ML4027-DCO-HLB-X

Technical Reference

CFP2 DCO MCB – MSA Compliant

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1. General Description

The **ML4027-DCO-HLB-X** is a CFP2-DCO Module Compliant Board. It is designed to provide an efficient and easy method of programming and testing CFP2-DCO modules.
The **ML4027-DCO-HLB-X** is designed to simulate an ideal environment for CFP2-DCO module testing, making the host board as electrically transparent as possible, and allowing a more accurate assessment of the module performance.

2. ML4027-DCO-HLB-X test board – key features

- ✓ CFP2-DCO MSA Form Factor
- ✓ Supports eight TX & RX Lanes
- ✓ MDIO interface
- ✓ FTDI Chip accessible through USB connector
- ✓ Access to Control/Alarm signals provided through pin headers
- ✓ Current Sense
- ✓ Voltage Sense
- ✓ Temperature Sense

3. Ordering Information

Default Configuration	Part Number	Description
Single supply	ML4027-DCO-HLB-3	power-up using single supply 3.3 V
Dual Supply	ML4027-DCO-HLB-5	power-up using dual supply (5 V **AND** 3.3 V)

4. Power-Up and Operation

The powering up method depends on the default configuration, based on the part number. The different methods are described below.

4.1 ML4027-DCO-HLB-3

The **ML4027-DCO-HLB-3** part number is powered up using single supply, as described below:

1. U13 jumper should be populated
2. Connect the banana plug (U8) to 3.3 V
3. Connect the GND to the banana plug (U5)

4.2 ML4027-DCO-HLB-5

The **ML4027-DCO-HLB-5** part number is powered up using dual-supply, as described below:

1. U12 jumper must be populated
2. Connect banana plug (U8) to 3.3 V, **AND**
3. Connect banana plug (U14) to 5 V
4. Connect the GND to the banana plug (U5)

When dual supply is used, the user has the ability to control the module input voltage to one of three voltage levels: 3.15 V, 3.3 V or 3.45 V.

The image below shows the common-pad SMD jumper, that could be populated on U12 **or** U13, depending on the ordering part number.

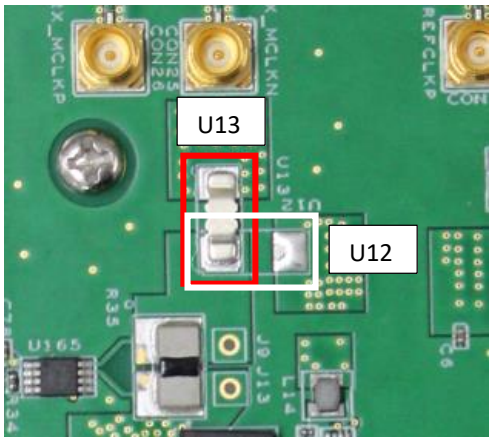

Figure 1: SMD Jumper Population Option

After board power up, and in order to communicate to the board, connect the host to your PC using a Type-B mini to Type-A USB cable through one of the USB connectors, depending on the user application, where two options are available:

1- USB_MICRO: where communication is established through the microcontroller.
2- USB_FTDI: where communication is established through the FTDI chip.

5. Operating Conditions

Based on the used powering method, as described in the previous section, the input voltage supply must follow the table below.

Parameter	Symbol	Condition	Min	Typical	Max	Unit
+5	P5V	Supply from U14 (P5V Pin)	-	+5	-	V
+3.3	P3V3	Supply from U8 (P3V3 Pin)	+3.0	+3.3	+3.6	

6. LEDs Indicators

The **ML4027-DCO-HLB-X** boards, include on-board LEDs, for quick debugging and monitoring purposes. LEDs are summarized below:

- LED D11 indicates whether a USB cable is plugged or not in the JR4 connector (USB_MICRO).
- LED D3 indicates whether a USB cable is plugged or not in the USB connector responsible to communicate with the FTDI (USB_FTDI).

- LEDs D12 and D13, are used for diagnostic purposes.
  - If the green LED, D13, is on: USB is locked and device is recognized by the USB driver.
  - If the red LED, D12, is on: USB not connected or USB driver not found.
  - If both LEDs are off: Board not powered correctly or firmware is corrupted.

- LED D7: PRG_ALRM1 signal Monitoring
- LED D8: PRG_ALRM2 signal Monitoring
- LED D10: PRG_ALRM3 signal Monitoring
- LED D17: RX_LOS signal Monitoring
- LED D18: MOD_ABS signal Monitoring
- LED D16: GLB_ALRMn signal Monitoring

7. MDIO Interface

The MDIO bus can be driven from two sources: Microcontroller or FTDI chip.
The MDIO source is selected by the user by selecting jumpers placement. The placement shown below is used when the MDIO bus is driven from the microcontroller (default placement). To use the other option (FTDI chip), both jumpers need to be moved to the opposite position.

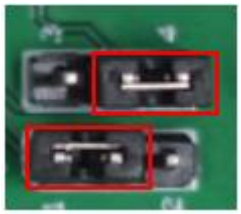

Figure 2: MDIO source selection

8. Hardware Signals

Hardware alarm pins, hardware control pins and MDIO pins can be accessed from the software via USB or through on-board pin headers. The dip switch U153 (HW_CNTRL) allows switching signaling pins control between software and hardware. And the dip switch U153 (S_MDIO) allows to operate the board via external MDIO.

The image below shows the default state of the switch, where in this case the signals are controlled through software. To access these signals via pin headers, the switches should be moved to the opposite side (switch to GND).

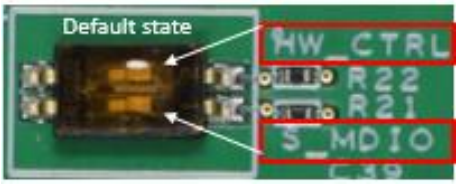

Figure 3: Dip Switch U153

8.1 MDIO Control

When the S_MDIO switch is moved to ground, the user could apply external MDIO through pin headers as shown below.
The user could access the MDIO bus for both MDIO 3.3 V (U155 pin header) and MDIO 1.2 V (TP4 and TP6 pins).

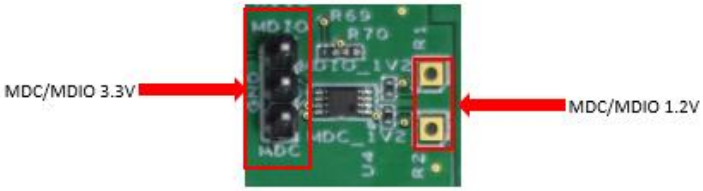

Figure 4: MDIO Pins

8.2 HW Control

When the HW_CTRL switch is moved to ground, the user could control the CFP2 control signals from an external source. All the hardware control and monitor signals could be accessed through pin headers shown below.

Figure 5: Control and Alarms Signals

All hardware control signals can be driven directly to ground using jumpers, as shown below (see Figure 4):

- J3: PRG_CTRL3
- J4: PRG_CTRL2
- J5: PRG_CTRL1
- J6: TX_DIS
- J7: MOD_LOPWR
- J19: MOD_RSTn. This is an independent pin. MOD_RSTn is connected to a switch for easy access from the user.

Figure 6: HW Control Signals Jumpers

9. FTDI Chip

The communication with the FTDI chip is done through the USB connector JR5 (USB_FTDI). The USB cable must be inserted in order to activate the FTDI Chip.
The FTDI has two output communications buses:

1- MDIO bus: in order to use the FTDI MDIO instead of the microcontroller MDIO bus, the jumpers placement should be changed as described in section 7.
2- UART bus: the UART_TX and UART_RX signals are connected to J10 pin header.

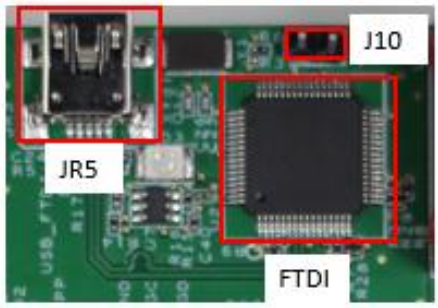

Figure 7: FTDI block

Appendix

Below is a summary of board deviations:

- In case of using dual supply it is expected to control the module input voltage to one of three options: 3.15 V, 3.3 V, and 3.45 V.
  - The initial state of the board is that the three options are as follow: 3.19 V, 3.3 V and 3.41 V

- The currently sent boards have the correct voltage levels (starting serial number 20)
  - The voltage levels are: 3.15 V, 3.3 V and 3.45 V.

Revision History

Revision number	Date	Description
0.1	12/10/2019	▪ Preliminary
0.2	8/7/2020	▪ Update format ▪ Add section for ordering information (section 3) ▪ Add paragraph for the powering up method to each part number (section 4) ▪ Add other LEDs indicators (section 6) ▪ Update appendix: deviation is fixed in the recent boards

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