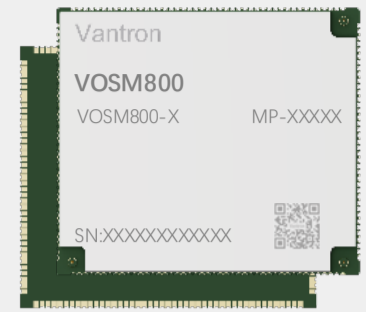


## VOSM800 System-on-Module










### Product Brief

VOSM800 system-on-module is powered by NXP i.MX 8M Mini processor with main frequency up to 1.8GHz. The module integrates a quad-core Arm Cortex-A53 processor and provides up to 4GB LPDDR4 memory and 64GB eMMC storage. It boasts a variety of expansion interfaces, including video output interfaces, on-board Wi-Fi and Bluetooth, USB 2.0, and GPIOs to increase its versatility for diverse scenarios. The module features an LGA packaging that allows for direct welding, eliminating the need for additional connectors. Additionally, it is compliant with Open Standard Modules (OSM) V1.1, which enables seamless integration into various products. Moreover, the module provides an extended service life that meets the rigorous demands of industrial customers.

The module is designed to cater to a vast of application scenarios including but not limited to handheld devices, smart home appliances, industrial IoT devices, and gym instruments.

### Features and benefits

#### VOSM800

-  Flexible option for advanced & compact editions
-  Rich interfaces, robust system performance
-  On-board Wi-Fi & Bluetooth
-  Android operating system
-  Compact size, LGA packaging
-  Open Standard Modules (OSM) V1.1 compliant
-  Extended service life (7+ years)

### Application Scenarios



Robotics



Security & Surveillance



Fitness Console



Home Appliance

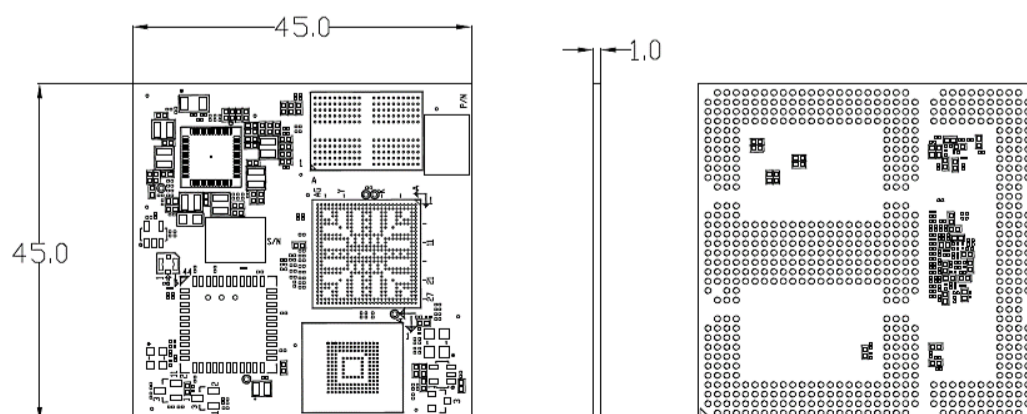


Industrial IoT



Smart Retail

### Product Outlines



## VOSM800 System-on-Module Datasheet

| Specifications        |                     |  |                            |
|-----------------------|---------------------|--|----------------------------|
| System                | CPU                 | NXP i.MX 8M Mini, Quad-core ARM Cortex-A53, up to 1.8GHz |                            |
|                       | Memory              | 2GB LPDDR4 (Optional: 4GB)                               |                            |
|                       | Storage             | 16GB eMMC 5.1 (Optional: 64GB)                           |                            |
|                       | EEPROM              | 2Kb (for hardware configuration information)             |                            |
|                       | PMIC                | PCA9450AHN   |                            |
| Communication         | Wi-Fi               | Wi-Fi 802.11 a/b/g/n/ac                                  |                            |
|                       | Bluetooth           | Bluetooth 5.0  |                            |
| Media                 | Video processing    | 1080p60 H265, VP9 decoder<br>1080p60 H264, VP8 decoder   | 1080p60 H.264, VP8 encoder |
|                       | Graphics processing | GCNanoUltra for 3D acceleration                          | GC320 for 2D acceleration  |
| Power                 | Input               | 5V/2A DC input   |                            |
| Software              | Operating system    | Android 11, Linux (Support by request)                   |                            |
|                       | Device management   | BlueSphere MDM (Optional for Android version)            |                            |
| Mechanical            | Dimensions          | 45mm x 45mm x 1mm  |                            |
| Environment Condition | Temperature         | Operating: -10°C ~ +60°C (Optional: -40°C ~ +85°C)       | Storage: -20°C ~ +70°C     |
|                       | Humidity            | ≤95% RH (Non-condensing)                                 |                            |
|                       | Certification       | CE, FCC, CCC   |                            |

| I/Os             |  |                              |  |
|------------------|--|------------------------------|--|
| MIPI DSI         | 1 x 4-lane MIPI DSI, up to 1080P @60Hz |                              |  |
| MIPI CSI         | 1 x 4-lane MIPI CSI                    |                              |  |
| I <sup>2</sup> S | 1 x I <sup>2</sup> S                   |                              |  |
| SDIO             | 1 x 4-bit SDIO V3.0                    |                              |  |
| RGMII (Ethernet) | 1 x RGMII                              |                              |  |
| SPI              | 1 x SPI                                |                              |  |
| UART             | 1 x Debug UART (1.8V level)            | 2 x Communication UART (TTL) |  |
| USB              | 1 x USB 2.0 Host                       | 1 x USB 2.0 OTG              |  |
| I <sup>2</sup> C | 2 x I <sup>2</sup> C                   |                              |  |
| GPIO             | 26 x GPIO (Max.)                       |                              |  |
| JTAG             | Supported                              |                              |  |
| Key              | 1 x Power key                          | 1 x Reset key                |  |
| PWM              | 2 x PWM                                |                              |  |

## Electrical Characteristics

### Absolute Maximum Ratings

Voltage beyond absolute maximum ratings may cause permanent damage to the module. Operation of the module outside of recommended conditions may result in reduced lifetime and/or reliability problems even if the absolute maximum ratings are not exceeded.

| Parameter                | Min.         | Max. | Unit |   |
|--------------------------|--------------|------|------|---|
| Voltage of the SOM       | -0.5         | 6    | V    |   |
| Voltage on Wi-Fi/BT chip | VBAT         | -0.5 | 3.9  | V |
|                          | VDDIO        | -0.5 | 5    | V |
| Voltage of LPDDR4        | LPDDR4X VDD1 | -0.4 | 2.1  | V |
|                          | LPDDR4X VDD2 | -0.4 | 1.5  | V |
|                          | LPDDR4X VDDQ | -0.4 | 1.5  | V |
| Storage temperature      | -20          | 70   | °C   |   |

### Recommended Operating Conditions

You are recommended to operate the module in the following conditions to achieve optimized performance of the module.

| Parameter                | Min.         | Typ. | Max. | Unit |   |
|--------------------------|--------------|------|------|------|---|
| Voltage of the SOM       | 2.7          | 4.4  | 5.5  | V    |   |
| Voltage on Wi-Fi/BT chip | VBAT         | 3    | 3.3  | 4.4  | V |
|                          | VDDIO        | 1.6  | 1.8  | 3.6  | V |
| Voltage of EMCP          | eMMC VCC     | 2.7  | 3.3  | 3.6  | V |
|                          | eMMC VCCQ    | 1.7  | 1.8  | 1.95 | V |
|                          | LPDDR4X VDD1 | 1.7  | 1.8  | 1.95 | V |
|                          | LPDDR4X VDD2 | 1.06 | 1.1  | 1.17 | V |
|                          | LPDDR4X VDDQ | 0.57 | 0.6  | 0.65 | V |

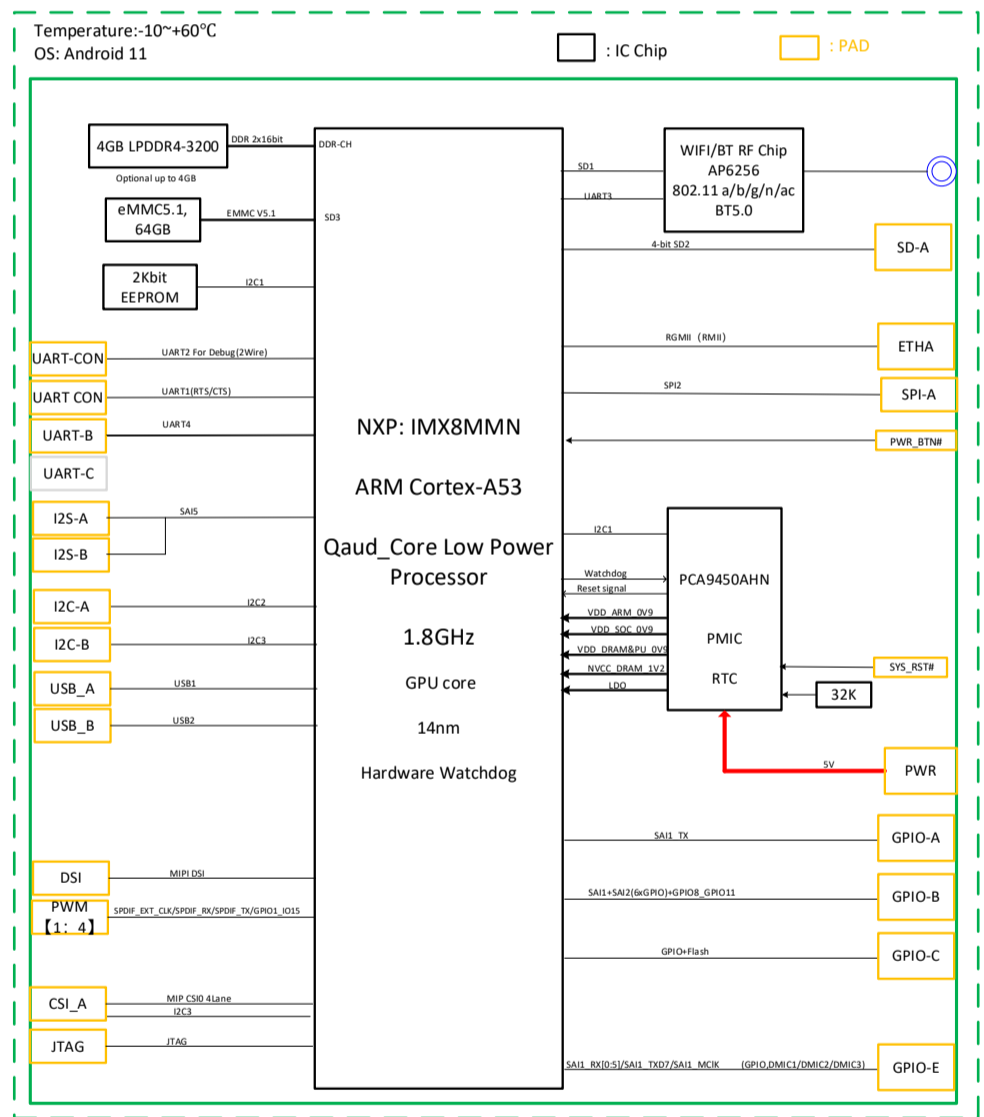
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Recommended Operating Conditions (Cont'd)

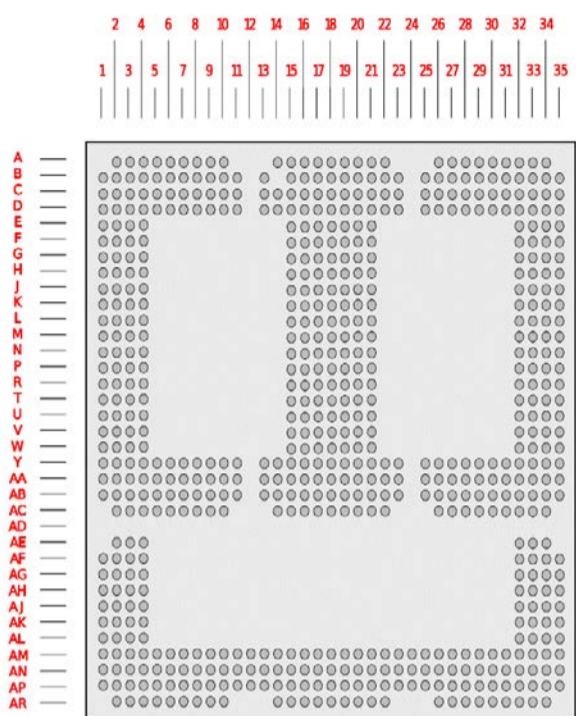
| Parameter        | Min.  | Typ. | Max. | Unit |
|------------------|-------|------|------|------|
| NVCC_SNVS_1P8    | 1.62  | 1.8  | 1.98 | V    |
| VDD_SNVS_OP8     | 0.8   | 0.9  | 1.1  | V    |
| VDD_24M_XTAL_1P8 | 1.62  | 1.8  | 1.98 | V    |
| VDD_ARM          | 0.805 | 0.85 | 0.95 | V    |
| VDD_SOC          | 0.78  | 0.82 | 0.9  | V    |
| VDD_VPU          | 0.805 | 0.85 | 1    | V    |
| VDD_GPU          | 0.805 | 0.85 | 1    | V    |
| VDD_DRAM         | 0.805 | 0.85 | 1    | V    |
| VDD_DRAM_PLL_OP8 | 0.805 | 0.85 | 1    | V    |
| NVCC_DRAM        | 1.06  | 1.1  | 1.17 | V    |
| VDD_DRAM_PLL_1P8 | 1.62  | 1.8  | 1.98 | V    |
| NVCC_JTAG        | 1.62  | 1.8  | 1.98 | V    |
| NVCC_NAND        | 1.62  | 1.8  | 1.98 | V    |
| NVCC_SAI1        | 1.62  | 1.8  | 1.98 | V    |
| NVCC_SAI2        | 1.62  | 1.8  | 1.98 | V    |
| NVCC_SAI3        | 1.62  | 1.8  | 1.98 | V    |
| NVCC_SAI5        | 1.62  | 1.8  | 1.98 | V    |
| NVCC_GPIO1       | 1.62  | 1.8  | 1.98 | V    |
| NVCC_I2C         | 1.62  | 1.8  | 1.98 | V    |
| NVCC_UART        | 1.62  | 1.8  | 1.98 | V    |
| NVCC_ECSPi       | 1.62  | 1.8  | 1.98 | V    |
| NVCC_ENET        | 1.62  | 1.8  | 1.98 | V    |
| NVCC_SD1         | 1.62  | 1.8  | 1.98 | V    |
| NVCC_SD2         | 1.62  | 1.8  | 1.98 | V    |
| NVCC_CLK         | 1.62  | 1.8  | 1.98 | V    |
| VDD_USB_3P3      | 3.069 | 3.3  | 3.6  | V    |
| PVCC0_1P8        | 1.62  | 1.8  | 1.98 | V    |
| VDD_ARM_PLL_1P8  | 1.62  | 1.8  | 1.98 | V    |
| VDD_ANA0_1P8     | 1.62  | 1.8  | 1.98 | V    |
| VDD_USB_1P8      | 1.62  | 1.8  | 1.98 | V    |

| Parameter       | Min.  | Typ. | Max. | Unit |
|-----------------|-------|------|------|------|
| VDD_PCI_1P8     | 1.62  | 1.8  | 1.98 | V    |
| VDD_MIPI_1P8    | 1.62  | 1.8  | 1.98 | V    |
| VDD_ARM_PLL_OP8 | 0.78  | 0.82 | 0.9  | V    |
| VDD_ANA_OP8     | 0.78  | 0.82 | 0.9  | V    |
| VDD_USB_OP8     | 0.78  | 0.82 | 0.9  | V    |
| VDD_PCI_OP8     | 0.78  | 0.82 | 0.9  | V    |
| VDD_MIPI_1P2    | 1.14  | 1.2  | 1.26 | V    |
| VDD_MIPI_OP9    | 0.855 | 0.9  | 1    | V    |

Block Diagram



## Pinout



| Pin  | Name               | Type    | Description                        |
|------|--------------------|---------|------------------------------------|
| U19  | NC                 |         | No connection                      |
| R18  | NC                 |         | No connection                      |
| V17  | EXT_EN             | Passive | OSM module control signal          |
| T17  | BOOT_MODE1         | Passive | System config Pin                  |
| AA9  | ON/OFF             | Passive | Power on/off                       |
| W17  | NC                 |         | No connection                      |
| U17  | NRST               | Passive | System reset input, active low     |
| AB18 | VCC_BAT            | Power   | Power input, battery voltage       |
| AA18 | VCC_BAT            | Power   | Power input, battery voltage       |
| Y25  | VCC_IN_5V          | Power   | 5V Power in                        |
| Y26  | VCC_IN_5V          | Power   | 5V Power in                        |
| Y27  | VCC_IN_5V          | Power   | 5V Power in                        |
| Y28  | VCC_IN_5V          | Power   | 5V Power in                        |
| C2   | MIPI_CSI_MCLK/GPIO | Passive | Camera clock output/GPIO           |
| G3   | MIPI_CSI_PWDN/GPIO | Passive | Camera power down/GPIO             |
| G4   | MIPI_CSI_RST/GPIO  | Passive | Camera interrupt signal input/GPIO |
| B3   | CSI0A_L2N          | Passive | Channel input CSI0A lane 2 N       |
| B4   | CSI0A_L2P          | Passive | Channel input CSI0A lane 2 P       |
| C1   | CSI0A_L1N          | Passive | Channel input CSI0A lane 1 N       |
| B1   | CSI0A_L1P          | Passive | Channel input CSI0A lane 1 P       |
| A2   | CSI0B_L0N          | Passive | Channel input CSI0B lane 0 N       |
| A3   | CSI0B_L0P          | Passive | Channel input CSI0B lane 0 P       |
| A5   | CSI0A_L0N          | Passive | Channel input CSI0A lane 0 N       |
| A6   | CSI0A_L0P          | Passive | Channel input CSI0A lane 0 P       |

| Pin  | Name                     | Type    | Description  |
|------|--------------------------|---------|--|
| B6   | CSI0B_L1N                | Passive | Channel input CSI0B lane 1 N                               |
| B7   | CSI0B_L1P                | Passive | Channel input CSI0B lane 1 P                               |
| C4   | I2C3_SCL                 | Passive | I2C3 clock signal  |
| C3   | I2C3_SDA                 | Passive | I2C3 data signal   |
| F4   | MIPI_DSI_BL_EN<br>/GPIO  | Passive | MIPI_DSI 1V8 backlight enable signal<br>output/GPIO        |
| F3   | MIPI_DSI_VDD_EN/<br>GPIO | Passive | MIPI_DSI 3V3 power enable signal<br>output/GPIO            |
| E18  | MIPI_DSI_PWM             | Passive | MIPI_DSI backlight PWM signal output                       |
| AB8  | MIPI_TX_CLKN             | Passive | MIPI_DSI differential clock lane -                         |
| AB7  | MIPI_TX_CLKP             | Passive | MIPI_DSI differential clock lane +                         |
| AB11 | MIPI_TX_D0N              | Passive | MIPI_DSI differential lane 0 -                             |
| AB10 | MIPI_TX_D0P              | Passive | MIPI_DSI differential lane 0 +                             |
| AC9  | MIPI_TX_D1N              | Passive | MIPI_DSI differential lane 1 -                             |
| AC8  | MIPI_TX_D1P              | Passive | MIPI_DSI differential lane 1 +                             |
| AC6  | MIPI_TX_D2N              | Passive | MIPI_DSI differential lane 2 -                             |
| AC5  | MIPI_TX_D2P              | Passive | MIPI_DSI differential lane 2 +                             |
| AB5  | MIPI_TX_D3N              | Passive | MIPI_DSI differential lane 3 -                             |
| AB4  | MIPI_TX_D3P              | Passive | MIPI_DSI differential lane 3 +                             |
| AA3  | LCD_ID                   | Passive | LCD_ID   |
| V21  | SAI5_RXD0                | Passive | not used   |
| W21  | SAI5_TXD0                | Passive | HDMI audio signal output                                   |
| V19  | SAI5_RXD1                | Passive | Audio signal input   |
| W19  | SAI5_TXD1                | Passive | Audio signal output  |
| W20  | SAI5_BCLK                | Passive | Audio/HDMI I2S bit clock                                   |
| W18  | SAI5_LRCLK               | Passive | Audio/HDMI I2S left-right channel<br>synchronization clock |
| V18  | SAI5_MCLK                | Passive | Audio/HDMI I2S master clock                                |
| AA15 | I2C2_SCL                 | Passive | I2C2_SCL   |
| AA16 | I2C2_SDA                 | Passive | I2C2_SDA   |
| AA20 | I2C3_SCL                 | Passive | I2C3_SCL   |
| AA21 | I2C3_SDA                 | Passive | I2C3_SDA   |
| AB13 | OTG1_DN                  | Passive | USB2.0 OTG1 data -   |
| AC14 | OTG1_DP                  | Passive | USB2.0 OTG1 data +   |
| AC16 | USB_A_EN                 | Passive | OTG pulled high, no input detected at VBUS                 |
| AB14 | OTG1_ID                  | Passive | USB2.0 OTG1 ID, high for device, low for host              |

(To be continued...)



| Pin  | Name          | Type    | Description                |
|------|---------------|---------|----------------------------|
| AC15 | OTG1_OC       | Passive | not used                   |
| AB16 | USB1_VBUS     | Passive | USB1_VBUS                  |
| AB23 | USB2_DN       | Passive | USB2.0 HOST data -         |
| AC22 | USB2_DP       | Passive | USB2.0 HOST data +         |
| AC20 | OTG1_DRV      | Passive | HOST2 OC IC enable         |
| AB22 | USB2_ID       | Passive | USB2.0 HOST ID, always low |
| J21  | SD2_NCD       | Passive | SD card detection          |
| F21  | SD2_CLK       | Passive | SDIO clock                 |
| E20  | SD2_CMD       | Passive | SDIO command/response      |
| G20  | SD2_DATA0     | Passive | SDIO data line             |
| G21  | SD2_DATA1     | Passive | SDIO data line             |
| H20  | SD2_DATA2     | Passive | SDIO data line             |
| H21  | SD2_DATA3     | Passive | SDIO data line             |
| C20  | NVCC_SD2      | Passive | not used                   |
| D20  | SD2_WP        | Passive | not used                   |
| D21  | SD2_Nrst      | Passive | not used                   |
| Y15  | CPU_SPI2_SS0  | Passive | FLASH_CS0                  |
| U16  | CPU_SPI2_SCLK | Passive | FLASH_SCLK                 |
| U15  | CPU_SPI2_MISO | Passive | FLASH_MISO                 |
| V15  | CPU_SPI2_MOSI | Passive | FLASH_MOSI                 |
| AB2  | PCIE_RXN      | Passive | PCIe data receive -        |
| AB1  | PCIE_RXP      | Passive | PCIe data receive +        |
| AC3  | PCIE_TXN      | Passive | PCIe data transmit -       |
| AC2  | PCIE_TXP      | Passive | PCIe data transmit +       |
| V2   | PCIE20_PERST  | Passive | PCIe20_PERST               |
| W2   | PCIE20_CLKREQ | Passive | PCIe CLK                   |

| Pin  | Name             | Type    | Description  |
|------|------------------|---------|--|
| Y1   | PCIE_CLKN        | Passive | PCIe clock transmit -  |
| E19  | CPU_HUB_PRTWPWR1 | Passive | MIPI DSI/HDMI; active low for HDMI (default); active high for MIPI DSI |
| F19  | CPU_HUB_PRTWPWR2 | Passive | HDMI reset   |
| G19  | ENET_Nrst        | Passive | Interrupt request output (default)                                     |
| H19  | ENET_NINT        | Passive | High level, LED solid red  |
| J19  | RS232_485_SW     | Passive | TP reset   |
| K19  | TOUCH_Nrst       | Passive | High level, LED solid green  |
| L19  | TOUCH_INT        | Passive | LCD reset control; high level required                                 |
| D3   | LCD_IO_EN        | Passive | High level, LED solid red  |
| D4   | CPU_EXT_3V3_EN   | Passive | High level, LED solid green  |
| E3   | EXT_BL5V_EN      | Passive | Flash SPI WP signal  |
| AF32 | LCD_RESET        | Passive | High level, LED solid red  |
| AF33 | SYS_STATUS       | Passive | System status  |
| AG32 | CPU_EXT_TP_EN    | Passive | High level, LED solid red  |
| AG33 | EXT_BL12V_EN     | Passive | High level, LED solid green  |
| AH32 | PCIE_PWR_EN      | Passive | High level, LED solid red  |
| AH33 | USIM_DET2        | Passive | High level, LED solid green  |
| AJ32 | ASIX_INT0        | Passive | High level, LED solid red  |
| AJ33 | ASIX_INT1        | Passive | High level, LED solid green  |
| C14  | UART3_CTS        | Passive | UART RXD   |
| C13  | UART3_RTS        | Passive | UART3_RTS  |
| A14  | UART3_RXD        | Passive | UART3_RXD  |
| B13  | UART3_TXD        | Passive | UART3_TXD  |
| D14  | UART4_RXD        | Passive | UART4_RXD  |
| D13  | UART4_TXD        | Passive | UART4_TXD  |
| D22  | UART2_RXD        | Passive | UART2_RXD  |
| D23  | UART2_TXD        | Passive | UART2_TXD  |

(To be continued...)

| Pin | Name | Type | Description |
|-----|------|------|-------------|
| A15 | GND  | GND  | Ground      |
| A17 | GND  | GND  | Ground      |
| A18 | GND  | GND  | Ground      |
| A19 | GND  | GND  | Ground      |
| A21 | GND  | GND  | Ground      |
| B15 | GND  | GND  | Ground      |

| Pin | Name | Type | Description |
|-----|------|------|-------------|
| B16 | GND  | GND  | Ground      |
| B17 | GND  | GND  | Ground      |
| B18 | GND  | GND  | Ground      |
| B19 | GND  | GND  | Ground      |
| B20 | GND  | GND  | Ground      |
| B21 | GND  | GND  | Ground      |

\* Apart from those specified here, any pins not included in these sheets are not connected.

## Ordering Information

| Ordering No.         | Chipset          | Memory     | Storage   | Description   |
|----------------------|------------------|------------|-----------|---|
| VOSM800-L            | NXP i.MX 8M Mini | 2GB LPDDR4 | 16GB eMMC | MIPI DSI, UART, USB, I <sup>2</sup> C                                 |
| VOSM800-H            | NXP i.MX 8M Mini | 4GB LPDDR4 | 64GB eMMC |   |
| VT-SBC-VOSM800-EVB-L | NXP i.MX 8M Mini | 2GB LPDDR4 | 16GB eMMC | VOSM800-L + carrier board, MIPI DSI/HDMI, UART, USB, I <sup>2</sup> C |
| VT-SBC-VOSM800-EVB-H | NXP i.MX 8M Mini | 4GB LPDDR4 | 64GB eMMC | VOSM800-H + carrier board, MIPI DSI/HDMI, UART, USB, I <sup>2</sup> C |

| Packing list             |   |
|--------------------------|---|
| VOSM800 system-on-module | 1 |

| Optional accessories   |       |
|------------------------|-------|
| Adapter and power cord | 1 kit |
| Wi-Fi and BT antenna   | 1     |

## Company Profile

Since its establishment in 2002 by two Silicon Valley entrepreneurs, Vantron Technology has been at the forefront of the connected IoT devices and IoT platform solutions. Today, Vantron boasts a global customer base that includes several Fortune 500 companies. Its product lines cover edge intelligent hardware, IoT communication devices, industrial displays and BlueSphere cloud device management platforms.

With over 20 years of experience in R&D of embedded edge intelligent hardware, Vantron has provided users with diverse embedded solutions featuring ARM and X86 architectures. Its offerings range from Linux to Windows, from embedded to desktop level, and from gateway to server. In addition, it provides users with system clipping, driver transplantation and other related services.