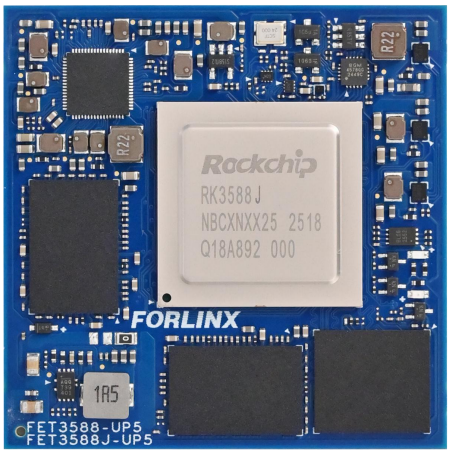
FET3588-UP5 / FET3588J-UP5 SoM

The FET3588-UP5/FET3588J-UP5 SoMs are built on Rockchip's flagship processors RK3588/RK3588J, utilizing advanced 8nm technology with an architecture of 4 x Cortex-A76 cores (up to 2.4 GHz) and 4 x Cortex-A55 cores (up to 1.8 Ghz), supporting 8K ultra-clear display and enable four different screens simultaneously, along with various high-speed data communication interfaces to accommodate diverse needs. It has passed rigorous environmental temperature and pressure tests, ensuring optimal performance and stable operation for high-end applications. FET3588-UP5 / FET3588J-UP5 It has passed rigorous environmental temperature and pressure tests, ensuring optimal performance and stable operation for high-end applications.



FET3588J-UP5 SoM

4×A76+4×A55 Architecture	up to 2.4GHz Clock	6 TOPS NPU
Mali-G610 MP4 GPU	50mm×50mm Dimensions	UP5 package Compatibility

Product Features:

- Simultaneous encoding and decoding of 8K videos, supporting multiple decoders;
- 48 - megapixel ISP3.0, meeting the requirements of image post - processing;
- Supports for multiple multi - channel video outputs with a resolution of up to 8K@60Hz;
- Supports for 4 x PCIe3.0 and 3 x PCIe2.1, with a transmission rate of up to 8Gbps per channel;
- Supports for multiple USB 3.1 Type - C interfaces and SATA 3.1;
- 6TOPS NPU, meeting edge AI requirements;
- 50mm × 50mm – compact size
- LGA Universal package and is compatible with the UP5 series of SoMs.

SoM Parameter:

Processor	**Rockchip RK3588/RK3588J** **RK3588 CPU：** 4×Cortex-A76@2.4GHz+4×Cortex-A55@1.8GHz **RK3588J CPU：** 4×Cortex-A76@1.6GHz+4×Cortex-A55@1.3GHz **NPU：** 6 TOPS, supporting INT4/INT8/INT16/FP16 combined operations **GPU：** Mali-G610 MP4、OpenGLES 1.1, 2.0, 3.2, OpenCL 2.2, Vulkan1.2 **VPU：** Hardware Decoding: •H.265, VP9: up to 8K@60fps •H.264: up to 8K@30fps •AV1: up to 4K@60fps Hardware Encoding: •H.265/HEVC, H.264/AVC: up to 8K@30fps
RAM	4GB/8GB/16GB/32GB LPDDR4
ROM	32GB/64GB/128GB eMMC
Operating Voltage	DC 5V-13V
Operating Temperature	0℃ ~ +70℃/-40℃ ~ +85℃
Net Weight	15.9g
Connection	LGA (624 pins; the ball pitch of the LGA is 1.25 mm, and the diameter of a single ball is 0.8 mm)

SoM Function Parameters:

Function	Maximum Number	Parameter	Number of interfaces defined by UP5	Parameter
MIPI DC PHY (DPHY/CPHY) *1	2	Supports DPHY or CPHY; 4-channel MIPI DPHY V1.2, up to 2.5 Gbps per lane; 3-channel MIPI CPHY V1.1, up to 2.5 Gbps per lane;	\	
MIPI CSI DPHY*1	4	2-channel MIPI DPHY V1.2, with a maximum data rate of 2.5 Gbps per lane; every two 2-channel DPHYs can be combined to form a single 4-channel DPHY for a parallel display interface, supporting a maximum resolution	4	1 x 4-channel MIPI DPHY V2.0, with a maximum of 4.5 Gbps per lane; 3 x 2-channel MIPI DPHY V1.2, with a maximum of 2.5 Gbps per lane; any two 2-channel DPHYs can be combined into a single 4-channel DPHY to serve a

		of WUXGA (1920 x 1200 @ 60 fps, 165 MHz pixel clock)		parallel display interface, supporting a maximum resolution of WUXGA (1920 x 1200 @ 60 fps, 165 MHz pixel clock)
DVP	1	8/10/12/16-bit standard DVP interface, with a maximum data input rate of 150 MHz; supports BT.601/BT.656 and BT.1120 VI interfaces;	\	
HDMI RX	1	Supports HDMI 2.0 at 3.4 Gbps to 6 Gbps; supports HDMI 1.4b at 250 Mbps to 3.4 Gbps; supports HDCP 2.3 and HDCP 1.4;	1	Supports HDMI 2.0 at 3.4 Gbps to 6 Gbps; supports HDMI 1.4b at 250 Mbps to 3.4 Gbps; supports HDCP 2.3 and HDCP 1.4;
HDMI/eDP TX	≤2	Supports 2 x HDMI/eDP TX combination ports (HDMI and eDP cannot operate simultaneously), with each port supporting x1, x2 and x4 configurations; HDMI supports a resolution of 7680x4320@60Hz, with bandwidths of 3, 6, 8, 10 and 12 Gbps, and supports HDCP 2.3; eDP supports a resolution of 4K@60Hz, with bandwidths of 1.62 Gbps, 2.7 Gbps and 5.4 Gbps, and supports HDCP 1.3;	2	Supports 2 x HDMI/eDP TX combination ports (HDMI and eDP cannot operate simultaneously), with each port supporting x1, x2 and x4 configurations; HDMI supports a resolution of 7680x4320@60Hz, with bandwidths of 3, 6, 8, 10 and 12 Gbps, and supports HDCP 2.3; eDP supports a resolution of 4K@60Hz, with bandwidths of 1.62 Gbps, 2.7 Gbps and 5.4 Gbps, and supports HDCP 1.3;
DP TX	2	Supports 2 x DP TX 1.4a ports, compatible with USB 3.1 Gen 1, supporting 1, 2 or 4 channels; resolution up to 7680x4320@30Hz; supports DP Alt Mode via USB Type-C;	\	
MIPI DSI	2	Supports 2 x MIPI DPHY 2.0 or CPHY 1.1 interfaces, with a resolution of up to 4K@60Hz; supports dual MIPI displays in	2	Supports 2 x MIPI DPHY 2.0 or CPHY 1.1 interfaces, capable of achieving up to 4K@60Hz resolution. It also supports dual

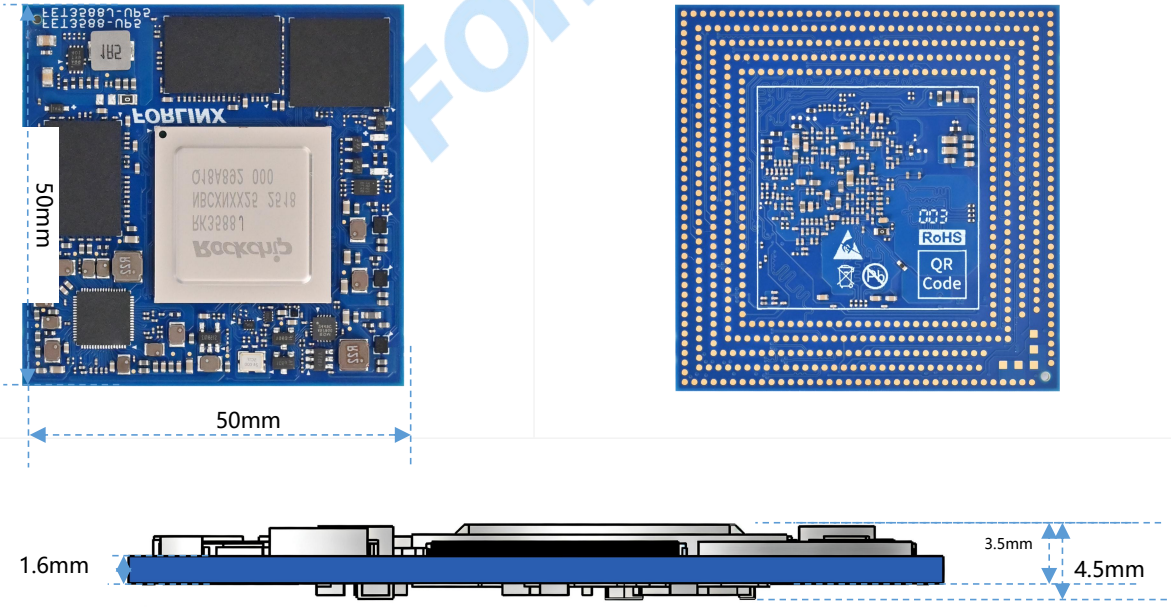
		left-right mode, and supports RGB/YUV formats (up to 10-bit);		MIPI display in left-right mode and supports RGB/YUV formats (up to 10-bit).;
BT.1120 output	1	Supports RGB format (up to 8-bit), with a data rate of up to 150 MHz; resolution up to 1920x1080@60Hz;	\	
I2S	≤4	Transmits and receives clock signals up to 50 MHz; supports time-division multiplexing (TDM), Inter-IC Communication (I2C) and similar formats; supports digital audio interface transmission (SPDIF, IEC 60958-1 and AES-3 formats); supports audio reference output clock;	1	Transmits and receives clock signals up to 50 MHz; supports time-division multiplexing (TDM), Inter-IC Communication (I2C) and similar formats; supports digital audio interface transmission (SPDIF, IEC 60958-1 and AES-3 formats); Supports an audio reference output clock;
SPDIF	2	Supports storage of 2x 16-bit audio data; Supports dual-phase stereo output;	\	
PDM	2	Up to 8 channels, with audio resolution ranging from 16 to 24 bits and a sampling rate of up to 192 kHz; supports PDM master receiver mode;	\	
DSM PWM	1	The audio PCM data is converted via direct bitstream digital encoding to produce a 1-bit signal stream; the output digital signal can be filtered to produce an audio signal;	\	
Ethernet	2	2 x GMAC, providing RGMII / RMII interface pins; supports 10/100/1000 Mbps data transfer rates;	2	2 × GMAC with RGMII / RMII interfaces Supports Data rates: 10/100/1000 Mbps;
USB3.1 Gen1*2	3	USB 3.1 Gen 1 data transfer rates of up to 5 Gbps; 2 x USB 3.1 OTG, shared with DP TX (USB3OTG_0	3	USB 3.1 Gen 1 data transfer rates of up to 5 Gbps; 2 x USB 3.1 OTG ports, USB3OTG_0 and

		and USB3OTG_1); USB3OTG_0 and USB3OTG_1 support USB Type-C and DP Alt; 1 x USB 3.1 Host, shared with PIPE PHY2 (USB3OTG_2);		USB3OTG_1, which support USB Type-C; 1 USB 3.1 Host port;
USB 2.0 Host	2	Supports 2 x USB2.0 Host;		
PCIe 2.0*2	≤3	Each PCIe2.1 interface supports 1 lane, with data rate up to 5Gbps;	≤2	Each PCIe2.1 interface supports 1 lane, with data rate up to 5Gbps;
PCIe 3.0*2	≤4	Supports RC and EP, with a maximum data rate of 8 Gbps; supports four configuration options: 1 x 4, 2 x 2, 4 x 1, and 1 x 2 + 2 x 1;	2	Supports RC and EP, with a maximum data rate of 8 Gbps; supports four configuration options: 1 x x4, 2 x x2;
SDMMC	1	Integrated with 1 SDMMC controller and 1 SDIO controller, both supporting the SDIO 3.0 protocol and MMC V4.51 protocol.	1	Integrated with 1 SDMMC controller and 1 SDIO controller, both supporting the SDIO 3.0 protocol and MMC V4.51 protocol.
SDIO	1		1	
SPI	≤5	Each controller supports two chip-select outputs; it supports both serial master and serial slave modes, which are software-configurable;	2	Each controller supports two chip-select outputs; it supports both serial master and serial slave modes, which are software-configurable;
I2C	≤9	Supports 7-bit and 10-bit address modes; data transfer rates of up to 100 kbits/s in standard mode and up to 400 kbits/s in high-speed mode;	4	Supports 7-bit and 10-bit addressing modes; standard mode data rate up to 100k bits/s, fast mode up to 400k bits/s.
UART	≤10	Features two built-in 64-bit FIFOs, which can be used separately for TX and RX; supports 5-bit, 6-bit, 7-bit and 8-bit serial data transmission and reception, with baud rates up to 4 Mbps; all 10 UARTs support automatic flow control mode;	4	Features two built-in 64-bit FIFOs, which can be used separately for TX and RX; supports 5-bit, 6-bit, 7-bit and 8-bit serial data transmission and reception, with baud rates up to 4 Mbps; all UARTs support automatic flow control mode; two of them support 485;

SATA*2	≤3	Features three SATA 3.0 controllers, and the PCIe and USB 3.0 HOST 2 controllers share PIPE PHY 0/1/2; supports eSATA, with a maximum data rate of 6 Gbps;	\	
PWM	≤16	Supports up to 16 on-chip PWM with interrupt-based operation and capture mode;;	2	Features interrupt-based operation and supports capture mode.
ADC	≤8	Supports 8 x 12bit single-ended input SAR-ADC with sampling rate up to 1MS/s;;	7	Supports 8 x 12bit single-ended input SAR-ADC with sampling rate up to 1MS/s;;

Note: The maximum number of parameters in the table is the theoretical value of hardware design or CPU; The number of interface resources defined by UP5 in the table is the maximum number supported by the UP5 universal package.

SoM Appearance & Parameters:



Note:
PCB thickness is 1.6mm, total PCBA height is 4.5mm, total height of PCB and components on the front side is 3.5mm, dimensional tolerance is ±0.2mm;
The 5 square pads on the back are non - functional pins and do not need to be soldered.

Software Support:

OS	Linux6.1, Android14, Forlinx Desktop 24.04
System flashing Method	• SD card • USB OTG

Peripheral Support List:

Linux6.1 Drive Support List	I2S	Audio Chip	NAU88C22YG
	I2C	RTC chip	PCF8563
	RS485	TTL to 485	FIT-485 V1.1
	PCIe	Onboard WIFI module	AW-CM276MA, AW-XM458
	PCIe	PCIe3.0x4	TL-NT521 10 Gigabit Ethernet Network Interface Card
	PCIe	M.2 NVMe SSD	Samsung 970 EVO Plus 250GB (Test Model)
	UART	BT	AW-CM276MA, AW-XM458
	USB	USB camera	Logitech C270 (UVC protocol）
	USB	4G module	Quectel EM05 (driver compatible with EC20-CEHDLG)
	USB	5G module	Quectel RM500U，RM500Q
	MIPI-CSI	Camera	OV13850
	MIPI-DSI	7-inch capacitive touch screen	FIT-LCD7.0C MIPI V2.0 V3.0
	eDP	12.5-inch LCD	BOE NV125FHM-N82,12.5-inch, 1920*1080 resolution
	DP	DP Display	4K
	HDMI	HDMI Display	8K
	RGMII	Gigabit Ethernet	RTL8211FSI-CG
	PWM	LCD Backlight	/
	UART	General	General
	SPI	General	General
	GPIO	General	General

	Interface	**Function**	**Solution**
Forlinx Desktop24.04 Drive Support List	I2S	Audio Chip	NAU88C22YG
	I2C	RTC chip	PCF8563
	RS485	TTL to 485	FIT-485 V1.1
	PCIe	Onboard WIFI module	AW-CM276MA 和 AW-XM458
	PCIe	PCIe3.0x4	TL-NT521 10 Gigabit Ethernet Network Interface Card
	PCIe	M.2 NVMe SSD	Samsung 970 EVO Plus 250GB (Test Model)
	UART	BT	AW-CM276MA 和 AW-XM458
	USB	USB camera	Logitech C270 (UVC protocol）

	USB	4G module	Quectel EM05 (driver compatible with EC20-CEHDLG)
	USB	5G module	Quectel RM500U，RM500Q
	MIPI-CSI	Camera	OV13850
	MIPI-DSI	7-inch capacitive touch screen	FIT-LCD7.0C MIPI V2.0 V3.0
	eDP	12.5-inch LCD	BOE NV125FHM-N82,12.5-inch,1920*1080 resolution
	DP	DP Display	4K
	HDMI	HDMI Display	8K
	RGMII	Gigabit Ethernet	RTL8211FSI-CG
	PWM	LCD Backlight	/
	UART	General	General
	SPI	General	General
	GPIO	General	General

Android14 Drive Support List	**Interface**	**Function**	**Solution**
	I2S	Audio	NAU88C22YG
	I2C	Capacitive touch	FT5x06
	I2C	Capacitive touch	GT9xx
	I2C	RTC	PCF8563
	RS485	TTL to 485	FIT-485 V1.1
	PCIe	2.4G/5G dual-band Wi-Fi	AW-CM276MA 和 AW-XM458
	UART	BT	AW-CM276MA 和 AW-XM458
	USB	4G module	Quectel EM05 (driver compatible with EC20-CEHDLG)
	USB	5G module	Quectel RM500U
	USB	USB camera	Logitech C270 (UVC protocol）
	MIPI-CSI	OV13855 camera	RF13855-JD01 V1.0, 4K
	MIPI-DSI	7-inch LCD	FIT-LCD7.0C V2.1,1024*600 resolution
	eDP	12.5-inch LCD	BOE NV125FHM-N82,12.5-inch,1920*1080
	DP	DP Display	4K
	HDMI	HDMI Display	8K
	RGMII	Gigabit Ethernet	RTL8211FSI-CG
	PWM	LCD Backlight	/
	UART	General	General
	SPI	General	General
	GPIO	General	General

Materials List:

Linux6.1+Qt5.15 Documentation List:	User Manual, Compilation Guide, Linux Kernel Source Code, File System, Factory Image, Development Environment VM Ubuntu Image, FTP Tool, YUV Video Playback Tool, Camera Test Tool, SD Flash Card Creation Tool, USB OTG Flash Tool, Mass Production Programming Tool, Driver Installation Tool, Firmware Flash Tool, Serial Port Driver Installation Tool, QT Test Routine Source Code, Application Notes.
Android14 Materials List:	User Manual, Compilation Guide, Linux Kernel Source Code, File System, Factory Image, Development Environment VM Ubuntu Image, FTP Tool, YUV Video Playback Tool, Camera Test Tool, SD Flash Card Creation Tool, USB OTG Flash Tool.
Forlinx Desktop24.04 Materials List:	User Manual, Compilation Guide, Linux Kernel Source Code, File System, Factory Image, Development Environment VM Ubuntu Image, FTP Tool, YUV Video Playback Tool, Camera Test Tool, SD Flash Card Creation Tool, USB OTG Flash Tool.
Hardware Documentation List:	Hardware Manual, Source File of Carrier Board Schematic Diagram (in AD format), Source File of Carrier Board PCB (in AD format), PDF of Carrier Board Schematic Diagram, Chip Data Sheet, 2D CAD Drawing of SoM, 2D CAD Drawing of Carrier Board, Pin Function Multiplexing Table*, Design Guide*

*: The documentation will be gradually provided and enriched after the product is released.

Ordering Model List:

Specification Model	Core	CPU Clock	RAM	ROM	Operating Temperature	Supply
FET3588-UP5+244GSE64GC	4×A76+4×A55	A76@2.4GHz A55@1.8GHz	4GB	64GB	0~+70℃	R&D
FET3588-UP5+248GSE64GC			8GB	64GB	0~+70℃	R&D
FET3588-UP5+2416GSE128GC			16GB	128GB	0~+70℃	R&D
FET3588J-UP5+224GSE32GI	4×A76+4×A55	A76@1.6GHz A55@1.3GHz	4GB	32GB	-40~+85℃	Samples:
FET3588J-UP5+228GSE64GI			8GB	64GB	-40~+85℃	Mass Production
FET3588J-UP5+2216GSE128GI			16GB	128GB	-40~+85℃	R&D

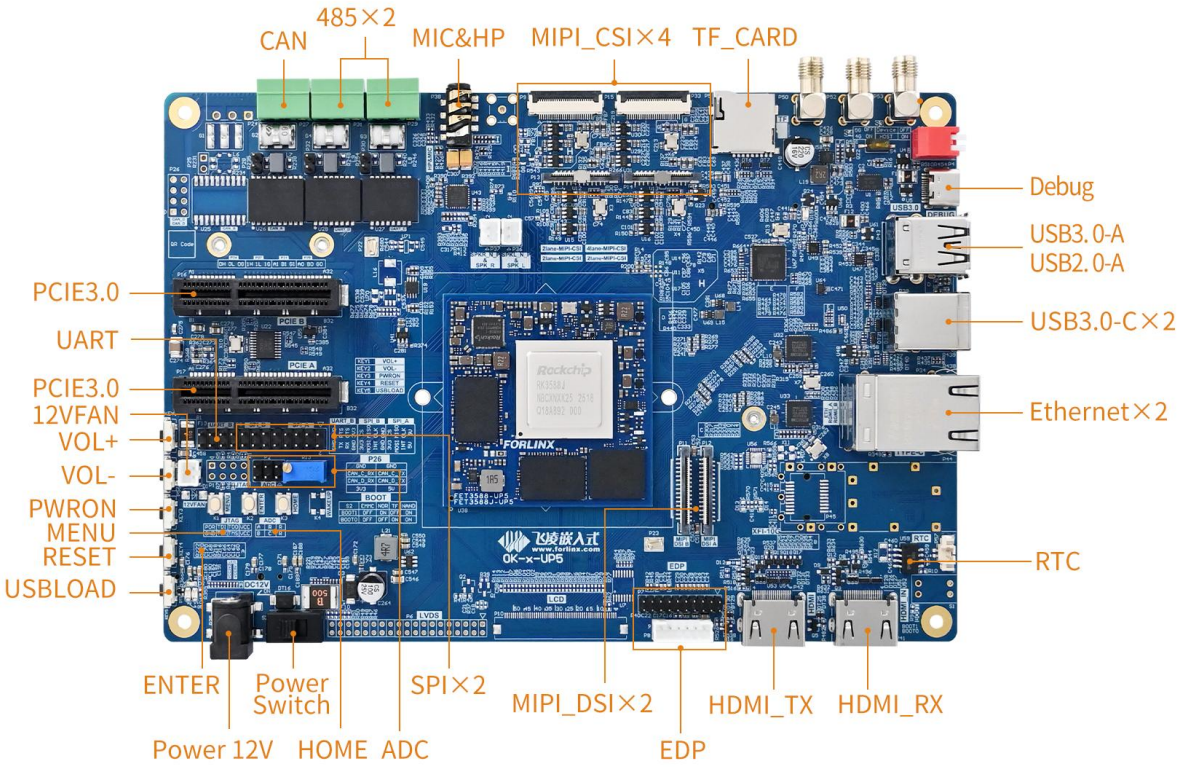
SoM Naming Rules:

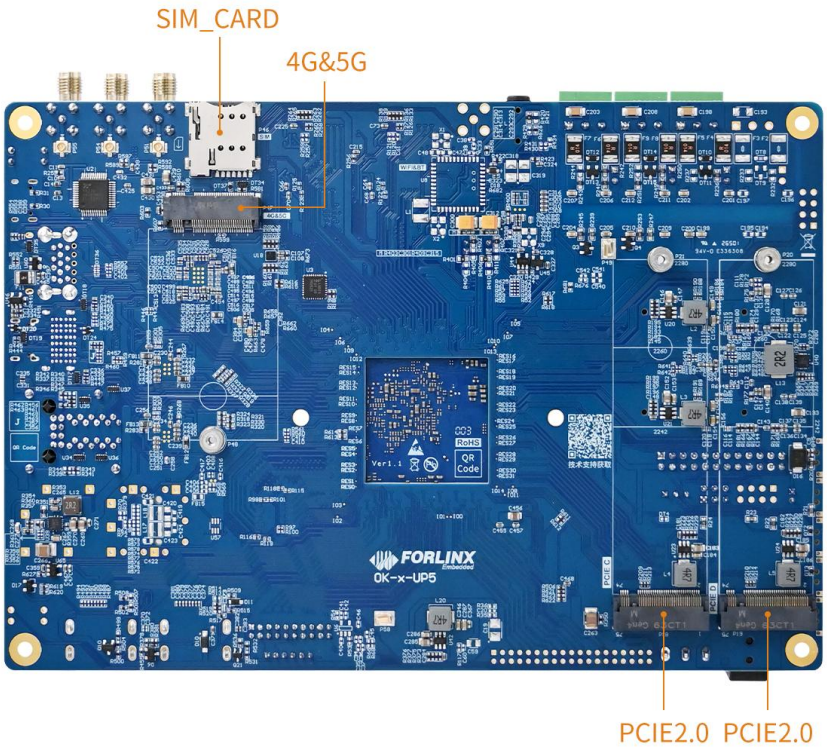
A	-	B	-	C	+	D	E	F	G	H	I	J	:	K	L

This table describes SoM number terms to define its characteristics (e.g., CPU, frequency, temperature grade, version).

Field	Field Description	Value	Description
A	Product Line Identification	FET	Forlinx Embedded SoM
		FL	Forlinx Embedded All in One Panel
-	Segment Identification	-	
B	CPU Name	3588	RK3588
		3588J	RK3588J
-	Segment Identification	-	
C	Connection	UP5	LGA general package dimension 50mm×50mm
+	Segment Identification	+	The configuration parameter section follows this identifier.
D	CPU Clock	22	2.2 GHz
		24	2.4 GHz
E	RAM Capacity (Unite: Byte)	4G	4GB
		8G	8GB
		16G	16GB
		32G	32GB
F	Single ROM Type	SE	eMMC
G	Single ROM Capacity (Unite: Byte)	32G	32GB
		64G	64GB
		128G	128GB
H	Operation Temperature	C	0 to 70℃ Commercial-grade
		I	-40 to 85℃ Industrial-grade
I	Configuration No.	A~Z	If the D ~ H field values of each product are the same, the field values are the same, in ascending order according to the configuration release time
J	PCB Version	10	V1.0
		11	V1.1
		xx	Vx.x
: KL	Internal Identification of the Manufacturer	: xx	It is manufacturer's internal logo without influence on use.

Development Board Interface（Size 190mm× 130mm）：





Development Board Function Parameters:

Function	Quantity	Parameter
MIPI CSI	4	1 x MIPI DPHY V2.0 4-lane interface, supporting up to 4.5 Gbps per lane; connected via a 26-pin FPC socket, with the OV13850 camera mounted by default; 3 x MIPI DPHY V1.2 2-lane interfaces, supporting up to 2.5 Gbps per lane; brought out via three 26-pin FPC sockets; pre-mounted with an OV5645 camera by default;
MIPI DSI	2	Each MIPI interface supports 4 lanes of output, with a maximum resolution of 4K@60fps; compatible with Feiling's 7-inch MIPI display, with a resolution of 1024 x 600@30fps; supports separate display and touch functionality.
HDMI RX	1	Led out via a standard HDMI connector; supports up to 4K@60Hz.
HDMI TX	1	Led out via a standard HDMI connector; supports up to 7680x4320@60Hz.
eDP TX	1	Compatible with 1080p@60Hz displays; supports up to 4K@60Hz.
USB3.1 Gen1	2	Led out via the Type-C interface; Used in conjunction with DP TX, with data rates of up to 5 Gbps;
USB3.0 Host	1	Connected via a Type-A USB port, with transfer speeds of up to 5 Gbps;
USB2.0 Host	1	Led out via a Type-A USB interface; supports High-Speed (480 Mbps), Full-Speed (12 Mbps), and Low-Speed (1.5 Mbps) modes.

PCIe3.0	2	2x2-lane PCIe signals routed out via two PCIe x4 slots; supports data rates of 2.5 Gbps (PCIe 1.1), 5 Gbps (PCIe 2.1) and 8 Gbps (PCIe 3.0);
PCIe2.0	2	Led out via one M.2 M-Key slot; supports speeds up to 5 Gbps
Ethernet	2	Led out via 2 x RJ45 interfaces; Supports 10/100/1000 Mbps data transmission rate.
TF Card	1	TF card is available, rate up to 150MHz，support SDR104 mode;
Audio	1	Codec chip on board, support headphone output, MIC input level Speaker output and other functions;
RS485	2	2 x RS485 CAN bus routed out through RS485 transceiver;
CAN	1	Connect one CAN bus via the CANFD transceiver;
UART	1	Led out via 2.54 mm pitch;Up to 4Mbps baud rate;
4G/5G	1	Supports M.2 packaged 4G/5G modules;
WIFI&BT	1	Supports Wi-Fi and Bluetooth modules in M.2 form factor; Forlinx has adapted modules that support Wi-Fi 6 SU and MU-MIMO, as well as Bluetooth 5.3;
ADC	5	Led out via a PH2.0 socket; 12-bit resolution and a sampling rate of up to 1 MS/s;
RTC	1	Onboard RTC chip and battery socket;
SPI	2	Routed via a 2.54mm pitch connector;
FAN	1	Onboard fan connector;

Note: The parameters in the table are the theoretical values of hardware design or CPU.

Power Consumption:

Linux System Power Consumption Table

No.	Test Item	SoM Power (W)	Development Board Power (W)
1	No-load starting peak power	9	9.6
2	No-load standby peak power	2.37	3.6
3	CPU + Memory + eMMC stress test	6.98	10
4	PWRPN_L: sleep mode power consumption	0.59	2.53

Android System Power Consumption

No.	Test Item	SoM Power (W)	Development Board Power (W)
1	No-load starting peak power	7.09	10.08
2	No-load standby peak power	1.63	4.1
3	AnTuTu Power Consumption	6.6	9.6
4	PWRON_L: sleep mode power consumption	1.32	3.56
5	PWRON_L Power-on/off via button	0.34	0.36

