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TEST REPORT

of

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

FCC ID: BEJTM05FNNAGM0
IC Certification: 2703H-TM05FNNAGM0

Equipment Under Test	:	Telematics Module
Model Name	:	TM05FNNAGM0
Variant Model Name(s)	:	TM05FNNAGM1
Applicant	:	FCC: LG Electronics USA IC: LG ELECTRONICS INC.
Manufacturer	:	LG Electronics Inc.
Date of Receipt	:	2022.07.22
Date of Test(s)	:	2022.07.25 ~ 2023.02.16
Date of Issue	:	2023.02.16

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: Teo Kim

Technical Manager: Jinhyoung Cho

SGS Korea Co., Ltd. Gunpo Laboratory

INDEX

Table of Contents Page

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

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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 : Cho, Hee-jae
Phone No. : +1 201 470 2696

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	Telematics Module
Model Name	TM05FNNAGM0
Variant Model Name	TM05FNNAGM1
Serial Number	Conducted: 351015130056680 Radiated: 351015130065751
Power Supply	DC 3.90 V
Rated Power	WCDMA Ⅱ, Ⅴ: 24 dBm WCDMA Ⅳ: 23.5 dBm
Frequency Range	WCDMA Ⅱ: 1 850 ㎒ ~ 1 910 ㎒ WCDMA Ⅳ: 1 710 ㎒ ~ 1 755 ㎒ WCDMA Ⅴ: 824 ㎒ ~ 849 ㎒
Modulation Technique	QPSK, 16QAM
Antenna Type	External Antenna
Antenna Gain※	Refer to the clause 1.11
H/W Version	REV.D
S/W Version	SW168
FVIN	N/A

1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Signal Generator	R&S	SMA100B	106887	Oct. 13, 2022	Annual	Oct. 13, 2023
Signal Generator	R&S	SMBV100A	255834	May 25, 2022	Annual	May 25, 2023
Spectrum Analyzer	R&S	FSV30	103210	Dec. 07, 2022	Annual	Dec. 07, 2023
Spectrum Analyzer	Agilent	N9020A	MY53421758	Aug. 26, 2022	Annual	Aug. 26, 2023
Mobile Test Unit	R&S	CMW 500	144034	Feb. 21, 2022	Annual	Feb. 21, 2023
Power Meter	Anritsu	ML2495A	1223004	Nov. 29, 2022	Annual	Nov. 29, 2023
Power Sensor	Anritsu	MA2411B	1207272	May 27, 2022	Annual	May 27, 2023
Temperature Chamber	ESPEC CORP.	SH-662	93000533	Jun. 02, 2022	Annual	Jun. 02, 2023
Low Pass Filter	Mini-Circuits	NLP-1200+	V 8979400903-1	May 13, 2022	Annual	May 13, 2023
High Pass Filter	Wainwright Instrument GmbH	WHKX10-900-1000-18000-40SS	7	Mar. 04, 2022	Annual	Mar. 04, 2023
High Pass Filter	Wainwright Instrument GmbH	WHKX2.2/12.75G-10SS	8	Mar. 04, 2022	Annual	Mar. 04, 2023
High Pass Filter	Wainwright Instrument GmbH	WHKX3.0/18G-6SS	21	Jun. 09, 2022	Annual	Jun. 09, 2023
High Pass Filter	Wainwright Instrument GmbH	WHNX7.5/26.5G-6SS	11	Oct. 24, 2022	Annual	Oct. 24, 2023
BRIDGE COUPLER	MARKI MICROWAVE INC	CBR16-0012	1542	May 06, 2022	Annual	May 06, 2023
Directional Coupler	KRYTAR	152613	122660	Jul. 06, 2022	Annual	Jul. 06, 2023
DC Power Supply	Agilent	U8002A	MY49030063	Jan. 20, 2023	Annual	Jan. 20, 2024
Preamplifier	H.P.	8447F	2944A03909	Aug. 04, 2022	Annual	Aug. 04, 2023
Preamplifier	R&S	SCU 18	10117	Jun. 13, 2022	Annual	Jun. 13, 2023
Preamplifier	TESTEK	TK-PA1840H	130016	Jan. 11, 2023	Annual	Jan. 11, 2024
Test Receiver	R&S	ESCI 7	100911	Feb. 23, 2022	Annual	Feb. 23, 2023
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 23, 2021	Biennial	Aug. 23, 2023
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB9163	01126	Feb. 07, 2022	Annual	Feb. 07, 2023
Horn Antenna	R&S	HF906	100326	Feb. 18, 2022	Annual	Feb. 18, 2023
Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA 9170	9170-540	Nov. 30, 2022	Annual	Nov. 30, 2023
Antenna Master	Innco systems GmbH	MA4640-XP-ET	MA4640/536/38330516/L	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	CO3000/963/38330516/L	N.C.R.	N/A	N.C.R.
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.6 m)	N/A	N.C.R.	N/A	N.C.R.
Coaxial Cable	RFONE	MWX221-NMSNMS (4 m)	J1023142	Oct. 04, 2022	Semi-Annual	Apr. 04, 2023
Coaxial Cable	Qualwave Inc.	QA500-18-NN-10 (10 m)	22200114	Oct. 04, 2022	Semi-Annual	Apr. 04, 2023
Coaxial Cable	RADIALL	TESTPRO 3	182287	Aug. 18, 2022	Semi-Annual	Feb. 18, 2023
Coaxial Cable	RADIALL	TESTPRO 3	182288	Aug. 18, 2022	Semi-Annual	Feb. 18, 2023
Coaxial Cable	RADIALL	TESTPRO 3	182291	Aug. 18, 2022	Semi-Annual	Feb. 18, 2023

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.

1.6. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 2, 22, 24 and 27 / IC RSS-Gen Issue 5, RSS-132 Issue 3, RSS-133 Issue 6 and RSS-139 Issue 3			
Section(s) in FCC	**Section(s) in IC**	**Test Item**	**Result**
§2.1046 §22.913(a)(5) §24.232(c) §27.50(d)(4)	RSS-132 Issue 3 5.4 RSS-133 Issue 6 6.4 RSS-139 Issue 3 6.5	E.R.P. / E.I.R.P.	Complied
§2.1053 §22.917(a) §24.238(a) §27.53(h)(1)	RSS-132 Issue 3 5.5 RSS-133 Issue 6 6.5 RSS-139 Issue 3 6.6	Radiated Spurious Emissions	Complied
§2.1046	RSS-Gen Issue 5 6.12	Conducted Output Power	Complied
§2.1049	RSS-Gen Issue 5 6.7	Occupied Bandwidth	Complied
§22.913(d) §24.232(d) §27.50(d)(5)	RSS-132 Issue 3 5.4 RSS-133 Issue 6 6.4 RSS-139 Issue 3 6.5	Peak-Average Ratio	Complied
§2.1051 §22.917(a) §24.238(a) §27.53(h)(1)	RSS-132 Issue 3 5.5 RSS-133 Issue 6 6.5 RSS-139 Issue 3 6.6	Spurious Emission at Antenna Terminal	Complied
§22.917(a) §24.238(a) §27.53(h)(1)	RSS-132 Issue 3 5.5 RSS-133 Issue 6 6.5 RSS-139 Issue 3 6.6	Band Edge	Complied
§2.1055 §22.355 §24.235 §27.54	RSS-Gen Issue 5 6.11 RSS-132 Issue 3 5.3 RSS-133 Issue 6 6.3 RSS-139 Issue 3 6.4	Frequency Stability	Complied

1.7. Sample Calculation for Offset

Where relevant, the following sample calculation is provided:

1.7.1. Conducted Test

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

1.7.2. Radiation test

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

1.8. Manufacturer Declaration

The EUT supports two ports and LTE, WCDMA and 5G NR FDD bands support only port 1.
The 5G NR TDD (n41, n77, n78) band supports both port 1 and port 2.

1.9. Worst Case Configuration and Mode

WCDMA mode, Output power measurements were measured on RMC, HSDPA, HSUPA, HSPA+ and DC-HSDPA Modulation. All testing was performed using RMC and HSDPA modulations, except radiated spurious emission and emission at antenna terminal were tested only RMC modulation as worst case. The worst-case is based on the average conducted output power measurement investigation results.

The radiation test of the EUT was investigated in three orthogonal orientations X, Y, and Z, and the worst case data is reported.

1.10. Measurement Configuration

Test Items	Band	Test Channel			Modulation		
		Low	Mid	High	RMC	HSUPA	HSDPA
Conducted Output Power	Band Ⅱ	V	V	V	V	V	V
	Band Ⅳ	V	V	V	V	V	V
	Band Ⅴ	V	V	V	V	V	V
Frequency Stability	Band Ⅱ	-	V	-	V	-	-
	Band Ⅳ	-	V	-	V	-	-
	Band Ⅴ	-	V	-	V	-	-
Occupied Bandwidth	Band Ⅱ	-	V	-	V	-	V
	Band Ⅳ	-	V	-	V	-	V
	Band Ⅴ	-	V	-	V	-	V
Peak to Average Ratio	Band Ⅱ	V	V	V	V	-	V
	Band Ⅳ	V	V	V	V	-	V
	Band Ⅴ	V	V	V	V	-	V
Band Edge	Band Ⅱ	V	-	V	V	-	V
	Band Ⅳ	V	-	V	V	-	V
	Band Ⅴ	V	-	V	V	-	V
Spurious Emission at Antenna Terminal	Band Ⅱ	V	V	V	V	-	-
	Band Ⅳ	V	V	V	V	-	-
	Band Ⅴ	V	V	V	V	-	-
Radiated Spurious Emissions	Band Ⅱ	V	V	V	V	-	-
	Band Ⅳ	V	V	V	V	-	-
	Band Ⅴ	V	V	V	V	-	-

1.11. Antenna Information

Band	Operating Frequency (㎒)	Antenna Peak Gain (㏈i)
WCDMA Ⅴ	824 ~ 849	0.37
WCDMA Ⅳ	1 710 ~ 1 755	5.19
WCDMA Ⅱ	1 850 ~ 1 910	5.12

1.12. Measurement Uncertainty

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

Parameter		Uncertainty
RF Output Power		0.32 ㏈
Occupied Bandwidth		3.90 ㎑
Conducted Spurious Emissions		0.61 ㏈
Peak to Average Ratio		0.60 ㏈
Frequency Stability		5.97 ㎑
Radiated Emission, 9 ㎑ to 30 ㎒	H	3.40 ㏈
	V	3.40 ㏈
Radiated Emission, below 1 ㎓	H	4.50 ㏈
	V	5.10 ㏈
Radiated Emission, above 1 ㎓	H	3.70 ㏈
	V	3.90 ㏈

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

1.13. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL003823	2023.02.16	Initial

1.14. Emission Designator and Max Power

Band	Modulation	Low Freq. (㎒)	Upper Freq. (㎒)	Conducted Power (dB m)	Ant. Gain (dB i)	E.R.P. / E.I.R.P. Average (dB m)	E.R.P. / E.I.R.P. Average (W)	Emission Designator
WCDMA Ⅱ	RMC	1 852.4	1 907.6	23.47	5.12	28.59	0.723	4M14F9W
	HSDPA			23.24		28.36	0.685	4M14F9W
WCDMA Ⅳ	RMC	1 712.4	1 752.6	23.87	5.19	29.06	0.805	4M15F9W
	HSDPA			23.79		28.98	0.791	4M14F9W
WCDMA Ⅴ	RMC	826.4	846.6	24.05	0.37	22.27	0.169	4M17F9W
	HSDPA			24.02		22.24	0.167	4M17F9W

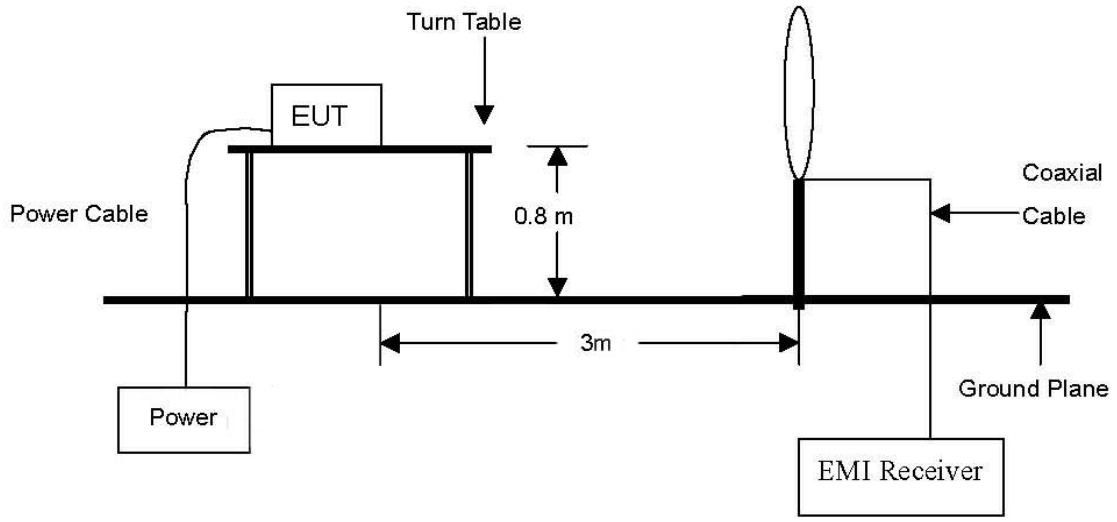
1.15. Information of Variant Model

Model Name		Description
Basic Model	TM05FNNAGM0	- Dual GNSS
Variant Model	TM05FNNAGM1	- Same RF circuit and PCB as basic model, except GNSS part - Single GNSS

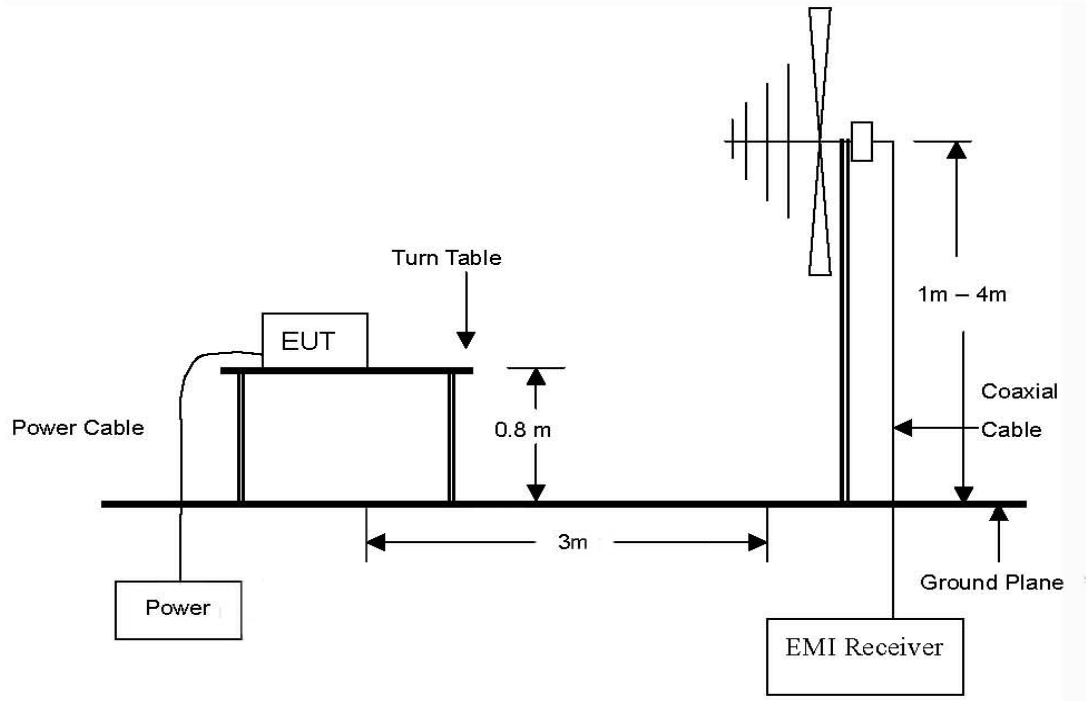
2. E.R.P. / E.I.R.P. & Radiated Spurious Emissions

2.1. Test setup

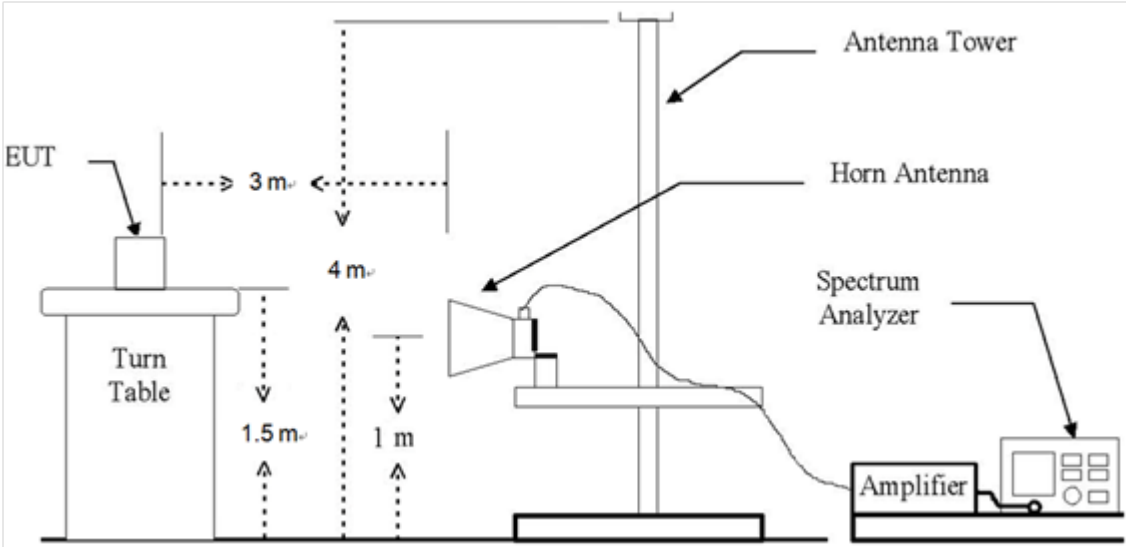
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒.



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



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to 20 ㎓ 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(d)(4), fixed, mobile, and portable (hand-held) stations operating in the 1 710-1 755 ㎒ band and mobile and portable stations operating in the 1 695-1 710 ㎒ and 1 755-1 780 ㎒ bands are limited to 1 watt EIRP.

IC
- 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. Mobile stations and hand-held portables are limited to 2 watts maximum e.i.r.p. The equipment shall employ means to limit the power to the minimum necessary for successful communication.

- 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 ㎒ shall not exceed one watt.

2.2.2. 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 + 10log(P) ㏈.

- §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) ㏈.

- §27.53(h)(1), for operations in the 1 695-1 710 ㎒, 1 710-1 755 ㎒, 1 755-1 780 ㎒, 1 915-1 920 ㎒, 1 995-2 000 ㎒, 2 000-2 020 ㎒, 2 110-2 155 ㎒, 2 155-2 180 ㎒, 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) ㏈.

IC
- 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 ㎒ 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 ㏈) below the transmitter output power P (㏈ W) by at least 43 + 10 $\log_{10}$ p (watts).

(ii) After the first 1.0 ㎒ immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 ㎑ bandwidth shall be attenuated (in ㏈) below the transmitter output power P (㏈ 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 ㎑ is required.

- RSS-133 Issue 6
6.5, Equipment shall comply with the limits in (i) and (ii) below.

(i) In the 1.0 ㎒ 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 ㏈) below the transmitter output power P (㏈ W) by at least 43 + 10 $\log_{10}$ p(watts).

(ii) After the first 1.0 ㎒, the emission power in any 1 ㎒ bandwidth shall be attenuated (in ㏈) below the transmitter output power P (㏈ 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 ㎒ is required.

- RSS-139 Issue 3
6.6, (i) In the first 1.0 ㎒ 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 ㏈ W) by at least 43 + 10 $\log_{10}$ p (watts) ㏈.

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

2.3. Test Procedure: Based on ANSI/TIA 603E: 2016 and ANSI C63.26-2015, 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 ㎑ for emissions below 1 ㎓ and 1 ㎒ for emissions above 1 ㎓, VBW ≥ 3 x 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) ℃
Relative humidity : 47 % R.H.

2.4.1. E.R.P. / E.I.R.P.

WCDMA

Band	Frequency (㎒)	Maximum Conducted Power (dB m)	Maximum Conducted Power (W)	Antenna Gain (dB i)	Maximum E.I.R.P. (dB m)	Maximum E.I.R.P. (W)	Maximum E.R.P. (dB m)	Maximum E.R.P. (W)	Limit
WCDMA Ⅱ	1 850 ~ 1 910	23.47	0.222	5.12	28.59	0.723			2 W E.I.R.P.
WCDMA Ⅳ	1 710 ~ 1 755	23.87	0.244	5.19	29.06	0.805			1 W E.I.R.P.
WCDMA Ⅴ	824 ~ 849	24.05	0.254	0.37	24.42	0.277	22.27	0.169	7 W E.R.P.

Remark;

1. E.I.R.P. (dB m) = Maximum Conducted Power (dB m) + Antenna Gain (dB i)
2. E.R.P. (dB m) = E.I.R.P. (dB m) - 2.15 (dB); where E.R.P. and E.I.R.P. are expressed in consistent units.

2.4.2. Radiated Spurious Emissions

WCDMA Ⅱ

Frequency (㎒)	Measured Level (dB㎶)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB㎶/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (1 852.4 ㎒)									
3 702.48	50.04	V	32.10	-36.61	45.53	-95.26	-49.73	-13	36.73
5 554.68	45.37	V	33.90	-34.18	45.09	-95.26	-50.17	-13	37.17
Above 5 600.00	Not detected	-	-	-	-	-	-	-	-
Middle Channel (1 880 ㎒)									
5 636.72	41.93	V	33.90	-33.48	42.35	-95.26	-52.91	-13	39.91
Above 5 700.00	Not detected	-	-	-	-	-	-	-	-
High Channel (1 907.6 ㎒)									
5 719.20	42.42	V	33.94	-33.54	42.82	-95.26	**-52.44**	-13	39.44
Above 5 800.00	Not detected	-	-	-	-	-	-	-	-

WCDMA Ⅳ

Frequency (㎒)	Measured Level (dB㎶)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB㎶/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (1 712.4 ㎒)									
3 423.23	64.91	H	30.89	-36.92	58.88	-95.26	-36.38	-13	23.38
3 427.33	72.28	V	30.92	-36.89	66.31	-95.26	-28.95	-13	15.95
5 134.20	54.98	H	33.27	-35.46	52.79	-95.26	-42.47	-13	29.47
5 134.20	60.74	V	33.27	-35.46	58.55	-95.26	-36.71	-13	23.71
6 854.25	66.38	H	35.30	-33.85	67.83	-95.26	-27.43	-13	14.43
6 854.50	72.74	V	35.30	-33.85	74.19	-95.26	**-21.07**	-13	8.07
8 567.50	64.36	H	36.54	-33.50	67.40	-95.26	-27.86	-13	14.86
8 564.75	66.07	V	36.53	-33.50	69.10	-95.26	-26.16	-13	13.16
10 268.00	48.03	H	37.80	-31.26	54.57	-95.26	-40.69	-13	27.69
10 271.85	51.21	V	37.80	-31.26	57.75	-95.26	-37.51	-13	24.51
11 982.85	54.50	H	38.50	-30.67	62.33	-95.26	-32.93	-13	19.93
11 993.30	56.22	V	38.50	-31.12	63.60	-95.26	-31.66	-13	18.66
13 693.80	42.26	H	40.40	-27.89	54.77	-95.26	-40.49	-13	27.49
13 702.90	45.31	V	40.41	-27.95	57.77	-95.26	-37.49	-13	24.49
15 408.95	44.01	H	40.00	-25.95	58.06	-95.26	-37.20	-13	24.20
15 409.15	45.21	V	40.00	-25.96	59.25	-95.26	-36.01	-13	23.01
17 121.10	37.55	H	42.24	-22.61	57.18	-95.26	-38.08	-13	25.08
17 133.30	39.91	V	42.27	-22.79	59.39	-95.26	-35.87	-13	22.87
Above 17 200.00	Not detected	-	-	-	-	-	-	-	-

Frequency (㎒)	Measured Level (dB㎶)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB㎶/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
Middle Channel (1 732.6 ㎒)									
3 463.78	59.04	H	31.10	-36.77	53.37	-95.26	-41.89	-13	28.89
3 462.83	64.91	V	31.10	-36.77	59.24	-95.26	-36.02	-13	23.02
5 201.65	51.60	H	33.50	-35.17	49.93	-95.26	-45.33	-13	32.33
5 200.75	56.77	V	33.50	-35.17	55.10	-95.26	-40.16	-13	27.16
6 925.75	57.32	H	35.35	-33.43	59.24	-95.26	-36.02	-13	23.02
6 927.55	63.03	V	35.36	-33.41	64.98	-95.26	-30.28	-13	17.28
8 656.60	49.57	H	36.73	-34.15	52.15	-95.26	-43.11	-13	30.11
8 665.60	53.04	V	36.76	-34.33	55.47	-95.26	-39.79	-13	26.79
10 397.80	47.57	H	37.80	-30.95	54.42	-95.26	-40.84	-13	27.84
10 403.20	53.66	V	37.80	-30.98	60.48	-95.26	-34.78	-13	21.78
12 124.25	41.76	H	38.45	-29.12	51.09	-95.26	-44.17	-13	31.17
12 120.30	42.68	V	38.46	-29.13	52.01	-95.26	-43.25	-13	30.25
13 865.95	33.72	H	40.60	-26.32	48.00	-95.26	-47.26	-13	34.26
13 852.60	35.21	V	40.60	-27.27	48.54	-95.26	-46.72	-13	33.72
15 574.20	33.59	H	40.10	-25.50	48.19	-95.26	-47.07	-13	34.07
15 586.35	33.77	V	40.10	-25.65	48.22	-95.26	-47.04	-13	34.04
17 323.25	33.93	H	42.75	-24.10	52.58	-95.26	-42.68	-13	29.68
17 308.85	35.39	V	42.72	-23.81	54.30	-95.26	-40.96	-13	27.96
Above 17 400.00	Not detected	-	-	-	-	-	-	-	-

Frequency (㎒)	Measured Level (dB㎶)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB㎶/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
High Channel (1 752.6 ㎒)									
3 506.53	52.15	H	31.09	-36.70	46.54	-95.26	-48.72	-13	35.72
3 506.78	58.69	V	31.09	-36.70	53.08	-95.26	-42.18	-13	29.18
5 255.35	50.08	H	33.62	-35.06	48.64	-95.26	-46.62	-13	33.62
5 254.60	56.80	V	33.62	-35.07	55.35	-95.26	-39.91	-13	26.91
7 009.65	45.29	H	35.50	-33.09	47.70	-95.26	-47.56	-13	34.56
7 005.85	51.22	V	35.50	-33.08	53.64	-95.26	-41.62	-13	28.62
8 757.40	39.36	H	37.01	-33.63	42.74	-95.26	-52.52	-13	39.52
8 756.80	41.96	V	37.01	-33.64	45.33	-95.26	-49.93	-13	36.93
10 537.15	36.55	H	37.70	-31.00	43.25	-95.26	-52.01	-13	39.01
10 512.90	37.92	V	37.70	-31.04	44.58	-95.26	-50.68	-13	37.68
12 189.20	34.42	H	38.40	-28.98	43.84	-95.26	-51.42	-13	38.42
12 361.20	35.34	V	38.40	-28.84	44.90	-95.26	-50.36	-13	37.36
14 012.45	34.13	H	40.82	-28.09	46.86	-95.26	-48.40	-13	35.40
14 005.25	33.20	V	40.81	-28.02	45.99	-95.26	-49.27	-13	36.27
15 751.55	33.97	H	40.20	-23.41	50.76	-95.26	-44.50	-13	31.50
15 763.15	33.69	V	40.20	-23.49	50.40	-95.26	-44.86	-13	31.86
17 537.50	33.14	H	43.35	-23.19	53.30	-95.26	-41.96	-13	28.96
17 512.70	33.26	V	43.25	-23.29	53.22	-95.26	-42.04	-13	29.04
Above 17 600.00	Not detected	-	-	-	-	-	-	-	-

WCDMA V

Frequency (㎒)	Measured Level (dB㎶)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB㎶/m)	CF (dB)	E.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (826.4 ㎒)									
Below 1 000.00	Not detected	–	-	-	-	-	-	-	-
Above 1 000.00	Not detected	–	-	-	-	-	-	-	-
Middle Channel (836.6 ㎒)									
Below 1 000.00	Not detected	–	-	-	-	-	-	-	-
Above 1 000.00	Not detected	–	-	-	-	-	-	-	-
High Channel (846.6 ㎒)									
Below 1 000.00	Not detected	–	-	-	-	-	-	-	-
Above 1 000.00	Not detected	–	-	-	-	-	-	-	-

Remark;

1. AF = Antenna Factor, CL = Cable Loss, CF = Conversion Factor.
2. E (dB㎶/m) = Measured Level (dB㎶) + Antenna Factor (dB/m) + AMP (dB) + Cable Loss (dB).
3. E.I.R.P. (dB m) = E (dB㎶/m) + CF (dB).
4. E.R.P. (dB m) = E (dB㎶/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 ANSI C63.26-2015 5.2.7 and KDB 971168 D01 v03r01 5.8.4.
6. The frequency spectrum is examined from 9 ㎑ 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.

3. Conducted Output Power

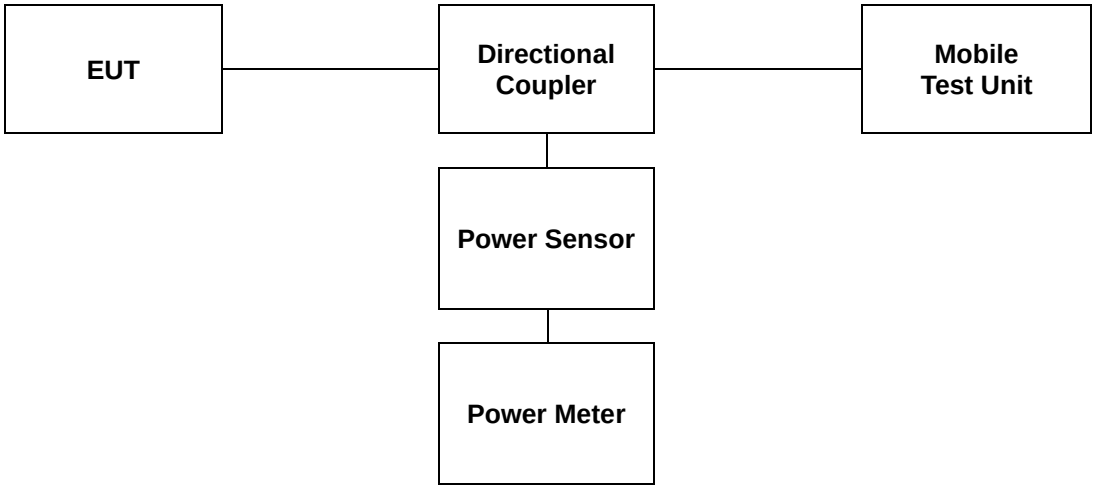
3.1. Limit

CFR 47, Section FCC §2.1046 and IC RSS-Gen Issue 5 6.12.

3.2. Test Procedure

Output power shall be measured at the RF output terminals for all configurations.

1. The RF output of the transmitter was connected to the input of the mobile test unit in order to establish communication with the EUT.
2. The EUT was set up for the max. output power with pseudo random data modulation by using mobile test unit parameters.
3. The measurement performed using a wideband RF power meter.
4. This EUT was tested under all configurations and the highest power was investigated and reported.



3.3. Test Result

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

WCDMA Ⅱ							
Mode	3GPP 34.121 Subtest	Conducted Output Power					
		9262 (1 852.4 ㎒)		9400 (1 880.0 ㎒)		9538 (1 907.6 ㎒)	
		(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
Release 99	12.2 Kbps RMC	23.37	0.217	**23.47**	**0.222**	23.26	0.212
HSDPA	Subtest 1	23.22	0.210	**23.24**	**0.211**	23.12	0.205
	Subtest 2	22.10	0.162	22.22	0.167	22.22	0.167
	Subtest 3	21.64	0.146	21.74	0.149	21.68	0.147
	Subtest 4	21.67	0.147	21.65	0.146	21.62	0.145
HSUPA	Subtest 1	22.15	0.164	22.16	0.164	22.08	0.161
	Subtest 2	21.72	0.149	21.69	0.148	21.60	0.145
	Subtest 3	22.22	0.167	22.18	0.165	22.16	0.164
	Subtest 4	22.24	0.167	22.13	0.163	22.13	0.163
	Subtest 5	22.13	0.163	22.17	0.165	22.10	0.162
DC-HSDPA	Subtest 1	22.76	0.189	22.81	0.191	22.69	0.186
	Subtest 2	22.79	0.190	22.82	0.191	22.74	0.188
	Subtest 3	21.97	0.157	22.07	0.161	21.94	0.156
	Subtest 4	22.06	0.161	22.05	0.160	21.99	0.158
HSPA+		21.89	0.155	21.89	0.155	21.72	0.149

WCDMA Ⅳ							
Mode	3GPP 34.121 Subtest	Conducted Output Power					
		1312 (1 712.4 ㎒)		1413 (1 732.6 ㎒)		1513 (1 752.6 ㎒)	
		(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
Release 99	12.2 Kbps RMC	23.83	0.242	**23.87**	**0.244**	23.74	0.237
HSDPA	Subtest 1	**23.79**	**0.239**	22.26	0.168	23.20	0.209
	Subtest 2	22.13	0.163	21.14	0.130	22.39	0.173
	Subtest 3	21.78	0.151	20.74	0.119	21.69	0.148
	Subtest 4	21.73	0.149	20.76	0.119	21.62	0.145
HSUPA	Subtest 1	22.17	0.165	22.07	0.161	22.13	0.163
	Subtest 2	21.38	0.137	21.76	0.150	21.75	0.150
	Subtest 3	22.30	0.170	22.24	0.167	22.19	0.166
	Subtest 4	22.30	0.170	22.22	0.167	22.18	0.165
	Subtest 5	22.29	0.169	22.22	0.167	22.16	0.164
DC-HSDPA	Subtest 1	23.13	0.206	23.11	0.205	23.02	0.200
	Subtest 2	23.14	0.206	23.13	0.206	23.10	0.204
	Subtest 3	22.40	0.174	22.30	0.170	22.21	0.166
	Subtest 4	22.34	0.171	22.25	0.168	22.13	0.163
HSPA+		20.96	0.125	21.84	0.153	21.87	0.154

WCDMA Ⅴ							
Mode	3GPP 34.121 Subtest	Conducted Output Power					
		4132 (826.4 ㎒)		4183 (836.6 ㎒)		4233 (846.6 ㎒)	
		(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
Release 99	12.2 Kbps RMC	24.00	0.251	**24.05**	**0.254**	24.03	0.253
HSDPA	Subtest 1	**24.02**	**0.252**	23.95	0.248	24.01	0.252
	Subtest 2	22.89	0.195	23.03	0.201	23.02	0.200
	Subtest 3	22.39	0.173	22.43	0.175	22.49	0.177
	Subtest 4	22.51	0.178	22.54	0.179	22.49	0.177
HSUPA	Subtest 1	22.85	0.193	22.93	0.196	22.94	0.197
	Subtest 2	22.33	0.171	22.49	0.177	22.38	0.173
	Subtest 3	22.89	0.195	22.98	0.199	22.99	0.199
	Subtest 4	22.95	0.197	23.00	0.200	22.86	0.193
	Subtest 5	22.85	0.193	22.91	0.195	22.91	0.195
DC-HSDPA	Subtest 1	23.10	0.204	23.17	0.207	23.14	0.206
	Subtest 2	23.20	0.209	23.14	0.206	23.11	0.205
	Subtest 3	22.64	0.184	22.65	0.184	22.64	0.184
	Subtest 4	22.62	0.183	22.60	0.182	22.63	0.183
HSPA+		22.95	0.197	22.92	0.196	22.94	0.197

4. Occupied Bandwidth

4.1. Limit

CFR 47, Section FCC §2.1049 and IC RSS-Gen Issue 5 6.7.

4.2. Test Procedure

FCC
The test follows section 5.4.4 of ANSI C63.26-2015.

a. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation. products including the emission skirts (typically a span of 1.5 × OBW is sufficient).
b. The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1 % to 5 % of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
c. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
d. Set the detection mode to peak, and the trace mode to max-hold.
e. If the instrument does not have a 99 % OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5 % of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5 % of the total is reached and record that frequency as the upper OBW frequency. The 99 % power OBW can be determined by computing the difference these two frequencies.
f. The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

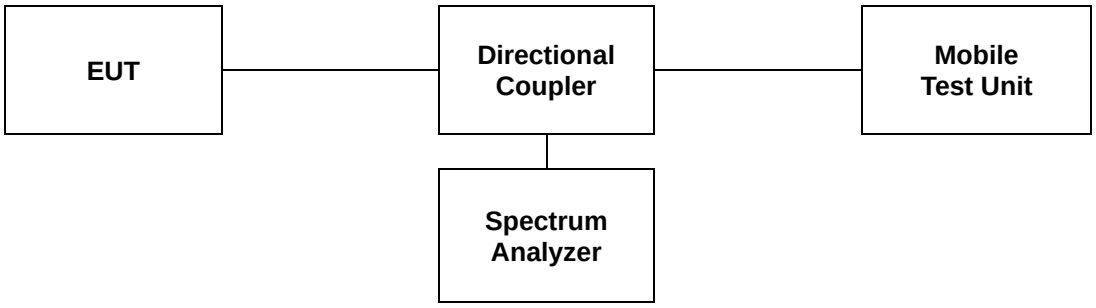
IC

The following conditions shall be observed for measuring the occupied bandwidth and x dB bandwidth:

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.
- The detector of the spectrum analyzer shall be set to “Sample”. However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or “Max Hold”) may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.
- The resolution bandwidth (RBW) shall be in the range of 1 % to 5 % of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99 % emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99 % emission bandwidth).

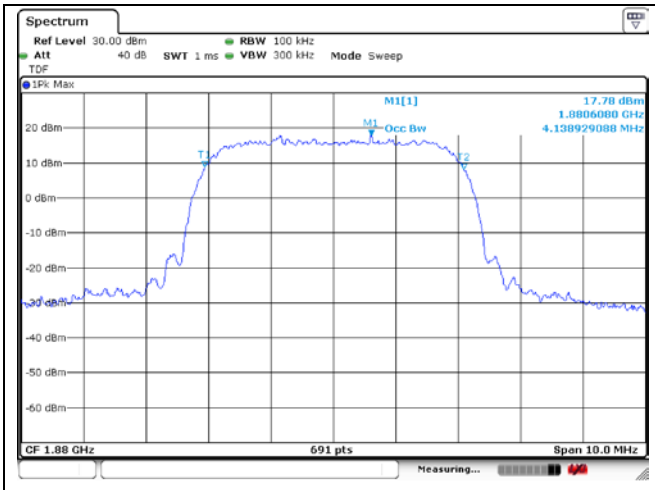


4.3 Test Results

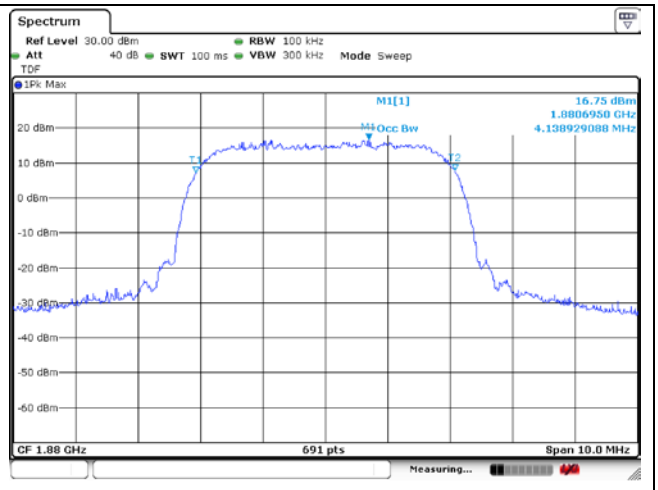
Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

Band	Mode	Frequency (㎒)	Occupied Bandwidth (㎒)
WCDMA Ⅱ	RMC	1 880.0	4.139
	HSDPA		4.139
WCDMA Ⅳ	RMC	1 732.6	4.153
	HSDPA		4.139
WCDMA Ⅴ	RMC	836.6	4.168
	HSDPA		4.168

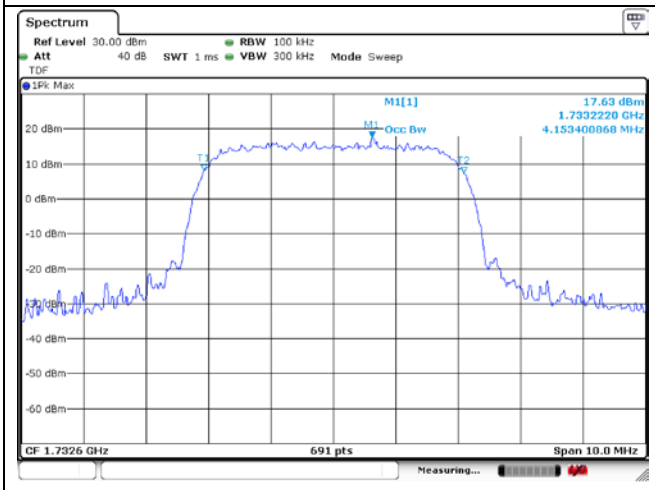
- Test plots



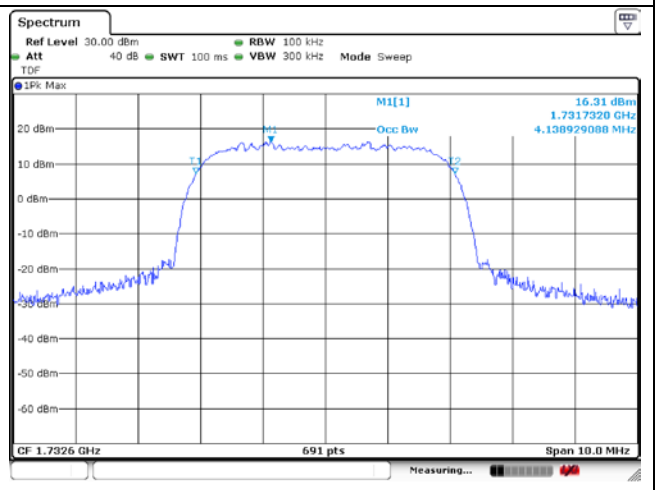
WCDMA Ⅱ RMC Middle Channel



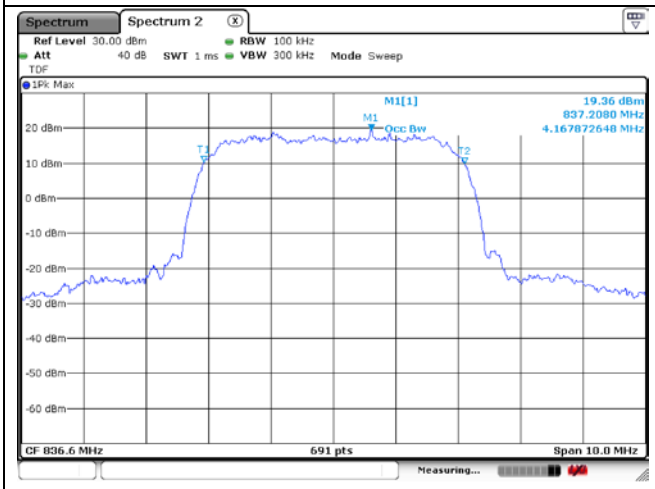
WCDMA Ⅱ HSDPA Middle Channel



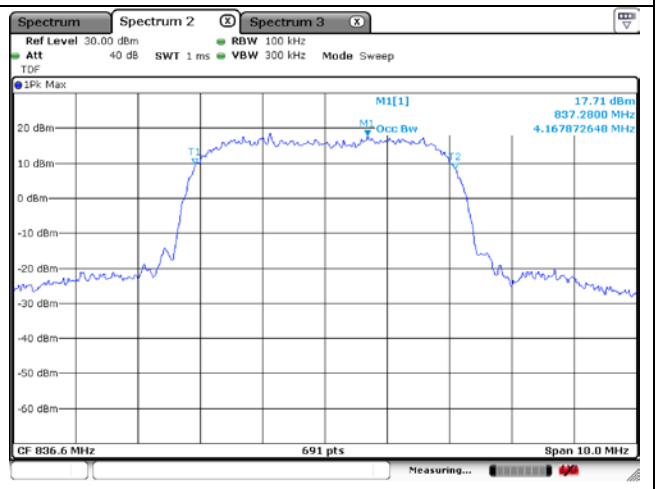
WCDMA Ⅳ RMC Middle Channel



WCDMA Ⅳ HSDPA Middle Channel



WCDMA Ⅴ RMC Middle Channel



WCDMA Ⅴ HSDPA Middle Channel

5. Peak-Average Ratio

5.1. Limit

FCC

- §22.913(d) Measurement of the ERP of Cellular base transmitters and repeaters must be made using an average power measurement technique. The peak-to-average ratio (PAR) of the transmission must not exceed 13 ㏈.

- §24.232(d), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 ㏈.

- §27.50(d)(5), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 ㏈.

IC

- RSS-132 Issue 3

5.4, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 ㏈ for more than 0.1 % of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

- RSS-133 Issue 6

6.4, the transmitter's peak-to-average power ratio (PAPR) shall not exceed 13 ㏈ for more than 0.1 % of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

- RSS-139 Issue 3

6.5, the peak to average power ratio (PAPR) of the equipment shall not exceed 13 ㏈ for more than 0.1 % of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission.

5.2. Test Procedure

The test follows section 5.2.3.4 of ANSI C63.26-2015.

See instrumentation-specific application literature for further guidance regarding use of the CCDF capability. The following guidelines are offered for performing a CCDF measurement.

a. Set resolution/measurement bandwidth ≥ OBW or specified reference bandwidth.

b. Set the number of counts to a value that stabilizes the measured CCDF curve.

c. Set the measurement interval as follows:

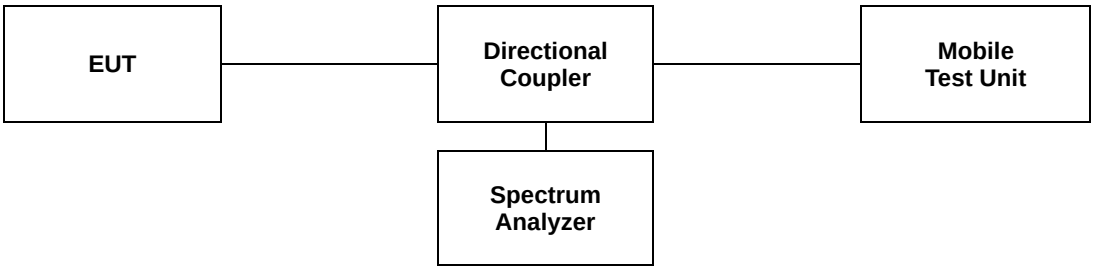
1) For continuous transmissions, set to greater of [10 x (number of points in sweep) x (transmission symbol period)] or 1 ms.

2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement interval to a time that is less than or equal to the burst duration.

3) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.

d. Record the maximum PAPR level associated with a probability of 0.1 %.

e. The peak power level is calculated form the sum of the PAPR value from step d) to the measured average power.



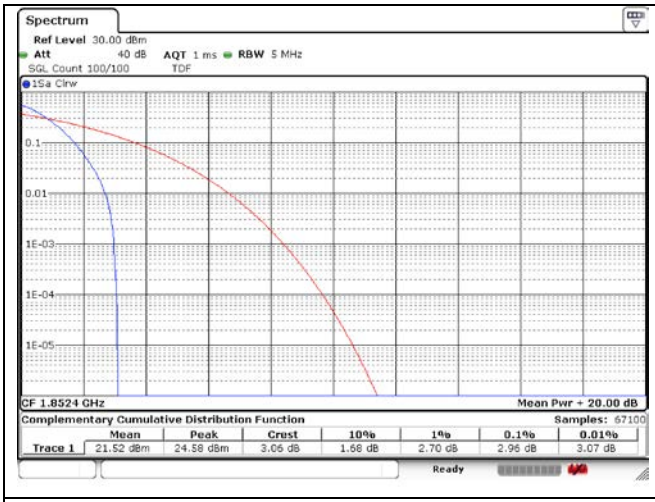
5.3 Test Results

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

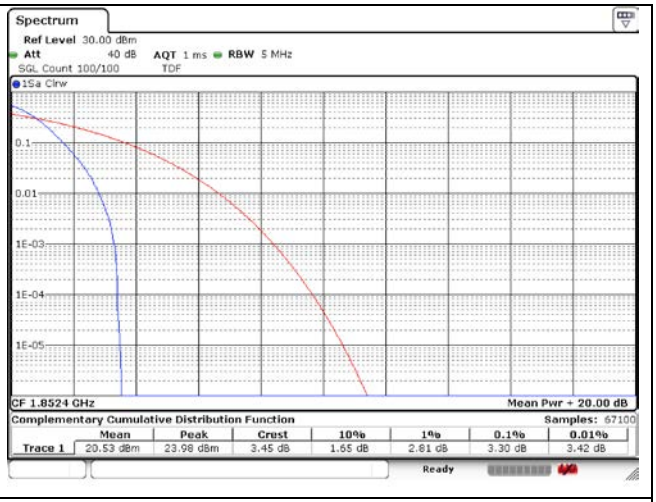
Band	Mode	Frequency (㎒)	PAR (㏈)
WCDMA Ⅱ	RMC	1 852.4	2.96
		1 880.0	3.01
		1 907.6	2.96
	HSDPA	1 852.4	3.30
		1 880.0	3.30
		1 907.6	3.25
WCDMA Ⅳ	RMC	1 712.4	2.96
		1 732.6	2.93
		1 752.6	2.96
	HSDPA	1 712.4	3.28
		1 732.6	3.25
		1 752.6	3.28
WCDMA Ⅴ	RMC	826.4	3.10
		836.6	2.96
		846.6	2.93
	HSDPA	826.4	3.39
		836.6	3.33
		846.6	3.28

- Test plots

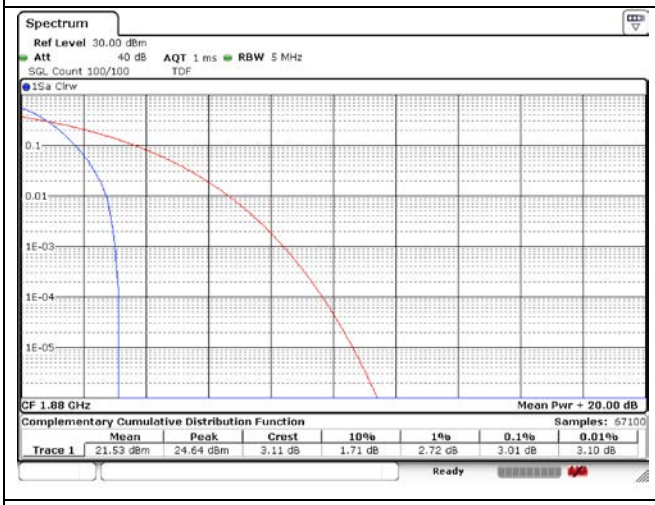
WCDMA Ⅱ



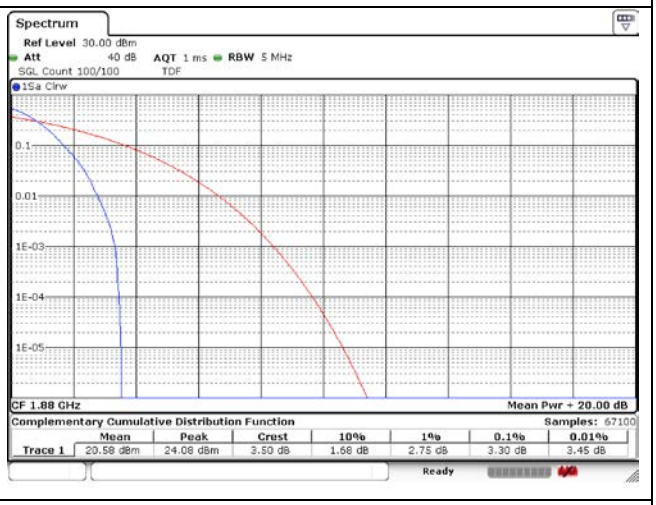
WCDMA Ⅱ RMC Low Channel



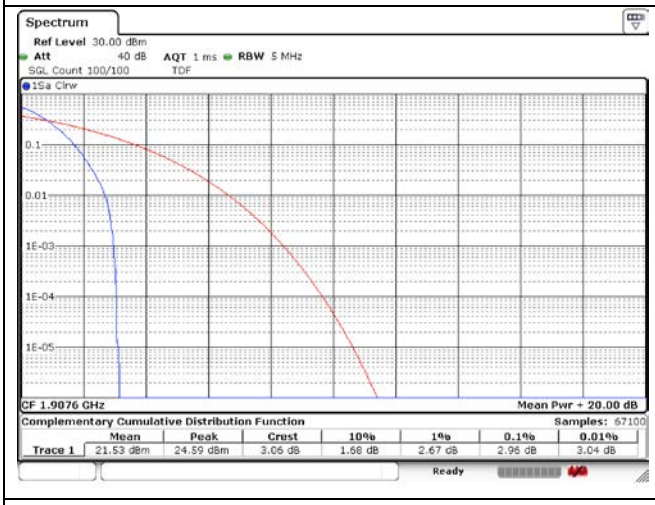
WCDMA Ⅱ HSDPA Low Channel



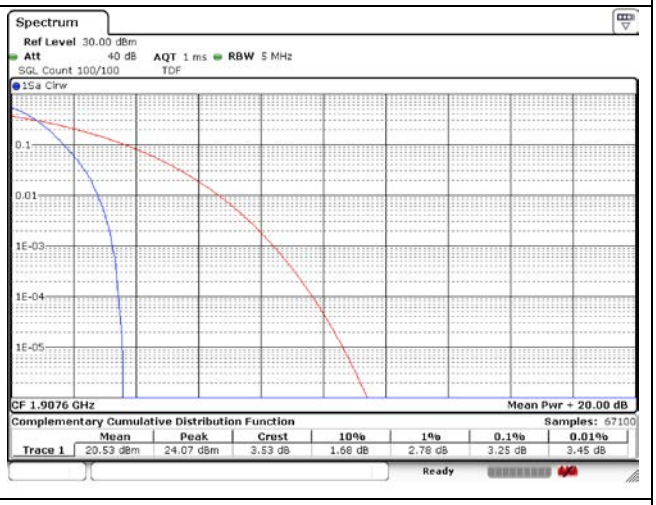
WCDMA Ⅱ RMC Middle Channel



WCDMA Ⅱ HSDPA Middle Channel

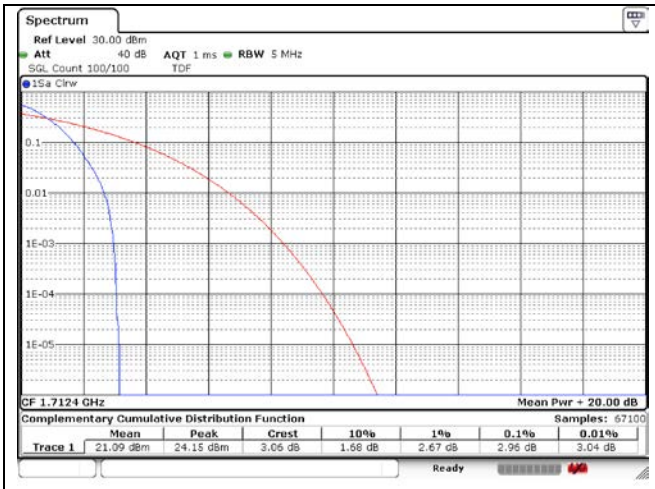


WCDMA Ⅱ RMC High Channel

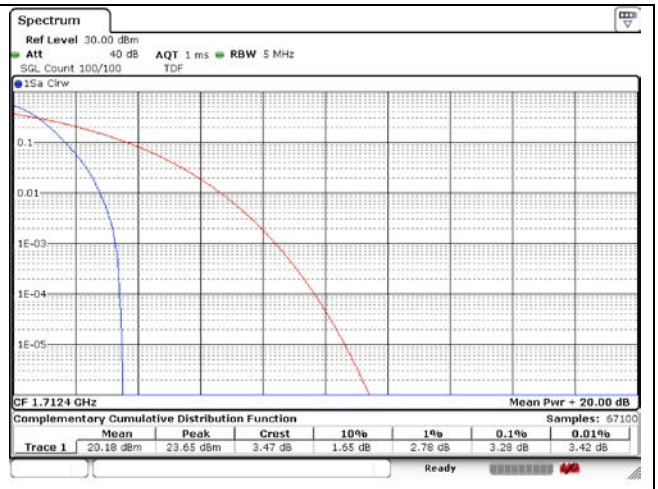


WCDMA Ⅱ HSDPA High Channel

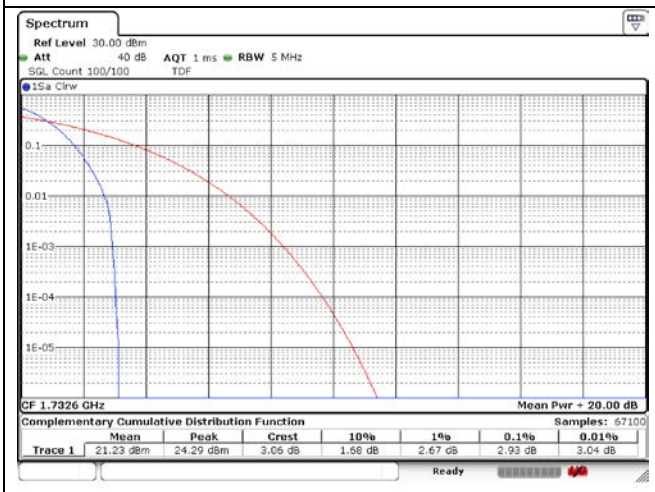
WCDMA Ⅳ



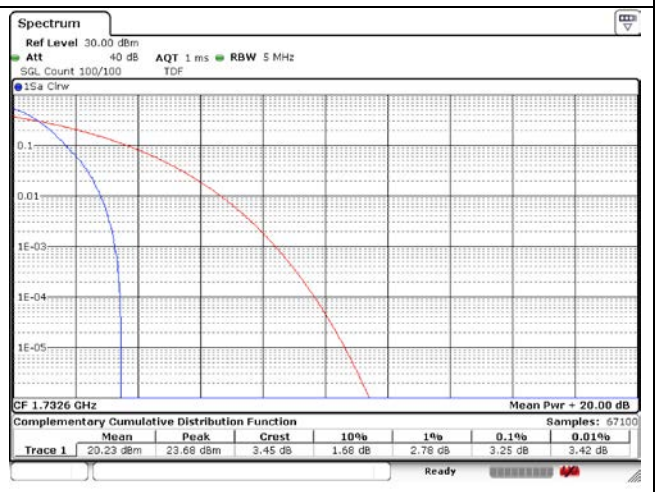
WCDMA Ⅳ RMC Low Channel



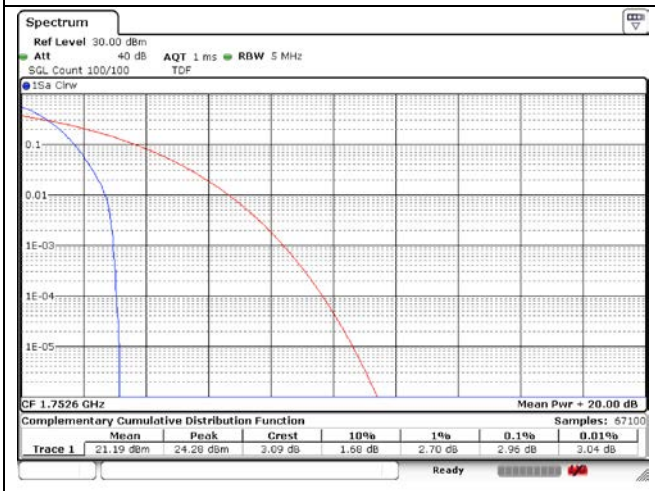
WCDMA Ⅳ HSDPA Low Channel



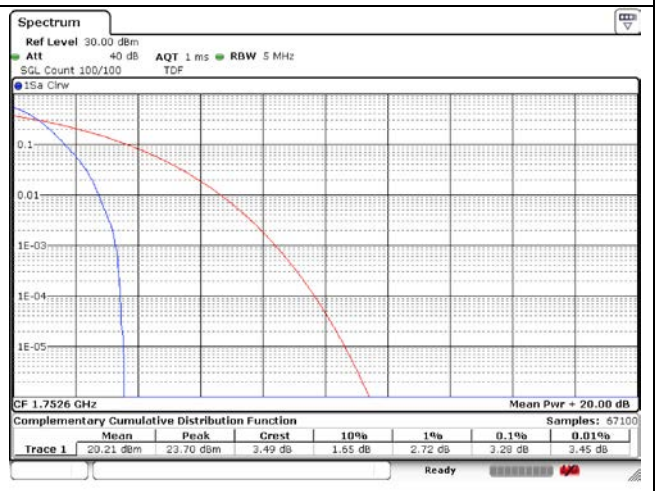
WCDMA Ⅳ RMC Middle Channel



WCDMA Ⅳ HSDPA Middle Channel

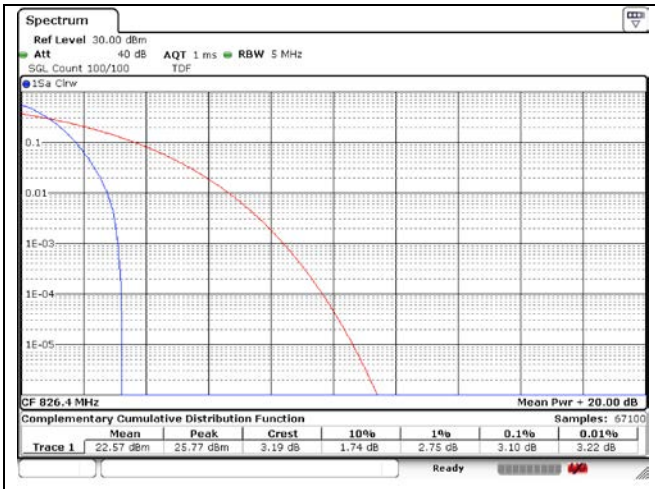


WCDMA Ⅳ RMC High Channel

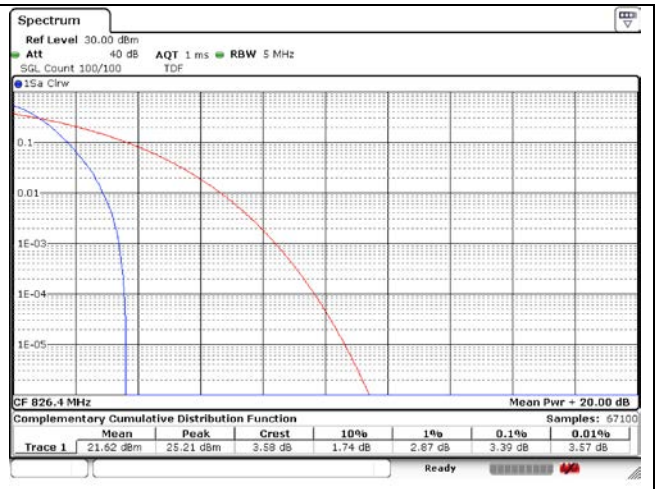


WCDMA Ⅳ HSDPA High Channel

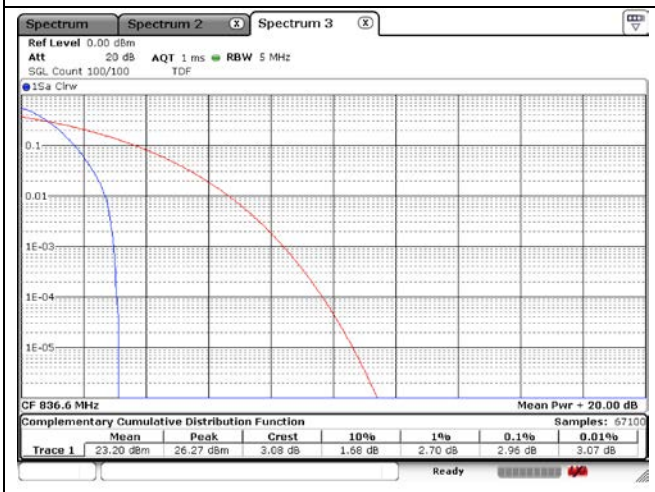
WCDMA Ⅴ



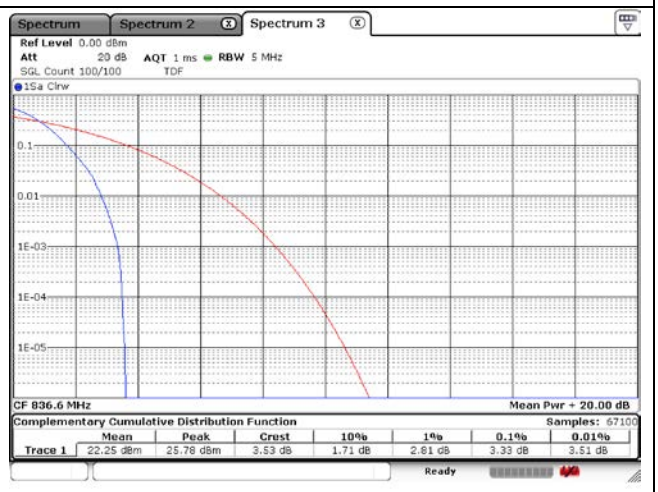
WCDMA Ⅴ RMC Low Channel



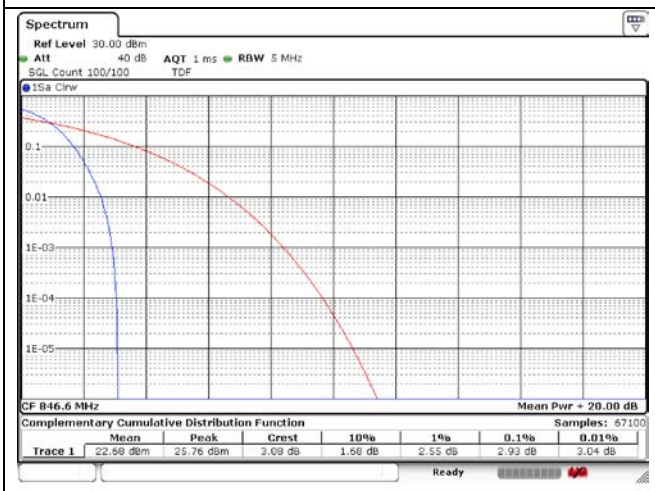
WCDMA Ⅴ HSDPA Low Channel



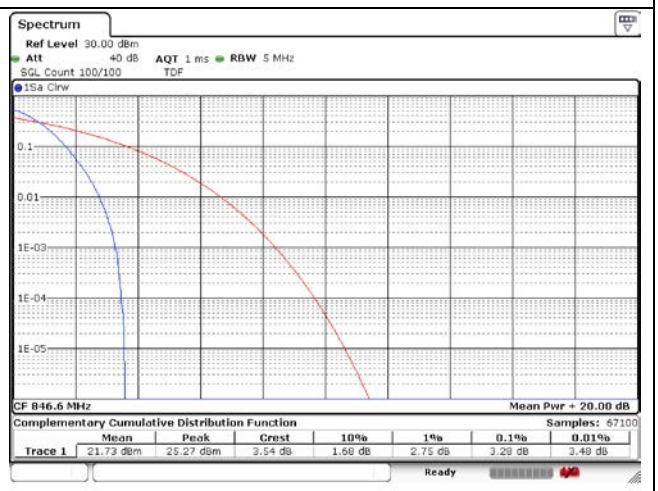
WCDMA Ⅴ RMC Middle Channel



WCDMA Ⅴ HSDPA Middle Channel



WCDMA Ⅴ RMC High Channel



WCDMA Ⅴ HSDPA High Channel

6. Spurious Emissions at Antenna Terminal

6.1. Limit

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 + 10log(P) ㏈.

- §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) ㏈.

- §27.53(h)(1), for operations in the 1 695-1 710 ㎒, 1 710-1 755 ㎒, 1 755-1 780 ㎒, 1 915-1 920 ㎒, 1 995-2 000 ㎒, 2 000-2 020 ㎒, 2 110-2 155 ㎒, 2 155-2 180 ㎒, 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) ㏈.

IC

- 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 ㎒ 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 ㏈) below the transmitter output power P (㏈ W) by at least 43 + 10 $\log_{10}$ p (watts).

(ii) After the first 1.0 ㎒ immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 ㎑ bandwidth shall be attenuated (in ㏈) below the transmitter output power P (㏈ 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 ㎑ is required.

- RSS-133 Issue 6

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

(i) In the 1.0 ㎒ 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 ㏈) below the transmitter output power P (㏈ W) by at least 43 + 10 $\log_{10}$ p(watts).

(ii) After the first 1.0 ㎒, the emission power in any 1 ㎒ bandwidth shall be attenuated (in ㏈) below the transmitter output power P (㏈ 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 ㎒ is required.

- RSS-139 Issue 3

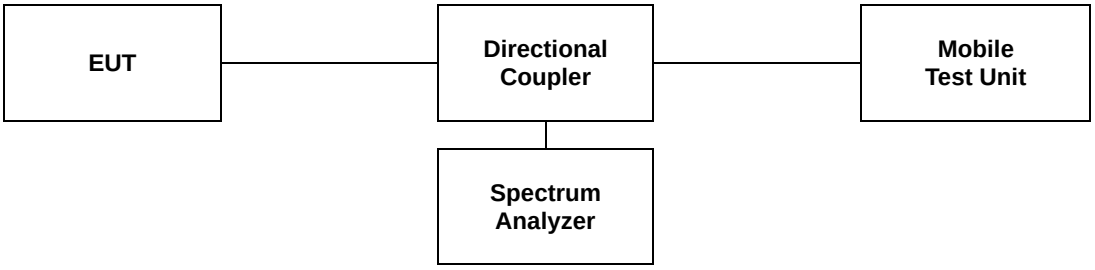
6.6, (i) In the first 1.0 ㎒ bands immediately outside and adjacent to the equipment’s smallest operating frequency block, which can contain the equipment’s occupied bandwidth, the emission power per any 1 % of the emission bandwidth shall be attenuated below the transmitter output power P (in ㏈ W) by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

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

6.2. Test Procedure

The test follows section 5.7 of ANSI C63.26-2015.

1. Start frequency was set to 9 ㎑ and stop frequency was set to at least 10* the fundamental frequency.
2. Detector = RMS.
3. Trace mode = Max hold.
4. Sweep time = Auto couple.
5. The trace was allowed to stabilize.
6. Please see notes below for RBW and VBW settings.
7. For plots showing conducted spurious emissions from 9 ㎑ to 20 ㎓, all path loss of wide frequency range was investigated and compensated to spectrum analyzer as TDF function.



Note;

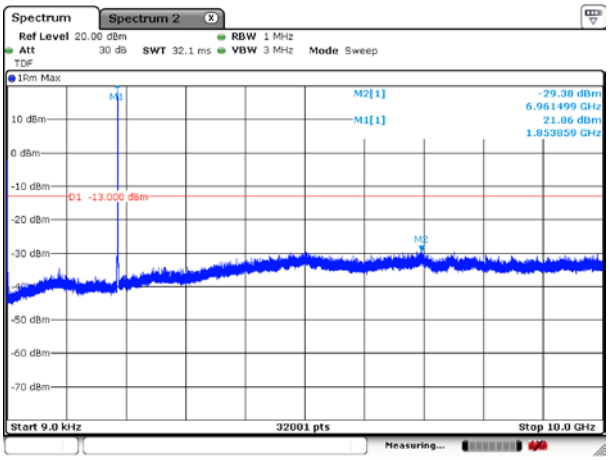
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 ㎑ or greater for frequencies less than 1 ㎓ and frequencies greater than 1 ㎓. However, in the 1 ㎒ bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two point, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 ㏈ below the transmitter power.

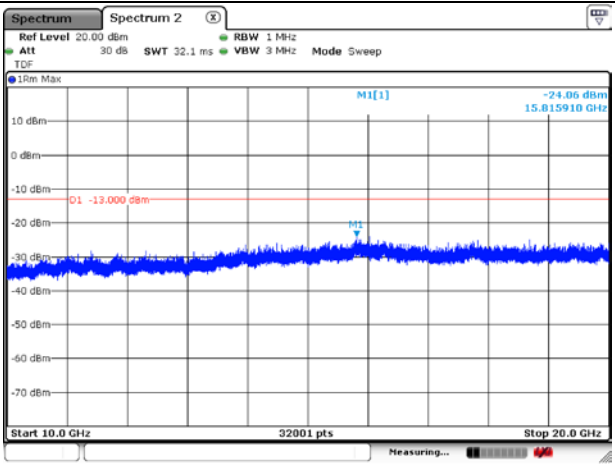
6.3. Test Results

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

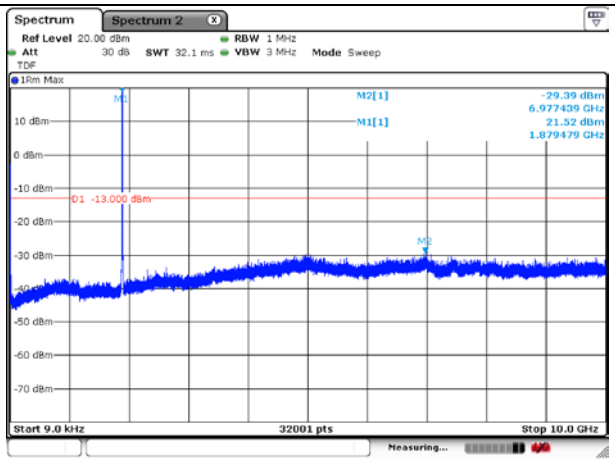
- Test plots

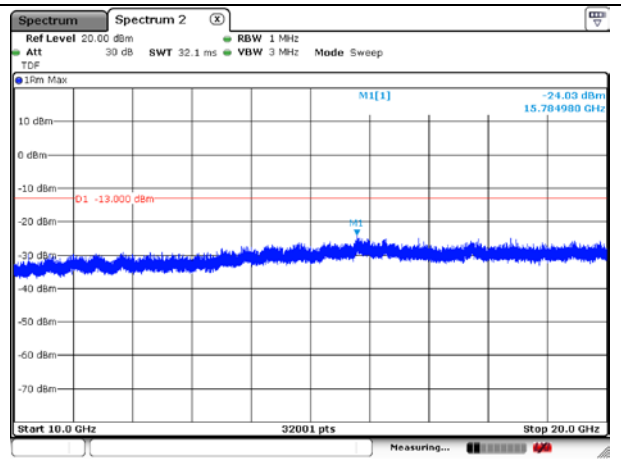
WCDMA Ⅱ



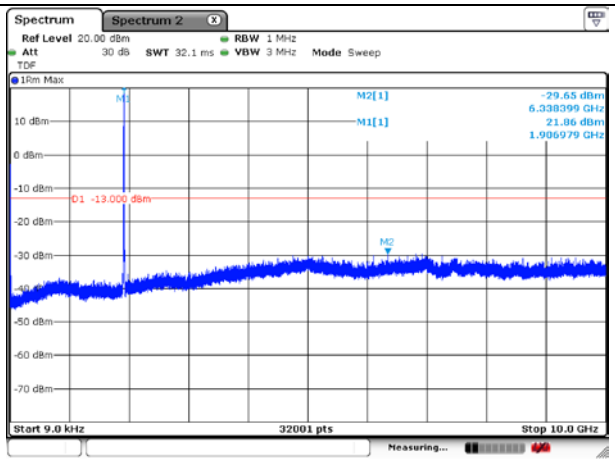


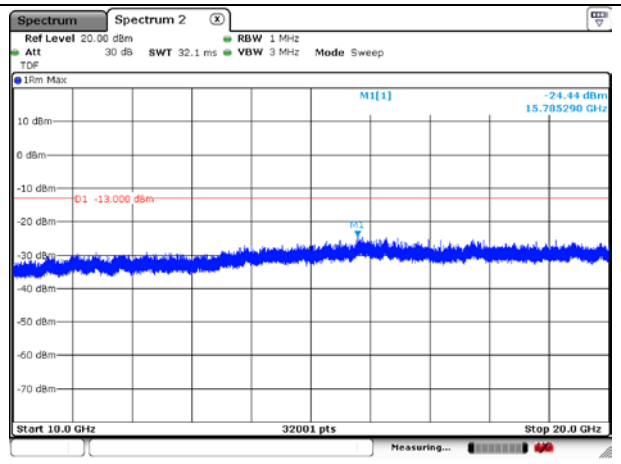
WCDMA Ⅱ RMC Low Channel





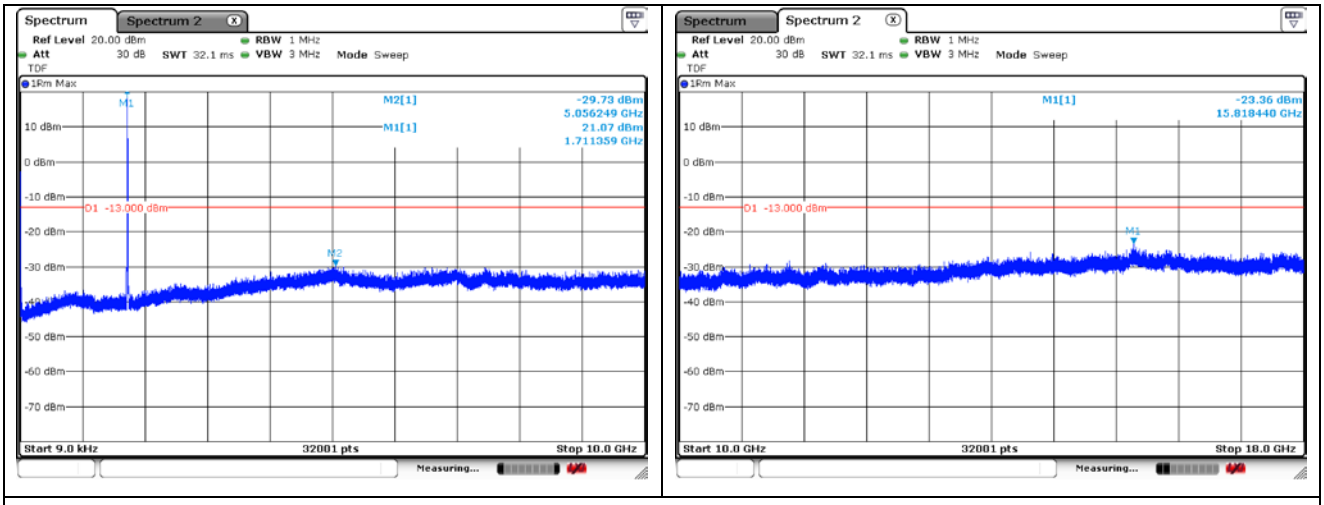
WCDMA Ⅱ RMC Middle Channel



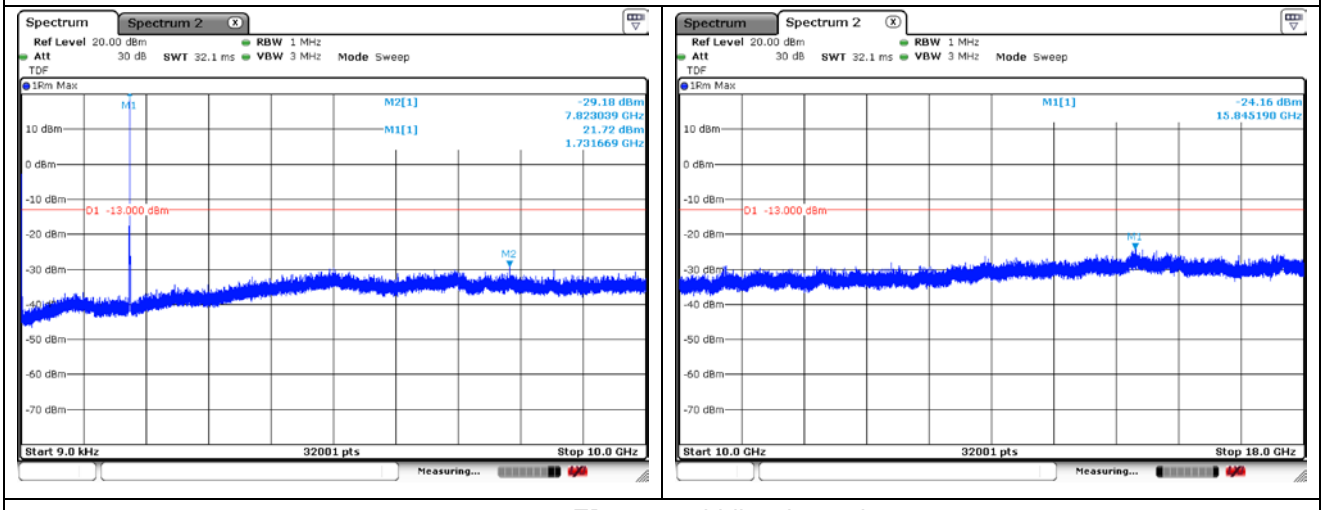


WCDMA Ⅱ RMC High Channel

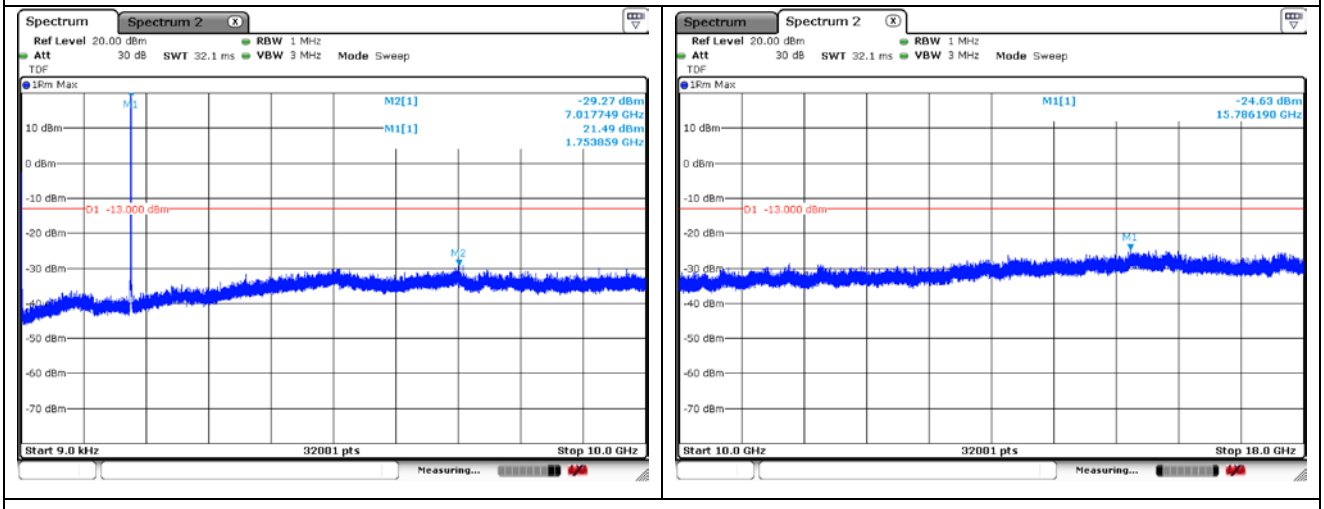
WCDMA Ⅳ



WCDMA Ⅳ RMC Low Channel

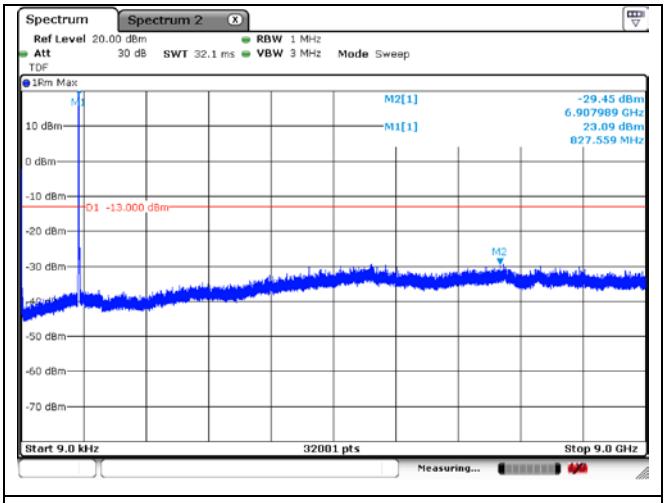


WCDMA Ⅳ RMC Middle Channel

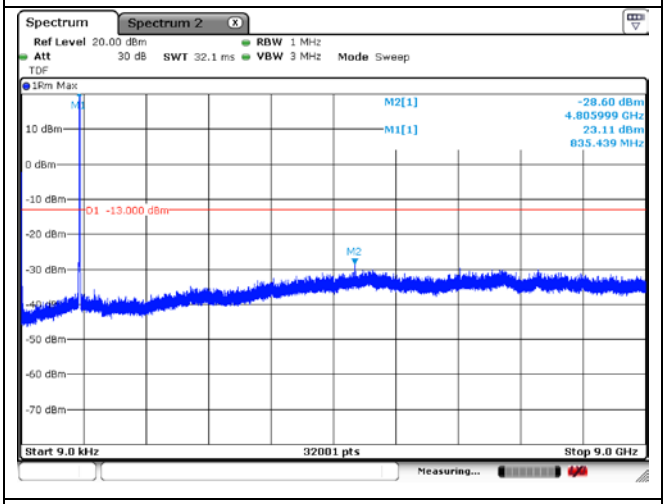


WCDMA Ⅳ RMC High Channel

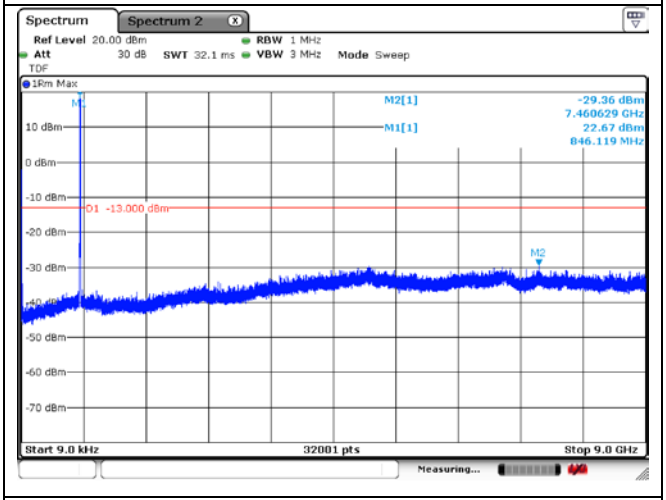
WCDMA Ⅴ



WCDMA Ⅴ RMC Low channel



WCDMA Ⅴ RMC Middle channel



WCDMA Ⅴ RMC High channel

7. Band Edge

7.1. Limit

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 + 10log(P) ㏈.

- §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) ㏈.

- §27.53(h)(1), for operations in the 1 695-1 710 ㎒, 1 710-1 755 ㎒, 1 755-1 780 ㎒, 1 915-1 920 ㎒, 1 995-2 000 ㎒, 2 000-2 020 ㎒, 2 110-2 155 ㎒, 2 155-2 180 ㎒, 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) ㏈.

IC

- 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 ㎒ 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 ㏈) below the transmitter output power P (㏈ W) by at least 43 + 10 $\log_{10}$ p (watts).

(ii) After the first 1.0 ㎒ immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 ㎑ bandwidth shall be attenuated (in ㏈) below the transmitter output power P (㏈ 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 ㎑ is required.

- RSS-133 Issue 6

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

(i) In the 1.0 ㎒ 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 ㏈) below the transmitter output power P (㏈ W) by at least 43 + 10 $\log_{10}$ p(watts).

(ii) After the first 1.0 ㎒, the emission power in any 1 ㎒ bandwidth shall be attenuated (in ㏈) below the transmitter output power P (㏈ 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 ㎒ is required.

- RSS-139 Issue 3

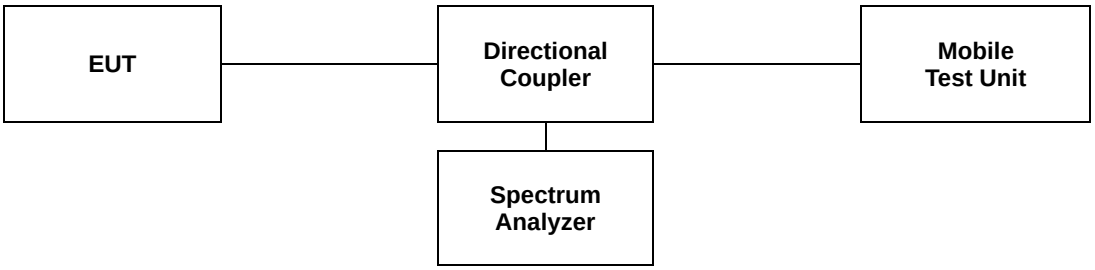
6.6, (i) In the first 1.0 ㎒ bands immediately outside and adjacent to the equipment’s smallest operating frequency block, which can contain the equipment’s occupied bandwidth, the emission power per any 1 % of the emission bandwidth shall be attenuated below the transmitter output power P (in ㏈ W) by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

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

7.2. Test Procedure

The test follows section 5.7 of ANSI C63.26-2015.

a. Span was set large enough so as to capture all out of band emissions near the band edge.
b. RBW ≥ 1 % of OBW
c. VBW ≥ 3 x RBW.
d. Detector = RMS.
e. Trace mode = Average.
f. Sweep time = Auto.
g. The trace was allowed to stabilize.
h. All path loss of frequency range was investigated and compensated to spectrum analyzer as TDF function.

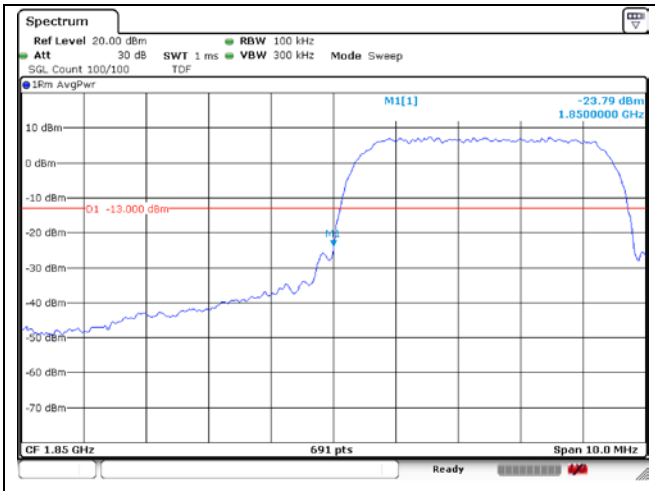


7.3. Test Results

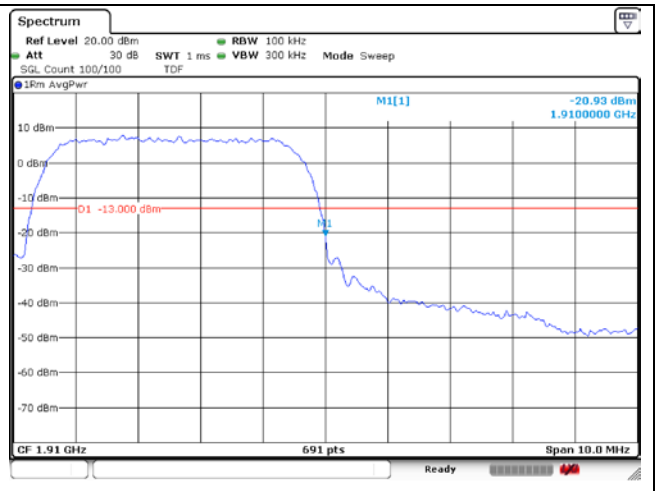
Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

- Test plots

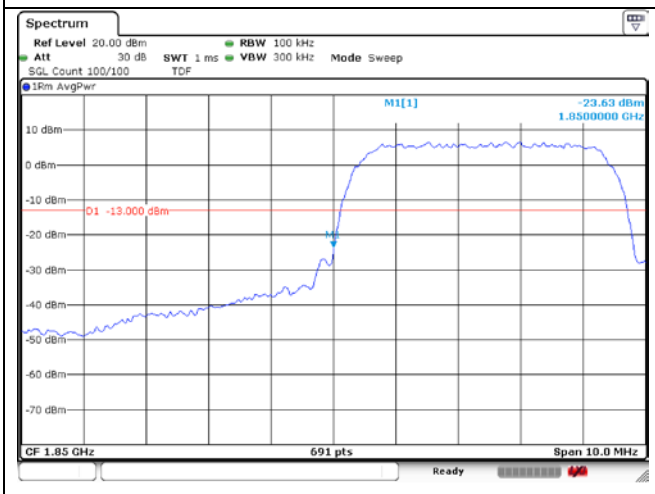
WCDMA Ⅱ



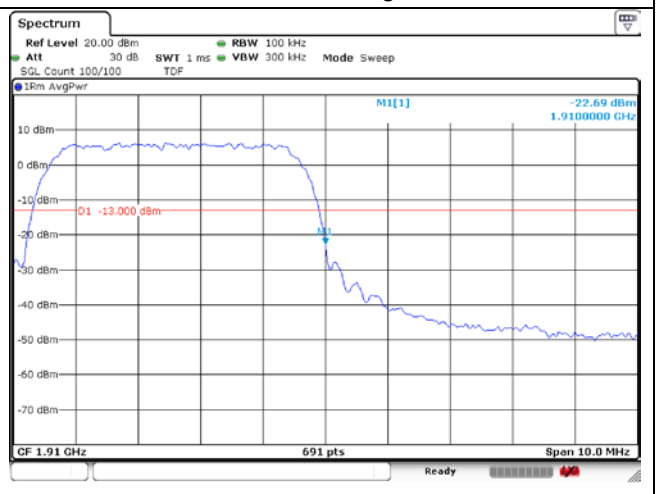
WCDMA Ⅱ RMC Low Channel



WCDMA Ⅱ RMC High Channel

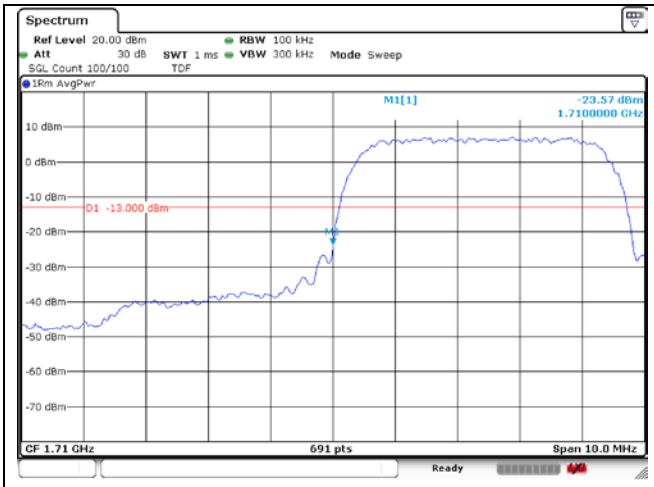


WCDMA Ⅱ HSDPA Low Channel

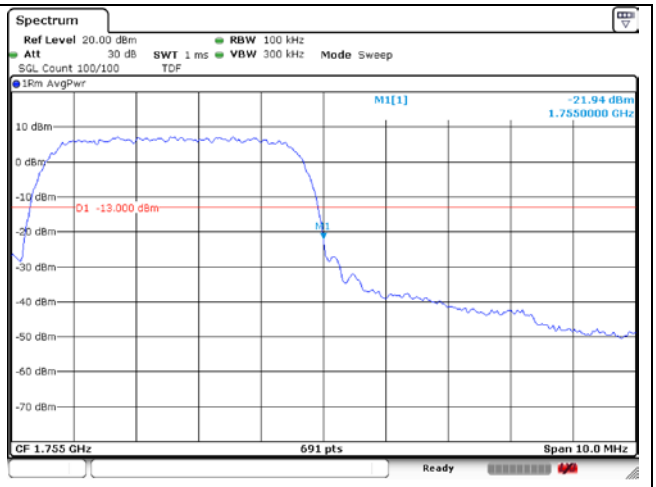


WCDMA Ⅱ HSDPA High Channel

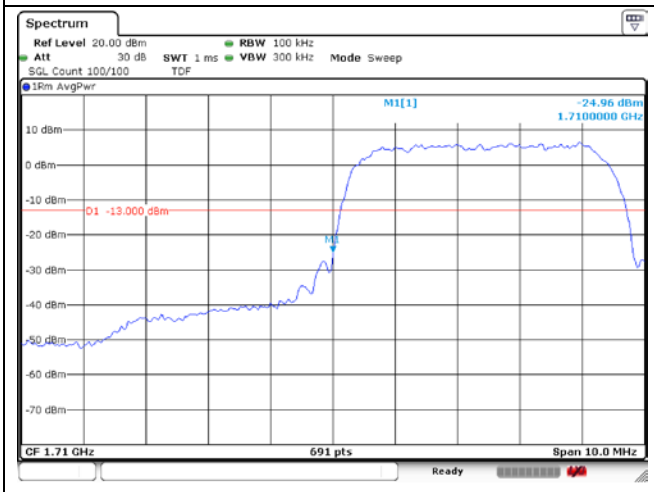
WCDMA Ⅳ



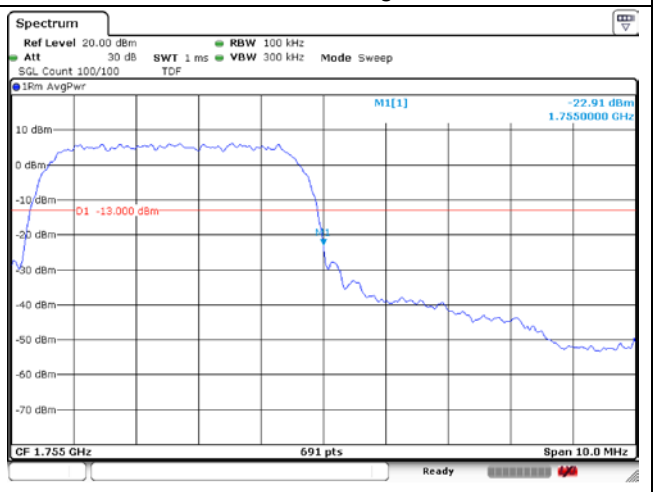
WCDMA Ⅳ RMC Low Channel



WCDMA Ⅳ RMC High Channel

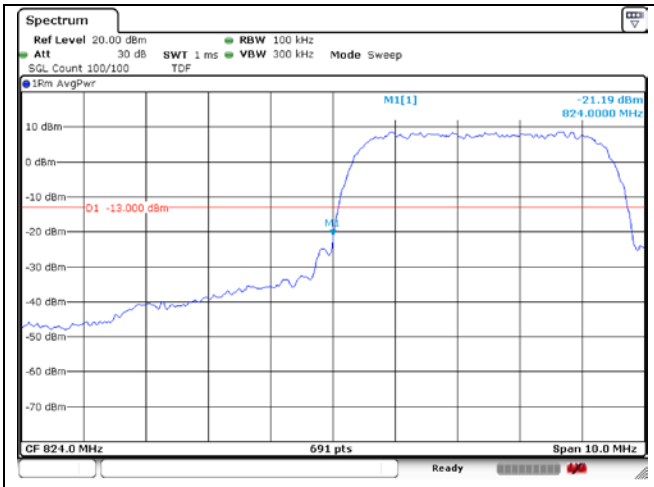


WCDMA Ⅳ HSDPA Low Channel

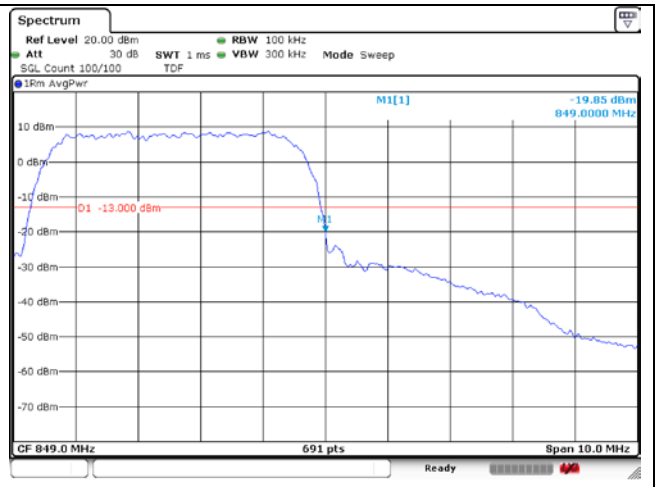


WCDMA Ⅳ HSDPA High Channel

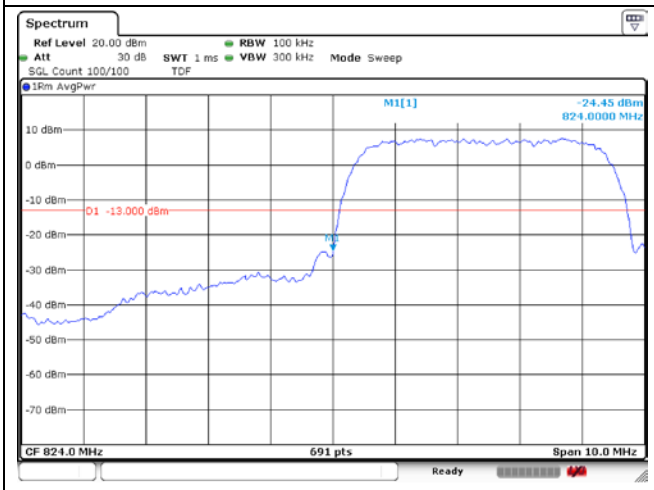
WCDMA Ⅴ



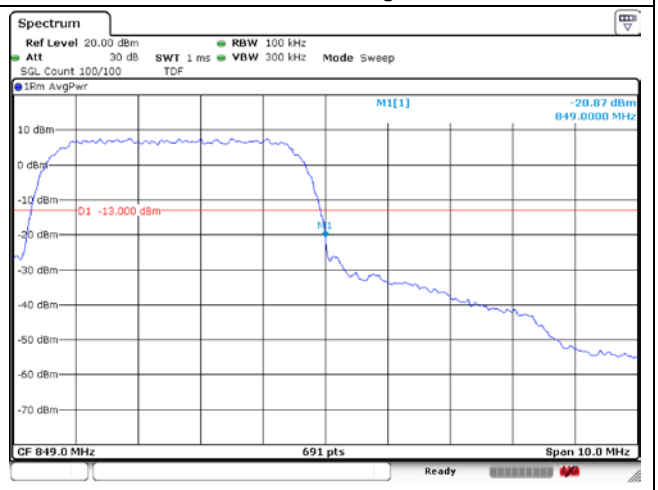
WCDMA Ⅴ RMC Low Channel



WCDMA Ⅴ RMC High Channel



WCDMA Ⅴ HSDPA Low Channel



WCDMA Ⅴ HSDPA High Channel

8. Frequency Stability

8.1. Limit

FCC
- § 2.1055 (a), § 2.1055 (d) & following:

- §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table of this section.
For Mobile devices operating in the 824 to 849 ㎒ band at a power level less than or equal to 3 Watts, the limit specified in Table C-1 is +/- 2.5 ppm.

- §24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

- §27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

IC
- RSS-Gen Issue 5
6.11, for licensed devices, the following measurement conditions apply:
a. at the temperatures of -30°C (-22°F), +20°C (+68°F) and +50°C (+122°F), and at the manufacturer's rated supply voltage

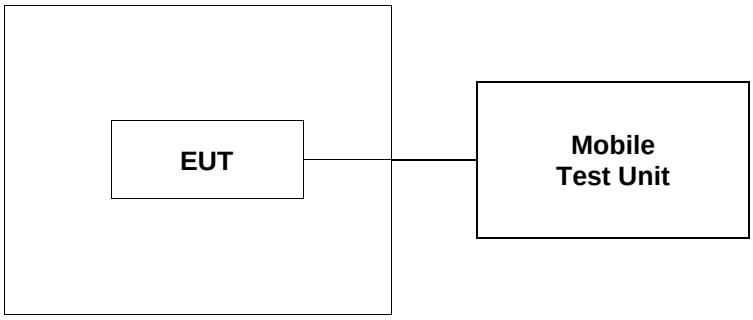
- RSS-132 Issue 3
5.3, The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations and ±1.5 ppm for base stations.

- RSS-133 Issue 6
6.3, the carrier frequency shall not depart from the reference frequency, in excess of ±2.5 ppm for mobile stations and ±1.0 ppm for base stations.

- RSS-139 Issue 3
6.4, the frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

8.2. Test Procedure

1. Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a Mobile Test Unit via feed-through attenuators.
2. The EUT was placed inside the temperature chamber.
3. After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from Mobile Test Unit.



Temperature Chamber

8.3. Test Results

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

WCDMA Ⅱ mode at middle channel

Reference Frequency: 1 880.0 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	3.90	190	0.025 00
40		156	0.006 91
30		191	0.025 53
20(Ref.)		143	-
10		189	0.024 47
0		177	0.018 09
-10		190	0.025 00
-20		177	0.018 09
-30		144	0.000 53
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	3.32 (85%)	160	0.009 04
	4.49 (115%)	176	0.017 55

WCDMA Ⅳ mode at middle channel

Reference Frequency: 1 732.6 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	3.90	180	0.136 79
40		146	0.117 16
30		120	0.102 16
20(Ref.)		-57	-
10		-99	-0.024 24
0		-95	-0.021 93
-10		-92	-0.020 20
-20		-95	-0.021 93
-30		12	0.039 82
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	3.32 (85%)	-47	0.005 77
	4.49 (115%)	-27	0.017 32

WCDMA Ⅴ mode at middle channel

Reference Frequency: 836.6 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	3.90	-4	0.037 05
40		-3	0.038 25
30		28	0.075 30
20(Ref.)		-35	-
10		-27	0.009 56
0		-23	0.014 34
-10		-37	-0.002 39
-20		-3	0.038 25
-30		3	0.045 42
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	3.32 (85%)	-25	0.011 95
	4.49 (115%)	-29	0.007 17

- End of the Test Report -