

# AFE-R360

## Intel® Core™ Ultra 7/5 Processors, (Code Name: Meteor Lake-H/U) 3.5" SBC

NEW



### Features

- Intel® Core™ Ultra 7/5 Processors, up to 16 Cores, TDP 28/15W
- Dual Channel DDR5-5600, up to 96GB
- Support 4x MIPI-CSI/ GMSL through 120pin B2B connector
- 3x LAN, 7x USB (incl. 3x USB-C), 4x UART, 2x CAN FD
- 4x Expansions: M.2 E-Key, B-Key, 2x M-Key (support NVMe)
- Supports Ubuntu22.04/ 24.04 LTS, Windows 10/ 11 LTSC, embedded software API SUSI, ROS2, DeviceOn, Edge AI SDK

#### Software APIs:



#### Utilities:

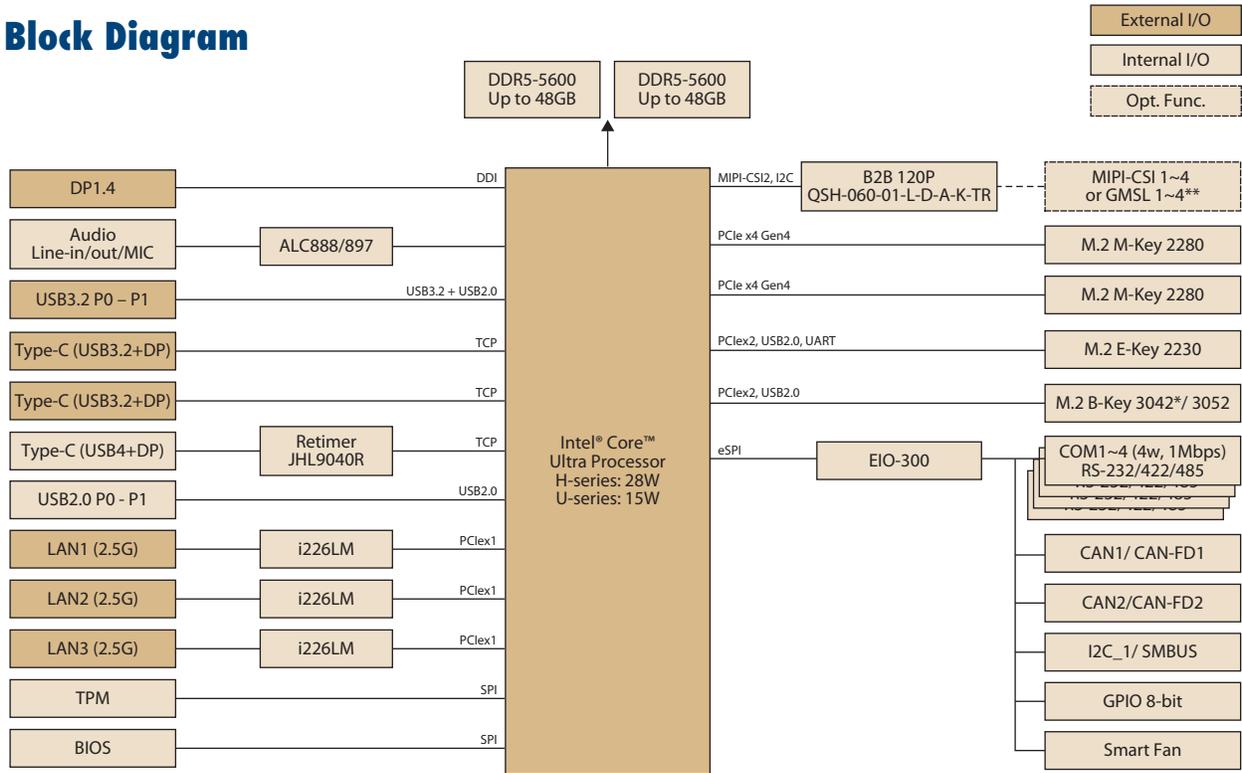


### Specifications

	Processor	Core Ultra 7, 155H	Core Ultra 5, 125H	Core Ultra 7, 155U	Core Ultra 5, 125U
Platform	Max. Frequency	4.8GHz	4.5GHz	4.8GHz	4.3GHz
	Base Frequency (P-Core)	1.4GHz	1.2GHz	1.7GHz	1.3GHz
	Core/ Thread	16, 6P+8E+2LE/ 22	14, 4P+8E+2LPE/ 18	12, 2P+8E+2LE / 14	12, 2P+8E+2LE / 14
	LLC	24MB	18MB	12MB	12MB
	CPU TDP	28W	28W	15W	15W
	Chipset	On-package Intel 600 Series Chipset			
Memory	BIOS	AMI EFI 256Mbit			
	Technology	DDR5 5600			
	Max. Capacity	Up to 96GB			
Graphics	Channel/ Socket	Dual Channels/ 2 Sockets			
	Controller	Intel® ARC® Graphics	Intel® Arc™ graphics	Intel® Graphics	Intel® Graphics
	Max. Frequency	2.25GHz	2.2GHz	1.95GHz	1.85GHz
	Execution Unit	128	112	128	112
Display I/F	3D/ HW Acceleration	DX12.2, OGL4.6, OCL3.0, HW encode/ decode: H.265 (HEVC), H.264, AV1, VP9			
	DisplayPort	1 x DP1.4a, up to 4096 x 2160x 36bpp @60Hz			
Ethernet	Controller	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 (PCIe x2/ SATA, USB2.0) w' Nano SIM (PCIe x2/ SATA, USB2.0) w' Nano SIM			
	M.2 M-Key	2 x M-Key 2280 (PCIex4 Gen.4 NVMe)			
	120Pin B2B	8 lanes MIPI-CSI, I2C, 3.3V, 1.8V...			
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			
	Internal I/O	USB4	1 USB4 with USB Type-C, Bandwidth min. 20Gbps, max. 40Gbps, with USB4/ Display/ PCIe		
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		1x 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			
Board Feature	GMSL	Up to 4x FAKRA, expanded through GMSL interfaced card, MIOe-GMSL			
	Watchdog Timer	65536 level, 0-65535 sec			
	TPM	Discrete TPM2.0, fTPM* support by request			
Power	SUSI	SW API for Hardware Monitor, Smart Fan Control, I2C, GPIO, WDT			
	Supply Voltage	Vin: DC 12V-24V +/- 10%; RTC Battery: Lithium 3V/210mAH			
	Connector	2P Phoenix, optional to ATX 2x2 pin 90D			
	Power Management	AT, ATX			
	Max Consumption	116.04 (12V)/ 128.4 (24V)	129.96W (12V)/ 134.4W (24V)	81.10 (12V)/ 82.44W (24V)	115.26W (12V)/ 123.40W (24V)
Environment	Idle Consumption	13.06 (12V)/ 15.19 (24V)	15.36W (12V)/ 17.69W (24V)	14.6W (12V)/ 15.84W (24V)	12.74W (12V)/ 15.12W (24V)
	Temperature	Operating 0-60°C (32-140°F); *extend: -40-80°C (-40-176 °F), support with selected SKU. Storage: -40 ~ 85 °C (-40 ~ 185 °F)			
	Humidity	Operating: 40 °C @ 95% relative humidity, non-condensing Storage: 60 °C @ 95%relative humidity, non-condensing			
Certification	Vibration Resistance	3.5 Grms			
	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, AFE-R360 can support up to 4xMIPI-CSI or 4x GMSL cameras.

## Ordering Information

PN	CPU sku	Core	Max. Frequency	TDP	Thermal	Operating Temp.	Made in
AFE-R360C7P-Q8A1	Core Ultra 7, 155H	16C, 6P+8E+2LPE	4.8GHz	28W	Active Cooler	0 ~ 60 °C	China
AFE-R360C7P-Q8A1U	Core Ultra 7, 155H	16C, 6P+8E+2LPE	4.8GHz	28W	Active Cooler	0 ~ 60 °C	Taiwan
AFE-R360C7PX-Q8A1	Core Ultra 7, 155H	16C, 6P+8E+2LPE	4.8GHz	28W	Active Cooler	-40 ~ 80 °C	China
AFE-R360C5P-Q5A1	Core Ultra 5, 125H	14C, 4P+8E+2LPE	4.5GHz	28W	Active Cooler	0 ~ 60 °C	China
AFE-R360C7-Q8A1	Core Ultra 7, 155U	12C, 2P+8E+2LPE	4.8GHz	15W	Passive Heatsink	0 ~ 60 °C	China
AFE-R360C7X-Q8A1	Core Ultra 7, 155U	12C, 2P+8E+2LPE	4.8GHz	15W	Passive Heatsink	-40 ~ 80 °C	China
AFE-R360C5-Q3A1	Core Ultra 5, 125U	12C, 2P+8E+2LPE	4.3GHz	15W	Passive Heatsink	0 ~ 60 °C	China

## Development Kit Ordering Information

Part No.	Description	AFE-R360	Extension card	Memory	Storage	Camera	Image
AFE-R360DVK-M01	AFE-R360, 125H, 4x MIPI (2MP) development kit	AFE-R360C5P-Q5A1	MIOe-MIPI-RPA1	16GB	128GB	4x EV2M-00M1 (innodisk)	22.04 (kernel 6.6.30)
AFE-R360DVK-G02	AFE-R360, 125H, 2x GMSL (2.5MP) development kit	AFE-R360C5P-Q5A1	MIOe-GMSL-4PA1	16GB	128GB	2x oToCAM222	22.04 (kernel: 6.5.0-1027-oem)

## Packing List

Part No.	Description	Quantity
1700030406-01	AFE-R360 SBC	1
1700031582-01	M Cable 2*5P-2.0/USB-A 4P(F)*2 20cm	1
1700019584-01	COM1-4 Cable, D-SUB 9P(M)/1*5P-1.25, 20cm	4
1700005512T001	A Cable 2*5P-2.0/Audio JACK*3 20cm	1
1970005973T001	Active cooler for TDP 28W CPU	1
1970005973T001	Passive heatsink for TDP 15W CPU	1

## Optional Accessories

Part No.	Description
1970005998T001	AFE-R360 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-MIPI	MIOe-MIPI Module, 4x 22pin FPC or 2x 30pin IPEX
MIOe-GMSL	MIOe-GMSL Module, 4x GMSL
MIOe-UMXM	MIOe-UMXM USB4 to MXM carrier card

## Rear IO View



## Embedded OS/API

OS	Part No.	Description
Win11	20706WLH1S0036	64-bit (UEFI mode only)
Ubuntu 24.04 LTS	20706U24DS0012	UbuntuD AFE-R360 64b 24.04 ENU
Ubuntu 24.04 LTS	20706U24DS0026	Ubuntu 24.04, bundled Preempt-RT patch, and Advantech Robotic Suite (ROS2)
Software API	Download from website	SUSI5 for AFE-R360
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

## AFE-R360 Compatible Sensors List

Sensors	Manufacturer	Spec	Compatible Sensors for Autonomous Applications			
			Sensor MPN	Camera Resolution	Camera sensor	Advantech PN
MIPI Camera	Innodisk	2D	<a href="#">EV2M-GOM1</a>	2 MP	ONSEMI AR0330	-
	Innodisk	2D	<a href="#">EV2M-00M1</a>	2.3MP	Onsemi AR0234	968DD00501
	e-con	2D	<a href="#">e-CAM25_CUR360</a>	2.3MP	Onsemi AR0234	-
	e-con	2D	<a href="#">e-CAM81_CUR360</a>	8.3MP	Onsemi AR0821	968DD00520
GMSL Camera	RealSense	2D+3D	<a href="#">D457</a>	1 MP (RGB) 1 MP (depth)	OMNIVISION OV9782	96ICAM-D457
	oToBrite	2D	<a href="#">oToCAM222</a>	2 MP	Sony ISX021	96ICAM-222
	Apro (Support by TPN)	2D	<a href="#">E-09</a>	8.3MP	Sony IMX415	-
	Apro (Support by TPN)	2D	<a href="#">E-10</a>	5 MP	Sony IMX335	-
	Apro (Support by TPN)	2D	<a href="#">E-11</a>	2.3MP	Onsemi AR0234	TBD
	Apro (Support by TPN)	2D	<a href="#">E-12</a>	2 MP	Sony IMX290	-
	Apro (Support by TPN)	2D	<a href="#">E-13</a>	8.3MP	Onsemi AR0822	-
	D3 Embedded	2D	<a href="#">DesignCore® Discovery Series</a>	3 MP	Sony ISX031	-
USB Camera	Orbbec	2D+3D	<a href="#">Gemini 335L</a>	1 MP (RGB) 1 MP (depth)		TBD
	Innodisk	2D	EV8U-LSM1	8.3MP	IMX415	-
IMU	e-con	2D	<a href="#">See3CAM_CU81</a>	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			-