UW-E230D-V1.0 Face Panel Motherboard

Technical Specification

Document Revision History

	Remarks	Date
1	Created	2025-01

1 Product Overview

UW-M230D-V1.0 is a face panel motherboard developed based on the EEASYTECH SA230D main chip. This motherboard is equipped with built-in 1Gb 16-bit DDR3L, onboard 8GB eMMC or optional 1Gb SPI NAND (default 1Gb SPI NAND), and supports functions such as MIPI/RGB screen display and dual MIPI cameras.

The SA230D is a professional AI SoC with a neural network acceleration engine, designed for applications in video security, residential access control, gate barriers, building intercoms, smart cabinets, and other products. Its integrated neural network processor supports up to 0.5 TOPS of deep neural network computing power. Typical applications include face recognition with liveness detection, gesture detection, and people counting. The SA230D combines   Arm Cortex-A7 processor and RISC-V processor, providing rich general-purpose computing capabilities for customized application development. Integrated H.264 video encoding and decoding ensure real-time performance, delivering high-resolution, high-frame-rate, and high-quality images. The integrated high-performance ISP supports 3D noise reduction, ensuring excellent performance in low-light scenarios. It can simultaneously process two digital camera interfaces. The display processing unit supports hardware mouse layer, graphics layer, and video **layer overlay, accelerating GUI and video synthesis.**

Main features:

- Arm Cortex-A7 CPU & RISC-V CPU @1.0GHz, NPU @0.5 TOPS

- Supports MIPI screen display with resolutions up to 1920×1200@60Hz

- Supports RGB screen display with resolutions up to 1920×1080@60Hz

- Dual 1/2MP cameras, integrated high-performance ISP with 3D noise reduction

- Supports 2.4G Wi-Fi/CAT1 4G/Ethernet

- 3 TTL serial ports (1 can be configured as RS485), relay, Wiegand IN/OUT, I2C, fill light, GPIO, and other rich expansion interfaces

2 **Specifications**

Hardware specifications：

|	
CPU	Arm Cortex-A7 CPU/RISC-V CPU
NPU	Built-in CNN accelerator NPU,0.5TOPS
Memory	Built-in DDR3L 1Gb 16-bit
Internal Storage	Optional SPI NAND or EMMC 8GB/16G/32G（default 1Gb SPI NAND）
Display Interfaces	MIPI interface, supports max resolution 1920×1200@60Hz RGB interface, supports max resolution 1920×1080@60Hz
Network	100M Ethernet interface
	2.4G USB WIFI module, supports Wi-Fi 802.11b/g/n
	Optional CAT1 4G (default: not installed)
Real-Time Clock	Built-in RTC battery
Interface device	Supports dual MIPI cameras
	1 USB port (USB OTG function)
	3 TTL ports (1 can be configured as RS485), 1 Wiegand IN/OUT flexible configuration, relay, I2C, GPIO, and other rich peripheral， interfaces for connecting locks, card

	readers, scanners, ID modules, etc.
	Built-in amplifier, supports 2W 8Ω speaker
Audio Input	Supports MIC, 1 microphone interface
Touchscreen	Supports capacitive touchscreen
Fill Light	Supports white light and infrared fill light

Software Specifications:

OS	Linux system
Face Algorithm	Dynamic face detection and tracking based on video stream,1:N recognition algorithm; Dynamic dual camera anti-counterfeiting, completely solving the deception of photos and videos on various carriers; Supports 1000 face database entries and 10K recognition records; At 1000-face database, 0.01% false acceptance rate, 97% pass rate.
Application Software	Supports saving on-site images during face recognition or stranger detection; Management system backend deployed via public cloud; Supports local face registration, database import, network settings, liveness detection switch, and other basic functions.
API Interface	Framework provides C/C++ API; Supports online API(HTTPS);

3 main interfaces

3.1 Interface diagram
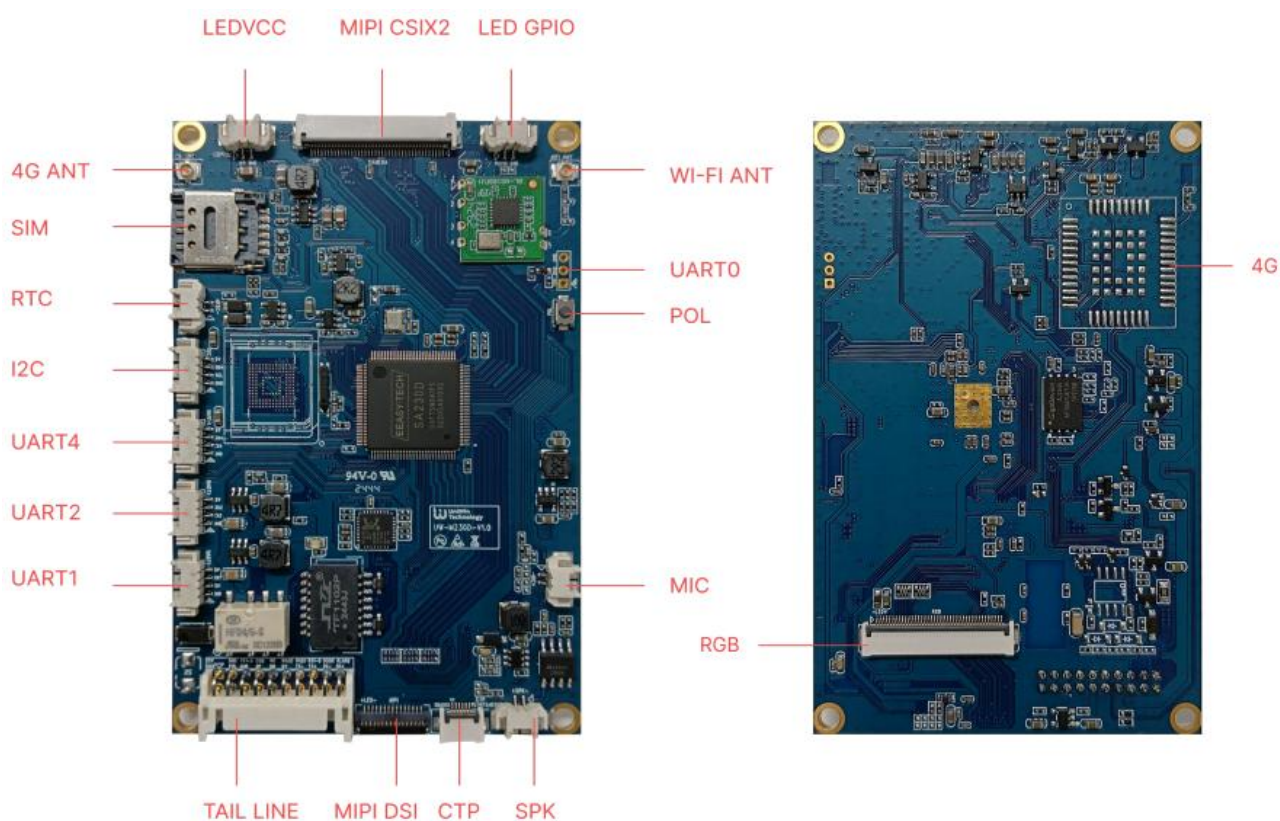
3.2 Main Interfaces Introduction

◆ **SPK(Triangle marks Pin 1，2PIN/1.25mm)Speaker Interface**

S/N	Definition	Attribute	Description
1	OUTN	Output	Audio - signal (connect to speaker -)
2	OUTP	Output	Audio + signal (connect to speaker +)

Notes：

1. Connect the speaker before powering on. Do not hot-plug the speaker.
2. Default output power: 8Ω/2W. Ensure the speaker's rated power matches.

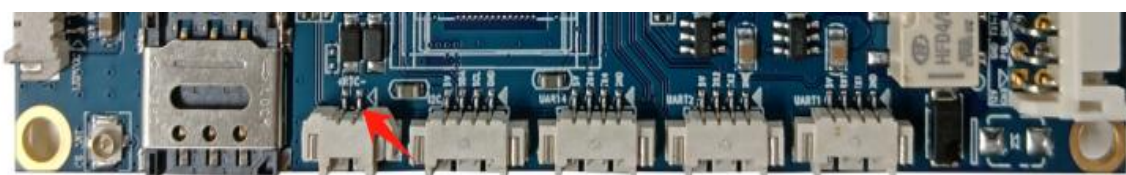◆ **MIC(Triangle marks Pin 1，2PIN/1.25)Microphone Interface**

S/N	Definition	Attribute	Description
1	MIC-	Audio Input	Audio input negative
2	MIC+	Audio Input	Audio input positive

Notes：

1. Ensure the microphone's polarity matches the mainboard's.
2. Recommended MIC sensitivity: -37dB.

◆ **RTC BAT(Triangle marks Pin 1，2PIN/1.25mm) RTC Battery Interface**

S/N	Definition	Attribute	Description
1	3V Battery -	Power	3V battery negative
2	3V Battery +	Power	3V battery positive

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Notes:

1. Ensure correct polarity when connecting the RTC battery. Reverse connection may cause short circuits, posing fire or explosion risks.

2. If RTC time is inaccurate, replace the battery with a 3V CR2032 button cell with leads. Contact FAE for specifications.

◆ **WHITE LIGHT IO(Triangle marks Pin 1，2PIN/1.25mm) White Light Fill Light IO Control**

S/N	Definition	Attribute	Description
1	LED-GPIO	Signal Output	High level turns on white LED （default: unconnected, reserved）
2	GND	Ground	Ground

Notes:

1. Ensure the signal and ground connections match the mainboard's pinout.

◆ **Fill Light Power (Triangle marks Pin 1，2PIN/1.25mm)**

S/N	Definition	Attribute	Description
1	12V	Power	12V controllable output for white fill light
2	GND	Ground	GND

Notes:

1. Ensure the power and ground connections match the mainboard's pinout. Incorrect connections may damage the mainboard or light panel.

◆ **UART0(Triangle marks Pin 1，3PIN/2.0mm) DEBUG Serial Port**

S/N	Definition	Attribute	Description
1	TX0	Signal Output	DEBUG serial port TX0
2	RX0	Signal Input	DEBUG serial port RX0
3	GND	Ground	GND

Notes：

1. This port is typically used for engineering debugging only.
2. The port uses TTL 3.3V level. Do not connect RS232 or 5V serial debug tools.

◆ **UART1(Triangle marks Pin 1，4PIN/1.25mm) TTL Serial Port, reuse UART 1 with the tail line interface(Configurable as RS485)**

S/N	Definition	Attribute	Description
1	GND	Ground	Ground
2	TX1	Signal Output	TTL serial port1 （configurable as 485-A）
3	RX1	Signal Input	TTL serial port1 （configurable as 485-B）
4	5V	Power	5V power supply

◆ **UART2(Triangle marks Pin 1，4PIN/1.25mm) TTL Serial Port**

S/N	Definition	Attribute	Description
1	GND	Ground	Ground
2	TX2	Signal Output	TTL serial port 2
3	RX2	Signal Input	TTL serial port 2
4	5V	Power	5V power supply

◆ **UART4(Triangle marks Pin 1，4PIN/1.25mm) TTL Serial Port**

S/N	Definition	Attribute	Description
1	GND	Ground	Ground
2	TX4	Signal Output	TTL serial port 4
3	RX4	Signal Input	TTL serial port 4
4	5V	Power	5V power supply

TTL&RS485 Serial Port Usage Notes:

1. Ensure the serial port level matches (3.3V TTL).
2. When configured as RS485, connect only RS485 devices (not TTL or RS232).
3. Do not reverse TX/RX connections. For RS485, TX corresponds to RS485 A, RX to RS485 B.
4. Serial port access nodes must match (e.g., serial port 1 corresponds to TTYS1).

◆ **I2C(Triangle marks Pin 1，4PIN/1.25mm) I2C Serial Port**

S/N	Definition	Attribute	Description
1	GND	Ground	Ground
2	SCL	Output	Clock signal
3	SDA	I/O	I2C data
4	5V	Power	5V power supply

I2C Interface Usage Notes

1. Ensure voltage levels match (3.3V).
2. Do not reverse SCL/SDA connections. Do not hot-plug.

◆ **CTP(Triangle marks Pin 1， 6PIN/0.5mm) CTP Capacitive Touchscreen Interface**

S/N	Definition	Attribute	Description
1	SDA	I/O	I2C data
2	SCK	Output	Clock signal
3	REST	Output	Reset
4	INT	Input	Interrupt
5	GND	Ground	Ground
6	3.3V	output	3.3V output

Notes:

1. Ensure the touchscreen uses an I2C interface.
2. Interface signals (I2C, RST, INT) are 3.3V. For 1.8V touchscreens, use level conversion.
3. Connect the touchscreen before powering on. Do not hot-plug.

◆ **MIPI LCD(Triangle marks Pin 1，31PIN/0.3mm) MIPI Signal Output**

S/N	Definition	Attribute	Description
1-2	AVCC	Power	3.3V power supply
3	DVCC	Power	1.8V power supply
4	GND	Ground	Ground
5	RESET	Signal Input	Reset pin
6	DVCC	Power	1.8V power supply
7	GND	Ground	Ground
8	DSI-D3N	Output	MIPI DATA
9	DSI-D3P	Signal Input	MIPI DATA
10	GND	Ground	Ground
11	DSI-D0N	Output	MIPI DATA
12	DSI-D0P	Signal Input	MIPI DATA
13	GND	Ground	Ground
14	DSI-CLKN	Output	MIPI CLK

15	DSI-CLKP	Signal Input	MIPI CLK
16	GND	Ground	Ground
17	DSI-D1N	Output	MIPI DATA
18	DSI-D1P	Signal Input	MIPI DATA
19	GND	Ground	Ground
20	DSI-D2N	Output	MIPI DATA
21	DSI-D2P	Signal Input	MIPI DATA
22-23	GND	Ground	Ground
24~27	LED-	Power	Backlight power negative
28	NC	NC	NC
29~31	LED+	Power	Backlight power positive

Notes:

1. Ensure the screen's voltage/current parameters match the mainboard's (default backlight current: 120mA). If the current parameters of the selected screen do not meet the requirements, you can seek support from our company's FAE.

2. Ensure the screen's pinout matches the mainboard's. Use the correct FPC cable.

3. Interface signals (e.g., RST) are 1.8V. For 3.3V modules, use level conversion.

◆ **TAIL LINE Interface（Triangle marks Pin 1，20PIN/2.0）**
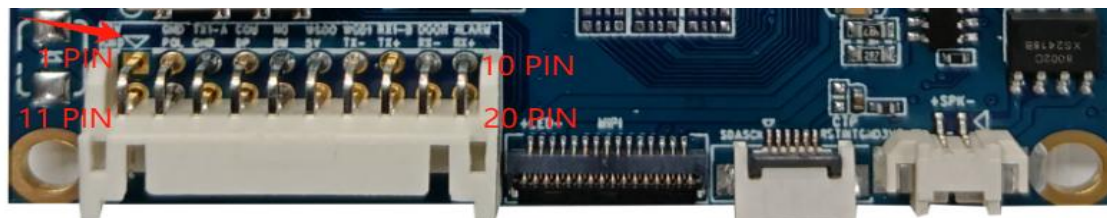
S/N	Definition	Attribute	Description
1	12V	Power	+12Vpower input
2	NC	Control Line	Relay normally closed
3	UART1TX	Control Line	TTL TX，configurable as RS485 A
4	COM	Control Line	Relay common terminal
5	NO	Control Line	Relay normally open
6	WGOD0	Data Line	Wiegand input/output D0
7	WGOD1	Data Line	Wiegand input/output D1
8	UART1 RX	Signal Input	TTL RX，configurable as RS485 B
9	DOOR	Data Line	Input for door sensor
10	ALARM	Data Line	Input for door opening or alarm
11	GND	Ground	Ground

12	ALARM_OUT	Data Line	Alarm output
13	GND	Ground	Ground
14	USB_OTG_ DP	I/O	D+ signal line
15	USB_OTG_ DM	I/O	D- signal line
16	USB 5V	Power Output	+5V Power Output
17	TX-	Ethernet Line	Ethernet TX-
18	TX+	Ethernet Line	Ethernet TX+
19	RX-	Ethernet Line	Ethernet RX-
20	RX+	Ethernet Line	Ethernet RX+

Notes:

1. Use a power supply or adapter compliant with 3C standards, with 30%-50% margin (e.g., 2.5A-3A for 1.5A total current).

2. Use twisted pairs for differential signals (e.g., TX-TX+/RX-RX+, USB DM/DP, UART1TX/RX).

3. Ensure the tail cable's pinout matches the mainboard's to avoid malfunctions or damage.

4. USB 5V output max current: 1A.

◆ **MIPI CSIX2 (Triangle marks Pin 1，40PIN/0.5mm) Dual MIPI Camera Interface**

S/N	Definition	Attribute	Description
1	VDD2V8	Power	2.8V Output
2	VDD3V3	Power	3.3V Output
3	IR-PWDN	Output	IR_Camera power-down control
4	IR-RST	Output	IR_Camera reset signal
5	SCL	Output	SCL signal
6	SDA	I/O	SDA signal
7	GND	Ground	Ground
8	IR-XCLK	Output	IR_Camera master clock
9	GND	Ground	Ground
10	IR-MCP	I/O	IR_Camera MIPI clock channel +
11	IR-MCN	I/O	IR_Camera MIPI clock channel -
12	GND	Ground	Ground

13	IR-D0P	I/O	IR_Camera MIPI data channel 0 +
14	IR-D0N	I/O	IR_Camera MIPI data channel 0 -
15	GND	Ground	Ground
16	IR-D1P	I/O	IR_Camera MIPI data channel 1 +
17	IR-D1N	I/O	IR_Camera MIPI data channel 1 -
18	GND	Ground	Ground
19	DOVDD1V8	Power	1.8V output
20	FSYC-IN	/	NC
21	LED-GPIO	/	NC
22	IR-DVDD1V2	Power	1.2V output
23	RGB-DVDD1V2	Power	1.2V output
24	RGB-PWDN	Output	RGB_Camera power-down control
25	RGB-RST	Output	RGB_Camera reset signal
26	GND	Ground	Ground
27	RGB-XCLK	Output	RGB_Camera master clock
28	GND	Ground	Ground
29	RGB-MCP	I/O	RGB_Camera MIPI clock channel +
30	RGB-MCN	I/O	RGB_Camera MIPI clock channel -
31	GND	Ground	Ground
32	RGB-D0P	I/O	RGB_Camera MIPI data channel 0 +
33	RGB-D0N	I/O	RGB_Camera MIPI data channel 0 -
34	GND	Ground	Ground
35	RGB-D1P	I/O	RGB_Camera MIPI data channel 1 +
36	RGB-D1N	I/O	RGB_Camera MIPI data channel 1 -
37	GND	Ground	Ground
38	5V	Power	Infrared fill light controllable power
39	5V	Power	Infrared fill light controllable power
40	5V	Power	Infrared fill light controllable power

Notes:

1. Ensure the mainboard's pinout matches the camera's. Confirm the cable is same-side or cross-side.

2. Do not hot-plug the camera interface.

◆ **Reserved RGB Interface and MiPI screen signal multiplexing, choose one or the other(Triangle marks Pin 1，40PIN/0.5)**
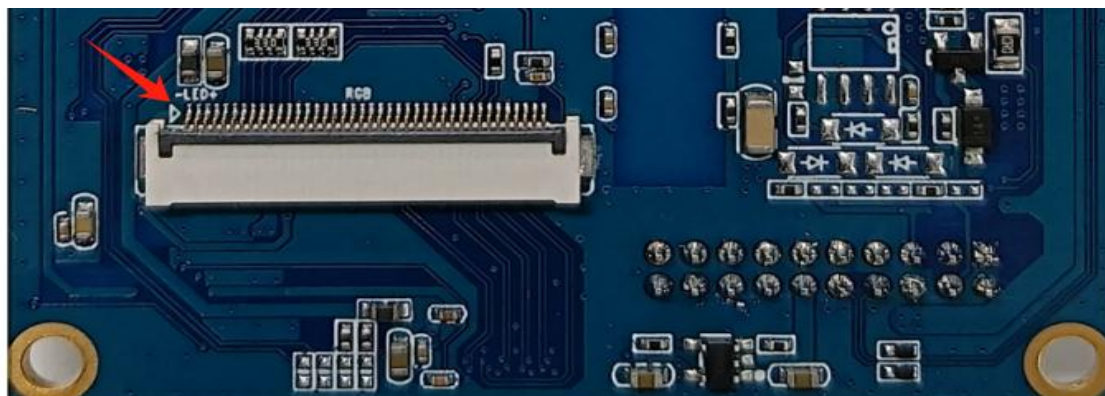
S/N	Definition	Attribute	Description
1	LED-	Power	Backlight negative input(constant current)
2	LED+	Power	Backlight positive input (constant current)
3、5、6、13、14、21、22、29、36	GND	Ground	Ground
4	VDD	Power	3.3V power supply
7-12	Red Data	Output	RGB Red Data
15-20	Green Data	Output	RGB Green Data
23-28	Blue Data	Output	RGB Blue Data
30	LCD-CLK	Output	RGB LCD-CLK
31	STBY#	Output	LCD STBY#
32	LCD-HSYNC	Output	LCD HSYNC
33	LCD-VSYNC	Output	LCD VSYNC
34	LCD-DE	Output	RGB LCD-DE
35、37、38、39、40	NC	NC	NC

Notes:

1. This RGB interface shares signals with MIPI; only one can be used. Default: MIPI. For RGB, hardware/software changes are required.

2. Ensure the screen's voltage/current parameters match the mainboard's (default backlight current: 120mA). If the current parameters of the selected screen do not meet the requirements, you can seek support from our company's FAE.

4 Electrical Performance

Item		Min	Typical	Max
Power Parameters	Voltage	––	12V	––
	Ripple	––	––	50mV
	Current	1.5A		
Power Current (No Peripherals)	Operating		90mA	300mA
	Standby		10mA	30mA
Power Current (with MIPI)	Operating		300mA	1000mA
Total Output	Current	––	––	1.5A
Environment	Humidity	––	––	80%
	Operating Temp	0℃	––	60℃
	Storage Temp	−20℃	––	70℃

Note: Current consumption for RGB/MIPI screens depends on the screen model and is not listed above.

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5 Minimum Test Items

Description:

Minimum Stability and Reliability Tests		
No.	Test Item	Test Details
1	Basic Function Test	Test main functions: screen, Wi-Fi, Ethernet, USB, serial ports, speaker, microphone, etc.
2	Software Upgrade Test	Verify upgrade functionality (e.g., line flashing, USB drive upgrade).
3	High-Temperature Aging Test	high-temperature resistance: Operate at 60℃ for 3 days without crashes, display issues, or black screens.
4	Low-Temperature Power-Off Test	low-temperature resistance: Operate at 0℃ for 3 days without crashes, display issues, or black screens.
5	ESD Test	Simulate electrostatic discharge resistance per IEC 61000-4-2: ±4KV contact, ±8KV air. Must meet Class A/B.
6	Sweep Vibration Test	Test the product's vibration resistance involves simulating transportation conditions and assessing the solder joints and component durability to prevent potential issues. Using a vibration tester, the product is tested, and if the structure shows no loosening or detachment after testing, operates normally without malfunctions, screen abnormalities, black screens, or other electrical or structural defects, it is deemed OK.
7	Free-Fall Test	Simulate the transportation and handling of the product to assess its drop resistance, determining the structural durability of the device to prevent potential issues. This serves as a reference for design and process improvements. After testing, if the sample functions normally without electrical failures (such as freezing, screen abnormalities, black screens) or structural/external damage, it is deemed OK.

8	Short-duration power loss test (room temperature)	This test verifies the product's capability to endure repeated power on/off cycles.

6 Configurable Parameters (Variants)

Type	Standard		Mid-Range		High-End	
SPI_NAND	512MB	☐	1G	☑	2G	☐
EMMC	8	☐	16	☐	16	☐
	32	☐	32	☐	32	☐
	64	☐	64	☐	64	☐
WIFI+BT	2.4G	☑	2.4G+BT	☐	2.4G+BT	☐
	5G+BT	☐	5G+BT	☐	5G+BT	☐
4G	☐		☐		☐	
SIM 卡	☐		☐		☐	
ETH/RJ45	☑		☐		☐	
MIPI	☑		☐		☐	
RGB	☐		☐		☐	
USB*OTG	☑		☐		☐	
TTL*3	☑		☐		☐	
RS485*1	☐		☐		☐	

7 Usage Notes

During assembly and usage, please pay attention to the following (but not limited to) potential issues.

- Do not install or connect peripherals while the board is powered. Use anti-static tools (e.g., wrist straps).
- When connecting peripherals via cables, ensure pin definitions match the motherboard sockets to prevent short circuits due to incorrect wiring.
- When fixing the board with screws, distribute force evenly to avoid PCB deformation and potential open circuits.
- For interfaces with selectable voltages (e.g., LVDS, eDP), ensure the voltage matches the screen's specifications.
- For peripherals (USB, UART, IO, etc.), ensure level and current output compatibility.
- For serial ports, ensure level matching and correct TX/RX/485-A/485-B connections.
- Select a power supply that meets the total peripheral power requirements (voltage, current).
- Consider board height limits and heat dissipation in the overall product design.

8 Dimensions

8.1 Board Dimensions

PCB length 95.4mm，width：60.9mm，hole diameter:3.5mm，overall board height is approximately 10mm. For detailed drawings, contact sales for DXF files.