1 Characteristic

- 1-channel 4K60 (3840x2160) coaxial camera input
- 1 HDMI output, supports up to 4K60 (3840x2160) resolution
- 2 USB3.0 ports: supports USB storage devices, USB mice, and more
- 1 Gigabit Ethernet
- 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 2A
- Size: 90mmx70mm

- 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 ZM4B is a compact yet powerful single-board solution featuring the latest fifth-generation image processing system. With advanced ISP capabilities, it delivers real-time 4K60 low-latency image processing for up to one channel. The system incorporates a 2.5TOPS@INT8 intelligent video analysis acceleration engine, providing essential hardware support for intelligent image processing and applications. This ensures seamless upgrades and facilitates distributed deployment planning.

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.

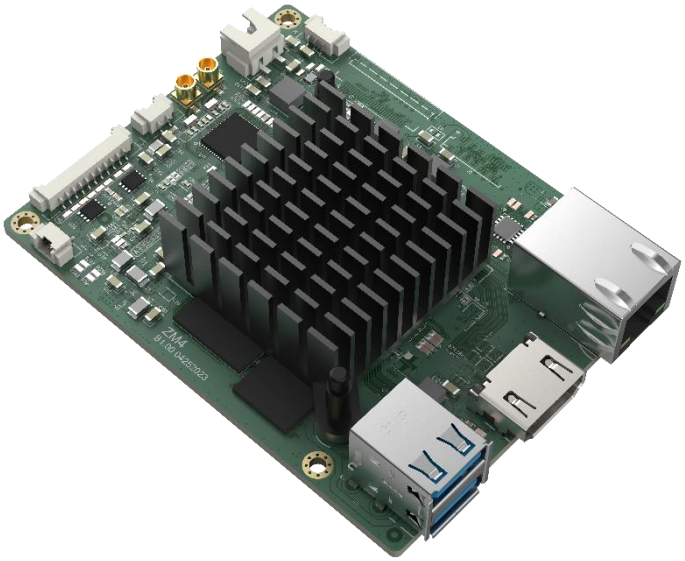
The TX23 series adapter board enables integration with OV series electronic microscopes, creating a portable hard-tube microscope with electronic microscope functionality.

3 Main Application Scenarios

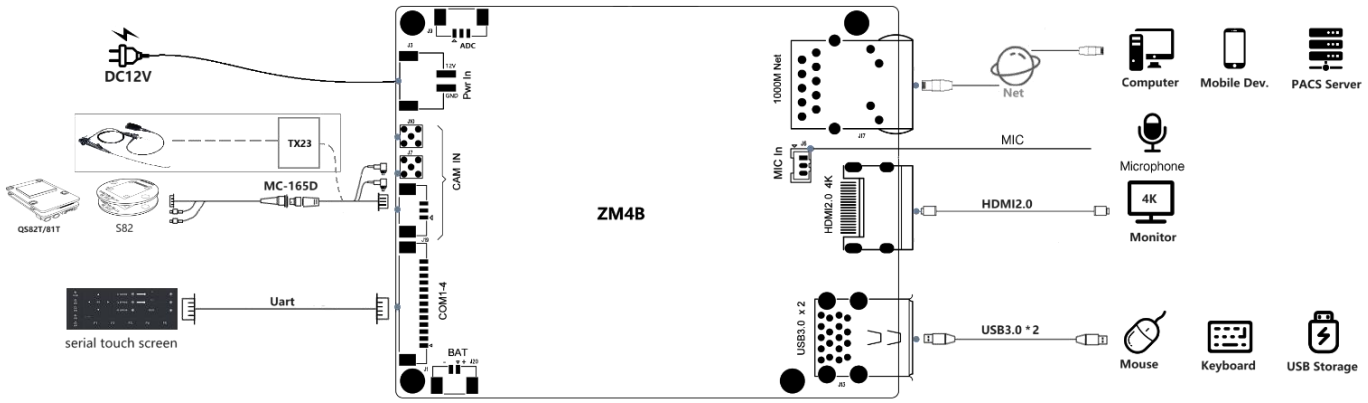
Portable endoscope

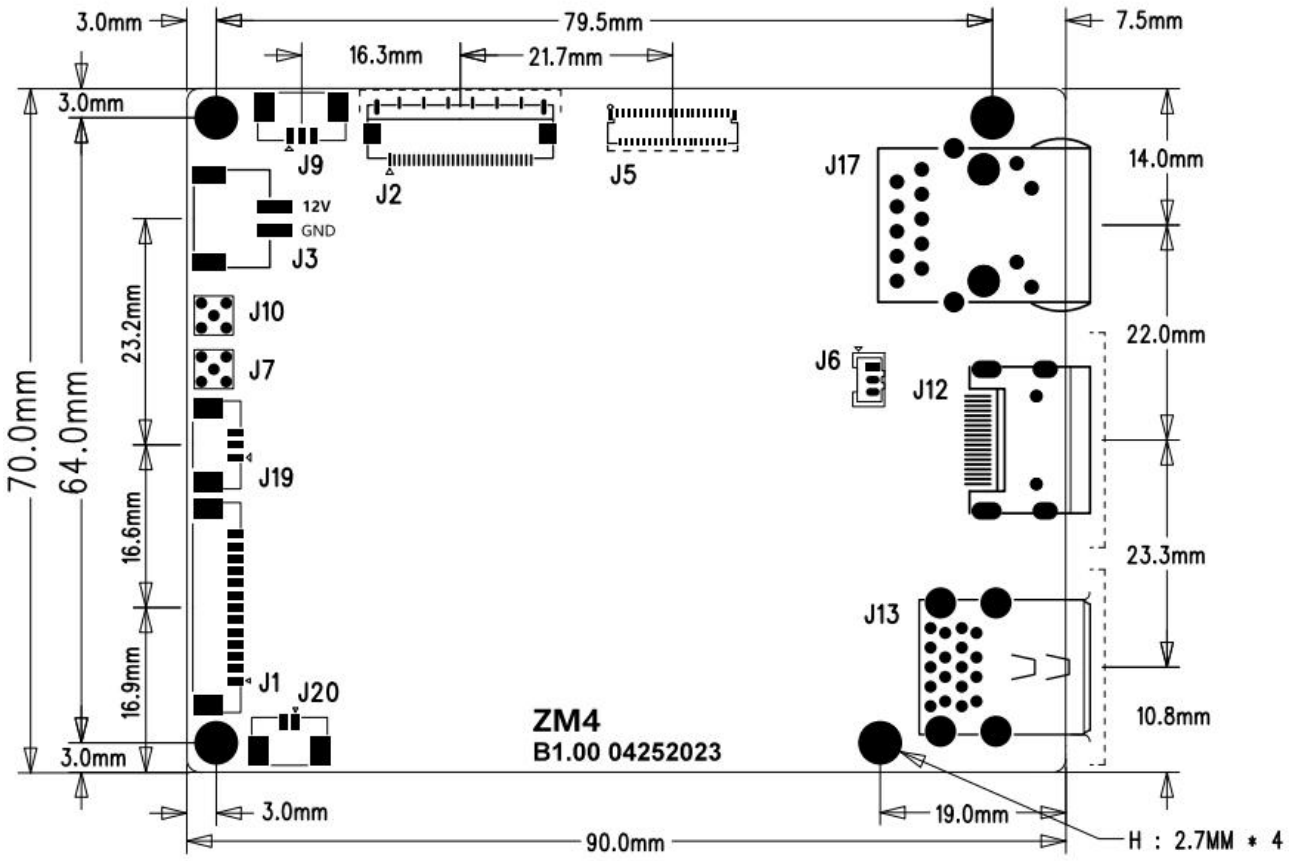
Industrial Mirror

surgical microscope



4 Apply Block Diagram





5 Interface Definition

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

name	item	Pin definition	direction for use
ADC	J9	3pin 1.25mm wafer：A1251WR-S-3P Pin1: 5V, maximum current ≤500mA Pin2：GND Pin3：ADC IN	The ADC level does not exceed 5V You can customize button functions through the system menu. No more than 10 operation buttons can be expanded.
power input	J3	2pin 2.50mm wafer：A2501WR-S-2P Pin1：GND Pin2: Power Input (Type: 12VDC, Range: 7.5~13.5VDC)	To ensure stable system operation, the 12V driver must provide at least 2A current with ripple below 60mVp-p.
Camera input	J7、J10、J19	J7, J10: MMCX, video signal input J19: A1251WR-S-3P, Camera Detection and Power Supply Pin1: 5V, maximum current ≤500mA Pin2：GND Pin3：ADC IN	Supports dedicated cameras such as the S82/QS82T series
Battery socket	J20	2pin 1.25mm wafer：A1251WR-S-2P Pin1: VBAT+ (Battery Positive, +3V) Pin2：GND	The battery's maximum voltage should not exceed 3.3V, and 3V button batteries are typically used.
gorge line ：RS232	J1	13pin 1.25mm wafer：A1251WR-S-13P Pin13:5V, maximum current ≤150mA Pin12: GND Pin11: RXD4 serial port 4 data reception Pin10: TXD4 serial port 4 data transmission Pin9: Ground Pin8: RXD3 serial port 3 data reception Pin7: TXD3 serial port 3 data transmission Pin6: GND Pin5: RXD2 serial port 2 data reception Pin4: TXD2 serial port 2 data transmission Pin3: GND Pin2: RXD1 serial port 1 data reception Pin1: TXD1 serial port 1 data transmission	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.
HDMI	J12	HDMI 2.0: Supports up to 4K 60Hz resolution output	
USB	J13	2 USB 3.0 Hosts	Supports USB storage device recording and snapshot capture, and USB mouse and keyboard operation
Net	J17	1000MHz Ethernet: RJ45	Provide wired Ethernet connection applications
Audio	J6	PIN1：MIC_IN_R PIN2：MIC_IN_L PIN3：GND	Microphone input

6 Electrical Specifications

1) work environment

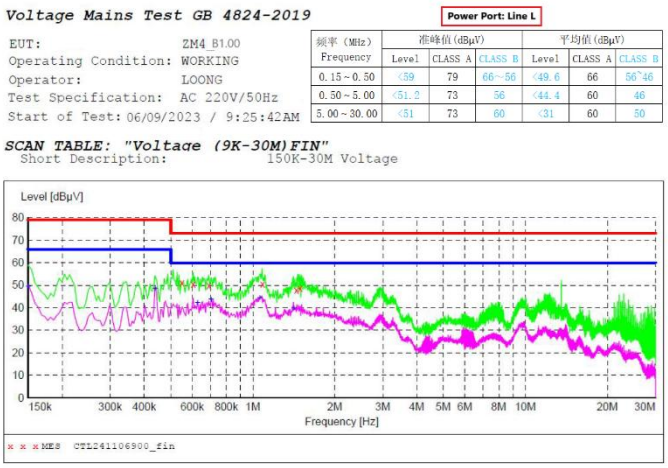
parameter	minimum	typical case	maximum	explain
input voltage (V)	7.5	12	13.5	
working current (mA)		2000		
ambient temperature (℃)	5	25	45	
humidity (%rh)	5	55	85	
atmos (kPa)	50	101	106	

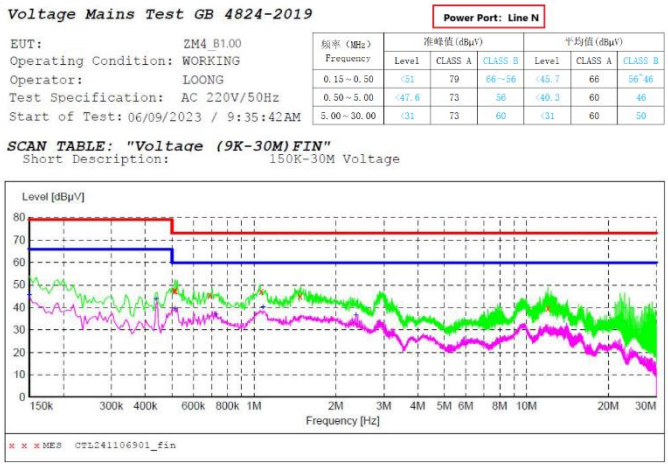
2) Electromagnetic compatibility (YY9706.102-2021:6.1.1 Electromagnetic Interference: Conductive and Radiated Emissions; 6.2.x Antenna Interference)

Test conditions: AC 220V/50Hz, external power supply (GSM18U05), ZM4B (shielded housing)

A. electromagnetic distrubance ：

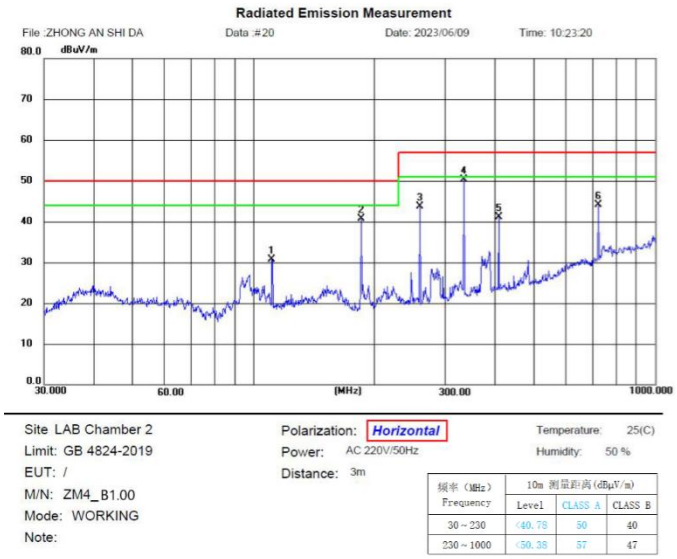
a) Conduction emission: Meets the GB 4824-2019 power terminal electromagnetic interference (EMI) voltage

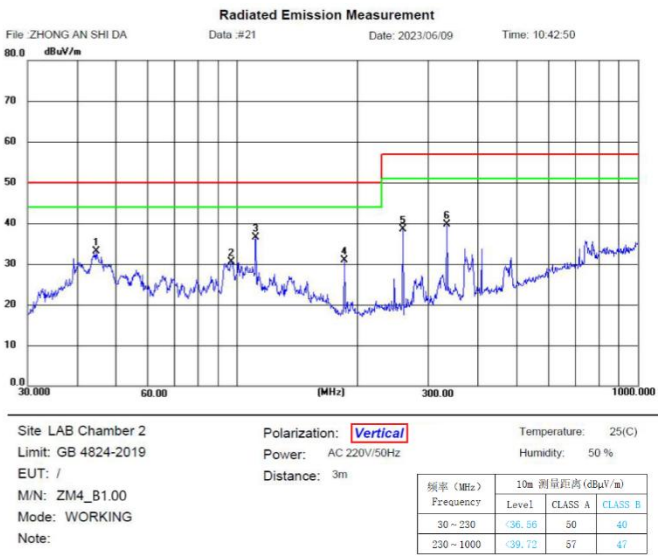




limit (Group 1, Class B) requirements

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





B. Robustness: 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): ±8KV	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 1.2/50μs Line-to-ground: ±2 kV peak voltage, open-circuit voltage waveform 1.2/50μs	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%Ut, lasting 0.5 cycles 2. Test voltage at 40% of Ut for 5 cycles 3. Test voltage at 70% of Ut for 25 cycles 4. Test voltage <5%Ut, for 250 cycles	qualified
6.2.8.1	Power frequency magnetic field	3A/m	qualified

7 Related components: S82, QS82T, MLS0x, TX23