

**Real-time !!**

**LEDmsg protocol**

- RS232/TTL
- Ethernet
- RS485
- PLC SSR signal

**PC server**

**Embedded controller**

**Sensor**

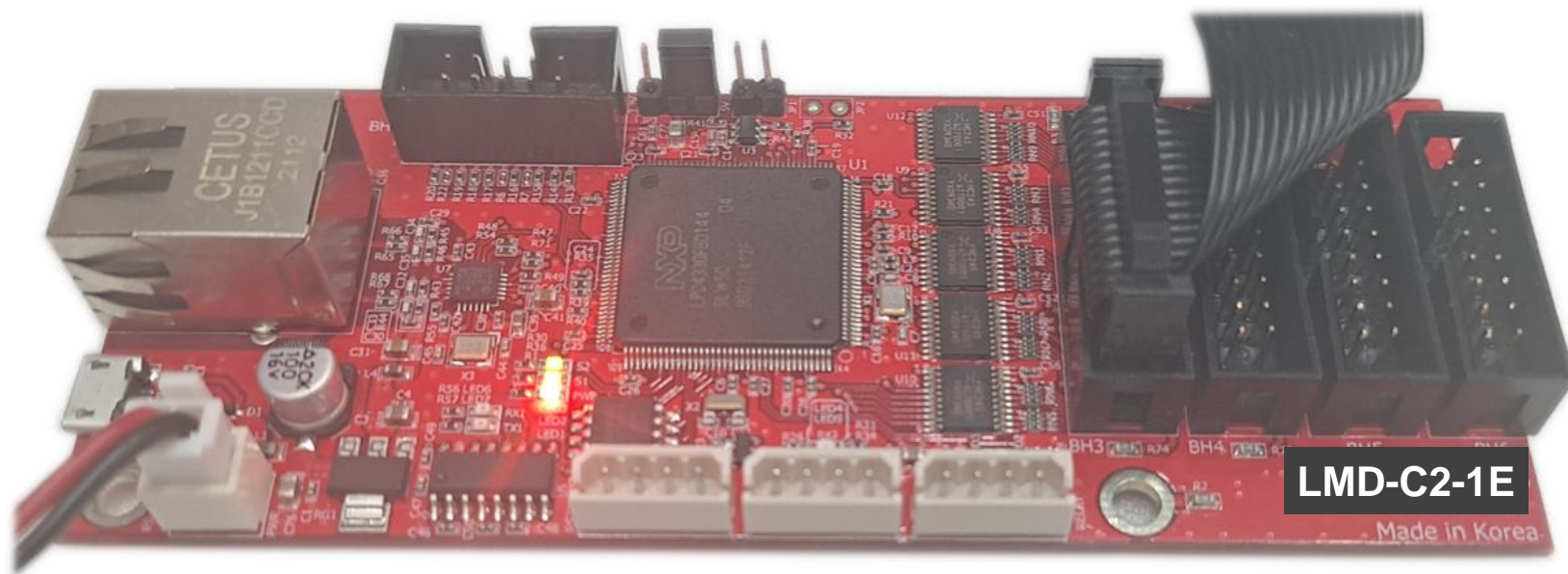
**PLC**

Industrial LED Message Display for PLC PC Embedded IoT Robot Cloud Sensor...

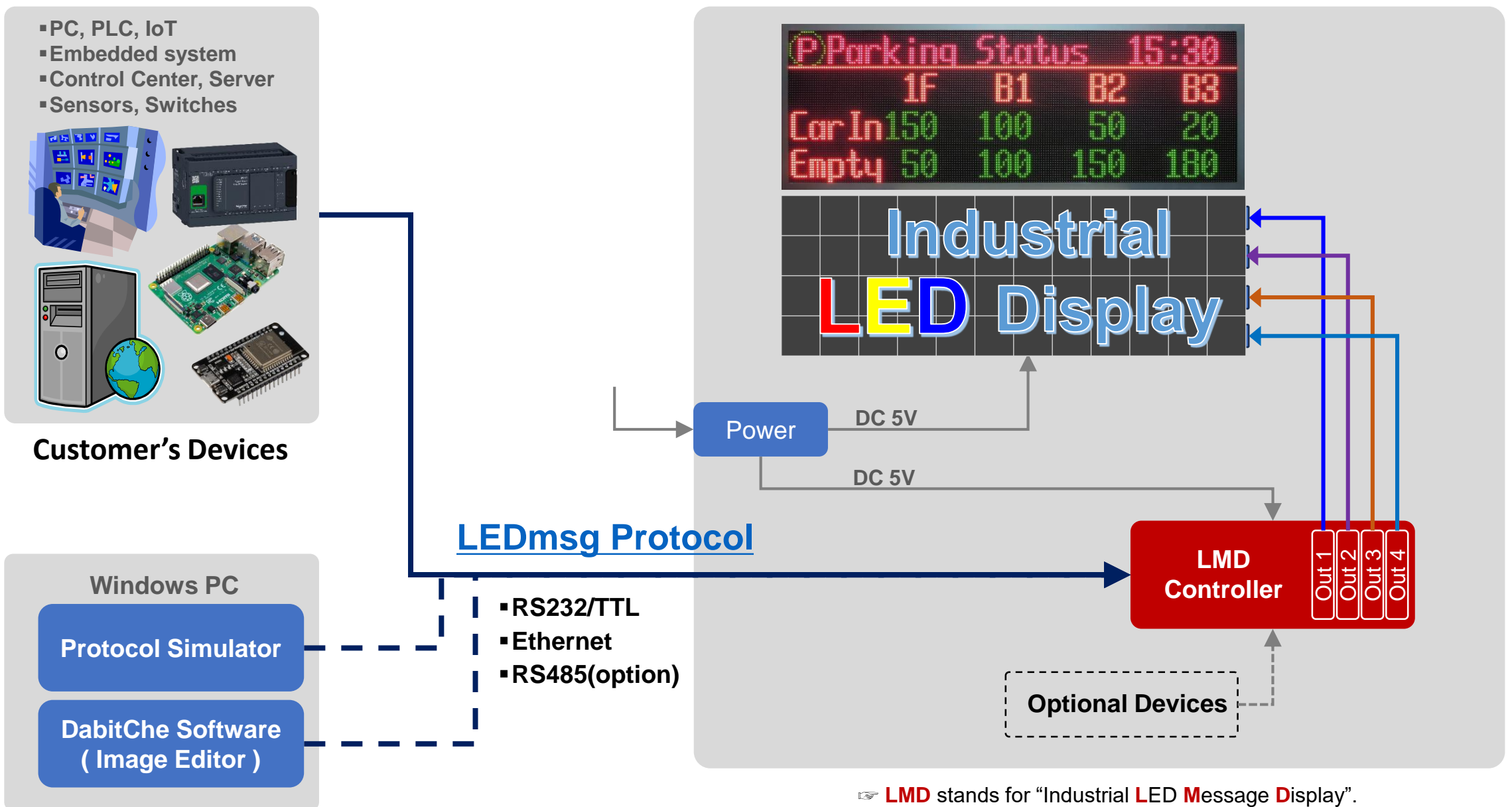
# LMD Controller Manual ( Model : LMD-C2-1E )

## Contents

1. <a href="#">Composition</a>	Page 2
2. <a href="#">Features</a>	3
3. <a href="#">Specification</a>	4
4. <a href="#">Dimension</a>	5
5. <a href="#">Port Function Setup</a>	6



If you have any questions regarding the contents of this manual, please contact "82-2-2272-5038 or [LEDmsg01@gmail.com](mailto:LEDmsg01@gmail.com)".



LMD stands for "Industrial LED Message Display".

Components	Description																	
<b>Customer's Devices</b>	A customer's system or device that sends message data to display on the LED signboard It could be " PC, PLC, IoT, Embedded system, Control Center, Server, Sensors, Switches ....".																	
<b>LMD Controller</b>	<table border="1"> <thead> <tr> <th>Model</th> <th>Max. Screen Size ( Row x Column )</th> <th>Communication Methods</th> <th>Display Contents</th> </tr> </thead> <tbody> <tr> <td>LMD-C1-1S</td> <td>2R x 16C or 1R x 32C</td> <td>RS232/TTL, RS485(option)</td> <td rowspan="4"> <ul style="list-style-type: none"> <li>• Real Time Message</li> <li>• Page Messages (Stored Message)</li> <li>• Background Images (Text, Graphic, Animation)</li> </ul> </td> </tr> <tr> <td>LMD-C1-1E</td> <td>2R x 16C or 1R x 32C</td> <td>RS232/TTL, Ethernet</td> </tr> <tr> <td>LMD-C2-1E</td> <td>4R x 20C or 2R x 40C</td> <td>RS232/TTL, Ethernet, RS485(option)</td> </tr> <tr> <td>LMD-C3-1S</td> <td>8R x 16C</td> <td>RS232, Ethernet(option)</td> </tr> </tbody> </table>	Model	Max. Screen Size ( Row x Column )	Communication Methods	Display Contents	LMD-C1-1S	2R x 16C or 1R x 32C	RS232/TTL, RS485(option)	<ul style="list-style-type: none"> <li>• Real Time Message</li> <li>• Page Messages (Stored Message)</li> <li>• Background Images (Text, Graphic, Animation)</li> </ul>	LMD-C1-1E	2R x 16C or 1R x 32C	RS232/TTL, Ethernet	LMD-C2-1E	4R x 20C or 2R x 40C	RS232/TTL, Ethernet, RS485(option)	LMD-C3-1S	8R x 16C	RS232, Ethernet(option)
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<b>Optional Devices</b>	<p>This type of the controller can be used in connection with the devices below.</p> <ul style="list-style-type: none"> <li>• <a href="#">RS485 Converter</a></li> <li>• <a href="#">Switch IO Board to display stored message</a></li> <li>• <a href="#">Brightness Control sensor</a></li> <li>• <a href="#">GPS Time receiver</a></li> <li>• <a href="#">Relay Output(2channel)</a></li> </ul>																	
<b>LED module</b>	The LMD controller uses common HUB75E RGB 16x16 MATRIX LED modules produced in China. The display signal pattern of an LED module varies depending on the manufacturer and module type. Therefore, compatibility with the LMD controller must be tested according to "" <a href="#">Protocol Simulator Manual, A-7 How to set LED Display Signal</a> ". Otherwise, we recommend using our company's verified " <a href="#">LMD LED modules</a> ."																	
<b>Power</b>	DC5V shall be supplied to LMD controller and LED panels.																	
<b>Protocol Simulator</b>	This runs on a Windows PC and can perform basic setup and protocol simulation of the LED signboard. For details, refer to " <a href="#">Dabit Protocol Simulator Manual</a> "																	
<b>DabitChe Software</b>	By using DabitChe on Windows PC, you can create various image files, save them in one B.G Playlist(Max. 255) and upload them to the LMD controller. Then, you can call the file number and display it alone or use it as the background for a protocol message. For details, refer to " <a href="#">DABIT Software Manual, chapter 4 and attachment 6</a> "																	

### A. Hardware side

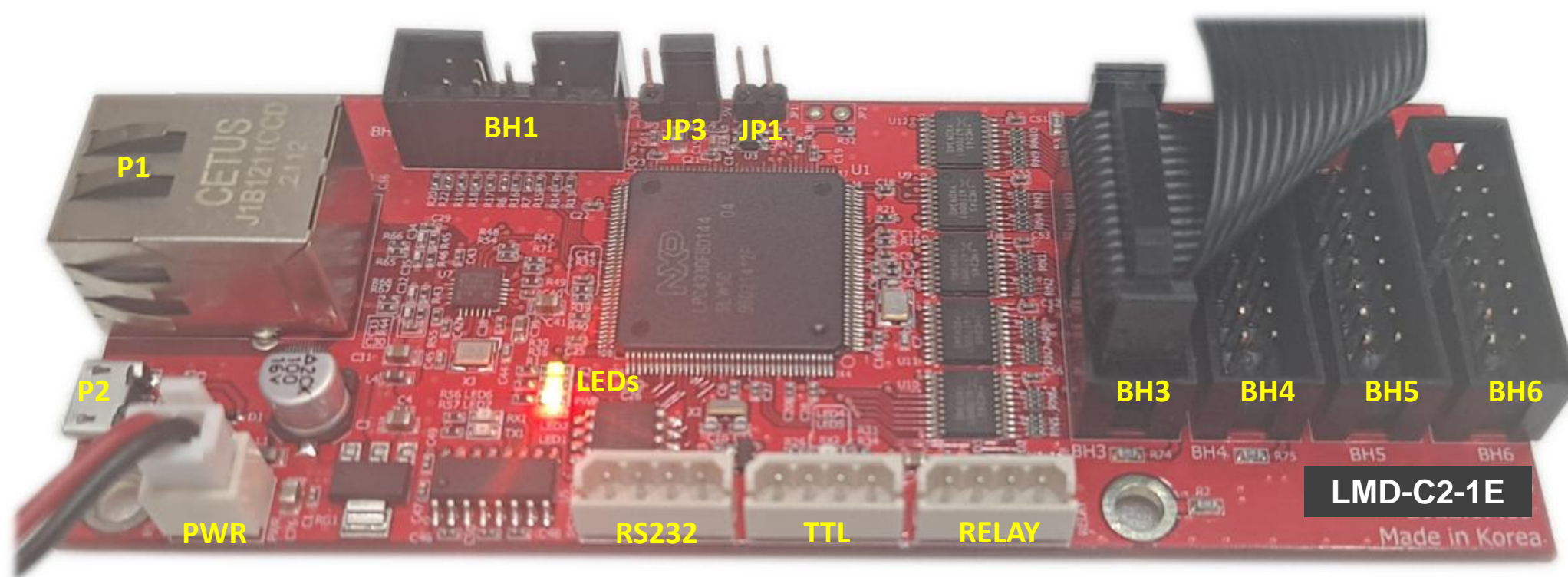
1. Built-in high-performance Dual Core CPU, enabling use of various ports and multi-communications
2. Various optional products available
  - 1) [RS485 Converter](#): communicates with RS485 devices
  - 2) [Switch IO Board](#): displays the stored message by directly receiving switching signals from PLC, relays, switches, sensors.
  - 3) [Brightness Control sensor](#): automatically adjusts the brightness of the LED screen according to the surrounding brightness. As for the outdoor LED signboard, it has the effect of reducing power consumption, reducing glare, and increasing LED lifespan.
  - 4) [GPS Time receiver](#): receives and updates the accurate time data to the controller.
  - 5) [Relay Output\(2-channel\)](#): controls peripheral devices such as warning lights, buzzers, fans and guide bars.
  - 6) USB/SD card socket: increases the memory when necessary.
  - 7) [Ethernet converter<sup>\[1\]</sup>](#): converts Serial(TTL ports) to Ethernet
3. Since 2005, LMD solution has developed and proven in various industrial fields such Parking lots, subway/train/bus stations, terminals, airports, factories, roads, tunnels, stadiums, power plants, buildings, etc.  
These days, LMD controllers is often used as a small, high-brightness, low-power high-LED display for drones, robots, and IOT devices due to its' **simple, economic and effective display performance.**

### B. Software side

1. The [LEDmsg Protocol](#) is simple and highly scalable, so even beginners can easily apply it.  
If you simply sketch the text or image you want to display on the LED signboard and send it to us, we will provide you with a sample packets of the corresponding message protocol.
2. There are various ways to display messages as follows.
  - 1) Send message protocol and display it in real time
  - 2) Send multiple message protocols and display them in page order
  - 3) Add a background image file number into the message protocol and display them together
3. There are various message display effects.
  - 1) Supports over 40 effects, including moving effects and text/background blinking.  
But, The LMD-C3-1S model has limitations on the use of scrolling effects, 3D effects, etc. on screens larger than "4 rows x 20 columns".
  - 2) The screen can be divided into up to 4 sections, and individual message data can be transmitted and displayed with individual effects.
  - 3) Long messages can be displayed continuously up to 120 characters (240 English characters) by moving them to the left.
4. Through the DABIT Protocol Simulator, initial environment setup and message simulation can be easily performed.
5. You can create various image files with [DabitChe software](#) and save them on the LMD controller in advance, then import and display them directly or use them as background images for messages.

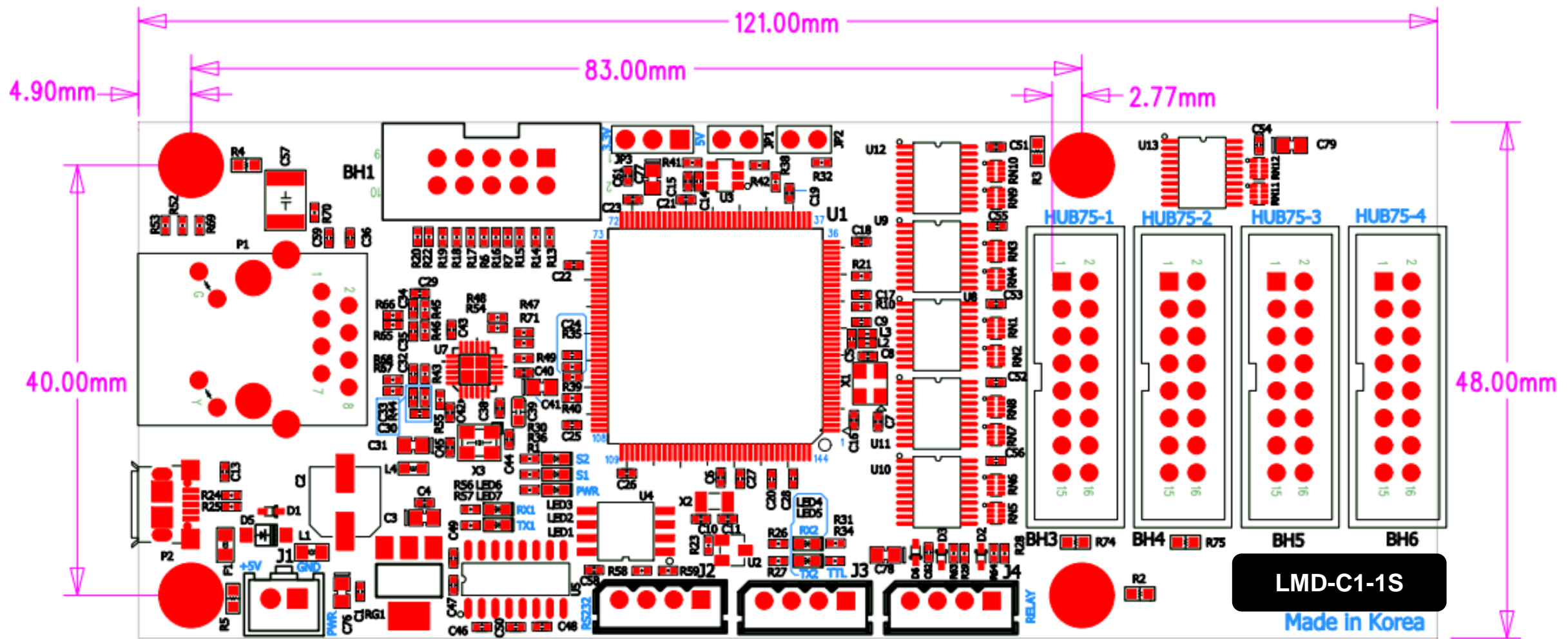
**[NOTE 1]** The Ethernet module built-in the LMD-C2-1E controller may have display and communication problems in sites with heavy network traffic. As a result of the [PING TEST](#), sites where the average round-trip speed exceeds 300ms or where "timed out" occurs even intermittently are considered to have poor traffic. In such cases, the cause must first be identified and improved. However, even in such a field, much improvement can be expected if the [Ethernet converter](#) is used separately.

- Max. Screen resolution : **64 x 320** dots ( 4 rows by 20 columns, 2 rows by 32 columns ) >>refer to [here](#)
- Display Image / Color : text, graphic and animation in **7 colors** (red, green, yellow, blue, pink, sky blue, white)
- Main Process : ARM Cortex-M4 Dual core microcontroller, 180MHz
- Memory : 2MByte Flash memory, 264KByte SRAM, USB memory
- Scan rate : 1/32, 1/16, 1/8, 1/4
- Serial Port : RS-232 1 port  
☞ 9,600/38,400/57,600/**115,200bps**, **N**(Parity check), **8**(Data bit), **1**(Stop bit)... Default
- Ethernet Port : IP-**192.168.0.201**, Gateway-**192.168.0.1**, Port-**5000**, **Server Mode**
- Working temp. : -40°C ~ 85°C
- Power Consumption : DC5V, 350mA(Max.)



Port	Description	Port	Description
<b>PWR</b>	Power (DC5V, Max. 350mA)	<b>LED (PWR)</b>	LED(red) lights up when power is applied
<b>P1<sup>[2]</sup></b>	Ethernet Port	<b>LED (S1)</b>	LED(green) blinks when CPU is normal. If not, the CPU might be in problem.
<b>RS232</b>	RS232 Port (5V-TX-RX-GND )	<b>LED (S2)</b>	LED(green) blinks when the video output signal is normal.
<b>TTL</b>	5V-TX-RX-GND <a href="#">GPS Time receiver</a> can be connected.	<b>P2</b>	Micro USB type B
<b>RELAY</b>	1. <a href="#">Relay output (2-channel, 5V-D2-D1-GND)</a> 2. <a href="#">CdS sensor</a>	<b>JP3</b>	No use
<b>BH1</b>	1. <a href="#">RS485 converter</a> 2. <a href="#">PLC SSR signal IO board</a>	<b>JP1</b>	Used for Factory reset
		<b>BH3</b>	These are the video signal output to LED screen. BH3: Connect to the 1 <sup>st</sup> row
		<b>BH4</b>	BH4: Connect to the 2 <sup>nd</sup> row
		<b>BH5</b>	BH5: Connect to the 3 <sup>rd</sup> row
		<b>BH6</b>	BH6: Connect to the 4 <sup>th</sup> row

**[NOTE 2]** There are left (green) and right (yellow) LEDs on the P1 connector. When the LAN cable is not connected, both LEDs should be turned off. If anyone is turned on, the controller is abnormal. When the cable is connected, the right LED lights up, and the left LED blinks only when data is being communicated



- 121(width) x 48(height) x 20(depth) mm
- Diameter of the holes(4) : 4mm

By referring to ["Dabit Simulator Manual, A-9"](#), you can set the functionality and baud rate of ports on LMD controller depending on your optional devices or requirement.

On the DABIT Protocol Simulator, click "Special Function > Board Functions" to open "Board Functions" setup window as shown on the right, and try the followings:

## A. "J2(RS232), J3(TTL)" Baud rate

The default is "115200bps" .

You can change it to "9600, 38400, 57600bps ...." to match your serial device baud rate according to ["Simulator Manual, A-9."](#)

## B. "J4(4-pin)" function

The default is "[Relay Signal Output](#)" mode.

When you use "[CDS sensor](#)", you need to change it to "CDS" mode.

## C. "BH1" function

When you use RS485 converter, insert the jumper into "GND (center) - 5V" of JP3.

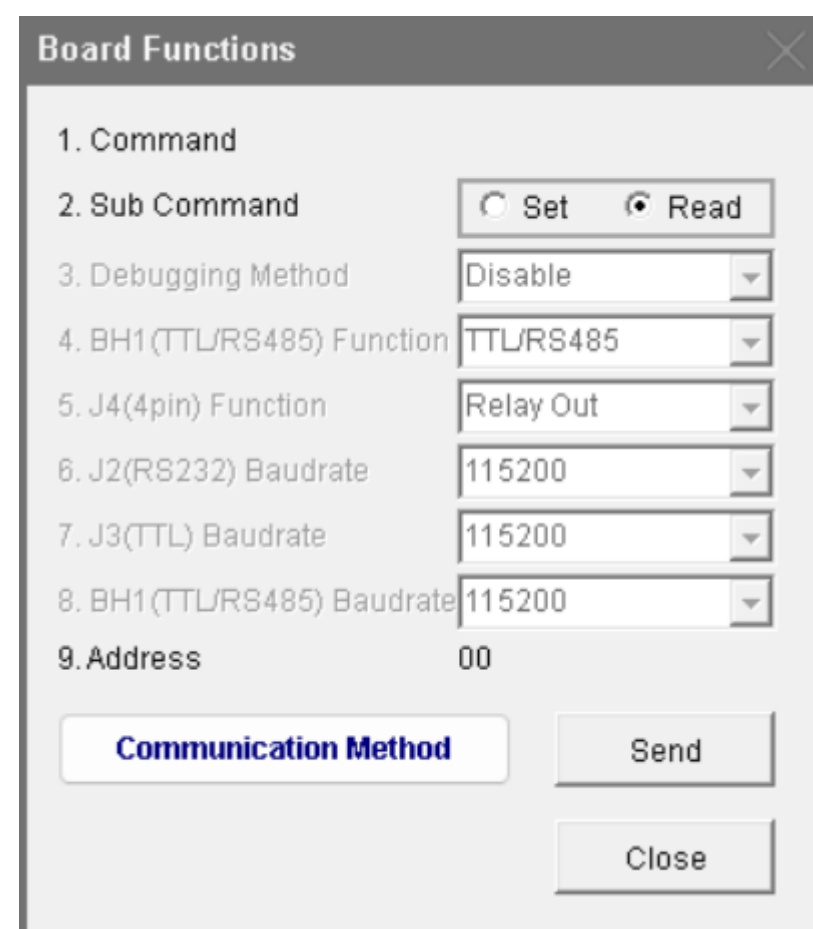
For details, refer to "[How to use LMD RS485 to TTL converter](#)".

## D. "JP1" for Factory Reset

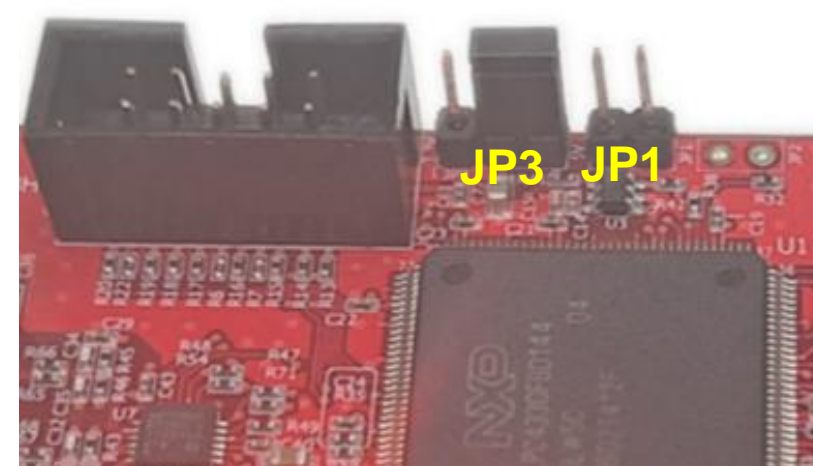
If you short-circuit "JP1" with a flat-blade screwdriver or jumper while the controller is powered on and then reset the power, the LMD controller will be factory reset.

After the Factory Reset, the above settings and all message data and image files are initialized.

However, the settings of "Screen size, Display signal type, Font file" are maintained.



"Board Functions" setup window showing the default mode of the LMD controller



Jumper Pin and Jumper