

User Manual

(TCUA NAD Module, TM13LNNAJL0)

1. Product Introduction

TM13LNNAJL0 is a telematics module that LGE is developing for the vehicles. It's a small box installed deep inside passenger cars, and the TM13LNNAJL0 is designed for the automotive industry.

TM13LNNAJL0 supports LTE, WCDMA, and GSM air Interface standards. The TM13LNNAJL0 is based on the Qualcomm MDM9628 wireless chipsets and support following RF bands.

[2G/3G]

Tech	Band	F _{UL_low} – F _{UL_high}		F _{DL_low} – F _{DL_high}		Target Power[dBm]	Tolerance[dB]
GSM	GSM1900	1850 MHz	– 1910 MHz	1930 MHz	– 1990 MHz	30.0	+/- 2.0
GSM	GSM850	824 MHz	– 849 MHz	869 MHz	– 894MHz	33.0	+/- 2.0
WCDMA	2	1850 MHz	– 1910 MHz	1930 MHz	– 1990 MHz	23.0	+/- 2.0
WCDMA	4	1710 MHz	– 1755 MHz	2110 MHz	– 2155 MHz	23.0	+/- 2.0
WCDMA	5	824 MHz	– 849 MHz	869 MHz	– 894MHz	23.0	+/- 2.0

[LTE]

Tech	Band	F _{UL_low} – F _{UL_high}		F _{DL_low} – F _{DL_high}		Target Power[dBm]	Tolerance[dB]
LTE	2	1850 MHz	– 1910 MHz	1930 MHz	– 1990 MHz	23.0	+/- 2.0
LTE	4	1710 MHz	– 1755 MHz	2110 MHz	– 2155 MHz	23.0	+/- 2.0
LTE	5	824 MHz	– 849 MHz	869 MHz	– 894MHz	23.0	+/- 2.0
LTE	7	2500 MHz	– 2570 MHz	2620 MHz	– 2690 MHz	23.0	+/- 2.0
LTE	12	699 MHz	– 716 MHz	729 MHz	– 746 MHz	23.0	+/- 2.0
LTE	13	777 MHz	– 787 MHz	746 MHz	– 756 MHz	23.0	+/- 2.0
LTE	17	704 MHz	– 716 MHz	734 MHz	– 746 MHz	23.0	+/- 2.0

[GNSS]

Band	Signal
GNSS L1	Gps (L1)
	Galileo (E1)

This Module is authorized for installation in only LGE's devices and will not be marketed to the general public. Electrical specifications are defined in the table below.

Electrical Characteristic	Operating Voltage	6.5V ~ 16V
	Current	Max 1A
	Temperature	-40 ~ 85 degree

2. 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.

2. Notice

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 : 2703H-TM13LNNAJL0" 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 : 2703H-TM13LNNAJL0 est le numéro d'homologation du module

3. OEM Manual

The List of applicable FCC rules

FCC : Part 22, Part 24, Part 27

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

Planar Inverted F 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.

Frequency [MHz]	699	704	716	729	734	746	748	758	777	787	791	803
Peak Gain (dBi)	-2.53	-2.44	-1.89	-0.66	-0.21	0.68	0.75	0.92	0.2	-0.35	-0.3	-0.69
Average Gain(dBi)	-5.71	-5.63	-5.23	-4.58	-4.27	-3.43	-3.31	-2.96	-3.3	-3.86	-3.86	-4.42
Frequency [MHz]	814	824	832	849	859	869	880	894	915	925	960	
Peak Gain (dBi)	-1.1	-1.26	-1.4	-1.12	-1.07	-1.11	-0.68	-0.99	-1.11	-0.95	-0.65	
Average Gain(dBi)	-4.91	-5.22	-5.46	-4.79	-4.74	-4.79	-4.88	-5.27	-4.77	-4.75	-4.05	
Frequency [MHz]	1710	1755	1785	1805	1850	1880	1910	1920	1930	1980	1990	2110
Peak Gain (dBi)	0.48	1.25	1.28	1.13	2.25	2.51	2.24	2.09	2.09	2.84	2.88	2.98
Average Gain(dBi)	-4.41	-3.76	-3.78	-3.92	-3.13	-3.15	-3.48	-3.62	-3.58	-2.89	-2.85	-2.05
Frequency [MHz]	2155	2170	2300	2400	2500	2570	2620	2690				
Peak Gain (dBi)	2.93	2.95	2.7	2.41	1.31	0.07	-0.53	-1.71				
Average Gain(dBi)	-2.38	-2.44	-2.77	-3.38	-4.41	-5.67	-6.16	-7.58				

3. OEM Manual

Label and compliance information

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

Contains FCC ID : BEJTM13LNNAJL0

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.