H616 is a new-generation high picture quality 64-bit 4K@60fps decoding SoC provided by Allwinner for the OTT and IPTV markets. It integrates the quad core 64-bit Cortex™-A53 processor, and the new G31 GPU engine of ARM that supports OpenGL ES 3.2/Vulkan 1.1. Besides, H616 supports full-format 4K@60fps 10-bit ultra-HD video decoding, Allwinner self-developed SmartColor3.3™ picture enhancement engine, Dolby, and DTS audio processing. H616 adopts the new generation of power consumption technology, and reduces power consumption of 20% than the last generation.

**Overview**

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**Highlights**

- Quad core ARM Cortex™-A53, 64-bit architecture
- High performance multi-core G31 GPU, supporting OpenGL ES 3.2/Vulkan 1.1
- Full formats H.265/VP9/AVS2 4K@60fps decoding
- Maximum 6K@30fps H.265 decoding performance
- Low latency H.264 4K@25fps video encoding
- Supports HDR10, HLG
- SmartColor™ 3.3 picture enhancement engine

**Features**

**CPU**
- Quad-core ARM Cortex™-A53

**GPU**
- G31 MP2
- Supports OpenGL ES 3.2/2.0/1.0, Vulkan 1.1, OpenCL 2.0

**Memory**
- 32-bit DDR4/DDR3/DDR3L/LPDDR3/LPDDR4 interface, supporting maximum capacity of 4GB
- SD3.0/eMMC5.0 interface
- 8-bit Nand flash interface with maximum 80-bit/1KB ECC
Video Engine

Video decoder:
• H.265 Main10@L5.1 decoder up to 4K@60fps or 6K@30fps
• VP9 Profile 2 decoder up to 4K@60fps
• AVS2 JiZhun 10bit decoder up to 4K@60fps
• H.264 BP/MP/HP@L4.2 decoder up to 4K@30fps
• Multi-format 1080p@60fps video playback formats, including H.264 BP/MP/HP, H.263 BP, VP8, MPEG-1 MP/HL, MPEG-2 MP/HL, MPEG-4 SP/ASP@L5, AVS+/AVS JiZhun, WMV9/VC1, etc

Video encoder:
• H.264 BP/MP/HP encoder up to 4K@25fps or 1080p@60fps
• JPEG snapshot performance of 1080p@60fps

Audio
• Two DAC channels
• Supports 1 audio output interface (differential LINEOUTP/N or single-end LINEOUT/ LINEOUTR)
• One Audio HUB, supporting internal mixing function
• Embedded 3 I2S/PCM (I2S0 for extended audio codec, I2S2 for BT, I2S3 for digital power amplifier)
• Supports Left-justified, Right-justified, Standard I2S mode, PCM mode, and TDM mode
• I2S mode supports 8 channels, and 32-bit/192kbit sample rate
• I2S and TDM modes support maximum 16 channels, and 32-bit/96kbit sample rate
• One OWA OUT interface, supporting 16-/20-/24-bit inputs and outputs
• Integrated digital microphone(DMIC), supporting maximum 8 digital PDM microphones

Display and Graphic
• Output size up to 4096 x 2048
• Six alpha blending channels for main display
• Four overlay layers in each channel, and has an independent scaler
• Potter-duff compatible blending operation
• Supports AFBC buffer
• Supports keystone correction
• Frame Packing/Top-and-Bottom/Side-by-Side
• Full/Side-by-Side Half 3D format data
• Supports 10-bit processing path for HDR video
• Supports SDR/HDR10/HLG EOTF and color space conversion
• Supports SmartColor™ 3.3 for excellent display experience
• Supports one hardware accelerator for 2D graphic
• Supports one de-interlacing module

Security Engine
• Supports Full Disk Encryption
• AES, DES, 3DES, and XTS encryption and decryption algorithms
• MD5, SHA, and HMAC tamper proofing
• RSA, ECC signature and verification algorithms
• Supports 160-bit hardware pseudo random number generator(PRNG)
• Supports 256-bit hardware true random number generator(TRNG)
• Integrated one EFUSE for chip ID and security application

Connectivity
• 3 x USB2.0 Host, 1 x USB2.0 OTG
• One 10/100/1000 Mbps Ethernet port with RGMII and RMII interfaces
• One 100Mbps Ethernet port with PHY
• SDIO 3.0, TSC, CIR Receiver
• TWI, SPI, UART
• PWM, LRADC

Display Output
• HDMI 2.0a up to 4K@60fps
• TV CVBS output, supporting PAL/NTSC

Package
• TFBGA 284balls
• 14 mm x 12 mm body size, 0.65 mm ball pitch, 0.35 mm ball size
Allwinner Technology is a leading fabless design company dedicated to smart application processor SoCs and smart analog ICs. Its product line includes multi-core application processors for smart devices and smart power management ICs used by brands worldwide.

With its focus on cutting edge UHD video processing, high performance multi-core CPU/GPU integration, and ultra-low power consumption, Allwinner Technology is a mainstream solution provider for the global tablet, internet TV, smart home device, automotive in-dash device, smart power management, and mobile connected device markets. Allwinner Technology is headquartered in Zhuhai, China.

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