

Overview

The PD charger + battery example is a simple demonstration based on the MCUXpresso SDK PD stack. The application simulate battery product (for example: laptop), it prints the battery percent continually. The demo works as DRP. When connect, the board can be source or sink.

System Requirement

Hardware requirements

- One or two Type-C shield board
- One or two 9V DC power suppliers
- Type-C Cable
- One or two hardwares (Tower module/base board, and so on) for a specific device, for example: lpcxpresso54114 board
- Personal Computer

Software requirements

- The project files are in:
<MCUXpresso_SDK_Install>/boards/<board>/usb_examples/usb_pd_charger_battery/<rtos>/<toolchain>.

Note

The <rtos> is Bare Metal or FreeRTOS OS.

- Terminal tool.

Getting Started

Hardware Settings

- Remove 0ohm resistor R167, R784 and remap J19-1 to GPIO_EMC_35.
- There is a known limitation that MIMXRT1015 will fail to boot after pressing SW3 button to do power on reset when the shield board is connected and powered. So you must follow these steps below to ensure MIMXRT1015 boot successfully.
 1. Power on the MIMXRT1015 board, then power on the shield board.
 2. Press SW9 button to reset MIMXRT1015 instead of using SW3 button to reset MIMXRT1015.
 3. If you press SW3 button accidentally or want to do power on reset, you need repeat the above steps to bring MIMXRT1015 back to work.

For detailed instructions, see the appropriate board User's Guide.

Note

Set the hardware jumpers (Tower system/base module) to default settings.

Prepare the example

1. Download the program to the target board.
2. Power on Type-C shield board then power on development board.

Run the example

1. Connect the board to one charger or another shield board + development board (download this program too) with Type-C cable.
2. Connect the OpenSDA USB port to the PC and open terminal.
3. If running as source after connect.
 - If battery is (30%, 100%]: source caps are high power (5V/9V).
 - If battery is (0%, 30%]: source caps are low power (only 5V).
 - If partner request power role swap: accept.
 - prefer to work as sink.
 - get partner source cap, and judge whether to swap (if partner is external powered and satisfy self request).
 - * if get partner source cap fail, retry one more time.
 - * if can swap, then start power role swap.
 - * if cannot swap or get source cap fail. still work as source.
 - do power role swap.
 - * if fail, re-try one more time, if still fail, still work as source.
 - * if success, please reference to sink description.
 - battery will decrease (if battery decrease to [0%, 20%]):
 - get partner source cap, and judge whether to swap (source cap satisfy self request).
 - * if get partner source cap fail, retry one more time.
 - * if can swap, then start power role swap.
 - * if cannot swap or get source cap fail, send low power source caps.
 - do power role swap.
 - * if fail, re-try one more time, if still fail send low power source caps.
 - * if success, please reference to sink description.
 - if swap fail, after send low power source caps to trigger source capabilities change.
 - * retry swap with interval 10s.
 - if battery decrease to 5%:
 - * stop provide vbus.
 - * set Try.SNK
4. Running as sink after connect.
 - when connect:
 - if battery is less than 100%: request high power (9V).
 - if battery is 100%: request low power (5V).
 - when battery increase to 100%, request low power (5V).
 - If partner request power role swap
 - if battery is (30%, 100%]: accept.
 - if battery is [0%, 30%]: reject.
 - when battery increase to (30%, 100%]:
 - update self source caps as high power.