TN1206
Technical note

Tape and reel shipping media for STM8 and STM32 microcontrollers in QFP packages

Introduction

QFP packages can be supplied in tape and reel shipping media.

The reels have a 13” typical diameter.

The types of reel used are in plastic either anti static or conductive, with a black conductive cavity tape. The cover tape is transparent anti static or conductive.

The devices are positioned in the cavities with the identifying pin (normally Pin “1”) on the same side as the sprocket holes in the tape.

STMicroelectronics tape and reels are compliant with EIA 481 and IEC 60286-3 standard specifications.

Table 1 lists the QFP packages available for STM8 and STM32 microcontrollers, as well as the corresponding shipping media.

<table>
<thead>
<tr>
<th>Package</th>
<th>Description</th>
<th>Package code</th>
<th>Reel diameter</th>
<th>Tape width</th>
<th>Tape pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>TQFP 10x10</td>
<td>LQFP44 leads, 10x10x1.4 mm, 1.0 mm</td>
<td>4Y</td>
<td>13”</td>
<td>24 mm</td>
<td>16 mm</td>
</tr>
<tr>
<td></td>
<td>LQFP64 leads, 10x10x1.4 mm, 1 mm</td>
<td>5W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LQFP52 leads, 10x10x1.4 mm</td>
<td>DC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TQFP 14x14</td>
<td>LQFP100 leads, 14x14x1.4 mm 1 mm</td>
<td>1L</td>
<td>13”</td>
<td>32 mm</td>
<td>24 mm</td>
</tr>
<tr>
<td></td>
<td>LQFP64 leads, 14x14x1.4 mm, 1 mm</td>
<td>1R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LQFP80 leads, 14x14x1.4 mm, 1 mm</td>
<td>1S</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LQFP128 leads, 14x14x1.4 mm, 1.0 mm</td>
<td>TC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TQFP 20x20</td>
<td>LQFP144 leads, 20x20x1.4 mm, 2 mm</td>
<td>1A</td>
<td>13”</td>
<td>44 mm</td>
<td>32 mm</td>
</tr>
<tr>
<td>TQFP 24x24</td>
<td>LQFP176 leads, 24x24x1.4 mm</td>
<td>1T</td>
<td></td>
<td>44 mm</td>
<td>32 mm</td>
</tr>
<tr>
<td>TQFP 28X28</td>
<td>LQFP208 leads, 28x28x1.4 mm, 1.0 mm</td>
<td>UH</td>
<td></td>
<td>44 mm</td>
<td>36 mm</td>
</tr>
<tr>
<td>TQFP 7x7</td>
<td>LQFP48 leads, 7x7x1.4 mm, 1 mm</td>
<td>5B</td>
<td>13”</td>
<td>16 mm</td>
<td>12 mm</td>
</tr>
<tr>
<td></td>
<td>LQFP32 leads, 7x7x1.4 mm, 1 mm</td>
<td>5V</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. QFP packages available in tape and reel packing

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1 Reel description

Figure 1. Reel diagram

Note: Drive spokes optional; if used, dimensions B and D shall apply.
<table>
<thead>
<tr>
<th>Reel size (inch)</th>
<th>Tape size (mm)</th>
<th>A max. (mm)</th>
<th>Reeds without drive hole</th>
<th>Reeds with drive hole</th>
<th>N(mm)</th>
<th>W1(mm)(2)</th>
<th>W2 max.(mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>B min.(mm)</td>
<td>C (mm)</td>
<td>D min.(mm)</td>
<td>B min.(mm)</td>
<td>C max.(m m)</td>
</tr>
<tr>
<td>13</td>
<td>16</td>
<td>330</td>
<td>1.5</td>
<td>13.0+0.5/-0.2</td>
<td>20.2</td>
<td>NA</td>
<td>29.2</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. NA stands for “not applicable”.
2. W1 is measured at the hub.
2 Leader and trailer tape specifications

The leader has a minimum width of 400 mm which includes at least 100 mm of carrier tape with empty cavities and sealed cover tape (see Figure 2). The leader tape is affixed to the last turn of carrier tape by using a transparent adhesive anti static or paper based tape of a width not higher than the one of the cover tape.

The trailer is a carrier tape which minimum width is 160 mm with empty cavities and sealed cover tape, as shown in Figure 2. The trailer tape must be affixed to the reel by using the tape slot of the reel hub.

During the unwinding operation, the entire carrier tape must be easily released from the reel hub as the last portion of the tape unwinds from the reel without damaging the carrier tape and the remaining components in the cavities.

Figure 2. Leader and trailer tape schematics

![Leader and trailer tape schematics](image-url)
3 Labeling

STMicroelectronics “inner box” standard label is placed on each reel at the following locations:

- On the box that directly holds the reel
- On the damp proof bag if the units are dry packed
- On the reel itself

The label is attached to the flange that is facing the user when the tape is extracted from the reel at the top right (see Figure 3).

Figure 3. Labeling location on reel for carrier tape
4 Device Orientation

The largest axis of the component outline is perpendicular to the tape length. The device is positioned in the carrier tape cavity as shown in Figure 4: Device orientation on tape. Ball 1 is located on the top left corner of the package.

Figure 4. Device orientation on tape
5 Carrier tape mechanical dimensions

5.1 Carrier tape width ≤ 24 mm

Possible widths are 16 and 24 mm (refer to Table 1: QFP packages available in tape and reel packing).

![Figure 5. Embossed carrier tape (width ≤ 24 mm)](image)

**Table 3. Carrier tape constant dimensions (width ≤ 24 mm)**

<table>
<thead>
<tr>
<th>Tape width</th>
<th>D0</th>
<th>D1 min</th>
<th>E1</th>
<th>P0</th>
<th>P2</th>
<th>R(1)</th>
<th>S1</th>
<th>T max.</th>
<th>T1 max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 mm</td>
<td>1.5±0.1 /-0.0</td>
<td>1.5</td>
<td>1.75±0.1</td>
<td>4.0±0.1</td>
<td>2.0±0.1</td>
<td>30</td>
<td>0.6</td>
<td>0.6</td>
<td>0.1</td>
<td>mm</td>
</tr>
<tr>
<td>24 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. The maximum radius the tape with or without components can bend without damage is specified in Section 6: Bending radius requirements.
**Table 4. Carrier tape variable dimensions (width ≤ 24 mm)**

<table>
<thead>
<tr>
<th>Tape width</th>
<th>B1</th>
<th>E2</th>
<th>F</th>
<th>P1</th>
<th>T2 max.</th>
<th>W max.</th>
<th>A0, B0, K0</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 mm</td>
<td>12.1</td>
<td>14.25</td>
<td>7.5±0.1</td>
<td>4.0±0.1 to 12.0±0.1 by 4.0 increments</td>
<td>8.0</td>
<td>16.3</td>
<td>See (1)</td>
<td></td>
</tr>
<tr>
<td>24 mm</td>
<td>20.1</td>
<td>22.25</td>
<td>11.5±0.1</td>
<td>4.0±0.1 to 20.0±0.1 by 4.0 increments</td>
<td>12.0</td>
<td>24.3</td>
<td>mm</td>
<td></td>
</tr>
</tbody>
</table>

1. The cavity defined by A0, B0 and K0 surrounds the component with sufficient clearance so that:
   - The component does not protrude above the top surface of the carrier tape.
   - The component can be removed vertically from the cavity without mechanical restriction, after the top cover tape has been removed.
   - Rotation of the component is limited to 20° maximum for 12 mm tapes and to 10° maximum for 16 mm and 24 mm tapes.
   - Lateral movements of the component are restricted to 0.5 mm maximum for 12 mm tapes and to 1.0 mm maximum for 16 mm and 24 mm tapes.

### 5.2 Carrier tape width > 24 mm

Possible widths are 32 and 44 mm (refer to *Table 1: QFP packages available in tape and reel packing*).

![Figure 6. Embossed carrier tape (width > 24 mm)](image)
### Table 5. Carrier tape constant dimensions (width > 24 mm)

<table>
<thead>
<tr>
<th>Tape width</th>
<th>D0</th>
<th>D1 min</th>
<th>E1</th>
<th>P0</th>
<th>P2</th>
<th>R(1)</th>
<th>S1</th>
<th>T max.</th>
<th>T1 max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 mm</td>
<td>1.5±0.1- 0.0</td>
<td>2.0</td>
<td>1.75±0.1</td>
<td>4.0±0.1</td>
<td>2.0±0.1</td>
<td>2.0±0.15</td>
<td>50</td>
<td>0.6</td>
<td>0.6</td>
<td>0.1</td>
</tr>
<tr>
<td>44 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>mm</td>
</tr>
</tbody>
</table>

1. The maximum radius the tape with or without components can bend without damage is specified in Section 6: Bending radius requirements.

### Table 6. Carrier tape variable dimensions (width > 24 mm)

<table>
<thead>
<tr>
<th>Tape width</th>
<th>B1</th>
<th>F</th>
<th>P1</th>
<th>S0</th>
<th>T2 max.</th>
<th>W max.</th>
<th>A0, B0, K0</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 mm</td>
<td>23.0</td>
<td>14.2±0.10</td>
<td>4.0±0.1 to 32.0±0.1 by 4.0 increments</td>
<td>28.4±0.1</td>
<td>12.0</td>
<td>32.0±0.3</td>
<td></td>
<td>See (1) mm</td>
</tr>
<tr>
<td>44 mm</td>
<td>35.0</td>
<td>20.2±0.15</td>
<td>4.0±0.1 to 44.0±0.1 by 4.0 increments</td>
<td>40.4±0.1</td>
<td>16.0</td>
<td>44.0±0.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. The cavity defined by A0, B0 and K0 surrounds the component with sufficient clearance so that:
   - The component does not protrude above the top surface of the carrier tape.
   - The component can be removed vertically from the cavity without mechanical restriction, after the top cover tape has been removed.
   - Rotation of the component is limited to 10° maximum for 44 mm tapes.
   - Lateral movements of the component are restricted to 1.0 mm maximum.
6 Bending radius requirements

Figure 7. Bending radius requirements
7 Camber requirements

Carrier camber should not exceed more than 1 mm in 250 mm of carrier tape length.

Figure 8. Camber requirements

To accurately measure camber, place the starting end of the carrier tape sample on the left end of the measurement fixture or straight edge. Moving to the right, measure the allowable camber at the highest point between where the left edge and the right edge of the carrier tape make contact with the measurement fixture or straight edge.
8 Revision history

Table 7. Document revision history

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-Feb-2015</td>
<td>1</td>
<td>Initial release.</td>
</tr>
</tbody>
</table>
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