MINEWSEMI

LoRaWAN Module

ME25LS02

Datasheet

V 1.0.0

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Version Note

Version	Details	Contributor(s)	Date	Notes
1.0.0	First edit	Vincle	2025.05.08	

Part Number

Model	Hardware Code
ME25LS02-LLCC68	1N68TD-X
ME25LS02-SX1262	1N62TD-X

Note: The meaning of "X"	
	0 AS923, Support 923MHz frequency 1 AU915, Support 915-928MHz frequency 2 CN470, Support 470-510MHz frequency 3 CN779, Support 779-787MHz frequency 4 EU433, Support 433MHz frequency 5 EU868, Support 863-870MHz frequency 6 IN865, Support 865-867MHz frequency 7 KR920, Support 920-923MHz frequency 8 RU864, Support 864-870MHz frequency 9 US915, Support 902-928MHz frequency

The marking on the product's shielding cover is subject to change based on certification updates.
The actual marking on the shielding cover at the time of shipment shall prevail.

Please be aware that changes in the marking do not affect product performance or usage; therefore, no separate notification will be issued regarding such changes.

For customization requests, please contact MinewSemi's sales team for confirmation.

Click the icon to view and download the latest product documents electronically.
https://en.minewsemi.com/file/ME25LS02_LLCC68&SX1262_Datasheet_K_EN.pdf

ME25LS02-LLCC68/SX1262+nRF54L15

High-Performance, Ultra-Long-Range, Small-Size, Ultra-Low-Power LoRaWAN Module with Multi-protocol Support

The ME25LS02 is a high-performance, ultra-low-power LoRaWAN module supporting BLE 6.0 and LoRaWAN protocols. It features a dual-core MCU (ARM Cortex M33 & RISC-V), 256KB RAM, and 1.5MB Flash, making it ideal for long-range, low-power IoT applications.

With excellent reception sensitivity (BLE: -104dBm, LoRa: -126dBm) and high transmission power (BLE: +8dBm, LoRa: 22dBm), the module ensures reliable communication over extended distances. It operates at 3.3V, offers 27 GPIOs, and supports interfaces like USB, UART, and I2C. The open-source development platform enables easy customization and secondary development.

FEATURES

- Dual-Core MCU: ARM Cortex M33 & RISC-V architecture for high performance and efficiency.
- Ultra-Low Power Consumption: with dual low-power chip combination.
- Multi-Protocol Support: BLE 6.0 (including long-range mode) and LoRaWAN.
- Rich I/O Interfaces: 27 GPIOs, USB, UART, I2C, and more.
- Open-Source Development Platform: Enables easy customization and secondary development.
- High Sensitivity and Power Output: Ensures long-range communication with low power consumption.

KEY PARAMETERS

ME25LS02			
Chip Model	LLCC68/SX1262+nRF54L15	**Antenna**	PCB + U.FL Connector
Module size	25x15x3.2mm	**GPIO**	27
Flash	1.5MB	**RAM**	256KB
Receiving Sensitivity	BLE: -96dBm, 1Mbps -104dBm, 125Kbps LoRa:-125dBm	**Transmission Power**	BLE:-40-+8dBm LoRa: +15-+22dBm
Current(TX)	156mA	**Current(RX)**	15mA

APPLICATION

Agricultural Automation

Asset Tracking

Inventory Management

Livestock Tracking

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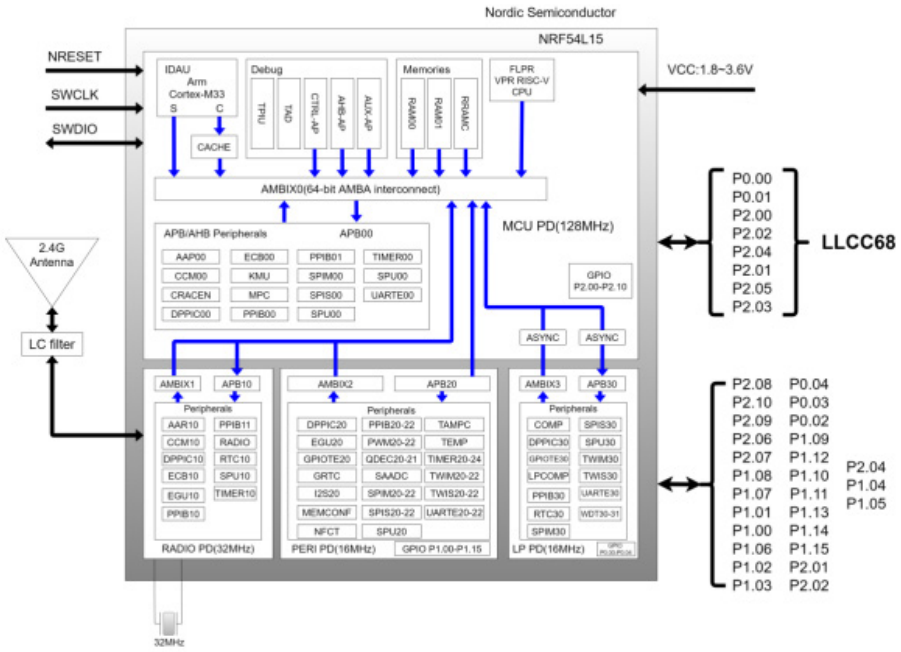
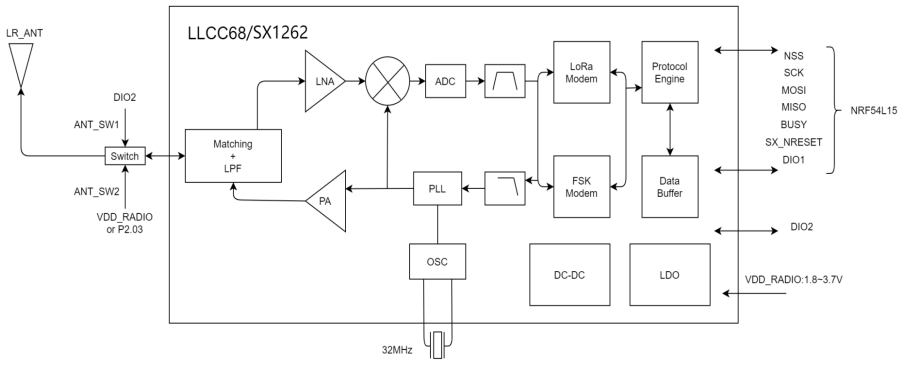
1 BLOCK DIAGRAM





2 ELECTRICAL SPECIFICATION

Parameter	Values	Notes
Operating Voltage	1.7V-5.5V	Standard power supply voltage 3.3V
Working Temperature	-40℃~+85℃	Storage temperature is -40℃~+125℃
Opearting Frequency	LoRa：150MHz - 960MHz BLE：2.4GHz	LoRa：Optional 868MHz/915MHz，Default set is 868MHz
Transmission Power	BLE：-20 ~ +8dBm LoRa：+22dBm	Configurable
Current(RX)	15mA	Max receiving current
Current(TX)	156mA	Max transmission current
Module Dimension	25*15*3.2mm	
Quantity of IO Port	27	GPIOs、I2C、I2S、PWM、UART etc.

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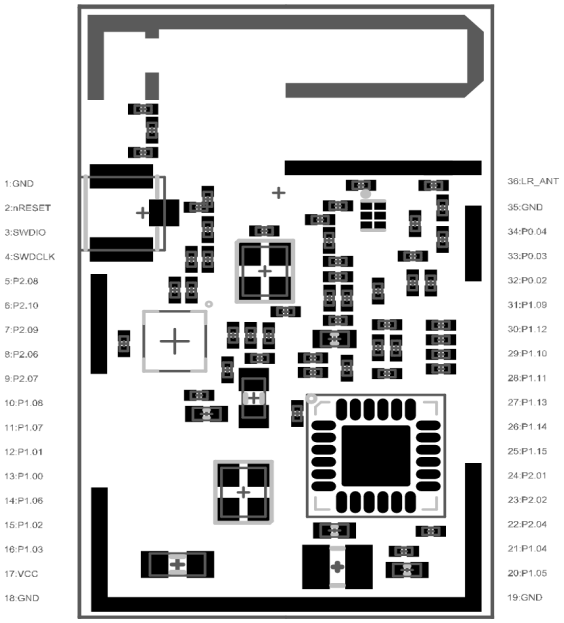
3 PIN DESCRIPTION



4 PIN DEFINITION

Symbol	Type	Definition	Notes
VCC	Positive power supply	Power supply, 1.7V-3.6V, with this pin	Normal 3.3V
GNS	Negative power supply	Grounded	
LR_ANT	External antenna pin	LoRa antenna RF pin	
SWCLK/SWDIO	I/O, Debug pin	I/O pin multiplexing, debug pin. During debugging, only connect this pin with the power and ground pins:	
P0.02 - P0.04	GPIO	General IO port	
P0.13 -P0.14	GPIO	General IO port	
P1.00 - P1.15	GPIO	General IO port	P2.01：LoRa_SCK
P2.01 - P2.02	GPIO	General IO port	P2.02：LoRa_MOSI
P2.04	GPIO	General IO port	P2.04：LoRa_MISO
P2.06 - P2.10	GPIO	General IO port	
nRESET	Reset	Reset	MCU reset pin

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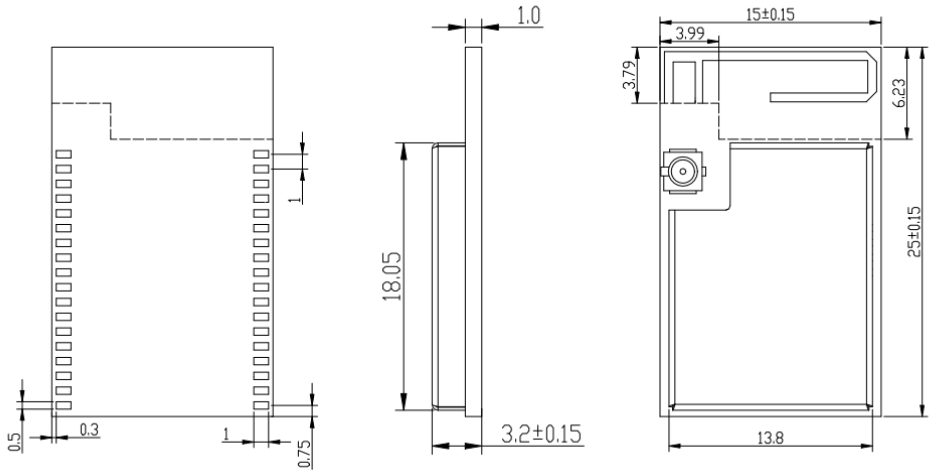
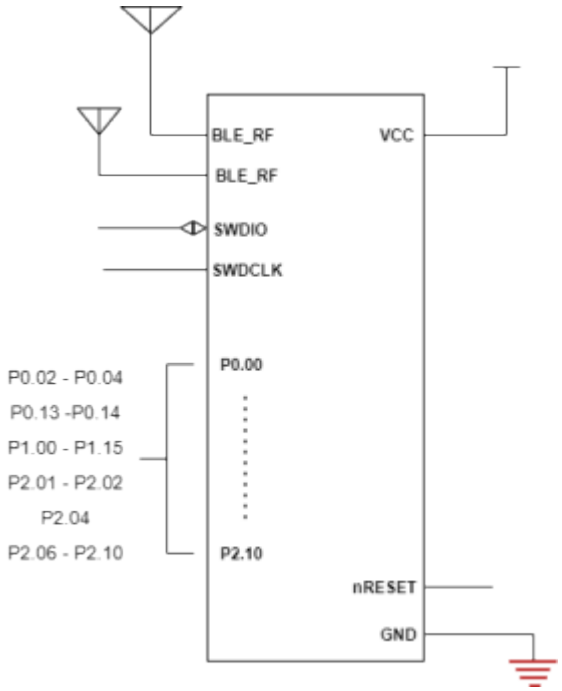
4.1 Mechanical Drawing



Default unit: mm Default tolerance: ±0.15

5 MODULE CONNECTION DESCRIPTION

5.1 Connection Diagram



5.2 Power Supply

The operating voltage range of the chip is 1.8V to 3.6V. To ensure proper operation, it is recommended to maintain the supply voltage at 3.3V.

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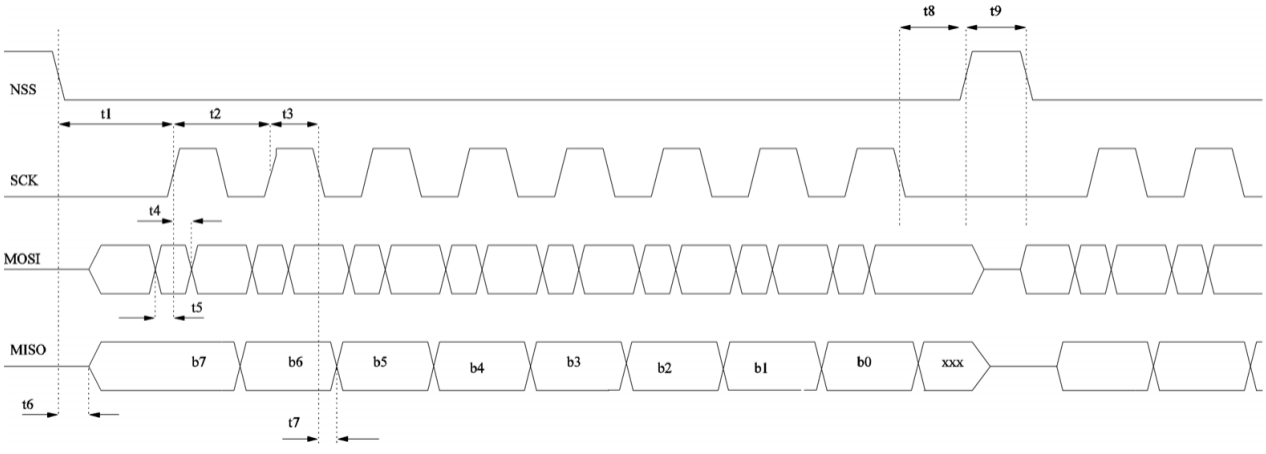
5.3 SPI Interface Character

SPI operates using an external SCK clock, allowing it to reach a speed of up to 16MHz.
Data transmission begins when the NSS pin goes low. When NSS is high, the MISO line is in a high-impedance state.
The SPI timing requirements apply (the chip only functions as an SPI Slave).

Symbol	Description	Minimum	Typical	Maximum	unit
t1	NSS falling edge to SCK setup time	32	-	-	ns
t2	SCK period	62.5	-	-	ns
t3	SCK high-level time	31.25	-	-	ns
t4	MOSI to SCK hold time	5	-	-	ns
t5	MOSI to SCK setup time	5	-	-	ns
t6	NSS falling edge to MISO delay time	0	-	15	ns
t7	SCK falling edge to MISO delay time	0	-	15	ns
t8	SCK to NSS rising edge hold time	31.25	-	-	ns
t9	NSS high-level time	125	-	-	ns
t10	NSS falling edge to SCK setup time when switching from SLEEP to STDBY_RC mode	100	-	-	s
t11	NSS falling edge to MISO delay time when switching from SLEEP to STDBY_RC mode	0	-	150	s

Active Timing



5.3.1 DIO with IRQ Control

Commands for controlling the chip's IRQs and DIOs (at least one DIO is required for IRQ, and the BUSY line is also mandatory).

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Command	Operate Code	Parameters	Description
SetDioIrqParams	0x08	IrqMask[15:0], Dio1Mask[15:0], Dio2Mask[15:0], Dio3Mask[15:0]	Configure IRQs and DIOs for each IRQ event
GetIrqStatus	0x12	-	Retrieve the value of the triggered IRQs
ClearIrqStatus	0x02	-	Clear one or more IRQs
SetDIO2AsRfSwitchCtrl	0x9D	Enable	Configure DIO2 to control the RF switch
SetDIO3AsTcxoCtrl	0x97	tcxoVoltage, timeout[23:0]	Configure DIO3 to control the TCXO

5.3.2 Module Internal TX, RX Mode Control

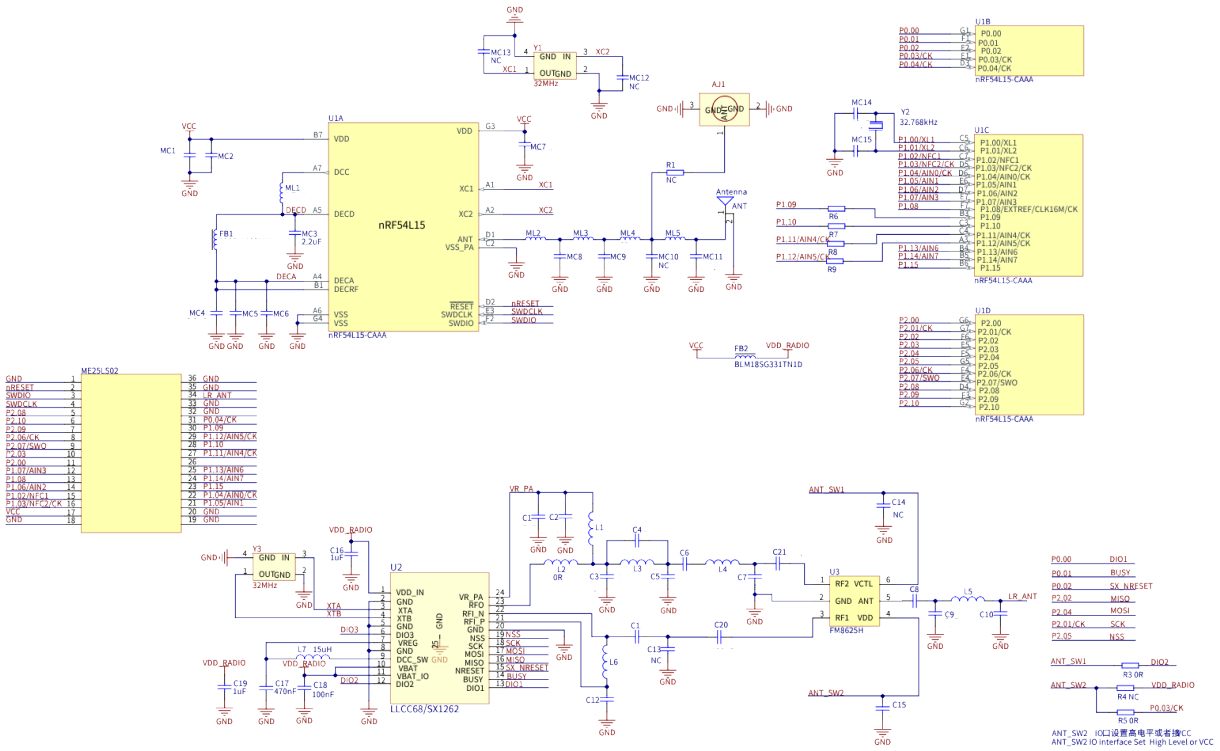
ANT_SW1 for detecting TX and RX level pin

1)When ANT_SW2 detects a high level, the mode is TX mode.

2)When ANT_SW2 detects a low level, the mode is RX mode.

MODE	DIO2(ANT_SW1)
TX	1
RX	0

6 ELECTRICAL SCHEMATIC



Note: Please get in touch with the salesperson for instructions if you need a different LoRa solution.

Table 2. VCTL Truth Table for RF Channel Operating Mode

VCTL	RF Channel Operating Mode
Low	ANT to RF1 active
High	ANT to RF2 active

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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:

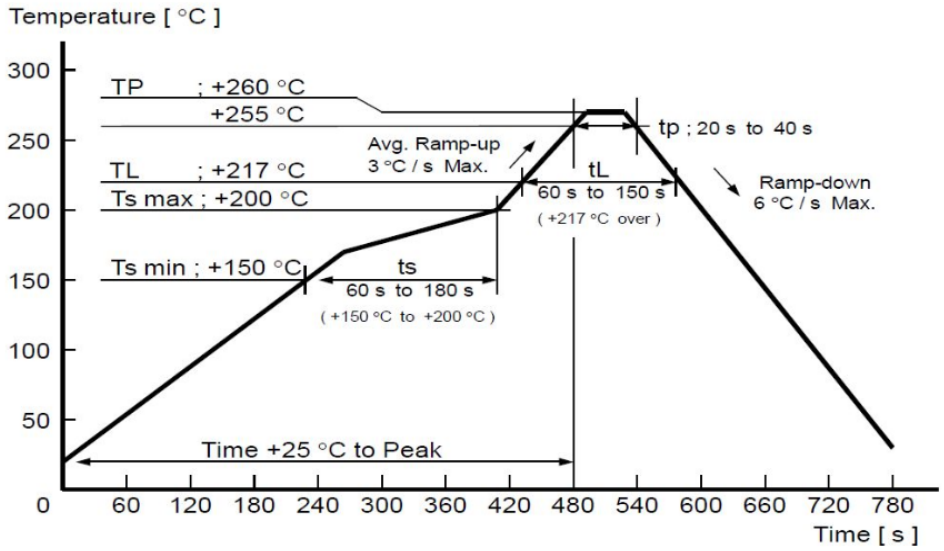
Layout Notes:

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.

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

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; Number of reflows: ≤2 times; 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 co



3) For module SMT, it is recommended to make a local step steel mesh with a thickness of 0.13-0.15mm and a pin length of 1-1.3mm.
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.

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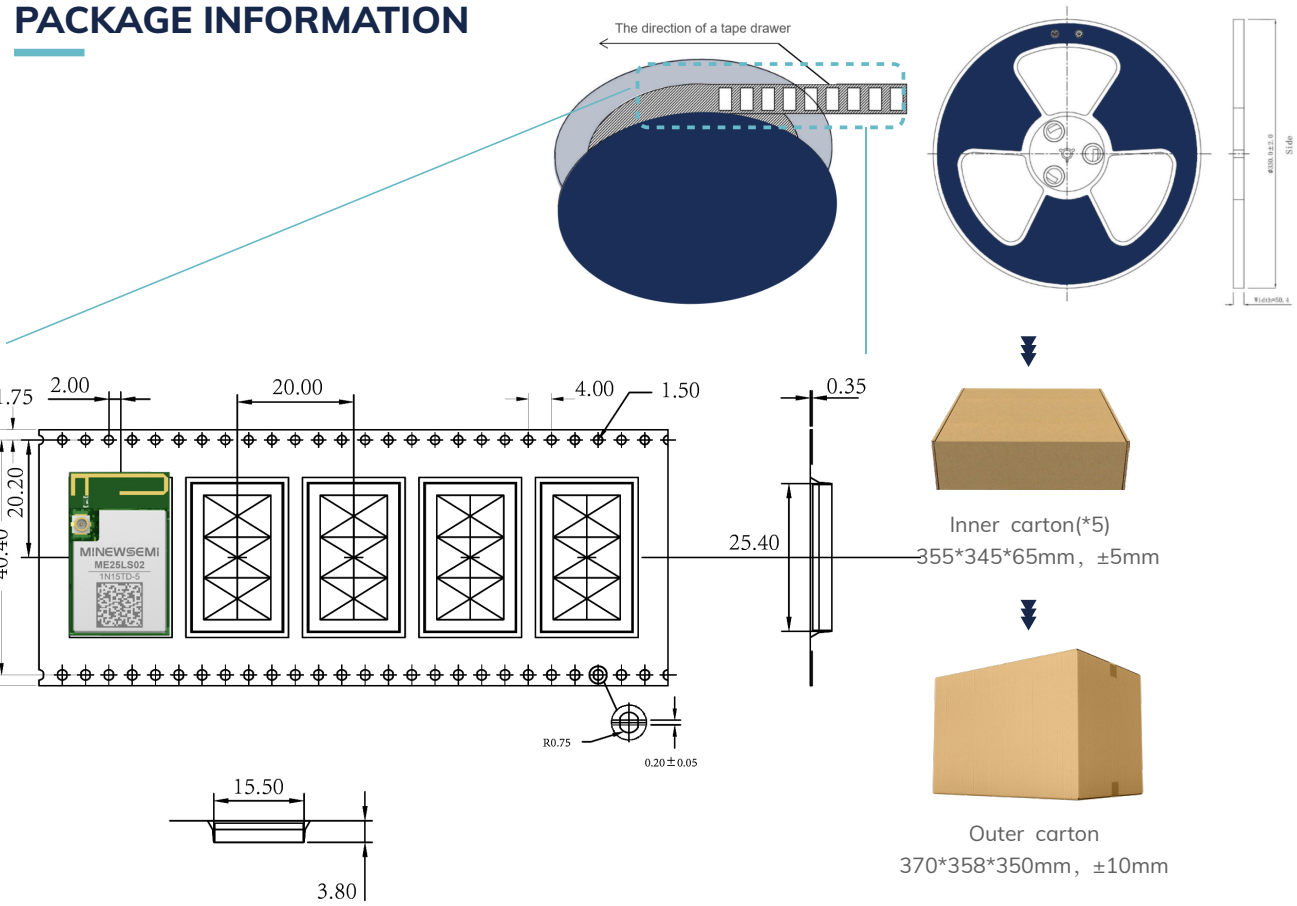
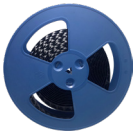
9 PACKAGE INFORMATION

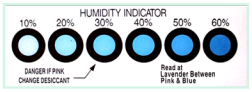


Remarks

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
ME25LS02	700PCS	1050g	TBD	W=44mm，T=0.35mm

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

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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 (CI2, 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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