# TEBF0808 Master CPLD

## Table of contents


- 1 Table of contents
- 2 Overview
  - 2.1 Feature Summary
  - 2.2 Firmware Revision and supported PCB Revision
- 3 Product Specification
  - 3.1 Port Description
  - 3.2 Functional Description
    - 3.2.1 JTAG
    - 3.2.2 Power
    - 3.2.3 Reset
    - 3.2.4 Enable
    - 3.2.5 USB
    - 3.2.6 ETH
    - 3.2.7 Display Port
    - 3.2.8 CAN
    - 3.2.9 SD
    - 3.2.10 RGPIO
    - 3.2.11 LED
- 4 Appx. A: Change History
  - 4.1 Revision Changes
  - 4.2 Document Change History
- 5 Appx. B: Legal Notices
  - 5.1 Data Privacy
  - 5.2 Document Warranty
  - 5.3 Limitation of Liability
  - 5.4 Copyright Notice
  - 5.5 Technology Licenses
  - 5.6 Environmental Protection
  - 5.7 REACH, RoHS and WEEE


## Overview

Firmware for PCB-Master CPLD with designator U17. First CPLD Device in Chain: LCMX02-1200HC

### Feature Summary

- FMC VADJ Power
- JTAG / FMC JTAG / PJTAG
- RESET/Enable Management
- LED
- RGPIO
- SD
- CAN
- USB
- DisplayPort

### Firmware Revision and supported PCB Revision

See Document Change History

# Product Specification

## Port Description

| Schematic /Souce Code Name | Direction | Pin | Description | PCB REV2 Exception |
|---|---|---|---|---|
| C_T1 | | 24 | / currently_not_used | NC |
| C_T2 | | 26 | / currently_not_used | NC |
| C_T3 | | 25 | / currently_not_used | NC |
| C_TCK | in | 131 | JTAG J28 (XMOD2) / FMC JTAG | |
| C_TDI | in | 136 | JTAG J28 (XMOD2) / FMC JTAG | |
| C_TDO | out | 137 | JTAG J28 (XMOD2) / FMC JTAG | |
| C_TMS | in | 130 | JTAG J28 (XMOD2) / FMC JTAG | |
| CAN_FAULT | in | 106 | CAN | |
| CAN_RX | in | 107 | CAN | |
| CAN_S | out | 105 | CAN | |
| CAN_TX | out | 104 | CAN | |
| CLK_125MHZ / PHY_CLK | in | 70 | / currently_not_used | |
| CON_NTRST | | 117 | / currently_not_used | |
| CON_RTCK / JTAG_RTCK | out | 125 | JTAG, Connector J30 | |
| CON_SRST / JTAG_SRST | in | 127 | JTAG, Connector J30 | |
| CON_TCK / JTAG_TCK | in | 122 | JTAG, Connector J30 / PJTAG0 | |
| CON_TDI / JTAG_TDI | in | 119 | JTAG, Connector J30 / PJTAG0 | |
| CON_TDO / JTAG_TDO | out | 126 | JTAG, Connector J30 / PJTAG0 | |
| CON_TMS / JTAG_TMS | in | 121 | JTAG, Connector J30 / PJTAG0 | |
| DIR_T1 | | 23 | / currently_not_used | NC |
| DIR_T2 | | 28 | / currently_not_used | NC |
| DIR_T3 | | 27 | / currently_not_used | NC |
| DP_AUX_DE / DP_DE | out | 92 | Display Port | |
| DP_AUX_RX / DP_RX | in | 91 | Display Port | |
| DP_AUX_TX / DP_TX | out | 93 | Display Port | |
| DP_EN | out | 77 | Display Port | |
| DP_TX_HPD /DP_HDP | in | 94 | Display Port | |
| ETH_RST | out | 62 | Ethernet | |
| EX_IO1 | | 112 | PMOD / currently_not_used | |
| EX_IO2 | | 113 | PMOD / currently_not_used | |
| EX_IO3 | | 114 | PMOD / currently_not_used | |
| EX_IO4 | | 115 | PMOD / currently_not_used | |
| F2_EN | | 19 | FAN J35 / currently_not_used | NC |
| F2PWM | | 20 | FAN J35 / currently_not_used | NC |

| | | | | |
|---|---|---|---|---|
| F2SENSE | | 21 | FAN J35 / currently_not_used | NC |
| FMC_CLK_DIR | in | 73 | FMC | |
| FMC_TCK | out | 95 | FMC | |
| FMC_TDI | out | 96 | FMC | |
| FMC_TDO | in | 97 | FMC | |
| FMC_TMS | out | 98 | FMC | |
| FMC_VID0 | out | 139 | FMC VADJ Power Selection | |
| FMC_VID1 | out | 140 | FMC VADJ Power Selection | |
| FMC_VID2 | out | 141 | FMC VADJ Power Selection | |
| GND | | 84 | REV03 unconnected / currently_not_used | USB_TRST, other USB HUB |
| HDIO_SC10 / SC10 | inout | 60 | FPGA / DP_RX or 'Z' | |
| HDIO_SC11 / SC11 | in | 59 | FPGA / DP_DE | |
| HDIO_SC12 / SC12 | out | 58 | FPGA / DP_HPD | |
| HDIO_SC13 / SC13 | out | 57 | FPGA / RGPIO TX | |
| HDIO_SC14 / SC14 | in | 56 | FPGA / RGPIO RX | |
| HDIO_SC15 / SC15 | in | 55 | FPGA / RGPIO CLK | |
| HDIO_SC16 / SC16 | in | 54 | FPGA / CAN_S | |
| HDIO_SC17 / SC17 | in | 52 | FPGA / XMOD LED | |
| HDIO_SC18 / SC18 | in | 68 | FPGA / CAN_TX | |
| HDIO_SC19 / SC19 | out | 69 | FPGA / CAN_RX | |
| I2C_RST | out | 61 | I2C | |
| JTAGENB | | 120 | external Pin for CPLD Firmware Update | |
| LED_1A / JLED1 | out | 109 | USB3.0 LED Jellow | |
| LED_2A / JLED2A | out | 111 | USB3.0 LED Green/Orange | |
| LED_2B / JLED2B | out | 110 | USB3.0 LED Green/Orange | |
| MIO26 | in | 41 | MIO / PJTAG | |
| MIO27 | in | 40 | MIO / PJTAG | |
| MIO28 | in | 39 | MIO / PJTAG | |
| MIO29 | in | 38 | MIO / PJTAG | |
| OCLK_EN / OSC_EN | out | 74 | Programmable Oscillator U45 | |
| PHY_CONFIG | out | 65 | ETH PHY | |
| PHY_LED0 | in | 67 | ETH PHY | |
| PHY_LED1 | in | 86 | ETH PHY | |
| PHY_LED2 | in | 85 | ETH PHY | |
| SC_CLK0 / CLK0 | in | 76 | / currently_not_used | SC_CLK_P |
| SC_CLK1 / CLK1 | in | 75 | / currently_not_used | SC_CLK_N |
| SC_IO0 / X0 | in | 50 | Master-Slave SC-Communication / Power Reset | |
| SC_IO1 / X1 | in | 49 | Master-Slave SC-Communication / Power Reset | |
| SC_IO2 / X2 | in | 48 | Master-Slave SC-Communication / currently_not_used | |
| SC_IO3 / X3 | in | 47 | Master-Slave SC-Communication / currently_not_used | |

| | | | | |
|---|---|---|---|---|
| SC_IO4 / X4 | out | 45 | Master-Slave SC-Communication / SD WP to Slave CPLD | |
| SC_IO5 / X5 | out | 44 | Master-Slave SC-Communication / currently_not_used | |
| SC_IO6 / X6 | out | 43 | Master-Slave SC-Communication / Sanity check to other CPLD (FMC VADJ Enable) | |
| SC_IO7 / X7 | out | 42 | Master-Slave SC-Communication / Sanity check to other CPLD (FMC VADJ Enable) | |
| SC_IO8 | | 22 | Master-Slave SC-Communication / currently_not_used | NC |
| SC_SCL / SCL | in | 14 | I2C Mux U27 / currently_not_used | |
| SC_SDA / SDA | in | 13 | I2C Mux U27 / currently_not_used | |
| SC2_SW3 / SW3 | in | 6 | DIP-Switch S5-3 | |
| SC2_SW4 / SW4 | in | 5 | DIP-Switch S5-4 | |
| SD_WP | in | 100 | MMC SD | |
| SFP_LED1 / SFP_LED0 | out | 81 | SFP | |
| SFP_LED2 / SFP_LED1 | out | 82 | SFP | |
| SFP_LED3 / SFP_LED2 | out | 78 | SFP | |
| SFP_LED4 / SFP_LED3 | out | 83 | SFP | |
| SFP1_LOS | | 32 | SFP / currently_not_used | NC, controlled by FPGA |
| SFP1_TX_DIS | out | 33 | SFP | NC, controlled by FPGA |
| SFP2_LOS | | 35 | SFP / currently_not_used | NC, controlled by FPGA |
| SFP2_TX_DIS | out | 34 | SFP | NC, controlled by FPGA |
| STAT_LED0 / LED0 | | 99 | LED D4 Green | |
| STAT_LED1 / LED1 | | 128 | LED D1 Red | |
| USB0_RST / USB_RST | out | 71 | USB (U9) PHY Reset | USB PHY and HUB Reset |
| USBH_LED_G3 | | 11 | USB Hub (U4) / currently_not_used | NC, other USB HUB |
| USBH_LED_G4 | | 12 | USB Hub (U4) / currently_not_used | NC, other USB HUB |
| USBH_LED_SS1 | | 9 | USB Hub (U4) / currently_not_used | NC, other USB HUB |
| USBH_LED_SS2 / dummy | out | 133 | USB Hub (U4) Dummy Signal / currently_not_used | NC, other USB HUB |
| USBH_LED_SS3 | | 132 | USB Hub (U4) / currently_not_used | NC, other USB HUB |
| USBH_LED_SS4 | | 138 | USB Hub (U4) / currently_not_used | NC, other USB HUB |
| USBH_MODE0 | out | 142 | USB Hub (U4) | NC, other USB HUB |
| USBH_MODE1 | out | 143 | USB Hub (U4) | NC, other USB HUB |
| USBH_RST | out | 10 | USB Hub (U4) | NC, other USB HUB |
| XMOD1_A | | 3 | J28 (XMOD 2) / currently_not_used | |
| XMOD1_B | | 2 | J28 (XMOD 2) / currently_not_used | |
| XMOD1_E /XMOD_E | out | 4 | J28 (XMOD 2 LED) | |
| XMOD1_G / XMOD_G | in | 1 | J28 (XMOD 2 Button) | |

# Functional Description

## JTAG

JTAGENB set carrier board CPLD into the chain for firmware update. For Update set DIP S4-3 to ON.

FMC JTAG is connected to XMOD2 JTAG. Set DIP S4-3 to OFF for FMC access.

PJTAG (MIO29..26) is connected to JTAF Pinheader J30.

## Power

FMC VADJ is 1.8V if S5-4 is ON else 1.2V.

## Reset

Main Reset is send by Slave CPLD via X0, X1 Pins.

USB PHY hold ~0,6s after Main Reset or XMOD_G Reset or inv.RGPIO Bus Pin 0 (if active).

USB HUB hold ~0,25s after Main Reset or XMOD_G Reset or inv. RGPIO Bus Pin 0 (if active). Long delay is a BUGFIX: is currently need to start Linux before Reset is disabled.

I2C Reset is Main Reset  or inv. RGPIO Bus Pin 2 (if active).

ETH Reset is  Main Reset  or inv. RGPIO Bus Pin 3 (if active).

## Enable

FMC VADJ Enable is set from Slave CPLD via Saity Check (X6, X7).

SFP1 and SFP2 are always enabled.

Oscillator U45 is enabled

## USB

USB Hub Device Operation Mode (USBH_MODEx Pins) are set to internal ROM configuration. Can be controlled by RGPIO Bus Pin 4 and 5.

## ETH

PHY Address is 1.

## Display Port

SC10 is controlled by DP_RX when SC11 is zero else high impedance state. DP_TX controlled by SC10 and DP_DE controlled by SC11.SC12 is controlled by DP_HPD.

## CAN

CAN_TX soured by SC18.

SC19 sourced by CAN_RX.

CAN_S sourced by S16.

## SD

SD WP is forwarded to Slave CPLD.

## RGPIO

| RGPIO Pin to FPGA | Value |
|---|---|
| 0 | SW3 |
| 1 | SW4 |
| 2 | SD_WP |
| 3 | XMOD_G |
| 4 | '0' |
| 5 | '0' |
| 6 | '0' |
| 7 | '0' |
| 8 | CAN_FAULT |
| 9 | PHY_LED0 |
| 10 | PHY_LED1 |
| 11 | PHY_LED2 |
| 12 | FMC_TDO |
| 13 | FMC_CLKDIR |
| 14 | JTAG_TRST |
| 15 | JTAG_SRST |
| 16 | '0' |
| 17 | '0' |
| 18 | '0' |
| 19 | DP_HPD |
| 20 | SDA |
| 21 | SCL |
| 22-23 | unused zero |
| 24-27 | reserved |
| 28-31 | Interface detection |

| RGPIO Pin from FPGA | Value |
|---|---|
| 0 | not USB_RST |
| 1 | not USBH_RST |
| 2 | not I2C_RST |
| 3 | not ETH_RST |
| 4 | not USBH_MODE0 |
| 5 | not USBH_MODE1 |
| 6 | LED0 |

| | |
|---|---|
| 7 | LED1 |
| 8 | SFP_LED0 |
| 9 | SFP_LED1 |
| 10 | SFP_LED2 |
| 11 | SFP_LED3 |
| 12 | JLED1 |
| 13 | JLED2A |
| 14 | JLED2B |
| 15-23 | unused |
| 24-27 | reserved |
| 28-31 | Interface detection |

## LED

| Name | Description |
|---|---|
| LED0 D4 Green | RGPIO (6) when active else USB HUB RSTN |
| LED1 D1 Red | RGPIO (7) when active else Main Reset from Slave CPLD |
| SFP_LED0 Red | RGPIO (8) when active else blinking when PCB power is on and reset Button is pressed else off |
| SFP_LED1 Green | RGPIO (9) when active else blinking when PCB power is on and reset Button is pressed else off |
| SFP_LED2 Red | RGPIO (10) when active else blinking when PCB power is on and reset Button is pressed else off |
| SFP_LED3 Green | RGPIO (11) when active else blinking when PCB power is on and reset Button is pressed else off |
| JLED1 Yellow | RGPIO (12) when active else blinking when PCB power is on and reset Button is pressed else not PHY_LED0 when X1 is zero else off |
| JLED2A Green | RGPIO (13) when active else blinking when PCB power is on and reset Button is pressed else not PHY_LED1 when X1 is zero else on |
| JLED2B Orange | RGPIO (14) when active else blinking when PCB power is on and reset Button is pressed else off |
| XMOD_E Red | Blinking when Main Power Reset else SC17 |

*Blinking: ~1,5Hz

# Appx. A: Change History

## Revision Changes

CPLD REV05 to REV06

- BUGFIX: renamed SC19 to SC17
- Connect FMC JTAG to XMOD2 JTAG

- Connect PJTAG0 (MIO29..26) to JTAG Pin Header J30
- Connect CAN to PL
- RGPIO Pin changes

CPLD REV04 to REV05

- SD WP
- XMOD LED access over PL

Older Revision (PCB REV03) to CPLD REV04

- Fix USB HUB Mode default state over RGPIO
- Invert JLED2B over RGPIO

Older Revision (PCB REV02) to CPLD REV04

- Add all functionality from older Revision (PCB REV03)

## Document Change History

To get content of older revision  got to "Change History"  of this page and select older document revision number.

| Date | Document Revision | CPLD Firmware Revision | Supported PCB Revision | Authors | Description |
|---|---|---|---|---|---|
| | **Error rendering macro 'page-info'**<br><br>Ambiguous method overloading for method jdk.proxy241.$Proxy3496#hasContentLevelPermission. Cannot resolve which method to invoke for [null, class java.lang.String, class com.atlassian.confluence.pages.Page] due to overlapping prototypes between: [interface com.atlassian.confluence.user.ConfluenceUser, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject] [interface com.atlassian.user.User, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]<br><br>Unknown macro: 'metadata' | REV06 | (REV02 Special Firmware!), REV03,REV04 | **Error rendering macro 'page-info'**<br><br>Ambiguous method overloading for method jdk.proxy241.$Proxy3496#hasContentLevel | • small Update Pinout Table |

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|---|---|---|---|---|---|
| 2017-10-18 | v.25 | REV06 | (REV02 Special Firmware!), REV03,REV04 | John Hartfiel | • Revision 06 finished |
| 2017-06-20 | v.23 | REV05 | (REV02 Special Firmware!), REV03,REV04 | John Hartfiel | • Document Bugfix, XMOD LED is connected to SC17 |
| 2017-06-12 | v.22 | REV05 | (REV02 Special Firmware!), REV03,REV04 | John Hartfiel | • Port description update |
| 2017-06-09 | v.21 | REV05 | (REV02 Special Firmware!), REV03,REV04 | John Hartfiel | • Revision 05 finished |
| 2017-06-08 | v.17 | REV04 | (REV02 Special Firmware!), REV03,REV04 | John Hartfiel | • document style update |
| 2017-03-10 | v.15 | REV04 | (REV02 Special Firmware!), REV03,REV04 | John Hartfiel | • Revision 04 finished |
| 2016-12-14 | v.1 | --- | | **Error rendering macro 'page-info'** Ambiguous method overloading for method jdk.proxy241.$Proxy3496#hasConten | • Initial release |

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# Appx. B: Legal Notices

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# REACH, RoHS and WEEE

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Users of electrical and electronic equipment in private households are required not to dispose of waste electrical and electronic equipment as unsorted municipal waste and to collect such waste electrical and electronic equipment separately. By the 13 August 2005, Member States shall have ensured that systems are set up allowing final holders and distributors to return waste electrical and electronic equipment at least free of charge. Member States shall ensure the availability and accessibility of the necessary collection facilities. Separate collection is the precondition to ensure specific treatment and recycling of waste electrical and electronic equipment and is necessary to achieve the chosen level of protection of human health and the environment in the European Union. Consumers have to actively contribute to the success of such collection and the return of waste electrical and electronic equipment. Presence of hazardous substances in electrical and electronic equipment results in potential effects on the environment and human health. The symbol consisting of the crossed-out wheeled bin indicates separate collection for waste electrical and electronic equipment.

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