

TEST REPORT

of

FCC Part 15 Subpart E §15.407

FCC ID: BEJTFBMEIBN3EU

Equipment Under Test : Telematics
Model Name : TFBMEIBN3EU
Variant Model Name(s) : Refer to page 4
Applicant : LG Electronics USA, Inc.
Manufacturer : LG Electronics Co., Ltd.
Date of Receipt : 2023.12.13
Date of Test(s) : 2024.11.04 ~ 2024.11.06
Date of Issue : 2024.11.13

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

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We are responsible for all the information of this test report except for the data(※) provided by the customer.

Tested by:



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Technical
Manager:



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Report Number: F690501-RF-RTL005554

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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, Inc.

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

Contact Person : Kim, David

Phone No. : +1 201 470 2696

1.3. Details of Manufacturer

Company : LG Electronics Inc.

Address : 128, Yeoui-daero, Yeongdeungpo-gu, Seoul, Republic of Korea, 07336

1.4. Description of EUT

Kind of Product	Telematics			
Model Name	TFBMEIBN3EU			
Approved Module	FCC ID: BEJTM16FNNABM0			
Variant Model Names	TFBMNINN0EN, TFBMEIBN3FR			
Serial Number	Conducted: #1			
Power Supply	DC 12 V			
Frequency Range	5 955 MHz ~ 6 415 MHz (Band 5: 11a, 11ax_HE20) 5 965 MHz ~ 6 405 MHz (Band 5: 11ax_HE40) 5 985 MHz ~ 6 385 MHz (Band 5: 11ax_HE80) 6 025 MHz ~ 6 345 MHz (Band 5: 11ax_HE160) 6 535 MHz ~ 6 855 MHz (Band 7: 11a, 11ax_HE20) 6 565 MHz ~ 6 845 MHz (Band 7: 11ax_HE40) 6 625 MHz ~ 6 785 MHz (Band 7: 11ax_HE80) 6 665 MHz (Band 7: 11ax_HE160)			
Modulation Technique	OFDM, OFDMA			
Number of Channels	24 channels (Band 5: 11a, 11ax_HE20) 12 channels (Band 5: 11ax_HE40) 6 channels (Band 5: 11ax_HE80) 3 channels (Band 5: 11ax_HE160) 17 channels (Band 7: 11a, 11ax_HE20) 8 channels (Band 7: 11ax_HE40) 3 channels (Band 7: 11ax_HE80) 1 channel (Band 7: 11ax_HE160)			
Antenna Type	Ant. 1: Pattern	Ant. 2: Pattern	Ant. 3: Chip	
Antenna Gain ※	Frequency range	Ant. 1	Ant. 2	Ant. 3
	5 925 MHz ~ 6 425 MHz	2.86 dB i	0.77 dB i	2.40 dB i
	6 525 MHz ~ 6 875 MHz	1.11 dB i	0.02 dB i	2.50 dB i
H/W Version	Rev. C3			
S/W Version	v010.038.045			
FVIN	N/A			

1.5. Declaration by the Manufacturer

- The EUT has four ports (Port1, Port 2, Port 3 and Port 4).
- Port 4 is operate WLAN 2G, 5G and not operate on WLAN 6G.
- WLAN 6G transmits both SISO and MIMO mode.

1.6. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Signal Generator	R&S	SMA100B	106887	Oct. 11, 2024	Annual	Oct. 11, 2025
Spectrum Analyzer	R&S	FSV30	103454	Dec. 01, 2023	Annual	Dec. 01, 2024
Directional Coupler	KRYTAR	152613	122660	Jul. 09, 2024	Annual	Jul. 09, 2025
Attenuator	Agilent	8496A	3308A14831	Jun. 19, 2024	Annual	Jun. 19, 2025
DC Power Supply	R&S	HMP2020	022802107	Oct. 31, 2024	Annual	Oct. 31, 2025
Coaxial Cable	RFONE	PL360P-292M292M-1.5M-A	20200324002	Oct. 11, 2024	Semi-Annual	Apr. 11, 2025

► Support Equipment

Description	Manufacturer	Model	FCC ID
Access Point	ASUS	GT-AXE11000	MSQ-RTAXJF00
Notebook	Lenovo	T440p	-

Note;

- For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

1.7. Summary of Test Result

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15 Subpart E		
Section	Test Item(s)	Result
15.407(d)(10)	Transmit power control (TPC) mechanism	Complied

1.8. Test Procedure(s)

The measurement procedures described in the guidance provided in KDB 987594 D02 U-NII 6 GHz EMC Measurement v03 was used in the measurement of the DUT.

1.9. Sample Calculation

Where relevant, the following sample calculation is provided:

1.9.1. Conducted Test

Offset value (dB) = Directional Coupler (dB) + Attenuator (dB) + Cable loss (dB)

1.10. Information of Software for test

- Using the software of MobaXterm v23.6 to test for the WLAN.

1.11. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Maximum Power Spectral Density	0.65 dB

All measurement uncertainty values are shown with a coverage factor $k = 2$ to indicate a 95 % level of confidence

1.12. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL005554	2024.11.13	Initial

1.13. Information of Variant Models

Model Names	*Installation capability on PCB	GNSS	WiFi / BLE	Backup Battery	Model Remark
TFBMEIBN3EU	O	O	O	O	Basic Model
TFBMNINN0EN	X	O	O	X	Variant Model
TFBMEIBN3FR	O	O	O	O	

*Cellular Antennas are mounted on TFBMEIBN3EU, TFBMNINN0EN, TFBMEIBN3FR

O: Popped

X: De-Popped

Note;

All test items performed with basic model.

1.14. Device Capabilities

Mode	SISO				MIMO / CDD		
	Port 1	Port 2	Port 3	Port 4	Port 1 + 2	Port 1 + 3	Port 1 + 4
Bluetooth Low Energy	O	X	X	X	X	X	X
WLAN 2 GHz	X	X	O	O	O	O	O
WLAN 5 GHz	X	X	O	O	O	O	O
WLAN 6 GHz	X	X	O	X	O	O	X

Note;

The EUT has four ports and all ports transmit by one WLAN module.

11b mode is transmit only SISO in Port 3 and Port 4.

The Port 1 passes directly through the module and Port 2, Port 3 and Port 4 are distributed through the switch end.

All the conducted test for SISO and MIMO mode were performed at the point of before the switch as the worst case.

1.15. Antenna Information

Antenna used in this product is Pattern antenna and peak max gain of antenna as below.

Band	U-NII 5 5 925 MHz ~ 6 425 MHz	U-NII 7 6 525 MHz ~ 6 875 MHz
Mode	11a, 11ax_HE20, HE40, HE80 and HE160	
Ant. 1 Gain (dB i)	2.86	1.11
Ant. 2 Gain (dB i)	0.77	0.02
Ant. 3 Gain (dB i)	2.40	2.50
Directional Gain (dB i)	5.64	4.84

According to ANSI C63.10-2013 14.4.3, unequal antenna gains with equal transmit powers.

a) If transmit signals are correlated, then

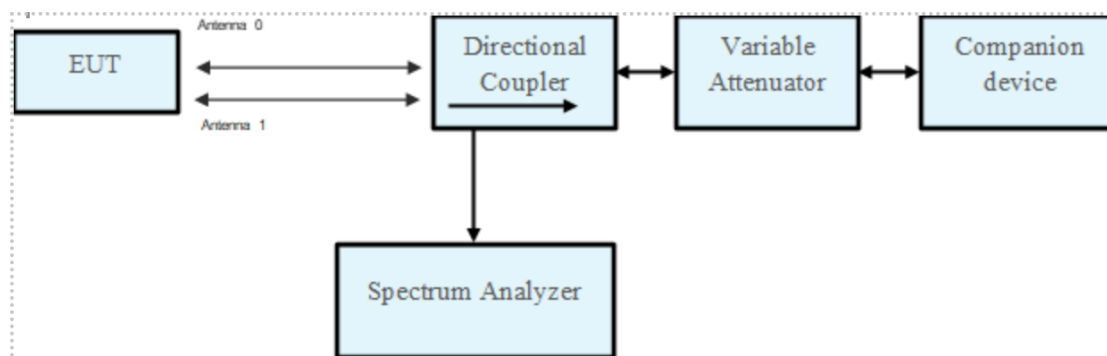
$$\text{Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N_{\text{ANT}}] \text{ dB i}$$

Note that the purpose of the factor 20 in the denominator of each exponent and the square of the sum of terms is to combine the signal levels coherently.

In Directional Gain were calculated with worst gain.

2. Transmit Power Control (TPC) Mechanism

2.1. Test Setup



2.2. Limit

According to §15.407(d)(10), Very low power devices operating in the 5.925-6.425 and 6.525-6.875 GHz bands shall employ a transmit power control (TPC) mechanism. A very low power device is required to have the capability to operate at least 6 dB below the maximum EIRP power spectral density (PSD) value of -5 dB m/MHz.

2.3. Test Procedure

1. Establish connection with the companion device.
2. Set the variable attenuator to 10 dB attenuation and ensure a noise free environment
3. Measure the spectral density (PSD) as high power RSSI. If the device supports MIMO operation, sum the power from all transmission ports.
4. Verify PSD power is ≤ -11 dB m/MHz.
5. Increase variable attenuation until the PSD increase power and record the transmit power.
6. Verify PSD power is increased to the maximum compliance power of that test configuration.

Spectrum setting

1. Set RBW = 1 MHz.
2. Set VBW = 3 MHz.
3. Detector = RMS.
4. Trace average at least 100 traces in power averaging (rms) mode.

2.4. Test Result

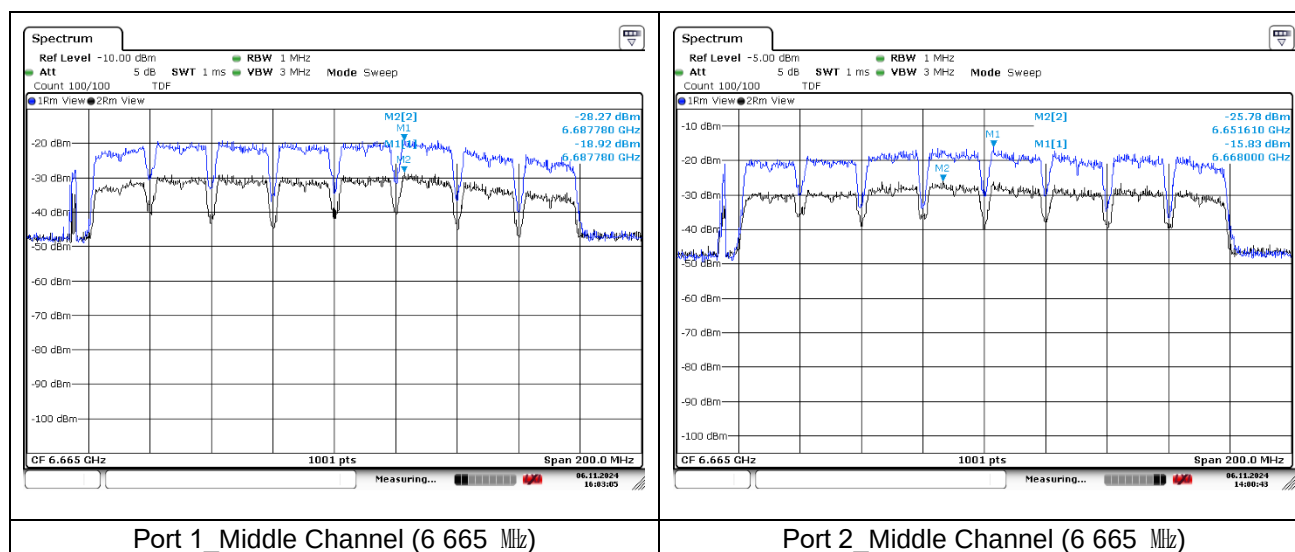
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

Band	Frequency (MHz)	High RSSI (dB m/1 MHz)			Low RSSI (dB m/1 MHz)			
		Port 1	Port 2	MIMO	Port 1	Port 2	MIMO	
U-NII 7	6 665	-28.27	-25.78	-23.84	-18.92	-15.83	-14.10	
		High RSSI MIMO (dB m/1 MHz)		Low RSSI MIMO (dB m/1 MHz)		Deviation (dB)		
		-23.84		-14.10		9.74		
Band	Frequency (MHz)	Measured PSD (dB m/1 MHz)		Directional Antenna Gain (dB i)	E.I.R.P. PSD (dB m/1 MHz)		Limit (dB m/1 MHz)	
		High RSSI MIMO	Low RSSI MIMO		High RSSI	Low RSSI	High RSSI	Low RSSI
U-NII 7	6 665	-23.84	-14.10	4.84	-19.00	-9.26	-11	-5

Remark;

- According to KDB 662911, power spectral density of each port and antenna gain was combined by using below calculation.
 - PSD: $10 \log \{10^{(\text{Port 1 PSD} / 10)} + 10^{(\text{Port 2 PSD} / 10)}\}$
 - Unequal antenna gains, with equal transmit powers. For antenna gains given by $G_1, G_2, \dots, G_N$ dB i
 - If transmit signals are correlated, then
 Directional gain = $10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N_{\text{ANT}}]$ dB i [Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]
- E.I.R.P. PSD (dB m/1 MHz) = Measured PSD (dB m/1 MHz) + Directional Antenna Gain (dB i)

- Test plots



- End of the Test Report -