XDRV1 – XAAR 1003 PRINTHEAD DRIVER BOARD

HARDWARE USER GUIDE

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Version 1.2

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1 Overview

XDRV1 is AEWA printhead driver board for XAAR 1003 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 XAAR 1003 printhead (360 dpi, 1000 nozzles).
- Optical fiber interface for long distances, 600 Mbits/sec.
- Accurate printhead voltage generation.
- Printhead voltage control with respect to temperature.
- Correct voltage sequencing during power ON and power OFF.
- Gray scale printing, up to 16 levels.
- Printing waveform stored in the EEPROM.
- Tickling pulse generation logic to keep nozzles always active.
- Firmware update over optical interface.
- Single 48V input voltage with reverse polarity, over current and surge current protection.
- SHA Encryption for firmware copy protection.
- Small footprint, 110mm x 105mm.
- Easy software integration with APMB SDK which supports native C++ and .NET programming languages such as C# or Visual Basic.
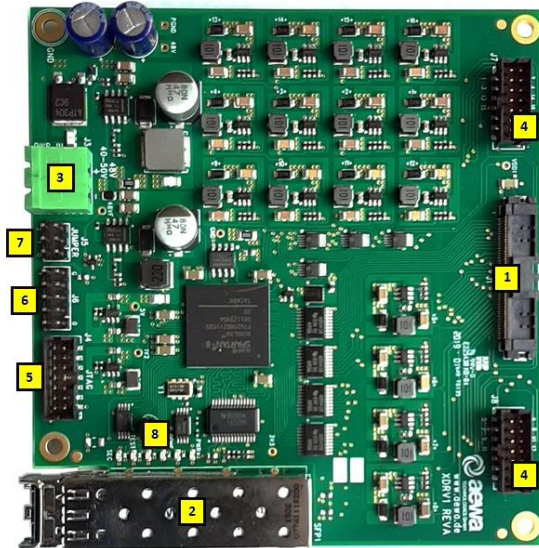- Compatible with APRINT RIP and Print software.

2 Board Components

IMAGE 1 – XDRV1 BOARD COMPONENTS

2.1 Printhead Connector (J1, J2)

XDRV1 connects to the printhead with J1 and J2 connectors through 2x50 pin flat cable. J2 is located on the bottom side of the board. 1003 Printhead is delivered with cables integrated.

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)

XDRV1 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.

XDRV1 is delivered with SFP transceiver module, but the optical cable is not included since the distance from the XDRV1 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	48V (40V – 50V)
Max. current consumption, 1003 printhead, all nozzles firing with maximum speed, printhead voltage 26V	1.4A @48V
Max. current consumption, not printing	0.2A @48V

TABLE 2 - INPUT POWER SPECIFICATIONS

2.4 Printhead voltage calibration connectors (J7, J8)

Only for AEWA internal usage. J7 and J8 are used to calibrate the DC/DC converters which generate 16 different printhead voltages with an external electronics.

2.5 JTAG Connector (J4)

This connector is for internal use by AEWA for testing, debugging and updating the firmware. XDRV1 firmware can also be updated over optical interface using ApmbDiag or APRINT software.

2.6 Test Connector (J6)

Test header. Only for AEWA internal usage.

2.7 Jumper (J5)

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

2.8   LEDs

There are 6 diagnostics LEDs on the XDRV1 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 XDRV1 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 XDRV1 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 XDRV1 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	No meaning. Reserved for future use.

Blink 6 times, than OFF for 1 second	Printhead voltages are switched off due to an over temperature or voltage error condition.

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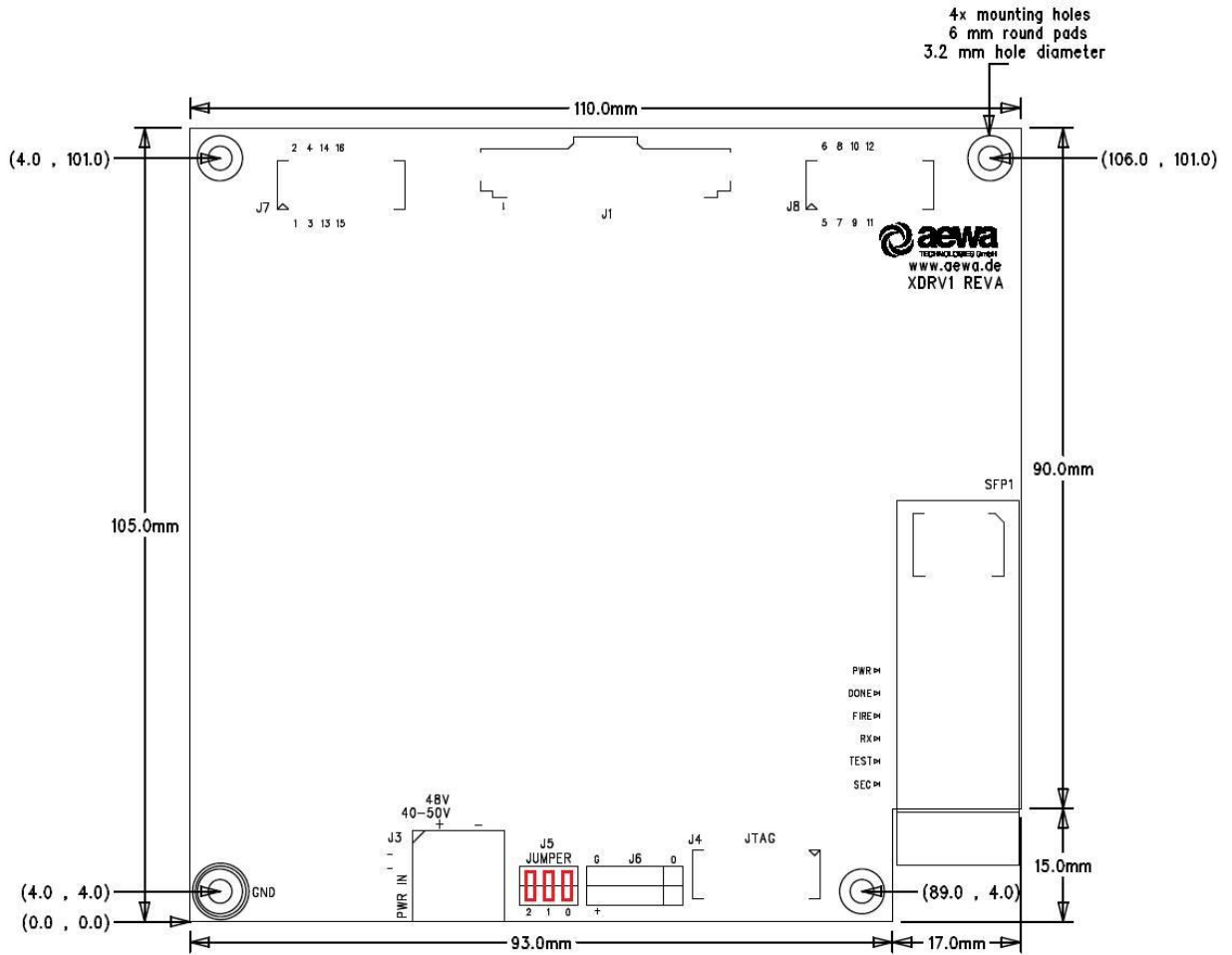
3 Mechanical Dimensions

IMAGE 3 – XDRV1 MECHANICAL DIMENSIONS

4 Connectors and Cables

XDRV1 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
XDRV1	XAAR 1003 printhead board.
XDRV1-CC	XDRV1 with conformal coating for harsh environments.

TABLE 5 – ORDERING INFORMATION