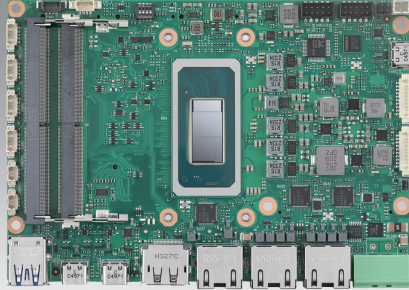


ASR-A502

Intel® Core™ Ultra Processors (Series 2) (Code Name: Arrow Lake-H) 3.5" AMR Controller Board

NEW



Features

- Intel® Core™ Ultra Processors, up to 96 TOPS, TDP 28W
- Dual Channel DDR5-5600, up to 96GB
- Dedicated I/Os for AMR: 3xGbE, 7x USB (incl. 3x USB-C), 4xCOM, 2x CANFD
- 4x Expansions: M.2 E-Key, B-Key, 2x M-Key (support NVMe)
- Power input support 12-24V DC-in, contact: 8KV, air: 15KV, ESD protection
- Supports Ubuntu 22.04/ 24.04 LTS, Windows 11 LTSC, embedded software API SUSI, ROS2, DeviceOn

Software APIs:



Utilities:

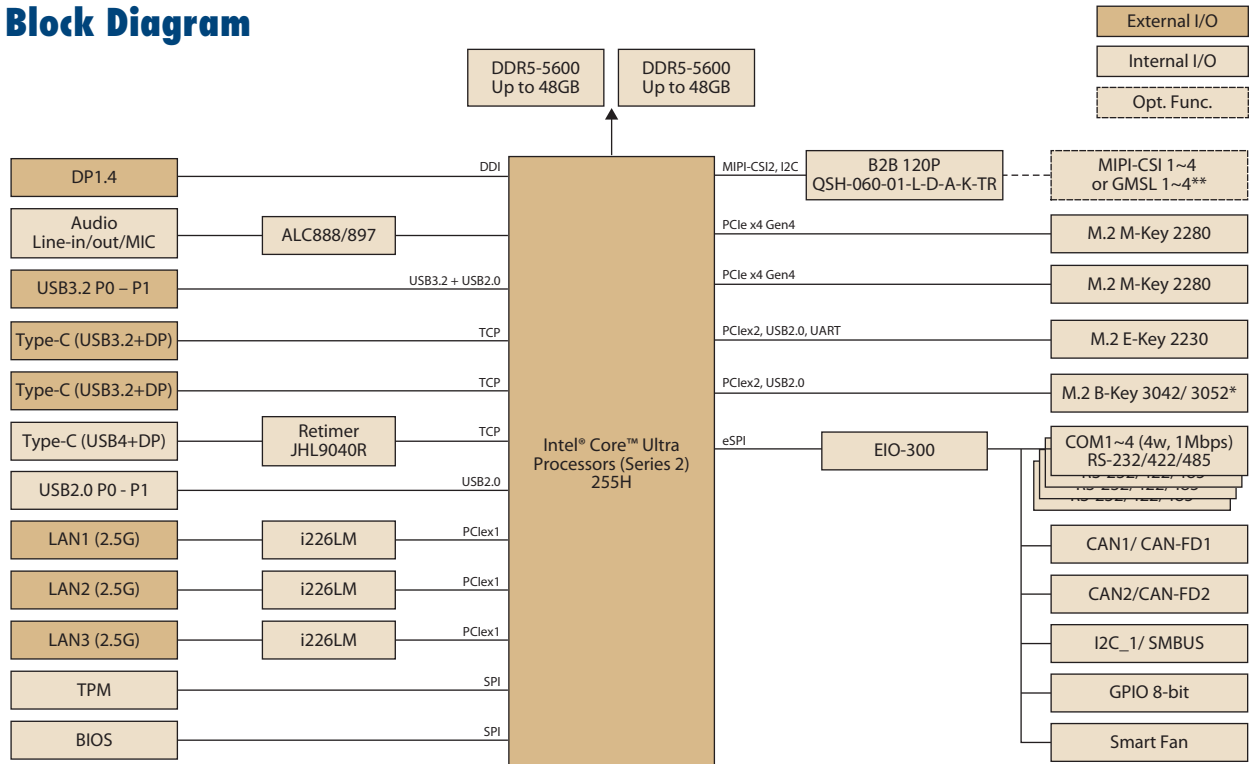


Specifications

Platform	Processor	255H
	Max. Frequency	5.1 GHz
	Base Frequency (P-Core)	2 GHz
	Core/Thread	16C, 6P+8E+2LE/ 16T
	LLC	24MB
	CPU TDP	28W
	Chipset	On-package Intel 600 Series Chipset
BIOS	AMI EFI 256Mbit	
Memory	Technology	DDR5-5600
	Max. Capacity	96GB
	Channel/Socket	Dual Channels / 2 Sockets
Graphics	Controller	Intel® Arc™ 140T GPU
	Max. Frequency	2.25 GHz
	GPU TOPS (Int8)	74 TOPS
3D/HW Acceleration	DX12.2, OGL4.6, OCL3.0, HW encode/ decode: H.265 (HEVC), H.264, AV1, VP9	
NPU	Name	Intel® AI Boost
	TOPS (Int8)	13 TOPS
Display I/F	DisplayPort	1 x DP1.4a, up to 4096 x 2160x 36bpp @60Hz
Ethernet	Controller	LAN1-3: Intel i226LM
	Speed	LAN1-3: 2.5GbE
Expansion	M.2 E-Key	1 x E-Key 2230 (PCIex2, USB2.0)
	M.2 B-Key	1 x B-Key 3042/3052* (PCIex2/SATA, USB2.0) w NanoSIM
	M.2 M-Key	2 x M-Key 2280 (PCIex4 Gen.4 NVMe)
External I/O	Ethernet	3 x RJ-45
	DP	1
	USB Type-C	2 x USB3.2 Gen2x1 10Gbps, support DisplayPort1.4 Alt. Mode
	USB Type-A	2 x USB3.2 Gen2x1 10Gbps
	Power Connector	2-pin phoenix connector, optional 4-pin ATX connector
	USB4	1 USB4 with USB Type-C, Bandwidth min. 20Gbps, max. 40Gbps, with USB4/ Display/ PCIe
Internal I/O	USB2.0	2
	COM Port	4 x RS-232/422/485, max. 1Mbps
	CANBus	2x CAN-FD. Data bitrate 1M/ 2M/ 4M/ 6M/ 8Mbps are supported.
	Serial Bus	1 x I2C/ SMBus
	Audio	Realtek ALC888s, Line-in/Line-out/MIC
	GPIO	8-bit general purpose input output I/O
	Fan	12V, 1A (4-wire)
	Front Panel Control	Power-on, Reset, Buzzer, CaseOpen
	MIPI-CSI	Up to 4x 22pin FPC, or option to 2x 30pin I-PEX MIPI-CSI ports, expanded through MIPI-CSI interfaced card, MIOe-MIPI
	GMSL	Up to 4x FAKRA, expanded through GMSL interfaced card, MIOe-GMSL
Board Feature	Watchdog Timer	65536 level, 0-65535 sec
	TPM	Discrete TPM2.0, fTPM* support by request
	SUSI	SW API for Hardware Monitor, Smart Fan Control, I2C, GPIO, WDT
Power	Supply Voltage	Vin: DC 12V~24V ± 10%; RTC Battery: Lithium 3V/210mAh
	Connector	2P Phoenix, optional to ATX 2x2 pin 90D
	Power Management	AT (default), ATX
	Max. Consumption	155.16 (12V)/ 188.35 (24V)
Idle Consumption	13.90 (12V)/ 15.55 (24V)	
Environment	Temperature	Operating: 0 ~ 60 °C (32 ~ 140 °F) Storage: -40 ~ 85 °C (-40 ~ 185 °F)
	Humidity	Operating: 40 °C @ 95% relative humidity, non-condensing Storage: 60 °C @ 95% relative humidity, non-condensing
	Vibration Resistance	3.5 Grms
Certification	EMC	CE, FCC Class B
Mechanical	Dimensions	146 x 102 mm (5.7" x 4")
	Net Weight	170g

*Note: Support by request

Block Diagram



*Support by request

**With optional MIOe-MIPI/ MIOe-GMSL module, ASR-A502 can support up to 4xMIPI-CSI or 4x GMSL cameras.

Ordering Information

Part No.	CPU sku	Core	Max. Frequency	Overall TOPS	TDP	Thermal Solution	Operating Temp.
ASR-A502-X0A1	255H	16C, 6P+8E+2LPE	5.1 GHz	96 TOPS	28W	Active	0 ~ 60 °C

Packing List

Part No.	Description	Quantity
	ASR-A502 SBC	
1700030406-01	M Cable 2*5P-2.0/USB-A 4P(F)*2 20cm	1
1700031582-01	COM3/4 Cable, D-SUB 9P(M)/1*5P-1.25 20cm	4
1970005512T001	Active cooler for TDP 28W CPU	1

Optional Accessories

Part No.	Description
1970005998T001	Heatspreader
1960110006N000	M.2 3042/2242 to 3052 extension bracket
1700009001	2P Phoenix to DC jack power cable
1700035016-01	4 wires COM RS-422/485 cables
1700030518-01	CANBus Cable D-SUB 9P 15cm
MIOe-UMXM-FVA1	MIOe-UMXM USB to MXM carrier card, support A, B, B+ MXM GPU
1700034699-01	Thunderbolt3 cable (compatible to USB4), 20cm
EAI-1200-00A1	M.2 key B+M 1x Hailo-8 AI module

Rear IO View



Embedded OS/API

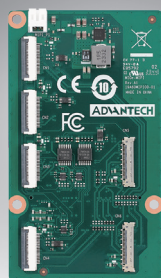
OS	Part No.	Description
Windows11	20706WLH1S0090	64-bit (UEFI mode only)
Ubuntu 24.04 LTS	20706U24DS0037	UbuntuD ASR-A502 64b 24.04 ENU, bundled with Advantech Robotic Suite
Software API	Download from website	SUSI5 for ASR-A502
ROS2	NA	Ready by Advantech Robotic Suite

MIOe-MIPI

4x 2lane MIPI-CSI or 2x 4lane MIPI-CSI module card

MIOe-GMSL

4x GMSL module card



Specifications

General	Product	MIOe-MIPI-RPA1	MIOe-MIPI-IPA1
	Interface	Samtec 120pin B2B connector	
Power	DC input	From AFE-R360	
	Connector	NA	NA
Camera	Interface	MIPI-CSI	MIPI-CSI
	Connector	4x 22pin FPC	2x 30pin IPEX
	MIPI lane	4x 2 lane	2x 4lane
	Data pin	I2C	I2C, GPIO
	Output Voltage	3.3V	3.3 & 1.8V
Environment	Operating Temperature	0 ~ 60 °C (32 ~ 140 °F)	
	Operating Humidity	40°C @ 95% relative humidity, non-condensing	
	Storage	60 °C @ 95%relative humidity, non-condensing	
	Vibration Resistance	3.5 Grms	
	Certification	CE, FCC Class B	
Mechanical	Dimensions	55 x 95 mm	
	Net weight	30g	
Compatibility	Board	AFE-R360 series	
	Camera	Innodisk: EV2M-00M1, EV2M-GOM1	e-con: e-CAM25, e-CAM81



Specifications

General	Product	MIOe-GMSL-4PA1
	Interface	Samtec 120pin B2B connector
Power	DC input	12~24V
	Connector	2P Pwr Conn.
Camera	Interface	GMSL
	Connector	4x FAKRA
	MIPI lane	4 x 2lane
	Data pin	I2C, GPIO
	Output Voltage	12V (support POC)
Environment	Operating Temperature	0 ~ 60 °C (32 ~ 140 °F)
	Operating Humidity	40°C @ 95% relative humidity, non-condensing
	Storage	60 °C @ 95%relative humidity, non-condensing
	Vibration Resistance	3.5 Grms
	Certification	CE, FCC Class B
Mechanical	Dimensions	55 x 95 mm
	Net weight	60g
Compatibility	Board	AFE-R360 series
	Camera	Intel RealSense: D457 (OV9782), oToBrite: oToCAM222 (ISX021), D3: D3CMC69N-115-084 (ISX031), Apro E9-E13 (IMX415, IMX335, AR0234, IMX290, AR0822).

Ordering Information

Part No.	Description	Camera Input	Interface
MIOe-MIPI-RPA1	MIOe-MIPI Module, 4x MIPI 22P	4x MIPI	FPX 22pin
MIOe-MIPI-IPA1	MIOe-MIPI Module, 2x IPEX 30P	2x MIPI	IPEX 30pin
MIOe-GMSL-4PA1	MIOe-GMSL Module, 4x FAKRA port	4x GMSL	FAKRA

ASR-A502 Compatible Sensor List

Sensors	Manufacturer	Spec	Compatible Sensors for Autonomous Applications			
			Sensor MPN	Camera Resolution	Camera sensor	Advantech PN
MIPI Camera	Innodisk	2D	EV2M-GOM1	2 MP	ONSEMI AR0330	-
	Innodisk	2D	EV2M-00M1	2.3MP	Onsemi AR0234	968DD00501
	e-con	2D	e-CAM25_CUR360	2.3MP	Onsemi AR0234	-
	e-con	2D	e-CAM81_CUR360	8.3MP	Onsemi AR0821	968DD00520
GMSL Camera	RealSense	2D+3D	D457	1 MP (RGB) 1 MP (depth)	OMNIVISION OV9782	96ICAM-D457
	oToBrite	2D	oToCAM222	2 MP	Sony ISX021	96ICAM-222
	Apro (Support by TPN)	2D	E-09	8.3MP	Sony IMX415	-
	Apro (Support by TPN)	2D	E-10	5 MP	Sony IMX335	-
	Apro (Support by TPN)	2D	E-11	2.3MP	Onsemi AR0234	TBD
	Apro (Support by TPN)	2D	E-12	2 MP	Sony IMX290	-
	Apro (Support by TPN)	2D	E-13	8.3MP	Onsemi AR0822	-
	D3 Embedded	2D	DesignCore® Discovery Series	3 MP	Sony ISX031	-
USB Camera	Orbbec	2D+3D	Gemini 335L	1 MP (RGB) 1 MP (depth)		TBD
	Innodisk	2D	EV8U-LSM1	8.3MP	IMX415	-
IMU	e-con	2D	See3CAM_CU81	8.3MP	AR0821	-
	Movella	9-axis	MTI-3-5A-DK			-
	Movella	9-axis	Xsens MTI-320			TBD
Lidar	Slamtec	2D	RPLIDAR-A2M12			-
	Slamtec	2D	RPLIDAR C1 LIDAR			-
	SICK	2D	NanoScan3			-
	SICK	3D	multiScan100			-