HAILO

Empowering Intelligence

Hailo-8L M.2 ET Module

Key A+E, Size 2230



Data Sheet

Part Number: HM21LB1C2KAE

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Documentation Control

Revision History

Version	Date	Description
1.0	July 2023	Initial release
2.0	July 2024	Typo correction Storage Temperature -40°C Added definition of PET and PER pins
3.0	November 2024	Added module height and dimension tolerances
4.0	November 2025	Updated module photos

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1. Overview

1.1. Introduction

The Hailo-8L M.2 Key A+E ET Module compatible with the M.2 Key A+E 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-8L 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

  or
  - Microsoft Windows 64 bits

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1.3. System Level Block Diagram

The following functional block diagram illustrates the Hailo-8L M.2 Key A+E ET Module:

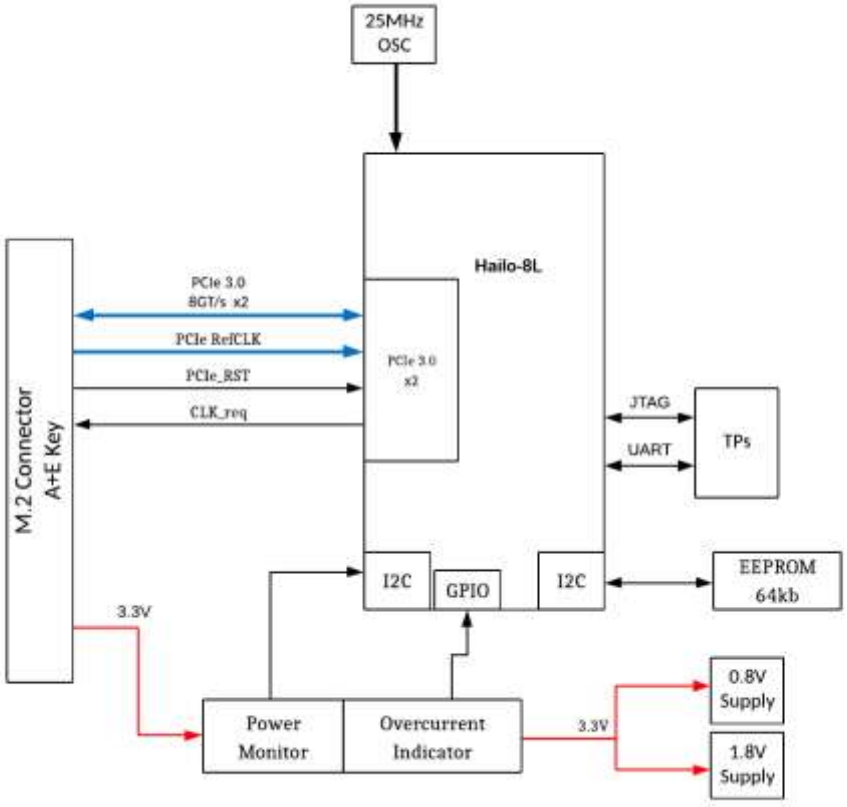


Figure 1: Hailo-8L M.2 Key A+E ET Functional Block Diagram

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2. Specifications

2.1. Key Properties

Compliance	
Certification	CE; FCC Class A
Environmental	
Storage Temperature	-40° to 85° C
Operating Temperature	-40° to 85° C *(refer to section 3.2 for further details)*
Storage/Operating Humidity	5% to 90% RH (non-condensing)
Physical	
Form Factor	M.2 Key A+E
Dimensions[1]	22 x 30 mm (2230-D3-A-E)
Height[2]	2.626 mm
Electrical	
Power supply	3.3V ± 5%
Thermal design power (TDP)	6.6W
Interface	PCIe Gen 3, 2-lanes (x2)
Peak Performance (INT8)	13 TOPS

Table 1. Hailo-8L M.2 Key A+E ET Key properties

[1] Tolerance is as defined in the M.2 standard ±0.15mm
[2] Tolerance is ±0.2mm

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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: Hailo-8L M.2 Key A+E ET Pin Description

- PETpx and PETnx pins (the Transmitter differential pair of the connector) are output signals from the Module and shall be connected to the PCI Express Receiver differential pair on the system board.
- PERpx and PERnx pins (the Receiver differential pair of the connector) are input signals to the Module and shall be connected to the PCI Express Transmitter differential pair on the system board

For more information, please refer to the *PCI Express M.2 Specification Revision 3.0* on the PCISIG website.

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2.3. Mechanical Properties

Below is a mechanical outline for the Hailo-8L M.2 Key A+E ET module. The module is type 2230-D3-A-E.

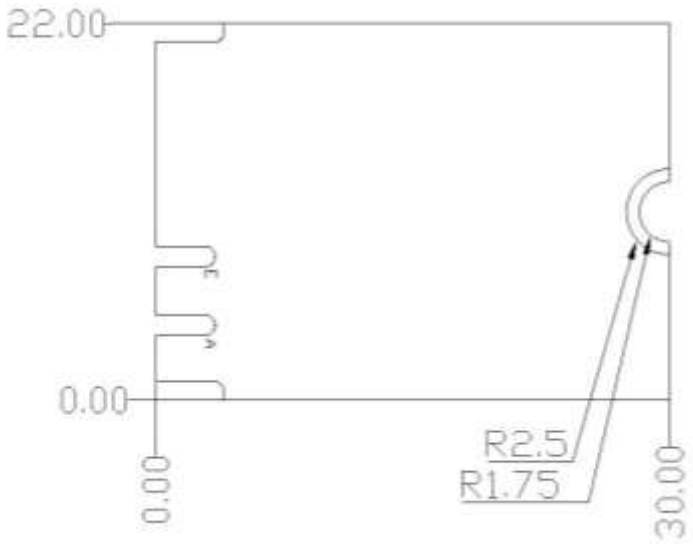


Figure 2: Mechanical outline (Top View)

For more information, please refer to the *PCI Express M.2 Specification Revision 3.0, Version 1.2* on the PCISIG website.

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2.4. Module Configuration

The form factor for this module is 2230. Figure 3 below displays photos of the board layout, front and back side views.

	
Hailo-8L M.2 Key A+E ET 2230	Hailo-8L M.2 Key A+E ET 2230 Back side

Figure 3: Module board layout for Hailo-8L M.2 Key A+E ET

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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 @ 433 FPS	1.9
MobileNet-SSD 300x300 @ 500 FPS	1.4

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 Hailo-8L M.2 Key A+E ET was tested and validated for industrial temperature grade (−40°C to 85°C) when mounted in a test fixture.

Proper heat dissipation must be employed to ensure that the Hailo-8L chip does not overheat. Hailo-8L is designed to dissipate most of the

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heat to the top surface of the package.

For more information on typical use configurations and design guidelines, please refer to *Hailo-8L AI Acceleration Module Thermal Design Considerations Application Note*[3].

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, please refer to 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 the HailoRT User Guide[3]

[3] This document can be accessed through the Hailo development zone

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