

Hailo-8™ M.2 ET Module

Key A+E, Size 2230



Data Sheet

Part Number: HM218B1C2KAE

Rev. 2.04
May 2023



Disclaimer and Proprietary Information Notice

Copyright

© 2023 Hailo Technologies Ltd ("Hailo"). All Rights Reserved.

No part of this document may be reproduced or transmitted in any form without the express, written permission of Hailo. Nothing contained in this document should be construed as granting any license or right to use proprietary information without the written permission of Hailo.

This version of the document supersedes all previous versions.

General Notice

Hailo, to the fullest extent permitted by law, provides this document "as-is" and disclaims all warranties, either express or implied, statutory or otherwise, including but not limited to the implied warranties of merchantability, non-infringement of third parties' rights, and fitness for particular purpose.

Hailo assumes no liability for any error in this document and for damages, whether direct, indirect, incidental, consequential or otherwise, that may result from such errors, including but not limited to loss of data or profits.

The content in this document is subject to change without prior notice. Hailo reserves the right to make changes to the content in this document without prior notification to users.

Documentation Control

Revision History

Version	Date	Description
1.0	February 2022	Extended temperature mass production release
1.01	March 2022	Fixed typo on part number
1.1	June 2022	2.2 Fixed typo in Connector Pinout
2.0	October 2022	Updated board image and added module photos for configurations A and B
2.02	November 2022	Updated configuration B image and typo
2.03	January 2023	Updated Table 1 PER and PET signals
2.04	May 2023	Installation and Troubleshooting section replaced with a link to new location for this section

Table of Contents

1. Overview	5
1.1. Introduction.....	5
1.2. System Requirements	5
1.3. System Level Block Diagram.....	6
2. Specifications	7
2.1. Key Properties	7
2.2. PCIe Connector Pinout	8
2.3. Mechanical Properties	9
2.4. Module Configurations.....	9
3. Power Consumption and Thermal Management	11
3.1. Module Power Consumption.....	11
3.2. Thermal Management Requirements	11
3.3. Overheat and Overcurrent Protection	12
4. Installation and Troubleshooting.....	12

1. Overview

1.1. Introduction

The Hailo-8™ M.2 Key A+E ET Module (part number HM218B1C2KAE), compatible with the M.2 Key A+E form factor is a 26 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-8™ AI processor and features a full PCIe Gen 3 2- lane interface (x2), 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 M.2 slot (Key A+E, Socket 1 type – sometimes called NVME)
- 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 Hailo-8™ M.2 Key A+E ET Module (HM218B1C2KAE):

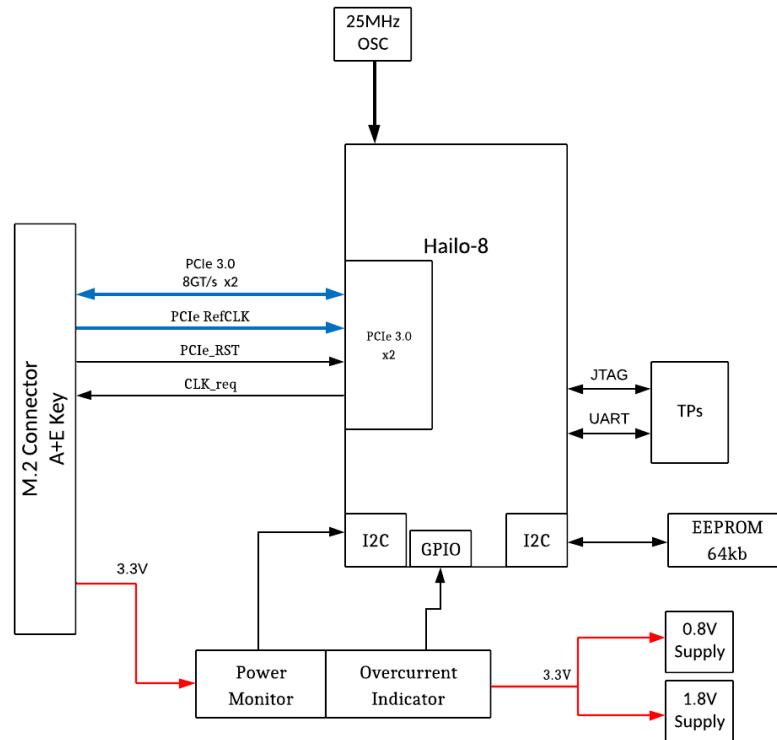


Figure 1: HM218B1C2KAE Functional Block Diagram

2. Specifications

2.1. Key Properties

Compliance	
Certification	CE; FCC Class A
Environmental	
Storage Temperature	-40°-85° C
Operating Temperature	-40°-85° C (<i>refer to section 3.2 for further details</i>)
Storage/Operating Humidity	5% to 90% RH (non-condensing)
Physical	
Form Factor	M.2 Key A+E
Dimensions	22 x 30 mm (2230-D3-A-E)
Electrical	
Power supply	3.3V ± 5%
Thermal design power (TDP)	6.93W
Interface	PCIe Gen 3, 2-lanes (x2)
Peak Performance (INT8)	26 TOPS

Table 1. Key properties

2.2. PCIe Connector Pinout

Pin Number(s)	Signal	Type
1,7,18,33,39,45,51,57,63,69,75	GND	Power
2,4,72,74	3.3V	Power
52	PERST#	I
53	CLKREQ#	I/O
55	PEWAKE#	I/O
49	REFCLKN	Clock
47	REFCLKP	Clock
37/35	PER0 (n/p)	I
43/41	PET0 (n/p)	O
61/59	PER1 (n/p)	I
67/65	PET1 (n/p)	O

Table 2: HM218B1C2KAE Pin Description

For more information, see the *PCI Express M.2 Specification Revision 3.0* on the [PCISIG website](#).

2.3. Mechanical Properties

Below is a mechanical outline for the HM218B1C2KAE module. The module is type 2230-D3-A-E.

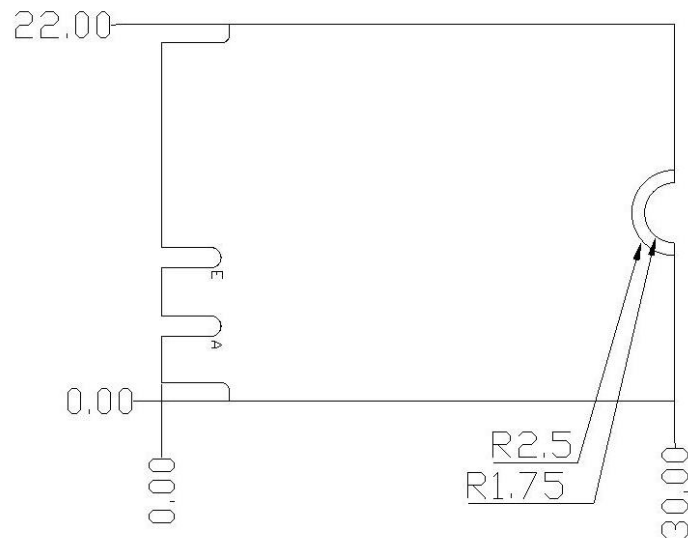


Figure 2: HM218B1C2KAE Mechanical outline (Top View)

For more information, see the *PCI Express M.2 Specification Revision 3.0, Version 1.2* on the [PCISIG website](https://www.pcisig.com).

2.4. Module Configurations

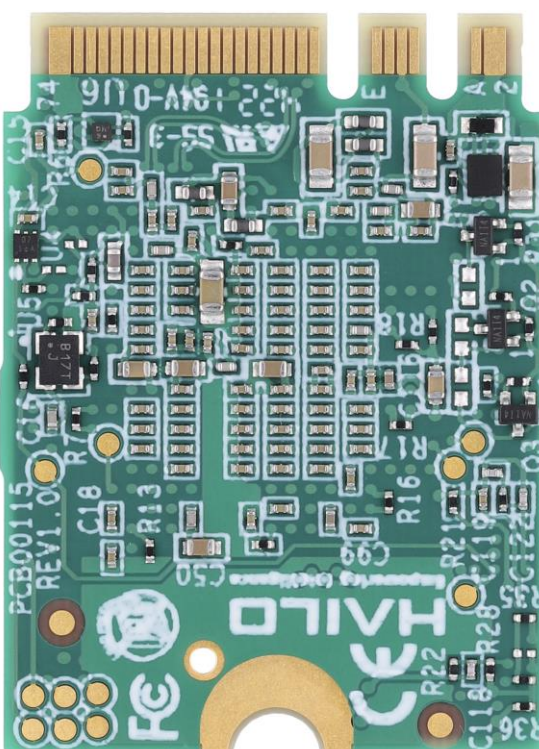
This module is being offered in two configurations with similar characteristics (performance, power consumption, reliability), due to multi-sourcing of the power supply components. See below photos for the module in its two configurations:



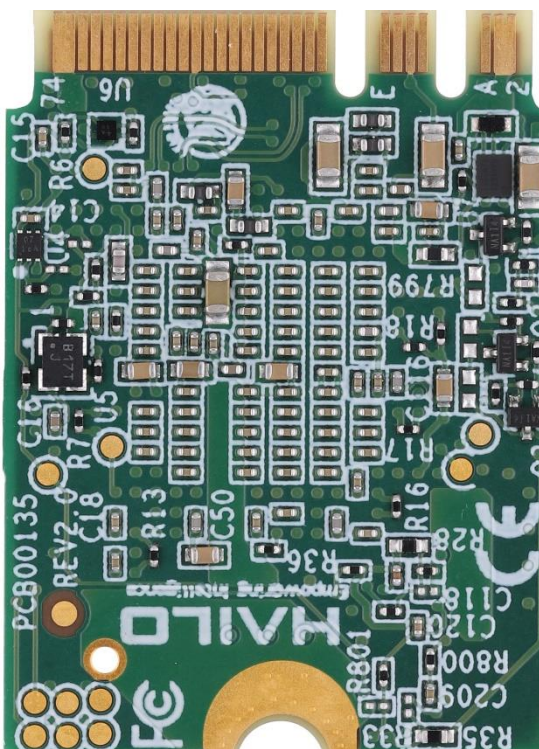
Hailo-8™ M.2 Key A+E ET 2230
Configuration MEA



Hailo-8™ M.2 Key A+E ET 2230
Configuration MEB



Hailo-8™ M.2 Key A+E ET 2230
Configuration MEA
Back side



Hailo-8™ M.2 Key A+E ET 2230
Configuration MEB
Back side

Figure 3: Two module configurations for Hailo8 M.2 Key A+E ET 2230

3. Power Consumption and Thermal Management

3.1. Module Power Consumption

The module requires a 3.3V supply (power pins are as listed in Table 2). The module's power consumption is dependent on the resources utilized for inference. Maximum power consumption is 6.6W (or 2A 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 HM218B1C2KAE is tested and validated for industrial temperature grade (−40°C – 85°C) when mounted in a test fixture.

Proper heat dissipation must be employed to ensure that the Hailo-8™ chip does not overheat. The Hailo-8™ 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-8™ 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 M.2 Specification Revision 3.0* 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