Bitmain Sophon™ BM1880 Product Brief

Product Overview

Bitmain Sophon™ BM1880 is SoC ASIC chip for Deep Learning inference acceleration focusing on edge application. BM1880 TPU can provide 1TOPS@INT8, and up to 2TOPs by enabling Winograd convolution acceleration. The special designed TPU schedule engine is very powerful, and can supply extremely high bandwidth data flow efficiently to all the Tensor Processor cores. 2MB on chip memory enables best programing flexibility for performance optimization and data reuse.

A powerful deep learning model compiler and software SDK are provided to end users. The mainstream deep learning frameworks (such as Caffe / Tensor flow) could be ported to BM1880 platform easily. All the popular CNN / RNN / DNN network topologies can be greatly accelerated on BM1880 platform.

Sophon™ BM1880 is the multi-functional platform for AI. It can be defined as the co-processor to the host for Deep Learning Inference acceleration. It can also be used as the host to receive video, images or other data from the Ethernet or USB interface, then perform inference and other computer vision tasks. Host SOC can send the raw image files of each video frame or the motion jpeg files to BM1880, BM 1880 can then inference the images and return the results back to the host.

Product Features

Application Processor Subsystem
- Dual core ARM Cortex A53@1.5GHz
- Neon acceleration and integrated FPU

RISC-V Processor Subsystem
- Single core RISC-V @1.0GHz

Tensor Processor Subsystem
- 512MAC, 1TOPS @INT8
- Up to 2 TOPS@INT8 with Winograd convolution

Audio Subsystem
- dual I2S inputs and output
- Voice encoding/decoding with multiple protocols by using software

Physical Specification
- Typical Power consumption of 2.5W
- 0.9V core voltage, 1.8V/3.3V IO
- 14mm x 14 mm FCBA Package

Video Subsystem
- H.264 Video decoder
- MJPEG encoder/decoder
- Video Post Processor
- 1080P@60fps or 2 channel 1080p@30fps

Peripheral Interfaces
- One USB 3.0/USB2.0 host/device
- Two Integrated GMAC, supporting the RGMII and RMII
- 5xI2C / 16x PWM / 4x UART / Multi GPIO

Memory Interface
- DDR3/LPDDR3/DDR4/LPDDR4
- DDR capacity from 1Gbit to 4GB
- SPI NOR / NAND / eMMC / SDIO interface
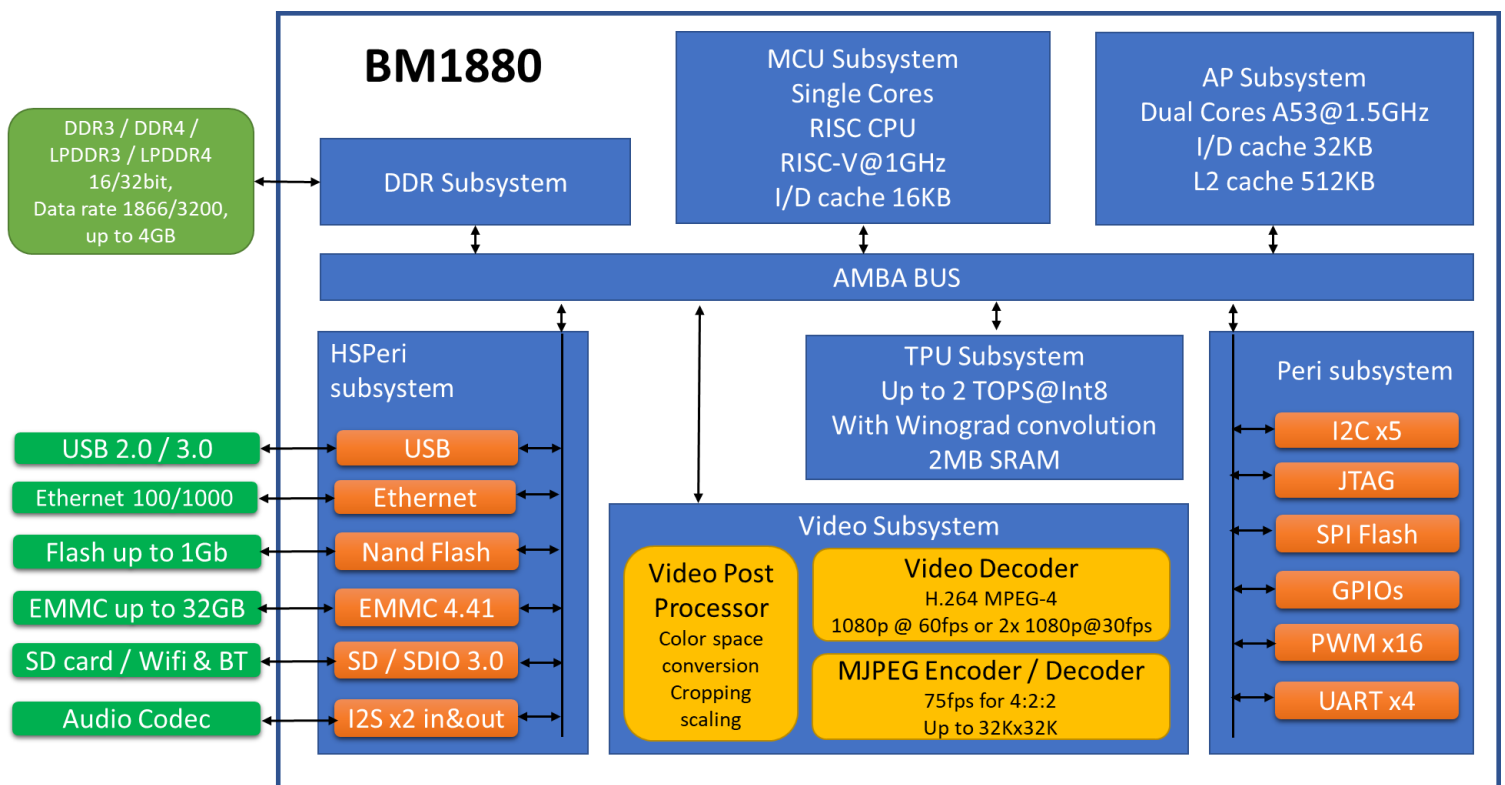- eMMC capacity up to 32GB

Target AI functions

- Facial detection, recognition and expression analysis
- Human attributes and pose analysis
- Object detection and recognition
- Vehicle license plate recognition
- Voice print recognition

Typical Applications

- Bitmain Sophon™ Neural Network Stick
- Bitmain Sophon™ Edge Development Board
- Surveillance and Home AI IP Camera
- Ethernet AI Edge Box
- AI Robots

Function Block Diagram

BM1880

DDR3 / DDR4 / LPDDR3 / LPDDR4 16/32bit, Data rate 1866/3200, up to 4GB

DDR Subsystem

MCU Subsystem
Single Cores
RISC CPU
RISC-V@1GHz
I/D cache 16KB

AP Subsystem
Dual Cores A53@1.5GHz
I/D cache 32KB
L2 cache 512KB

AMBA BUS

HSPeri subsystem

- USB
- Ethernet
- Nand Flash
- EMMC 4.41
- SD / SDIO 3.0
- I2S x2 in&out

- USB 2.0 / 3.0
- Ethernet 100/1000
- Flash up to 1Gb
- EMMC up to 32GB
- SD card / Wifi & BT
- Audio Codec

TPU Subsystem
Up to 2 TOPS@Int8
With Winograd convolution
2MB SRAM

Video Subsystem

Video Post Processor
Color space conversion
Cropping
scaling

Video Decoder
H.264 MPEG-4
1080p @ 60fps or 2x 1080p@30fps

MJPEG Encoder / Decoder
75fps for 4:2:2
Up to 32Kx32K

Peri subsystem

- I2C x5
- JTAG
- SPI Flash
- GPIOs
- PWM x16
- UART x4

SOPHON Wechat

SOPHON Blog