# Qualcomm Kryo 585 Octa Core Application Processors User Guide

Contents



## Qualcomm Kryo 585 Octa Core Application Processors

## Product Information

**Product Specifications**

- **Premium Tier:**
  - **Processor:** Kryo 585 Octa-Core
  - **CPU Cores:** 15 TOPS
  - **AI Performance (INT 8):** 48 TOPS
  - **GPU:** Adreno 650
  - **Wi-Fi Standards:** 2×2 802.11ax
  - **Camera:** 5 Cameras (concurrent), 36+36+36 MP30 ZSL, 64+36 MP30 ZSL, 108 MP30 ZSL, 200 MP photo capture
  - **Display:** 3480 x 2160 @ 120 Hz, 3360 x 1600 @ 144 Hz
  - **Video:** Decode: 4K240/8K60, Encode: 4K120/8K30 AV1 Decoder
- **High Tier:**
  - …

## Product Usage Instructions

**Powering On the Device:**

1. Press and hold the power button until the device powers on.
2. Follow the on-screen instructions to set up the device for first-time use.

**Taking Photos:**
To take photos using the device's camera:

1. Open the camera app.
2. Frame your shot and tap the capture button to take a photo.
3. You can adjust settings like resolution and filters within the camera app.

**Connecting to Wi-Fi:**

1. Go to the device's settings menu.
2. Select Wi-Fi and turn it on.
3. Choose your desired Wi-Fi network and enter the password if required.

**Frequently Asked Questions (FAQ)**

- **Q: How do I update the device's software?**
  **A:** To update the device's software, go to Settings > System > Software Update and follow the on-screen instructions to check for and install any available updates.
- **Q: What do I do if the device freezes?**
  **A:** If the device freezes, try holding down the power button for about 10 seconds to force a restart. If the issue persists, contact customer support for further assistance.

Application processors powering the next generation of high-tech devices for the Internet of Things (IoT)

## Compare Qualcomm IoT Application Processors

Qualcomm Technologies' Application Processors are driving innovation beyond the smartphone and powering the next generation of high-tech devices for the Internet of Things, making them more aware, connected, intelligent, and interactive.

| | Processor | CPU Cores | AI Performance (INT 8) | GPU | Wi-Fi Standards | Camera | | Display | | Video | Peripherals | | OS | Expected Product Longevity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Premium Tier | Qualcomm® QCS8550 | Qualcomm® Kryo™ Octa-Core | 48 TOPS | Qualcomm® Adreno™ 740 | 2×2 802.11be | 5 Cameras (concurrent) | 36+36+36 MP30 ZSL<br>64+36 MP30 ZSL<br>108 MP30 ZSL<br>200 MP photo capture | 4 Displays | 3480 x 2160 @ 120 Hz<br>3360 x 1600 @ 144 Hz | Decode: 4K240/8K60 Encode: 4K120/8K30 AV1 Decoder | PCIe Gen 3<br>PCIe Gen 4<br>SD 3.0 | UFS 4.0 Gear 5<br>USB 3.1 Type-C w/ DP e USB 2.0 | Android Linux | 2033 |
| | Qualcomm® QRB5165 | Kryo 585 Octa-Core | 15 TOPS | Adreno 650 | 2×2 802.11ax | 7 Cameras (concurrent) | 25+25 MP30 ZSL<br>64 MP30 ZSL<br>200 MP photo capture | 3 Displays | 5040 x 2160 @ 60 Hz<br>2560 x 2560 @ 120 Hz | Decode: 4K240/8K60 Encode: 4K120/8K30 | PCIe Gen 3<br>SD 3.0<br>UFS 3.0 Gear 4 | USB 3.1<br>USB 3.1 Type-C w/ DP | Linux Ubuntu | 2035 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Qualcomm® QCS8250 | Kryo 585 Octa-Core | 15 TOPS | Adreno 650 | 2×2 802.11ax | 7 Cameras (concurrent) | 25+25 MP30 ZSL<br>64 MP30 ZSL | 3 Displays | 5040 x 2160 @ 60 Hz<br>2560 x 2560 @ 120 Hz | Decode: 4K240/8K60 Encode: 4K 120/8K30 | PCIe Gen 3<br>SD 3.0<br>UFS 3.0 Gear 4 | USB 3.1<br>USB 3.1 Type-C w/ DP | Android | 2036 |
| | Qualcomm® QCS6490 | Kryo 670 Octa-Core | 12 TOPS | Adreno 643 | 2×2 802.11ax | 5 Cameras (concurrent) | 22+22+22 MP30 ZSL<br>36+22 MP30 ZSL<br>64 MP30 ZSL<br>192 MP NZSL | 2 Displays | 2520 x 1080 @ 144 Hz | Decode: 4K60 Encode: 4K30 | eMMC 5.1<br>PCIe Gen 3<br>SD 3.0 | UFS 2.x/3.1 Gear 4<br>USB 2.0<br>USB 3.1 Type-C w/ DP | Android Linux Ubuntu Windows | 2036 |
| High Tier | Qualcomm® QCS610 | Kryo 460 Octa-Core | 1 TOPS | Adreno 612 | 1×1 802.11ac | 3 Cameras | 16+16 MP<br>24 MP30 | 2 Displays | 2520 x 1080 @ 60 Hz<br>1920 x 1200 @ 60 Hz | Decode: 4K30 Encode: 4K30 | eMMC 5.1<br>SD 3.0<br>UFS 2.1 Gear 3 | USB 2.0<br>USB 3.1 Type-C w/ DP | Android Linux | 2030 |
| | Qualcomm® QCS6125 | Kryo 260 Octa-Core | 1 TOPS | Adreno 610 | 1×1 802.11ac | 2 Cameras (concurrent) | 16+16 MP<br>25 MP30 ZSL<br>48 MP | 1 Display | 2520 x 1080 @ 60 Hz | Decode: 4K30 Encode: 4K30 | eMMC 5.1<br>SD 3.0<br>UFS 2.1 Gear 3 | USB 2.0<br>USB 3.1 Type-C w/ DP | Android Linux | N/A |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Qualcomm® QCS5430 | Kryo 670 | Up to 13 TOPS | Adreno 642L | 2×2 802.11ax | 4 Cameras | 22+22 MP30 ZSL<br>64 MP30<br>(scalable) | 2 Displays | 2520 x 1080 @ 120 Hz<br>(scalable) | Decode: 4K60 Encode: 4K30 | eMMC 5.1<br>PCIe Gen 3<br>SD 3.0 | UFS 2.x/3.1 Gear 4<br>USB 2.0<br>USB 3.1 Type-C w/ DP | Android Linux Ubuntu Windows | 2032 |
| | Qualcomm® QCS4490 | Kryo Octa-Core | N/A | Adreno 613 | 2×2 802.11ax | 3 Cameras | 16+16 MP30 ZSL<br>25 MP30 ZSL<br>64 MP NZSL | 1 Display | 2520 x 1080 @ 90/120 Hz | Decode: 1080p60 Encode: 1080p60 | eMMC 5.1<br>PCIe Gen 3<br>SD 3.0 | UFS 3.1 Gear 4/UFS 2.2<br>USB 3.1 Type-C | Android | 2030 |
| Medium Tier | Qualcomm® QCS4290 | Kryo 260 Octa-Core | 1 TOPS | Adreno 610 | 1×1 802.11ac<br>1×1 802.11ax-ready | 3 Cameras | 13+13 MP30<br>25+5 MP30<br>16+16 MP24 | 1 Display | 2520 x 1080 @ 90 Hz<br>1600 x 900 @ 60 Hz | Decode: 1080p60 Encode: 1080p60 | eMMC 5.1<br>SD 3.0 | UFS 2.1 Gear 3<br>USB 3.1 Type-C | Android Linux | 2027 |
| Qualcomm® QRB4210 | Kryo 260 Octa-Core | 1 TOPS | Adreno 610 | 1×1 802.11ac<br>1×1 802.11ax-ready | 3 Cameras | 13+13 MP30<br>25+5 MP30<br>16+16 MP24 | 1 Display | 2520 x 1080 @ 90 Hz<br>1600 x 900 @ 60 Hz | Decode: 1080p60 Encode: 1080p60 | eMMC 5.1<br>SD 3.0 | UFS 2.1 Gear 3<br>USB 3.1 Type-C | Linux ROS | 2032 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Qualcomm® QCS410 | Kryo 460 Quad-Core | 1.7 TOPS | Adreno 612 | 1×1 802.11ac | 3 Cameras | 16+16 MP<br>21 MP | 2 Displays | 2520 x 1080 @ 60 Hz<br>1920 x 1200 @ 60 Hz | Decode: 1080p90 Encode: 1080p90 | eMMC 5.1<br>SD 3.0<br>UFS 2.1 Gear 3 | USB 2.0<br>USB 3.1 Type-C w/ DP | Android Linux | 2030 |
| Entry Tier | Qualcomm® QCS2290 | 4x Arm® Cortex®-A53 CPU @ up to 2.0 GHz | N/A | Adreno 702 | 1×1 802.11ac | 2 Cameras | 13+13 MP30 ZSL<br>25 MP30 ZSL | 1 Display | 1680 x 720 @ 60 Hz | Decode: 1080p30 Encode: 1080p30 | eMMC 5.1<br>SD 3.0 | USB 3.1 Type-C/ Micro USB | Android Linux | 2030 |
| | Qualcomm® QRB2210 | 4x Cortex®-A53 CPU @ up to 2.0 GHz | N/A | Adreno 702 | 1×1 802.11ac | 2 Cameras (concurrent) | 13+13 MP30 ZSL<br>25 MP30 ZSL | 1 Display | 1680 x 720 @ 60 Hz | Decode: 1080p30 Encode: 1080p30 | eMMC 5.1<br>SD 3.0 | USB 3.1 Type-C/ Micro USB | Linux ROS | 2032 |

## Application Processors

#### IoT Product Segments and Use Cases

#### Robotics

- In-store service robots to provide directions and product information to customers
- Inventory robots to track shelving stock and even grab objects for customers
- Delivery robots to bring the store to the customer autonomously
- Companion robots keep an eye on the kids while playing in the yard and send alerts in case of unusual activities
- Household robots to vacuum, clean, and perform other chores around the house
    - QRB5165
    - QCS8250
    - QCS610
    - QCS6125

- QCS4290
- QRB4210
- QCS410
- QRB2210

**Smart Cameras**

- Intelligent Motion Detection can analyze video in real-time and detect valid motion in a scene. It filters out “noise” such as lighting changes, natural tree movements, water movements, small animals, and even small video artifact noise
- Object Tracking tracks objects of interest and draws bounding boxes around them
- Camera Tamper Detection identifies any event that significantly changes the field of view of the camera
- Face Detection and Recognition detects and recognizes people from an on-device database
- Body Cams, Dash Cams, Sports Cameras, Surveillance
- Collaboration systems, such as conference systems with high-quality video/audio and AI
    - QCS8250
    - QCS610
    - QCS4290
    - QCS410
    - QCS2290

**Digital Signage/Shelf Labels**

- More targeted signage with analytics through facial recognition, edge processing, and AI
- Enhanced interactive and bonding experience by integrating touch, voice, gestures, location, and camera
- Display standards-based bi-directional, secure communication, driving display and sensors
- Camera customer engagement/counting via anonymous edge processing
    - QCS8250
    - QCS6490
    - QCS4490
    - QCS2290


**Smart Displays/Home Entertainment**

- Connected device that responds to voice commands and displays relevant information, including reminders, alerts, to-do lists, stream music and video
- Integrated camera for face detection/recognition and gesture commands, while supporting video calling
- Integrated sensors for temperature and light control as well as other appliances
    - QCS8250
    - QCS6490
    - QCS610
    - QCS4290
    - QCS410
    - QCS2290

**Retail and Payments**

- Handheld POS, Electronic Cash Registers
- Eliminate overstocks and out-of-stocks
- Adjusting prices
- Product organization on shelves with Multimedia Video ads
- Predict and influence customer behaviour
- Self-service kiosk & checkout, cashier-free stores
    - QCS8250
    - QCS6490
    - QCS610
    - QCS6125
    - QCS4490
    - QCS4290
    - QCS410
    - QCS2290

**Kiosks/Vending Machines**

- Product Locator, Price Checking, Way Finding
- Advertising, Ordering and Checkout, Store Pickup
- Magic Mirror (Augmented Reality)
- Vending machines with CaCamerasFacial Detection/Recognition
    - QCS610
    - QCS410
    - QCS2290

**Control Panels/Industrial Panels**

- Automation control
- Remote operation, setup, and control, including the ability to see what's going on at home or place of business
- Monitor and control devices such as safety lights, doors, and other sensors
- Program alerts
- Monitor and control power consumption, temperature, access, schedules, and collaboration
    - QRB5165
    - QCS6490
    - QCS610
    - QCS4290
    - QRB4210
    - QCS410
    - QCS2290

**Industrial Handheld Scanners**

- Superior bar code scanning and image capture in low light
- Fast scanning/returns
- Enhanced picture quality with low power usage
- Inventory management which is accurate and real-time
- Staff collaboration
    - QCS6490
    - QCS6125
    - QCS4490
    - QCS4290
    - QRB4210
    - QCS2290

**Product Longevity Program**
Qualcomm Technologies, Inc. builds Qualcomm® SoCs for certain applications that may require longer life cycles. These products are developed and engineered with product longevity and durability in mind, helping to bring

stability to our customer product designs. In support of the foregoing, Qualcomm Technologies has established a Product Longevity Program, which covers a select catalogue of Qualcomm SoCs that have been designed to meet a list of qualifications that are tailored to help address life cycle requirements of certain industrial and enterprise use cases. The processors in this guide* all belong to the Product Longevity Program.


* Excepting the QCS6125 processor.

## QCS8550 Application Processor

The premium-tier QCS8550 processor combines powerful computing, extreme edge AI processing, Wi-Fi 7, and robust video and graphics for a wide range of use cases for the Internet of Things (IoT).

**QCS8550 Application Processor**

**Get Started**
Commercial Modules and Development Tools

**Target Applications**

- Autonomous Mobile Robots (AMRs)
- Industrial Drones
- Retail
- Video Collaboration
- Video Transcoding
- Cloud Gaming
- Edge AI Gateways

**Features**

- 8th Gen AI engine
- Concurrent GPS, Glonass, BeiDou, Galileo, QZSS, NavIC
- Sensor-Assisted Positioning 6.0
- Computer vision processor for improved video denoising, digital video stabilization, and image correction adjustment
- Qualcomm Spectra™ Image Signal Processor – Cognitive ISP, Triple 18-bit ISPs
- Qualcomm® Hexagon™ Tensor Processor (HTP) with Hexagon Vector eXtensions (HVX) and Hexagon Matrix eXtensions (HMX)
- Qualcomm Aqstic™ audio codec
- Qualcomm Aqstic smart speaker amplifier
- Total Harmonic Distortion + Noise (THD+N), Playback: -108 dB
- Qualcomm® Audio and Voice Communication Suite

- Long-term support is expected through April 2033 with the Product Longevity Program

**Ordering Information**

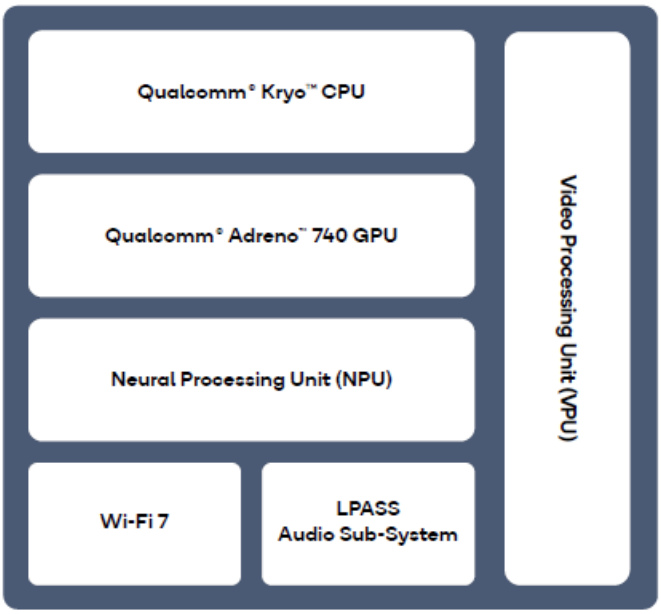
- Product QCS8550
- Part Number* QCS8550-1-AC

Part numbers are subject to change. Please check with the distributor for the most accurate ordering information.

**Specifications**

| | |
|---|---|
| | QCS8550 |
| Technology/Package | 4 nm, 15.6 x 14.0 mm |
| CPU | Octo-core Kryo CPU, 64-bit:<br>1x GoldPlus @ 3.2 GHz + (2+2) Gold @ 2.8 GHz + 3x Silver @ 2.0 GHz |
| Memory | 4 x 16 LPDDR5/5x @ 4200 MHz, Memory Density: Up to 16 GB |
| Location | Gen 9 v5, GPS L1/L5/L2C, GLO G1, BDS B1I/B1C/B2A/B2B, GAL E1/E5A/E5B, QZSS L1/L5/L2C, NavIC L5 |
| Connectivity | WLAN: 802.11be, 2×2 MIMO, Bluetooth® 5.3 |
| GPU | Adreno 740 GPU<br>Ray tracing, OpenGL ES 3.2, Vulkan 1.2, OpenCL 3.0 full profile, Adreno NN direct |
| Compute DSP | V73 AI-optimized tensor processor, six threads scalar DSP |
| Sensor DSP | Qualcomm® Sensing Hub 3.0 |
| Camera | 18 bpp, 64 + 36 MP30, or 3 x 36 MP30 or 1 x 108 MP30 fps ZSL,<br>8 x D-PHY 1.2/C-PHY 2.0; 3 IFE + 2 IFE Lite; Always-On |
| Display | QHD240 (embedded) + 1x 4K60 (external) w/ MST, 2x DSI, 1x DP 1.4 over USB-C |
| Video | Video decode up to 4K240/8K60,<br>Video encode up to 4K120/8K30, AV1 decoder |
| Audio DSP | Hexagon V73M 2Cluster – 4 Thread DSP,<br>5.5 MB of LPI memory, AI Processor (eNPU) v3, to accelerate neural networking use cases |
| AI | Dual eNPU V3, 4x HVX, HMX, 48 INT8, 12 FP16 TOPs |
| Storage/Peripherals | 1x PCIe 2-lane Gen 4, 1x PCIe 2-lane Gen 3, UFS 4.0, USB 3.1 Gen 2 with DP + data, eUSB |
| Security Features | Qualcomm® Trusted Execution Environment (TEE) v5.3, Qualcomm® Type-1 Hypervisor enables multiple trusted VMs (TVMs) |

**Block Diagram**




**SoMs, SiPs, and Smart Modules**

SNM970 SoM
by MeiG Smart Technology Co.

SG885G-WF Smart Module
by Quectel

TurboX™ C8550 SoM
by Thundercomm Technology

**Development Kits**

TurboX™ C8550 Dev Kit
by Thundercomm Technology

**Reference Designs**

TurboX™ EB5Gen2 Edge AI Station
by Thundercomm Technology

[More Info:]

## QRB5165 Application Processor

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

### Target Applications

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

### Features

- 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 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
- 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 offers superior security designed to help safeguard your facial data, iris scan, and other biometric data. It supports hardware root of trust, Qualcomm TEE, Secure boot, and camera security
- Long-term support is expected through September 2035 with the Product Longevity Program

### Ordering Information

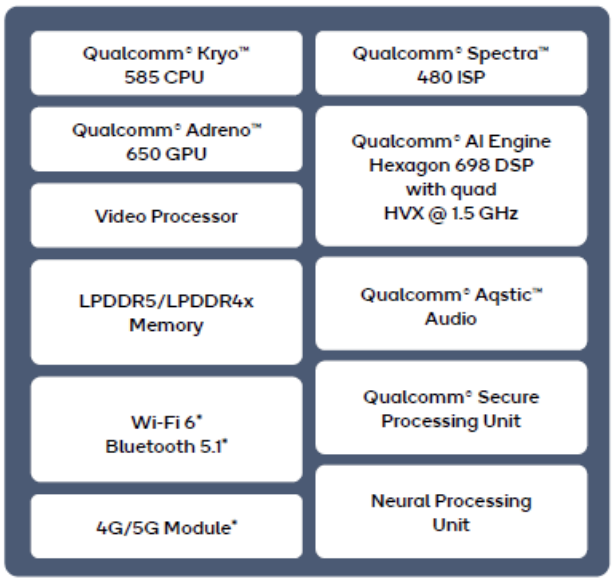
- **Product**
  - QRB5165 (LPDDR5 PoP)
  - QRB5165 (LPDDR4 PoP)
- **Part Number***
  - QRB-5165-0-MPSP1099
  - QRB-5165-1-MPSP1017

Part numbers are subject to change. Please check with the distributor for the most accurate ordering information.

#### Specifications

| | |
|---|---|
| | QRB5165 |
| Technology/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 |
| Memory | LPDDR5 up to 2750 MHz, LPDDR4X up to 2133 MHz<br>Memory Density: Up to 16 GB |
| ISP | Qualcomm Spectra 480 ISP with Dual 14-bit image signal processing |
| Connectivity | WLAN 2 x 2 802.11ax with DBS, Bluetooth 5.1 |
| GPU | Adreno 650 GPU w/ support for Open GL ES & Open CL |
| Compute DSP | Hexagon 698 DSP with HVX, Hexagon Tensor Accelerator and Hexagon Scalar Accelerator |
| Video | 8K video capture @ 30 FPS, Up to 10-bit colour depth video capture, 4K video capture + 64 MP Photo, 4K video capture @ 120 FPS, 4K HDR video capture<br>Decode: 8K60/4K240; Encode: 8K30/4K120 |
| Camera Support | Up to 200 MP photo capture<br>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<br>by C-PHY (7 concurrent) |
| Security Features | Camera Security, Crypto Engine, Cryptographic Accelerator, Qualcomm TEE, Secure Boot, Qualcomm® Crypto Engine Core is FIPS 140-2 Certified |
| Operating System | Ubuntu, Linux |

**Block Diagram**



## SoMs, SiPs, and Smart Modules

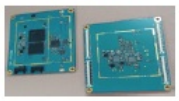
LEC-RB5 SMARC
by Adlink Technology, Inc.

QRB551 SBC
by DFI

Aikri QRB5165: Aikri-51X-65S
by eInfochips

ISQ 5165 SoM
by Innominds Software

SoM 5165
by Insignal



Open-Q™ 5165RB SoM
by Lantronix

TurboX™ C5165 SoM
by Thundercomm Technology

TurboX™ C5165N SoM
by Thundercomm Technology


## Development Kits

I-Pi SMARC RB5 Dev Kit
by Adlink Technology Inc.

QRB551 Dev Kit
by DFI

Aikri QRB5165: Aikri-51X-65D
by eInfochips

DVK 5165
by Insignal

Open-Q™ 865 Dev Kit
by Lantronix

VOXL® 2 Dev Kit (Board Only)
by ModalAI

VOXL® 2 Mini Dev Kit (Board Only)
by ModalAI

Qualcomm® Robotics RB5 Dev Kit
by Thundercomm Technology

Qualcomm® Robotics RB6 Platform
by Thundercomm Technology

VVDN-QRB5165 Dev Kit
by VVDN Technologies

## Reference Designs

EC700-QRB
by DFI

iDhi 5165
by Innominds Software

VOXL® 2 AI & 5G Development Drone - Sentinel
by ModalAI

Qualcomm Flight™ RB5 5G Platform Drone
by ModalAI

VOXL® 2 Flight Deck
by ModalAI

TurboX™ EB5 Edge AI Cube
by Thundercomm Technology

TurboX™ EB5 Edge AI Station
by Thundercomm Technology

For additional information for a chosen product please check directly with the manufacturer.

**More Info:**

## QCS8250 Application Processor

The premium-tier QCS8250 processor is designed to help you deliver maximum performance for compute-intensive camera and Edge AI applications with Wi-Fi 6 and 5G for the Internet of Things (IoT).

### Target Applications

- Connected Cameras
- Retail Self Checkout
- Video Collaboration
- Digital Signage
- Fleet Management
- Healthcare

### Features

- Adreno 650 GPU with improved GPU performance and power efficiency
- Native 8-bit integer support for efficient GPU DNN
- Hexagon DSP with Quad Hexagon Vector eXtensions (HVX) V66Q, 1.5 GHz, for machine learning, integrated DNN for advanced VA and Qualcomm® Neural Processing SDK framework
- Kryo 585 CPU with 4x Kryo Gold (2.85 GHz) + 4x Kryo Silver (1.8 GHz) w/ 4MB L3 cache
- Camera: Dual 14-bit Spectra 480 ISP supports 64 MP single camera capture
- Support for up to 24 cameras or seven concurrent cameras
- Superior image quality in zzHDR, video denoising, mid/low-frequency denoising, lens shading correction, video super-resolution
- Supports triple 4K display
- Video/Display: Concurrent UHD encode/decode, 3x DisplayPort, MIPI-DSI
- Long-term support is expected through February 2036 with the Product Longevity Program

All comparisons to previous generations

### Ordering Information

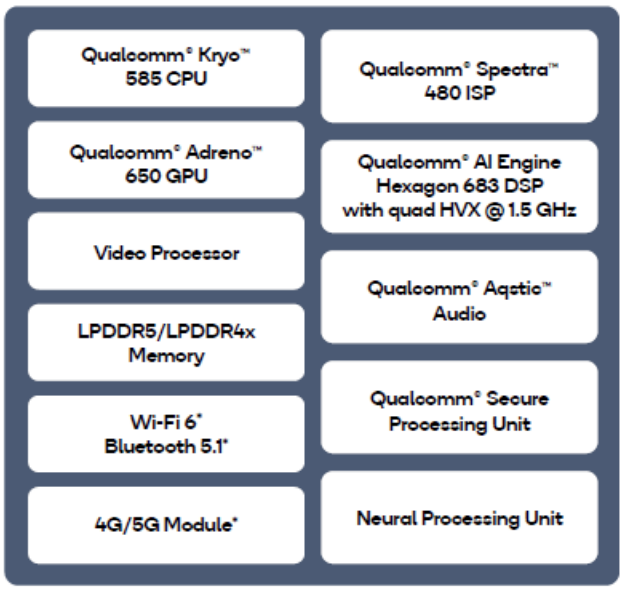
- **Product**
  - QCS8250 (LPDDR5 PoP)
  - QCS8250 (LPDDR4 PoP)
- **Part Number***
  - QCS-8250-0-MPSP1099
  - QCS-8250-1-MPSP1017

Part numbers are subject to change. Please check with the distributor for the most accurate ordering information.

**Specifications**

| | QCS8250 |
|---|---|
| Technology/Package | 7 nm FFP, 12.4 x 12.7 mm LP4, 12.4 x 14 mm LP5 MEP |
| CPU | Kryo 585, Octa-core 64-bit Arm® v8-M processor |
| Memory | Quad-channel PoP high-speed LPDDR5/LPDDR4x SDRAM up to 2750 MHz ( LPDDR5) |
| Connectivity | WLAN 2 x 2 802.11ax with DBS, Bluetooth® 5.1 |
| Modem | 5G modem attachment with support for sub-6 GHz and mmWave |
| GPU | Adreno 650 GPU |
| Compute DSP | Hexagon DSP with Quad HVX V66Q, 1.5 GHz |
| Display | Adreno 995 DPU, supports up to three 4K displays, 2x 4-Lane DSI, DisplayPort and Miracast support |
| Camera | Dual ISP: 64 MP @ 30 fps ZSL |
| Video | Decode: 8K60/4K240; Encode: 8K30/4K120 |
| Machine Learning | Dedicated NPU 230 |
| I/O Storage | UFS 3.0 gear 4 (2 lanes) + UFS 2.1, SD 3.0, Two USB 3.1 ports, support Type -C with DisplayPort v1.4 in one port |
| Security Features | Dedicated SPU with Improved Crypto |
| Operating System | Android 10 |

**Block Diagram**



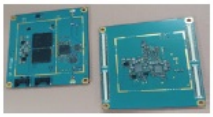

Supported with a companion module.

## SoMs, SiPs, and Smart Modules

Aikri QCS8250: Aikri-82X-50S
by eInfochips

ISQ 8250 SoM
by Innominds Software

SoM 8250
by Insignal



Open-Q™ 8250CS SoM
by Lantronix

SNM950 SoM
by MeiG Smart Technology Co.

SNM951 SoM
by MeiG Smart Technology Co.

SG865W-WF Smart EVB
by Quectel

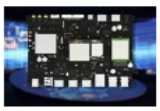
TurboX™ C865 SoM
by Thundercomm Technology

TurboX™ C865C SoM
by Thundercomm Technology

## Development Kits

Aikri QCS8250: Aikri-82X-50D
by eInfochips

Multimedia Industrial Board
by FAIOT Co.,LTD



DVK 8250
by Insignal

Open-Q™ 865 Dev Kit
by Lantronix

TurboX™ C865 Dev Kit
by Thundercomm Technology

TurboX™ C865C Dev Kit
by Thundercomm Technology

VVDN-QCS8250 Dev Kit
by VVDN Technologies

## Reference Designs

QCS8250 Video Collaboration Ref Design
by AmTRAN

5G Edge Computing Device Solution
by FAIOT Co.,LTD

iDhi 8250
by Innominds Software

TurboX™ EB5 Edge AI Station
by Thundercomm Technology

**More Info:**

For additional information for a chosen product please check directly with the manufacturer.

## QCS6490 Application Processor

The high-tier QCS6490 processor is designed for Enterprise and IoT applications including support for 5G and Wi-Fi 6E for ubiquitous coverage, powerful AI, and expanded interfaces for industrial use cases.

### Target Applications

- Transportation & Logistics
- Smart Warehousing
- Retail
- Manufacturing
- Healthcare
- E-Commerce

### Features

- Qualcomm® AI Engine features a fused AI-accelerator architecture and brings the total performance up to 12 TOPS
- Adreno 633 VPU for high-quality, ultra HD video encoding and decoding
- Qualcomm® Universal Bandwidth Compression with camera, display, GPU, video, and compute DSP
- Display support: FHD+, 10-bit DisplayPort, eight hardware layers, improved HDR10+, and wide color Gamut, Qualcomm® Low-Power Picture Enhancement display feature, and Qualcomm® True Palette Display feature
- One 4-lane DSI DSC 1.2, D-PHY 1.2, or C-PHY 1.0; VESA DSC 1.2
- Triple 14-bit image signal processing (ISP) + two lite ISP 22 + 22 + 22 MP, 64 MP/30 fps
- Five 4-lane CSIs (4/4/4/4/4) D-PHY 1.2 or C-PHY 1.2
- Support for USB 3.1 Type-C with DisplayPort and USB 2.0
- Long-term support for Android OS upgrades, Linux, Ubuntu, Windows 11 IoT Enterprise, security updates, and enterprise-grade hardware
- Long-term support is expected through July 2036 with the Product Longevity Program

### Ordering Information

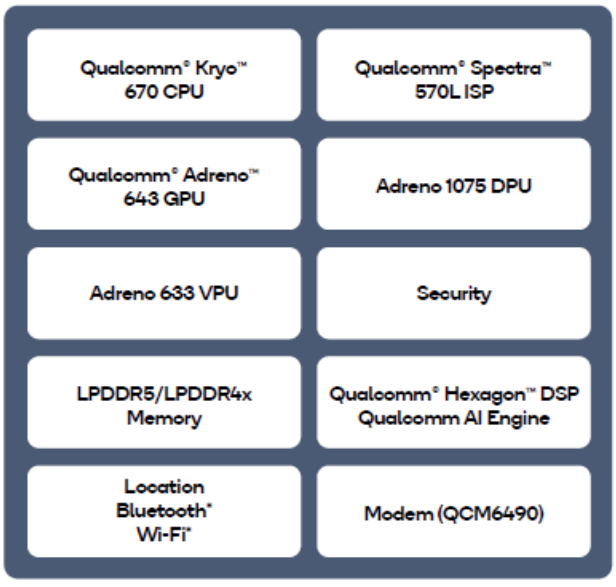
- **Product**
  - QCS6490
  - QCM6490
- **Part Number***
  - QCS6490-1-AA
  - QCM6490-1-AA

Part numbers are subject to change. Please check with the distributor for the most accurate ordering information.

#### Specifications

| | |
|---|---|
| | QCS6490 |
| Technology/Package | 6 nm, 12 x 14 mm |
| CPU | 8x Kryo 670 CPU from 1.9 up to 2.7 GHz |
| Memory/Storage | Dual-channel, non-PoP LPDDR5/LPDDR4X SDRAM, UFS 2.x/3.1, two-lane HS gear 4, SD v3.0, eMMC 5.1, PCIe two-lane NVMe |
| Location | GPS, GLONASS, NavIC, BeiDou, Galileo, QZSS, and SBAS |
| Connectivity | WLAN: Wi-Fi 6 (802.11ax) and Wi-Fi 6E (6 GHz), Bluetooth® 5.2 and FM sup ported. Uplink/Downlink MU-MIMO, 4K QAM,<br>160 MHz channels (5 & 6 GHz) |
| Modem | 2G/3G/4G/5G – mmWave and sub-6 GHz bands (Rel. 15)<br>3.7 Gbps DL, 2.5 Gbps UL, 400 MHz mmW, 100 MHz sub-6 (QCM6490 only) |
| GPU | Adreno GPU 643 @ 812 MHz with support for Open GL ES 3.2, Open CL 2.0, Vulkan 1.x, DX FL 12 |
| DSP | Compute Hexagon DSP with dual HVX and 4K HMX |
| Display Support | Adreno 1075 DPU |
| Camera Support | Spectra ISP 570L<br>64 MP / 36 + 22 MP / 3 x 22 MP @ 30 fps ZSL<br>192 MP non-ZSL |
| Video | Up to 4K60 decode for H.264/H.265/VP9, Up to 4K30 encode for H.264/H.265; Support for HDR10 and HDR10+ playback |
| AI | 6th Gen Qualcomm AI Engine |
| Operating System | Android, Linux, Ubuntu, Windows 11 IoT Enterprise |

**Block Diagram**



Supported with a companion module

**SoMs, SiPs, and Smart Modules**

ISQ 6490 SoM
by Innominds Software

5G Smart Module SRM955
by MeiG Smart Technology Co.

AI Computing Module SNM930
by MeiG Smart Technology Co.

5G Smart Module SRM930
by MeiG Smart Technology Co.

5G SG560D Smart Module
by Quectel

TurboX™ C6490 SoM
by Thundercomm Technology

TurboX™ C6490P SoM
by Thundercomm Technology

VVDN-QCS6490 SoM
by VVDN Technologies

**Development Kits**

AI Computing Solution
by FAIOT Co.,LTD

TurboX™ C6490 Dev Kit
by Thundercomm Technology

TurboX™ C6490P Dev Kit
by Thundercomm Technology

**Reference Designs**

Industry Handheld Terminal
by FAIOT Co.,LTD

QCM6490 Reference Design
by Sigma Group

TurboX™ EB3Gen2 Edge AI Station
by Thundercomm Technology

[More Info:]

For additional information for a chosen product please check directly with the manufacturer.

## QCS610 Application Processor

The QCS610 processor is purpose-built to deliver high-performing, power-efficient edge computing for next-gen smart cameras and smart enterprise, home, and automotive IoT applications.

**Target Applications**

- Industrial IoT
- Smart AI Home Security
- Home IP Cameras
- Enterprise Security Cameras
- Dash Cams and Body Cams
- Smart Display, Videoconferencing

**Features**

- Dual 14-bit Spectra 250L ISP capable of supporting up to dual sensors. 24 MP @ 30 fps with dual ISPs; each ISP capable of 16 MP
- Fabricated using the advanced 11 nm FinFET process for exceptional thermal and power efficiency
- Adreno 612 GPU with 64-bit addressing @ up to 845 MHz with the latest API support
- Hexagon DSP with dual HVX, 1.1 GHz for running DNN models and advanced Qualcomm Neural Processing SDK support
- Eight Kryo 460 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
- Long-term support is expected through June 2030 with the Product Longevity Program

**Ordering Information**

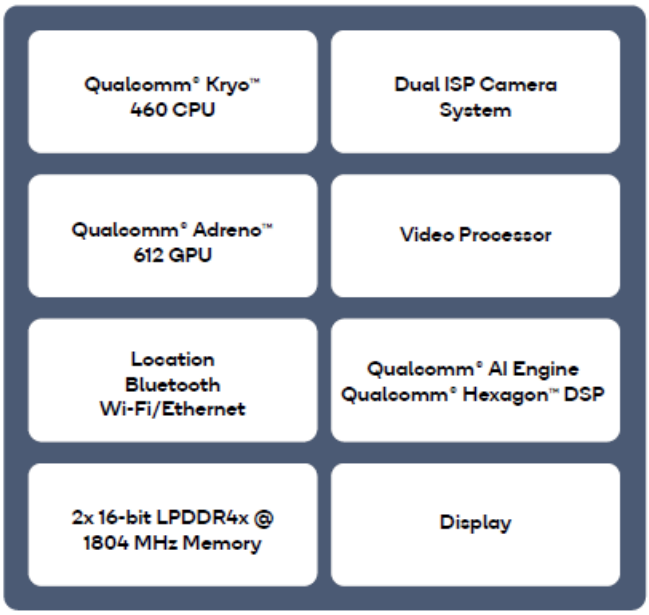
- **Product**
  - QCS610
  - PMIC
  - Connectivity
- **Part Number***
  - QCS-610-0-PSP806-MT-01-0-AC
  - PM6150, PM6150L
  - WCN-3980

Part numbers are subject to change. Please check with the distributor for the most accurate ordering information.

**Specifications**

| | | |
|---|---|---|
| | | QCS610 |
| Technology/Package | | 11 nm, 12 x 11.1 mm non-PoP |
| CPU | | Kryo 460: 64-bit Octa-cores, 2x Gold (2.2 GHz) + 6x Silver (1.8 GHz) |
| Memory | | 2 x 16-bit LPDDR4x @ 1804 MHz |
| Location | | GPS/GLONASS, BeiDou, Galileo |
| Connectivity | | Ethernet RGMII, Integrated 1×1 802.11a/b/g/n/ac, Bluetooth 5.0, FM |
| GPU | | Adreno 612 GPU @ up to 845 MHz |
| Compute DSP | | Hexagon DSP with dual HVX, 1.1 GHz |
| Sensor DSP | | Hexagon DSP-based |
| PMIC | | Qualcomm® PM6150 + Qualcomm® PM6150L |
| Display | Resolution | 2520 x 1080 @ 60 fps + 1920 x 1200 @ 60 fps (external) |
| | Interface | 1×4 lane DSI D-PHY 1.2 support + DP over USB-C (external) |
| Camera | Performance | 24 MP (2x ISP/16 + 16 MP), 4K30<br>IQ improvement: MCTF, TNR, sHDR, EIS, Dewarp, Zoom |
| | Interface | CSI 4+4+4 lane (or 4+4+2+1), D-PHY 1.2, C-PHY 1.0 |
| Video | Decode | 4K30 8-bit: HEVC/VP9 |
| | Encode | 4K30 8-bit: HEVC |
| Audio | Analog | Integrated Qualcomm® WCD9370 / Qualcomm® WCD9341 codec + Qualcomm® WSA8810 / Qualcomm® WSA8815 speaker amplifier |
| | Playback | Hi-Res/192 kHz, Native 44.1 kHz, audio on dedicated DSP |
| Storage | | eMMC 5.1, UFS 2.1 Gear 3 1-lane, SD 3.0 |
| Peripherals | | 1x USB 3.1 Type-C with DisplayPort and USB 2.0 |

**Block Diagram**




## SoMs, SiPs, and Smart Modules

Aikri QCS610: Aikri-X10-6S-4
by eInfochips

SoM 610
by Insignal

Open-Q™ 610 µSOM
by Lantronix

TurboX™ 610/410 SoM
by Thundercomm Technology

VVDN-QCS610 SoM
by VVDN Technologies

## Development Kits

IPC610 Open Dev Kit
by Altek Corp.

qSmartAI80_CUQ610 AI Vision Kit
by e-con Systems

Aikri QCS610: Aikri-X10-6D-4
by eInfochips

DVK 610
by Insignal

ROS 610 Dev Kit
by Insignal

Open-Q™ 610 µSOM Dev Kit
by Lantronix

TurboX™ C610/C410 Open Kit
by Thundercomm Technology

VVDN-QCS610/QCS410 Dev Kit
by VVDN Technologies

## Reference Designs


**More Info:**

For additional information for a chosen product please check directly with the manufacturer.

## QCS6125 Application Processor

The Qualcomm® QCS6125 processor is optimized for retail IoT solutions to support payment applications ranging from secure-rich POS devices to touchless and biometric payment platforms.

### Target Applications

- Electronic Cash Registers
- Video Conferencing
- Dash Cams
- Robotics
- Handheld Devices

### Features

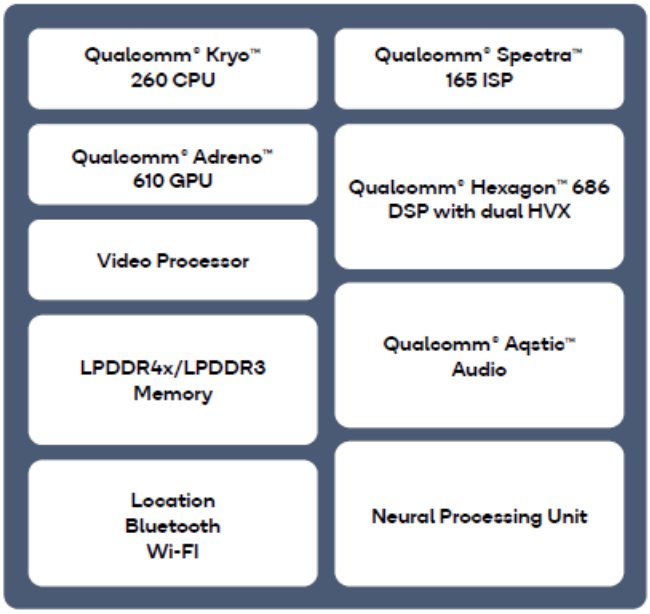
- Qualcomm® Hexagon™ 686 DSP and Hexagon Vector eXtensions (HVX) for advanced imaging and computing
- Qualcomm® Adreno™ 610 GPU enables gameplay in optimal game-world conditions with ultra-fast frame rates, super smooth interactions, surround-sound audio, and extremely realistic graphics
- Support for state-of-the-art Vulkan® 1.1 graphics library that uses 20% less power than Open GL ES and integrates enhanced developer tools to improve gaming graphics and battery life
- aptX Audio and Qualcomm Aqstic™ Technology deliver a smooth, crystal-clear audio experience
- Advanced features include Hybrid Autofocus, Optical Zoom, Zero Shutter Lag, and Multi-Frame Noise Reduction, for almost endless still and video capture possibilities
- With the 48 MP Snapshot feature, capture every detail and even a hi-res photo that could be blown up to the size of a billboard
- Triple Camera with support for Telephoto, Wide and Ultra-Wide images

- Snapdragon® X12 LTE modem designed to support superior connectivity with LTE download speeds up to 600 Mbps
- Integrated 1×1 802.11ac Wi-Fi with MU-MIMO
- Octa-core Kryo 260 CPU, built-in 11 nm, balances between 4 performance and 4 efficiency cores
- Qualcomm® Quick Charge™ 3.0 technology

**Specifications**

| | QCS6125 |
|---|---|
| Technology/Package | 14 nm, 11 nm |
| CPU | Kryo 260 CPU: 64-bit Octa-cores, 2 GHz |
| Memory/Storage | Dual-channel non-PoP high-speed memory,<br>LPDDR4X SDRAM designed for 1804 MHz clock (2 x 16-bit), LPDDR3 SDRAM designed for 933 MHz clock (1 x 32-bit), UFS 2.1 gear 3 (one-lane), eMMC 5.1, and SD 3.0 |
| Location | GLONASS, Beidou, SBAS, GPS, QZSS, Galileo |
| Connectivity | Integrated 1×1 802.11ac, Bluetooth 5.0 |
| GPU | Adreno 610 GPU @ 950 MHz |
| Compute DSP | Hexagon DSP with dual HVX |
| Display | FHD+ (2520 x 1080) @ 60 Hz |
| Camera Support | Qualcomm Spectra™ 165<br>Dual Camera (ZSL, 30 fps): Up to 25 MP<br>Single Camera (MFNR, ZSL, 30 fps): Up to 25 MP Single Camera: Up to 48 MP |
| Video | Video decode: 4K30 Video encode: 4K30 |
| Audio | Qualcomm Aqstic™ audio technology, Qualcomm® aptX™ HD, Qualcomm® aptX™ Audio |
| Interfaces | SD 3.0, USB 3.1 Type-C with DisplayPort 1.4 |
| Security Features | Qualcomm® Mobile Security, Qualcomm® Processor Security, Qualcomm® Content Protection |

**Block Diagram**




## SoMs, SiPs, and Smart Modules

5G SLM925 SoM
by MeiG Smart Technology Co.

5G SLM920 SoM
by MeiG Smart Technology Co.

5G SC668S Smart Module
by Quectel

5G SC696S Smart Module
by Quectel

TurboX™ CM6125/C6125 SoM
by Thundercomm Technology

## Development Kits

TurboX™ CM6125/C6125 Dev Kit
by Thundercomm Technology

## Reference Designs

6125 10" Enterprise Display Platform
by Arima Communications

[More Info:]

## QCS5430 Application Processor

The Qualcomm QCS5430 processor is a high-tier IoT solution that combines premium connectivity, high-level performance, and edge AI-powered camera capabilities with the option to upgrade features over the air via software now or later according to your product needs.

### Target Applications

- Robotics
- Industrial Handhelds
- Retail
- Cameras
- Drones and Controllers
- Edge AI Box
- Autonomous Mobile Robots

### Features

- Kryo 670 CPU built on Arm v8-M architecture
- All feature packs include premium connectivity and enterprise-grade security features with upgradeable options for:
- Increased CPU, GPU, and AI performance
- Expanded peripherals support
- Significant reductions in latency, smooth handoffs and increased responsiveness for latency-sensitive applications
- Superior location accuracy
- Qualcomm® AI Engine includes a hardware and software AI solution with on-device machine learning to enable edge computing
- Qualcomm® Edge AI Box Solutions intelligently chooses between device edge or cloud processing of multiple camera connections, optimizing processing time and power efficiency
- Support for up to five concurrent vision sensor inputs
- 6th Gen Qualcomm AI Engine: A fused AI accelerator packing Hexagon Tensor Accelerator (HTA), Large shared AI memory, Hexagon Scalar Accelerator, Hexagon Vector eXtensions (HVX)
- Long-term OS support for Android, Ubuntu, Windows 11 Enterprise IoT, and Yocto Embedded Linux.
- Long-term support is expected through July 2032 with the Product Longevity Program

### Ordering Information

- **Product**

    - QCS5430
- **Part Number***
    - QCS-5430-1-PSP1287-TR-00-0-AA

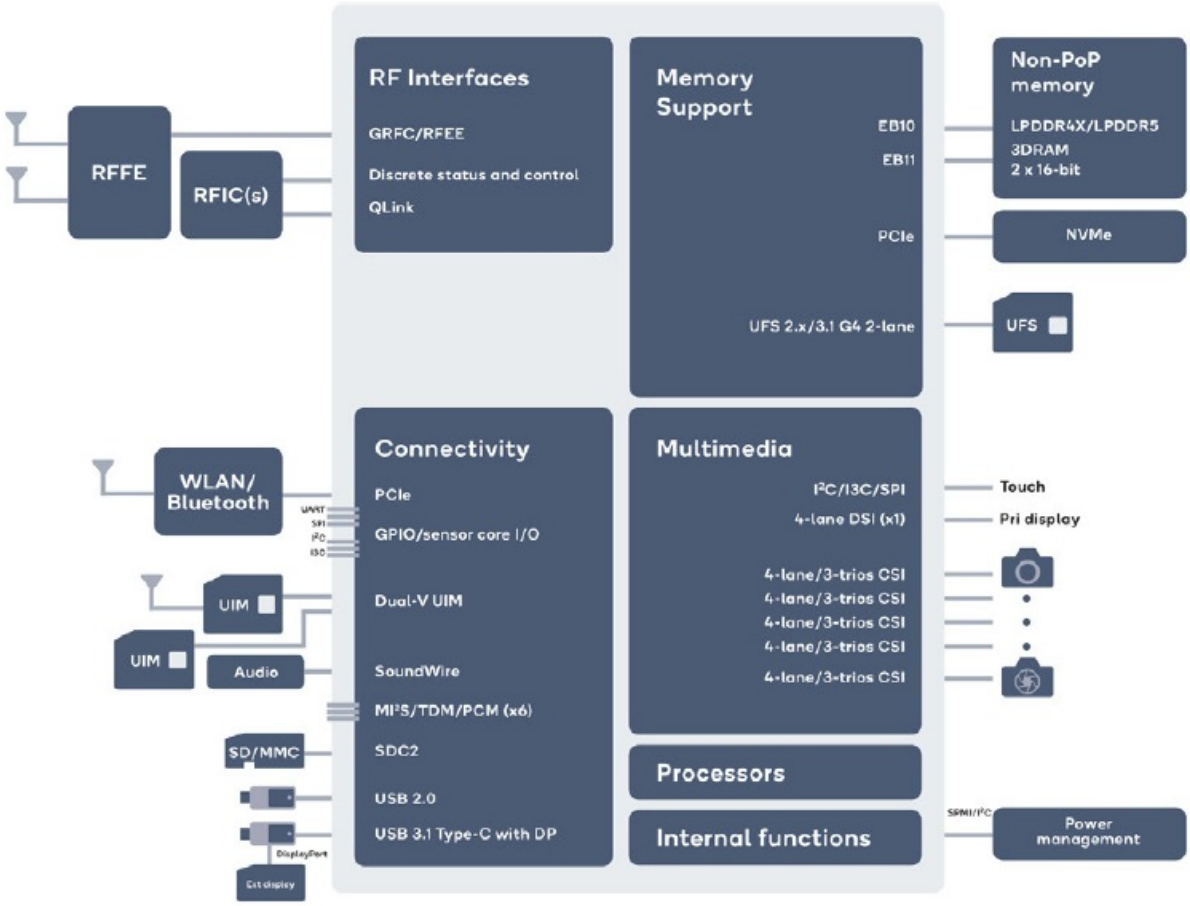
Part numbers are subject to change. Please check with the distributor for the most accurate ordering information.

#### Specifications

QCS5430 is available via two pre-defined feature packs, or through custom build. The scalable specs are CPU, GPU, DSP, Display, Camera, and USB. Please see Feature Pack 1 and Feature Pack 2 below, as well as the customizable range available through a custom feature pack.

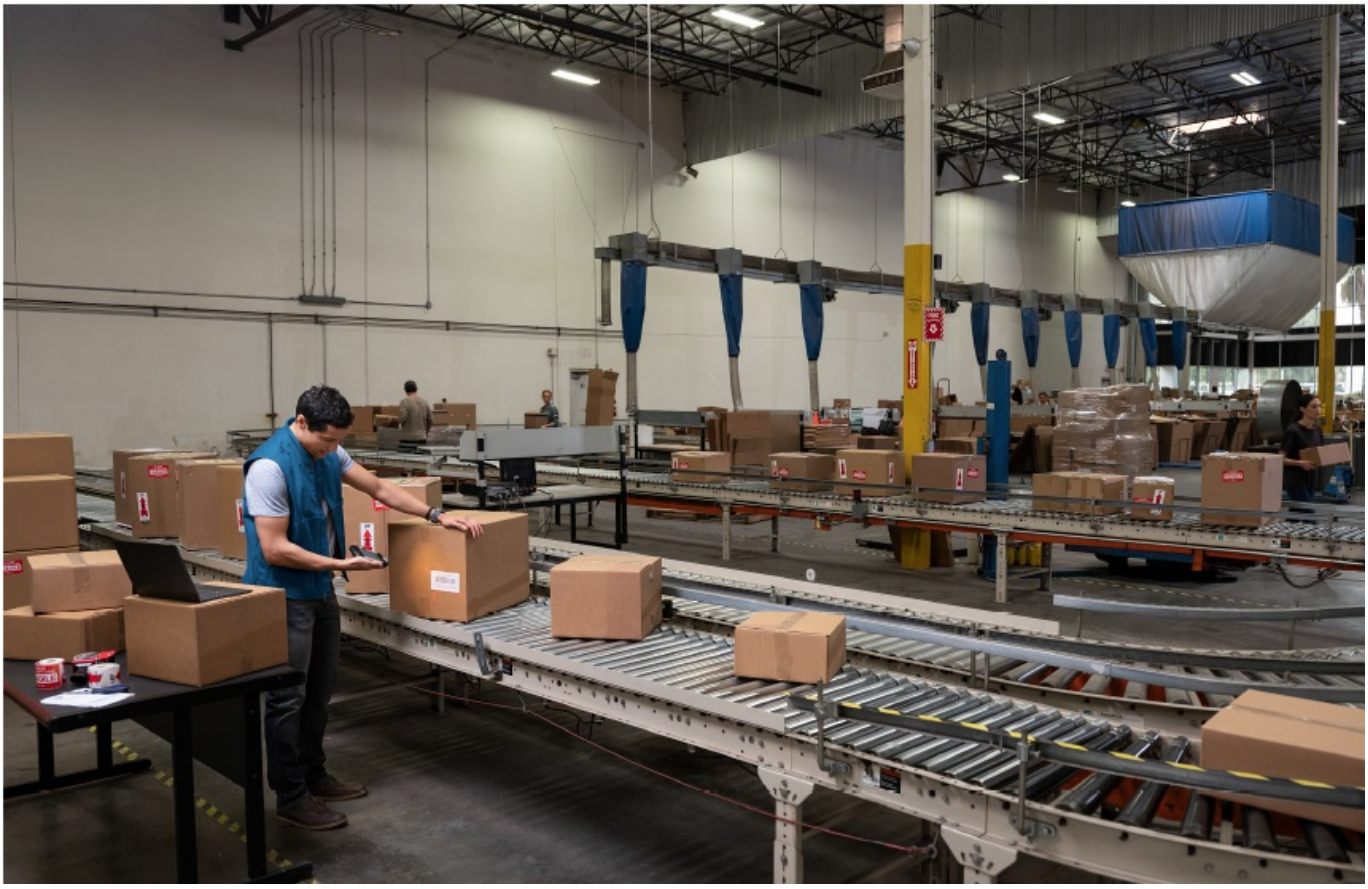
| | Feature Pack 1 | Feature Pack 2 | Custom Feature Pack |
|---|---|---|---|
| Technology/Package | 6 nm, 12 x 14 mm; non-PoP | | |
| CPU | Hex-core Kryo 670 CPU from 1.8 GHz to 2.1 GHz | Octa-core Kryo 670 CPU from 1.8 GHz to 2.1 GHz | Octa-core Kryo 670 CPU Scalable via licensing from<br>1.9 GHz to 2.7 GHz |
| Memory/Storage | Dual-channel, non-PoP LPDDR5/LPDDR4X SDRAM, UFS 2.x/3.1, two-lane HS gear 4, SD v3.0, eMMC 5.1 | | |
| Connectivity | WLAN: Wi-Fi 6 (802.11ax) & Wi-Fi 6E (6 GHz), Bluetooth® 5.2 & FM supported Uplink/Downlink MU-MIMO, 4K QAM, 160 MHz channels (5 & 6 GHz) | | |
| GPU | Qualcomm® Adreno™ 642L GPU @ 315 MHz | | Scalable via licensing Adreno 642L GPU @ 812 MHz |
| | Support for Open GL ES 3.2, Open CL 2.0, Vulkan 1.x, DX FL 12 | | |
| Compute DSP | Hexagon DSP with dual HVX and 2K HMX (~3.5 INT8 TOPS) Clock Speed 1.4 GHz | | Scalable via licensing (12.15 INT8 TOPS) |
| Display Technology | Adreno 1075 DPU, On-device display resolution: FHD+ (1080 x 2520 pixels) 8L @ 120 fps, 1x DSI D-PHY (4- lane), DP 1.4 SST | | On-device display resolution scalable via licensing to FHD+<br>@ 144 Hz, FHD+ @ 120 fps |
| Camera ISP | Qualcomm Spectra™ 570L ISP, Dual Camera: 2 x 22 MP | | Scalable via licensing to 3 x 22 MP |
| Video | Up to 4K60 decode for H.264/H.265/VP; up to 4K30 encode for H.264/H.265; Support for HDR10 and HDR10+ playback | | |
| Audio | Qualcomm® Noise and Echo Cancellation V10, Integrated low power VA (more keywords, Command First), Audio ML DSP: LPI, Shared 2 MB, 1.4 GHz | | |
| Interfaces | USB Type-C 3.1, USB 2.0, UFS 2.x/3.1, eMMC 5.1, SD 3.0, 1x PCIe | with 2x PCIe | Scalable via licensing with 2x PCIe |
| Security Features | Hardware Key Manager & ECC, Secure Boot, Crypto Engine, Key Provisioning Security, Qualcomm TEE, Qualcomm® Content Protection (Widevine, Camera Security Framework, Secure User Interface) | | |

**Block Diagram**




**SoMs, SiPs, and Smart Modules**


For additional information for a chosen product please check directly with the manufacturer.



More Info:

## QCS4490 Application Processor

Premium connectivity meets next-gen processing with the QCS4490 processor. The QCS4490 delivers key, advanced features now required by industrial handheld, industrial computing, and other IoT devices.

### Target Applications

- Industrial Handheld
- Retail POS Devices
- Control & Automation
- Industrial Computing Devices
- Industrial & Personal Security Panels

### Features

- Wi-Fi 6E uses the 6 GHz spectrum to extend advanced Wi-Fi 6 MU-MIMO and OFDMA into the new band and deliver superior performance, even in congested areas

- Delivers speeds of up to 3.6 Gbps, supported by Qualcomm® 4K Quadrature Amplitude Modulation (QAM), 160 MHz channel support and unique 4-stream (2×2 + 2×2) Dual Band Simultaneous (DBS)
- 4th generation 5G NR Sub-6 modem with 3GPP Rel. 16 capable and true global carrier support
- Voice-over-NR (VoNR), 5G location (E-CID)
- Multi-gen leap to Kryo Octa-core CPU (up to 2x over the previous generation in performance benchmarks)
- On-device processing allows for efficient data analysis between the device and the cloud (intelligent edge computing)
- Planned software support for Android releases 13 through 18 allows you to design products up to 2030*
- Save costs by investing in just one IoT chipset for multi-year industrial design, development, and maintenance support from Qualcomm Technologies and ODMs
- Significant reductions in latency and increased responsiveness for latency-sensitive applications (voice, video)
- Smooth handoffs and superior connectivity, even in large, complex environments with multiple high-demand devices such as hospitals and warehouses
- Audio AI accelerator enhances voice quality and voice UI accuracy
- Enhanced camera ISP hardware to support superior image quality
- Long-term support is expected through April 2030 with the Product Longevity Program

Subject to change without notice

**Ordering Information**

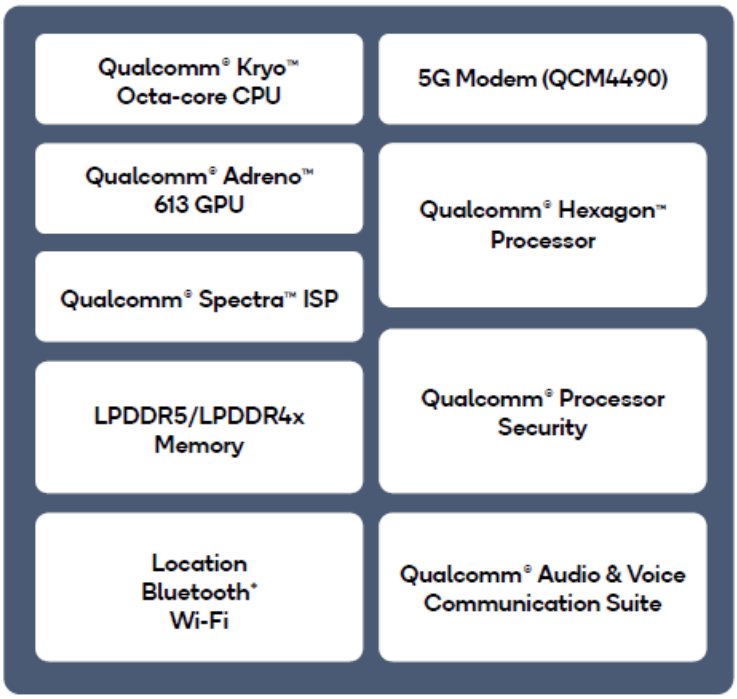
- **Product**
  - QCS4490
- **Part Number***
  - QCS-4490-0-AB

Part numbers are subject to change. Please check with the distributor for the most accurate ordering information.

**Specifications**

| | QCS4490 |
|---|---|
| Technology/Package | 4 nm, 12 x 11 mm |
| CPU | Kryo Octa-core CPU: 2x Gold A78 @ 2.4 GHz + 6x Silver A55 @ 2.0 GHz, 1 MB L3 cache |
| Memory/Storage | LPDDR4X/LPDDR5 SDRAM (2 x 16-bit) @ up to 3.2 GHz |
| Location | Gen 9 VT v5, GPS, BeiDou, GLONASS, Galileo, dual-frequency L1/L5, Navic |
| Connectivity | WLAN: Wi-Fi 6E (802.11b/g/n/ac/ax)<br>2×2 160 MHz, 4K QAM, 2×2 DBS (Qualcomm® WCN6856)<br>Bluetooth® 5.2 |
| Modem | 5G R16 Sub-6 100 MHz (QCM4490 only) |
| GPU | Qualcomm® Adreno™ GPU 613 |
| Display | FHD+ (1080 x 2520) @ 90/120 Hz |
| Camera Support | Qualcomm® Spectra™ ISP |
| Video | Video decode: Up to 1080p60D for H.264/H.265/VP9 Video encode: Up to 1080p60E for H.264/H.265 |
| Audio | eNPU processor, Integrated SVA, 1 MB shared LPI with sensor |
| Interfaces | USB 3.1 type-C, eMMC v5.1, SD 3.0, UFS 3.1, PCIe |
| Security Features | Secure Boot, Secure Debug, HW encryption, Qualcomm TEE, pIMEM, TME1.0 |

**Block Diagram**




* Supported with a companion module

**SoMs, SiPs, and Smart Modules**


For additional information for a chosen product please check directly with the manufacturer.


**More Info:**

## QCS4290 Application Processor

The QCS4290 application processor delivers greater performance, a better AI Engine, and broader connectivity options compared to previous generations. It delivers powerful performance, dynamic camera capabilities, and Wi-Fi 6-ready connectivity, ideal for industrial and commercial IoT applications.

**Target Applications**

- Industrial Handheld
- Security Panels
- Cameras

**Features**

- Kryo 260 CPU, octa-core CPU architecture for increased and sustained speeds
- 11 nm Process Technology for improved performance and lower power consumption
- Dual Frequency GNSS (L1 and L5) and support for India’s NavIC satellite system
- Qualcomm® FastConnect™ 6100 system provides the Wi-Fi 6-ready subsystem, integrated with Bluetooth 5.1 and FM
- Dedicated Hexagon 683 compute DSP with dual HVX @ 1.0 GHz
- Qualcomm® Universal Bandwidth Compression with Display and GPU
- Display support: FHD+, four hardware layers, 10-bit end-to-end, and Qualcomm® True Palette Display feature
- One 4-lane DSI D-PHY 1.2 @ 1.5 Gbps per lane, split link supported
- 3x ISP (13 MP + 13 MP)/(25 MP + 5 MP) @ 30 fps
- Three 4-lane CSIs (4/4/4 or 4/4/2/1) D-PHY 1.2 @ 2.5 Gbps per lane or C-PHY 1.0 @ 10 Gbps (3.42 Gbps/trio)
- Support for USB 3.1 Type-C
- Long-term support is expected through September 2027 with the Product Longevity Program

All comparisons to previous generations

**Ordering Information**

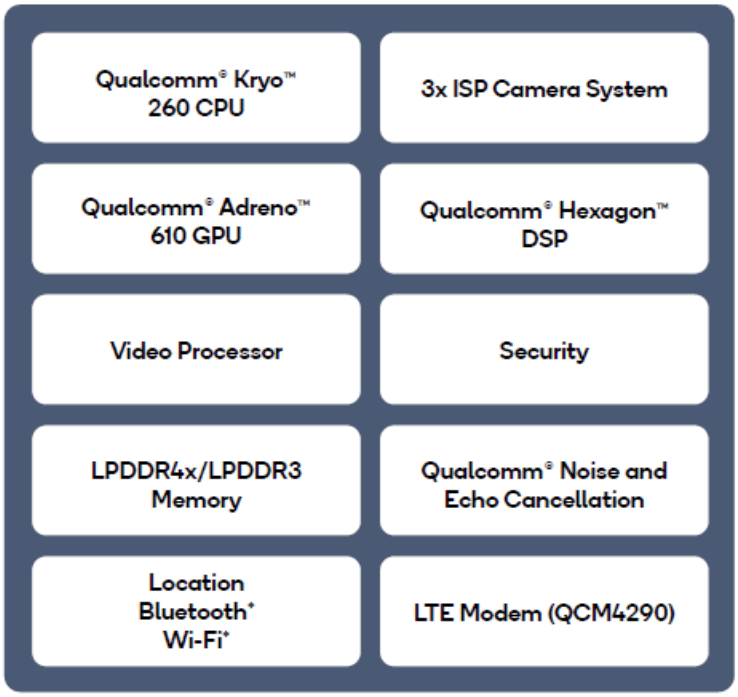
- **Product**
  - QCS4290
- **Part Number***
  - QCS-4290-0-NSP752

Part numbers are subject to change. Please check with the distributor for the most accurate ordering information.

#### Specifications

| | |
|---|---|
| | QCS4290 |
| Technology/Package | 752 NSP, 12.0 x 12.4 x 0.91 mm; 0.4 mm pitch |
| CPU | 8x Kryo 260 CPU from 1.8 up to 2.0 GHz |
| Memory/Storage | Dual-channel, non-PoP high-speed memory: LPDDR4x SDRAM @ 1866 MHz clock (2 x 16-bit), LPDDR3 SDRAM @ 933 MHz clock (1 x 32-bit), eMMC 5.1, SD 3.0 |
| Location | GPS, GLONASS, NavIC, BeiDou, Galileo, QZSS, and SBAS |
| Connectivity | WLAN 1×1 802.11a/b/g/n/ac, Bluetooth 5.0, and FM with Qualcomm® WCN3950 or Qualcomm® WCN3988 (1×1 ax-ready) |
| GPU | Adreno 610 GPU @ 950 MHz with support for Open GL ES 3.2, Open CL 2.0, Vulkan 1.1 |
| DSP | Hexagon 683 compute DSP with dual HVX @ 1.0 GHz |
| Display Support | Adreno 921 DPU |
| Camera Support | 13 MP + 13 MP/25 MP + 5 MP @ 30 fps or 16 MP + 16 MP @ 24 fps |
| Multimedia | 1080p60 8-bit decode for H.264/H.265/VP9, 1080p60 8-bit encode for H.264/H.265 |
| Audio | Integrated low power island (LPI) for voice UI, Qualcomm® Noise and Echo Cancellation, Qualcomm® Voice Suite |
| Security Features | Secure Boot, Secure Debug, Crypto Engines, Key Provisioning Security, Qualcomm TEE |

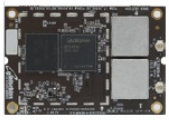
**Block Diagram**




Supported with a companion module.

**SoMs, SiPs, and Smart Modules**

Aikri QCS4290: Aikri-42X-90AS-4
by elnfochips



Open-Q™ 4200 Series SiP (Android)
by Lantronix

5G Smart Module SLM926
MeiG Smart Technology Co.


5G LTE SC680A Smart Module
by Quectel


5G LTE SC686A Smart Module
by Quectel


TurboX™ C4290/CM4290
by Thundercomm Technology


**Development Kits**

Aikri QCS4290: Aikri-42X-90AD-4
by elnfochips

Open-Q™ AL Dev Kit
by Lantronix

TurboX™ CM4290/C4290 Dev Kit
by Thundercomm Technology

**Reference Designs**

iDhi 4290
by Innominds Software

[More Info:]

For additional information for a chosen product please check directly with the manufacturer.

## QRB4210 Application Processor

The Qualcomm® Robotics RB2 platform (QRB4210) integrates high-level features, AI solutions, and powerful performance in a unified, cost-effective solution giving OEMs, ODMs, and developers flexibility to design and create a generation of high-performance everyday robotics and IoT products.

**Target Applications**

- Robot Vacuum Cleaners
- Home Service Robots
- Entry-Tier Commercial Service Robots
- E-Scooters
- Smart Cameras – Body, Dash, etc.
- Rugged Handhelds, Smart Panels

**Features**

- 11 nm process technology for improved performance and lower power consumption
- Designed with CPU architectures for increased speeds and sustained performance
- Kryo 260 CPU with quad high-performance cores @ 2.0 GHz and quad power-saving cores @ 1.8 GHz
- Adreno GPU 610 @ 950 MHz with 64-bit addressing
- Dual-channel non-PoP high-speed memory
- FastConnect 6100 Mobile Connectivity System provides Wi-Fi 6-ready, integrated with Wi-Fi subsystem with Bluetooth 5, WPA3 Security, and digital FM. Bluetooth 5.1 provides an improvement in power performance from the previous generation
- Qualcomm Universal Bandwidth Compression with Display and GPU
- Support FHD+ display, four hardware layers, 10-bit end-to-end, and Qualcomm True Palette Display feature
- 1080p60 video encode/decode
- Long-term support is expected through May 2032 with the Product Longevity Program

**Ordering Information**

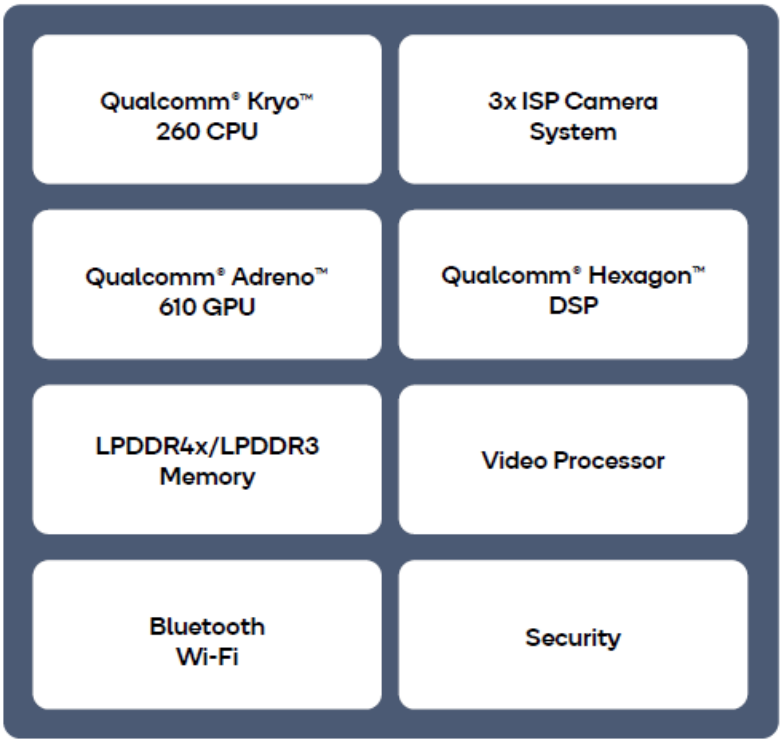
- **Product**
  - QRB4210
- **Part Number***
  - QRB-4210-0-NSP752

Part numbers are subject to change. Please check with the distributor for the most accurate ordering information.

**Specifications**

| | |
|---|---|
| | QRB4210 |
| Technology/Package | 11 nm, 12 x 12.4 mm |
| CPU | Octo-core Kryo 260 CPU @ up to 2.0 GHz |
| Memory/Storage | Dual-channel non-PoP high-speed memory:<br>LPDDR4X SDRAM is designed for an 1866 MHz clock (2 x 16-bit), LPDDR3 SDRAM is designed for a 933 MHz clock (1 x 32-bit), Support for USB 3.1 Type-C, UFS 2.1 gear 3 (one-lane), eMMC 5.1,<br>and SD 3.0 |
| Connectivity | 1×1 Wi-Fi 802.11a/b/g/n/ac Bluetooth 5.0 specification |
| GPU | Adreno 610 GPU @ 950 MHz with 64-bit addressing |
| DSP | Dedicated compute DSP – Hexagon DSP with dual HVX @ 1.0 GHz |
| Camera/Video | 3x ISP (13 MP + 13 MP)/(25 MP + 5 MP) @ 30 fps or (16 MP + 16 MP) @ 24 fps;<br>3x 4-lane CSIs (4/4/4 or 4/4/2/1),<br>D-PHY 1.2 @ 2.5 Gbps per lane<br>or C-PHY 1.0 @ 10 Gbps (3.42 Gbps/trio) |
| Video | 1080p60 8-bit HEVC (H.265)/H.264 encode and decode Concurrency: 1080p30 decode + 1080p30 encode |
| Security Features | Hardware Key Manager, Key Provisioning Security,<br>Qualcomm TEE, Trust Zone, Secure Boot, DSP Secure Domain, Secure Debug |
| Operation System | Linux, ROS 2 |

**Block Diagram**




**SoMs, SiPs, and Smart Modules**

Aikri QRB4210: Aikri-42X-10LS-3
by eInfochips

Open-Q™ 4200 Series SiP (LE)
by Lantronix


TurboX™ C4210 SoM
by Thundercomm Technology


**Development Kits**

Aikri QRB4210: Aikri-42X-10LD-3
by eInfochips

Open-Q™ RB Dev Kit
by Lantronix

Qualcomm® Robotics RB2 Platform
by Thundercomm Technology

For additional information for a chosen product please check directly with the manufacturer.

**More Info:**

## QCS410 Application Processor

The QCS410 processor is 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.

### Target Applications

- Industrial IoT
- Smart AI Home Security
- Home IP Cameras
- Enterprise Security Cameras
- Dash Cams and Body Cams
- Smart Display, Videoconferencing

### Features

- Dual 14-bit Spectra 250L ISP capable of supporting up to dual sensors. 24 MP @ 30 fps with dual ISPs; each ISP capable of 16 MP

- Fabricated using the advanced 11 nm FinFET process for exceptional thermal and power efficiency
- Adreno 612 GPU with 64-bit addressing @ up to 845 MHz with the latest API support
- Hexagon DSP with dual HVX, 1.1 GHz for running DNN models and advanced Qualcomm Neural Processing SDK support
- Four Kryo 460 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
- HW-based security is designed with features such as secure boot from hardware root of trust, TEE, hardware crypto engines, storage security, secure debug, and key provisioning
- Long-term support is expected through June 2030 with the Product Longevity Program

**Ordering Information**

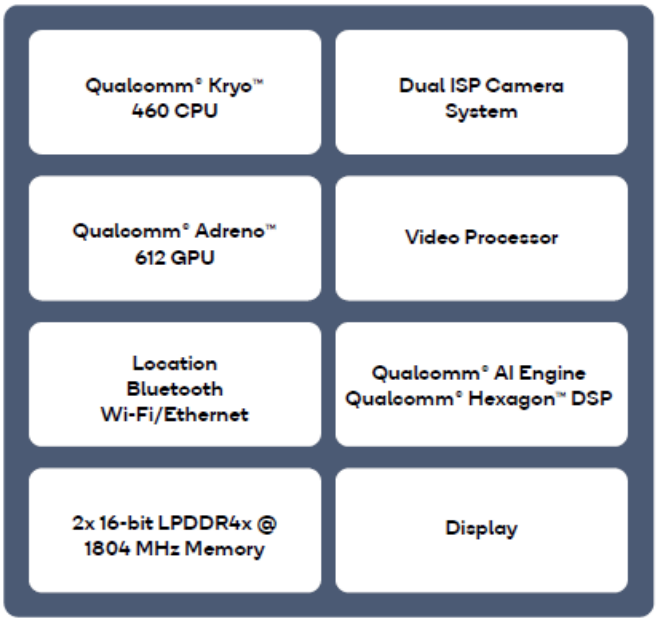
- **Product**
  - QCS 410
  - PMIC
  - Connectivity
- **Part Number***
  - QCS-410-0-PSP806-MT-01-0-AC
  - PM6150, PM6150L
  - WCN-3980

Part numbers are subject to change. Please check with the distributor for the most accurate ordering information.

**Specifications**

| | | |
|---|---|---|
| | | QCS410 |
| Technology/Package | | 11 nm, 12 x 11.1 x 0.92 mm non-PoP |
| CPU | | Quad-core Kryo 460 |
| Memory | | 2 x 16-bit LPDDR4x @ 1804 MHz |
| Location | | GPS/GLONASS, BeiDou, Galileo |
| Connectivity | | Ethernet RGMII, Integrated 1×1 802.11a/b/g/n/ac, Bluetooth 5.0, FM |
| PMIC | | Qualcomm® PM6150 + Qualcomm® PM6150L |
| Sensor DSP | | Hexagon DSP-based |
| Display | Resolution | 2520 x 1080 @ 60 fps + 1920 x 1200 @ 60 fps (external) |
| | Interface | 1×4 lane DSI D-PHY 1.2 support + DP over USB-C (external) |
| Camera | Performance | 21 MP (2x ISP/16+16 MP), 1080p30<br>IQ improvement: MCTF, TNR, sHDR, EIS, Dewarp, Zoom |
| | Interface | CSI 4+4+4 lane (or 4+4+2+1), D-PHY 1.2, C-PHY 1.0 |
| Video | Decode | 1080p 8-bit: HEVC/VP9 |
| | Encode | 1080p 8-bit: HEVC |
| Audio | Analog | Integrated Qualcomm® WCD9370 / Qualcomm® WCD9341 codec<br>+ Qualcomm® WSA8810 / Qualcomm® WSA8815 speaker amplifier |
| | Playback | Hi-Res/192 kHz, Native 44.1 kHz, audio on dedicated DSP |
| Storage | | eMMC 5.1, UFS 2.1 gear 3 1-lane, SD 3.0 |
| Peripherals | | 1x USB 3.1 Type-C with DisplayPort and USB 2.0 |

**Block Diagram**




### SoMs, SiPs, and Smart Modules

Aikri QCS410: Aikri-X10-4S-4
by eInfochips

Open-Q™ 410 SoM
by Lantronix

TurboX™ 610/410 SoM
by Thundercomm Technology


VVDN-QCS410 SoM
by VVDN Technologies

### Development Kits

IPC410 Open Dev Kit
by Altek Corp.

Aikri QCS410: Aikri-X10-4D
by eInfochips

Open-Q™ 410 Dev Kit
by Lantronix

TurboX™ C610/C410 Open Kit
by Thundercomm Technology

VVDN-QCS610/QCS410 Dev Kit
by VVDN Technologies

[More Info:]

For additional information for a chosen product please check directly with the manufacturer.

### QCS2290 Application Processor

The robust, entry-level QCS2290 processor delivers enhanced GPS and advanced camera features. It enables reliable performance and power conservation with upgraded features and memory support for low power consumption.

**Target Applications**

- Retail POS
- Industrial Handheld
- Asset Tracking
- Camera

**Features**

- Customized 64-bit Cortex-A53 quad-core applications processor @ up to 2.0 GHz
- Dedicated DSP shared between sensor core and low-power audio subsystem
- Adreno 702 GPU @ 845 MHz, 3D graphics accelerator with 64-bit addressing
- Qualcomm Universal Bandwidth Compression with GPU
- Display support: HD+, 720 x 1680 @ 60 Hz,
- 10-bit end-to-end, and up to four hardware layer compositions. Features Qualcomm® Low-Power Picture Enhancement and Qualcomm True Palette Display
- One 4-lane DSI D-PHY 1.2 @ 1.5 Gbps per lane, split link supported
- Two 4-lane CSIs (4/4 or 4/2/1) D-PHY 1.2 @ 2.5 Gbps per lane or C-PHY 1.0 @ 10 Gbps (3.42 Gbps/trio)
- Support for USB 3.1 Type-C/Micro USB
- Always-on subsystem with RPM for power management
- Long-term support is expected through November 2030 with the Product Longevity Program

**Ordering Information**

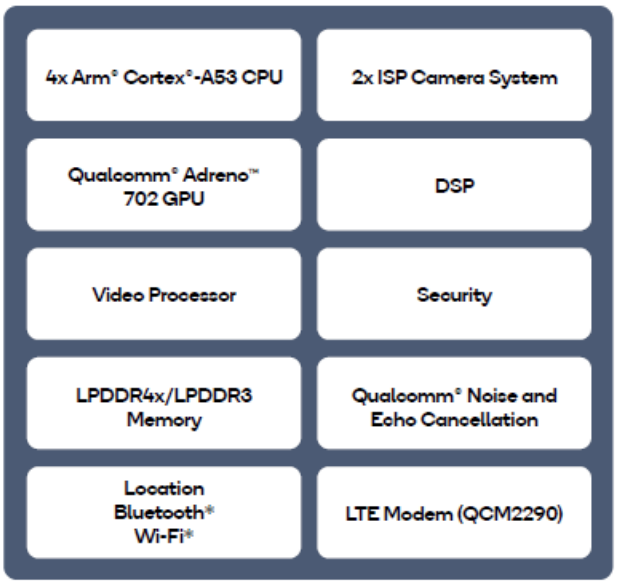
- **Product**
  - QCS2290
- **Part Number***
  - QCS-2290-0-NSP752

Part numbers are subject to change. Please check with the distributor for the most accurate ordering information.

**Specifications**

| | |
|---|---|
| | QCS2290 |
| Technology/Package | 752 NSP, 12.0 x 12.4 x 0.91 mm; 0.4 mm pitch |
| CPU | Quad-core Cortex-A53 processor @ up to 2.0 GHz |
| Modem | 6th generation LTE multimode modem 3GPP Rel. 10 with selected 3GPP Rel. 12 features. (QCM2290 only) |
| Memory/Storage | Dual-channel, non-PoP high-speed memory: LPDDR4x SDRAM @ 1804 MHz clock (2 x 16-bit), LPDDR3 SDRAM @ 933 MHz clock (1 x 32-bit) |
| Location | GPS, GLONASS, NavIC, BeiDou, Galileo, QZSS, and SBAS |
| Connectivity | WLAN 1×1 802.11a/b/g/n/ac, Bluetooth 5.0, and FM with Qualcomm® WCN3950 or Qualcomm® WCN3910 (802.11b/g/n) |
| GPU | Adreno 702 GPU @ 845 MHz with support for Open GL ES 3.1, Open CL 2.0, Vulkan 1.1 |
| Display Support | Adreno 920 DPU |
| Camera Support | 12x ISP (13 MP + 13 MP or 25 MP) @ 30 fps ZSL |
| Multimedia | 1080p30 8-bit decode for H.264/H.265/VP9, 1080p30 8-bit encode for H.264/H.265 |
| Audio | Integrated Low Power Island (LPI) DSP for Voice UI, Qualcomm Noise and Echo Cancellation, Qualcomm Voice Suite |
| Security Features | Secure Boot, Secure Debug, Key Provisioning Security, TrustZone, Qualcomm TEE, hardware-supported KeyStore |

**Block Diagram**




Supported with a companion module.

**SoMs, SiPs, and Smart Modules**

Aikri QCS2290: Aikri-22X-90AS-4
by eInfochips

ISQ 2290
by Innominds Software

Open-Q™ 2200 Series SiP (Android)
by Lantronix

5G Smart Module SLM550
by MeiG Smart Technology Co.

5G LTE SC200E Smart Module
by Quectel

5G LTE SC206E Smart Module
by Quectel

TurboX™ CM2290/C2290 SoM
by Thundercomm Technology

VVDN-QCM2290/QCS2290 SoM
by VVDN Technologies

**Development Kits**

Aikri QCS2290: Aikri-22X-90AD-4
by eInfochips

Open-Q™ AL Dev Kit
by Lantronix

TurboX™ CM2290/C2290 Dev Kit
by Thundercomm Technology

[More Info:]

For additional information for a chosen product please check directly with the manufacturer.

## QRB2210 Application Processor

The Qualcomm® Robotics RB1 Platform (QRB2210) integrates high-level features, AI solutions, and powerful performance in a unified, cost-effective solution giving OEMs, ODMs, and developers the flexibility to design and create a generation of high-performance everyday robotics and IoT products.

### Target Applications

- Social, Companion, & Educational Robots
- Dash Cams & Surveillance Cameras
- Smart Displays & Interactive Control Panels
- Home Assistants
- Smart Energy Gateways
- Industrial Handhelds

### Features

- Customized 64-bit Cortex-A53 quad-core applications processor @ up to 2.0 GHz

- Dedicated DSP shared between sensor core and low-power audio subsystem
- Adreno GPU 702 @ 845 MHz, 3D graphics accelerator with 64-bit addressing
- Dual-channel non-PoP high-speed memory
- Qualcomm Universal Bandwidth Compression (UBWC) with GPU
- Display support: HD+, 720 x 1680 @ 60 Hz, 10-bit end-to-end, and up to four hardware layer compositions. Features Qualcomm Low-Power Picture Enhancement and Qualcomm True Palette Display
- Support for eMMC 5.1, SD 3.0, and USB 3.1 Type-C
- Always-on subsystem with RPM for power management
- Long-term support is expected through May 2032 with the Product Longevity Program

**Ordering Information**

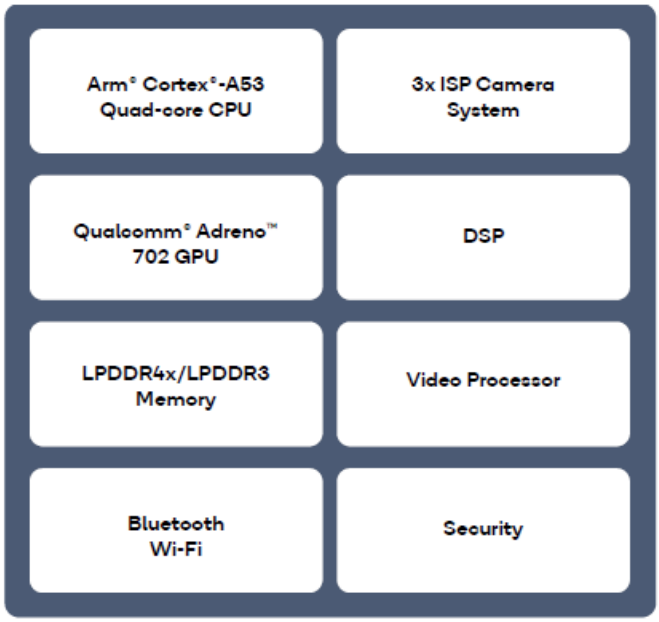
- **Product**
  - QRB2210
- **Part Number***
  - QRB-2210-0-NSP752

Part numbers are subject to change. Please check with the distributor for the most accurate ordering information.

**Specifications**

| | QRB2210 |
|---|---|
| Technology/Package | 11 nm LPP, NSP752, 12.0 x 12.4 x 0.91 mm, 0.4 mm pitch, non-PoP |
| CPU | Cortex-A53 processor @ up to 2.0 GHz |
| Memory/Storage | Dual-channel non-PoP high-speed memory:<br>LPDDR4X SDRAM designed for 1804 MHz clock (2 x 16-bit), LPDDR3 SDRAM designed for 933 MHz clock (1 x 32-bit) |
| Connectivity | 1×1 Wi-Fi 802.11a/b/g/n/ac Bluetooth 5.0 specification |
| GPU | Adreno 702 GPU @ 845 MHz<br>3D graphics accelerator with 64-bit addressing |
| Camera Support | 2x ISP (13 MP + 13 MP or 25 MP) @ 30 fps ZSL;<br>Two 4-lane CSIs (4/4 or 4/2/1) D-PHY 1.2 @ 2.5 Gbps per lane or C-PHY 1.0 @ 10 Gbps (3.42 Gbps/trio) |
| Video | 1080p30 8-bit HEVC (H.265)/H.264 encode and decode; Concurrency: 1080p30 decode + 720p30 encode |
| Security Features | Secure Boot, Secure Debug, Key Provisioning Security, Qualcomm TEE, TrustZone, hardware supported KeyStore |
| Operation System | Linux, ROS 2 |

**Block Diagram**




**SoMs, SiPs, and Smart Modules**

Aikri QRB2210: Aikri-22X-10LS-3
eInfochips

Open-Q™ 2200 Series SiP (LE)
by Lantronix

TurboX™ C2210 SoM
by Thundercomm Technology


**Development Kits**

Aikri QRB2210: Aikri-22X-10LD-3
eInfochips

Open-Q™ RB Dev Kit
by Lantronix

TurboX™ C2210 Dev Kit
by Thundercomm Technology

Qualcomm Robotics RB1 Platform
by Thundercomm Technology

For additional information for a chosen product please check directly with the manufacturer.


## Design. Build. Optimize

**Qualcomm Developer Network**
Qualcomm Developer Network (QDN) is a comprehensive program designed to equip the next generation of mobile pioneers to develop what's next. Our collection of software and hardware tools and resources is designed so you can build upon our foundational technologies in new and innovative ways, creating the power to build products, enrich lives, and even transform entire industries.

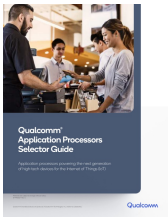
At Qualcomm Developer Network, we aim to help you kick-start your development by being the catalyst for your vision, today, tomorrow, and in the future.

- **To learn more visit:** [developer.qualcomm.com](developer.qualcomm.com).

**Locate Module Vendors**

| Company | Website | Product Based on |
|---|---|---|
| Adlink Technology, Inc. | https://www.adlinktech.com/en/Computer_on_Modules | QRB5165 |
| Altek | https://store.altek.com.tw/qualcomm/ | QCS610, QCS410 |
| AmTRAN | https://www.amtran.com.tw/categories/QCS8250/ products/800517879 | QCS8250 |
| Arima Communications | http://www.arimacomm.com.tw/en/solutions-1.php?index_id=7 | QCS6125 |
| DFI | https://us.dfi.com/product/index/1611 | QRB5165 |
| e-con Systems | https://www.e-consystems.com/qualcomm-embedded-cameras/ qcs610-ai-vision-kit-imx415.asp | QCS610 |
| eInfochips / Edge Labs | https://eragon.einfochips.com/products.html | QRB5165, QCS8250, QCS610, QCS4290, QRB4210, QCS410, QCS2290 |
| FAIOT Co., LTD | https://www.faiot.com/?list_39/ | QCS8250, QCS6490, QRB2210 |
| Innominds Software | https://www.idhi.ai/kiteboard_soms_series/ | QRB5165, QCS8250, QCS6490, QCS4290 |
| Insignal | https://qcs.insignal.co.kr/ | QRB5165, QCS8250, QCS610, QRB2210 |
| Lantronix | https://www.lantronix.com/products-class/compute-som-dev-kits/ | QRB5165, QCS8250, QCS610, QCS4290, QRB4210, QCS410, QCS2290 |
| MeiG Smart Technology Company | https://en.meigsmart.com/product/nbiotmz53.html | QCS8550, QCS8250, QCS6125, QCS4290 |
| ModalAI | https://www.modalai.com/pages/development-kits | QRB5165 |
| Quectel | https://www.quectel.com/shop/ | QCS8550, QCS8250, QCS6125, QCS4290 |
| Sigma Group | https://www.sigmaconnectivity.com/qualcomm | QCS6490 |
| Thundercomm | https://www.thundercomm.com/products/ | QCS8550, QRB5165, QCS8250, QCS6490, QCS610, QCS6125, QCS5430, QCS4490, QCS4290, QRB4210, QCS410, QCS2290, QRB2210 |
| VVDN | https://www.vvdntech.com/en-us/partners/qualcomm | QRB5165, QCS8250, QCS6490, QCS610, QCS410 |

## Documents / Resources

| | |
|---|---|
|   | Qualcomm Kryo 585 Octa Core Application Processors [pdf] User Guide<br>Kryo 585 Octa Core Application Processors, Kryo 585, Octa Core Application Processors, Application Processors, Processors |

## References

- User Manual