**Intel® x IEI TANK AIoT Developer Kit**

## *Features*

* 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 Open Visual Inference & Neural Network Optimization (OpenVINO™) toolkit
* Pre-installed Ubuntu 16.04 LTS

DDR4 2133

Display

Dual


## *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.

**Al**

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.

**Learning from existing data**

**Training**

**Training Dataset**

**Predict new input data**

**Inference**

**New Data**

**Trained Model**

**?**

 **Forward**

 **Forward**

**DOG**

**CAT**

「**DOG**」

**Backward**

## *OpenVINO™ toolkit*

OpenVINO™ is based on convolutional neural networks (CNN), the toolkit extends workloads across Intel® hardware and maximizes performance.

It can optimize pre-trained deep learning models such as Caffe, MXNET, and 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).

* Intel® Deep Learning Deployment Toolkit
	+ Model Optimizer
	+ Inference Engine
* Optimized computer vision libraries
* Intel® Media SDK
* OpenCL™ graphics drivers and runtimes.

(OpenCL™ is the trademark of Apple Inc. used by permission by Khronos)

* Current Supported Topologies: AlexNet, GoogleNet, Tiny Yolo, LeNet, SqueezeNet, VGG16, ResNet (more variants are coming soon)

**OpenVINO™ toolkit**

Video Decode

Intel® Media SDK H.264 H.265 MPEG-2

Image Process

Inference Engine

Intel®

Deep learning Development toolkit

Image Process

OpenCV OpenVX Mophology Blob detect

OpenCV OpenVX Overlay Text

Video Encode

Intel® Media SDK H.264 H.265 MPEG-2

**Intel Accelerator**

Optimize IR

**Inference Engine**

Convert to optimized Intermediate Representation

**IR**

**Model Optimizer**

**Trained Model**

|  |
| --- |
| CPU |
| GPU |
| FPGA |
| VPU |

## *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.

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 (IPCIE-4POE) to enhance performance and function for various applications.

## *Machine Vision*

Vision Analytics on the factory floor adds intelligence to factories design and process. Today's technologies automate the collection, storage, retrieval, and decision making across multiple factories and factory sub-systems at the edge.

## *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.

## *Numerous Face Recognition*

Face analysis with AI has explosive growth in various domains. It not only infers human features like gender, age and facial expression, but also identifies identity, which can greatly reduce labor costs and provide services via big data in retail, finance and medicine.

## *Specifications*

TANK AIoT Dev. Kit-2018-V13

|  |  |
| --- | --- |
| **Model Name** | **TANK AIoT Dev. Kit** |
| **Chassis** | **Color** | Black C + Silver |
| **Dimensions (WxHxD) (mm)** | 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 3.0** | 4 |
| **USB 2.0** | 4 |
| **Ethernet** | 2 x RJ-45LAN1: 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 VGA1 x HDMI/DP1 x iDP (optional) |
| **Resolution** | VGA: Up to 1920 x 1200@60HzHDMI/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 slot1 x Full-size PCIe Mini slot (supports mSATA, colay with SATA) |
| **Power** | **Power Input** | DC Jack: 9 V~36 V DCTerminal 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 |

***Fully Integrated I/O***

**Power Switch**

1. Long-press 3 sec. to power on
2. Long-press 5 sec. to power off

Reset VGA

LED 4 x USB 2.0

2 x GbE LAN

2 x RS-232

4 x USB 3.0

2 x RS-232/

422/485

DIO

AT/ATX Mode

HDMI+DP

ACC Mode

2 x Expansion Slots

## *Dimensions*

***(Unit: mm)***

2 x RS-232

Audio

Power2 (DC Jack)

To Ground

Power1 (Terminal Block)

***TANK AIoT Dev. Kit***

## *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), 8 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-i7/8G/2A-R11** Ruggedized embedded system with Intel® Core™ i7-6700TE 2.4GHz, (up to 3.4 GHz, Quad Core, TDP 35W), 8 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-i5/8G/2A-R11** Ruggedized embedded system with Intel® Core™ i5-6500TE 2.3GHz, (up to 3.3 GHz, Quad Core, TDP 35W), 8 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

## *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

## *Peripheral Options*

**Part No. Description**

**IPCIE-4POE-R10** PCI Express Power over ethernet card, 4-port 1000 Base(T), 802.3af compliant, RoHS

**63040-010150-400-RS** Adapter Power; FSP; FSP150M-ABA; 9NA1505201; Active PFC; Vin: 90 ~ 264VAC; 150W; Dim: 85 x 170 x 42.5mm; Plug=6.5mm; Cable=1200mm;

MEDICAL; Vout: 19VDC; Din 4Pin/lock; CCL; RoHS

**72213100-5010000-000-RS** 2.5” HDD;WD;Caviar Blue;WD10SPZX;SATA3.0(6Gb/s, 600MB/s);1TB;128MB;5400 RPM;NoAssign;NoAssign;;CCL;RoHS

## *Packing List*

1 x Chassis Screw

1 x Mounting Bracket

1 x QSG

1 x 120W Adapter

1 x Power Cord