



PL22 Tag Hardware Specification



M2COMMUNICATION Inc.

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| | | | |

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1. *Objective & Scope*

1.1 *Objective*

This document defines the features and performance requirements for the M2COMM PL22 tag module to enable the successful integration with the other network equipment required for an PL22 system. To achieve this goal, the requirements detailed within this document will permit an independent evaluation.

1.2 *Scope*

This specification is a definition of the M2COMM PL22 tag module from a functional and design perspective.

This document may be updated as the product design evolves.

1.3 *Glossary*

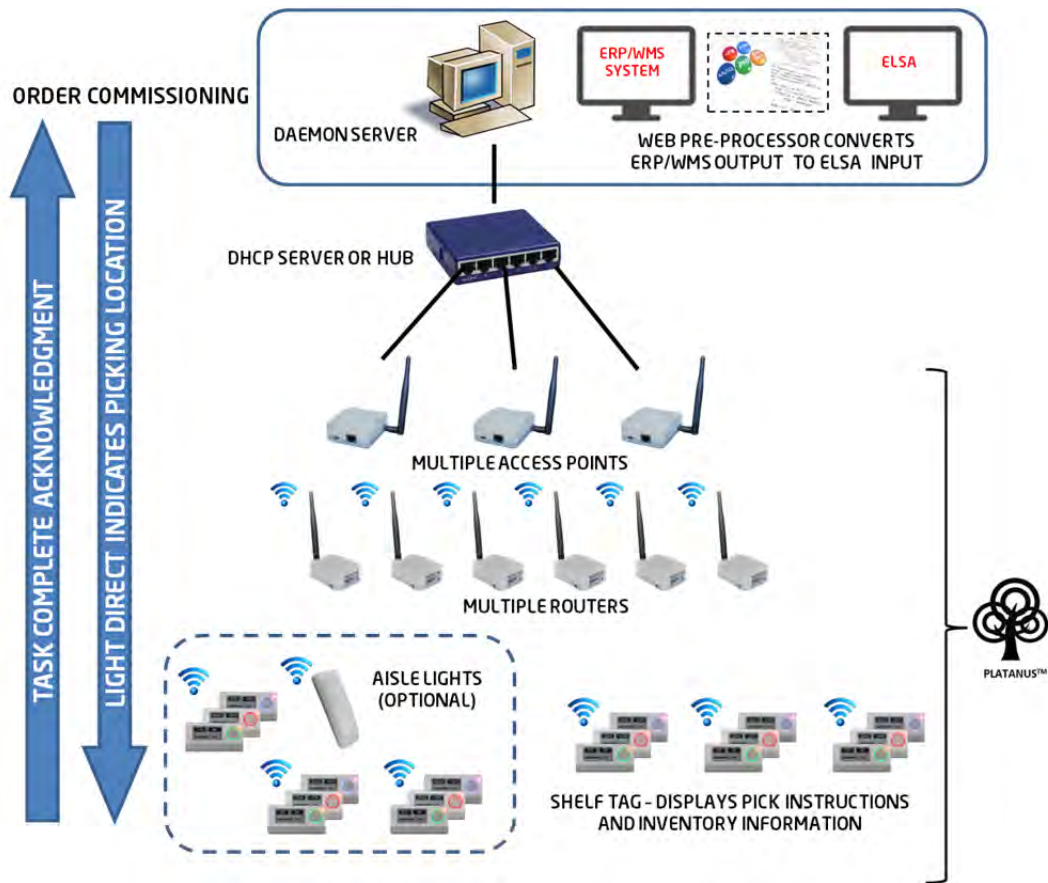
| | |
|-----|------------------------------|
| mm | millimeters |
| CPU | Central Processing Unit |
| LED | Light Emitting Diode |
| I/O | Input/Output |
| AC | Alternating Current |
| FRU | Field Replaceable Unit |
| CRU | Customer Replaceable Unit |
| PCB | Printed Circuit Board |
| EMI | Electromagnetic Interference |

2. Overview

The M2COMM PL22 tag module is available in a white and grey plastic housing.

The tag utilizes a high resolution e-paper display for 170° viewing and will be available in a color (Red, Black and White) version only.

Communications with the tag are via a unique wireless protocol, M2COMM's proprietary Platanus network, tuned to optimize power consumption and network efficiency.



2.1 Operating Frequency

| Channel Frequencies | |
|-----------------------|----------------|
| Frequency Range | Country/Region |
| 864.25MHz - 867.75MHz | Europe |
| 903MHz - 910.75MHz | US/Japan |
| 913.25MHz - 927MHz | US/Japan |

Maximum RF Output power 7.0 dBm

3. Key Features and Components

3.1 Housing

The tag housing will consist of five individually molded plastic parts comprised of the front cover, rear PCB/battery housing, LED SlickButton, ePaper battery cover and the LED battery access cover.

The housing shall be designed to allow easy customer access to all batteries.

The housing shall be designed for easy access to a recessed wake-up/reset button that will be mounted on the tag PCB assembly.

The rear housing shall be designed to accommodate easy assembly to customer shelf level display rails and/or the M2COMM shelving mount.

3.2 Power

The rear housing will be designed to accommodate two lithium coin cell batteries.

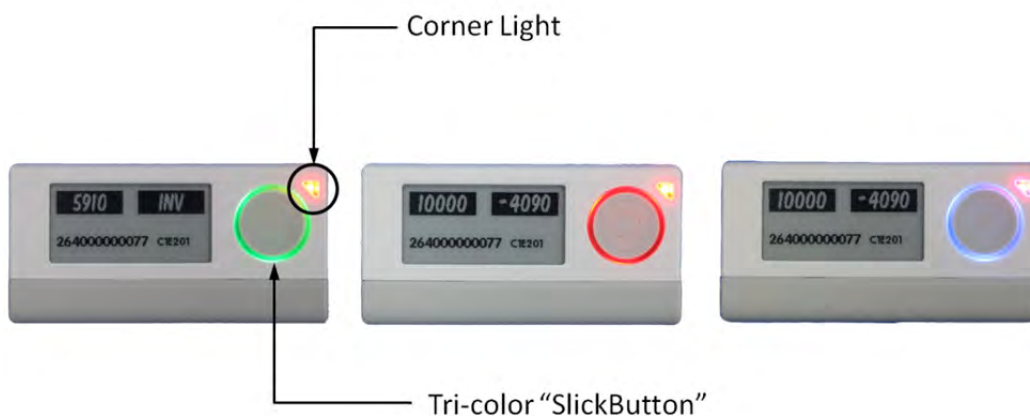
The front cover will be designed to accommodate two AAA Dry Cell Alkaline batteries

3.3 Display module

Custom E-Ink ePaper display (active matrix)

| Size | Pixel Dimensions | Resolution (dpi) | Active Area (mm) |
|----------|------------------|------------------|------------------|
| 2.2 inch | 212 x 104 | 111 | 48.1 x 23.4 |

3.4 Illuminated SlickButton and LED Functionality



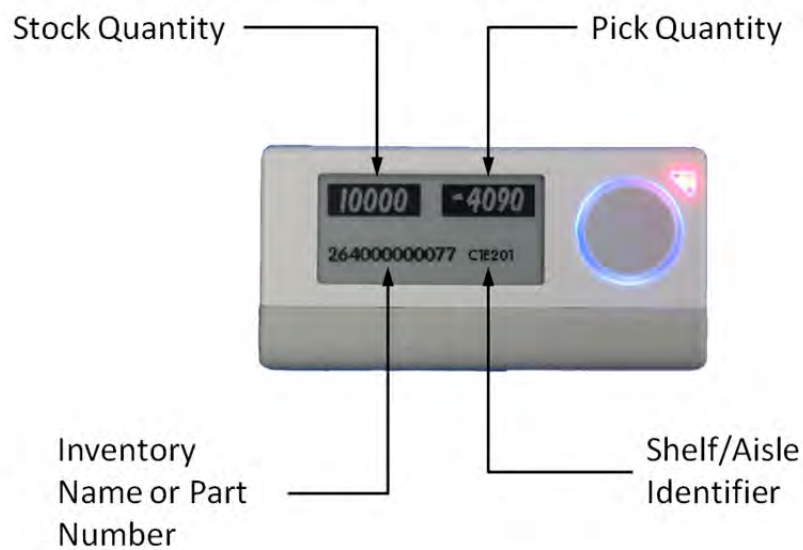
The tag corner light shall be single color; Red to alert user that a pick is required.

The illuminated “SlickButton” shall be tri-color; Green, Red and Blue to allow for multiple sequential picks.

Upon receipt of a pick order from the Warehouse Management System (WMS) both the “SlickButton” and corner light will illuminate. Once the pick has been carried out the “SlickButton” shall be pressed once as confirmation of the pick and a message will be returned to the WMS.

After the completion of a pick/confirmation the “SlickButton” and corner light will be extinguished until a new pick order is received.

3.5 *ePaper Functionality*



After pick/confirmation the stock quantity will auto update to display remaining quantity

4. System Physical Constraints

4.1 Power

2x Lithium Coin Cell batteries – CR2450

Each CR2450 battery energy reservoir is rated 620mA-hr (at 2.0V)

2x AAA Alkaline Dry Cell batteries – LR03

Total energy reservoir is assumed to be 860 – 1200mA-hr

4.2 Installation Environments

The tag shall comply with the requirements defined as an industrial signage product, operating within the ISM (industrial, scientific, and medical radio) band frequency range

4.3 User Replaceable Items

- Lithium Coin Cell Batteries

Slide cover to the
right to remove



- Alkaline Dry Cell Batteries



Slide cover down
to remove

4.4 *Service Life*

Battery service life may vary according to the use scenario and environment.

For reference, the battery service life of the lithium coin cell (ePaper display) is estimated to be between a minimum of 12 months and a maximum of 60 months of continuous use at 25°C sea level external (room) ambient, based on 4 updates per day without external interference or system abnormalities.

For reference, the battery service life of the alkaline dry cell (LED indicators) is estimated to be a minimum of 4 months at an on/off blink ratio of 1/9.

It is noted that service lifetime may be reduced when the temperature is below freezing point (0°C) due to battery or other components temperature characteristics. Please contact M2COMM for details.

In addition, the following components shall have evidence (from testing and analysis) that they will have the required L10 life in a normal service environment:

- Lithium Coin Cell Batteries
- Alkaline Dry Cell Batteries

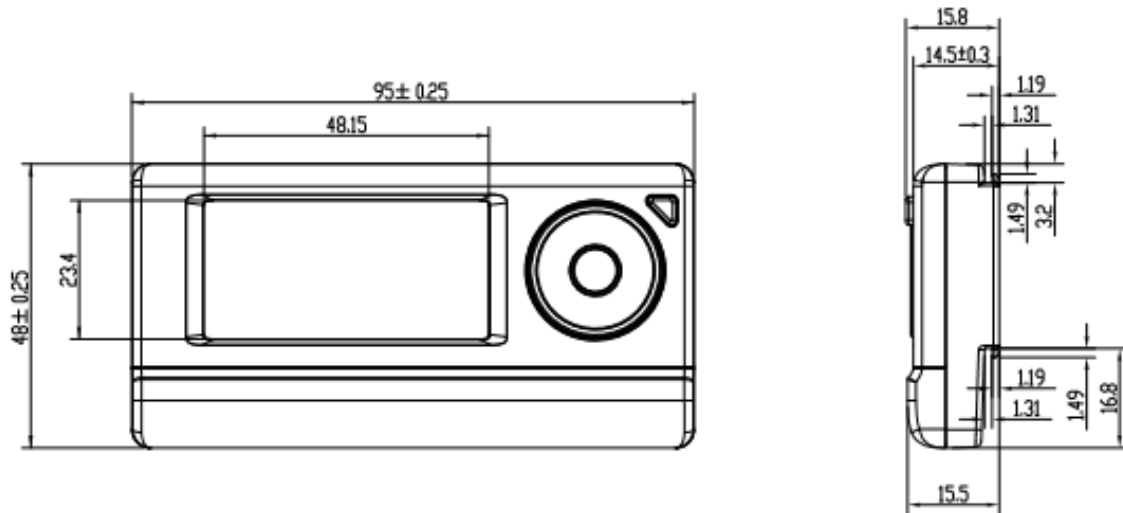
5. Dimensions & Weight

5.1 Material

TEIJIN PC Panlite L-1225L series

5.2 Key Dimensions

5.2.1 Housing Length x Width x Depth



Dimensions are in mm

Dimensional tolerance ± 0.25 mm

5.3 Part & Subassembly Dimensions & Tolerances

Full dimensional tolerance analysis and critical-to-function analysis will be performed on the following;

- PCBA module
- Housing

5.4 Weight, Total

Assembled weight is 68.4g maximum, excluding transit packaging, documents, accessory kit, etc.

6. Labeling Requirements

Each tag shall carry the following labels

6.1 Unique Tag MAC address and Barcode Label



Barcode shall be Code 128 compliant

Label shall be adhered to the bottom edge of the tag as shown above.

6.2 Manufacturer and Compliance Label



The manufacturer and compliance label shall be adhered to the rear of the tag as shown above

7. Design for the Environment (DFE)

7.1 Hazardous Materials in Product or Process

No components or process containing the following material maybe used;

- Beryllium Oxide
- Cadmium
- Silicone
- Mercury
- Chlorinated paraffin's
- Poly Chlorinated Biphenyl (PCB)
- Polychlorinated Naphthalene (PCN)
- Poly Chlorinated Triphenyl (PCT)
- Poly Brominated Biphenyl Ethers/Oxides (PBBE/PBBO)
- Tetra Brominated Biphenyl A (TBBA)
- Chlorofluorocarbons (CFC)
- Class 1 Ozone-depleting substances

Coin Cell type batteries contain mercury, silver, cadmium, lithium, or other heavy metals as their main component and should be disposed off in accordance with country/region regulations.

Dispose of used (or excess) alkaline batteries in compliance with federal, state/provincial and local regulations. Do not accumulate large quantities of used batteries for disposal as accumulations could cause batteries to short-circuit. Do not incinerate. In countries, such as Canada and the EU, where there are regulations for the collection and recycling of batteries, consumers should dispose of their used batteries into the collection network at municipal depots and retailers. They should not dispose of batteries with household trash.

8. Serviceability

8.1 Maintenance Items & Intervals

No subsystems or components shall require scheduled maintenance intervals.

8.2 Switches

The tag will be fitted with a multi-function switch, in the form of a momentary action switch.

The switch shall be located on the PCB and will be accessible via a hole in the side of the rear cover to protect against accidental operation.



Switch Functions;

- I. Wake up (Short Press)
- II. Deep Sleep (Long Press for 3~5 seconds)



Sleep mode indicator

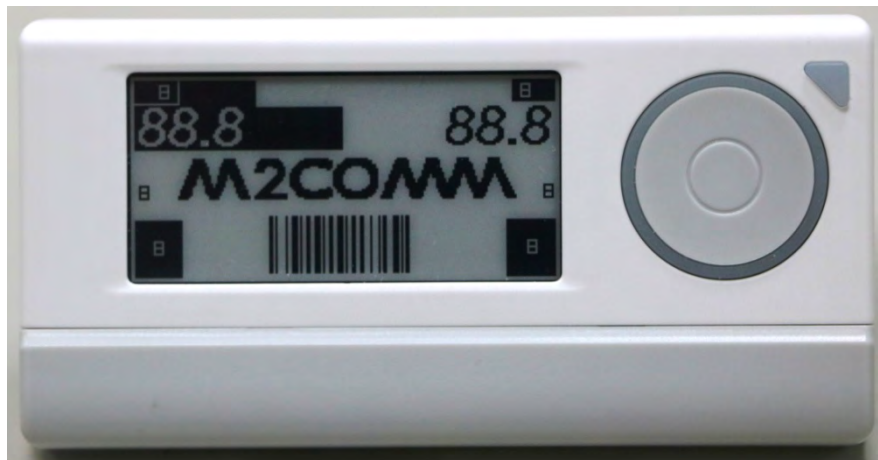
III. Show Device Barcode Address and firmware version (Double-click)



IV. Show Devices detailed information (Double-click)



V. Show Main Image (Double-click)



9. *Thermal*

9.1 *Component Operating Temperature Limits*

In any permitted configuration, all the tag components shall remain within the component manufacturers' normal operating specifications.

10. *Climatic Environments*

All tag features shall function normally in the operating ranges listed below. All tag features shall endure the non-operating ranges listed below without cosmetic or functional damage.

10.1 *Operating Temperature and Humidity*

0°C to +40°C, 16 hrs dwell at extreme; IEC 60068-2-1
35% to 55% RH at 40°C, non-condensed; IEC 60068-2-3

10.2 *Shipping/Storage Temperature and Humidity*

10.2.1 *Shipping*

Temperature: -20°C to +50°C
Humidity: 35% to 80% RH
Duration: <240 hours (10 days)

10.2.2 *Storage*

Temperature: 0°C to +40°C
Humidity: 35% to 80% RH
Duration: <6 months

11. *Mechanical, EMC, Environmental & Safety Compliance*

11.1 *Random Vibration*

1 to 200 Hz, 1.15 Grms, 30 minutes in Z axis, 10 minutes in X, Y and -Z axes

11.2 *Un-packaged Non-operating Free Fall*

500mm drop height; 3 drops onto unit bottom face; IEC 60068-2-32.

11.3 *Un-packaged Edge/Corner Drop*

800mm drop height; 6 drops onto bottom face; IEC 60068-2-31.

800mm drop height; 3 drops onto each corner, 12 drops total; 3 drops onto each edge, 12 drops total; IEC 60068-2-31.

11.4 *Electromagnetic Compatibility – Emissions*

11.4.1 *Radiated Emissions*

CE (Europe):

The Product shall comply with EN55022: 1998/CISPR 22 Class B for radiated emissions.

FCC (USA):

The Product shall comply with FCC Part 15 Subpart B Revision October 1st 1998. The limit for this product shall be Class B of the FCC Part 15 Subpart B requirements.

11.4.2 *Electrostatic Discharge*

CE (Europe):

The Product shall comply with EN55024: 2010. The test method used shall be EN61000-4-2. The test level to be used is $\pm 4\text{kV}$ air discharge and $\pm 2\text{kV}$ contact discharge.

12. *Part Numbers and Ordering Information*

The M2COMM PL22 tag part numbering system is based upon tag size, color and country/region operating frequency, please refer to Section 2.1 for country/region frequencies; shown below are the part numbers available for the PL22 tag

| Part Number | Frequency | Color | Remarks |
|---------------|-----------|--------------|---------|
| PL22 | | | |
| PPL22GN57XEQ9 | 915MHz | Black, White | |

13.certification

FCC (USA):

The Product shall comply with FCC Part 15 Subpart B & FCC Part 15 Subpart C .

The limit for this product shall be Class B of the FCC Part 15 Subpart B & Subpart C requirements.

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:**FCC Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

NCC (Taiwan):

The Product shall comply with NCC LP0002 Spec. and the limit for this product shall be requirements.

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