



**PHB-CF3 – TOSHIBA CF3
PRINTHEAD DRIVER BOARD
HARDWARE USER GUIDE**

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1 Overview

PHB-CF3 is AEWA printhead driver board for Toshiba CF3 printhead. It connects to AEWA Print Manager Board (APMB) via optical fiber cable which makes the data transfer immune to electromagnetic interference. It can also be run in electrically noisy environments without concern as electrical noise will not affect fiber.

Features

- Supports Toshiba CF3 printhead (600 dpi, 1278 nozzles).
- Can print also 2 colors with one printhead.
- Optical fiber interface for long distances, 600 Mbits/sec.
- Generates accurate printhead driving voltages which are factory programmed. Printhead voltages can be further adjusted for special ink types.
- Printhead voltage control with respect to temperature.
- Correct voltage sequencing during power ON and power OFF.
- Gray scale printing, up to 8 levels.
- Printing waveform stored in the EEPROM.
- Tickling pulse generation logic to keep nozzles always active.
- Printhead temperature monitor, over temperature protection.
- Firmware update over optical interface.
- Single 24V input voltage with reverse polarity, over current and surge current protection.
- SHA Encryption for firmware copy protection.
- Small footprint, 75mm x 100mm.
- Easy software integration with APMB SDK which supports native C++ and .NET programming languages such as C# or Visual Basic.
- Compatible with APRINT RIP and Print software.



2 Board Components

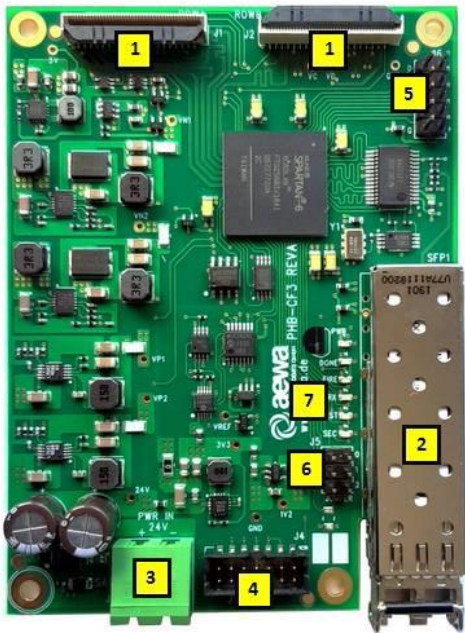


IMAGE 1 – PHB-CF3 BOARD COMPONENTS

2.1 Printhead Connector (J1, J2)

PHB-CF3 connects to the printhead with J1 and J2 connectors through 2x40 pin flat FPC cables. CF3 Printhead is delivered with cables integrated.

Connect J1 to the ROW A and J2 to the ROW B cable of the printhead as follows:

- Rotate the connector's actuator upright.
- Insert the FPC cable in the connector slot assuring that the conductive traces of the FPC are facing away from the actuator.
- Press the actuator down.

For more information, please see **FH40 Series Datasheet** from Hirose Electric Co Ltd.

IMPORTANT: Don't connect or unconnect the printhead cable when the printhead board is powered on. This may damage the printhead and/or the printhead board.



2.2 Optical Interface (SFP1)

PHB-CF3 connects to AEWA Print Manager Board (APMB) over optical fiber cable. Fiber cable is connected to an SFP (small form factor pluggable) transceiver module and plugged into the SFP connector.

PHB-CF3 is delivered with SFP transceiver module, but the optical cable is not included since the distance from the PHB-CF3 to APMB differs from system to system.

Following table shows the fiber cables supported.

Fiber Cable Type	Distance between PHB and APMB
OM2, 62.5µm/125µm, Multimode fiber, with LC connectors	0.5-300m
OM3, 50µm/125µm, Multimode fiber, with LC connectors	0.5-500m

TABLE 1 - SUPPORTED OPTICAL FIBER CABLES



IMAGE 2 - OPTICAL FIBER CONNECTION WITH SFP MODULE

2.3 Power Input Connector (J3)

J3 is a 2-port terminal block connector for power input. Switching mode or analog AC/DC power converters can be used. Converters with PFC feature is recommended. Following table can be used to estimate the total current usage.

Parameter	Value
Input Voltage	24V (+/- 0.5V)
Max. current consumption, with CF3 printhead connected, all nozzles firing with maximum speed, printhead voltage 15V	4A @24V
Max. current consumption, not printing	0.3A @24V

TABLE 2 -INPUT POWER SPECIFICATIONS



2.4 JTAG Connector (J4)

This connector is for internal use by AEWA for testing, debugging and updating the firmware. PHB-CF3 firmware can also be updated over optical interface using ApmbDiag or APRINT software.

2.5 Test Connector (J6)

Test header. Only for AEWA internal usage.

2.6 Jumper (J5)

3-port jumper. Currently not used. Leave open.

2.7 LEDs

There are 6 diagnostics LEDs on the PHB-CF3 PCB.

PWR LED is connected to the 3.3V voltage rail. It is ON when board power is OK.

DONE LED is ON when FPGA firmware is loaded correctly, otherwise none of the features of PHB-CF3 is available.

FIRE LED is ON when printhead nozzles are active and printing. It switches OFF when printing is stopped.

RX LED is ON when AEWA Print Manager Board is sending printing data to PHB-CF3 board, otherwise it is OFF.

SEC LED is OFF when SHA Encryption keys programmed into the device is correct. If this LED is ON, printing functions of the PHB-CF3 board are disabled.

TEST LED is error indicator LED. Following table shows errors reported by TEST LED.

TEST LED Behavior	Meaning
OFF	No error. Image data stream is counting data.
ON	No error. Image data stream is not counting data.
Blink once, than OFF for 1 second	Checksum Error. Incoming data packages from Print Manager Board have CRC checksum errors.
Blink 2 times, than OFF for 1 second	Data packaging error. Incoming data packages from Print Manager Board have wrong number of bytes.



Blink 3 times, than OFF for 1 second	Speed error. Printing speed or row to row delay setting is too high.
Blink 4 times, than OFF for 1 second	Waveform error. Either no waveform is loaded or the loaded waveform has errors.
Blink 5 times, than OFF for 1 second	Input under voltage error.
Blink 6 times, than OFF for 1 second	Printhead voltages are switched off due to an over temperature or voltage error condition.

TABLE 3 – TEST LED FUNCTIONS

Same errors can also be read by APMB software. More error types might be added in future with firmware updates.



3 Mechanical Dimensions

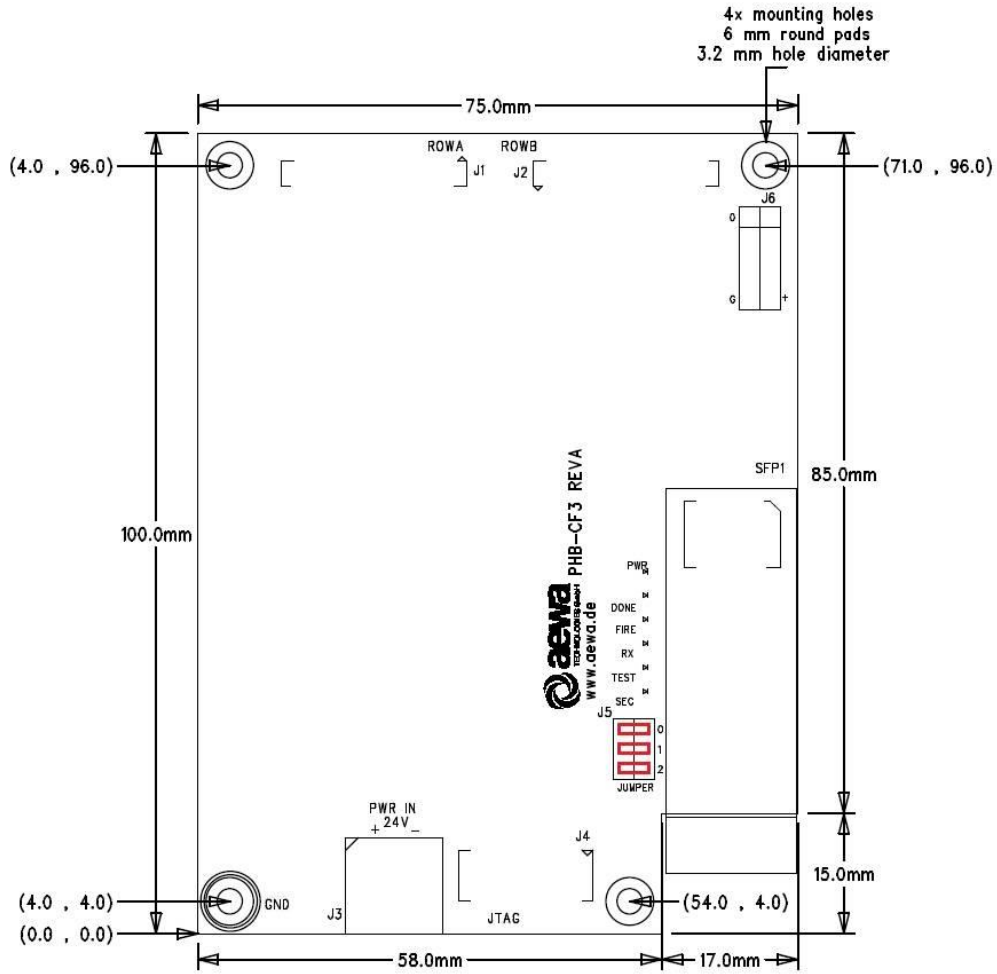


IMAGE 3 – PHB-CF3 MECHANICAL DIMENSIONS



4 Connectors and Cables

PHB-CF3 is assembled with very high quality industrial terminal blocks and connectors for power and input/output. Following table lists the PCB connectors and their mating cable connectors.

Description	PCB Side	Mating Side
J3, Power input connector	PCB header, 5.08 mm raster, 2 poles, MSTBA 2,5/ 2-G-5,08 Manufacturer: Phoenix Contact Order No: 1757242	Plug, 5.08 mm raster, 2 poles, MSTB 2,5/ 2-ST-5,08 Manufacturer: Phoenix Contact Order No: 1757019 or equivalent

TABLE 4 – CONNECTORS AND CABLES

5 Ordering Information

Order No	Item
PHB-CF3	Toshiba CF3 printhead driver board.
PHB-CF3-CC	PHB-CF3 with conformal coating for harsh environments.

TABLE 5 – ORDERING INFORMATION

