KPRINT2 – KONICA MINOLTA PRINTHEAD DRIVER BOARD

HARDWARE USER GUIDE

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Version 1.6

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1 Overview

KPRINT2 is printhead driver board for Konica Minolta KM1024i, KM1280i and KM1800i printheads. It connects to AEWA Print Manager Board via optical fiber cable which makes the data transfer immune to electromagnetic interference.

Performance

- Optical fiber interface: 600 Mbits/sec.
- Maximum Printing Speed, KM1024i printhead: 39 KHz, 60 KHz with data packing.
- Maximum Printing Speed, KM1800i printhead: 27 KHz, 90 KHz with data packing.

Features

- Supports Konica Minolta KM1024i, KM1280i, and KM1800i printheads.
- Generates accurate printhead driving voltages which are factory programmed. User can adjust printhead voltages further for special ink types.
- Correct voltage sequencing during power ON and power OFF.
- Grey scale printing, 8 levels.
- Printing waveform is generated and programmed with ApmbWave software and stored in EEPROM.
- Can generate tickle (or shake) pulse during zero data (or no data) phase to keep nozzles alive.
- Accurate printhead temperature control, over temperature protection.
- Firmware update over optical fiber interface.
- Single 24V input voltage with reverse polarity, over voltage, over current and surge current protection.
- SHA-1 Encryption for firmware copy protection.
- Small footprint, 90mm x 85mm.
- Easy software integration with APMB SDK which supports native C++ and .NET programming languages such as C# or Visual Basic.
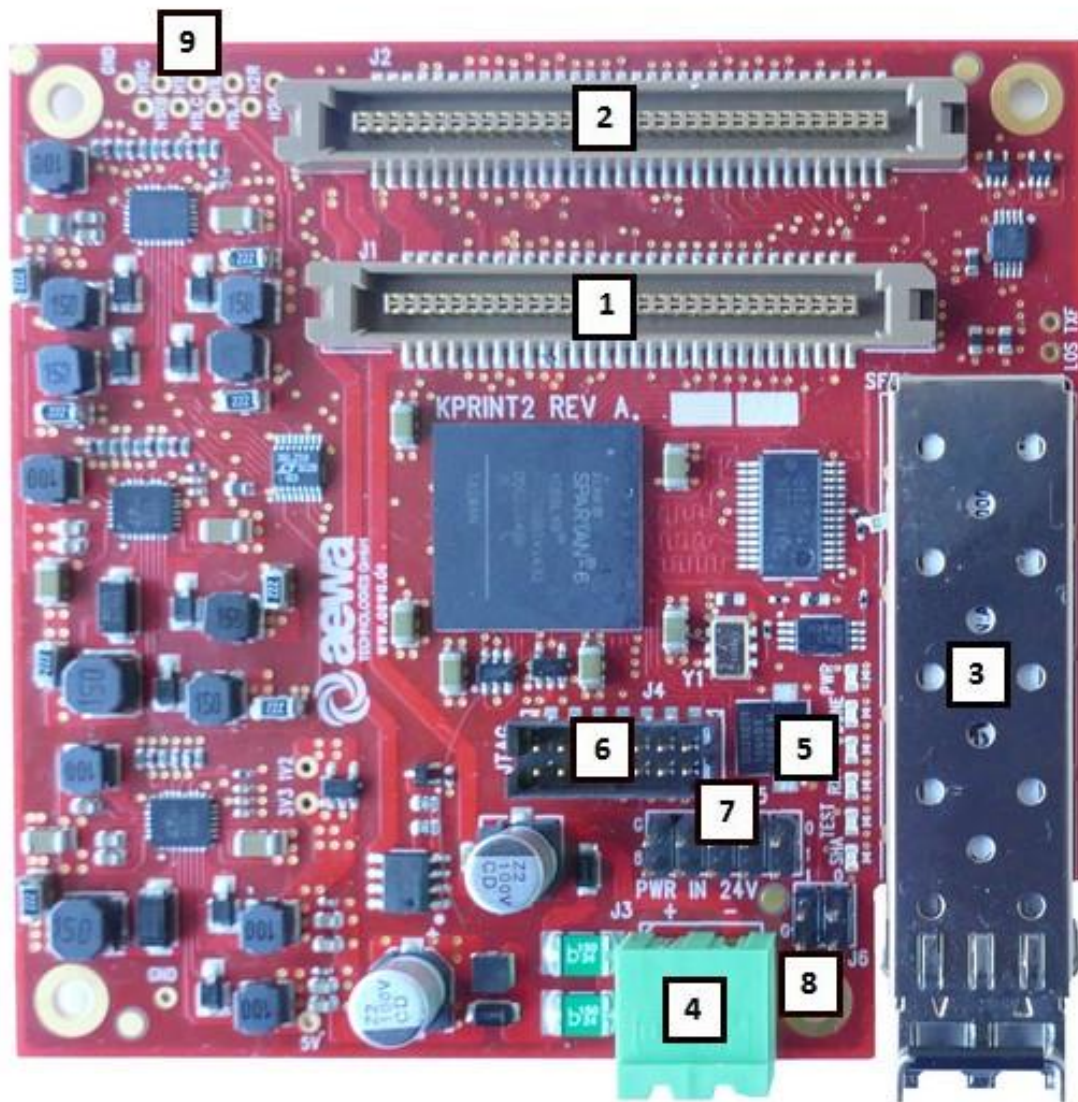- Compatible with APRINT software.

2 Board Components

IMAGE 1 – KPRINT2 BOARD COMPONENTS

2.1 KM1024i and KM1280i Printhead Connector (J1)

KPRINT2 connects to the KM1024i or KM1280i printhead with J1 connector through a 60 pin flat cable. Flat cable can also be ordered from AEWA with the desired length. Maximum recommended cable length is 50 cm. Please see "Connectors and Cables" chapter for the manufacturer and part numbers of connectors and cables.

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 KM1800i Printhead Connector (J2)

KPRINT2 connects to the KM1800i printhead with J2 connector through a 68 pin flat cable. Flat cable can also be ordered from AEWA with the desired length. Maximum recommended cable length is 50 cm. Please see "Connectors and Cables" chapter for the manufacturer and part numbers of connectors and cables.

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.

2.3 Optical Interface (SFP1)

KPRINT2 connects to AEWA Print Manager Board over optical fiber cable. Fiber cable is connected to an SFP (small form factor pluggable) transceiver module and plugged into the SFP connector.

KPRINT2 is delivered with SFP transceiver module, but the optical cable is not included since the distance from the KPRINT2 to APMB differs from system to system.

Following table shows the fiber cables supported.

Fiber Cable Type	Distance between KPRINT2 and APMB boards
OM2, 62.5µm/125µm, Multimode fiber, with LC connectors	0.5-300m
OM3, 50µm/125µm, Multimode fiber, with LC connectors	0.5-500m

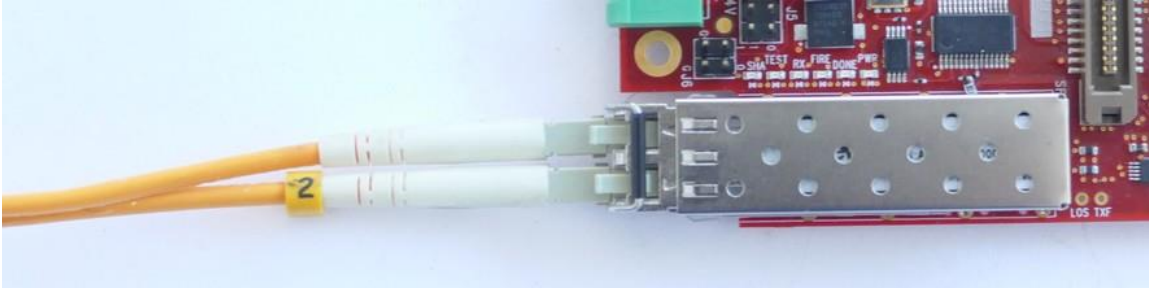TABLE 1 - SUPPORTED OPTICAL FIBER CABLES

IMAGE 2 - OPTICAL FIBER CONNECTION WITH SFP MODULE

2.4   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 (23.5 – 24.5V)
Max. current consumption, KPRINT2 + KM1024i printhead, all nozzles firing with maximum speed	1.2A @24V
Max. current consumption, KPRINT2 + KM1800i printhead, all nozzles firing with maximum speed	1.7A @24V
Max. current consumption, printhead heater	1A @24V

TABLE 2 -INPUT POWER SPECIFICATIONS

2.5 LEDs

There are 6 diagnostics LEDs on the KPRINT2 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 KPRINT2 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 KPRINT2 board, otherwise it is OFF.

SHA LED is OFF when SHA-1 Encryption keys programmed into the device is correct. If this LED is ON, complete functions of the KPRINT2 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 is too high for the printhead with the current waveform and bits per pixels setting.
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.
Blink 7 times, than OFF for 1 second	Voltage error. At least one of the DC/DC converters which generate printhead voltages has errors.

TABLE 3 –TEST LED FUNCTION

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

2.6 JTAG Connector (J4)

This connector is for internal use by AEWA for testing, debugging and updating the firmware. KPRINT2 firmware can also be updated over optical interface using ApmbDiag software.

2.7 Test Connector (J5)

J5 is test header for internal use by AEWA.

2.8 Jumper (J6)

KPRINT2 has a 2-port jumper on J6. They are marked as 0 and 1 on the PCB. See "Mechanical Dimensions" section for the correct orientation of jumpers.

.Jumper 0 and 1 selects between different printhead types as shown in the following table:

Jumper 1	Jumper 0	Function
Open	Open	KM1024i
Open	Closed	KM1800i, high speed interface (OPR function) enabled
Closed	Open	KM1280i
Closed	Closed	KM1800i, high speed interface (OPR function) disabled

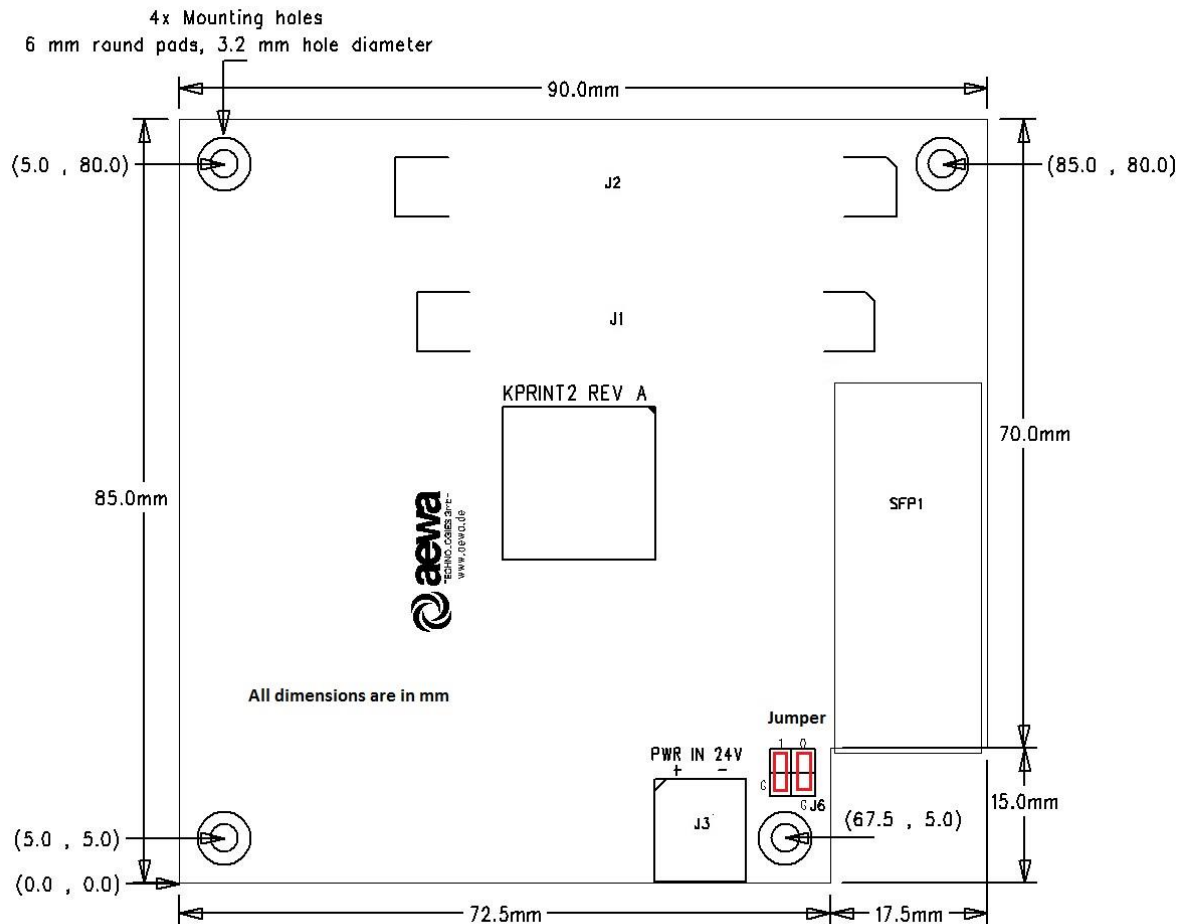TABLE 4 – JUMPER FUNCTION TABLE

3 Mechanical Dimensions

IMAGE 3 – KPRINT2 MECHANICAL DIMENSIONS

4 Connectors and Cables

KPRINT2 is assembled with very high quality industrial terminal blocks and connectors for power in and input/output. Following table lists the PCB connectors and their mating cable connectors.

Description	PCB Side	Mating Side
J1, KM1024i and KM1280i printhead connector	60-pin PCB connector Manufacturer: KEL Part Number: 8930E-060-178MS-F	60-pin flat cable connector Manufacturer: KEL Part Number: 8925R-060-179-F
Cable for J1		60-pin flat cable Manufacturer: 3M Part Number: 3754/60
J2, KM1800i printhead connector	68-pin PCB connector Manufacturer: KEL Part Number: 8930E-068-178MS-F	68-pin flat cable connector Manufacturer: KEL Part Number: 8925R-068-179-F
Cable for J2		68-pin flat cable Manufacturer: 3M Part Number: 3754/68
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 compatible

TABLE 5 – CONNECTORS AND CABLES

5 Ordering Information

Order No	Item
KPRINT2	KPRINT2 PCB
KPRINT2-CC	KPRINT2 PCB with conformal coating for harsh environments.
KAK60-XX	Assembled cable for KM1024i or KM1280i printheads. XX is the length of the cable in centimeters between 5 and 50.
KAK68-XX	Assembled cable for KM1800i printhead. XX is the length of the cable in centimeters between 5 and 50.

TABLE 6 – ORDERING INFORMATION