FCC TEST REPORT

(PART 22)

REPORT NO.:	RF140124C26
MODEL NO.:	USC5310
FCC ID:	LDK53100936
RECEIVED:	Jan. 27, 2014
TESTED:	Jan. 28, 2014
ISSUED:	Feb. 10, 2014

APPLICANT:	Cisco Systems, Inc
ADDRESS:	170 Tasman Drive, San Jose, CA95134, USA.

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
LAB ADDRESS:	No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)
TEST LOCATION:	No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Testing Laboratory 2021

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140124C26	Original release	Feb. 10, 2014

1 CERTIFICATION

PRODUCT:	Universal Small Cell 5310 3G Module
MODEL:	USC5310
BRAND:	Cisco
APPLICANT:	Cisco Systems, Inc
TESTED:	Jan. 28, 2014
TEST SAMPLE:	Production Unit
STANDARDS:	**FCC PART 22, Subpart H**

The above equipment (model: USC5310) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch,** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Vera Huang **, DATE :** Feb. 10, 2014

Vera Huang / Specialist

APPROVED BY : Sam chen **, DATE :** Feb. 10, 2014

Sam Chen / Assistant Manager

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 22 & Part 2			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**REMARK**
2.1046 22.913 (a)	Effective radiated power	PASS	Meet the requirement of limit.
2.1055 22.355	Frequency Stability	PASS	Meet the requirement of limit.
2.1049	Occupied Bandwidth	PASS	Meet the requirement of limit.
22.917	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 22.917	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 22.917	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -25.47dB at 38.37MHz.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	150kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.2 TEST SITE AND INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100744	Apr. 15, 2013	Apr. 14, 2014
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 21, 2013	Dec. 20, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Mar. 25, 2013	Mar. 24, 2014
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-209	Sep. 12, 2013	Sep. 11, 2014
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 18, 2013	Dec. 17, 2014
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
Preamplifier EMCI	EMC 184045	980116	Jan. 13, 2014	Jan. 12, 2015
Preamplifier EMCI	EMC 330H	980112	Dec. 27, 2013	Dec. 26, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 18, 2013	Oct. 17, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 18, 2013	Oct. 17, 2014
RF signal cable Worken	RG-213	NA	Nov. 07, 2013	Nov. 06, 2014
Software	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 690701.
5. The IC Site Registration No. is IC 7450F-10.

3 GENERAL INFORMATION

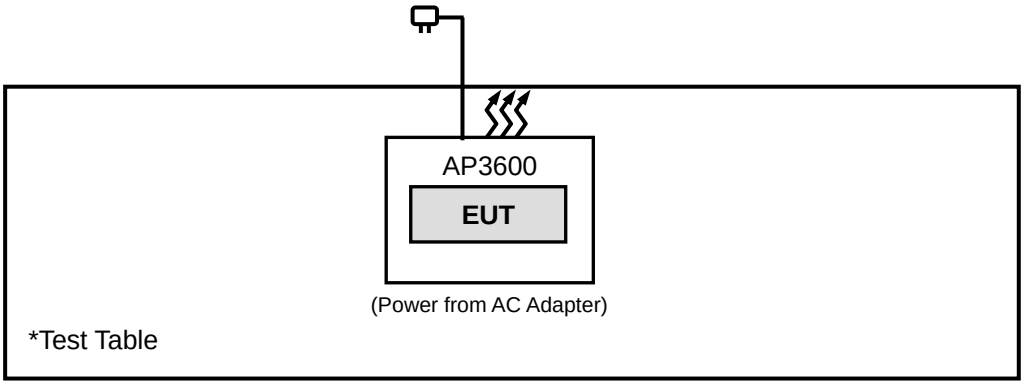
3.1 GENERAL DESCRIPTION OF EUT

EUT	Universal Small Cell 5310 3G Module
MODEL NO.	USC5310
POWER SUPPLY	48Vdc (from adapter for AP3600)
MODULATION TYPE	BPSK
FREQUENCY RANGE	871.4MHz ~ 891.6MHz
MAX. ERP POWER	66.83mW
EMISSION DESIGNATOR	4M17F9W
ANTENNA TYPE	Fixed Internal Antenna
I/O PORTS	Refer to users' manual
DATA CABLE	Refer to NOTE as below
ACCESSORY DEVICES	Refer to NOTE as below
S/N	FOC1802N511

NOTE:

1. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 CONFIGURATION OF SYSTEM UNDER TEST



3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	AC Adapter	CISCO	AA25480L	ALD0551GEGL	N/A
2	PLATFORM	CISCO	AP3600	FGL1703W2PL	LDK102075

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1m power cable
2	N/A

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Items 1-2 were provided by client.

3.4 TEST ITEM AND TEST CONFIGURATION

Following channel(s) was (were) selected for the final test as listed below:

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
ERP	4357 to 4458	4357, 4407, 4458	WCDMA
FREQUENCY STABILITY	4357 to 4458	4407	WCDMA
OCCUPIED BANDWIDTH	4357 to 4458	4357, 4407, 4458	WCDMA
BAND EDGE	4357 to 4458	4357, 4458	WCDMA
CONDCUDETED EMISSION	4357 to 4458	4407	WCDMA
RADIATED EMISSION	4357 to 4458	4407	WCDMA

TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP	25deg. C, 65%RH	120Vac, 60Hz	Anson Lin
FREQUENCY STABILITY	25deg. C, 65%RH	120Vac, 60Hz	Howard Kao
OCCUPIED BANDWIDTH	25deg. C, 65%RH	120Vac, 60Hz	Howard Kao
BAND EDGE	25deg. C, 65%RH	120Vac, 60Hz	Howard Kao
CONDCUDETED EMISSION	25deg. C, 65%RH	120Vac, 60Hz	Howard Kao
RADIATED EMISSION	25deg. C, 65%RH	120Vac, 60Hz	Anson Lin

3.5 EUT OPERATING CONDITIONS

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.6 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 22

ANSI/TIA/EIA-603-C 2004

NOTE: All test items have been performed and recorded as per the above standards.

4 TEST TYPES AND RESULTS

4.1 OUTPUT POWER MEASUREMENT

4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

Mobile / Portable station are limited to 7 watts e.r.p.

4.1.2 TEST PROCEDURES

EIRP / ERP MEASUREMENT:

a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 5MHz for WCDMA mode.

b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step b. Record the power level of S.G

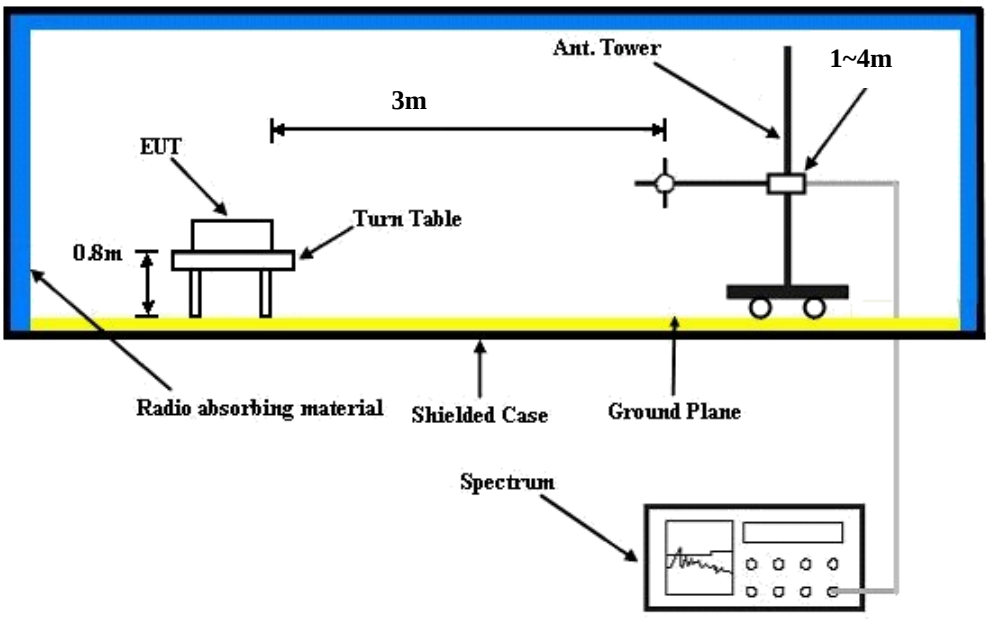
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power - 2.15dBi.

CONDUCTED POWER MEASUREMENT:

The EUT was set up for the maximum power with WCDMA link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

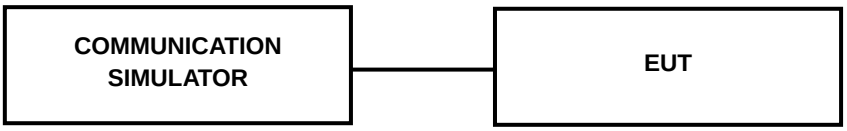
4.1.3 TEST SETUP

EIRP / ERP MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

CONDUCTED POWER MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.4 TEST RESULTS

CONDUCTED OUTPUT POWER (dBm)

Band	WCDMA V		
Channel	4357	4407	4458
Frequency (MHz)	871.4	881.4	891.6
RMC 12.2K	**20.80**	20.06	20.09

ERP POWER (dBm)

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
4357	871.4	-14.01	32.62	16.46	44.26	H
4407	881.4	-12.86	32.52	17.51	56.36	H
4458	891.6	-12.25	32.65	18.25	66.83	H
4357	871.4	-18.68	32.76	11.93	15.60	V
4407	881.4	-18.02	32.39	12.22	16.67	V
4458	891.6	-17.81	32.54	12.58	18.11	V

4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

4.2.2 TEST PROCEDURE

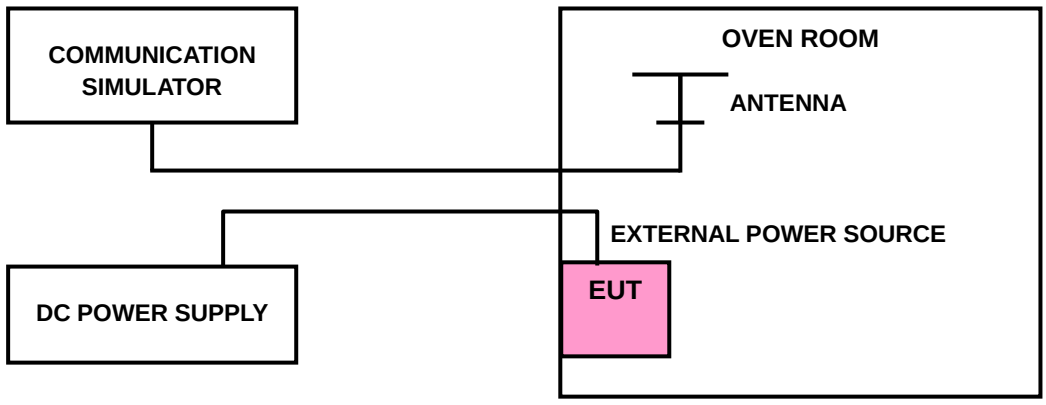
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.2.3 TEST SETUP



4.2.4 TEST RESULTS

FREQUENCY ERROR vs. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)	LIMIT (ppm)
	WCDMA	
3.3	-0.012	1.5
2.805	-0.013	1.5
3.795	-0.011	1.5

FREQUENCY ERROR vs. TEMPERATURE

TEMP. (℃)	FREQUENCY ERROR (ppm)	LIMIT (ppm)
	WCDMA	
0	-0.012	1.5
10	-0.014	1.5
20	-0.010	1.5
30	-0.011	1.5
40	-0.010	1.5

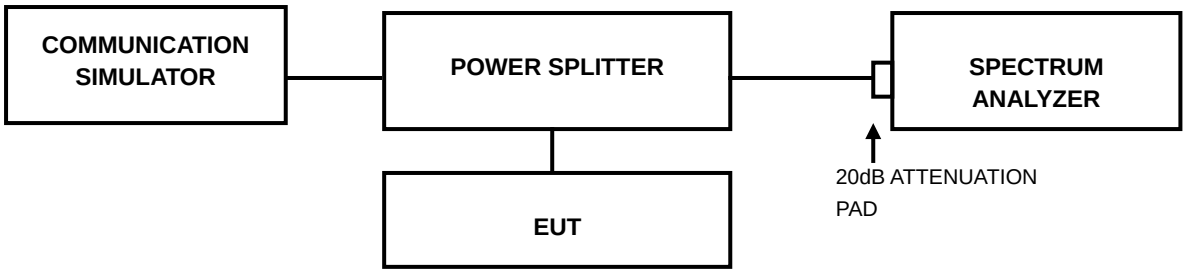
Note:
1. The applicant declared that the normal operating temperature of the EUT is from 0˚C to 40˚C.
2. The EUT would shut down automatically at -10 ~ -30˚C and 50˚C.

4.3 OCCUPIED BANDWIDTH MEASUREMENT

4.3.1 TEST PROCEDURES

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

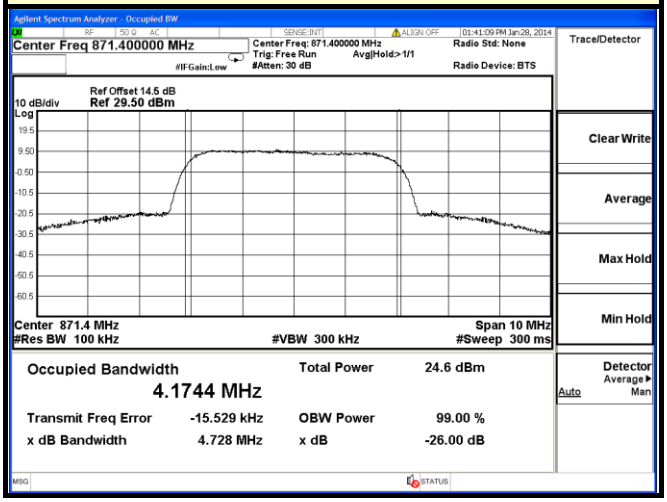
4.3.2 TEST SETUP



4.3.3 TEST RESULTS

CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)
		WCDMA
4357	871.4	4.1744
4407	881.4	4.1531
4458	891.6	4.1733

SPECTRUM PLOT OF WORST VALUE
WCDMA

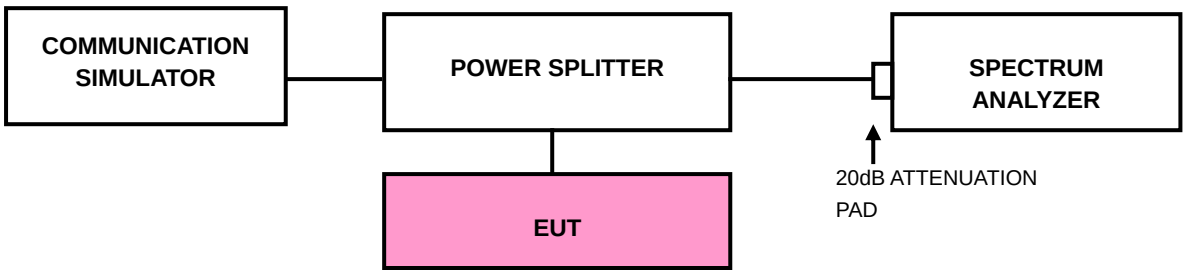


4.4 BAND EDGE MEASUREMENT

4.4.1 LIMITS OF BAND EDGE MEASUREMENT

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz 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.

4.4.2 TEST SETUP



4.4.3 TEST PROCEDURES

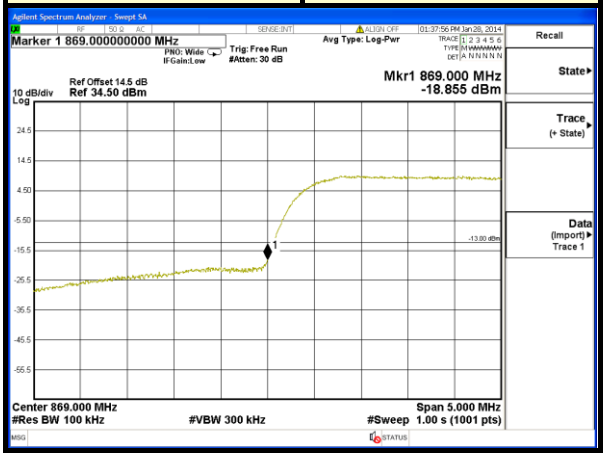
a. All measurements were done at low and high operational frequency range.

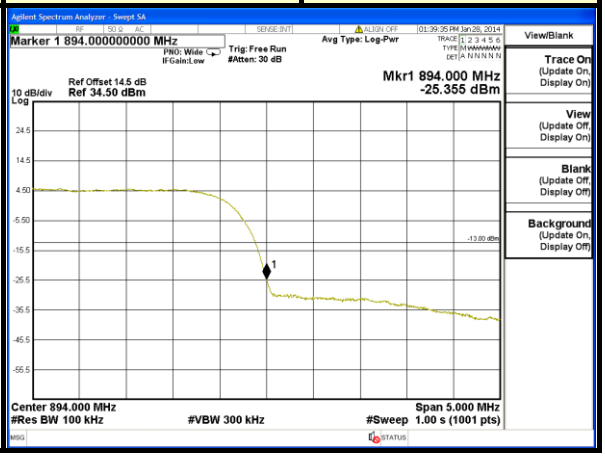
b. The center frequency of spectrum is the band edge frequency and span is 5MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (WCDMA/LTE).

c. Record the max trace plot into the test report.

4.4.4 TEST RESULTS

WCDMA			
CHANNEL	4357	CHANNEL	4458





4.5 CONDUCTED SPURIOUS EMISSIONS

4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

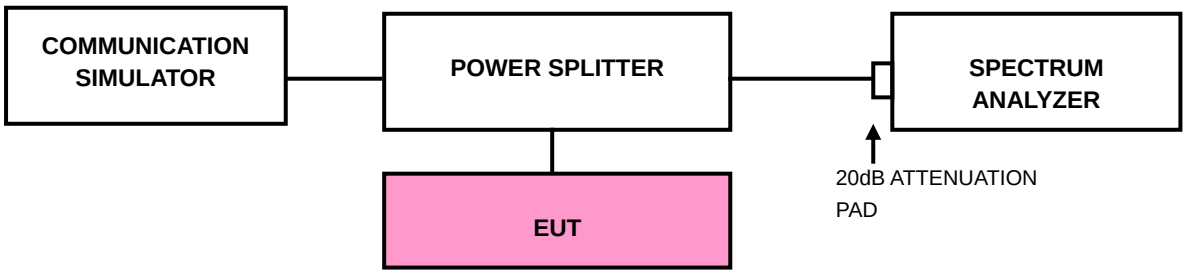
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to –13dBm.

4.5.2 TEST PROCEDURE

a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.

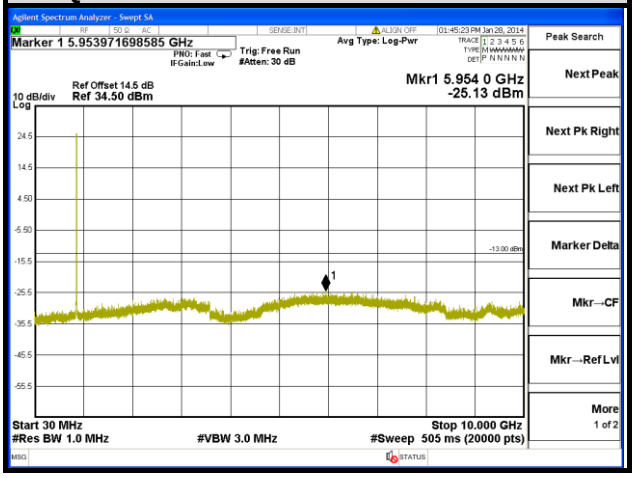
b. Measuring frequency range is from 30 MHz to 9GHz. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

4.5.3 TEST SETUP



4.5.4 TEST RESULTS

WCDMA
CHANNEL 4407
FREQUENCY RANGE : 30MHz~9GHz



4.6 RADIATED EMISSION MEASUREMENT

4.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to –13dBm.

4.6.2 TEST PROCEDURES

a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step a. Record the power level of S.G

c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.

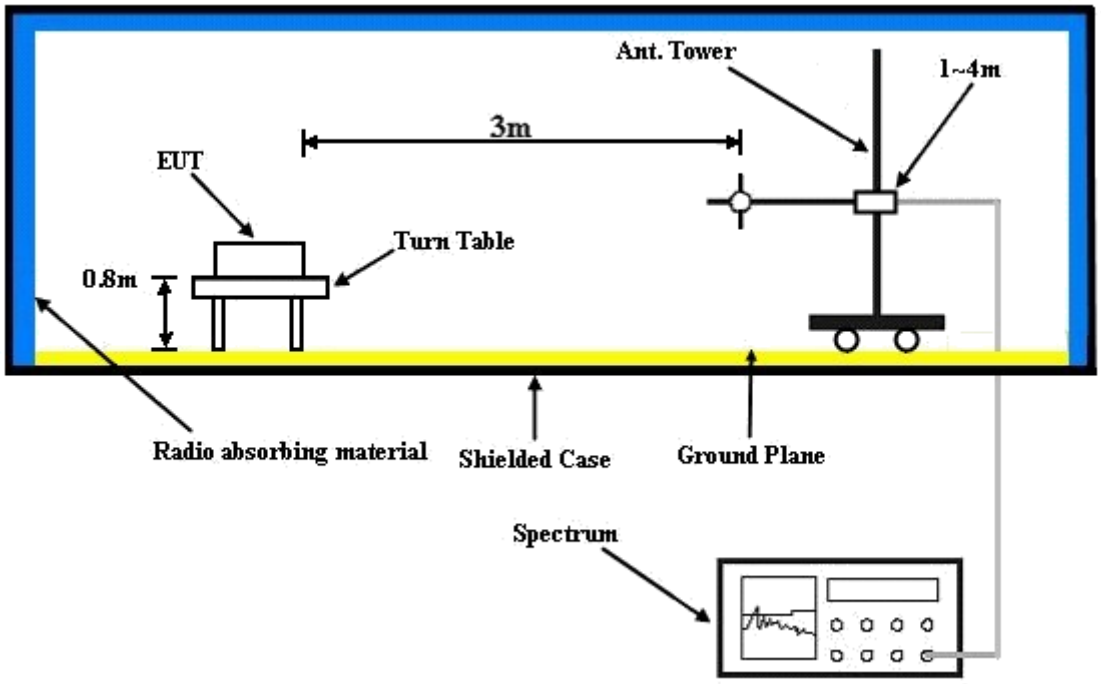
d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power - 2.15dBi.

NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.6.3 DEVIATION FROM TEST STANDARD

No deviation

4.6.4 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.6.5 TEST RESULTS

Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA. Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
38.37	-45.68	-13	-32.68	-42.67	-32.47	0.52	-10.54	H	Pass
152.04	-54.06	-13	-41.06	-44.13	-51.57	1.00	0.66	H	Pass
260.04	-53.82	-13	-40.82	-41.63	-56.88	1.31	6.52	H	Pass
339.2	-58.59	-13	-45.59	-50.49	-61.56	1.45	6.57	H	Pass
483.4	-65.03	-13	-52.03	-61.41	-67.56	1.80	6.48	H	Pass
682.9	-62.64	-13	-49.64	-62.55	-64.69	2.10	6.30	H	Pass
2644.2	-52.50	-13	-39.5	-40.97	-56.15	3.99	9.79	H	Pass
4407	-49.44	-13	-36.44	-41.73	-52.35	5.18	10.24	H	Pass
38.37	-38.47	-13	-25.47	-35.26	-25.26	0.52	-10.54	V	Pass
157.44	-54.29	-13	-41.29	-44.40	-52.56	1.00	1.42	V	Pass
232.77	-52.95	-13	-39.95	-44.7	-56.57	1.25	7.02	V	Pass
374.9	-61.63	-13	-48.63	-59.75	-64.59	1.60	6.71	V	Pass
521.2	-70.89	-13	-57.89	-64.63	-73.29	1.90	6.45	V	Pass
729.1	-67.51	-13	-54.51	-63.33	-69.1	2.30	6.04	V	Pass
2644.2	-54.00	-13	-41	-42.59	-57.65	3.99	9.79	V	Pass
4407	-42.55	-13	-29.55	-34.84	-45.46	5.18	10.24	V	Pass

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

6 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:
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Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

7 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications were made to the EUT by the lab during the test.

---END---