Future Technology Devices International Ltd

TN_161 FT4222H Errata Technical Note

Document Reference No.: FT_001198

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The intention of this errata technical note is to give a detailed description of known functional or electrical issues with the FTDI FT4222H series device.
The current revision of the FT4222H series is **Revision D, released April 2018.**

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1 FT4222H Revision

FT4222H part numbers are listed in Table 1. The letter at the end of the date code identifies the device revision.

The current revision of the FT4222H series is **revision D, released April 2018.**

Part Number	Package
FT4222HQ	32 pin VQFN

Table 1 FT4222H Part Numbers

This errata technical note covers the revisions of FT4222H listed in Table 2.

Revision	Notes
A	First device revision. Launched Sep 2014
B	Second device revision. Launched Sep 2015
C	Third device revision. Launched Oct 2016
D	Forth device revision. Launched Apr 2018

Table 2 FT4222H Series Revisions

2 Errata History Table – Functional Errata

Functional Errata	Short description	Errata occurs in device revision
FT4222H	Android issues	A
FT4222H	CPU usage too high	A
FT4222H	I²C combined message support	A
FT4222H	Default pin status change	A
FT4222H	More suspend setting support	A
FT4222H	Custom PID settings are ignored	B
FT4222H	Slow response after the host restarts	B
FT4222H	SPI master in single mode	B
FT4222H	I2C Data path is not fully reset	A,B,C
FT4222H	Not Response STALL to Get BOS Descriptor defined in USB3.0	A,B,C
FT4222H	Flash operation mode support	A,B,C
FT4222H	SPI slave data lost	C
FT4222H	Error handling : writes over the range of the data buffer	A,B,C,D

Table 3 Functional Errata

2.1 Errata History Table – Electrical & Timing Specification Deviations

Deviations	Short description	Errata occurs in device revision
-	No known issues	-

Table 4 Electrical and Timing Errata

3 Functional Errata of FT4222H

3.1 Revision A

3.1.1 Android issues

Introduction:

FT4222H supports Android devices. With J2XX, it is possible to develop an app utilizing the FT4222H.

Issue:

The following issues may happen when the FT4222H connects to an Android device.

1. The FT4222H works as an SPI master, it may reset during transferring data.
2. The FT4222H works as I^2C slave, the last byte may be lost when the receiving buffer is full.

Workaround:

There are no known workarounds available. This issue is corrected at revision B.

Package specific:

The effected packages are listed in Table 5.

Package	Applicable (Yes/No)
FT4222HQ	Yes

Table 5 Affected Packages

3.1.2 CPU usage and latency timer issue

Introduction:

In USB, data is received from the device to the PC by a polling method. The driver will request a certain amount of data from the USB scheduler. The latency timer is provided to allow efficient polling and flushing short data packets.

Issue:

The FT4222H doesn't support the latency timer feature and causes the USB scheduler to be busy and uses too much CPU resource.

Workaround:

There are no known workarounds available. This issue is corrected at revision B.

Package specific:

The effected packages are listed in Table 6.

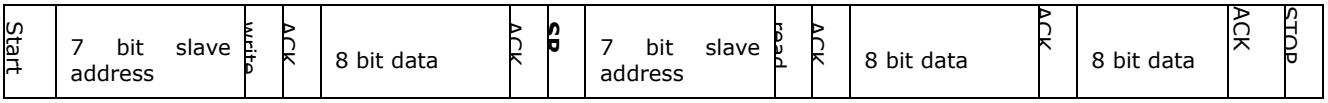
Package	Applicable (Yes/No)
FT4222HQ	Yes

Table 6 Affected Packages

3.1.3 I²C combined message issue

Introduction:

A master issues at least two reads and/or writes to one or more slaves. In a combined message, each read or write begins with a START and the slave address. After the first START, the subsequent starts are referred to as repeated START bits; repeated START bits are not preceded by STOP bits, which indicate to the slave the next transfer is part of the same message.



Issue:

Some I²C devices need to communicate with a combined message format. However, the FT4222H doesn't support this feature.

Workaround:

There are no known workarounds available. The feature of I²C combined messages will be supported at revision B.

Package specific:

The effected packages are listed in Table 7.

Package	Applicable (Yes/No)
FT4222HQ	Yes

Table 7 Affected Packages

3.1.4 Default pin status

Introduction:

By default, the FT4222H will be initialized as an SPI master after power on. When the FT4222H is ready, i.e. finishes USB enumeration, the status of the pins of the Rev.A device is as shown below:

Pin num	Pin name	Mode 0	Mode 1	Mode 2	Mode 3
8	SCK	SCK (OUT, low)	SCK (OUT, low)	SCK (OUT, low)	SCK (OUT, low)
9	MISO	MISO (IN)	MISO (IN)	MISO (IN)	MISO (IN)
10	MOSI	MOSI (OUT, high)	MOSI (OUT, high)	MOSI (OUT, high)	MOSI (OUT, high)
11	IO2	IO2 (IN)	IO2 (IN)	IO2 (IN)	IO2 (IN)
12	IO3	IO3 (IN)	IO3 (IN)	IO3 (IN)	IO3 (IN)
13	GPIO0	GPIO0 (OUT, low)	SS1O (OUT, low)	SS1O (OUT, low)	GPIO0 (OUT, low)
14	GPIO1	GPIO1 (OUT, low)	SS2O (OUT, low)	SS2O (OUT, low)	GPIO1 (OUT, low)
15	GPIO2	suspend out (OUT, low)	suspend out (OUT, low)	SS3O (OUT, low)	suspend out (OUT, low)
16	GPIO3	remote wakeup (IN)	remote wakeup (IN)	remote wakeup (IN)	remote wakeup (IN)
17	SS0O	SS0O (OUT, low)	SS0O (OUT, low)	SS0O (OUT, low)	SS0O (OUT, low)
32	SS	SS (IN)	SS (IN)	SS (IN)	SS (IN)

Table 8 Rev.A FT4222H ready

In the Rev.B, the pin status will be changed as per the table below:

Pin num	Pin name	Mode 0	Mode 1	Mode 2	Mode 3
8	SCK	SCK (OUT, low)	SCK (OUT, low)	SCK (OUT, low)	SCK (OUT, low)
9	MISO	MISO (IN)	MISO (IN)	MISO (IN)	MISO (IN)
10	MOSI	MOSI (OUT, high)	MOSI (OUT, high)	MOSI (OUT, high)	MOSI (OUT, high)
11	IO2	IO2 (IN)	IO2 (IN)	IO2 (IN)	IO2 (IN)
12	IO3	IO3 (IN)	IO3 (IN)	IO3 (IN)	IO3 (IN)
13	GPIO0	GPIO0 (IN)	SS1O (OUT, high)	SS1O (OUT, high)	GPIO0 (IN)
14	GPIO1	GPIO1 (IN)	SS2O (OUT, high)	SS2O (OUT, high)	GPIO1 (IN)
15	GPIO2	suspend out (OUT, low)	suspend out (OUT, low)	SS3O (OUT, high)	suspend out (OUT, low)
16	GPIO3	remote wakeup (IN)	remote wakeup (IN)	remote wakeup (IN)	remote wakeup (IN)
17	SS0O	SS0O (OUT, high)	SS0O (OUT, high)	SS0O (OUT, high)	SS0O (OUT, high)
32	SS	SS (IN)	SS (IN)	SS (IN)	SS (IN)

Table 9 Rev.B FT4222H ready

Package specific:

The effected packages are listed in Table 10.

Package	Applicable (Yes/No)
FT4222HQ	Yes

Table 10 Affected Packages

3.1.5 Additional Suspend Settings Supported

Introduction:

The FT4222H provides flexible settings for suspend behavior via FT_Prog. The rev.B of the FT4222H device provides additional options for customers to configure the pin status during suspend.

- SUSPEND_OUT_POL
  - **Suspend output is High active. (default)**
  - Suspend output is Low active.
- SPI_SUSPEND_MODE
  - **Disable SPI IP and make SPI pins input (tri-state). (default)**
  - Keep SPI pin status when the FT4222H suspends.
  - Enable SPI pin control. Refer to SPI_SUSPEND for detail settings.
- SPI_SUSPEND (enable by SPI_SUSPEND_MODE)
  - miso_suspend
    - push low when suspend
    - push high when suspend
  - mosi_suspend
    - push low when suspend
    - push high when suspend
  - io2_io3_suspend
    - push low when suspend
    - push high when suspend
  - ss0O_suspend
    - No change (default)
    - push low when suspend
    - push high when suspend

- GPIO_SUSPEND
  - gpio0_suspend
    - No change (default)
    - input (tri-state)
    - push low when suspend
    - push high when suspend
  - gpio1_suspend
    - No change (default)
    - input (tri-state)
    - push low when suspend
    - push high when suspend
  - gpio2_suspend
    - No change (default)
    - input (tri-state)
    - push low when suspend
    - push high when suspend
  - gpio3_suspend
    - No change (default)
    - input (tri-state)
    - push low when suspend
    - push high when suspend

The default pin status of the Rev.A device during suspend is shown below:

Pin num	Pin name	Mode 0	Mode 1	Mode 2	Mode 3
8	SCK	SCK (OUT, low)	SCK (OUT, low)	SCK (OUT, low)	SCK (OUT, low)
9	MISO	MISO (OUT, low)	MISO (OUT, low)	MISO (OUT, low)	MISO (OUT, low)
10	MOSI	MOSI (OUT, low)	MOSI (OUT, low)	MOSI (OUT, low)	MOSI (OUT, low)
11	IO2	IO2 (OUT, low)	IO2 (OUT, low)	IO2 (OUT, low)	IO2 (OUT, low)
12	IO3	IO3 (OUT, low)	IO3 (OUT, low)	IO3 (OUT, low)	IO3 (OUT, low)
13	GPIO0	GPIO0 (OUT, low)	SS1O (OUT, no change)	SS1O (OUT, no change)	GPIO0 (OUT, low)
14	GPIO1	GPIO1 (OUT, low)	SS2O (OUT, no change)	SS2O (OUT, no change)	GPIO1 (OUT, low)
15	GPIO2	suspend out (OUT, high)	suspend out (OUT, high)	SS3O (OUT, no change)	suspend out (OUT, high)
16	GPIO3	remote wakeup (IN)	remote wakeup (IN)	remote wakeup (IN)	remote wakeup (IN)
17	SS0O	SS0O (OUT, no change)	SS0O (OUT, no change)	SS0O (OUT, no change)	SS0O (OUT, no change)
32	SS	SS (IN)	SS (IN)	SS (IN)	SS (IN)

Table 11 Rev.A FT4222H suspend

In the Rev.B device, the default suspend setting is changed as per the table below:

Pin num	Pin name	Mode 0	Mode 1	Mode 2	Mode 3
8	SCK	SCK (tri-state)	SCK (tri-state)	SCK (tri-state)	SCK (tri-state)
9	MISO	MISO (IN)	MISO (IN)	MISO (IN)	MISO (IN)
10	MOSI	MOSI (IN)	MOSI (IN)	MOSI (IN)	MOSI (IN)
11	IO2	IO2 (IN)	IO2 (IN)	IO2 (IN)	IO2 (IN)
12	IO3	IO3 (IN)	IO3 (IN)	IO3 (IN)	IO3 (IN)
13	GPIO0	GPIO0 (no change)	SS1O (OUT, no change)	SS1O (OUT, no change)	GPIO0 (no change)
14	GPIO1	GPIO1 (no change)	SS2O (OUT, no change)	SS2O (OUT, no change)	GPIO1 (no change)
15	GPIO2	suspend out (OUT, high)	suspend out (OUT, high)	SS3O (OUT, no change)	suspend out (OUT, high)
16	GPIO3	remote wakeup (IN)	remote wakeup (IN)	remote wakeup (IN)	remote wakeup (IN)
17	SS0O	SS0O (OUT, no change)	SS0O (OUT, no change)	SS0O (OUT, no change)	SS0O (OUT, no change)
32	SS	SS (IN)	SS (IN)	SS (IN)	SS (IN)

Table 12 Rev.B FT4222H suspend

Package specific:

The effected packages are listed in Table 13.

Package	Applicable (Yes/No)
FT4222HQ	Yes

Table 13 Affected Packages

3.2 Revision B

3.2.1 Custom PID Settings are ignored

Introduction

It is not possible to change the PID on the FT4222H from our default value of 601C to a custom value. Note, there are no problems changing the VID.

Issue

Any changes made to the PID using the OTP are ignored and the value returns to its default state.

Workaround

There are no known workarounds available. This issue is corrected at revision C.

Package specific:

The effected packages are listed in Table 14.

Package	Applicable (Yes/No)
FT4222HQ	Yes

Table 14 Affected Packages

3.2.2 Slow Response after the Host Restarts

Issue

After the host restarts, the FT4222H may have slow response or outputs unexpected bytes from its USB interface.

Workaround

There are no known workarounds available. This issue is corrected at revision C.

Package specific:

The effected packages are listed in Table 15.

Package	Applicable (Yes/No)
FT4222HQ	Yes

Table 15 Affected Packages

3.2.3 SPI master in single mode loses data and no response

Issue

The SPI master in single mode may lose the last byte and then no response. This issue may be observed easily in the following configurations:

- 48M/128, 48M/256, 48M/512
- 24M/64, 24M/128, 24M/256, 24M/512

When this issue happens, the support lib function FT4222_SPIMaster_SingleReadWrite may not return, or

return FT_FAILED_TO_WRITE_DEVICE.

This issue can be observed with the rev A also.

Workaround

There are no known workarounds available. This issue is corrected at revision C.

Package specific:

The effected packages are listed in Table 16.

Package	Applicable (Yes/No)
FT4222HQ	Yes

Table 16 Affected Packages

3.3 Revision C

3.3.1 Data path is not fully reset when a reset on I²C is executed

Issue

When the I²C bus encounters errors or works abnormally, users can use the reset APIs to reset the I²C function. When a reset command is received, only the I²C controller is reset. The transferring data may still be left in the related USB pipe. The USB pipe associated to I²C functions should be also reset as the initial status for the next transfer.

Workaround

There are no known workarounds available. This issue is corrected at revision D.

Package specific:

The effected packages are listed in Table 17.

Package	Applicable (Yes/No)
FT4222HQ	Yes

Table 17 Effected Packages

3.3.2 No Response STALL to Get BOS Descriptor defined in USB3.0

Issue

BOS (Binary device Object Store) descriptor is a new defined descriptor in the USB3.0 specification. Since the FT4222H is a USB2.0 compliant USB device, getting a BOS descriptor command is not supported. A STALL should be returned, but the FT4222H returns NAKs.

Workaround

There are no known workarounds available. This issue is corrected at revision D.

Package specific:

The affected packages are listed in Table 18.

Package	Applicable (Yes/No)
FT4222HQ	Yes

Table 18 Affected Packages

3.3.3 Flash Operating Mode Support

Issue

When accessing Toshiba flash with SPI Master Quad mode, FT4222H will hang without giving any responses.

FT4222H operates as master with supporting Dual or Quad SPI with three phases as illustrated in Figure 1.

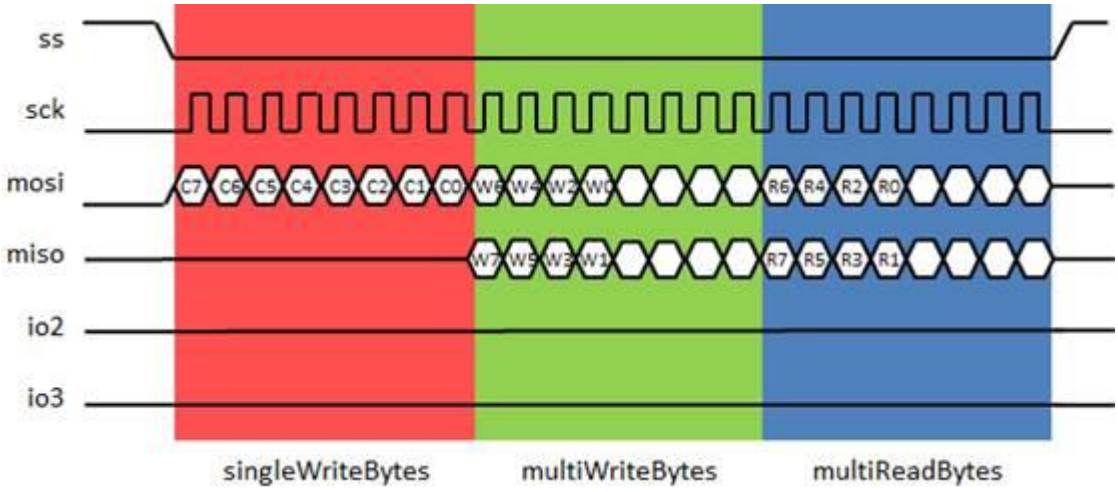


Figure 1 Quad SPI with Multi Write Phase

As shown in Figure 1 'C', 'W' and 'R', correspond to "Command Phase", "Write Phase" and "Read Phase", where there are information/data in all three phases that are to be exchanged.

Some flash devices operate with single write and multi read protocol but without the multi write phase as illustrated in Figure 2:

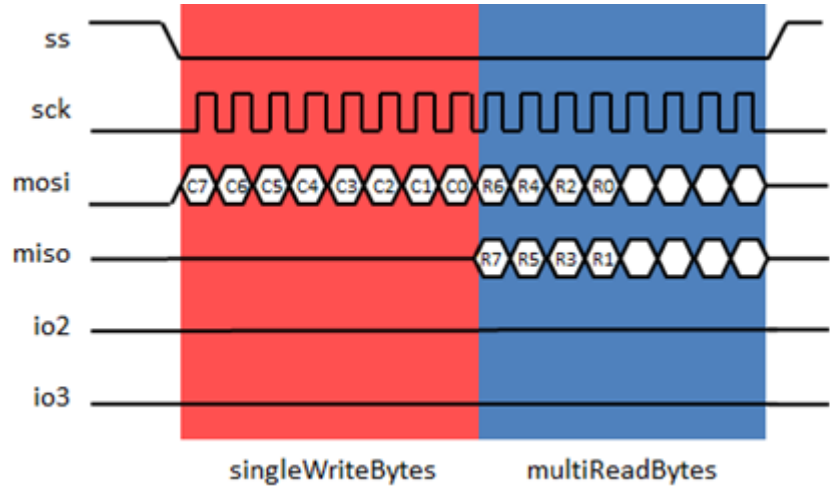


Figure 2 Quad SPI without Multi Write Phase

Write Phase has no information/data to transfer. This combination of operating mode is not supported with Rev A, B and C.

Workaround

In SPI Master Quad mode, the operation of single write with quad read was not supported. No workaround was provided, this feature is implemented with Revision D.

Package specific:

The affected packages are listed in Table 19.

Package	Applicable (Yes/No)
FT4222HQ	Yes

Table 19 Affected Packages

3.3.4 SPI Slave Data Lost

Issue

When operating in SPI Slave mode, the FT4222H would occasionally loose data packets.

Workaround

Verified that the latency Timer configuration was not correct, hence causing no full packet responses, instead all packets responded with short packets. This results in packet drops with D2XX driver.
No workaround was provided, this issue is corrected at revision D.

Package specific:

The effected packages are listed in Table 20.

Package	Applicable (Yes/No)
FT4222HQ	Yes

Table 20 Affected Packages

3.4 Bus Error condition in USB Device Controller

3.4.1 The USB Device Controller writes past the range of the data buffer when a babble error occurs

Introduction:

A babble error occurs when USB device receives more data than the maximum packet size.

Issue:

If the data packet comes with the correct CRC16, the USB Device Controller accepts it and responds with ACK. It then writes the data over the address boundary of the data buffer for the endpoint.

If the data packet comes with the incorrect CRC16, the USB Device Controller discards it and times out. However, it still writes the data over the address boundary of the data buffer for the endpoint.

Workaround:

Currently, there is no workaround for this issue.

Package specific:

The effected packages are listed in Table 21.

Package	Applicable (Yes/No)
FT4222HQ	Yes

Table 21 Affected Packages

4 FT4222H Series Package Markings

The FT4222H is supplied in a RoHS compliant leadless VQFN-32 package. The package is lead (Pb) free, and uses a 'green' compound. The package is fully compliant with European Union directive 2002/95/EC. An example of the markings on the package is shown in the figures below.

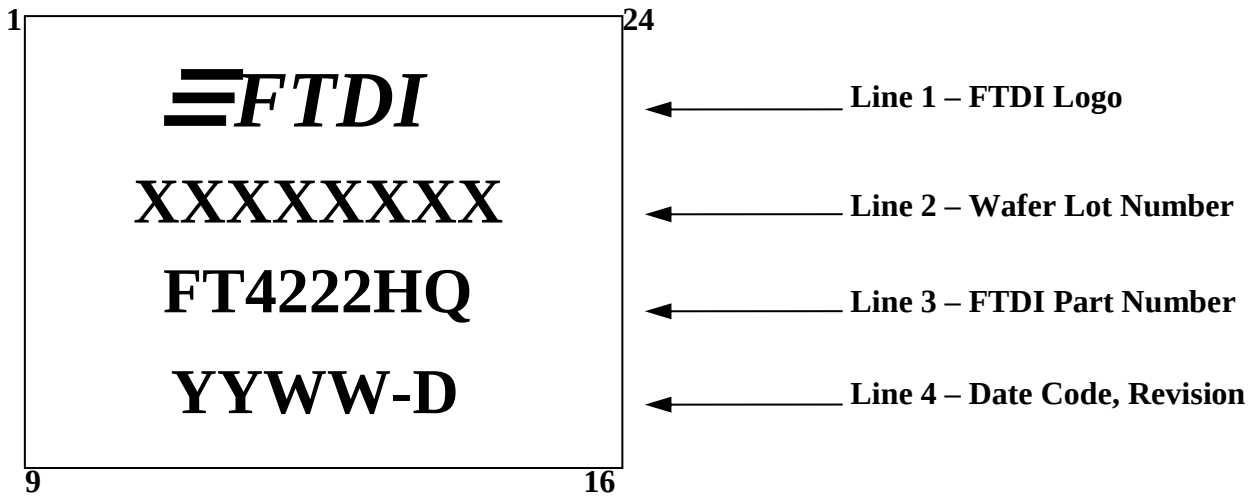


Figure 3 VQFN-32 Package Markings

The date code format is **YYWW** where WW = 2 digit week number, YY = 2 digit year number. This is followed by the revision number.

The code **XXXXXXXX** is the manufacturing LOT code.

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Distributor and Sales Representatives

Please visit the Sales Network page of the FTDI Web site for the contact details of our distributor(s) and sales representative(s) in your country.

Appendix A – References

Document References

NA

Acronyms and Abbreviations

Terms	Description
CPU	Central Processing Unit
GPIO	General Purpose Input/output
I2C	Inter-Integrated Circuit
MISO	Master In Slave Out
MOSI	Master Out Slave In
PC	Personal Computer
SS	Slave Select
SCK	Serial Clock
SPI	Serial Peripheral Interface
USB	Universal Serial Bus
VQFN	Very Thin Quad Flat Non-Leaded Package

Appendix B – List of Tables & Figures

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Appendix C – Revision History

Document Title: TN_161 FT4222H Errata Technical Note
Document Reference No.: FT_001198
Clearance No.: FTDI# 455
Product Page: http://www.ftdichip.com/Products/ICs/FT4222H.html
Document Feedback: Send Feedback

Revision	Changes	Date
1.0	Initial Release	2015-08-31
1.1	Updated with custom PID issue.	2016-05-17
1.2	Updated with rev C fixes	2016-10-18
1.3	Updated with rev D fixes	2018-03-28