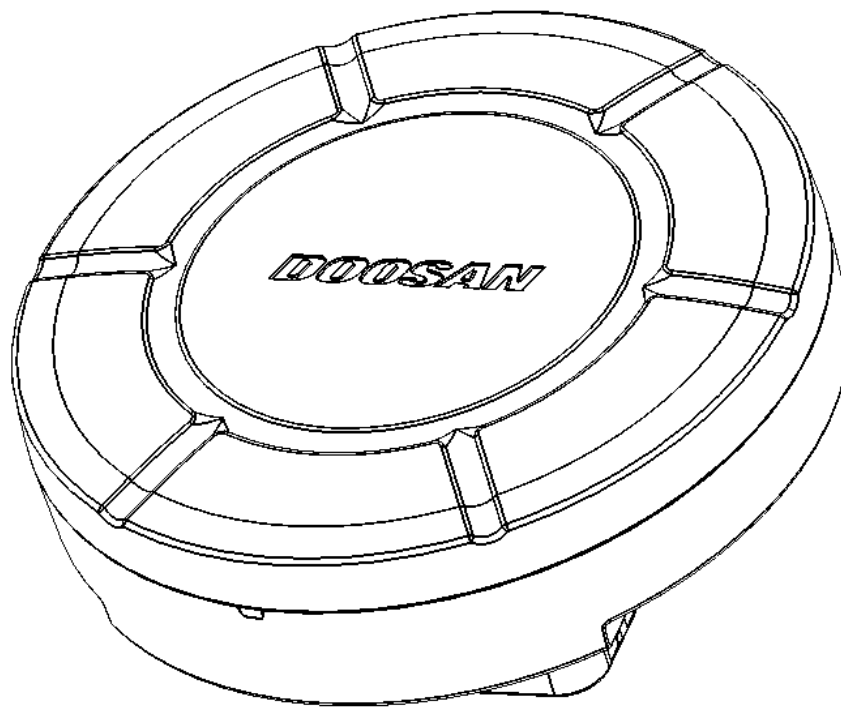


# DTM-02L

## USER'S GUIDE





## Revision History

| Revision | Issue Date | Author  | Scope           |
|----------|------------|---------|-----------------|
| 1.0      | 2019/08/14 | Lim.J.H | Initial Release |
|          |            |         |                 |
|          |            |         |                 |



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# 1 Warnings for safety operation

This is to protect your safety and property. Please read this manual carefully before using.

## ■ Operational Environment

- The operating voltage of this products is between 9Vdc and 34Vdc. Please use the specified operating volgage.
- Use within the specified temperature range.
- This product is specialized for industrial vehicles.

## ■ Insallation Precaustions

- Insallation and wiring require professional skills. Be sure to install it with the help of a propessional. Incorrect insallation and wiring can cuase the fire or malfuncation.
- When installing the product, install it so that it does not inferfere with the operation of safety devices such as airbags and brake levers...etc.
- Insall in a location free from moisture. It may cuase damage or accidents if it is installed in places where water or rain is splashed or dusty.
- When wiring, be sure to check the position of pipes, tanks, electric wiring, etc., and pay special attention to avoid interference or contact.
- Use specified cables and components.
- Be careful not to fall down when installing in a place where the ceiling and vibration of the vehicle are severe.
- Do not block the vent or heat sink. It may cause the fire.
- Protect the wire tube by winding the insulation tape around the area where the wire is in contact with the metal part. It can cause the fire or electric shock.

## ■ Important Safety Precautions

- Do not operate the device by manually during the vehicle operation. It can cuase the accidents.
- Any modification of this product is prohibited and will void your warranty. Any use of the product or its components for purposes not expressly authorized by this document is prohibited and will void your warranty.
- Allow only authorized personnel to service the unit. Unauthorized service can invalidate the warranty.



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.

#### FCC notification to users

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 when the equipment is operated in a commercial environment.

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, the user is encouraged to try to correct the interference by consulting with a dealer or an experienced technician for technical assistance.

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

#### WARNING & SAFETY INFORMATION

The antenna(s) used for this device must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.



**CAUTION  
RISK OF EXPLOSION IF BATTERY IS REPLACED  
BY AN INCORRECT TYPE.  
DISPOSE OF USED BATTERIES ACCORDING  
TO THE INSTRUCTIONS**

### **IC Information**

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

- (1) This device may not cause interference; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.”

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

**Cet équipement doit être installé et utilisé avec un  
minimum de 20 cm de distance entre la source de  
rayonnement et votre corps.**

## 2 Introduction

The DTM-02L is a product to the Doosan Lin-Q system. This product is an IoT(Internet of Things) terminal that can be used anywhere in the world by using LTE communication networks or WIFI communication networks.

User can access the Lin-Q system and this product after registrationin on the Lin-Q homepage or by contacting the administrator.

Below is the Lin-Q system diagram.

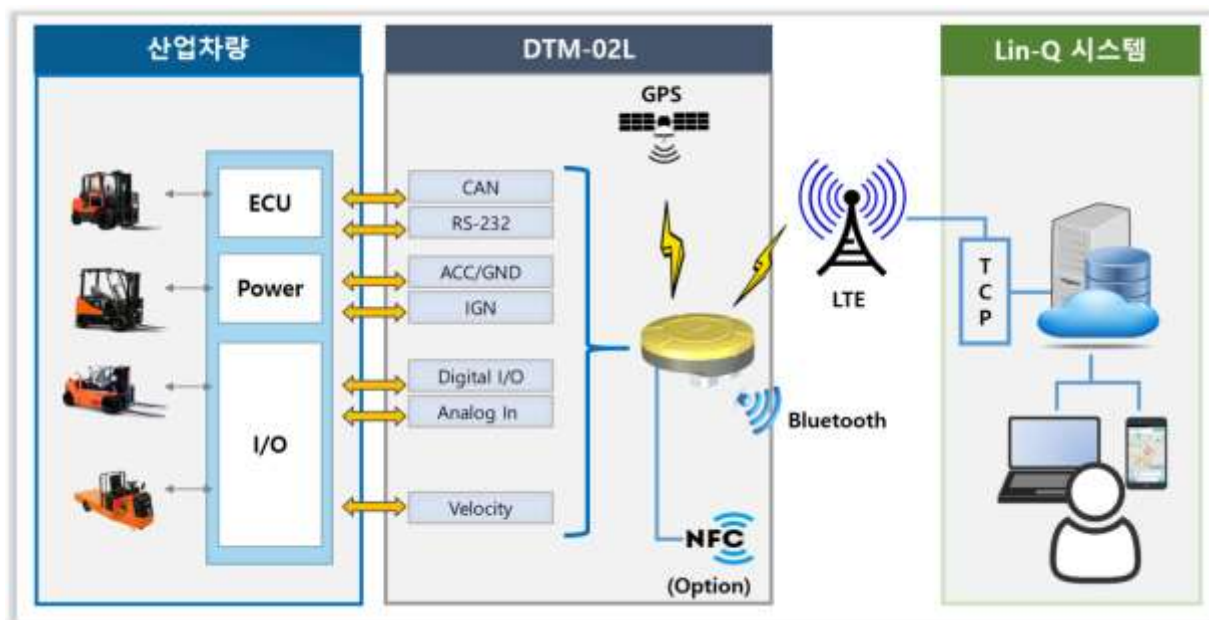


Figure 1 Lin-Q System

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## 3 Overview

### 3.1 Components

DTM-02L is composed of the following components. It is required that separate harness cable assembly for the connection with the vehicle.

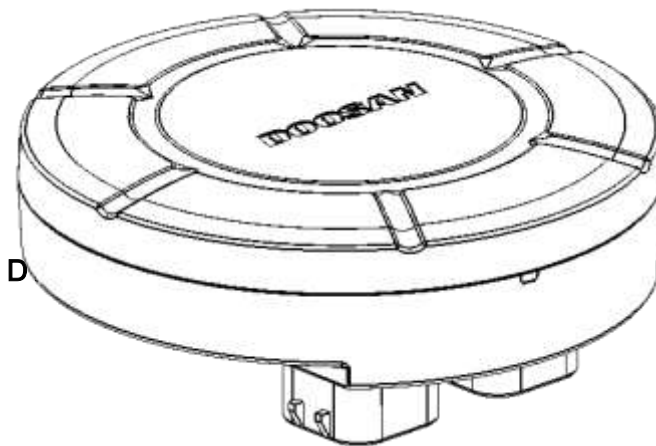


Figure 2 DTM-02L Terminal

### 3.3 Features

- LTE communication, support Global
- Optimized functions for industrial vehicles
- CAN data collection function
- Various sensor data collection function of vehicle
- Periodic transmission function for collected data
- Non periodic event data transfer function
- Shock detection function
- Firmware over the air function.
- Remote limitation function (will be updated)
  - ✓ Speed limitation / Driver limitation / Torque limitation / RPM limitation
- Various I/O ports
  - ✓ 2 Digital Input
  - ✓ 3 Digital In/Output
  - ✓ 1 Analog Input
  - ✓ CAN
  - ✓ UART 2Port

## 4 Hardware Descriptions

### 4.1 DTM-02L

The name of each part of the terminal is as follows.

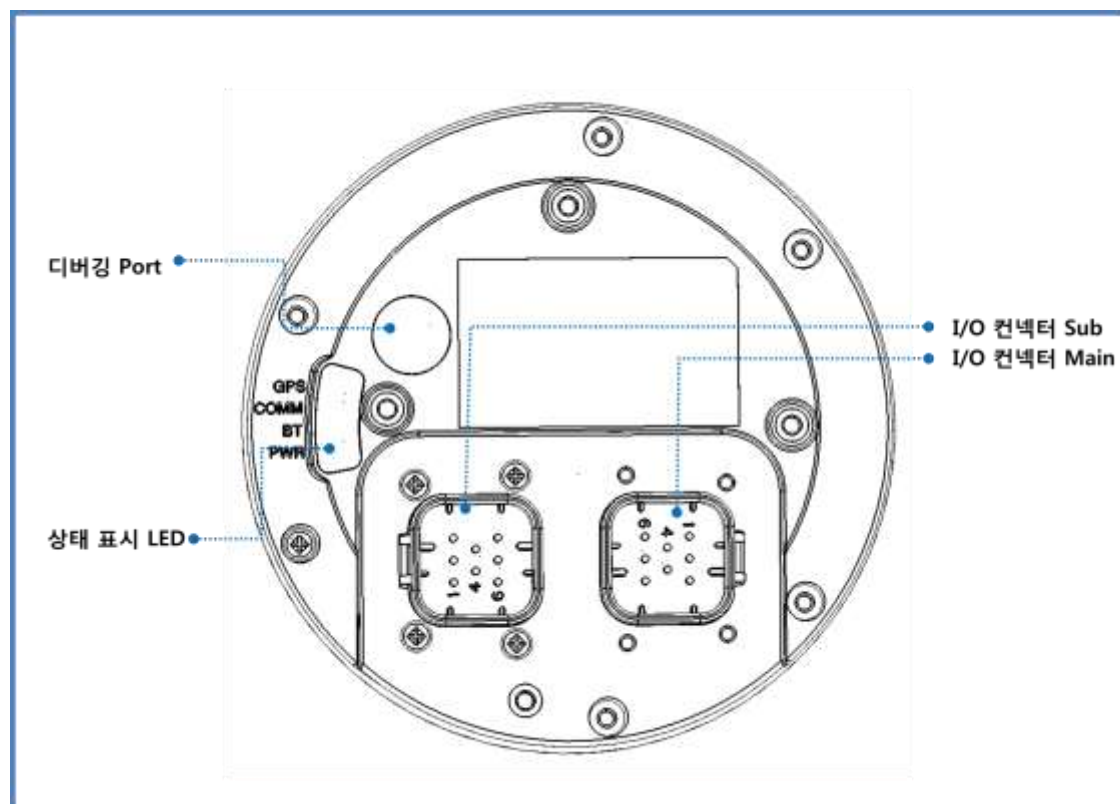


Figure 3 DTM-02L Terminal

The following table shows the specifications of each parts.

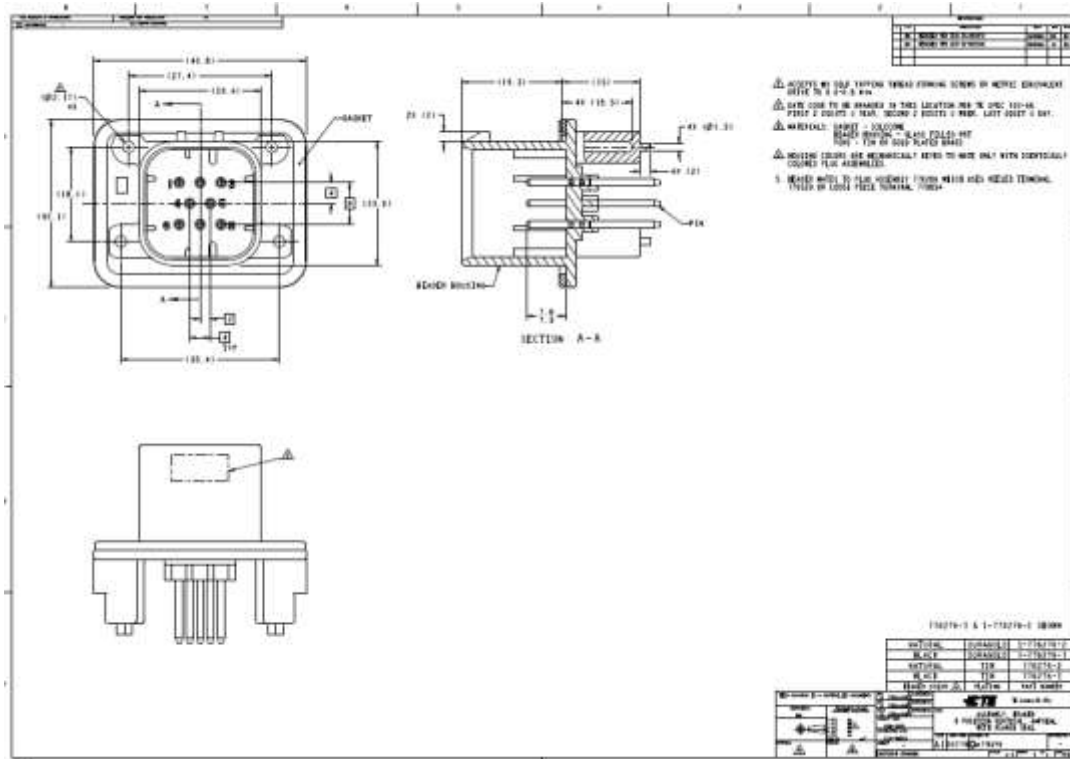
| Parts              | Functions                           | Description    |
|--------------------|-------------------------------------|----------------|
| I/O Connector Main | Connector that connect with vehicle | 8 pin, Black   |
| I/O Connector Sub  | Connector that connect with vehicle | 8 pin, Natural |
| Status LED         | Represent the terminal status       | 4 LEDs         |
| Debug Port         | Develop debug Port                  |                |

Table 1 Descriptions for each parts of DTM-02L

Detailed descriptions for each parts are as follows.

### 4.1.1 I/O Connector

The I/O connector is connected to the vehicle via harness cable and consists of 8+8 pins. The shape of the connector is shown in the below figure.



### Figure 4 I/O Connector

The below table shows the description of the each pin.

#### CONNECTOR Main (776276-1, Black)

| PN | Pin Name | Pin Type     | Comments                       |
|----|----------|--------------|--------------------------------|
| 1  | FUEL_ADC | Input        | Signal Input Analog (with ADC) |
| 2  | CAN Low  | Input/Output | CAN Low Signal                 |
| 3  | IGN+     | Input        | IGN+ Signal Input (Logic)      |
| 4  | BRK      | Input        | Brake signal Input (Logic)     |
| 5  | GND1     | Power        | Digital Ground                 |
| 6  | SPD      | Input        | Speed signal Input (Logic)     |
| 7  | CAN High | Input/Output | CAN High Signal                |
| 8  | BAT+     | Power        | Car Battery +                  |

#### CONNECTOR Sub (776276-2, Natural)

| PN | Pin Name | Pin Type     | Comments                              |
|----|----------|--------------|---------------------------------------|
| 1  | ACC_TXD  | Output       | RS232C Level TXD Signal (Acc_Sensor)  |
| 2  | GPI01    | Input/Output | Digital Signal Input1/Output1 (Logic) |
| 3  | NFC_TXD  | Output       | RS232C Level TXD Signal (NFC Reader)  |
| 4  | GPI02    | Input/Output | Digital Signal Input2/Output2 (Logic) |
| 5  | GND2     | Power        | Digital Ground                        |
| 6  | ACC_RXD  | Input        | RS232C Level RXD Signal (Acc_Sensor)  |
| 7  | GPI03    | Input/Output | Digital Signal Input3/Output3 (Logic) |
| 8  | NFC_RXD  | Input        | RS232C Level RXD Signal (NFC Reader)  |

Table 2 Pin descriptions for I/O connector

## 4.1.2 Status LED

DTM-02L displays the status of the terminal with LED.

The LED is composed of four, and the status of the terminal according to the color is shown in the following table.

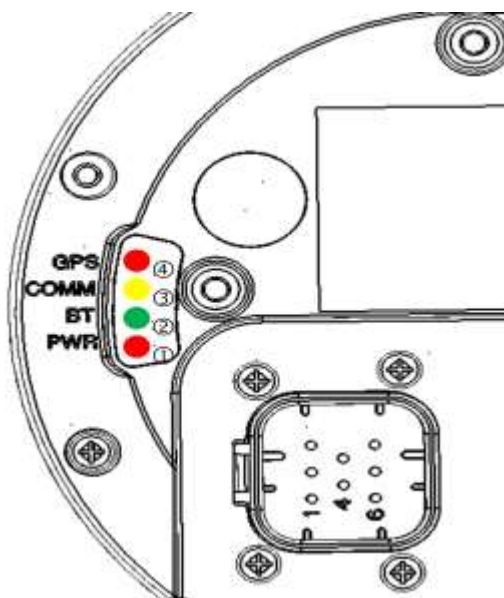


Figure 5 Status LED

| No. | Item  | Color  | Status               |          | Description                                   |
|-----|-------|--------|----------------------|----------|-----------------------------------------------|
| ①   | POWER | Red    | Power status         | Off      | • Power Off                                   |
|     |       |        |                      | On       | • Power On                                    |
| ②   | BT    | Green  | communication status | Off      | • Network is not connected                    |
|     |       |        |                      | On       | • Network is successfully connected           |
|     |       |        |                      | Blinking | • On transmitting the data                    |
| ③   | COMM  | Yellow | Communication Status | Off      | • LTE, WiFi network is not connected          |
|     |       |        |                      | On       | • LTE, WiFi network is successfully connected |
|     |       |        |                      | Blinking | • On transmitting the data or setting         |
| ④   | GPS   | Red    | GPS Status           | Off      | • GPS is not fixed                            |
|     |       |        |                      | On       | • GPS is 3D fix status                        |

Table 3 Status LED

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## 5 How To Use

Be sure to read the following instructions before using.

### 5.1 User Registration

User registration is required to use this product.

In order to registration, please contact to your sales office or visit the ["https:// lin-q.doosan-iv.com"](https://lin-q.doosan-iv.com).

For more detailed information, please reefer to the Lin-Q user's guide.

### 5.2 LTE Mode Operation

In order to operate the terminal in lte mode, it must be subscribed to LTE communication service.

In general, The ESIM card is preinstalled to the DTM-02L from the factory. To activate your SIM card, please contact your dealer or customer service center.

## 6 Specifications

### 6.1 DTM-02L

| Item                  | Specification                                                                            |                                         |
|-----------------------|------------------------------------------------------------------------------------------|-----------------------------------------|
| Size                  | ø117.7(D) x 31(H) [mm] [Unit: mm]                                                        |                                         |
| Weight                | 204 grams                                                                                |                                         |
| Operating Temperature | -30°C ~ +70°C                                                                            |                                         |
| Storage Temperature   | -40°C ~ +85°C                                                                            |                                         |
| Vibration             | Random 5~20Hz 0.05g2/Hz, 20~150Hz: -3dB/oct.(1.7g rms), 3-axis, 30minutes for each axis. |                                         |
| Thermal Shock         | -40°C(1H)/+85°C(1H), 1cycle- Total24 cycle, 48H, non-operating                           |                                         |
| Humidity              | +70°C/95%/48 Hours, Operating                                                            |                                         |
| Communication         | LTE                                                                                      | LTE Data Modem(LTE Cat4, Worldwide)     |
|                       | BT                                                                                       | nRF52810, Bluetooth 5.0                 |
| GPS                   | Chipset                                                                                  | Gen8C-Lite                              |
|                       | TTFF                                                                                     | Cold Stat : 35sec<br>Hot Start : 2.5sec |
| Ingress Protection    | IP66                                                                                     |                                         |
| Operating Voltage     | +9Vdc ~ +34Vdc, under $\text{---}$ 3A                                                    |                                         |
| I/O port              | 2 X 8 Pin waterproof connector                                                           |                                         |
| Antenna               | LTE                                                                                      | Internal                                |
|                       | BT                                                                                       | Internal                                |
| SIM                   | ESIM                                                                                     |                                         |
| LED                   | 4 LEDs                                                                                   |                                         |

\*Symbol :  $\text{---}$  , direct current.

**Table 4 DTM-02L Specifications**

## 7 Limited Warranty

- This product is manufactured through strict quality control and inspection process.
- In the event of a malfunction in normal use by the customer, the Service Center will repair it free of charge during the warranty period (one year from the date of purchase).
- Even within the warranty period, the following cases will be charged for repair.
  - Fault caused by customer's negligence or carelessness
  - Failure due to fire, flood or natural disaster
  - Flaws caused by arbitrary modification and disassembly
  - If you want to purchase parts or consumables separately
  - Lost warranty card
- When repair is required, please provide a warranty card.
- Please note that the warranty will not be re-issued.

|                     |                       |                           |                |
|---------------------|-----------------------|---------------------------|----------------|
| <b>Item</b>         | <b>Lin-Q Terminal</b> | <b>Model</b>              | <b>DTM-02L</b> |
| <b>Serial No.</b>   |                       | <b>Date of Purchasing</b> |                |
| <b>Where to Buy</b> |                       |                           |                |