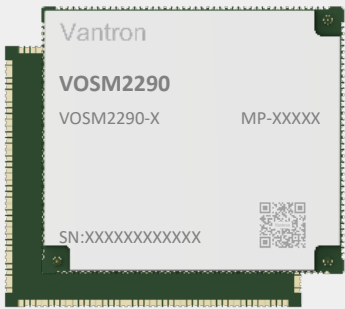


VOSM2290 System-on-Module



Product Brief

VOSM2290 system-on-module is powered by Qualcomm QCS2290 processor with a main frequency of up to 2.0GHz. The module integrates a quad-core ARM Cortex-A53 processor and Qualcomm Adreno 702 GPU that supports 3D graphics accelerator with 64-bit addressing. The on-board RF module is ready for use, offering 2.4GHz & 5GHz Wi-Fi, Bluetooth 5.0, and FM features.

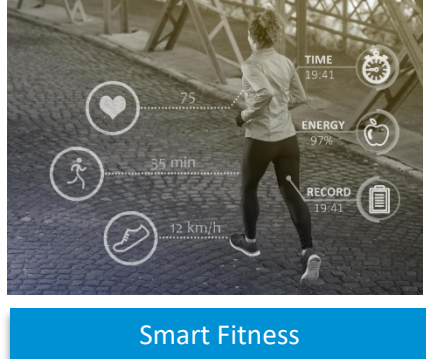
VOSM2290 offers high-definition display, up to 25MP camera ISP, as well as an internal Hexagon DSP for high-quality multimedia applications. In addition, the module features an LGA packaging that allows for direct welding, eliminating the need for additional connectors. It is compliant with the Open Standard Module (OSM) standard 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.

Users may choose the evaluation kit that includes a touchscreen monitor for reducing the time-to-market. Vosm2290 is versatile and suitable for diverse application scenarios such as retail point-of-sale (POS), industrial handhelds, smart home, and camera applications.

Features and benefits

| VOSM2290 |                                               |
|----------|-----------------------------------------------|
|          | Improved power performance                    |
|          | Enhanced DSP, dedicated noise cancellation    |
|          | 1080p @30fps video codec                      |
|          | On-board Wi-Fi & Bluetooth                    |
|          | Android 13 and later systems supported        |
|          | Compact size, LGA packaging, easy integration |
|          | Open Standard Module (OSM) V1.1 compliant     |
|          | Extended service life (7+ years)              |

Application Scenarios



VOSM2290 System-on-Module Datasheet

| Specifications        |                                                                                 |                                                                   |                                               |
|-----------------------|---------------------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------|
| System                | CPU                                                                             | Qualcomm QCS2290 Quad-core ARM Cortex-A53 processor, up to 2.0GHz |                                               |
|                       | GPU                                                                             | Qualcomm Adreno 702 GPU @ 845 MHz                                 |                                               |
|                       | Memory                                                                          | 4GB LPDDR4x                                                       |                                               |
|                       | Storage                                                                         | 32GB eMMC 5.1                                                     |                                               |
|                       | EEPROM                                                                          | 2Kb (for hardware configuration information)                      |                                               |
| Communication         | Wi-Fi & Bluetooth                                                               | Wi-Fi 802.11 a/b/g/n/ac & Bluetooth 5.0                           |                                               |
| Media                 | Video processing                                                                | 1080p 30 8-bit decoder for HEVC (H.265)/H.264/VP9                 | 1080p 30 8-bit encoder for HEVC (H.265)/H.264 |
|                       | Graphics processing                                                             | Support OpenGL ES 3.1, OpenCL 2.0, Vulkan 1.1                     |                                               |
|                       | DSP                                                                             | Qualcomm Hexagon DSP (QDSP6), for multimedia acceleration         |                                               |
| Power                 | Input                                                                           | 5V/2A DC input                                                    |                                               |
|                       | Consumption                                                                     | Idle current: 130mA @5V DC                                        | Operating current: 370mA @5V DC               |
| Software              | Operating system                                                                | Android 13+                                                       |                                               |
|                       | Device management                                                               | BlueSphere MDM (Optional)                                         |                                               |
| Mechanical            | Dimensions                                                                      | 45mm x 45mm x 2.79mm (with shield)                                |                                               |
| Environment Condition | Temperature                                                                     | Operating: -20°C ~ +60°C                                          | Storage: -40°C ~ +80°C                        |
|                       | Humidity                                                                        | ≤95% RH (Non-condensing)                                          |                                               |
|                       |                                                                                 |                                                                   |                                               |
| I/O                   |                                                                                 |                                                                   |                                               |
| Display               | 1 x 4-lane MIPI DSI (HD+, 720 x 1680 @60 Hz) / 1 x HDMI 1.4 (up to 720p @ 60Hz) |                                                                   |                                               |
| Camera                | 1 x 4-lane MIPI CSI (25MP @30 fps ZSL)                                          |                                                                   |                                               |
| Audio                 | 1 x Combo audio                                                                 | 1 x Microphone input                                              | 1 x Speaker output                            |
| I²S                   | 1 x I²S (support 1 x SDI, 1 x SDO)                                              |                                                                   |                                               |
| USB                   | 1 x USB 3.1 Type-C / Micro USB                                                  |                                                                   |                                               |
| SDIO                  | 1 x 4-bit SDIO V3.0                                                             |                                                                   |                                               |
| ADC                   | 1 x ADC input                                                                   |                                                                   |                                               |
| SPI                   | 2 x SPI                                                                         |                                                                   |                                               |
| UART                  | 1 x Debug UART (1.8V level)                                                     | 2 x Communication UART (TTL)                                      |                                               |
| JTAG                  | Supported                                                                       |                                                                   |                                               |
| I²C                   | 2 x I²C                                                                         |                                                                   |                                               |
| GPIO                  | 50 x GPIO (Max.)                                                                |                                                                   |                                               |
| PWM                   | 4 x PWM                                                                         |                                                                   |                                               |
| Key Signal            | 1 x Power key                                                                   | 2 x Volume +/- key                                                |                                               |

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  |              | -0.3 | 6.5  | V    |
| Voltage of LPDDR4x  | LPDDR4x VDD1 | -0.4 | 2.1  | V    |
|                     | LPDDR4x VDD2 | -0.4 | 1.5  | V    |
|                     | LPDDR4x VDDQ | -0.4 | 1    | 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. | Max. | Unit |
|-----------|------------|------|------|------|
| VDD_APC   | Turbo-L2   | 0.87 | 1.23 | V    |
|           | Turbo-L1   | 0.82 | 1.16 | V    |
|           | Turbo      | 0.76 | 1.07 | V    |
|           | Nominal-L1 | 0.71 | 1.00 | V    |
|           | Nominal    | 0.68 | 0.94 | V    |
|           | SVS-L1     | 0.62 | 0.86 | V    |
|           | SVS        | 0.57 | 0.78 | V    |
|           | Low-SVS    | 0.57 | 0.69 | V    |

(To be continued...)

Recommended Operating Conditions (Cont’d)

| Parameter                                 |                                | Min. | Max. | Unit |
|-------------------------------------------|--------------------------------|------|------|------|
| VDD_CX<br>(Digital core circuits)         | Turbo-L1                       | 0.79 | 1.07 | V    |
|                                           | Turbo                          | 0.73 | 1.07 | V    |
|                                           | Nominal-L1                     | 0.69 | 1.00 | V    |
|                                           | Nominal                        | 0.66 | 0.94 | V    |
|                                           | SVS-U1                         | 0.60 | 0.86 | V    |
|                                           | SVS                            | 0.55 | 0.78 | V    |
|                                           | Low-SVS                        | 0.49 | 0.69 | V    |
| VDD_CX_LPI<br>(LPI digital core circuits) | Turbo                          | 0.73 | 1.07 | V    |
|                                           | Nominal                        | 0.66 | 0.94 | V    |
|                                           | SVS-U1                         | 0.60 | 0.86 | V    |
|                                           | SVS                            | 0.55 | 0.78 | V    |
|                                           | Low-SVS                        | 0.49 | 0.69 | V    |
| VDD_MX_LPI<br>(LPI memory circuits)       | Turbo                          | 0.79 | 1.07 | V    |
|                                           | Nominal                        | 0.79 | 1.00 | V    |
| VDD_MX                                    | Memory and analog PLL circuits |      |      |      |
| VDD_MX_TXDAC                              | Turbo                          | 0.79 | 1.07 | V    |
| VDD_A_APC_PLL_0P9                         | Nominal                        | 0.79 | 1.00 | V    |
| VDD_A_EBI_0_0P9                           |                                |      |      |      |
| VDD_A_EBI_1_0P9                           |                                |      |      |      |
| VDD_A_DSI_0P9                             |                                |      |      |      |
| VDD_A_EBI_CC_0P9                          |                                |      |      |      |
| VDD_CX_WLAN<br>(WLAN core circuits)       | Nominal                        | 0.55 | 0.78 | V    |

| Parameter               |                                         | Min. | Typ. | Max. | Unit |
|-------------------------|-----------------------------------------|------|------|------|------|
| VDD_A_EBI_PLL_0P9       | EBI PLL circuit                         | 0.89 | 0.92 | 0.95 | V    |
| VDD_A_QREFS_0P9         | Reference voltage for QREFS 0P9 circuit |      |      |      |      |
| VDD_A_USB_HS_1P8        | USB HS 1.8 V circuit                    | 1.74 | 1.80 | 1.87 | V    |
| VDD_A_USB_SS_1P8        | USB SS 1.8 V circuit                    |      |      |      |      |
| VDD_A_AUDIO_PLL_1P      | Audio PLL circuit                       |      |      |      |      |
| VDD_A_CAMSS_PLL_1P8     | Camera PLL circuit                      |      |      |      |      |
| VDD_PX11                | CXO pad                                 |      |      |      |      |
| VDD_QFPROM              | QFPR OM circuit                         |      |      |      |      |
| VDD_A2                  | High voltage – analog circuit           |      |      |      |      |
| VDD_A_WLAN_PLL_1P8      | WLAN PLL circuit                        | 1.15 | 1.20 | 1.26 | V    |
| VDD_A_CSI_0_1P2         | CSIO 1.2 V circuit                      |      |      |      |      |
| VDD_A_CSI_1_1P2         | CSI1 1.2 V circuit                      |      |      |      |      |
| VDD_A_DSI_PLL_1P2       | DSI PLL circuit                         |      |      |      |      |
| VDD_A_DSI_1P2           | DSI 1.2 V circuit                       |      |      |      |      |
| VDD_A1                  | Low voltage – analog circuit            |      |      |      |      |
| VDD_A_PLL_HV_CC_EBI_1P2 | EBI PLL high voltage circuit            |      |      |      |      |

| Parameter                         |                          | Min. | Typ. | Max. | Unit |
|-----------------------------------|--------------------------|------|------|------|------|
| VDD_IO_EBI_0_CK                   | EBIO I/O clock circuit   | 0.59 | 0.60 | 0.63 | V    |
| VDD_IO_EBI_1_CK                   | EBI1 I/O clock circuit   |      |      |      |      |
| VDD_IO_EBI                        | EBI I/O clock circuit    |      |      |      |      |
| VDD_A_WLAN_ADCDAC_0_1P3           | WLAN ADC and DAC 0       | 1.25 | -    | 1.30 | V    |
| VDD_A_WLAN_ADCDAC_1_1P3           | WLAN ADC and DAC 1       |      |      |      |      |
| VDD_A_USB_SS_0P9                  | USB SS 0.9 V circuit     | 0.89 | 0.92 | 0.95 | V    |
| VDD_USB_HS_0P9                    | USB HS 0.9 V circuit     |      |      |      |      |
| VDD_A_USB_HS_3P1                  | USB HS 3.1 V circuit     | 2.95 | 3.10 | 3.20 | V    |
| VDD_SDCREF_1P25                   | Ref. voltage for SDC     | 1.15 | 1.25 | 1.30 | V    |
| VDD_PX0                           | Pad group 0              | 1.70 | 1.80 | 1.90 | V    |
| VDD_PX1                           | EBI I/O circuit          | 1.05 | 1.10 | 1.15 | V    |
| VDD_PX2<br>(Pad group 2-SDC2 pad) | Low voltage              | 1.70 | 1.80 | 1.90 | V    |
|                                   | High voltage             | 2.70 | 2.95 | 3.10 | V    |
| VDD_PX3                           | Pad group 3–most I/O pad | 1.70 | 1.80 | 1.90 | V    |
| VDD_PX7                           | Pad group 7–eMMC pad     | 1.70 | 1.80 | 1.90 | V    |

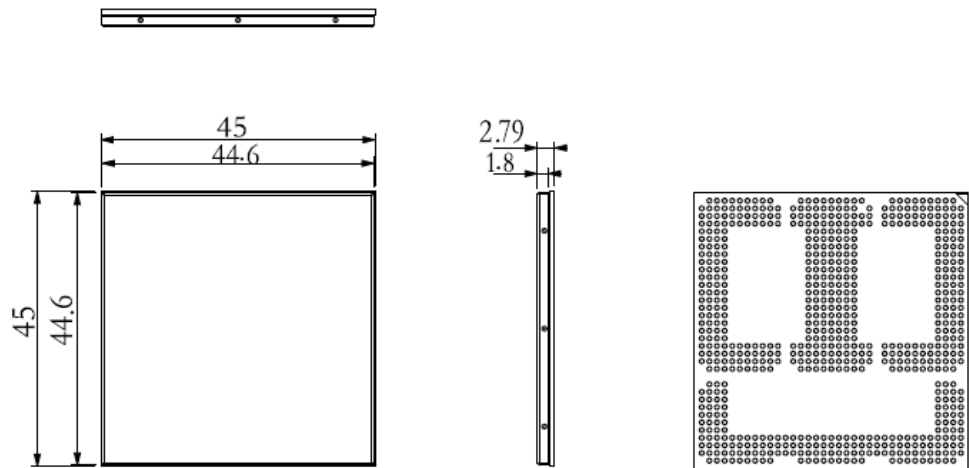
Thermal conditions

|                       |   |               |   |                |    |
|-----------------------|---|---------------|---|----------------|----|
| Operating temperature | T | Ambient = -30 | - | Junction = +95 | °C |
|-----------------------|---|---------------|---|----------------|----|

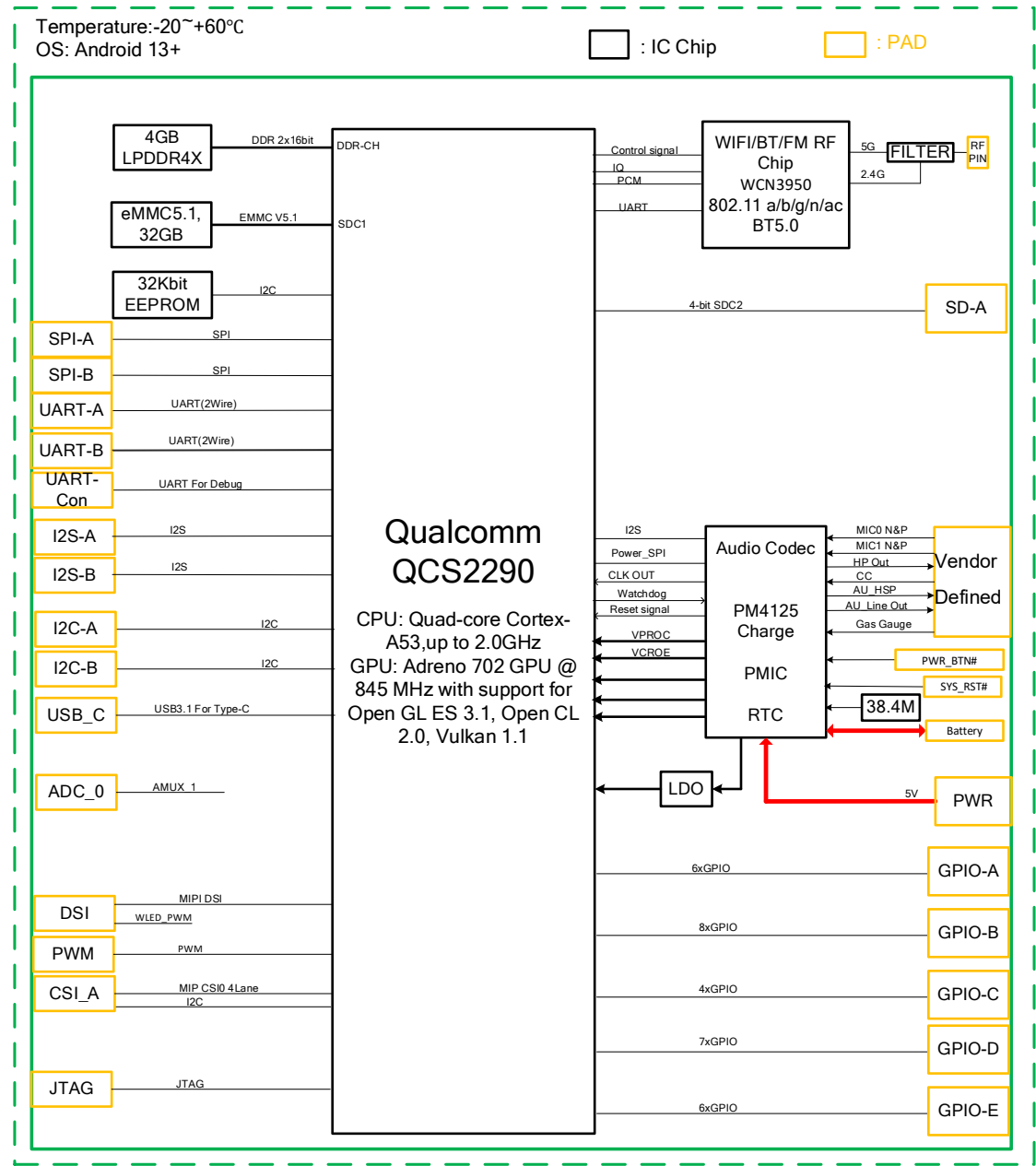
| VDD_CORE<br>(Retention mode) | Bit 31 (MSB) | Bit 30 | Bit 29 (LSB) |
|------------------------------|--------------|--------|--------------|
| 0.4V                         | 1            | 0      | 0            |
| 0.45V                        | 0            | 1      | 1            |
| 0.5V                         | 0            | 1      | 0            |
| 0.55V                        | 0            | 0      | 1            |
| 0.60V                        | 0            | 0      | 0            |

| VDD_MEM<br>(Retention mode) | Bit 19 (MSB) | Bit 18 | Bit 17 (LSB) |
|-----------------------------|--------------|--------|--------------|
| 0.49V                       | 1            | 0      | 0            |
| 0.55V                       | 0            | 1      | 1            |
| 0.58V                       | 0            | 1      | 0            |
| 0.65V                       | 0            | 0      | 1            |
| 0.70V                       | 0            | 0      | 0            |

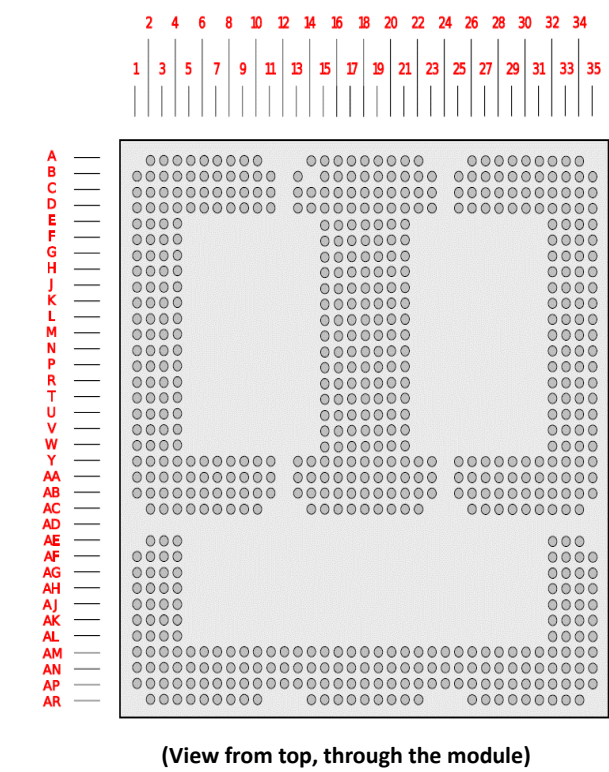
Product Outlines



Block Diagram



Pinout



| Pin*                            | Signal*         | CPU Pad Name*         | Description                                                                                                                                         |
|---------------------------------|-----------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| U19, R18,<br>W17, M19           | NC              |                       | No connection                                                                                                                                       |
| V17                             | LPI_GPIO_2      | LPI_GPIO_2            | GPIO                                                                                                                                                |
| T17                             | FORCED_USB_BOOT | GPIO_95               | To enter recovery mode if carrier board is at low level                                                                                             |
| AA9                             | PHONE_ON_N      | KYPDPWR_N<br>(PM4125) | Power button input from carrier board. Carrier to float the line in inactive state. Active low, level sensitive. Should be de-bounced on the module |
| U17                             | PM_RESIN_N      |                       | Reset input from carrier board, active low                                                                                                          |
| AB18                            | VCC_BAT         |                       | Power input, battery voltage                                                                                                                        |
| AA18                            | VCC_BAT         |                       | Power input, battery voltage                                                                                                                        |
| Y16, Y20, Y3,<br>C5, AA33, B29  | NC              |                       | No connection                                                                                                                                       |
| Y17, Y8, Y9                     | NC              |                       | No connection                                                                                                                                       |
| Y10, Y11, AE4,<br>AF4, AG4, AH3 | NC              |                       | No connection                                                                                                                                       |
| Y25, Y26,<br>Y27, Y28           | VCC_IN_5V       |                       | 5V power input                                                                                                                                      |
| AH4, AJ3, AJ4,<br>AK4, Y19, U18 | NC              |                       | No connection                                                                                                                                       |
| D18, E15, E21,<br>F16, F20, J16 | GND             |                       | Ground                                                                                                                                              |
| J20, L18, M16,<br>M20, P18      | GND             |                       | Ground                                                                                                                                              |
| R16, R20, V16,<br>V20, Y18      | GND             |                       | Ground                                                                                                                                              |

- \* **Pin** refers to the pin number defined by OSM as shown above.
- \* **Signal** refers to the pin name used by Vantron.
- \* **CPU Pad Name** refers to corresponding pad name on the QCS2290 CPU.

| Pin                                         | Signal | CPU Pad Name | Description   |
|---------------------------------------------|--------|--------------|---------------|
| AA14, AA17, AA19,<br>AA22, AB15, AB21       | GND    |              | Ground        |
| A4, A7, A10, B2, B5,<br>B8, B9, C11, D1, D5 | GND    |              | Ground        |
| D8, E2, H2, H4, L2, L4,<br>P2, P4, R1, U2   | GND    |              | Ground        |
| U4, V1, W3, Y2, AA1,<br>AA4, AA7, AA8, AB3  | GND    |              | Ground        |
| AA10, AA11, AB6,<br>AB9, AC4, AC7, AC10     | GND    |              | Ground        |
| A26, A29, A32, B27,<br>B28, B30, B33, C25   | GND    |              | Ground        |
| C32, C35, D28, D34,<br>F33, F35, G34, H32   | GND    |              | Ground        |
| J33, J35, K34, M35,<br>N34, T34, W34, AE2   | GND    |              | Ground        |
| AA25, AA26, AA27,<br>AA28, AA32, AB28       | GND    |              | Ground        |
| AB31, AB34, AC27,<br>AC30, AC33, AE34       | GND    |              | Ground        |
| AG3, AH2, AK3, AL2,<br>AF35, AH34, AJ35     | GND    |              | Ground        |
| AL34, AM13, AM16,<br>AM19, AM22, AM35       | GND    |              | Ground        |
| AN3, AN6, AN9, AP2,<br>AN11, AN15, AN18     | GND    |              | Ground        |
| AN21, AN33, AP5,<br>AP8, AP13, AP16         | GND    |              | Ground        |
| AP19, AP22, AP25,<br>AP28, AP31, AP34       | GND    |              | Ground        |
| AR14, AR17, AR20,<br>AR26, AR29, AR32       | GND    |              | Ground        |
| T18, T19, Y13, Y14,<br>AA13, N2, AA2, J32   | NC     |              | No connection |
| K32, K33, L32, M32,<br>M33, N32, P32, P34   | NC     |              | No connection |
| R32, R33, T32, T33,<br>AB25, AB26, AE32     | NC     |              | No connection |
| AL3, AL4, AM3, AM4,<br>AM5, AM6             | NC     |              | No connection |
| AM7, AM8, AM9,<br>AM10, AM23, AM24          | NC     |              | No connection |
| AM25, AM26, AM27,<br>AM28, AM29             | NC     |              | No connection |
| AM30, AM31, AN2,<br>AN5, AN7, AN8           | NC     |              | No connection |
| AN24, AN25, AN26,<br>AN27, AN28, AN29       | NC     |              | No connection |

(To be continued...)

| Pin                          | Signal        | CPU Pad Name    | Description                                    |
|------------------------------|---------------|-----------------|------------------------------------------------|
| AN30, AN31, AP10             | NC            |                 | No connection                                  |
| C2                           | CAM_MCLK0     | GPIO_20         | Camera master clock 0                          |
| G3                           | GPIO_61       | GPIO_61         | Camera power enable, active high output        |
| G4                           | GPIO_56       | GPIO_56         | Camera reset signal output                     |
| B3                           | CSIO_A0_CLK_M | CSIO_A0_CLK_M   | MIPI CSI 0 (DPHY), differential clock - minus  |
| B4                           | CSIO_NC_CLK_P | CSIO_NC_CLK_P   | MIPI CSI 0 (DPHY), differential clock + plus   |
| C1                           | CSIO_C0_LN0_M | CSIO_C0_LN0_M   | MIPI CSI 0 (DPHY), differential lane 0 - minus |
| B1                           | CSIO_B0_LN0_P | CSIO_B0_LN0_P   | MIPI CSI 0 (DPHY), differential lane 0 + plus  |
| A2                           | CSIO_B1_LN1_M | CSIO_B1_LN1_M   | MIPI CSI 0 (DPHY), differential lane 1 - minus |
| A3                           | CSIO_A1_LN1_P | CSIO_A1_LN1_P   | MIPI CSI 0 (DPHY), differential lane 1 + plus  |
| A5                           | CSIO_A2_LN2_M | CSIO_A2_LN2_M   | MIPI CSI 0 (DPHY), differential lane 2 - minus |
| A6                           | CSIO_C1_LN2_P | CSIO_C1_LN2_P   | MIPI CSI 0 (DPHY), differential lane 2 + plus  |
| B6                           | CSIO_C2_LN3_M | CSIO_C2_LN3_M   | MIPI CSI 0 (DPHY), differential lane 3 - minus |
| B7                           | CSIO_B2_LN3_P | CSIO_B2_LN3_P   | MIPI CSI 0 (DPHY), differential lane 3 + plus  |
| C4                           | CCI_I2C_SCL0  | CCI_I2C_SCL0    | I2C clock signal                               |
| C3                           | CCI_I2C_SDA0  | CCI_I2C_SDA0    | I2C data signal                                |
| F4                           | GPIO_40       | GPIO_40         | GPIO                                           |
| E18                          | WLED_PWM      | GPIO_02(PM4125) | Primary display brightness control through PWM |
| F3                           | GPIO_41       | GPIO_41         | GPIO                                           |
| AB8                          | DSIO_CLK_M    | DSIO_CLK_M      | DSI differential clock output (point to point) |
| AB7                          | DSIO_CLK_P    | DSIO_CLK_P      | DSI differential clock output (point to point) |
| AB11                         | DSIO_LN0_M    | DSIO_LN0_M      | DSI differential lane 0 (point to point)       |
| AB10                         | DSIO_LN0_P    | DSIO_LN0_P      | DSI differential lane 0 (point to point)       |
| AC9                          | DSIO_LN1_M    | DSIO_LN1_M      | DSI differential lane 1 (point to point)       |
| AC8                          | DSIO_LN1_P    | DSIO_LN1_P      | DSI differential lane 1 (point to point)       |
| AC6                          | DSIO_LN2_M    | DSIO_LN2_M      | DSI differential lane 2 (point to point)       |
| AC5                          | DSIO_LN2_P    | DSIO_LN2_P      | DSI differential lane 2 (point to point)       |
| AB5                          | DSIO_LN3_M    | DSIO_LN3_M      | DSI differential lane 3 (point to point)       |
| AB4                          | DSIO_LN3_P    | DSIO_LN3_P      | DSI differential lane 3 (point to point)       |
| AA3                          | GPIO_101      | GPIO_101        | GPIO                                           |
| M18                          | ADC_THERM     | AMUX_1 (PM4125) | Analog multiplexer (AMUX) input 1              |
| N18, AC18, D6, P19, C18, C16 | NC            |                 | No connection                                  |

| Pin                              | Signal            | CPU Pad Name         | Description                                                                                                                              |
|----------------------------------|-------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| R19                              | JTAG_TRST_N       | JTAG_TRST_N          | JTAG reset, active low, suggest not using                                                                                                |
| N17                              | JTAG_TCK          | JTAG_TCK             | JTAG clock, suggest not using                                                                                                            |
| P17                              | JTAG_TDI          | JTAG_TDI             | JTAG data input, suggest not using                                                                                                       |
| R17                              | JTAG_TDO          | JTAG_TDO             | JTAG data output, suggest not using                                                                                                      |
| N19                              | JTAG_TMS          | JTAG_TMS             | JTAG mode select, suggest not using                                                                                                      |
| B22                              | BATT_THERM        | BAT_THERM (PM4125)   | Battery temperature input to ADC for measuring the pack temperature                                                                      |
| P16                              | BATT_ID           | BAT_ID (PM4125)      | Battery ID input to the ADC                                                                                                              |
| D7                               | CDC_HS_DET        | CDC_HS_DET (PM4125)  | Headset detection input                                                                                                                  |
| Y29                              | MIC1_INM          | MIC1_INM (PM4125)    | Microphone channel 1 negative input                                                                                                      |
| Y30                              | MIC2_INM          | MIC2_INM (PM4125)    | Microphone channel 2 negative input                                                                                                      |
| Y31                              | LINEOUT_N         | LINEOUT_N (PM4125)   | Line out negative output                                                                                                                 |
| AA29                             | MIC1_INP          | MIC1_INP (PM4125)    | Microphone channel 1 positive input                                                                                                      |
| AA30                             | MIC2_INP          | MIC2_INP (PM4125)    | Microphone channel 2 positive input                                                                                                      |
| AA31                             | LINEOUT_P         | LINEOUT_P (PM4125)   | Line out positive output                                                                                                                 |
| AK32                             | KEY_VOLP_N        | GPIO_96              | Volume + input                                                                                                                           |
| AK33                             | CDC_HPH_L         | CDC_HPH_L (PM4125)   | Headphone left channel output                                                                                                            |
| AL32                             | CDC_HPH_R         | CDC_HPH_R (PM4125)   | Headphone right channel output                                                                                                           |
| AL33                             | CDC_HPH_REF       | CDC_HPH_REF (PM4125) | Headphone reference ground                                                                                                               |
| AM32                             | VBATT_CONN_VSNS_P | VBATT_SNS_P (PM4125) | Battery voltage sensing input plus. Connect to the battery positive remote sensing node or connect directly to the battery positive node |
| AM33                             | PACK_VSNS_M       | PACK_SNS_M (PM4125)  | Battery voltage sense input minus. Connect to the battery negative remote sense node or connect directly to the battery negative node    |
| F18                              | NC                |                      | No connection                                                                                                                            |
| G18                              | GPIO_52           | GPIO_52              | GPIO                                                                                                                                     |
| H18                              | GPIO_72           | GPIO_72              | GPIO                                                                                                                                     |
| J18                              | GPIO_74           | GPIO_74              | GPIO                                                                                                                                     |
| K18                              | GPIO_75           | GPIO_75              | GPIO                                                                                                                                     |
| AB17, AC17, C14, AB19, AC19, C13 | NC                |                      | No connection                                                                                                                            |

(To be continued...)

| Pin                            | Signal            | CPU Pad Name  | Description                                                    |
|--------------------------------|-------------------|---------------|----------------------------------------------------------------|
| A14                            | BT_SENS_UART_1_RX | LPI_GPIO_26   | UART serial port data input                                    |
| B13                            | BT_SENS_UART_1_TX | LPI_GPIO_25   | UART serial port data output                                   |
| D16, D15                       | NC                |               | No connection                                                  |
| D14                            | SSC_UART2_RX      | LPI_GPIO_112  | UART serial port data input                                    |
| D13                            | SSC_UART2_TX      | LPI_GPIO_111  | UART serial port data output                                   |
| A22, B23, C22, C23, V19, W19   | NC                |               | No connection                                                  |
| D22                            | DBG_UART_RX       | GPIO_13       | UART serial port data input, for AP debugging, 1.8V            |
| D23                            | DBG_UART_TX       | GPIO_12       | UART serial port data output, for AP debugging, 1.8V           |
| V21                            | LPI_MI2S1_DATA0   | GPIO_104      | LPI_MI2S 1 data 0                                              |
| W21                            | LPI_MI2S1_DATA1   | GPIO_105      | LPI_MI2S 1 data 1                                              |
| W20                            | LPI_MI2S1_CLK     | GPIO_102      | LPI_MI2S 1 clock                                               |
| W18                            | LPI_MI2S1_WS      | GPIO_103      | LPI_MI2S 1 word select                                         |
| V18                            | I2S_MCLK          | GPIO_108      | MI2S master clock 1_A                                          |
| AB2                            | USB0_SS_TX1_P     | USB0_SS_TX1_P | USB 0 super-speed transmit 1 + plus                            |
| AB1                            | USB0_SS_TX1_M     | USB0_SS_TX1_M | USB 0 super-speed transmit 1 - minus                           |
| AC3                            | USB0_SS_RX1_P     | USB0_SS_RX1_P | USB 0 super-speed receive 1 + plus                             |
| AC2                            | USB0_SS_RX1_M     | USB0_SS_RX1_M | USB 0 super-speed receive 1 - minus                            |
| V2, M34, L34, L35, K35, L33    | NC                |               | No connection                                                  |
| W2, Y1, W1, R2, T1, U1, T2     | NC                |               | No connection                                                  |
| D11                            | USB0_HS_DM        | USB0_HS_DM    | USB 0 high-speed data – minus                                  |
| D10                            | USB0_HS_DP        | USB0_HS_DP    | USB 0 high-speed data + plus                                   |
| C10                            | LPI_GPIO_22       | LPI_GPIO_22   | GPIO                                                           |
| D9                             | USB_CC1           | CC1 (PM4125)  | Input contact to announce OTG device insertion on USB 2.0 port |
| C8                             | USB_CC2           | CC2 (PM4125)  | USB over-current for port A                                    |
| B11                            | USB0_SS_RX0_M     | USB0_SS_RX0_M | USB 0 super-speed receive 0 – minus                            |
| B10                            | USB0_SS_RX0_P     | USB0_SS_RX0_P | USB 0 super-speed receive 0 + plus                             |
| A9                             | USB0_SS_TX0_M     | USB0_SS_TX0_M | USB 0 super-speed transmit 0 – minus                           |
| A8                             | USB0_SS_TX0_P     | USB0_SS_TX0_P | USB 0 super-speed transmit 0 + plus                            |
| C9                             | GPIO_100          | GPIO_100      | USB 0 port power detection                                     |
| D26, D25, C26, D27, C28, B26   | NC                |               | No connection                                                  |
| B25, A28, A27, C27, AB13, AC14 | NC                |               | No connection                                                  |
| AC16, AB14, AC15, AB16         | NC                |               | No connection                                                  |

| Pin                                | Signal         | CPU Pad Name      | Description                                          |
|------------------------------------|----------------|-------------------|------------------------------------------------------|
| AA15                               | SNS_I2C_SCL    | GPIO_110          | I2C port A clock signal                              |
| AA16                               | SNS_I2C_SDA    | GPIO_109          | I2C port A data signal                               |
| AA20                               | TS_I2C_SCL     | GPIO_7            | I2C port B clock signal                              |
| AA21                               | TS_I2C_SDA     | GPIO_6            | I2C port B data signal                               |
| AB23, AC22, AC20, AB22, AC21, AB20 | NC             |                   | No connection                                        |
| J21                                | SD_CARD_DET_N  | GPIO_88           | SDIO A card detection                                |
| F21                                | SDC2_CLK       | SDC2_CLK          | Secure digital controller 2 clock                    |
| E20                                | SDC2_CMD       | SDC2_CMD          | Secure digital controller 2 command                  |
| G20                                | SDC2_DATA_0    | SDC2_DATA_0       | Secure digital controller 2 data bit 0               |
| G21                                | SDC2_DATA_1    | SDC2_DATA_1       | Secure digital controller 2 data bit 1               |
| H20                                | SDC2_DATA_2    | SDC2_DATA_2       | Secure digital controller 2 data bit 2               |
| H21                                | SDC2_DATA_3    | SDC2_DATA_3       | Secure digital controller 2 data bit 3               |
| C20                                | VREG_L21A_2P96 | VREG_L21 (PM4125) | SDIO A Voltage. Used to provide the IO voltage level |
| D21, D20, T21                      | NC             |                   | No connection                                        |
| K20                                | GPIO_30        | GPIO_30           | GPIO                                                 |
| K21                                | GPIO_46        | GPIO_46           | GPIO                                                 |
| L20                                | GPIO_60        | GPIO_60           | GPIO                                                 |
| L21                                | GPIO_57        | GPIO_57           | GPIO                                                 |
| M21                                | GPIO_107       | GPIO_107          | GPIO                                                 |
| N20, N21, P20                      | NC             |                   | No connection                                        |
| P21, R21, U21                      | NC             |                   | No connection                                        |
| U20, AJ32, AJ33                    | NC             |                   | No connection                                        |
| D17                                | GPIO_45        | GPIO_45           | GPIO                                                 |
| E17                                | GPIO_31        | GPIO_31           | GPIO                                                 |
| F17                                | GPIO_64        | GPIO_64           | GPIO                                                 |
| G17                                | GPIO_63        | GPIO_63           | GPIO                                                 |
| H17                                | GPIO_28        | GPIO_28           | GPIO                                                 |
| J17                                | GPIO_37        | GPIO_37           | GPIO                                                 |
| D19                                | GPIO_36        | GPIO_36           | GPIO                                                 |
| E19                                | GPIO_32        | GPIO_32           | GPIO                                                 |
| F19                                | GPIO_33        | GPIO_33           | GPIO                                                 |
| G19                                | GPIO_34        | GPIO_34           | GPIO                                                 |
| H19                                | GPIO_35        | GPIO_35           | GPIO                                                 |
| J19                                | GPIO_39        | GPIO_39           | GPIO                                                 |
| K19                                | GPIO_44        | GPIO_44           | GPIO                                                 |
| L19                                | GPIO_38        | GPIO_38           | GPIO                                                 |
| D3                                 | GPIO_62        | GPIO_62           | GPIO                                                 |
| D4                                 | GPIO_77        | GPIO_77           | GPIO                                                 |
| E3                                 | GPIO_79        | GPIO_79           | GPIO                                                 |
| E4                                 | GPIO_78        | GPIO_78           | GPIO                                                 |
| U32                                | GPIO_114       | GPIO_114          | GPIO                                                 |

(To be continued...)

| Pin           | Signal       | CPU Pad Name | Description                |
|---------------|--------------|--------------|----------------------------|
| U33           | GPIO_113     | GPIO_113     | GPIO                       |
| V32           | GPIO_69      | GPIO_69      | GPIO                       |
| V33           | GPIO_82      | GPIO_82      | GPIO                       |
| W32           | GPIO_70      | GPIO_70      | GPIO                       |
| W33           | GPIO_86      | GPIO_86      | GPIO                       |
| Y32           | LPI_GPIO_21  | LPI_GPIO_21  | GPIO                       |
| AF32          | GPIO_80      | GPIO_80      | GPIO                       |
| AG32          | GPIO_71      | GPIO_71      | GPIO                       |
| AG33          | GPIO_97      | GPIO_97      | GPIO                       |
| AH32          | GPIO_81      | GPIO_81      | GPIO                       |
| AH33          | GPIO_98      | GPIO_98      | GPIO                       |
| W15, W16, K17 | NC           |              | No connection              |
| Y15           | SPI_CS_N     | GPIO_17      | SPI A master chip select 0 |
| U16           | SPI_SCLK     | GPIO_16      | SPI A serial data clock    |
| U15           | SPI_MISO     | GPIO_14      | SPI A serial data input    |
| V15           | SPI_MOSI     | GPIO_15      | SPI A serial data output   |
| AA23          | NFC_SPI_CS_N | GPIO_3       | SPI B master chip select 0 |
| L17, Y33, D29 | NC           |              | No connection              |
| Y21           | NFC_SPI_SCLK | GPIO_2       | SPI B serial data clock    |
| Y22           | NFC_SPI_MISO | GPIO_0       | SPI B serial data input    |
| Y23           | NFC_SPI_MOSI | GPIO_1       | SPI B serial data output   |
| C30           | GPIO_21      | GPIO_21      | GPIO                       |
| C29           | GPIO_27      | GPIO_27      | GPIO                       |
| D30           | GPIO_18      | GPIO_18      | GPIO                       |

| Pin | Signal           | CPU Pad Name | Description                    |
|-----|------------------|--------------|--------------------------------|
| F15 | GPIO_19          | GPIO_19      | GPIO                           |
| E16 | GPIO_25          | GPIO_25      | GPIO                           |
| R15 | GPIO_48          | GPIO_48      | GPIO                           |
| M15 | GPIO_59          | GPIO_59      | GPIO                           |
| L16 | GPIO_55          | GPIO_55      | GPIO                           |
| N15 | GPIO_58          | GPIO_58      | GPIO                           |
| P15 | GPIO_49          | GPIO_49      | GPIO                           |
| J15 | GPIO_26          | GPIO_26      | GPIO                           |
| K16 | GPIO_76          | GPIO_76      | GPIO                           |
| K15 | GPIO_42          | GPIO_42      | GPIO                           |
| L15 | GPIO_54          | GPIO_54      | GPIO                           |
| H15 | GPIO_47          | GPIO_47      | GPIO                           |
| G15 | GPIO_29          | GPIO_29      | GPIO                           |
| H16 | GPIO_43          | GPIO_43      | GPIO                           |
| G16 | GPIO_24          | GPIO_24      | GPIO                           |
| N16 | GPIO_50          | GPIO_50      | GPIO                           |
| T16 | GPIO_106         | GPIO_106     | GPIO                           |
| T15 | GPIO_73          | GPIO_73      | GPIO                           |
| A15 | GND              |              | Power return and reference GND |
| A17 | GND              |              | Power return and reference GND |
| B15 | GND              |              | Power return and reference GND |
| B16 | GND              |              | Power return and reference GND |
| B17 | GND              |              | Power return and reference GND |
| A16 | WLAN_2G_BT_5G_RF |              | WIFI/BT antenna                |

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

### Ordering Information

| Ordering No.                                                                   | Chipset | Memory      | Storage   | Description                                                                              |
|--------------------------------------------------------------------------------|---------|-------------|-----------|------------------------------------------------------------------------------------------|
| VOSM2290                                                                       | QCS2290 | 4GB LPDDR4x | 32GB eMMC | MIPI DSI/HDMI, MIPI CSI, SPI, UART, USB, I <sup>2</sup> C, GPIO                          |
| VT-SBC-VOSM2290-EVB                                                            | QCS2290 | 4GB LPDDR4x | 32GB eMMC | VOSM2290 + Carrier board, MIPI DSI/HDMI, MIPI CSI, UART, USB, I <sup>2</sup> C, GPIO, TP |
| * More variants are available, please contact the sales executive for details. |         |             |           |                                                                                          |

| Packing List              |   |
|---------------------------|---|
| VOSM2290 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.