

1 Characteristic

- 1-channel 4K60 (3840x2160) coaxial camera input
- 1 HDMI output, supports up to 4K60 (3840x2160) resolution
- 2 USB3.0 ports: Support USB storage devices, USB mice, etc.
- 1 Gigabit Ethernet
- 1-channel DVI 24+5 output
- 3G SDI output for Line 1
- Dual 8-bit LVDS outputs
- ADC input: supports up to 16 key extensions
- 4 RS232 ports: Enables light source (MLS0x) synchronization and serial port screen menu operations
- A clock battery interface to keep the real-time clock running after a power failure
- Power input: 12V 3A
- Size: 150mmx102mm
- Multiple metering modes: average, center, and peak
- One-click white balance adjustment with built-in color styles and adjustable color parameters
- Prevents color spillage, aiding in identifying surgical details obscured by blood-red during bleeding procedures.
- Support horizontal and vertical mirroring
- Image freeze, video recording, snapshot, and image comparison
- Dimming level adjustable, smoke elimination
- Store multiple scenario parameters for easy direct access in different scenarios
- Customize shortcut keys
- The system menu can be hidden and authorized for login, providing a set of serial port commands for system control, enabling users to develop customized serial port screen menu applications.
- Supports web applications and provides SDK packages
- Supports DICOM protocol

2 Summary

The ZR4L is a single-channel 4K ultra-high-definition imaging system featuring the latest fifth-generation image processing technology. With advanced ISP processing capabilities, it delivers real-time low-latency image processing at 4K60 resolution for up to one channel. The system incorporates a 2.5TOPS @INT8 intelligent video analysis acceleration engine, providing essential hardware support for intelligent image analysis and applications. This ensures seamless upgrades and facilitates distributed deployment planning for future implementations.

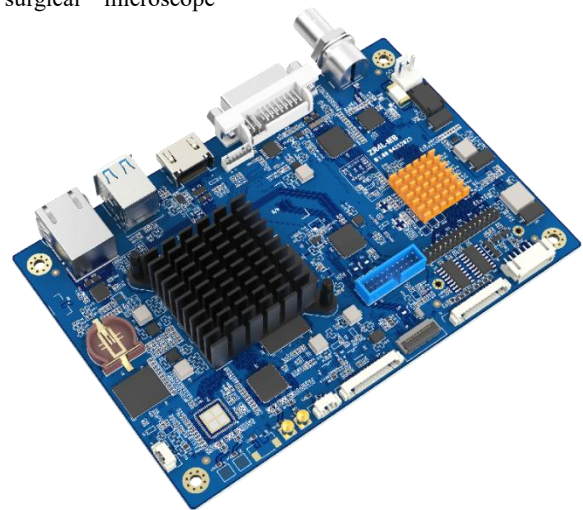
For close-up applications such as endoscopy, surgical microscopy, and industrial inspection, the system has been optimized for white balance locking, automatic metering, bright light suppression, smoke elimination, and red coverage in large bleeding environments, ensuring maximum recognition of tissue or object details in the field of view.

3 Main Application Scenarios

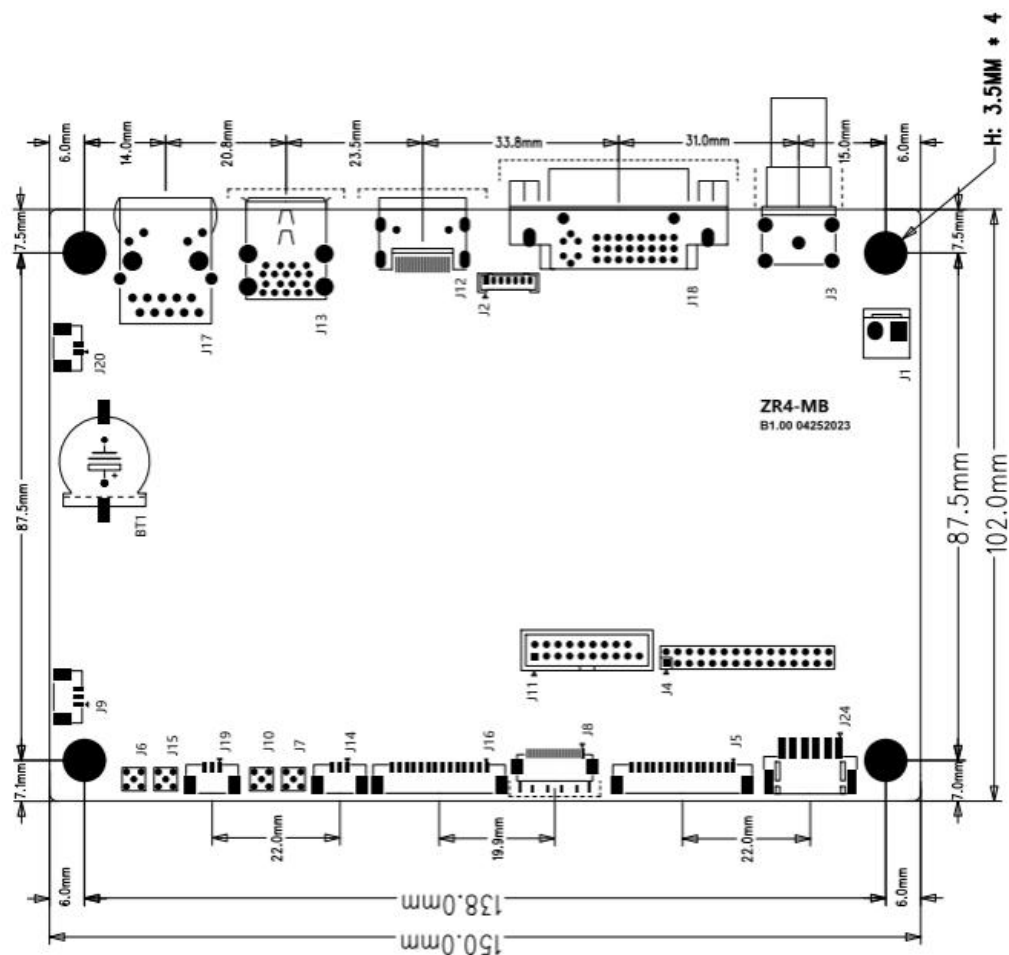
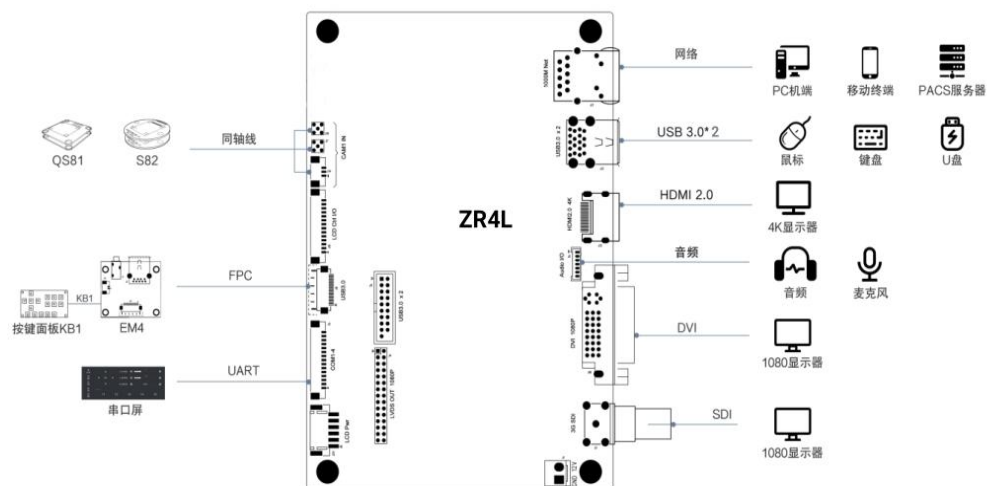
Medical endoscope

Industrial endoscope

surgical microscope



4 Apply Block Diagram

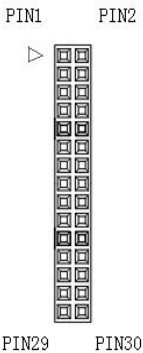


5 Interface Definition

Note: The "△" marks the first pin (Pin1).

name	item	Pin definition	direction for use
SDI	J3	75-ohm BNC socket SDI OUT	Supports 3G-SDI output with up to 1080p60 resolution
DVI	J18	DVI24+5 DVI OUT	Supports up to 1080p60 resolution
HDMI	J12	HDMI Type A HDMI OUT	HDMI 2.0: Supports up to 3840*2160P60 resolution output
USB 3.0	J13	Type A Dual USB 3.0 Port USB 3.0 port	Supports USB storage device recording and snapshot capture, and USB mouse and keyboard operation
Net	J17	1000MHz Ethernet: RJ45	Provide wired Ethernet connection applications
CAM_VCC	J9	Wafer: TH1.25 PIN1: CAM 5V PIN2: GND PIN3: key signal in	Detects 5V power supply and button input on the circuit
LCD_CTRL	J16	J16: Wafer: TH1.25*14 PIN1: 12V PIN2: 12V PIN3: GND PIN4: LCD_BL_EN PIN5: LCD_VBLADJ PIN6: GND PIN7: BUZZER_PWM PIN8: LCD_CSB PIN9: I2C0_SDA PIN10: I2C0_SCL PIN11: LCD_SDA/TP_RESET# PIN12: LCD_SCL/TP_INT# PIN13: GND PIN14: key signal in	LCD screen control
CSI1	J7 J10 J14	J7: MMCX CS2 IN J10: MMCX CS1 IN J14: Wafer: TH1.25 PIN1: CAM 5V	Supports dedicated cameras such as QS81/QS82 series

		PIN2: GND PIN3: key signal in	
Clock_VCC	J20	Wafer: TH1.25 * 2 PIN1: 3.3V PIN2: GND	The external power supply provides real-time clock power with a maximum voltage of 3.3V.
Front Board IF	J8	FFC20_0.5 PIN1: SARADC PIN2: GND PIN3: USB32_DM PIN4: USB32_DP PIN5: GND PIN6: 5V0_USB3_2 PIN7: 5V0_USB3_2 PIN8: USB32_RXP PIN9: USB32_RXM PIN10: GND PIN11: USB32_TXP PIN12: USB32_TXM PIN13: GND PIN14: SYS_PWRON PIN15: UART3_TXD PIN16: UART3_RXD PIN17: 5.0V PIN18: GND PIN19: 3.3V PIN20: 3.3V	One USB3.0 expansion port and one ADC input
CMOS	J5	TH1.25 * 15H PIN1: RS232_TXD0 PIN2: RS232_RXD0 PIN3: GND PIN4: RS232_TXD1 PIN5: RS232_RXD1 PIN6: GND PIN7: RS232_TXD2 PIN8: RS232_RXD2 PIN9: GND PIN10: RS232_TXD4 PIN11: RS232_RXD4 PIN12: GND PIN13: LIGHT_ADJ PIN14: GND PIN15: 5V/12V	The system provides four RS232 standard level interfaces - Designed to adjust the parameters of the MLS0xx series light source, it connects to the constant current board (EP1) via a serial port. - Connect the serial port touch screen and access the touch screen operating system menu.

LCD_Ctrl_1	J24	PH1*6_2.0 PIN1: LCD_VBLADJ PIN2: BL_EN PIN3: GND PIN4: GND PIN5: 12V PIN6: 12V		LCD screen control
	J4	HDR 2×15_2.0mm		Output LVDS video signal to LCD screen with 1920*720 resolution
		PIN1: 3.3V/5V PIN3: 3.3V/5V PIN5: GND PIN7: LVDS_CHO_T0- PIN9: LVDS_CHO_T1- PIN11: LVDS_CHO_T2- PIN13: GND PIN15: LVDS_CHO_TCK- PIN17: LVDS_CHO_T3- PIN19: LVDS_CHE_T0- PIN21: LVDS_CHE_T1- PIN23: LVDS_CHE_T2- PIN25: GND PIN27: LVDS_CHE_TCK- PIN29: LVDS_CHE_T3-	PIN2: 3.3V/5V PIN4: GND PIN6: GND PIN8: LVDS_CHO_T0+ PIN10: LVDS_CHO_T1+ PIN12: LVDS_CHO_T2+ PIN14: GND PIN16: LVDS_CHO_TCK + PIN18: LVDS_CHO_T3+ PIN20: LVDS_CHE_T0+ PIN22: LVDS_CHE_T1+ PIN24: LVDS_CHE_T2+ PIN26: GND PIN28: LVDS_CHE_TCK+ PIN30: LVDS_CHE_T3+	
USB Ext	J11	Wafer: CON2*10-HS PIN1: GND PIN2: USB33_DP PIN3: USB34_DP PIN4: USB33_DM PIN5: USB34_DM PIN6: GND PIN7: GND PIN8: USB33_TXP PIN9: USB34_TXP PIN10: USB33_TXM PIN11: USB34_TXM PIN12: GND PIN13: GND PIN14: USB33_RXP PIN15: USB34_RXP PIN16: USB33_RXM PIN17: USB34_RXM PIN18: 5V_USB		2-way USB3.0 expansion port

		PIN19: 5V_USB PIN20:	
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6 Electrical Specifications

1) work environment

parameter	minimum	typical case	maximum	explain
input voltage (V)	7.5	12	13.5	
working current (mA)		3000		
ambient temperature (°C)	5	25	45	
humidity (%rh)	5	55	85	
atmos (kPa)	50	101	106	

2) Electromagnetic compatibility (YY9706.102-2021:6.1.1 Electromagnetic Interference: Conductive and Radiated Emissions; 6.2.x Antenna Interference)

Test conditions: AC 220V/50Hz, ZR4B (ZS04E metal housing)

A.electromagnetic disturbance :

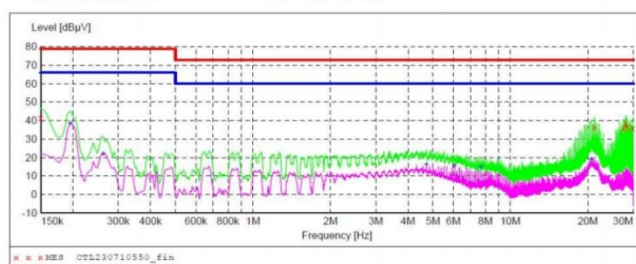
a) Conduction emission: Meets the GB 4824-2019 power terminal electromagnetic interference voltage limit (Group 1, Class B) requirements

Voltage Mains Test GB 4824

EUT: ZR4B
Manufacturer: /
Operating Condition: WORKING
Test Site: /
Operator: HONG
Test Specification: AC 220V/50Hz
Comment: /
Start of Test: 10/07/2023 / 19:27:14

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage

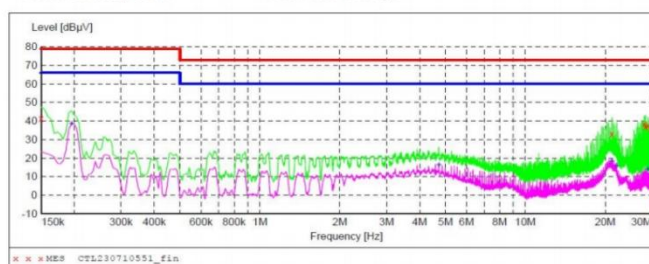


Voltage Mains Test GB 4824

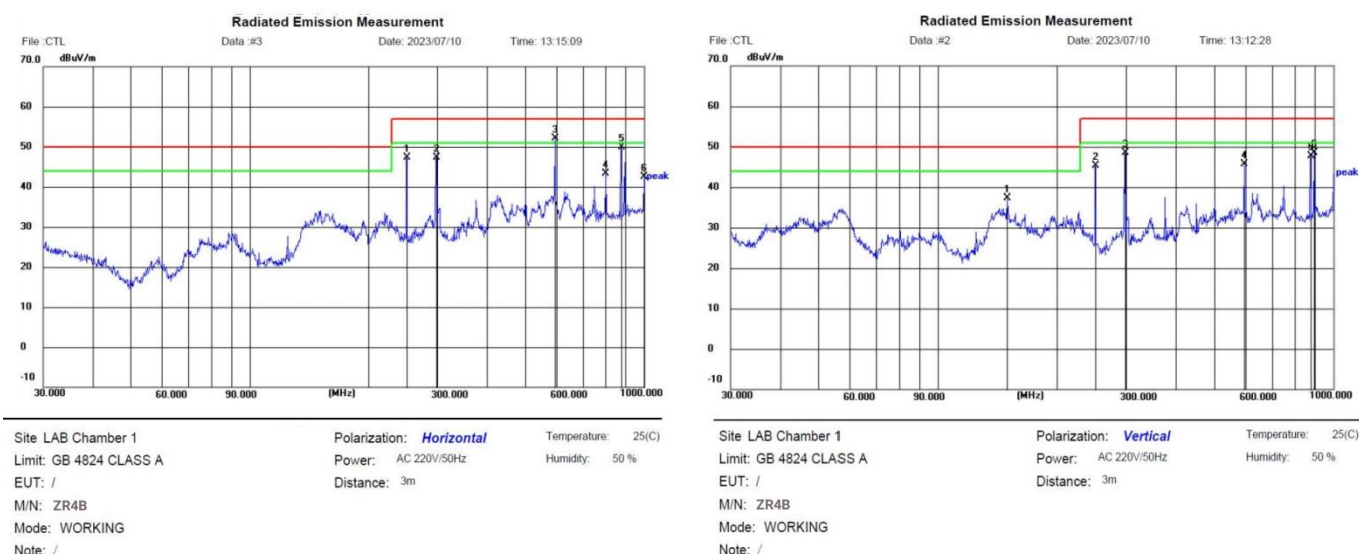
EUT: ZR4B
Manufacturer: /
Operating Condition: WORKING
Test Site: /
Operator: HONG
Test Specification: AC 220V/50Hz
Comment: /
Start of Test: 10/07/2023 / 19:30:29

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



b) Radiation emission: Meets the radiation disturbance (Group 1, Class A) limit requirements specified in GB 4824-2019



B. Dust and dirt resistance: meets the performance criteria specified in YY 9706.102-2021

YY 9706.102-2021	project	grade	bear fruit
6.2.2	electrostatic discharge	Contact discharge (± 6 kV) Air discharge (Air): ± 8 KV	qualified
6.2.3	Radio frequency electromagnetic field radiation immunity	3V/m, 80%AM (1kHz)	qualified
6.2.4	Fast transient pulse cluster	At the AC power supply port: Test voltage peak ± 2 kV, repetition frequency 5 kHz or 100 kHz, 5/50 ns Tr/Td waveform	qualified
6.2.5	surge	At the AC power supply port: Line-to-line: ± 1 kV peak voltage, open-circuit voltage waveform 1.2/50 μ s Line-to-ground: ± 2 kV peak voltage, open-circuit voltage waveform 1.2/50 μ s	qualified
6.2.6	RF field induced conducted immunity	3V,80%AM (1kHz)	qualified
6.2.7	The voltage on the power supply input line is temporarily Down, short interruptions, and voltage changes	1. Test voltage $< 5\%U_t$, lasting 0.5 cycles 2. Test voltage at 40% of U_t for 5 cycles 3. Test voltage at 70% of U_t for 25 cycles 4. Test voltage $< 5\%U_t$, for 250 cycles	qualified
6.2.8.1	Power frequency magnetic field	3A/m	qualified

7 Related components: S82, MLS0x