

FCC RF Test Report

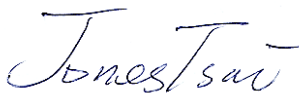
APPLICANT : Bullitt Group
EQUIPMENT : Smart Phone
BRAND NAME : CAT
MODEL NAME : B15
FCC ID : ZL5B15AWS
STANDARD : 47 CFR Part 2, 27(L)
CLASSIFICATION : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on May 14, 2013 and completely tested on Jun 14, 2013. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI / TIA / EIA-603-C-2004 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.



Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG2D2653-01B	Rev. 01	Initial issue of report	Jul. 18, 2013
FG2D2653-01B	Rev. 02	Update report for revising standard from KDB 971168 D01 Power Meas. License Digital Systems v02 to v02r01.	Jul. 19, 2013



SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	§2.1046	RSS-139 (6.4)	Conducted Output Power	N/A	PASS	-
3.2	§27.50(d)(5)	RSS-139 (6.4)	Peak-to-Average Ratio	< 13 dB	PASS	-
3.3	§27.50(d)(4)	RSS-139 (6.4) SRSP-513(5.1.2)	Equivalent Isotropic Radiated Power	< 1 Watts	PASS	-
3.4	§2.1049 §27.53(g)	RSS-GEN(4.6.1) RSS-139 (6.5)	Occupied Bandwidth	N/A	PASS	-
3.5	§2.1051 §27.53(g)	RSS-139 (6.5)	Band Edge Measurement	< 43+10log10(P[Watts])	PASS	-
3.6	§2.1051 §27.53(g)	RSS-139 (6.5)	Conducted Spurious Emission	< 43+10log10(P[Watts])	PASS	-
3.7	§2.1053 §27.53(g)	RSS-139 (6.5)	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 19.33 dB at 6936.000 MHz
3.8	§2.1055 §27.53(g)	RSS-139 (6.3)	Frequency Stability for Temperature & Voltage	< 2.5 ppm	PASS	-

1 General Description

1.1 Applicant

Bullitt Group

No. 4, The Aquarium, King Street, Reading, RG1 2AN United Kingdom

1.2 Manufacturer

Compal Communications (Nanjing) Co., Ltd.

No. 68-2, Suyuan Road, Nanjing Export, Processing Zone (South Area), P.R. China

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Smart Phone
Brand Name	CAT
Model Name	B15
FCC ID	ZL5B15AWS
EUT supports Radios application	GSM/EGPRS/WCDMA/HSDPA WLAN 11bgn / Bluetooth 2.1/3.0
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx Frequency	1712.4 MHz ~ 1752.6 MHz
Rx Frequency	2112.4 MHz ~ 2152.6 MHz
Maximum Output Power to Antenna	23.89 dBm
Antenna Type	PIFA Antenna
Type of Modulation	WCDMA : QPSK (Uplink) HSDPA : QPSK (Uplink)

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Maximum EIRP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	Maximum EIRP (W)	Frequency Tolerance (% , Hz, ppm)	Emission Designator
Part 27	WCDMA Band IV RMC 12.2Kpbs	QPSK	0.3811	0.01 ppm	4M18F9W

1.7 Testing Site

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	TH02-HY	03CH07-HY	722060/4086B-1

1.8 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2, 27(L)
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

Frequency range investigated for radiated emission: 30MHz to 18000 MHz.

Test Modes		
Band	Radiated TCs	Conducted TCs
WCDMA Band IV	■ RMC 12.2Kpbs Link	■ RMC 12.2Kpbs Link

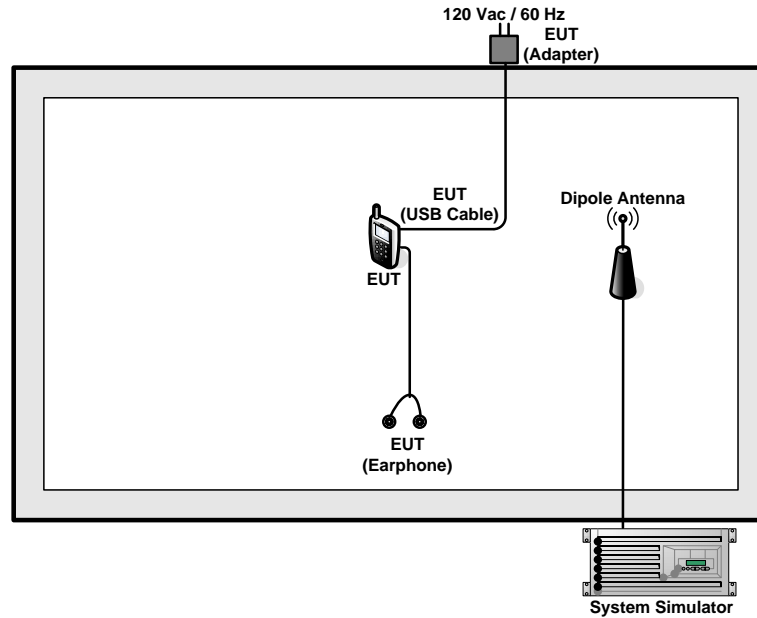
Note:

1. The maximum power levels is RMC 12.2Kpbs mode for WCDMA band IV, only these modes were used for all tests.
2. Because there are individual antennas for each WWAN, WLAN, and Bluetooth, the co-location test modes are not required.
3. All the tests were performed with Earphone 1, USB Cable, Adapter, and Battery.

The conducted power tables are as follows:

Conducted Power (*Unit: dBm)			
Band	WCDMA Band IV		
Tx Channel	1312	1413	1513
Rx Channel	1537	1638	1738
Frequency	1712.4	1732.6	1752.6
RMC 12.2K	23.81	23.89	23.72
HSDPA Subtest-1	23.72	23.86	23.60
HSDPA Subtest-2	22.64	22.79	22.57
HSDPA Subtest-3	22.13	22.35	22.13
HSDPA Subtest-4	22.13	22.34	22.18

2.2 Connection Diagram of Test System



2.3 Ancillary Equipment List

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU200	N/A	N/A	Unshielded, 1.8 m



2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Example :

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 4.2 + 10 = 14.2 \text{ (dB)} \end{aligned}$$

3 Test Result

3.1 Conducted Output Power Measurement

3.1.1 Description of the Conducted Output Power Measurement

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

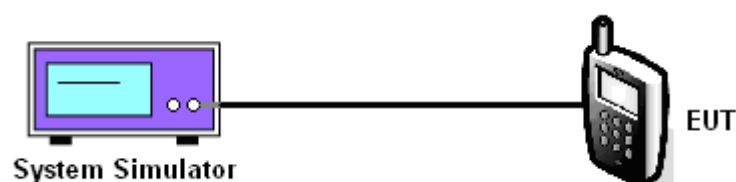
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure the maximum average power for WCDMA.

3.1.4 Test Setup





3.1.5 Test Result of Conducted Output Power

AWS Band			
Modes	WCDMA Band IV (RMC 12.2Kpbs)		
Channel	1312(Low)	1413 (Mid)	1513 (High)
Frequency (MHz)	1712.4	1732.6	1752.6
Conducted Power (dBm)	23.81	23.89	23.72
Conducted Power (Watts)	0.24	0.24	0.24

Note: maximum average power for WCDMA.

3.2 Peak-to-Average Ratio

3.2.1 Description of the PAR Measurement

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

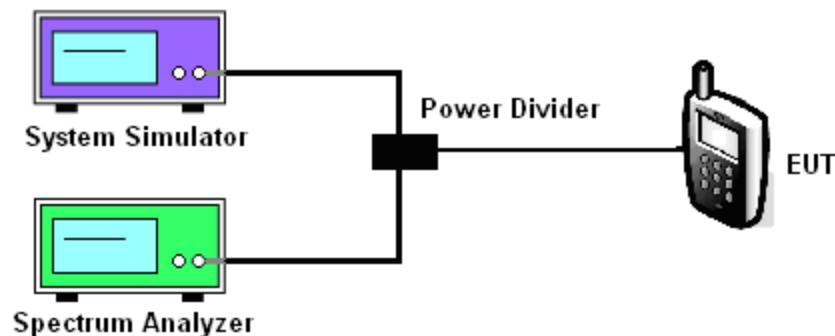
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and System Simulator via power divider.
2. UMTS operating modes:
 - a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
 - b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
3. Record the deviation as Peak to Average Ratio.

3.2.4 Test Setup



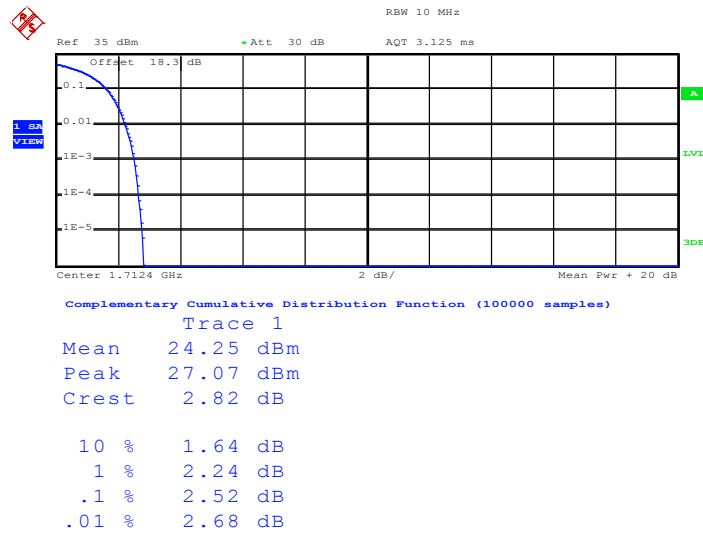
3.2.5 Test Result of Peak-to-Average Ratio

AWS Band			
Modes	WCDMA Band IV (RMC 12.2Kpbs)		
Channel	1312(Low)	1413 (Mid)	1513 (High)
Frequency (MHz)	1712.4	1732.6	1752.6
Peak-to-Average Ratio (dB)	2.52	2.44	3.04

3.2.6 Test Result (Plots) of Peak-to-Average Ratio

Band :	WCDMA Band IV	Test Mode :	RMC 12.2Kpbs Link (QPSK)
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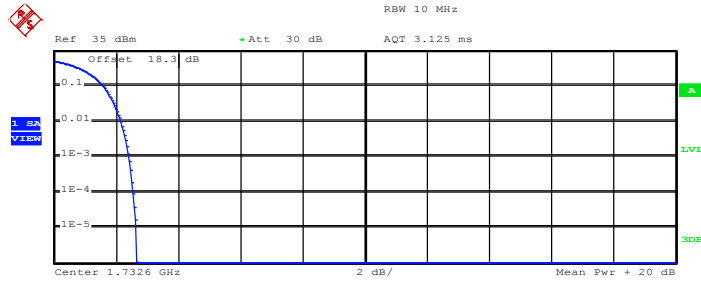
Peak-to-Average Ratio on Channel 1312 (1712.4 MHz)



Date: 14.JUN.2013 15:32:06



Peak-to-Average Ratio on Channel 1413 (1732.6 MHz)



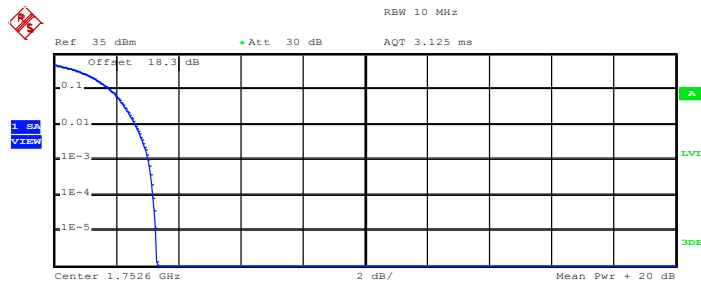
Complementary Cumulative Distribution Function (100000 samples)

Trace 1
 Mean 24.05 dBm
 Peak 26.72 dBm
 Crest 2.66 dB

10 % 1.60 dB
 1 % 2.16 dB
 .1 % 2.44 dB
 .01 % 2.56 dB

Date: 14.JUN.2013 15:33:02

Peak-to-Average Ratio on Channel 1513 (1752.6 MHz)



Complementary Cumulative Distribution Function (100000 samples)

Trace 1
 Mean 24.17 dBm
 Peak 27.49 dBm
 Crest 3.32 dB

10 % 1.80 dB
 1 % 2.64 dB
 .1 % 3.04 dB
 .01 % 3.20 dB

Date: 14.JUN.2013 15:34:12



3.3 Effective Isotropic Radiated Power Measurement

3.3.1 Description of the EIRP Measurement

The substitution method, in ANSI / TIA / EIA-603-C-2004, was used for EIRP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r01. The EIRP of mobile transmitters are limited to 1 Watts.

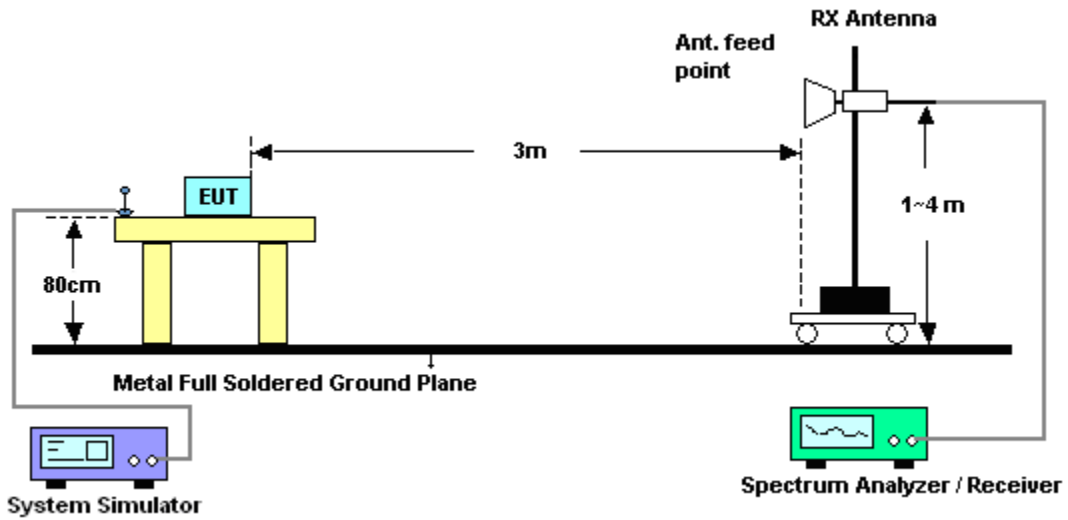
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The EUT was placed on a non-conductive rotating platform with 0.8 meter height in a semi-anechoic chamber. The radiated emission at the fundamental frequencies were measured at 3 m with a test antenna and a spectrum analyzer with the RBW= 300kHz, VBW= 1MHz for WCDMA, and RMS detector with channel power measurement option =5MHz settings per section 4.0 of KDB 971168 D01.
2. During the measurement, the EUT was enforced in maximum power and linked with a base station. The highest emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
3. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by dipole antenna (substitution antenna) at same location, and then a known power from S.G. was applied into the dipole antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor, $EIRP = LVL + \text{Correction factor}$.

3.3.4 Test Setup



3.3.5 Test Result of EIRP

WCDMA Band IV (RMC 12.2Kpbs) Radiated Power EIRP				
Horizontal Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1712.4	-19.55	41.74	22.19	0.1656
1732.6	-19.08	42.41	23.33	0.2153
1752.6	-19.71	41.82	22.11	0.1626
Vertical Polarization				
Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (W)
1712.4	-21.90	43.38	21.48	0.1406
1732.6	-19.62	45.43	25.81	0.3811
1752.6	-21.52	44.43	22.91	0.1954

* EIRP = LVL (dBm) + Correction Factor (dB)

3.4 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.4.1 Description of 99% Occupied Bandwidth and 26dB Bandwidth Measurement

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

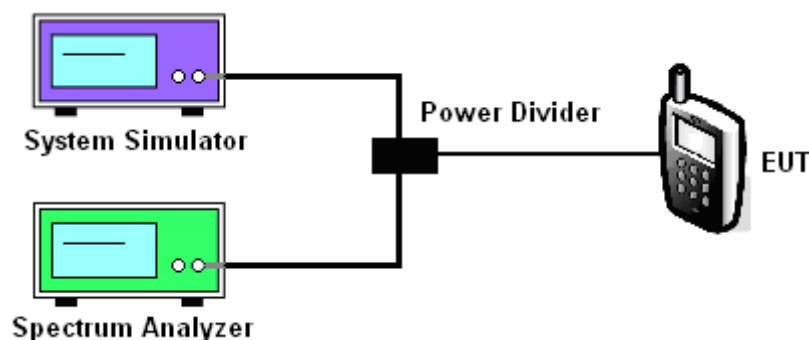
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3*RBW, sample detector, trace maximum hold.
4. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3*RBW, peak detector, trace maximum hold.

3.4.4 Test Setup





3.4.5 Test Result of Occupied Bandwidth and 26dB Bandwidth

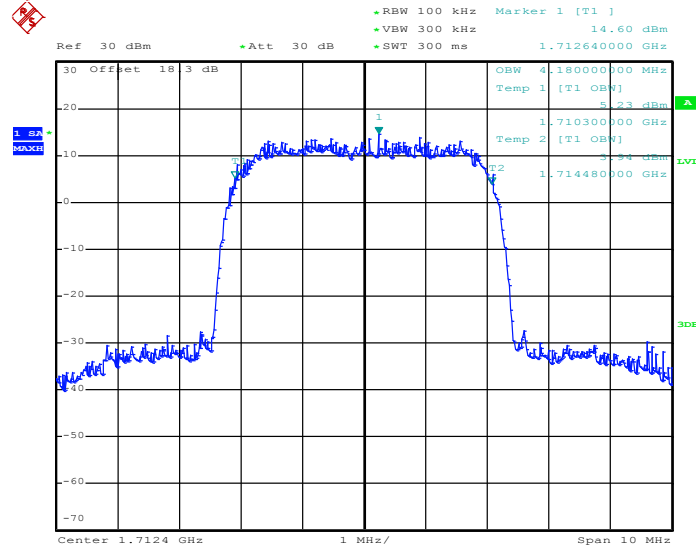
AWS Band			
Modes	WCDMA Band IV (RMC 12.2Kpbs)		
Channel	1312(Low)	1413 (Mid)	1513 (High)
Frequency (MHz)	1712.4	1732.6	1752.6
99% OBW (MHz)	4.18	4.16	4.16
26dB BW (MHz)	4.68	4.68	4.68



3.4.6 Test Result (Plots) of Occupied Bandwidth and 26dB Bandwidth

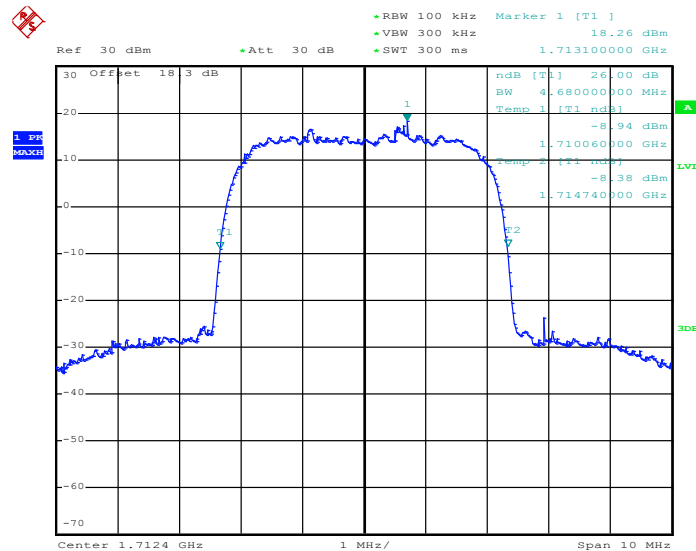
Band :	WCDMA Band IV	Test Mode :	RMC 12.2Kpbs Link (QPSK)
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99% Occupied Bandwidth Plot on Channel 1312 (1712.4 MHz)



Date: 14.JUN.2013 15:25:08

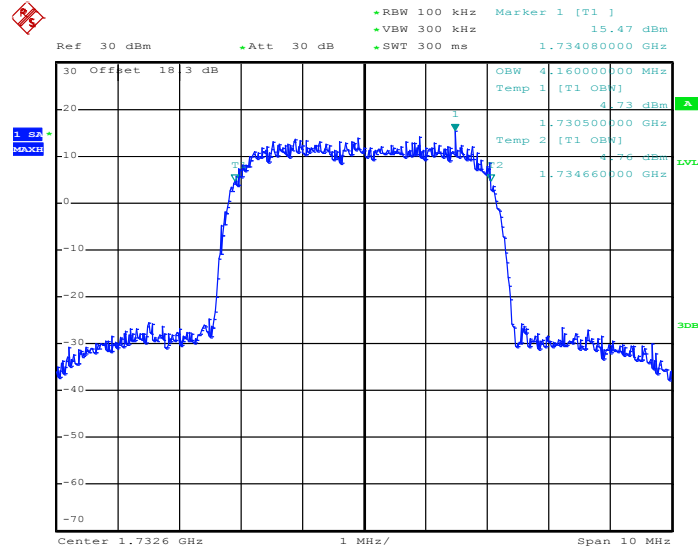
26dB Bandwidth Plot on Channel 1312 (1712.4 MHz)



Date: 14.JUN.2013 15:10:30

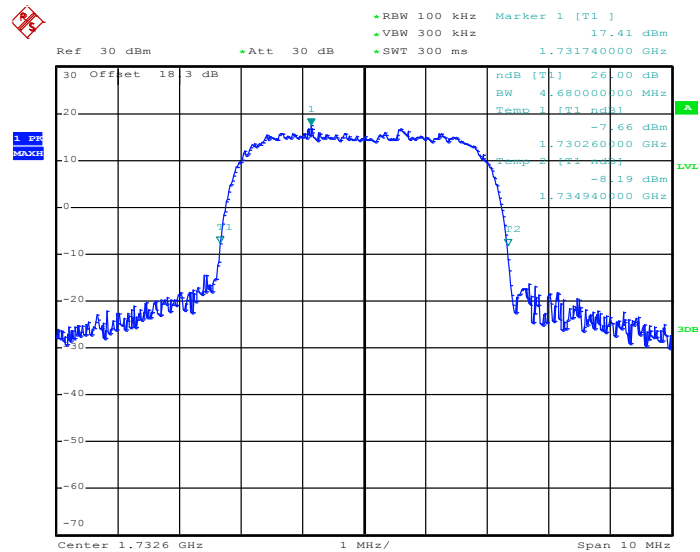


99% Occupied Bandwidth Plot on Channel 1413 (1732.6 MHz)



Date: 14.JUN.2013 15:25:34

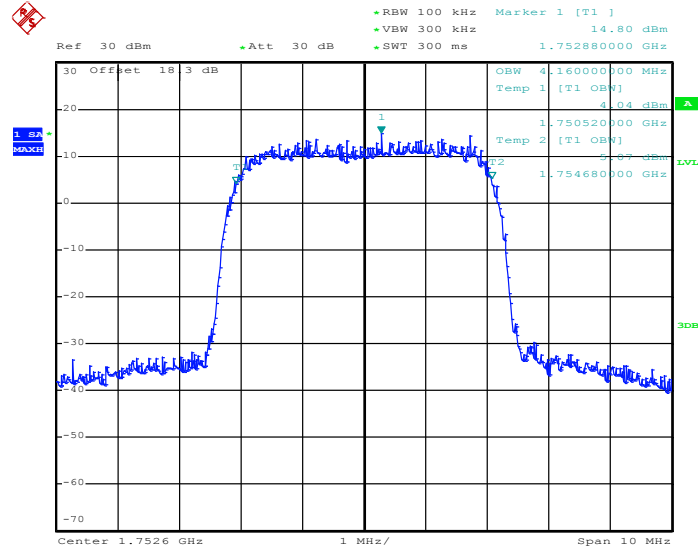
26dB Bandwidth Plot on Channel 1413 (1732.6 MHz)



Date: 14.JUN.2013 15:10:56

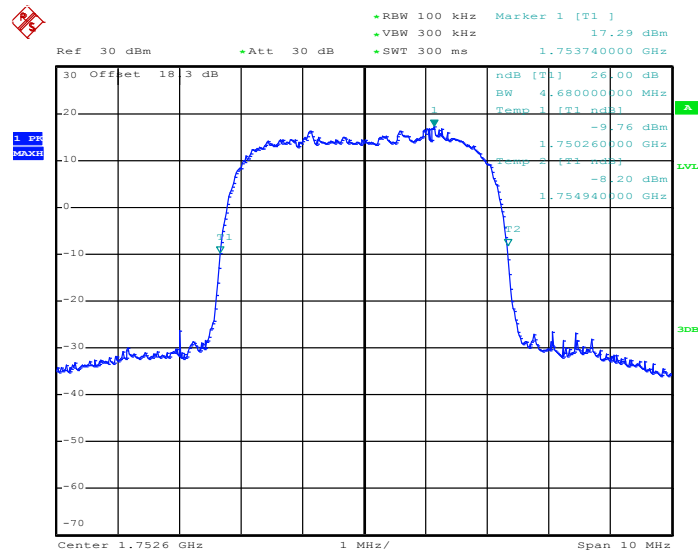


99% Occupied Bandwidth Plot on Channel 1513 (1752.6 MHz)



Date: 14.JUN.2013 15:12:41

26dB Bandwidth Plot on Channel 1513 (1752.6 MHz)



Date: 14.JUN.2013 15:24:20

3.5 Band Edge Measurement

3.5.1 Description of Band Edge Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.

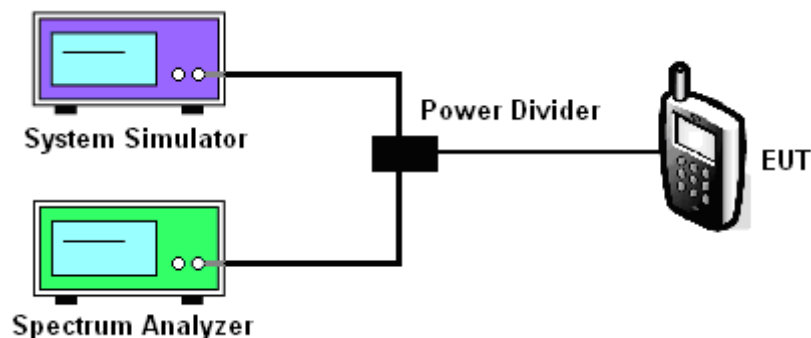
3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The band edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly $BW/100$.
4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
5. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)]$ (dB)
 $= [30 + 10\log(P)]$ (dBm) - $[43 + 10\log(P)]$ (dB)
 $= -13$ dBm.

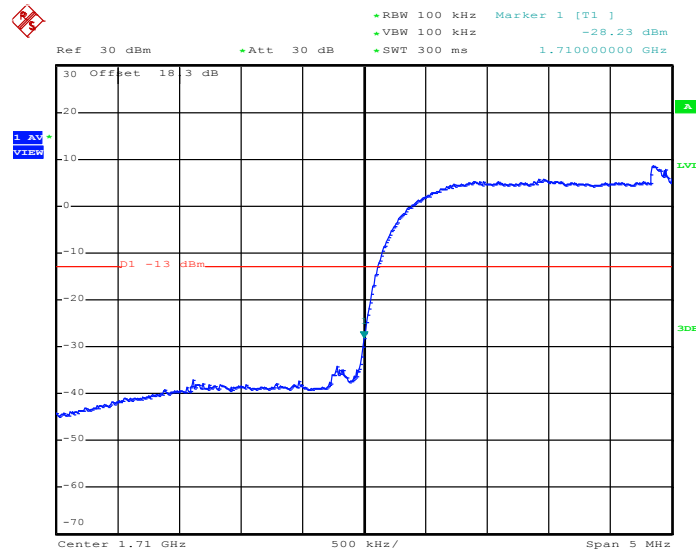
3.5.4 Test Setup



3.5.5 Test Result (Plots) of Conducted Band Edge

Band :	WCDMA Band IV	Test Mode :	RMC 12.2Kpbs Link (QPSK)
Correction Factor :	-3.30dB	Maximum 26dB Bandwidth :	4.680MHz
Band Edge :	-31.53dBm	Measurement Value :	-28.23dBm

Lower Band Edge Plot on Channel 1312 (1712.4 MHz)



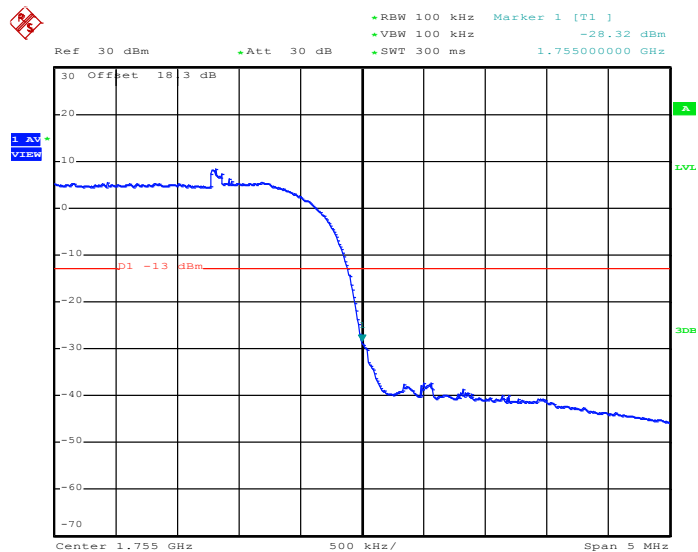
Date: 14.JUN.2013 15:13:08

1. Correction Factor(dB)= $10\log(1\% \text{ Emission BW/RBW})$
2. Band Edge= Measurement Value + Correction Factor(dB)



Band :	WCDMA Band IV	Test Mode :	RMC 12.2Kpbs Link (QPSK)
Correction Factor :	-3.30dB	Maximum 26dB Bandwidth :	4.680MHz
Band Edge :	-31.62dBm	Measurement Value :	-28.32dBm

Higher Band Edge Plot on Channel 1513 (1752.6 MHz)



Date: 14.JUN.2013 15:13:34

1. Correction Factor(dB)= $10\log(1\% \text{ Emission BW/RBW})$
2. Band Edge= Measurement Value + Correction Factor(dB)

3.6 Conducted Spurious Emission Measurement

3.6.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

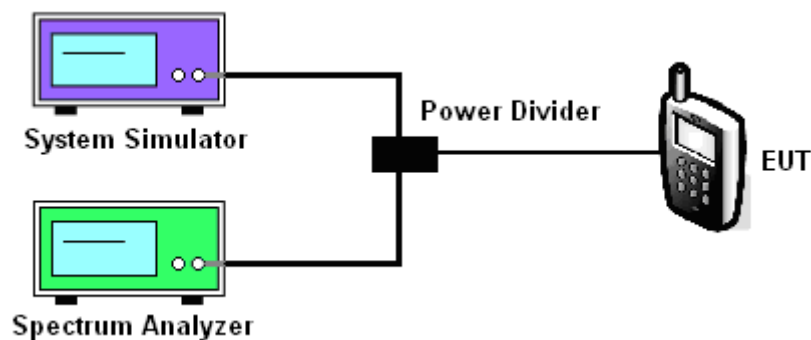
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

1. The EUT was connected to spectrum analyzer and base station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
= $P(W) - [43 + 10\log(P)]$ (dB)
= $[30 + 10\log(P)]$ (dBm) - $[43 + 10\log(P)]$ (dB)
= -13dBm.

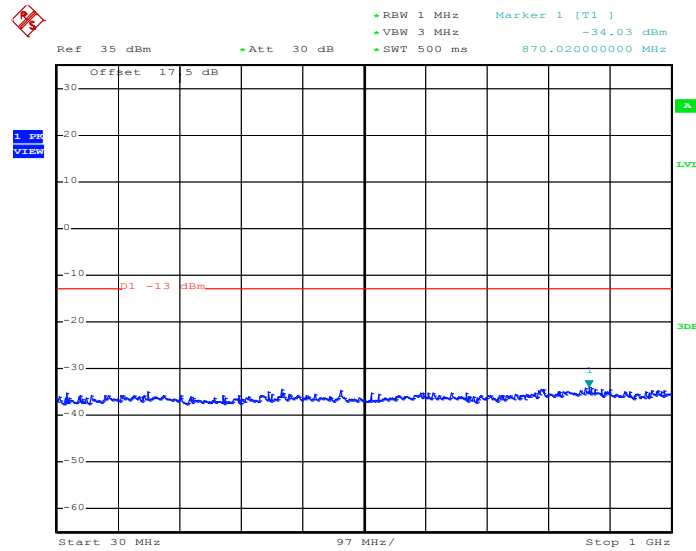
3.6.4 Test Setup



3.6.5 Test Result (Plots) of Conducted Spurious Emission

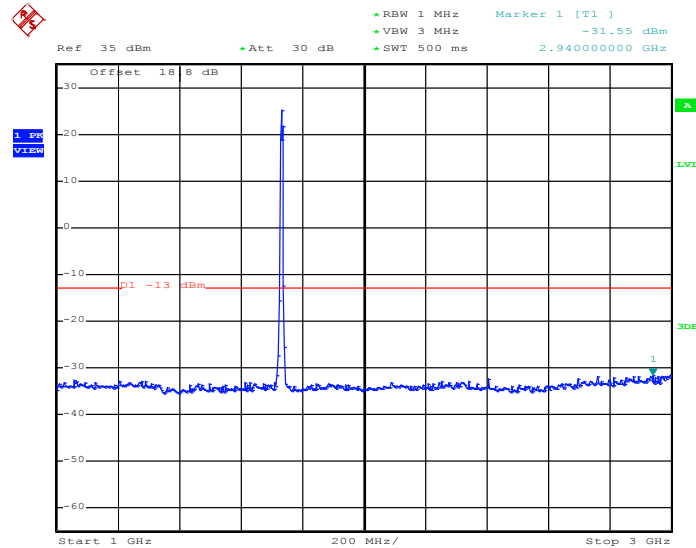
Band :	WCDMA Band IV	Channel :	CH1413
Test Mode :	RMC 12.2Kpbs Link (QPSK)	Frequency :	1732.6 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



Date: 14.JUN.2013 15:07:50

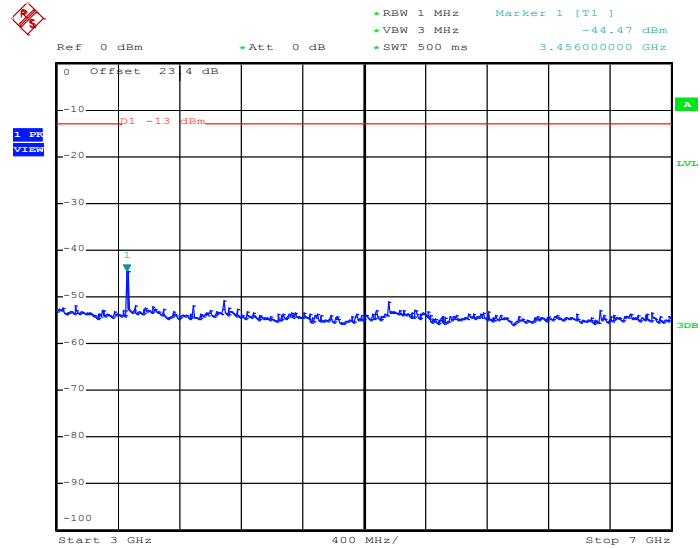
Conducted Spurious Emission Plot between 1GHz ~ 3GHz



Date: 14.JUN.2013 15:08:03

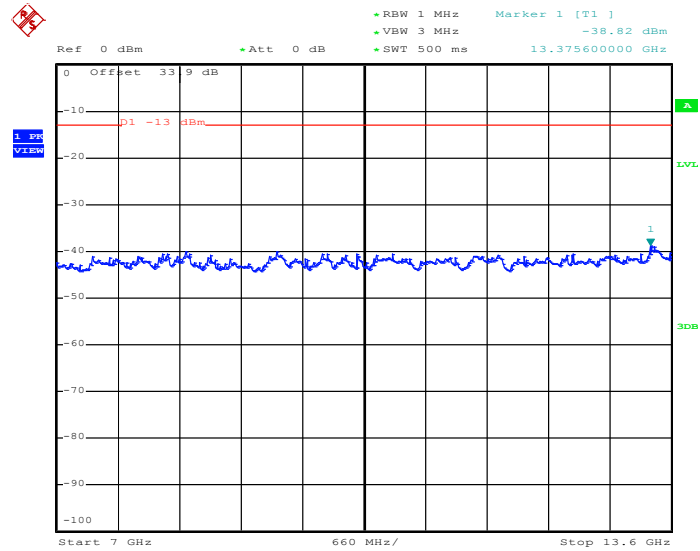


Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 14.JUN.2013 15:08:21

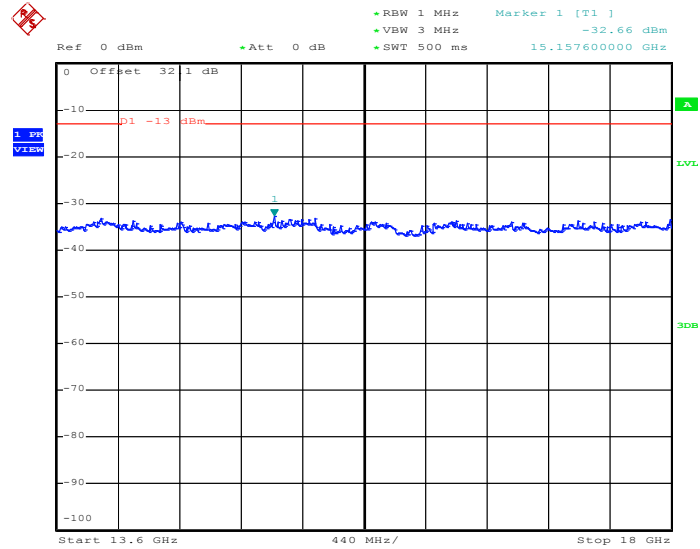
Conducted Spurious Emission Plot between 7GHz ~ 13.6GHz



Date: 14.JUN.2013 15:08:33



Conducted Spurious Emission Plot between 13.6GHz ~ 18GHz



Date: 14.JUN.2013 15:08:45

3.7 Field Strength of Spurious Radiation Measurement

3.7.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

3.7.3 Test Procedures

1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)

$$= P(W) - [43 + 10\log(P)] \text{ (dB)}$$

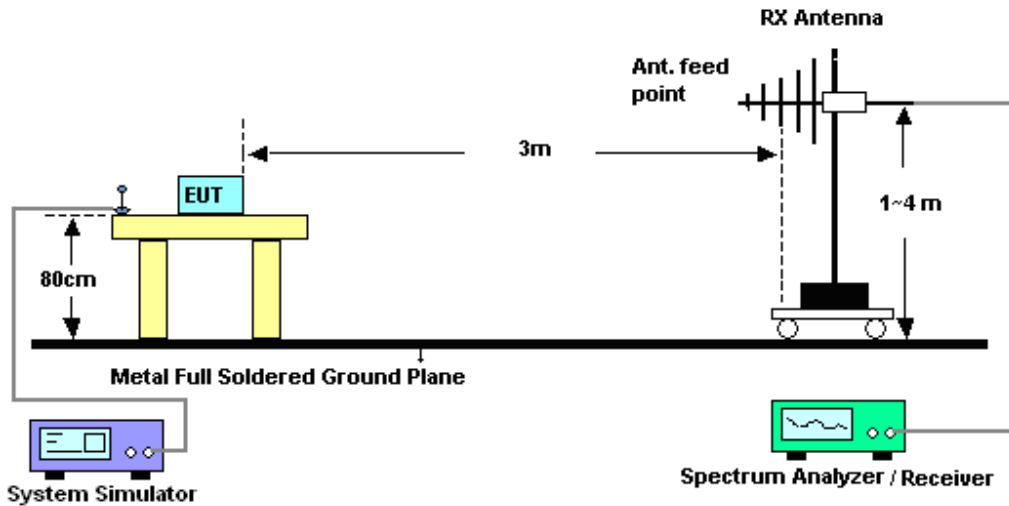
$$= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$$

$$= -13\text{dBm.}$$

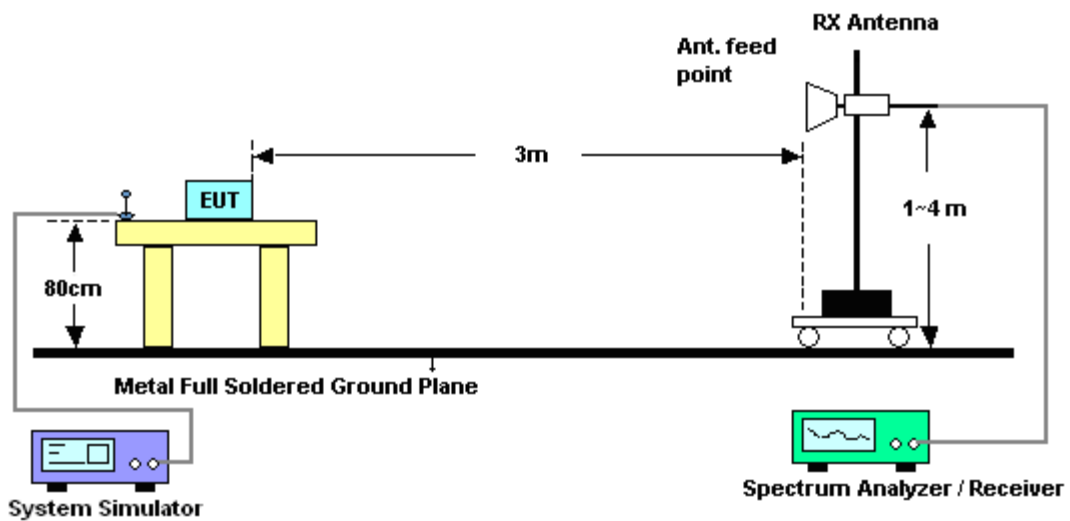
11. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain

3.7.4 Test Setup

For radiated emissions from 30MHz to 1GHz



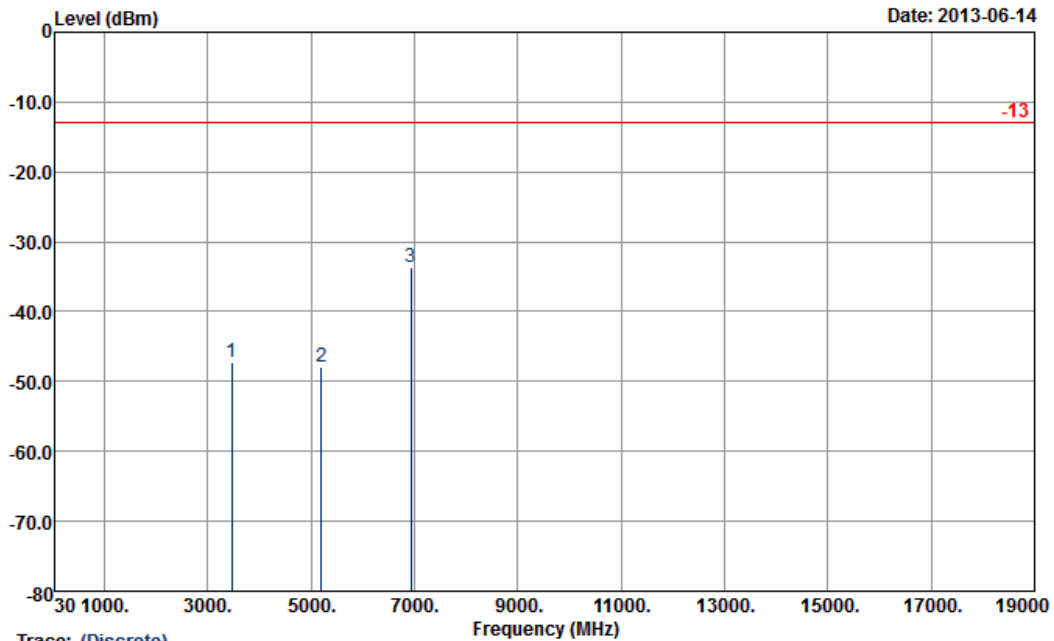
For radiated emissions above 1GHz





3.7.5 Test Result of Field Strength of Spurious Radiated

Band :	WCDMA Band IV	Temperature :	21~23°C
Test Mode :	RMC 12.2Kpbs Link (QPSK)	Relative Humidity :	51~53%
Test Engineer :	Beer Chang	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		

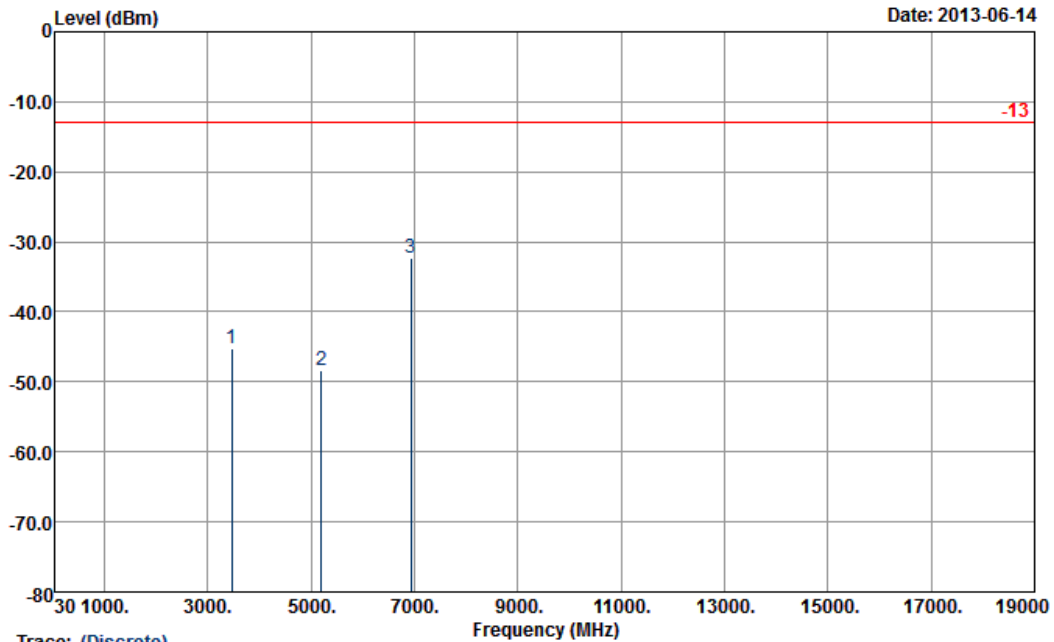


Trace: (Discrete)
 Site : 03CH07-HY
 Condition : -13 HF-EIRP(080306) HORIZONTAL

Frequency (MHz)	EIRP (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
3468	-47.30	-13	-34.30	-61.6	-51.13	4.48	8.31	H	Pass
5200	-47.89	-13	-34.89	-66.68	-52.53	5.332	9.98	H	Pass
6936	-33.60	-13	-20.60	-59.76	-38.84	6.1	11.34	H	Pass



Band :	WCDMA Band IV	Temperature :	21~23°C
Test Mode :	RMC 12.2Kpbs Link (QPSK)	Relative Humidity :	51~53%
Test Engineer :	Beer Chang	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Trace: (Discrete)
 Site : 03CH07-HY
 Condition : -13 HF-EIRP(080306) VERTICAL

Frequency (MHz)	EIRP (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
3464	-45.28	-13	-32.28	-60.82	-49.11	4.48	8.31	V	Pass
5200	-48.27	-13	-35.27	-67.1	-52.91	5.332	9.98	V	Pass
6936	-32.33	-13	-19.33	-57.67	-37.57	6.1	11.34	V	Pass

3.8 Frequency Stability Measurement

3.8.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency.

3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

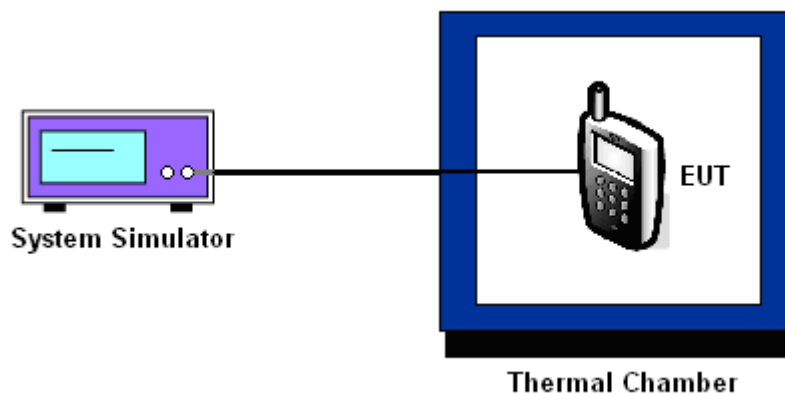
3.8.3 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C . The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. If the EUT cannot be turned on at -30°C , the testing lowest temperature will be raised in 10°C step until the EUT can be turned on.

3.8.4 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at $25\pm 5^{\circ}\text{C}$ and connected with the base station.
2. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

3.8.5 Test Setup



3.8.6 Test Result of Temperature Variation

Band :	WCDMA Band IV	Channel :	1413
Limit (ppm) :	2.5	Frequency :	1732.6 MHz

Temperature (°C)	RMC 12.2Kpbs		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	24	0.01	PASS
-20	-22	-0.01	
-10	18	0.01	
0	20	0.01	
10	-14	-0.01	
20	-16	-0.01	
30	-12	-0.01	
40	-14	-0.01	
50	16	0.01	



3.8.7 Test Result of Voltage Variation

Band & Channel	Mode	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
WCDMA Band IV CH1413	RMC 12.2Kpbs	3.7	-10	-0.01	2.5	PASS
		BEP	-12	-0.01		
		4.2	-9	-0.01		

Remark:

- 1. Normal Voltage = 3.7V.
- 2. Battery End Point (BEP) = 3.6 V.



4 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
System Simulator	R&S	CMU200	117995	N/A	Jul. 30, 2012	Jun. 14, 2013	Jul. 29, 2013	Conducted (TH02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Jun. 14, 2013	Jun. 06, 2014	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D3SP	TBN-930701	N/A	Jul. 23, 2012	Jun. 14, 2013	Jul. 22, 2013	Conducted (TH02-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Oct. 06, 2012	Jun. 14, 2013	Oct. 05, 2013	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9kHz ~ 30GHz	Nov. 30, 2012	Jun. 14, 2013	Nov. 29, 2013	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 22, 2012	Jun. 14, 2013	Aug. 21, 2013	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec. 01, 2012	Jun. 14, 2013	Nov. 30, 2013	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10-1000MHz. 32dB.GAIN	Feb. 26, 2013	Jun. 14, 2013	Feb. 25, 2014	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Sep. 03, 2012	Jun. 14, 2013	Sep. 02, 2013	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Jun. 14, 2013	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Jun. 14, 2013	N/A	Radiation (03CH07-HY)



5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.54
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95%(U = 2Uc(y))	4.72
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Appendix A. Photographs of EUT

Please refer to Sporton report number EP2D2653-01 as below.