TEST REPORT

of

FCC CFR 47 part 1, 1.1307(b), 1.1310

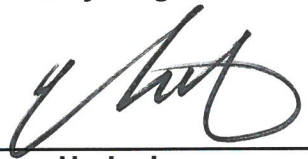
FCC ID: BEJ-TVA20ANFBN

Equipment Under Test	:	Telematics
Model Name	:	TVA20ANFBN
Variant Model Name	:	TVA20ANFNN
Applicant	:	LG Electronics USA
Manufacturer	:	LG Electronics Inc.
Date of Receipt	:	2018.04.16
Date of Test(s)	:	2018.04.19 ~ 2018.06.05
Date of Issue	:	2018.06.08

In the configuration tested, the EUT complied with the standards specified above.

Tested By:  **Date:** **2018.06.08**

Jinhyoung Cho

Technical Manager:  **Date:** **2018.06.08**

Harim Lee

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)
- Wireless Div. 2FL, 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx.

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1.2. Details of Applicant

Applicant : LG Electronics USA
Address : 1000 Sylvan Avenue, Englewood Cliffs, New Jersey, United States, 07632
Contact Person : Han, Kyung-Su
Phone No. : +1 201 816 2003

1.3. Details of manufacturer

Company : LG Electronics Inc.
Address : 10, Magokjungang 10-ro, Gangseo-gu, Seoul, Korea

1.4. Description of EUT

Kind of Product	Telematics
Model Name	TVA20ANFBN
Variant Model Name	TVA20ANFNN
Power Supply	DC 12 V
Frequency Range	2 412 ㎒ ~ 2 462 ㎒ (11b/g/n_HT20), 2 402 ㎒ ~ 2 480 ㎒ (Bluetooth)
Modulation Technique	DSSS, OFDM, GFSK, π/4DQPSK, 8DPSK
Number of Channels	11 channels (11b/g/n_HT20), 79 channels (Bluetooth)
Antenna Type	Dielectric Chip Antenna
Antenna Gain	3.95 ㏈i

1.5. Test report revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL012696	2018.05.17	Initial
1	F690501/RF-RTL012696-1	2018.06.05	Remove WWAN related and simultaneous transmission evaluation result
2	F690501/RF-RTL012696-2	2018.06.08	Added simultaneous transmission evaluation result

1.6. Information of Variant Model

Model Name		Back up battery	CAN Speed
Basic model	TVA20ANFBN	O	High / Low Speed
Variant model	TVA20ANFNN	X	High / Low Speed

2. RF Exposure Evaluation

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

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (㎒)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (㎽/㎠)	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**

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

Where Pd = power density in ㎽/㎠

Pout = output power to antenna in ㎽

G = gain of antenna in linear scale

Pi = 3.1416

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

Pd the limit of MPE, 1 ㎽/㎠. 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.

2.1.2. Test Result of RF Exposure Evaluation

Test Item : RF Exposure Evaluation Data
Test Mode : Normal Operation

2.1.3. Output Power into Antenna & RF Exposure Evaluation Distance

Bluetooth
- Maximum tune up tolerance

Frequency Range (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
2 402 ~ 2 480	3	3.95	0.000 986	1

WLAN 2.4
- Maximum tune up tolerance

Frequency Range (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
2 412 ~ 2 462	14	3.95	0.012 409	1

GSM 850
- Maximum tune up tolerance

Channel	Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Cable Loss (dB)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
128	824.2	35.5	-0.7	-5.45	0.171 289	0.549 467

GSM 1 900
- Maximum tune up tolerance

Channel	Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Cable Loss (dB)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
512	1 850.2	32.5	1.2	-8.29	0.069 140	1

WCDMA Band 2
- Maximum tune up tolerance

Channel	Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Cable Loss (dB)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
9262	1 852.4	25.7	1.2	-8.29	0.014 445	1

WCDMA Band 4
- Maximum tune up tolerance

Channel	Frequency (㎒)	Output Average Power to Antenna (㏈m)	Antenna Gain (㏈i)	Cable Loss (㏈)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
1312	1 712.4	25.7	-0.1	-7.95	0.011 581	1

WCDMA Band 5
- Maximum tune up tolerance

Channel	Frequency (㎒)	Output Average Power to Antenna (㏈m)	Antenna Gain (㏈i)	Cable Loss (㏈)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
4132	826.4	25.7	-0.7	-5.45	0.017 936	0.550 933

LTE Band 2
- Maximum tune up tolerance

Channel	Frequency (㎒)	Output Average Power to Antenna (㏈m)	Antenna Gain (㏈i)	Cable Loss (㏈)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
18607	1 850.7	25.7	1.2	-8.29	0.014 445	1

LTE Band 4
- Maximum tune up tolerance

Channel	Frequency (㎒)	Output Average Power to Antenna (㏈m)	Antenna Gain (㏈i)	Cable Loss (㏈)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
19957	1 710.7	25.7	-0.1	-7.95	0.011 581	1

LTE Band 5
- Maximum tune up tolerance

Channel	Frequency (㎒)	Output Average Power to Antenna (㏈m)	Antenna Gain (㏈i)	Cable Loss (㏈)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
20407	824.7	25.7	-0.7	-5.45	0.017 731	0.549 800

LTE Band 12
- Maximum tune up tolerance

Channel	Frequency (㎒)	Output Average Power to Antenna (㏈m)	Antenna Gain (㏈i)	Cable Loss (㏈)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
23017	699.7	25.7	-1.5	-4.79	0.017 367	0.466 467

LTE Band 13
- Maximum tune up tolerance

Channel	Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Cable Loss (dB)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
23205	779.5	25.7	-1.3	-5.16	0.016 701	0.519 667

LTE Band 17
- Maximum tune up tolerance

Channel	Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Cable Loss (dB)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
23755	706.5	25.7	-1.5	-4.82	0.017 248	0.471 000

Note:
- The power density Pd (5th column) at a distance of 20 ㎝ calculated from the friis transmission formula is far below the limit of 1 ㎽/㎠.
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed and operated with minimum 20 ㎝ 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.

Simultaneous transmission of MPE test exclusion for worst case configuration.

Bluetooth: the ratio is 0.000 986 / 1
WLAN: the ratio is 0.012 409 / 1
GSM 850: the ratio is 0.171 289 / 0.549 467

Confirm the sum result of individual MPEs ratio is ≤ 1.0;
Bluetooth + WLAN + GSM 850: (0.000 986 / 1) + (0.012 409 / 1) + (0.171 289 / 0.549 467)
= 0.325 132 ≤ 1.0

So this device meets the KDB447498 D01 v06 section 7.2 requirement of “Simultaneous transmission MPE test exclusion”

Note:
- Between GSM, WCDMA and LTE, GSM 850 is chosen as worst case.
- GSM, WCDMA and LTE do not transmit simultaneously.

- End of the Test Report -