RADIO PERFORMANCE TEST REPORT (CLASS II Permissive Change)

Test Report No.	**: OT-227-RWD-002**
Reception No.	**: 2109004087**
Applicant	**: LG Electronics USA**
Address	**: 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, 07632, United States**
Manufacturer	**: LG Electronics Inc.**
Address	**: 10, Magokjungang 10-ro, Gangseo-gu, Seoul, Korea, 07796**
Type of Equipment	**: Telematics Module**
FCC ID.	**: BEJ-TM04ANNABM0**
Model Name	**: TM04ANNABM0**
Serial number	**: 001, 002**
Total page of Report	**: 14 pages (including this page)**
Date of Incoming	**: June 08, 2022**
Date of issue	**: July 01, 2022**

SUMMARY

The equipment complies with the regulation; **Part 2 Subpart J, Part 22 Subpart C/H, Part 24 Subpart E, Part 27 Subpart C and Part 90 Subpart S.**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Tested by	Reviewed by	Approved by
Ju-Yun, Park / Manager	Tae-Ho, Kim / General Manager	Ki-Hong, Nam / General Manager
ONETECH Corp.	ONETECH Corp.	ONETECH Corp.

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

CONTENTS

PAGE

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-227-RWD-002	July 01, 2022	Class II Permissive Change	All

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1. VERIFICATION OF COMPLIANCE

Applicant	: LG Electronics USA
Address	: 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, 07632, United States
Contact Person	: Sung Soo, Kim / Director, Regulatory and Environmental Affairs
Telephone No.	: +201-266-2215
FCC ID	: BEJ-TM04ANNABM0
Model Name	: TM04ANNABM0
Serial Number	: 001, 002
Date	: July 01, 2022

EQUIPMENT CLASS	PCB-PCS Licensed Transmitter
EQUIPMENT DESCRIPTION	Telematics Module
THIS REPORT CONCERNS	Class II Permissive Change
MEASUREMENT PROCEDURES	ANSI C63.26:2015, KDB Publication 971168 D01
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	Part 2 Subpart J, Part 22 Subpart C/H, Part 24 Subpart E, Part 27 Subpart C and Part 90 Subpart S.
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. GENERAL INFORMATION

2.1 Product Description

The LG Electronics USA, Model TM04ANNABM0 (referred to as the EUT in this report) is a Telematics Module. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Telematics Module
Power Supply	DC 12.5 V
Rated Power	GSM 850: 33 dBm GSM 1900: 30 dBm WCDMA II, V: 24 dBm WCDMA IV: 24 dBm LTE Band 2, 4, 5, 12, 13, 17, 25, 26, 66, 71: 23 dBm
Frequency Range	GSM 850: 824 MHz ~ 849 MHz GSM 850: 1 850 MHz ~ 1 910 MHz WCDMA II: 1 850 MHz ~ 1 910 MHz WCDMA IV: 1 710 MHz ~ 1 755 MHz WCDMA V: 824 MHz ~ 849 MHz LTE Band 2: 1 850 MHz ~ 1 910 MHz LTE Band 4: 1 710 MHz ~ 1 755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1 850 MHz ~ 1 915 MHz LTE Band 26: 814 MHz ~ 824 MHz LTE Band 26: 824 MHz ~ 849 MHz LTE Band 66: 1 710 MHz ~ 1 780 MHz LTE Band 71: 663 MHz ~ 698 MHz

Emission Designator	GSM 850: 241KGXW (Voice) / 246KG7W (EDGE) GSM 1900: 241KGXW (Voice) / 245KG7W (EDGE) WCDMA II: 4M15F9W WCDMA IV: 4M15F9W WCDMA V: 4M14F9W LTE Band 12/17 (1.4 MHz): 1M10G7D (QPSK) / 1M10D7D (16QAM) LTE Band 12/17 (3 MHz): 2M69G7D (QPSK) / 2M69D7D (16QAM) LTE Band 12/17 (5 MHz): 4M52G7D (QPSK) / 4M53D7D (16QAM) LTE Band 12/17 (10 MHz): 8M97G7D (QPSK) / 8M97D7D (16QAM) LTE Band 13 (5 MHz): 4M52G7D (QPSK) / 4M53D7D (16QAM) LTE Band 13 (10 MHz): 8M92G7D (QPSK) / 8M94D7D (16QAM) LTE Band 25/2 (1.4 MHz): 1M10G7D (QPSK) / 1M10D7D (16QAM) LTE Band 25/2 (3 MHz): 2M69G7D (QPSK) / 2M70D7D (16QAM) LTE Band 25/2 (5 MHz): 4M52G7D (QPSK) / 4M53D7D (16QAM) LTE Band 25/2 (10 MHz): 8M97G7D (QPSK) / 8M97D7D (16QAM) LTE Band 25/2 (15 MHz): 13M6G7D (QPSK) / 13M5D7D (16QAM) LTE Band 25/2 (20 MHz): 18M0G7D (QPSK) / 18M0D7D (16QAM) LTE Band 26/5 (1.4 MHz): 1M10G7D (QPSK) / 1M10D7D (16QAM) LTE Band 26/5 (3 MHz): 2M69G7D (QPSK) / 2M69D7D (16QAM) LTE Band 26/5 (5 MHz): 4M52G7D (QPSK) / 4M52D7D (16QAM) LTE Band 26/5 (10 MHz): 8M97G7D (QPSK) / 8M97D7D (16QAM) LTE Band 26 (15 MHz): 13M5G7D (QPSK) / 13M5D7D (16QAM) LTE Band 66/4 (1.4 MHz): 1M10G7D (QPSK) / 1M10D7D (16QAM) LTE Band 66/4 (3 MHz): 2M70G7D (QPSK) / 2M69D7D (16QAM) LTE Band 66/4 (5 MHz): 4M52G7D (QPSK) / 4M52D7D (16QAM) LTE Band 66/4 (10 MHz): 8M97G7D (QPSK) / 8M97D7D (16QAM) LTE Band 66/4 (15 MHz): 13M5G7D (QPSK) / 13M5D7D (16QAM) LTE Band 66/4 (20 MHz): 17M9G7D (QPSK) / 18M0D7D (16QAM) LTE Band 71 (5 MHz): 4M52G7D (QPSK) / 4M53D7D (16QAM) LTE Band 71 (10 MHz): 8M97G7D (QPSK) / 8M97D7D (16QAM) LTE Band 71 (15 MHz): 13M5G7D (QPSK) / 13M5D7D (16QAM) LTE Band 71 (20 MHz): 17M9G7D (QPSK) / 18M0D7D (16QAM)

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Modulation Technique	QPSK, 16QAM, GMSK, 8PSK
Antenna Type	Shark antenna
Antenna gain	663 MHz ~ 698 MHz: 1.40 dBi 699 MHz ~ 716 MHz: 3.00 dBi 704 MHz ~ 716 MHz: 3.00 dBi 777 MHz ~ 787 MHz: 3.00 dBi 814 MHz ~ 849 MHz: 3.00 dBi 824 MHz ~ 849 MHz: 3.00 dBi 1 710 MHz ~ 1 755 MHz: 5.00 dBi 1 710 MHz ~ 1 780 MHz: 5.00 dBi 1 850 MHz ~ 1 910 MHz: 5.00 dBi 1 850 MHz ~ 1 915 MHz: 5.00 dBi 2 496 MHz ~ 2 690 MHz: 6.60 dBi 2 500 MHz ~ 2 570 MHz: 6.60 dBi
H/W Version	Rev.C3
S/W Version	WN22XA28

2.2 Alternative type(s)/model(s); also covered by this test report.

-. None

3. EUT MODIFICATIONS

-. None

4. MAXIMUM PERMISSIBLE EXPOSURE

4.1 RF Exposure Evaluation

Environmental evaluation and exposure limit according to FCC CFR 47 part 1, 1.1307(b), 1.1310

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	Average Time
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f^2	6
30-300	61.4	0.163	1.0	6
300-1 500	-	-	f/300	6
1 500-100 000	-	-	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f^2	30
30-300	27.5	0.073	0.2	30
300-1 500	-	-	f/1500	30
1 500-100 000	-	-	1.0	30

Friis transmission formula: Pd = (Pout*G)/(4*pi*R^2)

Where Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Pd the limit of MPE, 1 mW/cm^2. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

Note

- The power density Pd (5th column) at a distance of 20 cm calculated from the friis transmission formula is far below the limit of 1 mW/cm^2
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed and operated with minimum 20 cm between the radiator and your body.
- The antenna gain of this transmitter is less than 6 dBi and must not be collocated or operating in conjunction with any other antenna or transmitter unless authorized to do so by the FCC.
- According to KDB 447498 D01 RF Exposure Guidance 4.1.

4.2 Test data for Antenna Name: 920-631-001 [E.I.R.P]

According to above equation, the following result was obtained.

Band	Frequency (MHz)	Max tune up E.I.R.P		Antenna Gain (dBi)	Power Density @ 20 cm Separation (mW/cm²)	Limit (mW/cm²)
		(dBm)	(mW)			
GSM 1 900	1 850 - 1 910	29.58	907.82	2.40	0.18	1.00
WCDMA II	1 850 - 1 910	24.58	287.08	2.40	0.06	1.00
WCDMA IV	1 710 - 1 755	25.87	386.37	3.30	0.08	1.00
LTE 7	2 500 - 2 570	28.14	651.63	6.60	0.13	1.00
LTE25/2	1 850 - 1 915	24.58	287.08	2.40	0.06	1.00
LTE41	2 496 - 2 690	28.14	651.63	6.60	0.13	1.00
LTE66/4	1 710 - 1 780	25.87	386.37	3.30	0.08	1.00

Friis transmission formula: $Pd = (Pout*G)/(4*pi*R^2)$

Where Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

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4.3 Test data for Antenna Name: 920-631-001 [E.R.P]

According to above equation, the following result was obtained.

Band	Frequency (MHz)	Max tune up E.R.P		Antenna Gain (dBi)	Power Density @ 20 cm Separation (mW/cm²)	Limit (mW/cm²)
		(dBm)	(mW)			
GSM 850	824 - 849	32.23	1671.09	-0.95	0.33	0.55
WCDMA Ⅴ	824 - 849	22.43	174.98	-0.95	0.03	0.55
LTE 12/17	699 - 716	22.83	191.87	-0.75	0.04	0.47
LTE13	777 - 787	23.03	200.91	-0.55	0.04	0.52
LTE26/5	824 - 849	22.43	174.98	-0.95	0.03	0.55
LTE71	663 - 698	22.83	191.87	-0.75	0.04	0.44
LTE 26	814 - 824	23.33	215.28	-0.05	0.04	0.54

Friis transmission formula: $Pd = (Pout*G)/(4*pi*R^2)$

Where Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

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4.4 Test data for Antenna Name: 8705921 [E.I.R.P]

According to above equation, the following result was obtained.

Band	Frequency (MHz)	Max tune up E.I.R.P		Antenna Gain (dBi)	Power Density @ 20 cm Separation (mW/cm²)	Limit (mW/cm²)
		(dBm)	(mW)			
GSM 1 900	1 850 - 1 910	32.66	1845.02	5.00	0.37	1.00
WCDMA II	1 850 - 1 910	27.66	583.45	5.00	0.12	1.00
WCDMA IV	1 710 - 1 755	28.00	630.96	5.00	0.13	1.00
LTE 7	2 500 - 2 570	27.10	512.86	5.00	0.10	1.00
LTE25/2	1 850 - 1 915	27.66	583.45	5.00	0.12	1.00
LTE41	2 496 - 2 690	27.10	512.86	5.00	0.10	1.00
LTE66/4	1 710 - 1 780	28.00	630.96	5.00	0.13	1.00

Friis transmission formula: $Pd = (Pout*G)/(4*pi*R^2)$

Where Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

4.5 Test data for Antenna Name: 8705921 [E.R.P]

According to above equation, the following result was obtained.

Band	Frequency (MHz)	Max tune up E.R.P		Antenna Gain (dBi)	Power Density @ 20 cm Separation (mW/cm²)	Limit (mW/cm²)
		(dBm)	(mW)			
GSM 850	824 - 849	34.33	2710.19	0.85	0.54	0.55
WCDMA Ⅴ	824 - 849	24.53	283.79	0.85	0.06	0.55
LTE 12/17	699 - 716	24.73	297.17	0.85	0.06	0.47
LTE13	777 - 787	24.73	297.17	0.85	0.06	0.52
LTE26/5	824 - 849	24.53	283.79	0.85	0.06	0.55
LTE71	663 - 698	18.73	74.64	-5.15	0.01	0.44
LTE 26	814 - 824	24.53	283.79	0.85	0.06	0.54

Friis transmission formula: $Pd = (Pout*G)/(4*pi*R^2)$

Where Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

4.6 Test data for Antenna Name: 920-631-002 [E.I.R.P]

According to above equation, the following result was obtained.

Band	Frequency (MHz)	Max tune up E.I.R.P		Antenna Gain (dBi)	Power Density @ 20 cm Separation (mW/cm²)	Limit (mW/cm²)
		(dBm)	(mW)			
GSM 1 900	1 850 - 1 910	29.18	827.94	2.00	0.16	1.00
WCDMA II	1 850 - 1 910	24.18	261.82	2.00	0.05	1.00
WCDMA IV	1 710 - 1 755	25.87	386.37	3.30	0.08	1.00
LTE 7	2 500 - 2 570	28.04	636.80	6.50	0.13	1.00
LTE25/2	1 850 - 1 915	24.18	261.82	2.00	0.05	1.00
LTE41	2 496 - 2 690	28.04	636.80	6.50	0.13	1.00
LTE66/4	1 710 - 1 780	25.87	386.37	3.30	0.08	1.00

Friis transmission formula: $Pd = (Pout*G)/(4*pi*R^2)$

Where Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

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4.7 Test data for Antenna Name: 920-631-002 [E.R.P]

According to above equation, the following result was obtained.

Band	Frequency (MHz)	Max tune up E.R.P		Antenna Gain (dBi)	Power Density @ 20 cm Separation (mW/cm²)	Limit (mW/cm²)
		(dBm)	(mW)			
GSM 850	824 - 849	32.13	1633.05	-1.05	0.32	0.55
WCDMA Ⅴ	824 - 849	22.33	171.00	-1.05	0.03	0.55
LTE 12/17	699 - 716	23.13	205.59	-0.45	0.04	0.47
LTE13	777 - 787	23.13	205.59	-0.45	0.04	0.52
LTE26/5	824 - 849	22.33	171.00	-1.05	0.03	0.55
LTE71	663 - 698	22.63	183.23	-0.95	0.04	0.44
LTE 26	814 - 824	23.53	225.42	0.15	0.04	0.54

Friis transmission formula: $Pd = (Pout*G)/(4*pi*R^2)$

Where Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

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