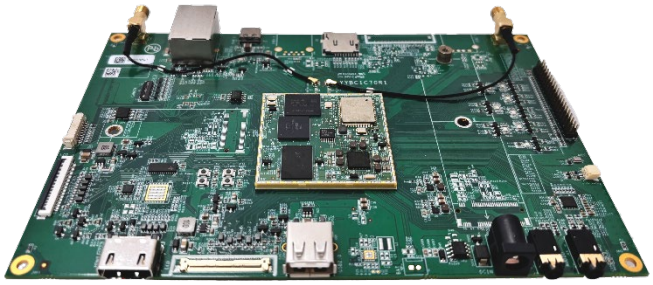
VT-SBC-VOSM93-EVB
Evaluation Board



User Manual

Version: 1.2

Revision History

No.	Version	Description	Date
1	V1.0	First release	Mar. 7, 2025
2	V1.1	Updated instructions on switching the display interface from LVDS to MIPI DSI.	May. 24, 2025
3	V1.2	1. Removed the description for LED and headphone ADC; 2. Updated the instructions for image flashing.	Aug. 20, 2025

Table of Contents

Foreword

Thank you for purchasing VT-SBC-VOSM93-EVB evaluation 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

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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.

Vantron Technology, Inc.

Address: 48434 Milmont Drive, Fremont, CA 94538

Tel: (650) 422-3128

Email: sales@vantrontech.com

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-VOSM93-EVB evaluation board is based on the VOSM93 system-on-module, offering a carrier board that implements multiple interfaces to facilitate the use of VOSM93. It is powered by the cost-effective NXP i.MX 9352 dual-core processor and low-power co-processor, offering on-board 2GB LPDDR4 memory and 16GB eMMC storage. It offers a high-efficiency Micro NPU to deliver optimized AI performance for low-power workloads like sensor fusion or object detection. The board provides Wi-Fi, Bluetooth, and an Ethernet jack as connectivity options, increasing its versatility for IoT scenarios.

The board supports Linux Yocto operating system, reducing time-to-market for proof-of-concepts and production deployments alike. When used together with a Vantron TMO/TMC series touchscreen monitor, it provides an overall display solution for customers, making it ideal for such scenarios as smart retail, self-service kiosks, intelligent medical health, and digital media.

1.2 Product Feature

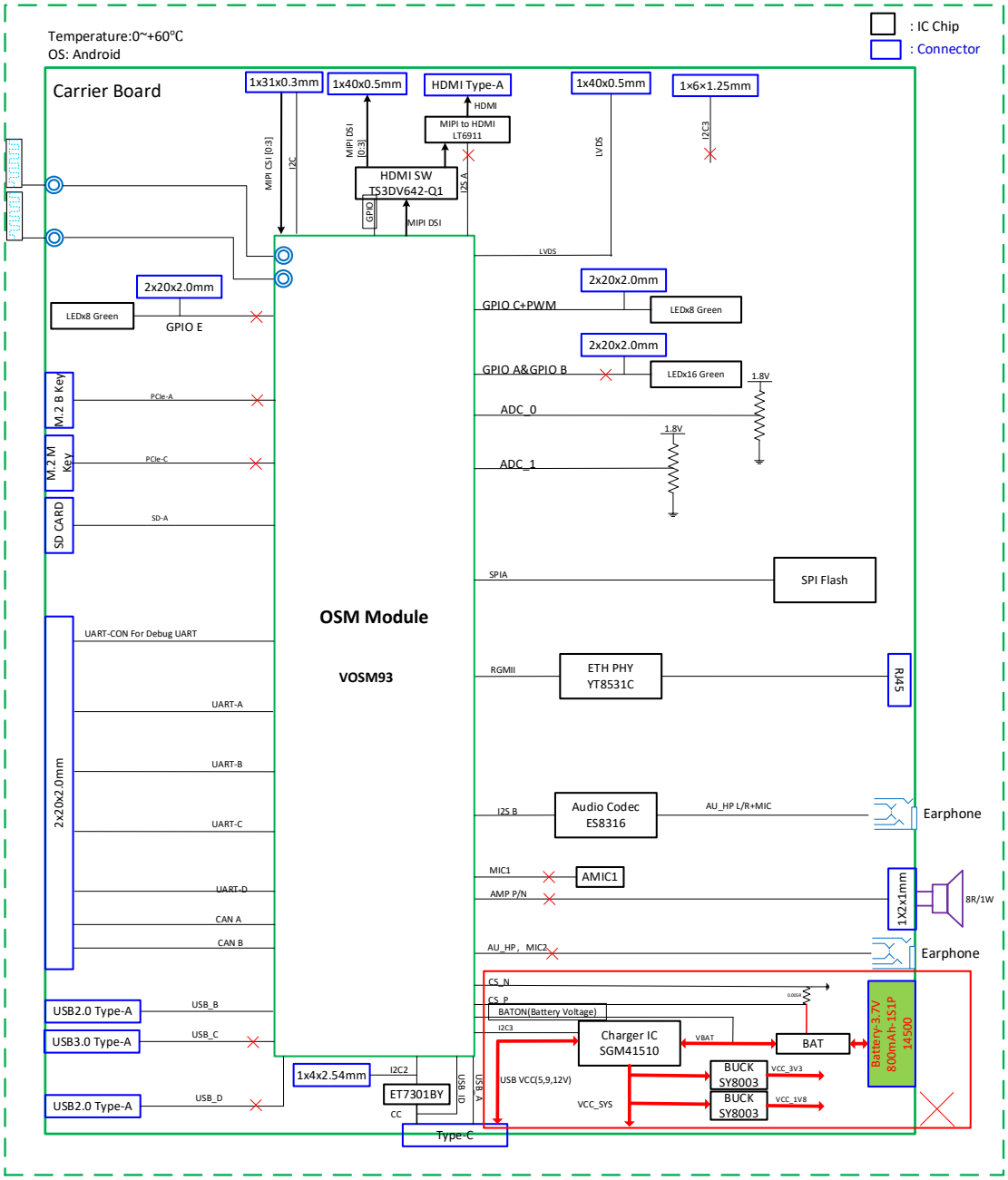
- NXP i.MX 9352 dual-core ARM Cortex-A55 processor
- ARM Cortex-M33 low-power real-time co-processor
- Default 2GB memory + 16GB storage
- 0.5 TOPS NPU for low-power workloads
- Single display support with MIPI DSI/LVDS
- 1080P/720P display output
- Medium Quality Sound (MQS) audio output
- Ethernet, Wi-Fi 5, BT 5.0 connectivity
- 2-Lane MIPI CSI interface, supporting 1080P @30fps camera ISP
- Rich interfaces for flexible expansion (GPIO, UART, USB, CAN)

1.3 Terminology/Acronym

Please refer to the table below for acronyms or terminologies used in this document, especially for those included in the pinout description of the device.

Terminology/Acronym	Description
NC	No connection
VCC	Voltage common collector
GND	Ground
P (+)	Positive difference signal
N (-)	Negative difference signal
SCL	Serial clock
SDA	Serial data
I	Input
O	Output
I/O	Input/output
GPIO	General purpose input and output
P	Power/ground
RX	Receive data
TX	Transmit data
PCIe	Peripheral component interconnect express
MDI	Media dependent interface
INT	Interrupt
RST	Reset
LVDS	Low Voltage Differential Signaling
PWM	Pulse width modulation

1.4 Block Diagram

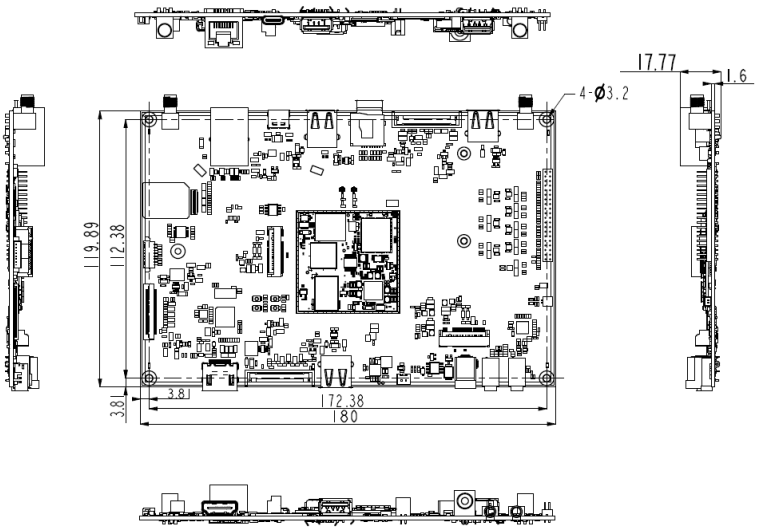


1.5 Specifications

VOSM93 Evaluation Board			
System	CPU	NXP i.MX 9352, Dual-core ARM Cortex-A55 processor, up to 1.7GHz ARM Cortex-M33 low-power real-time co-processor, 250MHz	
	Micro NPU	0.5 TOPS	
	Memory	2GB LPDDR4	
	Storage	16GB eMMC 5.1	
	EEPROM	2Kb (for hardware configuration information)	
Communication	Ethernet	1 x RJ45, 10M/100/1000Mbps	
	Wi-Fi & Bluetooth	Wi-Fi 802.11 a/b/g/n/ac + Bluetooth 5.0	
Media	Camera	8-bit Parallel YUV/RGB camera	
	Display	24-bit Parallel RGB display	
	Audio	Medium Quality Sound (MQS) output	
I/O	Display (Single display)	1 x 4-lane MIPI DSI, up to 1080P @60Hz output	
		1 x 4-lane LVDS, up to 720P @60Hz	
	MIPI CSI	1 x 2-lane MIPI CSI-2, 1080p @30Hz	
	Audio	1 x Headphone jack (CTIA standard)	
	USB	1 x USB 2.0 Type-A	1 x USB 2.0 Type-C (OTG)
	GPIO header	12 x GPIO (max.) 1 x Debug UART (1.8V), 3 x Communication UART (1.8V), 2 x PWM, 2 X CAN	
	SD slot	1 x Micro SD slot	
	Key	1 x Power key	1 x Reset key
		1 x Recovery key	
Power	Input	5V/2A DC input	
Software	Operating system	Linux Yocto	
Mechanical	Dimensions	180mm x 119.89mm x 17.77mm (EVB)	45mm x 45mm x 4.4mm (SOM with shield)
Environmental Condition	Temperature	Operating: 0℃ ~ +60℃ (Optional: -40℃ ~ +85℃)	Storage: -20℃ ~ +70℃
	Humidity	≤95% RH (Non-condensing)	

1.6 Mechanical Dimensions

- 180mm x 119.89mm x 17.77mm



1.7 Operating system

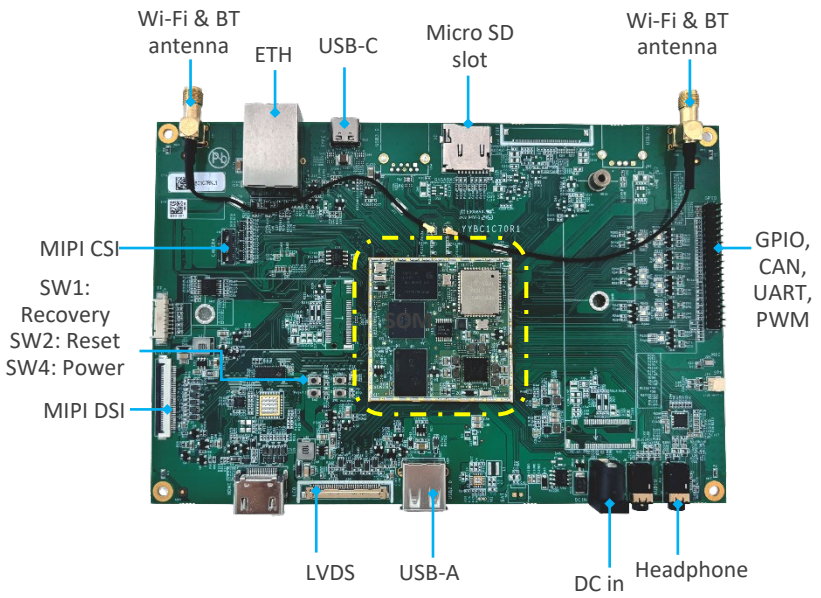
VT-SBC-VOSM93-EVB supports Linux Yocto operating system, with support for other Linux distributions by request.

1.8 Environmental Conditions

VT-SBC-VOSM93-EVB works at a temperature ranging from 0℃ to +60℃, with an extended-range option of -40℃ to +85℃. It is designed for storage within -20℃ to +70℃. The designed relative humidity range is between 0% and 95% for non-condensing purpose.

CHAPTER 2 HARDWARE FEATURES

2.1 Product Layout



Ports without annotation are non-functional.

2.2 Memory and Storage

2.2.1 LPDDR4 RAM

VT-SBC-VOSM93-EVB is equipped with a 2GB 16-bit LPDDR4 RAM.

2.2.2 eMMC Flash

VT-SBC-VOSM93-EVB provides an eMMC 5.1 flash, offering a default capacity of 16GB, used as the default boot and storage device.

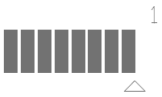
The board also offers a Micro SD slot for storage expansion.

2.2.3 EEPROM

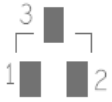
VT-SBC-VOSM93-EVB offers 2Kb EEPROM to store hardware configuration information.

2.3 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.



2.4 Connectors and Jumpers

The board offers a variety of interfaces to connect different peripherals, enabling extended functionality. This section is going to brief the connectors/jumpers on the board with corresponsive pinout description.

2.4.1 J001 Power Jack

VT-SBC-VOSM93-EVB works with 5V 2A DC power supplied via a 2.0mm power jack. Voltages above 5 V will permanently damage the board—use only the specified adapter.

2.4.2 J6 Ethernet Port

VT-SBC-VOSM93-EVB offers an RJ45 Ethernet jack that supports a transmission rate of 10/100/1000Mbps.

The Ethernet jack is designated as a WAN port by default, intended for connecting to a router or switch to establish Internet access.

2.4.3 Wi-Fi and Bluetooth

VT-SBC-VOSM93-EVB integrates a Wi-Fi and Bluetooth combo module, combining Wi-Fi 802.11 a/b/g/n/ac and Bluetooth 5.0. The two on-board SMA antenna connectors (J35, J36) are used for connecting the Wi-Fi and Bluetooth antennas.

2.4.4 J34 LVDS

VT-SBC-VOSM93-EVB offers a 4-lane LVDS connector for 720P @60Hz output. It supports single display mode, with LVDS as the default output interface.

Specs: 40P, 0.5mm (pitch), 1mm (height), cable thickness: 1mm

Pinout description:

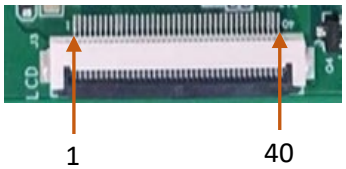
Pin	Name	Type	Level	Description
1	LEDB+	P	12V	LED backlight positive
2	LEDB+	P	12V	LED backlight positive
3	LEDB+	P	12V	LED backlight positive
4	NC			
5	LVDS_VDD_EN	P	3.3V	LVDS power enable
6	LED_PWMB	P	3.3V	Backlight PWM adjustment
7	NC			
8	LEDB-	P		LED backlight negative
9	LEDB-	P		LED backlight negative
10	LEDB-	P		LED backlight negative
11	NC			
12	NC			
13	GND	P		Ground
14	SEL68	P	3.3V	LVDS 6/8-bit select
15	NC			
16	GND	P		Ground
17	NC			
18	NC			
19	GND	P		Ground
20	LVDS_D3P	O	1.8V	LVDS lane 3 +
21	LVDS_D3N	O	1.8V	LVDS lane 3 -

Pin	Name	Type	Level	Description
22	GND	P		Ground
23	LVDS_CLK+	O	1.8V	LVDS differential clock +
24	LVDS_CLK-	O	1.8V	LVDS differential clock -
25	GND	P		Ground
26	LVDS_D2P	O	1.8V	LVDS lane 2 +
27	LVDS_D2N	O	1.8V	LVDS lane 2 -
28	GND	P		Ground
29	LVDS_D1P	O	1.8V	LVDS lane 1 +
30	LVDS_D1N	O	1.8V	LVDS lane 1 -
31	GND	P		Ground
32	LVDS_D0P	O	1.8V	LVDS lane 0 +
33	LVDS_D0N	O	1.8V	LVDS lane 0 -
34	I2C2_LCD1_SDA	I/O	3.3V	I^2C LCD data line (OD)
35	I2C2_LCD1_SCL	I/O	3.3V	I^2C LCD clock line (OD)
36	RST_LCD	O	3.3V	LCD reset
37	VCC_LCDB	P	3.3V	3.3V power supply for LCD
38	VCC_LCDB	P	3.3V	3.3V power supply for LCD
39	VCC_LCDB	P	3.3V	3.3V power supply for LCD
40	NC			

2.4.5 J3 MIPI DSI

VT-SBC-VOSM93-EVB offers a 4-lane MIPI DSI interface for up to 1080P @60Hz image output. Since LVDS is the default output interface, software configuration is required to switch to MIPI DSI for display.

Specs: 40P, 0.5mm (pitch), 1.2mm (height), cable thickness: 0.3mm



Pinout description:

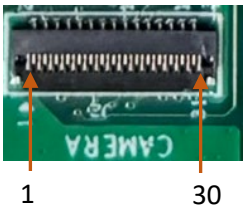
Pin	Name	Type	Level	Description
1	LED+	P	12V	LED backlight positive
2	LED+	P	12V	LED backlight positive
3	NC			
4	NC			
5	NC			
6	NC			
7	NC			
8	NC			
9	LED-	P		LED backlight negative
10	LED-	P		LED backlight negative
11	GND	P		Ground
12	NC			
13	NC			
14	LED_PWM	P	3.3V	Backlight brightness control
15	NC			
16	GND	P		Ground
17	NC			
18	NC			
19	GND	P		Ground
20	MIPI_D3P	O	1.8V	MIPI DSI differential lane 3 +
21	MIPI_D3N	O	1.8V	MIPI DSI differential lane 3 -
22	GND	P		Ground
23	MIPI_D2P	O	1.8V	MIPI DSI differential lane 2 +
24	MIPI_D2N	O	1.8V	MIPI DSI differential lane 2 -
25	GND	P		Ground
26	MIPI_CLK+	O	1.8V	MIPI DSI differential clock lane +
27	MIPI_CLK-	O	1.8V	MIPI DSI differential clock lane -
28	GND	P		Ground
29	MIPI_D1P	O	1.8V	MIPI DSI differential lane 1 +
30	MIPI_D1N	O	1.8V	MIPI DSI differential lane 1 -
31	GND	P		Ground
32	MIPI_D0P	O	1.8V	MIPI DSI differential lane 0 +
33	MIPI_D0N	O	1.8V	MIPI DSI differential lane 0 -
34	GND	P		Ground

Pin	Name	Type	Level	Description
35	NC			
36	RST_LCD	O	3.3V	LCD reset
37	GND	P		Ground
38	VCC_LCD	P	3.3V	3.3V power supply for LCD
39	VCC_LCD	P	3.3V	3.3V power supply for LCD
40	NC			

2.4.6 J2 MIPI CSI

VT-SBC-VOSM93-EVB offers a 2-lane MIPI CSI-2 interface for connecting a camera, supporting resolutions up to 1080p @30Hz.

Specs: 40P, 0.3mm (pitch), 1.0mm (height), cable thickness: 0.2±0.03mm



Pinout description:

Pin	Name	Type	Level	Description
1	GND	P		Ground
2	NC			
3	NC			
4	GND	P		Ground
5	NC			
6	NC			
7	GND	P		Ground
8	CONN_CAM1_D1N	I	1.8V	MIPI CSI Lane 1 -
9	CONN_CAM1_D1P	I	1.8V	MIPI CSI Lane 1 +
10	GND	P		Ground
11	CONN_CAM1_D0N	I	1.8V	MIPI CSI Lane 0 -
12	CONN_CAM1_D0P	I	1.8V	MIPI CSI Lane 0 +
13	GND	P		Ground

Pin	Name	Type	Level	Description
14	CONN_CAM1_CLKN	I	1.8V	MIPI CSI clock -
15	CONN_CAM1_CLKP	I	1.8V	MIPI CSI clock +
16	GND	P		Ground
17	I2C SCL_CAM1	O	1.8V	I^2C serial clock
18	I2C SDA_CAM1	I/O	1.8V	I^2C serial data
19	CAM1_RST	O	1.8V	Camera reset
20	CAM1_PWN	O	1.8V	Camera power down
21	GND	P		Ground
22	CONN_CAM1_MCLK	O	1.8V	Camera main clock
23	GND	P		Ground
24	NC			
25	VCC18_DVP1	P	1.8V	1.8V Power supply
26	VCC18_DVP1	P	1.8V	1.8V Power supply
27	VCC1V5_DVP1	P	1.5V	1.5V Power supply
28	VCC2V8_DVP1	P	2.8V	2.8V Power supply
29	VCC2V8_DVP1	P	2.8V	2.8V Power supply
30	NC			

2.4.7 U26 USB Type-A

VT-SBC-VOSM93-EVB offers a USB 2.0 Type-A, allowing users to connect external peripherals and extend the board's functionality.

2.4.8 B12 USB 2.0 Type-C

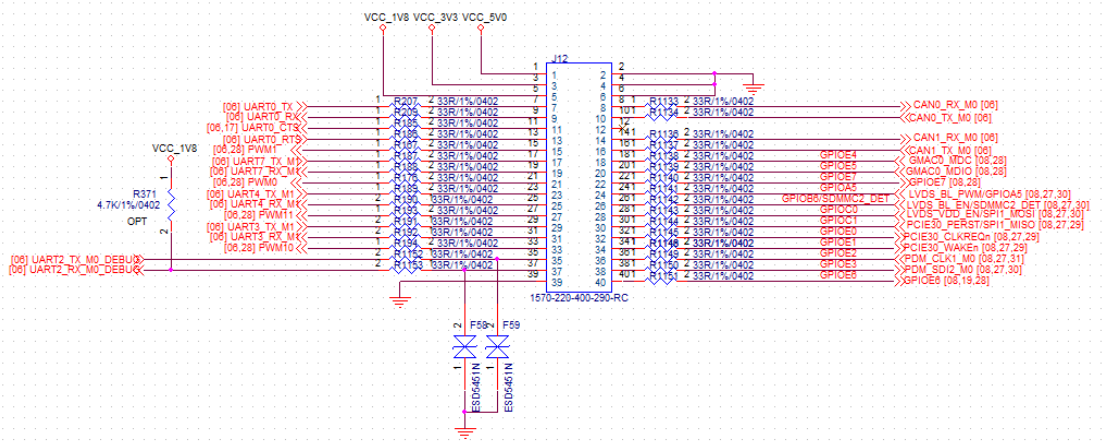
VT-SBC-VOSM93-EVB offers a USB 2.0 Type-C port supporting the OTG feature. Users can use this port for debugging or programming the board.

2.4.9 J15 Headphone Jack

VT-SBC-VOSM93-EVB offers a four-pole 3.5mm headphone jack (audio-out only); microphone input is not supported.

2.4.10 J12 GPIO

The board includes a GPIO header with 2 GPIOs (up to 12), 1 Debug UART (1.8V), 3 communication UARTs (1.8V), 2 CAN buses, and 2 PWMs.



The CAN buses on the GPIO header operate at 1.8V levels without on-board transceivers. It is recommended to install external CAN transceivers and a 120Ω termination resistor to each bus before connecting to a network.

UART 2 is for board debugging, identified as /dev/ttyLP0 in the software system. UART 0, UART 3, and UART 7 are for serial communication, mapped as /dev/ttyLP2, /dev/ttyLP4, and /dev/ttyLP1, respectively.

Refer to Chapter 3 for the detailed use of these ports.

2.4.11 Key

VT-SBC-VOSM93-EVB offers three keys: SW1 (Recovery), SW2 (Reset), and SW4 (Power).

SW1 is used for image flashing. Refer to section **3.3** for the instructions.

A short press of **SW2** will restart the board.

SW4 is for turning the board on or off after the external power supply is connected.

CHAPTER 3 YOCTO SYSTEM MANUAL

3.1 Connecting the Board to a Host Computer

When necessary, VT-SBC-VOSM93-EVB can establish connection with a host computer for debugging and development via:

1. Debug UART (UART2): mainly for Boot ROM, bootloader and kernel console access in Yocto. Refer to the following parameters when using the port.

Baud rate	Data bit	Polarity	Stop bit	Filename
User defined	8	None	1	/dev/ttyLP0

Refer to section **3.2.6** for the details of the debug UART pins marked out on the GPIO header. A USB to TTL adapter and DuPont wires might be necessary when connecting the debug UART to the host computer.

2. USB Type-C: This port allows users to flash images to the evaluation board, execute ADB commands, etc.

A USB Type-A to Type-C OTG cable is necessary to connect the USB Type-C port to the host computer.

3.2 Functionality Testing

3.2.1 EEPROM

EEPROM is a non-volatile memory that retains stored data even when the power is turned off. The device information is stored in the EEPROM.

Create a convenient link to the EEPROM device node:

```
sudo ln -s /sys/class/i2c-dev/i2c-0/device/0-0050/eeprom /dev/eeprom
```

Read the board's serial number.

```
vtvdm -r sn
```

3.2.2 Ethernet

The Ethernet IP configuration is set to use DHCP. The Ethernet interface is mapped as **eth0** in the filesystem.

1. Check the network interface information:

```
ifconfig
```

2. Set a static IP to the interface:

```
ifconfig eth0 192.168.9.12
```

3. Test the network connectivity:

```
ping 192.168.9.10
```

3.2.3 Wi-Fi

The system identifies the Wi-Fi interface as **wlan0**.

- **Station Mode Configuration**

1. Create a WPA supplicant configuration file:

```
vi /etc/wpa_supplicant.conf
```

Add the following content:

```
ctrl_interface=/var/run/wpa_supplicant
ctrl_interface_group=0
update_config=1
network={
ssid="vantron"                    # SSID of the target AP
psk="12345678"                    # password of the target AP
}
```

2. Connect to the target access point using the configuration of the prior step.

```
wpa_supplicant -Dnl80211 -i wlan0 -c /etc/wpa_supplicant.conf -B
```

- **AP Mode Configuration**

1. Configure dhcpd.

```
vi /etc/dhcp/dhcpd.conf

interface wlan0

start 192.168.43.2

end 192.168.43.254

max_leases 234

opt router 192.168.43.1
```

2. Configure hostapd.

```
vi /etc/hostapd.conf
interface=wlan0
driver=nl80211
ssid=vt-som-imx93-evb                # SSID for the board
hw_mode=g                            # 2.4GHz mode
channel= 11                          # Select a non-overlapping channel
dtim_period= 1
rts_threshold=2347
fragm_threshold=2346
auth_algs=3
wpa= 1
wpa_passphrase=12345678              # set a password for the board
wpa_key_mgmt=WPA-PSK
wpa_pairwise=TKIP CCMP
rsn_pairwise=CCMP
```

3. Bring up the interface and set the AP's IP.

```
ifconfig wlan0 up

ifconfig wlan0 192.168.43.1 netmask 255.255.255.0
```

4. Start the access point software.

```
hostapd -B /etc/hostapd.conf
```

5. Start DHCP service for clients.

```
udhcpd /etc/dhcp/dhcpd.conf &
```

6. Connect client devices to the board using the following credentials.

   ssid: vt-som-imx93-evb

   pwd: 12345678

3.2.4 Bluetooth

The board supports Bluetooth 5.0. The Bluetooth UART port is identified as **/dev/ttyLP5** and **hci0** is Bluetooth's logical interface.

1. Load Bluetooth firmware and initialize chip.

```
brcm_patchram_plus --enable_hci --no2bytes --tosleep 200000 –baudrate 115200 --patchram /usr/lib/firmware/bcmdhd/BCM4359C0.hcd /dev/ttyLP5 &    # Bluetooth UART port
[1] 578                                                                  # expected output
proc_enable_hci() TIOCSETD for 15                                        # Enable the HCI interface
proc_enable_hci() HCIUARTSETPROTO for 6
Done setting line discpline
```

2. Bring up the Bluetooth interface.

```
hciconfig hci0 up
hciconfig
hci0: Type: Primary Bus: UART
BD Address: CC:4B:73:16:62:19 ACL MTU: 1021:8 SCO MTU: 64:1    # board's MAC
UP RUNNING PSCAN                                               # expected output
RX bytes:1536 acl:0 sco:0 events:92 errors:0
TX bytes:1278 acl:0 sco:0 commands:92 errors:0
```

3. Pair a Bluetooth device.

```
bluetoothctl
Agent registered
[CHG] Controller 54:78:C9:8F:C3:17 Pairable: yes
[bluetooth]#
[bluetooth]# power on
Changing power on succeeded
[bluetooth]#
[bluetooth]# devices Paired
Device FC:A9:F5:85:2B:A8 2345968242's Redmi Note 13 Pro+
[bluetooth]#
```

```
[bluetooth]# remove FC:A9:F5:85:2B:A8
[DEL] Device FC:A9:F5:85:2B:A8 2345968242's Redmi Note 13 Pro+
Device has been removed
[bluetooth]#
[bluetooth]# scan on                                    # discover nearby devices
Discovery started
[CHG] Device 65:19:4C:13:A3:BA RSSI: -73                # list discovered devices
[CHG] Device 65:19:4C:13:A3:BA ServiceData Key: 0000fdaa-0000-1000-8000-00805f9b34fb
[CHG] Device FC:A9:F5:85:2B:A8 UUIDs: 00000000-0000-0000-0000-000000000000
[bluetooth]#
[bluetooth]# discoverable yes
Changing discoverable on succeeded
[bluetooth]#
[bluetooth]# pair FC:A9:F5:85:2B:A8                     # pair the target device
Attempting to pair with FC:A9:F5:85:2B:A8
[CHG] Device FC:A9:F5:85:2B:A8 Connected: yes
Request confirmation
[agent] Confirm passkey 253006 (yes/no): yes            # confirm the pair code
[CHG] Device FC:A9:F5:85:2B:A8 Bonded: yes
[CHG] Device FC:A9:F5:85:2B:A8 ServicesResolved: yes
[CHG] Device FC:A9:F5:85:2B:A8 Paired: yes
Pairing successful
[CHG] Device FC:A9:F5:85:2B:A8 ServicesResolved: no
[CHG] Device FC:A9:F5:85:2B:A8 Connected: no
[bluetooth]#
[bluetooth]# connect FC:A9:F5:85:2B:A8                  # establish a connection
Attempting to connect to FC:A9:F5:85:2B:A8
Failed to connect: org.bluez.Error.Failed br-connection-profile-unavailable  # connection failed due to lack of A2DP/HFP/HID in the target device
[DEL] Device 69:62:75:CE:07:6C 69-62-75-CE-07-6C
[bluetooth]#
[bluetooth]# exit                                       # exit
```

4. Transfer a file via obex object push.

```
hciconfig hci0 piscan
export DISPLAY=:0.0
echo 11111 > /root/device.txt
/usr/libexec/bluetooth/obexd -r /root -a & obexctl
[1] 7912
[NEW] Client /org/bluez/obex
[obex]#
[obex]# connect FC:A9:F5:85:2B:A8                    # establish a connection
Attempting to connect to FC:A9:F5:85:2B:A8
[NEW] Session /org/bluez/obex/client/session0 [default]
[NEW] ObjectPush /org/bluez/obex/client/session0
Connection successful
[FC:A9:F5:85:2B:A8]#
[FC:A9:F5:85:2B:A8]# send /root/device.txt           # send the file
Attempting to send /home/root/device.txt to /org/bluez/obex/client/session0
[NEW] Transfer /org/bluez/obex/client/session0/transfer0
Transfer /org/bluez/obex/client/session0/transfer0
Status: queued
Name: device.txt
Size: 5
Filename: /home/root/device.txt
Session: /org/bluez/obex/client/session0
[CHG] Transfer /org/bluez/obex/client/session0/transfer0 Status: complete   # status
[DEL] Transfer /org/bluez/obex/client/session0/transfer0
[FC:A9:F5:85:2B:A8]#
[FC:A9:F5:85:2B:A8]# exit                            # exit
```

3.2.5 USB

Insert a USB flash drive to the USB Type-A interface on the board, and input the following commands to test the functionality.

1. Identify the connected drive and its assigned device node:

```
lsusb                    # list all USB buses
fdisk -l                 # display the details of all storage devices and their partitions
```

2. Assume the USB drive is enumerated as /dev/sda1 in the prior step. Create a directory (e.g., /mnt/usb) and mount the USB drive to this directory:

```
mkdir -p /mnt/usb
mount /dev/sda1 /mnt/usb
```

3. List the content in the mount directory of prior step.

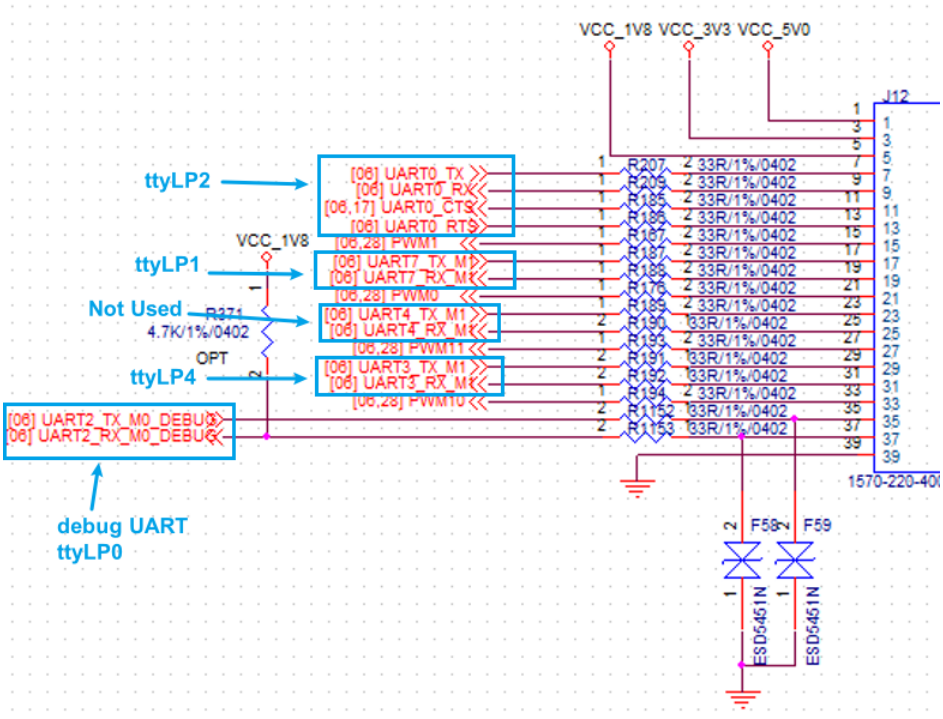
```
ls /mnt/usb/
```

4. Unmount the USB drive:

```
umount /dev/sda1
```

3.2.6 UART

VT-SBC-VOSM93-EVB offers three communication UARTs on the GPIO header (UART 0, UART 7, and UART 3), identified as /dev/ttyLP2 (pin 7, pin 9, pin 11, pin 13), /dev/ttyLP1 (pin 17, pin 19), and /dev/ttyLP4 (pin 31, pin 33), respectively in the filesystem. UART 2 is the debug port, identified as /dev/ttyLP0 in the system.



Test the communication between two UARTs (e.g., UART 7 and UART 3).

1. Wire UART 7 and UART 3 (RX-TX, TX-RX, GND-GND).
2. Launch a terminal (T1) and open UART 7 (/dev/ttyLP1) on T1.

```
stty -F /dev/ttyLP1 115200 raw -echo
```

3. Launch another terminal (T2) and open UART 3 (/dev/ttyLP4) on T2.

```
stty -F /dev/ttyLP4 115200 raw -echo
```

4. Use T2 to receive data.

```
cat /dev/ttyLP4 &
```

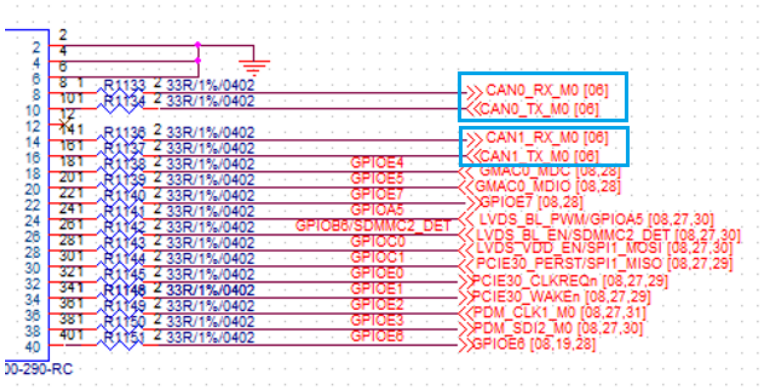
5. Use T1 to send data.

```
echo "test UART7→UART3" > /dev/ttyLP1
```

6. Verify if the content is displayed on T2. Vice versa.

3.2.7 CAN

VT-SBC-VOSM93-EVB offers two CAN buses without on-board transceivers. The following commands are used for testing the functionality of the buses only. It is recommended to install external CAN transceivers and a 120Ω termination resistor to each bus before connecting to a network.



1. Set up CAN0 and CAN1.

```
ip link set can0 up type can bitrate 125000          # enable can 0 and configure it
IPv6: ADDRCONF(NETDEV_CHANGE): can0: link becomes ready
ip link set can1 up type can bitrate 125000          # enable can 1 and configure it
IPv6: ADDRCONF(NETDEV_CHANGE): can1: link becomes ready
```

2. View the interface information.

```
ifconfig
can0 Link encap:UNSPEC HWaddr
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
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
```

3. Use CAN0 to send data and CAN 1 to receive data.

```
candump can1 &                  # can 1 to receive data
cansend can0 500#1E.10.12.22    # can 0 to send data
can1 500 [4] 1E 10 12 22        # expected output on can 1
cansend can0 500#1E.10.12       # can 0 to send data
can1 500 [3] 1E 10 12           # expected output on can 1
```

3.2.8 Display

The board offers two independent display interfaces. By default, it boots in single-display mode on LVDS. You can use an FFC/FPC cable of the recommended thickness to connect the interface and a monitor for display. Refer to sections **2.4.4** and **2.4.5** for the connector pinout and specifications.

The configuration file included in the software package is for LVDS use by default. To switch to MIPI DSI for display output:

1. Contact Vantron to obtain the device tree for MIPI DSI: **vt-som-imx93-evb.dtb**.
2. Copy the file to /boot/ (overwrite or rename the existing LVDS tree).
3. Reboot; the system will now drive the MIPI-DSI display instead of LVDS.

3.2.9 Camera

Before connecting an FFC/FPC camera to the board, refer to section **2.4.6** for the pinout and specifications of the MIPI CSI connector.

1. Connect the camera module to the board's MIPI CSI interface.
2. Verify the device node of the camera.

```
ls /dev/video*

/dev/video0
```

3. Test live preview:

```
gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-
raw,width=1920,height=1080,framerate=30/1 ! autovideosink

# device resolution support: 1080p @30fps
```

```
root@vtsmcimx93:~# gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,width=1920,height=1080,framerate=30/1 ! autovideosink
Setting pipeline to PAUSED ...
Pipeline is live and does not need PREROLL ...
Pipeline is PREROLLED ...
Setting pipeline to PLAYING ...
New c[ 2165.940134] cma: cma_alloc: linux,cma: alloc failed, req-size: 1013 pages, ret: -12
lock: GstSystemClock
[ 2166.414021] mxc-mipi-csi2.0: format: 0x2008
[ 2166.423226] bypass csc
[ 2166.425596] input fmt YUV4
[ 2166.428296] output fmt YUYV
[ 2166.431110] cma: cma_alloc: linux,cma: alloc failed, req-size: 1013 pages, ret: -12
[ 2166.625383] dwc-mipi-csi2-host 4ae00000.csi: enter enable=1
Redistribute latency...
0:00:01.9 / 99:99:99.
```

4. Capture a still image:

```
gst-launch-1.0 v4l2src device=/dev/video0 num-buffers=1 ! video/x-raw,width=640,height=480,framerate=30/1 ! jpegenc ! filesink location=capture.jpg
```

5. Shoot a video:

```
gst-launch-1.0 v4l2src device=/dev/video0 num-buffers=800 ! video/x-raw,width=640,height=480,framerate=30/1 ! avimux ! filesink location=./test_640_480.avi
```

3.2.10 Audio

Test the audio functionality of the board.

1. Prepare an audio clip (e.g., named “test.wav”)
2. Play the audio clip.

```
aplay test.wav
```

3. Adjust volume/mute settings.

```
alsamixer
```

Use ↑/↓ to change volume, **M** to unmute/mute channels.

3.2.11 ADC

View the current hardware version totest the ADC functionality on the board.

```
cat /sys/bus/iio/devices/iio\:device0/in_voltage0_raw
3
```

3.2.12 Micro SD

Test if the Micro SD slot functions properly.

1. Insert a valid Micro SD card into the slot and print the device information.

```
dmesg
[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. Display the device node of the SD card and mount it to the /mnt/ directory.

```
ls /dev/mmcblk*
mmcblk1 mmcblk2boot0 mmcblk2p1 mmcblk2rpmb
mmcblk1p1 mmcblk2 mmcblk2boot1 mmcblk2p2
mount /dev/mmcblk1p1 /mnt/
```

3. Display the content in the mount directory.

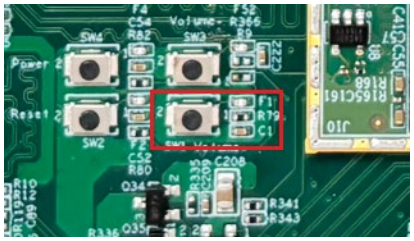
```
ls /mnt/
Image
imx8mp-ab2.dtb
imx8mp-ddr4-evk.dtb
imx8mp-evk-basler-ov2775.dtb
imx8mp-evk-basler-ov5640.dtb
imx8mp-evk-basler.dtb
imx8mp-evk-dsp-lpa.dtb
imx8mp-evk-dsp.dtb
```

3.3 Image Flashing

Prerequisites

- Software release package
- VT-SBC-VOSM93-EVB
- Ubuntu host computer (64-bit)
- USB OTG cable

1. Connect the evaluation board to an Ubuntu host computer using a USB OTG cable via the USB type-C port.
2. Press the SW1 key and hold.



3. Power on the evaluation board.
4. Release the SW1 key.
5. Copy the software release package it to the Ubuntu host computer. Unzip it and the following tools and files will be used.

uuu	Flash tool
uuu.auto	Flash script
Flash.bin	uboot
xxx.wic	Image and rootfs
Tools.deb	Binary executable file

6. Run the following command on the host computer to flash the image.

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

7. If the prior step executes successfully, the following content will display.

```
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
```

8. Unplug the USB OTG cable from the board and reboot.

CHAPTER 4 DISPOSAL AND PRODUCT WARRANTY

4.1 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.

4.2 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 a 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.