Technical Note

TN_166

FTDI Example IC PCB Footprints

Version 1.2

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This Technical Note shows examples of FTDI IC PCB footprints which can be used as a guide for creating your own IC PCB footprints.

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 Technical Note shows examples of FTDI IC PCB footprints which can be used as a guide for creating your own PCB footprints.

The IC footprints in this document are sourced from various FTDI hardware such as development and application modules and demo hardware, using the most common and cost effective package types.

The IC footprints in this document provide:

- A 1:1 scaled IC footprint
- An annotated IC footprint showing some key measurements

All dimensions shown are in millimeters (mm).

Additionally, a range of USB Interface IC solutions from FTDI Chip available through AltiumLive.

To view Altium files, you need either the full version of 'Altium Designer', or 'Altium Viewer' which can be downloaded for free from Altium's web site.

http://www.ftdichip.com/Support/Documents/PCBData.htm

Note that all IC footprints may not be available through AltiumLive. Please contact FTDI in this case.

1.1 Scope

These IC PCB footprints can be used as a guide to create your own IC PCB footprints with particular PCB design tools other than Altium.

Please refer to the IC datasheet for full IC package parameters.

Note: No guarantees can be provided in this document. These can be used as a guide only.

Note: FTDI Cables and Modules are recommended for product test and development prior to custom hardware development.

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2 All Scaled Footprints

This section shows all packages scaled to 1:1 size to show the exact package size which can help when selecting a package to use in your design.

Note that not all packages are available for all products. See Section 3 'Packages by Product' in this document, the product datasheet, or check the IC webpage:

http://www.ftdichip.com/Products/ICs.htm

2.1 DFN Packages

Figure 2.1 shown in pin count order from left to right:

DFN-10, DFN-12.

Figure 2.1 DFN Packages

2.2 QFP Packages

Figure 2.2 shown in pin count order from left to right:

LQFP-32, LQFP-48, LQFP-64, TQFP-64.

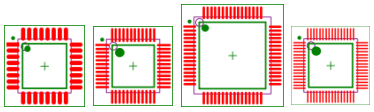

Figure 2.2 QFP Packages

2.3 QFN Packages

Figure 2.3 shown in pin count order from left to right:

QFN-16 (4x4), QFN-20, QFN-24, QFN-28, WQFN-28, QFN-32 (5x5), QFN-32 (7x7), QFN-48 (8x8), QFN-56 (7x7), VQFN-56 (8x8), QFN-64 (9x9), QFN-76.

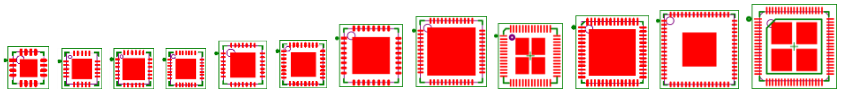

Figure 2.3 QFN Packages

2.4 SSOP Packages

Figure 2.4 shown in pin count order from left to right:

SSOP-16, SSOP-20, SSOP-24, SSOP-28, TSSOP-28.

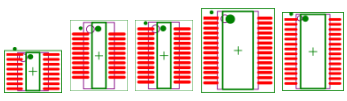

Figure 2.4 SSOP Packages

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3 Packages by Product

Package availability for FTDI products is shown in this section.

3.1 DFN Packages

Package	Part Numbers
DFN-10	FT200XD
DFN-12	FT234XD

Table 3.1 DFN Packages

3.2 QFP Packages

Package	Part Numbers
LQFP-32	FT232BL, FT245BL, FT311D-32L1C, FT312D-32L1C, VNC2-32L1B
LQFP-48	FT232HL, FT2232D, VNC1L-1A, VNC2--48L1B
LQFP-64	FT2232HL, FT4232HL, FT313HL
TQFP-64	FT313HP

Table 3.2 QFP Packages

3.3 QFN Packages

Package	Part Numbers
QFN-16 (4x4)	FT201XQ, FT220XQ, FT230XQ
QFN-20	FT221XQ, FT231XQ
QFN-24	FT240XQ
QFN-28	FT120Q
WQFN-28	FT260Q
QFN-32 (5x5)	FT232RQ, FT245RQ, FT4222HQ
QFN-32 (7x7)	FT311D-32Q1C, FT312D-32Q1C, VNC2-32Q1B
QFN-48 (8x8)	FT232HQ, VNC2-48Q1B
QFN-56 (7x7)	FT600Q
VQFN-56 (8x8)	FT2232H-56Q, FT4232H-56Q
QFN-64 (9x9)	FT2232HQ, FT4232HQ, FT313HQ
QFN-76	FT601Q, FT602Q

Table 3.3 QFN Packages

3.4 SSOP Packages

Package	Part Numbers
SSOP-16	FT201XS, FT220XS, FT230XS
SSOP-20	FT221XS, FT231XS
SSOP-24	FT240XS
SSOP-28	FT232RL, FT245RL
TSSOP-28	FT120T, FT260S

Table 3.4 SSOP Packages

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4 10-pin DFN

The 10-pin DFN is used on the following product:

- FT200XD

This package is nominally 3.00mm x 3.00mm. The solder pads are on a 0.50mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

4.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 4.1 10-pin DFN Scaled Footprint

4.2 Annotated Footprint

The annotated footprint shows key measurements.

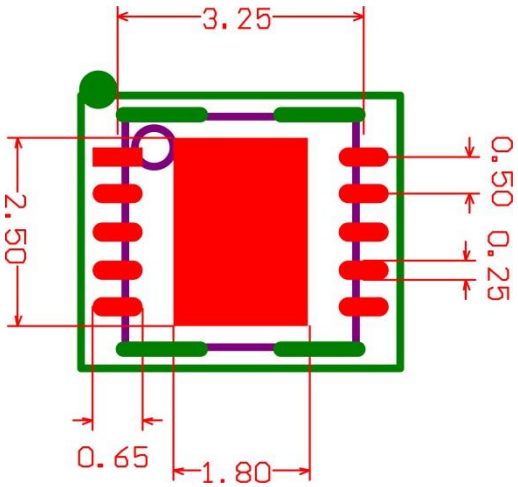

Figure 4.2 10-pin DFN Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

Note: Connect exposed center pad to GND. Do not place tracks on the top layer of the PCB in this area.

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5 12-pin DFN

The 12-pin DFN is used on the following product:

- FT234XD

This package is nominally 3.00mm x 3.00mm. The solder pads are on a 0.45mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

5.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 5.1 12-pin DFN Scaled Footprint

5.2 Annotated Footprint

The annotated footprint shows key measurements.

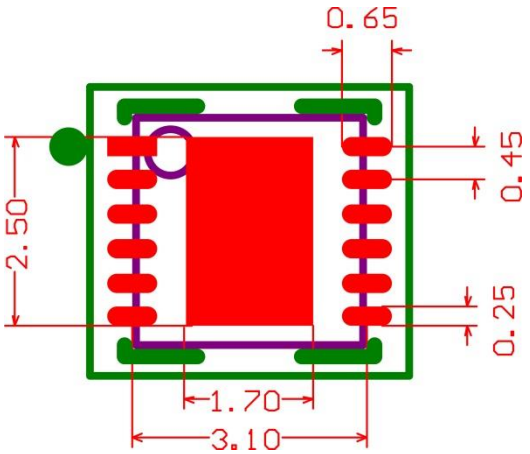

Figure 5.2 12-pin DFN Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

Note: Connect exposed center pad to GND. Do not place tracks on the top layer of the PCB in this area.

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6 16-pin QFN (4mm x 4mm)

The 16-pin QFN (4mm x 4mm) is used on the following products:

- FT201XQ
- FT220XQ
- FT230XQ

This package is nominally 4.00mm x 4.00mm. The solder pads are on a 0.65mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

6.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 6.1 16-pin QFN (4mm x 4mm) Scaled Footprint

6.2 Annotated Footprint

The annotated footprint shows key measurements.

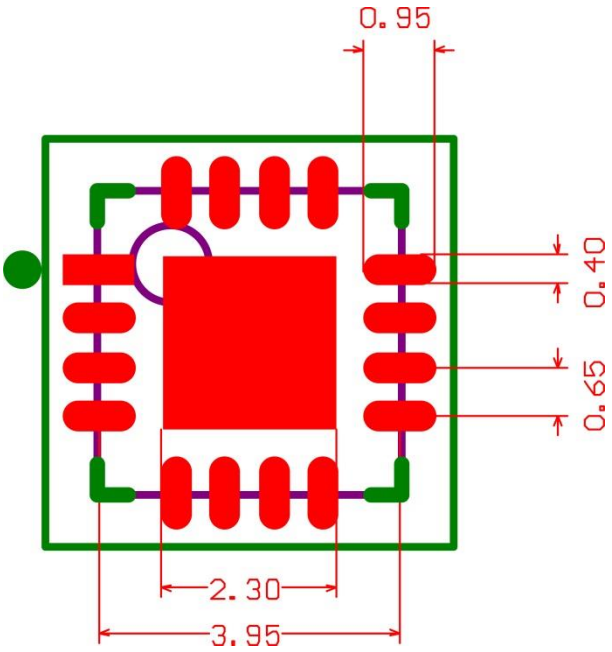

Figure 6.2 16-pin QFN (4mm x 4mm) Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

Note: Connect exposed center pad to GND. Do not place tracks on the top layer of the PCB in this area.

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7 16-pin SSOP

The 16-pin SSOP is used on the following products:

- FT201XS
- FT220XS
- FT230XS

This package is nominally 4.90mm x 3.91mm body (4.90mm x 5.99mm including pins). The solder pads are on a 0.635mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

7.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 7.1 16-pin SSOP Scaled Footprint

7.2 Annotated Footprint

The annotated footprint shows key measurements.

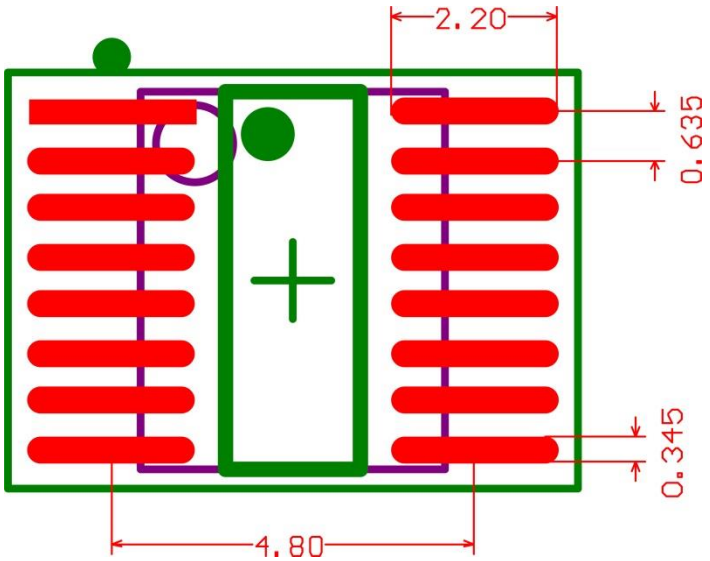

Figure 7.2 16-pin SSOP Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

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8 20-pin QFN

The 20-pin QFN is used on the following products:

- FT221XQ
- FT231XQ

This package is nominally 4.00mm x 4.00mm. The solder pads are on a 0.50mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

8.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 8.1 20-pin QFN Scaled Footprint

8.2 Annotated Footprint

The annotated footprint shows key measurements.

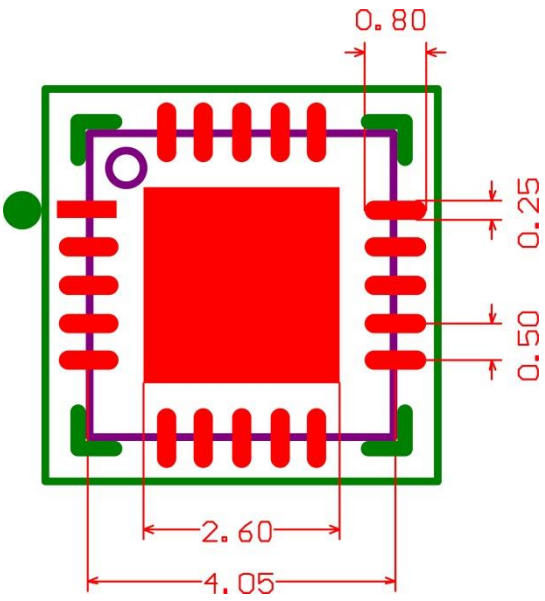

Figure 8.2 20-pin QFN Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

Note: Connect exposed center pad to GND. Do not place tracks on the top layer of the PCB in this area.

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9 20-pin SSOP

The 20-pin SSOP is used on the following products:

- FT221XS
- FT231XS

This package is nominally 8.66mm x 3.91mm body (8.66mm x 5.99mm including pins). The solder pads are on a 0.635mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

9.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 9.1 20-pin SSOP Scaled Footprint

9.2 Annotated Footprint

The annotated footprint shows key measurements.

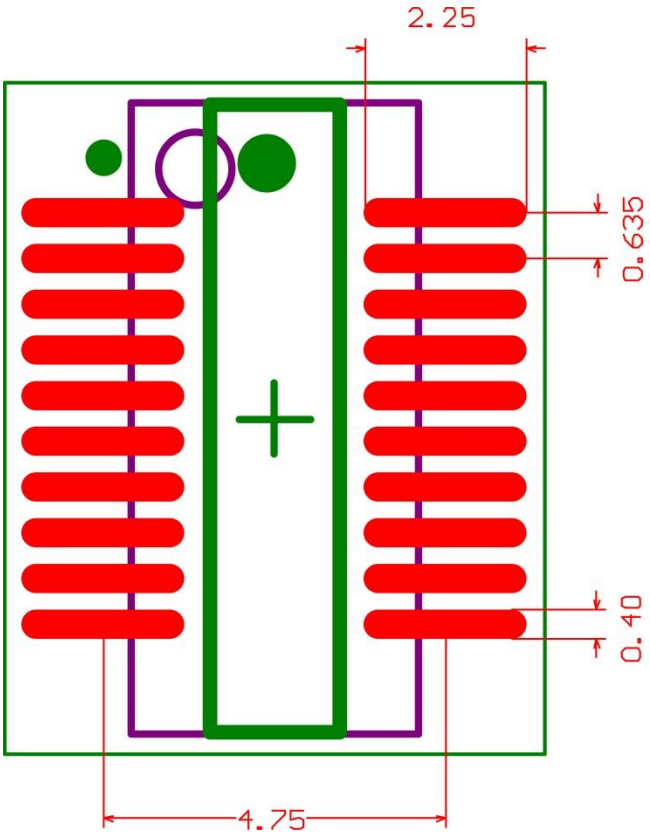

Figure 9.2 20-pin SSOP Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

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10 24-pin QFN

The 24-pin QFN is used on the following product:

- FT240XQ

This package is nominally 4.00mm x 4.00mm. The solder pads are on a 0.50mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

10.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 10.1 24-pin QFN Scaled Footprint

10.2 Annotated Footprint

The annotated footprint shows key measurements.

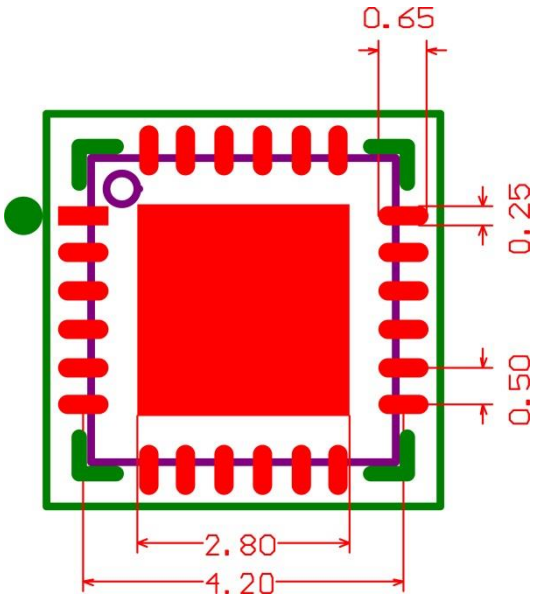

Figure 10.2 24-pin QFN Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

Note: Connect exposed center pad to GND. Do not place tracks on the top layer of the PCB in this area.

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11 24-pin SSOP

The 24-pin SSOP is used on the following products:

- FT240XS

This package is nominally 8.66mm x 3.91 mm body (8.66mm x 5.99mm including pins). The solder pads are on a 0.635mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

11.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 11.1 24-pin SSOP Scaled Footprint

11.2 Annotated Footprint

The annotated footprint shows key measurements.

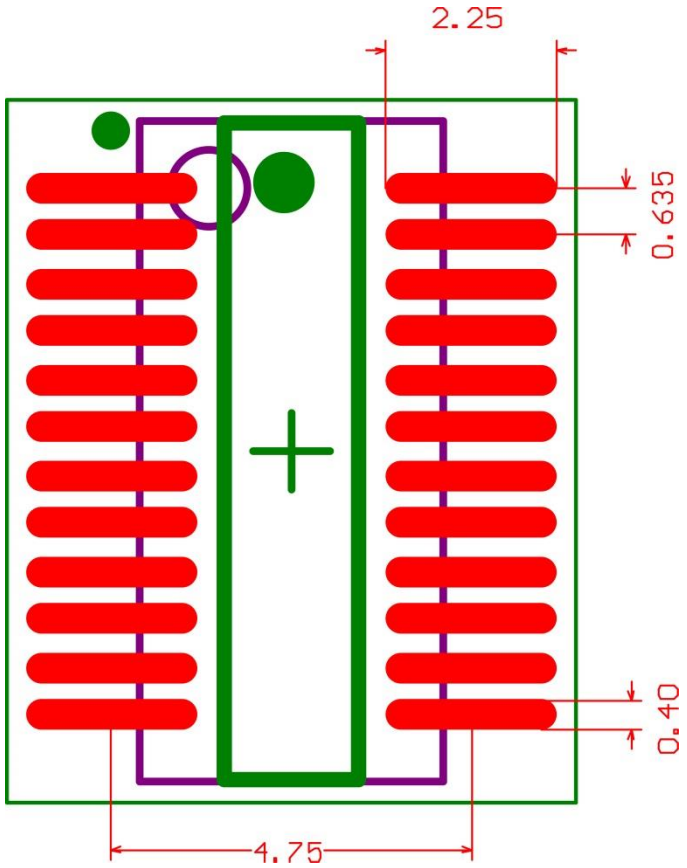

Figure 11.2 24-pin SSOP Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

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12 28-pin QFN

The 28-pin QFN is used on the following products:

- FT120Q

This package is nominally 4.00mm x 4.00mm. The solder pads are on a 0.40mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

12.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 12.1 28-pin QFN Scaled Footprint

12.2 Annotated Footprint

The annotated footprint shows key measurements.

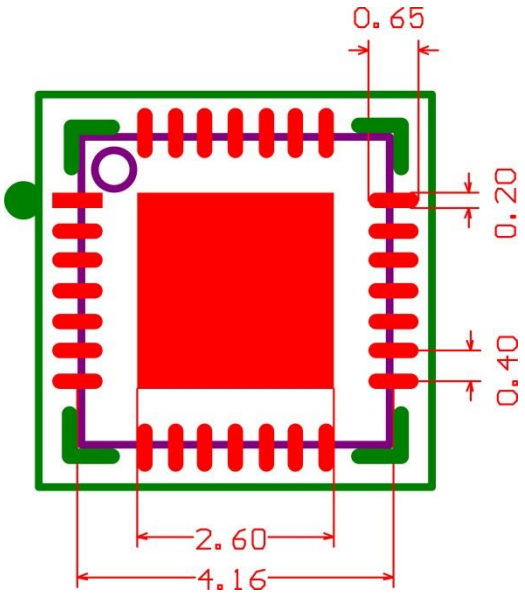

Figure 12.2 28-pin QFN Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

Note: Connect exposed center pad to GND. Do not place tracks on the top layer of the PCB in this area.

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13 28-pin SSOP

The 28-pin SSOP is used on the following products:

- FT232RL
- FT245RL

This package is nominally 5.30mm x 10.20mm body (7.80mm x 10.20mm including pins). The solder pads are on a 0.65mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

13.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 13.1 28-pin SSOP Scaled Footprint

13.2 Annotated Footprint

The annotated footprint shows key measurements.

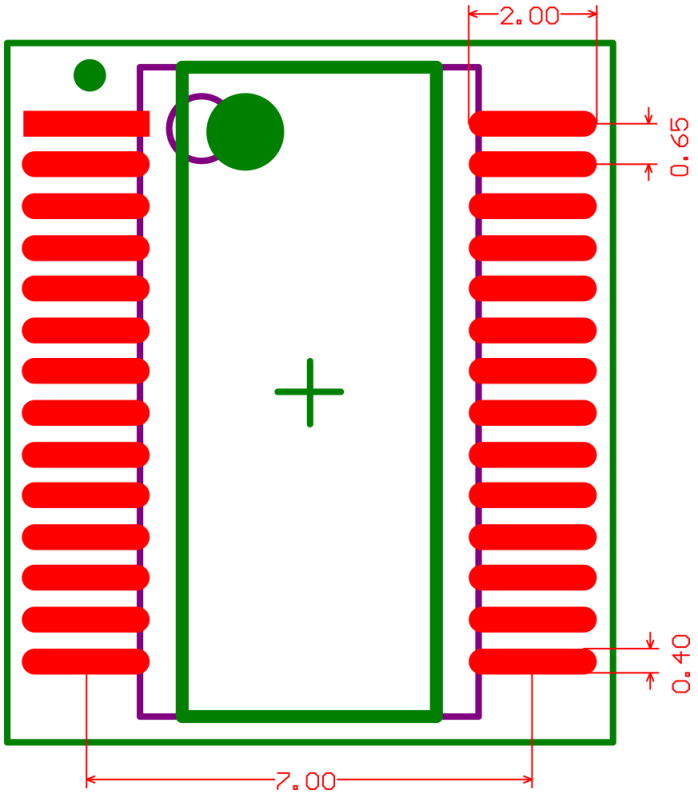

Figure 13.2 28-pin SSOP Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers

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14 28-pin TSSOP

The 28-pin TSSOP is used on the following products:

- FT120T
- FT260S

This package is nominally 9.7mm x 4.4mm body (9.7mm x 6.4mm including pins). The solder pads are on a 0.65mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

14.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 14.1 28-pin TSSOP Scaled Footprint

14.2 Annotated Footprint

The annotated footprint shows key measurements.

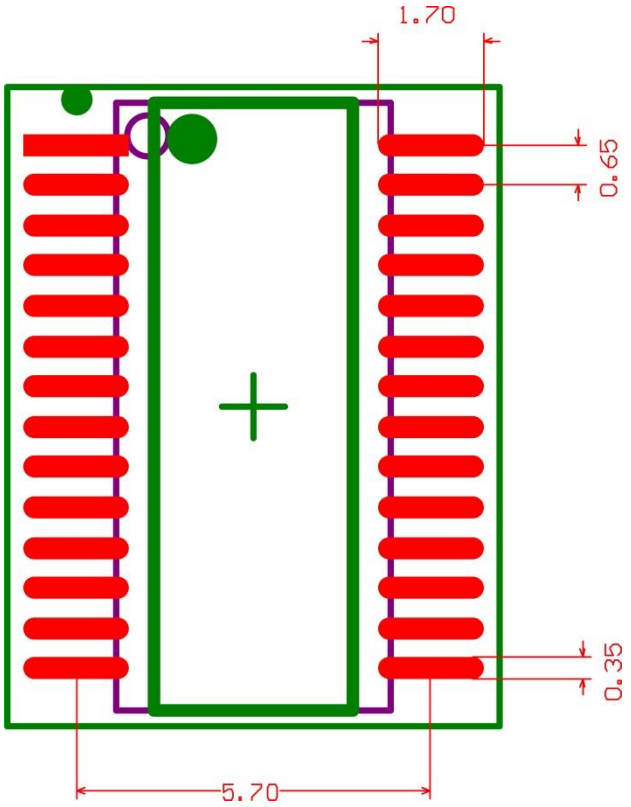

Figure 14.2 28-pin TSSOP Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

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15 28-pin WQFN

The 28-pin WQFN is used on the following product:

- FT260Q

This package is nominally 5.00mm x 5.00mm. The solder pads are on a 0.50mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

15.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 15.1 28-pin WQFN Scaled Footprint

15.2 Annotated Footprint

The annotated footprint shows key measurements.

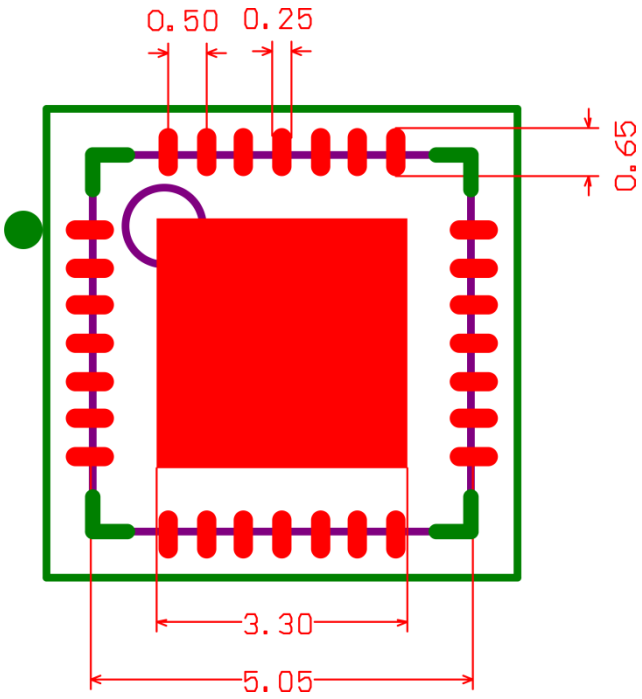

Figure 15.2 28-pin WQFN Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

Note: Connect exposed center pad to GND. Do not place tracks on the top layer of the PCB in this area.

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16 32-pin LQFP

The 32-pin LQFP is used on the following products:

- VNC2-32L1B
- FT311D-32L1C
- FT312D-32L1C
- FT232BL
- FT245BL

This package is nominally 9.00mm x 9.00mm. The solder pads are on a 0.80mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

16.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 16.1 32-pin LQFP Scaled Footprint

16.2 Annotated Footprint

The annotated footprint shows key measurements.

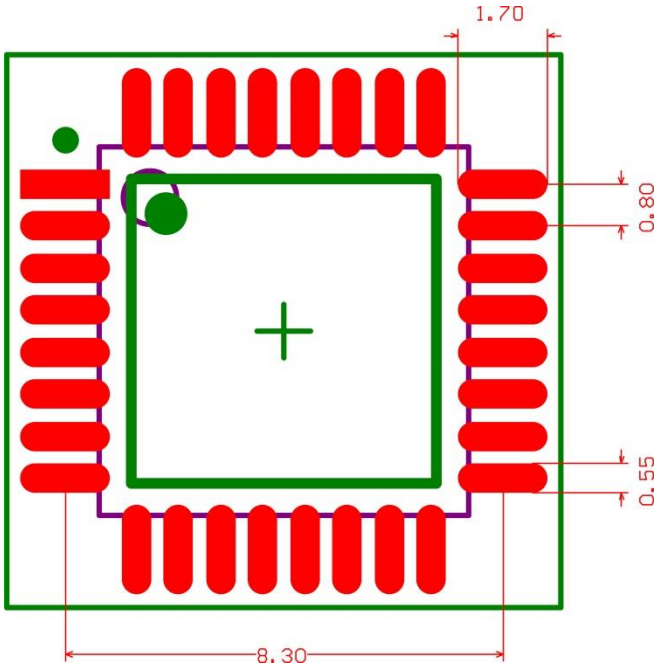

Figure 16.2 32-pin LQFP Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

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17 32-pin VQFN/QFN (5mm x 5mm)

The 32-pin VQFN/QFN (5mm x 5mm) is used on the following products:

- FT232RQ
- FT245RQ
- FT4222HQ

This package is nominally 5.00mm x 5.00mm. The solder pads are on a 0.50mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

17.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 17.1 32-pin VQFN/QFN (5mm x 5mm) Scaled Footprint

17.2 Annotated Footprint

The annotated footprint shows key measurements.

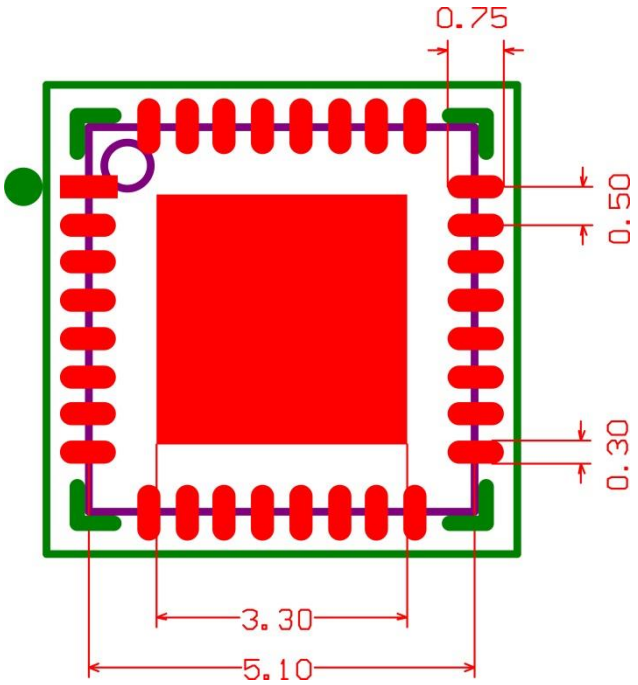

Figure 17.2 32-pin VQFN/QFN (5mm x 5mm) Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

Note: Connect exposed center pad to GND. Do not place tracks on the top layer of the PCB in this area.

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18 32-pin QFN (7mm x 7mm)

The 32-pin QFN (7mm x 7mm) is used on the following products:

- VNC2-32Q1B
- FT311D-32Q1C
- FT312D-32Q1C

This package is nominally 7.00mm x 7.00mm. The solder pads are on a 0.65mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

18.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 18.1 32-pin QFN (7mm x 7mm) Scaled Footprint

18.2 Annotated Footprint

The annotated footprint shows key measurements.

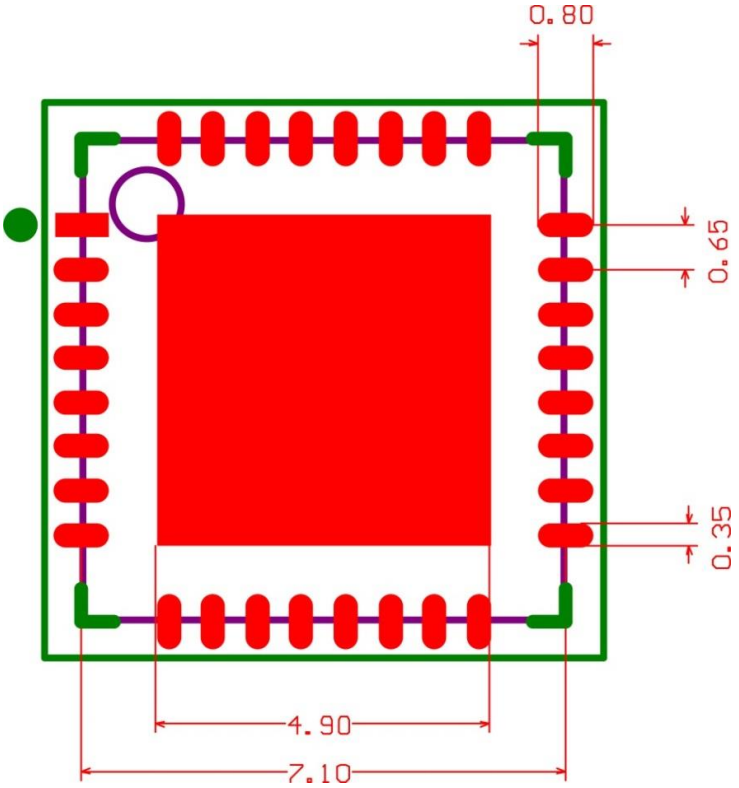

Figure 18.2 32-pin QFN (7mm x 7mm) Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

Note: Connect exposed center pad to GND. Do not place tracks on the top layer of the PCB in this area.

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19 48-pin LQFP

The 48-pin LQFP is used on the following products:

- FT232HL
- FT2232D
- VNC1L-1A
- VNC2-48Q1B

This package is nominally 9.00mm x 9.00mm. The solder pads are on a 0.50mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

19.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 19.1 48-pin LQFP Scaled Footprint

19.2 Annotated Footprint

The annotated footprint shows key measurements.

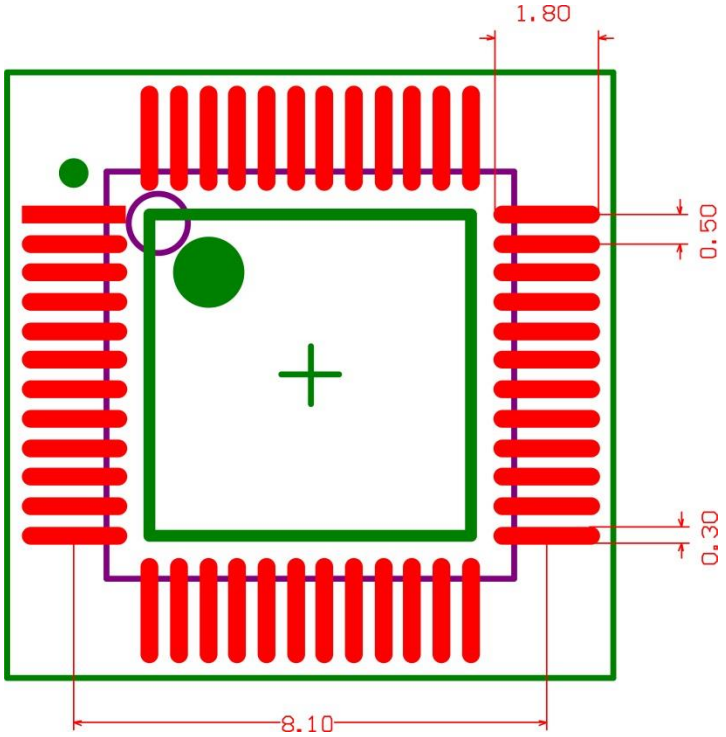

Figure 19.2 48-pin LQFP Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

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20 48-pin QFN (8mm x 8mm)

The 48-pin QFN (8mm x 8mm) is used on the following products:

- VNC2-48Q1B
- FT232HQ

This package is nominally 8.00mm x 8.00mm. The solder pads are on a 0.50mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

20.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 20.1 48-pin QFN (8mm x 8mm) Scaled Footprint

20.2 Annotated Footprint

The annotated footprint shows key measurements.

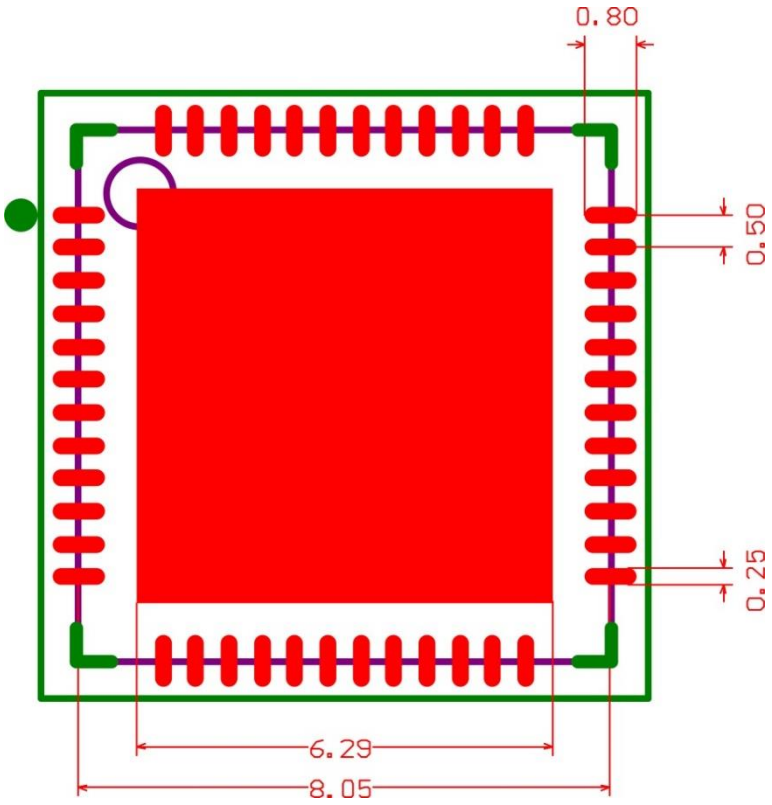

Figure 20.2 48-pin QFN (8mm x 8mm) Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

Note: Connect exposed center pad to GND. Do not place tracks on the top layer of the PCB in this area.

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21 56-pin QFN (7mm x 7mm)

The 56-pin QFN (7mm x 7mm) is used on the following product:

- FT600Q

This package is nominally 7.00mm x 7.00mm. The solder pads are on a 0.40mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

21.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 21.1 56-pin QFN (7mm x 7mm) Scaled Footprint

21.2 Annotated Footprint

The annotated footprint shows key measurements.

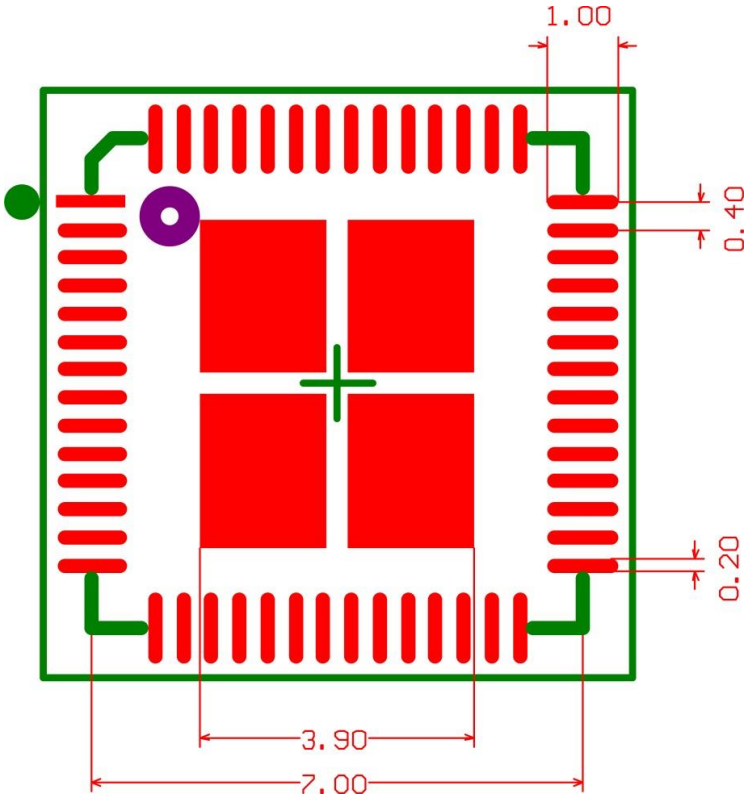

Figure 21.2 56-pin QFN (7mm x 7mm) Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

Note: Connect exposed center pad to GND. Do not place tracks on the top layer of the PCB in this area. Cross-hatching designs used for less solder paste and less heat up rate required.

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22 56-pin VQFN (8mm x 8mm)

The 56-pin VQFN (8mm x 8mm) is used on the following products:

- FT2232H-56Q
- FT4232H-56Q

This package is nominally 8.00mm x 8.00mm. The solder pads are on a 0.50mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

22.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 22.1 56-pin VQFN (8mm x 8mm) Scaled Footprint

22.2 Annotated Footprint

The annotated footprint shows key measurements.

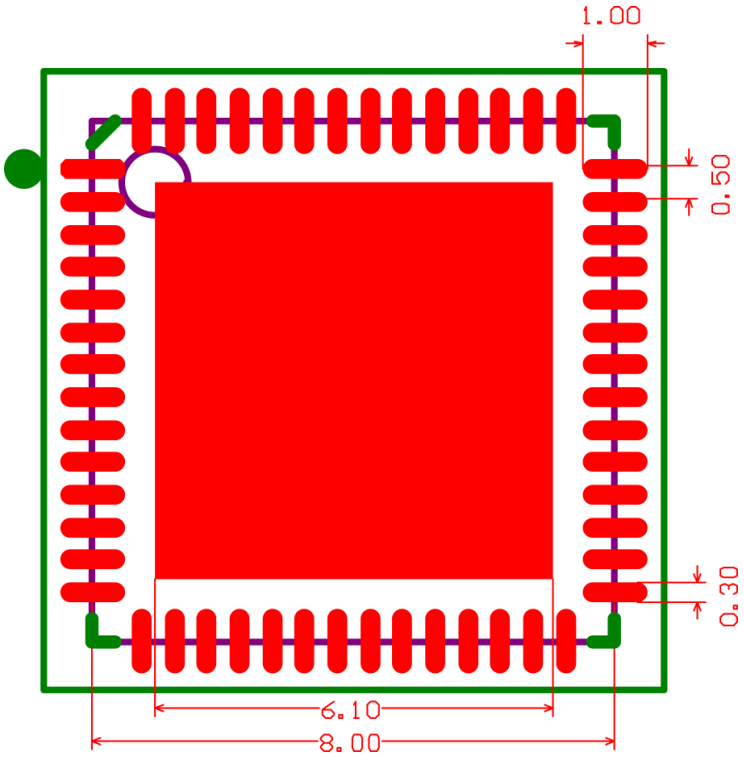

Figure 22.2 56-pin VQFN (8mm x 8mm) Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

Note: Connect exposed center pad to GND. Do not place tracks on the top layer of the PCB in this area.

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23 64-pin LQFP

The 64-pin LQFP is used on the following products:

- FT313HL
- FT2232HL
- FT4232HL

This package is nominally 12.00mm x 12.00mm. The solder pads are on a 0.50mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

23.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

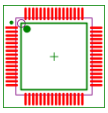

Figure 23.1 64-pin LQFP Scaled Footprint

23.2 Annotated Footprint

The annotated footprint shows key measurements.

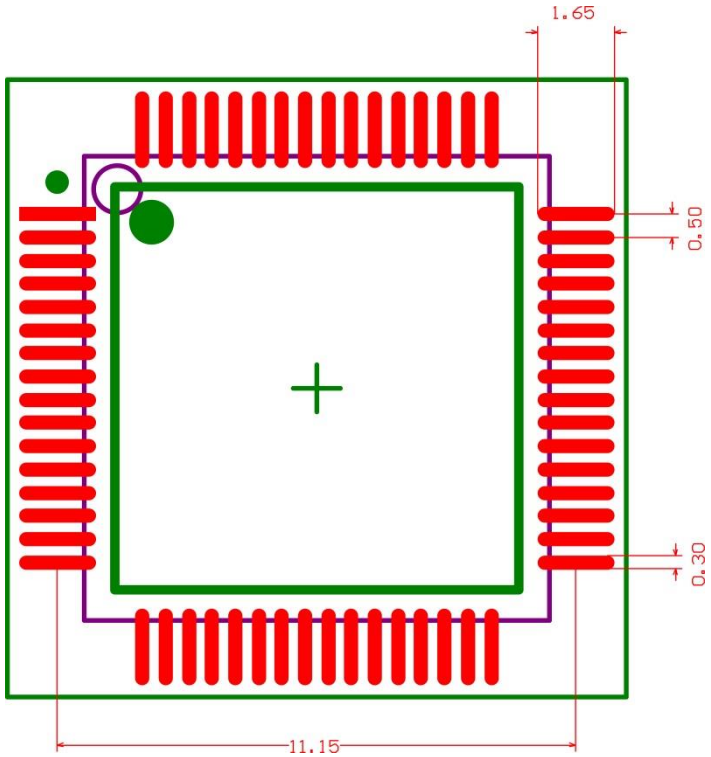

Figure 23.2 64-pin LQFP Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

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24 64-pin TQFP

The 64-pin TQFP is used on the following products:

- FT313HP

This package is nominally 9.00mm x 9.00mm. The solder pads are on a 0.40mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

24.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 24.1 64-pin TQFP Scaled Footprint

24.2 Annotated Footprint

The annotated footprint shows key measurements.

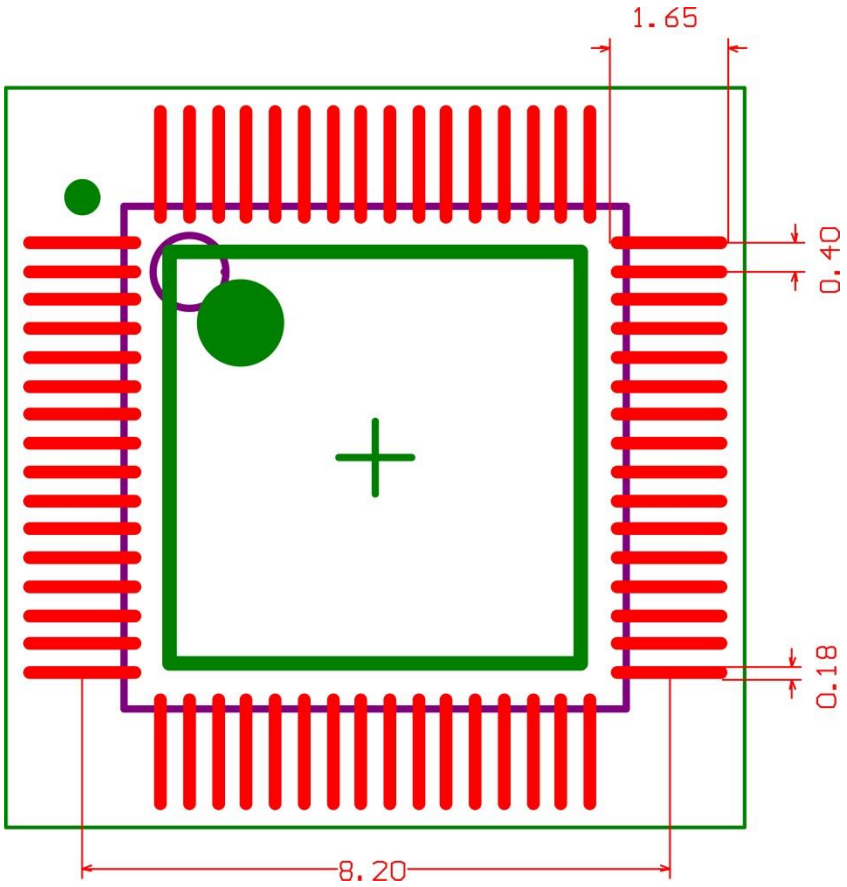

Figure 24.2 64-pin TQFP Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

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25 64-pin QFN (9mm x 9mm)

The 64-pin QFN (9mm x 9mm) is used on the following products:

- FT313HQ
- FT2232HQ
- FT4232HQ

This package is nominally 9.00mm x 9.00mm. The solder pads are on a 0.50mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

25.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 25.1 64-pin QFN (9mm x 9mm) Scaled Footprint

25.2 Annotated Footprint

The annotated footprint shows key measurements.

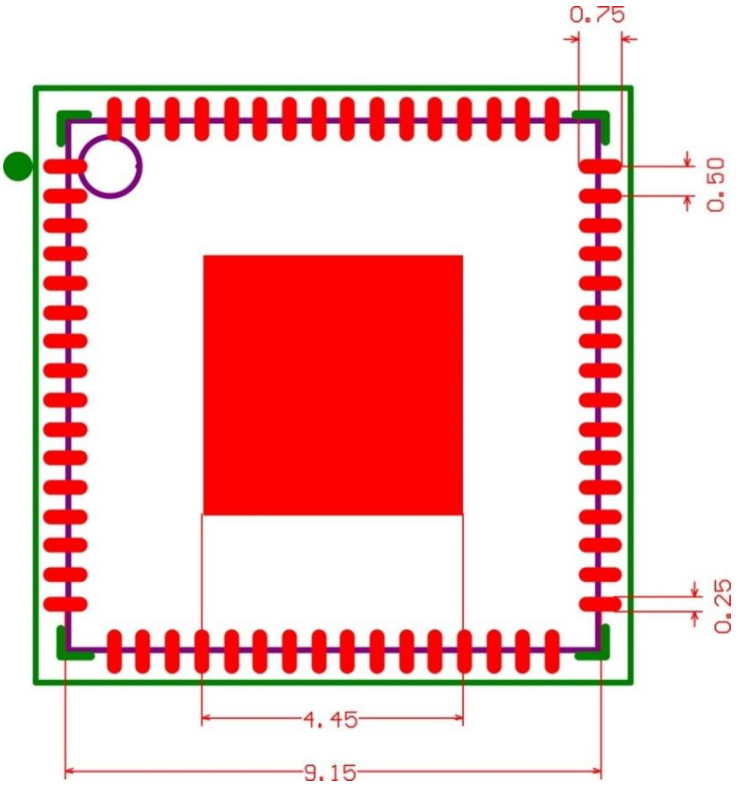

Figure 25.2 64-pin QFN (9mm x 9mm) Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

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Note: Connect exposed center pad to GND. Do not place tracks on the top layer of the PCB in this area.

25.2.1 Additional Information

This package is unique to all the other packages where there is extra strain relief between the exposed pad in the center and the IC pins at the edge of the IC.

The exposed strain relief is connected to the pins so it is very important to ensure that the center exposed pad is not larger than specified, otherwise it could short all the signals together rendering the device and PCB useless.

The exposed strain relief should not be connected to the PCB in any way and this area should be marked as keep out. Only the pins at the edge of the package and the center exposed pad should be connected to the PCB.

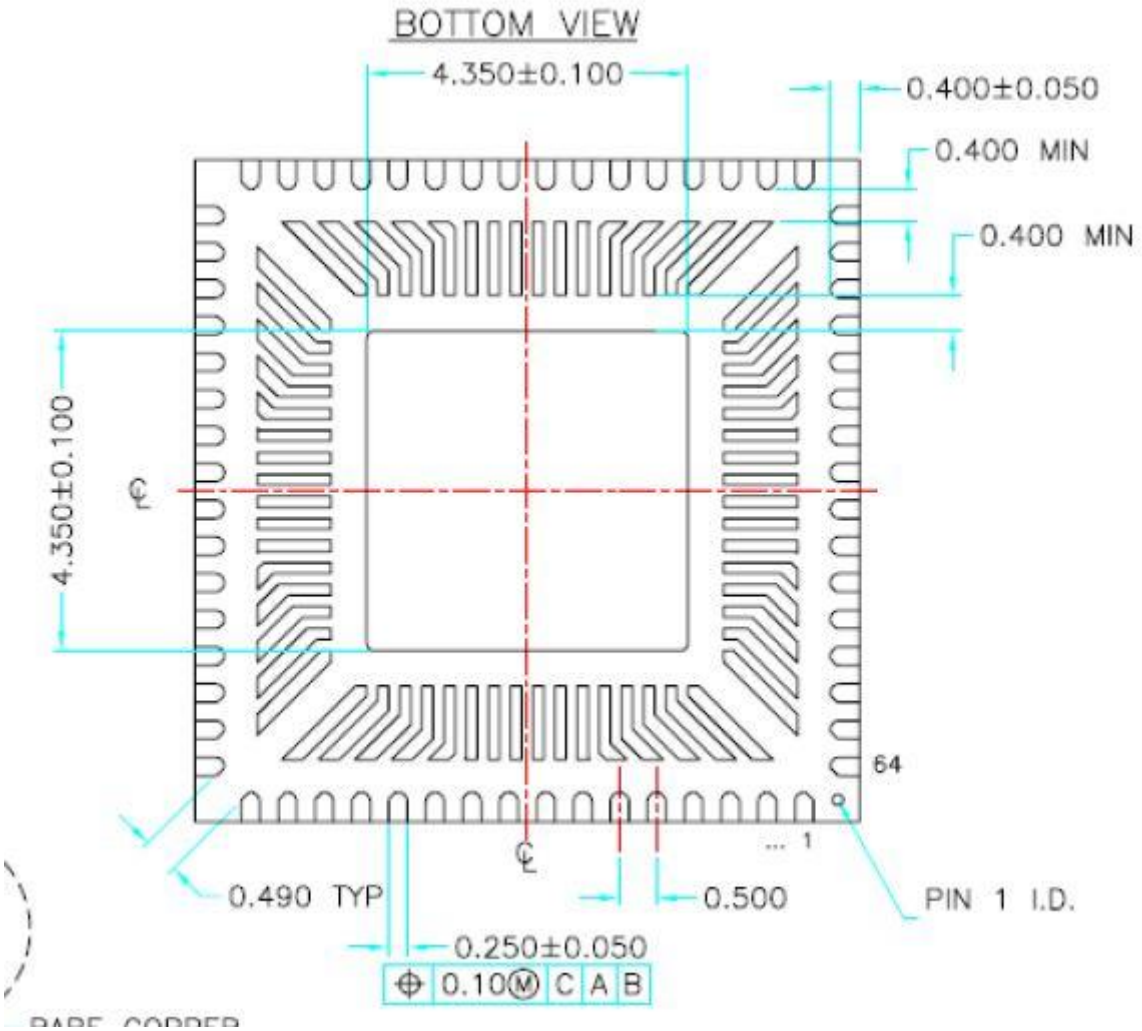

Figure 25.3 64-pin QFN (9mm x 9mm) Bottom View

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26 76-pin QFN

The 76-pin QFN is used on the following products:

- FT601Q
- FT602Q

This package is nominally 9.00mm x 9.00mm. The solder pads are on a 0.40mm pitch.

Please see the IC Package Parameters in the IC datasheet for full information.

26.1 Scaled Footprint

This 1:1 scaled footprint is the exact size when viewed or printed at 100%.

Figure 26.1 76-pin QFN Scaled Footprint

26.2 Annotated Footprint

The annotated footprint shows key measurements.

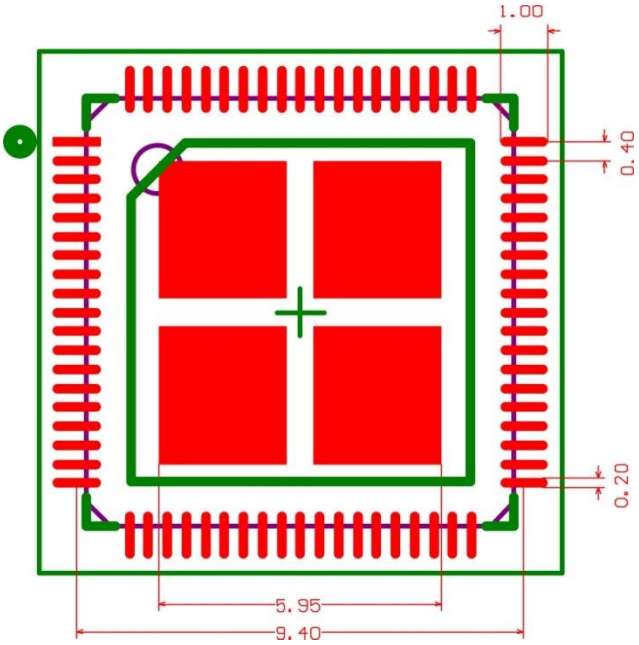

Figure 26.2 76-pin QFN Annotated Footprint

Note: Red = top layer copper, other colors are mechanical layers.

Note: Connect exposed center pad to GND. Do not place tracks on the top layer of the PCB in this area. Cross-hatching design used for less solders paste and less heat up rate required.

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Appendix A – References

Document References

http://www.ftdichip.com/Support/Documents/PCBData.htm

http://www.ftdichip.com/Products/ICs.htm

Altium

Acronyms and Abbreviations

Terms	Description
DFN	Dual-Flat No-Leads Package
IC	Integrated Circuit
LQFP	Low Profile Quad Flat Package
PCB	Printed Circuit Board
QFN	Quad Flat No-Leads Package
SSOP	Shrink Small-Outline Package
TSSOP	Thin-Shrink Small Outline Package
VQFN / WQFN	Very Thin Quad Flat No-Lead Package

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Appendix C – Revision History

Document Title: TN_166 FTDI Example IC PCB Footprints
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Clearance No.: FTDI# 501
Product Page: http://www.ftdichip.com/FTProducts.htm
Document Feedback: Send Feedback

Revision	Changes	Date
1.0	Initial Release	2016-04-27
1.1	Updated Release	2017-05-16
1.2	Removed discontinued parts (VNC2-64, FT121, FT122, FT51A) Removed Bridgetek parts as they are now covered in a separate document. Added FT602. Edited FT2232H-56Q and FT4232H-56Q part numbers. Added new footprints for SSOP28 (FT232RL, FT245RL), 56-pin VQFN (FT2232H-56Q, FT4232H-56Q)	2019-06-14

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