ochin_CM4 Hardware test number 3
USB switch, type-C and HUB

Devices used for tests

1. ochin CM4 carrier board
2. Raspberry Pi CM4 module with eMMC
3. USB Type-C cable
4. Host PC
5. Power Supply 0-30Vdc

Test description

This test aims to verify the functionality of the USB switch. This device has the function of switching the USB bus of the CM4 module, between the USB 2.0 4-ports hub and the USB Type-C port.

The switch event appends by means of the VBUS coming from the USB Type-C port when it is connected to a host computer. The switch event occurs only due to the VBUS voltage, regardless of whether the CM4 module is in host or device mode.

Furthermore, the VBUS coming from the USB Type-C connector is used only to switch the USB bus and not to power the board. This choice was made to avoid powering the CM4 module and all the peripherals connected to it via the USB port, not being able to supply the current required by the system to function.

Test execution

To test the switch to occurs, is possible to verify the functionality of the USB in both ways, host mode and device mode:

Host Mode:

Power on the CM4 module and let the OS boot.

Once the OS is started, check the functionality of the four USB ports by connecting an external device such as a usbstick.

To test that the USB hub is connected to the USB bus of the CM4 module, you can perform a quick read and write test on the usbstick.

```
sudo mount /dev/sda1 /media/usb -o uid=pi,gid=pi
dd if=/media/usb/output.file of=/dev/zero bs=20M count=5 oflag=dsync
dd if=/dev/zero of=/media/usb/output.file bs=20M count=5 oflag=direct
```

Once the USB has been tested turn off the board.

Device Mode:

Hold down the S1 button first, then power on the board. When the CM4 module is turned on with S1 pressed, it boots in device mode.

Connect the ochin board using a USB Type-C cable to the host and run the "rpiboot" official application. If the USB switch is working fine, the PC should see the CM4 as an USB drive.

NB: Even if the CM4 module is in host mode but the USB Type-C cable is connected to a host computer, the 4 USB ports will not work, being disconnected from the USB bus of the CM4 module. This happens because the VBUS coming from the host computer drives the switch.

Test results

The test was performed numerous times on different boards and never presented any problems.

Test Passed