



HT32F1653/HT32F1654 Development Board User Manual

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1 Introduction

The HT32F1653/1654 development board is designed for use with the HT32F1653/1654 series of microcontrollers. The HT32F1653/1654 series of microcontrollers contain a variety of peripherals such as high speed SAR ADC, I²S, EBI, CRC, COMPARATOR, USB, I²C, USART, UART, SPI, GPTM, MCTM, WDT, RTC, SW-DP (Serial Wire) and etc..

There are some specific components to help evaluate all the device peripherals (such as the RS232 transceiver, EEPROM, series NOR flash, Microphone, Stereo jack, potentiometer and so on).



Figure 1. HT32F1653/1654 Development Board

Features

- USB2.0 full speed connection
- 5V power supply: mini USB connector or 5V power jack
- RS232 connector
- Reset ,wakeup and two keys buttons
- Three LEDs
- I²C-compatible serial interface EEPROM
- SPI-compatible serial interface Flash
- SPI and EBI extension interfaces for LCD display application
- SD card slot (SPI mode)
- PWM output for Buzzer driving
- Backup battery
- Boot from Flash ,SRAM or boot loader
- SWD-10P debug port interface
- Multi interface including UART, I²C, SPI and GPIO functions for connecting various modules
- Audio input contains microphone and stereo jack
- Audio output contains speaker connector and stereo jack

2 Hardware Layout

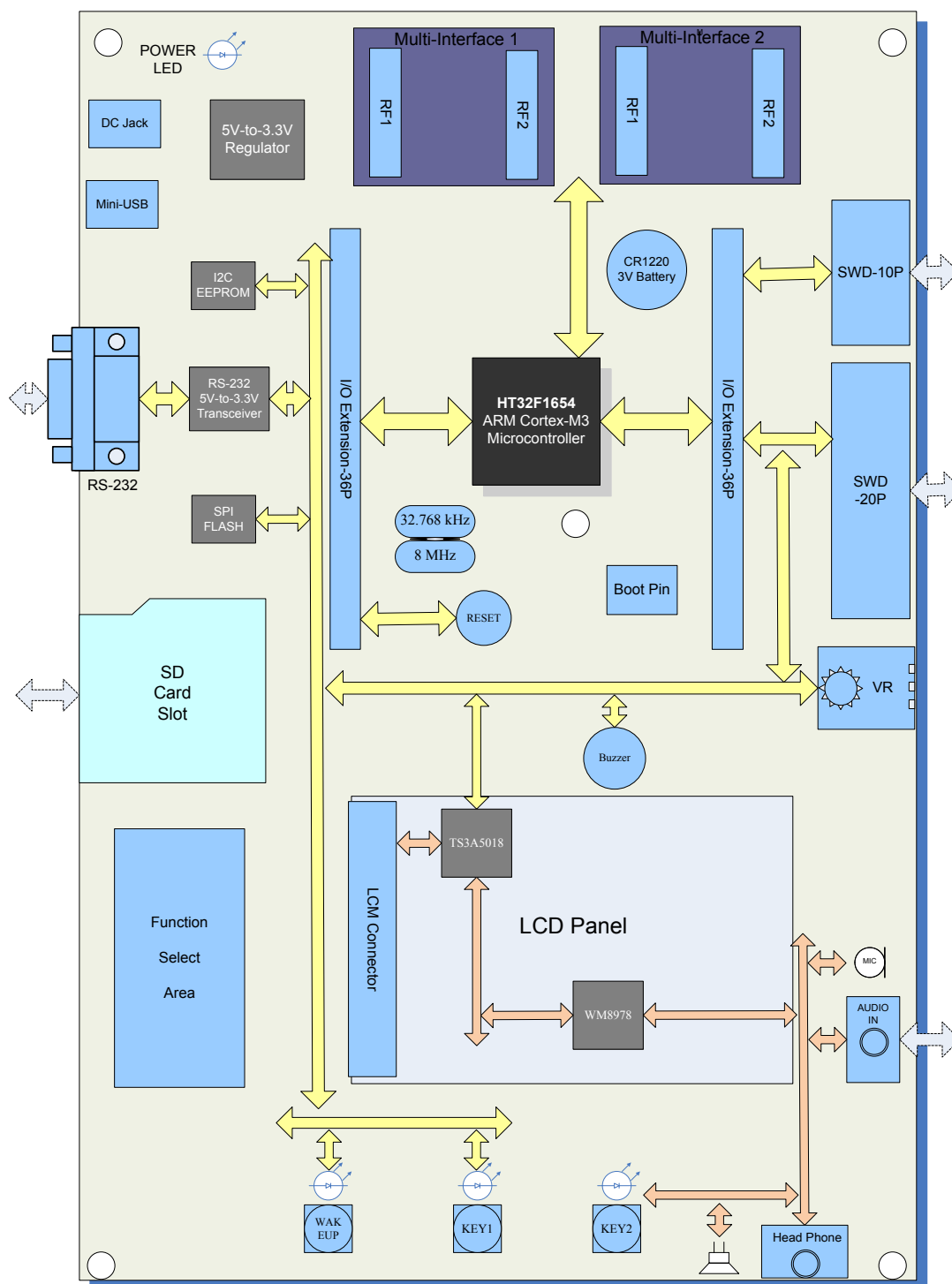


Figure 2. HT32F1653/1654 Development Board Block Diagram

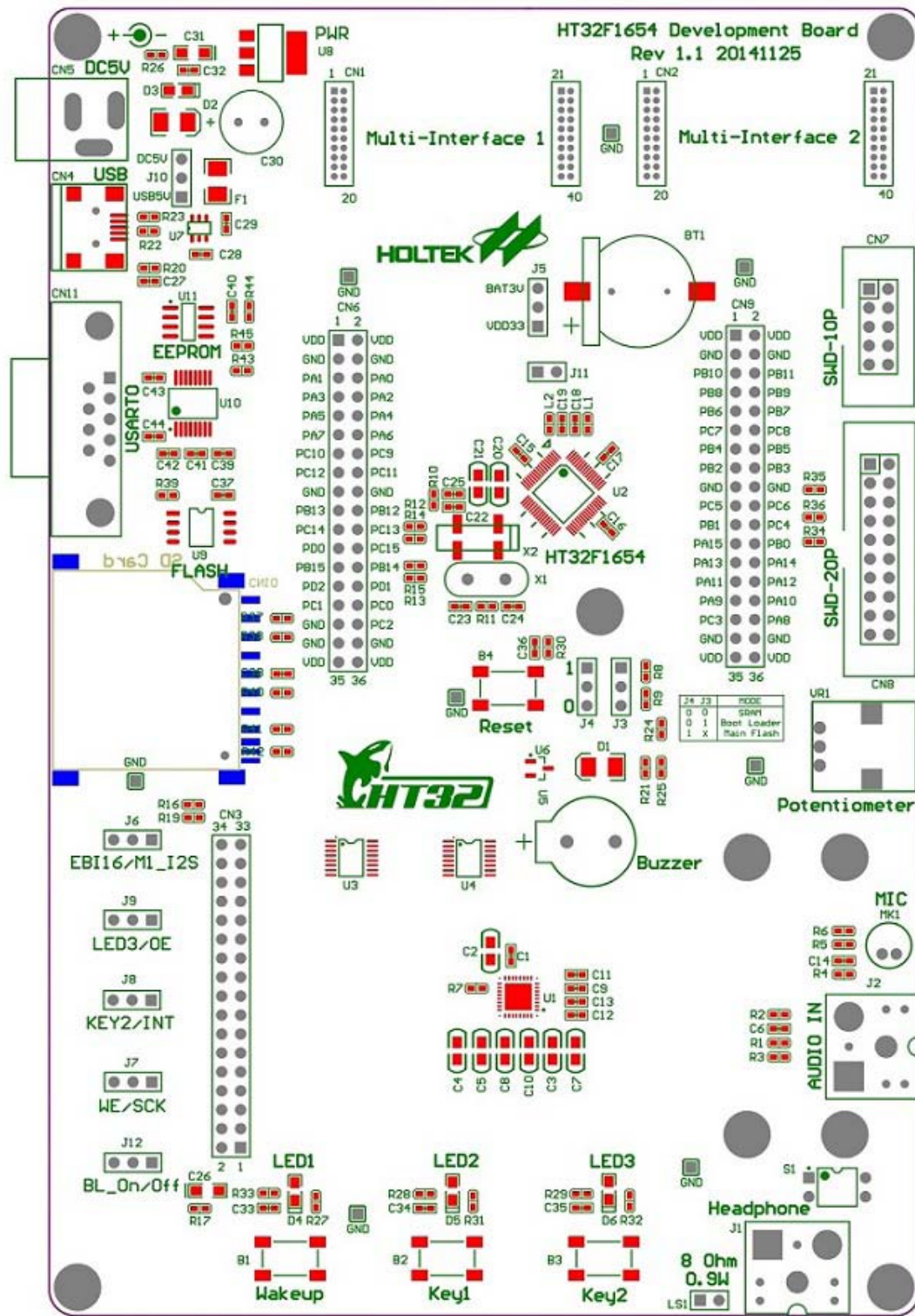
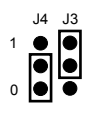
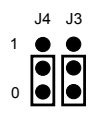
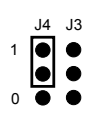


Figure 3. HT32F1653/1654 Development Board Layout



Boot Option

Table 1. Boot Jumpers

Jumper	Description
J3 & J4	<p>Boot loader mode</p>  <p>Boot from the embedded boot loader.</p>
	<p>SRAM mode</p>  <p>Boot from the embedded SRAM.</p>
	<p>Main flash mode - default setting</p>  <p>Boot from the embedded main flash. BOOT0 (J3) don't care and BOOT1 (J4) = 1 – default setting</p>



V_{BAT} Option

Table 2. V_{BAT} Jumpers

Jumper	Description
J5	<p>VDD33 pin is connected to 3.3V power - default setting</p> 
	<p>BAT3V pin is connected to the 3V CR1220 battery.</p> 

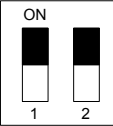
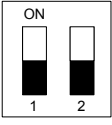
Power Supply Option

Table 3. Power Supply Jumpers

Jumper	Description
J10	For power supply sourced from the Mini USB port (CN4) - default setting  DC5V USB5V
	For power supply sourced from the power supply jack (CN5)  DC5V USB5V




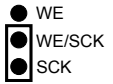


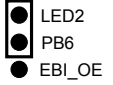
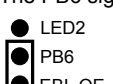

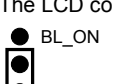
Audio Input Option

Table 4. Audio Input DIP Switch

Jumper	Description
S1	For audio input sourced from the Microphone (MK1) - default setting 
	For audio input sourced from the stereo jack (J2) 














EBI Interface Option

Table 5. EBI interface Switch

Jumper	Description
J6	EBI 16-bit mode signals are switched to the LCD connector (CN3) by the SPDT switch - default setting. 
	I2S and I/O signals are switched to the Speaker driver IC (U1) and Multi-Interface_1 (CN1) by the SPDT switch. 
J7	The LCD connector (CN3) WE/SCK pin is switched to the EBI_WE function - default setting. 
	The LCD connector (CN3) WE/SCK pin is switched to the SPI_SCK function. 
J8	The PB9 signal is used for Key2 control - default setting 
	The PB9 signal is used for LCD INT control. 
J9	The PB6 signal is used for LED2 control - default setting. 
	The PB6 signal is used for LCD EBI_OE control. 
J12	The LCD connector (CN3) BL pin is switched to a pull high - default setting 
	The LCD connector (CN3) BL pin is switched to a pull low (CN13). 

Functions switch Description

Table 6. Function Switch Description

Function	J6	J7	J8	J9
LCD EBI-16bit mode (can't use I ² S and MI_1)			X	X
LCD EBI-16bit mode (with touch screen controller)				X
LCD EBI-16bit mode (read LCD Data)			X	
LCD EBI-8bit mode & I ² S or Multi-interface1			X	X
LCD SPI mode	X		X	X
LCD SPI mode (with touch screen controller)	X			X

*Note: X = don't care

SWD-10P connector CN7

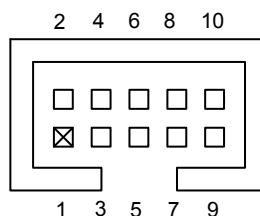


Figure 4. SWD-10P connector CN7

Table 7. SWD-10P connector CN7

Pin#	Description	Pin#	Description
1	3.3V	2	SWDIO (PA13)
3	GND	4	SWCLK (PA12)
5	GND	6	TRACESWO (PA11)
7	NC	8	NC
9	GND	10	Reset#

Extension connectors CN6

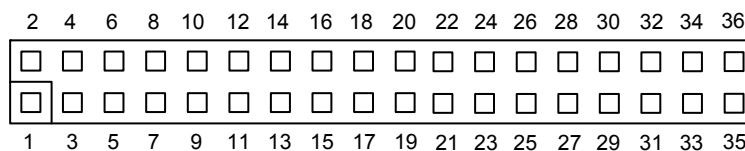


Figure 5. Extension connectors CN6

Table 8. Extension connector CN2

Pin#	Description	Pin#	Description
1	3.3V	2	3.3V
3	GND	4	GND
5	PA1	6	PA0
7	PA3	8	PA2
9	PA5	10	PA4
11	PA7	12	PA6
13	PC10	14	PC9
15	PC12	16	PC11
17	GND	18	GND
19	PB13	20	PB12
21	PC14	22	PC13
23	PD0	24	PC15
25	PB15	26	PB14
27	PD2	28	PD1
29	PC1	30	PC0
31	GND	32	PC2
33	GND	34	GND
35	3.3V	36	3.3V

Extension connectors CN9

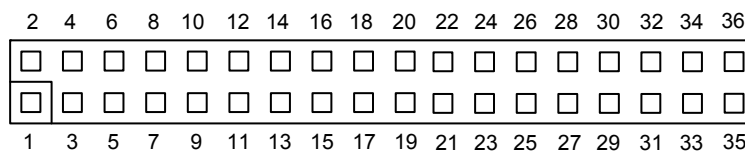


Figure 6. Extension connectors CN9

Table 9. Extension connector CN9

Pin#	Description	Pin#	Description
1	3.3V	2	3.3V
3	GND	4	GND
5	PB10	6	PB11
7	PB8	8	PB9
9	PB6	10	PB7
11	PC7	12	PC8
13	PB4	14	PB5
15	PB2	16	PB3
17	GND	18	GND
19	PC5	20	PC6
21	PB1	22	PC4
23	PA15	24	PB0
25	PA13	26	PA14
27	PA11	28	PA12
29	PA9	30	PA10
31	PC3	32	PA8
33	GND	34	GND
35	3.3V	36	3.3V

SWD-20P connector CN8

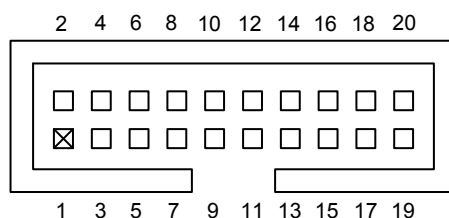


Figure 7. SWD-20P connector CN8

Table 10. SWD-20P connector CN8

Pin#	Description	Pin#	Description
1	3.3V	2	3.3V
3	NC	4	GND
5	NC	6	GND
7	SWDIO(PE13)	8	GND
9	SWCLK(PE12)	10	GND
11	NC	12	GND
13	TRACESWO(PE11)	14	GND
15	RESET#	16	GND
17	NC	18	GND
19	NC	20	GND

Multi-Interface CN1

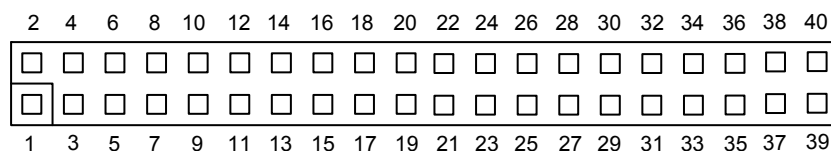


Figure 8. Multi-Interface CN1

Table 11. Multi-Interface CN1

Pin#	Description	Pin#	Description
1	VSS	2	NC
3	USR1_RTS(PA6)	4	NC
5	NC	6	USR1_TX(PA4)
7	USR1_TX(PA4)	8	USR1_RX(PA5)
9	USR1_RX(PA5)	10	IO0(PC6)
11	NC	12	IO1(PC2)
13	NC	14	SPI_SEL(PC5)
15	NC	16	SPI_SCK(PA4)
17	NC	18	SPI_MOSI(PA5)
19	GND	20	SPI_MISO(PA6)
21	NC	22	GND
23	NC	24	NC
25	NC	26	NC
27	3.3V	28	NC
29	3.3V	30	NC
31	NC	32	I2C0_SCL(PA0)
33	IO2(PC7)	34	I2C0_SDA(PA1)
35	NC	36	NC
37	NC	38	USR1_CTS(PC5)
39	IO3(PC8)	40	IO4(PC4)

Multi-Interface CN2

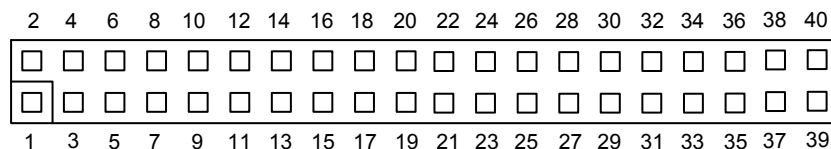


Figure 9. Multi-Interface CN2

Table 12. Multi-Interface CN2

Pin#	Description	Pin#	Description
1	VSS	2	NC
3	NC	4	NC
5	NC	6	UR1_TX(PB4)
7	UR1_TX(PB4)	8	UR1_RX(PB5)
9	UR1_RX(PB5)	10	IO0(PB8)
11	NC	12	IO1(PB3)
13	NC	14	SPI_SEL(PB7)
15	NC	16	SPI_SCK(PC10)
17	NC	18	SPI_MOSI(PC11)
19	GND	20	SPI_MISO(PC12)
21	NC	22	GND
23	NC	24	NC
25	NC	26	NC
27	3.3V	28	NC
29	3.3V	30	NC
31	NC	32	I2C0_SCL(PB0)
33	IO2(PB2)	34	I2C0_SDA(PB1)
35	NC	36	NC
37	NC	38	NC
39	IO3(PA15)	40	IO4(PA14)

RS232 port0 connector CN11

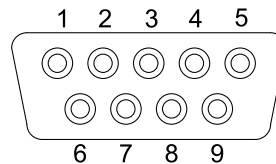


Figure 10. RS232 port0 connector CN11

Table 13. RS232 port0 connector CN11

Pin#	Description	Pin#	Description
1	Connect to PIN4	2	UART0_Rx (PA3)
3	UART0_Tx (PA2)	4	Connect to PIN6
5	GND	6	Connect to PIN1
7	Connect to PIN8	8	Connect to PIN7
9	NC		

SD card connector CN10

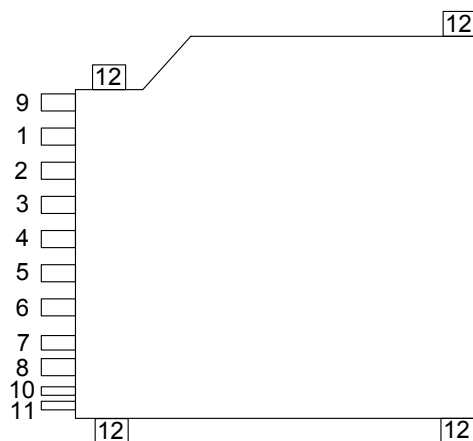


Figure 11. SD card connector CN10

Table 14. SD card connector CN10

Pin#	Description	Pin#	Description
1	SD_CARD_CS(PA9)	2	SPI1_MOSI(PC11)
3	GND	4	3.3V
5	SPI1_SCK(PC10)	6	GND
7	SPI1_MISO(PC12)	8	NC
9	NC	10	Pull high
11	NC	12	GND

LCD connector CN3

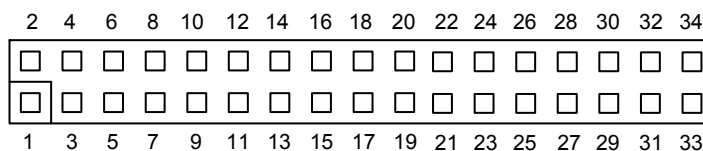


Figure 12. LCD connector CN3

Table 15. LCD connector CN3

Pin#	Description	Pin#	Description
1	5V	2	GND
3	LCD_BL(J12)	4	I2C0_SDA(PA1)
5	I2C0_SCL(PA0)	6	EBI_WE(PB8)
7	I/O(PB5)	8	I/O(PB4)
9	EBI_CS0(PB7)	10	LCD_INT(PB9)
11	NC	12	LCD_RESET(PC3)
13	GND	14	3.3V
15	EBI_AD0(PA14)	16	EBI_AD1(PA15)
17	EBI_AD2(PB0)	18	EBI_AD3(PB1)
19	EBI_AD4(PB2)	20	EBI_AD5(PB3)
21	EBI_AD6(PB4)	22	EBI_AD7(PB5)
23	EBI_AD8(PC7)	24	EBI_AD9(PC8)
25	EBI_AD10(PC4)	26	EBI_AD11(PC5)
27	EBI_AD12(PC6)	28	EBI_AD13(PC0)
29	EBI_AD14(PC1)	30	EBI_AD15(PC2)
31	NC	32	NC
33	EBI_OE(PB6)	34	EBI_A0(PA11)

Mini USB type B Connector CN4

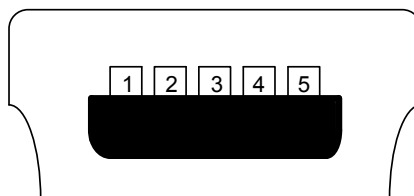


Figure 13. Mini USB type B connector CN4

Table 16. Mini USB type B connector CN4

Pin#	Description	Pin#	Description
1	USB_5V	2	D-
3	D+	4	NC
5	GND		

Power supply connector CN5

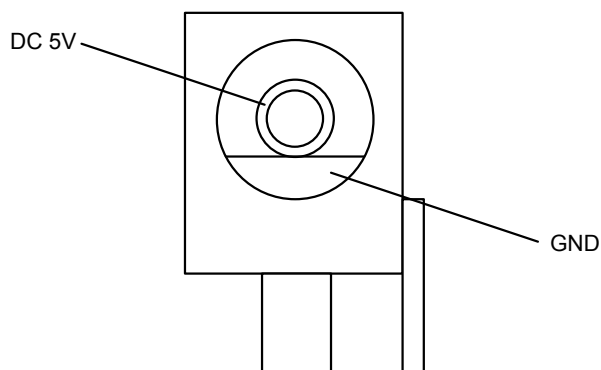


Figure 14. Power supply connector CN5

3 Schematics

This section shows the complete circuit of the HT32F1653/1654 development board:

- Figure 15. Includes the MCU and Boot Pins.
- Figure 16. Includes the SD card, Flash, RS-232 and EEPROM.
- Figure 17. Includes the LCD connector and Multi-interface.
- Figure 18. Includes the Power, Buttons, Buzzer, LED Display and Potentiometer.
- Figure 19. Includes the I²S Audio Codec.
- Figure 20. Includes the Extension Connector and SWD Connector.

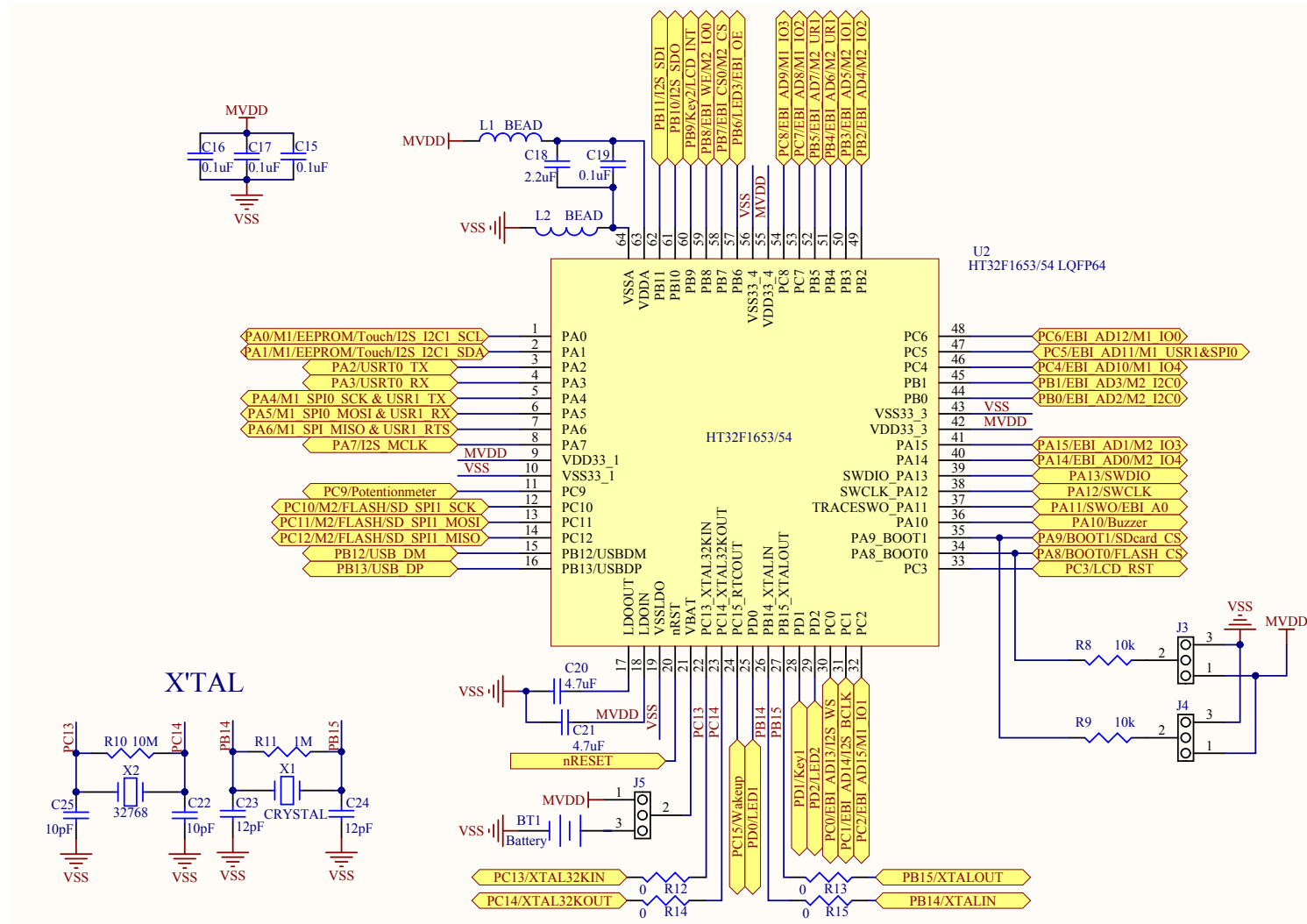
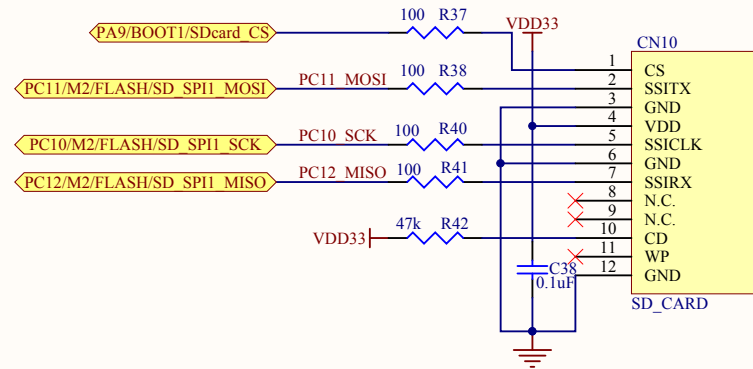
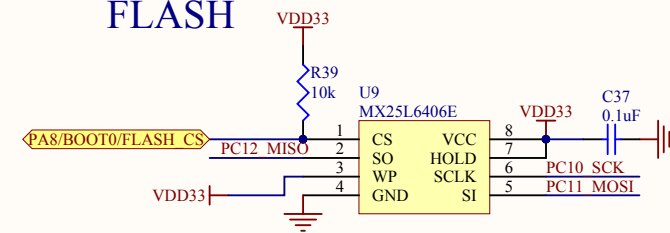


Figure 15. Includes the MCU and Boot Pins

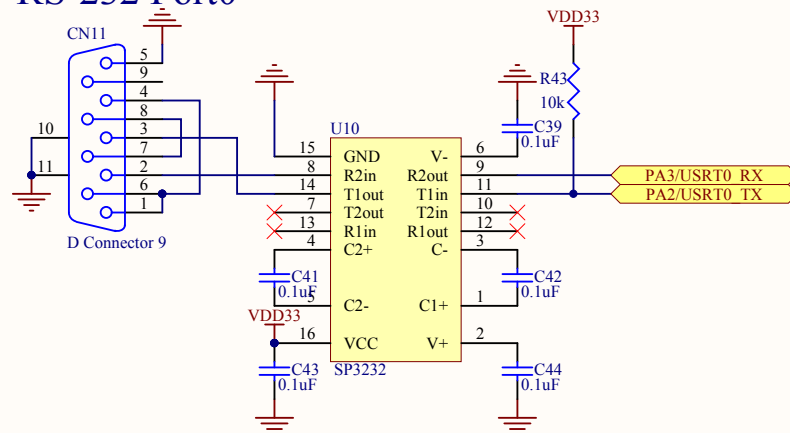
SSI- SD Card



FLASH



RS-232 Port0



EEPROM

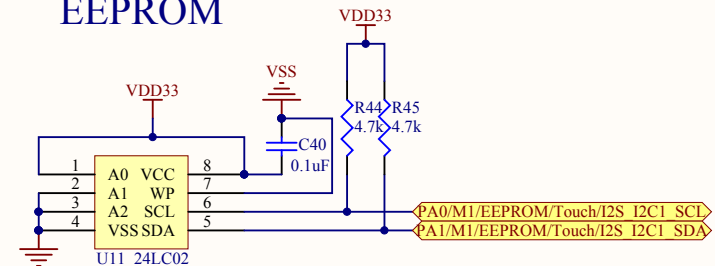
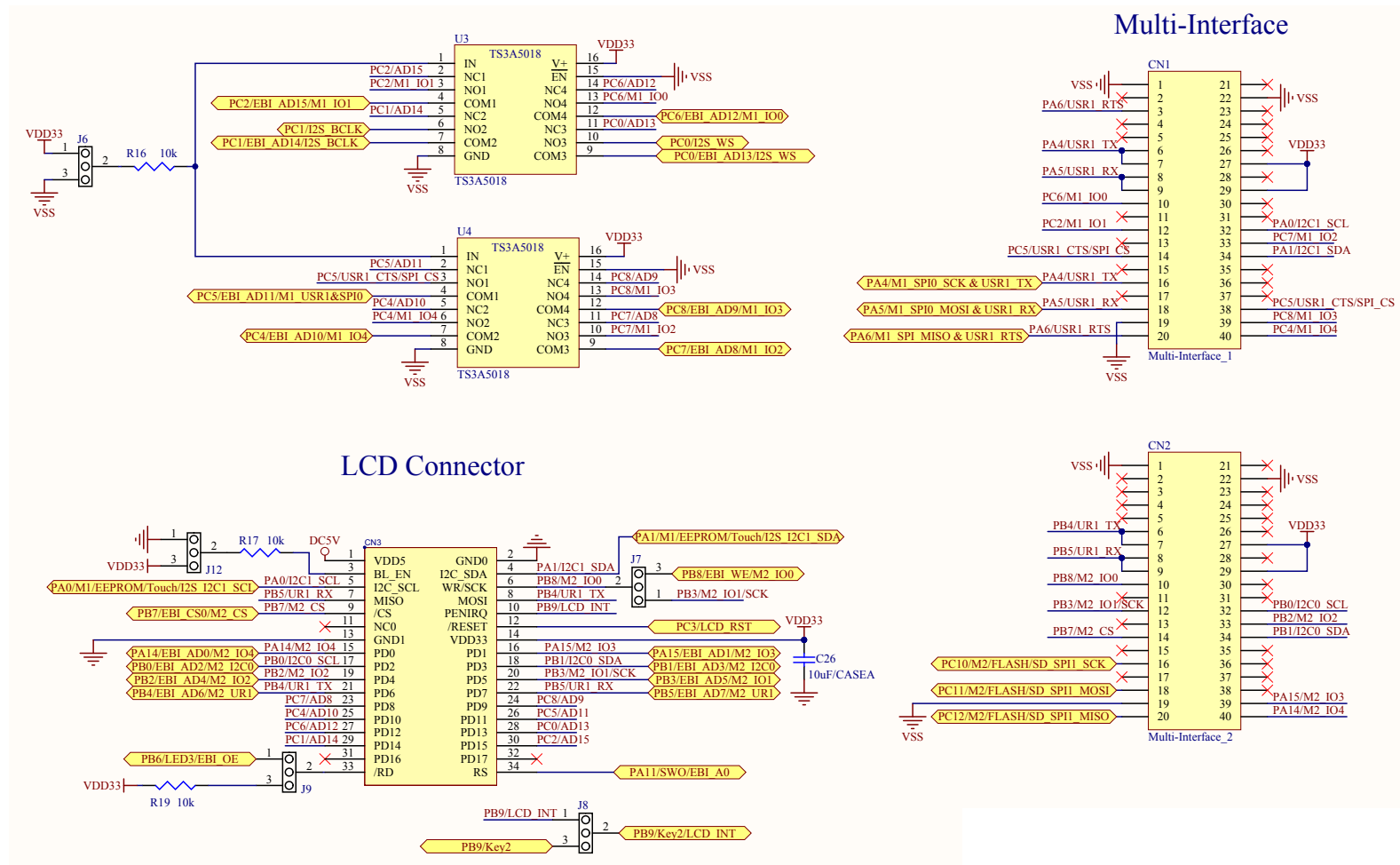


Figure 16. Includes the SD card, Flash, RS-232 and EEPROM



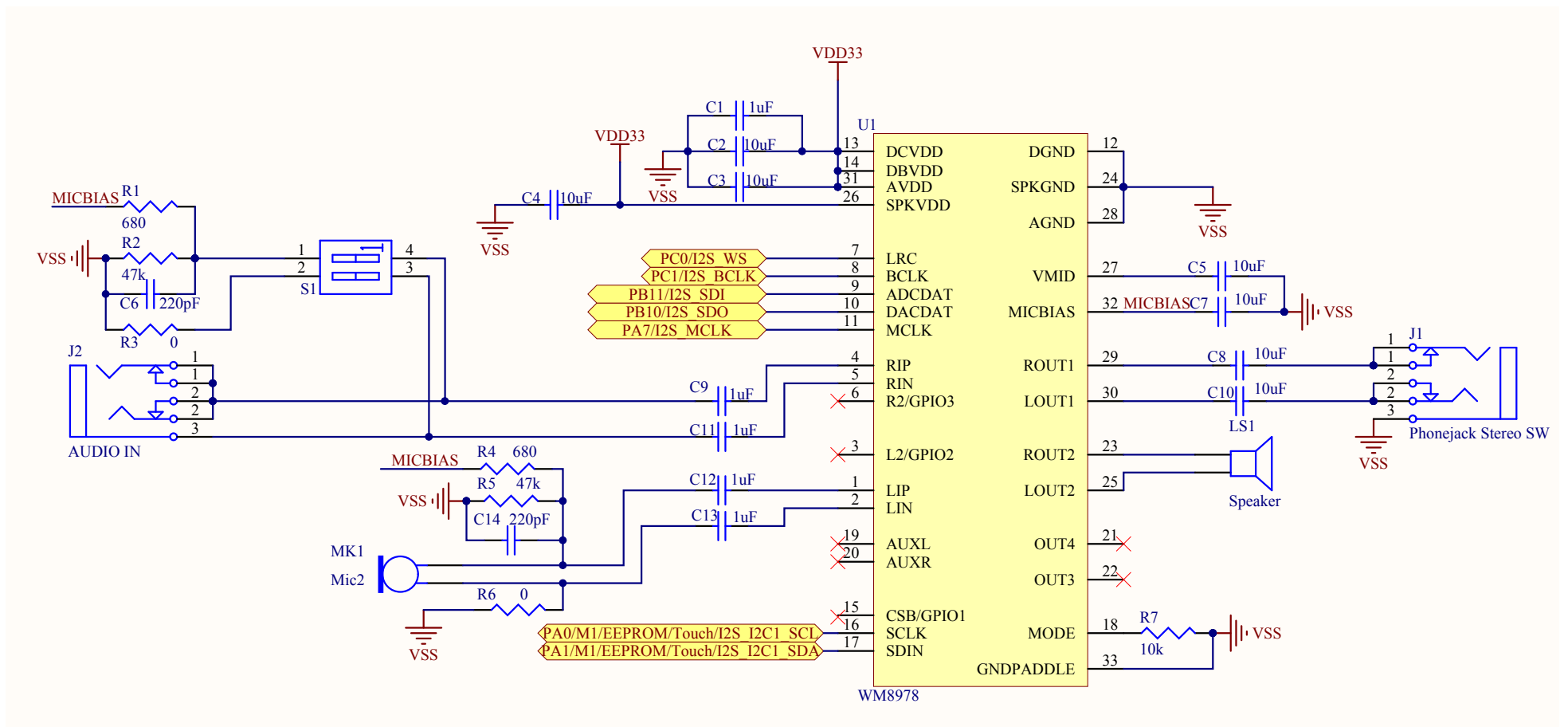


Figure 19. Includes the I²S Audio Codec

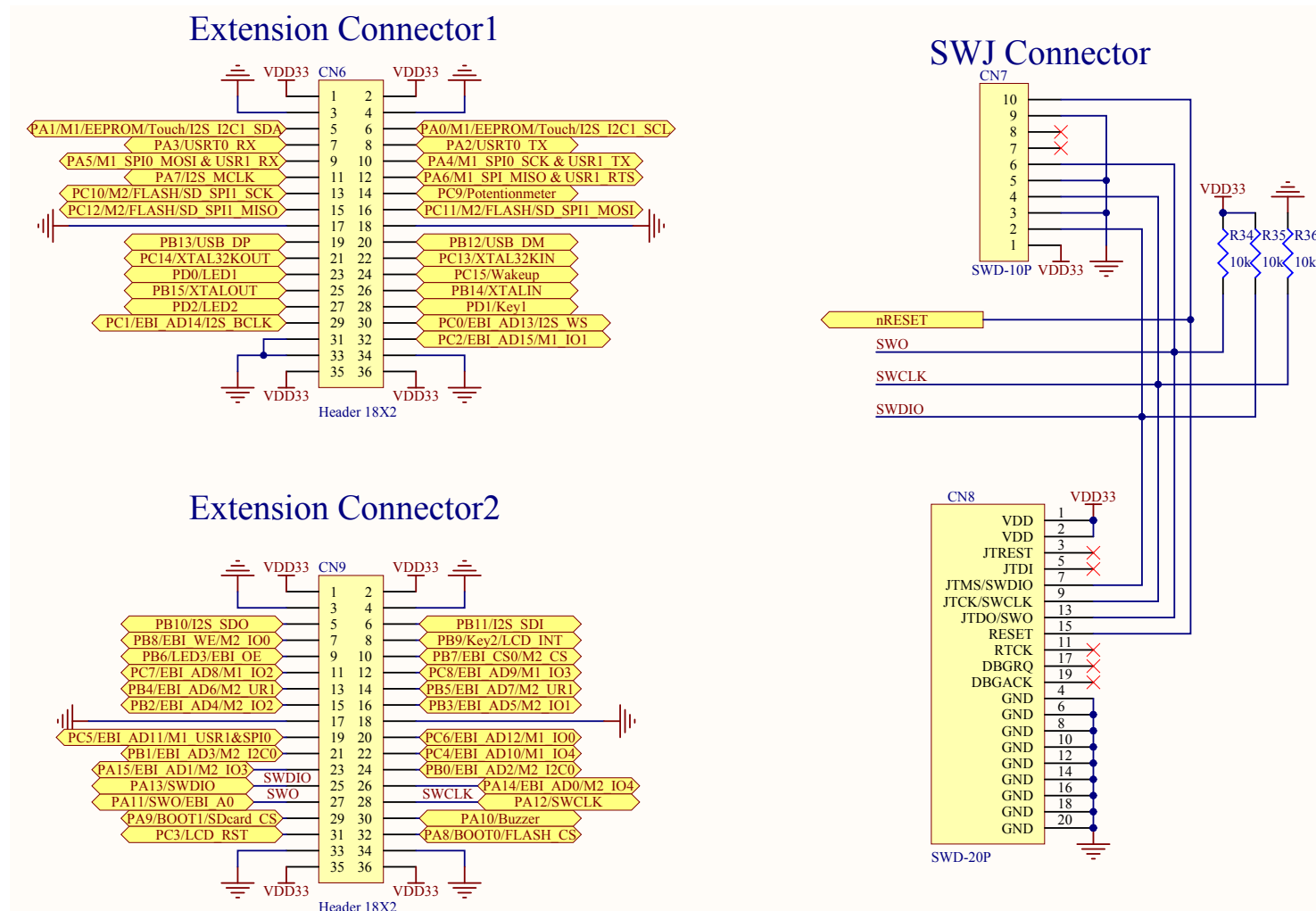


Figure 20. Includes the Extension Connector and SWD Connector

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