



Application Note

AN_448

FT4233HP_FT2233HP_FT233HP Configuration Guide

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Configuration guide for FT4233HP, FT2233HP and FT233HP

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1 Introduction

The FT4233HP/FT2233HP/FT233HP are high speed USB devices with two Type-C ports which include power delivery features. Within the power delivery functionality there are multiple configurable options available and this document describes all the configurable options. The configuration options covered in this document only cover the power delivery configuration. For USB configurations please refer to [AN 124 User Guide For FTDI FT_Prog Utility](#).

1.1 Overview

This document describes each configurable option and the configurable values of each parameter in the EEPROM of the FT4233HP/FT2233HP/FT233HP. The EEPROM is external and it is needed only if the design needs a custom configuration. If the default configuration is suitable then there is no need to have an EEPROM. For default values, please refer to the sections below.

1.2 Glossary of Terms

SI.No.	Term	Description
1	Port 1	The port which has data communication capability and USB is enumerated when connected to a host port is referred as "Port 1" in this document.
2	Port 2 / Charging Port	The second port is referred as either "Port 2" or "Charging Port" in this document.
3	Sink / Consumer	When the device is consuming power from the host port, the device is said to be in "Sink" mode or device is said to be a "consumer" Device will be in Sink mode when there is no charger connected to the charging port.
4	Source / Provider	When the device is supplying power to the host, then the device is operating in "Source" mode. The device can change the role from Sink to Source when a charger is attached to the charging port.
5	Pass-through	In pass-through mode, the device will duplicate the charger power profile and use it as its own source capability on port1. For ex: if the charger attached to charging port has 20V,15V and 5V profiles, then the device will also report 20V, 15V and 5V on its port1.
6	Power Role Swap	The process of changing the role is called as role swap. The device has the capability to switch the role from Sink to Source if the device is self-powered or a when a PD charger is connected on charging port.

2 Configuration Parameters

256 bytes in the configuration EEPROM are reserved for configuration options. **Table 1** gives the information for all the configurable options.

Parameter	Description	Default value	Configurable values
Sink Request Power Role Swap	Sink will initiate a PR SWAP request only if this option is set.	1 – Enabled.	0 – Disabled. 1 – Enabled.
Sink Accept PR Swap	Option to accept PR SWAP when FT4233HP /FT2233HP/FT233HP is a sink. If this option is not set, PR_SWAP request from a source will be rejected	0 – Reject.	0 – Reject. 1 – Accept.
Source Request PR SWAP	When the device is a Source, this option is used to decide whether to swap back to sink when it sees a port2 disconnect event.	0 – Disabled.	0 – Disabled. 1 – Enabled.
Source Accept PR SWAP	When the device is a source, a PR_SWAP request from sink can be accepted or rejected based on this option.	0 – Reject.	0 – Reject. 1 – Accept.
vConn Swap	Option to enable vConn swap support.	0 – Disabled	0 – Disabled 1 – Enabled
Pass Through	This is applicable only for the design with 2 type C port. Port2 is a charging port and when pass through is enabled, the profile used in port2 will be passed on to port1.	1 – Enabled.	0 – Disabled. 1 – Enabled.
External MCU	This is to switch over to external MCU mode.	0 – Internal MCU.	0 – Internal MCU. 1 – External MCU.
PD2 Enable	Enable or disable PD2 (Port2).	1 – Enabled.	0 – Disabled. 1 – Enabled.
PD1 Auto Clock	Auto clock enable / disable. Auto clock feature is explained in section 2.6.	0 – Disabled.	0 – Disabled. 1 – Enabled.
PD2 Auto Clock	Auto clock enable / disable.	0 – Disabled.	0 – Disabled. 1 – Enabled.
Use EFUSE	This option indicates whether to use trim values from EFUSE or not. Keep this enabled always. Configurable option is provided for characterization purpose only.	1 – Use EFUSE.	0 – Do not use EFUSE TRIM. 1 – Use EFUSE TRIM
External vConn	Configuration to use external vConn	0 – Disabled.	0 – Disabled. 1 – Enabled.

Parameter	Description	Default value	Configurable values
GPIO Count	PD Source uses GPIOs to control the power supplies. This option indicates how many GPIOs are used for power supply control.	2	0 – 7
GPIO Number1	GPIO number for power supply control. GPIO can also be used as an ISET in case of sink only configuration.	3	Following options are available as a dropdown list in FT_PROG . Values 0 – 7, A Text 'NA'. Select the appropriate GPIO value for this option. And if this field is unused, then select 'NA'.
GPIO Number2	GPIO number for power supply control. GPIO can also be used as an ISET in case of sink only configuration.	4	Following options are available as a dropdown list in FT_PROG . Values 0 – 7, A Text 'NA'. Select the appropriate GPIO value for this option. And if this field is unused, then select 'NA'.
GPIO Number3	GPIO number for power supply control. GPIO can also be used as an ISET in case of sink only configuration.	Not Selected in default Config.	Following options are available as a dropdown list in FT_PROG . Values 0 – 7, A Text 'NA'. Select the appropriate GPIO value for this option. And if this field is unused, then select 'NA'.
GPIO Number4	GPIO number for power supply control. GPIO can also be used as an ISET in case of sink only configuration.	Not Selected in default Config.	Following options are available as a dropdown list in FT_PROG . Values 0 – 7, A Text 'NA'. Select the appropriate GPIO value for this

Parameter	Description	Default value	Configurable values
			option. And if this field is unused, then select 'NA'.
GPIO Number5	GPIO number for power supply control. GPIO can also be used as an ISET in case of sink only configuration.	Not Selected in default Config.	Following options are available as a dropdown list in FT_PROG . Values 0 – 7, A Text 'NA'. Select the appropriate GPIO value for this option. And if this field is unused, then select 'NA'.
GPIO Number6	GPIO number for power supply control. GPIO can also be used as an ISET in case of sink only configuration.	Not Selected in default Config.	Following options are available as a dropdown list in FT_PROG . Values 0 – 7, A Text 'NA'. Select the appropriate GPIO value for this option. And if this field is unused, then select 'NA'.
GPIO Number7	GPIO number for power supply control. GPIO can also be used as an ISET in case of sink only configuration.	Not Selected in default Config.	Following options are available as a dropdown list in FT_PROG . Values 0 – 7, A Text 'NA'. Select the appropriate GPIO value for this option. And if this field is unused, then select 'NA'.
PD1 Load Enable	GPIO number configured with load enable switch for PD1	2	Following options are available as a dropdown list in FT_PROG . Values 0 – 7, A Text 'NA'. Select the appropriate GPIO value for this option. And if this field is unused, then select 'NA'.

Parameter	Description	Default value	Configurable values
PD2 Load Enable	GPIO number configured with load enable switch for PD2	Not Selected in default Config.	<p>Following options are available as a dropdown list in FT_PROG.</p> <p>Values 0 – 7, A Text 'NA'.</p> <p>Select the appropriate GPIO value for this option. And if this field is unused, then select 'NA'.</p>
Discharge Pin	GPIO to enable the discharge circuit	5	<p>(Should not be same as any of the GPIO Number1 to Number7 value). Following options are available as a dropdown list in FT_PROG.</p> <p>Values 0 – 7, A Text 'NA'.</p> <p>Select the appropriate GPIO value for this option. And if this field is unused, then select 'NA'.</p>
Discharge Enable BM	GPIO bitmap to enable the discharge circuit	1 – drive high	<p>Following options are available in the dropdown list of FT_PROG.</p> <p>Drive Low Drive Hi Input Mode. Don't Care.</p>
Discharge Disable BM	GPIO bitmap to disable the discharge circuit	0 – drive low	<p>Following options are available in the dropdown list of FT_PROG.</p> <p>Drive Low Drive Hi Input Mode. Don't Care.</p>
CC Indication	Option to indicate CC Orientation through a GPIO	Not Selected in Default Configuration	<p>(Should not be same as any of the GPIO Number1 to Number7 value). Following options are available as a dropdown list in FT_PROG.</p>

Parameter	Description	Default value	Configurable values
			<p>Values 0 – 7, A Text 'NA'.</p> <p>Select the appropriate GPIO value for this option. And if this field is unused, then select 'NA'.</p>
ISET1	<p>GPIO Number. State of the GPIO is used to indicate which sink profile is used. ISET1 is to indicate the case non-PD TYPEC_1.5A attachment.</p>	6	<p>Any GPIO number based on the board design can be used. Any GPIO value 0 – 7 can be used as long as these pins are not used for any other purpose. If the PCB design supports PD Source, then do not use the pins reserved for source as ISET.</p>
ISET2	<p>GPIO Number. State of the GPIO is used to indicate which sink profile is used. ISET2 is to indicate the case non-PD TYPEC_3A attachment.</p>	6	<p>Any GPIO number based on the board design can be used. Any GPIO value 0 – 7 can be used as long as these pins are not used for any other purpose. If the PCB design supports PD Source, then do not use the pins reserved for source as ISET.</p>
ISET3	<p>GPIO Number. State of the GPIO is used to indicate which sink profile is used. ISET3 is to indicate PD profile 1 (5V3A).</p>	6	<p>Any GPIO number based on the board design can be used. Any GPIO value 0 – 7 can be used as long as these pins are not used for any other purpose. If the PCB design supports PD Source, then do not use the pins reserved for source as ISET.</p>
EXTEND_ISET	<p>Not used by default. In case more than 3 ISET is needed and if the device is a sink only</p>	0	<p>0 – Extended ISET not used. 1 – Extended ISET used.</p>

Parameter	Description	Default value	Configurable values
	configuration, then source gpio pins can be used as ISET. When this bit is set, GPIO Number 1-7 is used as ISET.		When this is 1, GPIO_Number 1 is to indicate PD profile 2, GPIO_Number2 is to indicate PD Profile 3 and so on.
ISET_PD2	By default the ISET is applied only for the PD1 (port1) profile. If this bit is set, then all the ISET will be on Port2 (PD2).	0	0 – ISET is applied on PD1. 1 - ISET is applied on PD2.
ISET_ENABLED	bit to enable / disable ISET feature/	1	0 – Disable the ISET feature. All the above ISET fields will be ignored. 1 – ISET Enabled.
GPIO_BM_PDO1(vSafe5v)	<p>There are two cases for 5V.</p> <ol style="list-style-type: none"> 1. A pass through 5V in case port2 charger is a 5V charger. 2. vSafe5V during PR_SWAP before negotiating high power. <p>In case the GPIO mapping for these two are not same, then please use the mapping for case 2 using the vSafe5V option (another option available).</p> <p>In the default settings, PDO1 and vSafe5V GPIO settings are different.</p> <p>Default setting is for pass through case hence all the values are for pass through case by default.</p>	<p>GPIO3 – drive High GPIO4 – drive High</p>	<p>For each GPIO, following options are available as a dropdown list in FT_PROG.</p> <p>Drive High Drive Low. Input Mode. Don't Care.</p>
GPIO_BM_PDO2		<p>GPIO3 – Drive High GPIO4 – Drive High</p>	<p>Drive High Drive Low Input Mode. Don't Care.</p>
GPIO_BM_PDO3		<p>GPIO3 – Drive High GPIO4 – Drive High</p>	<p>Drive High Drive Low. Input Mode.</p>

Parameter	Description	Default value	Configurable values
			Don't Care.
GPIO_BM_PDO4		GPIO3 – Drive High GPIO4 – Drive High	Drive High Drive Low. Input Mode. Don't Care.
GPIO_BM_PDO5		GPIO3 – Drive High GPIO4 – Drive High	Drive High Drive Low. Input Mode. Don't Care.
GPIO_BM_PDO6		GPIO3 – Drive High GPIO4 – Drive High	Drive High Drive Low. Input Mode. Don't Care.
GPIO_BM_PDO7		GPIO3 – Drive High GPIO4 – Drive High	Drive High Drive Low Input Mode Don't Care.
vSet0V	Settings to set 0V (Turn off all supplies)	GPIO3 – Drive Low GPIO4 – Drive Low	Drive High Drive Low Input Mode Don't Care.
vSafe5V	GPIO4 is not driven high for vSafe5V in default settings.	GPIO3 – Drive High GPIO4 – Drive Low	Drive High Drive Low Input Mode Don't Care.
Sink PDO1	Voltage and current profile for PDO1. Typically PDO1 is vSafe5.	Voltage in 1mv Unit – 5000 (5v). And in 50mV Steps. Current in 1ma Unit – 3000 (3A), 10mA Steps.	Voltage – 5000 (5V) Current – (0-5000) (0-5A)
Sink PDO2	Voltage and current profile for PDO2.	0	0 Means this profile is not used. User is allowed to configure the profile to any valid voltage / current value without conflicting. A valid profile is a unique profile (Same voltage profile as another PDO not allowed – Also the profiles should be in the descending order of voltage).
Sink PDO3	Voltage and current profile for PDO3.	0	Same as above.
Sink PDO4	Voltage and current profile for PDO4.	0	Same as above.
Sink PDO5	Voltage and current profile for PDO5.	0	Same as above.
Sink PDO6	Voltage and current profile for PDO6.	0	Same as above.
Sink PDO7	Voltage and current	0	Same as above.

Parameter	Description	Default value	Configurable values
	profile for PDO7.		
Source PDO1	Voltage and current profile for PDO1. Typically PDO1 is vSafe5.	Voltage in 1mv Unit – 5000 (5v). And in 50mV Steps. Current in 1ma Unit – 300 (3A), 10mA Steps.	Voltage – 5000 (5V) Current – (0-5000) (0-5A)
Source PDO2	As default setting is pass through, the values populated for these PDOs are based on charger capabilities. However, these fields can be populated with proper PDO settings if pass through is disabled.	Pass-through	
Source PDO3		Pass-through	
Source PDO4		Pass-through	
Source PDO5		Pass-through	
Source PDO6		Pass-through	
Source PDO7		Pass-through	
Sink2 PDO1	Voltage and current profile for PDO1. Typically PDO1 is vSafe5.	Voltage in 1mv Unit – 5000 (5v). And in 50mV Steps. Current in 1ma Unit – 3000 (3A), 10mA Steps	Voltage – 100 (5V) Current – (0-500) (0-5A)
Sink2 PDO2		Pass-through	
Sink2 PDO3		Pass-through	
Sin2 PDO4		Pass-through	
Sink2 PDO5		Pass-through	
Sink2 PDO6		Pass-through	
Sink2 PDO7		Pass-through	
Sender Response Timer	tSenderResponse timer in the PD Spec Rev3.0.	27ms (all the timer values are in milli-seconds)	Any Value within Spec.
Hard Reset Timer	tPSHardReset timer in the PD Spec Rev3.0.	30ms	Any Value within Spec.
Source Capability Timer	tTypeCSendSourceCap timer in the PD Spec Rev3.0.	190ms	Any Value within Spec.
Discover Identity Timer	tDiscoverIdentity timer in the PD Spec Rev3.0.	45ms	Any Value within Spec.
Source Recover Timer	tSrcRecover timer in the PD Spec Rev3.0.	750ms	Any Value within Spec.
Transition Timer	tPSTransition timer in the PD Spec Rev3.0.	500ms	Any Value within Spec.
Source off timer	tPSSourceOff timer in the PD Spec Rev3.0.	890ms	Any Value within Spec.
No Response Timer	tNoResponse timer in the PD Spec Rev3.0.	4000ms	Any Value within Spec.
Sink Wait Capability Timer	tTypeCSinkWaitCap timer in the PD Spec Rev3.0.	465ms	Any Value within Spec.
Sink Activity Timer	tSinkActivity timer in the PD Spec. However	135ms	Any Value within Spec.

Parameter	Description	Default value	Configurable values
	this timer is not used as it is not required in type-c 1.2+.		
Sink Request Timer	tSinkRequest timer in the PD Spec.	110ms	Any Value within Spec.
Discharge Timer	Internal timer used to keep the discharge circuit on. During PR_SWAP and also during Source Voltage transition, discharge circuit will be turned on for the duration mentioned in this timer.	100ms	Any value based on the discharge circuit design.
Chunk not supported timer	tChunkingNotSupported timer in the PD Spec Rev 3.0.	40ms	Any Value within Spec.
I2C Address	Used for external MCU.	32 (0x20)	Any Valid address.
Power Reserved for OWN use	Power reserved for own use. When Pass-through option is on, instead of doing a real pass through, some power can be reserved for the internal power consumption. So this fields takes an input in milli-watts and source capabilities will be advertised with updated current after taking the internal power consumption into account.	Power reserved in milli-watts (mW) 2500	Min – 0. Max – 65535 (65watts).
TRIM1	Do not use this in Production. Set to 0. Used for characterization only.	0	
TRIM2	Do not use this in Production. Set to 0. Used for characterization only.	0	
External DC	This option indicates the device is self-powered and has a fixed External power supply. If the device is externally powered, then power role swap can be supported. Use this option to indicate externally powered device.	UNCHECK	CHECKBOX

Table 1 - Configuration Parameters

2.1 Power Role Swap Options

There are four different combinations for power role swap. And these are the four configurable options available.

- Sink Request Power Role (PR) Swap

When this option is set, sink initiates a power role swap request. Sink uses Port 2 connection status to decide whether to do power role swap or not. Port 2 should be connected to a PD charger and should have a valid PD contract negotiated in order to initiate a PR_SWAP on Port 1.

If this option is not enabled, then Port 1 will stay as sink even if Port 2 has a valid PD contract.

- Sink Accept PR Swap

In case the device is receiving a PR_SWAP request from the source, sink can either reject it or accept it based on this option. This option should be set only if the device is externally powered either through a DC power or through Port 2.

- Source Request PR SWAP

The device is an initial sink and the only way it can become a source is by PR_SWAP. And once PR_SWAP is successful, the device switches to source. The device can go back to sink if it sees disconnect on Port 2 if this option is set. However there is no guarantee that the device can successfully go back to sink, as it may lose power and can get power cycled.

- Source Accept PR SWAP

Similar to the above case, the device (source) can go back to sink if the present sink request for a PR_SWAP. Whether to accept the request or not is based on this option.

2.2 vConn Swap

When this option is set, the device will do a vConn Swap every time it changes the power role.

2.3 Pass Through

When this option is set, The PD Source capabilities of the charger connected to Port2 will be passed to the port1 and the same profile will appear on Port 1.

2.4 External MCU

By default Internal MCU will be active. If the customer design is using an external MCU instead of FT4233HP internal MCU, the customer needs to indicate this through a bit in the configuration. Select the "External MCU" Option to enable external MCU. Once this bit is set, internal MCU won't be active.

If the design does not have an EEPROM and but still needs External MCU, then both GPIO_0 and GPIO_1 of FT4233HP can be pulled high at power on to achieve this. This has the same behavior as setting the External MCU bit.

2.5 PD2 Enable

In case the Port 2 is not needed, it can be disabled by unchecking this option.

2.6 PD1 Auto Clock / PD2 Auto Clock

For power saving, clock can be turned off to both the PD1 and PD2 when there is no activity. With auto clock option enabled, clock will be automatically turned on whenever there is an activity and it goes off after the activity.

2.7 Use EFUSE

This is used for trimming. Trim values are present in EFUSE and this option helps to use those values from EFUSE. If this option is set to 0, then trim values are not taken from efuse. Instead, TRIM1 / TRIM2 values from EEPROM is used.

2.8 External vConn

This is to enable external vConn.

2.9 GPIO Count

When the device is a source, it uses GPIOs to manage the power supplies. There can be multiple GPIOs to control multiple power sources (5V, 9V, 15V etc.). The total number of GPIOs used to control the power supplies should be defined in this field.

FT4233HP/FT2233HP/FT233HP has a total of eight GPIO Pins. So the valid value for this field is 0 to 7. When the FT4233HP is configured as a sink only device, set this field to 0.

2.10 GPIO Number1 – 7

This field represents the GPIO pins used for controlling the power supply. In case there are three GPIO pins used, then GPIO Number 1 to GPIO Number 3 will indicate those three pins.

2.11 PD1 Load Enable

GPIO Pin used to enable the PD1 (Port 1) load.

2.12 PD2 Load Enable

GPIO Pin used to enable the PD2 (Port 2) load.

2.13 Discharge Pin

This indicates the GPIO Pin used for enabling and disabling the discharge circuit.

2.14 Discharge Enable BM

A 2 bit bitmap indicates how to enable discharge circuit.

This can be one of the following values. [FT_PROG](#) gives these options as a dropdown list and hence the user does not need to know the bitmap.

- Drive High
- Drive Low
- Input Mode.
- Don't Care (This means, this pin is not used).

2.15 Discharge Disable BM

A 2 bit bitmap indicates how to disable discharge circuit.

This can be one of the following values. [FT_PROG](#) gives these options as a dropdown list and hence the user does not need to know the bitmap.

- Drive High
- Drive Low
- Input Mode.
- Don't Care (This means, this pin is not used).

2.16 CC Indication

An option to indicate CC Orientation on a GPIO Pin.

When a valid GPIO pin number is selected for this option, GPIO level indicate the following.

Driven High – CC1 Orientation.

Driven Low – CC2 Orientation.

2.17 ISET

There are three ISET options by default. ISET1, ISET2 and ISET3.

These pins are used to indicate the power profile being used when the device is a sink. Even though there are 3 ISET options by default, ISET feature for legacy cable has been disabled. That is, TYPE-C 1.5A (ISET1) and TYPE-C 3A (ISET2) feature has been disabled and hence only ISET3 (PD MODE) can be used.

These are the GPIO pins.

ISET1 – Type-C 1.5A Attached. (No PD) - Feature has been disabled currently.

ISET2 – Type-C 3A Attached – 5V3A. (No PD) - Feature has been disabled currently.

ISET3 – PD. 5V, 3A profile.

In case more than three ISETs are needed, it is possible to configure more than three if the device is used in sink only configuration. In sink only configuration, GPIOs reserved for source power supply control are not needed hence those pins can be used as ISETs.

To do this, set the option "EXTEND_ISET" (described in below sections).

2.18 EXTEND_ISET

When the device is sink only, then there are more GPIO pins available to use as ISET.

When this bit is set, the GPIO Number 1 – Number 7 have a different meaning.

GPIO_Number1 = PD Profile 2.

GPIO_Number2 = PD Profile 3 and so on.

2.19 ISET_PD2

By default the ISET is for Port 1. However this option helps to indicate the profile on Port 2.

2.20 ISET_ENABLED

All the ISET related fields are valid only if this field is enabled. Instead of changing multiple ISET fields, this single enable / disable option helps to enable / disable the ISET feature.

2.21 GPIO_BM_PDO1 (vSafe5v)

GPIO Bitmap to select Source PDO1. The bitmap indicates the combination of the GPIOs state used to get the selected profile.

For example, for PD01, GPIO3 – Drive Hi, GPIO4 – Drive Hi, GPIO5 – Don't Care (NA).

These options are available as a table in [FT_PROG](#) and the states of the GPIO as dropdown list.

2.22 GPIO_BM_PDO2

GPIO Bitmap to select Source PDO2. The bitmap indicates the combination of the GPIOs state used to get the selected profile.

For example, GPIO3 – Drive Hi, GPIO4 – Drive Hi, GPIO5 – Don't Care (NA).

These options are available as a table in [FT_PROG](#) and the states of the GPIO as dropdown list.

2.23 GPIO_BM_PDO3

GPIO Bitmap to select Source PDO3. The bitmap indicates the combination of the GPIOs state used to get the selected profile.

For example, GPIO3 – Drive Hi, GPIO4 – Drive Hi, GPIO5 – Don't Care (NA).

These options are available as a table in [FT_PROG](#) and the states of the GPIO as dropdown list.

2.24 GPIO_BM_PDO4

GPIO Bitmap to select Source PDO4. The bitmap indicates the combination of the GPIOs state used to get the selected profile.

For example, GPIO3 – Drive Hi, GPIO4 – Drive Hi, GPIO5 – Don't Care (NA).

These options are available as a table in [FT_PROG](#) and the states of the GPIO as dropdown list.

2.25 GPIO_BM_PDO5

GPIO Bitmap to select Source PDO5. The bitmap indicates the combination of the GPIOs state used to get the selected profile.

For example, GPIO3 – Drive Hi, GPIO4 – Drive Hi, GPIO5 – Don't Care (NA).

These options are available as a table in [FT_PROG](#) and the states of the GPIO as dropdown list.

2.26 GPIO_BM_PDO6

GPIO Bitmap to select Source PDO6. The bitmap indicates the combination of the GPIOs state used to get the selected profile.

For example, GPIO3 – Drive Hi, GPIO4 – Drive Hi, GPIO5 – Don't Care (NA).

These options are available as a table in [FT_PROG](#) and the states of the GPIO as dropdown list.

2.27 GPIO_BM_PDO7

GPIO Bitmap to select Source PDO7. The bitmap indicates the combination of the GPIOs state used to get the selected profile.

For example, GPIO3 – Drive Hi, GPIO4 – Drive Hi, GPIO5 – Don't Care (NA).

These options are available as a table in [FT_PROG](#) and the states of the GPIO as dropdown list.

2.28 vSet0V

GPIO Bitmap to set 0V. The bitmap indicates the combination of the GPIOs state used to get the selected profile.

For example, GPIO3 – Drive Low, GPIO4 – Drive Low, GPIO5 – Don't Care (NA).

These options are available as a table in [FT_PROG](#) and the states of the GPIO as dropdown list.

2.29 vSafe5V

GPIO Bitmap to select vSafe5. This can be same as PDO1 too. The bitmap indicates the combination of the GPIOs state used to get the selected profile.

For example, GPIO3 – Drive Hi, GPIO4 – Drive Hi, GPIO5 – Don't Care (NA).

These options are available as a table in [FT_PROG](#) and the states of the GPIO as dropdown list.

2.30 Sink PDO [1:7]

Option to select Voltage and Current Profile for Sink PDO1.

Corresponding to every PDO option, there is a field to input the voltage and a field to input the current in [FT_PROG](#). Please input the voltage and current here for the PDO.

The lowest voltage profile should be PDO1 and the second lowest should be PDO2 and so on. Basically the PDO profile should be in ascending order with respect to the voltage.

2.31 Source PDO [1:7]

Option to select Voltage and Current Profile for Source PDO1.

Corresponding to every PDO option, there is a field to input the voltage and a field to input the current in [FT_PROG](#). Please input the voltage and current here for the PDO.

The lowest voltage profile should be PDO1 and the second lowest should be PDO2 and so on. Basically the PDO profile should be in ascending order with respect to the voltage.

2.32 Sink2 PDO [1:7]

Option to select Voltage and Current Profile for Port2 Sink PDO1.

Corresponding to every PDO option, there is a field to input the voltage and a field to input the current in [FT_PROG](#). Please input the voltage and current here for the PDO.

The lowest voltage profile should be PDO1 and the second lowest should be PDO2 and so on. Basically the PDO profile should be in ascending order with respect to the voltage.

2.33 Sender Response Timer

This option is to configure the *tSenderResponse* timer. Please refer to the PD spec for *tSenderResponse* timer details. Timer units are in milliseconds.

2.34 Hard Reset Timer

This option is to configure the *tPSHardReset* timer. Please refer to the PD spec for *tPSHardReset* timer details. Timer units are in milliseconds.

2.35 Source Capability Timer

This option is to configure the *tTypeCSendSourceCap* timer. Please refer to PD Spec for more details on *tTypeCSendSourceCap* timer. Timer units are in milliseconds.

2.36 Discover Identity Timer

This option is to configure the *tDiscoverIdentity* timer. Please refer to the PD Spec for more details on *tDiscoverIdentity* timer. Timer units are in milliseconds.

2.37 Source Recover Timer

This option is to configure the *tSrcRecover* timer. Please refer to the PD Spec for more details on *tSrcRecover* timer. Timer units are in milliseconds.

2.38 Transition Timer

This option is to configure the *tPSTransition* timer. Please refer to the PD Spec for more details on *tPSTransition* timer. Timer units are in milliseconds.

2.39 Source off timer

This option is to configure the *tPSSourceOff* timer. Please refer to the PD Spec for more details on *tPSSourceOff* timer. Timer units are in milliseconds.

2.40 No Response Timer

This option is to configure the *tNoResponse* timer. Please refer to the PD Spec for more details on *tNoResponse*. Timer units are in milliseconds.

2.41 Sink Wait Capability Timer

This option is to configure the *tTypeCSinkWaitCap* timer. Please refer to the PD Spec for more details on *tTypeCSinkWaitCap* timer. Timer units are in milliseconds.

2.42 Sink Request Timer

This option is to configure the *tSinkRequest* timer. Please refer to the PD Spec for more details on *tSinkRequest* timer. Timer units is in milliseconds.

2.43 Discharge Timer

Internal timer used to keep the discharge circuit enabled. Discharge circuit will be enabled and kept enabled for the timer duration. Timer units are in milliseconds.

2.44 Chunk Not Supported Timer

This option is to configure the *tChunkingNotSupported* timer. Please refer to the PD Spec for more details on *tChunkingNotSupported* timer. Timer units are in milliseconds.

2.45 I2C Address

This is used for the case of an external MCU. The I2C address will default to 0x20 if this is not specified.

2.46 Power Reserved for OWN use

In pass through mode, instead of passing through the actual charger profile to port1, the device may reserve some power for its own power consumption.

This field is in milliwatts Default value is 2500 (reserves 2.5watts – 5v500ma for internal use).

2.47 TRIM1

For Debug purpose only - Usually the TRIM values are taken from EFUSE. However EFUSE can be overridden using this field.

2.48 TRIM2

For Debug purpose only - Usually the TRIM values are taken from EFUSE. However EFUSE can be overridden using this field.

2.49 External DC

Even though the device has 2 Type-C ports, the device can still be externally powered through a DC power supply. In this case, Power Role Swap can be supported on Port1 without using any port2 connections. This configuration option can be set to initiate a power role swap request to switch over the role to source. Sink Request power role swap option also should be set along with this to achieve this.

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Appendix A – References

Document References

https://usb.org/sites/default/files/USB%20Power%20Delivery_1.zip

[FT_PROG](#)

[AN 124 User Guide For FTDI FT_Prog Utility](#)

[USB High Speed Series ICs](#)

Acronyms and Abbreviations

Terms	Description
BM	Bit Map
BOS	Binary Object Store
GPIO	General Purpose Input Output
PD	Power Delivery
PDO	Power Delivery Object
PR SWAP	Power Role Swap.
USB	Universal Serial Bus
USB-IF	USB Implementers Forum

Appendix B – List of Tables & Figures

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Appendix C – Revision History

Document Title: AN_448 FT4233HP_FT2233HP_FT233HP Configuration Guide
Document Reference No.: FT_001471
Clearance No.: FTDI#552
Product Page: [USB High Speed Series ICs](#)
Document Feedback: [Send Feedback](#)

Revision	Changes	Date
1.0	Initial Release	30-04-2020
1.1	Updated release (Support for FT233HP)	12-08-2020
1.2	Removed Power Management Options; Updated ISET section to reflect new ISET change for legacy cable; Removed BOS descriptor related sections (USB Minor Versions EXT Capability, Min and Max Power); Added CC Indication option; Added External DC option.	06-05-2021