

MM32F3270 Evaluation Board User Guide

Introduction

MM32F3270 Evaluation Board (hereinafter referred to as MM32F3270 EVB), cooperating with ARM Keil/IAR integrated development environment, MM32 Program programming software, MM32 FDS, and embedded MM32-LINK-OB emulator, works as a hardware product for evaluating MCU performance in the MindMotion MCU developing ecosystem.

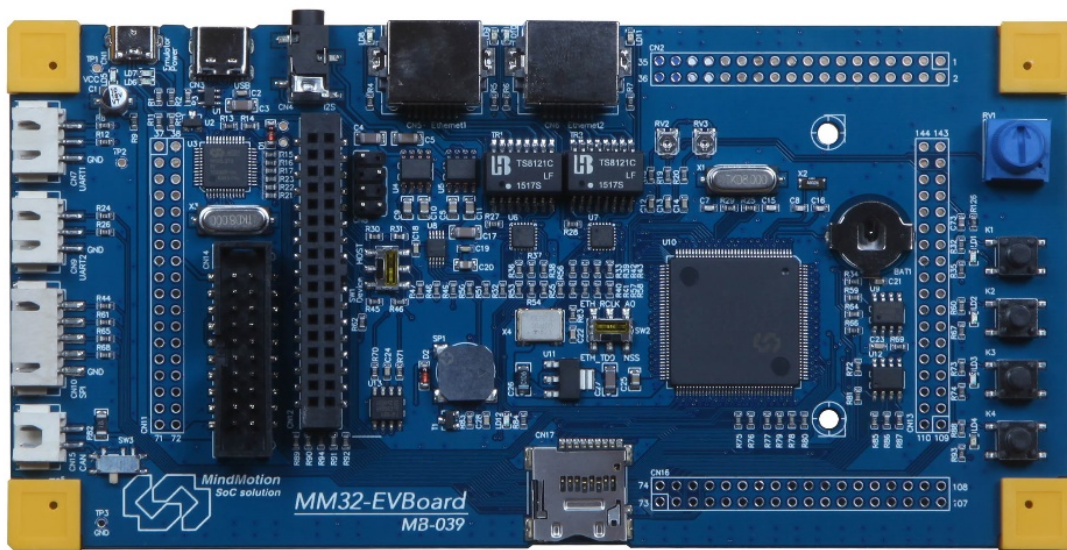


Figure 1. MM32F3270 EVB appearance picture

Features

MM32F3270 EVB has the following features :

- Support MindMotion MM32F3270 series MCU development evaluation
- External clock 8MHz/32.768KHz
- Support Keil uVision v5.0 / IAR EWARM v7.80 or later
- Support MindMotion MM32 Firmware development suite (MM32 FDS)
- Support MindMotion MM32 Program programming software
- The MCU power supply of the development board is designed based on 3.3V
- Embedded MM32-LINK-OB online emulator
- Support SWD debugging interface and CDC virtual serial port
- Emulator USB (Micro USB) socket power supply
- USB Host/Device Type-C interface
- 4-Buttons/4-LEDs

- 2-UART three-pin socket (with CMOS level)
- 1-SPI five-pin socket (with CMOS level)
- 1-CAN two-pin socket with CAN driver and terminal matching resistance selection switch
- 1-1MBytes SPI Flash memory
- 1-256Bytes I2C EEPROM memory
- 1-3.5mm headphone jack for I2S L/R audio output
- 1-TF Card socket
- 2-RJ45 network socket
- 1-34-pin parallel bus connector, support 2.8" LCD display (optional)
- CR1210 backup battery (customized)
- 1-Speaker
- 3-Analog input potentiometer
- 3-Switch: USB working mode, pin function and CAN terminal matching resistance
- 4-36pin is the same as the MCU pin sequence, with a double-row connector with a pitch of 0.1 inches
- PCB board size: 6.4*3.2 inches

Connectors and Switches

The function of MM32F3270 EVB connector is shown in the table below :

Table 1. List of connector functions

Item	Connector	Function	Descriptions
CN1	Micro USB	Power/Emulator	Power supply and debugging /download socket
CN2	2*18/0.1inch	MCU Pins (1)	MCU pin connector (pin No. 1-36)
CN3	Type-C USB	USB	MCU USB socket, supporting Host/Device mode
CN4	3.5mm L/R	Headphone	Headphone jack
CN5	RJ45	Ethernet (1)	Ethernet socket, PHY address = 0x0
CN6	RJ45	Ethernet (2)	Ethernet socket, PHY address = 0x1
CN7	3pin/0.1inch	UART (1)	UART socket, connected to MCU UART2
CN8	2*4/0.1inch	Emulator pgm	Reserved, unavailable to users
CN9	3pin/0.1inch	UART (2)	UART socket, connected to MCU UART3
CN10	5pin/0.1inch	SPI	SPI2 socket, NSS1 connects to PD11
CN11	2*18/0.1inch	MCU Pins (2)	MCU pin connector (pin No. 37-72)
CN12	2*17/0.1inch	Parallel / LCD	FSMC connector, supporting MDM2803 LCD module
CN13	2*18/0.1inch	MCU Pins (4)	MCU pin connector (pin No. 109-144)
CN14	2*10/0.1inch	Ext. Debug port	Debugging connector, available after MM32-LINK-OB upgrade
CN15	2pin/0.1inch	CAN	CAN socket, the board supports terminal matching resistance
CN16	2*18/0.1inch	MCU Pins (3)	MCU pin connector (pin No. 73-108)
CN17	TF Card	SDIO	SD/TF Card socket

The functions of MM32F3270 EVB toggle switch are shown in the table below:

Table 2. List of toggle switch functions

Item	Switch	Function	Descriptions
SW1	2*2	USB Host / Device	USB selection switch, functions are shown in PCB SW1 marking
SW2	2*2	Pin Functions	MCU pin alternate switch, functions are shown in PCB SW2 marking
SW3	1*2	CAN Res. Selection	Terminal resistance selection, switch to the right side to connect resistor

Peripherals

Key. LED. Socket

The connection relationship and functions of MM32F3270 EVB key are shown in the table below:

Table 3. Connection relationship between key function and MCU

Item	MCU	Active	Descriptions
K1	PB1	High	User key, the key action signal is used as the wakeup
K2	PB2	Low	User key, alternated with Ethernet ETH_INT1 signal
K3	PB10	Low	User key
K4	PB0	Low	User key

The connection relation of MM32F3270 EVB LED is shown in the table below:

Table 4. Connection relationship between LED and MCU

Item	MCU	Alternate	Descriptions
LD1	PA15	I2S WS	LED1, alternated with I2S WS signal
LD2	PB3	I2S SCK	LED2, alternated with I2S SCK signal
LD3	PB4	I2S Standby	LED3, alternated with I2S Standby signal
LD4	PB5	I2S SD	LED4, alternated with I2S SD signal

The connection relationship between FSMC and MCU is shown in the table below:

Table 5. Connection relationship between FSMC and MCU

Pin	MCU	Function	Descriptions
1	PD7	nCS	Chip select signal, active low
2	PD13	RS	RS signal
3	PD5	nWR	WR signal, active low
4	PD4	nRD	RD signal, active low
5	nRST	nRST	Reset signal, active low
6	PD15	D1	DATA 1
7	PD0	D2	DATA 2
8	PD1	D3	DATA 3
9	PE7	D4	DATA 4
10	PE8	D5	DATA 5
11	PE9	D6	DATA 6
12	PE10	D7	DATA 7
13	PE11	D8	DATA 8
14	PE13	D10	DATA 10
15	PE14	D11	DATA 11
16	PE15	D12	DATA 12
17	PD8	D13	DATA 13
18	PD9	D14	DATA 14
19	PD10	D15	DATA 15
20	---	Res.	Reserved
21	---	Res.	Reserved
22	PE12	D9	DATA 9
23	PF11	BL	Backlight control, active high
24	---	Res.	Reserved
25	VDD	VDD	VDD, 3.3V
26	PD14	D0	DATA 0
27	GND	GND	GND
28	---	Res.	Reserved
29	---	Res.	Reserved
30	---	Res.	Reserved
31	---	Res.	Reserved
32	---	Res.	Reserved
33	---	Res.	Reserved
34	---	Res.	Reserved

The pin definition of MM32F3270 EVB UART(1) socket is shown in the table below:

Table 6. UART (1) socket pin definition table

Pin	Function / MCU	Alternate	Descriptions
1	GND		Signal ground
2	RXD / PA3	---	MCU UART2 Receive signal, CMOS level
3	TXD / PA2	ETH_MDIO	MCU UART2 Send signal, CMOS level

The pin definition of MM32F3270 EVB UART(2) socket is shown in the table below:

Table 7. UART (2) socket pin definition table

Pin	Function / MCU	Alternate	Descriptions
1	GND		Signal ground
2	RXD / PE0	---	MCU UART8 Receive signal, CMOS level
3	TXD / PE1	---	MCU UART8 Send signal, CMOS level

The pin definition of MM32F3270 EVB SPI socket is shown in the table below:

Table 8. SPI socket pin definition table

Pin	Function / MCU	Alternate	Descriptions
1	GND		Signal ground
2	NSS1 / PD11	---	MCU PD11, CMOS level
3	MOSI / PB15	---	MCU SPI2 MOSI signal, CMOS level
4	MISO / PB14	---	MCU SPI2 MISO signal, CMOS level
5	SCK / PB13	ETH_TD1	MCU SPI2 SCK signal, CMOS level

The pin definition of MM32F3270 EVB CAN socket is shown in the table below:

Table 9. CAN socket pin definition table

Pin	Function	Alternate	Descriptions
1	CANH	---	CAN Bus High
2	CANL	---	CAN Bus Low

Signal

The connection relationship between MM32-LINK-OB CDC and MCU is shown in the table below:

Table 10. Connection relationship between MM32-LINK-OB CDC and MCU

MCU	Function	Descriptions
PA10	RXD	MCU UART1 RXD and CDC TXD signal, must be set to IPU mode during initialization
PA9	TXD	MCU UART1 TXD and CDC RXD signal

The connection relationship between analog signal and MCU is shown in the table below:

Table 11. Connection relationship between analog signal and MCU

MCU	Function	Descriptions
PA1	ADC1(RV3)	RV3, MCU Ain 1 signal, alternated with ETH_RCLK through switch SW2
PA4	ADC2(RV2)	RV2, MCU Ain 4 signal
PA5	ADC3(RV1)	RV1, MCU Ain 5 signal

The connection relationship between I2C EEPROM and MCU is shown in the table below:

Table 12. Connection relationship between I2C EEPROM and MCU

MCU	Function	Descriptions
PB6	SCL	MCU I2C1 SCL signal
PB7	SDA	MCU I2C1 SDA signal

The connection relationship between SPI Flash and MCU is shown in the table below:

Table 13. Connection relationship between SPI Flash and MCU

MCU	Function	Descriptions
PB12	NSS0	MCU SPI2 NSS0 signal, alternated with ETH_TD0 through switch SW2
PB13	SCK	MCU SPI2 SCK signal
PB14	MISO	MCU SPI2 MISO signal
PB15	MOSI	MCU SPI2 MOSI signal

The connection relationship between SD/TF Card and MCU is shown in the table below:

Table 14. Connection relationship between SD/TF Card and MCU

MCU	Function	Descriptions
PC6	DET	SD/TF Card existence detection signal, low level is active, LD12 LED is on
PC8	DAT0	MCU SDIO DATA 0 signal
PC9	DAT1	MCU SDIO DATA 1 signal
PC10	DAT2	MCU SDIO DATA 2 signal
PC11	DAT3	MCU SDIO DATA 3 signal
PC12	CLK	MCU SDIO CLK signal
PD2	CMD	MCU SDIO CMD signal

The connection relationship between Speaker and MCU in PWM mode is shown in the table below:

Table 15. Connection relationship between Speaker and MCU

MCU	Function	Descriptions
PA8	Speaker	MCU PWM output

The connection relationship between USB and MCU is shown in the table below:

Table 16. Connection relationship between USB and MCU

MCU	Function	Descriptions
PC13	PWR_ON	Host mode power output control, active low
PC2	CC1	USB Type-C CC1 Signal level detection
PC3	CC2	USB Type-C CC2 Signal level detection
PA11	DM	MCU USB DM Signal
PA12	DP	MCU USB DP Signal

The connection relationship between I2S and MCU is shown in the table below:

Table 17. Connection relationship between I2S and MCU

MCU	Function	Descriptions
PB4	Standby	MCU I2S audio output enable, active low, alternated with LD3 signal
PB5	SD	MCU I2S SD Signal, alternated with LD4 signal
PB3	SCK	MCU I2S SCK Signal, alternated with LD2 signal
PA15	WS	MCU I2S WS Signal, alternated with LD1 function
PC7	MCLK	MCU I2S MCLK Signal

The connection relationship between Ethernet PHY and MCU is shown in the table below:

Table 18. Connection relationship between Ethernet PHY and MCU

MCU	Function	Descriptions
PA2	MDIO	PHY Serial management data input/output
PC1	MDC	PHY Serial management clock
PB12	TD0	Transmit data 0, alternated with SPI2_NSS0 through switch SW2
PB13	TD1	Transmit data 1
PC4	RD0	Receive data 0
PC5	RD1	Receive data 1
PB11	TX_EN	Transmit enable
PA7	CRS_DV	Carrier sense / Receive data valid
PC0	INT0	Ethernet PHY Interrupt 0, Active low
PB2	INT1	Ethernet PHY Interrupt1, Active low
PC7	MCLK	External 50MHz clock input

MM32F3270 EVB GPIO are composed of four keys and four LEDs. There is no reset button in this system. If a reset operation is required, it must be realized through the emulator command or power-on again. The layout is shown in the figure below.

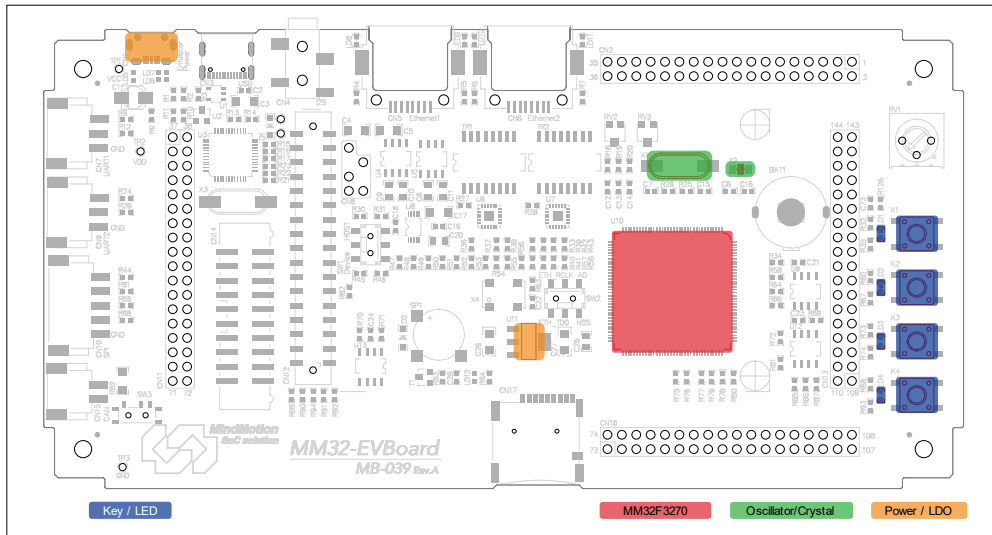


Figure 4. GPIO device layout

MM32F3270 EVB UART is equipped with three sets of interfaces :

1. Emulator virtual serial port
2. The two sockets CN7 and CN9 connected to the edge of the PCB

The layout is shown in the figure below.

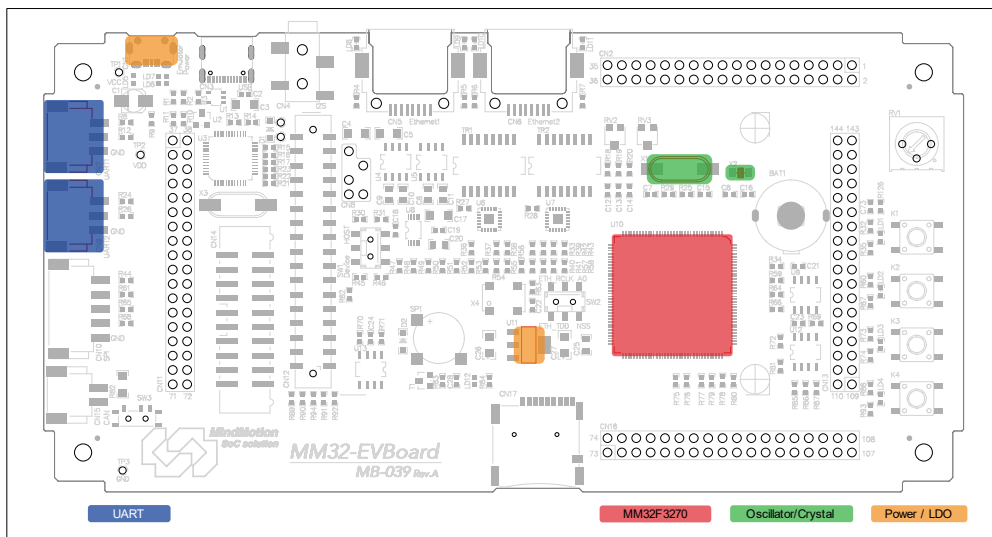


Figure 5. UART device layout

The MM32F3270 EVB SPI is evaluated in the following methods :

1. SPI Flash
2. Connect to the sockets CN10 on the edge of the PCB

The layout is shown in the figure below.

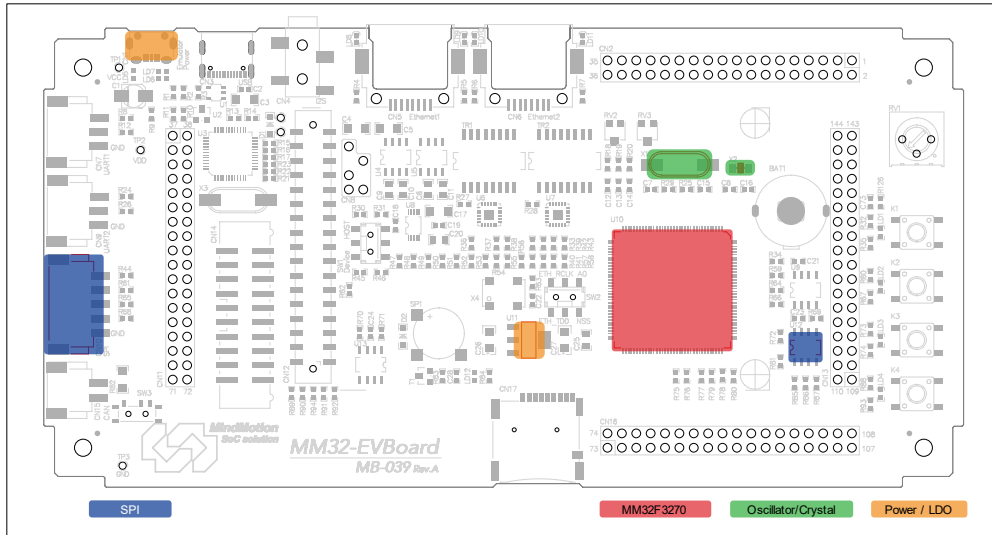


Figure 6. SPI device layout

MM32F3270 EVB CAN Bus is evaluated in the following methods :

1. CAN Bus driver
2. Terminal matching resistance selection switch
3. Connect to the socket CN15 on the edge of the PCB

The layout is shown in the figure below.

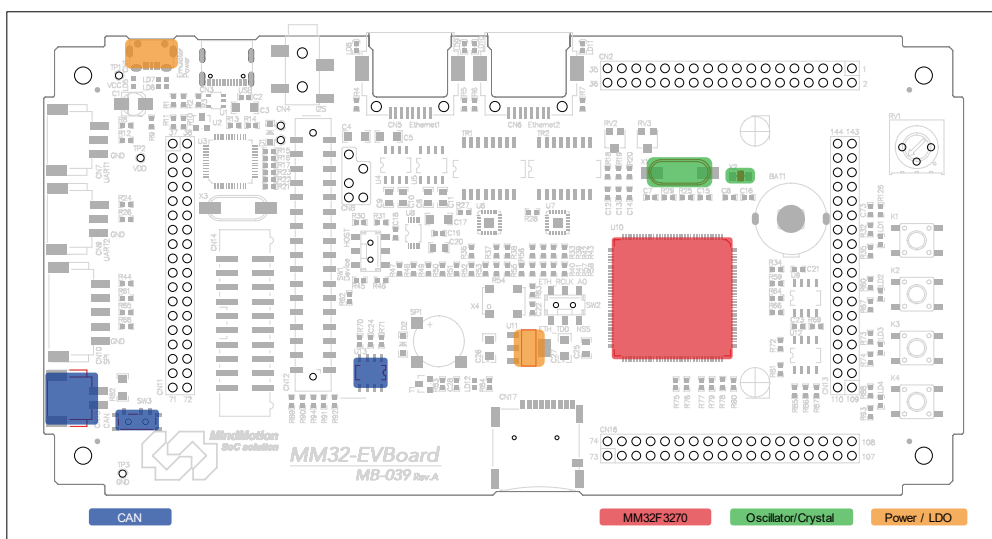


Figure 7. CAN Bus device layout

MM32F3270 EVB I2C Bus is connected to a 256Bytes EEPROM. The layout is shown in the figure below.

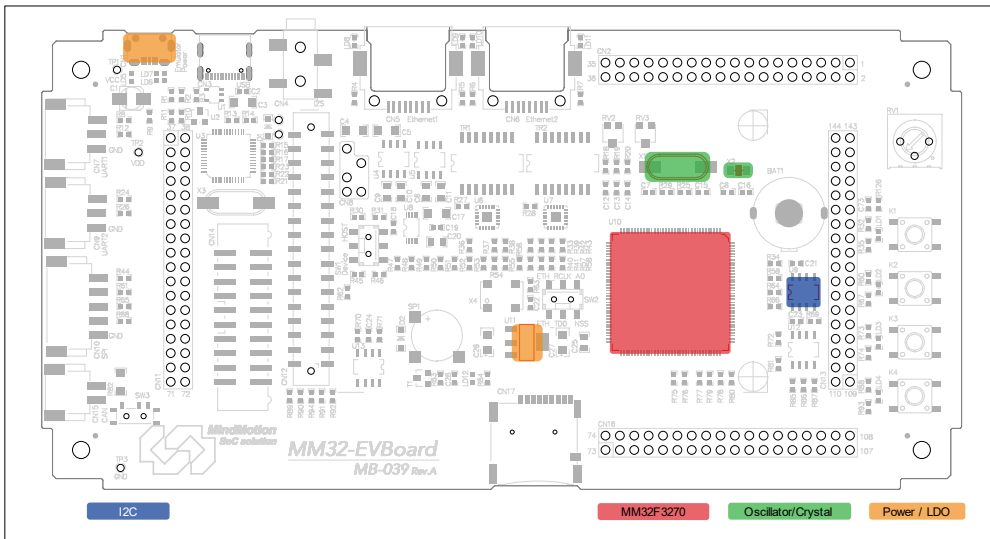


Figure 8. I2C EEPROM device layout

MM32F3270 EVB I2S audio connects an I2S audio decoder and two mono audio amplifiers, and outputs to 3.5mm Headphone jack. The layout is shown in the figure below.

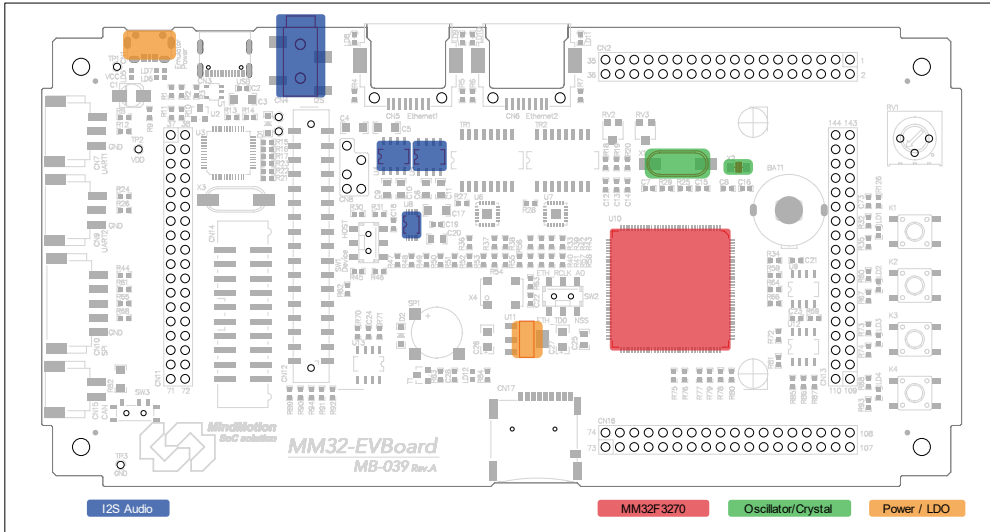


Figure 9. I2S Audio device layout

MM32F3270 EVB analog input samples three potentiometer input methods to evaluate MCU analog input performance. The layout is shown in the figure below.

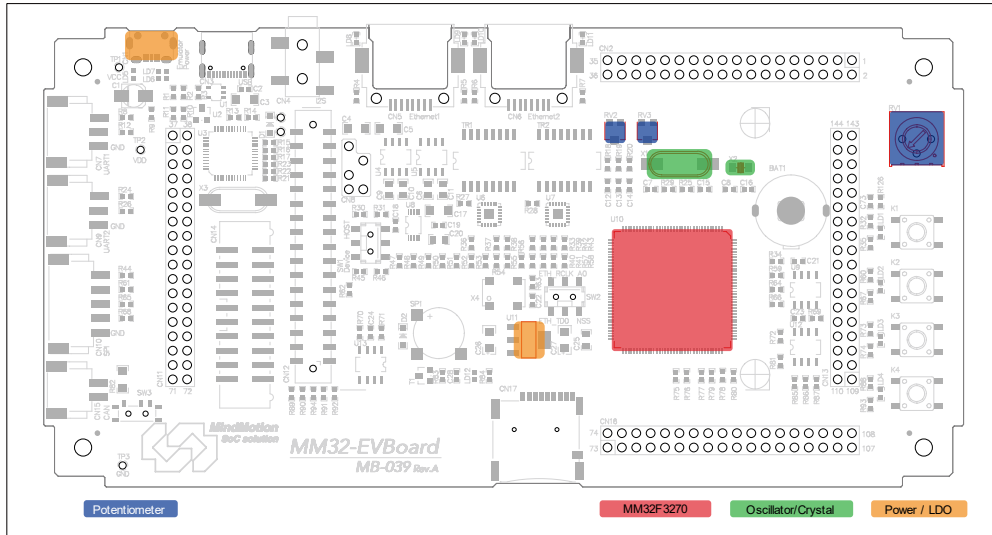


Figure 10. Potentiometer analog level input device layout

MM32F3270 EVB FSMC / LCD connector supports external memory, FPGA and LCDM. The layout is shown in the figure below.

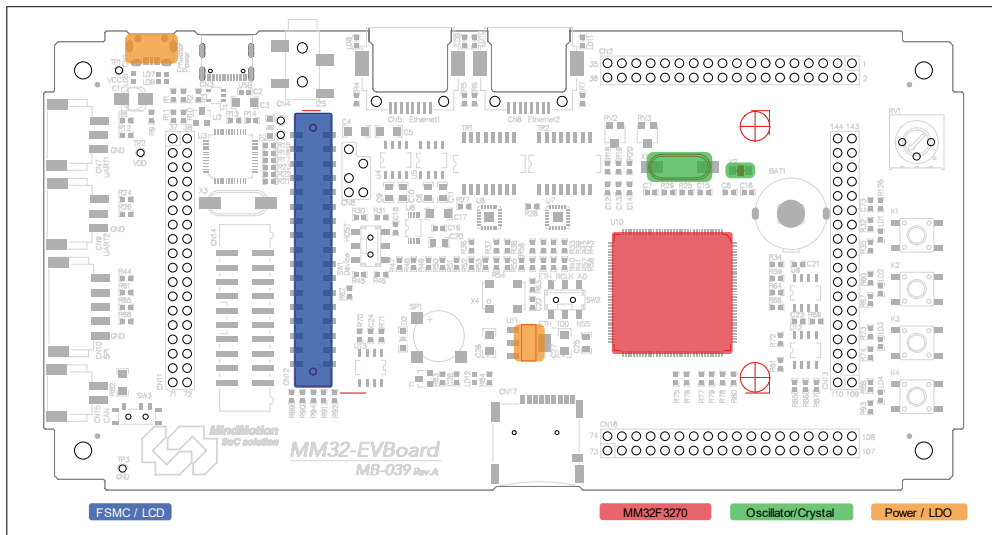


Figure 11. FSMC/LCD interface device layout

MM32F3270 EVB SDIO connects to a TF Card socket and supports card insertion detection function. The layout is shown in the figure below.

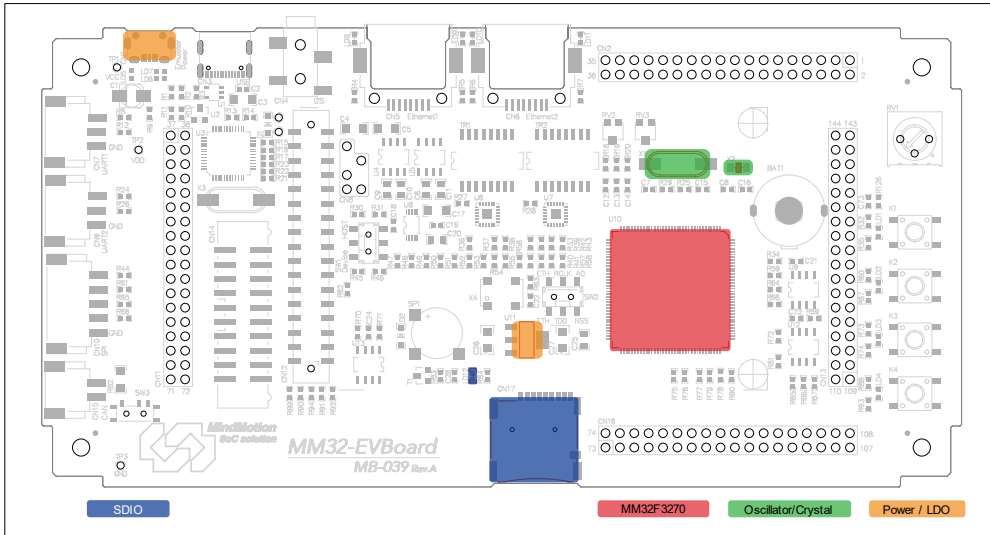


Figure 12. SDIO SD/TF Card interface device layout

MM32F3270 EVB PWM realize the function of audio output through simple driver. The layout is shown in the figure below.

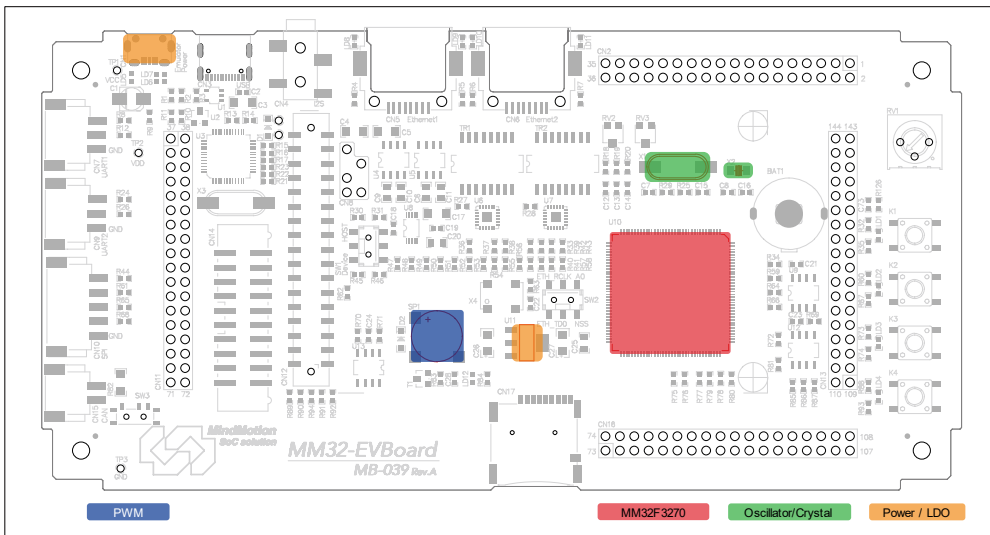


Figure 13. PWM audio output interface device layout

MM32F3270 EVB Ethernet MAC realizes the function of time-sharing operation on two physical interfaces through different PHY addresses. The layout is shown in the figure below.

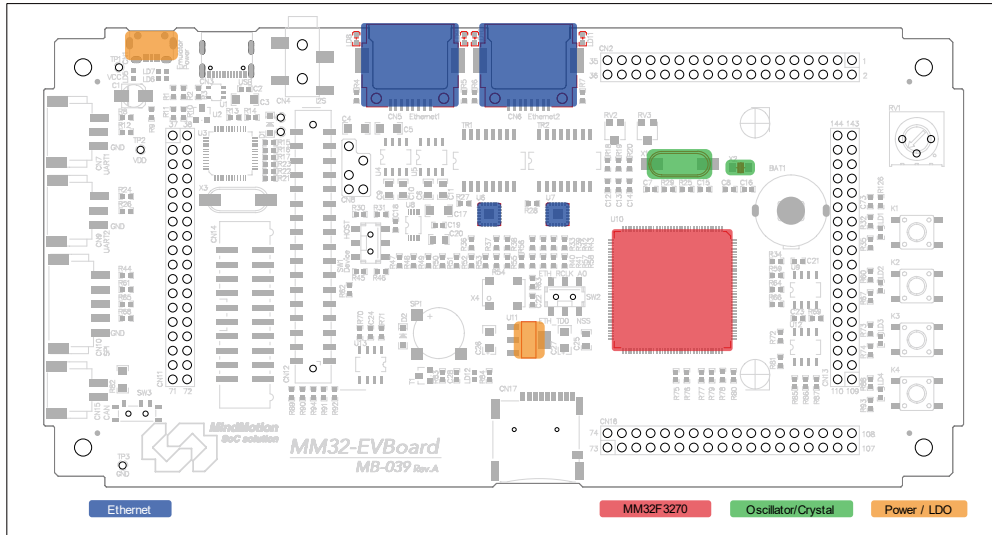


Figure 14. Ethernet interface device layout

The MM32F3270 EVB USB socket realizes the Host/Device function through hardware switches. The layout is shown in the figure below.

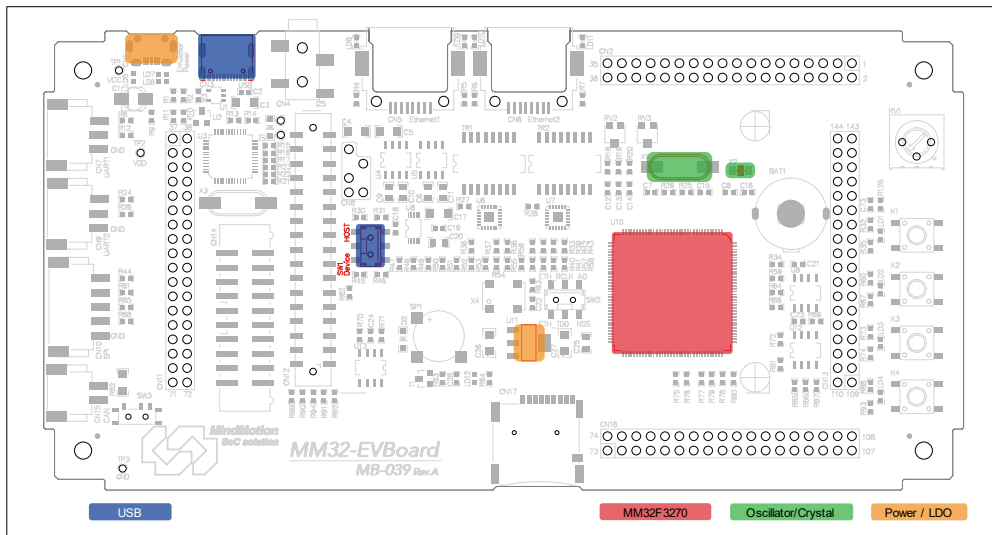


Figure 15. USB Host/Device interface device layout

The MM32F3270 EVB alternate function selector switch is used to select PA1 function between analog input and RMIIL_RCLK, PB12 between SPI2 NSS and RMIIL_TDO. The layout is shown in the figure below.

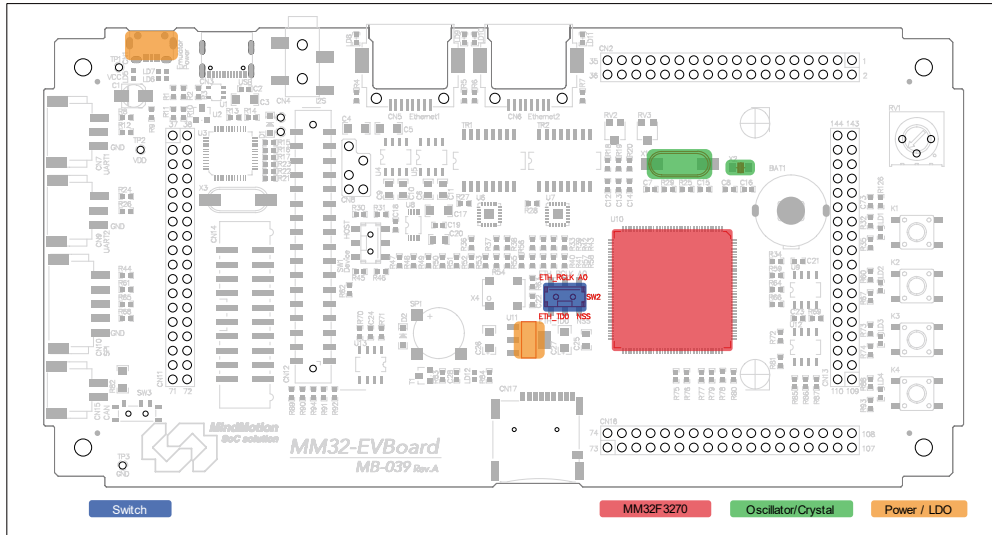


Figure 16. Control switch layout

MM32F3270 EVB on-board emulator, programmer and external emulation debugging connector make up the function circuit. The layout is shown in the figure below.

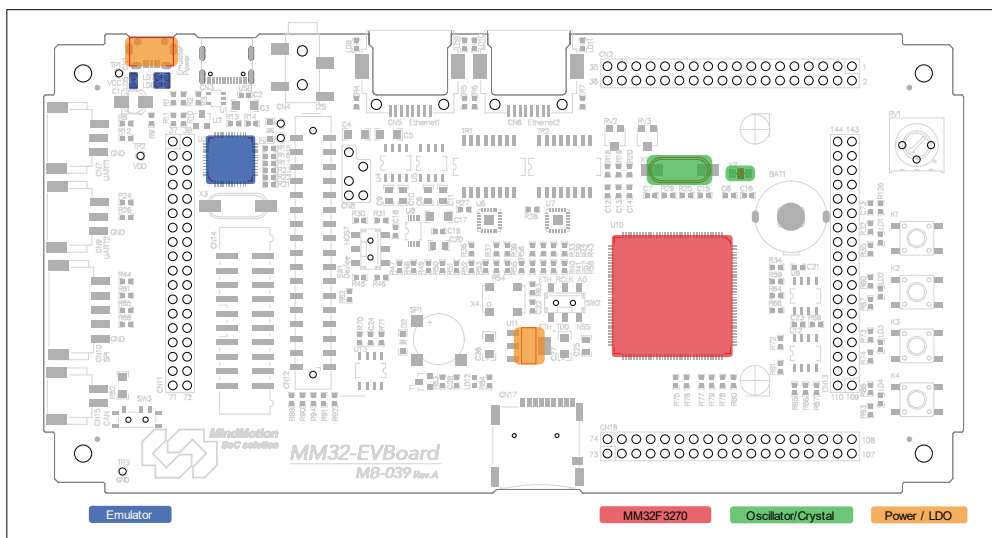


Figure 17. Power/debug/download interface device layout

Schematic diagram

Evaluation board schematic diagram

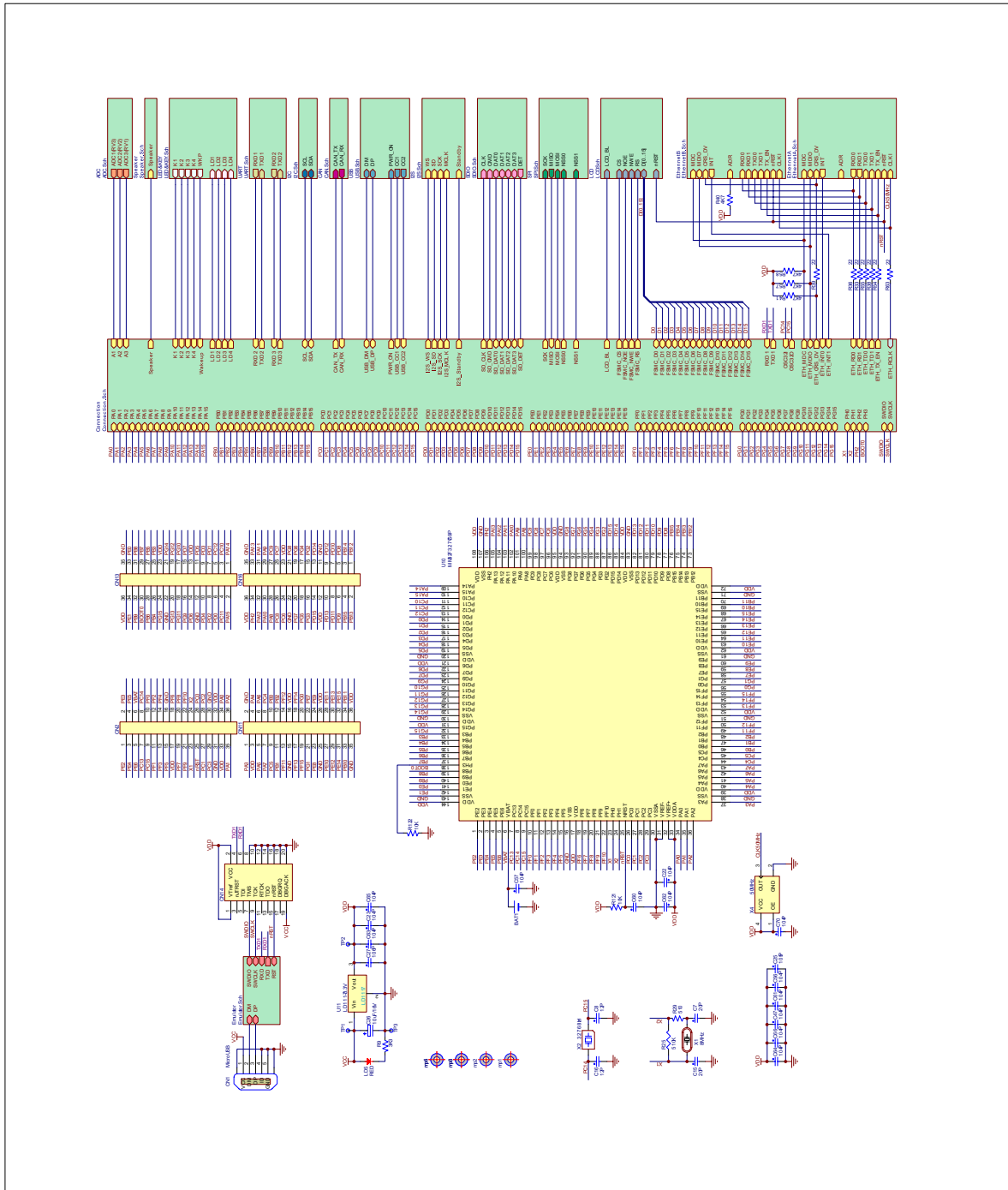


Figure 18. MM32F3270 EVB schematic diagram-architecture

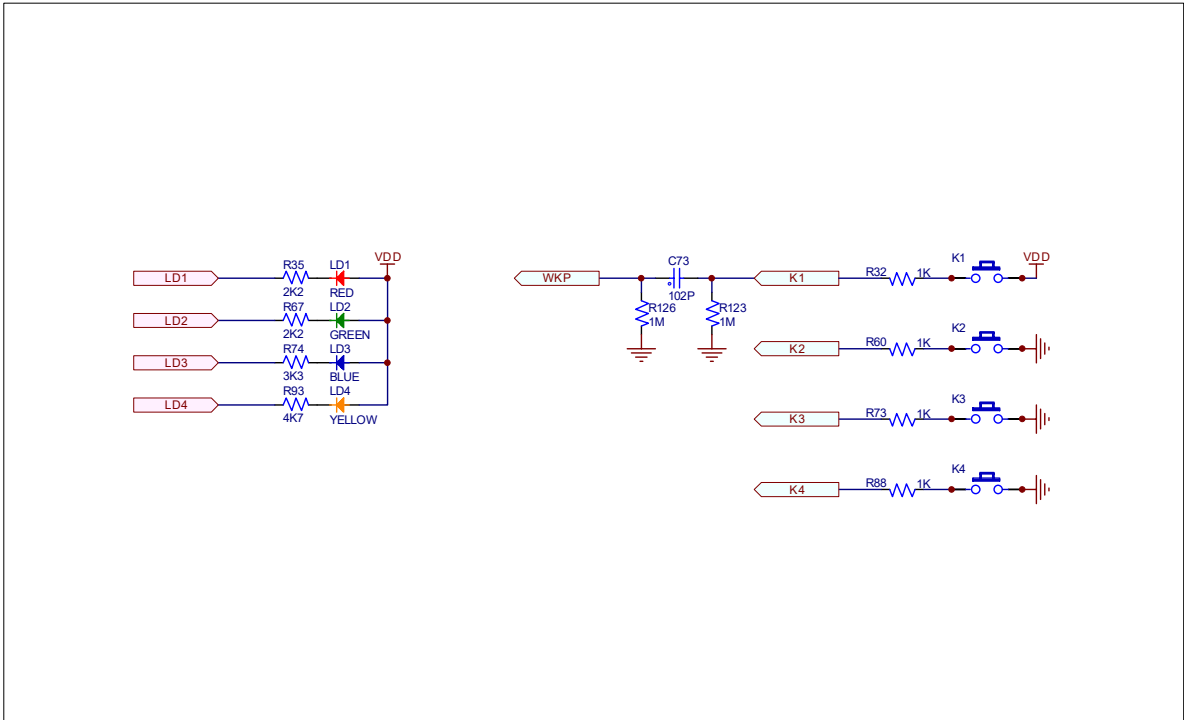


Figure 19. MM32F3270 EVB schematic diagram-GPIO

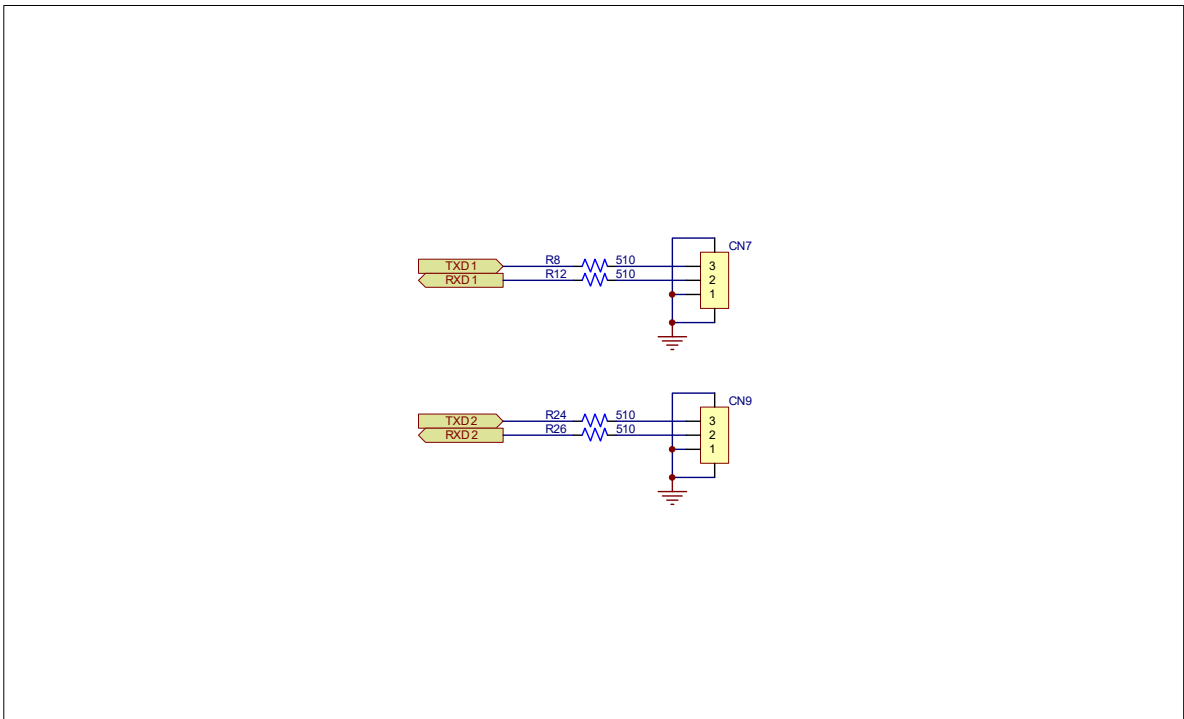


Figure 20. MM32F3270 EVB schematic diagram-UART

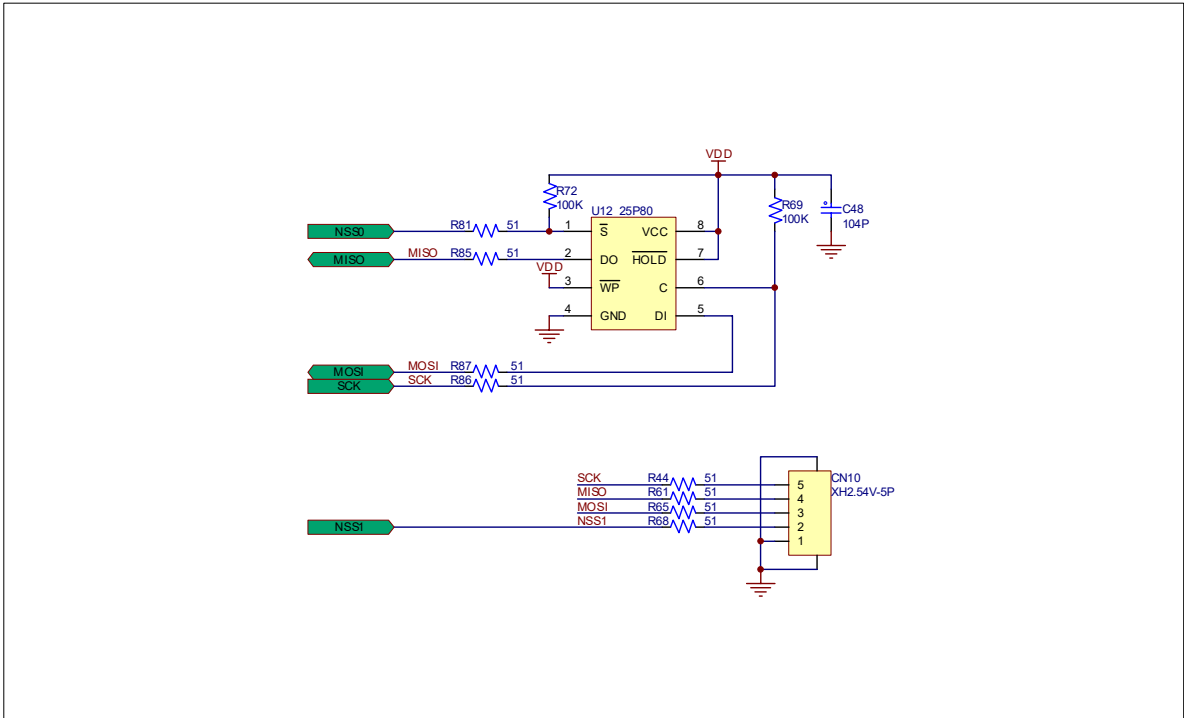


Figure 21. MM32F3270 EVB schematic diagram-SPI

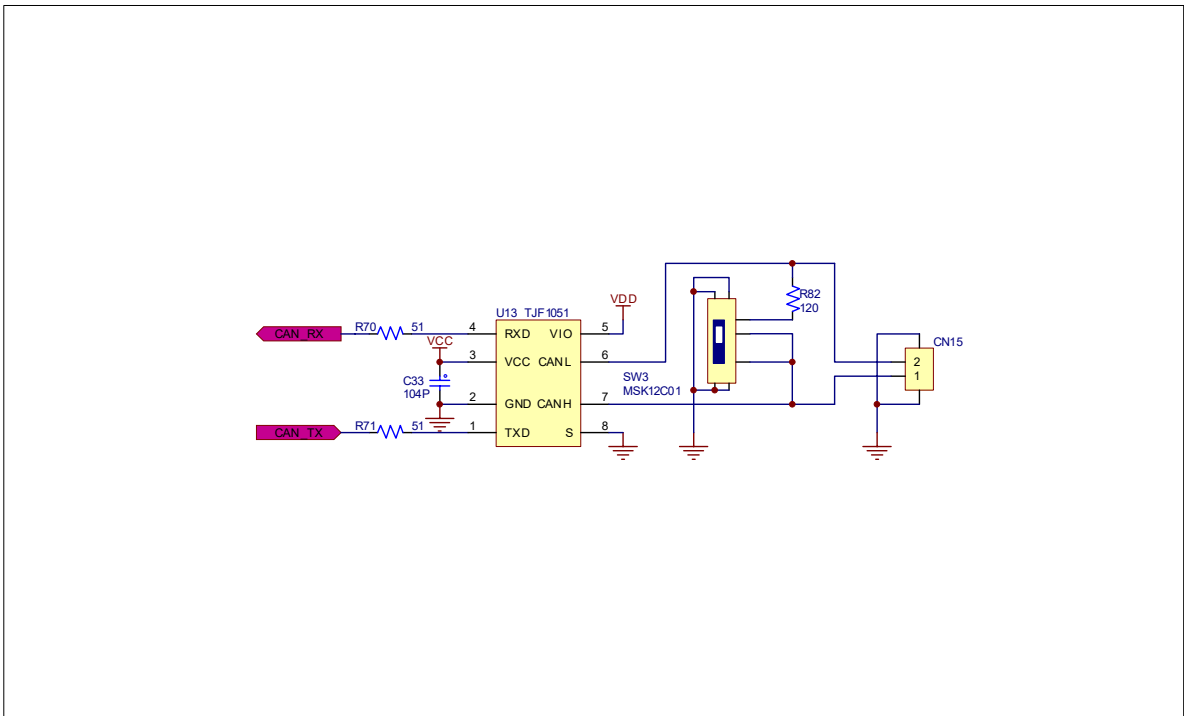


Figure 22. MM32F3270 EVB schematic diagram-CAN Bus

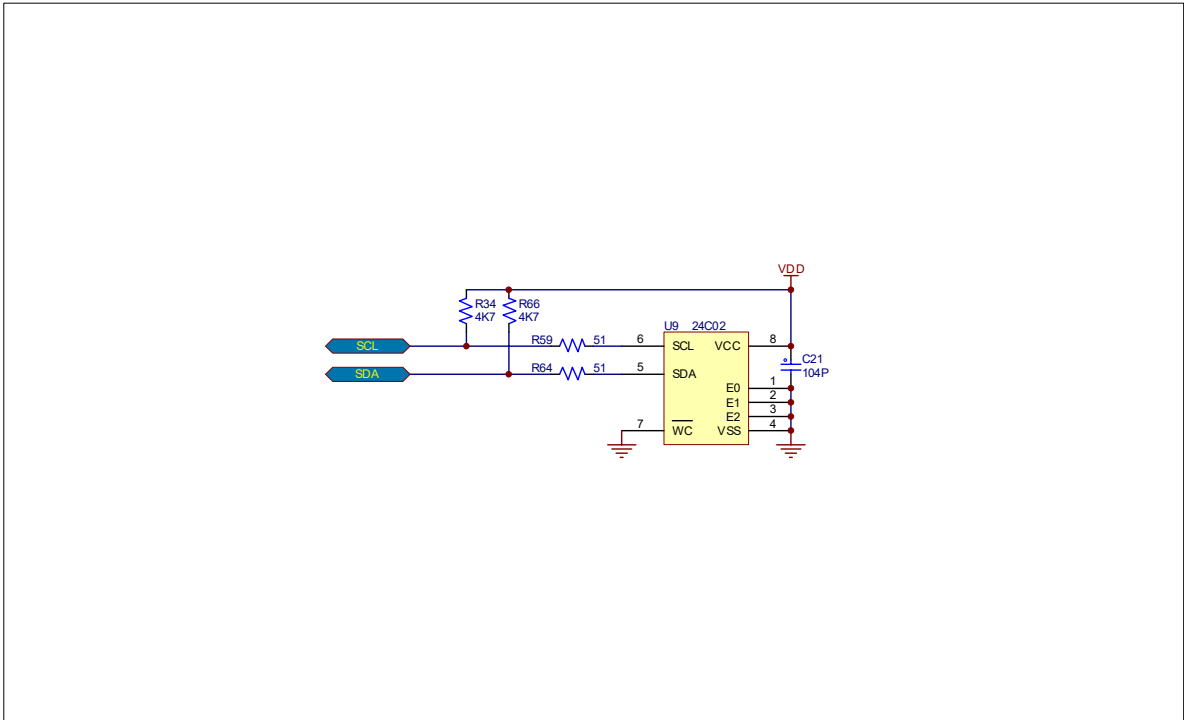


Figure 23. MM32F3270 EVB schematic diagram-I2C Bus

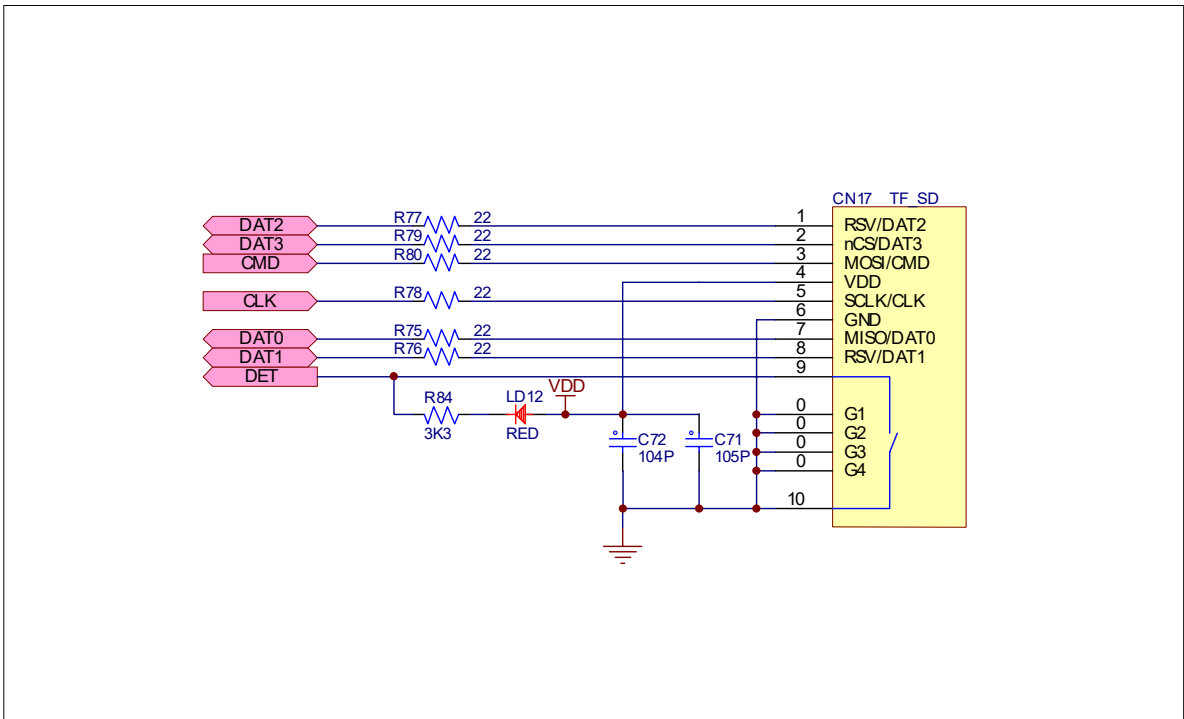


Figure 24. MM32F3270 EVB schematic diagram-SDIO/TF Card

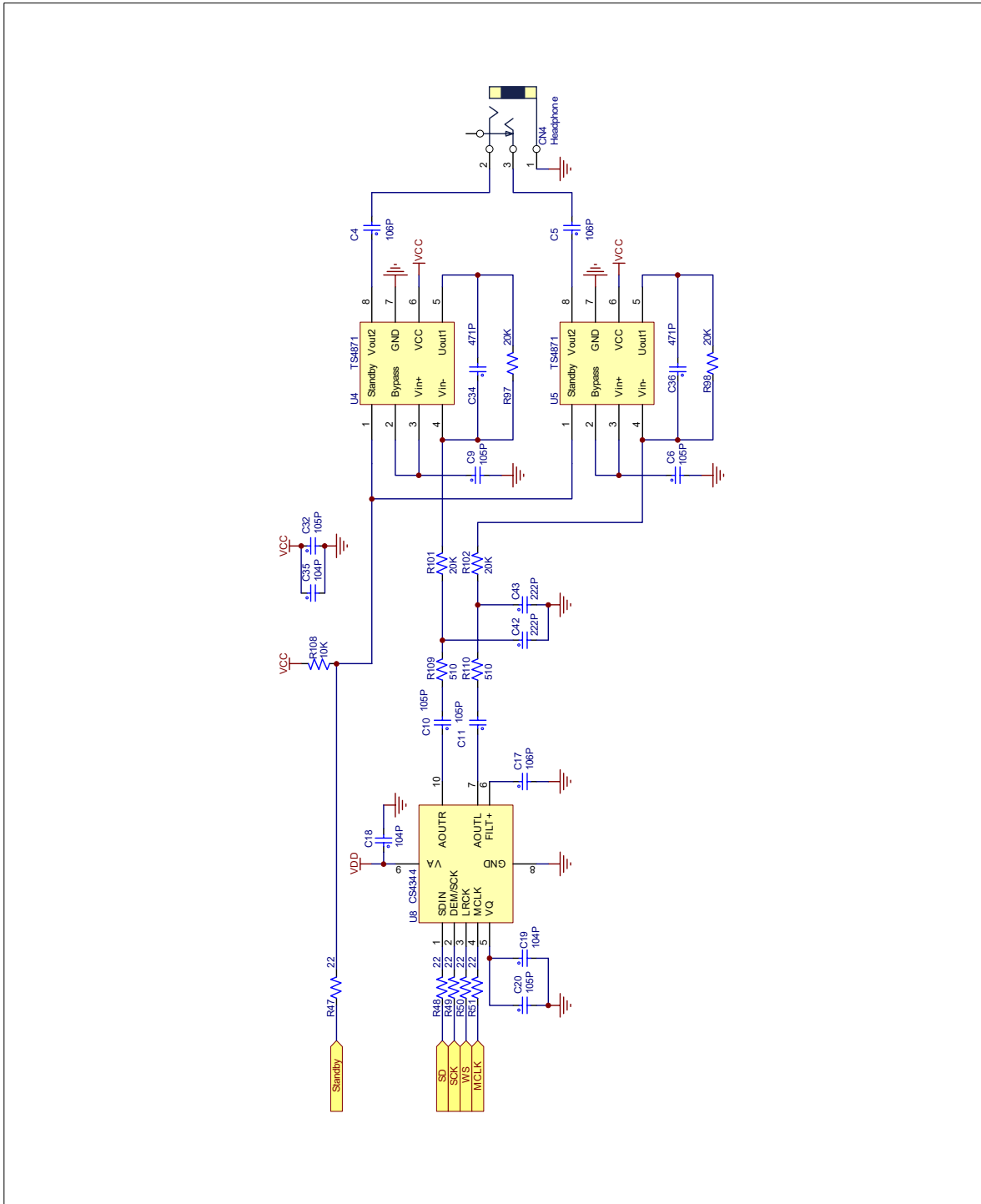


Figure 25. MM32F3270 EVB schematic diagram-I2S Audio

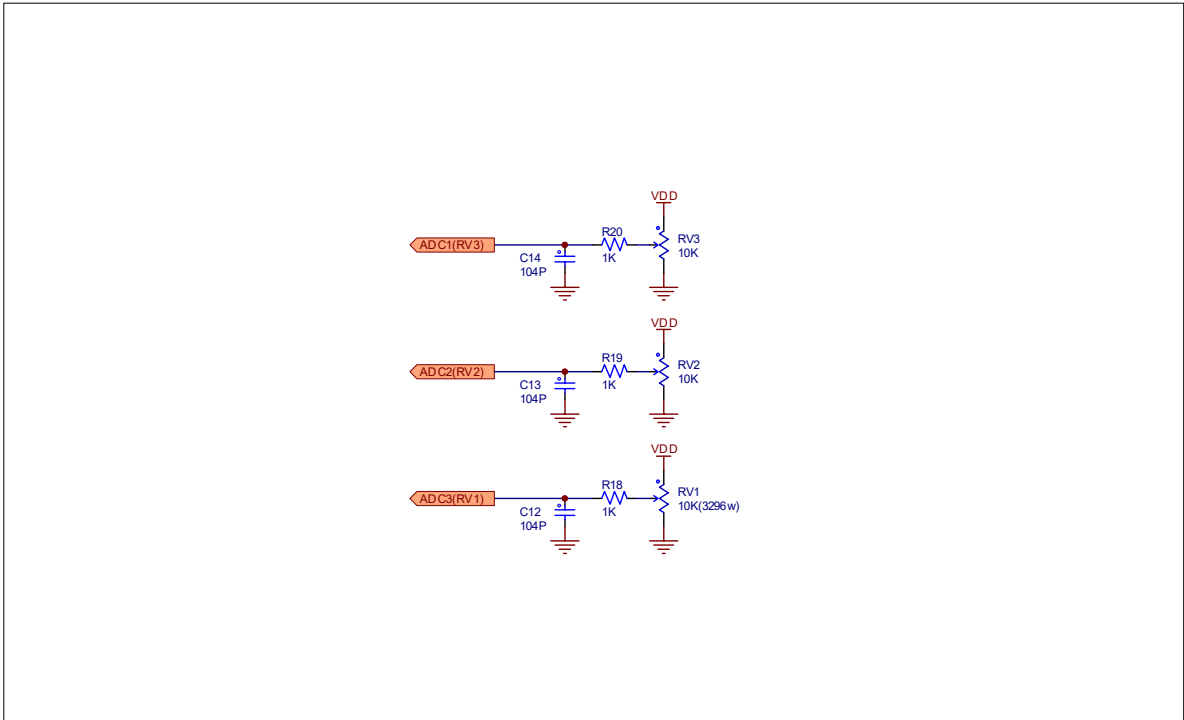


Figure 26. MM32F3270 EVB schematic diagram-Analog Input

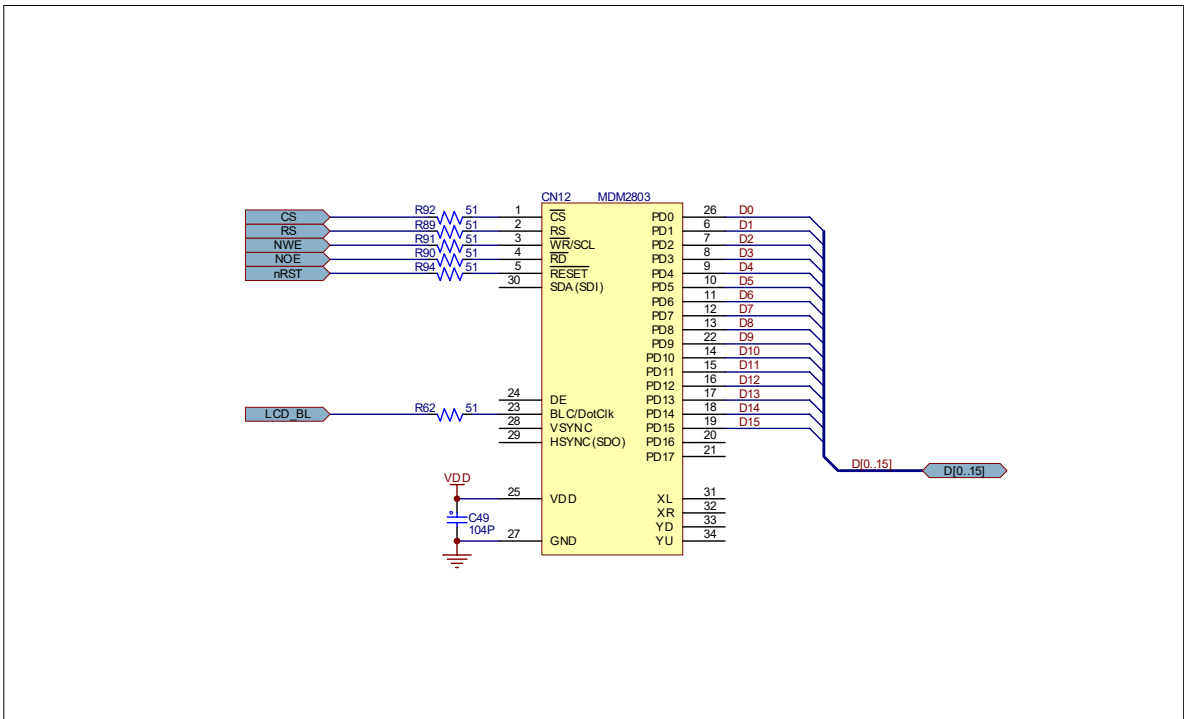


Figure 27. MM32F3270 EVB schematic diagram-FSMC/LCD Interface

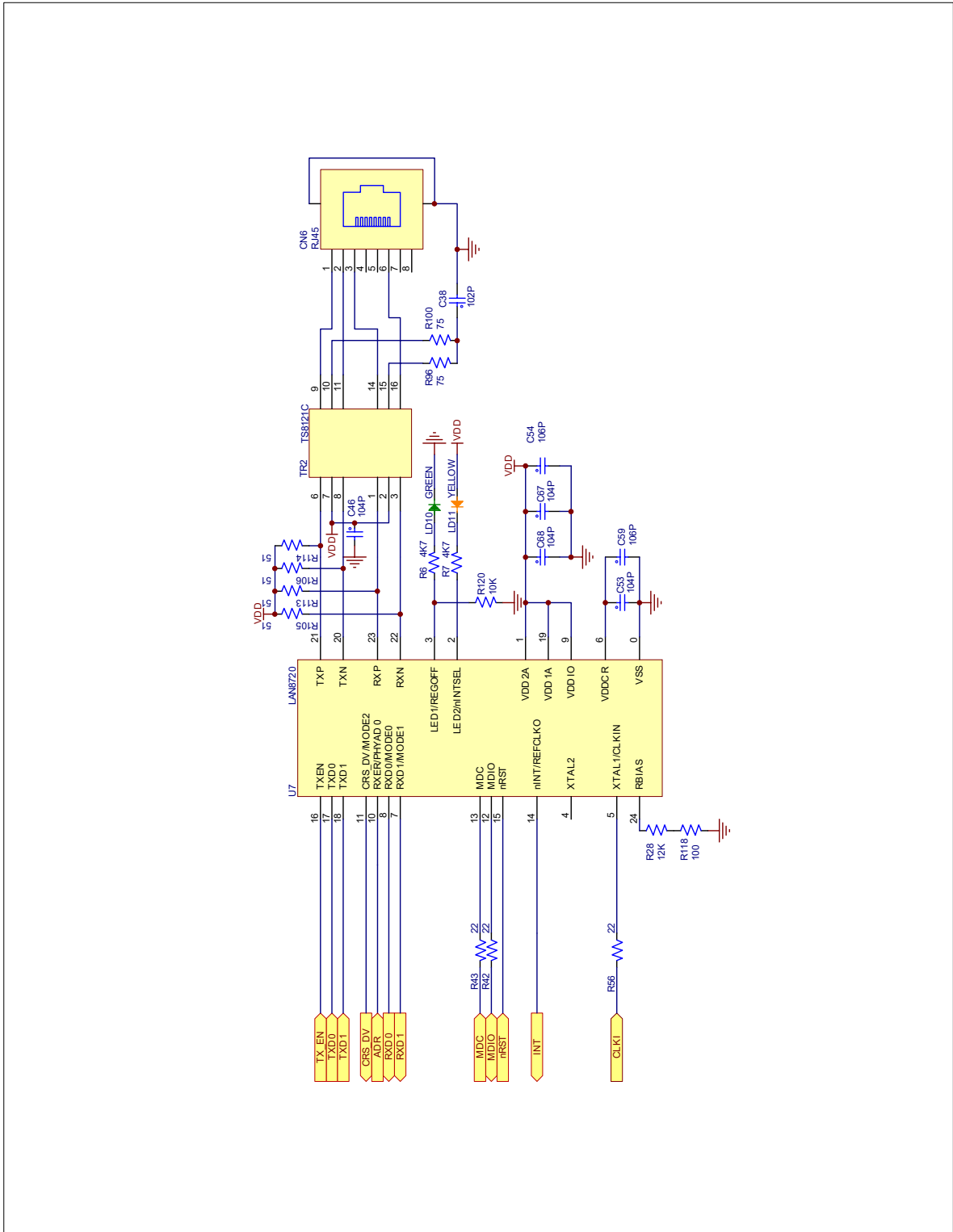


Figure 29. MM32F3270 EVB schematic diagram-Ethernet (2)

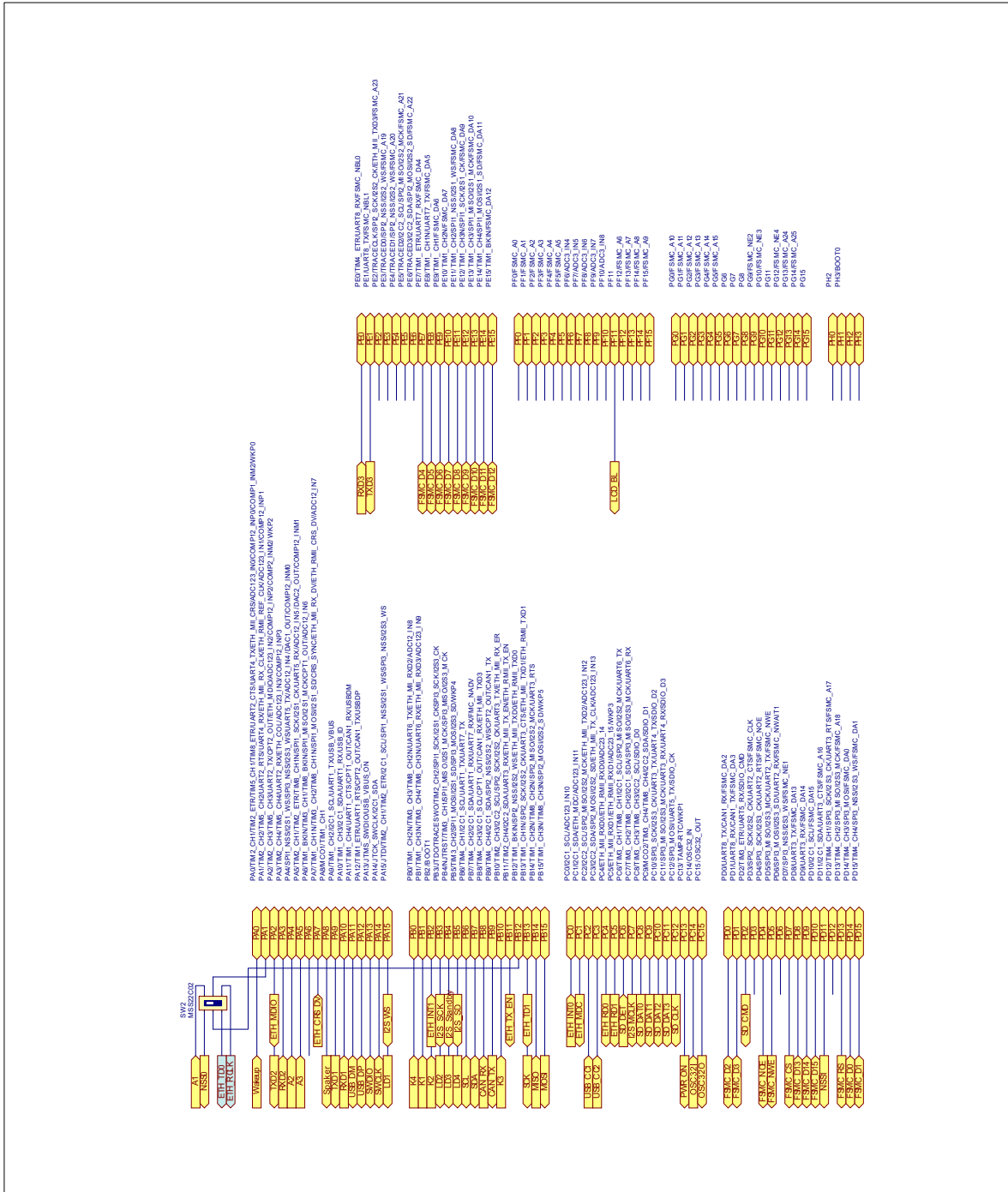


Figure 32. MM32F3270 EVB schematic diagram-signal connection

MM32-LINK-OB schematic

The function of the MM32-LINK-OB emulator embedded in MM32F3270 EVB is exactly the same as that of the independent standard MM32-LINK emulator, and the firmware upgrade code is also the same. The embedded MM32-LINK emulator share the common power supply with the evaluation target MCU.

When users emulate or download something through emulator, one end of the USB cable should be inserted into the CN1 socket, and the other end should be connected to the USB port of PC. When the power of emulator works normally, the power indicator light LD5 would be on. As the USB connection indicator, LD6 would turn off from red and LD7 would turn to green when MM32-LINK-OB is successfully connected to the computer.

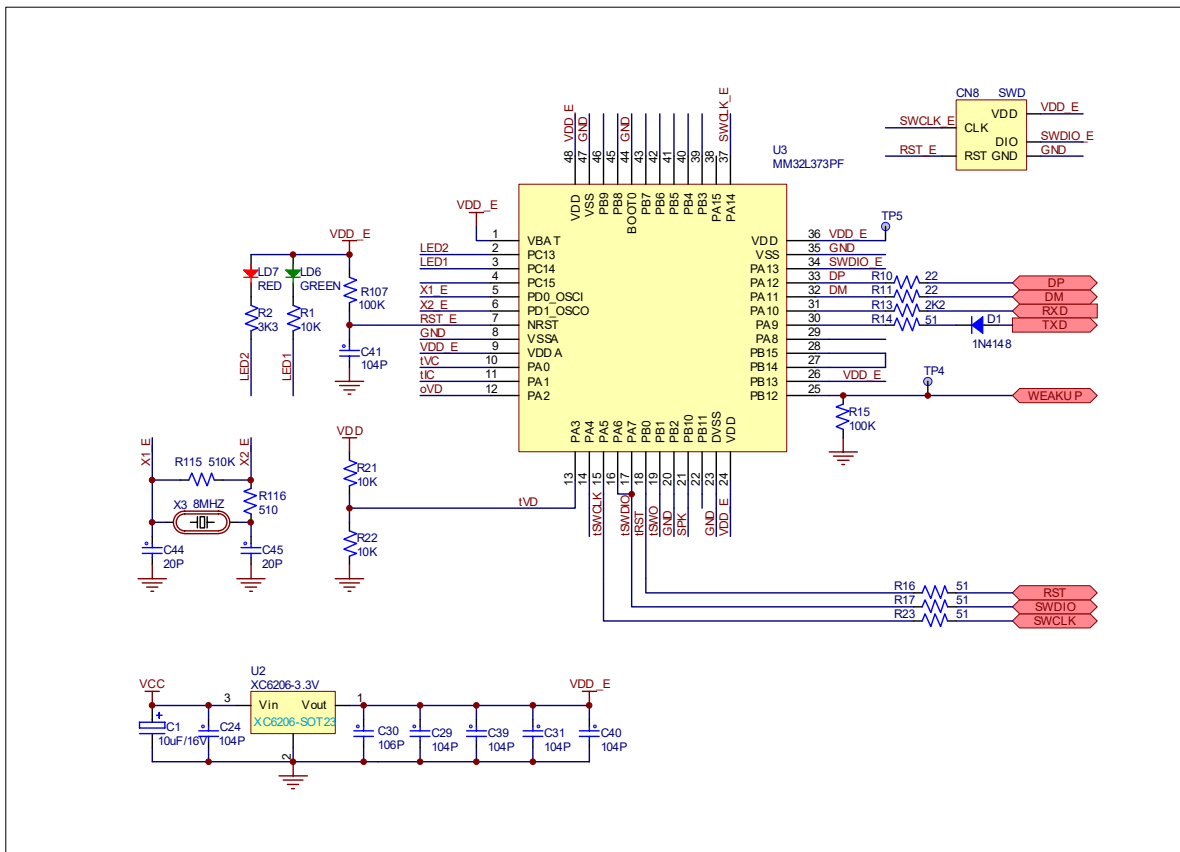


Figure 33. MM32F3270 EVB schematic diagram-MM32-LINK-OB

Configuration

Emulator configuration

The function of the MM32-LINK-OB emulator embedded in MM32F3270 EVB is the same as that of the independent MM32-LINK, and the software configuration method is also the same.

The initial default state of MM32-LINK is shown in the figure below.

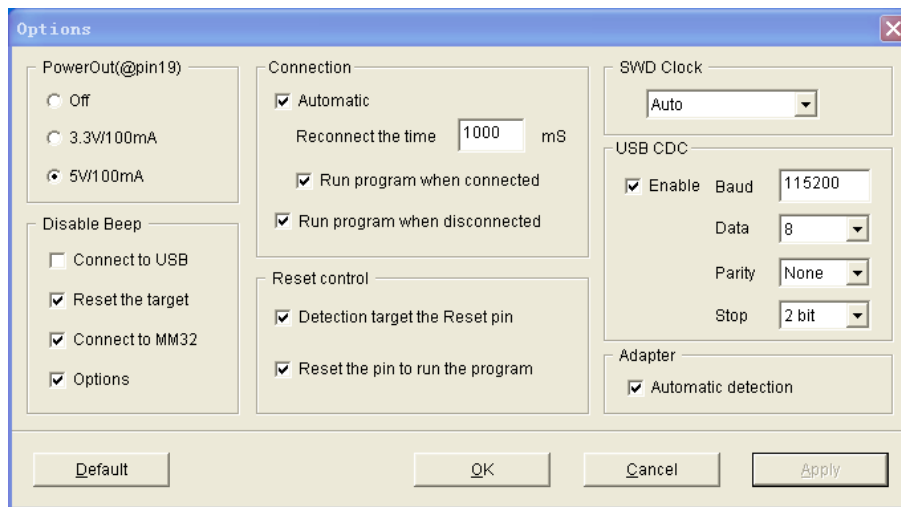


Figure 34. MM32-LINK-OB configuration dialog

Programmer configuration

Please refer to "MM32-LINK Programmer User Manual", download link:
<http://www.mindmotion.com.cn/download.aspx?cid=1243>

