 Based on Cortex-M0 Enhanced General series development board, support MM32F032 MCU
- eMiniBoard MB-032 Based on Cortex-M0 Low Pin Count development board, support MM32F00010 MCU

Features

The MM32 eMiniBoard development board has the following features:
- Support MindMotion MM32 Cortex-M series MCU development evaluation
- Support integrated development environment of Keil uVision v5.0 / IAR EWARM v7.80 or above
- Support MindMotion MM32 FDS firmware development platform
- Support MindMotion MM32 Program programming software
- Development board MCU power supply based on 3.3V voltage design
- Support up to 4KV EFT anti-interference ability
- Embedded MM32-LINK-OB in-circuit emulator, support SWD debugging interface and intelligently connected CDC virtual serial port
- Unified design of component numbers, locations, and functions of common parts of all development boards
- Emulator USB interface or target MCU USB interface power supply
- 4-Side button
- 4-LED
- 1-UART Connector
- 1-USB Connector
- 1-CAN Connector(Optional) and CAN driver and terminal matching resistor switch
- 1-16 Mbit SPI Flash memory
- 1-2048 bit I2C EEPROM memory
- 1-Speaker
- 1-3 Analog input potentiometers
- 1-Built-in expansion function and MCU pin function selection switch
- 0.1 inch pitch double-row pin socket with the same MCU pin (some function pins are not led out)
- Compatible with Arduino NUO interface, PCB size 3.0*2.85 inches
- Quickly distinguish the blue, black and white PCB color matching of the development board function
- SMT manufacturing process

General

The eMiniBoard development board is based on the General part of the buttons, LED indicators, UART / CAN(Optional) connector and MM32-LINK virtual serial port connection functions and relationships as shown in the following table:

Table 1. Key function and MCU connection relationship table

Keys	MB-020	MB-021	MB-022	MB-023	MB-024	MB-025	MB-032
K1	PD2	PB1	PB1	PB1	PB1	PB1	PA0
K2	PC13	PB2	PB2	PB2	PB2	PB2	PA4
K3	PC14	PB10	PB10	PB10	PB10	PB10	PA10
K4	PC15	PB11	PB11	PB11	PB11	PB11	PB1

Table 2. LED and MCU connection relationship table

LED	MB-020	MB-021	MB-022	MB-023	MB-024	MB-025	MB-032
LD1	PD3	PA15	PA15	PA15	PA15	PA15	PA1
LD2	PA15	PC10	PB3	PB3	PB3	PB3	PA6
LD3	PA3	PC11	PB4	PB4	PB4	PB4	PA9
LD4	PA4	PC12	PB5	PB5	PB5	PB5	PA12

Table 3. CN2 MM32-LINK Emulator USB Socket

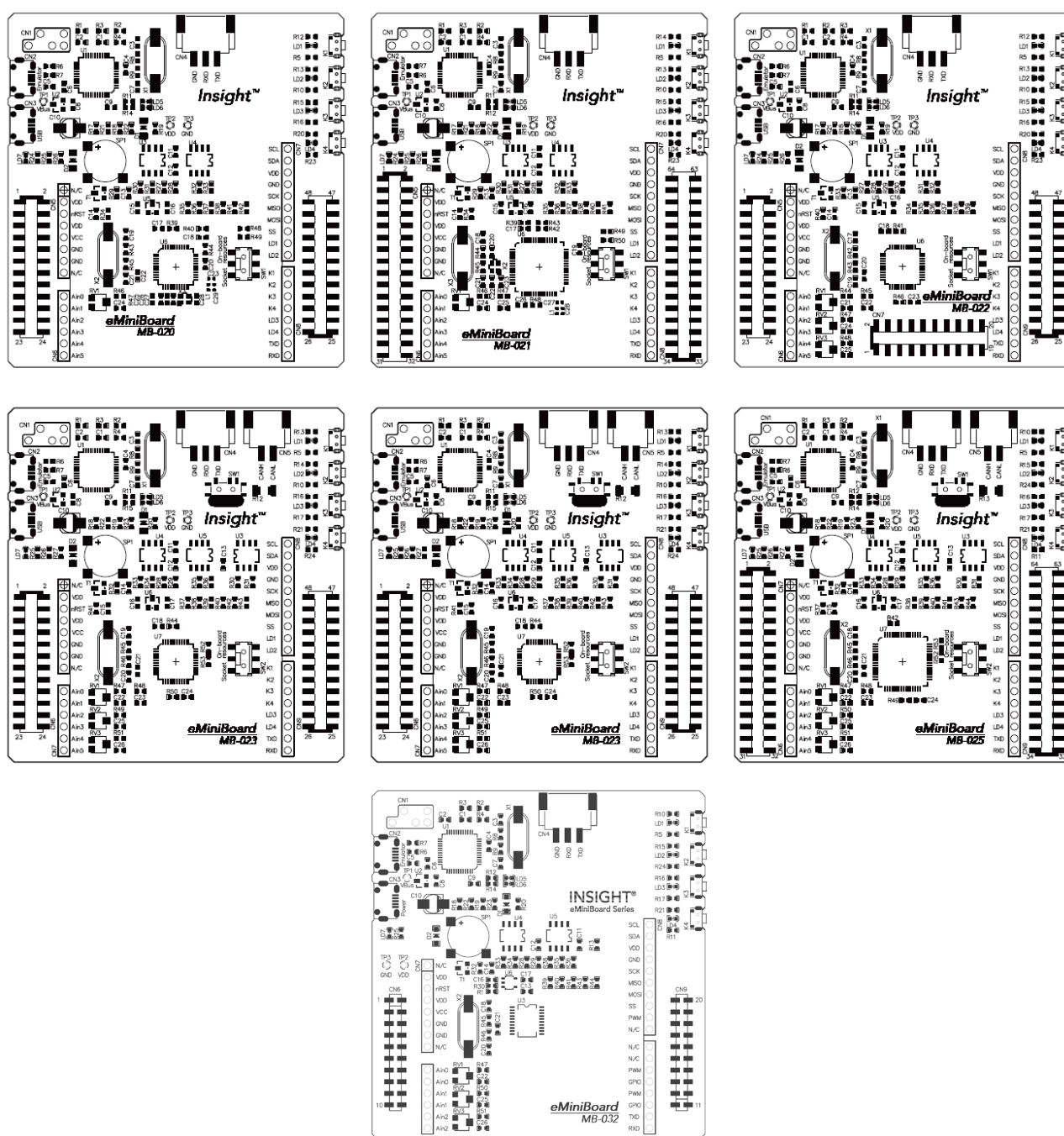| Pins	Function	MB-020	MB-021	MB-022	MB-023	MB-024	MB-025	MB-032
1	VCC	VCC						
2	USB-DM	USB-DM						
3	USB-DP	USB-DP						
4	GND	GND						
5	GND	GND						

Figure 2. eMiniBoard PCB layout

Table 4. CN3 Target MCU USB Socket

Pins	Function	MB-020	MB-021	MB-022	MB-023	MB-024	MB-025	MB-032
1	VCC	VCC						VCC
2	USB-DM	PA11						---
3	USB-DP	PA12						---
4	GND	GND						GND
5	GND	GND						GND

Table 5. CN4 UART Connector Sockets

Pins	Function	MB-020	MB-021	MB-022	MB-023	MB-024	MB-025	MB-032
1	GND	GND						GND
2	RXD	PA3						PA13
3	TXD	PA2						PA1

Table 6. CN5 CAN Connector Sockets

Function	MB-020	MB-021	MB-022	MB-023	MB-024	MB-025	MB-032	Notes
TX	--	--	--	PB8	PB8	PB8	---	Pin1: CAN-H
RX	--	--	--	PB9	PB9	PB9	---	Pin2: CAN-L

Table 7. Virtual Serial Port CDC and MCU Connection Relationship Table

MM32-LINK	Function	MB-020	MB-021	MB-022	MB-023	MB-024	MB-025	MB-032
TXD	RXD	PB7	PA10	PA10	PA10	PA10	PA10	PA12
RXD	TXD	PB6	PA9	PA9	PA9	PA9	PA9	PA0

The eMiniBoard development board MM32-LINK-OB emulator function is identical to the stand-alone standard MM32-LINK emulator. The firmware upgrade code is the same as the MM32-LINK emulator. The MM32-LINK emulator power supply is powered by an independent power supply and is separated from the target MCU power supply. Connector CN1 is only used to program the emulator MCU.

When using the emulator and powering the board, plug one end of the USB cable into the CN2 socket of the connector and the other end to the USB port of the PC. The red LED of the MM32-LINK emulator indicates that the emulator is not connected to the personal computer, and green indicates that the emulator is connected to the personal computer.

When using the USB function of the target MCU, connect the USB cable to the CN3 socket. Whether the emulator USB cable is connected or not is independent of the USB connection of the target MCU.
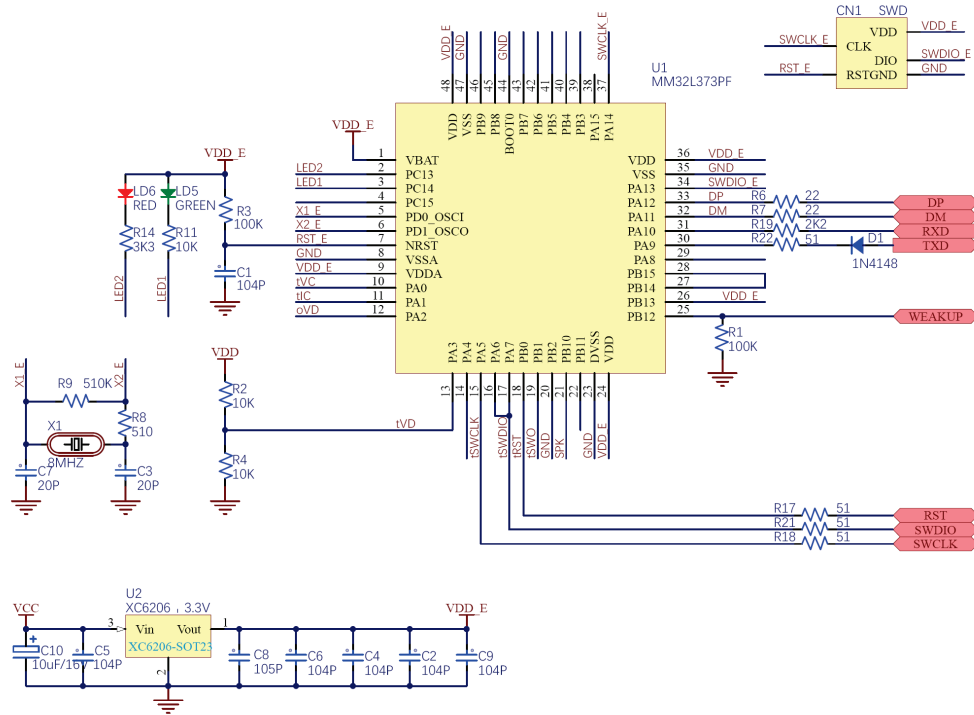
Figure 3. Schematic of the MM32-LINK-OB

Target

The eMiniBoard development board is based on the development object section: analog input, PWM, UART, CAN, SPI Flash, I2C and Bluetooth communication.

Table 8. Target MCU Analog Function Connection Relationship Table

RVs	MB-020	MB-021	MB-022	MB-023	MB-024	MB-025	MB-032
RV1	PA1	PA5	PA1	PA1	PA1	PA1	PA2
RV2	---	---	PA4	PA4	PA4	PA4	PA3
RV3	---	---	PA5	PA5	PA5	PA5	PA7

Table 9. Target MCU PWM Output Connection Relationship Table

Speak	MB-020	MB-021	MB-022	MB-023	MB-024	MB-025	MB-032
SP1	PB5	PA8	PA8	PA8	PA8	PA8	PA11

Table 10. Target MCU UARTs Output Connection Relationship Table

UART	MB-020	MB-021	MB-022	MB-023	MB-024	MB-025	MB-032
TX1(1)	PB7	PA9	PA9	PA9	PA9	PA9	PA12
RX1(1)	PB6	PA10	PA10	PA10	PA10	PA10	PA0
TX2(2)	PA2	PA2	PA2	PA2	PA2	PA2	PA1
RX2(2)	PA3	PA3	PA3	PA3	PA3	PA3	PA13

Note 1: When using the MM32-LINK CDC function, the emulator's TXD/RXD is cross-connected with the MCU's TX1 and RX1.
Note 2: The corresponding pins of the MCU's TX1 and RX1 connected to the double-row straight-pin connector are also connected to the CN4 UART expansion socket.

Table 11. Target MCU I2C Functional Connection Relationship Table

I2C	MB-020	MB-021	MB-022	MB-023	MB-024	MB-025	MB-032
SCL	PB8	PB6	PB8	PB6	PB6	PB6	PA5
SDA	PB9	PB7	PB9	PB7	PB7	PB7	PA1

Table 12. Target MCU SPI Function Connection Relationship Table

spi	MB-020	MB-021	MB-022	MB-023	MB-024	MB-025	MB-032
nSS	PB0(1)	PB12(1)	PB12(1)	PB12(1)	PB12(1)	PB12(1)	PA15
SCLK	PA5	PB13	PB13	PB13	PB13	PB13	PA8
MISO	PA6	PB14	PB14	PB14	PB14	PB14	PA10
MOSI	PB7	PB15	PB15	PB15	PB15	PB15	PA9

Note 1: SPI access to the SPI Flash resources on the board or to the double row pins is supported by the function selection switch.

Table 13. Target MCU CAN Function Connection Relationship Table

CAN	MB-020	MB-021	MB-022	MB-023	MB-024	MB-025	MB-032
TX	--	--	--	PB8	PB8	PB8	---
RX	--	--	--	PB9(1)	PB9(1)	PB9(1)	---

Note 1: Support CAN access to CAN driver resources on the board or to double-row pins via the function selector switch.
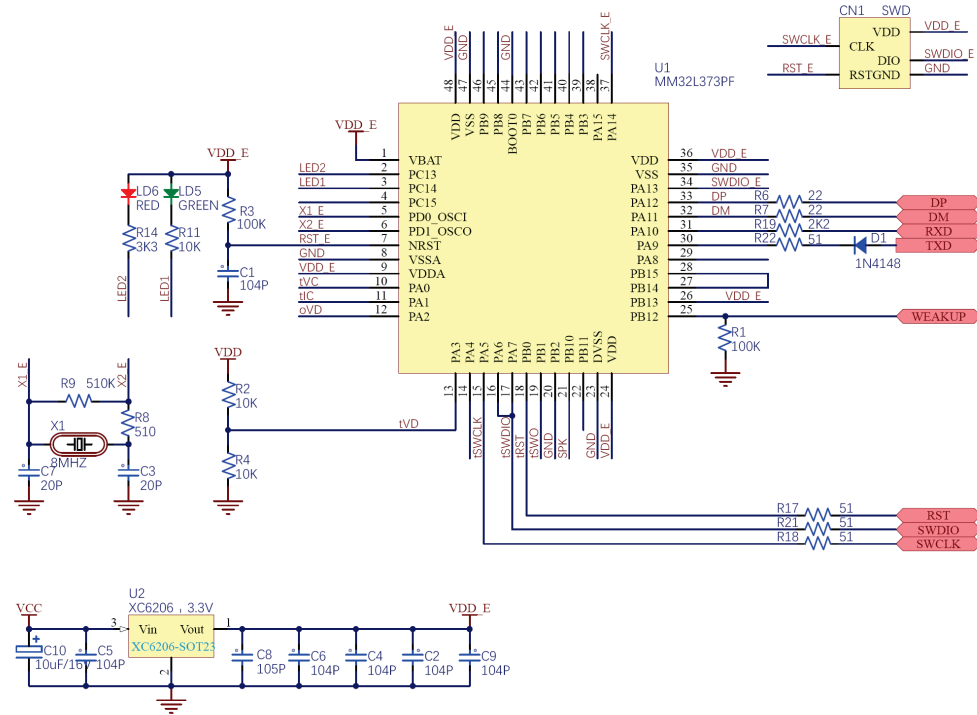
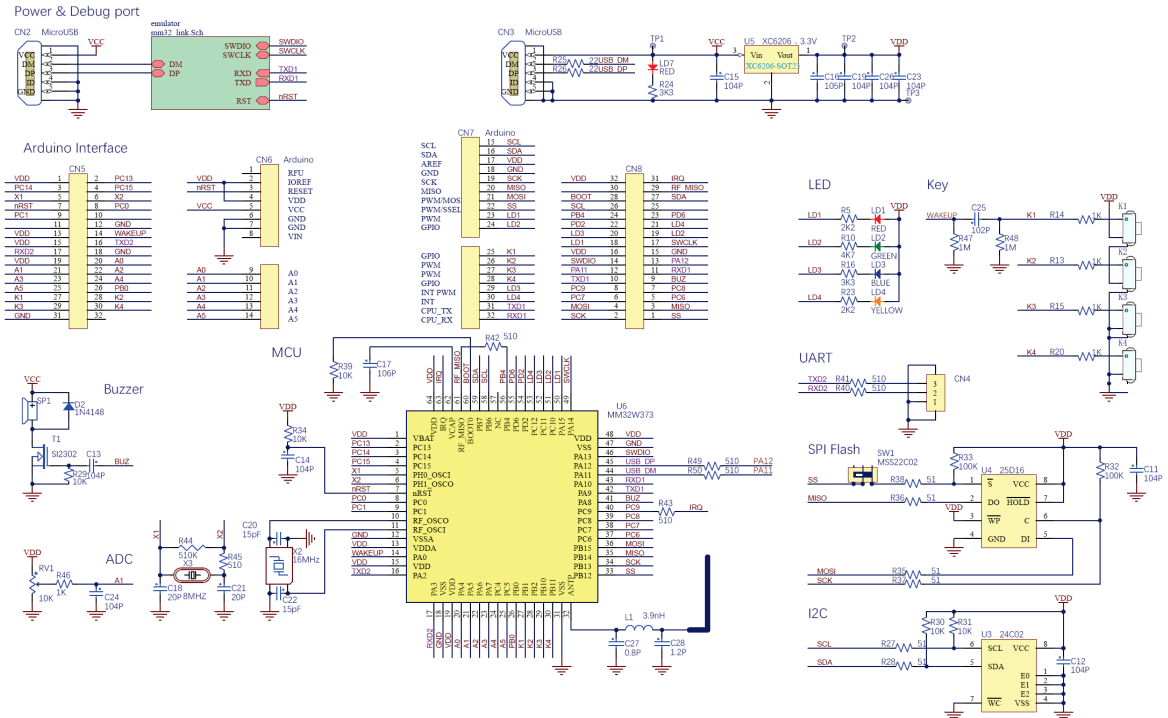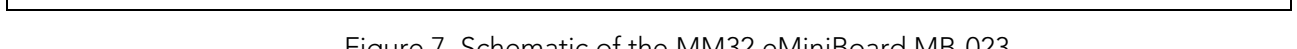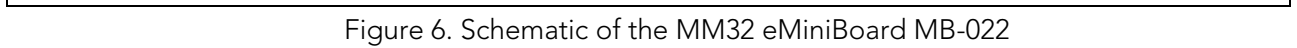Figure 4. Schematic of the MM32 eMiniBoard MB-020

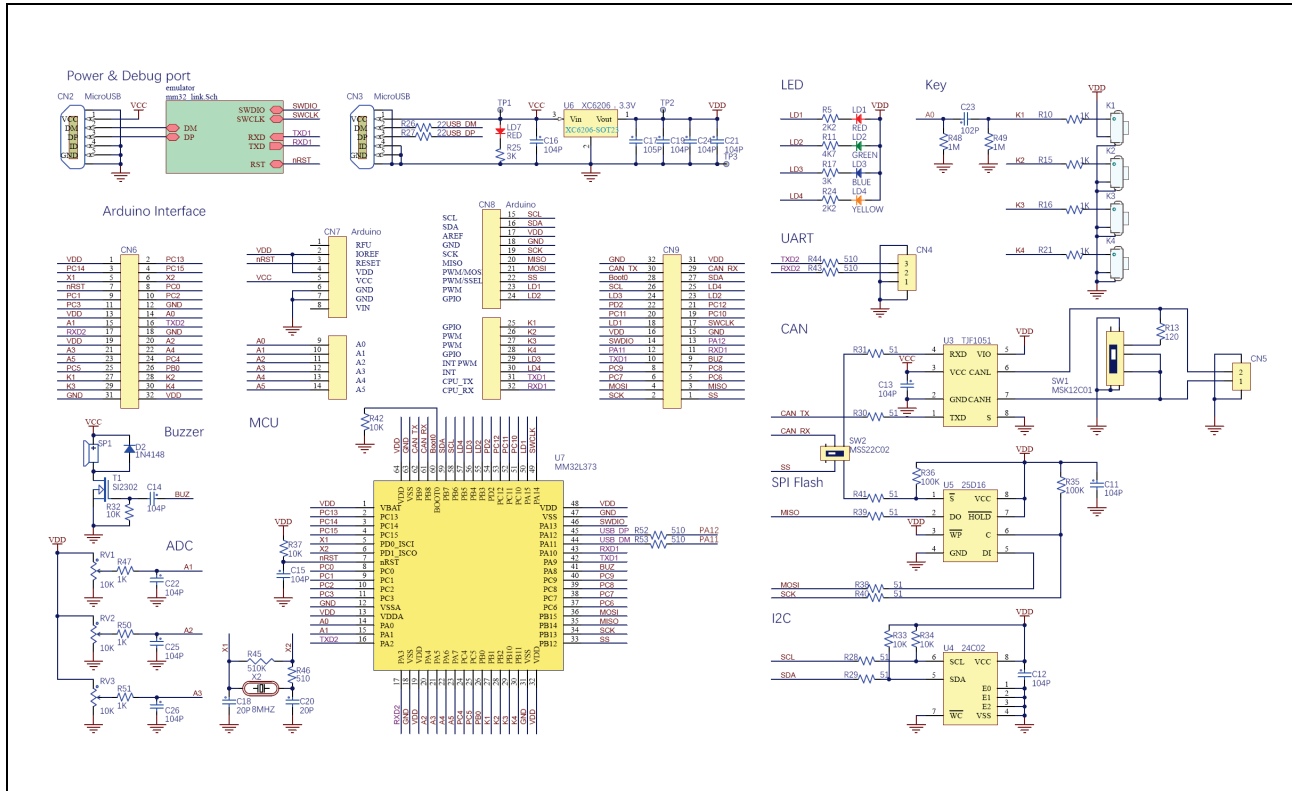Figure 5. Schematic of the MM32 eMiniBoard MB-021

Figure 6. Schematic of the MM32 eMiniBoard MB-022

Figure 7. Schematic of the MM32 eMiniBoard MB-023

Figure 8. Schematic of the MM32 eMiniBoard MB-024
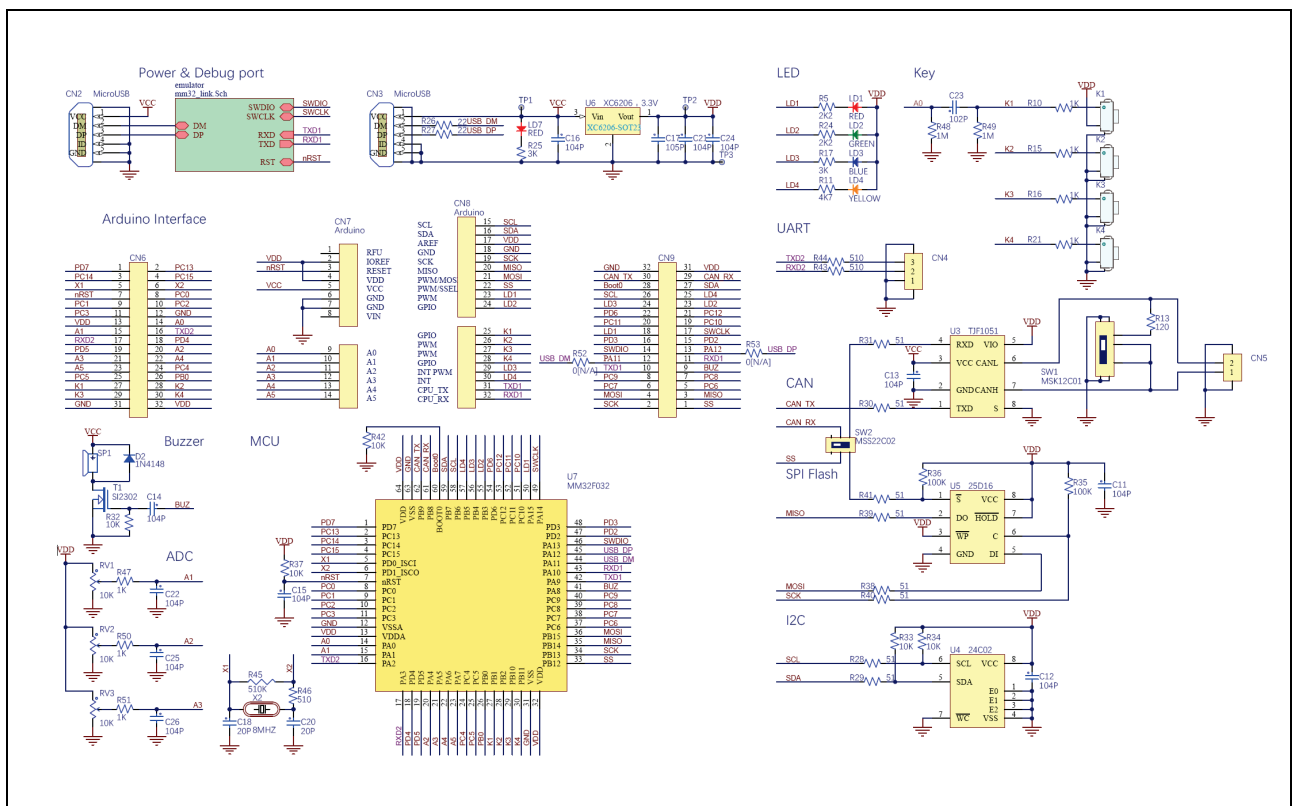
Figure 9. Schematic of the MM32 eMiniBoard MB-025

Figure 10. Schematic of the MM32 eMiniBoard MB-032(1)

Figure 11. Schematic of the MM32 eMiniBoard MB-032(2)
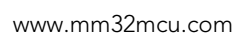
Revision history

Date	Modified markup	Update record
2019/11/25	V0.90	Initial version
2019/12/21	V0.91	Added description and notes on reset of development board
2020/08/14	V0.92	Added MB-032 MM32F0010　development board