



# DRV-GEN5 – RICOH GEN5 PRINTHEAD DRIVER BOARD

## HARDWARE USER GUIDE

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Version 1.4

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# 1 Overview

DRV-GEN5 is a printhead driver board for RICOH GEN5 printheads, MH5420 and MH5440. 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: 60 KHz

## Features

- Supports RICOH GEN5 printheads, MH5420 and MH5440.
- 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.
- SHA-1 Encryption for firmware copy protection.
- Small footprint, 102mm x 76mm.
- 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

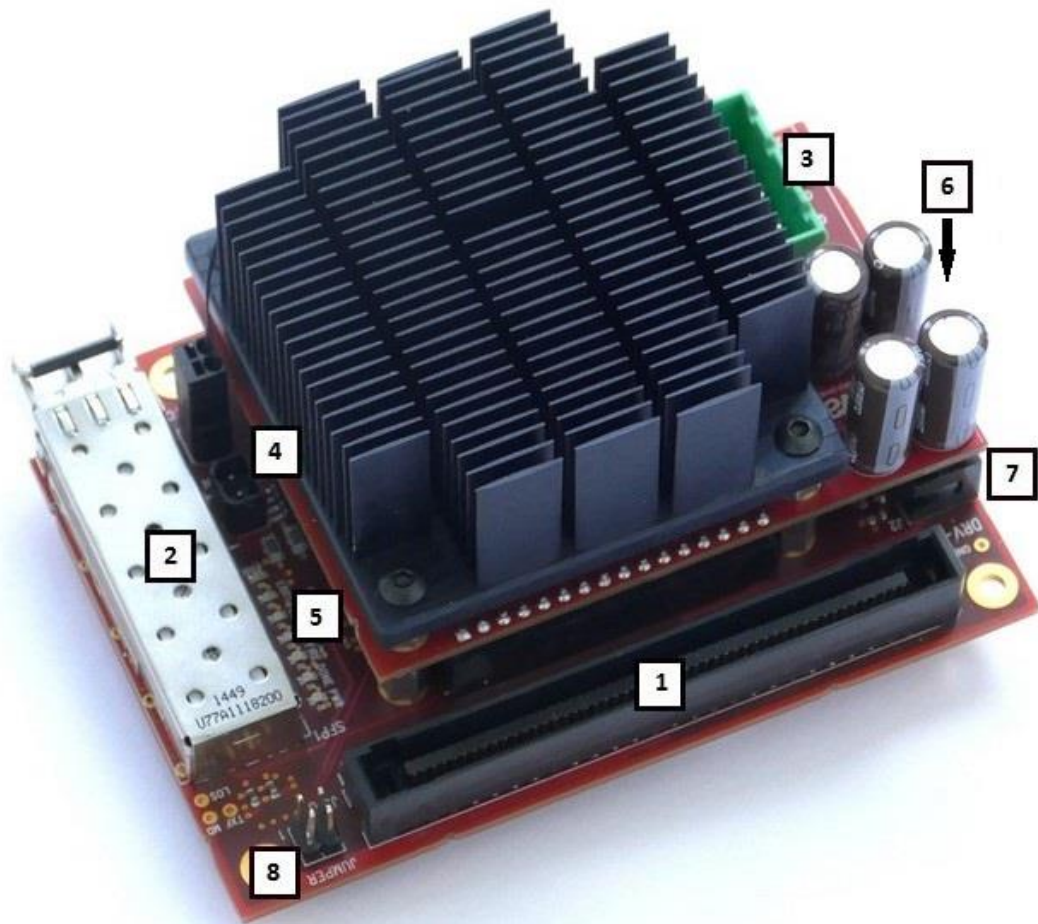


IMAGE 1 – DRV-GEN5 BOARD COMPONENTS



## 2.1 Printhead Connector (J1)

DRV-GEN5 connects to the Ricoh Gen5 printhead through J1 connector. It mates directly with the Adapter PCB which is delivered with the printhead.

## 2.2 Optical Interface (SFP1)

DRV-GEN5 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.

DRV-GEN5 is delivered with SFP transceiver module, but the optical cable is not included since the distance from the DRV-GEN5 to APMB differs from system to system.

Following table shows the fiber cables supported.

Fiber Cable Type	Distance between DRV-GEN5 and APMB boards
<b>OM2, 62.5µm/125µm, Multimode fiber, with LC connectors</b>	0.5-300m
<b>OM3, 50µm/125µm, Multimode fiber, with LC connectors</b>	0.5-500m

TABLE 1 - SUPPORTED OPTICAL FIBER CABLES

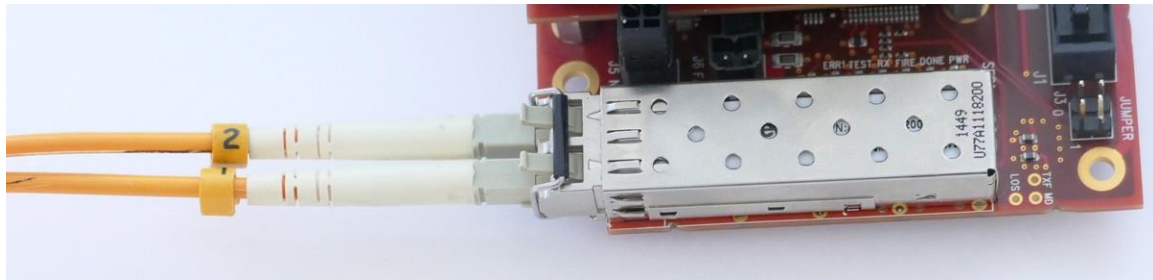


IMAGE 2 - OPTICAL FIBER CONNECTION WITH SFP MODULE

## 2.3 Power Input Connector (J11)

J1 is a 4-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
<b>Input Voltage</b>	24V (23.5 – 24.5V)
<b>Max. current consumption, DRV-GEN5 board + Gen 5 printhead, all nozzles firing with maximum speed</b>	1.7A @24V
<b>Max. current consumption, printhead heater</b>	368mA @24V

**TABLE 2 -INPUT POWER SPECIFICATIONS**

## 2.4 FAN Connector (J6)

If desired, DRV-GEN5 can be delivered with a 60mm axial fan attached to the Heat-Sink. J2 connector supplies power to the FAN.

FAN may be required for applications with high image coverage such as negative printing. Fan is only switched ON if the temperature of the Heat-sink exceeds a predefined value.

## 2.5 LEDs

There are 7 diagnostics LEDs on the DRV-GEN5 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 DRV-GEN5 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 DRV-GEN5 board, otherwise it is OFF.

**TEST** LED is OFF when the image data stream is counting data, otherwise it is ON. This LED is used for internal tests by AEWA.

**ERR1** LED is OFF when SHA-1 Encryption keys programmed into the device is correct. If this LED is ON, complete functions of the DRV-GEN5 board are disabled.

**ERR2** LED is error indicator LED. Following table shows errors reported by ERR2 LED.

ERR2 LED Behavior	Meaning
OFF	No error.
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	No meaning. Reserved for future use.

**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 (J2)

This connector is for internal use by AEWA for testing, debugging and updating the firmware. DRV-GEN5 firmware can also be updated over optical interface using ApmbDiag software.

## 2.7 Test Connector (J4)

J4 is test header for internal use by AEWA.

## 2.8 Jumper (J3)

DRV-GEN5 has a 2-port jumper on J3. They are marked as 0 and 1 on the PCB. See “Mechanical Dimensions” section for the correct orientation of jumpers.

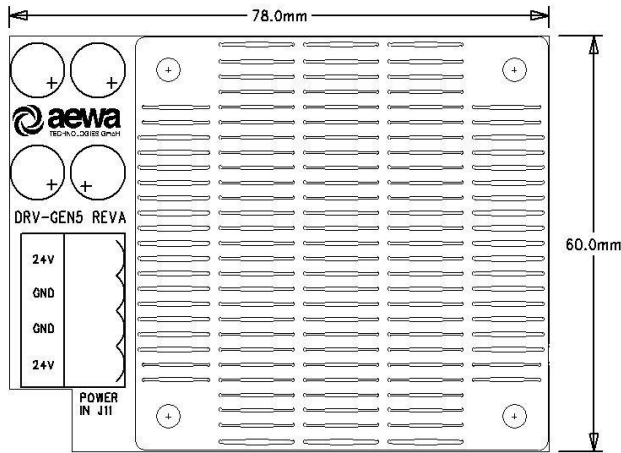
Following table shows the function of jumpers.

Index	Function
Jumper 0	No function. Reserved for future use.
Jumper 1	No function. Reserved for future use.

**TABLE 4 – JUMPER FUNCTION TABLE**



### 3 Mechanical Dimensions



Total height, top and bottom boards including Heat-sink: 45mm

IMAGE 3 – MECHANICAL DIMENSIONS, DRV-GEN5 UPPER BOARD WITH HEAT-SINK

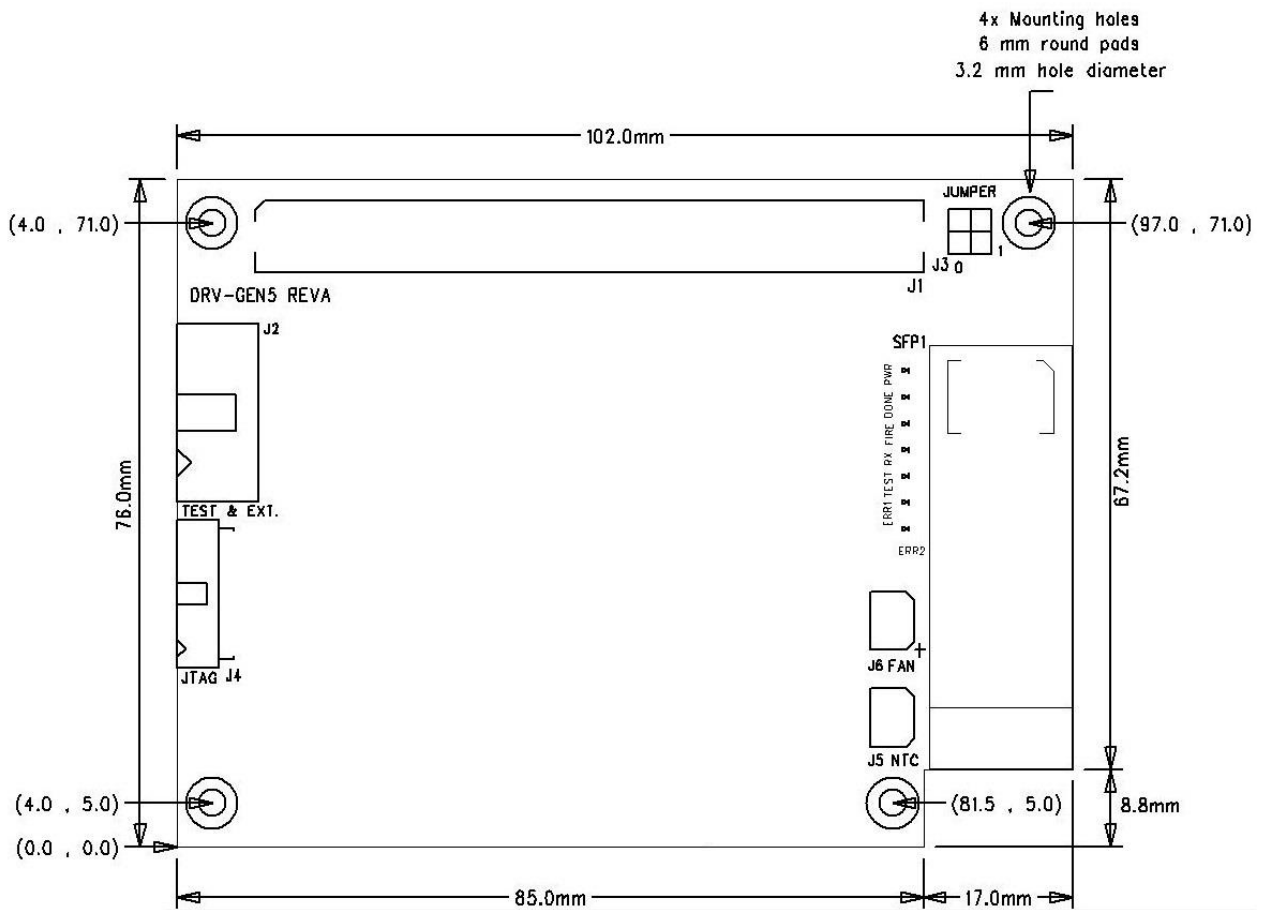


IMAGE 4 - MECHANICAL DIMENSIONS, DRV-GEN5 LOWER BOARD





## 4 Connectors and Cables

DRV-GEN5 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, Ricoh Gen5 printhead connector	100-pin PCB connector Manufacturer: JAE Electronics Part Number: TX25-100P-6ST-H1E	Mates directly with the Adapter PCB which is delivered with the printhead.
J6, External FAN connector	Terminal Block Header, 2.5 mm raster, 2 poles, 180° Manufacturer: Phoenix Contact Order No: 1778557	Terminal Block Plug, 2.5 mm raster, 2 poles Manufacturer: Phoenix Contact Order No: 1778832 or compatible
J11, Power input connector	PCB header, 5.08 mm raster, 4 poles, 180°, MSTBVA 2,5/ 4-G-5,08 Manufacturer: Phoenix Contact Order No: 1755752	Plug, 5.08 mm raster, 4 poles, MSTB 2,5/ 4-ST-5,08 Manufacturer: Phoenix Contact Order No: 1757035 or compatible

TABLE 5 – CONNECTORS AND CABLES



## 5 Ordering Information

Order No	Item
DRV-GEN5	DRV-GEN5 PCB with Heat-Sink
DRV-GEN5-CC	DRV-GEN5 PCB with conformal coating for harsh environments.

**TABLE 6 – ORDERING INFORMATION**

