# VOSM62L System-on-Module


## Product Brief

The VOSM62L system-on-module adopts Texas Instruments AM62L32 Sitara 64-bit industrial SoC and conforms to the solderable LGA specification of the Open Standard Module (OSM) form factor, delivering compact size, optimized power consumption and rich peripheral expansion for cost-focused embedded edge implementation scenarios.

Equipped with a dual-core Arm Cortex-A53 processors clocked up to 1.25GHz, the module is configured with 1GB DDR4 RAM alongside 16GB industrial-grade eMMC flash storage to satisfy local data caching demands.

The module offers rich industrial peripherals routed out through standard OSM pads, consisting of dual Gigabit Ethernet ports, CAN FD buses, GPIOs, multiple UART channels for hardware debugging and on-site serial data collection, as well as USB 2.0 connectivity. Its MIPI DSI interface enables up to 1080P high-definition display. Equipped with TI-native hardware security modules, it supports secure boot, TrustZone isolation and AES/SHA cryptographic acceleration to secure data transmission for payment terminals and smart medical devices.

With support for Linux Yocto operating system, it offers developers with a streamlined development path, backed by long-term software maintenance. This module is ideally suited for a wide range of edge applications, including smart charging piles, building automation controllers, portable medical monitoring terminals and industrial HMI equipment.

## Features and benefits

| VOSM62L |
| --- |
| Dual-core Cortex-A53 cost-effective processor |
| Low-power design for high energy efficiency |
| Single display output up to 1080P |
| Rich I/O: USB, UART, $I^2C$, CAN FD, GPIO |
| GbE on module, Wi-Fi & BT on the carrier board |
| Arm TrustZone security technology |
| Linux Yocto operating system support |
| OSM size-L compliant (45mm x 45mm) |
| Extended service life (7+ years) |

## Application Scenarios


Smart EV Charging

Industrial HMI

Building Automation

Smart Metering

Industrial Automation

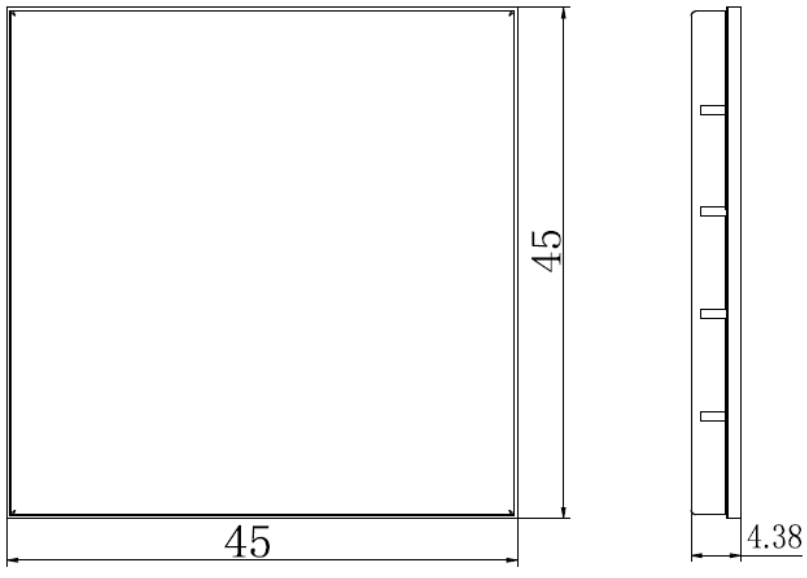
Portable Patient Monitor

# VOSM62L System-on-Module Datasheet

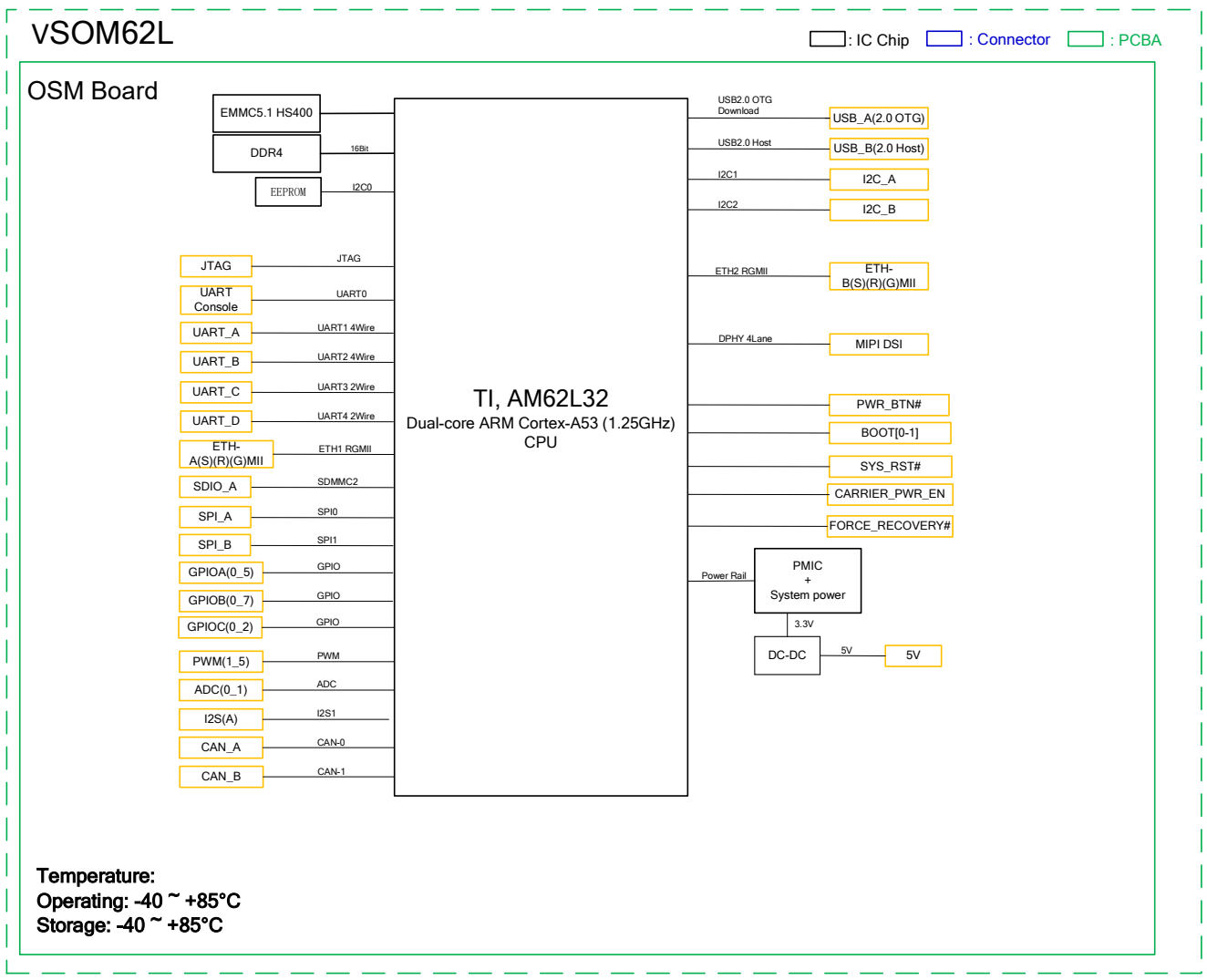
| Specifications | | | |
|---|---|---|---|
| **System** | CPU | TI AM62L32, Dual-core 64-bit Arm® Cortex®-A53 microprocessor, up to 1.25GHz | |
| | Memory | 1GB DDR4 | |
| | Storage | 16GB eMMC 5.1 | |
| **Communication** | Ethernet | GbE MAC (TSN) | |
| **Media** | Video processing | 4-Lane MIPI DSI, 1080P | |
| **Power** | Input | 5V DC input | |
| **Software** | Operating system | Linux Yocto | |
| **Mechanical** | Dimensions | 45mm x 45mm (OSM Size-L) | Packaging: LGA |
| **Miscellaneous** | RTC | Integrated RTC | |
| **Environmental Condition** | Temperature | Operating: -40℃ ~ +85℃ | Storage: -40℃ ~ +85℃ |
| | Humidity | 5%~95% RH (Non-condensing) | |

| I/O | |
|---|---|
| Display | 1 x 4-Lane MIPI DSI D-PHY, up to 1920 × 1080@60fps |
| Audio | 1 x $I^2S$, for carrier board codec |
| Ethernet | 2 x RGMII, 10/100/1000Mbps, TSN supported |
| USB | 1 x USB 2.0 OTG<br>1 x USB 2.0 Host |
| SDIO | 1 x 4-bit SDIO |
| ADC | 2 x 12-bit ADC |
| SPI | 2 x SPI |
| CAN | 2 x CAN FD, up to 5Mbps |
| UART | 4 x Communication UART<br>1 x Debug UART |
| JTAG | Supported |
| $I^2C$ | 2 x $I^2C$ |
| GPIO | 15 x GPIO |
| PWM | 1 x PWM for MIPI display<br>5 x PWM for general use |
| Key Signal | 1 x Reset key |

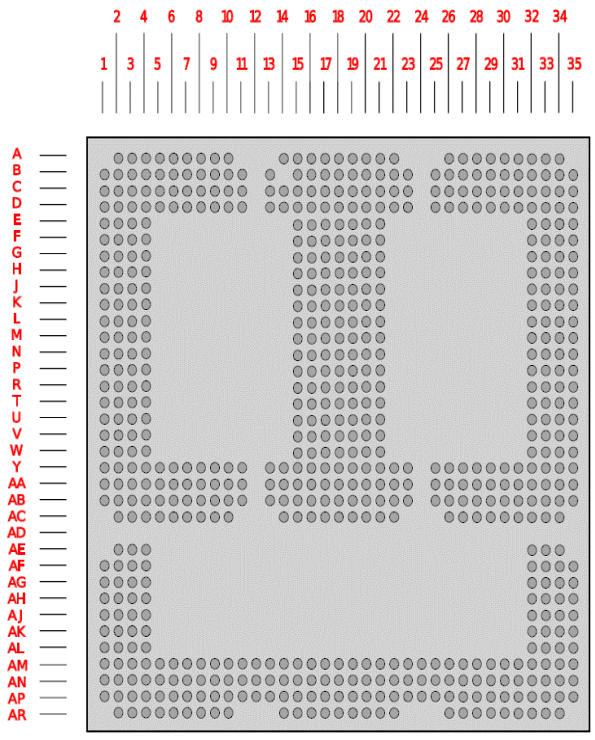
## Product Outlines




## Block Diagram



## Pinout




**(View from top, through the module)**

In the tables below:

* **Pin** refers to the pin number defined by OSM as shown in above figure.
* **Signal** refers to the pin name used by Vantron.
* **CPU Pad Name** refers to the corresponding designations of the AM62L32 CPU.
* Certain signals are derived from auxiliary ICs and the corresponding IC names are provided accordingly.
* Unless otherwise explicitly stated, all I/O signals use a **1.8V level**.

| Pin* | Signal* | CPU Pad Name* | Description |
|---|---|---|---|
| U19 | BOOTMODE0 | GPMC0_AD14 | BOOT config[0]<br>BOOT config[1:0]=11=USB DFU<br>BOOT config[1:0]=10=eMMC<br>BOOT config[1:0]=01=USB0 |
| R18 | BOOTMODE1 | GPMC0_AD15 | BOOT config[1]<br>BOOT config[1:0]=11=USB DFU<br>BOOT config[1:0]=10=eMMC<br>BOOT config[1:0]=01=USB0 |
| V17 | EXT_EN | GPMC0_BE1N | Carrier power control<br>1=ON; 0=OFF |
| T17 | NC | | No connection |
| AA9 | NC | | No connection |
| W17 | RTC_VBAT | | RTC power input (3V voltage) |
| U17 | RESETN | RESETZ | RESET KEY<br>0=active; 1=inactive (PU 10K) |
| AB18, AA18, M19, Y16, Y20, Y3 | NC | | No connection |
| C5, AA33, Y17, Y8, Y9, Y10, Y11 | NC | | No connection |
| Y25, Y26, Y27, Y28 | VCC_IN_5V | | **5V** power input for the module |
| AE4, AF4, AG4, AH3 | NC | | No connection |
| AH4, AJ3, AJ4, AK4<br>B29, Y19, U18, D18 | NC | | No connection |
| E15, E21, F16, F20,<br>J16, J20, L18, M16 | GND | | Ground |
| M20, P18, R16, R20,<br>V16, V20, Y18, AA14 | GND | | Ground |
| AA17, AA19, AA22,<br>AB15, AB21, A4, A7 | GND | | Ground |
| A10, B2, B5, B8, B9,<br>C11, D1, D5, D8, E2 | GND | | Ground |
| H2, H4, L2, L4, P2, P4,<br>R1, U2, U4, V1, W3 | GND | | Ground |
| Y2, AA1 AA4, AA7<br>AA8, AA10, AA11, AB3 | GND | | Ground |
| AB6, AB9 AC4, AC7,<br>AC10, A26, A29, A32 | GND | | Ground |
| B27, B28, B30, B33,<br>C25, C32, C35, D28 | GND | | Ground |
| D34, F33, F35, G34,<br>H32, J33, J35, K34 | GND | | Ground |
| M35, N34, T34, W34,<br>AA25, AA26, AE2 | GND | | Ground |
| AA27, AA28, AA32,<br>AB28, AB31, AB34 | GND | | Ground |
| AC27 AC30, AC33,<br>AE34, AF35, AG3 | GND | | Ground |
| AH2, AK3, AL2, AH34,<br>AJ35, AL34, AM13 | GND | | Ground |
| AM16, AM19, AN3,<br>AM22, AM35 | GND | | Ground |
| AN6, AN9, AN11, AP2<br>AN15, AN18, AP5 | GND | | Ground |
| AN21, AN33, AP8,<br>AP13, AP16, AP19 | GND | | Ground |
| AP22, AP25, AP28,<br>AP31, AP34, AR14 | GND | | Ground |
| AR17, AR20, AR26,<br>AR29, AR32 | GND | | Ground |
| F4 | LCD_BL_EN | GPMC0_WPN | Backlight enable for MIPI DSI display |
| E18 | BL_PWM | GPMC0_CLK | PWM dimming for MIPI DSI display |
| F3 | LCD_EN | UART0_CTSN | VDD logic enable for MIPI DSI display |
| AB8 | MIPI_DSI1_CKN | DSI_CLOCK_N | MIPI DSI clock - |
| AB7 | MIPI_DSI1_CKP | DSI_CLOCK_P | MIPI DSI clock + |
| AB11 | MIPI_DSI1_DN0 | DSI_DATA0_N | MIPI DSI differential data 0 - |
| AB10 | MIPI_DSI1_DP0 | DSI_DATA0_P | MIPI DSI differential data 0 + |

(To be continued…)

| Pin | Signal | CPU Pad Name | Description |
|---|---|---|---|
| AC9 | MIPI_DSI1_DN1 | DSI_DATA1_N | MIPI DSI differential data 1 - |
| AC8 | MIPI_DSI1_DP1 | DSI_DATA1_P | MIPI DSI differential data 1 + |
| AC6 | MIPI_DSI1_DN2 | DSI_DATA2_N | MIPI DSI differential data 2 - |
| AC5 | MIPI_DSI1_DP2 | DSI_DATA2_P | MIPI DSI differential data 2 + |
| AB5 | MIPI_DSI1_DN3 | DSI_DATA3_N | MIPI DSI differential data 3 - |
| AB4 | MIPI_DSI1_DP3 | DSI_DATA3_P | MIPI DSI differential data 3 + |
| AA3 | LCD_ID | GPMC0_CSN1 | ID of MIPI DSI display |
| M18 | ADC0_AIN0 | ADC_0 | ADC input (12-bit) |
| N18 | ADC0_AIN1 | ADC_1 | ADC input (12-bit) |
| AC18 | NC | | No connection |
| R19 | JTAG_TRSTN | TRSTN | JTAG test reset, active low |
| P19 | NC | | No connection |
| N17 | JTAG_TCK | TCK | JTAG test clock |
| P17 | JTAG_TDI | TDI | JTAG test data in |
| R17 | JTAG_TDO | TDO | JTAG test data out |
| N19 | JTAG_TMS | TMS | JTAG test mode select |
| F18 | PWM_1 | EXT_REFCLK1 | Pulse width modulation 1 |
| G18 | PWM_2 | GPMC0_WEN | Pulse width modulation 2 |
| H18 | PWM_3 | GPMC0_AD0 | Pulse width modulation 3 |
| J18 | PWM_4 | GPMC0_AD1 | Pulse width modulation 4 |
| K18 | PWM_5 | GPMC0_AD9 | Pulse width modulation 5 |
| AB17 | CAN0_TX | MCAN0_TX | CAN0 transmit data |
| AC17 | CAN0_RX | MCAN0_RX | CAN0 receive data |
| AB19 | CAN1_TX | GPMC0_DIR | CAN1 transmit data |
| AC19 | CAN1_RX | GPMC0_WAIT1 | CAN1 receive data |
| C14 | UART1_CTSn | MCASP0_AXR3 | UART clear to send |
| C13 | UART1_RTSn | MCASP0_AXR2 | UART request to send |
| A14 | UART1_RXD | MCASP0_AFSR | UART receive data |
| B13 | UART1_TXD | MCASP0_ACLKR | UART transmit data |
| D16 | UART2_CTSn | MMC1_DAT0 | UART B clear to send |
| D15 | UART2_RTSn | MMC1_DAT1 | UART B request to send |
| D14 | UART2_RXD | MMC1_DAT3 | UART B receive data |
| D13 | UART2_TXD | MMC1_DAT2 | UART B transmit data |
| A22 | UART3_RXD | MMC1_CLK | UART C receive data |
| B23 | UART3_TXD | MMC1_CMD | UART C transmit data |
| D22 | UART0_RXD | UART0_RXD | Debug UART receive data |
| D23 | UART0_TXD | UART0_TXD | Debug UART transmit data |
| C22 | UART4_RXD | GPMC0_CSN2 | UART D receive data |
| C23 | UART4_TXD | GPMC0_CSN3 | UART D transmit data |
| V21 | I2S0_RXD0 | MCASP0_AXR0 | I2S A receive data |
| W21 | I2S0_TXD0 | MCASP0_AXR1 | I2S A transmit data |

| Pin | Signal | CPU Pad Name | Description |
|---|---|---|---|
| V19, W19 | NC | | No connection |
| W20 | I2S0_BCLK | MCASP0_ACLKX | MI2S0 serial clock |
| W18 | I2S0_LCLK | MCASP0_AFSX | MI2S0 word select |
| AA15 | I2C_A_SCL | I2C1_SCL | I2C A serial clock (PU 4.7k) |
| AA16 | I2C_A_SDA | I2C1_SDA | I2C A serial data (PU 4.7k) |
| AA20 | I2C_B_SCL | I2C2_SCL | I2C B serial clock (PU 4.7k) |
| AA21 | I2C_B_SDA | I2C2_SDA | I2C B serial data (PU 4.7k) |
| AC15, AC21, AB22 | NC | | No connection |
| AB13 | USB0_DM | USB0_DM | USB A high-speed data - |
| AC14 | USB0_DP | USB0_DP | USB A high-speed data + |
| AB14 | USB0_ID | SPI0_CS1 | USB A OTG ID |
| AB16 | USB0_VBUS | USB0_VBUS | USB-A VBUS (**5V**) |
| AC16 | USB0_DRVVBUS | USB0_DRVVBUS | USB-A enable |
| AB23 | USB1_DM | USB1_DM | USB B high-speed data - |
| AC22 | USB1_DP | USB1_DP | USB B high-speed data + |
| AC20 | USB1_DRVVBUS | USB1_DRVVBUS | USB-B enable |
| AB20 | USB1_VBUS | USB1_VBUS | USB-B VBUS **(5V**) |
| J21 | MMC2_CD | MMC2_SDCD | SDMMC detection (PU 10K) |
| F21 | MMC2_CLK | MMC2_CLK | SDMMC 2 clock |
| E20 | MMC2_CMD | MMC2_CMD | SDMMC 2 command (PU 10K) |
| G20 | MMC2_D0 | MMC2_DAT0 | SDMMC 2 data bit 0 |
| G21 | MMC2_D1 | MMC2_DAT1 | SDMMC 2 data bit 1 |
| H20 | MMC2_D2 | MMC2_DAT2 | SDMMC 2 data bit 2 |
| H21 | MMC2_D3 | MMC2_DAT3 | SDMMC 2 data bit 3 |
| C20 | VCC_SD | | SDMMC 2 VDDIO (1.8V) |
| D21 | MMC2_PWR_EN | MMC2_SDWP | Voltage regulator (1.8V) |
| D17 | GPIO_A_0 | UART0_RTSN | GPIO/defined on carrier |
| E17 | GPIO_A_1 | OSPI0_CLK | GPIO/defined on carrier |
| F17 | GPIO_A_2 | OSPI0_D0 | GPIO/defined on carrier |
| G17 | GPIO_A_3 | OSPI0_D1 | GPIO/defined on carrier |
| H17 | GPIO_A_4 | OSPI0_D2 | GPIO/defined on carrier |
| J17 | GPIO_A_5 | OSPI0_D3 | GPIO/defined on carrier |
| D19 | GPIO_B_0 | OSPI0_D4 | GPIO/defined on carrier |
| E19 | GPIO_B_1 | OSPI0_D5 | GPIO/defined on carrier |
| H19 | GPIO_B_4 | OSPI0_CSN0 | GPIO/defined on carrier |
| J19 | GPIO_B_5 | OSPI0_CSN1 | GPIO/defined on carrier |
| K19 | GPIO_B_6 | OSPI0_CSN2 | GPIO/defined on carrier |
| L19 | GPIO_B_7 | OSPI0_CSN3 | GPIO/defined on carrier |
| D3 | GPIO_C_0 | OSPI0_DQS | GPIO/defined on carrier |
| D4 | GPIO_C_1 | OSPI0_LBCLKO | GPIO/defined on carrier |
| E3 | GPIO_C_2 | GPMC0_OEN_REN | GPIO/defined on carrier |

(To be continued…)

| Pin | Signal | CPU Pad Name | Description |
|---|---|---|---|
| Y15 | SPI0_CS0 | SPI0_CS0 | SPI_A chip select, active low |
| U16 | SPI0_CLK | SPI0_CLK | SPI_A serial clock |
| U15 | SPI0_DI | SPI0_D0 | SPI_A serial data in |
| V15 | SPI0_DO | SPI0_D1 | SPI_A serial data out |
| AA23 | SPI1_CS0 | GPMC0_AD4 | SPI_B chip select, active low |
| Y21 | SPI1_CLK | GPMC0_AD5 | SPI_B serial clock |
| Y22 | SPI1_DI | GPMC0_AD2 | SPI_B serial data in |
| Y23 | SPI1_DO | GPMC0_AD3 | SPI_B serial data out |
| C30, D29, C29, D30, F15, E16 | NC | | No connection |
| L16, N16, E1, D2 | NC | | No connection |
| K2, C6, C7, M2 | NC | | No connection |
| H15 | ENET_A_RGMII_TXD0 | RGMII1_TD0 | RGMII1 transmit data 0 |
| G15 | ENET_A_RGMII_TXD1 | RGMII1_TD1 | RGMII1 transmit data 1 |
| H16 | ENET_A_RGMII_TXD2 | RGMII1_TD2 | RGMII1 transmit data 2 |
| G16 | ENET_A_RGMII_TXD3 | RGMII1_TD3 | RGMII1 transmit data 3 |
| K16 | ENET_A_RGMII_TXCTL | RGMII1_TX_CTL | RGMII1 transmit control |
| J15 | ENET_A_RGMII_TXCLK | RGMII1_TXC | RGMII1 transmit clock |
| K15 | ENET_A_RGMII_RXD0 | RGMII1_RD0 | RGMII1 receive data 0 |
| L15 | ENET_A_RGMII_RXD1 | RGMII1_RD1 | RGMII1 receive data 1 |
| N15 | ENET_A_RGMII_RXD2 | RGMII1_RD2 | RGMII1 receive data 2 |
| P15 | ENET_A_RGMII_RXD3 | RGMII1_RD3 | RGMII1 receive data 3 |
| M15 | ENET_A_RGMII_RXCTL | RGMII1_RX_CTL | RGMII1 receive control |
| R15 | ENET_A_RGMII_RXCLK | RGMII1_RXC | RGMII1 receive clock |
| T15 | ENET_MDIO | MDIO0_MDIO | MDIO data |
| T16 | ENET_MDC | MDIO0_MDC | MDIO clock |
| M17 | VDD_1V8 | | ETH IO Power (1.8V) |
| G1 | ENET_B_RGMII_TXD0 | RGMII2_TD0 | RGMII2 transmit data 0 |
| F1 | ENET_B_RGMII_TXD1 | RGMII2_TD1 | RGMII2 transmit data 1 |
| G2 | ENET_B_RGMII_TXD2 | RGMII2_TD2 | RGMII2 transmit data 2 |
| F2 | ENET_B_RGMII_TXD3 | RGMII2_TD3 | RGMII2 transmit data 3 |
| J2 | ENET_B_RGMII_TXCTL | RGMII2_TX_CTL | RGMII2 transmit control |
| H1 | ENET_B_RGMII_TXCLK | RGMII2_TXC | RGMII2 transmit clock |
| J1 | ENET_B_RGMII_RXD0 | RGMII2_RD0 | RGMII2 receive data 0 |
| K1 | ENET_B_RGMII_RXD1 | RGMII2_RD1 | RGMII2 receive data 1 |
| M1 | ENET_B_RGMII_RXD2 | RGMII2_RD2 | RGMII2 receive data 2 |
| N1 | ENET_B_RGMII_RXD3 | RGMII2_RD3 | RGMII2 receive data 3 |
| L1 | ENET_B_RGMII_RXCTL | RGMII2_RX_CTL | RGMII2 receive control |
| P1 | ENET_B_RGMII_RXCLK | RGMII2_RXC | RGMII2 receive clock |

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

## Ordering Information

| Ordering No. | Memory | Storage | Connectivity | Description |
|---|---|---|---|---|
| VOSM62L | 1GB DDR4 | 16GB eMMC | GbE | MIPI DSI, SPI, CAN, UART, USB, $I^2C$, $I^2S$, GPIO |
| VT-SBC-VOSM62L-EVB | 1GB DDR4 | 16GB eMMC | GbE, Wi-Fi, Bluetooth | VOSM62L + Carrier board, MIPI DSI, UART, CAN, Audio, USB, GPIO |

| Packing List | |
|---|---|
| VOSM62L system-on-module | 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 many Fortune Global 500 companies. Its product lines cover edge intelligent hardware, IoT communication devices, industrial displays and BlueSphere cloud 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 trimming, driver transplantation and more to cater to the unique needs of its users.