



FCC RF Test Report

**Product Name: HSPA+/HSUPA/HSDPA/UMTS/GSM/GPRS/EDGE
Mobile Phone with Bluetooth**

Model Number: HUAWEI U9510E, U9510E

**Report No: SYBH(Z-RF)005082012-2003
FCC ID: QISU9510E**

Reliability Laboratory of Huawei Technologies Co., Ltd.

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Notice

1. The laboratory has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L0310.
2. The laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 97456.
3. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-2.
4. The test report is invalid if not marked with "exclusive stamp for the test report".
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Contents

1	<u>General Information</u>	5
1.1	APPLIED STANDARD.....	5
1.2	TEST LOCATION.....	5
1.3	TEST ENVIRONMENTAL CONDITION.....	5
2	<u>Summary</u>	6
3	<u>Product Description</u>	7
3.1	PRODUCT INFORMATION	7
4	<u>Test Description</u>	9
4.1	SUPPORTED FREQUENCY RANGE	9
4.2	TRANSMITTER / RECEIVER CHARACTERISTICS.....	9
4.3	ANTENNA GAIN.....	10
4.4	POWER SUPPLY	10
5	<u>General Test Conditions / Configurations</u>	11
5.1	RF CHANNELS UNDER TEST.....	11
5.2	TEST MODES.....	11
5.3	TEST ENVIRONMENT	11
5.4	TEST SETUP.....	12
5.5	TEST CONDITIONS	16
6	<u>Main Test Instruments</u>	18
7	<u>Test Results</u>	19
8	<u>Measurement Uncertainty</u>	19



1 General Information

1.1 Applied Standard	
Applied Rules:	47 CFR FCC Part 2:2011, Subpart J 47 CFR FCC Part 27:2011, Subpart C&L ANSI/TIA 603C:2004
1.2 Test Location	
Test Location 1:	Reliability Laboratory of Huawei Technologies Co., Ltd.
Address:	Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China
1.3 Test Environmental Condition	
Ambient Temperature:	20 – 25 °C
Ambient Relative Humidity:	45 – 55 %
Atmospheric Pressure:	101 kPa

2 Summary

Table 1 Summary of results

Test Case	FCC Part No.	Requirements	Result
AWS Band			
Transmitter Output Power	2.1046 & 27.50(d)	Peak EIRP not exceed 1 W Peak-to-average ratio not exceed 13 dB	Pass
Modulation Characteristics	2.1047	Digital modulation	Pass
Occupied Bandwidth	2.1049	(Not specified)	Pass
Band Edges Compliance	2.1051 & 27.53(h)	Below -13 dBm/1%*EBW, in 1 MHz range	Pass
Spurious Emission at Antenna Terminals	2.1051 & 27.53(h)	Below -13 dBm/1 kHz, 9 kHz to 150 kHz Below -13 dBm/10 kHz, 150 kHz to 30 MHz Below -13 dBm/1 MHz, 30 MHz to 10 th harmonics	Pass
Field Strength of Spurious Radiation	2.1053 & 27.53(h)	Below -13 dBm/1 MHz	Pass
Frequency Stability	2.1055 & 27.54	Stay within the authorized bands of operation	Pass

3 Product Description

3.1 Product Information

3.1.1 General Description

HUAWEI U9510E, U9510E is subscriber equipment in the WCDMA/GSM system. The HSPA+/HSUPA/HSDPA/UMTS frequency band is Band I, Band II, Band IV, Band V and Band VIII. Band IV can be used in this report. The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSPA+/HSUPA/HSDPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video, MMS service, GPS, AGPS and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and USIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

3.1.2 Board Information

Table 2 Board Information

HSPA+/HSUPA/HSDPA/UMTS/GSM/GPRS/EDGE Mobile Phone with Bluetooth		
HUAWEI U9510E, U9510E		
Board and Module		
Hardware Version	Software Version	Description
Ver.C	U9510EV100R001C00B104SP01	Main board of Mobile Phone

3.1.3 Adapter Technical Data

AC/DCAdapter Model	HW-050100U3W
Manufacturer	HUIZHOU BYD ELECTRONIC CO., LTD.
Input Voltage	~100-240V 50/60Hz 0.2A
Output Voltage	5V  1A
Rated Power	5W



3.1.4 Battery Technical Data

Name	Manufacture	Description
Rechargeable Li-ion	Huawei Technologies Co., Ltd.	Battery Model: HB5Q1HV Rated capacity: 2600mAh Nominal Voltage: \approx +3.75V Charging Voltage: \approx +4.3V



4 Test Description

4.1 Supported Frequency Range

Characteristics	Description
Downlink	2110 to 2155 MHz
Uplink	1710 to 1755 MHz

4.2 Transmitter / Receiver Characteristics

Characteristics	Description
System Type	UMTS
TX Output Power (per Antenna Port)	UMTS system: 24dBm
Channel Spacing(s) / Bandwidth(s)	UMTS system: 5 MHz
Designation of Emissions	UMTS system: 4M08F9W



4.3 Antenna Gain

Antenna Gain(dBi)	-1
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4.4 Power Supply

Specification	Description
Power Supply Type	Directly Connected to DC /AC Power Supply
Input to EUT (DC power)	DC Voltage Nominal: \approx 3.75 V DC Voltage Range: \approx 3.5 V to 4.3 V
Input to EUT (AC power)	AC Voltage Nominal: ~ 120 V (50/60 Hz) AC Voltage Range: ~ 100 V to 240 V

5 General Test Conditions / Configurations

5.1 RF Channels under Test

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
TM1/TM2/TM3	TX	Channel1312	Channel1412	Channel1513
		1712.4MHz	1732.4MHz	1752.6MHz
	RX	Channel 1537	Channel 1637	Channel 1738
		2112.4 MHz	2132.4 MHz	2152.6 MHz

5.2 Test Modes

Test Mode	Test Modes Description
TM1	WCDMA, QPSK modulation
TM2	HSDPA, QPSK modulation
TM3	HSUPA, QPSK modulation

5.3 Test Environment

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Temperature	TN	Ambient
Voltage	VL	3.5V
	VN	3.8V
	VH	4.3V

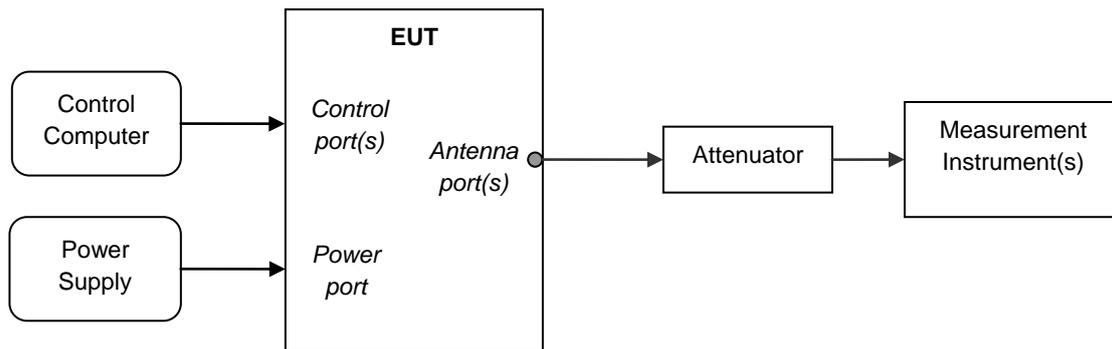
NOTE: VL= lower extreme test voltage
 VN= nominal voltage
 VH= upper extreme test voltage
 TN= normal temperature

5.4 Test Setup

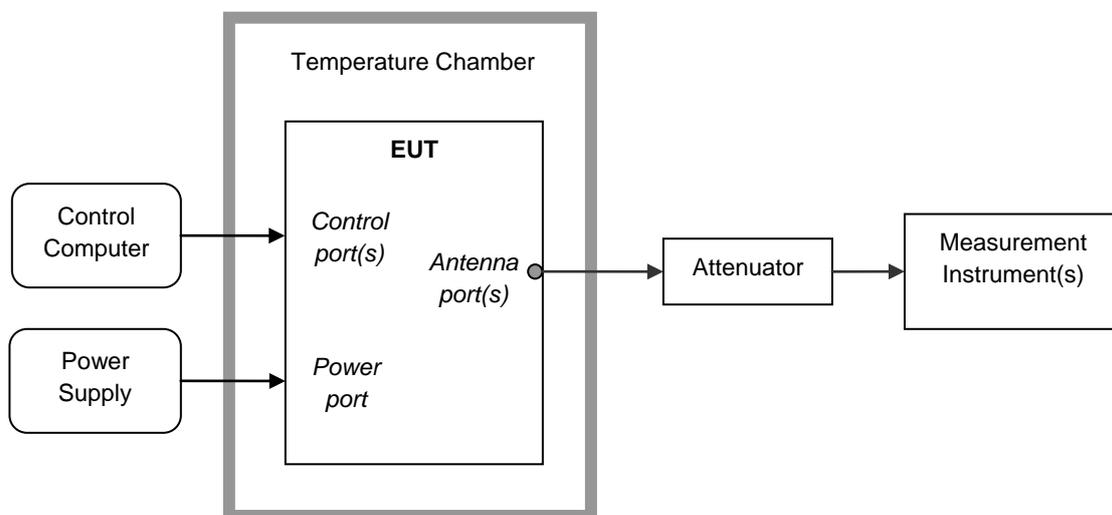
5.4.1 General Test Setup Configurations

Configuration	Description
Test Antenna Ports	Until otherwise declared, all TX tests are ONLY performed at the main Transmitter antenna port (e.g. TRXA, TXA and so on) of the EUT, and all RX tests are ONLY performed at the main Receiver antenna port (e.g. TRXA, RXA and so on) of the EUT.
Multiple RF Sources	Other than the tested RF source of the EUT, other RF source(s) are disabled or shutdown during measurements.

5.4.2 Test Setup 1



5.4.3 Test Setup 2



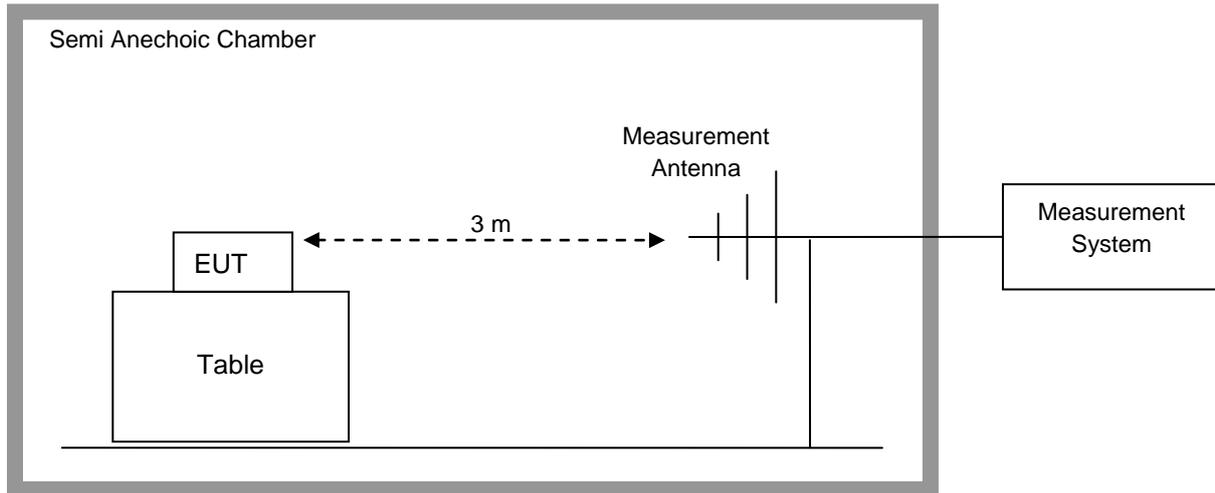
5.4.4 Test Setup 3

NOTE1: Effective radiated power (ERP) or Effective Isotropic radiated power (EIRP) refers to the EUT radiation power output, assuming all emissions are radiated from half-wave dipole antennas or horn antennas.

NOTE2: The EUT was set on insulator 80cm above the Ground Plane. The setup and test methods were according to ANSI-TIA-603C 2004. The measurements were carried through with a Rohde and Schwarz Test Receiver and control software.

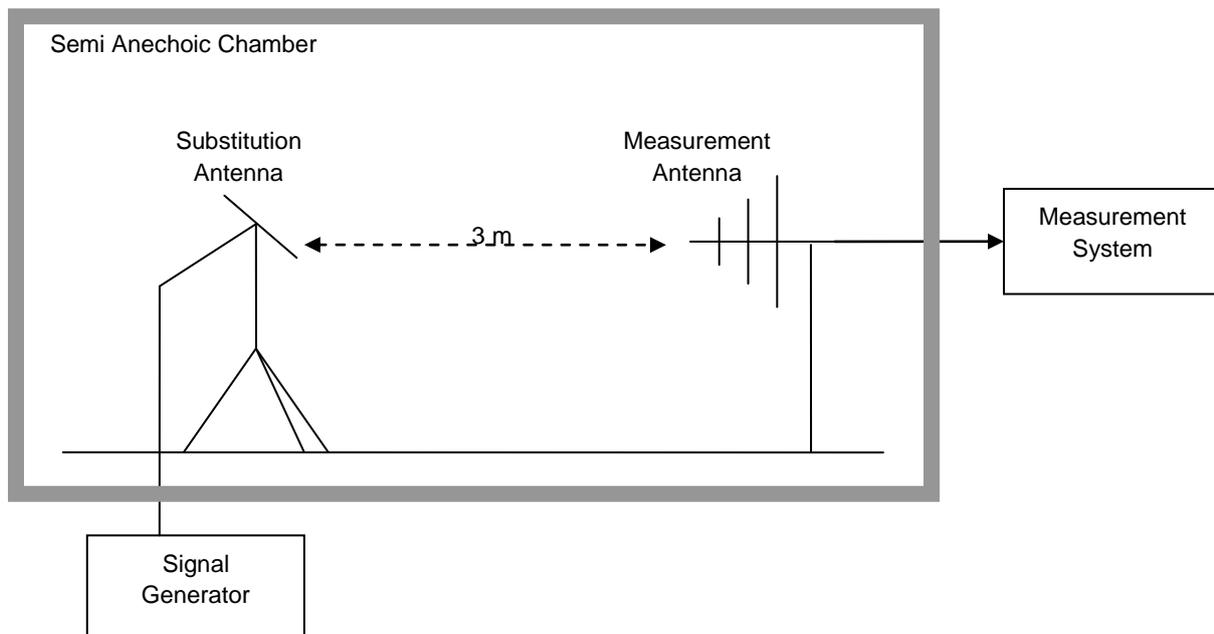
Step 1: Pre-test to find the Maximum ERP or EIRP

1. Connect the test system according to the following figure. EUT is running for 30 minutes before test, and measurement instruments are warming-up for 30 minutes.
2. Set up communication link between Universal radio communication tester and EUT, set EUT working frequency, and control EUT to transmit at maximum power.
3. Set the center frequency of the signal analyzer or receiver to the EUT's operating frequency, the RBW is equal to the emission bandwidth of the signal. Set RMS detector for the test, and the span is equal to 2 times of emission bandwidth, the other settings should remain automatic. Normally, the height range of antenna was 1m to 4m, the azimuth range of turntable was 0° to 360°. The receiver antenna has two polarizations V and H. A portable or small unlicensed wireless device shall be placed on a non-metallic test fixture or other non-metallic support during testing. The supporting fixture shall permit orientation of the EUT in each of three orthogonal (x, y, z) axis positions such that emissions from the EUT are maximized. Measure the EUT maximum RF power and record the result.
4. Changing EUT working frequency and measuring the RF power at channel L, M, H respectively.
Complete the test data.



Step 2: Substitution method to verify the maximum ERP or EIRP

1. Measurement setup is according to the following figure. EUT was substituted by antenna, and the polarization is identical with the test antenna; the signal generator was connected to the substitution antenna.
2. The radiated output power, measured by signal analyzer set, is the same as recorded in above. Then this power level is matched by a signal from a calibrated signal generator which is substituted for EUT. The power supplied by the generator is then equal to the ERP or EIRP after corrected by the antenna gain and cable loss.



5.5 Test Conditions

Test Case	Test Conditions	
Transmitter Output Power	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1 & Test Setup 3
	Detector	RMS
	RF Channels (TX)	L, M, H
	Test Mode	TM1/TM2/TM3
Modulation Characteristics	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	RF Channels (TX)	M
	Test Mode	TM1
Occupied Bandwidth	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Detector	PK
	RF Channels (TX)	L, M, H
	Test Mode	TM1
Band Edges Compliance	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Detector	RMS
	RF Channels (TX)	B, T
	Test Mode	TM1
Spurious Emission at Antenna Terminals	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Detector	PK
	RF Channels (TX)	L, M, H
	Test Mode	TM1
Field Strength of Spurious Radiation	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 3
	Detector	PK
	RF Channels (TX)	M
	Test Mode	TM1/TM2/TM3
Frequency Stability	Test Configuration	(1) -30 °C to +50 °C with step 10 °C at Rated Voltage; (2) 85%, 100% and 115% of Rated Voltage at Ambient Temperature.
	Test Setup	Test Setup 2
	RF Channels (TX)	M



Test Case	Test Conditions	
	Test Mode	TM1

6 Main Test Instruments

Table 3 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
Power supply	KEITHLEY	2303	1288003	Sept., 27,2012
Universal Radio Communication Tester	R&S	CMU200	117341	Jan., 12,2013
Universal Radio Communication Tester	Agilent	E5515C	MY50260239	Aug., 31,2012
Spectrum Analyzer	Agilent	E4440A	MY49420179	Jul., 17,2013
Signal Analyzer	R&S	FSQ31	200021	Sept., 27,2012
Temperature Chamber	WEISS	WKL64	24600294	Feb.,13,2013
Signal generator	Agilent	E8257D	MY49281095	Jul.,09,2013
Spectrum analyzer	R&S	FSU3	200474	Mar., 05, 2013
Spectrum analyzer	R&S	FSU43	100144	Mar., 05, 2013
Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100304	Apr., 05, 2013
Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100391	Apr., 05, 2013
Trilog Broadband Antenna (30M~3GHz)	SCHWARZBECK	VULB 9163	9163-521	Jul., 07, 2013
Pyramidal Horn Antenna(26GHz-40GHz)	ETS-Lindgren	3160-10	00123940	Feb., 27, 2013
Pyramidal Horn Antenna(18GHz-26.5GHz)	ETS-Lindgren	3160-09	00125912	Feb., 27, 2013

7 Test Results

No.	Test Item	Test Result
1	Transmitter Output Power	Appendix A
2	Modulation Characteristics	Appendix B
3	Occupied Bandwidth	Appendix C
4	Band Edges Compliance	Appendix D
5	Spurious Emission at Antenna Terminals	Appendix E
6	Field Strength of Spurious Radiation	Appendix F
7	Frequency Stability	Appendix G
8	Photos of Test Setup	Appendix H

NOTE: There is no test data in Appendix H, only Photos of Test Setup for Field Strength of Spurious Radiation.

8 Measurement Uncertainty

For a 95% confidence level ($k=2$), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Test Item		Extended Uncertainty
Transmitter Output Power	Power (dBm)	U =0.39 dB
Occupied Bandwidth	Magnitude (%)	U=0.2%
Band Edge Compliance	Disturbance Power (dBm)	U=2.0 dB
Conducted Spurious Emissions	Disturbance Power (dBm)	U=2.0 dB
Field Strength of Spurious Radiation	ERP (dBm)	U=4.6 dB (30 MHz – 1GHz) U=3.0 dB (above 1 GHz)
Frequency Stability	Frequency Accuracy (ppm)	U=0.21 ppm

-----The END-----



Appendix A

Transmitter Output Power According to FCC Part 2.1046 & Part 27 Subpart C&L

Conducted Power of Transmitter

Table 1 Measurement Results

TEST CONDITIONS		RF Output Power (Conducted)					
		Channel 1312(L)		Channel 1412(M)		Channel 1513(H)	
		1712.4MHz		1732.4MHz		1752.6MHz	
		dBm		dBm		dBm	
T_{nom} / V_{nom}		Measured	Limit	Measured	Limit	Measured	Limit
TM1		23.77	30	23.65	30	23.71	30
TM2	Case1	23.48	30	23.36	30	23.45	30
	Case2	22.15	30	22.08	30	22.11	30
	Case3	21.82	30	21.76	30	21.81	30
	Case4	21.55	30	21.49	30	21.53	30
TM3	Case1	22.36	30	22.27	30	22.31	30
	Case2	20.08	30	20.00	30	20.05	30
	Case3	21.22	30	21.13	30	21.19	30
	Case4	20.68	30	20.59	30	20.64	30
	Case5	22.72	30	22.64	30	22.67	30



Peak-to-Average Ratio

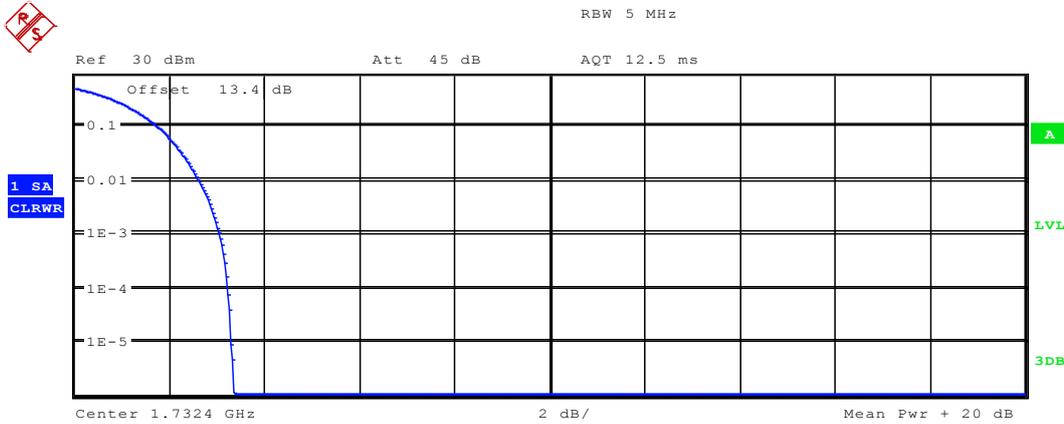
TEST CONDITIONS		RF Output Power (Conducted)					
		Channel 1312(L)		Channel 1412(M)		Channel 1513(H)	
		1712.4MHz		1732.4MHz		1752.6MHz	
		dB		dB		dB	
T_{nom} / V_{nom}		Measured	Limit	Measured	Limit	Measured	Limit
TM1		2.93	13	3.04	13	2.75	13
TM2	Case1	2.62	13	2.72	13	2.66	13
	Case2	2.53	13	2.55	13	2.48	13
	Case3	2.33	13	2.32	13	2.26	13
	Case4	2.28	13	2.34	13	2.30	13
TM3	Case1	2.39	13	2.53	13	2.45	13
	Case2	2.22	13	2.13	13	2.35	13
	Case3	2.38	13	2.45	13	2.47	13
	Case4	2.10	13	2.22	13	2.31	13
	Case5	2.55	13	2.61	13	2.49	13



Test Plot of Peak-to-Average Ratio

Note: All relevant operation modes have been tested, and the worst case Plot is included in this report.

TM1/TM2/TM3



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 7.1MHz

Trace 1	
Mean	23.48 dBm
Peak	26.84 dBm
Crest	3.36 dB
10 %	1.76 dB
1 %	2.60 dB
.1 %	3.04 dB
.01 %	3.24 dB

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Efficient Isotropic Radiated Power (EIRP)

Table 2 Substitution Results

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (EIRP) [dBm]	Limit [dBm]	Result
TM1	1712.4	22.77	Horn Ant.	19.17	4.5	1	22.67	30	Pass
TM1	1732.4	22.65	Horn Ant.	19.30	4.5	1	22.80	30	Pass
TM1	1752.6	22.71	Horn Ant.	19.06	4.8	1	22.86	30	Pass

Note: a, For getting the EIRP (Efficient Isotropic Radiated Power) in substitution method, the following formula should take to calculate it,

$$\text{EIRP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBi]}$$

b, SGP=Signal Generator Level

-----The END-----



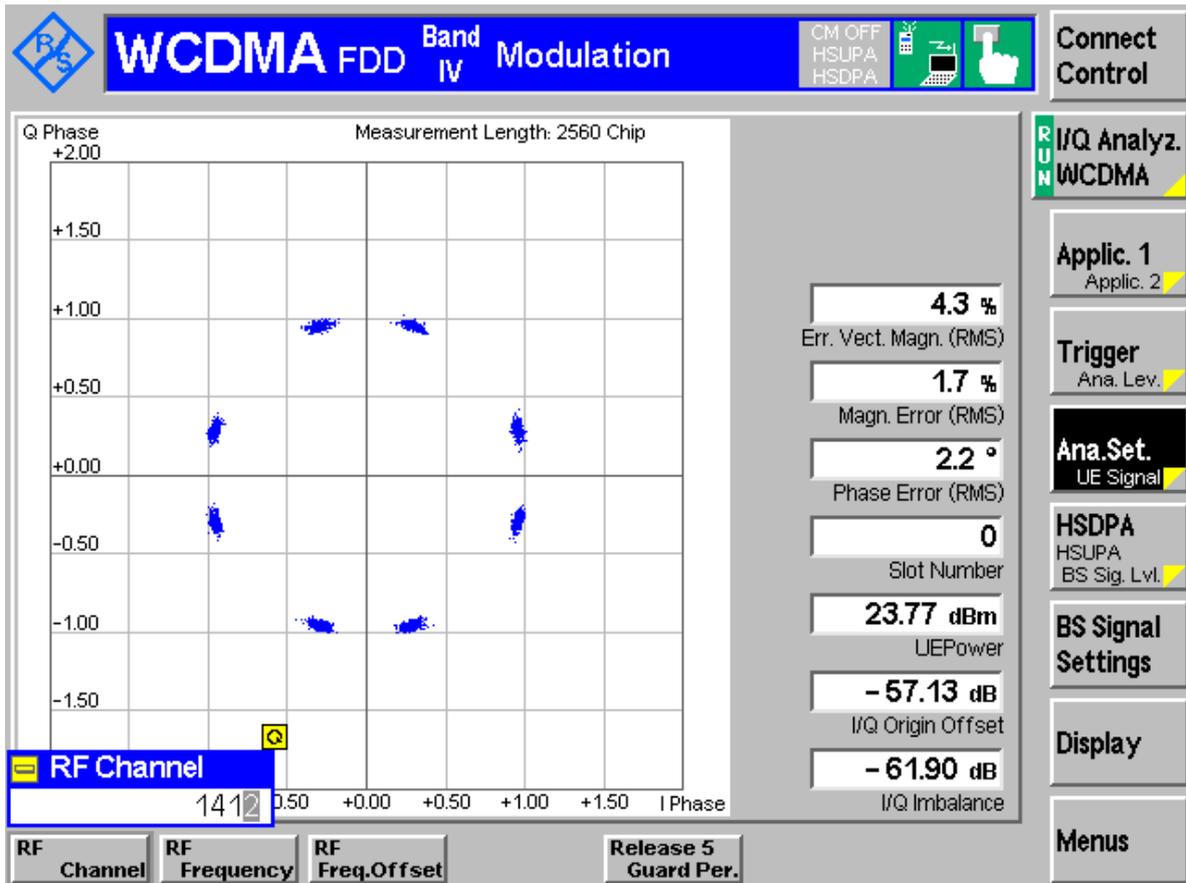
Appendix B

Modulation Characteristics

According to FCC Part 2.1047 & Part 27 Subpart C&L



TM1: WCDMA Channel 1412



-----The END-----



Appendix C

Occupied Bandwidth

According to FCC Part 2.1049 & Part 27 Subpart C&L



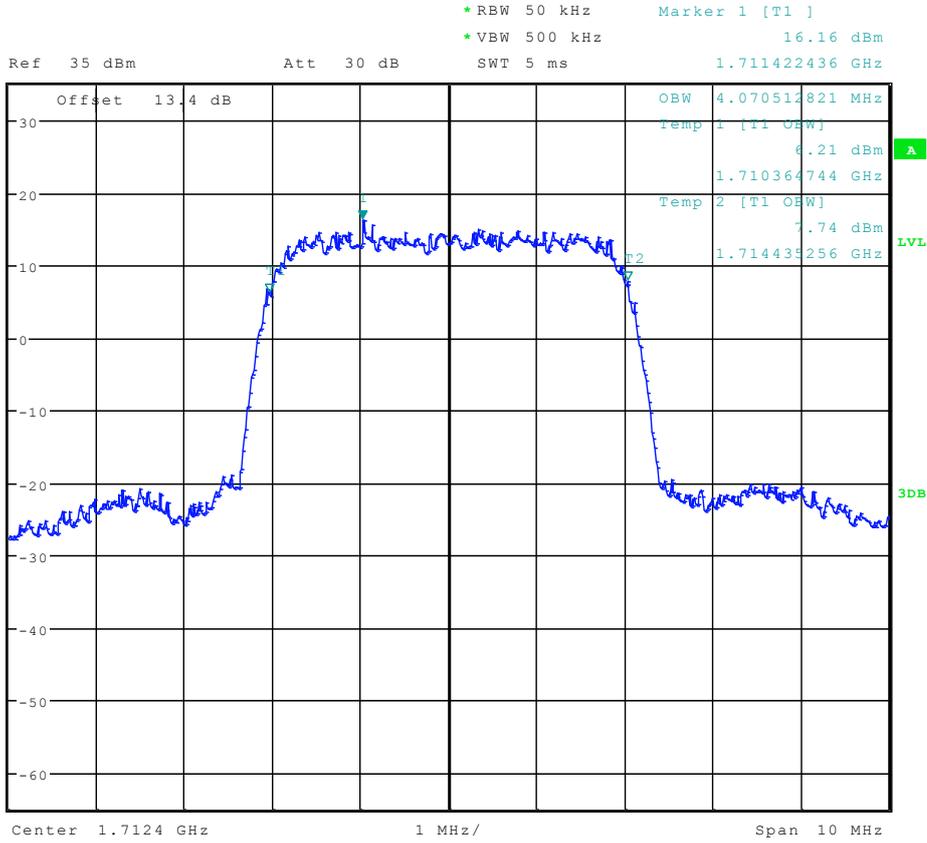
Result Table

Table 1 Measurement Results

Test Mode	RF Channel	Occupied Bandwidth [MHz]	Verdict
TM1	1312	4.07	Pass
	1412	4.07	Pass
	1513	4.07	Pass



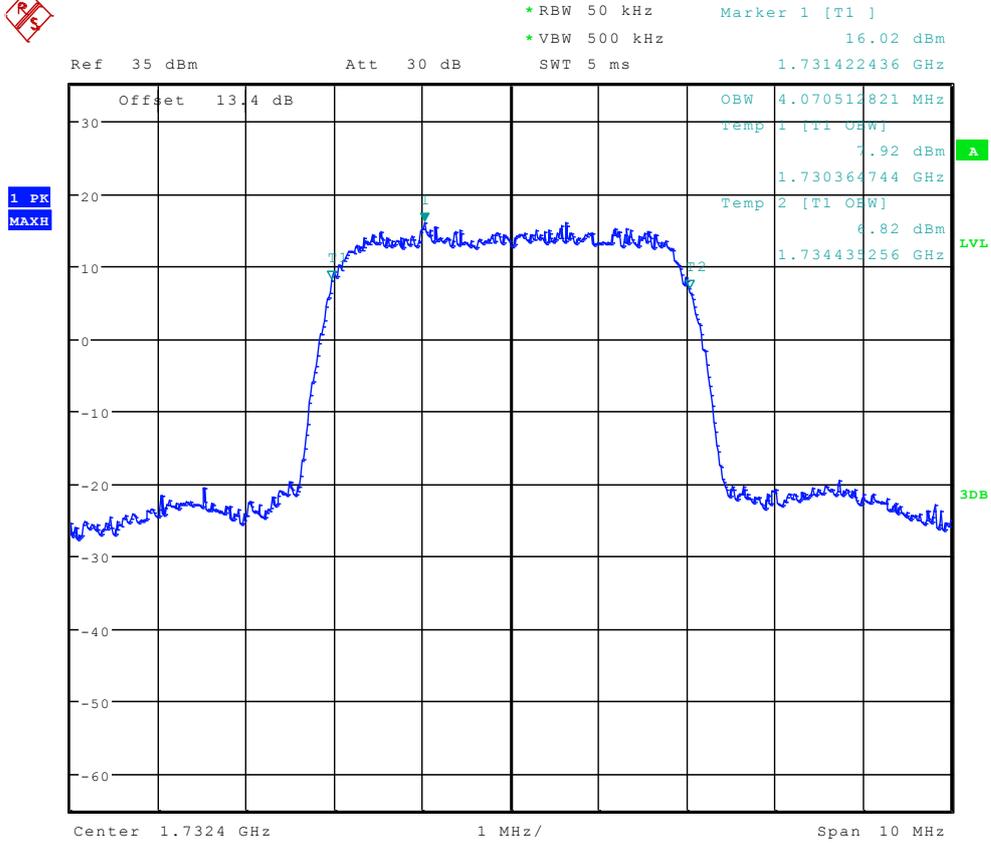
TM1: WCDMA Channel 1312



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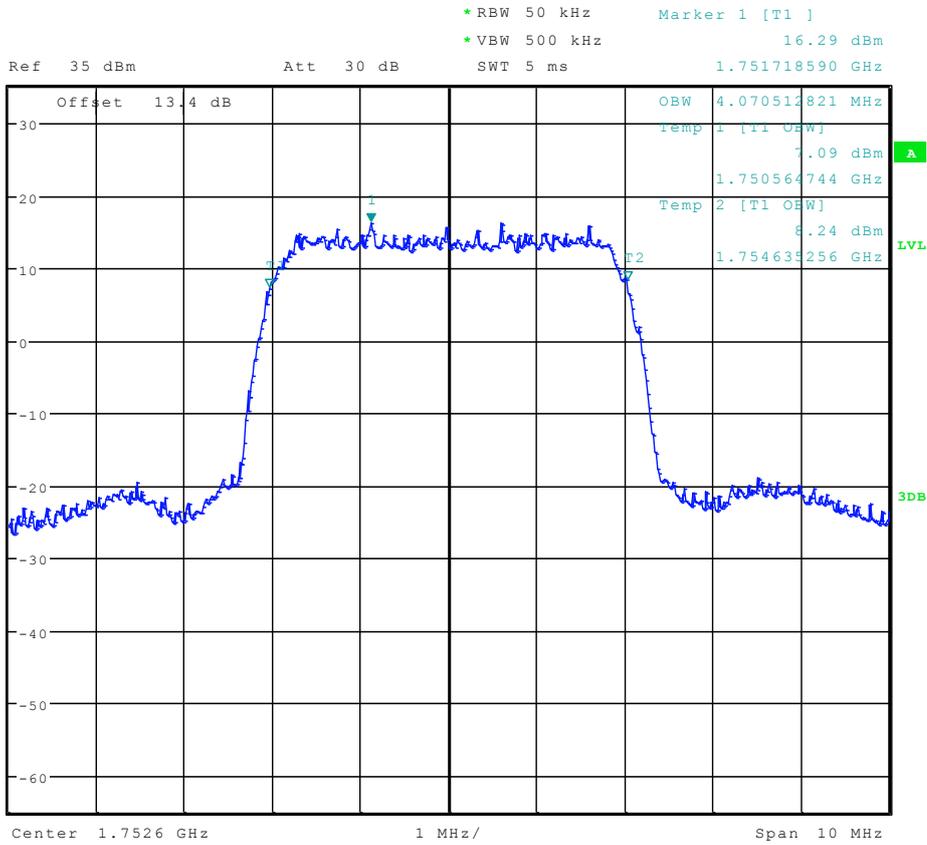
Channel 1412



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Channel 1513



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Appendix C

Band Edges Compliance

According to FCC Part 2.1051 & Part 27 Subpart C&L



TM1: WCDMA

Left Edge

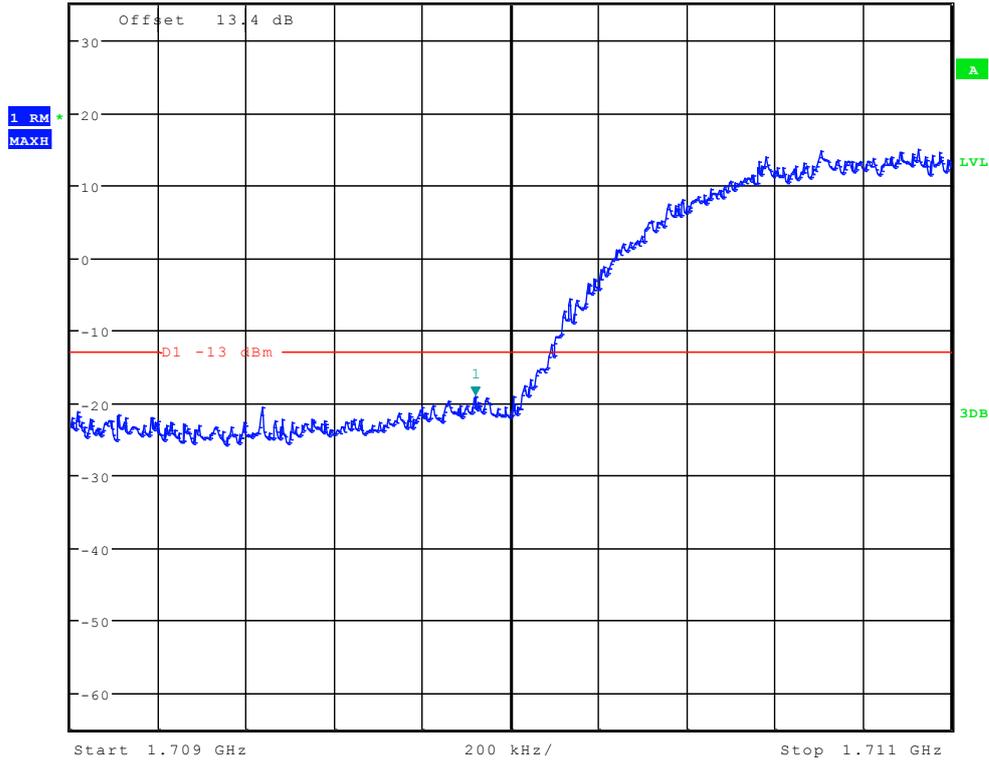
Channel 1312



Ref 35 dBm Att 50 dB SWT 2.5 ms Marker 1 [T1] -19.16 dBm

*RBW 50 kHz *VBW 200 kHz

1.709920000 GHz



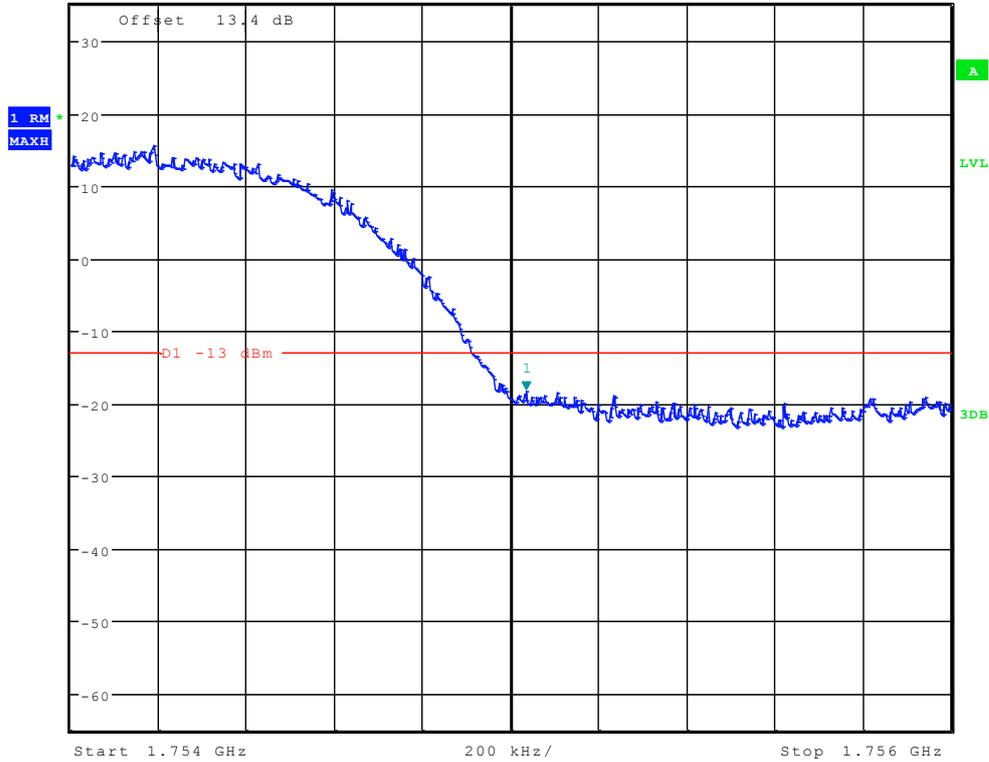
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Right Edge Channel 1513



Ref 35 dBm Att 50 dB RBW 50 kHz Marker 1 [T1]
VBW 200 kHz -18.24 dBm
SWT 2.5 ms 1.755035000 GHz



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Appendix D

Spurious Emission at Antenna Terminal

According to FCC Part 2.1051 & Part 27 Subpart C&L

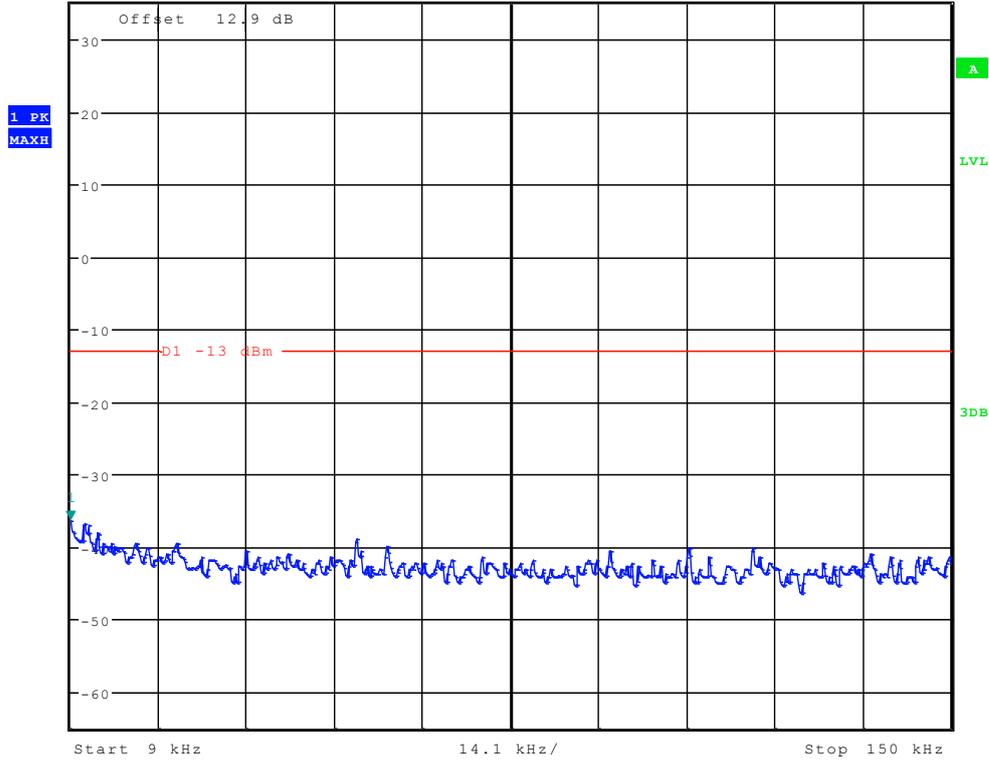


TM1: WCDMA

Channel 1312



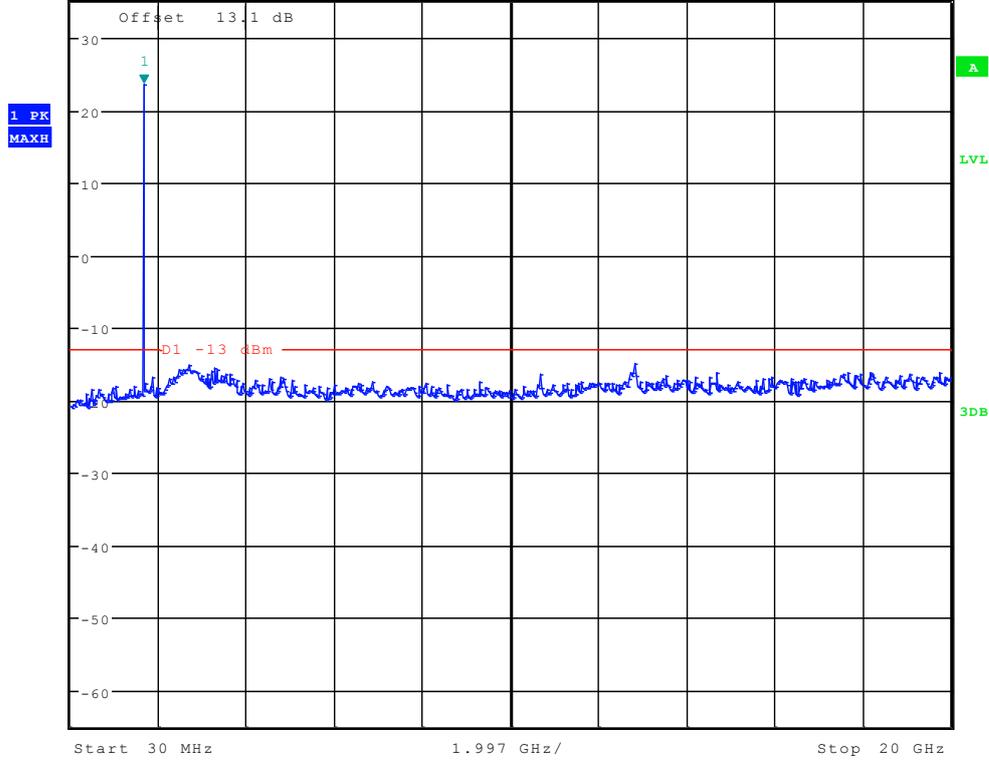
Ref 35 dBm Att 50 dB *RBW 1 kHz Marker 1 [T1] *VBW 10 kHz -36.38 dBm
SWT 145 ms 9.000000000 kHz



Date: 2.AUG.2012 10:50:54



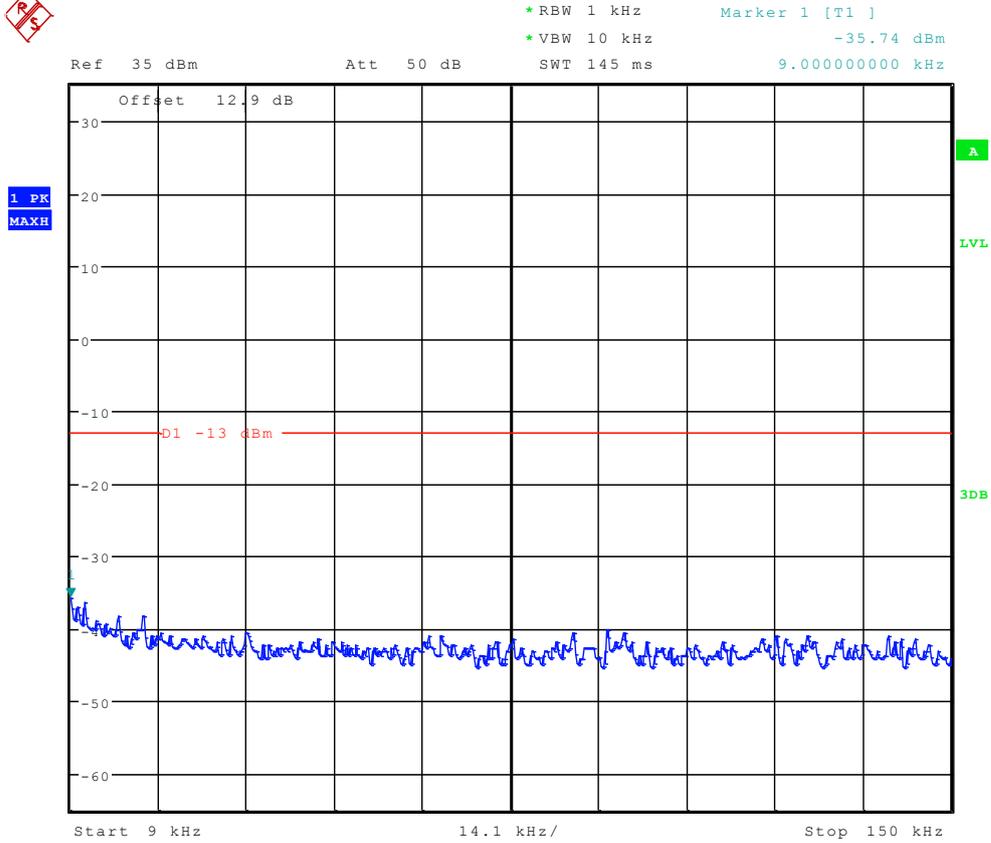
*RBW 1 MHz Marker 1 [T1]
*VBW 3 MHz 23.52 dBm
Ref 35 dBm Att 50 dB SWT 115 ms 1.694166667 GHz



Date: 2.AUG.2012 10:52:21



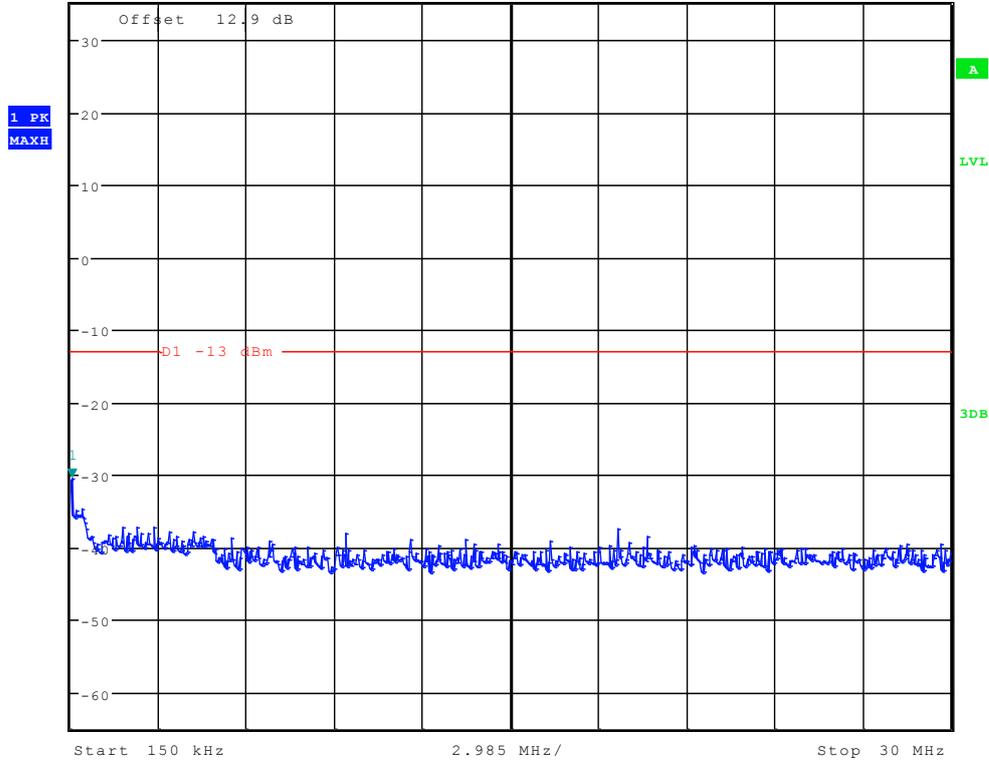
Channel 1412



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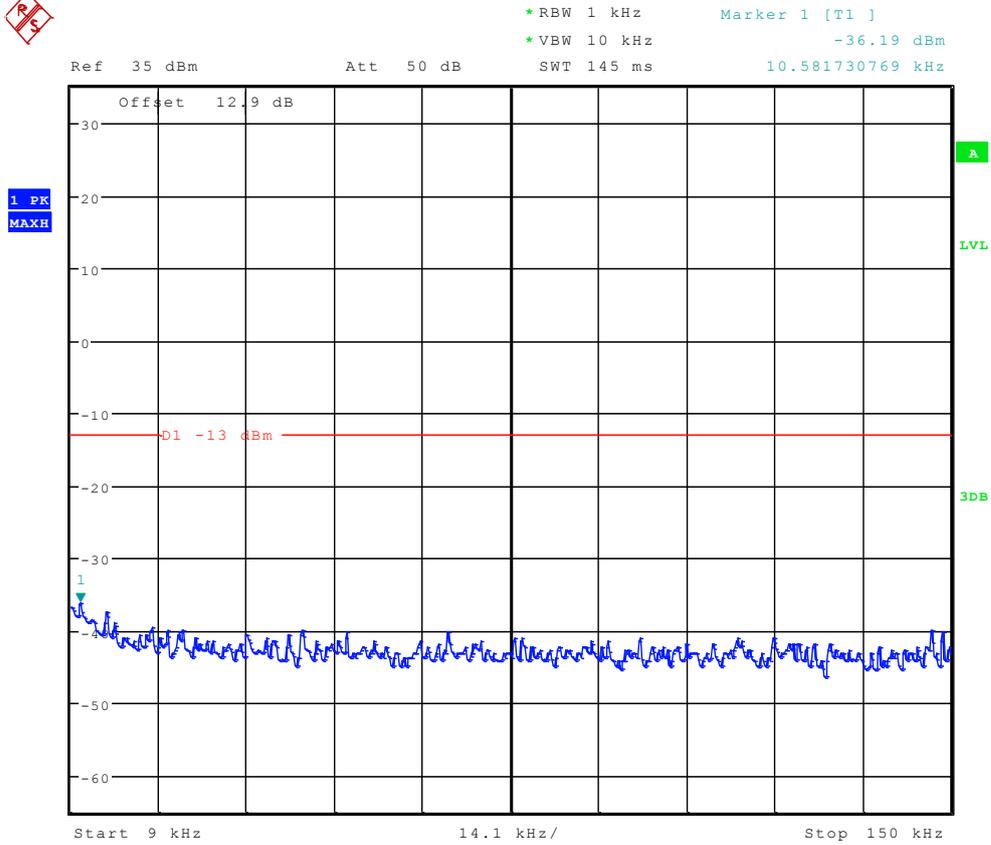
*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -30.51 dBm
Ref 35 dBm Att 50 dB SWT 300 ms 197.836538462 kHz



Date: 2.AUG.2012 10:51:52



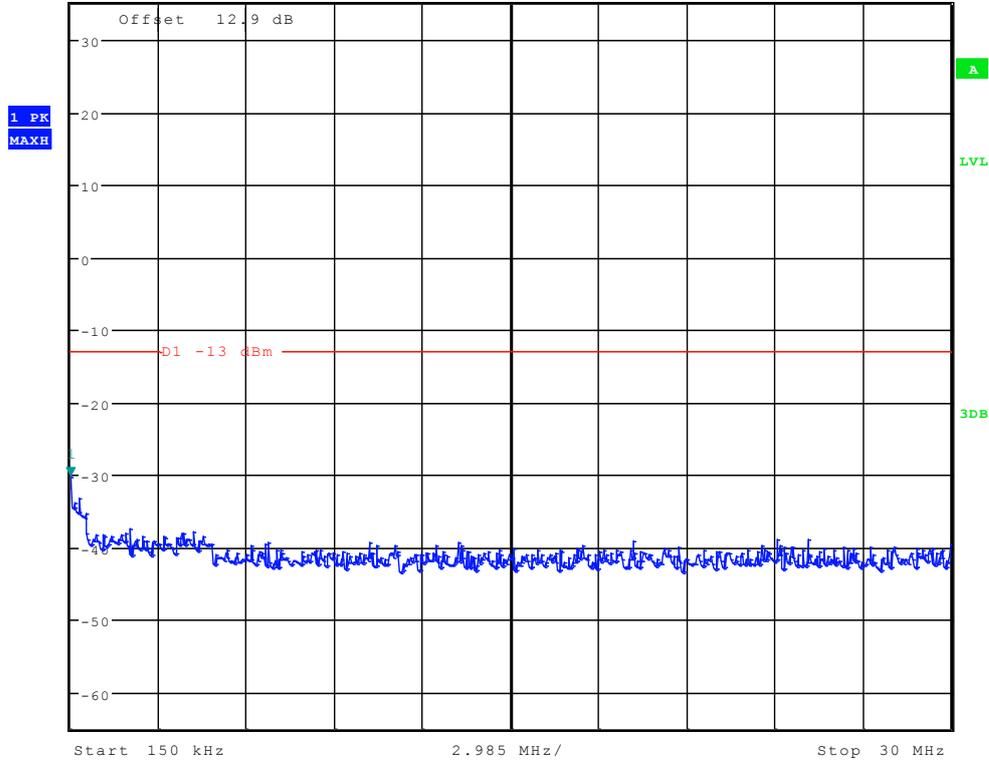
Channel 1513



Date: 2.AUG.2012 10:51:23



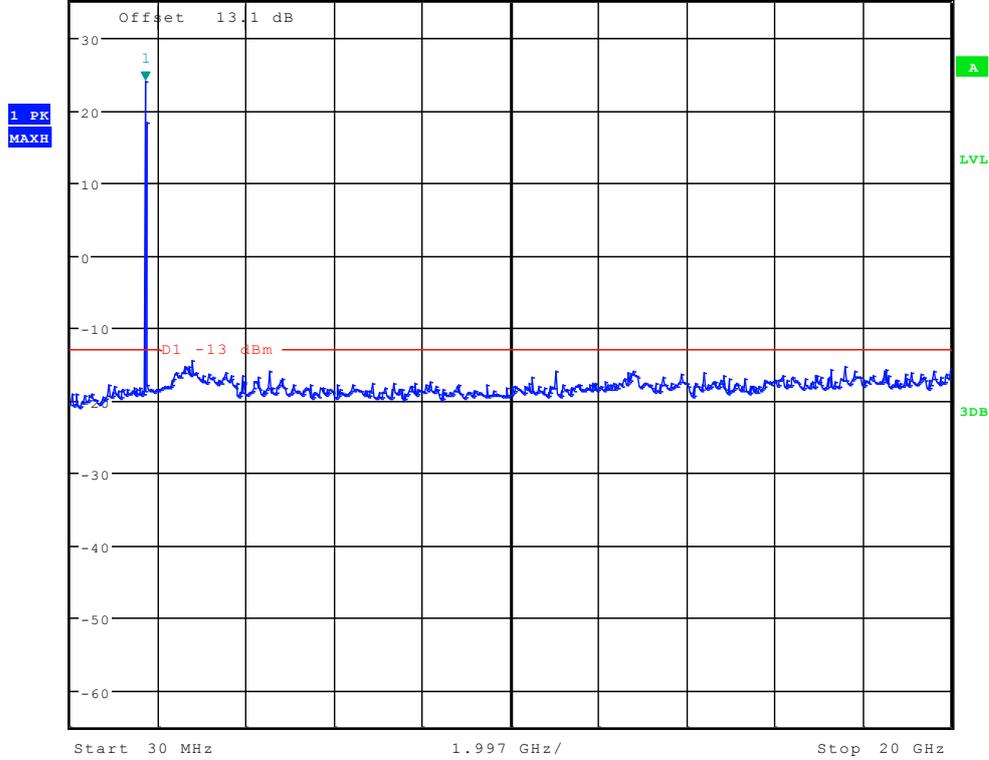
*RBW 10 kHz Marker 1 [T1]
 *VBW 30 kHz -30.22 dBm
 Ref 35 dBm Att 50 dB SWT 300 ms 150.000000000 kHz



Date: 2.AUG.2012 10:52:06



* RBW 1 MHz Marker 1 [T1]
 * VBW 3 MHz 23.89 dBm
 Ref 35 dBm Att 50 dB SWT 115 ms 1.726169872 GHz



Date: 2.AUG.2012 10:52:50

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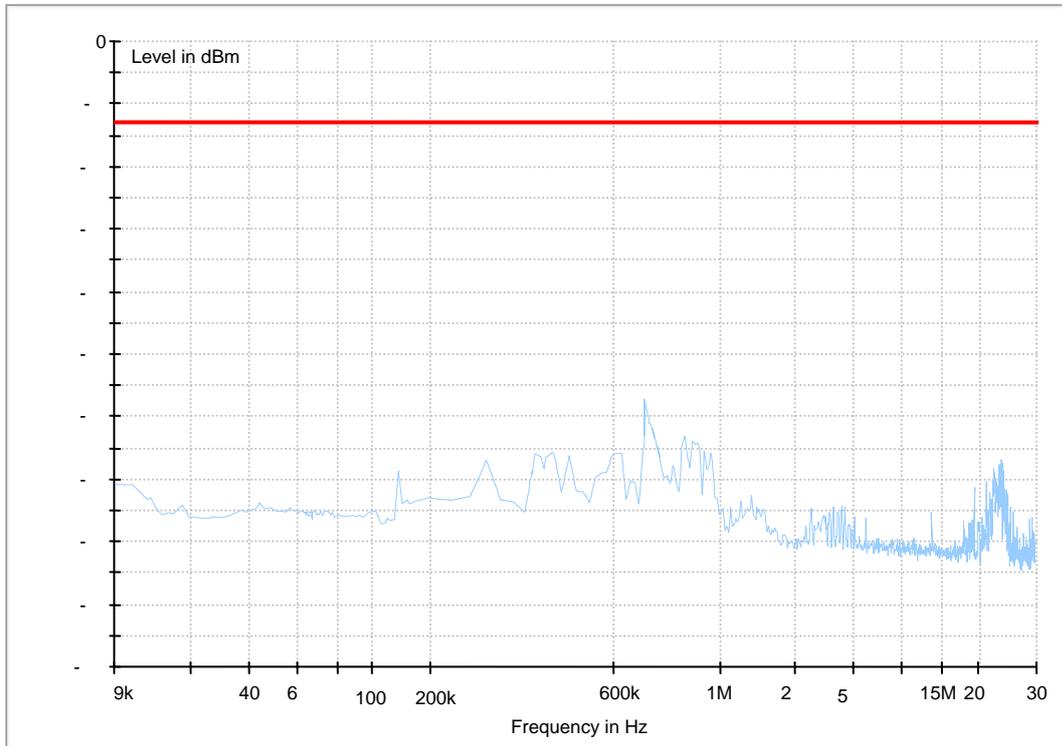
Appendix F

Radiated spurious emission

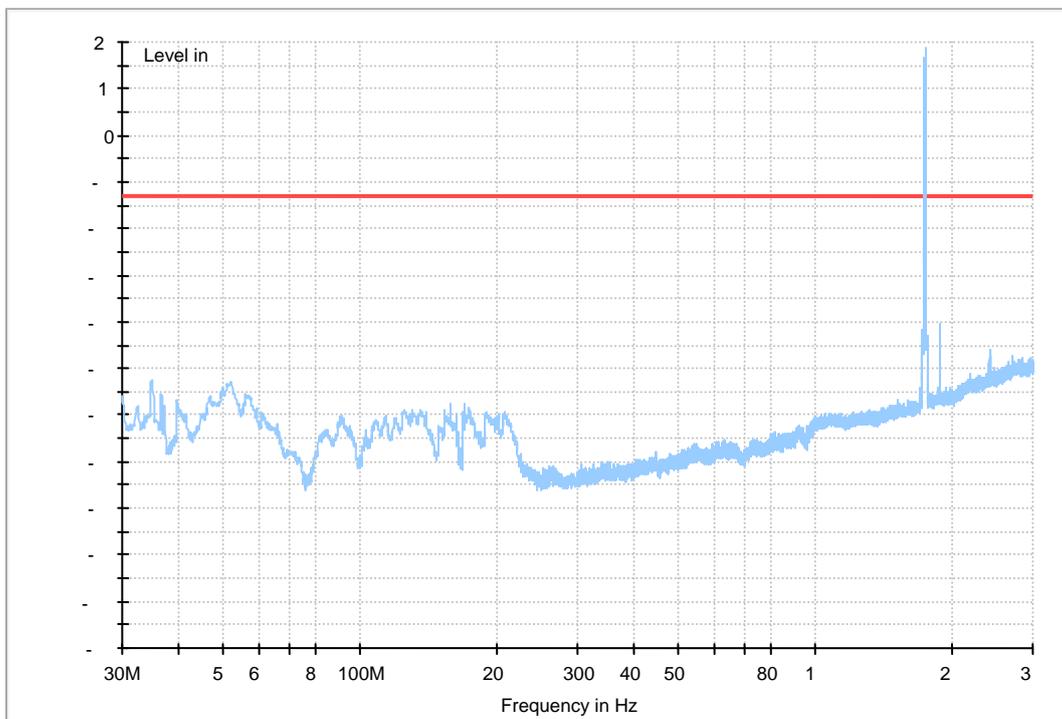
According to FCC Part 2.1053& Part 27.53(g)

WCDMA AWS

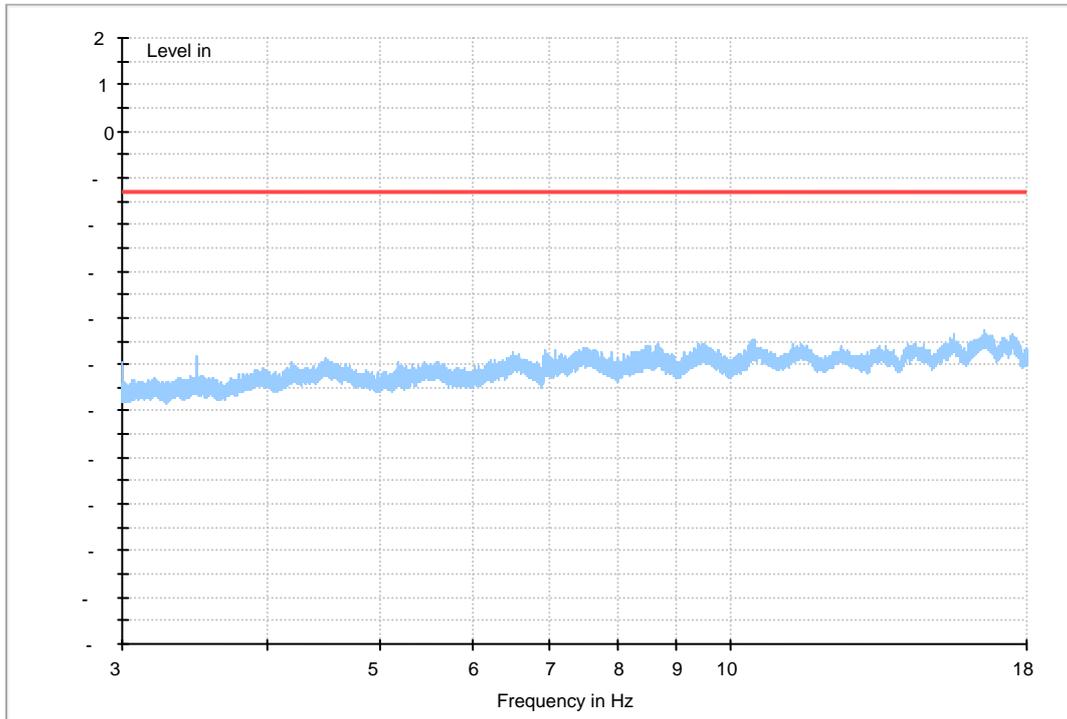
(9kHz~30MHz)



(30MHz~3GHz)

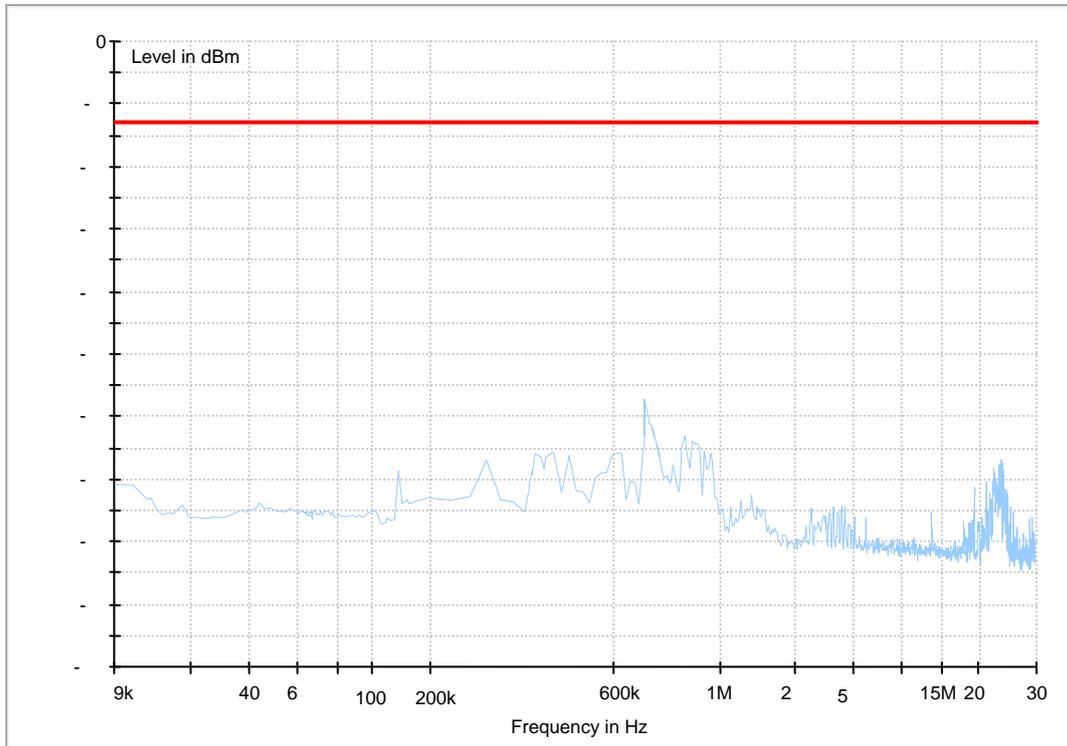


(3GHz~18GHz)

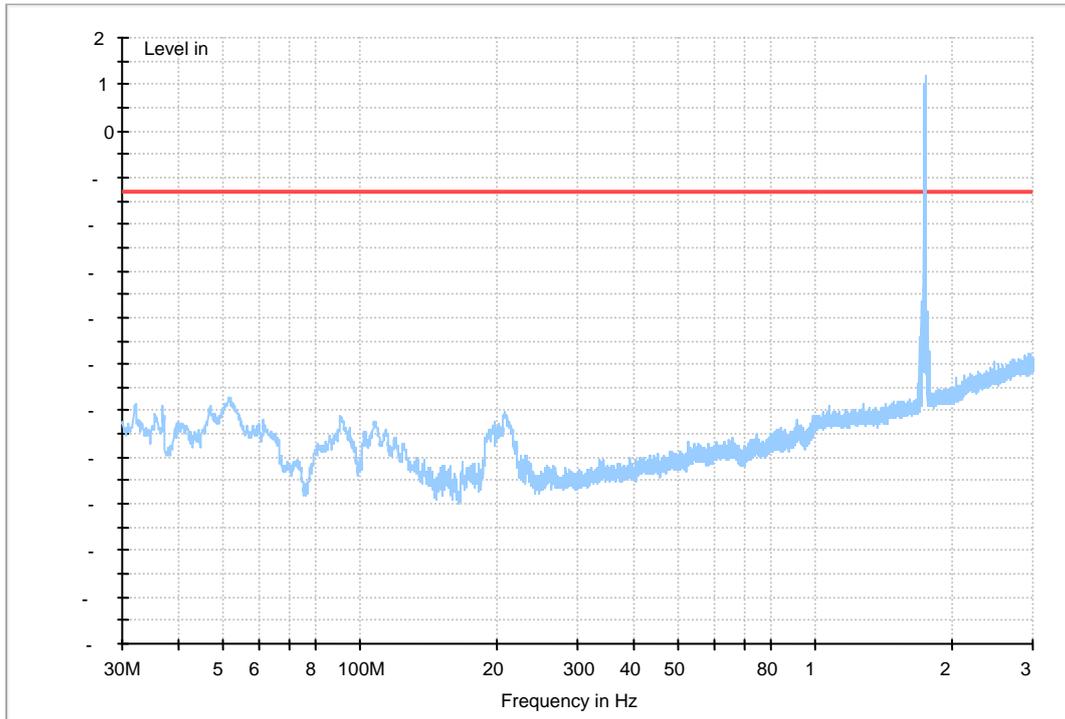


HSDPA AWS

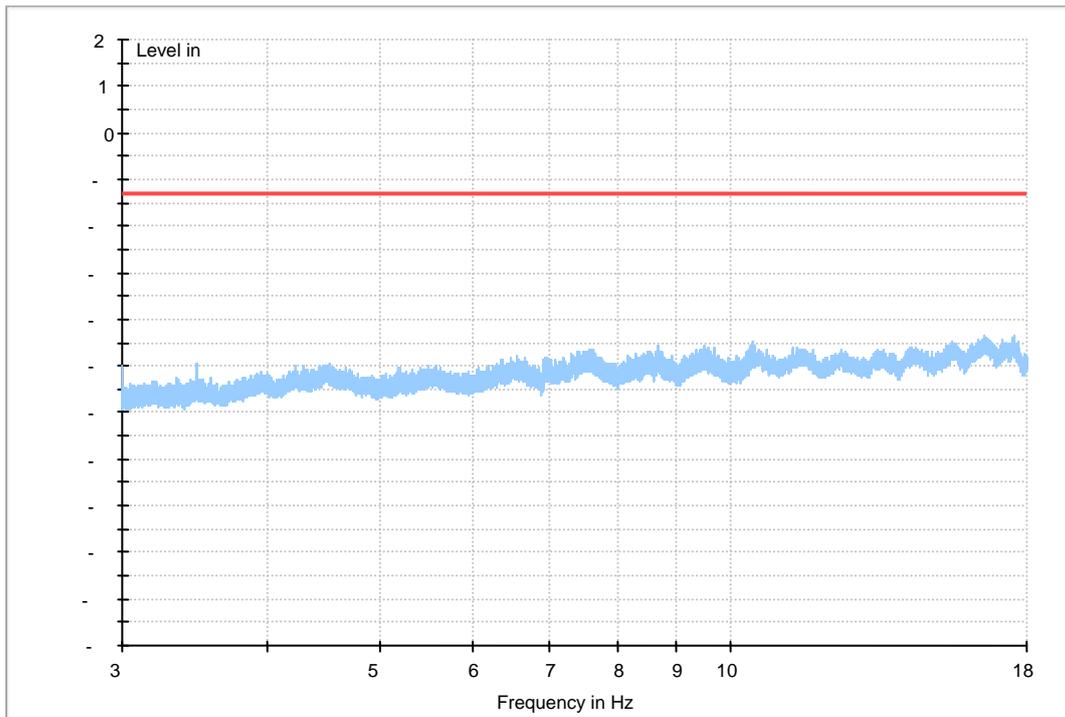
(9kHz~30MHz)



(30MHz~3GHz)

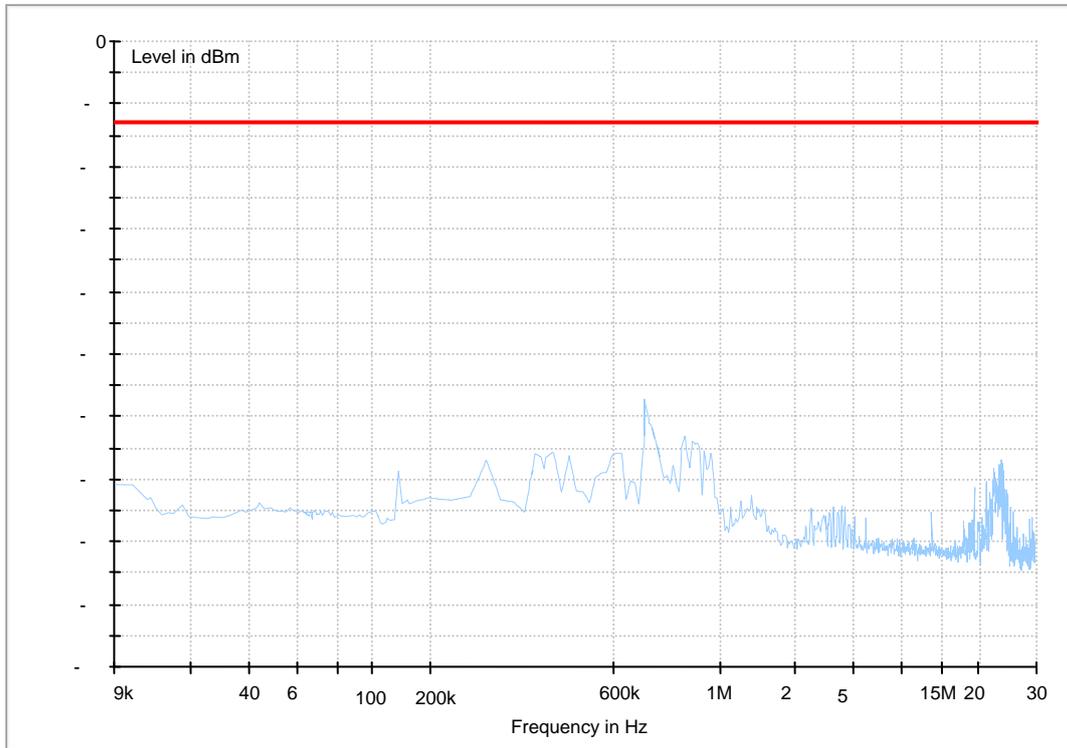


(3GHz~18GHz)

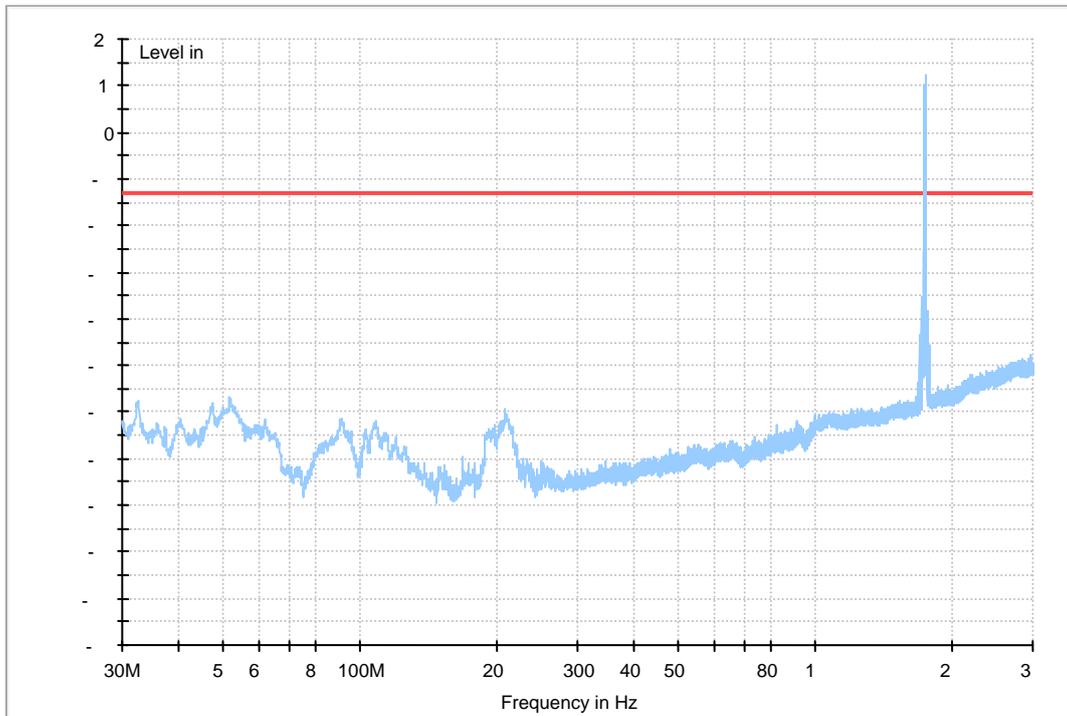


HSUPA AWS

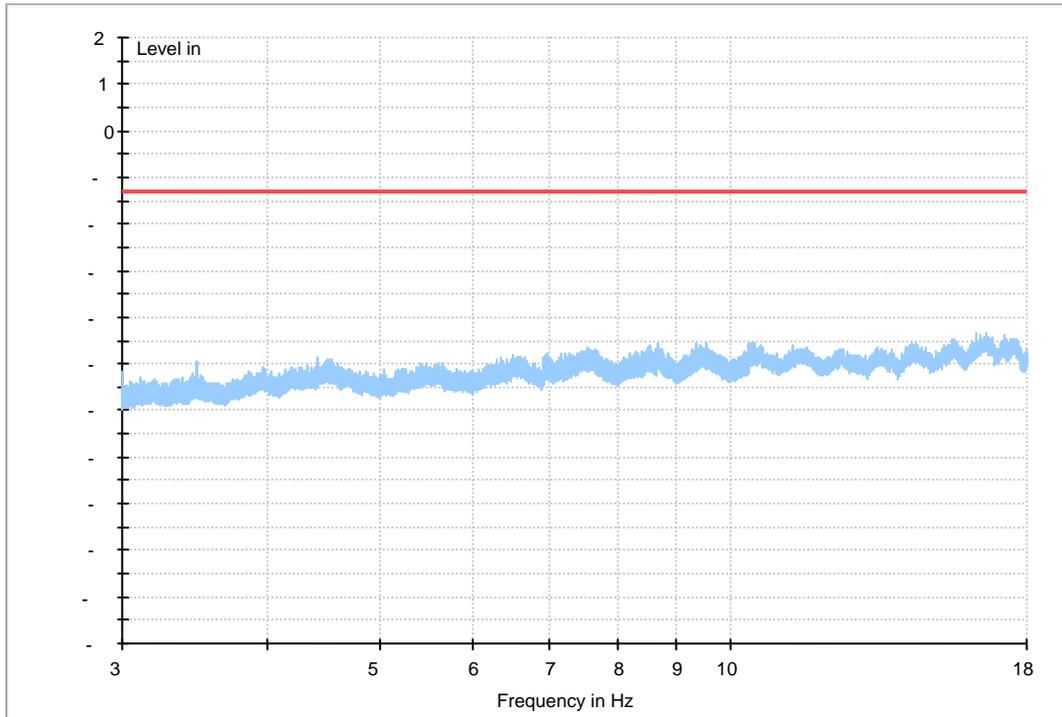
(9kHz~30MHz)



(30MHz~3GHz)



(3GHz~18GHz)



-----END-----



Appendix G

Frequency Stability According to FCC Part 2.1055 & Part 27.54



Frequency Error vs. Temperature:

Test Mode	RF Ch.	Volt.	Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Freq. vs. 20 °C [ppm]	Limit [ppm]	Verdict
TM 1	M	VN	-30 °C	9	0.00520	---	±2.5	Pass
			-20 °C	-15	-0.00866	---	±2.5	Pass
			-10 °C	-14	-0.00808	---	±2.5	Pass
			0 °C	10	0.00577	---	±2.5	Pass
			10 °C	-9	-0.00520	---	±2.5	Pass
			20 °C	-23	-0.01328	---	±2.5	Pass
			30 °C	13	0.00750	---	±2.5	Pass
			40 °C	-21	-0.01212	---	±2.5	Pass
		50 °C	-18	-0.01039	---	±2.5	Pass	

Frequency Error vs. Voltage:

Test Mode	RF Ch.	Temp.	Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Freq. vs. 20 °C [ppm]	Limit [ppm]	Verdict
TM 1	M	20 °C	VL	-15	-0.00866	---	±2.5	Pass
			VN	21	0.01212	---	±2.5	Pass
			VH	-8	-0.00462	---	±2.5	Pass

-----The END-----