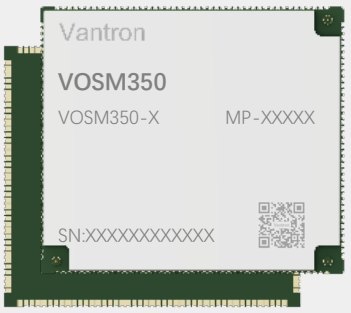
VOSM350 System-on-Module



Product Brief

VOSM350 system-on-module is powered by MediaTek G350 chipset, which integrates a quad-core ARM Cortex-A53 processor, a Mali-G52 GPU, a VP6 APU for AI and computer vision algorithms, and a HiFi4 audio engine DSP to fit for edge AI applications that require voice and vision processing. Its support for Wi-Fi and Bluetooth wireless connectivity increases its versatility for IoT scenarios. The module features LGA packaging that allows for direct welding, eliminating the need for additional connectors. Additionally, it is Open Standard Module (OSM) V1.1 compliant, which enables seamless integration into various products. The module design conforms to industrial standards, ensuring an extended service life that meets the rigorous demands of industrial customers.

Customers have the option to choose between two variants that offer advanced and compact configurations. 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

VOSM350
Rich interfaces, robust system performance
Internal DSP unit, low power design
Wi-Fi & Bluetooth integrated, RF debug ready
Android and Linux systems supported
Compact size, LGA/BGA packaging
Open Standard Module (OSM) V1.1 compliant
Extended service life (7+ years)

Application Scenarios


Robotics


AIDC (handheld)

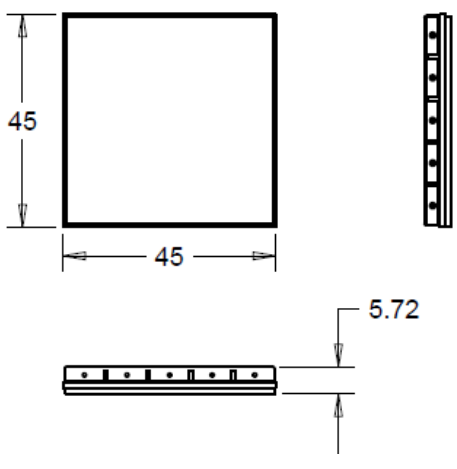

Fitness Console

Home Appliance


Industrial IoT

Smart Retail

Product Outlines



VOSM350 System-on-Module Datasheet

Specifications			
System	CPU	MTK MT8365 (G350), Quad-core ARM Cortex-A53 low-power processor, 2.0GHz (Max.)	
	GPU	ARM Mali-G52 GPU, 600MHz	
	APU	Cadence® Tensilica® VP6 processor, 700MHz at 0.825V	
	Memory	4GB LPDDR4 (Optional: 2GB)	
	Storage	32GB eMMC 5.1 (Optional: 16GB)	
	EEPROM	2Kb (for hardware configuration information)	
Communication	Wi-Fi	Wi-Fi 802.11 a/b/g/n/ac	
	Bluetooth	Bluetooth 5.2	
Media	Video processing	1080p60, H.265/H.264/JPEG video encoder	1080p60, H.265/H.264/VP9 video decoder
	Audio DSP	Tensilica HiFi4	
Power	Input	5V/1A DC input	
	Consumption	Idle current: 130mA @5V DC	Operating current: 370mA @5V DC
Software	Operating system	Android 10+, Linux Yocto	
	Device management	BlueSphere MDM (Optional for Android version)	
Mechanical	Dimensions	45mm x 45mm x 5.72mm (with shield)	Packaging: LGA, BGA
Environment Condition	Temperature	Operating: -20℃ ~ +60℃	Storage: -30℃ ~ +70℃
	Humidity	≤95% RH (Non-condensing)	

I/O		
Display	1 x 4-lane MIPI DSI, up to 1920 x 1080 @60Hz	
Camera	1 x 4-lane MIPI CSI, 13MP @30fps	
ADC	2 x ADC	
RGMII (Ethernet)	1 x RMII/MII	
SPI	1 x SPI	
Debug UART	1 x UART for debugging (1.8V level)	
Communication UART	2 x UART (TTL)	
I^2S	1 x I^2S	
I^2C	2 x I^2C	
PWM	Supported	
USB	1 x USB 2.0 OTG	1 x USB 2.0 Host
GPIO	25 x GPIO (max.)	
SDIO	1 x SDIO	
JTAG	Supported	

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	5.25	V
Voltage on Wi-Fi/BT chip	AVDD18	-0.3	1.98	V
	AVDD33	-0.3	3.63	V
Voltage of LPDDR4	LPDDR4X VDD1	-0.4	2.3	V
	LPDDR4X VDD2	-0.4	1.6	V
	LPDDR4X VDDQ	-0.4	1.6	V
Storage temperature		-30	70	℃

Recommended Operating Conditions

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

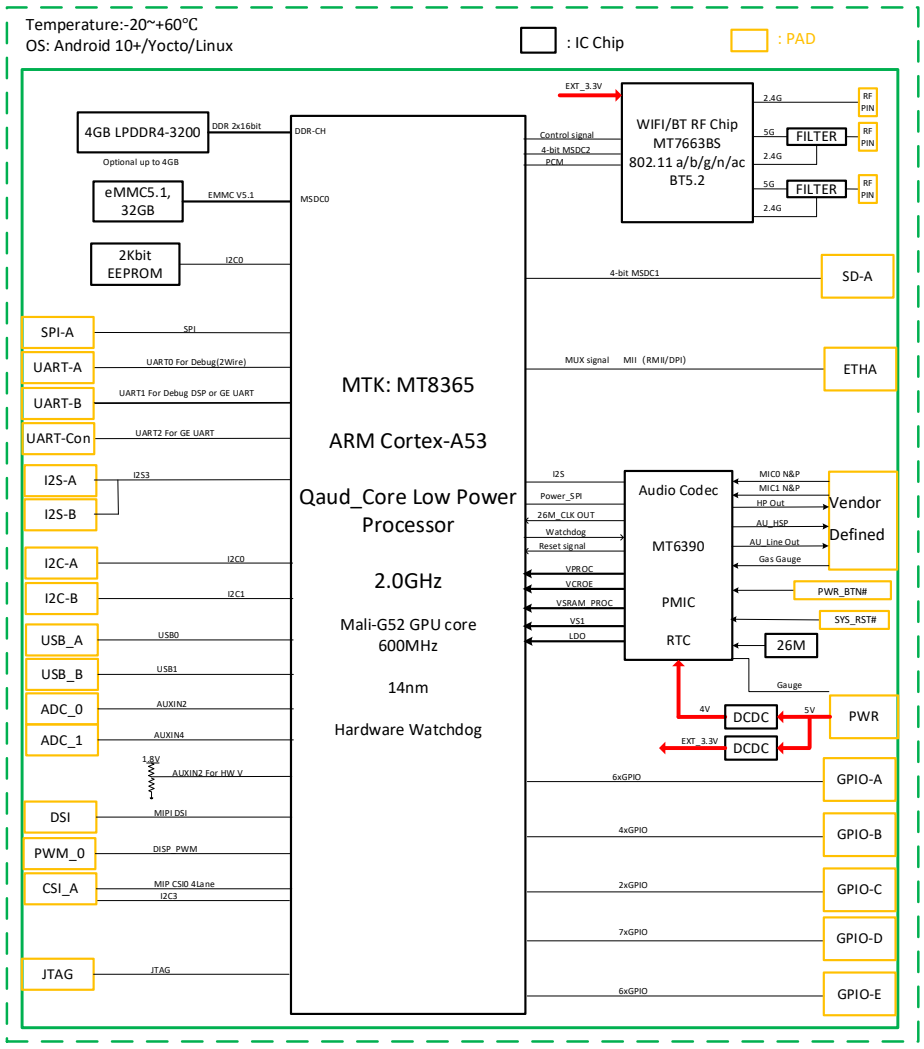
Parameter		Min.	Typ.	Max.	Unit
Voltage of the SOM		2.6	3.7	5.25	V
Voltage of EMCP	eMMC VCC	2.7	3.3	3.6	V
	eMMC VCCQ	1.7	1.8	1.95	V
	LPDDR4 VDD1	1.7	1.8	1.95	V
	LPDDR4 VDD2	1.06	1.1	1.17	V
	LPDDR4 VDDQ	1.06	1.1	1.17	V

(To be continued…)

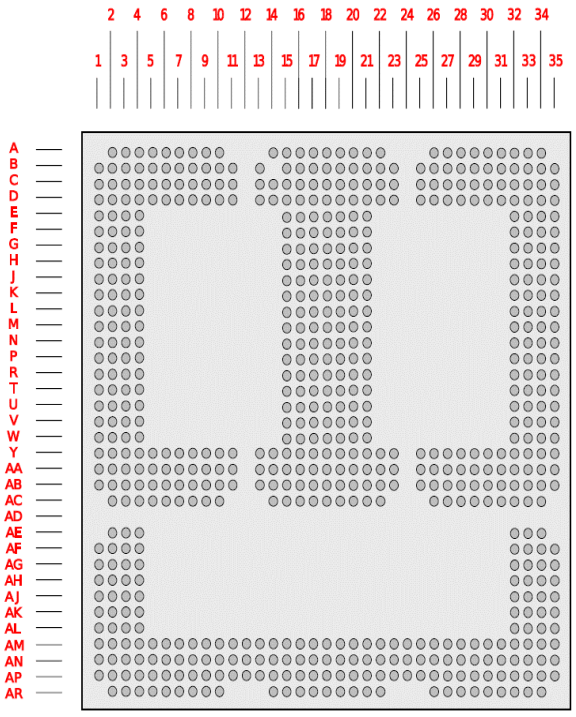
Recommended Operating Conditions (Cont'd)

Parameter		Min.	Typ.	Max.	Unit
Voltage on Wi-Fi/BT chip	AVDD18	1.6	1.8	1.9	V
	AVDD33	NA	3.3	3.63	V
Voltage on CPU	Processor	0.81	0.9	0.99	V
	Processor SRAM	0.65	0.8	1.025	V
	Core	0.8	0.9	1.05	V
	Core logic	0.8	0.9	0.94	V
	DSI/CSI/USB/WBG/PLLGP	0.55	0.8V	0.84	V
	DSI/CSI/USB/WBG/PLLGP/AP	0.81	0.9	0.99	V
	IO/MSDC0/MSDC2	1.14	1.2	1.26	V
	IO/MSDC1/EEPROM	1.7	1.8	1.9	V
	VQPS	1.7	1.8	1.9	V
	EMI0	1.7	1.8	1.9	V
	EMI	1.7	1.8	1.9	V

Block Diagram



Pinout



(View from top, through the module)

Pin	Signal*	CPU Pad Name*	Description
U19, R18, W17, M19	NC		No connection
V17	EXT_EN	DMIC3_CLK	GPIO
T17	FORCE_RECOVERY#	KPCOL0	To enter recovery mode if carrier board is at low level
AA9	PWR_BTN#		Power button input from carrier board. Carrier to float the line in in-active state. Active low, level sensitive. Should be de-bounced on the module
U17	SYSRSTB	SYSRSTB	System reset input, active low
AB18	VCC_BAT		Power input, battery voltage
AA18	VCC_BAT		Power input, battery voltage
Y16, Y20, Y3, C5, AA33, B29	NC		No connection
Y17, Y8, Y9	NC		No connection
Y10, Y11, AE4, AF4, AG4	NC		No connection
Y25, Y26, Y27, Y28	VCC_IN_5V		5V power input
AH3, AH4, AJ3, AJ4, AK4, Y19, U18	NC		No connection
D18, E15, E21, F16, F20, J16	GND		Ground
J20, L18, M16, M20, P18	GND		Ground
R16, R20, V16, V20, Y18	GND		Ground
AA14, AA17, AA19, AA22, AB15, AB21	GND		Ground
A4, A7, A10, B2, B5, B8, B9, C11, D1, D5	GND		Ground
D8, E2, H2, H4, L2, L4, P2, P4, R1, U2	GND		Ground
U4, V1, W3, Y2, AA1, AA4, AA7, AA8, AB3	GND		Ground
AA10, AA11, AB6, AB9, AC4, AC7, AC10	GND		Ground
A26, A29, A32, B27, B28, B30, B33, C25	GND		Ground
C32, C35, D28, D34, F33, F35, G34, H32	GND		Ground
J33, J35, K34, M35, N34, T34, W34, AE2	GND		Ground
AA25, AA26, AA27, AA28, AA32, AB28	GND		Ground
AB31, AB34, AC27, AC30, AC33, AE34	GND		Ground
AG3, AH2, AK3, AL2, AF35, AH34, AJ35	GND		Ground
AL34, AM13, AM16, AM19, AM22, AM35	GND		Ground
AN3, AN6, AN9, AP2, AN11, AN15, AN18	GND		Ground
AN21, AN33, AP5, AP8, AP13, AP16	GND		Ground
AP19, AP22, AP25, AP28, AP31, AP34	GND		Ground
AR14, AR17, AR20, AR26, AR29, AR32	GND		Ground
T18, T19, Y13, Y14, AA13, N2, AA2, J32	NC		No connection
K32, K33, L32, M32, M33, N32, P32, P34	NC		No connection
R32, R33, T32, T33, AB25, AB26, AE32	NC		No connection
AL3, AL4, AM3, AM4, AM5, AM6	NC		No connection
AM7, AM8, AM9, AM10, AM23, AM24	NC		No connection
AM25, AM26, AM27, AM28, AM29	NC		No connection
AM30, AM31, AN2, AN5, AN7, AN8	NC		No connection
AN24, AN25, AN26, AN27, AN28, AN29	NC		No connection

* Signal refers to the pin name used by Vantron.
* CPU Pad Name refers to corresponding pad name on the G350 CPU.

Pin	Signal	CPU Pad Name	Description
AN30, AN31, AP10	NC		No connection
C2	CMMCLK0	CMMCLK0	Camera clock output/GPIO
G3	MAINCAM_PDN	CMDAT1	Camera power down signal output, high active / GPIO
G4	MAINCAM_RST	CMDAT0	Camera interrupt signal input / GPIO
B3	CSI0A_L2N	CSI0A_L2N	Channel input CSI0A lane 2 N
B4	CSI0A_L2P	CSI0A_L2P	Channel input CSI0A lane 2 P
C1	CSI0A_L1N	CSI0A_L1N	Channel input CSI0A lane 1 N
B1	CSI0A_L1P	CSI0A_L1P	Channel input CSI0A lane 1 P
A2	CSI0B_L0N	CSI0B_L0N	Channel input CSI0B lane 0 N
A3	CSI0B_L0P	CSI0B_L0P	Channel input CSI0B lane 0 P
A5	CSI0A_L0N	CSI0A_L0N	Channel input CSI0A lane 0 N
A6	CSI0A_L0P	CSI0A_L0P	Channel input CSI0A lane 0 P
B6	CSI0B_L1N	CSI0B_L1N	Channel input CSI0B lane 1 N
B7	CSI0B_L1P	CSI0B_L1P	Channel input CSI0B lane 1 P
C4	SCL3	SCL3	I2C3 clock
C3	SDA3	SDA3	I2C3 data
F4	LCD_IO_EN_1V8	CMDAT2	GPIO
E18	DISP_PWM	DISP_PWM	MIPI display brightness control through PWM
F3	LCD_IO_EN_3V3	CMDAT3	GPIO
AB8	DSI_CKN	DSI_CKN	MIPI DSI differential clock output -
AB7	DSI_CKP	DSI_CKP	MIPI DSI differential clock output +
AB11	DSI_D0N	DSI_D0N	MIPI DSI differential output -
AB10	DSI_D0P	DSI_D0P	MIPI DSI differential output +
AC9	DSI_D1N	DSI_D1N	MIPI DSI differential output -
AC8	DSI_D1P	DSI_D1P	MIPI DSI differential output +
AC6	DSI_D2N	DSI_D2N	MIPI DSI differential output -
AC5	DSI_D2P	DSI_D2P	MIPI DSI differential output +
AB5	DSI_D3N	DSI_D3N	MIPI DSI differential output -
AB4	DSI_D3P	DSI_D3P	MIPI DSI differential output +
AA3	EXT_WOL	DSI_TE	GPIO
M18	AUXIN2	AUXIN2	Analog-digital converter 0
N18	AUXIN4	AUXIN4	Analog-digital converter 1

Pin	Signal	CPU Pad Name	Description
AC18, P19, C18, P16	NC		No connection
R19	JTRST	JTRST	JTAG reset, active low, suggest not using
N17	JTCK	JTCK	JTAG clock, suggest not using
P17	JTDI	JTDI	JTAG data input, suggest not using
R17	JTDO	JTDO	JTAG data output, suggest not using
N19	JTMS	JTMS	JTAG mode select, suggest not using
B22	SPDIF_IN	I2S_DATA_IN	SPDIF data input
C16	SPDIF_OUT	I2S_LRCK	SPDIF data output
D6	ACCDET		Accessory detection input
D7	HP_EINT		Headphone detection input
Y29	AU_VIN0_N		Microphone channel 0 negative input
Y30	AU_VIN1_N		Microphone channel 1 negative input
Y31	AU_LOLN		Line out negative output
AA29	AU_VIN0_P		Microphone channel 0 positive input
AA30	AU_VIN1_P		Microphone channel 1 positive input
AA31	AU_LOLP		Line out positive output
AK32	FCHR_ENB		Force charging enable
AK33	AU_HPL		Earphone left channel output
AL32	AU_HPR		Earphone right channel output
AL33	AU_REFN		Audio reference ground
AM32	CS_N		Fuel gauge ADC input -
AM33	CS_P		Fuel gauge ADC input +
F18	PWM_C	GPIO18	PWM_C signal output, LED control on EVB
G18, H18, J18, K18, AB17, AC17, AB19, AC19, C14, C13	NC		No connection
A14	URXD1	URXD1	UART1 receive data
B13	UTXD1	UTXD1	UART1 transmit data
D16	NC		No connection
D15	NC		No connection
D14	URXD2	URXD2	UART2 receive data
D13	UTXD2	UTXD2	UART2 transmit data

(To be continued…)

Pin	Signal	CPU Pad Name	Description
A22	NC		No connection
B23	NC		No connection
D22	URXD0	URXD0	UART0 receive data, for debugging (1.8V) / GPIO
D23	UTXD0	UTXD0	UART0 transmit data, for debugging (1.8V) / GPIO
C22, C23, V21	NC		No connection
W21	I2S3_DO	CMDAT7	I2S3 digital audio output
V19	NC		No connection
W19	NC		No connection
W20	I2S3_BCLK	CMDAT4	I2S3 bit clock
W18	I2S3_LRCLK	CMDAT5	I2S3 left-right channel synchronization clock
V18	I2S3_MCLK	CMDAT6	I2S3 Master clock output to I2S codec
AB2, AB1, AC3, AC2, V2, M34	NC		No connection
L34, L35, K35, L33, W2, Y1, W1	NC		No connection
R2, T1, U1, T2	NC		No connection
D11	USB_DM_P0	USB_DM_P0	USB differential data pairs for port A
D10	USB_DP_P0	USB_DP_P0	USB differential data pairs for port A
C10	USB_DRVVBUS	GPIO16	GPIO
D9	IDDIG	GPIO17	USB OTG device detection
C8	USB_OC_P0	TDM_TX_DATA3	USB over-current for port A
C9	USB_VBUS	USB_VBUS_P0	USB power detection for port A
B11, B10, A9, A8	NC		No connection
D26	USB_DM_P1	USB_DM_P1	USB differential data pairs for port B
D25	USB_DP_P1	USB_DP_P1	USB differential data pairs for port B
C26	DRV_VBUS_P1	DMIC3_DAT0	GPIO
C28	USB_OC_P1	TDM_TX_DATA2	USB over current signal input for port B
D27, B26, B25,	NC		No connection
A28, A27, C27	NC		No connection

Pin	Signal	CPU Pad Name	Description
AA15	SCL2	SCL2	I2C2 clock signal / GPIO
AA16	SDA2	SDA2	I2C2 data signal / GPIO
AA20	SCL1	SCL1	I2C1 clock signal / GPIO
AA21	SDA1	SDA1	I2C1 data signal / GPIO
AB13, AC14, AC16	NC		No connection
AB14, AC15, AB16	NC		No connection
AB23, AC22, AC20	NC		No connection
AB22, AC21, AB20	NC		No connection
J21	MSDC1_INSI	NREB	SD card detection
F21	MSDC1_CLK	MSDC1_CLK	SDIO clock
E20	MSDC1_CMD	MSDC1_CMD	SDIO command/response
G20	MSDC1_DAT0	MSDC1_DAT0	SDIO data line, push-pull
G21	MSDC1_DAT1	MSDC1_DAT1	SDIO data line, push-pull
H20	MSDC1_DAT2	MSDC1_DAT2	SDIO data line, push-pull
H21	MSDC1_DAT3	MSDC1_DAT3	SDIO data line, push-pull
C20	VMC_PMU		SDIO 1 voltage
D21	NC		No connection
D20	NC		No connection
T21	NC		No connection
K20	NC		No connection
K21	NC		No connection
L20	NC		No connection
L21	NC		No connection
M21	NC		No connection
N20	NC		No connection
T20	VIO18_PMU		SDIO 2 voltage
N21, P20, P21	NC		No connection
R21, U21, U20	NC		No connection

(To be continued…)

Pin	Signal	CPU Pad Name	Description
D17	CMDAT8	CMDAT8	GPIO
E17	GPIO129	DMIC1_CLK	GPIO
F17	EINT_G	NRNB	GPIO
G17	GPIOO2	NCEB1	GPIO
H17	GPIO_SPK2_EN	KPCOL1	GPIO
J17	LCM_RST	LCM_RST	GPIO
D19	GPIO_SPK1_EN	KPROW0	GPIO
E19	GPIO122	DMIC1_DAT1	GPIO
F19	GPIOO1	NCLE	GPIO
G19	GPIOO3	NCEB0	GPIO
H19	NC		No connection
J19	NC		No connection
K19	NC		No connection
L19	NC		No connection
D3	ENIT_CTP_INT	CMHSYNC	GPIO
D4	NC		No connection
E3	GPIO_CTP_RST	CMVSYNC	GPIO
E4	NC		No connection
U32	TDM_TX_BCK	TDM_TX_BCK	GPIO
U33	TDM_TX_LRCK	TDM_TX_LRCK	GPIO
V32	TDM_TX_MCK	TDM_TX_MCK	GPIO
V33	TDM_TX_DATA0	TDM_TX_DATA0	GPIO
W32	DMIC0_CLK	DMIC0_CLK	GPIO
W33	DMIC0_DAT0	DMIC0_DAT0	GPIO

Pin	Signal	CPU Pad Name	Description
Y32	DMIC0_DAT1	DMIC0_DAT1	GPIO
AF32	LAN_RESET#	TDM_TX_DATA1	GPIO
AF33	CHG_NPG	DMIC1_DAT0	GPIO
AG32	LCM_ENP	I2S_BCK	GPIO
AG33	GPIO_CHG_OTG	DMIC2_CLK	GPIO
AH32	GPIO_CHG_PSEL	DMIC2_DAT0	GPIO
AH33	GPIO_CHG_EN	DMIC2_DAT1	GPIO
AJ32	NC		No connection
AJ33	NC		No connection
W15	NC		No connection
W16	NC		No connection
Y15	SPI_CS	SPI_CS	CONN_TEST_CK/SPI A master chip select 0
K17, AA23, L17	NC		No connection
U16	SPI_CK	SPI_CK	SPI A serial data clock
U15	SPI_MI	SPI_MI	SPI A serial data input
V15	SPI_MO	SPI_MO	SPI A serial data output
Y21, Y22, Y23, C30	NC		No connection
Y33, D29, C29, D30	NC		No connection
F15	EXT_COL	GPIO13	Port A collision detection (half speed only)
E16	CRS_DV	GPIO7	Port A carrier sensing
R15	EXT_RXC	GPIO6	Port A receive clock
M15	RXDV	GPIO7	Port A receive data validation

(To be continued…)

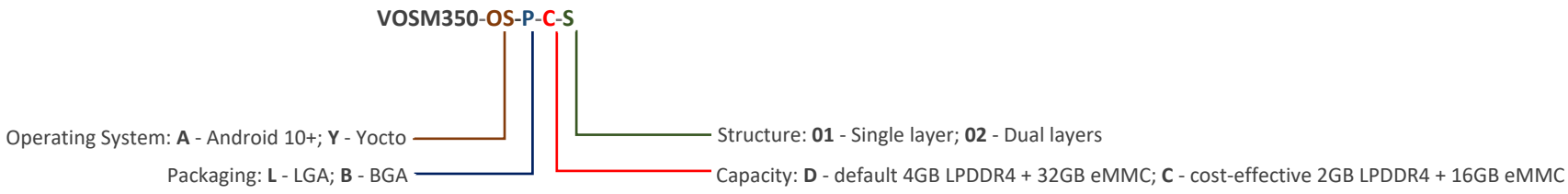
Pin	Signal	CPU Pad Name	Description
L16	EXT_RXER	GPIO5	Port A receive error signal
N15	EXT_RXD2	GPIO10	Port A received data bit 2
P15	EXT_RXD3	GPIO11	Port A received data bit 3
J15	EXT_TXC	GPIO4	Port A transmit clock
K16	EXT_TXEN	GPIO12	Port A transmit enable (Error)
K15	EXT_RXD0	GPIO8	Port A received data bit 0 (receive first)
L15	EXT_RXD1	GPIO9	Port A received data bit 1
H15	EXT_TXD0	GPIO0	Port A transmit data bit 0 (transmit first)
G15	EXT_TXD1	GPIO1	Port A transmit data bit 1
H16	EXT_TXD2	GPIO2	Port A transmit data bit 2
G16	EXT_TXD3	GPIO3	Port A transmit data bit 3
N16, E1, D2, P1, L1, K2, M1, N1, H1	NC		No connection
J2, J1, K1, G1, F1, G2, F2, C6, C7, M2	NC		No connection

Pin	Signal	CPU Pad Name	Description
M17	VIO18_PMU		1.8V IO power for all Ethernet interfaces
T16	EXT_MDC	GPIO15	Management bus clock signal for Ethernet
T15	EXT_MDIO	GPIO14	Management bus data signal for Ethernet
AR18	WIFI0_ANT		Wi-Fi antenna
AR19, AR22, AP17, AP18, AP20, AP21	GND		Module signal, power return, and GND reference
AR21	BT_ANT		BT antenna
AP26, AP27, AP29, AP30, AP14	NC		No connection
AR16	WIFI1_ANT		Wi-Fi antenna
AR15, AP15	GND		Ground
AB35, AC34, W35, T35, U34, R35, P35, N35, V34, V35, U35	NC		No connection

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

Ordering Information

Nomenclature



Example Ordering No.	Operating system	Packaging	Memory	Storage	Structure
VOSM350-ALD01	Android 10+	LGA	4GB LPDDR4	32GB eMMC	Single layer
VOSM350-YBD02	Yocto	BGA	4GB LPDDR4	32GB eMMC	Dual layers
VOSM350-ABC01	Android 10+	BGA	2GB LPDDR4	16GB eMMC	Single layer
VOSM350-YLD02	Yocto	LGA	4GB LPDDR4	32GB eMMC	Dual layers

Packing list	
VOSM350 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 intelligent edge hardware including SOMs, motherboards, and embedded industrial computers, Vantron has provided users with diverse embedded solutions featuring ARM and X86 architectures. Its offerings range from Linux, Android to Windows, from embedded level to desktop level, and from gateways to servers. In addition, it provides services such system trimming, driver transplantation and more to cater to the unique needs of its users.