

# iSOM-AWA40i

## SYSTEM-ON-MODULE

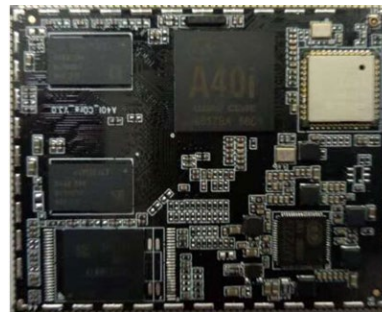
The AWA40i-SOM is an intelligent industrial automotive grade processing device that is part of iENSO's modular ecosystem of SOMs, cameras, and wireless connectivity solutions. The processor is ideal for applications that require 3D graphics, advanced video processing, rich user interfaces, high quality, low power consumption and a high level of system integration.

### APPLICATIONS

- Robotics and industrial automation
- Retail signage, maps and kiosks
- Security systems including facial recognition and Public View Monitor
- Video conferencing and telepresence
- AR/VR and immersive video
- Infotainment and Smart Card readers

### KEY SPECIFICATIONS

- CPU: Quad-Core Cortex™-A7
- GPU: Mali400MP2
- Video Playback: 1080p60/multiformat
- Video Capture: 1080p45/h.264
- Connectivity: 2G/3G/4G Module
- Resolution: 1920x1080
- OS: Android 7.1 or above & Linux SDK
- Memory: 1G, 2G, DDR2, DDR3, DDR3L, LPDDR2/LPDDR3
- Operating Temperature: -40°C to 85°C



### EXCEPTIONAL PERFORMANCE

The AWA40i delivers industrial-grade, low-power performance based on an Allwinner System-on-Chip multimedia application processor with quad-core ARM Cortex™ A7 architecture and Mali400MP2 GPU. This compact SOM uses an industry-standard DIMM connection interface for robust and cost-effective integration into embedded systems.

### DYNAMIC AND COST-EFFECTIVE

It can support up to 4 cameras and wireless connectivity modules to build an IoT camera using either a Wi-Fi/Bluetooth module or fully 3GPP compliant modems (LTE Cat 1 or Cat M1).

### AVAILABLE INTERFACE MODULES

- AWI-xx interface boards adapt to:
- Camera modules, 1 megapixel to 8M/4K.
- Wi-Fi/Bluetooth radio module
- LTE module: Cat M1
- LTE module: Cat 1 with Wi-Fi/BT

## TECHNICAL SPECIFICATIONS

### CPU:

- ARM Cortex-A7 Quad-Core MPCore
- Clock rate 1.2 GHz
- 512 KB L2-Cache (shared between 4 cores)
- 32 KB (Instruction) / 32 KB (Data) L1-Cache per core
- 512 KB L2 cache
- Large Physical Address Extensions (LPAE)
- NEON Advanced SIMD
- VFPv4 floating point
- ARMv7 ISA standard ARM instruction set
- Thumb-2 Technology
- Jazeller RCT
- Hardware virtualization support
- JTAG debug
- One general timer for per CPU

### GPU:

#### 3D:

- Mali400 MP2 GPU
- Support for OpenGL ES 2.0 / OpenVG 1.1 standards

#### 2D:

- Support for BLT and ROP2/3/4
- Support for 90° /180° /270° rotations
- Support for 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 Featuring 1 vertex shader (GP) and 2 fragment shaders (PP).

### CAMERA:

4-channel CVBS input

2x parallel interfaces:

- 8-bit YUV422 and 8-bit BT656 support for each interface
- CCIR656 (NTSC/PAL) support for each parallel interface
- CSIO:
  - 1080p30, still capture up to 5M
  - 24-bit RGB/YUV444 interface
  - Multi-channel ITU-R BT.656 time-multiplexed format
- CSI1:
  - 720p30, still capture up to 5M
  - 16-bit BT1120 interface

### VIDEO DISPLAY:

Resolution 2048 x 2048

Display Engine 2.0:

- Motion-adaptive de-interlacing
- Allwinner's SmartColor 2.0 technology for better images & videos
  - Adaptive edge sharpening
  - Adaptive color enhancement
  - Adaptive contrast enhancement and flesh tone rectification

HD1080:

- HDMI 1.4 | 1080p60, HDCP V1.2 supported
- 4-lane MIPI DSI | 1080p60
- 2x LVDS 4-lane | 1080p60
- 2x RGB LCD | 1080p60

CVBS:

- 4-channel CVBS
- 1-ch YPbPr
- 1-ch VGA

**DECODING:** Resolution 3840 x 2160, 1080p45 supported

**OS:** Android 7.1, Linux 3.10

### MULTI-FORMAT PLAYBACK:

- MPEG1,2 MP/HL: 1080p@45fps
- MPEG4 SP/ASP L5: 1080p@45fps
- H.263 BP: 1080p@45fps
- H.264 BP/MP/HP Level4.2: 1080p@45fps
- xvid: 1080p@45fps
- Sorenson Spark: 1080p@45fps
- VP6 6.0/6.1/6.2/8: 1080P@45fps
- AVS/AVS+ JiZhun: 1080p@45fps
- WMV7/WMV8: 1080p@45fps
- WMV9/VC-1 SP/MP/AP: 1080p@30fps
- JPEG: 16384 x 16384@45MPPS

### AUDIO INPUT:

- Support 4 analog audio inputs: 2 mono mic inputs, 1 stereo line-in, 1 stereo FM input
- 1 low-noise analog mic bias
- 2 ADC channels (stereo), up to 93 dB SNR, 8 to 192 kHz sampling

### AUDIO OUTPUT:

- 2 audio outputs: 1 differential PHONEOUT, 1 stereo headphone out
- 2 DAC channels (stereo), up to 100 dB SNR, 8 to 192 kHz sampling
- Supports analog/digital volume control and dynamic range control
- 2 mixers
- OWA (one-wire audio) output:
  - IEC-60958 transmitter
  - S/PDIF compliant
  - 32x24 bit TX FIFO for audio data transmitter

### AUDIO CODEC:

- 24 bit/192 kHz DAC playback
- Philips I2S compliant audio interface, 8-channel and 2-channel input
- PCM, 8-bit or 16-bit linear sampling, 8-bit u-law & A-law companded sampling
- AC97 2.3 compliant:
  - Full duplex synchronous serial interface
  - 2-channel and 6-channel audio data output
  - Up to 48 kHz sampling
  - 16/18/20 bit mono/stereo samples
  - DRA mode support
- 8 channels of TDM, precision up to 32 bit/192 kHz

### SECURITY:

- Crypto Engine
  - Symmetrical algorithm: AES, DES, 3DES
    - AES mode: ECB,CBC,CTR,CTS,OFB,CFB
    - DES/3DES mode: ECB,CBC,CTR
  - Hash: MD5,SHA1,SHA224,SHA256,SHA384,SHA512,HMAC
  - Asymmetrical algorithm: RSA512,RSA1024,RSA2048
  - 160-bit hardware PRNG with 175-bit seed
  - 256-bit hardware TRNG
- Security ID
  - One on-chip efuse
  - Up to 2 kbit security chip ID
- Supports on-line LDO programming

### ENCODING:

- h.264 1080p45
- JPEG baseline up to 4080 x 4080
- Alpha blending
- Thumbnail generation
- 4x2 scaling ratio from 1/16 to 64 arbitrary non-integer ratio

### MEMORY:

#### SDRAM

- Compatible with JEDEC, DDR2, DDR3, DDR3L, LPDDR2, LPDDR3
- 32-bit bus width
- Address space up to 2 GB
- 16 address signal lines and 3 bank signal lines

#### DMA support

- 8 channels normal and 8 dedicated DMA
- Data width 8/16/32 bit
- Linear and IO address modes
- Memory-to-memory, memory-to-peripheral, peripheral-to-memory

#### Boot ROM

- On-chip 36KB ROM boot loader
- Fast boot from NAND Flash, eMMC, SD/TF card and SPI Nor Flash
- System code download through USB OTG

#### SD/MMC interface

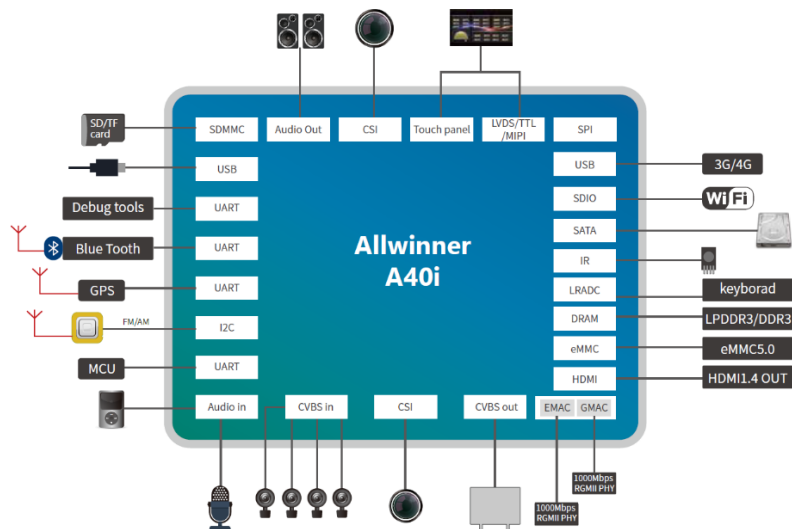
- Up to 4 SMHC controllers
- eMMC v.5.0 compliant
- SDIO card v3.0 compliant
- 1/4/8-bit bus width

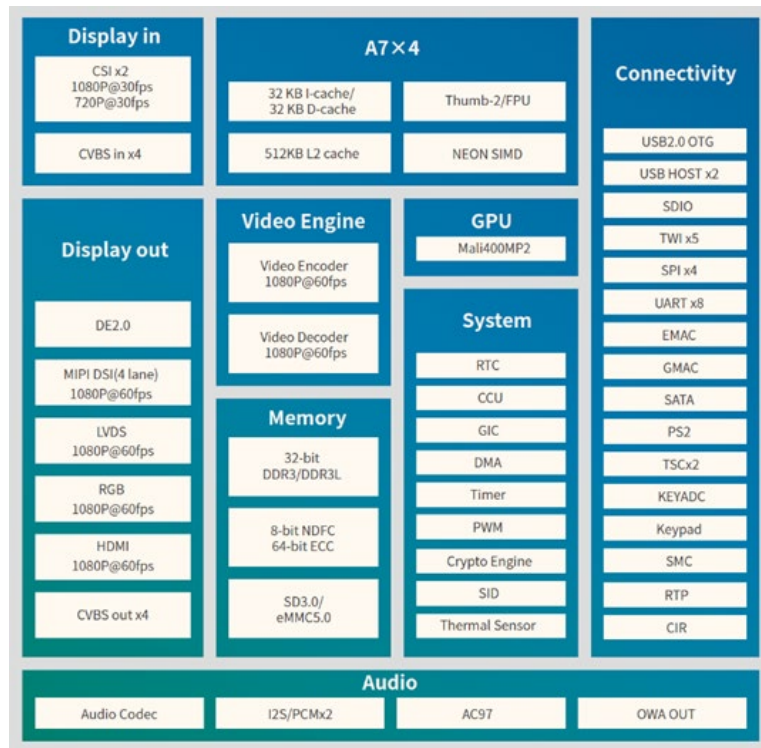
#### NAND

- Supports SLC/MLC NAND and EF-NAND with 64-bit ECC & 8-bit NDFC
- Supports SDR/Toggle DDR/ONFI DDR NAND interface
- 16 address signal lines and 3 bank signal lines
- Up to 8-bit bus width

### CONNECTIVITY:

- 1 USB2.0 OTG, 2 USB2.0 EHCI/OHCI Hosts
- SDIO
- 5x 2-wire Interface/I2C, Standard 100 kbps or Fast 400 kbps, 10-bit addressing
- 4x SPI, 1- or 2-wire mode
- Up to 8x UART controllers
  - 64 byte transmit/receive FIFOs
  - 16550 compliant
  - Infrared Data Association IrDA 1.0 SIRR support
  - UART0 2 wires, UART 1 8 wires, UART2/3 4 wires, others 2 wires
- GMAC/Ethernet MAC (10/100/1000 Mbps)
- RGMII/MII PHY interface
- IEEE 802.3-2002 compliant
- SATA
  - 1 host controller
  - 1.5 Gbps and 3.0 Gbps support
  - SATA 2.6 and AHCI rev. 1.3 compliant
  - eSATA support
  - Power management includes auto Partial to Slumber transition
- 2x PS2 controllers
- 2x TSC (Transport Stream Controller)
- Keypad support
  - One keypad matrix interface up to 8 rows and 8 columns
  - Interrupt for key press or key release
  - Internal debouncing filter to prevent switching noise
  - 2x 6-bit ADC channels, 2V range
- Smart Card reader
  - ISO/IEC 7816-3 and EMV2000(4.0) compliant
- Support for synchronous and non-ISO/non-EMV compliant cards
- RTP
  - 4 wire interface
  - 12-bit SAR ADC, up to 2 MHz sampling
  - Dual-touch detection
  - X,Y change function
- CIR, receiver for IR remote, up to 2 IR controllers, programmable FIFO thresholds
- 8 PWM output channels, cycle and pulse mode, pre-scale from 1 to 64
- 4x SDHC





## THE RIGHT EMBEDDED VISION SYSTEM FOR YOUR APPLICATION

**CONSISTENT QUALITY:** From six-axis lens alignment to consistently accurate color quality, to AI and ubiquitous connectivity, we guarantee that every iENSO embedded vision system will perform to spec.

**SECURE SUPPLY:** With iENSO engineers on the floor in all of our manufacturing partner facilities, we guarantee the quality and quantity of supply you need to make your application a success.

**COMPELLING ECONOMICS:** With our years of experience in the design and development of industrial, machine and consumer vision technologies, we can provide a cost-effective, no compromise embedded vision solution for your application.

## ABOUT iENSO

Established in 2003, iENSO provides imaging and wireless solutions that are helping global brands take their products to the next level in the age of embedded systems and AI platforms. iENSO accelerates the deployment of innovative imaging and wireless products in a wide range

of verticals such as IoT, home automation, automotive, drones, professional entertainment, robotics, remote surveillance and security. With offices in Canada and China, iENSO has perfected the engineering ecosystems that exist between initial design and high-volume manufacturing.

