FZ3 Card – Deep Learning Accelerator Card

- *Xilinx Zynq UltraScale+ ZU3EG MPSoC based on 1.2 GHz Quad Arm Cortex-A53 and 600MHz Dual Cortex-R5 Cores*
- *4GB DDR4 SDRAM (64-bit, 2400MHz)*
- *8GB eMMC Flash, 32MB QSPI Flash, 32KB EEPROM*
- *USB 2.0, USB 3.0, Gigabit Ethernet, TF, DisplayPort (DP), PCIe, MIPI-CSI, BT1120, USB-UART, JTAG…*
- *Computing Power up to 1.2TOPS, MobileNet up to 100FPS*
- *Ready-to-Run PetaLinux*
- *Supports Baidu's PaddlePaddle Deep Learning AI Framework*

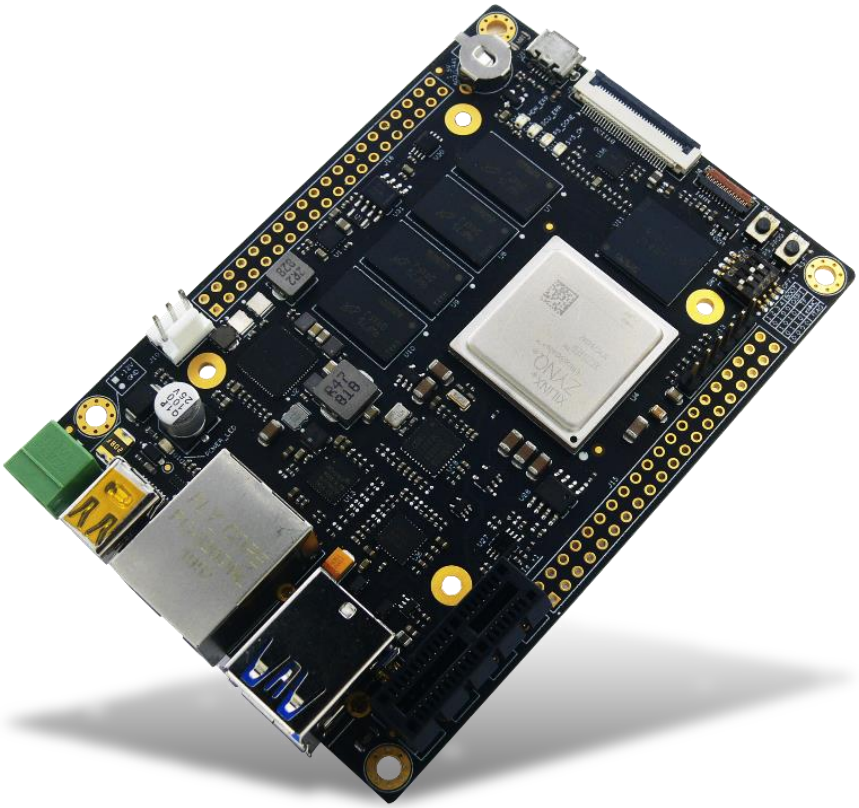

Figure 1-1 FZ3 Card

The **FZ3 Card** is a powerful deep learning accelerator card based on **Xilinx Zynq UltraScale+ ZU3EG MPSoC** which features a 1.2 GHz quad-core ARM Cortex-A53 64-bit application processor, a 600MHz dual-core real-time ARM Cortex-R5 processor, a Mali400 embedded GPU and rich FPGA fabric. Besides, it integrates **4GB DDR4, 8GB eMMC, 32MB QSPI Flash and 32KB EEPROM** as well as many peripherals including **USB 2.0, USB 3.0, Gigabit Ethernet, TF, DisplayPort (DP), PCIe interface, MIPI-CSI, BT1120 camera, USB-UART, JTAG, IO expansion interfaces, etc**. The rich resources enable users to integrate intelligent hardware easily.

The **FZ3 Card** is able to run **PetaLinux** and supports **PaddlePaddle** **deep learning 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. Typical applications are AI camera, AI computing device, robotics, intelligent car, intelligent electronic scale, patrol UAV and other embedded intelligent applications.

MYIR provides **FZ3 Kit** which contains the **FZ3 Card** with installed radiator and some necessary accessories including one power adaptor, one 16GB TF card, one mini USB cable and one mini DP to HDMI cable. It helps users start their development rapidly when getting the kit out-of-box right away.

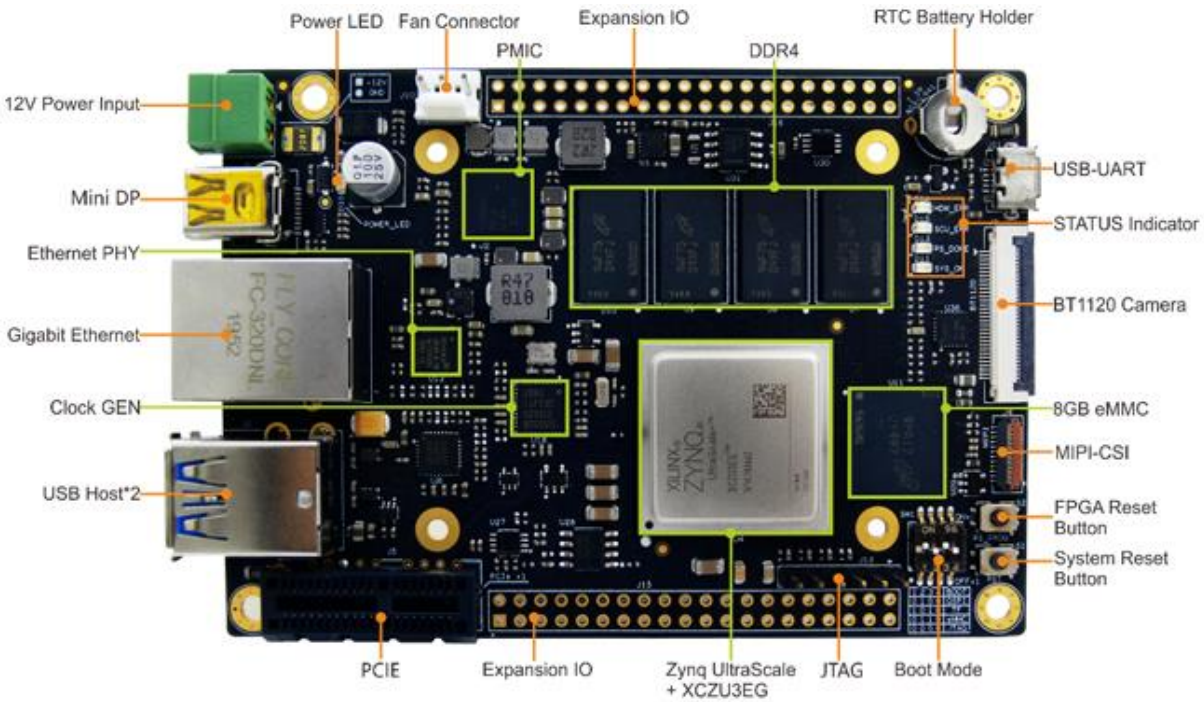

Figure 1-2 FZ3 Card Top View

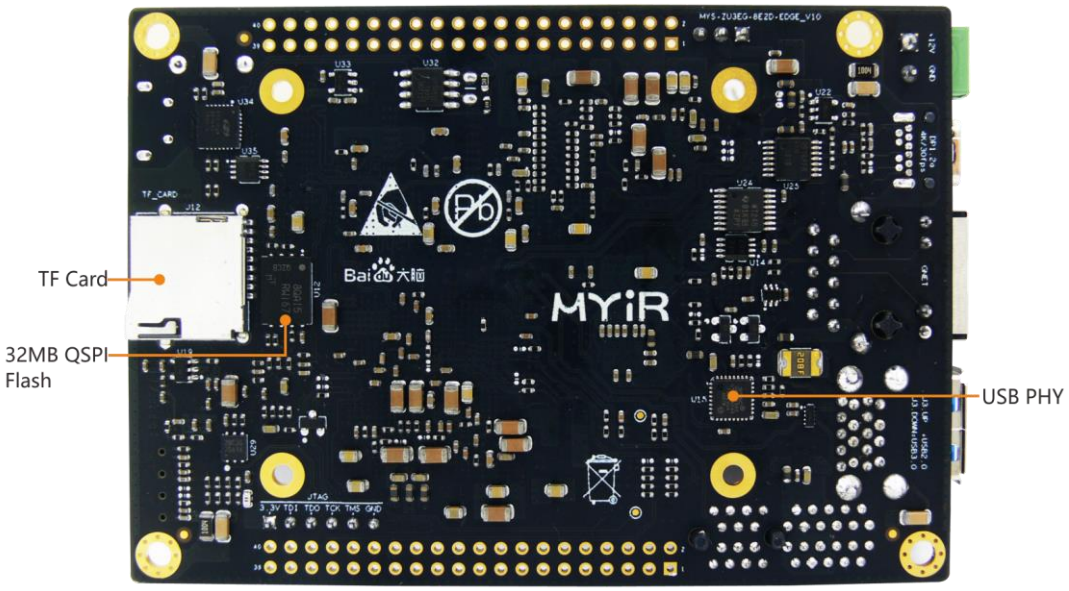

Figure 1-3 FZ3 Card Bottom View

Figure 1-4 FZ3 Kit

Hardware Specification

Zynq® UltraScale+™ MPSoC devices provide 64-bit processor scalability while combining real-time control with soft and hard engines for graphics, video, waveform, and packet processing. Built on a common real-time processor and programmable logic equipped platform, three distinct variants include dual application processor (CG) devices, quad application processor and GPU (EG) devices, and video codec (EV) devices.

	CG Devices	EG Devices	EV Devices
Application Processor	**Dual**-core ARM® Cortex™-A53 MPCore™ up to **1.3GHz**	**Quad**-core ARM Cortex-A53 MPCore up to **1.5GHz**	**Quad**-core ARM Cortex-A53 MPCore up to **1.5GHz**
Real-Time Processor	Dual-core ARM Cortex-R5 MPCore up to **533MHz**	Dual-core ARM Cortex-R5 MPCore up to **600MHz**	Dual-core ARM Cortex-R5 MPCore up to **600MHz**
Graphics Processor		Mali™-400 MP2	Mali™-400 MP2
Video Codec			H.264 / H.265
Programmable Logic	103K–600K System Logic Cells	103K–1143K System Logic Cells	192K–504K System Logic Cells
Applications	• Sensor Processing & Fusion • Motor Control • Low-cost Ultrasound • Traffic Engineering	• Flight Navigation • Missile & Munitions • Military Construction • Secure Solutions • Networking • Cloud Computing Security • Data Center • Machine Vision • Medical Endoscopy	• Situational Awareness • Surveillance/Reconnaissance • Smart Vision • Image Manipulation • Graphic Overlay • Human Machine Interface • Automotive ADAS • Video Processing • Interactive Display

Figure 1-5 Zynq UltraScale+ MPSoCs

The Zynq UltraScale+ family provides footprint compatibility to enable users to migrate designs from one device to another. Any two packages with the same footprint identifier code (last letter and number sequence) are footprint compatible. MYIR is using the **XCZU3EG-1SFVC784I** MPSoC for FZ3 CARD by default, the C784 package covers the widest footprint compatibilities that enable users to select devices among CG, EG and EV.

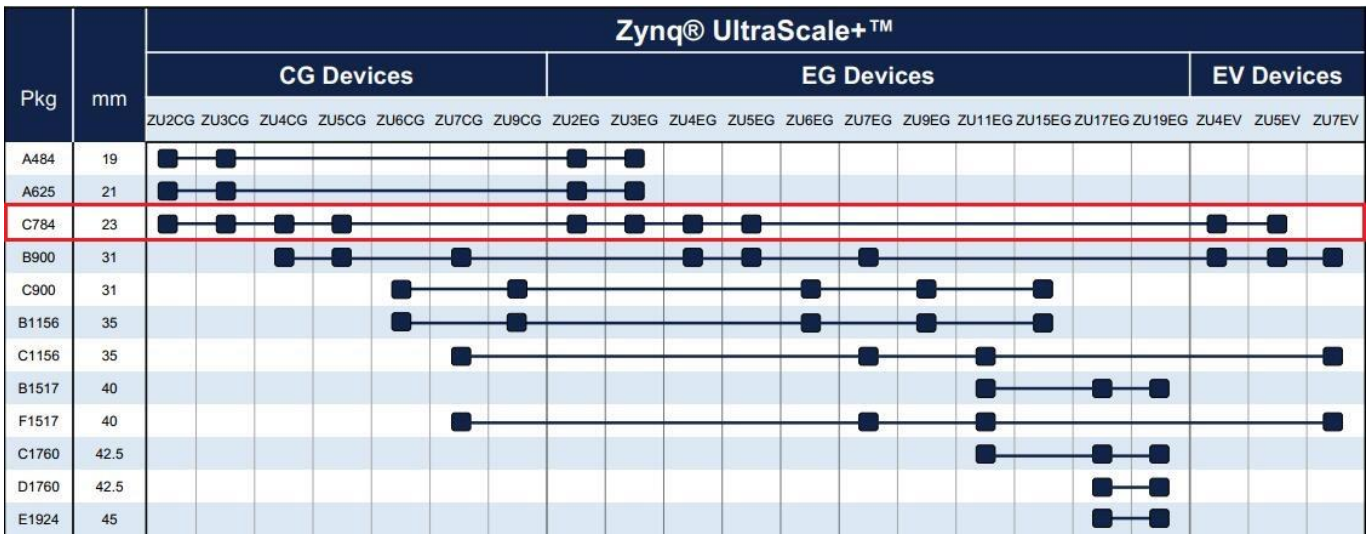

Figure 1-6 Zynq® UltraScale+™ MPSoC Device Migration Table

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				

Table 1-1 MPSoC device selection guide

The FZ3 Deep Learning Accelerator Card takes full advantages of the Xilinx Zynq UltraScale+ ZU3EG MPSoC. The main features are listed in below table.

Item	Features
SoC	Xilinx Zynq UltraScale+ XCZU3EG-1SFVC784I (ZU3EG, 784 Pin Package) MPSoC - 1.2 GHz 64 bit Quad-core ARM® Cortex™-A53 - 600MHz Dual-core ARM® Cortex™-R5 processor - ARM Mali™-400MP Graphics Processor - 16nm FinFET+ FPGA fabric
Memory	4GB DDR4 SDRAM (64bit, 2400MHz)
Storage	8GB eMMC 32MB QSPI Flash 32KB EEPROM TF card interface
Communications	1 x PCIe 2.1 interface (1-lane) 1 x 10/100/1000Mbps Ethernet 1 x USB 3.0 Host, 1 x USB 2.0 Host 1 x USB-UART debug interface
Display	1 x Mini DisplayPort (DP), 4K/30fps, 2-lane
Camera	1 x MIPI-CSI, FPC_25PIN 4-lane 1 x BT1120, FPC_32PIN 16-bit
User I/O	Brought out via two 2.54mm pitch 2x20-pin IO Expansion Interfaces 2 x USB2.0 Host, 1 x CAN, 1 x RS485, 4 x PS_MIO, PL_IO (12 pairs x HD_IO, 8 pairs x HP_IO)
Dimensions	100mm x 70mm (12-layer PCB design)
Power supply	DC 12V/2A
Working Temp.	-45~85 Celsius
Others	1 x 2.54mm pitch 6-pin JTAG interface 2 x Buttons (1x FPGA Reset, 1 x System Reset) 5 x LEDs (1 x Power LED, Status_LED: 2 x RED, 2 x Green)
Software	Supports PetaLinux, Provided with PaddlePaddle deep learning AI framework
Target Applications	Evaluation and Prototyping for XCZU3EG Zynq UltraScale+ MPSoC AI Camera AI Computing Box AI Robot Smart car Intelligent electronic scale Patrol UAV

Table 1-2 Features of FZ3 Card

Software Features

The **FZ3 Card** is able to run **PetaLinux 2019.1** and supports **PaddlePaddle** **deep learning 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.

Figure 1-7 Baidu Brain's AI Development Tools

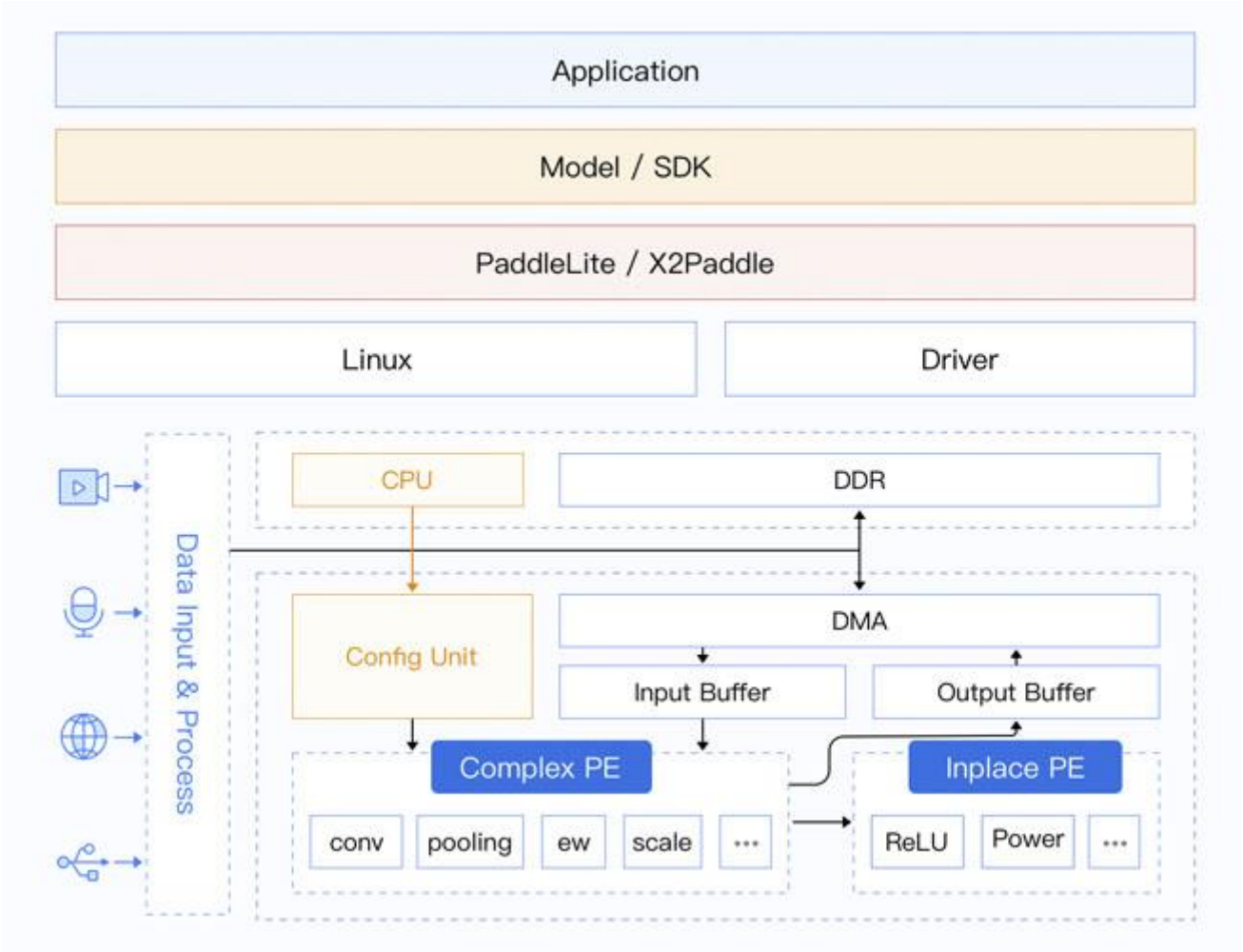

Figure 1-8 Software Architecture of FZ3 Card

Dimension Chart

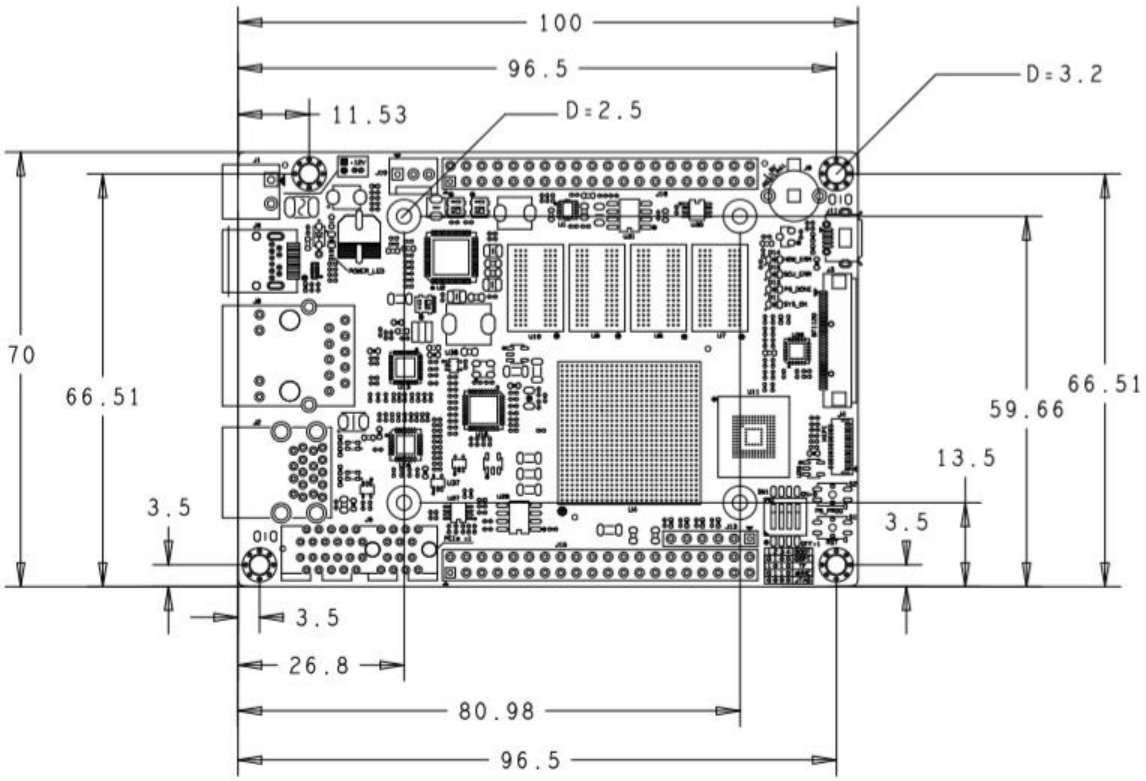

Figure 1-9 Dimension Chart of FZ3 Card

Order Information

Item	Packing List
FZ3 Card (Part No.: MYS-ZU3EG-8E4D-EDGE)	➢ FZ3 Deep Learning Accelerator Card (without any accessories, only production recommended)
FZ3 Kit (Part No.: MYS-ZU3EG-8E4D-EDGE-K2)	➢ One FZ3 Card (Installed with active heatsink) ➢ One 12V/2A Power Adapter ➢ One Mini USB Cable ➢ One 16GB TF Card ➢ One Mini DP to HDMI Cable
Note: Please contact MYIR to get development resources (including documentations and software BSP) download link after placing your order.	

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