December 2022

Qualcomm

Recommended Hardware and Software Platforms

Qualcomm® Vietnam Innovation Challenge – 2023

Hardware/Software Platform Summary

No.	Device	Category	Specification	Development Environment (OS, Firmware, SDK)			Remark
				OS/Firmware	SDK/Tools	Source Available	
1	Qualcomm® Robotics RB5 Development Kit	• Robotics • ML/AI	RB5 Kit Specs	Linux Embedded (Kernel 4.19) or Ubuntu 18.04 (Kernel 4.19)	• AI framework: SNPE, TensorFlow Lite. • Qualcomm® Robotics Vision/ Computer Vision/ Hexagon™ DSP SDK • ROS2	No kernel source code available	Download resource from Thundercomm website by purchased account. Sample Apps
2	QCS605 AI Box	• ML/AI • AI Camera	QCS605 AI Box Specs	Linux Embedded (Kernel: 4.9) or Android 10	SNPE, Tensorflow Lite-2.x, GStreamer1.0-1.x	Yes (OS source code)	• Get document and patched source from ExcelPoint • Get based source code from Qualcomm website.
3	Snapdragon 600 Series (SDM660/Quectel SC66)	• ML/AI • Edge computing (high tier)	*Snapdragon 660 Processor *Quectel SC66 Product Specs	Android 9, 10	* AI framework: TensorFlow Lite, SNPE	Yes (OS source code)	Download resource from Quectel server by registered account.
4	Snapdragon 200 Series (SDM210/Quectel SC20)	• ML/AI • Edge computing (entry tier)	* Snapdragon 210 Processor * Quectel SC20 Product Specs	Android (7, 8) Or Linux Embedded (Kernel 3.18)	* AI framework: TensorFlow Lite, SNPE	Yes (OS source code)	Download resource from Quectel server by registered account.
5	MDM9207 IoT Modem (Quectel EC25)	• Edge computing (entry tier) • IoT gateway	*MDM9207 Processor *Quectel EC25 Product Specs	Linux Embedded (Kernel 3.18)		Yes (OS source code)	Download resource from Quectel server by registered account.
6	MDM9206 IoT Modem (Quectel BG96)	IoT (low power)	*MDM9206 Processor *Quectel BG96 Product Specs	ThreadX OS (SDK version V4.2.4)	* LLVM toolchain	No kernel source code available	• Download resource from Quectel server by registered account. • Sign NDA and register account to download LLVM tool (Qualcomm CreatePoint)
7	VOXL2 Flight Deck	Drone based solution	VOXL2 Flight Deck Specs	Debian Buster, Linux Kernel v4.19	PX4, ROS 1 / 2, Open CV, MAVROS, MAVSDK, Tensorflow Lite, SNPE.	Yes (OS source code)	• Download resources by registered account from ModalAI • Open sourced and documented software stack • Open source PX4 flight controller support
8	QCA4020	IoT/Home gateway	QCA4020 Overview	RTOS	SDK: Qualcomm QCA4020 SDK , Moddable SDK IDE: Eclispe	Yes (SDK/firmware source)	Download from Qualcomm website by registered account.
9	IPQ8074A	Router/ Access Point	IPQ8074A Specs	OpenWRT Linux (kernel 5.4)	QSDK	Yes (OS source)	Download resource from Qualcomm website by registered account.

Qualcomm® Robotics RB5 Development Kit

Application Areas

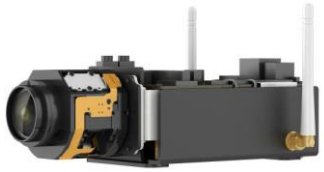
No.	Item	Description	Remark
1	Development Kit	Qualcomm® Robotics RB5 Development Kit	• Download OS/SDK from Thundercomm website. • Only binary images are available. Source code is not available.
2	OS	Ubuntu 18.04 (Kernel 4.19)	
3	SDK	Qualcomm® Neural Processing SDK for AI, Qualcomm® Robotics Vision SDK, Qualcomm® Computer Vision SDK, Qualcomm® Hexagon™ DSP SDK,	
4	NPU	15 TOPS	

[RB5 Development Kit Specs]

Category	Description
SOM Platform	Qualcomm® QRB5165 Qualcomm® Kryo™ 585 Qualcomm® Adreno™ 650 GPU, Adreno™ 665 VPU, Adreno™ 995 DPU Qualcomm® Hexagon™ DSP with quad HVX Qualcomm® Spectra™ 480 image processing
Camera	Vision kit(IMX577 | GMSL| OV9282) , & Accessories (Nuvoton® (ToF) - Sensor[MN34906] &Intel® RealSense (D435i)
Storage	128 GB UFS3.1 Onboard Storage & 1 x MicroSD Card Slot
Display	1 x HDMI 1.4 (Type A - full) on Board Connector
Memory & Storage	LPDDR4x, 4x16 bit; up to 1866MHz, 8GB RAM
Sensor	Accelerometer + Gyro Sensor (TDK ICM-42688/ ICM-42688-P) Barometric Pressure
USB	1 x USB 2.0 Micro B (Debug only), 1 x USB 3.0 Type C (OTG Mode), 2 x USB 3.0 Type A (Host Mode Only)
Wireless Connectivity	WLAN 802.11a/b/g/n/ac/ax 2.4/5GHz 2x2 MIMO n-Board WLAN Antennas
Ethernet	1 x 1GbE Ethernet
Audio	2 x Class-D on Board Speaker Amplifier, WSA8810 1 x on Board PDM MIC on Mainboard, 4 x on Board PDM MIC on NAV MEZZ
Location	GPS, Glonass, BeiDou, Galileo, QZSS, and SBAS
Expansion interfaces	High-speed connector (MIPI CSI , USB 3.0, GPIO, CCI I2C, etc) Low-speed connectors (UART, SPI, I2C, GPIO, CAN, I2S, etc)

QCS605 AI Box

High-performing, power-efficient edge computing for next-generation smart cameras and smart home applications.



Smart City

Smart Camera

Smart Surveillance

360 Camera

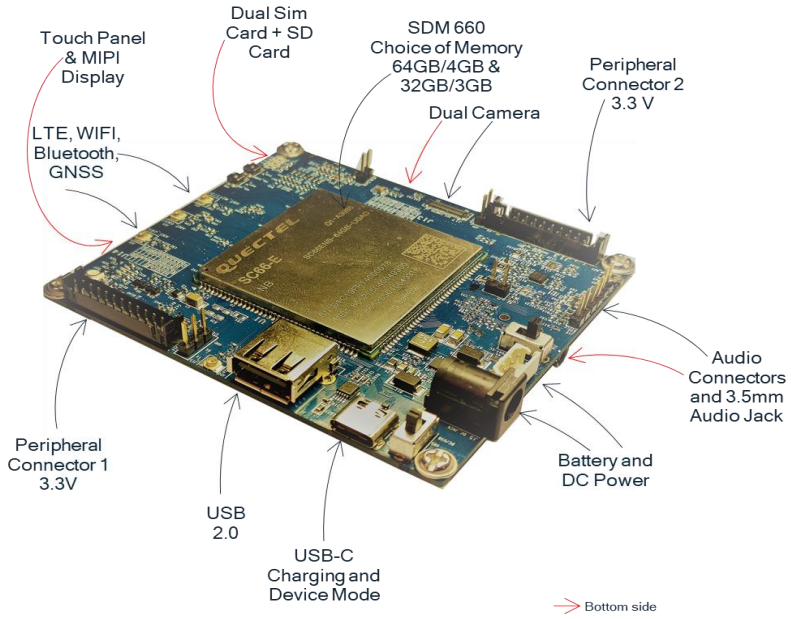
No.	Item	Description	Remark
1	Development Kit	QCS605 AI Box Kit	
2	OS	Linux Embedded (Kernel: 4.9) or Android 10	
3	SDK	SNPE, Tensorflow Lite-2.x, GStreamer1.0-1.x	

Category	Item	Description
Platform	Chipset	QCS605
	CPU	Qualcomm QCS605 Kryo 300 CPU, Octa-core CPU (2x2.5GHz, 6x1.7Ghz)
	GPU	Qualcomm® Adreno™ 615
	DSP	Qualcomm® Hexagon™ 685 DSP
	OS	Android 10
	Memory and Storage	LPDDR4x 8GB + eMMC 16GB
Multimedia	Display	Micro HDMI (DSI-HDMI bridge-LT9611), Resolution up to 4k/30hz Ultra HD
	Decode	4K60 10-bit: HEVC/VP9/H.264 HDR 10
	Encode	4K60 8-bit: HEVC/H.264 + 1080P60
	Audio	1xLine in, 1xLine out
Connectivity	WiFi/BT	802.11a/b/g/n/ac 2.4/5Ghz 2×2 MIMO & Bluetooth 5.0
	Ethernet	Integrated POE/RJ45 1Gbps
	Location	GPS / GLONASS
	Others	1x RS485, 2xDigital Input, 2xDigital Output, 1xUSB Type C
Dimension	123.42 x 124 x 42.5 mm	

QCS605 SoC:
https://www.qualcomm.com/products/technology/processors/application-processors/qcs605
QCS605 AI Box Kit:
https://bhs.bkav.com/aibox

Quectel SC66 (featuring Qualcomm® SDM660 SoC)

High Tier Solution for extensive computation applications



- Application Areas
  - Machine Learning
  - Tensor Flow
  - High Computation needs
  - Dual Camera
  - GPU

No.	Item	Description	Remark
1	Development Kit	Startup kit or Quectel EVB	
2	OS/SDK	Android 9,10 AI framework: TensorFlow, SNPE	• Sign NDA with Quectel to get resources. • OS and SDK source code are downloaded from Quectel server. • Able to customize and re-compile OS/SDK

Specifications

Android 9.0
32GB + 3GB & 64GB+4GB(optional)
SDM660(64Bit,2.2Ghz, Octacore, Kyro 260)

Features

Cellular/WIFI/BT
Dual Camera(12MP)
Peripheral Connector at 3.3V(SPI/I2C/GPIO)
Touch Display
USB 3.0 TypeC Connector
USB 2.0 TypeA Host Connector
Dual Sim
Audio: 3.5mm Jack/Loud Speaker/Mic/Earpiece Connector
Battery

Dimensions

80mm x 90mm

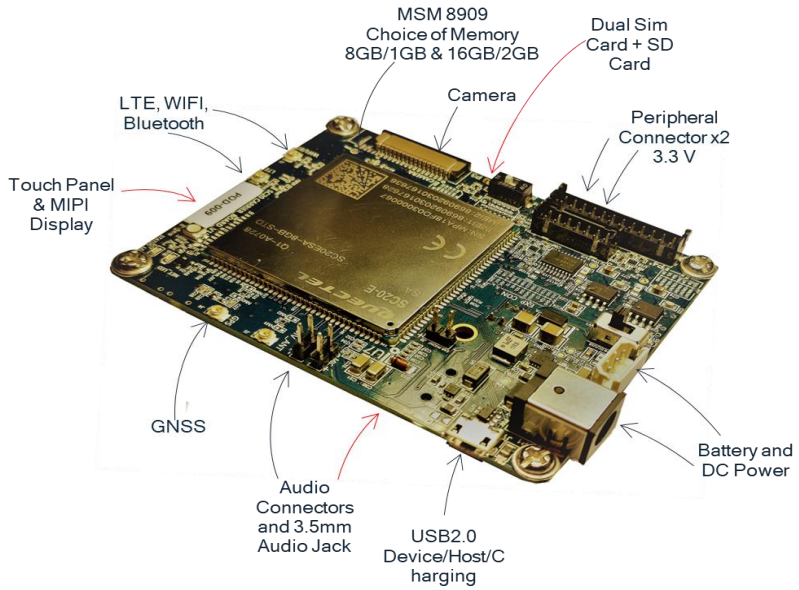
References

Snapdragon 660 Processor
Quectel SC66 Product Specs

Qualcomm SDM660, Qualcomm Snapdragon, and Qualcomm Kryo are products of Qualcomm Technologies, Inc., and/or its subsidiaries.

Quectel SC20 (featuring Qualcomm® MSM8909 SoC)

Entry Tier Solution for Smart IoT applications



- Application Areas
  - Machine Learning
  - Tensor Flow Lite
  - Gateways
  - Single Camera
  - Medical Applications

No.	Item	Description	Remark
1	Development Kit	Startup kit or Quectel EVB	*Sign NDA with Quectel to get resources. * Download source code/binary images from Quectel * Source code of Android and Linux OS are available
2	OS/SDK	• Android (Android 7, 8) Or Linux Embedded (Kernel 3.18) • AI framework: TensorFlow Lite, SNPE	

Specifications

Android /Linux
8GB + 1GB & 16GB +2GB
MSM8909 (1.1Ghz Quadcore Processor)

Features

Cellular/WIFI/BT
Peripheral Connector at 3.3V(SPI/I2C/GPIO)
5inch MIPI-DSI Touch Panel Display
MIPI CSI Single Camera 5MP
Debug with USB OTG port
Debug with UART port
Battery Charging with USB and DC-IN
SD Card Support
LED Indicators: Status and Net-Light
Dual Sim
Audio: 3.5mm Jack/Loudspeaker/Mic/Earphones

Dimensions

85mm x 65mm

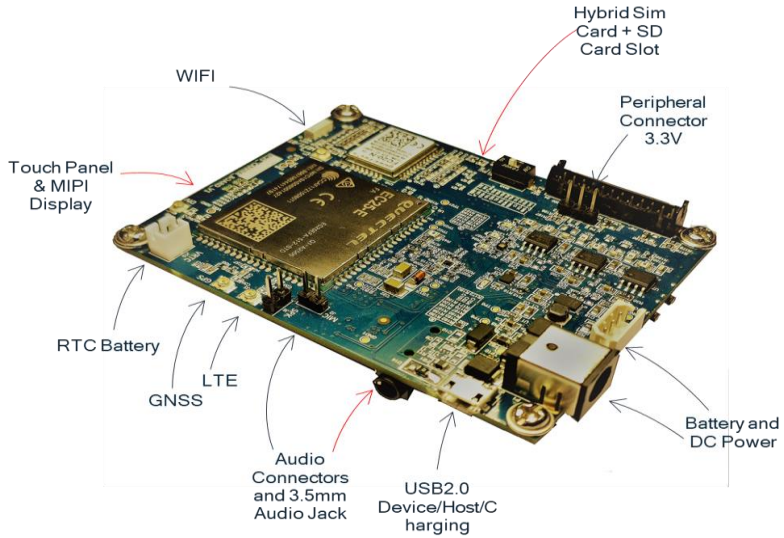
References

Snapdragon 210 Processor
Quectel SC20 Product Specs

Qualcomm snapdragon and Qualcomm MSM8909 are products of Qualcomm Technologies, Inc., and/or its subsidiaries.

Quectel EC25 (featuring Qualcomm® MDM9207-1 IoT Modem)

Edge Computing and LTE Solutions



- Application Areas
  - Gateways
  - Sensor Interface
  - Edge Computing

No.	Item	Description	Remark
1	Development Kit	Startup kit or Quectel EVB	*Sign NDA with Quectel to get resources. *Download source code/binary images from Quectel.
2	OS/SDK	* Linux Embedded (Kernel 3.18)	

Specifications

Linux
MDM9207 (1.3Ghz Cortex A7 Processor)

Features

Cellular connectivity 2G, 3G, 4G
GNSS
Wi-Fi/BT
Peripherals Connector at 3.3V(GPIO, I2C, SPI, UART)
Debug with USB, Debug with UART
Battery Charging with USB and DC-IN.
SD Card support
LED Indicators: Status and Net-Light
Audio: Speaker header, Headphone jack/ Mic/Earphones

Dimensions

85mm x 65mm

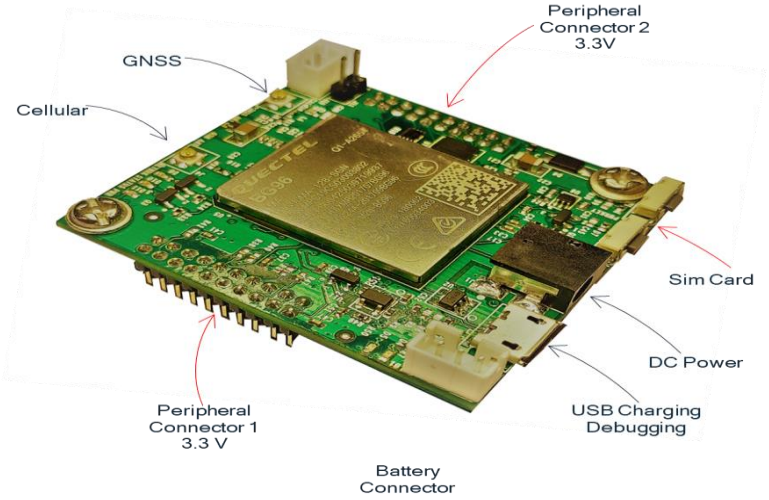
References

MDM9207 Processor
Quectel EC25 Product Specs

Qualcomm MDM9207 is a product of Qualcomm Technologies, Inc., and/or its subsidiaries.

Quectel BG96 (featuring Qualcomm® MDM9206 IoT Modem)

Low Power IoT Solutions (NB-IoT/CAT-M1/GPRS)



- Application Areas
  - Trackers
  - Sensor Interface
  - Edge Computing

No.	Item	Description	Remark
1	Development Kit	Startup kit or Quectel EVB	• SDK source code is not available (only binaries). Sample app sources are available. • Download SDK /firmware, documents from Quectel server • Need to sign NDA with Qualcomm to enable LLVM feature.
2	OS/SDK	ThreadX OS (SDK version V4.2.4)	

Specifications

ThreadX OS
MDM9206 (1.3Ghz Cortex A7 Processor)

Features

Cellular connectivity 2G, 3G, 4G
GNSS
Peripherals Connector at 3.3V(GPIO, I2C, SPI, UART)
Debug with USB, Debug with UART
Battery Charging with USB and DC-IN.
Boot without battery with DC-IN or USB.
LED Indicators: Status and Net-Light

Dimensions

85mm x 65mm

References

MDM9206 Processor
Quectel BG96 Product Specs

Qualcomm MDM9206 is a product of Qualcomm Technologies Inc., and/or its subsidiaries.

VOXL2 Flight Deck

Mount and Fly Obstacle Avoidance and GPS-Denied Navigation Kit

Application Areas

Infrastructure (Indoor/Outdoor Asset Inspection

E-Commerce (Drones for Deliveries)

Intelligent Surveillance

Agriculture

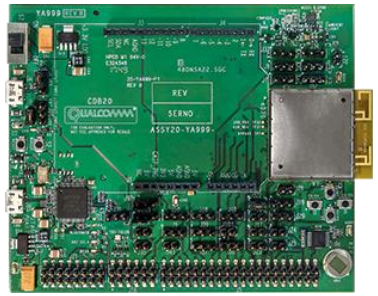
Refs:
[VOXL2 Flight Brief and Block Diagram Download Resource]

Category	Description
CPU	QRB5165, 8 cores up to 3.091GHz
OS	Debian Buster, Linux Kernel v4.19
GPU	Adreno 650 GPU -1024 ALU
NPU	15 TOPS
Flight Controller	Integrated flight controller on DSP with TDK ICM-42688 IMU and ICP-10111 Barometer
Add-on Connectivity	WiFi, 5G, 4G/LTE, Microhard (No built-in Wi-Fi)
Video Encoding	up to: 8K30 h.264/h.265 108MP still images
Computer Vision Sensors	2 Stereo Pair, 1 Tracking
Tracking Sensor	Yes
Dimensions & weight	70mm x 36mm - 16g
SDK	VOXL SDK: GPS-denied navigation, SLAM, obstacle avoidance, object recognition,
QGroundControl	Yes
Software features	- PX4, ROS 1 / 2, Open CV, MAVROS, MAVSDK, Tensorflow Lite, SNPE. - Open source Linux kernel, cross-compilers - Docker build environment for CPU, GPU (OpenCL) and DSP (Hexagon SDK) heterogeneous computer vision and deep learning processing
Other	NDAA '20 Section 848 Compliant (Assembled in USA)

Qualcomm Snapdragon 821 is product of Qualcomm Technologies, Inc., and/or its subsidiaries.

QCA4020

Multi-mode intelligent connectivity solution integrating dual-band Wi-Fi, Bluetooth 5 and 802.15.4 technology



Application Areas

Home Gateway

Home Control

Smart Cities

Appliances

No.	Item	Description	Remark
1	OS	RTOS	Development tool/resource: - Moddable SDK - Eclipse IDE with JTAG - Other tools/resources
2	SDK/Tools	Qualcomm QCA4020 SDK	

Category		Description
CPU		Arm Cortex-M4F @ up to 128MHz
Connectivity	Wi-Fi	Wi-Fi 4 (802.11a, 802.11b, 802.11g, 802.11n) 2 bands support (2.4 GHz, 5 GHz)
	Bluetooth	Bluetooth® 5.0, BLE, Qualcomm® Bluetooth® mesh technology
	LR-WPAN	Zigbee 3.0 and OpenThread support
Interface	Peripherals	SPI, UART, PWM, I2S, I2C, SDIO, ADC and GPIOs
	USB	USB 2.0
Security		Qualcomm® Trusted Execution Environment (TEE), Secure Boot, Secure Storage, Application-Level Security, True Random Number Generator, Hardware-based Crypto Engine, Key Provisioning Security, Software Image Encryption.

Refs: https://www.qualcomm.com/products/technology/wi-fi/qca4020#Overview

IPQ8074A

High-capacity 802.11ax SoC for Routers, Gateways and Access Points

Application Areas

Routers

Gateways

Access Points

No.	Item	Description	Remark
1	OS/firmware	OpenWRT Linux (kernel 5.4)	Download firmware source code/sdk from Qualcomm website (CreatePoint).
2	SDK	QSDK	

Ref: https://www.qualcomm.com/products/application/wireless-networks/wi-fi-networks/ipq8074

Category		Description
CPU		4x ARM Cortex-A53 (Up to 2.0 GHz)
Wi-Fi	Generation	W-Fi 6
	Speed	Up to 4.8 Gbps
	Standards	802.11ax
	Spectral Bands	2.4 GHz, 5 GHz
	MIMO	12x12 (8x8 5 GHz + 4x4 2.4 GHz)
	Encryption	AES-CCMP, AES-GCMP
	Security	WPA, PRNG, TKIP, WPS, WAPI, WPA2, WEP
Features		Uplink scheduling, Advanced QoS, TxBF, MU-MIMO, OFDMA, Qualcomm® Wi-Fi SON
Memory		DDR3L, DDR4
Flash		Type: NOR, NAND
Peripherals	Interfaces	SD/eMMC, LCD, UART, PCIe 2.0, SPI, Ethernet, Bluetooth, I²S, I²C, USB 3.0, SDIO, LTE
	Master I²S	PCM
	USB	USB 3.0
	PCIe	PCIe 2.0

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