

TEST REPORT

Report Number: 3161936ATL-001

September 30, 2008

Product Designation: 850 MHz MCPA - 4x2

Standard: FCC Part 22

Tested by:

Intertek Testing Services NA Inc.
1950 Evergreen Blvd., Suite 100
Duluth, GA 30096

Client:

Hitachi Telecom, USA
13617 Parkway Lane, Suite 100
Norcross, GA 30092
Contact: Nick Yasui
Phone: 770.797.2530
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Tests performed by:



David J. Schramm
Assistant Chief Engineer - EMC

Report reviewed by:



Jeremy O. Pickens
EMC Department Manager

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1.0 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 3.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested complies with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

2.0 Test Summary

Section	Test Full Name	Test Date	Result
4.0	System setup including cable interconnection details, support equipment and simplified block diagram. (System Setup)		
5.0	Description of test facility (Test Site Location)		
6.0	RF Output Power (Conducted) (FCC Part 2.1046 Cond)	09/09/2008	PASS
7.0	Occupied Bandwidth (FCC Part 2.1049)	09/11/2008	PASS
8.0	Spurious emissions at antenna terminals (FCC Part 2.1051)	09/10/2008	PASS
NA	FCC Part 22 Radiated Power (ERP) and FCC Part 24 Radiated Power (EIRP) (Radiated Power) was waived due to Radiated Power set at time of licensing		
9.0	Spurious emissions at antenna terminals (Intermodulation Products) (FCC Part 2.1051)	09/09/2008	PASS
10.0	Spurious emissions at antenna terminals (Band edge) (FCC Part 2.1051)	09/10/2008	PASS
11.0	Field strength of spurious radiation (FCC Part 2.1053)	09/11/2008	
NA	Conducted emissions on AC power lines (Conducted Emissions) was waived due to EUT does not connect to the AC power lines		
NA	Frequency Stability (FCC Part 2.1055) was waived due to not being applicable to amplifiers.		

3.0 Description of Equipment Under Test

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
850 MHz MCPA	Hitachi Telecom	HMC081901C	No 2
850 MHz MCPA	Hitachi Telecom	HMC081901C	No 4
Chassis	Hitachi Telecom	HMCSR001C	MUL0711000015
Duplexer / Combiner	Hitachi Telecom	HMCDD0822C-0A0	N8D0803000099

EUT receive date:	9/8/2008
EUT receive condition:	Good

Description of EUT provided by Client:

The EUT is an 850 MHz 190W MCPA (Multi-Carrier Power Amplifier) for GSM, EDGE and W-CDMA base-station applications. The amplifier is installed in a 19 inch rack which receives power from a +27 Vdc power source.

Description of EUT exercising:

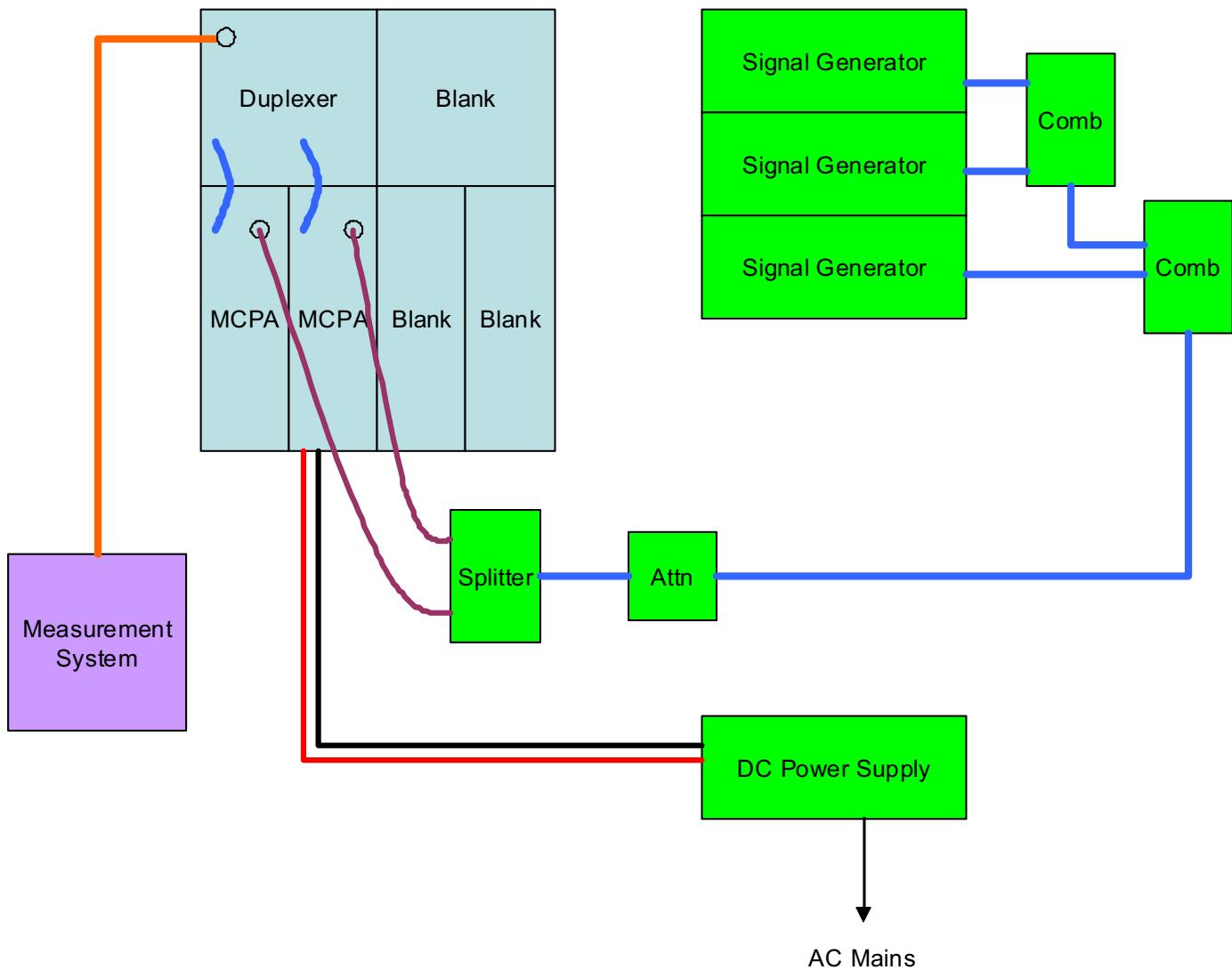
During testing where a single carrier was used, the input level was adjusted to obtain 190 Watts out on a single channel.

During testing where more than one channel is used, the power of each carrier must be reduced so the total power output is no greater than 260 Watts composite power. GSM, GSM Edge, CDMA and W-CDMA signals were used during the testing and are indicated in each section of this report as appropriate.

4.0 System setup including cable interconnection details, support equipment and simplified block diagram. (System Setup)

Method:

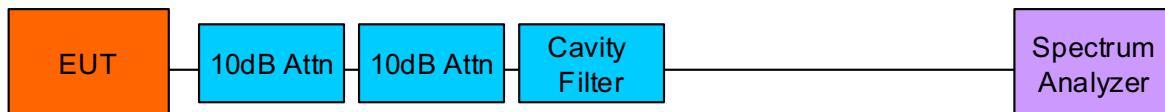
Record the details of EUTcabling, document the support equipment, and show the interconnections in a block diagram.

Drawing:

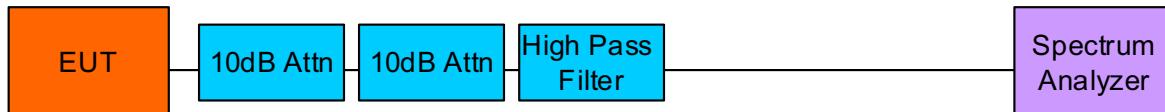
EUT Setup Diagram

4.0 System setup including cable interconnection details, support equipment and simplified block diagram. (System Setup)**Drawing:**

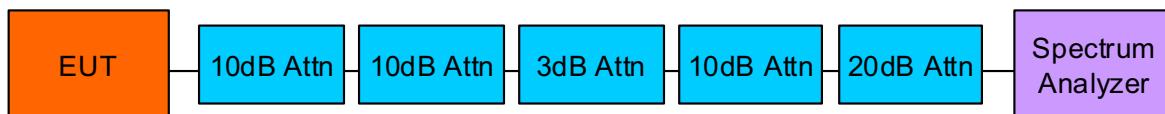
Test Setup for Spurious Emissions and Band Edge, 30-2500 MHz



Test Setup for Spurious Emissions, 2500-10000 MHz



Test Setup for Power, Occupied Bandwidth and Inter-modulation measurement



Test Setup Diagram

4.0 System setup including cable interconnection details, support equipment and simplified block diagram. (System Setup)

Data:

EUT Cabling						
ID	Description	Length	Shielding	Ferrites	Connection	
					From	To
A	Coax x2	1m	Coax	None	EUT	Splitter
B	Coax	0.1m	Coax	None	Splitter	Step Attenuator
C	Coax	2m	Coax	None	Step Attenuator	Combiner
D	Coax x4	0.3m	Coax	None	Combiner	Signal Generators
E	Coax	3m	Coax	None	EUT	Load / Measurement system
F	DC Supply	10m	None	None	EUT	DC Supply

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Signal Generator	Agilent	E4438C	MY42081816
Signal Generator	Agilent	E4438C	MY42080517
Signal Generator	Agilent	E4438C	MY42080520
DC Power Supply	Argantix	XPS 30-167-208	11579

5.0 Description of test facility (Test Site Location)

Method:

The Intertek-Duluth site is located at 1950 Evergreen Blvd., Suite 100, Duluth, Georgia. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of ANSI C63.4: 2003. 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.

This site is on file with the FCC.

6.0 RF Output Power (Conducted) (FCC Part 2.1046 Cond)**Method:**

Connect the transmitter output to a calibrated coaxial attenuator. Connect the other end of the attenuator to a power meter. Transmitter output was read off the power meter in dBm. If the emission bandwidth is wider than the spectrum analyzer bandwidth settings, then either an average power meter or the channel power feature of the spectrum analyzer may be used.

Perform the test for each modulation at three frequencies (low, middle, and high channels) and on the highest power levels, which can be setup on the transmitter.

Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
Attenuator, 03 dB, <18GHz	Weinschel Corp	2	200003	08/05/2008	08/05/2009
Attenuator, 10 dB, <18GHz	Weinschel Corp	2	200009	08/05/2008	08/05/2009
Attenuator, 10 dB, <18GHz, 50W	Weinschel	47-10-34	200061	08/05/2008	08/05/2009
Attenuator, 10 dB, <2.5 GHz 1000W	JFW Industries, Inc	50FHAM-010-1000	200073	03/21/2008	03/21/2009
Attenuator, 20 dB, <18GHz	Hewlett Packard	11582A 8491B 020	213101a	08/19/2008	08/19/2009
Cable E04, <18GHz	Huber-Suhner	Sucoflex 104PE	E04	06/04/2008	06/04/2009
Cable E202, 18 GHz, N, 3m	Megaphase	TM18 NKNK 118	E202	01/16/2008	01/16/2009

Results: The sample tested was found to Comply.

6.0 RF Output Power (Conducted) (FCC Part 2.1046 Cond)**Photo:**

Setup photo

6.0 RF Output Power (Conducted) (FCC Part 2.1046 Cond)

Data:

EUT Mode	Frequency MHz	Channel	RBW/VBW MHz	Measured Power	Measured Power
				dBm	Watts
GSM	869.4	Low	1/1 MHz	52.79	190.1
	881.5	Mid	1/1 MHz	52.79	190.1
	893.6	High	1/1 MHz	52.79	190.1
Edge	869.4	Low	1/1 MHz	52.77	189.2
	881.5	Mid	1/1 MHz	52.85	192.8
	893.6	High	1/1 MHz	52.97	198.2
CDMA	870.0	Low	Note 1	52.83	191.9
	881.5	Mid	Note 1	52.80	190.5
	893.0	High	Note 1	52.82	191.4
W-CDMA	871.5	Low	Note 1	52.83	191.9
	881.5	Mid	Note 1	52.81	191.0
	891.5	High	Note 1	52.83	191.9

Note 1: Used Channel Power function from Spectrum Analyzer (RS FSEK30)

7.0 Occupied Bandwidth (FCC Part 2.1049)

Method:

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.

Connect the antenna port of the EUT to a spectrum analyzer using a calibrated coaxial cable and attenuator. Set the EUT to transmit at its highest power setting. The 99% bandwidth function of the analyzer was used to automatically generate the occupied bandwidth plots. Repeat for low, mid, and high channels of each band of the EUT.

For amplifiers, the output bandwidth shall be less than or equal to the input bandwidth.

Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
Attenuator, 03 dB, <18GHz	Weinschel Corp	2	200003	08/05/2008	08/05/2009
Attenuator, 10 dB, <18GHz	Weinschel Corp	2	200009	08/05/2008	08/05/2009
Attenuator, 10 dB, <18GHz, 50W	Weinschel	47-10-34	200061	08/05/2008	08/05/2009
Attenuator, 10 dB, <2.5 GHz 1000W	JFW Industries, Inc	50FHAM-010-1000	200073	03/21/2008	03/21/2009
Attenuator, 20 dB, <18GHz	Hewlett Packard	11582A 8491B 020	213101a	08/19/2008	08/19/2009
Cable E04, <18GHz	Huber-Suhner	Sucoflex 104PE	E04	06/04/2008	06/04/2009
Spectrum Analyzer, 20Hz-40GHz	Rohde & Schwarz	FSEK30	200062	03/19/2008	03/19/2009

Results: The sample tested was found to Comply.

7.0 Occupied Bandwidth (FCC Part 2.1049)

Data:

Mode	Frequency MHz	Resolution Bandwidth	Video Bandwidth	Sweep time Seconds	Output Measured Bandwidth MHz	Input Measured Bandwidth MHz
GSM	869.4	3 kHz	30 kHz	2	0.250510	0.250510
GSM	881.5	3 kHz	30 kHz	2	0.250510	0.250510
GSM	893.6	3 kHz	30 kHz	2	0.250510	0.250510
GSM Edge	869.4	3 kHz	30 kHz	2	0.245490	0.245490
GSM Edge	881.5	3 kHz	30 kHz	2	0.245490	0.245490
GSM Edge	893.6	3 kHz	30 kHz	2	0.245490	0.245490
CDMA	870	30 kHz	30 kHz	2	1.26697	1.26697
CDMA	881.5	30 kHz	30 kHz	2	1.26697	1.26697
CDMA	893	30 kHz	30 kHz	2	1.26697	1.26697
WCDMA	871.5	30 kHz	30 kHz	2	4.13704	4.13704
WCDMA	881.5	30 kHz	30 kHz	2	4.16987	4.16987
WCDMA	891.5	30 kHz	30 kHz	2	4.15345	4.16987

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

Method:

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

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.

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz.

Connect the RF output of the EUT to a spectrum analyzer through appropriate attenuation. Set the EUT to transmit at its maximum power level. Sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

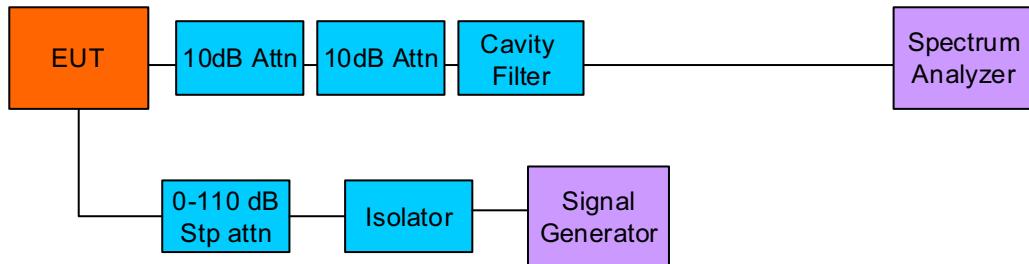
Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
Attenuator, 10 dB, <18GHz, 50W	Weinschel	47-10-34	200061	08/05/2008	08/05/2009
Attenuator, 10 dB, <2.5 GHz 1000W	JFW Industries, Inc	50FHAM-010-1000	200073	03/21/2008	03/21/2009
Cable E04, <18GHz	Huber-Suhner	Sucoflex 104PE	E04	06/04/2008	06/04/2009
Cable E202, 18 GHz, N, 3m	Megaphase	TM18 NKNK 118	E202	01/16/2008	01/16/2009
Filter, 2 GHz High Pass	Filtek	HP12/2000-5AB	213155a	03/21/2008	03/21/2009
Filter, Band Reject, Cavity Design, 80 dB	Wainwright Inst.	WRCG 869/894	200078	12/18/2007	12/18/2008

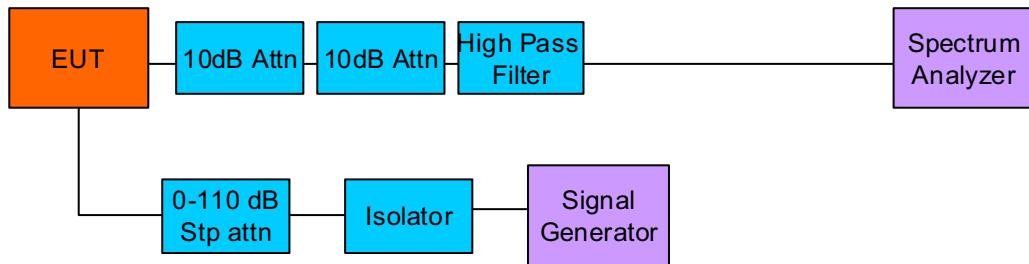
Results: The sample tested was found to Comply.

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)**Drawing:**

Test Setup for Spurious Emissions, 30-2500 MHz



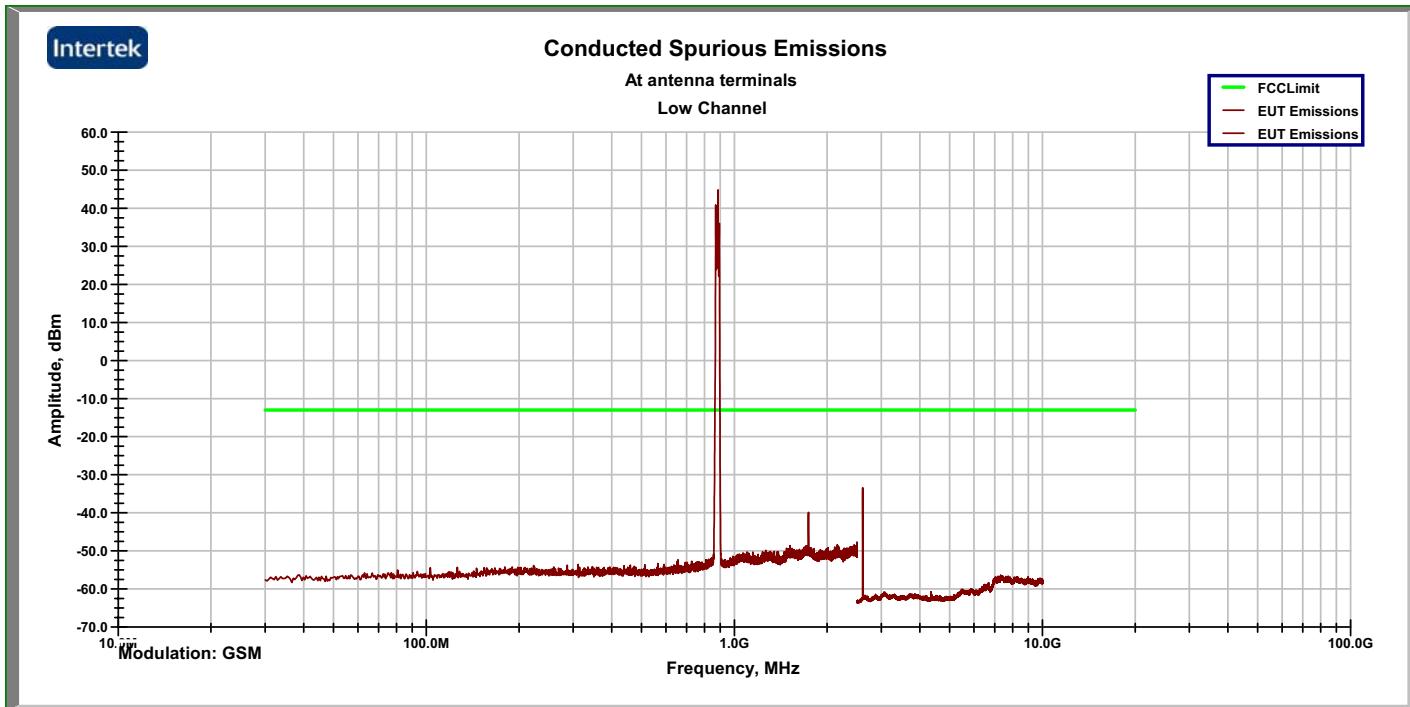
Test Setup for Spurious Emissions, 2500-10000 MHz



Setup Diagram

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

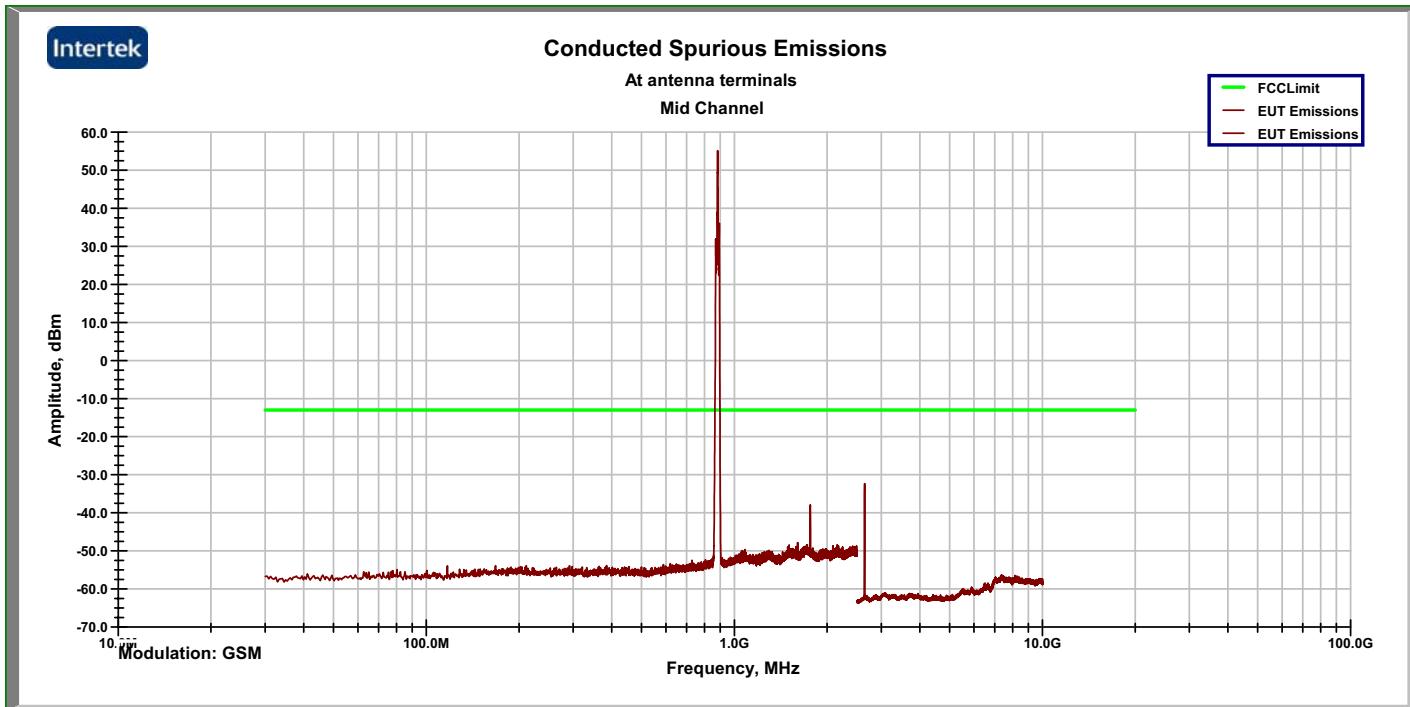
Plot:



GSM - Low Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

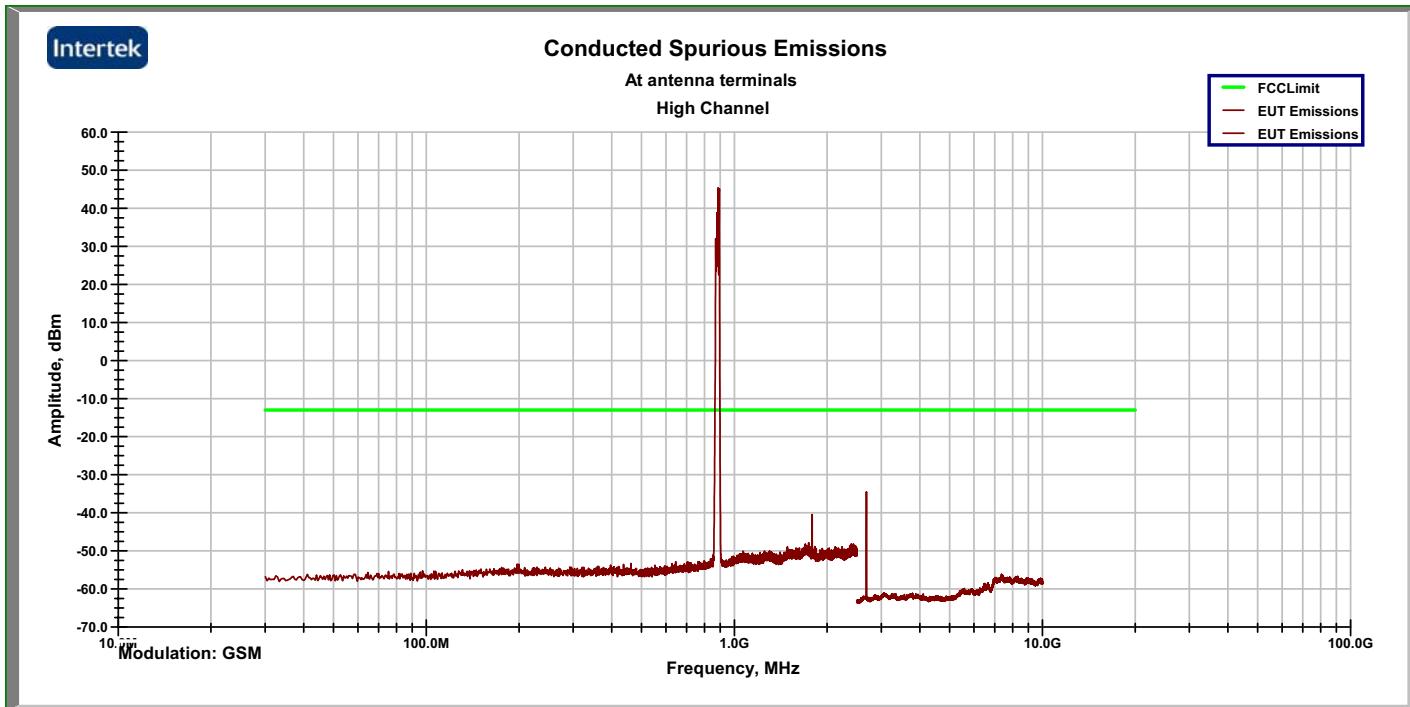
Plot:



GSM - Mid Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

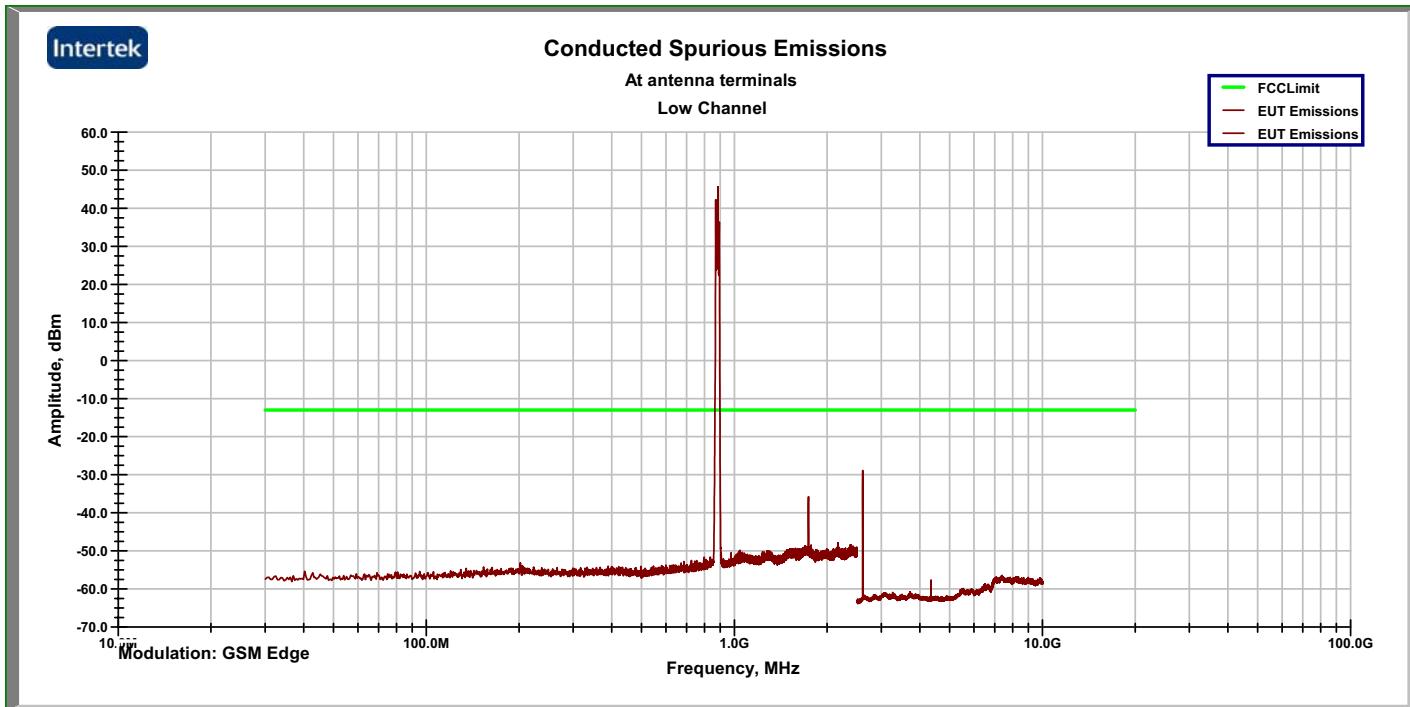
Plot:



GSM - High Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

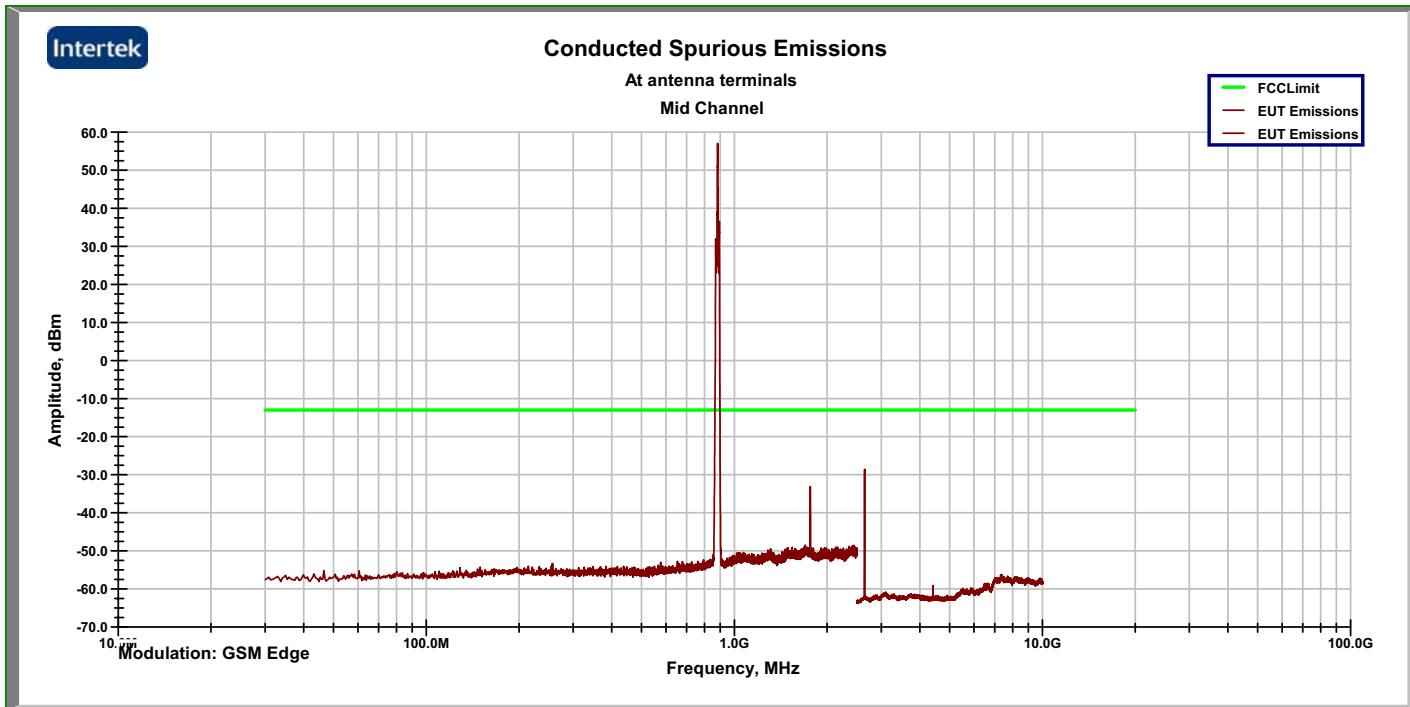
Plot:



GSM Edge - Low Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

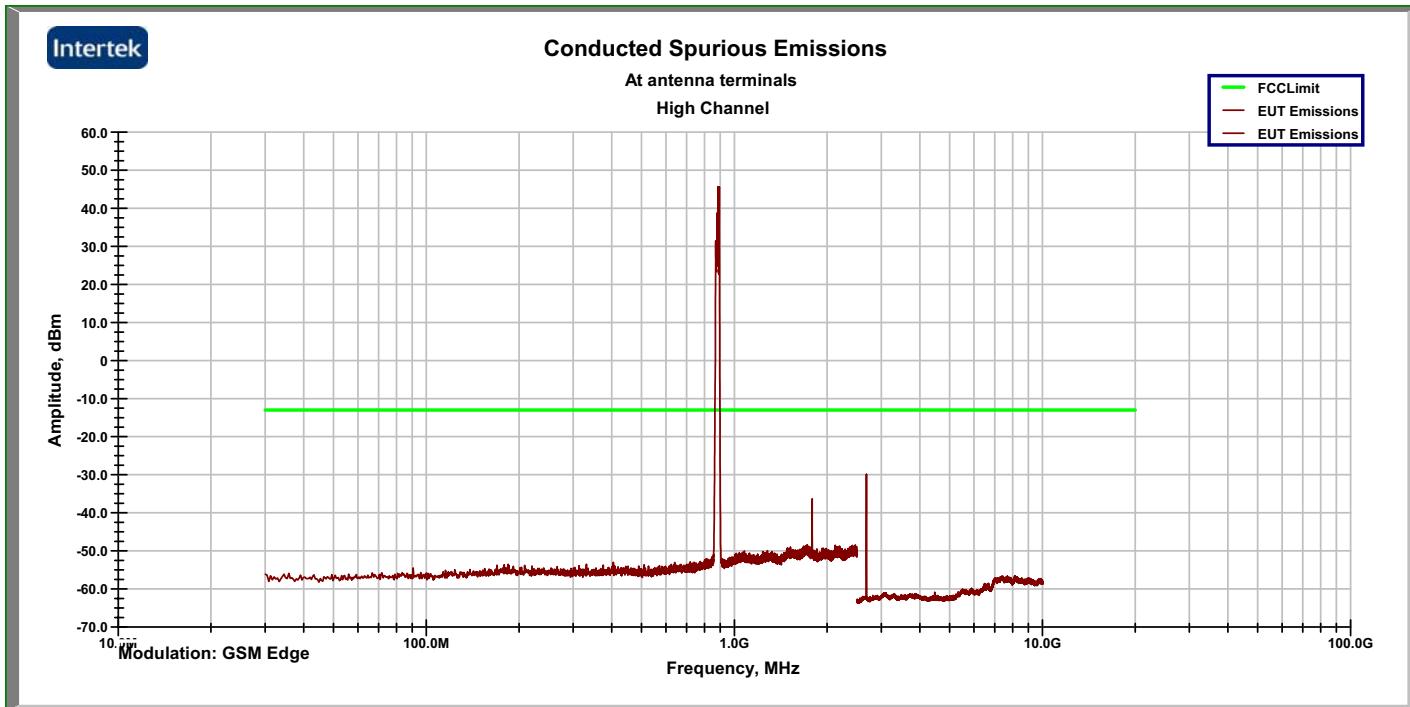
Plot:



GSM Edge - Mid Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

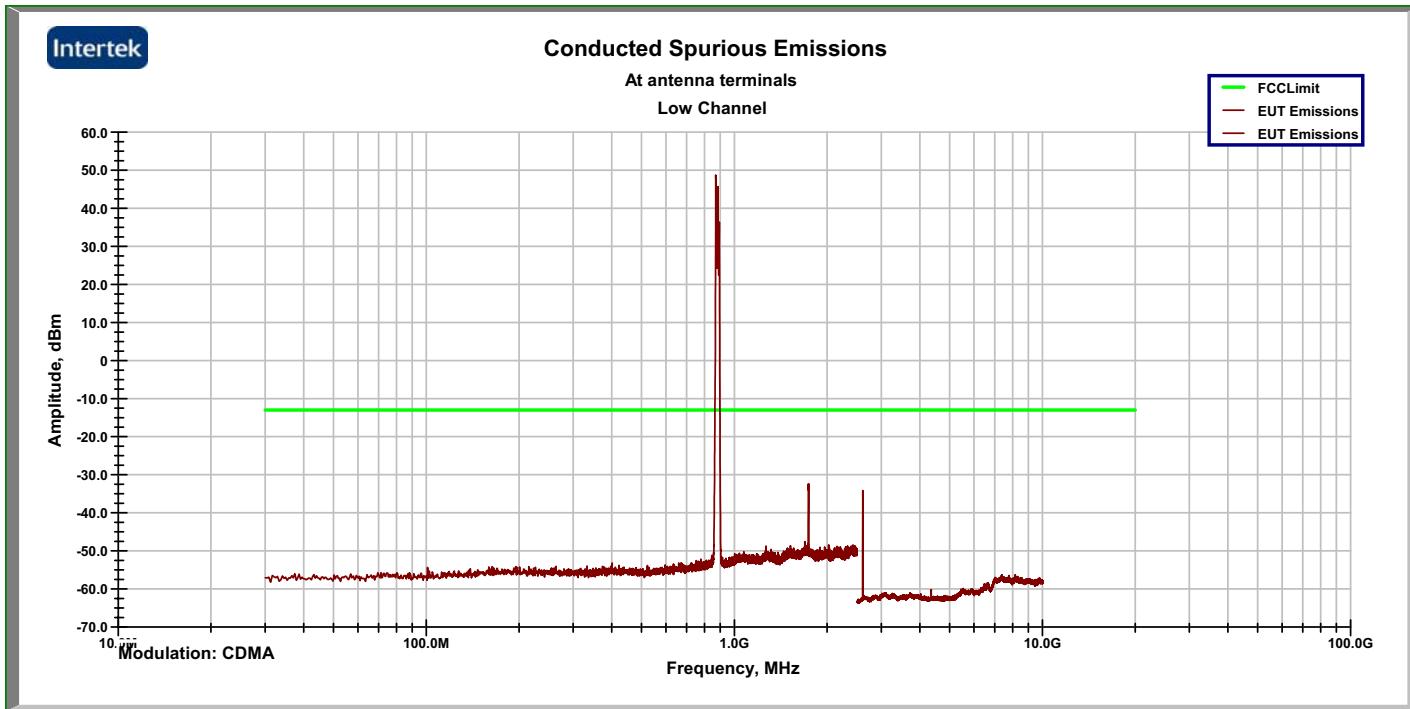
Plot:



GSM Edge - High Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

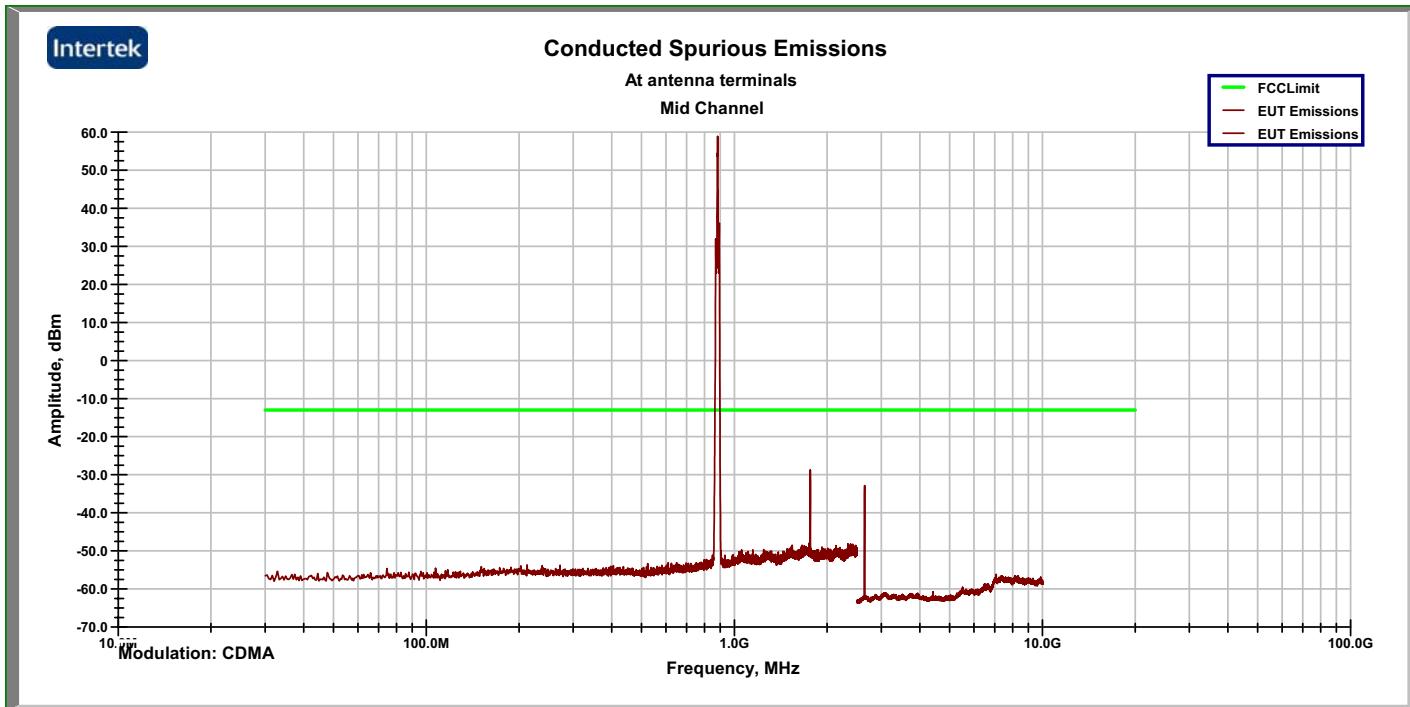
Plot:



CDMA - Low Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

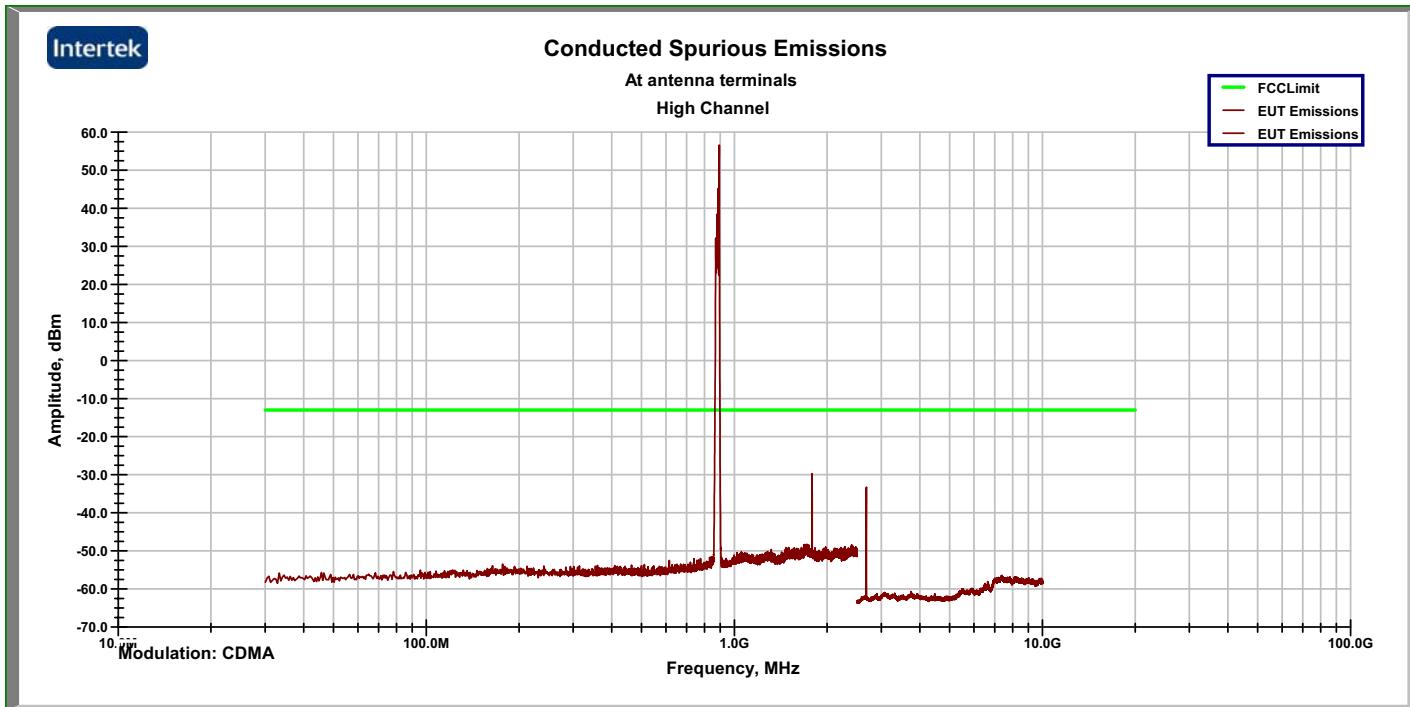
Plot:



CDMA - Mid Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

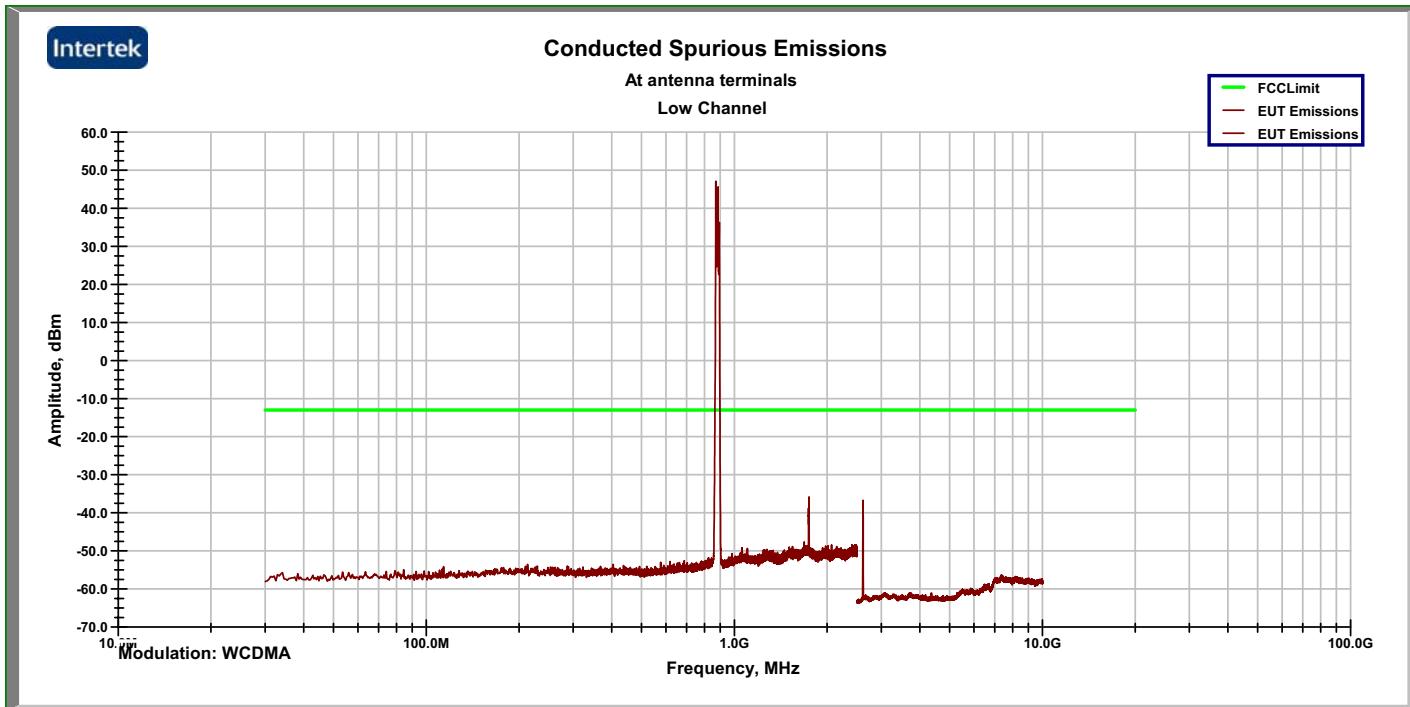
Plot:



CDMA - High Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

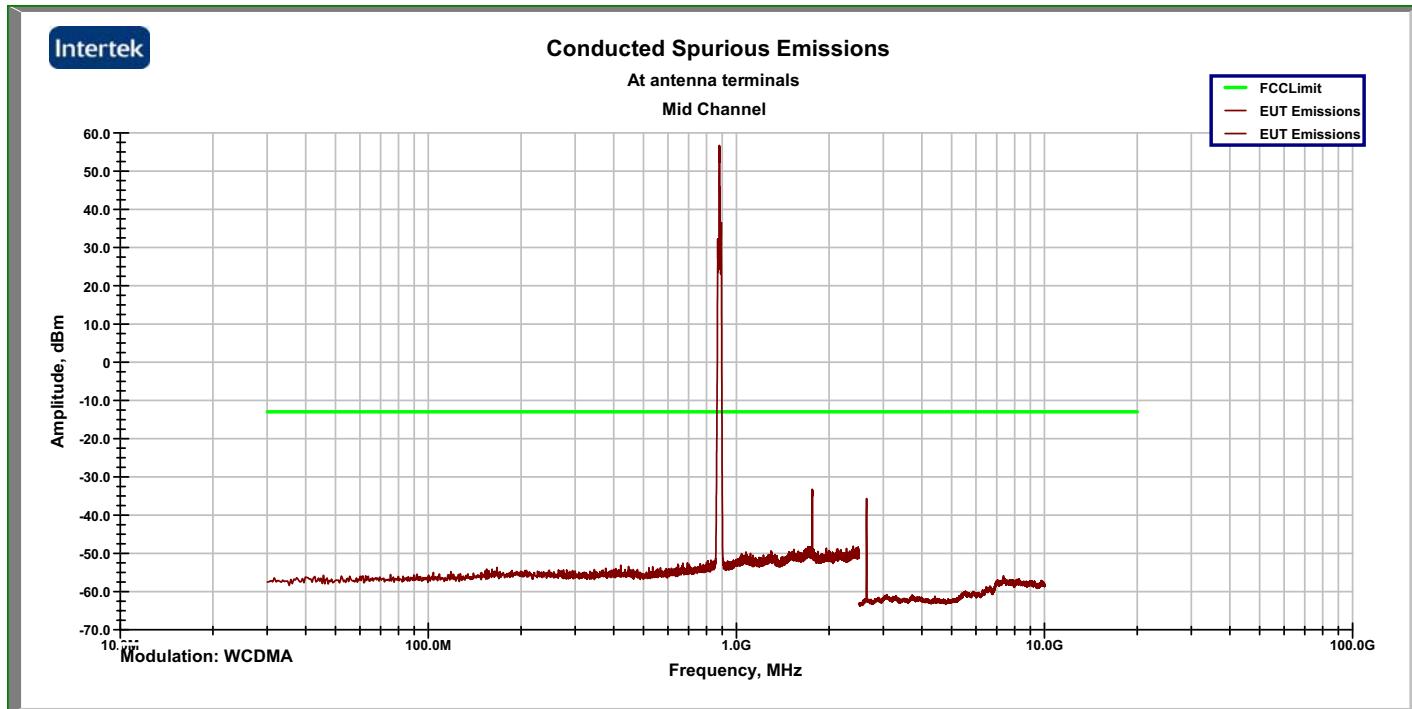
Plot:



WCDMA - Low Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

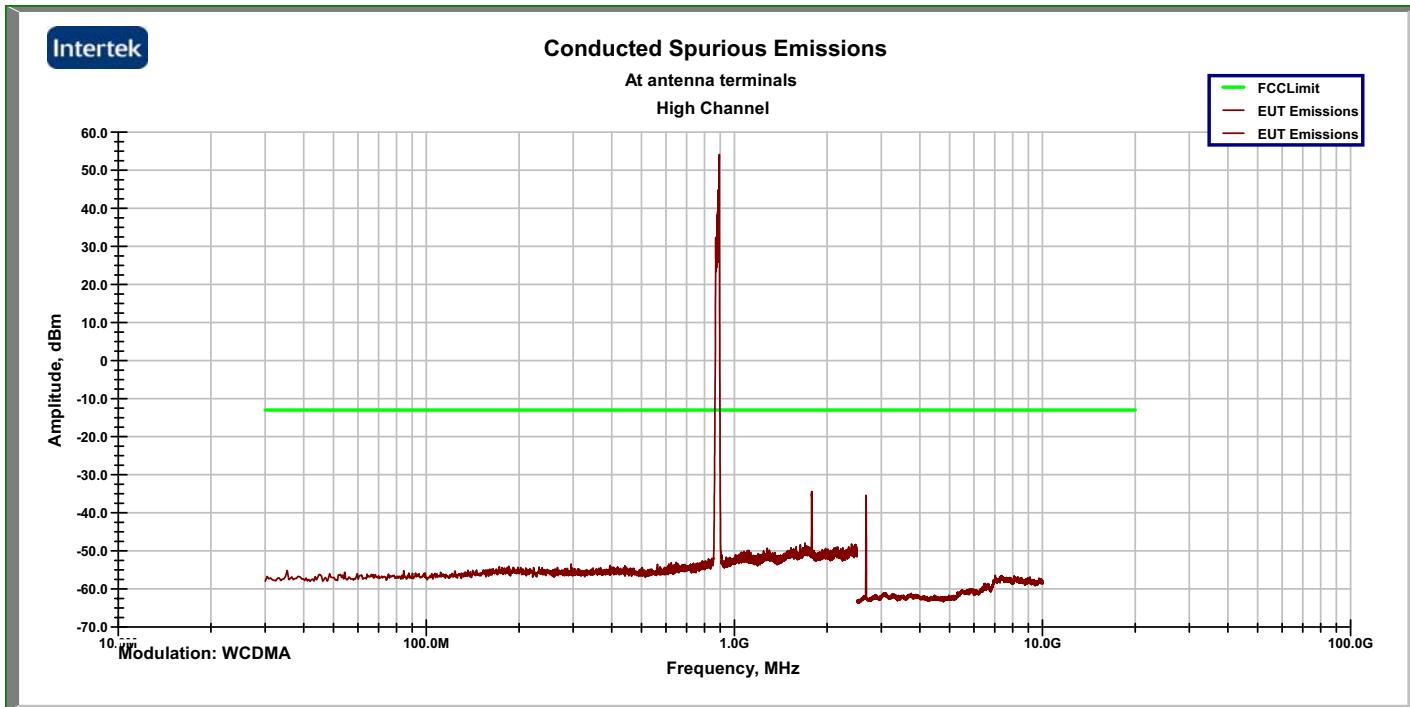
Plot:



WCDMA - Mid Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

Plot:



WCDMA - High Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

Data:

Mode	Frequency MHz	RBW/VBW	Peak EUT Emission dBm	Limit dBm	Margin dB
GSM - Low CH	1738.54	100 kHz	-39	-13	-26
GSM - Low CH	2608.216	100 kHz	-33	-13	-20
GSM - Mid CH	1762.877	100 kHz	-38	-13	-25
GSM - Mid CH	2644.289	100 kHz	-32	-13	-19
GSM - High CH	1787.214	100 kHz	-40	-13	-27
GSM - High CH	2680.361	100 kHz	-34	-13	-21
GSM Edge - Low CH	1738.54	100 kHz	-35	-13	-22
GSM Edge - Low CH	2608.216	100 kHz	-28	-13	-15
GSM Edge - Mid CH	1762.877	100 kHz	-33	-13	-20
GSM Edge - Mid CH	2644.289	100 kHz	-28	-13	-15
GSM Edge - High CH	1787.214	100 kHz	-36	-13	-23
GSM Edge - High CH	2680.361	100 kHz	-29	-13	-16
CDMA - Low CH	1738.953	100 kHz	-32	-13	-19
CDMA - Low CH	2609.219	100 kHz	-34	-13	-21
CDMA - Mid CH	1762.465	100 kHz	-28	-13	-15
CDMA - Mid CH	2644.289	100 kHz	-32	-13	-19
CDMA - High CH	1786.389	100 kHz	-29	-13	-16
CDMA - High CH	2679.359	100 kHz	-33	-13	-20
WCDMA - Low CH	1745.553	100 kHz	-36	-13	-23
WCDMA - Low CH	2613.226	100 kHz	-36	-13	-23
WCDMA - Mid CH	1763.702	100 kHz	-33	-13	-20
WCDMA - Mid CH	2643.286	100 kHz	-36	-13	-23
WCDMA - High CH	1781.852	100 kHz	-34	-13	-21
WCDMA - High CH	2673.347	100 kHz	-35	-13	-22

9.0 Spurious emissions at antenna terminals (Intermodulation Products) (FCC Part 2.1051)

Method:

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

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.

Connect the RF output of the EUT to a spectrum analyzer through appropriate attenuation. Set the EUT to transmit at its maximum power level.

For Amplifiers, an intermodulation test is also performed. Test all modulations types [TDMA, CDMA, and FM (covers GSM and F1D)].

- CW signal rather than typical signal is acceptable (for FM).
- At maximum drive level, for each modulation: one test with three tones, or two tests (high-, low-band edge) with two tones
- Limit usually is -13dBm conducted.
- Not needed for Single Channel systems.
- Combination of modulation types not needed.

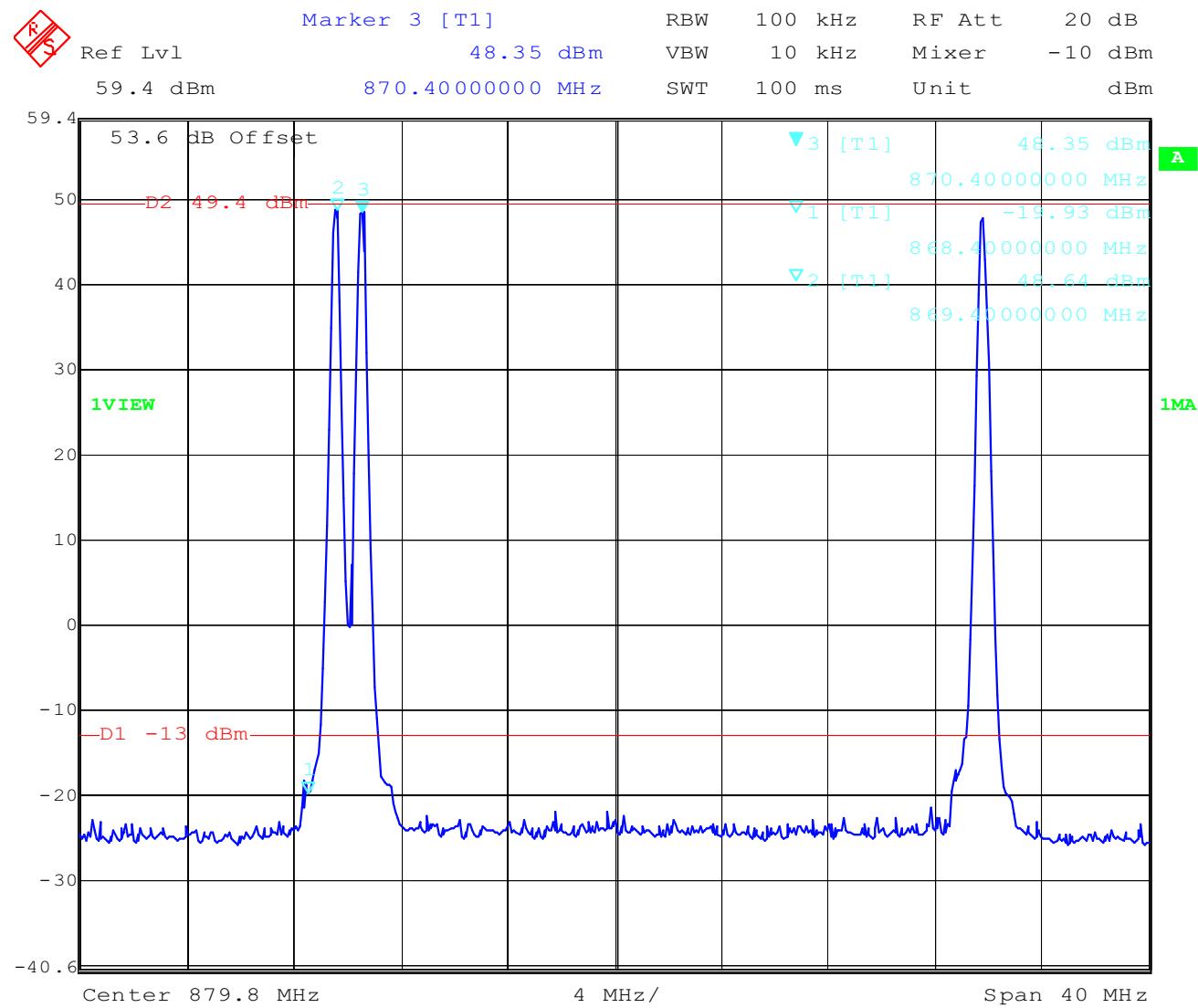
Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
Attenuator, 03 dB, <18GHz	Weinschel Corp	2	200003	08/05/2008	08/05/2009
Attenuator, 10 dB, <18GHz	Weinschel Corp	2	200009	08/05/2008	08/05/2009
Attenuator, 10 dB, <18GHz, 50W	Weinschel	47-10-34	200061	08/05/2008	08/05/2009
Attenuator, 10 dB, <2.5 GHz 1000W	JFW Industries, Inc	50FHAM-010-1000	200073	03/21/2008	03/21/2009
Attenuator, 20 dB, <18GHz	Hewlett Packard	11582A 8491B 020	213101a	08/19/2008	08/19/2009
Cable E04, <18GHz	Huber-Suhner	Sucoflex 104PE	E04	06/04/2008	06/04/2009
Cable E202, 18 GHz, N, 3m	Megaphase	TM18 NKNK 118	E202	01/16/2008	01/16/2009
Spectrum Analyzer, 20Hz-40GHz	Rohde & Schwarz	FSEK30	200062	03/19/2008	03/19/2009

Results: The sample tested was found to Comply.

9.0 Spurious emissions at antenna terminals (Intermodulation Products) (FCC Part 2.1051)

Photo:

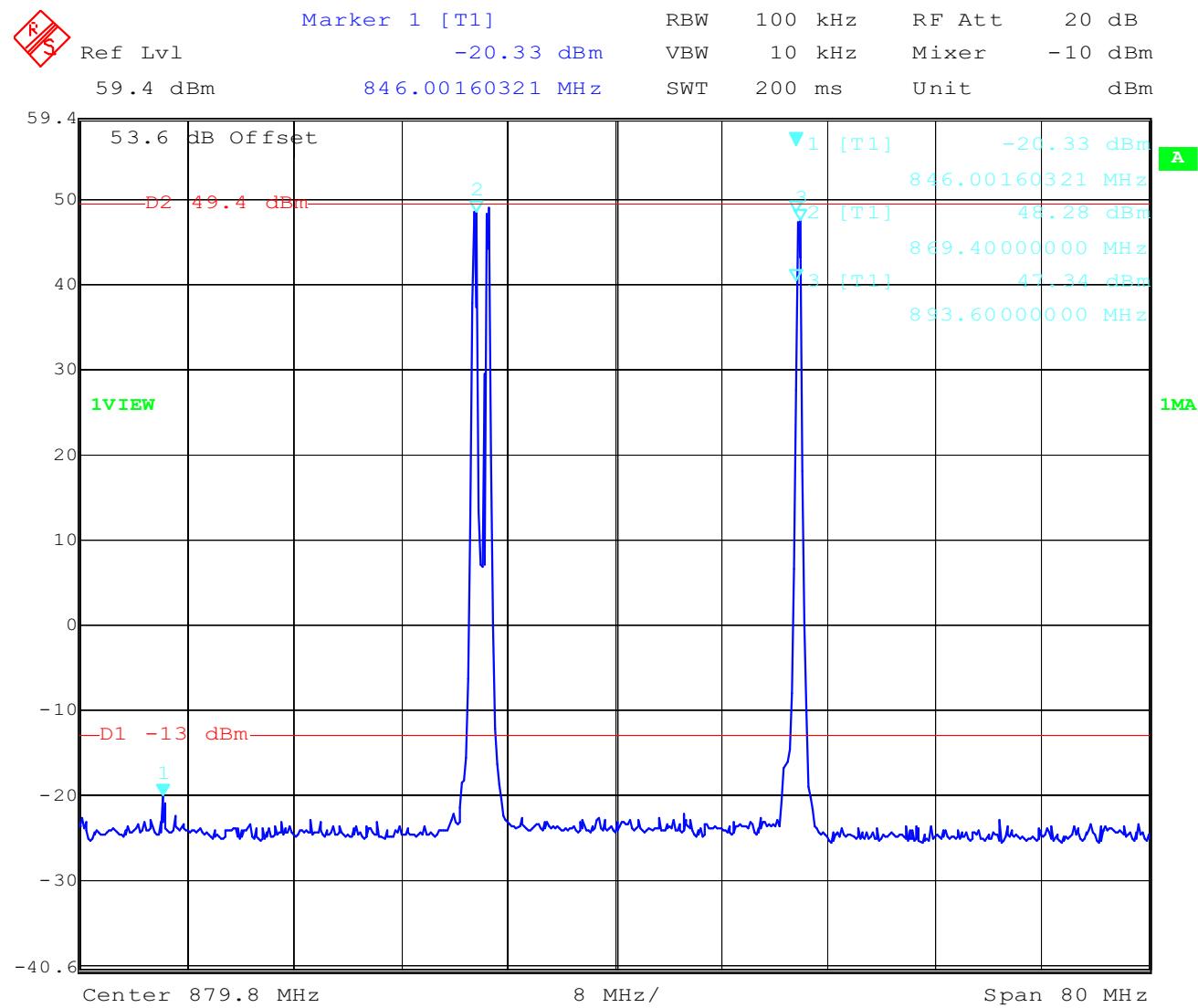


Date: 9.SEP.2008 12:16:31

Intermodulation - GSM

9.0 Spurious emissions at antenna terminals (Intermodulation Products) (FCC Part 2.1051)

Photo:

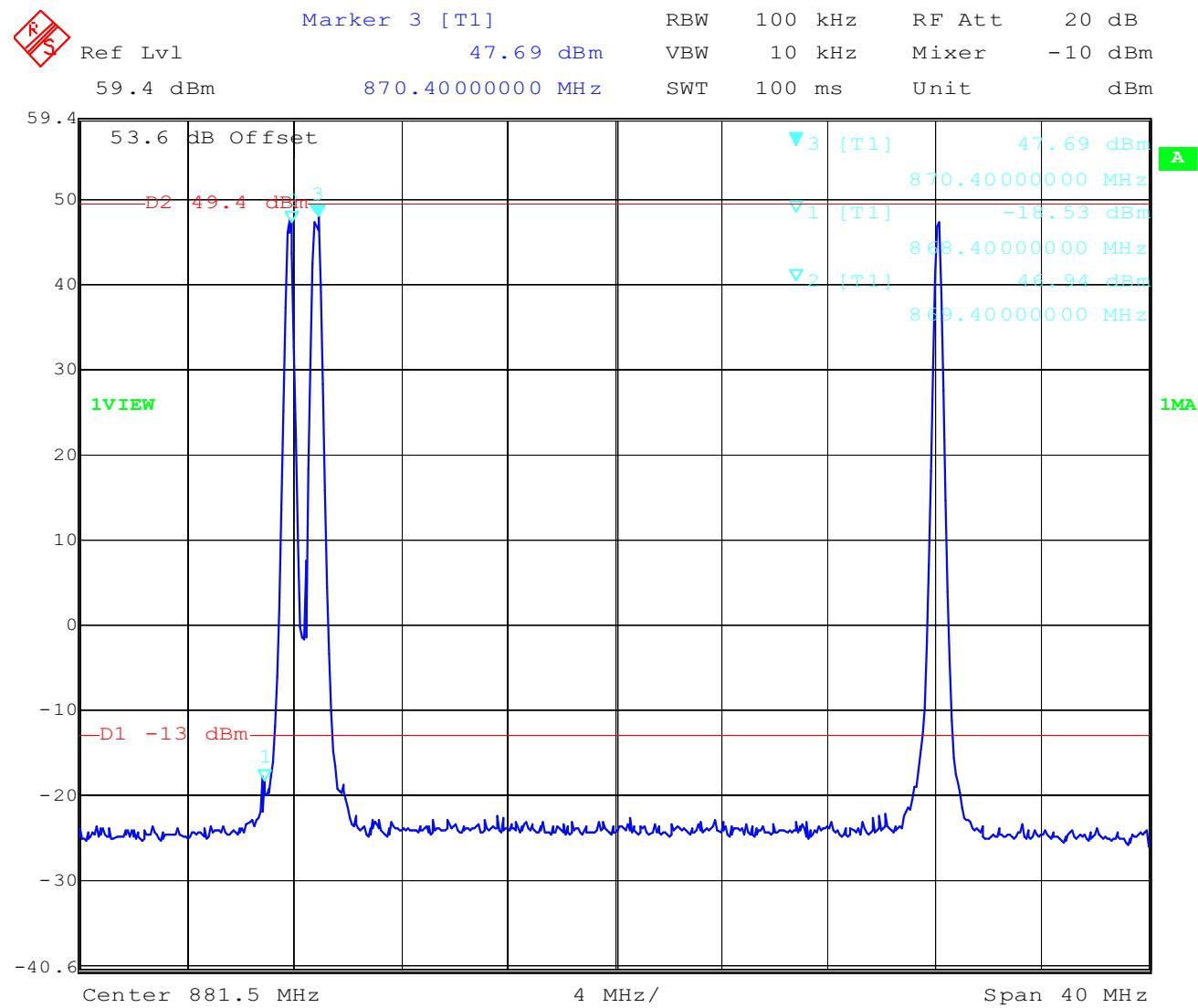


Date: 9.SEP.2008 12:18:38

Intermodulation - GSM

9.0 Spurious emissions at antenna terminals (Intermodulation Products) (FCC Part 2.1051)

Photo:

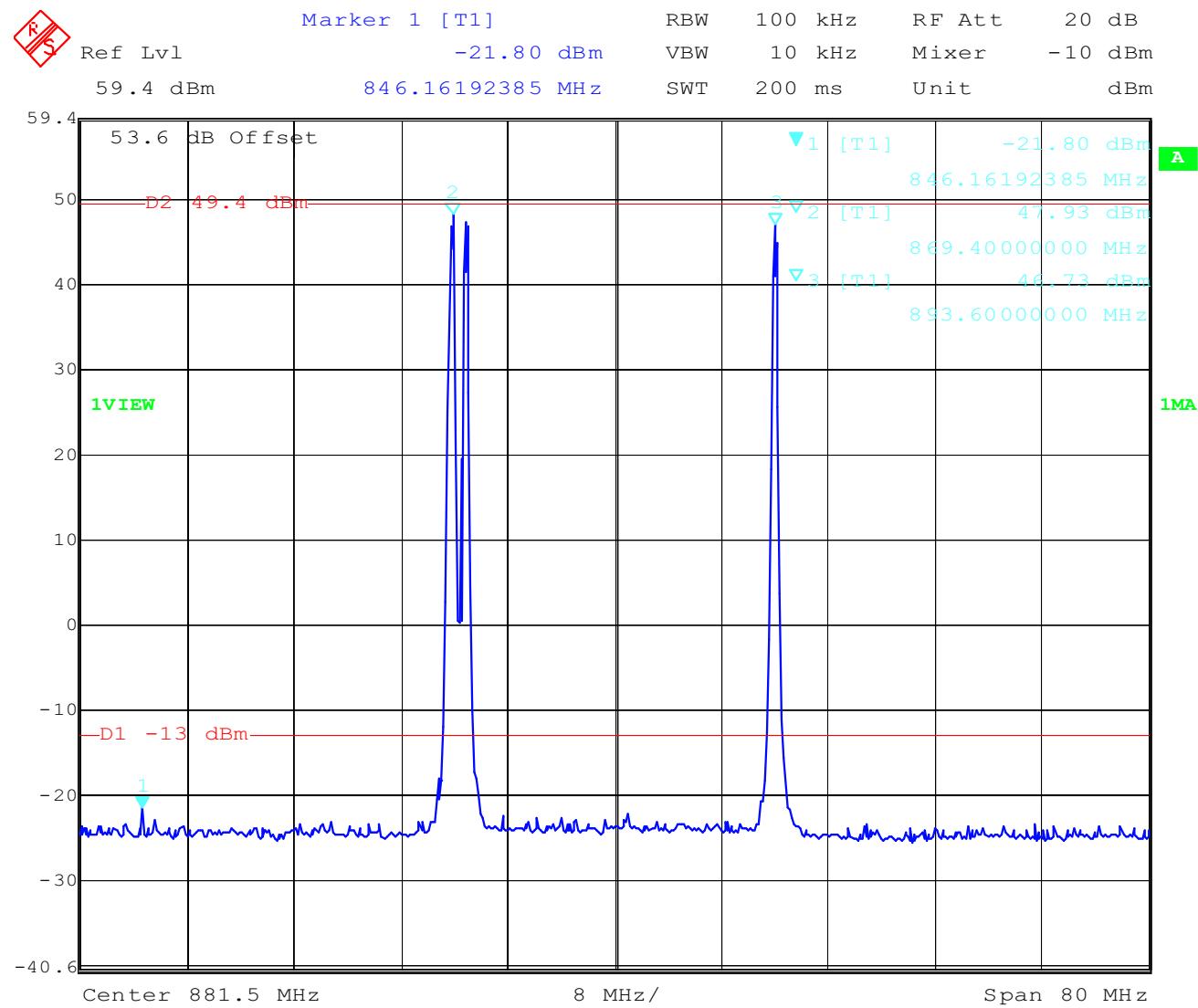


Date: 9.SEP.2008 12:31:21

Intermodulation - GSM Edge

9.0 Spurious emissions at antenna terminals (Intermodulation Products) (FCC Part 2.1051)

Photo:

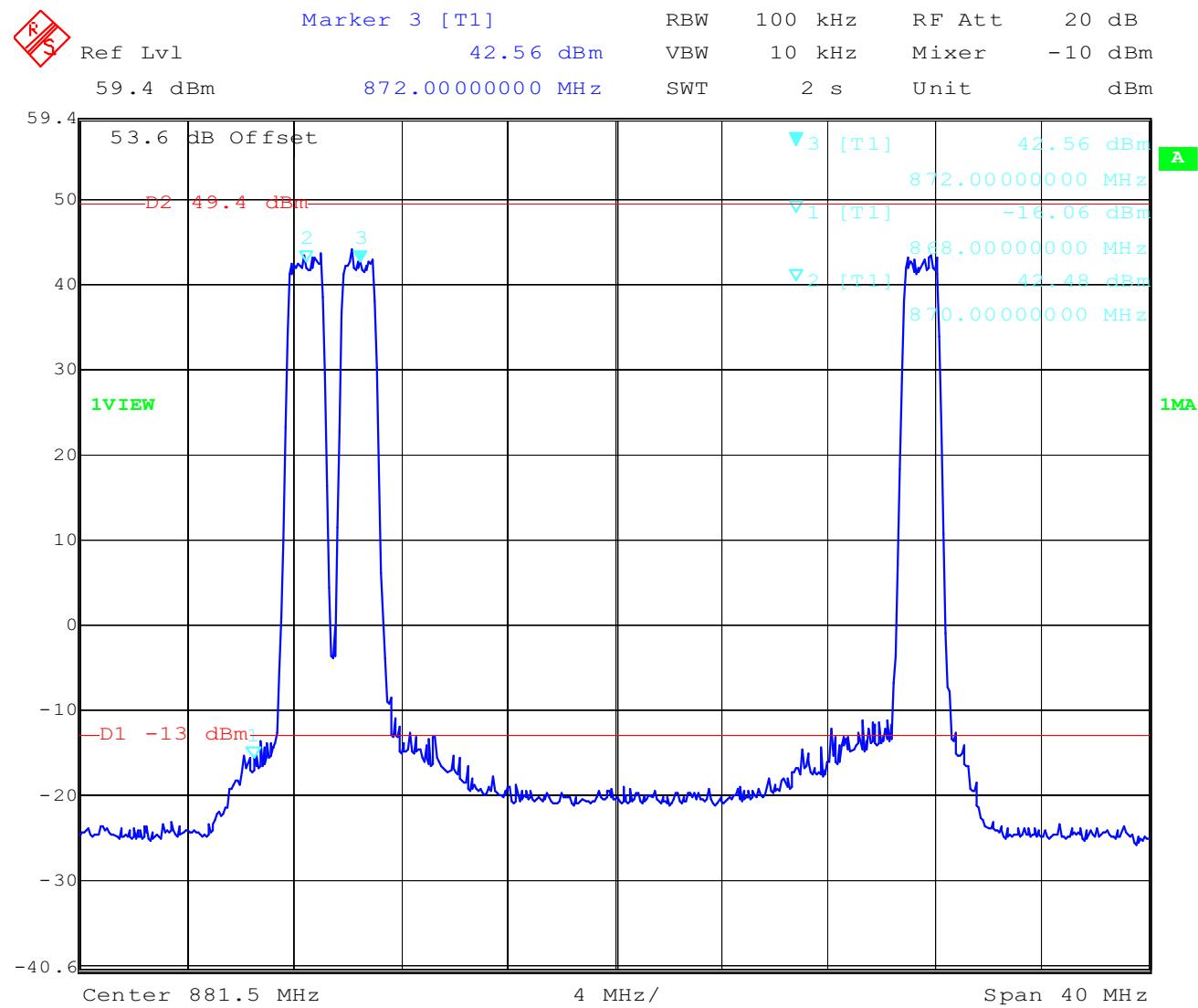


Date: 9.SEP.2008 12:32:32

Intermodulation - GSM Edge

9.0 Spurious emissions at antenna terminals (Intermodulation Products) (FCC Part 2.1051)

Photo:

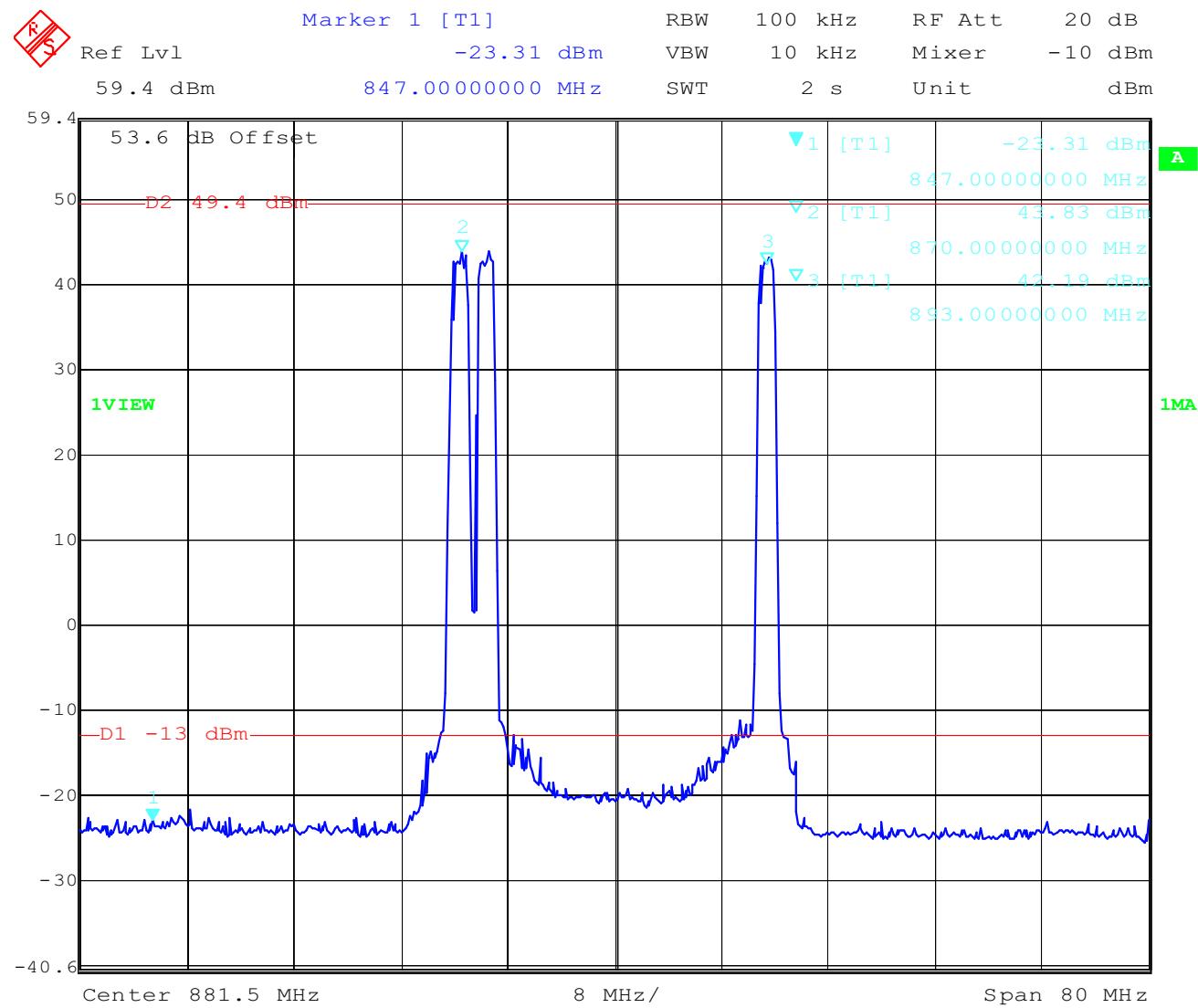


Date: 9.SEP.2008 13:22:07

Intermodulation - CDMA

9.0 Spurious emissions at antenna terminals (Intermodulation Products) (FCC Part 2.1051)

Photo:

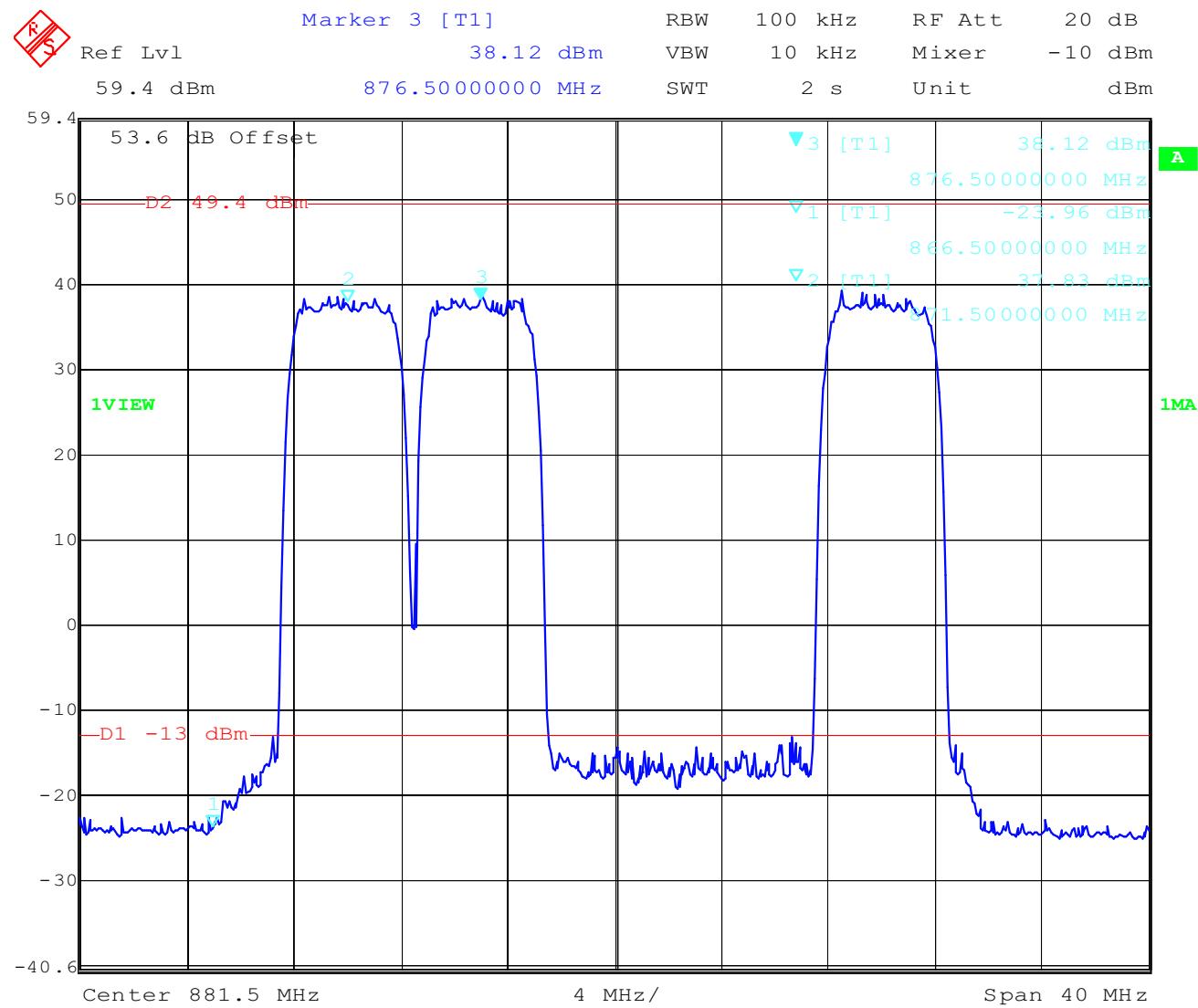


Date: 9.SEP.2008 13:23:16

Intermodulation - CDMA

9.0 Spurious emissions at antenna terminals (Intermodulation Products) (FCC Part 2.1051)

Photo:

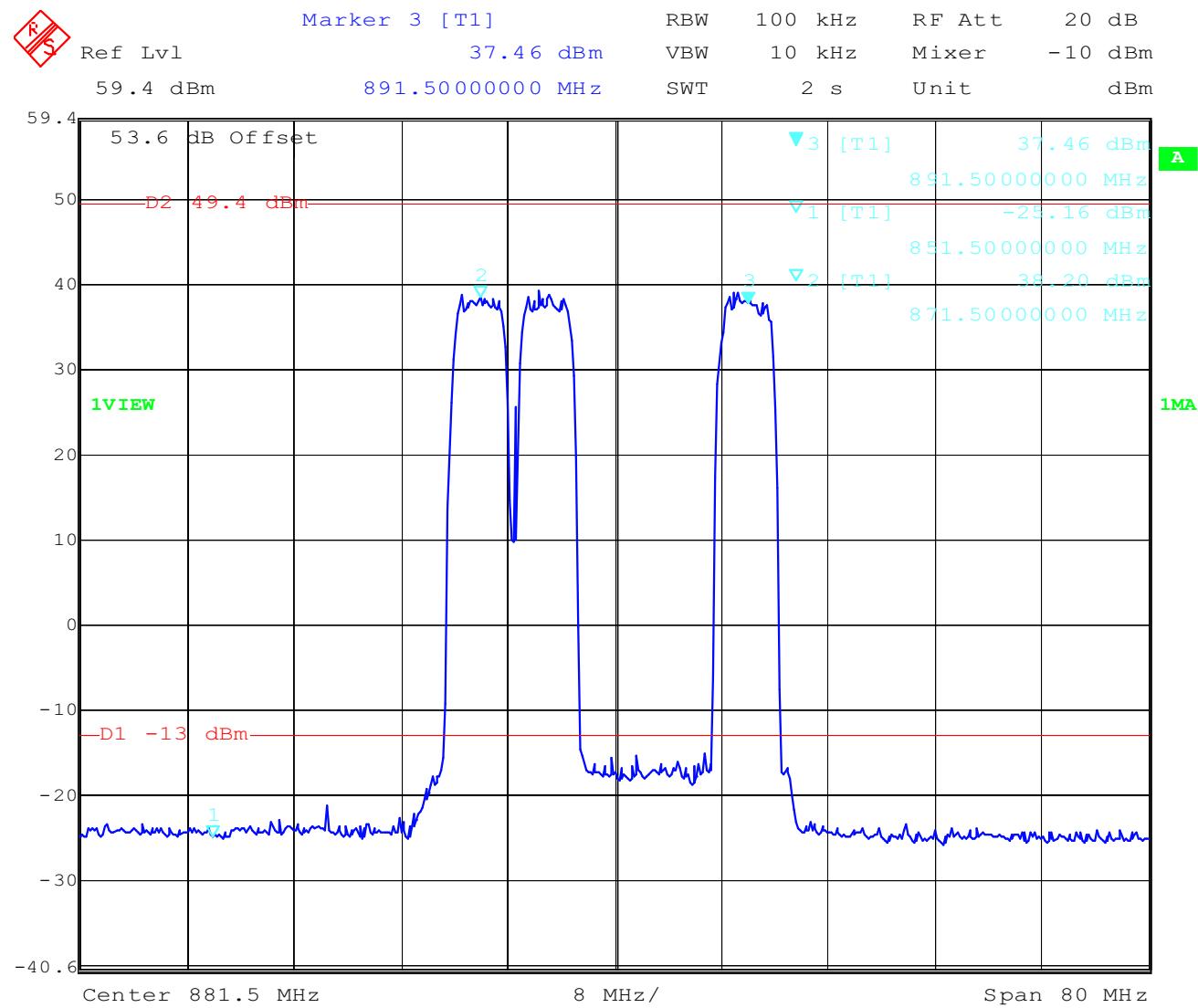


Date: 9.SEP.2008 12:48:15

Intermodulation - WCDMA

9.0 Spurious emissions at antenna terminals (Intermodulation Products) (FCC Part 2.1051)

Photo:



Date: 9.SEP.2008 12:49:31

Intermodulation - WCDMA

10.0 Spurious emissions at antenna terminals (Band edge) (FCC Part 2.1051)**Method:**

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

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.

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.

Connect the RF output of the EUT to a spectrum analyzer through appropriate attenuation. Set the EUT to transmit at its maximum power level.

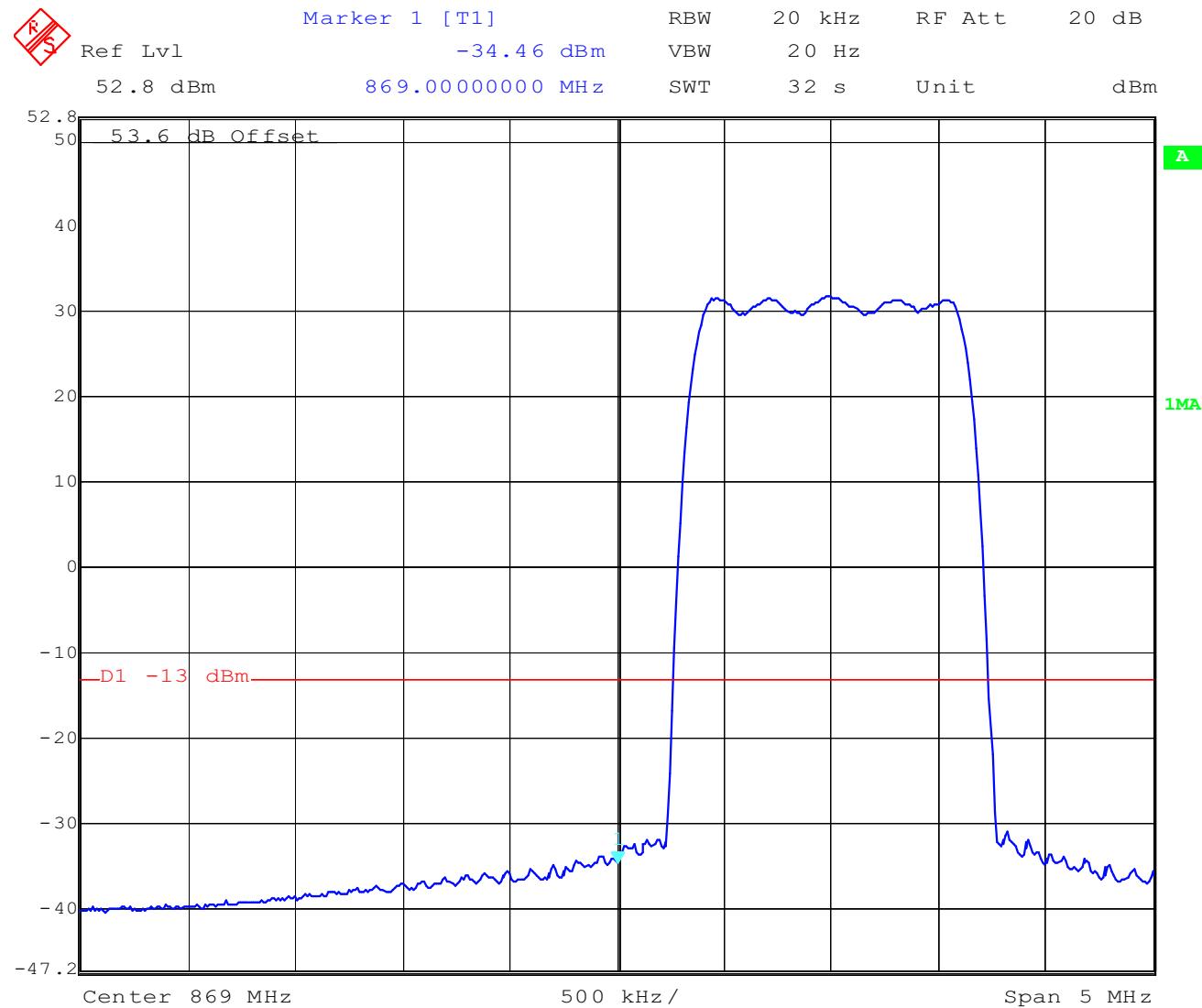
Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
Attenuator, 03 dB, <18GHz	Weinschel Corp	2	200003	08/05/2008	08/05/2009
Attenuator, 10 dB, <18GHz	Weinschel Corp	2	200009	08/05/2008	08/05/2009
Attenuator, 10 dB, <18GHz, 50W	Weinschel	47-10-34	200061	08/05/2008	08/05/2009
Attenuator, 10 dB, <2.5 GHz 1000W	JFW Industries, Inc	50FHAM-010-1000	200073	03/21/2008	03/21/2009
Attenuator, 20 dB, <18GHz	Hewlett Packard	11582A 8491B 020	213101a	08/19/2008	08/19/2009
Cable E04, <18GHz	Huber-Suhner	Sucoflex 104PE	E04	06/04/2008	06/04/2009
Cable E202, 18 GHz, N, 3m	Megaphase	TM18 NKNK 118	E202	01/16/2008	01/16/2009
Spectrum Analyzer, 20Hz-40GHz	Rohde & Schwarz	FSEK30	200062	03/19/2008	03/19/2009

Results: The sample tested was found to Comply.

10.0 Spurious emissions at antenna terminals (Band edge) (FCC Part 2.1051)

Photo:

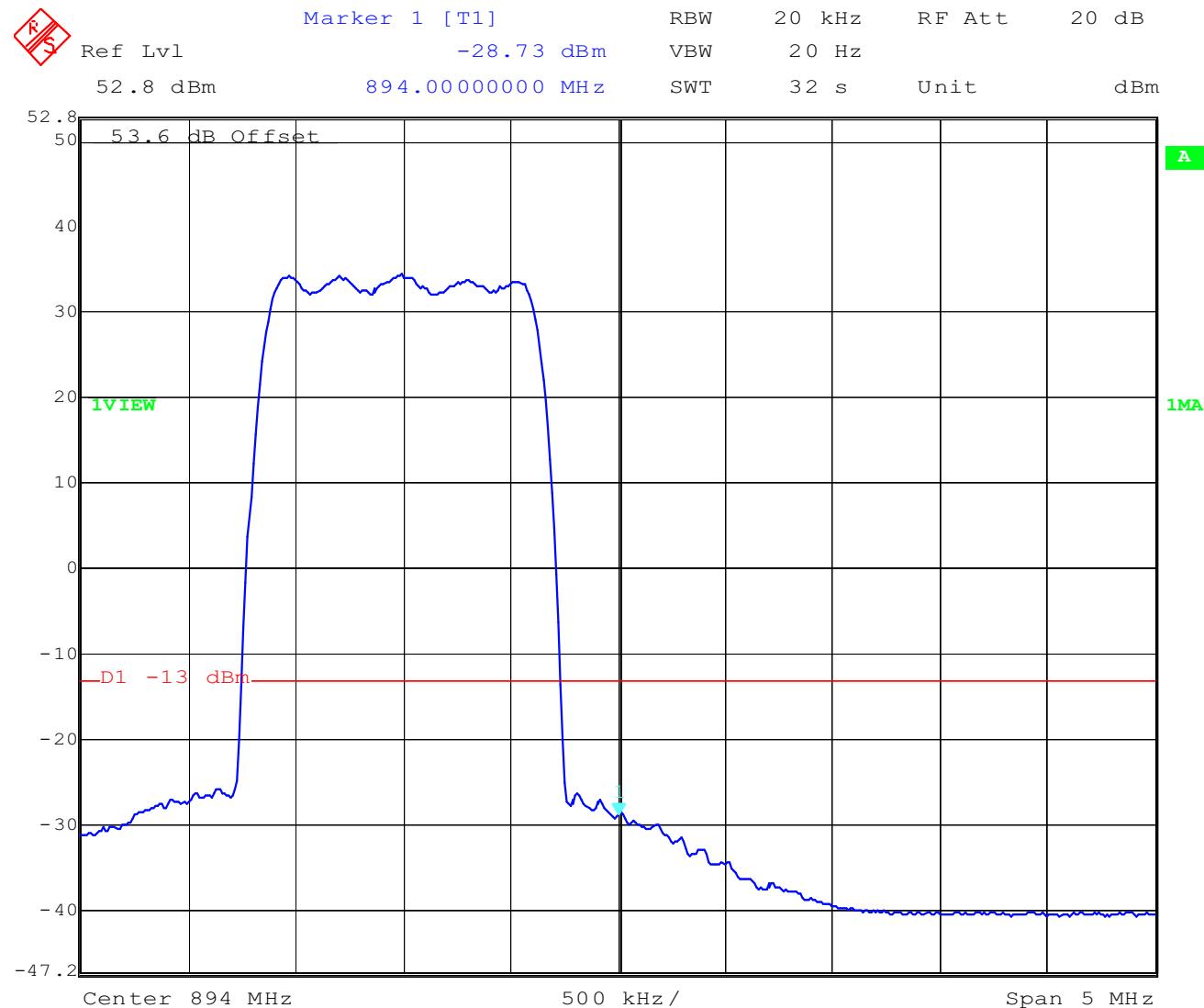


Date: 10.SEP.2008 08:06:34

CDMA - Low Channel

10.0 Spurious emissions at antenna terminals (Band edge) (FCC Part 2.1051)

Photo:

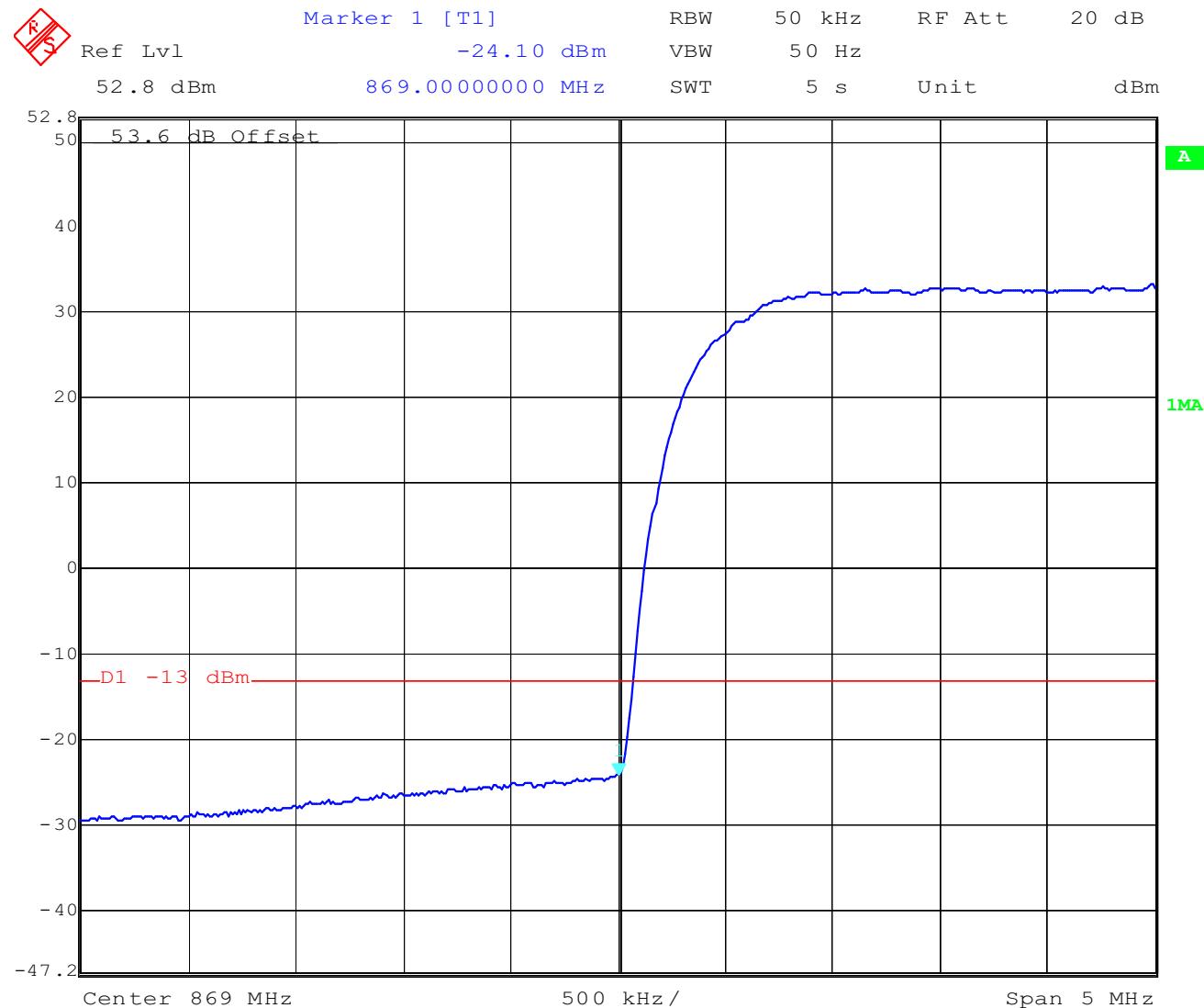


Date: 10.SEP.2008 08:14:05

CDMA - High Channel

10.0 Spurious emissions at antenna terminals (Band edge) (FCC Part 2.1051)

Photo:

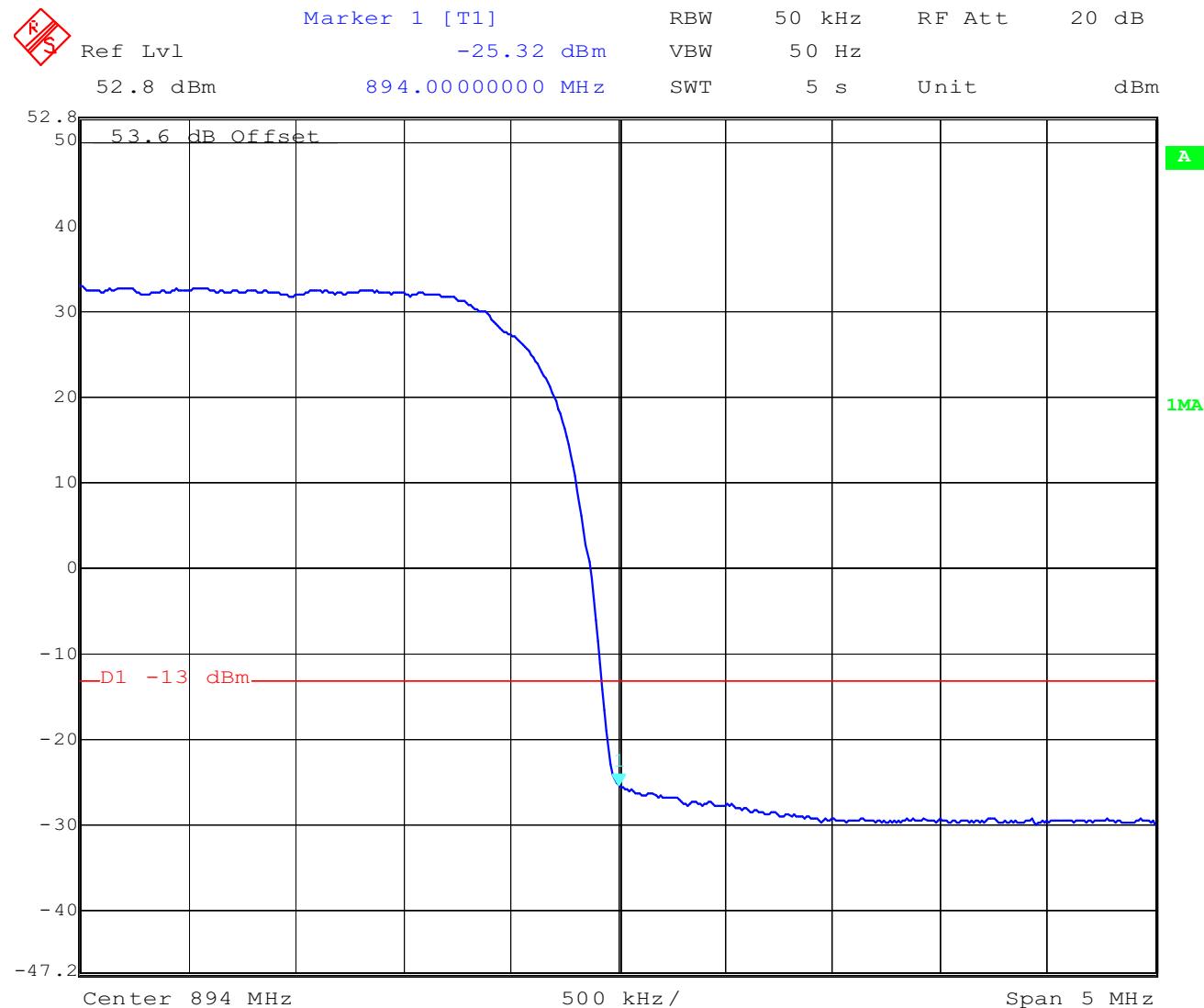


Date: 10.SEP.2008 08:21:06

WCDMA - Low Channel

10.0 Spurious emissions at antenna terminals (Band edge) (FCC Part 2.1051)

Photo:

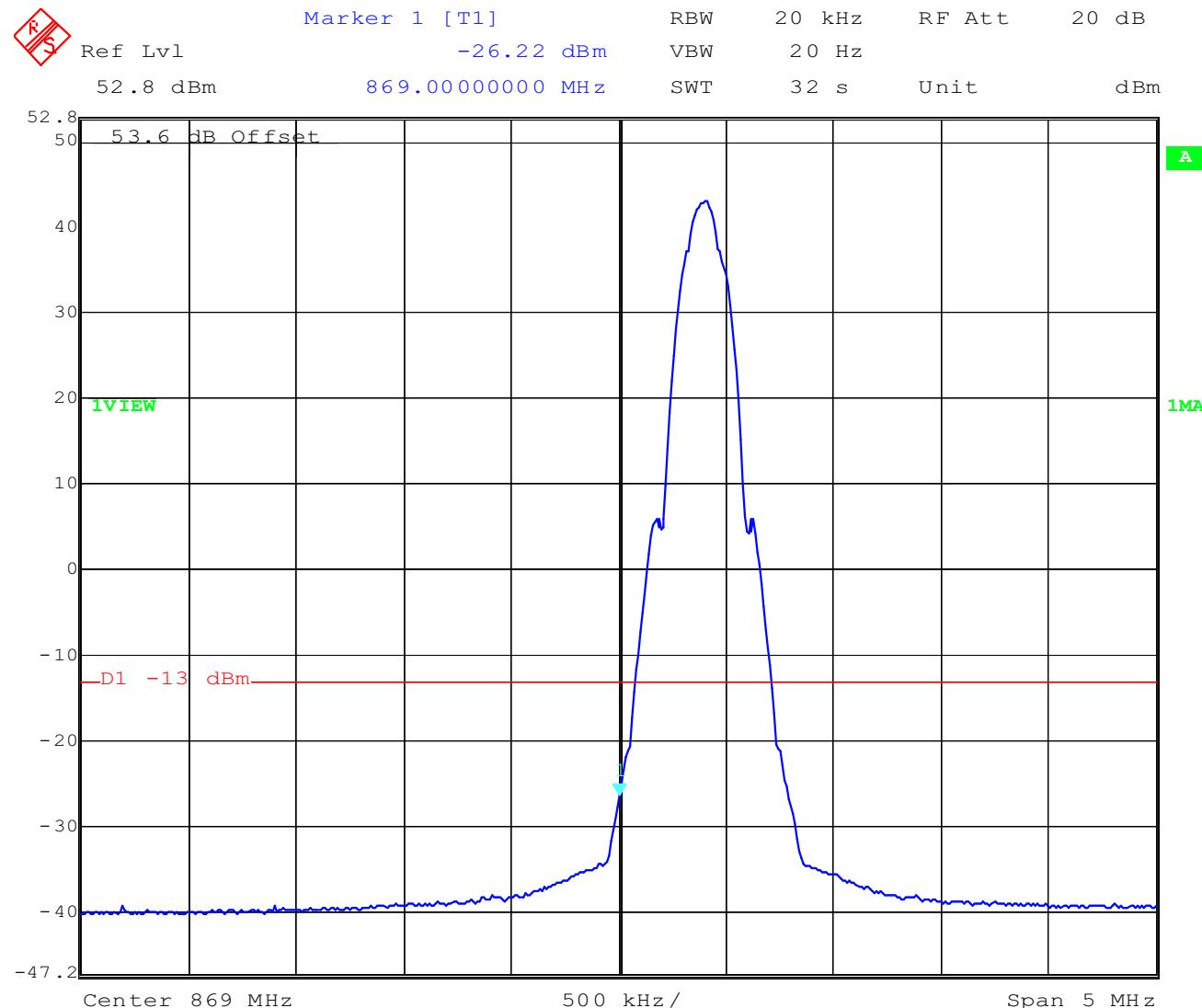


Date: 10.SEP.2008 08:18:12

WCDMA - High Channel

10.0 Spurious emissions at antenna terminals (Band edge) (FCC Part 2.1051)

Photo:

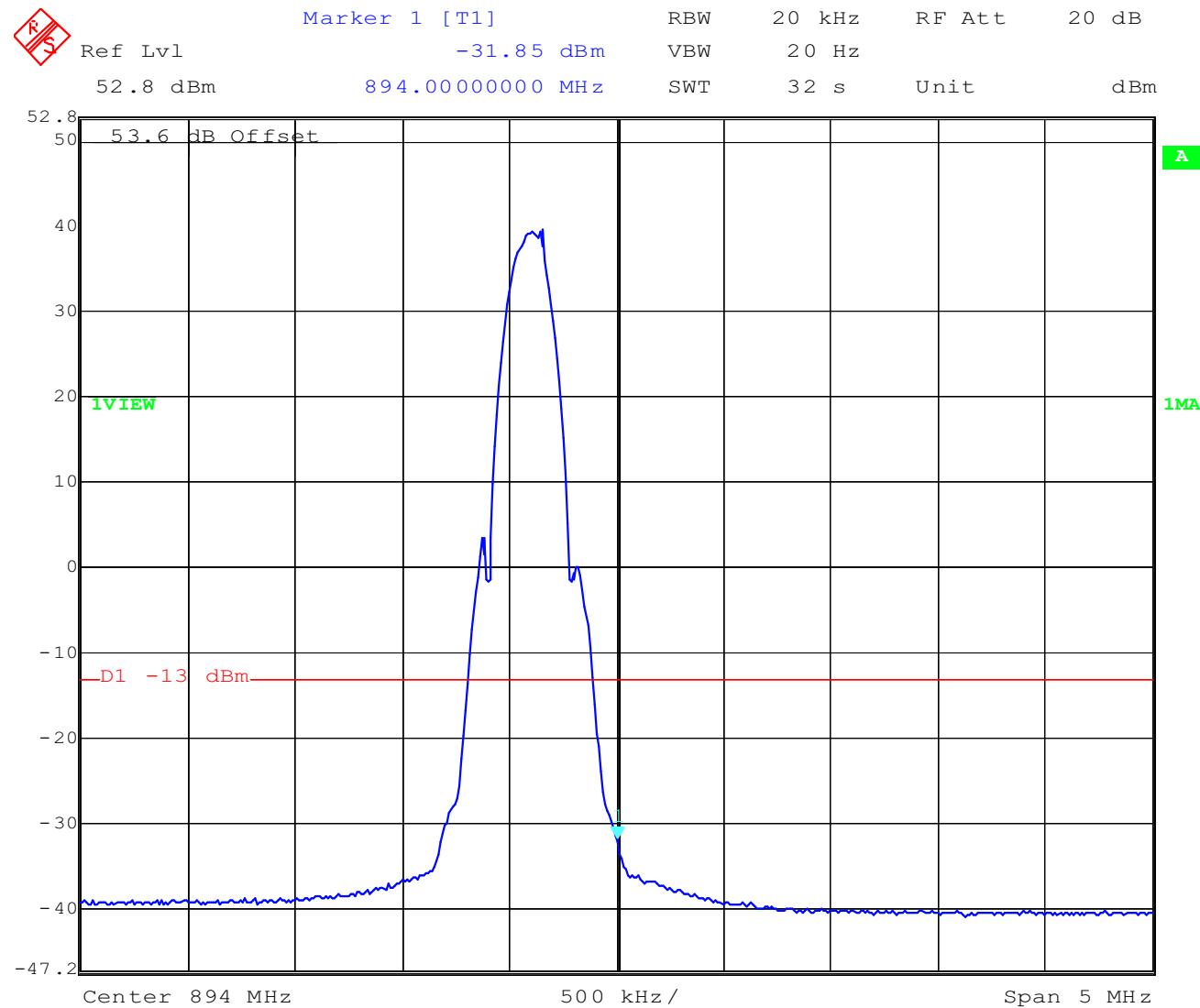


Date: 10.SEP.2008 08:58:44

GSM - Low Channel

10.0 Spurious emissions at antenna terminals (Band edge) (FCC Part 2.1051)

Photo:

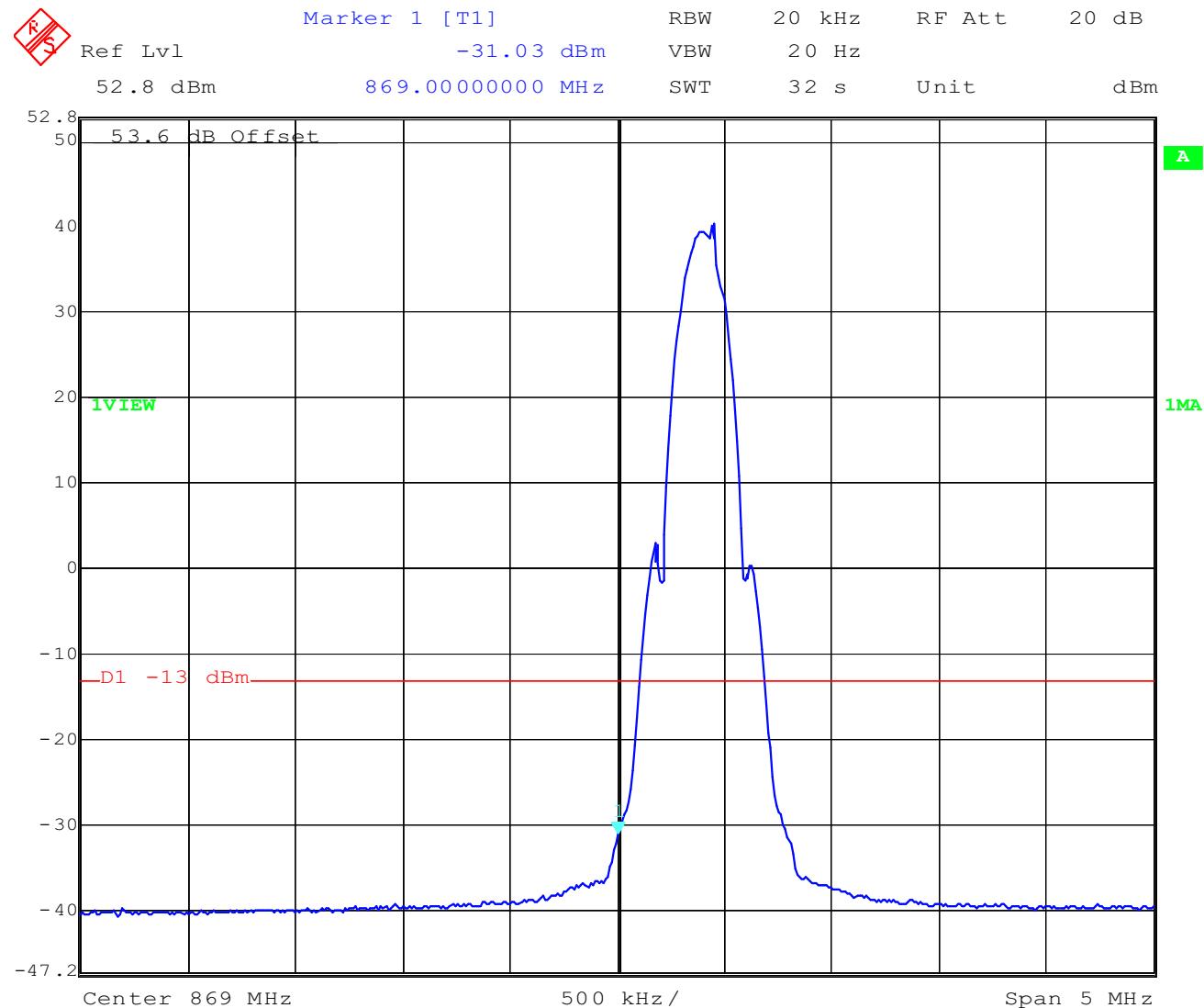


Date: 10.SEP.2008 08:54:19

GSM Edge - High Channel

10.0 Spurious emissions at antenna terminals (Band edge) (FCC Part 2.1051)

Photo:

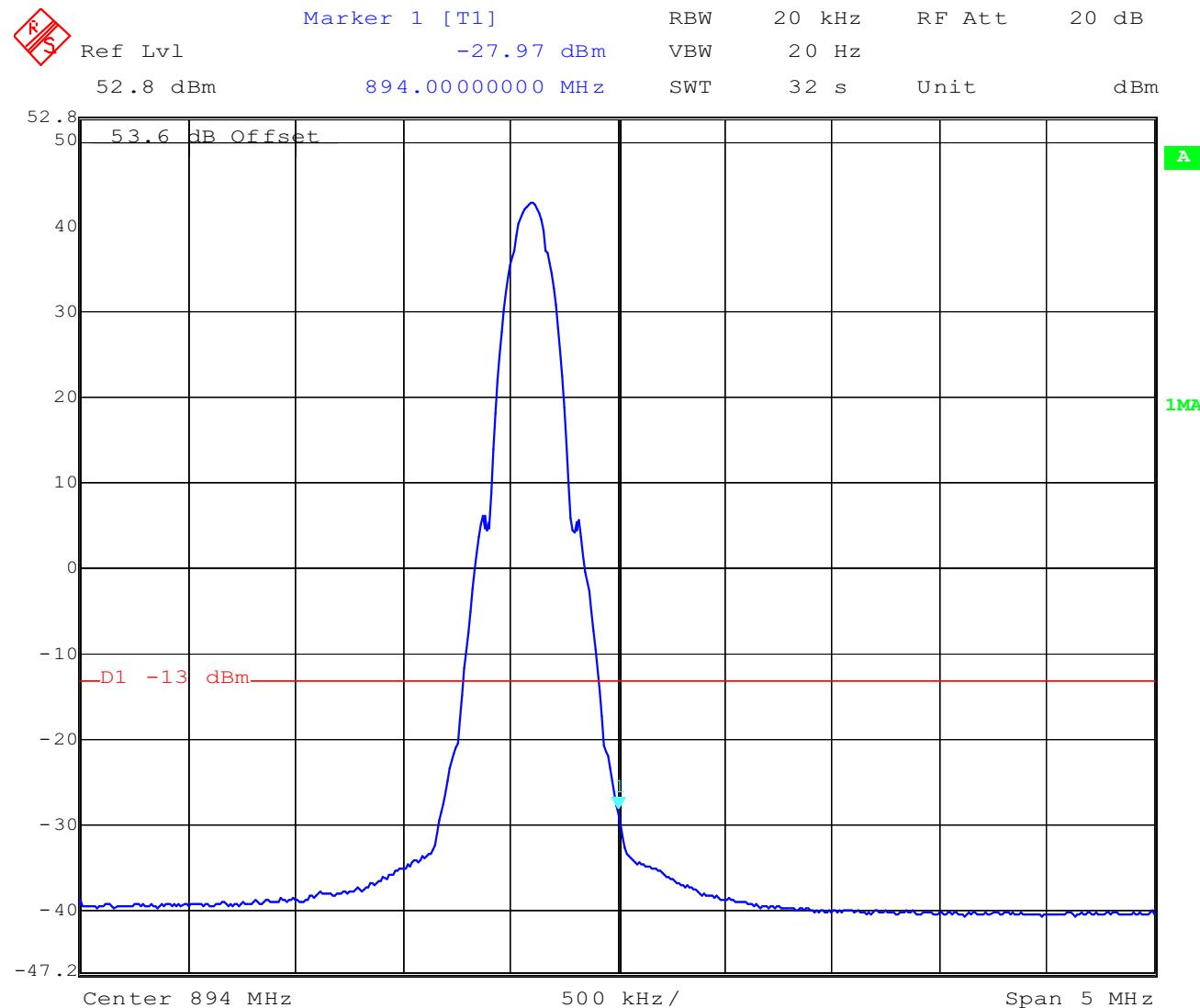


Date: 10.SEP.2008 08:56:47

GSM Edge - Low Channel

10.0 Spurious emissions at antenna terminals (Band edge) (FCC Part 2.1051)

Photo:



Date: 10.SEP.2008 09:01:28

GSM - High Channel

11.0 Field strength of spurious radiation (FCC Part 2.1053)

Method:

Applies to the following Standards:
 TIA-603-C (land mobile)
 FCC 47 CFR Part 90 (land mobile)
 RSS-119 (land mobile/fixed)

PROCEDURE

- A) Connect the equipment as illustrated. Place the transmitter to be tested on the turntable in the test site, in its normal operating position. If the transmitter is intended to be hand held, the testing must be repeated with the transmitter in three orthogonal orientations.
- B) Attach a non-radiating standard load to the antenna port, using the shortest possible interconnecting shielded cable. For devices with integral, antennas, run the test with the integral antenna operating.
- C) Select the larger test distance consistent with the site noise floor; use 10m if possible, 3m if ambient noise requires a shorter distance.
- D) Typical spectrum analyzer settings are given below. Refer to the table above, and the specific standard, for correct settings.
 - 1) RBW = 10 kHz below 1 GHz, 1 MHz above 1 GHz.
 - 2) VBW = 300 kHz below 1 GHz, 3 MHz above 1 GHz.
 - 3) Sweep speed sufficiently slow to maintain calibration.
 - 4) detector mode = positive peak.
- E) Place the test antenna in its vertical polarization position; use an attenuator with 6 - 10 dB loss (A) as a matching pad between the test antenna and its cable.
- F) The spectrum is to be scanned from the lowest RF frequency generated in the equipment to the 10th harmonic of the carrier, excepting the occupied bandwidth. Specific standards may require a different maximum frequency.
- G) For each spurious emission detected, raise and lower the test antenna from 1 to 4m with the transmitter facing the test antenna, and record the highest received signal from the transmitter in dBmR. Rotate the turntable through 360 degrees to find the maximum emission value at that frequency.
- H) Rotate the test antenna to its horizontal polarization position. Repeat steps g) and h).
- I) Replace the transmitter under test with a substitution antenna whose gain above that of a half-wave dipole is known to be G(dBd). Refer to the illustration below.
- J) Place the center of the substitution antenna at the same location on the table as the transmitter under test, using vertical polarization for both substitution and test antennas. Connect the substitution antenna to the signal generator, using a cable with known signal loss LC. Use an attenuator with loss S as a matching pad between the substitution antenna and its cable.
- K) Raise the test antenna from 1m to 4m to maximize the analyzer display from the substitution antenna. At the maximum display value for each spurious frequency, adjust the signal level dBmT so that the spectrum analyzer displays the maximum signal observed in steps g) - h) above.
- L) Calculate the output power of the transmitter in ERP according to:

$$\text{spurious power in (dBm)} = \text{dBmT} - \text{LC} - \text{S} + \text{dBd}$$
- M) Repeat steps k) - l) for both antennas horizontally polarized. Record the spurious power separately for the vertical and horizontal polarizations.

NOTE: For FCC purposes, emissions > 20 dB below the regulatory spurious limit do not have to be determined by the substitution method. The regulatory limit for many licensed transmitters is -13 dBm or 82.2 dBuV/m at 3m.

MEASUREMENT UNCERTAINTY

Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes. The values given are the measurement uncertainty values with an expanded uncertainty of k=2.

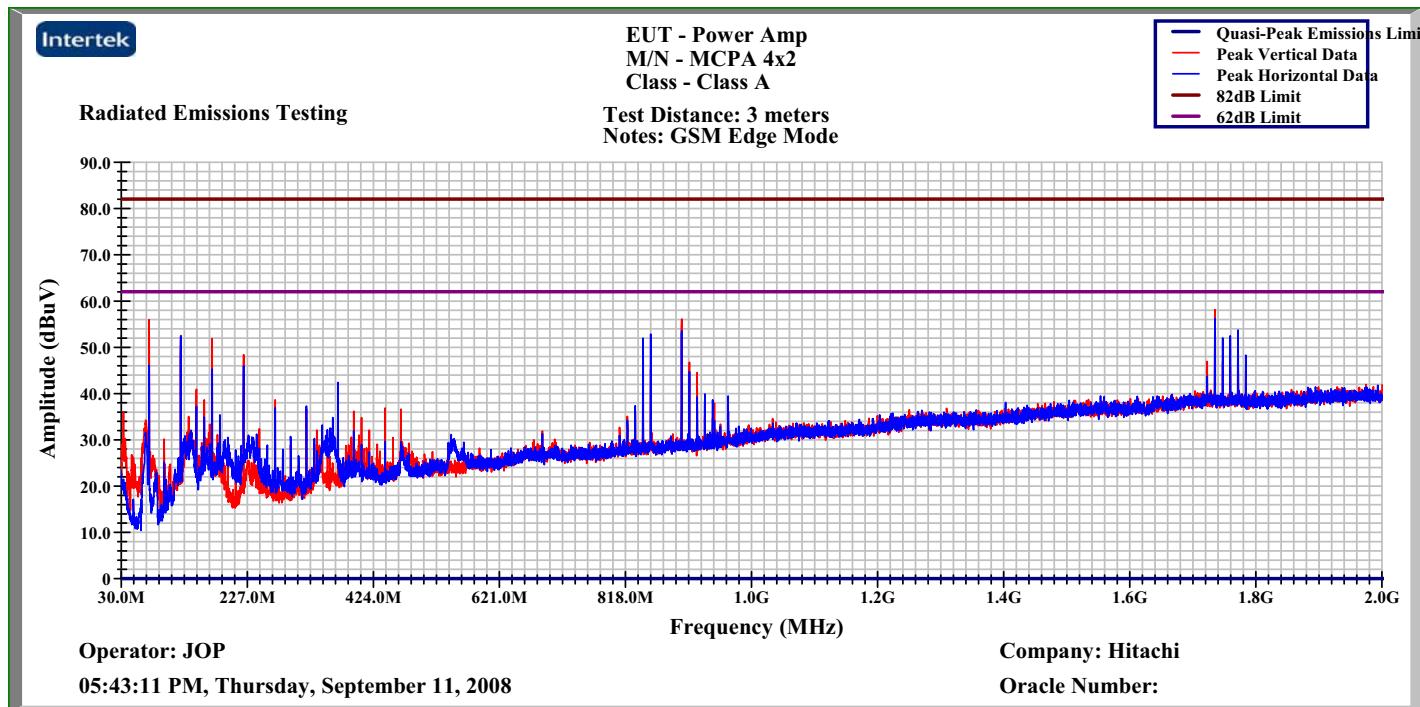
+/- 3.85 dB

Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
Antenna, BiLog, 20-2000MHz	Chase	CBL6112A	211518	12/20/2007	12/20/2008
Antenna, Horn, <18 GHz	EMCO	3115	213061	04/18/2008	04/18/2009
Cable E05, <18GHz	Huber-Suhner	Sucoflex 104PEA	E05	05/05/2008	05/05/2009
Cable E201, 18 GHz, N, 3m	Megaphase	TM18 NKNK 118	E201	01/16/2008	01/16/2009
Cable MP3, 18 GHz, N, 10m	Megaphase	G919-NKNK-394	MP3	05/05/2008	05/05/2009
Cable ST1, 7m, N-N, 18 GHz	Storm Products Co.	PR90-206-7MTR	ST1	01/16/2008	01/16/2009
Filter, 2 GHz High Pass	Filtek	HP12/2000-5AB	213155a	03/21/2008	03/21/2009
Filter, Band Reject, Cavity Design, 80 dB	Wainwright Inst.	WRCG 869/894	200078	12/18/2007	12/18/2008
Preamplifier, 10 MHz to 2000 MHz, 30 dB gain	Mini-Circuits	ZKL-2	200069	09/18/2007	09/18/2008
Preamplifier, 20 MHz to 18 GHz, 40 dB	A.H. Systems	PAM-0118	200108	03/27/2008	03/27/2009
Spectrum Analyzer, 20Hz-40GHz	Rohde & Schwarz	FSEK30	200062	03/19/2008	03/19/2009

11.0 Field strength of spurious radiation (FCC Part 2.1053)

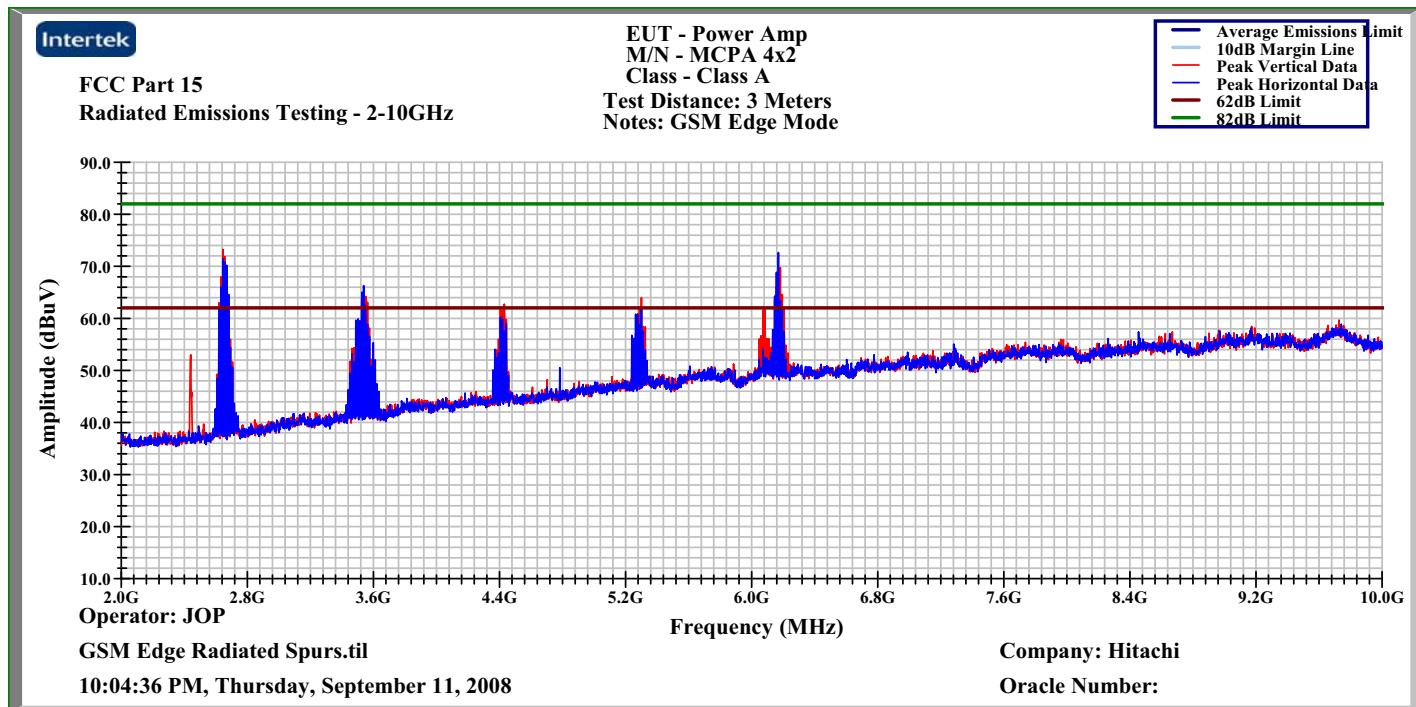
Plot:



Peak Plot - GSM Edge - 30MHz-2GHz

11.0 Field strength of spurious radiation (FCC Part 2.1053)

Plot:



Peak Plot - GSM Edge - 2GHz-10GHz

11.0 Field strength of spurious radiation (FCC Part 2.1053)

Data:

Date: 9/12/2008		Limit: FCC Part 22 (-13 dBm or 82.2 dBuV/m)							
Frequency Range (MHz): 30-10000		Test Distance (m): 3							
Input power: 27Vdc		Modifications for compliance (y/n): n							
A	B	C	D	E	F	G	H	J	
Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Net dB(uV/m)	3m Limit dB(uV/m)	Margin dB	Detectors / Bandwidths Det/RBW/VBW
GSM									
v	2620.250	59.6	28.5	8.6	40.9	55.8	82.2	-26.5	AV/IM/1.6Hz
v	2632.350	60.2	28.5	8.6	40.9	56.4	82.2	-25.9	AV/IM/1.6Hz
v	2644.500	69.7	28.5	8.6	40.9	65.9	82.2	-16.4	AV/IM/1.6Hz
v	2656.500	66.8	28.5	8.6	40.9	63.0	82.2	-19.3	AV/IM/1.6Hz
h	2668.625	67.7	28.6	8.6	40.9	64.0	82.2	-18.3	AV/IM/1.6Hz
v	2680.800	61.2	28.6	8.6	40.9	57.5	82.2	-24.8	AV/IM/1.6Hz
GSM EDGE									
v	2602.250	58.1	28.5	8.6	40.9	54.3	82.2	-27.9	AV/IM/1.6Hz
v	2632.350	62.5	28.5	8.6	40.9	58.7	82.2	-23.6	AV/IM/1.6Hz
v	2644.500	67.3	28.5	8.6	40.9	63.5	82.2	-18.8	AV/IM/1.6Hz
v	2656.500	68.3	28.5	8.6	40.9	64.5	82.2	-17.8	AV/IM/1.6Hz
h	2668.625	66.7	28.6	8.6	40.9	63.0	82.2	-17.9	AV/IM/1.6Hz
v	2680.800	58.2	28.6	8.6	40.9	54.5	82.2	-27.8	AV/IM/1.6Hz
CDMA									
v	2644.650	63.8	28.5	8.6	40.9	60.0	82.2	-22.3	AV/IM/1.6Hz
h	2656.000	63.5	28.6	8.6	40.9	59.8	82.2	-22.5	AV/IM/1.6Hz
v	2656.000	62.5	28.5	8.6	40.9	58.7	82.2	-23.6	AV/IM/1.6Hz
h	2667.500	65.4	28.6	8.6	40.9	61.7	82.2	-24.8	AV/IM/1.6Hz
v	2667.500	60.3	28.5	8.6	40.9	56.5	82.2	-25.8	AV/IM/1.6Hz
v	2679.000	57.0	28.6	8.6	40.9	53.3	82.2	-29.0	AV/IM/1.6Hz
Calculations		G=C+D+E-F		I=G-H					

Note: No other emissions detected within 20 dB of the limit

Substitution Measurement						
A	B	C	D	E	F	G
Ant. Pol. (V/H)	Frequency MHz	Substitution Reading dBm	TX ant Gain dBi	EIRP dBm	Limit dBm	Margin dB
GSM						
v	2644.500	-35.1	10.0	-25.1	-13.0	-12.1
v	2656.500	-38.5	10.0	-29.1	-13.0	-16.1
h	2668.625	-39.0	10.0	-29.1	-13.0	-16.1
GSM- Edge						
v	2632.250	-43.2	10.0	-33.2	-13.0	-20.2
v	2656.500	-38.5	10.0	-28.5	-13.0	-15.5
v	2668.625	-39.0	10.0	-29.0	-13.0	-16.0
h	2668.630	-44.7	10.0	-34.7	-13.0	-21.7
Calculations		E=C+D		G-E-F		