Industrial Core Boards Specification

Model:SOM-V2L-OSM

REVISION HISTORY					
Version	**Date**	**Board ID**	**Page**	**Descriptive**	
V1.0	2026/3/12	RRZ220413_V1.0	20	Initial version	

CONTENTS

1. Product Introduction 1
2. Product Pictures 1
3. Hardware Block Diagram 2
4. Hardware Parameters 2
5. Software Parameter 4
6. Development Information 5
7. Electrical Characteristics 5
    7.1 Working Environment 5
    7.2 Power Consumption Parameters 5
8. Mechanical Dimensions 6
9. Core Board Pin Definitions 7
10. Precautions For Use 17

1. Product Introduction

The SOM-V2L-OSM is based on Renesas' low-power, powerful and efficient RZ/V2L SoC. Equipped with a 64-bit dual-core ARM Cortex-A55 processor at up to 1.2GHz, as well as an ARM Cortex-M33 real-time kernel, and an integrated high-performance image-processing Mail-G31 GPU, the SOM-V2L-OSM is ideal for applications such as industrial control, data gateway and edge computing. industrial control, human-computer interaction, data gateway, edge computing and other application scenarios.

- 64-bit dual-core ARM Cortex-A55 processor up to 1.2GHz with ARM Cortex-M33 real-time core
- Integrated high-performance image processing Mail-G31 GPU
- References OSM-L standard pinout IO, LGA package, 45 x 45 mm size saves more valuable space
- 2GB RAM, 16GB eMMC flash memory
- Support MIPI-DSI output interface, dual Gigabit network interface
- Provides other interfaces such as I2C UART SPI SDIO3.0 USB2.0 PWM I2S, etc.
- Support Linux Yocto system, stable and reliable performance.
- Industrial standard design, 7X24 hours long time stable operation.

Note: This core board references OSM-L standard IOs, LGA package, but some IOs are different from OSM standard.

2. Product Pictures

The following images are for reference only：

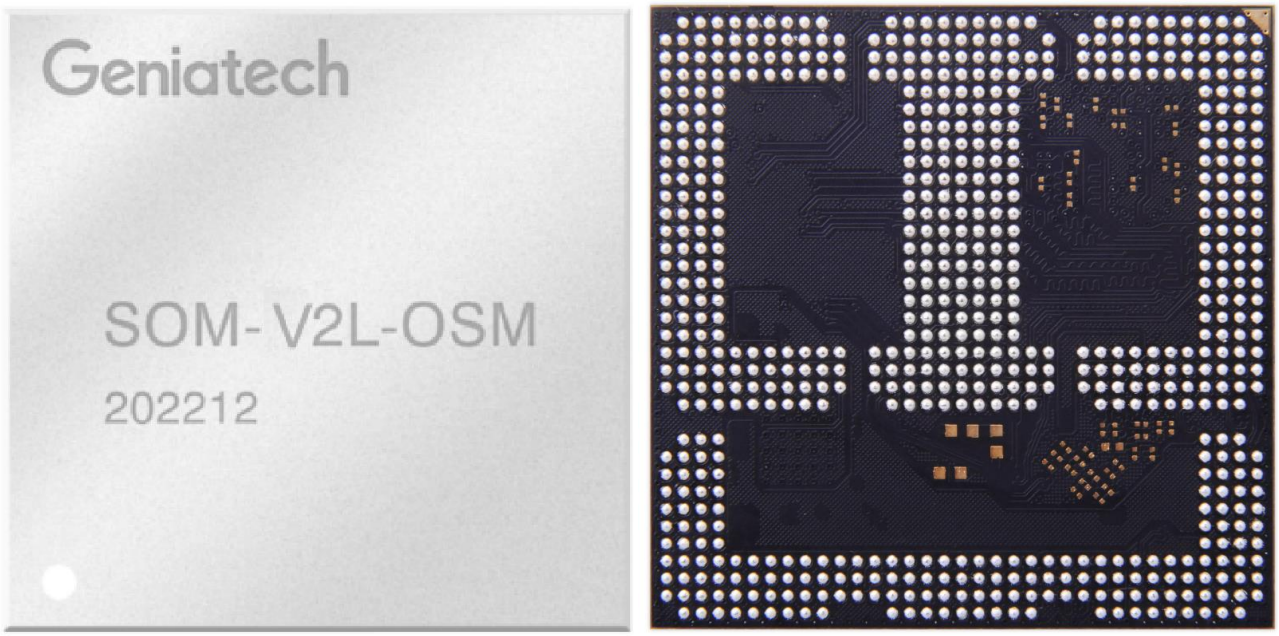

Figure 1 Core board front and back view

3. Hardware Block Diagram

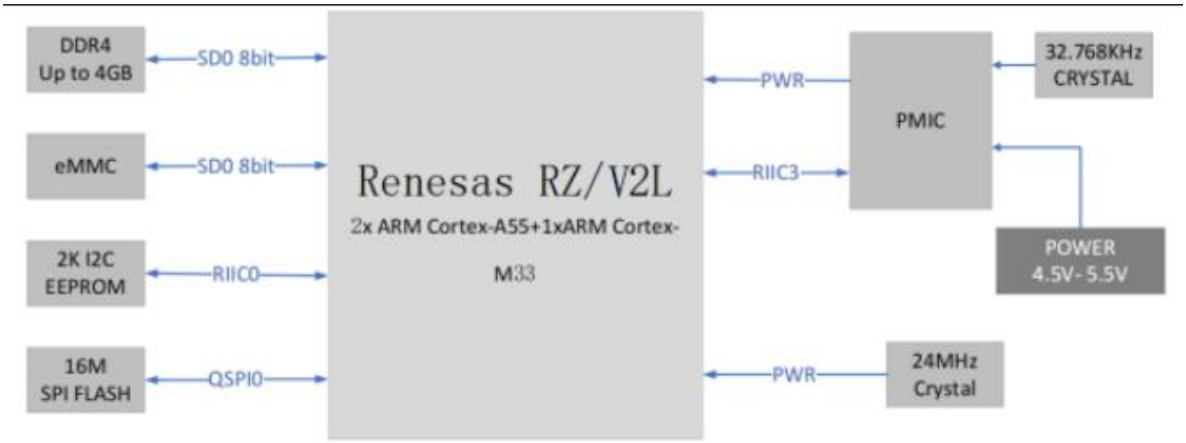

Figure 2 Core board hardware block diagram

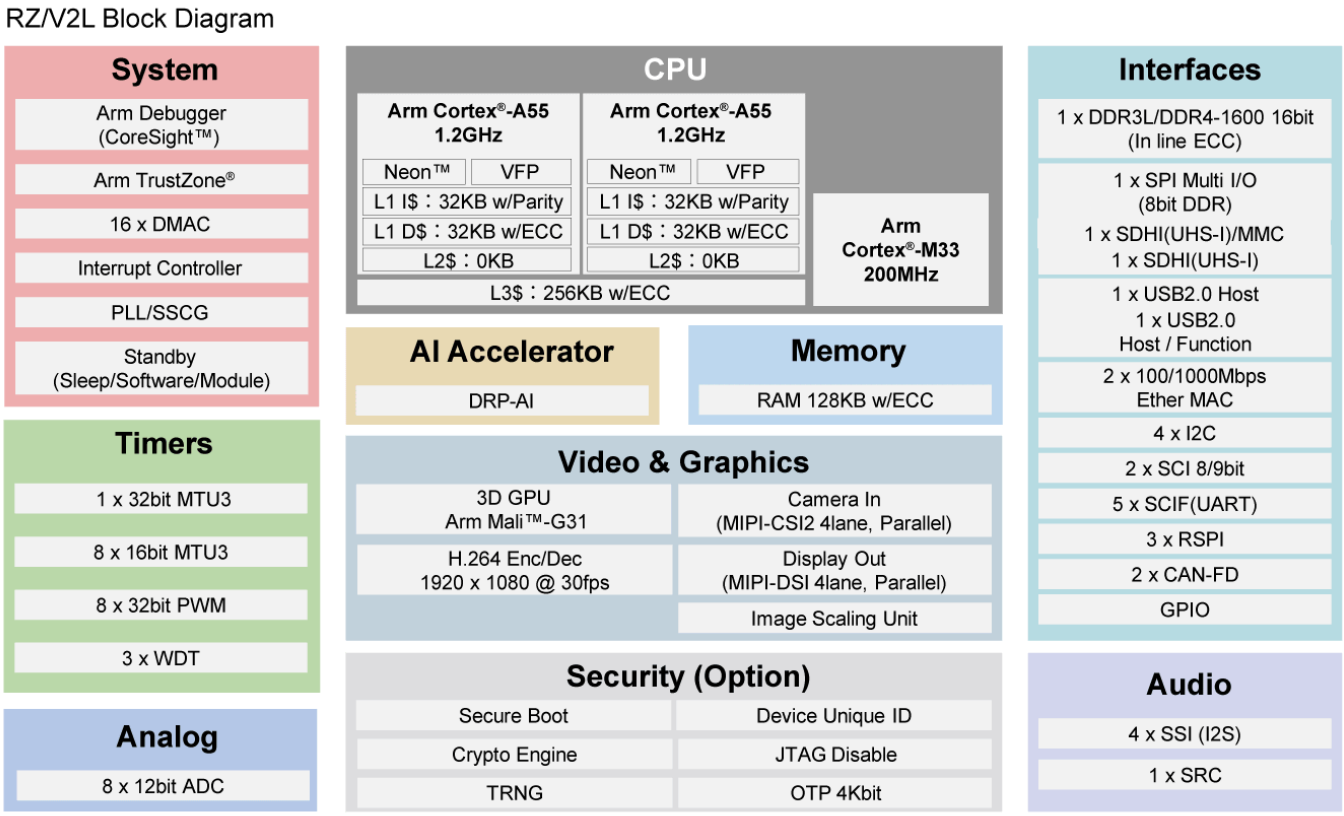

Figure 3 RZ/V2L processor architecture diagram

4. Hardware Parameters

Processor	Chip model	Renesas RZ/V2L

		CPU	Dual-Core ARM Cortex-A55+ARM Cotex-M33
		GPU	Mali-G31 GPU OpenGL ES1.1 / 2.0 / 3.0 / 3.1 and 3.2
Audio and Video Coding and Decoding		Video Codec	H.264 codec module H.264 / AVC (High Profile / Main Profile / Baseline Profile) H.264 / MVC (Stereo High Profile) Maximum pixel rate: 1920 × 1080 × 30 fps Color farmat(Coded input)：supports YcbCr 4:2:0 semi-planar Color farmat(Coded output)：supports YcbCr 4:2:0 semi-planar
		Audio Codec	Dual channel serial transmission Supports I2S/Mono/TDM audio formats Multi channel formats Supports 8, 16, 18, 20, 22, 24 and 32-bit data formats Supports transmission and reception of 32-level FIFOs Supports LR clock signaling, continuous LR clock signaling
		Image Scaling Unit	Scaling down function with bilinear interpolation Input image size (maximum): 5M (2800 × 2047) Output image size (maximum): Full HD (1920 × 1080) Support Color format conversion RGB / ARGB / YcbCr422 / YcbCr420 / RAW (Grayscale)
Storage		RAM	2GB
		ROM	16GB（optional 8G/32G）eMMC
Hardware Source	MIPI CSI	1	Provides a 4-lane MIPI camera serial interface, supports up to 1.5Gbps per lane, Support 5MP, 30 fps (RAW12)
	MIPI DSI	1	Provides 1 4-lane MIPI display serial interface, supporting up to 1.5 Gbps per lane; supports up to resolution is 1920 x 1080@60fps(RGB888);
	USB HOST	1	Compliance with USB2.0（supports up to 480 Mbps）;
	USB OTG	1	Compliance with USB2.0（supports up to 480 Mbps）; Supports On-The-Go (OTG) Function
	DVP	1	Supports WXGA((1280 × 800)60 fps Support Output Data Format: RGB666 / RGB888 CLK / HD / VD timing signal supported
	Ethernet	2	Includes 1x ENET, 1x ENET_QOS network port; Supports RMII/RGMII interfaces, where RMII supports 1.8V/3.3V levels and RGMII supports 1.8V/3.3V Power Levels; Supports 10/100/1000Mbps network port configuration; Supports network adaption;
	SD	2	Supports 1-bit / 4-bit SD bus Channel 0 supports SDHI / e-MMC (boot supported) Channel 1 supports SDHI Compliant with SD 3.0 Supports default, high-speed, UHS-I/SDR50, SDR104 transfer modes supported
	CAN FD	2	Compliant with CAN-FD ISO 11898-1 (CD2014) with transmission speeds up to 4Mbps

	SPI	1	Supports master and slave modes Programmable bit length, clock polarity, clock phase selectable Maximum transmission rate is: 50 Mbps
	UART	4	The maximum supported baud rate is 5Mbps; Supports hardware or software flow control;
	I2C	3	Supports master and slave modes, multi-host operation, and timeout detection Supports 7bit and 10bit slave address formats; Note: The core board's onboard EEPROM has used I2C0 at address 0x50.
	PWM	1	Has a 16-bit time base counter; Supports up to 66MHz operating frequency;
	Watchdog	3	Watchdog Timer; Supports time setting range of 0.5~128s; The time resolution is 0.5s
	Audio	1	Supports I2S, Mono, and TDM modes;
	QSPI	1	Maximum Clock Frequency: 50 MHz (Quad-SPI DDR), 66 MHz (Quad SPI SDR),100 MHz (Octal-SPI, HyperFlash)
	ADC	2	Resolution is: 12-bit Input voltage: 0V~1.8V Conversion time: 1us Operation mode: single scan/continuous scan A/D conversion start condition: - Software trigger - Asynchronous trigger (support external trigger) - Synchronous trigger The timers are issued (MTU and PWM timers.);
	JTAG	1	Supports JTAG debugging interface
Package		LGA package，OSM 1.1 standard，662Pin	
Size		45mm × 45mm	
Power supply		DC input voltage 5V	

Note: Some of the pin resources have a multiplexing relationship

5. Software Parameter

Kernel	4.19	
Uboot	2020.10	
File system	Yocto	
Driver support	eMMC	DDR4
	MMC/SD	LED
	KEY	USB WIFI/4G/Mouse
	UART/RS232/RS485	I2C
	CAN-FD	MIPI CAMERA
	MIPI LCD	Ethernet

	LINE IN/OUT	Touch Screen
	RTC	

6. Development Information

- Provide core board pin definition, core board 3D graphic files, editable base board schematic, editable base board PCB, chip Datasheet, shorten the hardware design cycle.
- Provides file system images, kernel driver source code, and a wealth of demo programs
- Provides complete platform development kits, getting started tutorials to save time on software organization and make application development easier.

7. Electrical Characteristics

7.1 Working Environment

Environmental parameters	Minimum	Typical	Maximum
Operating temperature	-40°C	/	85°C
Storage temperature	-50°C	/	90°C
Operating humidity	35%（no condensation）	/	75%（no condensation）
Storage humidity	35%（no condensation）	/	75%（no condensation）
Operating voltage	/	5.0V	/

7.2 Power Consumption Parameters

Operating state	Voltage Typical	Current Typical	Power Consumption Typical
Free state	5.0V	0.24A	1.24W
Fully loaded state	5.0V	0.482A	2.41W

Note: Power consumption is measured based on the evaluation board. The test data is related to specific application scenarios and is for reference only.

Free state: the system starts up, the evaluation board is not connected to other external modules, and the program is not executed.

Fully loaded state: the system is booted, the evaluation board is not connected to other external modules, and the DDR pressure read/write test program is running, the resource utilization of the two ARM Cortex-A53 cores is about 100%.

8. Mechanical Dimensions

The main hardware-related parameters of the core board are shown below for reference only.

PCB Size	45mm*45mm
PCB Layers	10 层
PCB Board Thickness	1.2mm
Maximum component height	2.8mm
Weights	15.0g

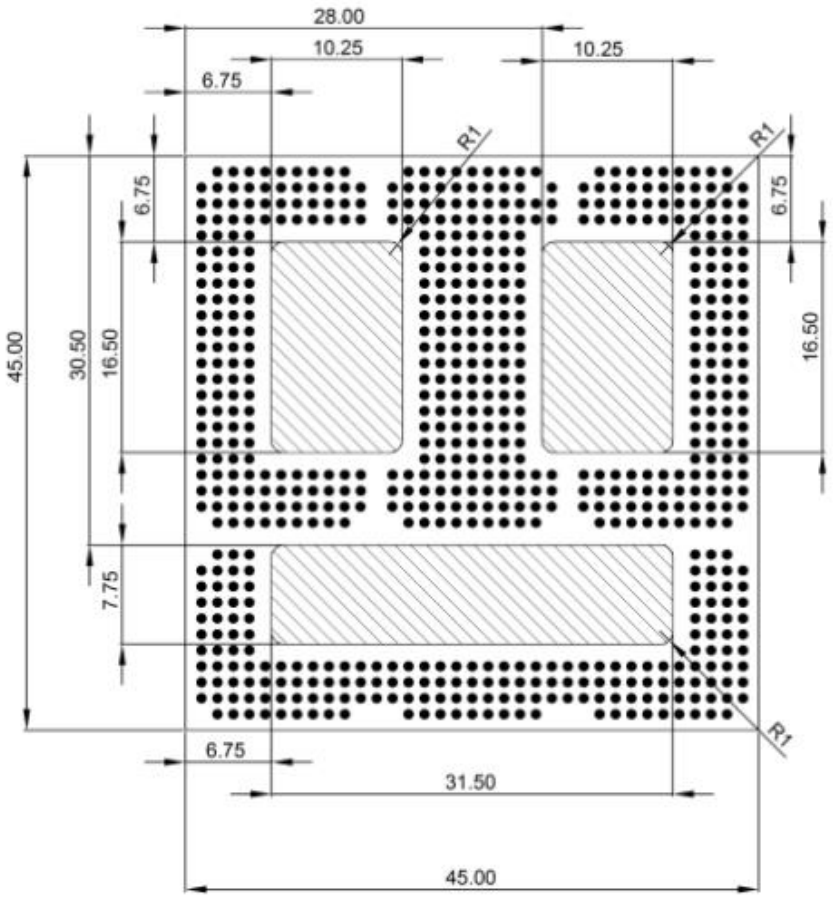

Figure 4 Core board mechanical dimensions

Maximum component height: the height difference between the highest component level of the core board and the level of the PCB front side. The highest component of the core board is the shield cover.

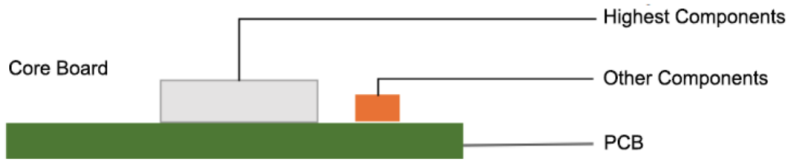

Figure 5 Schematic diagram of the highest devices on the core board

9. Core Board Pin Definitions

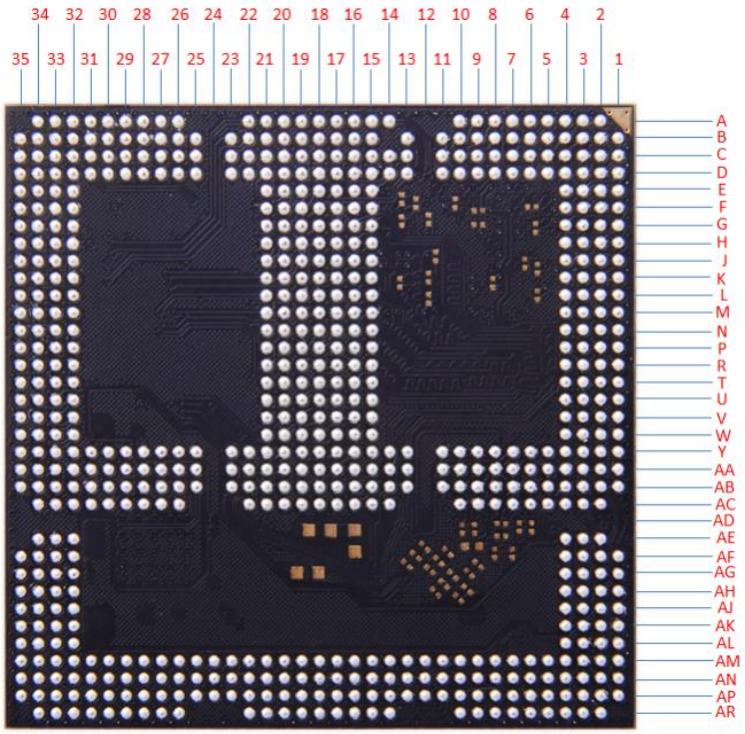

Figure 6 Core board Pin definition diagram

Note: Please refer to the pin table and the core board hardware manual for more detailed pin descriptions.

Pin No.	Default Function	Pin No.	Default Function
A2	CSI_DATA1_N	A3	CSI_DATA1_P
A4	GND	A5	CSI_DATA2_N
A6	CSI_DATA2_P	A7	GND
A8	NC	A9	NC
A10	GND	A14	SCIF1_RXD
A15	NC	A16	NC
A17	NC	A18	NC
A19	NC	A20	NC
A21	NC	A22	NC
A26	GND	A27	NC

A28	NC	A29	GND
A30	NC	A31	NC
A32	GND	A33	NC
A34	NC	B1	CSI_DATA0_P
B2	GND	B3	CSI_CLKN
B4	CSI_CLKP	B5	GND
B6	CSI_DATA3_N	B7	CSI_DATA3_P
B8	GND	B9	GND
B10	NC	B11	NC
B13	SCIF1_TXD	B15	NC
B16	NC	B17	NC
B18	NC	B19	NC
B20	NC	B21	NC
B22	NC	B23	NC
B25	NC	B26	NC
B27	GND	B28	GND
B29	VREF_DDR	B30	GND
B31	NC	B32	NC
B33	GND	B34	NC
B35	NC	C1	CSI_DATA0_N
C2	CAM_MCLK	C3	RIIC_SDA
C4	RIIC0_SCL	C5	VREF_DDR
C6	ET1_MDC	C7	ET1_MDIO
C8	NC	C9	NC
C10	NC	C11	GND
C13	SCIF1_RTS	C14	SCIF1_CTS
C15	NC	C16	NC
C17	NC	C18	NC
C19	NC	C20	VDD_SD1_M
C21	NC	C22	NC
C23	NC	C25	GND
C26	NC	C27	NC
C28	NC	C29	NC
C30	NC	C31	NC
C32	GND	C33	NC
C34	NC	C35	GND

D1	GND	D2	NC
D3	RZ_P7_2	D4	RZ_P8_0
D5	GND	D6	NC
D7	NC	D8	GND
D9	NC	D10	NC
D11	NC	D13	SCIF2_TXD
D14	SCIF2_RXD	D15	SCIF2_RTS
D16	SCIF2_CTS	D17	RZ_P46_2
D18	GND	D19	RZ_P42_4
D20	SD1_WP	D21	SD1_PWER_EN
D22	SCIF0_RXD	D23	SCIF0_TXD
D25	NC	D26	NC
D27	NC	D28	GND
D29	NC	D30	NC
D31	NC	D32	NC
D33	NC	D34	GND
D35	NC	E1	NC
E2	GND	E3	RZ_P11_0
E4	RZ_P11_1	E15	GND
E16	NC	E17	RZ_P46_3
E18	PWM_0(RZ_P0_0)	E19	RZ_P43_0
E20	SD1_CMD	E21	GND
E32	NC	E33	NC
E34	NC	E35	NC
F1	ET1_TXD1	F2	ET1_TXD3
F3	RZ_P14_1(DISP_DATA16)	F4	RZ_P15_0(DISP_DATA17)
F15	NC	F16	GND
F17	RZ_P1_0	F18	RZ_P0_1
F19	RZ_P43_1	F20	GND
F21	SD1_CLK	F32	NC
F33	GND	F34	NC
F35	GND	G1	ET1_TXD0
G2	ET1_TXD2	G3	RZ_P4_1
G4	RZ_P40_2	G15	ET0_TXD1
G16	ETO_TXD3	G17	RZ_P1_1
G18	NC	G19	RZ_P43_2

G20	SD1_DATA0	G21	SD1_DATA1
G32	NC	G33	NC
G34	GND	G35	NC
H1	ET1_TXC	H2	GND
H3	NC	H4	GND
H15	ET0_TXD0	H16	ET0_TXD2
H17	RZ_P2_0	H18	NC
H19	RZ_P43_3	H20	SD1_DATA2
H21	SD1_DATA3	H32	GND
H33	NC	H34	NC
H35	NC	J1	ET1_RXD0
J2	ET1_TX_CTL	J3	DISP_nRST(RGB_RESET)
J4	DISP_DE(RGB_DE)	J15	ET0_TXC
J16	GND	J17	RZ_P2_1
J18	NC	J19	RZ_P47_0
J20	GND	J21	SD1_CD
J32	NC	J33	GND
J34	NC	J35	GND
K1	ET1_RXD1	K2	ET1_RX_ERR
K3	DISP_HSYNC(RGB_HSYNC)	K4	DISP_PWREN(RGB_DISP)
K15	ET0_RXD0	K16	ET0_TX_CTL
K17	RZ_P42_2	K18	NC
K19	RZ_P47_1	K20	NC
K21	NC	K32	NC
K33	NC	K34	GND
K35	NC	L1	ET1_RX_CTL
L2	GND	L3	DISP_VSYNC(RGB_VSYNC)
L4	GND	L15	ET0_RXD1
L16	ET0_RX_ERR	L17	RZ_P42_3
L18	GND	L19	RZ_P47_2
L20	NC	L21	NC
L32	NC	L33	NC
L34	NC	L35	NC
M1	ET1_RXD2	M2	NC
M3	DISP_DATA23(P17_2)--(RGB_B5)	M4	DISP_CLK(RGB_CLK)
M15	ET0_RX_CTL	M16	GND

M17	ETHER_IO_VDD	M18	ADC_CH0
M19	D1.8V_M	M20	GND
M21	NC	M32	NC
M33	NC	M34	NC
M35	GND	N1	ET1_RXD3
N2	NC	N3	DISP_DATA21(P17_0)--(RGB_B3)
N4	DISP_DATA22(P17_1)--(RGB_B4)	N15	ET0_RXD2
N16	NC	N17	TCK_SWDCLK(JTAG_TCK_SWCLK)
N18	ADC_CH1	N19	TMS_SWDIO(JTAG_TMS_SWDIO)
N20	NC	N21	NC
N32	NC	N33	NC
N34	GND	N35	NC
P1	ET1_RXC	P2	GND
P3	DISP_DATA20(P16_1)--(RGB_B2)	P4	GND
P15	ET0_RXD3	P16	NC
P17	TDI(JTAG_TDI)	P18	GND
P19	NC	P20	NC
P21	NC	P32	NC
P33	NC	P34	NC
P35	NC	R1	GND
R2	NC	R3	DISP_DATA19(P16_0)--(RGB_B1)
R4	DISP_DATA18(P15_1)--(RGB_B0)	R15	ET0_RXC
R16	GND	R17	TDO_SWO(JTAG_TDO_SWO)
R18	NC	R19	TRST_N(JTAG_nTRST)
R20	GND	R21	NC
R32	NC	R33	NC
R34	NC	R35	NC
T1	NC	T2	NC
T3	DISP_DATA14(P13_2)--(RGB_G4)	T4	DISP_DATA15(P14_0)--(RGB_G5)
T15	ET0_MDIO	T16	ET0_MDC
T17	FORCE_nRECOVERY	T18	NC
T19	NC	T20	NC
T21	NC	T32	NC
T33	NC	T34	GND
T35	NC	U1	NC
U2	GND	U3	DISP_DATA13(P13_1)--(RGB_G3)

U4	GND	U15	QSPI1_IO0
U16	QSPI1_SPCLK	U17	SYS_RESET
U18	D1.8V/3.3V_M	U19	NC
U20	NC	U21	NC
U32	NC	U33	NC
U34	NC	U35	NC
V1	GND	V2	NC
V3	DISP_DATA11(P12_1)--(RGB_G1)	V4	DISP_DATA12(P13_0)--(RGB_G2)
V15	QSPI1_IO1	V16	GND
V17	PMIC_EXT_EN	V18	I2S_MCLK
V19	NC	V20	GND
V21	I2S0_SDIN	V32	NC
V33	NC	V34	NC
V35	NC	W1	NC
W2	NC	W3	GND
W4	DISP_DATA10(P12_0)--(RGB_G0)	W15	QSPI1_IO3
W16	QSPI1_IO2	W17	VBAT_RTC_3V3
W18	I2S0_LRCK	W19	NC
W20	I2S0_BCK	W21	I2S0_SDOUT
W32	NC	W33	NC
W34	GND	W35	NC
Y1	NC	Y2	GND
Y3	D3.3V_M	Y4	DISP_DATA7(P10_1)--(RGB_R5)
Y5	DISP_DATA6(P10_0)(RGB_R4)	Y6	DISP_DATA4(P9_0)--(RGB_R2)
Y7	DISP_DATA2(P8_1)--(RGB_R0)	Y8	VCC5V0_SYS
Y9	VCC5V0_SYS	Y10	VCC5V0_SYS
Y11	VCC5V0_SYS	Y13	NC
Y14	NC	Y15	QSPI1_SSL
Y16	D1.2V_M	Y17	VCC5V0_SYS
Y18	GND	Y19	NC
Y20	D1.1V_M	Y21	RSPI1_CK
Y22	RSPI1_MISO	Y23	RSPI1_MOSI
Y25	VCC5V0_SYS	Y26	VCC5V0_SYS
Y27	VCC5V0_SYS	Y28	VCC5V0_SYS
Y29	NC	Y30	NC
Y31	NC	Y32	NC

Y33	NC	Y34	NC
Y35	NC	AA1	GND
AA2	NC	AA3	NC
AA4	GND	AA5	DISP_DATA5(P9_1)--(RGB_R3)
AA6	DISP_DATA3(P8_2)--(RGB_R1)	AA7	GND
AA8	GND	AA9	PMIC_PWRON
AA10	GND	AA11	GND
AA13	NC	AA14	GND
AA15	RIIC1_SCL	AA16	RIIC1_SDA
AA17	GND	AA18	NC
AA19	GND	AA20	RIIC2_SCL(P3_0)
AA21	RIIC2_SDA(P3_1)	AA22	GND
AA23	RSPI1_SSL	AA25	GND
AA26	GND	AA27	GND
AA28	GND	AA29	NC
AA30	NC	AA31	NC
AA32	GND	AA33	VDD_SD0_M
AA34	NC	AA35	NC
AB1	NC	AB2	NC
AB3	GND	AB4	DSI_DATA3_P
AB5	DSI_DATA3_N	AB6	GND
AB7	DSI_CLKP	AB8	DSI_CLKN
AB9	GNE	AB10	DSI_DATA0_P
AB11	DSI_DATA0_N	AB13	USB0_DM
AB14	USB0_OTG_ID	AB15	GND
AB16	USB_A_VBUS	AB17	CAN0_RX(RZ_P46_1)
AB18	NC	AB19	NC
AB20	NC	AB21	GND
AB22	NC	AB23	USB1_DM
AB25	NC	AB26	NC
AB27	NC	AB28	GND
AB29	NC	AB30	NC
AB31	GND	AB32	NC
AB33	NC	AB34	GND
AB35	NC	AC2	NC
AC3	NC	AC4	GND

AC5	DSI_DATA2_P	AC6	DSI_DATA2_N
AC7	GND	AC8	DSI_DATA1_P
AC9	DSI_DATA1_N	AC10	GND
AC14	USB0_DP	AC15	USB0_OVRCUR_N
AC16	USB0_VBUSEN	AC17	CAN0_TX(RZ_46_0)
AC18	DEBUG_EN	AC19	NC
AC20	USB1_VBUSEN	AC21	USB1_OVRCUR_N
AC22	USB1_DP	AC26	NC
AC27	GND	AC28	NC
AC29	NC	AC30	GND
AC31	NC	AC32	NC
AC33	GND	AC34	NC
AE2	GND	AE3	NC
AE4	VCC5V0_SYS	AE32	NC
AE33	NC	AE34	GND
AF1	NC	AF2	NC
AF3	NC	AF4	VCC5V0_SYS
AF32	NC	AF33	NC
AF34	NC	AF35	GND
AG1	NC	AG2	NC
AG3	GND	AG4	VCC5V0_SYS
AG32	NC	AG33	NC
AG34	NC	AG35	NC
AH1	NC	AH2	GND
AH3	VCC5V0_SYS	AH4	VCC5V0_SYS
AH32	NC	AH33	NC
AH34	GND	AH35	NC
AJ1	NC	AJ2	NC
AJ3	VCC5V0_SYS	AJ4	VCC5V0_SYS
AJ32	NC	AJ33	NC
AJ34	NC	AJ35	GND
AK1	NC	AK2	NC
AK3	GND	AK4	VCC5V0_SYS
AK32	NC	AK33	NC
AK34	NC	AK35	NC
AL1	NC	AL2	GND

AL3	NC	AL4	NC
AL32	NC	AL33	NC
AL34	GND	AL35	NC
AM1	NC	AM2	NC
AM3	NC	AM4	NC
AM5	NC	AM6	NC
AM7	NC	AM8	NC
AM9	NC	AM10	NC
AM11	NC	AM12	NC
AM13	GND	AM14	NC
AM15	NC	AM16	GND
AM17	NC	AM18	NC
AM19	GND	AM20	NC
AM21	NC	AM22	GND
AM23	NC	AM24	NC
AM25	NC	AM26	NC
AM27	NC	AM28	NC
AM29	NC	AM30	NC
AM31	NC	AM32	NC
AM33	NC	AM34	NC
AM35	GND		
AN1	NC	AN2	NC
AN3	GND	AN4	NC
AN5	NC	AN6	GND
AN7	NC	AN8	NC
AN9	GND	AN10	NC
AN11	GND	AN12	NC
AN13	NC	AN14	NC
AN15	GND	AN16	NC
AN17	NC	AN18	GND
AN19	NC	AN20	NC
AN21	GND	AN22	NC
AN23	NC	AN24	NC
AN25	NC	AN26	NC
AN27	NC	AN28	NC
AN29	NC	AN30	NC

AN31	NC	AN32	NC
AN33	GND	AN34	NC
AN35	NC		
AP1	NC	AP2	GND
AP3	NC	AP4	NC
AP5	GND	AP6	NC
AP7	NC	AP8	GND
AP9	NC	AP10	NC
AP11	NC	AP12	NC
AP13	GND	AP14	NC
AP15	NC	AP16	GND
AP17	NC	AP18	NC
AP19	GND	AP20	NC
AP21	NC	AP22	GND
AP23	NC	AP24	NC
AP25	GND	AP26	NC
AP27	NC	AP28	GND
AP29	NC	AP30	NC
AP31	GND	AP32	NC
AP33	NC	AP34	GND
AP35	NC		
AR2	NC	AR3	NC
AR4	NC	AR5	NC
AR6	NC	AR7	NC
AR8	NC	AR9	NC
AR10	NC	AR14	GND
AR15	NC	AR16	NC
AR17	GND	AR18	NC
AR19	NC	AR20	GND
AR21	NC	AR22	NC
AR26	GND	AR27	NC
AR28	NC	AR29	GND
AR30	NC	AR31	NC
AR32	GND	AR33	NC
AR34	NC		

10. Precautions For Use

1. Do not squeeze, bend, or disassemble the board.
2. Keep circuit boards away from static electricity.
3. Do not allow water or other liquids to come into contact with the board
4. Clean the board with a soft, dry towel or brush.
5. Do not use long connection cables, which may affect performance and image quality