

Hailo-8™ M.2 ET Module

Key M, Size 2242, 2280



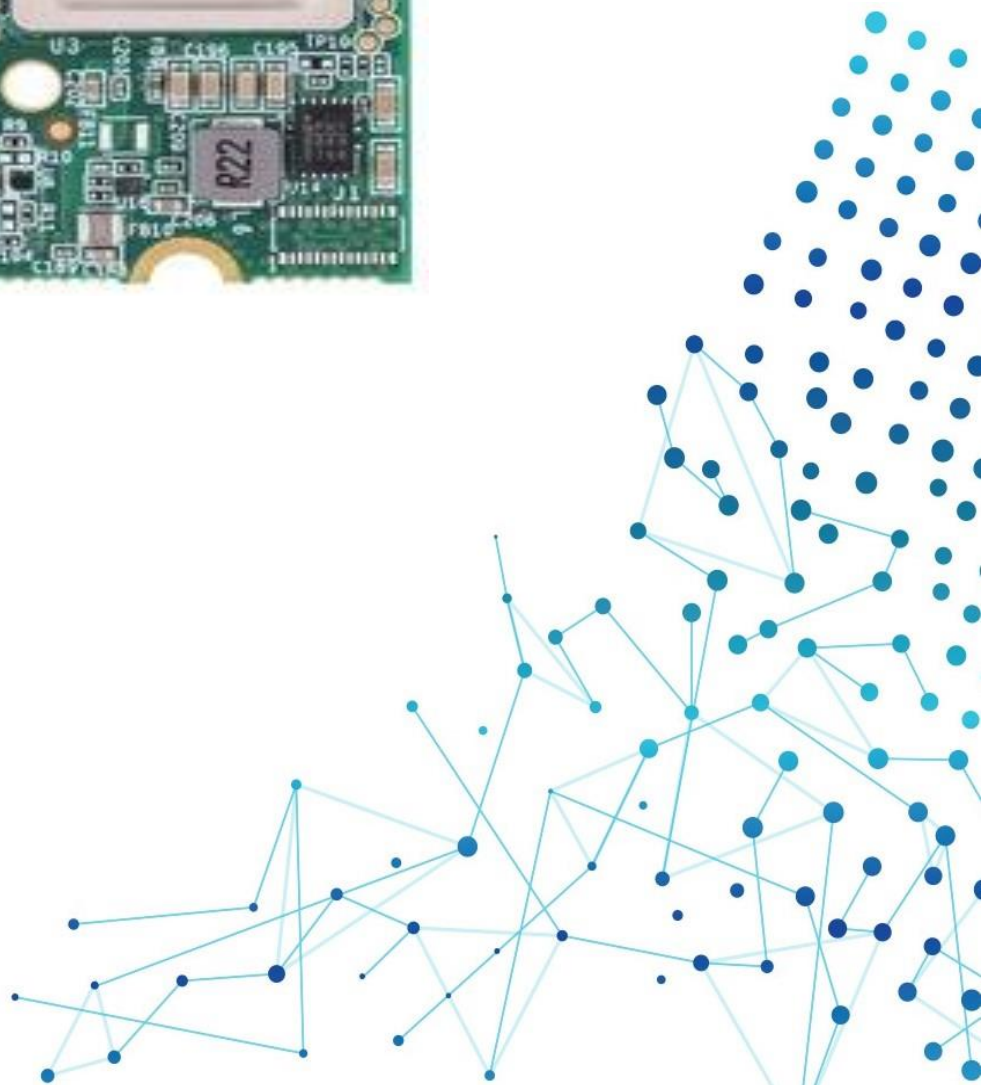
Data Sheet

Part Numbers:

2242: HM218B1C2HAE

2280: HM218B1C2FAE

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May 2023



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Documentation Control

Revision History

Version	Date	Description
0.8	January 2022	Extended temperature preliminary release
1.0	February 2022	Extended temperature mass production release
2.0	October 2022	Updated board images and added module photos for configurations A and B
2.1	November 2022	Added new part numbers
2.2	May 2023	Installation and Troubleshooting section replaced with a link to new location for this section

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1. Overview

1.1. Introduction

The Hailo-8™ M.2 Key M ET Module, compatible with the M.2 Key M form factor, is a 26 TOPS acceleration module, supports extended operating temperature range (see section 2.3 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 has two form-factors: 2242 (part number HM218B1C2HAE) and 2280 (part number HM218B1C2FAE).

The module is based on the Hailo-8™ AI processor and features a full PCIe Gen 3 4-lane interface (x4), 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 M, Socket 3 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 block diagram illustrates the Hailo-8™ M.2 Key M ET Module:

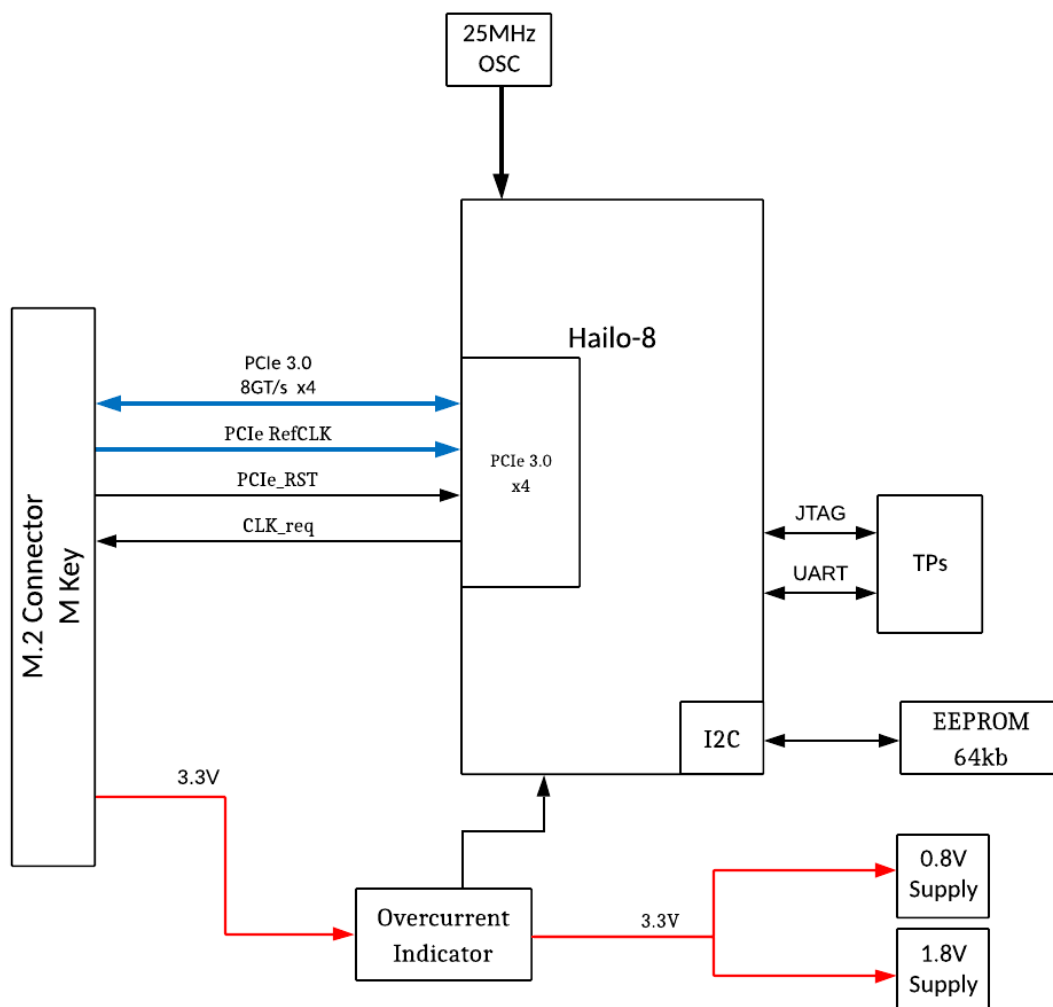


Figure 1: Hailo-8™ M.2 Key M ET Functional block diagram

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 M
Dimensions	22 x 42 / 22 x 60 / 22 x 80 mm
Electrical	
Power supply	3.3V ± 5%
Thermal design power (TDP)	8.65W
Interface	PCIe Gen 3, 4-lanes (x4)
Peak Performance (INT8)	26 TOPS

Table 1. Key properties

2.2. PCIe Connector Pinout

Pin Number(s)	Signal	Type
21	CONFIG_0 (GND)	Defines module type: SSD-PCIe
69	CONFIG_1 (NC)	
75	CONFIG_2 (GND)	
1	CONFIG_3 (GND)	
3,9,15,27,33,39,45,51,57,71,73	GND	Power
2,4,12,14,16,18,70,72,74	3.3V	Power
50	PERST#	I
52	CLKREQ#	I/O
54	PEWAKE#	I/O
53,55	REFCLK[n/p]	I
41,43	PET[n/p]0	O
47,49	PER[n/p]0	I
29,31	PET[n/p]1	O
35,37	PER[n/p]1	I
17,19	PET[n/p]2	O
23,25	PER[n/p]2	I
5,7	PET[n/p]3	O
11,13	PER[n/p]3	I

Table 2: Hailo-8™ M.2 Key M ET Pin description

2.3. Mechanical Properties

Note that this module has 2 different part numbers: HM218B1C2HAE (for the 2242 form-factor) and HM218B1C2FAE (for the 2280 form-factor)



2.4. Module Configurations

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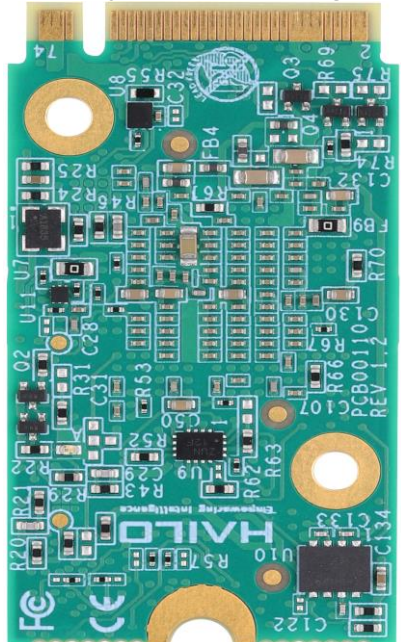
power consumption, reliability), due to multi-sourcing of the power supply components. See below photos for the module in its two configurations.



Hailo-8™ M.2 Key M ET 2242 Configuration M2A



Hailo-8™ M.2 Key M ET 2242 Configuration M2B

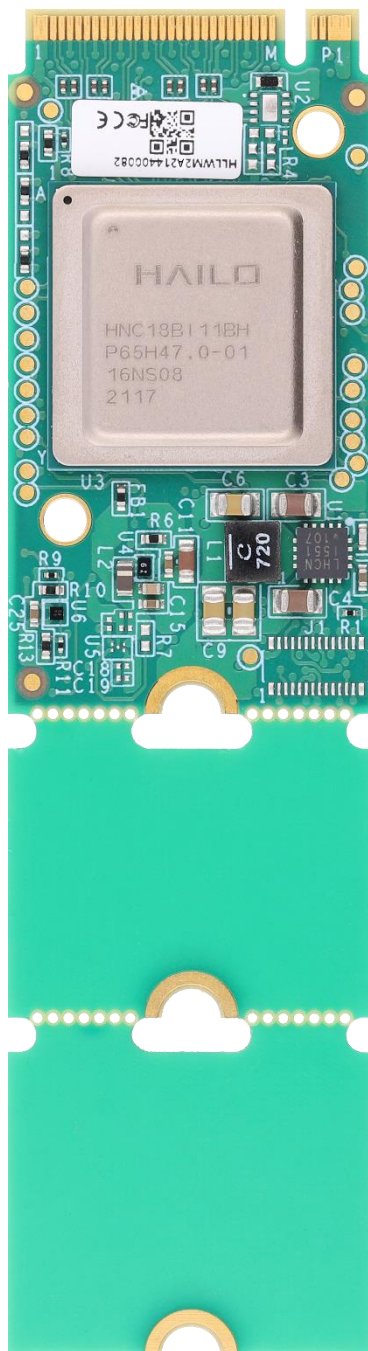


Hailo-8™ M.2 Key M ET 2242 Configuration M2A
Back side

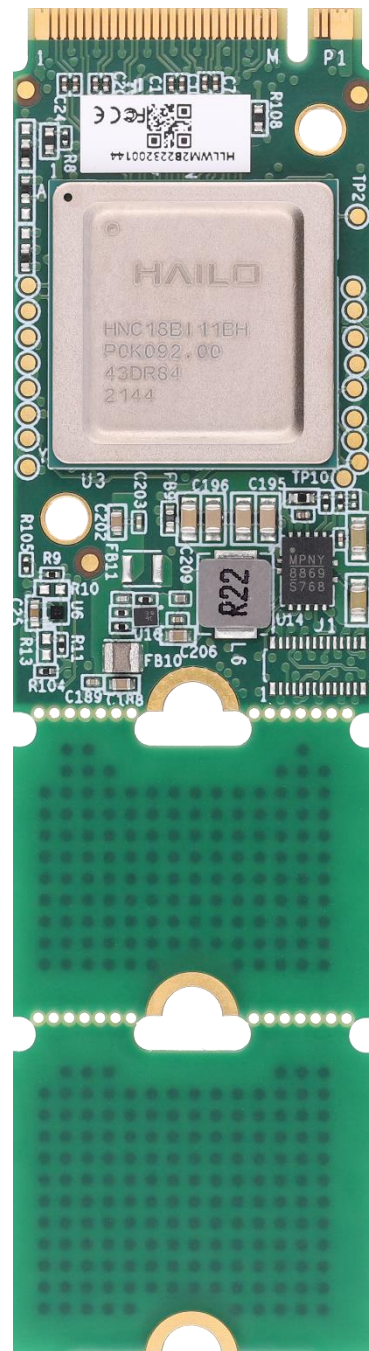


Hailo-8™ M.2 Key M ET 2242 Configuration M2B
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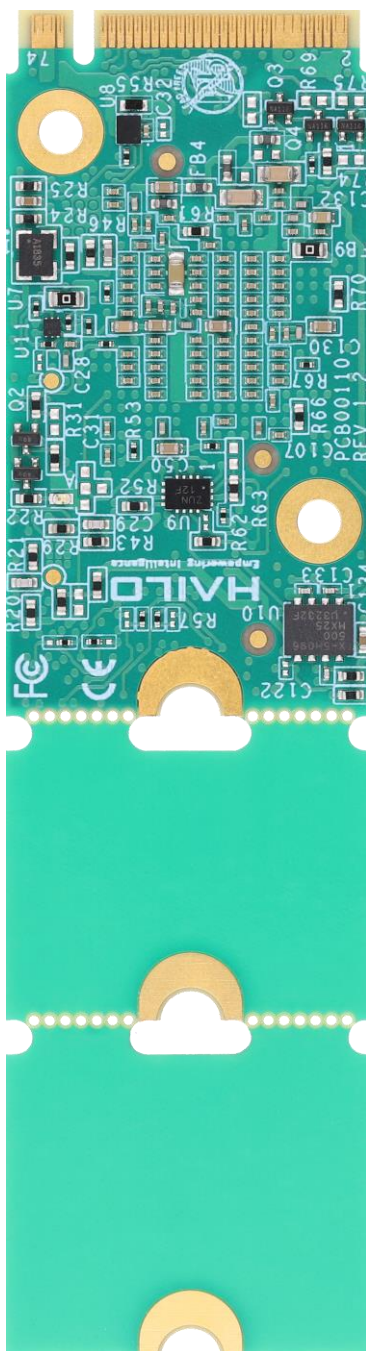
Figure 3: Two module configurations for Hailo-8™ M.2 Key M ET 2242



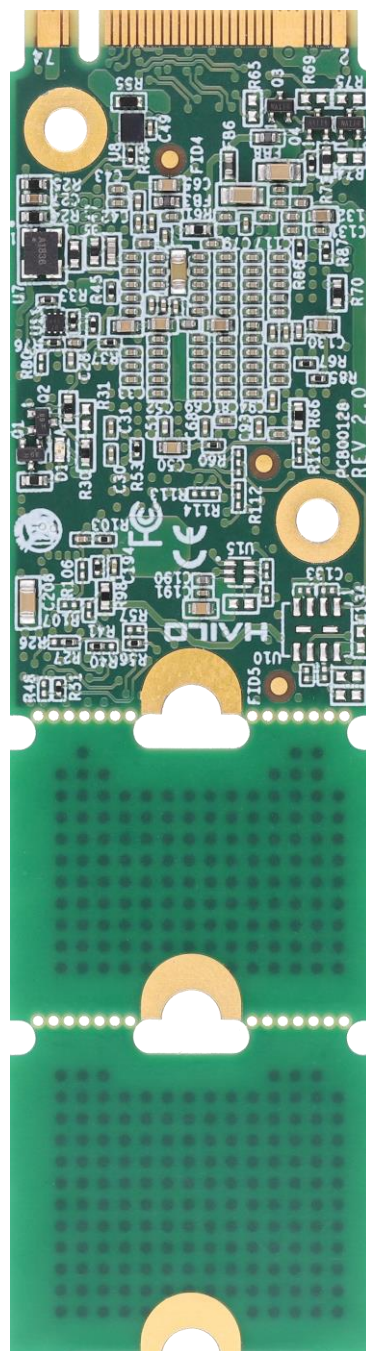
Hailo-8™ M.2 Key M ET 2280 Configuration M2A



Hailo-8™ M.2 Key M ET 2280 Configuration M2B



Hailo-8™ M.2 Key M ET 2280 Configuration M2A
Back side



Hailo-8™ M.2 Key M ET 2280 Configuration M2B
Back side

Figure 4: Two module configurations for Hailo-8™ M.2 Key M ET 2280

3. Power Consumption and Thermal Management

3.1. Module Power Consumption

The module requires a 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 8.25W (or 2.5A 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 Hailo-8™ M.2 Key M ET was 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