Application Note

AN_184

FTDI Device Input Output Pin States

Version 3.0

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This application note describes the reset, suspend and active states of the input / output pins of the following devices: FT232R, FT245R, FT232H, FT2232H, FT4232H, FT2232D, FT200XD, FT201X, FT220X, FT221X, FT230X, FT234XD, FT231X, FT240X, FT120, FT121, FT122, FT313H & FT4222H

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1 Introduction

This application note explains the various states of input and output pins of the following FTDI devices:

FT232R, FT245R, FT232H, FT2232H, FT4232H, FT2232D, FT200XD, FT201X, FT220X, FT221X, FT230X, FT231X, FT234XD, FT240X, FT120, FT121, FT122, FT313H & FT4222H.

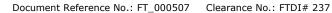Note: The convention used throughout this document for active low signals is the signal name followed by a #.

1.1 Applicable Documents

The following data sheets can be downloaded by clicking on the appropriate links below:

FT232R USB UART IC Data Sheet

FT245R USB FIFO Data Sheet

FT232H Single Channel Hi-Speed USB to Multipurpose UART/FIFO IC Data Sheet

FT2232H Hi-Speed Dual USB UART/FIFO IC Data Sheet

FT4232H Hi-Speed Quad USB UART IC Data Sheet

FT2232D Dual USB UART/FIFO IC Data Sheet

FT200XD Full-Speed USB to I2C bridge in 10 pin DFN package Data Sheet

FT201X Full-Speed USB to I2C bridge Data Sheet

FT220X Full-Speed USB to 4-bit SPI/FT1248 bridge Data Sheet

FT221X Full-Speed USB to 8-bit SPI/FT1248 bridge Data Sheet

FT230X Full-Speed USB to basic UART Data Sheet

FT231X Full-Speed USB to full handshake UART Data Sheet

FT234XD Full-Speed USB to basic UART Data Sheet

FT240X Full-Speed USB to 8-bit FIFO Data Sheet

FT120 USB Full-Speed Device Controller Data Sheet

FT121 USB Full-Speed Device Controller Data Sheet

FT122 USB Full-Speed Device Controller Data Sheet

FT313H Hi-Speed Host Controller

2 FT232R – I/O Pins

FT232R							
Pin Name	**Pin Number (QFN)**	**Pin Number (SSOP)**	**RESET# Low**	**SUSPEND** (Pull Down IO Pins in USB Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
CBUS 0	22	23	TriSt- PU	Selected Function	TriSt-PD	Driving Low	Selected Function
CBUS 1	21	22	TriSt- PU	Selected Function	TriSt-PD	Driving Low	Selected Function
CBUS 2	10	13	TriSt- PU	Selected Function	TriSt-PD	Driving Low	Selected Function
CBUS 3	11	14	TriSt	Selected Function	TriSt-PD	Input	Selected Function
CBUS 4	9	12	TriSt	Selected Function	TriSt-PD	Input	Selected Function
TXD	30	1	TriSt- PU	Output	TriSt-PD	TriSt- PU	Output
DTR#	31	2	TriSt- PU	Output	TriSt-PD	TriSt- PU	Output
RTS#	32	3	TriSt- PU	Output	TriSt-PD	TriSt- PU	Output
RXD	2	5	TriSt- PU	Input - PU	TriSt-PD	TriSt- PU	Input- PU
RI#	3	6	TriSt- PU	Input - PU	TriSt-PD	TriSt- PU	Input - PU
DSR#	6	9	TriSt- PU	Input - PU	TriSt-PD	TriSt- PU	Input - PU
DCD#	7	10	TriSt- PU	Input - PU	TriSt-PD	TriSt- PU	Input - PU
CTS#	8	11	TriSt- PU	Input - PU	TriSt-PD	TriSt- PU	Input - PU

Table 2.1 FT232R I/O States

2.1 FT232R - CBUS Selected Function

FT232R Pin	TXDN	PWRON#	RXLED#	TXLED#	TX & RXLED#	SLEEP#	CLK48	CLK24	CLK12	CLK6	I/O Mode	BitBang WRn	BitBang RDn
CBUS 0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CBUS 1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CBUS 2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CBUS 3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CBUS 4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗

Table 2.2 FT232R CBUS selected functions

3 FT245R - I/O Pins

FT245R							
Pin Name	**Pin Number (QFN)**	**Pin Number (SSOP)**	**RESET# Low**	**SUSPENDED** (Pull Down IO Pins in USB Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
RXF#	22	23	TriSt- PU	RXF#	TriSt-PD	Driving Low	Output
TXE#	21	22	TriSt- PU	TXE#	TriSt-PD	Driving Low	Output
RD#	10	13	TriSt- PU	RD#	TriSt-PD	Driving Low	Input
WR	11	14	TriSt	WR#	TriSt-PD	Input	Input
PWREN#	9	12	TriSt	PWREN#	TriSt-PD	Input	PWREN#
D0	30	1	TriSt- PU	TriSt- PU driving when RD# is low	TriSt-PD	TriSt- PU	Input- PU driving when RD# is low
D1	2	5	TriSt- PU	TriSt- PU driving when RD# is low	TriSt-PD	TriSt- PU	Input - PU driving when RD# is low
D2	32	3	TriSt- PU	TriSt- PU driving when RD# is low	TriSt-PD	TriSt- PU	Input - PU driving when RD# is low
D3	8	11	TriSt- PU	TriSt- PU driving when RD# is low	TriSt-PD	TriSt- PU	Input - PU driving when RD# is low
D4	31	2	TriSt- PU	TriSt- PU driving when RD# is low	TriSt-PD	TriSt- PU	Input - PU driving when RD# is low
D5	6	9	TriSt- PU	TriSt- PU driving when RD# is low	TriSt-PD	TriSt- PU	Input - PU driving when RD# is low
D6	7	10	TriSt- PU	TriSt- PU driving when RD# is low	TriSt-PD	TriSt- PU	Input - PU driving when RD# is low
D7	3	6	TriSt- PU	TriSt- PU driving when RD# is low	TriSt-PD	TriSt- PU	Input - PU driving when RD# is low

Table 3.1 FT245R I/O States

4 FT232H– I/O Pins

FT232H							
Pin Name	**Pin Number**	**RESET# Low**	**Default**	**SUSPEND** (Pull Down IO Pins in USB Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
ADBUS0	13	TriSt	TXD	Function	TriSt-PD	Output	Function
ADBUS1	14	TriSt -PU	RXD	Function	TriSt-PD	Input-PU	Function
ADBUS2	15	TriSt	RTS#	Function	TriSt-PD	Output	Function
ADBUS3	16	TriSt -PU	CTS#	Function	TriSt-PD	Input-PU	Function
ADBUS4	17	TriSt	DTR#	Function	TriSt-PD	Output	Function
ADBUS5	18	TriSt -PU	DSR#	Function	TriSt-PD	Input-PU	Function
ADBUS6	19	TriSt -PU	DCD#	Function	TriSt-PD	Input-PU	Function
ADBUS7	20	TriSt -PU	RI#	Function	TriSt-PD	Input-PU	Function
ACBUS0	21	TriSt-PU	TriSt-PU	Function/Selection	TriSt-PD	TriSt-PU	Function/Selection
ACBUS1	25	TriSt-PU	TriSt-PU	Function/Selection	TriSt-PD	TriSt- PU	Function/Selection
ACBUS2	26	TriSt-PU	TriSt-PU	Function/Selection	TriSt-PD	TriSt- PU	Function/Selection
ACBUS3	27	TriSt-PU	TriSt-PU	Function/Selection	TriSt-PD	TriSt- PU	Function/Selection
ACBUS4	28	TriSt-PU	TriSt-PU	Function/Selection	TriSt-PD	TriSt- PU	Function/Selection
ACBUS5	29	TriSt-PU	TriSt-PU	Function/Selection	TriSt-PD	TriSt- PU	Function/Selection
ACBUS6	30	TriSt-PU	TriSt-PU	Function/Selection	TriSt-PD	TriSt- PU	Function/Selection
ACBUS7	31	TriSt-PD	TriSt-PU	Input-PD or MPSSE	TriSt-PD	TriSt-PD	Input-PD or MPSSE
ACBUS8	32	TriSt-PU	TriSt-PU	Function/Selection	TriSt-PD	TriSt- PU	Function/Selection
ACBUS9	33	TriSt-PU	TriSt-PU	Function/Selection	TriSt-PD	TriSt- PU	Function/Selection

Table 4.1 FT232H I/O States

4.1 FT232H - Selected Function

FT232H										
Pin		**Pin functions (depends on configuration)**								
Pin #	Pin Name	ASYNC Serial RS232	245 FIFO SYNC	245 FIFO	ASYNC Bit-bang	SYNC Bit-bang	MPSSE	Fast Serial interface	CPU Style FIFO	FT1248
13	ADBUS0	TXD	D0	D0	D0	D0	TCK/SK	FSDI	D0	MIOSI0
14	ADBUS1	RXD	D1	D1	D1	D1	TDI/DO	FSCLK	D1	MIOSI1
15	ADBUS2	RTS#	D2	D2	D2	D2	TDO/DI	FSDO	D2	MIOSI2
16	ADBUS3	CTS#	D3	D3	D3	D3	TMS/CS	FSCTS	D3	MIOSI3
17	ADBUS4	DTR#	D4	D4	D4	D4	GPIOL0	** TriSt-UP	D4	MIOSI4
18	ADBUS5	DSR#	D5	D5	D5	D5	GPIOL1	** TriSt-UP	D5	MIOSI5
19	ADBUS6	DCD#	D6	D6	D6	D6	GPIOL2	** TriSt-UP	D6	MIOSI6
20	ADBUS7	RI#	D7	D7	D7	D7	GPIOL3	** TriSt-UP	D7	MIOSI7
21	ACBUS0	* TXDEN	RXF#	RXF#	ACBUS0	ACBUS0	GPIOH0	** ACBUS0	CS#	SCLK
25	ACBUS1	** ACBUS1	TXE#	TXE#	WRSTB#	WRSTB#	GPIOH1	** ACBUS1	A0	SS_N
26	ACBUS2	** ACBUS2	RD#	RD#	RDSTB#	RDSTB#	GPIOH2	** ACBUS2	RD#	MISO
27	ACBUS3	* RXLED#	WR	WR	ACBUS3	ACBUS3	GPIOH3	** ACBUS3	WR	ACBUS3
28	ACBUS4	* TXLED#	SIWU#	SIWU#	SIWU#	SIWU#	GPIOH4	SIWU#	SIWU#	ACBUS4
29	ACBUS5	** ACBUS5	CLKOUT	ACBUS5	** ACBUS5	** ACBUS5	GPIOH5	** ACBUS5	** ACBUS5	ACBUS5
30	ACBUS6	** ACBUS6	OE#	ACBUS6	ACBUS6	ACBUS6	GPIOH6	** ACBUS6	** ACBUS6	ACBUS6
31	ACBUS7	PWRSAV#	USBVCC	USBVCC	USBVCC	USBVCC	GPIOH7	USBVCC	USBVCC	USBVCC
32	ACBUS8	** ACBUS8	** ACBUS8	** ACBUS8	** ACBUS8	** ACBUS8	** ACBUS8	** ACBUS8	** ACBUS8	ACBUS8
33	ACBUS9	** ACBUS9	** ACBUS9	** ACBUS9	** ACBUS9	** ACBUS9	** ACBUS9	** ACBUS9	** ACBUS9	ACBUS9

Table 4.2 FT232H Selected functions

Pins marked * are EEPROM selectable.

Pins marked ** default to tri-stated inputs with an internal 75KΩ (approx.) pull up resistor to VCCIO.

Pin marked *** default to GPIO line with an internal 75KΩ pull down resistor to GND. Using the EEPROM,

this pin can be enabled USBVCC mode instead of GPIO mode.

5 FT2232H

5.1 FT2232H – Channel A Pins

FT2232H Channel A							
Pin Name	Pin Number	RESET# Low	Default	SUSPEND (Pull Down IO Pins in Suspend - Not Set)	SUSPEND (Pull Down IO Pins in USB Suspend – Set)	During Enumeration (out of reset prior to EEPROM read)	Active (device enumerated after eeprom read)
16	ADBUS0	TriSt	TXD	Function	TriSt-PD	TXD	Function
17	ADBUS1	TriSt-PU	RXD	Function	TriSt-PD	RXD	Function
18	ADBUS2	TriSt	RTS#	Function	TriSt-PD	RTS#	Function
19	ADBUS3	TriSt-PU	CTS#	Function	TriSt-PD	CTS#	Function
21	ADBUS4	TriSt	DTR#	Function	TriSt-PD	DTR#	Function
22	ADBUS5	TriSt-PU	DSR#	Function	TriSt-PD	DSR#	Function
23	ADBUS6	TriSt-PU	DCD#	Function	TriSt-PD	DCD#	Function
24	ADBUS7	TriSt-PU	RI#	Function	TriSt-PD	RI#	Function
26	ACBUS0	TriSt	TXDEN	Function	TriSt-PD	TXDEN	Function
27	ACBUS1	TriSt-PU	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
28	ACBUS2	TriSt-PU	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
29	ACBUS3	TriSt-PU	RXLED#	Function	TriSt-PD	TriSt-PU	Function
30	ACBUS4	TriSt-PU	TXLED#	Function	TriSt-PD	TriSt-PU	Function
32	ACBUS5	TriSt-PU	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
33	ACBUS6	TriSt-PU	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
34	ACBUS7	TriSt-PU	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function

Table 5.1 FT2232H I/O States Channel A

5.2 FT2232H – Channel B Pins

FT2232H Channel B							
Pin Name	**Pin Number**	**RESET# Low**	**Default**	**SUSPEND** (Pull Down IO Pins in Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
38	BDBUS0	TriSt	TXD	Function	TriSt-PD	TXD	Function
39	BDBUS1	TriSt-PU	RXD	Function	TriSt-PD	RXD	Function
40	BDBUS2	TriSt	RTS#	Function	TriSt-PD	RTS#	Function
41	BDBUS3	TriSt-PU	CTS#	Function	TriSt-PD	CTS#	Function
43	BDBUS4	TriSt	DTR#	Function	TriSt-PD	DTR#	Function
44	BDBUS5	TriSt-PU	DSR#	Function	TriSt-PD	DSR#	Function
45	BDBUS6	TriSt-PU	DCD#	Function	TriSt-PD	DCD#	Function
46	BDBUS7	TriSt-PU	RI#	Function	TriSt-PD	RI#	Function
48	BCBUS0	TriSt	TXDEN	Function	TriSt-PD	TXDEN	Function
52	BCBUS1	TriSt-PU	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
53	BCBUS2	TriSt-PU	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
54	BCBUS3	TriSt-PU	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
55	BCBUS4	TriSt-PU	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
57	BCBUS5	TriSt-PU	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
58	BCBUS6	TriSt-PU	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
59	BCBUS7	TriSt-PD	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function

Table 5.2 FT2232H I/O States Channel B

5.3 FT2232H - Selected Function

		FT2232H								
Pin		**Pin functions (depends on configuration)**								
Pin #	Pin Name	ASYNC Serial (RS232)	245 FIFO SYNC	245 FIFO	ASYNC Bit-bang	SYNC Bit-bang	MPSSE	Fast Serial interface	CPU Style FIFO	Host Bus Emulation
					Channel A					
16	ADBUS0	TXD	D0	D0	D0	D0	TCK/SK	USES CHANNEL B	D0	AD0
17	ADBUS1	RXD	D1	D1	D1	D1	TDI/DO		D1	AD1
18	ADBUS2	RTS#	D2	D2	D2	D2	TDO/DI		D2	AD2
19	ADBUS3	CTS#	D3	D3	D3	D3	TMS/CS		D3	AD3
21	ADBUS4	DTR#	D4	D4	D4	D4	GPIOL0		D4	AD4
22	ADBUS5	DSR#	D5	D5	D5	D5	GPIOL1		D5	AD5
23	ADBUS6	DCD#	D6	D6	D6	D6	GPIOL2		D6	AD6
24	ADBUS7	RI#	D7	D7	D7	D7	GPIOL3		D7	AD7
26	ACBUS0	TXDEN	RXF#	RXF#	**	**	GPIOH0		CS#	A8
27	ACBUS1	**	TXE#	TXE#	WRSTB#	WRSTB#	GPIOH1		A0	A9
28	ACBUS2	**	RD#	RD#	RDSTB#	RDSTB#	GPIOH2		RD#	A10
29	ACBUS3	RXLED#	WR#	WR#	**	**	GPIOH3		WR#	A11
30	ACBUS4	TXLED#	SIWUA	SIWUA	SIWUA	SIWUA	GPIOH4		SIWUA	A12
32	ACBUS5	**	CLKOUT	**	**	**	GPIOH5		**	A13
33	ACBUS6	**	OE#	**	**	**	GPIOH6		**	A14
34	ACBUS7	**	**	**	**	**	GPIOH7		**	A15
					Channel B					
38	BDBUS0	TXD		D0	D0	D0	TCK/SK	FSDI	D0	CS#
39	BDBUS1	RXD		D1	D1	D1	TDI/DO	FSCLK	D1	ALE
40	BDBUS2	RTS#		D2	D2	D2	TDO/DI	FSDO	D2	RD#
41	BDBUS3	CTS#		D3	D3	D3	TMS/CS	FSCTS	D3	WR#
43	BDBUS4	DTR#		D4	D4	D4	GPIOL0		D4	IORDY
44	BDBUS5	DSR#		D5	D5	D5	GPIOL1		D5	CLKOUT
45	BDBUS6	DCD#		D6	D6	D6	GPIOL2		D6	I/O0
46	BDBUS7	RI#		D7	D7	D7	GPIOL3		D7	I/O1
48	BCBUS0	TXDEN		RXF#	**	**	GPIOH0		CS#	**
52	BCBUS1	**		TXE#	WRSTB#	WRSTB#	GPIOH1		A0	**
53	BCBUS2	**		RD#	RDSTB#	RDSTB#	GPIOH2		RD#	**
54	BCBUS3	RXLED#		WR#	**	**	GPIOH3		WR#	**
55	BCBUS4	TXLED#		SIWUB	SIWUB	SIWUB	GPIOH4	SIWUB	SIWUB	**
57	BCBUS5	**		**	**	**	GPIOH5		**	**
58	BCBUS6	**		**	**	**	GPIOH6		**	**
59	BCBUS7	PWRSAV#	PWRSAV#	PWRSAV#	PWRSAV#	PWRSAV#	GPIOH7	PWRSAV#	PWRSAV#	PWRSAV#

Table 5.3 FT2232H Selected functions

Pins marked ** default to tri-stated inputs with an internal 75KΩ (approx.) pull up resistor to VCCIO.

6 FT4232H

6.1 FT4232H – Channel A Pins

FT4232H Channel A							
Pin Name	**Pin Number**	**RESET# Low**	**Default**	**SUSPEND** (Pull Down IO Pins in Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
16	ADBUS0	TriSt-PU	TXD	TXD	TriSt-PD	TXD	TXD
17	ADBUS1	TriSt-PU	RXD	RXD	TriSt-PD	RXD	RXD
18	ADBUS2	TriSt-PU	RTS#	RTS#	TriSt-PD	RTS#	RTS#
19	ADBUS3	TriSt-PU	CTS#	CTS#	TriSt-PD	CTS#	CTS#
21	ADBUS4	TriSt-PU	DTR#	DTR#	TriSt-PD	DTR#	DTR#
22	ADBUS5	TriSt-PU	DSR#	DSR#	TriSt-PD	DSR#	DSR#
23	ADBUS6	TriSt-PU	DCD#	DCD#	TriSt-PD	DCD#	DCD#
24	ADBUS7	TriSt-PU	RI#	Selection	TriSt-PD	RI#	Selection

Table 6.1 FT4232H I/O States Channel A

6.2 FT4232H – Channel B Pins

FT4232H Channel B							
Pin Name	**Pin Number**	**RESET# Low**	**Default**	**SUSPEND** (Pull Down IO Pins in Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
26	BDBUS0	TriSt-PU	TXD	TXD	TriSt-PD	TXD	TXD
27	BDBUS1	TriSt-PU	RXD	RXD	TriSt-PD	RXD	RXD
28	BDBUS2	TriSt-PU	RTS#	RTS#	TriSt-PD	RTS#	RTS#
29	BDBUS3	TriSt-PU	CTS#	CTS#	TriSt-PD	CTS#	CTS#
30	BDBUS4	TriSt-PU	DTR#	DTR#	TriSt-PD	DTR#	DTR#
32	BDBUS5	TriSt-PU	DSR#	DSR#	TriSt-PD	DSR#	DSR#
33	BDBUS6	TriSt-PU	DCD#	DCD#	TriSt-PD	DCD#	DCD#
34	BDBUS7	TriSt-PU	RI#	Selection	TriSt-PD	RI#	Selection

Table 6.2 FT4232H I/O States Channel B

6.3 FT4232H – Channel C Pins

FT4232H Channel C							
Pin Name	Pin Number	RESET# Low	Default	SUSPEND (Pull Down IO Pins in Suspend - Not Set)	SUSPEND (Pull Down IO Pins in USB Suspend – Set)	During Enumeration (out of reset prior to EEPROM read)	Active (device enumerated after eeprom read)
48	CDBUS0	TriSt-PU	TXD	TXD	TriSt-PD	TXD	TXD
52	CDBUS1	TriSt-PU	RXD	RXD	TriSt-PD	RXD	RXD
53	CDBUS2	TriSt-PU	RTS#	RTS#	TriSt-PD	RTS#	RTS#
54	CDBUS3	TriSt-PU	CTS#	CTS#	TriSt-PD	CTS#	CTS#
55	CDBUS4	TriSt-PU	DTR#	DTR#	TriSt-PD	DTR#	DTR#
57	CDBUS5	TriSt-PU	DSR#	DSR#	TriSt-PD	DSR#	DSR#
58	CDBUS6	TriSt-PU	DCD#	DCD#	TriSt-PD	DCD#	DCD#
59	CDBUS7	TriSt-PU	RI#	Selection	TriSt-PD	RI#	Selection

Table 6.3 FT4232H I/O States Channel C

6.4 FT4232H – Channel D Pins

FT4232H Channel D							
Pin Name	Pin Number	RESET# Low	Default	SUSPEND (Pull Down IO Pins in Suspend - Not Set)	SUSPEND (Pull Down IO Pins in USB Suspend – Set)	During Enumeration (out of reset prior to EEPROM read)	Active (device enumerated after eeprom read)
26	DDBUS0	TriSt-PU	TXD	TXD	TriSt-PD	TXD	TXD
27	DDBUS1	TriSt-PU	RXD	RXD	TriSt-PD	RXD	RXD
28	DDBUS2	TriSt-PU	RTS#	RTS#	TriSt-PD	RTS#	RTS#
29	DDBUS3	TriSt-PU	CTS#	CTS#	TriSt-PD	CTS#	CTS#
30	DDBUS4	TriSt-PU	DTR#	DTR#	TriSt-PD	DTR#	DTR#
32	DDBUS5	TriSt-PU	DSR#	DSR#	TriSt-PD	DSR#	DSR#
33	DDBUS6	TriSt-PU	DCD#	DCD#	TriSt-PD	DCD#	DCD#
34	DDBUS7	TriSt-PD	RI#	Selection	TriSt-PD	RI#	Selection

Table 6.4 FT4232H I/O States Channel D

6.5 FT4232H - Selected Function

Pins		Pin functions (depend on configuration)			
Pin #	Pin Name	ASYNC Serial (RS232)	ASYNC Bit-bang	SYNC Bit-bang	MPSSE
Channel A					
16	ADBUS0	TXD	D0	D0	TCK/SK
17	ADBUS1	RXD	D1	D1	TDI/DO
18	ADBUS2	RTS#	D2	D2	TDO/DI
19	ADBUS3	CTS#	D3	D3	TMS/CS
21	ADBUS4	DTR#	D4	D4	GPIOL0
22	ADBUS5	DSR#	D5	D5	GPIOL1
23	ADBUS6	DCD#	D6	D6	GPIOL2
24	ADBUS7	RI#/ TXDEN*	D7	D7	GPIOL3
Channel B					
26	BDBUS0	TXD	D0	D0	TCK/SK
27	BDBUS1	RXD	D1	D1	TDI/DO
28	BDBUS2	RTS#	D2	D2	TDO/DI
29	BDBUS3	CTS#	D3	D3	TMS/CS
30	BDBUS4	DTR#	D4	D4	GPIOL0
32	BDBUS5	DSR#	D5	D5	GPIOL1
33	BDBUS6	DCD#	D6	D6	GPIOL2
34	BDBUS7	RI#/ TXDEN*	D7	D7	GPIOL3
Channel C					
38	CDBUS0	TXD	D0	D0	RS232 or Bit-Bang interface
39	CDBUS1	RXD	D1	D1	RS232 or Bit-Bang interface
40	CDBUS2	RTS#	D2	D2	RS232 or Bit-Bang interface
41	CDBUS3	CTS#	D3	D3	RS232 or Bit-Bang interface
43	CDBUS4	DTR#	D4	D4	RS232 or Bit-Bang interface
44	CDBUS5	DSR#	D5	D5	RS232 or Bit-Bang interface
45	CDBUS6	DCD#	D6	D6	RS232 or Bit-Bang interface
46	CDBUS7	RI#/ TXDEN*	D7	D7	RS232 or Bit-Bang interface
Channel D					
48	DDBUS0	TXD	D0	D0	RS232 or Bit-Bang interface
52	DDBUS1	RXD	D1	D1	RS232 or Bit-Bang interface
53	DDBUS2	RTS#	D2	D2	RS232 or Bit-Bang interface
54	DDBUS3	CTS#	D3	D3	RS232 or Bit-Bang interface
55	DDBUS4	DTR#	D4	D4	RS232 or Bit-Bang interface
57	DDBUS5	DSR#	D5	D5	RS232 or Bit-Bang interface
58	DDBUS6	DCD#	D6	D6	RS232 or Bit-Bang interface
59	DDBUS7	RI#/ TXDEN*	D7	D7	RS232 or Bit-Bang interface

Table 6.5 Selected Function

7 FT2232D – Channel A Pins

FT2232D Channel A							
Pin Name	**Pin Number**	**RESET# Low**	**Default**	**SUSPEND** (Pull Down IO Pins in Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
24	ADBUS0	TriSt	TXD	Function	TriSt- PD	TriSt	Function
23	ADBUS1	TriSt-PU	RXD	Function	TriSt- PD	TriSt-PU	Function
22	ADBUS2	TriSt	RTS#	Function	TriSt- PD	TriSt	Function
21	ADBUS3	TriSt-PU	CTS#	Function	TriSt- PD	TriSt-PU	Function
20	ADBUS4	TriSt	DTR#	Function	TriSt- PD	TriSt	Function
19	ADBUS5	TriSt-PU	DSR#	Function	TriSt- PD	TriSt-PU	Function
17	ADBUS6	TriSt-PU	DCD#	Function	TriSt- PD	TriSt-PU	Function
16	ADBUS7	TriSt-PU	RI#	Function	TriSt- PD	TriSt-PU	Function
15	ACBUS0	TriSt	TXDEN	Function	TriSt- PD	TriSt	Function
13	ACBUS1	TriSt	SLEEP#	Function	TriSt- PD	TriSt	Function
12	ACBUS2	TriSt-PU	RXLED#	Function	TriSt- PD	TriSt-PU	Function
11	ACBUS3	TriSt-PU	TXLED#	Function	TriSt- PD	TriSt-PU	Function

Table 7.1 FT2232D I/O States Channel A

7.1 FT2232D – Channel B Pins

FT2232D Channel B							
Pin Name	**Pin Number**	**RESET# Low**	**Default**	**SUSPEND** (Pull Down IO Pins in Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
40	BDBUS0	TriSt	TXD	Function	TriSt- PD	TriSt	Function
39	BDBUS1	TriSt-PU	RXD	Function	TriSt- PD	TriSt-PU	Function
38	BDBUS2	TriSt	RTS#	Function	TriSt- PD	TriSt	Function
37	BDBUS3	TriSt-PU	CTS#	Function	TriSt- PD	TriSt-PU	Function
36	BDBUS4	TriSt	DTR#	Function	TriSt- PD	TriSt	Function
35	BDBUS5	TriSt-PU	DSR#	Function	TriSt- PD	TriSt-PU	Function
33	BDBUS6	TriSt-PU	DCD#	Function	TriSt- PD	TriSt-PU	Function
32	BDBUS7	TriSt-PU	RI#	Function	TriSt- PD	TriSt-PU	Function
30	BCBUS0	TriSt	TXDEN	Function	TriSt- PD	TriSt	Function
29	BCBUS1	TriSt	SLEEP#	Function	TriSt- PD	TriSt	Function
28	BCBUS2	TriSt-PU	RXLED#	Function	TriSt- PD	TriSt-PU	Function
27	BCBUS3	TriSt-PU	TXLED#	Function	TriSt- PD	TriSt-PU	Function

Table 7.2 FT2232D I/O States Channel B

7.2 FT2232D - Selected Function – Channel A

Pin#	Generic Pin name	Pin Definitions by Chip Mode **Note 1						
		232 UART Mode	245 FIFO	Enhanced Asynchronous and Synchronous Serial	MPSSE **Note 3	MCU Host Bus Emulation Mode **Note 4	Fast Opto-Isolated Serial Mode	CPU FIFO Interface Mode
24	ADBUS0	TXD	D0	D0	TCK/SK AD0	**Note 2	D0	D0
23	ADBUS1	RXD	D1	D1	TDI/D0	AD1	D1	D1
22	ADBUS2	RTS#	D2	D2	TDO/DI	AD2	D2	D2
21	ADBUS3	CTS#	D3	D3	TMS/CS AD3	D3		D3
20	ADBUS4	DTR#	D4	D4	GPIOL0	AD4	D4	D4
19	ADBUS5	DSR#	D5	D5	GPIOL1	AD5	D5	D5
17	ADBUS6	DCD#	D6	D6	GPIOL2	AD6	D6	D6
16	ADBUS7	RI#	D7	D7	GPIOL3	AD7	D7	D7
15	ACBUS0	TXDEN	RXF#	WR# **Note 5	GPIOH0	I/O0	CS#	CS#
13	ACBUS1	SLEEP#	TXE#	RD# **Note 5	GPIOH1	I/O1	A0	A0
12	ACBUS2	RXLED#	RD#	WR# **Note 6	GPIOH2	IORDY	RD#	RD#
24	ADBUS0	TXD	D0	D0	TCK/SK AD0	**Note 2	D0	
11	ACBUS3	TXLED#	WR	RD# **Note 6	GPIOH3	OSC	WR#	WR#

Table 7.3 Pin Definition by Chip Mode - Channel A

**Note 1: 232 UART, 245 FIFO, CPU FIFO Interface, and Fast Opto-Isolated modes are enabled in the external EEPROM. Enhanced Asynchronous and Synchronous Bit-Bang modes, MPSSE, and MCU Host Bus Emulation modes are enabled using the driver command set bit mode.

**Note 2:   Channel A can be configured in another IO mode if channel B is in Fast Opto-Isolated Serial Mode. If both Channel A and Channel B are in Fast Opto-Isolated Serial Mode all of the IO will be on Channel B.

**Note 3: MPSSE is Channel A only.

**Note 4: MCU Host Bus Emulation requires both Channels.

**Note 5: The Bit-Bang Mode (synchronous and asynchronous) WR# and RD# strobes are on these pins when the main Channel mode is 245 FIFO, CPU FIFO interface, or Fast Opto-Isolated Serial Modes.

**Note 6: The Bit-Bang Mode (synchronous and asynchronous) WR# and RD# strobes are on these pins when the main Channel mode is 232 UART Mode.

7.3 FT2232D - Selected Function – Channel B

Pin#	Generic Pin name	Pin Definitions by Chip Mode **Note 1						
		232 UART Mode	245 FIFO	Enhanced Asynchronous and Synchronous Serial	MPSSE **Note 3	MCU Host Bus Emulation Mode **Note 4	Fast Opto-Isolated Serial Mode	CPU FIFO Interface Mode
40	BDBUS0	TXD	D0	D0	A8	FSDI	D0	D0
39	BDBUS1	RXD	D1	D1	A9	FSCLK	D1	D1
38	BDBUS2	RTS#	D2	D2	A10	FSDO	D2	D2
37	BDBUS3	CTS#	D3	D3	A11	FSCTS	D3	D3
36	BDBUS4	DTR#	D4	D4	A12	**Note 2	D4	D4
35	BDBUS5	DSR#	D5	D5	A13	D5		D5
33	BDBUS6	DCD#	D6	D6	A14	D6		D6
32	BDBUS7	RI#	D7	D7	A15	D7		D7
30	BCBUS0	TXDEN	RXF#	WR# **Note 7	CS#	CS#		CS#
29	BCBUS1	SLEEP#	TXE#	RD# **Note 7	ALE	A0		A0
28	BCBUS2	RXLED#	RD#	WR# **Note 6	RD#	RD#		RD#
27	BCBUS3	TXLED#	WR	RD# **Note 6	WR#	WR#		WR#

Table 7.4 Pin Definition by Chip Mode - Channel B

Note 1: 232 UART, 245 FIFO, CPU FIFO Interface, and Fast Opto-Isolated modes are enabled in the external EEPROM. Enhanced Asynchronous and Synchronous Bit-Bang modes, MPSSE, and MCU Host Bus Emulation modes are enabled using the driver command set bit mode.

Note 2:   Channel A can be configured in another IO mode if channel B is in Fast Opto-Isolated Serial Mode. If both Channel A and Channel B are in Fast Opto-Isolated Serial Mode all of the IO will be on Channel B.

Note 3: MPSSE is Channel A only.

Note 4: MCU Host Bus Emulation requires both Channels.

Note 5: The Bit-Bang Mode (synchronous and asynchronous) WR# and RD# strobes are on these pins when the main Channel mode is 245 FIFO, CPU FIFO interface, or Fast Opto-Isolated Serial Modes.

Note 6: The Bit-Bang Mode (synchronous and asynchronous) WR# and RD# strobes are on these pins when the main Channel mode is 232 UART Mode.

Note 7: The Bit-Bang Mode (synchronous and asynchronous) WR# and RD# strobes are on these pins when the main Channel mode is 245 FIFO, CPU FIFO interface. Bit-Bang mode is not available on Channel B when Fast Opto-Isolated Serial Mode is enabled.

8 FT200XD – I/O Pins

FT200XD						
Pin Name	**Pin Number**	**RESET# Low**	**SUSPEND** (Pull Down IO Pins in USB Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
SDA	8	TriSt-PU	SDA	TriSt-PD	SDA	SDA
SCL	6	TriSt-PU	SCL	TriSt-PD	SCL	SCL
CBUS0	5	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function

Table 8.1 FT200XD I/O States

Note 1: When used in Input Mode, the input pins are pulled to VCCIO via internal 75kΩ (approx.) resistors. These pins can be programmed to gently pull low during USB suspend (PWREN# = "1") by setting an option in the MTP memory.

Note 2: Clock stretching is not supported.

9 FT201X – I/O Pins

FT201X							
Pin Name	**Pin Number (QFN)**	**Pin Number (SSOP)**	**RESET# Low**	**SUSPEND (Pull Down IO Pins in USB Suspend - Not Set)**	**SUSPEND (Pull Down IO Pins in USB Suspend – Set)**	**During Enumeration (out of reset prior to EEPROM read)**	**Active (device enumerated after eeprom read)**
SDA	2	4	TriSt-PU	SDA	TriSt-PD	SDA	SDA
SCL	16	2	TriSt-PU	SCL	TriSt-PD	SCL	SCL
CBUS 0	12	15	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
CBUS 1	11	14	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
CBUS 2	5	7	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
CBUS 3	14	16	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
CBUS 4	4	6	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
CBUS 5	15	1	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function

Table 9.1 FT201X I/O States

Note 1: When used in Input Mode, the input pins are pulled to VCCIO via internal 75kΩ (approx.) resistors. These pins can be programmed to gently pull low during USB suspend (PWREN# = "1") by setting an option in the MTP memory.

Note 2: Clock stretching is not supported.

10 FT220X – I/O Pins

FT220X							
Pin Name	**Pin Number (QFN)**	**Pin Number (SSOP)**	**RESET# Low**	**SUSPEND** (Pull Down IO Pins in USB Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
MIOSIO[0]	15	1	TriSt-PU	MIOSIO[0]	TriSt-PD	MIOSIO[0]	MIOSIO[0]
MIOSIO[1]	2	4	TriSt-PU	MIOSIO[1]	TriSt-PD	MIOSIO[1]	MIOSIO[1]
MIOSIO[2]	16	2	TriSt-PU	MIOSIO[2]	TriSt-PD	MIOSIO[2]	MIOSIO[2]
MIOSIO[3]	4	6	TriSt-PU	MIOSIO[3]	TriSt-PD	MIOSIO[3]	MIOSIO[3]
CLK	12	15	TriSt-PU	CLK (Input-PU)	TriSt-PD	CLK (Input-PU)	CLK (Input-PU)
CS#	11	14	TriSt-PU	CS# (Input-PU)	TriSt-PD	CS# (Input-PU)	CS# (Input-PU)
MISO	5	7	TriSt-PU	MISO	TriSt-PD	MISO	MISO
CBUS3	14	16	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function

Table 10.1 FT220X I/O States

Note 1: When used in Input Mode, the input pins are pulled to VCCIO via internal 75kΩ (approx.) resistors. These pins can be programmed to gently pull low during USB suspend (PWREN# = "1") by setting an option in the MTP memory.

11 FT221X – I/O Pins

FT221X							
Pin Name	**Pin Number (QFN)**	**Pin Number (SSOP)**	**RESET# Low**	**SUSPEND** (Pull Down IO Pins in USB Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
MIOSIO[0]	17	20	TriSt-PU	MIOSIO[0]	TriSt-PD	MIOSIO[0]	MIOSIO[0]
MIOSIO[1]	1	4	TriSt-PU	MIOSIO[1]	TriSt-PD	MIOSIO[1]	MIOSIO[1]
MIOSIO[2]	19	2	TriSt-PU	MIOSIO[2]	TriSt-PD	MIOSIO[2]	MIOSIO[2]
MIOSIO[3]	6	9	TriSt-PU	MIOSIO[3]	TriSt-PD	MIOSIO[3]	MIOSIO[3]
MIOSIO[4]	18	1	TriSt-PU	MIOSIO[4]	TriSt-PD	MIOSIO[4]	MIOSIO[4]
MIOSIO[5]	4	7	TriSt-PU	MIOSIO[5]	TriSt-PD	MIOSIO[5]	MIOSIO[5]
MIOSIO[6]	5	8	TriSt-PU	MIOSIO[6]	TriSt-PD	MIOSIO[6]	MIOSIO[6]
MIOSIO[7]	2	5	TriSt-PU	MIOSIO[7]	TriSt-PD	MIOSIO[7]	MIOSIO[7]
CLK	15	18	TriSt-PU	Input-PU	TriSt-PD	Input-PU	CLK(Input-PU)
CS#	14	17	TriSt-PU	Input-PU	TriSt-PD	Input-PU	CS#(Input-PU)
MISO	7	10	TriSt-PU	MISO	TriSt-PD	MISO	MISO
CBUS3	16	19	TriSt-PU	Function	TriSt-PD	Function	Function

Table 11.1 FT221X I/O States

Note 1: When used in Input Mode, the input pins are pulled to VCCIO via internal 75kΩ (approx.) resistors. These pins can be programmed to gently pull low during USB suspend (PWREN# = "1") by setting an option in the MTP memory.

12 FT230X – I/O Pins

FT230X							
Pin Name	**Pin Number (QFN)**	**Pin Number (SSOP)**	**RESET# Low**	**SUSPEND** (Pull Down IO Pins in USB Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
TXD	15	1	TriSt-PU	TXD	TriSt-PD	TXD	Output (TXD)
RXD	2	4	TriSt-PU	RXD	TriSt-PD	RXD	Input (RXD)
RTS#	16	2	TriSt-PU	RTS#	TriSt-PD	RTS#	Output (RTS#)
CTS#	4	6	TriSt-PU	CTS#	TriSt-PD	CTS#	Input (CTS#)
CBUS0	12	15	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
CBUS1	11	14	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
CBUS2	5	7	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
CBUS3	14	16	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function

Table 12.1 FT230X I/O States

Note 1: When used in Input Mode, the input pins are pulled to VCCIO via internal 75kΩ (approx.) resistors. These pins can be programmed to gently pull low during USB suspend (PWREN# = "1") by setting an option in the MTP memory.

13 FT231X – I/O Pins

FT231X							
Pin Name	**Pin Number (QFN)**	**Pin Number (SSOP)**	**RESET# Low**	**SUSPEND** (Pull Down IO Pins in USB Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
TXD	17	20	TriSt-PU	TXD	TriSt-PD	TXD	TXD
RXD	1	4	TriSt-PU	RXD	TriSt-PD	RXD	RXD
RTS#	19	2	TriSt-PU	RTS#	TriSt-PD	RTS#	RTS#
CTS#	6	9	TriSt-PU	CTS#	TriSt-PD	CTS#	CTS#
DTR#	18	1	TriSt-PU	DTR#	TriSt-PD	DTR#	DTR#
DSR#	4	7	TriSt-PU	DSR#	TriSt-PD	DSR#	DSR#
DCD#	5	8	TriSt-PU	DCD#	TriSt-PD	DCD#	DCD#
RI#	2	5	TriSt-PU	RI#	TriSt-PD	RI#	RI#
CBUS0	15	18	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
CBUS1	14	17	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
CBUS2	7	10	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
CBUS3	16	19	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function

Table 13.1 FT231X I/O States

Note 1: When used in Input Mode, the input pins are pulled to VCCIO via internal 75kΩ (approx.) resistors. These pins can be programmed to gently pull low during USB suspend (PWREN# = "1") by setting an option in the MTP memory.

14 FT234XD – I/O Pins

FT234XD						
Pin Name	**Pin Number**	**RESET# Low**	**SUSPEND** (Pull Down IO Pins in USB Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
TXD	7	TriSt-PU	TXD	TriSt-PD	TXD	Output (TXD)
RXD	10	TriSt-PU	RXD	TriSt-PD	RXD	Input (RXD)
RTS#	8	TriSt-PU	RTS#	TriSt-PD	RTS#	Output (RTS#)
CTS#	11	TriSt-PU	CTS#	TriSt-PD	CTS#	Input (CTS#)
CBUS0	6	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function

Table 14.1 FT234XD I/O States

Note 1: When used in Input Mode, the input pins are pulled to VCCIO via internal 75kΩ (approx.) resistors. These pins can be programmed to gently pull low during USB suspend (PWREN# = "1") by setting an option in the MTP memory.

15 FT240X – I/O Pins

FT240X							
Pin Name	**Pin Number (QFN)**	**Pin Number (SSOP)**	**RESET# Low**	**SUSPEND** (Pull Down IO Pins in USB Suspend - Not Set)	**SUSPEND** (Pull Down IO Pins in USB Suspend – Set)	**During Enumeration** (out of reset prior to EEPROM read)	**Active** (device enumerated after eeprom read)
RESET#	13	16	Input-PU	Input-PU	Input-PU	Input-PU	Input-PU
SIWU#	7	10	TriSt-PU	Input-PU	TriSt-PD	Input-PU	Input-PU
CBUS5	20	23	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
CBUS6	19	22	TriSt-PU	Function	TriSt-PD	TriSt-PU	Function
D0	21	24	TriSt-PU	D0	TriSt-PD	D0	D0
D1	1	4	TriSt-PU	D1	TriSt-PD	D1	D1
D2	23	2	TriSt-PU	D2	TriSt-PD	D2	D2
D3	6	9	TriSt-PU	D3	TriSt-PD	D3	D3
D4	22	1	TriSt-PU	D4	TriSt-PD	D4	D4
D5	4	7	TriSt-PU	D5	TriSt-PD	D5	D5
D6	5	8	TriSt-PU	D6	TriSt-PD	D6	D6
D7	2	5	TriSt-PU	D7	TriSt-PD	D7	D7
RD#	8	11	TriSt-PU	RD# (Input-PU)	TriSt-PD	RD# (Input-PU)	RD# (Input-PU)
WR	9	12	TriSt-PU	WR (Input-PD)	TriSt-PD	WR (Input-PD)	WR (Input-PD)
TXE#	17	20	TriSt-PU	TXE# (OP)	TriSt-PD	TXE# (OP)	TXE# (OP)
RXF#	18	21	TriSt-PU	RXF# (OP)	TriSt-PD	RXF# (OP)	RXF# (OP)

Table 15.1 FT240X I/O States

Note 1: When used in Input Mode, the input pins are pulled to VCCIO via internal 75kΩ (approx.) resistors. These pins can be programmed to gently pull low during USB suspend (PWREN# = "1") by setting an option in the MTP memory.

16 FT120 – I/O Pins

FT120						
Pin Name	**Pin Number (QFN)**	**Pin Number (TSSOP)**	**RESET# Low**	**SUSPEND**	**During Enumeration (out of reset)**	**Active (device enumerated)**
DATA0	26	1	TriSt	TriSt	TriSt, driving when RD_N is low and CS_N or DMACK_N is low	TriSt, driving when RD_N is low and CS_N is low or DMACK_N is low
DATA1	27	2	TriSt	TriSt		
DATA2	28	3	TriSt	TriSt		
DATA3	1	4	TriSt	TriSt		
DATA4	2	6	TriSt	TriSt		
DATA5	3	7	TriSt	TriSt		
DATA6	4	8	TriSt	TriSt		
DATA7	5	9	TriSt	TriSt		
SUSPEND	8	12	Driving Low	TriSt	Output	Output
CLKOUT	9	13	Driving Low	Output	Output	Output
INT_n	10	14	Driving High	Output	Output	Output
GL_n	17	21	Driving High	Output	Output	Output
DMREQ	13	17	Driving Low	Output	Output	Output

Table 16.1 FT120 I/O States

17 FT121 – I/O Pins

FT121						
Pin Name	**Pin Number (QFN)**	**Pin Number (TSSOP)**	**RESET# Low**	**SUSPEND**	**During Enumeration (out of reset)**	**Active (device enumerated)**
MOSI	7	9	TriSt	TriSt	Output	Output
MISO	6	8	TriSt	TriSt	Output	Output

Table 17.1 FT121 I/O States

18 FT122 – I/O Pins

FT122						
Pin Name	**Pin Number (QFN)**	**Pin Number (TSSOP)**	**RESET# Low**	**SUSPEND**	**During Enumeration (out of reset)**	**Active (device enumerated)**
D0	26	1	TriSt	TriSt	TriSt, driving when RD_N is low and CS_N or DMACK_N is low	TriSt, driving when RD_N is low and CS_N is low or DMACK_N is low
D1	27	2	TriSt	TriSt		
D2	28	3	TriSt	TriSt		
D3	1	4	TriSt	TriSt		
D4	3	6	TriSt	TriSt		
D5	4	7	TriSt	TriSt		
D6	5	8	TriSt	TriSt		
D7	6	9	TriSt	TriSt		
SUSPEND	9	12	Driving Low	TriSt	Output	Output
CLKOUT	10	13	Driving Low	Output	Output	Output
INT_n	11	14	Driving High	Output	Output	Output
GL_n	18	21	Driving High	Output	Output	Output
DMREQ	14	17	Driving Low	Output	Output	Output

Table 18.1 FT122 I/O States

19 FT313H – I/O Pins

FT313					
Pin Name	**Pin Number (QFN)**	**Pin Number (LQFP)**	**Pin Number (TQFP)**	**RESET# Low**	**Active**
AD0	2	2	2	TriSt	Input/Output
AD1	3	3	3	TriSt	Input/Output
AD2	4	4	4	TriSt	Input/Output
AD3	5	5	5	TriSt	Input/Output
AD4	7	7	7	TriSt	Input/Output
AD5	8	8	8	TriSt	Input/Output
AD6	9	9	9	TriSt	Input/Output
AD7	10	10	10	TriSt	Input/Output
AD8	11	11	11	TriSt	Input/Output
AD9	12	12	12	TriSt	Input/Output
AD10	13	13	13	TriSt	Input/Output
AD11	14	14	14	TriSt	Input/Output
AD12	16	16	16	TriSt	Input/Output
AD13	17	17	17	TriSt	Input/Output
AD14	18	18	18	TriSt	Input/Output
AD15	19	19	19	TriSt	Input/Output

Table 19.1 FT313H I/O States

20 FT4222H Rev A – I/O Pins

20.1 Configuration Mode 0

FT4222H CNFMODE0			I/O Status in Revision-A				
Pin Number	Pin Name	Default Function	When Reset	After Reset	During Enumeration	SUSPEND (Default)	Active Function (After Enum.)
8	SCK	SCK (Master)	TriSt	TriSt	Output-Low	(Output-Low)	Function*
9	MISO	MISO (Master)	TriSt	TriSt	TriSt	(Output-Low)	Function*
10	MOSI	MOSI (Master)	Output-High	TriSt	Output-High	(Output-Low)	Function*
11	IO2	IO2 (Master)	TriSt	TriSt	TriSt	(Output-Low)	Function*
12	IO3	IO3 (Master)	TriSt	TriSt	TriSt	(Output-Low)	Function*
13	GPIO0	GPIO0	TriSt	TriSt	Output-Low	(Output-Low)	Function*
14	GPIO1	GPIO1	TriSt	TriSt	Output-Low	(Output-Low)	Function*
15	GPIO2	SUSP_OUT	TriSt	TriSt	Output-Low	(Output-High)	Function**
16	GPIO3	WAKEUP	TriSt	TriSt	TriSt	(TriSt)	Function**
17	SS0O	SS0O	Output-Low	Output-High	Output-Low	(Output-Low)	Default*
32	SS	SS	TriSt	TriSt	TriSt	TriSt	Default*

Table 20.1 FT4222H Rev.B I/O States Configuration Mode0

Default*: Default means the function is as referred to in the column – "Default Function"

Function*: Function means that the function for each pin can be selected by the support library(LibFT4222)

Function**: Function means that the function for each pin can be selected by the support library(LibFT4222) or FTDI - FT Prog Setting

(I/O Status): I/O Status with parentheses means the I/O status will be changed by the support library(LibFT4222) or can be set by FTDI - FT Prog Setting

20.2 Configuration Mode 1

FT4222H CNFMODE1			I/O Status in Revision-A				
Pin Number	Pin Name	Default Function	When Reset	After Reset	During Enumeration	SUSPEND (Default)	Active Function (After Enum.)
8	SCK	SCK (Master)	TriSt	TriSt	Output-Low	(Output-Low)	Function*
9	MISO	MISO (Master)	TriSt	TriSt	TriSt	(Output-Low)	Function*
10	MOSI	MOSI (Master)	Output-High	TriSt	Output-High	(Output-Low)	Function*
11	IO2	IO2 (Master)	TriSt	TriSt	TriSt	(Output-Low)	Function*
12	IO3	IO3 (Master)	TriSt	TriSt	TriSt	(Output-Low)	Function*
13	GPIO0	SS1O (Master)	TriSt	TriSt	Output-Low	(Output-Low)	Default*
14	GPIO1	SS2O (Master)	TriSt	TriSt	Output-Low	(Output-Low)	Default*
15	GPIO2	SUSP_OUT	TriSt	TriSt	Output-Low	(Output-High)	Function**
16	GPIO3	WAKEUP	TriSt	TriSt	TriSt	(TriSt)	Function**
17	SS0O	SS0O	Output-Low	Output-High	Output-Low	(Output-Low)	Default*
32	SS	SS	TriSt	TriSt	TriSt	TriSt	Default*

Table 20.2 FT4222H Rev.B I/O States Configuration Mode1

Default*: Default means the function is as referred to in the column – "Default Function"

Function*: Function means that the function for each pin can be selected by the support library(LibFT4222)

Function**: Function means that the function for each pin can be selected by the support library(LibFT4222) or FTDI - FT Prog Setting

(I/O Status): I/O Status with parentheses means the I/O status will be changed by the support library(LibFT4222) or can be set by FTDI - FT Prog Setting

20.3 Configuration Mode 2

FT4222H CNFMODE2			I/O Status in Revision-A				
Pin Number	Pin Name	Default Function	When Reset	After Reset	During Enumeration	SUSPEND (Default)	Active Function (After Enum.)
8	SCK	SCK (Master)	TriSt	TriSt	Output-Low	(Output-Low)	Function*
9	MISO	MISO (Master)	TriSt	TriSt	TriSt	(Output-Low)	Function*
10	MOSI	MOSI (Master)	Output-High	TriSt	Output-High	(Output-Low)	Function*
11	IO2	IO2 (Master)	TriSt	TriSt	TriSt	(Output-Low)	Function*
12	IO3	IO3 (Master)	TriSt	TriSt	TriSt	(Output-Low)	Function*
13	GPIO0	SS1O (Master)	TriSt	TriSt	Output-Low	(Output-Low)	Default*
14	GPIO1	SS2O (Master)	TriSt	TriSt	Output-Low	(Output-Low)	Default*
15	GPIO2	SS3O (Master)	TriSt	TriSt	Output-Low	(Output-Low)	Default*
16	GPIO3	WAKEUP	TriSt	TriSt	TriSt	(TriSt)	Function**
17	SS0O	SS0O	Output-Low	Output-High	Output-Low	(Output-Low)	Default*
32	SS	SS	TriSt	TriSt	TriSt	TriSt	Default*

Table 20.3 FT4222H Rev.B I/O States Configuration Mode2

Default*: Default means the function is as referred to in the column – "Default Function"

Function*: Function means that the function for each pin can be selected by the support library(LibFT4222)

Function**: Function means that the function for each pin can be selected by the support library(LibFT4222) or FTDI - FT Prog Setting

(I/O Status): I/O Status with parentheses means the I/O status will be changed by the support library(LibFT4222) or can be set by FTDI - FT Prog Setting

20.4 Configuration Mode 3

FT4222H CNFMODE3			I/O Status in Revision-A				
Pin Number	Pin Name	Default Function	When Reset	After Reset	During Enumeration	SUSPEND (Default)	Active Function (After Enum.)
8	SCK	SCK (Master)	TriSt	TriSt	Output-Low	(Output-Low)	Function*
9	MISO	MISO (Master)	TriSt	TriSt	TriSt	(Output-Low)	Function*
10	MOSI	MOSI (Master)	Output-High	TriSt	Output-High	(Output-Low)	Function*
11	IO2	IO2 (Master)	TriSt	TriSt	TriSt	(Output-Low)	Function*
12	IO3	IO3 (Master)	TriSt	TriSt	TriSt	(Output-Low)	Function*
13	GPIO0	GPIO0	TriSt	TriSt	Output-Low	(Output-Low)	Function*
14	GPIO1	GPIO1	TriSt	TriSt	Output-Low	(Output-Low)	Function*
15	GPIO2	SUSP_OUT	TriSt	TriSt	Output-Low	Output-High	Default*
16	GPIO3	WAKEUP	TriSt	TriSt	TriSt	(TriSt)	Default*
17	SS0O	SS0O	Output-Low	Output-High	Output-Low	(Output-Low)	Default*
32	SS	SS	TriSt	TriSt	TriSt	TriSt	Default*

Table 20.4 FT4222H Rev.B I/O States Configuration Mode3

Default*: Default means the function is as referred to in the column – "Default Function"

Function*: Function means that the function for each pin can be selected by the support library(LibFT4222)

Function**: Function means that the function for each pin can be selected by the support library(LibFT4222) or FTDI - FT Prog Setting

(I/O Status): I/O Status with parentheses means the I/O status will be changed by the support library(LibFT4222) or can be set by FTDI - FT Prog Setting

21 FT4222H Rev B – I/O Pins

21.1 Configuration Mode 0

FT4222H CNFMODE0			I/O Status in Revision-B				
Pin Number	Pin Name	Default Function	When Reset	After Reset	During Enumeration	SUSPEND (Default)	Active Function (After Enum.)
8	SCK	SCK (Master)	TriSt	TriSt	Output-Low	(TriSt)	Function*
9	MISO	MISO (Master)	TriSt	TriSt	TriSt	(TriSt)	Function*
10	MOSI	MOSI (Master)	Output-High	TriSt	Output-High	(TriSt)	Function*
11	IO2	IO2 (Master)	TriSt	TriSt	TriSt	(TriSt)	Function*
12	IO3	IO3 (Master)	TriSt	TriSt	TriSt	(TriSt)	Function*
13	GPIO0	GPIO0	TriSt	TriSt	TriSt	(TriSt)	Function*
14	GPIO1	GPIO1	TriSt	TriSt	TriSt	(TriSt)	Function*
15	GPIO2	SUSP_OUT	TriSt	TriSt	(Output-Low)	(Output-High)	Function**
16	GPIO3	WAKEUP	TriSt	TriSt	TriSt	(TriSt)	Function**
17	SS0O	SS0O	Output-Low	Output-High	Output-High	(Output-High)	Default*
32	SS	SS	TriSt	TriSt	TriSt	TriSt	Default*

Table 21.1 FT4222H Rev.A I/O States Configuration Mode0

Default*: Default means the function is as referred to in the column – "Default Function"

Function*: Function means that the function for each pin can be selected by the support library(LibFT4222)

Function**: Function means that the function for each pin can be selected by the support library(LibFT4222) or FTDI - FT Prog Setting

(I/O Status): I/O Status with parentheses means the I/O status will be changed by the support library(LibFT4222) or can be set by FTDI - FT Prog Setting

21.2 Configuration Mode 1

FT4222H CNFMODE1			I/O Status in Revision-B				
Pin Number	Pin Name	Default Function	When Reset	After Reset	During Enumeration	SUSPEND (Default)	Active Function (After Enum.)
8	SCK	SCK (Master)	TriSt	TriSt	Output-Low	(TriSt)	Function*
9	MISO	MISO (Master)	TriSt	TriSt	TriSt	(TriSt)	Function*
10	MOSI	MOSI (Master)	Output-High	TriSt	Output-High	(TriSt)	Function*
11	IO2	IO2 (Master)	TriSt	TriSt	TriSt	(TriSt)	Function*
12	IO3	IO3 (Master)	TriSt	TriSt	TriSt	(TriSt)	Function*
13	GPIO0	SS1O	TriSt	TriSt	Output-High	(Output-High)	Default*
14	GPIO1	SS2O	TriSt	TriSt	Output-High	(Output-High)	Default*
15	GPIO2	SUSP_OUT	TriSt	TriSt	(Output-Low)	(Output-High)	Function**
16	GPIO3	WAKEUP	TriSt	TriSt	TriSt	(TriSt)	Function**
17	SS0O	SS0O	Output-Low	Output-High	Output-High	(Output-High)	Default*
32	SS	SS	TriSt	TriSt	TriSt	TriSt	Default*

Table 21.2 FT4222H Rev.A I/O States Configuration Mode1

Default*: Default means the function is as referred to in the column – "Default Function"

Function*: Function means that the function for each pin can be selected by the support library(LibFT4222)

Function**: Function means that the function for each pin can be selected by the support library(LibFT4222) or FTDI - FT Prog Setting

(I/O Status): I/O Status with parentheses means the I/O status will be changed by the support library(LibFT4222) or can be set by FTDI - FT Prog Setting

21.3 Configuration Mode 2

FT4222H CNFMODE2			I/O Status in Revision-B				
Pin Number	**Pin Name**	**Default Function**	**When Reset**	**After Reset**	**During Enumeration**	**SUSPEND** (Default)	**Active Function** (After Enum.)
8	SCK	SCK (Master)	TriSt	TriSt	Output-Low	(TriSt)	Function*
9	MISO	MISO (Master)	TriSt	TriSt	TriSt	(TriSt)	Function*
10	MOSI	MOSI (Master)	Output-High	TriSt	Output-High	(TriSt)	Function*
11	IO2	IO2 (Master)	TriSt	TriSt	TriSt	(TriSt)	Function*
12	IO3	IO3 (Master)	TriSt	TriSt	TriSt	(TriSt)	Function*
13	GPIO0	SS1O	TriSt	TriSt	Output-High	(Output-High)	Default*
14	GPIO1	SS2O	TriSt	TriSt	Output-High	(Output-High)	Default*
15	GPIO2	SS3O	TriSt	TriSt	Output-High	(Output-High)	Default*
16	GPIO3	WAKEUP	TriSt	TriSt	TriSt	(TriSt)	Function**
17	SS0O	SS0O	Output-Low	Output-High	Output-High	(Output-High)	Default*
32	SS	SS	TriSt	TriSt	TriSt	TriSt	Default*

Table 21.3 FT4222H Rev.A I/O States Configuration Mode2

Default*: Default means the function is as referred to in the column – "Default Function"

Function*: Function means that the function for each pin can be selected by the support library(LibFT4222)

Function**: Function means that the function for each pin can be selected by the support library(LibFT4222) or FTDI - FT Prog Setting

(I/O Status): I/O Status with parentheses means the I/O status will be changed by the support library(LibFT4222) or can be set by FTDI - FT Prog Setting

21.4 Configuration Mode 3

FT4222H CNFMODE3			I/O Status in Revision-B				
Pin Number	Pin Name	Default Function	When Reset	After Reset	During Enumeration	SUSPEND (Default)	Active Function (After Enum.)
8	SCK	SCK (Master)	TriSt	TriSt	Output-Low	(TriSt)	Function*
9	MISO	MISO (Master)	TriSt	TriSt	TriSt	(TriSt)	Function*
10	MOSI	MOSI (Master)	Output-High	TriSt	Output-High	(TriSt)	Function*
11	IO2	IO2 (Master)	TriSt	TriSt	TriSt	(TriSt)	Function*
12	IO3	IO3 (Master)	TriSt	TriSt	TriSt	(TriSt)	Function*
13	GPIO0	GPIO0	TriSt	TriSt	TriSt	(TriSt)	Function*
14	GPIO1	GPIO1	TriSt	TriSt	TriSt	(TriSt)	Function*
15	GPIO2	SUSP_OUT	TriSt	TriSt	(Output-Low)	(Output-High)	Default*
16	GPIO3	WAKEUP	TriSt	TriSt	TriSt	(TriSt)	Default*
17	SS0O	SS0O	Output-Low	Output-High	Output-High	(Output-High)	Default*
32	SS	SS	TriSt	TriSt	(TriSt)	TriSt	Default*

Table 21.4 FT4222H Rev.A I/O States Configuration Mode3

Default*: Default means the function is as referred to in the column – "Default Function"

Function*: Function means that the function for each pin can be selected by the support library(LibFT4222)

Function**: Function means that the function for each pin can be selected by the support library(LibFT4222) or FTDI - FT Prog Setting

(I/O Status): I/O Status with parentheses means the I/O status will be changed by the support library(LibFT4222) or can be set by FTDI - FT Prog Setting.

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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

FT232R USB UART IC Data Sheet

FT245R USB FIFO Data Sheet

FT232H Single Channel Hi-Speed USB to Multipurpose UART/FIFO IC Data Sheet

FT2232H Hi-Speed Dual USB UART/FIFO IC Data Sheet

FT4232H Hi-Speed Quad USB UART IC Data Sheet

FT2232D Dual USB UART/FIFO IC Data Sheet

FT200XD Full-Speed USB to I2C bridge in 10 pin DFN package Data Sheet

FT201X Full-Speed USB to I2C bridge Data Sheet

FT220X Full-Speed USB to 4-bit SPI/FT1248 bridge Data Sheet

FT221X Full-Speed USB to 8-bit SPI/FT1248 bridge Data Sheet

FT230X Full-Speed USB to basic UART Data Sheet

FT231X Full-Speed USB to full handshake UART Data Sheet

FT234XD Full-Speed USB to basic UART Data Sheet

FT240X Full-Speed USB to 8-bit FIFO Data Sheet

FT120 USB Full-Speed Device Controller Data Sheet

FT121 USB Full-Speed Device Controller Data Sheet

FT122 USB Full-Speed Device Controller Data Sheet

FT313H Hi-Speed Host Controller

FT4222H Hi-Speed Quad SPI/I2C IC Data Sheet

Acronyms and Abbreviations

Terms	Description
PD	Internal pull-down resistor to GND
PU	Internal pull-up resistor to VCCIO
TriSt	High-impedance off-state ('tristate')
USB	Universal Serial Bus
USB-IF	USB Implementers Forum

Appendix B – List of Tables

List of Tables

Appendix C – Revision History

Document Title: AN_184 FTDI Device Input Output Pin States

Document Reference No.:   FT_000507

Clearance No.:   FTDI# 237

Product Page: http://www.ftdichip.com/FTProducts.htm

Document Feedback: Send Feedback

Revision	Changes	Date
1.0	Initial Release	2011-11-24
2.0	Updated to include FT-X series, FT12 series & FT313H	2012-03-13
3.0	Updated to include FT4222H	2015-09-10