







# Quad-Core Industrial Control Processor

## Overview

The A40i processor represents Allwinner's latest achievement in the intelligent industrial control sector. The processor is ideal for applications that require 3D graphics, advanced video processing, rich user interfaces, high quality, low power consumption and a high level of system integration.

The A40i is mainly applied to industrial control products based on visual interaction.

## Highlights

-  Content can be displayed on either 4-lane MIPI DSI displays, an RGB panel or a Dual-channel LVDS panel. CVBS-out and HDMI V1.4 is also supported.
-  Supports dual CMOS sensor parallel interfaces and 4-channel CVBS-in , which is capable of executing multi-channel video recording.
-  A40i meets the standard of industrial grade, and the operating temperature reaches the standard of AEC-Q100 grade3.
-  Integrated audio codec with 24bit/192KHz DAC playback, and supports I2S/PCM interface for connecting to an external audio codec.I2S/PCM interface includes eight channels of TDM with sampling precision up to 32bit/192KHz.
-  To reduce the total system cost, the A40i has an extensive range of support for hardware peripherals allowing for an array of configurations, such as 3\*USB2.0, GMAC, EMAC, SATA, 2\*TSC, PS2, RTP, 4\*SDHC etc.
-  Supports Linux3.10, Android 7.1 and the above system.

# Feature List

## CPU Architecture

- Quad-core ARM Cortex™-A7 MPCore Processor
- ARMv7 ISA standard ARM instruction set
- Thumb-2 Technology
- Jazeller RCT
- NEON Advanced SIMD
- VFPv4 floating point
- Hardware virtualization support
- Large Physical Address Extensions(LPAE)
- JTAG debug
- One general timer for per CPU
- 32KB Instruction and 32KB Data L1 cache for per CPU
- 256KB L2 cache

## Memory Subsystem

### SDRAM

- Compatible with JEDEC standard DDR2/DDR3 /DDR3L/LPDDR2/LPDDR3 SDRAM
- Up to 2GB address space
- 16 address signal lines and 3 bank signal lines
- 32-bit bus width

## SD/MMC Interface

- Up to four SMHC controllers
- Comply with eMMC standard specification V5.0
- Comply with SDIO card specification V3.0
- 1/4/8-bits bus width

## Video Decoding

- Support picture size up to 3840x2160
- Support decoding speed up to 1080p@60fps
- Supported multi-formats: MPEG1/2, MPEG4 SP/ASP, WMV, H.263 including Sorenson Spark, H.264 BP/MP/HP, VP6/8, AVS/AVS+, JPEG/MJPEG, etc

## GPU Architecture

- 3D
  - Mali400 MP2 GPU
  - Support OpenGL ES 2.0 / OpenVG 1.1 standard
- 2D
  - Support BLT and ROP2/3/4
  - Support 90° /180° /270° rotation
  - Support mirror/ alpha (plane and pixel alpha) /color key
  - Format conversion: ARGB 8888/4444/1555, RGB565, MONO 1/2/4/8bpp, Palette 1/2/4/8bpp (input only), YUV

## NAND Flash

- Supports SLC/MLC NAND and EF-NAND
- Supports SDR/Toggle DDR/ONFI DDR NAND interface
- 16 address signal lines and 3 bank signal lines
- up to 8-bit data bus width

## USB

- One USB 2.0 OTG
- Two EHCI/OHCI compliant Hosts

## Video Encoding

- H.264 HP up to 1080p@45fps
- JPEG baseline: picture size up to 4096x4096
- Alpha blending
- Thumb generation
- 4x2 scaling ratio from 1/16 to 64 arbitrary non-integer ratio

## **Video Output**

- HDMI 1.4 transmitter with HDCP up to 1080p@60fps
- Supports 4 lanes MIPI DSI up to 1080p@60fps
- Supports LVDS interface up to 1920 x 1080@60fps
- Supports RGB interface up to 1920 x 1080@60fps
- Supports CVBS out, 4-ch CVBS, 1-ch YPbPr or 1-ch VGA

## **Video Input**

- Supports 4-ch analog CVBS in
- Supports Dual parallel interfaces:CSI0 and CSI1
- Supports CCIR656 protocol for each CSI
- Supports 16-bit BT1120 interface for CSI0
- Supports 24-bit RGB/YUV444 input for CSI1

## **EMAC**

- Support 10/100Mbps MII PHY interface
- Comply with the IEEE 802.3-2002 standard

## **GMAC**

- Support 10/100/1000Mbps RGMII/MII PHY interface
- Comply with the IEEE 802.3-2002 standard

## **PWM**

- 8 PWM channels outputs
- Support cycle mode and pulse mode
- The pre-scale is from 1 to 64

## **Smart Card Reader**

- One smart card reader controller supporting ISO/IEC 7816-3 and EMV2000 specifications
- Support synchronous and any other non-ISO 7816 and non-EMV cards

## **UART**

- Up to 8 UART controllers
- 64-Bytes Transmit and receive data FIFOs for all UART
- Compliant with industry-standard 16550 UARTs
- Support Infrared Data Association(IrDA) 1.0 SIRR

## **Analog Audio Output**

- Stereo audio DAC
- Stereo capless headphone drivers
- One low-noise analog microphone bias
- Dedicated headphone outputs
- Two mixers to meet different requirements

## **Analog Audio Input**

- Support four analog audio inputs
- Stereo audio ADC

## **Digital Audio**

- One I2S compliant audio interface, supporting 8-channel and 2-channel input
- One PCM, supporting linear sample (8-bit or 16-bit), 8-bit u-law and A-law companded sample
- One AC97 audio codec, supporting 2-channel and 6-channel audio data output

## **DMA**

- 16 channels:8 channels with normal DMA,8 channels with dedicated DMA
- Support data width of 8/16/32 bits
- Support linear and IO address modes
- Support data transfer types with memory-to-memory, memory-to-peripheral, peripheral-to-memory

## **CIR**

- A flexible receiver for IR remote
- Up to two IR controllers
- Programmable FIFO thresholds

## **SATA**

- One SATA Host controller
- Support SATA 1.5Gb/s and SATA 3.0Gb/s
- Comply with SATA spec 2.6
- Support external SATA(eSATA)

## Keypad

- One keypad matrix interface up to 8 rows and 8 columns
- Interrupt for key press or key release
- Internal debouncing filter to prevent switching noises

## TWI

- Up to 5 TWIs(Two Wire Interface) controllers
- Support Standard mode (up to 100K bps) and Fast mode (up to 400K bps)

## SPI

- Up to 4 SPI controllers

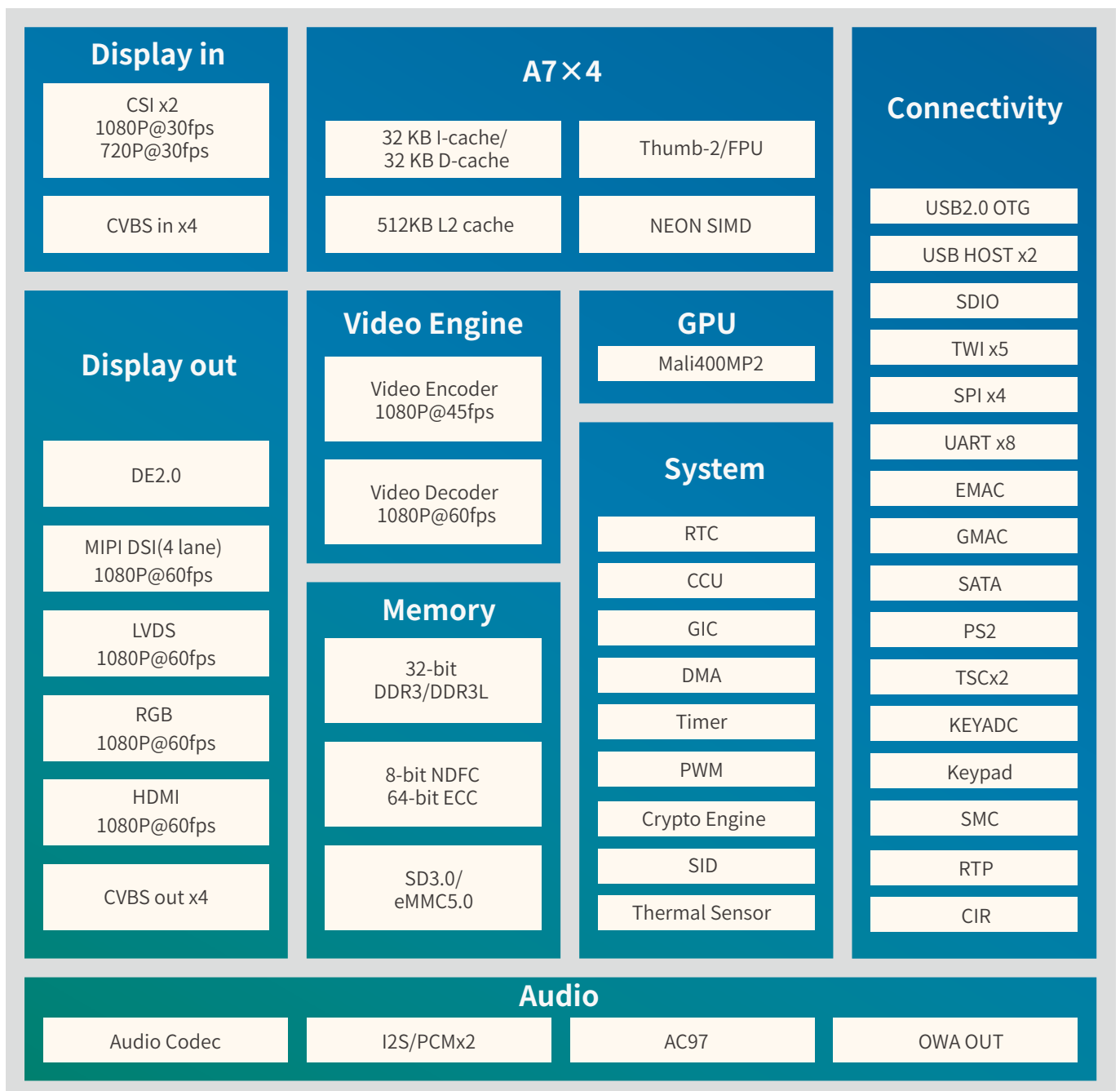
## Package

- BGA 468 balls,0.65mm ball pitch, 0.35mm ball size, 16x16mm

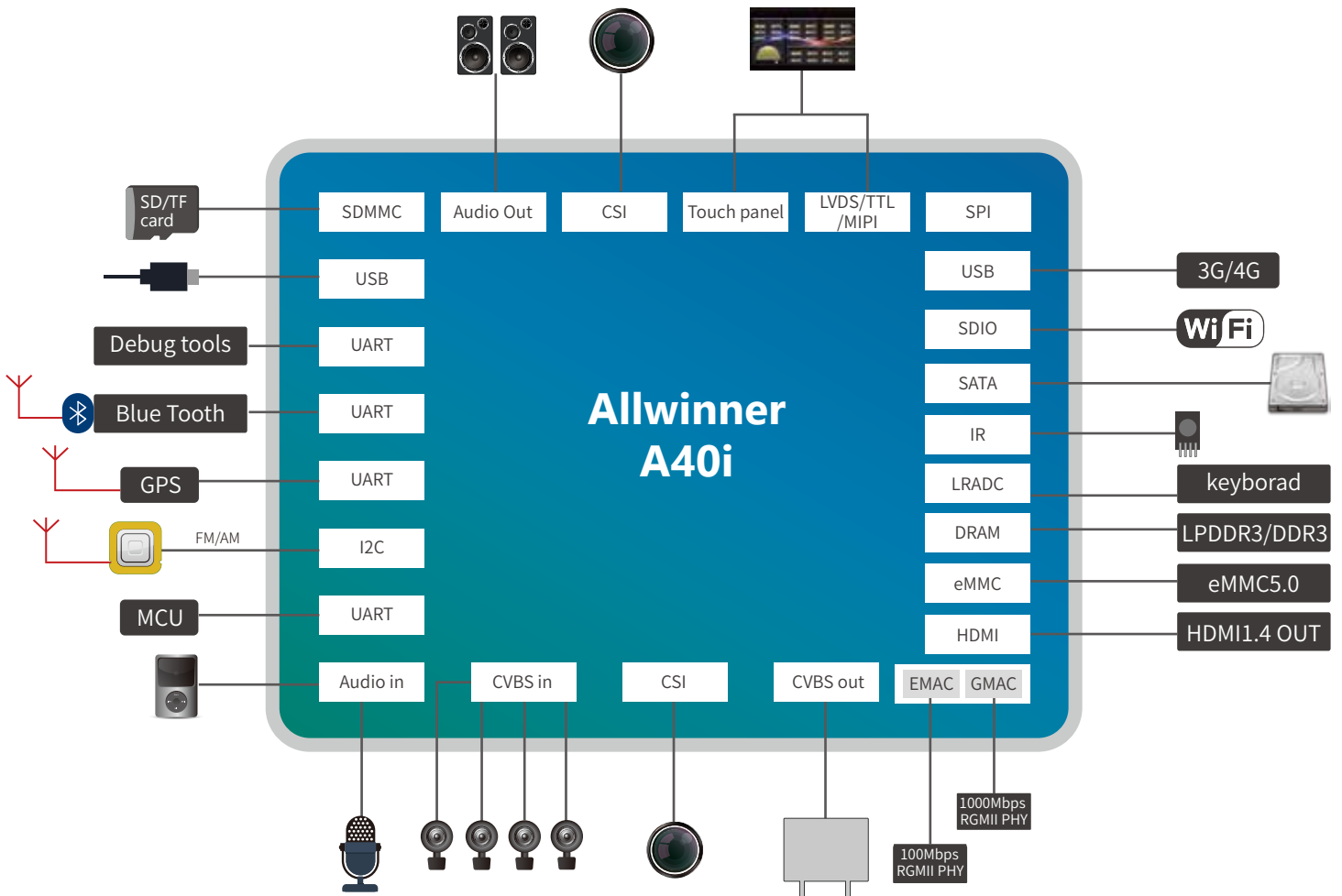
## Operating Temperature

- - 40°C~ 85°C

## Block Diagram



# Application Diagram



## 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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