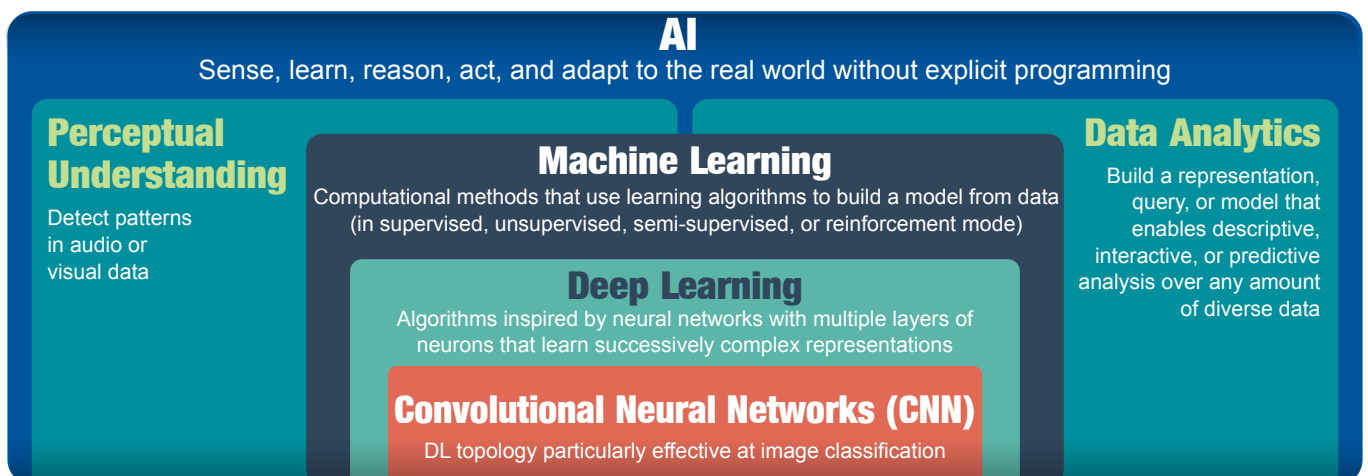# Smart Choice for Inference System with AI

Artificial Intelligence, AI, is changing our lives from the past to the future. It enables machine learning by using a variety of training models to simulate and infer the status or appearance of objects. For example, the inference system with the video analysis model can perform face and vehicle license plate analysis for safety and security purposes.

Today, most of AI technology still rely on the data center to execute the inference, which will increase the risk of real-time application for applications such as traffic monitoring, security CCTV, etc. Therefore, it's crucial to implement a low-latency. real-time edge computing platform.

» Deep learning and inference

Deep learning is part of the machine learning method. It allows computational models that are composed of multiple processing layers to learn representations of data with multiple levels of abstraction.Deep neural network and recurrent neural network architectures have been used in applications such as object recognition, object detection, feature segmentation, text-to-speech, speech-to-text, translation, etc.In some cases the performance of deep learning algorithms can be even more accurate than human judgement.

AI
Sense, learn, reason, act, and adapt to the real world without explicit programming

Perceptual Understanding

Detect patterns in audio or visual data

Machine Learning
Computational methods that use learning algorithms to build a model from data (in supervised, unsupervised, semi-supervised, or reinforcement mode)

Deep Learning
Algorithms inspired by neural networks with multiple layers of neurons that learn successively complex representations

Convolutional Neural Networks (CNN)
DL topology particularly effective at image classification

Data Analytics

Build a representation, query, or model that enables descriptive, interactive, or predictive analysis over any amount of diverse data
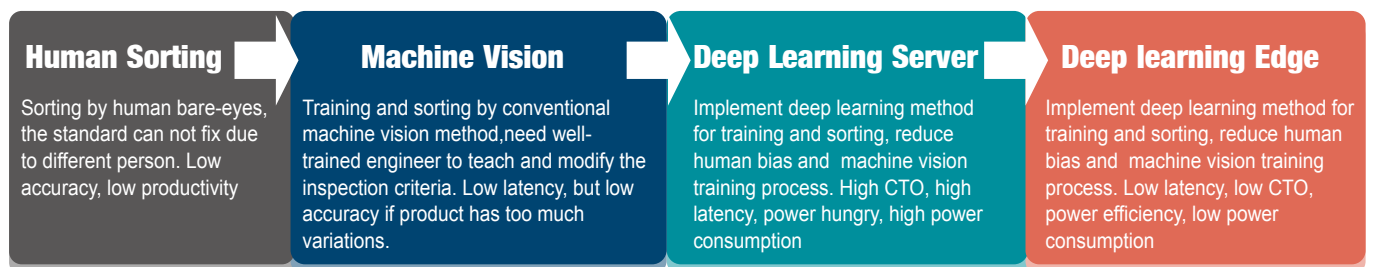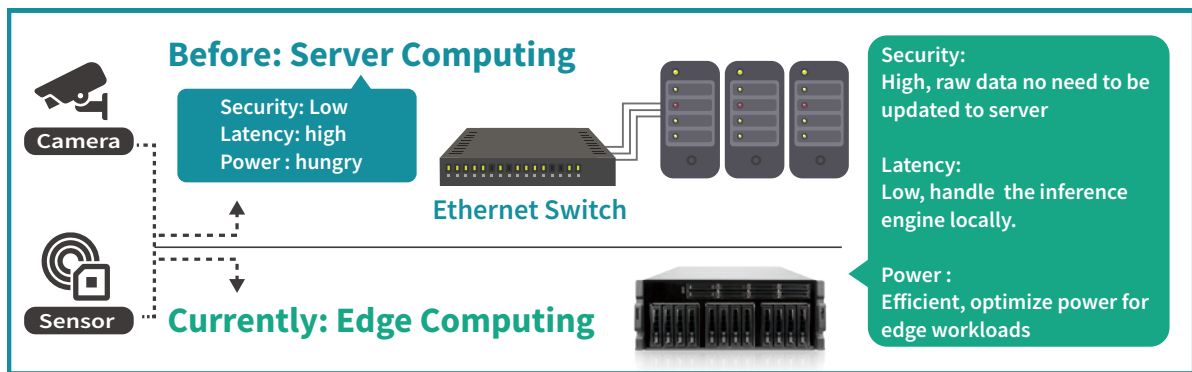
In the past, machine learning required researchers and domain experts knowledge to design filters that extracted the raw data into feature vectors. However, with the contributions of deep learning accelerators and algorithms, trained models can be applied to the raw data, which could be utilized to recognize new input data in inference.
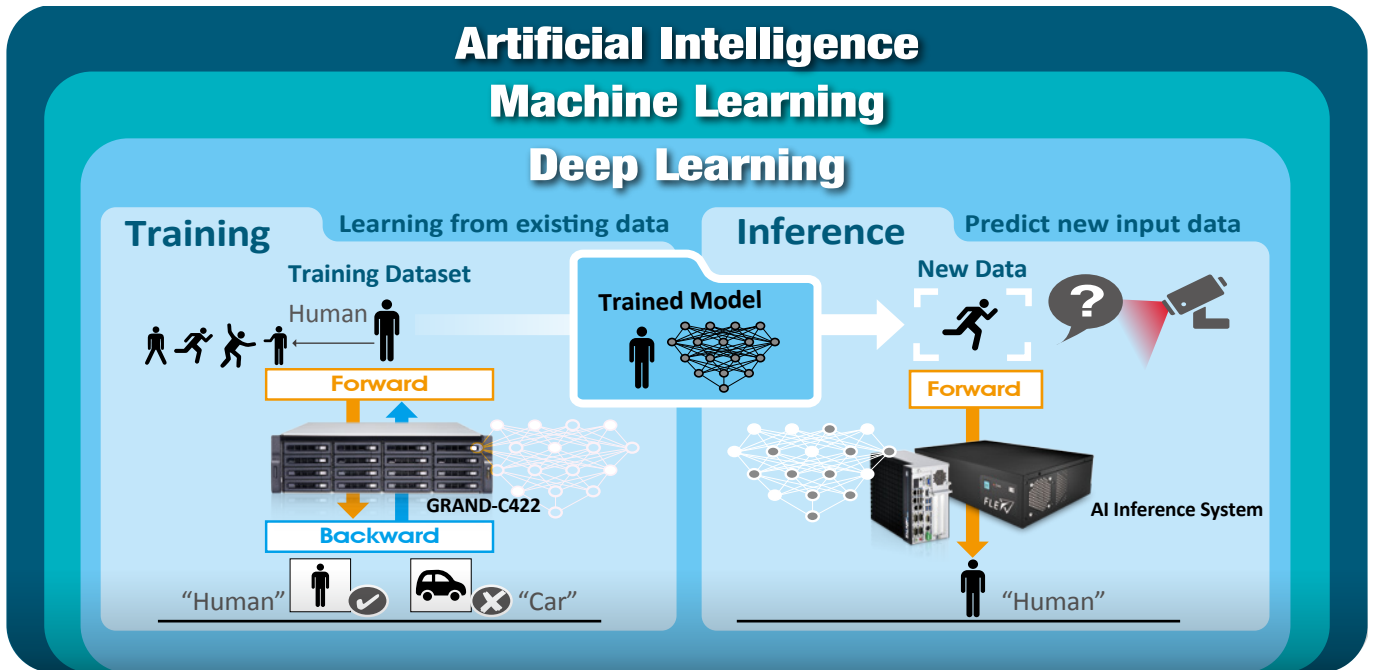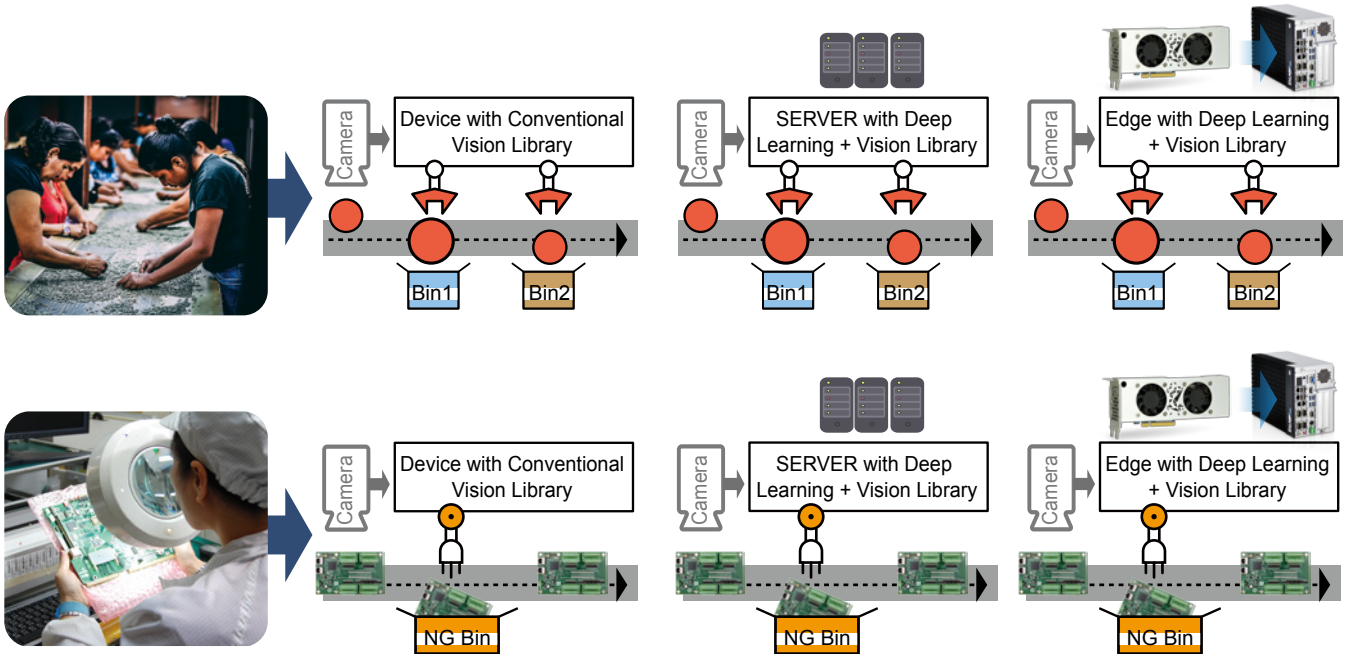

Edge Computing

The advantages of edge computing:

● Reduce data center loading, transmit less data, reduce network traffic bottlenecks.
● Real-time applications, the data is analyzed locally, no need long distant data center.
● Lower costs, no need to implement sever grade machine to achieve non complex applications.

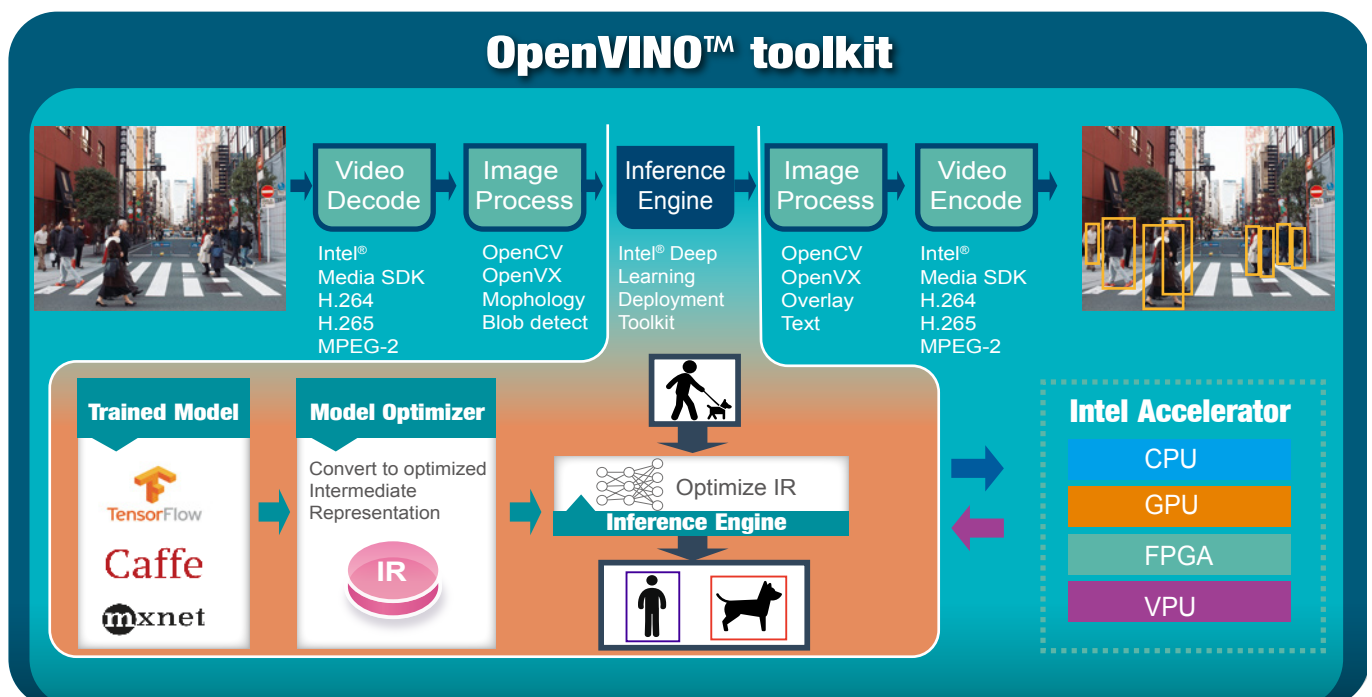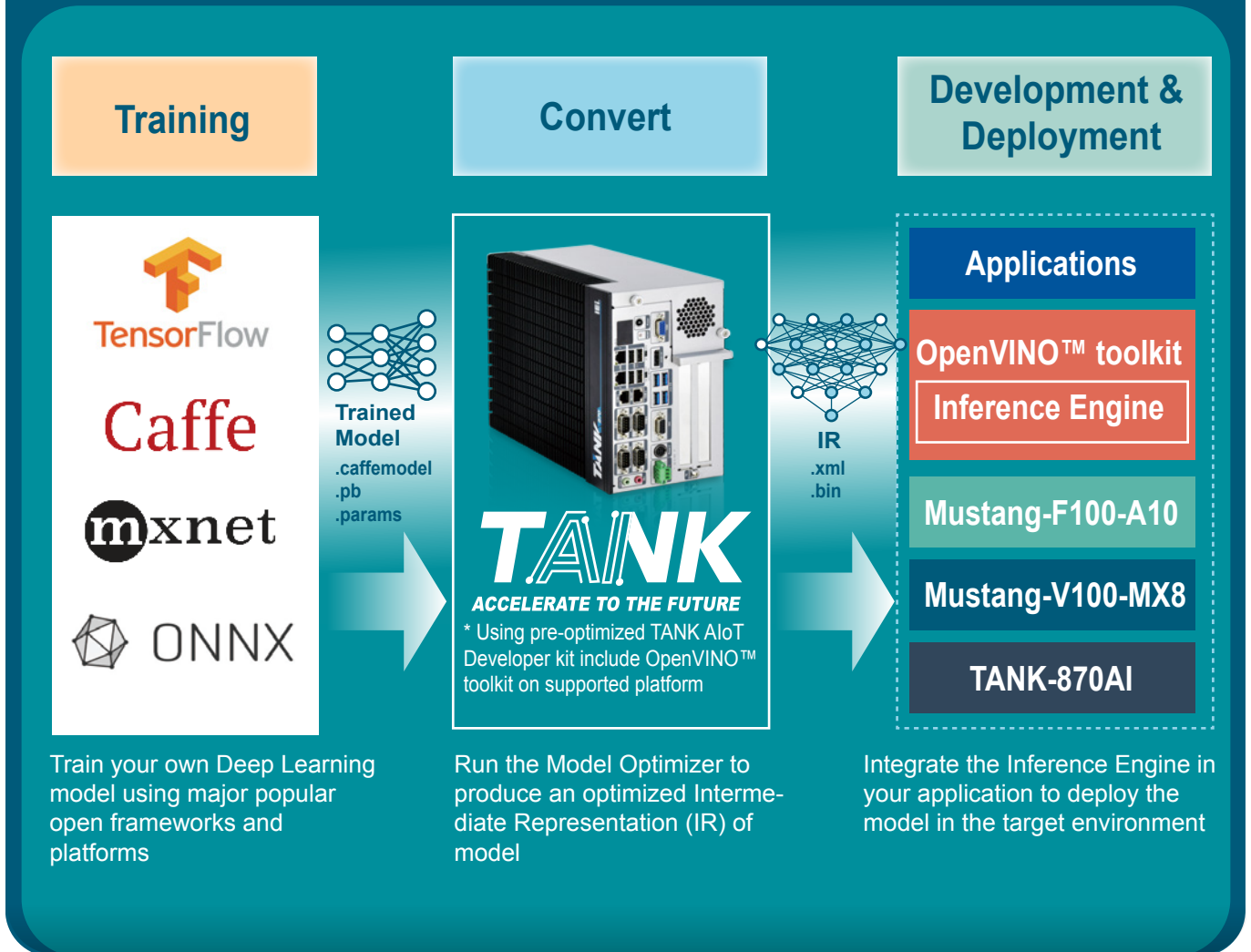| Human Sorting	Machine Vision	Deep Learning Server	Deep learning Edge
Sorting by human bare-eyes, the standard can not fix due to different person. Low accuracy, low productivity	Training and sorting by conventional machine vision method, need well-trained engineer to teach and modify the inspection criteria. Low latency, but low accuracy if product has too much variations.	Implement deep learning method for training and sorting, reduce human bias and machine vision training process. High CTO, high latency, power hungry, high power consumption	Implement deep learning method for training and sorting, reduce human bias and machine vision training process. Low latency, low CTO, power efficiency, low power consumption

Intel® Distribution of OpenVINO™ toolkit

Intel® Distribution of OpenVINO™ toolkit is based on convolutional neural networks (CNN), the toolkit extends workloads across multiple types of Intel® platforms and maximizes performance.

It can optimize pre-trained deep learning models such as Caffe, MXNET, and ONNX Tensorflow. The tool suite includes more than 20 pre-trained models, and supports 100+ public and custom models (includes Caffe*, MXNet, TensorFlow*, ONNX*, Kaldi*) for easier deployments across Intel® silicon products (CPU, GPU/Intel®Processor Graphics, FPGA, VPU).

Software

Easy to use Deployment Workflow

Training

Trained
Model
.caffemodel
.pb
.params

Convert

TANK
ACCELERATE TO THE FUTURE

* Using pre-optimized TANK AIoT Developer kit include OpenVINO™ toolkit on supported platform

IR
.xml
.bin

Development & Deployment

Applications

OpenVINO™ toolkit

Inference Engine

Mustang-F100-A10

Mustang-V100-MX8

TANK-870AI

Train your own Deep Learning model using major popular open frameworks and platforms

Run the Model Optimizer to produce an optimized Intermediate Representation (IR) of model

Integrate the Inference Engine in your application to deploy the model in the target environment

- **Operating Systems**
  Ubuntu 16.04.3 LTS 64bit, CentOS 7.4 64bit, Windows 10 64bit

- **OpenVINO™ toolkit**
  – Intel® Deep Learning Deployment Toolkit
    • Model Optimizer
    • Inference Engine
  – Optimized computer vision libraries
  – Intel® Media SDK
  – Current Supported Topologies: AlexNet, GoogleNet V1/V2/V4, Yolo Tiny V1/V2, Yolo V2/V3, SSD300,SSD512, ResNet-18/50/101/152, DenseNet121/161/169/201, SqueezeNet 1.0/1.1, VGG16/19, MobileNet-SSD, Inception-ResNet-v2,Inception-V1/V2/V3/V4,SSD-MobileNet-V2-coco, MobileNet-V1-0.25-128, MobileNet-V1-0.50-160, MobileNet-V1-1.0-224, MobileNet-V1/V2, Faster-RCNN
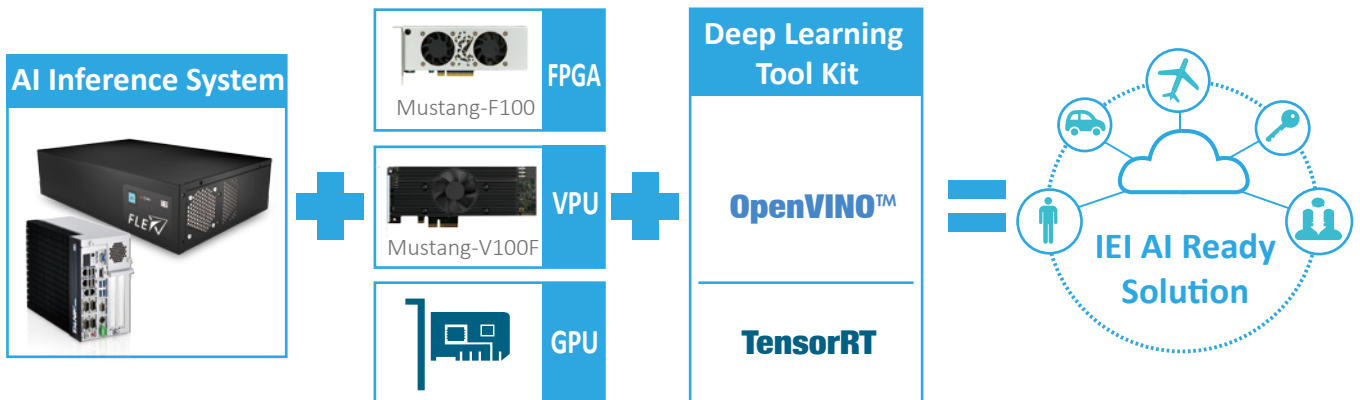 (more variants are coming soon)

- **High flexibility, develop on OpenVINO™ toolkit structure which allows trained data such as Caffe, TensorFlow, and MXNet to execute on it after convert to optimized IR.**

Applications

Classification

Trained Model

Cat ✗
Dog ✓

Segmentation

Fields

Surveillance

LPR
(License Plate Recognize)

Retail

Manufacturing

Mobile ADAS

Medical diagnose
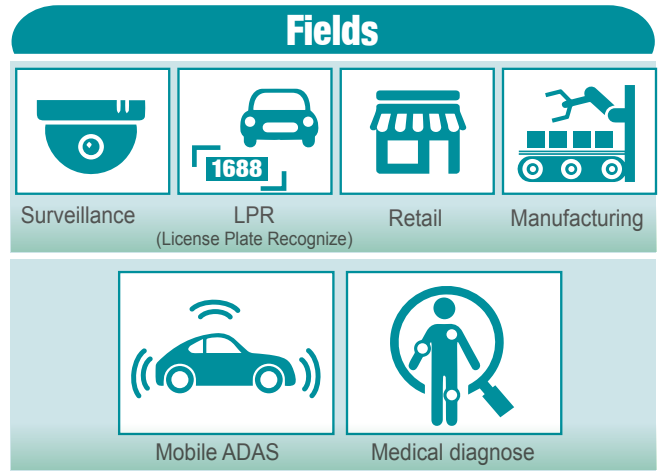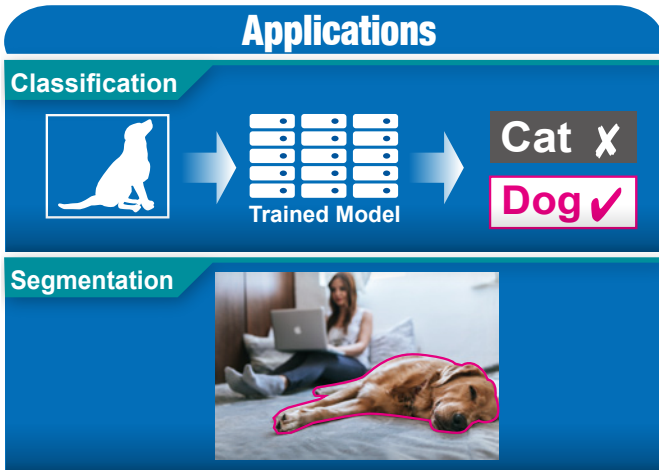
		TS-X77 with GPU	GRANG-C422 with GPU	TANK-870AI with Mustang-F100-A10	TANK-870AI with Mustang-V100-MX8	FLEX-BX200-Q370 with Mustang-F100-A10	FLEX-BX200-Q370 with Mustang-V100-MX8
Applications	Inference Training	O	O				
	Inference Engine	O	O	O	O	O	O
	Image Classification	O	O	O	O	O	O
	Image Localization	O	O	O	O	O	O
Features	Energy Efficent			O	O	O	O
	Low-latency.			O	O	O	O
	Compact Size			O	O	O	O

IEI AI Ready Solution Accelerates Your AI Initiative

The FLEX-BX200 and TANK-870AI dev. kit are AI hardware ready system ideal for deep learning inference computing to help you get faster, deeper insights into your customers and your business. IEI's FLEX-BX200 and TANK-870AI dev. support graphics cards, Intel® FPGA acceleration cards, and Intel® VPU acceleration cards, and provides additional computational power plus end-to-end solution to run your tasks more efficiently. With the Intel® OpenVINO toolkit and NVIDIA TensorRT, it can help you deploy your solutions faster than ever.

AI Inference System

FPGA
Mustang-F100

VPU
Mustang-V100F

GPU

Deep Learning Tool Kit

OpenVINO™

TensorRT

IEI AI Ready Solution

» Industrial Manufacturing

• Industrial automation

Mustang series solutions help enable intelligent factories to be more efficient on work order schedule arrangements. In today's production line, sticking to manufacturing schedules is becoming more and more important for business efficiency. From raw material storage to fabrication and complete products, all information from factory such as manufacturing equipment process time and warehouse storage status are essential to achieve production goals. Solutions based on AI technology can produce more detailed, accurate, and meaningful digital models of equipment and processes for product management.
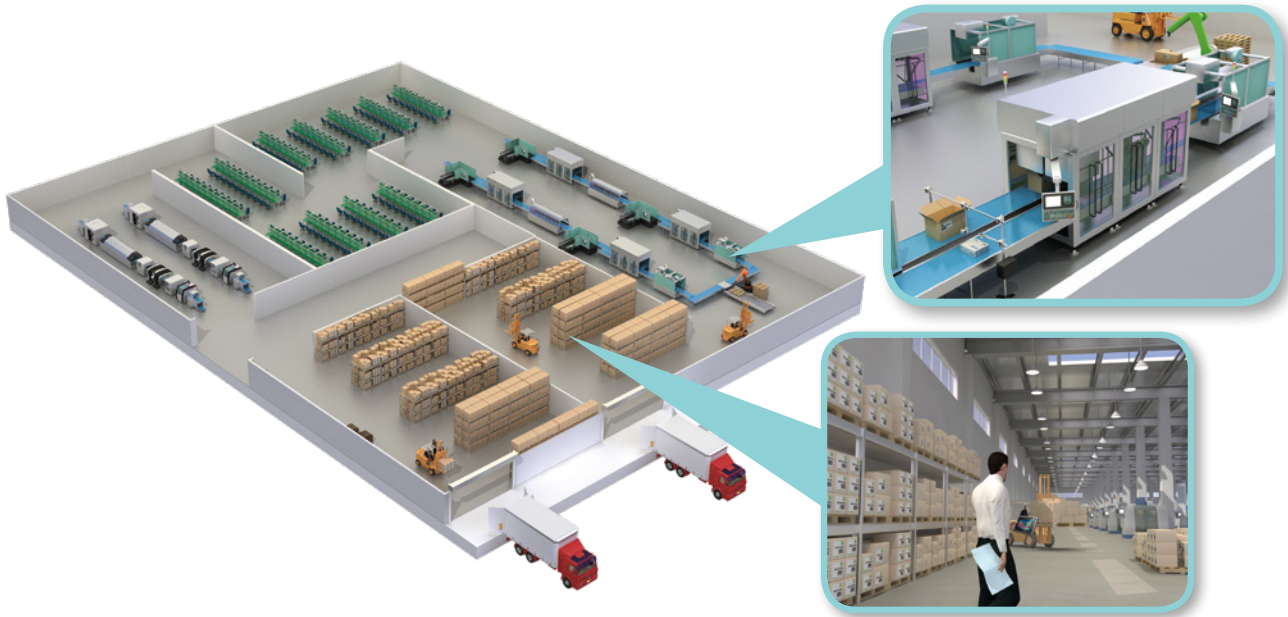
• Machine Vision for Sorting and Grading of Agricultural Products

Agricultural products are valued by their appearance. The color indicates parameters like ripeness, defects, etc. The quality decisions vary among the graders and often inconsistent. Machine vision technology offers the solution for all these problems.
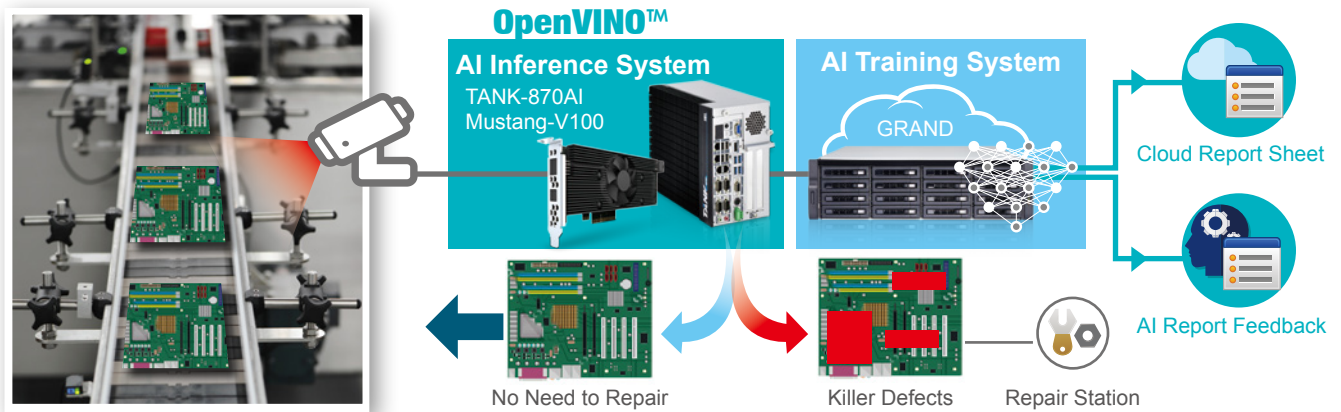
The FLEX series designed for machine vision market has four PCIe 3.0 expansion slots for installing motion controller cards, GP GPU/FPGA/VPU cards and the PoE Ethernet card which is developed by IEI and has four GbE Power over Ethernet (PoE) ports compliant with IEEE 802.3af for direct connection to CCTV cameras without needing separate power.
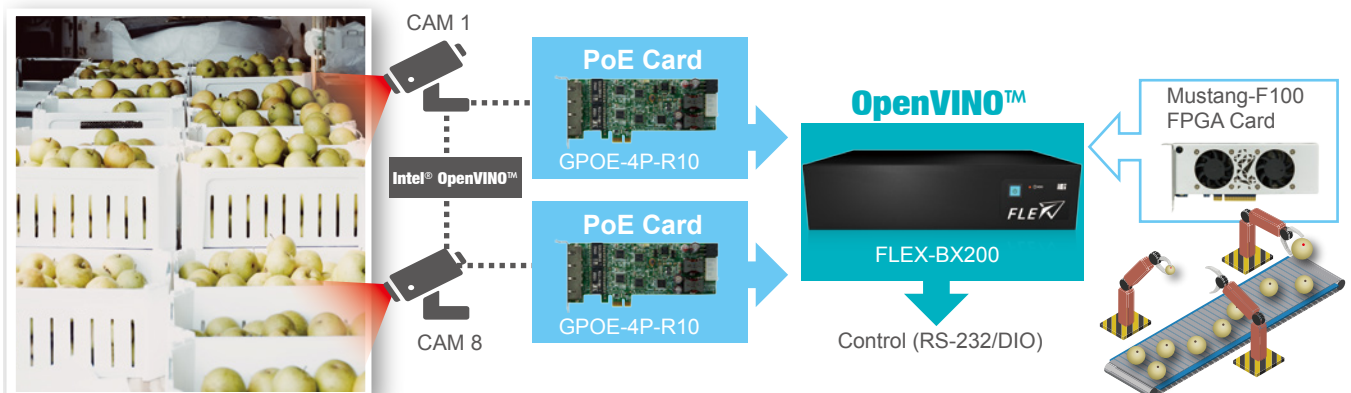
• AOI Defect Classification

During the manufacturing process, defects could be introduced and harmful to the quality. It is necessary to classify the defects detected by AOI machine appropriately especially killer defects. The higher accuracy to classify defects, the less cost spent on review and repair station.

The TANK AIoT Dev. Kit features rich I/O and dual PCIe slots (x16) to support add-ons like the Acceleration cards (Mustang-F100-A10 & Mustang-V100-MX8) or the PoE to enhance the defects detected performance.

OpenVINO™

AI Inference System
TANK-870AI
Mustang-V100

AI Training System
GRAND

Cloud Report Sheet

AI Report Feedback

No Need to Repair — Killer Defects — Repair Station

» Retail

• Smart Retail

Using the Mustang series for computer vision solutions at the edge of retail sites can quickly recognize the gender and age of the customers and provide relevant product information through digital signage display to improve product sales and inventory control. Self-checkout can reduce human resource cost so that retail owners can spend more resources on promoting products and understanding business patterns.

In addition, it can help to analyze customer's in-store behavior, and provide customer information based on gender and age to facilitate product positioning. Quickly converting the business intelligence gained and help build better business practices and increase profitability.

Self-checkout

Smart Retail

Interactive digital signage
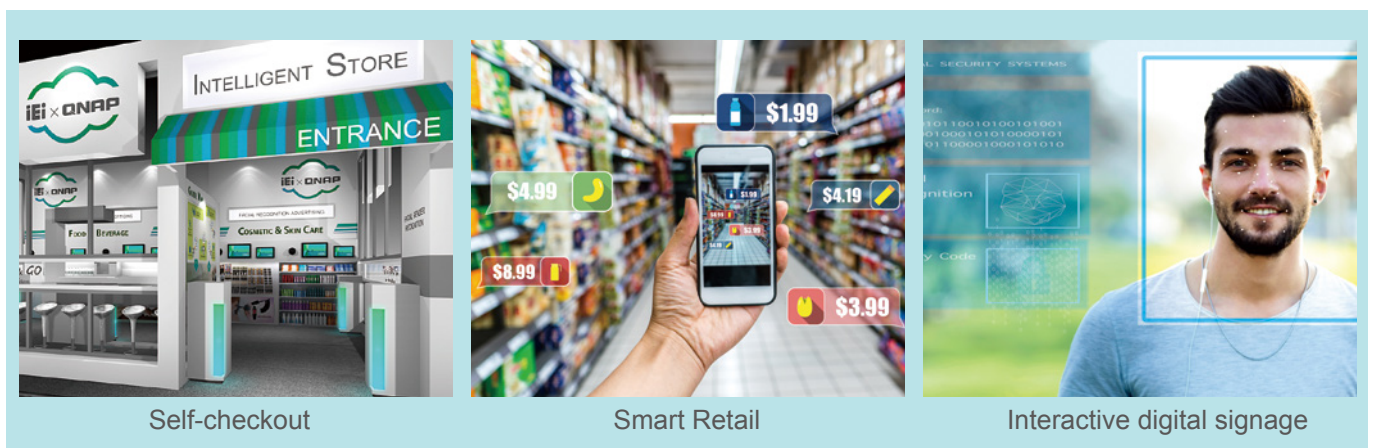
Medical

• Medical Diagnostics

With AI based technology, healthcare and medical centers can diagnose, locate and identify suspicious areas such as tumors and other abnormalities more quickly and accurately. Using segmentation technology and trained models on the Mustang series can be used to locate and identify abnormalities with a high degree of accuracy helping doctors and researchers quickly serve the patient.
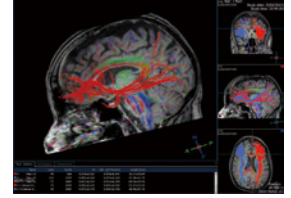
Case Study — Eye Related Disease (Age-related macular degeneration)

Trained Model .pb → IR .xml .bin

Training

The 22K Labeled OCT image data are used to train an image classification model (using Inception v3) to recognize the eye disease.

GRAND-C422

Convert

The model optimizer is used to convert the trained model to IR file.

Model Optimizer

TANK-870AI

Development & Deployment

An eye disease classification program is developed, and integrated the Inference Engine to gain the great performance and efficiency for age-related macular degeneration classification.

TANK-870AI   Inference Engine

Transportation

• Numerous Vehicle License Plate Analysis

Efficient road tolling and parking reduces fraud related to non-payment, makes charging effective, and reduces required manpower to process. Vehicle license plate analysis can be deployed on highways for electronic toll collection, and can be implemented as a method of cataloguing the movement of traffic as well as provide enhanced security by establishing data on suspicious vehicles in a more efficient way.
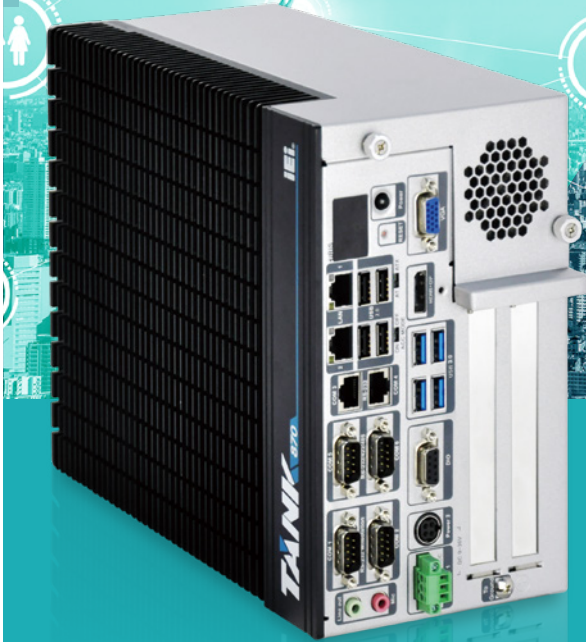
Traffic management

LPR

TANK
ACCELERATE TO THE FUTURE
AIoT Dev. Kit

The TANK AIoT Dev. Kit features rich I/O and dual PCIe slots (x16) to support add-ons like the Acceleration cards (Mustang-F100-A10 & Mustang-V100-MX8) or the PoE card to enhance performance and function for various applications.

≫ Integrate AI into IOT applications

Open the door to faster deployments of Inference Systems with the TANK AIoT Dev. Kit via the Intel® Distribution of OpenVINO™ toolkit & Intel® Media SDK

TANK
ACCELERATE TO THE FUTURE
TANK-AIoT Dev. Kit
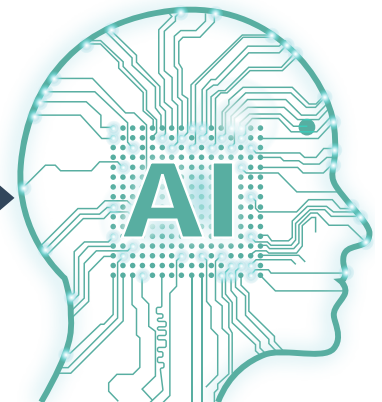
- 6th/7th Gen Intel® Core™/Xeon® processor platform with Intel® Q170/C236 chipset and DDR4 memory
- Pre-install OpenVINO™ toolkit for AI inference acceleration
- Support Intel® CPU、GPU、FPGA、VPU acceleration

intel FPGA

Mustang-F100-A10

intel Movidius™

Mustang-V100-MX8

AI

TANK AIoT Developer Kit

NEW

Feature

- 6th/7th Gen Intel® Core™/Xeon® processor platform with Intel® Q170/C236 chipset and DDR4 memory
- Dual independent display with high resolution support
- Rich high-speed I/O interfaces on one side for easy installation
- On-board internal power connector for providing power to add-on cards
- Great flexibility for hardware expansion
- Pre-installed Ubuntu 16.04 LTS
- Pre-installed Intel® Distribution of Open Visual Inference & Neural Network Optimization (OpenVINO™) toolkit,Intel® Media SDK, Intel® System Studio and Arduino® Create

Specifications

Model Name	TANK AIoT Dev. Kit
Chassis	
Color	Black C + Silver
Dimensions (WxDxH)	121.5 x 255.2 x 205 mm (4.7" x 10" x 8")
System Fan	Fan
Chassis Construction	Extruded aluminum alloys
Weight (Net/Gross)	4.2 kg (9.26 lbs)/ 6.3 kg (13.89 lbs)
Motherboard	
CPU	Intel® Xeon® E3-1268LV5 2.4GHz (up to 3.4 GHz, Quad Core, TDP 35W) Intel® Core™ i7-7700T 2.9GHz (up to 3.8 GHz, Quad Core, TDP 35W) Intel® Core™ i5-7500T 2.7GHz (up to 3.3 GHz, Quad Core, TDP 35W) Intel® Core™ i7-6700TE 2.4 GHz (up to 3.4GHz, quad-core, TDP 35W) Intel® Core™ i5-6500TE 2.3 GHz (up to 3.3GHz, quad-core, TDP 35W)
Chipset	Intel® Q170/C236 with Xeon® E3 only
System Memory	2 x 260-pin DDR4 SO-DIMM, 8 GB pre-installed (for i5/i5KBL/i7 sku) 16 GB pre-installed (for i7KBL sku) 32 GB pre-installed (for E3 sku)
Storage	
Hard Drive	2 x 2.5'' SATA 6Gb/s HDD/SSD bay, RAID 0/1 support (1x 2.5" 1TB HDD pre-installed)
I/O Interfaces	
USB 3.1 Gen 1	4
USB 2.0	4
Ethernet	2 x RJ-45 LAN1: Intel® I219LM PCIe controller with Intel® vPro™ support LAN2 (iRIS): Intel® I210 PCIe controller
COM Port	4 x RS-232 (2 x RJ-45, 2 x DB-9 w/2.5KV isolation protection) 2 x RS-232/422/485 (DB-9)

Digital I/O	8-bit digital I/O, 4-bit input / 4-bit output
Display	1 x VGA 1 x HDMI/DP 1 x iDP (optional)
Resolution	VGA: Up to 1920 x 1200@60Hz HDMI/DP: Up to 3840x2160@30Hz / 4096×2304@60Hz
Audio	1 x Line-out, 1 x Mic-in
TPM	1x Infineon TPM 2.0 Module
Expansions	
Backplane	2 x PCIe x8
PCIe Mini	1 x Half-size PCIe Mini slot 1 x Full-size PCIe Mini slot (supports mSATA, colay with SATA)
Power	
Power Input	DC Jack: 9 V~36 V DC Terminal Block: 9 V~36 V DC
Power Consumption	19 V@3.68 A (Intel® Core™ i7-6700TE with 8 GB memory)
Internal Power output	5V@3A or 12V@3A
Reliability	
Mounting	Wall mount
Operating Temperature	Xeon® E3 -20°C ~ 60°C with air flow (SSD), 10% ~ 95%, non-condensing i7-7700T -20°C ~ 35°C with air flow (SSD), 10% ~ 95%, non-condensing i5-7500T -20°C ~ 45°C with air flow (SSD), 10% ~ 95%, non-condensing i7-6700TE -20°C ~ 45°C with air flow (SSD), 10% ~ 95%, non-condensing i5-6500TE -20°C ~ 60°C with air flow (SSD), 10% ~ 95%, non-condensing
Operating Vibration	MIL-STD-810G 514.6 C-1 (with SSD)
Safety/EMC	CE/FCC/RoHS
OS	
Supported OS	Win10/Linux Ubuntu 16.04 LTS

Ordering Information

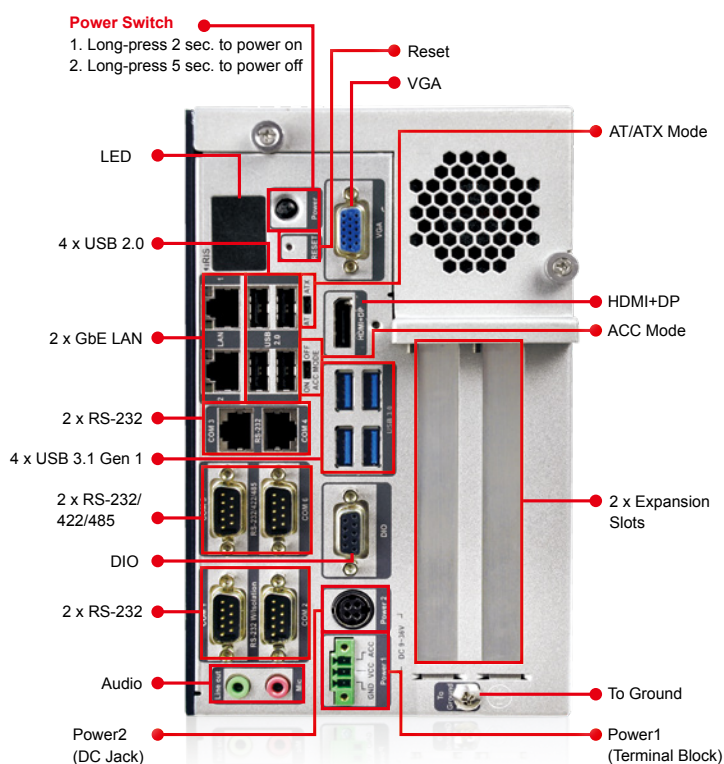| Part No.	Description
TANK-870AI-E3/32G/2A-R11	Ruggedized embedded system with Intel® Xeon® E3-1268LV5 2.4GHz, (up to 3.4 GHz, Quad Core, TDP 35W), 32 GB DDR4 pre-installed memory, 2 x PCIe by 8 expansion, 2.5" 1TB HDD , TPM 2.0 , 9~36V DC, 120W AC DC power adaptor , RoHS
TANK-870AI-i7KBL/16G/2A-R11	Ruggedized embedded system with Intel® Core™ i7-7700T 2.9GHz, (up to 3.8 GHz, Quad Core, TDP 35W), 16 GB DDR4 pre-installed memory, 2 x PCIe by 8 expansion, 2.5" 1TB HDD , TPM 2.0 , 9~36V DC, 120W AC DC power adaptor, RoHS
TANK-870AI-i5KBL/8G/2A-R11	Ruggedized embedded system with Intel® Core™ i5-7500T 2.7GHz, (up to 3.3 GHz, Quad Core, TDP 35W), 8GB DDR4 pre-installed memory, 2 x PCIe by 8 expansion, 2.5" 1TB HDD , TPM 2.0 , 9~36V DC, 120W AC DC power adaptor , RoHS
TANK-870AI-i7/8G/2A-R11	Ruggedized embedded system with Intel® Core™ i7-6700TE 2.4GHz, (up to 3.4 GHz, Quad Core, TDP 35W), 8GB DDR4 pre-installed memory, 2 x PCIe by 8 expansion, 2.5" 1TB HDD , TPM 2.0 , 9~36V DC, 120W AC DC power adaptor , RoHS
TANK-870AI-i5/8G/2A-R11	Ruggedized embedded system with Intel® Core™ i5-6500TE 2.3GHz, (up to 3.3 GHz, Quad Core, TDP 35W), 8GB DDR4 pre-installed memory, 2 x PCIe by 8 expansion, 2.5" 1TB HDD , TPM 2.0 , 9~36V DC, 120W AC DC power adaptor , RoHS

AI Accelerator Card Options

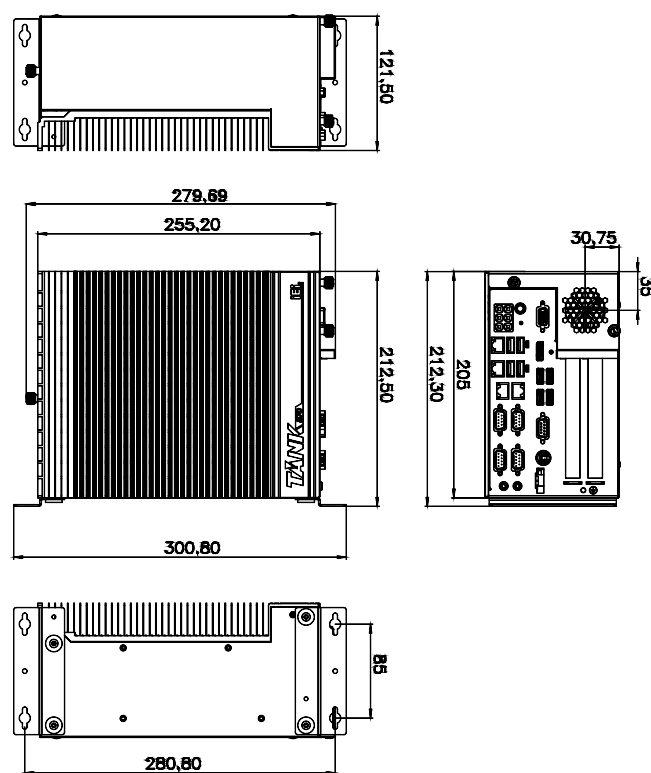| Part No.	Description
Mustang-F100-A10-R10	PCIe FPGA Highest Performance Accelerator Card with Arria 10 1150GX support DDR4 2400Hz 8GB, PCIe Gen3 x8 interface, RoHS
Mustang-V100-MX8-R10	Computing Accelerator Card with 8 x Movidius Myriad X MA2485 VPU, PCIe Gen2 x4 interface, RoHS

Packing List

1 x Chassis Screw	1 x 120W Adapter
1 x Mounting Bracket	1 x Power Cord
1 x QSG	

Fully integrated I/O

Power Switch
1. Long-press 2 sec. to power on
2. Long-press 5 sec. to power off

- Reset
- VGA
- AT/ATX Mode
- LED
- 4 x USB 2.0
- 2 x GbE LAN
- HDMI+DP
- ACC Mode
- 2 x RS-232
- 4 x USB 3.1 Gen 1
- 2 x RS-232/422/485
- DIO
- 2 x Expansion Slots
- 2 x RS-232
- Audio
- Power2 (DC Jack)
- Power1 (Terminal Block)
- To Ground

Dimensions (Unit:mm)

121,50

279,69
255,20
212,50
212,30
205
30,75
35
300,80

85
280,80

IEI AI Ready Modular Box PC

Critical Success Factors for Edge Inference Systems

**The FLEX series offers six features to help AI developers to build diverse AI solutions.**

Industrial grade

Meet MIL-810F vibration test and support extended operating temperature from -10°C~50°C to assure assures system reliability and endurance under the highest level in volatile, harsh and critical environments.

Interconnectivity

IEI's FLEX series offer diverse I/O, including COM, USB, GbE LAN, HDMI and audio ports, highly interconnected with arrays of sensors and peripherals
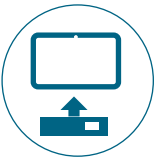
Flexible deployment

Compact 2U system for flexible deployment allows it to be installed everywhere by rack mounting, wall mounting, and even converted to an all-in-one panel PC.

High volume RAID 0/1/5/10 storage capacity

AI systems are highly dependent on enormous volumes of data. IEI's inference computing system, the FLEX series, is equipped with 4 hot-swappable HDDs and dual NVMe SSDs supporting massive storage capacity required for AI workloads.
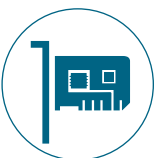
Flexible expansion capability

Two PCIe x8 and two PCIe x4 expansion slots allow AI developers to install AI add-on-cards, like VPU, GPU, capture cards and I/O cards, to accelerate AI development.
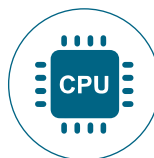
8th Generation Intel® Core™ Desktop Processors

Equipped with a powerful CPU processor, IEI's FLEX system offers advanced computing and graphics performance for computationally intensive processes.

8th Generation Intel® Core™ Desktop Processors

For applying inference prediction immediately based on trained model, how to select system components is a huge puzzle. The numbers of GPU, the cores of CPU and the size of the memory always matter. CPU is responsible mainly for data processing and communicating with GPU. Hence, the number of cores and threads per core are paramount. It is better to choose a multi-core processor to handle AI tasks.
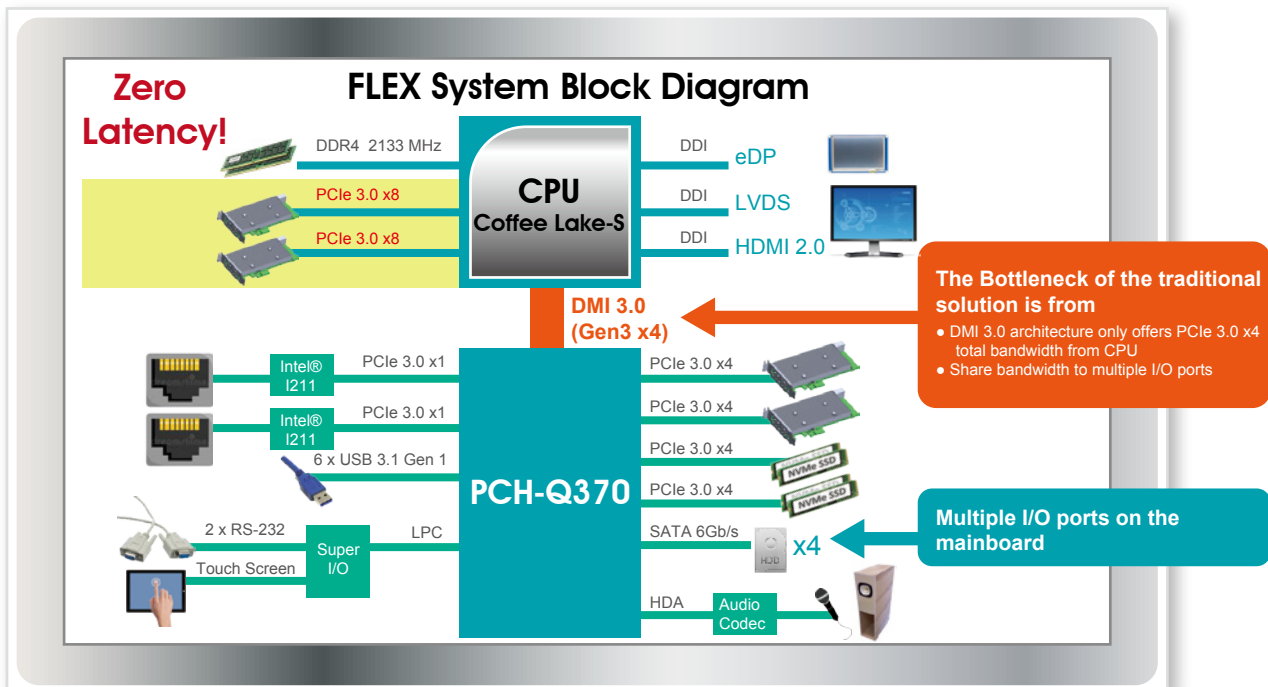
IEI FLEX series adopts the 8th Generation Intel® Core™ desktop processor, of which the Core i7 is moving to six cores with HyperThreading, Core i5 is moving to six cores, and Core i3 is moving to four core. The equipped LGA 1151 socket supports a wide range of performance options up to 65W TDP processors. The dual DDR4 DIMM slot with more direct trace routes support up to 64GB of memory.

CFL-S
65/35W, LGA

CFL-S
6/4/2 cores

DMI

CNL PCH-H

CPU Generation	P/N	Lithography	# of Cores	# of Threads	Frequency	TDP
8th Gen. Intel® Coffee Lake	i7-8700T	14nm	6	12	2.40GHz	35W
	i5-8500T	14nm	6	6	2.10GHz	35W
	i3-8100T	14nm	4	4	2.40GHz	35W
	P-G5400T	14nm	2	4	3.10GHz	35W
7th Gen. Intel® Kaby Lake	i7-7700T	14nm	4	8	2.90GHz	35W
	i5-7500T	14nm	4	4	2.70GHz	35W
	i3-7100T	14nm	2	4	3.40GHz	35W
	C-G4900T	14nm	2	2	2.9GHz	35W

Breakthrough the Bottleneck of DMI 3.0

The signal of the two PCIe 3.0 by 8 slots directly connect to CPU instead of DMI 3.0 channel. By doing this, the PCIe 3.0 x8 add-on cards can run with lower latency and achieve complete AI card performance.

Zero Latency!

FLEX System Block Diagram

DDR4 2133 MHz

PCIe 3.0 x8

PCIe 3.0 x8

CPU Coffee Lake-S

DDI → eDP

DDI → LVDS

DDI → HDMI 2.0

DMI 3.0 (Gen3 x4)

The Bottleneck of the traditional solution is from
- DMI 3.0 architecture only offers PCIe 3.0 x4 total bandwidth from CPU
- Share bandwidth to multiple I/O ports

Intel® I211 — PCIe 3.0 x1

Intel® I211 — PCIe 3.0 x1

6 x USB 3.1 Gen 1

2 x RS-232

Touch Screen

Super I/O — LPC

PCH-Q370

PCIe 3.0 x4

PCIe 3.0 x4

PCIe 3.0 x4

PCIe 3.0 x4 — NVMe SSD

SATA 6Gb/s — x4

Multiple I/O ports on the mainboard

HDA — Audio Codec

PCIe 3.0 High Speed Expansion Slots

All of the expansion slots of the FLEX series support PCIe 3.0, which doubles the speed per lane from 500MB/s to 1GB/s compared to PCIe 2.0. The high-speed PCIe 3.0 can fulfill the bandwidth requirements of 10G Ethernet cards, USB 3.1 cards, even the high end graphics cards and PCIe NVMe SSDs.
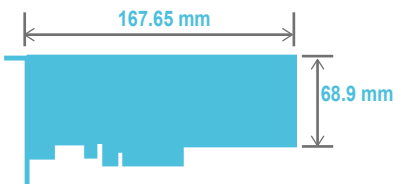
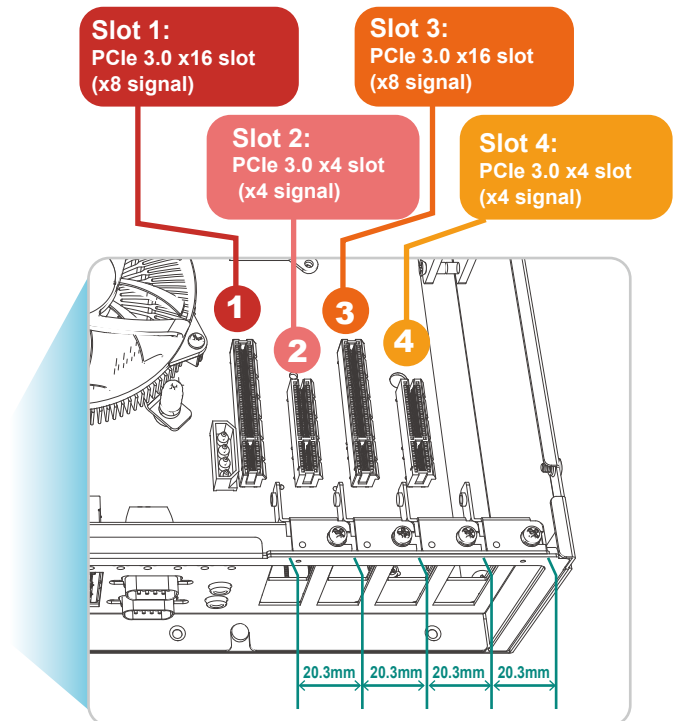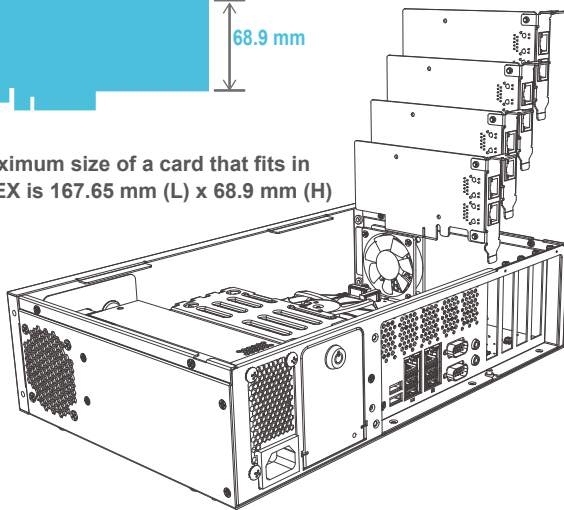| Interface	Theory Bandwidth
PCIe 2.0 x1	5GT/s
PCIe 3.0 x1	8GT/s

Four PCIe x4/x8 Low Profile Expansion Slots

The FLEX series supports multiple PCIe slots including two PCIe 3.0 x8 and two PCIe 3.0 x4 slots, which are compatible with standard low profile add-on cards, to meet different edge inference computing applications.

● High Speed: 10GbE card, fiber network card
● I/O card: Serial port card, USB card, LAN card, etc.
● AI accelerating card: VPU card, FPGA, GPU card, etc.
● Wireless card: Wi-Fi card, mobile wireless card, etc.
● Storage card

Slot 1:
PCIe 3.0 x16 slot
(x8 signal)

Slot 3:
PCIe 3.0 x16 slot
(x8 signal)

Slot 2:
PCIe 3.0 x4 slot
(x4 signal)

Slot 4:
PCIe 3.0 x4 slot
(x4 signal)

167.65 mm

68.9 mm

The maximum size of a card that fits in this FLEX is 167.65 mm (L) x 68.9 mm (H)

20.3mm 20.3mm 20.3mm 20.3mm

❯❯ Thunderbolt™ 3 Dual Ports (optional)

The FLEX series can be built-in with IEI thunderbolt™ 3 card, the TB3-40GDP-R10, to support dual Thunderbolt 3 ports for connecting displays and USB devices and provide more speed.

How fast is it?

● 40Gpbs Thunderbolt, PCI Express Gen 3 and Display Port
● Double the speed of previous generation
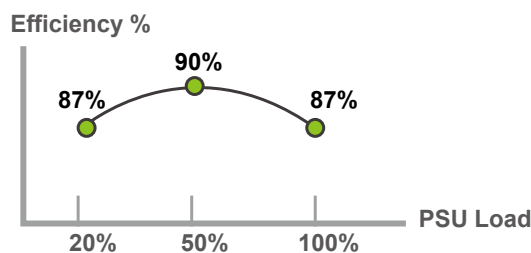● Four times the data and twice the vide bandwidth of any other cable

P/N	TB3-40GDP-R10
Interface	PCIe 3.0 x4
I/O ports	2 x Thunderbolt 3 port (USB Type-C) 1 x mini-DisplayPort

Only supported by the pcieX4_1 slot in the system

THUNDERBOLT™

USB 2.0	480 mbps
USB 3.1 Gen 1	5 Gbps
Thunderbolt™	10 Gbps
Thunderbolt™ 2	20 Gbps
Thunderbolt™ 3	40 Gbps
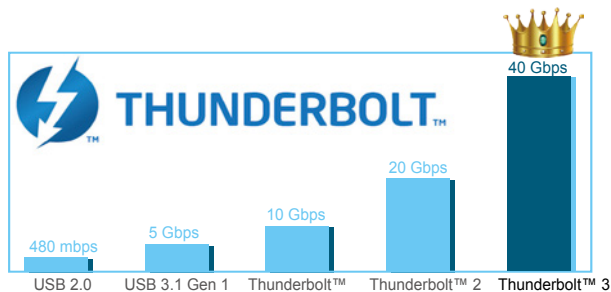
❯❯ Built-in 80-Plus Gold Power Supply

The 80-plus Gold power supply is implemented into the FLEX series, which reduces power loss and increases efficiency during power transition. With the certified power supply, the power transition between AC source and DC source could maintain up to 87% efficiency, and the power loss is only 13% or less. For customers, the high efficiency of power transition could reduce not only cost but also heat loss. Furthermore, it could make an eco-friendly environment.

Efficiency %

90%
87%   87%

20%   50%   100%   PSU Load

| Parameters	Loading	Gold	Silver	Bronze	80 Plus
Efficiency	20%	87%	85%	82%	80%
	50%	90%	88%	85%	80%
	100%	87%	85%	82%	80%
Power Factor	50%	90% (across the full range)			90% (@100% Load)

❯❯ Dual M.2 M-Key NVMe PCIe 3.0 x4 SSD Support

The FLEX series provides higher transfer speed and reliability with support for two additional PCIe by 4 M.2 2280 NVMe SSDs with 32Gb/s high speed transfer rate. It is safer to have NVMe SSDs installed in the system internally, because users can install operating system in it to avoid OS crash caused by unplugging the storage accidentally, and to prevent the drive from being stolen.

● NVMe reduces latency
● Delivers higher input/output per second (IOPS)

4-Bay Hot Swappable HDD RAID 0/1/5/10 Protection

The FLEX series offers four 2.5"HDD bays with high speed SATA 6Gb/s interface that can expand storage capabilities and enable fast data transfers. The equipped Intel Q370 chipset provides reliable and high performance hardware RAID protection to back-up your media and critical information. You can configure the RAID 0/1/5/10 from the BIOS menu to increase performance and/or provide automatic protection against data loss from drive failure.
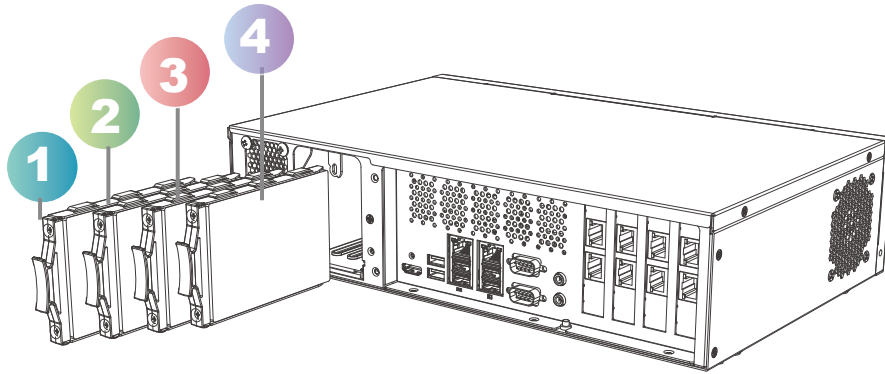

Secured and Strong HDD Bays

Flexible Deployment

All-in-One Panel PC

The FLEX series featuring a modular design can be fitted with different sizes of panel kits to expand its capabilities.

- Various monitor choices: 15"/15.6"/17"/18.5"/21.5"/23.8"
- PCAP touch screen
- Easy assembly and maintenance
- One stop shopping and build your own system to accelerates time to market

FLEX-BX200-Q370

FLEX-PLKIT

15"~24" Modular Panel PC
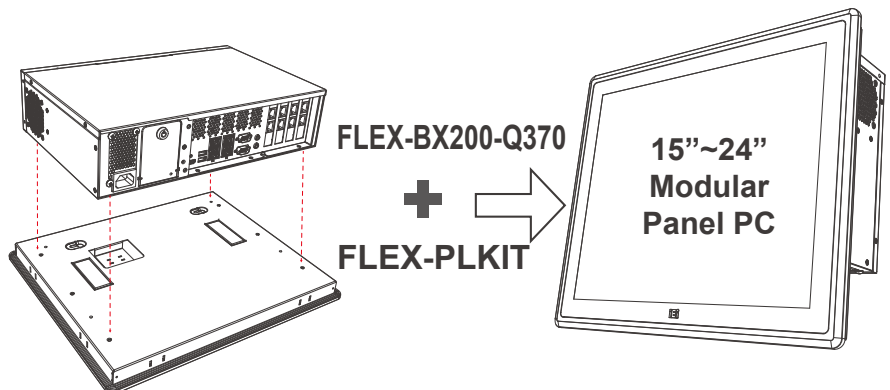
FLEX-BX200 | 2U AI Modular PC with 8th Generation LGA1151 Core™ i7/i5/i3 and Pentium® Processor

NEW

Hardware Feature

- 2U AI Modular PC with 8th Generation LGA 1151 Intel® Core™ i7/i5/i3 and Pentium® processor
- Four hot-swappable and accessible HDD drive bays, support RAID 0/1/5/10
- Two PCIe 3.0 by 4 and two PCIe 3.0 by 8 slots
- Dual M.2 2280 PCIe Gen 3.0 x4 NVMe™ SSD support
- QTS-Gateway support

Specifications

Model		FLEX-BX200-Q370
System	CPU	8th Genertion Intel® Core™ i7/i5/i3 porcessors in the LGA 1151 package (Please choose the TDP of the the processor under 65W)
	Chipset	Intel® 300 Series Chipsets Q370 (Coffee Lake)
	Memory	2 x 288-pin 2666/2400 MHz dual-channel DDR4 unbuffered DIMM supporting up to 64GB
	Graphics Engine	Intel® HD Graphics Gen 9 Engines with Low power 16 execution unit, supports DX2015, OpenGL 5.X and OpenCL2.x, ES 2.0
	Ethernet	Intel® I211 controller
Storage		4 x accessible 2.5" HDD/SSD SATA 6 Gb/s bay (with RAID 0/1/5/10 support) with LED indicator 2 x NGFF M.2(2280) M Key socket (support NVMe SSD)
I/O Ports and Switches		1 x HDMI output 2 x GbE LAN 6 x USB 3.1 Gen 1 (5Gb/s) Type-A 2 x RS-232 DB-9 type 1 x Mic in1 x Line out 1 x AC Inlet Power button with power LED (power on=Blue) AT/ATX mode switch Reset button
Expansion Slots		2 x PCIe 3.0 by 8 (by 16 slot) 2 x PCIe 3.0 by 4 (Maximum card size supported: 68 mm x 167 mm)
Thermal Solution		System Fan x3, CPU Cooler x1
Power supply		AC input ATX power supply 1. 250W power supply - Input: 115VAC~230VAC, 50/60Hz - Output (Max.): 3.3V@12A, 5V@14A, 12V@25A, -12V@0.3A,+5Vsb@3A 2. 350W power supply (Build to Order) - Input: 115VAC~264VAC, 50/60Hz - Output (Max.): 3.3V@14A, 5V@16A, 12V@29A, -12V@0.3A,+5Vsb@3A -Efficiency: Full load (100%) 87%, Typical load (50%) 90%, Light load (20%) 87%
Watchdog Timer		Software Programmable support 1~255 sec. System reset
Construction	Chassis Construction	Metal Housing
	Mounting	Wall and Rack Mount
	Color	Black
	Dimensions (LxDxH) (mm)	357 x 230 x 88
	Weight (kg) Net/Gross	4/6
Environmental	Operating Temperature	-20°C ~ 50°C (with SSD and TDP 65W processor) -20°C ~ 40°C (with HDD or add-on cards without fan)
	Storage Temperature	-20°C ~ 60°C
	Operating Humidity	5% ~95%, non-condensing
	Vibration	5~17Hz, 0.1 double amplitude displacement 17~640Hz 1.5G acceleration peak to peak
	shock	10G acceleration part to part (11ms)

Ordering Information

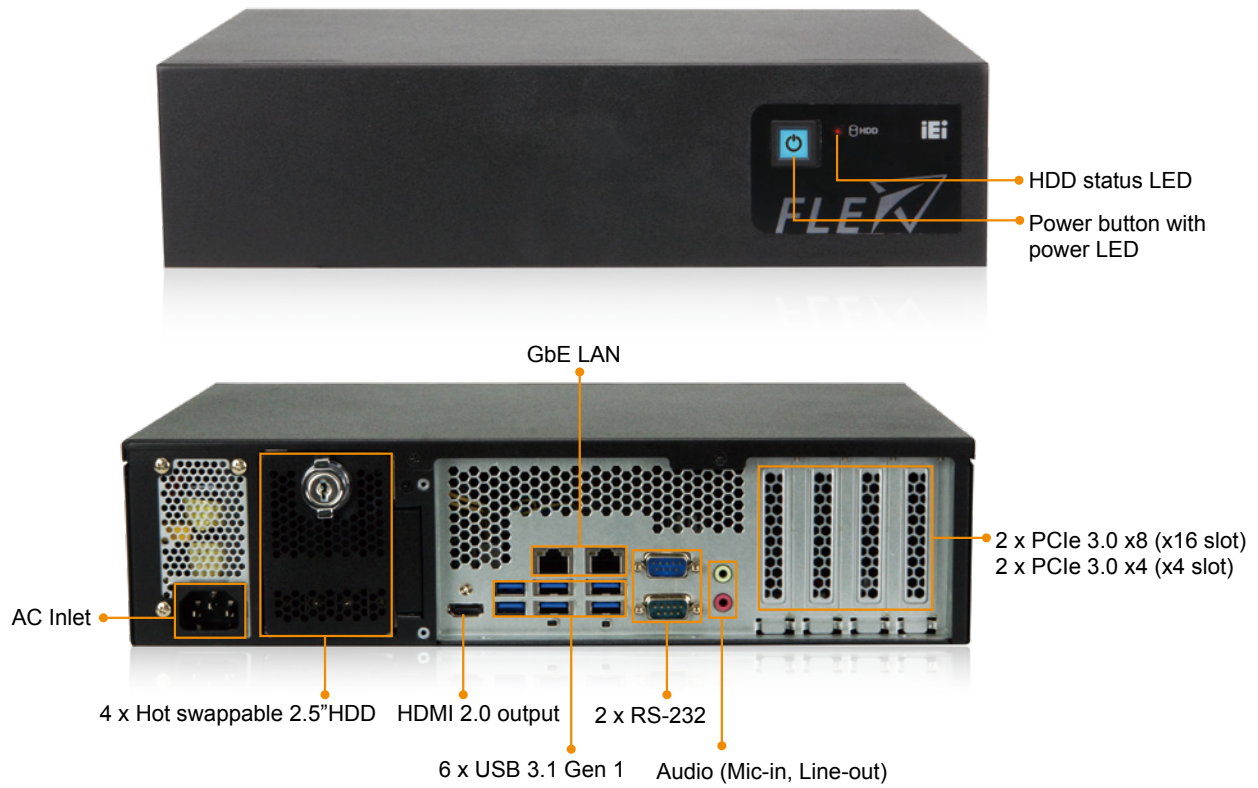| Part No.	Description
FLEX-BX200-Q370-P/25-R10	2U AI Modular Box PC, Intel® Pentium® Gold G5400T Processor (2-core, 4-thread, 3.10 GHz) TDP 35W, two PCIe x4 and two PCIe x8 slots, four HDD bays, 250W PSU, R10
FLEX-BX200-Q370-i3/25-R10	2U AI Modular Box PC, Intel® Core™ i3-8100T Processor (4-core, 4-thread, 3.10 GHz) TDP 35W, two PCIe x4 and two PCIe x8 slots, four HDD bays, 250W PSU, R10
FLEX-BX200-Q370-i5/25-R10*	2U AI Modular Box PC, Intel® Core™ i5-8500T Processor (6-core, 6-thread, 2.1 GHz) TDP 35W, two PCIe x4 and two PCIe x8 slots, four HDD bays, 250W PSU, R10
FLEX-BX200-Q370-i7/25-R10*	2U AI Modular Box PC, Intel® Core™ i7-8700T Processor (6-core,12-thread,2.4 GHz) TDP 35W, two PCIe x4 and two PCIe x8 slots, four HDD bays, 250W PSU, R10
FLEX-BX200-Q370-P/35-R10*	2U AI Modular Box PC, Intel® Pentium® Gold G5400T Processor (2-core, 4-thread, 3.10 GHz) TDP 35W, two PCIe x4 and two PCIe x8 slots, four HDD bays, 350W PSU, R10
FLEX-BX200-Q370-i3/35-R10*	2U AI Modular Box PC, Intel® Core™ i3-8100T Processor (4-core, 4-thread, 3.10 GHz) TDP 35W, two PCIe x4 and two PCIe x8 slots, four HDD bays, 350W PSU, R10
FLEX-BX200-Q370-i5/35-R10*	2U AI Modular Box PC, Intel® Core™ i5-8500T Processor (6-core, 6-thread, 2.1 GHz) TDP 35W, two PCIe x4 and two PCIe x8 slots, four HDD bays, 350W PSU, R10
FLEX-BX200-Q370-i7/35-R10*	2U AI Modular Box PC, Intel® Core™ i7-8700T Processor (6-core,12-thread,2.4 GHz) TDP 35W, two PCIe x4 and two PCIe x8 slots, four HDD bays, 350W PSU, R10

*Build to order

Packing List

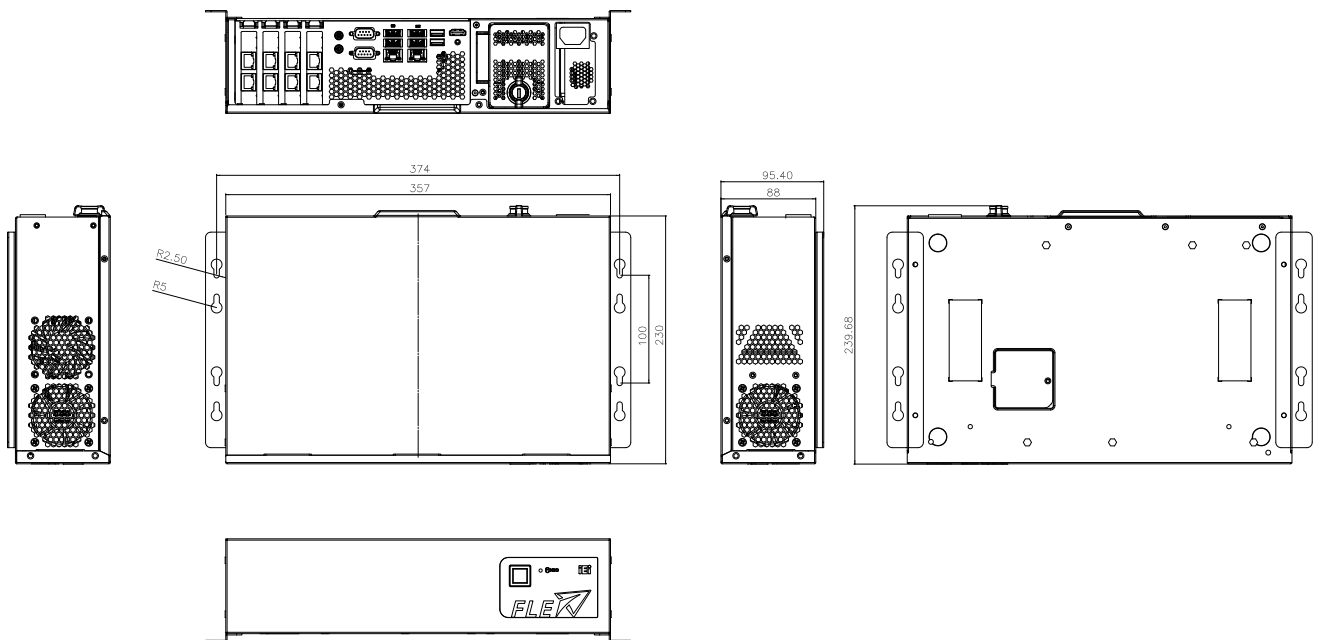| Item	Q'ty	Remark
32702-000200-100-RS	1	European power cord, 1830mm
41020-0521C2-00-RS	2	wall mount kit, black
44035-040062-RS	4	M4*6 oval head screw for wall mount kit, black
	1	Key for HDD cover

Options

Part No.	Description
FLEX-BXRK-R10	Rack mount kit

I/O Interface

HDD status LED

Power button with power LED

GbE LAN

2 x PCIe 3.0 x8 (x16 slot)
2 x PCIe 3.0 x4 (x4 slot)

AC Inlet

4 x Hot swappable 2.5"HDD   HDMI 2.0 output   2 x RS-232

6 x USB 3.1 Gen 1   Audio (Mic-in, Line-out)

FLEX-BX200
Dimensions *(Unit: mm)*

374
357
R2.50
R5
100
230
95.40
88
239.68

Configurable Systems

Panel Kit Modules

Specifications

Model		FLEX-PLKIT-F15	FLEX-PLKIT-F17	FLEX-PLKIT-FW15	FLEX-PLKIT-FW19	FLEX-PLKIT-FW22	FLEX-PLKIT-FW24
TFT LCD	LCD Size	15”	17”	15.6"	18.5"	21.5”	23.8”
	Max. Resolution	1024x768	1280x1024	1366x768	1366x768	1920x1080	1920x1080
	Brightness (cd/m²)	450	350	400	400	250	250
	Contrast Ratio	800:1	1000:1	500:1	1000:1	1000:1	3000:1
	LCD Color	16.2M	16.7M	16.2M	16.7M	16.7M	16.7M
	Viewing Angle (H/V)	160°/150°	170°/160°	170°/160°	170°/160°	170°/160°	178°/178°
	Backlight MTBF (Hrs)	70,000	50,000	50,000	50,000	30,000	30,000
Touch Screen		PCAP touch with 10-point multitouch and anti-glare coating					
Video Interface		LVDS					
IP Rating		IP66-rated front panel					
Other		Support FLEX-BX200-Q370 only					

Ordering Information

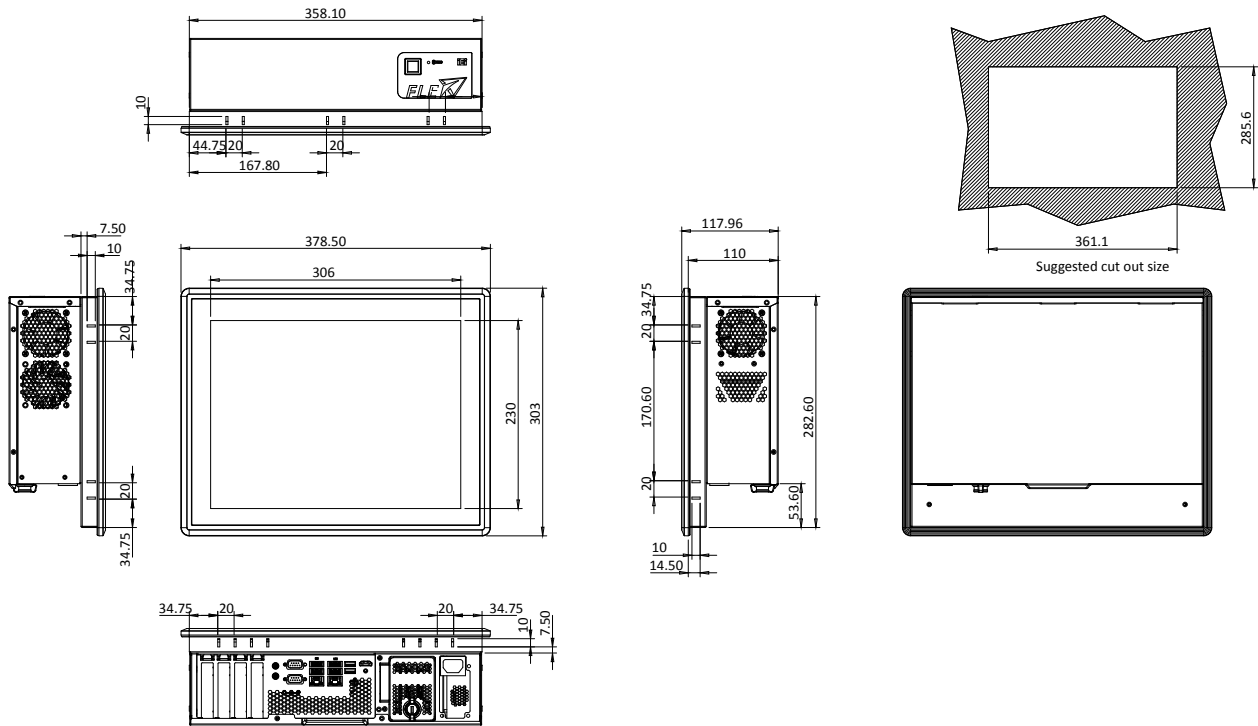| Part No.	Description
FLEX-PLKIT-F15/PC-R10	15" 450cd/m² 1024 x768 FLEX modular resistive touch window/LCD kit, R10
FLEX-PLKIT-F17/PC-R10	17" 350cd/m² 1280 x 1024 FLEX modular PCAP touch window/LCD kit, R10
FLEX-PLKIT-FW15/PC-R10	15.6" 400cd/m² 1366 x 768 FLEX modular PCAP touch window/LCD kit, R10
FLEX-PLKIT-FW19/PC-R10	18.5" 400cd/m² 1366 x 768 FLEX modular PCAP touch window/LCD kit, R10
FLEX-PLKIT-FW22/PC-R10	21.5" 250cd/m² 1920 x 1080 FLEX modular PCAP touch window/LCD kit, R10
FLEX-PLKIT-FW24/PC-R10	23.8" 250cd/m² 1920 x 1080 FLEX modular PCAP touch window/LCD kit, R10

Options

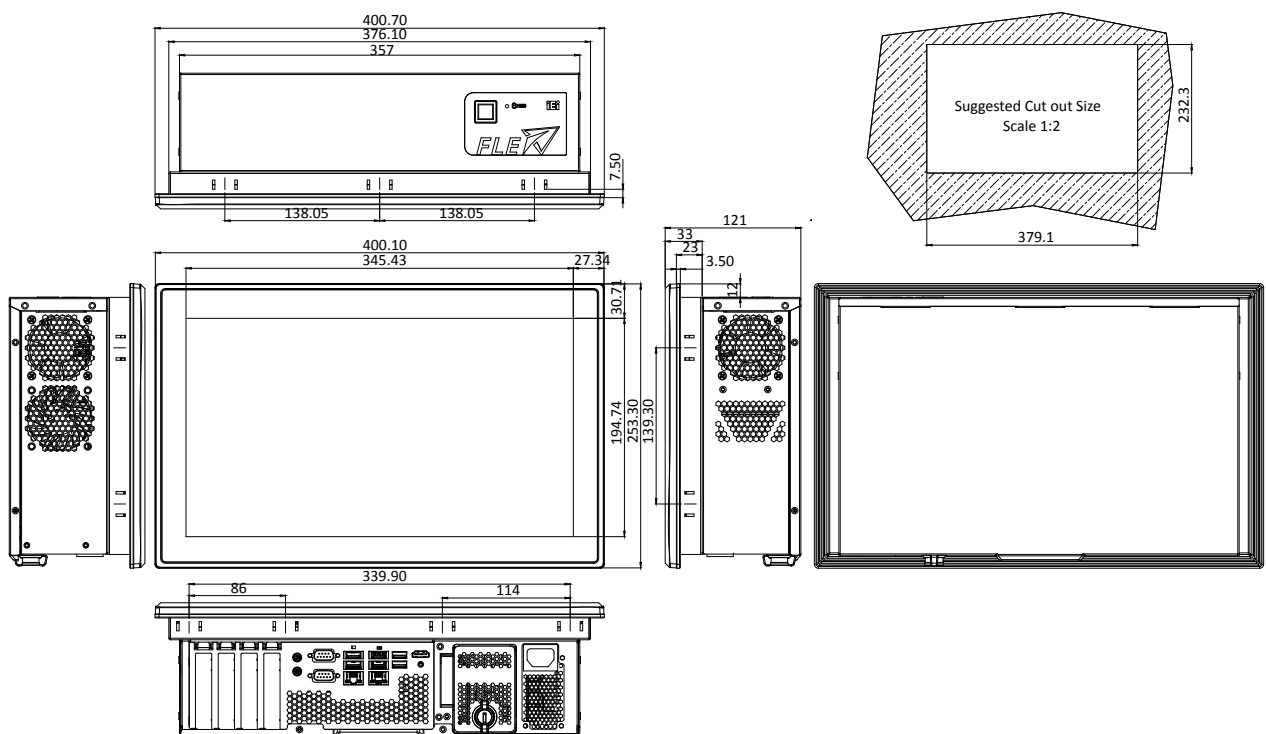| Item	FLEX-PLKIT-F15	FLEX-PLKIT-FW15	FLEX-PLKIT-F17	FLEX-PLKIT-FW19	FLEX-PLKIT-FW22	FLEX-PLKIT-FW24
Panel Mount Kit	FPK-12-R10	FPK-14-R10	FPK-13-R10	FPK-13-R10	FPK-13-R10	FPK-14-R10
Rack Mount Kit	FRK15C-R10	FRKW15C-R10	FRK17C-R10	FRKW19C-R10	N.A.	N.A.

FLEX-BX200 Series

+

FLEX-PLKIT Series

=   PPC-FxxC Series
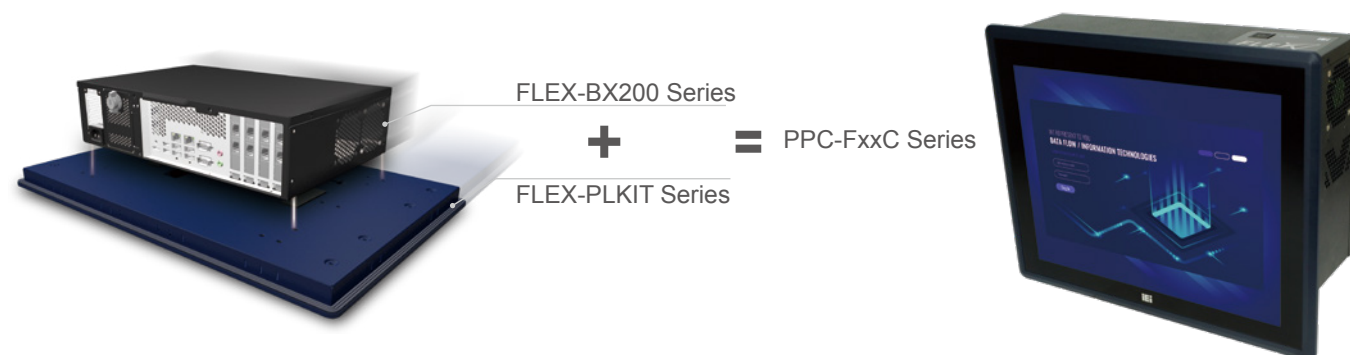
Configurable Systems

PPC-F15C-Q370 Dimensions (Unit: mm)

Suggested cut out size

PPC-FW15C-Q370 Dimensions (Unit: mm)

Suggested Cut out Size
Scale 1:2

Configurable Systems

PPC‑F17C‑Q370 Dimensions (Unit: mm)

Suggested Cutout Size
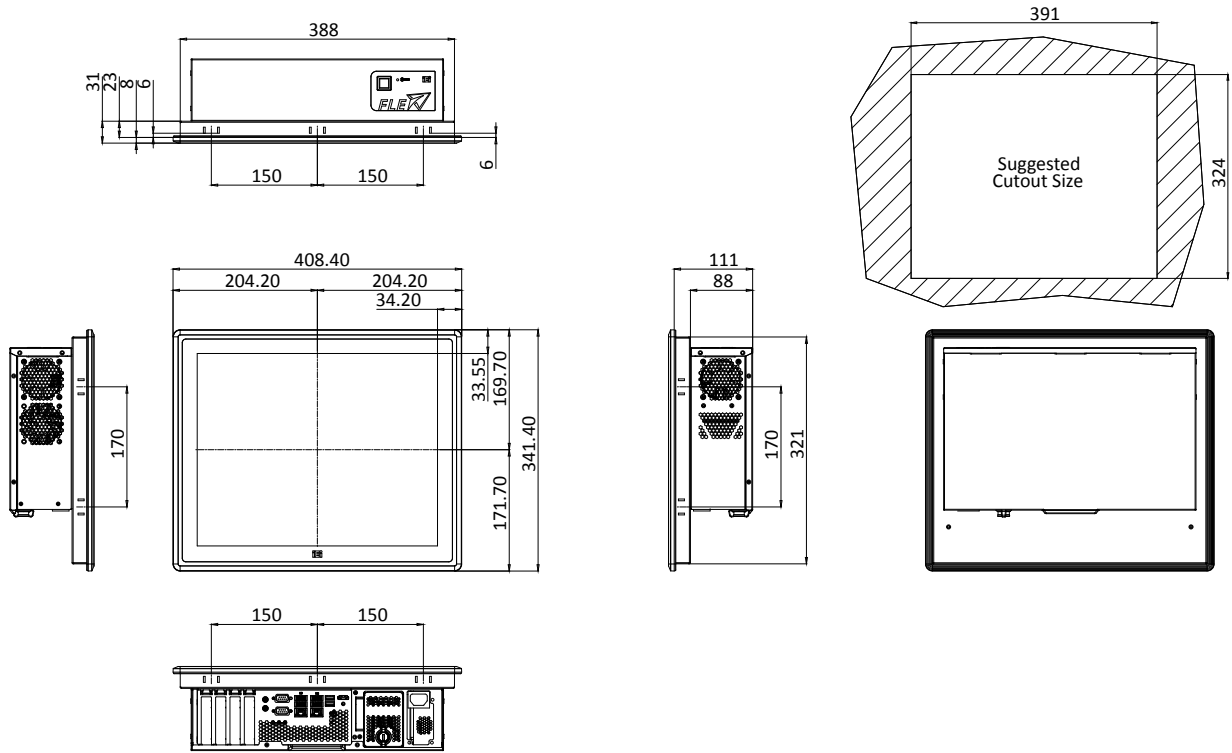
PPC‑FW19C‑Q370 Dimensions (Unit: mm)

Suggested Cut Out Size
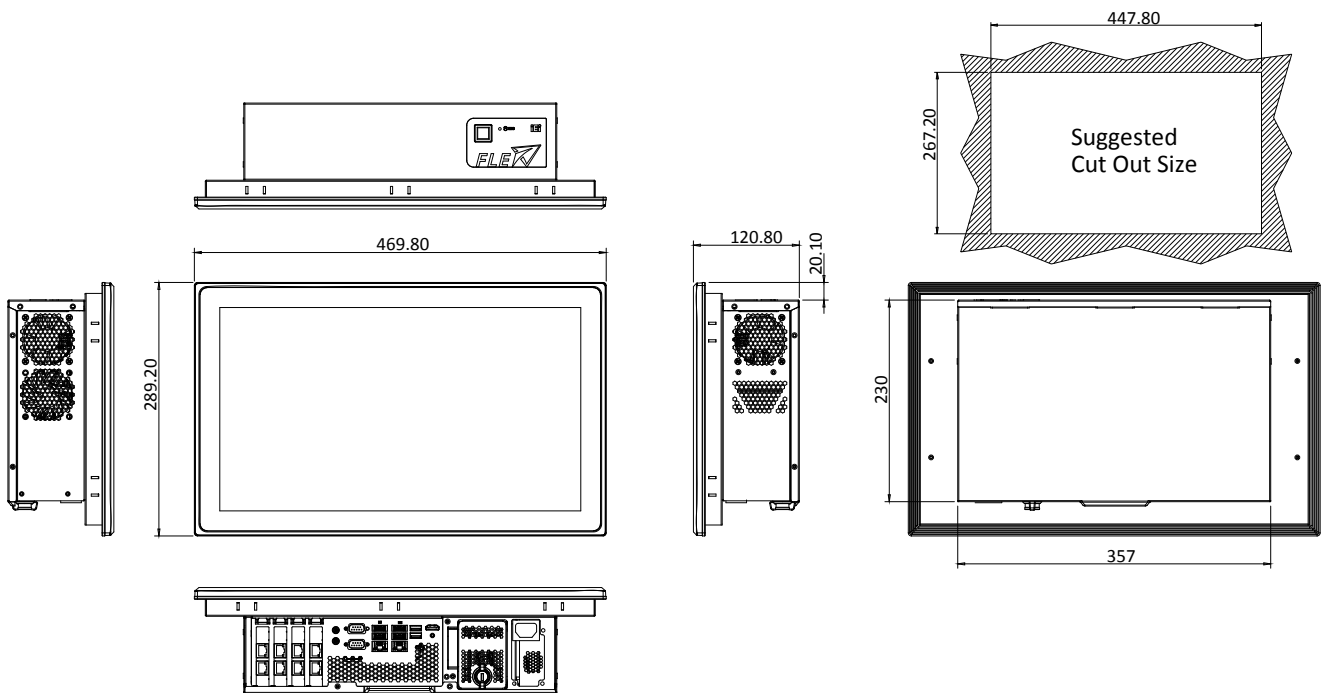
Configurable Systems

PPC-FW22C-Q370 Dimensions (Unit: mm)

Suggested Cut out Size
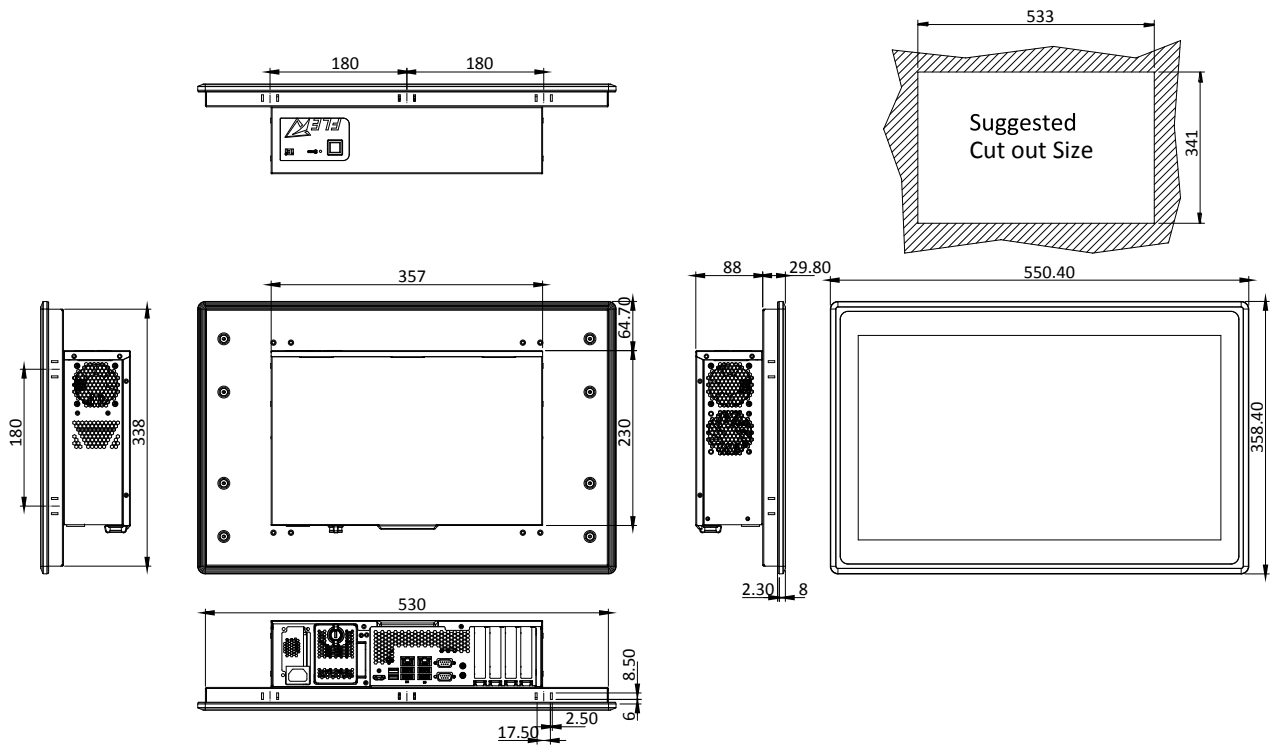
## PPC-FW24C-Q370 Dimensions (Unit: mm)

Suggested Cut Out Size
Scale 1:2
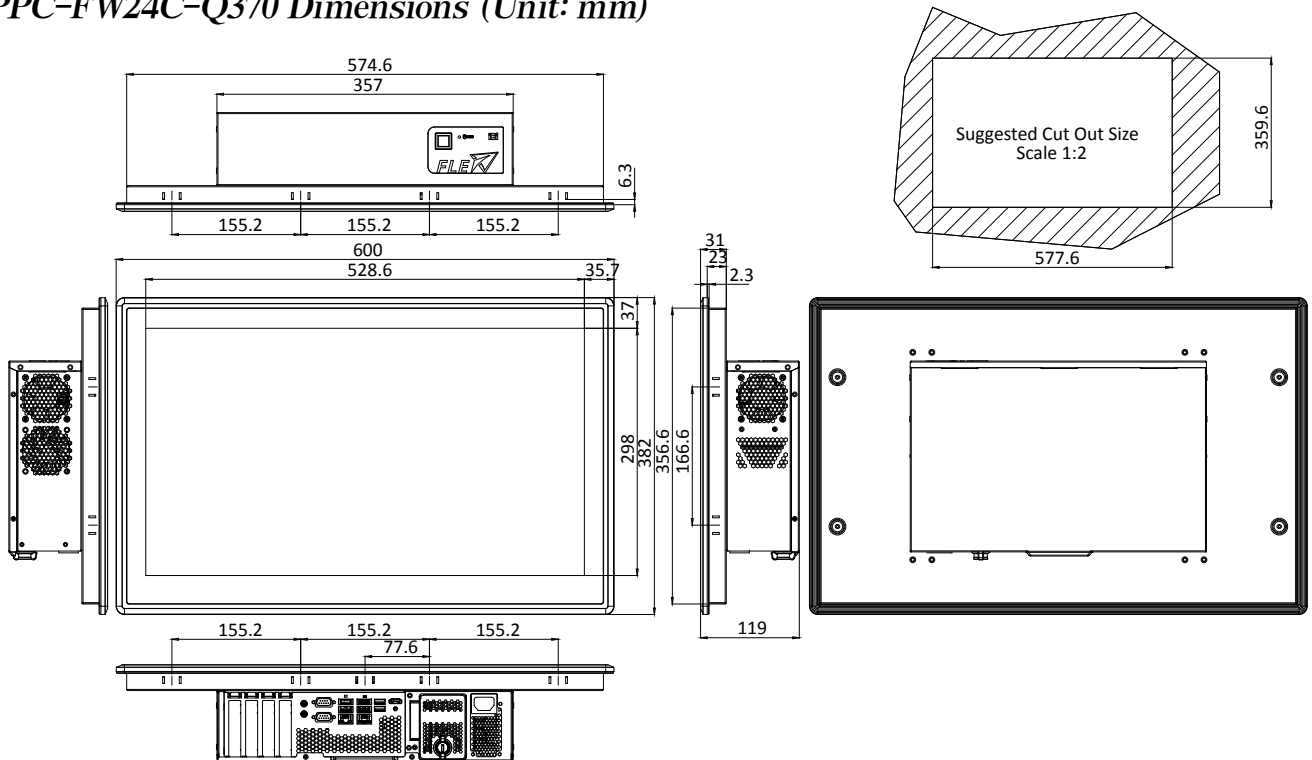
GRAND-C422-20D

## GRAND AI training server system

The GRAND-C422-20D is an AI training system which has maximum expansion ability to add in AI computing accelerator cards for AI model training or inference.

» Intel® Xeon® W family processor supported
» 6 x PCIe Slot, up to 4 dual width GPU cards
» Water cooling system on CPU
» Support two U.2 SSD
» Support one M.2 SSD M-key slot (NVMe PCIe 3.0 x4)
» Support 10GbE network
» IPMI remote management
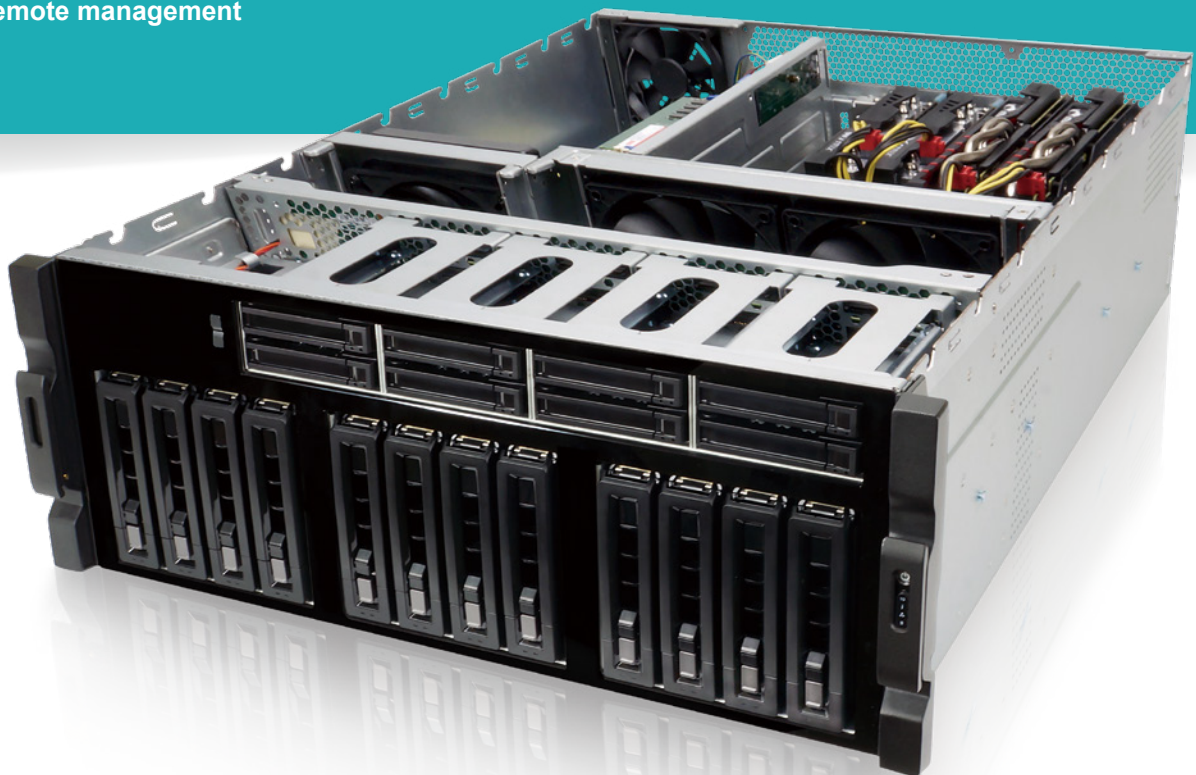
» Demand for AI computing is booming

The application of AI computing is absolutely not enough through the CPU computing. With the decentralized architecture, the huge data is calculated to obtain the computing result. Therefore, we have developed a water-cooled chassis system with high expansion capability by adding multiple GPUs, FPGA or VPU acceleration cards for AI deep learning and inference.
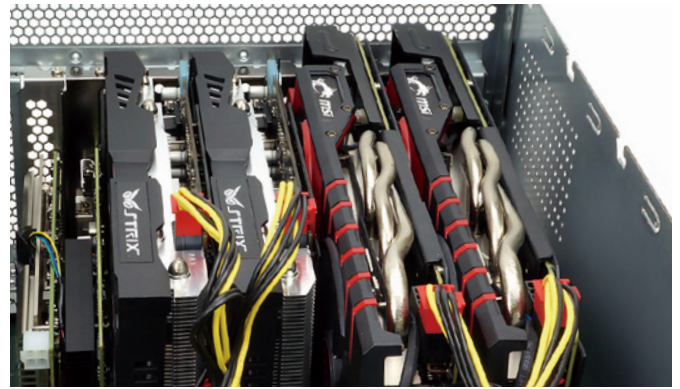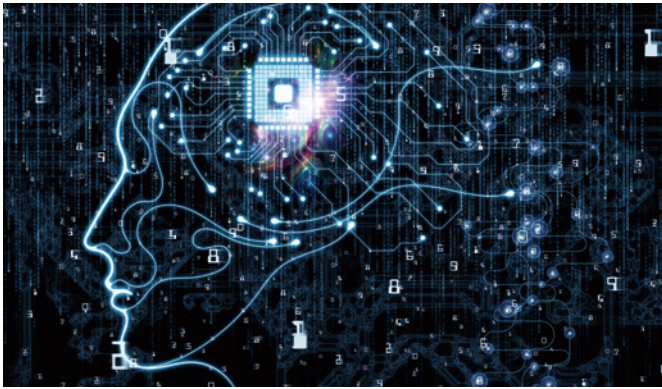
» Hyper converged infrastructure

Hyper converged infrastructure (HCI) is scale-out software-defined infrastructure that converges core data services on flash-accelerated, industry-standard servers, delivering flexible and powerful building blocks under unified management.

Efficient, agile, flexible, and integrated, these systems allow for easy scale-out storage, cost-savings, and simplicity to manage your systems. To find out if hyperconverged is the best solution for your Data Center, consider the following.

Hyper Converged Infrastructure

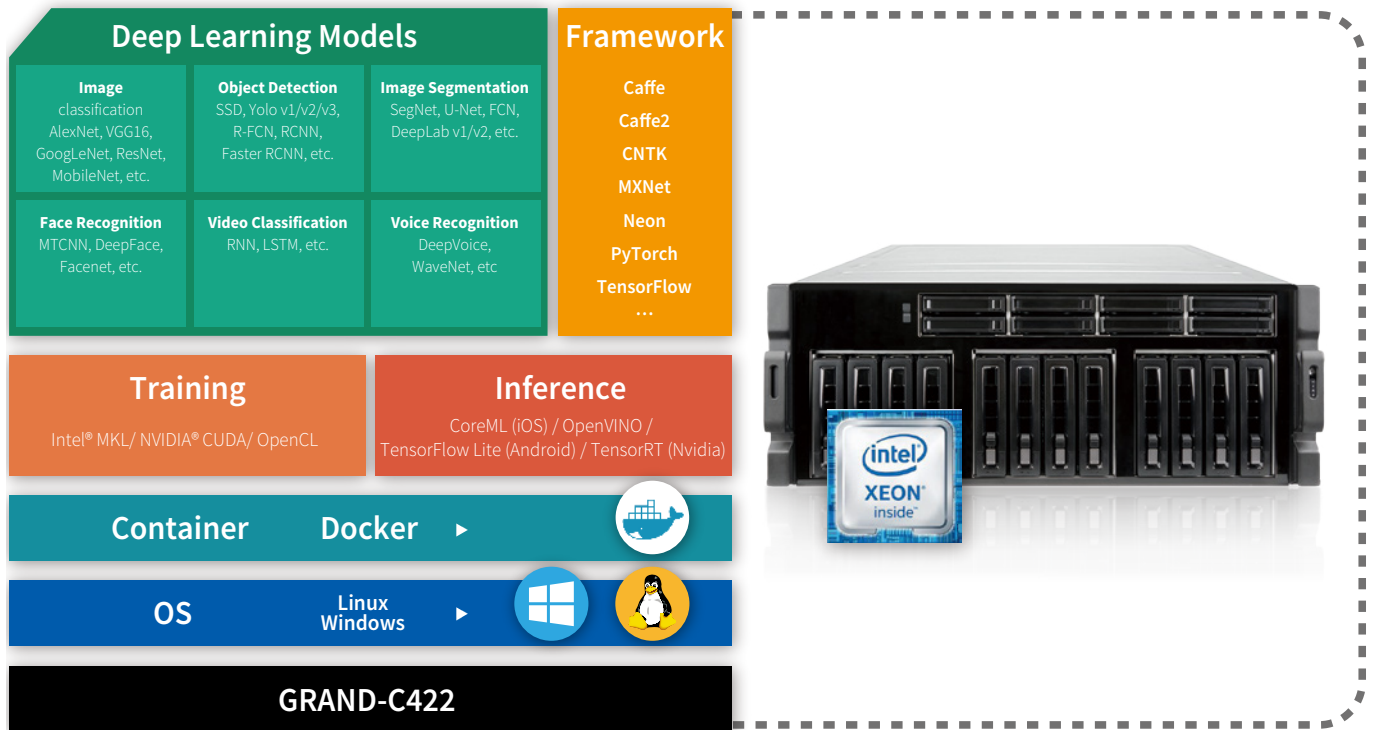| Virtual Compute | + | Virtual Memory | + | Virtual Storage | + | Virtual Network | + | Virtual Management |

In one easy to manage appliance
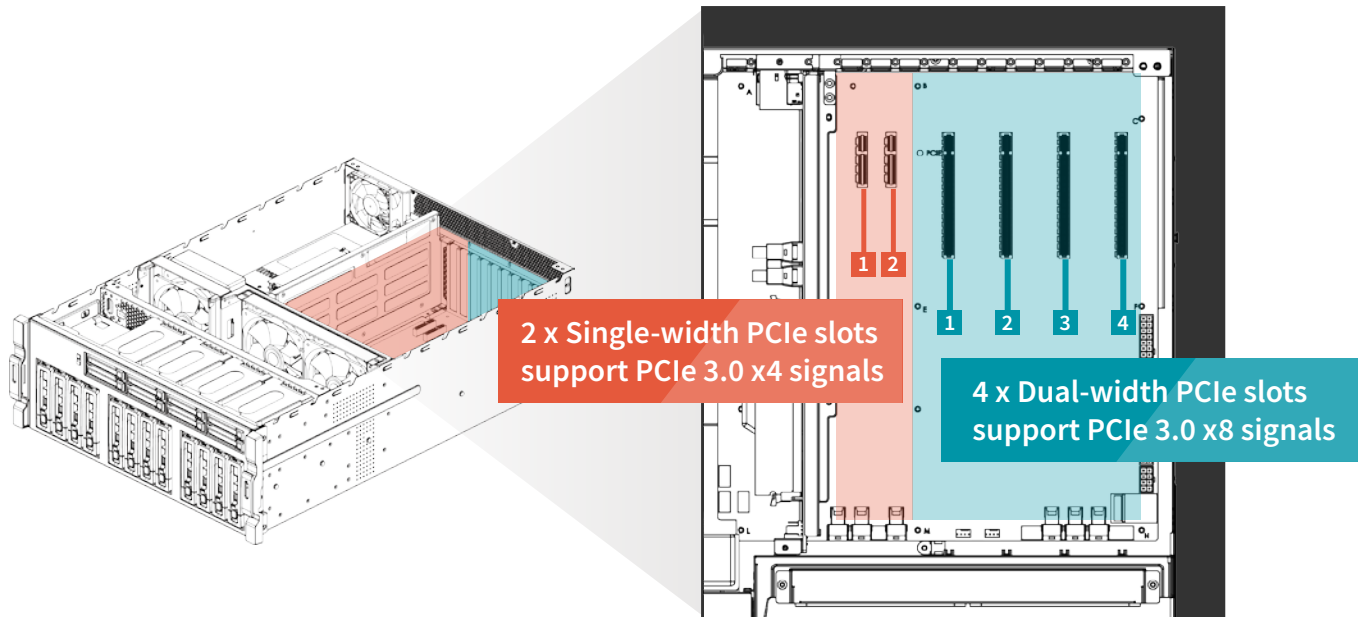
》 AI Training System

The AI training system GRAND-C442 is dedicated for these tasks because it offers a wide range of slots for storage expansion, acceleration cards and video capture, Thunderbolt™ or PoE add-on cards for unlimited data acquisition possibilities. In order to develop a useful training model, existing and widely used deep learning training frameworks such as Caffe, Tensor-Flow or Apache MXNet are recommended. These facilitate the definition of the apt architecture and algorithms for a distinct AI application.

Supported Software

TensorFlow PyTorch mxnet neon Microsoft CNTK

K Keras Caffe2 Caffe Chainer

Deep Learning Models			Framework
Image classification AlexNet, VGG16, GoogLeNet, ResNet, MobileNet, etc.	**Object Detection** SSD, Yolo v1/v2/v3, R-FCN, RCNN, Faster RCNN, etc.	**Image Segmentation** SegNet, U-Net, FCN, DeepLab v1/v2, etc.	Caffe Caffe2 CNTK MXNet Neon PyTorch TensorFlow ...
Face Recognition MTCNN, DeepFace, Facenet, etc.	**Video Classification** RNN, LSTM, etc.	**Voice Recognition** DeepVoice, WaveNet, etc	

Training	Inference
Intel® MKL/ NVIDIA® CUDA/ OpenCL	CoreML (iOS) / OpenVINO / TensorFlow Lite (Android) / TensorRT (Nvidia)

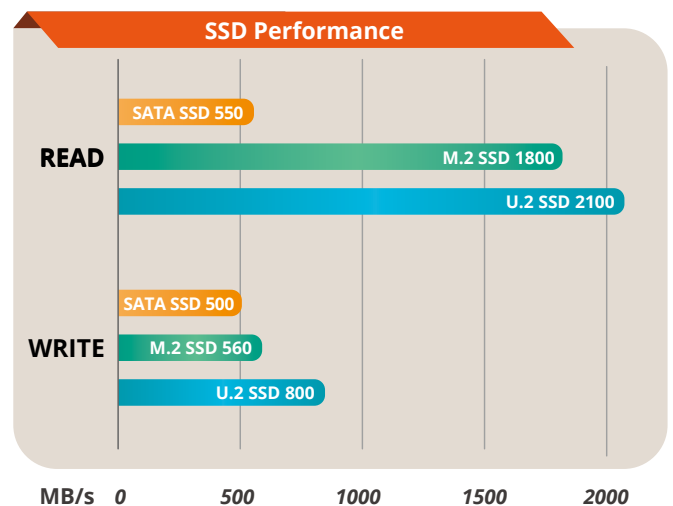**Container** Docker ▶

OS Linux Windows ▶

GRAND-C422

≫ Expandable to suit your needs

AI computing requires huge computing power, so our system can support up to 4 dual-width expansion slots (PCIe x8) and 2 single-width expansion slots (PCIe x4) for maximum expansion ability to meet computing needs.
All six of the backplane slots connect directly to the system host board. This is perfect for applications that require minimal latency.
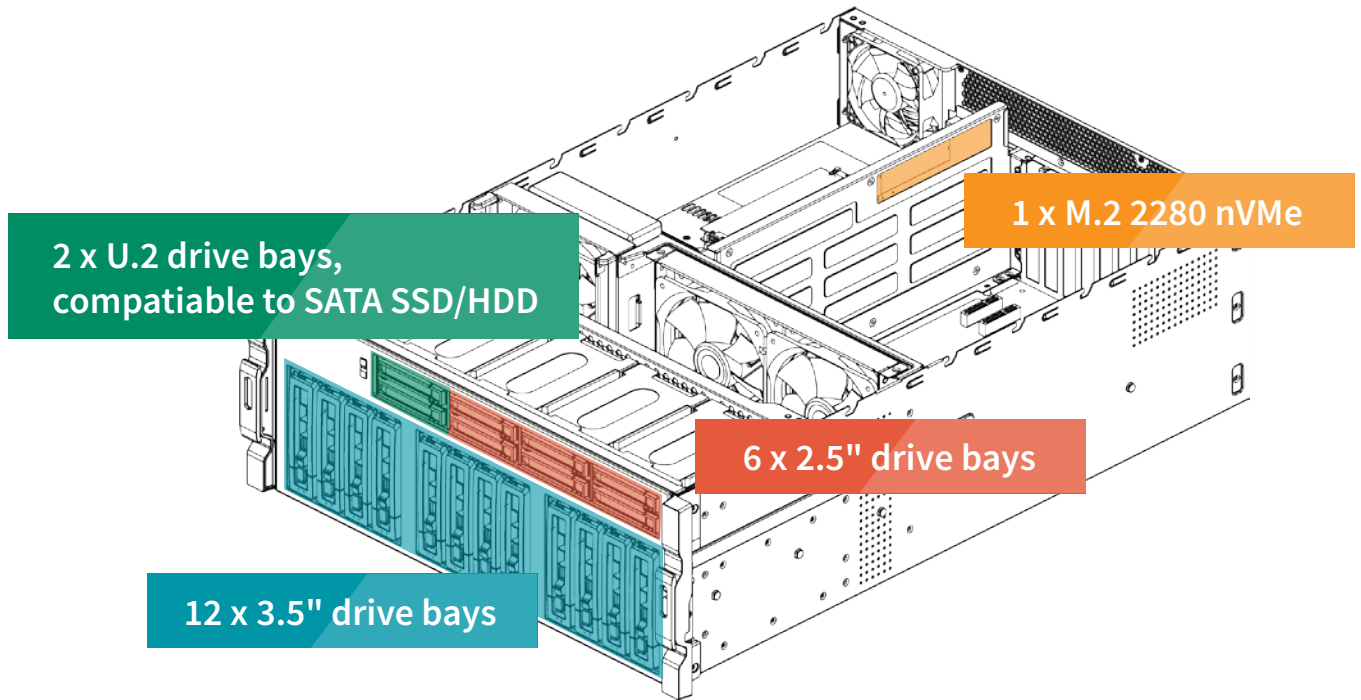

2 x Single-width PCIe slots support PCIe 3.0 x4 signals

4 x Dual-width PCIe slots support PCIe 3.0 x8 signals

≫ U.2 SSD

U.2 uses the same concept as a general hard disk. With a connection cable, a hard disk can be installed in the case without occupying the space of the motherboard. Therefore, M.2 and U.2 interfaces can be coexistence because they have different application environment. M.2 is more suitable for laptops or microcomputers, and U.2 is more suitable on a desktop or server. The U.2 interface features high-speed, low-latency, low-power, NVMe standard protocol, and PCIe 3.0 x4 channel. The theoretical transmission speed is up to 32Gbps, while SATA is only 6Gbps, which is 5 times faster than SATA.
The U.2 interface utilizes the existing physical interface, but the bandwidth is faster. The four-channel design makes the bandwidth upgrade from PCIe x2 to PCIe 3.0 x4, which is several times more than SATA interface. The U.2 interface combines the features of SATA and SAS, and uses the signal pin to fill the connector of the SAS interface. The L-type foolproof design, except the PCIe interface, also compatible with various mainstream hard disc interface such as SATA, SAS and SATA E.

SSD Performance

READ
SATA SSD 550
M.2 SSD 1800
U.2 SSD 2100

WRITE
SATA SSD 500
M.2 SSD 560
U.2 SSD 800

MB/s 0   500   1000   1500   2000

Storage (M.2, U.2, SATA)

The GRAND-C422-20D support M.2 nVMe SSD, U.2 SSD and SATA HDD/SSD. It has a built-in M.2 nVMe port and 20 bays of HDD/SSD slots including two U.2 SDD slots. The GRAND-C422-20D supports M.2 solid-state disk which is the next-generation small-sized form factor introduced by Intel after mSATA. It has better performance than general SATA SSD but it is lighter and more power-saving.

1 x M.2 2280 nVMe

2 x U.2 drive bays, compatiable to SATA SSD/HDD

6 x 2.5" drive bays

12 x 3.5" drive bays

Water Cooling System for CPU

IEI uses the latest 14nm Intel Xeon Processor W family which uses the LGA2066 interface and Skylake-SP architecture with 4, 6, 8, 10, 14 and 18 core versions.

High performance means higher power consumption, therefore IEI designed water cooling system for CPU with smaller size, higher efficiency cooling system makes CPU cooler and keep the high performance, and it can support up to 250W TDP.

	Water Cooling	Air Cooling
Cooler Size	Small 🥇	Large
Working Noise	Small 🥇	Large
Cooling Efficiency	Better 🥇	Worse

Specifications

Model		GRAND-C422-20D
Chassis	Dimensions (H x W x D)	176.15 mm x 480.94 mm x 644 mm
	System Fan	2 x 120 mm, 12V DC
	Chassis Construction	4U, Rackmount
	System Cooling	2 x Cooling Fans with Smart Fan
Motherboard	CPU	Support LGA-2066 Intel® Xeon® W family processor
	Processor Cooling	Water cooling system
	Chipest	C422
	Memory	Total slot: 4 x DDR4 ECC RDIMM/LRDIMM
		Memory expandable up to:256GB (4 x 64GB)
Security	TPM	1 x TPM 2.0 Pin header
IPMI	IPMI Solution	IPMI LAN port, IPMI VGA
Storage	Hard Drive	12 x 2.5" / 3.5" drive bay 8 x 2.5" drive bay
	M.2	1 x M.2 built in on SBC
	U.2	2 x U.2 SSD drive bay compatible to SATA
Networking	Ethernat IC	1 GbE NIC: Intel® i210-AT with NCSI support 10 GbE NIC: Aquantia AQC107
I/O Interface	USB 3.1 Gen 1	4
	USB 2.0	2
	Ethernet	1 x 1GbE RJ45 combo LAN ports / IPMI 1 x 10GbE RJ45 LAN port
	Display	1 x IPMI VGA display
	Buttons	Power button
Internal I/O	COM port	2 x RS232 pin header
	USB 3.1 Gen 1	2 x USB 3.1 Gen 1 (5Gb/s) pin header
	USB 2.0	1 x USB DOM header
Indicator	LEDs	10 GbE, Status, LAN, Storage Expansion Port Status
	LCM	LCM, 2 buttons
Expansion	PCIe	4 x PCIe 3.0 x8 2 x PCIe 3.0 x4
Power	Power Input	110-240 AC,47-63Hz
	Power Consumption	In Operation: 285W
	Type/Watt	Redundant Power 1600W
Reliability	Operating Temperature	0~40°C
	Relative Humidity	5 to 95% non-condensing, wet bulb: 27˚C.
	Weight	23.59 kg
	Certification	CE/FCC
OS	support OS	Windows server 2016 Linux

Ordering Information

Part No.	Description
GRAND-C422-20D-S1A1-R10	20-bay(3.5" x12, 2.5" x 8) 4U Rackmount, Intel® Xeon® W-2123 with C422 chipset, 32G DDR4 w/ECC, 6 x PCIe expansion slot, and 1600W redundant PSU, RoHS
GRAND-C422-20D-S1B2-R10	20-bay(3.5" x12, 2.5" x 8) 4U Rackmount, Intel® Xeon® W-2133 with C422 chipset, 64G DDR4 w/ECC, 6 x PCIe expansion slot, and 1600W redundant PSU, RoHS
GRAND-C422-20D-S1C3-R10	20-bay(3.5" x12, 2.5" x 8) 4U Rackmount, Intel® Xeon® W-2145 with C422 chipset, 128G DDR4 w/ECC, 6 x PCIe expansion slot, and 1600W redundant PSU, RoHS
GRAND-C422-20D-S1D3-R10	20-bay(3.5" x12, 2.5" x 8) 4U Rackmount, Intel® Xeon® W-2155 with C422 chipset, 128G DDR4 w/ECC, 6 x PCIe expansion slot, and 1600W redundant PSU, RoHS
GRAND-C422-20D-S1E4-R10	20-bay(3.5" x12, 2.5" x 8) 4U Rackmount, Intel® Xeon® W-2195 with C422 chipset, 256G DDR4 w/ECC, 6 x PCIe expansion slot, and 1600W redundant PSU, RoHS

Options

Item	Part No.	Description
Slide rail	RAIL-A02-90	Kingslide Rail kit for TS-EC2480U-RP, maximum load 90 kg

Packing List

Flat head screws (for 2.5" HDD)	Flat head screws (for 3.5" HDD)
1 x Cat5e LAN cable	1 x QIG
2 x Power cord	1 x Cat6A LAN cable

Intel® Vision Accelerator Design Products

Powered by Open Visual Inference & Neural Network Optimization (OpenVINO™) toolkit

- Ubuntu 16.04.3 LTS 64bit, CentOS 7.4 64bit (Windows® & more OS are coming soon).
- Supports popular frameworks...such as TensorFlow, MxNet, and CAFFE.
- Provides optimized computer vision libraries to quick handle the computer vision tasks

A Perfect Choice for AI Deep Learning Inference Workloads

Compact Size   Multiple Cards   Low Power consumption   **OpenVINO™ toolkit**

Movidius MA2485 Myriad X   intel ARRIA® 10
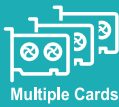
》 IEI Mustang Series Accelerators

In AI applications, training models are just half of the whole story. Designing a real-time edge device is a crucial task for today's deep learning applications.

FPGA is short for field programmable gate array, and VPU stands for vision processing unit. It can both run AI faster, and are well suited for real-time applications such as surveillance, retail, medical, and machine vision. With the advantage of low power consumption, it is perfect to be implemented in AI edge computing device to reduce total power usage, providing longer duty time for the rechargeable edge computing equipment. AI applications at the edge must be able to make judgements without relying on processing in the cloud due to bandwidth constraints, and data privacy concerns.Therefore, how to resolve AI task locally is becoming more important.

In the era of AI explosion, various computations rely on server or device which needs larger space and power budget to install accelerators to ensure enough computing performance.

In the past, solution providers have been upgrading hardware architecture to support modern applications, but this has not addressed the question on minimizing physical space. However, space may still be limited if the task cannot be processed on the edge device.

We are pleased to announce the launch of the Mustang-F100-A10 and Mustang-V100-MX8, features with small form factor, low power consumption. Perfect choice for AI deep learning inference workloads and compatible with IEI TANK-870AI compact IPC for those with limited space and power budget.

Mustang-200

Hardware Feature

- Dual 10Gbps network based x86 computing accelerator
- Decentralized computing architecture for independent tasks
- PCI Express x4 delivers scalable and flexible solution
- Two Intel® Core™ i7-7567U/i5-7267/Celeron® 3865U processors, up to 4.00 GHz
- Support high-end graphics engine - Intel® Iris™ Plus Graphics 650
- Pre-installed 32 GB DDR4 (max. 64 GB) and 1 TB NVMe (max. 2 TB)

Specifications

Model Name	Mustang-200
Main Chipset	Two (2) Intel Kabylake ULT CPU
	Intel® Core™ i7-7567U (28 W) (4M Cache, up to 4.00 GHz)
	Intel® Core™ i5-7267U (28 W) (4M Cache, up to 3.50 GHz)
	Intel® Celeron® 3865U (15W) (2M Cache, 1.80 GHz)
Processor Graphics	Intel® Core™ i7-7567U & i5-7267U support Iris™ Plus Graphics 650 (GT3e) •Graphics base frequency 300 MHz •Graphics max dynamic frequency: 1.05 GHz •Embedded graphics DRAM per GPU: 64 MB
	Intel® Celeron® 3865U supports Intel® HD Graphics 610 •Graphics base frequency 300 MHz •Graphics max dynamic frequency: 900 MHz
Hardware Video Decode	H.264, H.265/HEVC
	MPEG2, M/JPEG
	VC-1
	VP8(8 bit)/VP9(10 bit)
Hardware Video Encode	H.264, H.265/HEVC
	MPEG2, M/JPEG
	VC-1
	VP8 (8-bit)
Display Output	2 x Micro HDMI for debugging
USB 2.0	4 x USB 2.0 (pin header) for debugging
Memory	(2 SO-DIMMs per CPU) 4 x DDR4 8GB SO-DIMM (Core™ i7/i5 SKU) 4 x DDR4 2GB SO-DIMM (Celeron® 3865U SKU)
Storage	2 x Intel® SSD 600P series (Core™ i7/i5 SKU only) (512GB M.2 80mm PCIe 3.0 x4, 3D1, TLC)
Dataplane Interface	PCI Express x4
	Compliant with PCI Express Specification V2.0
	Compatible with PCI Express x4, x8, and x16 slots
External Interfaces	Reset button
	Power button
Indicator	Seven segment (indicate card number and debug code)
Power Input	12V PCIe 6-pin power input
Power Consumption	12V@7.41A (Intel® Core™ i7-7567U SKU)
Operating Temperature	0°C~40°C
Fan	Dual fan
Dimensions (DxWxH)	40mm x 210mm x 111mm
Operating Humidity	10% ~ 90%

Ordering Information

Part No.	Description
Mustang-200-i7-1T/32G-R10	Computing Accelerator Card supports Two Intel® Core™ i7-7567U with Intel® 600P 1TB (512GB x2) SSD, 32GB (8GB x4) DDR4, PCIe x4 interface, QTS-Lite, and RoHS
Mustang-200-i5-1T/32G-R10	Computing Accelerator Card supports Two Intel® Core™ i7-7267U with Intel® 600P 1TB (512GB x2) SSD, 32GB (8GB x4) DDR4, PCIe x4 interface, QTS-Lite, and RoHS
Mustang-200-C-8G-R10	Computing Accelerator Card supports Two Intel® Celeron® 3865U with 8GB (2GB x4) DDR4, PCIe x4 interface, QTS-Lite, and RoHS (without NVMe storage)
19B00-000396-00-RS	Mustang-200 dual-port USB cable

Packing List

1 x Mustang-200
1 x QIG
1 x 4 pin to PCIe power cable
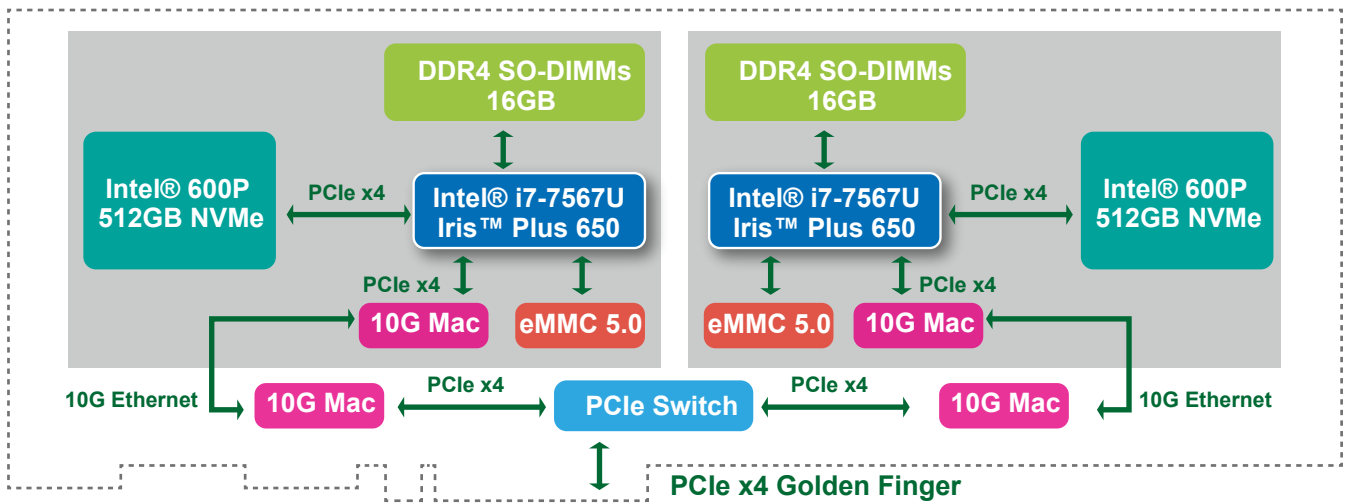
• Block Diagram

Every CPU on the Mustang-200 is accompanied with 16GB (2 x 8GB) RAM and an Intel® 600P series 512GB NVMe SSD. Once installed in a PCIe x4 slot, the host computer will be connected to both computing nodes on the Mustang-200 with 10GbE networks. The advantage of utilizing network-based structures is that no proprietary hardware is needed thus a lower cost is achieved. The computing nodes are powered by QTS-Lite, a lightweight version of QNAP's award-winning QTS operating system, and the eMMC component will serve as storage for QTS-Lite.

Mustang-200 Dimensions (Unit: mm)
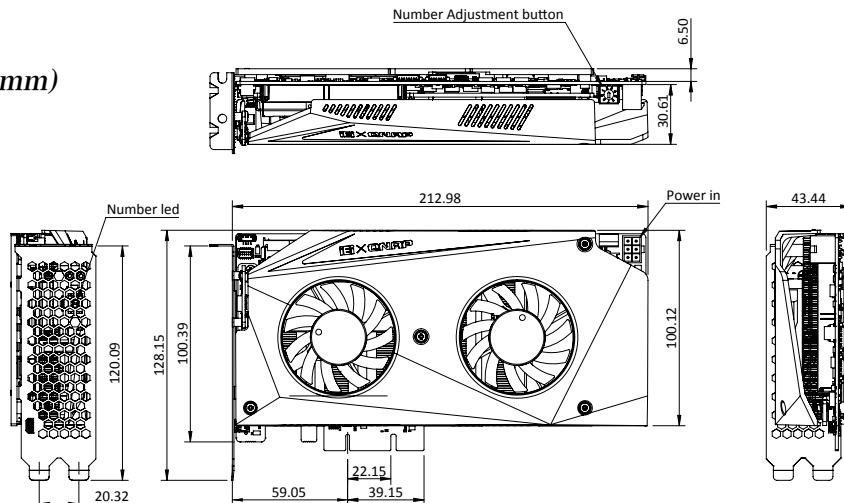
Mustang-F100-A10

NEW

Feature

- Half-Height, Half-Length, Double-slot.
- Power-efficiency, low-latency.
- Supported OpenVINO™ toolkit, AI edge computing ready device.
- FPGAs can be optimized for different deep learning tasks.
- Intel® FPGAs supports multiple float-points and inference workloads.

intel® / ubuntu

Specifications

Model Name	Mustang-F100-A10
Main FPGA	Intel® Arria® 10 GX1150 FPGA
Operating Systems	Ubuntu 16.04.3 LTS 64-bit, CentOS 7.4 64-bit (Windows® & more OS are coming soon)
Voltage Regulator and Power Supply	Intel® Enpirion® Power Solutions
Memory	8G on board DDR4
Dataplane Interface	PCI Express x8
	Compliant with PCI Express Specification V3.0
Power Consumption	<60W
Operating Temperature	5°C~60°C (ambient temperature)
Cooling	Active fan
Dimensions	Standard Half-Height, Half-Length, Double-slot
Operating Humidity	5% ~ 90%
Power Connector	*Preserved PCIe 6-pin 12V external power
Dip Switch/LED indicator	Identify card number
Support Topology	AlexNet, GoogleNet V1/V2/V4, Yolo Tiny V1/V2, Yolo V2/V3, SSD300,SSD512, ResNet-18/50/101/152, DenseNet121/161/169/201, SqueezeNet 1.0/1.1, VGG16/19, MobileNet-SSD, Inception-ResNet-v2,Inception-V1/V2/V3/V4,SSD-MobileNet-V2-coco, MobileNet-V1-0.25-128, MobileNet-V1-0.50-160, MobileNet-V1-1.0-224, MobileNet-V1/V2, Faster-RCNN

*Standard PCIe slot provides 75W power, this feature is preserved for user in case of different system configuration.
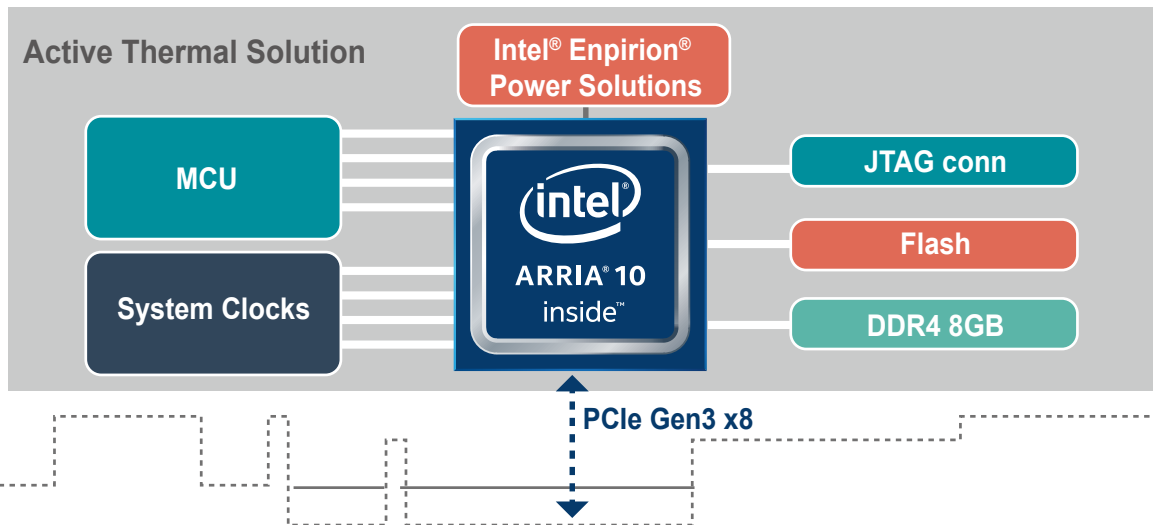
Ordering Information

Part No.	Description
Mustang-F100-A10-R10	PCIe FPGA Highest Performance Accelerator Card with Arria 10 1150GX support DDR4 2400Hz 8GB, PCIe Gen3 x8 interface
7Z000-00FPGA00	7Z0-OTHERS PERIPHERAL DEVICE;FPGA Download Cable; IEI USB DOWNLOAD CABLE;GALAXY;USB Download+USB CABLE+IDE CABLE+FPGA CABLE

*It's Mandatory to use this FPGA programmer kit (7Z000-00FPGA00)to upgrade the FPGA bitstreams between different Intel® OpenVINO™ toolkit versions

Packing List

1 X Full height bracket
1 x External power cable
1 x QIG

Scalable FPGA Deep Learning Acceleration Add-in Card

Active Thermal Solution

Intel® Enpirion® Power Solutions

MCU

System Clocks

intel® ARRIA® 10 inside™

JTAG conn

Flash

DDR4 8GB

PCIe Gen3 x8

Mustang-F100-A10 Block Diagram

● Intel® Arria® 10 1150 GX FPGAs delivering up to 1.5 TFLOPs
● Interface: PCIe Gen3 x 8
● Form Factor: Standard Half-Height, Half-Length, Double-slot
● Cooling: Active fan.
● Operation Temperature : 5°C~60°C(ambient temperature)
● Operation Humidity : 5% to 90% relative humidity
● Power Consumption: < 60W
● Power Connector: *Preserved PCIe 6-pin 12V external power
● DIP Switch/LED Indicator: Identify card number.
● Voltage Regulator and Power Supply: Intel® Enpirion® Power Solutions

*Standard PCIe slot provides 75W power, this feature is preserved for user in case of different system configuration.

Mustang-F100-A10 Dimensions *(Unit: mm)*
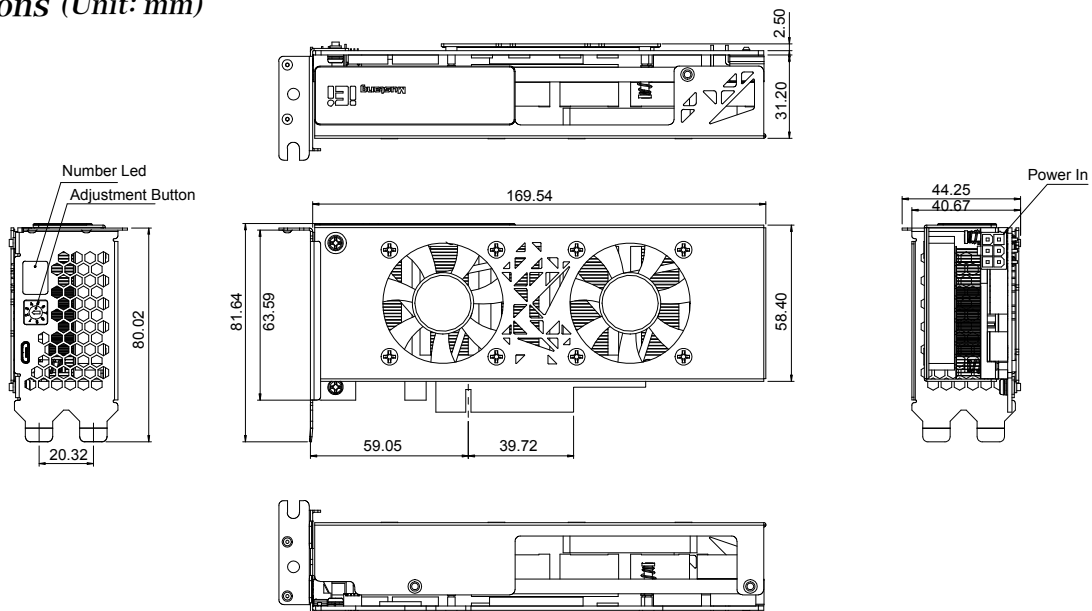
Mustang-V100-MX8

NEW

Feature

● Half-Height, Half-Length, Single-slot compact size

● Low power consumption ,approximate 2.5W for each Intel® Movidius™ Myriad™ X VPU.

● Supported OpenVINO™ toolkit, AI edge computing ready device

● Eight Intel® Movidius™ Myriad™ X VPU can execute multiple topologies simultaneously.

Specifications

Model Name	Mustang-V100-MX8
Main Chip	Eight Intel® Movidius™ Myriad™ X MA2485 VPU
Operating Systems	Ubuntu 16.04.3 LTS 64bit, CentOS 7.4 64bit, Windows10 64bit (more OS are coming soon)
Dataplane Interface	PCI Express x4
	Compliant with PCI Express Specification V2.0
Power Consumption	<30W
Operating Temperature	5°C~55°C (ambient temperature)
Cooling	Active fan
Dimensions Standard	Half-Height, Half-Length, Single-slot PCIe
Operating Humidity	5% ~ 90%
Power Connector	*Preserved PCIe 6-pin 12V external power
Dip Switch/LED indicator	Identify card number
Support Topology	AlexNet, GoogleNet V1/V2/V4, Yolo Tiny V1/V2, Yolo V2/V3, SSD300,SSD512, ResNet-18/50/101/152, DenseNet121/161/169/201, SqueezeNet 1.0/1.1, VGG16/19, MobileNet-SSD, Inception-ResNetv2, Inception-V1/V2/V3/V4,SSD-MobileNet-V2-coco, MobileNet-V1-0.25-128, MobileNet-V1-0.50-160, MobileNet-V1-1.0-224, MobileNet-V1/V2, Faster-RCNN

*Standard PCIe slot provides 75W power, this feature is preserved for user in case of different system configuration
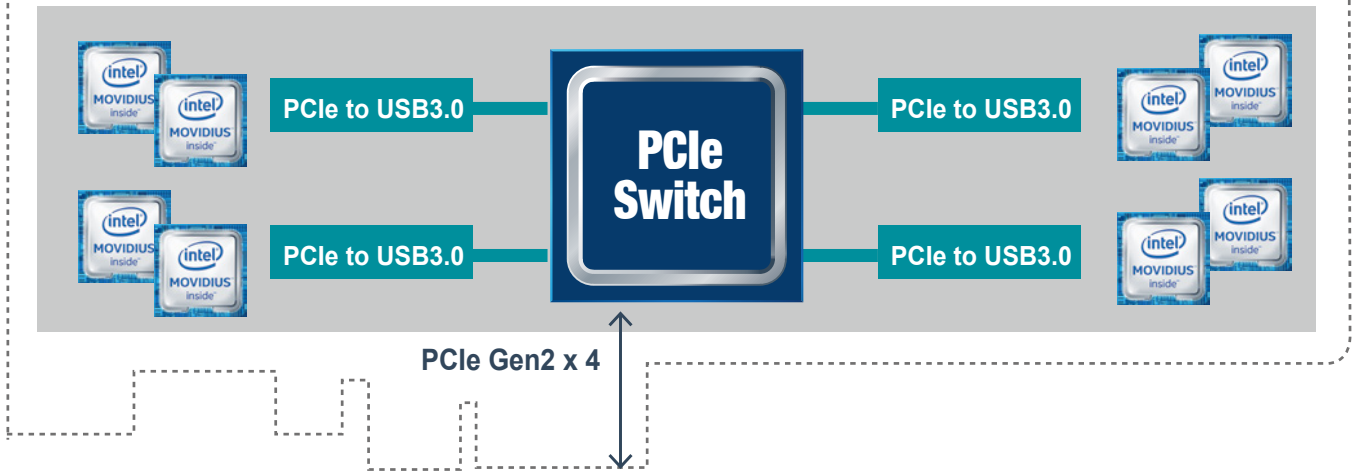
Ordering Information

Part No.	Description
Mustang-V100-MX8-R10	Computing Accelerator Card with 8 x Movidius Myriad X MA2485 VPU, PCIe Gen2 x4 interface, RoHS

Packing List

| |
|---|
| 1 X Full height bracket |
| 1 x External power cable |
| 1 x QIG |

Multiple Intel® Movidius™ Myriad™ X Deep Learning Acceleration Add-in Card

Mustang-V100-MX8 Block Diagram

- Intel® Movidius™ Myriad™ X VPU delivering up to 1 TOPs of dedicated networks compute
- Interface: PCIe Gen2 x 4
- Form Factor: Standard Half-Height, Half-Length, Single-slot
- Cooling: Active fan.
- Operation Temperature : 5°C~55°C(ambient temperature)
- Operation Humidity : 5% to 90% relative humidity
- Power Consumption: < 30W
- Power Connector: *Preserved PCIe 6-pin 12V external power
- DIP Switch/LED Indicator: Identify card number.
  *Standard PCIe slot provides 75W power, this feature is preserved for user in case of different system configuration

Mustang−V100−MX8 Dimensions (Unit: mm)
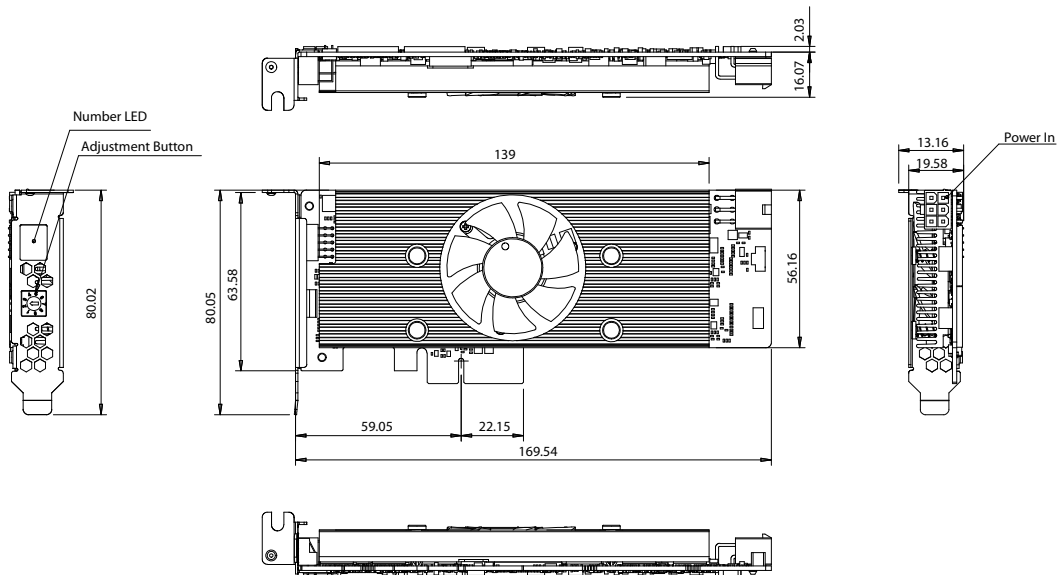
Mustang-V100-MX4

Preliminary

Feature

- PCIe Gen 2 x 2 form factor
- 4 x Intel® Movidius™ Myriad™ X VPU MA2485
- Power efficiency, only 15W.
- Operating Temperature 5°C to 55°C
- Powered by Intel's OpenVINO™ toolkit
- Multiple cards supported

Introduction

The Mustang-V100-MX4 is a PCIe Gen 2 x 2 card included 4 Intel® Movidius™ Myriad™ X VPU, providing an flexible AI inference solution for compact size and embedded systems.

VPU is short for vision processing unit. It can run AI faster, and is well suited for low power consumption applications such as surveillance, retail, transportation. With the advantage of power efficiency and high performance to dedicate DNN topologies, it is perfect to be implemented in AI edge computing device to reduce total power usage, providing longer duty time for the rechargeable edge computing equipment.

Specifications

Model Name	Mustang-V100-MX4
Main Chip	4 x Intel® Movidius™ Myriad™ X MA2485 VPU
Operating Systems	Ubuntu 16.04.3 LTS 64bit, CentOS 7.4 64bit, Windows® 10 64bit
Dataplane Interface	PCIe Gen 2 x 2
Power Consumption	15W
Operating Temperature	0°C ~ 55°C (ambient temperature)
Cooling	Active fan
Dimensions	TBD
Operating Humidity	5% ~ 90%
Dip Switch/LED indicator	Identify card number
Support Topology	AlexNet, GoogleNet V1/V2/V4, Yolo Tiny V1/V2, Yolo V2/V3, SSD300,SSD512, ResNet-18/50/101/152, DenseNet121/161/169/201, SqueezeNet 1.0/1.1, VGG16/19, MobileNet-SSD, Inception-ResNet-v2, Inception-V1/V2/V3/V4, SSD-MobileNet-V2-coco, MobileNet-V1-0.25-128, MobileNet-V1-0.50-160, MobileNet-V1-1.0-224, MobileNet-V1/V2, Faster-RCNN

Ordering Information

Part No.	Description
Mustang-V100-MX4-R10	Computing Accelerator Card with 4x Intel® Movidius™ Myriad™ X MA2485 VPU, PCIe Gen 2 x 2 interface, RoHS

Packing List

1 x Full height bracket
1 x QIG

Key Features of Intel® Movidius™ Myriad™ X VPU:

- Native FP16 support
- Rapidly port and deploy neural networks in Caffe and Tensorflow formats
- End-to-End acceleration for many common deep neural networks
- Industry-leading Inferences/S/Watt performance

10X Higher Performance

1 Trillion operatioms per second

1 TOPS

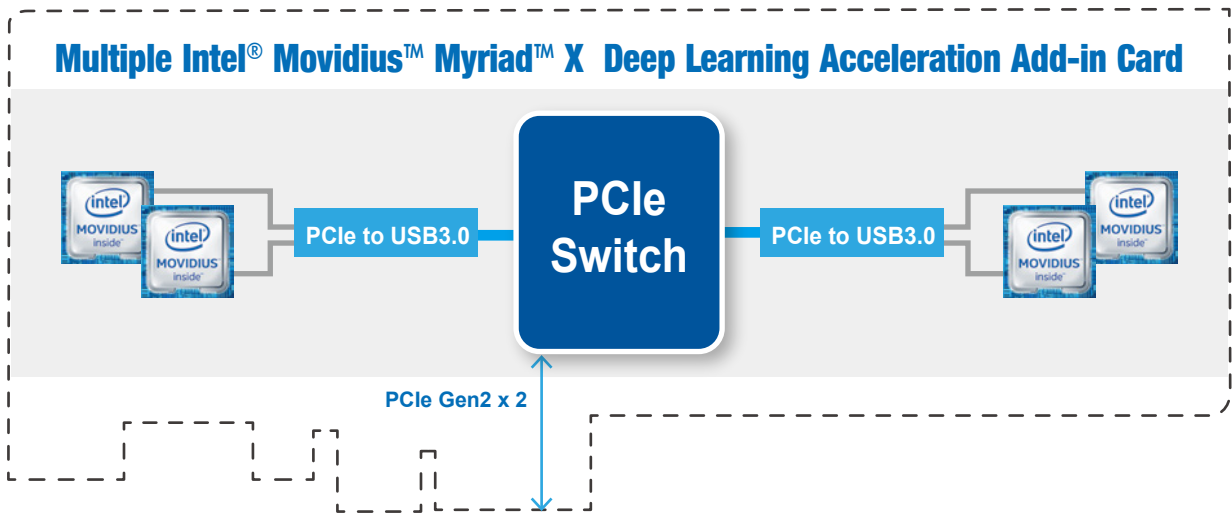1 Trillion operatioms per second of dedicated neural networks compute

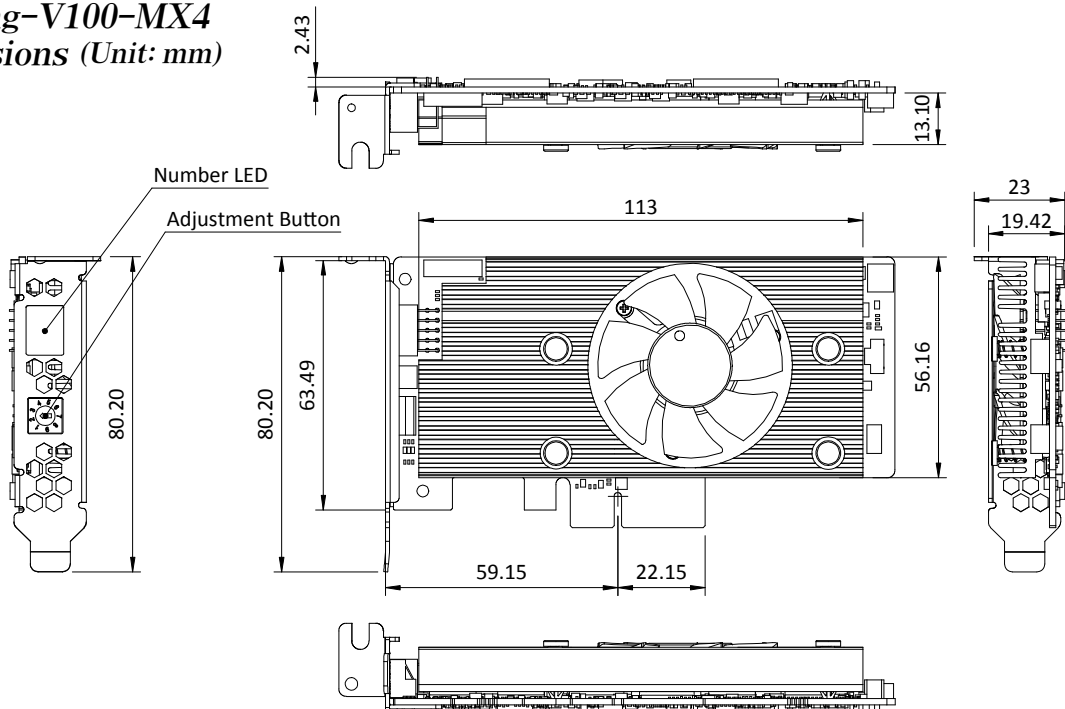Movidius
MA2485
Myriad X

ULTRA
Low power

Multiple Intel® Movidius™ Myriad™ X Deep Learning Acceleration Add-in Card

PCIe to USB3.0 — **PCIe Switch** — PCIe to USB3.0

PCIe Gen2 x 2

Mustang−V100−MX4 Dimensions (Unit: mm)

Number LED
Adjustment Button

2.43
13.10
80.20
80.20
63.49
113
56.16
23
19.42
59.15
22.15

Mustang-V100-MX4-10G1T

Preliminary

Feature

- PCIe Gen 2 x 4 form factor
- 4 x Intel® Movidius™ Myriad™ X VPU MA2485
- One 10G RJ45 LAN port
- Power efficiency, only 30W.
- Operating Temperature 0° C to 50°C
- Powered by Intel's OpenVINO™ toolkit
- Multiple cards supported.

Introduction

The Mustang-V100-MX4-10G1T is a PCIe Gen 2 x 4 card included 4 Intel® Movidius™ Myriad™ X VPU and one RJ45 10G LAN port, which providing an flexible AI inference solution for compact size and embedded systems.

VPU is short for vision processing unit. It can run AI faster, and is well suited for low power consumption applications such as surveillance, retail, transportation. With the advantage of power efficiency and high performance to dedicate DNN topologies, it is perfect to be implemented in AI edge computing device to reduce total power usage, providing longer duty time for the rechargeable edge computing equipment.

Specifications

Model Name	Mustang-V100-MX4-10G1T
Main Chip	4x Intel® Movidius™ Myriad™ X MA2485 VPU
LAN Chip	Aquantia
Operating Systems	Ubuntu 16.04.3 LTS 64bit, CentOS 7.4 64bit, Windows® 10 64bit
Dataplane Interface	PCIe Gen 2 x 4
Power Consumption	30W
Operating Temperature	0°C~50°C (ambient temperature)
Cooling	Active FAN
Dimensions	167x56x23mm
Operating Humidity	5% ~ 90%
Dip Switch/LED indicator	Identify card number
Support Topology	AlexNet, GoogleNet V1/V2/V4, Yolo Tiny V1/V2, Yolo V2/V3, SSD300,SSD512, ResNet-18/50/101/152, DenseNet121/161/169/201, SqueezeNet 1.0/1.1, VGG16/19, MobileNet-SSD, Inception-ResNet-v2,Inception-V1/V2/V3/V4,SSD-MobileNet-V2-coco, MobileNet-V1-0.25-128, MobileNet-V1-0.50-160, MobileNet-V1-1.0-224, MobileNet-V1/V2, Faster-RCNN

Ordering Information

Part No.	Description
Mustang-V100-MX4-10G1T	Computing accelerator card with 4 x Intel® Movidius™ Myriad™ X MA2485 VPU and 1 x Aquantia 10G RJ45 port, PCIe Gen2 x 4 interface , RoHS

Packing List

1 x Full height bracket
1 x QIG

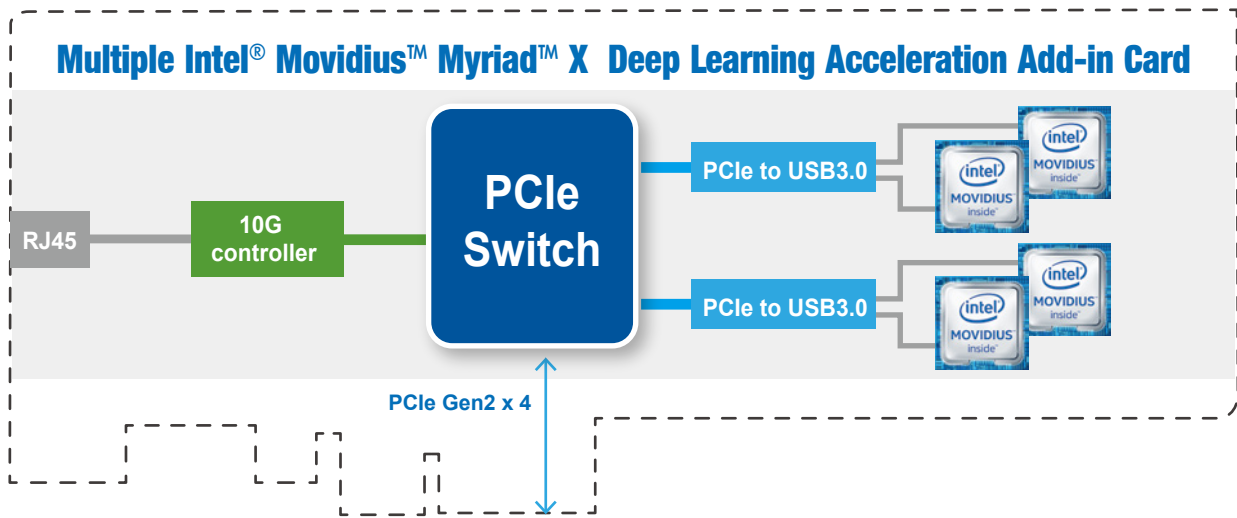## Key Features of Intel® Movidius™ Myriad™ X VPU:

- Native FP16 support
- Rapidly port and deploy neural networks in Caffe and Tensorflow formats
- End-to-End acceleration for many common deep neural networks
- Industry-leading Inferences/S/Watt performance

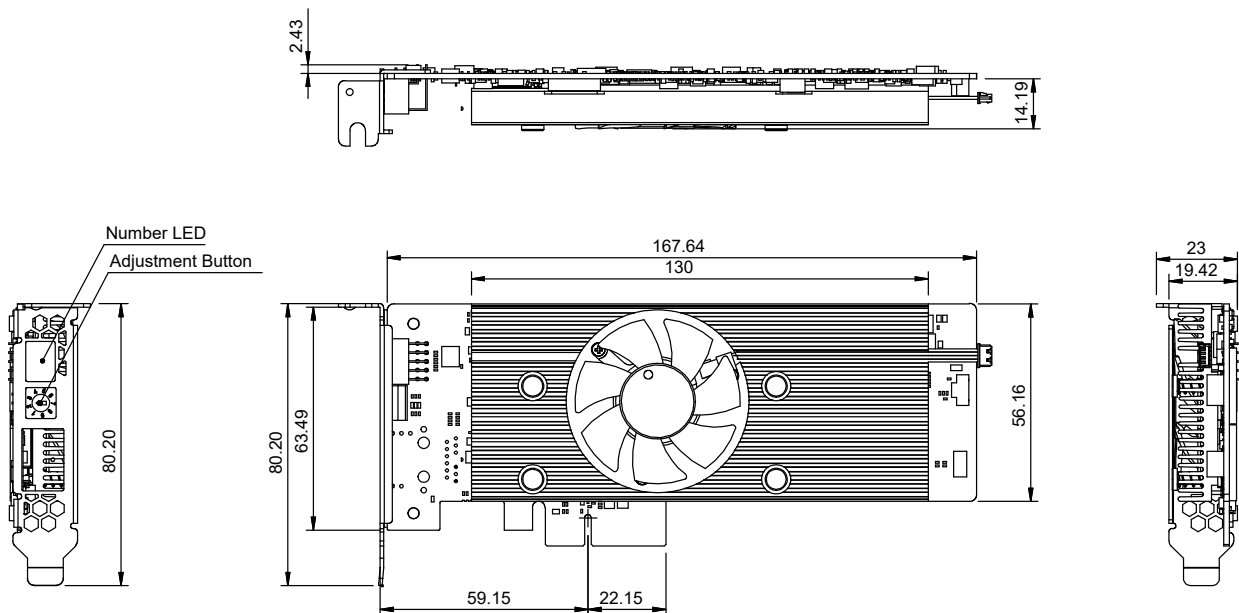**10X Higher Performance**

1 Trillion operatioms per second

1 TOPS

1 Trillion operatioms per second of dedicated neural networks compute

Movidius
MA2485
Myriad X

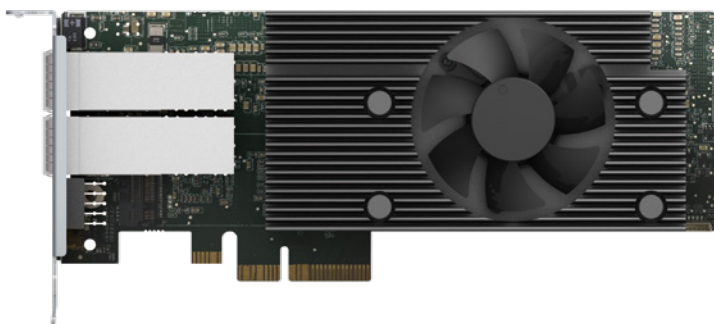**ULTRA** Low power

Multiple Intel® Movidius™ Myriad™ X Deep Learning Acceleration Add-in Card

RJ45 — 10G controller — PCIe Switch — PCIe to USB3.0 — intel MOVIDIUS inside / intel MOVIDIUS inside

PCIe to USB3.0 — intel MOVIDIUS inside / intel MOVIDIUS inside

PCIe Gen2 x 4

Mustang−V100−MX4−10G1T
Dimensions (Unit: mm)

2.43
14.19

Number LED
Adjustment Button

80.20

80.20
63.49

167.64
130

56.16

23
19.42

59.15
22.15

Mustang-V100-MX4-10G2SF

Preliminary

Feature

- PCIe Gen 3 x 4 form factor
- 4 x Intel® Movidius™ Myriad™ X VPU MA2485
- TWO 10G SFP LAN port
- Power efficiency, only 30W.
- Operating Temperature 0° C to 50°C
- Powered by Intel's OpenVINO™ toolkit
- Multiple cards supported.

Introduction

The Mustang-V100-MX4-10G2SF is a PCIe Gen 3 x 4 card included 4 Intel® Movidius™ Myriad™ X VPU and two SFP 10G LAN port, which providing an flexible AI inference solution for compact size and embedded systems.

VPU is short for vision processing unit. It can run AI faster, and is well suited for low power consumption applications such as surveillance, retail, transportation. With the advantage of power efficiency and high performance to dedicate DNN topologies, it is perfect to be implemented in AI edge computing device to reduce total power usage, providing longer duty time for the rechargeable edge computing equipment.

Specifications

Model Name	Mustang-V100-MX4-10G2SF
Main Chip	4x Intel® Movidius™ Myriad™ X MA2485 VPU
LAN Chip	Mellanox
Operating Systems	Ubuntu 16.04.3 LTS 64bit, CentOS 7.4 64bit, Windows® 10 64bit
Dataplane Interface	PCIe Gen 3 x 4
Power Consumption	30W
Operating Temperature	0°C~50°C (ambient temperature)
Cooling	Active FAN
Dimensions	167x56x23mm
Operating Humidity	5% ~ 90%
Dip Switch/LED indicator	Identify card number
Support Topology	AlexNet, GoogleNet V1/V2/V4, Yolo Tiny V1/V2, Yolo V2/V3, SSD300,SSD512, ResNet-18/50/101/152, DenseNet121/161/169/201, SqueezeNet 1.0/1.1, VGG16/19, MobileNet-SSD, Inception-ResNet-v2,Inception-V1/V2/V3/V4,SSD-MobileNet-V2-coco, MobileNet-V1-0.25-128, MobileNet-V1-0.50-160, MobileNet-V1-1.0-224, MobileNet-V1/V2, Faster-RCNN

Ordering Information

Part No.	Description
Mustang-V100-MX4-10G2SF-R10	Computing accelerator card with 4 x Intel® Movidius™ Myriad™ X MA2485 VPU and 2 x Mellanox 10G SFP port, PCIe Gen3 x 4 interface , RoHS

Packing List

1 x Full height bracket
1 x QIG

Key Features of Intel® Movidius™ Myriad™ X VPU:

- Native FP16 support
- Rapidly port and deploy neural networks in Caffe and Tensorflow formats
- End-to-End acceleration for many common deep neural networks
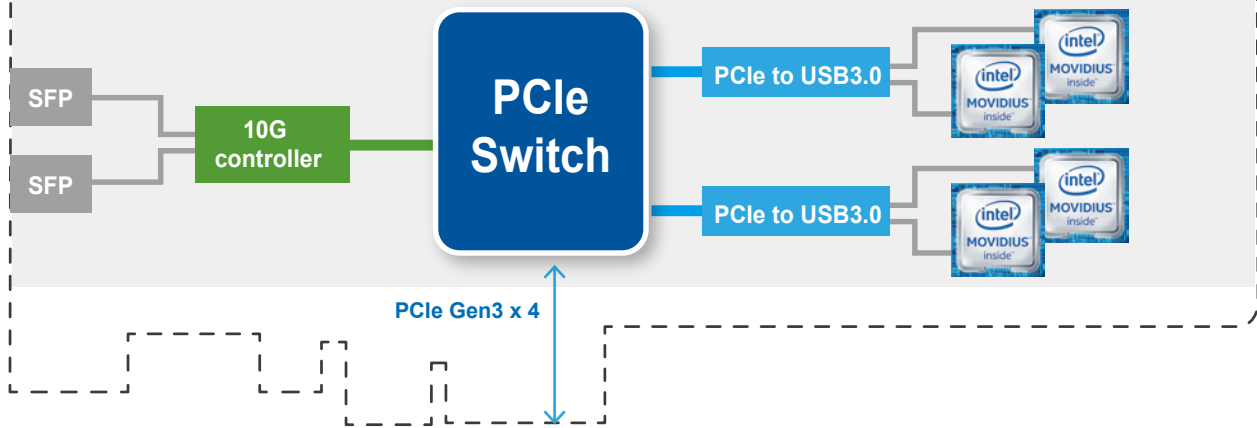- Industry-leading Inferences/S/Watt performance

10X Higher Performance

1 Trillion operatioms per second

1 TOPS

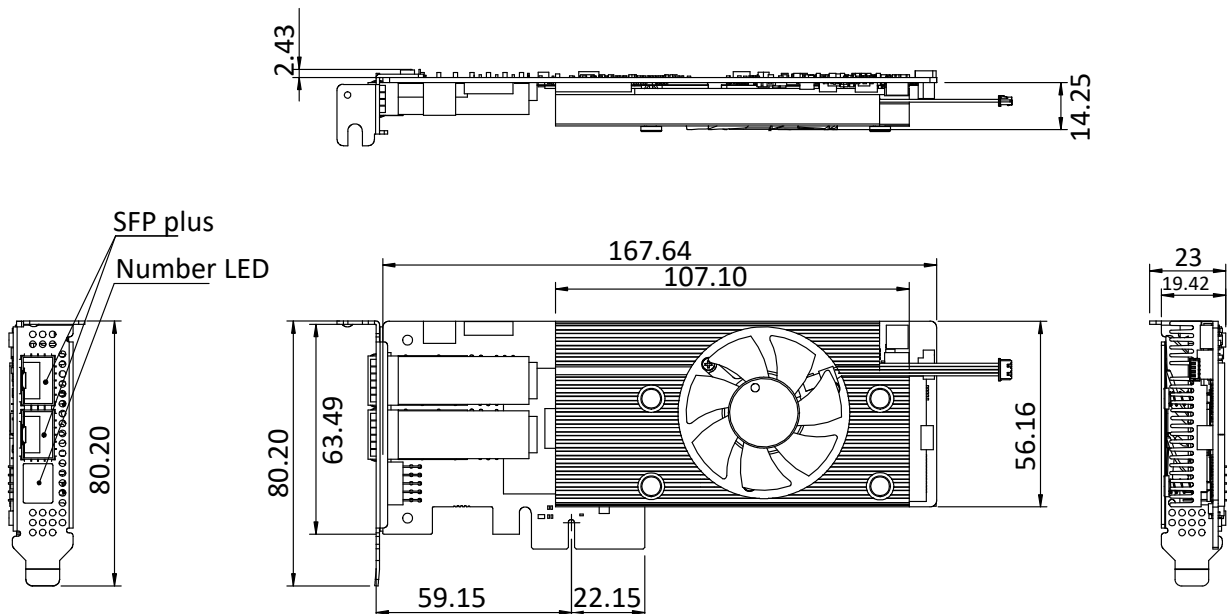1 Trillion operatioms per second of dedicated neural networks compute

Movidius
MA2485
Myriad X

ULTRA
Low power

Multiple Intel® Movidius™ Myriad™ X Deep Learning Acceleration Add-in Card
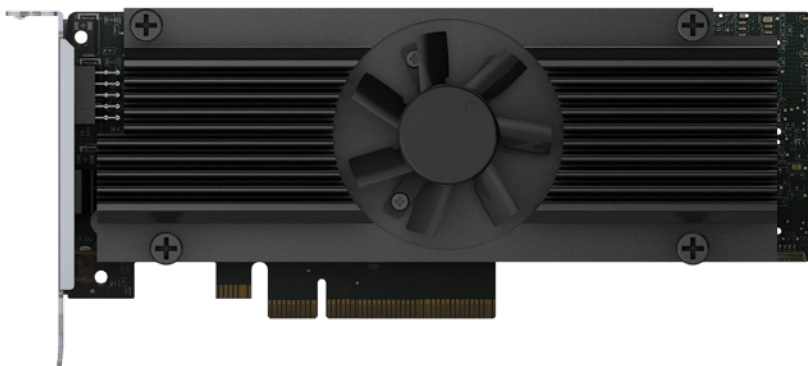

PCIe Gen3 x 4

Mustang−V100−MX4−10G2SF
Dimensions *(Unit: mm)*

Mustang-V100-MX4-2P

Preliminary

Feature

- PCIe Gen 3 x 8 form factor
- 4 x Intel® Movidius™ Myriad™ X VPU MA2485
- Two M.2 2280 M key storage slots
- Power efficiency, only 30W.
- Operating Temperature 0° C to 50°C
- Powered by Intel's OpenVINO™ toolkit
- Multiple cards supported.

Introduction

The Mustang-V100-MX4-2P is a PCIe Gen 3 x 8 card included 4 Intel® Movidius™ Myriad™ X VPU and two M.2 2280 M key storage slots, which providing an flexible AI inference solution for compact size and embedded systems.

VPU is short for vision processing unit. It can run AI faster, and is well suited for low power consumption applications such as surveillance, retail, transportation. With the advantage of power efficiency and high performance to dedicate DNN topologies, it is perfect to be implemented in AI edge computing device to reduce total power usage, providing longer duty time for the rechargeable edge computing equipment.

Specifications

Model Name	Mustang-V100-MX4-2P
Main Chip	4x Intel® Movidius™ Myriad™ X MA2485 VPU
LAN Chip	Two 2280 M.2 M key slots
Operating Systems	Ubuntu 16.04.3 LTS 64bit, CentOS 7.4 64bit, Windows® 10 64bit
Dataplane Interface	PCIe Gen 3 x 8
Power Consumption	30W
Operating Temperature	0°C~50°C (ambient temperature)
Cooling	Active FAN
Dimensions	167x56x23mm
Operating Humidity	5% ~ 90%
Dip Switch/LED indicator	Identify card number
Support Topology	AlexNet, GoogleNet V1/V2/V4, Yolo Tiny V1/V2, Yolo V2/V3, SSD300,SSD512, ResNet-18/50/101/152, DenseNet121/161/169/201, SqueezeNet 1.0/1.1, VGG16/19, MobileNet-SSD, Inception-ResNet-v2,Inception-V1/V2/V3/V4,SSD-MobileNet-V2-coco, MobileNet-V1-0.25-128, MobileNet-V1-0.50-160, MobileNet-V1-1.0-224, MobileNet-V1/V2, Faster-RCNN

Ordering Information

Part No.	Description
Mustang-V100-MX4-2P-R10	Computing accelerator card with 4 x Intel® Movidius™ Myriad™ X MA2485 VPU and 2 x M.2 2280 key M slot , PCIe Gen3 x 8 interface , RoHS

Packing List

1 x Full height bracket
1 x QIG

Key Features of Intel® Movidius™ Myriad™ X VPU:

- Native FP16 support
- Rapidly port and deploy neural networks in Caffe and Tensorflow formats
- End-to-End acceleration for many common deep neural networks
- Industry-leading Inferences/S/Watt performance

10X Higher Performance

1 Trillion operatioms per second

1 TOPS
1 Trillion operatioms per second of dedicated neural networks compute

Movidius
MA2485
Myriad X

ULTRA
Low power

Multiple Intel® Movidius™ Myriad™ X Deep Learning Acceleration Add-in Card

M.2 M Key

M.2 M Key

PCIe Switch

PCIe to USB3.0

PCIe to USB3.0

PCIe Gen3 x 8

Mustang−V100−MX4−2P
Dimensions (Unit: mm)

2.43

14.37

Number LED
Adjustment Button

153

63.49

80.20

80.20

56.16

23

19.42

59.15

39.18

Mustang-M2AE-MX1

Preliminary

Feature

- M.2 AE key form factor (22 x 30 mm)
- 1xIntel® Movidius™ Myriad™ X VPU MA2485
- Power efficiency, only 2.5W
- Operating Temperature 0° C to 50°C
- Powered by Intel's OpenVINO™ toolkit

Introduction

The Mustang-M2AE-MX1M.2 AE-key card included one Intel® Movidius™ Myriad™ X VPU, providing an flexible AI inference solution for compact size and embedded systems.

VPU is short for vision processing unit. It can run AI faster, and is well suited for low power consumption applications such as surveillance, retail, transportation. With the advantage of power efficiency and high performance to dedicate DNN topologies, it is perfect to be implemented in AI edge computing device to reduce total power usage, providing longer duty time for the rechargeable edge computing equipment.

Key Features of Intel® Movidius™ Myriad™ X VPU:

- Native FP16 support
- Rapidly port and deploy neural networks in Caffe and Tensorflow formats
- End-to-End acceleration for many common deep neural networks
- Industry-leading Inferences/S/Watt performance

10X Higher Performance

1 Trillion operatioms per second

1 TOPS
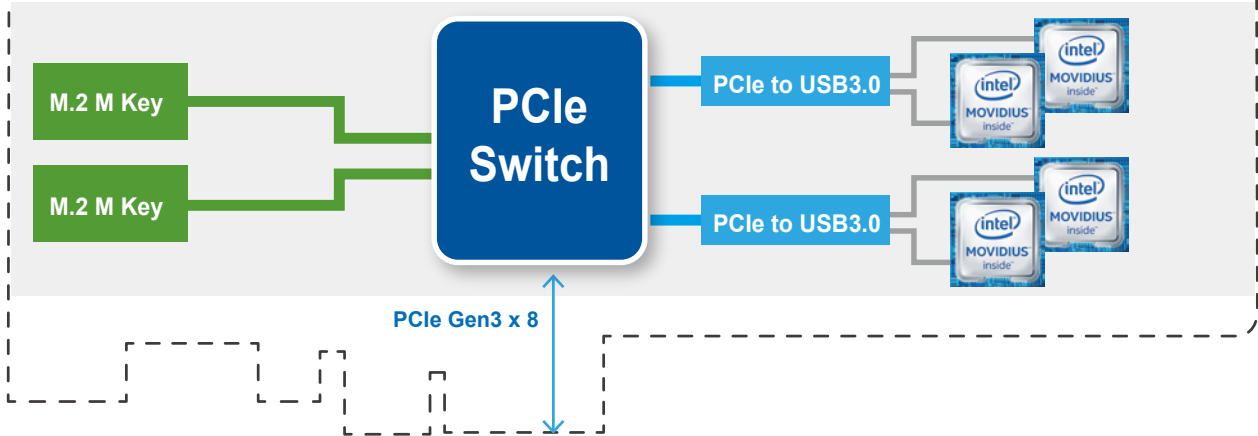1 Trillion operatioms per second of dedicated neural networks compute

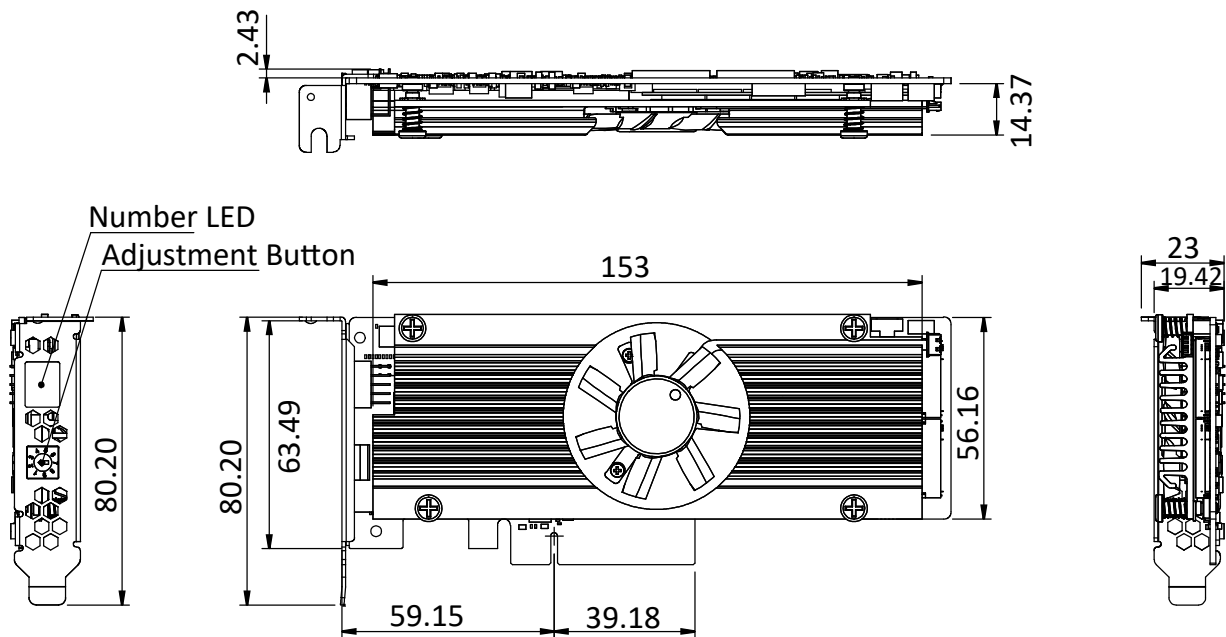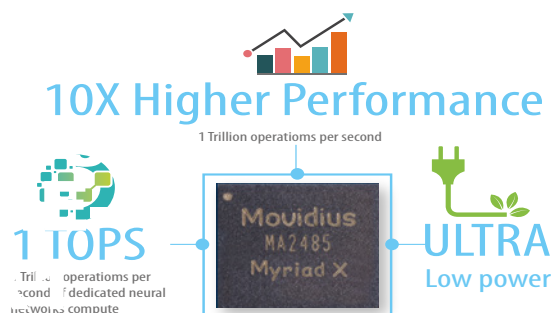Movidius MA2485 Myriad X

ULTRA Low power

Specifications

Model Name	Mustang-M2AE-MX1
Main Chip	1x Intel® Movidius™ Myriad™ X MA2485 VPU
Operating Systems	Ubuntu 16.04.3 LTS 64bit, CentOS 7.4 64bit, Windows® 10 64bit
Dataplane Interface	M.2 AE Key
Power Consumption	<2.5W
Operating Temperature	0°C~50°C (ambient temperature)
Cooling	Passive Heatsink
Dimensions	22 x 30 mm
Operating Humidity	5% ~ 90%
Support Topology	AlexNet, GoogleNet V1/V2/V4, Yolo Tiny V1/V2, Yolo V2/V3, SSD300,SSD512, ResNet-18/50/101/152, DenseNet121/161/169/201, SqueezeNet 1.0/1.1, VGG16/19, MobileNet-SSD, Inception-ResNet-v2,Inception-V1/V2/V3/V4,SSD-MobileNet-V2-coco, MobileNet-V1-0.25-128, MobileNet-V1-0.50-160, MobileNet-V1-1.0-224, MobileNet-V1/V2, Faster-RCNN

Dimensions (Unit: mm)

1.4 1.8

13.63 4

22

26

30

Ordering Information

Part No.	Description
Mustang-M2AE-MX1	Computing Accelerator Card with 1x Intel® Movidius™ Myriad™ X MA2485 VPU,M.2 AE key interface,2230, RoHS

Packing List

1 x QIG

Mustang-M2BM-MX2

Preliminary

Feature

- M.2 BM key form factor (22 x 80 mm)
- 2xIntel® Movidius™ Myriad™ X VPU MA2485
- Power efficiency, only 5W.
- Operating Temperature 0° C to 50°C
- Powered by Intel's OpenVINO™ toolkit

Introduction

The Mustang-M2BM-MX2 card included two Intel® Movidius™ Myriad™ X VPU, providing an flexible AI inference solution for compact size and embedded systems.

VPU is short for vision processing unit. It can run AI faster, and is well suited for low power consumption applications such as surveillance, retail, transportation. With the advantage of power efficiency and high performance to dedicate DNN topologies, it is perfect to be implemented in AI edge computing device to reduce total power usage, providing longer duty time for the rechargeable edge computing equipment.

Key Features of Intel® Movidius™ Myriad™ X VPU:

- Native FP16 support
- Rapidly port and deploy neural networks in Caffe and Tensorflow formats
- End-to-End acceleration for many common deep neural networks
- Industry-leading Inferences/S/Watt performance

10X Higher Performance

1 Trillion operatioms per second

1 TOPS
1 Trillion operatioms per second of dedicated neural networks compute

Movidius MA2485 Myriad X

ULTRA Low power

Specifications

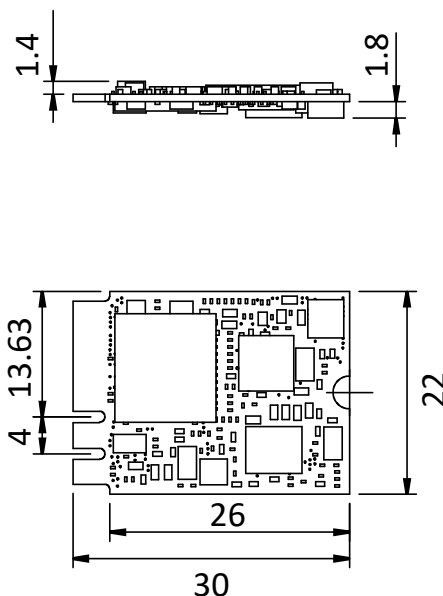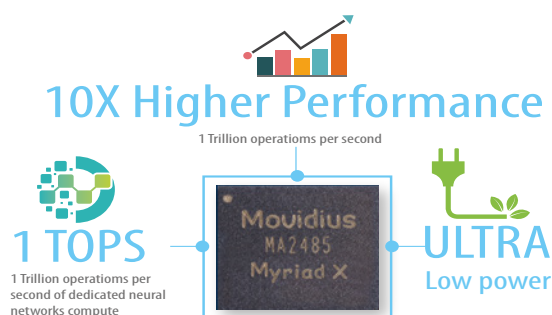| Model Name	Mustang-M2BM-MX2
Main Chip	2x Intel® Movidius™ Myriad™ X MA2485 VPU
Operating Systems	Ubuntu 16.04.3 LTS 64bit, CentOS 7.4 64bit, Windows® 10 64bit
Dataplane Interface	M.2 BM Key
Power Consumption	<5W
Operating Temperature	0°C~50°C (ambient temperature)
Cooling	Passive Heatsink
Dimensions	22 x 80 mm
Operating Humidity	5% ~ 90%
Support Topology	AlexNet, GoogleNet V1/V2/V4, Yolo Tiny V1/V2, Yolo V2/V3, SSD300,SSD512, ResNet-18/50/101/152, DenseNet121/161/169/201, SqueezeNet 1.0/1.1, VGG16/19, MobileNet-SSD, Inception-ResNet-v2,Inception-V1/V2/V3/V4,SSD-MobileNet-V2-coco, MobileNet-V1-0.25-128, MobileNet-V1-0.50-160, MobileNet-V1-1.0-224, MobileNet-V1/V2, Faster-RCNN

Dimensions *(Unit: mm)*

11.75 4.88   1.75

80 76   22   1.8

Ordering Information

Part No.	Description
Mustang-M2BM-MX2-R10	Deep learning inference accelerating M.2 BM key card with 2 x Intel® Movidius™ Myriad™ X MA2485 VPU, M.2 interface 22mmx80mm, RoHS

Packing List

1 x QIG
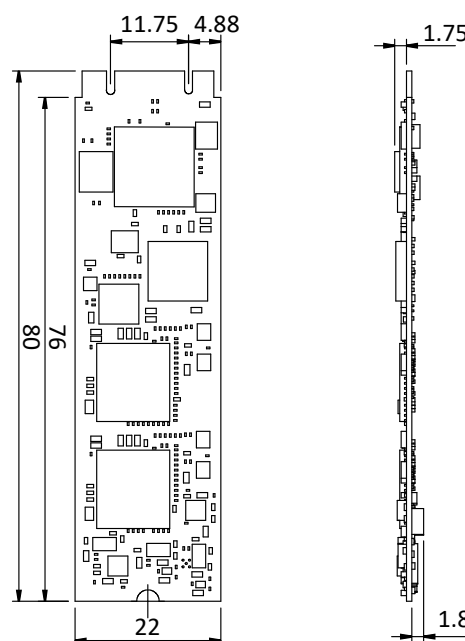
Mustang-MPCIE-MX2

Preliminary

Feature

- miniPCIe form factor (30 x 50 mm)
- 2xIntel® Movidius™ Myriad™ X VPU MA2485
- Power efficiency, only 5W.
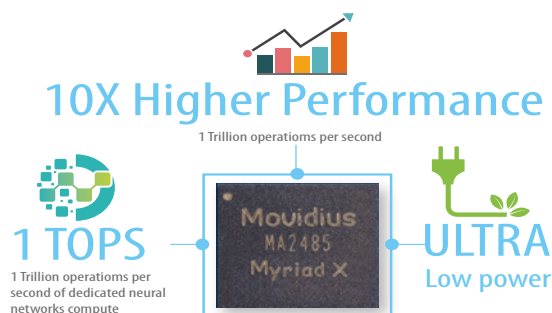- Operating Temperature 0° C to 50°C
- Powered by Intel's OpenVINO™ toolkit

Introduction

The Mustang-MPCIE-MX2 card included two Intel® Movidius™ Myriad™ X VPU, providing an flexible AI inference solution for compact size and embedded systems.

VPU is short for vision processing unit. It can run AI faster, and is well suited for low power consumption applications such as surveillance, retail, transportation. With the advantage of power efficiency and high performance to dedicate DNN topologies, it is perfect to be implemented in AI edge computing device to reduce total power usage, providing longer duty time for the rechargeable edge computing equipment.

Key Features of Intel® Movidius™ Myriad™ X VPU:

- Native FP16 support
- Rapidly port and deploy neural networks in Caffe and Tensorflow formats
- End-to-End acceleration for many common deep neural networks
- Industry-leading Inferences/S/Watt performance

10X Higher Performance

1 Trillion operatioms per second

1 TOPS
1 Trillion operatioms per second of dedicated neural networks compute

Movidius MA2485 Myriad X

ULTRA Low power

Specifications

| Model Name	Mustang-MPCIE-MX2
Main Chip	2x Intel® Movidius™ Myriad™ X MA2485 VPU
Operating Systems	Ubuntu 16.04.3 LTS 64bit, CentOS 7.4 64bit, Windows® 10 64bit
Dataplane Interface	miniPCIe
Power Consumption	<5W
Operating Temperature	0°C~50°C (ambient temperature)
Cooling	Passive Heatsink
Dimensions	30 x 50 mm
Operating Humidity	5% ~ 90%
Support Topology	AlexNet, GoogleNet V1/V2/V4, Yolo Tiny V1/V2, Yolo V2/V3, SSD300,SSD512, ResNet-18/50/101/152, DenseNet121/161/169/201, SqueezeNet 1.0/1.1, VGG16/19, MobileNet-SSD, Inception-ResNet-v2,Inception-V1/V2/V3/V4,SSD-MobileNet-V2-coco, MobileNet-V1-0.25-128, MobileNet-V1-0.50-160, MobileNet-V1-1.0-224, MobileNet-V1/V2, Faster-RCNN

Dimensions *(Unit: mm)*

Ordering Information

Part No.	Description
Mustang-MPCIE-MX2-R10	Deep learning inference accelerating miniPCIe card with 2 x Intel® Movidius™ Myriad™ X MA2485 VPU, miniPCIe interface 30mmx50mm, RoHS

Packing List

1 x QIG
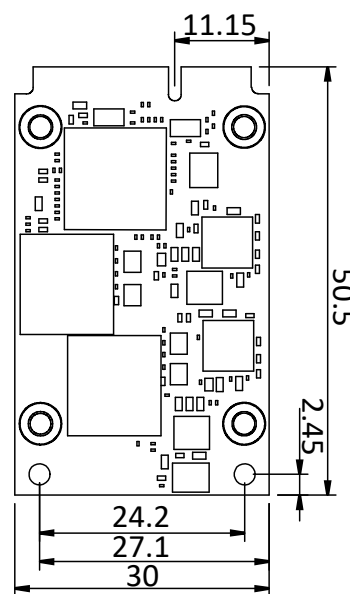
Mustang-NCB-MX2

Feature

- USB 3.1 Gen2(10 Gbit/s) plug and play
- 2xIntel® Movidius™ Myriad™ X VPU MA2485
- Operating Temperature 0° C to 40°C
- Powered by Intel's OpenVINO™ toolkit

Introduction

TThe Mustang-NCB-MX2 included two Intel® Movidius™ Myriad™ X VPU, USB interface provide plug and play function for deep learning developer to complete projects via laptop.
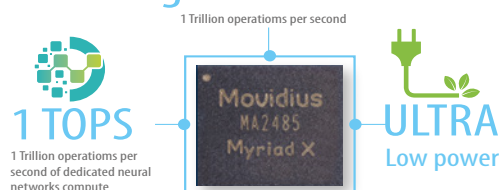
VPU is short for vision processing unit. It can run AI faster, and is well suited for low power consumption applications such as surveillance, retail, transportation. With the advantage of power efficiency and high performance to dedicate DNN topologies, it is perfect to be implemented in AI edge computing device to reduce total power usage, providing longer duty time for the rechargeable edge computing equipment.

Key Features of Intel® Movidius™ Myriad™ X VPU:

- Native FP16 support
- Rapidly port and deploy neural networks in Caffe and Tensorflow formats
- End-to-End acceleration for many common deep neural networks
- Industry-leading Inferences/S/Watt performance

10X Higher Performance

1 Trillion operations per second

1 TOPS
1 Trillion operatioms per second of dedicated neural networks compute

Movidius MA2485 Myriad X

ULTRA Low power

Specifications

Model Name	Mustang-NCB-MX2
Main Chip	2x Intel® Movidius™ Myriad™ X MA2485 VPU
Operating Systems	Ubuntu 16.04.3 LTS 64bit, CentOS 7.4 64bit, Windows® 10 64bit
Dataplane Interface	USB3.0
Power Consumption	<8W
Operating Temperature	0°C~40°C (ambient temperature)
Cooling	Active Fan
Dimensions	112x56x27.5 mm
Operating Humidity	5% ~ 90%
Support Topology	AlexNet, GoogleNet V1/V2/V4, Yolo Tiny V1/V2, Yolo V2/V3, SSD300,SSD512, ResNet-18/50/101/152, DenseNet121/161/169/201, SqueezeNet 1.0/1.1, VGG16/19, MobileNet-SSD, Inception-ResNet-v2,Inception-V1/V2/V3/V4,SSD-MobileNet-V2-coco, MobileNet-V1-0.25-128, MobileNet-V1-0.50-160, MobileNet-V1-1.0-224, MobileNet-V1/V2, Faster-RCNN

Dimensions (Unit: mm)

112

27.5

56

Ordering Information

Part No.	Description
Mustang-NCB-MX2-R10	Neural Computing Box with 2 x Intel® Movidius™ Myriad™ X MA2485 VPU, USB3.1 Gen2 (10 Gbit/s) interface, RoHS

Packing List

1 x QIG