theobroma SYSTEMS

Qseven System-on-Module
Hexa-Core ARM Cortex-A72/A53
featuring the **Rockchip RK3399** application processor

70x70mm Qseven

Secure Element

64 ARMv8

2x 2.0GHz 4x 1.4GHz

up to 4GB DDR3-1600

HDMI 2.0 2160p

eDP

2x MIPI-DSI

2x MIPI-CSI

PCIe 2.1

Gigabit Ethernet

3x USB3.0 1x USB2.0

CAN

Best-in-class scalability with a hexa-core big.LITTLE configuration

Built on the industry-leading Rockchip RK3399, the **RK3399-Q7** module redefines the performance expected of embedded processor modules.

The RK3399 is a low power, high performance processor for computing, personal mobile internet devices and other smart device applications. Based on a big.LITTLE architecture, it integrates a dual-core Cortex-A72 and a quad-core Cortex-A53. These 64bit-capable ARMv8 processors support both the ARM Crypographic Extension (e.g. for wire-rate AES encryption) and AdvSIMD vector processing.

A dual-channel memory interface sustains the memory bandwidths required by even the most demanding embedded applications.

Ready for visual computing and image processing applications

The **RK3399-Q7** module unlocks new application areas that require visual computing and image processing.

Content can be output on 3 independent display interfaces concurrently via HDMI 2.0, eDP and two MIPI-DSI interfaces. The ability to receive camera sensor input through two independent MIPI-CSI interfaces and to process the resulting imagestream in real-time with the powerful ARM processor cores enables a new class of vision and image-analytics applications.

The RK3399 supports multi-format video decoding (including H.264 and H.265 at 2160p60) and video encoding. An embedded high-performance ARM Mali T-864MP4 GPU supports OpenGL ES1.1/2.0/3.0/3.1 and OpenCL. A dedicated 2D hardware engine provides offloading for image scaling, rotation and window composition.

Connect to networks at Gigabit Ethernet speed

The **RK3399-Q7** module continues the design paradigm of our other embedded products. Gigabit Ethernet is a built-in peripheral of the RK3399 which ensures wire-rate throughput without any artifical performance bottlenecks and utilises the full capabilities of DMA to the main memory.

Connecting to industrial I/O modules through a 4-lane PCI-Express 2.1 interface

Industrial applications often require access to customer-specific I/O fabrics or programmable logic resources. With the **RK3399-Q7** module, customer-specific and standard off-the-shelf peripherals can be connected through a 4-lane PCI-Express 2.1 interface. On top of this, the **RK3399-Q7** module makes it easy to build application-specific PCIe accelerator cards by configuring it as a PCIe endpoint.

Enabling high-bandwidth connections through USB 3.0 SuperSpeed ports

As a high-bandwidth interconnect to external peripherals and storage devices, the **RK3399-Q7** module supports three USB 3.0 (with one port operating either in host or device mode) and one legacy USB 2.0 ports. Utilising USB 3.0 SuperSpeed, applications can transfer up to 5Gb/s per port.

State-of-the-art security for your assets

The **RK3399-Q7** features a secure element featured in all our system-on-module products. Enjoy the peace of mind afforded by a government-grade security solution for all identification, key-storage and asset-protection requirements. A Common Criteria (EAL4+) certified security module ensures that you will never again have to sacrifice security for performance.

Built on a GlobalPlatform 2.2.1 compliant JavaCard environment, the **RK3399-Q7** module provides a trusted foundation for security applications including digital asset protection, secure key-storage and remote device authentication.

Designed and supported in Vienna, Austria

Every module we design is backed by our expertise in system-level design, embedded software engineering and performance engineering. Our experienced engineering team offers engineering services to augment your in-house design resources—bringing your design faster to market.

Technical Summary

Form factor	Qseven 2.1

Processor	Rockchip RK3399
	Hexa-Core ARM Cortex-A72/A53, up to 2.0GHz
	  2x Cortex-A72 (48KB+32KB L1 cache and 1024KB L2 cache)
	  4x Cortex-A53 (32KB+32KB L1 cache and 512KB L2 cache)
	ARM Mali T-864MP4 GPU
	Multi-format video encoding/decoding co-processor
	  video decoding up to 2160p (60fps)
	  video encoding up to 1080p (30fps)

Memory[1]	DDR3-1600 (2 independent channels, each 32 bit wide), up to 4GB on-module
NOR Flash[2]	SPI NOR flash on-module
eMMC Flash[3]	Up to 128GB eMMC on-module
Ethernet	10/100/1000 Mbps (with an on-module triple-speed GbE PHY)
USB	1x USB 3.0 SuperSpeed dual-role port 2x USB 3.0 SuperSpeed host port 1x USB 2.0 high-speed host ports
PCI-Express	4-lane PCIe 2.1, up to 5GT/s
Display[4,5,6]	HDMI 2.0, up to 2160p (60fps) 2x MIPI-DSI, each up to 2560x1600 (60fps) Embedded DisplayPort (eDP), up to 4 lanes (2.7Gb/s each)
Camera[6,7]	2x MIPI-CSI, each with 4 lanes (up to 1.5Gb/s per lane)
CAN	On-module communication offload controller for CAN
Additional Interfaces	UART, 8x GPIO, I²S, I²C, SMBus, SPI, FAN
Security Module	Global Platform 2.2.1 compliant JavaCard environment On-module state-of-the-art, EAL4-certified smartcard controller Note: Custom board variants may exclude the security-module option.
Operating Systems	Linux Android
Power Management	DVFS for thermal and power management
Power Supply	Operates from a single 5V supply
Consumption	< 15W
Operating environment	Commercial 0ºC to 60ºC Industrial -20ºC to 85ºC
Dimensions	70mm x 70mm (2.75" x 2.75")

[1] Orderable memory configurations: 512MB, 1GB, 2GB (standard configuration), 4GB
[2] Orderable SPI NOR flash configurations: 16Mb (standard configuration), 32Mb, 64Mb, 128Mb
[3] Orderable eMMC flash configurations: 8GB (standard configuration), 16GB, 32GB, 64GB, 128GB
[4] The RK3399 supports three concurrent active display output channels.
[5] Embedded DisplayPort (eDP) and the primary MIPI-DSI controller share the QSeven "LVDS-A" pin-group.
[6] The secondary MIPI-DSI controller and the secondary MIPI-CSI controller shares the QSeven "LVDS-B" pin-group.
[7] The primary MIPI-CSI controller is available through the QSeven CSI feature connector.