



# High-performance quad-core 64-bit intelligent cockpit processor T5 Series

## Overview

T5 series (T507/T517) is a high-performance quad-core Cortex<sup>™</sup>-A53 platform SoC for the new generation of automotive markets. T5 series is qualified to Automotive AEC-Q100 testing. The chip family integrates Cortex-A53 quad-core CPU, G31 MP2 GPU, 32-bit DDR3/LPDDR3/DDR4/LPDDR4 DRAM, multi video output interfaces (RGB/2\*LVDS/ HDMI/CVBS OUT), and multi video input interfaces(MIPI CSI/BT656/BT1120). The chip family supports 4K@60fps H.265 decoder, 4K@25fps H.264 encoder, DI, 3D noise reduction, SmartColor system, and keystone correction module, which provides smooth user experience and professional visual effect. T5 series can be used in IVI, digital cluster, HD AVM, HUD and other intelligent cockpit products.

## Highlights

- Automotive grade: AEC-Q100 certified.
- High performance: T5 series integrates 1.5GHz 4\*A53 CPU, G31 MP2 GPU, and 4GB DDR3/DDR4/LPDDR3/LPDDR4 at maximum frequency of 800MHz, which provides smooth user experience and professional visual effect.
- Video multimedia: Supports full format video playback, 4K@60fps H.265 video decoder, and 4K@25fps H.264 video encoder.
- Video output: Supports multi video output interfaces such as RGB888, dual link LVDS, HDMI, CVBS OUT, to achieve different display in dual screen.
- Video input: Integrated MIPI CSI and parallel CSI can support maximum 8-ch HD camera inputs (maximum processing 6-ch of data at the same time) to achieve 360° AVM, DVR functions.
- Rich interfaces: Supports 4xUSB, 2xEthernet MAC, 6xUART, 6xTWI, 4xGPADC, greatly facilitating product expansion.

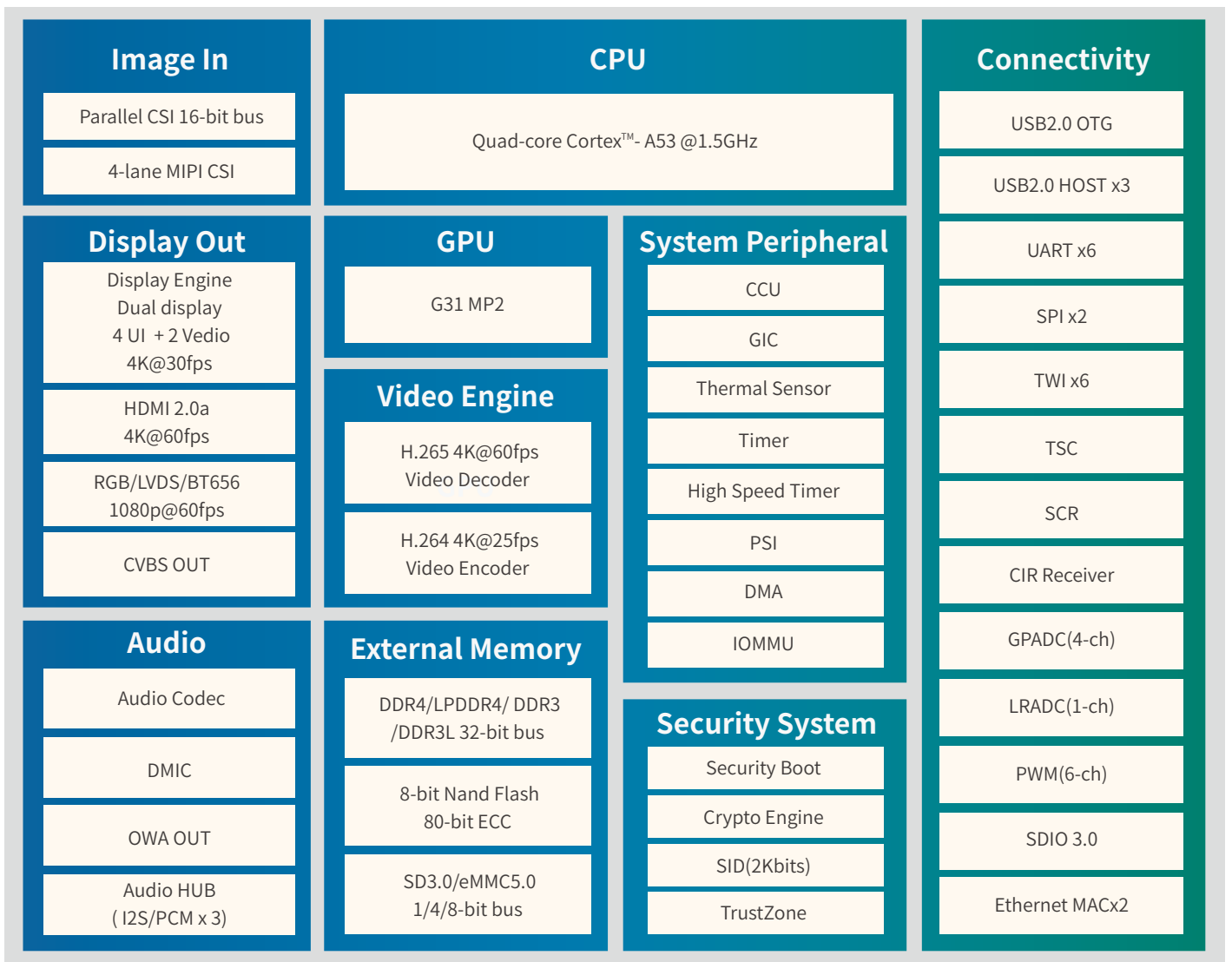
## Features

CPU	<ul style="list-style-type: none"> <li>• Quad-core ARM Cortex<sup>™</sup>-A53@1.5GHz</li> </ul>
GPU	<ul style="list-style-type: none"> <li>• G31 MP2</li> <li>• Supports OpenGL ES 3.2/2.0/1.0, Vulkan 1.1, OpenCL 2.0</li> </ul>

Memory	<ul style="list-style-type: none"> <li>• 32-bit DDR4/DDR3/DDR3L/LPDDR3/LPDDR4 interface, supporting maximum capacity of 4GB</li> <li>• SD3.0/eMMC5.0 interface</li> <li>• 8-bit Nand flash interface with maximum 80-bit/1KB ECC</li> </ul>
Video Engine	<p><b>Video decoder</b></p> <ul style="list-style-type: none"> <li>• H.265 MP decoder up to 4K@60fps</li> <li>• H.264 BL/MP/HP decoder up to 4K@30fps</li> <li>• VP9 decoder up to 4K@60fps</li> <li>• AVS2 decoder up to 4K@60fps</li> <li>• Multi-format 1080p@60fps video playback, including VP8, MPEG1/2 SP/MP, MPEG4 SP/ASP, AVS+/AVS JIZHUN, VC1 SP/MP</li> </ul> <p><b>Video encoder</b></p> <ul style="list-style-type: none"> <li>• H.264 encoder up to 4K@25fps</li> <li>• MJPEG encoder up to 4K@15fps</li> <li>• JPEG encoder up to 8K x 8K resolution</li> </ul>
Video Input	<ul style="list-style-type: none"> <li>• Supports one 8-/10-/12-/16-bit digital camera(DC) interface</li> <li>• Maximum pixel clock of 148.5MHz for each DC interface</li> <li>• BT656, BT1120 video input for multichannel YUV</li> <li>• Four-lane MIPI CSI, up to 1Gbps per lane in HS transmission, compliant with MIPI-CSI2 V1.00 and MIPI DPHY V1.00</li> <li>• Maximum video capture resolution of 8M@30fps or 4x 1080p@25fps for MIPI CSI</li> <li>• Supports formats: YUV422, YUV420, RAW-8, RAW-10, RAW-12</li> </ul>
Audio	<ul style="list-style-type: none"> <li>• Two DAC channels</li> <li>• Supports 1 audio output interface (differential LINEOUTP/N or single-end LINEOUTL/LINEOUTR)</li> <li>• One Audio HUB, supporting internal mixing function</li> <li>• Embedded 3 I2S/PCM for connecting the external devices (I2S0 for extended audio codec, I2S2 for BT, I2S3 for digital power amplifier)</li> <li>• Supports Left-justified, Right-justified, Standard I2S mode, PCM mode, and TDM mode</li> <li>• I2S mode supports 8 channels, and 32-bit/192kbit sample rate</li> <li>• I2S and TDM modes support maximum 16 channels, and 32-bit/96kbit sample rate</li> <li>• One OWA OUT interface, supporting 16-/20-/24-bit outputs</li> <li>• Integrated digital microphone, supporting maximum 8 digital PDM microphones</li> </ul>
Display Output	<ul style="list-style-type: none"> <li>• HDMI 2.0a up to 4K@60fps (only for T50 7)</li> <li>• TV CVBS output, supporting PAL/NTSC</li> <li>• LVDS interface with dual link, up to 1080p@60fps</li> <li>• RGB interface with DE/SYNC mode, up to 1080p@60fps</li> </ul>
Security Engine	<ul style="list-style-type: none"> <li>• Supports Full Disk Encryption</li> <li>• AES, DES, 3DES, and XTS encryption and decryption algorithms</li> <li>• MD5, SHA, and HMAC tamper proofing</li> <li>• RSA, ECC signature and verification algorithms</li> <li>• Supports 160-bit hardware pseudo random number generator(PRNG) with 175-bit seed</li> <li>• Supports 256-bit hardware true random number generator(TRNG)</li> <li>• Integrated 2K-bit EFUSE for chip ID and security application</li> </ul>

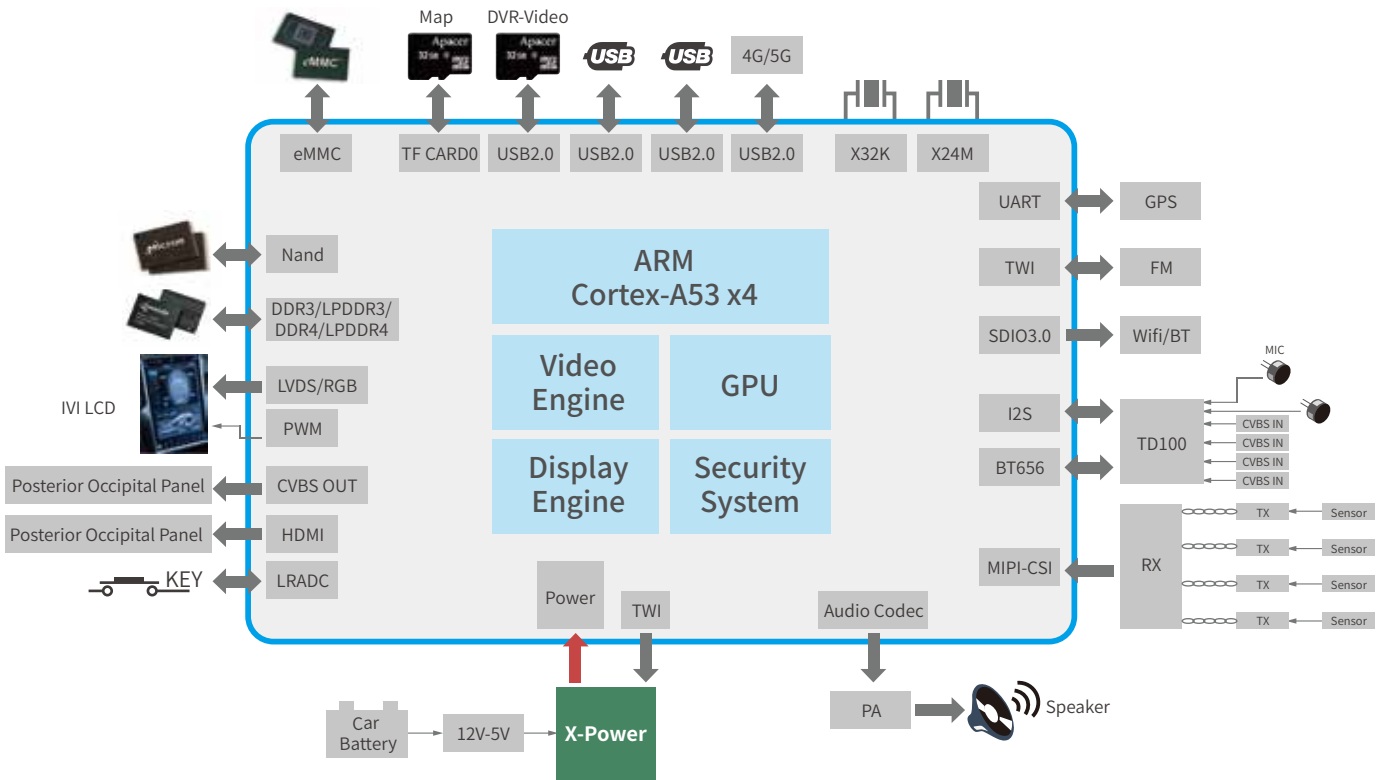
Connectivity	<ul style="list-style-type: none"> <li>• 3 x USB2.0 Host, 1 x USB2.0 OTG</li> <li>• 2 x Ethernet MAC (one 10/100 Mbps Ethernet port with RMI interface, one 10/100/1000 Mbps Ethernet port with RGMII and RMI interfaces)</li> <li>• SDIO 3.0, TSC, SCR, CIR Receiver</li> <li>• 6 x TWI, 2 x SPI, 6 x UART</li> <li>• 6-ch PWM, 4-ch GPADC, 1-ch LRADC</li> </ul>
PMIC	<ul style="list-style-type: none"> <li>• Companion Allwinner Power Management IC</li> </ul>
Package	<ul style="list-style-type: none"> <li>• TFBGA 421balls</li> <li>• 15 mm x 15 mm size, 0.65 mm ball pitch, 0.35 mm ball size</li> </ul>
Process	<ul style="list-style-type: none"> <li>• 28nm HPC</li> </ul>

## Block Diagram



Note: Only T507 supports HDMI

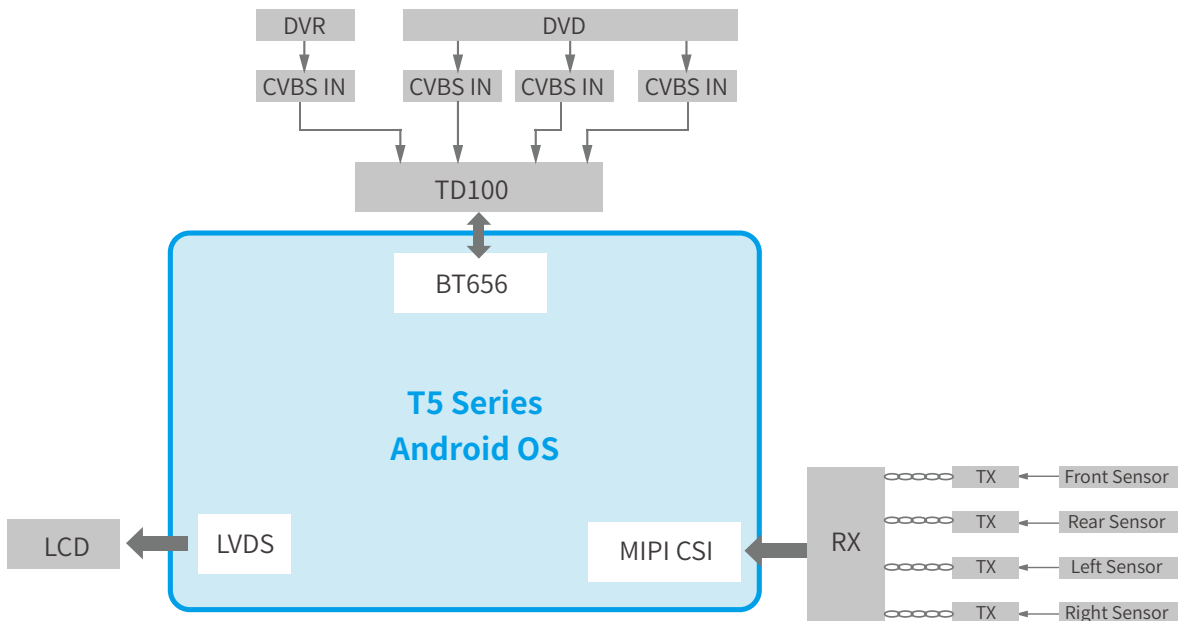
# Application Diagram



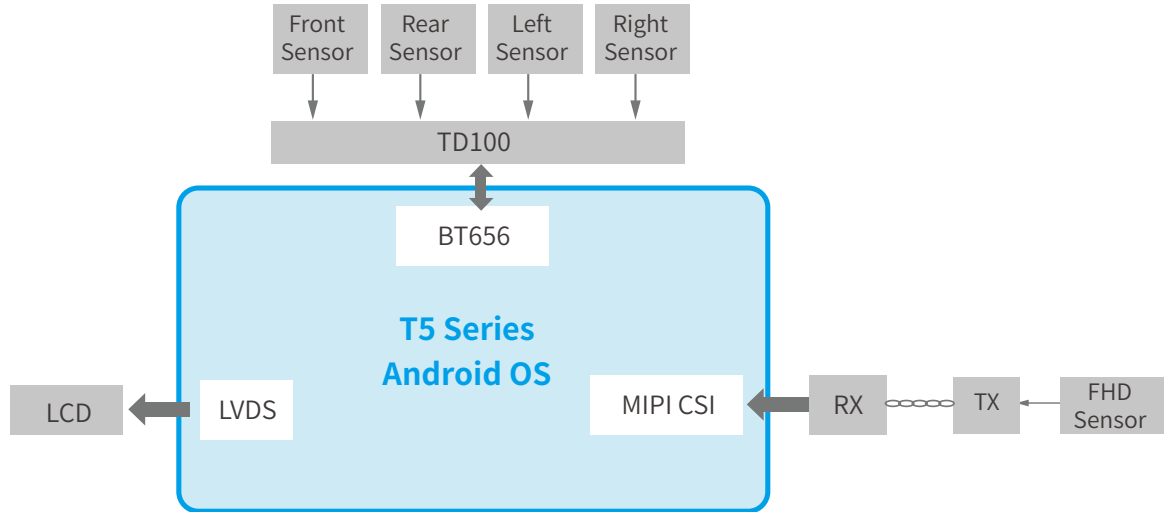
Note: Only T507 supports HDMI

# Product Diagram

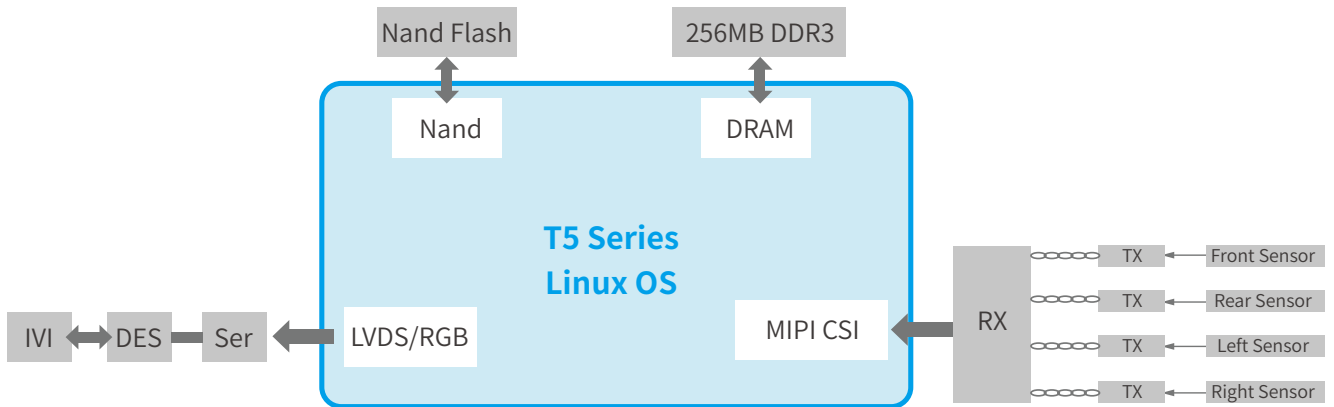
IVI + HD 360°



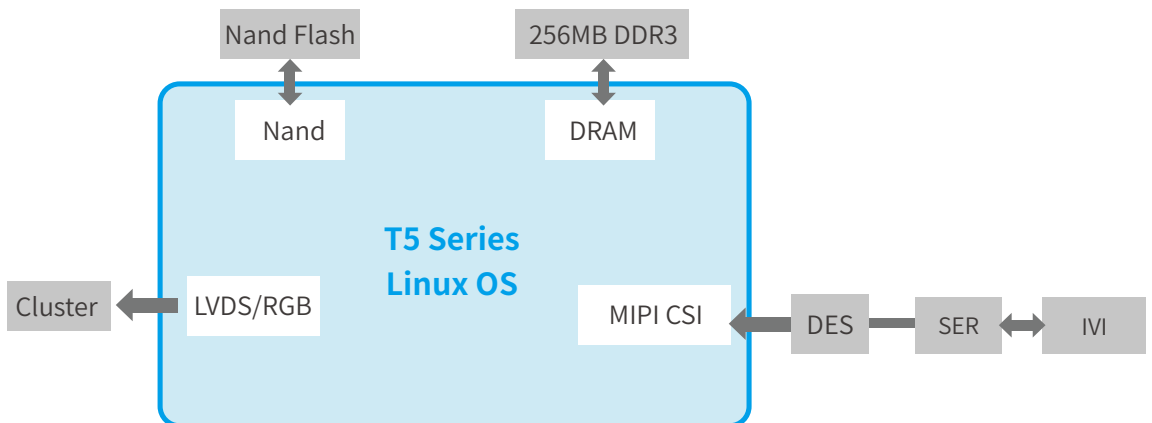
## IVI + SD 360° + DVR



## HD AVM Box



## Digital Cluster



### ABOUT ALLWINNER

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.

### CONTACT US

For more product info, please contact [service@allwinnertech.com](mailto:service@allwinnertech.com), or scan the QR code to follow us on Wechat.

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