



FZ5 Card AI Accelerator Card Overview



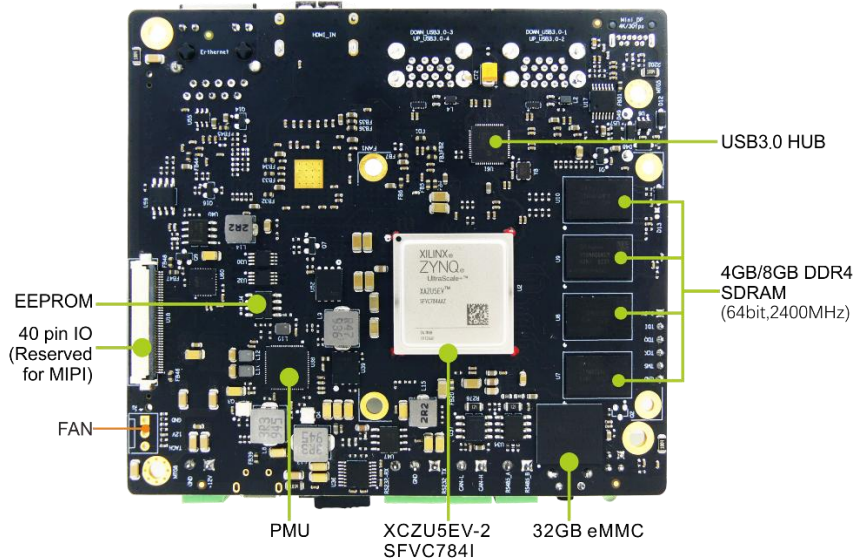
- ✓ Xilinx Zynq UltraScale+ ZU5EV MPSoC based on 1.5 GHz Quad Arm Cortex-A53 and 600MHz Dual Cortex-R5 Cores
- ✓ 8GB DDR4 SDRAM (64-bit, 2400MHz)
- ✓ 32GB eMMC Flash, 64MB QSPI Flash, 32KB EEPROM
- ✓ RS232, RS485, 4 x USB 3.0, Gigabit Ethernet, CAN, TF, DisplayPort (DP), HDMI, JTAG ...
- ✓ Computing Power up to 2.4TOPS, Runs at 55 FPS for ResNet-50
- ✓ Supports 8- to 16-channel Video Decoding and 4- to 8-channel Intelligent Analysis
- ✓ Supports Running PetaLinux
- ✓ Supports Baidu's PaddlePaddle AI Framework



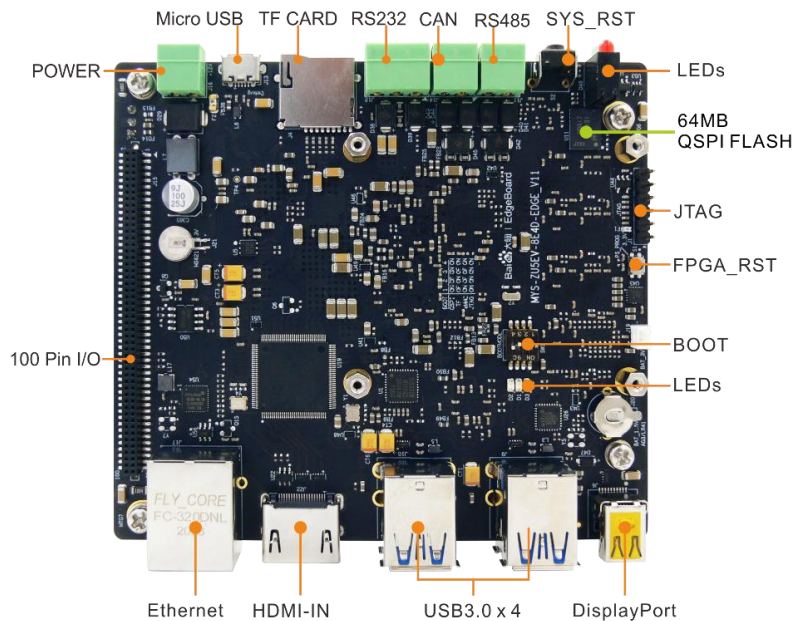
The **FZ5 Card** is an excellent Artificial Intelligence (AI) accelerator card based on [Xilinx Zynq UltraScale+ ZU5EV MPSoC](#) which features a 1.5 GHz quad-core ARM Cortex-A53 64-bit application processor, a 600MHz dual-core real-time ARM Cortex-R5 processor, a Mali400 embedded GPU, a H.264/H.265 Video Codec Unit (VCU) and rich FPGA fabric. It has computing power up to 2.4TOPS and can be seamlessly used with 55 FPS ResNet-50 backbone networks.

Besides, the **FZ5 Card** has integrated **8GB DDR4, 32GB eMMC, 64MB QSPI Flash and 32KB EEPROM** as well as many peripheral interfaces including **RS232, RS485, 4 x USB 3.0, Gigabit Ethernet, CAN, TF, DisplayPort (DP), HDMI-IN, USB-UART, JTAG, IO expansion interfaces, etc.** It is easy for your secondary development or used for your AI box or many other embedded designs.

The **FZ5 Card** is able to run **PetaLinux 2019.1** and provided with complete Linux BSP. It can also support **PaddlePaddle AI framework** which is fully compatible to use **Baidu Brain's AI development tools like EasyDL, AI Studio and EasyEdge** to enable developers and engineers to quickly leverage Baidu-proven technology or deploy self-defined models, enabling faster deployment.



FZ5 Card Top-View (delivered with active heatsink by default)



FZ5 Card Bottom-View



MYIR also offers an [FZ5 EdgeBoard AI Box](#) for the [FZ5 Card](#) which has a rugged and fanless enclosure to enable efficient development for many embedded vision applications such as multimedia, automotive ADAS, surveillance, industrial quality inspection, medical diagnosis, etc. The device can support -40 to 70 Celsius degree extended working temperature with small size and good stability. It has powerful AI capabilities to provide massive and iterative models to realize the image recognition of face, human body, animal, object, text, logo and various customized scenes.



FZ5 EdgeBoard AI Box Front View



FZ5 EdgeBoard AI Box Rear View



The main features for the XCZU2CG, XCZU3CG, XCZU3EG, XCZU4EV and XCZU5EV MPSoC devices are summarized as below.

Device	XCZU2CG	XCZU3CG	XCZU3EG	XCZU4EV	XCZU5EV
Logic cells (k)	103	154	154	192	256
CLB Flip-Flops (K)	94	141	141	176	234
CLB LUTs (K)	47	71	71	88	117
Block RAM (Mb)	5.3	7.6	7.6	4.5	5.1
UltraRAM (Mb)	-	-	-	13.5	18.0
DSP Slices	240	360	360	728	1,248
GTX transceivers	PS-GTR4x (6Gb/s)	PS-GTR4x (6Gb/s)	PS-GTR4x (6Gb/s)	PS-GTR4x (6Gb/s), GTH4x (16.3Gb/s)	PS-GTR4x (6Gb/s), GTH4x (16.3Gb/s)
Processor Units					
Application Processor Unit	Dual-core ARM® Cortex™-A53 MPCore™ up to 1.3GHz		Quad-core ARM® Cortex™-A53 MPCore™ up to 1.5GHz		
Memory w/ECC	L1 Cache 32KB I / D per core, L2 Cache 1MB, on-chip Memory 256KB				
Real-Time Processor Unit	Dual-core ARM Cortex-R5 MPCore™ up to 600MHz				
Memory w/ECC	L1 Cache 32KB I / D per core, Tightly Coupled Memory 128KB per core				
Graphics Processing Unit	-	-	Mali™-400 MP2 up to 667MHz		
Video Codec	-	-	-	H.264 / H.265	
Memory L2 Cache	64KB				
External Memory, Connectivity, Integrated Block Functionality					
Dynamic Memory Interface	x32/x64: DDR4, LPDDR4, DDR3, DDR3L, LPDDR3 with ECC				
Static Memory Interfaces	NAND, 2x Quad-SPI				
High-Speed Connectivity	PCIe® Gen2 x4, 2x USB3.0, SATA 3.1, DisplayPort, 4x Tri-mode Gigabit Ethernet				
General Connectivity	2 x USB 2.0, 2 x SD/SDIO, 2 x UART, 2 x CAN 2.0B, 2 x I2C, 2 x SPI, 4 x 32b GPIO				
Power Management	Full / Low / PL / Battery Power Domains				
Security	RSA, AES, and SHA				
AMS - System Monitor	10-bit, 1MSPS – Temperature and Voltage Monitor				

MPSoC device selection guide



The [FZ5 AI Accelerator Card](#) takes full advantages of the Xilinx Zynq UltraScale+ ZU5EV MPSoC. The main features are listed in below table.

Item	Features
Dimensions	107mm x 96mm (14-layer PCB design)
Power supply	DC 12V/3A
Working Temp.	-40~85 Celsius
SoC	Xilinx Zynq UltraScale+ XCZU5EV-2SFVC784I (ZU5EV, 784 Pin Package) MPSoC - 1.5 GHz 64 bit Quad-core ARM® Cortex™-A53 Application Processing Unit - 600MHz Dual-core ARM® Cortex™-R5 Real-time Processing Unit - ARM Mali™-400 MP2 Graphics Processing Unit (GPU) - H.264 and H.265 Video Codec Unit (VCU) - 16nm FinFET+ FPGA fabric
Memory	8GB DDR4 (64bit, 2400MHz)
Storage	32GB eMMC 64MB QSPI Flash 32KB EEPROM 1 x Micro-SD Card Slot
Communications	1 x RS232 1 x RS485 1 x CAN Interface 1 x 10/100/1000Mbps Ethernet 4 x USB 3.0 Host 1 x USB-UART Debug Interface
Display	1 x HDMI Input port 1 x Mini DisplayPort (DP), 4K/30fps
RTC	1 x 3V Rechargeable RTC Battery Interface (battery is not soldered by default, Model MS621T is recommended) 1 x 1.5V Non-Rechargeable RTC Battery Holder (battery is not provided by default, Model AG3 or LR41 is recommended)
User I/O	1 x FPC_40PIN (Reserved for MIPI-CSI) 1 x 1.27mm pitch 2x50-pin IO Expansion Interface (5 x PS_MIO, 69 x PL_IO)
Others	1 x 2.54mm pitch 6-pin JTAG interface 2 x Buttons (1x FPGA Reset, 1 x System Reset) 5 x LEDs (Power LED: 1 x RED; Status LED: 2 x RED, 2 x Green)
Software	Supports Running PetaLinux Supports Baidu's PaddlePaddle AI Framework
Target Applications	Evaluation and Prototyping for XCZU5EV Zynq UltraScale+ MPSoC Intelligent Security Industrial Testing Medical Diagnosis UAV Inspection Scientific Research Consumer Electronics Driverless Technology

Features of FZ5 Card



Software Features

The [FZ5 Card](#) is able to run **PetaLinux 2019.1** and provided with complete Linux BSP. The features are as below:

Item	Features	Description	Source code provided
Tool chains	gcc8.2.0	gcc version 8.2.0	
	gcc 5.2.1	gcc version 5.2.1 (Linaro GCC 5.2)	
Bootloader	boot.bin	First boot program including FSBL and u-boot2019.01	Yes
Linux Kernel	Linux 4.19.0	Customized kernel for FZ5 Card	Yes
	USB2.0/3.0 Host	USB2.0/3.0 Host driver	Yes
	Ethernet	Gigabit Ethernet driver	Yes
	MMC/SD/TF	MMC/SD/TF card driver	Yes
	Qspi flash	Qspi flash driver	Yes
	CAN	CAN driver	Yes
	DP	DP driver	Yes
	I2C	I2C driver	Yes
	UART	UART driver	Yes
	Watchdog	Watchdog driver	Yes
	GPIO	GPIO driver	Yes
	LED	LED driver	Yes
	Button	Button driver	Yes
	RTC	RTC driver	Yes
	HDMI	HDMI IN driver	Yes
Application	HDMI	HDMI IN example	Yes
	CAN	CAN example	Yes
	Net	Socket example	Yes
File system	Ramdisk	Ramdisk System Image	
	Rootfs	Buildroot making including Qt	Yes
Petalinux	Petalinux2019.1	Supports Xilinx Petalinux2019.1 development tools. MYIR provides complete BSP for the FZ5 card.	

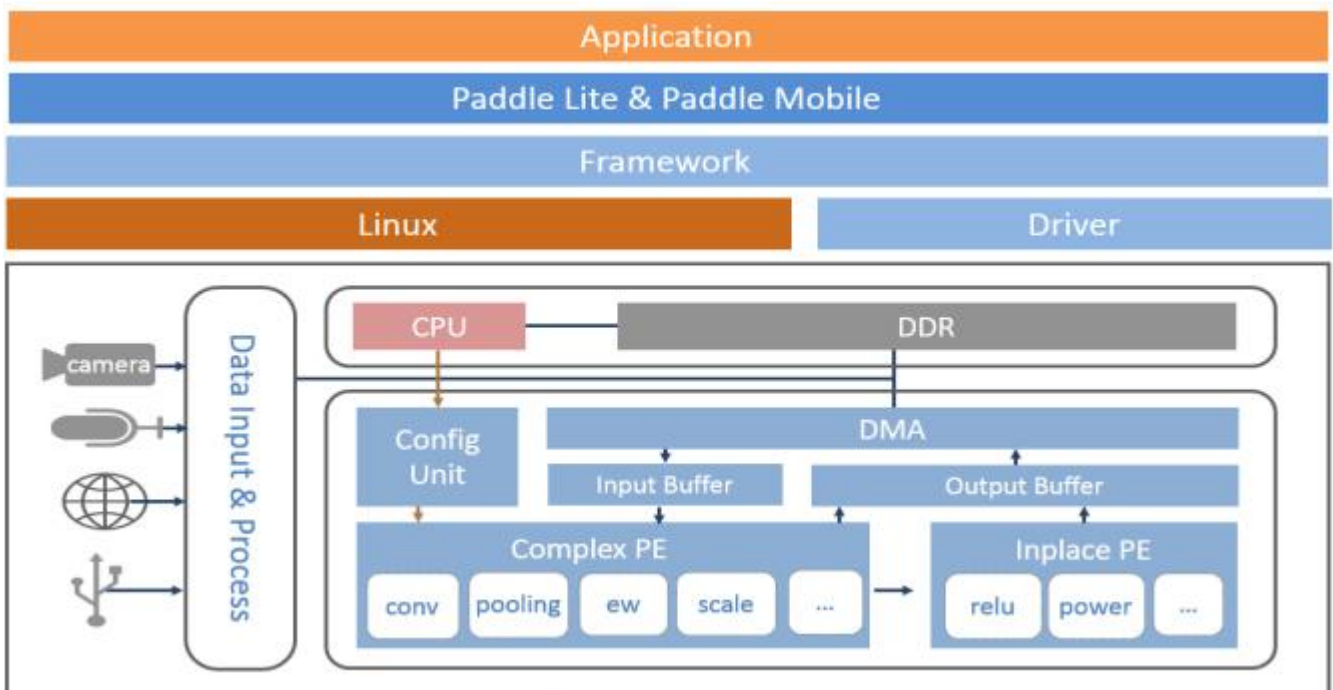
Features of Linux BSP



The FZ5 Card supports **PaddlePaddle AI framework** which is fully compatible to use **Baidu Brain's AI development tools like EasyDL, AI Studio and EasyEdge** to enable developers and engineers to quickly leverage Baidu-proven technology or deploy self-defined models, enabling faster deployment.



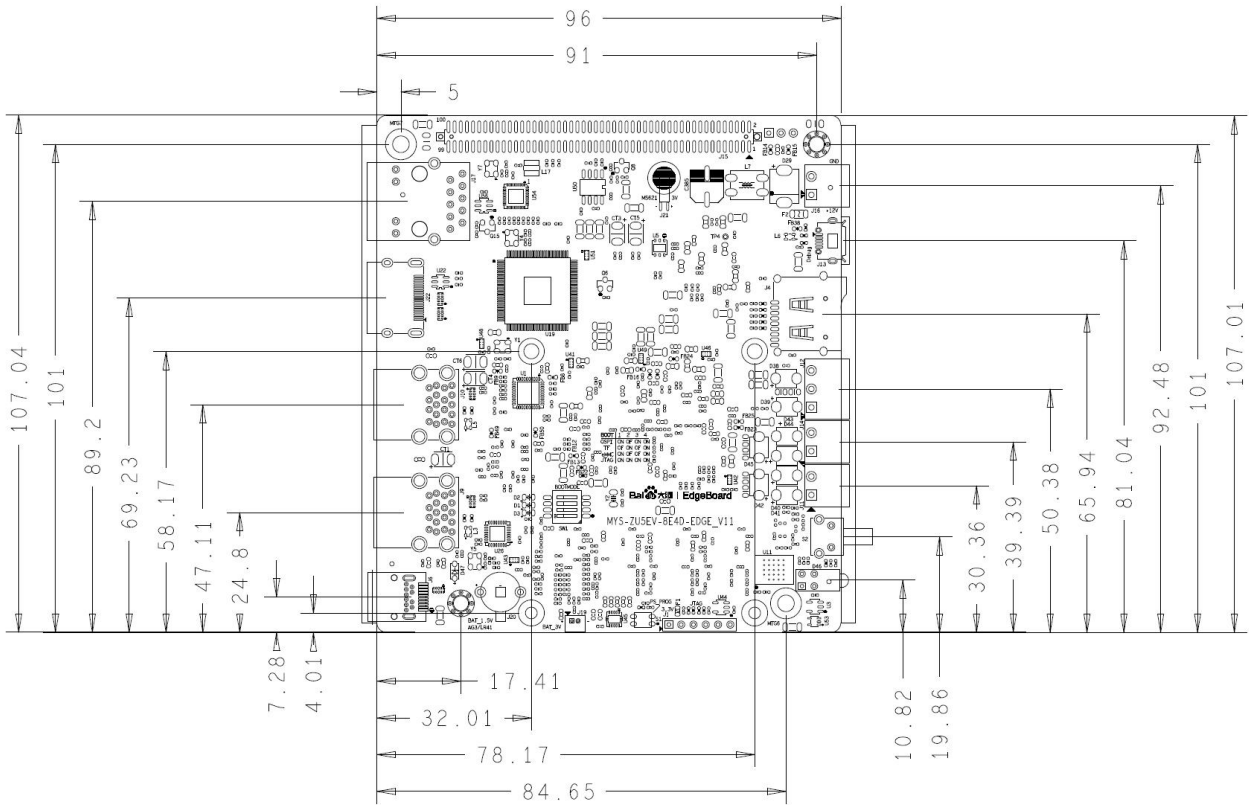
Baidu Brain's AI Development Tools



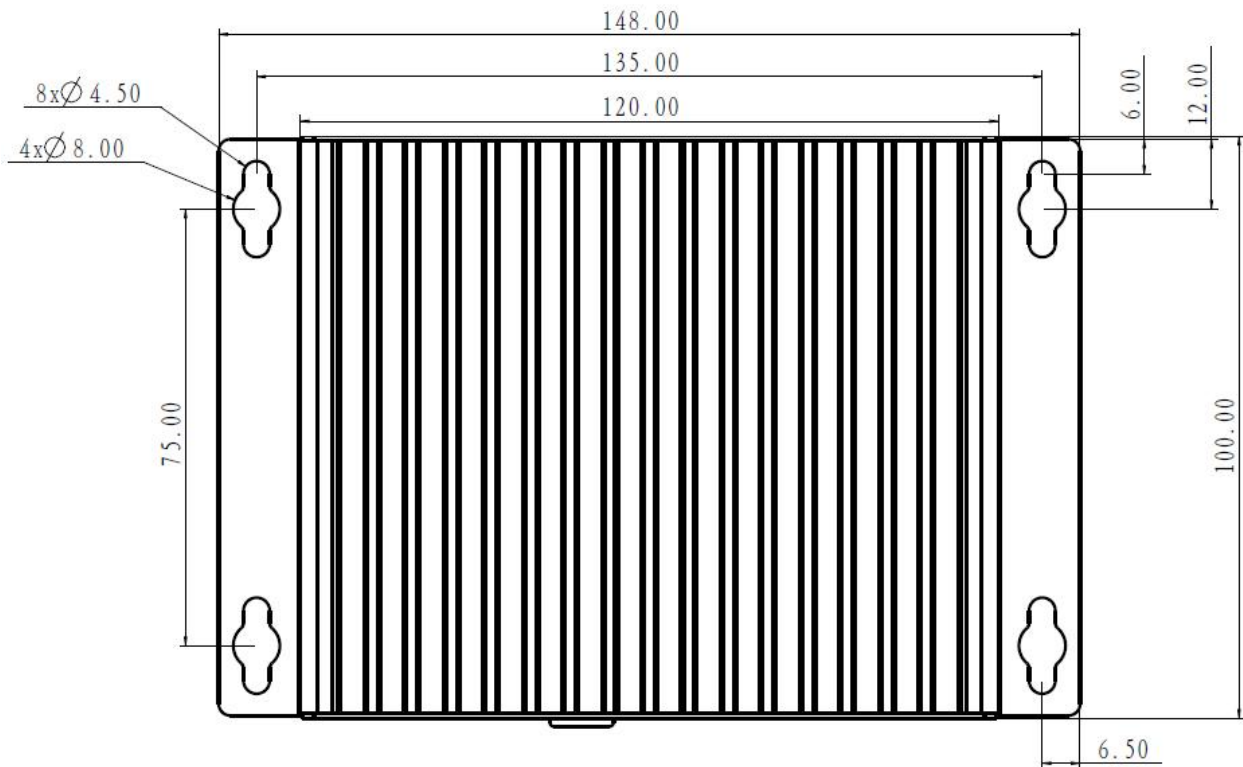
Software Architecture of FZ5 Card



Dimension Chart



Dimension Chart of FZ5 Card (Unit: mm)



Dimension Chart of FZ5 EDGE AI BOX (Unit: mm)



Order Information

Item	Packing List
FZ5D Card (Part No.: MYS-ZU5EV-32E8D-EDGE-K1)	<ul style="list-style-type: none"> ✓ One FZ5 Card (installed with active heat sink by default) ✓ One 12V/3A Power Adapter ✓ One DC Power Adapter Cable ✓ One Mini USB Cable ✓ One 32GB TF Card
FZ5D EDGE AI BOX (Part No.: MYS-ZU5EV-32E8D-EDGE-BOX)	<ul style="list-style-type: none"> ✓ One FZ5 EDGE AI BOX ✓ One 12V/3A Power Adapter ✓ One DC Power Adapter Cable ✓ One Mini USB Cable ✓ One 32GB TF Card
Note: Please contact MYIR to get development resources (including documentations and software BSP) download link after placing your order.	



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