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TEST REPORT

of

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

FCC ID: 2AHTD-CFXCAM
IC Certification: 21258-CFXCAM

Equipment Under Test	:	CleanFLEX
Model Name	:	CFX-CAM
Variant Model Name(s)	:	-
Applicant	:	Ecube Labs Co., Ltd.
Manufacturer	:	Ecube Labs Co., Ltd.
Date of Receipt	:	2021.04.06
Date of Test(s)	:	2021.04.06 ~ 2021.05.24
Date of Issue	:	2021.05.24

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

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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

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx.
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1.2. Details of Applicant

Applicant : Ecube Labs Co., Ltd.
Address : #710, Daeryungposttower, 288, Digital-ro, Guro-gu, Seoul, South Korea, 08380
Contact Person : Park, Jin
Phone No. : +82 2 2109 0294

1.3. Details of Manufacturer

Company : Same as applicant
Address : Same as applicant

1.4. Description of EUT

Kind of Product	CleanFLEX
Model Name	CFX-CAM
Approved Module	FCC ID: XMR201510UC20 IC Certification: 10224-A201510UC20
Serial Number	Conducted: 01 Radiated: 02
Power Supply	DC 3.6 V
Rated Power	WCDMA Ⅱ: 22.5 dBm WCDMA Ⅳ: 23.0 dBm
Frequency Range	WCDMA Ⅱ: 1 850 ㎒ ~ 1 910 ㎒ WCDMA Ⅴ: 824 ㎒ ~ 849 ㎒
Modulation Technique	QPSK, 16QAM
Emission Designator	WCDMA Ⅱ: 4M16F9W WCDMA Ⅴ: 4M19F9W
Antenna Type	PCB Pattern Antenna
Antenna Gain	824 ㎒ ~ 849 ㎒: 4.0 dBi 1 850 ㎒ ~ 1 910 ㎒: -7.0 dBi
H/W Version	1.0
S/W Version	1.0

1.5. 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	R&S	FSV30	103210	Dec. 07, 2020	Annual	Dec. 07, 2021
Mobile Test Unit	R&S	CMW500	144034	Feb. 22, 2021	Annual	Feb. 22, 2022
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	WHKX10-900-1000-18000-40SS	7	Mar. 08, 2021	Annual	Mar. 08, 2022
High Pass Filter	Wainwright Instrument GmbH	WHK3.0/18G-10SS	344	May 18, 2020	Annual	May 18, 2021
High Pass Filter	Wainwright Instrument GmbH	WHNX7.5/26.5G-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	MY49030063	Feb. 02, 2021	Annual	Feb. 02, 2022
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	TESTEK	TK-PA1840H	1546891	Jan. 07, 2021	Annual	Jan. 07, 2022
Test Receiver	R&S	ESU26	100109	Feb. 19, 2021	Annual	Feb. 19, 2022
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 22, 2019	Biennial	Aug. 22, 2021
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB9163	01126	Dec. 22, 2020	Biennial	Dec. 22, 2022
Horn Antenna	R&S	HF906	100326	Feb. 04, 2021	Annual	Feb. 04, 2022
Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA9170	BBHA9170223	Sep. 16, 2020	Annual	Sep. 16, 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	CO3000/963/38330516/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	PL520-NMNM-10M (10 m)	20200324001	Dec. 01, 2020	Semi-annual	Jun. 01, 2021
Coaxial Cable	Rosenberger	LA1-C006-1500	131014 01/20	Feb. 19, 2021	Semi-annual	Aug. 19, 2021
Coaxial Cable	Rosenberger	LA1-C006-1500	131014 05/20	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

▶ **Support Equipment**

Description	Manufacturer	Model	Serial Number
N/A	-	-	-

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 and 24 / IC part RSS-132 Issue 3, RSS-133 Issue 6 and RSS-Gen Issue 5			
Section(s) in FCC	**Section(s) in IC**	**Test Item(s)**	**Result**
§2.1046 §22.913(a)(5) §24.232(c)	RSS-132 Issue 3 5.4 RSS-133 Issue 6 6.4	RF Radiated Output Power	Complied
§2.1053 §22.917(a) §24.238(a)	RSS-132 Issue 3 5.5 RSS-133 Issue 6 6.5	Spurious Radiated Emission	Complied
§2.1046	RSS-Gen Issue 5 6.12	Conducted Output Power	Complied
§2.1049	RSS-Gen Issue 5 6.7	Occupied Bandwidth	N/A[1)]
§22.913(d) §24.232(d)	RSS-132 Issue 3 5.4 RSS-133 Issue 6 6.4	Peak-Average Ratio	N/A[1)]
§2.1051 §22.917(a) §24.238(a)	RSS-132 Issue 3 5.5 RSS-133 Issue 6 6.5	Spurious Emission at Antenna Terminal	Complied
§22.917(a) §24.238(a)	RSS-132 Issue 3 5.5 RSS-133 Issue 6 6.5	Band Edge	Complied
§2.1055 §22.355 §24.235	RSS-Gen Issue 5 6.11 RSS-132 Issue 3 5.3 RSS-133 Issue 6 6.3	Frequency Stability	Complied

Note;

1) The test items were used the results from the approved module.
Approved module information
FCC ID: XMR201510UC20
IC Certification: 10224-A201510UC20

1.7. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL002015	2021.04.27	Initial
1	F690501-RF-RTL002015-1	2021.05.13	1. Retest RF radiated output power and spurious radiated emission 2. Revise applicant address 3. Revise antenna gain 4. Tested the frequency stability additionally
2	F690501-RF-RTL002015-2	2021.05.24	Added the test results Spurious Emissions at Antenna Terminal and Band Edge

1.8. Sample Calculation for Offset

Where relevant, the following sample calculation is provided:

1.8.1. Conducted Test

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

1.8.2. Radiation test

- E.I.R.P. dB m) = Measured level (dBμV) + Antenna factor (dB) + 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)

1.9. Worst Case Configuration and Mode

The worst-case is based on the average conducted output power measurement investigation results. Output power measurements were measured on RMC, HSDPA and HSUPA Modulation. All testing was performed using RMC modulations to represent the worst case.

1.10. Measurement Uncertainty

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

Parameter		Uncertainty
RF Output Power		± 0.36 dB
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

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

1.11. Spot Check Data

Band	Test item	Frequency (㎒)	Limit	Approved Module		Basic Model		Deviation (㏈)	Remark
				UC20-G		CFX-CAM			
				FCC ID: XMR201510UC20 IC Certification: 10224-A201510UC20		FCC ID: 2AHTD-CFXCAM IC Certification: 21258-CFXCAM			
				(㏈m)	(W)	(㏈m)	(W)		
WCDMA Ⅱ	Conducted power	1 850 ~ 1 910	2 W	22.84	0.192	23.35	0.216	0.51	-
WCDMA Ⅴ	Conducted power	824 ~ 849	7 W	23.53	0.225	23.37	0.217	-0.16	-

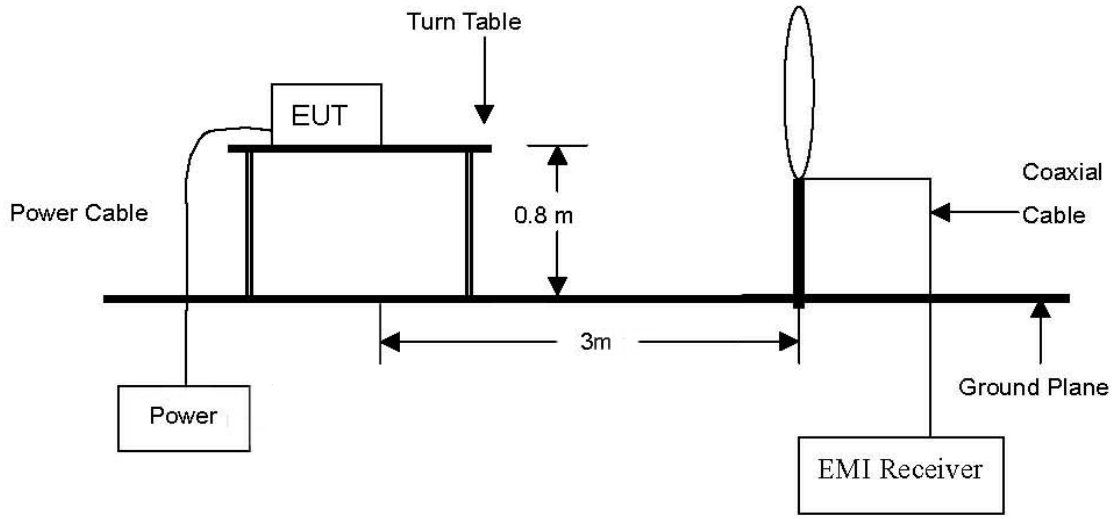
Note;

All conducted output power was measured.
Output power compared the approved module with the host equipment.

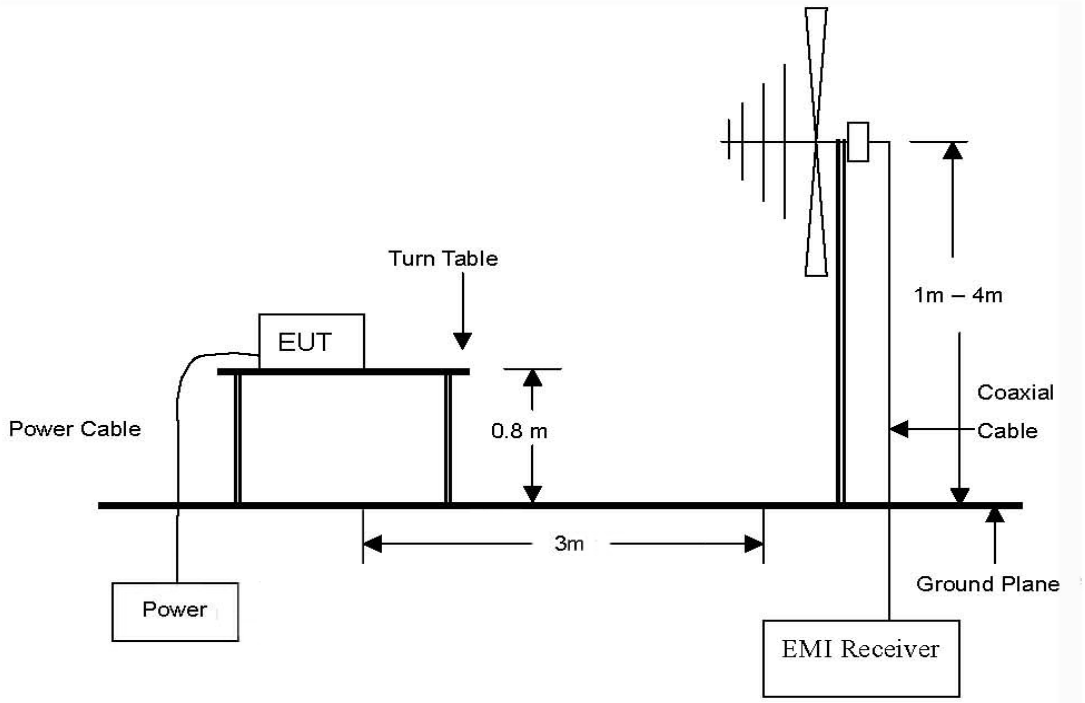
2. RF Radiated Output Power & Spurious Radiated Emission

2.1. Test setup

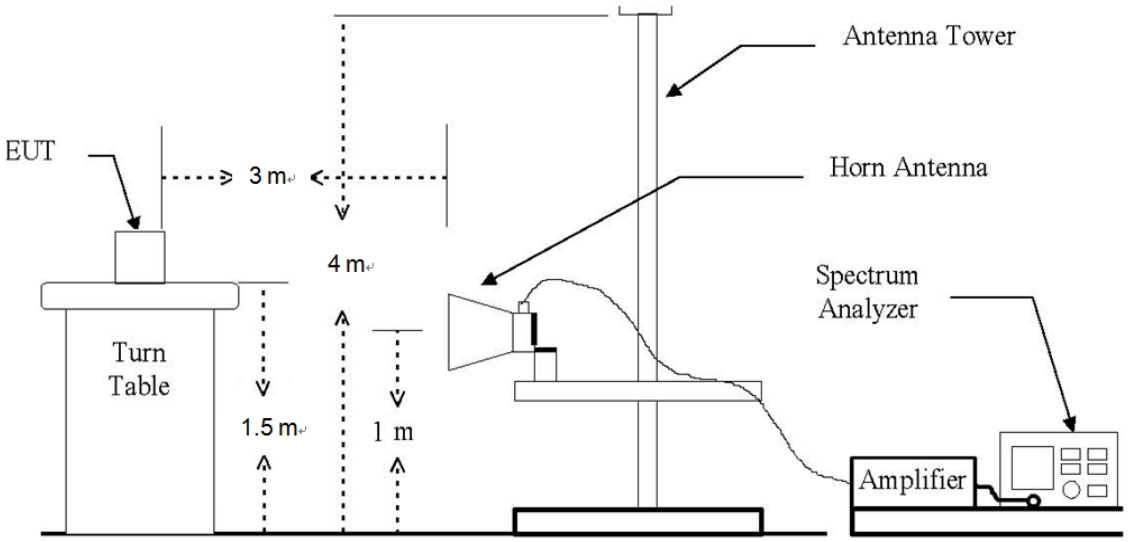
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒.



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 RF Radiated Output Power

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.

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. Moreover, base station transmitters operating in the band 1 930-1 995 ㎒ shall not have output power exceeding 100 watts.

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 + 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) ㏈.

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.

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. 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 ㎒), VBW ≥ 3 x 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 ㎑ 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.
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 Results

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

2.4.1. RF Radiated Output Power

WCDMA Ⅱ

Frequency (㎒)	Measured Level (dBμV)	Ant. Pol.	AF (dB/m)	CL (dB)	E (dBμV/m)	CF (dB)	E.I.R.P.	
							(dB m)	(W)
1 852.4	79.09	H	27.60	5.59	112.28	-95.26	17.02	0.050
1 852.4	78.86	V	27.60	5.59	112.05	-95.26	16.79	0.048
1 880.0	80.38	H	27.54	5.57	113.49	-95.26	18.23	0.067
1 880.0	78.14	V	27.54	5.57	111.25	-95.26	15.99	0.040
1 907.6	80.41	H	27.50	5.41	113.32	-95.26	18.06	0.064
1 907.6	78.50	V	27.50	5.41	111.41	-95.26	16.15	0.041

WCDMA Ⅴ

Frequency (㎒)	Measured Level (dBμV)	Ant. Pol.	AF (dB/m)	CL (dB)	E (dBμV/m)	CF (dB)	E.R.P.	
							(dB m)	(W)
826.4	92.15	H	26.96	3.59	122.70	-97.41	25.29	0.338
826.4	88.67	V	26.96	3.59	119.22	-97.41	21.81	0.152
835.0	93.00	H	27.30	3.60	123.90	-97.41	26.49	0.446
835.0	87.86	V	27.30	3.60	118.76	-97.41	21.35	0.137
846.6	92.36	H	27.36	3.69	123.41	-97.41	26.00	0.398
846.6	87.89	V	27.36	3.69	118.94	-97.41	21.53	0.142

Remark;

1. AF = Antenna Factor, CL = Cable Loss, CF = Conversion Factor.
2. E (dBμV/m) = Measured Level (dBμV) + Antenna Factor (dB/m) + 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 ANSI C63.26-2015 5.2.7 and KDB 971168 D01 v03r01 5.8.4

2.4.2. Spurious Radiated Emission

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 ㎒)									
3 702.64	68.89	H	32.11	-36.66	64.34	-95.26	-30.92	-13	17.92
3 702.36	65.37	V	32.11	-36.66	60.82	-95.26	-34.44	-13	21.44
5 553.34	57.26	H	34.00	-34.93	56.33	-95.26	-38.93	-13	25.93
5 553.30	53.68	V	34.00	-34.93	52.75	-95.26	-42.51	-13	29.51
Middle Channel (1 880.0 ㎒)									
3 757.49	69.68	H	32.29	-36.79	65.18	-95.26	-30.08	-13	17.08
3 757.68	66.75	V	32.28	-36.79	62.24	-95.26	-33.02	-13	20.02
5 636.48	52.08	H	34.00	-34.99	51.09	-95.26	-44.17	-13	31.17
5 636.55	54.68	V	34.00	-34.99	53.69	-95.26	-41.57	-13	28.57
High Channel (1 907.6 ㎒)									
3 812.68	70.43	H	32.17	-36.58	66.02	-95.26	**-29.24**	-13	16.24
3 812.64	67.16	V	32.17	-36.58	62.75	-95.26	-32.51	-13	19.51
5 702.48	50.78	H	34.00	-34.96	49.82	-95.26	-45.44	-13	32.44
5 702.35	55.82	V	34.00	-34.97	54.85	-95.26	-40.41	-13	27.41

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 ㎒)									
2 482.62	59.61	H	28.33	-39.10	48.84	-97.41	-48.57	-13	35.57
2 482.80	56.90	V	28.33	-39.10	46.13	-97.41	-51.28	-13	38.28
4 137.85	48.76	H	32.18	-36.33	44.61	-97.41	-52.80	-13	39.80
4 136.55	47.21	V	32.17	-36.31	43.07	-97.41	-54.34	-13	41.34
Middle Channel (835.0 ㎒)									
2 506.68	60.14	H	28.31	-39.01	49.44	-97.41	**-47.97**	-13	34.97
2 506.42	57.43	V	28.31	-39.01	46.73	-97.41	-50.68	-13	37.68
4 178.46	47.85	H	32.14	-36.18	43.81	-97.41	-53.60	-13	40.60
4 177.68	45.62	V	32.14	-36.18	41.58	-97.41	-55.83	-13	42.83
High Channel (846.6 ㎒)									
2 543.05	58.96	H	28.39	-38.93	48.42	-97.41	-48.99	-13	35.99
2 543.02	56.87	V	28.39	-38.93	46.33	-97.41	-51.08	-13	38.08
4 237.62	46.58	H	32.10	-36.27	42.41	-97.41	-55.00	-13	42.00
4 238.64	44.38	V	32.10	-36.27	40.21	-97.41	-57.20	-13	44.20

Remark;

1. AF = Antenna Factor, CL = Cable Loss, CF = Conversion Factor.
2. E (dB㎶/m) = Measured Level (dB㎶) + Antenna Factor (dB/m) + 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

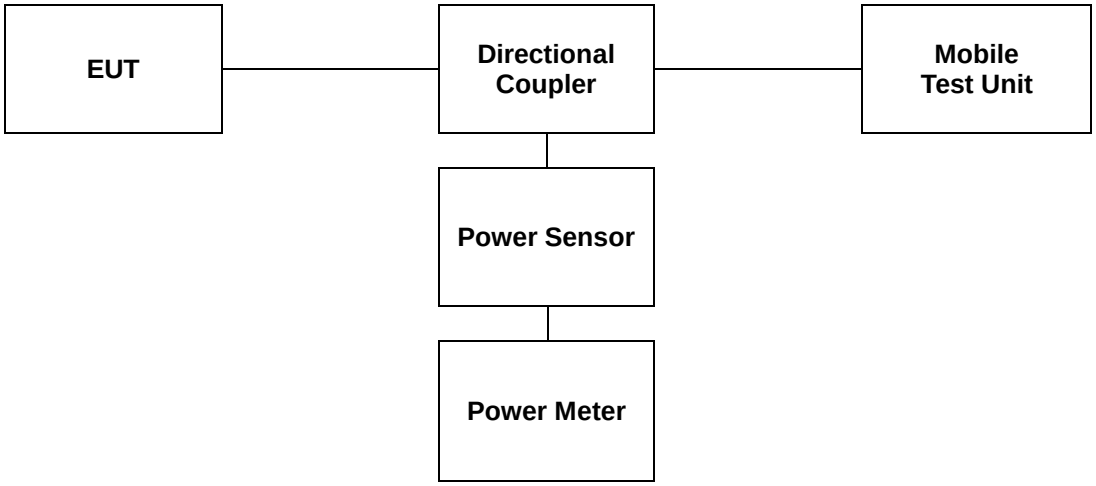
3.1. Limit

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.

Band	3GPP Release Version	Channel		9262		9400		9538	
		Frequency (㎒)		1 852.4		1 880.0		1 907.6	
				Average Power		Average Power		Average Power	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
Ⅱ	99	WCDMA	RMC	23.16	0.207	**23.35**	0.216	23.30	0.214
	5	HSDPA	Subtest 1	22.41	0.174	22.52	0.179	22.60	0.182
	5		Subtest 2	22.56	0.180	22.60	0.182	22.63	0.183
	5		Subtest 3	21.82	0.152	21.98	0.158	21.96	0.157
	5		Subtest 4	21.68	0.147	21.85	0.153	21.72	0.149
	6	HSUPA	Subtest 1	21.98	0.158	22.23	0.167	22.18	0.165
	6		Subtest 2	21.73	0.149	22.07	0.161	22.19	0.166
	6		Subtest 3	21.99	0.158	22.02	0.159	22.19	0.166
	6		Subtest 4	22.41	0.174	22.74	0.188	22.42	0.175
	6		Subtest 5	22.33	0.171	22.40	0.174	22.22	0.167

Band	3GPP Release Version	Channel		4132		4175		4233	
		Frequency (㎒)		826.4		835.0		846.6	
				Average Power		Average Power		Average Power	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
Ⅴ	99	WCDMA	RMC	**23.76**	0.238	23.63	0.231	23.37	0.217
	5	HSDPA	Subtest 1	23.61	0.230	23.50	0.224	23.34	0.216
	5		Subtest 2	23.64	0.231	23.52	0.225	23.05	0.202
	5		Subtest 3	23.20	0.209	22.95	0.197	22.74	0.188
	5		Subtest 4	23.15	0.207	23.07	0.203	22.71	0.187
	6	HSUPA	Subtest 1	23.59	0.229	23.34	0.216	23.13	0.206
	6		Subtest 2	23.55	0.226	23.36	0.217	23.11	0.205
	6		Subtest 3	23.36	0.217	23.20	0.209	22.85	0.193
	6		Subtest 4	23.74	0.237	23.63	0.231	23.24	0.211
	6		Subtest 5	23.74	0.237	23.62	0.230	23.23	0.210

4. Spurious Emissions at Antenna Terminal

4.1. 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) ㏈.

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.

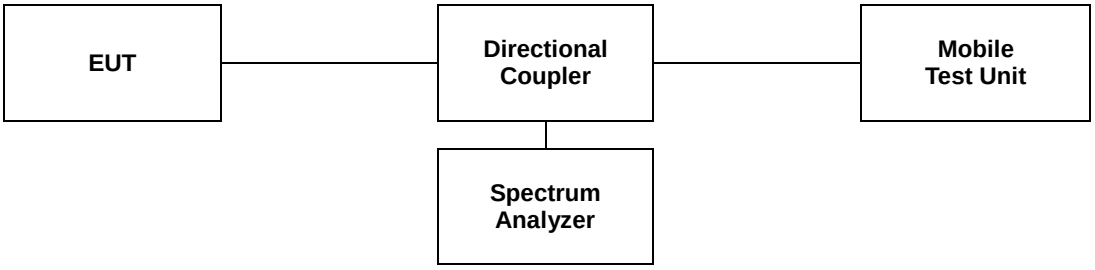
(i) In the 1.0 ㎒ bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1 % of the emission bandwidth shall be attenuated (in ㏈) below the transmitter output power P (㏈ W) by at least 43 + 10 $\log_{10}$ p(watts).

(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.

4.2. 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 = Peak.
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.



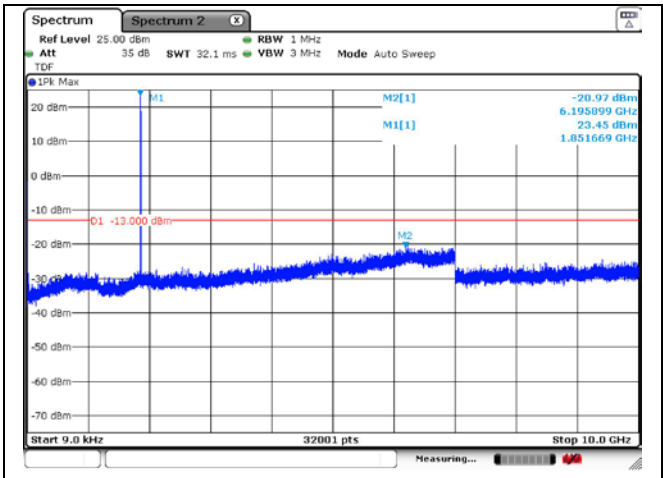
Note;

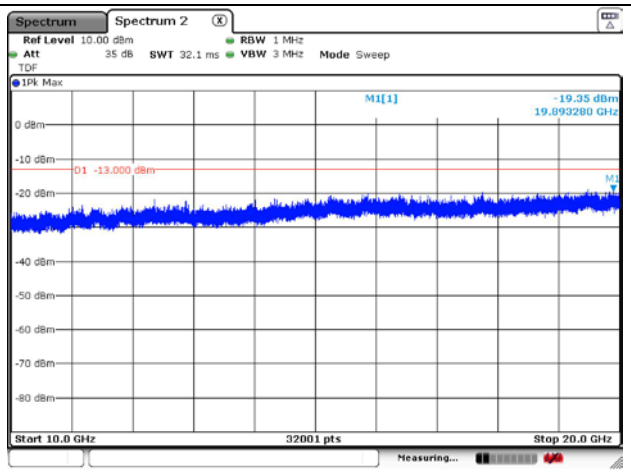
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 ㎑ or greater for frequencies less than 1 ㎓ and frequencies greater than 1 ㎓. However, in the 1 ㎒ bands immediately outside and adjacent to the frequency block a resolution 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.

4.3. Test Results

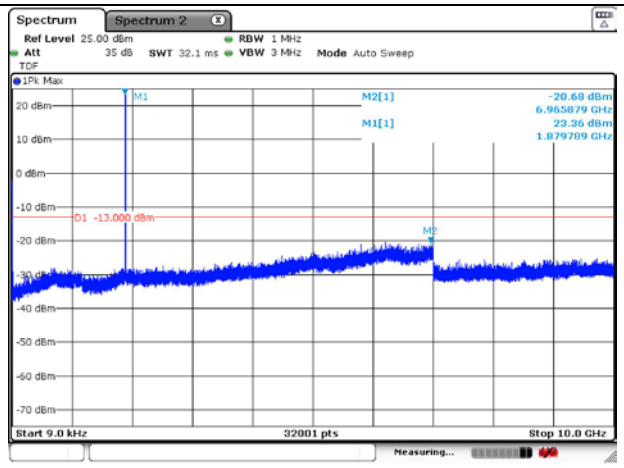
Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

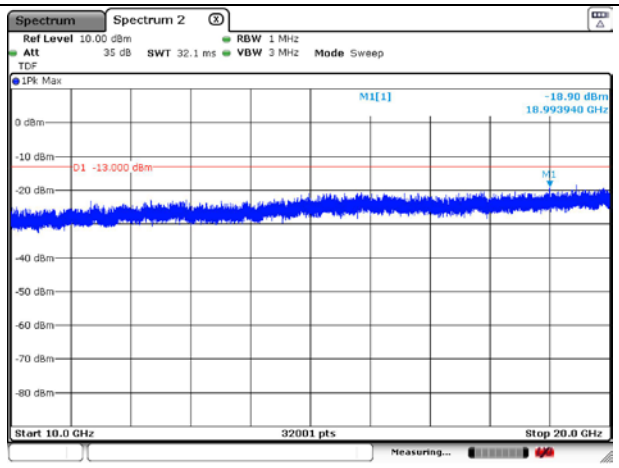
- Test plots



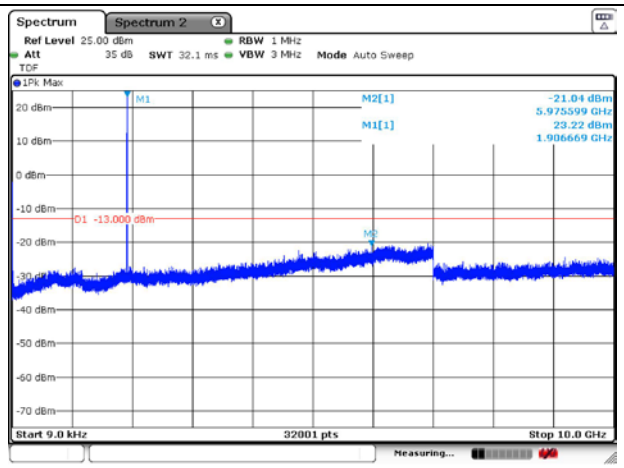


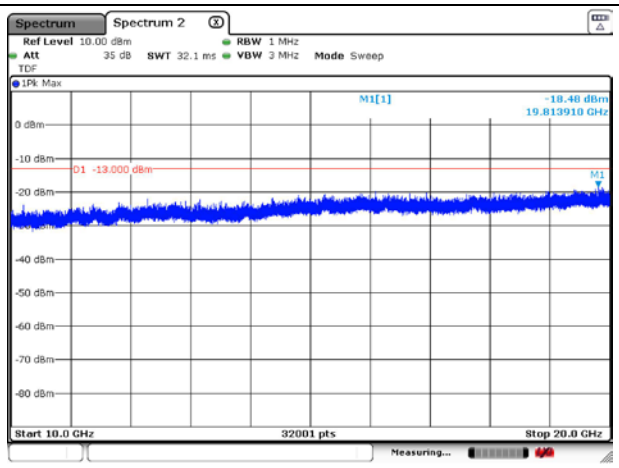
WCDMA Ⅱ Low Channel



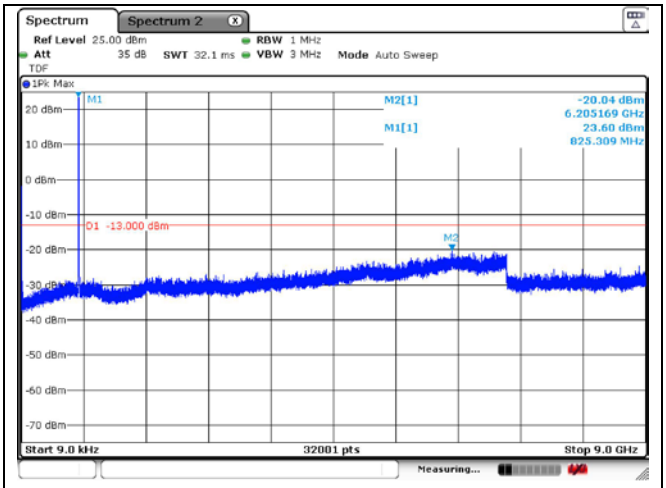


WCDMA Ⅱ Middle Channel

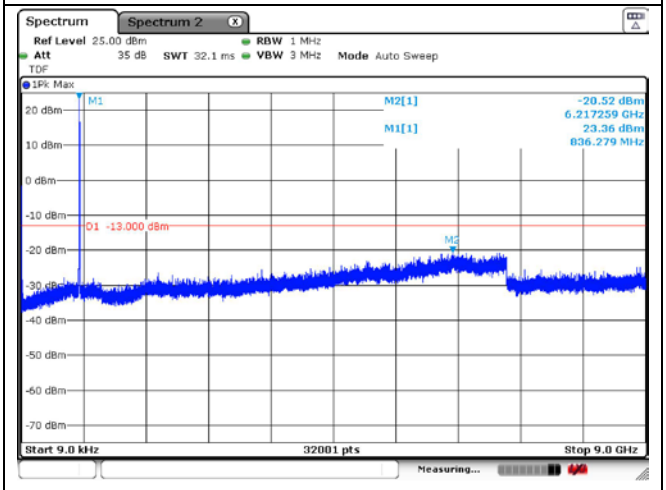




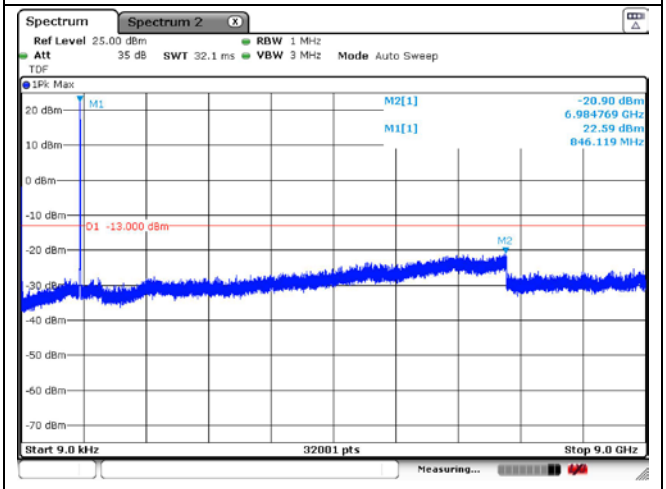
WCDMA Ⅱ High Channel



WCDMA Ⅴ Low Channel



WCDMA Ⅴ Middle Channel



WCDMA Ⅴ High Channel

5. Band Edge

5.1. 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) ㏈.

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.

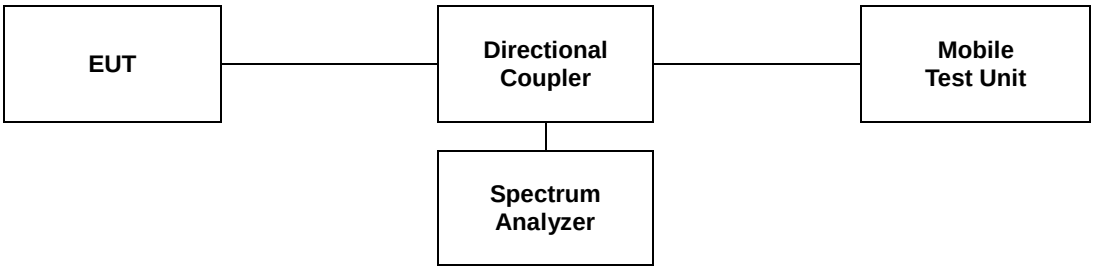
(i) In the 1.0 ㎒ bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1 % of the emission bandwidth shall be attenuated (in ㏈) below the transmitter output power P (㏈W) by at least 43 + 10 $\log_{10}$ p(watts).

(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.

5.2. Test Procedure

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

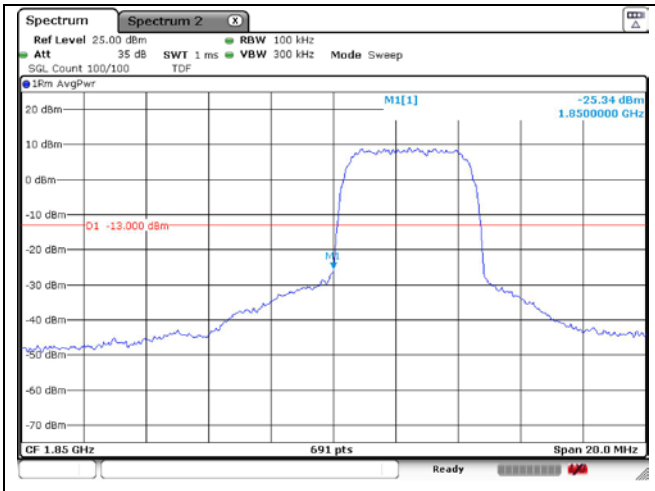
a. Span was set large enough so as to capture all out of band emissions near the band edge.
b. RBW ≥ 1 % of OBW
c. VBW ≥ 3 x RBW.
d. Detector = RMS.
e. Trace mode = Average.
f. Sweep time = Auto.
g. The trace was allowed to stabilize.
h. All path loss of frequency range was investigated and compensated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



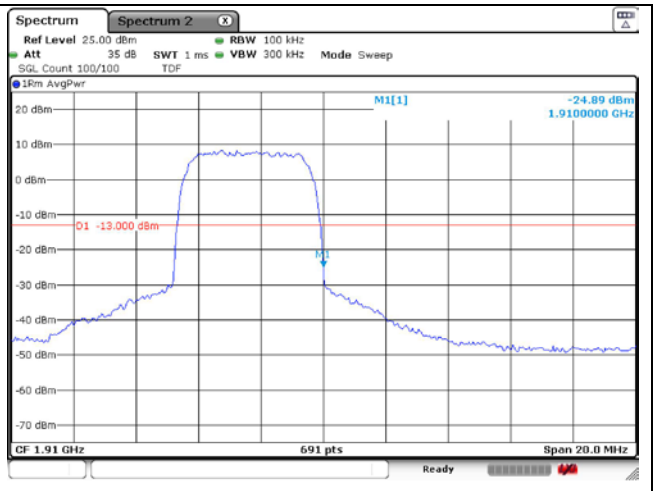
5.3. Test Results

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

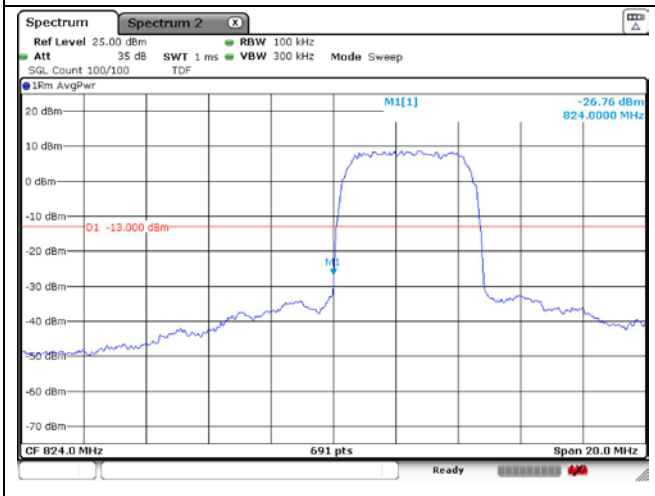
- Test plots



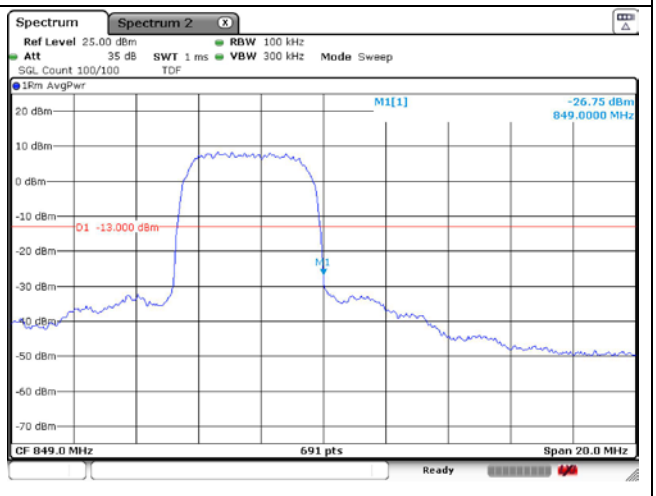
WCDMA Ⅱ Low Channel



WCDMA Ⅱ High Channel



WCDMA Ⅴ Low Channel



WCDMA Ⅴ High Channel

6. Frequency Stability

6.1. 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.

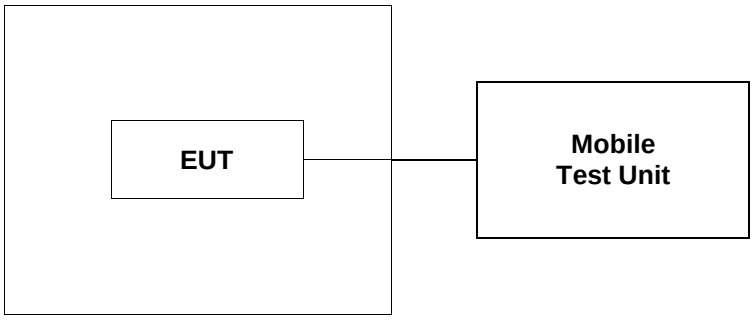
IC
- RSS-Gen Issue 5
6.11, for licensed devices, the following measurement conditions apply:
a. at the temperatures of -30°C (-22°F), +20°C (+68°F) and +50°C (+122°F), and at the manufacturer's rated supply voltage

- 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.

6.2. 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

6.3. Test Results

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

WCDMA Ⅱ at middle channel

Operating Frequency: 1 880.0 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (°C)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	3.6	11	0.005 9
40		8	0.004 3
30		6	0.003 2
20 (Ref.)		5	-
10		12	0.006 4
0		6	0.003 2
-10		8	0.004 3
-20		13	0.006 9
-30		16	0.008 5
Frequency Stability versus Power Supply			
Environment Temperature (°C)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	4.14	7	0.003 7
	3.06	3	0.001 6

WCDMA Ⅴ at middle channel

Operating Frequency: 835.0 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (°C)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	3.6	11	0.013 2
40		6	0.007 2
30		7	0.008 4
20 (Ref.)		3	-
10		5	0.006 0
0		6	0.007 2
-10		6	0.007 2
-20		9	0.010 8
-30		13	0.015 6
Frequency Stability versus Power Supply			
Environment Temperature (°C)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	4.14	3	0.003 6
	3.06	4	0.004 8

- End of the Test Report -