



# Trion & Titanium FPGAs Live Demonstrations

RISC-V Days Tokyo 2022 Spring (May 31<sup>st</sup> ~ Jun 2<sup>nd</sup>, 2022)

Efinix Japan

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## Live Demonstrations

- Trion T20                      Biometric and Power measurements
- Titanium Ti60                Edge Vision SoC
- Trion T120                     Object Tracking (Plumerai)

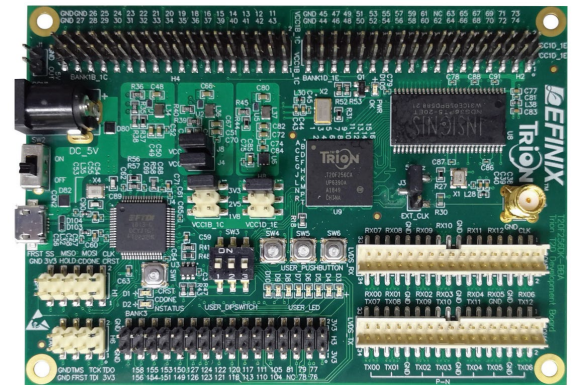
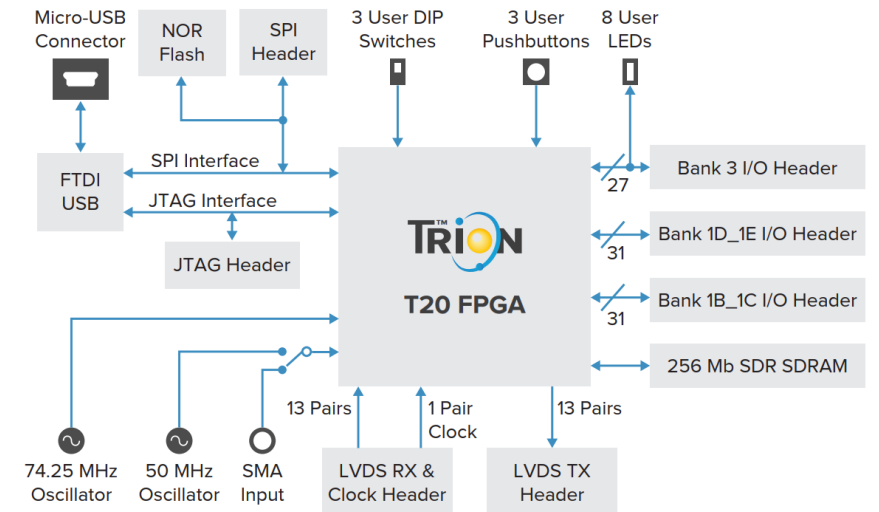


# Trion T20F256C-DK Biometric and Power measurements

# T20 - Biometric and Power measurements

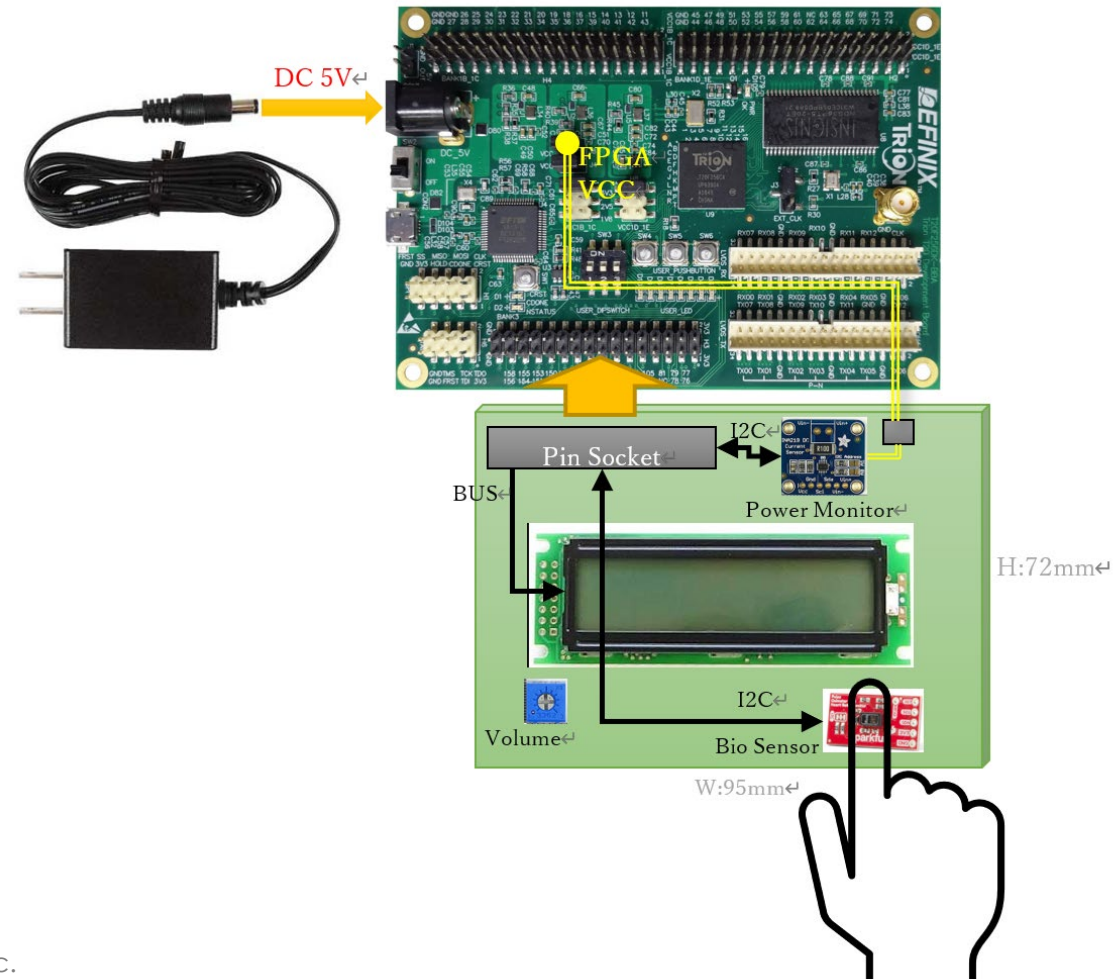
## T20F256C-DK Features

- T20 FPGA in 256-ball FBGA package
- 8 user LEDs
- 3 user pushbutton switches, 3 user DIP switches
- Micro-USB port (SPI, JTAG)
- SPI, JTAG headers to facilitate configuration
- 3 I/O headers to connect to external devices
- 50 and 74.25 MHz oscillators
- LVDS TX, RX, and clock headers
- 256Mb SDR SDRAM

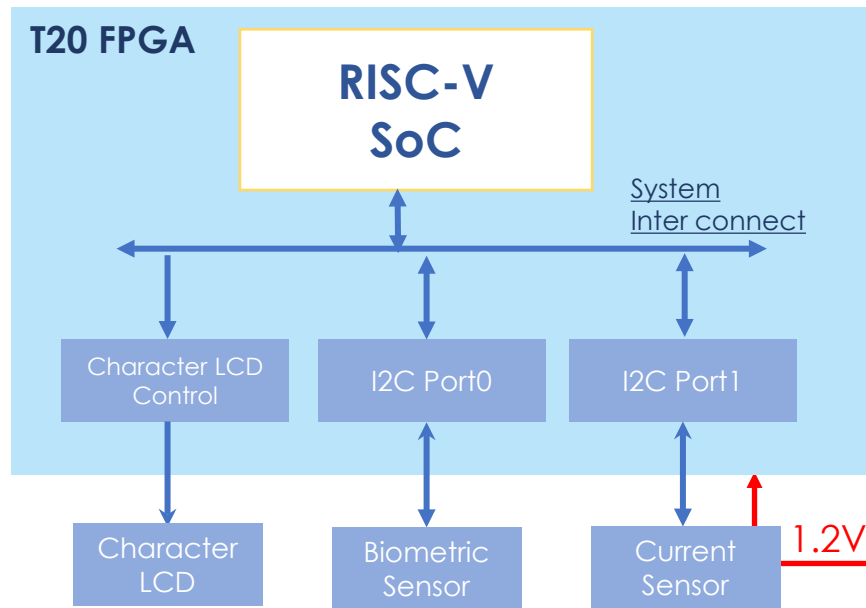


# T20 - Biometric and Power measurements

- RISC-V (Sapphire) SoC on T20 FPGA
- Sensor Extension Board
  - 16 x 2 Character LCD (Parallel)
  - Current Sensor (I2C)
  - Biometric Sensor (I2C)



# T20 - Biometric and Power measurements



## RISC-V SoC on T20 FPGA

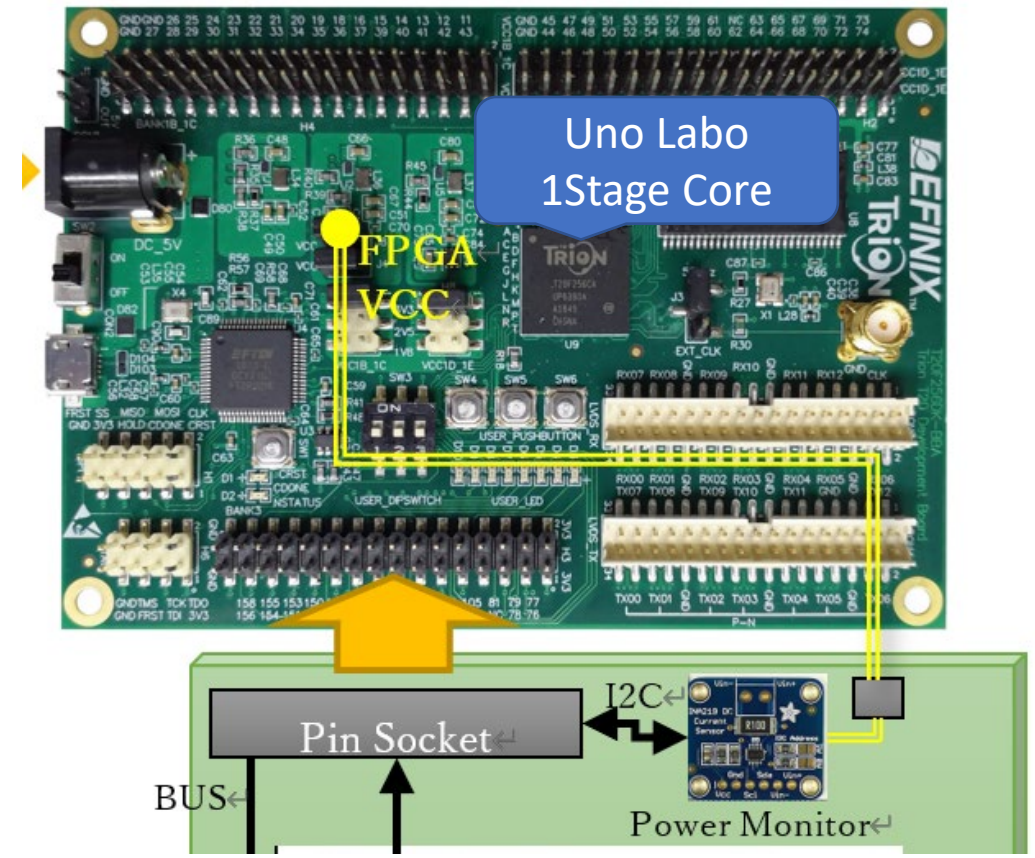
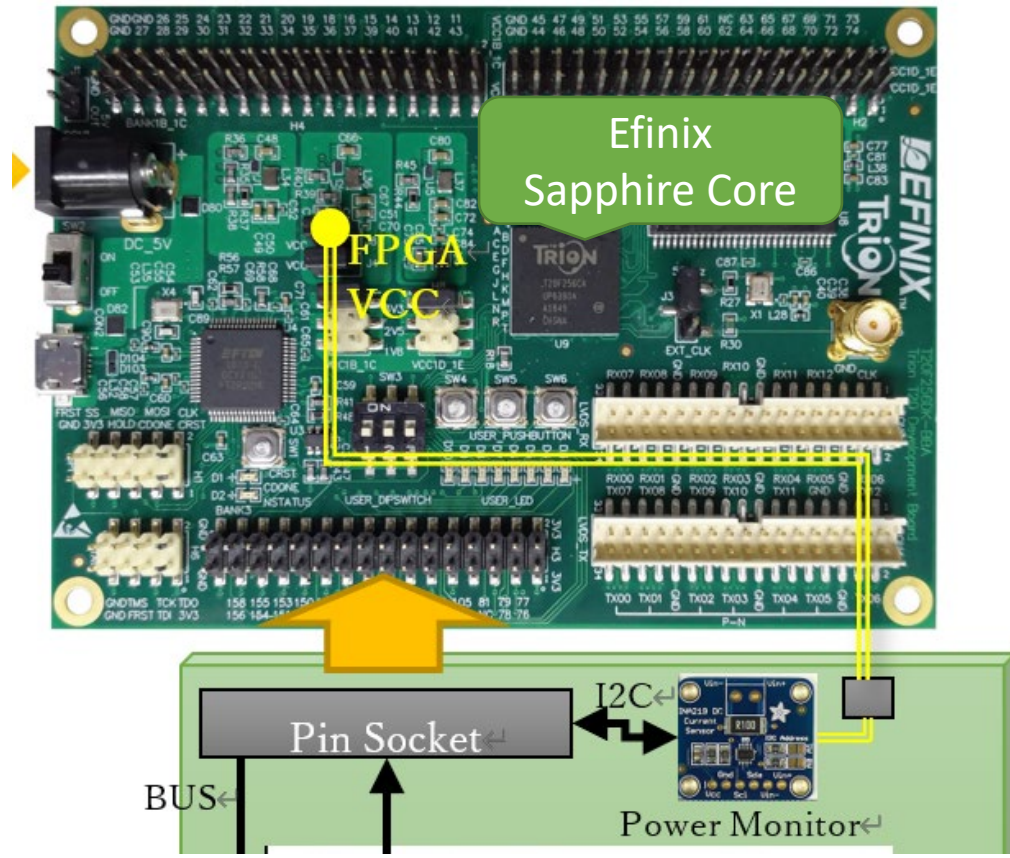
### RISC-V SoC

- Capture and Process Sensor Data
- Display to character LCD

### FPGA fabric

- I2C Bus Control (Efinix IP core)
- Character LCD Control

# Comparing Powers on two RISC-V cores





# Demonstration





# Titanium Ti60F225C-DK Edge Vision SoC

Comparing image processing performances between SW processing on RISC-V and HW accelerator with RISC-V on Titanium Ti60 FPGA

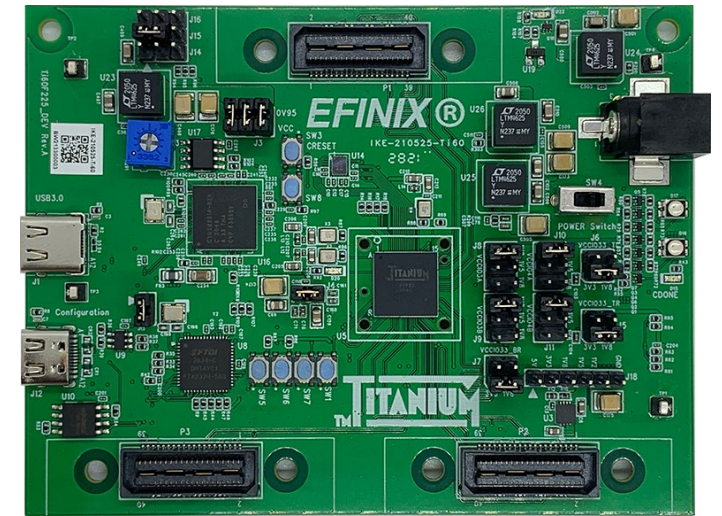
# Ti60 – Edge Vision SoC

## Ti60F225C-DK Features

- Ti60 FPGA in a 225-ball FBGA package
- 256 Mb HyperRAM memory with x16 bits (up to 400M bps)
- SPI NOR flash memory
- Three MIPI, LVDS, and GPIO high-speed connectors
- Micro-SD card slot
- USB v3.0 interface and type-C connector
- USB Type-C connector for programming
- 2 RGB LEDs
- 4 User pushbutton switches
- 2 User DIP switches
- 25 MHz, 33.3333 MHz, and 74.25 MHz oscillators

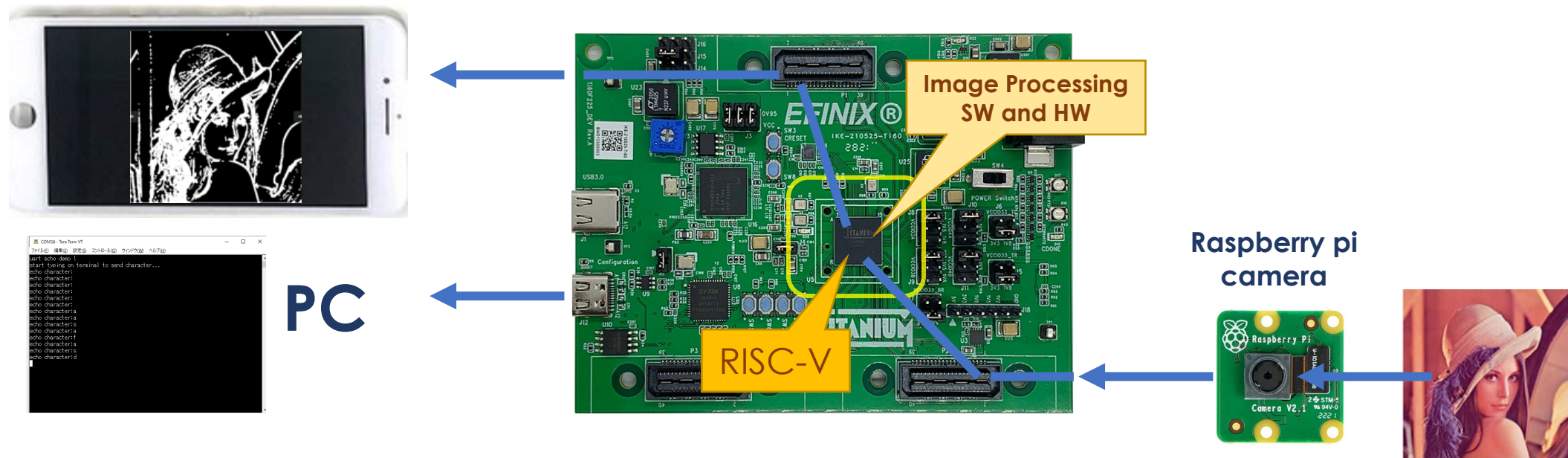
## Bundled with

- Raspberry Pi v2 camera module
- MIPI DSI Panel

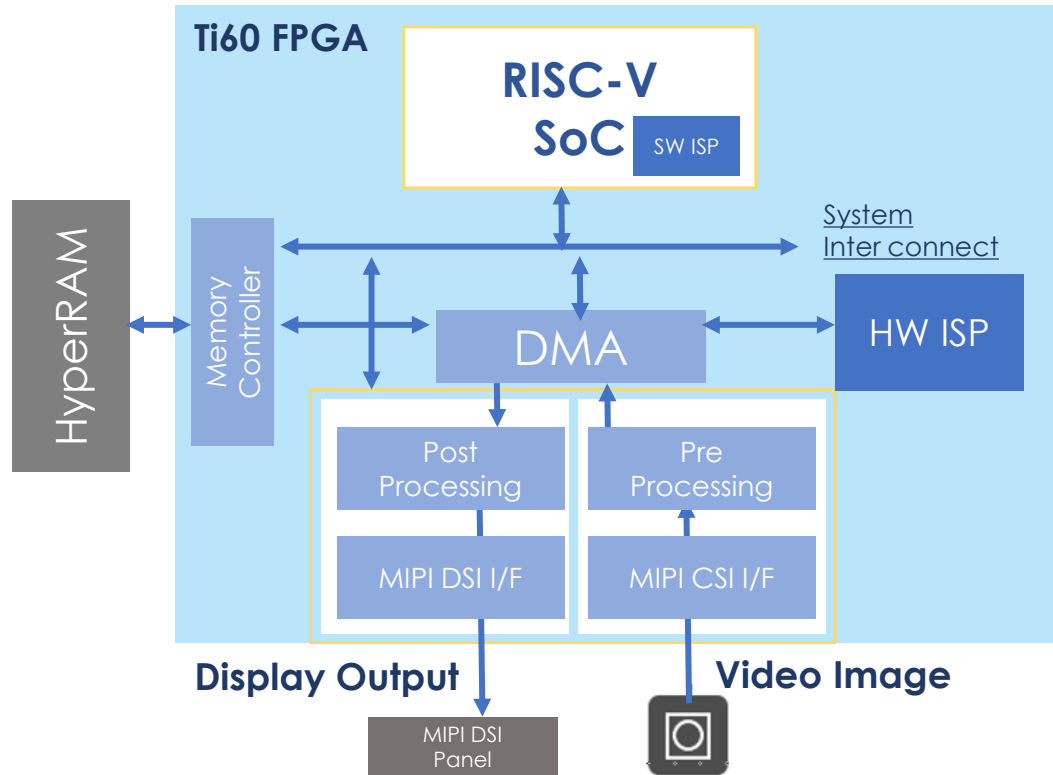


# Ti60 – Edge Vision SoC

Video streaming data from RPi camera is processed by either RISC-V software or hardware accelerator with RISC-V, and output to MIPI DSI display with Titanium Ti60 FPGA



# Ti60 – Edge Vision SoC



## RISC-V on Ti60 FPGA

### RISC-V SoC

- Flow control
- UART communication
- Image Processing (Software)

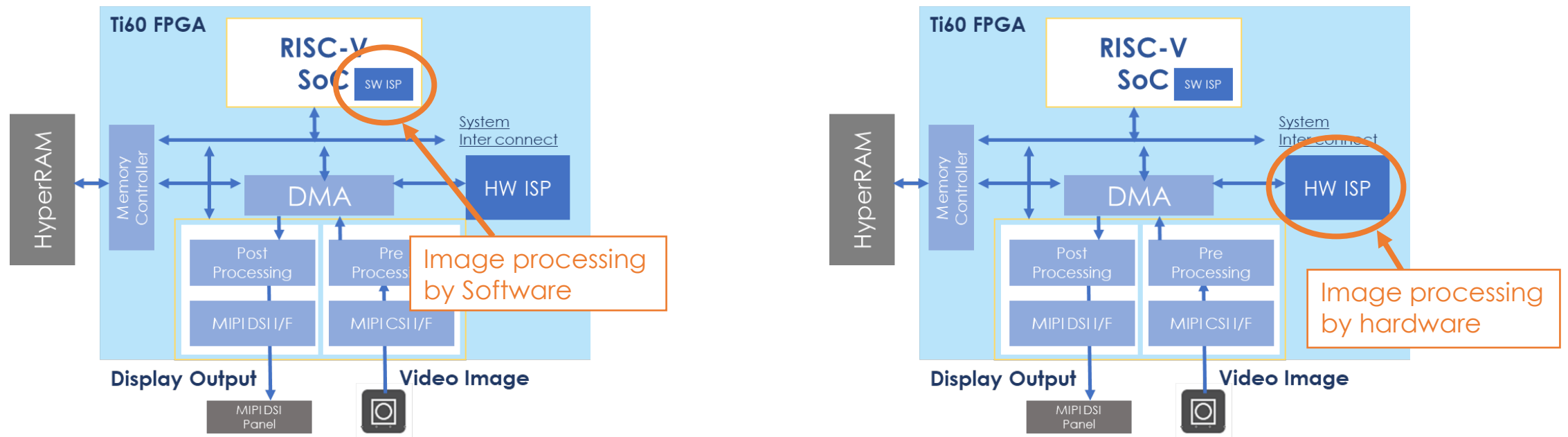
### FPGA fabric

- Video Pre-processing
- DMA
- Memory controller
- Image Processing (Hardware)

Note: Available on Efinix website

# Ti60 – Edge Vision SoC

To compare SW processing and HW processing



RISC-V with hardware accelerator is better performance than software processing



# Demonstration

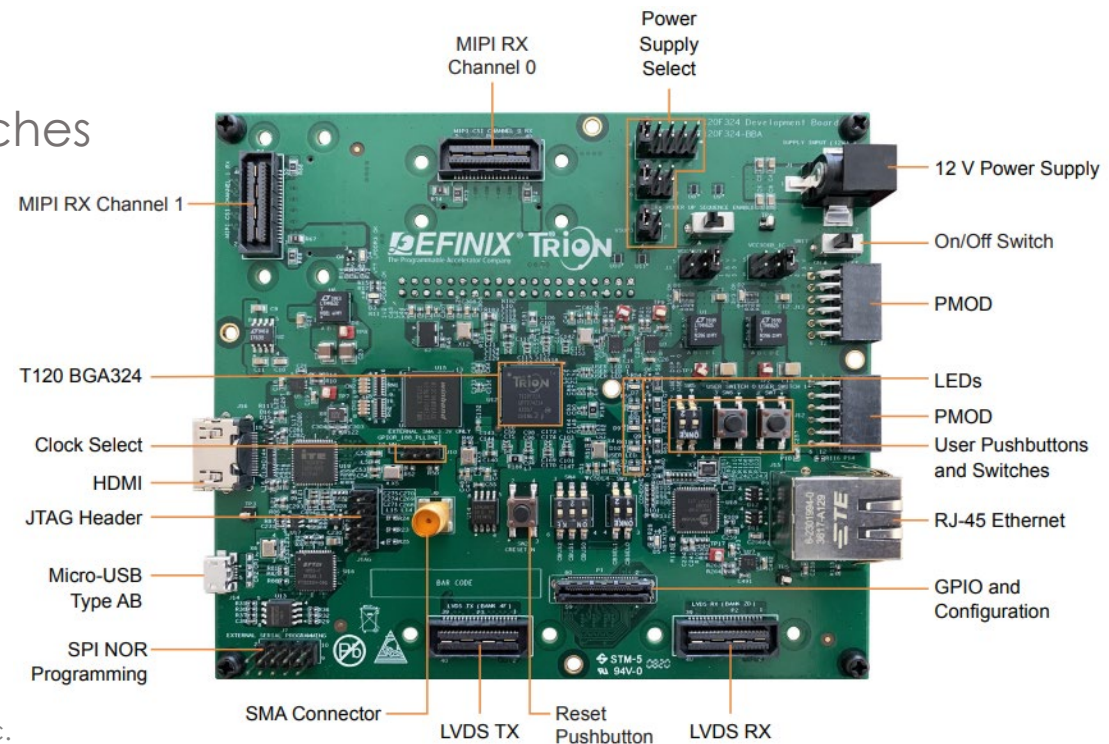


# Trion T120F324C-DK Object Tracking

# T120 – Object Tracking

## T120F324C-DK Features

- T120 FPGA in a BGA324 package with MIPI CSI-2 interface and DDR DRAM controller
- LPDDR3 256 Mbit x 16 bits memory
- HDMI 1080p transmitter for video output
- Triple-speed Ethernet PHY
- 4 user LEDs, 2 user pushbutton switches, 2 user DIP switches
- Designed to accommodate up to 7 daughter cards
- Two 12-pin PMOD-compatible GPIO sockets
- 40-pin header to connect to Raspberry Pi computer
- 60-pin GPIO and configuration expansion header
- 10, 20, 25, 30, 50, and 74.25 MHz oscillators
- Micro-USB port
- SPI and JTAG headers to facilitate configuration





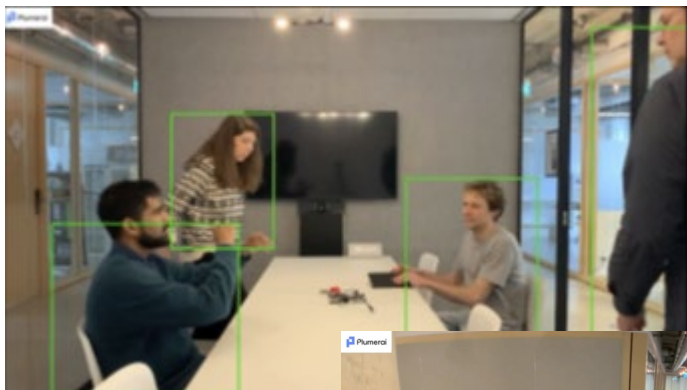
# Plumerai Ikva AI – Object Tracking

Object Tracking with Efinix Sapphire Risc-V SoC + Plumerai's Ikva AI Accelerator for FPGA core on Titanium Ti60 FPGA or Trion T120 FPGA

## **about Plumerai (<https://plumerai.com/>) "Ikva AI Accelerator for FPGA"**

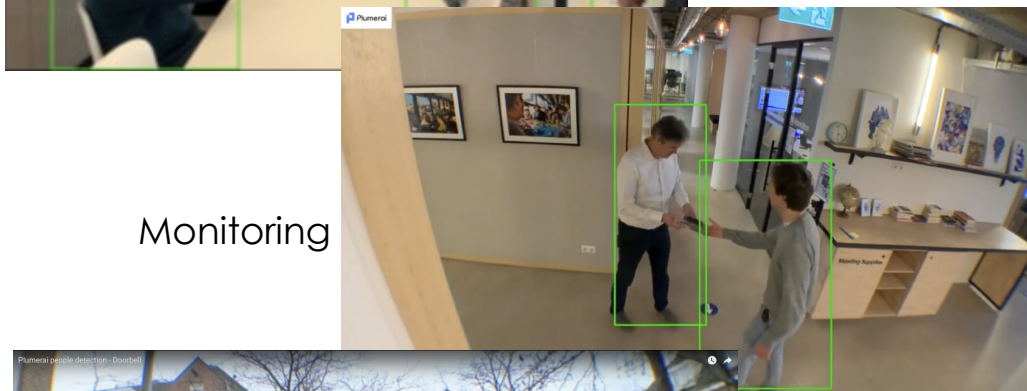
- Energy efficient: optimized for low power processing, utilization of 75-85% on popular networks
- Area efficient: architected for small silicon area
- Configurable and scalable: 8 / 16 / 32 / 64 MAC configurations and up
- Mixed-quantization: 8-bit, Binarized Neural Networks, and mixed networks
- Robust model support: optimized for vision, supports wide variety of 8-bit CNNs and Plumerai's BNNs
  - Layer support: 3D, 2D and depth-wise convolutions, Average and Max pooling, skip layers and non-linear operations
- Easy to use and ultra efficient toolflow:
  - Integrates with TFLite Micro. Extensive software support with conversion and optimization tools.
  - Includes Plumerai's memory-optimization technology that saves typically 50% in system memory
- Integrates with host CPU: low overhead driver runs on host CPU

# Plumerai Ikva AI - Object Tracking

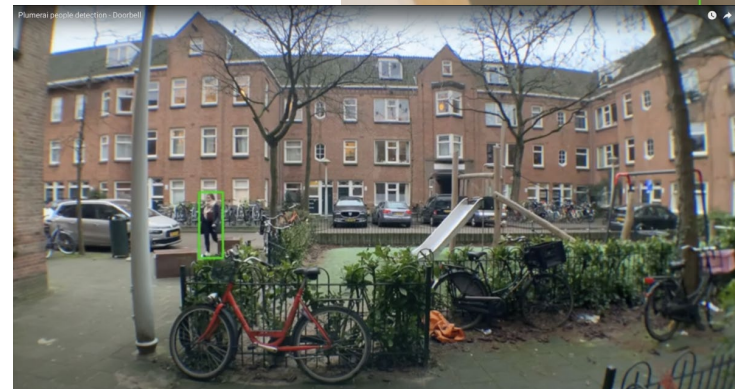


Conf. room

USB カメラ

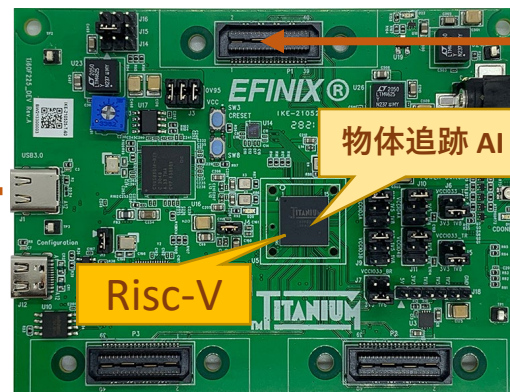


Monitoring

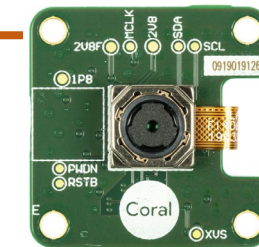


Intercom

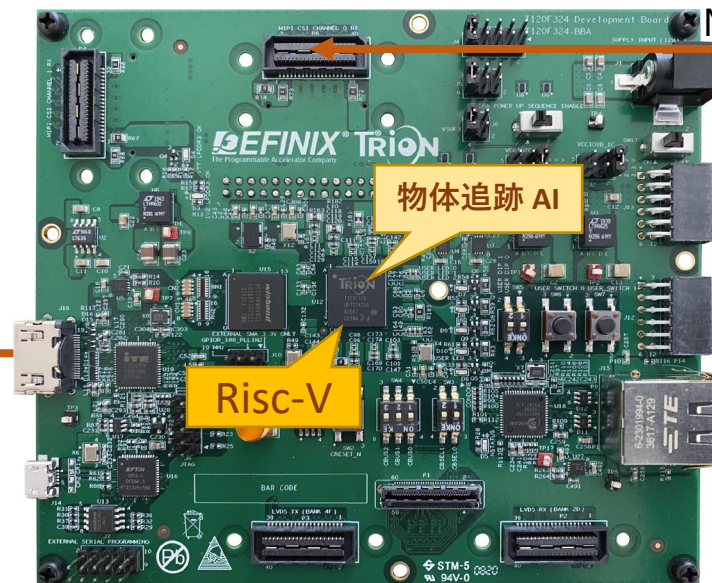
Efinix Titanium Ti60



MIPI



Efinix Trion T120



MIPI





# Demonstration



## *Please join our live demo sessions*

May 31 <sup>st</sup>	16:00-17:00 / 18:00-19:00
June 1 <sup>st</sup>	10:00-11:00 / 12:00-13:00 / 17:00-18:00
June 2 <sup>nd</sup>	11:00-12:00 / 13:00-14:00 / 16:00-17:00

Contact: [support-jp@efinixinc.com](mailto:support-jp@efinixinc.com)