FCC
RF Test Report

Product Name: HSPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth; Apollo

Model Number: HUAWEI U8867Z, U8867Z

Report No: SYBH(Z-RF)010072012-2002
FCC ID：QISU8867Z

Reliability Laboratory of Huawei Technologies Co., Ltd.

Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China
Tel: +86 755 28780808 Fax: +86 755 89652518

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.
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Applicant:	Huawei Technologies Co., Ltd.
Address:	Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China
Date of Receipt Test Item:	Jul., 06, 2012
Start Date of Test:	Jul., 09, 2012
End Date of Test:	Jul., 23, 2012
Test Result:	Pass

	Date	Name	Signature
Approved By Senior Engineer	Sep, 04, 2012	Dai Linjun	Dai Linjun
Reviewed By	Sep, 04, 2012	Cousy Xu	Cousy XU
Operated By	Sep, 04, 2012	Huang Qiuliang	Huang Qiuliang

Modification Record

Last Report No.	Date	Modification Description
SYBH(Z-RF) 010072012-2003	2012-8-10	First report.
SYBH(Z-RF) 010072012-2003	2012-9-04	1**.Increase** Test Procedure for Peak-to-Average Power Ratio at page 12 of main report.

Contents

1 General Information 6

1.1 APPLIED STANDARD 6
1.2 TEST LOCATION 6
1.3 TEST ENVIRONMENTAL CONDITION 6

2 Summary 7

3 Product Description 8

3.1 PRODUCT INFORMATION 8

4 Test Description 10

4.1 SUPPORTED FREQUENCY RANGE 10
4.2 TRANSMITTER / RECEIVER CHARACTERISTICS 10
4.3 ANTENNA GAIN 10

5 General Test Conditionss / Configurations 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 Main Test Instruments 17

7 Test Results 18

8 Measurement Uncertainty 18

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	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 10th 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 U8867Z, U8867Z subscriber equipment in the WCDMA/GSM system. The HSPA/UMTS frequency band is Band II and Band IV and Band V, but only Band IV test data included in this report. The GSM/GPRS/EDGE frequency band includes GSM850 and PCS1900. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSPA/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/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth; Apollo		
HUAWEI U8867Z, U8867Z		
Board and Module		
Equipment Designation / Description	Software	Hardware
MAINBOARD	U8867Z V100R001USAC189B824	HD2U8867ZM

3.1.3 Adapter Technical Data

AC/DCAdapter Model	HW-050100U1W
Manufacturer	Huawei Technologies Co., Ltd.
Input Voltage	~100-240V 50/60Hz 0.2A
Output Voltage	5V ⎓ 1A
Rated Power	5W

AC/DCAdapter Model	HW-050100E1W
Manufacturer	Huawei Technologies Co., Ltd.
Input Voltage	~100-240V 50/60Hz 0.2A
Output Voltage	5V ⎓ 1A
Rated Power	5W

AC/DCAdapter Model	HW-050100Z1W
Manufacturer	Huawei Technologies Co., Ltd.
Input Voltage	~100-240V 50/60Hz 0.2A
Output Voltage	5V ⎓ 1A
Rated Power	5W

3.1.4 Battery Technical Data

Name	Qty.	Manufacture	Description
Rechargeable Li-ion	1	Huawei Technologies Co., Ltd.	Battery Model: HB5N1HA Rated capacity: 1650mAh 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: 4M15F9W

4.3 Antenna Gain

Antenna Gain(dBi)	1.5

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5 General Test Conditionss / 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	3.6V
	VN	3.7V
	VH	4.2V

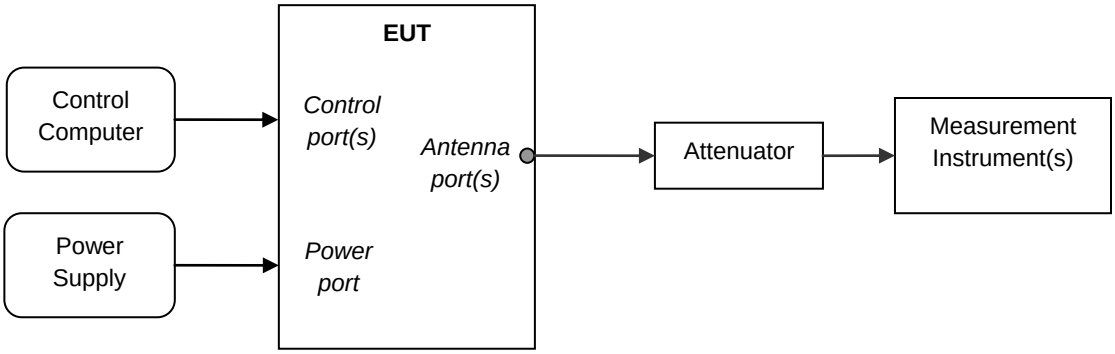
NOTE: VL= lower extreme test voltage
VN= nominal voltage
VH= upper extreme test voltage
TN= normal temperature

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.

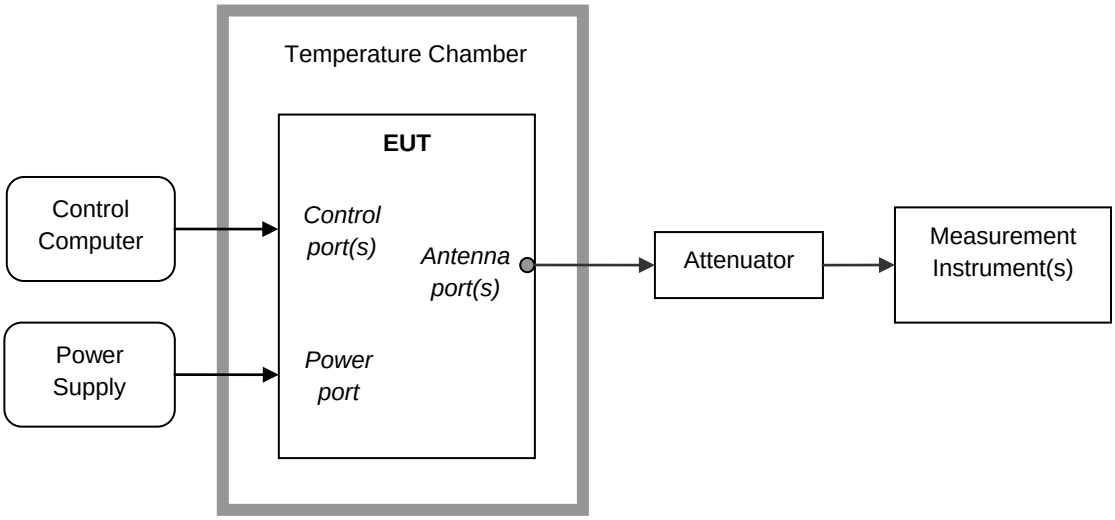
5.4.2 Test Setup 1



Note: Test Procedure for Peak-to-Average Power Ratio

Measurement Function	Preset to normal spectrum mode, use the “CCDF” measurement function.
Center Frequency	Signal Nominal Center Frequency (for each carrier of the carriers-configuration).
Meas BW/RBW	≥ Nominal Signal Channel Bandwidth.
Trigger	Trigger setting to ensure the measurement is only performed within burst-on duration (if the signal duty cycle X is not 100%).
Measurement Interval	Triggered duration length. For example, if the gate trigger is made on one-slot of the GSM signal (about 577μs), the trigger length and the measurement interval should be 577μs. (Note: FCC KDB 971168 require using 1 ms setting. This may result into error result especially for TDD or TDMA system)
Count Number	A value that stabilizes the measured CCDF curve (normally > 10E6).

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.

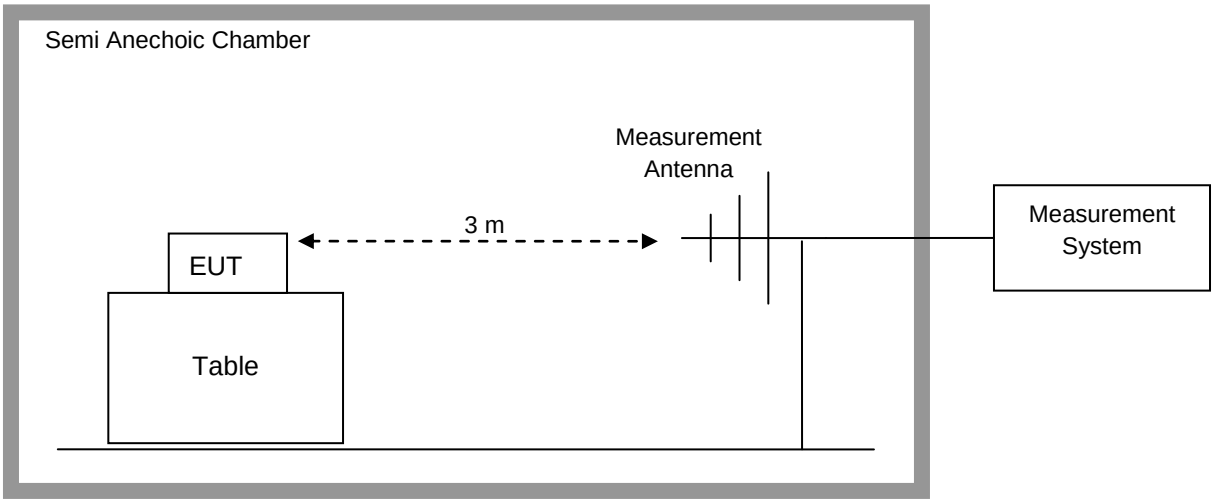
NOTE2: The EUT was set on insulator 80cm above the Ground Plane. The setup and test methods were according to ANSI-TIA-603C 2004.The measurements were carried through with a Rohde and Schwarz Test Receiver and control software.

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

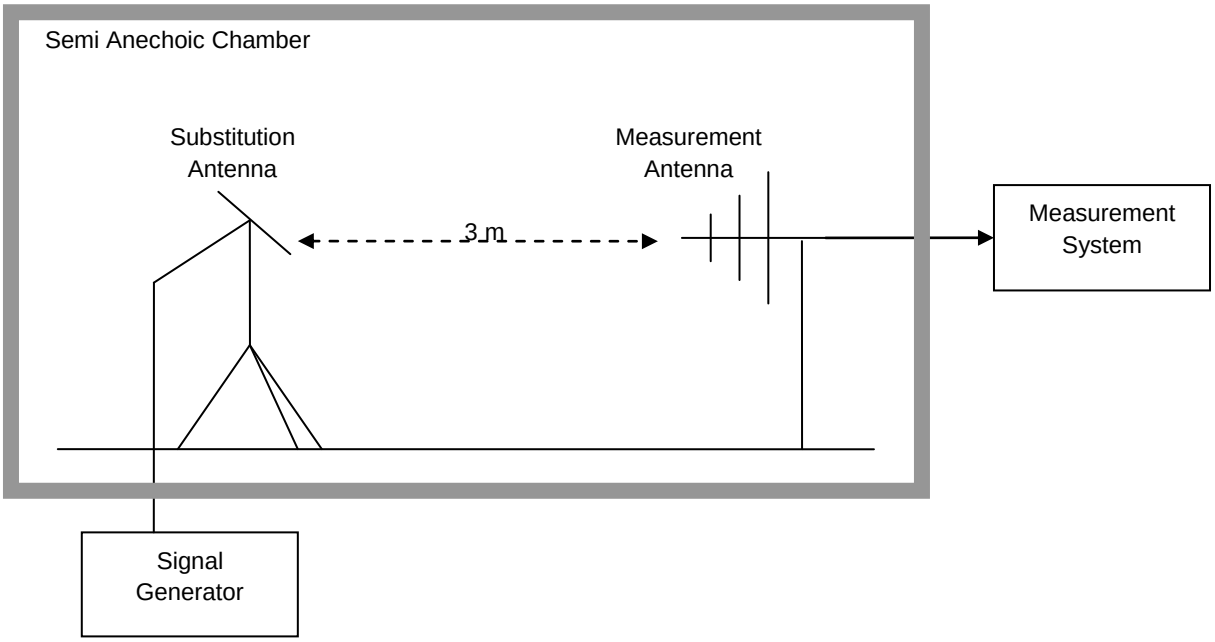
antenna has two polarizations V and H. A portable or small unlicensed wireless device shall be placed on a non-metallic test fixture or other non-metallic support during testing. The supporting fixture shall permit orientation of the EUT in each of three orthogonal (x, y, z) axis positions such that 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 item 5). 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 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	105822	Oct., 24, 2012
Wireless Communication Test set	Agilent	N4010A	MY49081592	Dec., 14, 2012
Universal Radio Communication Tester	Agilent	E5515C	MY50260239	Aug., 31, 2012
Spectrum Analyzer	Agilent	E4440A	MY49420179	Apr., 20, 2013
Signal Analyzer	R&S	FSQ31	200021	Sept., 27, 2012
Temperature Chamber	WEISS	WKL64	24600294	Jan., 03, 2013
Signal generator	Agilent	E8257D	MY49281095	Jul., 09, 2013
Vector Signal Generator	R&S	SMU200A	104162	Sept., 07, 2012
Test receiver	R&S	ESU26	100150	May., 24, 2013
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	919/1009	Dec., 13, 2012
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	Dec., 13, 2012
Horn Antenna	R & S	HF906	100683	May., 16, 2013
Horn Antenna	R & S	HF906	100684	May., 16, 2013
Broadband Antenna	Schwarzbeck	VULB 9163	9163-357	Sep.,15, 2012
Broadband Antenna	Schwarzbeck	VULB 9163	9163-356	Sep., 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 Test Setup	Appendix H

NOTE1: There is no test data in Appendix H, only Photos of Test Setup for Field Strength of Spurious Radiation.

NOTE2: HSDPA & HSUPA implementation of this device and the uplink modulation (QPSK) are the same as WCDMA. No additional channels and modulations (16 QAM, and 64 QAM) are supported in uplink. For HSDPA& HSUPA, only the ERP/EIRP test result are included in this report, the other test item results are taken from the reference of the WCDMA test results, because the WCDMA test mode is the worst case.

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

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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		22.89	30	22.91	30	22.68	30
TM2	Case1	23.22	30	23.08	30	22.87	30
	Case2	23.16	30	23.11	30	22.63	30
	Case3	22.23	30	22.43	30	22.01	30
	Case4	22.33	30	22.41	30	21.84	30
TM3	Case1	22.21	30	22.97	30	22.44	30
	Case2	21.38	30	21.19	30	20.71	30
	Case3	21.92	30	22.79	30	22.25	30
	Case4	21.44	30	20.92	30	21.24	30
	Case5	22.15	30	22.78	30	22.23	30

Peak-to-Average Ratio

Table 2 Measurement Results

TEST CONDITIONS		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		3.02	13.0	3.04	13.0	3.01	13.0
TM2	Case1	2.94	13.0	2.98	13.0	2.96	13.0
	Case2	2.87	13.0	2.85	13.0	2.83	13.0
	Case3	2.84	13.0	2.86	13.0	2.81	13.0
	Case4	2.74	13.0	2.78	13.0	2.79	13.0
TM3	Case1	2.71	13.0	2.72	13.0	2.74	13.0
	Case2	2.64	13.0	2.68	13.0	2.65	13.0
	Case3	2.69	13.0	2.67	13.0	2.63	13.0
	Case4	2.79	13.0	2.76	13.0	2.73	13.0
	Case5	2.77	13.0	2.74	13.0	2.78	13.0

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	24.39	Horn Ant.	20.99	4.5	1.0	24.49	30	Pass
TM1	1732.4	24.41	Horn Ant.	21.03	4.5	1.0	24.53	30	Pass
TM1	1752.6	24.18	Horn Ant.	20.18	4.8	1.0	23.98	30	Pass

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

EIRP [dBm] = SGP [dBm] – Cable Loss [dB] + Gain [dBi]

b, SGP=Signal Generator Level

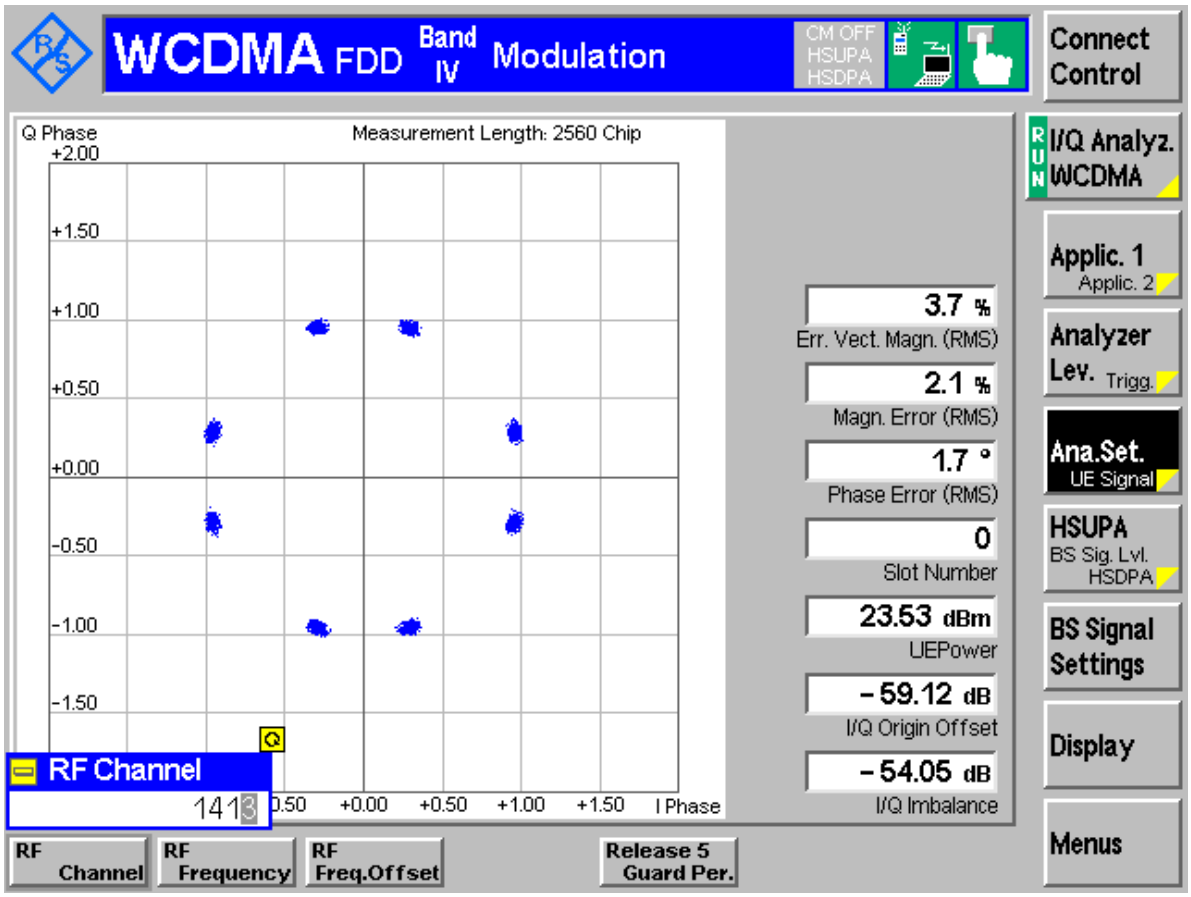
----------The END----------

Appendix B

Modulation Characteristics

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

TM1: WCDMA
Channel 1412



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Appendix C

Occupied Bandwidth

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

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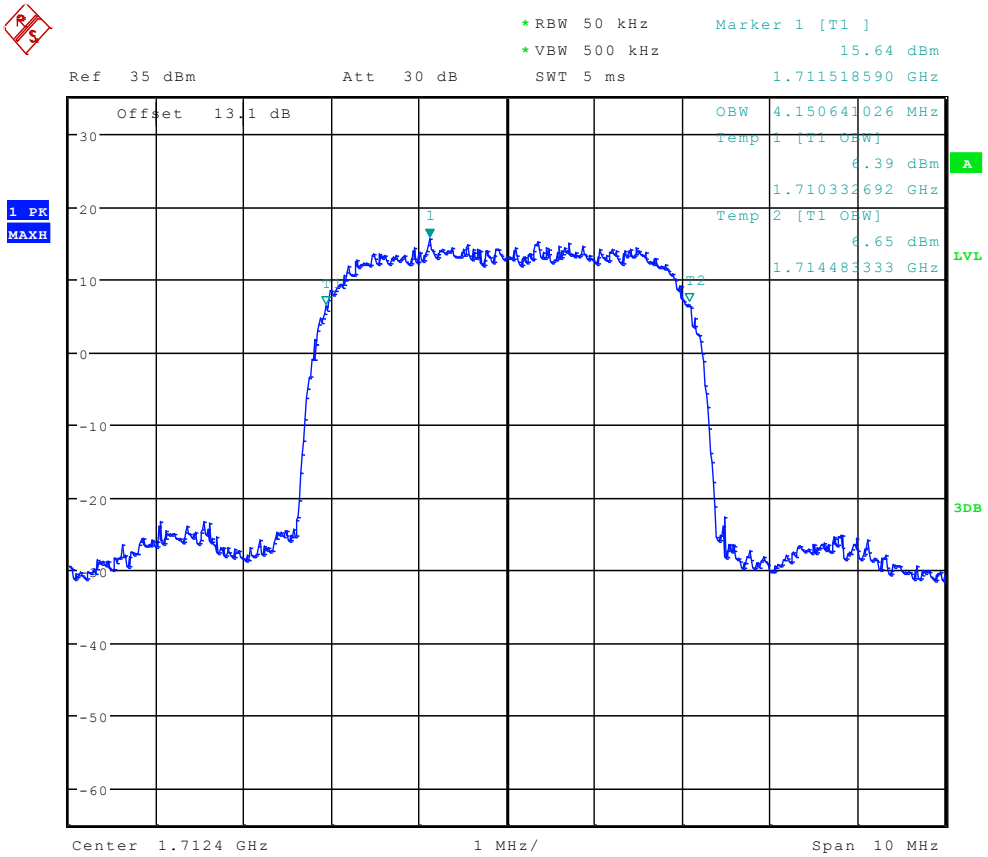
Result Table

Table 1 Measurement Results

Test Mode	RF Channel	Occupied Bandwidth [MHz]	Verdict
TM1	1312	4.15	Pass
	1412	4.15	Pass
	1513	4.15	Pass

TM1: WCDMA

Channel 1312



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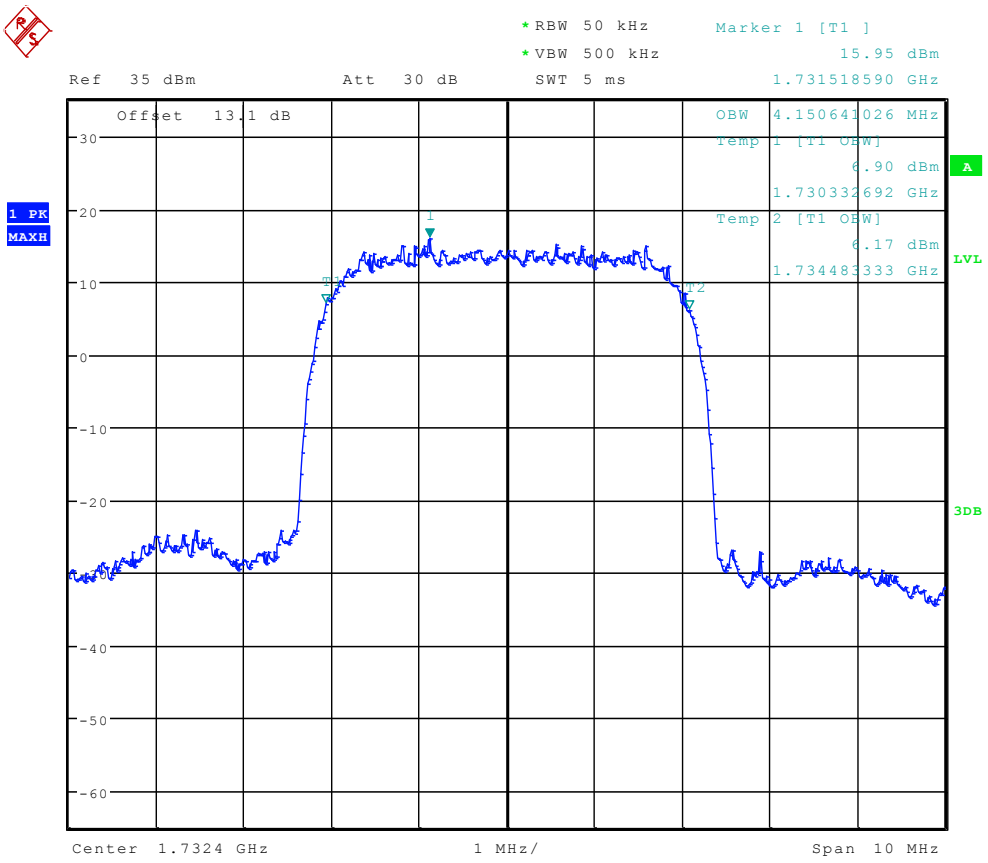
Channel 1412



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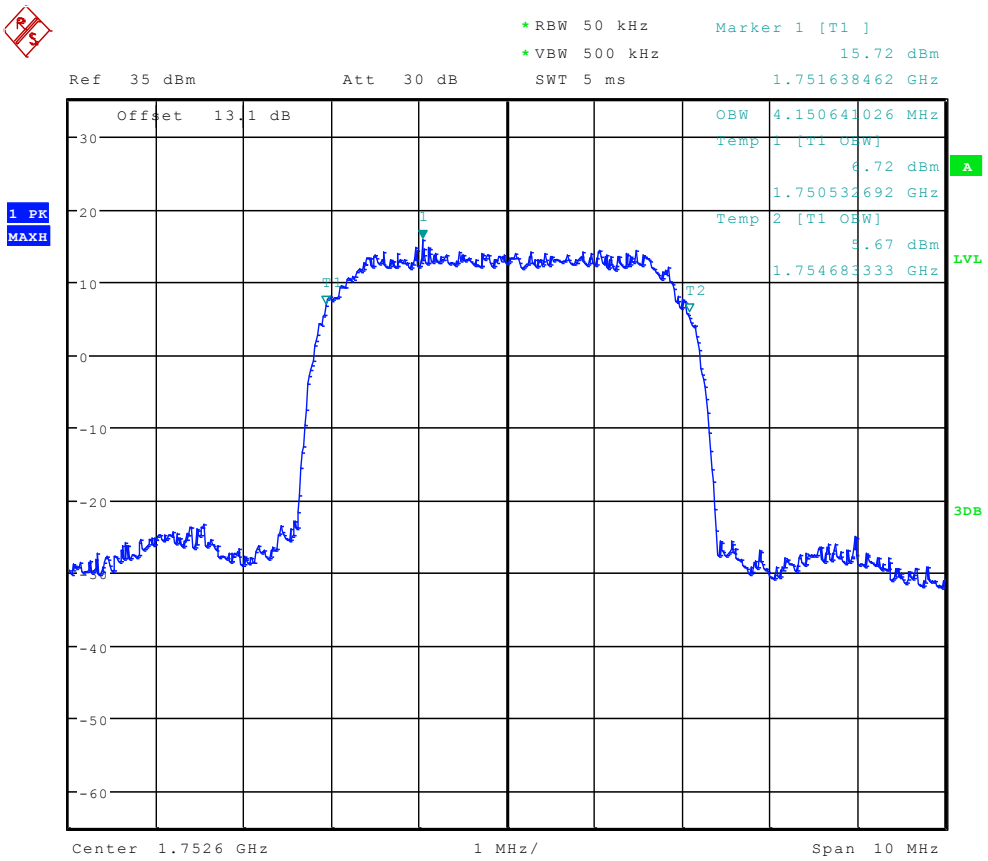
Channel 1513



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Appendix D

Band Edges Compliance

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

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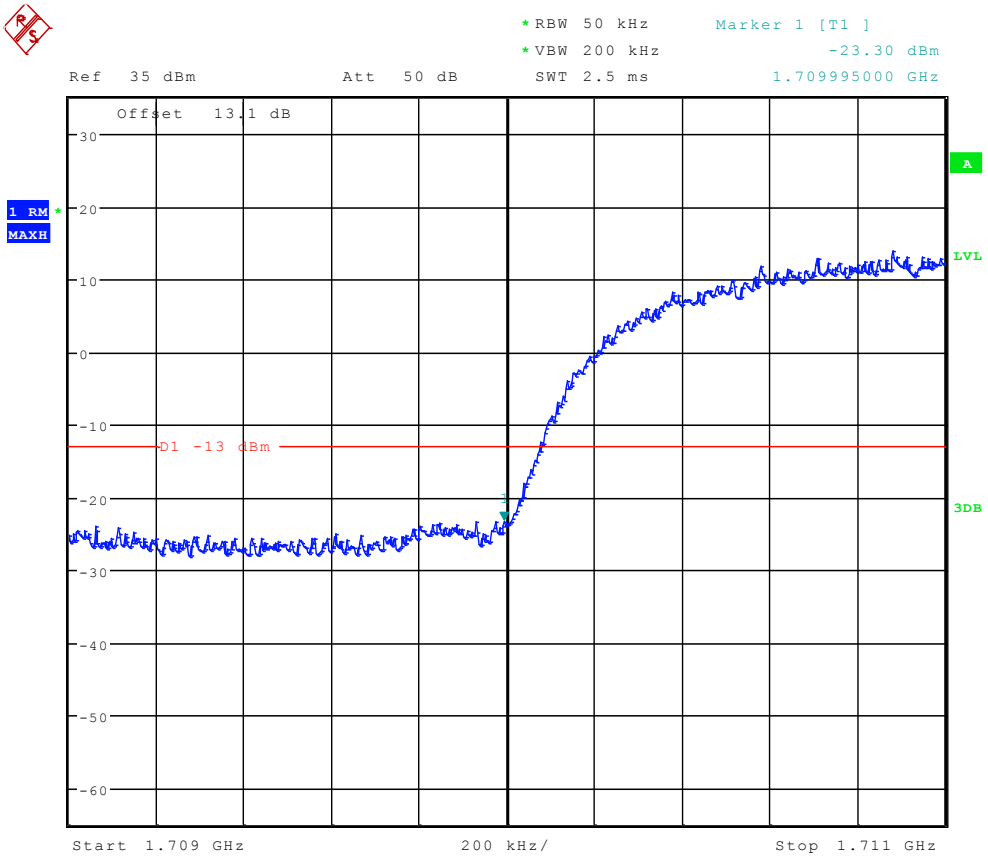
TM1: WCDMA

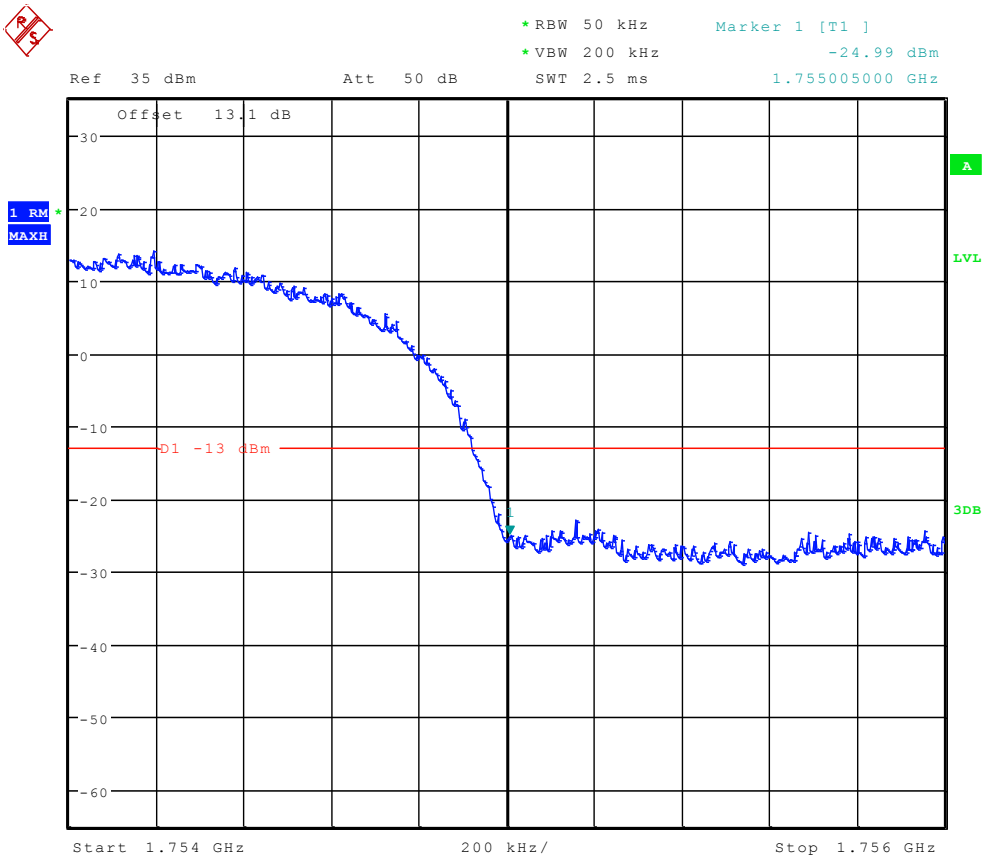
Left Edge

Channel 1312



Date: 8.JUL.2012 15:00:15

Right Edge
Channel 1513



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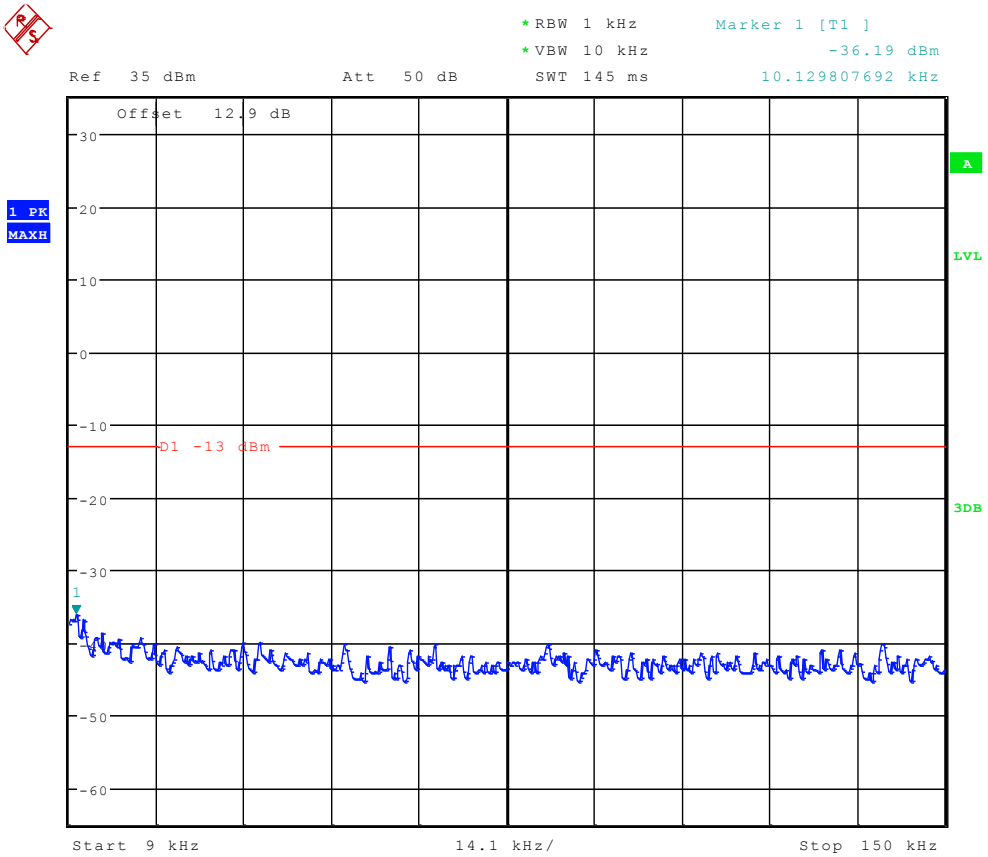
Appendix E

Spurious Emission at Antenna Terminal

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

TM1: WCDMA

Channel 1312



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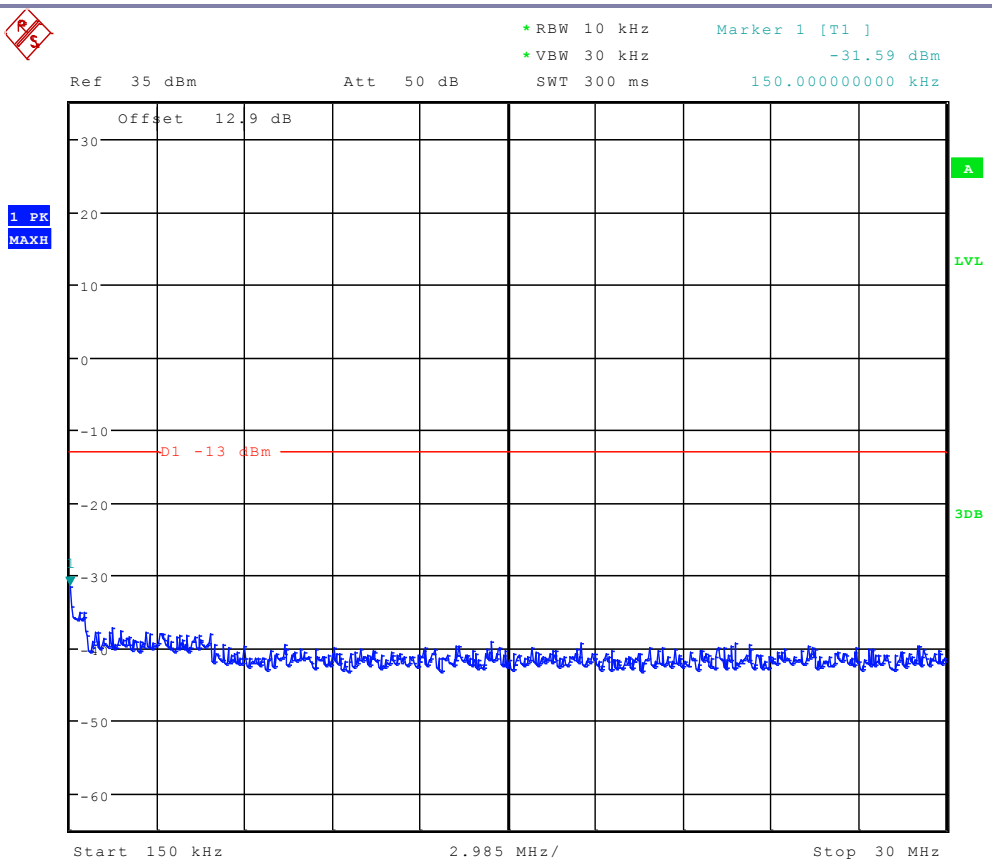

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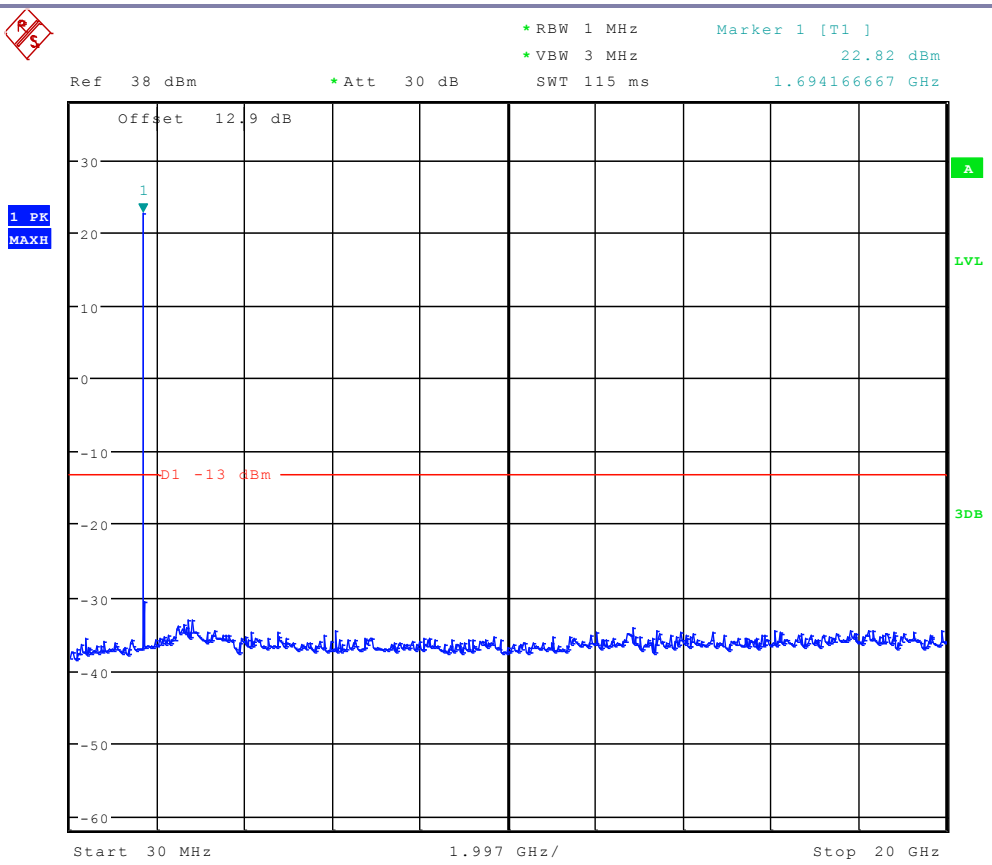

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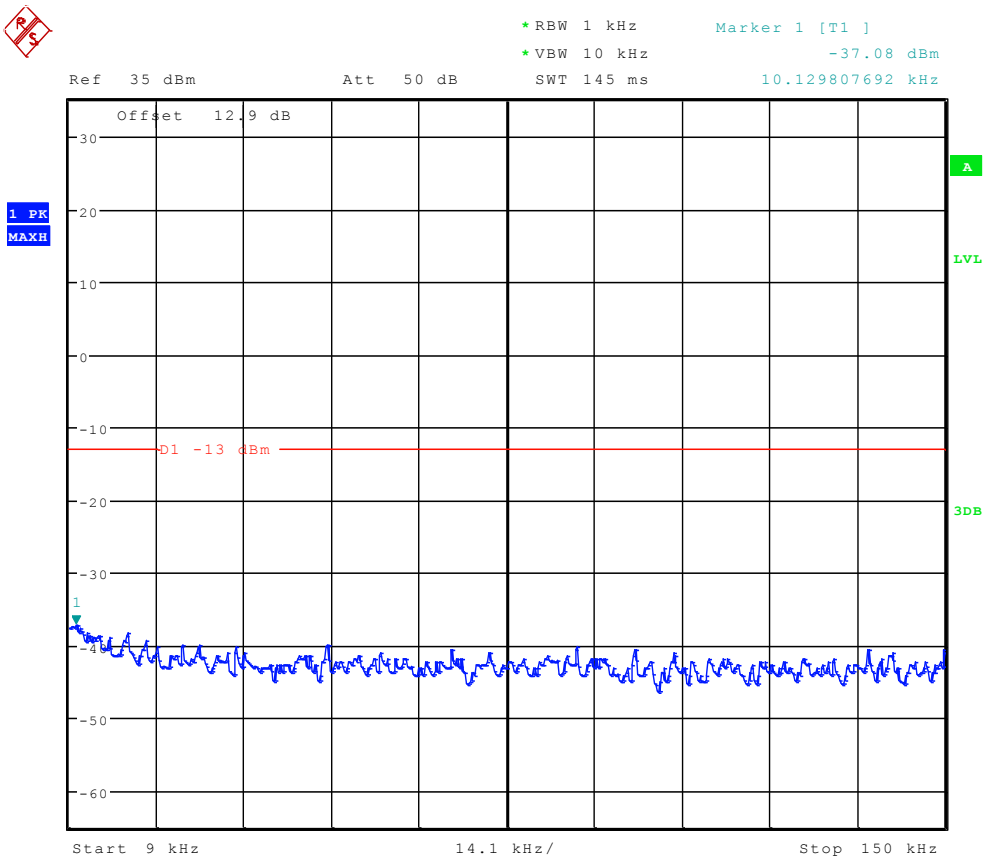
Channel 1412



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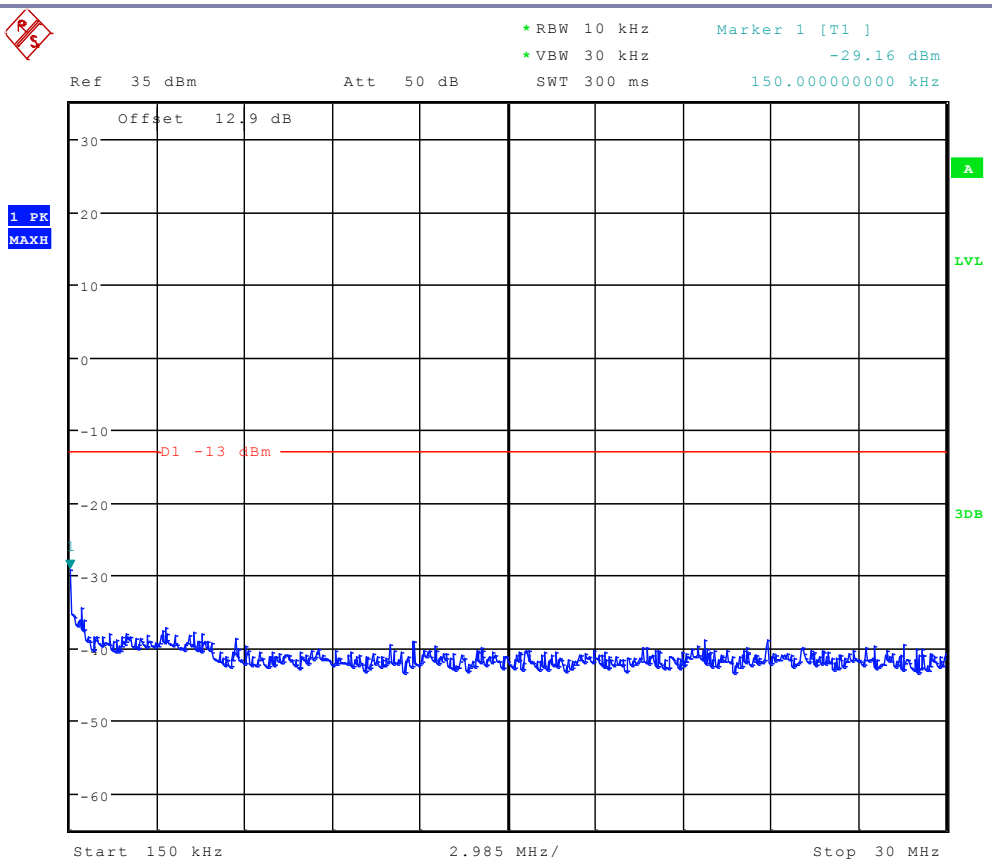

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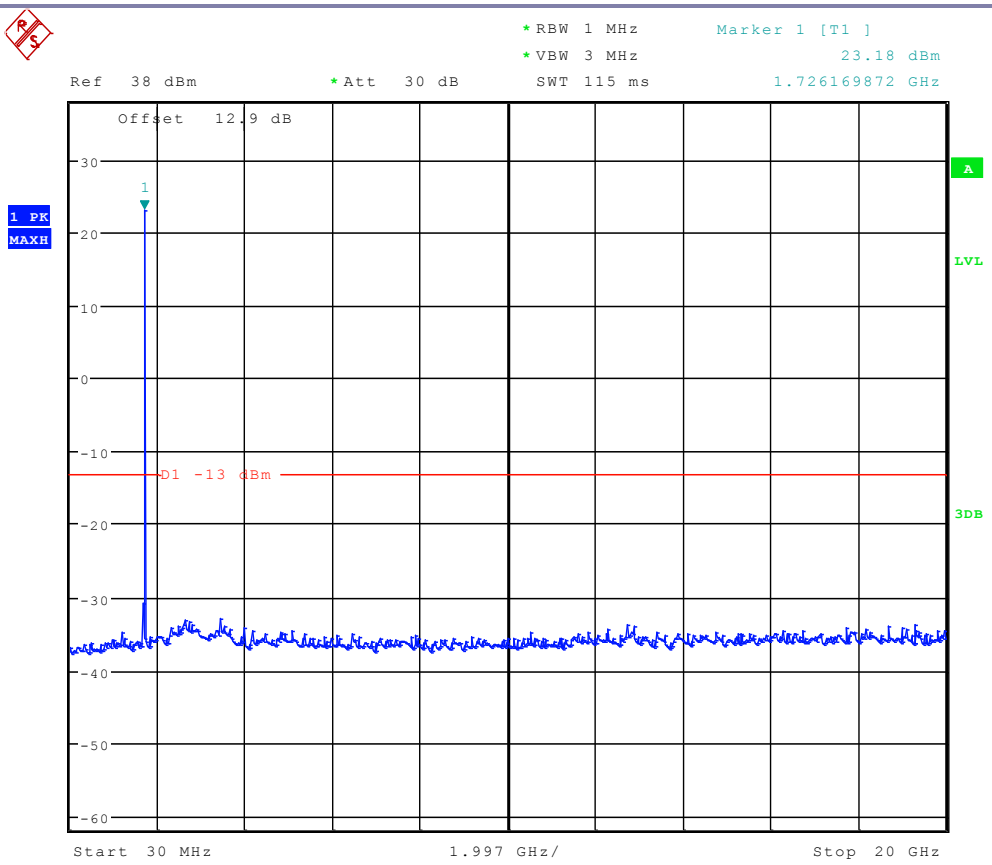

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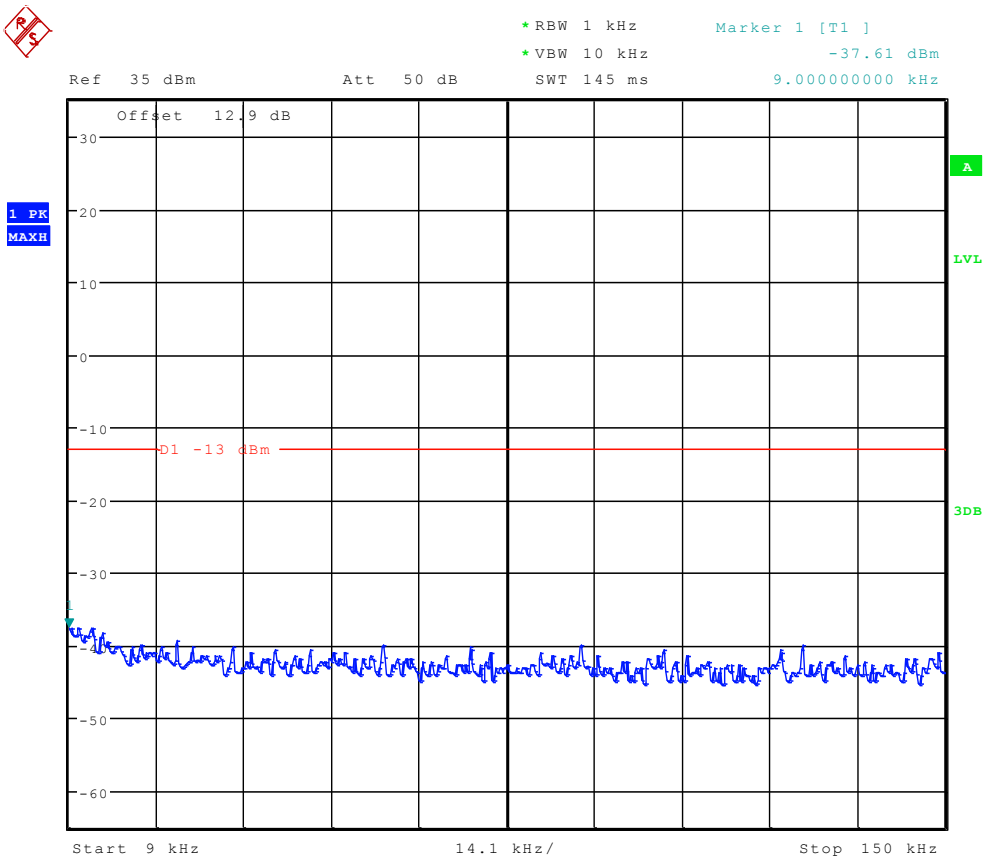
Channel 1513



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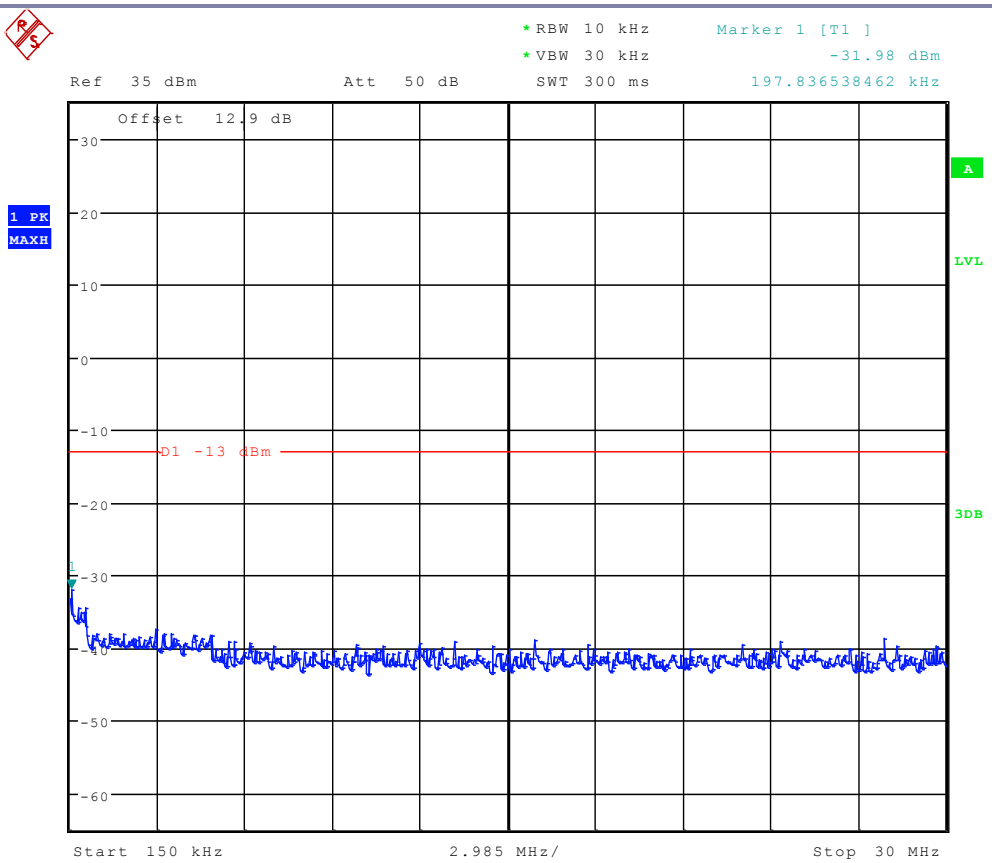

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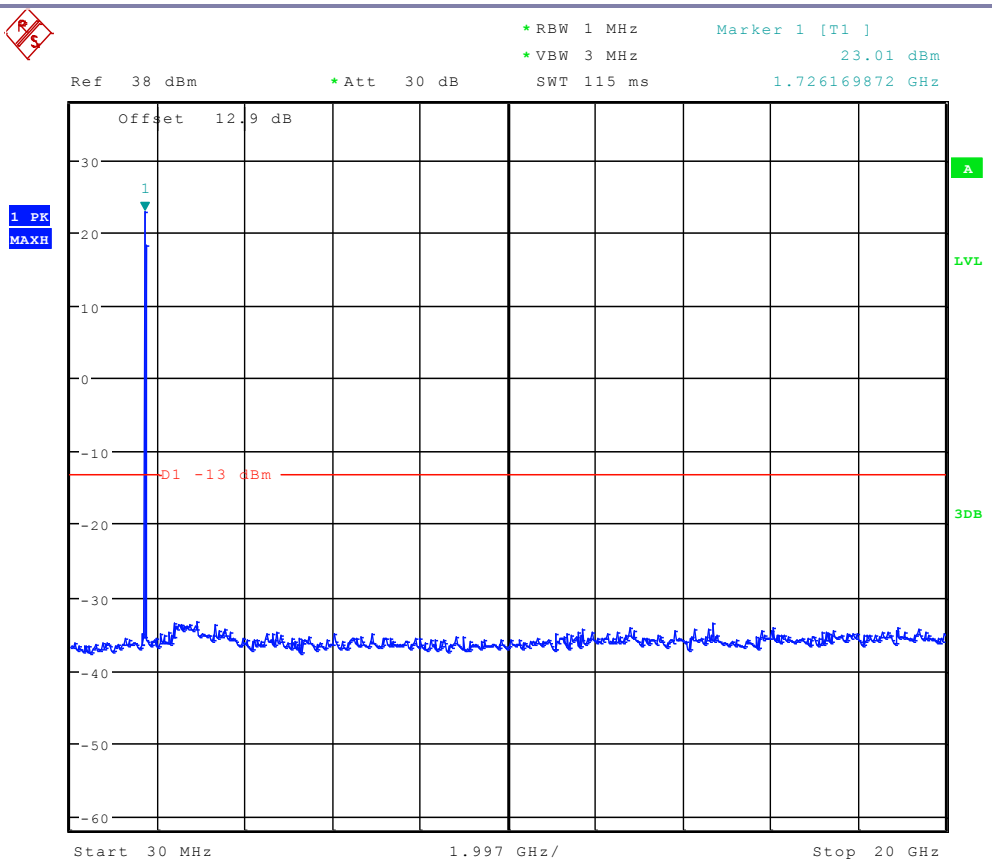

Date: 8.JUL.2012 15:00:01

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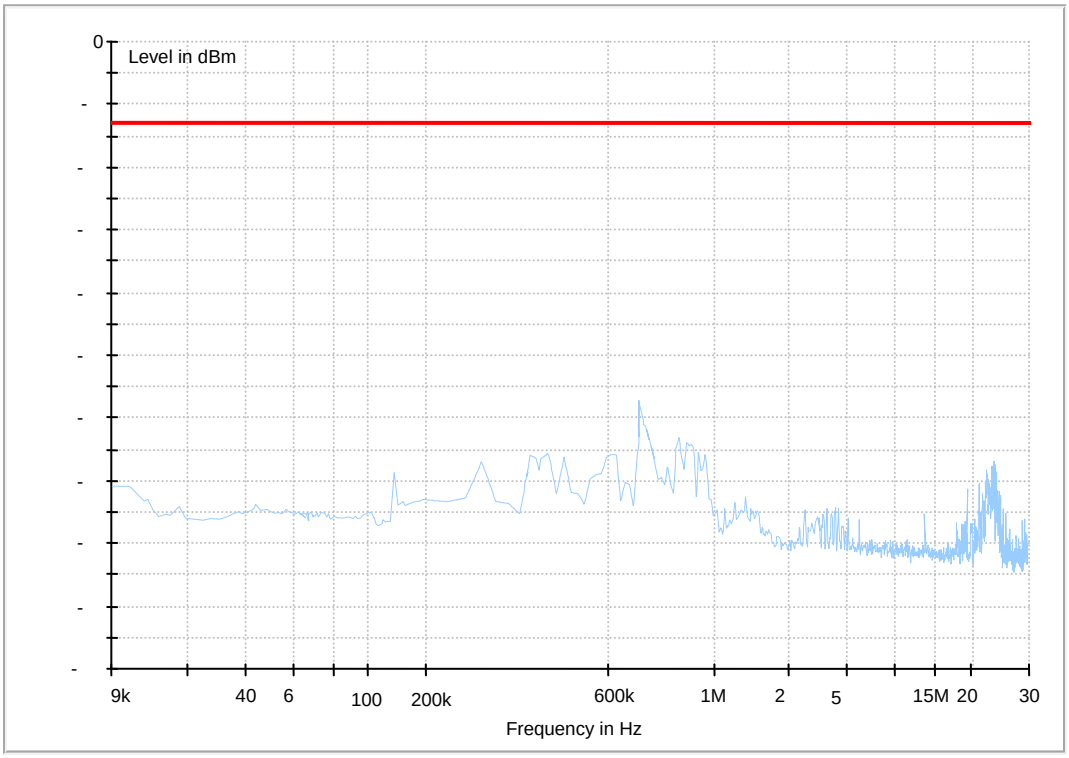
Appendix F

Radiated spurious emission

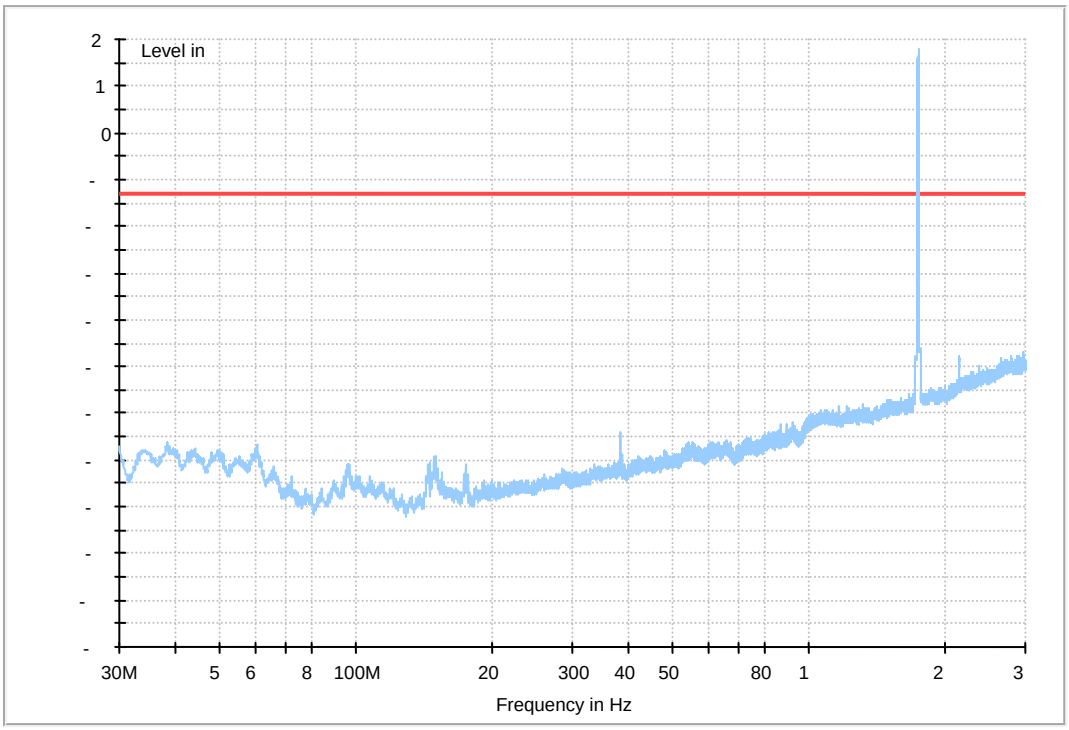
According to FCC Part 2.1053& Part 27.53(g)

WCDMA AWS

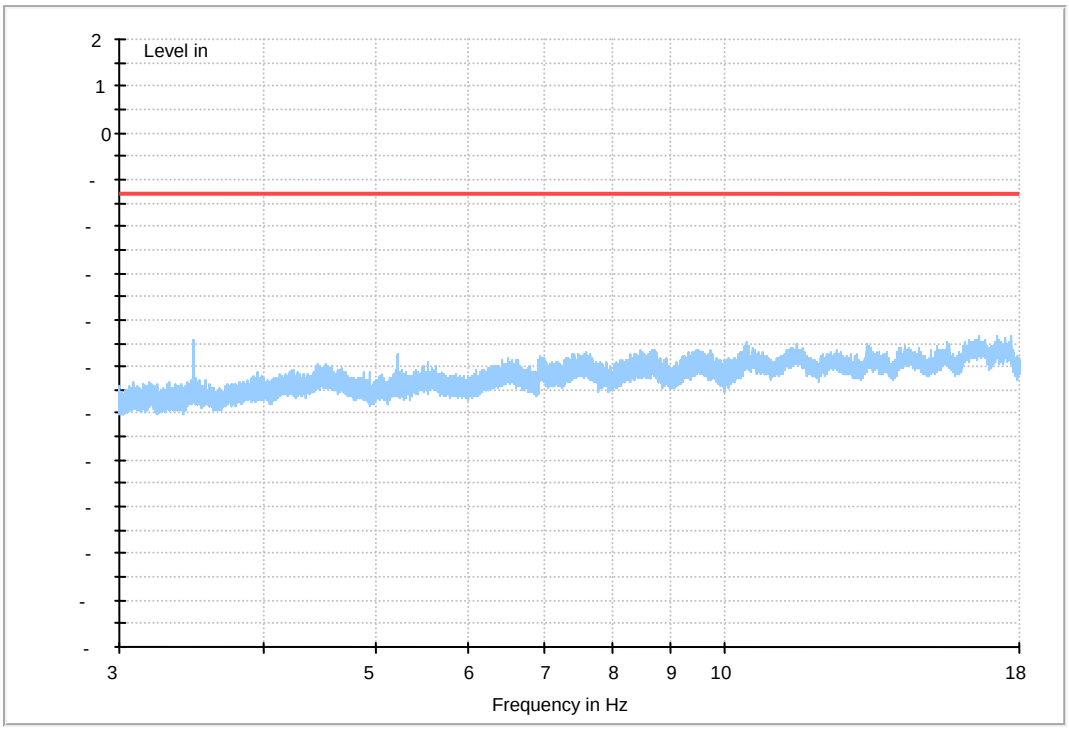
(9kHz~30MHz)



(30MHz~3GHz)

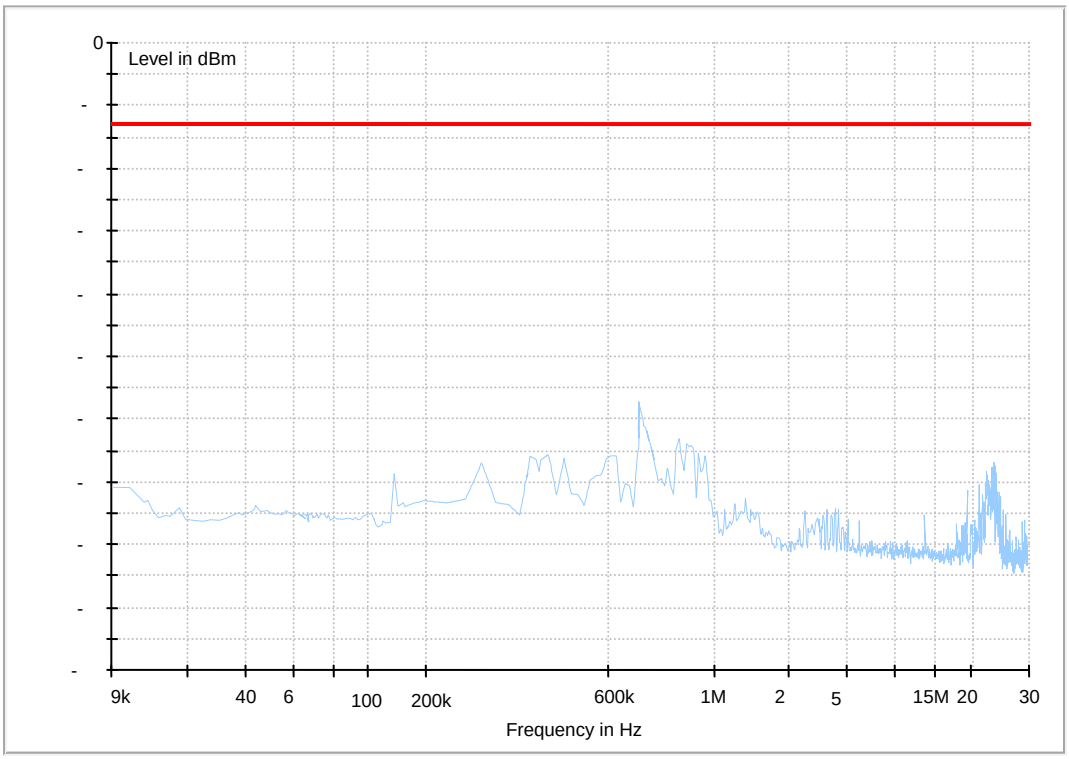


(3GHz~18GHz)

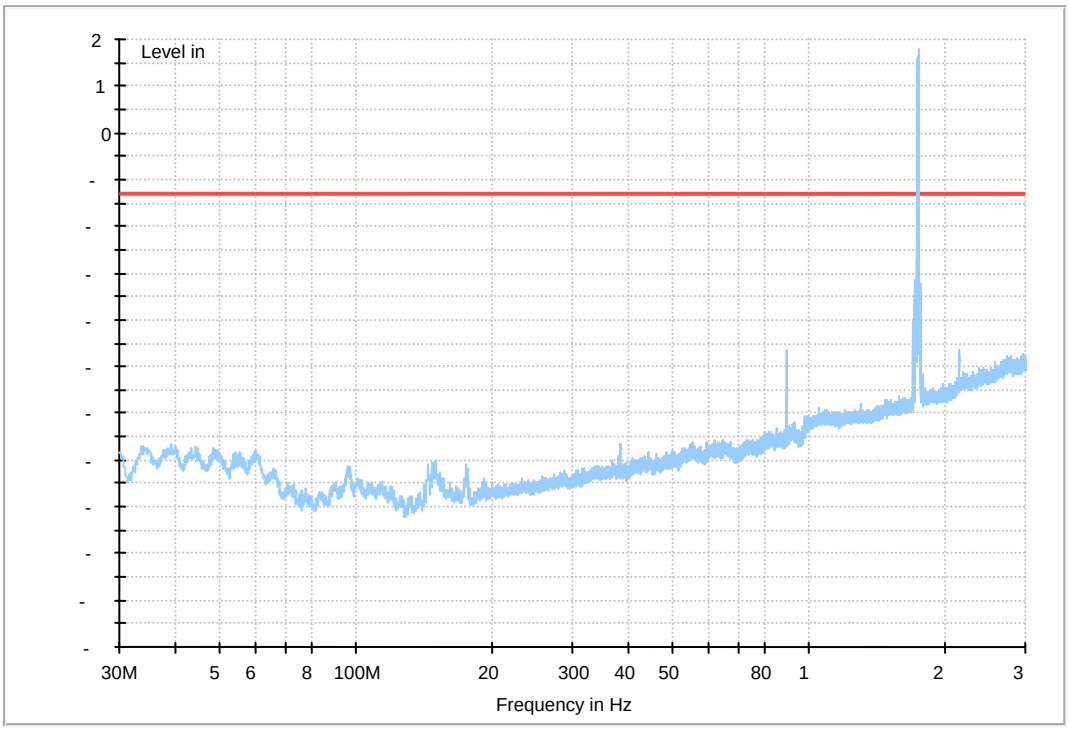


HSDPA AWS

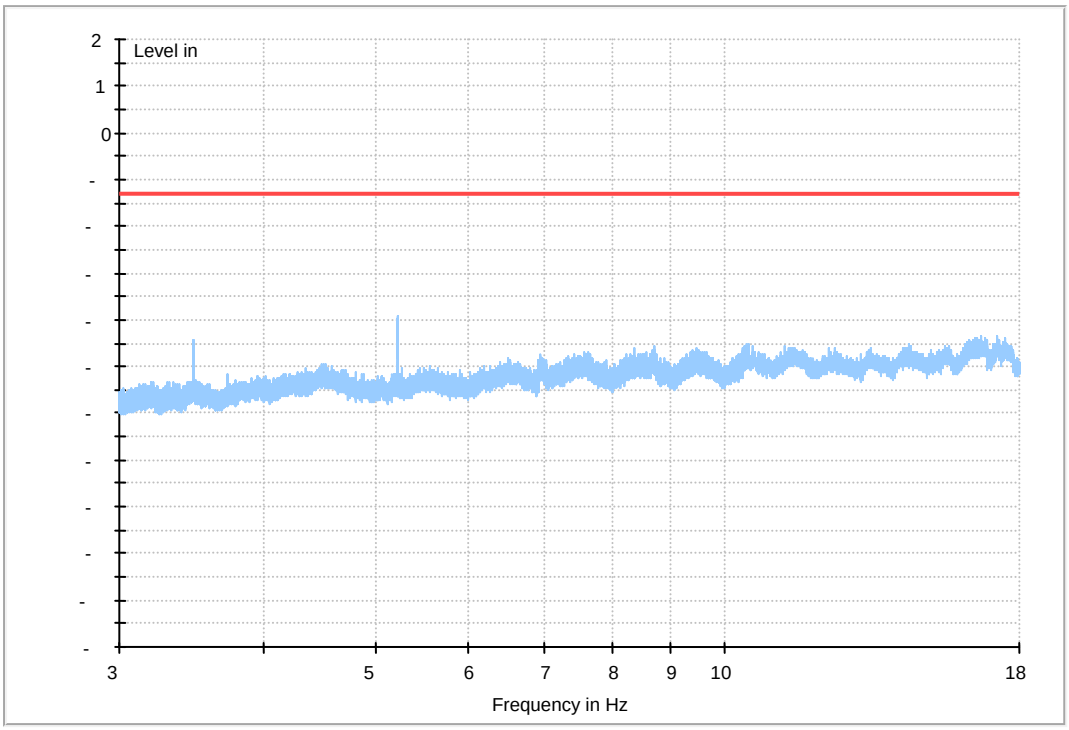
(9kHz~30MHz)



(30MHz~3GHz)

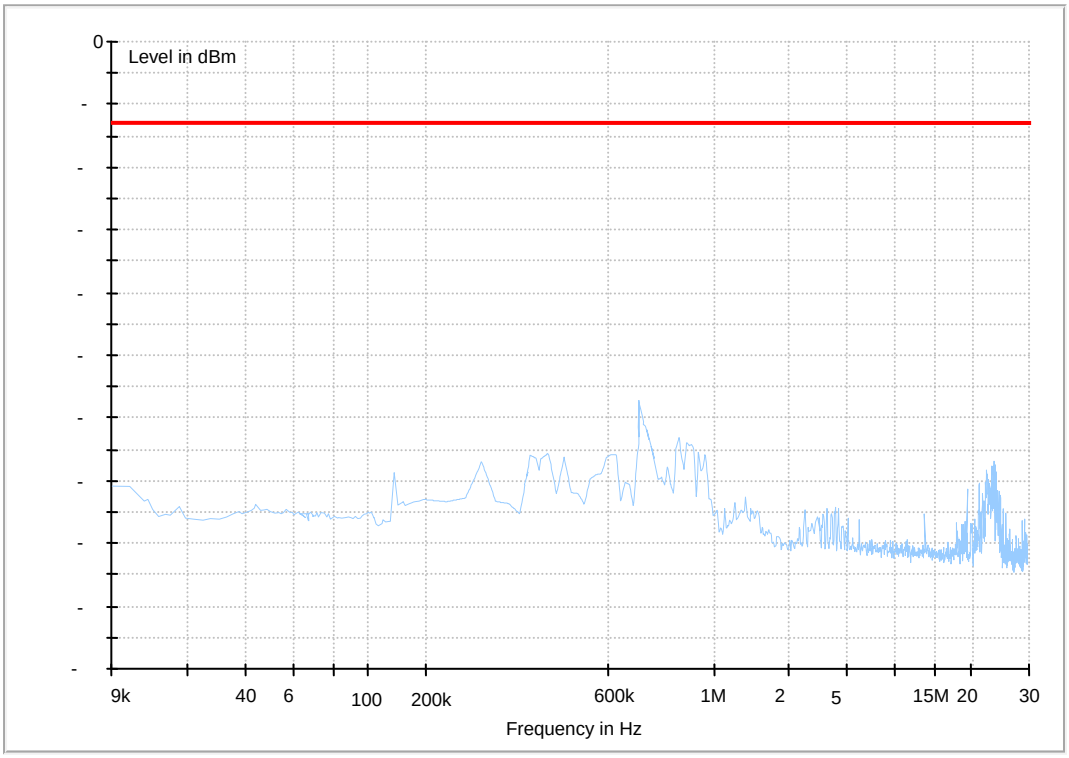


(3GHz~18GHz)

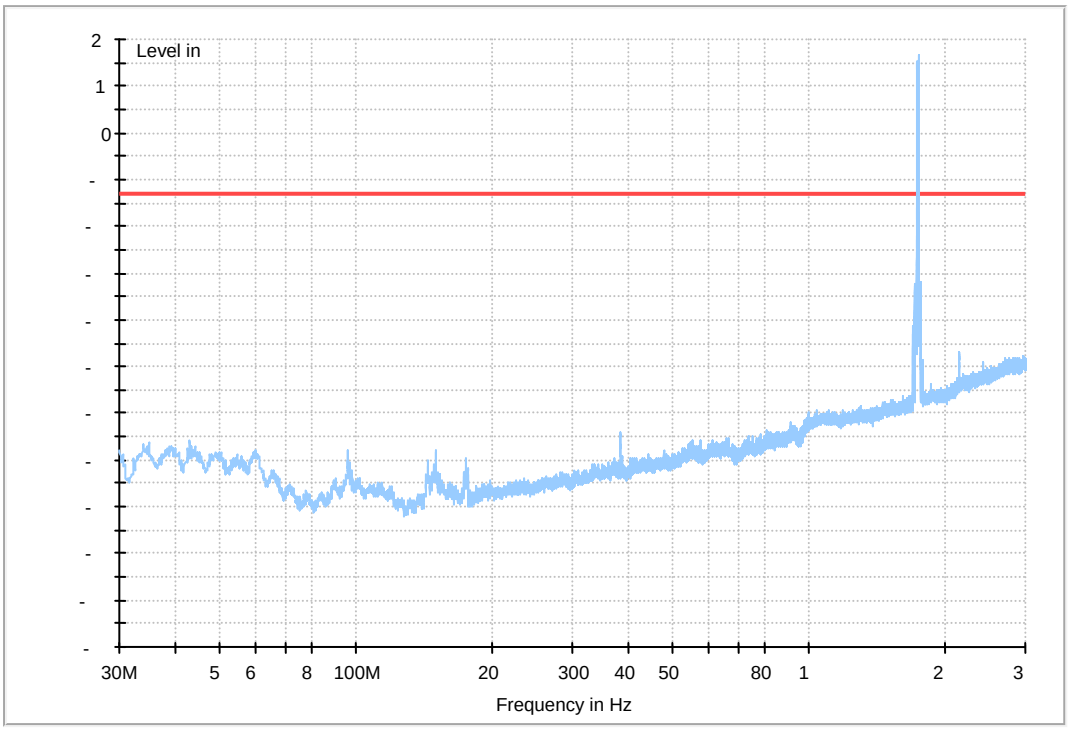


HSUPA AWS

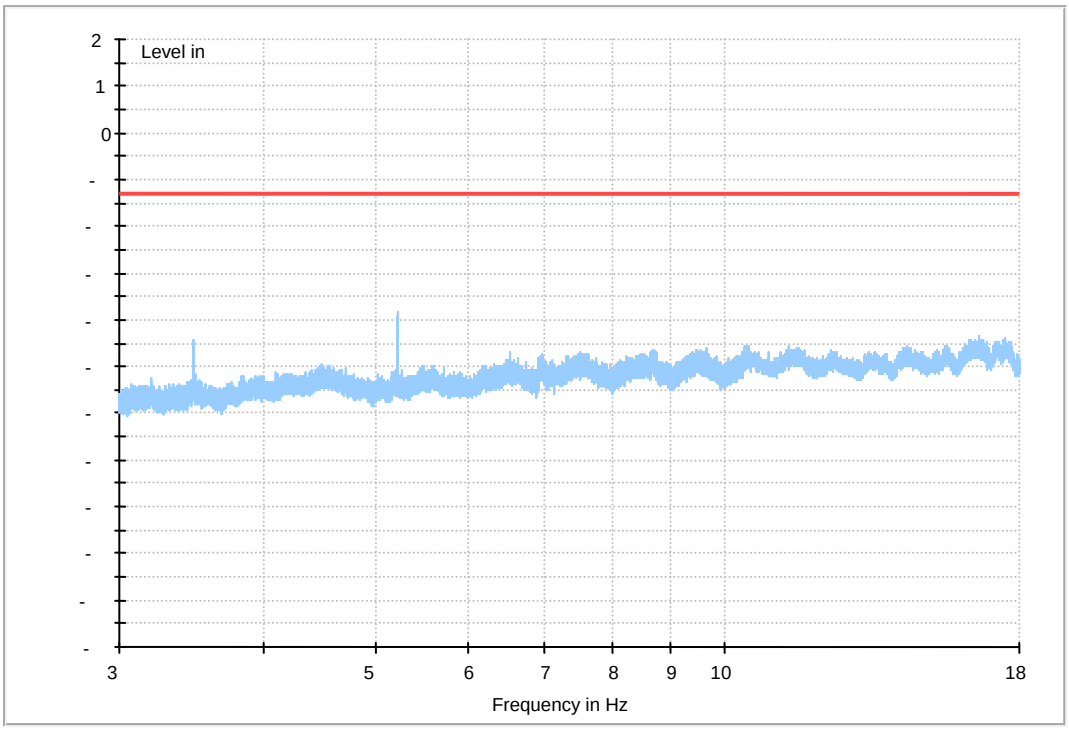
(9kHz~30MHz)



(30MHz~3GHz)



(3GHz~18GHz)



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	-13	-0.0075	---	±2.5	Pass
			-20 °C	-19	-0.011	---	±2.5	Pass
			-10 °C	9	0.0052	---	±2.5	Pass
			0 °C	-21	-0.0121	---	±2.5	Pass
			10 °C	12	0.00693	---	±2.5	Pass
			20 °C	-17	-0.0098	---	±2.5	Pass
			30 °C	-20	-0.0115	---	±2.5	Pass
			40 °C	10	0.00577	---	±2.5	Pass
			50 °C	-17	-0.0098	---	±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	0.01039	---	±2.5	Pass
			VN	-13	-0.0075	---	±2.5	Pass
			VH	15	0.00866	---	±2.5	Pass

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