About This Document

This document describes the package and silk marking of Espressif modules.

Release Notes

<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Release Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020.05</td>
<td>V1.0</td>
<td>Initial release.</td>
</tr>
<tr>
<td>2022.01</td>
<td>V1.1</td>
<td>1. Added a note about carrier tape;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Updated description on module silk marking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and specification identifier for mass production</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and NPI products</td>
</tr>
</tbody>
</table>

Documentation Change Notification


Certification

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1. Module Packaging

Espressif modules are packaged 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.

1.1. Tape and Reel Specifications

1.1.1. Tape Specifications

Figure 1-1 and Table 1-1 show the carrier tape specifications of typical Espressif modules.

![Figure 1-1. Carrier Tape Specifications](image)

**Table 1-1. Carrier Tape Specifications (Unit: mm)**

<table>
<thead>
<tr>
<th>Carrier Tape Width (W)</th>
<th>Cavity Pitch (P₁)</th>
<th>Cavity Width (A₀)</th>
<th>Cavity Length (B₀)</th>
<th>Cavity Height (K₀)</th>
</tr>
</thead>
<tbody>
<tr>
<td>44.0 ± 0.30</td>
<td>24.0 ± 0.10</td>
<td>Module width + 0.5</td>
<td>Module length + 0.5</td>
<td>Module height + 0.5</td>
</tr>
</tbody>
</table>

**Note:**

1. The surface resistance of the carrier tape is $10^4 \sim 10^{11}$ ohms.
2. The cavity dimensions may differ from different modules.
3. The Figure 1-1 above is for illustration purposes only. Actual product may vary.
1. Module Packaging

1.1.2. Reel Specifications

Figure 1-1 and Table 1-2 show the reel specifications of typical Espressif modules.

![Figure 1-2. Reel Specifications](image)

### Table 1-2. Reel Specifications

<table>
<thead>
<tr>
<th>Reel Size</th>
<th>Outer Diameter (mm)</th>
<th>Inner Diameter (mm)</th>
<th>Reel Width (W) (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13&quot;</td>
<td>330</td>
<td>100</td>
<td>44</td>
</tr>
</tbody>
</table>

**Note:**

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

2. The quantity per tape of typical Espressif modules is 650, but can be different from modules. For example,
   - ESP8089M16 and ESP-WROOM-5C: 1,300.

For details, please check [ESP-Product Selector](#).
1.2. MBB and Pizza Box Specifications

![Image of MBB and Pizza Box](image-url)

Inside of the pizza box of typical Espressif modules, the following items are also packed together with the tape and reel:

**Table 1-3. Items and Labels inside the Moisture Barrier Bag**

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ESD Precautions Label</td>
<td>50 mm × 50 mm</td>
</tr>
<tr>
<td>2</td>
<td>Humidity-indicator Card (HIC)</td>
<td>102 mm × 36 mm, a cobalt-free brown to azure HIC</td>
</tr>
<tr>
<td>3</td>
<td>Desiccant</td>
<td>1.3 g</td>
</tr>
<tr>
<td>4</td>
<td>Product Label</td>
<td>100 mm × 60 mm. See the detailed drawing and explanation in Section 1.2.1.</td>
</tr>
</tbody>
</table>
1. Module Packaging

1.2.1. Product Label

A detailed drawing of a type Espressif product label is shown below:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PW Number</td>
<td>Espressif’s order number at the module manufacturers</td>
</tr>
<tr>
<td>Product Name</td>
<td>Module name</td>
</tr>
<tr>
<td>Product Number</td>
<td>Espressif’s MPN (internal use)</td>
</tr>
<tr>
<td>Quantity</td>
<td>The quantity of modules per package</td>
</tr>
<tr>
<td>Firmware Version</td>
<td>Indicates the firmware version downloaded to the modules:</td>
</tr>
<tr>
<td></td>
<td>• No firmware:</td>
</tr>
<tr>
<td></td>
<td>• IDF: N/A</td>
</tr>
<tr>
<td></td>
<td>• AT: N/A</td>
</tr>
<tr>
<td></td>
<td>• FW P/N: NA</td>
</tr>
<tr>
<td></td>
<td>• Espressif default firmware:</td>
</tr>
<tr>
<td></td>
<td>• IDF: IDF version</td>
</tr>
<tr>
<td></td>
<td>• AT: AT version</td>
</tr>
<tr>
<td></td>
<td>• FW P/N: firmware code</td>
</tr>
<tr>
<td></td>
<td>• Customized firmware:</td>
</tr>
<tr>
<td></td>
<td>• IDF: Customized firmware version</td>
</tr>
<tr>
<td></td>
<td>• AT: N/A</td>
</tr>
<tr>
<td></td>
<td>• FW P/N: firmware code</td>
</tr>
<tr>
<td>Country of Origin</td>
<td>MADE IN China</td>
</tr>
<tr>
<td>Seal Date</td>
<td>Date of packaging</td>
</tr>
<tr>
<td>Lot Number</td>
<td>Used internally by Espressif for tracking production.</td>
</tr>
<tr>
<td>OQC</td>
<td>Indicates the QC inspection is passed.</td>
</tr>
<tr>
<td>OR code</td>
<td>Scanning this OR code returns you production information including product name, product number, lot number, quantity, production number, and Espressif internal code.</td>
</tr>
</tbody>
</table>
2. Module Marking

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

2.1. Module Marking Information

![Module Marking Diagram](image)

Figure 2-1. Espressif Module Marking

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Company Logo</td>
<td>ESPRESSIF logo</td>
</tr>
<tr>
<td>2</td>
<td>Module Name</td>
<td>Espressif module name</td>
</tr>
<tr>
<td>3</td>
<td>Certification ID</td>
<td>Indicates the certification this module has passed.</td>
</tr>
<tr>
<td>4</td>
<td>Company Name</td>
<td>Espressif Systems (Shanghai) Co., Ltd (in Chinese)</td>
</tr>
<tr>
<td>5</td>
<td>Specification Identifier</td>
<td>See Section 2.2 below.</td>
</tr>
<tr>
<td>6</td>
<td>Data Matrix</td>
<td>See Section 2.3 below.</td>
</tr>
</tbody>
</table>

Table 2-1. Espressif Module Marking
2. Module Marking

2.2. Specification Identifier Convention

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

Figure 2-2 below demonstrates how to understand the Specification Identifier on module marking:

XX N 4 R2 XX

### Table 2-2. Specification Identifier Convention

<table>
<thead>
<tr>
<th>Field (from bottom up)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Status</strong></td>
<td>2 digits:</td>
</tr>
<tr>
<td></td>
<td>• XX: mass production</td>
</tr>
<tr>
<td></td>
<td>• Mn digit: mass production, n can be 0, 1, 2, 3…</td>
</tr>
<tr>
<td></td>
<td>• Others: NPI product</td>
</tr>
<tr>
<td><strong>Temperature</strong></td>
<td>1 digit:</td>
</tr>
<tr>
<td></td>
<td>• N: 85°C/65°C</td>
</tr>
<tr>
<td></td>
<td>• H: 105°C</td>
</tr>
<tr>
<td><strong>Flash Size</strong></td>
<td>1 digit or 2 digits:</td>
</tr>
<tr>
<td></td>
<td>• 2: 2 MB</td>
</tr>
<tr>
<td></td>
<td>• 4: 4 MB</td>
</tr>
<tr>
<td></td>
<td>• 8: 8 MB</td>
</tr>
<tr>
<td></td>
<td>• 16: 16 MB</td>
</tr>
<tr>
<td></td>
<td>• 32: 32 MB</td>
</tr>
<tr>
<td><strong>PSRAM</strong></td>
<td>1 digit:</td>
</tr>
<tr>
<td></td>
<td>• R: PSRAM inside</td>
</tr>
<tr>
<td><strong>PSRAM Size</strong></td>
<td>1 digit:</td>
</tr>
<tr>
<td></td>
<td>• 2: 2 MB</td>
</tr>
<tr>
<td></td>
<td>• 8: 8 MB</td>
</tr>
<tr>
<td><strong>Reserved</strong></td>
<td>2 digits: for customized product</td>
</tr>
<tr>
<td></td>
<td>0 digit: mass production product</td>
</tr>
</tbody>
</table>
2. Module Marking

2.3. Data Matrix Convention

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

Table 2-4. Data Matrix Code Convention

<table>
<thead>
<tr>
<th>Digit (from left to right)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digit 1 and Digit 2</td>
<td>Reserved for Espressif use.</td>
</tr>
<tr>
<td>Digit 3 to Digit 6</td>
<td>The production Date Code (YYWW), indicating the WW week of YYYY year.</td>
</tr>
<tr>
<td>Digit 7 to Digit 18</td>
<td>Module MAC ID</td>
</tr>
</tbody>
</table>

**Note:**

1. **Product Status:**
   - Both XX and Mn are used to indicate mass production products.
     - XX is used for products launched earlier;
     - Mn is commonly used for newly launched products or products with new ECOs launched. For example, M0, M1….
     - Examples of other possible codes can be E1, D2, and P3, indicating this is an NPI product under development or in trial run.

2. 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.