

Qualcomm

Qualcomm® Robotics RB5 Platform (Qualcomm® QRB5165)

An advanced robotics platform designed to help you build smarter and powerful consumer, enterprise or industrial robots with on-device AI and 5G connectivity and more.

The Qualcomm Robotics RB5 Platform supports the development of next generation of high-compute, AI-enabled, low power robots and drones for the consumer, enterprise, defense, industrial and professional service sectors that can be connected by 5G.

The platform's QRB5165 processor, customized for robotics applications, offers a powerful heterogeneous computing architecture coupled with the leading fifth-5th generation Qualcomm® Artificial Intelligence (AI) Engine delivering 15 Tera 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, on device machine learning, and accurate edge inferencing. 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). With support for 4G and 5G connectivity speeds via a companion module, the Qualcomm Robotics RB5 platform helps pave the way for the proliferation of 5G in robotics and intelligent systems.

The [Qualcomm Robotics RB5 hardware development kit](#), based on the QRB5165 processor, contains a robotics-focused development board and is compliant with the 96Boards open hardware specification to support a broad range of mezzanine-board expansions for developing innovative proof-of-concepts and rapid prototyping. Developers have flexible software capabilities with the platform offering support for Linux, Ubuntu and Robot Operating System (ROS) 2, as well as pre-integrated drivers for various cameras, sensors and connectivity.

Highlights

On-device AI intelligence

The Qualcomm Robotics RB5 Platform supports the leading 5th generation Qualcomm AI Engine with the brand-new Hexagon Tensor Accelerator, pushing 15 trillion operations per second 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 & supports temperature range of -30°C to 105°C and has an option for extended lifecycle support until 2029. Communicates via industrial protocols such as EtherCAT & TSN and supports security at every layer.



Flexible commercialization design options

In addition to a feature packed development kit, the platform offers a range of solutions for commercialization from off-the-shelf System-on-Module (SoM) solutions to speed commercialization, to the flexibility for chip-on-board designs for cost-optimization at scale and also package-on-package (POP) and non-POP designs.



Qualcomm Robotics RB5 Platform Applications

- Face Detection & Recognition
- Object Depth and Avoidance
- Gesture and Hand Tracking
- Path Planning & 3D Map Formation
- Deep Learning
- vSLAM (Visual Localization & Mapping)

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.
- Qualcomm® Adreno™ 650 Visual Processing Subsystem deliver's 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 wide-array of use cases.
- Qualcomm® Kryo™ 585 CPU: Manufactured in 7nm process node, optimized across four high-performance Kryo Gold cores and four low-power Kryo Silver cores.
- Qualcomm® Secure Processing Unit (SPU) offers vault-like 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.

Software

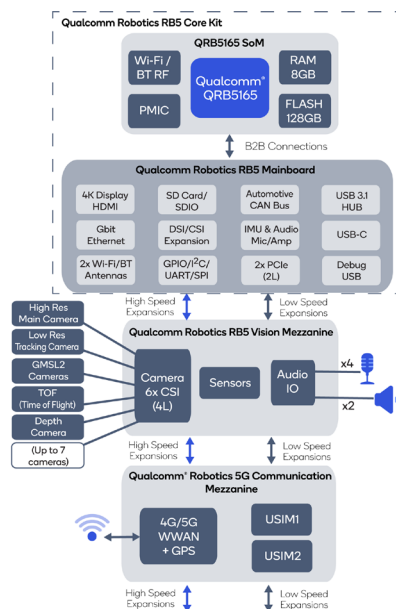
- **Software support for :** Ubuntu 18.04, Linux distribution based off Yocto Dunfell, Kernel 4.19, ROS 2
- **Qualcomm® Neural Processing SDK:** Optimizing deep learning processing performance across available resources to achieve superior edge computing experience.
- **Qualcomm® Computer Vision SDK:** Offers a mobile-optimized computer vision (CV) library which enables new user experiences like gesture recognition, face detection, tracking and recognition, augmented reality and more.
- **Hexagon DSP SDK:** Designed to optimize the features, and performance of multimedia software that allows audio, imaging, embedded vision and heterogeneous computing acceleration on the Hexagon DSP to create compelling multimedia user experiences and help provide improvements in the power dissipation and performance of intensive multimedia and computational applications.

To learn more visit:

www.qualcomm.com/robotics



Platform Block Diagram



Platform Specifications

	Qualcomm Robotics RB5 Platform
CPU	Kryo 585 CPU, 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 with Zero Shutter Lag, Up to 64 MP single camera @ 30 FPS with Zero Shutter Lag. Support for 12 cameras by D-PHY and 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 with support for Open GL ES and Open CL
DSP	Hexagon 698 DSP with HVX, Hexagon Tensor Accelerator and Hexagon Scalar Accelerator
Memory & Storage	LP-DDR5 up to 2750 MHz, LPDDR4x up to 2133 MHz. Memory Density: up to 16 GB
Wireless Connectivity	Advance connectivity using Qualcomm® FastConnect™ 6800 System with Wi-Fi 6, Wi-Fi 6-ready, 802.11ad, 802.11ay, 802.11ac Wave 2, 802.11a/b/g/n. Support for Dual-band simultaneous (DBS), WPA3-Enterprise, WPA3-Enhanced Open, WPA3 Easy Connect, WPA3-Personal, 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.

Qualcomm Computer Vision SDK, Qualcomm Spectra, Qualcomm Adreno, Qualcomm Kryo, Qualcomm Secure Processing Unit, Qualcomm Neural Processing SDK, Qualcomm Robotics 5G Communication Mezzanine, Qualcomm FastConnect, Qualcomm Trusted Execution Environment, and Qualcomm Crypto Engine Core are products of Qualcomm Technologies, Inc. and/or its subsidiaries.

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