

FET3576-UP5 / FET3576J-UP5

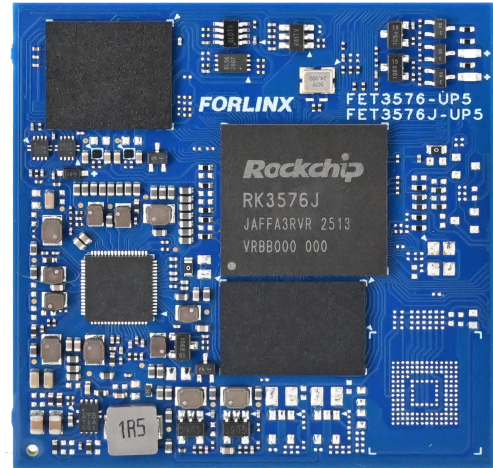
SoM

The FET3576-UP5/FET3576J-UP5 SoM is developed and designed based on the Rockchip RK3576 processor. It is a high - performance, low - power, feature - rich application processor developed by Rockchip for the AIoT and industrial markets.

It integrates four ARM Cortex - A72 and four ARM Cortex - A53 high - performance cores, and has a built - in NPU with a computing power of up to 6 TOPS, which can provide strong support for AI applications. It has passed rigorous industrial environment testing in Forlinx Embedded's laboratory, ensuring stable and reliable quality. It also offers 10–15 years longevity, guaranteeing long-term and stable supply.

Product Features:

- 8nm manufacturing process technology;
- Compatible with the pin design of the *FET3576 - C SoM, leaving room for performance upgrades;
- Supports the RK Firewall function to achieve real hardware resource isolation;
- Supports the DSMC parallel bus for easy connecting with FPGA and DSP;
- 6TOPS NPU, meeting edge AI requirements;
- 50mm × 50mm – compact size;
- Rich bus interfaces: PCIe 2.1, USB 3.2, CAN-FD, etc.



FET3576J-UP5 SoM

4×A72+4×A53 CPU	2.2 GHz Clock	50mm×50mm Dimensions
Mali-G52 MC3 GPU	6TOPS NPU	UP5 package Compatibility

SoM Parameter:

Processor	Rockchip RK3576 / RK3576J ARM: 4×Cortex-A72 + 4×Cortex-A53 NPU: 6TOPS INT8, supports INT4/INT8/INT16/FP16/BF16/TF32 GPU: ARM Mali-G52 MC3, supports OpenGL ES 1.1/2.0/3.2、OpenCL 2.0、Vulkan 1.1 VPU: Hardware Encoding: H.264, H265, 4K@60fps Hardware Decoding: H.264, H.265, VP9, AV1, AVS2, 8K@30fps or 4K@120fps
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RAM	2GB/4GB/8GB LPDDR4
ROM	16GB/32GB/64GB eMMC
Operating Temperature	FET3576-UP5 SoM 0°C~+70°C FET3576J-UP5 SoM: -40°C~+85°C
Working Voltage	DC 5V-13V
Net Weight	14.4g
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 CSI	5	Supports 5 CSI-2 Interfaces: Four of these interfaces each have 2 D-PHY v1.2 data lanes, with 2.5 Gbps per lane; These four interfaces can be combined into two interfaces, each with 4 data lanes; The fifth interface supports either 4 D-PHY data lanes or 3 C-PHY trios; D-PHY v2.0 lane speed: 4.5 Gbps; C-PHY v1.1 trio speed: 2.4 Gbps.	4	Supports 4 CSI-2 Interfaces Three of these interfaces each have 2 D-PHY v1.2 data lanes, with 2.5 Gbps per lane; The fourth interface supports either 4 D-PHY data lanes or 3 C-PHY trios; D-PHY v2.0 lane speed: 4.5 Gbps; C-PHY v1.1 trio speed: 2.4 Gbps.
DVP	1	Standard DVP interface (8/10/12/16-bit, up to 150 Mhz); Supports BT.601, BT.656, and BT.1120 VI interfaces	\	
HDMI/eDP TX	1	Supports 1 HDMI / eDP TX combined interface HDMI Interface HDMI v2.1 Supports up to 4K@120 Hz Data formats: RGB/YUV444/YUV422/YUV420 8/10-bit	1	Supports 1 HDMI_TX interface. HDMI Interface HDMI v2.1 Supports up to 4K@120 Hz Data formats: RGB/YUV444/YUV422/YUV420 8/10-bit

		Supports CEC and ARC HDCP v2.3 and HDCP v1.4 eDP Interface eDP v1.3 Main link includes 4 physical lanes Supports up to 4K@60 Hz HDCP v1.3		Supports CEC and ARC HDCP v2.3 and HDCP v1.4
DP&USB 3.2Gen1 OTG	1	Supports 1 USB / DP combined interface. USB Interface USB 3.2 Gen1x1 Dual-Role Device (DRD) DisplayPort TX Interface DisplayPort v1.4 Supports 1/2/4 lanes with lane speeds of 1.62, 2.7, 5.4, and 8.1 Gbps Supports up to 4K@120 Hz Data formats: RGB/YUV444/YUV422/YUV420 8/10-bit Supports Multi-Stream Transport (MST) with 3 displays Supports DP Altmode on USB Type-C Supports HDCP v2.3 and HDCP v1.3	\	Supports 1 USB / DP combined interface. USB Interface USB 3.2 Gen1x1 Dual-Role Device (DRD) DisplayPort TX Interface DisplayPort v1.4 Supports 1/2/4 lanes with lane speeds of 1.62, 2.7, 5.4, and 8.1 Gbps Supports up to 4K@120 Hz Data formats: RGB/YUV444/YUV422/YUV420 8/10-bit Supports Multi-Stream Transport (MST) with 3 displays Supports DP Altmode on USB Type-C Supports HDCP v2.3 and HDCP v1.3
MIPI DSI	1	Supports 1 MIPI DSI-2 TX interface. D-PHY v2.0 or C-PHY v1.1 4 data lanes on D-PHY 3 data trios on C-PHY Supports up to 2560 × 1600@60 Hz Data format: RGB (up to 10-bit)	1	Supports 1 MIPI DSI-2 TX interface. D-PHY v2.0 or C-PHY v1.1 4 data lanes on D-PHY 3 data trios on C-PHY Supports up to 2560 × 1600@60 Hz Data format: RGB (up to 10-bit)
Parallel	1	Supports 1 parallel output interface. Supports RGB/BT.656/BT1120 Supports up to 1920 × 1080@60 Hz Data format: RGB (up to 10-bit)	\	
EBC	1	Supports 1 EBC output interface. Supports E-ink EPD (Electronic	\	

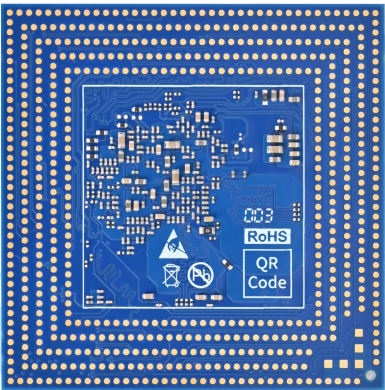
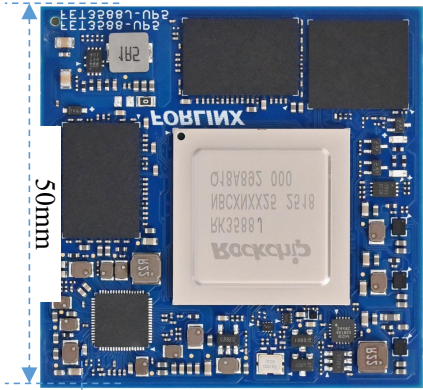
		Paper Display) Supports 2560 × 1920 hardware decoding Data bus width: 16-bit Supports up to 32-level gray scale Supports Direct mode, LUT mode, 3-window mode Supports window display mode		
SAI	≤5	Supports 5 SAI interfaces. SAI 0/1 supports 4 TX lanes and 4 RX lanes. SAI 2/3/4 supports 1 TX lane and 1 RX lane. Supports I2S/TDM/PCM mode Maximum sample rate: 192 kHz Audio resolution: 16 to 32 bits	1	Supports 1 SAI interface. SAI 2 supports 1 TX lane and 1 RX lane. Supports I2S/TDM/PCM mode Maximum sample rate: 192 kHz Audio resolution: 16 to 32 bits
SPDIF TX	≤2	· Supports 2 x SPDIF TX ports;	1	
SPDIF RX	≤2	· Supports 2 x SPDIF RX ports;	1	
PDM	≤2	Up to 8 channels, audio resolution: 16-bit to 24-bit, sample rate up to 192 kHz; Supports PDM master receive mode	1	
Ethernet	≤2	2 × GMAC with RGMII / RMII interfaces; Supports Data rates: 10/100/1000 Mbps	2	2 × GMAC with RGMII / RMII interfaces; Supports Data rates: 10/100/1000 Mbps
Combo high speed interface	2	Supports 1 x PCIe2.1/SATA3.1 interface with one data lane; Supports 1 x PCIe2.1/SATA3.1/USB3.2 Gen1x1 interface with one data lane	2	Supports 1 x PCIe2.1/SATA3.1 interface with one data lane
USB 2.0 OTG	2	· 2 x USB2.0 OTG	1	
SDIO	≤2	·SDIO v3.0, 4-bit data bus widths	2	·SDIO v3.0, 4-bit data bus widths
SPI	≤5	Supports two chip-select in each interface; Supports serial-master and serial-slave mode	2	Supports two chip-select in each interface; Supports serial-master and serial-slave mode
I2C	≤9	Supports 7-bit and 10-bit address modes; Data transmission rate of 100K	4	Supports 7-bit and 10-bit address modes; Data transmission rate of 100K

		bits/s in standard mode and 400k bits/s in fast mode.		bits/s in standard mode and 400k bits/s in fast mode.
I3C	≤ 2	· Supports 2 x I3C master ports	\	
UART	≤ 12	Built-in 2×64 -bit FIFO (separate TX/RX) Supports 5-, 6-, 7-, 8-bit serial data transmission Baud rate up to 4 Mbps $12 \times$ UART all support auto-flow-control (AFC) mode $12 \times$ UART all support RS-485 mode	4	Both UART support automatic flow control mode and RS485 mode.
CAN	≤ 2	Compliant with CAN & CAN FD specifications; Supports standard & extended frame transmission 8192-bit receive FIFO;	2	Compliant with CAN & CAN FD specifications; Supports standard & extended frame transmission 8192-bit receive FIFO;
DSMC	≤ 1	· Supports up to select 4 chips · Supports 8-wire and 16-wire serial transfer mode · Supports configurable serial address width: 16 bits or 32 bits		
FlexBus	≤ 1	· Supports built-in DMA and ping-pong operation for allocating two address · Supports transmission and receiving mode · Supports single mode and continuous mode	\	
PWM	≤ 16	Supports up to 16 on-chip PWM with interrupt-based operation and capture mode;	2	Supports up to 2 on-chip PWM with interrupt-based operation and capture mode;
ADC	≤ 8	· Supports 8 x 12bit single-ended input SAR-ADC with sampling rate up to 1MS/s;	4	· Supports 4 x 12bit single-ended input SAR-ADC with sampling rate up to 1MS/s;
GPIO	n	All GPIOs can be used to generate interrupts; Supports level-triggered and edge-triggered interrupts; Supports configuration of level-triggered polarity; Supports rising-edge, falling-edge and dual-edge interrupts; Supports configuration of pull-up/pull-down (weak pull-up and	16	All GPIOs can be used to generate interrupts; Supports level-triggered and edge-triggered interrupts; Supports configuration of level-triggered polarity; Supports rising-edge, falling-edge and dual-edge interrupts; Supports configuration of pull-up/pull-down (weak pull-up and

		weak pull-down); Supports configuration of drive capability Configurable drive strength.		weak pull-down); Supports configuration of drive capability Configurable drive strength.
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Note: The parameters in the table are the theoretical values of the hardware design or CPU. There is GPIO multiplexing for the interfaces, and the values represent the theoretical maximum quantity.

■ 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 $\pm 0.2\text{mm}$;
The 5 square pads on the back are non - functional pins and do not need to be soldered.

■ Software Support:

OS	Linux 84, Forlinx Desktop 24.04 (based on Ubuntu 24.04 file system) , Android 14
Flashing method	• USB OTG • TF card

■ Peripheral Support List:

Linux 6.1 Drive Support List	Interface	Function	Solution
	SDIO	Wi-Fi	AWCM358SM
	UART	Bluetooth	
	I2C	RTC	RX8010SJ
	I2C	IO Expansion	PCAL6524
	SAI	Audio Chip	NAU88C22YG
	MIPI-DSI / I2C	MIPI display capacitive touch	LCD070CM+1024600AB21
	PCIe	PCIe to 1000M Ethernet	PCIE to RJ45, RTL8111E
	MIPI-UP5SI	Camera	OV13855
	USB	4G/5G	Quectel EM05/RM500U, M.2 package; compatible with EC20
	UART	TTL to 485	FIT-485 V1.1
	RGMII	Gigabit Ethernet	RTL8211FSI-CG
	CAN	General	
	PWM	General	
	ADC	General	
Forlinx Desktop24.04 Drive Support List	Interface	Function	Solution
	SDIO	Wi-Fi	AWCM358SM
	UART	Bluetooth	
	I2C	RTC	RX8010SJ
	I2C	IO Expansion	PCAL6524
	SAI	Audio Chip	NAU88C22YG
	MIPI-DSI / I2C	MIPI display capacitive touch	LCD070CM+1024600AB21
	PCIe	PCIe to 1000M Ethernet	PCIE to RJ45, RTL8111E
	MIPI-UP5SI	Camera	OV13855
	UART	TTL to 485	FIT-485 V1.1
	RGMII	Gigabit Ethernet	RTL8211FSI-CG
	CAN	General	
	PWM	General	
	ADC	General	
Android14 Drive Support List	Interface	Function	Solution
	SDIO	Wi-Fi	AWCM358SM
	UART	Bluetooth	
	I2C	RTC	RX8010SJ
	I2C	IO Expansion	PCAL6524

	SAI	Audio Chip	NAU88C22YG
	HDMI	/	Up to 3840 x 2160 120Hz
	DP	/	Up to 1920x1080 60Hz
	MIPI-DSI / I2C	MIPI display capacitive touch	LCD070CM+1024600AB21
	PCIe	PCIe to 1000M Ethernet	PCIE to RJ45, RTL8111E
	USB	4G/5G	Quectel EM05/RM500U, M.2 package; drive compatible with EC20
	UART	TTL to 485	FIT-485 V1.1
	RGMII	Gigabit Ethernet	RTL8211FSI-CG
	USB	USB to four serial port module	FIT-USB-TO-4-UARTS:V10
	CAN	General	
	PWM	General	
	ADC	General	

■ Product Materials:

Linux 6.1	User's Manual, User's Compilation Manual, Factory Image, Kernel Source Code, Test Program Source Code, File System, Driver Tool, Download Tool, Burning Tool, Development , Application Notes.
Forlinx Desktop24.04	User's Manual, User's Compilation Manual, Factory Image, Kernel Source Code, Test Program Source Code, File System, Driver Tool, Download Tool, Burning Tool, Development , Application Notes.
Android 14.0	User's Manual, User's Compilation Manual, Factory Image, Kernel Source Code, Program Source Code, File System, Driver Tool, Download Tool, Flashing Tool, Development , Application Notes.
Hardware Documentation	Hardware Manual, Pin Multiplexing Comparison Table, Pin Function Comparison Table, SoM STEP File, Carrier Board STEP File, SoM DXF File, Carrier Board DXF File, Carrier Board PDF Schematic, Carrier Board PCB Source File, Carrier Board Design Data.

* Forlinx will keep providing more product information.

■ Ordering Model List:

Specification Model	CPU SoM and main frequency	DDR	RAM	ROM	Temperature Scope	Supply
FET3576-UP5+222GSE32GCxx: xx	4×A72@2.2GHz +4×A53@2.0GHz Z	LPDDR 4	2GB	32GB	0°C~+70°C	R&D
FET3576-UP5+224GSE32GCxx: xx	4×A72@2.2GHz +4×A53@2.0GHz Z	LPDDR 4	4GB	32GB	0°C~+70°C	R&D

FET3576- UP5+228GSE64GCxx: xx	4×A72@2.2GHz +4×A53@2.0GHz Z	LPDDR 4	8GB	64GB	0°C~+70°C	R&D
FET3576J- UP5+212GSE16GIxx: xx	4×A72@2.1GHz +4×A53@1.9GHz Z	LPDDR 4	2GB	16GB	-40°C~+85°C	R&D
FET3576J- UP5+214GSE32GIxx: xx	4×A72@2.1GHz +4×A53@1.9GHz Z	LPDDR 4	4GB	32GB	-40°C~+85°C	Mass Production
FET3576J- UP5+218GSE64GIxx: xx	4×A72@2.1GHz +4×A53@1.9GHz Z	LPDDR 4	8GB	64GB	-40°C~+85°C	R&D

■ SoM Naming Rules:

A	B	-	C	+	D	E	F	G	H	I	J	:	K	L
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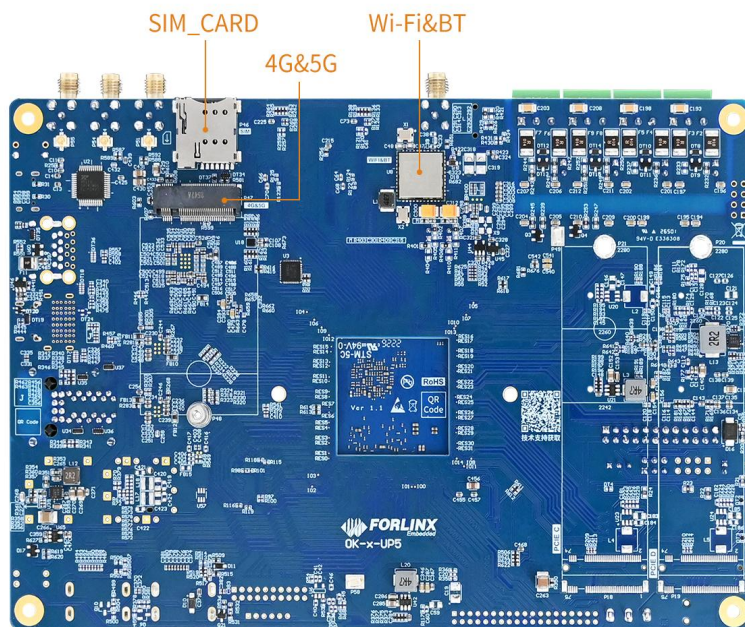
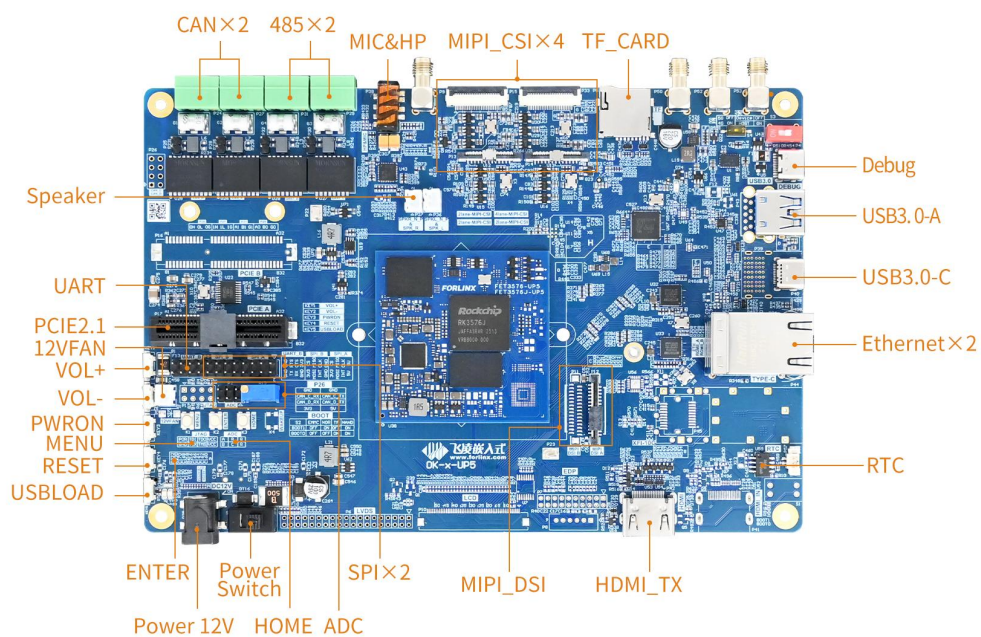
This table describes SoM number terms to define its characteristics (e.g., CPU, frequency, temperature grade, version).

Field	Field Description	Value	Description
A	Product Line Identification	FET	Forlinx Embedded SoM
		FL	Forlinx Embedded All in One Panel
B	CPU Name	3576	Commercial level
		3576J	Industrial-grade
-	Segment Identification	-	
C	Connection	UP5	LGA general package dimension 50mm×50mm
+	Segment Identification	+	The configuration parameter section follows this identifier.
D	CPU Clock (Max.)	22	2.2 GHz
		21	2.1 GHz
E	RAM Capacity (Unit: Byte)	2G	2GB
		4G	4GB
		8G	8GB
F	Single ROM Type	SE	eMMC
G	Single ROM Capacity (Unit: Byte)	16G	16GB
		32G	32GB
		64G	64GB
H	Operation Temperature	C	0 to 70°C Commercial-grade
		I	-40 to 85°C Industrial-grade
I	Configuration	A~Z	If the D ~ H field values of each product are the same, the field values

	No.		are the same, in ascending order according to the configuration release time
J	PCB Version	10	V1.0
		11	V1.1
		xx	Vx.x
:	Separator	:	This symbol is followed by the internal identification of the manufacturer, which has no effect on the use.
KL	Internal Identification of the Manufacturer	xx	This is the internal identification of the manufacturer and has no impact on the 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	1	Each MIPI interface supports 4 lanes of output, with a maximum resolution of 2560 x 1600@60Hz; Compatible with Forlinx 7-inch MIPI display, with a resolution of 1024 x 600@30fps;
HDMI TX	1	Led out via a standard HDMI connector; supports up to 7680x4320@60Hz.
USB3.2 Gen1	1	Routed through a Type-C connector;
USB3.0Host	1	Routed through a Type-A USB connector;
PCIe2.1	1	Led out x 4 slot; · Supports 5Gbps speed;
Ethernet	2	Connected via a single dual-layer RJ45 socket; · Supports data transfer rates of 10/100/1000 Mbps;
TF Card	1	TF card is available, rate up to 150MHz, support SDR104 mode;
Audio	1	On-board codec chip, supporting functions such as headphone output, microphone input and speaker output;
RS485	2	2 x RS485 CAN bus routed out through RS485 transceiver;
CAN	2	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	On-board Wi-Fi and Bluetooth module; an external Wi-Fi antenna must be connected
ADC	3	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 through a 2.54mm pitch connector;
FAN	1	On-board fan connector;

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

■ Power Consumption:

Linux System Power Consumption Table

No.	Test Item	SoM Power (W)	Development Board Power (including SoM) (W)
1	No-load starting peak power	3.66	5.88
2	No-load standby peak power	0.82	2.33
3	CPU+GPU+Memory+eMMC pressure test	5.87	7.39
4	7-inch LCD screen + 4G + U disk + video decoding	2.02	10.02
5	7-inch LCD screen + 4G + U disk + video encoding	3.06	10.48
6	Pwron Key (Long press)	0.28	0.32

Android System Power Consumption

No.	Test Item	SoM Power (W)	Development Board Power (including SoM) (W)
1	No-load starting peak power	4.86	7.09
2	No-load standby peak power	0.95	2.43
3	Peak power during the AnTuTu 3D test	6.04	10.29
4	Pwron Key (Long press)	0.28	0.32
5	Pwron Key (Short press)	0.65	2.19