FCC
RF Test Report

Product Name: UMTS/GPRS/GSM Mobile Phone with Bluetooth

Model Number: HUAWEI U5300

Report No: SYBH(Z-RF)017072011-2001

FCC ID: QISU5300

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

Notice 2

Modification Information:

Modification Information

Modification Information	1	
	2	
	3	Not Applicable!
	4	
	5	
	6	
	7	

REGULATION	**FCC CFR47 Part 2: Subpart J;**
	FCC CFR47 Part 22 : Subpart H;
START OF TEST	**Jul.14, 2011**
END OF TEST	**Jul.17, 2011**
Final Judgement:	**Pass**

Approved By	Jul.28, 2011	Chenxiaohong	Chen Xiaohong
	Date	Name	Signature
Reviewed By	Jul.28, 2011	Xuguangyi	Xuguangyi
	Date	Name	Signature
Operator	Jul.28, 2011	Huang Qiuliang	Huang Qiuliang
	Date	Name	Signature

Contents

1 Summary

The table below summarizes the measurements and results for the EUT. 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	22.913	Effective Radiated Power of Transmitter	PASS
2.1046	22.913	Conducted Power of Transmitter	PASS
2.1047		Modulation Characteristics	PASS
2.1049		Occupied Bandwidth	PASS
2.1051	22.917	Band Edges compliance	PASS
2.1051	22.917	Spurious Emission at Antenna Terminal	PASS
2.1055	22.355	Frequency Stability	PASS
2.1053	22.917	Radiated Spurious Emissions	PASS

2 Product Description

2.1 Production Information

2.1.1 General Description

HSUPA/HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth HUAWEI U5300 is subscriber equipment in the WCDMA/GSM system. The HSUPA/HSDPA/UMTS frequency band is Band II and AWS. The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only GSM850MHz band test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSUPA/HSDPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video, MMS service, and GPSI 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 exchange data with other Bluetooth devices.

2.1.2 Support function and Service

The EUT 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	GPRS/GSM
Data	Modulation: 8PSK	TM2	EDGE

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

3.1 Testing Period

The test have been performed during the period of

Jul.14, 2011 – Jul.17, 2011

3.2 General Set up Description

TM1: GSM/GPRS Mode with GMSK Modulation
TM2: EDGE Mode with 8PSK Modulation

4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Table 4 Frequency Range

Uplink band:	824 to 849 MHz
Downlink band:	869 to 894 MHz

4.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

	EDGE/GPRS/GSM
Channel Raster	200kHz
Channel Spacing:	200kHz

4.1.3 Type of Emission

Table 6 Type of Emission

	GPRS/GSM	EDGE
Emission Designation:	-	-

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

AC voltage nominal:	~ 120 V
AC voltage range	~ 100 V to ~ 240 V
AC current maximal:	1A

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:

Applied RF module DC Voltages and Currents

Voltage:	⎓ +3.6~4.2V
Current:	1A According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8)

4.2 EUT Identification List

4.2.1 Board Information

Table 9 Board Information

UMTS/GPRS/GSM Mobile Phone with Bluetooth		
HUAWEI U5300		
Board and Module		
Hardware Version	Software Version	Serial Number
Ver.B	U5300CBTB208	U9V7NB1162700241

4.2.2 Adapter

AC/DCAdapter Model	HS-050040U6
Manufacturer	Huawei Technologies Co., Ltd.
Input Voltage	~100-240V 50/60Hz 0.2A
Output Voltage	5V ⎓ 0.4A
Rated Power	2W
S/N	HKAAC0909330

4.2.3 Battery Technical Data

Battery Model:	HB5A2H
Rated capacity:	1150 mAh
Nominal Voltage:	⎓ 3.7 V
Charging Voltage:	⎓ 4.2 V

4.2.4 FCC Identification

Grantee Code: **QIS**
Product Code: **U5300**
FCC Identification: **QISU5300**

5 Main Test Instruments

Table 10Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
Power supply	KEITHLEY	2303	1288003	Sep.27,2011
Universal Radio Communication Tester	R&S	CMU200	105822	Oct.24.2011
Wireless Communication Test set	Agilent	N4010A	MY49081592	Dec.14.2011
Universal Radio Communication Tester	Agilent	E5515C	MY50260239	Aug.04,2011
Spectrum Analyzer	Agilent	E4440A	MY49420179	Apr.24,2012
Signal Analyzer	R&S	FSQ31	200021	Sep.27,2011
Temperature Chamber	WEISS	WKL64	24600294	Jan.03,2012
Signal generator	Agilent	E8257D	MY49281095	Jul.09.2012
Vector Signal Generator	R&S	SMU200A	104162	Sep.07,2011
Test receiver	R&S	ESIB26	100318	May.04.2012
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	919/1009	Dec.13.2011
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	Dec.13.2011
Horn Antenna	R & S	HF906	359287/005	May.07, 2012
Horn Antenna	R & S	HF906	359287/006	April.27, 2012
Broadband Antenna	SCHAFFNER	CBL 6112B	2536	Sep.21, 2011
Broadband Antenna	SCHAFFNER	CBL 6112B	2941	Jun.11, 2012
Horn Antenna	ETS-LINDGREN	3160	60008	Sep.20.2011
Horn Antenna	ETS-LINDGREN	3160	60006	Oct.27.2011

6 Transmitter Measurements

6.1 Effective Radiated Power of Transmitter (ERP)

6.1.1 Test Conditions

Table 11 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25℃
Relative humidity:	55%
Test Configurations:	TM1/TM2 at Channel Bottom, Middle, Top

6.1.2 Test Specifications and Limits

6.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 22 subpart H

6.1.2.2 Supporting Standards

Table 12 Supporting Standards:

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.1.2.3 Limits

Compliance with part 22.913, mobile/portable stations are limited to 7 watts ERP peak power.
W (dBm)= 10*log ($W_{in\ mW}$).

Table 13 Limits

Maximum Output Power (Watts)	< 7 Watts
Maximum Output Power (dBm)	< 38.5 dBm

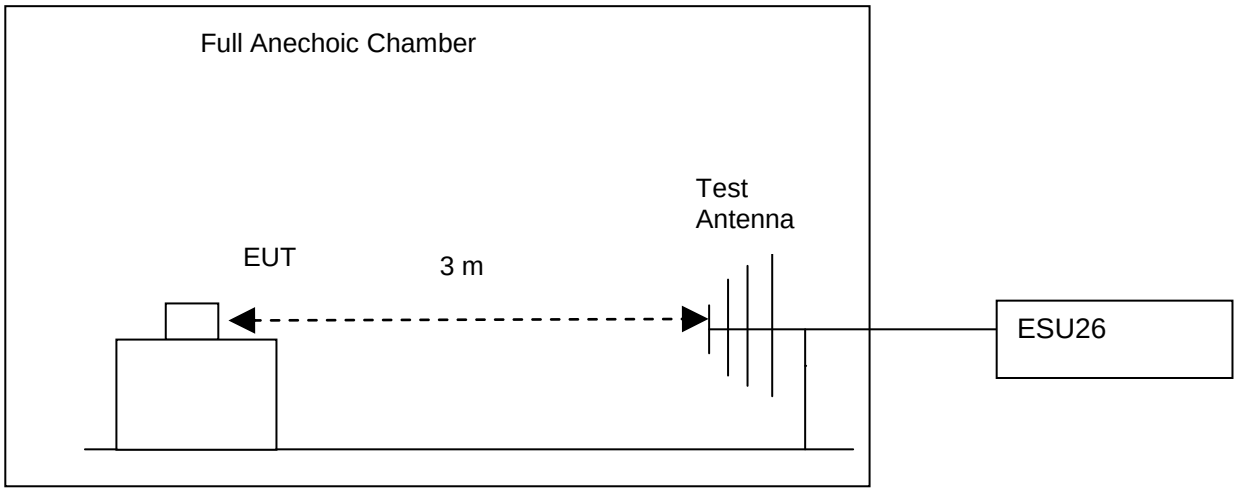
6.1.3 Test Method and Setup

(a) 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 Mobile Phone to the wireless communication tester CMU200 via the air interface. The band is set as 850M.
(b) Test the Radiated maximum output power by the CMU200 received 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 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 ERP

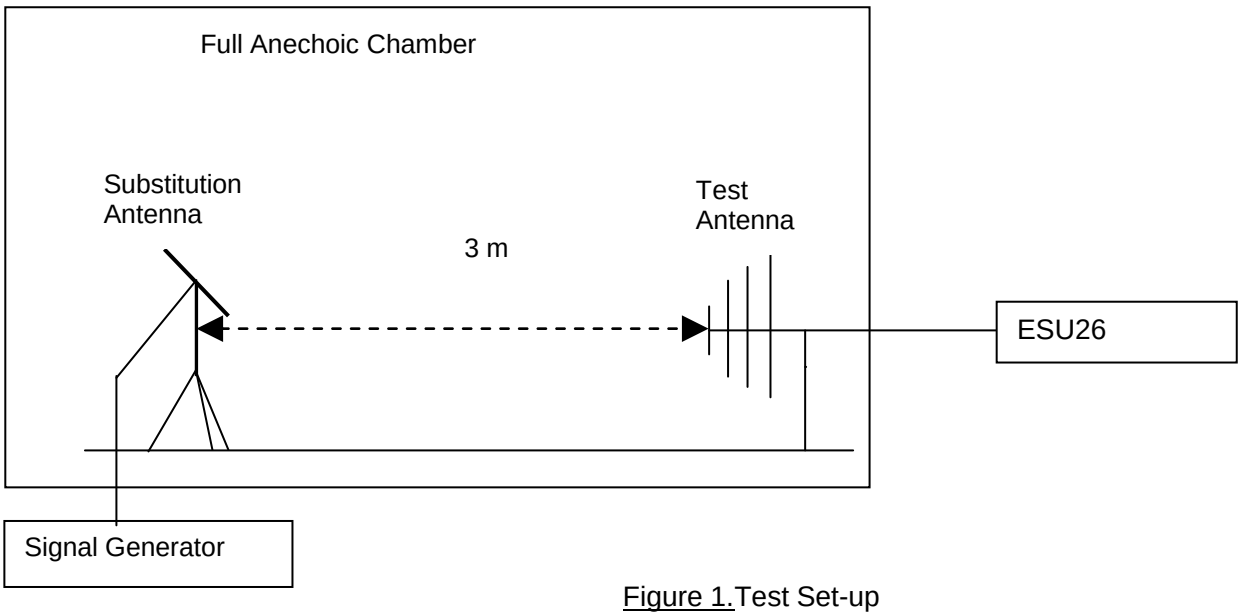


Figure 1.Test Set-up

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

6.1.4 Measurement Results

6.1.4.1 Pre-test Results

	RF Output Power (ERP)					
TEST CONDITIONS	Channel128(B) 824.2MHz		Channel192(M) 837.0MHz		Channel251(T) 848.8MHz	
	dBm		dBm		dBm	
T_{nom} (25 °C)/ V_{nom} (3.7V)	Measured	Limit	Measured	Limit	Measured	Limit
TM1	30.26	38.5	30.32	38.5	30.39	38.5
TM2	23.39	38.5	23.42	38.5	23.46	38.5

6.1.4.2 Substitution Results

Table 14 Substitution Results

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBd]	Cable Loss [dB]	Substitution Level (ERP) [dBm]	FCC limit [dBm]	Result
TM1	824.2	30.26	Dipole Ant.	33.57	-2.75	0.6	30.22	38.5	Pass
TM1	837.0	30.32	Dipole Ant.	33.84	-2.87	0.6	30.37	38.5	Pass
TM1	848.8	30.39	Dipole Ant.	33.77	-2.85	0.6	30.32	38.5	Pass
TM2	824.2	23.39	Dipole Ant.	26.68	-2.75	0.6	23.33	38.5	Pass
TM2	837.0	23.42	Dipole Ant.	26.93	-2.87	0.6	23.46	38.5	Pass
TM2	848.8	23.46	Dipole Ant.	26.94	-2.85	0.6	23.49	38.5	Pass

Note: a, For get the ERP (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

b, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 250kHz for TM1 and TM2 .

6.1.5 Conclusion

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

6.2 Conducted Power of Transmitter

6.2.1 Test Conditions

Table 15 Test Conditions

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

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 22 subpart H

6.2.2.2 Supporting Standards

Table 16 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.2.2.3 Limits

Compliance with part 22.913, in no any case may the peak power of a mobile station transmitter exceed 7 W. The calculated longitude ERP by following formula:

ERP(dBm)= 10*log ($ERP_{in\ watts}$).

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

P_{cod}.(dBm)=ERP(dBm)- Gain(dBd).
and Gain (dBd)= Gain(dBi)- 2.15dB

Table 17 Limits

Maximum Output Power (Watts)	< 7 Watts(38.5dBm)
Antenna Gain(dBi):	-1.0
Antenna Gain(dBd):	-3.15
Maximum Conducted Output Power (dBm)	<41.65

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 Mobile Phone to the wireless communication tester CMU200 via the antenna connector. The band class is set as US Cellular.
(b)Test the Conducted maximum output power by the CMU200.

Test setup

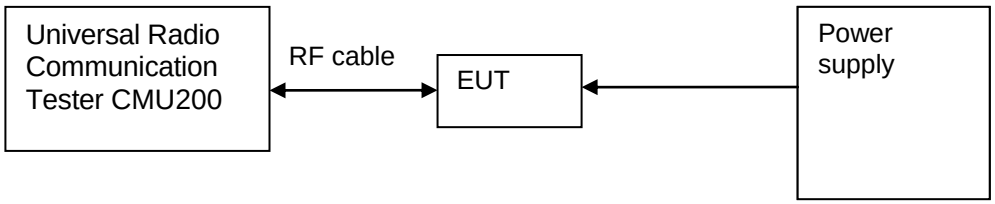


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 18 Measurement Results

	RF Output Power (Conducted)					
TEST CONDITIONS	Channel128(B) 824.2MHz		Channel192(M) 837.0MHz		Channel251(T) 848.8MHz	
	dBm		dBm		dBm	
Tnom (25 °C)/ Vnom (3.7V)	Measured	Limit	Measured	Limit	Measured	Limit
TM1	33.41	41.65	33.47	41.65	33.54	41.65
TM2	26.54	41.65	26.57	41.65	26.61	41.65

6.2.5 Conclusion

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

6.3 Modulation Characteristics

6.3.1 Test Conditions

Table 19 Test Conditions

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

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 22 subpart H

6.3.2.2 Supporting Standards

Table 20 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	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 22 subpart H.

Table 21 Limits

Limits	Not applicable

6.3.3 Test Method and Setup

Connect the Mobile Phone to Universal Radio Communication Tester CMU200 via the antenna connector. The frequency band is set as 850M; the Mobile Phone's output is matched with 50 Ω load, test method was according to 3GPP TS 51.010. The waveform quality and constellation of the Mobile Phone was tested.

Test setup

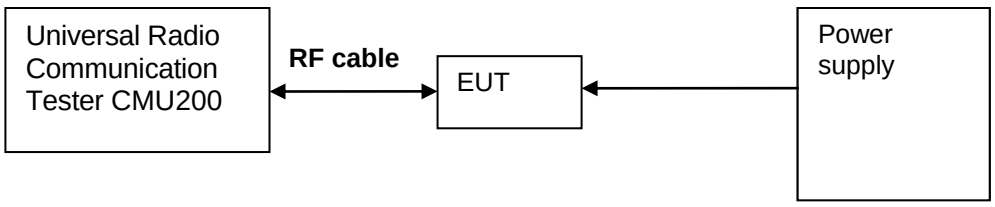


Figure 3.Test Set-up

6.3.4 Measurement Results

Table 22 Measurement Results

		Modulation Characteristic	
TEST CONDITIONS		Channel Middle	
		Measured	
		TM1	TM2
T_{nom} (25 °C)	V_{nom} (3.7V)	Refer to Appendix A	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 23 Test Conditions

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

6.4.2 Test Specifications and Limits

6.4.2.1 Specification

CFR 47 (FCC) part 2.1049 and part 22 subpart H.

6.4.2.2 Supporting Standards

Table 24 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.4.2.3 Limits

No specific occupied bandwidth requirement in part 22 subpart H, 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 25 Limits

Upper /lower frequency limits	0.5% of the mean power

6.4.3 Test Method and Setup

Mobile Phone was connected to the wireless signal analyzer R&S FSQ31 via the one RF connector. The band class is set as 850M; Mobile Phone was controlled to transmit maximum power. Measure and record the occupied bandwidth of the Mobile Phone by the R&S FSQ31.

The OBW, that is 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 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

Test Set-up

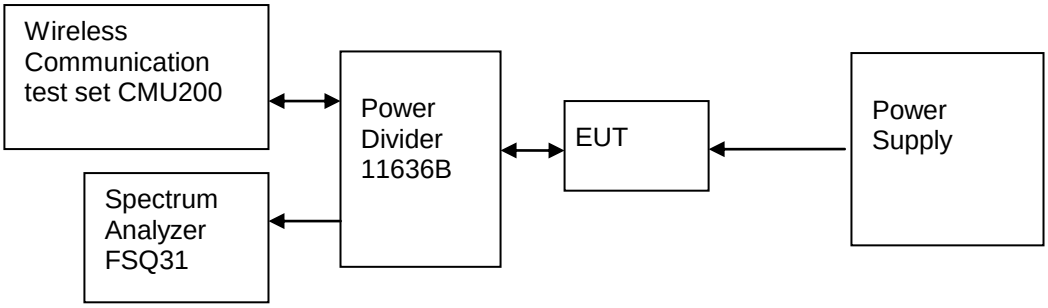


Figure 4.Test Set-up

6.4.4 Measurement Results

Table 26 Measurement Results

TEST CONDITIONS		Occupied Bandwidth					
Center Frequency		Channel128(B) 824.2MHz		Channel192(M) 837.0MHz		Channel251(T) 848.8MHz	
		Measured (kHz)		Measured (kHz)		Measured (kHz)	
		TM1	TM2	TM1	TM2	TM1	TM2
T_{nom} (25 °C) V_{nom} (3.7V)	99%	245.19	241.99	243.59	233.97	243.59	235.58

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 27 Test Conditions

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

6.5.2 Test Specifications and Limits

6.5.2.1 Specification

CFR 47 (FCC) part 2.1051 and Part22 Subpart H

6.5.2.2 Supporting Standards

Table 28 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.5.2.3 Limits

Compliance with part 22.917, all spurious emission must be attenuated below the transmitter power by at least 43 +10 $\log_{10}$ P（W）. (Where as P is the rated power of the EUT).

Table 29 Limits

	TM1	TM2
Rated Power:	33 dBm	27 dBm
Required attenuation:	43+10log (2) = 46 , 33 dBm - 46 dB	43+10log (0.5) = 40 , 27 dBm - 40 dB
Absolute level	- 13 dBm	- 13 dBm

6.5.3 Test Method and Setup

Mobile Phone was connected to the wireless signal analyzer R&S FSQ31 via the one RF connector, the band class is set as 850M. Mobile Phone was controlled to transmit maximum power. Measure and record band edges compliance of the Mobile Phone by the R&S FSQ31.

For TM1/TM2 following RBW and VBW are employed:

Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)
Video bandwidth (VBW): 10 kHz

Test Set-up

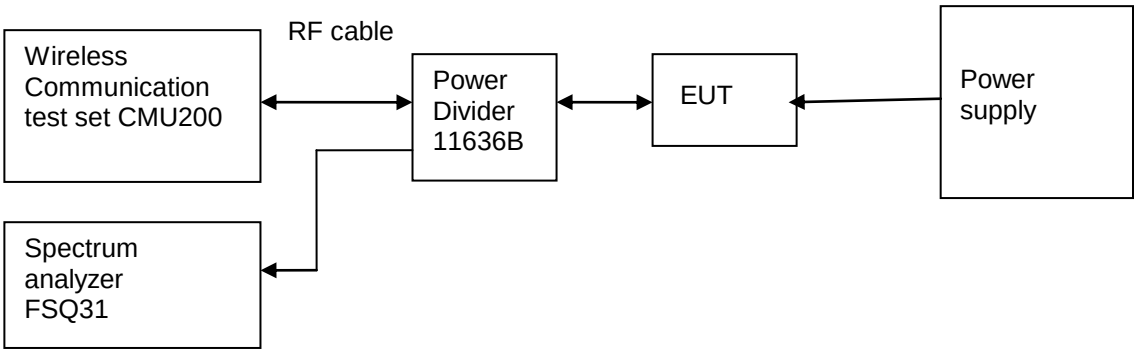


Figure 5. Test Set-up

6.5.4 Measurement Results

Table 30 Measurement Results outside Band Edges-- Single Carrier

Band	Frequency of Band edges [MHz]	Channel Number	Test Mode	Spurious Level measured [dBm]	FCC limit	Result
Cellular	T_{nom} (25 °C), V_{nom} (3.7V)					
	824.2	128	TM1	<-13(See appendix C)	- 13 dBm	Pass
	848.8	251	TM1	<-13(See appendix C)	- 13 dBm	Pass
	824.2	128	TM2	<-13(See appendix C)	- 13 dBm	Pass
	848.8	251	TM2	<-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 31 Test Conditions

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

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and Part22 Subpart H

6.6.2.2 Supporting Standards

Table 32 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.6.2.3 Limits

Compliance with part 22.917, 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 33 Limits

	TM1	TM2
Rated Power:	33dBm	27 dBm
Required attenuation:	43+10log (2) = 46 , 33 dBm - 46 dB	43+10log (0.5) = 40 , 27 dBm - 40 dB
Absolute level	- 13 dBm	- 13 dBm

6.6.3 Test Method and Setup

Mobile Phone was connected to the wireless signal analyzer R&S FSQ31 via the one RF connector, the band class is set as 850M. Mobile Phone was controlled to transmit maximum power. Measure and record the Conducted Spurious Emission of the Mobile Phone by the R&S FSQ31.

According to part 22.917, the defined measurement bandwidth as following:

22.917 (b) Measurement procedure: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 KHz: 1 kHz;
Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz;
Measurement bandwidth (RBW) for 30 MHz up to 1 GHz: 100 kHz;
Measurement bandwidth (RBW) for 1 GHz up to 12.75 GHz: 1 MHz;

Test Set-up

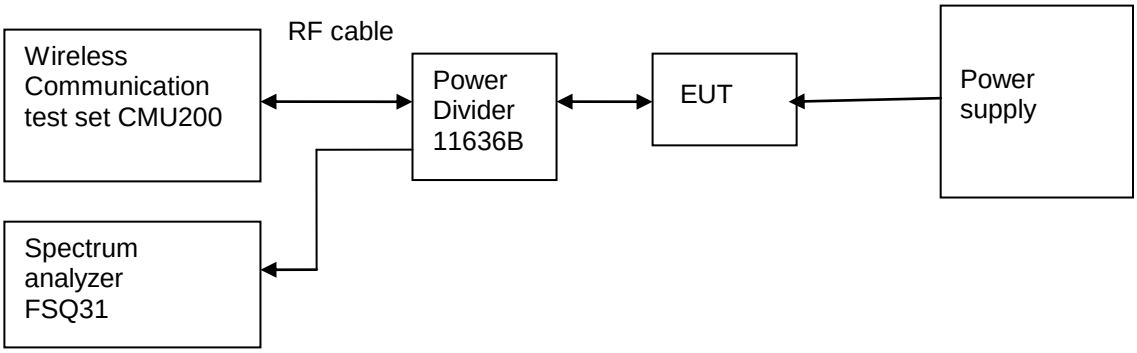


Figure 6. Test Set-up

6.6.4 Measurement Results

Table 34 Measurement Results

Channel Number	Test Mode	Test Range (Frequency)	Output Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
Channel 128(B)	TM1	9 kHz ~12.75GHz	33	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	TM2	9 kHz ~12.75GHz	27	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 192(M)	TM1	9 kHz ~12.75GHz	33	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	TM2	9 kHz ~12.75GHz	27	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 251(T)	TM1	9 kHz ~12.75GHz	33	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	TM2	9 kHz ~12.75GHz	27	<- 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 Emissions

6.7.1 Test Conditions

Test Conditions

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

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 2.1053 and part 22.917

6.7.2.2 Supporting Standards

Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.7.2.3 Limits

Compliance with part 22.917, 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).

Limits

Rated Power:	24 dBm
Required attenuation:	43+10log (0.25) = 37 , 24 dBm – 37 dB
Absolute level	- 13 dBm

6.7.3 Test Method and Setup

A test site fulfilling the requirements of ITU-R Recommendation SM329-11 was used. The EUT was placed on a non-conducting support in the anechoic chamber and was operated from a power source via an RF filter to avoid radiation from the power leads.

According to part 22.917, the defined measurement bandwidth as following:

22.917 (b) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

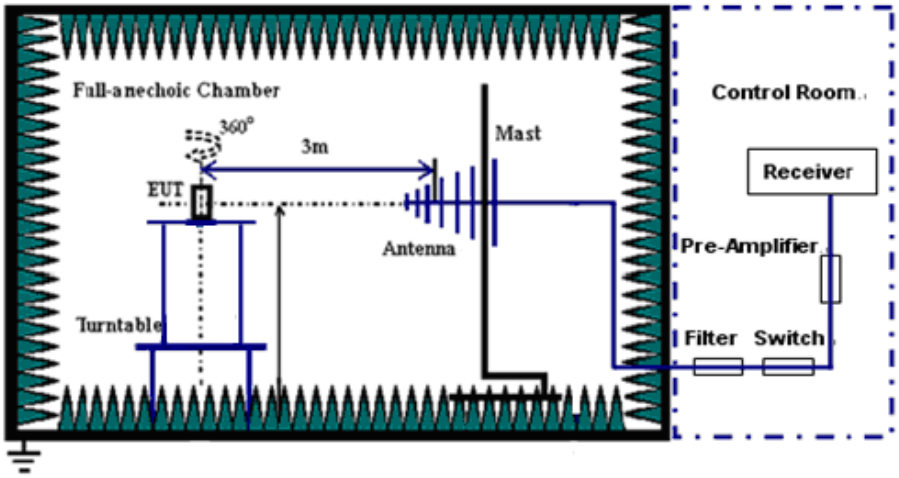
Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;
Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz;

Measurement bandwidth (RBW) for 30MHz up to 1GHz: 100k Hz;
Measurement bandwidth (RBW) for 1GHz up to 18GHz: 1MHz;

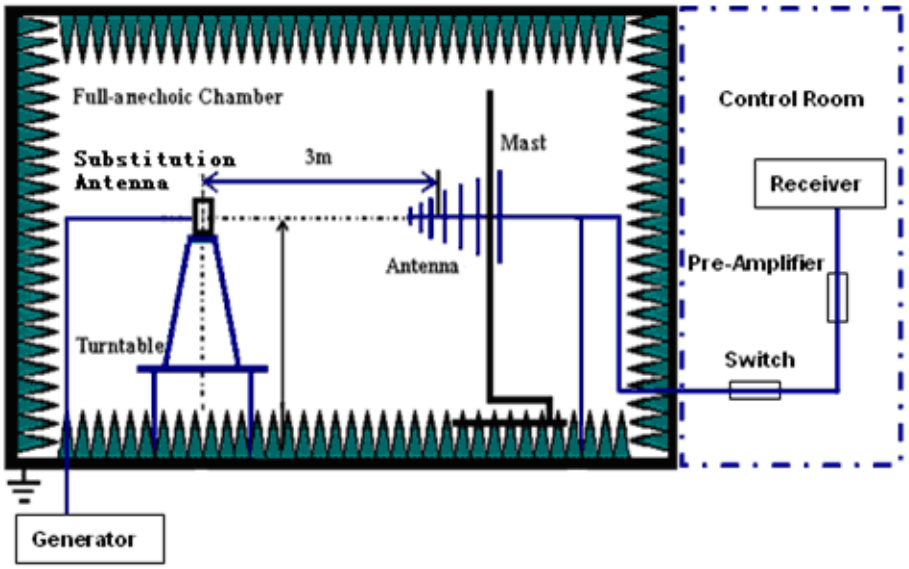
Test Set-up

Step 1:
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 EUT to the BTS simulator via the air interface.

Test the Radiated maximum output power by the Test Receiver from test antenna.



Step 2:
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 step1 on Test Receiver, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.



Test should be performed in normal voltage condition.

No peak found in pre- test. All frequency points' margin is bigger than 20dB, so the substitution method isn't used.
Calculation Sample:

Substitution Results

Freq. [MHz]	Measurement Value [dBm]	Substitution Antenna Type	Gain [dBd]	Cable Loss [dB]	Signal Generator Level [dBm]	Substitution Level [dBm]	FCC limit [dBm]	Result

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

E.R.P. [dBm] = SGP [dBm] - Cable Loss [dB] + Gain [dBd]
NOTE: SGP- Signal Generator Level

6.7.4 Conclusion

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

6.8 Frequency Stability

6.8.1 Test Conditions

Table 35 Test Conditions

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

6.8.2 Test Specifications and Limits

6.8.2.1 Specification

CFR 47 (FCC) part 2.1055 and Part22 Subpart H

6.8.2.2 Supporting Standards

Table 36 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.8.2.3 Limits

According to part 22.355, from 821MHz to 896MHz, for mobile device, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances 2.5ppm.

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 equipment except that specified in subparagraphs
(2) and (3) of paragraph 2.1055

(a) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10^{o} 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.

(b) 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.

(c) 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) 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.)

The EUT can only work in such extreme voltage 3.6V and 4.2V, so here the EUT is tested in the 3.6V and 4.2V.

Test Set up

Connect the Mobile Phone to the Wireless Communication test set CMU200 via the connector. Then measure the frequency error by the Wireless Communication test set CMU200. The EUT's output is matched with a 50 Ω load.

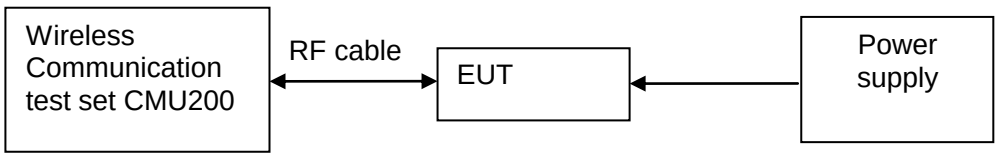


Figure 7. Test Set up

6.8.4 Measurement Results

6.8.4.1 Measurement Results vs. Variation of Temperature

- **TM1, 3.7V DC Channel No.192(837.0MHz)**

Table 37 Measurement Results vs. Variation of Temperature—TM1

Temperature	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	837.0	-15	Pass
-20 °C	837.0	-10	Pass
-10 °C	837.0	-19	Pass
0 °C	837.0	15	Pass
+10 °C	837.0	10	Pass
+20 °C	837.0	-13	Pass
+30 °C	837.0	18	Pass
+40 °C	837.0	7	Pass
+50 °C	837.0	-5	Pass

- **TM2, 3.7V DC Channel No.192(837.0MHz)**

Table 38 Measurement Results vs. Variation of Temperature—TM2

Temperature	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	837.0	-12	Pass
-20 °C	837.0	10	Pass
-10 °C	837.0	-6	Pass
0 °C	837.0	13	Pass
+10 °C	837.0	9	Pass
+20 °C	837.0	14	Pass
+30 °C	837.0	-8	Pass
+40 °C	837.0	-13	Pass
+50 °C	837.0	15	Pass

6.8.4.2 Measurement Results vs. Variation of Voltage

- **TM1, 25 °C ,Channel No. 192(837.0MHz)**

Table 39 Measurement Results vs. Variation of Voltage—TM1

Voltage	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
4.2 V	837.0	-7	Pass
3.7 V	837.0	7	Pass
3.6V	837.0	-10	Pass

- **TM2, 25 °C ,Channel No. 192(837.0MHz)**

Table 40 Measurement Results vs. Variation of Voltage—TM2

Voltage	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
4.2 V	837.0	-10	Pass
3.7V	837.0	9	Pass
3.6 V	837.0	-16	Pass

6.8.5 Conclusion

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

7 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 41 System Measurement Uncertainty

Items		Extended Uncertainty
Effective Radiated Power of Transmitter	ERP (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

8 Appendices

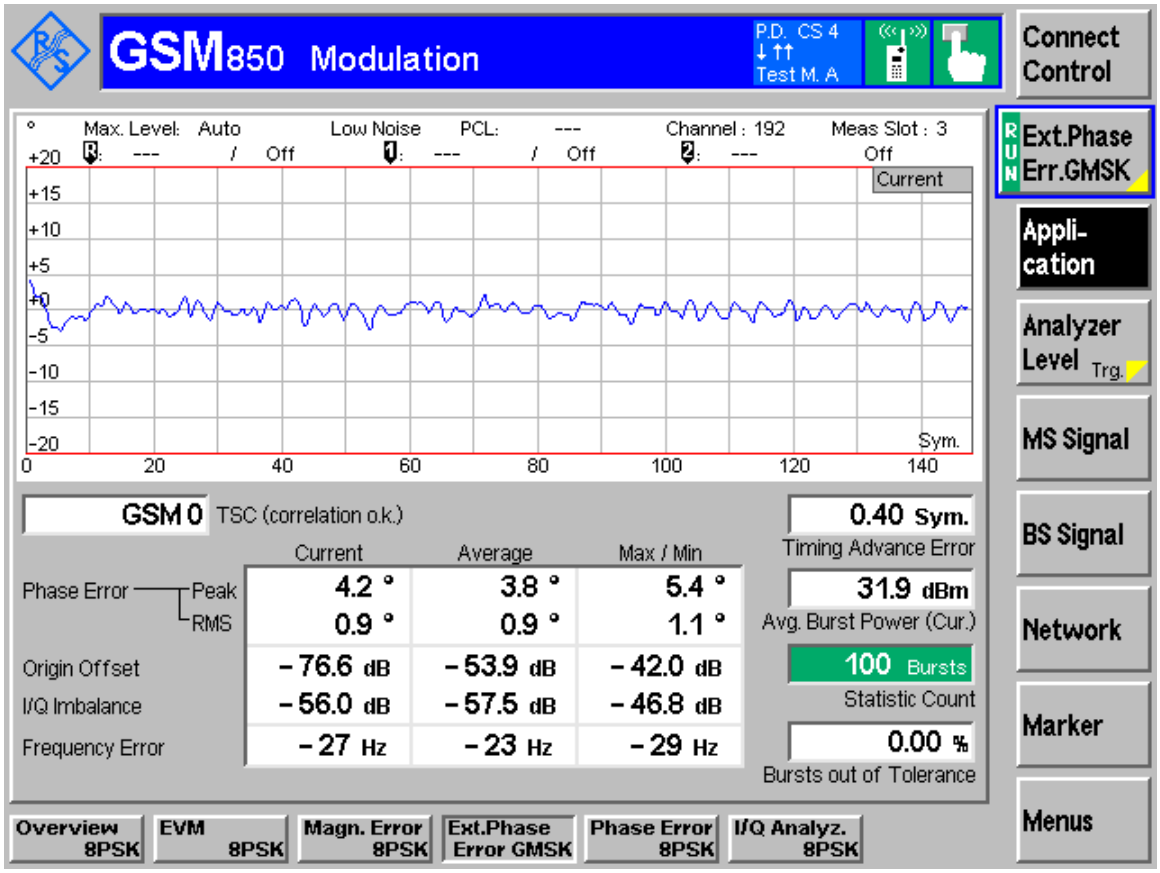
Appendix A	Measurement Results Modulation Characteristics
Appendix B	Measurement Results Occupied Bandwidth
Appendix C	Measurement Results Band Edges
Appendix D	Measurement Results Spurious Emission at Antenna Terminal
Appendix E	Measurement Results Radiated Spurious Emissions
Appendix F	Photos of Radiated Spurious Emissions

Appendix A

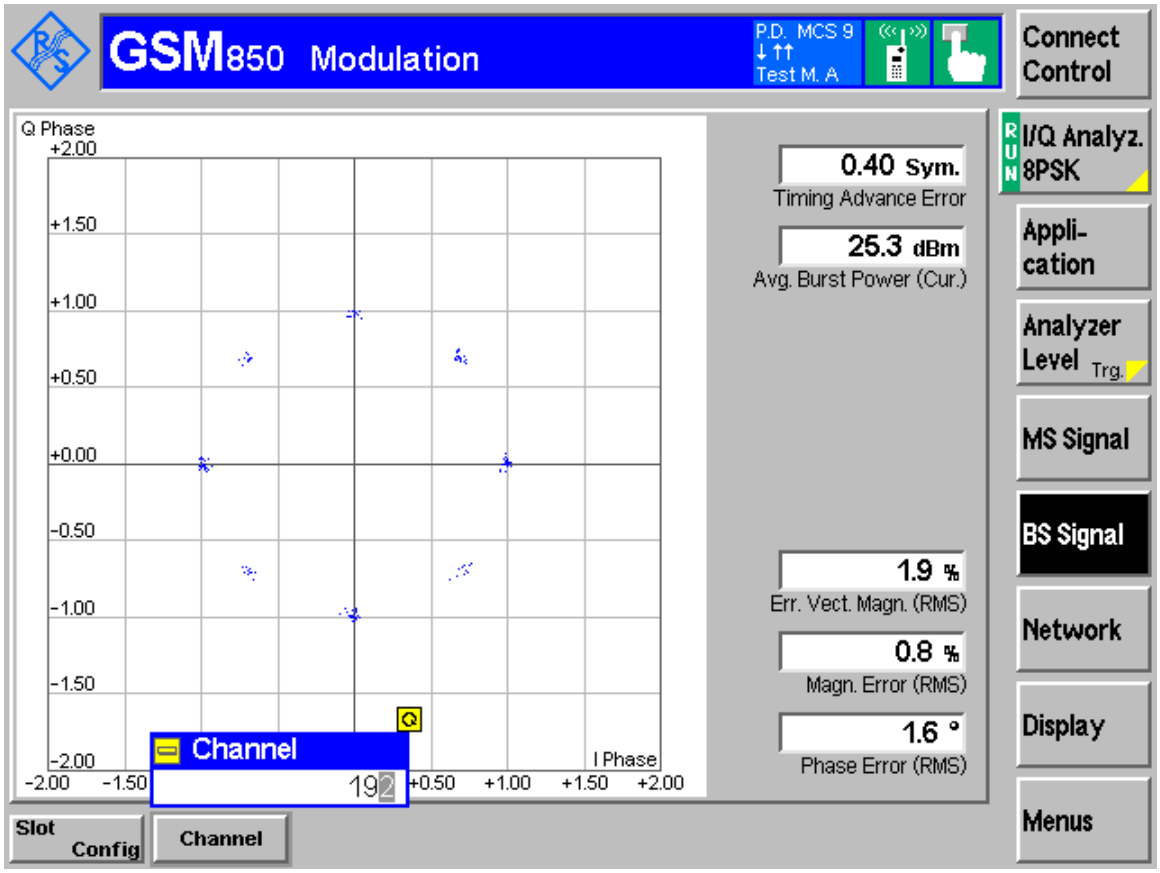
Modulation Characteristics

According to FCC Part 2.1047 & Part22 Subpart H

TM1:GPRS/GSM
Channel 192



TM2:EDGE
Channel 192

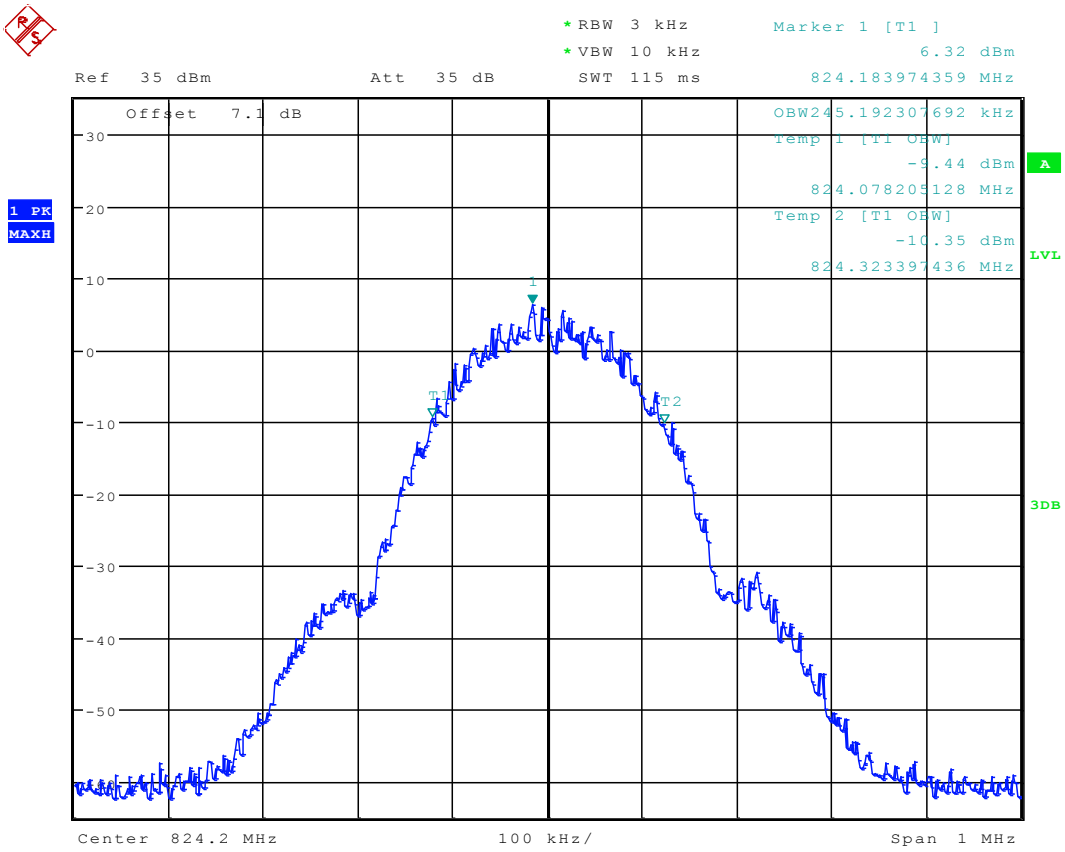


Appendix B

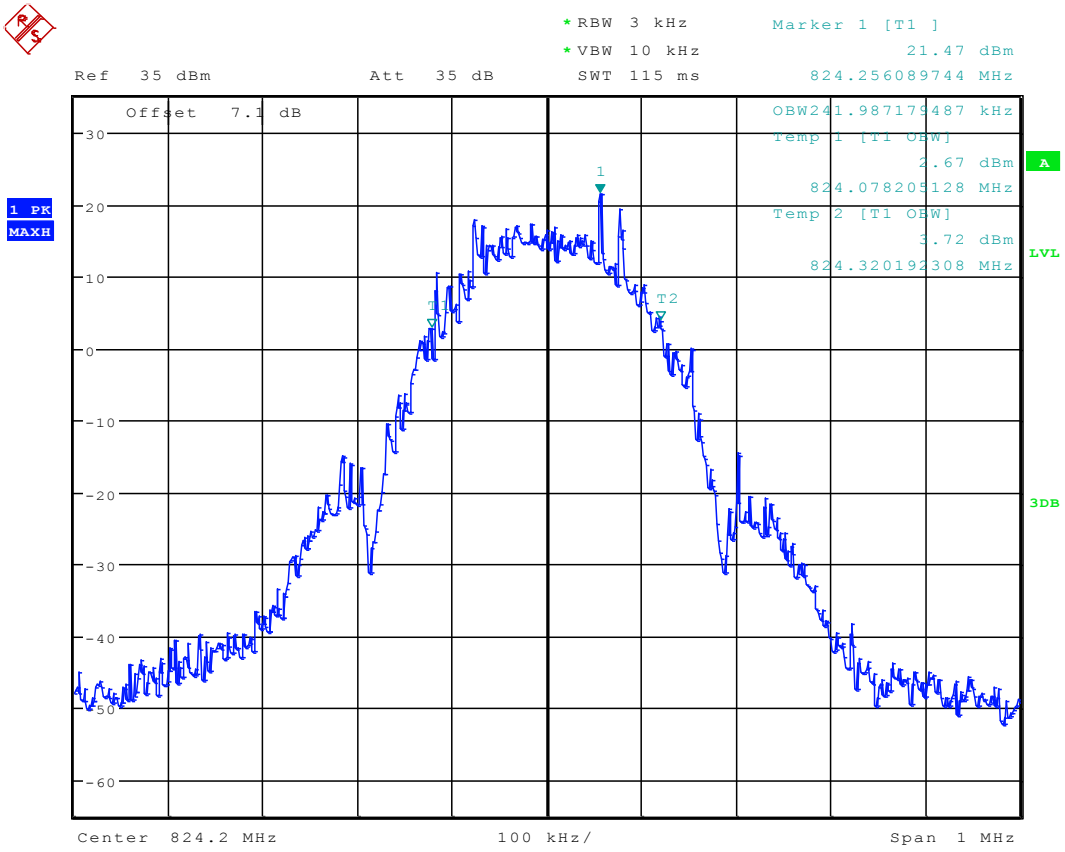
Occupied Bandwidth

According to FCC Part 2.1049 & Part 22 Subpart H

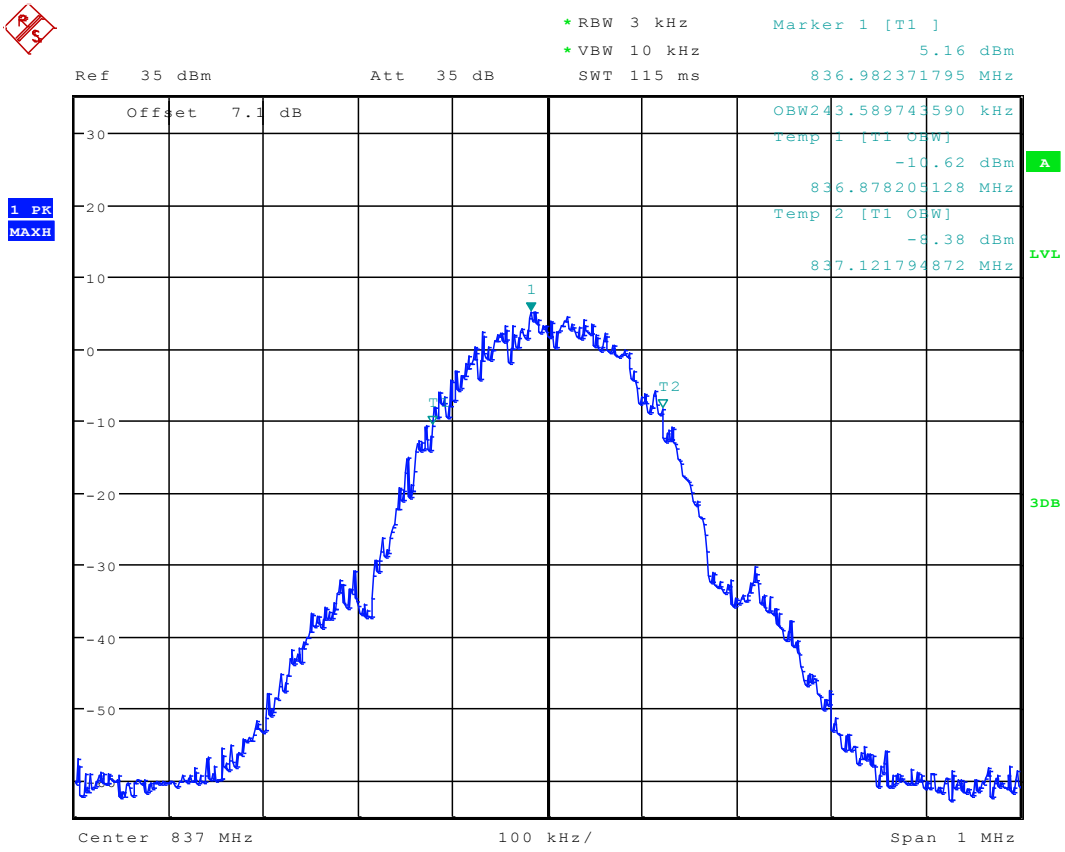
TM1:GPRS/GSM
Channel 128



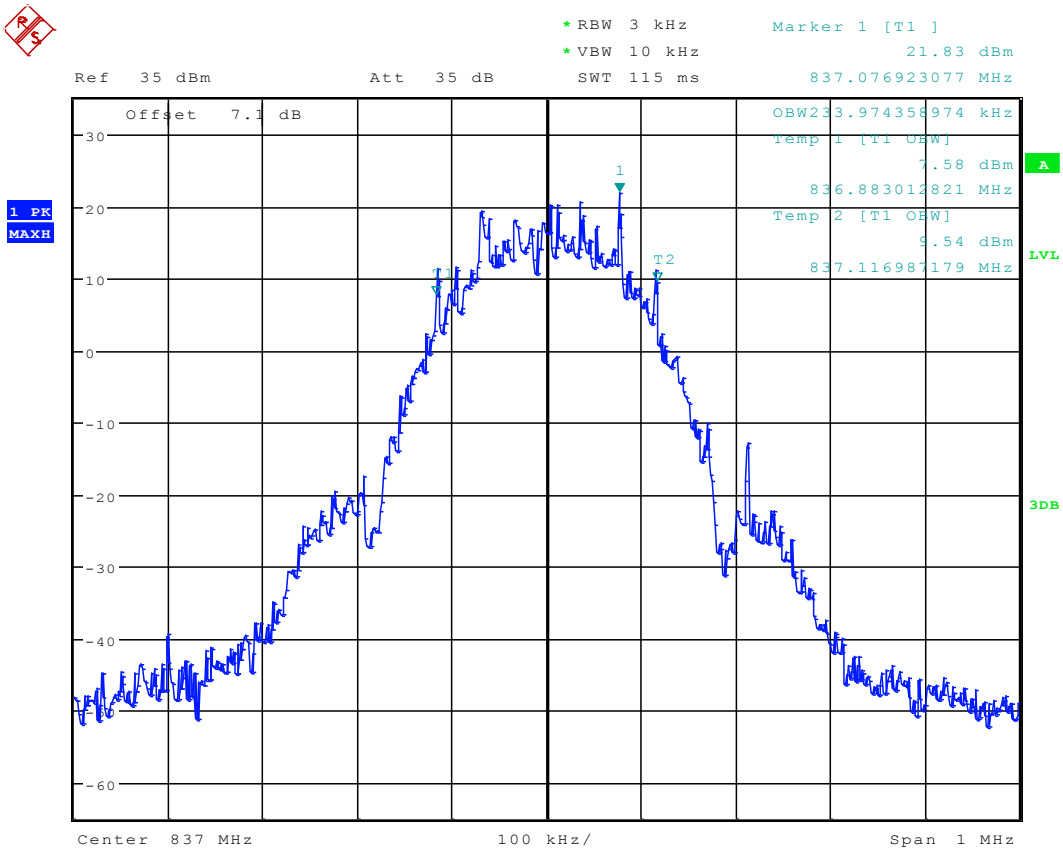
TM2:EDGE
Channel 128



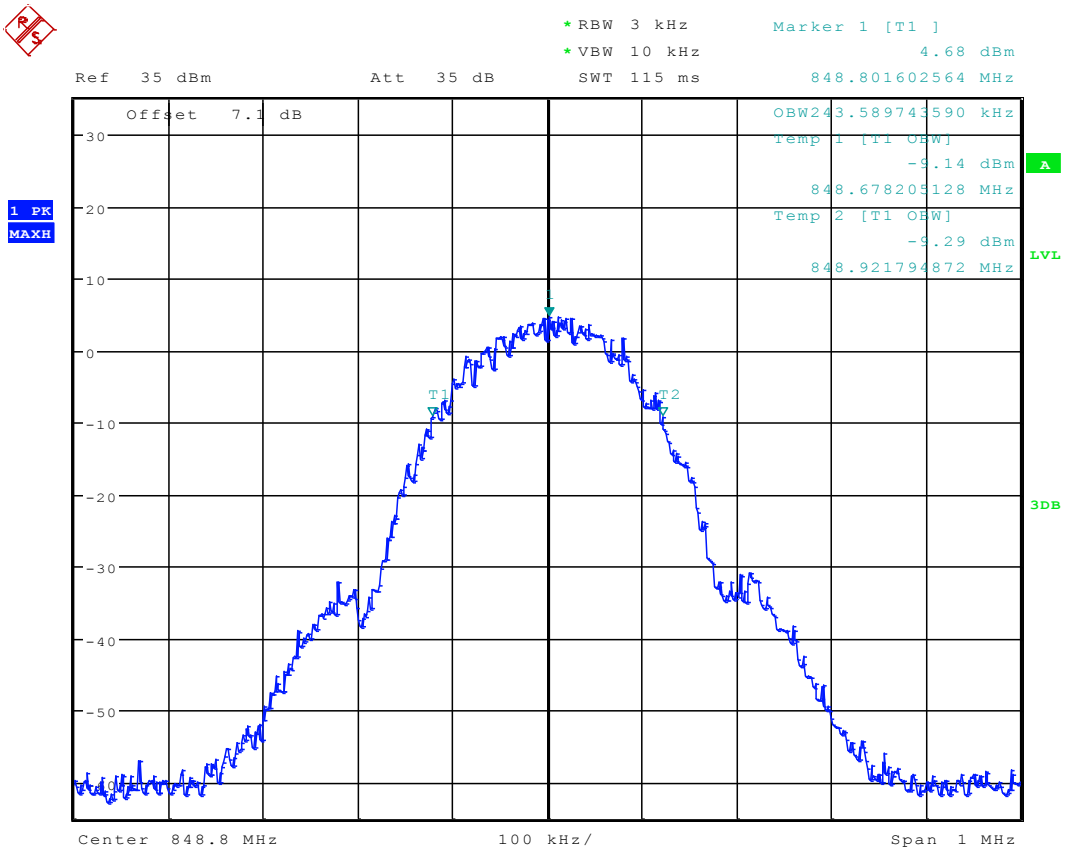
TM1:GPRS/GSM
Channel 192



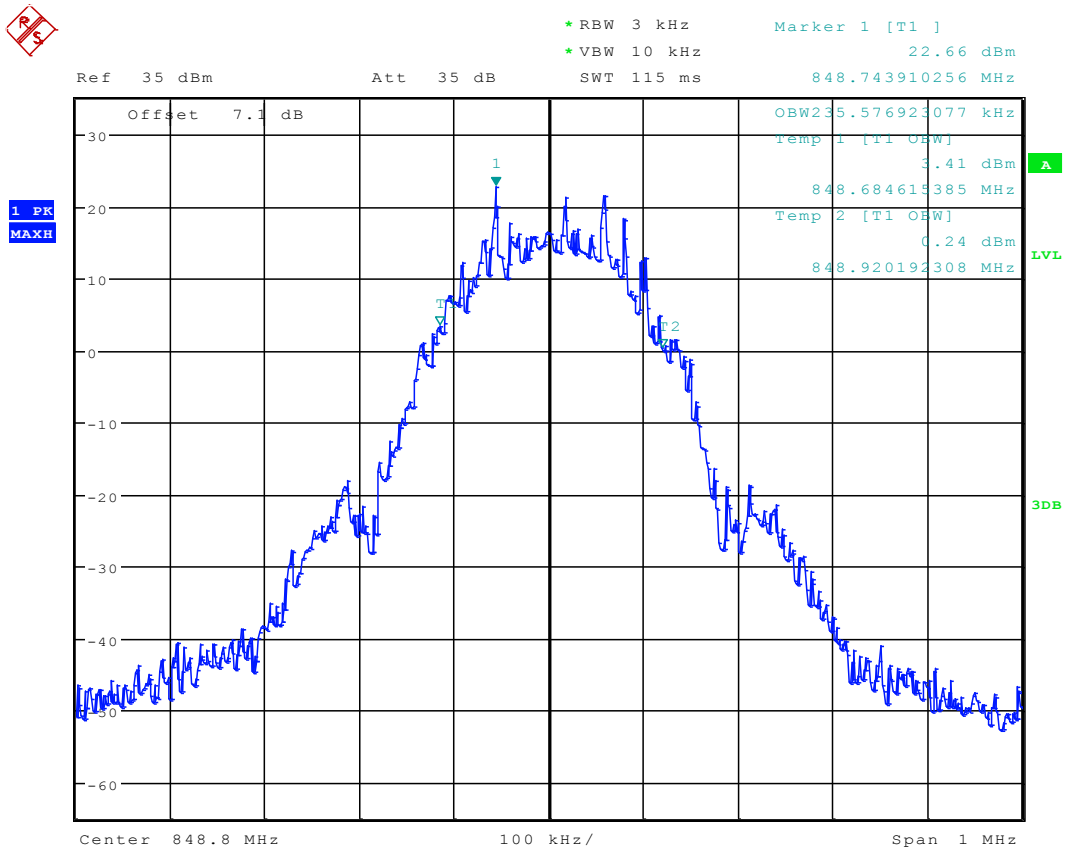
TM2:EDGE
Channel 192



TM1:GPRS/GSM
Channel 251



TM2:EDGE
Channel 251



Appendix C

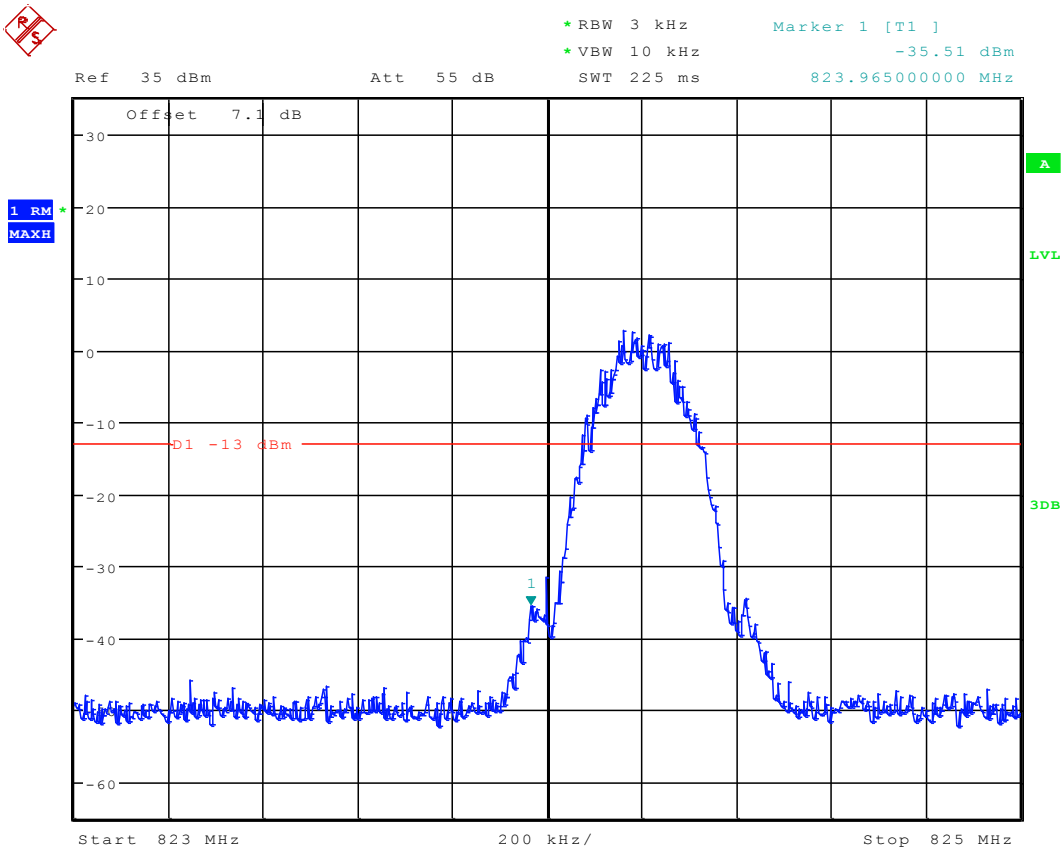
Band Edges Compliance

According to FCC Part 2.1051 & 22.917

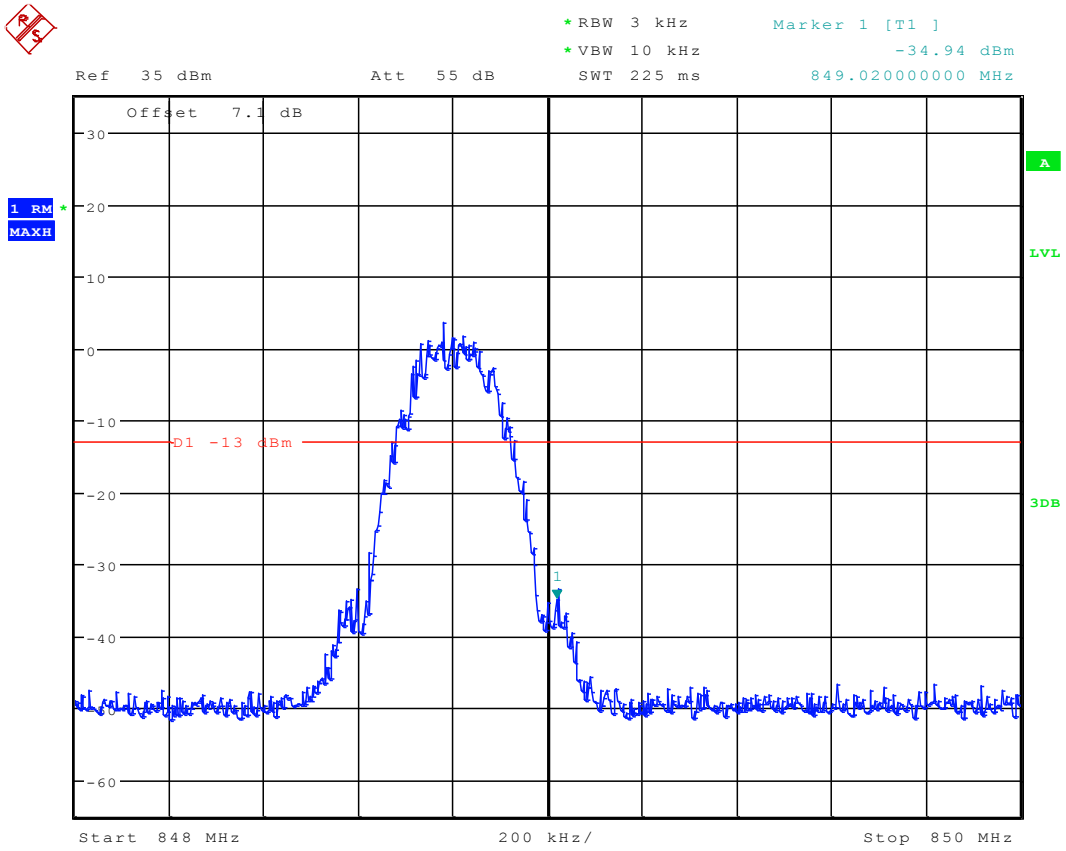
TM1:GPRS/GSM

Left Edge

Channel 128



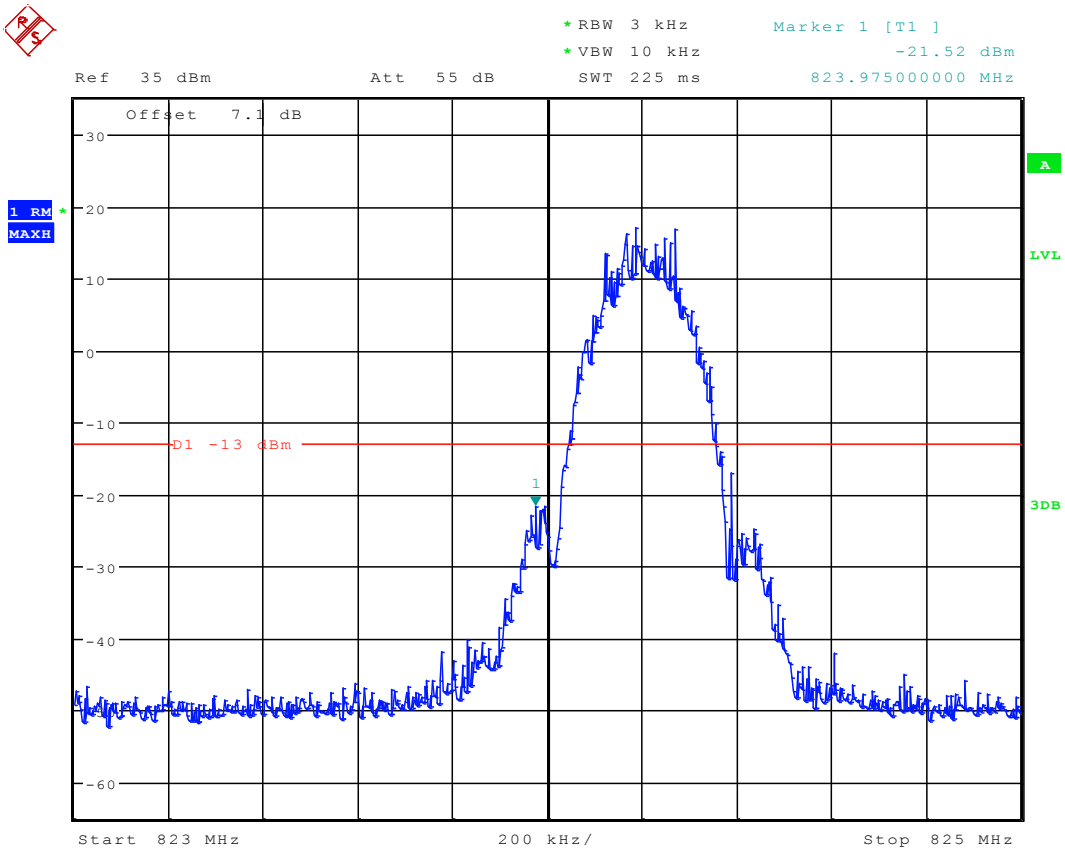
Right Edge
Channel 251



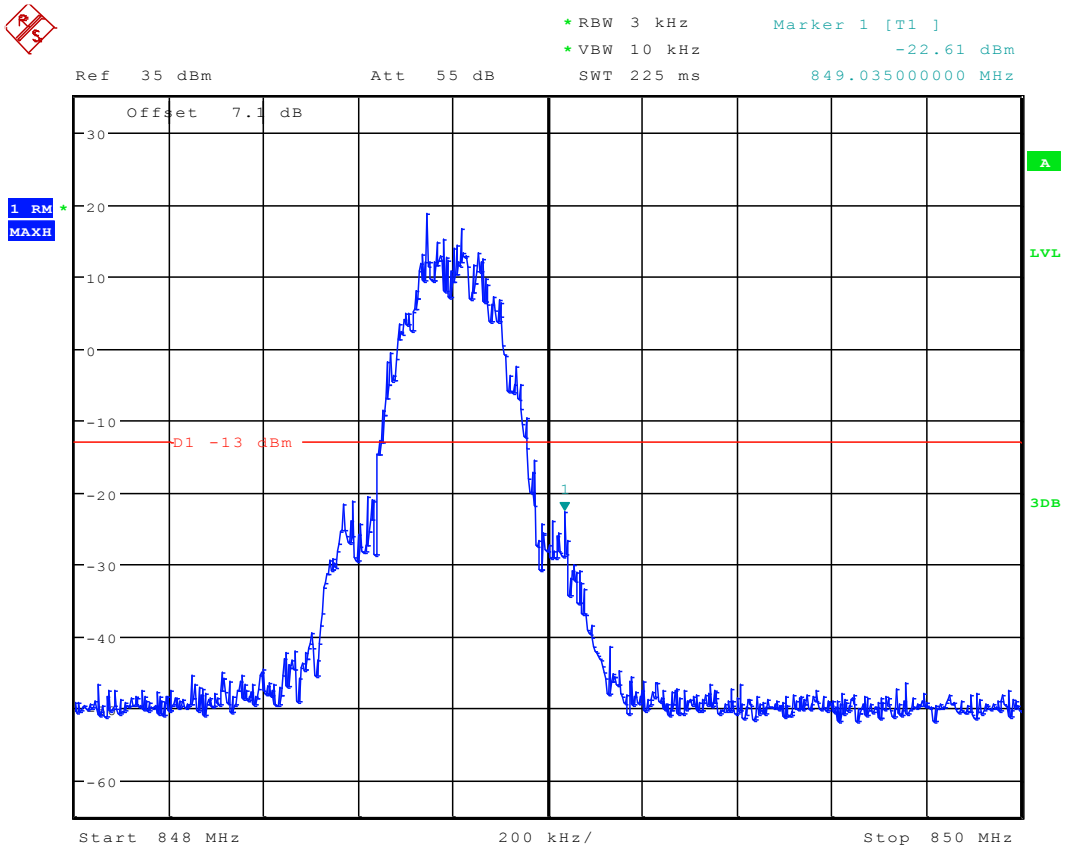
TM2:EDGE

Left Edge

Channel 128



Right Edge
Channel 251



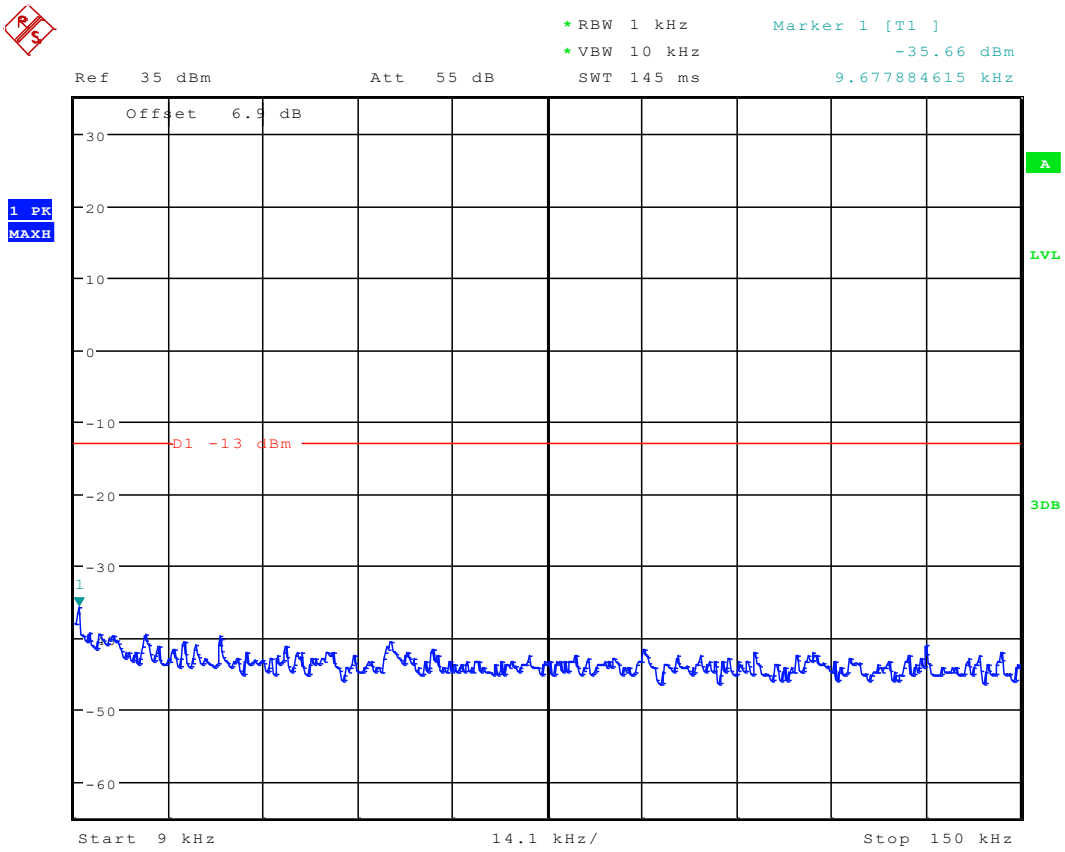
Appendix D

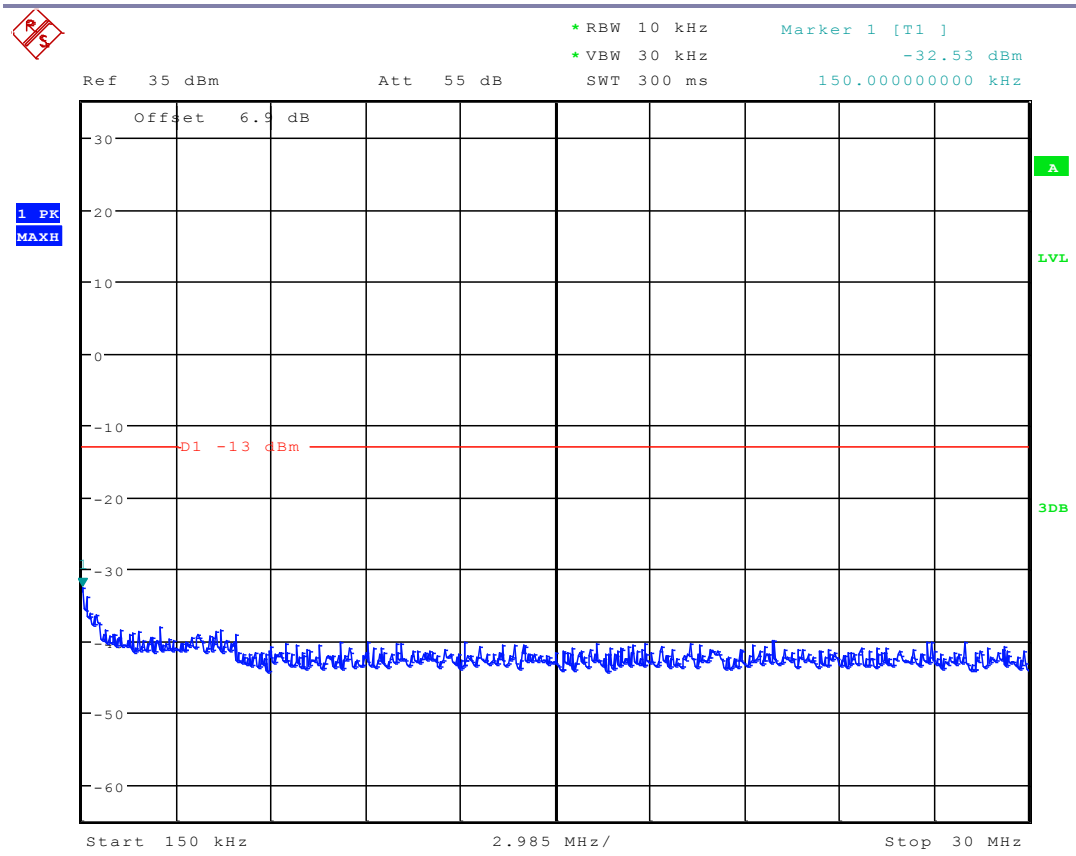
Spurious Emission at Antenna Terminal

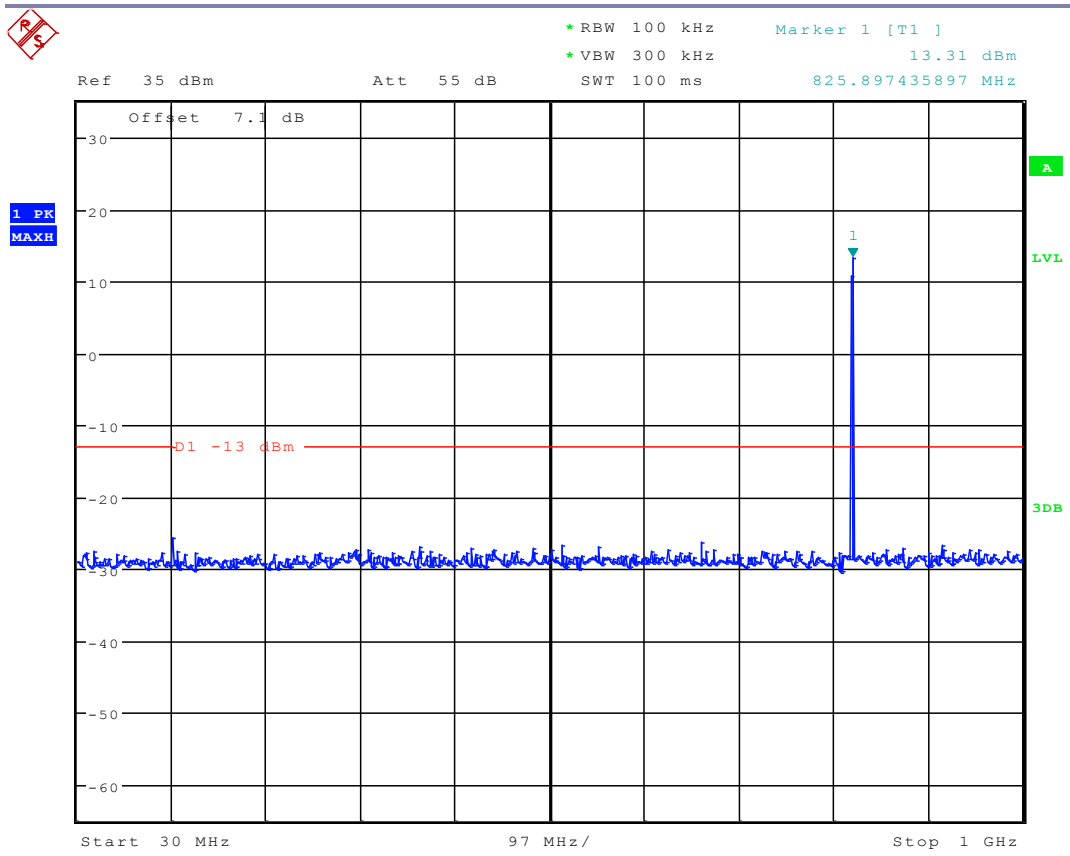
According to FCC Part 2.1051 & 22.917

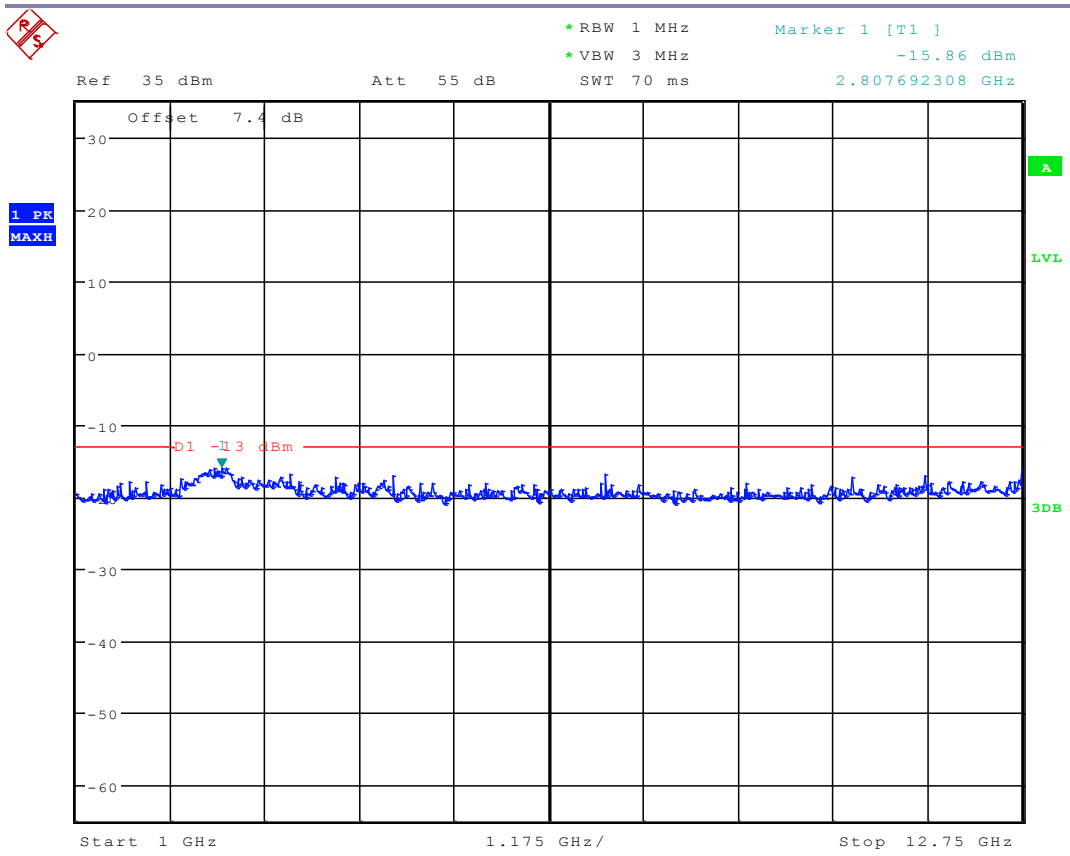
TM1:GPRS/GSM

Channel 128

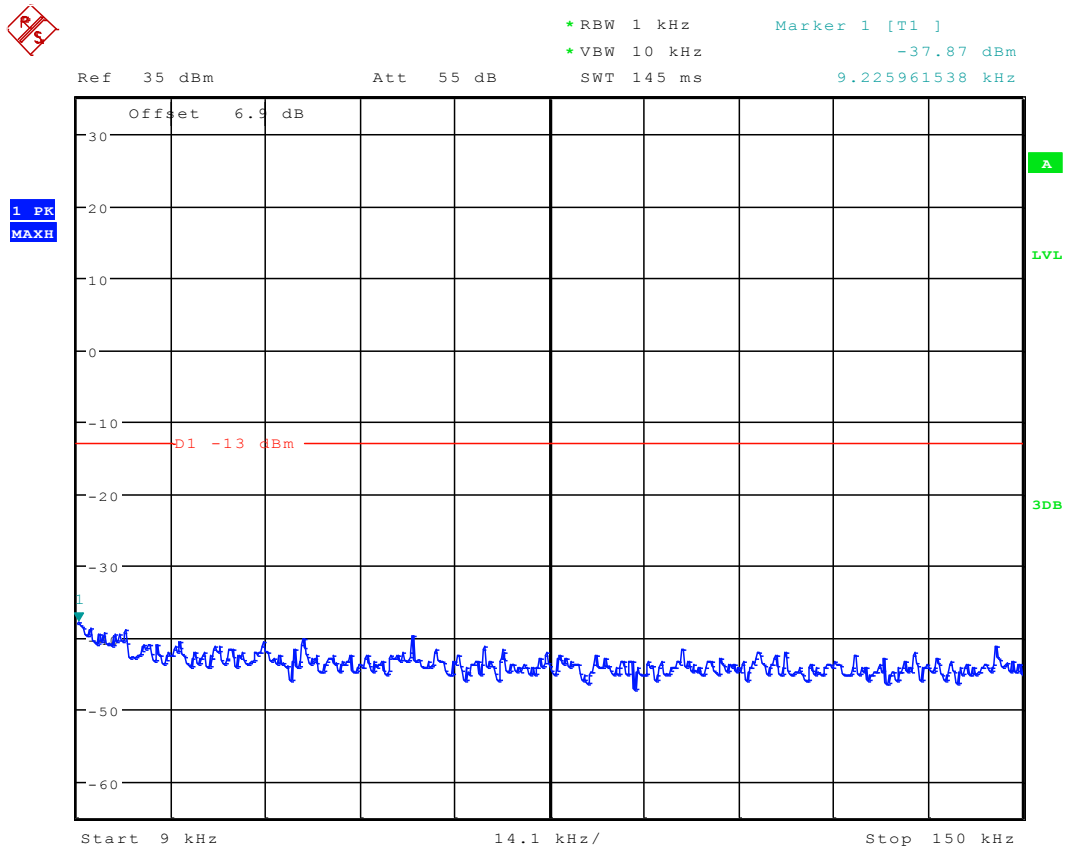


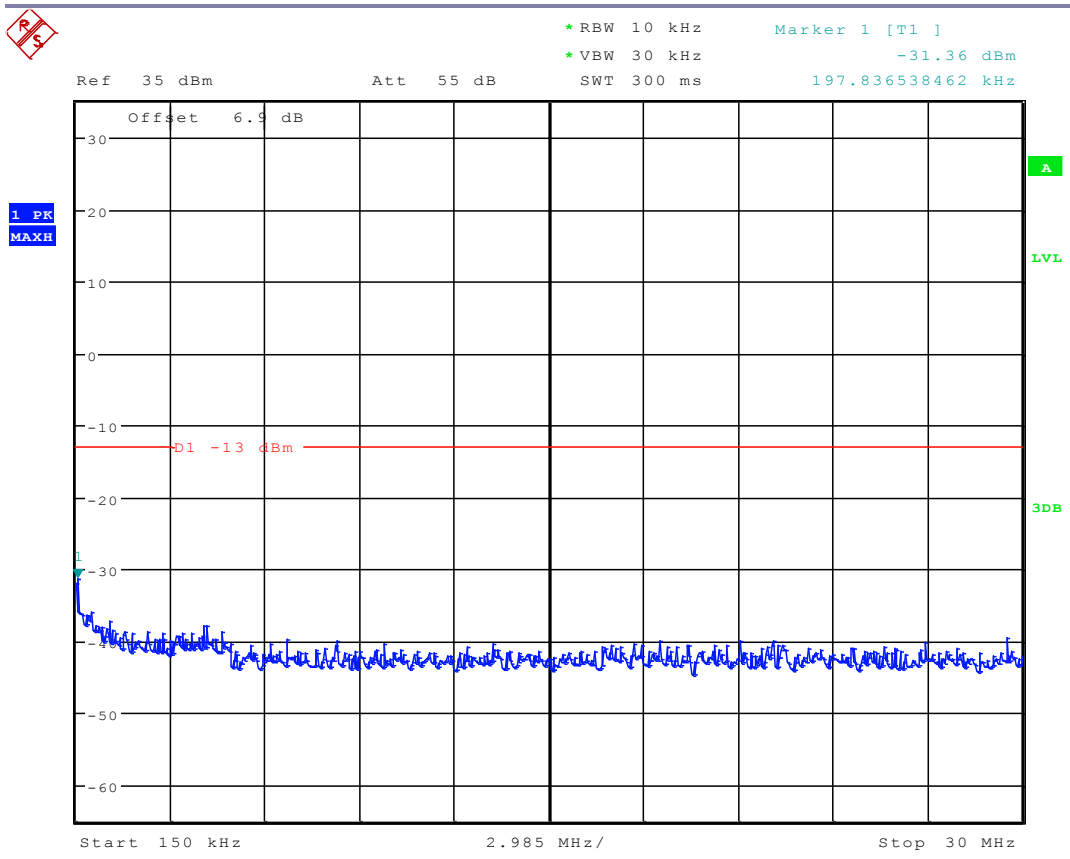

* RBW 10 kHz
* VBW 30 kHz
SWT 300 ms
Marker 1 [T1]
-32.53 dBm
150.000000000 kHz
Ref 35 dBm
Att 55 dB
Offset 6.9 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-50
-60
Start 150 kHz
2.985 MHz/
Stop 30 MHz

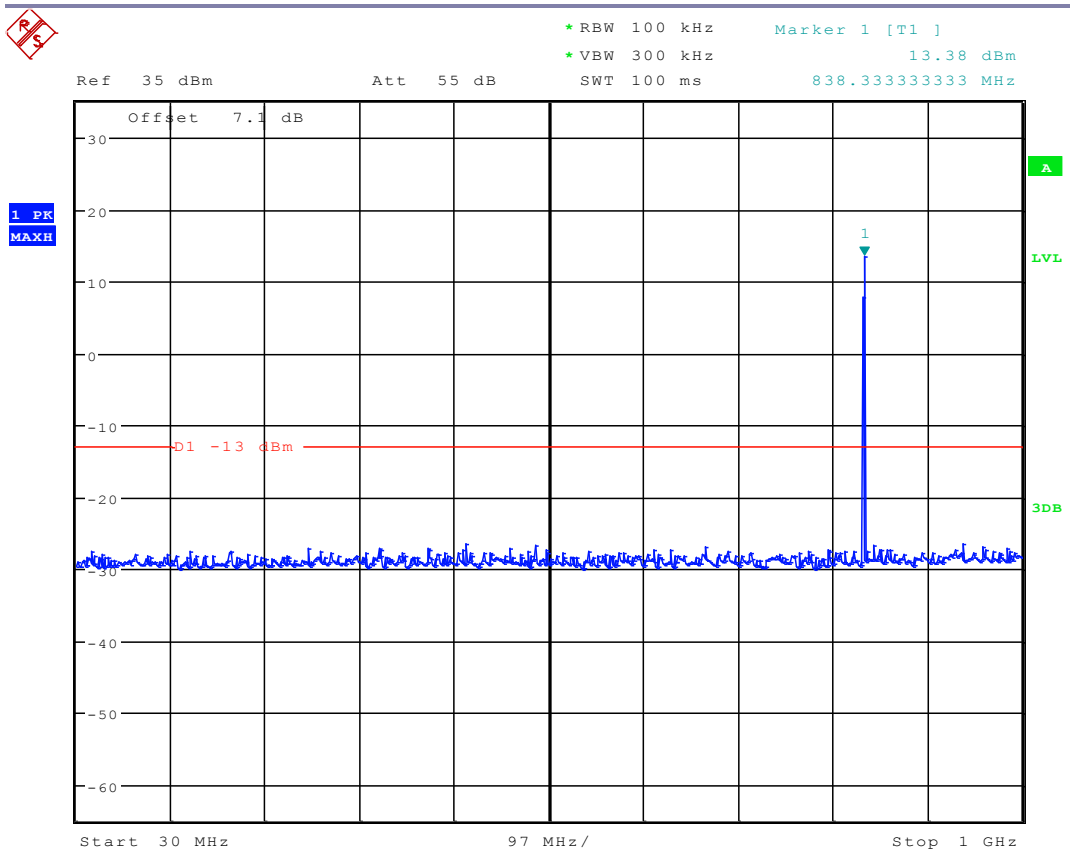

* RBW 100 kHz
* VBW 300 kHz
SWT 100 ms
Marker 1 [T1]
13.31 dBm
825.897435897 MHz
Ref 35 dBm
Att 55 dB
Offset 7.1 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-40
-50
-60
Start 30 MHz
97 MHz/
Stop 1 GHz

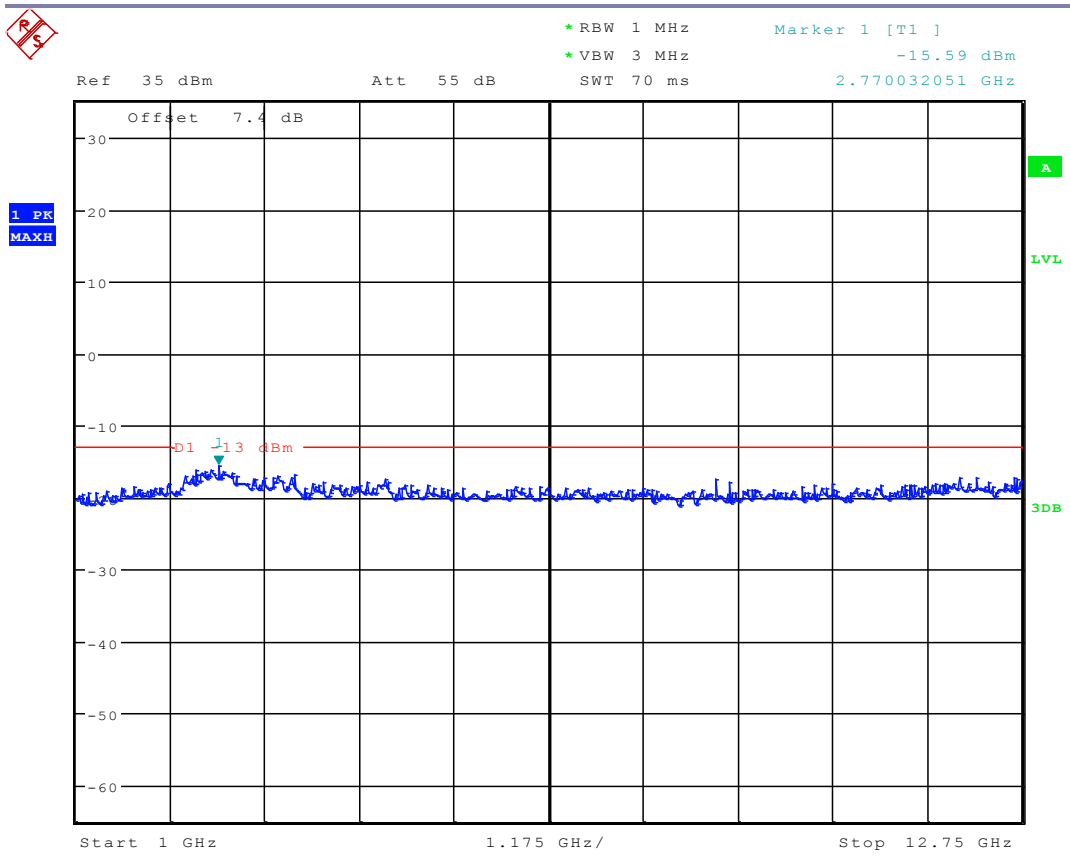

*RBW 1 MHz
*VBW 3 MHz
SWT 70 ms
Marker 1 [T1]
-15.86 dBm
2.807692308 GHz
Ref 35 dBm
Att 55 dB
Offset 7.4 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-30
-40
-50
-60
Start 1 GHz
1.175 GHz/
Stop 12.75 GHz

Channel 192

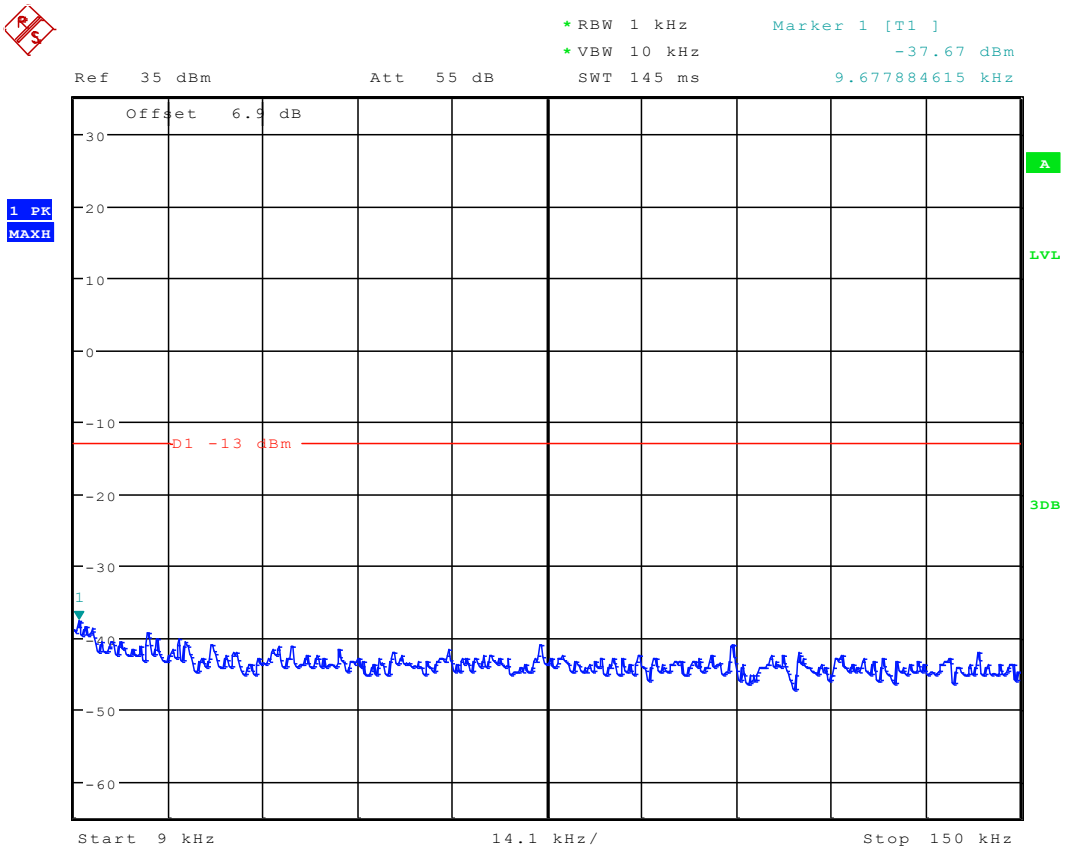

*RBW 1 kHz
*VBW 10 kHz
SWT 145 ms
Marker 1 [T1]
-37.87 dBm
9.225961538 kHz
Ref 35 dBm
Att 55 dB
Offset 6.9 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-50
-60
Start 9 kHz
14.1 kHz/
Stop 150 kHz

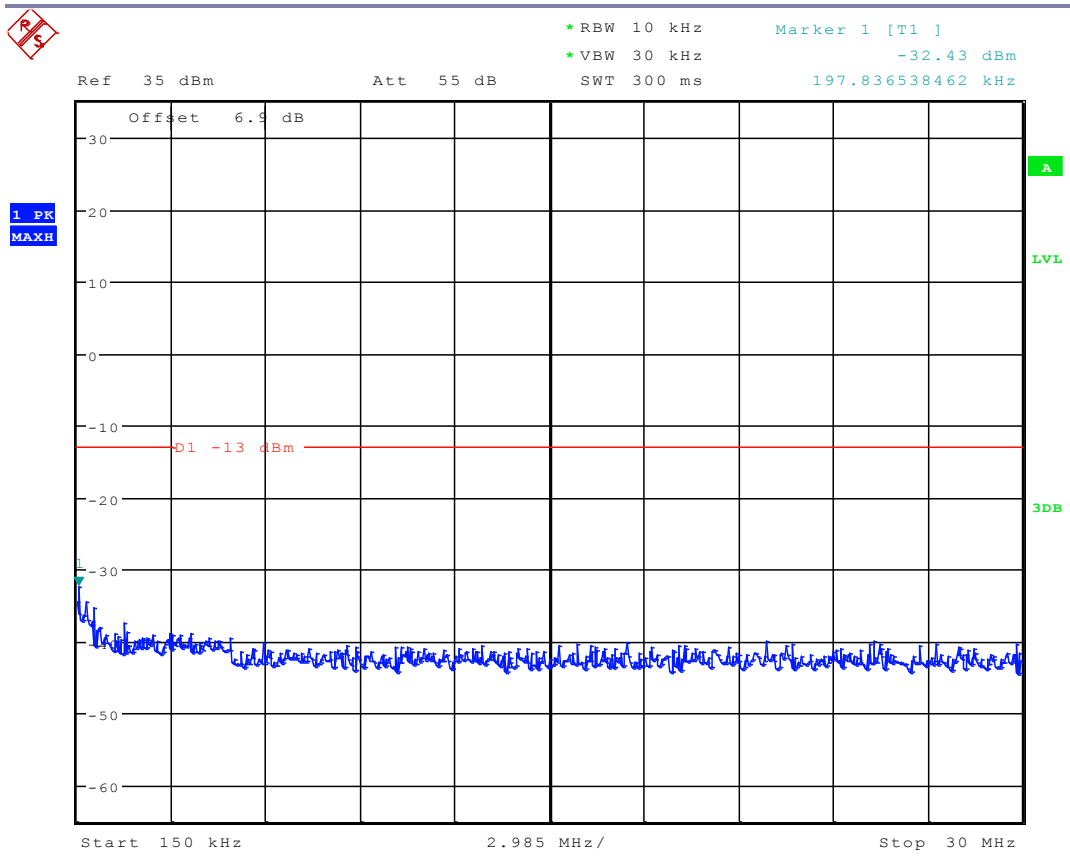

RBW 10 kHz
VBW 30 kHz
SWT 300 ms
Marker 1 [T1]
-31.36 dBm
197.836538462 kHz
Ref 35 dBm
Att 55 dB
Offset 6.9 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-40
-50
-60
Start 150 kHz
2.985 MHz/
Stop 30 MHz

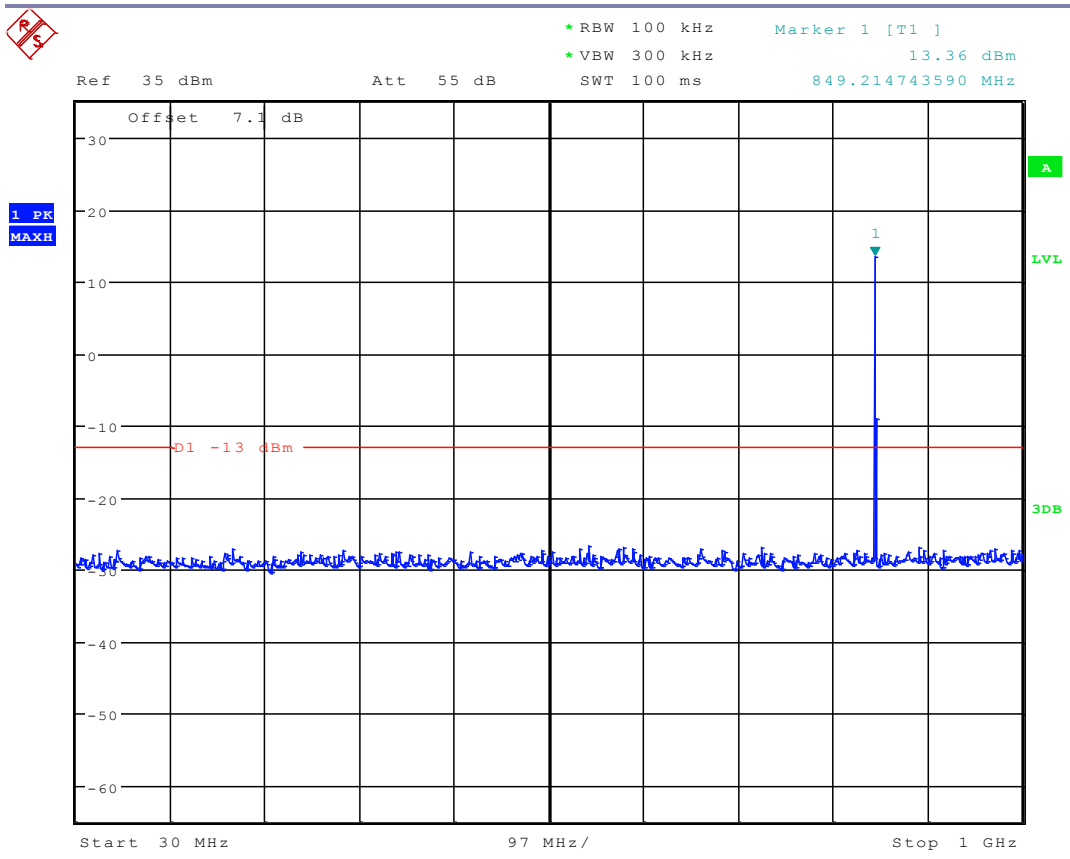

* RBW 100 kHz
* VBW 300 kHz
SWT 100 ms
Marker 1 [T1]
13.38 dBm
838.333333333 MHz
Ref 35 dBm
Att 55 dB
Offset 7.1 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-40
-50
-60
Start 30 MHz
97 MHz/
Stop 1 GHz

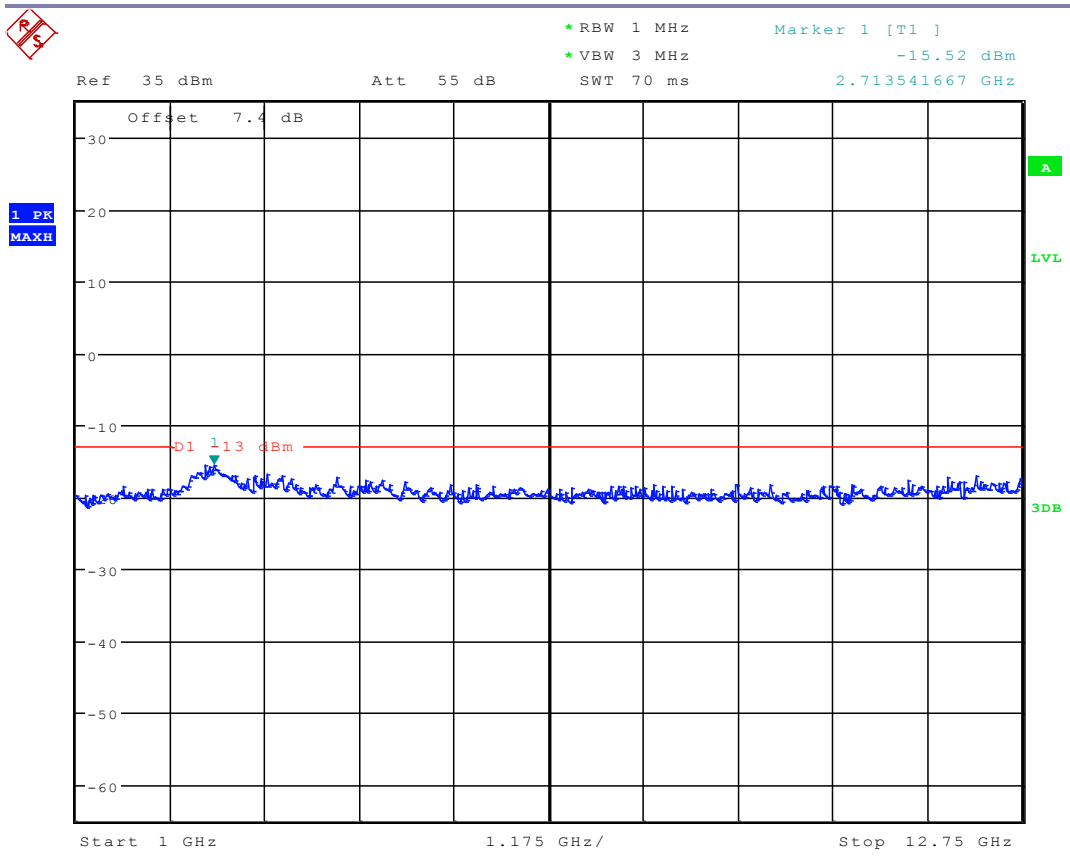

RBW 1 MHz
VBW 3 MHz
SWT 70 ms
Marker 1 [T1]
-15.59 dBm
2.770032051 GHz
Ref 35 dBm
Att 55 dB
Offset 7.4 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-30
-40
-50
-60
Start 1 GHz
1.175 GHz/
Stop 12.75 GHz

Channel 251

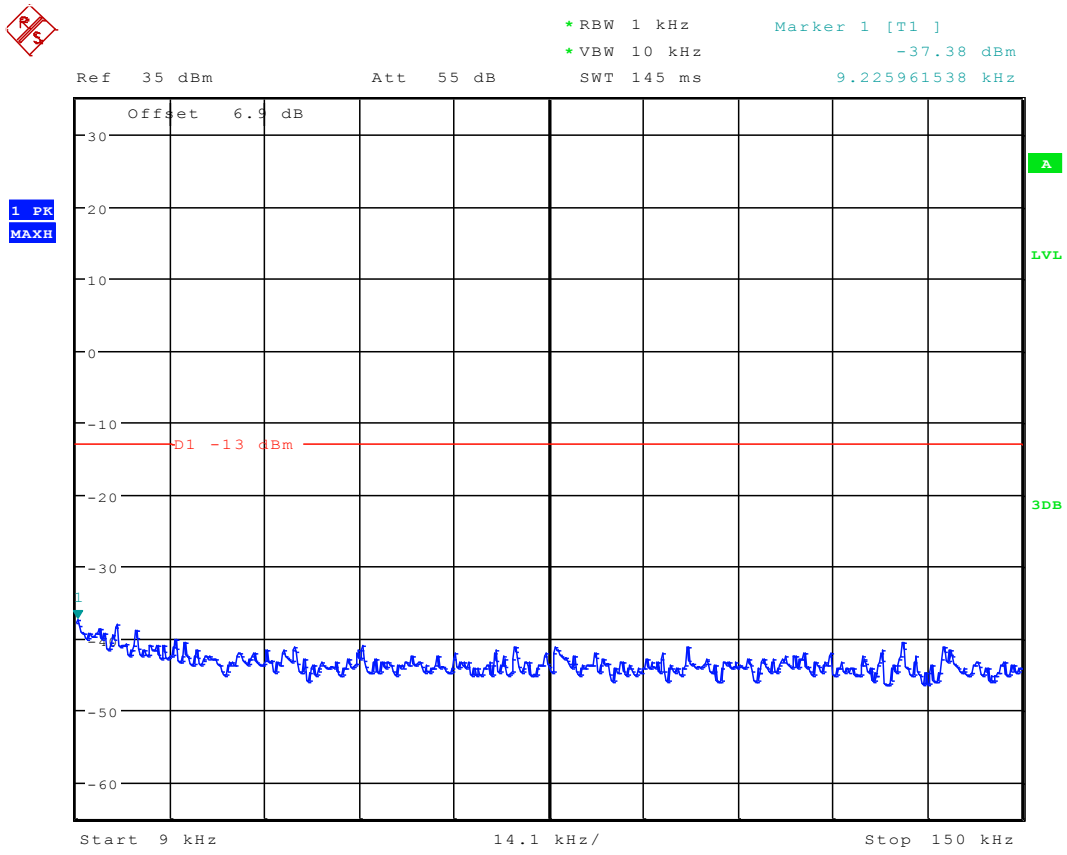

*RBW 1 kHz
*VBW 10 kHz
SWT 145 ms
Marker 1 [T1]
-37.67 dBm
9.677884615 kHz
Ref 35 dBm
Att 55 dB
Offset 6.9 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-40
-50
-60
Start 9 kHz
14.1 kHz/
Stop 150 kHz

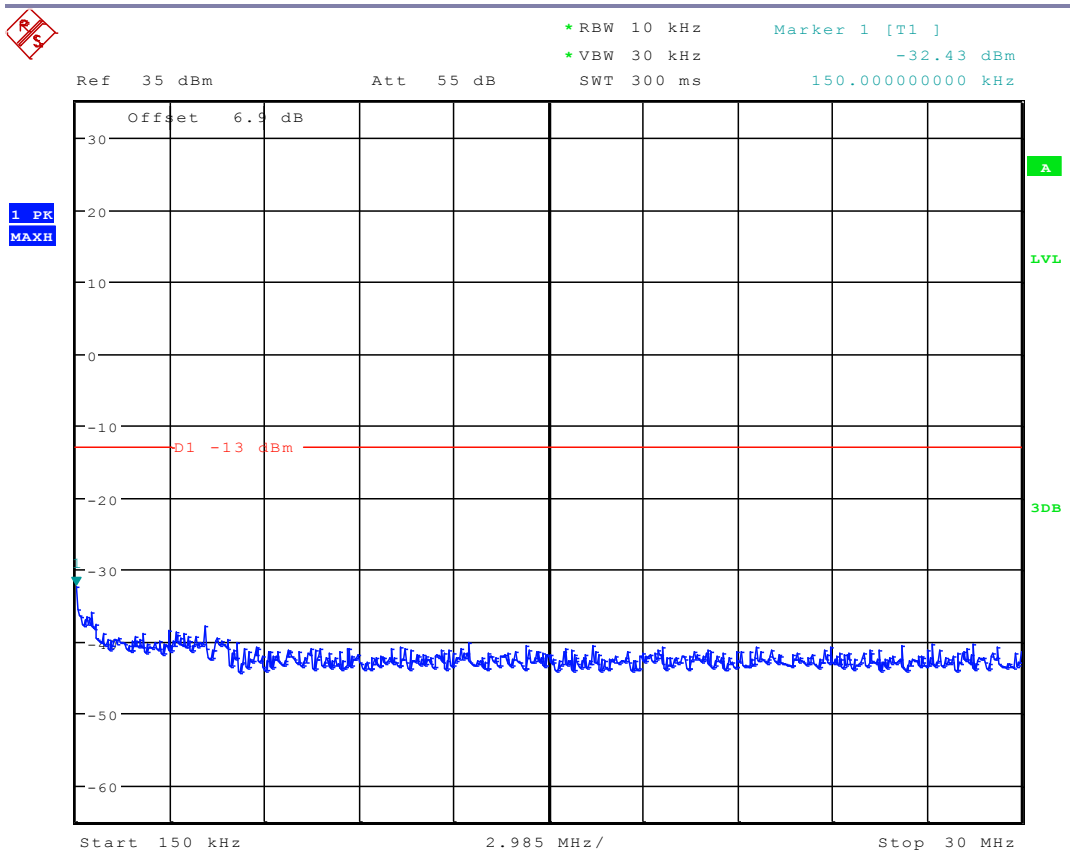

*RBW 10 kHz
*VBW 30 kHz
SWT 300 ms
Marker 1 [T1]
-32.43 dBm
197.836538462 kHz
Ref 35 dBm
Att 55 dB
Offset 6.9 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-50
-60
Start 150 kHz
2.985 MHz/
Stop 30 MHz

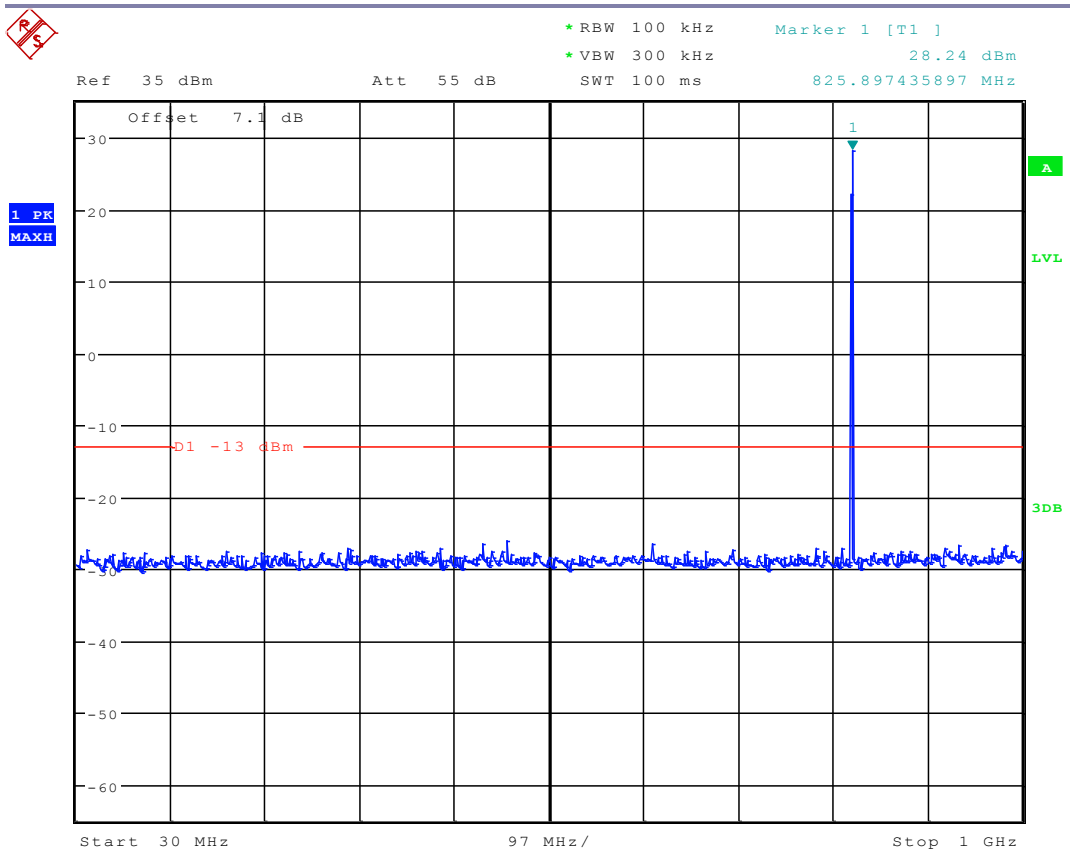

RBW 100 kHz
VBW 300 kHz
SWT 100 ms
Marker 1 [T1]
13.36 dBm
849.214743590 MHz
Ref 35 dBm
Att 55 dB
Offset 7.1 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
Start 30 MHz
97 MHz/
Stop 1 GHz

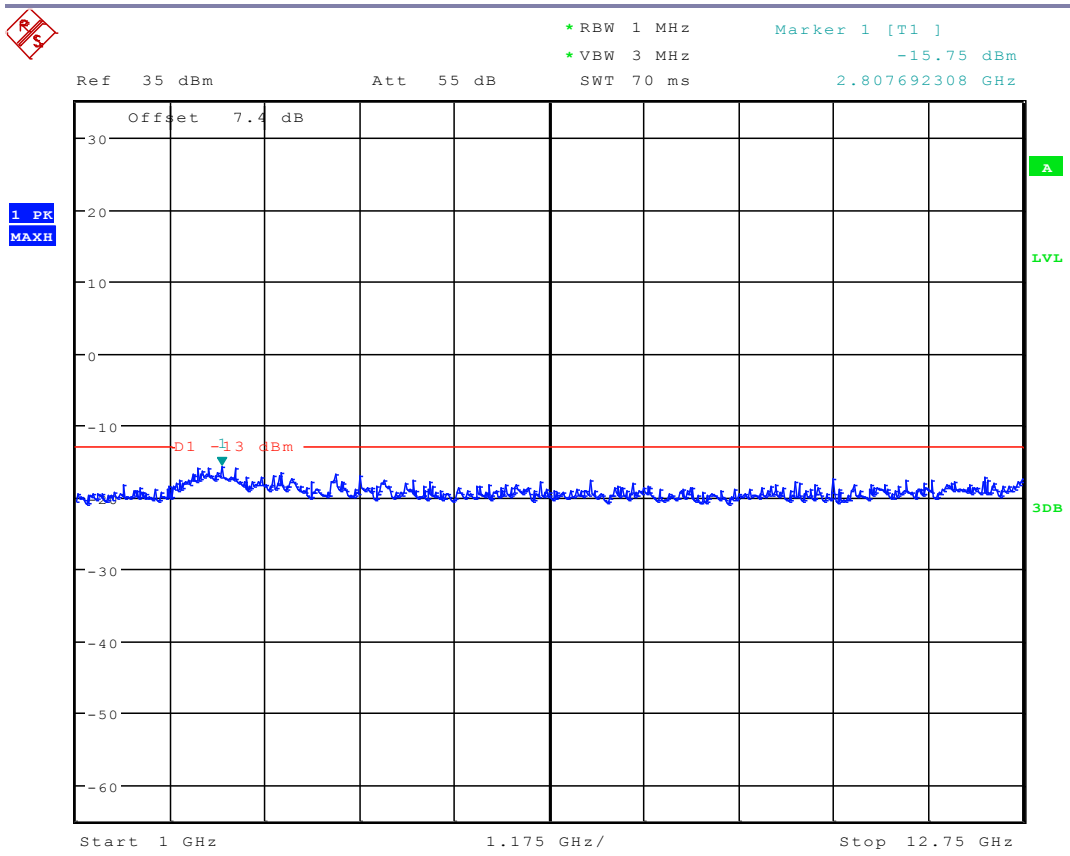

RBW 1 MHz
VBW 3 MHz
SWT 70 ms
Marker 1 [T1]
-15.52 dBm
2.713541667 GHz
Ref 35 dBm
Att 55 dB
Offset 7.4 dB
1 PK
MAXH
A
LVL
3DB
D1 13 dBm
30
20
10
0
-10
-30
-40
-50
-60
Start 1 GHz
1.175 GHz/
Stop 12.75 GHz

TM2:EDGE
Channel 128

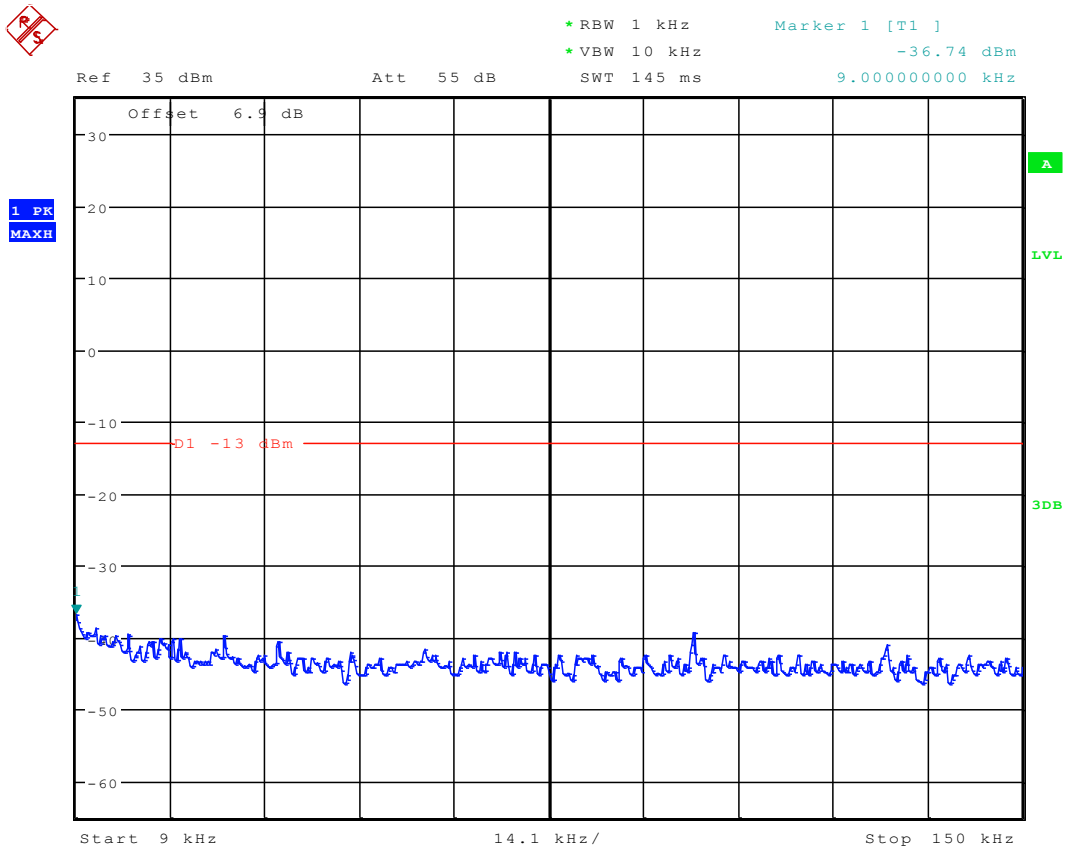


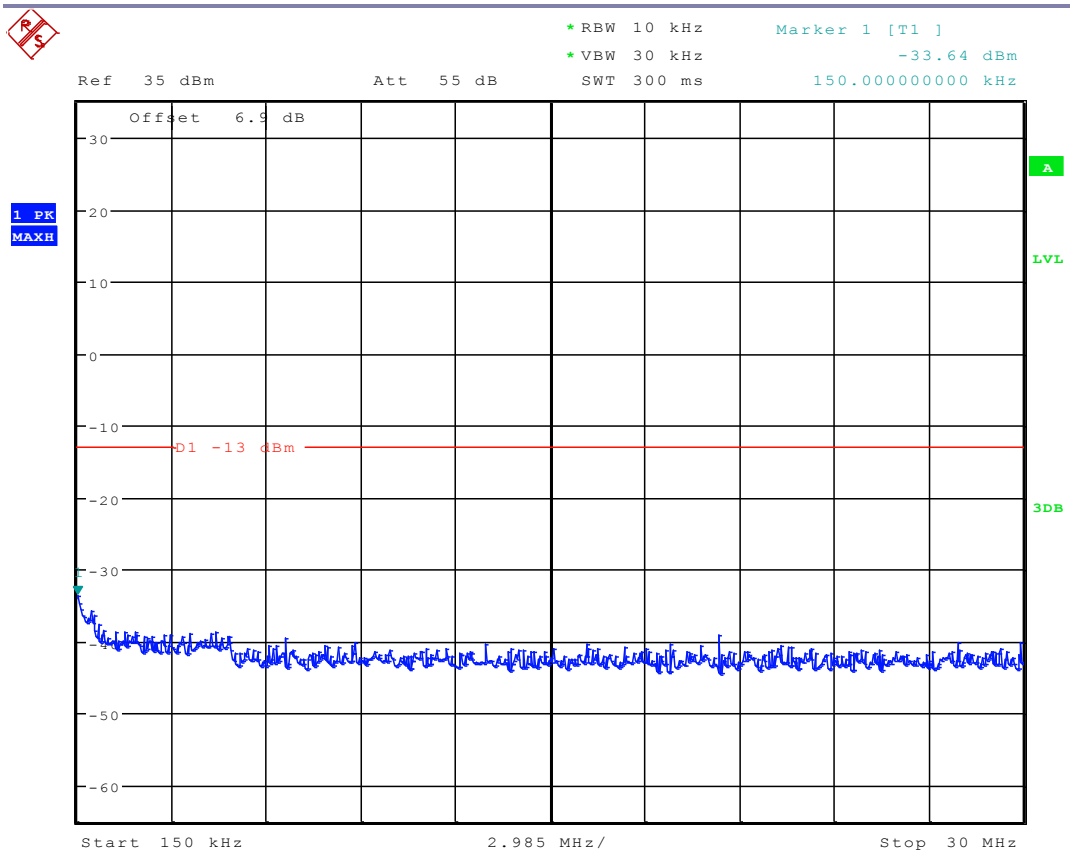

RBW 10 kHz
VBW 30 kHz
SWT 300 ms
Marker 1 [T1]
-32.43 dBm
150.000000000 kHz
Ref 35 dBm
Att 55 dB
Offset 6.9 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-40
-50
-60
Start 150 kHz
2.985 MHz/
Stop 30 MHz

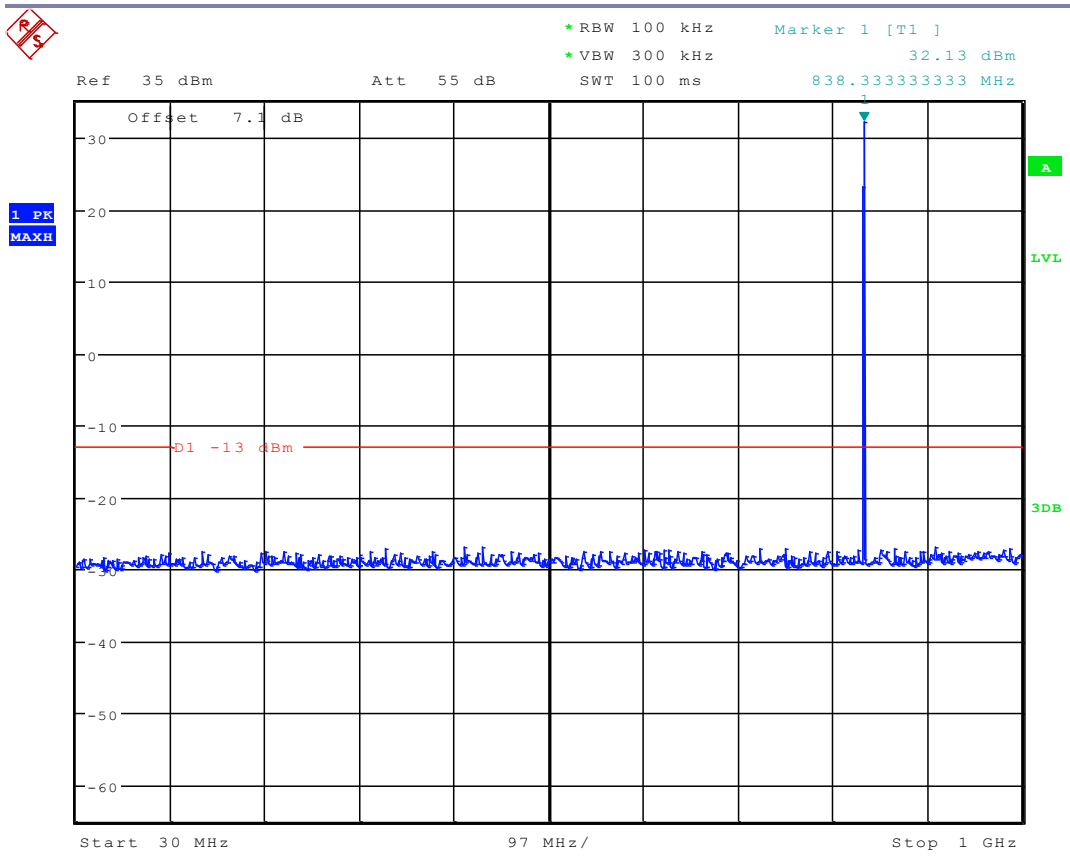

RBW 100 kHz
VBW 300 kHz
SWT 100 ms
Marker 1 [T1]
28.24 dBm
825.897435897 MHz
Ref 35 dBm
Att 55 dB
Offset 7.1 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-40
-50
-60
Start 30 MHz
97 MHz/
Stop 1 GHz

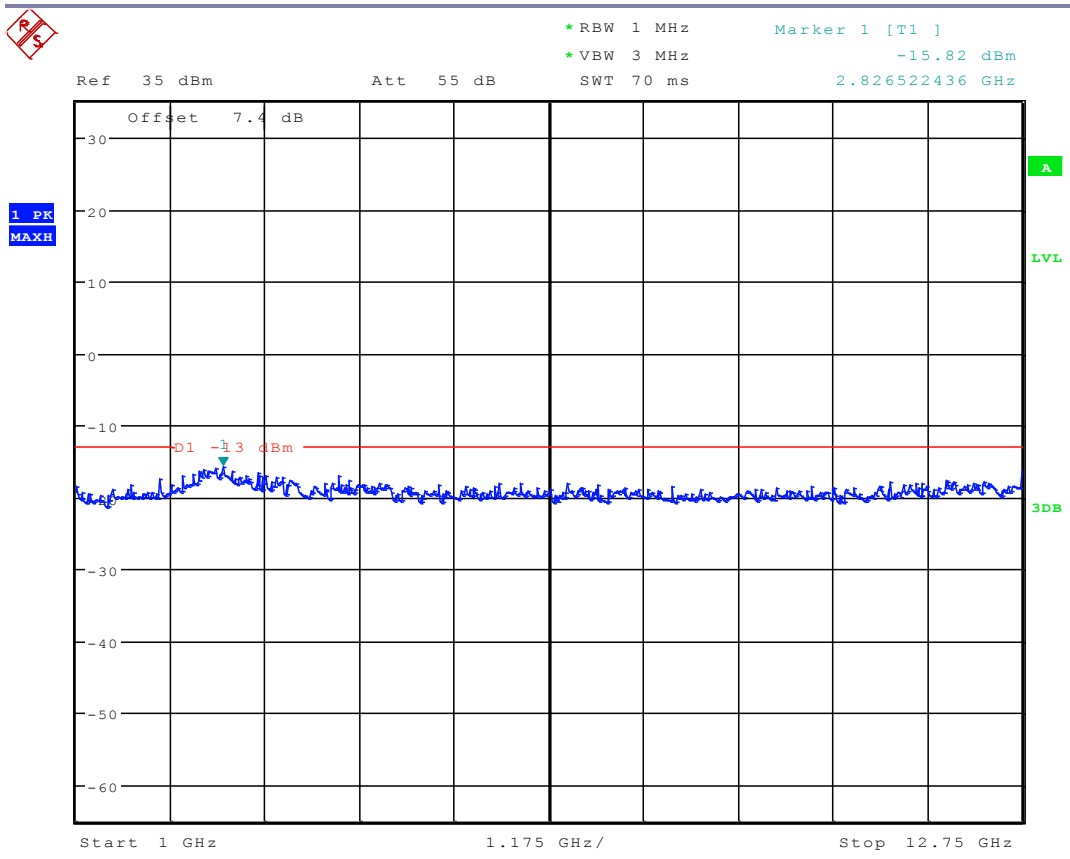

*RBW 1 MHz
*VBW 3 MHz
SWT 70 ms
Marker 1 [T1]
-15.75 dBm
2.807692308 GHz
Ref 35 dBm
Att 55 dB
Offset 7.4 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-30
-40
-50
-60
Start 1 GHz
1.175 GHz/
Stop 12.75 GHz

Channel 192

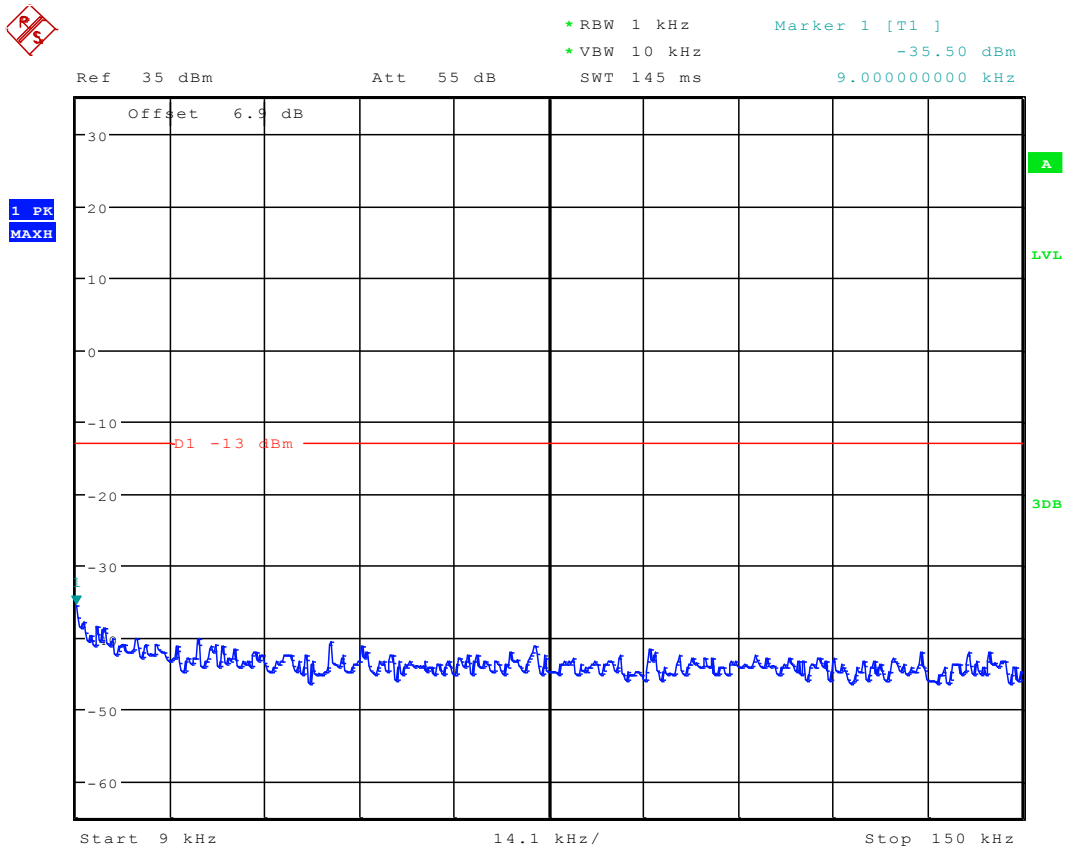

*RBW 1 kHz
*VBW 10 kHz
SWT 145 ms
Marker 1 [T1]
-36.74 dBm
9.000000000 kHz
Ref 35 dBm
Att 55 dB
Offset 6.9 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-50
-60
Start 9 kHz
14.1 kHz/
Stop 150 kHz

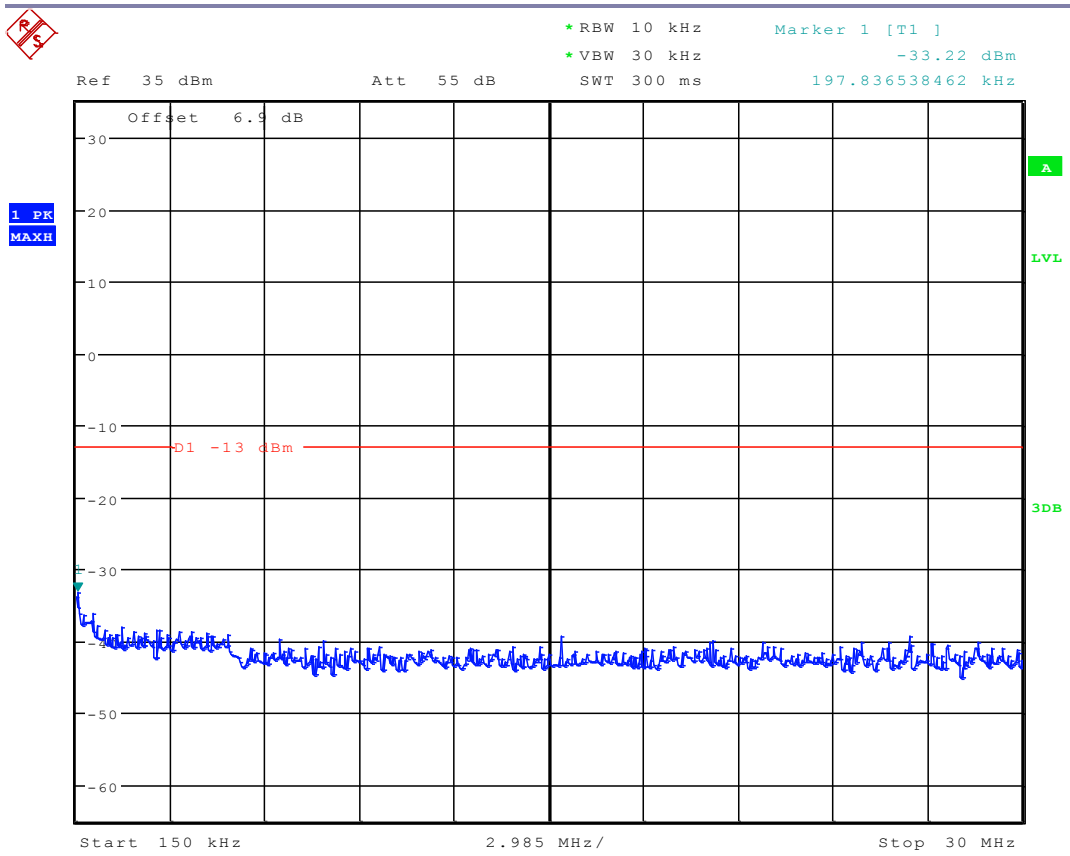

*RBW 10 kHz
*VBW 30 kHz
SWT 300 ms
Marker 1 [T1]
-33.64 dBm
150.000000000 kHz
Ref 35 dBm
Att 55 dB
Offset 6.9 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-40
-50
-60
Start 150 kHz
2.985 MHz/
Stop 30 MHz

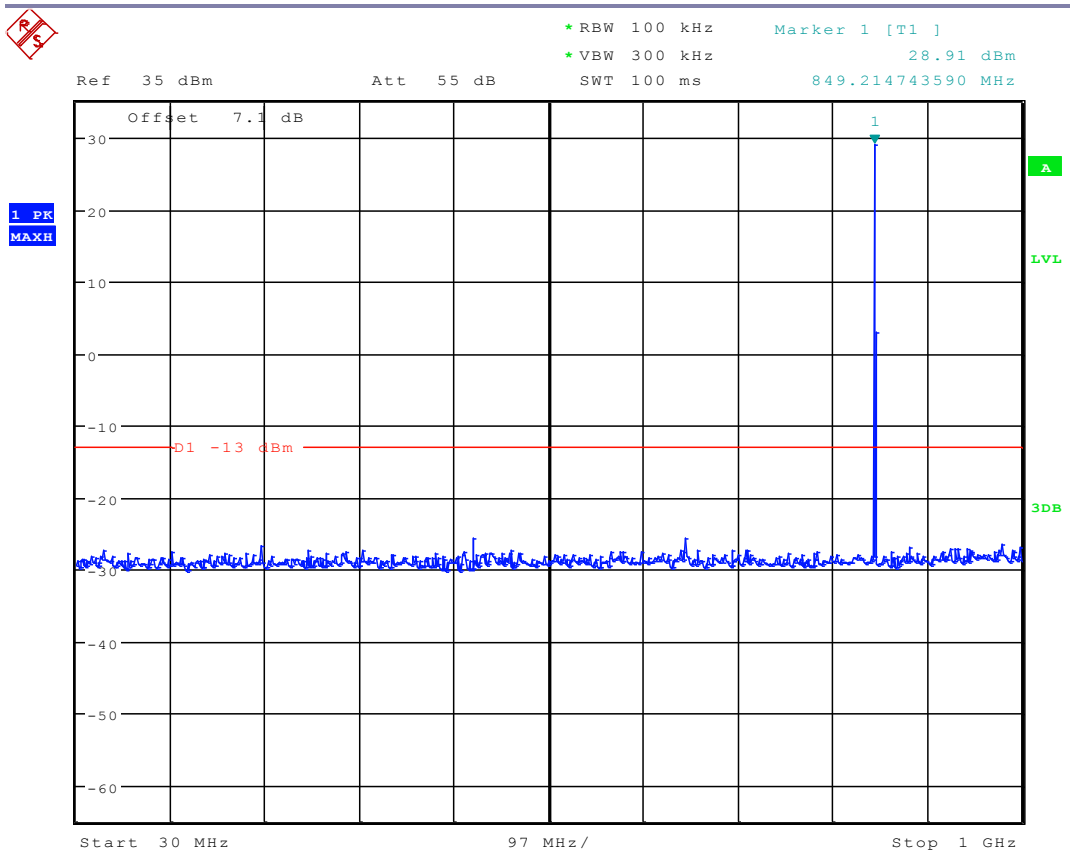

RBW 100 kHz
VBW 300 kHz
SWT 100 ms
Marker 1 [T1]
32.13 dBm
838.333333333 MHz
1
Ref 35 dBm
Att 55 dB
Offset 7.1 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-40
-50
-60
Start 30 MHz
97 MHz/
Stop 1 GHz

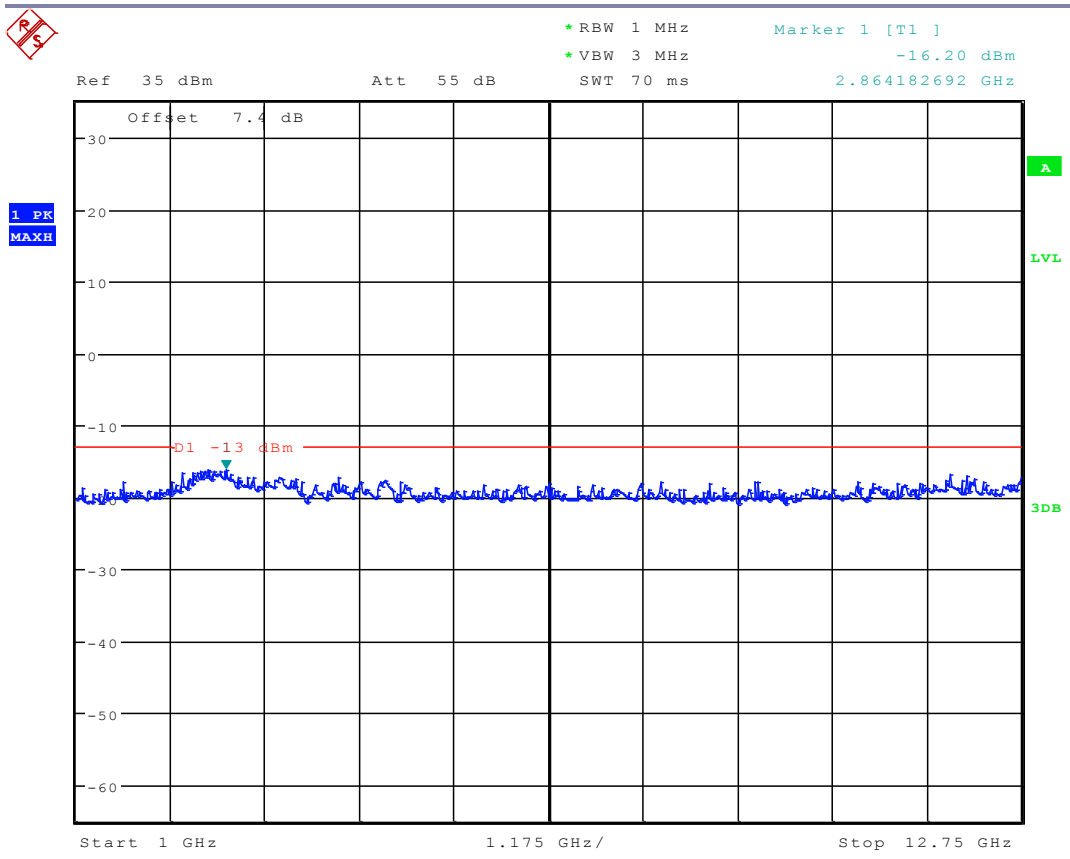

*RBW 1 MHz
*VBW 3 MHz
SWT 70 ms
Marker 1 [T1]
-15.82 dBm
2.826522436 GHz
Ref 35 dBm
Att 55 dB
Offset 7.4 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-30
-40
-50
-60
Start 1 GHz
1.175 GHz/
Stop 12.75 GHz

Channel 251


* RBW 1 kHz
* VBW 10 kHz
SWT 145 ms
Marker 1 [T1]
-35.50 dBm
9.000000000 kHz
Ref 35 dBm
Att 55 dB
Offset 6.9 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-50
-60
Start 9 kHz
14.1 kHz/
Stop 150 kHz


*RBW 10 kHz
*VBW 30 kHz
SWT 300 ms
Marker 1 [T1]
-33.22 dBm
197.836538462 kHz
Ref 35 dBm
Att 55 dB
Offset 6.9 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-40
-50
-60
Start 150 kHz
2.985 MHz/
Stop 30 MHz


RBW 100 kHz
VBW 300 kHz
SWT 100 ms
Marker 1 [T1]
28.91 dBm
849.214743590 MHz
Ref 35 dBm
Att 55 dB
Offset 7.1 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-20
-30
-40
-50
-60
Start 30 MHz
97 MHz/
Stop 1 GHz


RBW 1 MHz
VBW 3 MHz
SWT 70 ms
Marker 1 [T1]
-16.20 dBm
2.864182692 GHz
Ref 35 dBm
Att 55 dB
Offset 7.4 dB
1 PK
MAXH
A
LVL
3DB
D1 -13 dBm
30
20
10
0
-10
-30
-40
-50
-60
Start 1 GHz
1.175 GHz/
Stop 12.75 GHz

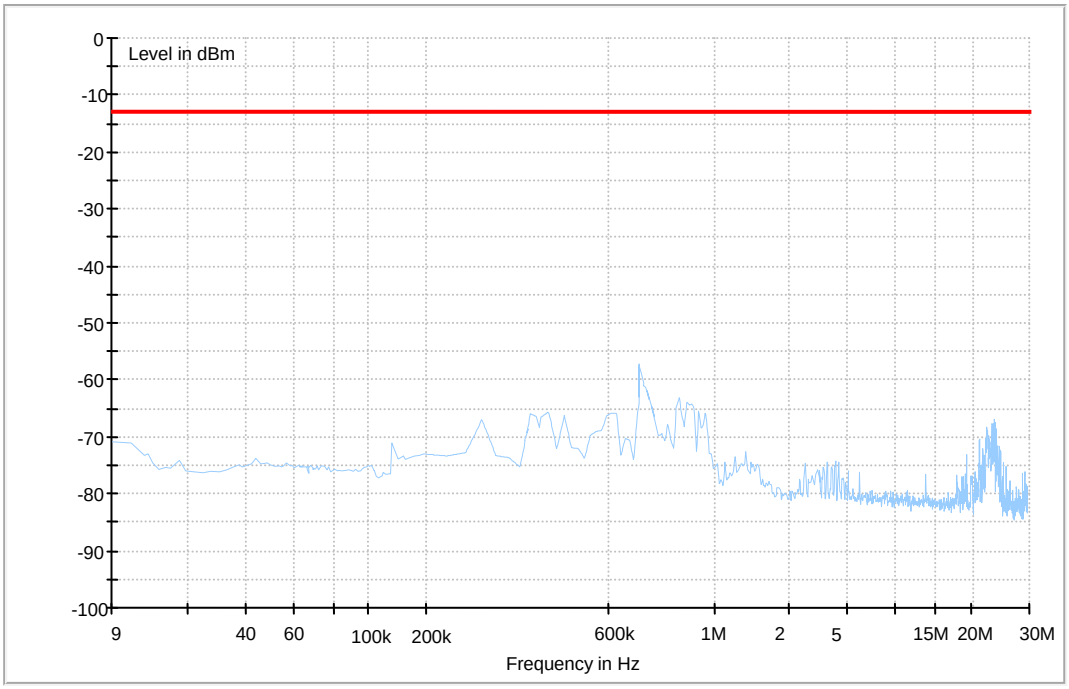
Appendix E

Radiated spurious emission

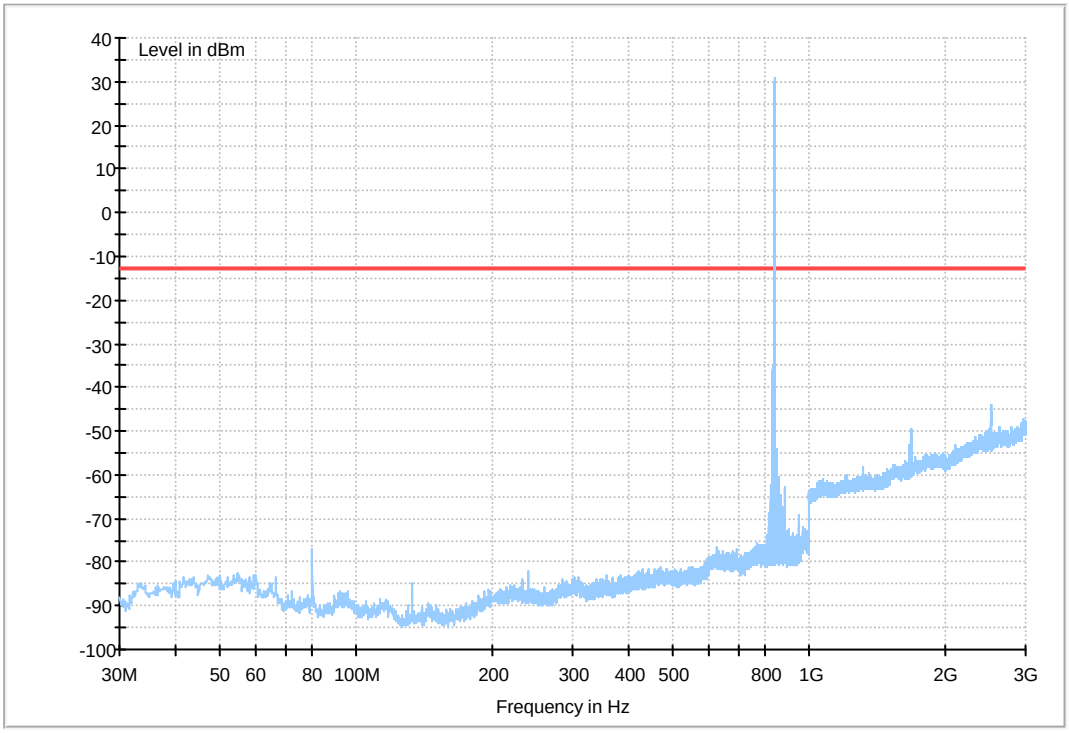
According to FCC Part 2.1053& Part 22.917

GSM 850

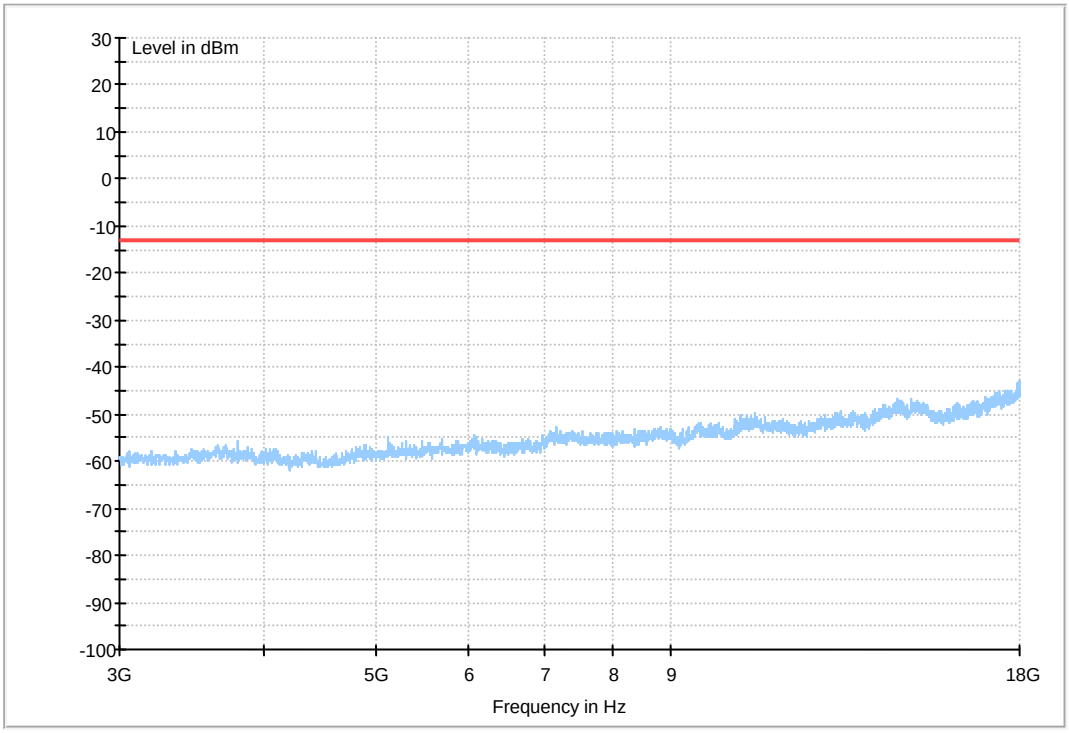
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-3GHz)

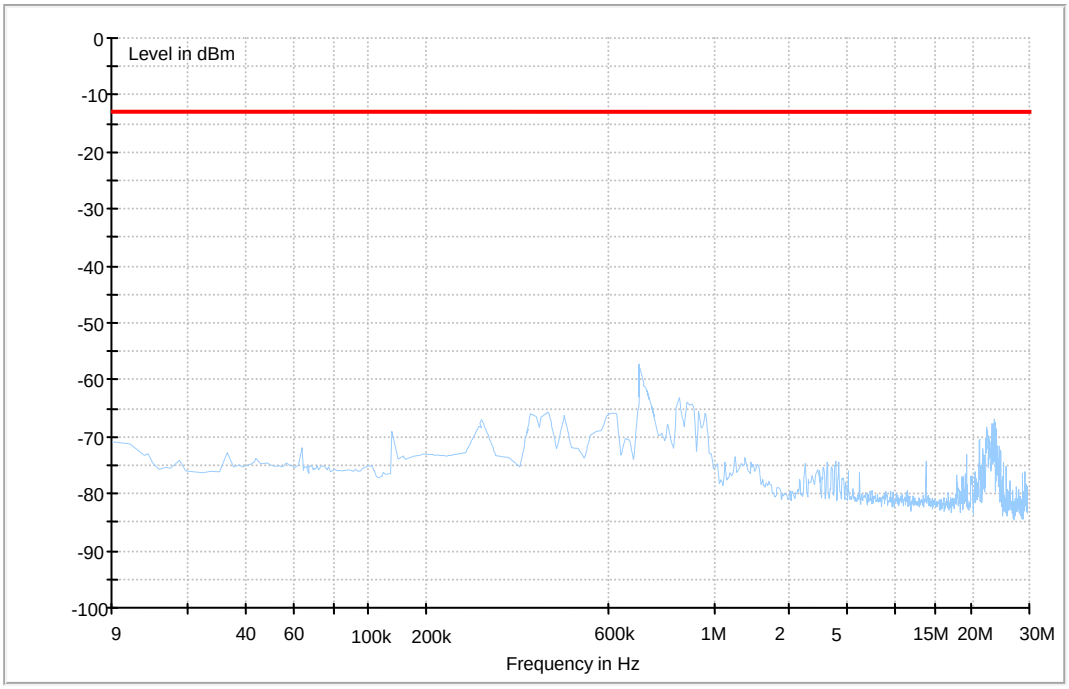


Traffic Mode (3GHz-18GHz)

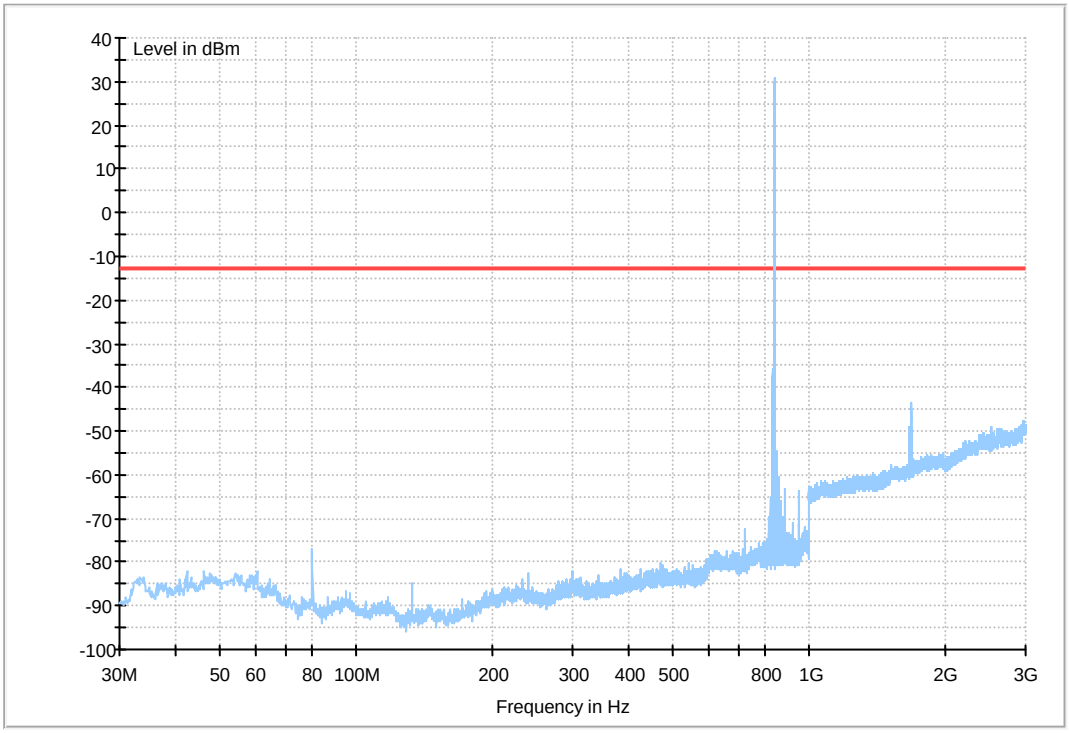


GPRS 850

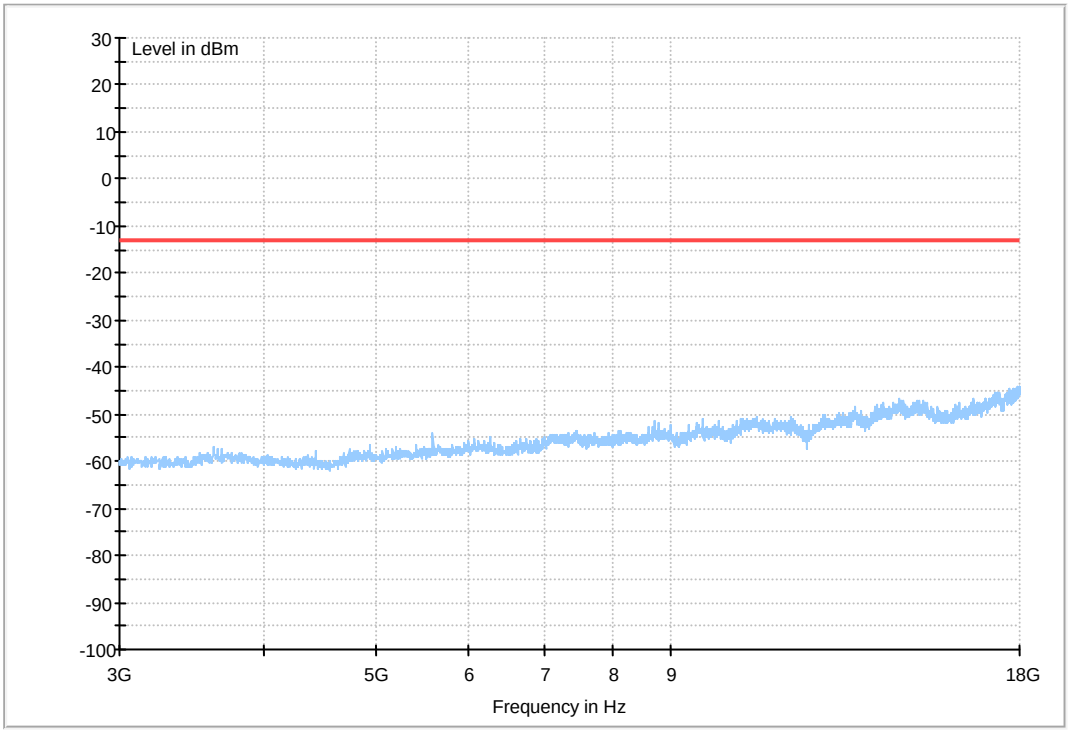
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-3GHz)

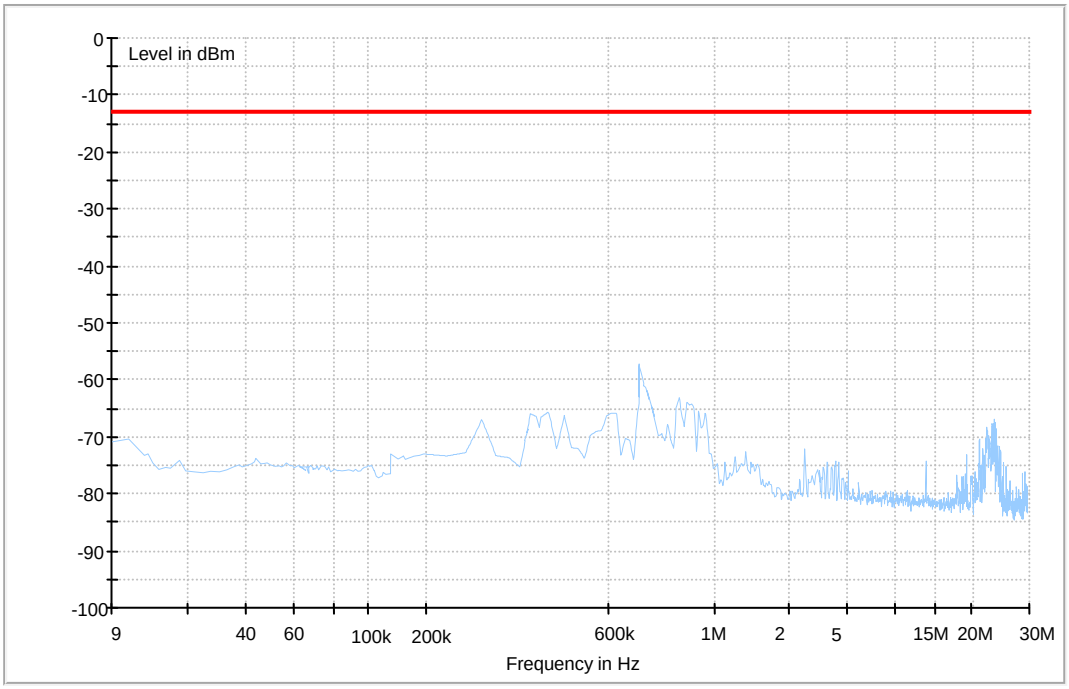


Traffic Mode (3GHz-18GHz)

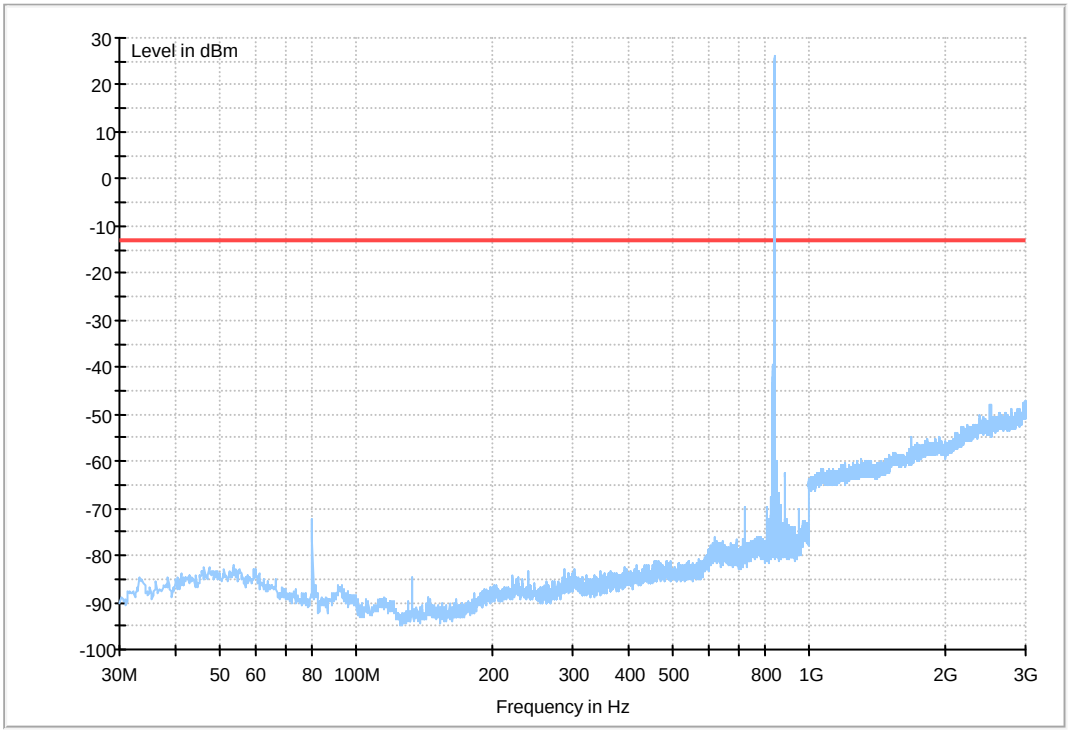


EDGE 850

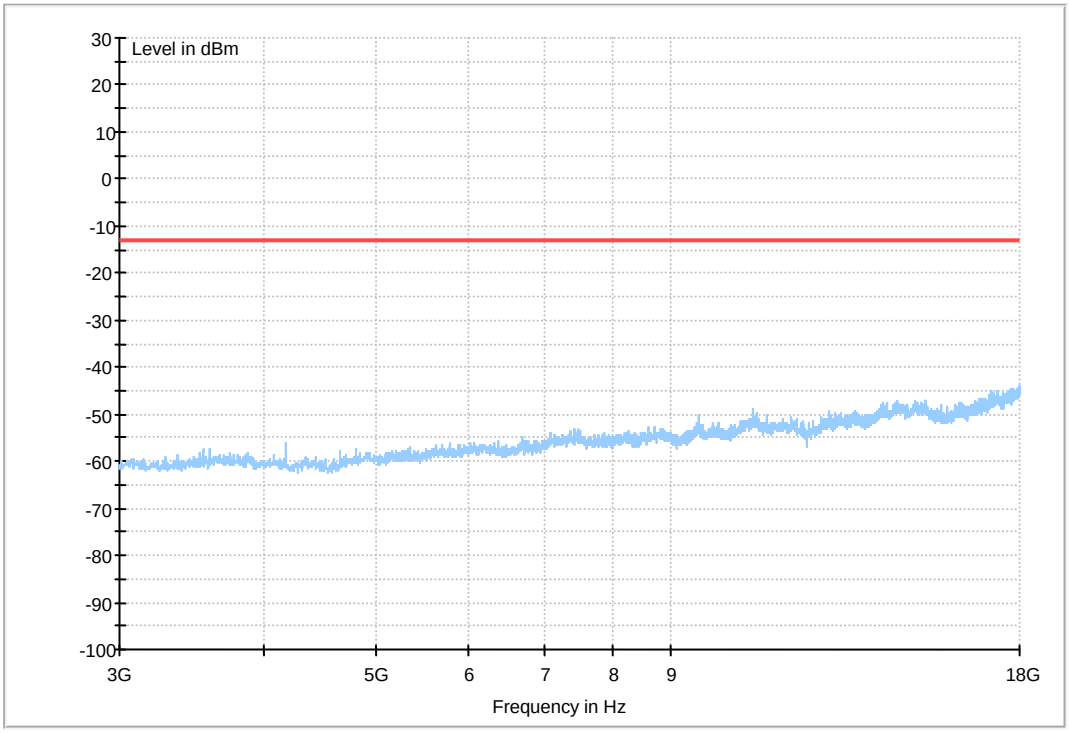
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-3GHz)



Traffic Mode (3GHz-18GHz)



Appendix F

Photos of Radiated Spurious Emissions

Photos of Test Setup

1 Radiated Spurious Emissions

Radiated Spurious Emission (below 3GHz)

Radiated Spurious Emission (3GHz to18GHz)