

TEST REPORT

of

FCC Part 2 Subpart J, Part 22 Subpart C/H, Part 24 Subpart E,
Part 27 Subpart C, Part 90 Subpart I/S, Part 96 Subpart E
IC RSS-130 Issue 2, RSS-132 Issue 4, RSS-133 Issue 7,
RSS-139 Issue 4, RSS-192 Issue 5, RSS-198 Issue 1,
RSS-199 Issue 4 and RSS-Gen Issue 5

FCC ID: BEJTFBMEIBN3EU
IC Certification: 2703H-TFBMEIBN3EU

Equipment Under Test : Telematics
Model Name : TFBMEIBN3EU
Variant Model Name(s) : Refer to page 3
Applicant : FCC: LG Electronics USA, Inc.
IC: LG ELECTRONICS INC.
Manufacturer : LG Electronics Inc.
Date of Receipt : 2025.05.23
Date of Test(s) : 2025.06.30 ~ 2025.07.02
Date of Issue : 2025.07.07

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

- 1) The results of this test report are effective only to the items tested.
- 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.
- 3) This test report cannot be reproduced, except in full, without prior written permission of the Company.
- 4) The data marked ※ in this report was provided by the customer and may affect the validity of the test results.

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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Report Number: F690501-RF-RTL006169

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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

FCC Applicant : LG Electronics USA, Inc.

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

IC Applicant : LG ELECTRONICS INC.

IC Address : 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, Korea (Republic of), 451-713

Contact Person : Cho, Hee-jae

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		
Variant Model Names	TFBMNINN0EN, TFBMEIBN3FR		
Approved Module	TM16FNNABM0		
Module ID	FCC ID: BEJTM16FNNABM0 IC Certification: 2703H-TM16FNNABM0		
Serial Number	503VIPAH25176		
Power Supply	DC 12 V		
Rated Power	WCDMA II, V: 24 dBm LTE Band 2, 4, 5, 7, 12, 13, 17, 25, 26, 38, 42, 66, 71: 23 dBm LTE Band 48: 22 dBm NR Band 2, 5, 7, 12, 25, 41, 66, 71, 77, 78: 23 dBm NR Band 48: 22 dBm NR Band 48: 20 dBm (MIMO) NR Band 77: 25 dBm (Tx diversity and MIMO) NR Band 78: 23 dBm (MIMO)		
Frequency Range	WCDMA II: 1 850 MHz ~ 1 910 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 7: 2 500 MHz ~ 2 570 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 (FCC): 814 MHz ~ 824 MHz LTE Band 26: 824 MHz ~ 849 MHz LTE Band 38: 2 570 MHz ~ 2 620 MHz LTE Band 42 (IC only): 3 450 ~ 3 600 MHz LTE Band 48: 3 550 ~ 3 700 MHz LTE Band 66: 1 710 MHz ~ 1 780 MHz LTE Band 71: 663 MHz ~ 698 MHz	NR Band 2: 1 850 MHz ~ 1 910 MHz NR Band 5: 824 MHz ~ 849 MHz NR Band 7: 2 500 MHz ~ 2 570 MHz NR Band 12: 699 MHz ~ 716 MHz NR Band 25: 1 850 MHz ~ 1 915 MHz NR Band 41(FCC): 2 496 MHz ~ 2 690 MHz NR Band 41(IC): 2 500 MHz ~ 2 690 MHz NR Band 48: 3 550 MHz ~ 3 700 MHz NR Band 66: 1 710 MHz ~ 1 780 MHz NR Band 71: 663 MHz ~ 698 MHz NR Band 77(FCC): 3 450 MHz ~ 3 550 MHz NR Band 77(FCC): 3 700 MHz ~ 3 980 MHz NR Band 78(FCC): 3 450 MHz ~ 3 550 MHz NR Band 78(FCC): 3 700 MHz ~ 3 800 MHz NR Band 77(IC): 3 450 MHz ~ 3 900 MHz NR Band 77(IC): 3 900 MHz ~ 3 980 MHz NR Band 78(IC): 3 450 MHz ~ 3 800 MHz	
Modulation Technique	BPSK, QPSK, 16QAM, 64QAM, 256QAM		
Antenna Type	Ant. 1: PIFA	Ant. 2: PIFA	Ant. 3: PIFA
Antenna Gain*	Refer to the clause 1.11		
H/W Version	Rev. D3		
S/W Version	v010.047.018		
FVIN	N/A		

1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Due	Cal. Interval
Signal Generator	R&S	SMA100B	106887	10/11/2025	Annual
Spectrum Analyzer	Agilent	N9020A	MY53421758	09/10/2025	Annual
Spectrum Analyzer	Agilent	N9030A	US51350132	11/29/2025	Annual
Communication Analyzer	Anritsu	MT8821C	6262192291	02/19/2026	Annual
Low Pass Filter	Mini-Circuits	NLP-1200+	V 8979400903-1	05/23/2026	Annual
High Pass Filter	Wainwright Instrument GmbH	WHKX10-900-1000-18000-40SS	7	02/24/2026	Annual
High Pass Filter	Wainwright Instrument GmbH	WHKX3.0/18G-10SS	21	06/17/2026	Annual
High Pass Filter	Wainwright Instrument GmbH	WHNX7.5/26.5G-6SS	11	10/16/2025	Annual
DC Power Supply	Agilent	U8002A	MY49030063	01/23/2026	Annual
Preamplifier	H.P.	8447F	2944A03909	08/09/2025	Annual
Preamplifier	R&S	SCU18F	101058	02/27/2026	Annual
Preamplifier	MITEQ Inc.	JS44-18004000-35-8P	1546891	10/14/2025	Annual
Test Receiver	R&S	ESU26	100109	01/13/2026	Annual
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	03/25/2027	Biennial
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB9163	01126	03/05/2027	Biennial
Horn Antenna	R&S	HF906	100326	02/24/2026	Annual
Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA 9170	9170-540	12/11/2025	Annual
Antenna Master	Innco systems GmbH	MA4640-XP-ET	MA4640/536/38330516/L	N.C.R.	N/A
Turn Table	Innco systems GmbH	DS 1200S	N/A	N.C.R.	N/A
Controller	Innco systems GmbH	CONTROLLER CO3000-4P	CO3000/963/38330516/L	N.C.R.	N/A
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.6 m)	N/A	N.C.R.	N/A
Coaxial Cable	SENSORVIEW	NMST-13A26-NMST-5 m	TPC2402190004	Oct. 08, 2025	Semi-Annual
Coaxial Cable	SENSORVIEW	NMST-13A26-NMST-10 m	TPC2402190001	Oct. 08, 2025	Semi-Annual

1.6. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 2, 22, 24, 27, 90 and 96 / IC RSS-Gen Issue 5, RSS-130 Issue 2, RSS-132 Issue 4, RSS-133 Issue 7, RSS-139 Issue 4, RSS-192 Issue 5, RSS-198 Issue 1 and RSS-199 Issue 4			
Section(s) in FCC	Section(s) in IC	Test Item	Result
§2.1046 §22.913(a)(5) §24.232(c) §27.50(b)(9), §27.50(c)(9)(10) §27.50(d)(4), §27.50(h)(2) §27.50(j)(3), §27.50(k)(3) §90.635(b) §96.41(b)	RSS-130 Issue 2 4.6 RSS-132 Issue 4 5.4 RSS-133 Issue 7 5.5 RSS-139 Issue 4 5.5 RSS-192 Issue 5 5.5 RSS-198 Issue 1 5.5 RSS-199 Issue 4 5.5	E.R.P. / E.I.R.P.	Pass ¹⁾
§22.917(a) §24.238(a) §27.53(c)(2), §27.53(f) §27.53(g), §27.53(h)(1) §27.53(l)(2), §27.53(m)(4) §27.53(n)(2) §90.691(a) §96.41(e)(ii)	RSS-130 Issue 2 4.7 RSS-132 Issue 4 5.5 RSS-133 Issue 7 5.6 RSS-139 Issue 4 5.6 RSS-192 Issue 5 5.6 RSS-198 Issue 1 5.6 RSS-199 Issue 4 5.6	Spurious Radiated Emission	Pass ²⁾
§2.1046	RSS-Gen Issue 5 6.12	Conducted Output Power	Pass ¹⁾
§2.1049	RSS-Gen Issue 5 6.7	Occupied Bandwidth	Pass ¹⁾
§22.913(d) §24.232(d) §27.50(d)(5) §27.50(j)(4) §27.50(k)(4) §96.41(e)(ii)	RSS-130 Issue 2 4.6 RSS-132 Issue 4 5.4 RSS-133 Issue 7 5.5 RSS-139 Issue 4 5.5 RSS-192 Issue 5 5.5 RSS-198 Issue 1 5.5 RSS-199 Issue 4 5.5	Peak-Average Ratio	Pass ¹⁾
§22.917(a) §24.238(a) §27.53(c)(2), §27.53(g) §27.53(h)(1), §27.53(l)(2) §27.53(m)(4), §27.53(n)(2) §90.691(a) §96.41(e)(ii)	RSS-130 Issue 2 4.7 RSS-132 Issue 4 5.5 RSS-133 Issue 7 5.6 RSS-139 Issue 4 5.6 RSS-192 Issue 5 5.6 RSS-198 Issue 1 5.6 RSS-199 Issue 4 5.6	Spurious Emission at Antenna Terminal	Pass ¹⁾
§22.917(a) §24.238(a) §27.53(c)(2), §27.53(c)(4) §27.53(g), §27.53(h)(1) §27.53(l)(2), §27.53(m)(4) §27.53(n)(2) §90.691(a) §96.41(e)(ii)	RSS-130 Issue 2 4.7 RSS-132 Issue 4 5.5 RSS-133 Issue 7 5.6 RSS-139 Issue 4 5.6 RSS-192 Issue 5 5.6 RSS-198 Issue 1 5.6 RSS-199 Issue 4 5.6	Band Edge and Emission Mask	Pass ¹⁾
§2.1055 §22.355 §24.235 §27.54 §90.213(a)	RSS-Gen Issue 5 6.11 RSS-130 Issue 2 4.5 RSS-132 Issue 4 5.3 RSS-133 Issue 7 5.4 RSS-139 Issue 4 5.4 RSS-192 Issue 5 5.4 RSS-198 Issue 1 5.4 RSS-199 Issue 4 5.4	Frequency Stability	Pass ¹⁾

Note;

- 1) The test items were used the results from original test report.
- 2) This product has been classified as a C2PC case due to hardware modifications. Accordingly, only the radiated spurious emission test was performed for Antenna 3, as it's the component impacted by these changes. Compliance with the relevant standards was confirmed.

1.7. Sample Calculation for Offset

Where relevant, the following sample calculation is provided:

1.7.1. Radiation test

- E.I.R.P. (dB m) = Measured level (dB μ V) + Antenna factor (dB/m) + Cable loss (dB) + 20 Log D - 104.8;
where D is the measurement distance in meters.
- E.R.P. (dB m) = E.I.R.P. (dB m) - 2.15 (dB)

1.8. Manufacturer Declaration

The EUT has three antennas, antennas 1 and 2 are the main antennas, and antenna 3 can be switched to the main antenna 1. Antennas 1 and 3 are use the same module output port and are operated by switching. The EUT can be transmitted simultaneously to antennas 1 and 2 in TX diversity and MIMO modes. MIMO mode is supporting only CP-OFDM mode on LTE Band 48, NR Band 48, 77 and 78. TX diversity mode is supporting DFT-S-OFDM and CP-OFDM on NR Band 77.

1.9. Measurement Uncertainty

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

Parameter	Uncertainty	
Radiated Emission, 9 kHz to 30 MHz	H	3.40 dB
	V	3.40 dB
Radiated Emission, below 1 GHz	H	4.60 dB
	V	5.00 dB
Radiated Emission, above 1 GHz	H	3.60 dB
	V	3.60 dB

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

1.10. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL006169	2025.07.07	Initial

1.11. Antenna Information

Ant. No.	Ant. Type	Frequency Range	Support Band		
			LTE	NR	WCDMA
Ant. 1	PIFA	Below 3 GHz, Above 3 GHz	2, 4, 5, 7, 12, 13, 17, 25, 26, 38, 42, 48, 66, 71	2, 5, 7, 12, 25, 41, 66, 71, 48, 77, 78	II, V
Ant. 2	PIFA	Above 3 GHz	42, 48	48, 77, 78	
Ant. 3	PIFA	Below 3 GHz, Above 3 GHz	2, 4, 5, 7, 12, 13, 17, 25, 26, 38, 42, 48, 66, 71	2, 5, 7, 12, 25, 41, 66, 71, 48, 77, 78	II, V
Ant.1 + Ant. 2	PIFA	Above 3 GHz		48, 77, 78	

Note;

- Ant. 1 and Ant. 3 are in switching.

Band	Operating Frequency (MHz)	Antenna Peak Gain (dB i)			
		Ant. 1	Ant. 2	Ant. 3	Ant. 1 + Ant. 2
LTE 25/2 WCDMA II NR 25/2	1 850 ~ 1 915	<u>1.86</u>		-0.32	
LTE 66/4 NR 66	1 710 ~ 1 780	<u>1.37</u>		-0.03	
LTE 26/5 WCDMA V NR 5	824 ~ 849	<u>-2.43</u>		-3.16	
LTE 7 NR 7	2 500 ~ 2 570	0.92		<u>2.79</u>	
LTE 12/17 NR 12	699 ~ 716	-3.98		<u>-1.20</u>	
LTE 13	777 ~ 787	-4.60		<u>-3.16</u>	
LTE 26	814 ~ 824	<u>-2.43</u>		-3.16	
LTE 38	2 570 ~ 2 620	0.92		<u>2.79</u>	
LTE 42	3 450 ~ 3 600	-0.66	-1.37	<u>0.96</u>	
LTE 48	3 550 ~ 3 700	-0.66	-1.37	<u>0.96</u>	
NR 48	3 550 ~ 3 700	-0.66	-1.37	<u>0.96</u>	<u>2.00</u>
LTE 71 NR 71	663 ~ 698	-2.45		<u>-1.60</u>	
NR 41	2 496 ~ 2 690	0.92		<u>2.79</u>	
NR 77	3 450 ~ 3 550	0.34	0.12	<u>1.58</u>	<u>3.24</u>
	3 700 ~ 3 980	0.34	0.12	<u>1.58</u>	<u>3.24</u>
NR 78	3 450 ~ 3 550	0.34	0.12	<u>1.58</u>	<u>3.24</u>
	3 700 ~ 3 800	0.34	0.12	<u>1.58</u>	<u>3.24</u>

Note;

Antenna gains were compared between antennas and mark the worst gain of each band.

1) According to KDB 662911 D01 Multiple Transmitter Output v02r01 F)2)d(i),
Port 1 + Port 2 Antenna Gain = $10 * \log[(10^{G_1/10} + 10^{G_2/10})^2 / N_{ANT}]$

Where,

G_1 = antenna gain of port 1,
 G_2 = antenna gain of port 2,
 N_{ANT} = the number of antennas

1.12. Radiated Emissions Test Case

Radiated spurious emissions were tested in the band with the lowest margin of previously data and selected respectively above 1 GHz and below 1 GHz.

Fundamental Frequency Range	Worst Case
Below 1 GHz	LTE Band 13 (10 MHz – QPSK)
Above 1 GHz	LTE Band 7 (20 MHz – QPSK)

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

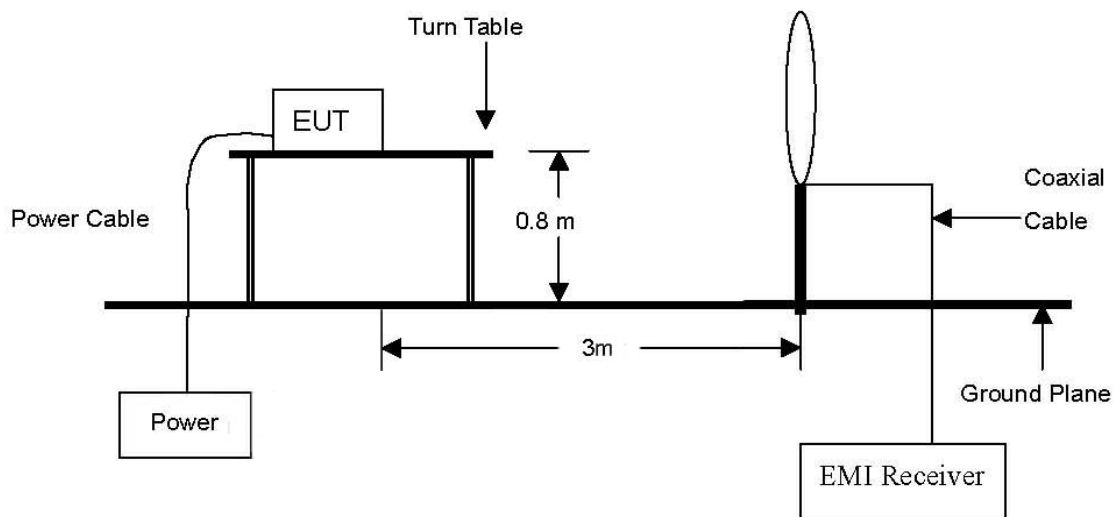
Note;

All test items performed with basic model

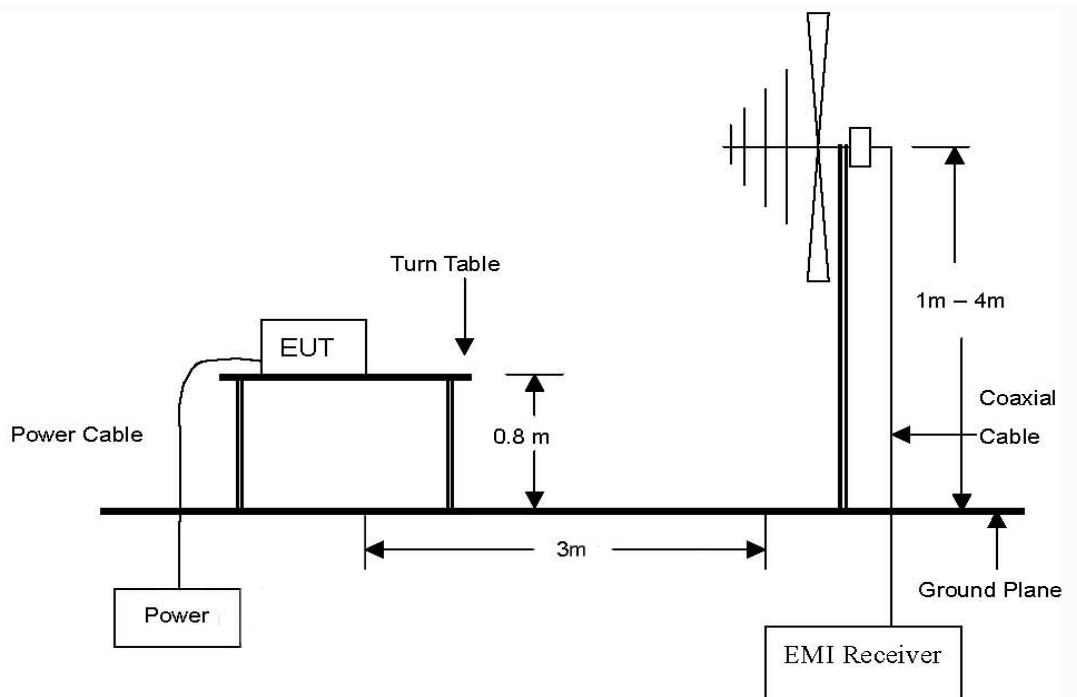
2. Radiated Spurious Emissions

2.1. Test setup

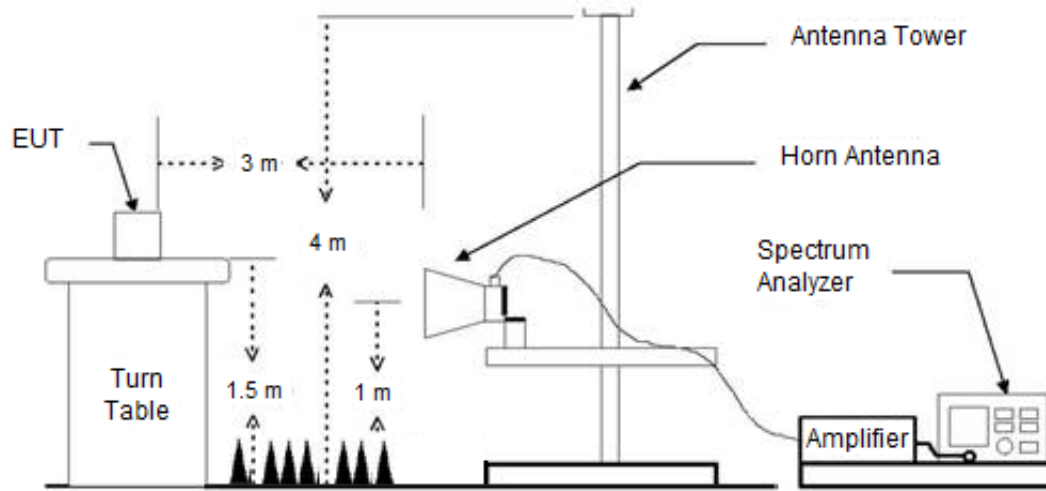
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 MHz to 30 MHz.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission. The spurious emissions were investigated from 1 GHz to the 10th harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.



2.2. Limit

2.2.1. Limit of Radiated Spurious Emissions

FCC

- §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P)$ dB.

- §24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

- §27.53(c)(2), on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB.

- §27.53(f), For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1 559-1 610 MHz shall be limited to -70 dB W/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dB W EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

- §27.53(g), the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB.

- §27.53(h)(1), for operations in the 1 695-1 710 MHz, 1 710-1 755 MHz, 1 755-1 780 MHz, 1 915-1 920 MHz, 1 995-2 000 MHz, 2 000-2 020 MHz, 2 110-2 155 MHz, 2 155-2 180 MHz, and 2 180-2 200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB.

- §27.53(l)(2), for mobile operations in the 3 700-3 980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm /MHz. Compliance with this paragraph (l)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

- §27.53(n)(2), for mobile operations in the 3 450-3 550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm /MHz.. Compliance with this paragraph (n)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

- §27.53(m)(4), for mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log_{10}(P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log_{10}(P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log_{10}(P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log_{10}(P)$ dB on all frequencies between 2 490.5 MHz and 2 496 MHz and $55 + 10 \log_{10}(P)$ dB at or below 2 490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2 495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

- §90.691(a), Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

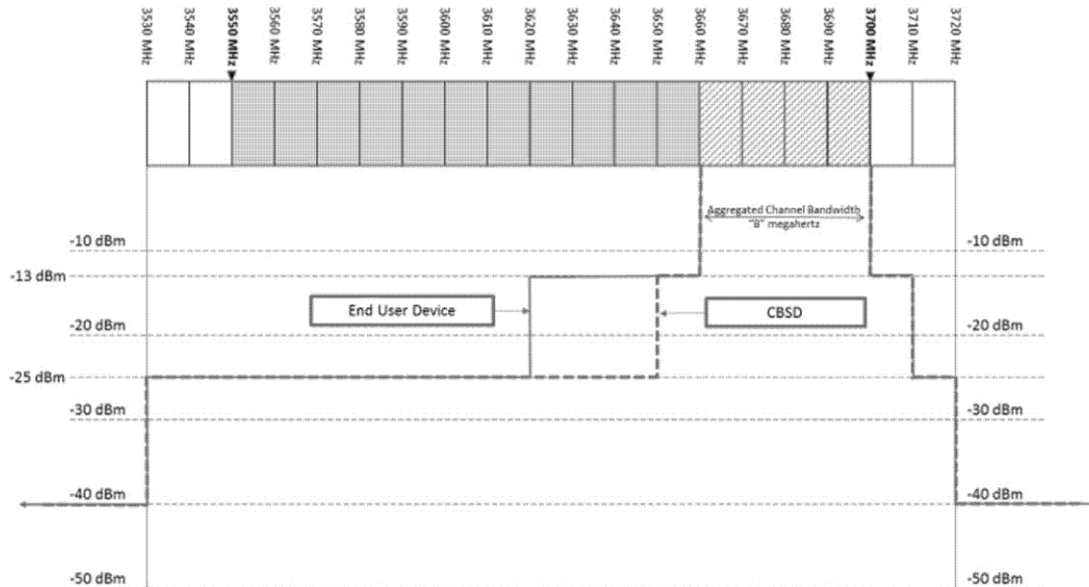
(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

- §96.41(e), 3.5GHz Emissions and Interference Limits

(1) General protection levels.

Figure 1 to paragraph (e) – Protection levels



(i) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside the fundamental emission bandwidth as specified in paragraph (e)(3) of this section (whether the emission is inside or outside of the authorized band) shall not exceed -13 dB m/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed -25 dB m/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

(ii) Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by a CBSD to End User Devices, the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dB m/MHz within 0 to B megahertz (where B is the bandwidth in megahertz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B megahertz below the lower CBSD-assigned channel edge. At all frequencies greater than B megahertz above the upper CBSD assigned channel edge and less than B megahertz below the lower CBSD-assigned channel edge, the conducted power of any End User Device emission shall not exceed -25 dB m/MHz. Notwithstanding the emission limits in this paragraph, the Adjacent Channel Leakage Ratio for End User Devices shall be at least 30 dB.

(2) **Additional protection levels.** Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3 540 MHz or above 3 710 MHz shall not exceed -25 dB m/MHz, and the conducted power of emissions below 3 530 MHz or above 3 720 MHz shall not exceed -40 dB m/MHz.

IC

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4.7.1, the unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dB W), by at least $43 + 10 \log_{10} p$ (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

4.7.2, In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

a) The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dB W), by at least:

- (i) $76 + 10 \log_{10} p$ (watts), dB, for base and fixed equipment, and
- (ii) $65 + 10 \log_{10} p$ (watts), dB, for mobile and portable equipment.

b) The e.i.r.p. in the band 1 559-1 610 MHz shall not exceed -70 dB W/MHz for wideband signal and -80 dB W for discrete emission with bandwidth less than 700 Hz.

- RSS-132 Issue 4

5.5, Equipment shall meet the unwanted emission limits specified below.

(i) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1 % of the occupied bandwidth shall be attenuated below the transmitter output power P (dB W) by at least $43 + 10 \log(p)$ dB.

(ii) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated below the transmitter output power P (dB W) by at least $43 + 10 \log(p)$ dB. If the measurement is performed using 1 % of the occupied bandwidth, power integration over 100 kHz is required.

- RSS-133 Issue 7

5.6, Unwanted emissions shall be measured in terms of average values while the transmitter is operating at the manufacturer's rated power and modulated as specified in RSS-Gen.

Equipment shall meet the unwanted emission limits, specified in table 3, outside each frequency block group. For each channel bandwidth supported by the equipment under test, the unwanted emissions shall be measured and reported for two channel frequencies: one located as close as possible to the low end and one located as close as possible to the high end of the equipment's operating frequency range.

For the unwanted emission limits, in the 1 MHz bands immediately outside and adjacent to the frequency block group, the power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth (OBW). Beyond these 1 MHz bands, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth may be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz, or 1% of the OBW, as applicable.

For all equipment, the TRP or total conducted power (sum of conducted power across all antenna connectors), where applicable, of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in the table 3.

Table 3: Unwanted emission limits for all equipment

Offset frequency from the edge of the frequency block group (MHz)	Unwanted emission limit
≤ 1	-13 dB m/(1% of OBW)
> 1	-13 dB m/MHz

- RSS-139 Issue 4

5.6, Unwanted emissions shall be measured in terms of average values.

For all equipment, the TRP or total conducted power (sum of conducted power across all antenna connectors) of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in table 6.

Table 6: Unwanted emission limits

Offset from the edge of the frequency block or frequency block group	Unwanted emission limit
≤1 MHz	-13 dB m/(1% of OB)*
>1 MHz	-13 dB m

* OB is the occupied bandwidth

- RSS-192 Issue 5

5.6, unwanted emissions shall be measured in terms of average values when the transmitter is operating at the manufacturer's rated power and modulated as specified in RSS-Gen.

Equipment shall meet the unwanted emission limits, specified below, outside each frequency block group. For each channel bandwidth supported by the equipment under test, the unwanted emissions shall be measured and reported for two channel frequencies: one located as close as possible to the low end and one located as close as possible to the high end of the equipment's operating frequency range.

If the transmitter is designed for multi-carrier operation, the tests shall be carried out using both the maximum and minimum number of carriers intended for the equipment.

5.6.3, subscriber equipment shall have the TRP or conducted power (per antenna), where applicable, of unwanted emission not exceeding the following:

a. the limits in table 6

b. a limit of -30 dBm/MHz in the frequency range greater than (B+5) MHz from the edge of the frequency band

Table 6: Unwanted emission limits for subscriber equipment

Frequency block group (B)	Offset frequency from the edge of the frequency block group (MHz)			
	0-1	1-5	5-B	>B
10 MHz, 20 MHz, 30 MHz and 40 MHz	-13 dBm/1% of B	-10 dBm/MHz	-13 dBm/MHz	-25 dBm/MHz
> 40 MHz	-13 dBm/400 kHz	-10 dBm/MHz	-13 dBm/MHz	-25 dBm/MHz

- RSS-198 Issue 1

5.6, unwanted emissions shall be measured in term of average value when the transmitter is operating at the manufacturer's rated power and modulated as specified in RSS-Gen.

Equipment shall meet the unwanted emission limits, specified below, outside each frequency block group. For each channel bandwidth supported by the equipment under test, the unwanted emissions shall be measured and reported for two channel frequencies: one located as close as possible to the low end and one located as close as possible to the high end of the equipment's operating frequency range.

5.6.1, the unwanted emission outside the frequency block group shall not exceed the TRP or total conducted power (sum of conducted power across all antenna connectors) limits as specified in table 2.

Table 2: Unwanted emission limits for all equipment

Offset frequency from the edge of the frequency block group (MHz)	Unwanted emission limits for all equipment
≤1	-13 dBm/1% OB*
>1	-13 dBm/MHz

*OB is the occupied bandwidth

- RSS-199 Issue 4

5.6, unwanted emissions shall be measured in terms of average values when the transmitter is operating at the manufacturer's rated power and modulated as specified in RSS-Gen.

Equipment shall meet the unwanted emission limits, specified below, outside each frequency block group. For each channel bandwidth supported by the equipment under test, the unwanted emissions shall be measured and reported for two channel frequencies: one located as close as possible to the low end and one located as close as possible to the high end of the equipment's operating frequency range.

For the unwanted emission limits, in the 1 MHz band immediately outside and adjacent to the frequency block group, the power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth for fixed stations, base stations, and fixed subscriber equipment, and 2 % for subscriber equipment other than fixed subscriber equipment. Beyond this 1 MHz band, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz, or 1 % or 2 % of the occupied bandwidth, as applicable.

For all equipment, the TRP or total conducted power (sum of conducted power across all antenna connectors), where applicable, of the unwanted emissions outside the frequency block or frequency block group shall not exceed the limits shown in the tables below.

Table 4: Unwanted emission limits for fixed station, base station and fixed subscriber equipment

Offset from the edge of the frequency block or frequency block group (MHz)	Unwanted emission limit
≤1	-13 dB m/(1% of OB*)
>1	-13 dB m/MHz

* OB is the occupied bandwidth

Table 5: Unwanted emission limits for subscriber equipment other than fixed subscriber equipment

Offset from the edge of the frequency block or frequency block group (MHz)	Unwanted emission limit
0-1	-10 dB m/(2% of OB*)
1-5	-10 dB m/MHz
5-X**	-13 dB m/MHz
≥X	-25 dB m/MHz

* OB is the occupied bandwidth

** X is 6 MHz or the equipment occupied bandwidth, whichever is greater

In addition to complying with the limits in table 5, subscriber equipment other than fixed subscriber equipment shall not exceed -13 dB m/MHz on all frequencies between 2 490.5 MHz and 2 496 MHz, and -25 dB m/MHz at or below 2 490.5 MHz.

2.3. Test Procedure

2.3.1. Radiated Spurious Emissions

The test based on ANSI/TIA 603E: 2016 and ANSI C63.26-2015 and KDB 971168 D01 Power Meas License Digital Systems v03r01.

1. On a test site, the EUT shall be placed at 0.8 m or 1.5 m height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. Radiated spurious emissions measurement method was set as follows:
RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz, VBW $\geq 3 \times$ RBW,
Detector = RMS, trace mode = max hold, per the guidelines of KDB 971168 D01 Power Meas License Digital Systems v03r01.
5. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until the maximum signal level is detected by the measuring receiver.
7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
11. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
12. The measurement shall be repeated with the test antenna orientated for horizontal polarization.

2.4. Test Results

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

2.4.1. Radiated Spurious Emissions

LTE Band 13 (10 MHz - QPSK)

Frequency (MHz)	Measured Level (dBμV)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dBμV/m)	CF (dB)	E.R.P./ E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
Middle Channel (782.0 MHz)									
1 572.80	52.55	H	25.29	-36.86	40.98	-95.26	-54.28	-40	14.28
1 572.94	49.83	V	25.29	-36.86	38.26	-95.26	-57.00	-40	17.00
2 359.16	51.35	H	28.18	-34.27	45.26	-97.41	-52.15	-13	39.15
2 359.34	51.90	V	28.18	-34.26	45.82	-97.41	-51.59	-13	38.59
Above 2 400.00	Not detected	-	-	-	-	-	-	-	-

LTE Band 7 (20 MHz - QPSK)

Frequency (MHz)	Measured Level (dBμV)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dBμV/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (2 510.00 MHz)									
5 020.18	38.04	H	33.50	-28.39	43.15	-95.26	-52.11	-25	27.11
5 020.30	38.76	V	33.50	-28.38	43.88	-95.26	-51.38	-25	26.38
7 530.35	44.12	H	36.04	-24.87	55.29	-95.26	-39.97	-25	14.97
7 530.20	44.05	V	36.04	-24.87	55.22	-95.26	-40.04	-25	15.04
Above 7 600.00	Not detected	-	-	-	-	-	-	-	-
Middle Channel (2 535.00 MHz)									
5 070.05	38.38	H	33.50	-28.52	43.36	-95.26	-51.90	-25	26.90
5 070.41	38.67	V	33.50	-28.53	43.64	-95.26	-51.62	-25	26.62
7 604.97	41.45	H	35.99	-24.44	53.00	-95.26	-42.26	-25	17.26
7 605.16	40.07	V	35.99	-24.44	51.62	-95.26	-43.64	-25	18.64
Above 7 700.00	Not detected	-	-	-	-	-	-	-	-
High Channel (2 560.00 MHz)									
5 120.21	37.03	H	33.54	-28.47	42.10	-95.26	-53.16	-25	28.16
5 120.27	35.37	V	33.54	-28.47	40.44	-95.26	-54.82	-25	29.82
7 680.05	36.57	H	35.90	-24.56	47.91	-95.26	-47.35	-25	22.35
7 680.45	37.17	V	35.90	-24.56	48.51	-95.26	-46.75	-25	21.75
Above 7 700.00	Not detected	-	-	-	-	-	-	-	-

Remark;

1. AF = Antenna Factor, CL = Cable Loss, CF = Conversion Factor.
2. E (dBμV/m) = Measured Level (dBμV) + Antenna Factor (dB/m) + AMP (dB) + Cable Loss (dB).
3. E.I.R.P. (dB m) = E (dBμV/m) + CF (dB).
4. E.R.P. (dB m) = E (dBμV/m) + CF (dB) - 2.15 (dB); where E.R.P. and E.I.R.P. are expressed in consistent units.
5. CF (dB) = 20 log D - 104.8; where D is the measurement distance in meters, According to KDB 971168 D01 v03r01 5.8.4.
6. The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

- End of the Test Report -