LoRaWAN Module

ME25LS01

Datasheet

V 1.1.0

Version Note

Version	Details	Contributor(s)	Date	Notes
1.0.0	First edit	Vincle, Leo	2024.06.06	
1.1.0	Added Internal Module Connections	Vincle	2026.05.18	

Part Number

Model	Hardware Code
ME25LS01	4Y10TD-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/ME25LS01_LR1110_Datasheet_K_EN.pdf

ME25LS01-LR1110+nRF52840

High-Performance Long-Range Ultra-Low-Power Module with Wi-Fi Scan, GNSS, BLE 5.4, and LoRaWAN Multi-Protocol Support

The ME25LS01 is a compact, high-performance, ultra-low-power wireless module that supports Wi-Fi scan, GNSS (GPS/BDS), BLE 5.4, and LoRaWAN multi-protocol connectivity. Powered by the LR1110 and nRF52840 platform, it features 256 KB RAM and 1 MB Flash for flexible IoT application development. The module delivers excellent RF performance, with BLE sensitivity down to -96 dBm and LoRa sensitivity as low as -125.6 dBm, supporting reliable long-range communication. It also supports up to +8 dBm BLE TX power and +22 dBm LoRa TX power, operates at 3.3 V, provides abundant GPIOs, and supports open-source development for easy customization.

FEATURES

- Cortex M4 high performance MCU
- Low power, dual low power chip combination
- BLE 5.3, supports BLE long-range
- Abundant IO ports, USB, Uart, I2C, etc
- Open-source development platform

KEY PARAMETER

ME25LS01			
Chip Model	LR1110+nRF52840	**Antenna**	ANT pin
Module Size	25.5x20x2.5mm	**GPIO**	44
Flash	1MB	**RAM**	256KB
Receiving Sensitivity	BLE：-96dBm LoRa:-125.6dBm	**Transmission Power**	BLE: -40~+8dBm LoRa: 22dBm
Current(TX)	Max- 118mA	**Current(RX)**	Max-10.7mA

APPLICATION

Agricultural automation

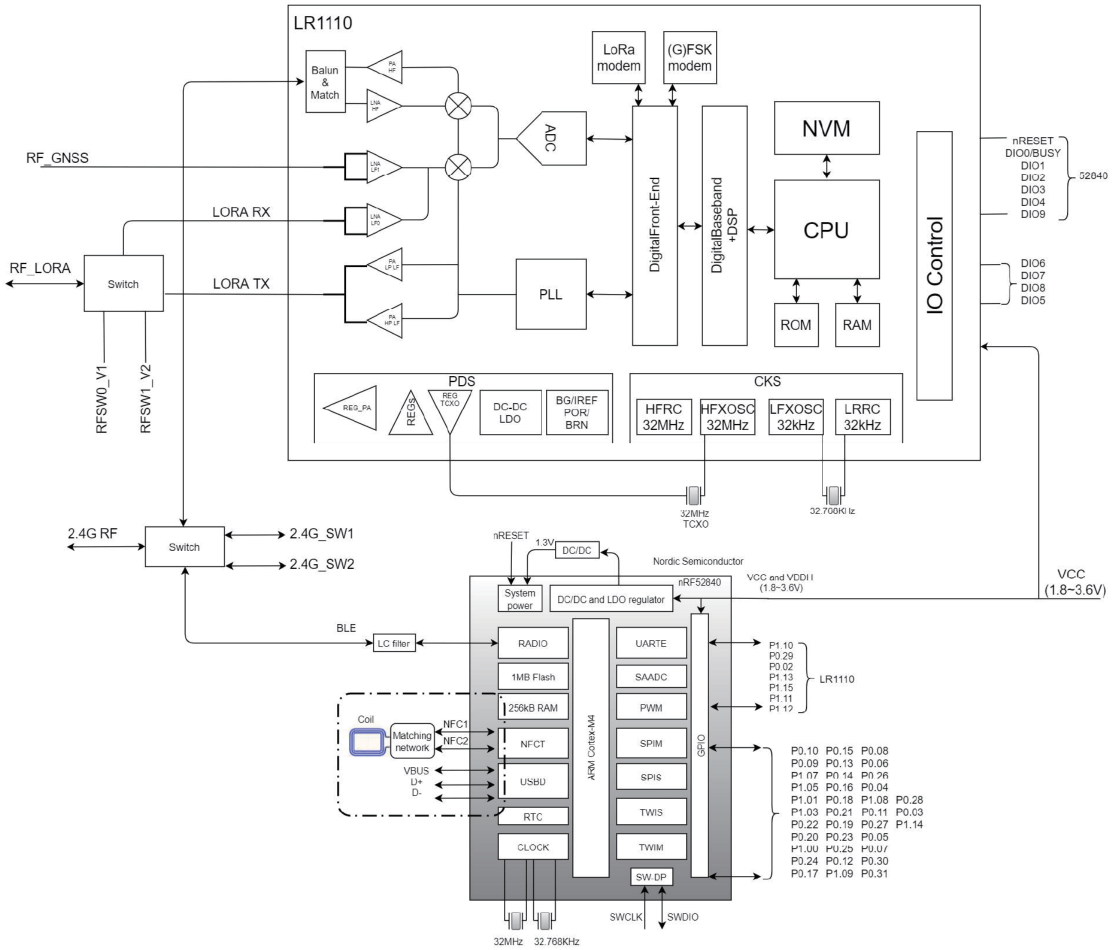
Asset tracking

Inventory management

Livestock tracking

INDEX

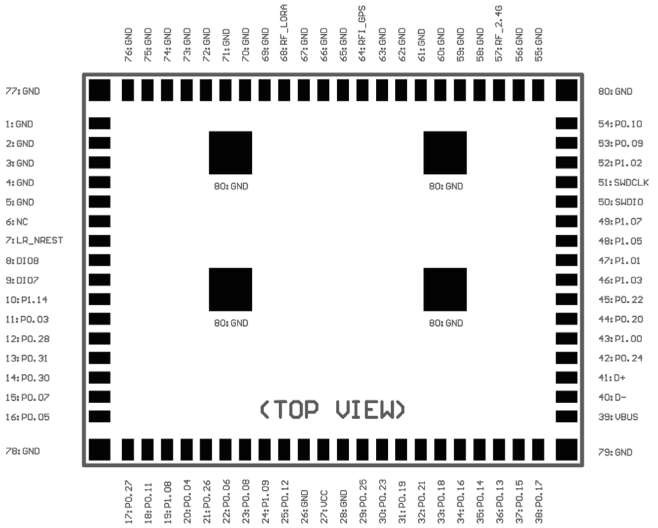
1 BLOCK DIAGRAM



2 ELECTRICAL SPECIFICATION

Parameter	Values	Notes
Operating Voltage	1.7V-5.5V	To ensure RF work, the standard power supply voltage is 3.3V.
Working Temperature	-40°C~+85°C	Storage temperature is -40℃~+125℃
Opearting Frequency	LoRa: 150MHz - 960MHz GNSS: GPS L1，BDS B1	LoRa: support 868MHz/915MHz
Transmission Power	BLE: -40~+8dBm LoRa: +22dBm	Configurable
Current(RX)	10.7mA	Max receiving current
Current(TX)	118mA	Max transmission current
Module Dimension	25.5*20*2.5mm	
Quantity of IO Port	44	I2C、UART、USB、SPI etc.

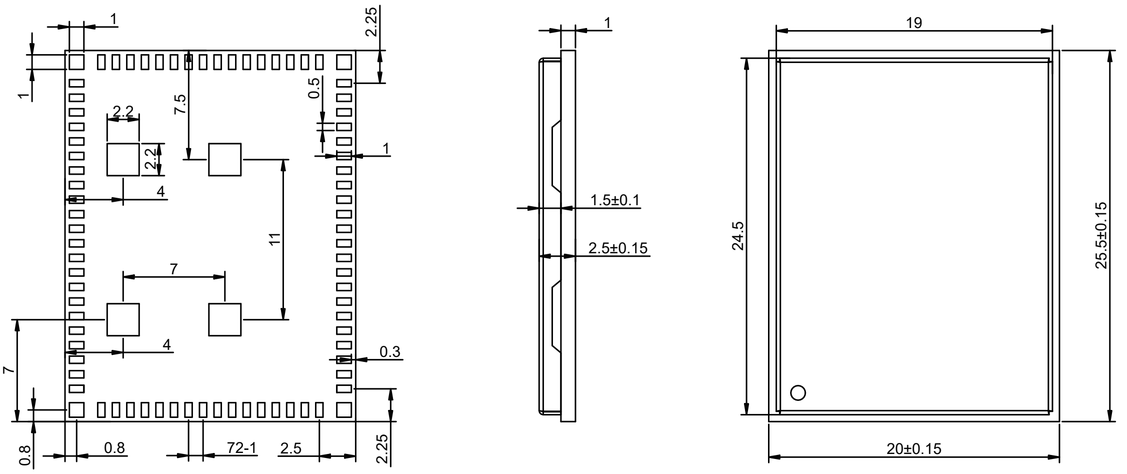
3 PIN DESCRIPTION



4 PIN DEFINITION

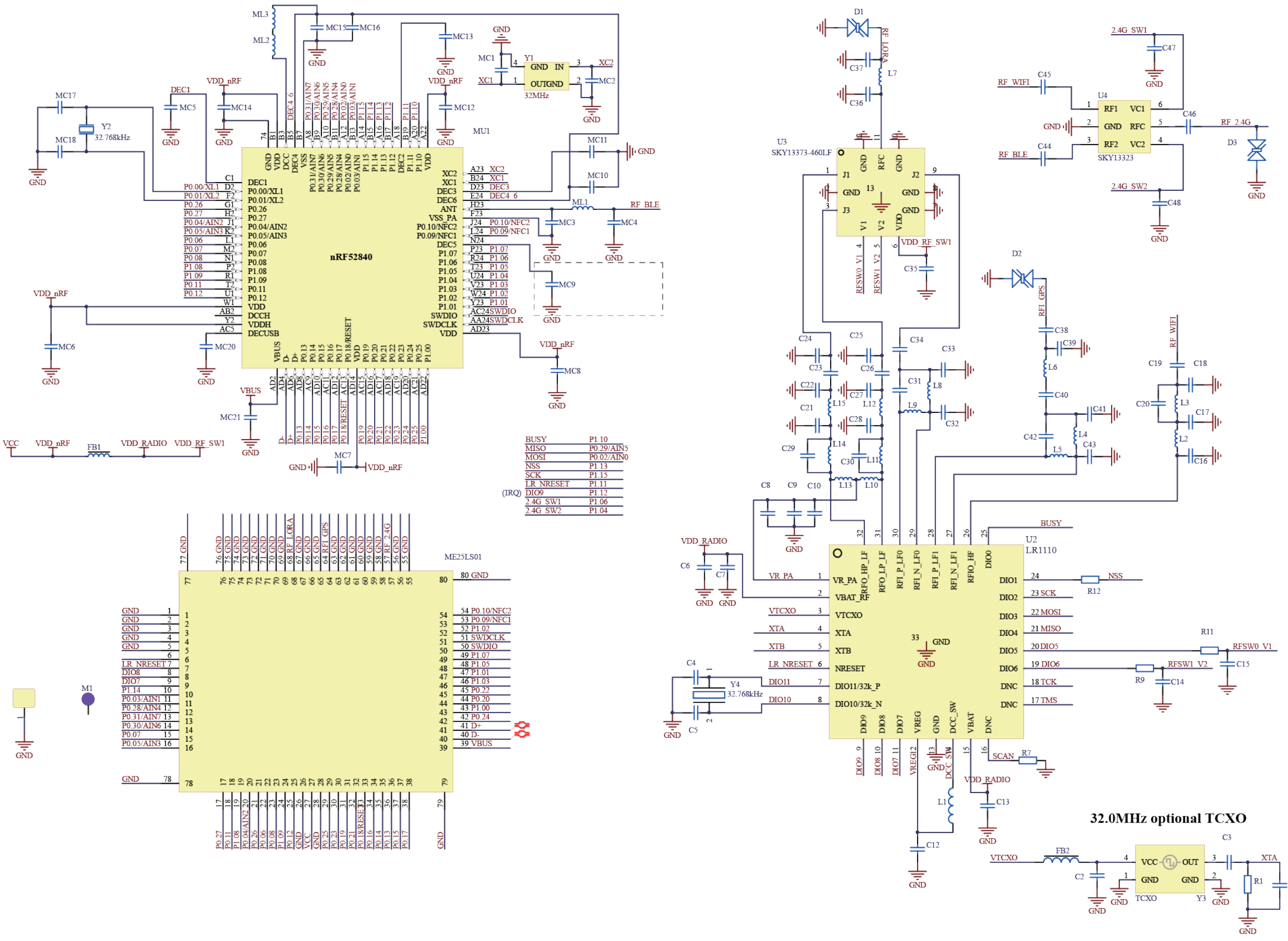
Symbol	Type	Definition
VCC	Positive power supply	Power supply, 1.7V-3.6V, with this pin
VBUS	Power supply	Power supply conversion access required for USB port
GND	Negative power supply	Grounded
SWCLK/SWDIO	Programming pins	Only the power supply pins, GND, and these two pins are required during programming.
P0.03-P0.31	GPIO	General IO port
P1.00-P1.03		
P1.07-P1.09- P1.05/P1.14		
DIO7-DIO8		
D+	Digital interface	USB D+
D-	Digital interface	USB D-
LR-NREST	Reset	LoRa reset pin
RF-LORA	External antenna pin	LoRa antenna pin
RF-GPS	External antenna pin	GNSS antenna pin(GPS/BDS)
RF-2.4G	External antenna pin	2.4G antenna pin
NC	NC	Empty pin

5 MECHANICAL DRAWING



Default unit： mm Default tolerance：±0.15

6 ELECTRICAL SCHEMATIC



7 INTERNAL MODULE CONNECTIONS

7.1 The following nRF52 pins are used to communicate with the LR1110 and therefore must not be configured to do anything else.

nRF Pin	LR1110 Pin	Description
P1.12	DIO1	IRQ
P1.11	SX_NRESET	Reset signal, active low
P1.15	SCK	SPI clock
P1.13	NSS	SPI Slave Shelect
P0.29	MISO	SPI master input
P0.02	MOSI	SPI master output
P1.10	BUSY	BUSY indicator

7.2 RF Switch

7.2.1 The following LR1110 pins are used to communicate with the LoRa RF switch and therefore must not be configured to do anything else.

nRF Pin	2.4G RF Switch Pin
P1.06	2.4G_SW1
P1.04	2.4G_SW2

7.2.3 RF Switch Logic List

7.2.3.1 2.4G RF Switch U4(SKY13323)

2.4G_SW1	2.4G_SW2	State
0	1	RF_BLE
1	0	RF_WiFi

⚠ Notice: “1” = +1.8 V to +5 V. “0” = 0 V to +0.2 V. Any state other than described in this table places the switch into an undefined state. An undefined state will not damage the device.

7.2.3.2 LoRa RF Switch U3 (SKY13373)

RFSW0_V1	RFSW0_V2	State
0	0	Shutdown
1	0	RFC to RFI_P_LF0 (J2)
0	1	RFC to RFO_HP_LF (J1)
1	1	RFC to RFO_LP_LF (J3)

⚠ Notice:1=1.65 to 3.30 V: 0=0 to 0.4V. Any state other than described in this table places the switch into an undefined state.

8 PCB DESIGN

8.1 Disclaimer

This document is provided as a recommended design reference for wireless modules and does not constitute any explicit or implied guarantee of performance or compliance. Due to differences in PCB layout, enclosure structure, antenna selection, and application environments of the end product, this document cannot guarantee RF performance in all scenarios. Users must conduct sufficient RF performance and compliance verification after completing the final product design and shall bear full responsibility for design and application outcomes. Our company reserves the right to modify the contents of this document without prior notice.

8.2 Core Rules for Module Placement

Board Edge Priority Rule

The RF output/antenna side of the module must face the edge of the main PCB to ensure that antenna radiation is directed outward from the board without obstruction. Placing the module in a closed central area of the PCB is strictly prohibited.

Keep-Out Area Rule

A 0.5 mm area around the module body must be kept clear. Non-ground components and non-ground signal traces are prohibited within this area. Within 4 mm around the RF side of the module, copper pours, unrelated components, and non-RF signal traces are strictly prohibited.

Interference Isolation Rule

The module must maintain a minimum safe distance from strong interference sources. Adjacent placement on the same layer is prohibited. Isolation using different PCB layers and shielding covers is recommended. General isolation requirements are as follows:

Interference Source Type	Minimum Recommended Isolation Distance
DC-DC switching power supplies, power inductors, power transformers	20mm
USB 3.0 / HDMI 2.0 / DDR / High-speed SDIO interfaces	20mm
MCU high-frequency clock circuits, Ethernet PHY chips	15mm
Displays, cameras, FPC cables with wiring	25mm

Structural Clearance Rule

The minimum distance between the module and metal screws, clips, standoffs, and other structural parts must be ≥5 mm. At least 4 mm of SMT soldering and rework clearance must be reserved around the module. The RF side of the module must not be enclosed inside a fully metal cavity.

Multiple Modules on the Same PCB

When placing multiple wireless modules of the same or different types on the same PCB, the minimum spacing between modules must be ≥50 mm to avoid mutual interference.

8.3 GENERAL PCB DESIGN REQUIREMENTS

Grounding Design

The main PCB must maintain a complete and continuous ground plane. Splitting the ground plane within the module projection area or RF surrounding area is strictly prohibited. All module ground pins must be soldered. At least one grounding via should be placed near each ground pad and connected to the main ground plane. A complete ground plane with dense grounding vias may be placed under the non-RF area of the module to improve shielding performance.

Power Supply Design

Decoupling capacitor combinations must be placed close to the module power input pins. The trace length between capacitor pads and power pins should be ≤0.5 mm, and at least two grounding vias should be placed near the ground terminal. For switching power supply applications, a π-type filter circuit footprint must be reserved near the module power input pins.

RF Trace Design

The entire RF path must maintain a strict 50 Ω characteristic impedance (tolerance ±10%). RF traces should be as short as possible and routed preferably in straight lines. Sharp or right-angle corners are prohibited; curved routing with a radius ≥3 times the trace width is recommended. Branch traces and stub traces are prohibited. A continuous reference ground plane must exist beneath the RF traces, and no other signal traces should be routed within 3 times the trace width on either side. Ground shielding should be applied throughout the RF routing.

Control Interface Design

Control signal traces such as UART, SPI, and I2C should be routed away from RF areas with short and simple routing paths and continuous ground shielding. Parallel routing adjacent to RF traces is prohibited. ESD protection devices must be placed close to external PCB connectors and must not be placed near module pins.

Footprint Design

Strictly use the standard PCB footprint provided by our company. Unauthorized modification of pad size or spacing is prohibited to ensure soldering reliability.

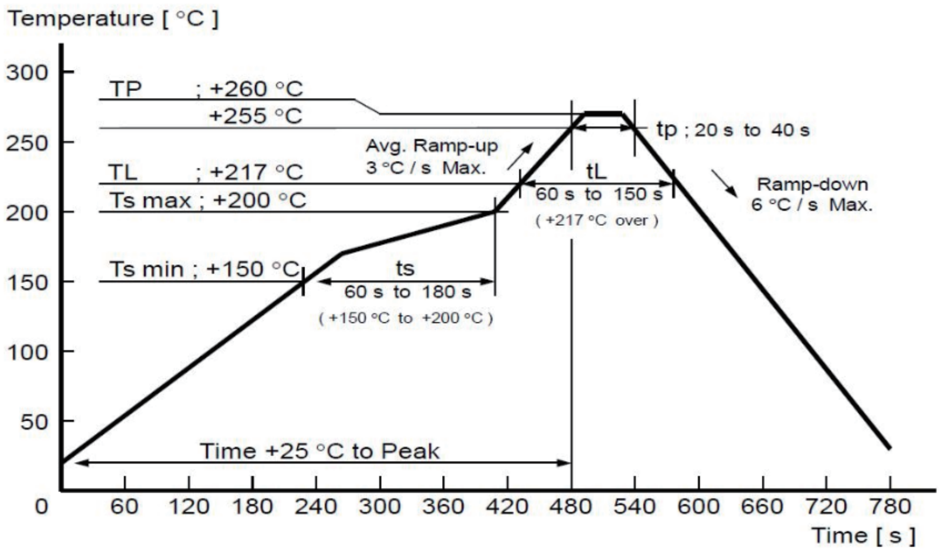
8.4 DESIGN RESTRICTIONS

Do not place the RF side of the module facing the inside of the PCB or away from the board edge.
Do not place copper pours, components, or fully enclosed metal housings without openings over the antenna area.
Do not route RF traces across split ground planes, without a complete reference ground, or with right-angle corners.
Do not place modules adjacent to strong interference sources or split the ground plane in the module area.
Do not leave module ground pins unconnected or inadequately grounded.

9 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 company.

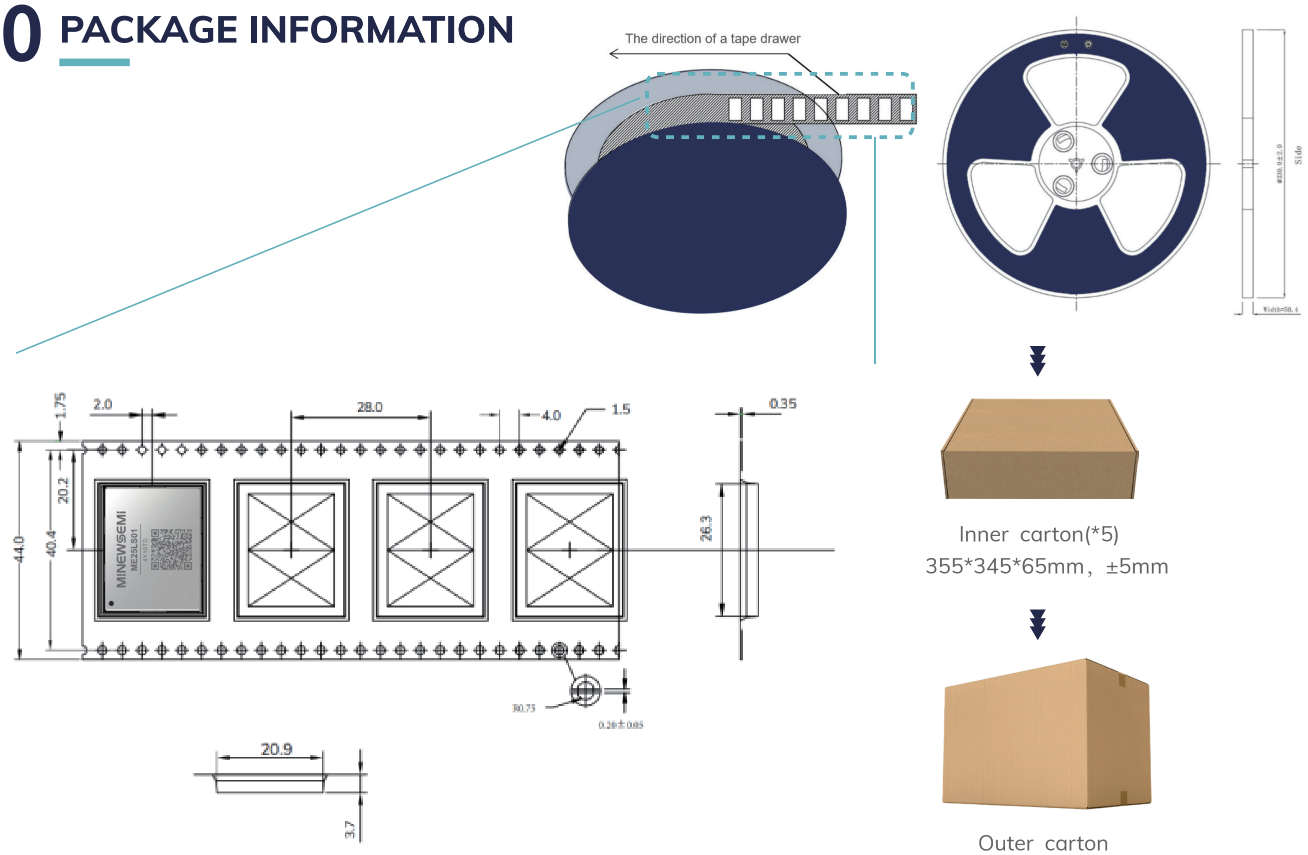


3) Suggesting to make Steel mesh thickness 0.1-0.12mm of module SMT, then pin opening 1:0.9, no expansion.

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.

10 PACKAGE INFORMATION



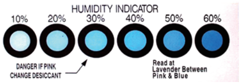
Inner carton(*5)
355*345*65mm, ±5mm

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
ME25LS01	620PCS	1612g	2128.8g	W=44mm，T=0.35mm

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

11 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.

12 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.

13 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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15 RELATED DOCUMENTS

- MinewSemi_Product_Naming_Reference_Manual
  https://en.minewsemi.com/file/MinewSemi_Product_Naming_Reference_Manual_EN.pdf
- MinewSemi_Connectivity_Module_Catalogue
  https://en.minewsemi.com/file/MinewSemi_Connectivity_Module_Catalogue_EN.pdf

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