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凌華科技 GPU 解決方案

簡化邊緣運算與邊緣人工智慧應用的設計與部署

藉由硬體最佳化擴充系統性能、產品週期與投資報酬率

- 嵌入式繪圖/深度學習加速器
- GPU 運算平台
- 邊緣 AI 平台
- 客製化服務

www.adlinktech.com/tw

2020

目錄

關於凌華科技

凌華科技是全球領先的邊緣運算解決方案供應商，同時也是 NVIDIA® Quadro® Embedded、Jetson™ Elite 的合作夥伴和 OEM 合作夥伴。

凌華科技憑藉在嵌入式系統和邊緣應用方面的豐富產業經驗，透過硬體優化策略，提供了全面最佳化異質運算解決方案，利用 GPU 加速邊緣運算平台，滿足廣泛的嵌入要求和邊緣人工智慧部署。

Quadro Embedded Partner

Jetson Elite Partner

OEM Preferred Partner

凌華科技藉由提供尖端技術與可靠的解決方案，解決客戶面臨的關鍵性商業與技術的挑戰，方案包括強固型板卡、模組與系統、即時資料擷取解決方案，以及實現人工智能 + 物聯網 (AIoT) 的應用等。專注於服務工業自動化、網路通訊、醫療、國防航太、博弈娛樂、零售、能源和交通等垂直市場之客戶。凌華科技積極擴大合作夥伴生態系，並參與制訂多項國際技術標準。凌華科技的產品已行銷於全球超過 40 多個國家，全球各地皆有銷售與服務據點。(圖一) 凌華科技獲得 ISO-9001、ISO-14001、ISO-13485 與 TL9000 等專業品質認證，並為台灣證券交易所的上市公司 (股票代號：6166)。

圖一。凌華科技研發與整合中心

簡化邊緣運算與邊緣人工智慧應用的設計與部署

重點摘要

嵌入式繪圖功能讓系統開發人員可以提高許多類型工作負載的效能，其中包含了影像處理與分析、加速運算、人工智慧。繪圖解決方案通常透過繪圖處理器 GPU 提高應用的速度與準確性，同時減少延遲。許多嵌入式系統開發人員已在實際應用中導入嵌入式繪圖解決方案，例如例如醫學造影、製造業的缺陷檢測、以及智慧城市的交通流量分析，等其它嵌入式應用。(圖二)

圖二。繪圖功能廣泛用於嵌入式應用

儘管如此，將 GPU 加到嵌入式系統仍然是一項複雜的任務。有大約三分之一的博弈應用是採用細分市場開發的 GPUs 繪圖卡。但是，這些繪圖卡通常不能滿足重要的嵌入式系統要求，例如低系統延遲、長產品週期與效能。

為解決這些問題，凌華科技設計出一系列產品，大大簡化 GPU 加入的瓶頸。這些產品可以滿足各種嵌入式要求，包含效能、長時間的產品壽命、功耗與外形尺寸。

下一節，凌華科技提供 GPU 解決方案如何在邊緣運算和邊緣人工智慧應用程序中使用，以及凌華科技產品可以為系統開發人員，OEM 和系統整合商簡化設計過程的方式。

[1]「GPU 市場到 2024 年將突破 800 億美元： Global Market Insights，」2019 年 1 月 29 日，
https://www.globenewswire.com/news-release/2019/01/29/1706699/0/en/Graphic-Processing-Unit-GPU-Market-to-cross-80bn-by-2024-Global-Market-Insights-Inc.html。

關鍵的任務

部署邊緣運算與邊緣人工智慧應用滿足許多業務目標，包含：

改進訊號與影像處理效能

嵌入式繪圖解決方案讓系統開發人員，OEM 與系統整合商能夠顯著提高各種應用領域（包含航太、海事、醫療與工業自動化）的訊號與影像處理效能。

最佳化投資，提高生產率

企業如果打算盡可能地利用深度學習與人工智慧來創新並提高生產力，應考慮利用最佳化的運算平台，最佳化相關的演算法。

主要挑戰

導入 GPU 型解決方案的解決方案供應商面臨各種業務考慮，例如：

延長產品週期

由於使用者要求最新最好的繪圖技術，許多商業繪圖解決方案（例如為博弈應用開發的解決方案）的產品週期相對較短。嵌入式解決方案供應商在實施這些商業繪圖解決方案時，可能會被迫進行頻繁的產品認證，既耗時又昂貴。相較於 CPU 型的通用解決方案，提供嵌入式 GPU 型運算解決方案的供應商相對較少，讓情況變得更加困難。

平衡成本與效率

許多人工智慧工作負載需要大量記憶體、平行運算與低精度運算。[2] 系統架構設計師面臨的挑戰是如何定義一個最佳化的人工智慧平台，滿足速度與準確性的要求，考慮成本效益來提供這些運算資源。對於部署在邊緣的平台，系統架構設計師必須滿足其他要求，例如環境耐受與嚴格的 SWaP 條件。

解決設計挑戰

凌華科技產品與服務讓開發人員能夠改進其系統設計，例如：

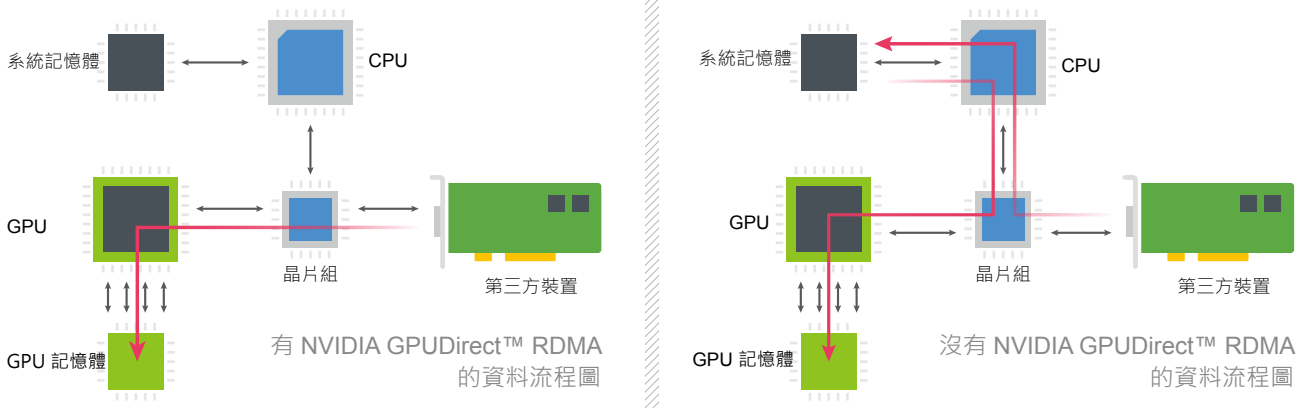
提高嵌入式繪圖效能

嵌入式應用案例中一個常見的情境是需要從感測器與其他來源快速移動外部資料至 GPU 進行處理。凌華科技導入了遠端直接存取記憶體 (RDMA) 來達成此一目標，RDMA 是 NVIDIA® Quadro® GPU 中 NVIDIA GPU Direct™ 技術的一項特點，可以提高資料傳輸量約 80%（每秒 3.6 至 6.5 千兆位元組）。RDMA 讓外部資料來源可以直接存取 GPU 的外部記憶體，如左側圖三所示。如果沒有此功能，資料將在到達 GPU 之前複製到 CPU 的記憶體中（圖三右側的紅線），增加了不必要的資料傳輸與延遲。

作為擁有豐富嵌入式應用經驗的 NVIDIA Quadro 嵌入式合作夥伴，凌華科技具有獨特的優勢，可以為系統開發人員提供 GPUDirect 解決方案，使其能夠引進嵌入式繪圖與人工智慧的力量。

[2] Sundeep Bajikar, "Why AI Workloads Require New Computing Architectures,"

圖四。開發人員需要評估許多領域以獲得針對 AI 解決方案的優化運算平台



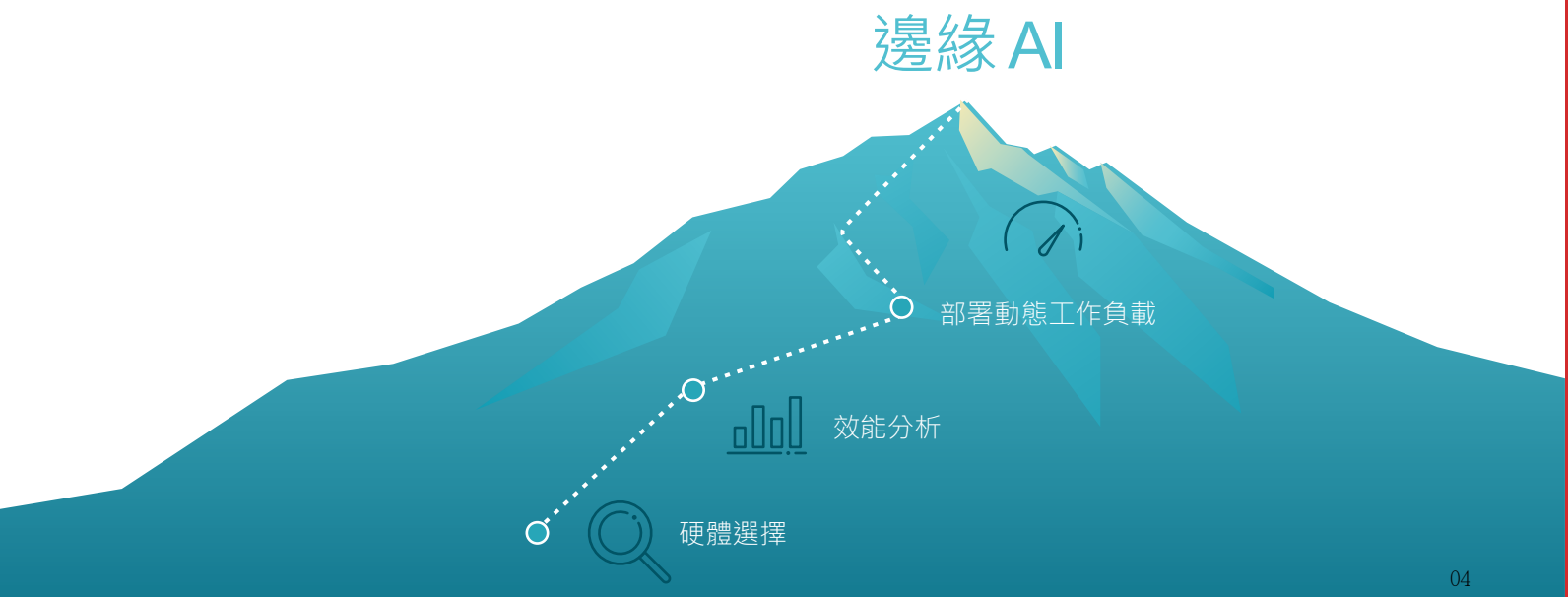
圖三。NVIDIA GPUDirect™ 範例 [3]

最佳化人工智慧的執行工作負載

為了獲得用於深度學習和人工智慧解決方案的最佳化運算平台，開發人員可能需要評估許多方面（圖二），包含：

- **選擇硬體：**確定哪些運算核心與效能等級最適合執行人工智慧演算法，以及需要多少運算能力與 I/O 頻寬。硬體選擇還應考慮 SWaP 與成本限制，尤其是當人工智慧部署在網路邊緣時。
- **調整人工智慧效能：**找出軟體或硬體瓶頸，由於平台資源不足（例如記憶體、I / O、運算核心與快取記憶體）、軟體執行緒調度效率低下、或各種執行程序之間的資源競爭。這類分析通常需要軟體分析工具與其他類型的效能調整工具。
- **跨網路部署動態工作負載：**具備在整個網路上部署與布建動態工作負載的能力，以調整的人工智慧模型改善推理結果，應對新挑戰。動態工作負載需要靈活、適應性強的運算架構，以實現可擴充、即時且可靠的部署環境。

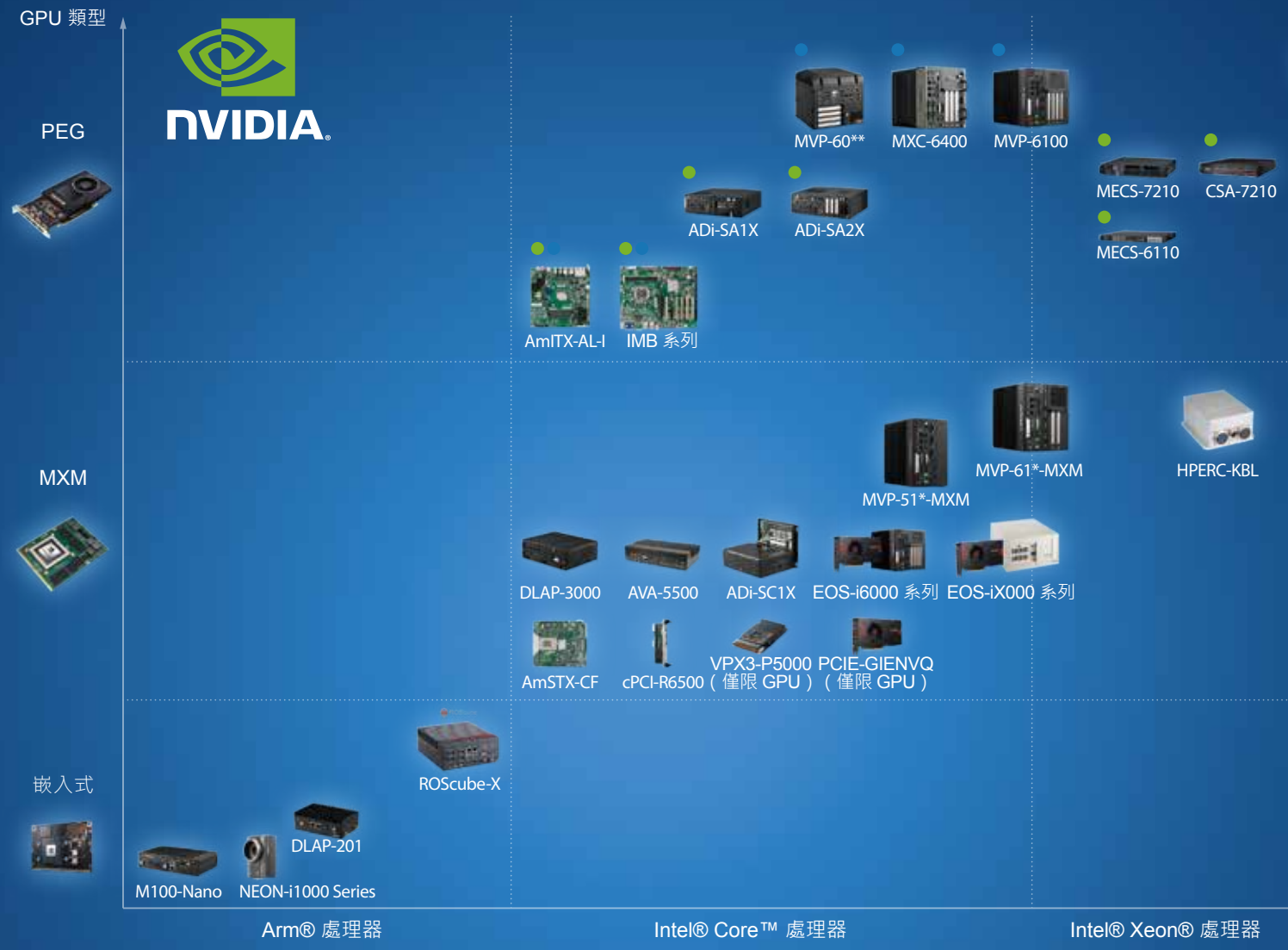
[3] NVIDIA GPUDirect™ 技術，http://developer.download.nvidia.com/devzone/devcenter/cuda/docs/GPUDirect_Technology_Overview.pdf。



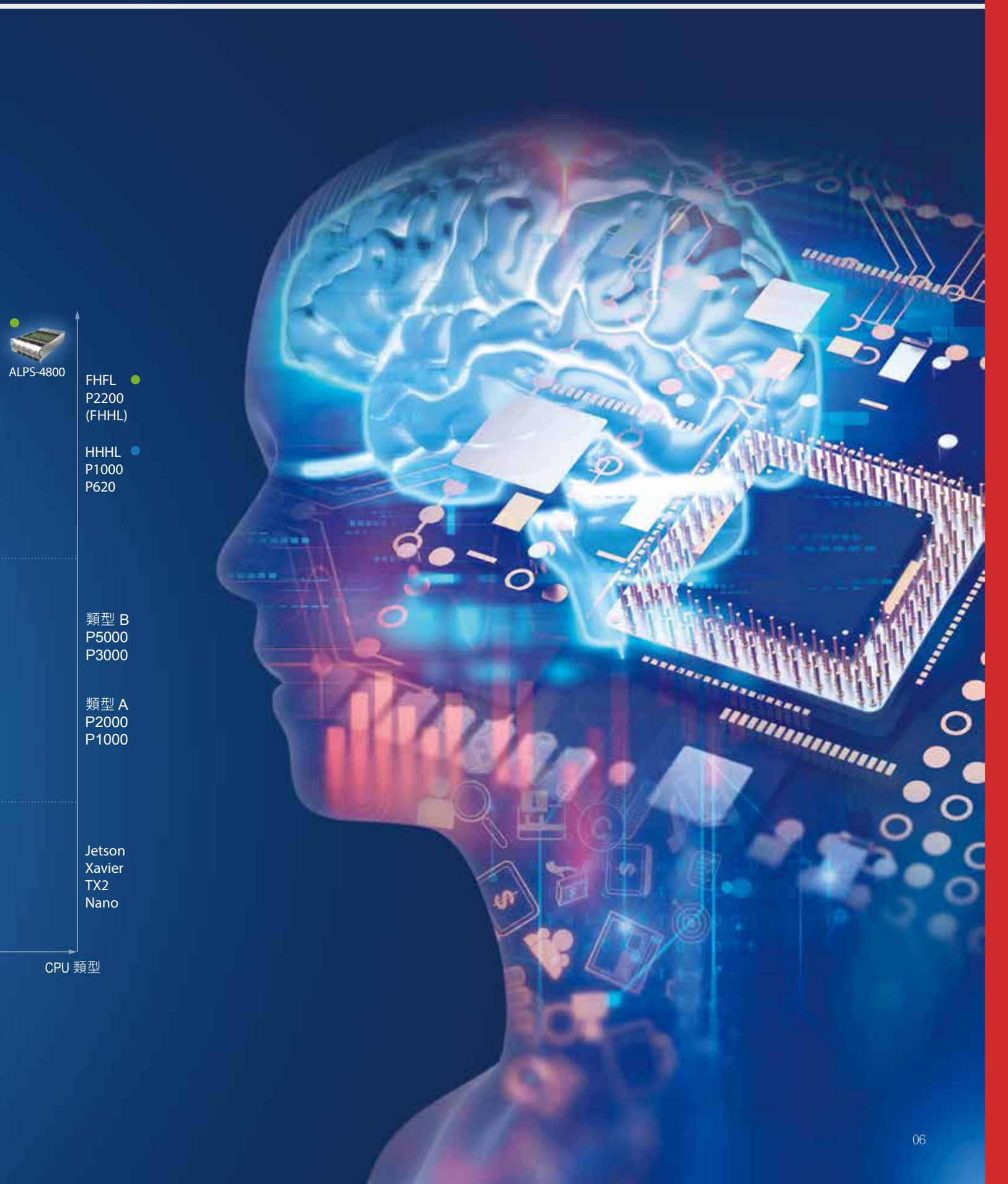
凌華科技的 GPU 解決方案

為了滿足高度複雜，但低產量應用的需求，凌華科技提供了一系列由 NVIDIA Quadro 嵌入式 GPU 支援的嵌入式繪圖產品。這個廣泛的產品組合包括 NVIDIA Jetson 的平台和 GPU 運算平台，可滿足邊緣運算和邊緣 AI 應用程序的特定性能和 SWaP 要求。另外，還可針對嵌入式客戶進行規格客製化需求。

系統開發人員、OEM 與系統整合商可以利用凌華科技的 GPU 解決方案，在應用中更輕鬆地加入嵌入式繪圖功能與人工智慧，如圖五所示。產品組合包含嵌入式繪圖產品，GPU 運算平台、邊緣 AI 平台、深度學習諮詢與最佳化服務、以及客製化服務。



圖五。凌華科技 GPU 系列解決方案


ALPS-4800
FHFL
P2200
(FHHL)
HHHL
P1000
P620
類型 B
P5000
P3000
類型 A
P2000
P1000
Jetson
Xavier
TX2
Nano
CPU 類型

嵌入式繪圖 / 深度學習加速器

凌華科技提供兩種嵌入式繪圖產品系列，非常適合影像處理與分析、加速運算、人工智慧。

- 行動 PCI Express 模組 (MXM) 非常適合受限於 SWaP 的應用，如聲納成像、雷達聲納系統和空中紅外成像等應用。
- PCI Express 繪圖 (PEG) 卡透過通用界面連接，易於整合用於許多嵌入式應用領域，例如醫學造影 (MRI) 與電腦斷層掃描 (CT)、製造業的缺陷檢測（AOI 檢查）、以及智慧城市的交通流量分析，還有許多其它嵌入式應用。

凌華科技提供嵌入式客戶客製化韌體、支援長產品週期、以及與 MXM 與 PEG 相容的主機板與系統。（圖六）

NVIDIA® QUADRO® CERTIFIED
EMBEDDED

影像處理與分析

加速運算

人工智慧引擎

EGX-MXM-P1000

搭載 NVIDIA® Quadro® 嵌入式 P1000 GPU 的行動 PCI Express 模組

EGX-MXM-P3000

搭載 NVIDIA® Quadro® 嵌入式 P3000 GPU 的行動 PCI Express 模組

Quadro-E PEG P620

搭載 NVIDIA® Quadro® 嵌入式 P620 的 PCI Express 顯示卡

Quadro-E PEG P2200

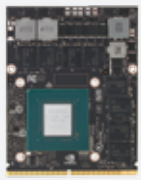
搭載 NVIDIA® Quadro® 嵌入式 P2200 的 PCI Express 顯示卡

EGX-MXM-P2000

搭載 NVIDIA® Quadro® 嵌入式 P2000 GPU 的行動 PCI Express 模組

EGX-MXM-P5000

搭載 NVIDIA® Quadro® 嵌入式 P5000 GPU 的行動 PCI Express 模組



Quadro-E PEG P1000

搭載 NVIDIA® Quadro® 嵌入式 P1000 的 PCI Express 顯示卡

Quadro-E PEG P4000

搭載 NVIDIA® Quadro® 嵌入式 P4000 的 PCI Express 顯示卡

圖六。凌華科技嵌入式繪圖產品具有長產品週期、NVIDIA GPU Direct™ RDMA 與 NVIDIA Video Codec SDK。

GPU 運算平台

對於受限於 SWaP 的應用，凌華科技的 Matrix 小型無風扇嵌入式電腦提供了最佳的每瓦效能與較長的產品生命週期以及可擴充性選項，其中包含先前已討論的 MXM 卡。主動冷卻的深度學習加速平台 (DLAP)，支援在受溫度影響較小的環境下執行的應用。

對於任務的關鍵應用，凌華科技的可配置嵌入式電腦提供了可擴充的建置模組，搭載多個加速器，整合工作負載到一個系統上，其中包含了高度平行的繪圖運算、運動控制、與資料採集。對於要求更高擴充性的應用，凌華科技提供了高度可配置的主機板與機架式工業型機櫃，做為凌華科技的大型工業 ATX 主機板系列的外殼。該主機板搭載多重 PCIe/PCI/LAN/USB3.0 的豐富功能，實現即時多工部署、平衡效能及可擴充性。

DLAP-3000-CFL：可擴充 GPU 效能的最小型系統，是邊緣異質運算的理想選擇。

MVP-6100-MXM：可擴充的 GPU 工作站，支援 MXM GPU 模組、影像擷取卡、資料採集與運動控制。

AMSTX-CF：唯一支援 GPU 平行運算的 Micro-STX 平台非常適合運算密集型影像處理。

邊緣人工智慧平台

凌華科技已開發出許多邊緣 AI 平台內建全系列 NVIDIA Jetson 模組，包含 NVIDIA® Jetson Nano™、NVIDIA® Jetson™ TX2 與 NVIDIA® Jetson AGX Xavier。以下列出我們最新邊緣人工智慧產品：

M100-Nano-AINVR：小型多頻道 AI 網路視訊錄影機 (NVR)，可在大眾運輸與檢查站進出控制應用中提供身份辨識與自動追踪。

DLAP-201-JT2：深度學習加速平台，可用於分析交叉路口的即時交通流量，達到管理交通的目的。

ROScube-X：採用 NVIDIA® Jetson AGX Xavier™ 模組的 ROS 2 機器人控制器，支援 NVIDIA JetPack SDK 和凌華科技的 Neuron SDK 開發的全部資源，特別適用在高規格人工智慧運算且功耗最低的機器人應用。

深度學習諮詢服務與最佳化服務

深度學習諮詢服務

凌華科技藉由深度學習提供諮詢服務，協助使用者確定合適的硬體平台，同時滿足其應用需求與成本效益，如圖七所示。凌華科技開發了一套分析工具，基於人工智慧演算法的要素，例如：

- 神經網路的類型，例如 AlexNet、MobileNet、ResNet。
- 神經網路的層數。

依照人工智慧與深度學習加速器的大型資料庫，該分析工具執行此輸入與其他輸入，產生統計數據，例如每秒推理數、 每瓦效能、常用神經網路的每單價效能。此外，該工具還可以協助開發人員確定其用可以透過何種加速器達到神經網路的最佳效能。

效能分析服務

為了深入調整效能，開發人員可以讓凌華科技在其軟體上執行 x86 和 GPU 效能分析工具。這些分析工具有助於確定硬體與軟體瓶頸，在糾正這些瓶頸後可以大幅提高每秒輸送量與推理、每單價效能、以及 SWaP。

凌華科技還與研究機構及學術機構合作，尋找人工智慧平台的瓶頸，剖析可改善效能的系統問題。例如，確定系統是否備份太多記憶體，或者增加資源（例如，記憶體大小）是否會提高效能。

部署動態工作負載

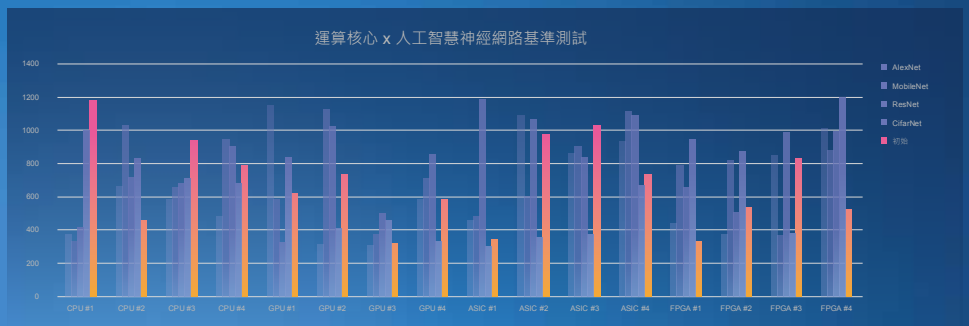
凌華科技的 Data River™ 是一項用於部署動態工作負載，並可自由移動資料的基礎技術。在開發人工智慧解決方案時，其解決了一項重要挑戰，允許跨網路交換資料與布建工作負載。此解決方案有助於在運算節點與裝置之間傳遞資料。

凌華科技的解決方案是基於分佈式資料服務 (DDS) 的可擴充加速引擎，是一種訊息導向的中介軟體，支援以資料為中心進行發布與訂閱的通訊。這種分佈式架構允許大量運算節點連接至網路。換言之，即使在部署人工智慧之後，使用者也可以基於分析結果新增最適合其應用需求的其他硬體加速器。

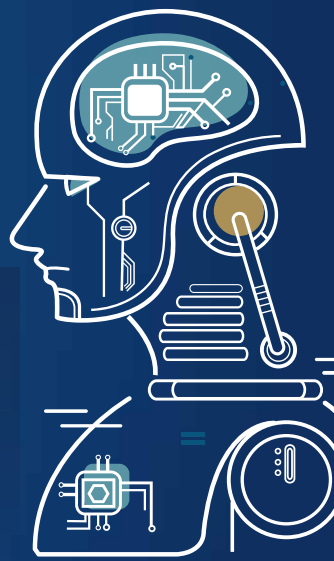
客製化服務

通常需要客製化規格才能為不同的嵌入式應用領域提供最佳化的解決方案。憑藉我們在設計嵌入式模組、載板與系統方面的長期成功經驗，作為 NVIDIA® Quadro® 嵌入式合作夥伴的凌華科技，可以快速開發基於 NVIDIA Quadro 嵌入式 GPU 與 Jetson 模組的邊緣 AI 平台，滿足個別的專案需求。這讓我們的客戶能夠在邊緣端快速運用 AI 的力量。

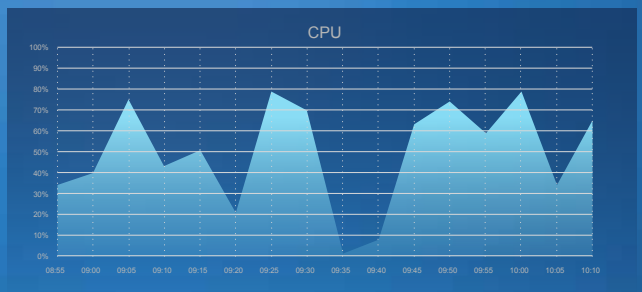
硬體選擇

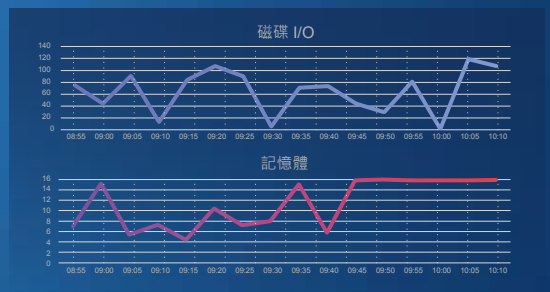


- 神經網路
- 運算核心
- 批次大小



效能分析





圖七。凌華科技提供諮詢服務，協助使用者確定正確的硬體平台

減少您的設計工作

凌華科技是嵌入式客戶的首選。憑藉其在市場上的豐富經驗，提供多樣化的產品組合滿足內建 Quadro 嵌入式解決方案與 Jetson 模組的嵌入式應用，成為全球為數不多的 NVIDIA® Quadro® Embedded 與 Jetson Elite 合作夥伴。憑藉在設計嵌入式模組、載板和系統方面的長期成功經驗，凌華科技非常適合透過客製 GPU 韌體、內建整合顯示核心、較長的產品生命週期，來支援嵌入式客戶加速邊緣運算與 AI 的部署。藉由與凌華科技合作，可以更輕鬆地：

- 降低解決方案的成本：選擇正確的硬體平台適應目標工作負載。
- 提高系統效能：消除平台瓶頸，避免降低嵌入式顯示與人工智慧演算法的執行速度。
- 簡化部署 利用凌華科技的深度學習諮詢服務、最佳化服務與 Data River™，可以更輕鬆地整合系統、共享資料、在整個網路中分配運算處理能力。

GPU 常見問題

Q1 哪些應用會需要嵌入式 GPU 呢？

答

要求高解析度、支援多螢幕、平行運算和支援 AI 人工智慧。例如臨床診斷造影裝置、堅固耐用的軍用筆記型電腦、航太與國防的成像雷達、遊戲賓果機等應用，凌華科技認為這些應用很大程度都受惠於嵌入式繪圖處理。

受惠於嵌入式繪圖產品的應用還包括：

- **高解析度、多螢幕的應用：**航空管制、電子海圖顯示及資訊系統 (ECDIS)、電視牆、數位看板、電玩競賽、醫療
- **平行運算：**需求高運算效能的應用，包含航太和國防的雷達聲納系統、醫療產業的超音波影像、電信業的多接取邊緣運算 (MEC)
- **AI 人工智慧引擎：**導入人工智慧模型訓練和推論的應用，包含智慧製造、智慧城市、電信、航太、國防、交通運輸

Q2 凌華科技搭載 NVIDIA® Quadro® 嵌入式 GPU 的產品有何優勢呢？

答

- **長期供貨：**相較於消費性 NVIDIA® GeForce® GPU 的生命週期為 18 個月，NVIDIA Quadro GPU 為 3 年，而 NVIDIA Quadro 嵌入式 GPU 則支援 5 年以上的產品生命週期，符合嵌入式應用的要求。凌華科技的 MXM 繪圖卡支援長達 5 年的產品生命週期。PEG 繪圖卡支援 3 年，若選擇性延長方案可再多支援 5 年。

型號	產品生命週期
MXMs	5 年
PEG 卡	3 (+5)* 年

* 特殊條件適用。

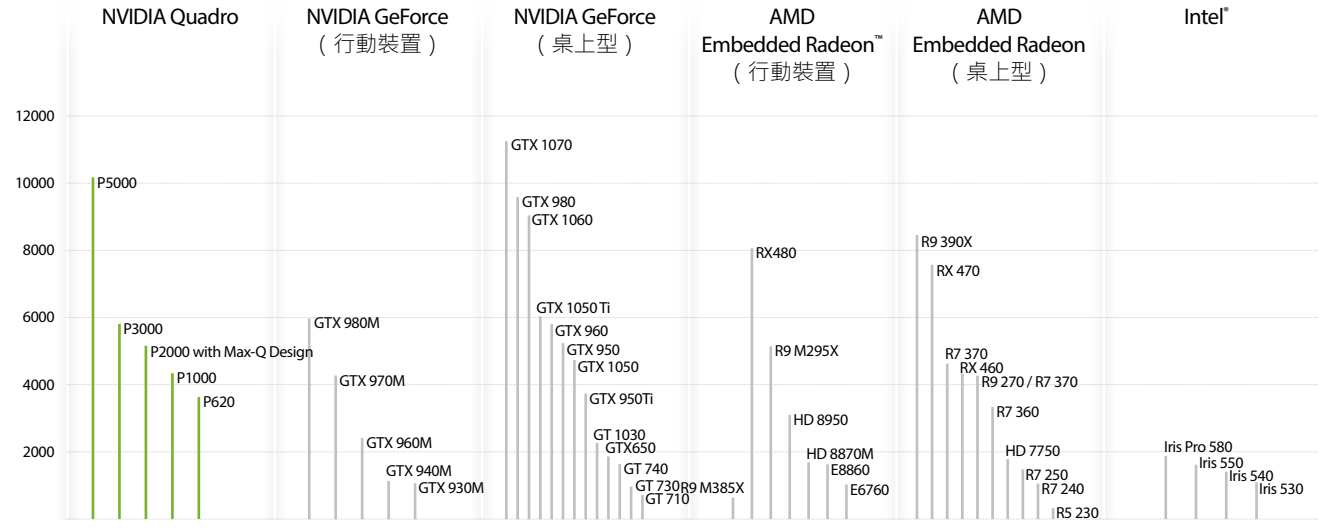
- **較低的開發成本：**由於長期供貨的支援，減少頻繁更換繪圖卡所需的開發時間、人力、費用等成本。 特別是那些需經由耗時的驗證和測試過程的安全關鍵型應用程序，其開發成本可能高達六位數 [1]。相較於消費性等級的繪圖應用，提升三倍的使用壽命。很明顯地，開發嵌入式繪圖應用將帶來卓越的投資回報 (ROI)。
- **提升系統反應速度：**NVIDIA Quadro 嵌入式 GPU 中的 NVIDIA GPUDirect RDMA(Remote Direct Memory Access) 可以提高約 80% 資料吞吐量、降低 60% 延遲 [2]。GPU 與第三方裝置間具有直接的資料交換路徑 [3]，不須在資料送達 GPU 前複製到 CPU 記憶體，大幅提高 GPU 加速應用的資料通量和系統反應速度。

[1] 產品開發成本和時間表，https://www.acornpd.com/blog/product-development-cost-and-timelines。
[2] 性能測試中使用的軟體和工作負載可能僅針對凌華科技平台上的性能進行了優化。使用特定的電腦系統、組件、軟體、操作和功能來測量性能測試。任何這些因素的任何變化都可能導致結果變化。請與凌華科技聯繫，以獲得有關性能和基準測試結果的更完整信息。有關效能與效能評定的更多資訊，請聯絡凌華科技。
[3] NVIDIA GPUDirect™ 技術，http://developer.download.nvidia.com/devzone/devcenter/cuda/docs/GPUDirect_Technology_Overview.pdf。

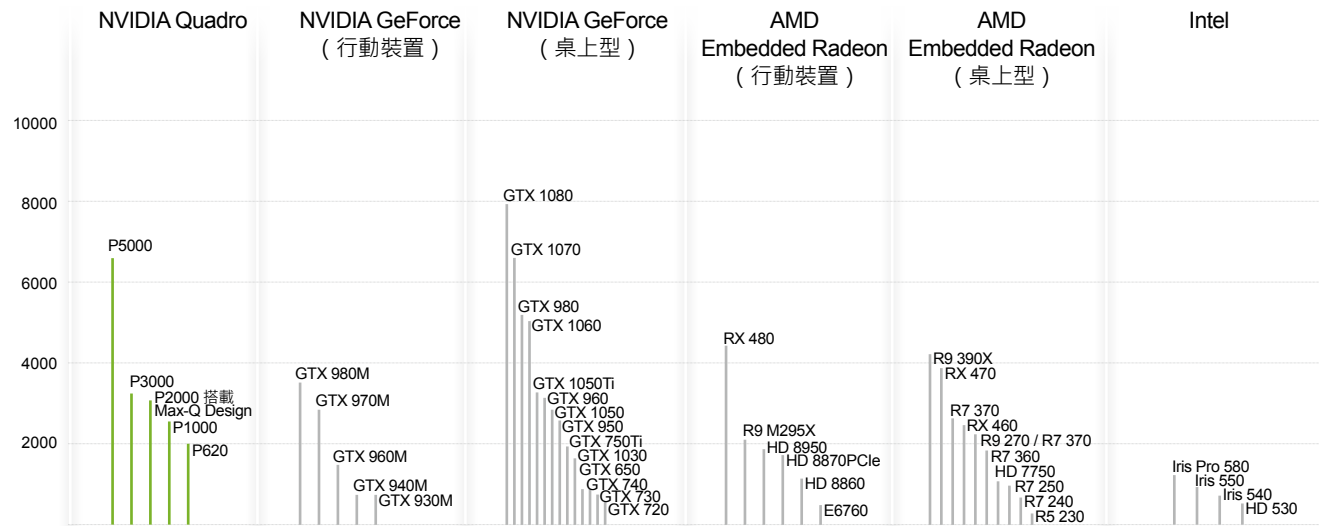
Q3 比較 NVIDIA Quadro 嵌入式 GPU 與其他 GPU 和 CPU 的差異？

答

對於應用多在處理高解析度、多螢幕的繪圖需求，請參考圖八中的性能測試結果。對於應用多在處理高度平行的工作負載或 AI 學習和推論的運算，請參考圖九中的性能測試結果。



圖八。Passmark G3D 為基準



圖九。DirectCompute 為基準

Q4 凌華科技嵌入式繪圖產品優於其他長期供貨的繪圖產品的原因？

答

繪圖產品的常見三種用途包含高解析的多螢幕應用，平行運算和 AI 引擎。在第一種應用場景中，他牌繪圖產品雖然支援較長的產品週期，以及超過四個顯示輸出優勢，但對於高度平行的運算和 AI 應用，凌華科技嵌入式繪圖處理產品不但可以降低 CPU 負擔，提高約 80% 資料吞吐量，還同時兼具降低 60% 延遲來提高系統反應速度。

Q5 透過凌華科技或其經銷商購買 NVIDIA Quadro® 嵌入式 GPU 產品的好處？

答

在全球四個僅有的 NVIDIA Quadro 嵌入式合作夥伴中，凌華科技的經驗是唯一經過市場驗證，可提供滿足嵌入式應用需求的多樣化產品組合。凌華科技提供包括 MXM 和 PEG 多樣尺寸的嵌入式繪圖產品，以及與 MXM 和 PEG 相容的平台和模組，加速促進在嵌入式應用導入 GPU。

Q6 如何根據應用來挑選凌華嵌入式繪圖產品？

答

凌華科技的 Mobile Express 模組 (MXM) 具有每瓦高性能和延伸的工作溫度範圍，非常適合行動應用或受限於尺寸重量功率 (SWaP) 的應用、被動式冷卻應用，例如攜帶式超音波、機載雷達和空中紅外線成像。

PCI Express 繪圖 (PEG) 卡透過一般介面連接，方便進入既有的嵌入式市場，例如醫療核磁共振 (MRI) 和電腦斷層掃描 (CT)、工業自動化（AOI 檢驗），和電信業的多存取邊緣運算。

GPU 板載解決方案可以滿足垂直市場（例如博弈與醫療產業），以及 PC/104 與 VPX 等各種尺寸的 ODM 專案要求。

Q7 從網路可購買其他 NVIDIA GPU 的 Mobile Express 模組，為什麼要向凌華科技或其經銷商購買？

答

凌華科技和其經銷商提供的 NVIDIA Quadro® 嵌入式 GPU 的 MXM 模組，具有網路供應商無法提供的 5 年產品週期和技術支援。網購的 NVIDIA GPU 的 MXM 很可能是灰市產品，沒有保固或長期性支援。此外，採用 Quadro® 的 MXM 在嵌入式應用時，需要 VBIOS、系統 BIOS 和 cookie 的支援來驅動。

Q8 NVIDIA Jetson 平台的產品週期為何？

答

部分 Jetson 平台可支援至 2025 年，符合嵌入式應用的要求。

型號	有效時間
Jetson Nano	2025 年 1 月
Jetson TX2	2022 年 4 月
Jetson AGX Xavier	2025 年 1 月

產品指南

嵌入式繪圖 / 深度學習加速器

Model Name	EGX-MXM-P1000	EGX-MXM-P2000	EGX-MXM-P3000	EGX-MXM-P5000
				
Graphic Core				
Graphic Architecture	NVIDIA® Pascal™ GP107		NVIDIA® Pascal™ GP104	
GPU	Quadro® P1000	Quadro® P2000	Quadro® P3000	Quadro® P5000
Display Output	4x DisplayPort 1.4 digital video outputs Support for High Dynamic Range (HDR) video 4K at 120Hz or 5K at 60Hz with 10-bit color depth		Up to 1 internal display plus 5 external display outputs 5x DisplayPort 1.4 digital video outputs (DP++) 1x HDMI, 2x DVI, 1x eDP	
Signal Interface	MXM 3.1, PCI Express Gen3 x16 support			
GPGPU Computing				
CUDA Support	512 CUDA® cores, 1.8 TFLOPS SP Peak	768 CUDA® cores, 2.3 TFLOPS SP Peak	1280 CUDA cores, 3.9 TFLOPS peak FP32 Performance	2048 CUDA cores, 6.4 TFLOPS peak FP32 performance
Memory	GDDR5 4GB memory, memory width: 128-bit, bandwidth: 96 GB/s	GDDR5 4GB memory, memory width: 128-bit, bandwidth: 96 GB/s	GDDR5 6GB memory, memory width: 192-bit, bandwidth: 168.2 GB/s	GDDR5 16GB memory, memory width: 256-bit, bandwidth: 192.2 GB/s
Compute API	CUDA Toolkit 8.0, CUDA Compute version 6.1, OpenCL™ 1.2		CUDA Toolkit 8.0, CUDA Compute version 6.1, OpenCL™ 1.2, Direct Compute	
Graphic API	DirectX® 12, OpenGL 4.5, Vulcan 1.0		DirectX® 12, OpenGL 4.5, Vulkan 1.0 Shader Model 5.1	
NVIDIA Technology	-	-	NVIDIA® Mosaic Technology, NVIDIA® nView® Display Management Technology	NVIDIA® VR Ready, NVIDIA® Mosaic Technology, NVIDIA® nView® Display Management Technology
Mechanicals				
Dimensions	82 (W) x 70 (D) x 4.8 (H) mm		87 (W) x 105 (D) x 4.8 (H) mm	
Locking Mechanism	Standard MXM 3.1 Type A		Standard MXM 3.1 Type B	
Environmental				
Operating Temp.	Standard: 0˚C to 55˚C, ETT: -40˚C to 85˚C		0 to 55˚C	
Storage Temp.	-40˚C to 85˚C		-40˚C to 125˚C	
Module Power Consumption	48W	58W	75W	100W
SW Support				
OS Support	Windows 7/10 & Linux drivers, 64-bit			

Model	Quadro-E PEG P620	Quadro-E PEG P1000	Quadro-E PEG P2200	Quadro-E PEG P4000
				
Graphic Core				
Graphic Architecture	NVIDIA® Pascal™ GP107		NVIDIA® Pascal™ GP106	NVIDIA® Pascal™ GP104
GPU	Quadro® P620	Quadro® P1000	Quadro® P2200	Quadro® P4000
Display Output	4x mDP 1.4, 4096x2160 @ 60Hz/5120x2880 @ 60Hz HDCP 2.2 support * VGA/DVI/HDMI support via adapter/connector/bracket		4x DP 1.4, 4096x2160 @ 60Hz/ 5120x2880 @ 60Hz * VGA/DVI/ HDMI support via adapter/ connector/bracket	4x DP 1.4, 7680×4320 @120 Hz/ 7680×4320 @ 60 Hz/ 5120×2880 @ 60 Hz HDCP 2.2 support * VGA/DVI/ HDMI support via adapter/ connector/bracket
Signal Interface	PCI Express Gen3 x16 support			
GPGPU Computing				
CUDA Support	512 CUDA cores, 1.38 TFLOPS peak FP32 performance	640 CUDA cores, 1.89 TFLOPS peak FP32 performance	1280 CUDA cores, 3.8 TFLOPS peak FP32 performance	1792 CUDA cores, 5.3 TFLOPS peak FP32 performance
Memory	GDDR5 2GB memory, memory width: 128-bit, bandwidth: 80 GB/s	GDDR5 4GB memory, memory width: 128-bit, bandwidth: 80 GB/s	GDDR5 5GB memory, memory width: 160-bit, bandwidth: 200 GB/s	GDDR5 8GB memory, memory width: 256-bit, bandwidth: 243 GB/s
Compute API	CUDA Toolkit 8.0, CUDA Compute version 6.1, OpenCL™ 1.2, Direct Compute			
Graphic API	DirectX® 12, OpenGL 4.5, Vulkan 1.0 Shader Model 5.1			
NVIDIA Technology	NVIDIA® Mosaic Technology, NVIDIA® nView® Display Management Technology			
Mechanicals				
Dimensions	2.713" × 5.7", single slot	2.713" × 5.7", single slot	4.4" H x 7.9" L, single slot	4.4" H x 9.5" L, single slot
Weight	129g	129g	256g	475g
Environmental				
Operating Temp.	0 to 55˚C			
Storage Temp.	-40˚C to 75˚C			
Module Power Consumption	40W	47W	75W	105W
SW Support				
OS Support	Windows 7/10 & Linux drivers, 64-bit			

EGX-MXM-P1000

Mobile PCI Express Module with NVIDIA® Quadro® Embedded P1000

Features

- MXM 3.1 Type A form factor (82 x 70 mm)
- 512 NVIDIA® CUDA® cores
- 1.8 TFLOPS SP peak performance
- 4GB GDDR5 memory
- 96GB/s maximum memory bandwidth
- Support up to 4 UHD displays, 50W TDP
- 5-year availability

Introduction

The EGX-MXM-P1000 features advanced NVIDIA Quadro GPU with NVIDIA Pascal™ Architecture technology in MXM 3.1 Type A form factor. The EGX-MXM-P1000 has 512 NVIDIA CUDA cores and a peak single-precision floating-point performance of 1.8 TFLOPS. The EGX-MXM-P1000 has 4GB of GDDR5 memory and supports NVIDIA GPUDirect™ RDMA which helps increase data throughput by up to 80% and consequently system responsiveness by up to 60%*. Additionally, 4 UHD display outputs and an extended operating temperature range of -40°C to 85°C are supported. The embedded graphics product is suitable for mission-critical harsh-environment edge computing applications with size, weight, and power (SWaP) and network connectivity constraints.

Ordering Information

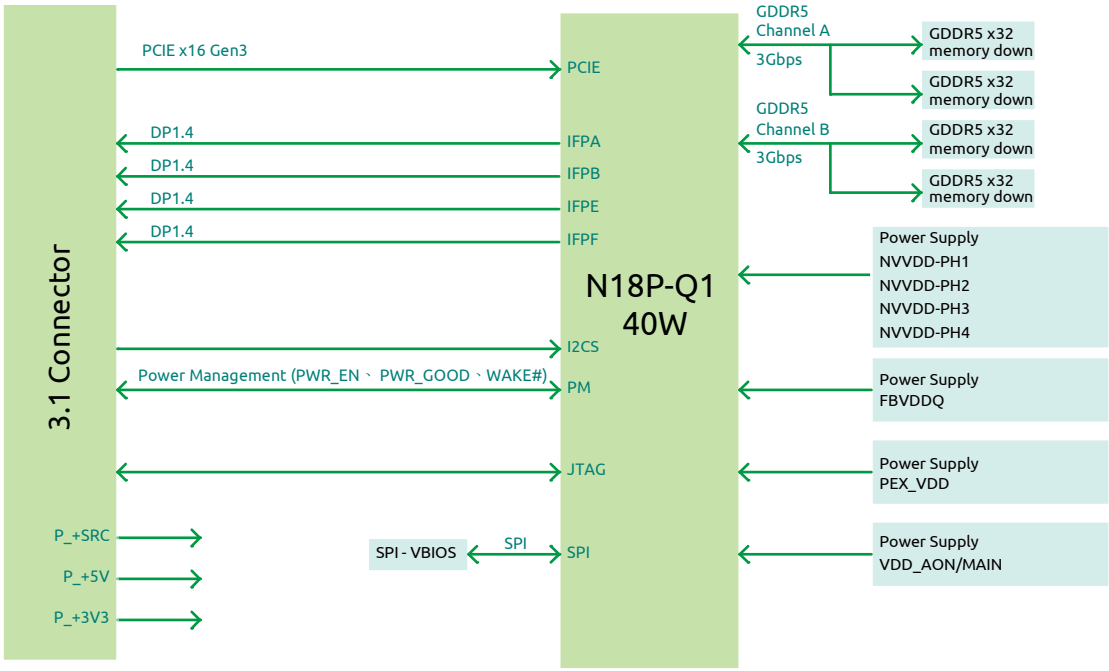
- **EGX-MXM-P1000**
  NVIDIA Quadro Embedded P1000, MXM 3.1 type A,
  82 x 70mm, PCIe x16 Gen3

Specifications

	EGX-MXM-P1000
Graphic Core	
Graphic Architecture	NVIDIA Pascal GP107
GPU	Quadro P1000
Display Outputs	4x DisplayPort 1.4 digital video outputs Support for High Dynamic Range (HDR) video 4K at 120Hz or 5K at 60Hz with 10-bit color depth
Signal Interface	MXM 3.1, PCI Express Gen3 x16 supports
GPGPU Computing	
CUDA Supports	512 CUDA cores, 1.8 TFLOPS SP Peak CUDA Toolkit 8.0, CUDA Compute version 6.1 OpenCL™ 1.2, DirectX® 12, OpenGL 4.5, Vulcan 1.0
Memory	GDDR5 4GB memory, memory width: 128-bit, bandwidth: 96 GB/s
Mechanicals	
Dimensions	82 (W) x 70 (D) x 4.8 (H) mm
Locking Mechanism	Standard MXM 3.1 Type A
Environmental	
Operating Temp.	Standard: 0˚C to 55˚C, ETT: -40˚C to 85˚C
Storage Temp.	-40˚C to 85˚C
SW	
OS Support	Windows 7/10 & Linux Drivers, 64-bit

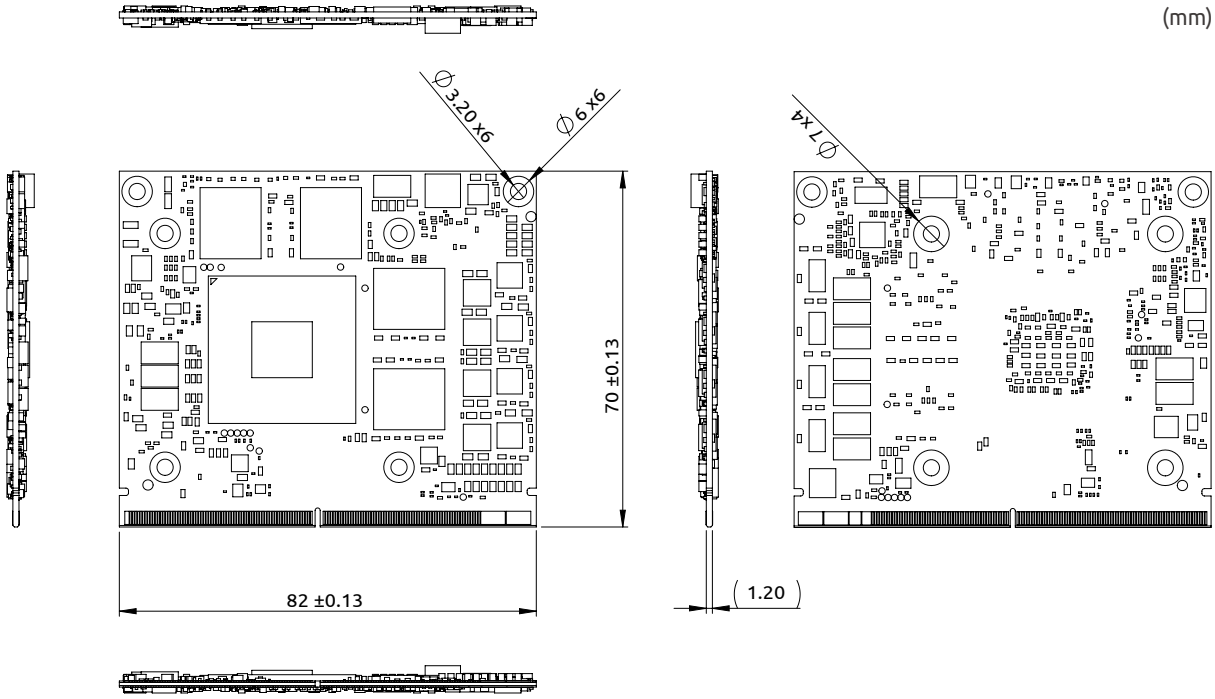
* The software and workloads used in performance tests were optimized for performance on ADLINK platforms. Performance tests are measured using specific computer systems, components, software, operations and functions. Any changes to these factors may cause the results to vary. Contact ADLINK for more complete information about performance and benchmark results.

Block Diagram



Mechanical Drawing

(mm)



EGX-MXM-P2000

Mobile PCI Express Module with NVIDIA® Quadro® Embedded P2000

Features

- MXM 3.1 Type A form factor (82 x 70 mm)
- 768 NVIDIA® CUDA® cores
- 2.3 TFLOPS SP peak performance
- 4GB GDDR5 memory
- 96GB/s maximum memory bandwidth
- Support up to 4 UHD displays, 58W TDP
- 5-year availability

Introduction

The EGX-MXM-P2000 features advanced NVIDIA Quadro GPU with NVIDIA Pascal™ Architecture technology in MXM 3.1 Type A form factor. The EGX-MXM-P2000 has 768 NVIDIA CUDA cores and a peak single-precision floating-point performance of 2.3 TFLOPS. The EGX-MXM-P2000 has 4GB of GDDR5 memory and supports NVIDIA GPUDirect™ RDMA which helps increase data throughput by up to 80% and consequently system responsiveness by up to 60%*. Additionally, 4 UHD display outputs and an extended operating temperature range of -40°C to 85°C are supported. The embedded graphics product is suitable for mission-critical harsh-environment edge computing applications with size, weight, and power (SWaP) and network connectivity constraints.

Ordering Information

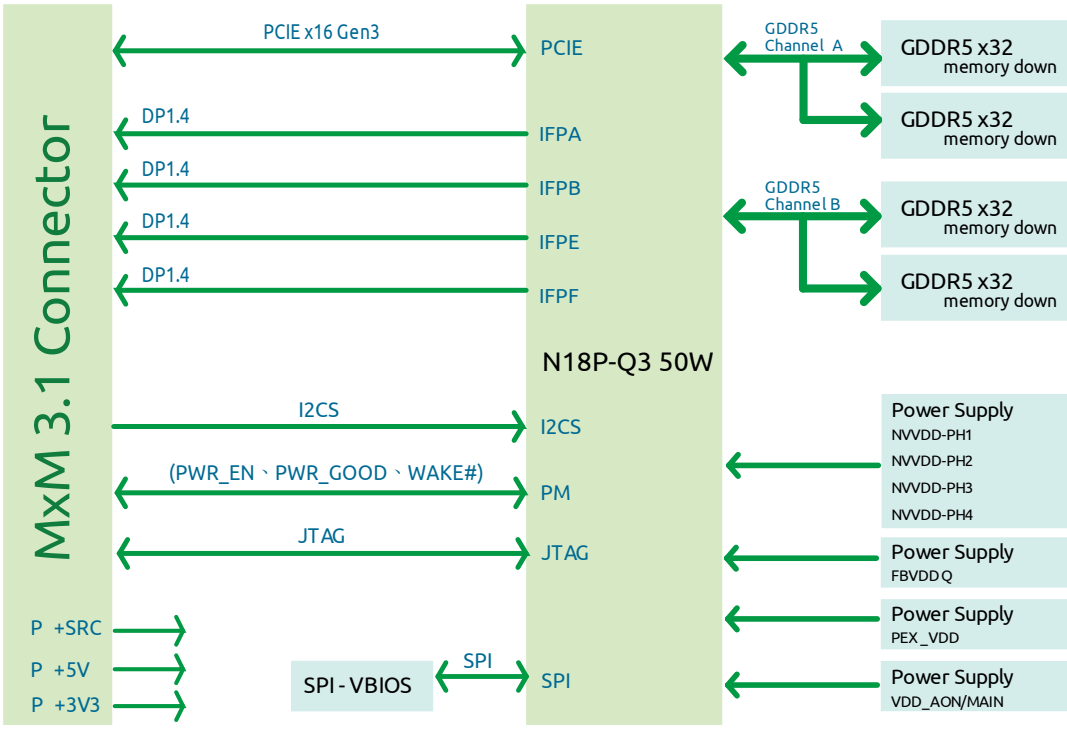
- **EGX-MXM-P2000**
  NVIDIA Quadro Embedded P2000, MXM 3.1 type A,
  82 x 70mm, PCIe x16 Gen3

Specifications

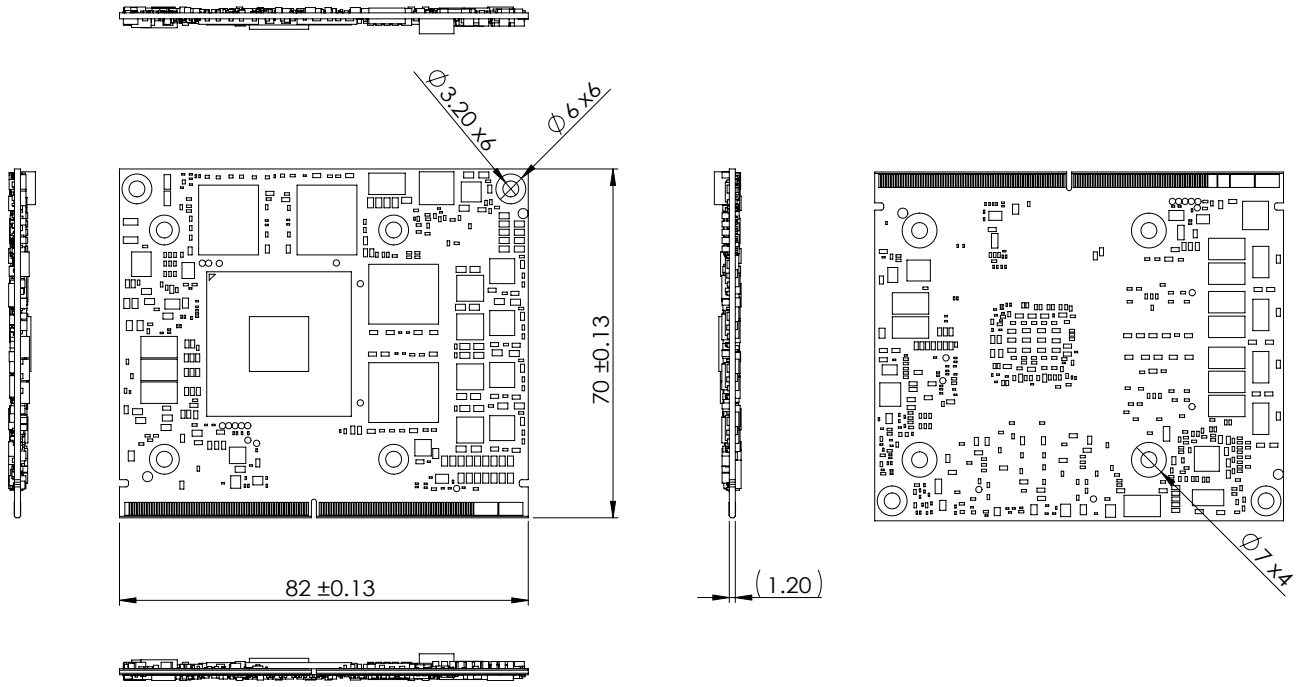
	EGX-MXM-P2000
Graphic Core	
Graphic Architecture	NVIDIA Pascal GP107
GPU	Quadro P2000
Display Outputs	4x DisplayPort 1.4 digital video outputs Support for High Dynamic Range (HDR) video 4K at 120Hz or 5K at 60Hz with 10-bit color depth
Signal Interface	MXM 3.1, PCI Express Gen3 x16 supports
GPGPU Computing	
CUDA Supports	768 CUDA cores, 2.3 TFLOPS SP Peak CUDA Toolkit 8.0, CUDA Compute version 6.1 OpenCL™ 1.2, DirectX® 12, OpenGL 4.5, Vulcan 1.0
Memory	GDDR5 4GB memory, Memory width: 128-bit, bandwidth: 96 GB/s
Mechanicals	
Dimensions	82 (W) x 70 (D) x 4.8 (H) mm
Locking Mechanism	Standard MXM 3.1 Type A
Environmental	
Operating Temp.	Standard: 0˚C to 55˚C, ETT: -40˚C to 85˚C
Storage Temp.	-40˚C to 85˚C
SW supports	
OS Support	Windows 7/10 & Linux Drivers, 64bit

* The software and workloads used in performance tests were optimized for performance on ADLINK platforms. Performance tests are measured using specific computer systems, components, software, operations and functions. Any changes to these factors may cause the results to vary. Contact ADLINK for more complete information about performance and benchmark results.

Block Diagram



Mechanical Drawing

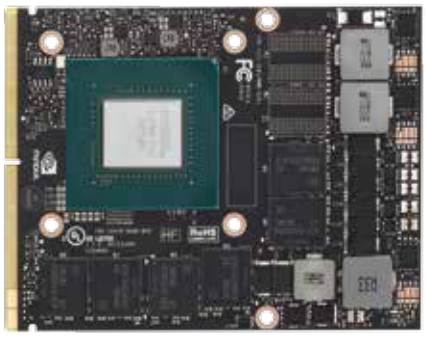


EGX-MXM-P3000

Mobile PCI Express Module with NVIDIA® Quadro® Embedded P3000

Features

- MXM 3.1 Type B form factor (82mm x 105 mm)
- 1280 CUDA cores
- 3.9 TFLOPS peak FP32 performance
- 6GB GDDR5 memory
- 168GB/s peak memory bandwidth
- Maximum power 75W
- 5-year availability



Introduction

Meeting the needs of embedded, ruggedized, and mobile system builders, the EGX-MXM-P3000 is specifically purposed to accommodate form factors incompatible with conventional PCI Express cards, and is built to maintain operations under a wide range of thermal and other environmental conditions. It's the ideal choice for blade-based and other deployments where high GPU density is critical, with a choice of GPU memory capacity, extremely reasonable power requirements, and flexible display options.

Ordering Information

- **EGX-MXM-P3000**
  NVIDIA® Quadro® Embedded P3000 , MXM 3.1 type B, 82 x 105mm, PCIe x16 Gen3
  * The product is recommended to use with PIS-5500.

Specifications

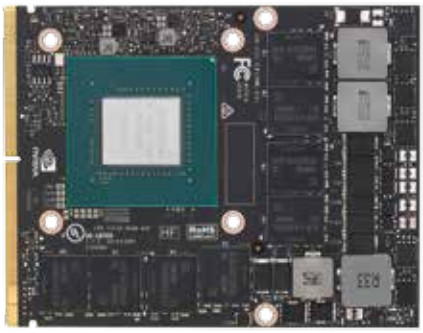
	EGX-MXM-P3000
Graphic Core	
Graphic Architecture	NVIDIA® Pascal™ GP104
GPU	Quadro® P3000
Display Outputs	Up to 4 display outputs 4x DisplayPort 1.4 digital video outputs (DP++), 1x HDMI, 2x DVI, 1x eDP
Signal Interface	MXM 3.1, PCI Express Gen3 x16 supports
GPGPU Computing	
CUDA Supports	1280 CUDA cores, 3.9 TFLOPS peak FP32 Performance
Memory	GDDR5 6GB memory, memory width: 192-bit, bandwidth: 168.2 GB/s
Mechanicals	
Dimensions	87 (W) x 105 (D) x 4.8 (H) mm
Locking Mechanism	Standard MXM 3.1 Type B
Environmental	
Operating Temp.	0 to 55˚C
Storage Temp.	-40˚C to 125˚C
Operating RH	5% to 90%
Storage RH	5% to 95%
Module Power Consumption	75W
SW	
OS Support	Windows 7/10 & Linux drivers, 64-bit
Graphic API	DirectX® 12, OpenGL 4.5, Vulkan 1.0 Shader Model 5.1
Compute API	CUDA Toolkit 8.0, CUDA Compute version 6.1 OpenCL™ 1.2, Direct Compute
NVIDIA technology	NVIDIA® Mosaic Technology/ NVIDIA® nView® Display Management Technology

EGX-MXM-P5000

Mobile PCI Express Module with NVIDIA® Quadro® Embedded P5000

Features

- MXM 3.1 Type B form factor (82mm x 105 mm)
- 2048 CUDA cores
- 6.4 TFLOPS peak FP32 performance
- 16GB GDDR5 memory
- 192GB/s peak memory bandwidth
- Maximum power 100W
- 5-year availability



Introduction

Meeting the needs of embedded, ruggedized, and mobile system builders, the EGX-MXM-P5000 utilizes Quadro Pascal architecture to deliver superior graphics and computing performance. The EGX-MXM-P5000 is specifically purposed to accommodate form factors incompatible with conventional PCI Express cards, and is built to maintain operations under a wide range of thermal and other environmental conditions. It's the ideal choice for blade-based and other deployments where high GPU density is critical, with a choice of GPU memory capacity, extremely reasonable power requirements, and flexible display options.

Ordering Information

- **EGX-MXM-P5000**
  NVIDIA® Quadro® Embedded P5000, MXM 3.1 type B, 82 x 105mm, PCIe x16 Gen3

Specifications

	EGX-MXM-P5000
Graphic Core	
Graphic Architecture	NVIDIA® Pascal™ GP104
GPU	Quadro® P5000
Display Outputs	Up to 4 display outputs 4x DisplayPort 1.4 digital video outputs (DP++), 1x HDMI, 2x DVI, 1x eDP
Signal Interface	MXM 3.1, PCI Express Gen3 x16 support
GPGPU Computing	
CUDA Supports	2048 CUDA cores, 6.4 TFLOPS peak FP32 performance
Memory	GDDR5 16GB memory, memory width: 256-bit, bandwidth: 192.2GB/s
Mechanicals	
Dimensions	87 (W) x 105 (D) x 4.8 (H) mm
Locking Mechanism	Standard MXM 3.1 Type B
Environmental	
Operating Temp.	0 to 55˚C
Storage Temp.	-40˚C to 125˚C
Operating RH	5% to 90%
Storage RH	5% to 95%
Module Power Consumption	100W
SW	
OS Support	Windows 7/10 & Linux drivers, 64-bit
Graphic API	DirectX® 12, OpenGL 4.5, Vulkan 1.0 Shader Model 5.1
Compute API	CUDA Toolkit 8.0, CUDA Compute version 6.1 OpenCL™ 1.2, Direct Compute
NVIDIA technology	NVIDIA® VR Ready/ NVIDIA® Mosaic Technology/ NVIDIA® nView® Display Management Technology

Quadro-E PEG P620

PCI Express Graphic Card with NVIDIA® Quadro® Embedded P620

Features

- Mini DisplayPort 1.4 x4
- DisplayPort with audio
- NVIDIA nView® Desktop Management Software
- HDCP 2.2 support
- NVIDIA Mosaic
- Dedicated hardware video encode and decode engines
- 3 (+5)†years

Introduction

Quadro-E PEG P620 combines a 512 CUDA core Pascal GPU, ample onboard memory, and advanced display technologies to deliver superior performance in a range of applications. 2GB ultrafast GPU memory enables complex 2D and 3D models, and a flexible single-slot, low-profile form factor allow compatibility with space and power-constrained chassis mounting, and display quality is maximized with support for up to four 4K displays (4096x2160 @ 60 Hz) with HDR color.

Ordering Information

- **Quadro-E PEG P620**
  NVIDIA® Quadro® Embedded P620, PCIe x16 Gen3, 4x mDP 1.4, 2.713" H x 5.7" L, single slot, low profile

* The product is recommended to use with MXC-6400, MVP-6010, MVP-6020 and MVP-6000.
† Special conditions apply.

Specifications

	Quadro-E PEG P620
Graphic Core	
Graphic Architecture	NVIDIA® Pascal™ GP107
GPU	Quadro® P620
Display Outputs	4x mDP 1.4, 4096x2160 @ 60Hz / 5120x2880 @ 60Hz HDCP 2.2 support * VGA/DVI/HDMI support via adapter/connector/bracket
Signal Interface	PCI Express Gen3 x16 support
GPGPU Computing	
CUDA Supports	512 CUDA cores, 1.38 TFLOPS peak FP32 performance
Memory	GDDR5 2GB memory, memory width: 128-bit, bandwidth: 80 GB/s
SW	
OS Support	Windows 7/10 & Linux Drivers, 64bit
Graphic API	DirectX® 12, OpenGL 4.5, Vulkan 1.0 Shader Model 5.1
Compute API	CUDA Toolkit 8.0, CUDA Compute version 6.1 OpenCL™ 1.2, Direct Compute
NVIDIA technology	NVIDIA® Mosaic Technology/ NVIDIA® nView® Display Management Technology
Environmental	
Operating Temp.	0 to 55˚C
Storage Temp.	-40˚C to 75˚C
Operating RH	5% to 90%
Storage RH	5% to 95%
Module Power Consumption	40W
Mechanicals	
Dimensions	2.713" × 5.7", single slot
Weight	129g

Quadro-E PEG P1000

PCI Express Graphic Card with NVIDIA® Quadro® Embedded P1000

Features

- Mini DisplayPort 1.4 x4
- DisplayPort with audio
- NVIDIA nView® Desktop Management Software
- HDCP 2.2 support
- NVIDIA Mosaic
- Dedicated hardware video encode and decode engines
- 3 (+5)†years

Introduction

Quadro-E PEG P1000 combines a 640 CUDA core Pascal GPU, 4GB GDDR5 onboard memory, and advanced display technologies in a low-profile form factor to deliver the graphics performance demanded in professional application. Support for four 4K displays (4096x2160 @ 60Hz) with HDR color provides an expansive visual workspace with maximum detail.

Ordering Information

- **Quadro-E PEG P1000**
  NVIDIA® Quadro® Embedded P1000, PCIe x16 Gen3, 4x mDP 1.4, 2.713" H x 5.7" L, single slot, low profile

  * The product is recommended to use with MXC-6400, MVP-6010, MVP-6020 and MVP-6000.
  † Special conditions apply.

Specifications

	Quadro-E PEG P1000
Graphic Core	
Graphic Architecture	NVIDIA® Pascal™ GP107
GPU	Quadro® P1000
Display Outputs	4x mDP 1.4, 4096x2160 @ 60Hz / 5120x2880 @ 60Hz HDCP 2.2 support * VGA/DVI/HDMI support via adapter/connector/bracket
Signal Interface	PCI Express Gen3 x16 support
GPGPU Computing	
CUDA Supports	640 CUDA cores, 1.89 TFLOPS peak FP32 performance
Memory	GDDR5 4GB memory, memory width: 128-bit, bandwidth: 80 GB/s
SW	
OS Support	Windows 7/10 & Linux Drivers, 64-bit
Graphic API	DirectX® 12, OpenGL 4.5, Vulkan 1.0 Shader Model 5.1
Compute API	CUDA Toolkit 8.0, CUDA Compute version 6.1 OpenCL™ 1.2, Direct Compute
NVIDIA technology	NVIDIA® Mosaic Technology/NVIDIA® nView® Display Management Technology
Environmental	
Operating Temp.	0 to 55˚C
Storage Temp.	-40˚C to 75˚C
Operating RH	5% to 90%
Storage RH	5% to 95%
Module Power Consumption	47W
Mechanicals	
Dimensions	2.713" × 5.7", single slot
Weight	129g

Quadro-E PEG P2200

PCI Express Graphic Card with NVIDIA® Quadro® P2200

Features

- DisplayPort 1.4 x4
- DisplayPort with audio
- NVIDIA nView® Desktop Management Software
- HDCP 2.2 support
- NVIDIA Mosaic
- NVIDIA Iray and MentalRay support

Introduction

The Quadro-E PEG P2200 perfectly balances performance, features, and compact form factor to deliver exceptional creative experience and productivity across a variety of 3D applications. The Pascal GPU with 1280 CUDA cores, 5GB GDDR5 onboard memory and support for up to four 5K (5120x2880 @ 60Hz) native displays accelerate product development and creation workflow demanding fluid interactivity for large, complex 3D workpieces.

Ordering Information

- **Quadro-E PEG P2200**
  NVIDIA® Quadro® P2200, PCIe x16 Gen3, 4x DP 1.4,
  4.4" H x 7.9" L, single slot
  * The product is sold with ADLINK platforms. Recommended models are AMITX-SL, IMB-M43H, IMB-M43-C236, IMB-M43, and NuPRO-E43 paired with
  EBP-13E2.

Specifications

	Quadro-E PEG P2200
Graphic Core	
Graphic Architecture	NVIDIA® Pascal™ GP106
GPU	Quadro® P2200
Display Outputs	4x DP 1.4, 4096x2160 @ 60Hz / 5120x2880 @ 60Hz HDCP 2.2 Support * VGA/DVI/HDMI support via adapter/connector/bracket
Signal Interface	PCI Express Gen3 x16 support
GPGPU Computing	
CUDA Support	1280 CUDA cores, 3.8 TFLOPS peak FP32 performance
Memory	GDDR5 5GB memory, memory width: 160-bit, bandwidth up to: 200 GB/s
SW	
OS Support	Windows 7/10 & Linux drivers, 64-bit
Graphic API	DirectX® 12, OpenGL 4.5, Vulkan 1.0 Shader Model 5.1
Compute API	CUDA Toolkit 8.0, CUDA Compute version 6.1 OpenCL™ 1.2, Direct Compute
NVIDIA Technology	NVIDIA® Mosaic Technology/ NVIDIA® nView® Display Management Technology
Environmental	
Operating Temp.	0 to 55˚C
Storage Temp.	-40˚C to 75˚C
Operating RH	5% to 95%
Storage RH	5% to 95%
Module Power Consumption	75W
Mechanicals	
Dimensions	4.4" H x 7.9" L, single slot
Weight	256g

Quadro-E PEG P4000

PCI Express Graphic Card with NVIDIA® Quadro® P4000

Features

- DisplayPort 1.4 x4
- DisplayPort with audio
- NVIDIA nView® Desktop Management Software
- HDCP 2.2 support
- NVIDIA Mosaic
- NVIDIA Iray and MentalRay support
- 3 (+5)† years

Introduction

The Quadro-E PEG P4000 perfectly balances performance, features, and compact form factor to deliver exceptional creative experience and productivity across a variety of 3D applications. The Pascal GPU with 1792 CUDA cores, 8GB GDDR5 onboard memory and support for up to four 8K (7680×4320 @ 60 Hz) native displays accelerate product development and creation workflow demanding fluid interactivity for large, complex 3D workpieces.

Ordering Information

- **Quadro-E PEG P4000**
  NVIDIA® Quadro® P4000, PCIe x16 Gen3, 4x DP 1.4,
  4.4" H x 9.5" L, single slot

  * The product is sold with ADLINK platforms. Recommended models are AMITX-SL, IMB-M43H, IMB-M43-C236, IMB-M43, and NuPRO-E43 paired with EBP-13E2.
  † Special conditions apply.

Specifications

	Quadro-E PEG P4000
Graphic Core	
Graphic Architecture	NVIDIA® Pascal™ GP104
GPU	Quadro® P4000
Display Outputs	4x DP 1.4, 7680×4320 @120 Hz/7680×4320 @ 60 Hz/5120×2880 @ 60 Hz HDCP 2.2 support * VGA/DVI/HDMI support via adapter/connector/bracket
Signal Interface	PCI Express Gen3 x16 support
GPGPU Computing	
CUDA Supports	1792 CUDA cores 5.3 TFLOPS peak FP32 performance
Memory	GDDR5 8GB memory Memory width: 256-bit Bandwidth: up to 243 GB/s
SW	
OS Support	Windows® 7/10 & Linux drivers, 64-bit
Graphic API	DirectX® 12, OpenGL 4.5, Vulkan 1.0 Shader Model 5.1
Compute API	CUDA Toolkit 8.0, CUDA Compute version 6.1 OpenCL™ 1.2, Direct Compute
NVIDIA Technology	NVIDIA® Mosaic Technology/ NVIDIA® nView® Display Management Technology
Environmental	
Operating Temp.	0 to 55˚C
Storage Temp.	-40˚C to 75˚C
Operating RH	5% to 90%
Storage RH	5% to 95%
Module Power Consumption	105W
Mechanicals	
Dimensions	4.4" H x 9.5" L, single slot
Weight	475g

MVP-5100-MXM 系列

Value Family 9th Gen Intel® Core™ i7/i5/i3® Processor-Based Embedded GPU/AI Platforms

New

Features

- 9th Gen Intel® Core™ i7/i5/i3 LGA processor
- Dual SODIMMs sockets for up to 32GB DDR4
- Abundant I/O:
  - Up to 4x additional DP 1.4 from MXM
  - 2x DP++, DVI, VGA, 3x GbE, 3x COM, TPM2.0
  - 3x USB 3.1 Gen 1, 3x USB 2.0
- Rich storage options: 2x 2.5" SATA, M.2 2280
- Front accessible I/O and adaptive Function Module 2.0 options
- Embedded slots for Mini PCIe, M.2 3042, 2x USIM
- World leading embedded GP/GPU computing options built-in

NVIDIA QUADRO CERTIFIED
• EMBEDDED

Software Support

- **Windows 10 IoT Enterprise CBB/LTSB 64-bit**
- **Linux Ubuntu18.04 LTS**

Optional Accessories

- **Factory Installed 2.5" SSD/HDD/M.2 Storage**
- **Wireless Mini PCIe/M.2 Module**
  Wi-Fi/ BT/ 3G/ 4G LTE/ LoRa wireless kit (w/ antenna)
- **AC/DC Adapter**
  220W (P/N: 31-62149-0000)
  280W (P/N: 91-95263-0010)

Ordering Information

Model	CPU	Memory
MVP-510A-MXM/M4G/[GPU]	Intel® Core™ i7-9700E	4GB non-ECC DDR4
MVP-5101-MXM/M4G/[GPU]	Intel® Core™ i7-9700TE	4GB non-ECC DDR4
MVP-5102-MXM/M4G/[GPU]	Intel® Core™ i5-9500TE	4GB non-ECC DDR4
MVP-5103-MXM/M4G/[GPU]	Intel® Core™ i3-9100TE	4GB non-ECC DDR4

GPU Options

Model	GPU	Power	CUDA® Cores	Graphics Memory
EGX-MXM-P1000	NVIDIA® Quadro® Embedded P1000	47W	512	GDDR5 4GB
EGX-MXM-P2000	NVIDIA® Quadro® Embedded P2000	58W	768	GDDR5 4GB
EGX-MXM-P3000	NVIDIA® Quadro® Embedded P3000	75W	1280	GDDR5 6GB
EGX-MXM-P5000	NVIDIA® Quadro® Embedded P5000	100W	2048	GDDR5 16GB

Specifications

Model Name	MVP-510A-MXM	MVP-5101-MXM	MVP-5102-MXM	MVP-5103-MXM
System Core				
Processor	Intel® Core™ i7-9700E	Intel® Core™ i7-9700TE	Intel® Core™ i5-9500TE	Intel® Core™ i3-9100TE
TDP	65 W	35 W	35 W	35 W
# of Cores	8	8	6	4
Base Frequency	2.6 GHz	1.8 GHz	2.2 GHz	2.2 GHz
Max Turbo Frequency	4.4 GHz	3.8 GHz	3.6 GHz	3.2 GHz
Chipset	Intel® H310 (Optional: C246)			
Memory	4GB DDR4 non-ECC 2400 MHz, dual SODIMMs, up to 32GB (Optional: 8/16/32GB ECC, only for Intel Core i3 w/ C246)			
I/O Interface				
Graphics	Dual independent displays: 2x DP++ 1.2/ 1x DVI-D/VGA (3 independent ones w/ C246) Extra 4x DP 1.4 powered by MXM P1000/P2000 or 3x DP 1.4 powered by MXM P3000/P5000			
Ethernet	3x Intel® GbE: i219 + 2x i211AT (support Intel AMT/vPro w/ C246)			
Serial Ports	COM1/2: RS-232/422/485, COM3: RS-232			
USB	3x USB 3.1 Gen 1, 3x USB 2.0, 1x internal USB2.0 dongle (2x USB 3.1 up to Gen 2 w/ C246)			
M.2	1x socket 2, key B+M or B, 2280/3042 (USB3.1 + SATA III + PCIex1. Up to PCIex2 w/ C246)			
Mini PCIe	1x Full size (USB 2.0, PCIe)			
USIM	2			
I2C	2 (3.3V/5V)			
TPM	TPM 2.0			
Storage Device				
2.5" SATA	2x internal (support RAID 0/1 w/ C246)			
Mechanical				
Dimensions	125 (W) x 240 (D) x 210 (H) mm (4.92" x 9.45" x 8.27")			
Cooling	Fanless passive cooling			
Weight	6.5 kg (14.4 lbs)			
Mounting	Wall mount			
Power Supply				
DC Input	12 to 24V			
AC Input	Optional 220W or 280W AC/DC adapter			
Environmental				
Operating Temperature	Standard: 0°C to 45°C, w/ air flow Extended: -20°C to 45°C (w/ air flow & Ind. storage)	Standard: 0°C to 50°C, w/ air flow Extended: -20°C to 60°C (w/ Ind. storage)		
Storage Temperature	-40°C to 85°C (-40°F to 185°F) (excl. storage)			
Humidity	~95% @ 40°C (non-condensing)			
Vibration	Operating: 3 Grms, 5-500 Hz, 3 axes (w/ 2.5" SSD/CFast))			
Shock	Operating: 50 G, half sine 11ms duration (w/ 2.5" SSD)			
ESD	Contact 4kV, Air 8kV			
EMC	EN61000-6-4/-2, CE, FCC Class A			
Safety	UL/cUL, CB			

MVP-6100-MXM 系列

Value Family 9th Gen Intel® Xeon®/Core™ i7/i5/i3® Processor-Based Expandable GPU Workstation Platforms

New

Features

- 9th Gen Intel® Xeon®/Core™ i7/i5/i3 LGA processor
- Dual SODIMMs sockets for up to 32GB DDR4 non-ECC/ECC
- Abundant I/O:
  - Up to 4x additional DP 1.4 from MXM
  - 2x DP++, DVI, VGA, 3x GbE, 3x COM, TPM2.0
  - 2x USB 3.1 Gen 2, 1x USB 3.1 Gen 1, 3x USB 2.0
- Rich storage options: up to 4x 2.5" SATA, M.2 2280
- Front accessible I/O and adaptive Function Module 2.0 options
- Flexible functionality expansion:
  - Expansion slots for standard PCIe and PCI card
  - Embedded slots for Mini PCIe, M.2 3042, 2x USIM
- World leading embedded GP/GPU computing options built-in

Software Support

- **Windows 10 IoT Enterprise CBB/LTSB 64-bit**
- **Linux Ubuntu 18.04 LTS**

Optional Accessories

- **Factory Installed 2.5" SSD/HDD/M.2 Storage**
- **Optional 2x 2.5" SATA Kit**
  Includes cables and bracket
- **Wireless Mini PCIe/M.2 Module**
  Wi-Fi/ BT/ 3G/ 4G LTE/ LoRa wireless kit (w/ antenna)
- **AC/DC Adapter**
  220W (P/N: 31-62149-0000)
  280W (P/N: 91-95263-0010)

Ordering Information

Model	CPU	Expansion Slots
MVP-612X-MXM-1E/M4G/[GPU]	Intel® Xeon® E-2278GE	1 PCIe x4
MVP-612A-MXM-1E/M4G/[GPU]	Intel® Core™ i7-9700E	1 PCIe x4
MVP-6121-MXM-1E/M4G/[GPU]	Intel® Core™ i7-9700TE	1 PCIe x4
MVP-6122-MXM-1E/M4G/[GPU]	Intel® Core™ i5-9500TE	1 PCIe x4
MVP-6123-MXM-1E/M4G/[GPU]	Intel® Core™ i3-9100TE	1 PCIe x4
MVP-614X-MXM-2E/M4G/[GPU]	Intel® Xeon® E-2278GE	2 PCIe x4, 1 PCI
MVP-614A-MXM-2E/M4G/[GPU]	Intel® Core™ i7-9700E	2 PCIe x4, 1 PCI
MVP-6141-MXM-2E/M4G/[GPU]	Intel® Core™ i7-9700TE	2 PCIe x4, 1 PCI
MVP-6142-MXM-2E/M4G/[GPU]	Intel® Core™ i5-9500TE	2 PCIe x4, 1 PCI
MVP-6143-MXM-2E/M4G/[GPU]	Intel® Core™ i3-9100TE	2 PCIe x4, 1 PCI

GPU Options

Model	GPU	Power	CUDA® Cores	Graphics Memory
EGX-MXM-P1000	NVIDIA® Quadro® Embedded P1000	47W	512	GDDR5 4GB
EGX-MXM-P2000	NVIDIA® Quadro® Embedded P2000	58W	768	GDDR5 4GB
EGX-MXM-P3000	NVIDIA® Quadro® Embedded P3000	75W	1280	GDDR5 6GB
EGX-MXM-P5000	NVIDIA® Quadro® Embedded P5000	100W	2048	GDDR5 16GB

Specifications

Model Name	MVP-610X-MXM	MVP-610A-MXM	MVP-6101-MXM	MVP-6102-MXM	MVP-6103-MXM
System Core					
Processor	Intel® Xeon® E-2278GE	Intel® Core™ i7-9700E	Intel® Core™ i7-9700TE	Intel® Core™ i5-9500TE	Intel® Core™ i3-9100TE
TDP	80 W	65 W	35 W	35 W	35 W
# of Cores	8	8	8	6	4
Base Frequency	3.3 GHz	2.6 GHz	1.8 GHz	2.2 GHz	2.2 GHz
Max Turbo Frequency	4.7 GHz	4.4 GHz	3.8 GHz	3.6 GHz	3.2 GHz
Chipset	Intel® C246				
Memory	4GB DDR4 non-ECC 2400 MHz, dual SODIMMs, up to 32GB (Optional: 8, 16, 32GB ECC, only for Intel® Xeon®/Core™ i3)				
I/O Interface					
Graphics	3 independent displays: 2x DP++ 1.2/ 1x DVI-D/VGA Extra 4x DP 1.4 powered by MXM P1000/P2000 or 3x DP 1.4 powered by MXM P3000/P5000				
Ethernet	3x Intel® GbE(2x i211AT, 1x i219) w/ iAMT/vPro support				
Serial Ports	COM1/2: RS-232/422/485, COM3: RS-232				
USB	2x USB 3.1 Gen 2, 1x USB 3.1 Gen 1, 3x USB 2.0, 1x internal USB2.0 dongle				
I2C	2 (3.3V/5V)				
TPM	TPM 2.0				
M.2	1x socket 2, key B+M or B, 2280/3042 (USB3.1 + SATA III + PCIe x2)				
Mini PCIe	1x Full size (USB 2.0, PCIe)				
USIM	2				
Expansion Slots	MVP-6120-MXM: 1 PCIe x4 MVP-6140-MXM: 2 PCIe x4, 1 PCI				
Storage Device					
2.5" SATA	2 (extra 2 by optional kit), support RAID 0/1/5/10				
Mechanical					
Dimensions	MVP-6120-MXM: 165 (W) x 240 (D) x 210 (H) mm (6.5" x 9.45" x 8.27") MVP-6140-MXM: 206 (W) x 240 (D) x 210 (H) mm (8.11" x 9.45" x 8.27")				
Cooling	System/MXM: Active fan cooling				
Weight	MVP-6120-MXM: 6.0 kg (13.2 lbs) MVP-6140-MXM: 6.4 kg (14.0 lbs)				
Mounting	Wall mount				
Power Supply					
DC Input	12 to 24V				
AC Input	220W or 280W AC/DC adapter (optional)				
Environmental					
Operating Temperature	Standard: (w/ air flow)				
	0°C to 40°C (35°C for P5000)	0°C to 50°C			
	Extended: (w/ air flow & ind. storage)				
	-20°C to 40°C (35°C for P5000)	-20°C to 50°C	-20°C to 60°C		
Storage Temperature	-40°C to 85°C (-40°F to 185°F) (excl. storage)				
Humidity	~95% @ 40°C (non-condensing)				
Vibration	Operating: 2 Grms, 5-500 Hz, 3 axes (w/ 2.5" SSD/CFast) Operating: 0.3 Grms, 5-500 Hz, 3 axes (w/ HDD)				
Shock	Operating: 50 G, half sine 11ms duration (w/ 2.5" SSD)				
ESD	Contact 4kV, Air 8kV				
EMC	EN61000-6-4/-2, CE, FCC Class A				
Safety	UL/cUL, CB				

DLAP-3000-CFL 系列

Embedded System supporting MXM Graphics Module with 8th/9th Generation Intel® Core™ i7/i5/i3 in LGA1151 Socket

Preliminary

Features

- ADLINK MXM Graphics module support (Type A/B, up to 120W)
- 8th/9th Gen Intel® Core™ i7/i5/i3, Celeron® processor
- Dual SODIMMs for up to 64GB DDR4 non-ECC memory (dependent on CPU)
- DisplayPort (2 from CPU, 4 from MXM)
- 1x M.2 E key supporting 1630 or 2230 for Wi-Fi/Bluetooth module, 1x M.2 B key supporting 2242 or 2280 for SATA storage module
- Reliable Molex type 12V DC-in connector

Software Support

- **Windows 10 IoT Enterprise CBB 64-bit**
- **Ubuntu 16.04 LTS**

Optional Accessories

- **2.5" SATA SSD/HDD, M.2 Storage**
- **Wireless Module**
  Wi-Fi/Bluetooth/4G LTE wireless kit (w/ antenna)
- **240W AC/DC Adapter**

Ordering Information

Model	MXM Support	Chipset	DC-in
DLAP-3000-CFP1	EGX-MXM-P1000	H310	12V
DLAP-3000-CFP2	EGX-MXM-P2000	H310	12V
DLAP-3000-CFP12	EGX-MXM-P1000/2000 (not incl.)	H310	12V
DLAP-3000-CFP3	EGX-MXM-P3000	H310	12V
DLAP-3000-CFP5	EGX-MXM-P5000	H310	12V
DLAP-3000-CFP35	EGX-MXM-P3000/5000 (not incl.)	H310	12V

Specifications

Model	DLAP-3000-CFP1	DLAP-3000-CFP2	DLAP-3000-CFP3	DLAP-3000-CFP5
	DLAP-3000-CFP12*		DLAP-3000-CFP35*	
MXM Support	EGX-MXM-P1000	EGX-MXM-P2000	EGX-MXM-P3000	EGX-MXM-P5000
Processor	Intel® Core™ i7-9700TE, 1.8GHz 12M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (8C/8T) Intel® Core™ i7-8700T, 2.4GHz 12M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/12T) Intel® Core™ i5-8500T, 2.1GHz, 9M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/6T) Intel® Core™ i3-8100T, 3.1GHz, 6M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (4C/4T) Intel® Celeron® G4900T, 2.9GHz, 2M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (2C/2T)			
Chipset	Intel® H310 Chipset			
Memory	Non-ECC DDR4 2666/2400MHz, 2x SO-DIMM, up to 64GB (dependent on CPU) system memory			
I/O Interfaces				
Display	6x DisplayPort (2 from CPU, 4 from MXM)			
Ethernet	1x GbE (Intel® i219-LM), 3x GbE (Intel® i210-AT)			
Serial Ports	1x RS-232/422/485, 1x RS-232			
USB	4x USB 3.1 Gen1 ports, 4x USB 2.0 ports			
M.2	1x M.2 E key supporting 1630 or 2230 for Wi-Fi/BT module, 1x M.2 B key supporting 2242 or 2280 for SATA storage module			
Digital IO	Default: w/o DIO Option: 1x DI/DO with 4 in, 4 out, one ground pin , and one power pin (no power/5V/12V, 0.5A by BIOS selection)			
Audio	Default: w/o Audio Option 1: Mic-in, Line-out, Line-in Option 2: Mic-in, L/R speaker-out (6W + 6W) Option 3: Line-in, L/R speaker-out (6W + 6W)			
TPM 2.0	Optional			
eSIM	Optional			
Storage				
SATA	2x 2.5" SATA 6Gb/s external drive bays 1x SATA 6Gb/s signal via M.2 B key connector			
Mechanical				
Dimensions	235 x 182 x 75mm (W x D x H)			
Mounting	Optional wall-mount bracket			
Power Supply				
DC Input	DC 12V input (Molex DC-in jack)			
AC Input	Optional: 240W (12V/20A) AC/DC adapter			
Environmental				
Operating Temperature	0°C to 50°C (W/MXM, W/SSD)			
Storage Temperature	-20°C to 60°C			
Humidity	10% to 90%, non-condensing			
EMC	EN55032/EN55024			
Safety	UL/cUL, CB, CCC			

*Note: These models do not include an MXM graphics module.

DLAP-4000 系列

Embedded System supporting FHFL dual-width PEG slot with 8th/9th Generation Intel® Core™ i7/i5/i3 in LGA1151 Socket

Features

- NVIDIA® Quadro® PEG card support
- 8th/9th Gen Intel® Core™ i7/i5/i3 processor
- Dual SODIMMs for up to 32GB DDR4 non-ECC memory (dependent on CPU)
- 1x DVI, 1x HDMI, 1x DP (from CPU), additional display outputs from PEG cards
- 1x Mini PCIe slot for Wi-Fi/Bluetooth or LTE module, 1x M.2 M key supporting 2280 SATA SSD module
- 300W/400W/500W Flex ATX PSU

Software Support

- **Windows 10 IoT Enterprise CBB 64-bit**
- **Ubuntu 16.04 LTS**

Optional Accessories

- **3.5" SATA HDD, 2.5" SATA SSD/HDD, M.2 2280 SATA SSD**
- **Wireless Module**
  Wi-Fi/Bluetooth or 4G LTE wireless kit (w/ antenna)

Ordering Information

Model	CPU	Memory
DLAP-4001/M8G/[PEG]	Intel® Core™ i7-9700E	8GB non-ECC DDR4
DLAP-4002/M8G/[PEG]	Intel® Core™ i5-9500E	8GB non-ECC DDR4
DLAP-4003/M8G/[PEG]	Intel® Core™ i3-9100E	8GB non-ECC DDR4
DLAP-4004/M8G/[PEG]	Intel® Core™ i7-9700TE	8GB non-ECC DDR4
DLAP-4005/M8G/[PEG]	Intel® Core™ i5-9500TE	8GB non-ECC DDR4
DLAP-4006/M8G/[PEG]	Intel® Core™ i3-9100TE	8GB non-ECC DDR4
DLAP-4007/M8G/[PEG]	Intel® Core™ i7-8700	8GB non-ECC DDR4
DLAP-4008/M8G/[PEG]	Intel® Core™ i5-8500	8GB non-ECC DDR4
DLAP-4009/M8G/[PEG]	Intel® Core™ i3-8100	8GB non-ECC DDR4
DLAP-400A/M8G/[PEG]	Intel® Core™ i7-8700T	8GB non-ECC DDR4
DLAP-400B/M8G/[PEG]	Intel® Core™ i5-8500T	8GB non-ECC DDR4
DLAP-400C/M8G/[PEG]	Intel® Core™ i3-8100T	8GB non-ECC DDR4

PEG Card Options

PEG	Model	Power	CUDA® Cores	Graphics Memory
P2200	NVIDIA® Quadro® P2200	75W	1280	GDDR5 5GB
P4000	NVIDIA® Quadro® P4000	105W	1792	GDDR5 8GB
P5000	NVIDIA® Quadro® P5000	180W	2560	GDDR5 16GB
RTX4000	NVIDIA® Quadro® RTX 4000	160W	2304	GDDR6 8GB
RTX5000	NVIDIA® Quadro® RTX 5000	265W	3072	GDDR6 16GB
RTX6000	NVIDIA® Quadro® RTX 6000	295W	4608	GDDR6 24GB
RTX8000	NVIDIA® Quadro® RTX 8000	295W	4608	GDDR6 48 GB

Specifications

Model	DLAP-4000						
Processor	Intel® Core™ i7-9700E, 2.6GHz, 12M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (8C/8T) Intel® Core™ i5-9500E, 3.0GHz, 9M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (6C/6T) Intel® Core™ i3-9100E, 3.1GHz, 6M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (4C/4T) Intel® Core™ i7-9700TE, 1.8GHz, 12M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (8C/8T) Intel® Core™ i5-9500TE, 2.2GHz, 9M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/6T) Intel® Core™ i3-9100TE, 2.2GHz, 6M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (4C/4T) Intel® Core™ i7-8700, 3.2GHz, 12M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (6C/12T) Intel® Core™ i5-8500, 3.0GHz, 9M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (6C/6T) Intel® Core™ i3-8100, 3.6GHz, 6M Cache, 65W TDP, LGA1151, DDR4 2400MHz support (4C/4T) Intel® Core™ i7-8700T, 2.4GHz 12M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/12T) Intel® Core™ i5-8500T, 2.1GHz, 9M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/6T) Intel® Core™ i3-8100T, 3.1GHz, 6M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (4C/4T)						
Chipset	Intel® H310 Chipset						
Memory	Non-ECC DDR4 2666/2400MHz, 2x SO-DIMM, up to 32GB (dependent on CPU) system memory						
PEG Card Support	NVIDIA® Quadro® P2200	NVIDIA® Quadro® P4000	NVIDIA® Quadro® P5000	NVIDIA® Quadro® RTX 4000	NVIDIA® Quadro® RTX 5000	NVIDIA® Quadro® RTX 6000	NVIDIA® Quadro® RTX 8000
I/O Interfaces							
Display	1x DVI, 1x HDMI, 1x DP (from CPU), additional display outputs from PEG cards						
Ethernet	2x GbE (Realtek RTL8111G)						
Serial Ports	1x RS-232/422/485, 4x RS-232						
USB	4x USB 3.1 Gen1 ports, 2x USB 2.0 ports						
M.2	1x Mini PCIe slot for Wi-Fi/Bluetooth or LTE module 1x M.2 M key supporting 2280 SATA SSD modules						
Audio	Mic-in, Line-out, Line-in						
TPM 2.0	Optional						
Storage							
SATA	2x 2.5" SATA 6Gb/s internal drive bays 1x SATA 6Gb/s signal via M.2 M key slot						
Mechanical							
Dimensions	220 x 300 x 150 mm (W x D x H)						
Power Supply							
AC Input	100 to 240 VAC						
Output Rating	300W	300W	400W	400W	500W	500W	500W
Environmental							
Operating Temperature	0°C to 50°C	0°C to 50°C	0°C to 40°C	0°C to 50°C	0°C to 40°C	0°C to 40°C	0°C to 40°C
Storage Temperature	-20°C to 60°C						
Humidity	5% to 90%, non-condensing						
EMC	EN55032/EN55035						
Safety	UL/cUL, CB, CCC						

ADi-SC1X

High-Performance Gaming Platform
Fully Modular Slot-In Platform with Backplane Architecture
Supports up to Eight Independent 4K/UHD Displays

Features

- Flexible platform selection: 6th Gen. and later Intel® Core™ CPU and AMD Ryzen™ APU with COMe support
- Flexible maintenance and upgrade: slot-in/backplane design, CPU COMe module, GPU MXM module
- Full-scale customization options: GDDR5, V-BIOS, video ports, I/O ports, etc.
- High level of integration: FPGA & logging controller onboard

Introduction

ADLINK's ADi-SC1X gaming platform with backplane architecture features a wide range of powerful processing and graphics options for gaming applications.

Equipped with a COM Express Type 6 interface and an MXM Type B slot, ADi-SC1X provides superior scalability for all possible use cases and performance requirements.

With the powerful processing performance, advanced security functions, smart middleware solutions, and versatile I/O array, ADi-SC1X fully satisfies the needs of gaming applications.

The platform is designed to meet the GLI-11 (Gaming Laboratories International) certification and all major global gaming market compliance requirements. The comprehensive middleware as well as the security and extensive I/O solutions enable developers to easily bridge applications with peripheral devices, sensors, and surrounding solutions up to central monitoring and control systems.

High Scalability and Ideal Range of Performance Class
ADi-SC1X is designed with highly scalable and reliable hardware that can be flexibly scaled from entry level up to the highest performance class, with tailored configuration of COMe CPU and MXM GPU selections.

Multi-Display Graphics Capabilities
ADi-SC1X provides support for up to 4K resolutions and is capable of supporting dedicated graphics cards for up to eight independent monitors that conform to the latest DisplayPort 1.2 standard.

Advanced Security and NVRAM PCI Express for Gaming Designed to Meet GLI-11
High-speed PCI Express card with up to 64 MB NVRAM. It offers a crypto and authentication security chip with power-off monitoring and event logging designed to meet the GLI-11 (Gaming Laboratories International) certification requirements. Further features are also available, such as TPM1.2 trusted platform module or custom secure BIOS options.

Ordering Information

- **ADi-SC1Xxxxxx**
- **ADi-SA2X-KB-BAAS (call for availability)**

*Other configurations on request

Options

- **ADiAPI**
  Intelligent middleware used for controlling peripheral devices

Optional Accessories

- **ADi-BSEC cable**
- **Box PC cable kit**
- **ADi-BSDK board**
- **ADi-BSDK board cable kit**

Specifications

Model Name	ADi-SC1X (preliminary data subject to change)
Core System	
Processor	COM Express Type 6 up to 65W
Chipset	Dependent on COM Express module
BIOS	Socketed dual AMI uEFI-based BIOS on with Intel® AMT 11.0 support; onboard BIOS socket and SPI header
Expansion Slot	1x M.2 / 1x MXM Type B
Memory	Dual-channel, non-ECC 1333/1600/2133 MHz DDR4/DDR3L memory up to 32 GB in dual vertical SODIMM sockets
Graphics Card	Integrated graphics dependent on COM Express module
	NVIDIA Quadro® P1000 embedded MXM
	Various other MXM options
Storage	3x SATA 6Gb/s (onboard)
	2x HDD/SSD/CFast
	Flexible, field-removable 2.5" drive bay on front panel
	Up to 3x SATADOM support
	1x M.2 (M Key, Socket 3 type)
	3x EEPROM storage support (1x with 3.3V/5V support)
I/O Interfaces	
Ethernet	2x GbE ports (10/100/1000 GbE connection)
Serial Ports	2x RS232/422/485/TTL; 4x RS232; 2x RS232/TTL; 2x RS232/CCTALK
Audio Interface	7.1 channel audio via 5 jacks and S/PDIF output on rear I/O; 7.1 channel audio signals and S/PDIF output via internal header; optional 2.1 Class D amplifier
USB	8 x USB on backplane (USB 2.0/3.0 distribution dependent on chipset)
	2x USB 3.0 on front panel
	2x USB 2.0/3.0 on internal vertical connector
DisplayPort	Up to 4x COMe DP outputs dependent on COM Express module
	4x MXM card DP outputs (optional)
Other	SPI, 1-Wire, I²C, removable EEPROM modules
Gaming-Specific Features and Security	
	NVRAM up to 4x 8MB (battery-buffered)
	Intrusion detection
	Event logging processor (battery-buffered)
	3x high-current outputs
	24 x open drain /40V LED drivers
	32x digital inputs / 32x digital outputs
	8x independent current-sensed hardmeter support
	Key lock, eyelet for sealing, TPM, GLI covers, dedicated security ICs, secure key storage, SHA and AES support
	Fully customizable secure BIOS
Power Supply	
	12V or 24V input (optional)
Mechanical	
Dimensions	292mm (W) x 255mm (D) x 230mm (H)
Operating System Support	
	Windows® 32/64-bit, Linux 32/64-bit (optional)
Environmental & Safety	
Operating Temp.	0°C to 50°C (32°F to 122°F)
Storage Temp.	-20°C to 70°C (-4°F to 158°F) (excl. HDD/SSD/CFast)
Humidity	~ 85% @ 50°C (122°F) (non-condensing)
Shock	Operating, 20 G, half sine 11 ms duration (w/ CFast or SSD)
EMC	CE and FCC Class A
ESD	Contact +/-4 KV and Air +/-8 KV
Safety	UL/cUL, CB, KCC

AMSTX-CF 系列

Embedded Motherboard supporting MXM Graphics Module with 8th/9th Generation Intel® Core™ i7/i5/i3 in LGA1151 Socket

Features

Preliminary

- ADLINK MXM Graphics module support (Type A/B, up to 120W)
- 8th/9th Gen Intel® Core™ i7/i5/i3, Celeron® processor
- Dual SODIMMs for up to 64GB DDR4 non-ECC memory (CPU dependent)
- 6 x DisplayPort (2 from CPU, 4 from MXM). one internal HDMI (vertical connector from CPU), LVDS optional
- 1x M.2 E key supporting 1630 or 2230 for wireless LAN / Bluetooth module, 1x M.2 B key supporting 2242 or 2280 for SATA storage module, 1x M.2 M key supporting 2242 or 2280 for SATA/PCIe x4 storage module (not supported by H310 Chipset)
- Reliable Molex type 12V DC-in connector

Software Support

- **Windows 10 IoT Enterprise CBB 64-bit**
- **Ubuntu 16.04 LTS**

Optional Accessories

- **2.5" SATA SSD/HDD, M.2 Storage**
- **Wireless Module**
  Wi-Fi/Bluetooth/4G LTE wireless kit (w/ antenna)
- **240W AC/DC Adapter**

Ordering Information

Model	MXM Support	Chipset	DC-in
AMSTX-CFP12-Q370	EGX-MXM-P1000/P2000	Q370	12V
AMSTX-CFP35-Q370	EGX-MXM-P3000/P5000	Q370	12V
AMSTX-CFP12-H310	EGX-MXM-P1000/P2000	H310	12V
AMSTX-CFP35-H310	EGX-MXM-P3000/P5000	H310	12V

Specifications

Model	AMSTX-CFP12-Q370	AMSTX-CFP35-Q370	AMSTX-CFP12-H310	AMSTX-CFP35-H310
MXM Support	EGX-MXM-P1000/P2000	EGX-MXM-P3000/P5000	EGX-MXM-P1000/P2000	EGX-MXM-P3000/P5000
Processor	Intel® Core™ i7-9700E, 2.6GHz, 12M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (8C/8T) Intel® Core™ i7-9700TE, 1.8GHz, 12M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (8C/8T) Intel® Core™ i7-8700, 3.2GHz, 12M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (6C/12T) Intel® Core™ i7-8700T, 2.4GHz 12M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/12T) Intel® Core™ i5-8500, 3.0GHz, 9M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (6C/6T) Intel® Core™ i5-8500T, 2.1GHz, 9M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/6T) Intel® Core™ i3-8100, 3.6GHz, 6M Cache, 65W TDP, LGA1151, DDR4 2400MHz support (4C/4T) Intel® Core™ i3-8100T, 3.1GHz, 6M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (4C/4T) Intel® Celeron® G4900, 3.1GHz, 2M Cache, 54W TDP, LGA1151, DDR4 2400MHz support (2C/2T) Intel® Celeron® G4900T, 2.9GHz, 2M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (2C/2T)			
Chipset	Intel® Q370 Chipset		Intel® H310 Chipset	
Memory	Non-ECC DDR4 2666/2400MHz, 2x SO-DIMM, up to 64GB system memory (CPU dependent)			
I/O Interfaces				
Display	6x DisplayPort (2 from CPU, 4 from MXM). One internal HDMI (vertical connector from CPU), LVDS optional			
Ethernet	1x GbE (Intel® i219-LM), 3x GbE (Intel® i210-AT)			
Serial Ports	1x RS-232/422/485 pin header, 1x RS-232 pin header (CCtalk supported by jumper setting)			
USB	4x USB 3.1 Gen1 ports, 2x USB 2.0 pin headers, 2x USB 3.1 Gen1 pin headers		4x USB 3.1 Gen1 ports, 4x USB 2.0 pin headers	
Audio	Default: One 10-pin wafer(box header) for Mic-in/Line out/Line in Optional 1: Mic in /(6W speaker_out_L+6W speaker_out_R. (on board 10-pin wafer. Connector via additional audio module) Optional 2: Line in /(6W speaker_out_L+6W speaker_out_R. (on board 10-pin wafer. Connector via additional audio module)			
M.2	1x M.2 E key supporting 1630 or 2230 for Wi-Fi/ BT module, 1x M.2 B key supporting 2242 or 2280 for SATA storage module, 1x M.2 M key supporting 2242 or 2280 for SATA/PCIe x4 storage module		1x M.2 E key supporting 1630 or 2230 for Wi-Fi / BT module, 1x M.2 B key supporting 2242 or 2280 for SATA storage module	
PCB Edge Connector	1x PCIe x8 Gen2 PCB edge connector (data is from 2x PCIe x4 root ports, one set of clocks, up to 50W), one PCIe power connector up to 12V @3.5A		PCIe x1 Gen2 signals (up to 50W), one PCIe power connector up to 12V @3.5A	
Digital I/O	One 1x 10-pin/2.0mm wafer: DI/DO: 4 in and 4 out, one ground pin, one power pin (no power/5V/12V, 0.5A by BIOS selection)			
TPM 2.0	Optional			
eSIM	Optional			
Storage				
SATA	2x SATA 6Gb/s, one SATA power connector 2x SATA 6Gb/s signals via M.2 M & B key connector Intel® RST RAID Support		2x SATA 6Gb/s, one SATA power connector 1x SATA 6Gb/s signal via M.2 B key connector	
Mechanical				
Dimensions	197.72 x 167.32 mm (W x L)			
Mounting	ADLINK proprietary mounting hole locations, ADLINK proprietary CPU cooler bracket			
Power Supply				
DC Input	DC 12V input (Molex DC-in jack)			
AC Input	Optional: 240W (12V @20A) AC/DC adapter			
Environmental				
Operating Temperature	0°C to 60°C (w/o MXM), 0°C to 55°C (w/ MXM)			
Storage Temperature	-40°C to 85°C			
Humidity	10% to 90%, non-condensing			
EMC	EN55032/EN55024			

MVP-6100 系列

Value Family 9th Generation Intel® Xeon®/Core™ i7/i5/i3 & 8th Gen Celeron® Processor-Based Expandable Computer

Features

- 9th Gen Intel® Xeon®/Core™ i7/i5/i3 & 8th Gen Celeron® LGA processor
- Dual SODIMMs for up to 32GB DDR4 non-ECC/ ECC memory
- Rich I/O: 2x DP++/ DVI/ VGA/ 3x GbE/ 4x COM/ 8-ch DI/ 8-ch DO/ TPM2.0
- 2x USB 3.1 Gen2 + 1x USB 3.1 Gen1 + 3x USB 2.0
- Rich storage: up to 4x 2.5" SATA, CFast, M.2 2280
- Embedded Expansion: Mini PCIe/ M.2 3042/ 2x USIM
- Front accessible I/O and adaptive Function Module v.2 option
- Flexible modular expansion with 2 or 4 slots

Software Support

- **Win10 IoT Enterprise CBB 64bit**
- **Linux Ubuntu 18.04**

Optional Accessories

- **MVP-6100 Fan Kit (P/N: 91-95267-000E)**
- **Factory Installed 2.5" SATA SSD/HDD/M.2/CFast**
- **Wireless Module**
  Wi-Fi/ BT/ 3G/ 4G LTE/ LoRa wireless kit (w/ antenna)
- **Optional 2x 2.5" SATA Kit (w/ Bracket and Cable)**
- **AC/DC Adapter**
  220W (P/N: 31-62149-0000)
  280W (P/N: 91-95263-0010)

Ordering Information

Model	CPU	PCH	Slot #
MVP-612X/M4G-1E	Intel® Xeon® E-2278GE	C246	2
MVP-612A/M4G-1E	Intel® Core™ i7-9700E	H310	2
MVP-6121/M4G-1E	Intel® Core™ i7-9700TE	H310	2
MVP-6122/M4G-1E	Intel® Core™ i5-9500TE	H310	2
MVP-6123/M4G-1E	Intel® Core™ i3-9100TE	H310	2
MVP-6124/M4G-1E	Intel® Celeron® G4900T	H310	2
MVP-614X/M4G-3E	Intel® Xeon® E-2278GE	C246	4
MVP-614A/M4G-3E	Intel® Core™ i7-9700E	C246	4
MVP-6141/M4G-3E	Intel® Core™ i7-9700TE	C246	4
MVP-6142/M4G-3E	Intel® Core™ i5-9500TE	C246	4
MVP-6143/M4G-3E	Intel® Core™ i3-9100TE	C246	4
MVP-6144/M4G-3E	Intel® Celeron® G4900T	C246	4

Specifications

Model Name	MVP-610X	MVP-610A	MVP-6101	MVP-6102	MVP-6103	MVP-6104
System Core						
Processor	Intel® Xeon® E-2278GE	Intel® Core™ i7-9700E	Intel® Core™ i7-9700TE	Intel® Core™ i5-9500TE	Intel® Core™ i3-9100TE	Intel® Celeron® G4900T
TDP	80W	65W	35W	35W	35W	35W
# of Cores	8	8	8	6	4	2
Base Freq.	3.3 GHz	2.6 GHz	1.8 GHz	2.2 GHz	2.2 GHz	2.9 GHz
Max Turbo Freq.	4.7 GHz	4.4 GHz	3.8 GHz	3.6 GHz	3.2 GHz	-
Chipset	C246	MVP-6120 series: H310 MVP-6140 series: C246				
Memory	4GB DDR4 non-ECC 2400 MHz, dual SODIMMs, up to 32GB (Optional: 8/16/32GB ECC, only for Intel® Xeon®/Core™ i3/Celeron w/ C246)					
I/O Interface						
Display	2x DP++ 1.2, DVI-D, VGA (dual independent displays w/ H310, 3 independent displays w/ C246)					
Ethernet	3x Intel GbE: 2x i211AT + i219 (Support Intel® AMT/vPro™ w/ C246)					
Serial Ports	COM1/2: RS-232/422/485, COM3/4: RS-232 (Optional COM5/6: RS-232, shared w/ DI/O)					
USB	3x USB 3.1 Gen 1 + 3x USB 2.0, 1x internal USB 2.0 dongle (2x USB 3.1 up to Gen 2 w/ C246)					
Audio	Line-out, Mic-in (Optional: speaker-out)					
Mini PCIe	1x Full size (USB 2.0 + PCIe)					
M.2	1x socket 2, key B+M or B, 2280/3042 (USB3.1 + SATA III + PCIe x1. Up to PCIe x2 w/ C246)					
USIM	2					
DI/O	8-CH DI and 8-CH DO					
I2C	2 (3.3V/5V)					
TPM	TPM2.0					
Expansion Slots	MVP-6120 series: PCIe x16 + PCI (total up to 150W) MVP-6140 series: PCIe x16 + 2 PCIe x4 + PCI (total up to 150W with 12V in; total up to 250W with 24V in)					
Storage Device						
2.5" SATA	2x internal (RAID 0/1/5/10 support w/ C246) (Optional: additional 2x internal, w/ C246)					
CFast	1 Type II					
Mechanical						
Dimensions	MVP-6120 series: 165 (W) x 240 (D) x 210 (H) mm (6.5" x 9.45" x 8.27") MVP-6140 series: 206 (W) x 240 (D) x 210 (H) mm (8.11" x 9.45" x 8.27")					
Weight	MVP-6120 series: 4.8 kg (10.6 lbs) MVP-6140 series: 5.1 kg (11.2 lbs)					
Mounting	Wall mount					
Fan	Optional					
Power Supply						
DC Input	12-24V (± 10% tolerance)					
AC Input	Optional: 220W/280W AC/DC adapter					
Environmental						
Operating Temperature	Standard: (w/ air flow)					
	0°C to 40°C	0°C to 50°C				
	Extended: (w/ air flow & ind. storage)					
	-20°C to 40°C	-20°C to 50°C	-20°C to 60°C			
Storage Temperature	-40°C to 85°C (-40°F to 185°F) (excl. storage)					
Humidity	~95% @ 40°C (non-condensing)					
Vibration	Operating: 5 Grms, 5-500 Hz, 3 axes (w/2.5" SSD/CFast, 3 Grms w/ fan) Operating: 0.5 Grms, 5-500 Hz, 3 axes (w/ HDD)					
Shock	Operating: 50 Grms, half sine 11ms duration (w/ 2.5" SSD/CFast)					
ESD	Contact +/-4KV, Air +/-8KV					
EMC	EN61000-6-4/-2, CE & FCC Class A					
Safety	UL/cUL, CB, CCC					

MVP-6010/6020 系列

Value Family 6th Generation Intel® Core™ i7/i5/i3 Processor-Based Expandable Fanless Embedded Computer

Features

- 6th Gen Intel® Core™ i7/i5/i3 processors with H110/Q170 chipset
- Dual-channel DDR4 SO-DIMM sockets support up to 32GB memory
- Support for 2 independent displays with 1 VGA, 1 DVI and 2 DisplayPort
- 4 expansion slots
  - MVP-6010: 1 PCIe Gen3 x16 and 3 PCI expansion slots
  - MVP-6020: 2 PCIe Gen3 x8 and 2 PCI expansion slots
- 3 Intel® GbE ports with teaming function
- 2 software-programmable RS-232/422/485 + 2 RS-232 ports
- Built-in 8CH DI & 8CH DO
- Front-accessible I/O for simplified installation and maintenance
- Extremely cost-effective, high performance Fanless system
  - Support up to 65W CPU with fanless operation

Introduction

ADLINK's newly introduced MVP-6010/6020 Series value line of fanless embedded computing platforms, incorporating the 6th Generation Intel® Core™ processor, provides one PCIex16 and three PCI or two PCIe x8 and two PCI expansion slots, 1 mini PCIe slot and single-side access for I/O ports, optimizing easy maintenance in industrial automation environments. The series retains the robust design of all ADLINK MXC/MXE lines, at a new extremely cost-effective price point.

The MVP-6010/6020 Series supports dual-channel DDR4 memory for more powerful computing and the Intel® HD Graphics 530 speeds graphics performance. Along with a versatile I/O array and flexible expansion capacity, the MVP-6010/6020 Series fully satisfies all the needs of industrial automation with the performance demanded by vision inspection, motion control, and surveillance applications. Fanless construction not only overcomes contaminant and noise challenges presented by harsh IA environments, the elimination of problematic structural elements that negatively affect MTBF greatly increases life cycle expectations for the platform.

Optional Accessories

- **Optional Fan Module**
  Fan module for MVP-6010/6020 series
- **8/16/32 GB DDR4 Option**
  Upgrade to 8/16/32 GB DDR4 memory
- **500 GB / 1TB HDD Option**
  Factory-installed 500 GB / 1 TB SATA hard disk drive
- **64 GB SSD Option**
  Factory-installed 64 GB MLC SATA solid-state drive
- **160W AC-DC Adapter**
  160W Industrial grade AC-DC adapter

Software Support

- **Windows® 10 / 7 / Embedded Standard 7**
- **Linux**

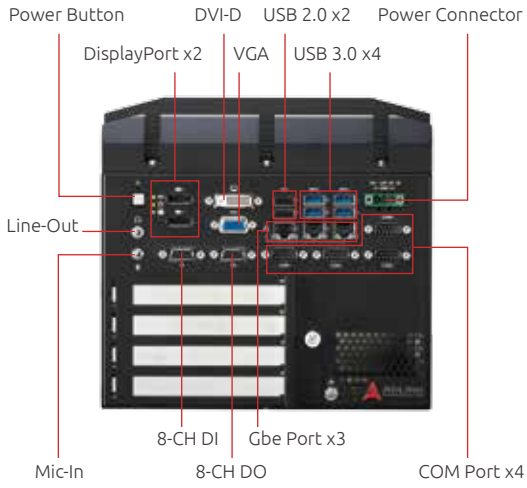
Ordering Information

- **MVP-6011**
  Intel® Core™ i7-6700TE fanless embedded computer
  1 PCIe Gen3 x16 + 3 PCI expansion slots
- **MVP-6012**
  Intel® Core™ i5-6500TE fanless embedded computer
  1 PCIe Gen3 x16 + 3 PCI expansion slots
- **MVP-6013**
  Intel® Core™ i3-6100TE fanless embedded computer
  1 PCIe Gen3 x16 + 3 PCI expansion slots
- **MVP-6015**
  Intel® Core™ i7-6700 fanless embedded computer
  1 PCIe Gen3 x16 + 3 PCI expansion slots
- **MVP-6021**
  Intel® Core™ i7-6700TE fanless embedded computer
  2 PCIe Gen3 x8 + 2 PCI expansion slots
- **MVP-6022**
  Intel® Core™ i5-6500TE fanless embedded computer
  2 PCIe Gen3 x8 + 2 PCI expansion slots
- **MVP-6023**
  Intel® Core™ i3-6100TE fanless embedded computer
  2 PCIe Gen3 x8 + 2 PCI expansion slots
- **MVP-6025**
  Intel® Core™ i7-6700 fanless embedded computer
  2 PCIe Gen3 x8 + 2 PCI expansion slots

Specifications

	Expandable Fanless Embedded Computers		Integrated Fanless Embedded Computers
Model Name	**MVP-6010/6020 Series**	**MVP-6000 Series**	**MVP-5000 Series**
			
System			
Processor	Intel® Core™ i7-6700TE/ i5-6500TE/ i3-6100TE	Intel® Core™ i7-6700 (65W)	Intel® Core™ i7-6700TE/ i5-6500TE/ i3-6100TE
Chipset	MVP-6010 Series: H110 MVP-6020 Series: Q170		H110
Video	1 VGA + 2 DisplayPort + 1 DVI-D		
Memory	4 GB DDR4 2133 MHz (up to 32 GB)		
I/O Interface			
Expansion slots	1 PCIe Gen3 x16 + 3 PCI expansion slots for MVP-6010 Series 2 PCIe Gen3 x8 + 2 PCI expansion slots for MVP-6020 Series	1 PCIe Gen3 x16 + 1 PCI	-
Ethernet	3 Intel® I211 AT GbE ports WOL and teaming functions are supported		
Serial Ports	4 COM by DB9 connector 2 BIOS selectable RS-232/422/485 + 2x RS-232 RS-485 with auto flow control		
USB	6 external USB ports (4 USB 3.0 +2 USB 2.0) 1 internal USB 2.0 port		
DIO	8-CH DI and 8-CH DO		
Mini PCIe	1 internal mini PCIe socket		
USIM	1 USIM socket		
Audio	1 Mic-in and 1 Line out		
Power Supply			
DC Input	Built-in 12-24 VDC wide-range DC input 3P pluggable connector with latch (V-, GND, V+)		
AC Input	Optional 160 W external AC-DC adapter for AC input		
Storage Device			
SATA HDD	1 SATA port for 2.5" HDD/SSD installation (up to 6 Gb/s)		
CompactFlash Socket	1 Type II CFast		
Mechanical			
Dimensions	220 (W) x 210 (D) x 208.7 (H)mm (8.67" x 8.27" x 8.21")	220 (W) x 210 (D) x 170 (H) mm (8.67" x 8.27" x 6.69")	220 (W) x 210 (D) x 121(H) mm (8.67" x 8.27" x 4.76")
Weight	4.7 kg (10.36 lbs)	4.5 kg (9.92 lbs)	3.6 kg (7.9 lb)
Mounting	Wall mount kit		
Environmental			
Operating Temperature	0 to 50°C	0 to 40°C	0 to 50°C
Storage Temperature	-40 to 85°C (-40 to 185°F) (excl. HDD/SDD/CFast)		
Humidity	~95% @ 40°C (non-condensing)		
Vibration	Operating, 5 Grms, 5-500 Hz, 3 axes (w/ CFast or SSD) Operating, 0.5 Grms, 5-500 Hz, 3 axes (w/ HDD)		
ESD	Contact +/-4KV, Air +/-8KV		
Shock	Operating, 100 Grms, half sine 11ms duration (w/ CFast or SSD)		
EMC	CE & FCC Class A		
Safety	UL/cUL, CB, CCC		

Product Illustration

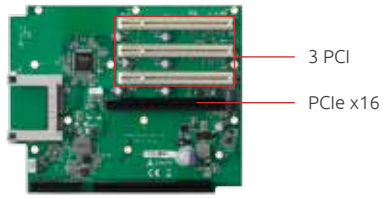


MVP-6010/6020 Series

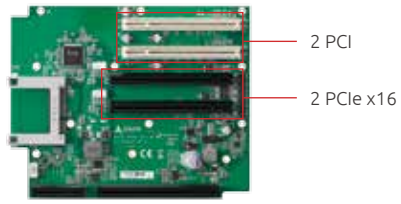
Versatile Expansion

The MVP-6010/6020 Series offer various of expansion slot options for flexible function enhancement and easier system integration.

MVP-6010 Series (4 Slots)



MVP-6020 Series (4 Slots)



MXC-6400 系列

6th Generation Intel® Core™ i7/i5/i3 Processor-Based Expandable Fanless Embedded Computer

Features

- 6th Gen Intel® Core™ i7/i5/i3 Processors and QM170 chipset
- 2 DDR4 SO-DIMM sockets support up to 32 GB memory
- 1 PCI and 2 PCIe Gen3 x8 (or 1 PCIe Gen3 x16) slots
- Support for 3 independent displays via 2 DisplayPort and 1 DVI-I ports with resolution up to 4K UHD
- 6 USB 3.0 ports and 1 internal USB 2.0 wafer connector
- 2 hot-swappable SATA III trays on the front panel and 2 internal SATA III ports with RAID 0/1/5/10 support
- Remote power on/off switch connector on the front panel
- Rugged construction provides fanless -20°C to 70°C operability (with industrial grade SSD/CFast)
- Built-in SEMA 3.0

Introduction

The Matrix MXC-6400 series is a line of high-performance fanless embedded computers, integrating 6th generation Intel® Core™ i7/i5/i3 processors and the QM170 chipset for more powerful computing and graphics performance with minimal power consumption.

Features include 3 PCI/PCIe expansion slots allowing installation of a variety of off-the-shelf PCI/PCIe cards for configurable applications, 2 internal mPCIe, and 1 USIM slot for 4G/3G communication. In addition, the MXC-6400 series offers independent digital display support from DisplayPort and DVI-I with resolution up to 4K UHD, as well as 6 USB 3.0 and 3 GbE LAN ports with Intel® iAMT 11.0 and teaming function. The 2 hot-swappable SATA III trays support 2.5" storage in the front panel with high speed SATA 6.0 Gb/s and 2 internal SATA III ports carry RAID 0, 1, 5, 10 support. 16 channel isolated DI/O with digital filter meets the needs of general purpose industrial automation.

Features with the integrated 6th Generation Intel® Core™ i7/i5/i3 processor, 4x 2.5” SATA III (6Gb/s) ports, fanless rugged constrction, operating shock tolerance up to 50G, withstanding vibration up to 5Grms and extended operating temperatures of -20°C to 70°C (with industrial grade SSD/CFast), the MXC-6400 Series fully satisfies all the needs of Intelligent Transportation System as railway rolling stock, maritime, in-vehicle infotainment, and high-speed data processing and mission critical industrial automation.

Software Support

- **Win10/Win7/Embedded Standard 7**
- **Linux® Ubuntu 16.04 LTS**

Ordering Information

- **MXC-6401D**
  Intel® Core™ i7-6820EQ, 4GB DDR4 SODIMM
- **MXC-6402D**
  Intel® Core™ i5-6440EQ, 4GB DDR4 SODIMM
- **MXC-6403D**
  Intel® Core™ i3-6100E, 4GB DDR4 SODIMM

Optional Accessories

- **MXC-6400 Optional Fan Module**
  P/N: 91-95199-0010
- **8/16/32 GB DDR4 Option**
  Upgrade to 1x 8GB/ 2x 8GB/ 2x 16GB DDR4 SODIMM
- **2.5" SATA HDD/SSD & CFast**
  Factory-installed and test
- **160W AC-DC Adapter**
  160W industrial grade AC-DC adapter (-20 to 70°C. -4°F to 158°F)
- **Extended Temperature Option***
  Optional screening service to extended operating temperature (-20 to 70°C)
- **Kit for Internal USB Wafer Connector**
  P/N: 91-95199-100E (including 2 sets)
  A cable for type A USB connector, bracket and screws for fixing the cable

Specifications

Model Name	MXC-6401D	MXC-6402D	MXC-6403D
System Core			
Processor	Intel® Core™ i7-6820EQ 4 Core/8 Threads, 2.8GHz, 8M Cache (Max Turbo Frequency 3.5 GHz)	Intel® Core™ i5-6440EQ 4 Core/4 Threads, 2.7GHz, 6M Cache (Max Turbo Frequency 3.4 GHz)	Intel® Core™ i3-6100E 2 Core/4 Threads, 2.7 GHz, 3M Cache
Chipset	Intel® QM170		
Video	2 DisplayPort (4K2K resolution) 1 DVI-I		
Memory	2x DDR4 SODIMM up to 32GB		
I/O Interface			
Expansion slots	1 PCI +2 PCIe Gen3 x8 or 1 PCI + 1 PCIe Gen3 x16 (auto switched)		
Mini PCIe	2x full size Mini PCIe		
USIM	1 USIM		
Ethernet	3x GbE (2 Intel I210IT + 1 I219 PHY)		
Serial Ports	COM1/2: RS-232/422/485 COM3/4: RS-232		
USB	6 USB 3.0 2 w/ 1600 mA, 4 w/ 900 mA 1 internal USB 2.0 wafer connector		
DIO	Isolated 16x DI + 16x DO		
Audio	ALC262, Line-out/ Mic-in		
KB/MS	1 PS/2 keyboard and 1 PS/2 mouse		
Manageability			
Security	TPM1.2		
WDT	Watch Dog Timer supported		
Storage Device			
2.5" SATA	2x removable drive bays 2x internal (RAID 0/ 1/ 5/ 10)		
CompactFlash	1 type II CFast		
Power Supply			
DC Input	Built-in 9-32 VDC wide-range DC input 3 pluggable connectors with latch (GND, V-, V+) 3-pin remote power on/off switch on the front		
AC Input	Optional 160 W external AC-DC adapter		
Mechanical			
Optional Fan Module	Optional hot-pluggable fan module, smart fan control		
Dimensions	170 (W) x 225 (D) x 200 (H) mm		
Weight	4 kg (8,82 lbs)		
Mounting	Wall-mount kit		
Environmental			
Operating Temperature	Standard: 0°C to 50°C (32°F to 122°F) (w/HDD) Extended option*: -20°C to 70°C (-4°F to 158°F) (w/Ind. SSD or CFast)		
Storage Temperature	-40°C to 85°C (-40°F to 185°F) (excl. HDD/SSD/CFast)		
Humidity	approx. 95% @ 40°C (104°F) (non-condensing)		
Vibration	Operating, 5 Grms, 5-500 Hz, 3 axes (w/ CFast or SSD) Operating, 0.5 Grms, 5-500 Hz, 3 axes (w/ HDD)		
ESD	Contact +/-4 KV and Air +/-8 KV		
Shock	Operating, 50 G, half sine 11 ms duration (w/ CFast or SSD)		
EMC	CE and FCC Class A		
Safety	UL/cUL,CB		

*Extended operating temperature is optional and requires use of an industrial solid-state drive storage device or CFast card.
**Other Linux Distribution support by request

MXC-6600 系列

9th Gen Intel® Xeon®, Core™ i7/i3 and 8th Gen Intel® Core™ i5 Processor-Based Embedded Fanless Computer

New

Features

- 9th Gen Intel® Xeon®, Core™ i7/i3 and 8th Gen Intel® Core™ i5 Processor-Based Embedded Fanless Computer
- Dual SODIMMs for up to 32GB DDR4
- Rich I/O: 2x DP++, 1x HDMI, 2x GbE, 6x COM, 8-ch DI, 8-ch DO, TPM 2.0
- 2x USB 3.1 Gen2, 2x USB 3.1 Gen1, 4x USB 2.0
- Rich storage: up to 4 internal 2.5" SATA 6 Gb/s ports with RAID 0/1/5/10 support, CFast, M.2 2280
- Embedded expansion: 1x Mini PCIe, 1x M.2 3042, 2x USIM
- Front accessible I/O and adaptive Function Module v.2 option
- 5x user defined LEDs
- Flexible modular expansion with 2 or 4 slots

Software Support

- **Win10 IoT Enterprise CBB 64bit**
- **Linux Ubuntu 18.04**

Ordering Information

- **MXC-662X-2E1/M4G**
  Intel® Xeon® E-2276ME 45W, CM246, 4GB RAM
- **MXC-6621-2E1/M4G**
  Intel® Core™ i7-9850HE 45W, CM246, 4GB RAM
- **MXC-6622-2E1/M4G**
  Intel® Core™ i5-8400H 45W, CM246, 4GB RAM
- **MXC-6623-2E1/M4G**
  Intel® Core™ i3-9100HL 45W, CM246, 4GB RAM
- **MXC-664X-3E1/M4G**
  Intel® Xeon® E-2276ME 45W, CM246, 4GB RAM
- **MXC-6641-3E1/M4G**
  Intel® Core™ i7-9850HE 45W, CM246, 4GB RAM
- **MXC-6642-3E1/M4G**
  Intel® Core™ i5-8400H 45W, CM246, 4GB RAM
- **MXC-6643-3E1/M4G**
  Intel® Core™ i3-9100HL 45W, CM246, 4GB RAM

Optional Accessories

- **2.5" SSD, HDD, M.2, CFast Storage**
- **MXC-6600 Fan Kit (P/N: 91-95267-000E)**
- **Additional 2x 2.5" SATA expansion kit**
- **Wireless Module**
  Wi-Fi, BT, 3G, 4G LTE, LoRa wireless kit (w/ antenna)
- **AC/DC Adapter**
  280W (P/N: 91-95263-0010)
  220W (P/N: 31-62149-0010-A0)

Specifications

Model Name	MXC-660X	MXC-6601	MXC-6602	MXC-6603
System Core				
Processor	Intel® Xeon® E-2276ME 45W	Intel® Core™ i7-9850HE 45W	Intel® Core™ i5-8400H 45W	Intel® Core™ i3-9100HL 45W
Core	6	6	4	4
Base Freq.	2.8 GHz	2.7 GHz	2.5 GHz	1.6 GHz
MAX Turbo Freq.	4.5 GHz	4.4 GHz	4.2 GHz	2.9 GHz
Chipset	Mobile Intel® CM246			
Memory	4GB DDR4 2400MHz, dual SODIMMs, up to 32GB Optional: 8, 16, 32GB DDR4 ECC 2400MHz (Xeon® and i3 support ECC)			
Display	2x DP++ and 1x HDMI			
I/O Interfaces				
Ethernet	2x Intel® GbE: 1x i211AT + 1x i219 iAMT support			
Serial Ports	COM1/2: RS-232/422/485, COM3/4/5/6: RS-232			
USB	2x USB 3.1 Gen 2 + 2x USB 3.1 Gen 1 + 4x USB 2.0, 1x internal USB 2.0 dongle			
Audio	Line-out, Mic-in (Optional: speaker-out)			
Mini PCIe	1x Full size (USB 2.0 + PCIe)			
M.2	1x socket 2, key B+M or B, 2280/3042: USB 3.1 Gen 1, SATA 6 Gb/s and PCIe x2			
USIM	2 (1 for Mini PCIe and 1 for M.2)			
DI/O	8-ch DI and 8-ch DO			
I2C	2 (3.3V & 5V)			
TPM 2.0	Supported			
Expansion Slots	MXC-6620 series : PCIe x16 + PCIe x4 (Total up to 150W) MXC-6640 series : PCIe x16 + 2 PCIe x4 + PCI (Total up to 150W with 12V in; total up to 250W with 24V in)			
Storage Devices				
2.5" SATA	2x internal (supports RAID 0, 1, 5, 10) Optional: additional 2x internal			
CFast	1x Type II			
Mechanical				
Dimensions	MXC-6620 series: 165 (W) x 240 (D) x 210 (H) mm (6.5" x 9.45" x 8.27") MXC-6640 series: 206 (W) x 240 (D) x 210 (H) mm (8.11" x 9.45" x 8.27")			
Weight	MXC-6620 series : 4.6 kg (10.2 lbs) MXC-6640 series : 4.9 kg (10.8 lbs)			
Mounting	Wall mount			
Power Supply				
DC Input	9 to 32V (± 10% tolerance)			
AC Input	Optional: 220W or 280W AC/DC adapter			
Environmental				
Operating Temperature	Standard: 0°C to 50°C w/ airflow			
	Extended temperature (w/ ind. storage, airflow) -20°C to 70°C (-4˚F to 158˚F) (only support single SODIMM) -20°C to 60°C (-4˚F to 140˚F) (w/ dual SODIMMs)			
Storage Temperature	-40°C to 85°C (-40°F to 185°F) (excluding storage)			
Humidity	~95% @ 40°C (104°F) (non-condensing)			
Vibration	Operating: 5 Grms, 5-500 Hz, 3 axes (w/ SSD/CFast) Operating: 0.5 Grms, 5-500 Hz, 3 axes (w/ HDD)			
Shock	Operating: 100 Grms, half sine 11ms duration (w/ SSD/CFast)			
ESD	Contact ±8KV, Air ±15KV			
EMC	EN61000-6-4/-2, CE & FCC Class B with validated AC/DC adapter			
Safety	UL/cUL, CB			

ADi-SA1X-KB/SL

Ultimate Performance Gaming Platform based on 7th Gen Intel® Core™ Processors Supports up to 11x Independent Displays Including 4K UHD

Features

Perfect for multi-player table games!

- Ultimate " all-in-one" gaming platform
- The best-in-class graphics capabilities in games with high levels of detail
- Up to 11x independent HD monitors supporting 4K UHD
- Advanced security feature set and software solutions
- Intelligent middleware shortens development time

Introduction

ADLINK's ADi-SA1X-KB/SL all-in-one gaming platform features powerful processing and graphics performance for gaming infotainment and retail. Equipped with 7th Generation Intel® Core™ processors, the ADi-SA1X-KB/SL provides compelling graphics performance from a PCI Express 3.0 x16 discrete graphics card and/or an embedded Intel® HD Graphics 630 together with multi-display support for up to eleven independent monitors. With the powerful processing performance, advanced security functions, smart middleware solutions, and versatile I/O array, the ADi-SA1X-KB/SL fully satisfies the needs of your gaming application.

The ADi-SA1X-KB/SLL is a true application-ready gaming platform providing OEMs with a highly flexible and reliable all-in-one system that offers unparalleled portfolio of services that help developers save time and remain in compliance. The platform is designed to meet the GLI-11 (Gaming Laboratories International) certification and all major global gaming market compliance requirements. The comprehensive middleware as well as the security and extensive I/O solutions enable developers to easily bridge applications with peripheral devices, sensors, and surrounding solutions up to central monitoring and control systems.

Ultimate Performance Processing and Graphics
The ADi-SA1X-KB/SL supports Intel® Core™ i7/i5 processors clocked at up to 4.2 GHz with boost With integrated Intel® HD Graphics 630 and optionally with PCI Express 3.0 x16 or 2x PCI Express 3.0 x8 discrete graphics providing compelling processing and graphics performance.

Multi-Display Graphics Capabilities
The ADi-SA1X-KB/SL provides support for up to 4K resolutions via three standard video outputs based on the Intel® Q170 chipset. It is capable of supporting dedicated graphics cards for up to eleven independent monitors that conform to the latest DisplayPort 1.2 standard.

Advanced Security and NVRAM PCI Express for Gaming
Designed to Meet GLI-11
ADLINK's ADi-BSEC is a high-speed PCI Express card with up to 16 MB NVRAM & SRAM. It offers a crypto and authentication security chip with power-off monitoring and event logging designed to meet the GLI-11 (Gaming Laboratories International) certification requirements. Further features are also available, such as TPM1.2 trusted platform module, Bit Lock, Software Chain of Trust (sCOT), BIOS customizations, Intrusion Detection, Security Dongle to provide the comprehensive protection of the assets.

ADLINK Comprehensive Middleware Solutions
ADLINK's ADiAPI (intelligent Application Programming Interface) and SEMA® (Smart System Management Agent) provide advanced integration of hardware/software monitoring and controlling allowing simplified and unified application development without dependencies on the peripheral devices.

Product Illustration

ADi-SA1X-KB-CAAS
ADi-SA1X-SL-CAAS

ADi-SA1X-KB-DAAS
ADi-SA1X-SL-DAAS

Specifications

Model Name	ADi-SA1X-KB	ADi-SA1X-SL
Core System		
Processor	Socket LGA1151 supporting 7th Generation Intel® Core™ Processors from 35W up to 65W	Socket LGA1151 supporting 6th Generation Intel® Core™ Processors from 35W up to 65W
Chipset	Intel® Q170 or H110	
BIOS	AMI uEFI on 16 MB SPI BIOS flash with Intel® AMT 11.0 support via onboard BIOS socket and SPI header	
Expansion Slot	1 PCIe x16 slot	
	1 PCIe x1 slot	
	1 full-size Mini PCIe slot supporting PCIe+USB or mSATA (option for ADi-SA1X-SL)	
	1 half-size Mini PCIe slot supporting PCIe and USB	
Memory	Dual-channel, non-ECC 2133/2400 MHz DDR4 memory up to 32 GB in dual vertical SODIMM sockets	
Graphics	Intel® HD Graphics 630	Intel® HD Graphics 530
	NVIDIA® QUADRO® P620 embedded with extended availability NVIDIA® QUADRO® P1000 embedded with extended availability NVIDIA® QUADRO® P2000 embedded NVIDIA® QUADRO® P4000 embedded Other options on request	
Storage	2x HDD/SSD (2.5“)	
	2x CFast (via 2.5“ adapter option)	
	2x SATADOM *on request	
Security	Kensington Lock, Intrusion switch for ADi-BSEC power-off, Security Dongle, Eylet for seal, TPM, Bit Lock, Software Chain of Trust, BIOS Customization, ADi-BSEC security card (option) , Cable and connector covers (option)	
I/O interface		
Serial ATA	3x Serial ATA 6Gbps ports	
Ethernet	2x GbE ports (10/100/1000 GbE connection)	
Serial Ports	1x RS-232/422/485 via onboard header	
	3x RS-232 via onboard header	
Audio Interface	Codec Realtek ALC886	
	7.1 channel audio via 5 jacks and S/PDIF output on rear I/O	
	7.1 channel audio signals and S/PDIF output on internal header	
USB	4x USB 3.0 and 4x USB 2.0 on rear I/O	
	2x USB 3.0 on board header (H110:USB2.0)	
	1x USB 2.0 on vertical connector with keep out area for dongle	
DisplayPort	Q170: 3x outputs with resolution up to 4096 x 2160 pixels	
	H110: 2x outputs with resolution up to 4096 x 2160 pixels	
	Up to two additional PEG cards with up to 8x additional outputs (option, only for Q170)	
Wi-Fi	802.11 a/b/g/n (option)	
Power supply (option)		
	ADi-SPSU-500AC (500W), 24 pin ATX power adaptor	
Mechanical		
Dimensions	330 mm (W) x 330 mm (D) x 105 mm (H; w/o brackets) (13 in x 13 in x 4.1 in) ADi-SPSU option: +43 mm (w); ADi-BACC option: +20 mm (D)	
Environmental & Safety		
Operating Temperature	0°C to 50°C (32˚F to 122˚F)	
Storage Temperature	-20°C to 70°C (-4˚F to 158˚F) (excl. HDD/SSD/CFast)	
Humidity	~85% @ 50°C (144˚F) (non-condensing)	
Vibration	Operating, 1 Grms, 5-500 Hz, 3 axes (w/ CFast or SSD)	
	Operating, 0.5 Grms, 5-500 Hz, 3 axes (w/ 2.5“ HDD)	
	Operating, 20 G, half sine 11 ms duration (w/ CFast or SSD)	
Shock	Operating, 20 G, half sine 11 ms duration (w/ CFast or SSD)	
EMC	CE and FCC Class A	
ESD	Contact +/-4 KV and Air +/-8 KV	
Safety	UL/cUL, CB, KCC	
Operating Systems		
	Windows® 10 IoT	Windows® 7 32/64-bit, Linux 32/64-bit (option)

ADi-SA2X-KB/SL

High-Performance Gaming Platform based on 7th Gen Intel® Core™ Processors Supports up to Seven Independent Displays Including 4K UHD

Features

- High performance "all-in-one" gaming platform
- Highly scalable platform meets individual performance, graphics and power needs
- Compact dimension yet with intensive expansion for vertical add-ons
- Advanced security feature set and software solutions
- Intelligent middleware shortens development time

Introduction

ADLINK's ADi-SA2X-KB/SL all-in-one gaming platform features powerful processing and graphics performance for gaming infotainment and retail. Equipped with 7th Generation Intel® Core™ processors, the ADi-SA2X-KB/SL provides compelling graphics performance from a PCI Express 3.0 x16 discrete graphics card and/or an embedded Intel® HD Graphics 630 together with multi-display support for up to seven independent monitors. With the powerful processing performance, advanced security functions, smart middleware solutions, and versatile I/O array, the ADi-SA2X-KB/SL fully satisfies the needs of your gaming application.

The ADi-SA2X-KB/SL is a true application-ready gaming platform providing OEMs with a highly flexible and reliable all-in-one system that offers unparalleled portfolio of services that help developers save time and remain in compliance. The platform is designed to meet the GLI-11 (Gaming Laboratories International) certification and all major global gaming market compliance requirements. The comprehensive middleware as well as the security and extensive I/O solutions enable developers to easily bridge applications with peripheral devices, sensors, and surrounding solutions up to central monitoring and control systems.

High Scalability and Ideal Range of Performance Class
The ADi-SA2X-KB/SL is designed with highly scalable and reliable hardware that can be flexibly scaled from entry level up to the highest performance class, with tailored configuration of CPU and GPU selections. The platform also provides compact dimensions for developers using a more compact cabinet footprint and offers extensive expansion capabilities for the needs of vertical add-ons.

Multi-Display Graphics Capabilities
The ADi-SA2X-KB/SL provides support for up to 4K resolutions via three standard video outputs based on the Intel® Q170 chipset. It is capable of supporting dedicated graphics cards for up to seven independent monitors that conform to the latest DisplayPort 1.2 standard.

Advanced Security and NVRAM PCI Express for Gaming Designed to Meet GLI-11
ADLINK's ADi-BSEC is a high-speed PCI Express card with up to 16 MB NVRAM & SRAM. It offers a crypto and authentication security chip with power-off monitoring and event logging designed to meet the GLI-11 (Gaming Laboratories International) certification requirements. Further features are also available, such as TPM1.2 trusted platform module, Bit Lock, Software Chain of Trust (sCOT), BIOS customizations, Intrusion Detection, Security Dongle to provide the comprehensive protection of the assets.

ADLINK Comprehensive Middleware Solutions
ADLINK's ADiAPI (intelligent Application Programming Interface) and SEMA® (Smart System Management Agent) provide advanced integration of hardware/software monitoring and controlling allowing simplified and unified application development without dependencies on the peripheral devices.

Ordering Information

- **ADi-SA2X-SL-BAAS**
  Intel® Core™ i5-6500TE, Intel® Q170, TPM, SEMA, ADi-BSEC card(4MB SRAM), ADi-BACC-G2F, ADi-BAMP Card, 8G DDR4, 128GB SSD, with +12V/120W ATX power adaptor
- **ADi-SA2X-KB-BAAS (Call for availability)**
  *Other configurations on request

Optional Accessories

- **ADi-BSEC cable**
- **Box PC cable kit**
- **ADi-BACC Cable kit**

Options

- **ADi-BSEC**
  Intelligent Infotainment Security and NVRAM PCI Express Card
- **ADi-BAMP**
  Audio Amplifier, 2x 12-15W
- **ADi-BACC**
  Gaming and Retail Extension I/O Board
- **ADiAPI**
  Intelligent middleware used for controlling peripheral devices
- **ADiDLL**
  Middleware used for controlling optional add-on devices
- **SAS 6.02/6.03 engine**

Product Illustration

ADi-SA2X-KB-BAAS
ADi-SA2X-SL-BAAS

ADi-SA2X-KB-DAAS
ADi-SA2X-SL-DAAS

ADi-SA2X-KB-AAAS
ADi-SA2X-SL-AAAS

Specifications

Model Name	ADi-SA2X-KB	ADi-SA2X-SL
Core System		
Processor	Socket LGA1151 supporting 7th Generation Intel® Core™ Processors from 35W up to 65W	Socket LGA1151 supporting 6th Generation Intel® Core™ Processors from 35W up to 65W
Chipset	Intel® Q170 or H110	
BIOS	AMI uEFI on 16 MB SPI BIOS flash with Intel® AMT 11.0 support via onboard BIOS socket and SPI header	
Expansion Slot	1 PCIe x16 slot	
	1 PCIe x1 slot	
	1 full-size Mini PCIe slot supporting PCIe+USB or mSATA (by option)	
	1 half-size Mini PCIe slot supporting PCIe and USB	
Memory	Dual-channel, non-ECC 1333/1600/2133 MHz DDR4/DDR3L memory up to 32 GB in dual vertical SODIMM sockets	
Graphics	Intel® HD Graphics 630	Intel® HD Graphics 530
	NVIDIA® QUADRO® P620 embedded with extended availability NVIDIA® QUADRO® P1000 embedded with extended availability Other options on request	
Storage	2x HDD/SSD (2.5“)	
	2x CFast (via 2.5“ adapter option)	
	2x SATADOM *on request	
Security	Kensington Lock, Intrusion switch for ADi-BSEC power-off, Security Dongle, Eylet for seal, TPM, Bit Lock, Software Chain of Trust, BIOS Customization, ADi-BSEC security card (option) , Cable and connector covers (option)	
I/O interface		
Serial ATA	3x Serial ATA 6Gbps ports	
Ethernet	2x GbE ports (10/100/1000 GbE connection)	
Serial Ports	1x RS-232/422/485 via onboard header	
	3x RS-232 via onboard header	
Audio Interface	Codec Realtek ALC886	
	7.1 channel audio via 5 jacks and S/PDIF output on rear I/O	
	7.1 channel audio signals and S/PDIF output on internal header	
USB	4x USB 3.0 and 4x USB 2.0 on rear I/O	
	2x USB 3.0 on board header (H110:USB2.0)	
	1x USB 2.0 on vertical connector with keep out area for dongle	
DisplayPort	Q170: 3x outputs with resolution up to 4096 x 2160 pixels	
	H110: 2x outputs with resolution up to 4096 x 2160 pixels	
	4x PEG card outputs (option)	
Wi-Fi	802.11 a/b/g/n (option)	
Power supply (option)		
	ADi-SPSU (100-240VAC) or 3pin DC in connector (+9-36VDC) or 14 pin ATX power adaptor (+12V/120W)	
Mechanical		
Dimensions	265 mm (W) x 225 mm (D) x 87 mm (H; w/o brackets) (10.4 in x 8.9 in x 3.4 in) ADi-SPSU option: +43 mm (w); ADi-BACC option: +20 mm (D)	
Environmental & Safety		
Operating Temperature	0°C to 50°C (32˚F to 122˚F)	
Storage Temperature	-20°C to 70°C (-4˚F to 158˚F) (excl. HDD/SSD/CFast)	
Humidity	~85% @ 50°C (144˚F) (non-condensing)	
Vibration	Operating, 1 Grms, 5-500 Hz, 3 axes (w/ CFast or SSD)	
	Operating, 0.5 Grms, 5-500 Hz, 3 axes (w/ 2.5“ HDD)	
Shock	Operating, 20 G, half sine 11 ms duration (w/ CFast or SSD)	
EMC	CE and FCC Class A	
ESD	Contact +/-4 KV and Air +/-8 KV	
Safety	UL/cUL, CB, KCC	
Operating Systems		
	Windows® 10 IoT	Windows® 7 32/64-bit, Linux 32/64-bit

Gaming-Specific Features and Security (Options)	
	Up to 2x 8MB dual independent (battery-buffered) high-speed NVRAM (fast PCIe x1 interface)
	Crypto & Authentication Security Chip (SHA-256, RNG, UID, EEPROM, OTP)
	Intrusion detection and event logging (battery-buffered)
	EEPROM support (various; SMD down and DIP socket jurisdiction EEPROM)
	1-Wire bus support (multiple UID S/Ns silicon numbers and EEPROM)
	4x additional serial interfaces (RS-232, RS-232 TTL, ccTalk)
	ccTalk, ID003, EBDS, SSP, TCL and MDB
	32x digital inputs / 32x digital outputs
	24 x open drain /40V LED drivers
	3x high-current outputs
	EPFail support (early power fail detection input)
	User LEDs and function switches
	DIP switch option
	8x independent current-sensed hardmeter support
	SEC soft meter suport (SPI)
	1-Wire support (UID & EEPROM)
	Key lock, eyelet for sealing, TPM, dedicated security ICs, secure key storage
	Fully customizable secure BIOS

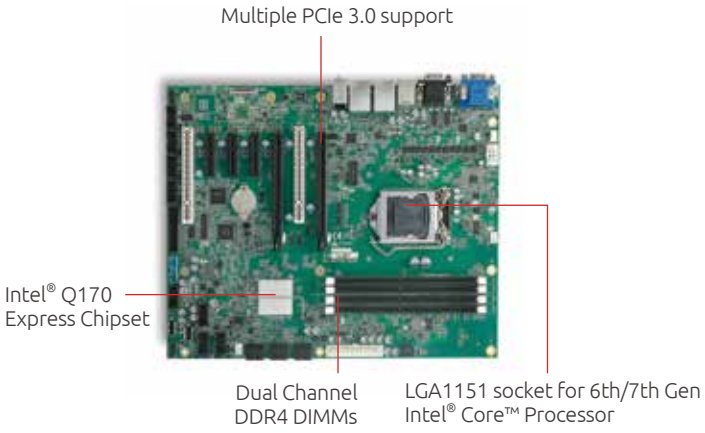
IMB-M43

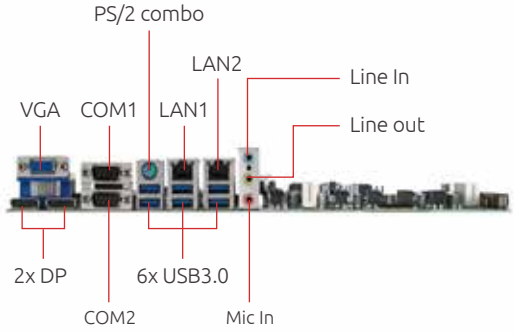
Industrial ATX Motherboard with 6th/7th Gen Intel® Core™ i7/i5/i3 Processor

Features

- 6th/7th Gen Intel® Core™ i7/i5/i3 processors and Q170 chipset
- Dual-channel DDR4 2133/2400 MHz memory up to 64 GB
- Intel® PCIe 3.0 slot bifurcation supports up to 5x PCIe 3.0 expansion slots
- Rugged I/O design to enhance I/O port compatibility and reliability
- Unique power design to ensure stable USB power of 5V ±5%
- IEC 61000-4-2~6 (Performance Criterion A), CE/FCC class B certified

Product Illustration





Ordering Information

- **IMB-M43**
  ATX 6th/7th Intel® Core™ i7/i5/i3 industrial motherboard
  Note: CPU, Memory module and Cooler kit are not included

Packing Lists

- **IMB-M43**
- **IMB-M43 I/O shield**
  Optional Accessories
- **USB 3.0 Cable**
  2-port USB 3.0 port cable with bracket
- **USB 2.0 Cable**
  4-port USB 2.0 port cable with bracket
- **LPT Cable**
  1-port LPT port cable with bracket
- **COM Cable**
  2-port COM port cable with bracket
- **2U CPU Cooler**
  LGA1156 2U Thermal Module

Specifications

Processor System	
CPU	Intel® Core™ i7-6700, 3.4 GHz, 8M Cache, 14nm, 65W TDP, LGA1151 (4C/8T)
	Intel® Core™ i7-6700TE, 2.4 GHz 8M Cache, 14nm, 35W TDP, LGA1151 (4C/8T)
	Intel® Core™ i5-6500, 3.2 GHz, 6M Cache, 14nm, 65W TDP, LGA1151 (4C/4T)
	Intel® Core™ i5-6500TE, 2.3 GHz, 6M Cache, 14nm, 35W TDP, LGA1151 (4C/4T)
	Intel® Core™ i3-6100, 3.7 GHz, 3M Cache, 14nm, 51W TDP, LGA1151 (2C/4T)
	Intel® Core™ i3-6100TE, 2.7 GHz, 4M Cache, 14nm, 35W TDP, LGA1151 (2C/4T)
	Intel® Pentium® G4400, 3.3GHz, 3M Cache, 14nm, 54W TDP, LGA1151 (2C/2T)
	Intel® Pentium® G4400TE, 2.4GHz, 3M Cache, 14nm, 35W TDP, LGA1151 (2C/2T)
	Intel® Celeron® G3900, 2.8GHz, 2M Cache, 14nm, 51W TDP, LGA1151 (2C/2T)
	Intel® Celeron® G3900TE, 2.3GHz, 2M Cache, 14nm, 35W TDP, LGA1151 (2C/2T)
	Intel® Core™ i7-7700, 3.6GHz, 8M Cache, 14nm, 65W TDP, LGA1151 (4C/8T)
	Intel® Core™ i7-7700T, 2.9GHz 8M Cache, 14nm, 35W TDP, LGA1151 (4C/8T)
	Intel® Core™ i5-7500, 3.4GHz, 6M Cache, 14nm, 65W TDP, LGA1151 (4C/4T)
	Intel® Core™ i5-7500T, 2.7GHz, 6M Cache, 14nm, 35W TDP, LGA1151 (4C/4T)
	Intel® Core™ i3-7101E, 3.9GHz, 3M Cache, 14nm, 54W TDP, LGA1151 (2C/4T)
	Intel® Core™ i3-7101TE, 3.4GHz, 3M Cache, 14nm, 35W TDP, LGA1151 (2C/4T)
Chipset	Intel® Q170 Express Chipset
Memory	Four 288 PIN DDR4 Sockets (vertical type) Dual channel DDR4 2133/2400 MHz, up to 64 GB
BIOS	AMI® UEFI BIOS, 128 Mb SPI Flash Memory
Watchdog Timer	software programmable and can be generate system reset
Hardware Monitor	CPU voltage
	+3.3 V voltage
	+5 V voltage
	+12 V voltage
	CPU temperature
	System temperature
	CPU fan speed
	System fan speed
Operating Systems	Microsoft® Windows® 7 32/64-bit (only for 6th Gen Intel® Core™ processors)
	Microsoft® Windows® 8.1 64-bit
	Microsoft® Windows® 10 64-bit
	Ubuntu 15.10 32/64-bit

I/O Interfaces	
Serial ATA	6x SATA 6.0 Gb/s connectors
	Software RAID support 0/1/5/10
USB	6x USB 3.0 connectors (rear)
	2x USB 3.0 pin headers
	4x USB 2.0 pin headers
	2x USB 2.0 (vertical type A connector)
Serial Ports	2x RS-232/422/485 with auto flow control connector (rear)
	4x RS-232 pin headers
Expansion slots	<Signal> If PEG3 is occupied, PEG1 is PCIex8 Gen3, PEG2 is PCIex4 Gen3, and PEG3 is PCIex4 Gen3 If PEG3 is not occupied and PEG2 is occupied, PEG1 is PCIex8 Gen3, PEG2 is PCIex8 Gen3, and PEG3 is no signal If PEG3 is not occupied and PEG2 is not occupied, PEG1 is PCIex16 Gen3,PEG2 and PEG3 is no signal PCIe1: PCIe x4 Gen3, PCIe2: PCIe x4 Gen3, PCI1: PCI 2.2, PCI2: PCI 2.2
	<Physical Slot> PEG1: PCIex16 slot, PCI1: PCI slot, PEG2: PCIex16 slot,PEG3: PCIex4 slot,PCIe1: PCIex4 slot,PCIe2: PCIex4 slot,PCI2: PCI slot
Parallel Port	1x LPT pin header
PS2 Combo Port	1x PS/2 keyboard & Mouse connector (rear)
DIO	1x 10-pin/2.54mm GPIO pin header: 4 in and 4 out, one ground pin and one power pin (5V/12V/no power, jumper selected)
Audio	
Audio Codec	Realtek® ALC262-VC2-GR
Interface	1x Mic-in, 1x Line-out and 1x Line-in connector (rear)
Graphics	
Graphics Engine	Integrated Intel® HD Graphics series (based on CPU)
VGA	1x VGA connector (rear), resolution up to 1920 x 1200 @ 60 Hz
DisplayPort 1.2	2x DP connector (rear), resolution up to 4096 x 2304 @ 60 Hz
Ethernet	
Controller	LAN1: Intel® I219-LM via RJ45 connector (rear)
	LAN2: Intel® I211-AT via RJ45 connector (rear)
Intel® AMT	LAN1 Support
Wake On LAN	LAN1 and LAN2 support
Mechanical and Environmental	
Form Factor	ATX
Dimension	305 mm x 244 mm (W x L)
Operating Temperature	0 °C to 60 °C
Storage Temperature	-40 °C to 85 °C
Relative Humidity	40° C @ 95% RH Non-condensing
Certification	CE & FCC Class B

*Extending operating temperature is optional and requires use of an industrial solid-state drive storage device or CFast card..
**Other Linux Distribution support by request

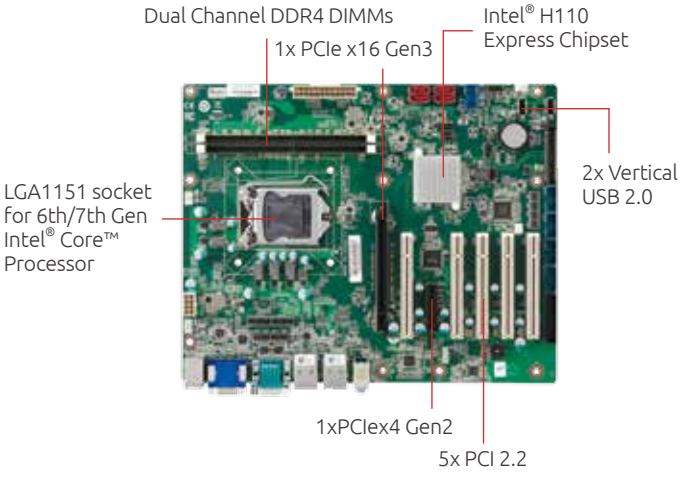
IMB-M43H

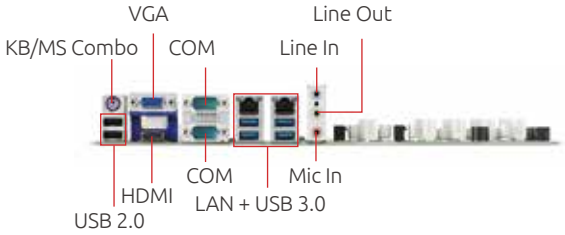
Industrial ATX Motherboard with 6th/7th Gen Intel® Core™ i7/i5/i3 Processor

Features

- 6th Gen Intel® Core™ i7/i5/i3 processors support, compatible with Windows® 7
- 7th Gen Intel® Core™ i7/i5/i3 processors support
- Up to 32 GB Dual-channel DDR4 2133/2400 MHz
- Unique power design to ensure stable USB power of 5V ±5%
- IEC 61000-4-2~6 (Performance Criterion A), CE/FCC class B certified

Product Illustration





Ordering Information

- **IMB-M43H**
  ATX Intel® Core™ i7/i5/i3 industrial motherboard
  Note: CPU, Memory module and Cooler kit are not included

Packing Lists

- **IMB-M43H**
- **IMB-M43H I/O shield**

Optional Accessories

- **USB 2.0 Cable**
  2-port USB 2.0 port cable with bracket
- **LPT Cable**
  1-port LPT port cable with bracket
- **COM Cable**
  2-port COM port cable with bracket
- **2U CPU Cooler**
  LGA1156 2U Thermal Module

Specifications

Processor System	
CPU	Intel® Core™ i7-6700, 3.4 GHz, 8M Cache, 14nm, 65W TDP, LGA1151 (4C/8T)
	Intel® Core™ i7-6700TE, 2.4 GHz 8M Cache, 14nm, 35W TDP, LGA1151 (4C/8T)
	Intel® Core™ i5-6500, 3.2 GHz, 6M Cache, 14nm, 65W TDP, LGA1151 (4C/4T)
	Intel® Core™ i5-6500TE, 2.3 GHz, 6M Cache, 14nm, 35W TDP, LGA1151 (4C/4T)
	Intel® Core™ i3-6100, 3.7 GHz, 3M Cache, 14nm, 51W TDP, LGA1151 (2C/4T)
	Intel® Core™ i3-6100TE, 2.7 GHz, 4M Cache, 14nm, 35W TDP, LGA1151 (2C/4T)
	Intel® Pentium® G4400, 3.3GHz, 3M Cache, 14nm, 54W TDP, LGA1151 (2C/2T)
	Intel® Pentium® G4400TE, 2.4GHz, 3M Cache, 14nm, 35W TDP, LGA1151 (2C/2T)
	Intel® Celeron® G3900, 2.8GHz, 2M Cache, 14nm, 51W TDP, LGA1151 (2C/2T)
	Intel® Celeron® G3900TE, 2.3GHz, 2M Cache, 14nm, 35W TDP, LGA1151 (2C/2T)
	Intel® Core™ i7-7700, 3.6GHz, 8M Cache, 14nm, 65W TDP, LGA1151 (4C/8T)
	Intel® Core™ i7-7700T, 2.9GHz 8M Cache, 14nm, 35W TDP, LGA1151 (4C/8T)
	Intel® Core™ i5-7500, 3.4GHz, 6M Cache, 14nm, 65W TDP, LGA1151 (4C/4T)
	Intel® Core™ i5-7500T, 2.7GHz, 6M Cache, 14nm, 35W TDP, LGA1151 (4C/4T)
	Intel® Core™ i3-7101E, 3.9GHz, 3M Cache, 14nm, 54W TDP, LGA1151 (2C/4T)
	Intel® Core™ i3-7101TE, 3.4GHz, 3M Cache, 14nm, 35W TDP, LGA1151 (2C/4T)
Chipset	Intel® H110 Express Chipset
Memory	Two 288 PIN DDR4 Sockets (vertical type) Dual channel DDR4 2133/2400 MHz, up to 32 GB
BIOS	AMI® UEFI BIOS, 128 Mb SPI Flash Memory
Watchdog Timer	software programmable and can be generate system reset
Hardware Monitor	CPU voltage
	+3.3 V voltage
	+5 V voltage
	+12 V voltage
	CPU temperature
	System temperature
	CPU fan speed
	System fan speed
Operating Systems	Microsoft® Windows® 7 32/64-bit (only for 6th Gen Intel® Core™ processors)
	Microsoft® Windows® 8.1 64-bit
	Microsoft® Windows® 10 64-bit
	OpenSUSE Leap 42.1 64-bit
	Fedora 25 64-bit
	Ubuntu 16.04 LTS 64 bit

I/O Interfaces	
Serial ATA	4x SATA 6.0 Gb/s connectors
USB	4x USB 3.0 connectors (rear)
	2x USB 2.0 connectors (rear)
	2x USB 2.0 pin headers
	2x USB 2.0 (vertical type A connector)
Serial Ports	2x RS-232/422/485 with auto flow control connector (rear)
	4x RS-232 pin headers
Expansion slots	1xPCIe x16 Gen3 1xPCIe x4 Gen2 5x PCI 2.2
Parallel Port	1x LPT pin header
PS2 Combo Port	1x PS/2 keyboard & Mouse connector (rear)
DIO	2x 20-pin/2.0mm GPIO pin header: 16 in and 16 out, one ground pin and one power pin (5V/12V/no power, jumper selected)
Audio	
Audio Codec	Realtek® ALC892-CG
Interface	1x Mic-in, 1x Line-out and 1x Line-in connector (rear)
Graphics	
Graphics Engine	Integrated Intel® HD Graphics series (based on CPU)
VGA	1x VGA connector (rear), resolution up to 1920 x 1200 @ 60 Hz
HDMI 1.4	1x HDMI connector (rear) resolution up to 4096 x 2160 @ 24 Hz
Ethernet	
Controller	LAN1: Intel® I219-LM via RJ45 connector (rear)
	LAN2: Intel® I211-AT via RJ45 connector (rear)
Wake On LAN	LAN1 and LAN2 support
Mechanical and Environmental	
Form Factor	ATX
Dimension	305 mm x 244 mm (W x L)
Operating Temperature	0 °C to 60 °C
Storage Temperature	-40 °C to 85 °C
Relative Humidity	40° C @ 95% RH Non-condensing
Certification (EMC)	CE & FCC Class B

*Extending operating temperature is optional and requires use of an industrial solid-state drive storage device or CFast card..
**Other Linux Distribution support by request

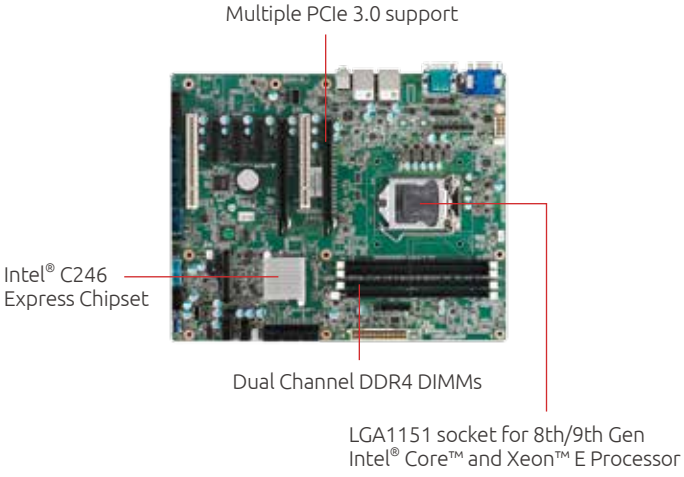
IMB-M45

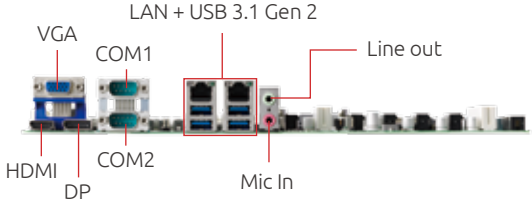
Industrial ATX Motherboard with 8th/9th Gen Intel® Core™ i7/i5/i3 or Xeon™ E Processors

Features

- 8th/9th Gen Intel® Core™ i7/i5/i3 or Xeon™ E processors and C246 chipset
- ECC or NON ECC UDIMM support(based on CPU)
- Dual-channel DDR4 2400/2666 MHz memory up to 128 GB (based on CPU)
- Intel® PCIe 3.0 slot bifurcation supports up to 5x PCIe 3.0 expansion slots
- Unique power design to ensure stable USB power of 5V ±5%

Product Illustration





Ordering Information

- **IMB-M45**
  ATX 8th/9th Intel® Core™ i7/i5/i3 or Xeon™E industrial motherboard
  Note: CPU, Memory module and Cooler kit are not included

Packing Lists

- IMB-M45
- IMB-M45 I/O shield

Optional Accessories

- **USB 3.0 Cable**
  2-port USB 3.0 port cable with bracket
- **USB 2.0 Cable**
  4-port or 2-port USB 2.0 port cable with bracket
- **LPT Cable**
  1-port LPT port cable with bracket
- **COM Cable**
  2-port COM port cable with bracket
- **PS2 Cable**
  PS/2 KB/MS Cable with Bracket from 6P pin-header
- **CPU Cooler**
  LGA1156 Thermal Module for Core™ i7/i5/i3 CPU
  LGA1156 Thermal Module for Xeon™ E CPU (>65W)

Specifications

Processor System	
CPU	Intel® Xeon™ E-2278GE, 3.3GHz, 16M Cache, 80W TDP, LGA1151, DDR4 2666MHz support, (8C/16T)
	Intel® Xeon™ E-2226GE, 3.4GHz, 12M Cache, 80W TDP, LGA1151, DDR4 2666MHz support, (6C/6T)
	Intel® Xeon™ E-2176G, 3.7GHz, 12M Cache, 80W TDP, LGA1151, DDR4 2666MHz support, (6C/12T)
	Intel® Xeon™ E-2124G, 3.4GHz, 8M Cache, 71W TDP, LGA1151, DDR4 2666MHz support, (4C/4T)
	Intel® Core™ i7-9700E, 2.6GHz, 12M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (8C/8T)
	Intel® Core™ i7-9700TE, 1.8GHz, 12M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (8C/8T)
	Intel® Core™ i5-9500E, 3.0GHz, 9M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (6C/6T)
	Intel® Core™ i5-9500TE, 2.2GHz, 9M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/6T)
	Intel® Core™ i3-9100E, 3.1GHz, 6M Cache, 65W TDP, LGA1151, DDR4 2400MHz support (4C/4T)
	Intel® Core™ i3-9100TE, 2.2GHz, 6M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (4C/4T)
	Intel® Core™ i7-8700, 3.2GHz, 12M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (6C/12T)
	Intel® Core™ i7-8700T, 2.4GHz 12M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/12T)
	Intel® Core™ i5-8500, 3.0GHz, 9M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (6C/6T)
	Intel® Core™ i5-8500T, 2.1GHz, 9M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/6T)
	Intel® Core™ i3-8100, 3.6GHz, 6M Cache, 65W TDP, LGA1151, DDR4 2400MHz support (4C/4T)
	Intel® Core™ i3-8100T, 3.1GHz, 6M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (4C/4T)
	Intel® Pentium® G5400, 3.7GHz, 4M Cache, 58W TDP, LGA1151, DDR4 2400MHz support (2C/4T)
	Intel® Pentium® G5400T, 3.1GHz, 4M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (2C/4T)
	Intel® Celeron® G4900, 3.1GHz, 2M Cache, 54W TDP, LGA1151, DDR4 2400MHz support (2C/2T)
	Intel® Celeron® G4900T, 2.9GHz, 2M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (2C/2T)
Chipset	Intel® C246 Express Chipset
Memory	Four 288 PIN DDR4 ECC or NON ECC Sockets Dual channel DDR4 2400/2666 MHz, up to 128 GB (based on CPU)
BIOS	AMI® UEFI BIOS, 256 Mb SPI Flash Memory
Watchdog Timer	software programmable and can be generate system reset
Hardware Monitor	CPU voltage
	+3.3 V voltage
	+5 V voltage
	+12 V voltage
	CPU temperature
	System temperature
	CPU fan speed
	System fan speed
Operating Systems	Microsoft® Windows® 10 64bit
	OpenSUSE Leap 15.1 64bit
	Fedora 30 64bit
	Ubuntu 18.10 LTS 64bit

*Other Linux Distribution support by request

I/O Interfaces	
Serial ATA	6x SATA 6.0 Gb/s connectors
	Software RAID support 0/1/5/10
USB	4x USB 3.1 Gen2 connectors (rear)
	2x USB 3.1 Gen1 pin headers
	6x USB 2.0 pin headers
	1x USB 3.1 Gen1 (vertical type A connector)
	1x USB 2.0 (vertical type A connector)
Serial Ports	2x RS-232/422/485 with auto flow control connector (rear)
	4x RS-232 pin headers
Expansion slots	<Signal> If PEG2 is occupied, PEG1 is PCIex8 Gen3, PEG2 is PCIex8 Gen3 If PEG2 is not occupied, PEG1 is PCIex16 Gen3,PEG2 is no signal PCIe1: PCIe x4 Gen3, PCIe2: PCIe x4 Gen3,PCIe3: PCIe x4 Gen3, PCI1: PCI 2.2, PCI2: PCI 2.2
	<Physical Slot> PEG1: PCIex16 slot, PCI1: PCI slot, PEG2: PCIex16 slot,PCIe1: PCIex4 slot,PCIe2: PCIex4 slot,PCIe3: PCIex4 slot,PCI2: PCI slot
Parallel Port	1x LPT pin header
PS2 Combo Port	1x PS/2 keyboard & Mouse pin header
DIO	2x 20-pin/2.0mm GPIO pin header: 16 in and 16 out, one ground pin and one power pin (5V/12V/no power, jumper selected)
Audio	
Audio Codec	Realtek® ALC892
Interface	1x Line-out and 1x Mic-in connector (rear)
Graphics	
Graphics Engine	Integrated Intel® HD Graphics series (based on CPU)
VGA	1x VGA connector (rear), resolution up to 1920 x 1200 @ 60 Hz
DisplayPort 1.2	1x DP connector (rear), resolution up to 4096 x 2304 @ 60 Hz
HDMI 1.4	1x HDMI connector (rear) resolution up to 4096 x 2160 @ 24 Hz
Ethernet	
Controller	LAN1: Intel® I219-LM via RJ45 connector (rear)
	LAN2: Intel® I210-AT via RJ45 connector (rear)
Intel® AMT	LAN1 Support
Wake On LAN	LAN1 and LAN2 support
Mechanical and Environmental	
Form Factor	ATX
Dimension	305 mm x 244 mm (W x L)
Operating Temperature	0 °C to 60 °C
Storage Temperature	-40 °C to 85 °C
Relative Humidity	40° C @ 95% RH Non-condensing
Certification	CE & FCC Class B

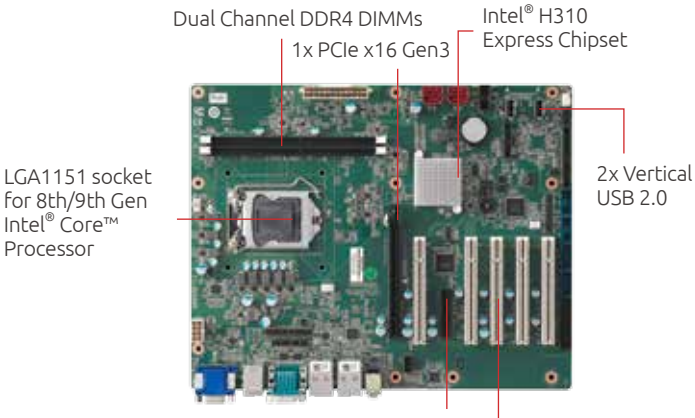
IMB-M45H

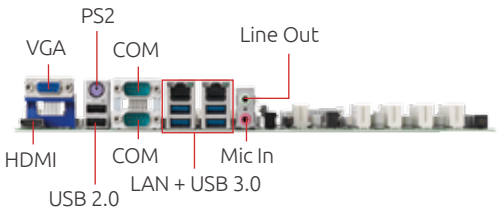
Industrial ATX Motherboard with 8th/9th Gen Intel® Core™ i7/i5/i3 Processor

Features

- 8th/9th Gen Intel® Core™ i7/i5/i3 processors support, compatible with Windows® 10
- Up to 64 GB Dual-channel DDR4 2666 MHz(based on CPU)
- Unique power design to ensure stable USB power of 5V ±5%

Product Illustration





Ordering Information

- **IMB-M45H**
  ATX Intel® Core™ i7/i5/i3 industrial motherboard
  Note: CPU, Memory module and Cooler kit are not included

Packing Lists

- **IMB-M45H**
- **IMB-M45H I/O shield**

Optional Accessories

- **USB 2.0 Cable**
  2-port USB 2.0 port cable with bracket
- **LPT Cable**
  1-port LPT port cable with bracket
- **COM Cable**
  2-port COM port cable with bracket
- **2U CPU Cooler**

Specifications

Processor System	
CPU	Intel® Core™ i7-9700E, 2.6GHz, 12M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (8C/8T)
	Intel® Core™ i7-9700TE, 1.8GHz, 12M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (8C/8T)
	Intel® Core™ i5-9500E, 3.0GHz, 9M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (6C/6T)
	Intel® Core™ i5-9500TE, 2.2GHz, 9M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/6T)
	Intel® Core™ i3-9100E, 3.1GHz, 6M Cache, 65W TDP, LGA1151, DDR4 2400MHz support (4C/4T)
	Intel® Core™ i3-9100TE, 2.2GHz, 6M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (4C/4T)
	Intel® Core™ i7-8700, 3.2GHz, 12M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (6C/12T)
	Intel® Core™ i7-8700T, 2.4GHz 12M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/12T)
	Intel® Core™ i5-8500, 3.0GHz, 9M Cache, 65W TDP, LGA1151, DDR4 2666MHz support (6C/6T)
	Intel® Core™ i5-8500T, 2.1GHz, 9M Cache, 35W TDP, LGA1151, DDR4 2666MHz support (6C/6T)
	Intel® Core™ i3-8100, 3.6GHz, 6M Cache, 65W TDP, LGA1151, DDR4 2400MHz support (4C/4T)
	Intel® Core™ i3-8100T, 3.1GHz, 6M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (4C/4T)
	Intel® Pentium® G5400, 3.7GHz, 4M Cache, 58W TDP, LGA1151, DDR4 2400MHz support (2C/4T)
	Intel® Pentium® G5400T, 3.1GHz, 4M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (2C/4T)
	Intel® Celeron® G4900, 3.1GHz, 2M Cache, 54W TDP, LGA1151, DDR4 2400MHz support (2C/2T)
	Intel® Celeron® G4900T, 2.9GHz, 2M Cache, 35W TDP, LGA1151, DDR4 2400MHz support (2C/2T)
Chipset	Intel® H310 Express Chipset
Memory	Two 288 PIN DDR4 Sockets (vertical type) Dual channel DDR4 2400/2666 MHz, up to 64 GB (based on CPU)
BIOS	AMI® UEFI BIOS, 128 Mb SPI Flash Memory
Watchdog Timer	software programmable and can be generate system reset
Hardware Monitor	CPU voltage
	+3.3 V voltage
	+5 V voltage
	+12 V voltage
	CPU temperature
	System temperature
	CPU fan speed
	System fan speed
Operating Systems	Microsoft® Windows® 10 64bit
	OpenSUSE Leap 15.1 64bit
	Fedora 30 64bit
	Ubuntu 18.10 LTS 64bit

*Other Linux Distribution support by request

I/O Interfaces	
Serial ATA	4x SATA 6.0 Gb/s connectors
USB	4x USB 3.0 connectors (rear)
	2x USB 2.0 connectors (rear)
	2x USB 2.0 pin headers
	2x USB 2.0 (vertical type A connector)
Serial Ports	2x RS-232/422/485 with auto flow control connector (rear)
	4x RS-232 pin headers
Expansion slots	1xPCIe x16 Gen3 1xPCIe x4 Gen2 5x PCI 2.2
Parallel Port	1x LPT pin header
PS2 Combo Port	1x PS/2 keyboard & Mouse connector (rear)
DIO	2x 20-pin/2.0mm GPIO pin header: 16 in and 16 out, one ground pin and one power pin (5V/12V/no power, jumper selected)
Audio	
Audio Codec	Realtek® ALC892
Interface	1x Mic-in and 1x Line-out connector (rear)
Graphics	
Graphics Engine	Integrated Intel® HD Graphics series (based on CPU)
VGA	1x VGA connector (rear), resolution up to 1920 x 1200 @ 60 Hz
HDMI 1.4	1x HDMI connector (rear) resolution up to 4096 x 2160 @ 24 Hz
Ethernet	
Controller	LAN1: Intel® I219-LM via RJ45 connector (rear)
	LAN2: Intel® I211-AT via RJ45 connector (rear)
Wake On LAN	LAN1 and LAN2 support
Mechanical and Environmental	
Form Factor	ATX
Dimension	305 mm x 244 mm (W x L)
Operating Temperature	0 °C to 60 °C
Storage Temperature	-40 °C to 85 °C
Relative Humidity	40° C @ 95% RH Non-condensing
Certification (EMC)	CE & FCC Class B

AmITX-SL-G

Mini-ITX Embedded Board with 6th/7th Gen Intel® Core™ i7/i5/i3 Desktop Processor

Features

- 6th/7th Gen Intel® Core™ i7/i5/i3, Intel® Pentium® and Celeron® Desktop Processor with Intel® Q170/H110 Chipset
- Up to 32GB dual channel DDR4 at 2133/2400MHz
- PCIe x16, PCIe x1 and Mini PCIe expansion
- 3 DisplayPort outputs on rear IO (Q170)
- Supports Smart Embedded Management Agent (SEMA®) functions

Specifications

- **Processor & System**

CPU

Desktop 6th Generation Intel® Core™ i7/i5/i3 and Pentium®/Celeron® Processor, LGA1151 socket

Intel® Core™ i7-6700 Processor, 4C, 3.4/4.0 GHz, 8M, 65W
Intel® Core™ i7-6700TE Processor, 4C, 2.4/3.4 GHz, 8M, 35W
Intel® Core™ i5-6500 Processor, 4C , 3.2/3.6 GHz 6M, 65W
Intel® Core™ i5-6500TE Processor, 4C, 2.3/3.3 GHz, 6M, 35W
Intel® Core™ i3-6100 Processor, 2C, 3.7 GHz, 3M, 51W
Intel® Core™ i3-6100TE Processor, 2C, 2.7 GHz, 4M, 35W
Intel® Pentium® G4400 Processor, 2C, 3.3 GHz, 3M, 54W
Intel® Pentium® G4400TE Processor, 2C, 2.4 GHz, 3M, 35W
Intel® Celeron® G3900 Processor, 2C, 2.8 GHz, 2M, 51W
Intel® Celeron® G3900TE Processor, 2C, 2.3 GHz, 2M, 35W

Desktop 7th Generation Intel® Core™ i7/i5/i3 and Pentium®/Celeron® Processor, LGA1151 socket

Intel® Core™ i7-7700 Processor, 4C, 3.6/4.2 GHz, 8M, 65W
Intel® Core™ i7-7700T Processor, 4C, 2.9/3.8 GHz, 8M, 35W
Intel® Core™ i5-7500 Processor, 4C, 3.4/3.8 GHz, 6M, 65W
Intel® Core™ i5-7500T Processor, 4C, 2.7/3.3 GHz, 6M, 35W
Intel® Core™ i3-7101E Processor, 2C, 3.9 GHz, 3M, 54W
Intel® Core™ i3-7101TE Processor, 2C, 3.4GHz, 3M, 35W

Supports: Intel® VT, Intel® TXT, Intel® SSE4.2, Intel® HT Technology, Intel® 64 Architecture, Execute Disable Bit, Intel® Turbo Boost Technology 2.0, Intel® AVX2, Intel® AES-NI, PCLMULQDQ Instruction, Intel® Secure Key and Intel® TSX-NI

Chipset

Intel® Q170/H110 Chipset

BIOS

AMI EFI in 16MB SPI BIOS with Intel® AMT 11.0 support (Q170 only)
SPI header for external BIOS, optional onboard SPI BIOS socket

Debug Interface

40-pin multipurpose flat cable connector for use in combination with DB-40 debug module providing BIOS

POST code LEDs, BMC access, SPI BIOS flashing, power testpoints, debug LEDs

Memory

Dual channel non-ECC 2133/2400 MHz DDR4 memory up to 32GB in dual vertical SODIM sockets

SEMA® Support

Supports: voltage/current monitoring, power sequence debug support, AT/ATX mode control, logistics and forensic information, flat panel control, general purpose I2C, failsafe BIOS (dual BIOS), watchdog timer and triple Smart Fan control

- **I/O Interfaces**

Expansion Slots

1 PCIe x16 Gen3

1 PCIe x1 Gen2

1x Mini-PCIe card (half size): support ing PCIex1(Gen 2)/USB 2.0 (top side)

1x Mini-PCIe card (full size): support ing PCIex1(Gen 2) or mSATA/USB 2.0 (bottom side)

Serial ATA

3x SATA 6 Gbps ports (Jumper select NA/3.3V/5V for SATA1 and SATA2 to deliver power by SATA pin7; Default is NA)

2x SATA power connector

USB

4x USB 3.0 and 4x USB 2.0 on rear I/O

2x USB 3.0 onboard header (H110: USB 2.0)

1x USB 3.0 on vertical connector with keep out area for dongle (H110: USB 2.0)

KB/MS

1x PS/2 internal header

Serial Ports

3x RS-232 headers, 1x RS-232/422/485 headers
(Support NA (Default)/5V/12V by jumper selection)

Digital IO

10 GPIO via onboard feature connector

Specifications

- **Audio**

Audio Codec

Realtek® ALC886

Interfaces

7.1 channel audio via 5 jacks and S/PDIF output on rear I/O

7.1 channel audio signals and S/PDIF output on internal header

- **Display**

Graphics Core

Intel® 9th generation LP graphics core architecture with up to 18 execution units supporting DirectX 11/12, OGL4.3/4.4, and up to three independent, simultaneous displays

DisplayPort

3x DisplayPort v1.2 with resolution up to 4096 x 2160 @ 24Hz
(3x DisplayPort(Q170) , 2x DisplayPort (H110)

LVDS

LVDS (optional): Single/dual channel 24-bit LVDS up to 1920x1080 @ 60 Hz (from eDP-to-LVDS converter)

eDP (build option)

eDP (optional): Supports 3840x2160 resolution @ 60Hz, 24bpp (not available concurrently with LVDS)

- **Ethernet**

Intel® i219-LM (PHY) Ethernet controller (H110: i219-V)

• Supports Intel® AMT 11.0 (Q170 only)

• Supports Intel® vPro™ (Q170 only)

Intel® i211AT (MAC/PHY) Ethernet controller

10/100/1000 GbE connection

- **TPM**

Atmel AT97SC3204 (optional)

- **Power**

Standard Input: ATX: 12V ±5% / 5Vsb ±5%

AT: 12V ±5%

Peripheral Output: Onboard headers for fan and SATA power

ATX Power Connector (14-pin)

- **Mechanical and Environmental**

Dimension (mm): 170 mm x 170 mm (L x W)

Operating Temperature

Standard: 0˚C to +60˚C

Storage Temperature: -20˚C to +80˚C

Certification: CE, FCC Class B

Relative Humidity

40° C @ 95% RH Non-condensing

- **Operating Systems**

Standard Support

6th Gen CPU: Windows 10/8.1/7, Linux

7th Gen CPU: Windows 10, Linux

Extended Support (BSP)

6th Gen CPU: WES7, Linux, VxWorks (TBD)

7th Gen CPU: Linux, VxWorks (TBD)

- **Intelligent Middleware**

SEMA®

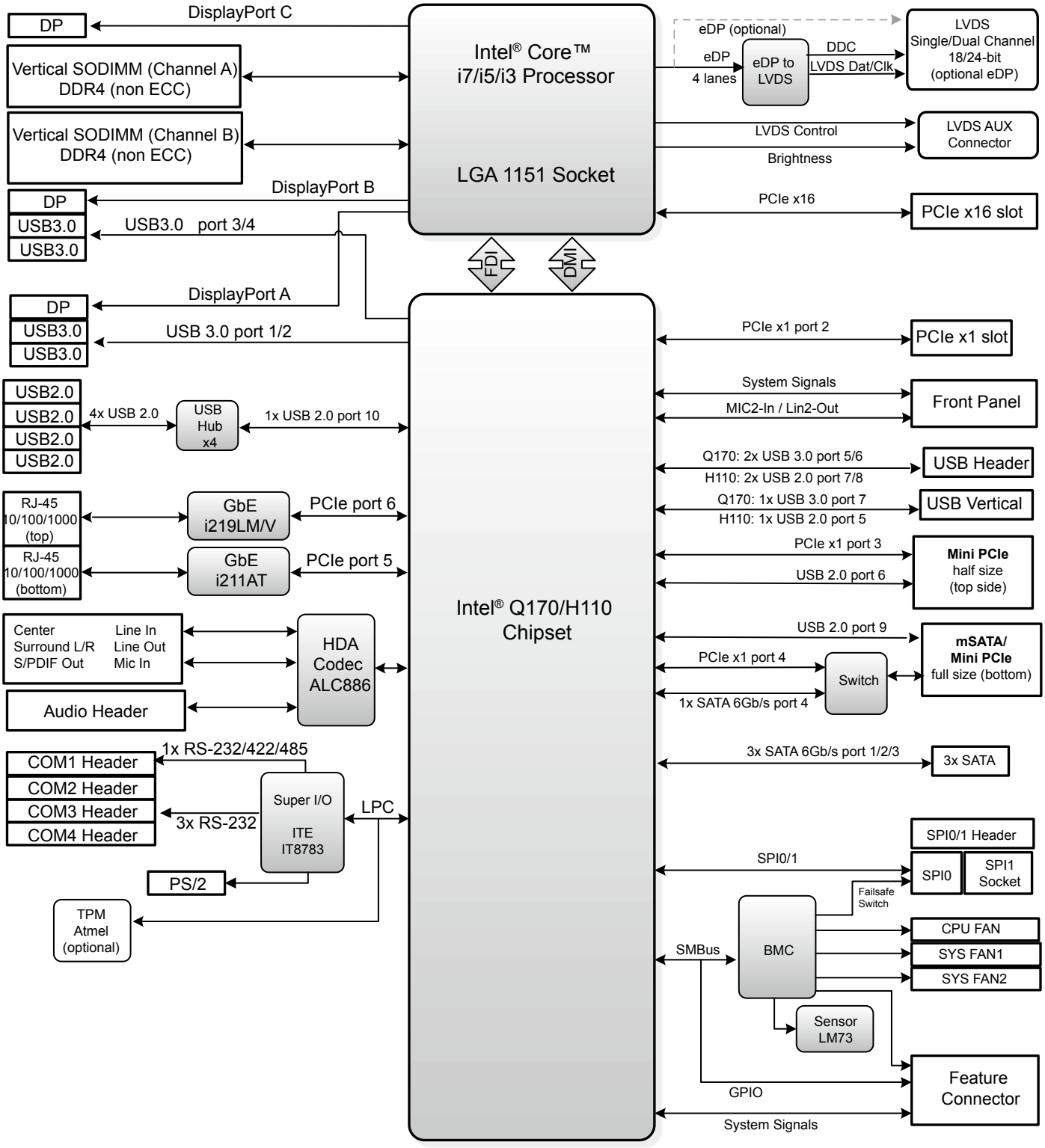
Local management, control of embedded computer systems

Extended EAPI for monitoring, controlling and analytics applications

Multiple OS support and across platforms (x86, ARM)

Note: "Build option" indicates an alternative BOM configuration to support additional or alternative functions that are not available on the standard product. Be aware that part numbers for SKUs with "build options" will need to be created and may cause production lead times.

Functional Diagram



Ordering Information

- **AmITX-SL-G-Q170**
  Mini-ITX Embedded Board with 6th/7th generation Intel® Core™ i7/i5/i3 Desktop Processor with Q170 Chipset

- **AmITX-SL-G-H110**
  Mini-ITX Embedded Board with 6th/7th generation Intel® Core™ i7/i5/i3 Desktop Processor with H110 Chipset

Packing List

- **30-20872-0000**
  ATX/AT Power Cable
- **30-20875-0000**
  SATA Dual Power Cable
- **30-10057-0600**
  SATA Cable
- **34-25314-1000**
  Rear I/O Shield

Optional Accessories

- **30-20876-0000**
  COM Port Cable, 1 Port, 25cm
- **30-20873-0000**
  PS/2 KB/MS Cable, 40cm
- **30-20963-0000**
  USB 3.0 Cable, 2 ports, 20cm (for AmITX-SL-G-Q170)
- **30-20874-1000**
  USB 2.0 Cable, 2 ports, 20cm (for AmITX-SL-G-H110)
- **32-20513-0000**
  LGA1150 CPU Cooler, H=30.0mm, 45W
- **32-20512-0000**
  LGA1150 CPU Cooler, H=46.05mm, 45W
- **32-20113-3000**
  LGA1150 CPU Cooler, H=50.2mm, 95W
- **32-20495-0000**
  LGA1150 CPU Cooler, H=61.4mm, 95W

AmITX-AL-I

Thin Mini-ITX Embedded board with Intel Atom® E3900 Series, Pentium®, and Celeron® SoC

Features

- Low-profile Thin Mini-ITX Embedded board
- Intel® VT-x/VT-d supported
- Up to 16GB non-ECC DDR3L memory at 1866/1600MHz in dual stacked SODIMM socket
- Intel® Gen9 Low Power graphics, up to 4k resolution and H.265 codec
- DisplayPort, HDMI, dual channel 18/24-bit LVDS (eDP by build option), supports three independent displays
- Supports Smart Embedded Management Agent (SEMA®) functions
- Extreme Rugged operating temperature: -40°C to +85°C (build option for selected SKUs)

Specifications

- **Processor & System**

CPU

Intel Atom®/Pentium®/Celeron® SoC on 14nm process
Atom® x7-E3950 1.6/2.0GHz (Burst Frequency), 12W (4C/1866)
Atom® x5-E3940 1.6/1.8GHz (Burst Frequency), 9.5W (4C/1866)
Atom® x5-E3930 1.3/1.8GHz (Burst Frequency), 6.5W (2C/1866)
Pentium® N4200 1.1/2.5GHz (Burst Frequency), 6W (4C/1866)
Celeron® N3350 1.1/2.4GHz (Burst Frequency), 6W (2C/1866)
Supports: Intel® VT, Intel® VT-d, Intel® TXT, Intel® 64 Architecture, IA 32-bit, Intel® AES-NI, dual or quad Out-of-Order Execution (OOE) processor cores, PCLMULQDQ Instruction DRNG

BIOS

AMI EFI in 16MB SPI BIOS

Debug Interface

40-pin multipurpose flat cable connector for use in combination with DB-40 debug module to provide BIOS POST code display, BMC access, SPI BIOS flashing, Power Testpoints, Debug LEDs

Memory

Dual channel non-ECC 1866/1600 MHz DDR3L memory up to 16GB in dual stacked SODIMM sockets

SEMA® Support

Supports: Voltage/Current monitoring, Power sequence debug support, AT/ATX mode control, Logistics and Forensic information, Flat Panel Control, General Purpose I2C, Failsafe BIOS (dual BIOS), Watchdog Timer and Fan Control

- **I/O Interfaces**

Expansion Slots

1x PCIe x1 slot
1x Mini PCIe (full size) with USB
1x mSATA (full size)
SIM card slot (build option)
microSD card slot (build option)
Serial ATA
2x SATA 6 Gbps ports (one shared with mSATA)

USB

4x USB 3.0 on rear I/O
1x USB 2.0 on front panel header
2x USB 2.0 on standard header
1x USB 2.0 on Mini PCIe

KB/MS

1x PS/2 internal header

Serial Ports

2x RS-232/422/485 via onboard headers (5V/12V support)
4x RS-232 via onboard headers

Digital IO

10x GPIO on internal feature connector

TPM

TPM header (supports TPM 2.0)

Specifications

- **Audio**

Audio Codec

Realtek® ALC888S

Interfaces

Line-out, Mic-in on rear I/O

7.1 channel signals and S/PDIF output on internal header

- **Display**

Graphics Core

Intel® Generation 9 Low Power Graphics Core Architecture supporting 3 independent and simultaneous display combinations of DisplayPort, HDMI, LVDS or eDP outputs

Hardware encode/transcode (including HEVC)

DirectX 12, DirectX 11.3, DirectX 10, DirectX 9.3 support

OpenGL 4.3 and ES 3.0 support

OpenCL 2.0 support

Triple display: DP + HDMI + LVDS (default)

DisplayPort

1x DisplayPort (2x DisplayPort is build option, one is in place of HDMI), resolution up to 4096x2160@24Hz

HDMI

1x HDMI (co-lay with DP), resolution up to 3840×2160@30 Hz

LVDS

Single/Dual channel 18/24-bit (build option, in place of eDP), resolution up to 1900x1200@ 60 Hz.

eDP

4 lane support (build option, in place of LVDS)

- **Ethernet**

Controller: 2x Intel® Ethernet controller i211 (MAC/PHY)
Note: Intel® Ethernet i210 (build option) is supported for -40°C to +85°C SKU

Interface: 10/100/1000 GbE connection

Wake-on-LAN: Yes

- **Power**

Standard Input: 12V ±5% from internal 4-pin power connector or external DC jack

Peripherals Output: Onboard headers for fan and SATA power

- **Mechanical and Environmental**

Form Factor: Thin Mini-ITX

Dimensions: 170 mm x 170 mm (L x W)

Operating Temp.

Standard Operating Temperature: 0°C to 60°C
Extreme Rugged Operating Temperature: -40°C + 85°C (build option for selected SKUs)

Shock and Vibration

MIL-STD-202G Method 214A, Table 214-I Condition D.

MIL-STD-202G Method 213B, Table 213-I Condition A.

Relative Humidity

10% to 90%, non-condensing

Certification

CE, FCC, Class B

- **Operating Systems**

Standard Support

Windows 10 64-bit, Linux 64-bit

Extended Support (BSP)

Linux 64-bit, VxWorks 64-bit (TBD)

- **Intelligent Middleware**

SEMA®

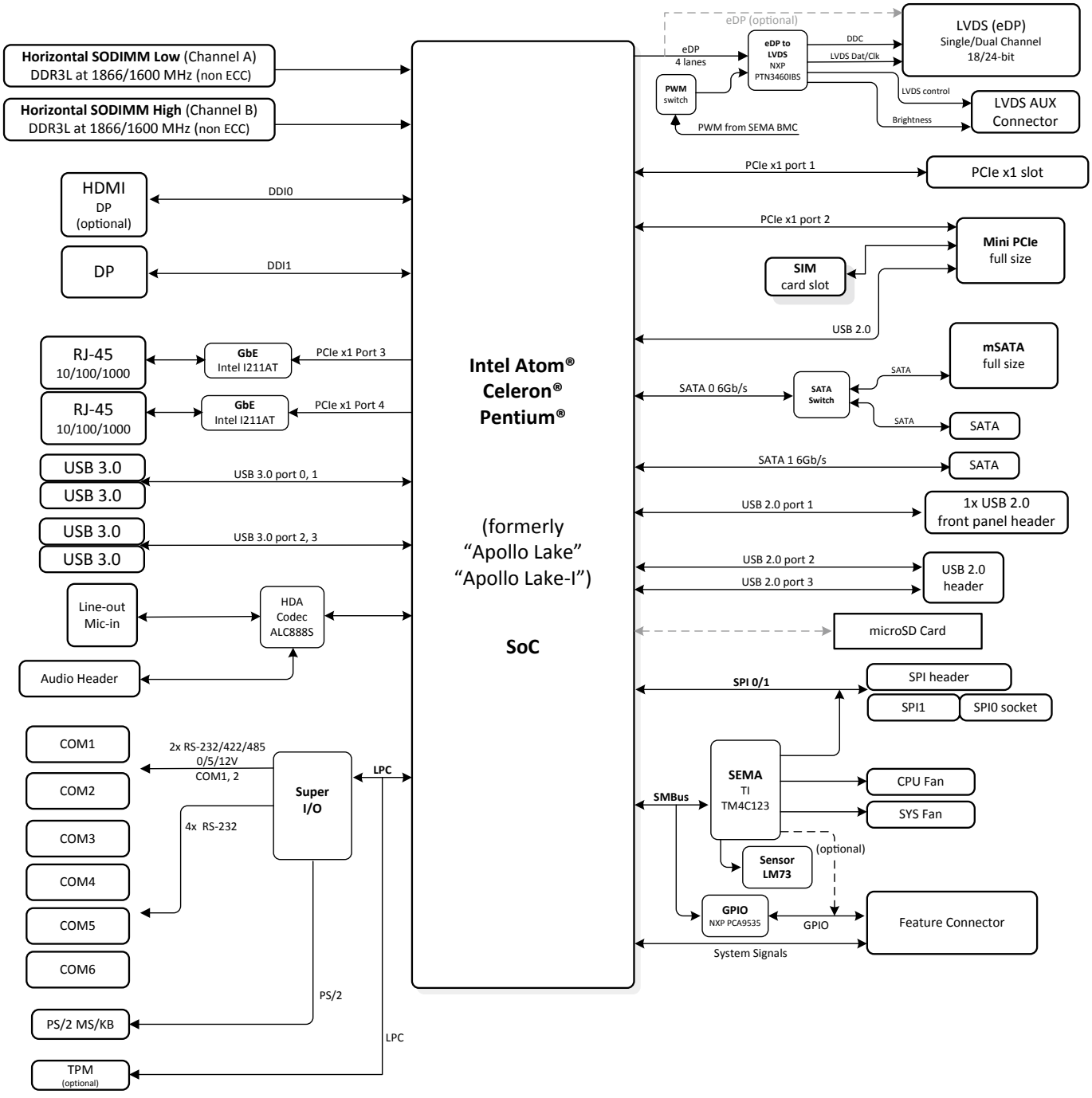
Local management, control of embedded computer systems

Extended EAPI for monitoring, control and analytics applications

Multiple OS support across platforms (x86, ARM)

Note: "Build option" indicates an alternative BOM configuration to support additional or alternative functions that are not available on the standard product. Be aware that part numbers for SKUs with "build options" will need to be created and may cause production lead times.

Functional Diagram



Ordering Information

- **AmITX-AL-I-E3950**
  Thin Mini-ITX motherboard with Intel Atom® x7-E3950 1.6/2.0GHz (Burst Frequency), 12W (4C/1866)
- **AmITX-AL-I-E3940**
  Thin Mini-ITX motherboard with Intel Atom® x5-E3940 1.6/1.8GHz (Burst Frequency), 9.5W (4C/1866)
- **AmITX-AL-I-E3930**
  Thin Mini-ITX motherboard with Intel Atom® x5-E3930 1.3/1.8GHz (Burst Frequency), 6.5W (2C/1866)
- **AmITX-AL-I-N4200**
  Thin Mini-ITX motherboard with Intel® Pentium® N4200 1.1/2.5GHz (Burst Frequency), 6W (4C/1866)
- **AmITX-AL-I-N3350**
  Thin Mini-ITX motherboard with Intel® Celeron® N3350 1.1/2.4GHz (Burst Frequency), 6W (2C/1866)

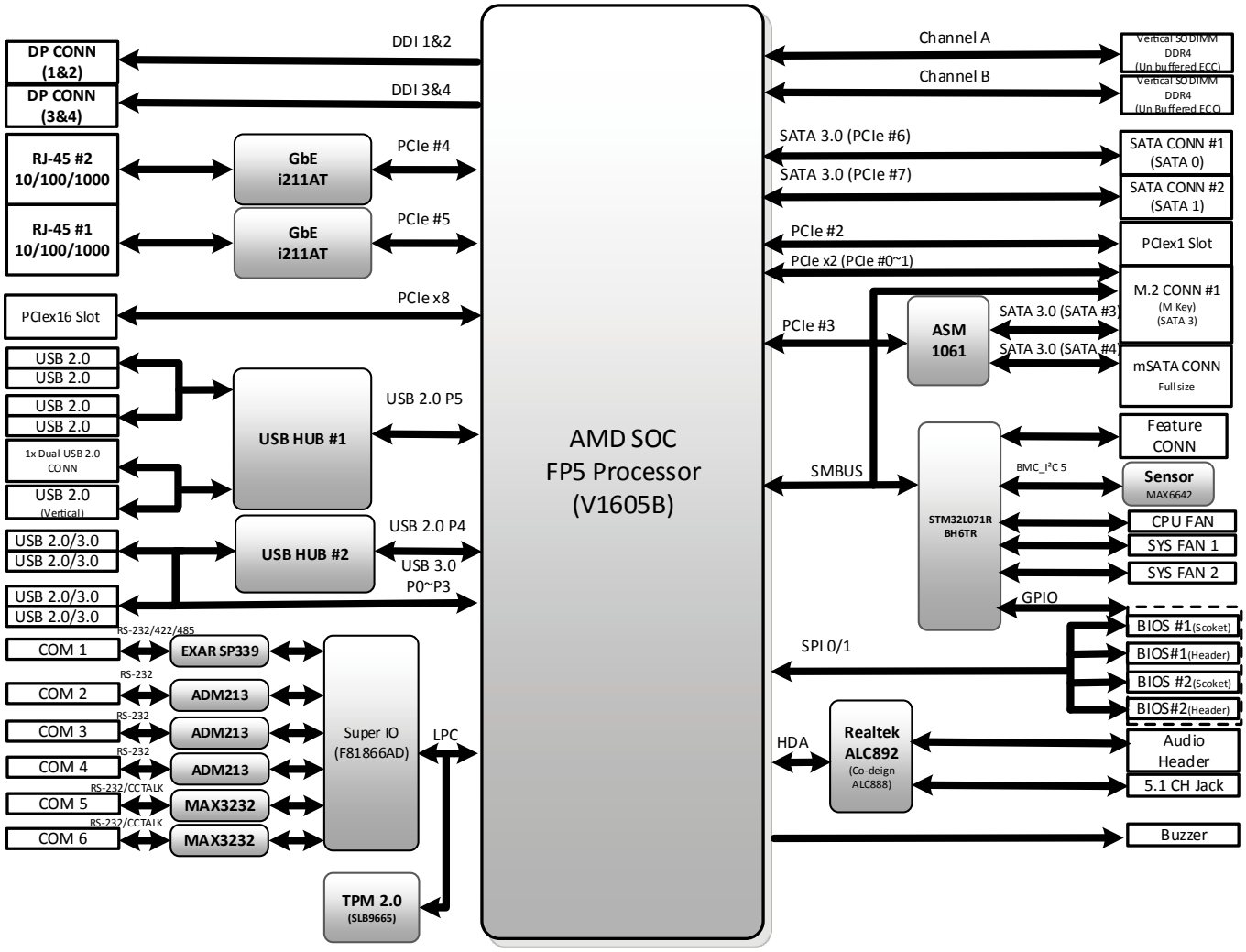
Packing List

- **30-20875-0000**
  SATA dual power cable
- **30-10057-0600**
  SATA cable

Optional Accessories

- **30-20876-0000**
  COM port cable (1 port, 25cm)
- **30-20873-0000**
  PS/2 KB/MS cable (40cm)
- **30-20874-1000**
  USB 2.0 cable (2 ports, 20cm)

Functional Diagram



M100-Nano-AINVR

AI-enabled Embedded NVR Powered by NVIDIA® Jetson Nano™

Preliminary

Features

- NVIDIA® Jetson Nano™ processing/inference engine
  - Quad-core ARM® Cortex®-A57 MPCore processor
  - 128 NVIDIA CUDA® cores
- 8x GbE/PoE for IP GigE cameras
- HDMI, 8-bit digital inputs/outputs, 2x RS-232, 2x USB, GbE for uplink
- Easy to maintain 2.5" SATA storage
- 12V DC input, optional AC/DC PSU

Specifications

	M100-Nano-AINVR
System Core	
Processor	NVIDIA® Jetson Nano™
Memory	4 GB LPDDR4
eMMC	16 GB eMMC 5.1
Graphic Output	
Graphic Output	1x HDMI 2.0
Front Panel I/O Interface	
Ethernet	2x GbE
Camera Interface	8x GbE/PoE (15W each)
USB 3.0	4
USB 2.0	OTG
Serial Port	2x RS-232/485
Side Panel I/O Interface	
DIO	4 input/ 4 output w/ 1KV isolation
Storage Device	
SATA Extension	2.5" SATA SSD
MicroSD	1 (on NVIDIA® Jetson Nano™)
Power Requirements	
DC Input	12V DC input
AC Input	Optional AC-DC adapter, 160W
Fail Reset	Reset/recovery button
Power LED Indicator	Power button
Mechanical	
Dimensions	210 x 170 x 55 (mm)
Weight	TBD
Mounting	Wall mount/ DIN-RAIL
Environmental	
Operating Temperature	0°C ~ +50°C
Operating Humidity	~95% @40°C (non-condensing)
Storage Temperature	-40°C ~ +85°C

DLAP-201-JT2

NVIDIA® Jetson™ TX2/TX1 Edge Inference Platform

Preliminary

Features

- Deep learning acceleration with NVIDIA® Jetson™ TX2
- Compatible with NVIDIA® Jetson™ TX1
- Compact fanless system 148(W)x105(D)x50(H)mm
- Wide temperature range from -20°C to 70°C

Specifications

	DLAP-201-JT2
System Core	
Processor	NVIDIA® Jetson™ TX2/ TX1
Memory	8GB/ 4GB
eMMC	16GB
Graphic Output	
Graphic Output	1 HDMI 2.0 (w. lock)
Front Panel I/O Interface	
Ethernet	2x GbE
USB 3.0	3x Type A
Audio	Mic-in, line-out (Optional)
Rear Panel I/O Interface	
USB 2.0	1x OTG
Serial Port	1x COM
CAN Bus	1 CAN bus (2.0b)
Internal I/O Interface	
Mini PCIe	1x PCIe mini-card slot
USIM	1x USIM slot
Wi-Fi/BT	Wi-Fi IEEE 802.11ac/ Bluetooth 4.0 (24Mbls) via TX2
DIO	4 channel DIO
Debug Port	1x debug console
Storage Device	
SATA Extension	mSATA
SD Card	1x SD
Power Requirements	
DC Input	12V
AC Input	Optional 40 W AC-DC adapter
Fail Reset	Reset/recovery button
Power LED Indicator	Power button
CMOS Battery	
Holder	BR2032
Protection	Reverse charge protection
Mechanical	
Antenna Hole	4 x SMA
Dimensions	148(W)x105(D)x50(H)mm
Weight	TBD
IP Grade	IP40
Mounting	Wall mount & VESA & din rail
Environmental	
Operating Temperature	Standard -20°C~70°C
Operating Humidity	~95% @40C (non-condensing)
Storage Temperature	-40°C~85°C

M300-Xavier

Embedded Robotic Controller Powered by NVIDIA® Jetson AGX Xavier™

Features

- ROS2-enabled robotic controller powered by NVIDIA® Jetson AGX Xavier™ module
- 1x USB 3.1 Gen2 + 6x USB 3.1 Gen1, MIPI CSI for camera connections
- Field control I/Os: UART, SPI, CAN, I²C, PWM, analog inputs, digital inputs/outputs
- Internal function expansions by mini PCIe, M.2 E key 2230, M.2 B+M key 3042/2280
- Optional external function expansions by ruggedized cassette, 1x PCIe Gen4 x8, 1x PCIe Gen3 x4
- 9-36V DC input

Specifications

	M300-Xavier
System Core	
Processor	NVIDIA® Jetson AGX Xavier™
Memory	Onboard 16GB
eMMC	32GB on module
Graphic Output	
Graphic Output	1x HDMI
Front Panel I/O Interface	
Ethernet	2x GbE
USB 3.1 GEN2	1
USB 3.1 GEN1	6
Serial Port	1x RS-232/485 + 3x RS-232
Side Panel I/O Interface	
GPIO	20 bit
Other Control Signals	UART, SPI, CAN, I2C, PWM
Storage Device	
M.2 Extension	1x Key B+M 3042/2280
SD Card	1x MicroSD
Optional Expansion	
Expansion Cassette	Optional 1x PCIe x8 + 1x PCIe x4
Power Requirements	
DC Input	9-36V
AC Input	Optional 280W adapter
Fail Reset	Recovery / Reset
Power LED Indicator	Storage / WDT
Mechanical	
Dimensions	Core module: 190 (W) x 210 (D) x 80 (H) With expansion: 322 (W) x 210 (D) x 80 (H)
Weight	5 kg
Mounting	Wall mount
Environmental	
Operating Temperature	0°C ~ +50°C
Operating Humidity	~95% @40°C (non-condensing)
Storage Temperature	-40°C ~ +85°C

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