

TEST REPORT

of

FCC Part 2 Subpart J, Part 22 Subpart C/H,
Part 24 Subpart E and Part 27 Subpart C, Part 90 Subpart S
IC RSS-130 Issue 2, RSS-132 Issue 3, RSS-133 Issue 6,
RSS-139 Issue 3, RSS-199 Issue 3 and RSS-Gen Issue 5

FCC ID: BEJTA4HEBN2
IC Certification: 2703H-TA4HEBN2

Equipment Under Test : Car Telematics Device
Model Name : TA4HEB-N2
Variant Model Name(s) : -
FCC Applicant : LG Electronics USA
IC Applicant : LG ELECTRONICS INC.
Manufacturer : LG Electronics Inc.
Date of Receipt : 2020.11.16
Date of Test(s) : 2021.01.13 ~ 2021.02.24
Date of Test(s) : 2021.03.05

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.
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Tested by:



Nancy Park

Technical
Manager:



Jinhyoung Cho

SGS Korea Co., Ltd. Gunpo Laboratory

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150
- CAB Identifier: KR0150

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Phone No. : +82 31 688 0901

Fax No. : +82 31 688 0921

1.2. Details of Applicant

FCC Applicant : LG Electronics USA

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 : 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-N2
Serial Number	001VITA000080
Power Supply	DC 12 V
Rated Power	WCDMA 2, 4, 5: 24 dB m GSM 850: 33 dB m GSM 1 900: 30 dB m LTE Band 2, 4, 5, 7, 12, 26: 23 dB m
Frequency Range	WCDMA 2: 1 850 MHz ~ 1 910 MHz WCDMA 4: 1 710 MHz ~ 1 755 MHz WCDMA 5: 824 MHz ~ 849 MHz GSM 850: 824 MHz ~ 849 MHz GSM 1 900: 1 850 MHz ~ 1 910 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 26: 824 MHz ~ 849 MHz LTE Band 26: 814 MHz ~ 824 MHz (Only for FCC)
Modulation Technique	QPSK, 16QAM, 64QAM, GMSK, 8PSK
Antenna Type	External antenna
Antenna Gain	699 MHz ~ 716 MHz: -1.85 dB i 814 MHz ~ 824 MHz: -3.18 dB i 824 MHz ~ 849 MHz: -2.45 dB i 1 710 MHz ~ 1 780 MHz: 1.45 dB i 1 850 MHz ~ 1 910 MHz: 1.13 dB i 2 500 MHz ~ 2 570 MHz: -1.67 dB i
H/W Version	Rev.D
S/W Version	V9.1.02

1.5. Introduction of Test Data Reuse

This report referenced from the FCC ID: BEJTM05GTJN2 and IC Certification: 2703H-TM05GTJN2 LTE, GSM and WCDMA.

The applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

1.6. Reference Detail

Reference applicant that contains the reused reference data in the individual test reports:

Mode	Reference FCC ID / IC Certification	Application type	Reference test report number	Exhibit type	Variant test report number	Data reuse
GSM, WCDMA	FCC: BEJTM05GTJN2 IC: 2703H-TM05GTJN2	Original grant	F690501-RF-RTL001646 (GSM, WCDMA)	Test Report	F690501-RF-RTL001712	All
LTE			F690501-RF-RTL001647 F690501-RF-RTL001648 (LTE)			
DTS			F690501-RF-RTL001644 (WLAN 2.4G)		F690501-RF-RTL001713	
NII			F690501-RF-RTL001645 (WLAN 5G)		F690501-RF-RTL001714	

1.7. Difference

Model name	Description
TM05GTJN2	- Reference model - Single modular
TA4HEB-N2	- Host equipment - Same to reference model except below - With external case

1.8. Worst Case Configuration and Mode

The 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 26/5
Above 1 GHz	GSM 1900, LTE 2, LTE 7

1.9. Spot Check Data

Mode	Test items	Frequency (MHz)	Limit	Original model		Spot check model		Deviation (dB)
				TM05GTJN2		TA4HEB-N2		
				FCC ID: BEJTM05GTJN2 IC Certification: 2703H-TM05GTJN2		FCC ID: BEJ-TA4HEBN2 IC Certification: 2703H-TA4HEBN2		
				(dB m)	(W)	(dB m)	(W)	
WCDMA II	Conducted Power	1 907.6	2 W	22.96	0.198	22.83	0.192	-0.13
	E.I.R.P.	1 850 ~ 1 910		25.70	0.372	25.70	0.372	-
WCDMA IV	Conducted Power	1 752.6	1 W	22.84	0.192	22.79	0.190	-0.05
	E.I.R.P.	1 710 ~ 1 755		25.70	0.372	25.70	0.372	-
WCDMA V	Conducted Power	826.4	7 W	22.63	0.183	22.65	0.184	0.02
	E.R.P.	824 ~ 849		25.70	0.372	25.70	0.372	-
GSM 850	Conducted Power	848.8	7 W	32.52	1.786	32.60	1.820	0.08
	E.R.P.	824 ~ 849		33.50	2.239	33.50	2.239	-
GSM 1 900	Conducted Power	1 850.2	2 W	29.78	0.951	29.66	0.925	-0.12
	E.I.R.P.	1 850 ~ 1 910		30.50	1.122	30.50	1.122	-
	Spurious	1 850.2	-13 dB m	-15.90	-	-15.08	-	0.82
LTE 2	Conducted Power	1 860	2 W	24.18	0.262	23.99	0.251	-0.19
	E.I.R.P.	1 850 ~ 1 910		25.50	0.355	25.50	0.355	-
	Spurious	1 860	-13 dB m	-15.81	-	-18.45	-	-2.64
LTE 4	Conducted Power	1 732.5	1 W	23.53	0.225	23.51	0.224	-0.02
	E.I.R.P.	1 710 ~ 1 755		25.50	0.355	25.50	0.355	-
LTE 7	Conducted Power	2 535	2 W	23.66	0.232	23.61	0.230	-0.05
	E.I.R.P.	2 500 ~ 2 570		25.50	0.355	25.50	0.355	-
	Spurious	2 535	-25 dB m	-28.05	-	-30.17	-	-2.12
LTE 12	Conducted Power	701.5	3 W	22.36	0.172	22.09	0.162	-0.27
	E.R.P.	699 ~ 716		25.50	0.355	25.50	0.355	-
LTE 26/5	Conducted Power	841.5	7 W	22.75	0.188	22.65	0.184	-0.10
	E.R.P.	824 ~ 849		25.50	0.355	25.50	0.355	-
	Spurious	848.3	-13 dB m	-38.41	-	-37.62	-	0.79
LTE 26	Conducted Power	821.5	7 W	22.55	0.180	22.61	0.182	0.06
	E.R.P.	814 ~ 824		25.50	0.355	25.50	0.355	-

1.10. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Signal Generator	R&S	SMR40	100272	Jun. 18, 2020	Annual	Jun. 18, 2021
Signal Generator	R&S	SMBV100A	255834	Jun. 03, 2020	Annual	Jun. 03, 2021
Spectrum Analyzer	Agilent	N9020A	MY53421758	Sep. 04, 2020	Annual	Sep. 04, 2021
Spectrum Analyzer	Agilent	N9030A	US51350132	Nov. 12, 2020	Annual	Nov. 12, 2021
Mobile Test Unit	R&S	CMW500	144034	Feb. 28, 2020	Annual	Feb. 28, 2021
Mobile Test Unit	Anritsu	MT8821C	6262192291	Oct. 08, 2020	Annual	Oct. 08, 2021
Power Meter	Anritsu	ML2495A	1223004	Jun. 01, 2020	Annual	Jun. 01, 2021
Power Sensor	Anritsu	MA2411B	1207272	Jun. 01, 2020	Annual	Jun. 01, 2021
High Pass Filter	Wainwright Instrument GmbH	WHKX10-900-1000-18000-4 0SS	7	Mar. 04, 2020	Annual	Mar. 04, 2021
High Pass Filter	Wainwright Instrument GmbH	WHKX1.5/15G-6SS	4	Jun. 11, 2020	Annual	Jun. 11, 2021
High Pass Filter	Wainwright Instrument GmbH	WHK3.0/18G-10SS	344	May 18, 2020	Annual	May 18, 2021
High Pass Filter	Wainwright Instrument GmbH	WHK7.5/26.5G-6SS	15	Jun. 05, 2020	Annual	Jun. 05, 2021
Directional Coupler	KRYTAR	152613	122660	Jun. 11, 2020	Annual	Jun. 11, 2021
DC Power Supply	Agilent	U8002A	MY53150029	Jun. 04, 2020	Annual	Jun. 04, 2021
Preamplifier	H.P.	8447F	2944A03909	Aug. 06, 2020	Annual	Aug. 06, 2021
Preamplifier	R&S	SCU 18	10117	Jun. 10, 2020	Annual	Jun. 10, 2021
Preamplifier	MITEQ Inc.	JS44-18004000-35-8P	1546891	May 08, 2020	Annual	May 08, 2021
Test Receiver	R&S	ESU26	100368	Nov. 05, 2020	Annual	Nov. 05, 2021
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 22, 2019	Biennial	Aug. 22, 2021
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB9163	396	Mar. 21, 2019	Biennial	Mar. 21, 2021
Horn Antenna	R&S	HF906	100326	Feb. 04, 2021	Annual	Feb. 04, 2022
Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA9170	9170-540	Jul. 24, 2019	Biennial	Jul. 24, 2021
Antenna Master	Innco systems GmbH	MM4000	N/A	N.C.R.	N/A	N.C.R.
Turn Table	Innco systems GmbH	DS 1200S	N/A	N.C.R.	N/A	N.C.R.
Controller	Innco systems GmbH	CONTROLLER CO3000-4P	CO3000/963/383 30516/L	N.C.R.	N/A	N.C.R.
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.4 m)	N/A	N.C.R.	N/A	N.C.R.
Coaxial Cable	RFONE	MWX221-NMSNMS (4 m)	J1023142	Dec. 01, 2020	Semi-annual	Jun. 01, 2021
Coaxial Cable	RFONE	SFX086-NMNM-10M (10 m)	20200324001	Dec. 01, 2020	Semi-annual	Jun. 01, 2021
Coaxial Cable	Rosenberger	LA1-C006-1500	131014 07/20	Feb. 19, 2021	Semi-annual	Aug. 19, 2021
Coaxial Cable	Rosenberger	LA1-C006-1500	131014 10/20	Feb. 19, 2021	Semi-annual	Aug. 19, 2021
Coaxial Cable	Rosenberger	LA1-C006-1500	131014 11/20	Feb. 19, 2021	Semi-annual	Aug. 19, 2021

► Support Equipment

Description	Manufacturer	Model	Serial Number
N/A	-	-	-

1.11. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 2, 22, 24, 27 and 90 / IC part RSS-130 Issue 2, RSS-132 Issue 3, RSS-133 Issue 6, RSS-139 Issue 3, RSS-199 Issue 3 and RSS-Gen Issue 5			
Section in FCC	Section in IC	Test Item(s)	Result
§22.913(a)(5) §24.232(c) §27.50(c)(10) §27.50(d)(4) §27.50(h)(2) §90.635(b)	RSS-130 Issue 2 4.6.3 RSS-132 Issue 3 5.4 RSS-133 Issue 6 6.4 RSS-139 Issue 3 6.5 RSS-199 Issue 3 4.4	E.R.P./E.I.R.P.	N/A ¹⁾
§22.917(a) §24.238(a) §27.53(g) §27.53(h)(1) §27.53(m)(4) §90.691(a)	RSS-130 Issue 2 4.7.1 RSS-132 Issue 3 5.5 RSS-133 Issue 6 6.5 RSS-139 Issue 3 6.6 RSS-199 Issue 3 4.5	Spurious Radiated Emission	Complied
§2.1046	RSS-Gen Issue 5 6.12	Conducted Output Power	N/A ¹⁾
§2.1049	RSS-Gen Issue 5 6.7	Occupied Bandwidth	N/A ¹⁾
§22.913(d) §24.232(d) §27.50(d)(5)	RSS-130 Issue 2 4.6.1 RSS-132 Issue 3 5.4 RSS-133 Issue 6 6.4 RSS-139 Issue 3 6.5 RSS-199 Issue 3 4.4	Peak-Average Ratio	N/A ¹⁾
§22.917(a) §24.238(a) §27.53(g) §27.53(h)(1) §27.53(m)(4) §90.691(a)	RSS-130 Issue 2 4.7.1 RSS-132 Issue 3 5.5 RSS-133 Issue 6 6.5 RSS-139 Issue 3 6.6 RSS-199 Issue 3 4.5	Spurious Emission at Antenna Terminal	N/A ¹⁾
§22.917(a) §24.238(a) §27.53(g) §27.53(h)(1) §27.53(m)(4) §90.691(a)	RSS-130 Issue 2 4.7.1 RSS-132 Issue 3 5.5 RSS-133 Issue 6 6.5 RSS-139 Issue 3 6.6 RSS-199 Issue 3 4.5	Band Edge	N/A 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 3 5.3 RSS-133 Issue 6 6.3 RSS-139 Issue 3 6.4 RSS-199 Issue 3 4.3	Frequency Stability	N/A ¹⁾

Note;

- 1) The TA4HEB-N2 uses same module with TM05GTJN2. So only spot check was performed and the rule was satisfied.

1.12. Sample Calculation for Offset

Where relevant, the following sample calculation is provided:

1.12.1. Conducted Test

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

1.12.2. Radiation test

- E.I.R.P. (dB m) = Measured level (dB μ V) + Antenna factor (dB/m) + Cable loss (dB) + 20 Log D - 104.5; where D is the measurement distance in meters.
- E.R.P. (dB m) = E.I.R.P. (dB m) - 2.15 (dB)

1.13. 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	± 3.66 dB
	V	± 3.66 dB
Radiated Emission, below 1 GHz	H	± 4.90 dB
	V	± 4.82 dB
Radiated Emission, above 1 GHz	H	± 3.62 dB
	V	± 3.64 dB

Uncertainty figures are valid to a confidence level of 95 %.

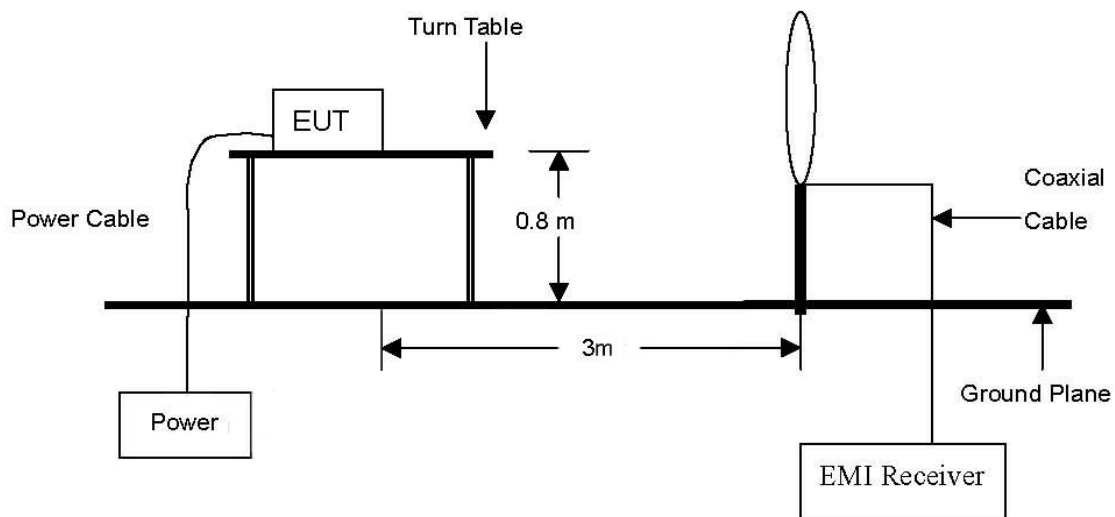
1.14. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL001712	2021.02.25	Initial
1	F690501-RF-RTL001712-1	2021.03.05	Corrected the typo in section 1.9.

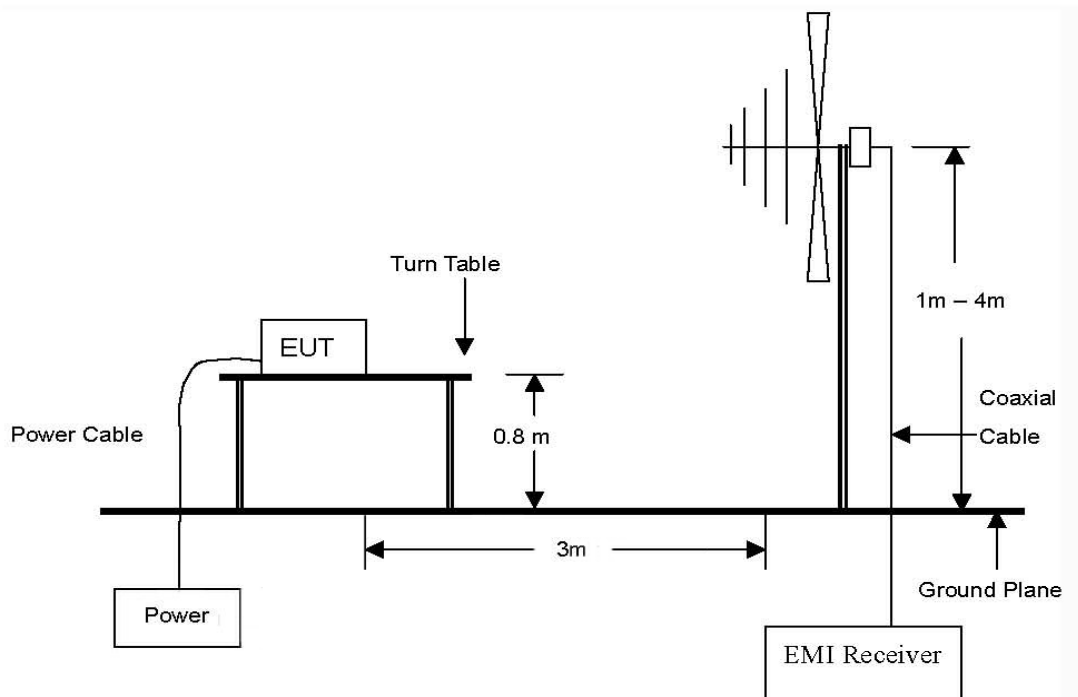
2. Spurious Radiated Emission

2.1. Test setup

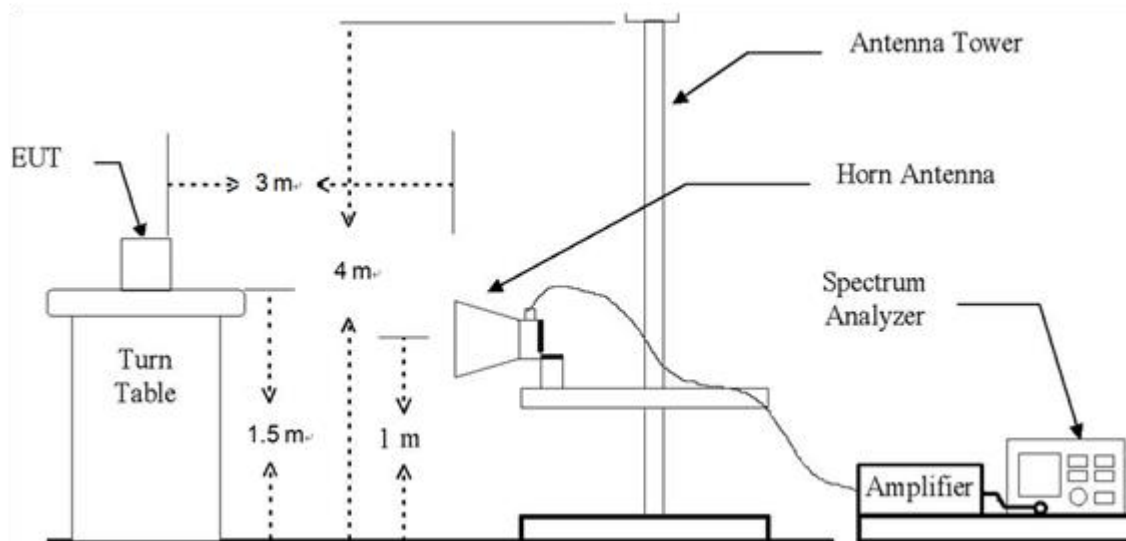
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz.



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 from 1 GHz to 26 GHz Emissions.



2.2. Limit

2.2.1. Limit of E.R.P./E.I.R.P.

FCC

- §22.913(a)(5), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.
- §24.232(c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.
- §27.50(c)(10), portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.
- §27.50(d)(4), fixed, mobile, and portable (hand-held) stations operating in the 1 710-1 755 MHz band and mobile and portable stations operating in the 1 695-1 710 MHz and 1 755-1 780 MHz bands are limited to 1 watt EIRP.
- §27.50(h)(2), mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.
- §90.635(b), the maximum output power of the transmitter for mobile stations is 100 watts (20 dB W).

IC

- RSS-130 Issue 2

4.6.3, the e.r.p. shall not exceed 30 watts for mobile equipment and outdoor fixed subscriber equipment. The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment.

For base and fixed equipment other than fixed subscriber equipment, refer to SRSP-518 for the e.i.r.p. limits.

- RSS-132 Issue 3

5.4, the transmitter output power shall be measured in terms of average power.

The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment shall not exceed 11.5 watts.

Refer to SRSP-503 for base station e.i.r.p. limits.

- RSS-133 Issue 6

6.4, the equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510. Moreover, base station transmitters operating in the band 1 930-1 995 MHz shall not have output power exceeding 100 watts.

- RSS-139 Issue 3

6.5, the equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters shall not exceed one watt. The e.i.r.p. for fixed and base stations in the band 1 710-1 780 MHz shall not exceed one watt.

- RSS-199 Issue 3

4.4, the transmitter output power shall be measured in terms of average value.

For base station equipment, refer to SRSP-517 for the maximum permissible e.i.r.p.

For mobile subscriber equipment, the e.i.r.p. shall not exceed 2 W. For fixed subscriber equipment, the transmitter output power shall not exceed 2 W and the e.i.r.p. shall be limited to 40 W.

2.2.2. Limit of Spurious Radiated Emission

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(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(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 2490.5 MHz and 2496 MHz and $55 + 10 \log_{10} (P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 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.

IC

- RSS-130 Issue 2

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.

- RSS-132 Issue 3

5.5, Mobile and base station equipment shall comply with the limits in (i) and (ii) 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 (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts).

(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 (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1 % of the occupied bandwidth, power integration over 100 kHz is required.

- RSS-133 Issue 6

6.5, Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1 % of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts).

(ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dB W) by at least $43 + 10 \log_{10} p$ (watts). If the measurement is performed using 1 % of the emission bandwidth, power integration over 1.0 MHz is required.

- RSS-139 Issue 3

6.6, (i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1 % of the emission bandwidth shall be attenuated below the transmitter output power P (in dB W) by at least $43 + 10 \log_{10} p$ (watts) dB.

(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dB W) by at least $43 + 10 \log_{10} p$ (watts) dB.

- RSS-199 Issue 3

4.5, In the 1 MHz band immediately outside and adjacent to the channel edge, the unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth for base station and fixed subscriber equipment, and 2% for mobile subscriber equipment. Beyond the 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.

Equipment shall comply with the following unwanted emission limits:

- a. for base station and fixed subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$
- b. for mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:
 - i. $40 + 10 \log_{10} p$ from the channel edges to 5 MHz away
 - ii. $43 + 10 \log_{10} p$ between 5 MHz and X MHz from the channel edges, and
 - iii. $55 + 10 \log_{10} p$ at X MHz and beyond from the channel edges

In addition, the attenuation shall not be less than $43 + 10 \log_{10} p$ on all frequencies between 2490.5 MHz and 2496 MHz, and $55 + 10 \log_{10} p$ at or below 2490.5 MHz.

In (a) and (b), p is the transmitter power measured in watts and X is 6 MHz or the equipment occupied bandwidth, whichever is greater.

2.3. Test Procedure: Based on ANSI/TIA 603E: 2016 and ANSI C63.26-2015

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. The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration band set to the emissions occupied bandwidth, RBW = 1-5 % of the OBW (not to exceed 1 MHz), VBW $\geq 3 \times$ RBW, Detector = power averaging (rms), sweep time = auto, trace average at least 100 traces in power averaging (rms) mode, per the guidelines of KDB 971168 D01 Power Meas License Digital Systems v03r01.
5. 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 ANSI C63.26-2015 and KDB 971168 D01 Power Meas License Digital Systems v03r01.
6. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
7. 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.
8. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
9. 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.
10. The maximum signal level detected by the measuring receiver shall be noted.
11. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
13. The measurement shall be repeated with the test antenna orientated for horizontal polarization.

2.4. Test result

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

GSM 1 900

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 (1 850.2 MHz)									
5 550.76	78.26	H	34.00	-34.60	77.66	-95.26	-17.60	-13	4.60
5 550.49	80.78	V	34.00	-34.60	80.18	-95.26	-15.08	-13	2.08

LTE band 2

- Modulation Signal: LTE band 2 (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 (1 860.0 MHz)									
5 553.25	76.02	H	34.00	-34.64	75.38	-95.26	-19.88	-13	6.88
5 553.30	77.45	V	34.00	-34.64	76.81	-95.26	-18.45	-13	5.45

* 1RB size / 0 Offset

LTE band 7

- Modulation Signal: LTE band 7 (5 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)
Middle Channel (2 535.0 MHz)									
5 065.48	60.99	H	33.33	-35.79	58.53	-95.26	-36.73	-25	11.73
5 065.62	67.56	V	33.33	-35.80	65.09	-95.26	-30.17	-25	5.17

* 1RB size / 0 Offset

LTE band 26/5

- Modulation Signal: LTE band 26/5 (1.4 MHz – QPSK)

Frequency (MHz)	Measured Level (dBμV)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dBμV/m)	CF (dB)	E.R.P. (dB m)	Limit (dB m)	Margin (dB)
High Channel (848.3 MHz)									
2 543.38	69.79	H	28.39	-38.39	59.79	-97.41	-37.62	-13	24.62
2 543.22	67.83	V	28.39	-38.39	57.83	-97.41	-39.58	-13	26.58

* 1RB size / 0 Offset

Remark;

1. AF = Antenna Factor, AMP= Amplifier Gain, CL = Cable Loss, CF = Conversion Factor.
2. $E \text{ (dB}\mu\text{V/m)} = \text{Measured Level (dB}\mu\text{V)} + \text{Antenna Factor (dB/m)} + \text{AMP (dB)} + \text{Cable Loss (dB)}$.
3. $E.I.R.P. \text{ (dB m)} = E \text{ (dB}\mu\text{V/m)} + CF \text{ (dB)}$.
4. $E.R.P. \text{ (dB m)} = E \text{ (dB}\mu\text{V/m)} + CF \text{ (dB)} - 2.15 \text{ (dB)}$; where E.R.P. and E.I.R.P. are expressed in consistent units.
5. $CF \text{ (dB)} = 20 \log D - 104.8$; where D is the measurement distance in meters, According to KDB 971168 D01 v03r01 5.8.4.

- End of the Test Report -