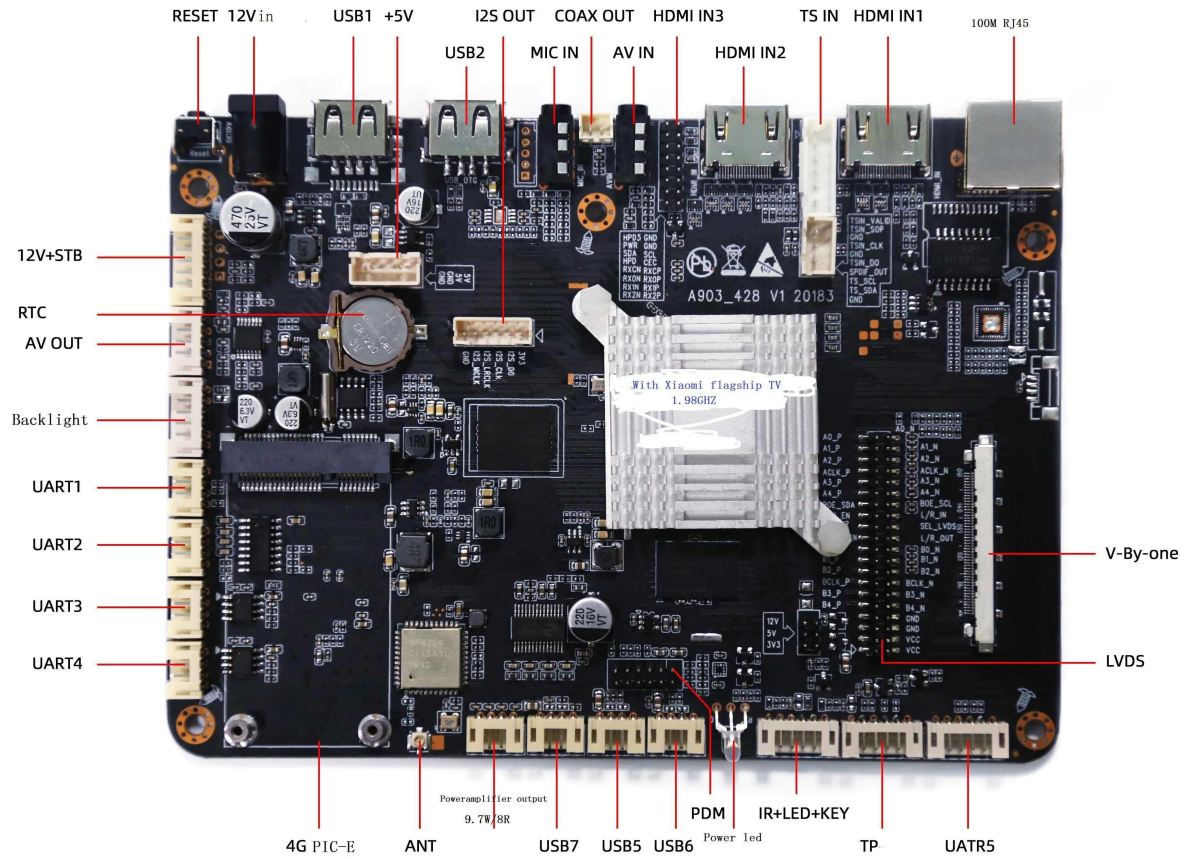
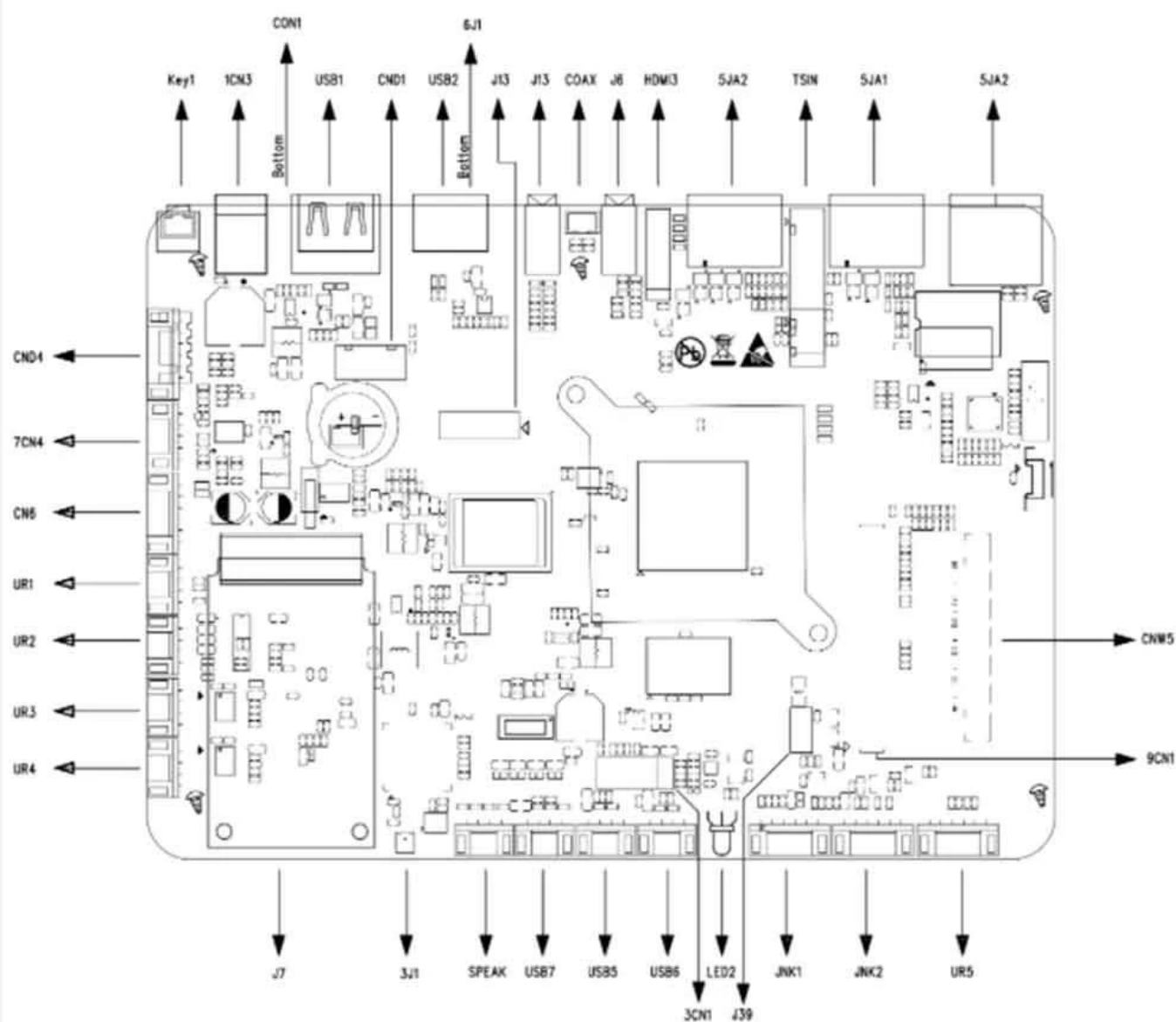


# All in one Android 9.0 Controller Board with eDP output

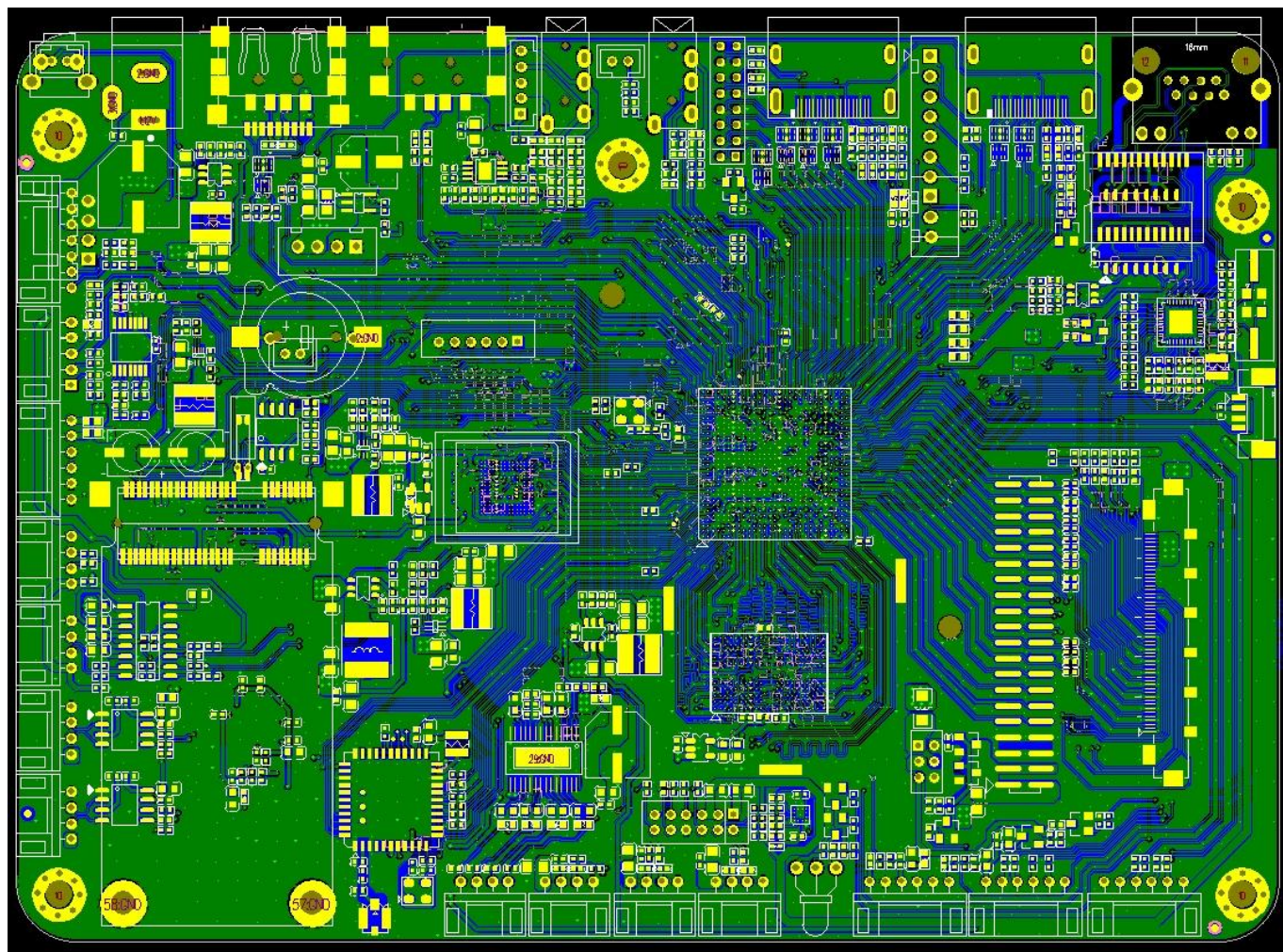
## Amlogic T972 Mainchip

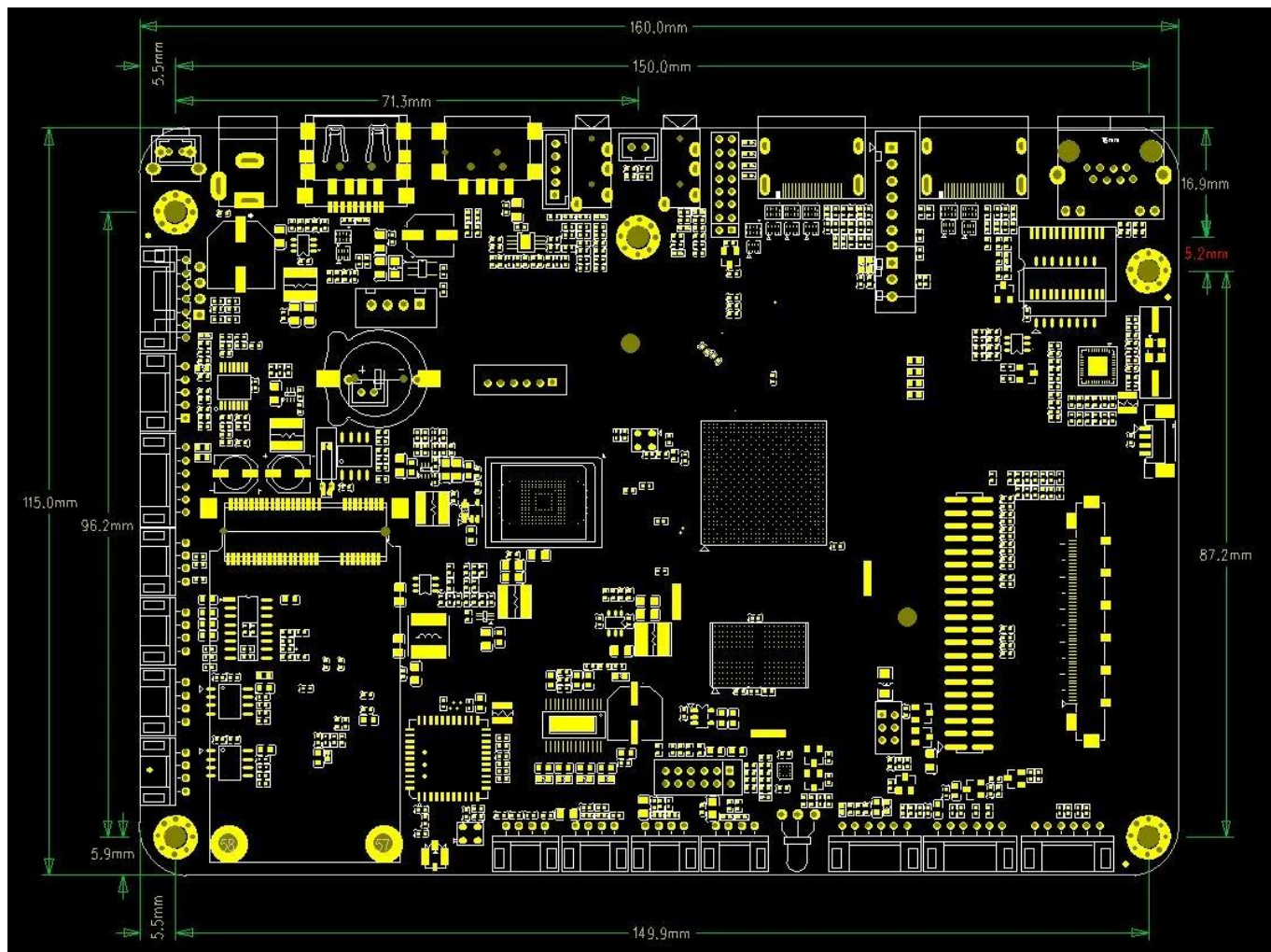
Specifications	
Model No.	Amlogic T972
CPU	Amlogic T972(T962X2) Quad Core ARM Cortex A55 1.98GHZ
GPU	Penta Core ARM Mail-450
RAM	DDR4 2GB/4GB (option)
ROM	16GB eMMC (can be expanded to 128GB via SD/USB)
OS	Android 9.0
Video&Audio CODEC	
Video/Picture CODEC	–Amlogic Video Engine (AVE-10) with dedicated hardware decoders up to 4Kx2K@75fps –Video/Picture Decoding –VP9 Profile 2-10 up to 8Kx4K@24fps or 4Kx2K@60fps –H.265 HEVC MP-10@L5.1 up to 8Kx4K@24fps or 4Kx2K@60fps –AVS2-P2 Profile up to 4Kx2K@60fps –H.264 AVC HP@L5.1 up to 4Kx2K@30fps –H.264 MVC up to 1080P@60fps –MPEG-4 ASP@L5 up to 1080P@60fps (ISO-14496) –WMV/VC-1 SP/MP/AP up to 1080P@60fps –AVS-P16(AVS+) /AVS-P2 JiZhun Profile up to 1080P@60fps –MPEG-2 MP/HL up to 1080P@60fps (ISO-13818) –MPEG-1 MP/HL up to 1080P@60fps (ISO-11172) –RealVideo 8/9/10 up to 1080P@60fps –Multiple language and multiple format sub-title video support –MJPEG and JPEG unlimited pixel resolution decoding (ISO/IEC-10918) –Supports JPEG thumbnail, scaling, rotation and transition effects –Supports *.mkv,*.wmv,*.mpg, *.mpeg, *.dat, *.avi, *.mov, *.iso, *.mp4, *.rm and *.jpg file formats
Video/Picture Encoding	–VP9 Profile 2-10 up to 8Kx4K@24fps or 4Kx2K@60fps –H.265 HEVC MP-10@L5.1 up to 8Kx4K@24fps or 4Kx2K@60fps –AVS2-P2 Profile up to 4Kx2K@60fps –H.264 AVC HP@L5.1 up to 4Kx2K@30fps –H.264 MVC up to 1080P@60fps –MPEG-4 ASP@L5 up to 1080P@60fps (ISO-14496) –WMV/VC-1 SP/MP/AP up to 1080P@60fps –AVS-P16(AVS+) /AVS-P2 JiZhun Profile up to 1080P@60fps –MPEG-2 MP/HL up to 1080P@60fps (ISO-13818) –MPEG-1 MP/HL up to 1080P@60fps (ISO-11172) –RealVideo 8/9/10 up to 1080P@60fps –Multiple language and multiple format sub-title video support –MJPEG and JPEG unlimited pixel resolution decoding (ISO/IEC-10918) –Supports JPEG thumbnail, scaling, rotation and transition effects –Supports *.mkv,*.wmv,*.mpg, *.mpeg, *.dat, *.avi, *.mov, *.iso, *.mp4, *.rm and *.jpg file formats
Audio CODEC and Input/Output	Supports MP3, AAC, WMA, RM, FLAC, Ogg, Dolby DTS Audio Optional and programmable with 7.1/5.1 down-mixing Low-power VAD and internal AEC loopback path 3 built-in TDM/PCM/I2S ports with TDM/PCM mode up to 384kHz x32bits x 8ch or 96kHz x32bits x 32ch and I2S mode up to 384kHz x 32bits x 8ch Digital microphone PDM voice input with programmable CIC, LPF & HPF, support up to 8 DMICs Built-in serial digital audio SPDIF/IEC958 output 2 L/R analog input channels and 2 L/R output channels Supports concurrent dual audio stereo channel output with combination of I2S+PCM Supports Audio EQ/DRC for audio speaker
Decoder Format	HD MPEG1/2/4, H.265/HEVC, HD AVC/VC-1, RM/RMVB, Xvid/DivX3/4/5/6, RealVideo8/9/10
Media Format	Avi/Rm/Rmvp/Ts/Vob/Mkv/Mov/ISO/wmv/asf/flv/dat/mpg/mpeg
Music Format	MP3/WMA/AAC/WAV/OGG/DDP/TrueHD/HD/FLAC/APE
Photo Format	HD JPEG/BMP/GIF/PNG/TIFF
Port	
Audio Input	1* 3.5MM headphone jack
Video Output	1*LVDS 40pin 2.0mm double-row pin, support 8bit/10bit screen 1*V-By-one, for optional choice
Video Input	HDMI*3
Audio Output	4pin 2.5mm 10W8Ω@2
Network port	*1 10M/100M RJ45 2.4G WIFI+BT (Dual band 2.4G/5G WiFi option) PCIe slot(4)x1
USB2.0 port	USB OTG*1(can be HOST) USB HOST*4
Backlight Interface	*2, 6pin 2.0mm
Infrared Interface	*1, 7pin 2.0mm, with LED indicator light (green&red)
Expansion ports	Serial ports*4
TF card slot	*1
SIM card slot	*1
Power	
Power Supply	STB, 5VSB, 5V, 12V, 12pin 2.00mm 12V / 4pin 2.54mm, 12V / 2.5DC plug



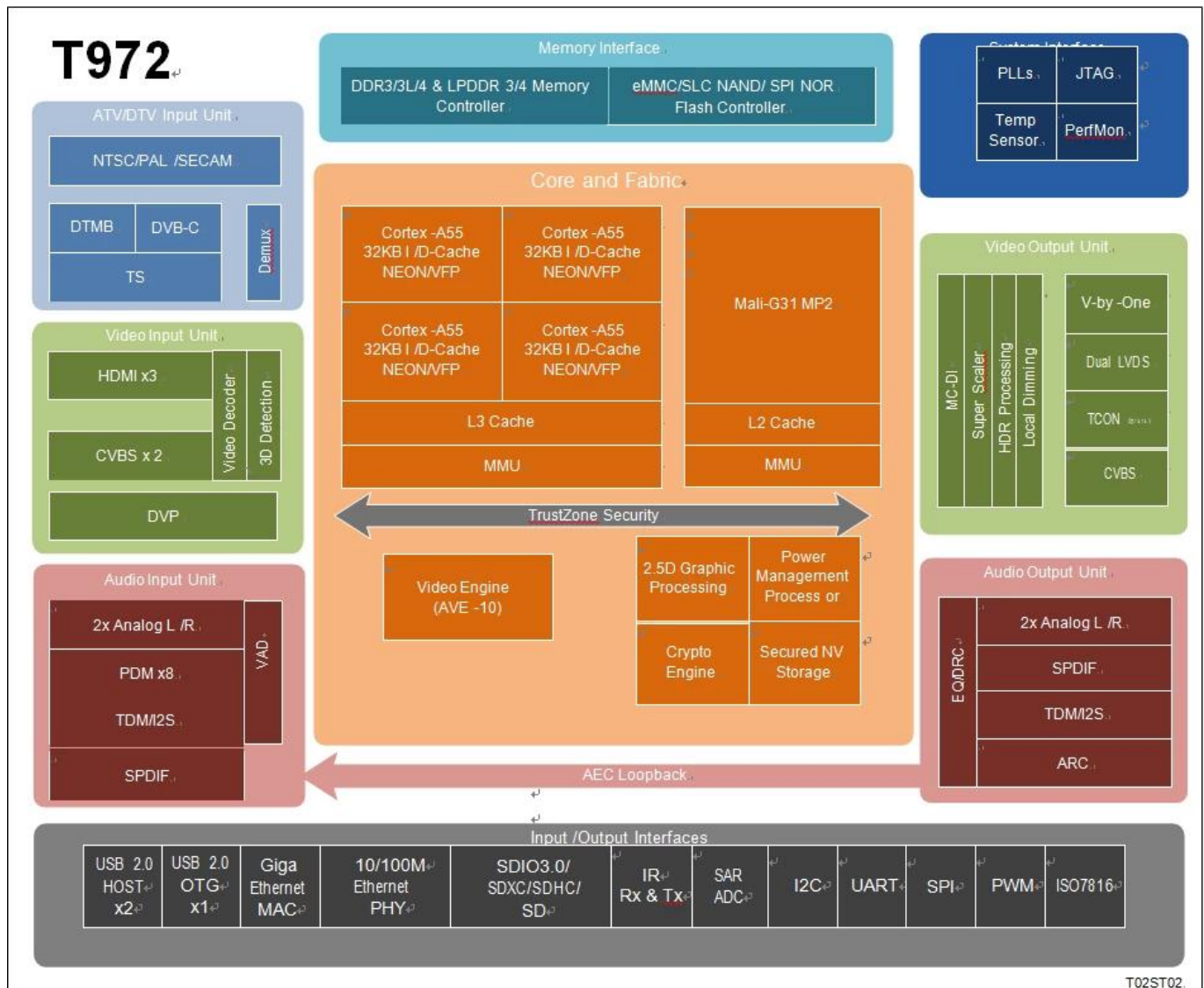












**Amlogic T972** is an advanced application processor designed for worldwide UHD TV applications. It integrates a powerful CPU/GPU subsystem, a best-in-class HDR image processing pipeline, a secured 8K/4K video CODEC engine with all major peripherals to form the ultimate cost-effective smart TV chip.

The main system CPU is a quad-core ARM Cortex-A55 CPU with shared L3 cache to improve system performance. In addition, the Cortex-A55 CPU includes the NEON SIMD co-processor to improve software media processing capability.

The graphic subsystem consists of two graphic engines and a flexible video/graphic output pipeline. The ARM Mali-G31 MP2 GPU handles all OpenGL ES 3.2, Vulkan 1.1 and OpenCL 2.0 graphic programs, while the 2.5D graphics processor handles additional scaling, alpha, rotation and color space conversion operations. Together, the CPU and GPU handle all operating system, network, user-interface and game related tasks.

Amlogic Video Engine (AVE-10) is a subsystem which uses dedicated hardware video decoders and encoders to offloads the Cortex-A55 CPUs from all video CODEC processing. AVE-10 is capable of decoding 4K2K resolution video within Trusted Video Path (TVP) for secured DRM applications. It supports all major video formats including MVC, MPEG-1/2/4, VC-1/WMV, AVS +, AVS2, RealVideo, MJPEG, H.264, H265-10, VP9-10 and also JPEG.

The video/graphics output pipeline includes HDR10+, HDR10, HLG and Technicolor Prime HDR processing, BT.2020/ BT.2100 processing, motion compensated and motion adaptive de-interlacer, flexible programmable super scalar, local dimming and many picture enhancement filters before passing the enhanced image to the video output ports. The 8-lane V-by-one and dual-channel LVDS

interface are available for UHD/FHD TV panel and 12-lane P2P interface with internal flexible timing control module Optional for UHD TCON-less panels including CEDS, CHPI, CMPI and iSP.

3 HDMI 2.1 receiver ports plus two sets of CVBS composite analog input ports are available. The HDMI ports support HDCP 1.4/2.2 and can receive up to 4K2K HDR video.

Amlogic T972 integrates the ATV demodulators which fully support worldwide analog TV standards including NTSC, PAL, and SECAM. DTV broadcasting streams can be received by the internal DTMB demodulator or the transport stream (TS) interface. The built-in three demux can process the TV streams from the serial transport stream input interface, which can connect to external tuner/demodulator. DVB Common Descrambler 1.0 is supported in addition to DES, Triple DES (TDES/3DES) and AES streaming crypto formats. An integrated ISO7816 controller is included for interfacing to external smart card.

Amlogic T972 is optimized for low power far-field voice application. The powerful main CPU can enable top of the line audio front end and wake word algorithms. It also has built-in Voice Activity Detection (VAD) module for ultra-low power operations during system standby and full digital MIC interface including PDM, TDM and I2S up to 8 channels are available.

Amlogic T972 SoC integrates rich advanced network and peripheral interfaces, including a 10/100/1000M Ethernet MAC with RGMII, 10/100M Ethernet PHY, USB 2.0 high-speed port, SDIO 3.0 controller, eMMC 5.0 controller, SLC NAND controller and multiple SDIO/SD card controllers, UART, I2C, high-speed SPI PWMs and a built-in IR blaster. The flexible and programmable QoS-based switch fabric and memory controller tie all the processing cores and peripherals together and connects to the DRAM memory bus.

Standard development environment utilizing SecureOS, Linux and GNU/GCC Android tool chain is supported. Please contact your AMLOGIC sales representative for more information.

### **CPU Sub-system**

Quad core ARM Cortex-A55 CPU

ARMv8.2 architecture with Neon extensions

Unified system L3 cache

Advanced TrustZone security system

Application based traffic optimization using internal QoS-based switching fabrics

CoreSight debugger support

### **3D Graphics Processing Unit**

ARM Mali-G31 MP2 GPU

4-wide warps, dual texture pipe, 2x 4-wide execution engines (EE)

Concurrent multi-core processing

OpenGL ES 3.2, Vulkan 1.1 and OpenCL 2.0 support

### **2.5 D Graphics Processor**

Fast bitblt engine with dual inputs and single output

Programmable raster operations (ROP)

Programmable polyphase scaling filter

Supports multiple video formats 4:2:0, 4:2:2 and 4:4:4 and multiple pixel formats (8/16/24/32 bits graphics layer)

Fast color space conversion

Advanced anti-flickering filter

### **Crypto Engine**

AES block cipher with 128/256 bits keys, standard 16 bytes block size and streaming ECB, CBC and

CTR modes

DES/3DES block cipher with ECB and CBC modes supporting 64 bits key for DES and 192 bits key for 3DES

Hardware key-ladder operation and DVB-CSA for transport stream encryption

Built-in hardware True Random Number Generator (TRNG) and SHA-1/SHA-2 engine

### **Video/Picture CODEC**

Amlogic Video Engine (AVE-10) with dedicated hardware decoders up to 4Kx2K@75fps

Video/Picture Decoding

VP9 Profile 2-10 up to 8Kx4K@24fps or 4Kx2K@60fps

H.265 HEVC MP-10@L5.1 up to 8Kx4K@24fps or 4Kx2K@60fps

AVS2-P2 Profile up to 4Kx2K@60fps

H.264 AVC HP@L5.1 up to 4Kx2K@30fps

H.264 MVC up to 1080P@60fps

MPEG-4 ASP@L5 up to 1080P@60fps (ISO-14496)

WMV/VC-1 SP/MP/AP up to 1080P@60fps

AVS-P16(AVS+) /AVS-P2 JiZhun Profile up to 1080P@60fps

MPEG-2 MP/HL up to 1080P@60fps (ISO-13818)

MPEG-1 MP/HL up to 1080P@60fps (ISO-11172)

RealVideo 8/9/10 up to 1080P@60fps

Multiple language and multiple format sub-title video support

MJPEG and JPEG unlimited pixel resolution decoding (ISO/IEC-10918)

Supports JPEG thumbnail, scaling, rotation and transition effects

Supports \*.mkv,\*.wmv,\*.mpg, \*.mpeg, \*.dat, \*.avi, \*.mov, \*.iso, \*.mp4, \*.rm and \*.jpg file formats

### **9th Generation Advanced Amlogic TruLife Image Engine**

Supports HDR10/10+, HLG, Technicolor Prime HDR

Motion compensated noise reduction and 3D digital noise reduction for random noise

Block noise, mosquito noise, spatial noise, contour noise reduction

Motion compensated and motion adaptive de-interlacer

Edge interpolation with low angle protection and processing

3:2/2:2 pulldown and Video on Film (VOF) detection and processing

Smart sharpness with SuperScaler technology including de-contouring, de-ring, LTI, CTI, de-jaggy, peaking

Local contrast and dynamic non-Linear contrast for detail enhancement

3D LUTs with 17x17x17 nodes, provide 4913 different control points, which is competent for matching calibrated displays to a target colorspace

High precision HSL color space based color management with low saturation protection, independent luma/hue/saturation adjustment to achieve blue/green extension, fresh tone correction, and wider gamut for video

Video mixer: 2 video planes and 2 graphics planes

Independent HDR re-mapping of video and graphic layer

Local dimming control for high nits backlights

### **LCD Panel Output**

8-lane V-By-One output with 1, 2, 4 regions supported, up to 4Kx2K 60Hz resolution

Dual-channel LVDS output supporting up to 1920x1080 60Hz resolution

Built-in (1-port 6-pair)/(2-port 3-pair) mini-LVDS output with programmable HD/FHD timing controller Optional up to 1920x1080Hz resolution

12-lane CEDS/CHPI/CMPI/iSP output with programmable UHD timing controller Optional for UHD TCON-less panel, up to 4Kx2K 60Hz resolution



Three independent Gamma table for LCD panel tuning  
Dithering logic for mapping to different LCD panel color depth

### **Video Input/output Interface**

3x HDMI 2.1 receiver ports with Dynamic HDR, ARC, HDCP 1.4 /2.2, 4Kx2K@60 max resolution input  
2x CVBS 480i/576i standard definition inputs  
Supports CVBS (PAL/NTSC) bypass output  
ITU 601/656 parallel camera input supporting 8-bit RGB565, CCIR656, CCIR601, YUV422, YCbCr422

### **Audio CODEC and Input/Output**

Supports MP3, AAC, WMA, RM, FLAC, Ogg, Dolby DTS Audio Optional and programmable with 7.1/5.1 down-mixing  
Low-power VAD and internal AEC loopback path  
3 built-in TDM/PCM/I2S ports with TDM/PCM mode up to 384kHz x32bits x 8ch or 96kHz x 32bits x 32ch and I2S mode up to 384kHz x 32bits x 8ch  
Digital microphone PDM voice input with programmable CIC, LPF & HPF, support up to 8 DMICs  
Built-in serial digital audio SPDIF/IEC958 output  
2 L/R analog input channels and 2 L/R output channels  
Supports concurrent dual audio stereo channel output with combination of I2S+PCM  
Supports Audio EQ/DRC for audio speaker

### **TV Demodulator**

Standard compliant NTSC, NTSC-J, PAL-BG, PAL-DK1, PAL-I, PAL-DK, PAL-M, PAL-N, SE- CAM-DK2, SECAM-DK3, SECAM-L ATV demodulators  
Worldwide analog TV audio standard: BTSC, A2, EIA-J and NICAM  
Supports Teletext, close caption, V-chip  
DTMB/DVB-C/ DTV demodulators  
Build-in VIF demodulator supports low IF interface from tuner module

### **DTV Broadcasting Interface**

3x Transport stream (TS) input interface with built-in demux processor for connecting to external digital TV tuner/demodulator  
Built-in PWM, I2C and SPI interfaces to control tuner and demodulator  
Integrated ISO 7816 smart card controller

### **Memory and Storage Interface**

32-bit DRAM memory interface with dual ranks and max 4GB total address space  
Compatible with JEDEC standard DDR3-2133 /DDR3L-2133 /DDR4-2666 /LPDDR3-2133 /LPDDR4-3200 SDRAM  
SDSC/SDHC/SDXC card and SDIO interface with 1-bit and 4-bit data bus width supporting spec version 2.x/3.x/4.x DS/HS modes up to UHS-I SDR104  
eMMC memory interface with 1/4/8-bit data bus width fully supporting spec version 5.0 HS400  
SLC NAND Flash controller  
Built-in 4K bits OTP memory for secured key storage

### **Network Interface**

IEEE 802.3 10/100/1000M Ethernet MAC with RGMII interface  
10/100M Ethernet PHY interface  
WiFi/IEEE802.11 supporting via USB or SDIO

Bluetooth supporting via USB or UART

Network interface optimized for mixed WIFI and BT traffic

### **Integrated I/O Controllers and Interfaces**

Triple USB 2.0 high-speed USB I/O, two USB Hosts and one USB OTG

Multiple UARTs, I2Cs and PWMs SPI interface

Programmable remote control input circuitry and IR-blaster output

Built-in 10bit SAR ADC with 4 input channels

General Purpose IOs with built-in pull up and pull down

System, Peripherals and Misc. Interfaces

Integrated general purpose timers, counters, DMA controllers

24 MHz crystal input

Embedded debug interface using ICE/JTAG

### **Power Management**

Multiple internal power domains controlled by software

Multiple sleep modes for CPU, system, DRAM, etc.

Multiple internal PLLs to adjust the operating frequencies

Multi-voltage I/O design for 1.8V and 3.3V

### **Security**

Trustzone based Trusted Execution Environment (TEE)

Secured boot, encrypted hardware self-setup OTP, encrypted DRAM with memory integrity checker, hardware key ladder and internal control buses and storage

Separated secure/non-secure Entropy true RNG

Pre-region/ID memory security control and electric fence

Hardware based Trusted Video Path (TVP), and secured contents (needs SecureOS software)

Secured IO and secured clock

### **Package**

FCBGA, 19 mm x 19 mm, 0.65 ball pitch, RoHS compliant

Revolutionize your digital signage and display solutions with our cutting-edge All-in-One Android 9.0 Controller Board, featuring the powerful Amlogic T972 Mainchip and eDP output capability.

Designed to deliver unparalleled performance and flexibility, this versatile board is the perfect solution for a variety of applications, including digital signage, interactive kiosks, information displays, and more.

At the heart of our controller board lies the Amlogic T972 Mainchip, a high-performance processor renowned for its exceptional speed, reliability, and energy efficiency. With quad-core processing and advanced GPU capabilities, this chipset ensures smooth operation and seamless multimedia performance, allowing you to deliver captivating content and engaging experiences to your audience.

The Android 9.0 operating system provides a robust and intuitive platform for running your applications and content. With access to the Google Play Store, you can easily download and install a wide range of apps, including digital signage software, media players, web browsers, and more. Whether you're showcasing promotional videos, interactive presentations, or real-time information feeds, our controller board provides the flexibility and functionality you need to bring your vision to life.

One of the standout features of our controller board is its eDP output support, allowing you to connect to a variety of display panels with ease. Whether you're using LCD, LED, or OLED displays, the eDP interface ensures seamless compatibility and high-quality image reproduction. With support for resolutions up to 4K Ultra HD, you can deliver stunning visuals and crisp, clear images to captivate your audience and leave a lasting impression.

In addition to its powerful processing capabilities and versatile connectivity options, our controller board offers a range of features designed to streamline installation and operation. With built-in Wi-Fi and Ethernet connectivity, you can easily connect to your network and access online content and services. The board also includes USB and HDMI ports for connecting peripherals such as cameras, sensors, and touchscreens, allowing you to create interactive experiences and customize your displays to suit your specific needs.

Setting up and configuring our controller board is quick and easy, thanks to its user-friendly interface and intuitive controls. With support for remote management and over-the-air updates, you can easily monitor and maintain your displays from anywhere, ensuring optimal performance and reliability at all times.

In summary, our All-in-One Android 9.0 Controller Board with Amlogic T972 Mainchip and eDP output is the ideal solution for powering your digital signage and display projects. With its powerful performance, versatile connectivity, and easy-to-use interface, it offers everything you need to create dynamic and engaging visual experiences for your audience. Upgrade your displays today and take your presentations to the next level with our innovative controller board.