MINEWSEMI

Low Power WiFi Module
ME16WS04

Datasheet

V 1.0.0

Version Note

Version	Details	Contributor(s)	Date	Notes
1.0.0	First edit	Vincle	2025.01.14	

Part Number

Model	Hardware Code
ME16WS04	-

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https://en.minewsemi.com/file/ME16WS04-BK7239N_Datasheet_K_EN.pdf

ME16WS04-BK7239N

High-Performance, Low-Power, 2.4g /5g Dual-Band, BLE 5.4, Support Multi-Protocol WiFi 6 Module

The ME16WS04 is a high-performance, low-power, and cost-effective dual-band WiFi 6 2.4G/5Ghz, BLE 5.4 module based on the BK7239N SoC. It features an ARM core STAR-MC1 RF transceiver with a core operating speed of 240MHz, along with 4MB SiP FLASH programmable space, 512kB RAM, an integrated 2.4GHz/5G transceiver, and other powerful supporting resources, providing a perfect solution for WiFi and Bluetooth coexistence. The BK7239N supports protocols such as 802.11a/b/g/nax, BLE 5.4, and IEEE 802.15.4. Its range in open spaces is estimated at up to 150 meters.

FEATURES

- Support BLE, 802.11 a/b/g/n ax and 802.15.4 protocols
- Supports STA and SoftAP mode
- Support WPA/ WPA2/WPA3
- High-performance, Low-power
- Wi-Fi 6 2.4G/5G, BLE 5.4

KEY PARAMETER

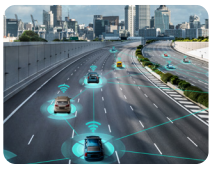
ME16WS04			
Chip Model	BK7239N	**Antenna**	PCB/u.FL
Module Size	23×15×3mm	**GPIO**	19
Flash	4MB+64KB	**RAM**	512KB
Receiving Sensitivity	Wi-Fi: -100dBm BLE: -98dBm	**Transmission Power**	Wi-Fi: +20dBm BLE: +0dBm
Current(TX)	2.4G-75mA 5G-90mA	**Current(RX)**	2.4G- 9mA 5G- 16mA
Firmware	No-firmware		

APPLICATION

Smart Buildings

Consumer Electronics

Smart Healthcare



Automotive Devices

Intelligent Wearable Device

Smart Agriculture

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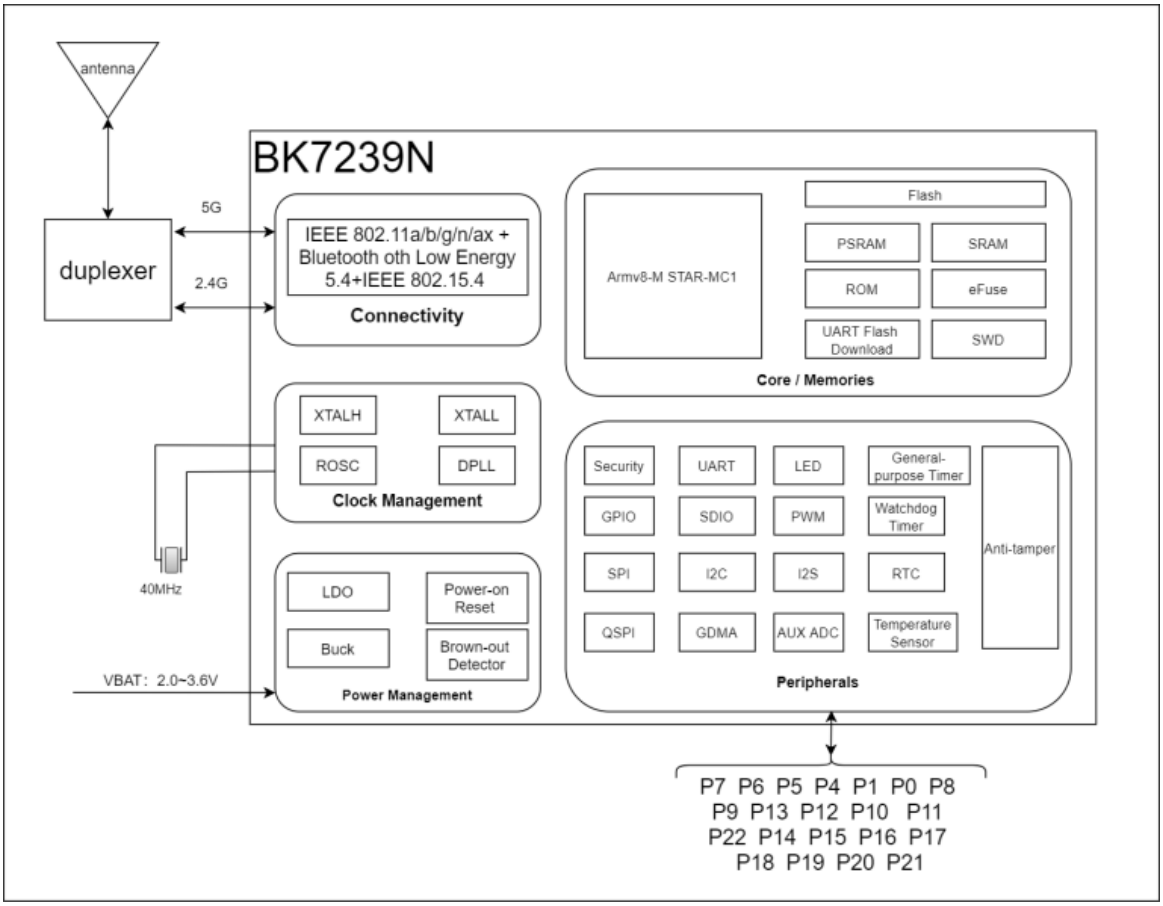
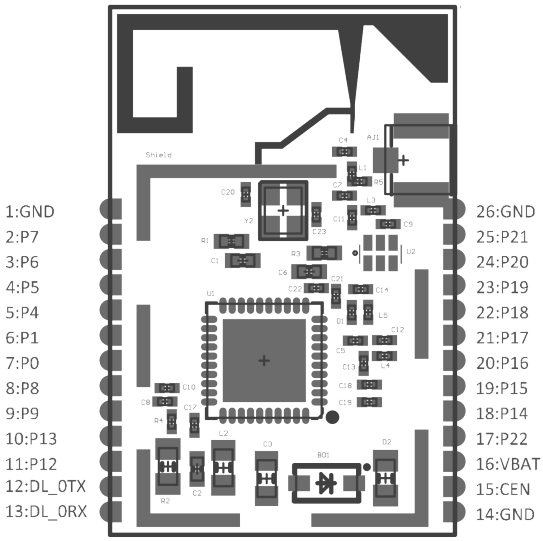
1 BLOCK DIAGRAM



2 ELECTRICAL SPECIFICATION

Parameter	Values	Notes
Working Voltage	1.8V-3.6V	To ensure RF work, it is recommended that the supply voltage should not be lower than 3.3V.
Working Temperature	-40℃~+85℃	Storage temperature is -40℃~+105℃
Transmission Power	Wi-Fi: +20dBm BLE: +0dBm	Configurable
Receiving Current	2.4G : 9mA 5G: 16mA	Maximum power
Emission Current	2.4G: 75mA 5G: 90mA	Maximum AV power
Sleep Deep	19μA	Sleep Mode
Module Dimension	23*15*3mm	
Quantity of IO Port	19	RGB LED、UART、ADC、SDIO、SPI,etc

3 PIN DESCRIPTION



(Top View)

4 PIN DEFINITION

Pin Number	Symbol	Type	Description	Definition
1	GND	GND	Ground	Negative terminal of power supply
2	P7	Digital I/O	GPIO	General Purpose IO; GPIO7; ADC6
3	P6	Digital I/O	GPIO	General Purpose IO; GPIO6; ADC5
4	P5	Digital I/O	GPIO	General Purpose IO; GPIO5; ADC4
5	P4	Digital I/O	GPIO	General Purpose IO; GPIO4; ADC3
6	P1	Digital I/O	GPIO	General Purpose IO; GPIO1; ADC13
7	P0	Digital I/O	GPIO	General Purpose IO; GPIO0; ADC12
8	P8	Digital I/O	GPIO	General Purpose IO; GPIO8; ADC10;32K_XO
9	P9	Digital I/O	GPIO	General Purpose IO; GPIO9; 32K_XI
10	P13	Digital I/O	GPIO	General Purpose IO; GPI13; ADC15
11	P12	Digital I/O	GPIO	General Purpose IO; GPI11; ADC14
12	DL_0TX	Burn firmware pin	Burn firmware	When burning firmware, only the power supply pin, ground, and these two pins need to be connected.
13	DL_0RX	Burn firmware pin	Burn firmware	When burning firmware, only the power supply pin, ground, and these two pins need to be connected.
14	GND	GND	Ground	Negative terminal of power supply
15	CEN	Enable	Chip enable	Active High Level
16	VBAT	VCC	Power supply	Power supply, 1.8V-3.6V, powered via this pin (VBAT connected to VIO)

Pin Number	Symbol	Type	Description	Definition
17	P22	Digital I/O	GPIO	General-purpose I/O
18	P14	Digital I/O	GPIO	General-purpose I/O
19	P15	Digital I/O	GPIO	General-purpose I/O
20	P16	Digital I/O	GPIO	General-purpose I/O
21	P17	Digital I/O	GPIO	General-purpose I/O
22	P18	Digital I/O	GPIO	General-purpose I/O
23	P19	Digital I/O	GPIO	General-purpose I/O
24	P20	Digital I/O	GPIO	General-purpose I/O
25	P21	Digital I/O	GPIO	General-purpose I/O
26	GND	GND	Ground	Negative terminal of power supply

Note：Pin multiplexing
The I/O multiplexer provides one configuration register for each I/O pin. By using the GPIOx_func_SEL[6:0] field of the configuration register, each I/O pin can be configured as either GPIO or peripheral I/O.

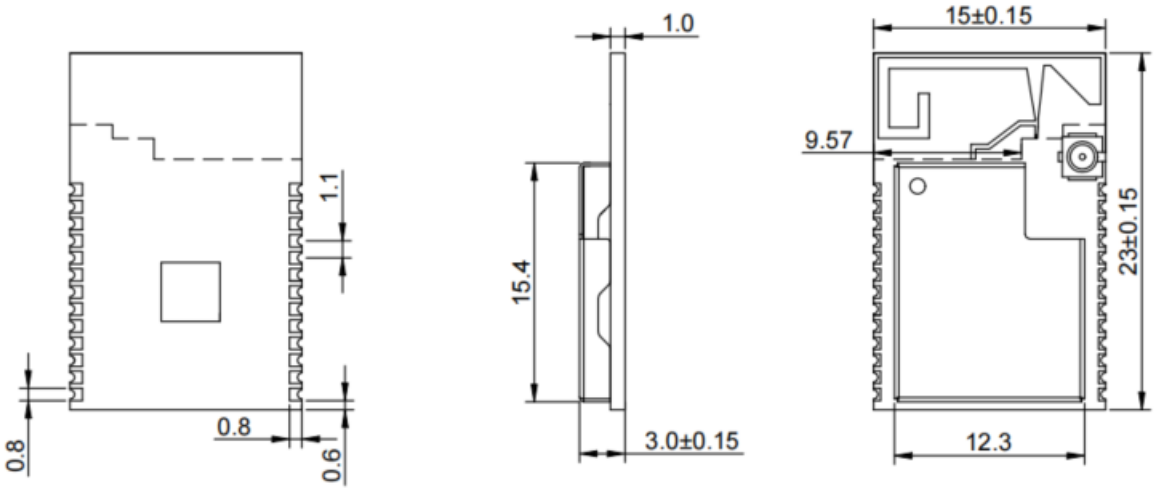
I/O MATRIX

FUNCTION	GPIOX_FUNC_SEL [6:0] VALUE	I/O FUNCTION NAME	I/O TYPE	DESCRIPTION
GPIO	7'd0	GPIO	High impedance	General-purpose I/O
	7'd1	GPIO	Input	General-purpose I/O
	7'd2	GPIO	Output	General-purpose I/O
	7'd3	GPIO	Input/output	General-purpose I/O
PTA	7'd4	BT_ACTIVE	Input	Bluetooth active
	7'd9	BT_PRIOPRITY	Input	Bluetooth procrity
	7'd92	WIFI_ACTIVE	Output	Wi-Fi active
AoA/AoD	7'd5	BT_ANT0	Output	Bluetooth antenna select
	7'd6	BT_ANT1	Output	Bluetooth antenna select
	7'd7	BT_ANT2	Output	Bluetooth antenna selec
	7'd8	BT_ANT3	Output	Bluetooth antenna selec
Clock	7'd10	CLK_AUXS	Output	Clock output derived from XTALH/LPO_CLK/DPLL
	7'd11	CLK_XTAL	Output	40 MHz clock output
	7'd12	CLK_XTAL_DIV	Output	40 MHz clock output (divide by 1/2/4/8)
	7'd40	LPO_CLK	Output	32 kHz clock output

FUNCTION	GPIOX_FUNC_SEL [6:0] VALUE	I/O FUNCTION NAME	I/O TYPE	DESCRIPTION
FEM support	7'd29	FEM_LNA_EN	Output	LNA bypass
	7'd93	WIFI_RX_EN	Output	Receive enable
	7'd94	WIFI_TX_EN	Output	Transmit enable
I2C0	7'd30	I2C0_SCL	Input/output	Serial clock
	7'd31	I2C0_SDA	Input/output	Serial data
I2C1	7'd32	I2C1_SCL	Input/output	Serial clock
	7'd33	I2C1_SDA	Input/output	Serial data
I2S	7'd34	I2S_MCLK	Output	Master clock
	7'd35	I2S_DIN	Input	Serial data Input
	7'd36	I2S_DOUT	Output	Serial data output
	7'd37	I2S_SCK	Input/output	Serial clock
	7'd38	I2S_SYNC	Input/output	Frame synchronization
LED	7'd39	LED	Output	LED output
PWM	7'd44	PWM0	Input/output	PWM0 channel
	7'd45	PWM1	Input/output	PWM1 channel
	7'd46	PWM2	Input/output	PWM2 channel
	7'd47	PWM3	Input/output	PWM3 channel
	7'd48	PWM4	Input/output	PWM4 channel
	7'd49	PWM5	Input/output	PWM5 channel
	7'd50	PWM6	Input/output	PWM6 channel
	7'd51	PWM7	Input/output	PWM7 channel
	7'd52	PWM8	Input/output	PWM8 channel
	7'd53	PWM9	Input/output	PWM9 channel
	7'd54	PWM10	Input/output	PWM10 channel
	7'd55	PWM11	Input/output	PWM11 channel
QSPI	7'd56	QSP_CS	Output	Data
	7'd57	QSP_IO0	Input/output	Data
	7'd58	QSP_IO1	Input/output	Data
	7'd59	QSP_IO2	Input/output	Data
	7'd60	QSP_IO3	Input/output	Data
	7'd61	QSP_SCK	Input/output	Data

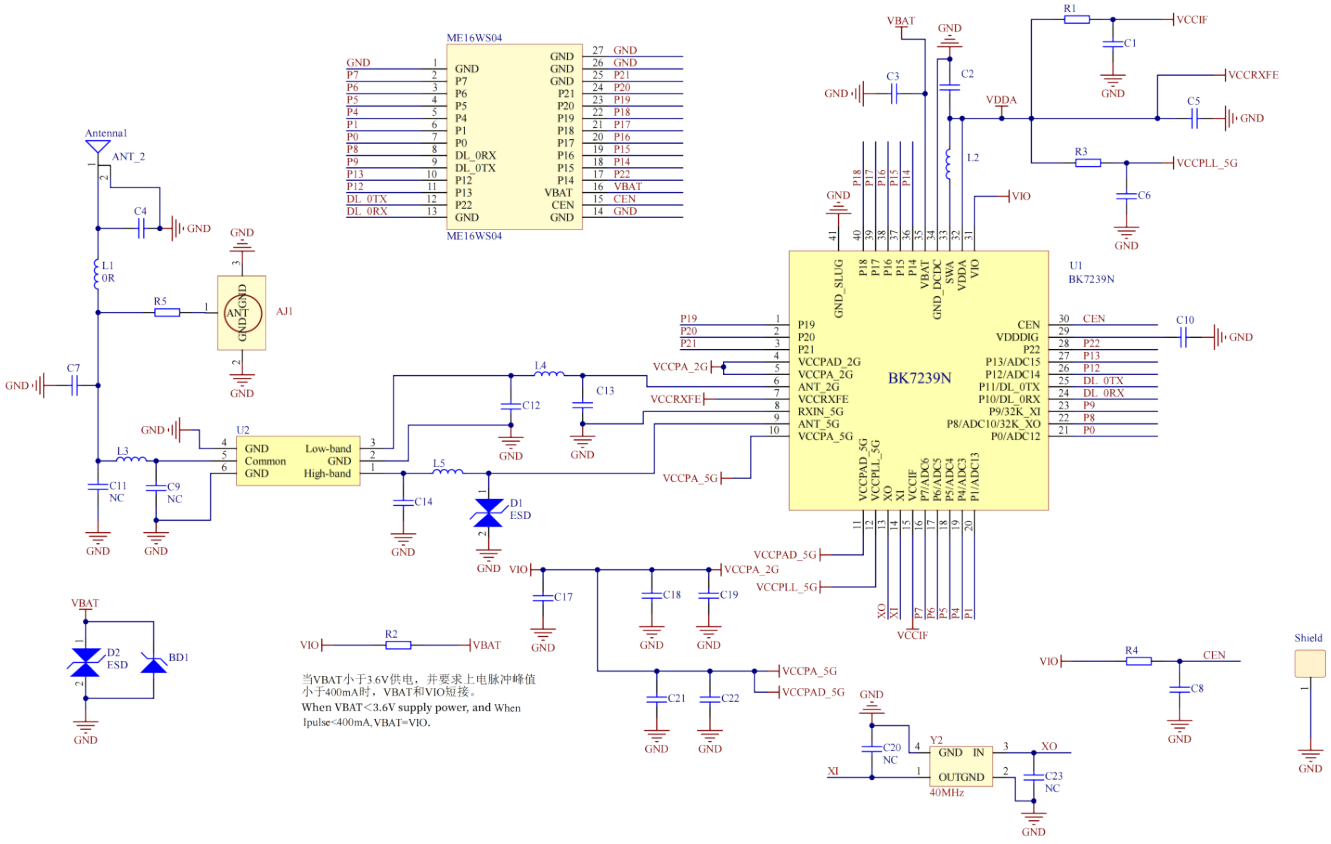
FUNCTION	GPIOX_FUNC_SEL [6:0] VALUE	I/O FUNCTION NAME	I/O TYPE	DESCRIPTION
SDIO	7'd62	SDIO_CS=LK	Input/output	Clock
	7'd63	SDIOI_CMD	Input/output	Command/response
	7'd64	SDIO_DATA0	Input/output	Data
	7'd65	SDIO_DATA1	Input/output	Data
	7'd66	SDIO_DATA2	Input/output	Data
	7'd67	SDIO_DATA3	Input/output	Data
SPI0	7'd68	SPI0_MISO	Input/output	Master in slave out
	7'd69	SPI0_MOSI	Input/output	Master in slave in
	7'd70	SPI0_CSN	Input/output	Chip select
	7'd71	SPI0_SCK	Input/output	Serial clock
SPI1	7'd72	SPI1_MISO	Input/output	Master in slave out
	7'd73	SPI1_MOSI	Input/output	Master in slave in
	7'd74	SPI1_CSN	Input/output	Chip select
	7'd75	SPI1_SCK	Input/output	Serial clock
SWD	7'd76	SWCLK	Input	Serial wire clock
	7'd77	SWDIO	Input/output	Serial wire data
Anti-tamper	7'd78	TAMP_RX	Input	Receive data input
	7'd79	TAMP_TX	Output	Transmit data output
UART0	7'd80	UART0_CTS	Input	Clear to send
	7'd81	UART0_RTS	Output	Request to send
	7'd82	UART0_RX	Input	Receive data input
	7'd83	UART0_TX	Output	Transmit data output
UART1	7'd84	UART1_RX	Input	Receive data input
	7'd85	UART1_TX	Output	Transmit data output
UART2	7'd86	UART2_RX	Input	Receive data input
	7'd87	UART2_TX	Output	Transmit data output
UART3	7'd88	UART3_CTS	Input	Clear to send
	7'd89	UART3_RTS	Output	Request to send
	7'd90	UART3_RX	Input	Receive data input
	7'd91	UART3_TX	Output	Transmit data output

5 MECHANICAL DRAWING



Default unit: mm Default tolerance: ±0.15

6 ELECTRICAL SCHEMATIC

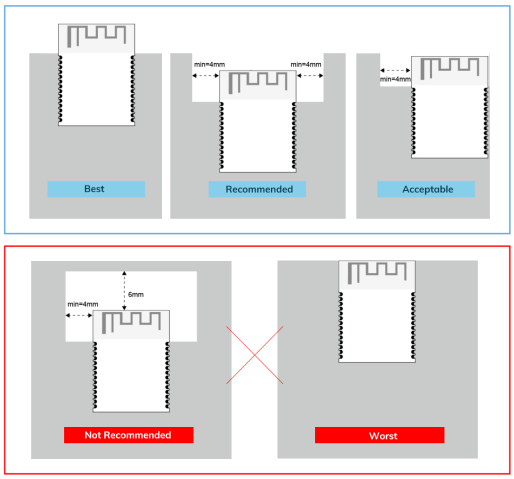


Before placing an order, please confirm the specific configuration required with the salesperson.

7 PCB LAYOUT

There should be no GND plane or metal cross wiring in the module antenna area, and no components should be placed nearby. It is best to make a hollow or clear area, or place it on the edge of the PCB board. The reference example is as follows:

> Notice: It is strongly recommended to use the first design method. The module antenna design is debugged according to the first wiring.



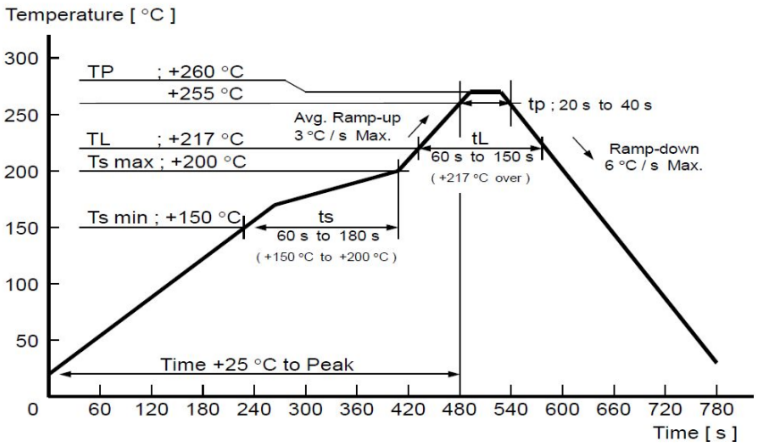
Layout Notes:

1)The module's antenna area should be completely clear of any metal obstructions to avoid affecting antenna performance (as shown in the diagram).
2)Outside the module's antenna area, try to maintain a solid copper pour to minimize interference from the mainboard signal lines or other sources.
3)A clear area of at least 4mm should surround the module's antenna (including its casing) to reduce interference with the antenna.
4)Ensure good grounding for components to minimize parasitic inductance.
5)Do not place copper under the module's antenna to prevent interference with signal radiation, which could affect transmission distance.
6)The antenna should be kept away from other circuits to maintain radiation efficiency and avoid impacting the normal operation of other circuits.
7)Position the module as close to the edge of the circuit board as possible, away from other circuitry.
8) It is recommended to use a ferrite bead for isolation when connecting the module to the power supply.

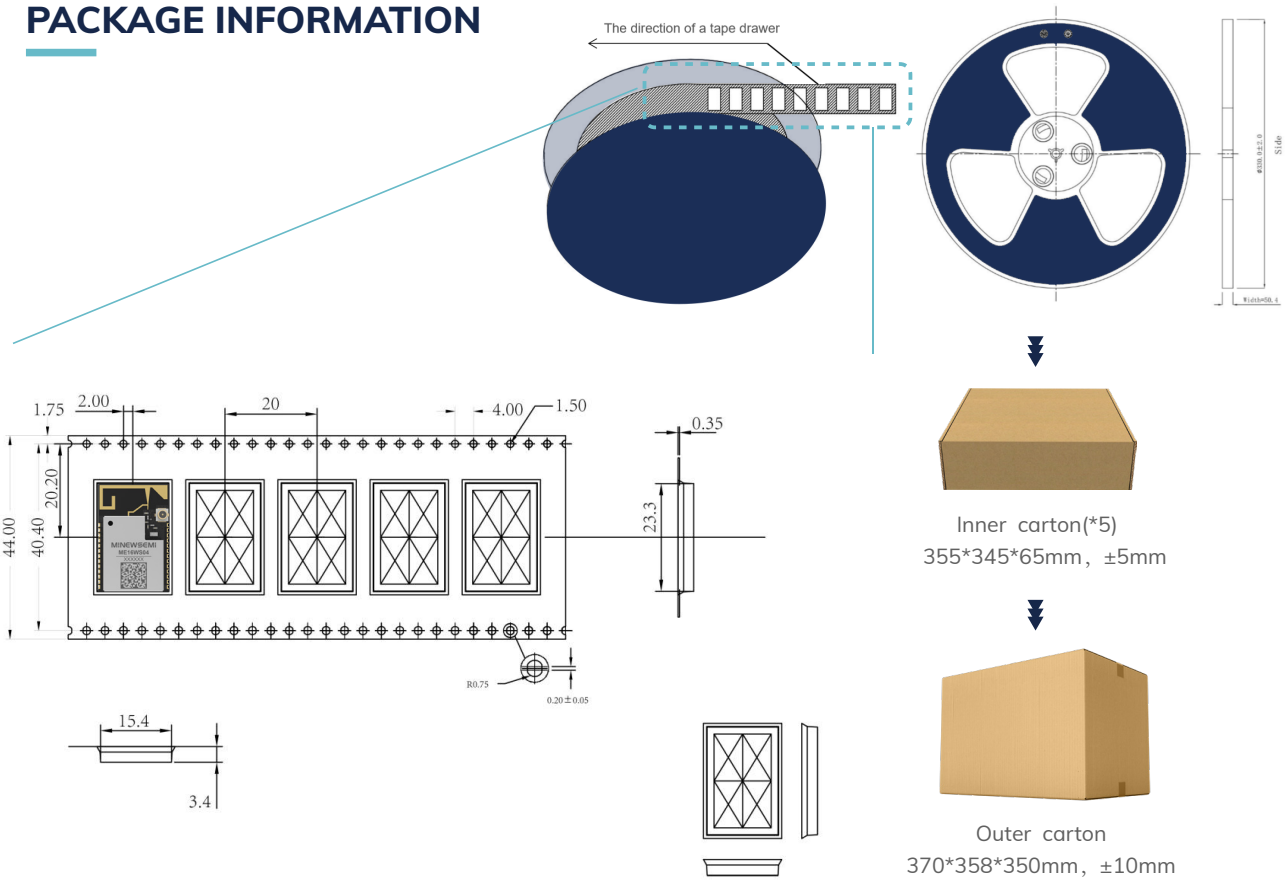
8 REFLOW AND SOLDERING

1)Perform SMT according to the reflow oven temperature profile provided below, with a maximum temperature of 260°C;
2)Follow IPC/JEDEC standards; Peak temperature: < 260°C; Maximum number of reflows: ≤2; For SMT involving double-sided placement, it is recommended that the module side undergoes reflow soldering only once. For any special processes, please contact our company.

3) Suggesting to make 0.2mm thickness of module SMT for partial ladder steel mesh, then make the opening extend 0.8mm
4)After opening, if the entire package is not used at once, it should be stored in a vacuum to prevent long-term exposure to air, which can cause moisture absorption and pad oxidation. If there is a gap of 7 to 30 days before reuse, it is recommended to bake the tape at 65-70°C for 24 hours without unrolling it before returning to SMT.
5) ESD protection measures should be implemented before using SMT.



9 PACKAGE INFORMATION



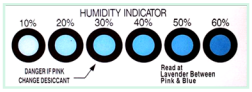
Inner carton(*5)
355*345*65mm，±5mm

Outer carton
370*358*350mm，±10mm

Remarks

General material list for FCL packaging:

Carrier tape packaging tray



Humidity Indicator
(1 pcs/bag)

Desiccant
(placed in a vacuum bag)

Vacuum bag

Inner carton(*5)
355*345*65mm，±5mm

Outer carton
370*358*350mm，±10mm

Other:

Moisture-proof label (attached to the vacuum bag)

Certification label (attached to the vacuum bag)

Outer box label

⚠ Default unit：mm Default tolerance：±0.1

Packing detail	Specification	Net weight	Gross weight	Dimension
ME16WS04	900PCS	1233g	-	W=44mm，T=0.35mm

⚠ Note: Default weight tolerance all are within 10g（except the special notes）

10 STORAGE CONDITIONS

- **Please use this product within 6 months after signing the receipt.**
  - This product should be stored without opening the package at an ambient temperature of 5~35°C and a humidity of 20~70%RH.
  - This product should be left for more than 6 months after receipt and should be confirmed before use.
  - The product must be stored in a non-corrosive gas (Cl2, NH3, SO2, NOx, etc.).
  - To avoid damaging the packaging material, do not apply any excessive mechanical shocks, including but not limited to sharp objects adhering to the packaging material and product dropping.

- **This product is suitable for MSL2 (based on JEDEC standard J-STD-020).**
  - After opening the package, the product must be stored at ≤30°C/<60%RH. It is recommended to use the product within 3-6 months after opening the package.
  - When the color of the indicator in the package changes, the product should be baked before welding.

- **Baking is not required for one year if exposure is limited to <30°C and 60%RH. Refer to MSL2 for exposure criteria for moisture sensitivity level. If exposed to (≥168h@85°C/60%RH) conditions or stored for more than one year, recommended baking conditions.**
  1. 120 +5/-5°C, 8 hours, 1 time
  Products must be baked individually on heat-resistant trays because the materials (base tape, reel tape, and cover tape) are not heat-resistant, and the packaging material may be deformed at temperatures of 120℃;
  2、90℃ +8/-0℃, 24hours, 1times
  The base tape can be baked together with the product at this temperature. Please pay attention to the uniformity of heat.

11 HANDLING CONDITIONS

• Be careful in handling or transporting products because excessive stress or mechanical shock may break products.
• Handle with care if products may have cracks or damages on their terminals. If there is any such damage, the characteristics of products may change. Do not touch products with bare hands that may result in poor solder ability and destroy by static electrical charge.

12 QUALITY

Cognizant of our commitment to quality, we operate our own factory equipped with state-of-the-art production facilities and a meticulous quality management system. We hold certifications for ISO9001, ISO14001, ISO27001, OHSA18001, BSCI.

Every product undergoes stringent testing, including transmit power, sensitivity, power consumption, stability, and aging tests. Our fully automated module production line is now in full operation, boasting a production capacity in the millions, capable of meeting high-volume production demands.

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14 RELATED DOCUMENTS

- MinewSemi_Product_Naming_Reference_Manual_V1.0
  https://en.minewsemi.com/file/MinewSemi_Product_Naming_Reference_Manual_EN.pdf
- MinewSemi_Connectivity_Module_Catalogue_V2.0
  https://en.minewsemi.com/file/MinewSemi_Connectivity_Module_Catalogue_EN.pdf

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MINEWSEMI
Innovative IoT Module Expert

SHENZHEN MINEWSEMI CO., LTD.

0086-755-2801 0353
https://minewsemi.com
minewsemi@minew.com
https://store.minewsemi.com
Gangzhilong Technology Park, Qinglong Road, Longhua District, Shenzhen