TEST REPORT

Report Number: 3192213LEX-001
Project Number: 3192213

Evaluation of the GNOV1N

FCC ID: LHJGNOV1N
Industry Canada ID: 2807-GNOV1N

FCC Part 22 Subpart H
FCC Part 24 Subpart E
FCC Part 15 Subpart B
RSS-132
RSS-133
RSS-GEN

For

Continental Automotive Systems

Test Performed by:	Test Authorized by:
Intertek 731 Enterprise Drive Lexington, KY 40510	Continental Automotive Systems 21440 West Lake Cook Road Deer Park, IL 60010

Prepared By:_____ **Date:**____10/28/2009_____

Jason Centers, Senior Project Engineer

Approved By:_____ **Date:**____10/28/2009_____

Bryan Taylor, Team Leader

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1 JOB DESCRIPTION

1.1 Company Information

Company Information	
Manufacturer:	Continental Automotive Systems
Address:	21440 West Lake Cook Road Deer Park IL 60010
Contact Name:	Irina Shmagin
Telephone Number:	(847) 932-9298

1.2 Test Sample Information

GNOV1N is a GSM/GPRS/EDGE- capable device for use within automotive environment to provide wireless connectivity within a vehicle. The device will be installed behind the radio panel of a commercial vehicle during the car factory assembly process.

Test sample		
Model Number:	GNOV1N	
Serial Number:	Test Sample 1	
FCC ID:	LHJGNOV1N	
ICID:	2807-GNOV1N	
Device Category:	Mobile	
RF Exposure Category:	General Population/Uncontrolled Environment	
Transmission Modes:	**GSM 850**	**GSM 1900**
Frequency Range, MHz:	824MHz - 849MHz	1850MHz – 1910MHz
Maximum Conducted RF Output Power:	32.5dBm	29.64 dBm
Antenna Type:	Not Supplied	Not Supplied
Antenna Location:	Externally Mounted	Externally Mounted

1.3 System Support Equipment

Table 1-1 contains the details of the support equipment associated with the Equipment Under Test during the testing.

Table 1-1: System Support Equipment

Description	Manufacturer	Model Number	Serial Number
Laptop	Compaq	EVO N410c	3902A783
Power Supply	Hewlett Packard	6296A	1929A03879
Antenna	MaxRad	ASPRDM1994S	Not Labeled

1.4 Cables Used During Testing

Table 1-2 contains the details of the cables used during the testing.

Table 1-2: Interconnecting Cables Used During Testing

Cables					
Description	Length	Shielding	Ferrites	Connection	
				From	To
Multi-Conductor Wiring Harness	2 ft	None	None	EUT	Test Interface Box
DC Power	6 ft	None	None	Test Interface Box	DC Power Supply
RS232 Signal	6 ft	Yes	None	Test Interface Box	Laptop
Coax Antenna Cable	2 ft	Yes	None	GSM Antenna Port	Cellular Antenna

1.5 System Block Diagram(s)

The diagrams below detail the interconnection of the EUT and its accessories during the testing.

Figure 1-1: Radiated Test Configuration

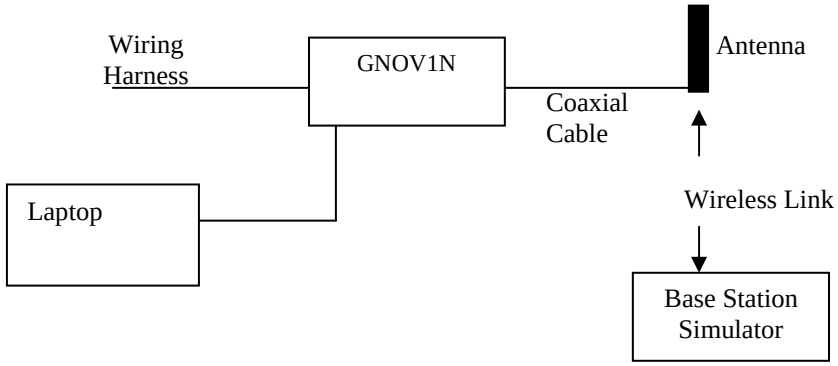
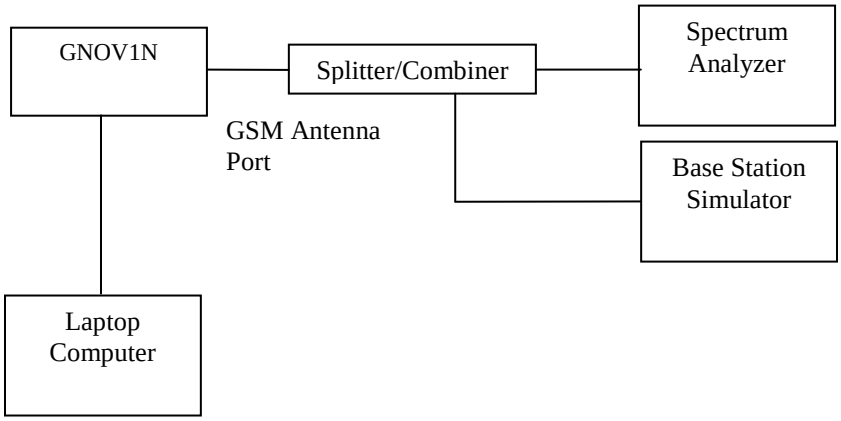


Figure 1-2: Conducted Test Configuration



1.6 Mode(s) of operation / Engineering Judgments

The GNOV1N was powered by a 13VDC laboratory power supply.

For radiated testing in receiver mode a representative cellular antenna was connected to the GNOV1N. For radiated spurious testing, the antenna port on the GNOV1N was terminated in a non-radiating load. For conducted measurements the antenna was removed and a calibrated coaxial cable inserted between the antenna port and the measuring equipment (spectrum analyzer or base station simulator. A base station simulator was used to force the GNOV1N to transmit at maximum output power.

2 EXECUTIVE SUMMARY

Testing performed for: Continental Automotive Systems

Equipment Under Test: GNOV1N

Receipt of Test Sample: 10/6/2009

Test Start Date: 10/12/2009

Test End Date: 10/21/2009

The GNOV1N was compliant with the requirements of FCC Part §22, Part §24, RSS-132, and RSS-133.

FCC RULE	IC RULE	DESCRIPTION OF TEST	RESULT	PAGE
§2.1046	-	RF Power Output	**Compliant**	9
§22.913, §24.232	RSS-132 4.4 RSS-133 (6.4)	ERP, EIRP	**Compliant**	9
§ 1.1310	NA	Maximum Permissable Exposure (MPE) Calculations	**Compliant**	10
§2.1049 §22.917(b)(d) §24.238(a)	RSS-GEN 4.6.1	Occupied Bandwidth, Emissions Limitations	**Compliant**	12
§2.1051 §22.917(a) §24.238(a)	RSS-132 (4.5) RSS-133 (6.3)	Out of Band Emissions at Antenna Terminals	**Compliant**	15
§2.1053 §22.917(a) §24.238(a)	RSS-132 (4.3) RSS-133 (6.3)	Radiated Spurious Emissions	**Compliant**	38
§15.107	RSS-Gen (7.2.2)	Power Line Conducted Emissions	**NA**[1]	-
§15.109	RSS-Gen (7.2.3.2)	Receiver Spurious Emission	**Compliant**	41
§2.1055, §22.355, §24.235	RSS-Gen (4.7)	Frequency Stability vs. Temperature	**Compliant**	43
§2.1055, §22.355, §24.235	RSS-Gen (4.7)	Frequency Stability vs. Voltage	**Compliant**	44

2.1 Modifications required for compliance

No modifications were implemented by Intertek. All results in this report pertain to the un-modified sample provided to Intertek.

[1] The GNOV1N is DC powered. This test is only applicable to AC powered devices.

3 TEST FACILITY

All testing was completed at the INTERTEK-Lexington location at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1 and ANSI C63.4. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters.

For radiated immunity testing, removable ferrite tiles are positioned between the transmitting antenna and the area occupied by the equipment under test. The remaining tests typically are performed outside the chamber on the conducting ground reference plane.

The Industry Canada filing number for this site is 2042M-1 The FCC registration number is 485103.

3.1 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Calibration due date
Environmental Chamber	Thermotron	SM-8C	32692	1/29/2010
Signal Generator	HP	83620B	3614A00199	10/8/2010
Horn Antenna	EMCO	3115	6556	8/4/2010
Horn Antenna	Antenna Research	DRG-118/A	1086	7/3/2010
EMI Receiver	Rohde & Schwarz	ESI26	10887490.26	9/14/2010
Bilog Antenna	EMCO	3142C	00051864	12/24/2009
Preamplifier	Miteq	AFS44-00102000-30-10P-44	987410	6/17/2010
Digital Multimeter	Fluke	87	65920874	5/20/2010
Base Station Simulator	Rhode & Schwarz	CMU200	837198089	6/24/2010
Base Station Simulator	Agilent	8960 Series 10	GB43344834	12/10/2009

4 CONDUCTED RF POWER

FCC Rule: §2.1046

4.1 Test Procedure

The transmitter output was connected to a calibrated coaxial cable, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The EUT was placed into a call and the transmitter output was read off the base station simulator in dBm. The power output at the transmitter antenna port was determined by adding the value of the cable insertion loss to the base station simulator power reading.

Tests were performed at three frequencies (low, middle, and high channels) and on the highest power levels, which can be setup on the transmitters.

4.2 Test Results

The GNOV1N met the RF power output requirements of FCC Part 22 Subpart H and FCC Part FCC Part 24 Subpart E. The test results are shown Table 4-1.

Table 4-1 Conducted RF Power

	GSM 850 Band			GSM 1900 Band		
Temp	**Channel 128**	**Channel 190**	**Channel 251**	**Channel 512**	**Channel 661**	**Channel 810**
GSM	32.5	32.5	32.4	29.49	29.52	29.57
GSM GPRS	32.42	32.41	32.42	29.54	29.62	29.64
GSM EDGE	26.87	26.89	26.76	26.12	26.07	26.12

5 RADIATED RF POWER

FCC Rule §22.913: The Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

FCC Rule §24.232; RSS-133 §6.2: The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

RSS-132 (4.4)
RSS-133 (6.4)

5.1 Test Procedure

Since the device is not supplied with an antenna, the maximum allowed antenna gain is calculated using the maximum measured conducted output power.

GSM 850 Band:

Gain (dBd) = ERP - Conducted Output Power (dBm)

Gain (dBd) = 32.1dBm – 32.5 dBm = -0.39dBd = 1.76dBi

GSM 1900 Band:

Gain (dBi) = EIRP - Conducted Output Power (dBm)

Gain (dBi) = 33dBm – 29.64 dBm = 3.36 dBi

5.2 Test Results

The GNOV1N meets the radiated power requirements of FCC §22.913 and §24.232 when an antenna of no more than 1.76 dBi of gain in the cell band and no more than 3.36 dBi of gain in the PCS band is used.

6 MAXIMUM PERMISSIBLE EXPOSURE (MPE) CALCULATIONS

The § 1.1310 Radiofrequency radiation exposure limits are listed in the table below.

	Frequency Range (MHz)	Power Density Limit (mW/cm^2)
Limits for Occupational/Controlled Exposures	0.3-3.0	100
	3.0-30	900/ Frequency2
	30-300	1.0
	300-1500	Frequency/300
	1500-100,000	5.0
Limits for General Population/Uncontrolled Exposure	0.3-1.34	100
	1.34-30	180/Frequency2
	30-300	0.2
	300-1500	Frequency/1500
	1500-100,000	1.0

For Cell bands the limit for general population / uncontrolled exposure is calculated to be $0.55mW/cm^2$

For PCS band, the limit for general population / uncontrolled exposure is $1.0mW/cm^2$

6.1 Calculations

Since the GNOV1N is not sold with an antenna the EIRP is calculated from the conducted power in the previous section of this report. That radiated power is then used to calculate the MPE at a 20 cm distance using the following formula:

$$\text{Maximum RF Exposure at 20cm} = (\text{EIRP in mW})/(4\text{Pi}(20\text{cm})^2)$$

Cell / AMPS Band:

The maximum ERP for the cell band was 32.1 dBm. To convert ERP to EIRP, 2.15dB was added to the ERP value in order to convert it to an EIRP of 34.26 dBm or 2664mW

Substituting this into the equation above, we get a Maximum RF Exposure (MPE) at 20cm of:

$$\text{MPE at 20cm} = 2664mW / (4\text{Pi}(20\text{cm})^2)$$

$$\text{MPE at 20cm} = 0.53mW/cm^2$$

PCS Band:

The maximum EIRP for the PCS band was 33dBm.

Substituting this into the equation above, we get a Maximum RF Exposure (MPE) at 20cm of:

$$\text{MPE at 20cm} = 2000mW / (4\text{Pi}(20\text{cm})^2)$$

$$\text{MPE at 20cm} = 0.397mW/cm^2$$

6.2 Test Results

The worst case MPE at 20cm of 0.53 mW/cm^2 is less than the $0.5mW/cm^2$ limit for general population/uncontrolled exposure shown in the table above for the cell band. For the PCS band, the worst case MPE at 20cm of $0.397mW/cm^2$ is less than the 1 mW/cm^2 limit.

7 EMISSION LIMITATIONS, OCCUPIED BANDWIDTH

CFR 47 §2.1049, §22.917(b)(d), §24.238(a) : The occupied bandwidth 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.

RSS-GEN 4.6.1

7.1 Test Procedure

In both CDMA 800 and 1900 modes the antenna port of the EUT was connected to a spectrum analyzer using a calibrated coaxial cable and power divider. The EUT was placed into a call using base station simulator. The base station simulator was set to force the EUT to its maximum power setting. The occupied bandwidth function of the analyzer was used to automatically generate the occupied bandwidth plots below.

7.2 Test Results

The occupied bandwidth data for the GNOV1N is shown in Figure 7-1 through Figure 7-4.

Figure 7-1: Occupied Bandwidth – GSM 850 Band Channel 190 – GSM/GPRS

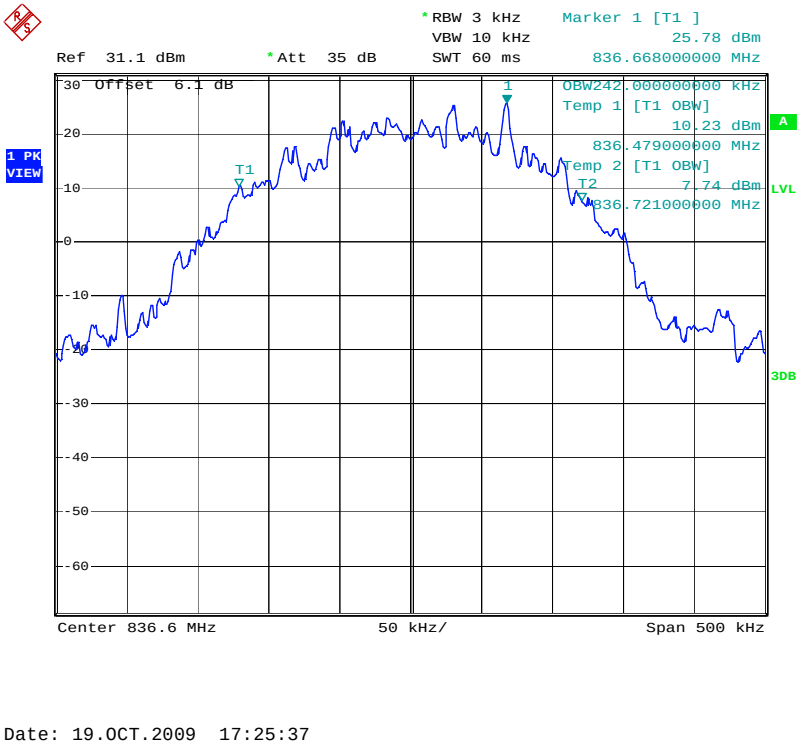


Figure 7-2: Occupied Bandwidth – GSM 850 Band Channel 190 GSM EDGE

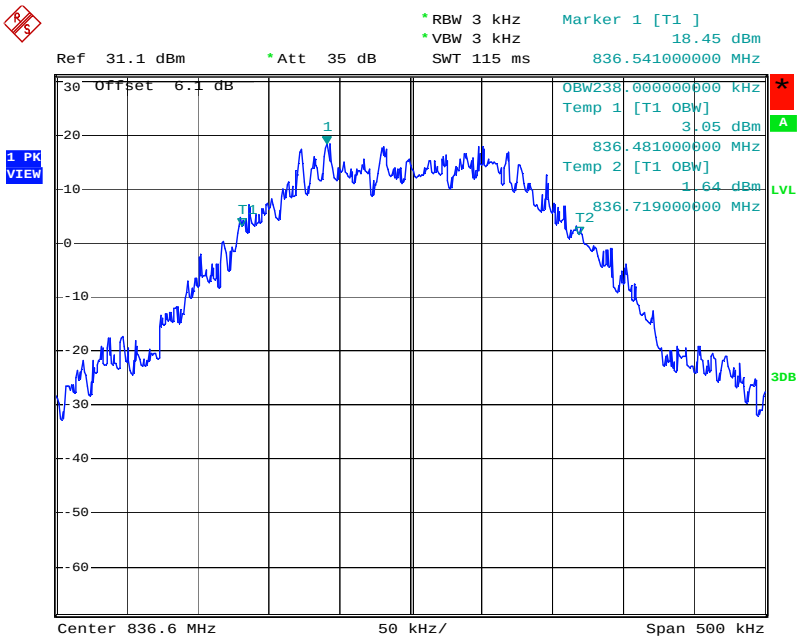


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Figure 7-3: Occupied Bandwidth – GSM 1900 Band Channel 661 - GSM/GPRS

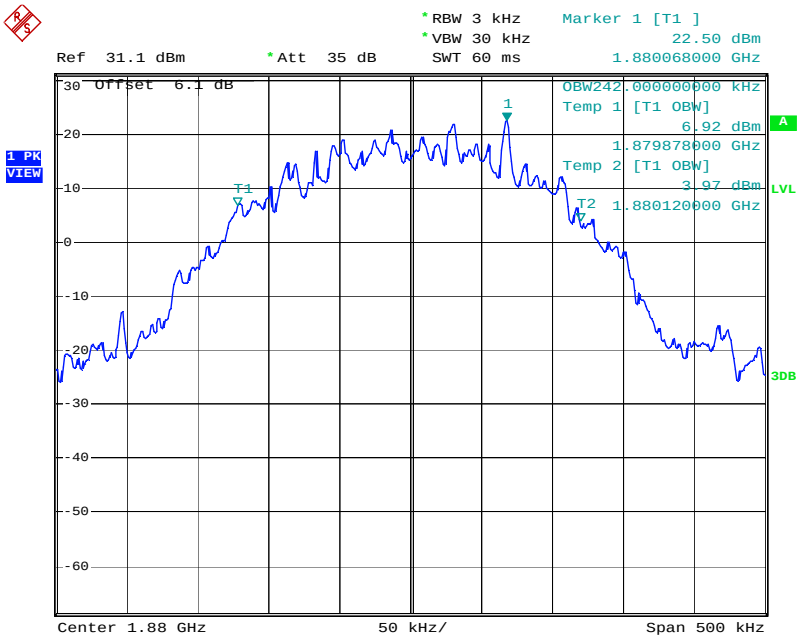

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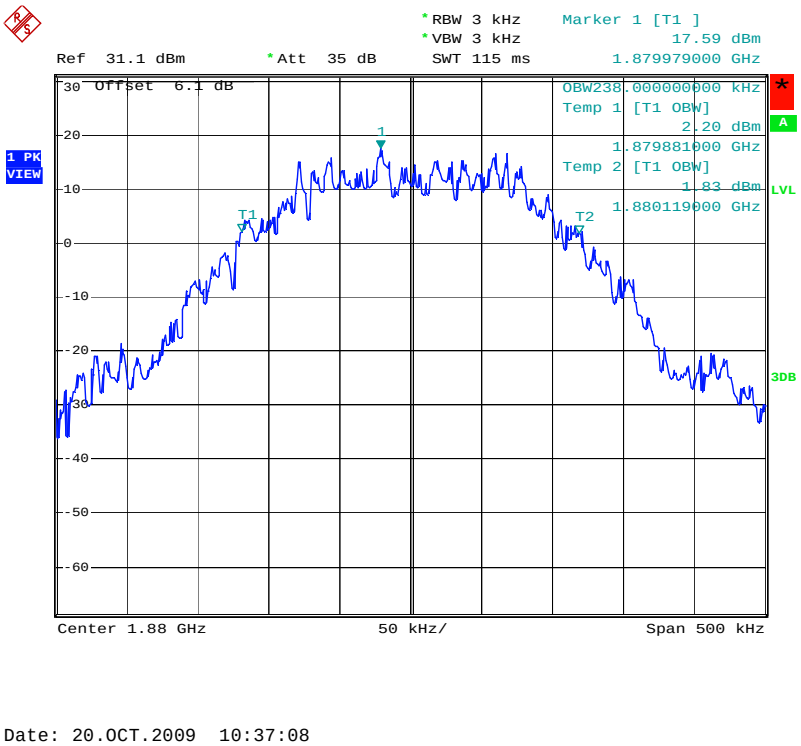
Figure 7-4: Occupied Bandwidth – GSM 1900 Band Channel 661 GSM EDGE



8 OUT OF BAND EMISSION AT ANTENNA TERMINALS

FCC §2.1049, FCC §2.1051, §22.917(a), FCC §24.238(a)

RSS-132 (4.5)

RSS-133 (6.3)

Out of Band Emissions: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

8.1 Test Procedure

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for the Cellular band and 1 MHz or greater in the PCS band. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The Base Station Simulator was set to force the EUT to its maximum power setting. The resolution bandwidth of the spectrum analyzer was set at 1 MHz. Sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

Test Results

The GNOV1N met the out of band emission at antenna terminal requirements. See Figure 8-1 through Figure 8-26 for data.

Figure 8-1: Out of band emissions at antenna terminals – GSM 850 Channel 128 – GSM Mode

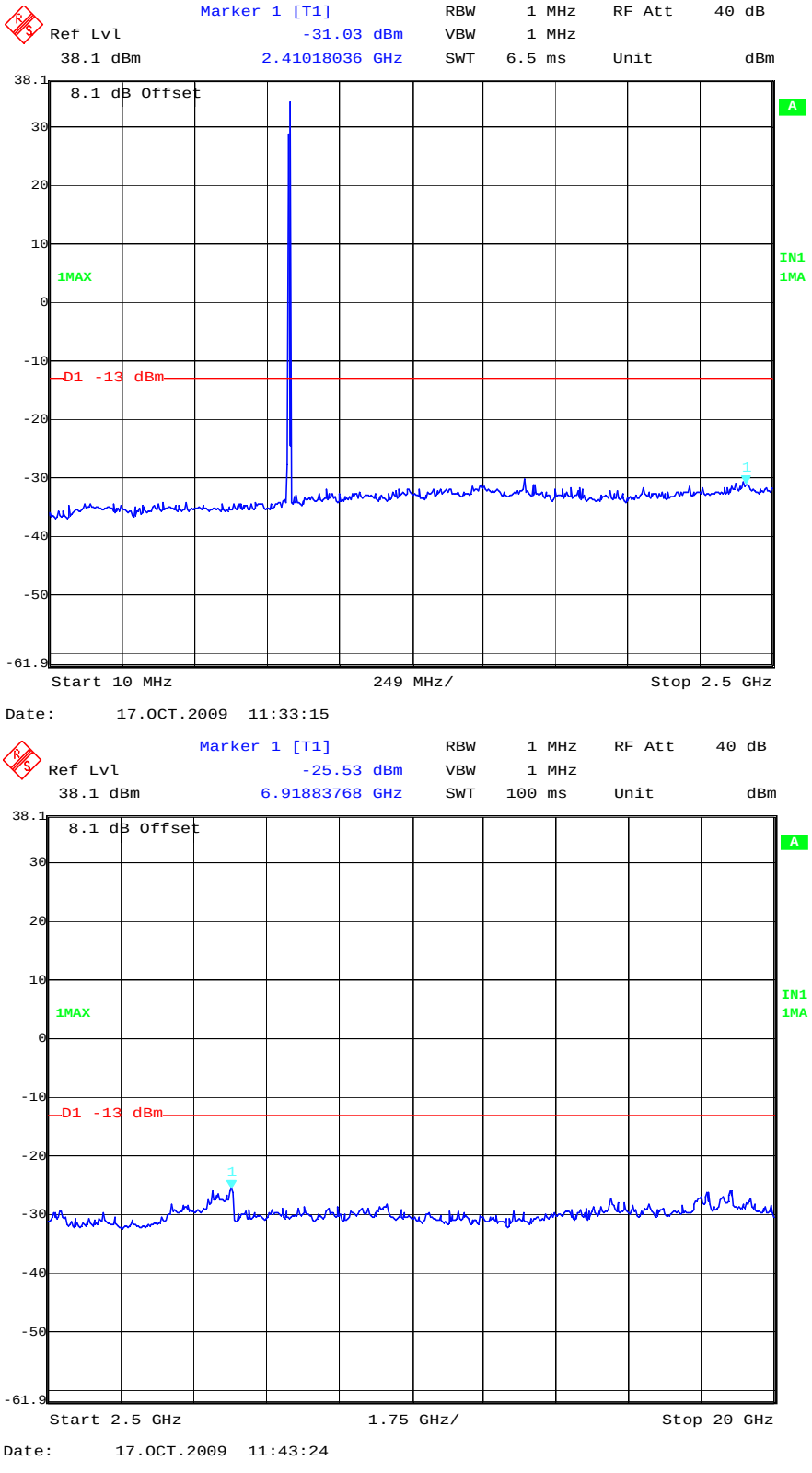
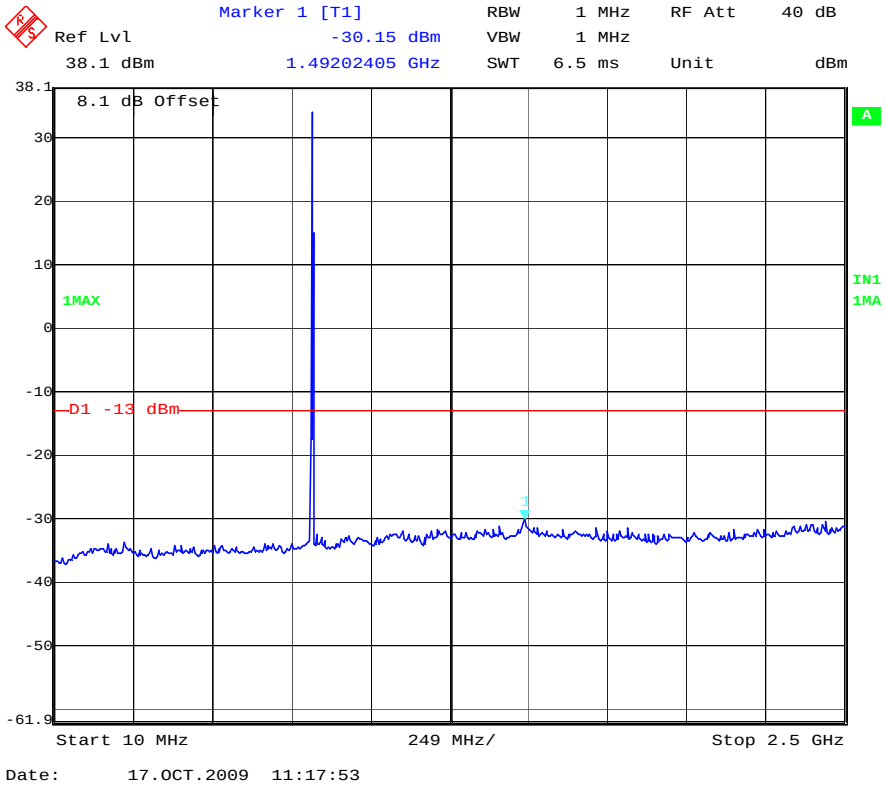


Figure 8-2: Out of band emissions at antenna terminals – GSM 850 Channel 128 – GPRS Mode



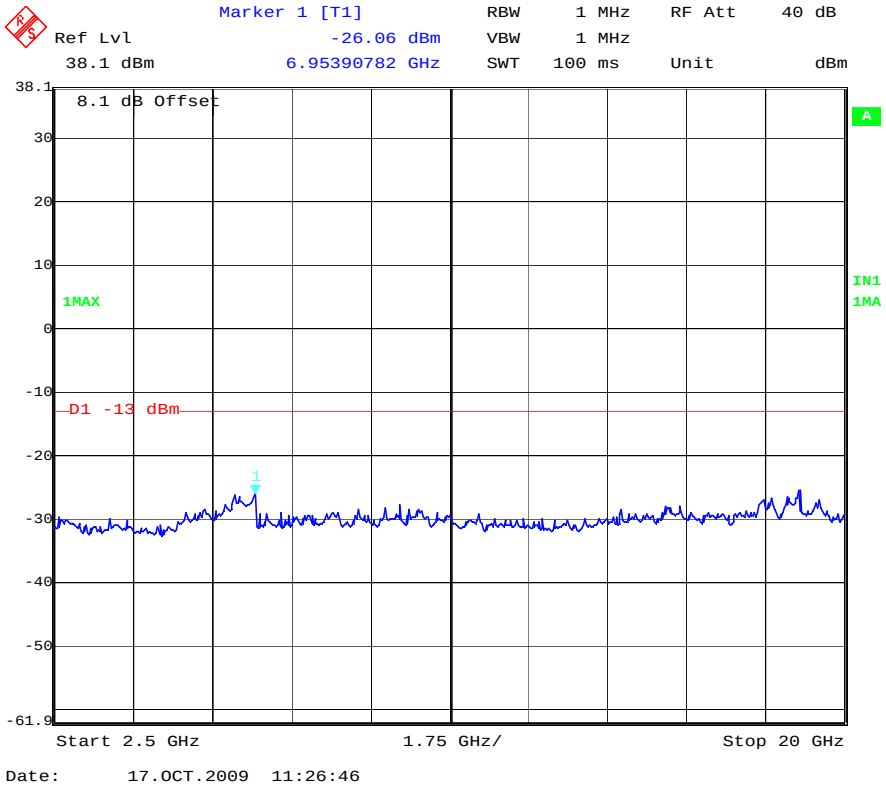
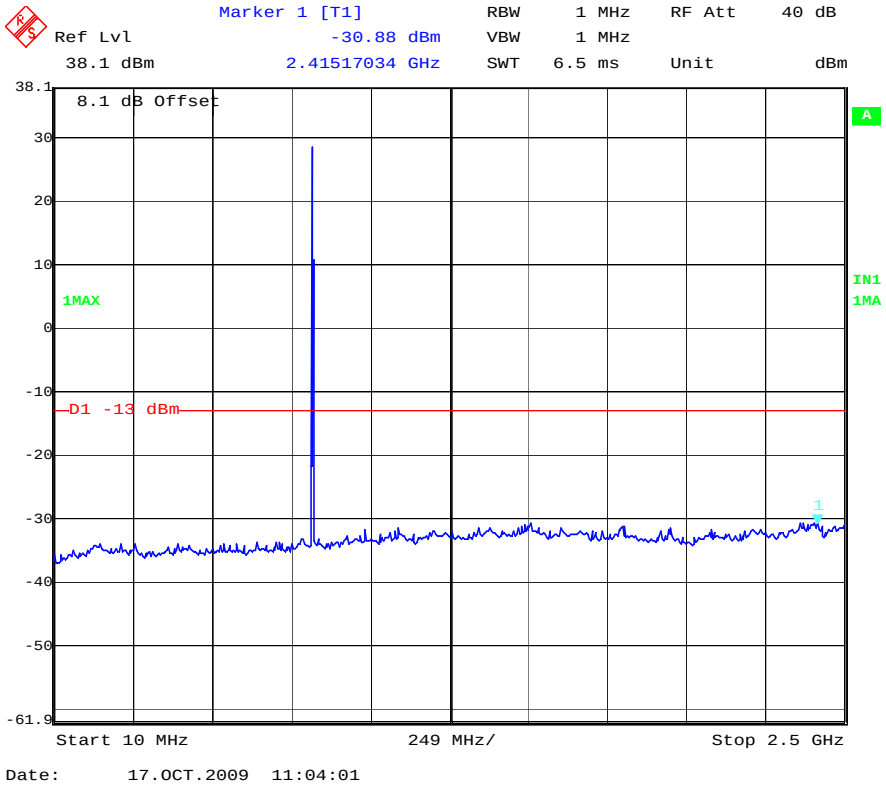


Figure 8-3: Out of band emissions at antenna terminals – GSM 850 Channel 128 – EDGE Mode



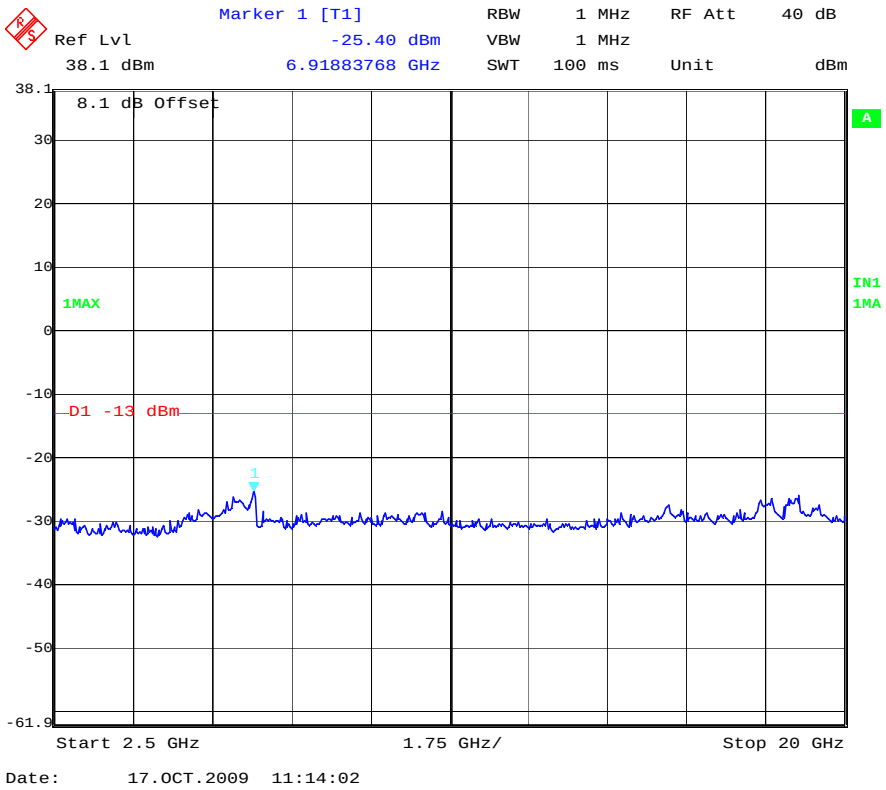
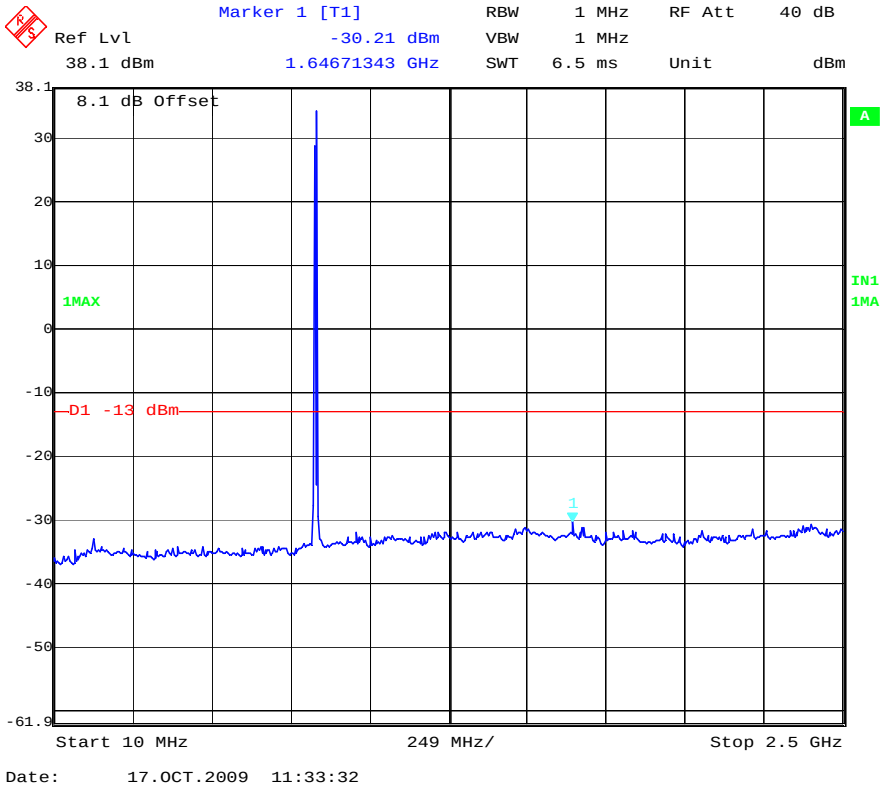


Figure 8-4: Out of band emissions at antenna terminals – GSM 850 Channel 190 – GSM Mode



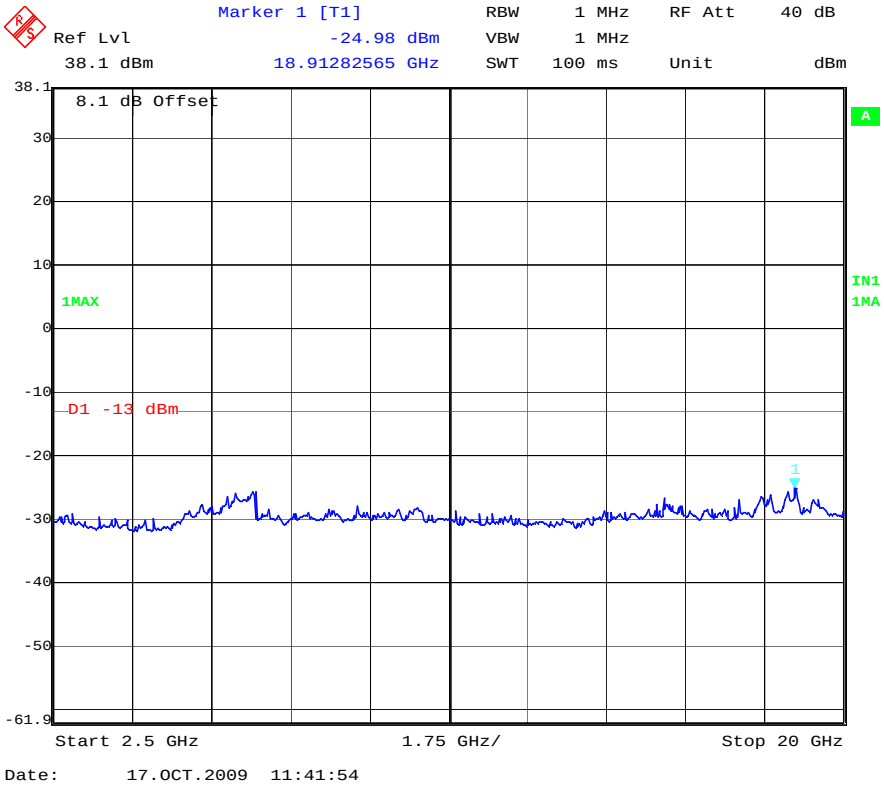


Figure 8-5: Out of band emissions at antenna terminals – GSM 850 Channel 190 – GPRS Mode

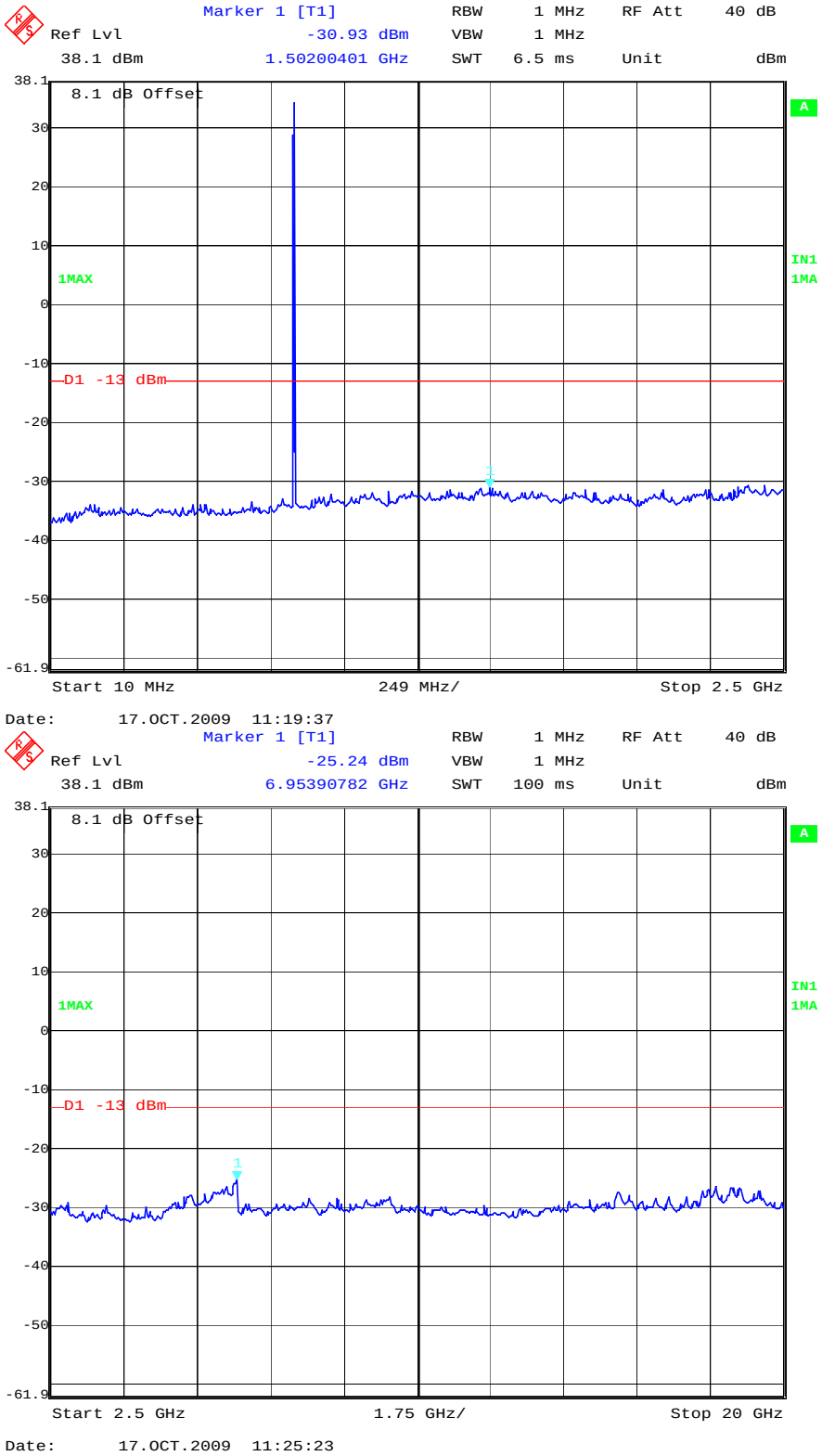
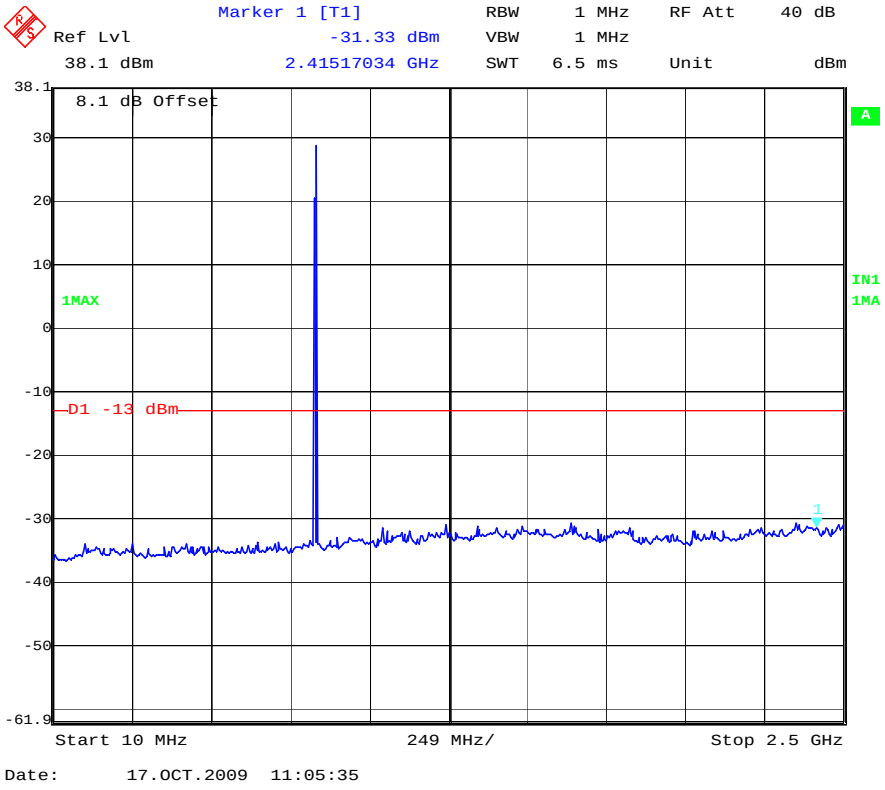


Figure 8-6: Out of band emissions at antenna terminals – GSM 850 Channel 190 – EDGE Mode



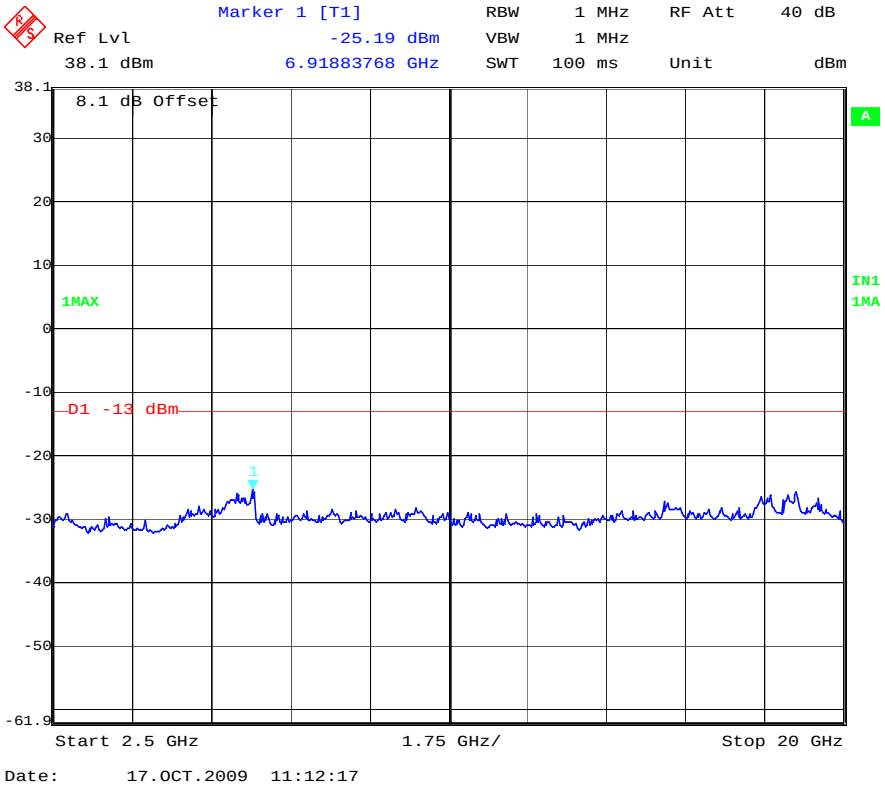


Figure 8-7: Out of band emissions at antenna terminals – GSM 850 Channel 251 – GSM Mode

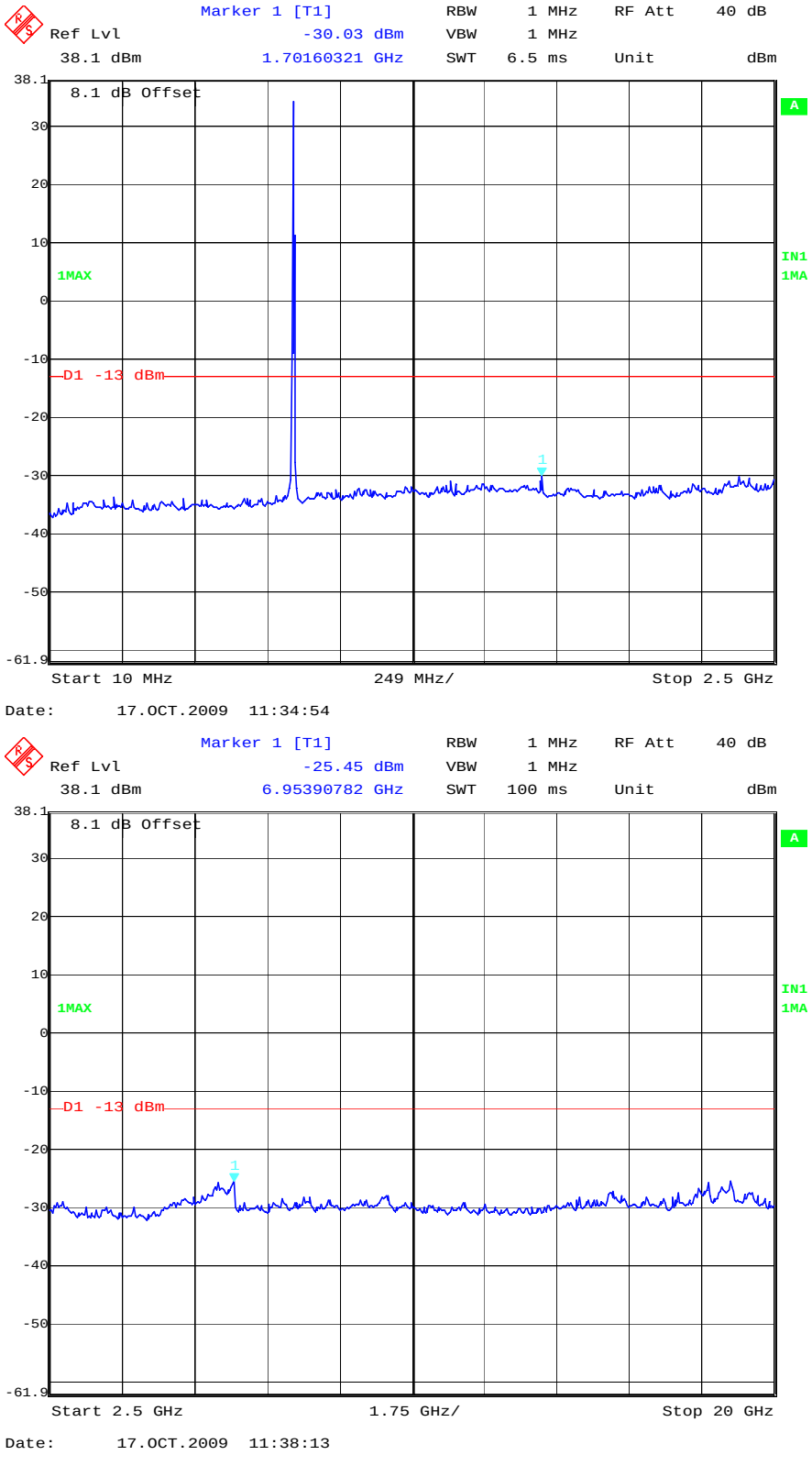


Figure 8-8: Out of band emissions at antenna terminals – GSM 850 Channel 251 – GPRS Mode

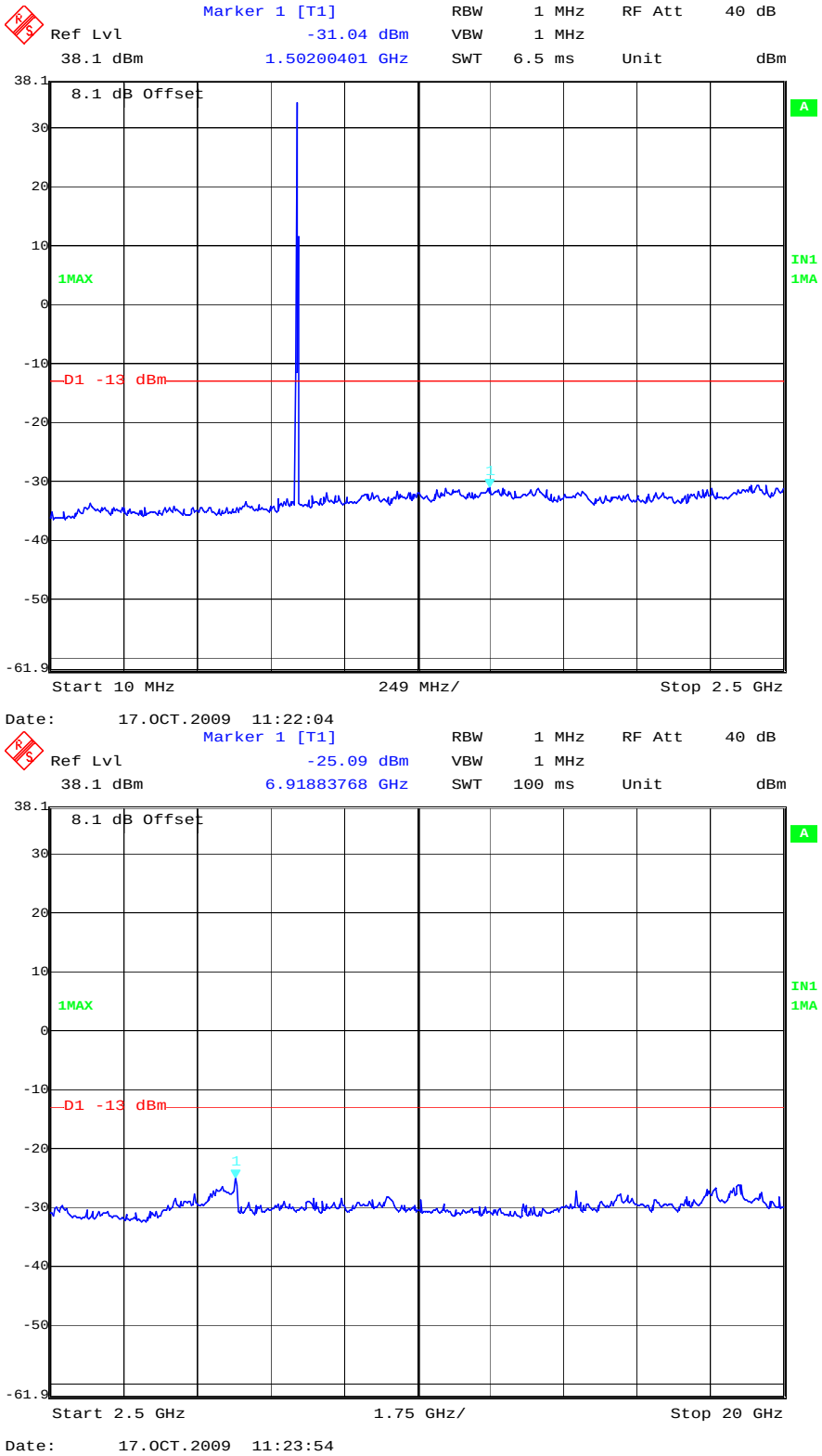
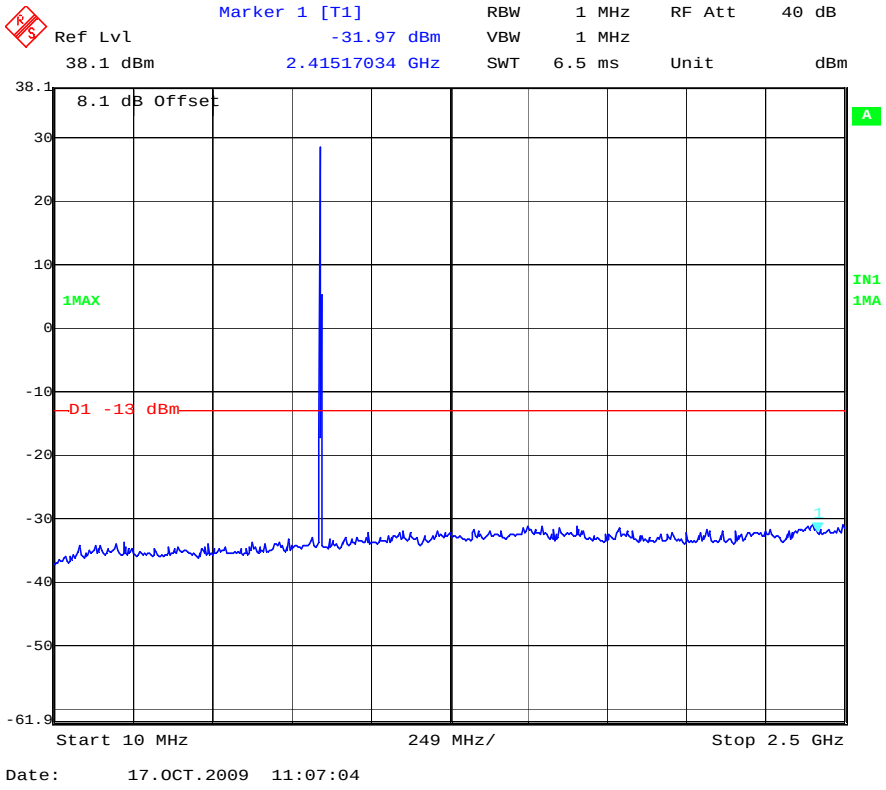


Figure 8-9: Out of band emissions at antenna terminals – GSM 850 Channel 251 – EDGE Mode



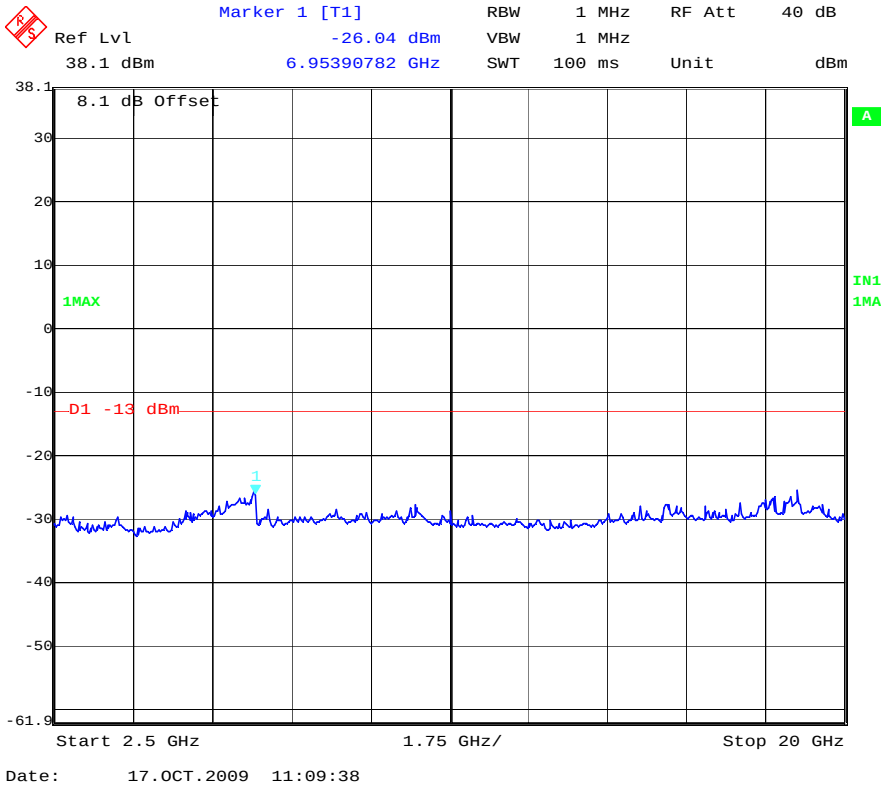
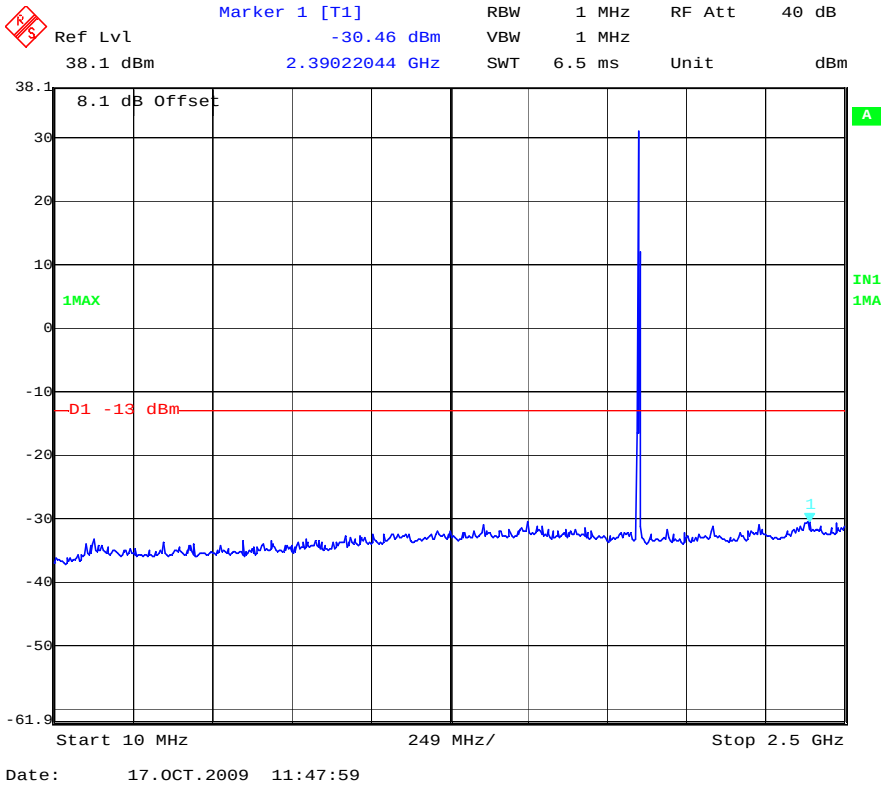


Figure 8-10: Out of band emissions at antenna terminals – GSM 1900 Channel 512 – GSM Mode



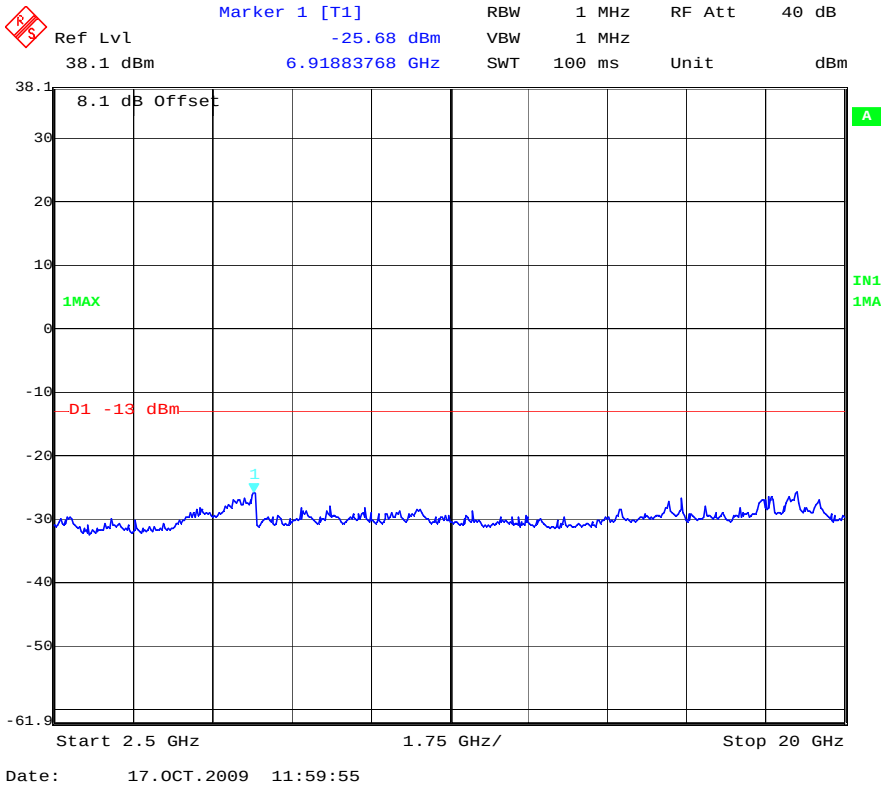


Figure 8-11: Out of band emissions at antenna terminals – GSM 1900 Channel 512 – GPRS Mode

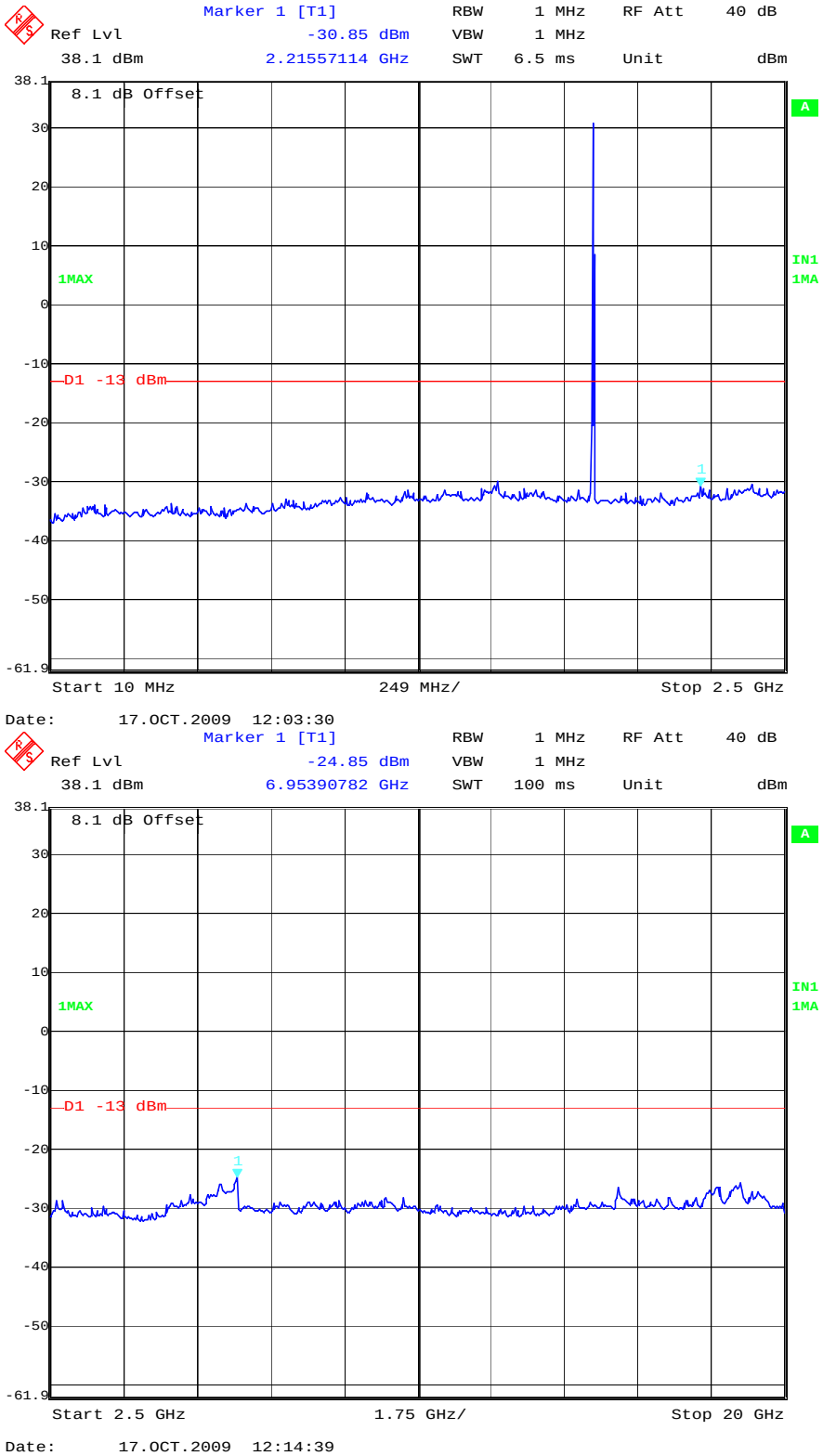


Figure 8-12: Out of band emissions at antenna terminals – GSM 1900 Channel 512 – EDGE Mode

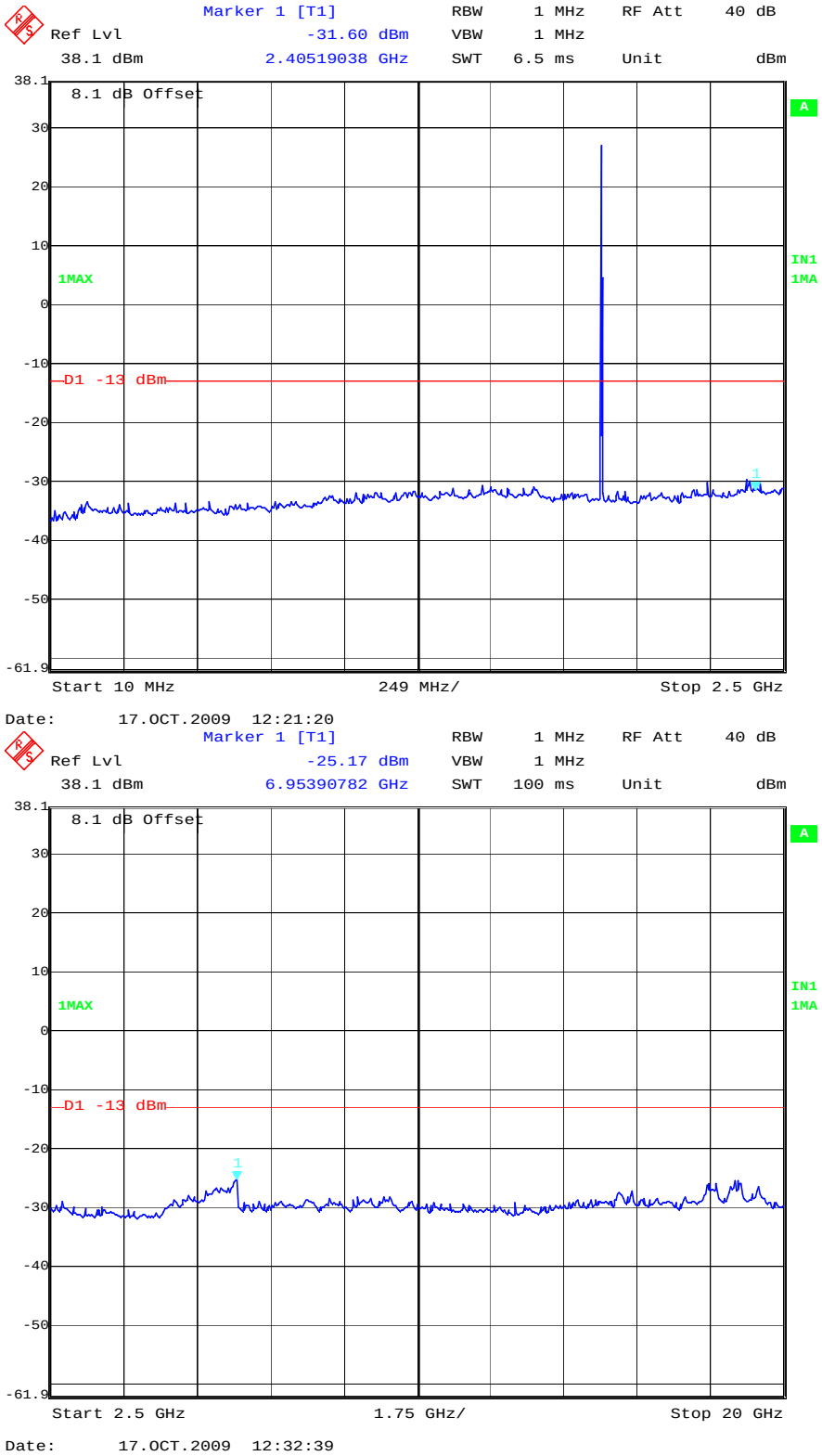


Figure 8-13: Out of band emissions at antenna terminals – GSM 1900 Channel 661 – GSM Mode

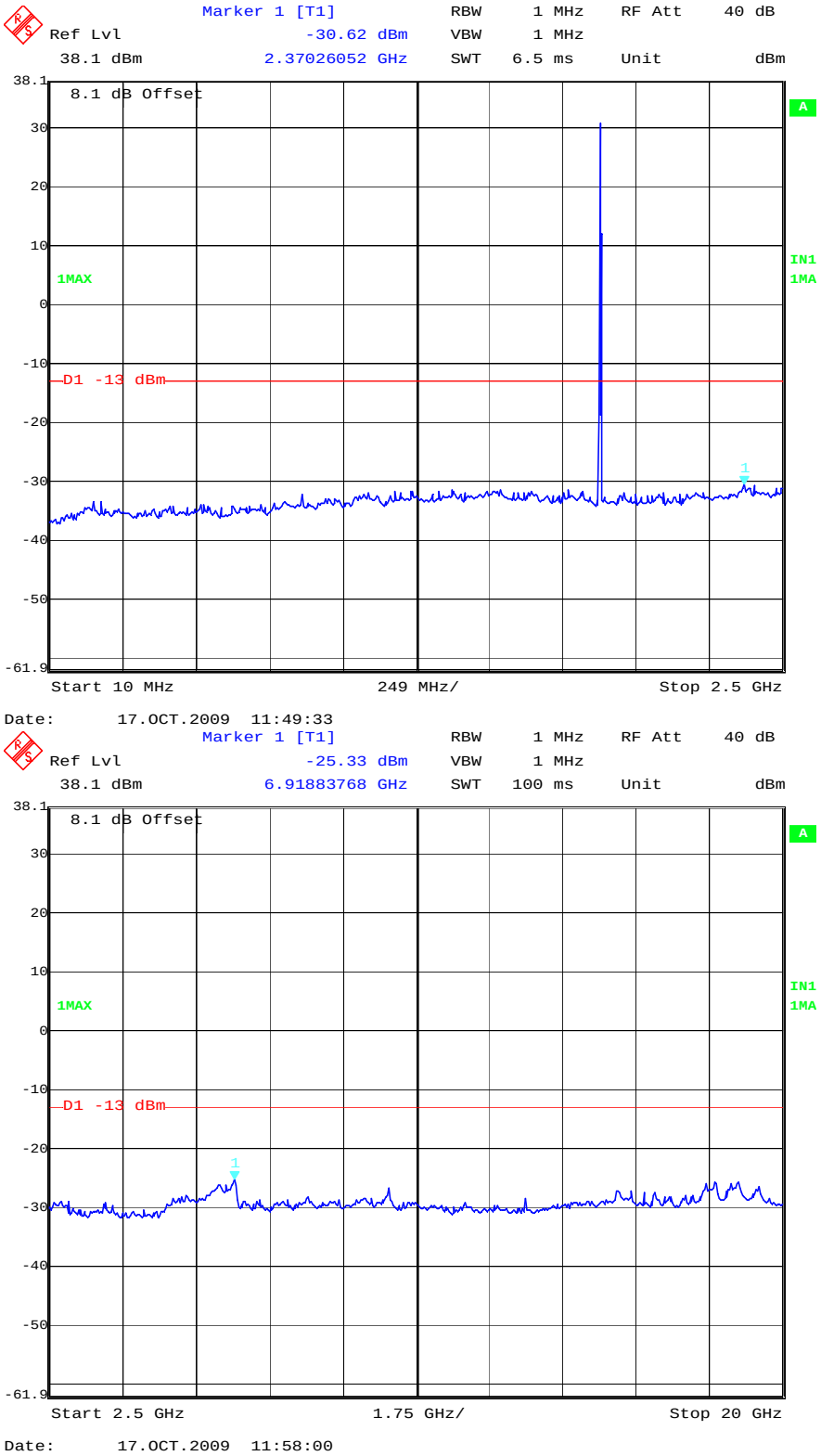


Figure 8-14: Out of band emissions at antenna terminals – GSM 1900 Channel 661 – GPRS Mode

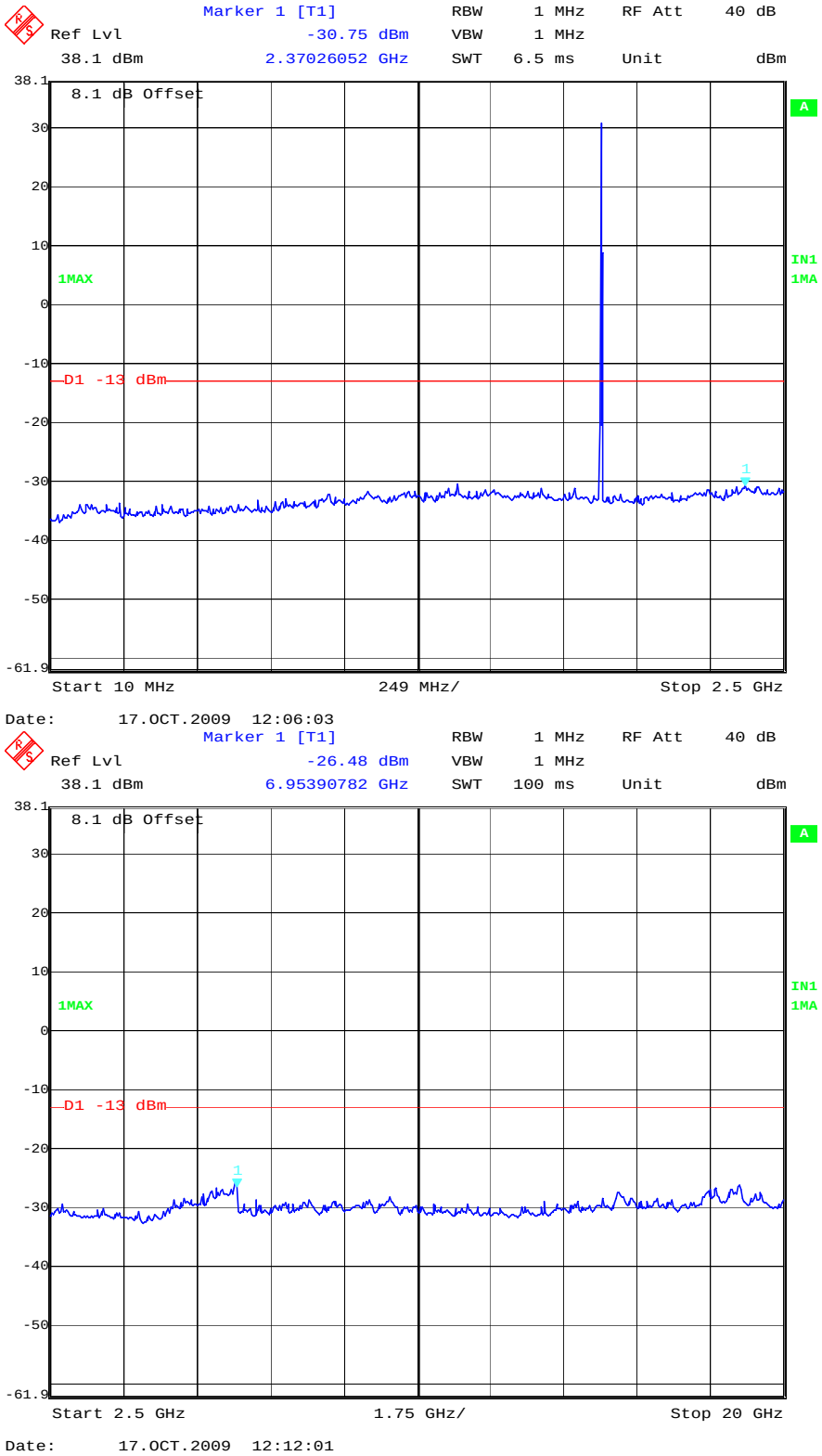


Figure 8-15: Out of band emissions at antenna terminals – GSM 1900 Channel 661 – EDGE Mode

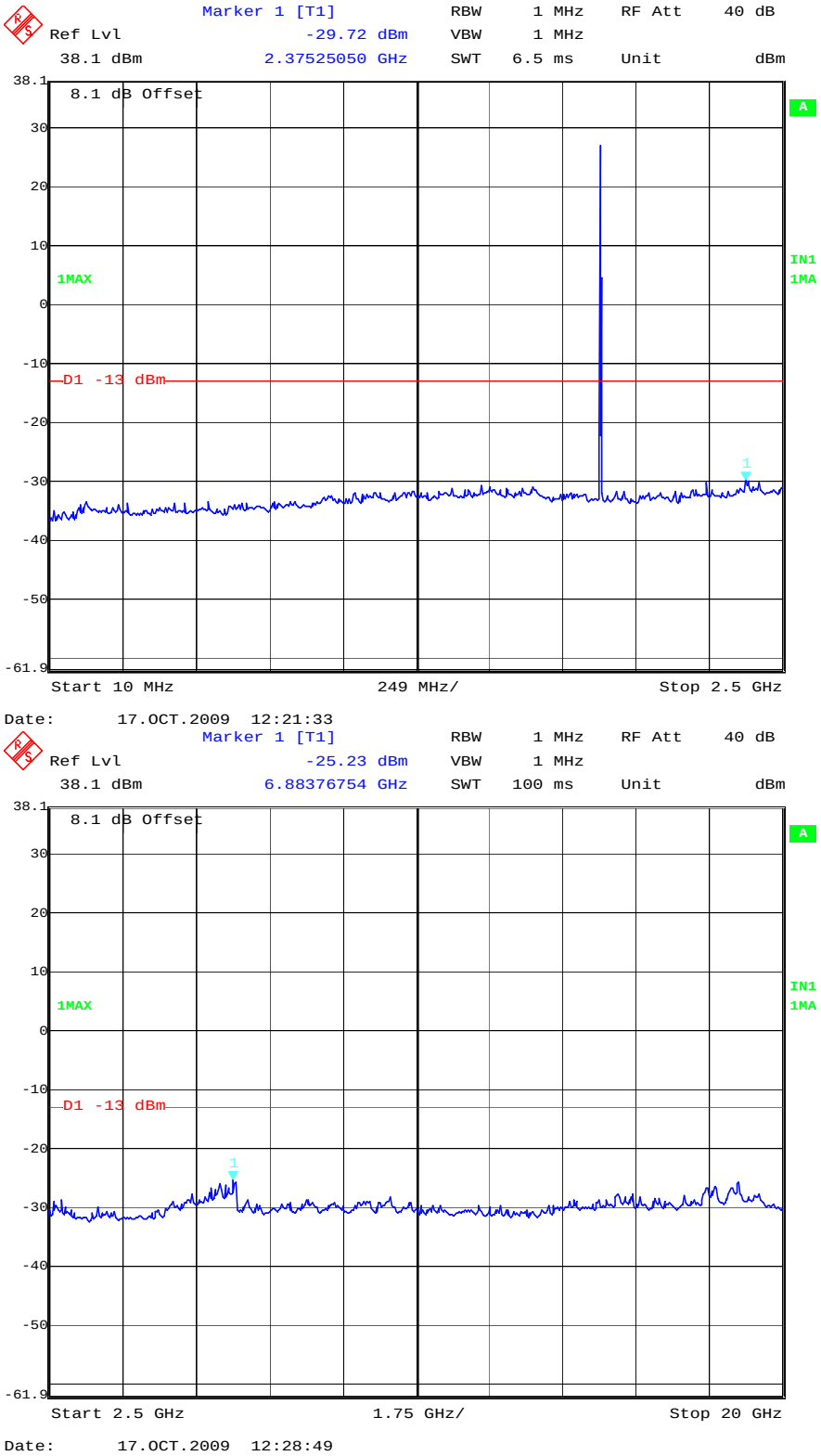


Figure 8-16: Out of band emissions at antenna terminals – GSM 1900 Channel 810 – GSM Mode

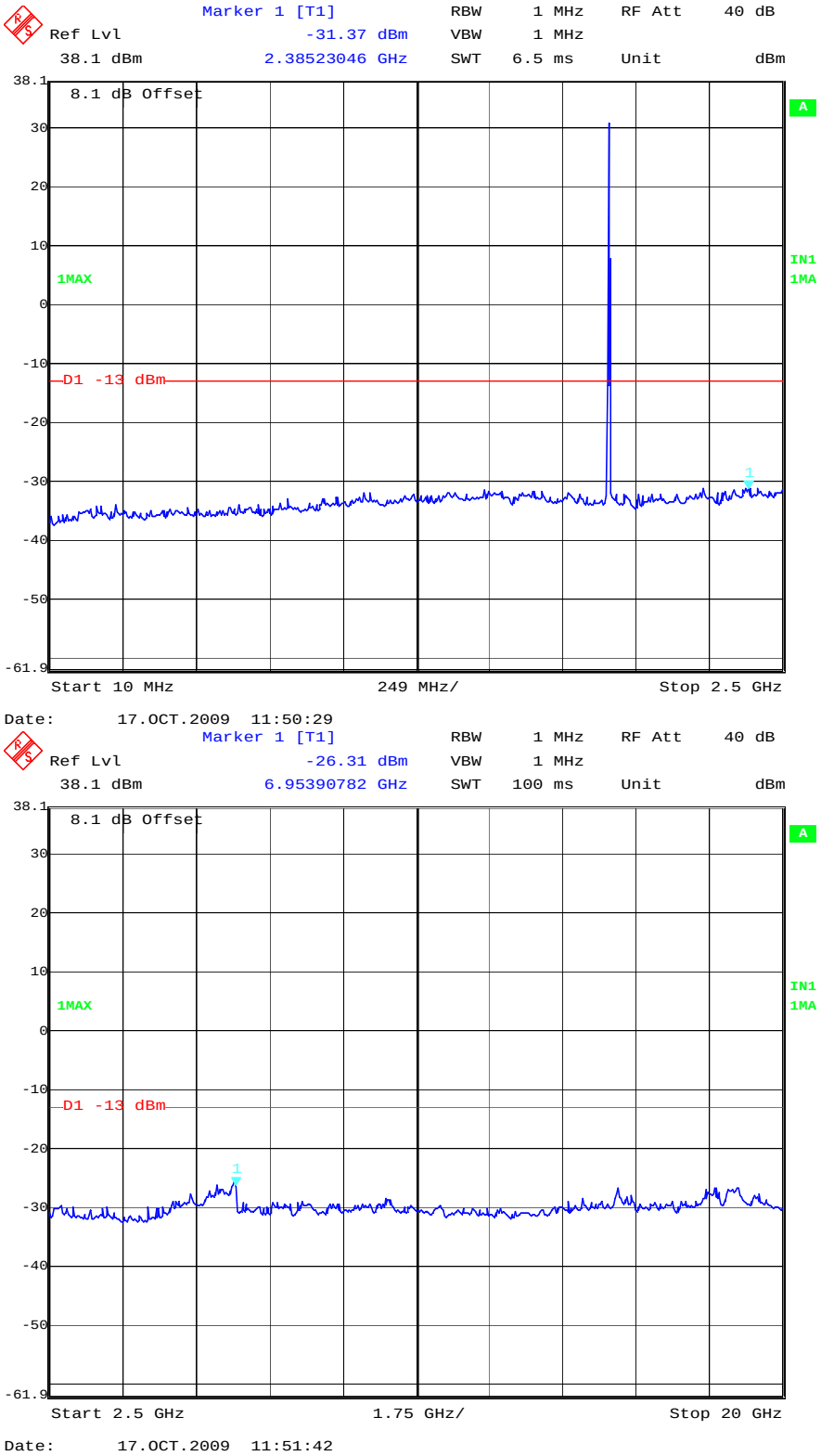


Figure 8-17: Out of band emissions at antenna terminals – GSM 1900 Channel 810 – GPRS Mode

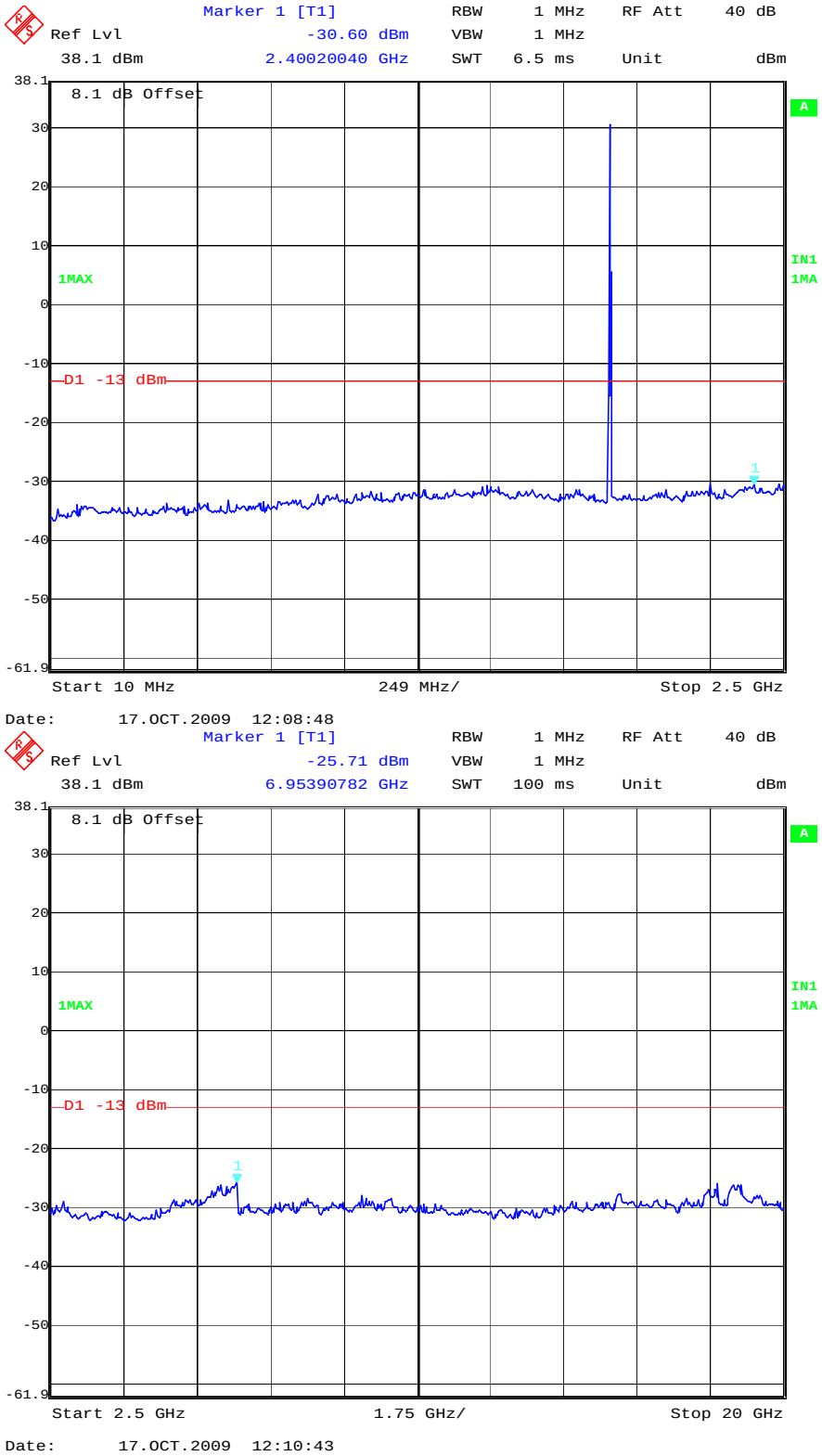


Figure 8-18: Out of band emissions at antenna terminals – GSM 1900 Channel 810 – EDGE Mode

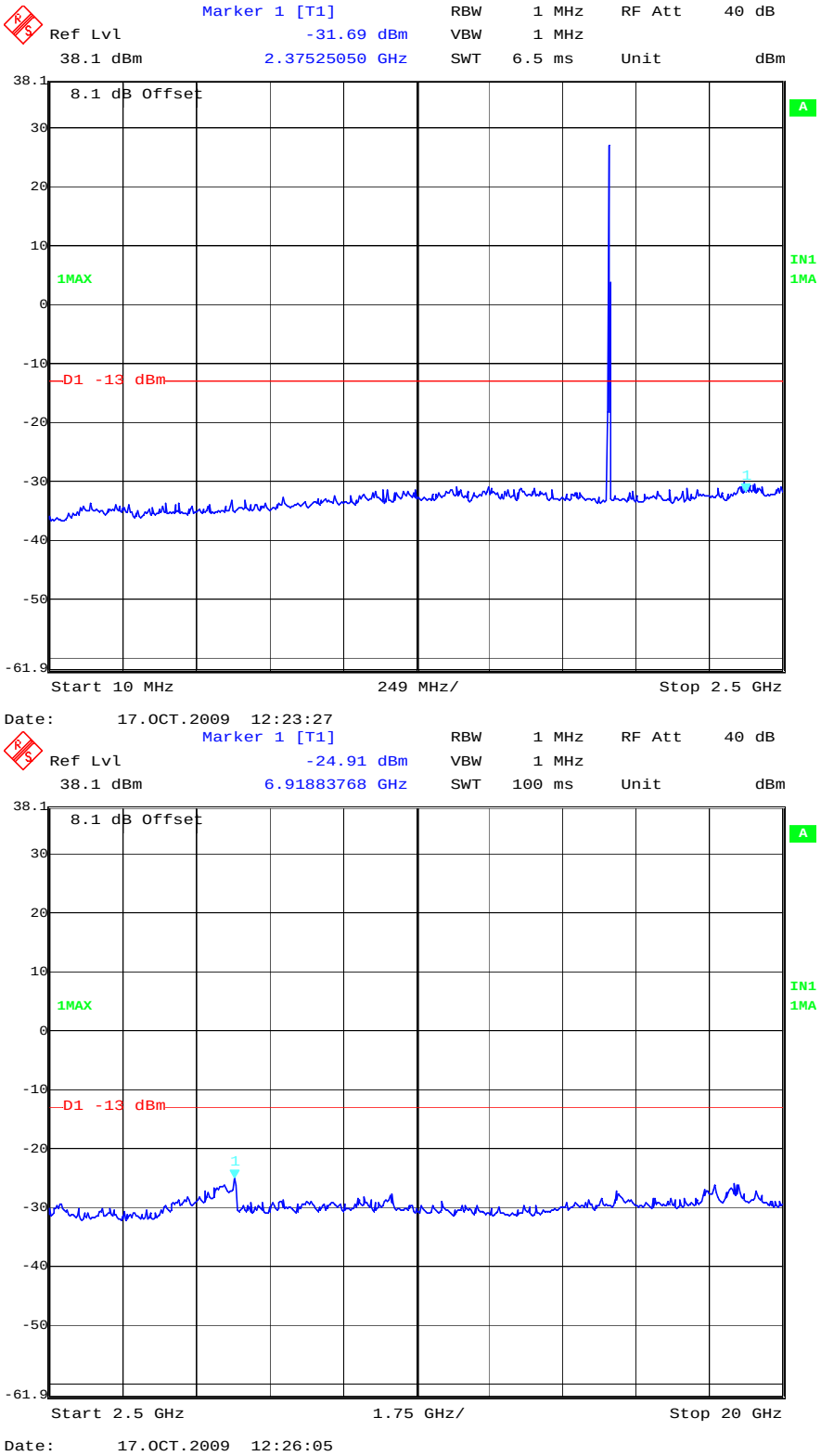


Figure 8-19: Emissions within 1 MHz of band edge, GSM 850 Channel 128 – GSM/GPRS Mode

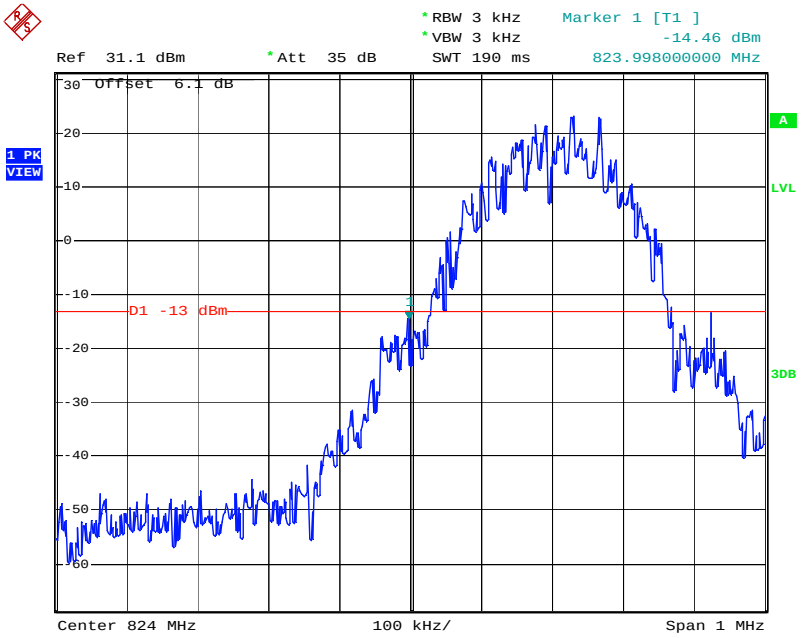


Figure 8-20: Emissions within 1 MHz of band edge, GSM 850 Channel 128 – EDGE Mode

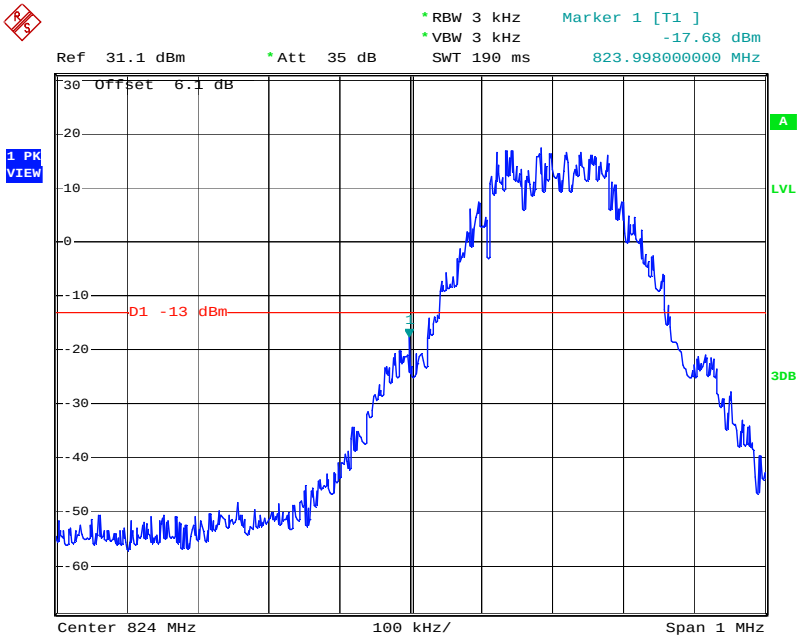
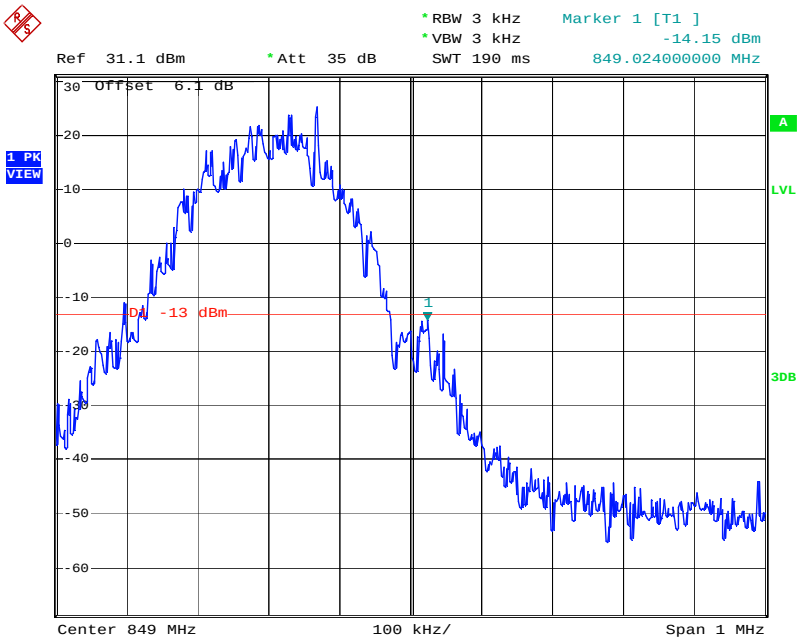
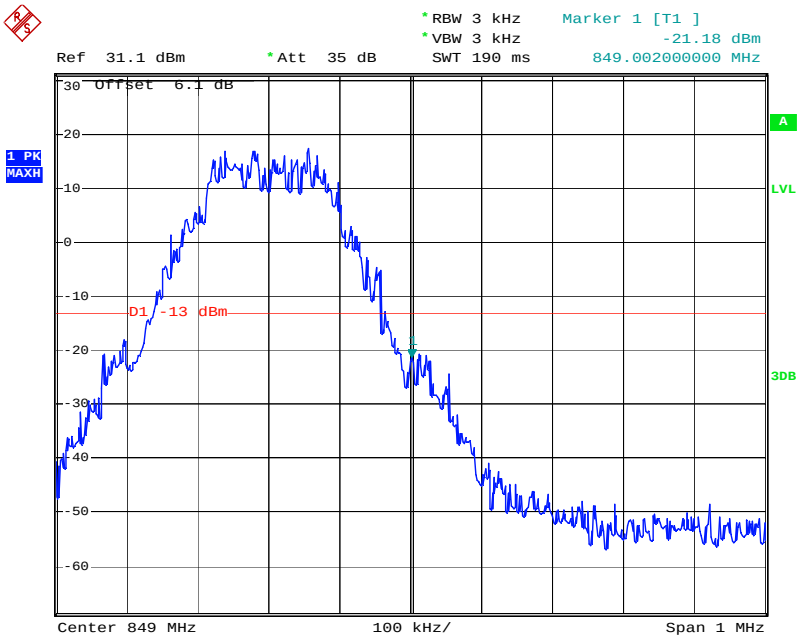


Figure 8-21: Band Edge, GSM 850 Channel 251 – GSM/GPRS Mode



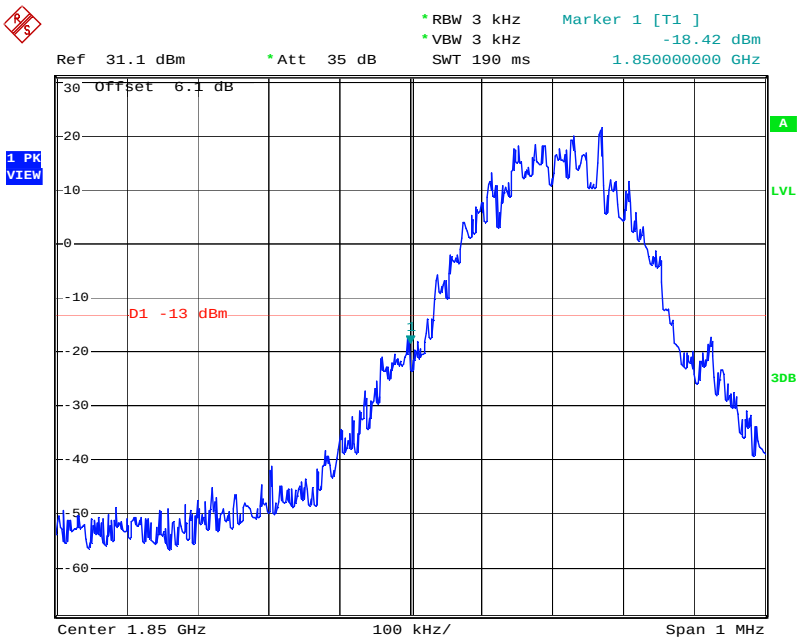
Date: 20.OCT.2009 09:49:04

Figure 8-22: Band Edge, GSM 850 Channel 251 – EDGE Mode



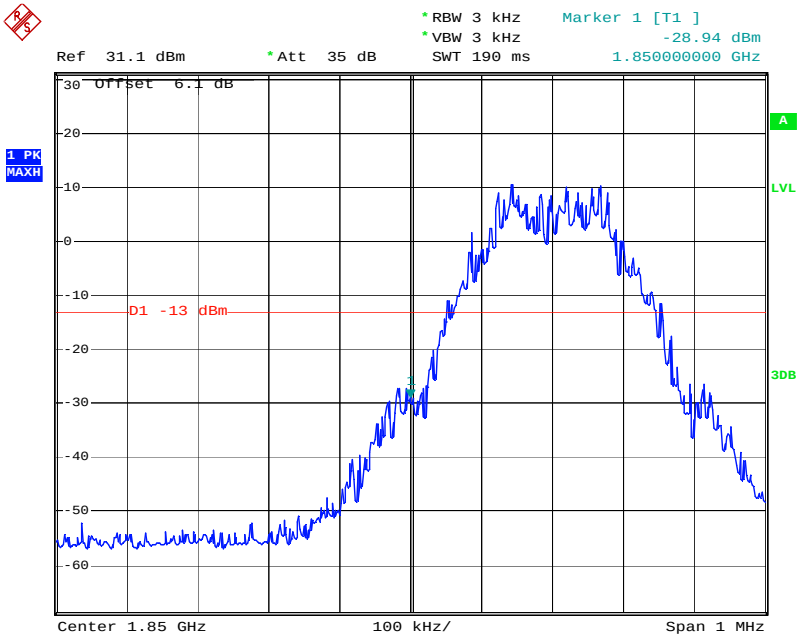
Date: 20.OCT.2009 10:57:17

Figure 8-23: Band Edge, GSM 1900 Channel 512 – GSM/GPRS Mode



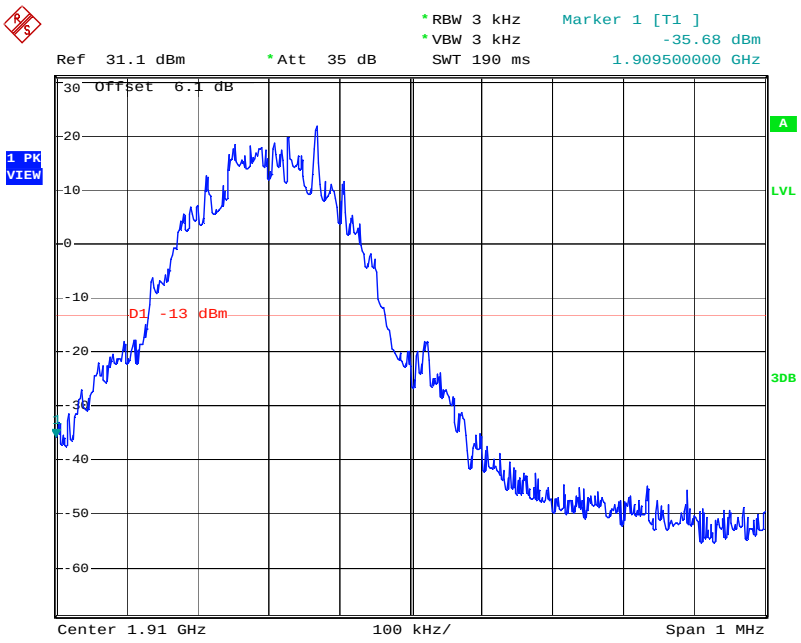
Date: 20.OCT.2009 10:00:38

Figure 8-24: Band Edge, GSM 1900 Channel 512 – EDGE Mode



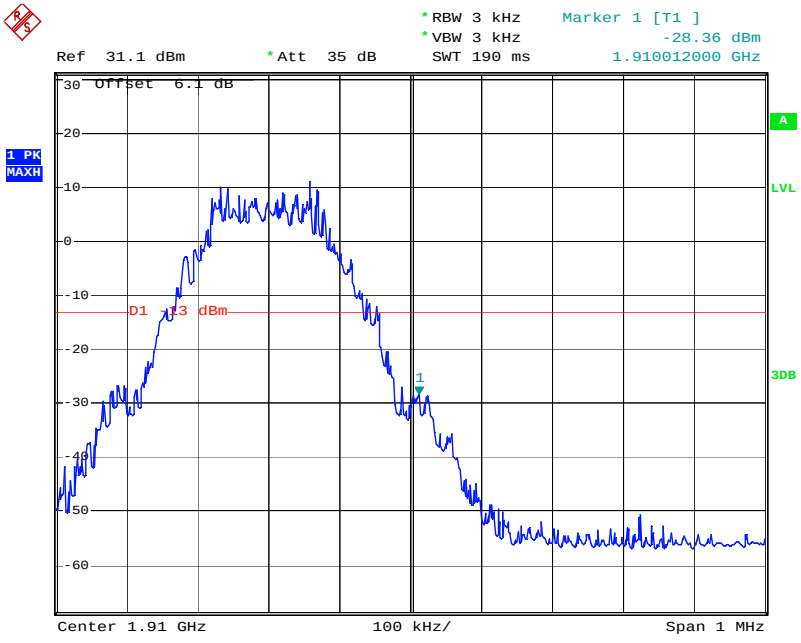
Date: 20.OCT.2009 11:02:13

Figure 8-25: Band Edge, GSM 1900 Channel 810 – GSM/GPRS Mode



Date: 20.OCT.2009 10:02:46

Figure 8-26: Band Edge, GSM 1900 Channel 810 – EDGE Mode



Date: 20.OCT.2009 11:06:47

9 RADIATED SPURIOUS EMISSIONS

FCC §2.1053, §22.917(a), §24.238(a)

RSS-132 (4.3), RSS-133(6.3)

9.1 Test Procedure

The EUT was placed on a non-conductive turntable. The antenna port was terminated with a non-radiating load. The measurement antenna was placed at a distance of 3 meters from the EUT. The Base Station Simulator was set to force the EUT to its maximum power setting. During the tests, the antenna height and EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle, and high channels) in each operating band. Once spurious emissions were identified, the power of the emission was determined using the substitution method described in TIA-603-B section 2.2.12 (Radiated Spurious Emissions).

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and at the spurious emissions frequency.

9.2 Test Results

The GNOV1N met the radiated spurious emissions requirements.. See Table 9-1 through Table 9-3 for test data.

Table 9-1: Radiated Spurious Emissions – GSM Mode

Band	TX Channel	Polarity	Spurious Emission Frequency	Device Reading (dBuV)	Signal Generator Output (dBm)	Cable Loss (dB)	Tx Antenna Gain (dBi)	Tx Antenna Gain (dBd)	Radiated Power (dBm)	Limit (dBm)	Margin (dB)
GSM 850	128	V	1648.4	38.09	-32.2	3.45	9.1	6.96	-28.69	-13	-15.69
GSM 850	128	V	2472.6	36.35	-26.6	4.1	9.3	7.16	-23.54	-13	-10.54
GSM 850	190	V	1673.2	42.94	-27.1	3.5	9.2	7.06	-23.54	-13	-10.54
GSM 850	251	V	1697.6	43.7	-26.1	3.5	9.4	7.26	-22.34	-13	-9.34
GSM 1900	661	V	7520	51.14	-38.5	10.0	9.9	7.76	-40.74	-13	-27.74
GSM 1900	661	V	9400	43.26	-38.9	9.7	10.9	8.76	-39.84	-13	-26.84
GSM 1900	661	V	11280	43.01	-36	10.6	10.4	8.26	-38.34	-13	-25.34
GSM 1900	810	V	5729.4	47.31	-49.1	7.3	11.4	9.26	-47.14	-13	-34.14
GSM 1900	810	V	7639.2	48.44	-37.6	10.1	10.1	7.96	-39.74	-13	-26.74
GSM 1900	810	V	11458.8	45.95	-34.1	10.9	10.3	8.16	-36.84	-13	-23.84

Table 9-2: Radiated Spurious Emissions – GPRS Mode

Band	TX Channel	Polarity	Spurious Emission Frequency	Device Reading (dBuV)	Signal Generator Output (dBm)	Cable Loss (dB)	Tx Antenna Gain (dBi)	Tx Antenna Gain (dBd)	Radiated Power (dBm)	Limit (dBm)	Margin (dB)
GSM 850	128	V	1648.4	37.64	-32.6	3.45	9.1	6.96	-29.09	-13	-16.09
GSM 850	128	V	2472.6	36.74	-26.1	4.1	9.3	7.16	-23.04	-13	-10.04
GSM 850	190	V	1673.2	42.82	-27.3	3.5	9.2	7.06	-23.74	-13	-10.74
GSM 850	251	V	1697.6	43.6	-26.2	3.5	9.4	7.26	-22.44	-13	-9.44
GSM 1900	661	V	7520	47.28	-43.3	10.0	9.9	7.76	-45.54	-13	-32.54
GSM 1900	661	V	9400	44.94	-37.8	9.7	10.9	8.76	-38.74	-13	-25.74
GSM 1900	661	V	11280	44.74	-34.3	10.6	10.4	8.26	-36.64	-13	-23.64
GSM 1900	810	V	5729.4	48.01	-48.2	7.3	11.4	9.26	-46.24	-13	-33.24
GSM 1900	810	V	7639.2	50.13	-36	10.1	10.1	7.96	-38.14	-13	-25.14
GSM 1900	810	V	11458.8	47.15	-32.7	10.9	10.3	8.16	-35.44	-13	-22.44

Table 9-3: Radiated Spurious Emissions – EDGE Mode

EUT Mode	TX Channel	Polarity	Spurious Emission Frequency	Device Reading (dBuV)	Signal Generator Output (dBm)	Cable Loss (dB)	Tx Antenna Gain (dBi)	Tx Antenna Gain (dBd)	Radiated Power (dBm)	Limit (dBm)	Margin (dB)
GSM 1900	661	V	7520	51.19	-39.3	10.0	9.9	7.76	-41.54	-13	-28.54
GSM 1900	661	V	9400	45.76	-36.9	9.7	10.9	8.76	-37.84	-13	-24.84
GSM 1900	661	V	11280	45.36	-33.8	10.6	10.4	8.26	-36.14	-13	-23.14
GSM 1900	810	V	5729.4	47.05	-49.4	7.3	11.4	9.26	-47.44	-13	-34.44
GSM 1900	810	V	7639.2	48.46	-37.8	10.1	10.1	7.96	-39.94	-13	-26.94
GSM 1900	810	V	11458.8	45.55	-35.6	10.9	10.3	8.16	-38.34	-13	-25.34

10 RECEIVER SPURIOUS EMISSIONS

FCC §15.109

RSS-GEN (7.2.3.2)

10.1 Test Limits

Table 10-1 Radiated Emission Limit for FCC §15.109

Radiated Emission Limits at 3 meters	
Frequency (MHz)	**Quasi-Peak limits, dB (µV/m)**
30 to 88	40.0
88 to 216	43.5
216 to 960	46.0
960 and up	54.0

10.2 Test Procedure

Measurements are made over the frequency range of 30 MHz to five times the highest frequency operating within the device. The measuring receiver meets the requirements of Section One of CISPR 16 and the measuring antenna correlates to a balanced dipole. From 30 to 1000 MHz, a quasi-peak detector was used for measurement. Above 1000 MHz, average measurements were performed.

Measurements of the radiated field are made with the antenna located at a distance of 3 meters from the EUT. If the field-strength measurements at 3m cannot be made because of high ambient noise level or for other reasons, measurements may be made at a closer distance, for example 1m. An inverse proportionality factor of 20 dB per decade should be used to normalize the measured data to the specified distance for determining compliance.

The antenna is adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth is varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) is varied during the measurements to find the maximum field-strength readings.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Equipment setup for radiated disturbance tests followed the guidelines of ANSI C63.4.

10.3 Test Results

The GNOV1N is **compliant** with the radiated disturbance requirements of FCC §15.109 for a class B device. The maximized emissions data can be found in Figure 10-2.

Figure 10-1 FCC §15.109 Receiver Spurious Emissions Graphical Data

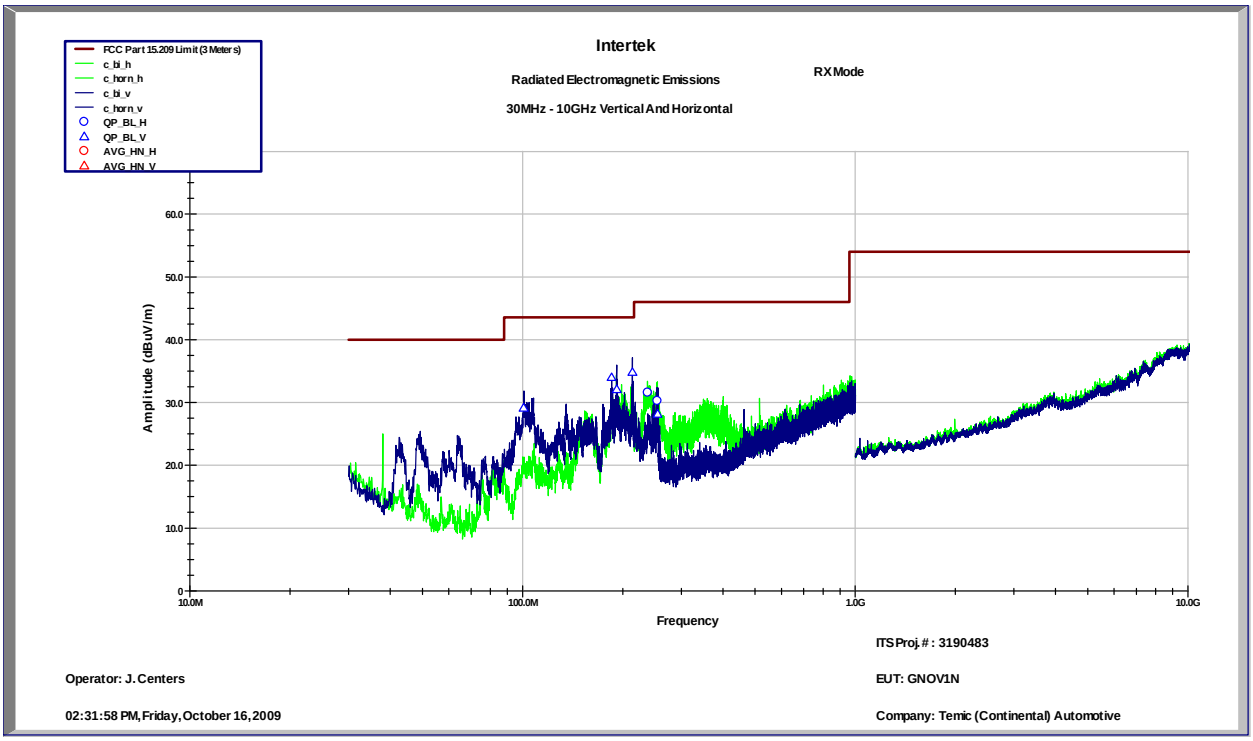


Figure 10-2 FCC §15.109 Maximized Radiated Emissions

Frequency (MHz)	Polarity (H/V)	Cab. (dB)	Ant. (dB)	Corr. Reading. (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Results
237.66 MHz	H	2.07	12.21	31.57	46.02	-14.45	**Compliant**
254.06 MHz	H	2.15	12.4	30.24	46.02	-15.78	**Compliant**
100.67 MHz	V	1.31	9.65	29.11	43.52	-14.41	**Compliant**
185.0 MHz	V	1.81	10.6	33.99	43.52	-9.53	**Compliant**
191.67 MHz	V	1.85	10.73	32.09	43.52	-11.43	**Compliant**
213.56 MHz	V	1.95	11.09	34.81	43.52	-8.71	**Compliant**
254.35 MHz	V	2.15	12.7	28.16	46.02	-17.86	**Compliant**

11 FREQUENCY STABILITY VS TEMPERATURE

FCC §2.1055, FCC §22.355, FCC §24.235

RSS-132 (4.3), RSS-133 (6.3), RSS-GEN (4.7)

11.1 Test Procedure

The equipment under test was connected to an external DC power supply and the RF output was connected to a CMU-200 Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for that purpose. After the temperature stabilized for approximately 30 minutes, the frequency error was read from the base station simulator.

11.2 Test Results

The GNOV1N met the frequency stability requirements of FCC §2.1055, FCC §22.355 and FCC §24.235. The test results are located in Table 11-1.

Table 11-1: Frequency Error (ppm) vs. Temperature

	GSM 850 Band	GSM 1900 Band
Temp	Channel 190	Channel 661
-30	0.0634	0.0484
-20	0.0502	0.0457
-10	0.0538	0.0410
0	0.0502	0.0420
10	0.0418	0.0410
20	0.0550	0.0479
30	0.0526	0.0463
40	0.0550	0.0447
50	0.0526	0.0452
60	0.0502	0.0431

12 FREQUENCY STABILITY VS VOLTAGE

FCC §2.1055, FCC §22.355, §24.235

RSS-GEN (4.7)

12.1 Test Procedure

An external DC power supply was connected to the power terminals of the equipment under test. The Base Station Simulator was set to force the EUT to its maximum power setting. The voltage was set to 115% of the nominal value and was then decreased to 85% of the nominal value. The output frequency error was recorded for each battery voltage.

12.2 Test Results

The GNOV1N met the frequency stability requirements of FCC §2.1055 and FCC §22.355. The test results are shown in Table 12-1.

Table 12-1: Frequency Error (ppm) vs. Input Voltage

	GSM 850 Band	GSM 1900 Band
Input Voltage	**Channel 190**	**Channel 661**
9VDC	0.0502	0.0441
16VDC	0.0526	0.0426