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Qualcomm® Vision Intelligence 300/400 Platforms (QCS603/QCS605)

The Qualcomm Vision Intelligence Platform is purpose-built with powerful image processing and machine learning for smart camera products in the consumer and enterprise IoT spaces.

Cameras have evolved to become smarter and more relevant in the Internet of Things (IoT). The Qualcomm Vision Intelligence Platform is designed to provide superior image processing together with enhanced Artificial Intelligence (AI) capabilities in a cost-effective platform to serve a variety of IoT devices. These include action, VR/360, home security, enterprise security and wearable cameras.

The platform features Qualcomm Technologies' first family of system-on-chips (SoCs) built specifically for IoT in an advanced 10-nanometer process and is engineered to support exceptional power and thermal efficiency. It also features Qualcomm Technologies' most advanced image sensor processor (ISP) and digital signal processor (DSP) to date, along with cutting-edge CPU, GPU, camera processing software, connectivity and security.

The Qualcomm Vision Intelligence 300 platform is based on our QCS603 and Qualcomm Vision Intelligence 400 platform on our QCS605 SoC. These SoCs are built to support Linux or Android as the operating system. Each design integrates power management ICs, audio codec support, and Wi-Fi/Bluetooth connectivity, empowering customers to reduce costs by saving on the BOM, as well as on the commercialization efforts to integrate several subsystems.

To further facilitate fast and cost-effective development, Qualcomm Technologies, Inc. has worked with ODMs to provide full form factor reference devices, as well as ISVs, to provide solutions that address various camera segments.

Highlights

Reference platforms designed to support a host of machine learning solutions

Perform face/body detection, face recognition, object classification, license plate recognition, etc. Third party algorithms for performing on-device stitching of dual camera streams are also demonstrated on the reference platforms.

Dual ISPs and 4K Ultra HD video with enhanced features

Dual ISPs support staggered HDR, low light noise reduction, and enhanced auto-focus performance. Premium 4K @60fps HEVC video capture and playback with support for secondary streams for preview and streaming.

Heterogeneous computing for on-device machine learning and more

Highly optimized custom CPU, GPU and DSP designed to provide high compute capability at low power. Heterogeneous computing made simple with easy to use SDKs giving flexibility to implement a variety of AI use cases including running DNNs and inferencing on the DSP.

Enhanced connectivity and peripherals

Integrated connectivity support for up to 2x2 802.11ac Wi-Fi, Bluetooth® 5.1, USB plus advanced on-device audio analytics and processing features with support for integrated display processor to provide a range of display

Qualcomm Vision Intelligence 300/400 Platform Applications

- Sports Cameras
- Wearable Cameras
- Robotics
- Smart Security Cameras
- VR 360 and 180 Cameras
- Smart Displays

Features

- Dual 14-bit Qualcomm Spectra™ 270 ISP capable of supporting up to dual 16MP sensors
- Fabricated using the advanced 10nm FinFET process for exceptional thermal and power efficiency
- Qualcomm® Adreno™ 615 GPU with 64-bit addressing @ up to 780MHz with latest API support
- Qualcomm® Hexagon™ 685 DSP with dual hexagon vector extensions for running DNN models and advanced
- Up to eight Qualcomm® Kryo™ 300 CPU cores optimized for power and DMIPS
- Support for high resolution 24-bit audio, with Qualcomm® aptX™ and aptX HD audio codecs, Qualcomm Aqstic™ audio codec
- HW based security designed with features such as secure boot from hardware root of trust, trusted execution environment, hardware crypto engines, storage security, debug security with lifecycle control, key provisioning and wireless protocol security
- Worldwide ecosystem of vendors, customers, developers and embedded device OEMs with experience in commercializing Qualcomm IoT solutions

Software

- OS support for Linux and Android
- Qualcomm® Connected Camera SDK: abstracting dependency of underlying layers designed to allow customers to easily develop and port their development of connected camera use cases between different operating systems and chipset of selection
- Qualcomm® Neural Processing SDK: optimizing deep learning processing performance across available resources to achieve superior edge computing experience
- Video Analytic Manager: enabling easy integration of 3rd party video analytic solution.
- Camera: Temporal Noise Reduction (TNR), stagger High Data Rate (sHDR) snapshot and video, Electronic Image Stabilization (EIS), Lens Distortion Correction (LDC), Chromatic Aberration Correction (CAC), Edge Smooth, etc.
- Voice UI: support for natural language processing, audio speech recognition, and "barge-in" capability for a reliable voice interface
- Security: Full Disk Encryption (FDE), Security Boot, Kernel and BSP Protection.

Platform Block Diagram

*GPS only available on QCS605
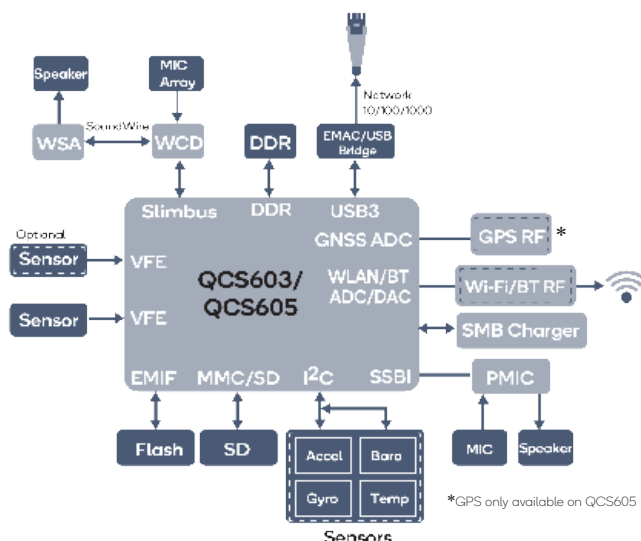
Platform Specifications

		Qualcomm Vision Intelligence 300 Platform	Qualcomm Vision Intelligence 400 Platform
CPU		**QCS603** Kryo 300: 64-bit quad-cores, 2x Gold (1.6GHz) + 2x Silver (1.7GHz)	**QCS605** Kryo 300: 64-bit octa-cores, 2x Gold (2.5GHz) + 6x Silver (1.7GHz)
Video	Decode	4K30 10-bit: HEVC/VP9	4K60 10-bit: HEVC/VP9, HDR 10
	Encode	4K30 HEVC/H.264 + 720p	4K60 HEVC/H.264 + 1080P60
Display Support		Quad HD + 4KUltra HD	1080p + 4K60
PMIC		PME605 + PM8005	PM670 + PM670L
Wireless Connectivity		Integrated 1x1 802.11b/g/n/ac, Bluetooth v5.1	Integrated 2x2 802.11b/g/n/ac, Bluetooth v5.1
Location		not supported	GPS/GLONASS, BeiDou, Galileo
Camera	Performance	24MP (2x ISP/16+16MP), 4K30 IQ improvement: MCTF, TNR, sHDR, EIS, Dewarp, Zoom	32MP (2x ISP/16+16MP), 4K60 IQ improvement: MCTF, TNR, sHDR, EIS, Dewarp, Zoom
	Interface	CSI 4+4+4 lane (or 4+4+2+1), DPHY1.2, CPHY 1.0	
Audio	Analog	Integrated codec PM670 or WCD9326/41	WCD9326/41
	Playback	Hi-Res/192kHz, Native 44.1kHz, audio on dedicated DSP	
	Technologies	Qualcomm® Noise and Echo Cancellation, SVA/Sense Audio w/ WCD	
Memory		2x 16-bit LPDDR4.x @ 1866MHz	
Storage		eMMC5.1, UFS2.1 Gear3 2-lane, SD 3.0	
GPU		Adreno 615 @ up to 780MHz	
DSP		AI Engine/Hexagon 685 DSP w/ dual hexagon vector extensions	
Sensor DSP		Hexagon DSP based	
Technology / Package		10nm LPE, 10.5x11.1 mm2 non-PoP	
Peripherals		1x USB3.1	

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Features

High Performance Heterogeneous Computing

- Up to 8x Kryo 300 CPU
- Adreno 615 GPU
- Hexagon 685 DSP, Qualcomm All-Ways Aware™ Sensor Technology
- Qualcomm® Artificial Intelligence AI), Qualcomm Neural Processing

4K Ultra HD HEVC/H.264 Video

- Up to 4K Ultra HD video capture @ 60 FPS
- Up to 4K Ultra HD video playback, 1080P/720P WI-FI preview streaming
- H.265 (HEVC)/ H.264 (AVC)

Machine Learning

- Deep Machine Learning on V65
- DSP + 2xHVX/1.2GHz, 50% performance improvement for 8-bit DNN network
- NPE Framework for easy programmability

VR360

- Independent 2A with frame synchronization
- Dual camera sensor with HW synchronization
- Spherical stabilization
- On-device photo stitching & video static / dynamic equi-rectangular stitching

Security

- Enhanced integrated solution with end-to-end protection
- HW Crypto. Secure storage & SEE improvements
- Fully secured Video IP Streaming

Available from Altek

store.altek.com.tw/qualcomm/product/qcs605-vr360-camera#TECH-NODE

Product Code: QCS605 VR360 Camera

360 Smart Camera Reference Design
based on Qualcomm Vision Intelligence 400 Platform (QCS605)

Specifications

CPU	**QCS605 SoC** Built specifically for IoT in an advanced 10-nanometer process Engineered to support exceptional power and thermal efficiency
Memory & Storage	LPDDR4 2GB, 1866MHz, eMMC 16GB, micro SD card up to 256G
Camera & Lens	2x SONY IMX577, 12MP, 1/2.3"(4:3), 1.55 um, 4 lanes MIPI, I^2C Up to 16 MP dual camera / 32 MP single camera 220 FOV, Fix focus with IR cut, F2.0, EFL 1.2 Embedded EEPROM for storage of calibration data
Connectivity	802.11n/ac, dual-band, 2x2 (2-stream) MIMO Configuration Bluetooth 5.0
Audio	PCM playback/record, Stereo/multi-channel AAC encoder Qualcomm Noise and Echo Cancellation, SVA/Sense Audio w/ WCD
Location	GPS, GLONASS, Beidou
Interfaces	Type C USB 3.1, Micro HDMI, Resolution up to 4K/30Hz Ultra HD JTAG/UART : On MB but not disclosure
Power	DC 5V/2A by USB, Battery 1300 mAh (support 2C)
Sensors	Accelerator, Gyroscope
Dimensions	131.35mm x 43mm x 24.3mm, weight: 160g

Qualcomm Vision Intelligence 300 Platform Reference Design Applications

- Consumer IP Camera - Home Security
- Enterprise IP Camera - Enterprise, Infrastructure

Features

High Performance Heterogeneous Computing

- Up to 4x Kryo 300 CPU
- Adreno 615 GPU
- Hexagon 685 DSP, Qualcomm All-Ways Aware
- Qualcomm AI, Qualcomm Neural Processing

4K Ultra HD HEVC/H.264 Video

- Up to 4K Ultra HD video capture @30 FPS
- Up to 4K Ultra HD video playback, 1080P/720P WI-FI preview streaming
- H.265 (HEVC)/ H.264 (AVC)

Machine Learning

- DSP + 2xHVX/1.2GHz, 50% performance improvement for 8-bit DNN network
- NPE Framework for easy programmability

IPC

- Optimized low light performance with sHDR and TNR
- Single IMX334 sensor with c-mount lens support
- PoE connectivity support

Security

- Enhanced integrated solution with end-to-end protection
- HW Crypto. Secure storage & SEE improvements
- Fully secured Video IP Streaming

Available from Altek

store.altek.com.tw/qualcomm

Enterprise Security Camera Reference Design
based on Qualcomm Vision Intelligence 300 Platform (QCS603)

Specifications

CPU	**QCS603 SoC**
	Built specifically for IoT in an advanced 10-nanometer process Engineered to support exceptional power and thermal efficiency
Memory & Storage	2GB LPDDR4x 2GB (1.5GB if supported by SW) 16GB (4GB/8GB if supported by SW), SD card
Camera & Lens	FOV: 110-170, IR cut filter w IR 4 LEDs, FF, Large pixel/aperture for low light, Lens mount C-mount, IMX334 Sensor
Connectivity	1x1 11n/ac Wi-Fi (WCN3980) / Bluetooth 5.0 Ethernet: Integrated POE/RJ45 1000M (over USB type C)
Audio	Line-in, Line-out
Location	GPS, GLONASS, Beidou
Interfaces	Type C USB, Alarm I/O 2/1, Wi-Fi/Bluetooth antenna SD card, Debug: ADB using USB 2.0, Debug Port/JTAG/UART
Keys/Buttons	Reset/On/Off, System reboot
LED Indicators	LED for PWR on/off/IR, Ethernet Link/Act
Power	PoE/ DC12V
OS	Linux, Android
Compliance	ONVIF, FCC, CE, Wi-Fi Alliance, Bluetooth SIG
Form Factor	Indoor, Bullet

Qualcomm Vision Intelligence 300 Platform
Reference Design Applications

- Consumer IP Camera - Home Security
- Enterprise IP Camera - Enterprise, Infrastructure

Features

- The vision AI developer kit enables on-device inferencing for AI on the edge

- Serves as a reference platform for developers and manufacturers to create AI products and runs in the family of devices that leverage the new Qualcomm Vision Intelligence platform

- Bringing intelligence even deeper into the edge by enabling the powerful AI models you create or customize to run even more closely to the sensors

- Run AI models on the edge with Qualcomm AI Engine or utilize the cloud

- Create, delpy and manage your models in the cloud and the edge with Azure ML and Azure IoT Edge

- This device runs on Qualcomm's Vision Intelligence Platform for on-device edge AI/compute and takes advantage of Azure Machine Learning to easily create and customize advanced AI applications that can be deployed using Azure IoT Edge

- To be included in the early access preview and receive a notification when the device is ready for pre-order visit:
  https://www.visionaidevkit.com

For additional Qualcomm product information go to:
createpoint.qti.qualcomm.com

Product Kits: Connected Camera
- **QCS603 Android Camera (Platform)**
- **QCS603 Linux Camera (Platform)**
- **QCS605 Android Camera (Platform)**

Vision AI Developer Kit
based on Qualcomm Vision Intelligence 300 Platform (QCS603)

Audio in
Audio out
Display
Power & data
Power button
SD card

Specifications

SoC	**QCS603**
	Built specifically for IoT in an advanced 10-nanometer process
	Engineered to support exceptional power and thermal efficiency
OS	Yocto Linux
PMIC	PME 605/8005
Connectivity	Wi-Fi / Bluetooth Low Energy, WCN3980 (1x1)/ Bluetooth 5.0
Camera	8MP/4K UHD
eMMC	16GB
LPDDR4x	4GB
Speaker / Mic	Line in / out / 4x Mic / Speaker
Ethernet (RJ45)	Via USB-C with adapter
Power	Rechargeable battery / PoE / USBC
Storage	SD slot for micro SD card
Indicator	3x LEDs
USB	USB Type C
HDMI	HDMI A

Materials are subject to change without notice.

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