

TEST REPORT

of

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

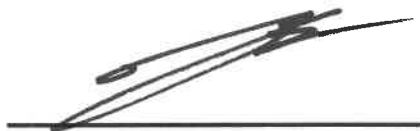
FCC ID: BEJTA4HEBW2

Equipment Under Test : Car Telematics Device
 Model Name : TA4HEB-W
 Variant Model Name(s) : TA4HEB-W2, TA4LEN-W, TA4LEN-W2
 Applicant : LG Electronics USA
 Manufacturer : LG Electronics Inc.
 Date of Receipt : 2020.11.16
 Date of Test(s) : 2021.01.13 ~ 2021.02.09
 Date of Issue : 2021.02.26

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

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Report Number: F690501-RF-RTL001655-1

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

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- Designation number: KR0150

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1.2. Details of Applicant

Applicant : LG Electronics USA

Address : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, United States,
07632

Contact Person : Kim, Dae-woong

Phone No. : +1 201 266 2215

1.3. Details of Manufacturer

Company : LG Electronics Inc.

Address : 10, Magokjungang 10-ro, Gangseo-gu, Seoul, Korea, 07796

1.4. Description of EUT

Kind of Product	Car Telematics Device
Model Name	TA4HEB-W
Variant Model Names	TA4HEB-W2, TA4LEN-W, TA4LEN-W2
Power Supply	DC 12V
Frequency Range	GSM 850: 824 MHz ~ 849 MHz GSM 1 900: 1 850 MHz ~ 1 910 MHz WCDMA 5: 824 MHz ~ 849 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2 500 MHz ~ 2 570 MHz LTE Band 26: 814 MHz ~ 849 MHz WLAN 2.4G (11b/g/n_HT20, HT40): 2 412 MHz ~ 2 462 MHz WLAN 5G Band 1 (11a/n_HT20, 11ac_VHT20): 5 180 MHz ~ 5 240 MHz WLAN 5G Band 1 (11n_HT40, 11ac_VHT40): 5 190 MHz ~ 5 230 MHz WLAN 5G Band 1 (11ac_VHT80): 5 210 MHz WLAN 5G Band 3 (11a/n_HT20, 11ac_VHT20): 5 745 MHz ~ 5 825 MHz WLAN 5G Band 3 (11n_HT40, 11ac_VHT40): 5 755 MHz ~ 5 795 MHz WLAN 5G Band 3 (11ac_VHT80): 5 775 MHz
Modulation Technique	DSSS, OFDM, QPSK, 16QAM, 64QAM, GMSK, 8PSK
Antenna Type	External antenna
Antenna Gain	2 400 MHz ~ 2 483.5 MHz: 0.94 dBi (WLAN 2.4 G) 5 150 MHz ~ 5 250 MHz: 5.71 dBi (WLAN 5 G) 5 725 MHz ~ 5 850 MHz: 3.82 dBi (WLAN 5 G) 814 MHz ~ 824 MHz: -1.79 dBi (LTE 26) 824 MHz ~ 849 MHz: -0.69 dBi (GSM 850, WCDMA 5, LTE 26/5) 1 850 MHz ~ 1 910 MHz: 0.85 dBi (GSM 1 900) 2 500 MHz ~ 2 570 MHz: 0.99 dBi (LTE 7)
H/W Version	Rev.D
S/W Version	V9.1.02

1.5. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL001655	2021.02.09	Initial
1	F690501-RF-RTL001655-1	2021.02.26	Revise variant model name

1.6. Information of Variant Models

Model Name	Information
TA4HEB-W	- Basic model
TA4LEN-W	- Same RF module and circuit to basic model, except below. - De-populated to Audio amp, DSP part - De-populated to BUB (Backup battery) part
TA4HEB-W2	- Same to basic model - Model name for Costa Rica, Thailand
TA4LEN-W2	- Same RF module and circuit to basic model, except below. - De-populated to Audio amp, DSP part - De-populated to BUB(Backup battery) part - Model name for Costa Rica, Thailand

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 (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	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
<u>300-1 500</u>	-	-	<u>f/1500</u>	<u>30</u>
<u>1 500-100 000</u>	-	-	<u>1.0</u>	<u>30</u>

2.1.1. Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d the limit of MPE, 1 mW/cm². 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. Test information of Cable Loss and Antenna Gain

Test Item	Frequency Range (MHz)	Cable Loss (dB)	Antenna Gain of EUT (dB i)	Final Antenna Gain (dB i)
GSM 850	824 ~ 849	-1.12	-0.69	-1.81
GSM 1900	1 850 ~ 1 910	-1.12	0.85	-0.27
WCDMA 5	824 ~ 849	-1.12	-0.69	-1.81
LTE 5	824 ~ 849	-1.12	-0.69	-1.81
LTE 7	2 500 ~ 2 570	-1.94	0.99	-0.95
LTE 26	814 ~ 824	-1.12	-1.79	-2.91
LTE 26	824 ~ 849	-1.12	-0.69	-1.81

Note;

-Final Antenna Gain = Cable Loss(dB) + Antenna Gain of EUT(dB i)

2.1.4. Output Power into Antenna & RF Exposure Evaluation Distance

WLAN (2.4G)

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
2 400 ~ 2 483.5	18.5	0.94	0.017 488	1

WLAN (5G)

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
5 150 ~ 5 250	11.5	5.71	0.010 465	1
5 725 ~ 5 850	11.5	3.82	0.006 772	1

GSM 850

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
824 ~ 849	32.7	-1.81	0.244 191	0.55

GSM 1 900

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
1 850 ~ 1 910	32	-0.27	0.296 299	1

WCDMA Band 5

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
824 ~ 849	25.5	-1.81	0.046 530	0.55

LTE - Band 5

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
824 ~ 849	25.5	-1.81	0.046 530	0.55

LTE - Band 7

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
2 500 ~ 2 570	25.5	-0.95	0.056 719	1

LTE - Band 26

- Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Final Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
814 ~ 824	25.5	-2.91	0.036 119	0.54
824 ~ 849	25.5	-1.81	0.046 530	0.55

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/cm².
- 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 dB i 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.

Simultaneous transmission of RF Exposure test exclusion for worst case configuration.

WLAN: the ratio is 0.017 488 / 1

WWAN: the ratio is 0.195 763 / 0.55

Confirm the sum result of individual MPEs ratio is ≤ 1.0 ;

WLAN + WWAN: $(0.017\ 488 / 1) + (0.195\ 763 / 0.55)$

$= 0.373\ 421 \leq 1.0$

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

- End of the Test Report -