

VT-SBC-SMARC Carrier Board



User Manual

Version: 1.0

© Chengdu Vantron Technology Co., Ltd. All rights reserved.

Revision History

No.	Version	Description	Date
1	1.0	First release	June 7, 2022

Table of Contents

Foreword.....	1
CHAPTER 1 INTRODUCTION.....	5
1.1 Product Overview.....	6
1.2 Terminology	6
1.3 Specifications	7
1.4 Mechanical Dimensions	8
1.5 Power Supply	8
1.6 Environmental Specifications.....	8
1.7 Module Installation	8
CHAPTER 2 HARDWARE, CONNECTORS, JUMPERS	9
2.1 Board Layout	10
2.2 Identification of Pin 1.....	10
2.3 Connectors	11
2.3.1 Power connector (1).....	11
2.3.2 Ethernet port (2)	11
2.3.3 eDP port (3).....	11
2.3.4 HDMI port (4).....	12
2.3.5 LVDS connector (5).....	13
2.3.6 MIPI CSI connector (6).....	14
2.3.7 Audio jack (7)	16
2.3.8 Microphone connector (8)	16
2.3.9 Speaker connector 1 (9)	17
2.3.10 Speaker connectors 2 & 3 (10)	17
2.3.11 RS485 connector (11).....	18
2.3.12 RS232 connector (12).....	18
2.3.13 M.2 B-key slot (13)	19
2.3.14 CAN bus (14)	22
2.3.15 SPI (15)	22
2.3.16 I ² C (16).....	23
2.3.17 GPIO (17).....	24
2.3.18 SATA (18)	25
2.3.19 USB OTG (19).....	25
2.3.20 USB 3.0 port (20).....	26
2.3.21 USB 2.0 port (21).....	26
2.3.22 USB pin header (22)	26
2.3.23 SD card slot (23)	27
2.3.24 Reset button (24)	27
2.3.25 LED (25)	27
2.4 Jumpers.....	27
2.4.1 J4	28
2.4.2 J5	28
2.4.3 JP1	28
2.4.4 JP2	28

- 2.4.5 J34 29
- 2.4.6 J39 29
- 2.4.7 J35 29
- 2.4.8 J40 29
- 2.4.9 J32 30
- 2.4.10 J27 30
- 2.4.11 J36 30
- 2.4.12 J41 30
- 2.4.13 J31 31
- 2.4.14 J30 31
- 2.4.15 J38 31
- 2.4.16 J29 31
- 2.4.17 J33 32
- 2.4.18 J42 32
- 2.4.19 J28 32
- 2.4.20 J37 32
- CHAPTER 3 DISPOSAL AND WARRANTY 41
- 3.1 Disposal 42
- 3.2 Warranty 43

Foreword

Thank you for purchasing VT-SBC-SMARC Carrier Board (“the Board” or “the Product”). This manual intends to provide guidance and assistance necessary on setting up, operating or maintaining the Product. Please read this manual and make sure you understand the functionality of the Product before putting it into use.

Intended Users

This manual is intended for:

- Embedded software developer
- Custom development software engineer
- Other technically qualified personnel

Copyright

Chengdu Vantron Technology Co., Ltd. (“Vantron”) reserves all rights of this manual, including the right to change the content, form, product features, and specifications contained herein at any time without prior notice. An up-to-date version of this manual is available at www.vantrontech.com.

The trademarks in this manual, registered or not, are properties of their respective owners. Under no circumstances shall any part of this user manual be copied, reproduced, translated, or sold. This manual is not intended to be altered or used for other purposes unless otherwise permitted in writing by Vantron. Vantron reserves the right of all publicly released copies of this manual.

Disclaimer

While all information contained herein has been carefully checked to assure its accuracy in technical details and typography, Vantron does not assume any responsibility resulting from any error or features of this manual, nor from improper uses of this manual or the software.

It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without notice.

Technical Support and Assistance

Should you have any question about the Product that is not covered in this manual, contact your sales representative for solution. Please include the following information in your question:

- Product name and PO number;
- Complete description of the problem;
- Error message you received, if any.

US Office: Vantron Technology, Inc.

Address: 440 Boulder Court, Suite 300 Pleasanton, CA 94566

Tel: 916-202-7042

Email: sales@vantrontech.com

China Office: Chengdu Vantron Technology Co., Ltd.



Address: 6th Floor, 1st Building, No.9, 3rd WuKe East Street, WuHou District, Chengdu, P.R. China 610045

Tel: 86-28-8512-3930/3931, 86-28-8515-7572/6320

Email: sales@vantrontech.com.cn

Symbology

This manual uses the following signs to prompt users to pay special attention to relevant information.




	Caution for latent damage to system or harm to personnel
	Attention to important information or regulations


General Safety Instructions

The Product is supposed be installed by knowledgeable, skilled persons familiar with local and/or international electrical codes and regulations. For your safety and prevention of damage to the Product, please read and observe carefully the following safety instructions prior to installation and operation. Keep this manual well for future reference.


- Do not disassemble or otherwise modify the Product. Such action may cause heat generation, ignition, electronic shock, or other damages including human injury, and may void your warranty.
- Keep the Product away from heat source, such as heater, heat dissipater, or engine casing.
- Do not insert foreign materials into any opening of the Product as it may cause the Product to malfunction or burn out.
- To ensure proper functioning and prevent overheating of the Product, do not cover or block the ventilation holes of the Product.
- Follow the installation instructions with the installation tools provided or recommended.
- The use or placement of the operation tools shall comply with the code of practice of such tools to avoid short circuit of the Product.
- Cut off the power before inspection of the Product to avoid human injury or product damage.

Precautions for Power Cables and Accessories

-  Use proper power source only. Make sure the supply voltage falls within the specified range.
-  Place the cables properly at places without extrusion hazards.
-  There is a coin cell battery for powering the RTC. Therefore, please avoid short circuit of the battery during transportation or operation at high temperatures.

 Cleaning instructions:

- Power off before cleaning the Product
- Do not use spray detergent
- Clean with a damp cloth
- Do not try to clean exposed electronic components unless with a dust collector

 Power off and contact Vantron technical support engineer in case of the following faults:

- The Product is damaged
- The temperature is excessively high
- Fault is still not solved after troubleshooting according to this manual

 Do not use in combustible and explosive environment:

- Keep away from combustible and explosive environment
- Keep away from all energized circuits
- Unauthorized removal of the enclosure from the device is not allowed. Do not change components unless the power cable is unplugged. In some cases, the device may still have residual voltage even if the power cable is unplugged. Therefore, it is a must to remove and fully discharge the device before replacement of the components.

CHAPTER 1

INTRODUCTION

1.1 Product Overview

VT-SBC-SMARC Carrier Board features a SMARC form factor that is easy to integrate with a computer on module (COM) to customize a single board computer (SBC) for specific use. The carrier board provides high-definition video and camera interfaces to optimize image display. It also offers a range of expansion options for different application scenarios of industry 4.0 including smart retail, self-service terminals, industrial automation, intelligent medical health, and digital media.

Featuring high flexibility and high performance, the carrier board could work under extreme environments with extended temperatures ranging from -20°C to +70°C (-40°C to +85°C optional), making it a reliable industrial IoT solution.

1.2 Terminology

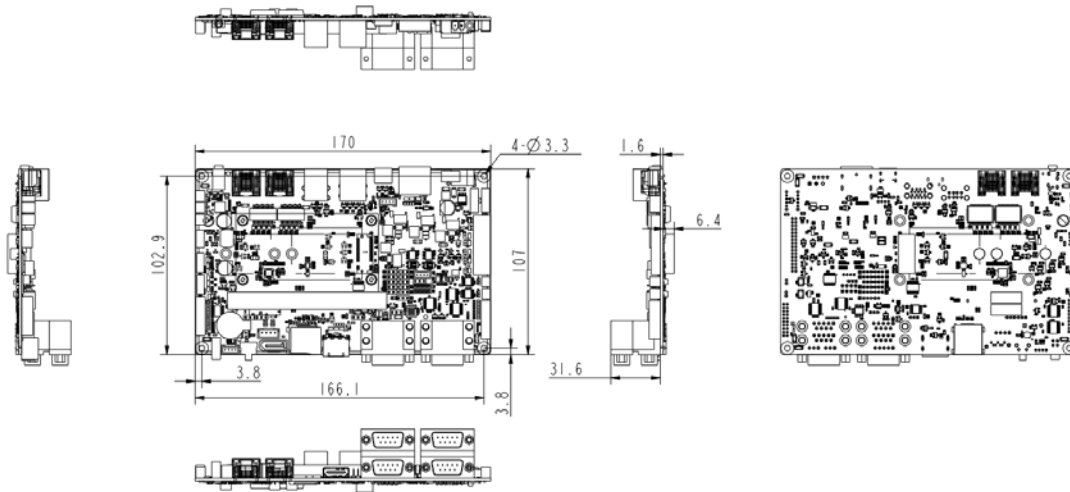
Terminology	Description
NC	No connection
VCC	Voltage common collector
GND	Ground
/	Active low signal
+	Positive of difference signal
-	Negative of difference signal
I	Input
O	Output
I/O	Input/output
P	Power or ground
A	Analog
OD	Open drain
CMOS	3.3 V CMOS
LVC MOS	Low Voltage CMOS
LVTTL	Low Voltage TTL
CK/CLK	Clock
PWM	Pulse-width modulation
MISO	Master in slave out
MOSI	Master out slave in
WP	Write protection

1.3 Specifications

VT-SBC-SMARC Carrier Board		
Communication	Ethernet	2 x 10/100/1000M Base-T
	3G/4G/5G	Supported (expansion by M.2 slot)
Media	Display	1 x 8-lane LVDS: 1 x 1080p60 or 2 x 720p60 1 x MIPI-DSI: Up to 2560 x 1440 1 x HDMI 2.0a: Up to 3840 x 2160 @ 30fps 1 x eDP, not connected to CPU
	Camera	1 x 4-lane MIPI-CSI: Up to 2560 x 1440 1 x 2-lane MIPI-CSI: Up to 720p80
	Backlight	2 x Backlight control connector
	Audio	1 x 3.5mm combo audio jack
	Mic	1 x Mic connector
	Speaker	2 x Speaker connector
	I/Os	Serial
USB		1 x USB Type-C 1 x Built-in USB 2 x USB 2.0 2 x USB 3.0
GPIO		14 x GPIO
SATA		1 x SATA (not connected to CPU)
SD		1 x Micro SD slot
RTC		Supported
Expansion		Bus
	System Control	Button LED
		1 x Reset 1 x 3G/4G/5G indicator 1 x System indicator
Power	Input	1 x DC in (12V)
Mechanical	Dimensions	170 x 110.8mm
Environment Condition	Temperature	Operating: -20°C~+70°C (Optional: -40°C~+85°C)

1.4 Mechanical Dimensions

- 170mm x 110.8mm



1.5 Power Supply

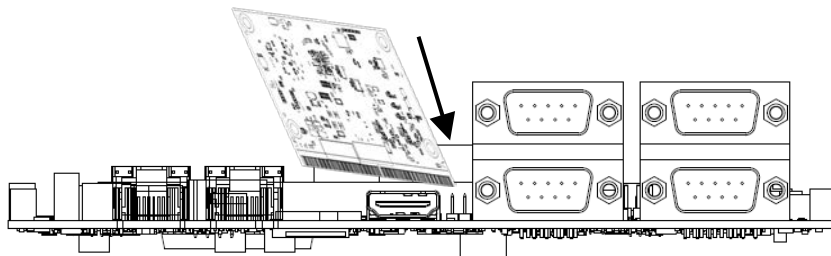
VT-SBC-SMARC works with +12V DC power input.

1.6 Environmental Specifications

VT-SBC-SMARC works at a temperature ranging from -20°C to +70°C (optional: -40°C to +85°C) and is designed to be stored at a temperature ranging from -40°C to +85°C and a humidity of 5%-95% RH for non-condensing purpose.

1.7 Module Installation

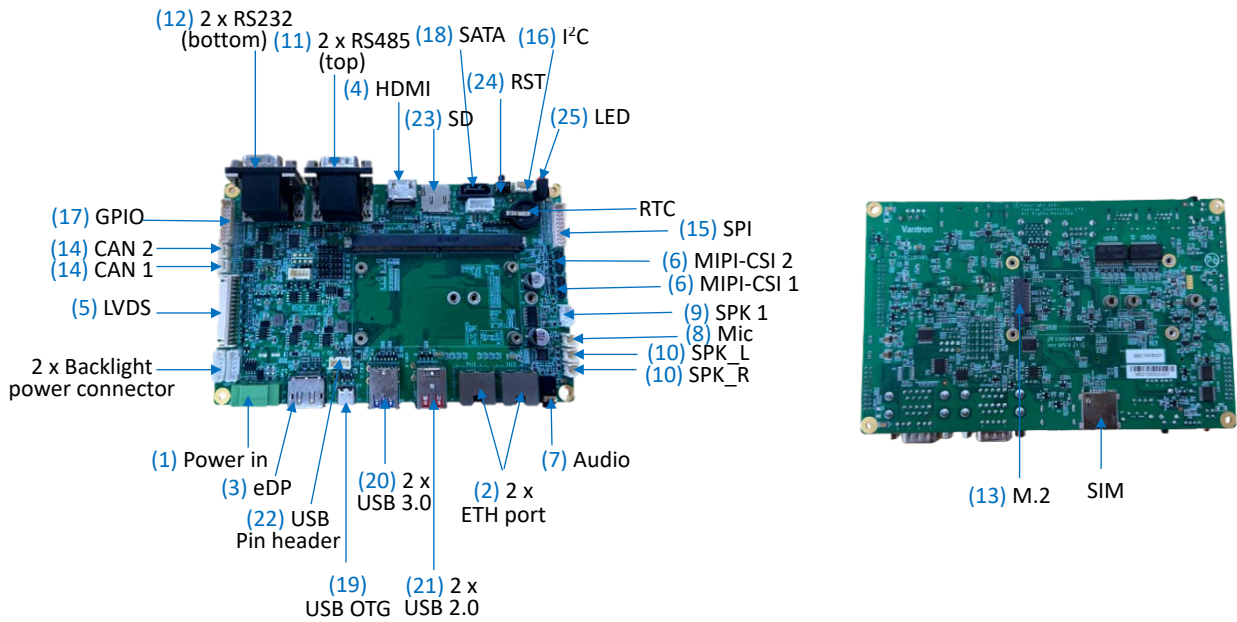
Insert a Vantron SMARC module (e.g., VT-SBC-SMARC-8MP) into the connector area reserved on the carrier board at a 45° angle, and press to secure the module.



CHAPTER 2

HARDWARE, CONNECTORS, JUMPERS

2.1 Board Layout



2.2 Identification of Pin 1

Unless otherwise stated, pin 1 of a connector is seated on a square pad that is different from the round pads used for other pins. Sometimes, pin 1 is next to a trigonal mark on the board. When there are two rows of pins on a connector, the row with pin 1 is composed of odd numbers and the other is composed of even numbers.



Usually, there will be numbers or marks next to the pins of a connector on the board to indicate the pinouts.

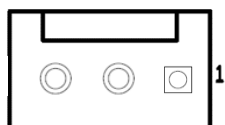


2.3 Connectors

This section is going to brief the connectors on the Board with corresponsive pinout description.

2.3.1 Power connector (1)

Specification: 1 x 3-pin, 3.81mm, 10A, No Lock, M, RA, CMT, THR, RoHS

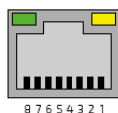


Pinout description:

Pin	Name	Type	Description
1	GND	P	Ground
2	GND	P	Ground
3	DC_IN	P	Power Supply, 12V

2.3.2 Ethernet port (2)

The Board offers two 8-pin 10M/100M/1000M Base-T Ethernet jacks with link/activity LEDs.



Pinout description:

Pin	Name	Type	Description
1	L_MDI_0P	IO	Ethernet MDI0+ Signal
2	L_MDI_0N	IO	Ethernet MDI0- Signal
3	L_MDI_1P	IO	Ethernet MDI1+ Signal
4	L_MDI_1N	IO	Ethernet MDI1- Signal
5	L_MDI_2P	IO	Ethernet MDI2+ Signal
6	L_MDI_2N	IO	Ethernet MDI2- Signal
7	L_MDI_3P	IO	Ethernet MDI3+ Signal
8	L_MDI_3N	IO	Ethernet MDI3- Signal

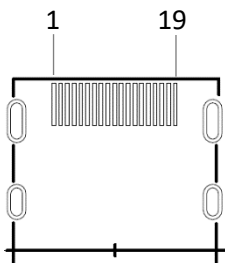
2.3.3 eDP port (3)

The Board offers an eDP interface. The interface is not connected to the CPU so it is not available for use for the moment.

2.3.4 HDMI port (4)

The Board supports a standard 19-pin HDMI 2.0 port, supporting resolution up to 4K@30fps.

Specification: Type A, No FLN, F, RA, -55°C ~85°C, SMT, RoHS



Pinout description:

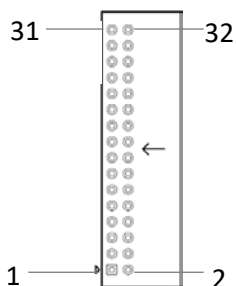
Pin	Name	Type	Description
1	HDMI_DATA2+	O	HDMI DATA
2	GND	P	Ground
3	HDMI_DATA2-	O	HDMI DATA
4	HDMI_DATA1+	O	HDMI DATA
5	GND	P	Ground
6	HDMI_DATA1-	O	HDMI DATA
7	HDMI_DATA0+	O	HDMI DATA
8	GND	P	Ground
9	HDMI_DATA0-	O	HDMI DATA
10	HDMI_CLK+	O	HDMI CLK
11	GND	P	Ground
12	HDMI_CLK-	O	HDMI CLK
13	NC		
14	NC		
15	HDMI_DDC_SCL	IO	HDMI DDC I2C CLK
16	HDMI_DDC_SDA	IO	HDMI DDC I2C DATA
17	GND	P	Ground
18	VCC_HDMI	P	HDMI POWER +5V
19	HDMI_HPD	I	HDMI HOT PLUG DETECTION

2.3.5 LVDS connector (5)

The Board offers a dual-channel LVDS connector (resolution: 1 x 1080p60 or 2 x 720p60) with an LCD backlight power connector.

LVDS connector: 2 x 16, 2.0mm, 3A, 5mm (H), M, RA, -40°C~105°C, THR, RoHS

Backlight power connector: 1 x 6, 2.0mm, 2A, 9.5mm (H), M, Vert, WDT, THR, RoHS



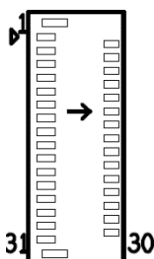
Pinout description:

Pin	Name	Type	Description
1	BTX3-	O	LVDS1_D3N
2	BTX3+	O	LVDS1_D3P
3	BCLK-	O	LVDS1_CLK_N
4	BCLK+	O	LVDS1_CLK_P
5	eDP1_HPD1	I	NC
6	eDP0_HPD0	I	NC
7	BTX2-	O	LVDS1_D2N
8	BTX2+	O	LVDS1_D2P
9	BTX1-	O	LVDS1_D1N
10	BTX1+	O	LVDS1_D1P
11	BTX0-	O	LVDS1_D0N
12	BTX0+	O	LVDS1_D0P
13	ATX3-	O	LVDS0_D3N
14	ATX3+	O	LVDS0_D3P
15	ACLK-	O	LVDS0_CLK_N
16	ACLK+	O	LVDS0_CLK_P
17	GND	P	Ground
18	GND	P	Ground
19	ATX2-	O	LVDS1_D2N
20	ATX2+	O	LVDS1_D2P
21	ATX1-	O	LVDS1_D1N

22	ATX1+	O	LVDS1_D1P
23	ATX0-	O	LVDS1_D0N
24	ATX0+	O	LVDS1_D0P
25	GND	P	Ground
26	GND	P	Ground
27	I2C4_CK_1	O	NC
28	I2C4_DAT_1	I/O	NC
29	LVDS1_PWR	P	Power Supply 3V3
30	LVDS1_PWR	P	Power Supply 3V3
31	LVDS0_PWR	P	Power Supply 3V3
32	LVDS0_PWR	P	Power Supply 3V3

2.3.6 MIPI CSI connector (6)

The Board supports two MIPI CSI camera interfaces. CSI1 supports up to 4 lanes with speed up to 1.5G/bps and CSI0 supports up to 2 lanes with speed up to 750M/bps.



CSI1 pinout description:

Pin	Name	Type	Description
1	GND	P	Ground
2	CONN_CAM1_D3N	I/O	MIPI Lane3 -
3	CONN_CAM1_D3P	I/O	MIPI Lane3 +
4	GND	P	Ground
5	CONN_CAM1_D2N	I/O	MIPI Lane2 -
6	CONN_CAM1_D2P	I/O	MIPI Lane2 +
7	GND	P	Ground
8	CONN_CAM1_D1N	I/O	MIPI Lane1 -
9	CONN_CAM1_D1P	I/O	MIPI Lane1 +
10	GND	P	Ground
11	CONN_CAM1_D0N	I/O	MIPI Lane0 -
12	CONN_CAM1_D0P	I/O	MIPI Lane0 +

13	GND	P	Ground
14	CONN_CAM1_CLKN	I/O	MIPI CLK -
15	CONN_CAM1_CLKP	I/O	MIPI CLK +
16	GND	P	Ground
17	SCL_CAM1	O	I2C_SCL
18	SDA_CAM1	I/O	I2C_SDA
19	CAM1_RST	O	Camera RESET
20	CAM1_PWN	O	Camera Power Down
21	GND	P	Ground
22	CONN_CAM1_MCLK	O	Camera Main CLK
23	GND	P	Ground
24	NC		
25	VCC18_DVP1	P	Power Supply 1.8V
26	VCC18_DVP1	P	Power Supply 1.8V
27	VCC1V5_DVP1	P	Power Supply 1.5V
28	NC		
29	VCC2V8_DVP1	P	Power Supply 2.8V
30	NC		
31	GND	P	Ground

CSI0 pinout description:

Pin	Name	Type	Description
1	GND	P	Ground
2	NC		
3	NC		
4	GND	P	Ground
5	NC		
6	NC		
7	GND	P	Ground
8	CONN_CAM0_D1N	I/O	MIPI Lane1 -
9	CONN_CAM0_D1P	I/O	MIPI Lane1 +
10	GND	P	Ground
11	CONN_CAM0_D0N	I/O	MIPI Lane0 -
12	CONN_CAM0_D0P	I/O	MIPI Lane0 +
13	GND	P	Ground
14	CONN_CAM0_CLKN	I/O	MIPI CLK -

15	CONN_CAM0_CLKP	I/O	MIPI CLK +
16	GND	P	Ground
17	SCL_CAM0	O	I2C_SCL
18	SDA_CAM0	I/O	I2C_SDA
19	CAM1_RST	O	Camera RESET
20	CAM1_PWN	O	Camera Power Down
21	GND	P	Ground
22	CONN_CAM0_MCLK	O	Camera Main CLK
23	GND	P	Ground
24	NC		
25	VCC18_DVP1	P	Power Supply 1.8V
26	VCC18_DVP1	P	Power Supply 1.8V
27	VCC1V5_DVP1	P	Power Supply 1.5V
28	NC		
29	VCC2V8_DVP1	P	Power Supply 2.8V
30	NC		
31	GND	P	Ground

2.3.7 Audio jack (7)

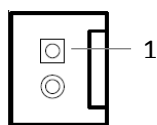
The Board supports a standard 3.5mm combo audio jack that switches to line out mode when an audio plug is plugged in.



- 40mW output power on 16Ω/3.3V
- Signal noise ratio (SNR) 90dB, total harmonic distortion (THD) -79dB at 20mW with 16Ω load

2.3.8 Microphone connector (8)

The Board provides a connector that supports programmable gain amplifier with gains ranging from -17.25dB to 30dB.



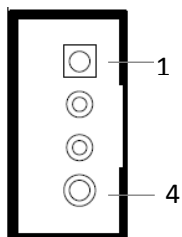
Pinout description:

Pin	Name	Type	Description
1	GND	P	Ground
2	MIC	I	MIC Input

2.3.9 Speaker connector 1 (9)

The 10W/8Ω speaker connector keeps the THD and noise below 10%.

Specification: 1 x 4-pin, 2.0mm, 2A, 9.5mm (H), M, Vert, WDT, THR, RoHS



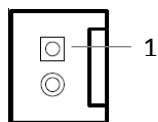
Pinout description:

Pin	Name	Type	Description
1	OUTL+	O	SPKL +
2	OUTL-	O	SPKL -
3	OUTR+	O	SPKR +
4	OUTR-	O	SPKR -

2.3.10 Speaker connectors 2 & 3 (10)

The two 1W/8Ω speaker connectors are driven by a class-D stereo amplifier to keep the THD and noise below 0.1%.

Specification: 1 x 2-pin, 2.0mm, 3A, 7mm (H), F, Vert, WDT, THR, RoHS



Pinout description of speaker connector 2:

Pin	Name	Type	Description
1	SPKNL	O	SPKL -
2	SPKPL	O	SPKL +

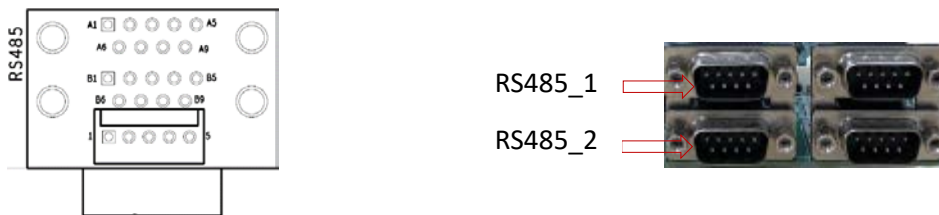
Pinout description of speaker connector 3:

Pin	Name	Type	Description
1	SPKNR	O	SPKR -
2	SPKPR	O	SPKR +

2.3.11 RS485 connector (11)

The Board supports two RS485 connectors, RS485_1 (pins A1-A5) and RS485_2 (pins B1 to B5). RS485_1 corresponds to ttymxc0. Currently, RS485_2 is not available.

Specification: DB9 connector, No nut, M, RA, -55°C~85°C, THR, RoHS



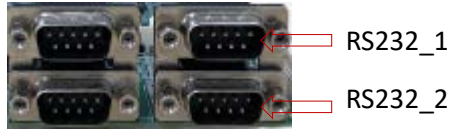
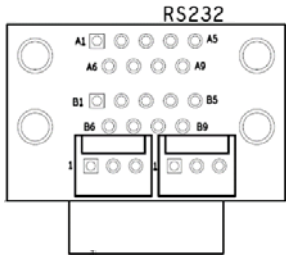
Pinout description:

Pin	Name	Type	Description
1	RS485_A	I/O	RS485_A
2	RS485_B	I/O	RS485_B
3	NC		
4	NC		
5	GND	P	Ground
6	NC		
7	NC		
8	NC		
9	NC		

2.3.12 RS232 connector (12)

The Board provides two RS232 serial connectors, RS232_1 (pins A1-A5) and RS232_2 (pins B1 to B5). RS232_1 corresponds to ttymxc1, for debugging by default and supporting serial communication as well. RS232_2 corresponds to ttymxc3.

Specification: DB9 connector, No Nut, M, RA, -55°C~85°C, THR, RoHS



Pinout description:

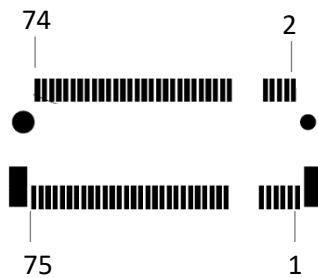
Pin	Name	Type	Description
1	NC		
2	RXD	I	RXD
3	TXD	O	TXD
4	NC		
5	GND	P	Ground
6	NC		
7	NC		
8	NC		
9	NC		

2.3.13 M.2 B-key slot (13)

The Board provides an M.2 B-Key slot, supporting both SATA channel and PCIe channel that can connect to a 3G/4G/5G module provided with a SIM card slot.

M.2 slot: Key B, 75-pin, 0.5mm, 6.7mm (H), WDT, SMT, RoHS;

SIM card slot: Micro SIM card, Push-Push, 6-pin, WDT, SMT, RoHS



Pinout description of the M.2 slot:

Pin	Name	Type	Description
1	CONFIG_3		NC
2	3P3V_2		Power Supply 3V3
3	GND_3		Ground
4	3P3V_4		Power Supply 3V3
5	GND_5		Ground
6	FULL_CARD_PWR_OFF_N		5G_PWR_OFF#1
7	USB_D+		USB1_DP
8	W_DISABLE_N		5G_DISABLE#1
9	USB_D-		USB1_DM
10	GPIO_9/DIS/DSS_N		NC
11	GND_11		Ground
20	GPIO_5		NC
21	CONFIG_0		CONFIG_0
22	GPIO_6		NC
23	GPIO_11		NC
24	GPIO_7		NC
25	DPR		NC
26	GPIO_10		GNSS_DISABLE#
27	GND_27		Ground
28	GPIO_8		NC
29	PERN1/USB3.0_RX-		USB2_SSRXM
30	UIM_RESET		5G_USIM_RESET
31	PERP1/USB3.0_RX+		USB2_SSRXP
32	UIM_CLK		5G_USIM_CLK
33	GND_33		Ground
34	UIM_DATA		5G_USIM_DATA
35	PETN1/USB3.0_TX-		USB2_SSTXM
36	UIM_PWR		5G_USIM_PWR
37	PETP1/USB3.0_TX+		USB2_SSTXP
38	DEVSLP		NC
39	GND_39		Ground
40	GPIO_0		NC
41	PERNO/SATA_B+		PCIE_RXN_A

42	GPIO_1		NC
43	PERP0/SATA_B-		PCIE_RXP_A
44	GPIO_2		NC
45	GND_45		Ground
46	GPIO_3		NC
47	PETN0/SATA_A-		PCIE_TXN_A
48	GPIO_4		NC
49	PETP0/SATA_A+		PCIE_TXP_A
50	PERST_N		PCIE_A_RST#
51	GND_51		Ground
52	CLKREQ_N		PCIE_A_CKREQ
53	REFCLKN		PCIE_CLKN_A
54	PEWAKE_N		PCIE_WAKE#
55	REFCLKP		PCIE_CLKP_A
56	NC_56		NC
57	GND_57		Ground
58	NC_58		NC
59	ANTCTL0		NC
60	COEX3		NC
61	ANTCTL1		NC
62	COEX2		NC
63	ANTCTL2		NC
64	COEX1		NC
65	ANTCTL3		NC
66	SIM_DETECT		SIM_DETECT1
67	RESET_N		WWAN_RESET#1
68	SSCLK		NC
69	PEDET_OC-PCIE/GND-SATA		CONFIG_1
70	3P3V_70		Power Supply 3V3
71	GND_71		Ground
72	3P3V_72		Power Supply 3V3
73	GND_73		Ground
74	3P3V_74		Power Supply 3V3
75	USB3.0IND_GND-OTHER		CONFIG_2

2.3.14 CAN bus (14)

The Board provides two CAN buses (CAN0 & CAN1).

Specification: 1 x 2, 2.0mm, 2A, 6.1mm (H), M, Vert, IND, THR, RoHS



Pinout description of CAN0:

Pin	Name	Type	Description
1	CAN0_LOW	I/O	CAN0_LOW
2	CAN0_HIGH	I/O	CAN0_HIGH

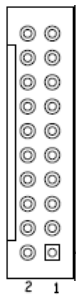
Pinout description of CAN1:

Pin	Name	Type	Description
1	CAN1_LOW	I/O	CAN1_LOW
2	CAN1_HIGH	I/O	CAN1_HIGH

2.3.15 SPI (15)

There are two SPI interfaces on the Board.

Specification: 2 x 10, 2.0mm, 3A, 6.5mm (H), M, Vert, -25°C ~85°C, THR, RoHS



Pinout description:

Pin	Name	Type	Description
1	VCC_3V3	P	Power Supply 3.3V
2	VCC_3V3	P	Power Supply 3.3V
3	SPIO_CS0#	O	ECSPI1_SS0* (3.3V)
4	SPI1_CS0#	O	ECSPI2_SS0 (3.3V)
5	SPIO_CLK	O	ECSPI1_SCLK (3.3V)

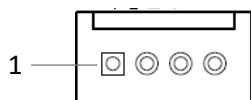
6	SPI1_CK	O	ECSPI2_SCLK (3.3V)
7	SPIO_MISO	O	ECSPI1_MISO (3.3V)
8	SPI1_MISO	O	ECSPI2_MISO (3.3V)
9	SPIO_MOSI	I	ECSPI1_MOSI (3.3V)
10	SPI1_MOSI	I	ECSPI2_MOSI (3.3V)
11	SPIO_CS1#		NC
12	ESPI_ALERT0#		NC
13	SPI1_CS1#		NC
14	ESPI_ALERT1#		NC
15	ESPI_IO2		NC
16	ESPI_IO3		NC
17	GND	P	Ground
18	ESPI_RESET#		NC
19	GND	P	Ground
20	GND	P	Ground

* ECSPI pins are on the edge connector of VT-SBC-SMARC-8MP core board, and the description assumes that the core board is installed on the carrier board.

2.3.16 I²C (16)

There is an I²C interface on the Board.

Specification: 1 x 4, 2.0mm, 3A, 7mm (H), F, Vert, WDT, THR, RoHS



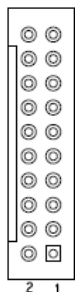
Pinout description:

Pin	Name	Type	Description
1	GND	P	Ground
2	SCL	O	NC
3	SDA	I/O	NC
4	VCC_3V3	P	Power Supply 3.3V

2.3.17 GPIO (17)

The Board supports 14 GPIOs.

Specification: 2 x 10, 2.0mm, 3A, 6.5mm (H), M, Vert, -25~85°C, THR, RoHS



Pinout description:

Pin	Name	Type	Description
1	VCC_3V3	P	Power Supply 3.3V
2	VCC_3V3	P	Power Supply 3.3V
3	GPIO0	I/O	General input/output
4	GPIO7	I/O	General input/output
5	GPIO1	I/O	General input/output
6	GPIO8	I/O	General input/output
7	GPIO2	I/O	General input/output
8	GPIO9	I/O	General input/output
9	GPIO3	I/O	General input/output
10	GND	P	Ground
11	GND	P	Ground
12	GPIO10	I/O	General input/output
13	GPIO4	I/O	General input/output
14	GPIO11	I/O	General input/output
15	GPIO5	I/O	General input/output
16	GPIO12	I/O	General input/output
17	GPIO6	I/O	General input/output
18	GPIO13	I/O	General input/output
19	GND	P	Ground
20	GND	P	Ground

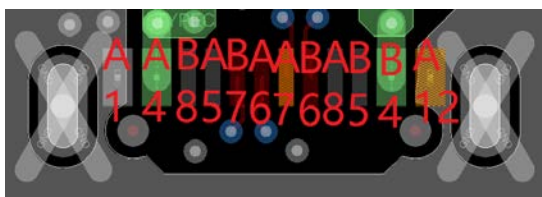
2.3.18 SATA (18)

The Board offers a SATA interface which is enabled depending on the configurations of the core board.

2.3.19 USB OTG (19)

The Board provides one USB Type-C OTG interface that switches between USB host and slave modes, and supports program download and debugging.

Specification: 2.0, Type C, 16-pin, F, RA, WDT, SMT, RoHS



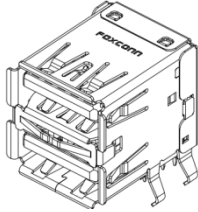
Pinout description:

Pin	Name	Type	Description
A4/A9	VBUS5V0_TYPEC	P	VCC5V
B4/B9	VBUS5V0_TYPEC	P	VCC5V
A1/B12	GND	P	Ground
B1/A12	GND	P	Ground
A5	CC1	I/O	CC
B5	CC2	I/O	CC
A8	NC		
B8	NC		
A7/B7	DM	I/O	USB Signal -
A6/B6	DP	I/O	USB Signal +

2.3.20 USB 3.0 port (20)

The Board provides two USB 3.0 Type-A ports.

Specification: 3.0, Type-A, Female, 17.5mm (L), Right angle, CMT, THR, RoHS

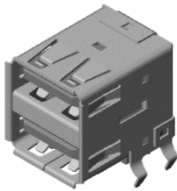


The pinout of the USB 3.0 port is in line with the pin assignment of standard USB 3.0 connector.

2.3.21 USB 2.0 port (21)

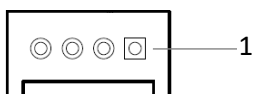
The Board provides two USB 2.0 Type-A ports.

Specification: 2.0, Type-A, Female, Right angle, Retention, WDT, THR, RoHS



The pinout of the USB 2.0 port is in line with the pin assignment of standard USB 2.0 connector.

2.3.22 USB pin header (22)



Pinout description:

Pin	Name	Type	Description
1	VCC_USB2.0_HDR	P	USB POWER +5V
2	VCC_USB2.0_HDR	P	USB POWER +5V
3	GND	P	Ground
4	GND	P	Ground

2.3.23 SD card slot (23)

There is a Micro SD card slot on the Board.

Specification: Micro SD, Push-Push, No WP, -25⁰C~90⁰C, SMT, RoHS

2.3.24 Reset button (24)

The Board provides a reset button that performs a system hard reset via control of the reset pin on the PMIC.



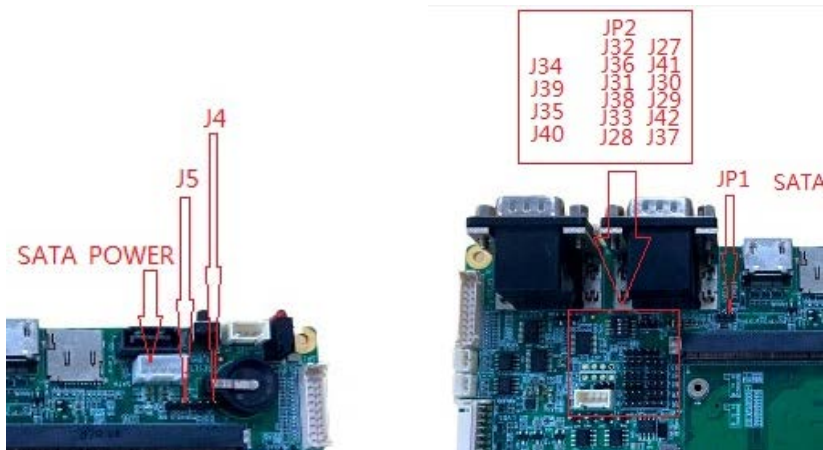
2.3.25 LED (25)

There are two LED indicators on the Board. The top one is user defined, and bottom one is a system power indicator that lights up when the Board is powered on.



2.4 Jumpers

This section is going to brief on the jumpers with corresponsive pinout description.



The pinout of jumpers with different pin numbers is shown as follows:



2-pin jumper



3-pin jumper



4-pin jumper

2.4.1 J4

Pinout description:

Pin	Name	Type	Description
1	GND	P	Ground
2	SMB_ALERT#	O	NC
3	VCC_EXT_3V3	P	Power Supply 3.3V

2.4.2 J5

Pinout description:

Pin	Name	Type	Description
1	GND	P	Ground
2	MDIO_DAT	I/O	NC
3	MDIO_CLK	O	NC

2.4.3 JP1

Pinout description:

Pin	Name	Type	Description
1	RS485_1_B	I/O	RS485_1_B
2	RS485_1_A	I/O	RS485_1_A
3	NC		NC

2.4.4 JP2

Pinout description:

Pin	Name	Type	Description
1	RS485_2_B	I/O	RS485_2_B
2	RS485_2_A	I/O	RS485_2_A
3	NC		NC

2.4.5 J34

Pinout description:

Pin	Name	Type	Description
1	VCC_EXT_3V3	P	Power Supply 3.3V
2	STM8_UART_RX		NC
3	STM8_UART_RX		NC
4	GND	P	Ground

2.4.6 J39

Pinout description:

Pin	Name	Type	Description
1	VCC_EXT_3V3	P	Power Supply 3.3V
2	STM_SWIM		NC
3	STM_NRST		NC
4	GND	P	Ground

2.4.7 J35

Pinout description:

Pin	Name	Type	Description
1	I2C1_DATA_1		NC
2	I2C1_DATA	I/O	I2C1_DATA 3.3V
3	I2C1_DATA_2		NC

2.4.8 J40

Pinout description:

Pin	Name	Type	Description
1	GND	P	Ground
2	I2C1_CL_1		NC
3	I2C1_DATA_1		NC
4	VCC_EXT_3V3	P	Power Supply 3.3V

2.4.9 J32

Pinout description:

Pin	Name	Type	Description
1	GND/VCC	P	Ground/ Power Supply 3.3V
2	CARRIER_STBY#_1	I/O	SD1_DATA5 3.3V
3	CARRIER_STBY#_2		NC

2.4.10 J27

Pinout description:

Pin	Name	Type	Description
1	TEST#		NC
2	TEST#		NC

2.4.11 J36

Pinout description:

Pin	Name	Type	Description
1	GND/VCC	P	Ground/ Power Supply 3.3V
2	CARRIER_PWR_ON_1	I/O	SAI5_RXD1 3.3V
3	CARRIER_PWR_ON_2		NC

2.4.12 J41

Pinout description:

Pin	Name	Type	Description
1	GND/VCC	P	Ground/ Power Supply 3.3V
2	RESET_IN#	O	WDT Reset Output Pin
3	RESET_IN#_2		NC

2.4.13 J31

Pinout description:

Pin	Name	Type	Description
1	GND/VCC	P	Ground/ Power Supply 3.3V
2	SLEEP#	I	SAI2_RXD0
3	SLEEP#1		NC

2.4.14 J30

Pinout description:

Pin	Name	Type	Description
1	GND/VCC	P	Ground/ Power Supply 3.3V
2	LID#	I	SAI1_MCLK
3	LID#1		NC

2.4.15 J38

Pinout description:

Pin	Name	Type	Description
1	I2C1_CL_1		NC
2	I2C1_CL	O	I2C1_SCL 3.3V
3	I2C1_CL_2		NC

2.4.16 J29

Pinout description:

Pin	Name	Type	Description
1	GND/VCC	P	Ground/ Power Supply 3.3V
2	CHARGING#	I	SAI_RXC
3	CHARGING#_1		NC

2.4.17 J33

Pinout description:

Pin	Name	Type	Description
1	GND/VCC	P	Ground/ Power Supply 3.3V
2	CHARGER_PRSENT#	I	SAI2_TXC
3	CHARGER_PRSENT#_1		NC

2.4.18 J42

Pinout description:

Pin	Name	Type	Description
1	GND/VCC	P	Ground/ Power Supply 3.3V
2	VIN_PWR_BAD#	I	PMIC_ON_REQ# 1.8V (higher level supported)
3	VIN_PWR_BAD#_1		NC

2.4.19 J28

Pinout description:

Pin	Name	Type	Description
1	GND/VCC	P	Ground/ Power Supply 3.3V
2	RESET_OUT#_1	O	SAI1_TXD7 1.8V
3	RESET_OUT#_2		NC

2.4.20 J37

Pinout description:

Pin	Name	Type	Description
1	GND/VCC	P	Ground/ Power Supply 3.3V
2	BATLOW#	I	SAI1_RXFS 3.3V/1.8V
3	BATLOW#_1		NC

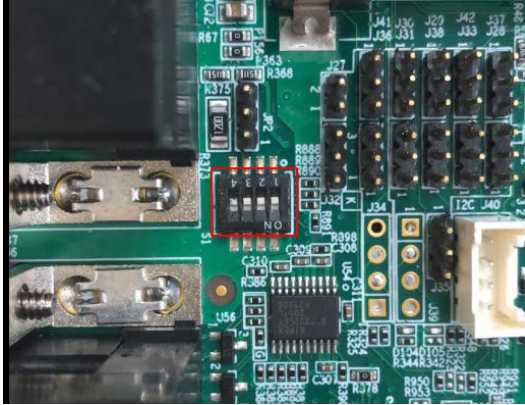
CHAPTER 3

SOFTWARE

When mating the Board with a core board (e.g., VT-SBC-SMARC-8MP), users will be able to enable system boot, system flashing, interface communication, etc.

3.1 System Boot

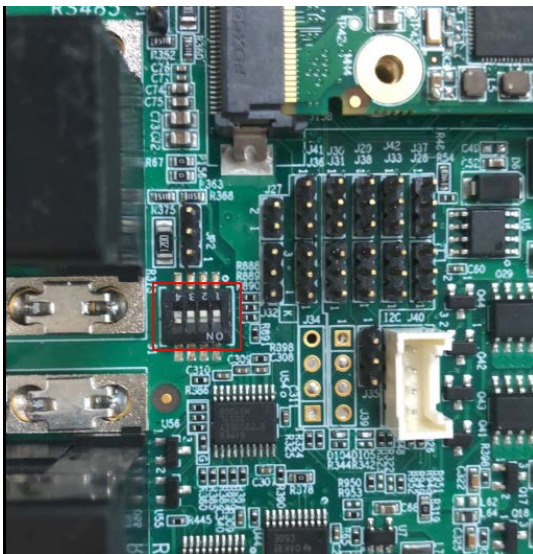
The system can boot from the eMMC flash on the core board.



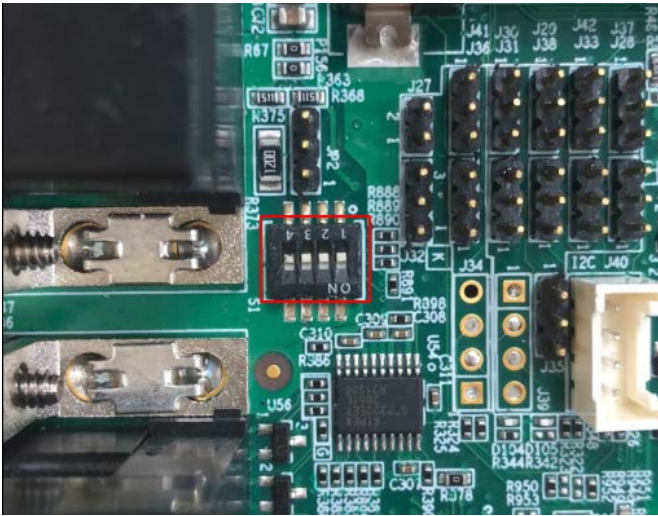
BOOT_MODE [4:1]	Description
0000	eMMC boot mode
1000	eMMC download mode

- 1: ON
- 0: OFF

eMMC download mode (1000):



eMMC boot mode (0000):



3.2 System Image Flashing

Whenever a new image is available, Vantron will provide a release package consisting of all the tools/files necessary so that you can flash the image in the Ubuntu environment.

Files in the release package include:

- flash.bin
- tools.deb
- uuu
- uuu.auto
- vtlinux-image-weston-vantron-imx8mm-som-20210730083054.rootfs.wic

File/tool name	Description
uuu	Flashing tool
uuu.auto	Flashing script
flash.bin	Uboot
xxx.wic	Image and rootfs
tools.deb	Binary executable file

3.2.1 Prerequisite

Prepare the following

- An Ubuntu host computer/device with terminal tools pre-installed
- A USB cable
- A USB to DB9 adapter cable
- A SD card of at least 8GB and a card reader

3.2.2 Steps for system flashing

1. Place the DIP switch to eMMC download mode (as indicated in the figure in 3.1);
2. Insert one end of the console cable to the USB OTG interface on the Board and the other end to the host computer or device that runs Ubuntu;



3. Plug the power cable into the terminal block and power on the Board;
4. Input the following command line in Ubuntu terminal to start the flashing;

```
sudo ./uuu uuu.auto.
```


5. The SBL binary image will be flashed at first;


```
uuu (Universal Update Utility) for nxp imx chips -- libuuu_1.3.134-0-g0b47f4d
Success 0   Failure 0
1:1      2/ 3 [          4%          ] SDPV: write -f imx-boot-imx8m-evk-sd.bin-flash_evk -skipssl
```

6. When the flashing succeeds, the following will be shown:

```
uuu (Universal Update Utility) for nxp imx chips -- libuuu_1.3.134-0-g0b47f4d
Success 1   Failure 0
3:14      8/ 8 [Done          ] FB: done
```

7. Once the flashing finishes, unplug the cables and place the DIP switch to eMMC boot mode;
8. Re-plug the power cable into the terminal to restart the Board.

 If you run Ubuntu on Vmware Workstation, the USB interface will restart once during the flashing process and may require reconnection in Vmware workstation.

 If the Board is not detectable over the USB interface, uuu (the flashing tool) will exit with an error message suggesting there is no device, so please restart the flashing process.

3.3 Interface Setup

3.3.1 Serial ports

VT-SBC-SMARC offers four serial ports, including two RS485 and two RS232, corresponding to ttymxc0, ttymxc1, ttymxc2 and ttymxc3 respectively.



- Configuring and enabling RS485_1:
 1. Use the USB to DB9 adapter cable to connect the Ubuntu host computer/device and RS485_1;



2. Install minicom;

```
# sudo apt-getinstall minicom
```

3. Configure minicom;

```
# sudo minicom -D /dev/ttyUSB0 -b 9600  
Welcome to minicom 2.7.1  
OPTIONS: I18n  
Compiled on Aug 13 2017, 15:25:34.  
Port /dev/ttyUSB0, 10:28:17  
Press CTRL-A Z for help on special keys
```

4. Input the following command to enable RS485_1:

```
# rs485_active /dev/ttymxc0
```

5. Run the command lines below to send data ("TEST") to RS485_1 and display the data.

```
# echo TEST > /dev/ttymxc0  
# cat /dev/ttymxc0 &
```

- RS232_1 is for debugging by default. Replace ttymxc0 with ttymxc1 that corresponds to this port to enable serial communication of this port.
- RS485_2 is currently not available.
- Follow the above steps to configure and enable RS232_2, only pay attention to replace ttymxc0 with ttymxc3 that corresponds to the port.

3.3.2 USB

Apart from USB OTG, VT-SBC-SMARC offers two USB 3.0 and two USB 2.0 in host mode by default.

In USB host mode, inserting a USB drive to any one of the USB ports will get a result like the following:

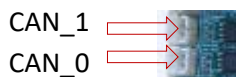
```
[ 43.450311] usb-storage 1-1:1.0: USB Mass Storage device detected
[ 43.456999] scsi host0: usb-storage 1-1:1.0
[ 45.396020] scsi 0:0:0:0: Direct-Access          SD Card Reader    1.00 PQ: 0
ANSI: 6
[ 45.405529] sd 0:0:0:0: [sda] 31457280 512-byte logical blocks: (16.1 GB/15.0 GiB)
[ 45.413661] sd 0:0:0:0: [sda] Write Protect is off
[ 45.419111] sd 0:0:0:0: [sda] No Caching mode page found
[ 45.424472] sd 0:0:0:0: [sda] Assuming drive cache: write through
[ 45.436604] sd 0:0:0:0: [sda] Attached SCSI removable disk
```

When switching to USB device mode, users will get a result like the following:

```
[ 45.681687] EXT4-fs (sda): mounted filesystem with ordered data mode. Opts:
(null)
[ 47.965906] usb 1-1: USB disconnect, device number 3
```

3.3.3 CAN

VT-SBC-SMARC offers two CAN buses (CAN0 & CAN1).



1. Configure CAN0 and CAN1 and run the commands:

```
# ip link set can0 up type can bitrate 125000
IPv6: ADDRCONF(NETDEV_CHANGE): can0: link becomes ready
# ip link set can1 up type can bitrate 125000
IPv6: ADDRCONF(NETDEV_CHANGE): can1: link becomes ready
#ifconfig
can0      Link encap:UNSPEC  HWaddr 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00
          UP RUNNING NOARP  MTU:16  Metric:1
          RX packets:12 errors:0 dropped:0 overruns:0 frame:0
          TX packets:5 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:10
          RX bytes:44 (44.0 B)  TX bytes:20 (20.0 B)
          Interrupt:32

can1      Link encap:UNSPEC  HWaddr 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00
          UP RUNNING NOARP  MTU:16  Metric:1
          RX packets:12 errors:0 dropped:0 overruns:0 frame:0
          TX packets:7 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:10
          RX bytes:44 (44.0 B)  TX bytes:24 (24.0 B)
          Interrupt:33
```

2. Data receiving and transmitting:

```
# candump can1 &
# cansend can0 500#1E.10.12.22
can1  500  [4]  1E 10 12 22
# cansend can0 500#1E.10.12
can1  500  [3]  1E 10 12y
```

3.3.4 GPIO

1. Write a GPIO pin number to “/sys/class/gpio/export” to export the pin, for instance pin 20:

```
~# echo 20 > /sys/class/gpio/export
```

2. Set the pin direction as input or output (in for input and out for output);

```
~# echo out > /sys/class/gpio/gpio20/direction
```

3. If you configured an output pin in the prior step, now you can set its value to 0 or 1 (corresponding to low or high) as follows:

```
~# echo 0 > /sys/class/gpio/gpio20/value [set it low], or
~# echo 1 > /sys/class/gpio/gpio20/value [set it high]
```

4. Read the GPIO value;

```
~# cat /sys/class/gpio/gpio20/value
```

5. When you finish using the pin, just unexport it. To do this, write the pin number to the unexport file:

```
~# echo 20 > /sys/class/gpio/unexport
```

3.3.5 Ethernet



Set up and verify the IP address of eth0:

```
# ifconfig eth0 192.168.9.12
# ping 192.168.9.10
PING 192.168.9.10 (192.168.9.10): 56 data bytes
64 bytes from 192.168.9.10: seq=0 ttl=64 time=1.296 ms
64 bytes from 192.168.9.10: seq=1 ttl=64 time=1.358 ms
```

3.3.6 Micro SD

1. Insert a Micro SD card into the slot:

```
[49.715803] mmc1: host does not support reading read-only switch, assuming write-
enable
[49.834757] mmc1: new ultra high speed DDR50 SDHC card at address aaaa
[49.842101] mmcblk1: mmc1:aaaa SL08G 7.40 GiB
[49.858066] mmcblk1: p1
```

2. Mount the Micro SD card based on the result of prior step:

```
# ls /dev/mmcblk
mmcblk1      mmcblk1p2    mmcblk2boot0  mmcblk2p1    mmcblk2rpmb
mmcblk1p1    mmcblk2      mmcblk2boot1  mmcblk2p2
# mount /dev/mmcblk1p1 /mnt/
# ls /mnt/
Image
imx8mp-ab2.dtb
imx8mp-ddr4-evk.dtb
imx8mp-evk-basler-ov2775.dtb
imx8mp-evk-basler-ov5640.dtb
imx8mp-evk-basler.dtb
imx8mp-evk-dsp-lpa.dtb
imx8mp-evk-dsp.dtb
```

CHAPTER 4

DISPOSAL AND WARRANTY

3.1 Disposal

When the device comes to end of life, you are suggested to properly dispose of the device for the sake of the environment and safety.

Before you dispose of the device, please back up your data and erase it from the device.

It is recommended that the device is disassembled prior to disposal in conformity with local regulations. Please ensure that the abandoned batteries are disposed of according to local regulations on waste disposal. Do not throw batteries into fire or put in common waste canister as they are explosive. Products or product packages labeled with the sign of “explosive” should not be disposed of like household waste but delivered to specialized electrical & electronic waste recycling/disposal center.

Proper disposal of this sort of waste helps avoid harm and adverse effect upon surroundings and people’s health. Please contact local organizations or recycling/disposal center for more recycling/disposal methods of related products.

3.2 Warranty

Product Warranty

VANTRON warrants to its CUSTOMER that the Product manufactured by VANTRON, or its subcontractors will conform strictly to the mutually agreed specifications and be free from defects in workmanship and materials (except that which is furnished by the CUSTOMER) upon shipment from VANTRON. VANTRON's obligation under this warranty is limited to replacing or repairing at its option of the Product which shall, within **24 months** after shipment, effective from invoice date, be returned to VANTRON's factory with transportation fee paid by the CUSTOMER and which shall, after examination, be disclosed to VANTRON's reasonable satisfaction to be thus defective. VANTRON shall bear the transportation fee for the shipment of the Product to the CUSTOMER.

Out-of-Warranty Repair

VANTRON will furnish the repair services for the Product which are out-of-warranty at VANTRON's then-prevailing rates for such services. At customer's request, VANTRON will provide components to the CUSTOMER for non-warranty repair. VANTRON will provide this service as long as the components are available in the market; and the CUSTOMER is requested to place a purchase order up front. Parts repaired will have an extended warranty of 3 months.

Returned Products

Any Product found to be defective and covered under warranty pursuant to Clause above, shall be returned to VANTRON only upon the CUSTOMER's receipt of and with reference to a VANTRON supplied Returned Materials Authorization (RMA) number. VANTRON shall supply an RMA, when required within three (3) working days of request by the CUSTOMER. VANTRON shall submit a new invoice to the CUSTOMER upon shipping of the returned products to the CUSTOMER. Prior to the return of any products by the CUSTOMER due to rejection or warranty defect, the CUSTOMER shall afford VANTRON the opportunity to inspect such products at the CUSTOMER's location and no Product so inspected shall be returned to VANTRON unless the cause for the rejection or defect is determined to be the responsibility of VANTRON. VANTRON shall in turn provide the CUSTOMER turnaround shipment on defective Product within **fourteen (14) working days** upon its receipt at VANTRON. If such turnaround cannot be provided by VANTRON due to causes beyond the control of VANTRON. VANTRON shall document such instances and notify the CUSTOMER immediately.