INVENTEK SYSTEMS

ISM4343-WBM-L151-U-EVB
Evaluation Board
EVB User's Manual

802.11 b/g/n + 5.3 BT/BLE + Cortex M33

Table of Contents

1 PART NUMBER DETAIL DESCRIPTION

1.1 Ordering Information

Device	Description	Ordering Number
ISM4343-WBM-L151-U-EVB	2.4 Wi-Fi + BT/BLE + Cortex M33 EVB	ISM4343-WBM-L151-U-EVB

2 OVERVIEW

The Inventek ISM4343-WBM-L151-U-EVB is a single-band IEEE 802.11n-compliant MAC/PHY, BT 5.3 radio and ST Micro STM32U585 MCU Evaluation Board platform. Channel bandwidth of 20MHz is supported for IEEE 802.11n traffic. 2.4GHz internal power amplifiers and a Power Management Unit (PMU), with one switching regulator.

The ISM4343-WBM-L151-U-EVB integrates clock, Wi-Fi/BT, and front end into the smallest form factor LGA Module. The ISM4343-WBM-L151-U-EVB IEEE 802.11 b/g/n enables wireless connectivity to the simplest existing sensor products with minimal engineering effort. ISM4343-WBM-L151-U-EVB reduces development time, lowers manufacturing costs, saves board space, simplifies certification compliance, and minimizes customer RF expertise required during development of target applications.

The ISM4343-WBM-L151-U-EVB provides the highest level of integration for a wireless system, with integrated single band Wi-Fi and BT/BLE based on Infineon' IEEE802.11 b/g/n single-stream and BT/BLE 5.3 with support for antenna diversity and provisions for supporting future specifications. The ISM4343-WBM-L151-U-EVB also supports BT 5.3 LE Secure Connection via the Infineon stack. Integrated power amplifiers, LNAs and T/R switches for the 2.4 GHz WLAN band are also included, greatly reducing the external part count, PCB footprint, and cost of the solution.

The ISM4343-WBM-L151-U-EVB small form-factor solution also minimizes external components to drive down cost for mass volumes and allows for handheld device flexibility in size, form and function. Comprehensive power management circuitry and software ensure the system can meet the needs of high mobile devices that require minimal power consumption and reliable operations.

The ISM4343-WBM-L151-U-EVB module includes an ST Micro STM32U585 Cortex M33 MCU. SPI and UART interfaces enable easy connection to an embedded design. The ISM4343-WBM-L151-U-EVB module requires no operating system.

The ISM4343-WBM-L151-U-EVB is compatible with the Bluetooth Low Energy operating mode, which provides a dramatic reduction in the power consumption of the Bluetooth radio and baseband. The primary application for this mode is to provide support for low data rate devices, such as sensors and remote controls.

The ISM4343-WBM-L151-U-EVB implements the highly sophisticated Enhanced Collaborative Coexistence algorithms and hardware mechanisms, allowing for an extremely collaborative Bluetooth coexistence scheme along with coexistence support for external radios such as cellular and LTE, GPS, and Ultra-Wideband. An independent, high-speed UART is provided for the Bluetooth host interface.

3 FEATURES

The ISM4343-WBM-L151-U-EVB supports the following WLAN, Bluetooth & MCU functions:

- STM32 ARM 32-bit CortexTM-M33 with a frequency up to 160 MHz
  - 2 Mbyte of MCU internal Flash
  - 768KB of SRAM
  - SPI, Quad SPI (support Dual mode), USART, PCM
  - ADC, I2C, I2S, GPIO, Timers
  - JTAG
- Single-band 2.4 GHz b/g/n, 802.11b, 802.11g, 802.11n (single stream)
  - IEEE 802.11b 1 – 11 Mbps
  - IEEE 802.11g 6 – 54 Mbps
  - IEEE 802.11n (2.4 GHz) 7.2 – 150Mbps
- Support BT COEX
- STM32CubeMX™ with Infineon AIROC™ Wi-Fi/Bluetooth STM32 Expansion Pack compatible
- IEEE 802.11b/g/n single-band radio with internal Power Amplifiers, LNAs and T/R switches
- Wi-Fi Security WEP, WPA, WPA2, WPA3
- Modulation Modes include:
  - Wi-Fi: CCK and OFDM with BPSK, QPSK, 16 QAM, 64QAM, 256QAM
  - BT: Dual-mode classic Bluetooth and Low Energy operation
- Concurrent Bluetooth and WLAN operation
- Single antenna support
- Supports a single 2.4 GHz antenna shared between WLAN and Bluetooth
- BT host digital interface (can be used concurrently with above interface):
  - UART (up to 4 Mbps)
- Bluetooth v5.3 with integrated Class 1 PA
- Bluetooth 2.1+EDR, Bluetooth 3.0, Bluetooth 5.3 (Bluetooth Low Energy)
- Bluetooth v5.3 LE Secure Connection via the Infineon BSA stack.

- ECI – enhanced coexistence support, ability to coordinate BT SCO transmissions around WLAN receives.
- I²S/PCM for BT audio
- HCI high-speed UART (H4, H4 +, H5) transport support
- Bluetooth low power inquiry and page scan
- Bluetooth Low Energy (BLE) support

The BBC supports all Bluetooth 5.3 required features, with the following benefits:

- Dual-mode classic Bluetooth and classic Low Energy (BT and BLE) operation.
- Low Energy Physical Layer
- Low Energy Link Layer
- Enhancements to HCI for Low Energy
- Low Energy Direct Test mode
- AES encryption

3.1 Limitations

Inventek Systems products are not authorized for use in safety-critical applications (such as life support) where a failure of the Inventek Systems product would reasonably be expected to cause severe personal injury or death.

4 COMPLEMENTARY DOCUMENTATION

4.1 EVB

- Evaluation Board
  - Evaluation Board Specification
  - EVB User's Guide
  - Design Guidelines

5 BLOCK DIAGRAM

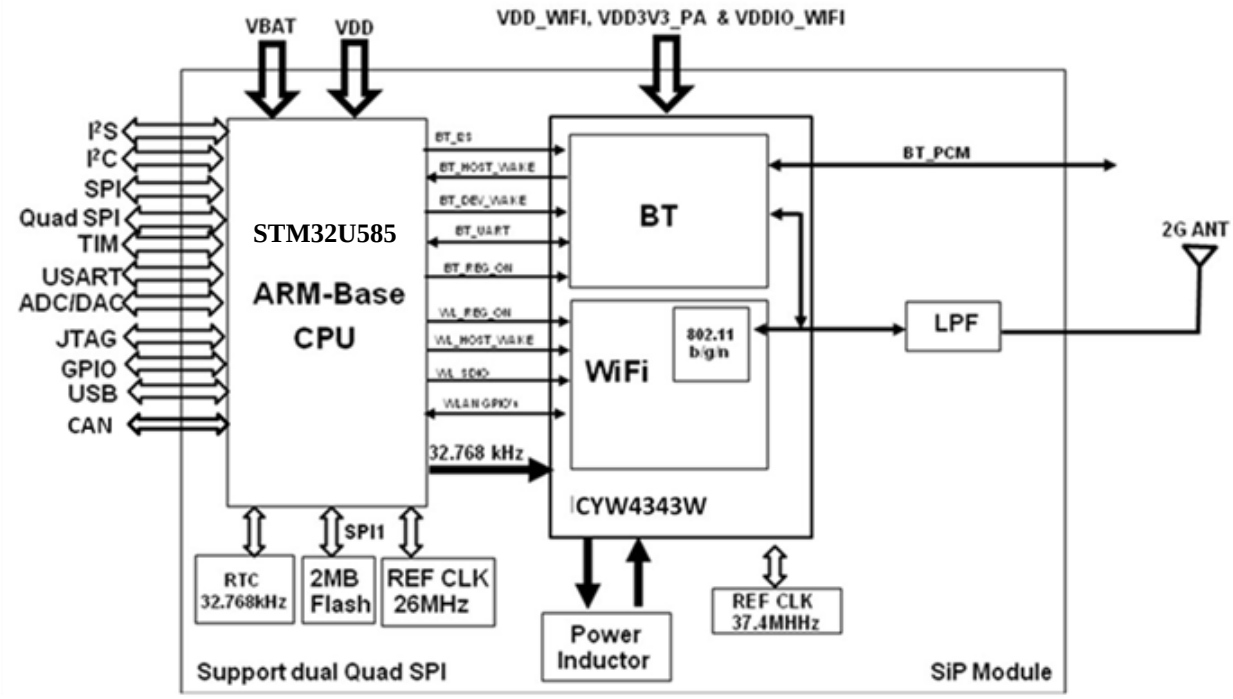


Figure 1: ISM4343-WBM-L151-U Module Block Diagram

- **ADC**: Analog to Digital Converter
- **I2C**: Intelligent Interface Controller
- **SPI**: Serial Peripheral Interface
- **Quad SPI**: Quad Serial Peripheral Interface
- **USART**: Universal Synchronous/Asynchronous Receiver Transmitters
- **TIM**: Timers
- **I2S:** Inter-integrated Sound

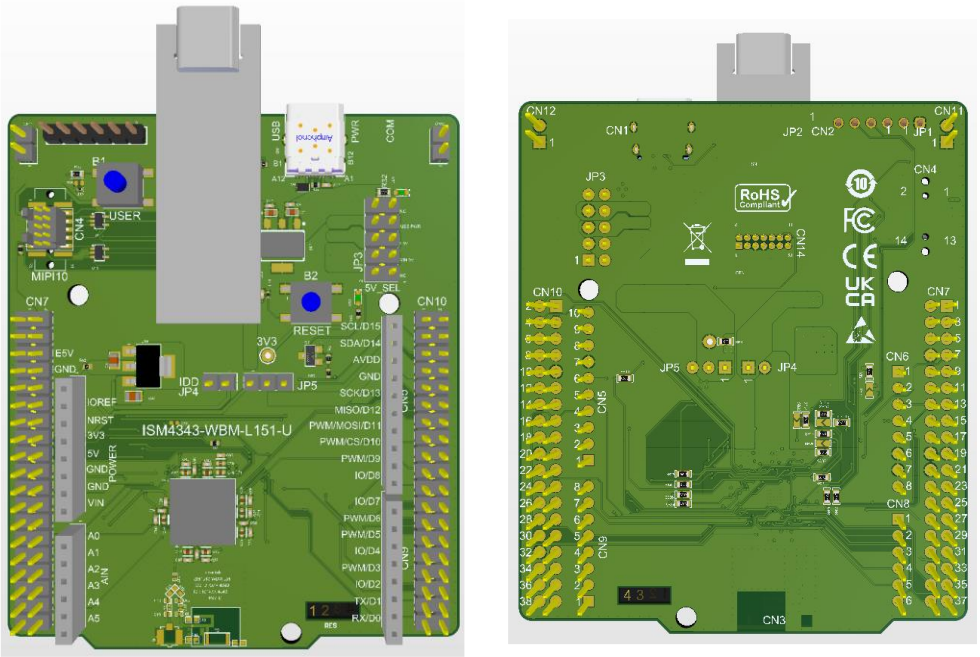


Figure 2: ISM4343-WBM-L151-U-EVB

6 INTRODUCTION

6.1 Applications

Applications developed using the ISM4343-WBM-L151-U-EVB and STM32CubeMX™ are downloaded via ST-Link V3 MINIE to the ISM4343-WBM-L151-U on the ISM4343-WBM-L151-U-EVB.

7 FEATURES

7.1 Feature List

The ISM4343-WBM-L151-U-EVB provides a platform for the design and development of applications the run on a ISM4343-WBM-L151.

Feature	Detail
ISM4343-WBM-L151-U	The ISM4343-WBM-L151-U includes and STM32U585 host microprocessor, and Infineon Wi-Fi/Bluetooth Chip - STM32U585: ARM-based 32-bit 160MHz, Flash memory up to 2048kbyte, Up to 768 Kbytes of system SRAM. - Infineon AIROC Wi-Fi /Bluetooth: Single chip IEEE802.11 b/g/n, Bluetooth 5.3 + HS
ISM4343-WBM-L151-U-EVB	The is a complete Wi-Fi / BT and networking solution and includes ISM4343-WBM-L151-U Module, RF SMA connector and power supply
Program & Debug Interface	Applications are downloaded to the STM32U585 host and debugged using either USB-JTAG interface or a J-Link JTAG interface
USB-Serial UART Interface	A UART on the STM32 host microprocessor connects to the EVB USB-serial interface to enable serial communications with a PC terminal application
Arduino® Compatible Headers and Additional Expansion Headers	The Arduino® and additional expansion header facilitates custom sensor interfaces and expansion boards
Reset Switch	Enable manual reset of the MCU
User Button	User Definable Button
Power Supply	The EVB may be powered directly from the USB interface or from an external +5V power supply.

7.2 EVB Hardware layout and configuration

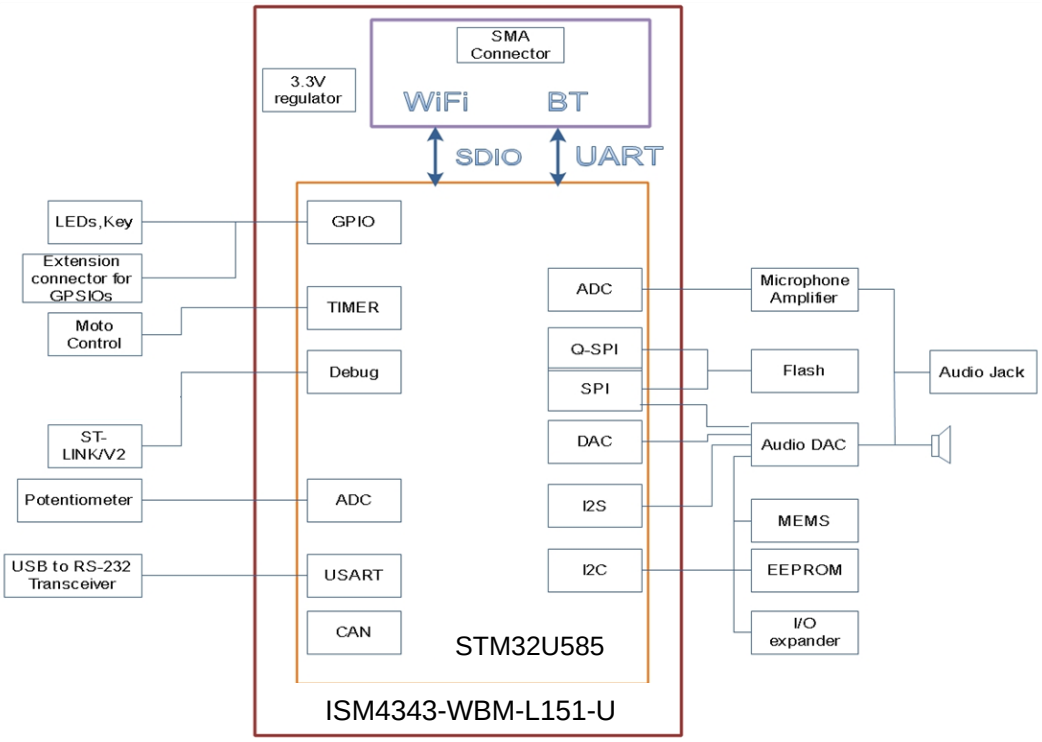
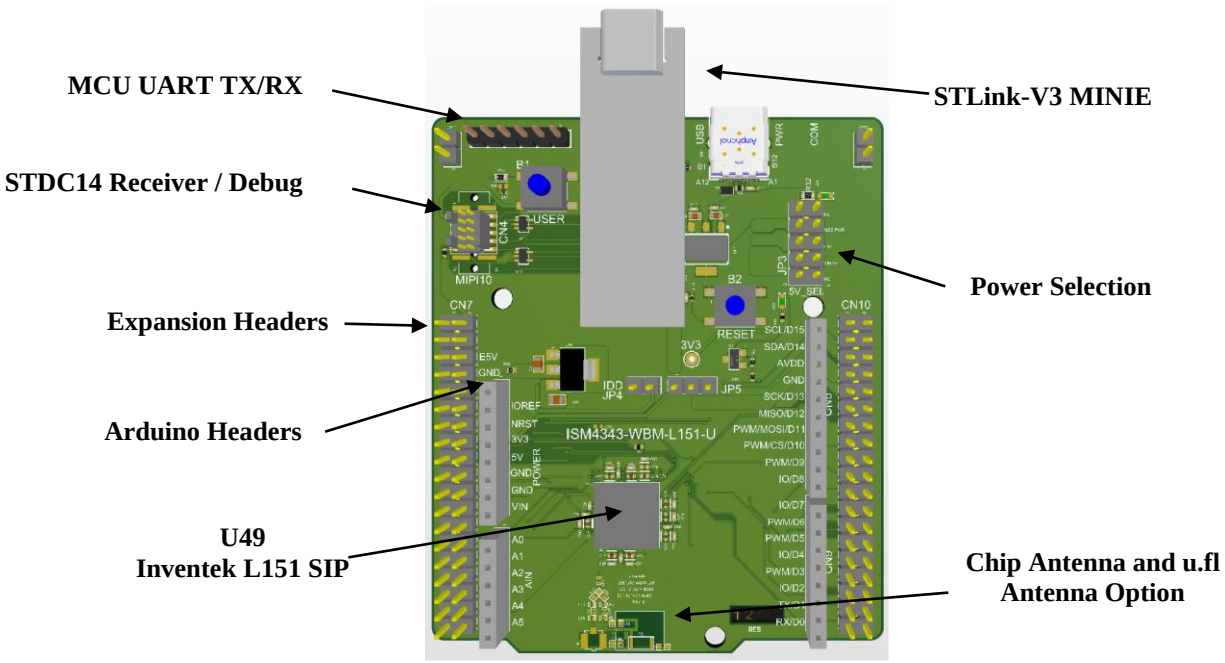
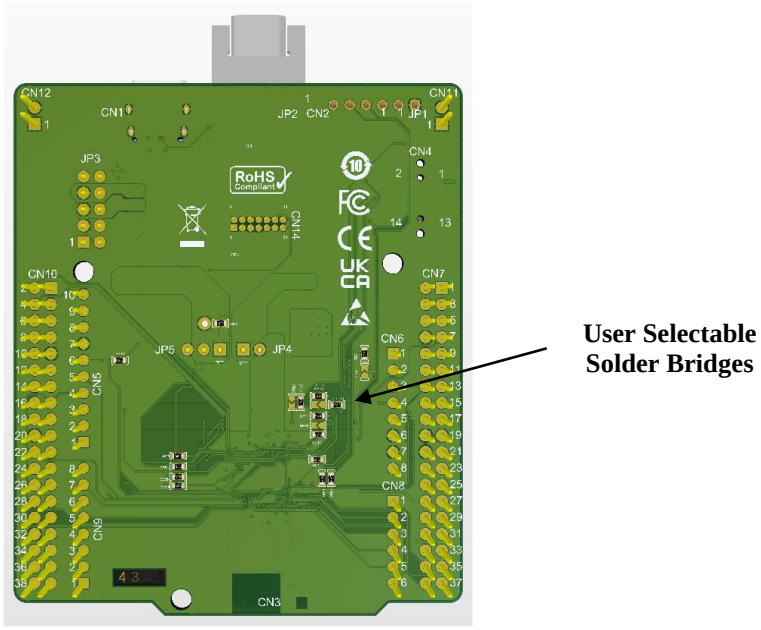


Figure 4: ISM4343-WBM-L151-U-EVB Block Diagram

7.3 Top View



7.4 Bottom View



8 POWER SUPPLY

8.1 The ISM4343-WBM-L151-U-EVB

Designed to be powered by a 5 V DC power supply.

- 5 V External power sources Via Expansion header on the board [VIN or E5V]
- 5 V DC power with 500mA limitation from P1, the USB Micro-C connector

9 BOOT OPTION

The ISM4343-WBM-L151-U-EVB can boot from:

- Embedded user Flash.
- System memory with boot loader for ISP
- Embedded SRAM for debugging

The boot option is configured by Hardware setting for BOOT0 (JP7).

BOOT 0	Boot source
0	ISM4343-WBM-L151 boots from **User Flash** (Default setting)
1	ISM4343-WBM-L151 boots from **Boot Loader**

BOOT0 related configure.

10 RESET SOURCE

The reset signal of the ISM4343-WBM-L151-U-EVB is low active and the reset source includes:

- Reset button B2.
- Debugging tools from JTAG connector CN4 or CN14 ST-Link V3-MINIE.

11 AUDIO

The ISM4343-WBM-L151-U-EVB enables stereo audio play and microphone recording by an external headset. An audio DAC IC is connected to both an I2S2 port and a DAC channel while a microphone amplifier is connected to the ADC of the ISM4343-WBM-L151. The DAC IC can be configured via I2C1.

1) Prefer usage of embedded ST-LINK/V2/V3 to external tool connected on CN4 or CN14 ST-Link V3-MINIE.
2) Configure MICRO_I2S2_SD GPIO speed (2 MHz or 10 MHz).

12 UART

The ISM4343-WBM-L151-U-EVB enables two channels of USART communication. One channel (LPUSART1) connects to CN9(Pin 1 and Pin 2) and CN10(Pin 35, and Pin 37). Second Channel connects to Header CN16 (Pin 5, and Pin 6), CN4 (Pin13 and Pin 14), and CN14(Pin 13 & Pin14).

* The second channel USART overlaps to I2S function.

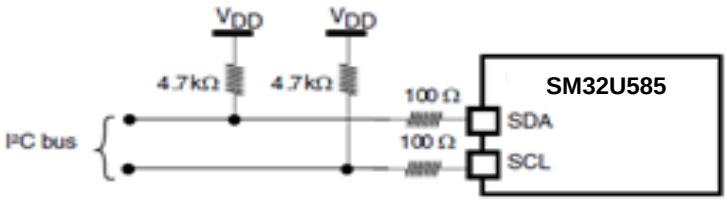
13 TIMER

The ISM4343-WBM-L151-U-EVB enables TIMER control signal and connects to header CN7 and CN10.

14 I2C

The ISM4343-WBM-L151-U-EVB enables two channels of I2C function. One channel connects to CN5 (Pin 9, and Pin 10) and CN10(Pin 3, and Pin 5). Another channel connects to CN8(Pin 5 & Pin 6) and CN7 (Pin 32, and Pin 24).

- I2C signal traces need to be terminated high.



15 ADC

The ISM4343-WBM-L151-U-EVB enables three channels of ADC signal. There are connecting to J12 (Pin28 ~ Pin30).

16 I2S

The ISM4343-WBM-L151-U-EVB enables I2S function. The function is connecting to CN7 and CN10.

* The I2S is overlap to USART6 function.

17 SPI

The ISM4343-WBM-L151-U-EVB enables two channels of SPI function. The First channel connects to CN5 (Pin 3, Pin 4, Pin 5, & Pin 6) and CN10(Pin 11, Pin 13, Pin 15, Pin 17). T

* SPI1 is connected internally to Flash.

17.1 Quad SPI

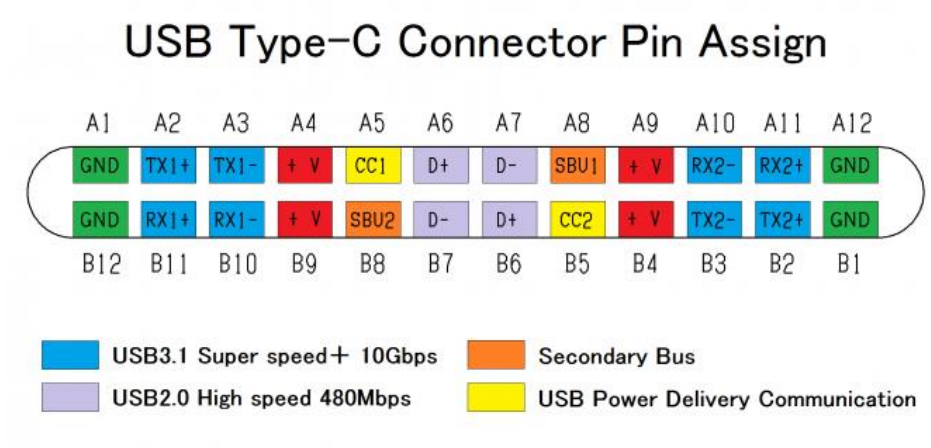
The ISM4343-WBM-L151-U-EVB enables two channels of QUAD SPI function. Function split across CN7 and CN10

18 CONNECTORS

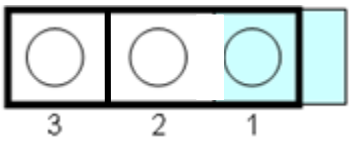
18.1 Power Supply Connector (USB C: CN1)

The ISM4343-WBM-L151-U-EVB can be powered from 5V DC power supply via the external USB C connector (CN1 Pin A4, Pin B9, Pin A9, and Pin B4) or external power supply hole.

- USB C Connector (CN1)

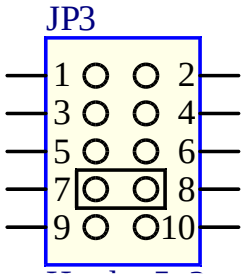


18.2 Power Source / Current Measurement PIN Header (JP5)



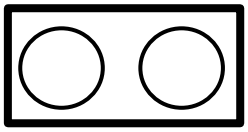
Pin	Description
1	VDD_3V3
2	Common
3	NC

18.3 Power source (JP3)

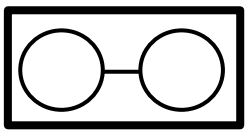


Pin	Description
1 - 2	NC
3 - 4	5V_VIN
5 - 6	E5V
7 - 8	VBUS
9 - 10	NC

18.4 IDD Measurement (JP4) (Normally Closed)

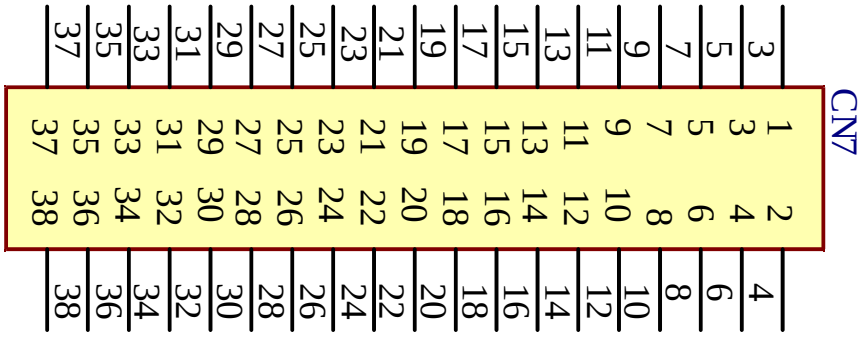


18.5 GND (CN11, CN12)



18.6 Function PIN Header

The ISM4343-WBM-L151-U-EVB enables I2S, I2C, SPI, USART, TIM, ADC, GPIO function

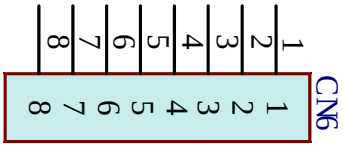


CN7 – Expansion Header

Pin	Description	Pin	Description
1	NC	2	NC
3	NC	4	NC
5	VDD	6	E5V
7	PH3_BOOT0	8	GND
9	NC	10	NC
11	NC	12	IOREF
13	MICRO_JTAG_TMS (PA13)	14	NRST
15	MICRO_JTAG_TCK (PA14)	16	3V3
17	MICRO_JTAG_TDI (PA15)	18	5V
19	GND	20	GND
21	NC	22	GND
23	PC13	24	VIN
25	NC	26	NC
27	NC	28	PA0
29	NC	30	MICRO_ADC_IN1 (PA1)
31	NC	32	MICRO_SPI1_NSS (PA4)
33	VBAT	34	MCIRO_GPIO_5 (PB0)
35	QUADSPI_BK2_IO0 (PE7)	36	MCIRO_GP IO_0 (PE3)
37	I2S2_SD (PC3)	38	QUADSPI_BK2_IO1 (PE8)

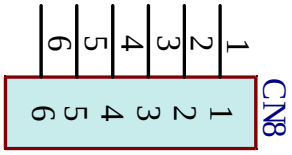
CN10 – Expansion Header

Pin	Description	Pin	Description
1	NC	2	MICRO_UART1_TX (PA9)
3	I2C1_SCL (PB6)	4	MICRO_UART1_RX (PA10)
5	I2C1_SDA (PB7)	6	NC
7	AVDD/VDD	8	VBUS
9	GND	10	NC
11	MICRO_SPI1_SCK (PA5)	12	MICRO_UART1_RTS (PA12)
13	MICRO_SPI1_MISO (PA6)	14	MICRO_UART1_CTS (PA11)
15	MICRO_SPI1_MOSI (PA7)	16	NC
17	PC9	18	NC
19	MICRO_I2S_DI (PE5)	20	GND
21	USART6_RX_I2S2_CK (PC7)	22	PB2
23	PA8	24	MCIRO_GPIO_26 (PD1)
25	I2C2_SDA (PB10)	26	MCIRO_GPIO_3 (PB15)
27	MICRO_JTAG_TRSTN (PB4)	28	MCIRO_GPIO_34 (PB14)
29	PB5	30	PB13
31	MICRO_JTAG_TDO (PB3)	32	GND
33	PC8	34	NC
35	MICRO_ADC_IN2 (PA2)	36	MCIRO_GPIO_28 (PB8)
37	MICRO_ADC_IN3 (PA3)	38	NC



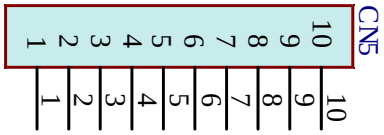
CN6 – Arduino® Compatible Header

Pin	Description
1	5V_VIN
2	IOREF
3	NRST
4	3V3
5	5V
6	GND
7	GND
8	VIN



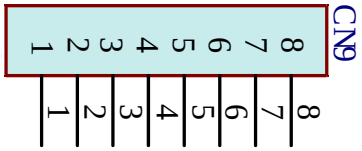
CN8 - Arduino® Compatible Header

Pin	Description
1	A0 (PA0)
2	A1 (PA1)
3	A2 (PA4)
4	A3 (PB0)
5	A4/SDA (PC4)
6	A5/SCL (PC5)



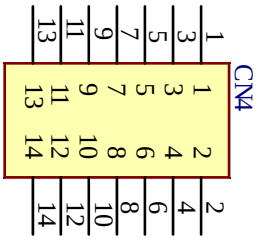
CN5 – Arduino® Compatible Header

Pin	Description
1	D8/IO (PC7)
2	D9/PWM (PE5)
3	D10/CS/PWM (PC9)
4	D11/MOSI/PWM (PA7)
5	D12/MISO (PA6)
6	D13/SCK (PA5)
7	GND
8	AVDD/VDD
9	D14/SDA (PB7)
10	D15/SCL (PB6)



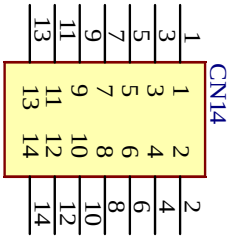
CN9 – Arduino® Compatible Header

Pin	Description
1	D0/RX (PA3)
2	D1/TX (PA2)
3	D2/IO (PC8)
4	D3/PWM (PB3)
5	D4/IO (PB5)
6	D5/PWM (PB4)
7	D6/PWM (PB10)
8	D7/IO (PA8)



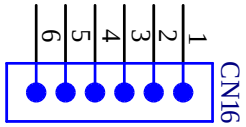
CN4 – STDC14 Receiver

Pin	Description	Pin	Description
1	NC	2	NC
3	VDD	4	JTMS/MCU_SWDIO
5	GND	6	JTCK/MCU_SWCLK
7	GND(KEY)	8	JTDO /MCU_SWO
9	NC	10	JTDI/MCU_JTDI
11	GND_DETECT	12	NRST
13	MCU_VCP_RX	14	MCU_VCP_TX



CN14 – ST-Link V3 MINIE

Pin	Description	Pin	Description
1	NC	2	NC
3	VDD	4	JTMS/MCU_SWDIO
5	GND	6	JTCK/MCU_SWCLK
7	GND(KEY)	8	JTDO /MCU_SWO
9	NC	10	JTDI/MCU_JTDI
11	GND_DETECT	12	NRST
13	MCU_VCP_RX	14	MCU_VCP_TX



CN16 - UART

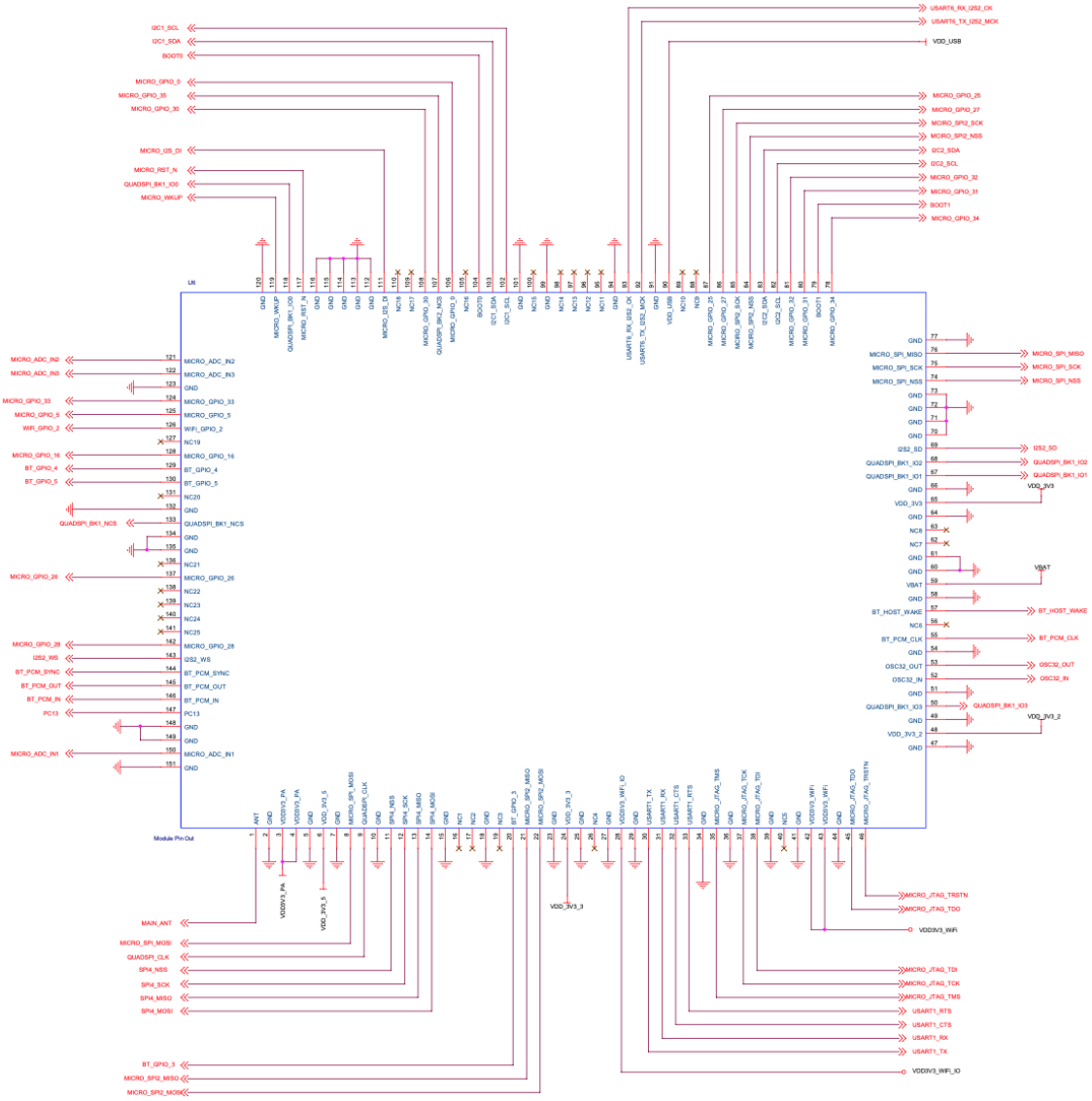
Pin	Description
1	GND
2	NC
3	NC
4	MCU_VCP_RX
5	MCU_VCP_TX
6	NC

19 SOLDER BRIDGES

Pin	Description
SB15	ARD_D0_RX/LPUART1_RX (PA3)
SB16	MCU_VCP_RX/LPUART1_RX (PA3)
SB17	ARD_D1_TX/LPUARTX1_TX (PA2)
SB23	USER BUTTON (PA0)
SB24	USER BUTTON (PC13)
SB26	MCU_VCP_TX/LPUART1_TX (PA2)
SB29	MCU_SWCLK (PA14)
SB30	MCU_SWDIO (PA13)
SB34	ARD_D0_RX/USART1_RX (PA10)
SB35	MCU_VCP_RX/USART1_RX (PA10)
SB36	ARD_D1_TX/USART1_TX (PA9)
SB37	MCU_VCP_TX/USART1_TX (PA9)
SB41	MCU_JTDI (PA15)

20 SCHEMATIC

20.1 ISM4343-M4G-L151-U Application schematic



21 REVISION CONTROL

Document: ISM4343-WBM-L151-U-EVB	Wi-Fi + BT/BLE + Cortex M33 Module
External Release	DOC-DS-20111-1

Date	Author	Revision	Comment
4/03/2023	RS	1.0	Preliminary
11/20/23	RS	1.1	Updated for Pampelonne
11/21/2023	SP	1.2	Updated and reviewed

22 CONTACT INFORMATION

Inventek Systems
100 Treble Cove Road
Billerica Ma, 01862
Tel: 978-667-1962
Sales@inventeksys.com

www.inventeksys.com