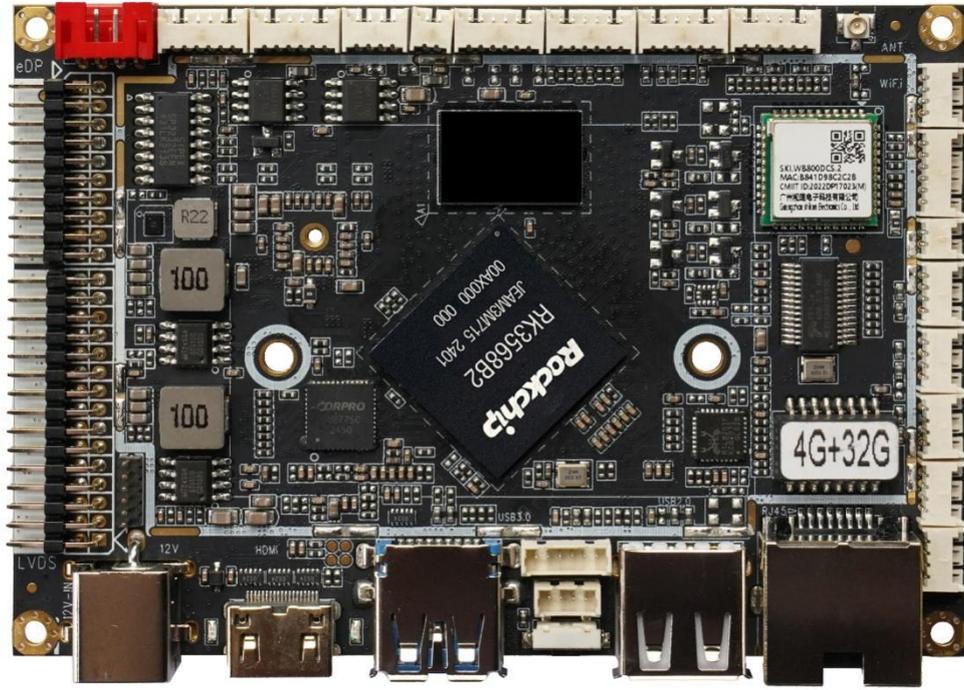


USR-EV208(RK3568)



catalogue

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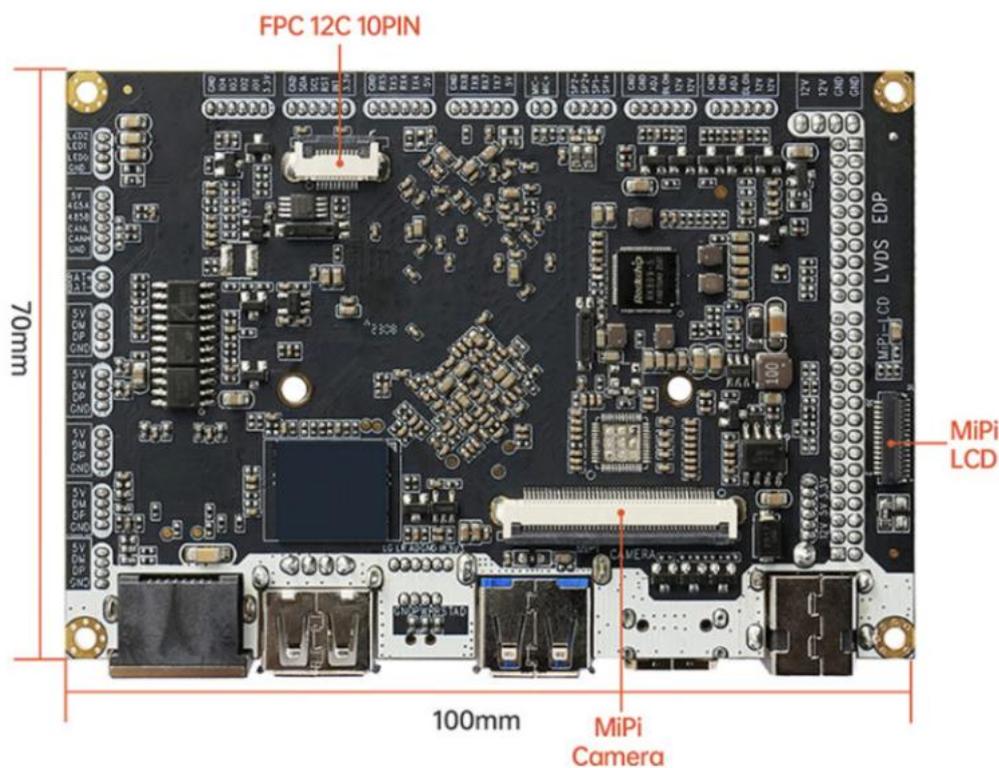
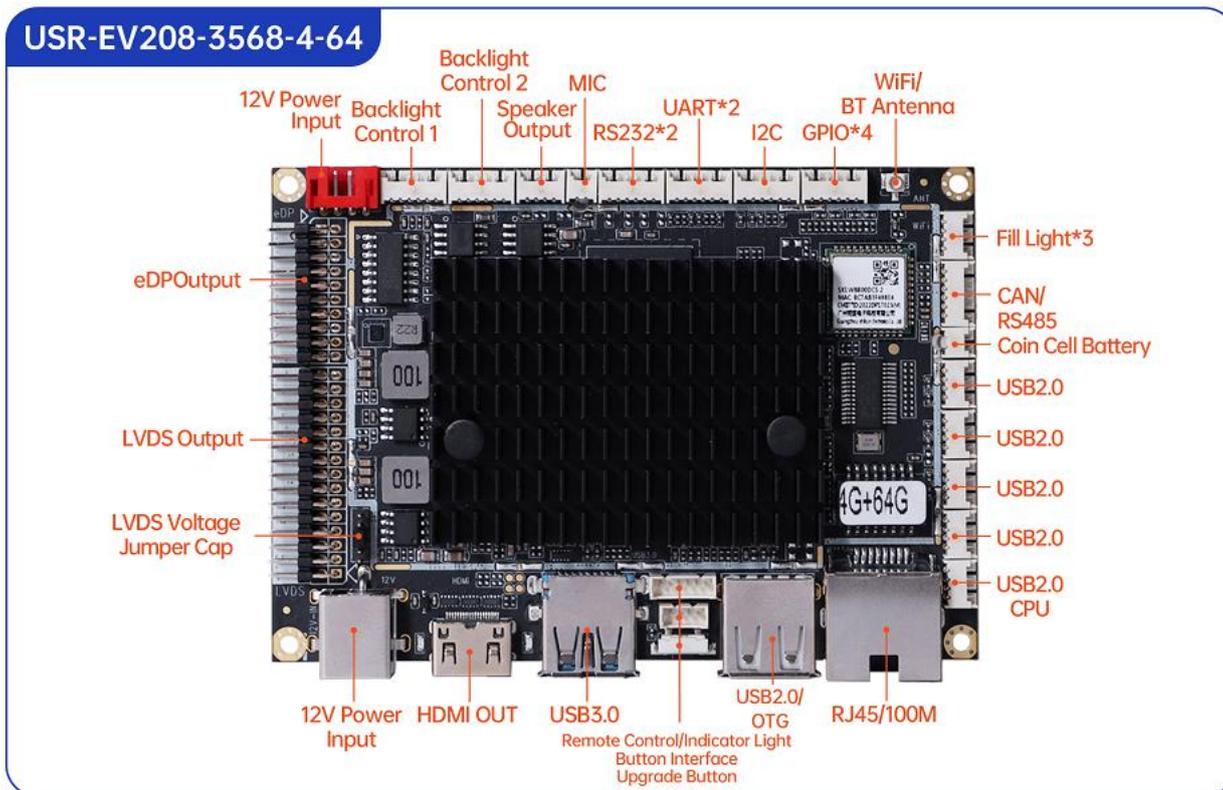
1. Product Overview

The USR-EV208-3568 high-performance motherboard features the Rockchip RK3568 CPU design. The RK3568 is a quad-core 64-bit ARMv8.2-A architecture CPU based on the quad-core A55 and manufactured using the latest 22nm process, with a clock speed up to 2.0 GHz and exceptional general-purpose computing performance. The GPU employs the ARM G52 2EE, while the CPU integrates an AI neural network processor (NPU) with a computing performance of 1.0 TOPS, supporting various AI development tools and interfaces. It supports multi-screen display functionality, LVDS interface for 1080P output, eDP and MIPI display interfaces, HDMI 4K output, 100Mbps Ethernet, WiFi/Bluetooth, as well as USB expansion, gravity sensing, CAN, RS232, RS485, IO expansion, backlighting, I2C expansion, MIPI camera, and infrared remote control, offering a rich array of interfaces. This cutting-edge quad-core AI chip delivers superior performance, making products more perfect and widely applicable in fields such as smart firefighting, smart construction sites, industrial quality inspection, autonomous vehicles, smart agriculture, intelligent sorting machines, AI robots, cloud servers, smart NVRs, metaverse, ARM PCs, security, healthcare, transportation, finance, industrial control, education, and retail. Thanks to its hardware platform-based and software-intelligent features, it ensures seamless human-machine interaction and network device connectivity on this smart terminal motherboard.

2. Characteristic

- **High Performance:** The RK3568 is a quad-core 64-bit CPU based on the ARMv8.2-A architecture, featuring a quad-core A55 processor and a cutting-edge 22nm process. With a clock speed of up to 2.0GHz, it delivers exceptional general-purpose computing performance. The GPU utilizes the ARM G52 2EE, while the CPU integrates an AI neural network processor (NPU) with a computing performance of 1.0TOPS. It supports multiple AI development tools and interfaces, enabling model conversion for frameworks like TensorFlow, Caffe, MXNet, and PyTorch. The device also provides AI development tools and supports cross-platform APIs including Android NN API, RKNN, and TensorFlow development interfaces.
- **High Stability:** The RK3568 AI motherboard incorporates proprietary technologies in both hardware and software to ensure product stability, enabling the final product to operate 24/7 without human intervention.
- **High integration:** The RK3568 AI motherboard utilizes military-grade TG170-8-layer ultra-high-density PCB, integrating features like 100Mbps Ethernet, WiFi/Bluetooth, HDMI, LVDS, eDP, MiPi, microphone, and gravity sensor, significantly simplifying overall design. Its ultra-thin design also enhances the aesthetic appeal of the device.
- **High expandability:** 7 USB ports, 3 fill light ports, 2 RS232 ports, 2 UART ports, 1 RS485 port, 1 CAN port, 1 I2C port, 4 IO expansion ports, and 1 AD port for additional peripheral devices.

3. Product interface



3.1. Hardware specifications

OPERATING SYSTEM	Ubuntu20.04/ Android11/Debian11
PROCESSOR CPU	Rockchip RK3568 (22nm process technology)

	ARM quad-core 64-bit processor with a maximum clock speed of 2.0GHz
GRAPHICS PROCESSING UNIT GPU	ARM G52 2EE GPU Supports OpenGL ES 1.1/2.0/3.2, OpenCL 2.0, and Vulkan 1.1, with built-in high-performance 2D acceleration hardware
NEURAL NETWORK PROCESSOR (NPU)	Built-in Neural Network Processor (NPU) with 1.0TOPS@INT8 performance. Supports models including Caffe, MXNet, TensorFlow, TF Lite, ONNX, and Darknet. Provide AI development tools: enable rapid model conversion.
INTERNAL STORAGE DDR	LPDDR4 4 GB (2 GB/4 GB/8 GB available, up to 8 GB)
MEMORY	eMMC 64 GB (32 GB/64 GB/128 GB/256 GB available)
NETWORK	Supports 10/100M Ethernet port
	Supports 2.4GHz and Wi-Fi 802.11 b/g/n/ac protocols (5G WiFi optional)
	Supports Bluetooth functionality, including Bluetooth 2.1+EDR/3.0/4.x/5.2
PICTURE ORIENTATION	Supports manual rotation at 0°,90°,180°, and 270°, and gravity-sensing auto-screen rotation (optional)
DISPLAY INTERFACE	1 eDP interface (eDP1.3 supports 2560*1600 60fps output), 3.3V/5V power supply 1 x eDP/LVDS interface (single/dual channel, 6-bit/8-bit), supports 1080P 60fps output, and operates on 3.3V/5V/12V power supply 1*HDMI 2.0 supports 4K 60Hz output 1*MiPi interface (supports MiPi 2560*1600 60fps output)
BOARD MOUNTED BACKLIGHT CONTROL	2*12V backlight power supply
AUDIO FREQUENCY	1*Speaker output (2*18W 4R) 1*Microphone input
TOUCH SCREEN	1* I2C interface (supports multi-point resistive and capacitive touch). Supports multiple touch modes including USB multi-point infrared, capacitive, nano-film, acoustic, and optical touch.
CAMERA	2* MIPI camera input, supports up to 13MP (optional) Supports USB camera (optional)
RTC	External real-time clock power battery with on/off timer
USB	4*USB-2.0 HOST ,1*USB-3.0 HOST,1* CPU USB2.0,1*USB2.0 OTG
INFRARED	1* Infrared receiver, supports infrared remote control
LED	1* Power status LED (red), 1* System LED (blue, default flashing)
KEY	1*Reset button, 1*Power button, 1*Upgrade button
GORGE LINE	2*RS232 , 2*UART TTL, 1*RS485
IO MOUTH	4* IO ports, supporting input or output
CAN MOUTH	1 CAN port
I2C PORT	1I2C port
AD MOUTH	1*AD port
FAN INTERFACE	Supports 5V/12V fan interface

No.	definition	attribute	description	
1	12V	output	12V output	
2	12V	output	12V output	
3	LCD-BLON	output	backlight control	
4	LCD-ADJ	output	backlight adjustment	
5	GND	earth wire	earth wire	
6	GND	earth wire	earth wire	

3.5.suona

The speaker output jack socket spacing is 1.25mm.

No.	definition	attribute	description	
1	LP	output	positive output of left channel	
2	LN	output	Left channel output negative pole	
3	RP	import	Right channel output positive	
4	RN	earth wire	Right channel output negative pole	

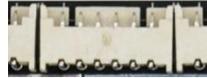
3.6.microphone

The MIC JACK socket spacing is 1.25mm.

No.	definition	attribute	description	
1	MIC+	import	MIC positive input	
2	MIC-	import	MIC negative input	

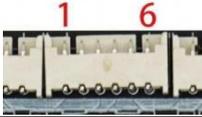
3.7.RS232

RS232 interface (RS232 JACK) with a 1.25mm pin spacing

No.	definition	attribute	description	
1	5V (optional 3.3V)	output	3.3V/5V voltage output	
2	TX7	output	Send (TX7)ttyS7	
3	RX7	import	Receive (TX7)ttyS7	
4	TX8	output	Send (TX8)ttyS8	
5	RX8	import	Receive (TX8)ttyS8	
6	GND	earth wire	earth wire	

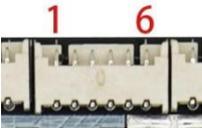
3.8.UART

UART TTL interface (UART TTL JACK) with a pin pitch of 1.25mm

No.	definition	attribute	description	
1	3.3V (optional 5V)	output	3.3V/5V voltage output	
2	TX4	output	Send (TX4)ttyS4	
3	RX4	import	Receive (TX4)ttyS4	
4	TX5	output	Send (TX5)ttyS5	
5	RX5	import	Receive (TX5)ttyS5	
6	GND	earth wire	earth wire	

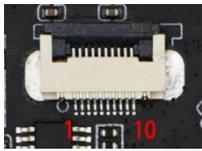
3.9.I2C

The I2C interface (I2C JACK) has a pin pitch of 1.25mm.

No.	definition	attribute	description	
1	3.3 V	output	3.3V voltage output	
2	INT (3.3V level)	import	external device interrupt	
3	RST (3.3V level)	output	External device reset	
4	SCL (3.3V level)	output	clock	
5	SDA (3.3V level)	output	data	
6	GND	earth wire	earth wire	

3.10. FPC I2C

FPC I2C Touch Screen Jack with 0.5mm spacing (bottom layer)

No.	definition	attribute	description	
1	GND	earth wire	earth wire	
2	GND	earth wire	earth wire	
3	3.3 V	output	3.3V voltage output	
4	SDA	output	data	
5	SCL	output	clock	
6	GND	earth wire	earth wire	
7	INT	import	external device interrupt	
8	RST	output	External device reset	
9	GND	earth wire	earth wire	
10	GND	earth wire	earth wire	

3.11. GPIO

The spacing between the GPIO jack sockets is 1.25mm.

No.	definition	attribute	description	
1	3.3V	output	3.3V voltage output	

2	I01 (3.3V level)	Input/Output	Default high level	
3	I02 (3.3V level)	Input/Output	Default high level	
4	I03 (3.3V level)	Input/Output	Default low level	
5	I04 (3.3V level)	Input/Output	Default low level	
6	GND	earth wire	earth wire	

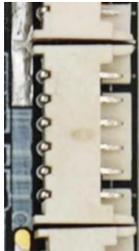
3.12. Backlight

The distance between the two sockets of the backlight jack (BL JACK) is 1.25mm.

No.	definition	attribute	description	
1	LED2	output	12V power output	
2	LED1	output	12V power output	
3	LED0	output	12V power output	
4	GND	earth wire	earth wire	

3.13. RS485

The RS485/CAN interface (RS485/CAN JACK) has a pin spacing of 1.25mm.

No.	definition	attribute	description	
1	5V (optional 3.3V)	output	3.3V/5V voltage output	
2	RS485-A	data	data	
3	RS485-B	data	data	
4	CAN-L	data	data	
5	CAN-H	data	data	
6	GND	earth wire	earth wire	

3.14. RTC cell

The battery jack (BAT JACK) has a socket spacing of 1.25mm.

No.	definition	attribute	description	
1	BAT+	import	3V input	
2	BAT-	earth wire	earth wire	

3.15. USB2.0

The USB2.0-HOST jack features a 1.25mm socket spacing.

No.	definition	attribute	description	
1	5V	output	5V voltage output	

2	DM	import	DM-	
3	DP	import	DP+	
4	GND	earth wire	earth wire	

The USB 2.0-CPU jack has a socket spacing of 1.25mm.

No.	definition	attribute	description	
1	5V	output	5V voltage output	
2	DM	import	DM-(CPU)	
3	DP	import	DP+(CPU)	
4	GND	earth wire	earth wire	

3.16. Indicator/Remote Control

The LED/IR IN JACK socket spacing is 1.25mm.

No.	definition	attribute	description	
1	3.3V	output	3.3V voltage output	
2	IR	import	receive	
3	GND	earth wire	earth wire	
4	AD	import	AD (Upgrade) button	
5	LEDR	output	power light	
6	LEDG	output	system indicator light	

3.17. key

The key jack socket spacing is 1.25mm.

No.	definition	attribute	description	
1	AD	import	AD (Upgrade) button	
2	RST	output	Reset button	
3	PWR	output	Power button	
4	GND	earth wire	earth wire	

3.18. LVDS

The LVDS jack has a socket spacing of 2.0mm.

No.	definition	attribute	description	
1	POWER	output	3.3V/5V/12V power output	
2	POWER			
3	POWER			
4	GND	earth wire	earth wire	
5	GND	earth wire	earth wire	
6	GND	earth wire	earth wire	

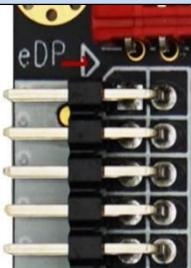
7	TA1-	output	data
8	TA1+	output	data
9	TB1-	output	data
10	TB1+	output	data
11	TC1-	output	data
12	TC1+	output	data
13	GND	earth wire	earth wire
14	GND	earth wire	earth wire
15	TCLK1-	output	clock
16	TCLK1+	output	clock
17	TD1-	output	data
18	TD1+	output	data
19	TA2-	output	data
20	TA2+	output	data
21	TB2-	output	data
22	TB2+	output	data
23	TC2-	output	data
24	TC2+	output	data
25	GND	earth wire	earth wire
26	GND	earth wire	earth wire
27	TCLK2-	output	clock
28	TCLK2+	output	clock
29	TD2-	output	data
30	TD2+	output	data

The LVDS LCD JP JACK connector features a 1.27mm pin pitch.

No.	definition	attribute	description	
1	12V	output	12V output	
2	LCD-VDD-IN	import	LCD voltage input	
3	5V	output	5V output	
4	LCD-VDD-IN	import	LCD voltage input	
5	3.3V	output	3.3V output	
6	LCD-VDD-IN	import	LCD voltage input	

3.19. eDP LED

eDP LCD jack with 2.0mm socket spacing

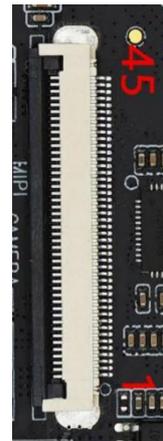
No.	definition	attribute	description	
1	VCC	output	3.3V/5V power supply output	
2	VCC	output		
3	GND	earth wire	earth wire	
4	GND	earth wire	earth wire	
5	D0-	output	data	
6	D0+	output	data	

7	D1-	output	data
8	D1+	output	data
9	D2-	output	data
10	D2+	output	data
11	D3-	output	data
12	D3+	output	data
13	GND	earth wire	earth wire
14	GND	earth wire	earth wire
15	AUX-	output	data
16	AUX+	output	data
17	GND	earth wire	earth wire
18	GND	earth wire	earth wire
19	3.3V	output	3.3V power supply output
20	HPD	import	HPD test foot

3.20. MIPI Camera

FPC MIPI CAMER jack with 0.5mm spacing between sockets (bottom layer)

No.	definition	attribute	description
1	5V-1	output	5V output
2	5V-2	output	5V output
3	IR_LED_PWM	output	IR(LED) control
4	GND	earth wire	earth wire
5	NC	NC barefoot	NC barefoot
6	NC	NC barefoot	NC barefoot
7	NC	NC barefoot	NC barefoot
8	NC	NC barefoot	NC barefoot
9	RGB_MDN1	output	data
10	RGB_MDP1	output	data
11	RGB_MDN0	output	data
12	RGB_MDP0	output	data
13	RGB_MCN	output	clock
14	RGB_MDP	output	clock
15	GND	earth wire	earth wire
16	RGB_MCLK	output	clock
17	GND	earth wire	earth wire
18	RGB_I2C_SDA	output	data
19	RGB_I2C_SCL	output	clock
20	RGB_RESET	output	RGB reset
21	RGB_PWDN	output	RGB enable
22	RGB_DVDD	output	RGB_DVDD
23	IR_DVDD	output	IR_DVDD
24	FYNC_IN	output	

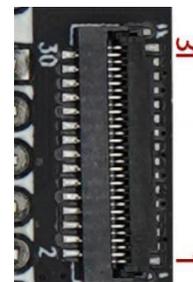


25	DOVDD_1V8	output	DOVDD_1V8
26	GND	earth wire	earth wire
27	NC	NC barefoot	NC barefoot
28	NC	NC barefoot	NC barefoot
29	NC	NC barefoot	NC barefoot
30	NC	NC barefoot	NC barefoot
31	IR_MDN1	output	data
32	IR_MDP1	output	data
33	IR_MDNO	output	data
34	IR_MDP0	output	data
35	IR_MCN	output	clock
36	IR_MCP	output	clock
37	GND	earth wire	earth wire
38	IR_MCLK	output	clock
39	GND	earth wire	earth wire
40	IR_I2C_SDA	output	data
41	IR_I2C_SCL	output	clock
42	IR_RESET	output	IR reset
43	IR_PWDN	output	IR enable
44	RGB_AVDD	source	RGB_AVDD
45	IR_AVDD	source	IR_AVDD

3.21. MiPi LED

FPC MiPi LCD jack with 0.3mm spacing between sockets (bottom layer)

No.	definition	attribute	description	
1	LED+	output	backlight anode	
2	LED+	output	backlight anode	
3	LED+	output	backlight anode	
4	GND	earth wire	earth wire	
5	LED-	output	backlight anode	
6	LED-	output	backlight anode	
7	LED-	output	backlight anode	
8	LED-	output	backlight anode	
9	GND	earth wire	earth wire	
10	GND	earth wire	earth wire	
11	MiPi2+	output	data	
12	MiPi 2-	output	data	
13	GND	earth wire	earth wire	
14	MiPi 1+	output	data	
15	MiPi 1-	output	data	
16	GND	earth wire	earth wire	
17	MiPi CLK+	output	clock	
18	MiPi CLK-	output	clock	



19	GND	earth wire	earth wire	
20	MiPi 0+	output	data	
21	MiPi 0-	output	data	
22	GND	earth wire	earth wire	
23	MiPi 3+	output	data	
24	MiPi 3-	output	data	
25	GND	earth wire	earth wire	
26	NC	NC	NC	
27	RESET	output	reset	
28	NC	NC	NC	
29	VDDIO1.8V	output	VDD1.8V	
30	VDD3.3V	output	VDD3.3V	
31	VDD3.3V	output	VDD3.3V	



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