



# FCC RF Test Report

**Product Name: Ascend D1;  
HSPA+/HSUPA/HSDPA/UMTS/GSM/GPRS/EDGE Mobile Phone  
with Bluetooth**

**Model Number: HUAWEI U9500, U9500,  
HUAWEI U9500-1, U9500-1, HUAWEI U9500-51, U9500-51**

**Report No: SYBH(Z-RF)013032012-2003  
FCC ID: QISU9500**

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China

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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".
5. The test report is invalid if not marked with the stamps or the signatures of the persons responsible for performing, revising and approving the test report.
6. The test report is invalid if there is any evidence of erasure and/or falsification.
7. If there is any dissidence for the test report, please file objection to the test centre within 15 days from the date of receiving the test report.
8. Normally, the test report is only responsible for the samples that have undergone the test.
9. Context of the test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of the laboratory.



**Applicant:** Huawei Technologies Co., Ltd.  
**Address:** Huawei Base, Bantian, Longgang District, Shenzhen  
518129, P.R. China  
**Date of Receipt Test Item:** Mar.02, 2012  
**Start Date of Test:** Mar.03, 2012  
**End Date of Test:** Mar.15, 2012  
  
**Test Result:** Pass

Approved By Senior Engineer Mar.17, 2012 Dai Linjun *Dai Linjun*  
Date Name Signature

Reviewed By Mar.17, 2012 Cousy Xu *Cousy XU*  
Date Name Signature

Operator Mar.17, 2012 Huang Qiuliang *Huang Qiuliang*  
Date Name Signature

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# 1 General Information

## 1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 2:2010, Subpart J  
47 CFR FCC Part 27:2010, 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 Environment 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	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 <sup>th</sup> 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 Production Information

##### 3.1.1 General Description

HUAWEI U9500, U9500, HUAWEI U9500-1, U9500-1, HUAWEI U9500-51, U9500-51 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

Ascend D1; HSPA+/HSUPA/HSDPA/UMTS/GSM/GPRS/EDGE Mobile Phone with Bluetooth	
HUAWEI U9500, U9500, HUAWEI U9500-1, U9500-1, HUAWEI U9500-51, U9500-51	
Board and Module	
Hardware Version	Software Version
Ver.B	U9500-1V100R001CHNC00B200-WMC

##### 3.1.3 Adapter Technical Data

AC/DCAdapter Model	HW-050100E3W
Manufacturer	HUIZHOU BYD ELECTRONIC CO., LTD.
Input Voltage	~100-240V 50/60Hz 0.2A
Output Voltage	5V <b>===</b> 1A
Rated Power	5W

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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: HB4Q1 Rated capacity: 1670mAh Nominal Voltage:  +3.7V Charging Voltage:  +4.2V

## 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)	0.08
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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: $\approx$ 3.7 V DC Voltage Range: $\approx$ 3.5 V to 4.2 V
Input to EUT (AC power)	AC Voltage Nominal: ~ 230 V (50/60 Hz) AC Voltage Range: ~100-240V

## 5 General Test Conditions / Configurations

### 5.1 RF Channels under Test

Test Mode	TX / RX	RF Channel		
		Bottom (B)	Middle (M)	Top (T)
TM1/TM2/TM3	TX	Channel1312(B)	Channel1412(M)	Channel1513(T)
		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 Environments

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Temperature	TN	Ambient
Voltage	VL	3.5V
	VN	3.7V
	VH	4.2V

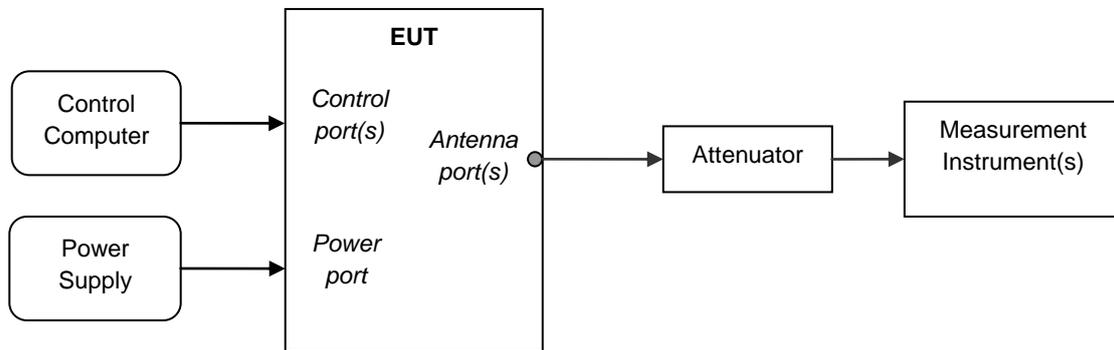
NOTE: VL= lower extreme test voltages  
VN= nominal voltage  
VH= upper extreme test voltage  
TN= normal temperature

## 5.4 Test Setups

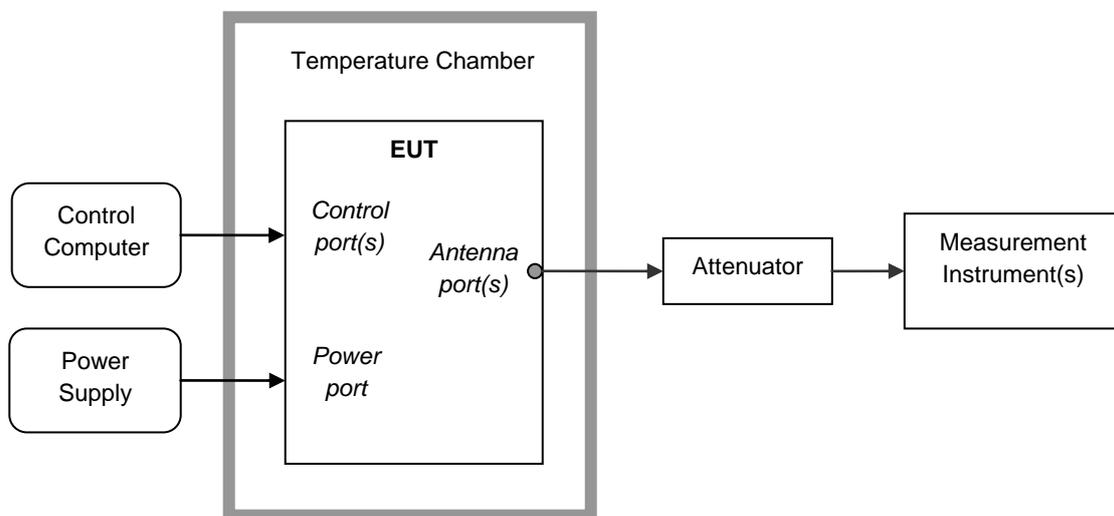
### 5.4.1 General Test Setup Configurations

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



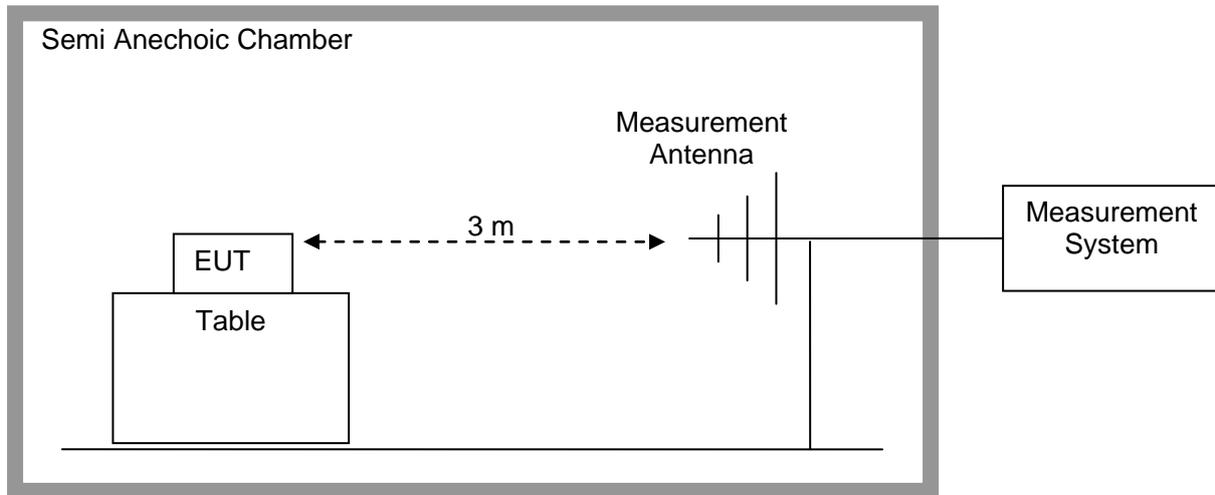
### 5.4.3 Test Setup 2



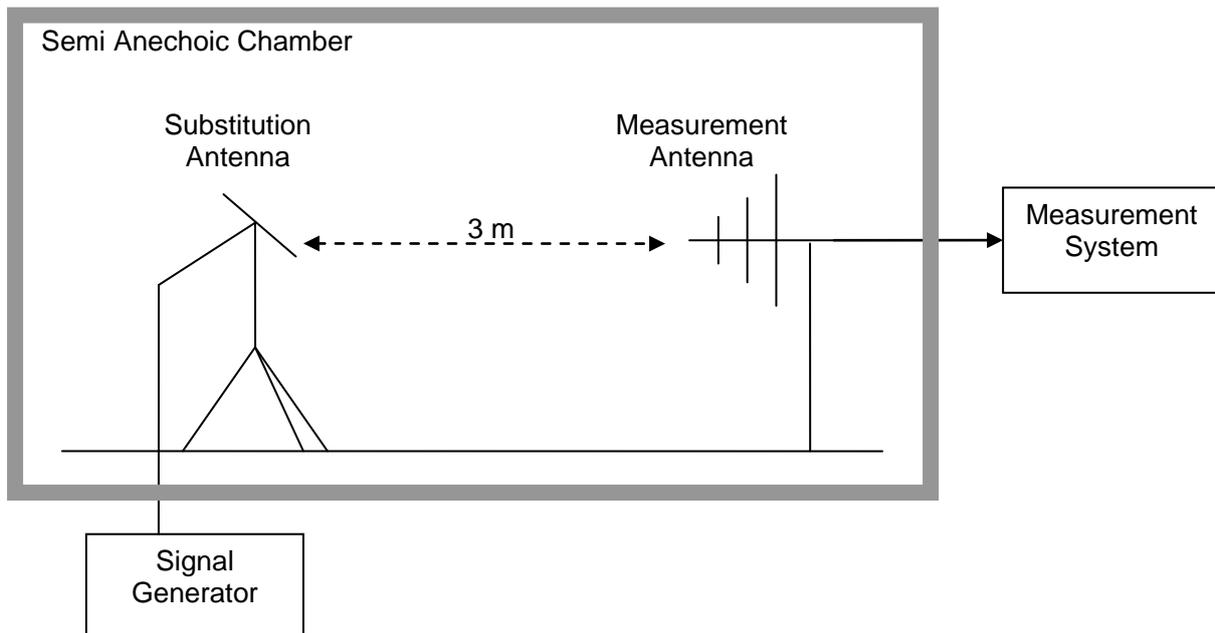
### 5.4.4 Test Setup 3

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

#### Step 1: Pre-test



#### Step 2: Substitution method to verify the maximum EIRP



## 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)	B, M, T
	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)	B, M, T
	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)	B, M, T
	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



Test Case	Test Conditions	
	RF Channels (TX)	M
	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	Sep.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	Apr.20,2012
Signal Analyzer	R&S	FSQ31	200021	Sep.27,2012
Temperature Chamber	WEISS	WKL64	24600294	Feb.13,2013
Signal generator	Agilent	E8257D	MY49281095	Jul.09.2012
Test receiver	R&S	ESU26	100150	May.29.2012
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	919/1009	Jan.29.2013
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	Jan.29.2013
Horn Antenna	R & S	HF906	100683	May.15, 2012
Horn Antenna	R & S	HF906	100684	Jul.01, 2012
Broadband Antenna	Schwarzbeck	VULB 9163	9163-357	May.15, 2012
Broadband Antenna	Schwarzbeck	VULB 9163	9163-356	May.15, 2012

## 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 Field Strength of Spurious Radiation	Appendix H

NOTE: The Appendix H only photos of Field Strength of Spurious Radiation, no test data.

## 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-----  
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# Appendix A

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



## Conducted Power of Transmitter

TEST CONDITIONS		RF Output Power (Conducted)					
		Channel1312(B)		Channel1412 (M)		Channel1513(T)	
		1712.4MHz		1732.4MHz		1752.6MHz	
		dBm		dBm		dBm	
$T_{nom} / V_{nom}$		Measured	Limit	Measured	Limit	Measured	Limit
TM1		23.56	30	23.54	30	23.67	30
TM2	Case1	23.22	30	23.14	30	23.31	30
	Case2	21.98	30	21.94	30	22.1	30
	Case3	21.64	30	21.6	30	21.74	30
	Case4	21.38	30	21.34	30	21.47	30
TM3	Case1	22.16	30	22.13	30	22.25	30
	Case2	19.84	30	19.79	30	19.91	30
	Case3	20.95	30	20.94	30	21.06	30
	Case4	20.4	30	20.39	30	20.51	30
	Case5	22.32	30	22.36	30	22.45	30



## Effective Isotropic Radiated Power of Transmitter (EIRP)

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (EIRP)	FCC limit [dBm]	Result
							[dBm]		
TM1	1712.4	23.64	Horn Ant.	20.15	4.5	1	23.65	30	Pass
TM1	1732.4	23.62	Horn Ant.	20.18	4.5	1	23.68	30	Pass
TM1	1752.6	23.75	Horn Ant.	19.99	4.8	1	23.79	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-----



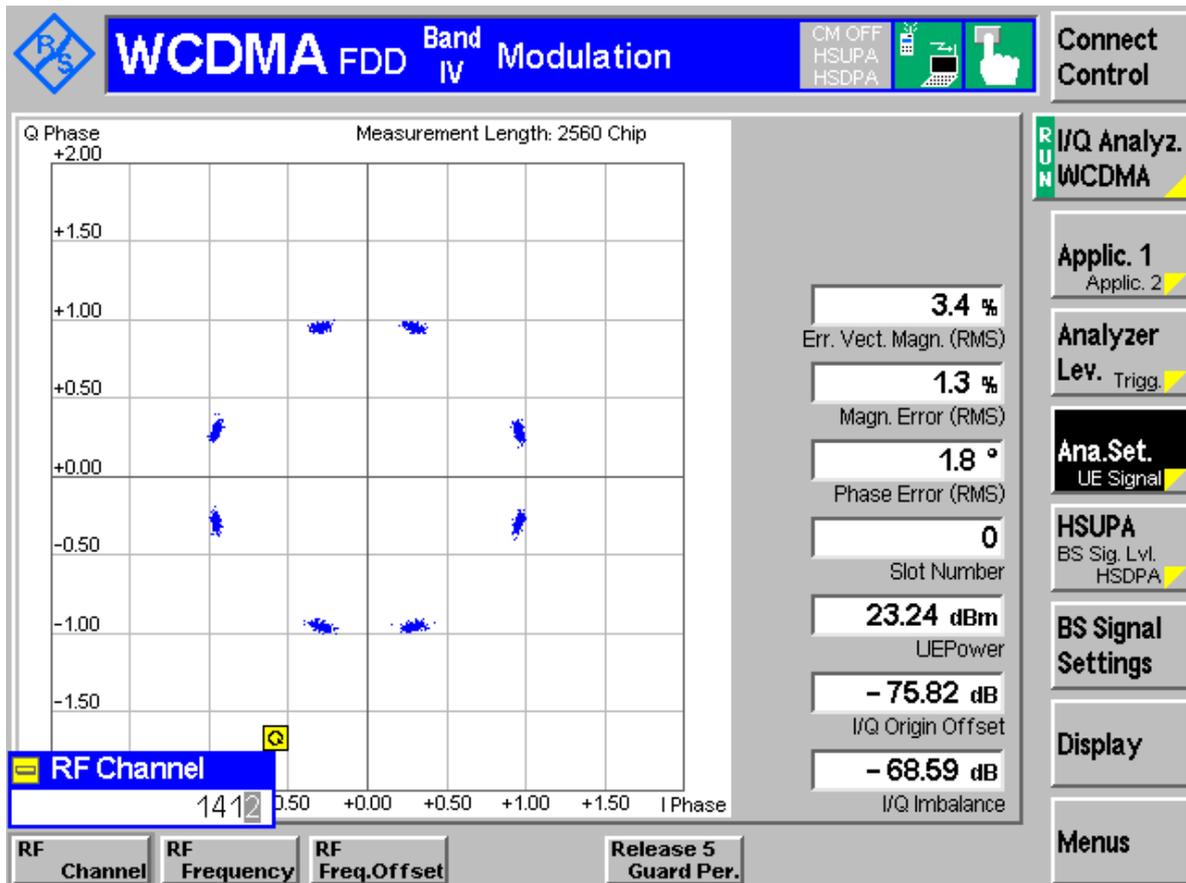
## Appendix B

# Modulation Characteristics

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



# TM1: WCDMA Channel 1412



-----The END-----  
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# 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	4.05	Pass
	1412	4.05	Pass
	1513	4.07	Pass

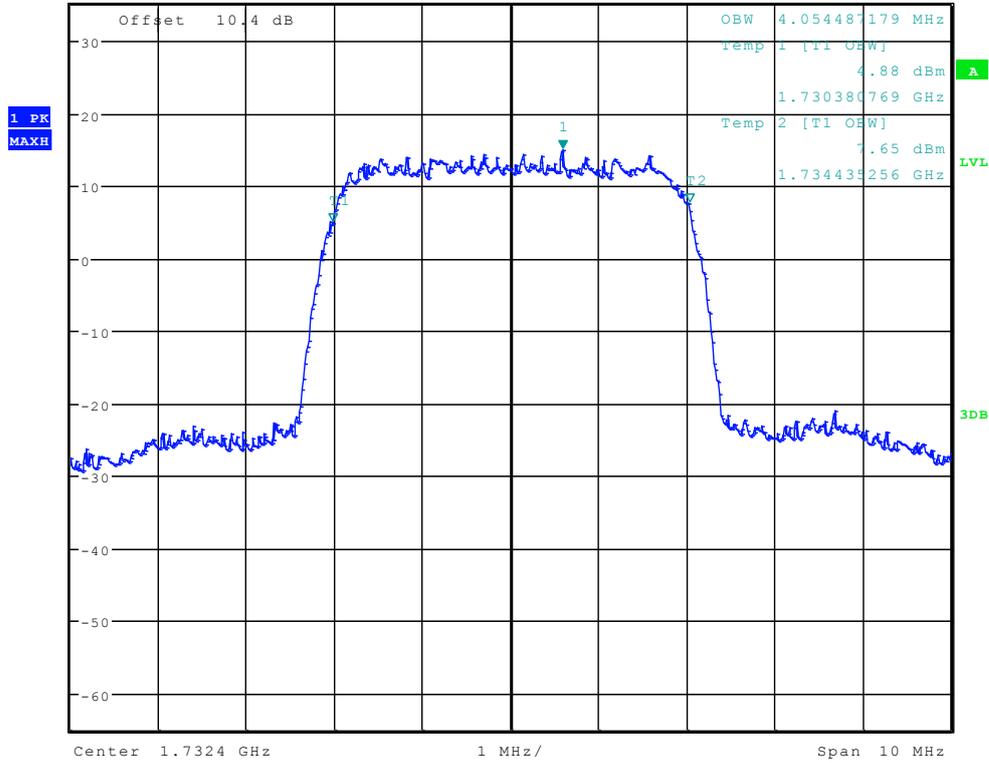




# Channel 1412



\*RBW 50 kHz      Marker 1 [T1 ]  
 \*VBW 500 kHz      14.84 dBm  
 Ref 35 dBm      Att 30 dB      SWT 5 ms      1.732992949 GHz



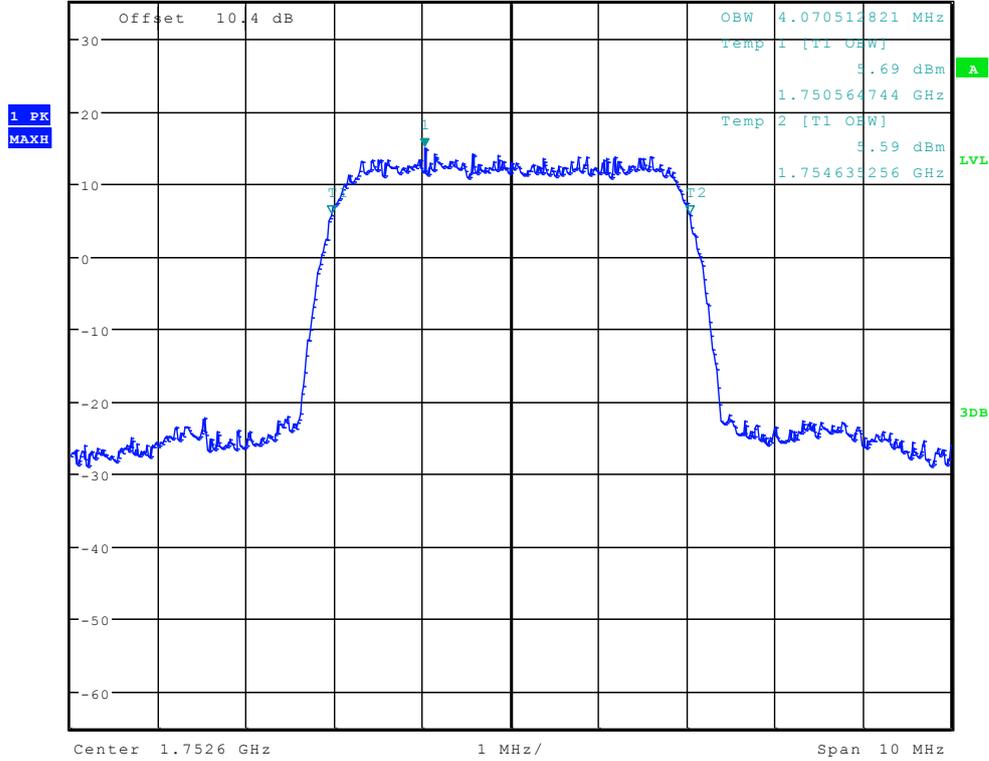
Date: 5.MAR.2012 00:03:09



# Channel 1513



\*RBW 50 kHz      Marker 1 [T1 ]  
 \*VBW 500 kHz      14.86 dBm  
 Ref 35 dBm      Att 30 dB      SWT 5 ms      1.751622436 GHz



Date: 5.MAR.2012 00:03:22

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



# Appendix D

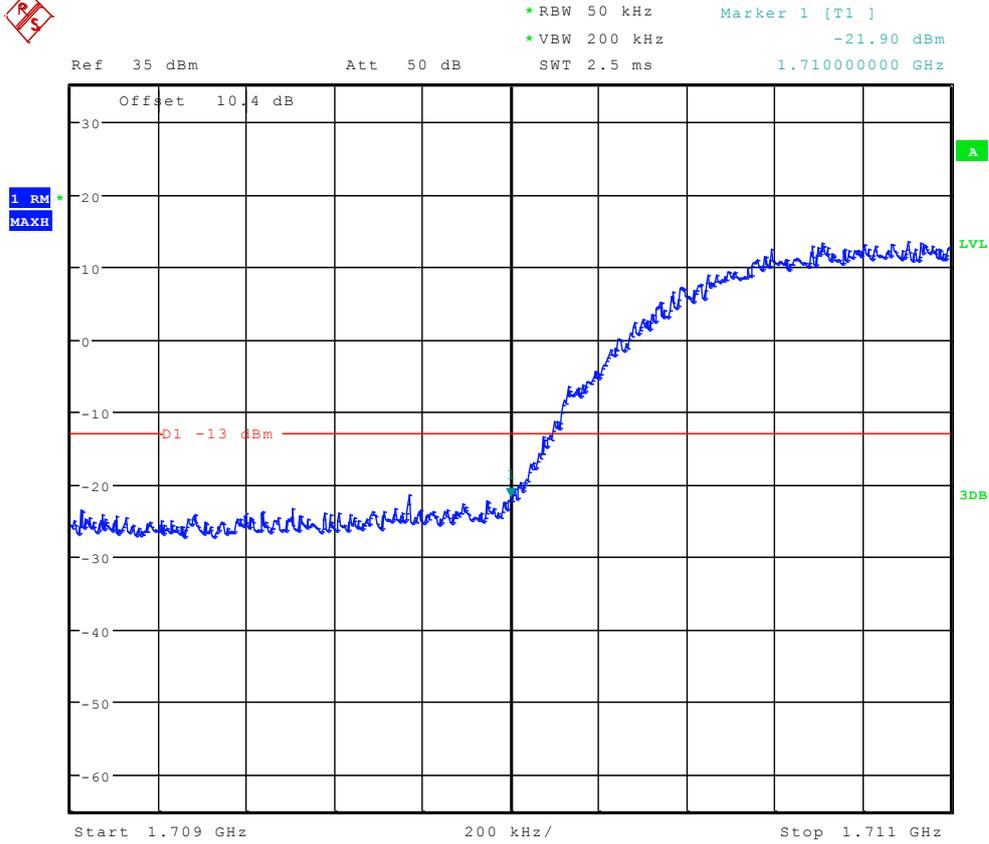
## Band Edges Compliance According to FCC Part 2.1051 & Part 27 Subpart C&L



# TM1: WCDMA

## Left Edge

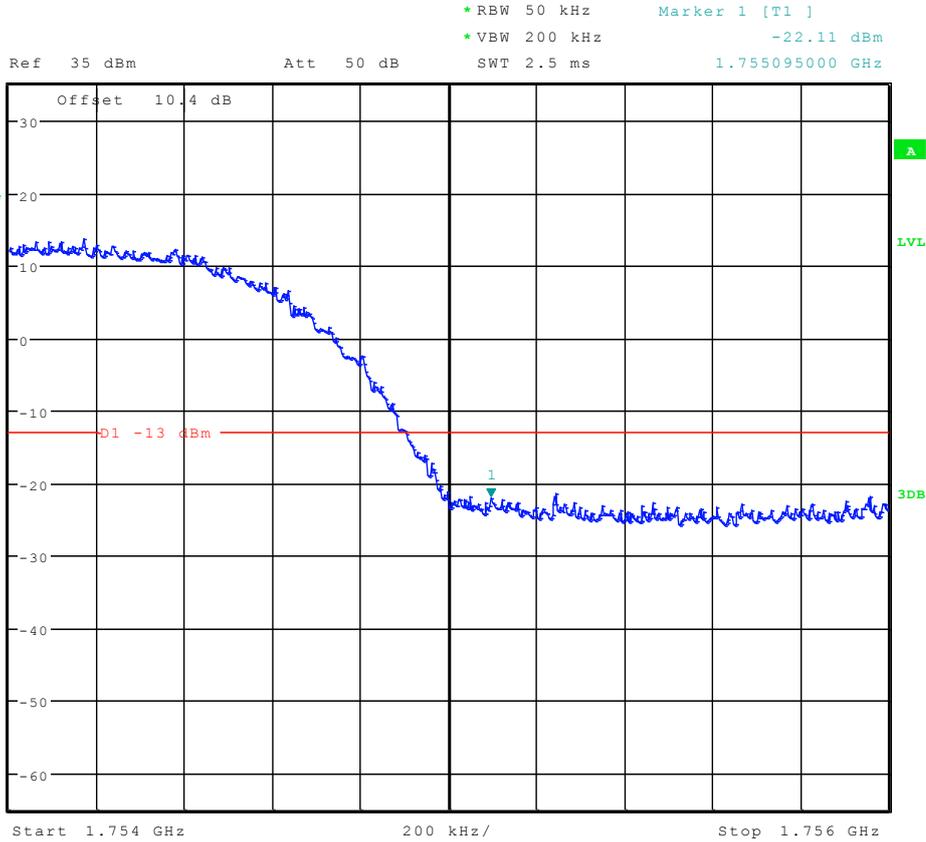
### Channel 1312



Date: 5.MAR.2012 00:05:48



## Right Edge Channel 1513



Date: 5.MAR.2012 00:06:02

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



## Appendix E

# Spurious Emission at Antenna Terminal

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

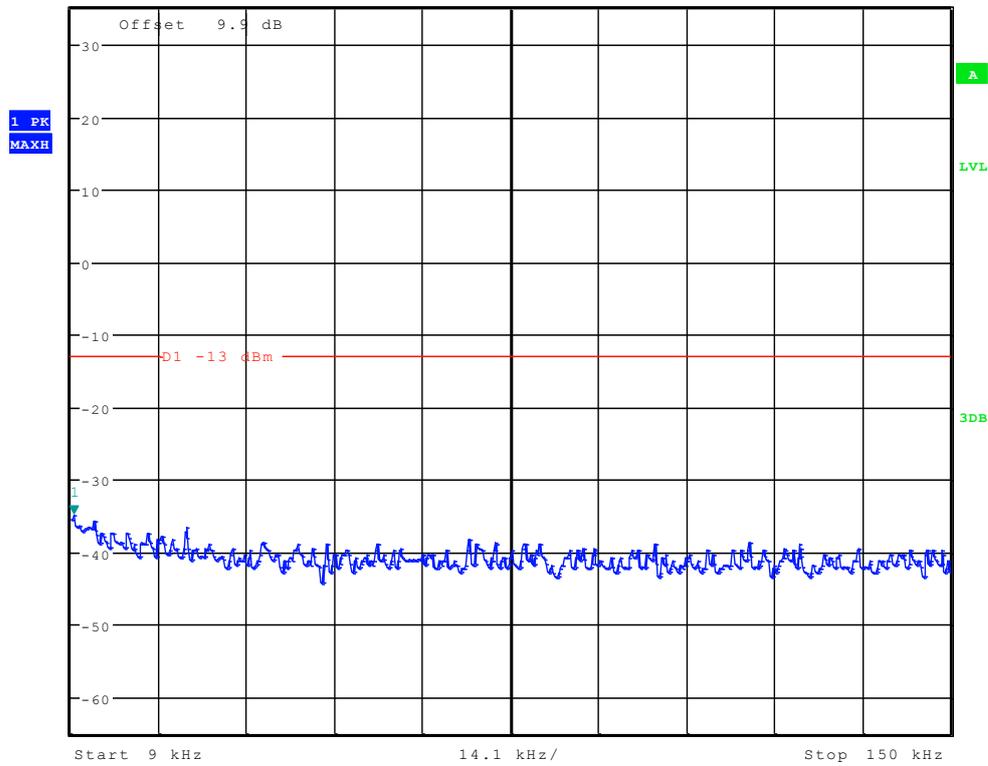


# TM1: WCDMA

## Channel 1312



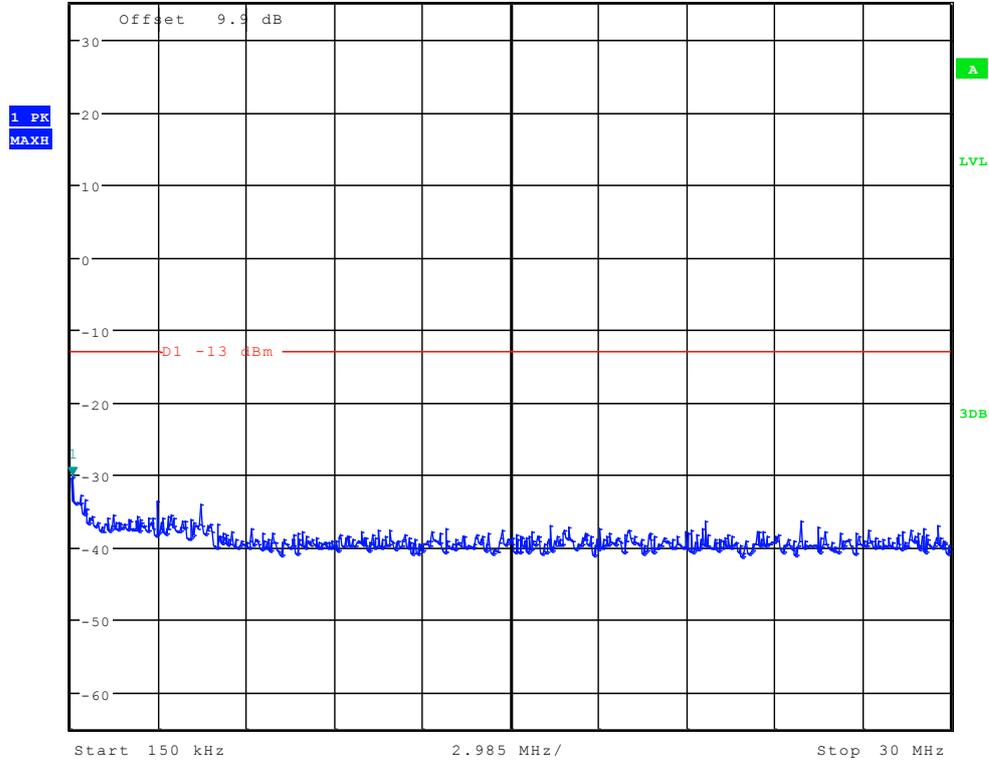
Ref 35 dBm Att 55 dB SWT 145 ms  
\*RBW 1 kHz Marker 1 [T1] -34.87 dBm  
\*VBW 10 kHz 9.451923077 kHz



Date: 5.MAR.2012 00:03:37



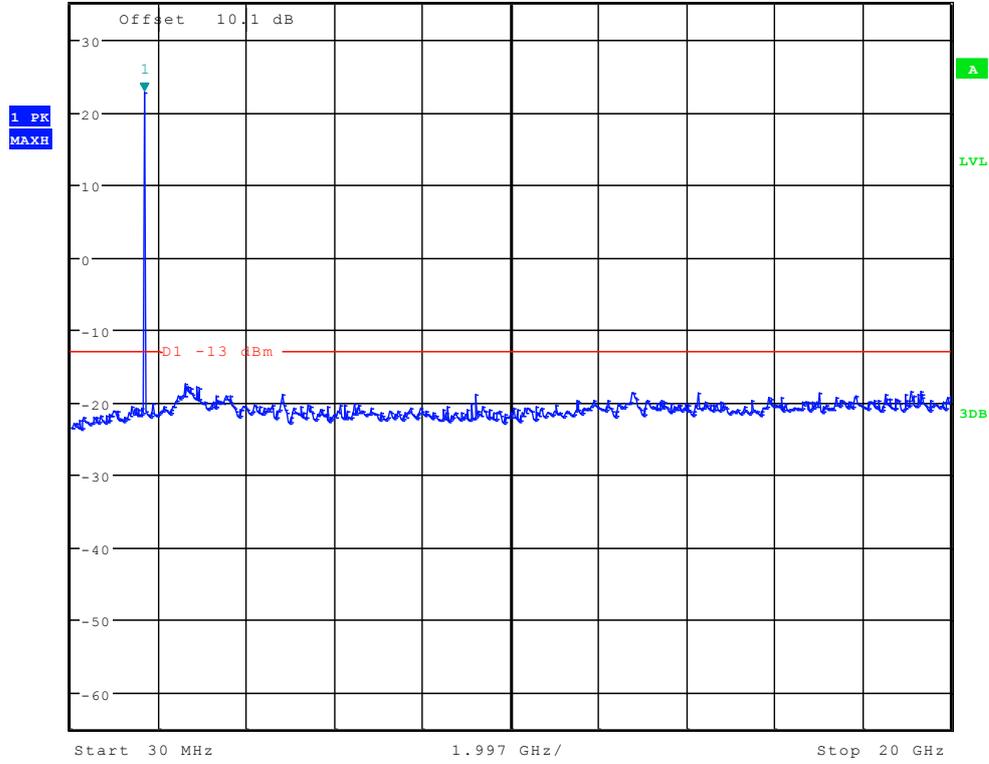
Ref 35 dBm Att 55 dB SWT 300 ms 197.836538462 kHz  
\*RBW 10 kHz Marker 1 [T1]  
\*VBW 30 kHz -30.22 dBm



Date: 5.MAR.2012 00:04:21



Ref 35 dBm Att 50 dB SWT 115 ms  
\*RBW 1 MHz Marker 1 [T1] 22.76 dBm  
\*VBW 3 MHz  
1.694166667 GHz



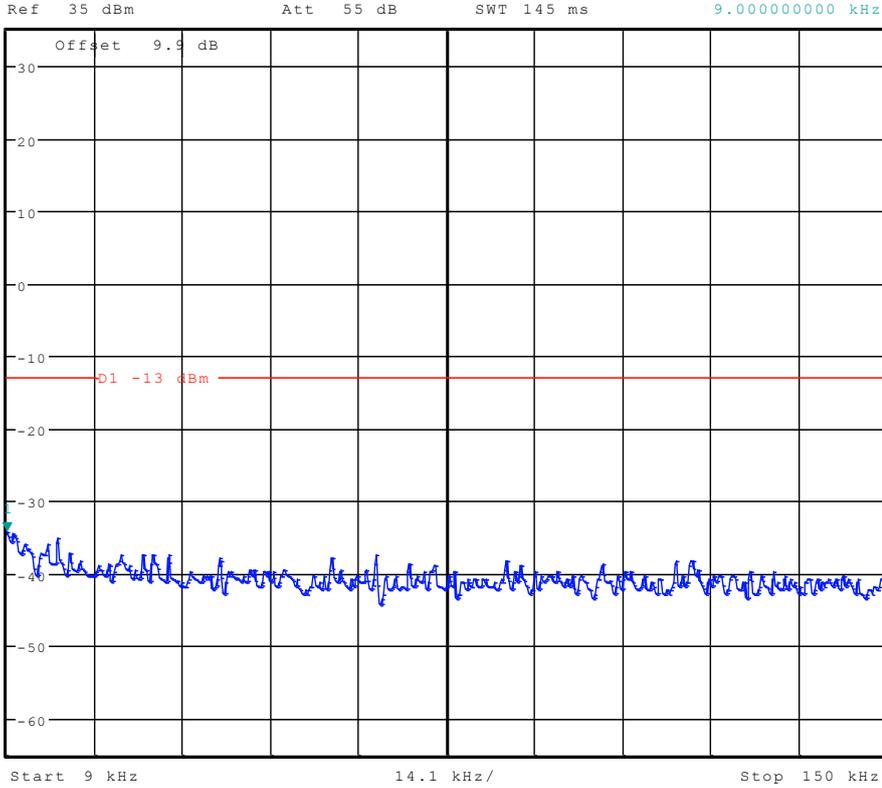
Date: 5.MAR.2012 00:05:05



# Channel 1412



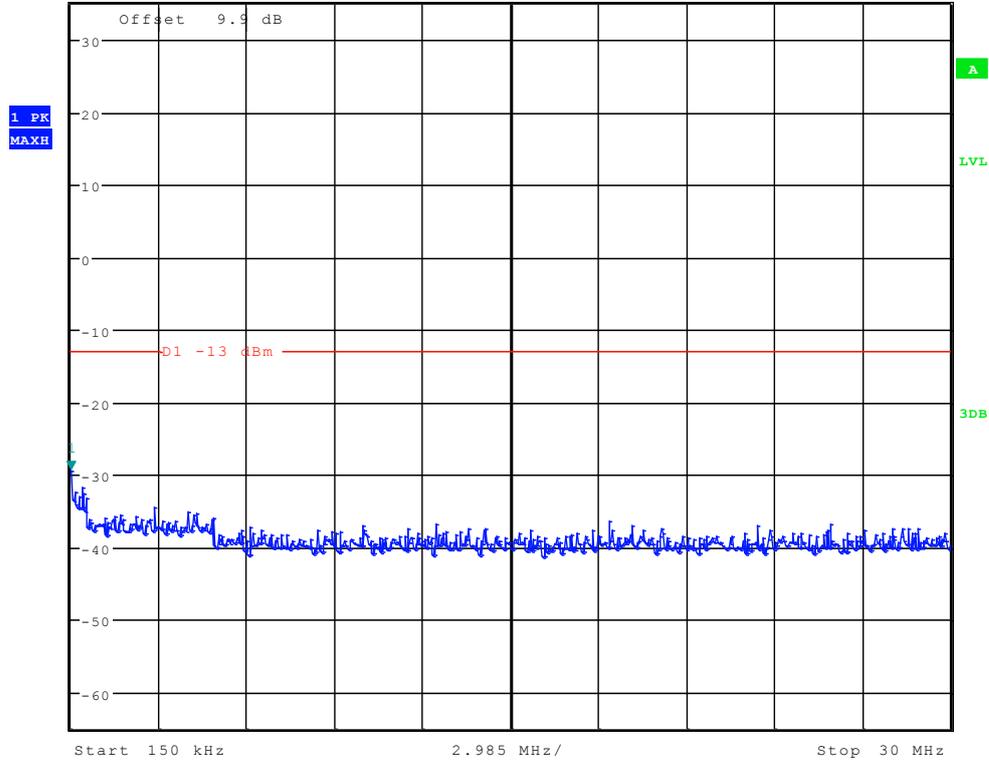
\*RBW 1 kHz      Marker 1 [T1 ]  
\*VBW 10 kHz      -34.19 dBm  
SWT 145 ms      9.000000000 kHz



Date: 5.MAR.2012 00:03:52



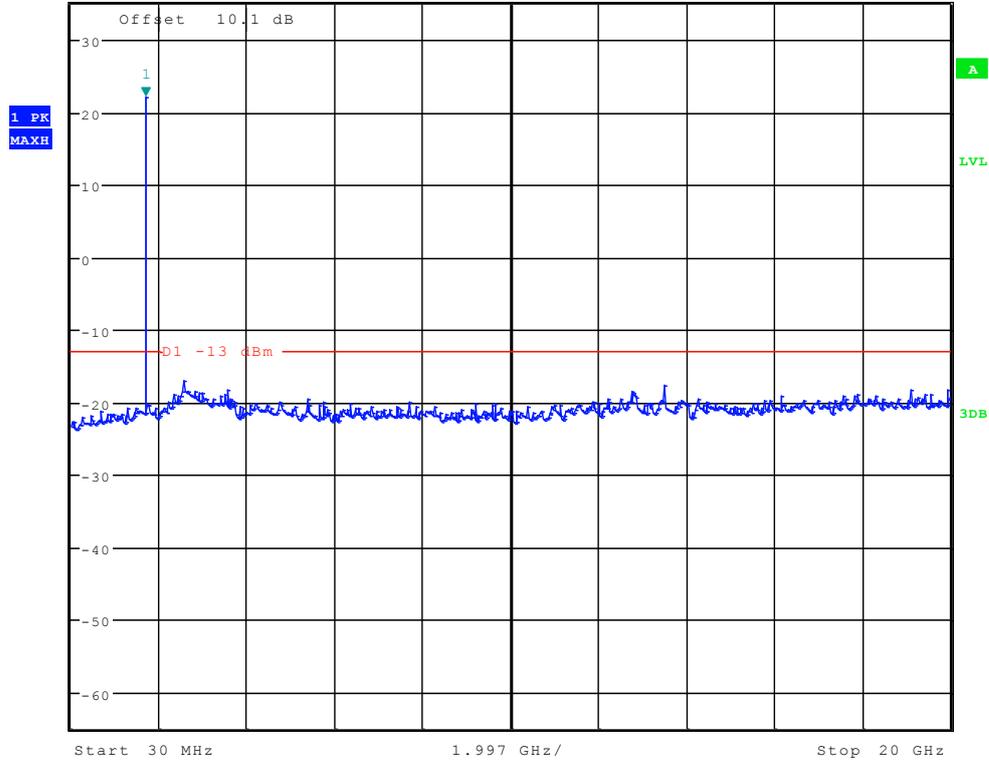
Ref 35 dBm Att 55 dB SWT 300 ms 150.00000000 kHz  
\*RBW 10 kHz Marker 1 [T1 ]  
\*VBW 30 kHz -29.32 dBm



Date: 5.MAR.2012 00:04:35



Ref 35 dBm Att 50 dB SWT 115 ms  
\*RBW 1 MHz Marker 1 [T1] 22.03 dBm  
\*VBW 3 MHz 1.726169872 GHz



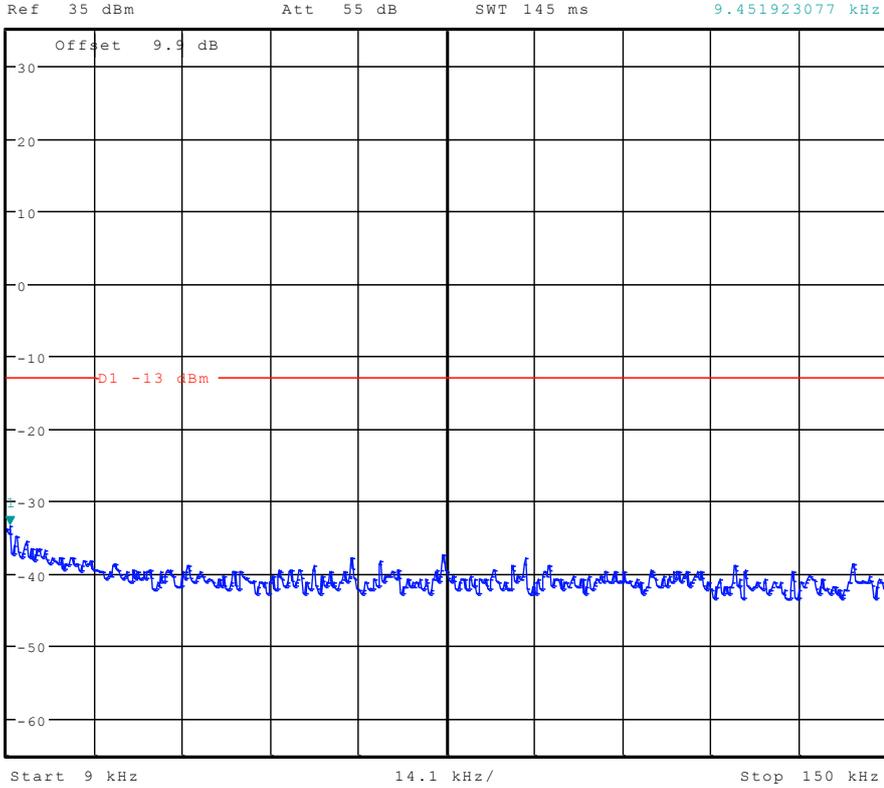
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# Channel 1513



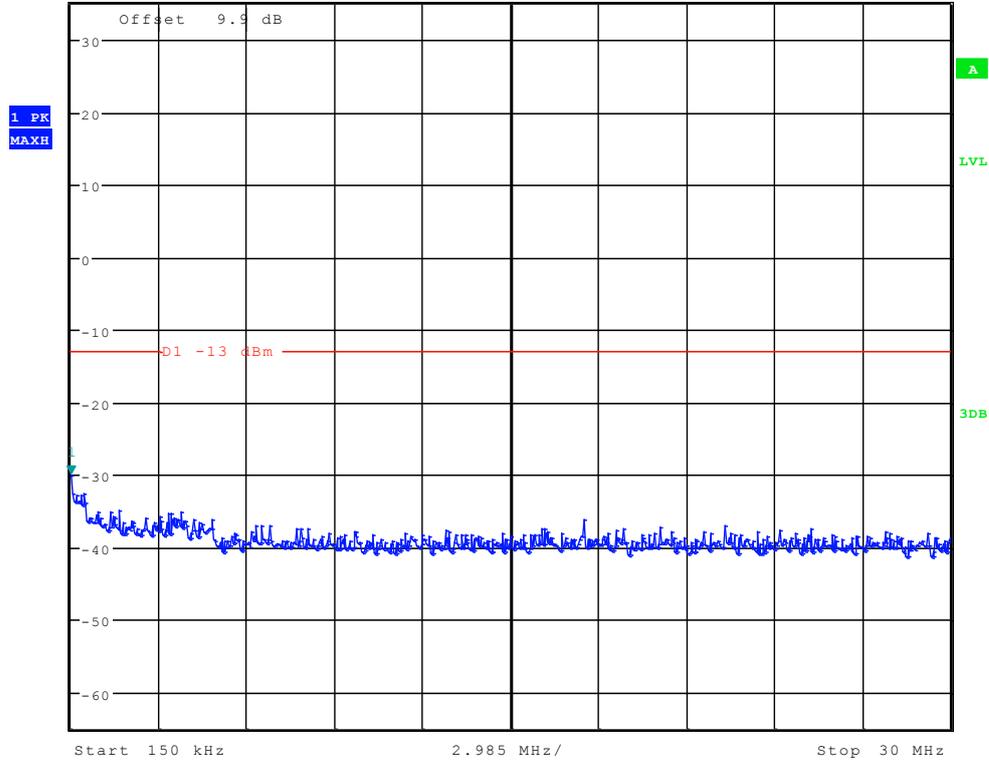
\*RBW 1 kHz      Marker 1 [T1 ]  
\*VBW 10 kHz      -33.48 dBm  
SWT 145 ms      9.451923077 kHz



Date: 5.MAR.2012 00:04:06



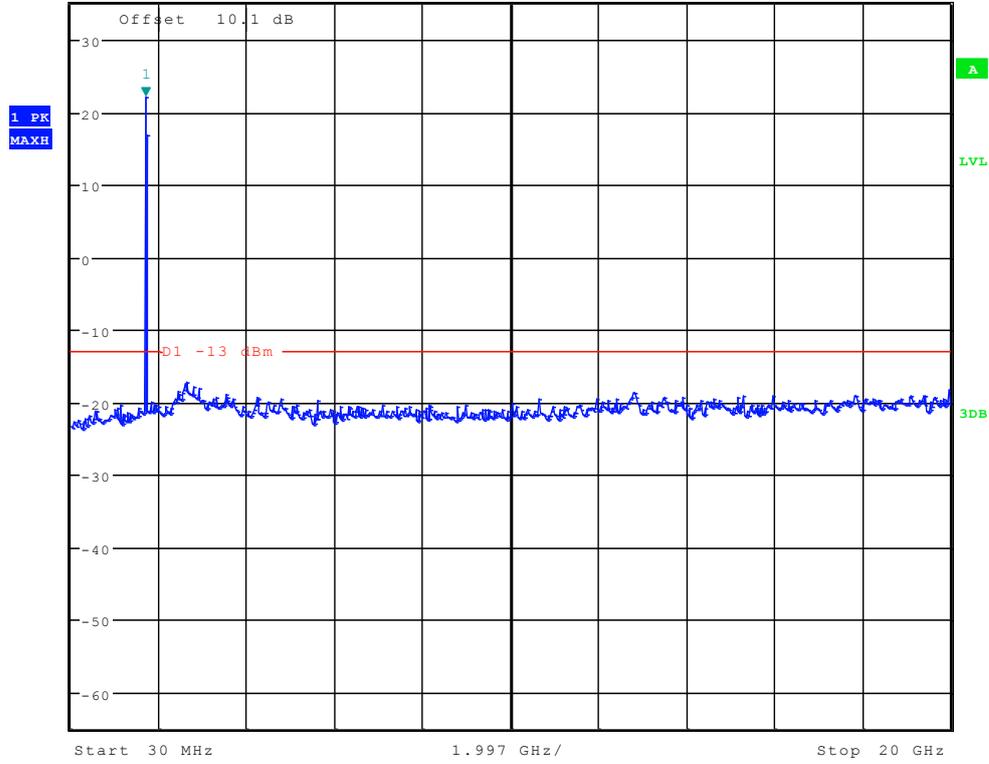
Ref 35 dBm Att 55 dB SWT 300 ms 150.00000000 kHz  
\*RBW 10 kHz Marker 1 [T1]  
\*VBW 30 kHz -30.04 dBm



Date: 5.MAR.2012 00:04:50



Ref 35 dBm Att 50 dB SWT 115 ms  
\*RBW 1 MHz Marker 1 [T1] 21.98 dBm  
\*VBW 3 MHz  
1.726169872 GHz



Date: 5.MAR.2012 00:05:34

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



# Appendix F

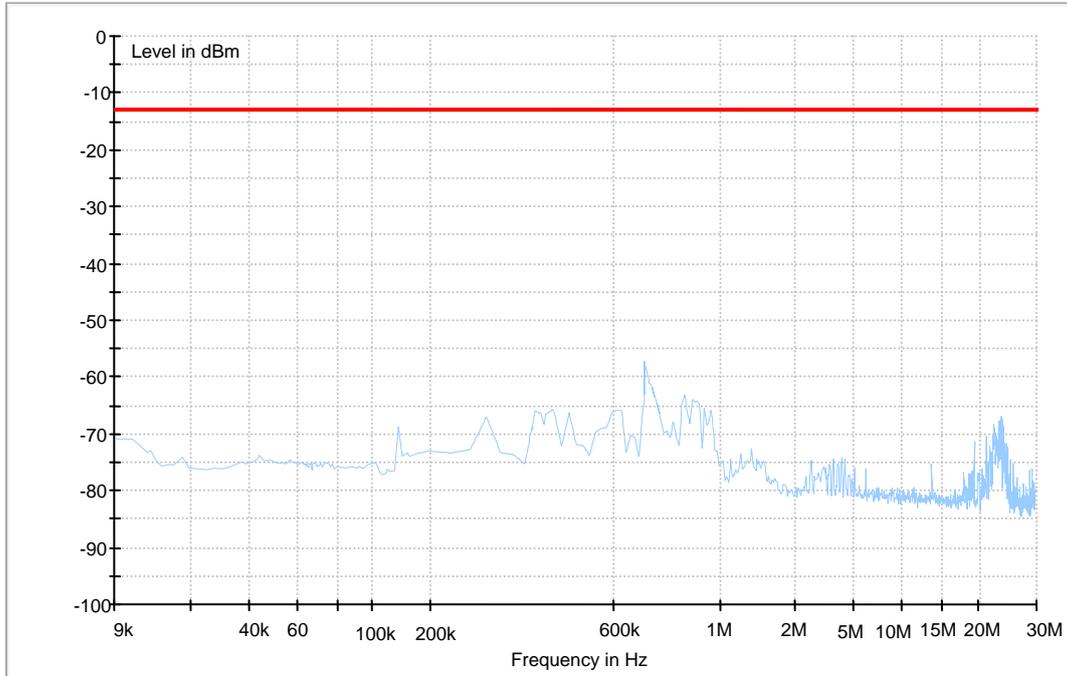
## Radiated spurious emission

According to FCC Part 2.1053& Part 27.53(g)



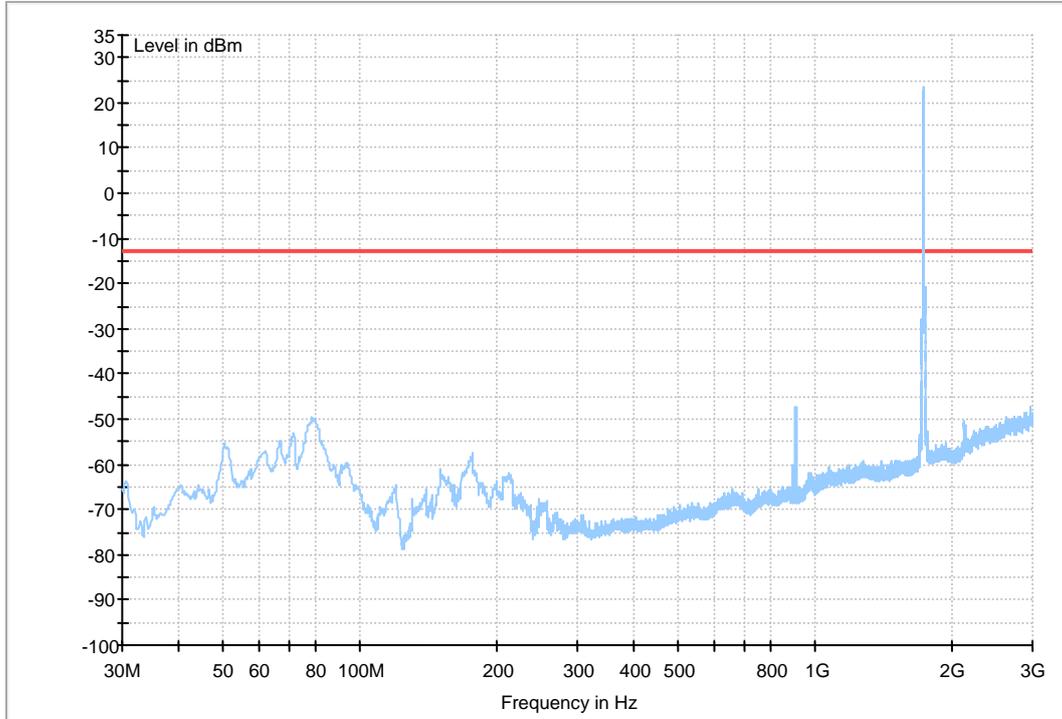
## WCDMA AWS

### Traffic Mode (9kHz-30MHz)



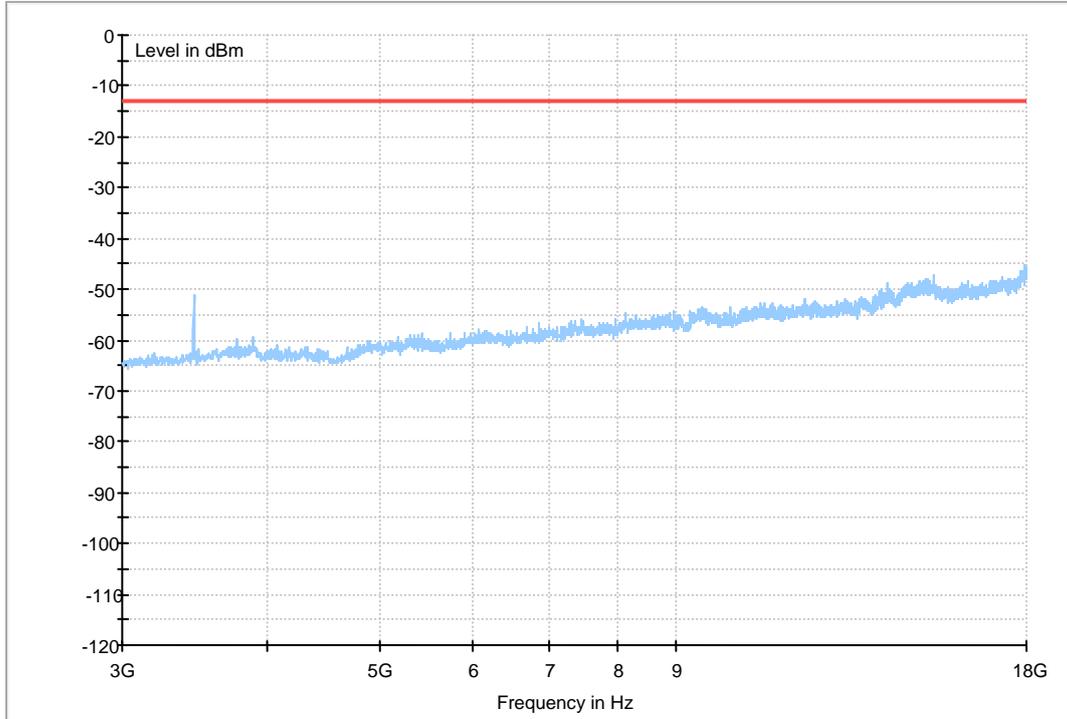


## Traffic Mode (30MHz-3GHz)





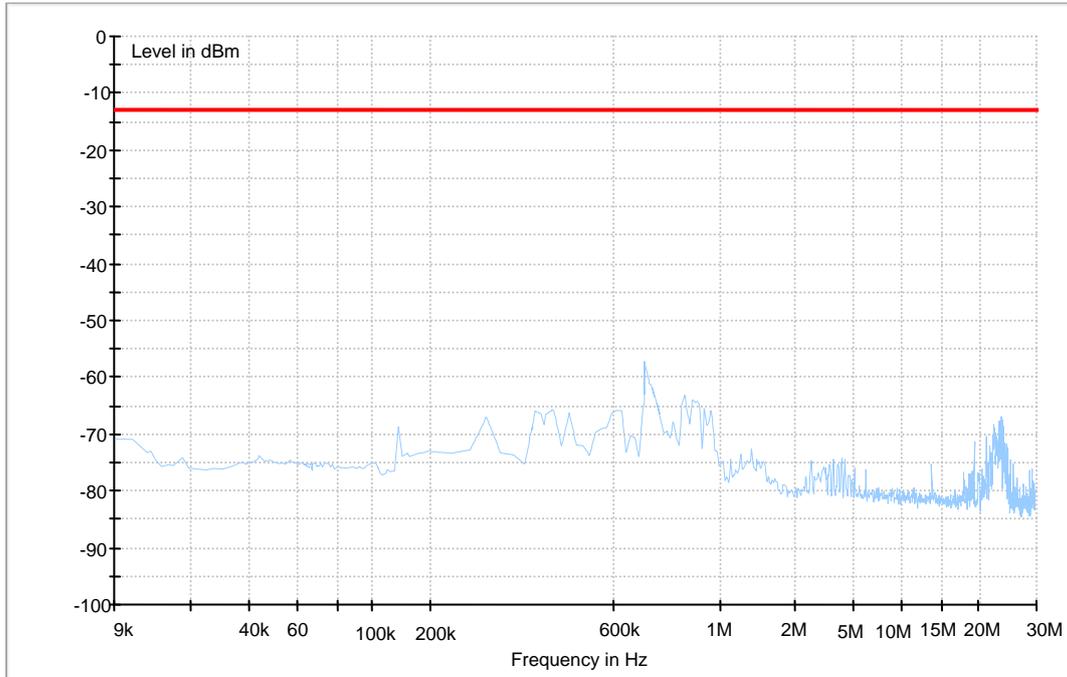
## Traffic Mode (3GHz-18GHz)





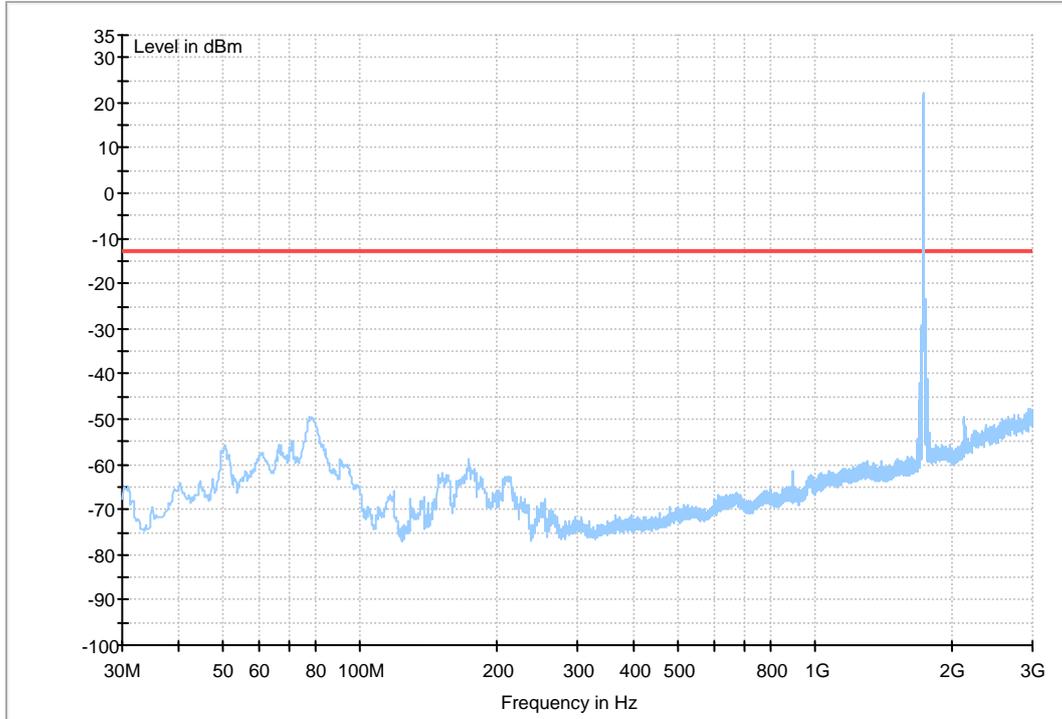
## HSDPA AWS

Traffic Mode (9kHz-30MHz)



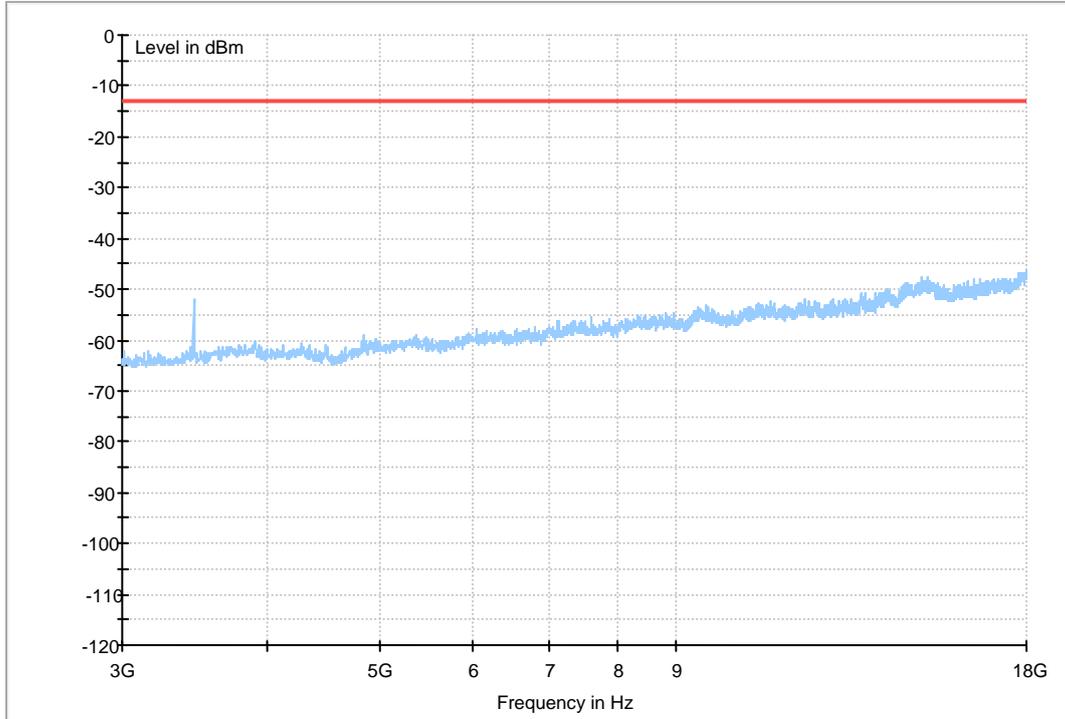


## Traffic Mode (30MHz-3GHz)





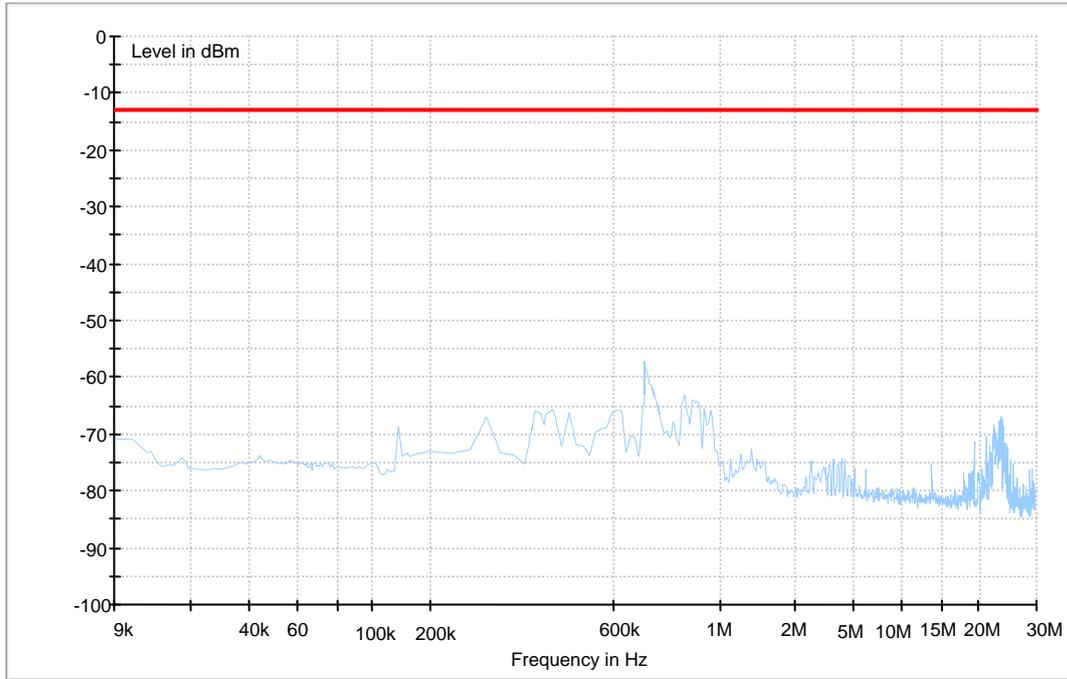
## Traffic Mode (3GHz-18GHz)





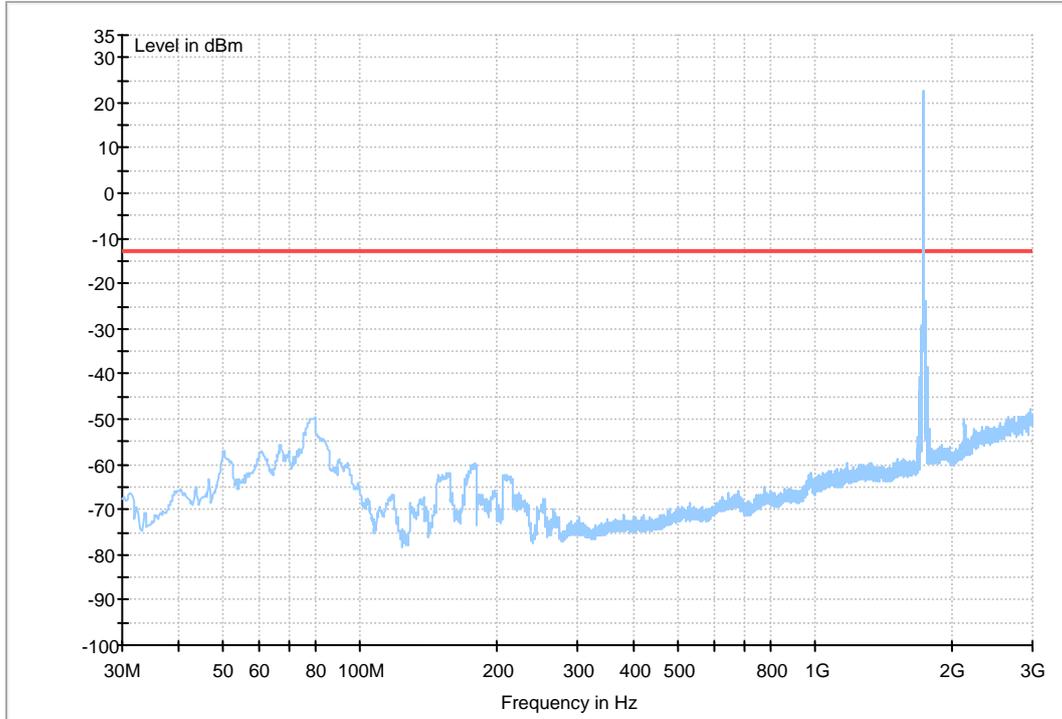
## HSUPA AWS

Traffic Mode (9kHz-30MHz)



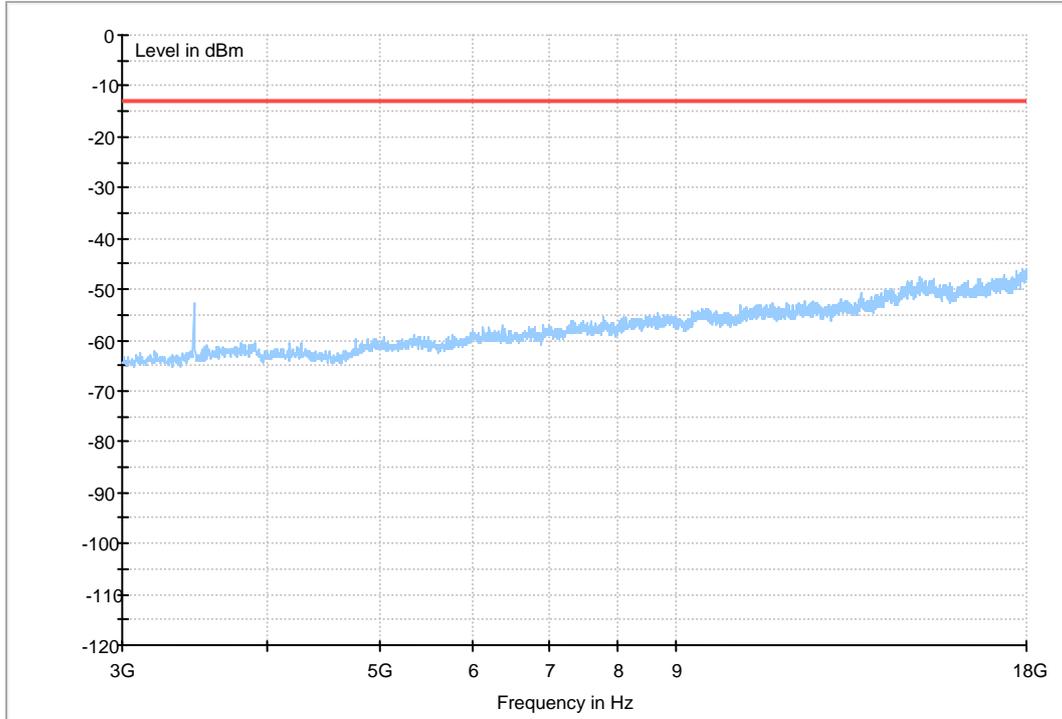


## Traffic Mode (30MHz-3GHz)





## Traffic Mode (3GHz-18GHz)



-----The 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	11	0.006350	---	±2.5	Pass
			-20 °C	-16	-0.009236	---	±2.5	Pass
			-10 °C	17	0.009813	---	±2.5	Pass
			0 °C	-12	-0.006927	---	±2.5	Pass
			10 °C	-14	-0.008081	---	±2.5	Pass
			20 °C	19	0.010967	---	±2.5	Pass
			30 °C	-16	-0.009236	---	±2.5	Pass
			40 °C	13	0.007504	---	±2.5	Pass
			50 °C	-12	-0.006927	---	±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	18	0.010390	---	±2.5	Pass
			VN	-13	-0.007504	---	±2.5	Pass
			VH	15	0.008659	---	±2.5	Pass

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