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# Qualcomm® QCS603/605 SoCs for IoT

**QCS603/605 10nm SoCs are purpose-built to deliver high-performing, power-efficient edge computing for next-generation smart cameras and smart home applications.**

The Qualcomm QCS60x family of high performance IoT System-on-Chips (SoCs) incorporates key features for building advanced use cases encompassing machine learning, edge computing, sensor processing, voice UI enablement and integrated wireless connectivity.

The 10nm QCS605 and QCS603 SoCs are engineered to deliver powerful computing for on-device camera processing and machine learning, with exceptional power and thermal efficiency, across a wide range of IoT applications. They integrate Qualcomm Technologies' most advanced image signal processor (ISP) to date and the Qualcomm® Artificial Intelligence (AI) Engine, along with a heterogeneous compute architecture including highly optimized custom CPU, GPU and DSP.

The QCS60x SoCs feature Qualcomm® Noise and Echo Cancellation, as well as advanced on-device audio analytics and processing features to support natural language processing, audio speech recognition, and "barge-in" capability for a reliable voice interface even in loud or noisy environments or when users are far from the device.

To further facilitate fast and cost-effective development, Qualcomm Technologies, Inc. has partnered with ODMs to provide full form factor reference devices, as well as ISVs to provide solutions that address various market segments. Third party algorithms for performing on-device stitching of dual camera streams is also demonstrated on the reference platforms.

## Highlights

### Better performance with low power consumption

Engineered specifically for camera applications that utilize intensive processing features, QCS603/605 chipsets are designed to use less power while performing better than if running on a more general purpose chip.



### Artificial Intelligence for differentiating user experiences

On-device machine learning through the Qualcomm AI Engine can support AI use cases including face detection, face recognition, object tracking and people counting.



### 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.



### Designed specifically for a variety of advanced camera applications

The QCS60x family of SoCs supports 4K video, multiple video streams at lower resolutions, 360-video stitching, WQHD displays, obstacle avoidance, and the creation of video highlight reels for action cameras.



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QCS60x

## QCS603/605 Target Applications

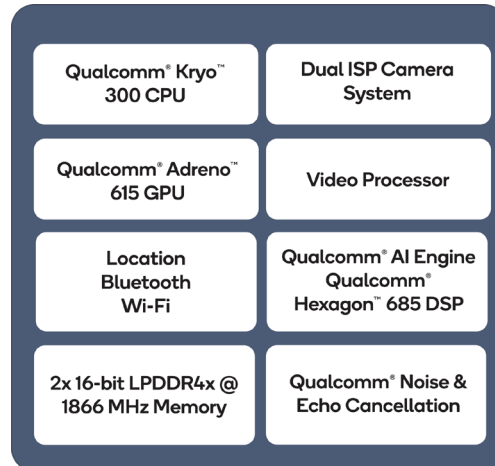
- Industrial IoT
- Action and VR360 Cameras
- Smart AI Home Security
- Enterprise Surveillance Cameras
- Smart Displays
- Home IP Cameras

## Features

- Dual 14-bit Qualcomm Spectra™ 270 ISP capable of supporting upto 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 Qualcomm® Neural Processing Engine SDK support
- Up to eight Qualcomm® Kryo™ 300 CPU cores optimized for power and DMIPS
- Qualcomm® AI Engine designed to support on-device machine learning
- Low power sensor core helps support always-on use cases at reduced power levels
- Supports up to 2x2 802.11ac Wi-Fi with MU-MIMO and dual band simultaneous transmission, Bluetooth 5.1
- 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

Product	Part Numbers
QCS 605 SoC	QCS-605-0-771PSP-MT-01-0-AC
PMIC	PM-670, PM-670L, PM-3003A
Connectivity	WCN-3990
QCS 603 SoC	QCS-603-1-771PSP-MT-01-0-AA
PMIC	PME-605, PM-8005
Connectivity	WCN-3980

## QCS60x Block Diagram



## QCS603 and QCS605 Specifications

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

Qualcomm AI Engine, Qualcomm Spectra, Qualcomm Adreno, Qualcomm Hexagon, Qualcomm Kryo, Qualcomm aptX, Qualcomm Aqstic, are products of Qualcomm Technologies, Inc. and/or its subsidiaries.

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