



User Manual

WISE-DB1500

M2.COM Carrier Board

ADVANTECH

Enabling an Intelligent Planet

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Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Declaration of Conformity

FCC Class B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

Part No.	Description
1931000590	Screw M2.5x5L F/S D=5.3 H=0.8 (1+) ST Ni
1700025876-01	M cable USB-A 4P(M)/Plug-in 2P-5.0 90CM
1700025875-01	A cable 1P-2.54*20/1P-2.54*20 20cm

Optional Accessories

Part No.	Description
XRISC-ADP-10HW-AG	USB adapter 100-240V 10W 5V/2A

Ordering Information

Part No.	Description
WISE-DB1500-0IA1E	Development board for M2.COM Module

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. **DO NOT COVER THE OPENINGS.**
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
 - The power cord or plug is damaged.
 - Liquid has penetrated into the equipment.
 - The equipment has been exposed to moisture.
 - The equipment does not work well, or you cannot get it to work according to the user's manual.
 - The equipment has been dropped and damaged.
 - The equipment has obvious signs of breakage.

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
- Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

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Chapter 1

Product Overview

1.1 Introduction

WISE-DB1500 is an evaluation carrier board designed for the M2.COM module. It is compatible with the M2.COM module WISE-1500 series and has rich I/O interfaces for evaluation and development. WISE-DB1500 is an ideal development board for evaluating IoT applications, such as sensor node, smart metering and control node. WISE-DB1500 is released along with M2,COM carrier board design documents: Carrier Board Design Guide, Layout, Schematic Checklist, and also the reference board schematics are ready for you to start your own carrier board design.

The main features of WISE-DB1500 are:

- Supports M2.COM module
- 1 RS-232/422/485, 1 USB OTG
- 2 I2C, 1 I2S, 8 GPIO, 2 PWM, 2 ADC
- 1 SD card slot
- On board Humidity/Temperature sensor
- Support wide temperature -20 ~ 75 °C

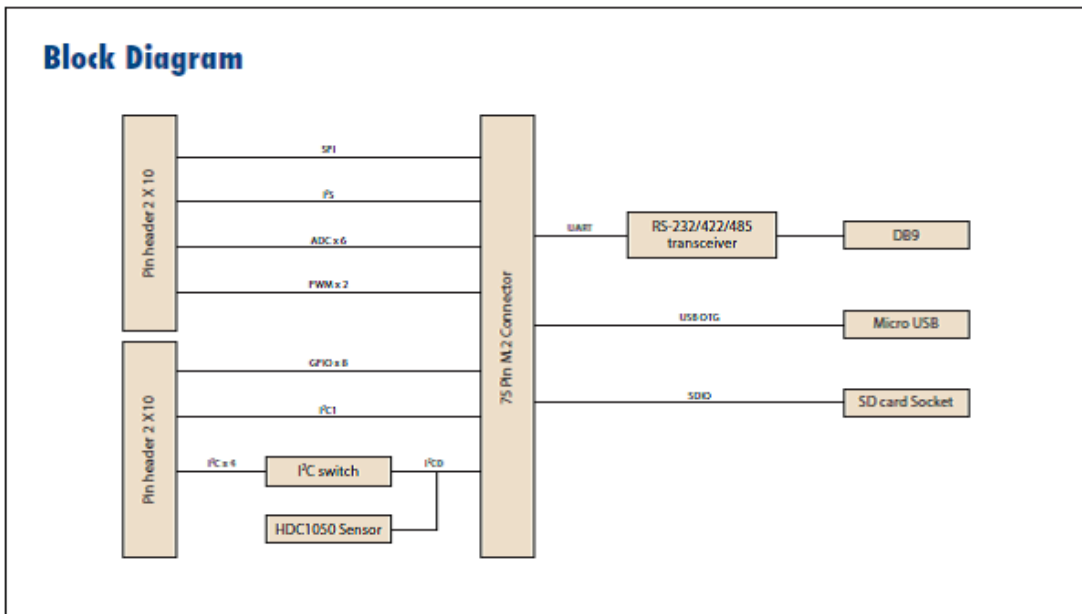
1.2 Specifications

Form Factor	Pico-ITX 100 x 72 mm	
Compatible Module	M2.COM module (22 x 30mm Key E)	
Storage	1 SD card slot	
I/O	UART	1 RS-232/422/485 (by JUMPER setting)
	I2C	2 (1 with 1 to 4 port switch)
	I2S	1
	GPIO	8
	PWM	2
	SPI	1
	ADC	6
	USB	1 USB micro Type B (OTG)
	Sensor	1 Humidity/Temperature sensor
	LED	2, Power LED , CB_PWR_ON LED
Indicator and button	Button	2, Reset, Wake Up
	Switch	2, Reconfiguration, RF disable
Power Input	Power	5V
Environment	Operational Temperature	-20 ~ 75° C
	Operating Humidity	5% ~ 95% Relative Humidity, non-condensing
Physical Characteristics	Dimensions (W x D)	100 x 72 mm

Note! Frequency Band can be configurable for Japan or Korea by request.



1.3 Block Diagram



Chapter 2

H/W Installation

2.1 Module Form Factor

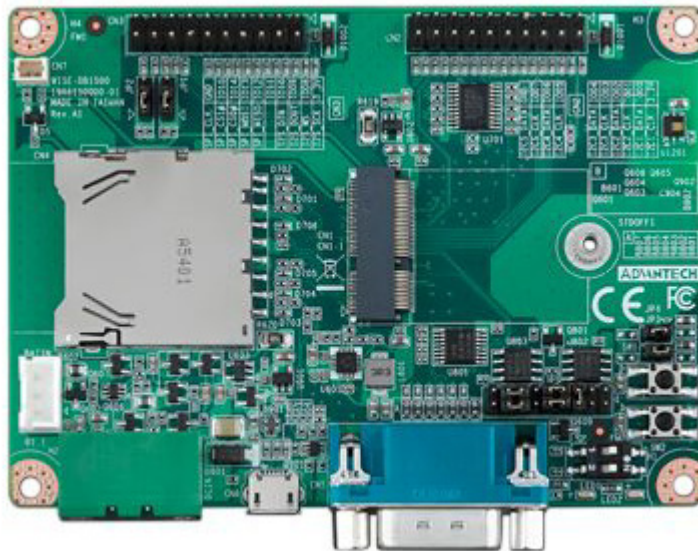
Form factor size, Pico-ITX100x72 mm

2.2 Environmental Specifications

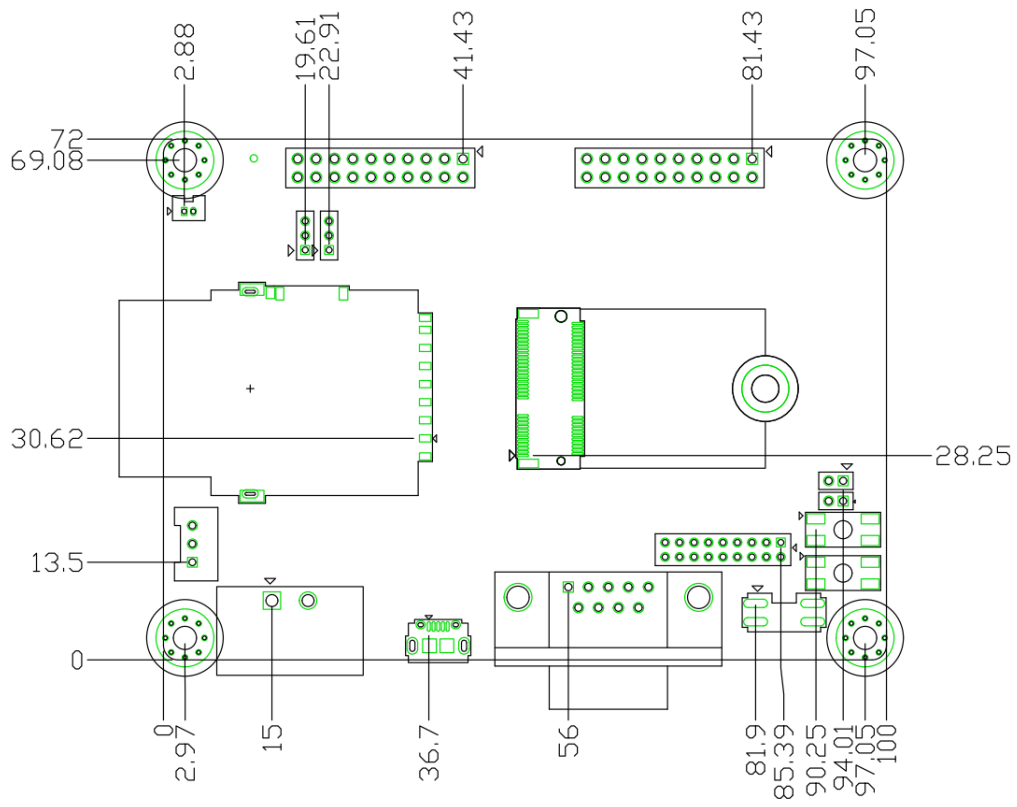
- Operating temperature: -20 ~ 75° C
The operating temperature refers to the environmental temperature for the model.
- Operating Humidity: 5% ~ 95% Relative Humidity, non-condensing

2.3 WISE DB1500 Looks

2.3.1 Overview



2.3.2 Dimension

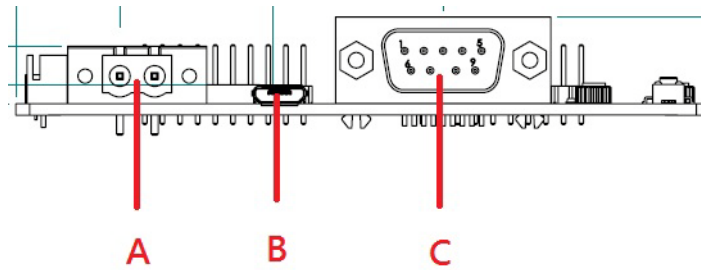


2.3.3 I/O Connectors



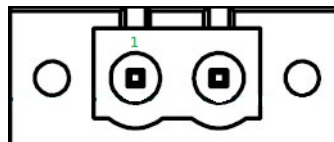
2.4 Rear I/O panel and Internal I/O

2.4.1 Rear I/O panel



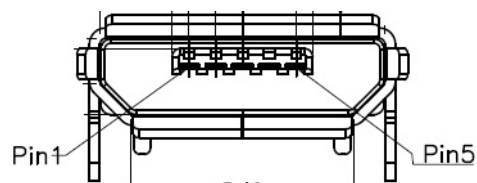
Item	Position	Description	
A	DCIN	Euroblock	A
B	CN6	MicroUSB	B
C	CN5	UART port	C

Item A



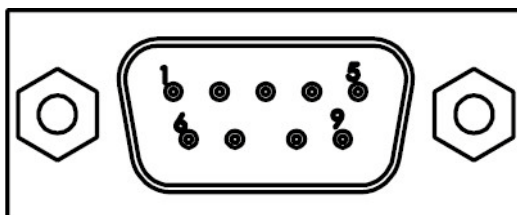
DCIN	Signal	Pin	Signal
1	+ADP_IN_CON	2	GND

Item B



CN6	Signal	Pin	Signal
1	+USB_OTG_5V_Z	2	USB_OTG_Z_DN
3	USB_OTG_Z_DP	4	USB_OTG_Z_ID
5	GND		

Item	C
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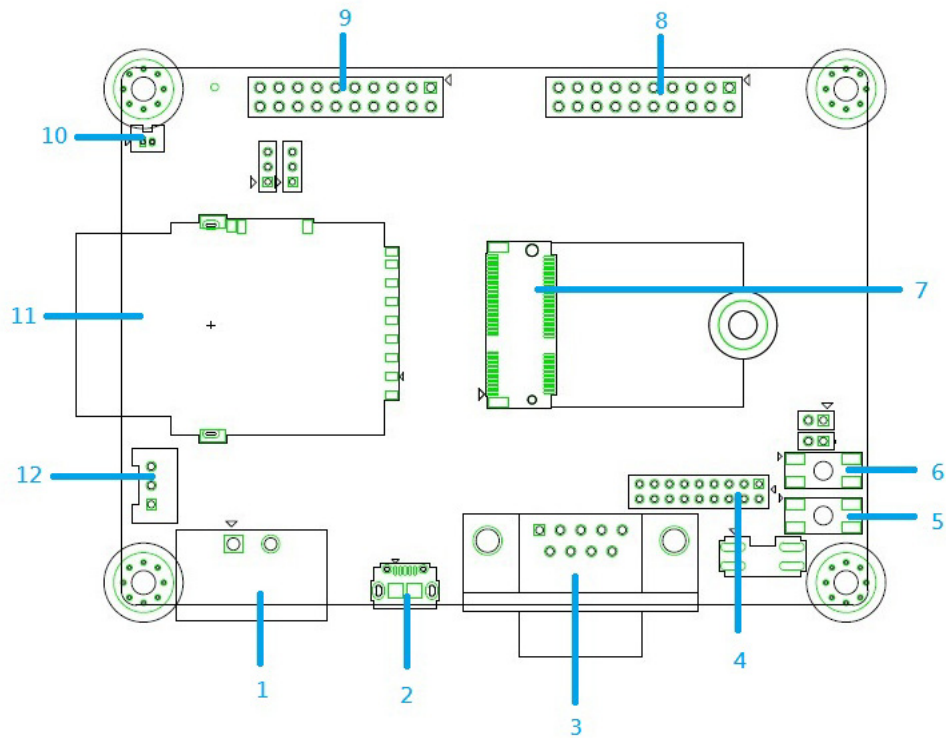


CN5		UART port (RS-232)	
Pin	Signal	Pin	Signal
1	NC	2	RX
3	TX	4	NC
5	GND	6	NC
7	RTS	8	CTS
9	NC		

CN5		UART port (RS-422)	
Pin	Signal	Pin	Signal
1	TXD-	2	TXD+
3	RXD+	4	RXD-
5	GND	6	NC
7	RTS	8	CTS
9	NC		

CN5		UART port (RS-485)	
Pin	Signal	Pin	Signal
1	D-	2	D+
3	NC	4	NC
5	GND	6	NC
7	RTS	8	CTS
9	NC		

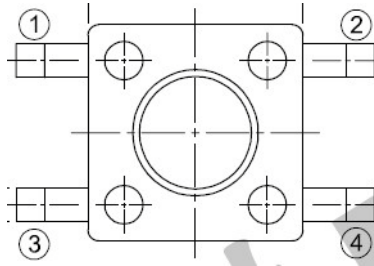
2.4.2 Internal I/O



Item	Position	Description
1	DCIN	Euroblock PLUG-IN BLOCK 2P 5.00mm 90D(M) DIP ME050-5002
2	CN6	MicroUSB MICRO USB B TYPE 5PIN 0.65mm 90D(F) SMD
3	CN5	UART port SUB Conn. 9P 2.77mm 90D(M) DIP DT10121-M5W3-4F
4	JP5	UART switch jumper PIN HEADER 9x2P 2.0mm 180D(M) DIP 21N22050-18S10
5	SW2	WAKE TACT SW STS-091 SMD 4P H=3.8mm
6	SW1	RESET TACT SW STS-091 SMD 4P H=3.8mm
7	CN1	M2.COM M.2 TYPE 2230-D3-E carrier
8	CN2	EXTENSION IO PIN HEADER 10x2P 2.54mm 180D(M) DIP 1130-010
9	CN3	EXTENSION IO PIN HEADER 10x2P 2.54mm 180D(M) DIP 1130-010
10	CN7	RTC connector WAFER BOX 2P 1.25mm 180D(M) DIP 53047-0210
11	CN4	SDCARD SD CARD 9P 90D(F) SMD WK2192C-S3D-7H
12	BATIN	Battery connector WAFER BOX 3P 2.5mm 180D(M) DIP A2501WV2-3P

2.4.3 WAKE AND REST

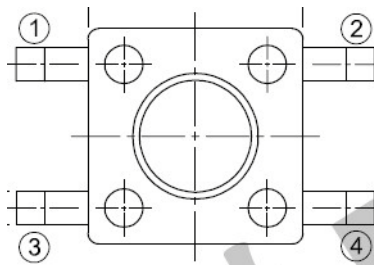
Item **5**



SW2 WAKE

Pin	Signal	Pin	Signal
1	GND	2	WAKE#
3	GND	4	WAKE#

Item **6**

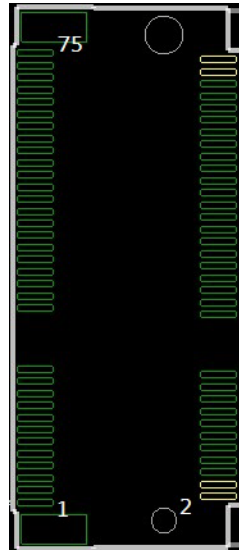


SW1 RESET

Pin	Signal	Pin	Signal
1	GND	2	RESET_IN#
3	GND	4	RESET_IN#

2.4.4 M2.COM

Item 7

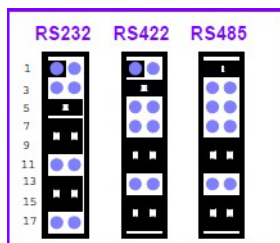


CN1		M2.COM	
Pin	Signal	Pin	Signal
1	GND	2	+VMOD
3	OTG_D+	4	+VMOD
5	OTG_D-	6	USB_OTG_ID
7	GND	8	I2S_SCK
9	SDIO_CLK	10	I2S_WS
11	SDIO_CMD	12	I2S_SD_OUT
13	SDIO_DATA0	14	I2S_SD_IN
15	SDIO_DATA1	16	CB_RESET_OUT#
17	SDIO_DATA2	18	GND
19	SDIO_DATA3	20	CB_PWR_ON
21	NC	22	UART_TXD
23	NC	24	NC
25	NC	26	NC
27	NC	28	NC
29	NC	30	NC
31	NC	32	UART_RXD
33	GND	34	UART_RTS#
35	I2C1_DATA	36	UART_CTS#
37	I2C1_CLK	38	GPIO0
39	GND	40	GPIO1
41	PWM0/GPIO8	42	GPIO2
43	PWM1/GPIO9	44	GPIO3
45	GND	46	GPIO4
47	ADC0/GPIO10	48	GPIO5
49	ADC1/GPIO11	50	GPIO6
51	GND	52	GPIO7
53	ADC2/GPIO12	54	USB_OTG_OC#
55	ADC3/GPIO13	56	W_DISABLE#

57	GND	58	I2C0_DATA
59	ADC4/GPIO14	60	I2C0_CLK
61	ADC5/GPIO15	62	SPI_MOSI
63	GND	64	SPI_MISO
65	+VDD_RTC	66	SPI_CLK
67	BACKUP#	68	SPI_CS0#
69	GND	70	SPI_CS1#
71	RESET_IN#	72	+VMOD
73	WAKE#	74	+VMOD
75	GND		

2.4.5 UART

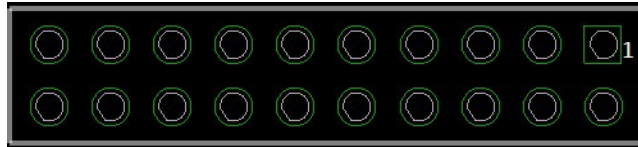
Item	4
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JP5 UART switch jumper			
Pin	Signal	Pin	Signal
1	UART_RXD	2	UART_485_RX
3	UART_RXD	4	UART_422_RX
5	UART_RXD	6	UART_232_RX
7	NC	8	RS232_RX
9	NDCD#_TXD422-	10	NRXD_TXD422+
11	RS422-485_TX-	12	RS422-485_TX+
13	RS232_TX	14	NC
15	NTXD_RXD422+	16	NDTR#_RXD422-
17	RS422_RX+	18	RS422_RX-

2.4.6 CN2 EXTENSION IO

Item 8



CN2 EXTENSION IO

Pin	Signal	Pin	Signal
1	+V3.3_IO1	2	I2C1_CLK
3	GPIO0	4	I2C1_DATA
5	GPIO1	6	I2C2_CLK
7	GPIO2	8	I2C2_DATA
9	GPIO3	10	I2C3_CLK
11	GPIO4	12	I2C3_DATA
13	GPIO5	14	I2C4_CLK
15	GPIO6	16	I2C4_DATA
17	GPIO7	18	I2C5_CLK
19	GND	20	I2C5_DATA

2.4.7 CN3 EXTENSION IO


Item 9



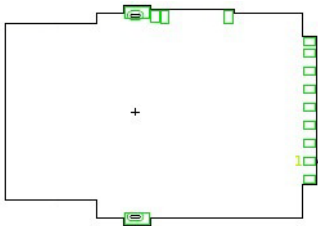
CN3 EXTENSION IO

Pin	Signal	Pin	Signal
1	+V3.3_IO2	2	I2S_SCK
3	PWM0/GPIO8	4	I2S_WS
5	PWM1/GPIO9	6	I2S_SD_OUT
7	ADC0/GPIO10	8	I2S_SD_IN
9	ADC1/GPIO11	10	NC
11	ADC2/GPIO12	12	SPI_MISO
13	ADC3/GPIO13	14	SPI_MOSI
15	ADC4/GPIO14_EXT	16	SPI_CS0#
17	ADC5/GPIO15_EXT	18	SPI_CS1#
19	GND	20	SPI_CLK


2.4.8 RTC connector

Item	10		
			
CN7	RTC connector		
Pin	Signal	Pin	Signal
1	+BAT_RTC_1	2	GND

2.4.9 SDCARD

Item	11		
			
CN4	SDCARD		
Pin	Signal	Pin	Signal
1	SDIO_Z_DATA3	2	SDIO_Z_CMD
3	+V3.3	4	GND
5	SDIO_Z_CLK	6	GND
7	SDIO_Z_DATA0	8	SDIO_Z_DATA1
9	SDIO_Z_DATA2		

2.4.10 Battery connector

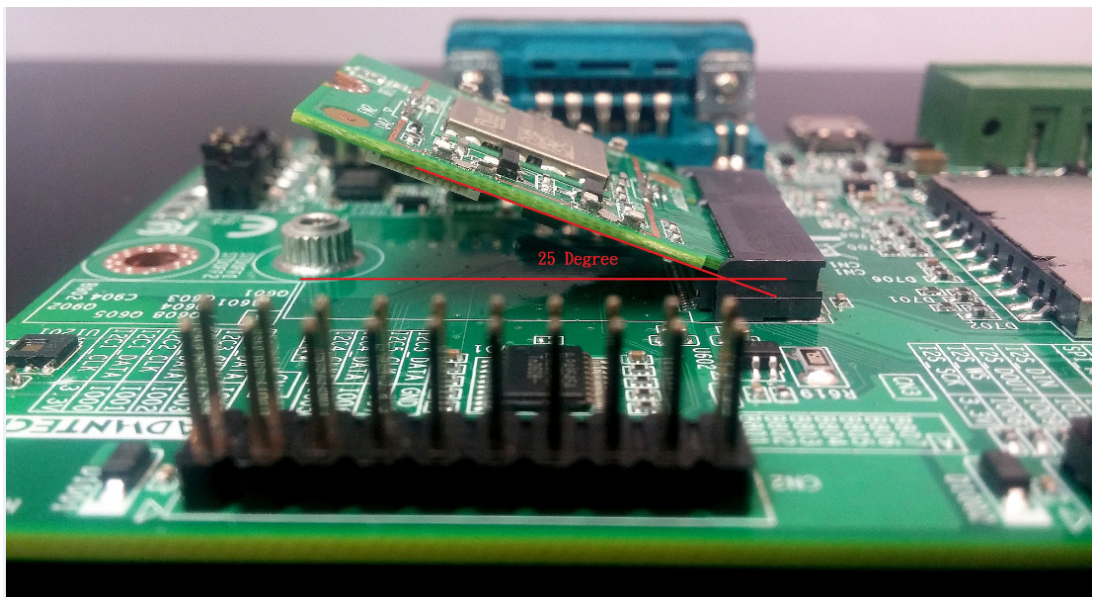
Item	12		
			
BATIN	Battery connector		
Pin	Signal	Pin	Signal
1	+BAT_IN_CONN	2	NC
3	gnd		

2.5 LED

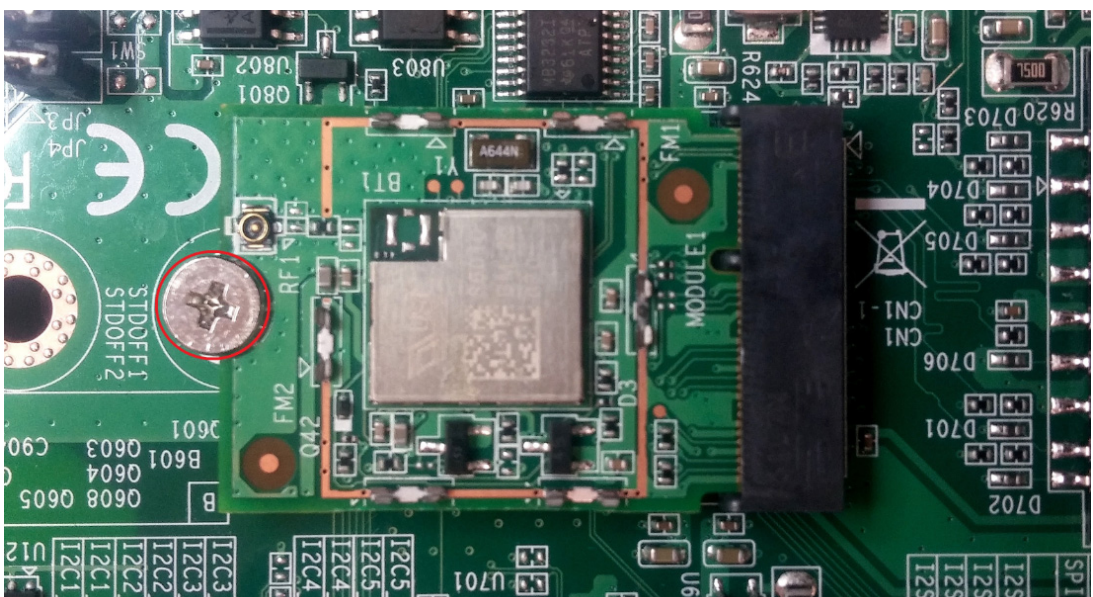
Position	Function
LED1	+V3.3A
LED2	CB_PWR_ON

2.6 HW Installation

1. Install the WISE-1500 series module board to carrier board DB1500 at 25 degree angle.



2. Press down the module board and make sure the 1 screw holes are aligned with the carrier board and adjust the 1 screws clockwise to fix them in place



Chapter 3

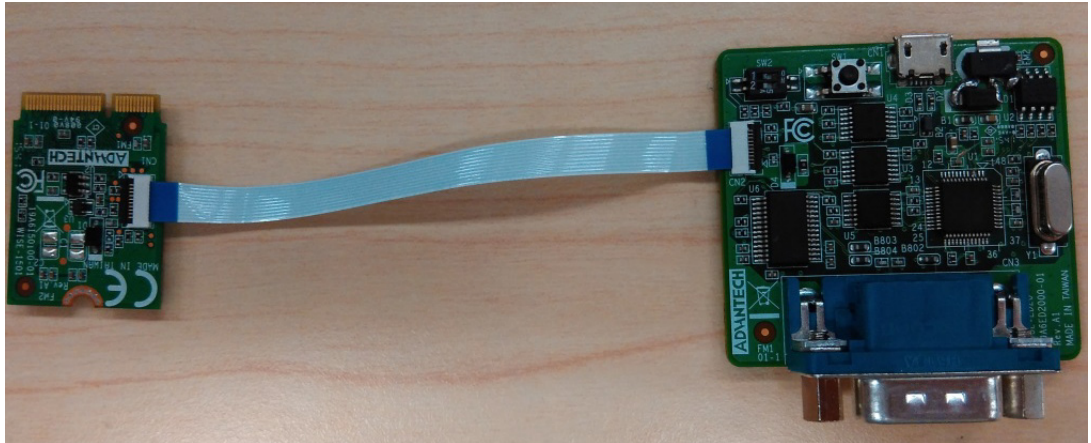
IO functionality
Introduction

This chapter is to help you to connect your main board and DB1500. We use WISE1520 as the main board. We only show the physical connectivity in this chapter, but the software control and testing, please refer to your main board's user manual.

3.1 Prepare WISE Boards

You should prepare WISE-ED20, WISE-ED30, WISE-1500 ?WISE-1520, and adjust JP as below figure.

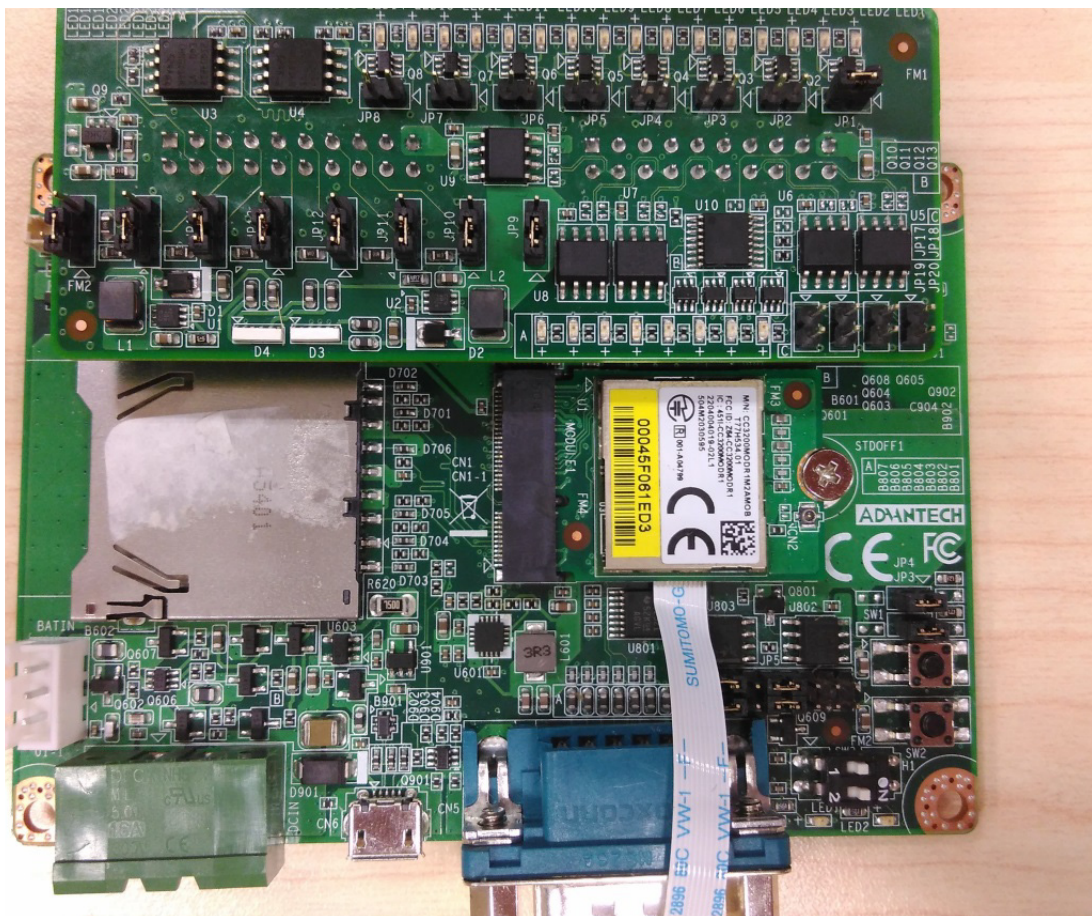
1. WISE-1520 connect to WISE-ED20, WISE-ED20 SW2 1,2 (all Open) through FPC.



2. Use WISE-1520 module plug with WISE-1500 CN1 and screw clockwise to fix in place, and then adjust JP1 (2-3 short), JP2(2-3 short), JP5 as below.



3. Use WISE-ED30 plug on WISE-1520 CN2and CN3.



Adjust JP1 (short), JP2~JP8 (Open), JP10~JP16 (1-2 Short), JP17~JP20(Open) on WISE-ED30.

4.
 - DC Power Cable plug WISE-1500 DCIN,
 - PC UART Cable connect to WISE-ED20 UART Port,
 - USB Mini type Power Cable connect to CN1 and the other side is connecting to USB Adapter,
 - WISE-1500 CN5 connect to RS232 loopback connector.

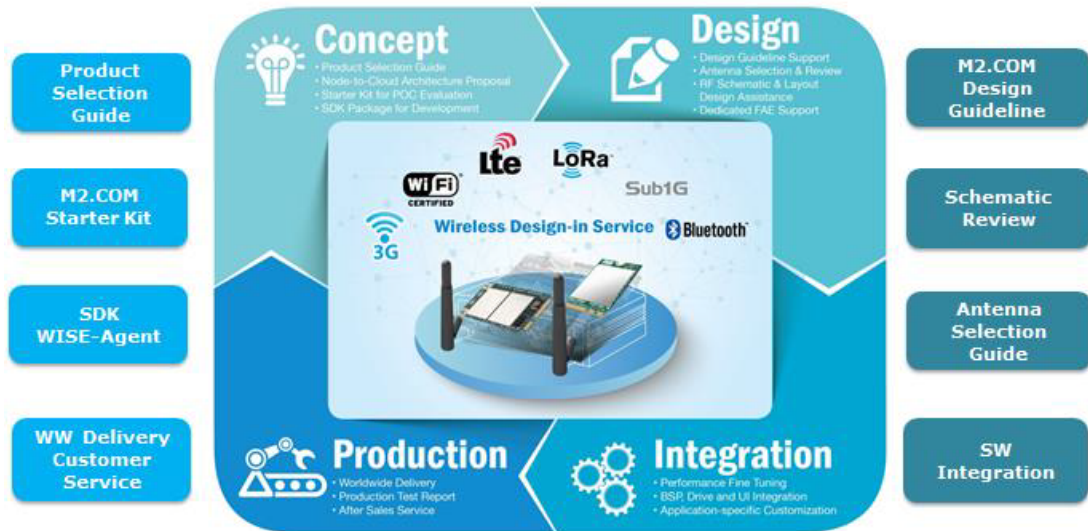


Chapter 4

WISE-EC Design-in
Services

4.1 WISE-EC Design-in Services

M2.COM WSN Design-In Service



The Acquisition of Information

Even if the individual client is able to obtain sufficient information to make the right decision for the specialized vertical application, some customers encounter difficult problems dealing with platform design in general and communicating with CPU or chipset manufacturers, thereby increasing carrier board design difficulties and risk as well as seriously impacting on time-to-market and lost market opportunities. Advantech WISE-EC Design-in Services help customers to reduce the time and work involved with designing new carrier boards. We handle the complexities of technical research and greatly minimize the development risk associated with carrier boards.

Easy Development

Advantech provides SW OS core, BSP, connectivity drivers and standard API with IoT WSN SW packages, VMware image and technical documents for customers. These help customers to easily develop their carrier boards and differentiate their embedded products and applications.

- Full Range of WISE-EC m2.COM Product Offerings
- Comprehensive Document Support
- Comprehensive R&D design and manufacture production flow to deliver exactly customer target product.

4.1.1 Concept

According to different network requirement, Advantech offers product selection guide and node-to-cloud architecture proposal for customer to choose the right solution. After preliminary selection of the specification. Customer can use start kit for POC Evaluations, since we not only offer hardware planning and technology consulting, but also software evaluation and peripheral module recommendations by delivering SDK packages. Resolving customer concerns is Advantech's main target at this stage. Indeed, we all know that product evaluation is the key task in the planning period, especially for performance and specification, so we try to help our customers conduct all the necessary tests for their IOT devices.

4.1.2 Design

When a product moves into the design stage, Advantech will supply a design guide of the carrier board for reference as well as Antenna selection & schematic review. The carrier board design guide provides pin definitions of the COM connector with limitations and recommendations for carrier board design, so customers can have a clear guideline to follow during their carrier board development. In addition, our team is able to assist customers to review the placement/layout and schematics to ensure the carrier board design meets their full requirements.

For software development, Advantech WISE-EC software team can assist customers to establish an environment for software development and evaluate the amount of time and resources needed. If customers outsource software development to a 3rd party, Advantech can also cooperate with the 3rd party and provide proficient consulting services. With

Advantech's professional support, the design process becomes much easier and product quality will be improved to meet their targets.

Design Assistance Service

Advantech provides check list for engineer for easy check their schematics and also review service based on customer carrier board schematics. Those services are preventative,

and help to catch design errors before they happen. It helps to save a lot of time and costs with regard to developing carrier boards.

- Schematic Review
- Placement and Layout Review
- Debugging Assistance Services
- General/Special Reference Design Database.

4.1.3 Integration

Integration stage

This phase comprises of HW/SW integration, application development, and peripheral module implementation. Due to the lack of knowledge and experience on platforms, customers need to spend a certain amount of time on analyzing integration problems. In addition, peripheral module implementation has a lot to do with driver designs on carrier boards, IoT platform have less support for ready-made drivers on the carrier board, therefore the customer has to learn from trial and error and finally get the best solution with the least effort. Advantech's team has completed a total standard HW/SW solution to do performance fine tune, BSP driver integration and application-specific customization. Consequently, we can support customers with professional advice and information as well as shortening development time and enabling more effective product integration.

Validation stage

After customer's ES sample is completed, the next step is a series of verification steps. In addition to verifying a product's functionality, the related test of the product's efficiency and stability are also an important part at this stage especially for WISE-EC platform. As a supportive role, Advantech primarily helps customers solve their problems in the testing process and will give suggestions and tips as well. Through an efficient verification process backed by our technical support, customers are able to optimize their applications with less fuss. Furthermore, Advantech's team can provide professional consulting services about further testing and equipment usage, so customers can find the right tools to efficiently identify and solve problems to further enhance their products quality and performance.

4.1.4 Production

Advantech has two manufacturing center in Taiwan and Kunshan to provide customized chassis assembly, testing services, packaging and labeling to meet customer special needs.

Customer can place an order via our smart and fast on-line system. With global peripheral procurement service and global logistics service, Advantech provide vertically integration in short lead time and competitive price for customers' one-stop shopping solutions, and then direct shipment to end users. After sales, a completed global repair service (RMA) take charge to provide device fully repairing service, and then execute efficient delivery.

ADVANTECH

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Please verify specifications before quoting. This guide is intended for reference purposes only.

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