Inventek Systems
Embedding Connectivity Everywhere

INVENTEK SYSTEMS
ISM4343-WBM-L151U-EVB
Evaluation Board
EVB User's Manual

802.11 b/g/n + 5.2 BT/BLE + Cortex M33

DOC-DS-20111-1

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1 PART NUMBER DETAIL DESCRIPTION

1.1 Ordering Information

Device	Description	Ordering Number
ISM4343-WBM-L151U-EVB	2.4 Wi-Fi + 5.2 BT/BLE + Cortex M33 EVB	ISM4343-WBM-L151U-EVB

2 OVERVIEW

The Inventek ISM4343-WBM-L151U-EVB is a single-band IEEE 802.11n-compliant MAC/PHY, BT 5.2 radio and STMicroelectronics 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-L151U-EVB integrates clock, Wi-Fi/BT and front end into the smallest form factor LGA Module. The ISM4343-WBM-L151U-EVB IEEE 802.11 b/g/n enables wireless connectivity to existing sensor products with minimal engineering effort. ISM4343-WBM-L151U-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-L151U-EVB provides the highest level of integration for a wireless system, with integrated single band Wi-Fi and BT/BLE based on Infineon's IEEE802.11 b/g/n single-stream and BT/BLE 5.2 with support for antenna diversity and provisions for supporting future specifications. The ISM4343-WBM-L151U-EVB also supports BT 5.2LE 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 the final system cost.

The ISM4343-WBM-L151U-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 mobile devices that require minimal power consumption and reliable operations.

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The ISM4343-WBM-L151U-EVB module includes an ST Microelectronics STM32U585 Cortex M33 MCU. SPI and UART interfaces enable easy connection to an embedded design. The ISM4343-WBM-L151U-EVB module requires no operating system

The ISM4343-WBM-L151U-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-L151U-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-L151U-EVB supports the following WLAN, Bluetooth & MCU functions:

- STM32 ARM 32-bit CortexTM-M33 with a frequency up to 143 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 for 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-FiSecurity WEP, WPA, WPA2 and WPA3
- Modulation Modes include:
    - WiFi: CCK and OFDM with BPSK, QPSK, 16 QAM, 64QAM, 256QAM
    - BT: Dual-mode classic Bluetooth and Classic Low Energy operation
- Concurrent Bluetooth and WLAN operation
- Single antenna support
- Supports a single 2.4 GHz antenna shared between WLAN and Bluetooth

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- BT host digital interface (can be used concurrently with above interface):
  - UART (up to 4 Mbps)
- Bluetooth v5.2 with integrated Class 1 PA
- Bluetooth 2.1+EDR, Bluetooth 3.0, Bluetooth 5.2 (Bluetooth Low Energy)
- Bluetooth v5.2LE 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 5.2 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.

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4 COMPLEMENTARY DOCUMENTATION

4.1 EVB

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

5 BLOCK DIAGRAM
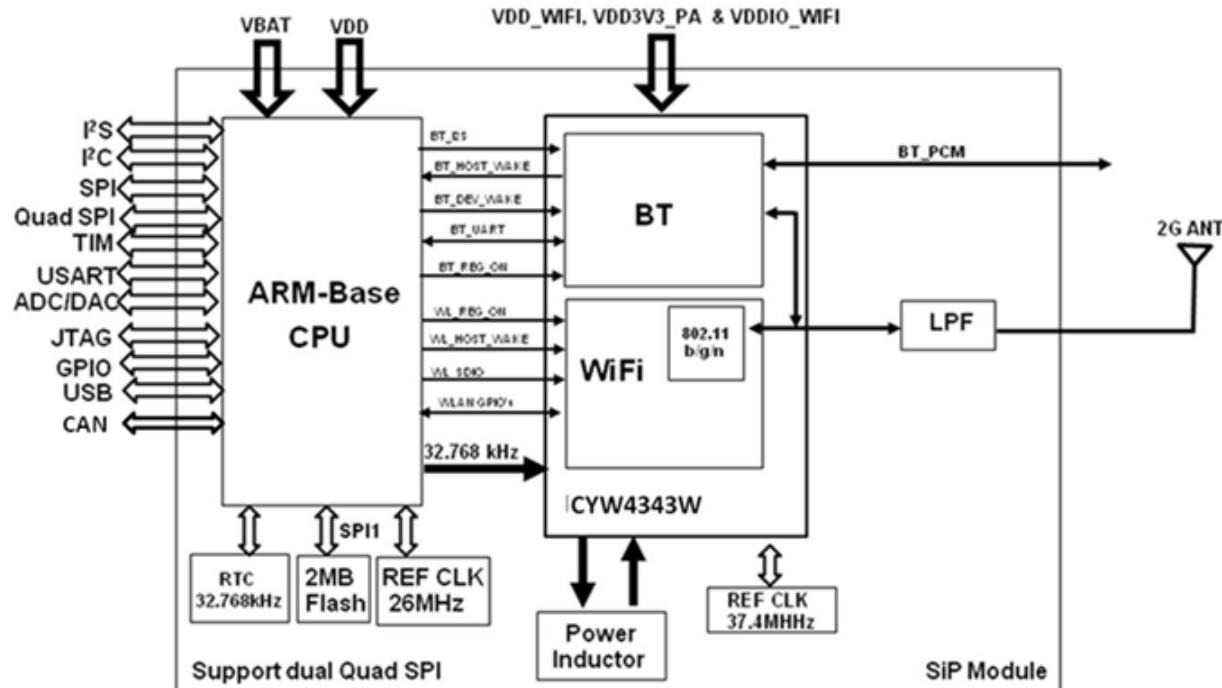
Figure 1: ISM4343-WBM-L151U Module Block Diagram

- **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

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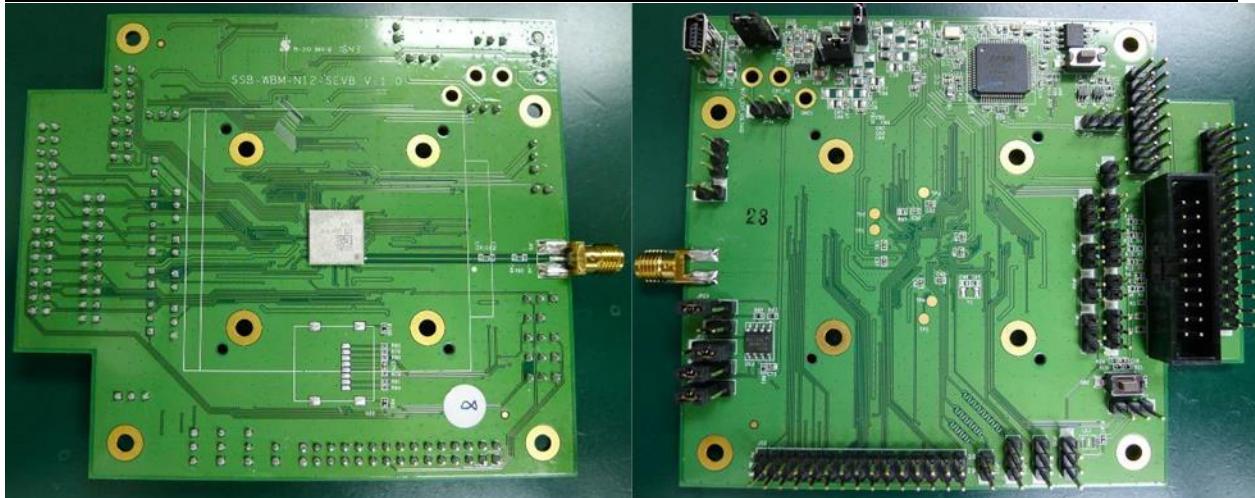
Figure 2: ISM4343-WBM-L151U-EVB

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.

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7 FEATURES

7.1 Feature List

The ISM4343-WBM-L151U-EVB provides a platform for the design and development of applications the run on a ISM4343-WBM-L151.

Feature	Detail

ISM4343-WBM-L151U	The ISM4343-WBM-L151U includes and STM32U585 host microprocessor, and Infineon WiFi/BT Radio Chip
	- STM32U585:
	  ARM-based 32-bit 160MHz, Flash memory up to 2Mbyte, up to 768 Kbytes of system SRAM.
	- Infineon AIROC WiFi /BT
	  Single chip IEEE802.11 b/g/n, Bluetooth 5.2 + HS

ISM4343-WBM-L151U-EVB	The is a complete WiFi / BT and networking solution and includes ISM4343-WBM-L151U 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
Expansion Header	The expansion header facilitates custom sensor interfaces and expansion boards
Reset Switch	Enable manual reset of the MCU
Power Supply	The EVB may be powered directly from the USB interface or from an external +5V power supply.

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7.2 EVB Hardware layout and configuration
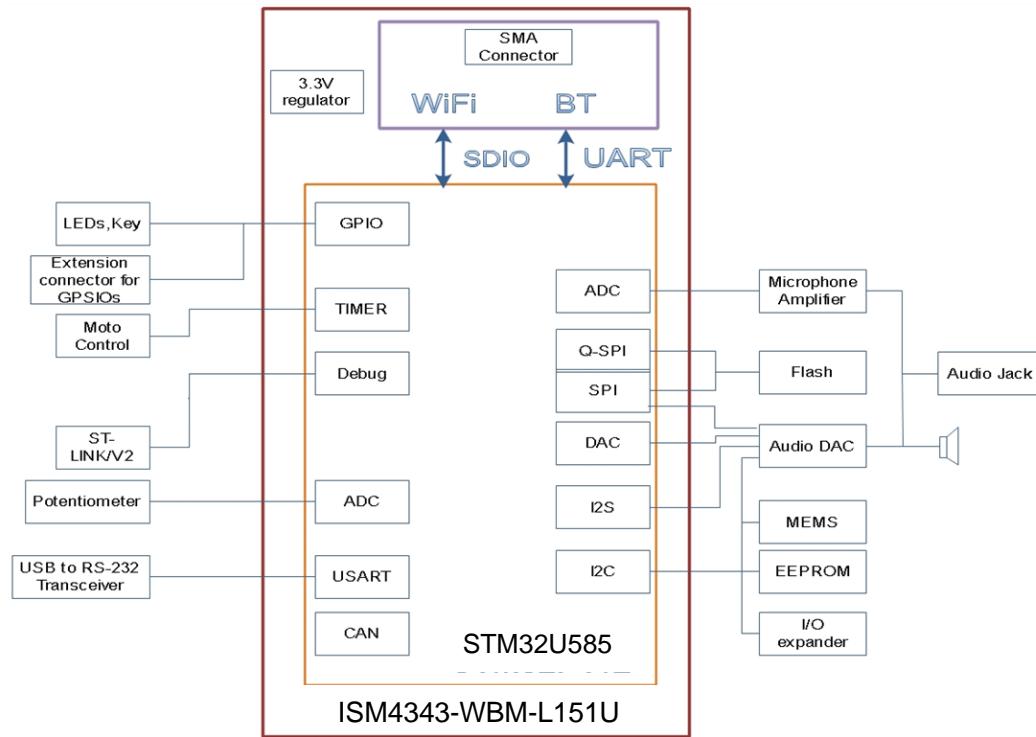
Figure 4: ISM4343-WBM-L151U-EVB Block Diagram

ISM4343-WBM-L151U

7.3 Top View

U7–ISM4343-WBM-L151U
SiP Module

U22
Micro SD card holder

JP8
RF SMA connector
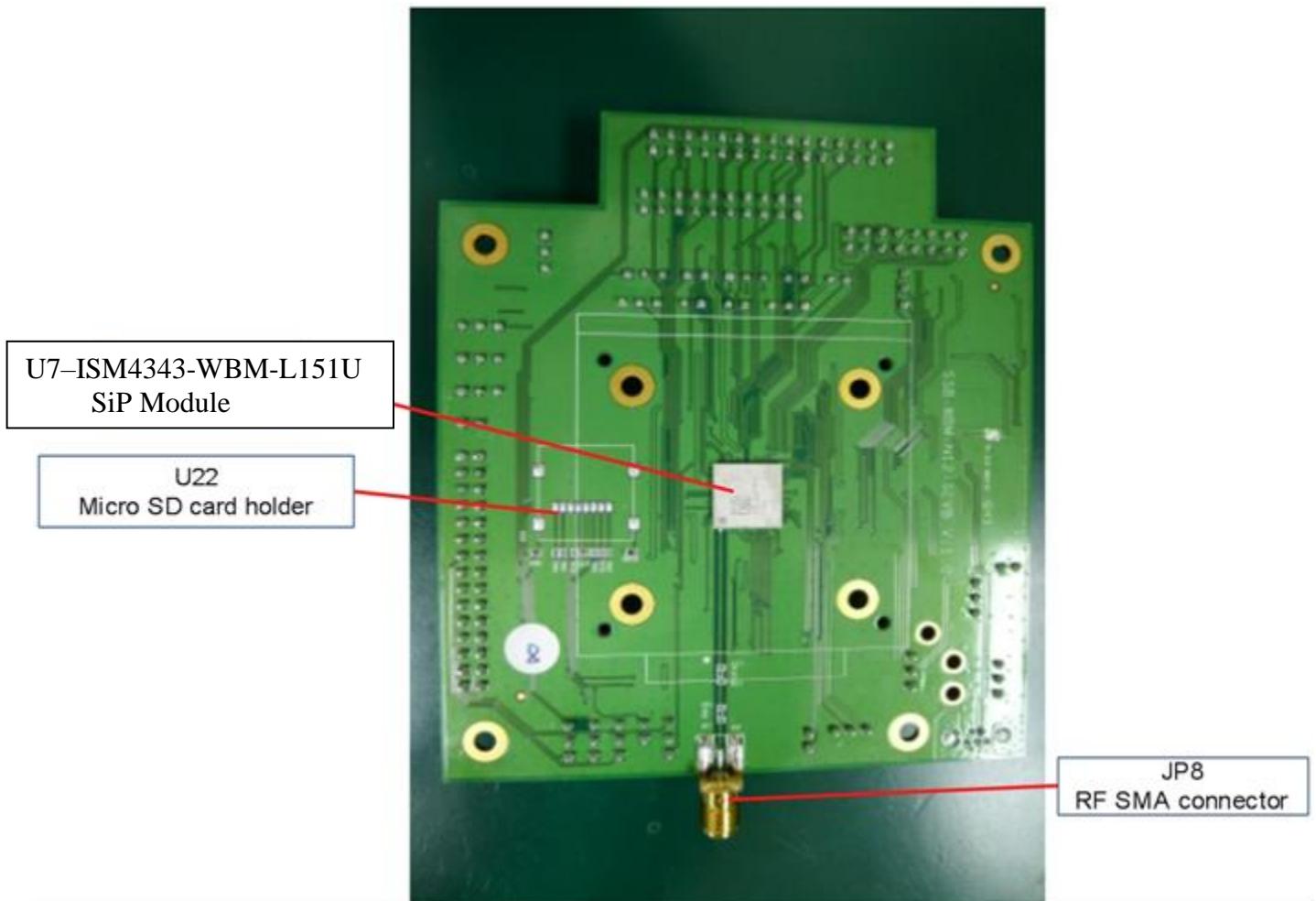
7.4 Bottom View
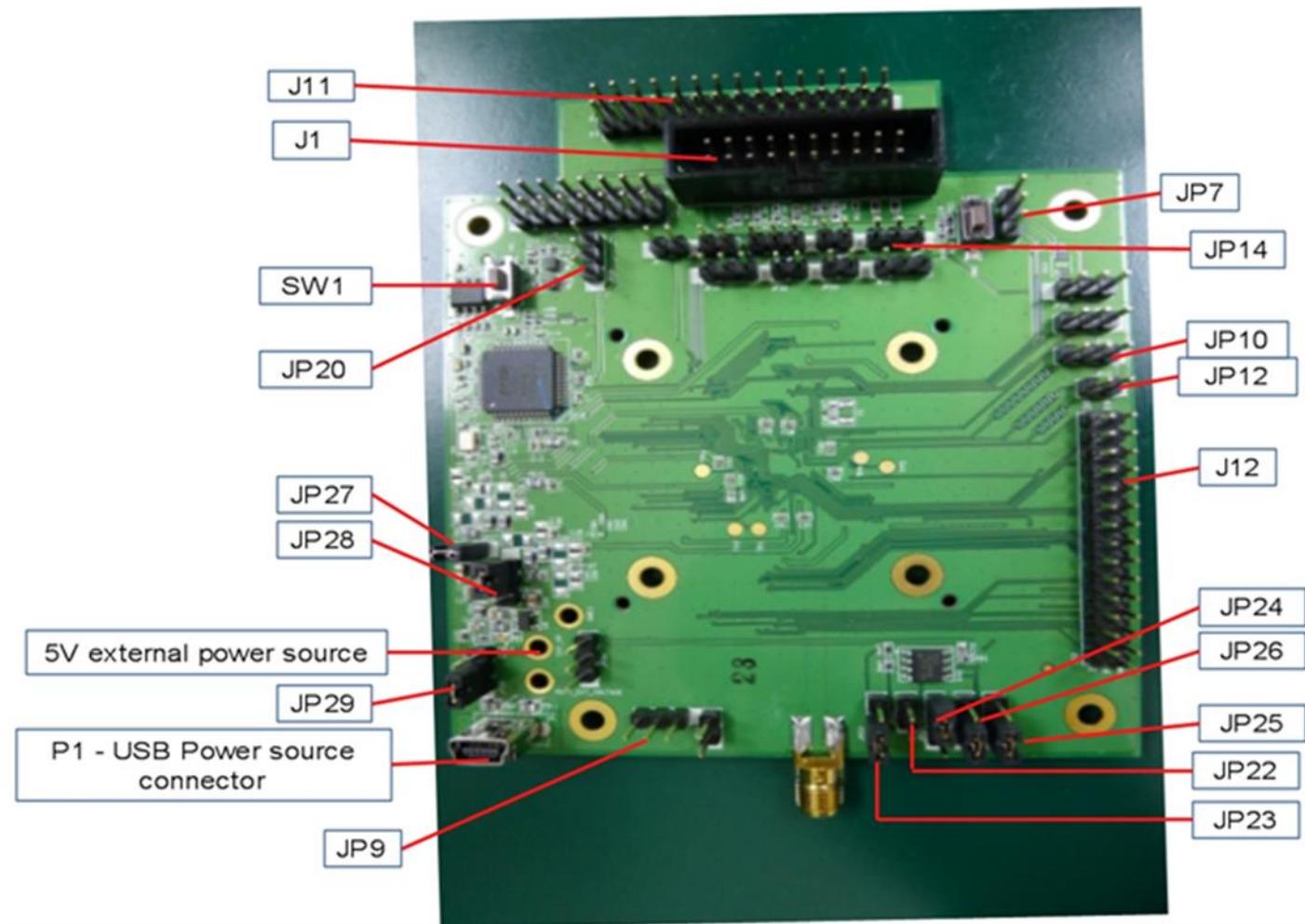
8 Power Supply

8.1 The ISM4343-WBM-L151U-EVB is designed to be powered by a 5 V DC power supply.

• 5 V External power source hole on the board.*(1)
• 5 V DC power with 500mA limitation from P1, the USB Micro-AB connecter
*(1) Set the jumper form pin 1-2 of JP29 to pin 2-3 of JP29 when using 5V external power source on the ISM4343-WBM-L151U-EVB. Also need connection JP27 and JP28 (Pin1 & Pin2)

Boot Option

The ISM4343-WBM-L151U-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) and BOOT1 (JP9).

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

BOOT related configure

8.2 Reset Source

The reset signal of the ISM4343-WBM-L151U-EVB is low active and the reset source includes:
• Reset button SW1.
• Debugging tools from JTAG connector J1.

8.3 Audio

The ISM4343-WBM-L151U-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 J1.
2) Configure MICRO_I2S2_SD GPIO in low speed (2 MHz or 10 MHz).

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8.4 UART

The ISM4343-WBM-L151U-EVB enables two channels of USART communication. One channel (USART1) connects to R20, R23 & U3 (USB to UART IC), and Header J12 (Pin21, Pin23, Pin25 & Pin27). Second Channel connects to header J12 (Pin20 & Pin24).

* The second channel USART overlaps to I2S function.

8.5 Timer

The ISM4343-WBM-L151U-EVB enables TIMER control signal and connects to header J11.

8.6 I2C

The ISM4343-WBM-L151U-EVB enables two channels of I2C function. One channel connects to J12 (Pin2 & Pin4). Another channel connects to J12 (pin8 & Pin10).

• I2C signal traces need to be pull high.
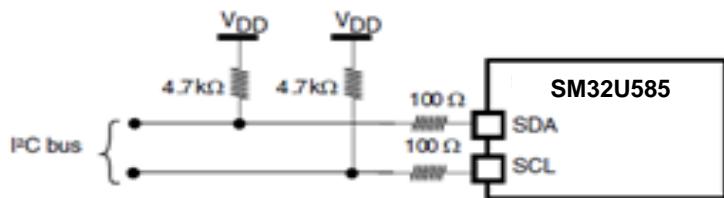
8.7   ADC

The ISM4343-WBM-L151U-EVB enables three channels of ADC signal. There are connecting to J12 (Pin28 ~ Pin30).

8.8 I2S

The ISM4343-WBM-L151U-EVB enables I2S function. The function is connecting to J12 (Pin14, Pin16, Pin18, & Pin20).

* The I2S is overlap to USART6 function.

8.9 SPI

The ISM4343-WBM-L151U-EVB enables two channels of SPI function. The First channel connects to J12 ((Pin1, Pin13, Pin5, & Pin7). The Second channel connects to J12 (Pin11, Pin13, Pin15, & Pin17).

* SPI1 is connected internally to Flash.

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8.10 Quad SPI

The ISM4343-WBM-L151U-EVB enables two channels of QUAD SPI function. The First channel connects to J11 ((Pin1, Pin4, Pin5, Pin14, & pin24). The Second channel connects to J11 (Pin6, Pin7, Pin12, Pin17, & Pin25).

8.11 BT GPIO

The BT GPIO function is connected to J20 (Pin1, Pin2, & Pin3).

9 Connectors

9.1 Power Supply Connector (Micro USB: P1)

The ISM4343-WBM-L151U-EVB can be powered from 5V DC power supply via the external Mini USB connector (P1) or external power supply hole.

-        Micro USB Connector (P1)
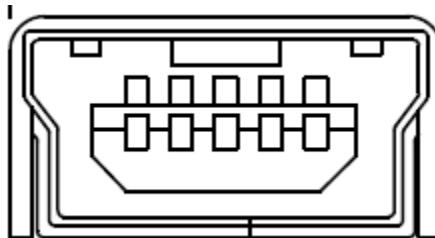
Front view

Pin	Description	Pin	Description
1	VBUS (5V)	4	NC
2	D- (connect to U1 pin 7)	5	GND
3	D+(connect to U1 pin 8)		

9.2 Boot0 Configure PIN Header (JP7)

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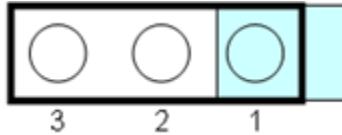
Pin	Description
1	VDD_3V3
2	Boot0
3	GND

9.3 PIN Header (JP9)
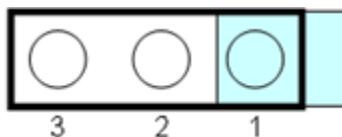
Pin	Description
1	GND
2	PB2
3	VDD_3V3

9.4 Power source (JP29)
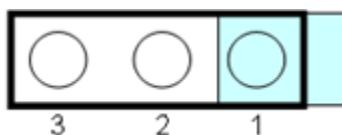
Pin	Description
1	VDD_5V-USB
2	5V to SiP
3	EXT_5V

9.5 Function PIN Header

The ISM4343-WBM-L151U-EVB enables I2S, I2C, SPI, USART, TIM, ADC, GPIO function

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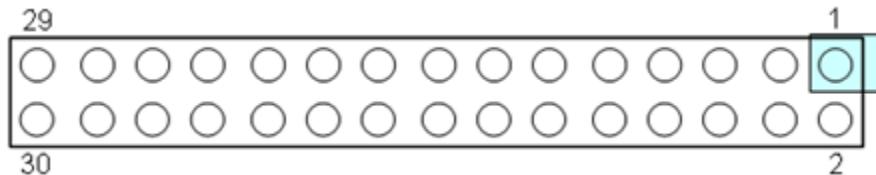
J11

Pin	Description	Pin	Description
1	QUADSPI_BK1_IO1 (PF9)	2	MCIRO_GPIO_0 (PE3)
3	MCIRO_GPIO_3 (PB15)	4	QUADSPI_BK1_IO0 (PF8)
5	QUADSPI_BK1_IO2 (PF7)	6	QUADSPI_BK2_IO3 (PC5)
7	QUADSPI_BK2_IO0 (PE7)	8	QUADSPI_CLK (PF10)
9	VDD_USB	10	MCIRO_GPIO_16 (PE15)
11	MCIRO_GPIO_25 (PD10)	12	QUADSPI_BK2_IO1 (PE8)
13	MCIRO_GPIO_27 (PD8)	14	QUADSPI_BK1_NCS (PG6)
15	MCIRO_GPIO_28 (PB8)	16	MCIRO_GPIO_26 (PD1)
17	QUADSPI_BK2_NCS (PC11)	18	MCIRO_GPIO_30 (PE0)
19	MCIRO_GPIO_33 (PB13)	20	MCIRO_GPIO_32 (PB12)
21	MCIRO_GPIO_5 (PB0)	22	MCIRO_GPIO_34 (PB14)
23	PC13	24	QUADSPI_BK1_IO3 (PF6)
25	QUADSPI_BK2_IO2 (PC4)	26	NC
27	NC	28	NC
29	GND	30	GND
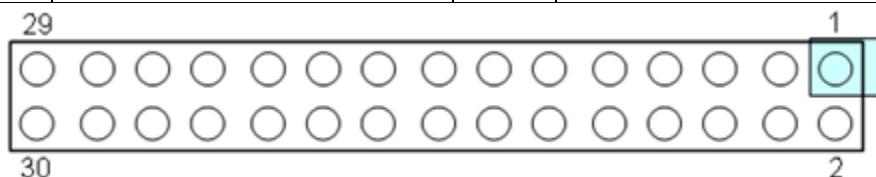
J12

Pin	Description	Pin	Description
1	MICRO_SPI1_NSS (PA4)	2	I2C2_SDA (PB10)
3	MICRO_SPI1_MISO (PA6)	4	I2C2_SCL (PB11)
5	MICRO_SPI1_SCK (PA5)	6	GND
7	MICRO_SPI1_MOSI (PA7)	8	I2C1_SDA (PB7)
9	GND	10	I2C1_SCL (PB6)
11	SPI3_SCK (PE12)	12	GND
13	SPI3_MOSI (PE14)	14	I2S2_SD (PC3)
15	SPI3_NSS (PE11)	16	I2S2_WS (PB9)
17	SPI3_MISO (PE13)	18	MICRO_I2S_DI (PE5)
19	GND	20	USART6_RX_I2S2_CK (PC7)
21	MICRO_UART1_RX (PA10)	22	GND
23	MICRO_UART1_RTS (PA12)	24	USART6_TX_I2S2_MCK(PC6)
25	MICRO_UART1_TX (PA9)	26	GND

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27	MICRO_UART1_CTS (PA11)	28	MICRO_ADC_IN1 (PA1)
29	MICRO_ADC_IN3 (PA3)	30	MICRO_ADC_IN2 (PA2)

Trace debugging (JTAG) connector J1
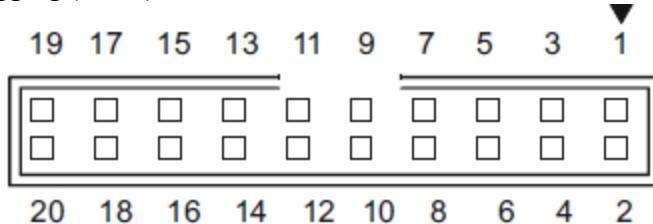
Pin	Description	Pin	Description
1	VDD_3V3	2	VDD_3V3
3	MICRO_JTAG_TRSTN (PB4)	4	GND
5	MICRO_JTAG_TDI (PA15)	6	GND
7	MICRO_JTAG_TMS (PA13)	8	GND
9	MICRO_JTAG_TCK (PA14)	10	GND
11	RTCK	12	GND
13	MICRO_JTAG_TDO (PB3)	14	GND
15	MICRO_RST_N	16	GND
17	DBGRQ	18	GND
19	DBGACK	20	GND

RTCK can choose pull high or low (Default is setting pull low).

- JP14
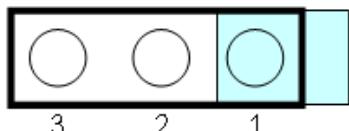
Pin	Description
1	MICRO_WKUP
2	GND
3	MICRO_RST_N

-JP20
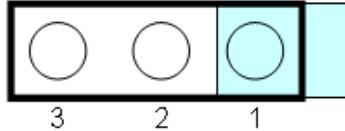
Pin	Description
1	BT_GPIO_3
2	BT_GPIO_4
3	BT_GPIO_5

-J23
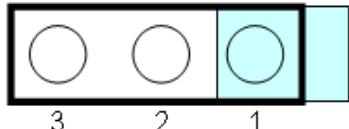
Pin	Description

-J24

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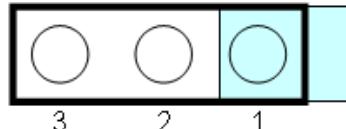
Pin	Description
1	SPI3_NSS
2	SPI_NSS
3	MICRO_SPI_NSS

Pin	Description
1	SPI3_MISO
2	SPI_MISO
3	MICRO_SPI_MISO

-J25
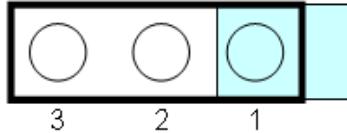
-J26
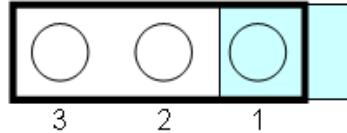
Pin	Description
1	MICRO_SPI_SCK
2	SPI_SCK
3	SPI3_SCK

Pin	Description
1	MICRO_SPI_MOSI
2	SPI_MOSI
3	SPI3_MOSI

9.6 BT PCM interface PIN Header

- JP12
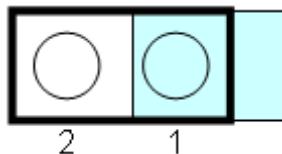
-JP10

Pin	Description
1	BT_PCM_OUT
2	BT_PCM_SYNC
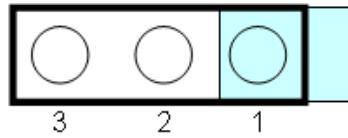
Pin	Description
1	BT_PCM_IN
2	GND
3	BT_PCM_CLK

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10 Schematic

10.1 ISM4343-M4G-L151U Application schematic
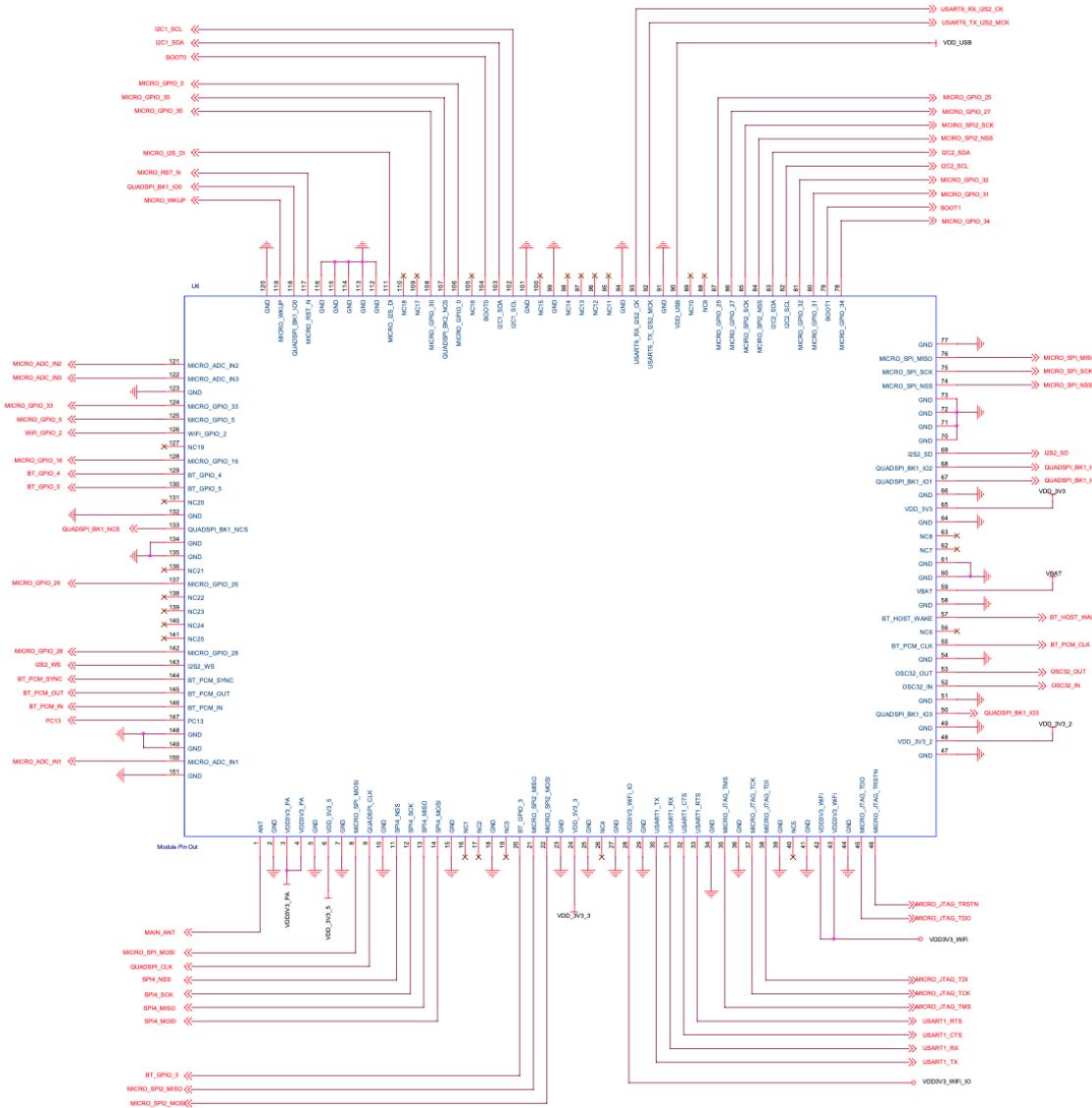
10.2 Schematic for Power
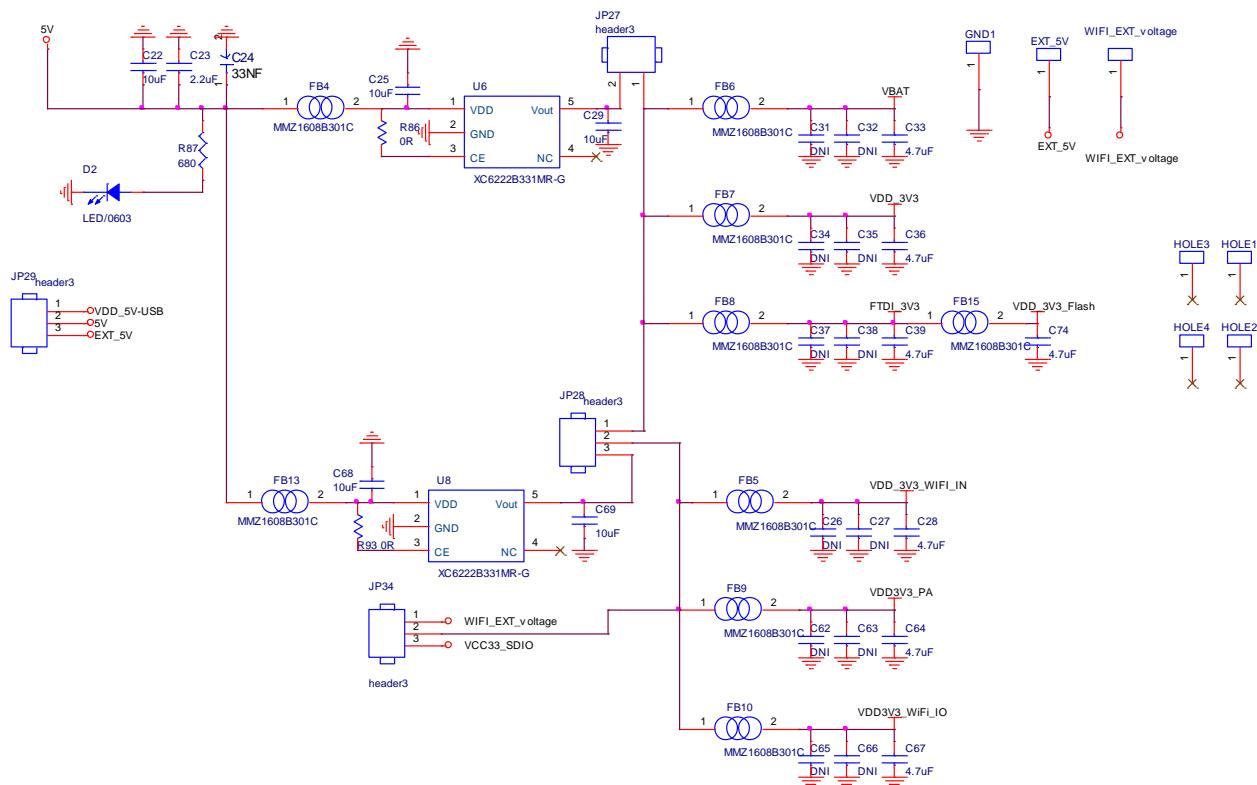
10.3 Schematic for USB to URAT, JTAG,& MCU Make Up
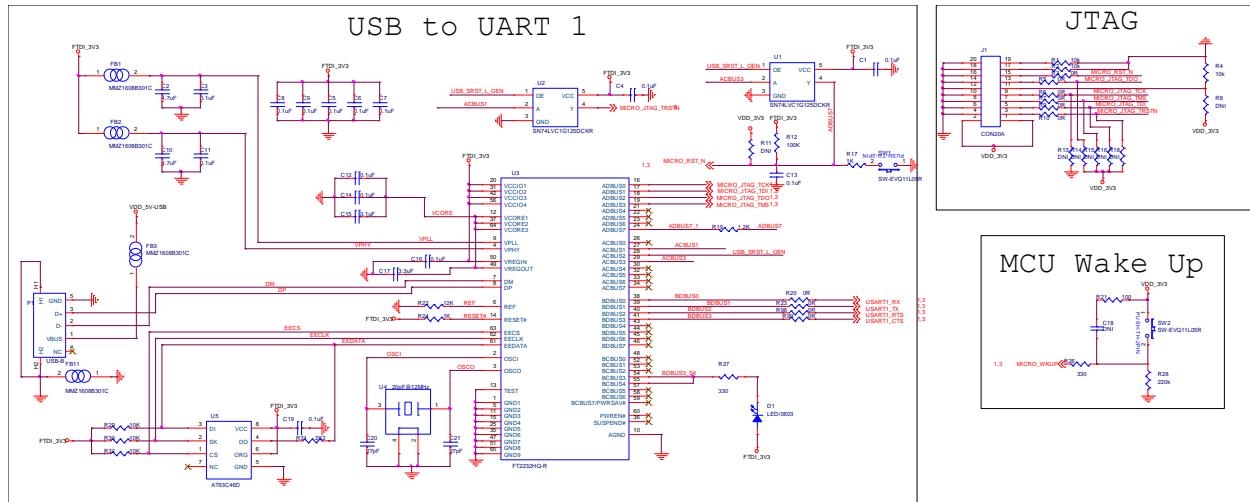
11 REVISION CONTROL

Document: ISM4343-WBM-L151U-EVB	Wi-Fi + BT/BLE + Cortex M33 Module
External Release	DOC-DS-20111-1

Date	Author	Revision	Comment
03/01/2024	RS	1.0	Preliminary

12 CONTACT INFORMATION

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