Espressif

Chip Packaging Information

Version 1.7

Espressif Systems

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About This Document

This document summarizes the packing requirements of Espressif's chip products, including the packing method, packing-material dimensions, standard packing quantity, labels, dry-packing requirements and marking conventions.

Release Notes

Date	Version	Release notes
2017.06	V1.0	Initial release.
2017.07	V1.1	Corrected a typo in Table 1-2. Reel Dimensions: The quantity per reel for 6 * 6 package is changed to 2,000.
2017.08	V1.2	Changed the quantity per reel for 6 * 6 package to 3,000 in Table 1-2. Reel Dimensions.
2018.07	V1.3	- Updated Table 1-2 in the Chapter 1; - Updated Chapter 2 for labels; - Added description for baking requirement in Chapter 3; - Updated Chapter 4.
2020.12	V1.4	- Updated Table 1-2 in Section 1.2 to include more Quantity Per Reel options for 6*6 and 7*7 packages; - Added Section 4.3 to include Product with Flash and PSRAM.
2021.05	V1.5	Added information for 4 * 4 package in Table 1-1 and Table 1-2.
2021.10	V1.6	- Update Figure 2-3 to include company logo on the product label; - Updated the marking convention in Chapter four.
2022.04	V1.7	Updated Figure 2-3.

Documentation Change Notification

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Table of Contents

1. Tape and Reel Packing

1.1. Tape

Table 1-1 shows the dimensions of the carrier tape.

Table 1-1. Carrier Tape Dimensions (Unit: mm)

Package	Carrier Tape Width (W)	Cavity Pitch (P_1)	Cavity Width (A_0)	Cavity Length (B_0)
4 * 4	12.0 ± 0.30	8.0 ± 0.10	4.30 ± 0.10	4.30 ± 0.10
5 * 5	12.0 ± 0.30	8.0 ± 0.10	5.30 ± 0.10	5.30 ± 0.10
6 * 6	16.0 ± 0.30	12.0 ± 0.10	6.30 ± 0.10	6.30 ± 0.10
7 * 7	16.0 ± 0.30	12.0 ± 0.10	7.30 ± 0.10	7.30 ± 0.10

📖 *Note:*

The surface resistance of the carrier tape is $10^4 \sim 10^{11}$ ohms.
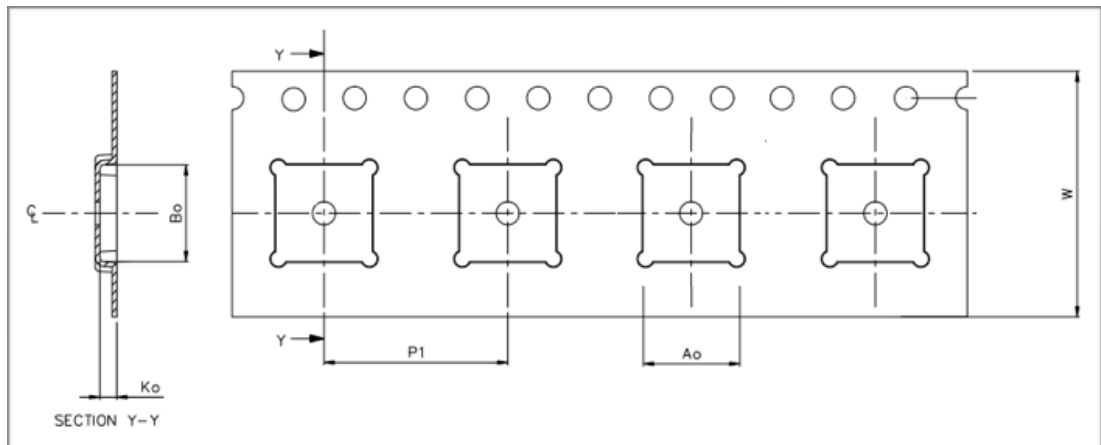
Figure 1-1. Carrier Tape Dimensions

1.2. Reel

Table 1-2 shows the dimensions of the reel.

Table 1-2. Reel Dimensions

Package	Reel Size	Quantity Per Reel
4* 4	13"	5,000
	7"	1,000
5 * 5	13"	5,000
	7"	1,000
6 * 6	13"	1,000
	13''	3,000
7 * 7	13"	1,000
	13"	2,000

📖 *Note:*

> *The surface resistance of the reel is $10^4 \sim 10^{11}$ ohms.*

Figure 1-2. Reel Dimensions

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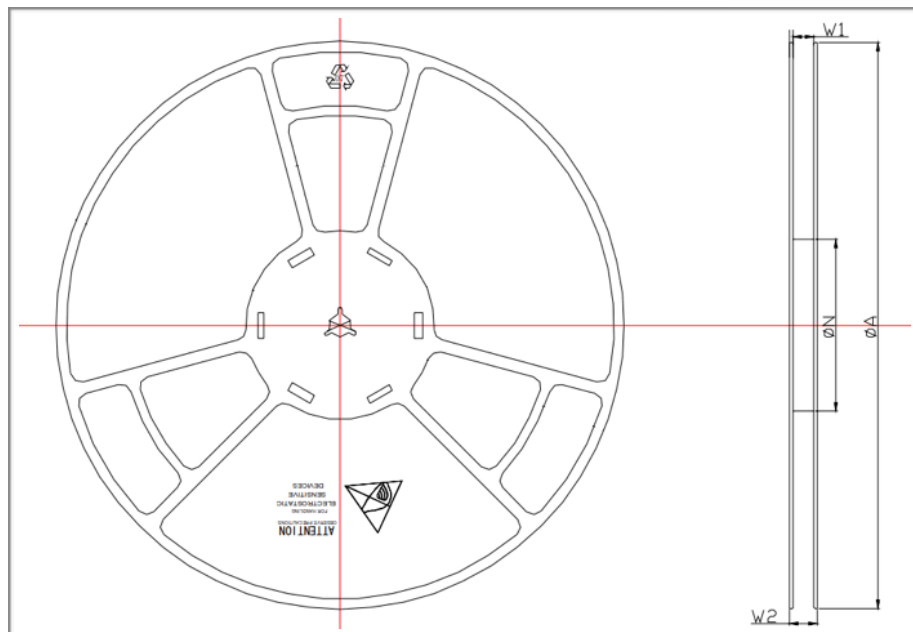
1.3.   Pin1 Location
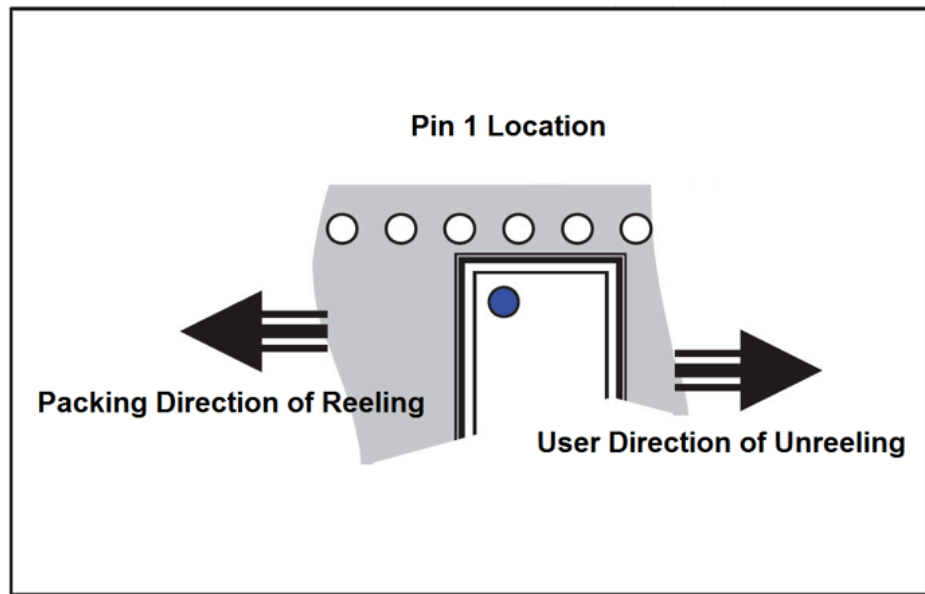
Figure 1-3. Pin 1 Orientation of Chips in Carrier Tape

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2. Labels and Symbols

Reel, moisture barrier bag (MBB) and pizza box have relevant labels and symbols, as shown in the figures below.

Figure 2-1. Reel Labelling

Figure 2-2. MBB Labels and Symbols

Figure 2-3. Label Format for Reel, MBB and Pizza Box

Table 2-1. Label Content

Item	Description
ESPRESSIF	Company logo and name
CPN	Espressif product name, e.g. ESP32-D0WDQ6
MPN	Manufacturing product name
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

3. Dry Packing Requirements

All Espressif products must be dry-packed, as their moisture sensitivity level (MSL) is 3. Dry packing consists of desiccant material (see figure 3-1) and a humidity-indicator card (HIC, see figure 3-2) sealed with the populated reel inside a moisture barrier bag (MBB).

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 table 3.

Products require bake, before mounting, if:

- The humidity-indicator card reads > 10%, when reading at 23 ± 5°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 3.

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.

Table 3-1. Moisture Classification Level and Floor Life

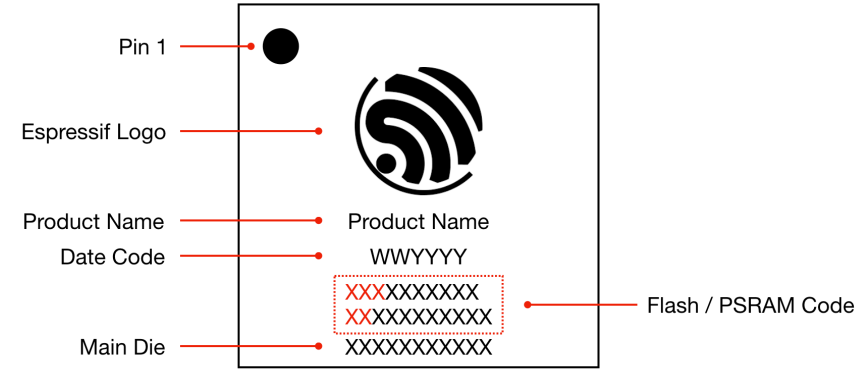| Level	Floor life (out of bag) at factory ambient ≤ 30°C/60% RH, or as stated
3	168 hours

Figure 3-1. Desiccant

Figure 3-2. HIC

Figure 3-3. Moisture Sensitivity Caution Label

4. Marking Conventions

Espressif chip has a silk marking on its shielding case, providing information such as chip name, flash size, and operating temperature.

4.1. Chip Marking Information

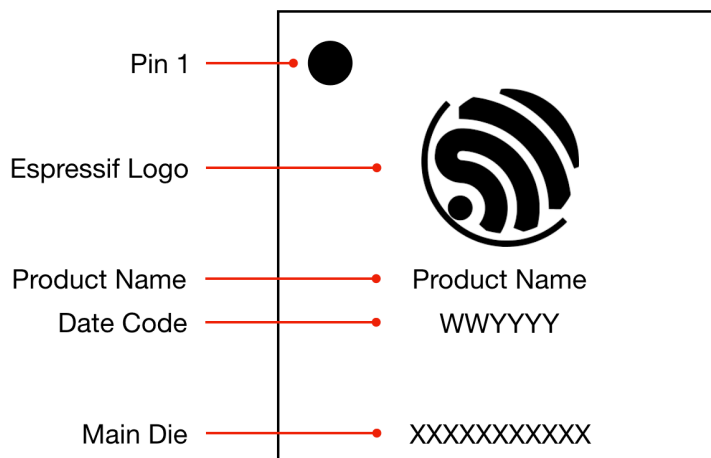| Item	Description
Diagram	
Pin 1	Position of Pin 1
Espressif Logo	Company logo
Product Name	Indicates the chip name
Date Code	WW is the week number of year YYYY. E.g., Date Code "122017" stands for the 12th week of year 2017.
Flash Code	A code that indicates: • (Optional) Temperature and flash size • The tracking information of the embedded flash The arrangement of flash code can be different by products. Please see Section 4.2 for details.
PSRAM Code	A code that indicates: • (Optional) Temperature and PSRAM size • The tracking information of the embedded PSRAM; The arrangement of PSRAM code can be different by products. Please see Section 4.2 for details.
Main Die	Main die tracking information. The length of this code is not fixed.

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4.2. Flash Code and PSRAM Code Conventions

Based on the embedded flash or PSRAM, Espressif chips can be divided into the following four categories.

4.2.1. No Flash, No PSRAM

This section applies to all Espressif chips without any embedded flash or PSRAM, such as ESP8266EX, ESP32, ESP32-S2, ESP32-C3, and ESP32-S3.
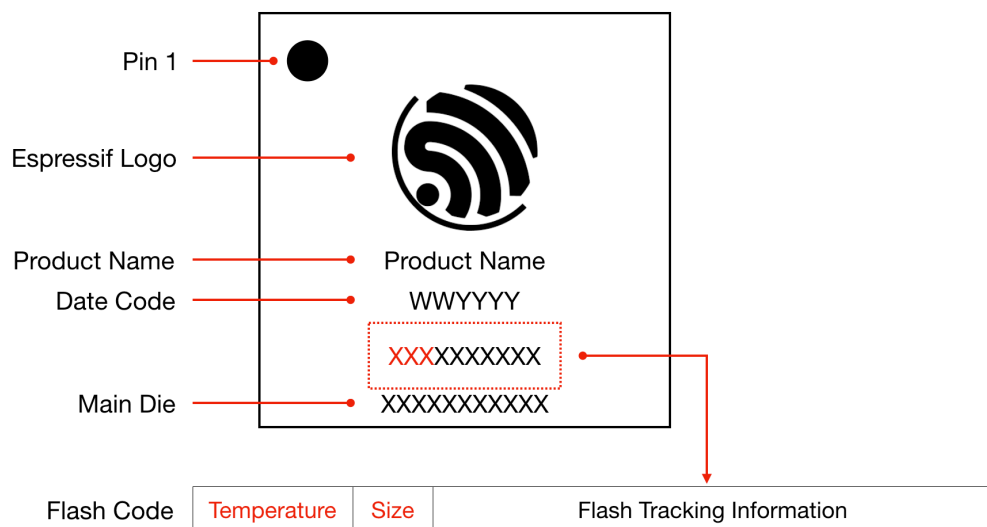
For such chips, no flash code and PSRAM code is provided on the chip marking. Therefore, these two codes are simply left empty.

Pin 1

Espressif Logo

Product Name — Product Name

Date Code — WWYYYY

Main Die — XXXXXXXXXXX

4.2.2. Embedded Flash, No PSRAM

This section applies to all Espressif chips with only embedded flash, except those listed in the note below as exceptions.

For such chips, only the flash code is used.

Pin 1

Espressif Logo

Product Name — Product Name

Date Code — WWYYYY

XXXXXXXXXX

Main Die — XXXXXXXXXXX

Flash Code	Temperature	Size	Flash Tracking Information

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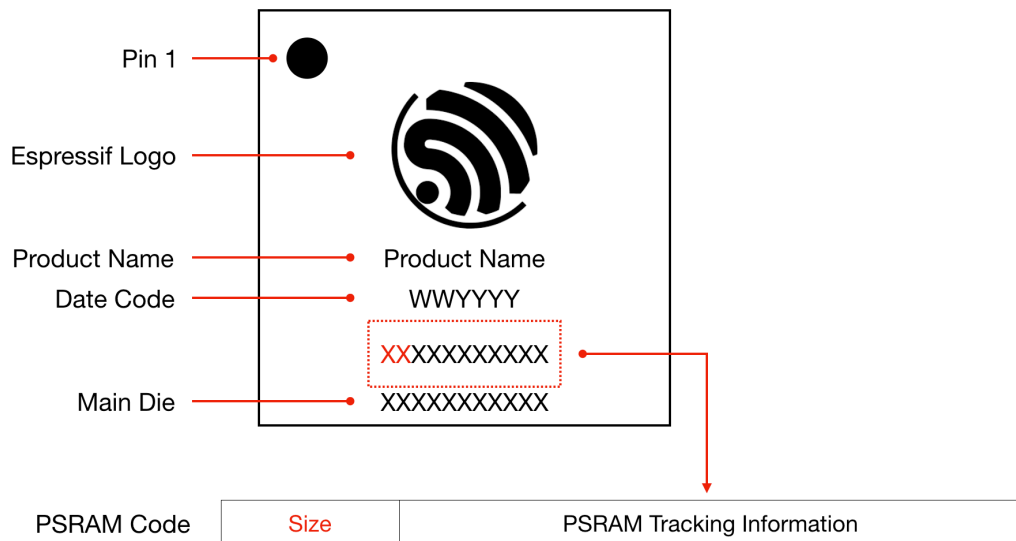| Item	Length (unit: character)	Description
Temperature	2	• FH: 105 °C • FN: 85 °C This field is optional.
Size	1	• 2: 2 MB • 4: 4 MB • 8: 8 MB This field is optional.
Flash Tacking Information	7	Flash tracking information. This field is mandatory.

📖 *Notes:*

1. *ESP32-S2, ESP8685 and ESP8285 series use 1 character, instead of 2 characters, to indicate the temperature:*

   • *H: 105 °C*

   • *N: 85 °C*

2. *Additionally, ESP8285 series uses Mbit, instead of MByte, to indicate flash size:*

   • *08: 8 Mbit*

   • *16: 16 Mbit*

3. *Instead of following the convention above, the flash codes are not provided on the silk markings of ESP32-PICO-V3 and ESP32-PICO-D4.*

4.2.3. Embedded PSRAM, No Flash

This section applies to all Espressif chips with only embedded PSRAM, except those listed in the note below as exceptions.

For such chips, only the PSRAM code is used.

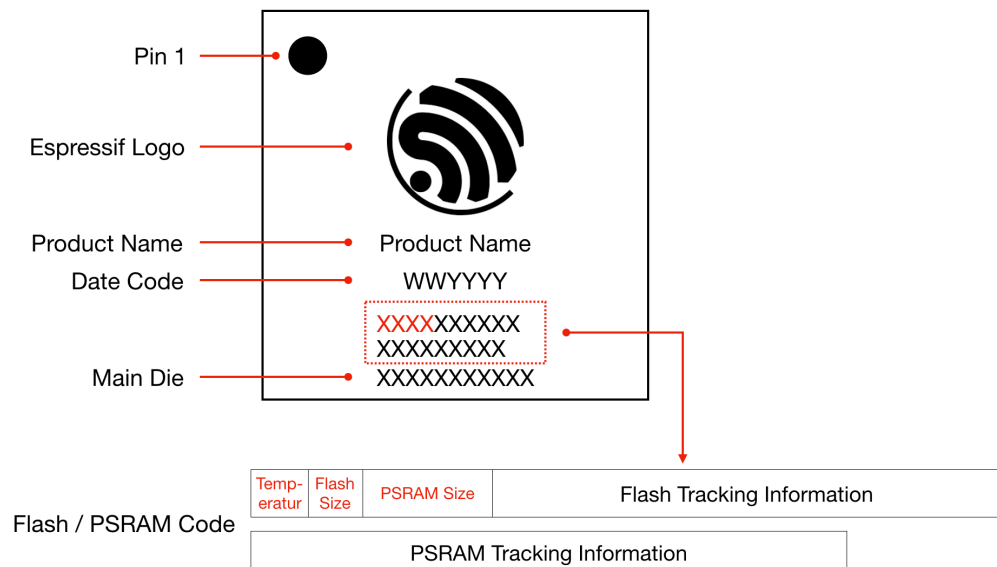| Item	Length (unit: character)	Description
Size	2	• R2: 2 MB • R8: 8 MB
PSRAM Tacking Information	9	PSRAM tracking information. This field is mandatory.

📖 *Notes:*

1. *ESP32-S3R8V has an additional character (V) between the Size field and PSRAM Tracking Information field, indicating this is a 1.8 V chip.*

4.2.4. Embedded Flash, Embedded PSRAM

This section applies to all Espressif chips with both embedded flash and PSRAM, except those listed in the note below as exceptions.

For such chips, both flash code and PSRAM code are used.

Item	Length (unit: character)	Description
Temperature	1	• H: 105 °C • N: 85 °C
Flash Size	1	• 4: 4 MB
PSRAM Size	2	• R2: 2 MB
Flash Tacking Information	7	Flash tracking information. This field is mandatory.
PSRAM Tacking Information	9	PSRAM tracking information. This field is mandatory.

📖 *Notes:*

1. *Instead of following the convention above, the flash code and PSRAM code is not provided on the silk marking of ESP32-PICO-V3-02.*

Espressif IoT Team

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