

ESP32-S31

Espressif Product Packaging Information



ESPRESSIF

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This document summarizes the packaging requirements of Espressif's ESP32-S31 series of products, including the product silk marking, dry-packing requirements, and product packing.

1 ESP32-S31 Chip Packaging Information

This document summarizes the packaging requirements of Espressif's ESP32-S31 series of chips, including the chip silk marking, dry-packing requirements, and chip product packing.

1.1 Chip Silk Marking

Espressif chip silk marking provides information such as chip name, flash size, and operating temperature.

Marking Convention

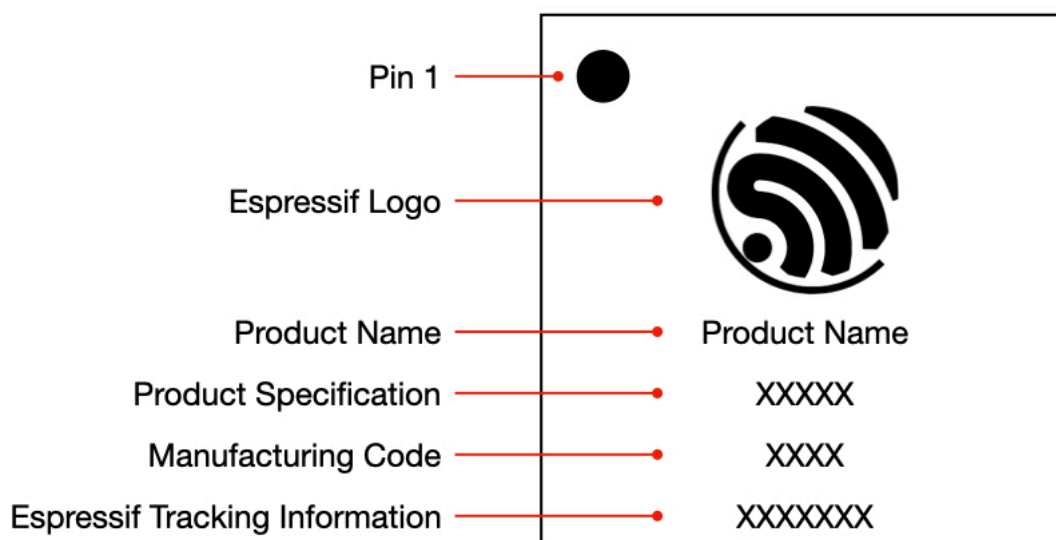


Fig. 1: Chip Silk Marking Diagram

- **Pin 1:** Position of Pin 1.
- **Espressif Logo:** Company logo.
- **Product Name:** Specifies the chip name.
- **Product Specification** is a code that indicates:
 - Operating temperature:**
 - * N = Up to 85 °C
 - * H = Up to 105 °C
 - (Optional) Flash and PSRAM configuration:**
 - * F = In-package flash
 - * R = In-package PSRAM
 - (Optional) Voltage level and interface:**
 - * No letter = 3.3 V Quad SPI
 - * V = 1.8 V Octal SPI

* W = 1.8 V Hex SPI

– (Optional) Flash or PSRAM size.

Examples:

–NRV16:

The chip supports up to 85 °C operating temperature, and includes in-package 1.8 V Octal SPI PSRAM (16 MB).

–NRV32:

The chip supports up to 85 °C operating temperature, and includes in-package 1.8 V Octal SPI PSRAM (32 MB).

- **Manufacturing Code:** Identifies the chip revision.
- **Espressif Tracking Information:** Identifies the chip lot number.

1.2 Chip Packing

Espressif chips are packed on tape and reel. Then the reel is packed in an aluminum moisture barrier bag (MBB) in vacuum state to protect chips from absorbing moisture during transportation and storage. At last, the MBB is packed into a pizza box.

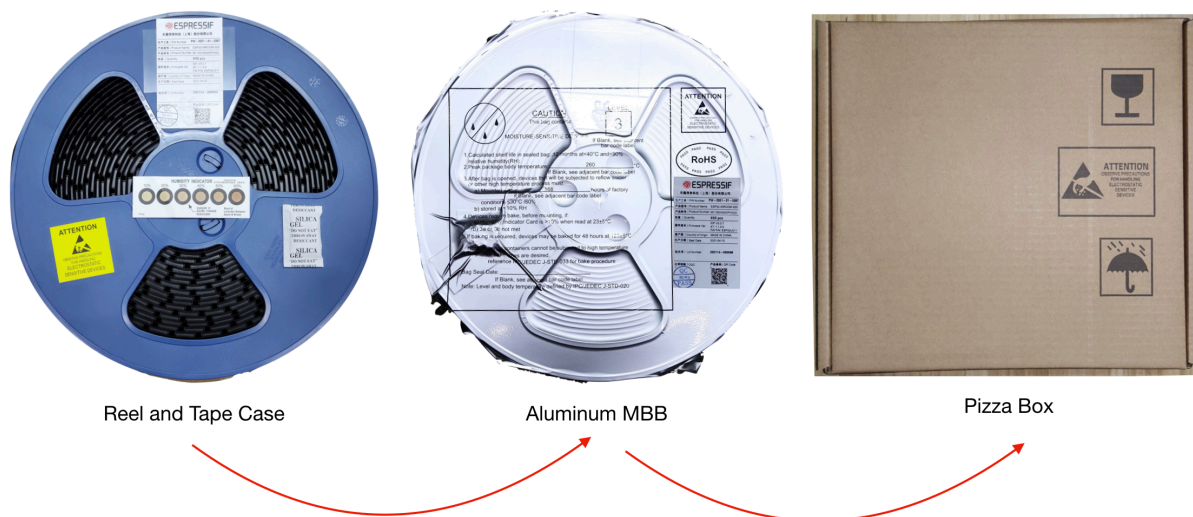


Fig. 2: Espressif Product Packing Method

Note: The figure(s) above is for illustration purposes only. Actual product may vary.

Tape

This section introduces the dimensions of the carrier tape.

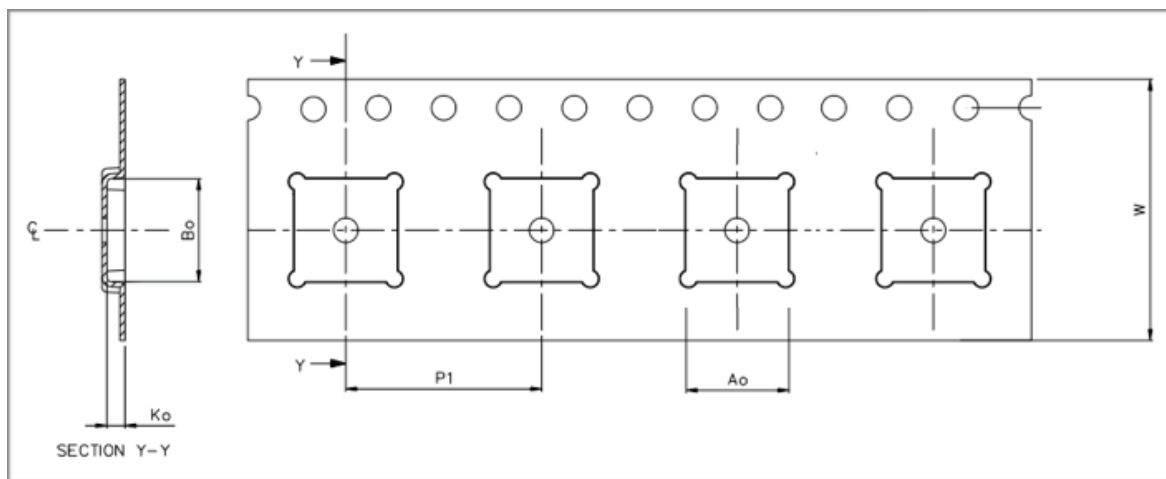


Table 1: Carrier Tape Dimensions (Unit: mm)

Package	Carrier Width (W)	Cavity Pitch (P_1)	Cavity Width (A_0)	Cavity Length (B_0)
8 * 8	16.0 ± 0.30	12.0 ± 0.10	8.30 ± 0.10	8.30 ± 0.10

Note: The surface resistance of the carrier tape is $10^4 \sim 10^{11}$ ohms.

Pin1 Location

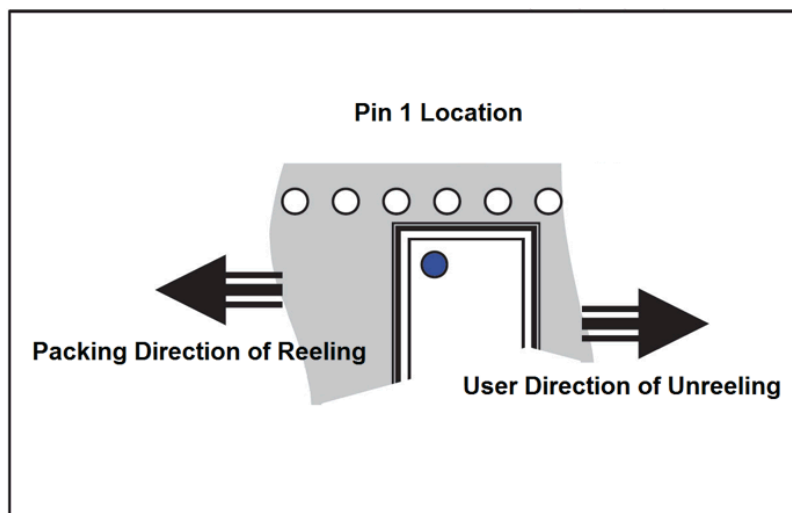


Fig. 3: Pin 1 Orientation of Chips in Carrier Tape

Reel

This section introduces the dimensions of the reel.

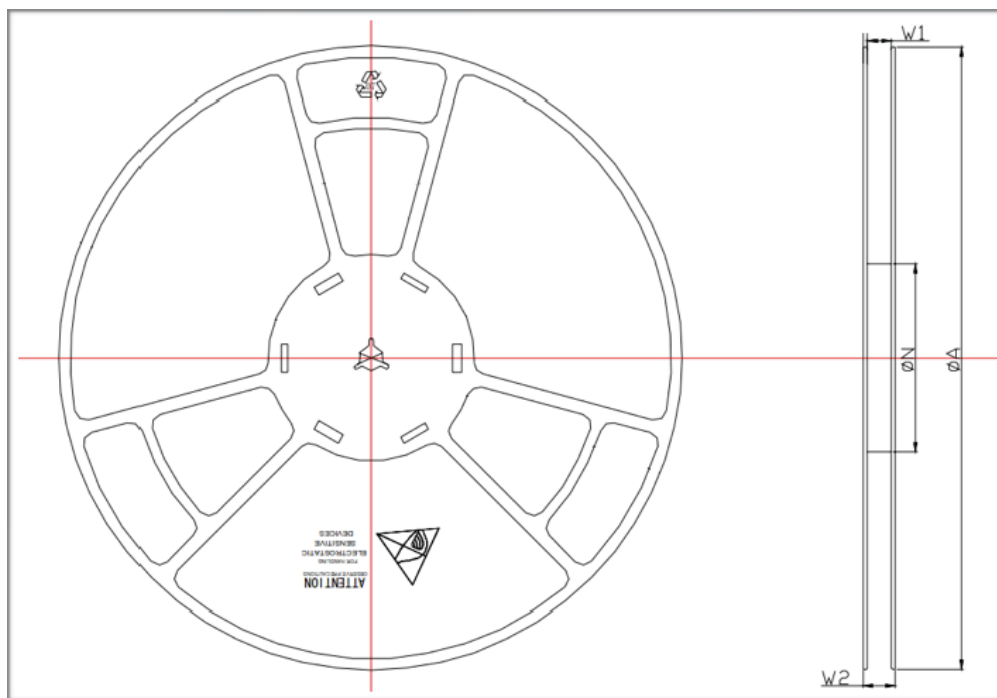


Table 2: Reel Dimensions

Package	Reel Size	Quantity Per Reel
8 * 8	13''	2,000

Note: The surface resistance of the carrier tape is $10^4 \sim 10^{11}$ ohms.

Pizza Box

Inside of the pizza box of typical Espressif chips, together with the tape and reel, product label and dry-packing related items are also packed.

This section describes the product label. For information about dry packing related items, please go to Section [Dry Packing Requirement](#).

Note: Espressif has updated the product label style starting from 2026. For details, please refer to [PCN202600201](#). During the transition period, the same product you receive may carry either of two label styles (**Style 1 (New)** or **Style 2 (Legacy)**). Please note that this is purely an update to label layout and a few field names — product specifications and quality remain unchanged.

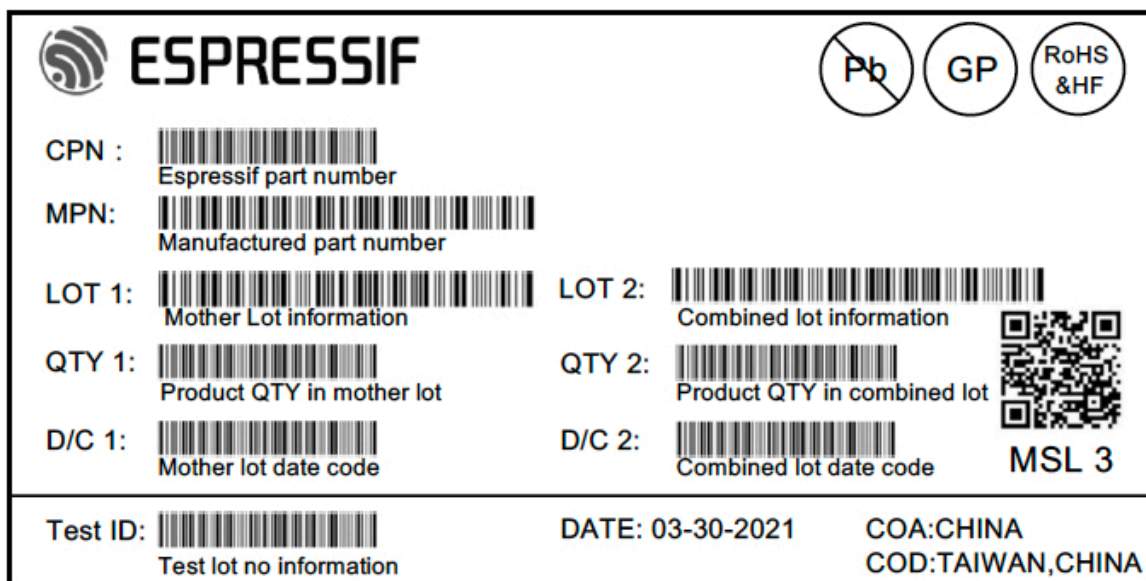


Fig. 4: Espressif Chip Label —Style 1 (New, from 2026)

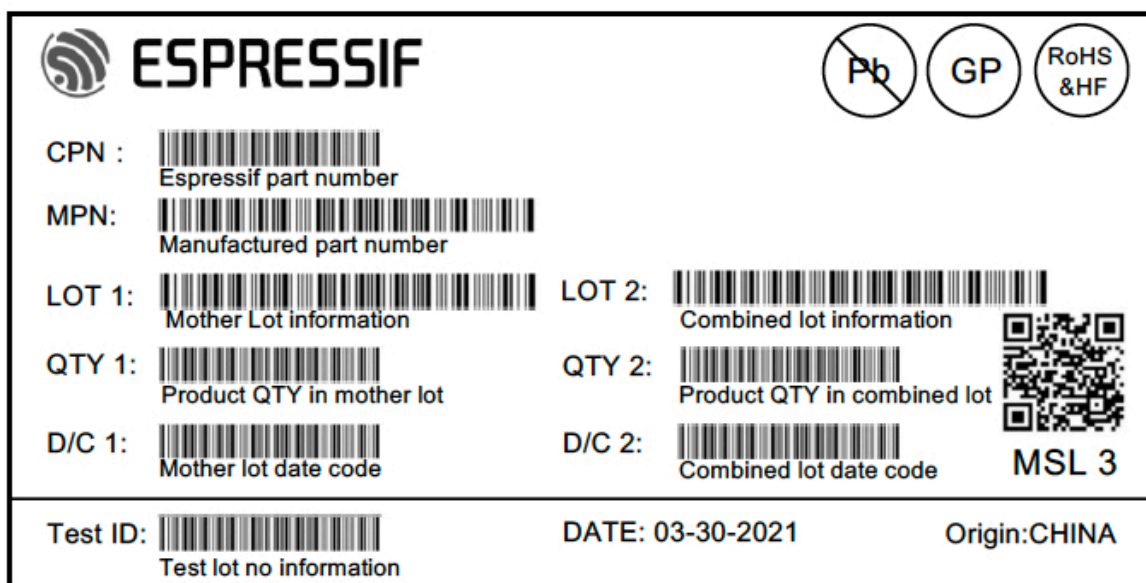


Fig. 5: Espressif Chip Label —Style 2 (Legacy)

The field descriptions below are based on Style 1 (New); Style 2 (Legacy) is identical except for the country information (see **COA** and **COD** below).

- **ESPRESSIF logo:** Company logo and name
- **CPN:** Espressif part number, e.g. ESP32-D0WDQ6
- **MPN:** Manufactured part number
- **LOT1:** Number of mother lot
- **LOT2:** Number of combined lot
- **QTY1:** Quantity of mother lot
- **QTY2:** Quantity of combined lot
- **D/C 1:** Assembly date code for LOT1

- **D/C 2:** Assembly date code for LOT2
- **Test ID:** Test information
- **DATE:** Packing date, MM-DD-YYYY, DATE “03-29-2016” stands for Mar 29th in 2016
- **COA:** Country of Assembly. On Style 2 (Legacy), this field is shown as **Origin** (e.g. Origin: CHINA).
- **COD:** Country of Diffusion. Not present on Style 2 (Legacy).

1.3 Dry Packing Requirement

All Espressif chip’s moisture sensitivity level (MSL) is 3, thus must be dry-packed. Dry packing usually consists of desiccant material, a humidity-indicator card (HIC), as well as a Moisture Sensitivity Caution Label sealed with the populated reel inside a moisture barrier bag (MBB).

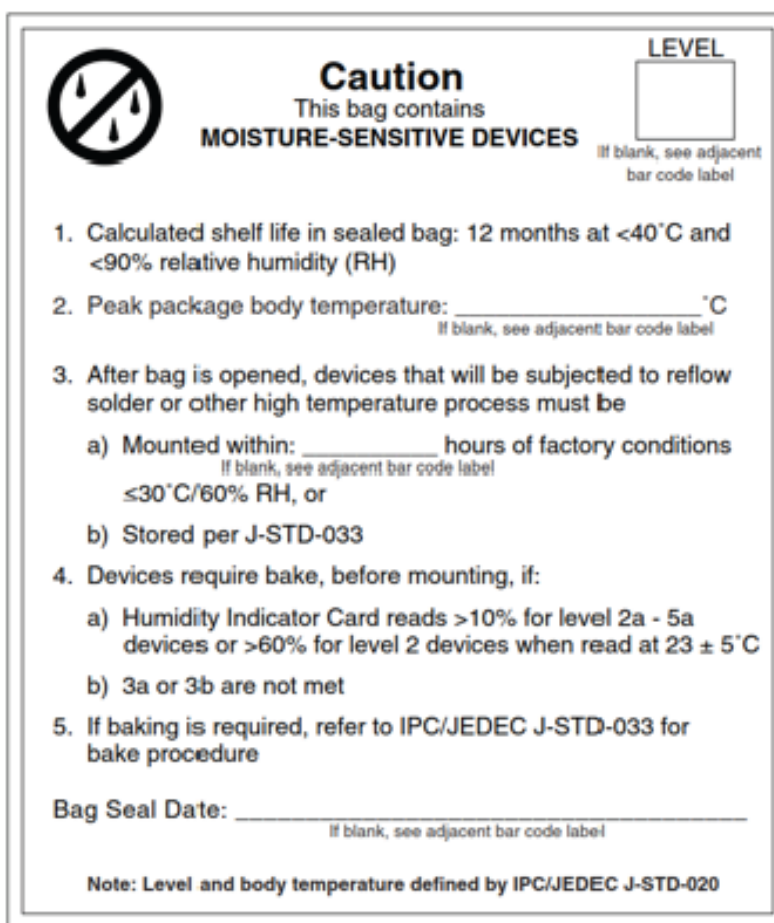


Fig. 6: Moisture Sensitivity Caution Label

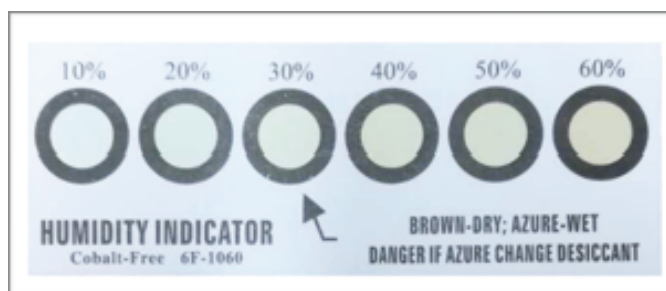


Fig. 7: Humidity-indicator Card

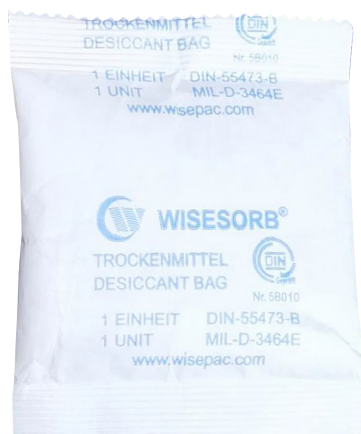


Fig. 8: Desiccant

Note: The figure(s) above is for illustration purposes only. Actual product may vary.

The floor life (the allowable period of time, after removal from a moisture barrier bag, dry storage or dry bake and before the reflow soldering process) is shown in the table below.

Level	Floor life (out of bag) at factory ambient $\leq 30^{\circ}\text{C}/60\% \text{ RH}$, or as stated
3	168 hours

Products require bake, before mounting, if:

- The humidity-indicator card reads $> 10\%$, when reading at $23 \pm 5^{\circ}\text{C}$;
- Or the period of time after removal from a moisture barrier bag or dry storage or dry bake and before the reflow soldering process is larger than the value listed in table above.

If baking is required, make sure that the products are taken out of the tape, and IPC/JEDEC J-STD-033 is followed during the bake procedure.

2 ESP32-S31 Module Packaging Information

This document summarizes the packaging requirements of Espressif's ESP32-S31 series of modules, including the module silk marking, dry-packing requirements, and module product packing.

2.1 Module Silk Marking

Espressif module silk marking provides information such as module name, flash size, and operating temperature.

Marking Convention

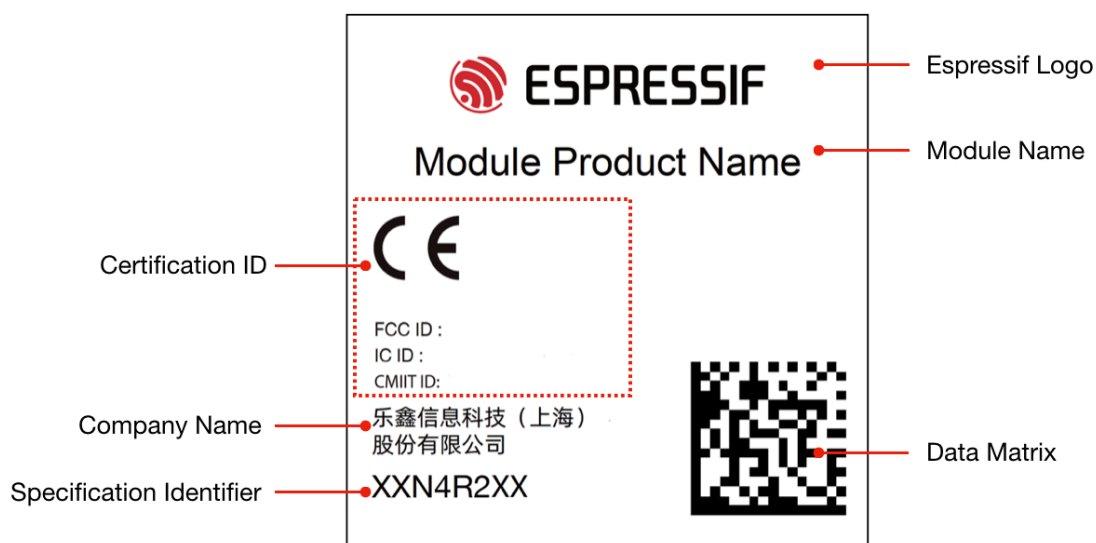


Fig. 9: Module Silk Marking Diagram

- **Company Logo:** ESPRESSIF logo.
- **Module Name:** Espressif module name.
- **Certification ID:** Indicates the certification this module has passed.
- **Company Name:** Espressif Systems (Shanghai) Co., Ltd (in Chinese).
- **Specification Identifier:** See [Specification Identifier Convention](#) below.
- **Data Matrix:** See [Data Matrix Convention](#) below.

Specification Identifier Convention The Specification Identifier is defined by Espressif to indicate the product status, operating temperature, and the memory inside Espressif modules.

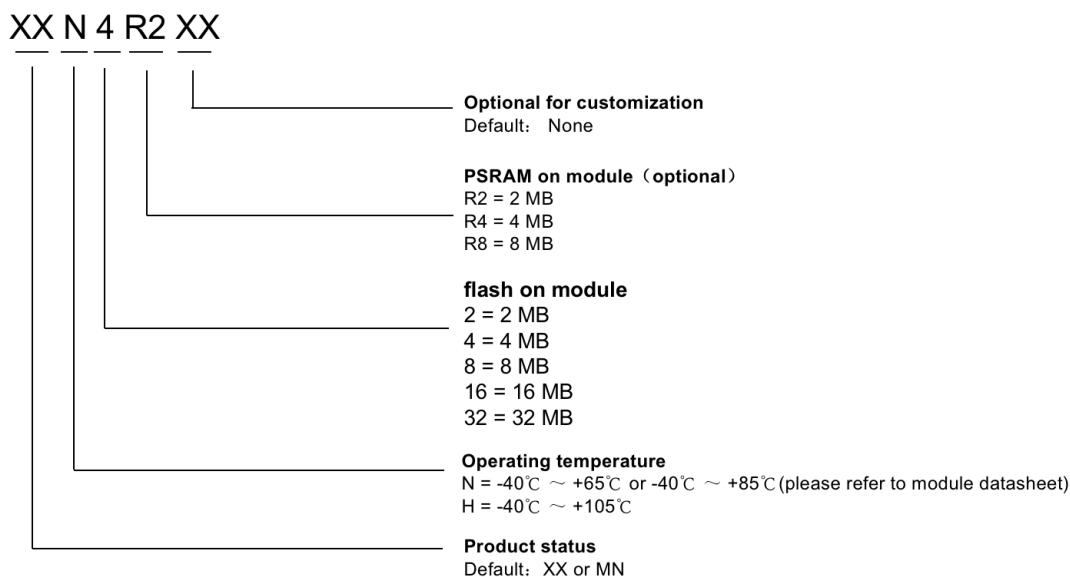


Fig. 10: Module Specification Identifier Diagram

•Product Status (2 characters):

- XX or MN: mass production
- Others: NPI product

See details in the Note below.

•Temperature (1 character):

- N: 85 °C/65 °C
- H: 105 °C

•Flash Size (1 character or 2 characters):

- 2: 2 MB
- 4: 4 MB
- 8: 8 MB
- 16: 16 MB
- 32: 32 MB

•PSRAM (1 character):

- R: PSRAM inside

•PSRAM Size (1 character):

- 2: 2 MB
- 8: 8 MB

•Reserved:

- 2 characters: for customized product
- 0 character: mass production product

Note:**Product Status:**

- XX is used for products launched earlier;
- MN is commonly used for newly launched products or products with new chip revisions launched. For example, M0, M1 or MA, MB...
- Examples of other possible codes can be E1, D2, and P3, indicating this is an NPI product under development or in trail run.

Note:

The PSRAM and PSRAM Size fields only exist if this module comes with PSRAM. For example,

- XXN4: indicates the module comes with 4 MB flash and no PSRAM.
- XXN4R2: indicates the module comes with 4 MB flash and 2 MB PSRAM.

Data Matrix Convention Scanning the Data Matrix on Espressif modules returns you an 18-character code. The convention for this code is described below:

Character (from left to right)	Description
Character 1 and Character 2	Reserved for Espressif use
Character 3 to Character 6	The production Date Code (YYWW), indicating the WW week of YYYY year
Character 7 to Character 18	Module MAC ID

2.2 Module Packing

Espressif modules are packed on tape and reel. Then the reel is packed in an aluminum moisture barrier bag (MBB) in vacuum state to protect modules from absorbing moisture during transportation and storage. At last, the MBB is packed into a pizza box.

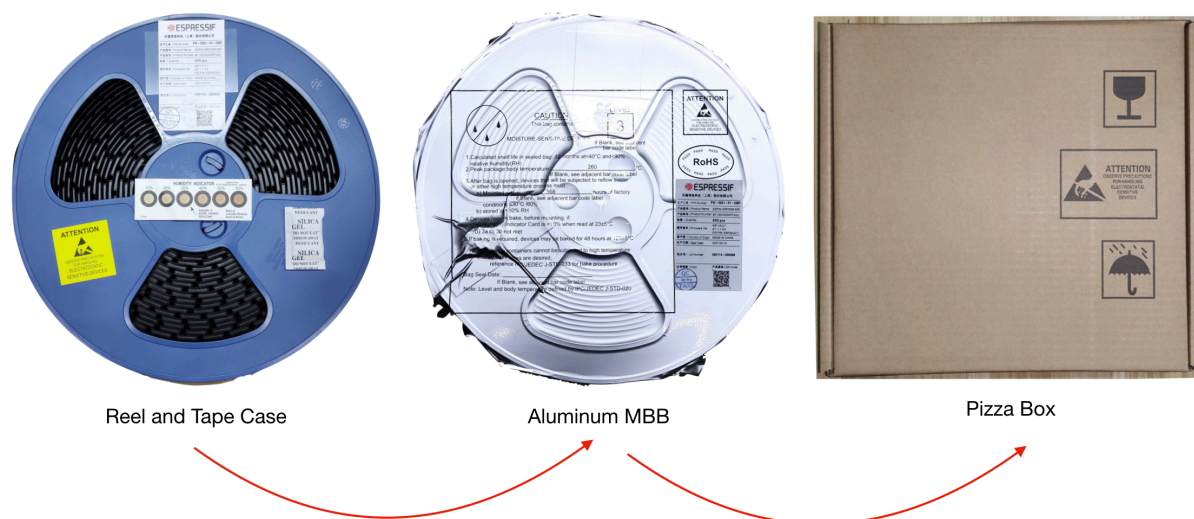
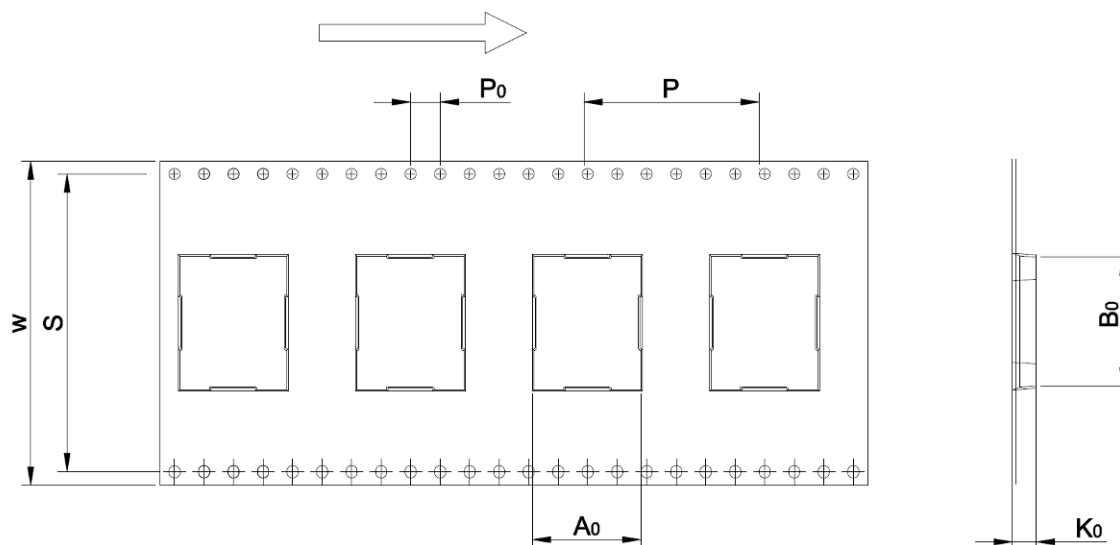


Fig. 11: Espressif Product Packing Method

Note: The figure(s) above is for illustration purposes only. Actual product may vary.

Tape

This section introduces the dimensions of the carrier tape.



Carrier Tape Dimensions

Carrier Tape Width (W)	Sprocket Hole Width (s)	Sprocket Hole Pitch (P ₀)	Cavity Pitch (P)
44.0	40.4	4.0	24.0

Note: The cavity pitch of ESP32-S31-WROOM-3 is 28.0.

Cavity Dimensions

Cavity Width (A ₀)	Cavity Length (B ₀)	Cavity Depth (K ₀)
MW + 0.5	ML + 0.5	MH + 0.5

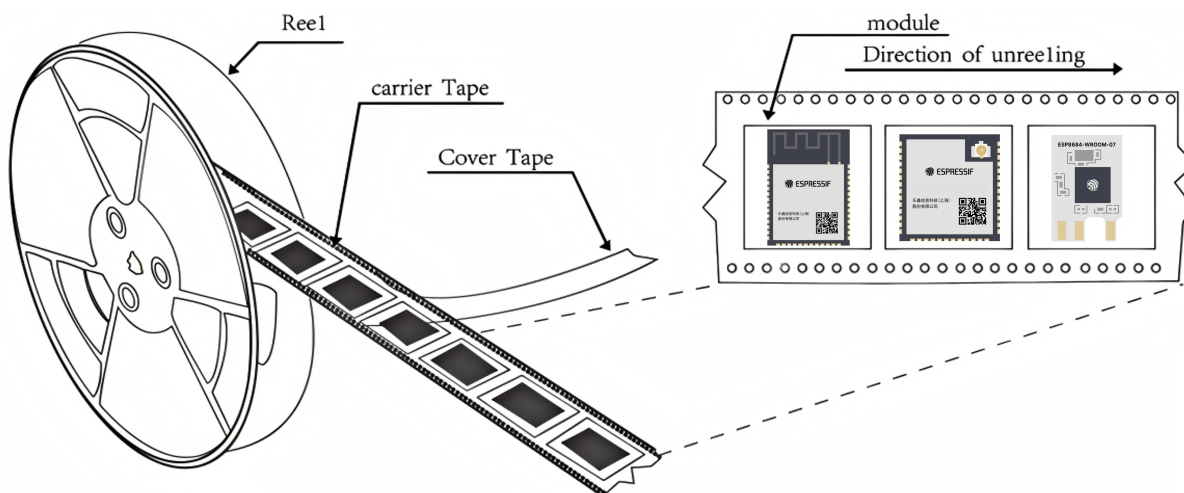
Note: The cavity dimensions may differ from different module width (MW), module length (ML) and module height (MH).

Note: Dimensions in the above tables are in millimeters (mm), with tolerances of ± 0.2 mm.

Note: The surface resistance of the carrier tape is $10^4 \sim 10^{11}$ ohms.

Module Placement and Tape Direction

This section introduces the module placement position in the carrier tape and the tape pull-out direction.



Note: Please refer to the expanded view on the right for module placement orientation in the carrier tape. The module's silk marking text direction should be parallel to the pull-out direction.

Reel

This section introduces the dimensions of the reel.



Table 3: Reel Dimensions

Reel Size	Outer Diameter (D)	Inner Diameter (d)	Reel Width (W)	Quantity Per Reel
13''	330 mm	100 mm	44 mm	650

Note: The quantity per reel of ESP32-S31-WROOM-3 is 500.

Note: The figure(s) above is for illustration purposes only. Actual product may vary.

Note: The surface resistance of the carrier tape is $10^4 \sim 10^{11}$ ohms.

Pizza Box

Inside of the pizza box of typical Espressif modules, together with the tape and reel, product label and dry-packing related items are also packed.

This section describes the product label. For information about dry packing related items, please go to Section [Dry Packing Requirement](#).

Note: Espressif has updated the product label style starting from 2026. For details, please refer to [PCN202600201](#). During the transition period, the same product you receive may carry either of two label styles (**Style 1 (New)** or **Style 2 (Legacy)**). Please note that this is purely an update to label layout and a few field names — product specifications and quality remain unchanged.

 ESPRESSIF 乐鑫信息科技（上海）股份有限公司	
生产工单 PW Number	PW-2025-03-0001
产品名称(型号) Product Name	ESP32-C5-WROOM-1
物料编号 Part Number	ESP32-C5-WROOM-1-N4
数量 Quantity	200 pcs
固件信息 Firmware	FW Ver:
	FW P/N:
	MBM NO:
组 装 地 COA(Country of Assembly)	CHINA
晶圆产地 COD(Country of Diffusion)	TAIWAN, CHINA
生产日期 Seal Date	2022-03-10
批 次 号 Lot Number	202203-000001
出货检验 OQC	产品条码 QR code
	

Fig. 12: Espressif Module Label — Style 1 (New, from 2026)

- **PW Number:** Espressif's order number at the module manufacturers.
- **Product Name:** Module name.
- **Part Number:** Espressif's MPN (internal use).
- **Quantity:** The quantity of modules per package.
- **Firmware: Indicates the firmware version flashed to the modules:**
 - **No firmware:**
 - * FW Ver: N/A
 - * FW P/N: N/A
 - * MBM NO: Specification Identifier, see Section *Specification Identifier Convention*.
 - **With firmware:**
 - * FW Ver: Firmware version
 - * FW P/N: Firmware code
 - * MBM NO: Specification Identifier, see Section *Specification Identifier Convention*.
- **COA (Country of Assembly):** CHINA/VIETNAM.
- **COD (Country of Diffusion):** Fixed value, always displays TAIWAN, CHINA.
- **Seal Date:** Date of packing.
- **Lot Number:** Used internally by Espressif for tracking production.
- **OQC:** Indicates the QC inspection is passed.
- **QR code: Scanning this QR code returns you production information including:**
 - Product name
 - Product number
 - Lot number
 - Quantity
 - Production number
 - Espressif internal code




 ESPRESSIF 乐鑫信息科技（上海）股份有限公司	
生产工单 PW Number	PW-2022-03-0001
产品型号 Product Name	ESP32-S3-WROOM-1
产品料号 Product Number	ESP32-S3-WROOM-1-N4
数量 Quantity	200 pcs
固件版本 Firmware Ver	IDF: AT: FW P/N: MBM NO:
原产国 Country of Origin	MADE IN CHINA
生产日期 Seal Date	2022-03-10
批次号 Lot Number	202205-000001
出货检验 OQC	产品条码 QR code
	

Fig. 13: Espressif Module Label — Style 2 (Legacy)

- **PW Number:** Espressif's order number at the module manufacturers.
- **Product Name:** Module name.
- **Product Number:** Espressif's MPN (internal use).
- **Quantity:** The quantity of modules per package.
- **Firmware Version: Indicates the firmware version flashed to the modules:**
 - No firmware:**
 - * IDF: N/A
 - * AT: N/A
 - * FW P/N: N/A
 - * MBM NO: Specification Identifier, see Section *Specification Identifier Convention*.
 - Espressif default firmware:**
 - * IDF: IDF version
 - * AT: AT version
 - * FW P/N: firmware code
 - * MBM NO: Specification Identifier, see Section *Specification Identifier Convention*.
 - Customized firmware:**
 - * IDF: Customized firmware version
 - * AT: N/A
 - * FW P/N: firmware code
 - * MBM NO: Specification Identifier, see Section *Specification Identifier Convention*.
- **Country of Origin:** MADE IN CHINA.
- **Seal Date:** Date of packing.

- **Lot Number:** Used internally by Espressif for tracking production.
- **OQC:** Indicates the QC inspection is passed.
- **QR code: Scanning this QR code returns you production information including:**
 - Product name
 - Product number
 - Lot number
 - Quantity
 - Production number
 - Espressif internal code

2.3 Dry Packing Requirement

All Espressif module's moisture sensitivity level (MSL) is 3, thus must be dry-packed. Dry packing usually consists of desiccant material, a humidity-indicator card (HIC), as well as a Moisture Sensitivity Caution Label sealed with the populated reel inside a moisture barrier bag (MBB).


	<p>Caution This bag contains MOISTURE-SENSITIVE DEVICES</p>	<p>LEVEL <input style="width: 50px; height: 20px;" type="text"/> <small>If blank, see adjacent bar code label</small></p>
<p>1. Calculated shelf life in sealed bag: 12 months at <math><40^{\circ}\text{C}</math> and <math><90\%</math> relative humidity (RH)</p> <p>2. Peak package body temperature: _____$^{\circ}\text{C}$ <small>If blank, see adjacent bar code label</small></p> <p>3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be</p> <p style="margin-left: 20px;">a) Mounted within: _____ hours of factory conditions <small>If blank, see adjacent bar code label</small> <math>\leq 30^{\circ}\text{C}/60\% \text{ RH}</math>, or</p> <p style="margin-left: 20px;">b) Stored per J-STD-033</p> <p>4. Devices require bake, before mounting, if:</p> <p style="margin-left: 20px;">a) Humidity Indicator Card reads >10% for level 2a - 5a devices or >60% for level 2 devices when read at $23 \pm 5^{\circ}\text{C}$</p> <p style="margin-left: 20px;">b) 3a or 3b are not met</p> <p>5. If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure</p> <p>Bag Seal Date: _____ <small>If blank, see adjacent bar code label</small></p> <p style="text-align: center;">Note: Level and body temperature defined by IPC/JEDEC J-STD-020</p>		

Fig. 14: Moisture Sensitivity Caution Label

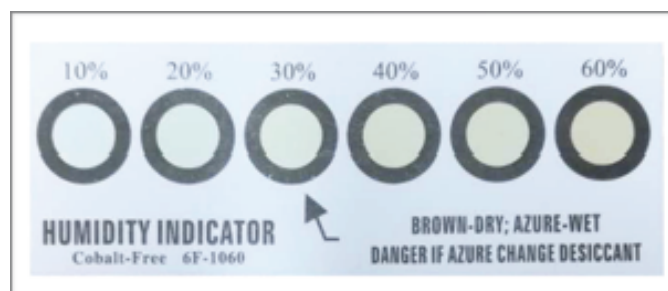


Fig. 15: Humidity-indicator Card

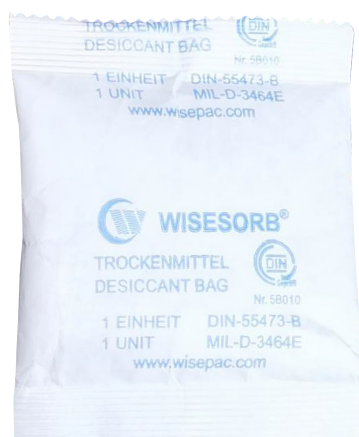


Fig. 16: Desiccant

Note: The figure(s) above is for illustration purposes only. Actual product may vary.

The floor life (the allowable period of time, after removal from a moisture barrier bag, dry storage or dry bake and before the reflow soldering process) is shown in the table below.

Level	Floor life (out of bag) at factory ambient $\leq 30^{\circ}\text{C}/60\% \text{ RH}$, or as stated
3	168 hours

Products require bake, before mounting, if:

- The humidity-indicator card reads $> 10\%$, when reading at $23 \pm 5^{\circ}\text{C}$;
- Or the period of time after removal from a moisture barrier bag or dry storage or dry bake and before the reflow soldering process is larger than the value listed in table above.

If baking is required, make sure that the products are taken out of the tape, and IPC/JEDEC J-STD-033 is followed during the bake procedure.

3 Disclaimer and Copyright Notice

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