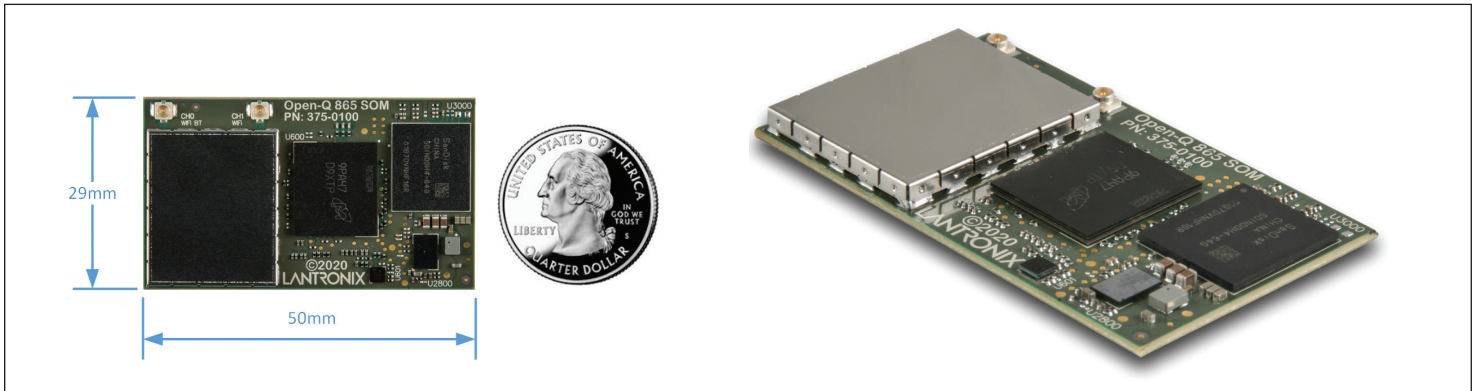


# Open-Q™ 5165RB SOM (System on Module)

Based on Qualcomm® QRB5165 System-on-Chip with Ubuntu Linux OS



## Advanced Robotics SOM in Ultra-compact Size

- SOM with powerful specialized processing cores
- On-device Qualcomm® AI Engine™ for machine vision, neural networks, deep learning
- Power-efficient edge AI computing solution pushing 15 TOPS
- Ubuntu 18.04 Linux with support for Robot Operating System 2.0
- Container and accelerator APIs - Docker, TensorFlow Lite, NNAPI and others

The Open-Q™ 5165RB SOM is an ultra-compact (50mm x 29mm) production-ready computing module based on the powerful Qualcomm® QRB5165 System-on-Chip. The QRB5165 utilizes Qualcomm Technologies' heterogenous compute expertise to provide an SoC with multiple specialized processing cores such as the 5th generation AI Engine, hardware video analytics engine, Qualcomm Spectra™ ISP, Qualcomm Adreno™ GPU, and Qualcomm Hexagon™ DSP. Coupled with the latest Wi-Fi 6 connectivity, advanced camera features, and high-speed interfaces, the 5165RB SOM creates the perfect computing core for a variety of leading-edge robotics applications. Along with the companion development kit, advanced robotics-focused OS and SDKs, and available accessories, it will accelerate your time to market for innovative new products requiring the highest AI processing performance in low-power embedded situations.

### Key Features

- Qualcomm® QRB5165 SoC – long life IIoT chipset
- 8GB LPDDR5 RAM + 128GB UFS Flash
- Ubuntu 18.04 Linux
- On-device AI Engine up to 15 TOPS
- Dedicated Computer Vision Engine
- Multiple MIPI camera and display ports
- Multiple high speed connectivity options
- Ultra-compact 50 x 29 mm form factor

### Applications

- Advanced Robotics – consumer/industrial/defense
- AI-enabled Drones and UAVs
- Machine vision platforms
- AI processing gateways
- Face detection and recognition
- Deep learning and neural network processing
- Autonomous systems

### Engineering Services:

We provide a full solution – our unparalleled engineering expertise and product development skills deliver innovative products that are cost-effective and can jumpstart your Go-to-Market timeline.

Our business model offers turnkey product development services, or we can augment your team in specific areas of development. The choice is yours.

### Key development expertise in:

- Camera development and tuning
- Voice control
- Machine learning
- Mechanical & RF design
- Thermal & power optimization.

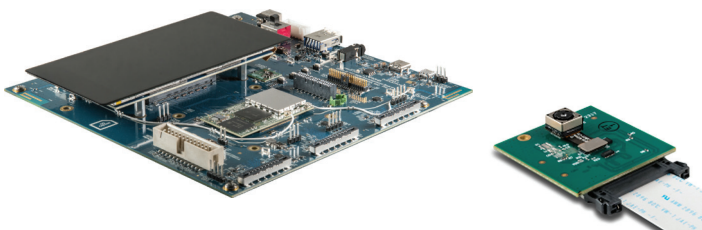
IoT product development made easy.

## Hardware Specifications:

|                                  |                                                                                                                                                                                                                                                                                                        |                                                                                                       |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| • <b>Processors</b>              | Qualcomm® QRB5165 SoC built on 7nm technology:<br>Kryo™ 585 Octa-core CPU: 1Kryo Gold prime @ 2.84 GHz + 3 Kryo Gold @ 2.42 GHz + 4 Kryo Silver @ 1.81 GHz<br>Hexagon™ 698 DSP with quad Hexagon Vector eXtensions                                                                                     |                                                                                                       |
|                                  | Adreno™ 650 GPU @ Fmax = 587 MHz<br>Spectra™ 480 Image Signal Processor<br>Adreno™ 665 Video Processing unit                                                                                                                                                                                           | Adreno™ 995 Display Processing unit<br>NPU230 Neural Processing unit<br>SPU240 Secure Processing unit |
| • <b>Memory/Storage</b>          | 8GB LPDDR5 @ 2750MHz, 128GB UFS                                                                                                                                                                                                                                                                        |                                                                                                       |
| • <b>Wireless</b>                | 802.11ax 2x2 MU-MIMO + Bluetooth 5.1, Bluetooth Milan ready                                                                                                                                                                                                                                            |                                                                                                       |
| • <b>Display Interfaces</b>      | Up to three 4K displays (1 internal display through DSI and 2 external displays through DisplayPort)<br>2x 4-lane MIPI DSI D-PHY 1.2, up to 5040 × 2160 @ 60 fps (or 120 Hz in VR mode) + touchscreen support<br>DisplayPort v1.4 on USB Type-C, at 8.1 Gbps/lane, with USB3 and USB2 data concurrency |                                                                                                       |
| • <b>Camera Interfaces</b>       | 3x 4-lane MIPI CSI camera ports + CCI I2C control                                                                                                                                                                                                                                                      | Spectra 480 ISP supporting multiple concurrent cameras<br>64 MP 30 fps ZSL with a dual ISP            |
| • <b>Video Performance</b>       | Decode up to 4K240/8K60, Encode up to 4K120/8K30                                                                                                                                                                                                                                                       | Concurrent 4K60 decode & 4K30 encode for wireless display                                             |
| • <b>Audio</b>                   | Supports WCD938x high fidelity audio codec and WSA881x speaker amp on carrier board<br>Dedicated Hexagon™ audio DSP, SoundWire, MI2S, DMIC, TDM/PCM interfaces for audio devices on carrier board                                                                                                      |                                                                                                       |
| • <b>High Speed Connectivity</b> | 1x PCIe Gen3 2-lane<br>1x USB3.1 with support for Type-C + DisplayPort v1.4 with USB SS data concurrency, 1x USB 3.1 Type-A                                                                                                                                                                            |                                                                                                       |
| • <b>I/O Interfaces</b>          | 4-bit SD 3.0, UART, I2C, I3C, SPI, configurable GPIOs, sensor I/O to dedicated Hexagon™ sensor DSP                                                                                                                                                                                                     |                                                                                                       |
| • <b>Power/Battery</b>           | Power management and battery charging solution on SOM                                                                                                                                                                                                                                                  |                                                                                                       |
| • <b>Operating Environment</b>   | Input voltage: 3.7V nominal<br>Operating Temperature: -25 to +85°C                                                                                                                                                                                                                                     |                                                                                                       |
| • <b>Form Factor</b>             | 50mm x 29mm with 2x 100-pin + 1x 120-pin board to board connectors                                                                                                                                                                                                                                     |                                                                                                       |

## Software:

|                                  |                                                                                                                                                              |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| • <b>Ubuntu Linux OS</b>         | Ubuntu 18.04, kernel v4.19, Wayland/Xorg display manager, apt pkg manager, ALSA sound, GStreamer, Video4Linux (V4L2), USB UVC camera support, Docker support |
| • <b>On-device Dev Tools</b>     | LLVM compiler, Python v2.7.5, Git, Perl, GCC, GDB                                                                                                            |
| • <b>Artificial Intelligence</b> | Support for TensorFlow Lite, Qualcomm Neural Processing SDK, Computer Vision SDK, Neural Networks API                                                        |
| • <b>Robotics Specific</b>       | Robot Operating System (ROS2) support                                                                                                                        |



Companion Development Kit, display and camera accessories available separately

## Certifications



## Purchasing Information:

|                                                 |                          |
|-------------------------------------------------|--------------------------|
| • <b>Open-Q™ 5165RB SOM (8+128GB)</b>           | PN: QRB5165-SOM-A        |
| • <b>Open-Q™ 865 Dev Kit (SOM not included)</b> | PN: QC-865-DK-CARRIERBRD |

Alternate SOM configurations available by special order (minimum order quantities apply) - e.g. different memory size, etc. Contact sales to discuss your specific needs today.

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