HAILO
Empowering Intelligence

Hailo-8R™ mPCIe Module
(PCI Express Full Mini Card-Mini F1)

Data Sheet
Part Number: HMP1RB1C2GA

Rev. 1.0
May 2023

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This version of the document supersedes all previous versions.

General Notice

Documentation Control

Revision History

Version	Date	Description
1.0	May 2023	Initial revision

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1. Overview

1.1. Introduction

The Hailo-8R™ mPCIe Module (part number HMP1RB1C2GA), compatible with the PCI Express Full Mini (mPCIe) form factor is a 13 TOPS acceleration module, supports extended operating temperature range (see Section 2.1 for details) targeting artificial intelligence (AI) applications. It is a member of Hailo's comprehensive family of PCI Express (PCIe) based acceleration modules that meet industry standards for a range of form factors and performance objectives.

The module is based on the Hailo-8R™ processor and features a PCIe Gen 3, 1-lane interface (x1) which enables high throughput of input and output data.

As a PCIe device, the module can be used to perform real-time, low latency neural network inference, using PCIe for streaming input data and for streaming inference results.

1.2. System Requirements

Hardware:

- CPU Architecture
    - x86 based ; or
    - ARM aarch-64 based
- At least 1 available mPCIe Full-Mini socket
- Software:
    - Linux Ubuntu or other distributions
    - Supported kernel versions: multiple, tested on Linux kernel versions 4.15.0-39-generic and 5.0.16-050016-generic.

    Or

    - Microsoft Windows 10 64 bits

1.3. System Level Block Diagram

The following functional block diagram illustrates the mPCIe Module (HMP1RB1C2GA):

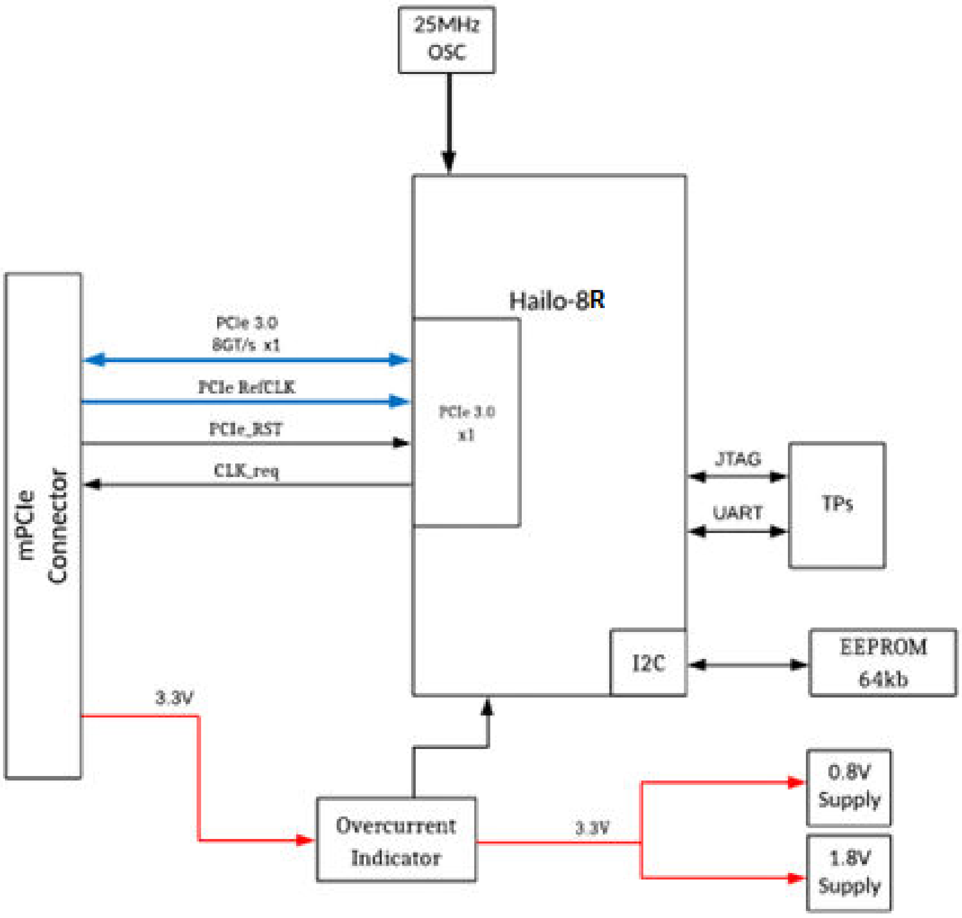

Figure 1: HMP1RB1C2GA Functional block diagram

2. Specifications

2.1. Key Properties

Compliance	
Certification	CE; FCC Class A
Environmental	
Storage Temperature	-0°-70° C
Operating Temperature	-0°-70° C *(refer to section 3.2 for further details)*
Storage/Operating Humidity	5% to 90% RH (non-condensing)
Physical	
Form Factor	PCI Express Full Mini Card-Mini F1
Dimensions	30 x 50.95 mm
Electrical	
Power supply	3.14V-3.59V
Thermal design power (TDP)	2.3W[1]
Interface	PCIe Gen 3, 1-lane (x1)
Peak Performance (INT8)	13 TOPS

Table 1. Key properties

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[1] As per PCI Express® Mini Card Electromechanical Specification Revision 2.1.
For AI acceleration application which are compute intensive, Hailo recommends using a higher TDP of 3.6W.

2.2. PCIe Connector Pinout

Pin Number(s)	Signal	Type
4,9,15,18,21,26,27, 29,34,35,37,40,43,50	GND	Power
2,24,39,41,52	3.3V	Power
22	PERST#	I
7	CLKREQ#	I/O
1	PEWAKE#	I/O
13	REFCLK+	I
11	REFCLK-	I
31,33	PER[n/p]0	I
23,25	PET[n/p]0	O

Table 2: HMP1RB1C2GAE Pin Description

For more information, see the *PCI Express® Mini Card Electromechanical Specification Revision 2.1* on the PCISIG website.

2.3. Mechanical Properties

Below is a mechanical outline for the HMP1RB1C2GA module.

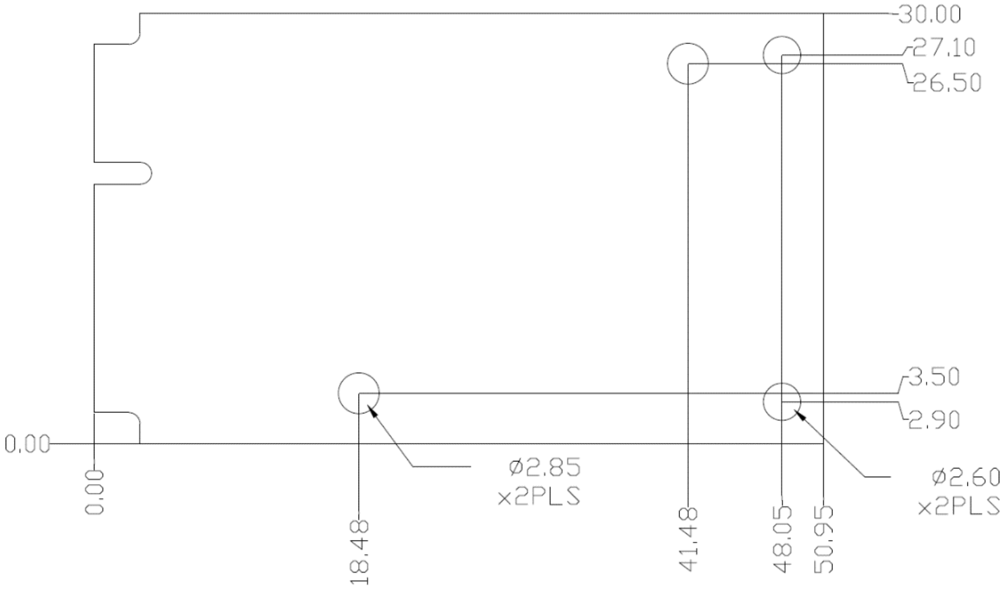
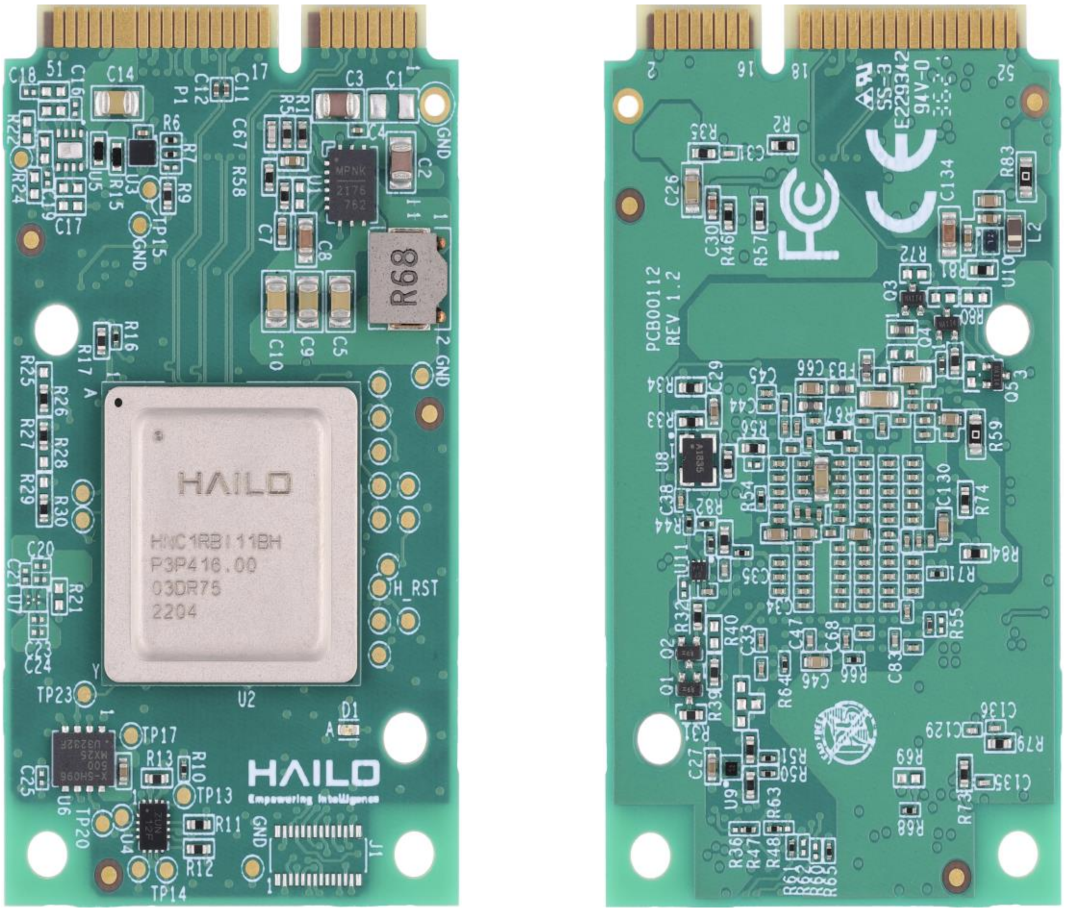


Figure 2 HMP1RB1C2GAMechanical outline – Top View (dimensions in millimeters)

For more information, see the *PCI Express® Mini Card Electromechanical Specification Revision 2.1* on the PCISIG website.

2.4. Module Board Layout

Below are images showing the board layout, front and reverse views.



Hailo-8R™ mPCIe

Hailo-8R™ mPCIe Back side

Figure 3: Module Board Layout for Hailo-8R™ mPCIe

3. Power Consumption and Thermal Management

3.1. Module Power Consumption

The module requires 3.3V supply (power pins are as detailed in Table 2). The module's power consumption is dependent on the resources utilized for inference. Maximum power consumption is 3.63W (or 1.1A total current draw from 3.3V pins) at full utilization.

The module's power consumption (typical at 25° C) is listed below for typical configurations:

Configuration	Power [W]
Resnet-50 224x224 @ 915 FPS	3.3
MobileNet-SSD 300x300 @ 996 FPS	2.4

Table 3 - Power Consumption for Typical Configurations

For up-to-date benchmark performance please visit the benchmarks page on Hailo's website.

3.2. Thermal Management Requirements

The HMP1RB1C2GA is tested and validated for industrial temperature grade (-0°-70°C) when mounted in a test fixture.

Proper heat dissipation must be employed to ensure that the Hailo-8R™ chip does not overheat. The Hailo-8R™ is designed to dissipate most of the heat to the top surface of the package.

For more information on typical use configurations and design guidelines, see Hailo's *Hailo-8R™ AI Acceleration Module Thermal Design Considerations Application Note*.

3.3. Overheat and Overcurrent Protection

The module features monitoring and protection from overheating conditions and excessive power consumption.

For additional information on thermal design, see Section 3.2.

For more information on power consumption limits, see the *PCI Express® Mini Card Electromechanical Specification Revision 2.1* on the PCISIG website.

4. Installation and Troubleshooting

For installation and troubleshooting instructions please refer to https://hailo.ai/developer-zone/documentation/hailort/latest/?sp_referrer=install/install.html