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ENGINEERING SPECIFICATION

Technical requirements and design for the RDK (Rapid Development Kit) Board.
Model No: UMOH-S009MD-070

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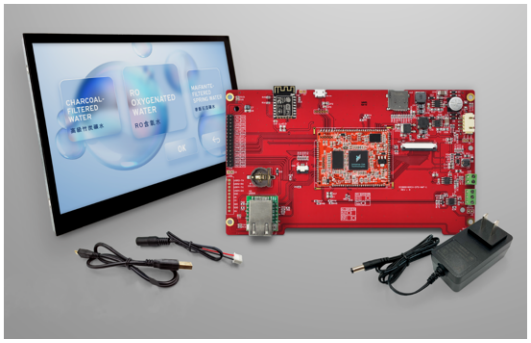
Revision History

Revision	Date Released	Description of Change
0	5/28/2024	Original Release

1 Table of Contents

2 Introduction for the RDK Kit

You are going to receive a box with the following components:



- LCD Display with RDK (Rapid Development Kit) Board
- Power Cables
- I/O Connectors

Our RDK comes with HMI software filled with Widgets and simulations capabilities so that you can easily design your user interface on the LCD Panel **(Figure 1)**.

Figure 1

- This HMI software is called the ADE (Acorn Development Environment) and you can download it from here: https://rdktech.org
- For reference manual and other educational materials including videos for the ADE, please visit: https://rdktech.org/rdk-documentation
- For educational videos, please access: https://www.youtube.com/@RDK_Tech
- If you have any questions, please contact Microtips Technology: mtusainfo@microtipsusa.com

3 General Description for LCD + RDK Board

The Nexus Panel is an MCU-based HMI solution. The goal of this product line is to address HMI applications that require extensive connectivity. The Nexus Panel supports a wide range of communication interfaces, and the combination of these interfaces are customizable. In addition, the Nexus Panel offers extensive I/O functions for control. The communication and control functionalities can be implemented in our ADE (Acorn Development Environment). This product must work with ADE to perform the HMI tasks designed in ADE. The Nexus Panel coupled with ADE offers a total HMI solution. This document describes the following product(s):

Table 1. Nexus Panel Product Line

Part Number	Resolution	Panel Size	Touch Type
UMOH-S009MD-070	800x480	7.0”	CTP

Note: CTP = Capacitive Touch Panel

The product described in this document supports the following communication interface(s):

Table 2. Communication Interfaces Supported

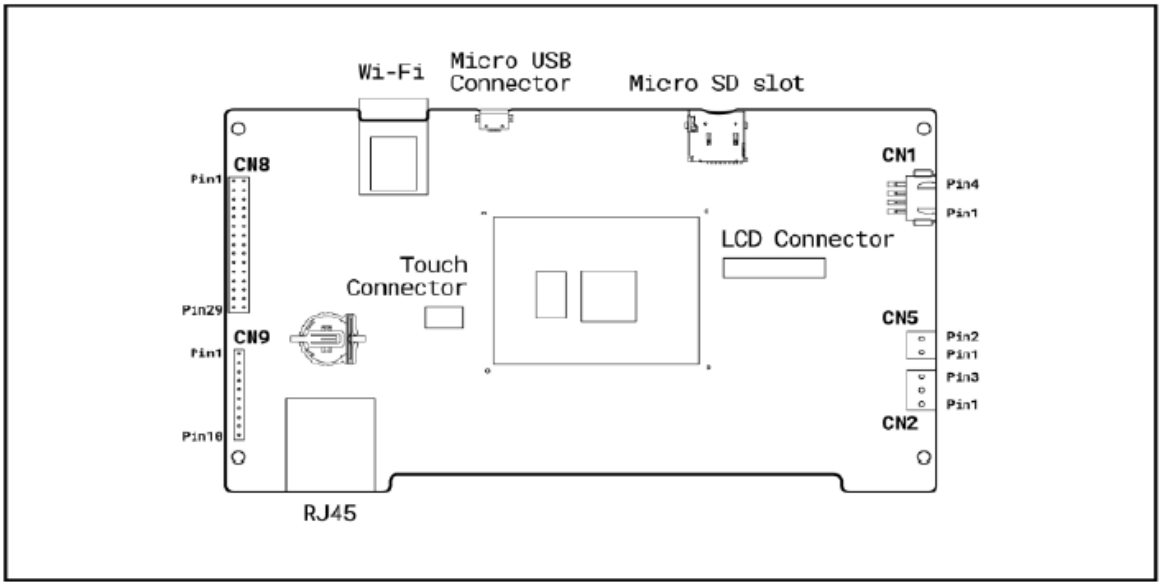
Interface	Supported by this product
RS-485	Yes
CAN Bus	Yes
Wi-Fi	Yes
Ethernet	Yes

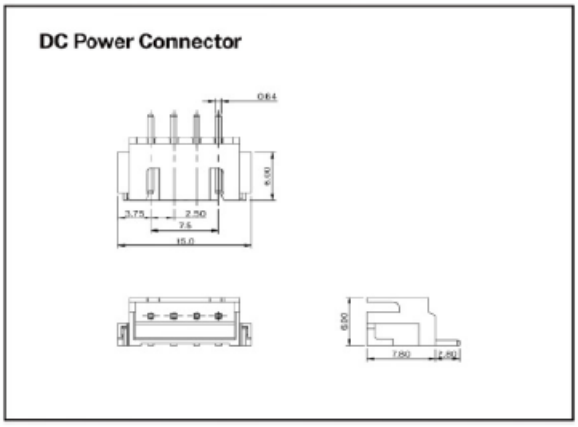
Features

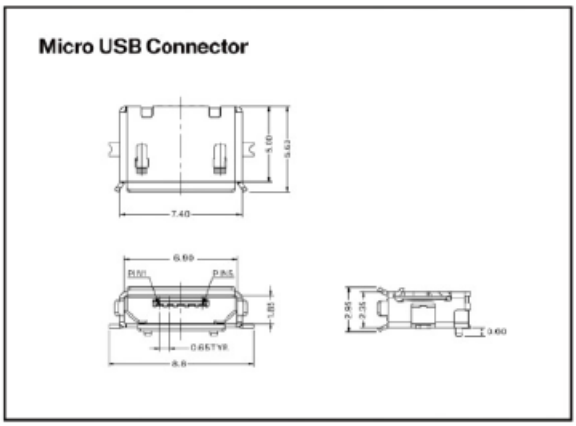
- Work with ADE for delivering HMI
- Support combinations of various communication interfaces such as RS-485, CAN Bus, Wi-Fi, and Ethernet
- ARM Cortex M7-based MCU @480MHz with 32MB DRAM
- Built-in 2Gb (256MB) Flash memory for storage
- 7.0” 800x480 IPS LCM with CTP
- Support ARGB888 (16,777,216 colors) with 256 levels of transparency
- Support LCM backlight control
- Support touch control
- Support GPIO, PWM, ADC functions
- Support input capture mode for frequency measurement
- Support UART communication interfaces
- Support I2C/SPI interface for expended applications
- Support DC 12V~DC 24V flexible DC input
- 4x 3.5mm holes for mounting tabs with M3 screws

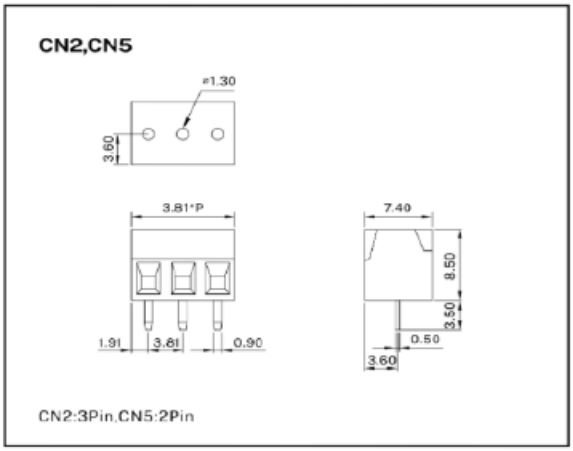
4 Interface Description for the RDK Board

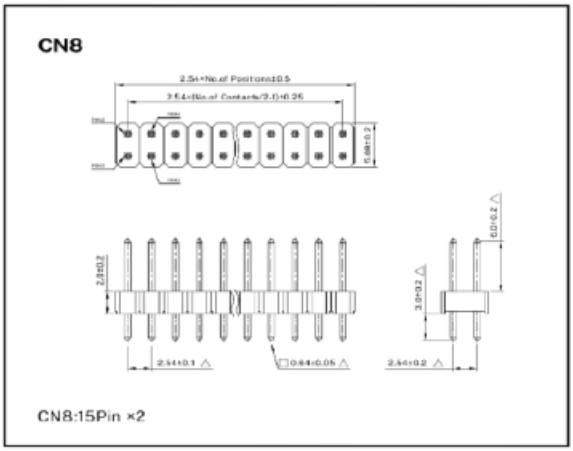
Figure 1. Control Board Outline











4.1 Connector 8 (CN8) Pin Definition

Figure 2. CN8 Pin Definition

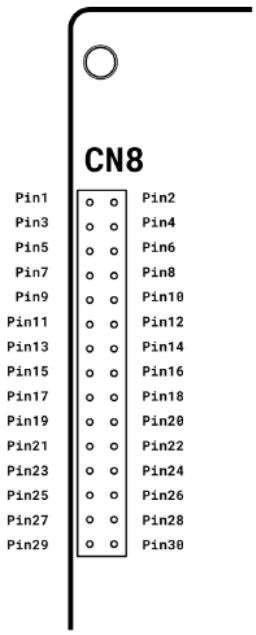


Table 3. CN8 Pin Definition

Pin Number	Name	I/O	Description
1	VIN	P	DC 5V input.
2	VIN	P	DC 3.3V input
3	VIN	P	DC 5V input.
4	VIN	P	DC3.3V input
5	GND	P	Supply Ground.
6	GND	P	Supply Ground.
7	GND	P	Supply Ground.
8	GND	P	Supply Ground.
9	nRST	I	Rest signal, active low.
10	I2C1_SCL	I/O	Clock signal for I2C interface.
11	PWM1	I/O	This pin offers three different functions: GPIO, PWM and Input-capture. Users can select which function to be assigned to this pin inside ADE. For PWM, this pin generates digital pulses based on the parameters including frequency and duration set in the ADE. For the input-capture, the capture mode and the corresponding behavior are all set inside ADE.

Pin Number	Name	I/O	Description
12	I2C1_SDA	I/O	Serial data signal for I2C interface.
13	PWM2	I/O	This pin shares the same functionality as that of PWM1. Please refer to PWM1 description for details.
14	GPIO0	I/O	General Purpose Input/Output, 3.3V Level - 5V Tolerant.
15	PWM3	I/O	This pin is reserved. This pin's behavior is the same as that of PWM4. However, users can NOT set this pin in ADE. Those who would like to use PWM3 must use Python to initialize this pin.
16	GPIO1	I/O	General Purpose Input/Output, 3.3V Level - 5V Tolerant.
17	PWM4	I/O	This pin offers two different functions: GPIO and PWM. Users can select which function to be assigned to this pin inside ADE. For PWM, this pin generates digital pulses based on the parameters including frequency and duration set in the ADE.
18	GPIO2	I/O	General Purpose Input/Output, 3.3V Level - 5V Tolerant.
19	PWM5	I/O	This pin shares the same functionality as that of PWM4. Please refer to PWM4 description for details.
20	GPIO3	I/O	General Purpose Input/Output, 3.3V Level - 5V Tolerant.
21	PWM6	I/O	This pin shares the same functionality as that of PWM4. Please refer to PWM4 description for details.
22	GPIO4	I/O	General Purpose Input/Output, 3.3V Level - 5V Tolerant.
23	GND	P	Supply Ground.
24	GND	P	Supply Ground.
25	ADC0	I/O	General Purpose I/O pin with Analog Capability. This pin has a range of 0-3.3V when used as an Analog Input, and is 3.3V tolerant only.
26	ADC1	I/O	General Purpose I/O pin with Analog Capability. This pin has a range of 0-3.3V when used as an Analog Input, and is 3.3V tolerant only.
27	ADC2	I/O	General Purpose I/O pin with Analog Capability. This pin has a range of 0-3.3V when used as an Analog Input, and is 3.3V tolerant only.
28	ADC3	I/O	General Purpose I/O pin with Analog Capability. This pin has a range of 0-3.3V when used as an Analog Input, and is 3.3V tolerant only.
29	ADC4	I/O	General Purpose I/O pin with Analog Capability. This pin has a range of 0-3.3V when used as an Analog Input, and is 3.3V tolerant only.
30	ADC5	I/O	General Purpose I/O pin with Analog Capability. This pin has a range of 0-3.3V when used as an Analog Input and is 3.3V tolerant only.

Note: I = Input, O = Output, P = Power

4.2 Connector 9 (CN9) Pin Definition

Figure 3. CN9 Pin Definition Pin

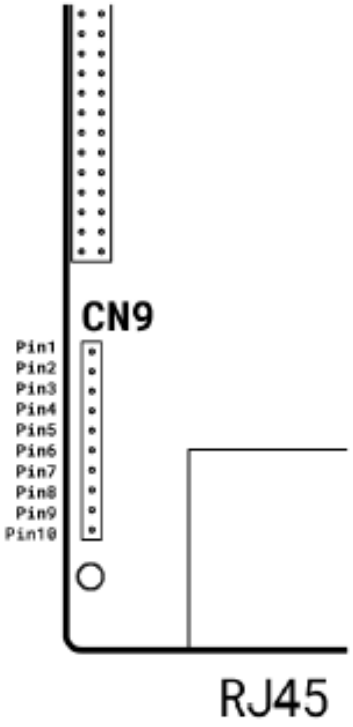


Table 4. CN9 Pin Definition

Pin Number	Name	I/O	Description
1~10	N/A	N/A	Reserved. These pins are not functional. Users should not use these pins.

4.3 Connector 5 (CN5) Pin Definition

Figure 4. CN5 Pin Definition

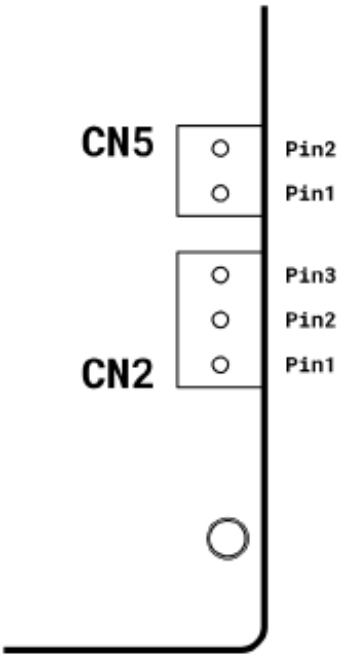


Table 5. CN5 Pin Definition

Pin Number	Name	I/O	Description
1	CAN1H	I/O	CAN Bus high-level volage. The CAN Bus physical interface meets ISO-11898 standard.
2	CAN1L	I/O	CAN Bus low-level volage. The CAN Bus physical interface meets ISO-11898 standard.

Note: I = Input, O = Output, P = Power

These two pins are the CAN Bus physical connection. If ID1 and ID2 are set to be UART function, then these two pins are not functional. If enabled, the maximum communication speed supported is 1 Mbps.

4.4 Connector 2 (CN2) Pin Definition

Figure 5. CN2 Pin Definition

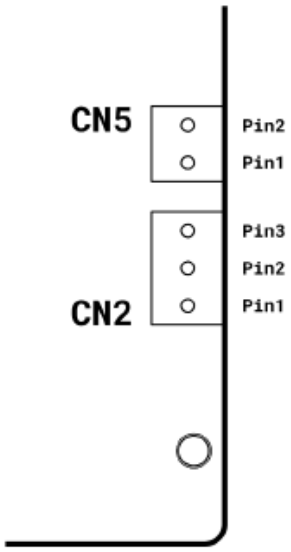


Table 6. CN2 Pin Definition

Pin Number	Name	I/O	Description
1	D+	I/O	Inverting RS-485 input and output.
2	D-	I/O	Noninverting RS-485 input and output.
3	GND	P	Supply Ground.

Note: I = Input, O = Output, P = Power

This RS-485 function is available when UART2 is disabled. These two functions are mutually exclusive. The maximum speed supported by this RS-485 interface is 5 Mbps.

4.5 **Wi-Fi Interface**

This Wi-Fi Interface supports 802.11b/g/n with a printed antenna. This Wi-Fi interface is connected via UART1. Users can program this Wi-Fi interface in ADE. This interface supports FTP, HTTP, NSMP and RIP protocols. However, HTML is NOT supported.

4.6 **RJ45 Connector (Ethernet)**

This Ethernet interface supports 10/100 BASE-TX compliant with IEEE802.3/802.3u. This Ethernet interface is connected via the SPI interface. Users can program this Ethernet in ADE. This interface supports FTP, HTTP, NSMP and RIP protocols. However, HTML is NOT supported.

4.7 Connector 1 (CN1) Pin Definition

Figure 6. CN1 Pin Definition

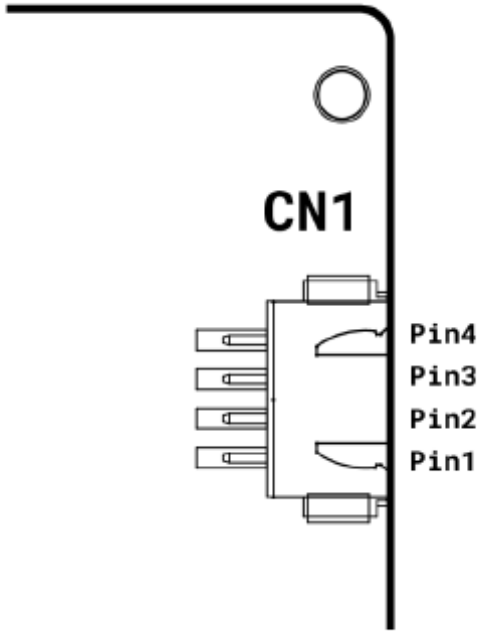


Table 7. CN1 Pin Definition

Pin Number	Name	I/O	Description
1	GND	P	Supply Ground.
2	Reserved.	2	Reserved.
3	Reserved.	3	Reserved.
4	VIN	P	12.0V~ 24.0V DC input.

Note: I = Input, O = Output, P = Power

5 Absolute Maximum Ratings for the RDK Board

Table 8. Absolute Maximum Ratings

Item	Minimum	Maximum	Unit
Storage temperature	-30	+80	℃
Operating ambient temperature	-20	+70	℃
Input supply voltage with respect to GND	9.0	24.0	V
IO voltage with respect to GND	+3.3 (±10%)	+5.0	V

Note: IO Voltage is specified under the no-pull configuration.

6 Electrical Characteristics for the RDK Board

6.1 DC Characteristics

The following table is measured when the control board is driving a 7" LCM @800cd/m^2.

Table 9. DC Characteristic

Symbol	Item	Minimum	Typical	Maximum	Unit
VIN	Input power voltage	9.0	12.0	24.0	V
VDD	Internal working voltage	3.0	3.3	3.5	V
	Operating current with backlight turned off		260		mA
VIH	I/O input high level	0.7VDD	–	5.0	V
VIL	I/O input low level	0	–	0.3VDD	V
VOH	I/O output high level	VDD-0.4	–	VDD	V
VOL	I/O output low level	0	–	0.3VDD	V

7 UART2 Communication Protocol

The default UART communication protocol will be described in this section. This is only applicable to UART2 interface. Various protocols can be selected in ADE. However, we do allow customization of the protocol. Please contact us for the customization service. The following Protocol format is IOT protocol will to seeing as below.

7.1 Command Format

Table 10. Command Format

Command	Lead Byte	Type Byte	Register ID Low Byte	Register ID High Byte	Tailing Bytes
Set Register	0x11	0x00	0x00~0xFF	0x00~0xFF	Data Payload
Read Register	0x11	0x01	0x00~0xFF	0x00~0xFF	N/A

7.2 Data Payload Format

Table 11. Data Payload Format

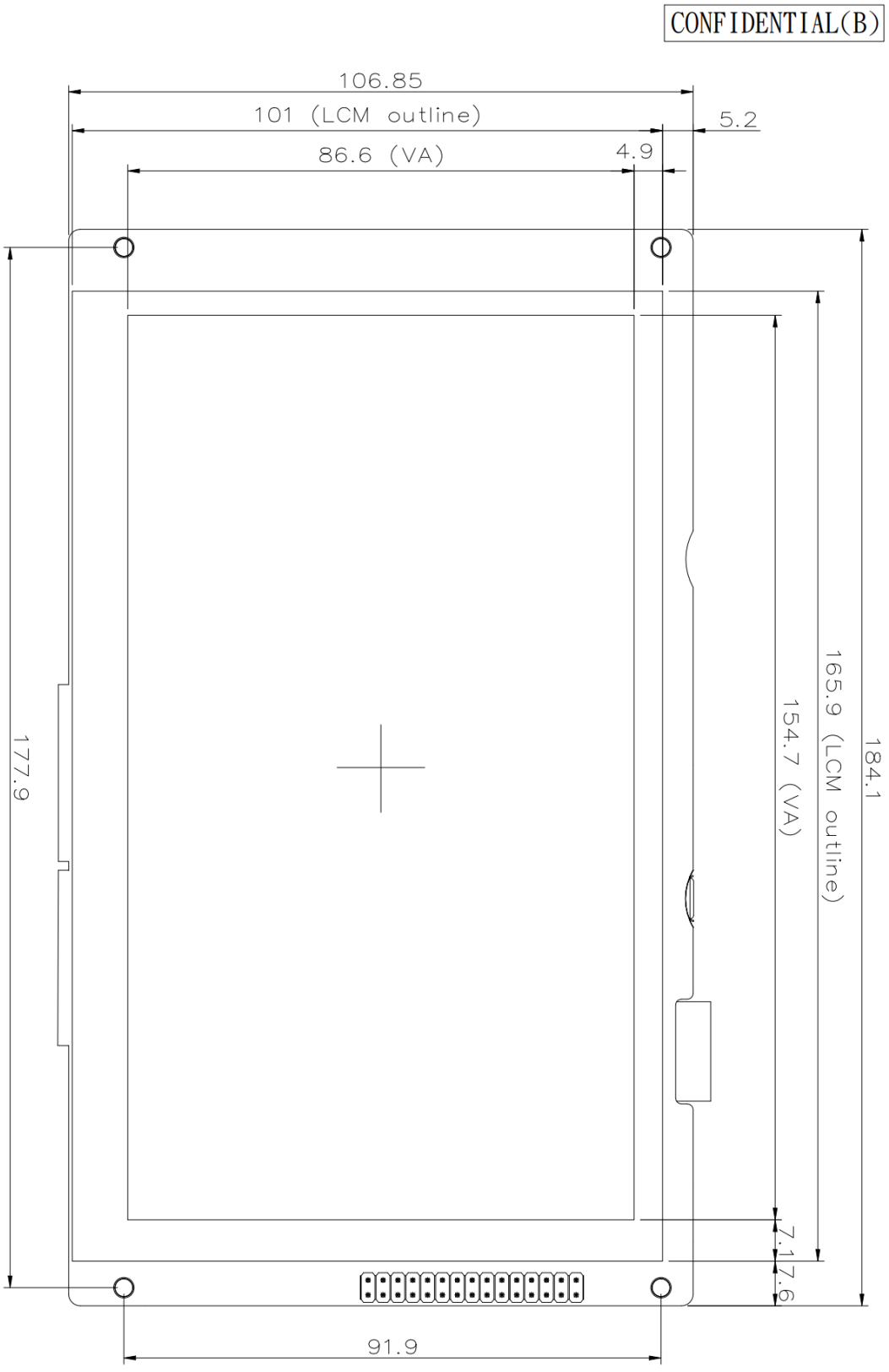
Payload Type	ID Byte	Length Low Byte	Length High Byte	Tailing Bytes
Boolean	0x00	0x01	0x00	Data Bytes
String	0x01	0x01~0xFF	0x00~0xFF	Date Bytes
Integer	0x02	0x01/02/04/08	0x00	Data Bytes
Unsigned Integer	0x03	0x01/02/04/08	0x00	Data Bytes
Floating Point	0x04	0x04/08	0x00	Data Bytes

Note: Data bytes are of the Little-Endian format.

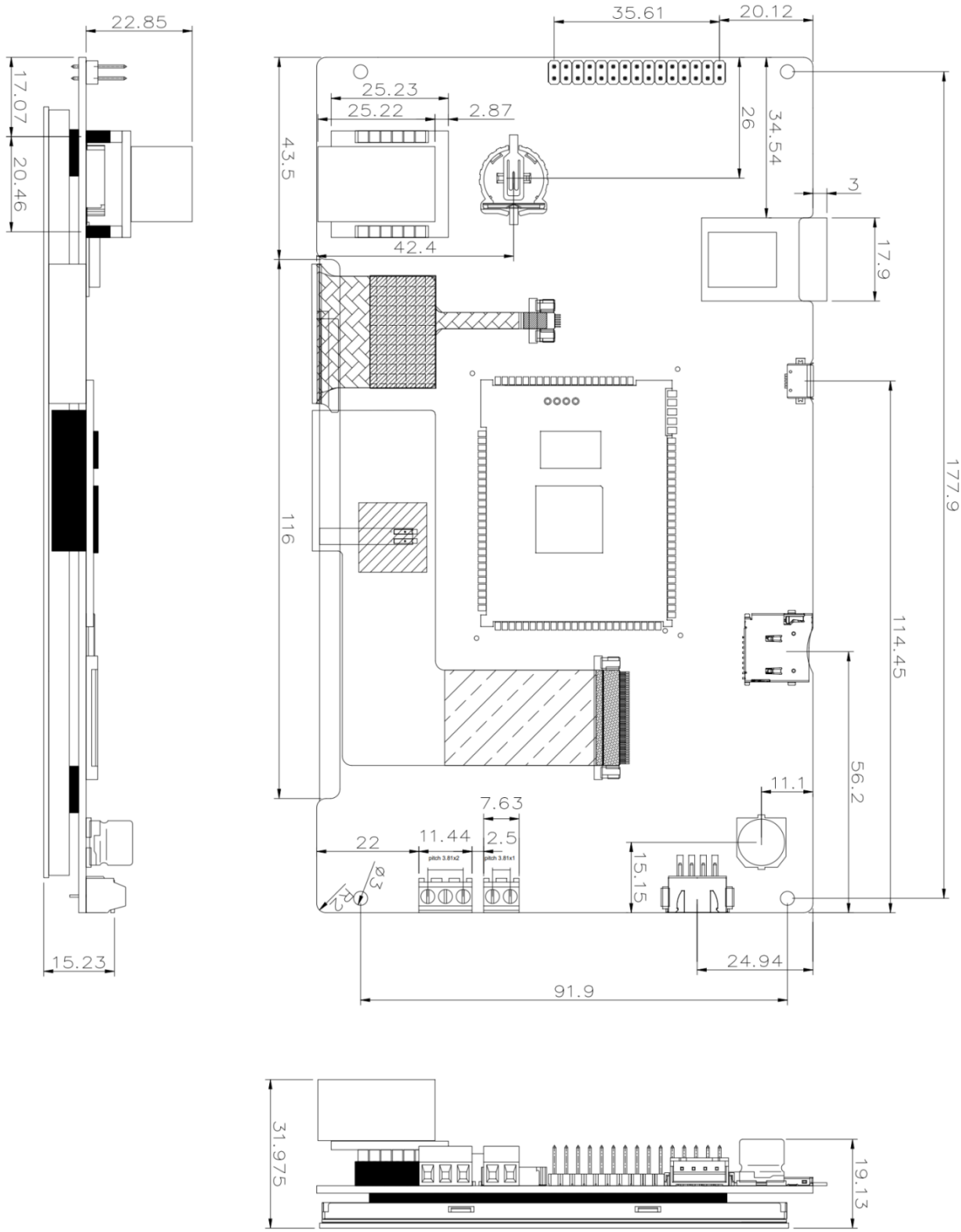
8 Mechanical Drawing (LCD + RDK Board)

8.1 Figure 7. Mechanical Drawing for UMOH-S009MD-070 with LCM.

For the full 7.0 ” LCD spec only, please download it from here: https://tinyurl.com/utkwju4z



CONFIDENTIAL(B)



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