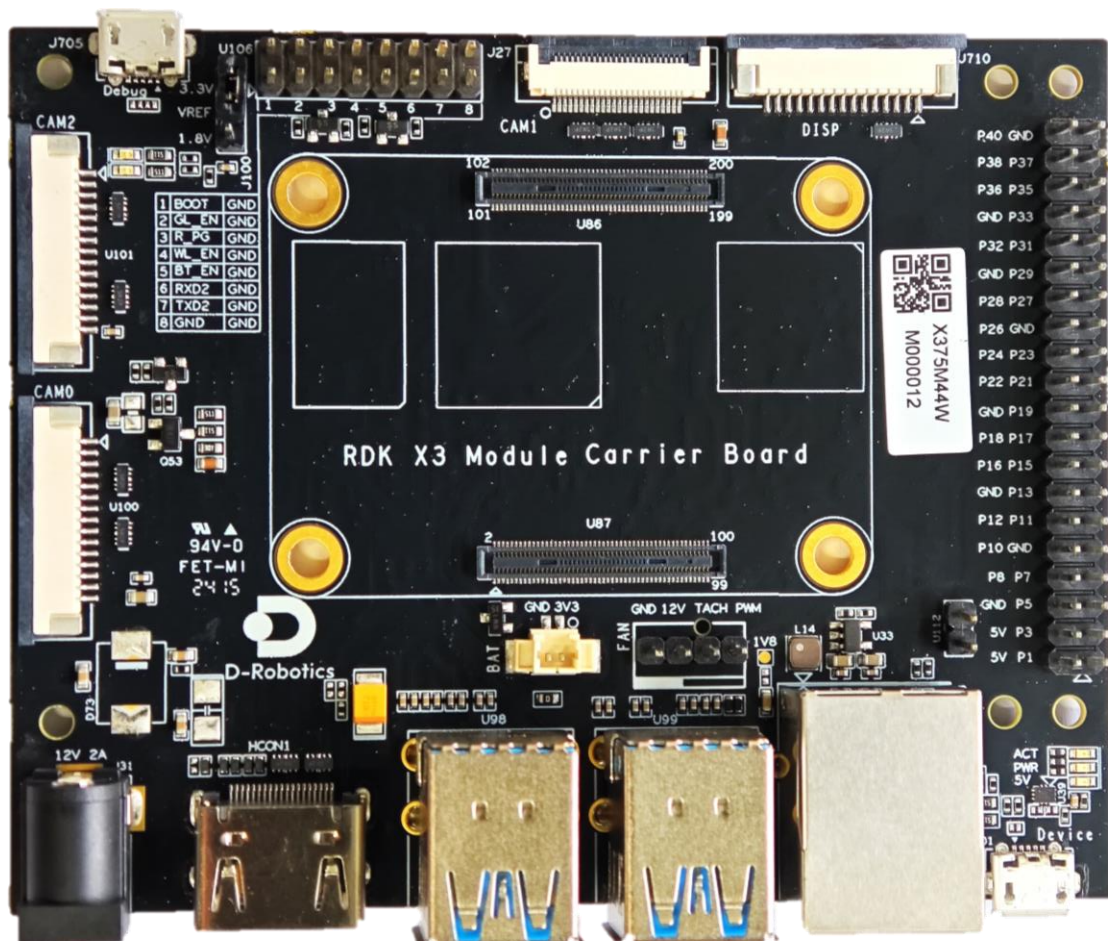# RDK X3 Module Carrier Board Product Brief
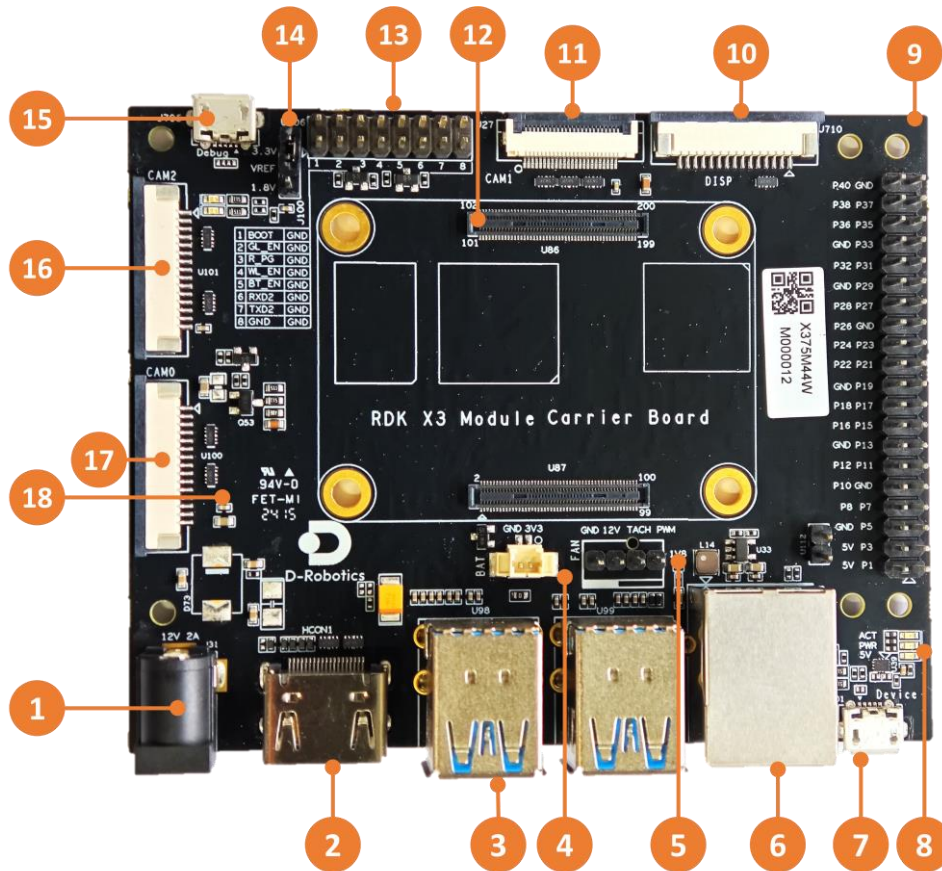
v1.0

Overview

The RDK X3 Module Carrier Board, serving as the companion baseboard for the X3 module, offers a rich array of configurations and interfaces, including USB 3.0, Ethernet, HDMI, MIPI CSI, MIPI DSI, 40-pin header, and more. This facilitates users in functional verification and development of the module.

Interface definition

The interface definition of the X3 module baseboard is as shown:

No.	Interface Function	No.	Interface Function	No.	Interface Function
1	Power Interface	7	Micro USB2.0 Device Port	13	Function Control IO Header
2	HDMI Port	8	Working Indicator Light	14	IO Level Select Header
3	USB3.0 Host Port	9	40-pin Header	15	Debug Port, USB to UART
4	RTC Battery Port	10	MIPI DSI Port	16	CAM2 Port, 2-lane
5	Fan Port	11	CAM1 Port, 4-lane	17	CAM0 Port, 2-lane
6	Gigabit Ethernet Port	12	Core Module Interface	18	Micro SD Card Interface (on the back)

Signal Definitions

Power Interface (Interface 1)

Number	Name	Attribute	Description
1	12V	Power Input	12V / 2A Input Reference Ground
2	GND	Reference Ground	12V / 2A Input Reference Ground

40pin header（Interface 9）

Number	Name	Attribute	Description
1	VDD3V3	Power Supply 3.3V Output	3.3V Output
2	VDD5V	Power Supply 5V Output	5V Output
3	GPIO2	3.3V Single-ended Signal	GPIO Signal Line
4	VDD5V	Power Supply 5V Output	5V Output
5	GPIO3	3.3V Single-ended Signal	GPIO Signal Line
6	GND	Signal Power Reference Ground	Ground
7	GPIO4	3.3V Single-ended Signal	GPIO Signal Line
8	GPIO14	3.3V Single-ended Signal	GPIO Signal Line
9	GND	Signal Power Reference Ground	Ground
10	GPIO15	3.3V Single-ended Signal	GPIO Signal Line
11	GPIO17	3.3V Single-ended Signal	GPIO Signal Line
12	GPIO18	3.3V Single-ended Signal	GPIO Signal Line
13	GPIO27	3.3V Single-ended Signal	GPIO Signal Line
14	GND	Signal Power Reference Ground	Ground
15	GPIO22	3.3V Single-ended Signal	GPIO Signal Line
16	GPIO23	3.3V Single-ended Signal	GPIO Signal Line
17	VDD3V3	Power Supply 3.3V Output	3.3V Output
18	GPIO24	3.3V Single-ended Signal	GPIO Signal Line
19	GPIO10	3.3V Single-ended Signal	GPIO Signal Line
20	GND	Signal Power Reference Ground	Ground
21	GPIO9	3.3V Single-ended Signal	GPIO Signal Line
22	GPIO25	3.3V Single-ended Signal	GPIO Signal Line
23	GPIO11	3.3V Single-ended Signal	GPIO Signal Line
24	GPIO8	3.3V Single-ended Signal	GPIO Signal Line
25	GND	Signal Power Reference Ground	Ground
26	GPIO7	3.3V Single-ended Signal	GPIO Signal Line
27	ID_SD	3.3V Single-ended Signal	I2C3 Data Line
28	ID_SC	3.3V Single-ended Signal	I2C3 Clock Line
29	GPIO5	3.3V Single-ended Signal	GPIO Signal Line
30	GND	Signal Power Reference Ground	Ground
31	GPIO6	3.3V Single-ended Signal	GPIO Signal Line
32	GPIO12	3.3V Single-ended Signal	GPIO Signal Line
33	GPIO13	3.3V Single-ended Signal	GPIO Signal Line
34	GND	Signal Power Reference Ground	Ground
35	GPIO19	3.3V Single-ended Signal	GPIO Signal Line
36	GPIO16	3.3V Single-ended Signal	GPIO Signal Line

37	GPIO26	3.3V Single-ended Signal	GPIO Signal Line
38	GPIO20	3.3V Single-ended Signal	GPIO Signal Line
39	GND	Signal Power Reference Ground	Ground
40	GPIO21	3.3V Single-ended Signal	GPIO Signal Line

MIPI DSI Interface（Interface 10）

Number	Name	Attribute	Description
1	GND	Signal Power Reference Ground	Ground
2	DSI1_D1_N	MIPI DSI Differential Signal Output Data Line	MIPI DSI Differential Signal, data1
3	DSI1_D1_P	MIPI DSI Differential Signal Output Data Line	MIPI DSI Differential Signal, data1
4	GND	Signal Power Reference Ground	Ground
5	DSI1_C_N	MIPI Differential Output	MIPI DSI Differential Signal, clk
6	DSI1_C_P	MIPI Differential Output	MIPI DSI Differential Signal, clk
7	GND	Signal Power Reference Ground	Ground
8	DSI1_D0_N	MIPI DSI Differential Signal Output Data Line	MIPI DSI Differential Signal, data0
9	DSI1_D0_P	MIPI DSI Differential Signal Output Data Line	MIPI DSI Differential Signal, data0
10	GND	Signal Power Reference Ground	Ground
11	SCL1	3.3V Single-ended Signal	I2C Data Signal
12	SDA1	3.3V Single-ended Signal	I2C Clock Signal
13	GND	Signal Power Reference Ground	Ground
14	VDD3V3	Power Supply 3.3V Output	Camera Power Supply, up to 500mA
15	VDD3V3	Power Supply 3.3V Output	Camera Power Supply, up to 500mA

HDMI Interface（Interface 2）

Number	Name	Attribute	Description
1	D2P	HDMI Differential Output	HDMI Differential Signal Output Data Line
2	GND	Signal Power Reference Ground	Ground
3	D2N	HDMI Differential Output	HDMI Differential Signal Output Data Line
4	D1P	HDMI Differential Output	HDMI Differential Signal Output Data Line
5	GND	Signal Power Reference Ground	Ground
6	D1N	HDMI Differential Output	HDMI Differential Signal Output Data Line

7	D0P	HDMI Differential Output	HDMI Differential Signal Output Data Line
8	GND	Signal Power Reference Ground	Ground
9	D0N	HDMI Differential Output	HDMI Differential Signal Output Data Line
10	CKP	HDMI Differential Output	HDMI Differential Signal Output Clock Line
11	GND	Signal Power Reference Ground	Ground
12	CKN	HDMI Differential Output	HDMI Differential Signal Output Clock Line
13	CEC	HDMI CEC	Consumer Electronics Control
14	NC		
15	SCL	SCL	HDMI SCL
16	SDA	SDA	HDMI SDA
17	GND	Signal Power Reference Ground	Ground
18	5V	5V POWER	HDMI 5V POWER
19	PLUG	HOT PLUG	HDMI HOT PLUG

RTC Power（Interface 4）

Number	Name	Attribute	Description
2	GND	Reference Ground	Battery Negative Terminal, Reference Ground
1	BAT_3V	Power Input 3V	Battery Positive Terminal, 3V or 3.3V

USB Debug（Interface 15）

Number	Name	Attribute	Description
1	USB_DEVICE_DEBUG	USB Vbus	
2	DM	USB Differential Data Positive	
3	DP	USB Differential Data Negative	
4	GND	Signal Power Reference Ground	Ground

Sensor Interface CAM0（Interface 17）

Number	Name	Attribute	Description
1	GND	Signal Power Reference Ground	Ground
2	CAM0_D0_N	MIPI Differential Input	MIPI CSI Differential Signal, data0
3	CAM0_D0_P	MIPI Differential Input	MIPI CSI Differential Signal, data0
4	GND	Signal Power Reference Ground	Ground
5	CAM0_D1_N	MIPI Differential Input	MIPI CSI Differential Signal, data1
6	CAM0_D1_P	MIPI Differential Input	MIPI CSI Differential Signal, data1
7	GND	Signal Power Reference	Ground

		Ground	
8	CAM0_C_N	MIPI Differential Input	MIPI CSI Differential Signal, clk
9	CAM0_C_P	MIPI Differential Input	MIPI CSI Differential Signal, clk
10	GND	Signal Power Reference Ground	Ground
11	Camera_GPIO	3.3V Single-ended Output	Camera Reset Signal
12	NC	Floating	Floating
13	ID_SC	3.3V Single-ended Signal	I2C Data Signal
14	ID_SD	3.3V Single-ended Signal	I2C Clock Signal
15	VDD3V3	Power Supply 3.3V Output	Supply Current 300mA

Sensor Interface CAM2（Interface 16）

Number	Name	Attribute	Description
1	GND	Signal Power Reference Ground	Ground
2	CAM2_D0_N	MIPI Differential Input	MIPI CSI Differential Signal, data0
3	CAM2_D0_P	MIPI Differential Input	MIPI CSI Differential Signal, data0
4	GND	Signal Power Reference Ground	Ground
5	CAM2_D1_N	MIPI Differential Input	MIPI CSI Differential Signal, data1
6	CAM2_D1_P	MIPI Differential Input	MIPI CSI Differential Signal, data1
7	GND	Signal Power Reference Ground	Ground
8	CAM2_C_N	MIPI Differential Input	MIPI CSI Differential Signal, clk
9	CAM2_C_P	MIPI Differential Input	MIPI CSI Differential Signal, clk
10	GND	Signal Power Reference Ground	Ground
11	Camera_GPIO	3.3V Single-ended Output	Camera Reset Signal
12	NC	Floating	Floating
13	I2C0_SCL_33	3.3V Single-ended Signal	I2C Data Signal
14	I2C0_SDA_33	3.3V Single-ended Signal	I2C Clock Signal
15	VDD3V3	Power Supply 3.3V Output	Supply Current 300mA

Sensor Interface CAM1（Interface 11）

Number	Name	Attribute	Description
1	SDA_1V8	1.8V Single-ended Signal	I2C Data Signal
2	SCL_1V8	1.8V Single-ended Signal	I2C Clock Signal
3	GND	Signal Power Reference Ground	Ground
4	CAM1_STANDBY_1V8	1.8V Single-ended Output	Camera Trigger Signal
5	Camera_GPIO_1	1.8V Single-ended	Camera Reset Signal

	V8	Output	
6	GND	Signal Power Reference Ground	Ground
7	CAM1_C_N	MIPI Differential Input	MIPI CSI Differential Signal, clk
8	CAM1_C_P	MIPI Differential Input	MIPI CSI Differential Signal, clk
9	GND	Signal Power Reference Ground	Ground
10	SENSOR1_MCLK	Clock Signal Output 1.8V	MCLK Signal
11	GND	Signal Power Reference Ground	Ground
12	CAM1_D0_N	MIPI Differential Input	MIPI CSI Differential Signal, data0
13	CAM1_D0_P	MIPI Differential Input	MIPI CSI Differential Signal, data0
14	CAM1_D1_N	MIPI Differential Input	MIPI CSI Differential Signal, data1
15	CAM1_D1_P	MIPI Differential Input	MIPI CSI Differential Signal, data1
16	CAM1_D2_N	MIPI Differential Input	MIPI CSI Differential Signal, data2
17	CAM1_D2_P	MIPI Differential Input	MIPI CSI Differential Signal, data2
18	CAM1_D3_N	MIPI Differential Input	MIPI CSI Differential Signal, data3
19	CAM1_D3_P	MIPI Differential Input	MIPI CSI Differential Signal, data3
20	GND	Signal Power Reference Ground	Ground
21	VDD3V3	Power Supply 3.3V Output	Camera Power Supply, up to 500mA
22	NC	Floating	Floating
23	VDD3V3	Power Supply 3.3V Output	Camera Power Supply, up to 500mA
24	NC	Floating	Floating

Warning:

- When using an external power supply with the RDK X3 Module, ensure compliance with relevant regional regulations and standards.

- This product should be used in well-ventilated environments. When used in enclosed spaces, adequate heat dissipation measures should be taken.

- When in use, the product should be placed on a stable, flat, and non-conductive surface.

- Connecting incompatible devices to the RDK X3 Module may result in

damage to the devices and will not be supported for repair.

○   All peripheral devices used with this product should comply with relevant national standards and be marked accordingly to ensure compliance with safety and performance requirements. Peripheral devices include but are not limited to keyboards, monitors, and mice used in conjunction with the RDK X3 Module.

○   Cables and connectors for all peripheral devices used with this product must have sufficient insulation to meet safety requirements.

Safety Guidelines

To prevent malfunction or damage to this product, please adhere to the following guidelines:

○   Do not expose the product to water, moisture, or place it on conductive surfaces during operation.

○   Avoid contact with any heat sources; the RDK X3 Module operates reliably within normal environmental temperatures.

○   During assembly, avoid causing mechanical or electrical damage to the printed circuit board and connectors.

○   When the device is powered on, refrain from touching the printed circuit board and device edges to minimize the risk of electrostatic discharge damage.

Revision record

Version	Date	Description
v1.0	2023.07.23	First Version