



Report No: SYBH(E) 60072007EB-2
FCC ID: QISE272

**FCC TEST REPORT OF
Huawei E272 Vodafone Mobile
Connect USB Modem**

M/N: E272

Aug. 10, 2007

Reliability Laboratory of Huawei Technologies Co., Ltd.

All Right Reserved

Notice

1.	The laboratory has obtained the accreditation of China National Accreditation Committee for Laboratories (CNAL), and accreditation number: L0310.
2.	The laboratory has obtained the accreditation of THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION (A2LA), and Accreditation Council Certificate Number: 2174.01.
3.	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.
4.	The laboratory also has been listed by the VCCI to perform EMC measurements. The accreditation number is C2583, R2364, and T256.
5.	The test report is invalid if not marked with "exclusive stamp for the test report".
6.	Any copy of the test report is invalid if not re-marked with the "exclusive stamp for the test report".
7.	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.
8.	The test report is invalid if there is any evidence of erasure and/or falsification.
9.	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.
10.	Normally, the test report is only responsible for the samples that have undergone the test.
11.	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.



**REPORT ON
Modem**

FCC Test of Huawei E272 Vodafone Mobile Connect USB

M/N: E272

Report No: SYBH(E) 60072007EB-2

REGULATION

FCC CFR47 Part 2: Subpart J;

FCC CFR47 Part 24: Subpart E;

FCC CFR47 Part 15: Subpart B;

CONCLUSION

There are 10 items need to be tested, 10 items have been tested. The sample of the model completely meets the requirements

Final Judgement: Pass



General Manager

2007.08.10

Guo Xiaoqi

Date

Name

signature

**Technical Responsibility
For Area of Testing**

2007.08.09

Zhang Xinghai

Date

Name

signature

Test Lab Engineer

2007.08.08

Hu Jun

Contents

1	<u>Summary</u>	5
2	<u>Product Description</u>	6
2.1	PRODUCTION INFORMATION	6
2.2	MODIFICATION INFORMATION	6
3	<u>Test Site Description</u>	7
3.1	TESTING PERIOD	7
3.2	GENERAL SET UP DESCRIPTION	7
4	<u>Product Description</u>	8
4.1	TECHNICAL CHARACTERISTICS.....	8
4.2	EUT IDENTIFICATION LIST.....	10
5	<u>Main Test Instruments</u>	11
6	<u>Transmitter Measurements</u>	12
6.1	EFFECTIVE RADIATED POWER OF TRANSMITTER (EIRP)	12
6.2	CONDUCTED POWER OF TRANSMITTER	15
6.3	MODULATION CHARACTERISTICS.....	18
6.4	OCCUPIED BANDWIDTH.....	20
6.5	BAND EDGES COMPLIANCE	23
6.6	SPURIOUS EMISSION AT ANTENNA TERMINAL.....	25
6.7	RADIATED SPURIOUS EMISSION	27
6.8	FREQUENCY STABILITY	31
7	<u>EMC Test</u>	37
7.1	CONDUCTED EMISSION AT POWER PORT.....	37
7.2	RADIATED EMISSION OF ENCLOSURE IN IDLE MODE	39
8	<u>System Measurement Uncertainty</u>	41
9	<u>Appendixes</u>	42

1 Summary

The table below summarizes the measurements and results for the Huawei E272 Vodafone Mobile Connect USB Modem. Detailed results and descriptions are shown in the following pages.

Table 1 Summary of results

FCC Measurement Specification	FCC Limits Part(s)	Description	Result
2.1046	24.232	Effective Radiated Power of Transmitter	PASS
2.1046	24.232	Conducted Power of Transmitter	PASS
2.1047		Modulation Characteristics	PASS
2.1049		Occupied Bandwidth	PASS
2.1051	24.238	Band Edges Compliance	PASS
2.1051	24.238	Spurious Emission at Antenna Terminal	PASS
2.1053	24.238	Radiated Spurious Emission	PASS
2.1055	24.235	Frequency Stability	PASS
-	15.107	Conducted Emission at Power Port	PASS
-	15.109	Radiated Emission of Enclosure in Idle Mode	PASS

2 Product Description

2.1 Production Information

2.1.1 General Description

Huawei E272 Vodafone Mobile Connect USB Modem is subscriber equipment in the GSM system. The frequency band is PCS. The E272 implements such functions as RF signal receiving / Transmitting, HSDPA/WCDMA/EDGE/GPRS/GSM protocol processing and data service etc. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface. It has two internal antennas as default. E272 uses Qualcomm MSM7200 chipset and Zero-IF technologies.

2.1.2 Support function and Service

The Huawei E272 Vodafone Mobile Connect USB Modem support the function and service as follows:

Table 2 Service and Test mode List

Service Name	Characteristic	Corresponding Test Mode	Note
data	Modulation: GMSK	TM1	
data	Modulation: 8PSK	TM2	
data	Modulation: QPSK	TM3	

Note: * The specified GPRS test conditions & settings are defined in 3GPP TS51.010 V5.4.0 and the EDGE test conditions & settings are defined in 3GPP TS51.010 V5.4.0.

2.2 Modification Information

For original equipment, following table is not application.

Table 3 Modification Information

Model Number	Board/Module	Original Version	New Version	Modify Information
Not applicable				

3 Test Site Description

The test site of:

***Huawei Technologies Co. Ltd.
P.O. Box 518129
Huawei base, bantian,
Longgang District, Shenzhen, China***

The test site description has been submitted to  and registration granted under the registration number **97456** on April 20, 2006. The test site has been accredited by  and the accredited number is **2174.01** in Jan of 2006.

3.1 Testing Period

The test have been performed during the period of

Jul. 18, 2007 –Aug. 10, 2007

3.2 General Set up Description

Huawei E272 Vodafone Mobile Connect USB Modem can support GPRS/EDGE mode and PCS Band. During this measurement, the Huawei E272 Vodafone Mobile Connect USB Modem just works in HSDPA/WCDMA/GPRS/EDGE mode and PCS Band.

TM1: GPRS/GSM Mode with GMSK Modulation

TM2: EDGE Mode with 8PSK Modulation

TM3: HSDPA/WCDMA Mode with QPSK Modulation

4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Table 4 Frequency Range

Uplink band:	1850 to 1910 MHz
Downlink band:	1930 to 1990 MHz

4.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

	EDGE/GPRS/GSM	HSDPA/WCDMA
Channel spacing	200k Hz	200k Hz
Channel separation:	200k Hz	5M Hz

4.1.3 Type of Emission

Table 6 Type of Emission

	EDGE/GPRS/GSM	HSDPA/WCDMA
Emission Designation:	300kGXW	5M0F9W

According to CFR 47 (FCC) part 2, subpart C, section 2.201 and 2.202

4.1.4 Environmental Requirements

Table 7 Environmental Requirements

Minimum temperature:	- 10 °C
Maximum temperature:	+ 55 °C
Relative Humidity:	5%-95%RH

4.1.5 Power Source

Table 8 Power Source

DC voltage nominal:	 +5V; Supplied by USB port of notebook
DC voltage range	 +4.75-5.25V
DC current maximal:	600mA

4.1.6 Tune-up Procedure

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (9).

Please reference the document Tune-up Procedure in TCF.

4.1.7 Applied DC Voltages and Currents

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8).

The voltage and current in the final RF stage is:

Table 9 Applied DC Voltages and Currents

Voltage:	 +2.85V
Current:	150mA According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8)

4.2 EUT Identification List

4.2.1 Board Information

Table 10 Board Information

1900MHz Huawei E272 Vodafone Mobile Connect USB Modem		
E272		
Board and Module		
Equipment Designation / Description	Serial Number	Remarks
-MAINBOARD	EF1AA10721600023	TCPU Ver.A

4.2.2 Adapter Technical Data

Not Applicable.

4.2.3 Battery Technical Data

Not Applicable.

4.2.4 FCC Identification

Grantee Code: QIS
Product Code: E272
FCC Identification: QISE272

5 Main Test Instruments

Table 11 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until (MM.DD.YYYY)
3m Semi Anechoic Chamber	S+M	N/A	N/A	12.25.2007
3m Full Anechoic Chamber	S+M	N/A	N/A	12.06.2007
Signal Analyzer	R&S	FSQ 26	100266	11.12.2007
Test Receiver Display Unit	R&S	ESMI 804.8932.52	829214/011	12.23.2007
Test Receiver RF Unit	R&S	ESMI 1032.5640.53	829550/008	11.21.2007
Receiver	R&S	ESIB 26	100318	10.18.2007
Receiver	R&S	ESCS30	830245/018	11.16.2007
Pre-Amplifier	Agilent	8447D	2944A10146	12.20.2007
Pre-Amplifier	Agilent	83017A	3950M00246	11.21.2007
Loop Antenna	Schwarzbeck	FMZB1516	1516115	12.09.2007
BiLog Antenna	Schaffner	CBL 6112B	2747	11.20.2007
BiLog Antenna	Schaffner	CBL 6112B	2536	12.23.2007
Horn Antenna	R&S	HF906 4044.4507.02	359287/005	12.08.2007
Horn Antenna	R&S	HF906 4044.4507.02	359287/006	12.06.2007
Horn Antenna	ETS-Lindgren	3116	00031541	11.15.2007
Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	12.16.2007
Signal Generator	R&S	SMT06	830264/009	11.17.2007
Signal Generator	R&S	SMR 40	100325	10.26.2007
Artificial Mains Network	Schwarzbeck	NNLK8121	8121416	11.23.2007
Power Supply	Keithley	2306	1045337	12.15.2007
Climate Chamber	WEISS	ACS-1	3604040034	11.27.2007
Universal Radio Communication Tester	R&S	CMU200	108035	12.23.2007
Wireless communication test set	Agilent	8960	GB43461081	11.25.2007

6 Transmitter Measurements

6.1 Effective Radiated Power of Transmitter (EIRP)

6.1.1 Test Conditions

Table 12 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25°C
Relative humidity:	55%
Test Configurations:	TM1/TM2/TM3 at frequency Bottom、Middle、Top

6.1.2 Test Specifications and Limits

6.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 24.232

6.1.2.2 Supporting Standards

Table 13 Supporting Standards:

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.1.2.3 Limits

Compliance with part 24.232, mobile/portable stations are limited to 2 watts EIRP peak power.
 $W(\text{dBm}) = 10 * \log(W_{\text{watts}})$.

Table 14 Limits

Maximum Output Power (Watts)	< 2 Watts
Maximum Output Power (dBm)	< 33 dBm

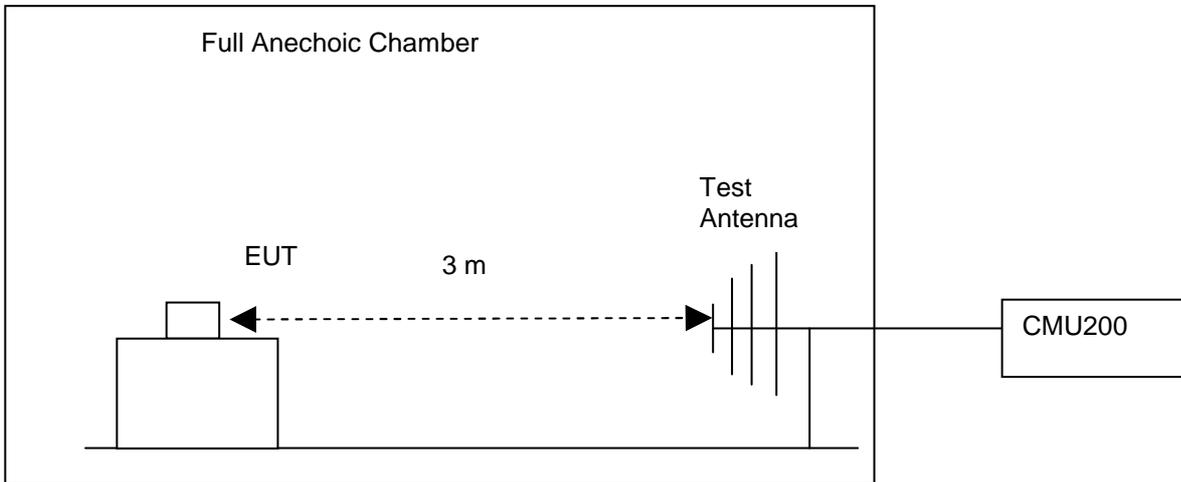
6.1.3 Test Method and Setup

- For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, ERP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the Huawei E272 Vodafone Mobile Connect USB Modem to the wireless communication tester CMU200 via the air interface. The band is set as PCS.
- Test the Radiated maximum output power by the CMU200 received from test antenna.
- Use substitution method to verify the maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the signal generator to get the same received power recorded in step (b) on CMU200, and record the

power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

Test setup

Step 1: Pre-test



Step 2: Substitution method to verify the maximum EIRP

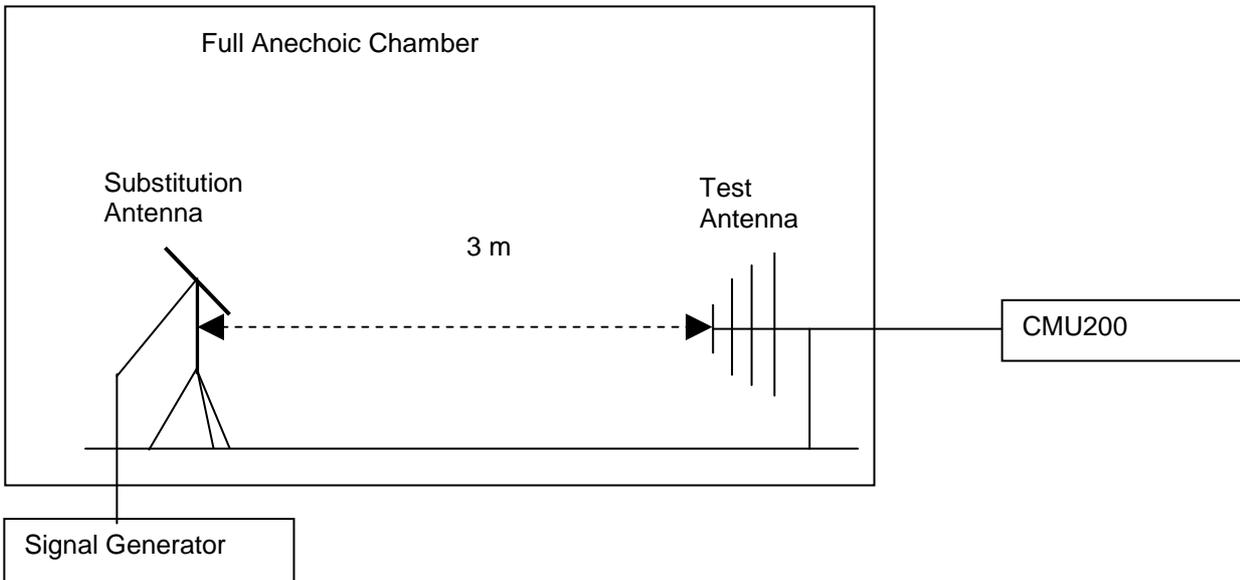


Figure 1. Test Set-up

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

There is a constant difference of 2.15 dB between EIRP and ERP.

$EIRP (dBm) = ERP (dBm) + 2.15$ (ITU-R Recommendation SM.329-10).

6.1.4 Measurement Results

6.1.4.1 Pre-test Results

Table 15 Measurement Results

TEST CONDITIONS		RF Output Power (EIRP)					
		Channel512(B) 1850.2MHz		Channel661 (M) 1880MHz		Channel810(T) 1909.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T _{nom} (25 °C) V _{nom} (5V)	31.52	33	31.59	33	31.54	33
TM2	T _{nom} (25 °C) V _{nom} (5V)	26.97	33	27.05	33	26.96	33
TEST CONDITIONS		Channel9262(B) 1852.4MHz		Channel9400(M) 1880MHz		Channel9538(T) 1907.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM3	T _{nom} (25 °C) V _{nom} (5V)	24.73	33	24.89	33	24.77	33

6.1.4.2 Substitution Results

Table 16 Substitution Results

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (EIRP) [dBm]	Result
TM1	1850.2	31.53	Dipole Ant.	27.94	4.6	1.0	31.54	Pass
TM1	1880	31.58	Dipole Ant.	27.83	4.7	1.0	31.53	Pass
TM1	1909.8	31.56	Dipole Ant.	27.71	4.8	1.0	31.51	Pass
TM2	1850.2	27.02	Dipole Ant.	23.45	4.6	1.0	27.05	Pass
TM2	1880	27.03	Dipole Ant.	23.31	4.7	1.0	27.01	Pass
TM2	1909.8	27.01	Dipole Ant.	23.26	4.8	1.0	27.06	Pass
TM3	1852.4	24.76	Dipole Ant.	21.15	4.6	1.0	24.75	Pass
TM3	1880	24.85	Dipole Ant.	21.12	4.7	1.0	24.82	Pass
TM3	1907.6	24.76	Dipole Ant.	20.91	4.8	1.0	24.71	Pass

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

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

NOTE: SGP- Signal Generator Level

b, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 200kHz for TM1 and TM2 and 5MHz for TM3.

6.1.5 Conclusion

The equipment **PASSED** the requirement of this clause.

6.2 Conducted Power of Transmitter

6.2.1 Test Conditions

Table 17 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1/TM2/TM3 at frequency Bottom、 Middle、 Top

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 24 subpart E

6.2.2.2 Supporting Standards

Table 18 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.2.2.3 Limits

Compliance with part 24.232, in no any case may the peak power of a mobile station transmitter exceed 2 W. The calculated longitude EIRP by following formula:

$$\text{EIRP(dBm)} = 10 \cdot \log(\text{EIRP}_{\text{in watts}}).$$

And for conducted power, we can use Antenna Gain to calculate the limit. So the conducted power:

$$\begin{aligned} P_{\text{cod}}(\text{dBm}) &= \text{EIRP}(\text{dBm}) - \text{Gain}(\text{dBi}), \\ \text{and Gain}(\text{dBi}) &= \text{Gain}(\text{dBd}) + 2.15\text{dB} \end{aligned}$$

Table 19 Limits

Maximum Output Power (Watts)	< 2 Watts
Antenna Gain(dBi):	<2
Maximum Conducted Output Power (dBm)	< 31dBm

6.2.3 Test Method and Setup

(a)For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, Conducted maximum power shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the Huawei E272 Vodafone Mobile Connect USB Modem to the wireless communication tester CMU200 via the antenna connector.
 (b)Test the Conducted maximum output power by the CMU200.

Test setup

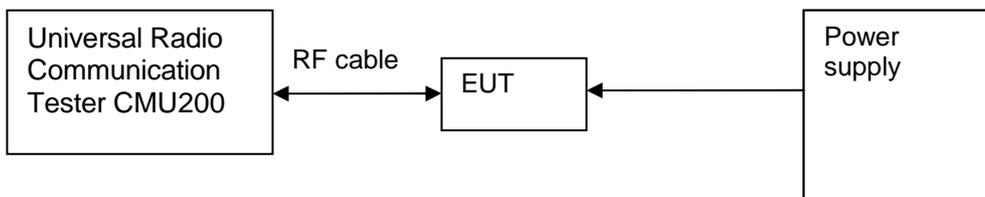


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 20 Measurement Results

TEST CONDITIONS		RF Output Power(Conducted)					
		Channel512(B) 1850.2MHz		Channel661 (M) 1880MHz		Channel810(T) 1909.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T _{nom} (25 °C) V _{nom} (5V)	29.82	31	29.89	31	29.84	31
TM2	T _{nom} (25 °C) V _{nom} (5V)	25.27	31	25.35	31	25.26	31
TEST CONDITIONS		Channel9262(B) 1852.4MHz		Channel9400(M) 1880MHz		Channel9538(T) 1907.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM3	T _{nom} (25 °C)	23.03	31	23.19	31	23.07	31

	V _{nom} (5V)						
--	-----------------------	--	--	--	--	--	--

6.2.5 Conclusion

The equipment **PASSED** the requirement of this clause.

6.3 Modulation Characteristics

6.3.1 Test Conditions

Table 21 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1/TM2/TM3 at frequency Middle

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 24 subpart E

6.3.2.2 Supporting Standards

Table 22 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.3.2.3 Limits

No specific modulation characteristics requirement limits in part 2.1047 and part 24 subpart E.

Table 23 Limits

Limits	Not applicable
--------	----------------

6.3.3 Test Method and Setup

Connect the Huawei E272 Vodafone Mobile Connect USB Modem to Universal Radio Communication Tester CMU200 via the antenna connector. The frequency band is set as PCS; the Huawei E272 Vodafone Mobile Connect USB Modem’s output is matched with 50 Ω loads, test method was according to 3GPP TS 51.010. The waveform quality and constellation of the Huawei E272 Vodafone Mobile Connect USB Modem was tested.

Test setup

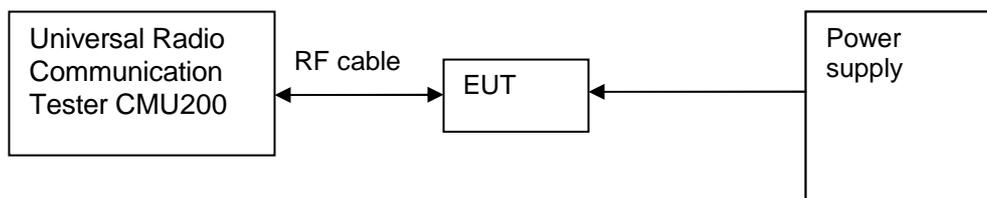


Figure 3. Test Set-up

6.3.4 Measurement Results

Table 24 Measurement Results

		Modulation Characteristic	
TEST CONDITIONS		Channel661(M) 1880MHz	
		Measured	
		TM1	TM2
T _{nom} (25 °C)	V _{nom} (5V)	Refer to Appendix A	Refer to Appendix A
		Modulation Characteristic	
TEST CONDITIONS		Channel9400(M) 1880MHz	
		Measured	
		TM3	
T _{nom} (25 °C)	V _{nom} (5V)	Refer to Appendix A	

6.3.5 Conclusion

The equipment **PASSED** the requirement of this clause.

For the measurement results refer to appendix A.

6.4 Occupied Bandwidth

6.4.1 Test Conditions

Table 25 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	55 %
Test Configurations:	TM1/TM2/TM3 at frequency Bottom、Top

6.4.2 Test Specifications and Limits

6.4.2.1 Specification

CFR 47 (FCC) part 2.1049 and part 24 subpart E

6.4.2.2 Supporting Standards

Table 26 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.4.2.3 Limits

No specific occupied bandwidth requirement in part 24 subpart E, but the occupied bandwidth was defined in part 2.1049: the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

Table 27 Limits

Upper /lower frequency limits	0.5% of the mean power
-------------------------------	------------------------

6.4.3 Test Method and Setup

Huawei E272 Vodafone Mobile Connect USB Modem was connected to the wireless signal analyzer R&S FSQ26 via one RF connector. The band class is set as PCS; Huawei E272 Vodafone Mobile Connect USB Modem was controlled to transmit maximum power. Measure and record the occupied bandwidth of the Huawei E272 Vodafone Mobile Connect USB Modem by the R&S FSQ26.

The OBW, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean radiated powers are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

Refer to 47CFR part2.1049 section (g) & (h).

(g) Transmitter in which the modulating base band comprises not more than three independent channels - when modulated by the full complement of signals for which the transmitter is rated. The level of modulation for each channel should be set to that prescribed in rule parts applicable to the

services for which the transmitter is intended. If specific modulation levels are not set forth in the rules, the tests should provide the manufacturer’s maximum rated condition.

(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudorandom generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at discretion of the user.

For TM1/TM2 following RBW and VBW are employed:

Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)

Video bandwidth (VBW): 10 kHz

For TM3 system following RBW and VBW are employed:

Measurement bandwidth (RBW): 50 kHz (Resolution bandwidth)

Video bandwidth (VBW): 500 kHz

Test Set-up

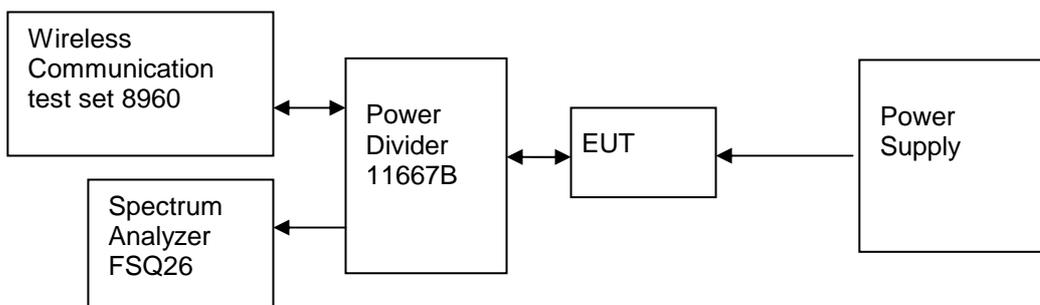


Figure 4. Test Set-up

6.4.4 Measurement Results

Table 28 Measurement Results

TEST CONDITIONS		Occupied Bandwidth					
		Channel512 (B) 1850.2MHz		Channel661 (M) 1880MHz		Channel810 (T) 1909.8MHz	
		Measured (kHz)		Measured (kHz)		Measured (kHz)	
		TM1	TM2	TM1	TM2	TM1	TM2
T _{nom} (25 °C)	99%	246.79	238.78	245.19	241.99	248.40	248.40
V _{nom} (5V)							
TEST CONDITIONS		Occupied Bandwidth					
		Channel9262(B) 1852.4MHz		Channel9400(M) 1880MHz		Channel9538 (T) 1907.6MHz	
		Measured		Measured		Measured	

		(MHz)	(MHz)	(KHz)
		TM3	TM3	TM3
T _{nom} (25 °C) V _{nom} (5V)	99%	4.183	4.215	4.183

6.4.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix B.

6.5 Band Edges Compliance

6.5.1 Test Conditions

Table 29 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55 %
Test Configurations:	TM1/TM2/TM3 at frequency Bottom、 Top

6.5.2 Test Specifications and Limits

6.5.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 24.238

6.5.2.2 Supporting Standards

Table 30 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.5.2.3 Limits

Compliance with part 24.238, all spurious emission must be attenuated below the transmitter power by at least $43 + 10 \log_{10} P$. (Whereas P is the rated power of the EUT).

Table 31 Limits for GPRS

	TM1	TM2	TM3
Rated Power:	30 dBm	26 dBm	24 dBm
Required attenuation:	$43 + 10 \log(1) = 43$, 30 dBm - 43 dB	$43 + 10 \log(0.4) = 39$, 26 dBm - 39 dB	$43 + 10 \log(0.25) = 37$, 24 dBm - 37 dB
Absolute level	- 13 dBm	- 13 dBm	- 13 dBm

6.5.3 Test Method and Setup

Huawei E272 Vodafone Mobile Connect USB Modem was connected to the wireless signal analyzer R&S FSQ26 via the one RF connector, the band class is set as PCS. Huawei E272 Vodafone Mobile Connect USB Modem was controlled to transmit maximum power. Measure and record band edges compliance of the Huawei E272 Vodafone Mobile Connect USB Modem by the R&S FSQ26.

In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed.

According to FCC part24.238.The FCC rules define the fundamental emission as -26dBc bandwidth. The limit is -13dBm.

Test Set-up

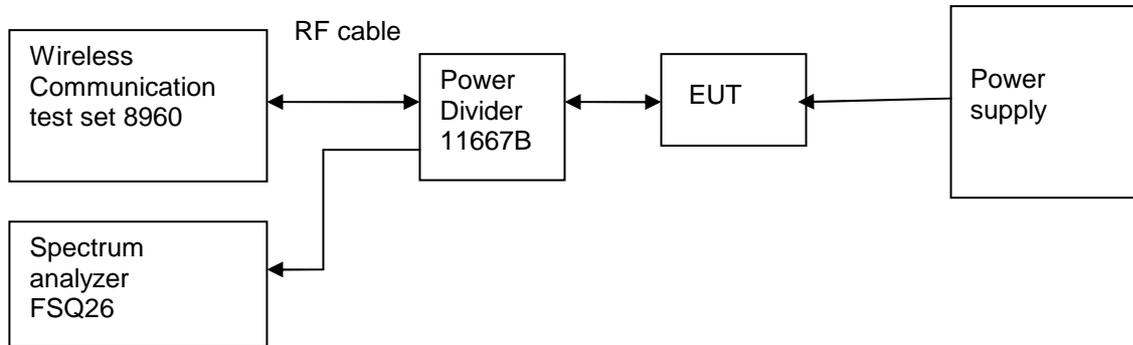


Figure 5. Test Set-up

6.5.4 Measurement Results

Table 32 Measurement Results outside Band Edges-- Single Carrier

Band	Frequency of Band edges [MHz]	Channel Number	Test Mode	Spurious Level measured [dBm]	FCC limit	Result
$T_{nom} (25\text{ }^{\circ}\text{C}), V_{nom} (5\text{V})$						
PCS	1850.2	512	TM1	<-13(See appendix C)	- 13 dBm	Pass
	1909.8	810	TM1	<-13(See appendix C)	- 13 dBm	Pass
	1850.2	512	TM2	<-13(See appendix C)	- 13 dBm	Pass
	1909.8	810	TM2	<-13(See appendix C)	- 13 dBm	Pass
	1852.4	9262	TM3	<-13(See appendix C)	- 13 dBm	Pass
	1907.6	9538	TM3	<-13(See appendix C)	- 13 dBm	Pass

6.5.5 Conclusion

The equipment **PASSED** the requirement of this clause. For the measurement results refer to appendix C.

6.6 Spurious Emission at Antenna Terminal

6.6.1 Test Conditions

Table 33 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	50 %
Test Configurations:	TM1/TM2/TM3 at frequency Bottom, Top

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 24.238

6.6.2.2 Supporting Standards

Table 34 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0:2005	Recommended GSM/EDGE MS conformance specification

6.6.2.3 Limits

Compliance with part 24.238, all spurious emission must be attenuated below the transmitter power by at least $43 + 10 \log_{10} P$. (Whereas P is the rated power of the EUT).

Table 35 Limits for GPRS Mode

	TM1	TM2	TM3
Rated Power:	30 dBm	26 dBm	24 dBm
Required attenuation:	$43 + 10 \log(1) = 43$, 30 dBm - 43 dB	$43 + 10 \log(0.4) = 39$, 26 dBm - 39 dB	$43 + 10 \log(0.25) = 37$, 24 dBm - 37 dB
Absolute level	- 13 dBm	- 13 dBm	- 13 dBm

6.6.3 Test Method and Setup

Huawei E272 Vodafone Mobile Connect USB Modem was connected to the wireless signal analyzer R&S FSQ26 via the one RF connector, the band class is set as PCS. Huawei E272 Vodafone Mobile Connect USB Modem was controlled to transmit maximum power. Measure and record the Conducted Spurious Emission of the Huawei E272 Vodafone Mobile Connect USB Modem by the R&S FSQ26.

According to part 24.238, the defined measurement bandwidth as following:

24.238 (b) Measurement procedure: Compliance with these provisions is based on the use of

measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 100 kHz: 1 kHz;
 Measurement bandwidth (RBW) for 100 kHz up to 30 MHz: 10 kHz;
 Measurement bandwidth (RBW) for 30 MHz up to 20GHz: 1 MHz;

Test Set-up

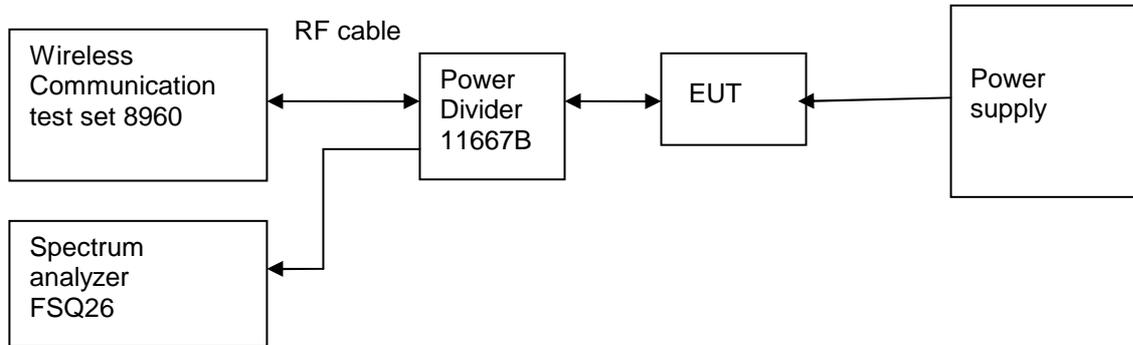


Figure 6. Test Set-up

6.6.4 Measurement Results

Table 36 Measurement Results

Channel Number	Test Mode	Test Range (Frequency)	Output Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
Channel 512(B)	TM1	9 kHz~20GHz	30	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	TM2	9 kHz~20GHz	26	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 9262(B)	TM3	9 kHz~20GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 810(T)	TM1	9 kHz~20GHz	30	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	TM2	9 kHz~20GHz	26	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 9538(T)	TM3	9 kHz~20GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass

6.6.5 Conclusion

The equipment **PASSED** the requirement of this clause.
 For the measurement results refer to appendix D.

6.7 Radiated Spurious Emission

6.7.1 Test Conditions

Table 37 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25 °C
Relative humidity:	53 %
Test Configurations:	TM1/TM2/TM3 at frequency M

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 2.1053 and part 24.238

6.7.2.2 Supporting Standards

Table 38 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.7.2.3 Limits

Compliance with part 24.238, all spurious emission must be attenuated below the transmitter power by at least $43 + 10 \log_{10} P$. (Whereas P is the rated power of the EUT).

Table 39 Limits for GPRS Mode

	TM1	TM2	TM3
Rated Power:	30 dBm	26 dBm	24 dBm
Required attenuation:	$43 + 10 \log(1) = 43$, 30 dBm - 43 dB	$43 + 10 \log(0.4) = 39$, 26 dBm - 39 dB	$43 + 10 \log(0.25) = 37$, 24 dBm - 37 dB
Absolute level	- 13 dBm	- 13 dBm	- 13 dBm

6.7.3 Test Method and Setup

(a) Measurements were made to detect spurious emissions radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data were supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph 2.1049(c) as appropriate. For equipment operating on frequencies below 890 MHz, an Open Field Test is normally required with the measuring instrument antenna located in the far field at all test frequencies. In the event it is either

impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurement will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections, which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with the reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

- (b) Measurements specified in paragraph (a) of this section shall be made for the following equipment:
- (1) Those in which the spurious emission are required to be 60 dB or more below the mean power of the transmitter.
 - (2) All equipment operating on frequencies higher than 25 MHz
 - (3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
 - (4) Other types of equipment as required, when deemed necessary by the Commission.

Huawei E272 Vodafone Mobile Connect USB Modem is equipment with non-integral antenna. And it should test according to part (b) of above section.

BTS simulator is connected to a communication antenna, by which communicate with the Huawei E272 Vodafone Mobile Connect USB Modem inside the test site. The BTS simulator controls the Huawei E272 Vodafone Mobile Connect USB Modem to transmit at maximum power which defined in specification of product when in traffic mode, field strength of spurious emission in idle mode were also tested. The Huawei E272 Vodafone Mobile Connect USB Modem operates on a typical channel.

The test procedure:

- (a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP. shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the Huawei E272 Vodafone Mobile Connect USB Modem to the BTS simulator via the air interface. The band class is set as PCS.
- (b) Test the Radiated maximum output power by the Rohde and Schwarz ESMI Test Receiver from test antenna.
- (c) Use substitution method to verify the maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the signal generator to get the same received power recorded in step (b) on ESMI Test Receiver, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

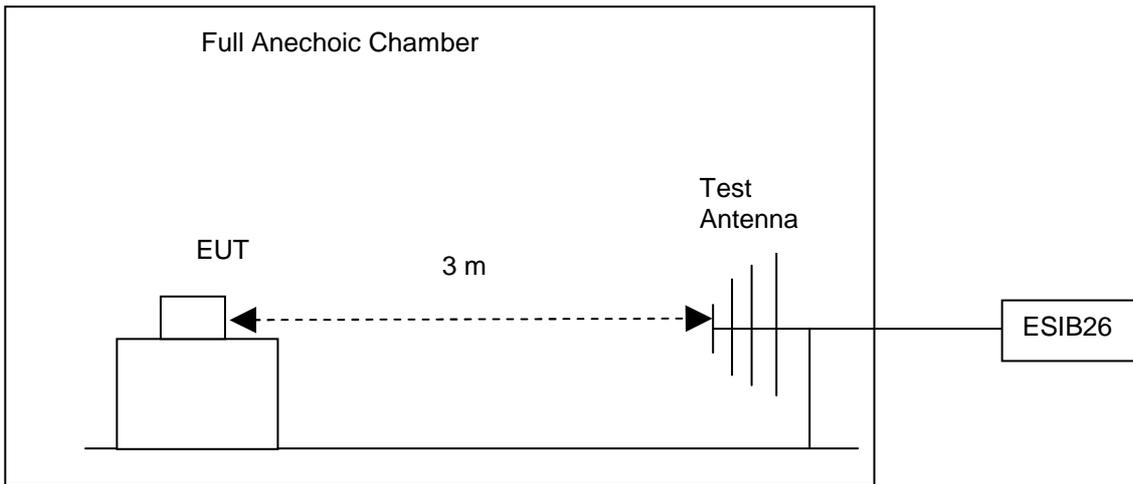
According to part 24.238, the defined measurement bandwidth as following:

24.238 (b) Measurement procedure: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 20GHz: 1 MHz;

Test setup

Step 1: Pre-test



Step 2: Substitution method to verify the maximum ERP

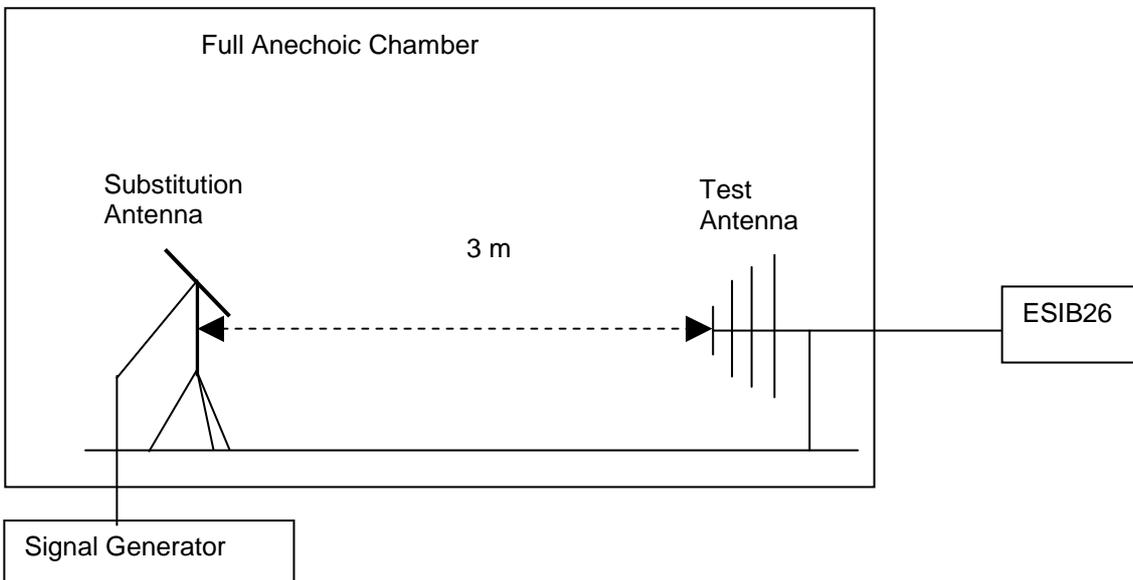


Figure 7. Test Set-up

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

6.7.4 Measurement Results

6.7.4.1 Pre-test Measurement Results

Table 40 Measurement Results

Channel Number	Mode	Test Range (Frequency)	Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
661	TM1	9 kHz~20GHz	30	<- 13 dBm (See appendix E)	- 13 dBm	Pass
661	TM2	9 kHz~20GHz	26	<- 13 dBm (See appendix E)	- 13 dBm	Pass
9400	TM3	9 kHz~20GHz	24	<- 13 dBm	- 13 dBm	Pass

				(See appendix E)		
--	--	--	--	------------------	--	--

6.7.4.2 Substitution Results

No obvious peak found in pre- test. All frequency point's margin is bigger than 20dB.

Calculation Sample:

Table 41 Substitution Results

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	Gain [dBd]	Cable Loss [dB]	Substitution Level [dBm]	FCC limit [dBm]	Result

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

$$ERP [dBm] = SGP [dBm] - Cable Loss [dB] + Gain [dBd]$$

NOTE: SGP- Signal Generator Level

6.7.5 Conclusion

The equipment **PASSED** the requirement of this clause.

For the measurement results refer to appendix E.

According to pre-test result, only the test data which the data card with the external antenna (the maximum radiated spurious emission condition) were given in appendix E.

6.8 Frequency Stability

6.8.1 Test Conditions

Table 42 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	See below
Relative humidity:	55 % at 25 °C
Test Configurations:	TM1/TM2/TM3 at frequency M

6.8.2 Test Specifications and Limits

6.8.2.1 Specification

CFR 47 (FCC) part 2.1055 and part 24.235

6.8.2.2 Supporting Standards

Table 43 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.8.2.3 Limits

No specific frequency stability requirement in part 2.1055 and part 24.235.

6.8.3 Test Method and Setup

The frequency stability shall be measured with variation of ambient temperature as follows:

- (1) From -30 ° to +50 °centigrade for all equipmen t except that specified in subparagraphs (2) and (3) of paragraph 2.1055

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

- (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
- (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point, which shall be specified by the manufacturer.
- (3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) and (d) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

Test Set up

Connect the Huawei E272 Vodafone Mobile Connect USB Modem to the Wireless Communication test set 8960 via the connector. Then measure the frequency error by the Wireless Communication test set 8960. The Huawei E272 Vodafone Mobile Connect USB Modem’s output is matched with a 50 Ω load.

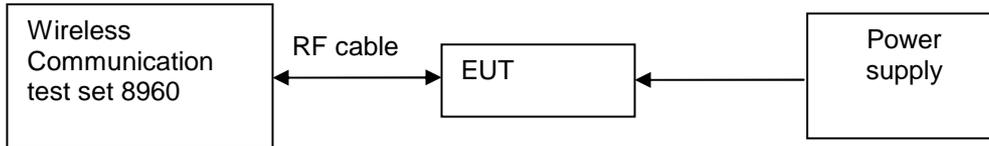


Figure 8. Test Set up

6.8.4 Measurement Results

6.8.4.1 Measurement Results vs. Variation of Temperature

- **GPRS Mode, 5V DC Channel No.661(1880.0MHz)**

Table 44 Measurement Results vs. Variation of Temperature – GPRS Mode

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 ℃	30	1880.0	-37.25	Pass
-20 ℃	30	1880.0	-26.61	Pass
-10 ℃	30	1880.0	13.22	Pass
0 ℃	30	1880.0	18.23	Pass
+10 ℃	30	1880.0	26.23	Pass
+20 ℃	30	1880.0	28.45	Pass
+30 ℃	30	1880.0	-12.53	Pass
+40 ℃	30	1880.0	22.45	Pass
+50 ℃	30	1880.0	-15.29	Pass

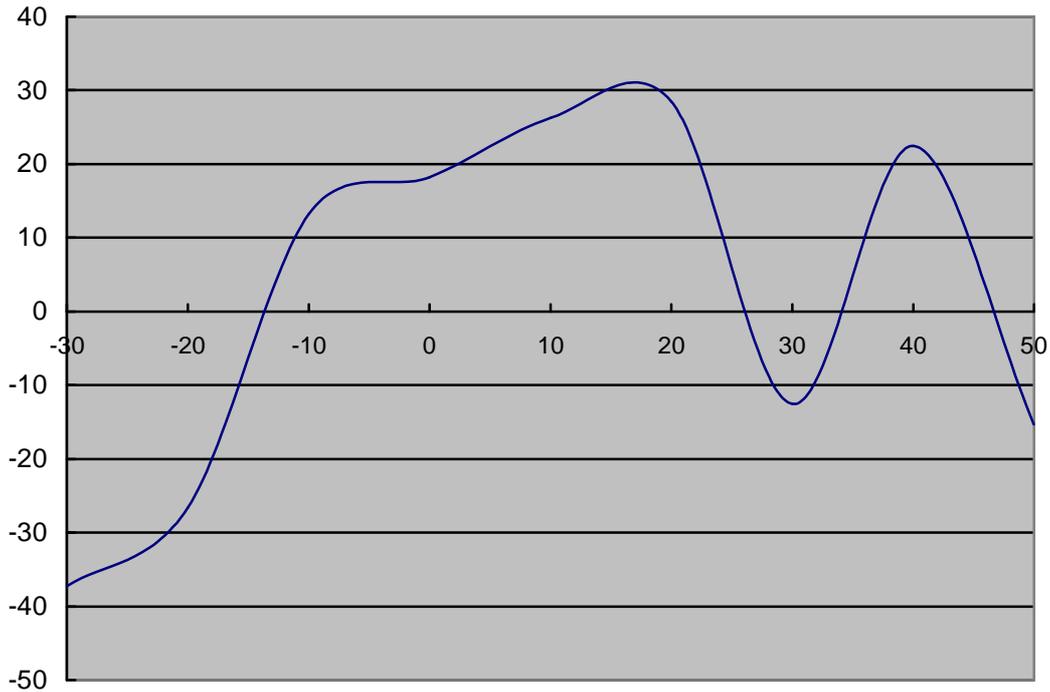


Figure 9.GPRS Mode Test Graph

● **EDGE Mode, 5V DC Channel No.661(1880.0MHz)**

Table 45 Measurement Results vs. Variation of Temperature – EDGE Mode

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	26	1880.0	-23.12	Pass
-20 °C	26	1880.0	-17.32	Pass
-10 °C	26	1880.0	21.13	Pass
0 °C	26	1880.0	26.05	Pass
+10 °C	26	1880.0	-13.25	Pass
+20 °C	26	1880.0	-22.86	Pass
+30 °C	26	1880.0	23.65	Pass
+40 °C	26	1880.0	19.85	Pass
+50 °C	26	1880.0	22.10	Pass

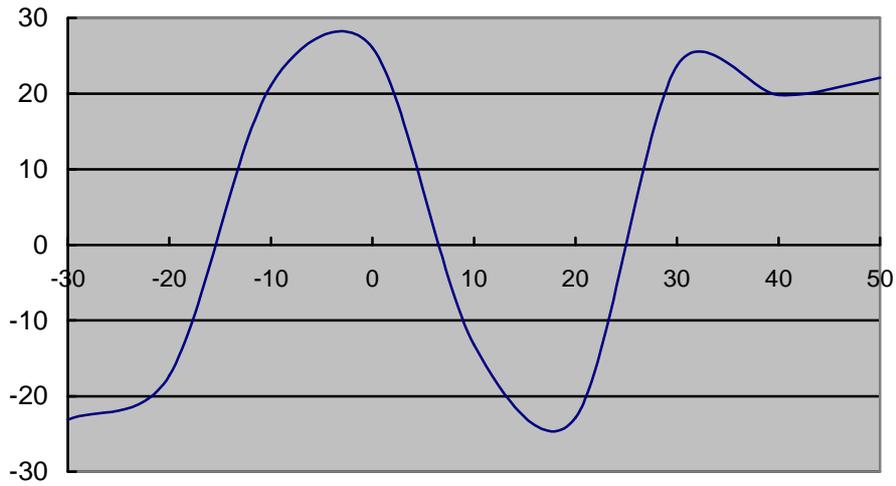


Figure 10. EDGE Mode Test Graph

● **HSDPA/WCDMA Mode, 5V DC Channel No.9400(1880.0MHz)**

Table 46 Measurement Results vs. Variation of Temperature—HSDPA/WCDMA Mode

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 ℃	24	1880.0	30.27	Pass
-20 ℃	24	1880.0	25.32	Pass
-10 ℃	24	1880.0	19.85	Pass
0 ℃	24	1880.0	11.58	Pass
+10 ℃	24	1880.0	18.76	Pass
+20 ℃	24	1880.0	15.62	Pass
+30 ℃	24	1880.0	-25.36	Pass
+40 ℃	24	1880.0	-22.83	Pass
+50 ℃	24	1880.0	-13.10	Pass

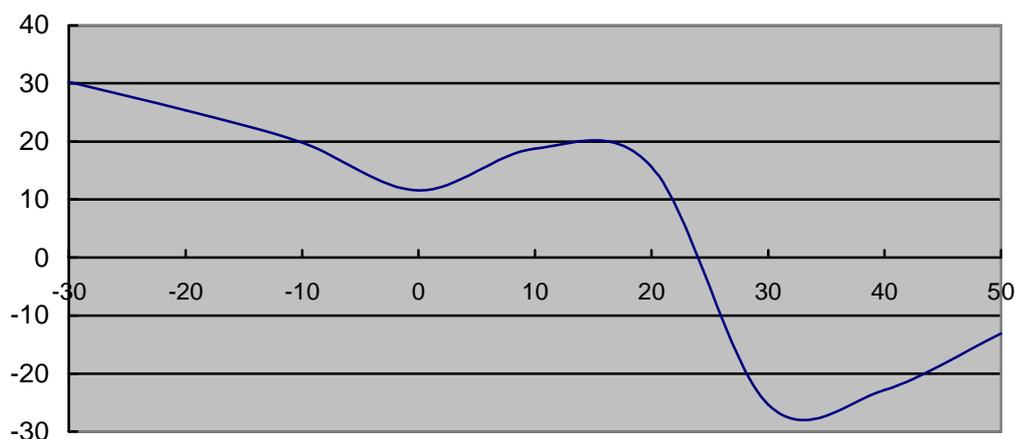


Figure 11. HSDPA/WCDMA Mode Test Graph

6.8.4.2 Measurement Results vs. Variation of Voltage

- **GPRS Mode, 25 °C ,Channel No. 661(1880.0MHz)**

Table 47 Measurement Results vs. Variation of Voltage—GPRS Mode

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
4.75	30	1880.0	25.12	Pass
5.0	30	1880.0	22.07	Pass
5.25	30	1880.0	-7.35	Pass

- **EDGE Mode, 25 °C ,Channel No. 661(1880.0MHz)**

Table 48 Measurement Results vs. Variation of Voltage—EDGE Mode

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
4.75	26	1880.0	-14.17	Pass
5.0	26	1880.0	19.30	Pass
5.25	26	1880.0	13.06	Pass

- **HSDPA/WCDMA Mode, 25 °C ,Channel No. 9400(1880.0MHz)**

Table 49 Measurement Results vs. Variation of Voltage—EDGE Mode

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
4.75	24	1880.0	29.32	Pass
5.0	24	1880.0	17.15	Pass
5.25	24	1880.0	15.62	Pass

6.8.5 Conclusion

The equipment **PASSED** the requirement of this clause.

7 EMC Test

7.1 Conducted Emission at Power Port

7.1.1 Test Conditions

Table 50 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Power port
Ambient temperature:	23.5°C
Relative humidity:	55 %
Test Configurations:	TM1 at frequency M

7.1.2 Test Specifications and Limits

7.1.2.1 Specification

CFR 47 (FCC) part 15.107

7.1.2.2 Supporting Standards

Table 51 Supporting Standards:

ANSI C63.4: 2003	Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
------------------	--

7.1.2.3 Limits

Compliance with part15.107, conducted emission must meet the requirement of following table.

Table 52 Limits

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

Note: * Decreases with the logarithm of the frequency.

7.1.3 Test Method and Setup

The Table-top EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4: 2003.

Conducted Disturbance at AC Port measurements were undertaken on the L and N Lines. The emissions were measured using a Quasi-Peak Detector and Average Detector.

Huawei Wireless Gateway was communicated with the BTS simulator through Air interface, the BTS

simulator controls the Wireless Gateway to transmitter the maximum power which defined in specification of product. The Wireless Gateway operated on the typical channel.

Measurement bandwidth (RBW) for 150 kHz to 30 MHz: 9 kHz;

Test Set-up

The Wireless Gateway was setup in the screened chamber and operated under nominal conditions.

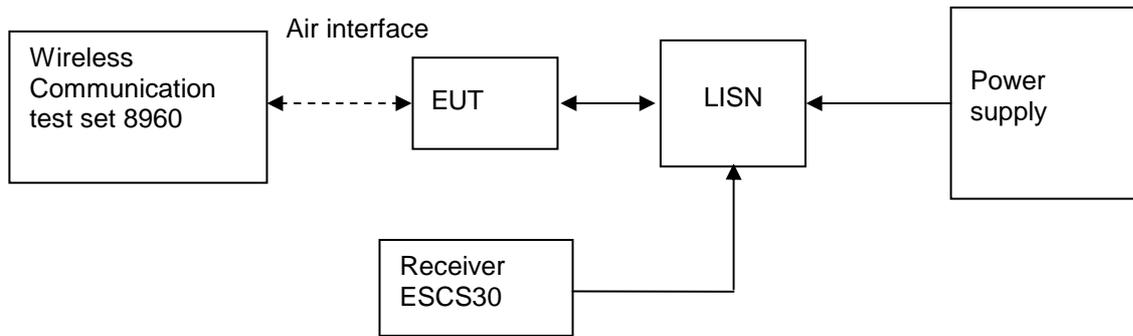


Figure 12. Test Set-up

7.1.4 Measurement Results

Table 53 MEASUREMENT RESULT:QP DECTECTOR

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	52.00	11.0	66	14.0	QP	L3	GND
0.478500	40.20	10.0	56	16.2	QP	L3	GND
0.955500	35.00	9.9	56	21.0	QP	L3	GND
2.940000	32.30	10.0	56	23.7	QP	N	GND
7.345500	38.70	10.3	60	21.3	QP	N	GND
13.375500	36.30	11.6	60	23.7	QP	N	GND

Table 54 MEASUREMENT RESULT:AV DECTECTOR

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.348000	32.10	10.2	49	16.9	AV	L3	GND
0.802500	31.80	9.9	46	14.2	AV	L3	GND
1.846500	32.50	10.1	46	13.5	AV	L3	GND
3.354000	31.50	10.1	46	14.5	AV	N	GND
11.445000	29.70	11.7	50	20.3	AV	N	GND
13.474500	35.50	11.6	50	14.5	AV	N	GND

7.1.5 Conclusion

The equipment **PASSED** the requirement of this clause. For the measurement results refer to appendix F.

7.2 Radiated Emission of Enclosure in Idle Mode

7.2.1 Test Conditions

Table 55 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1/TM2/TM3 at frequency M

7.2.2 Test Specifications and Limits

7.2.2.1 Specification

CFR 47 (FCC) part 15.109

7.2.2.2 Supporting Standards

Table 56 Supporting Standards:

ANSI C63.4: 2003	Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
------------------	--

7.2.2.3 Limits

The Radiated Emission of enclosure of EUT should compliance with the requirement of part 15.109. The limit showed in following table.

Table 57 Limits

Frequency of Emission (MHz)	Radiated Limit	
	Unit(uv/m)	Unit(dBuv/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
960-1000	500	54

7.2.3 Test Method and Setup

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2003). The test distance was 3m. The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4. The Radiated Disturbance measurements were made using a Rohde and Schwarz ESMI Test Receiver and control software ES-K1.

A preliminary scan and a final scan of the emissions were made from 30 MHz to 1GHz by using test script of software; the emissions were measured using a Quasi-Peak Detector. The maximal emission value was acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance

with the software setup. Normally, the height range of antenna was 1m to 4m, the azimuth range of turntable was 0° to 360°, The receive antenna has two polarizations V and H.

Huawei E272 communicated with the BTS simulator through Air interface. The E272 operated on the typical channel and the E272 worked in idle mode, transmitter did not work in this test.

Measurement bandwidth: 30 MHz – 1000 MHz: 120 kHz

Test set up

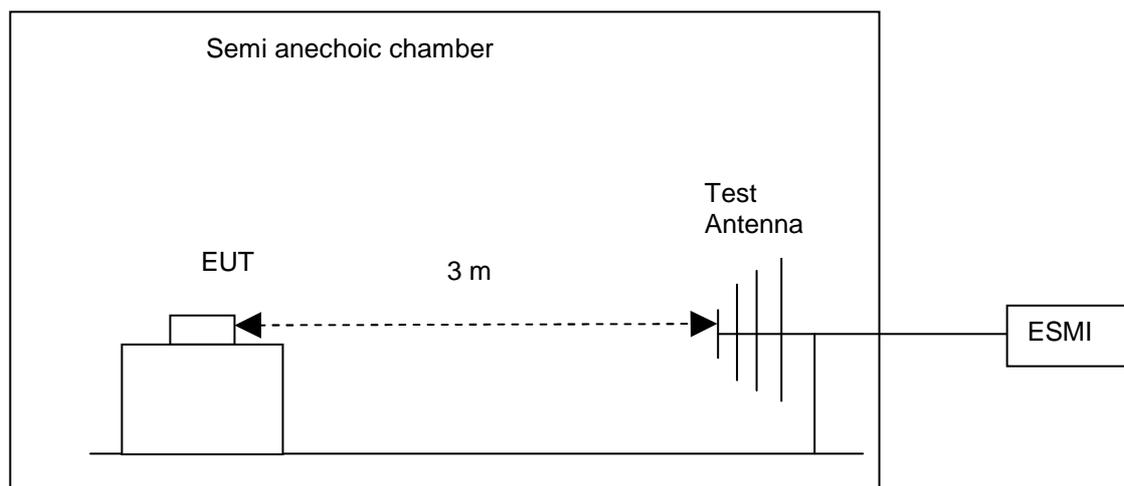


Figure 13. Test set up

7.2.4 Measurement Results

Table 58 MEASUREMENT RESULT: QP DECTER

Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
57.300000	31.60	-16.0	40.0	8.4	200.0	336.00	HORIZONTAL
121.800000	27.10	-9.6	43.5	16.4	118.0	352.00	HORIZONTAL
161.460000	26.80	-11.7	43.5	16.7	195.0	31.00	HORIZONTAL
240.120000	24.60	-9.2	46.0	21.4	126.0	43.00	HORIZONTAL
377.820000	22.90	-5.2	46.0	23.1	112.0	360.00	HORIZONTAL
664.200000	26.00	-1.5	46.0	20.0	131.0	50.00	HORIZONTAL

7.2.5 Conclusion

The equipment **PASSED** the requirement of this clause. For the measurement results refer to appendix G.

8 System Measurement Uncertainty

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

Table 59 System Measurement Uncertainty

Items		Extended Uncertainty
Effective Radiated Power of Transmitter	EIRP (dBm)	U=3dB; k=2
Band Width	Magnitude (%)	U= 0.2%; k=2
Band Edge Compliance	Disturbance Power (dBm)	U= 2.0dB; k=2
Conducted Spurious Emission at Antenna Terminal	Disturbance Power (dBm)	U= 2.0dB; k=2
Frequency Stability	Frequency Accuracy(ppm)	U= 0.21ppm; k=2
Field Strength of Spurious Radiation	ERP(dBm)	U=3dB; k=2
Conducted Output Power	Power(dBm)	U=0.39dB; k=2
Radiated Emission of enclosure at ideal mode	Field strength (dBμV/m)	U=3dB; k=2

9 Appendixes

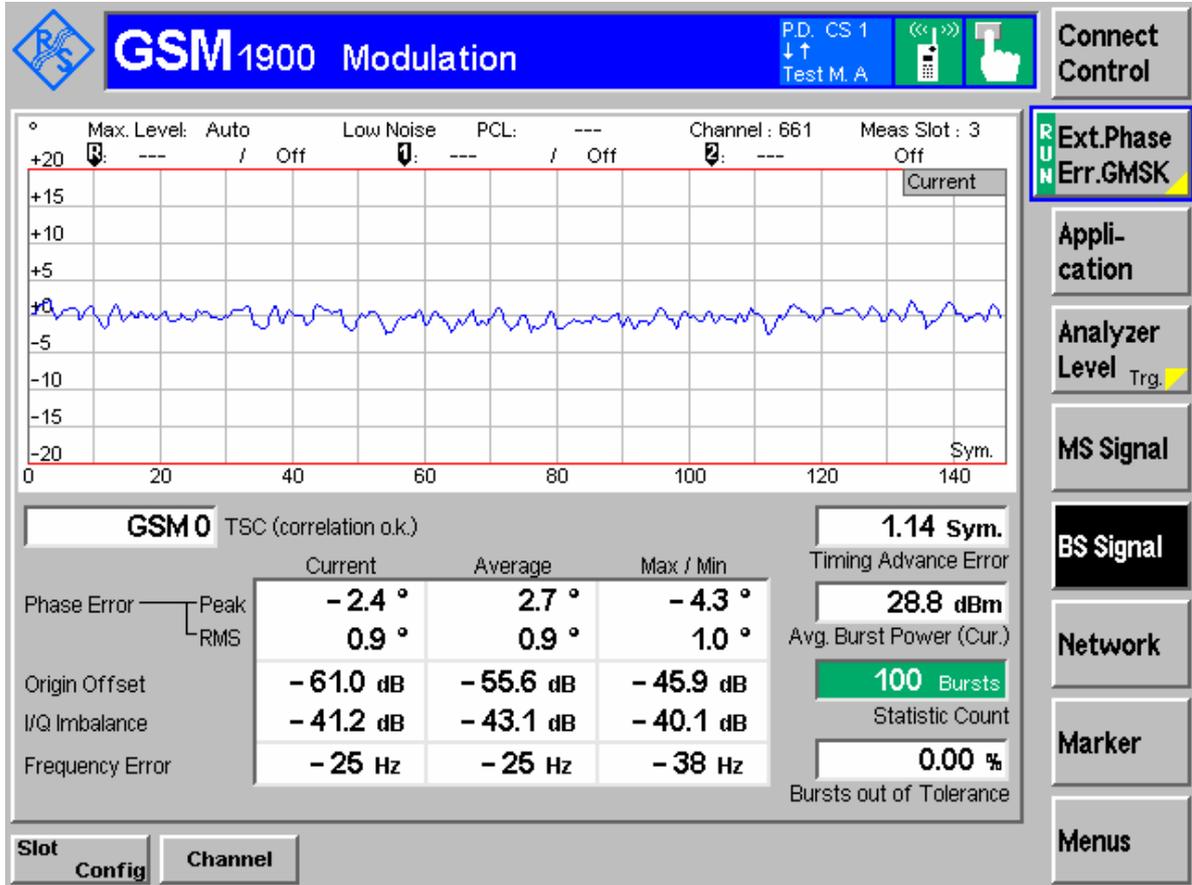
Appendix A	Measurement Results Modulation Characteristics	4 pages
Appendix B	Measurement Results Occupied Bandwidth	10 pages
Appendix C	Measurement Results Band Edges	7 pages
Appendix D	Measurement Results Spurious Emission at Antenna Terminal	46 pages
Appendix E	Measurement Results Radiated Spurious Emission	13 pages
Appendix F	Measurement Results Conducted Emission at Power Port	2 pages
Appendix G	Measurement Results Radiated Emission of Enclosure at Idle Mode	2 pages
Appendix H	Photos of Test Setup	4 pages

Appendix A

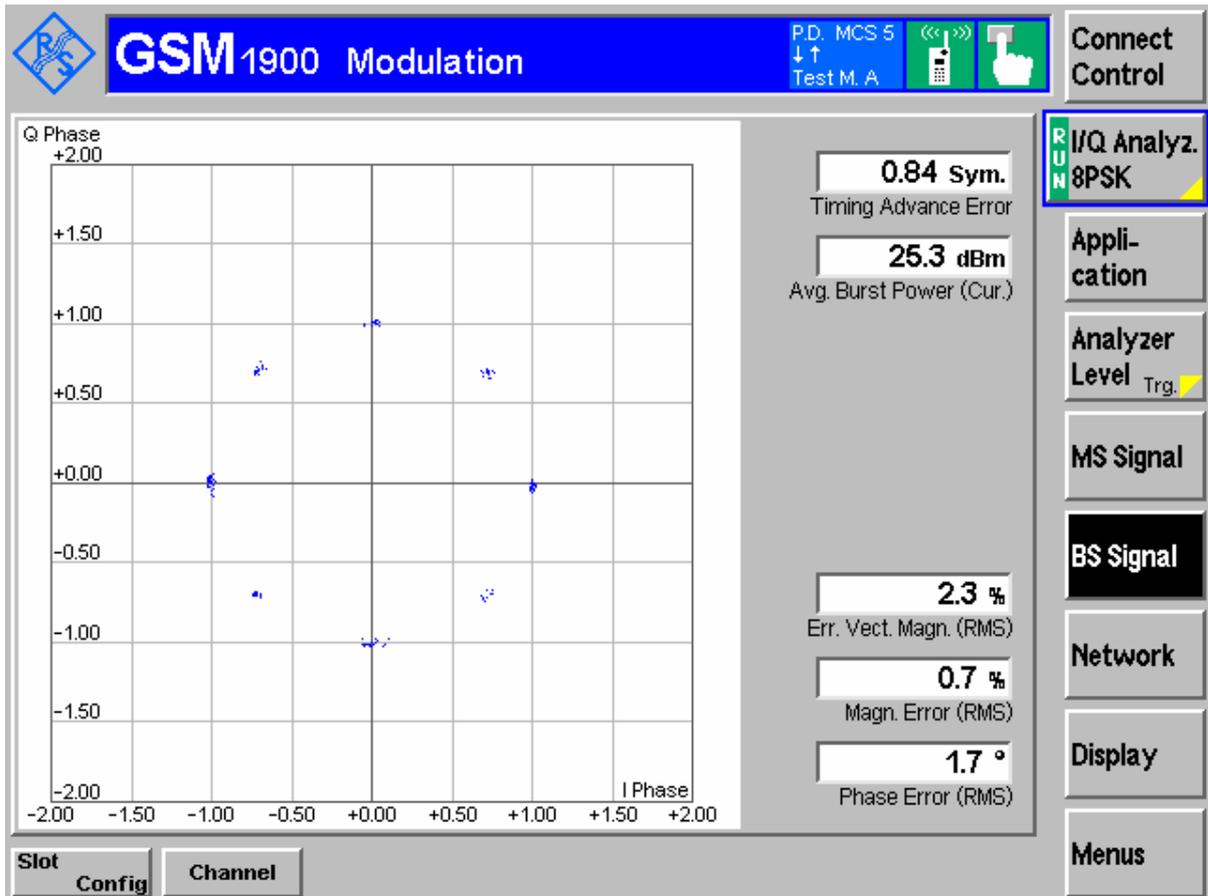
Modulation Characteristics

According to FCC Part 2.1047 & Part24 Subpart E

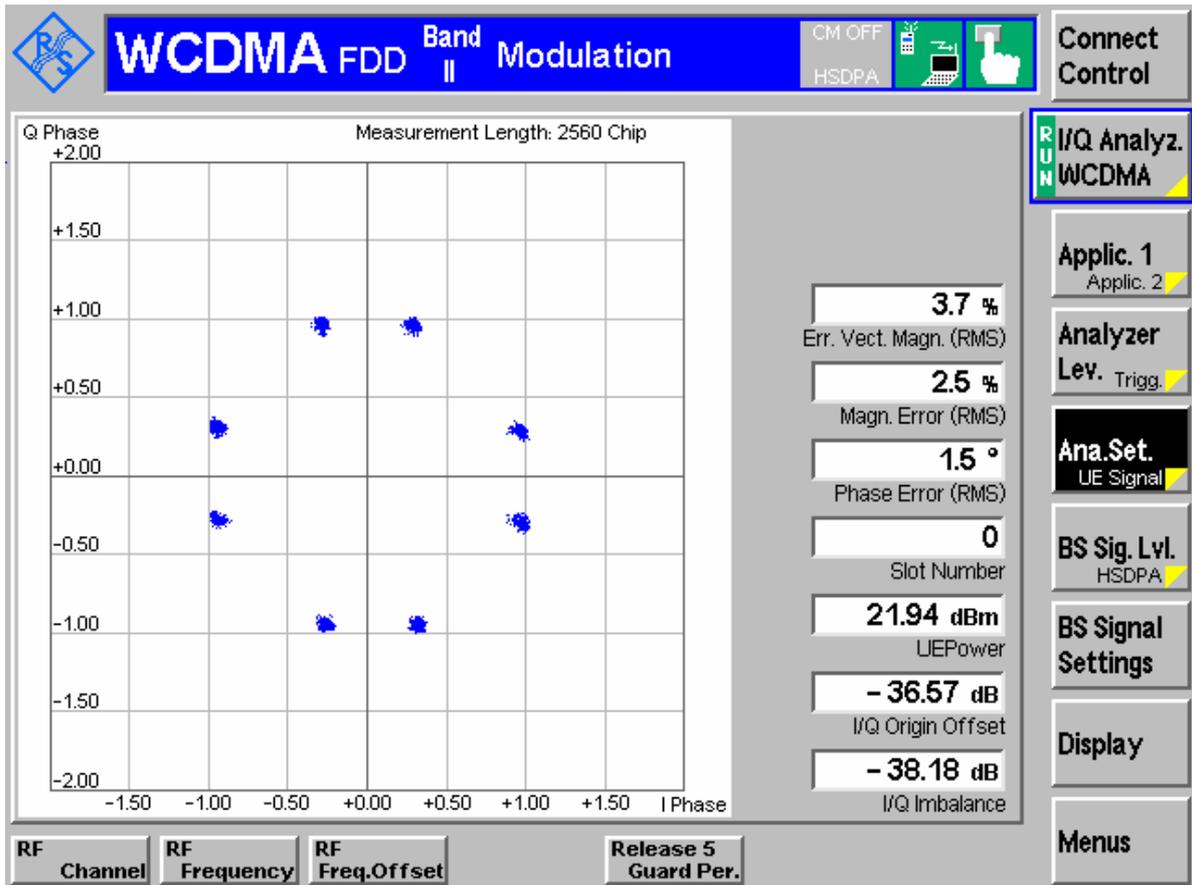
TM1:GPRS/GSM Channel 661



TM2:EDGE Channel 661



TM3:HSDPA/WCDMA Channel 9400

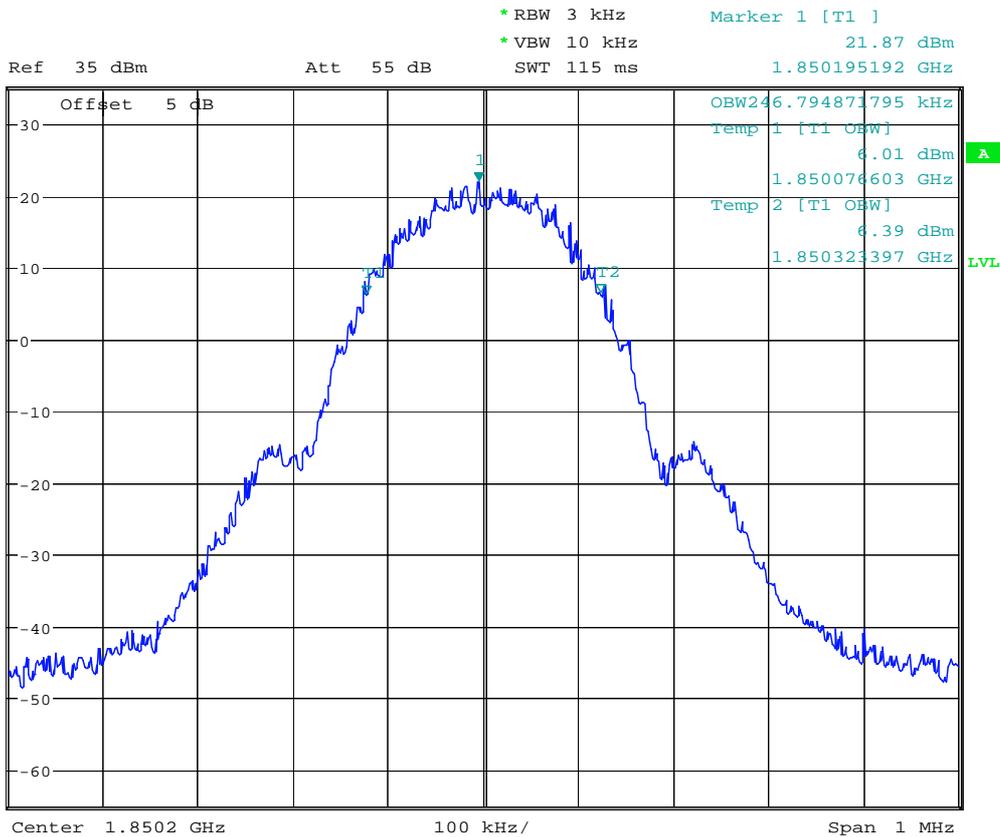


Appendix B

Occupied Bandwidth

According to FCC Part 2.1049 & Part 24 Subpart E

TM1:GPRS/GSM Channel 512

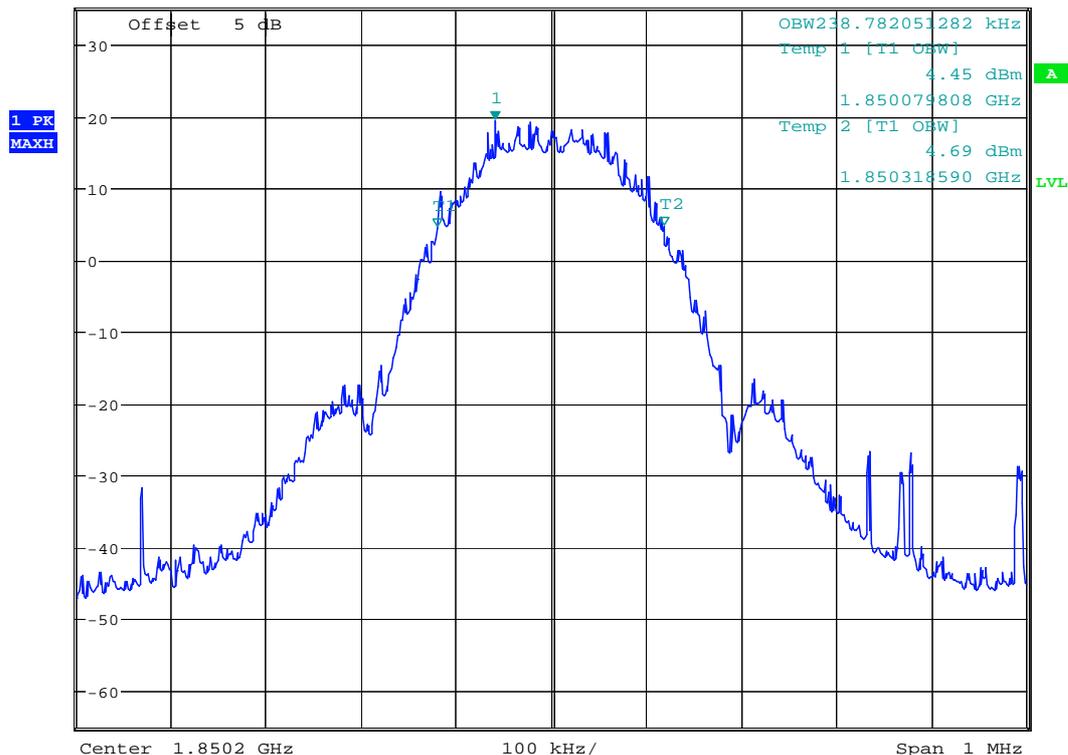


Date: 9.AUG.2007 10:41:57

TM2:EDGE Channel 512



*RBW 3 kHz Marker 1 [T1]
 *VBW 10 kHz 19.28 dBm
 Ref 35 dBm Att 55 dB SWT 115 ms 1.850140705 GHz

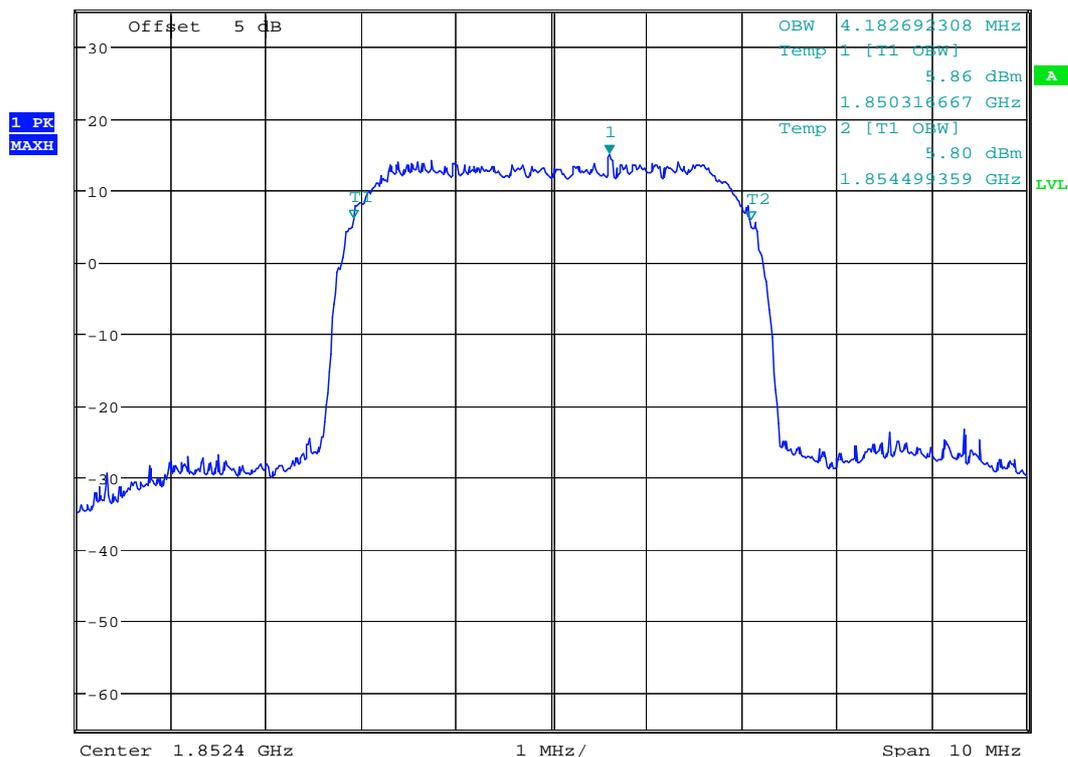


Date: 9.AUG.2007 10:44:21

TM3:HSDPA/WCDMA Channel 9262



*RBW 50 kHz Marker 1 [T1] 14.88 dBm
 *VBW 500 kHz
 Ref 35 dBm Att 35 dB SWT 5 ms 1.853008974 GHz

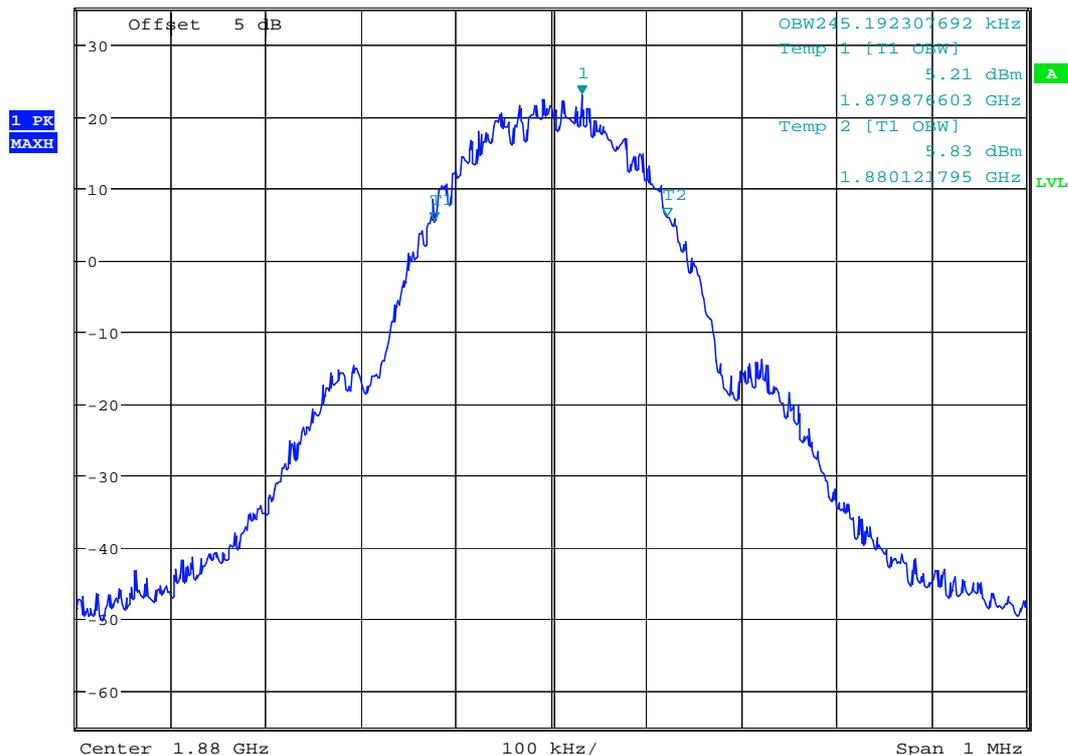


Date: 9.AUG.2007 12:19:04

TM1:GPRS/GSM Channel 661

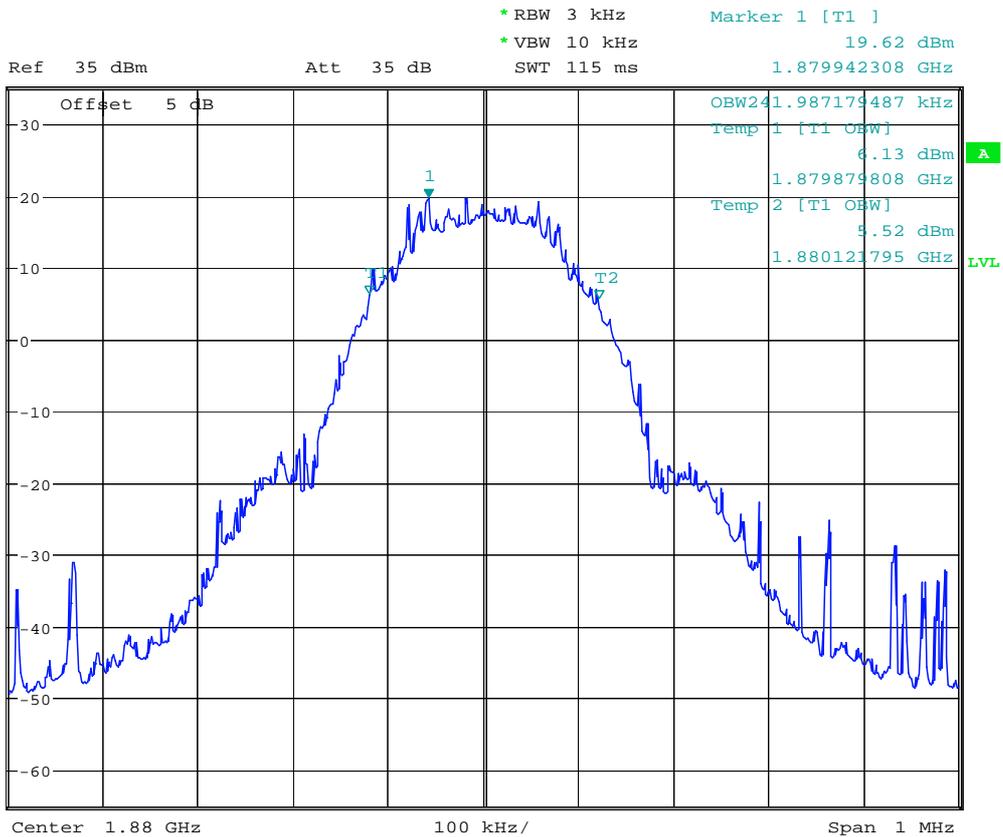


*RBW 3 kHz Marker 1 [T1]
 *VBW 10 kHz 22.86 dBm
 Ref 35 dBm Att 35 dB SWT 115 ms 1.880032051 GHz



Date: 9.AUG.2007 10:46:42

TM2:EDGE Channel 661

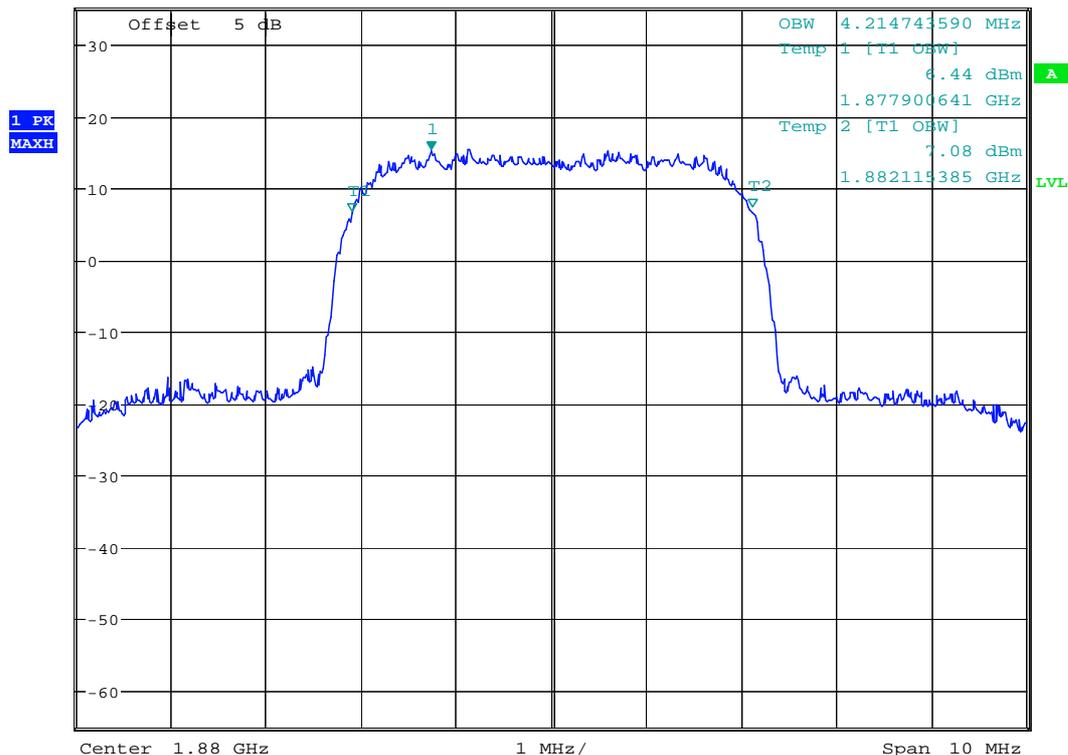


Date: 9.AUG.2007 10:51:44

TM3:HSDPA/WCDMA Channel 9400



*RBW 50 kHz Marker 1 [T1]
 *VBW 500 kHz 15.15 dBm
 Ref 35 dBm Att 35 dB SWT 5 ms 1.878733974 GHz

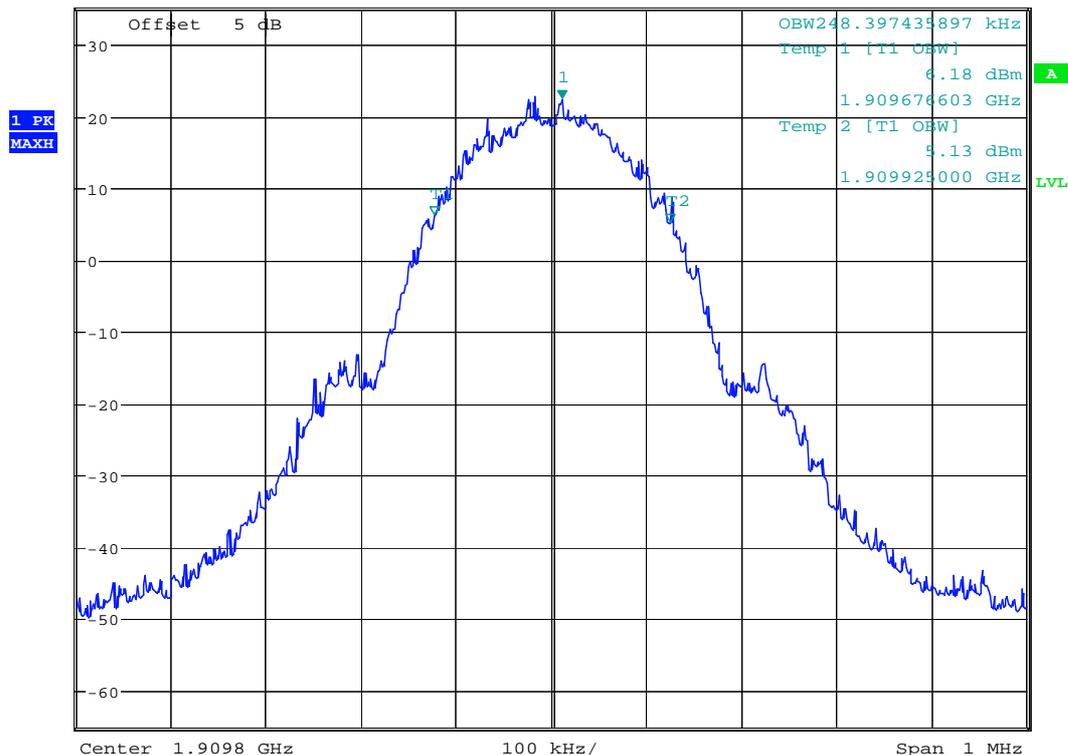


Date: 9.AUG.2007 12:23:28

TM1:GPRS/GSM Channel 810

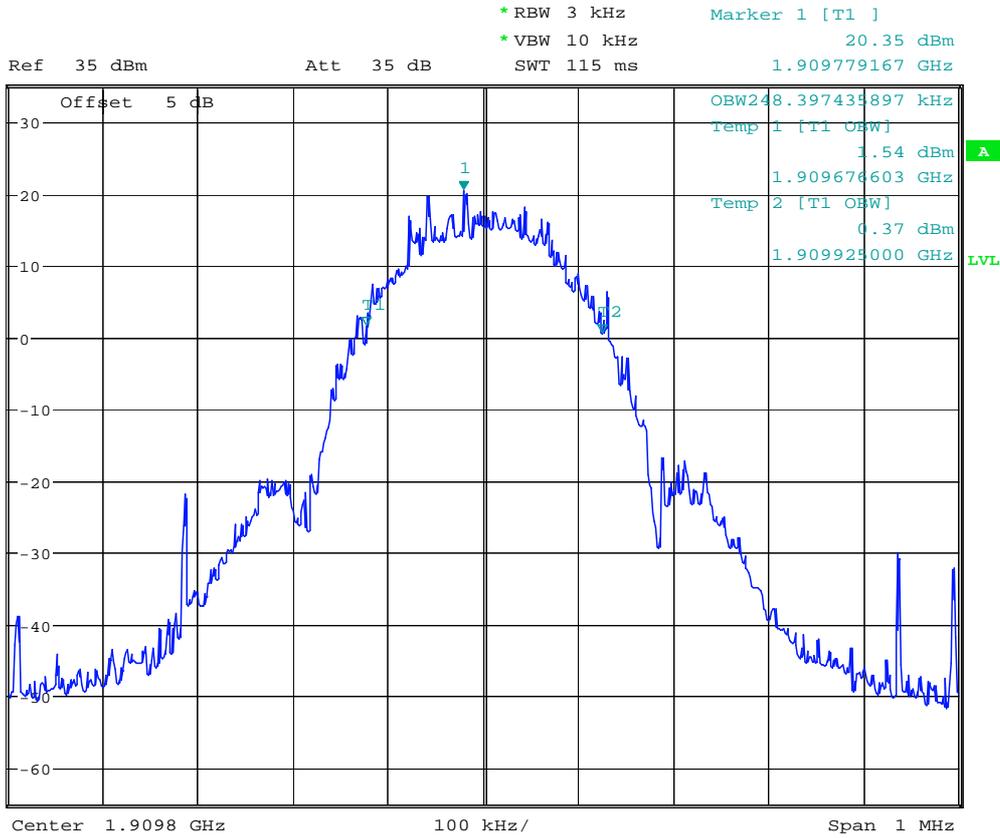


*RBW 3 kHz Marker 1 [T1]
 *VBW 10 kHz 22.28 dBm
 Ref 35 dBm Att 35 dB SWT 115 ms 1.909811218 GHz



Date: 9.AUG.2007 10:54:41

TM2:EDGE Channel 810



Date: 9.AUG.2007 10:55:51

TM3:HSDPA/WCDMA Channel 9538

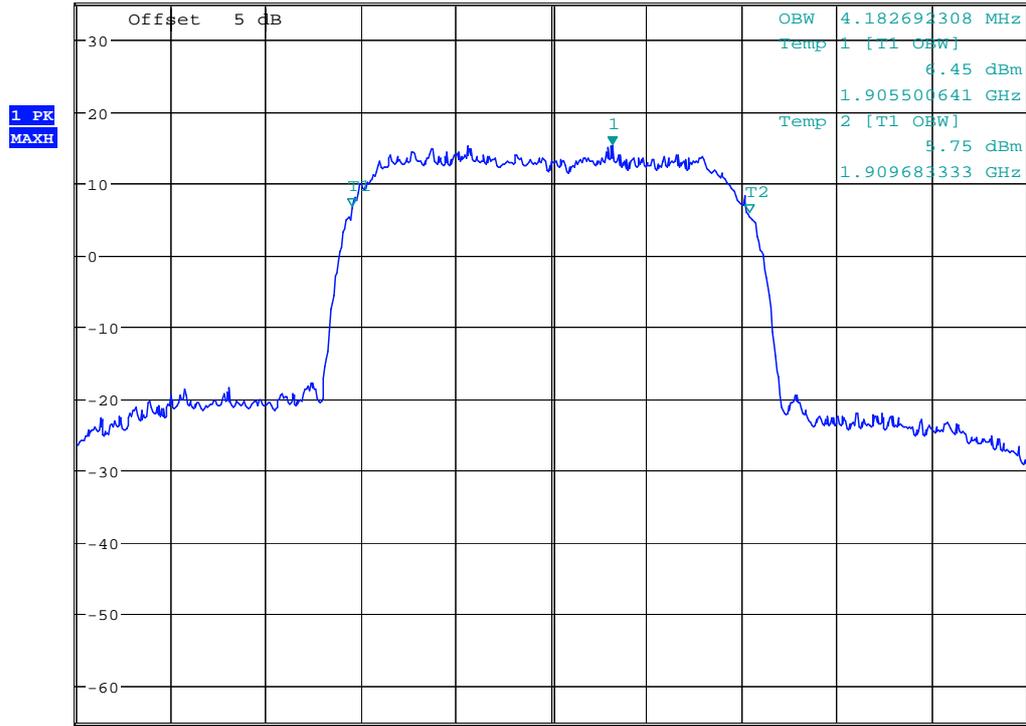


Ref 35 dBm Att 35 dB *RBW 50 kHz *VBW 500 kHz SWT 5 ms

Marker 1 [T1]

15.21 dBm

1.908241026 GHz



1 PK
MAXH

A

LVL

Date: 9.AUG.2007 12:25:22

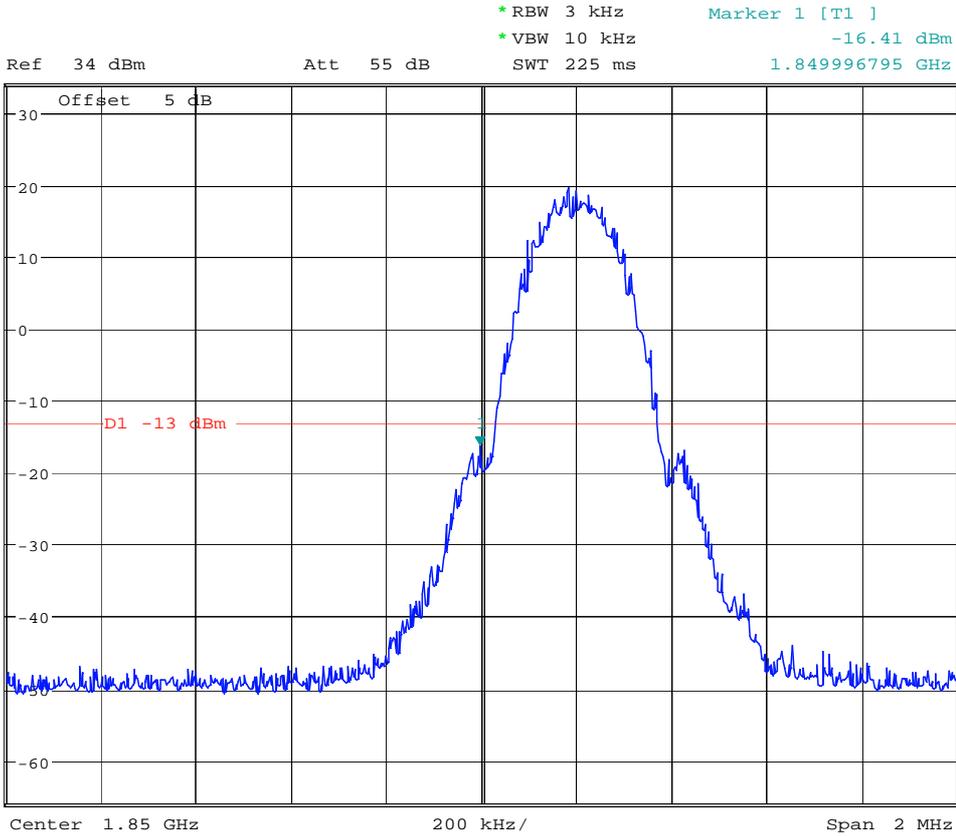
Appendix C

Band Edges Compliance According to FCC Part 2.1051 & 24.238

TM1:GPRS/GSM

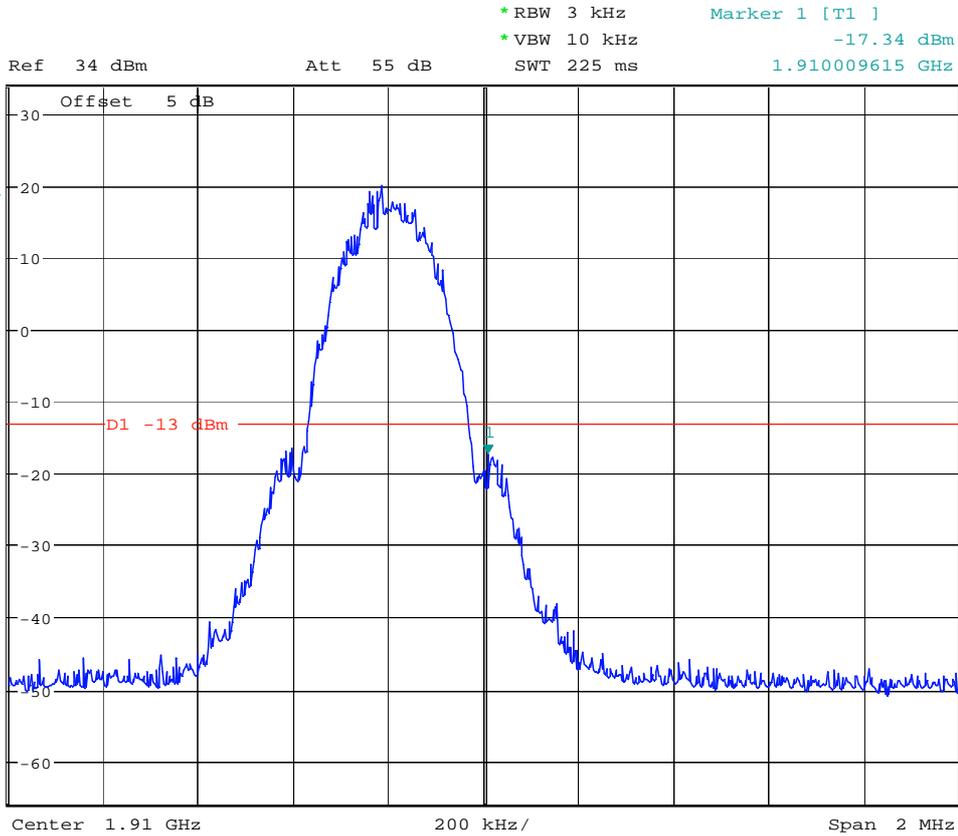
Left Edge

Channel 512



Date: 30.AUG.2007 03:10:42

Right Edge Channel 810



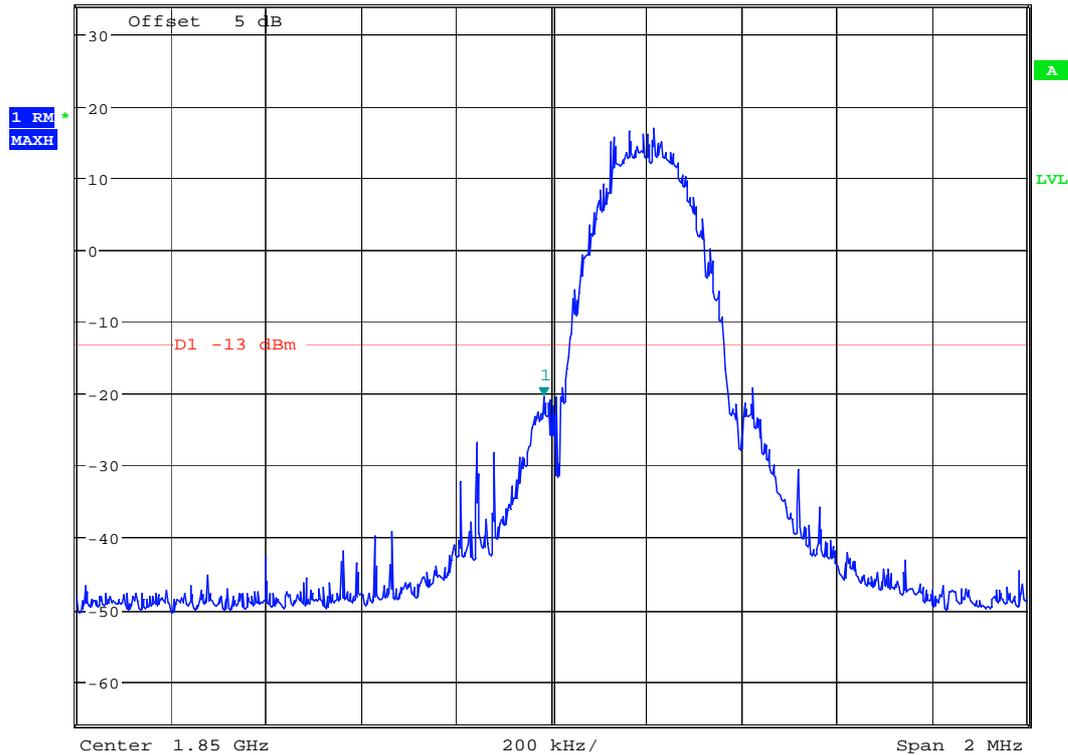
Date: 30.AUG.2007 03:12:19

EDGE Left Edge Channel 512



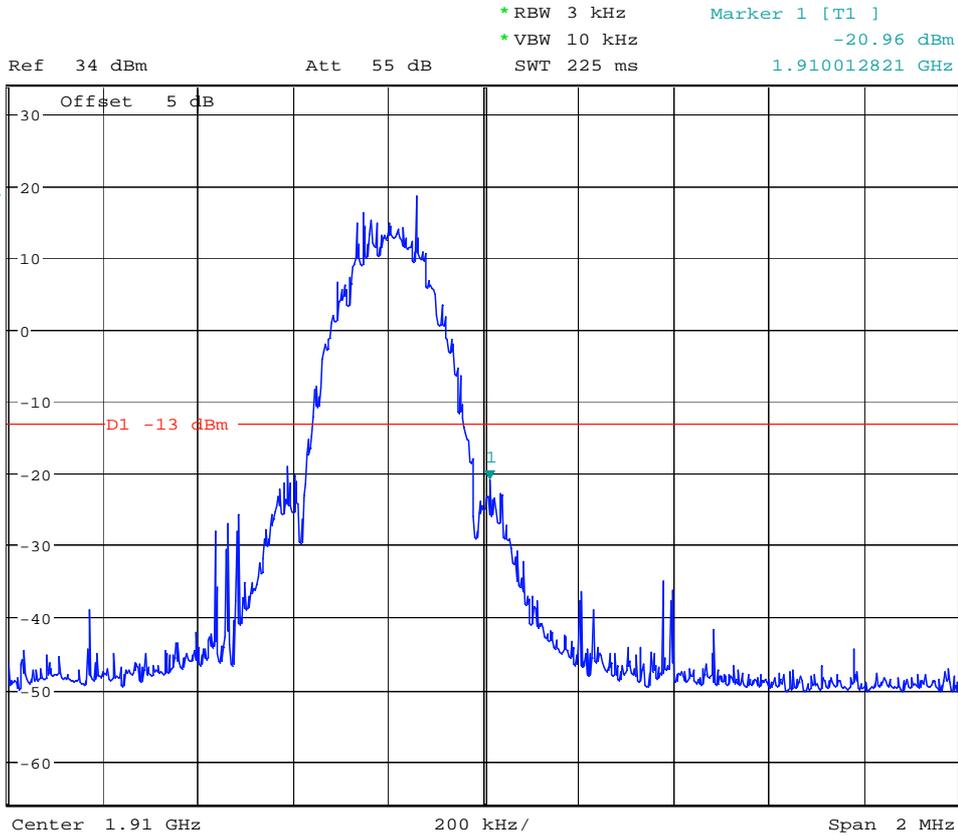
Ref 34 dBm Att 55 dB *RBW 3 kHz *VBW 10 kHz SWT 225 ms

Marker 1 [T1] -20.52 dBm 1.849983974 GHz



Date: 30.AUG.2007 03:18:25

Right Edge Channel 810



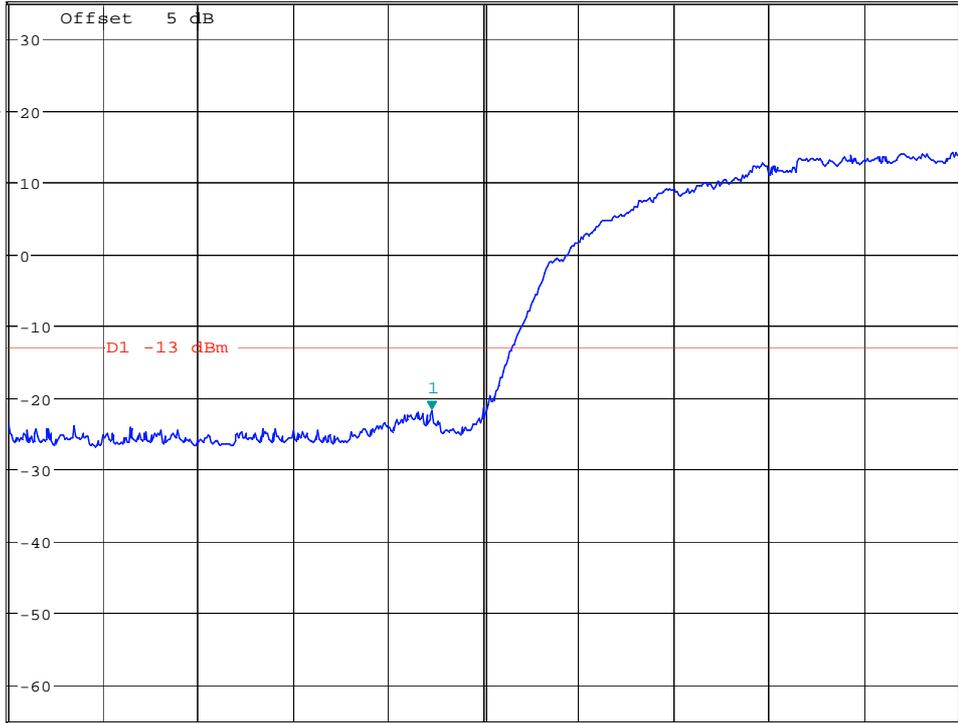
Date: 30.AUG.2007 03:24:03

TM3:HSDPA/WCDMA
Left dge
Channel 9262



Ref 35 dBm Att 55 dB *RBW 50 kHz *VBW 200 kHz SWT 2.5 ms

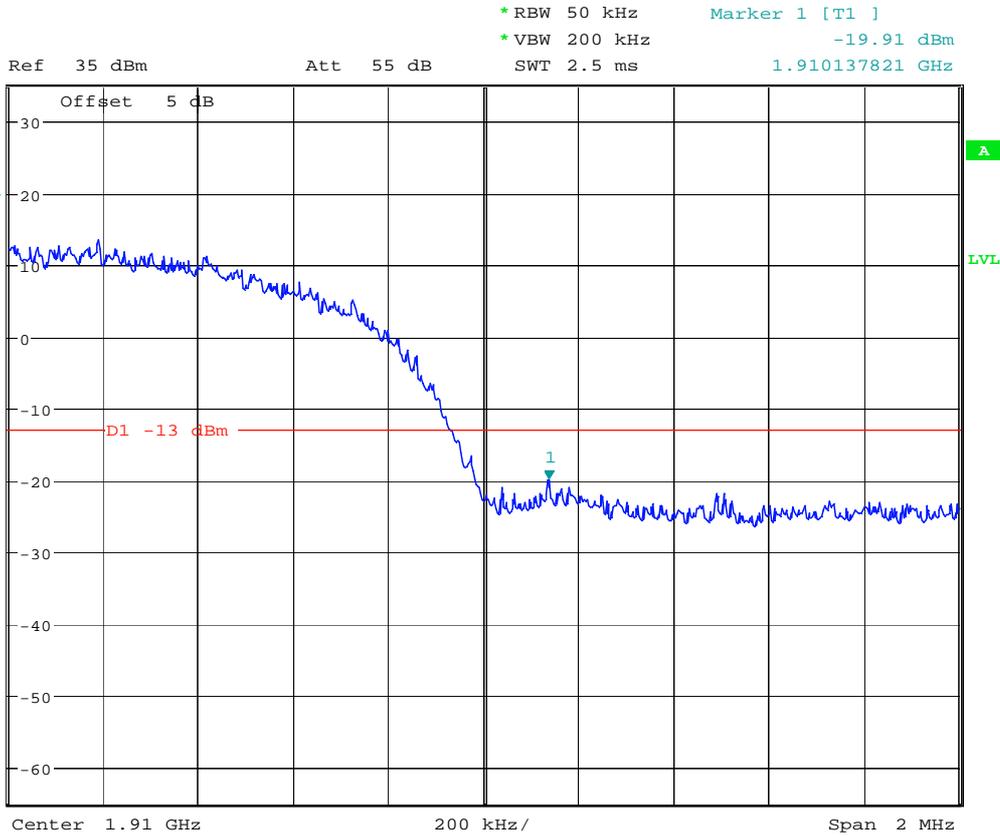
Marker 1 [T1]
-21.73 dBm
1.849891026 GHz



Center 1.85 GHz 200 kHz/ Span 2 MHz

Date: 9.AUG.2007 15:02:58

Right Edge Channel 9538



Date: 9.AUG.2007 15:15:04

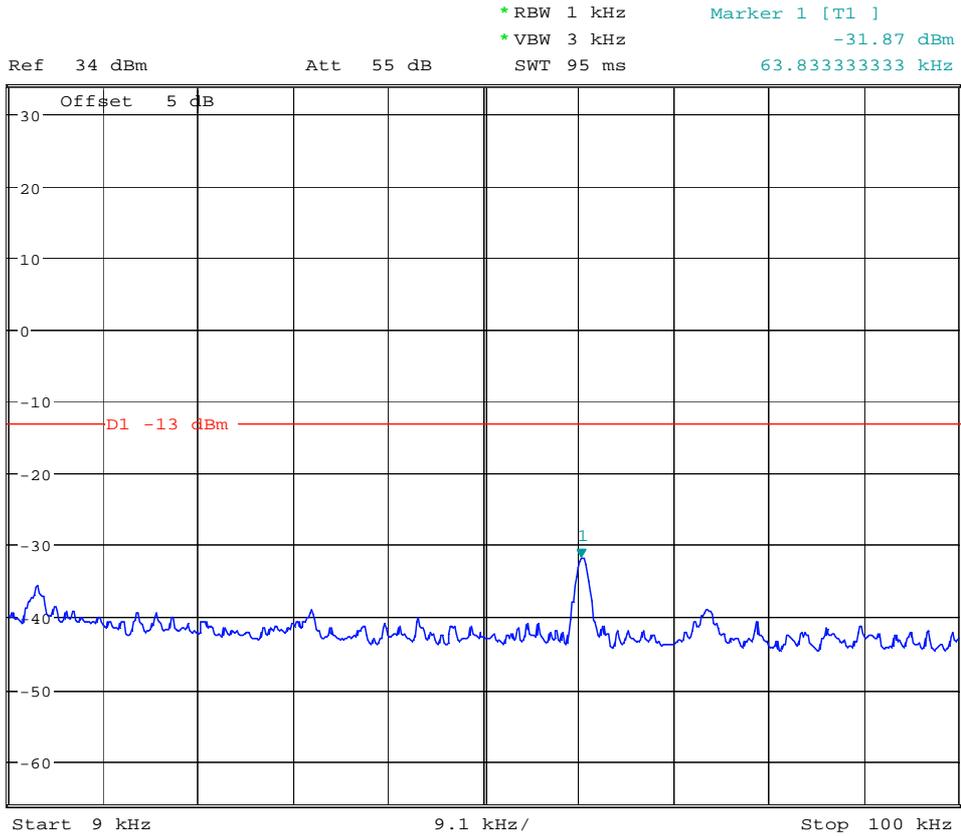
Appendix D

Spurious Emission at Antenna Terminal

According to FCC Part 2.1051 & 24.238

TM1:GPRS/GSM

Channel 512



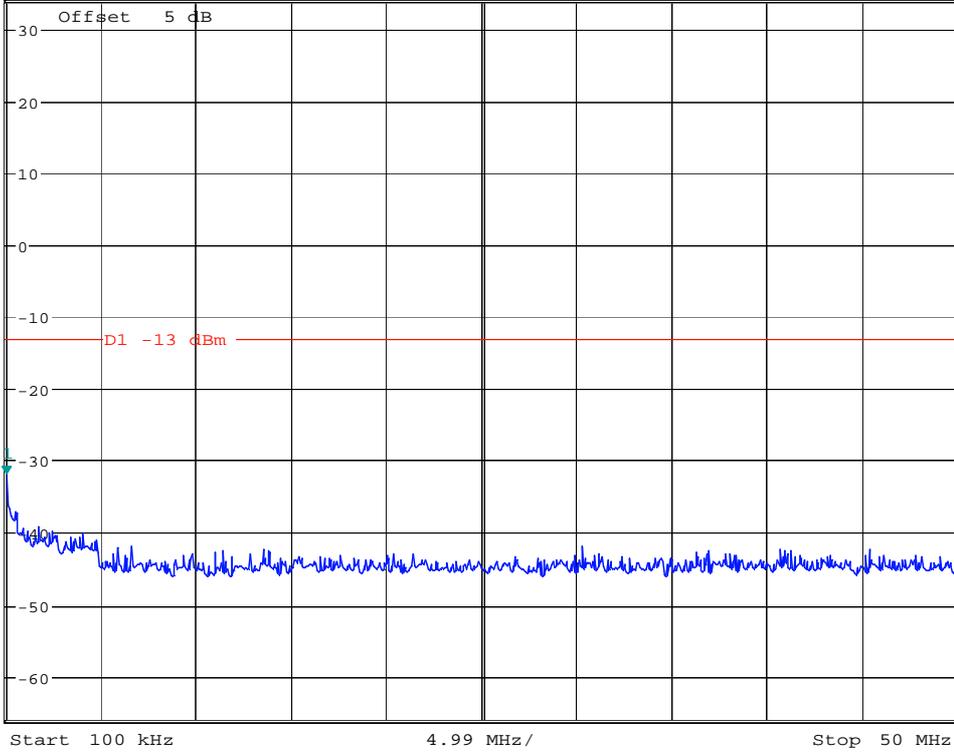
Date: 30.AUG.2007 04:08:19



*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -32.00 dBm
SWT 500 ms 100.00000000 kHz

Ref 34 dBm

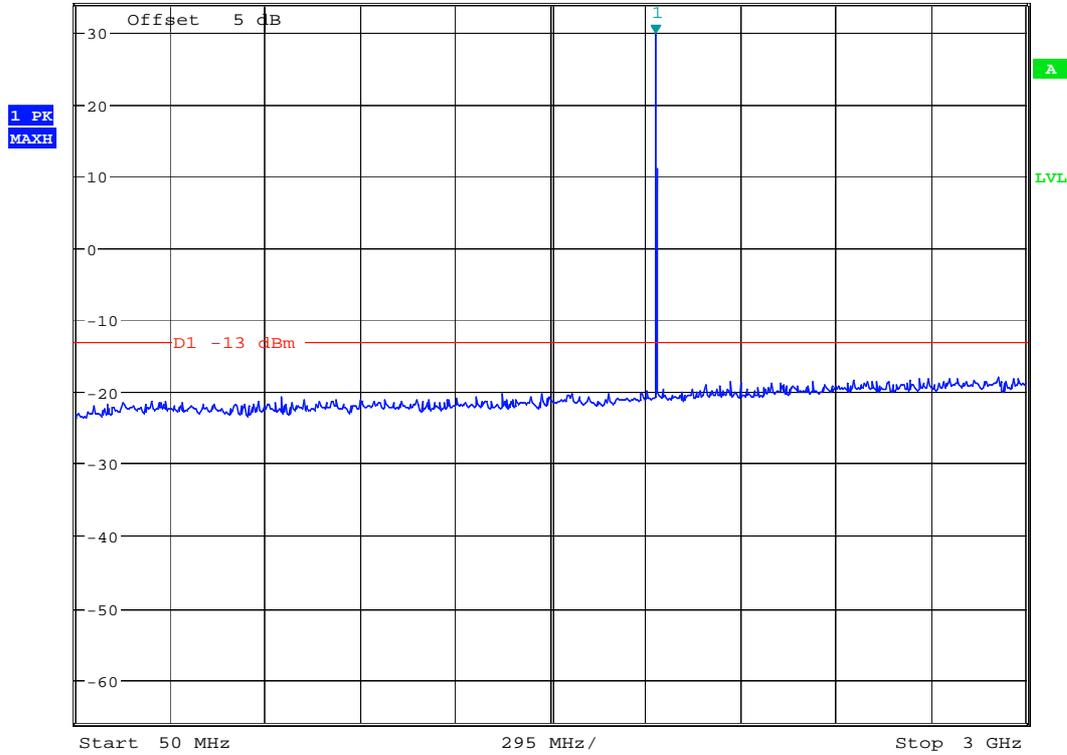
Att 55 dB



Date: 30.AUG.2007 04:10:09



Ref 34 dBm Att 55 dB SWT 10 ms
*RBW 1 MHz Marker 1 [T1]
*VBW 3 MHz 29.79 dBm
1.851201923 GHz



Date: 30.AUG.2007 04:12:50

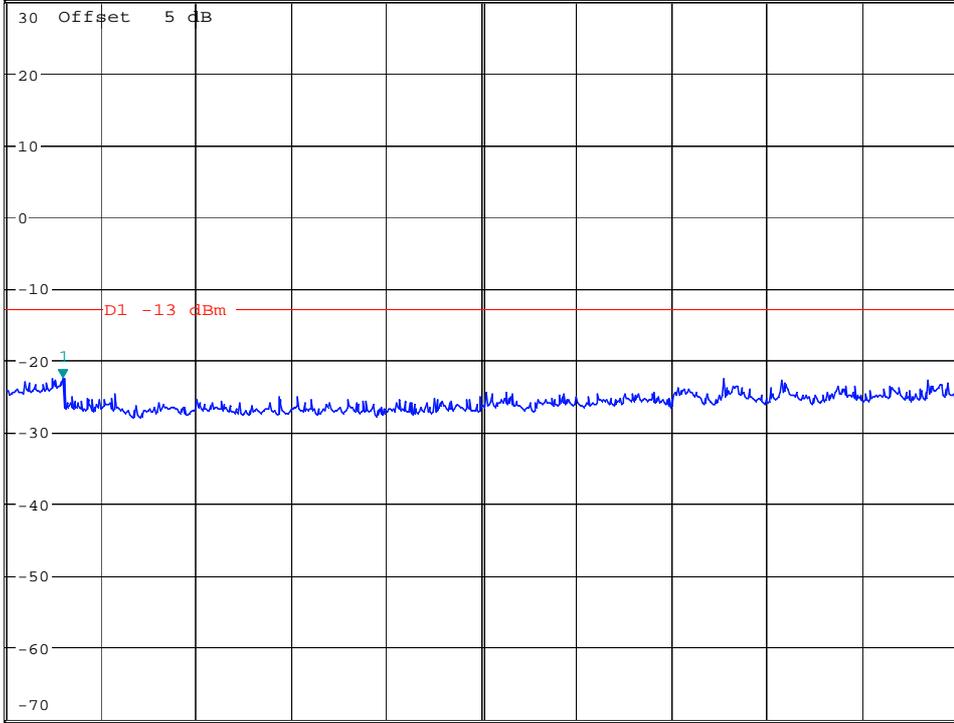


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -22.55 dBm
SWT 60 ms 3.578125000 GHz

Ref 30 dBm

Att 50 dB

1 PK
MAXH



Date: 9.AUG.2007 19:45:02

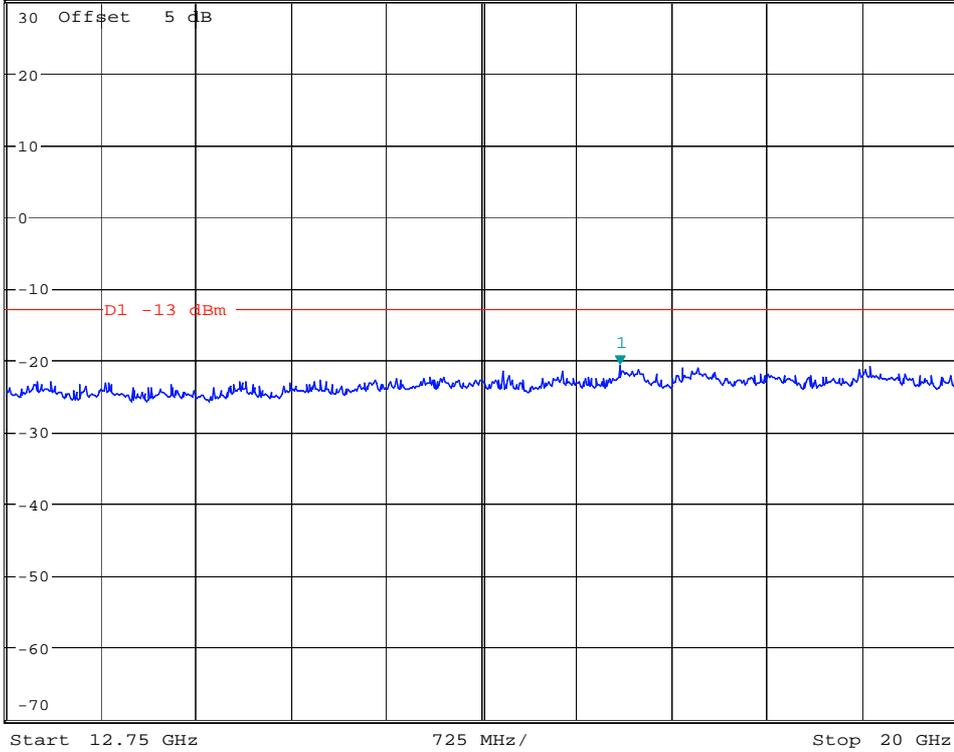


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -20.81 dBm
SWT 45 ms 17.432291667 GHz

Ref 30 dBm

Att 50 dB

1 PK
MAXH

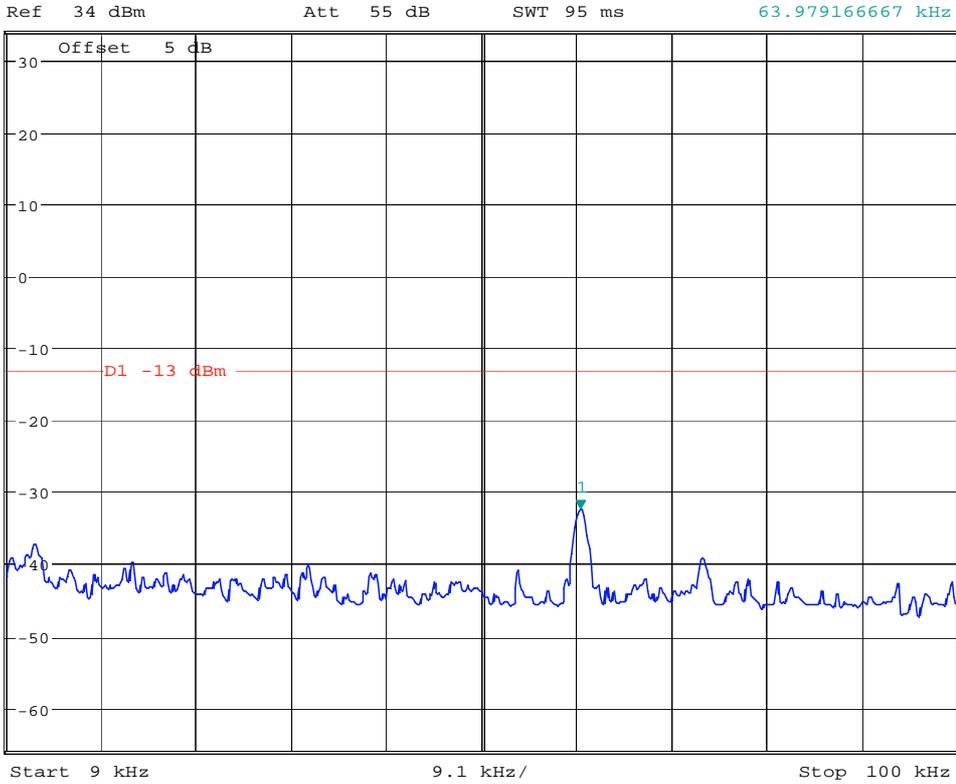


Date: 9.AUG.2007 19:46:15

Channel 661



*RBW 1 kHz
*VBW 3 kHz
Marker 1 [T1]
-32.50 dBm
63.979166667 kHz



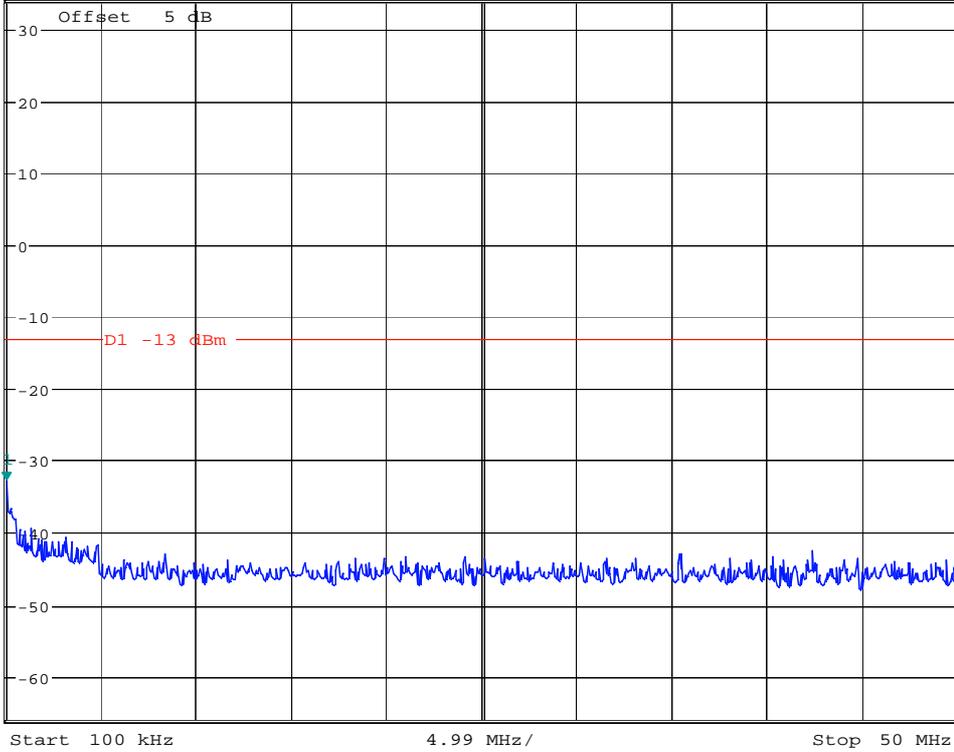
Date: 30.AUG.2007 04:08:35



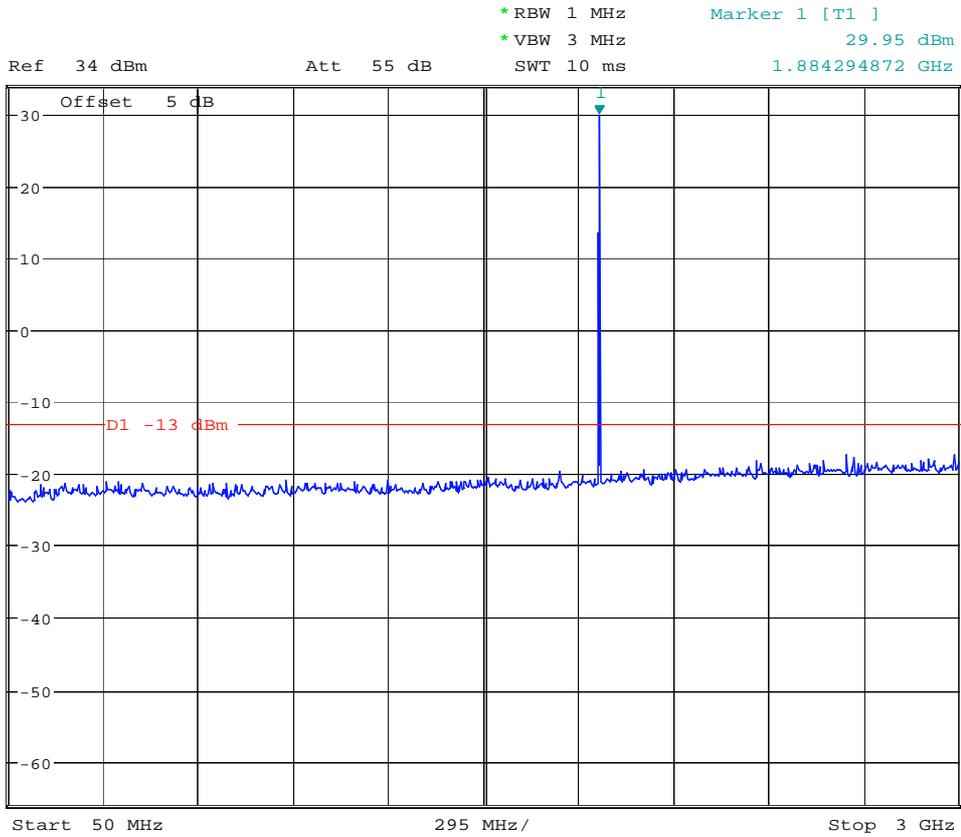
*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -32.95 dBm
SWT 500 ms 100.00000000 kHz

Ref 34 dBm

Att 55 dB



Date: 30.AUG.2007 04:10:20



Date: 30.AUG.2007 04:17:24

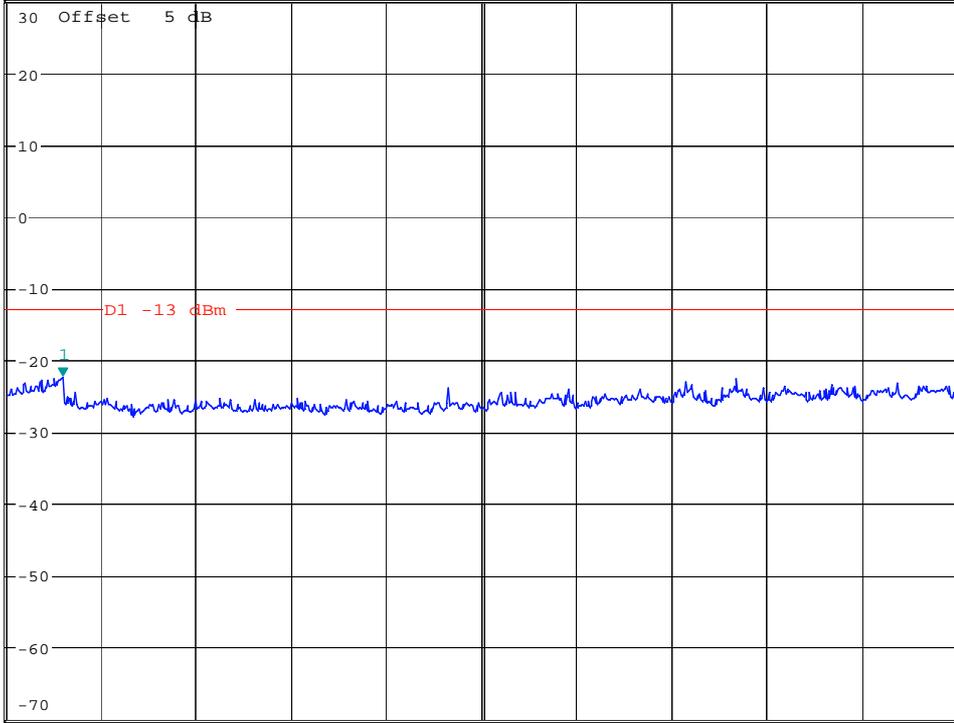


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -22.48 dBm
SWT 60 ms 3.578125000 GHz

Ref 30 dBm

Att 50 dB

1 PK
MAXH



Start 3 GHz

975 MHz/

Stop 12.75 GHz

Date: 9.AUG.2007 19:51:04

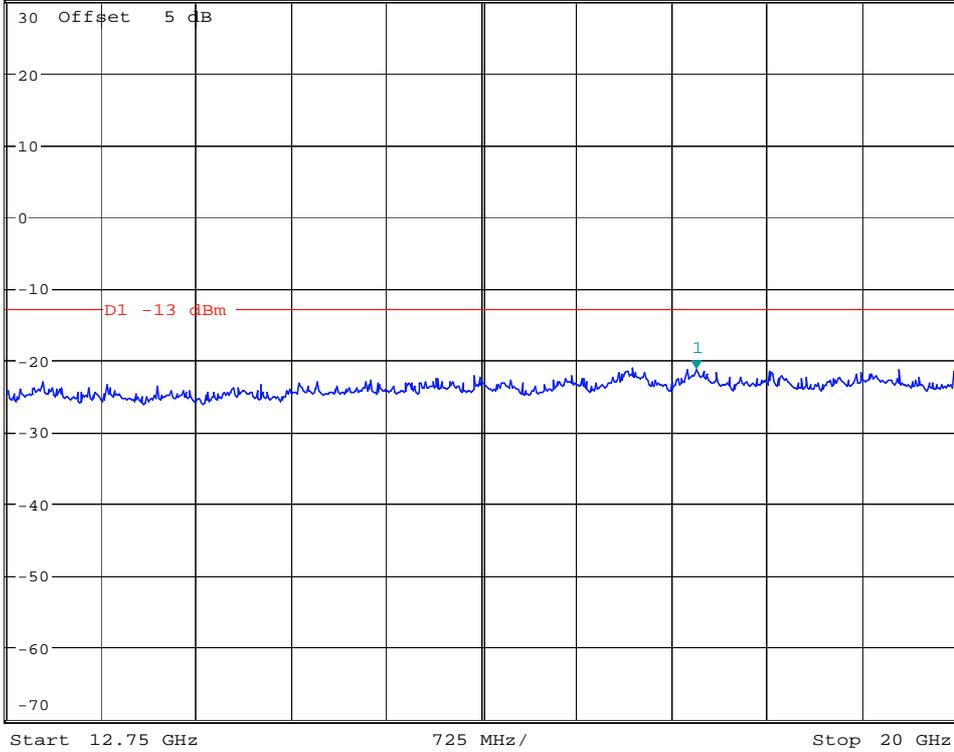


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -21.27 dBm
SWT 45 ms 18.013221154 GHz

Ref 30 dBm

Att 50 dB

1 PK
MAXH

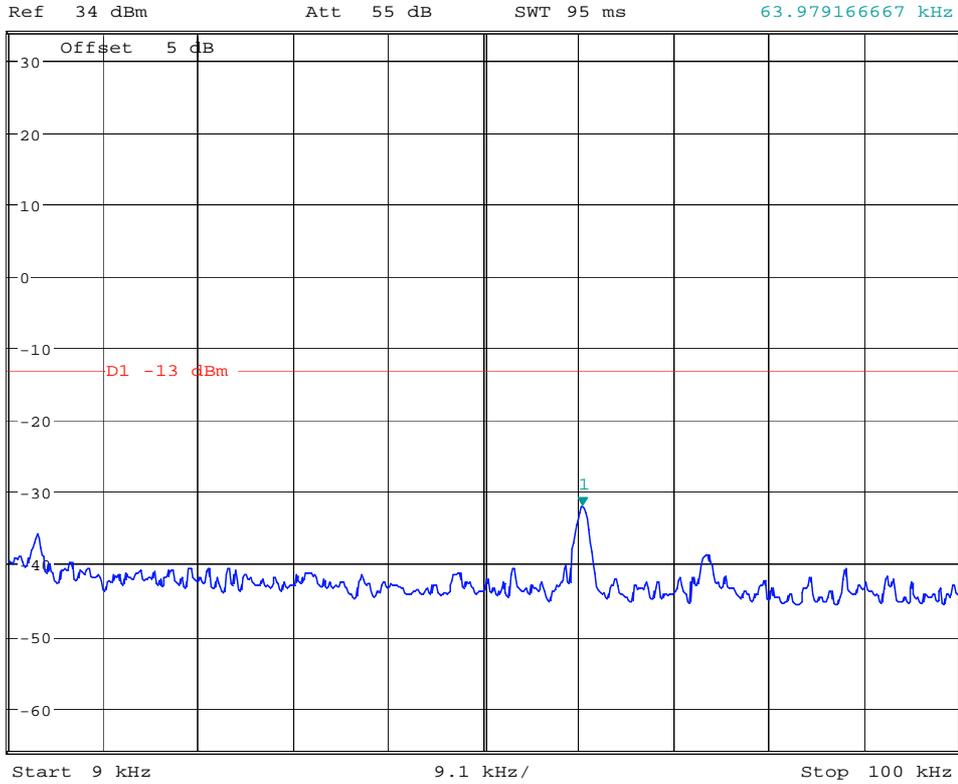


Date: 9.AUG.2007 19:48:56

Channel 810



*RBW 1 kHz
*VBW 3 kHz
Marker 1 [T1]
-32.08 dBm
63.979166667 kHz



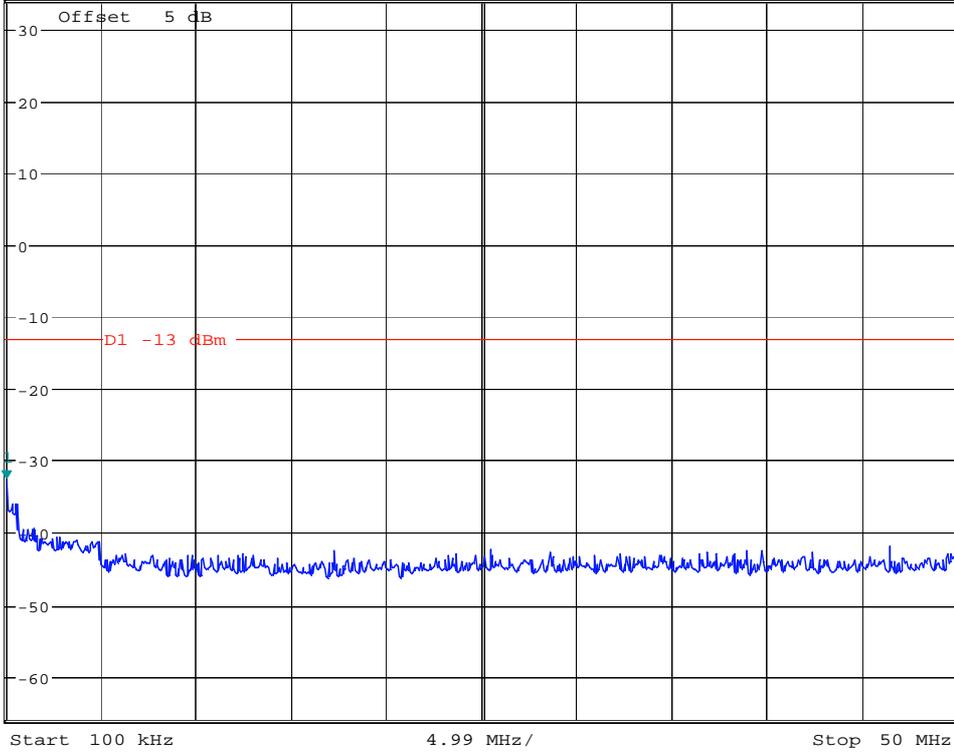
Date: 30.AUG.2007 04:09:10



*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -32.68 dBm
SWT 500 ms 100.00000000 kHz

Ref 34 dBm

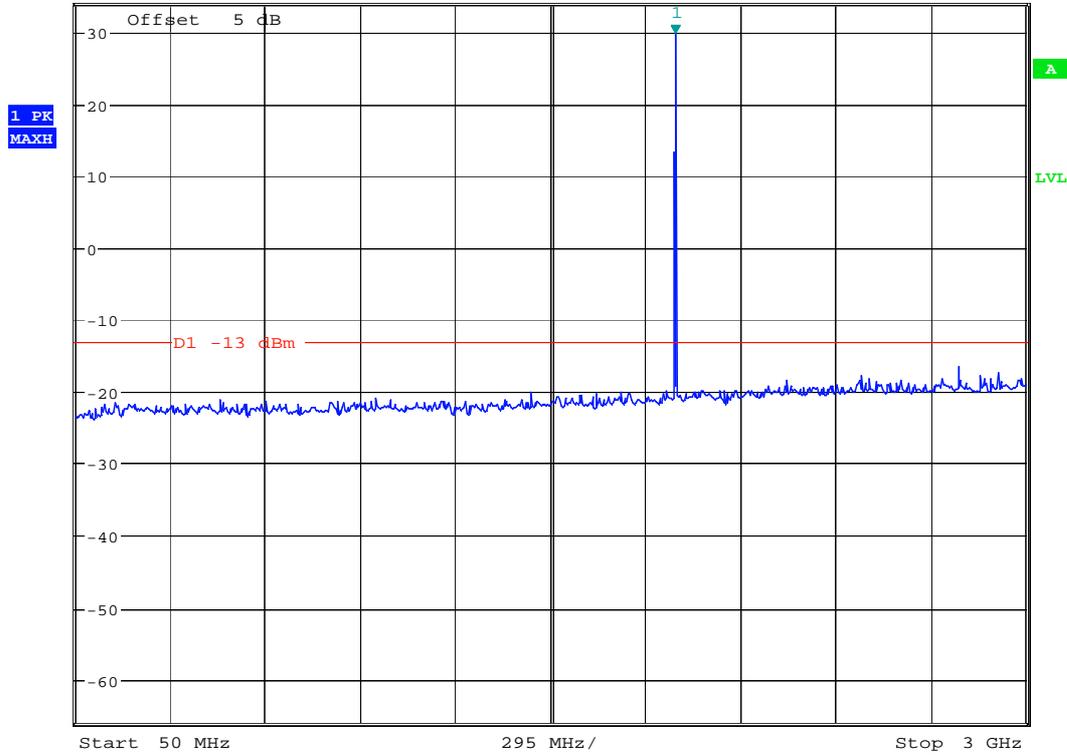
Att 55 dB



Date: 30.AUG.2007 04:10:56



Ref 34 dBm Att 55 dB SWT 10 ms *RBW 1 MHz *VBW 3 MHz Marker 1 [T1] 29.78 dBm 1.912660256 GHz



Date: 30.AUG.2007 04:18:30

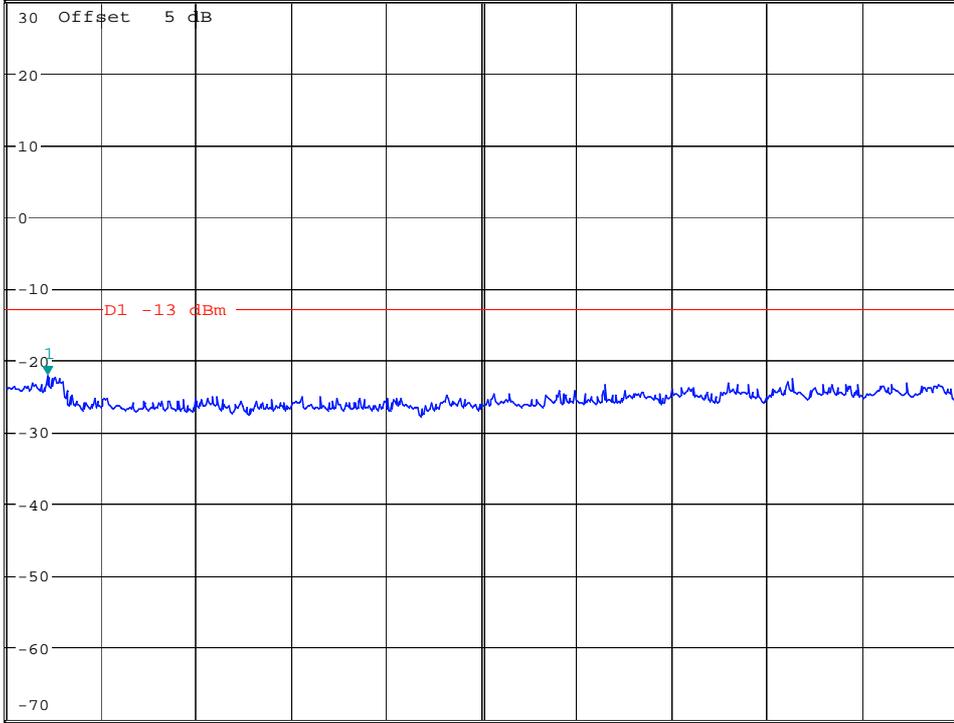


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -22.23 dBm
SWT 60 ms 3.421875000 GHz

Ref 30 dBm

Att 50 dB

1 PK
MAXH



Start 3 GHz

975 MHz/

Stop 12.75 GHz

Date: 9.AUG.2007 19:50:35

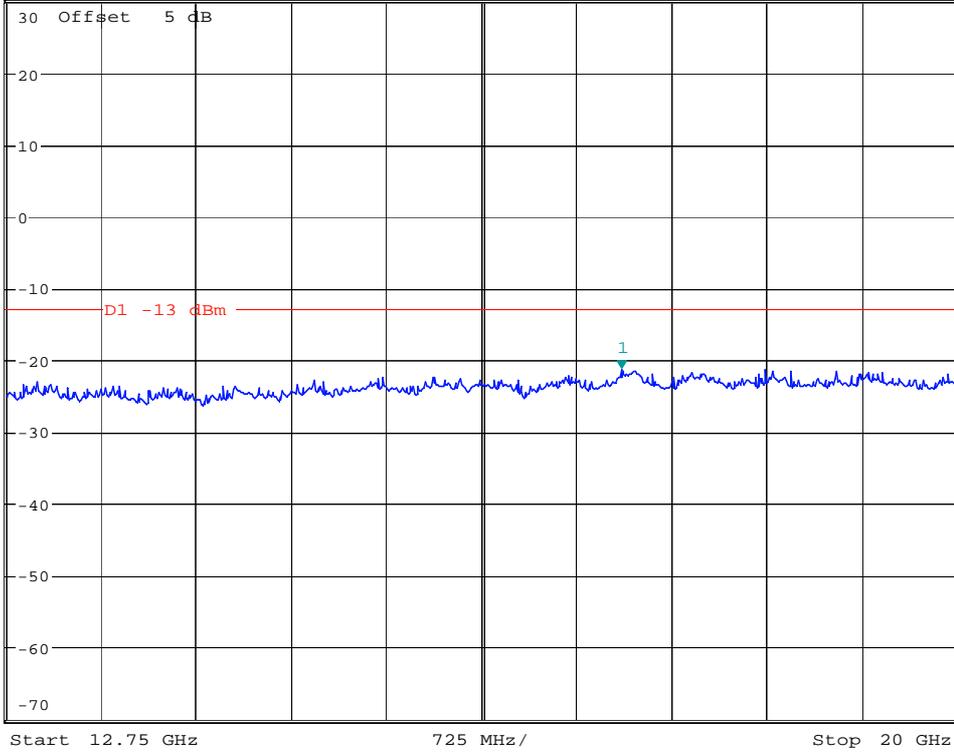


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -21.45 dBm
SWT 45 ms 17.443910256 GHz

Ref 30 dBm

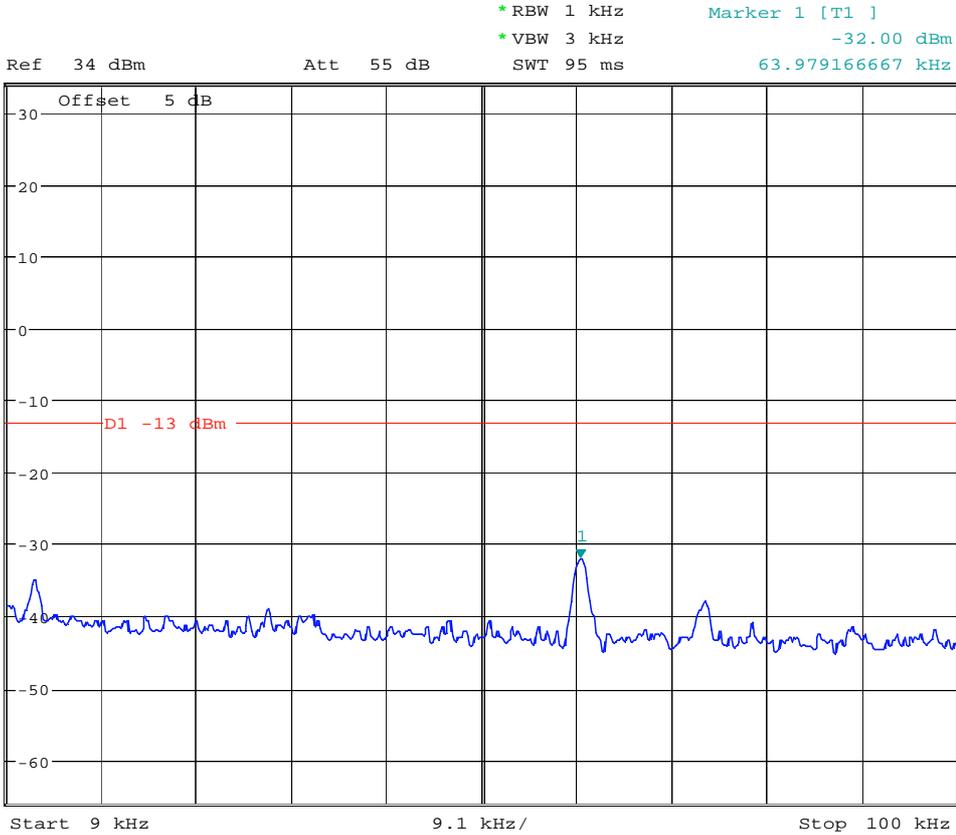
Att 50 dB

1 PK
MAXH



Date: 9.AUG.2007 19:49:37

TM2:EDGE Channel 512



Date: 30.AUG.2007 04:21:13

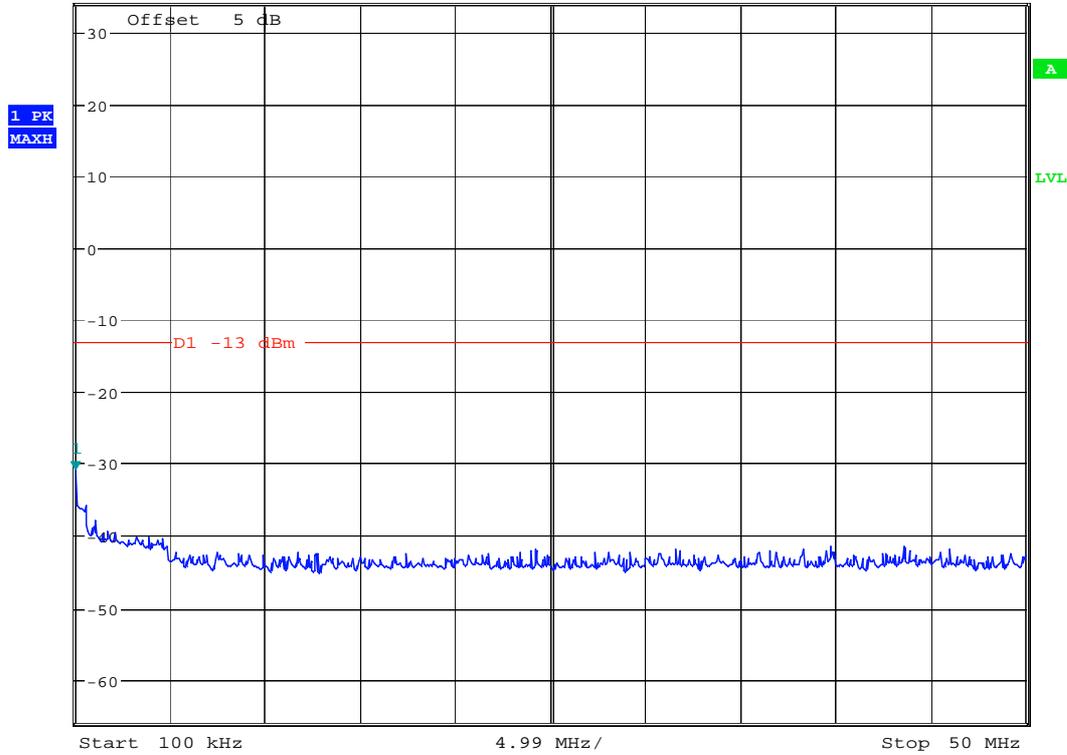


Ref 34 dBm Att 55 dB *RBW 10 kHz *VBW 30 kHz SWT 500 ms

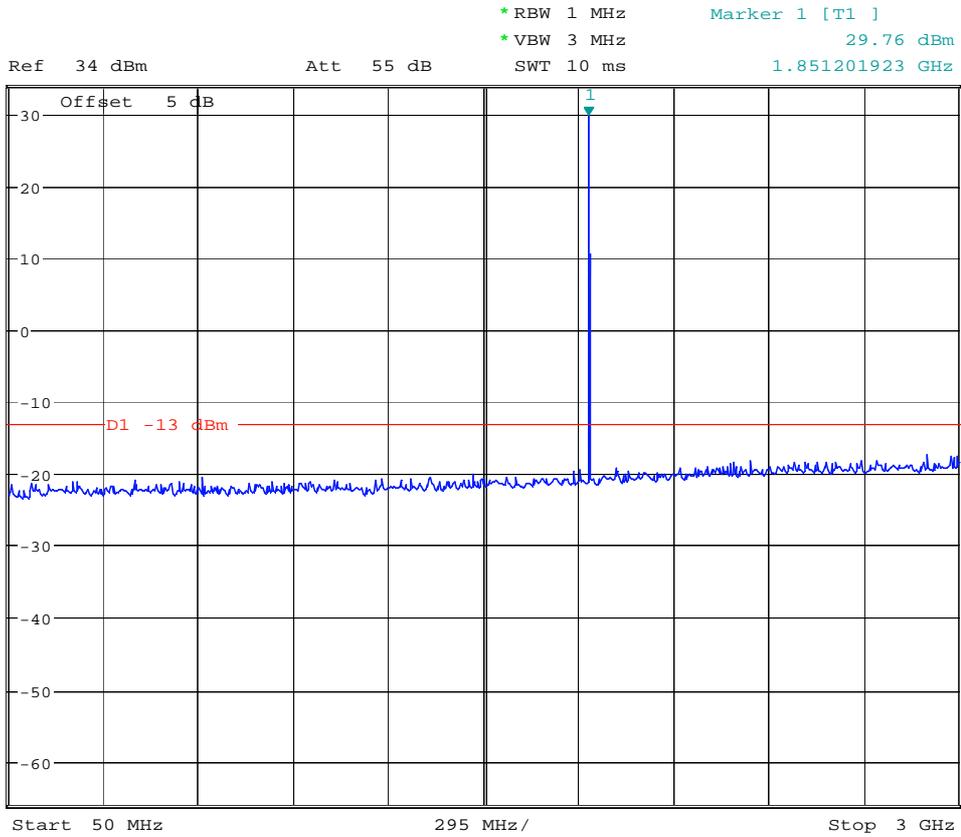
Marker 1 [T1]

-31.10 dBm

100.00000000 kHz



Date: 30.AUG.2007 04:24:11



Date: 30.AUG.2007 04:27:49

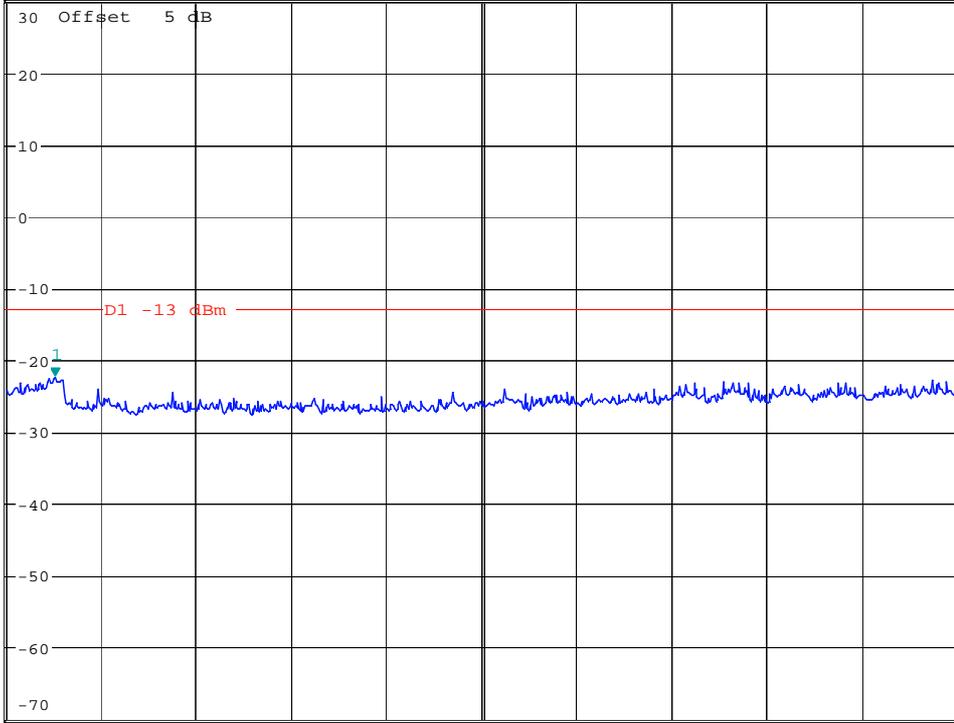


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -22.40 dBm
SWT 60 ms 3.500000000 GHz

Ref 30 dBm

Att 50 dB

1 PK
MAXH



Start 3 GHz

975 MHz/

Stop 12.75 GHz

Date: 9.AUG.2007 20:02:00

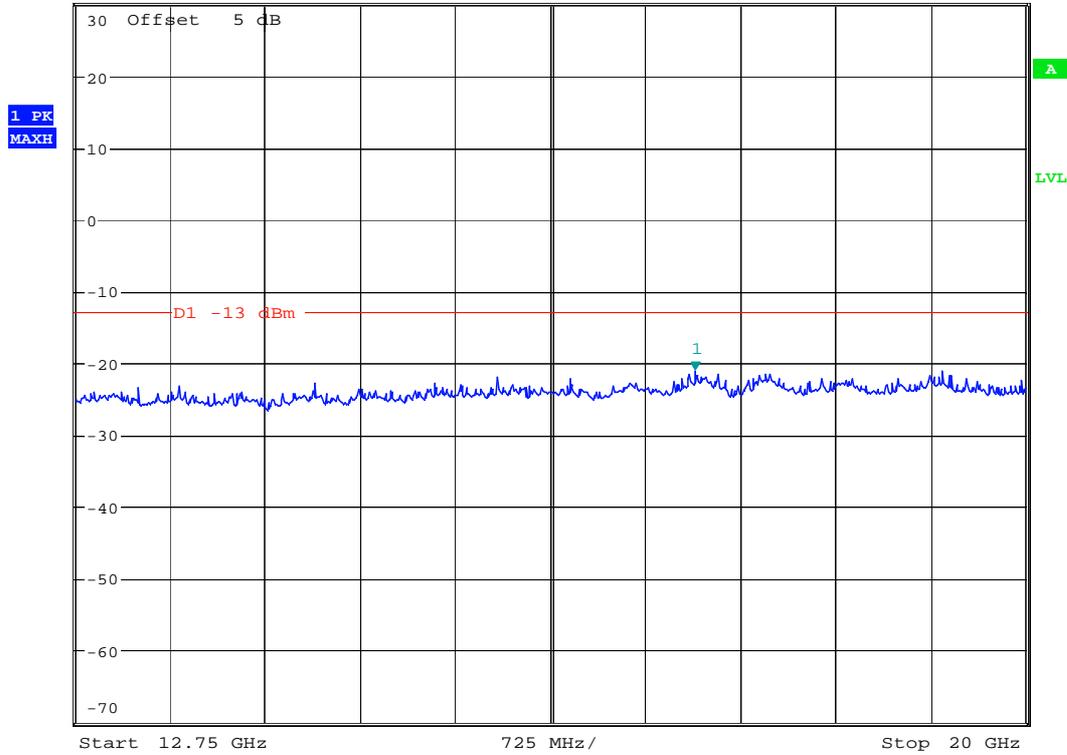


Ref 30 dBm Att 50 dB *RBW 1 MHz VBW 3 MHz SWT 45 ms

Marker 1 [T1]

-21.10 dBm

17.478766026 GHz

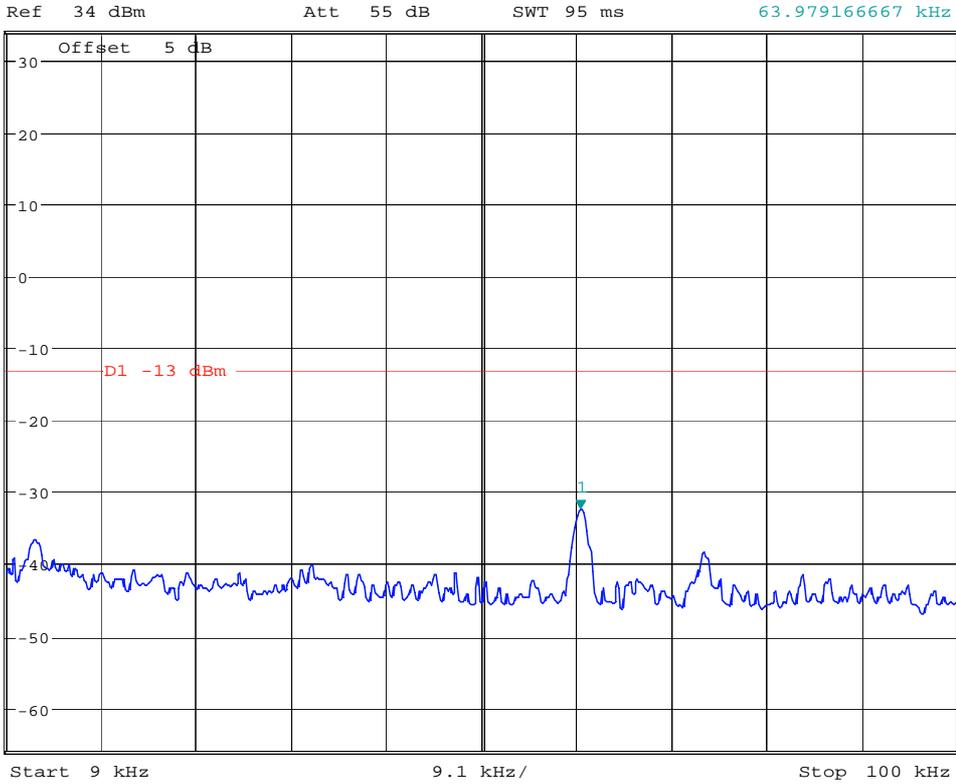


Date: 9.AUG.2007 20:03:22

Channel 661



*RBW 1 kHz
*VBW 3 kHz
Marker 1 [T1]
-32.42 dBm
63.979166667 kHz



Date: 30.AUG.2007 04:21:29

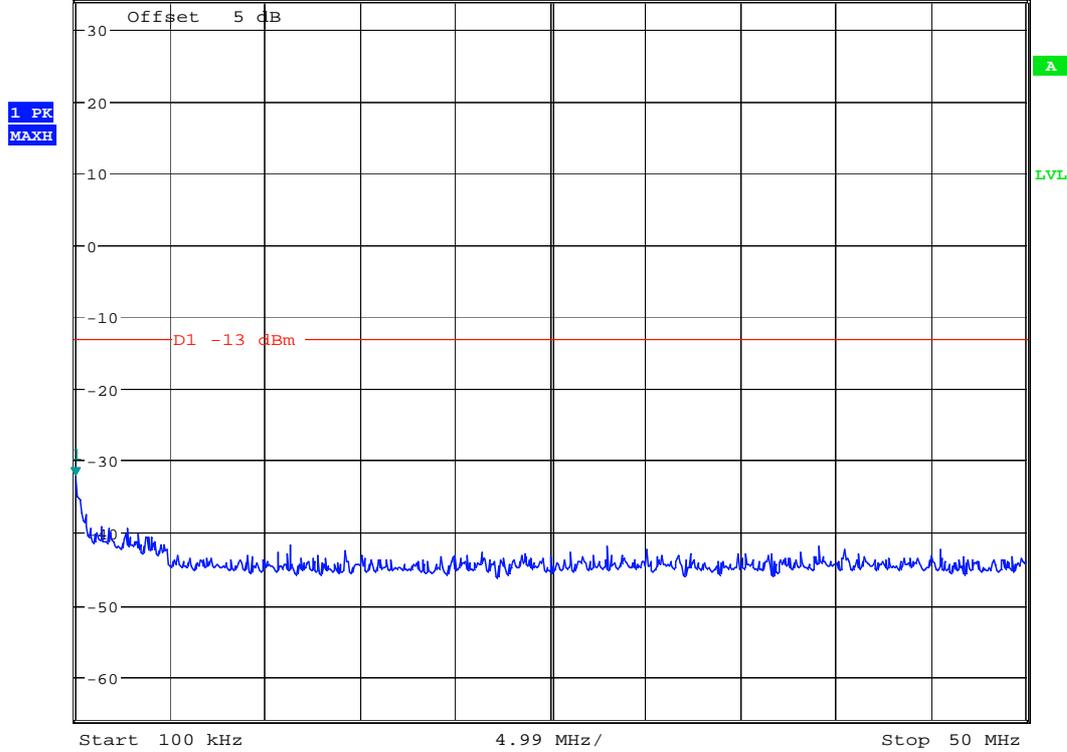


Ref 34 dBm Att 55 dB *RBW 10 kHz *VBW 30 kHz SWT 500 ms

Marker 1 [T1]

-32.37 dBm

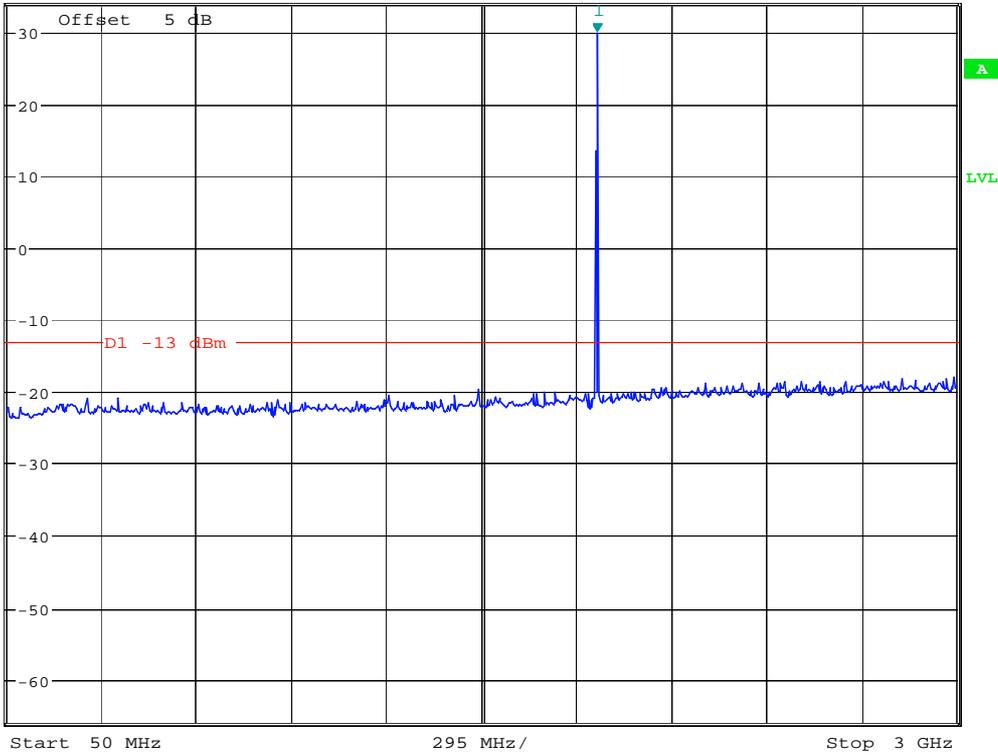
100.00000000 kHz



Date: 30.AUG.2007 04:24:49



Ref 34 dBm Att 55 dB SWT 10 ms *RBW 1 MHz *VBW 3 MHz Marker 1 [T1] 29.90 dBm 1.884294872 GHz



Date: 30.AUG.2007 04:28:52

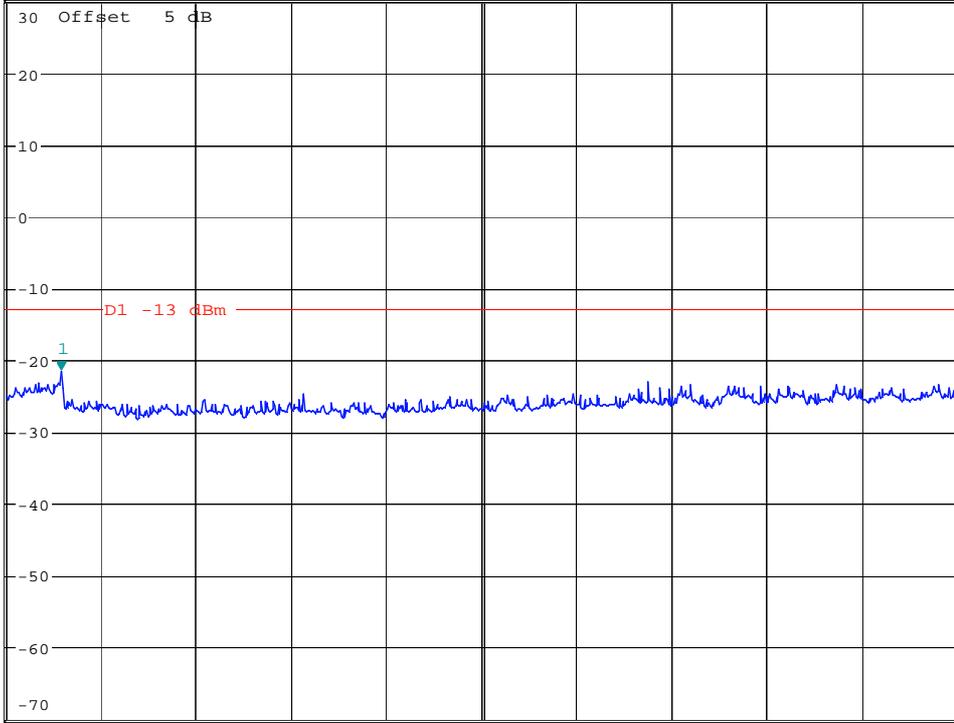


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -21.66 dBm
SWT 60 ms 3.56250000 GHz

Ref 30 dBm

Att 50 dB

1 PK
MAXH



Start 3 GHz

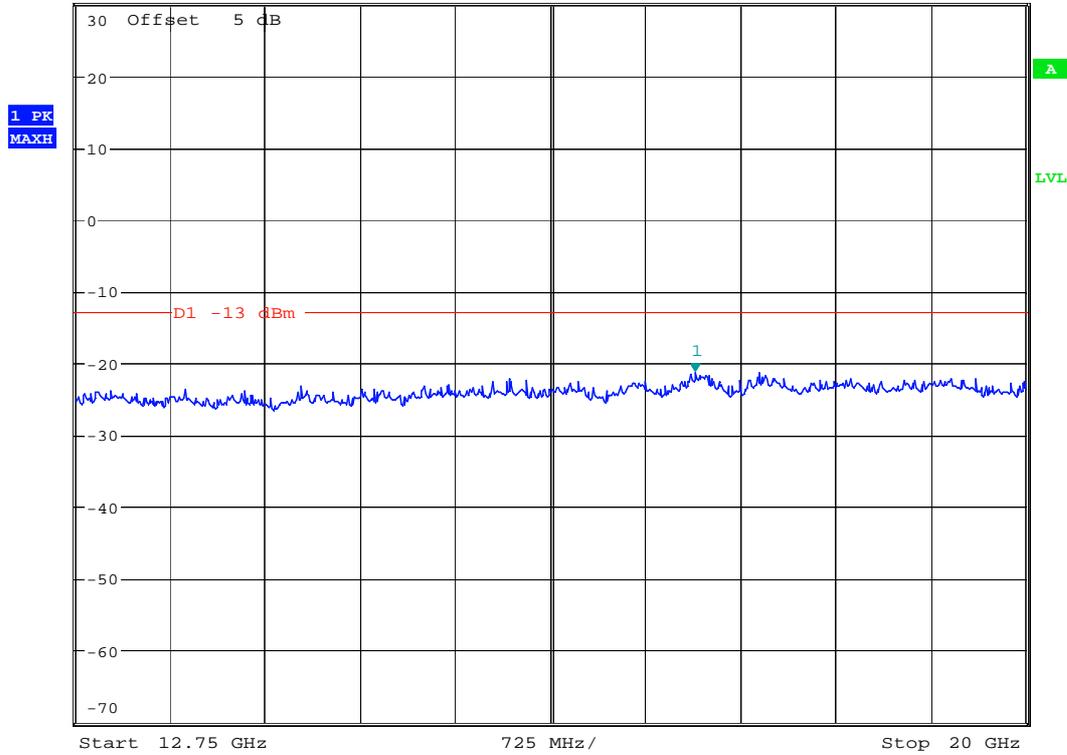
975 MHz/

Stop 12.75 GHz

Date: 9.AUG.2007 20:02:18

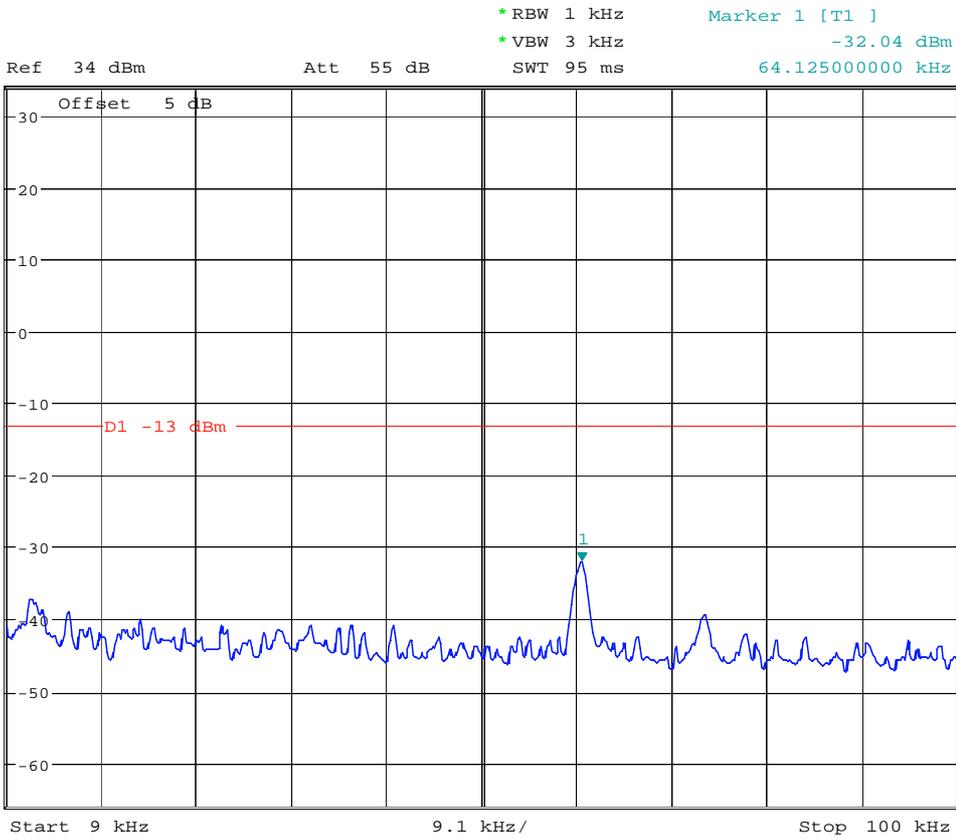


Ref 30 dBm Att 50 dB *RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -21.43 dBm
SWT 45 ms 17.478766026 GHz



Date: 9.AUG.2007 20:03:43

Channel 810



Date: 30.AUG.2007 04:21:41

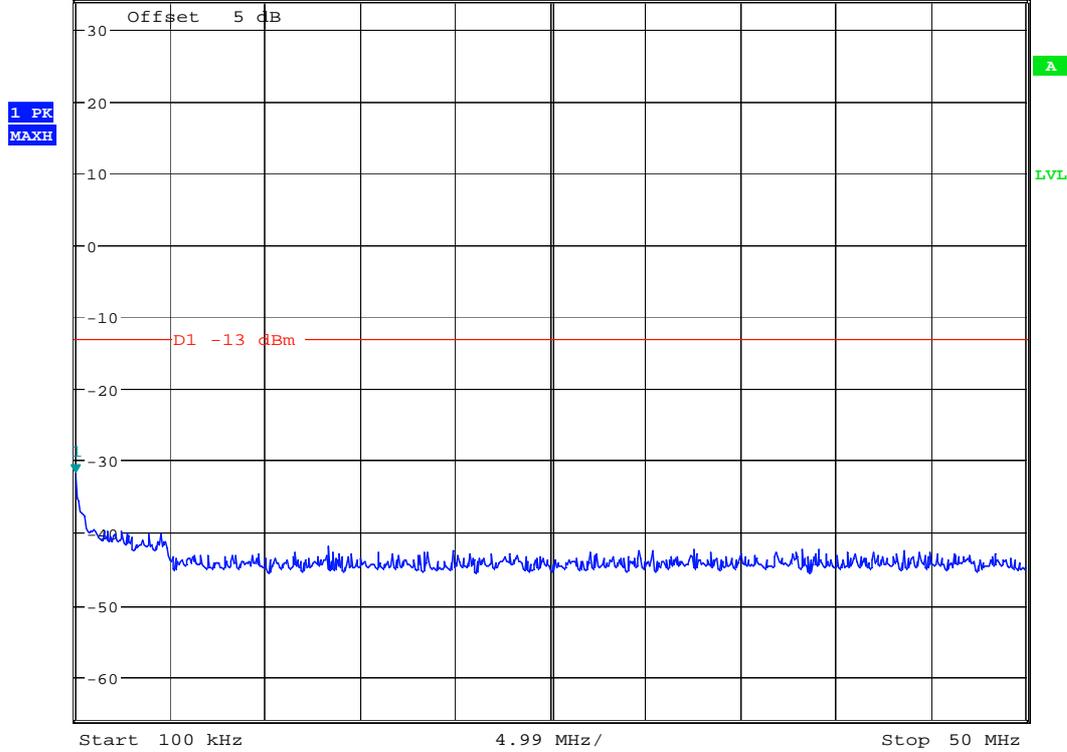


Ref 34 dBm Att 55 dB *RBW 10 kHz *VBW 30 kHz SWT 500 ms

Marker 1 [T1]

-31.83 dBm

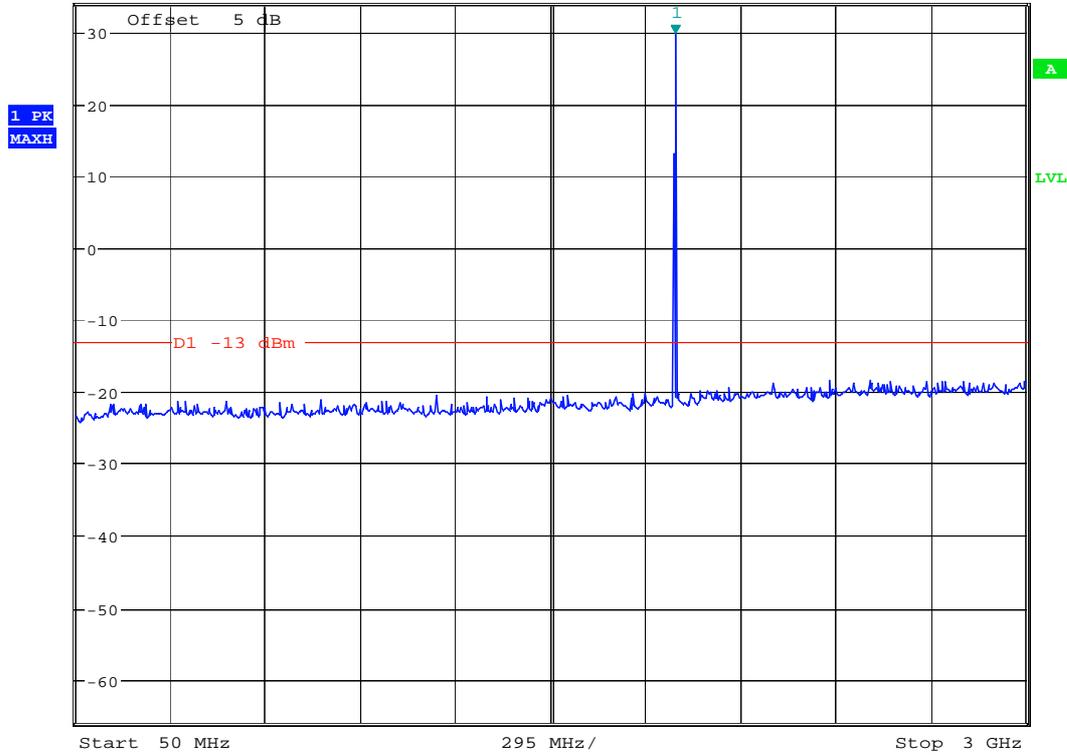
100.00000000 kHz



Date: 30.AUG.2007 04:25:46



Ref 34 dBm Att 55 dB SWT 10 ms
*RBW 1 MHz *VBW 3 MHz
Marker 1 [T1] 29.68 dBm
1.912660256 GHz



Date: 30.AUG.2007 04:29:28

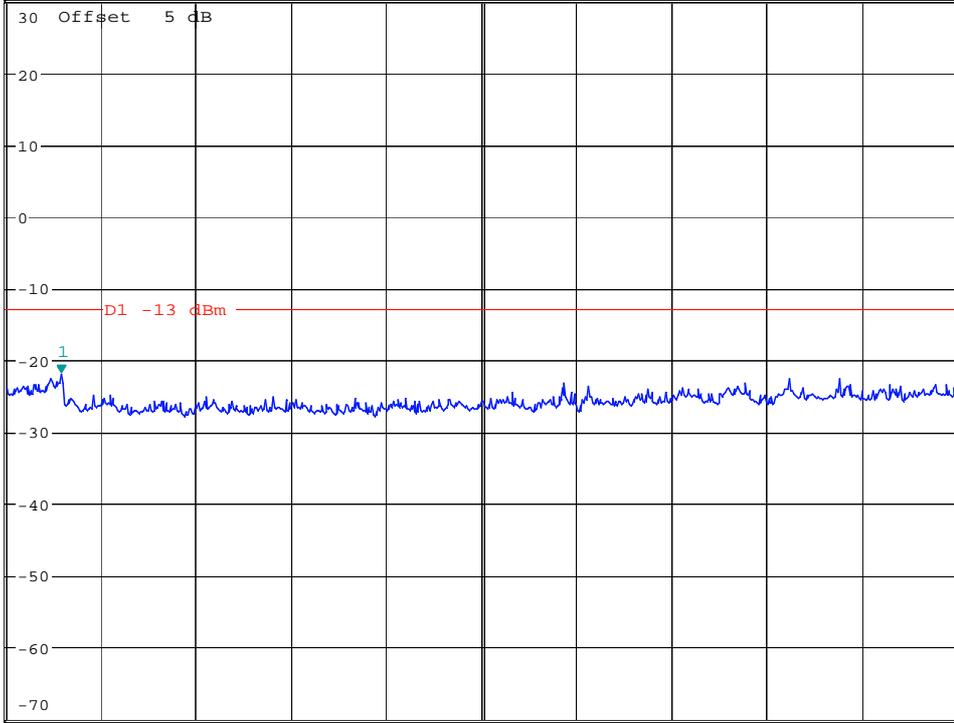


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -22.05 dBm
SWT 60 ms 3.56250000 GHz

Ref 30 dBm

Att 50 dB

1 PK
MAXH



Start 3 GHz

975 MHz/

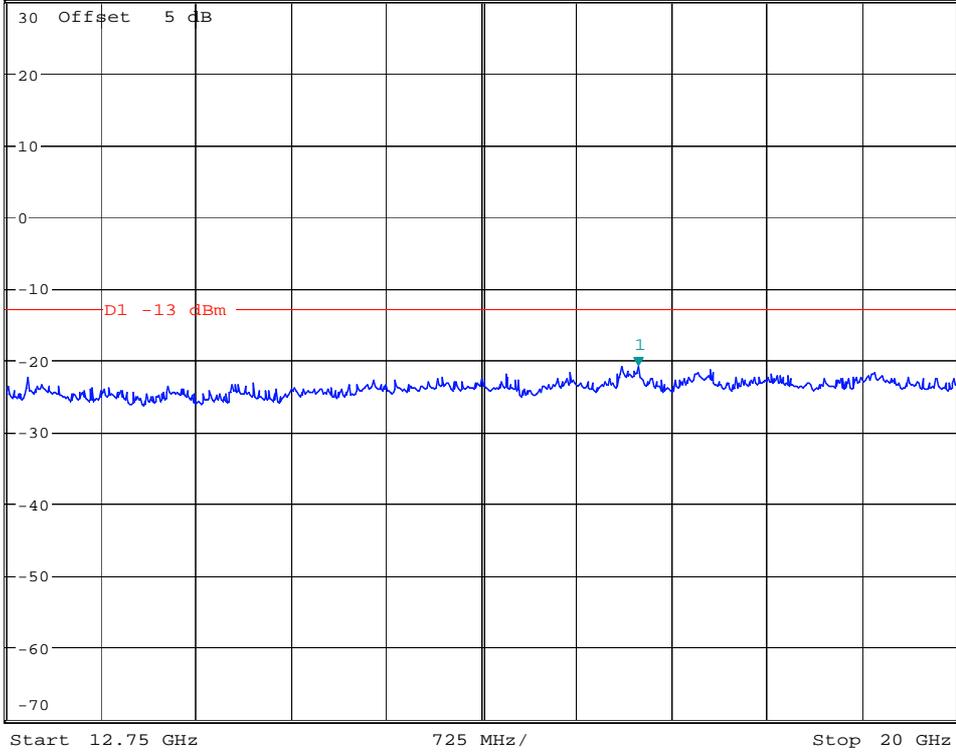
Stop 12.75 GHz

Date: 9.AUG.2007 20:02:44



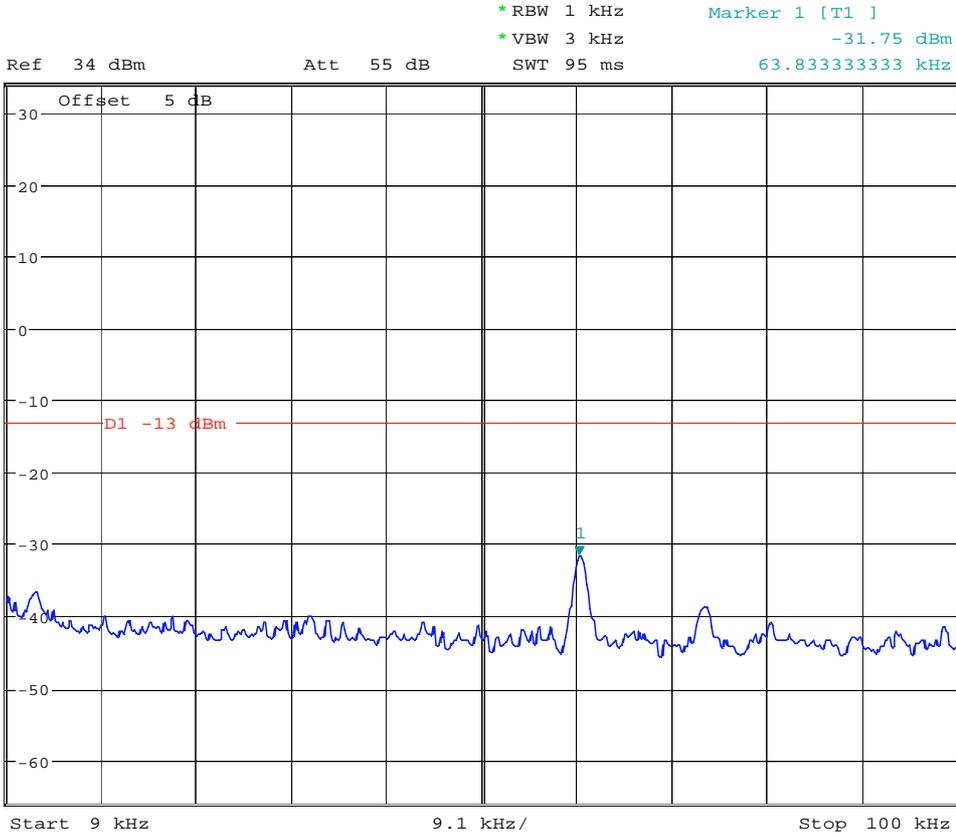
Ref 30 dBm Att 50 dB *RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -20.96 dBm
SWT 45 ms 17.571714744 GHz

1 PK
MAXH



Date: 9.AUG.2007 20:04:14

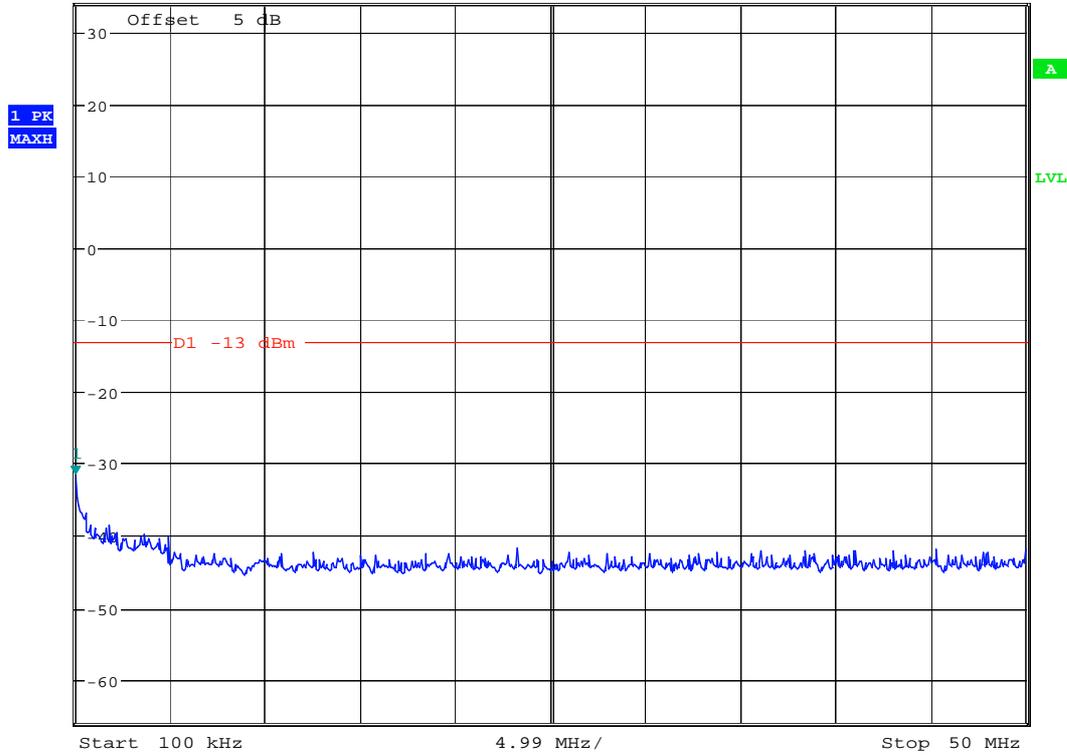
TM3:HSDPA/WCDMA Channel 9262



Date: 30.AUG.2007 04:31:56



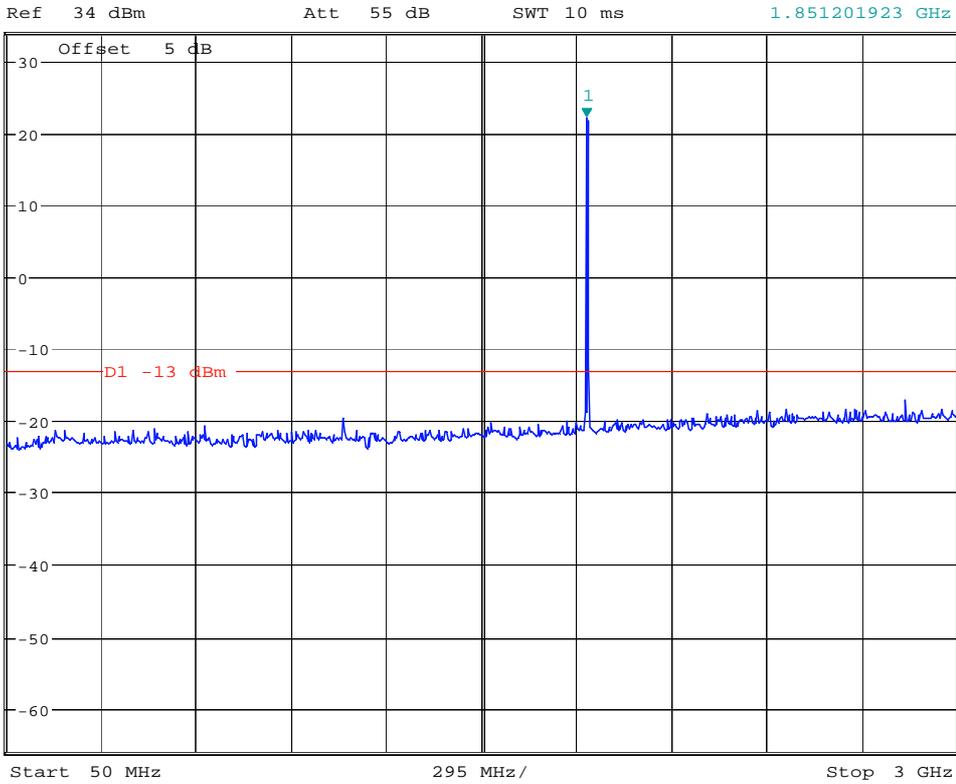
Ref 34 dBm Att 55 dB *RBW 10 kHz *VBW 30 kHz SWT 500 ms Marker 1 [T1]
-31.75 dBm
100.00000000 kHz



Date: 30.AUG.2007 04:35:46



*RBW 1 MHz Marker 1 [T1]
*VBW 3 MHz 22.06 dBm
SWT 10 ms 1.851201923 GHz



Date: 30.AUG.2007 04:37:24

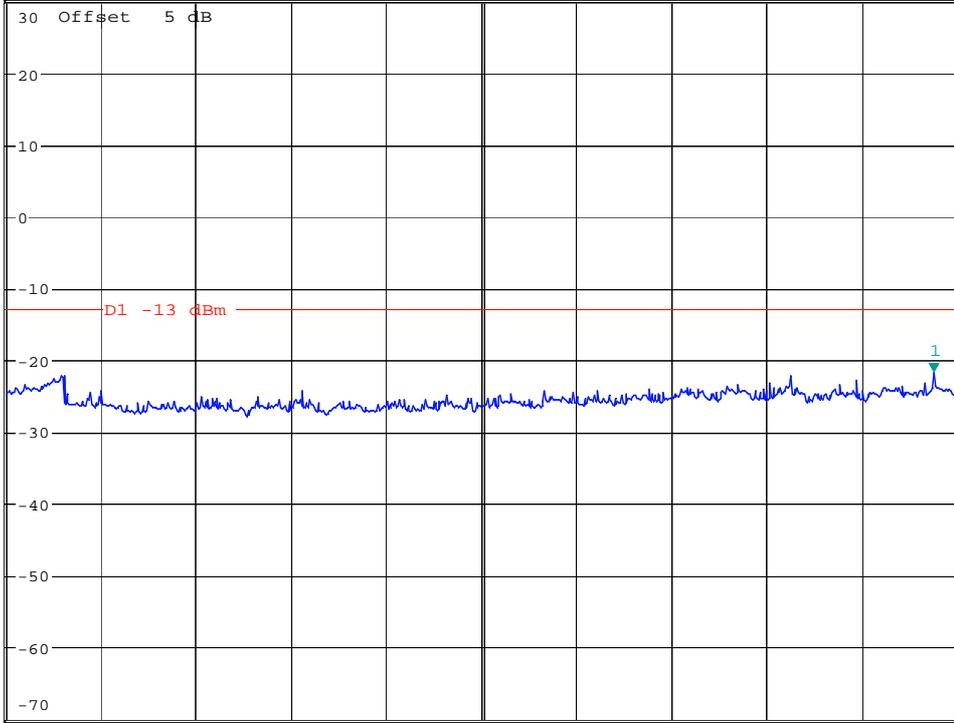


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -21.83 dBm
SWT 60 ms 12.515625000 GHz

Ref 30 dBm

Att 50 dB

1 PK
MAXH



Start 3 GHz

975 MHz/

Stop 12.75 GHz

Date: 9.AUG.2007 20:08:41

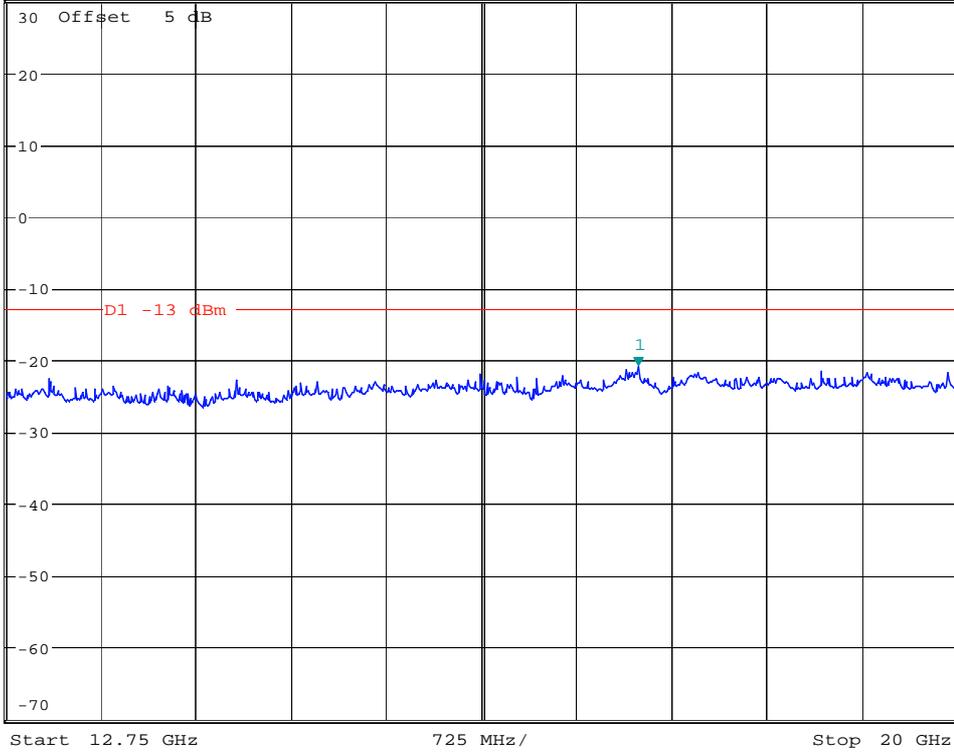


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -20.99 dBm
SWT 45 ms 17.571714744 GHz

Ref 30 dBm

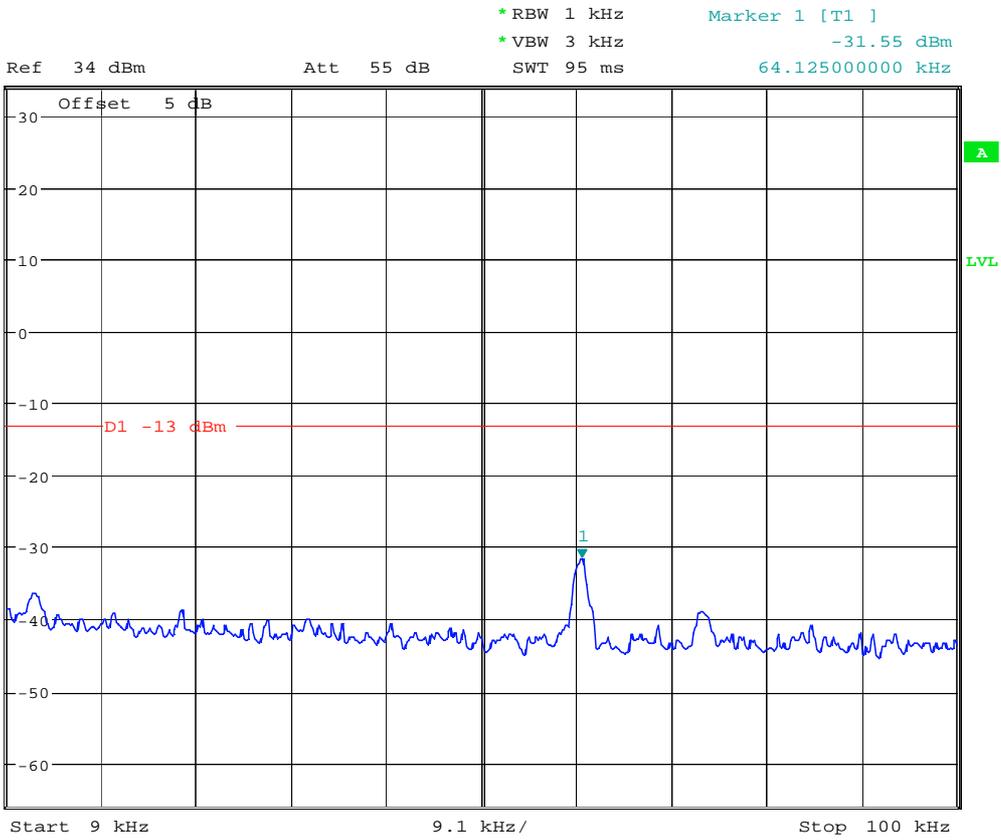
Att 50 dB

1 PK
MAXH



Date: 9.AUG.2007 20:10:56

Channel 9400



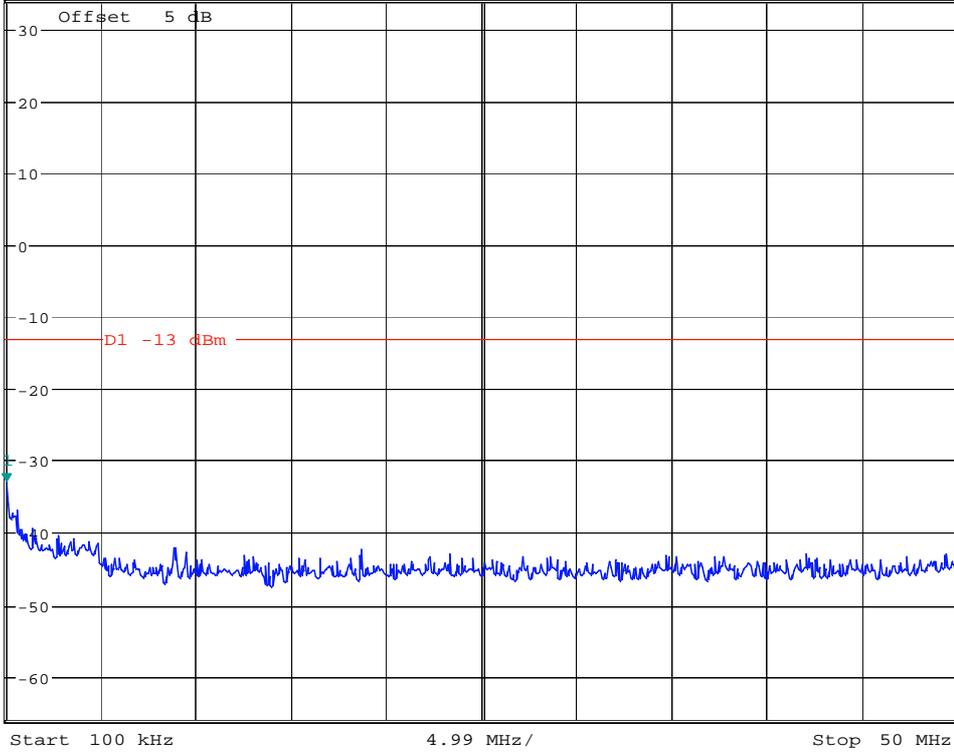
Date: 30.AUG.2007 04:33:21



*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -33.04 dBm
SWT 500 ms 100.00000000 kHz

Ref 34 dBm

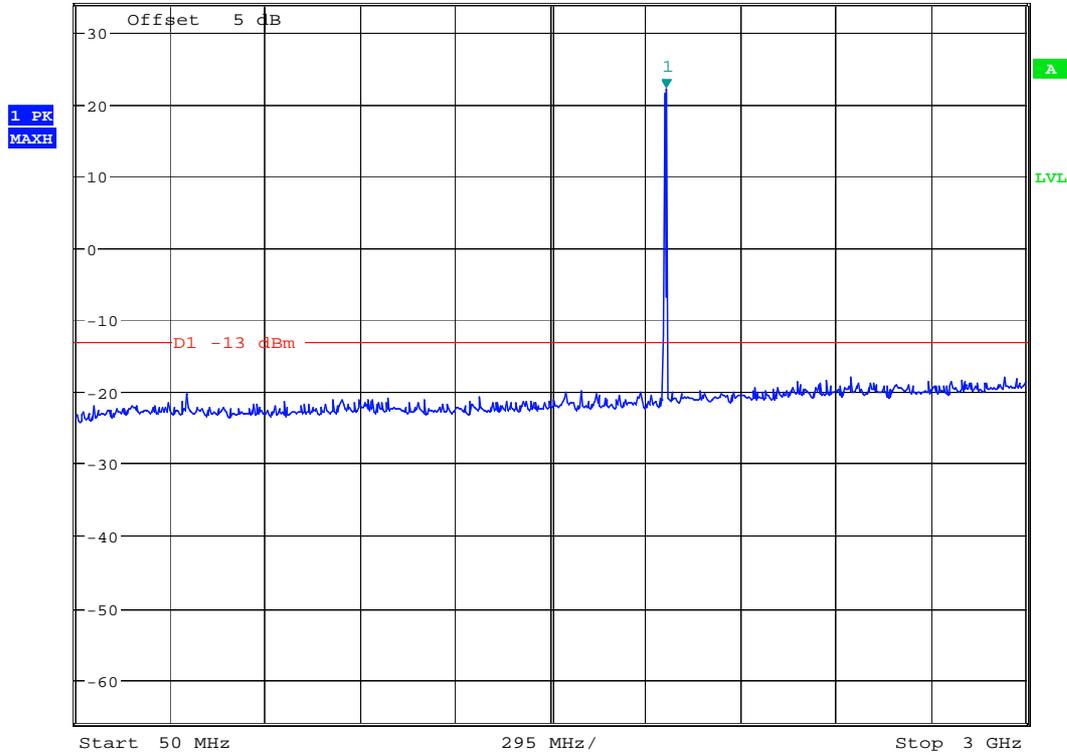
Att 55 dB



Date: 30.AUG.2007 04:36:07



Ref 34 dBm Att 55 dB SWT 10 ms *RBW 1 MHz *VBW 3 MHz Marker 1 [T1] 22.13 dBm 1.884294872 GHz



Date: 30.AUG.2007 04:38:11

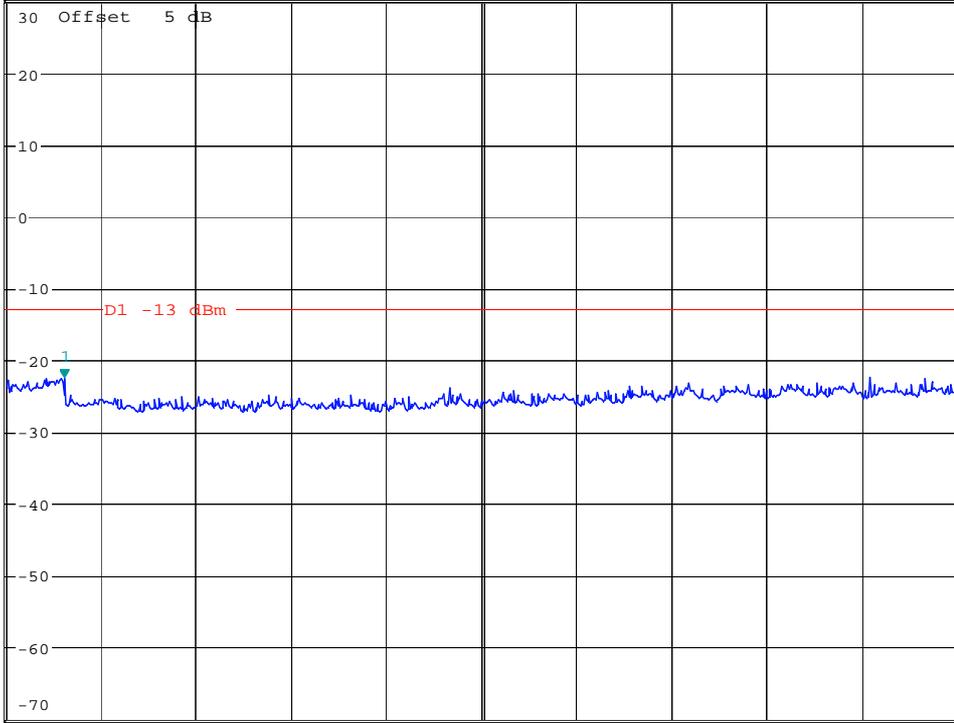


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -22.58 dBm
SWT 60 ms 3.593750000 GHz

Ref 30 dBm

Att 50 dB

1 PK
MAXH



Start 3 GHz

975 MHz/

Stop 12.75 GHz

Date: 9.AUG.2007 20:09:43

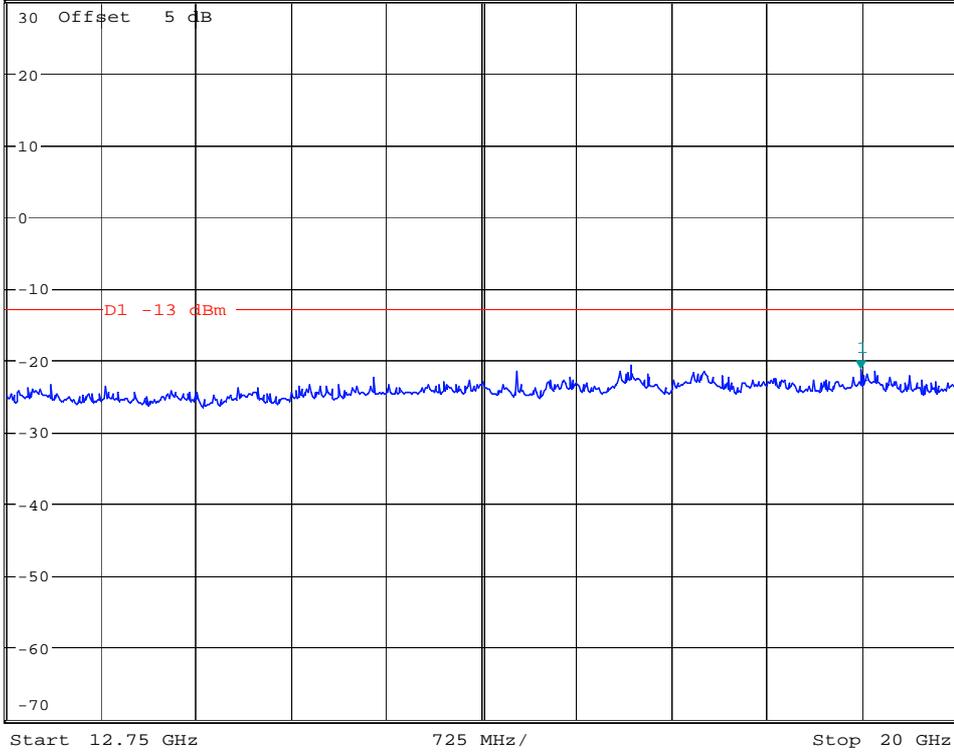


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -21.28 dBm
SWT 45 ms 19.268028846 GHz

Ref 30 dBm

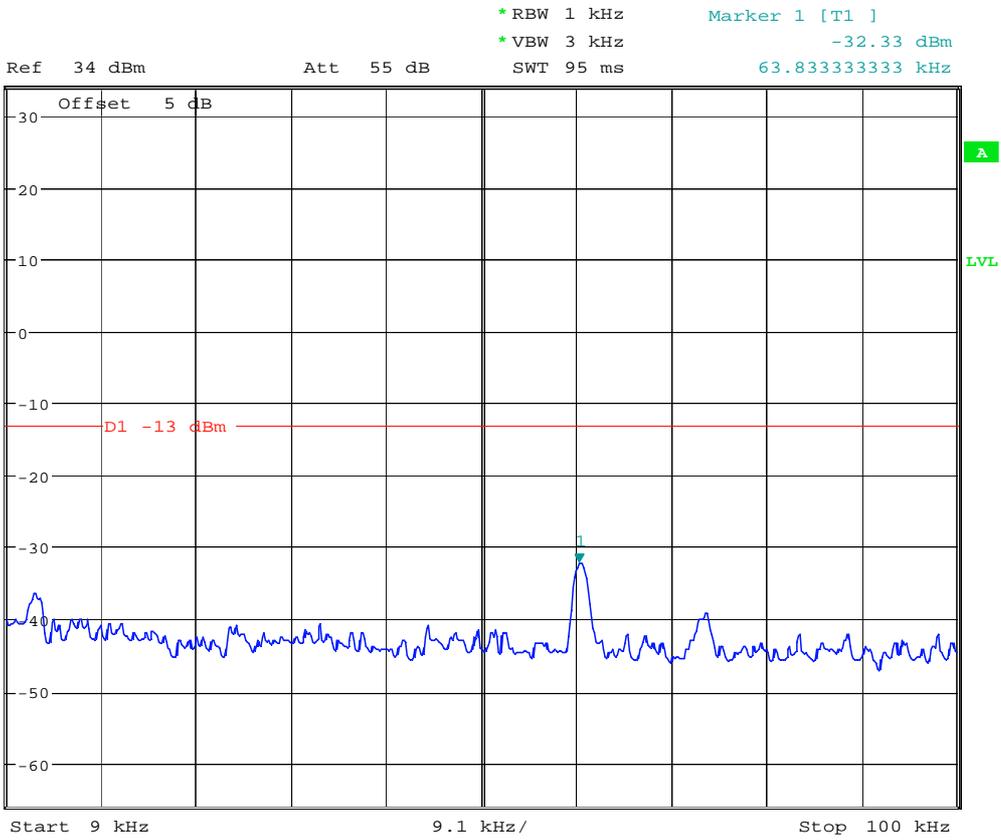
Att 50 dB

1 PK
MAXH



Date: 9.AUG.2007 20:11:14

Channel 9538



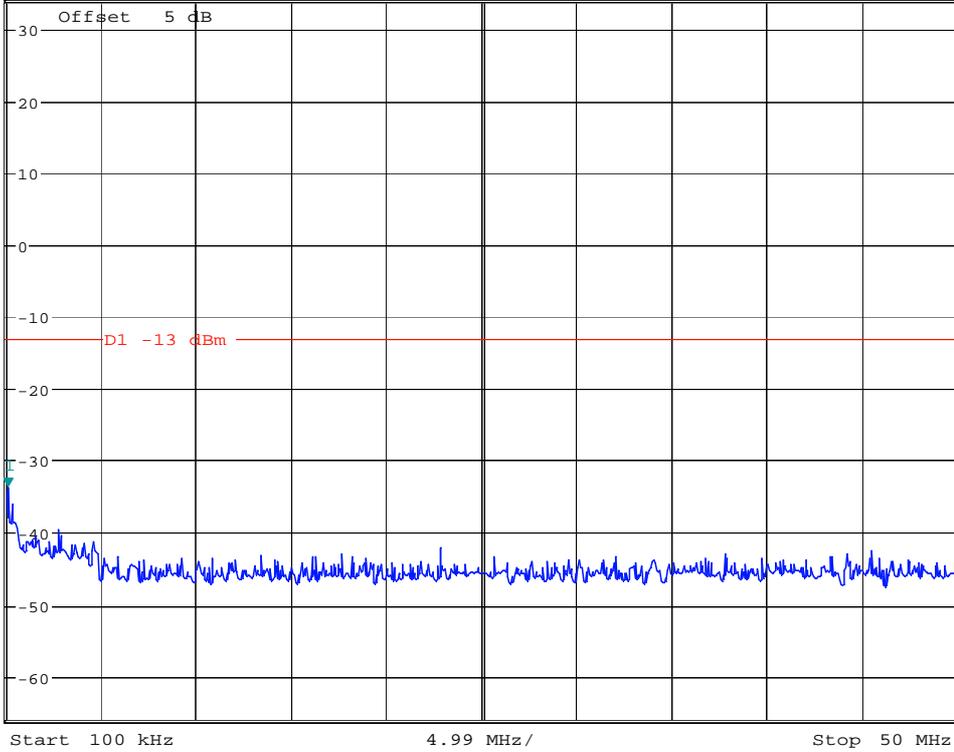
Date: 30.AUG.2007 04:33:54



*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -33.77 dBm
SWT 500 ms 179.967948718 kHz

Ref 34 dBm

Att 55 dB



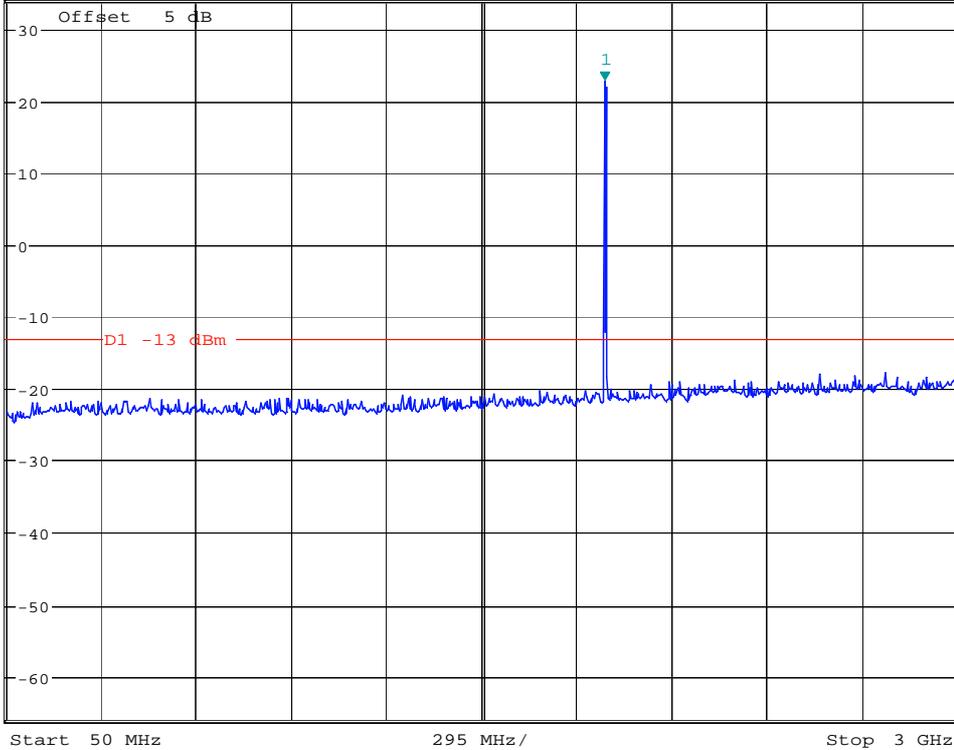
Date: 30.AUG.2007 04:36:20



*RBW 1 MHz Marker 1 [T1]
*VBW 3 MHz 22.70 dBm
SWT 10 ms 1.907932692 GHz

Ref 34 dBm

Att 55 dB



Date: 30.AUG.2007 04:38:45

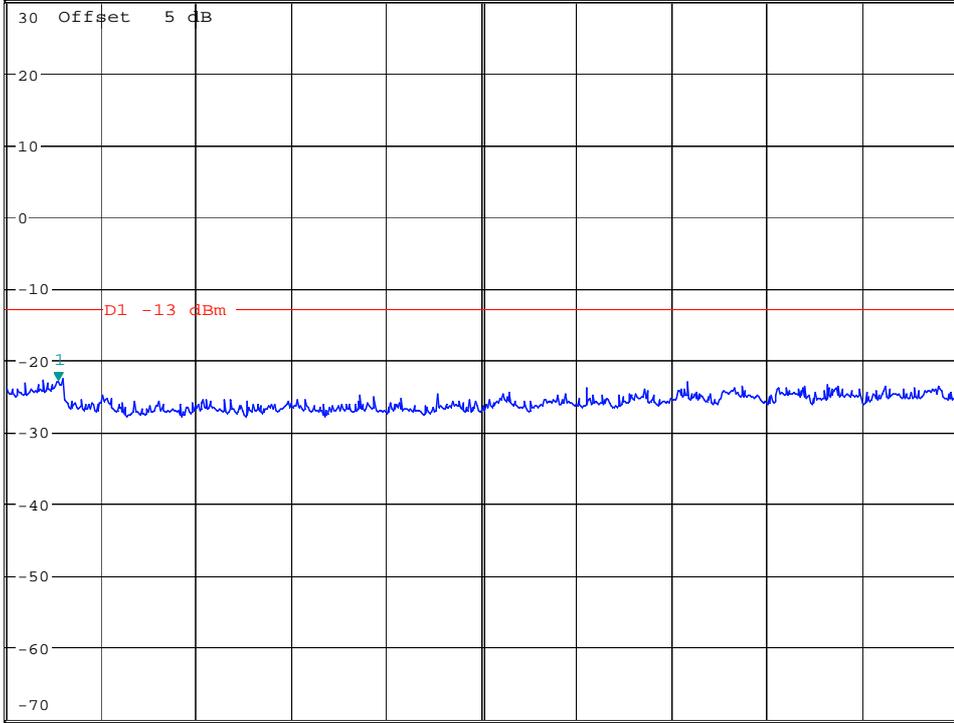


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -23.06 dBm
SWT 60 ms 3.53125000 GHz

Ref 30 dBm

Att 50 dB

1 PK
MAXH



Start 3 GHz

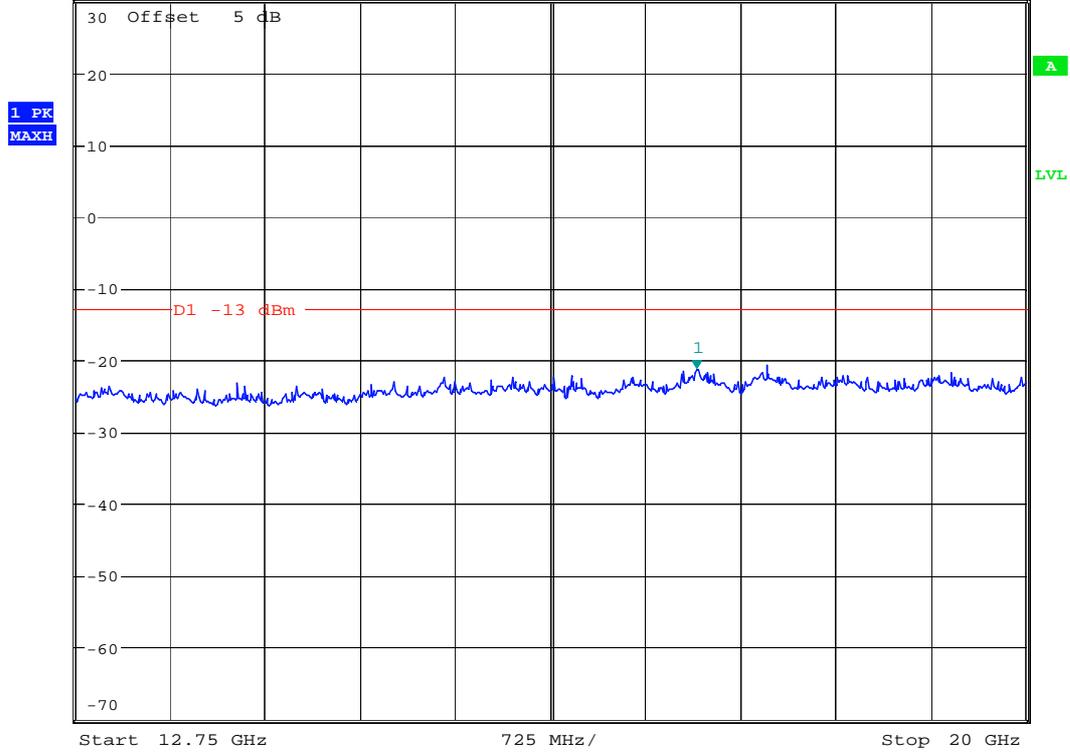
975 MHz/

Stop 12.75 GHz

Date: 9.AUG.2007 20:10:18



Ref 30 dBm Att 50 dB *RBW 1 MHz Marker 1 [T1]
VBW 3 MHz -21.41 dBm
SWT 45 ms 17.490384615 GHz



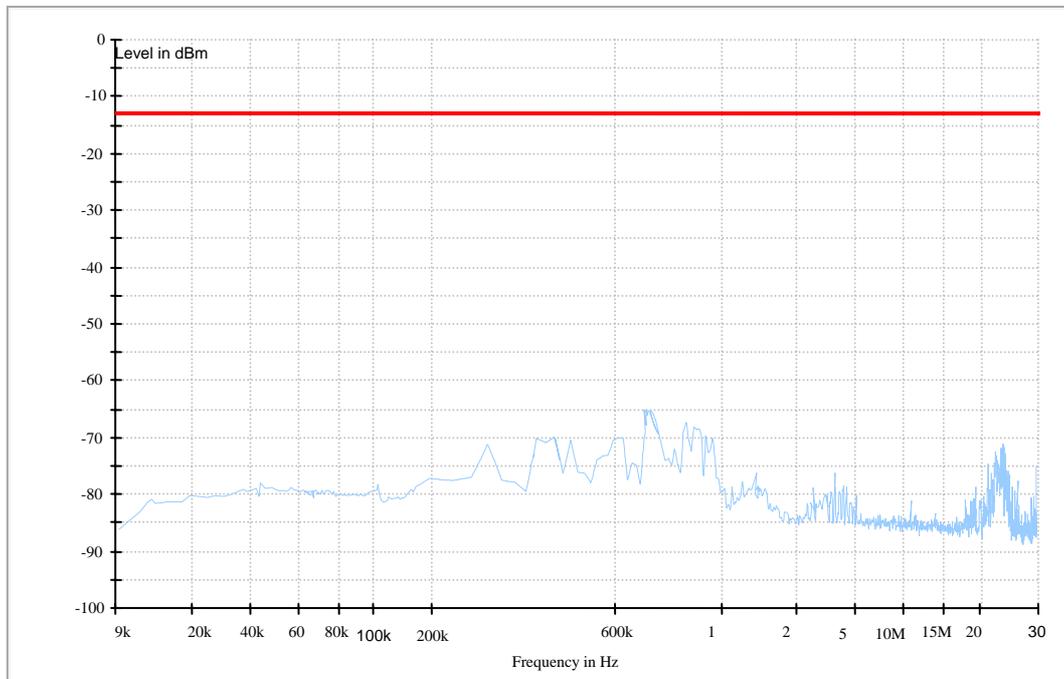
Date: 9.AUG.2007 20:11:35

Appendix E

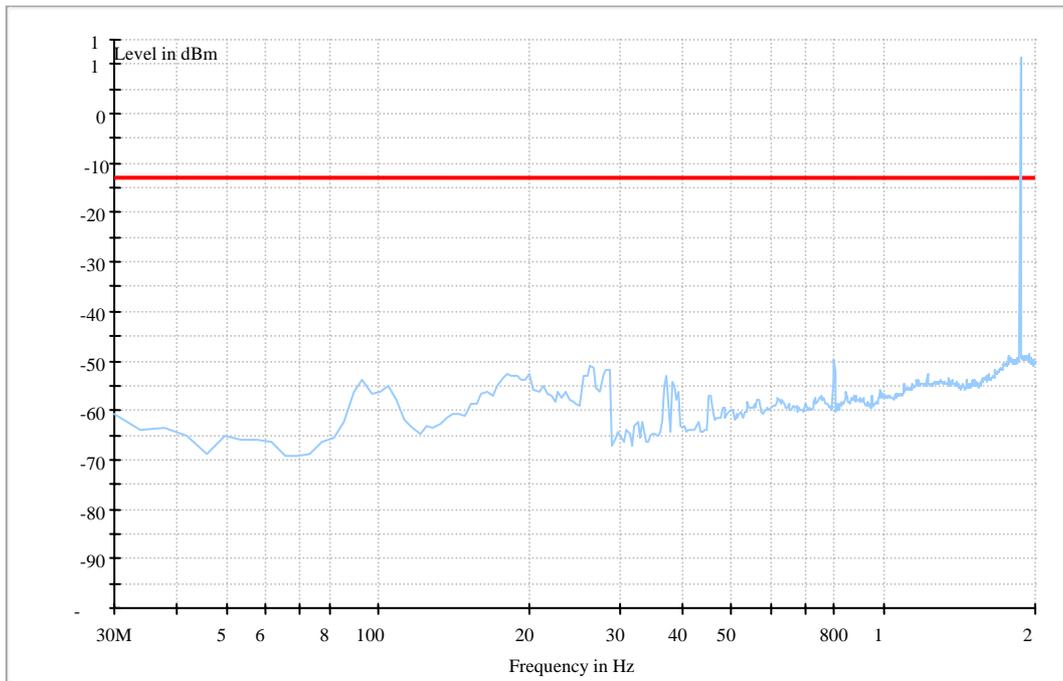
Radiated Spurious Emission

According to FCC Part 2.1053 & 24.238

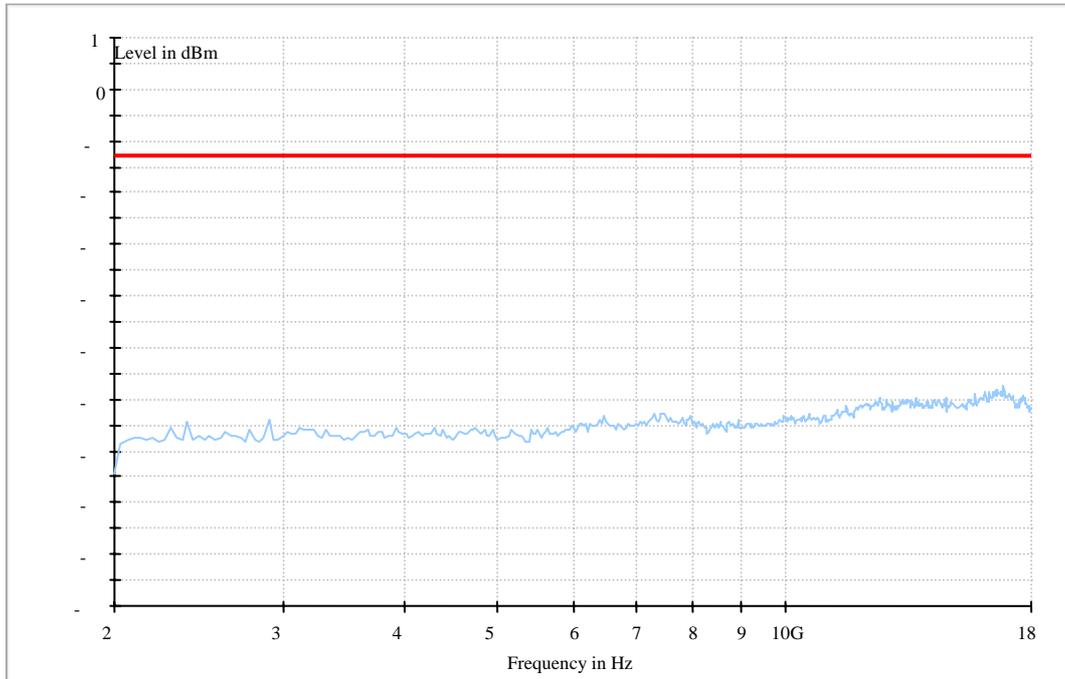
1、GPRS1900 Traffic Mode (9kHz-30MHz)



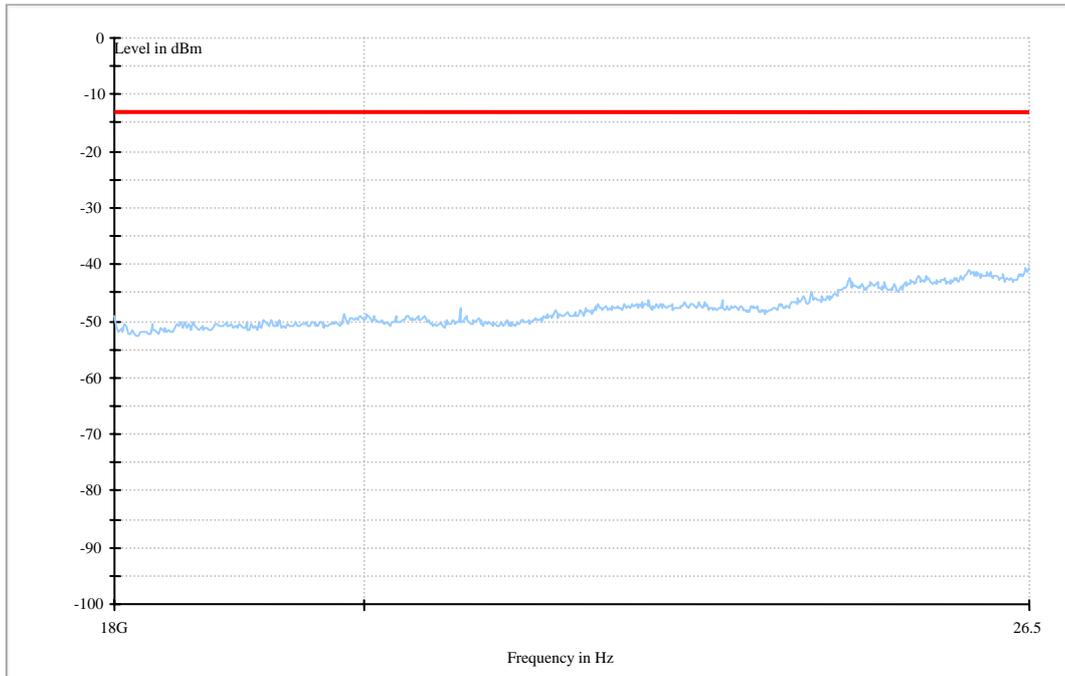
Traffic Mode (30MHz-2GHz)



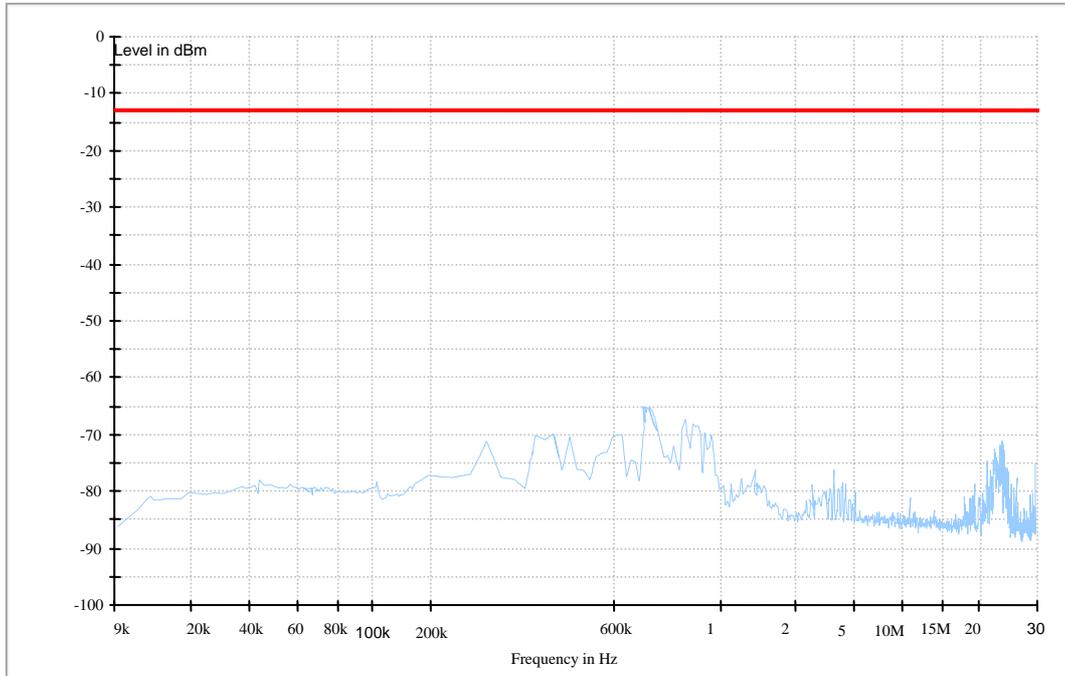
Traffic Mode (2GHz-18GHz)



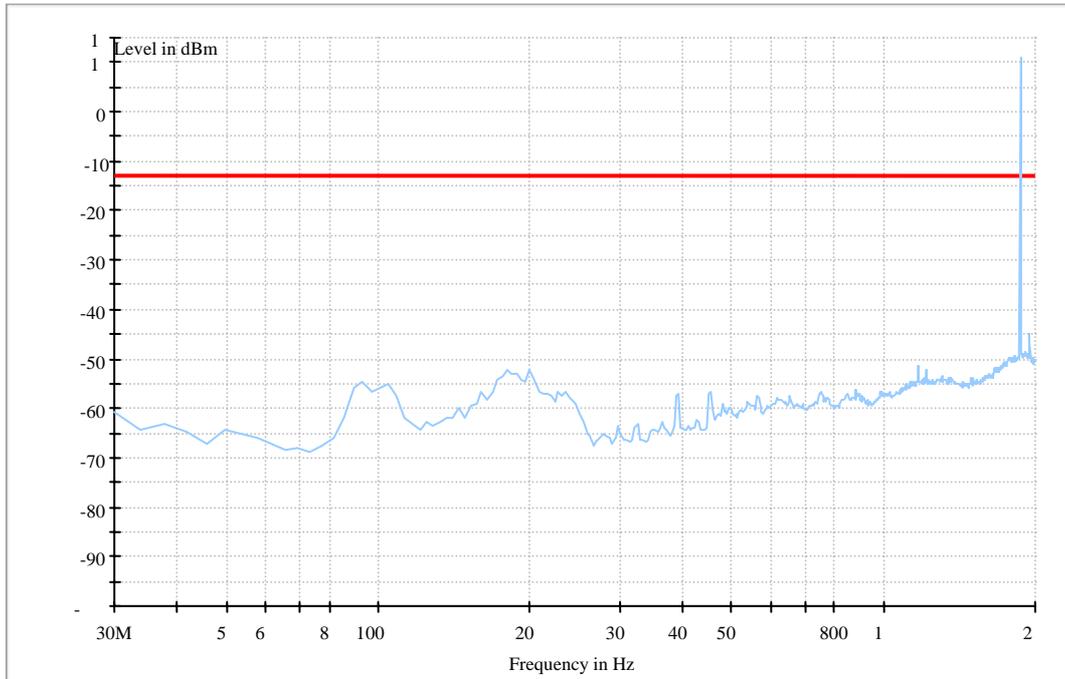
Traffic Mode (18GHz-26.5GHz)



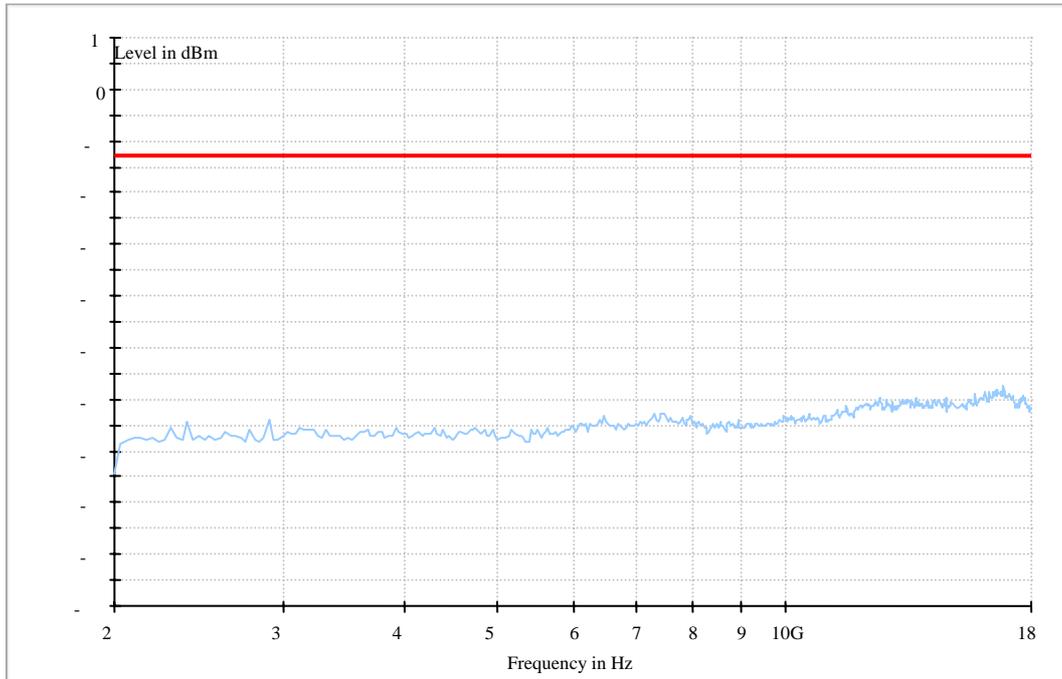
2、EGPRS1900 Traffic Mode (9kHz-30MHz)



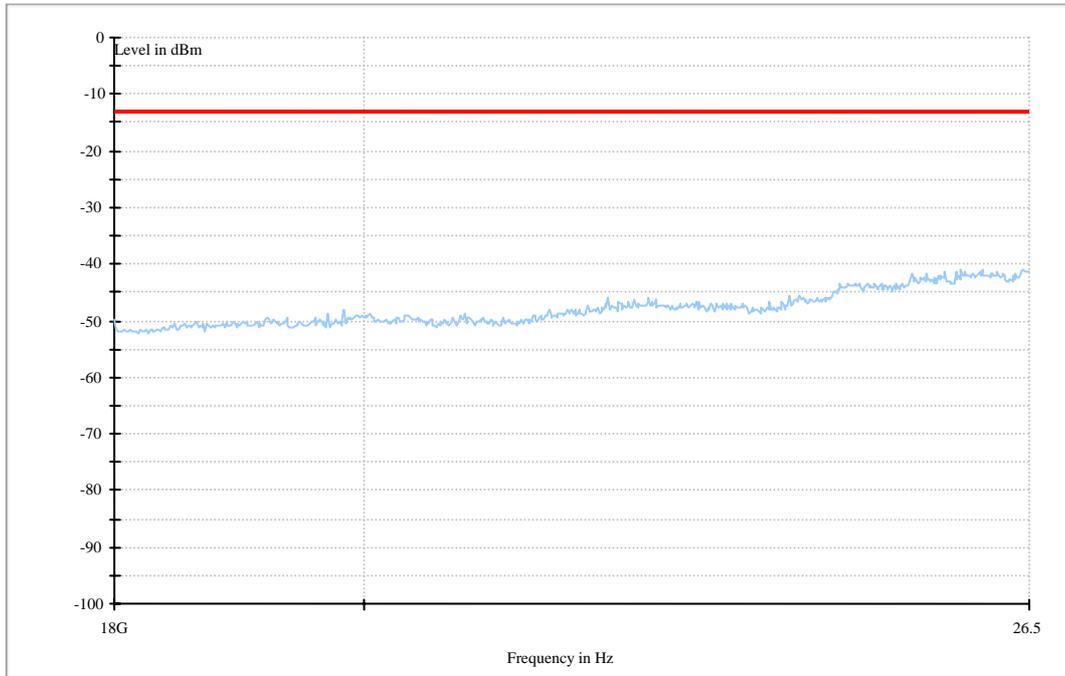
Traffic Mode (30MHz-2GHz)



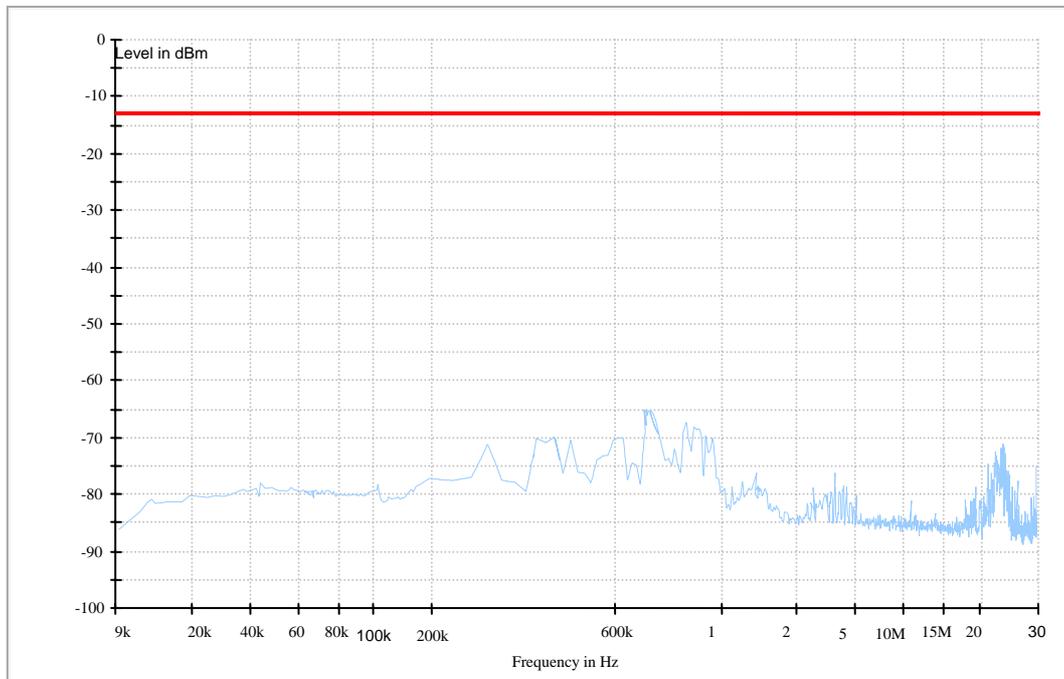
Traffic Mode (2GHz-18GHz)



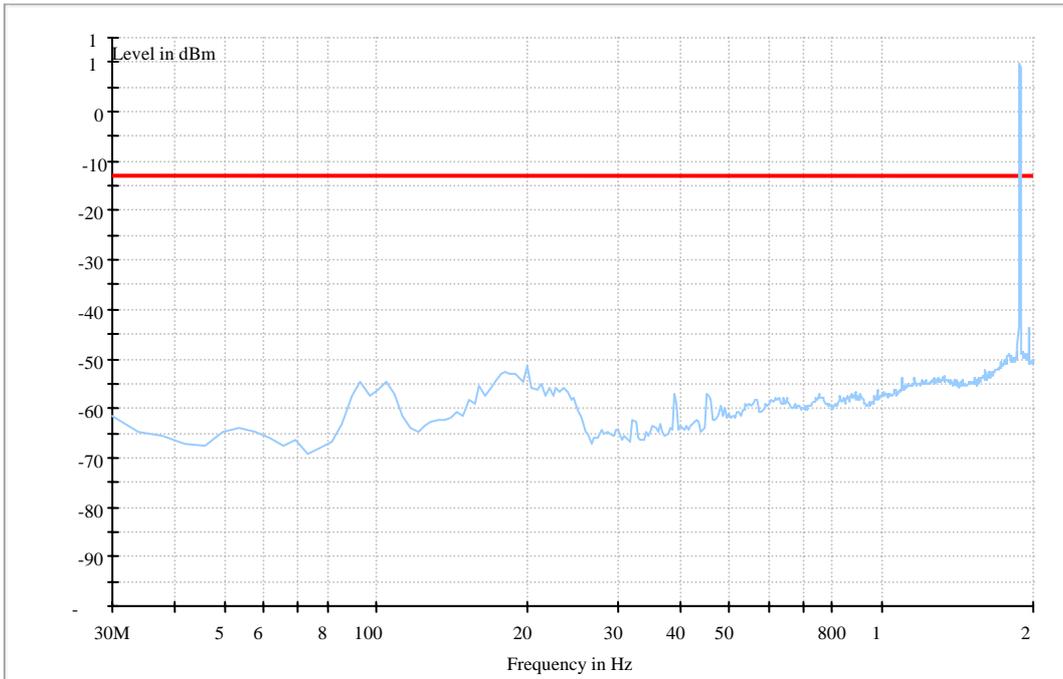
Traffic Mode (18GHz-26.5GHz)



3、 WCDMA1900 Traffic Mode (9kHz-30MHz)

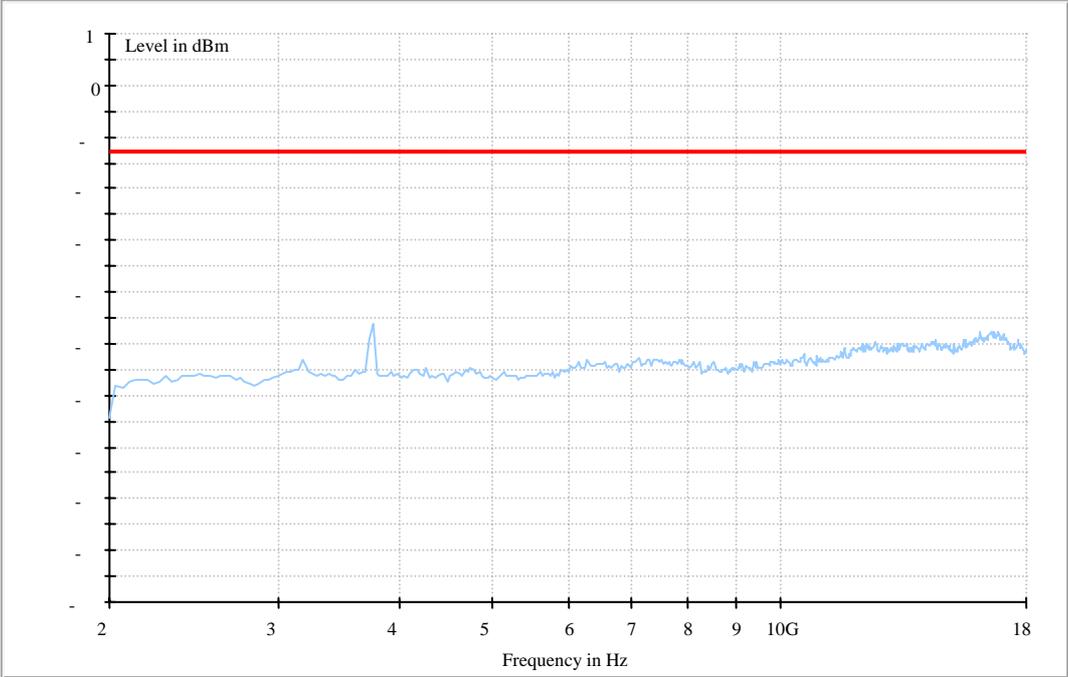


Traffic Mode (30MHz-2GHz)

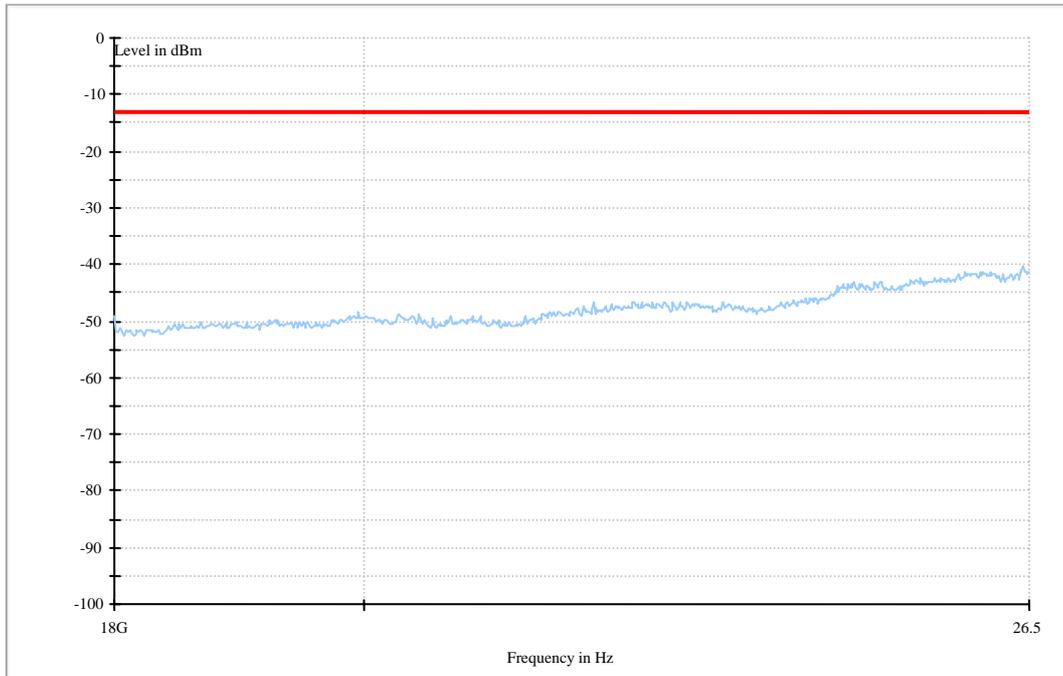




Traffic Mode (2GHz-18GHz)



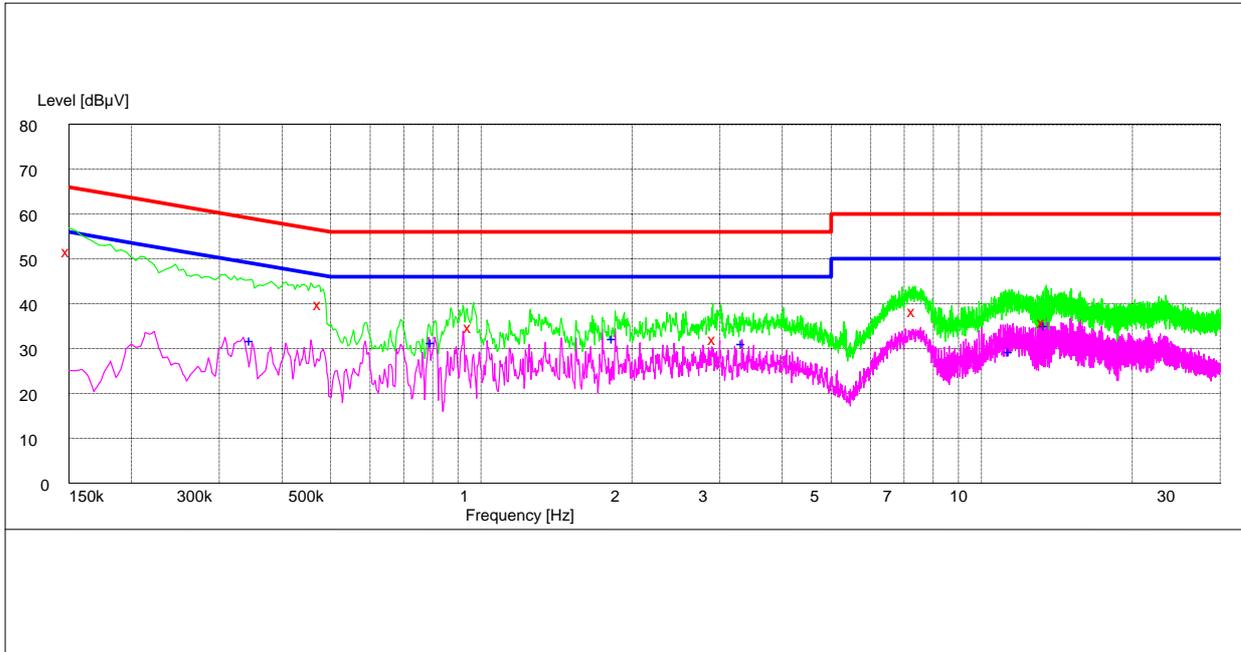
Traffic Mode (18GHz-26.5GHz)



Appendix F

Conducted Emission at Power Port

According to FCC Part 15.107



MEASUREMENT RESULT:QP DECTER

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	52.00	11.0	66	14.0	QP	L3	GND
0.478500	40.20	10.0	56	16.2	QP	L3	GND
0.955500	35.00	9.9	56	21.0	QP	L3	GND
2.940000	32.30	10.0	56	23.7	QP	N	GND
7.345500	38.70	10.3	60	21.3	QP	N	GND
13.375500	36.30	11.6	60	23.7	QP	N	GND

MEASUREMENT RESULT:AV DECTER

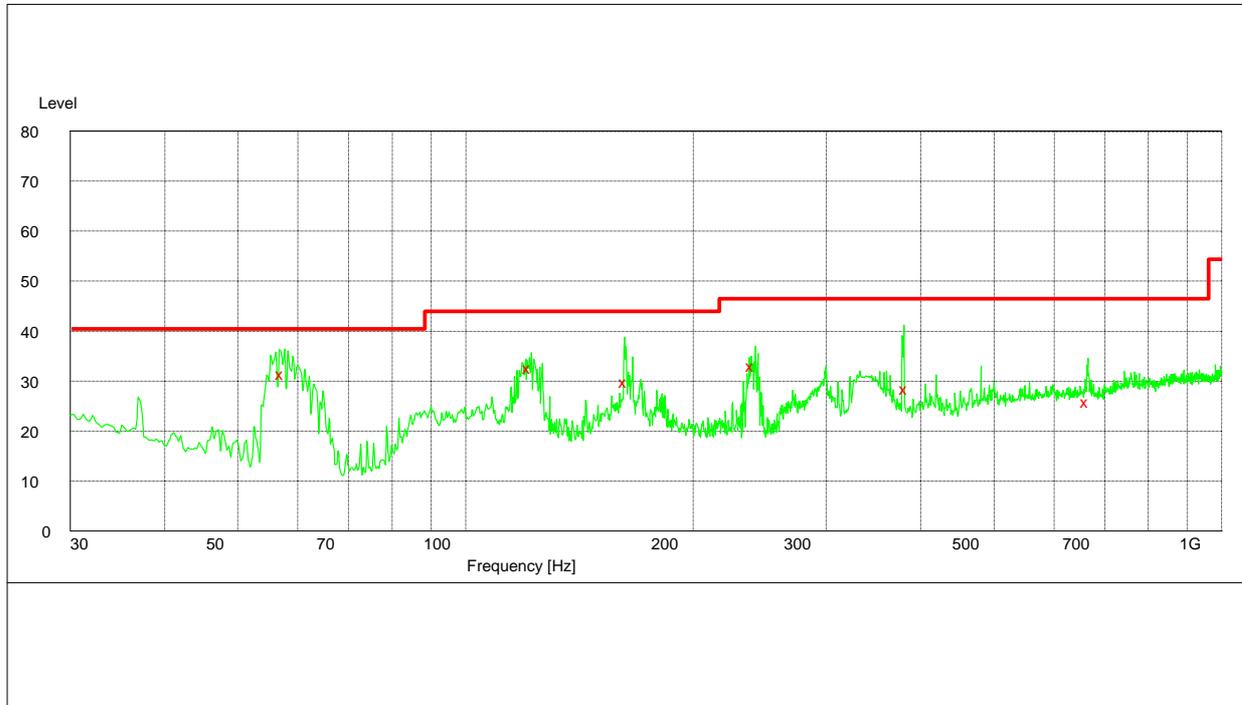
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.334500	35.40	10.2	49	13.9	AV	L3	GND
0.447000	37.60	10.0	47	9.3	AV	L3	GND
0.892500	32.00	9.9	46	14.0	AV	L3	GND
2.985000	28.70	10.0	46	17.3	AV	L3	GND
5.523000	27.50	10.2	50	22.5	AV	L3	GND
22.609500	18.20	15.2	50	31.8	AV	L3	GND

Appendix F

Radiated Emission of Enclosure in Idle Mode

According to FCC Part 15.109

1、WCDMA850



MEASUREMENT RESULT: QP DECTER

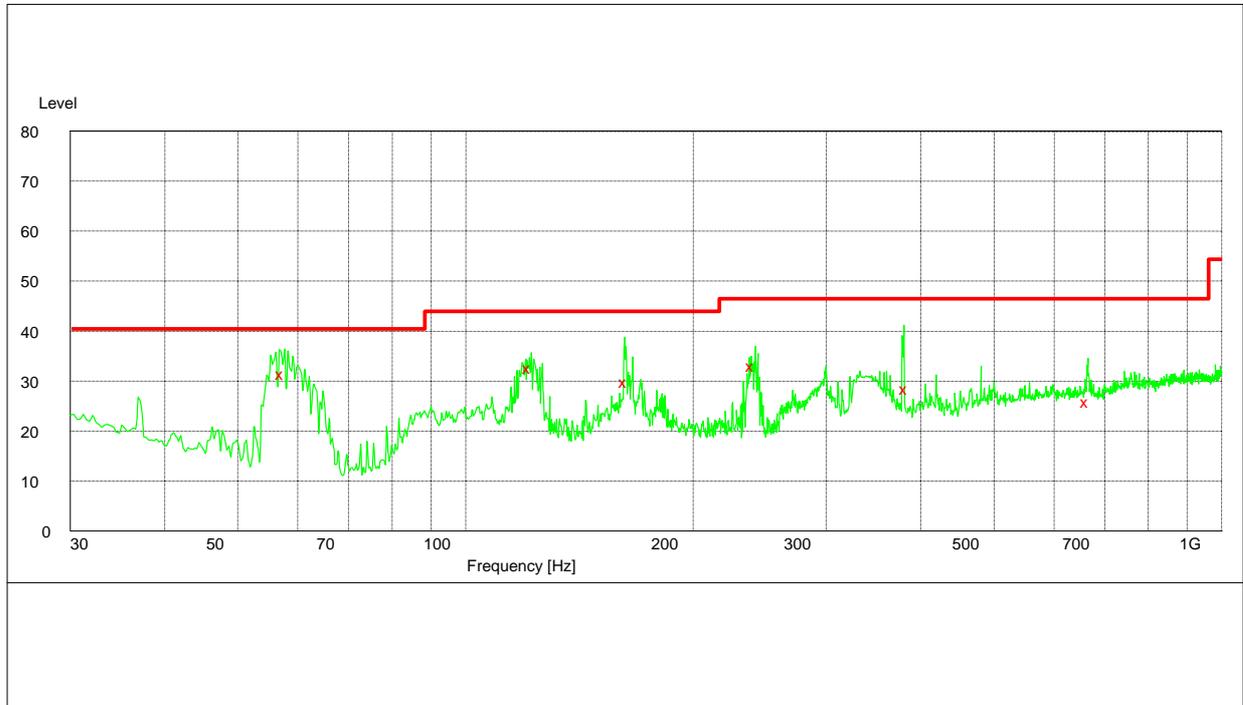
Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
57.300000	31.60	-16.0	40.0	8.4	200.0	336.00	HORIZONTAL
121.800000	33.10	-9.6	43.5	10.4	118.0	352.00	HORIZONTAL
161.460000	30.00	-11.7	43.5	13.5	195.0	31.00	HORIZONTAL
240.120000	31.60	-9.2	46.0	14.4	126.0	43.00	HORIZONTAL
377.820000	28.90	-5.2	46.0	26.1	112.0	360.00	HORIZONTAL
664.200000	26.00	-1.5	46.0	20.0	131.0	50.00	HORIZONTAL

Appendix F

Radiated Emission of Enclosure in Idle Mode

According to FCC Part 15.109

1、WCDMA850



MEASUREMENT RESULT: QP DECTER

Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
57.300000	31.60	-16.0	40.0	8.4	200.0	336.00	HORIZONTAL
121.800000	33.10	-9.6	43.5	10.4	118.0	352.00	HORIZONTAL
161.460000	30.00	-11.7	43.5	13.5	195.0	31.00	HORIZONTAL
240.120000	31.60	-9.2	46.0	14.4	126.0	43.00	HORIZONTAL
377.820000	28.90	-5.2	46.0	26.1	112.0	360.00	HORIZONTAL
664.200000	26.00	-1.5	46.0	20.0	131.0	50.00	HORIZONTAL