This document provides information on the tape and reel dimensions for FT232BL, FT245BL, FT232BQ, FT245BQ, FT232RL, FT245RL, FT232RQ, FT245RQ, FT2232D, FT2232HL, FT2232HQ, FT4232HL, FT4232HQ, FT-X series chips, FT12 series chips, FT311D, FT313H, FT4222HQ, VNC1L and VNC2

This Application Note supersedes the FTDI Application Note AN232B-11

Use of FTDI devices in life support and/or safety applications is entirely at the user's risk, and the user agrees to defend, indemnify and hold FTDI harmless from any and all damages, claims, suits or expense resulting from such use.
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1 Introduction

This document provides information on the tape and reel dimensions for FT232BL, FT245BL, FT232BQ, FT245BQ, FT232RL, FT245RL, FT232RQ, FT245RQ, FT232D, FT2232HL, FT232HQ, FT4322HL, FT4232HQ, FT-X series chips, FT12 series chips, FT311D, FT313H, FT4222HQ, VNC1L and VNC2.
2 Packaging options

FTDI can supply devices packaged in tape and reel packaging or in trays or tubes. The quantities in each package type are described below.

### 2.1 Tape and Reel Packaging

<table>
<thead>
<tr>
<th>IC – Tape and Reel</th>
<th>Package</th>
<th>Quantities (pieces)</th>
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<tbody>
<tr>
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<td>LQFP</td>
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<td>FT232BQ, FT245BQ – R</td>
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<td>FT232RL, FT245RL – R</td>
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<td>FT232RQ, FT245RQ – R</td>
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<td>FT2232D – R</td>
<td>LQFP</td>
<td>1000</td>
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<tr>
<td>FT2232HL – R</td>
<td>LQFP</td>
<td>1000</td>
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<tr>
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<td>FT4232HQ – R</td>
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<td>QFN</td>
<td>3000</td>
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<tr>
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<td>FT311DLQFP</td>
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<td>FT311D QFN 7X 7 X .9</td>
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<td>FT120Q- R, FT121Q – R, FT122Q – R</td>
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<td>FT313HP – R</td>
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<td>FT4222HQ-R</td>
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Table 2.1 – Tape and Reel Quantities
2.2 Tray/Tube Packaging

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<tr>
<th>IC – Tray/Tube</th>
<th>Package</th>
<th>Quantities (pieces)</th>
<th>Box of Trays/Tube (pieces)</th>
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<td>FT4232HL – Tray</td>
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<td>160</td>
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<td>260</td>
<td>-</td>
</tr>
<tr>
<td>VINC1L – A – Tray</td>
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<td>2500</td>
</tr>
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<td>LQFP</td>
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<td>-</td>
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<td>-</td>
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<td>VNC2-64LQFP</td>
<td>LQFP</td>
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<tr>
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<td>FT311DLQFP</td>
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<td>FT311D QFN 7X 7 X .9</td>
<td>QFN</td>
<td>260</td>
<td>-</td>
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<td>FT200XD- T, FT234XD-T</td>
<td>DFN</td>
<td>490</td>
<td>100</td>
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<td>FT201XS- U, FT220XS- U, FT230XS- U</td>
<td>SSOP</td>
<td>100</td>
<td>58</td>
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<td>FT240XS - U, FT231XS- U</td>
<td>SSOP</td>
<td>100</td>
<td>58</td>
</tr>
<tr>
<td>FT201XQ- T, FT220XQ- T, FT230XQ- T, FT240XQ- T</td>
<td>QFN</td>
<td>490</td>
<td>58</td>
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<td>FT120T- U, FT122T - U</td>
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<td>FT121T- U</td>
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<td>FT313HP - T</td>
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<td>FT313HL – T</td>
<td>LQFP</td>
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Table 2.2 – Tube/Tray Quantities
3 FT232BL, FT245BL and FT2232D Tape Dimensions

Figure 3.1 – FT232BL, FT245BL and FT2232D Tape Dimensions
4 FT232BL, FT245BL and FT2232D Reel Dimensions

Figure 4.1 – FT232BL, FT245BL and FT2232D Reel Dimensions
5 FT232BQ and FT245BQ Tape Dimensions

Figure 5.1 – FT232BQ and FT245BQ Tape Dimensions
6 FT232BQ and FT245BQ Reel Dimensions

![Reel Dimensions Diagram]

Figure 6.1 – FT232BQ and FT245BQ Reel Dimensions
7 FT232RL and FT245RL Tape Dimensions

Figure 7.1 – FT232RL and FT245RL Tape Dimensions
8 FT232RL and FT245RL Reel Dimensions

Figure 8.1 – FT232RL and FT245RL Reel Dimensions
9 FT232RQ and FT245RQ Tape Dimensions

Figure 9.1 – FT232RQ and FT245RQ Tape Dimensions
10  FT232RQ and FT245RQ Reel Dimensions

Figure 10.1 – FT232RQ and FT245RQ Reel Dimensions
11 FT2232HL and FT4232HL Tape Dimensions

Figure 11.1 – FT2232HL and FT4232HL Tape Dimensions
12 FT2232HL and FT4232HL Reel Dimensions

Figure 12.1 – FT2232HL and FT4232HL Reel Dimensions
FT2232HQ and FT4232HQ Tape Dimensions

Figure 13.1 - FT2232HQ and FT4232HQ Tape Dimensions

Table

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<tr>
<th>Dimension</th>
<th>Tolerance</th>
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<td>3</td>
<td>-0.1</td>
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</tbody>
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Notes:
1. Pin 1 Identifier.
2. Camber not to exceed 1 mm.
3. Material: P5 + C.
4. A0 and B0 measured at ambient.
5. Ao not measured from the base of the pocket hole.
6. Pocket hole located at top surface of the case.

Scale: 3:1
All dimensions are in millimeters.

Section A-A
14 FT2232HQ and FT4232HQ Reel Dimensions

Figure 14.1 – FT2232HQ and FT4232HQ Reel Dimensions
15 FT232HL and FT232HQ Reel Dimensions

Figure 15.1 – FT232HL and FT232HQ Reel Dimensions
16 FT232HL Cover Tape Dimensions

Figure 16.1 – FT232HL Cover Tape Dimensions
17 FT232HQ Cover Tape Dimensions

Figure 17.1 – FT232HQ Cover Tape Dimensions
Figure 18.1 - FT232HL Carrier Tape Dimensions

Notes:
1. To pocket hole, 4° Chord, pitch cumulative tolerance ± 0.2
2. Camber not to exceed 1mm in 100mm
3. Metre: Black Conductive Adhesive Polyimide
4. AO and BO measured on plane 3mm above the bottom of the pocket
5. AO measured from a plane on the inside bottom of the pocket
6. Pocket position required to locate hole measured as pocket is cut into the top surface of the carrier.

K = 1.6 mm
K0 = 2.2 mm
B0 = 9.6 mm
AO = 9.6 mm
19 FT232HQ Carrier Tape Dimensions

Figure 19.1 – FT232HQ Carrier Tape Dimensions
20 FT232HL Tray Dimensions

Figure 20.1 – FT232HL Tray Dimensions
21 FT232HL Tray Dimensions – Side View

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<thead>
<tr>
<th>TYPICAL CONDITION</th>
<th>NOMINAL PKG</th>
<th>GENERAL TOLERANCES</th>
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<tr>
<td>A</td>
<td>±0.005</td>
<td>±0.005</td>
</tr>
<tr>
<td>B</td>
<td>±0.010</td>
<td>±0.010</td>
</tr>
<tr>
<td>C</td>
<td>±0.015</td>
<td>±0.015</td>
</tr>
<tr>
<td>D</td>
<td>±0.020</td>
<td>±0.020</td>
</tr>
<tr>
<td>E</td>
<td>±0.025</td>
<td>±0.025</td>
</tr>
<tr>
<td>F</td>
<td>±0.030</td>
<td>±0.030</td>
</tr>
<tr>
<td>G</td>
<td>±0.035</td>
<td>±0.035</td>
</tr>
<tr>
<td>H</td>
<td>±0.040</td>
<td>±0.040</td>
</tr>
</tbody>
</table>

CRITERION FOR PACKAGE & TRAY COMPATIBILITY

- A > B + C + D + E + F + G + H
- Accept
- A ≤ B + C + D + E + F + G + H
- Zero

SECTION J - J

tray stacking
Figure 21.1 – FT232HL Tray Dimensions Side View
22 FT232HQ Tray Dimensions

Figure 22.1 – FT232HQ Tray Dimensions
23 FT232HQ Tray Dimensions – Side View
Figure 23.1 – FT232HQ Tray Dimensions Side View
24 FT232HL and FT232HQ Protective Belt

Figure 24.1 – FT232HL and FT232HQ Protective Belt
Figure 25.1 – VNC1L – A – Reel Vendor Part No. RD33008SW
26 VNC1L – A – Cover Tape Vendor Part No. AA13305NP

Figure 26.1 – VNC1L – A – Cover Tape Vendor Part No. AA13305NP
27  VNC1L – A – Carrier Tape Vendor Part No. Q07X07-A

Figure 27.1 – VNC1L – A – Carrier Tape Vendor Part No. Q07X07-A
28 VNC2 – LQFP-32, LQFP-48, LQFP-64, QFN-32, QFN-48 & QFN-64, FT311D–LQFP Reel Dimensions

Figure 28.1 – VNC2 – LQFP-32, LQFP-48, LQFP-64, QFN-32, QFN-48 and QFN-64, FT311D–LQFP Reel Dimensions
29  VNC2 – LQFP-32 VNC2 – LQFP-48, FT311D – LQFP Cover Tape Dimensions

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<th>P/N</th>
<th>VH-8D.5,20-300-E1</th>
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<th>VH-32-25.0,300-E1</th>
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### Figure 29.1 VNC2 – LQFP-32 VNC2 – LQFP-48, FT311D – LQFP Cover Tape Dimensions
30 VNC2 –LQFP-64, QFN-32, QFN-48, QFN-64, FT311D-QFN

Cover Tape Dimensions

Figure 30.1 VNC2 –LQFP-64, QFN-32, QFN-48, QFN-64, FT311D-QFN Cover Tape Dimensions
31 VNC2 – LQFP-32, VNC2 – LQFP-48, FT311D – LQFP Carrier Tape Dimensions

Notes:
1. Sprocket hole pitch cumulative tolerance ± 0.2
2. Camber not to exceed 1mm in 100mm
3. Material: Black Conductive Advantek Polyethylene
4. A0 and Bo measured on a plane 0.3mm above the bottom of the pocket to the top surface of the carrier.
5. Ko measured from a plane on the inside bottom of the pocket.
6. Pin 1 identifier determined from hole position of pocket, not pocket hole.

Figure 31.1 VNC2 – LQFP-32, VNC2 – LQFP-48, FT311D – LQFP Carrier Tape Dimensions
32 VNC2 – LQFP-64 Carrier Tape Dimensions

Figure 32.1 VNC2 – LQFP-64 Carrier Tape Dimensions
33 VNC2 – QFN-32, FT311D-QFN Carrier Tape Dimensions

Figure 33.1 VNC2 – QFN-32, FT311D-QFN Carrier Tape Dimensions
34 VNC2 – QFN-48 and QFN-64 Carrier Tape Dimensions

Figure 34.1 VNC2 – QFN-48 and QFN-64 Carrier Tape Dimensions
35 VNC2 – LQFP-32 VNC2 – LQFP-48 and FT311D QFN Tray Dimensions

Figure 35.1 VNC2 – LQFP-32 VNC2 – LQFP-48 and FT311D QFN Tray Dimensions
36 VNC2 – LQFP-32, VNC2 – LQFP-48 and FT311D LQFP
Tray Dimensions – Side View
Critical for Package & Tray Compatibility

1. A > F (Accept)
2. B > G (Accept)
3. C > D > E > Zero
4. G > A (Accept)
5. H > E > Zero
6. E > H

Table of Dimensions

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<th>Dimension</th>
<th>Value</th>
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<td>C</td>
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<td>D</td>
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37 VNC2 – LQFP-64 Tray Dimensions

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38  VNC2 – LQFP-64 Tray Dimensions – Side View
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39  VNC2 – QFN-32 and FT311D QFN Tray Dimensions

Figure 39.1 VNC2 – QFN-32 and FT311D QFN Tray Dimensions
40 VNC2 – QFN-48 and QFN-64 Tray Dimensions

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**Criteria for Package & Tray Compatibility**

1. A > F
   - Accept
2. B > A
   - Accept
3. G > E
   - Accept
4. C > E
   - Accept
5. H > 0
   - Accept

**Section A-A**

**Typical Condition**

**Nominal Tray**

**General Clearances**

**Dimensions in mm**
Figure 41.1 VNC2 – QFN-48 and QFN-64 Tray Dimensions – Side View
42 VNC2 – LQFP-32, LQFP-48, LQFP-64, QFN-32, QFN-48, QFN-64 and FT311D-LQFP, FT311D-QFN Protective Belt

Figure 42.1 VNC2 – LQFP-32, LQFP-48, LQFP-64, QFN-32, QFN-48, QFN-64 and FT311D-LQFP, FT311D-QFN Protective Belt
43 FT200XD, FT234XD Reel Dimensions

Figure 43.1 FT200XD, FT234XD Reel Dimensions
44 FT200XD, FT234XD Tape Dimensions

Notes:
1. 10 sprocket hole pitch cumulative tolerance ± 0.2.
2. Camber not to exceed 1mm in 100mm.
4. A0 and B0 measured on a plane 0.3mm above the bottom of the pocket.
5. The measured from a plane of the inside bottom of the pocket, not pocket hole.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.
7. Cover tape width 9.3±0.1mm.

Figure 44.1 FT200XD, FT234XD Tape Dimensions
45 FT201XQ, FT220XQ, FT221XQ, FT230XQ, FT231XQ, FT240XQ QFN Reel Dimensions

Figure 45.1 FT201XQ, FT220XQ, FT221XQ, FT230XQ, FT231XQ, FT240XQ QFN Reel Dimensions
46 FT201XQ, FT220XQ, FT221XQ, FT230XQ, FT231XQ, FT240XQ QFN Tape Dimensions

Notes:
1. 10 sprocket hole pitch cumulative tolerance ± 0.2
2. Camber: not to exceed 1mm in 100mm
3. Material: Black, Polyethylene
4. Ao and Bo measured on a plane on the inside bottom of the pocket. Au measured from the top surface of the carrier.
5. Pocket position: measured as true position of pocket, not pocket hole.

Figure 46.1 FT201XQ, FT220XQ, FT221XQ, FT230XQ, FT231XQ, FT240XQ QFN Tape Dimensions
47 FT201XQ, FT220XQ, FT230XQ SSOP Reel Dimensions

Figure 47.1 FT201XQ, FT220XQ, FT230XQ SSOP Reel Dimensions
48  FT201XQ, FT220XQ, FT230XQ SSOP Tape Dimensions

Notes:
1. 10 sprocket hole pitch cumulative tolerance ± 0.2mm
2. Camber not to exceed 1mm in 100mm
3. Material: Anti-Static Black Advantek Polyvinyl
4. Ao and Bo measured on a plane 0.5mm above the bottom of the pocket
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole location as true position of pocket, not pocket hole.

Figure 48.1 FT201XQ, FT220XQ, FT230XQ SSOP Tape Dimensions
49  FT221XQ, FT231XQ, FT240XQ SSOP Reel Dimensions

Figure 49.1 FT221XQ, FT231XQ, FT240XQ SSOP Reel Dimensions
50 FT221XQ, FT231XQ, FT240XQ SSOP Tape Dimensions

Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2
2. Camber not to exceed 1mm in 100mm.
3. Material: Block - Acetal, Polyethylene.
4. Ao and Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Kp measured from the top surface of the top pocket.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Figure 50.1 FT221XQ, FT231XQ, FT240XQ SSOP Tape Dimensions
51 FT120T, FT122T TSSOP Reel Dimensions

![Diagram of FT120T, FT122T TSSOP Reel Dimensions]

**Figure 51.1 FT120T, FT122T TSSOP Reel Dimensions**
52 FT120T, FT122T TSSOP Tape Dimensions

Figure 52.1 FT120T, FT122T TSSOP Tape Dimensions
53  FT121T, FT120Q, FT121Q, FT122Q Reel Dimensions

Figure 53.1 FT121T, FT120Q, FT121Q, FT122Q Reel Dimensions
54  FT120Q, FT122Q QFN Tape Dimensions

Figure 54.1 FT120Q, FT122Q QFN Tape Dimensions
55  FT121T TSSOP Tape Dimensions

Figure 55.1 FT121T TSSOP Tape Dimensions
56 FT121Q QFN Tape Dimensions

Figure 56.1 FT121Q QFN Tape Dimensions
57 FT201XS, FT220XS, FT230XS, FT240XS Reel Dimensions

Figure 57.1 FT201XS, FT220XS, FT230XS, FT240XS Reel Dimensions
58 FT221XS, FT231XS Reel Dimensions

Figure 58.1 FT221XS, FT231XS Reel Dimensions
59 FT231XS Tube Dimensions

Figure 59.1 FT231XS Tube Dimensions
60 FT313H-QFN Reel Dimensions

Figure 60.1 FT313H-QFN Reel Dimensions
61 FT313H-QFN Tape Dimensions

Notes:
1. Specified holes plus cumulative tolerance ± 0.2
2. Top edge of tape to center line of 7mm in 7.5mm
3. Material: Black Polyimide
4. A, b, and c are measured on a plane 0.3mm above the bottom of the cavity
5. "A" is the distance from the inside bottom of the cavity to the top surface of the footprint
6. Pocket position relative to specified hole, not pocket hole

Figure 61.1 FT313H-QFN Tape Dimensions
62 FT313H-LQFP Reel Dimensions

Figure 62.1 FT313H-LQFP Reel Dimensions
63 FT313H-LQFP Tape Dimensions

Figure 63.1 FT313H-LQFP Tape Dimensions
64  FT313H-TQFP Reel Dimensions

Figure 64.1 FT313H-TQFP Reel Dimensions
65 FT313H-TQFP Tape Dimensions

NOTES:
1. SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.2
2. CAMBER IN COMPLIANCE WITH EIA 481
3. POCKET POSITION RELATIVE TO SPROCKET HOLE MEASURED AS TRUE POSITION OF POCKET, NOT POCKET HOLE
4. COVER TAPE WIDTH : 13.3±0.1

Figure 65.1 FT313H-TQFP Tape Dimensions
66 FT600Q Reel Dimensions

Figure 66.1 FT600Q Reel Dimensions
67 FT600Q Tape Dimensions

NOTES:
1. DIM IN MM
2. SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.2
3. CAMER NOT TO EXCEED 1 MM IN 100 MM
4. POCKET POSITION RELATIVE TO SPROCKET HOLE MEASURED
5. SURFACE RESISTIVITY LESS THAN OR EQUAL TO 10^7 OHMS/SQ.

Figure 67.1 FT600Q Tape Dimensions
68  FT601Q, FT602Q Reel Dimensions

Figure 68.1 FT601Q, FT602Q Reel Dimensions
69 FT601Q, FT602Q Tape Dimensions

Notes:
1. 10 mm pocket hole pitch cumulative tolerance ± 0.2.
2. Camber: Not to exceed 1 mm in 100 mm.
4. Pins measured from a plane on the inside bottom of the pocket to the top surface of the corner.
5. Pin 1 identifier.
6. As the position of pocket.

Figure 69.1 FT601Q, FT602Q Tape Dimensions
70 FT4222HQ Reel Dimensions

Figure 70.1 FT4222HQ Reel Dimensions
71 FT4222HQ Tape Dimensions

Figure 71.1 FT4222HQ Tape Dimensions
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Appendix A – References

Document References

NA

Acronyms and Abbreviations

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<td>TSSOP</td>
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2010-05-24
2011-01-17
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2012-12-06
2017-07-12
2017-11-02