

# User Manual

**Model : LTD-GN1000**

Product: Telematics module

FCC ID : YZP-GN1000

IC Certification : 7414C-GN1000



## Summary

This document covers the technical specifications of module LTD-GN1000 ( hereinafter referred to as “ module ” ) designed by LG Innotek. Technical specifications include interface, mechanical specifications, Includes electrical characteristics and RF characteristics.

## 1. Product Introduction

( hereinafter referred to as “ module ” ) designed to be mounted and used in automobiles , and supports 5G NR / LTE. It also supports CA (Carrier Aggregatio) based on 3GPP TS 36.101 and TS 38.101 . Additionally, GNSS (Global Navigation Satellite System) such as GPS, GLONASS, Galileo and Beidou are also supported.

A total of 5 antennas are used, Each antenna supports the frequency bands shown in Table 1-1 .

Each Modem supports the bands shown Table 1-2 in each region.

See table 1-3 for a summary of module featur

**Table 1-1 Support frequency bands for each antenna**

| Band          | Ant1 | Ant2 | Ant3 | Ant4 |
|---------------|------|------|------|------|
| 1             | TRX  | RX   | RX   | RX   |
| 2, 25         | TRX  | RX   | RX   | RX   |
| 3             | TRX  | RX   | RX   | RX   |
| 4, 66         | TRX  | RX   | RX   | RX   |
| 5, 18, 19, 26 | TRX  | RX   |      |      |
| 7             | TRX  | RX   | RX   | RX   |
| 8             | TRX  | RX   |      |      |
| 12, 17        | TRX  | RX   |      |      |
| 13            | TRX  | RX   |      |      |
| 14            | TRX  | RX   |      |      |
| 20            | TRX  | RX   |      |      |
| 28            | TRX  | RX   |      |      |
| 29            | RX   | RX   |      |      |
| 30            | RX   | RX   | RX   | RX   |
| 32            | RX   | RX   |      |      |
| 34            | TRX  | RX   | RX   | RX   |
| 38, 41        | TRX  | RX   | RX   | RX   |
| 39            | TRX  | RX   | RX   | RX   |
| 40            | TRX  | RX   | RX   | RX   |
| 71            | TRX  | RX   |      |      |
| 77, 78        | RX   | TRX  | RX   | RX   |
| 79            | RX   | TRX  | RX   | RX   |

**Table 1-2. Available frequency bands for each SKU**

| <b>SKU</b>    | <b>LTD-GN1000</b>                                                          |
|---------------|----------------------------------------------------------------------------|
| <b>Region</b> | North America (NA)                                                         |
| <b>GSM</b>    | -                                                                          |
| <b>WCDMA</b>  | -                                                                          |
| <b>LTE</b>    | 2/25, 4/66, 5/26, 7, 12/17, 13, 14, 29(Rx), 30(Rx), 41, 71                 |
| <b>5G</b>     | n2/25, n5/26, n7, n12, n13, n14, n29(Rx), n30(Rx), n41, n66, n71, n77, n78 |
| <b>GNSS</b>   | GPS, GLONASS, Galileo, Beidou / L1, L5                                     |

**Table 1-3. Summary of module features**

| Feature                                  | Module capabilities                                                                                                                                                                                       |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>General</b>                           |                                                                                                                                                                                                           |
| Frequency bands                          | Please refer to the Table 1-2                                                                                                                                                                             |
| Output power<br>(according to Release14) | Class 3 (+23dBm $\pm$ 2.7dB) for LTE<br>Band 12/17 power level : 23dBm (Tolerance : -2.7 dB ~ +1.5dB)                                                                                                     |
| Output Power<br>(according to Release16) | Class 3 (+23dBm +2/-2dB) for 5G NR                                                                                                                                                                        |
| Power supply<br>2G/3G/4G/5G DCDC         | Operating conditions: 3.8V ~ 4.2V (Typ. 4.0V)                                                                                                                                                             |
| Operating temperature                    | -40°C to +85°C                                                                                                                                                                                            |
| Physical                                 | Dimensions: 46mm x 50mm x 3.5mm                                                                                                                                                                           |
|                                          | Weight : 16.5g                                                                                                                                                                                            |
| <b>5G NR features</b>                    |                                                                                                                                                                                                           |
| 3GPP Release 16                          | 5G NR in NSA and SA mode(Sub-6)<br><ul style="list-style-type: none"> <li>• 100MHz Bandwidth</li> <li>• 4X4 DL MIMO</li> <li>• 256 QAM supported for uplink and downlink</li> </ul> Waveform : DFT-s / CP |
| <b>LTE features</b>                      |                                                                                                                                                                                                           |
| 3GPP Release 16                          | UE CAT. (UL: 18, DL: 19) supported<br>4X4 DL MIMO, 256QAM                                                                                                                                                 |
| <b>GNSS features</b>                     |                                                                                                                                                                                                           |
| GNSS types                               | GPS, GLONASS, Galileo, Beidou / L1, L5                                                                                                                                                                    |

## Module environmental specifications

| Parameter                     | Temperature range            |
|-------------------------------|------------------------------|
| Ambient operating temperature | From -40°C to +85 °C         |
| Ambient storage temperature   | Temperature -40°C to +95 ° C |
| Ambient humidity              | 95% or less                  |

- **Note**

- The customer To ensure that the junction temperature of the main components within the module does not exceed 85 °C , the external board to which the module is attached must be designed so that the heat generated from the module can be well dissipated.

## Mechanical Specifications

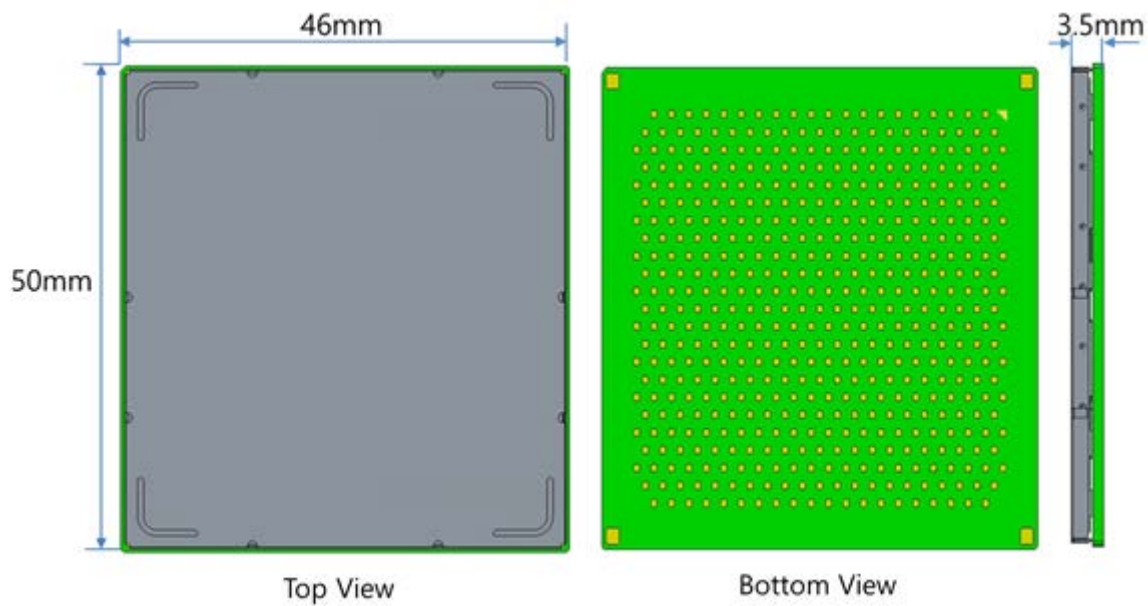
Module physical dimensions

| Parameter                                              | Nominal      | Tolerance | Units |
|--------------------------------------------------------|--------------|-----------|-------|
| Overall dimension <sup>1)</sup>                        | 46 .0 x 50.0 | ± 0.15    | mm    |
| Overall module height<br>(Excluding ball thickness)    | 3.5          | ±0.2      | mm    |
| Shield cover dimension                                 | 45.4 x 49.4  | ±0.1      | mm    |
| Shield fence dimension                                 | 44.9 x 48.9  | ±0.1      | mm    |
| Final coplanarity <sup>2)</sup><br>(Including warpage) | Max. 180     | -         | μm    |
| Ball PAD height <sup>2)</sup>                          | 240          | ± 60      | μm    |
| Weight                                                 | 16.5 ( T BD) | ± 1       | g     |

CTQ

CTQ

Mechanical Drawing



## Electrical Specifications

**Table. Specifications of external voltage VPH\_PWR for the module operation**

| Pin No.                  | Voltage node | I/O | Status | Min                             | Typ | Max | Unit |   |
|--------------------------|--------------|-----|--------|---------------------------------|-----|-----|------|---|
| AU21, AW21<br>AT22, AV22 | VPH_PWR_PMIC | I   | On     | 3.8                             | 4.0 | 4.2 | V    |   |
|                          |              |     | Off    | 0                               |     | 0.3 |      |   |
| A13, C13<br>B14, D14     | VPH_PWR_CH1  | I   | On     | Same as above<br>specifications |     |     |      | V |
|                          |              |     | Off    |                                 |     |     |      |   |
| A11, B12<br>C11, D12     | VPH_PWR_CH2  | I   | On     |                                 |     |     |      |   |
|                          |              |     | Off    |                                 |     |     |      |   |

**This module supports GNSS (GPS, GLONASS, BeiDou, Galileo) .**

**Table. GNSS interface characteristics**

| Characteristics |         | Value                                  |
|-----------------|---------|----------------------------------------|
| Frequency       | GPS L1  | Centered on 1575.42 MHz (BW 2.046 MHz) |
|                 | Glomass | 1597.5 – 1605.8 MHz (BW 8.3 .Hz)       |
|                 | Beidou  | 1559.05 – 1563.14 MHz (BW 4.092 MHz)   |
|                 | Galileo | Centered on 1575.42 MHz (BW 4.092 MHz) |
|                 | GPS L5  | Centered on 1176.45 MHz (BW 20.46MHz)  |
| RF Impedance    |         | 50 Ω                                   |

# OEM Manual

## The List of applicable FCC rules

FCC : Part 22, Part 24, Part 27, Part 90

## Summarize the specific operational use conditions

The module is designed for vehicle only, and has to be tested additional if insert in other host.

## Limited module procedures / Trace antenna designs

N/A

## RF exposure considerations

RF Exposure evaluation was performed with very specific installation condition at 20 cm. Any other installation condition may require additional test and permissive change procedure.

## Antennas

Dipole Antenna is used for testing, with unique antenna connector. The maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed the values listed in the following table.

| Mode                             | Frequency<br>(MHz) | Antenna<br>Gain<br>(dB i) |
|----------------------------------|--------------------|---------------------------|
| LTE Band 25/2<br>5G NR Band 25/2 | 1 850 ~ 1 915      | 1.90                      |
| LTE Band 66/4<br>5G NR Band 66   | 1 710 ~ 1 780      | 4.20                      |
| LTE Band 26/5<br>5G NR Band 26/5 | 824 ~ 849          | 1.99                      |
| LTE Band 26<br>5G NR Band 26     | 814 ~ 824          | 0.72                      |
| LTE Band 7<br>5G NR Band 7       | 2 500 ~ 2 570      | 4.43                      |
| LTE Band 12/17<br>5G NR Band 12  | 699 ~ 716          | 3.02                      |
| LTE Band 13<br>5G NR Band 13     | 777 ~ 787          | 1.01                      |
| LTE Band 14<br>5G NR Band 14     | 788 ~ 798          | 2.53                      |
| LTE Band 41<br>5G NR Band 41     | 2 500 ~ 2 690      | 4.43                      |
| LTE Band 71<br>5G NR Band 71     | 663 ~ 698          | -0.17                     |
| 5G NR Band 77                    | 3 450 ~ 3 550      | 4.69                      |
|                                  | 3 700 ~ 3 980      | 4.90                      |
| 5G NR Band 78                    | 3 450 ~ 3 550      | 4.69                      |
|                                  | 3 700 ~ 3 800      | 4.90                      |

## Label and compliance information

To satisfy the labeling requirements, the following text must appear on the exterior of the end product.

Contains FCC ID : YZP-GN1000

## Information on test modes and additional testing requirements

If additional module is inserted in the host, test modes should take into consideration different operational conditions for a standalone modular transmitter in a host.

## Additional testing, Part 15 Subpart B disclaimer

According to § 15.103 Exempted devices, (a), this module is exempted due to utilized exclusively in transportation vehicle.

## User Manual Notice

### FCC

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.

This module complies with FCC radiation exposure limits set forth for uncontrolled environments. This module must be installed and operated with minimum distance of 20 cm between the radiating element and the user. This module must not be co-located with any other transmitters or antennas.

### ISED

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

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

Ce dispositif contient des émetteurs/récepteurs exempts de licence qui sont conformes aux RSS exempts de licence d'Innovation, Sciences et Développement économique Canada. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage;
- (2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This module complies with ISED radiation exposure limits set forth for uncontrolled environments. This module must be installed and operated with minimum distance of 20 cm between the radiating element and the user. This module must not be co-located with any other transmitters or antennas.

Ce module est conforme aux limites d'exposition au rayonnement fixées par ISED pour les environnements non contrôlés. Ce module doit être installé et actionné à une distance minimale de 20 cm entre l'élément rayonnant et l'utilisateur. Ce module ne doit pas être situé avec d'autres émetteurs ou antennes.

Please notice that if the IC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains IC : 7414C-GN1000" any similar wording that expresses the same meaning may be used.

L'étiquette d'homologation d'un module d'Innovation, Sciences et Développement économique Canada devra être posée sur le produit hôte à un endroit bien en vue, en tout temps. En l'absence d'étiquette, le produit hôte doit porter une étiquette sur laquelle figure le numéro d'homologation du module d'Innovation, Sciences et Développement économique Canada, précédé du mot « contient », ou d'une formulation similaire allant dans le même sens et qui va comme suit : Contient IC :7414C-GN1000 est le numéro d'homologation du module