



Appendix A

Transmitter Output Power According to FCC Part 2.1046 & Part 22.913



Conducted Power of Transmitter

Table 1 Measurement Results

TEST CONDITIONS	RF Output Power (Conducted)					
	Channel128(B)		Channel192(M)		Channel251(T)	
	824.2MHz		837.0MHz		848.8MHz	
	dBm		dBm		dBm	
T_{nom} / V_{nom}	Measure d	Limit	Measured	Limit	Measured	Limit
TM1	32.44	38.5	32.61	38.5	32.59	38.5
TM2	25.86	38.5	26.05	38.5	26.12	38.5

Note: RBW > emission bandwidth, VBW > 3 x RBW.



Effective Radiated Power of Transmitter (ERP)

Table 2 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	31.29	Dipole Ant.	34.54	-2.75	0.6	31.19	38.5	Pass
TM1	837.0	31.46	Dipole Ant.	34.83	-2.87	0.6	31.36	38.5	Pass
TM1	848.8	31.44	Dipole Ant.	34.79	-2.85	0.6	31.34	38.5	Pass
TM2	824.2	24.71	Dipole Ant.	27.96	-2.75	0.6	24.61	38.5	Pass
TM2	837.0	24.90	Dipole Ant.	28.27	-2.87	0.6	24.80	38.5	Pass
TM2	848.8	24.97	Dipole Ant.	28.32	-2.85	0.6	24.87	38.5	Pass

Note1: RBW > emission bandwidth, VBW > 3 x RBW.

Note2: a, For getting the ERP (Efficient Radiated Power) in substitution method, the following formula should take to calculate it,

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

b, SGP=Signal Generator Level

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



Appendix B

Modulation Characteristics

According to FCC Part 2.1047 & Part22 Subpart H



TM1:GPRS/GSM Channel 192

GSM850 Modulation

P.D. CS 4
 ↓ ↑
 Test M. A

Channel: 192
 Meas Slot: 3

Max. Level: Auto
Low Noise: --- / Off
PCL: --- / Off

Channel: 192
Meas Slot: 3

Ext. Phase Err. GMSK

Application

Trigger Ana. Lvl.

MS Signal

BS Signal

Network

Marker

Menus

GSM 0 TSC (correlation o.k.)

0.02 Sym.

	Current	Average	Max / Min
Phase Error — Peak	4.4 °	3.9 °	5.7 °
RMS	0.7 °	0.7 °	0.8 °
Origin Offset	-60.4 dB	-55.2 dB	-45.8 dB
I/Q Imbalance	-59.2 dB	-58.4 dB	-47.2 dB
Frequency Err	1 Hz	10 Hz	

Timing Advance Error
 30.8 dBm

Avg. Burst Power (Cur.)
 100 Bursts

Statistic Count
 0.00 %

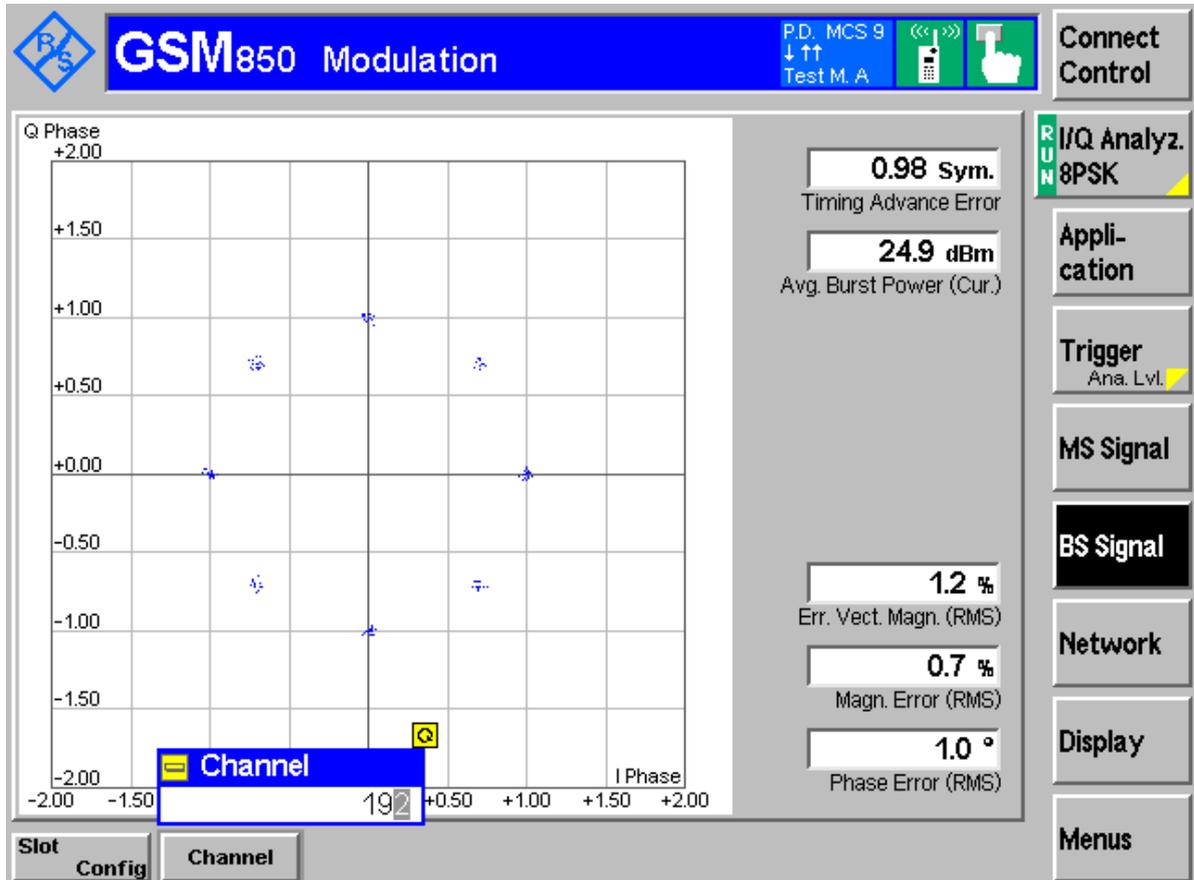
Bursts out of Tolerance

Slot Config

Channel 192



TM2:EDGE Channel 192



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



Appendix C

Occupied Bandwidth

According to FCC Part 2.1049 & Part 22 Subpart H



Result Table

Table 1 Measurement Results

Test Mode	RF Channel	Occupied Bandwidth [kHz]	-26dB BW [kHz]	Verdict
TM1	128	239.8	319.3	Pass
	192	238.6	314.7	Pass
	251	238.9	318.7	Pass
TM2	128	238.1	311.0	Pass
	192	243.3	318.1	Pass
	251	239.7	308.6	Pass



Channel 128(TM1:GPRS/GSM)



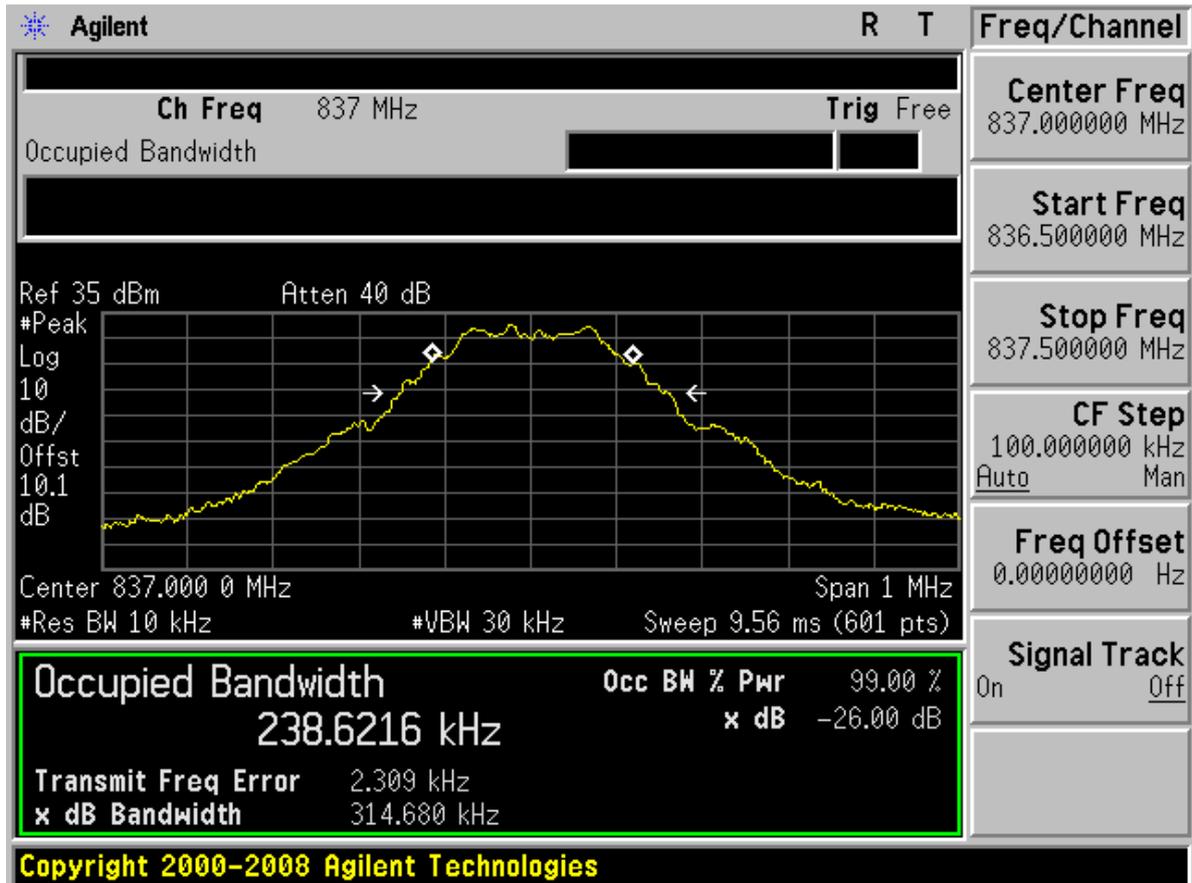


Channel 128(TM2:EDGE)





Channel 192(TM1:GPRS/GSM)





Channel 192(TM2:EDGE)



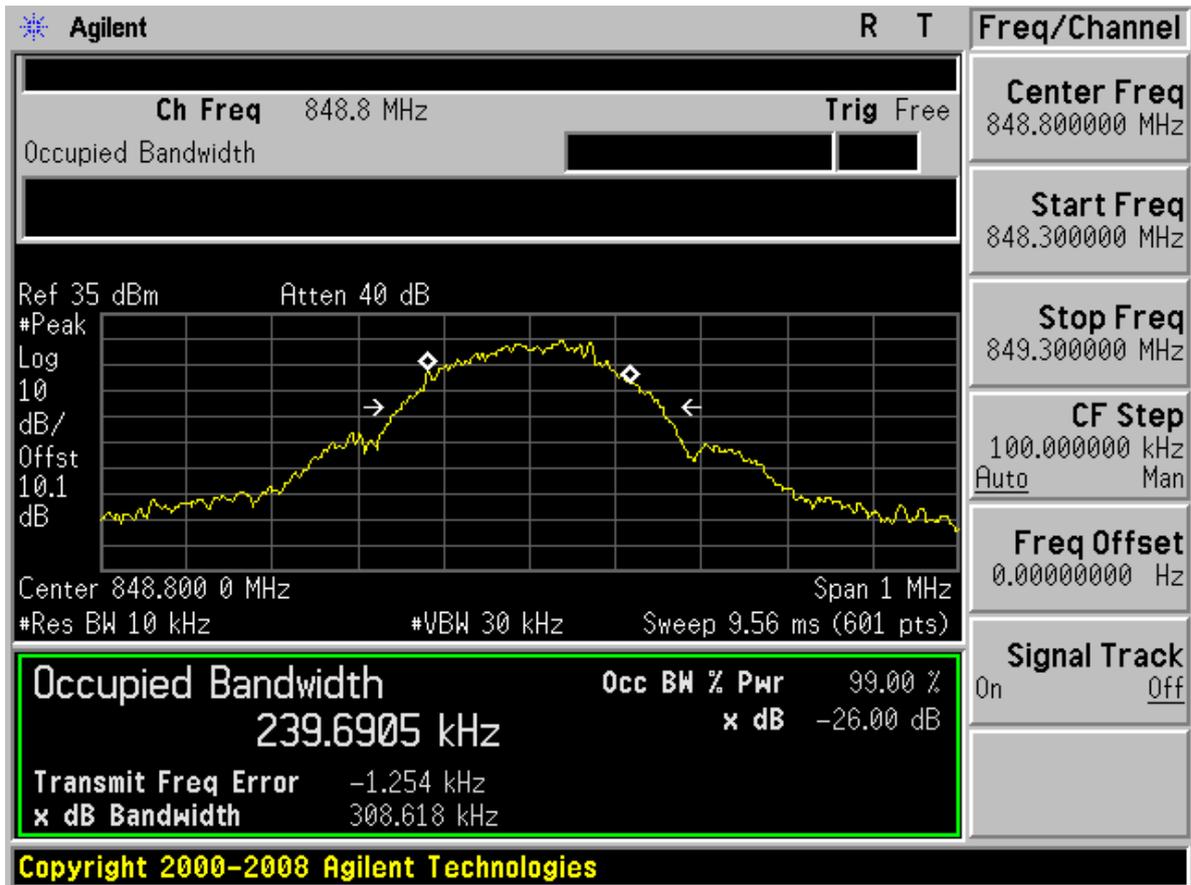


Channel 251(TM1:GPRS/GSM)





Channel 251(TM2:EDGE)



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



Appendix D

Band Edges Compliance

According to FCC Part 2.1051 & Part22 Subpart H



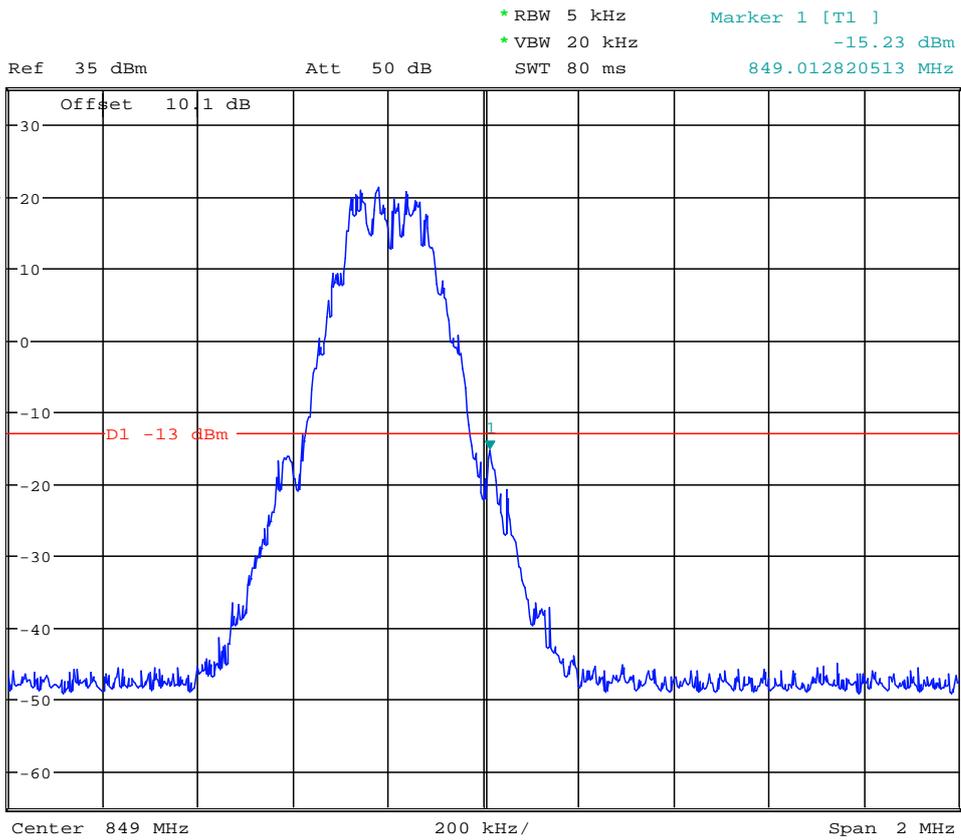
26dB Occupied Bandwidth

Note: All relevant operation modes have been tested, and the widest case data is included in this table.

Mode	-26dB BW [kHz]	RBW to Measure Band Edge [kHz]
TM1/TM2	319.3	≥ 3.19 , used 5



Right Edge Channel 251

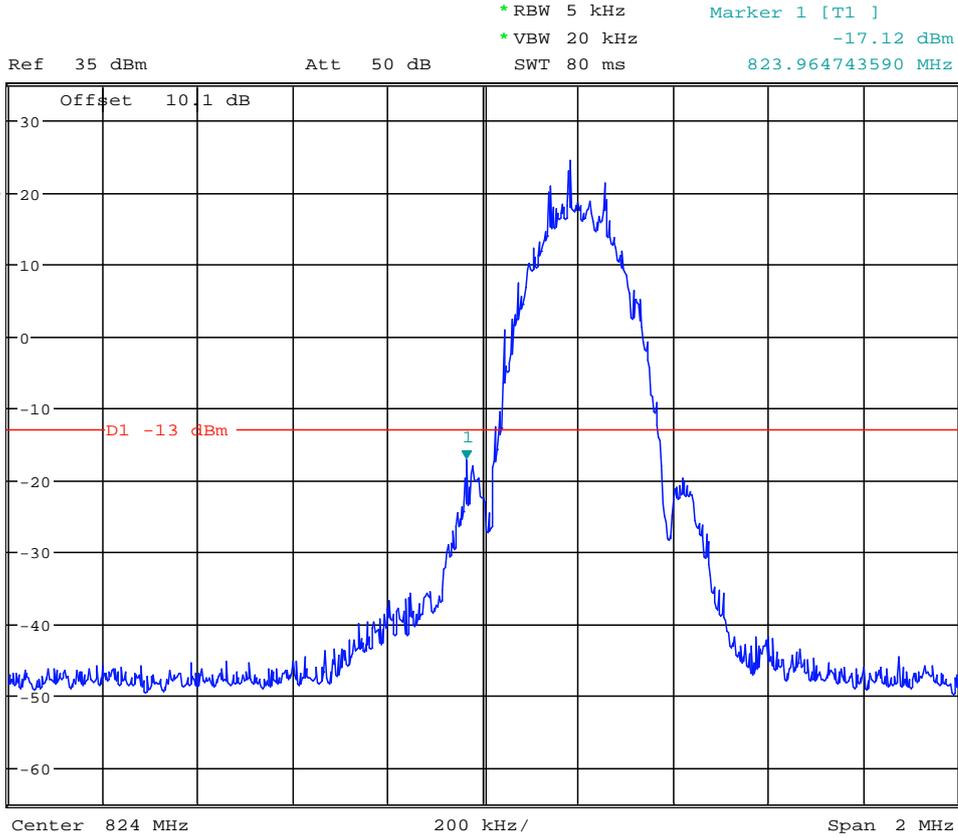




TM2:EDGE

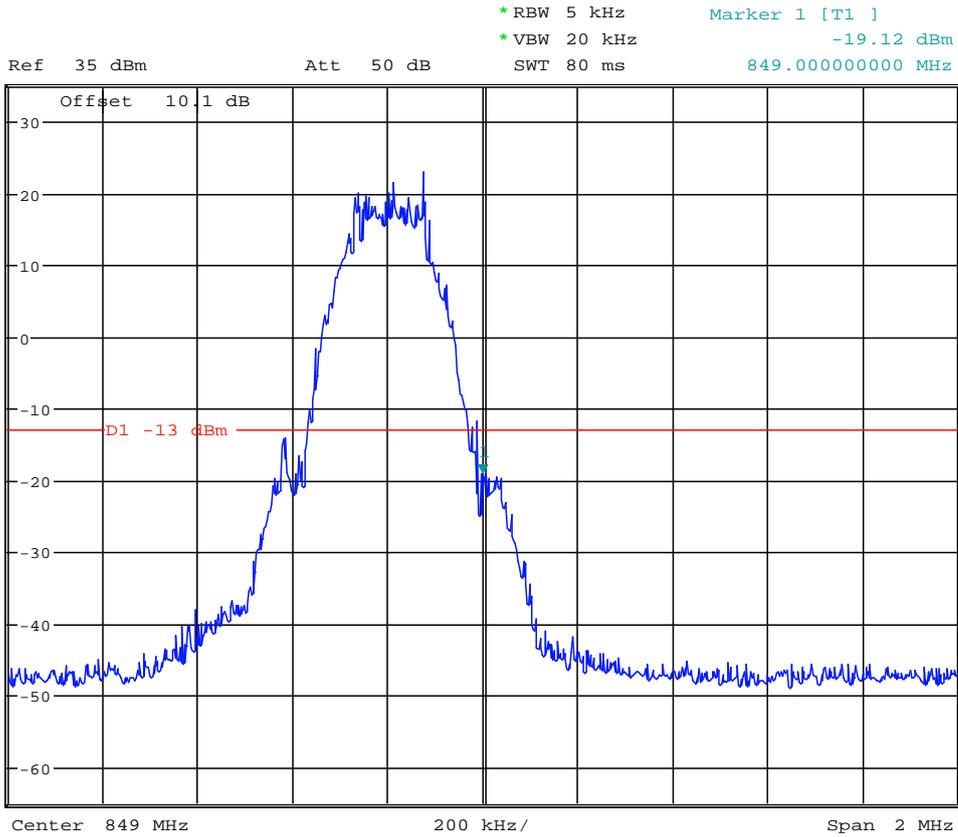
Left Edge

Channel 128





Right Edge Channel 251



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



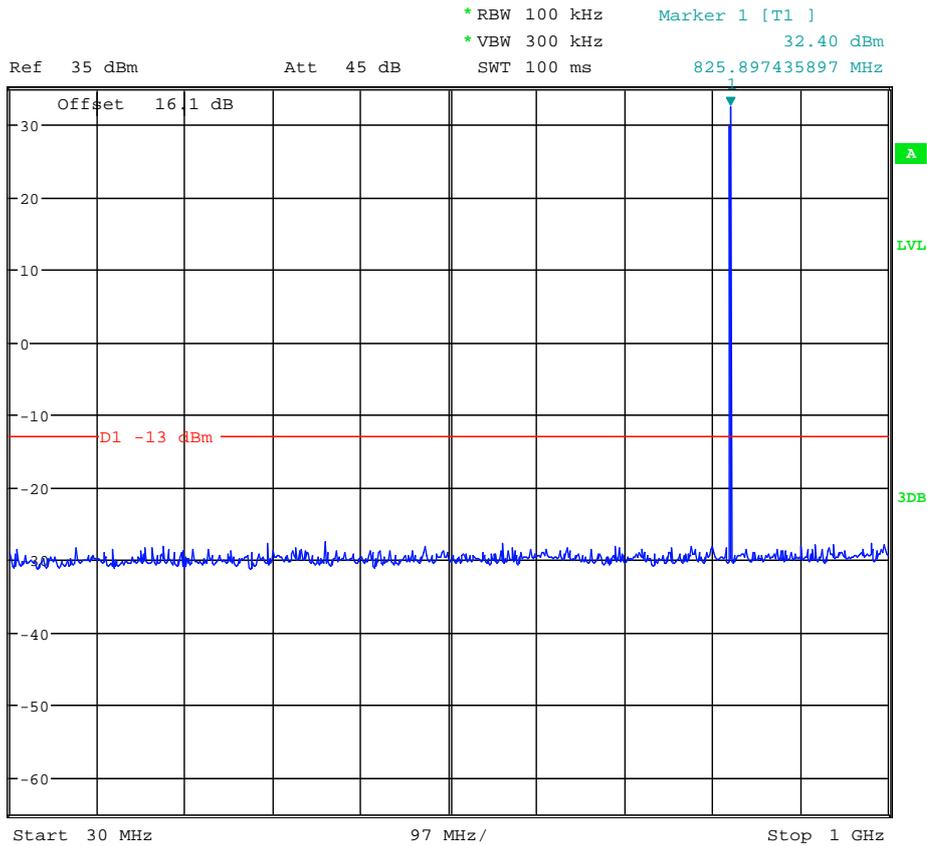
Appendix E

Spurious Emission at Antenna Terminal

According to FCC Part 2.1051 & Part22 Subpart H



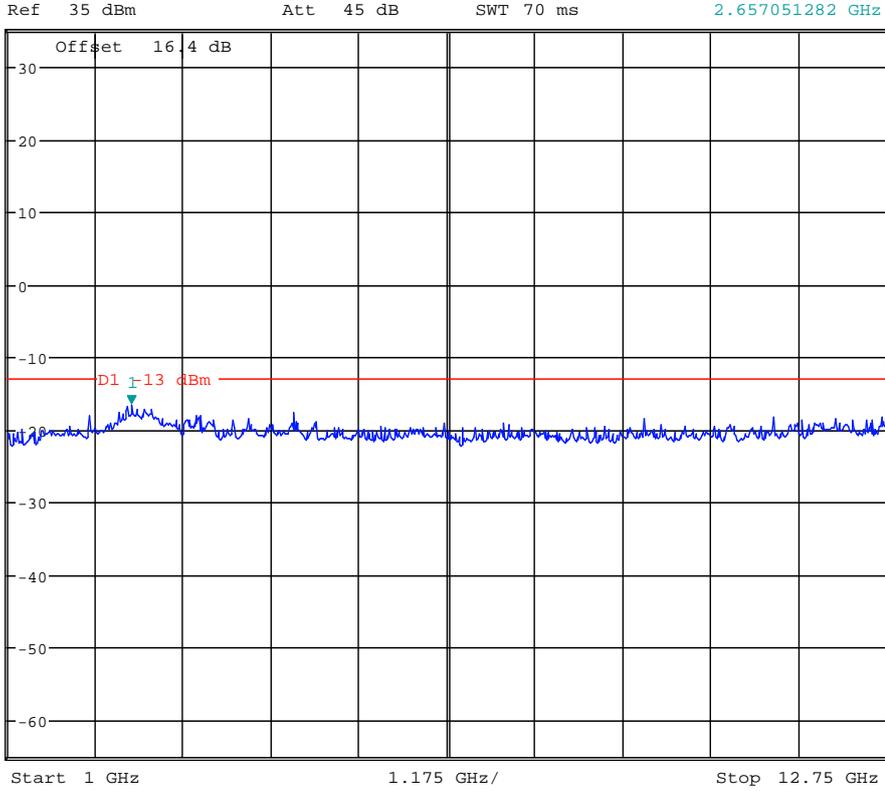
TM1:GPRS/GSM Channel 128



Date: 26.APR.2012 11:31:55



* RBW 1 MHz Marker 1 [T1]
* VBW 3 MHz -16.63 dBm
2.657051282 GHz



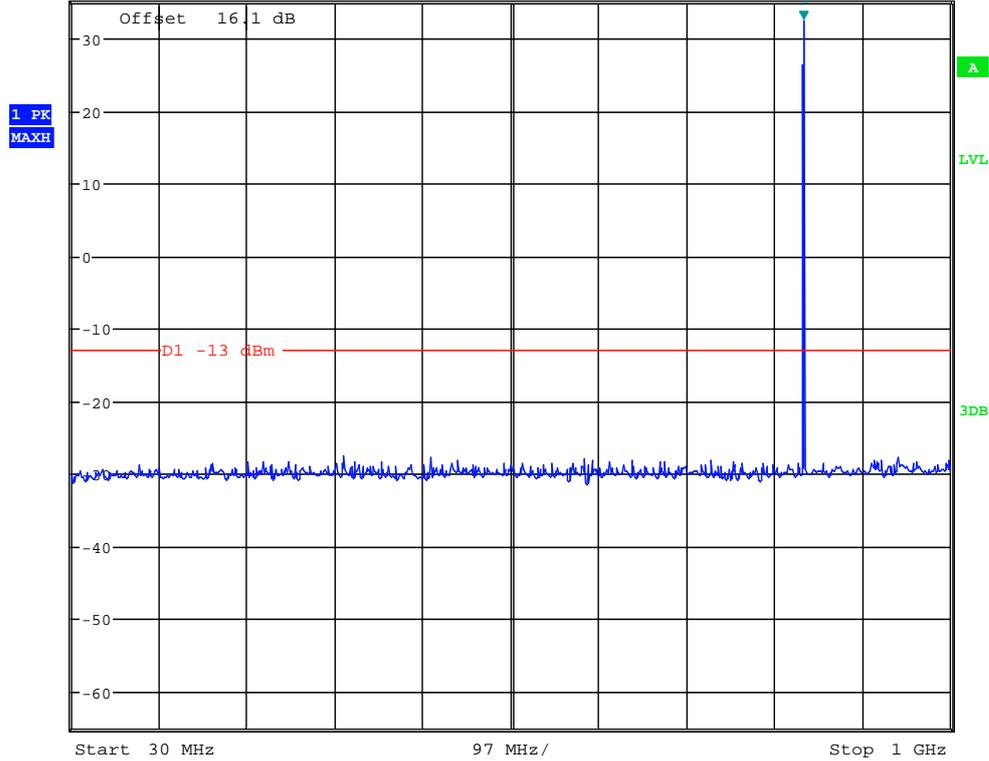
Date: 26.APR.2012 11:32:39



Channel 192



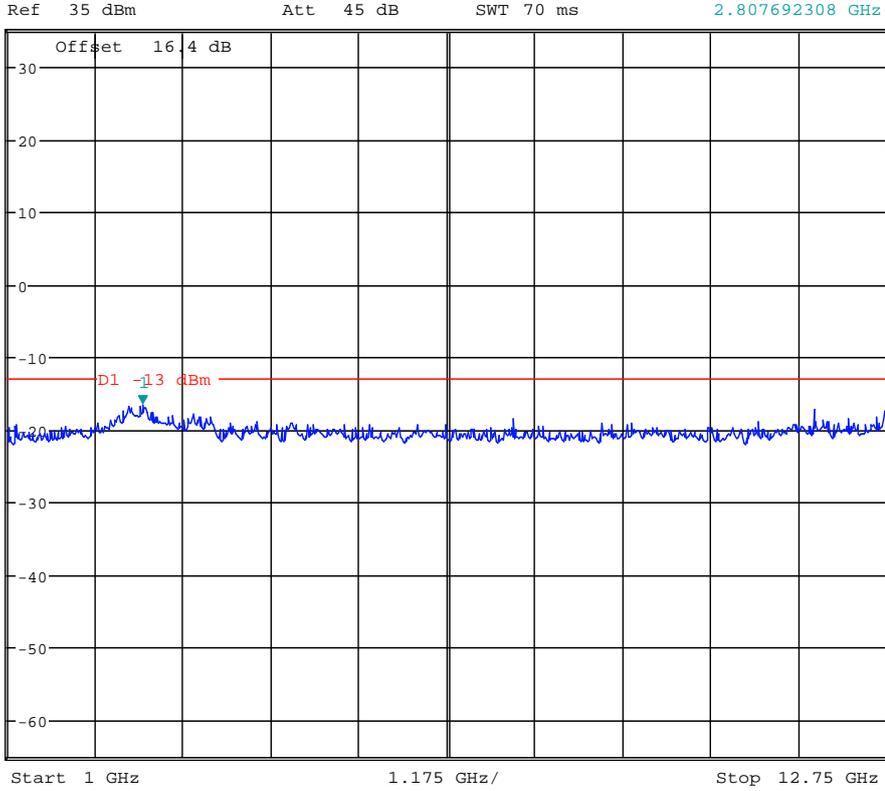
Ref 35 dBm Att 45 dB * RBW 100 kHz Marker 1 [T1] 32.29 dBm
* VBW 300 kHz
SWT 100 ms 838.333333333 MHz



Date: 26.APR.2012 11:32:09



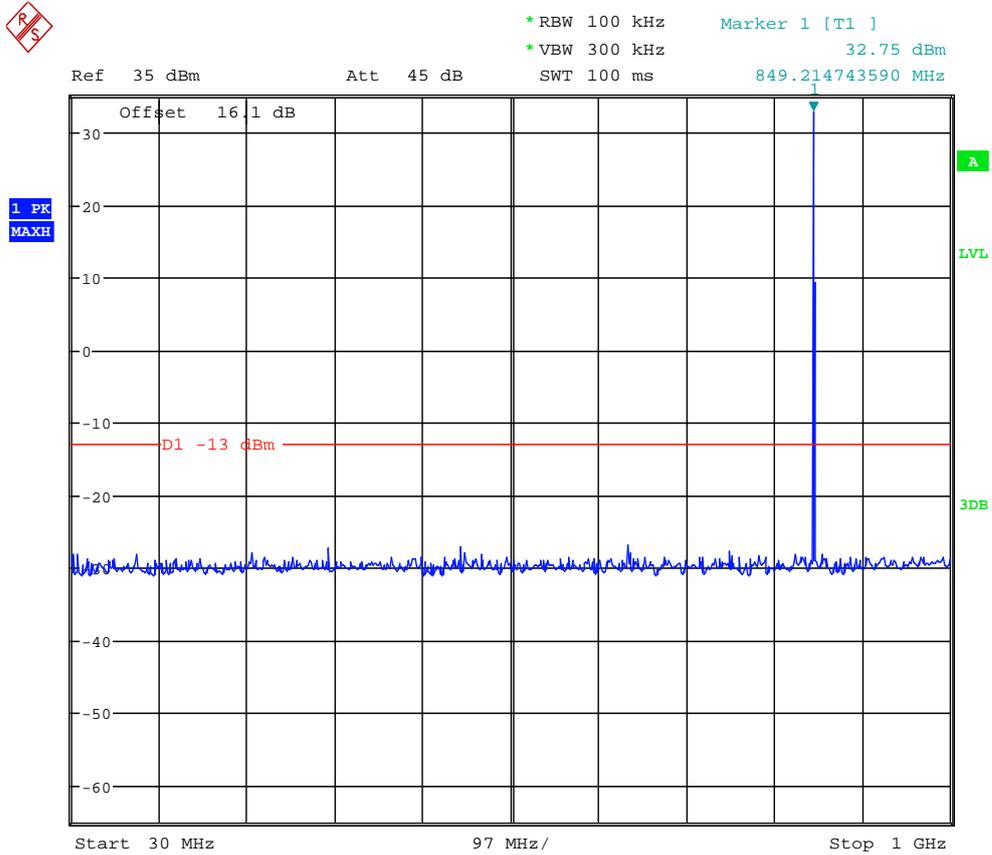
* RBW 1 MHz Marker 1 [T1]
* VBW 3 MHz -16.64 dBm
2.807692308 GHz



Date: 26.APR.2012 11:32:53



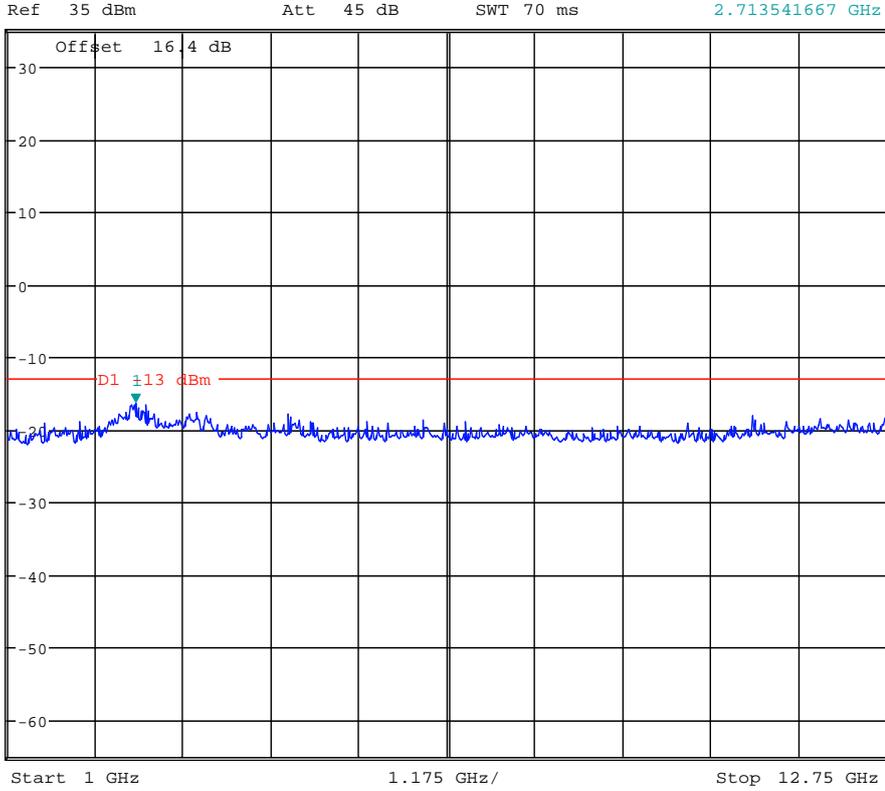
Channel 251



Date: 26.APR.2012 11:32:24



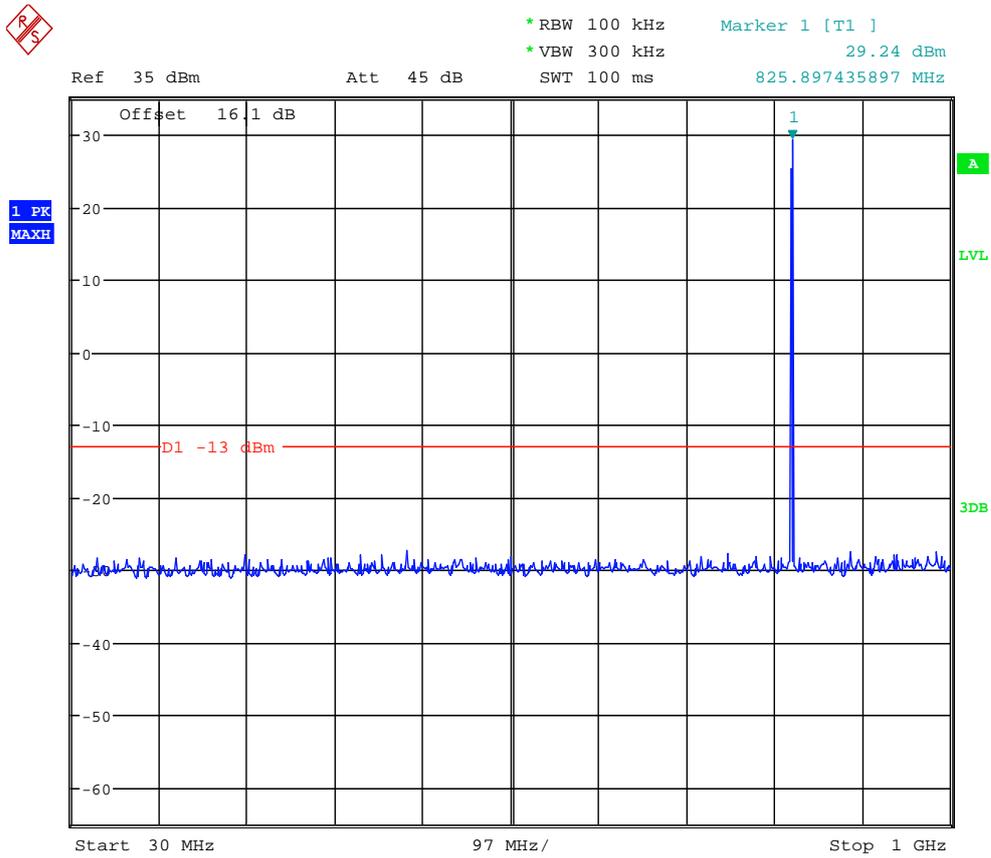
* RBW 1 MHz Marker 1 [T1]
* VBW 3 MHz -16.47 dBm
2.713541667 GHz



Date: 26.APR.2012 11:33:08



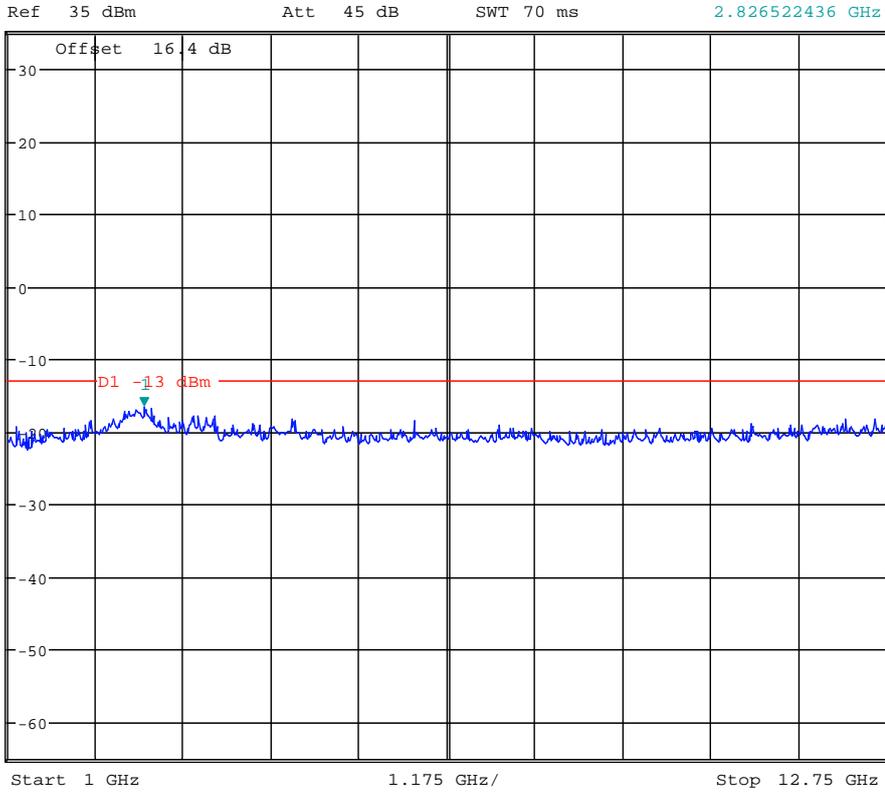
TM2:EDGE Channel 128



Date: 26.APR.2012 11:40:04



* RBW 1 MHz Marker 1 [T1]
* VBW 3 MHz -16.63 dBm
2.826522436 GHz



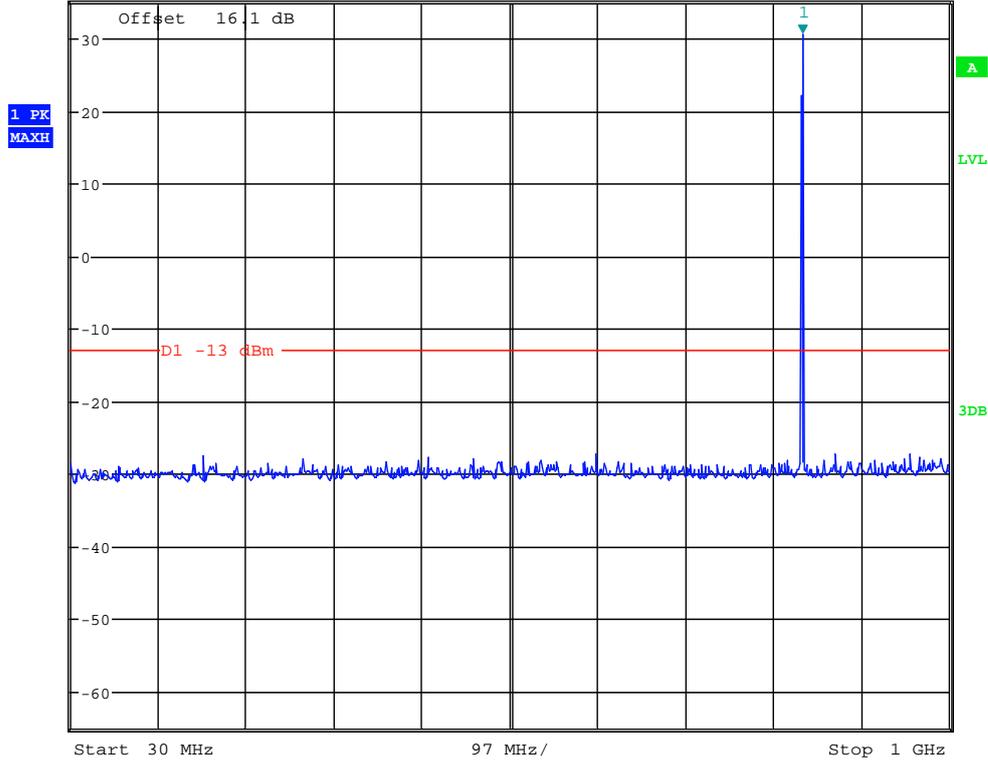
Date: 26.APR.2012 11:40:48



Channel 192



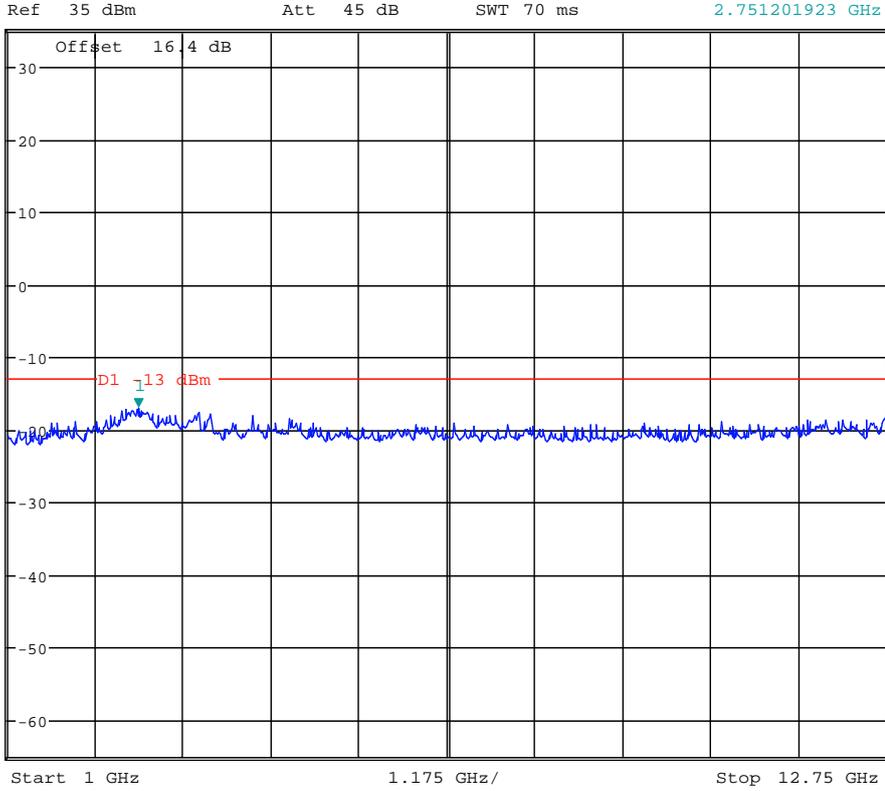
* RBW 100 kHz Marker 1 [T1]
 * VBW 300 kHz 30.57 dBm
 Ref 35 dBm Att 45 dB SWT 100 ms 838.333333333 MHz



Date: 26.APR.2012 11:40:19



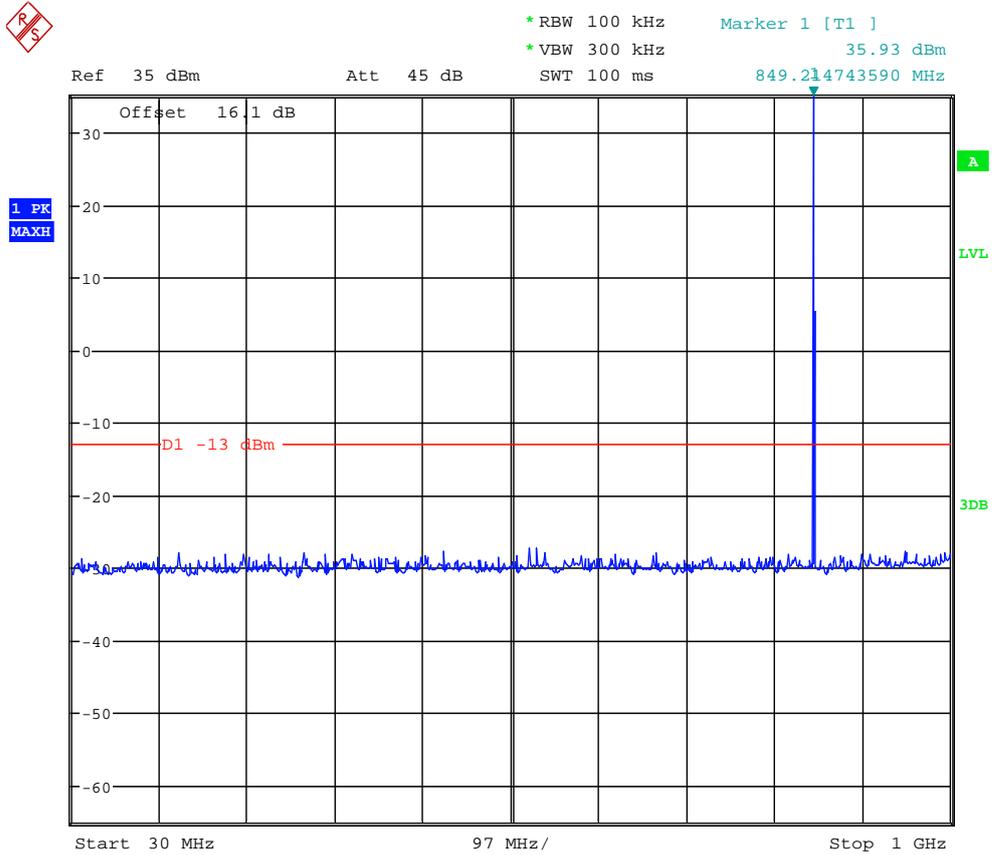
* RBW 1 MHz Marker 1 [T1]
* VBW 3 MHz -17.08 dBm
2.751201923 GHz



Date: 26.APR.2012 11:41:03



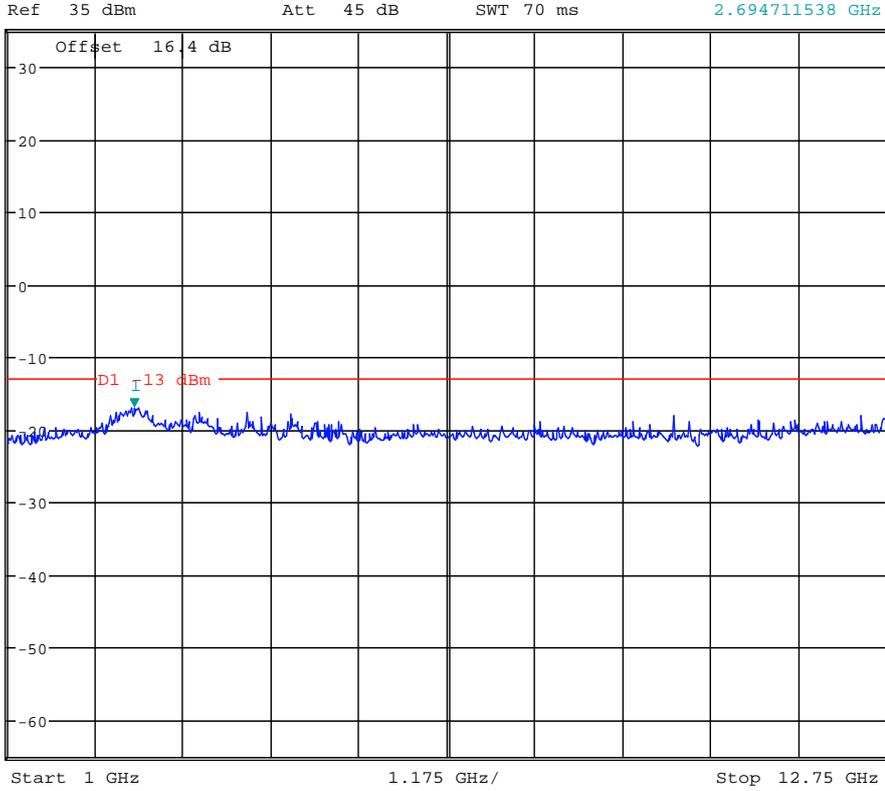
Channel 251



Date: 26.APR.2012 11:40:33



* RBW 1 MHz Marker 1 [T1]
* VBW 3 MHz -16.97 dBm
2.694711538 GHz



Date: 26.APR.2012 11:41:17

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



Appendix F

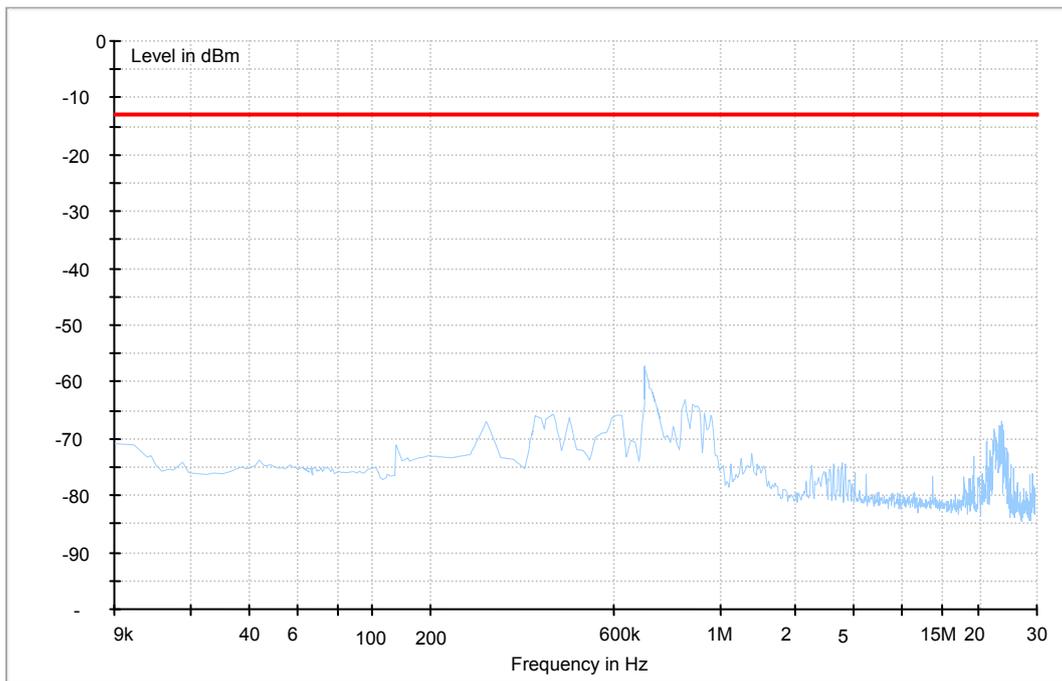
Radiated spurious emission



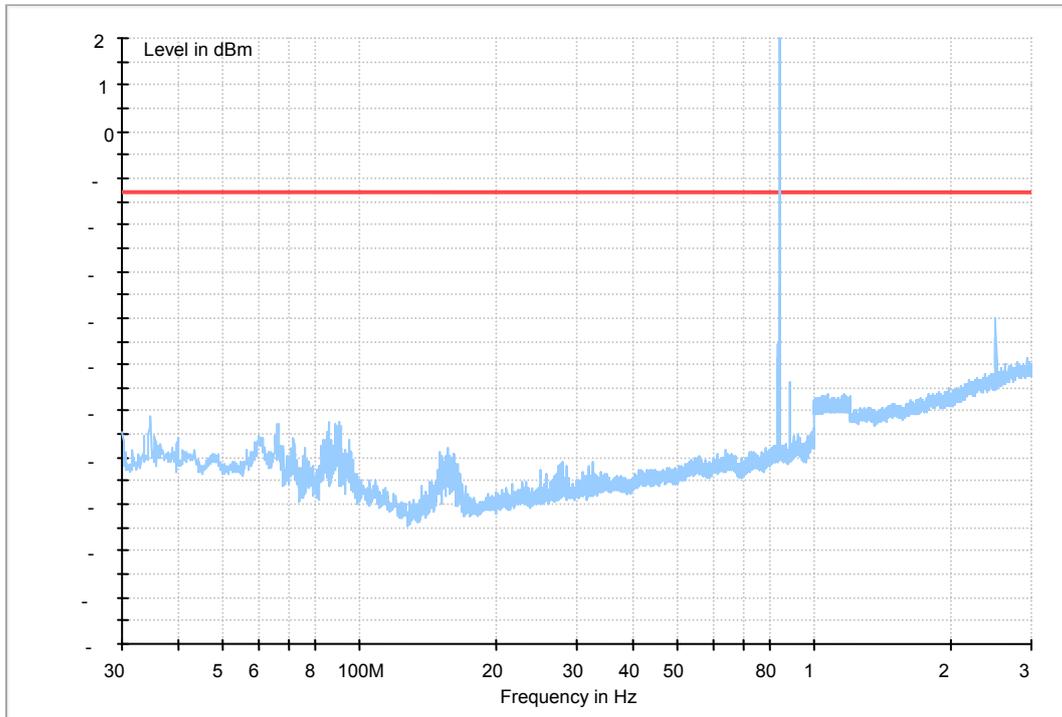
Note: 1. Simultaneous transmission was investigated and no new emissions were found.
2. RBW \geq 100 kHz, VBW $>$ 3 x RBW.

GSM 850

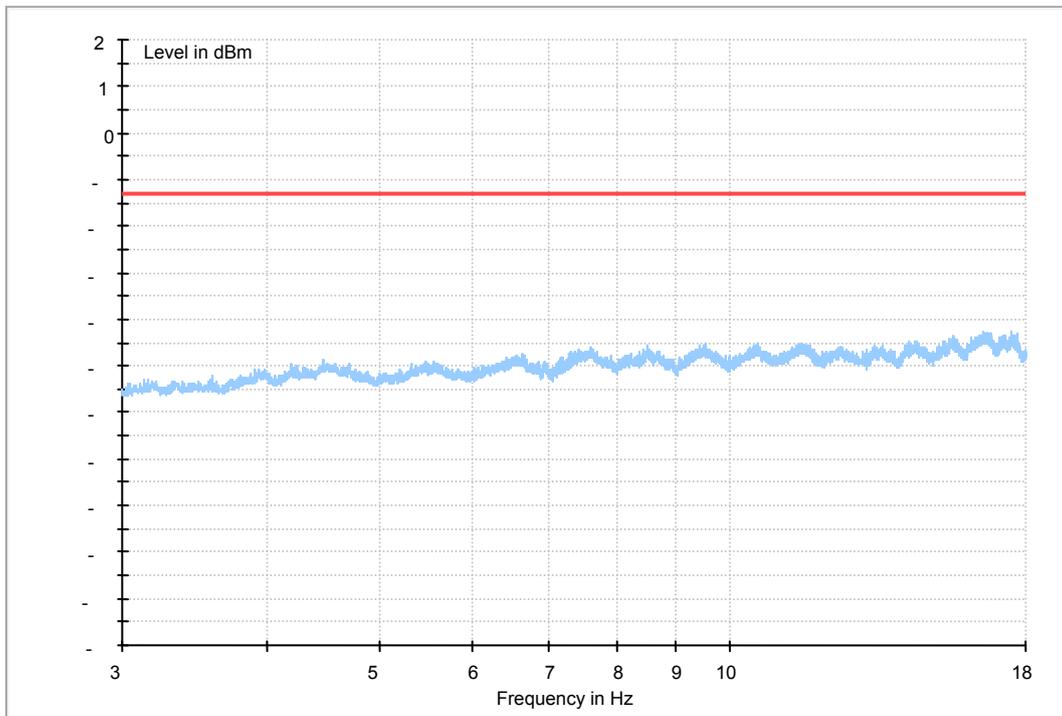
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-3GHz)



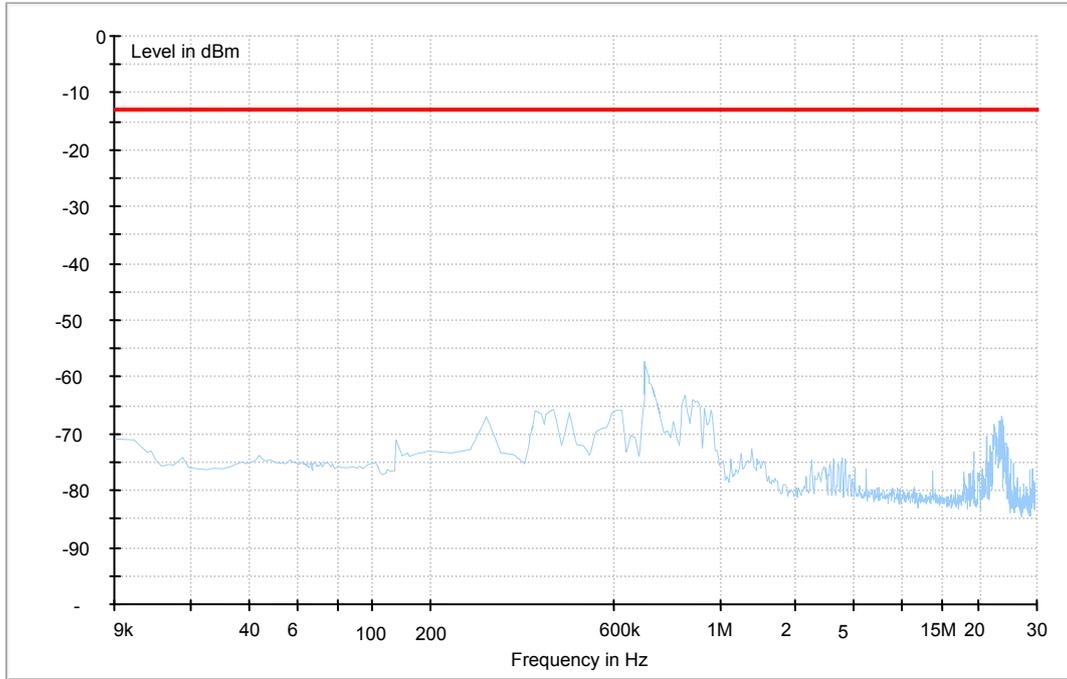
Traffic Mode (3GHz-18GHz)



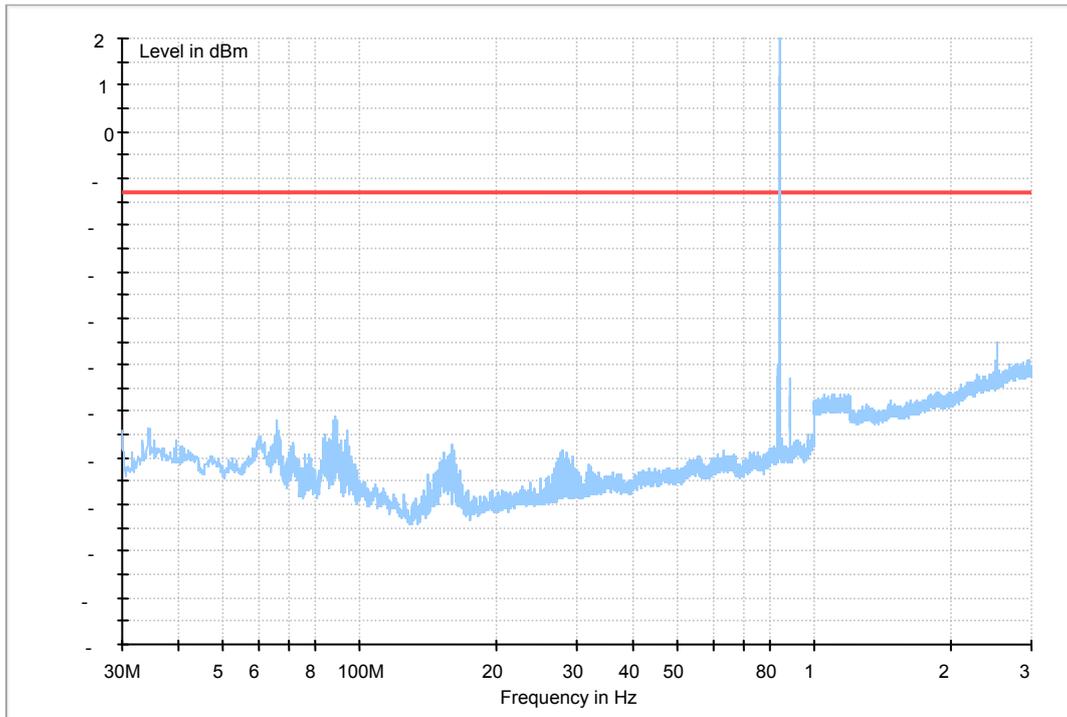


GPRS 850

Traffic Mode (9kHz-30MHz)

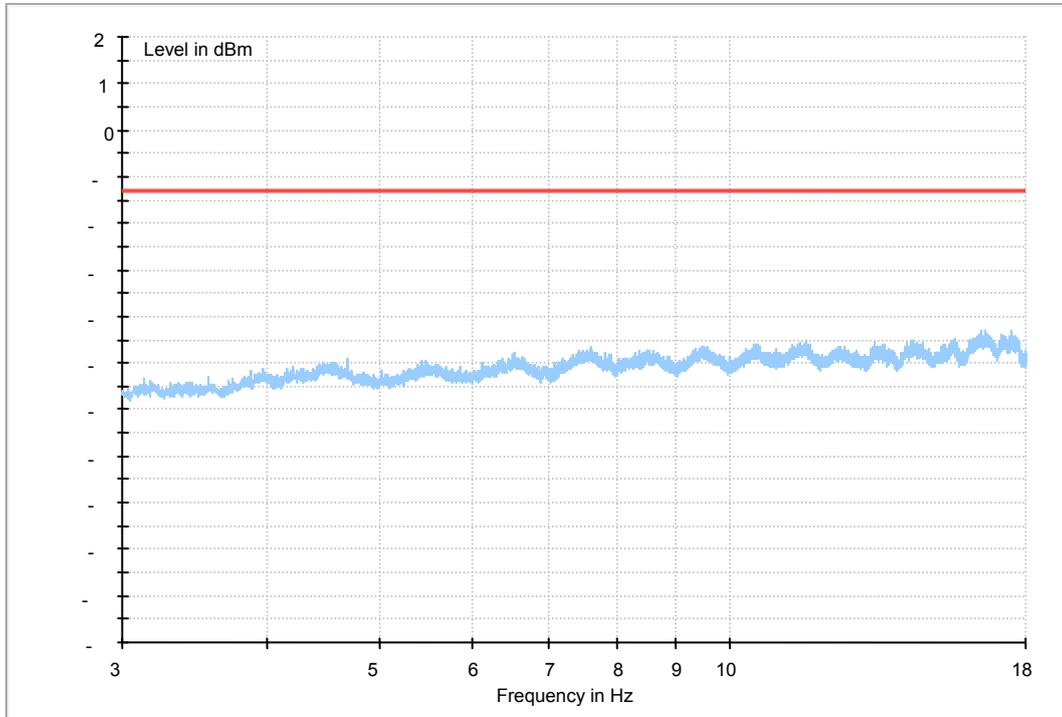


Traffic Mode (30MHz-3GHz)





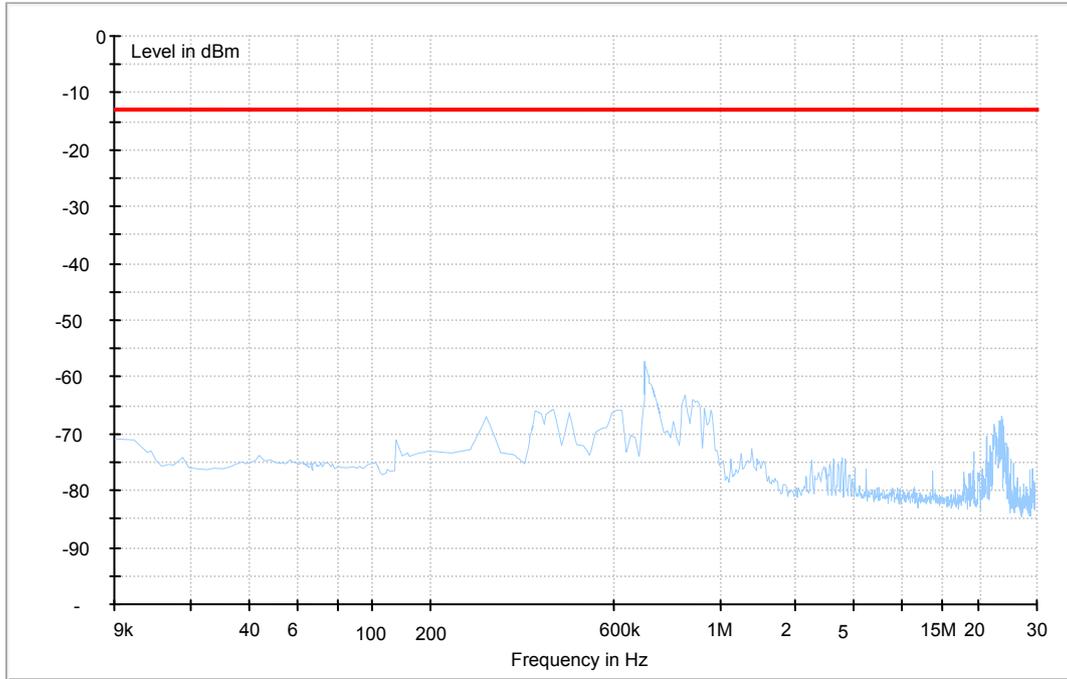
Traffic Mode (3GHz-18GHz)



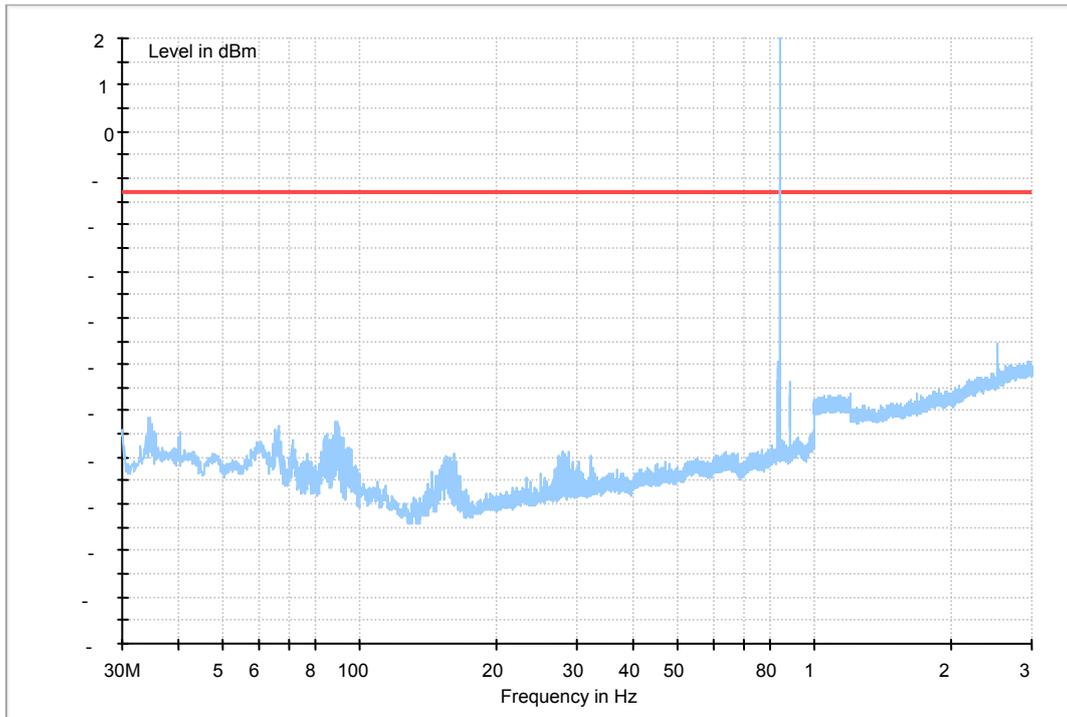


EDGE 850

Traffic Mode (9kHz-30MHz)

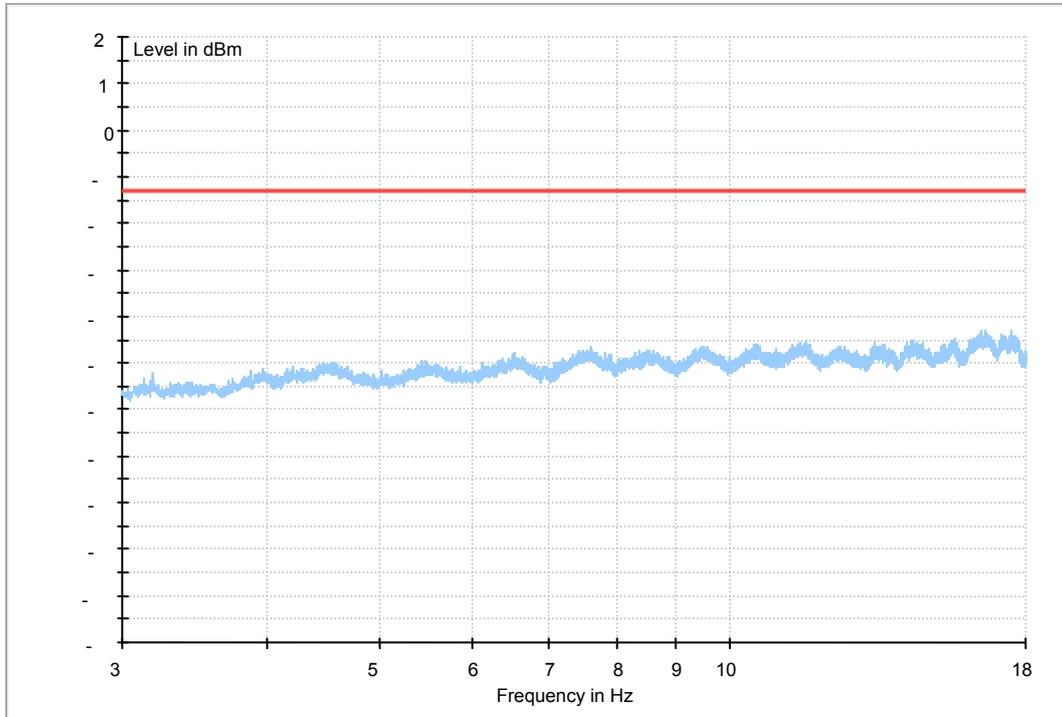


Traffic Mode (30MHz-3GHz)





Traffic Mode (3GHz-18GHz)





Appendix G

Frequency Stability According to FCC Part 2.1055& Part 22.355



Frequency Error vs. Temperature:

Test Mode	RF Ch.	Volt.	Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Freq. vs. 20 °C [ppm]	Limit [ppm]	Verdict
TM 1	M	VN	-30 °C	14	0.016726	---	±2.5	Pass
			-20 °C	-15	-0.01792	---	±2.5	Pass
			-10 °C	-18	-0.02151	---	±2.5	Pass
			0 °C	15	0.017921	---	±2.5	Pass
			10 °C	17	0.020311	---	±2.5	Pass
			20 °C	-15	-0.01792	---	±2.5	Pass
			30 °C	13	0.015532	---	±2.5	Pass
			40 °C	-11	-0.01314	---	±2.5	Pass
			50 °C	17	0.020311	---	±2.5	Pass
TM 2	M	VN	-30 °C	-15	-0.01792	---	±2.5	Pass
			-20 °C	16	0.019116	---	±2.5	Pass
			-10 °C	-18	-0.02151	---	±2.5	Pass
			0 °C	-13	-0.01553	---	±2.5	Pass
			10 °C	-18	-0.02151	---	±2.5	Pass
			20 °C	19	0.0227	---	±2.5	Pass
			30 °C	15	0.017921	---	±2.5	Pass
			40 °C	-14	-0.01673	---	±2.5	Pass
			50 °C	15	0.017921	---	±2.5	Pass



Frequency Error vs. Voltage:

Test Mode	RF Ch.	Temp.	Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Freq. vs. 20 °C [ppm]	Limit [ppm]	Verdict
TM 1	M	TN	VL	14	0.016726	---	±2.5	Pass
			VN	-15	-0.01792	---	±2.5	Pass
			VH	18	0.021505	---	±2.5	Pass
TM 2	M	TN	VL	-13	-0.01553	---	±2.5	Pass
			VN	18	0.021505	---	±2.5	Pass
			VH	17	0.020311	---	±2.5	Pass

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



Appendix H

Photos of Radiated Spurious Emissions



Photos of Test Setup



1 Radiated Spurious Emissions



Radiated Spurious Emission (below 3GHz)



Radiated Spurious Emission (3GHz to18GHz)

-----END-----