



Qualcomm® QRB5165 Processor

The premium-tier QRB5165 processor is designed to help you build smarter and powerful consumer, enterprise, or industrial robots with on-device AI and 5G connectivity and more.

The QRB5165 brings the latest IoT technologies in a highly integrated processor that powers the next generation of high-compute, AI-enabled, low-power robots and drones for the consumer, enterprise, industrial and professional service sectors that can be connected by 5G.

The QRB5165 processor, customized for robotics applications, offers a powerful heterogeneous computing architecture coupled with the industry-leading 5th generation Qualcomm® AI Engine delivering 15 trillion operations per second (TOPS) of AI performance to efficiently run complex AI and deep learning workloads and on-device edge inferencing while using lower power.

The processor also offers a powerful image signal processor (ISP) with support for seven concurrent cameras, a dedicated computer vision engine for enhanced video analytics (EVA), as well as the new Qualcomm® Hexagon™ Tensor Accelerator (HTA) and powerful Qualcomm® Adreno™ 650 GPU. With support for 4G and 5G connectivity speeds via a companion module, the QRB5165 helps pave the way for the proliferation of 5G in robotics and intelligent systems.

Highlights

On-device AI intelligence

The QRB5165 supports the industry-leading 5th generation Qualcomm AI Engine with the brand-new HTA with maximum efficiency to run complex AI and deep learning workloads at the edge.



Dedicated high-performance computer vision

Provides hardware acceleration for advanced computer vision applications using the dedicated computer vision hardware block EVA (Engine for Video Analytics). EVA provides enhancements for CV applications with reduced latencies for real-time image processing decisions under decreased power for demanding budgets, freeing up the DSP, GPU, and CPU capacity for other critical AI applications.



Designed for industrial conditions

Operates in harsh industrial conditions and supports a temperature range of -30°C to 105°C. Communicates via industrial protocols such as EtherCAT & TSN and supports security at every layer.



Flexible commercialization design options

The QRB5165 has a range of solutions for commercialization from off-the-shelf System-on-Module (SoM) solutions to speed up commercialization, to the flexibility for processor-on-board designs for cost-optimization at scale as well as package-on-package (POP) and non-POP designs.



Expected Product Longevity: September 2035

The QRB5165 processor is a part of the Product Longevity Program for Qualcomm IoT Portfolio. These products are developed and engineered with product longevity and durability in mind, helping to bring stability to our customer product designs. Product longevity dates are subject to change without notice.

QRB5165 Target Applications

- Autonomous Delivery Vehicles
- Commercial & Enterprise Drones
- Edge AI Box
- CoBots & Intelligent Machines

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QRB5165

Features

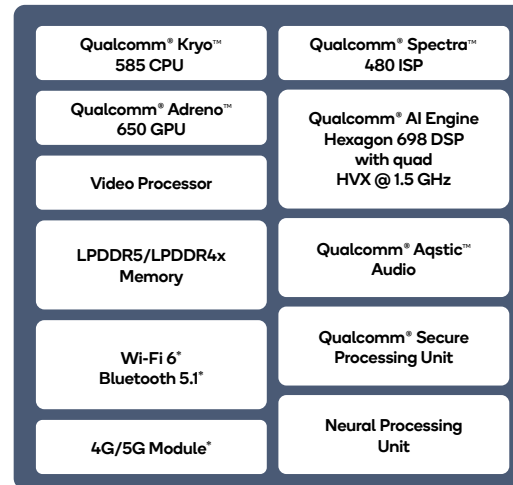
- Qualcomm Spectra™ 480 Image Signal Processor designed to deliver a premium camera experience that can process 2 Gigapixels per second with high-performance capture of 200 megapixel photos, 8K video recording, and 4K HDR video capture
- Adreno 650 Visual Processing Subsystem delivers quality graphics for larger-than-life immersive experiences using the Adreno graphics processing unit (GPU) and video processing unit (VPU)
- Hexagon 698 DSP with Hexagon Vector eXtensions (HVX), Hexagon Tensor Accelerator, and Hexagon Scalar Accelerator to support sophisticated, on-device AI processing, and delivers mobile-optimized computer vision (CV) experiences for a wide array of use cases
- Qualcomm® Kryo™ 585 CPU: Manufactured in 7 nm process node, optimized across four high-performance Kryo Gold cores and four low-power Kryo Silver cores
- Qualcomm® Secure Processing Unit (SPU) offers superior security that is designed to help safeguard your facial data, iris scan, and other biometric data. It supports hardware root of trust, Qualcomm® Trusted Execution Environment, Secure boot, and camera security
- Operating System: Ubuntu, Linux

Ordering Information

Product	Part Numbers
QRB5165 (LPDDR5 PoP)	QRB-5165-0-MPSP1099
QRB5165 (LPDDR4 PoP)	QRB-5165-1-MPSP1017

Please check part numbers for accuracy before ordering

Block Diagram



* Supported with a companion module

Specifications

Package	12.4 x 12.7 mm LP4, 12.4 x 14 mm LP5 MEP
CPU	Kryo 585 CPU, 64-bit, up to 2.84 GHz
ISP	Qualcomm Spectra 480 ISP with Dual 14-bit image signal processing
Camera	Up to 200 MP photo capture Up to 25 MP dual camera @ 30 FPS w/ Zero Shutter Lag Up to 64 MP single camera @ 30 FPS w/ Zero Shutter Lag Support for 12 cameras by D-PHY & 18 cameras by C-PHY (7 concurrent)
Video	8K video capture @ 30 FPS, Up to 10-bit color depth video capture, 4K video capture + 64 MP Photo, 4K video capture @ 120 FPS, 4K HDR video capture
GPU	Adreno 650 GPU w/ support for Open GL ES & Open CL
DSP	Hexagon 698 DSP with HVX, Hexagon Tensor Accelerator and Hexagon Scalar Accelerator
Memory	LPDDR5 up to 2750 MHz, LPDDR4X up to 2133 MHz Memory Density: up to 16 GB
Wireless Connectivity	WLAN: 2x2 802.11ax with DBS, Bluetooth® 5.1
Security	Camera Security, Crypto Engine, Cryptographic Accelerator, Qualcomm Trusted Execution Environment, Secure Boot, Qualcomm® Crypto Engine Core is FIPS 140-2 certified

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