# UW-M328 V1.2 AI Android Smart Motherboard

# Technical Specifications

## Document modification history

| | Remarks | Date |
|---|---|---|
| 1 | Creation | 2018-05-11 |
| 2 | Version Update | 2019-12-10 |
| | | |

# 1 Overview

UW-M328 is a multimedia network playback and LCD driver all-in-one board based on the Rockchip RK3288 mainstream chip. It simultaneously supports LVDS/EDP/MIPI Display Screen + HDMI and offers four dual-screen independent display modes: (LVDS+EDP)/(EDP+EDP)/(LVDS+MIPI)/(EDP+MIPI). It can drive 7-100 inch Display Screens, supports up to 4K Full HD video decoding, and supports TFT LCD screens with resolutions of 3840x2160 (for VOP_BIG) and 2560x1600 (for VOP_LIT). It represents a professional, highly integrated Android smart hardware solution.

It is also the first AI smart hardware solution on the market integrating Sense Time's face recognition algorithm chip, boasting superior hardware computing power and display driving capability to meet diverse industry application needs.

## 超强四核Cortex-A17

- 超强四核Cortex-A17，频率高达1.8GHz
- ARM Mali-T764 GPU, 支持OpenGL ES1.1/2.0/3.0, OpenVG1.1, OpenCL, DirectX11
- 支持4K、H.265硬解码10bits色深


## HDMI 2.0

视频输出：HDMI2.0接口，最高分辨率4k

## 百兆网卡/双频WIFI/蓝牙4.0

网络：拥有百兆网卡，2.4GHz/5GHz双频WIFI
蓝牙：Bluetooth 4.0


# 2 Specifications

## 2.1 Hardware Specifications:

| | |
|---|---|
| CPU | Rockchip RK3288, Quad-core ARM Cortex A17 1.8 GHz |
| GPU | Quad-core ARM Mali-T764 MP |
| Memory | DDR3 Standard 2GB, 1GB~4GB ( Optional ) |
| Built-in Storage | EMMC_FLASH Standard 8GB, 8GB/16GB/32GB Optional |
| Display Interfaces | 1 x LVDS Interface (single channel, 6 or 8-bit dual channel). Supports maximum resolution 1920x1080, 7"-100" Display Screen<br>2-lane EDP Interface (single-lane 6 or 8-bit). Supports maximum resolution 1920x1080, 7"-100" Display Screen<br>1-lane MIPI Interface (single-lane 8-bit). Supports maximum resolution 1920x1080, 7"-100" Display Screen |
| LCD Voltage Options | LCD_VCC Voltage: 3.3V/5V/12V select able<br>LCD_Backlight Voltage: 12V power supply |
| Network Interface | RJ45 Interface: 100M, Ethernet support. |
| | Integrated Bluetooth + Wi-Fi module: supports Wi-Fi 802.11b/g/n protocol, 2.4 GHz/5 GHz dual-band (optional) |

| | |
|---|---|
| | Bluetooth 4.0 protocol support |
| | Built-in 3G/4G data module: supports WCDMA, EVDO, CDMA, GSM, 2G/3G full frequency band 850/900/1800/1900 MHz/2100 MHz |
| | Supports HDMI2.0_OUT for 4K high-definition output. Output supports LVDS+HDMI synchronous and asynchronous display. |
| | 5 USB HOST ports, 1 USB OTG port |
| | 6 UART serial ports (default 2 TTL ports, 4 RS232 ports; power supply can be configured to 5V) |
| | 2 Backlight connectors ( One is dedicated to EDP1, the other is shared by EDP2 and LVDS ) |
| | 2 IO ports. 1 ADC button Interface, 1 power on/off button Interface, 1 infrared remote control Interface, 1 MIC input |
| | Built-in 3.5mm 4-pole headphone jack supporting headset functionality, dual speaker Interface, 1.5W*2 8 ohm/3W*2 4 ohm |
| Real-time Clock | Built-in real-time clock battery for power, supporting timed power on/off and time preservation for over 1 year. |
| System Watchdog | Supports software watchdog functionality. |
| Touchscreen | 2 I2C ports, multiple USB Interfaces: supports infrared, resistive, and capacitive touchscreens. |
| Power Supply | Input: DC12V or 4PIN2.0 socket 12V Power Supply. |

## 2.2 Software Specifications:

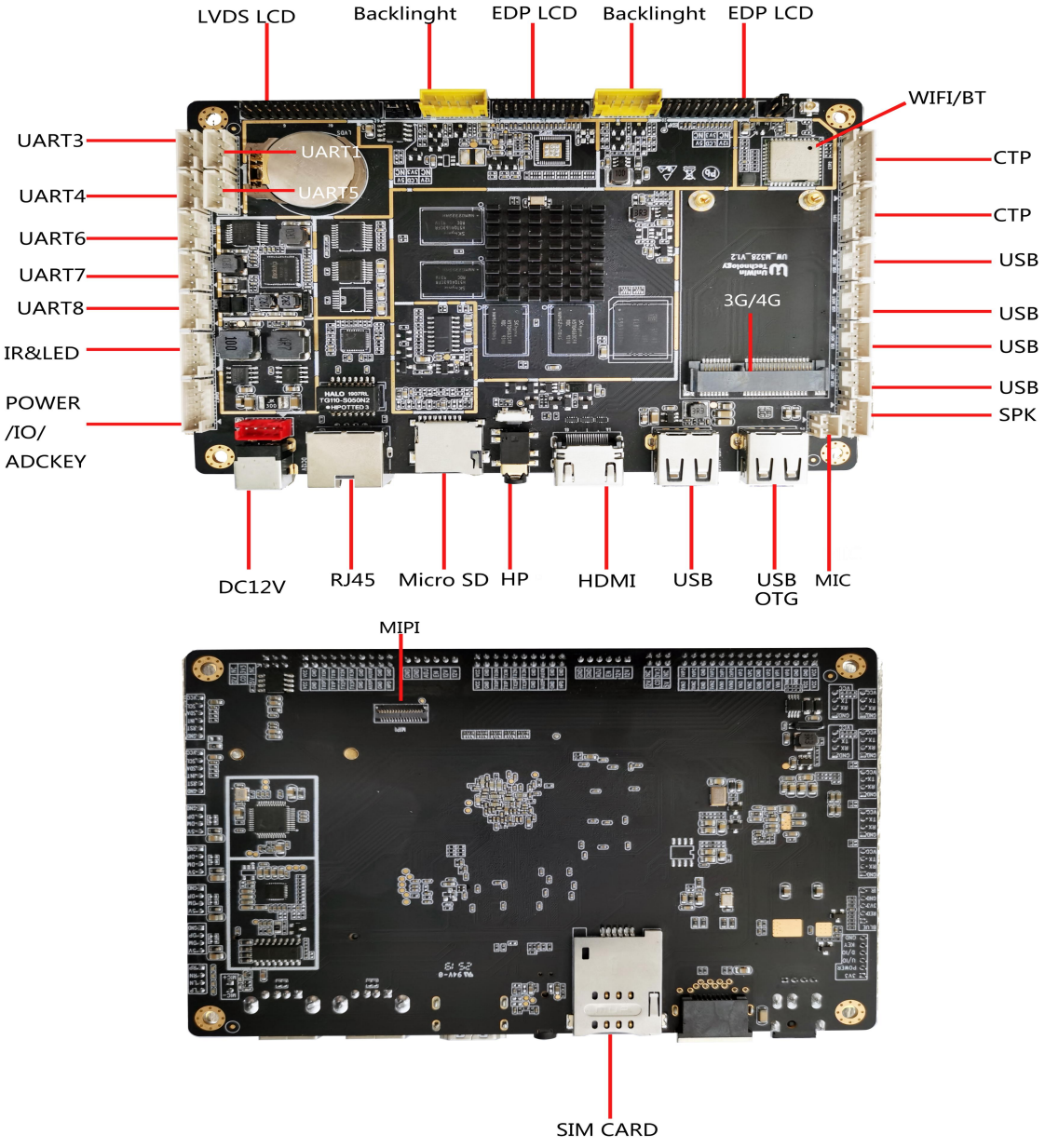
| | |
|---|---|
| Operating System | Google Android 7.1 System |
| Video | Supports 4K 10-bit VP9/H265/H264 video decoding, up to 60fps;<br>1080P multi-format video decoding (VC-1, MPEG-1/2/4, CP8);<br>1080P video encoding, supporting H.264, VP8 formats<br>Video Post Processor: Deinterlacing, denoising, edge/detail/color optimization |
| Audio | MP3, WMA, WAV, APE, FLAC, AAC, OGG, M4A, 3GP formats |
| Recording | Supports MP3 and WMA format recording |
| Image viewer | Supports browsing of JPG, BMP, PNG, and other image formats, and offers rotation, slideshow, and image zoom functionalities |
| Image Rotation | Supports 0, 90, 180, and 270-degree manual rotation |
| Sound Effect | Clock, Alarm, Calculator, Voice Recorder |
| Basic Software | Camera, Web Browsing, Online Chat, Email, E-book, File Manager |
| Language | Multi-country Languages |
| Tools | Calendar |
| | Alarm Clock |

| | |
|---|---|
| | Calculator |
| | Note Pad |
| | Weather + Clock |
| Document | EPUB, WORD, EXCEL, POWERPOINT, PDF, TXT |
| E-book | PDF/TXT/CHM/DOC/EXCEL/EPUB/RTF/FB2 |
| Input Method | Standard Android keyboard, with optional third-party input methods (Chinese, Korean, Japanese, etc.) |
| Network | Browser -ChromeLite |
| | GOOGLE Market |
| | Email |
| | Gmail |
| | Google talk |
| System Management | APK Installer |
| | Original Android system with open root access, enabling product customization and development. |
| | System setting |
| | Google Maps |

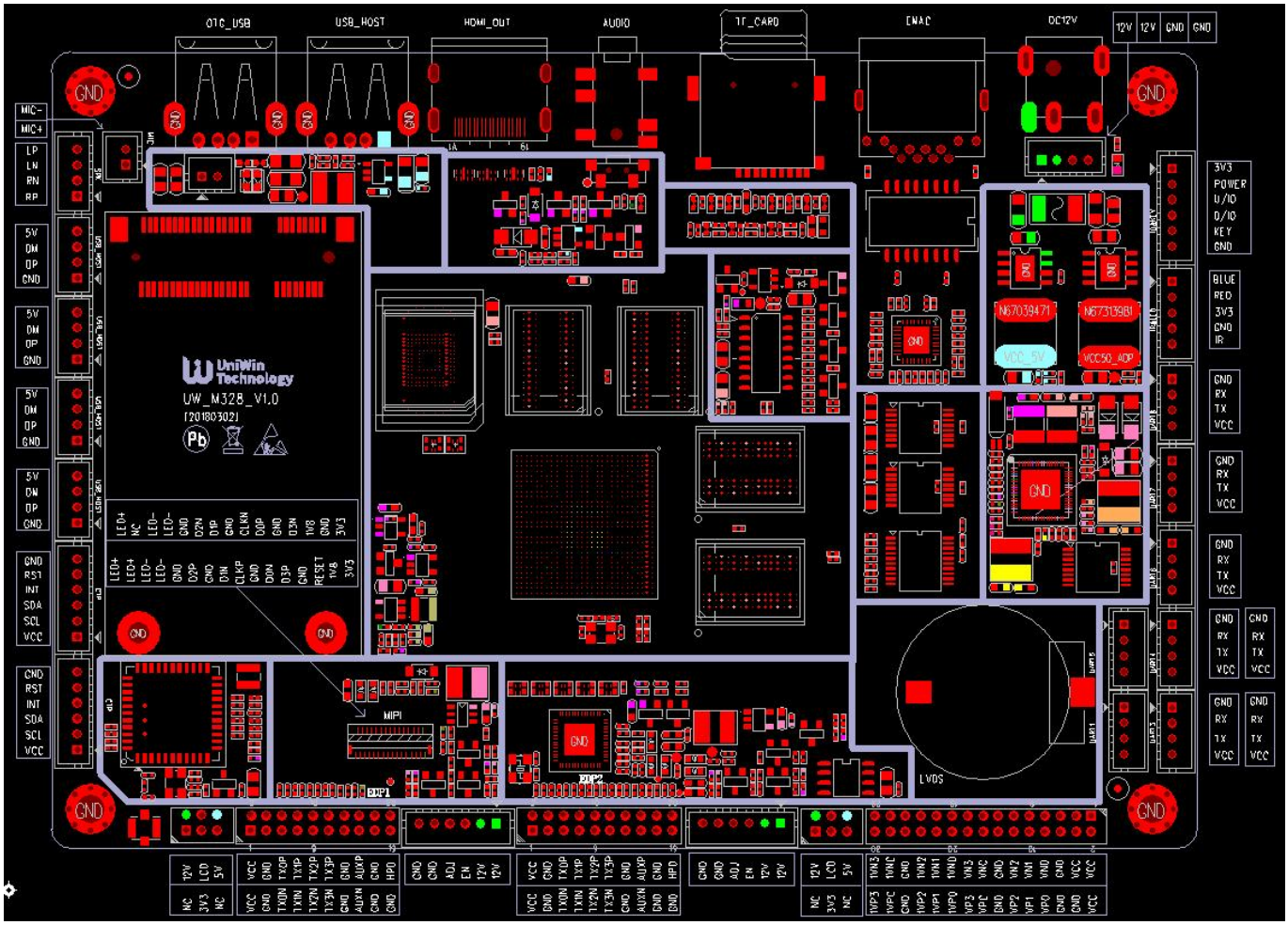
| | |
|---|---|
| | Global time, |
| | Supports OTA remote and incremental upgrades. |

# 3 Main Interfaces

## 3.1 Interface Distribution Diagram:



## 3.2 Main Interface PIN Definition Diagram:




1． 12V Power Supply Socket (4PIN/2.0)

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | 12V | Power Input | +12V Power Supply Input |
| 2 | 12V | Power Input | +12V Power Supply Input |
| 3 | GND | Ground | Power Supply Negative Pole |
| 4 | GND | Ground | Power Supply Negative Pole |

2. POWER/IO/ADCKEY（6PIN/2.0）

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | 3.3V | Output | 3.3V Output |
| 2 | PWR-ON | Output | Power On/Off Button |
| 3 | IO | Input/Output | Output Control Default Pull-up 3.3V |
| 4 | IO | Input/Output | Output Control Default Pull-down 3.3V |
| 5 | ADCKEY | Input | Requires Matched Key-Value Buttons |
| 6 | GND | Ground | Ground |

## 3. LED/IR（5PIN/2.0）

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | LED+ | Output | Motherboard Power Indicator Light |
| 2 | LED+ | Output | System Operation Indicator Light |
| 3 | VCC_3.3V | Output | Infrared Receiver Power Supply |
| 4 | GND | Ground | Receiver and LED Common Ground |
| 5 | IR_IN | Input | Infrared Receiver Signal Input |

## 4. UART8 Serial Port RS232 (4PIN/2.0) Optional TTL

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | GND | Ground | Ground |
| 2 | RX | Input | UART Data Input |
| 3 | TX | Output | UART Data Output |
| 4 | 3.3V | 3.3V Power Output | 3.3V Power Output, Optional 5V |

## 5. UART7 Serial Port RS232 (4PIN/2.0) Optional TTL

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | GND | Ground | Ground |
| 2 | RX | Input | UART Data Input |
| 3 | TX | Output | UART Data Output |
| 4 | 3.3V | 3.3V Power Output | 3.3V Power Output, Optional 5V |

## 6. UART6 Serial Port RS232 (4PIN/2.0) Optional TTL

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | GND | Ground | Ground |
| 2 | RX | Input | UART Data Input |
| 3 | TX | Output | UART Data Output |
| 4 | 3.3V | 3.3V Power Output | 3.3V Power Output, Optional 5V |

## 7. UART4 Serial Port TTL(4PIN/2.0) Optional RS232

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | GND | Ground | Ground |
| 2 | RX | Input | UART Data Input |
| 3 | TX | Output | UART Data Output |
| 4 | 3.3V | 3.3V Power Output | 3.3V Power Output, Optional 5V |

## 8. UART3 Serial Port TTL(4PIN/2.0) Optional RS232

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | GND | Ground | Ground |
| 2 | RX | Input | UART Data Input |
| 3 | TX | Output | UART Data Output |
| 4 | 3.3V | 3.3V Power Output | 3.3V Power Output, Optional 5V |

## 9. UART5 Serial Port RS232 (4PIN/2.0) Optional TTL

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | GND | Ground | Ground |
| 2 | RX | Input | UART Data Input |
| 3 | TX | Output | UART Data Output |
| 4 | 3.3V | 3.3V Power | 3.3V Power Output, Optional 5V |

| | | | |
|---|---|---|---|
| | | Output | |

## 10. UART1 Serial Port TTL System Print Information

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | GND | Ground | Ground |
| 2 | RX0 | Input | UART Data Input |
| 3 | TX0 | Output | UART Data Output |
| 4 | 3.3V | 3.3V Power Output | 3.3V Power Output, Optional 5V |

## 11. Speaker Output (4PIN/2.0)

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 4 | OUTP-L+ | Output | Left Channel Audio + Signal (Connect to Speaker +) |
| 3 | OUTN-L- | Output | Left Channel Audio - Signal (Connect to Speaker -) |
| 2 | OUTN-R- | Output | Right Channel Audio - Signal (Connect to Speaker -) |
| 1 | OUTP-R+ | Output | Right Channel Audio + Signal (Connect to Speaker +) |

## 12. MIC Microphone Interface (2PIN/2.0)

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | MIC+ | Audio Input | Audio Input+ |
| 2 | MIC- | Audio Input | Audio Input- |

## 13. USB_HOST Extension Interface (4PIN/2.0)

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | GND | Ground | Ground |
| 2 | DP1 | Input\Output | D+ Signal Line |

| | | | |
|---|---|---|---|
| 3 | DM1 | Input\Output | D- Signal Line |
| 4 | 5V Power Supply | Power Output | Power Output +5V |

## 14. USB_HOST Extension Interface (4PIN/2.0)

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | GND | Ground | Ground |
| 2 | DP1 | Input\Output | D+ Signal Line |
| 3 | DM1 | Input\Output | D- Signal Line |
| 4 | 5V Power Supply | Power Output | Power Output +5V |

## 15. USB_HOST Extension Interface (4PIN/2.0)

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | GND | Ground | Ground |
| 2 | DP1 | Input\Output | D+ Signal Line |
| 3 | DM1 | Input\Output | D- Signal Line |
| 4 | 5V Power Supply | Power Output | Power Output +5V |

## 16. USB_HOST Extension Interface (4PIN/2.0)

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | GND | Ground | Ground |
| 2 | DP1 | Input\Output | D+ Signal Line |

| | | | |
|---|---|---|---|
| 3 | DM1 | Input\Output | D- Signal Line |
| 4 | 5V Power Supply | Power Output | Power Output +5V |

## 17. Dual CTP Touch Screen Interface (6PIN/2.0)

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | 3.3V | Output | 3.3V Output |
| 2 | SCL | Output | Clock Signal |
| 3 | SDA | Input/Output | I2C Data |
| 4 | INT | Input | Interrupt |
| 5 | REST | Output | Reset |
| 6 | GND | Ground | Ground |

## 18. EDP1 LCD Screen Voltage Selection Interface (2X3PIN/2.0)

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | NC | NC | NC |
| 2 | LCD_12V | Power Input | Power Input, +12V |
| 3 | LCD_3.3V | Power Input | Power Input, +3.3V |
| 4 | LCD_OUT | Power Output | Power Output to Display Screen |
| 5 | NC | NC | NC |
| 6 | LCD_5V | Power Input | Power Input, +5V |

## 19. EDP2/LVDS LCD Screen Voltage Selection Interface (2X3PIN/2.0)

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | NC | NC | NC |
| 2 | LCD_12V | Power Input | Power Input, +12V |
| 3 | LCD_3.3V | Power Input | Power Input, +3.3V |
| 4 | LCD_OUT | Power Output | Power Output to Display Screen |
| 5 | NC | NC | NC |
| 6 | LCD_5V | Power Input | Power Input, +5V |

## 20. EDP1 Backlight Power Supply Control (6PIN/2.0/Yellow)

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | 12V | Power Output | Backlight Power Output |
| 2 | | | |
| 3 | BL_EN0 | Output | Backlight Board Switch Control Pin |
| 4 | BL_PWM | Output | Backlight Board Brightness Control Pin |
| 5 | GND | Ground | Ground |
| 6 | | | |

## 21. EDP2/LVDS Backlight Power Supply Control (6PIN/2.0/Yellow)

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | 12V | Power Output | Backlight Power Output |
| 2 | | | |
| 3 | BL_EN0 | Output | Backlight Board Switch Control Pin |

| | | | |
|---|---|---|---|
| 4 | BL_PWM | Output | Backlight Board Brightness Control Pin |
| 5 | GND | Ground | Ground |
| 6 | | | |

## 22. Dual EDP Display Output (EDP1, EDP2)

| | | |
|---|---|---|
| 1 | Output | 12V Output (Maximum Current 1500mA) |
| 2 | Output | 12V Output (Maximum Current 1500mA) |
| 3 | Ground | Ground |
| 4 | Ground | Ground |
| 5 | Output | EDP 0 Negative Data |
| 6 | Output | EDP 0 Positive Data |
| 7 | Output | EDP 1 Negative Data |
| 8 | Output | EDP 1 Positive Data |
| 9 | Output | EDP 2 Negative Data |
| 10 | Output | EDP 2 Positive Data |
| 11 | Output | EDP 3 Negative Data |
| 12 | Output | EDP 3 Positive Data |
| 13 | Ground | Ground |
| 14 | Ground | Ground |
| 15 | Output | Negative Sampling Clock |
| 16 | Output | Positive Sampling Clock |
| 17 | Ground | Ground |
| 18 | Ground | Ground |
| 19 | Ground | Ground |
| 20 | NC | NC |

# 23.LVDS Signal Output

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1.2.3 | VCC_Panel | Power Output | Power supply for the LCD Display Screen, selectable between 3.3V/5V/12V depending on the LCD screen (selected via jumper cap at item 19 in section 3.2) |
| 4.5.6 | GND | Ground | Power Supply Ground |
| 7 | RXO0- | Output | Pixel0 Negative Data (Odd) |
| 8 | RXO0+ | Output | Pixel0 Positive Data (Odd) |
| 9 | RXO1- | Output | Pixel1 Negative Data (Odd) |
| 10 | RXO1+ | Output | Pixel1 Positive Data (Odd) |
| 11 | RXO2- | Output | Pixel2 Negative Data (Odd) |
| 12 | RXO2+ | Output | Pixel2 Positive Data (Odd) |
| 13.14 | GND | Ground | Power Supply Ground |
| 15 | RXOC- | Output | Negative Sampling Clock (Odd) |
| 16 | RXOC+ | Output | Positive Sampling Clock (Odd) |
| 17 | RXO3- | Output | Pixel3 Negative Data (Odd) |
| 18 | RXO3+ | Output | Pixel3 Positive Data (Odd) |
| 19 | RXE0- | Output | Pixel0 Negative Data ( Even ) |
| 20 | RXE0+ | Output | Pixel0 Positive Data ( Even ) |
| 21 | RXE1- | Output | Pixel1 Negative Data ( Even ) |
| 21 | RXE1+ | Output | Pixel1 Positive Data ( Even ) |
| 23 | RXE2- | Output | Pixel2 Negative Data ( Even ) |
| 24 | RXE2+ | Output | Pixel2 Positive Data( Even ) |
| 25.26 | GND | Ground | Power Supply Ground |
| 27 | RXEC- | Output | Negative Sampling Clock ( Even ) |
| 28 | RXEC+ | Output | Positive Sampling Clock ( Even ) |
| 29 | RXE3- | Output | Pixel3 Negative Data ( Even ) |
| 30 | RXE3+ | Output | Pixel3 Positive Data ( Even ) |

## 24. MIPI Signal Output

| Serial No. | Definition | Attribute | Description |
|---|---|---|---|
| 1 | 3.3V | Power Supply | LCD_VCC |
| 2 | 3.3V | Power Supply | LCD_VCC |
| 3 | 1.8V | Power Supply | LCD_VDD |
| 4 | GND | Ground | Ground |
| 5 | RESET | Reset | Display Screen Reset |
| 6 | 1.8V | Power Supply | LCD_VDD |
| 7 | GND | Ground | Ground |
| 8 | D3N | Signal Input | MIPI DATA |
| 9 | D3P | Signal Input | MIPI DATA |
| 10 | GND | Ground | Ground |
| 11 | D0N | Signal Input | MIPI DATA |
| 12 | D0P | Signal Input | MIPI DATA |
| 13 | GND | Ground | Ground |
| 14 | CLKN | Signal Input | MIPI DATA |
| 15 | CLKP | Signal Input | MIPI DATA |
| 16 | GND | Ground | Ground |
| 17 | D1N | Signal Input | MIPI DATA |
| 18 | D1P | Signal Input | MIPI DATA |
| 19 | GND | Ground | Ground |
| 20 | D2N | Signal Input | MIPI DATA |
| 21 | D2P | Signal Input | MIPI DATA |
| 22 | GND | Ground | Ground |
| 23 | GND | Ground | Ground |
| 24 | LED- | Power Supply | Backlight Power Supply Negative |
| 25 | LED- | Power Supply | Backlight Power Supply Negative |

| | | | |
|---|---|---|---|
| 26 | LED- | Power Supply | Backlight Power Supply Negative |
| 27 | LED- | Power Supply | Backlight Power Supply Negative |
| 28 | NC | NC | NC |
| 29 | LED+ | Power Supply | Backlight Power Supply Positive |
| 30 | LED+ | Power Supply | Backlight Power Supply Positive |
| 31 | LED+ | Power Supply | Backlight Power Supply Positive |

# 4 Dimensions

## 4.1 Board Dimensions

PCB Length: 148mm; PCB Width: 102mm; Total board height approximately 11mm. For more details structural diagrams Please consult our sales representatives.