

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:

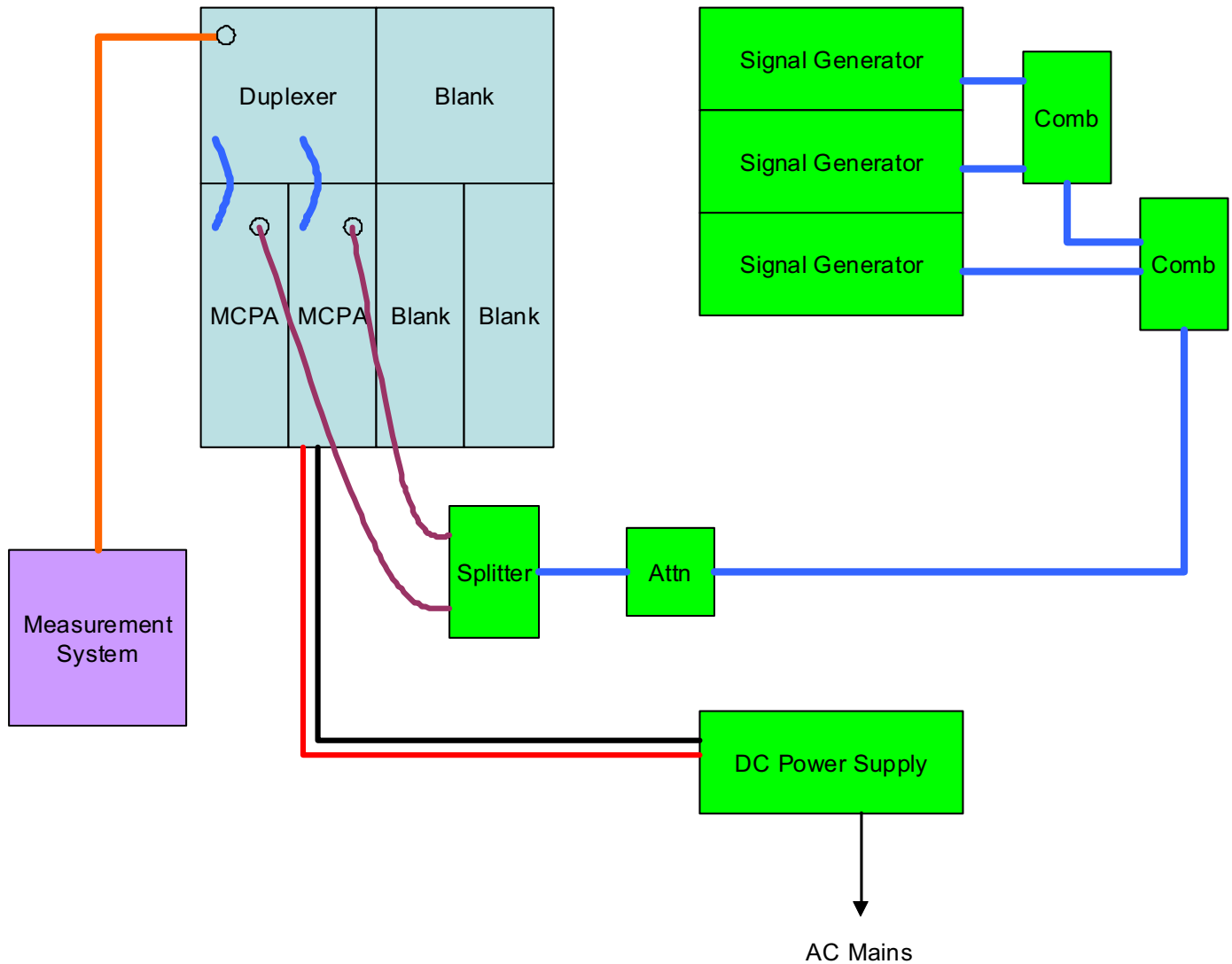
During testing where a single carrier was used, the input level was adjusted to obtain 190 Watts out on a single channel.

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 EUT cabling, document the support equipment, and show the interconnections in a block diagram.

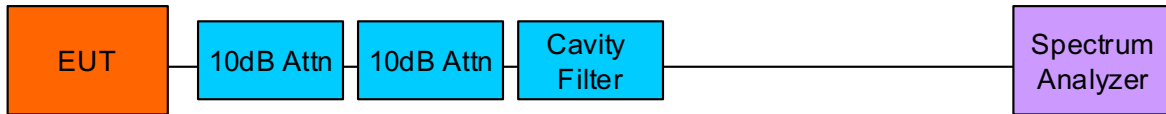
Drawing:

EUT Setup Diagram

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

Drawing:

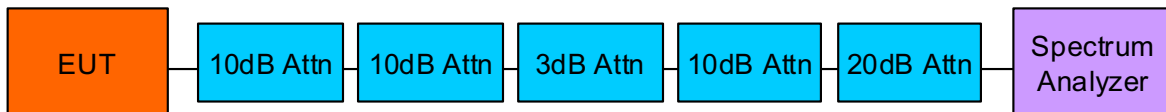
Test Setup for Spurious Emissions and Band Edge, 30-2500 MHz



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 dBm | Measured Power |
|----------|---------------|---------|-------------|--------------------|----------------|
| | | | | | 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:

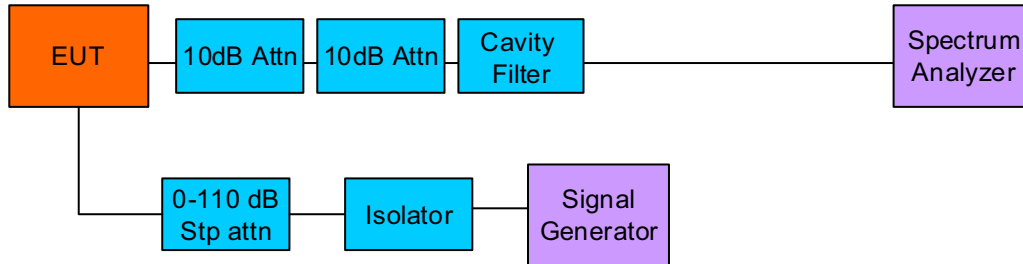
| Description: | Manufacturer: | Model: | Asset Number: | Cal Date: | Cal Due: |
|---|---------------------|-----------------|---------------|------------|------------|
| Attenuator, 10 dB, <18GHz, 50W | Weinschel | 47-10-34 | 200061 | 08/05/2008 | 08/05/2009 |
| Attenuator, 10 dB, <2.5 GHz 1000W | JFW 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.

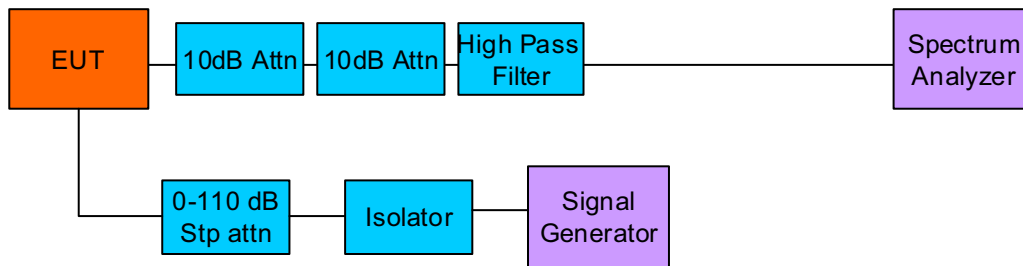
8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

Drawing:

Test Setup for Spurious Emissions, 30-2500 MHz



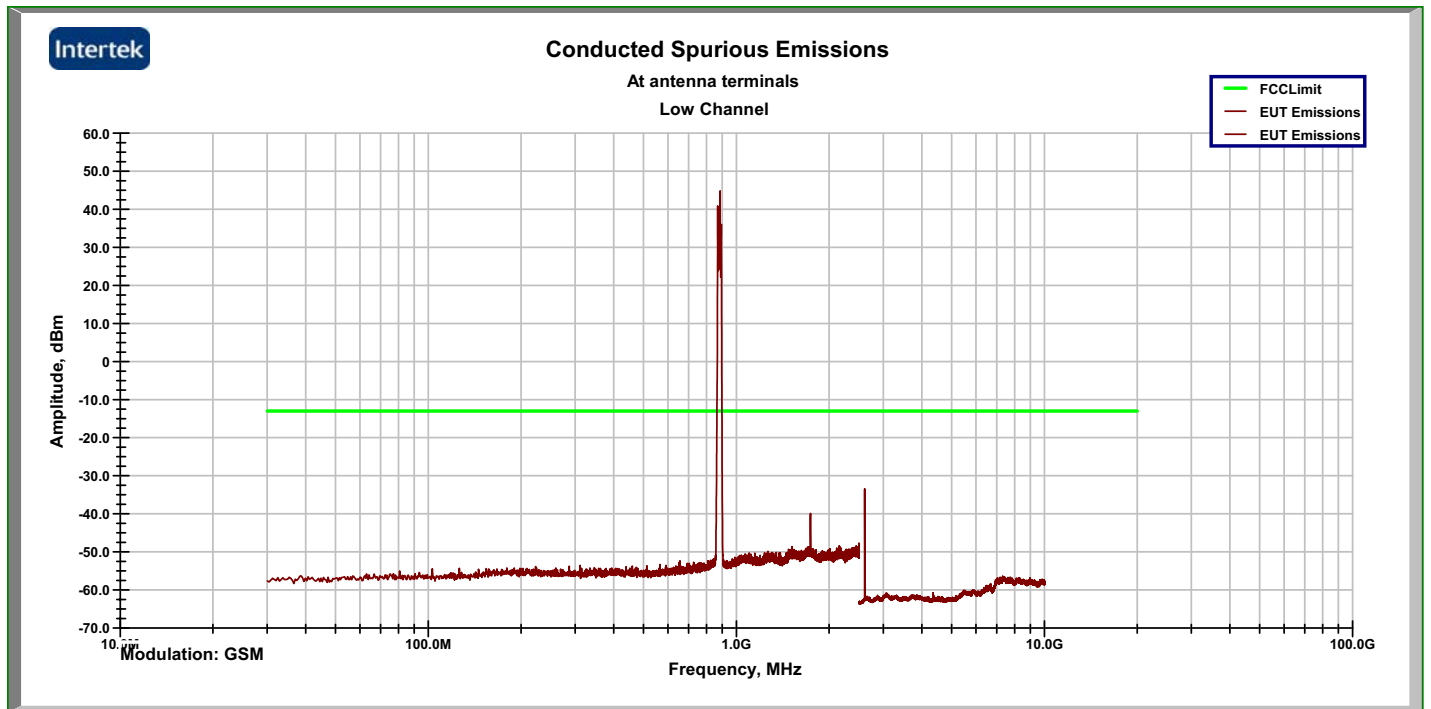
Test Setup for Spurious Emissions, 2500-10000 MHz



Setup Diagram

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

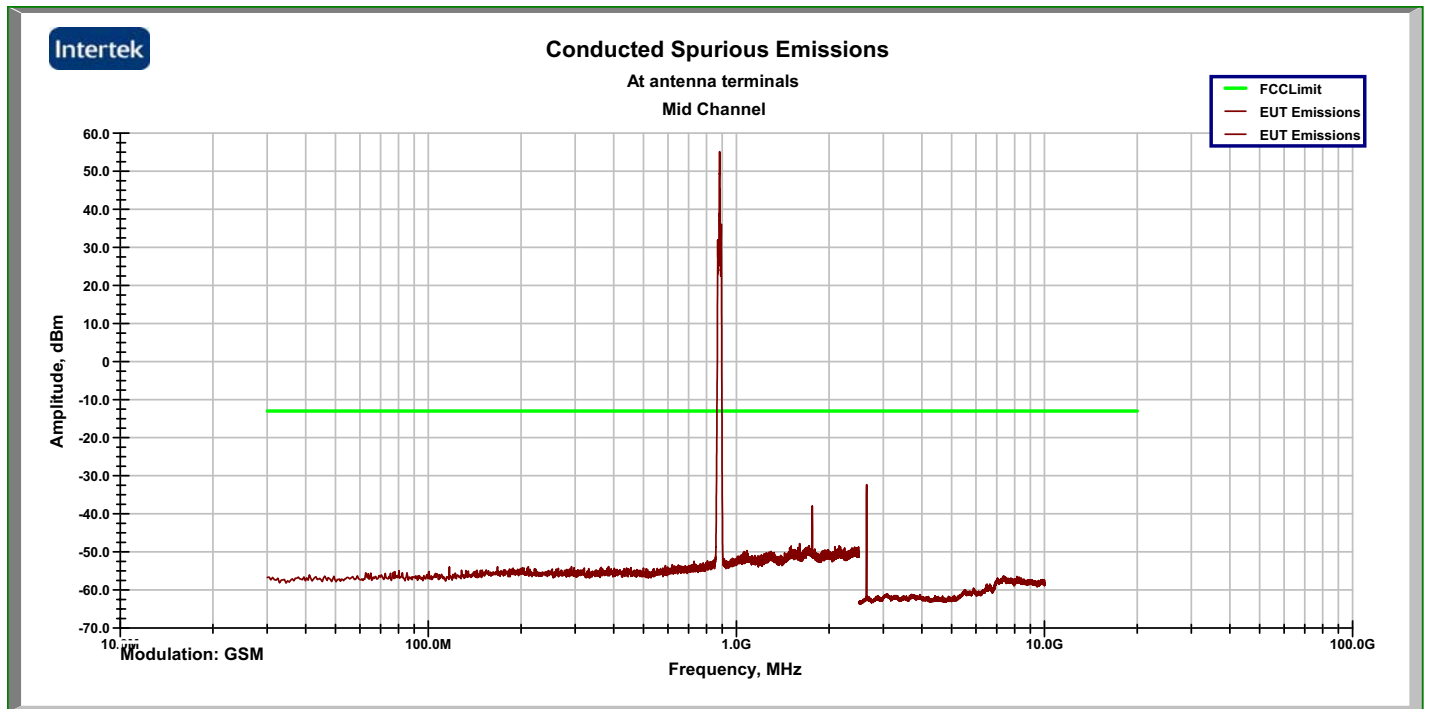
Plot:



GSM - Low Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

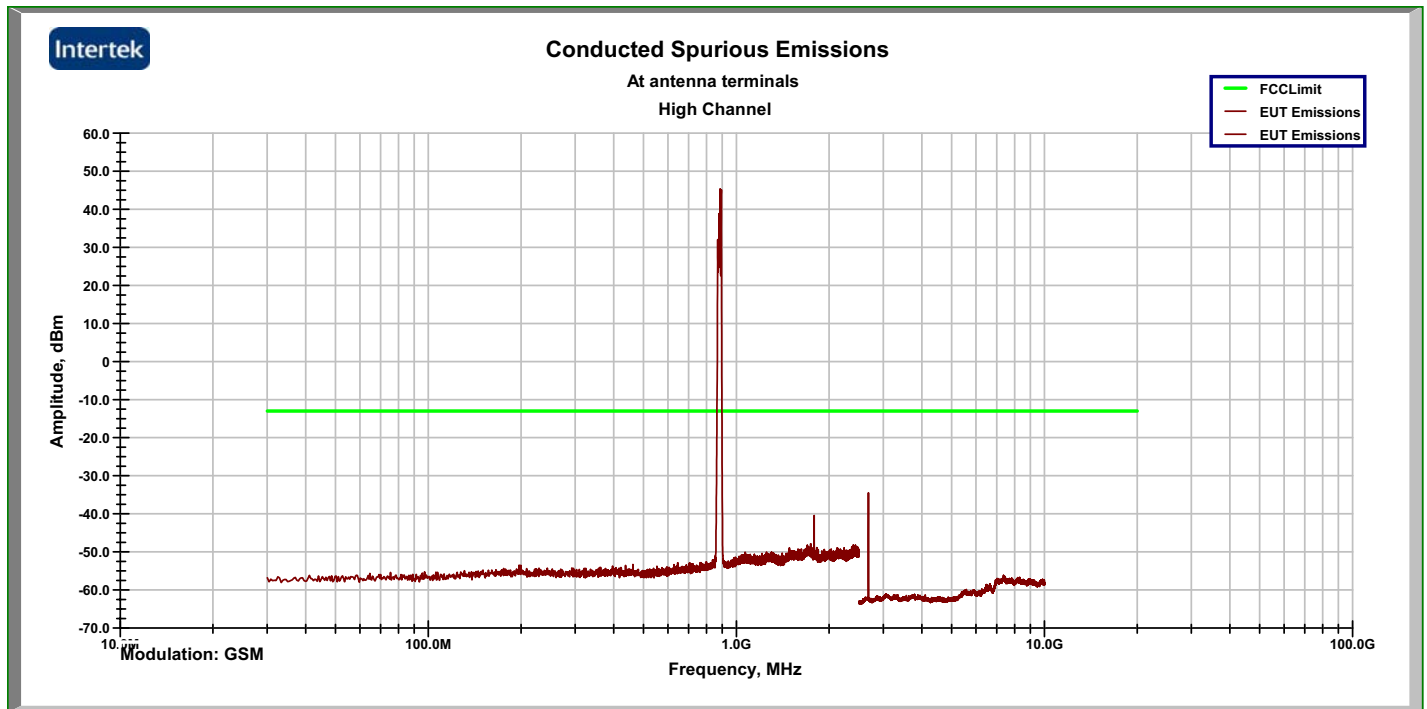
Plot:



GSM - Mid Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

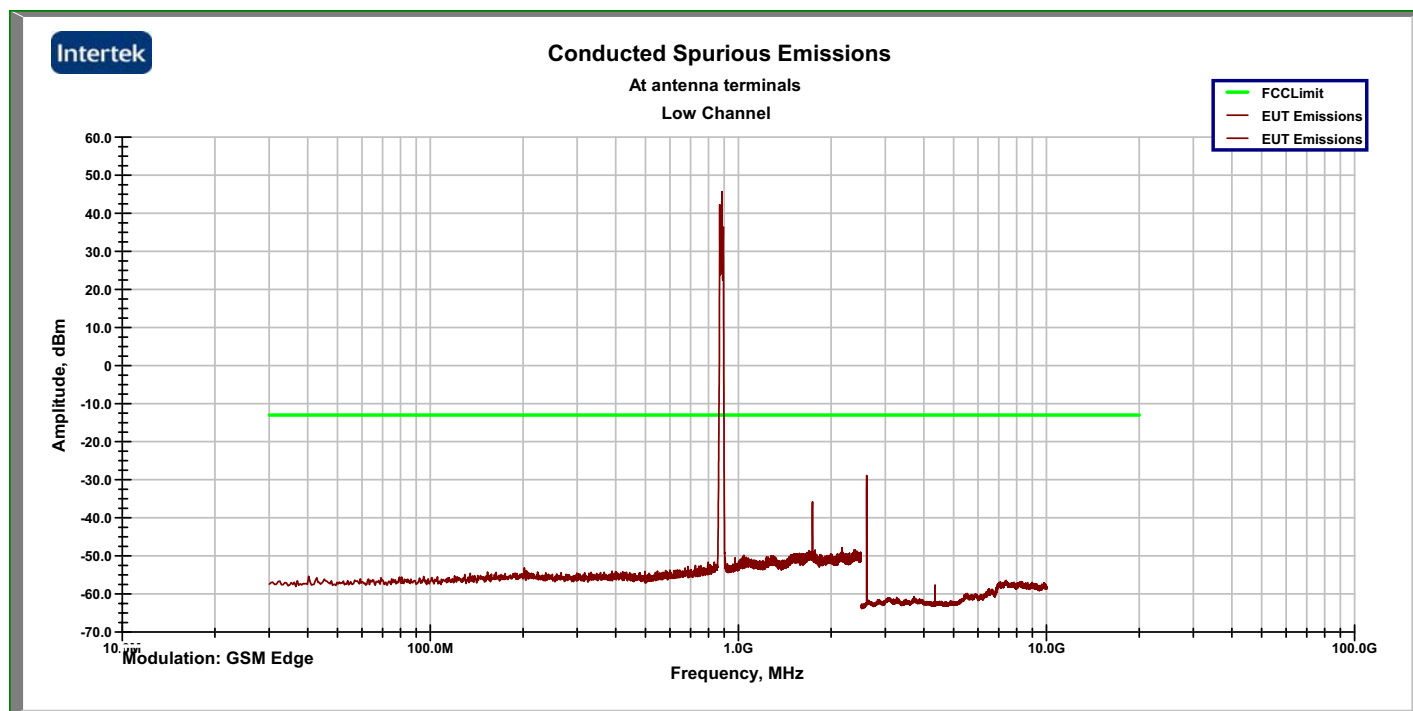
Plot:



GSM - High Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

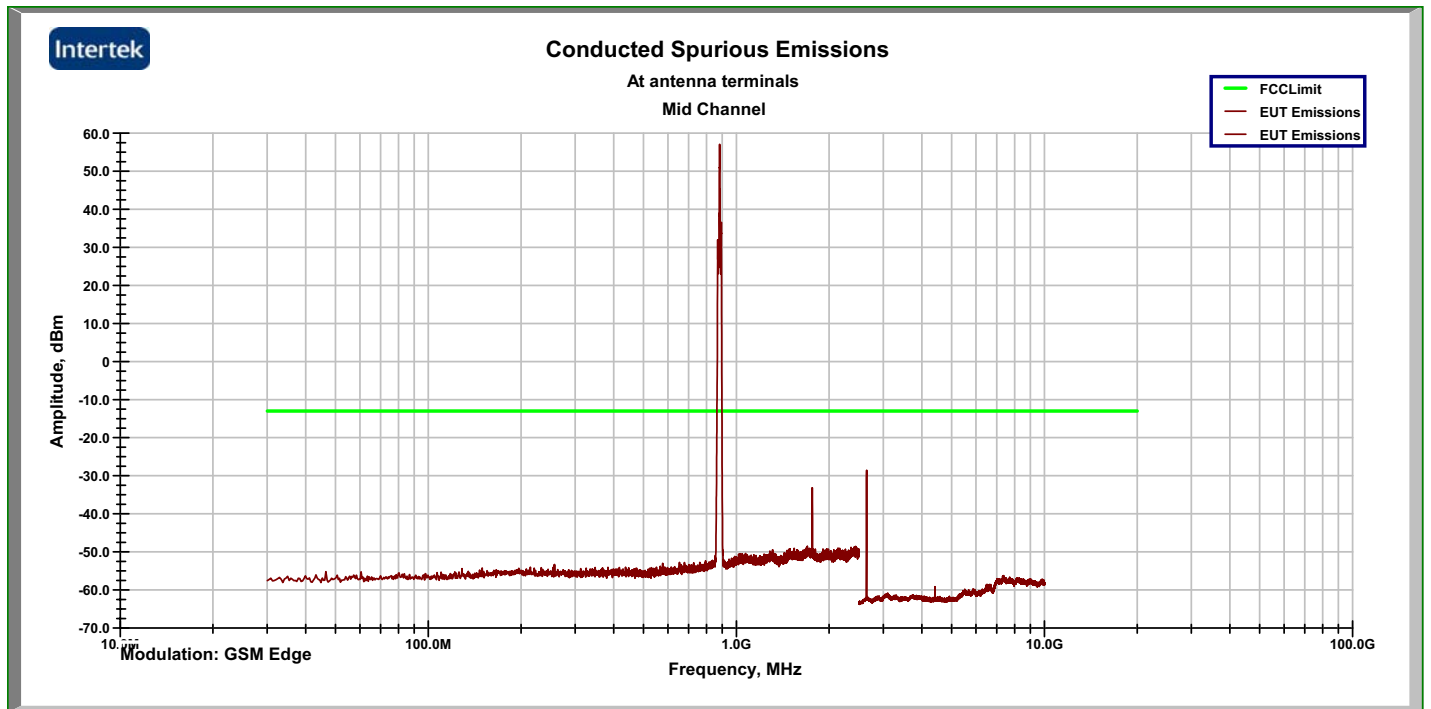
Plot:



GSM Edge - Low Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

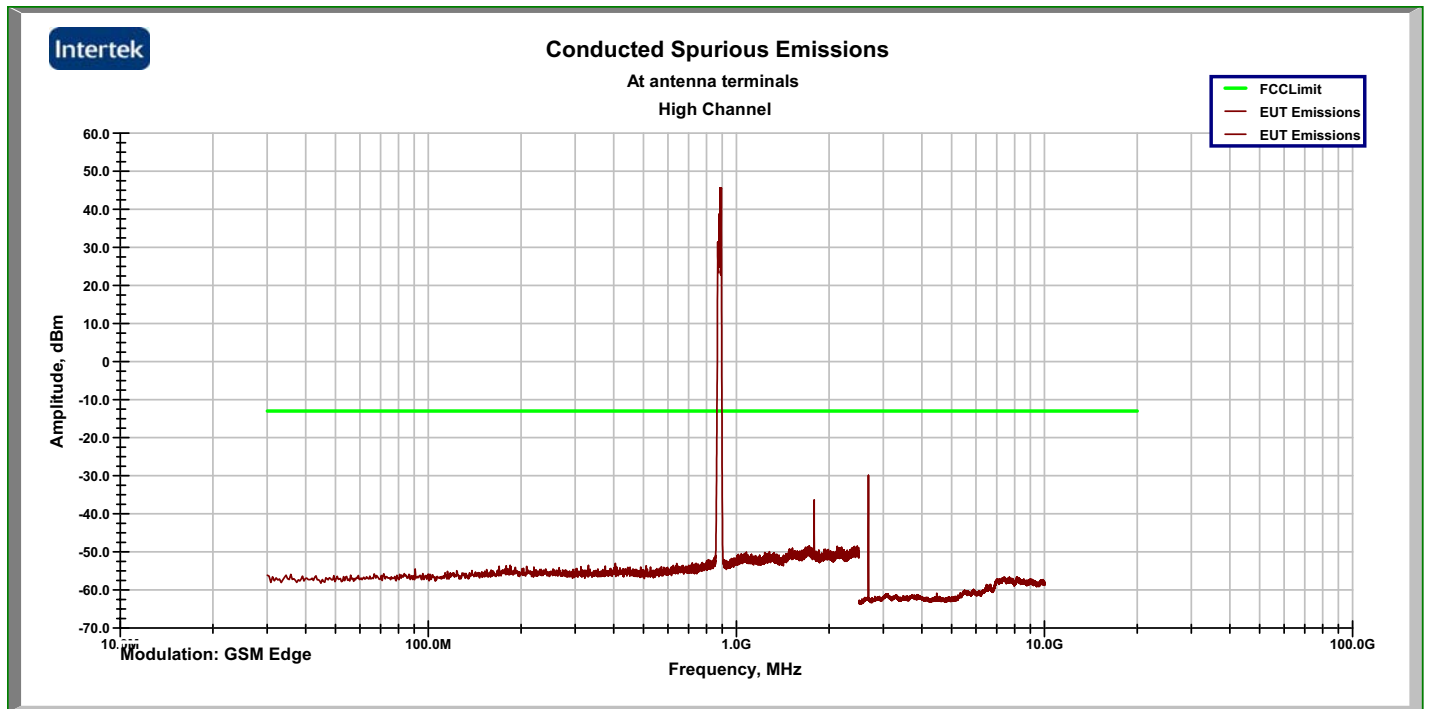
Plot:



GSM Edge - Mid Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

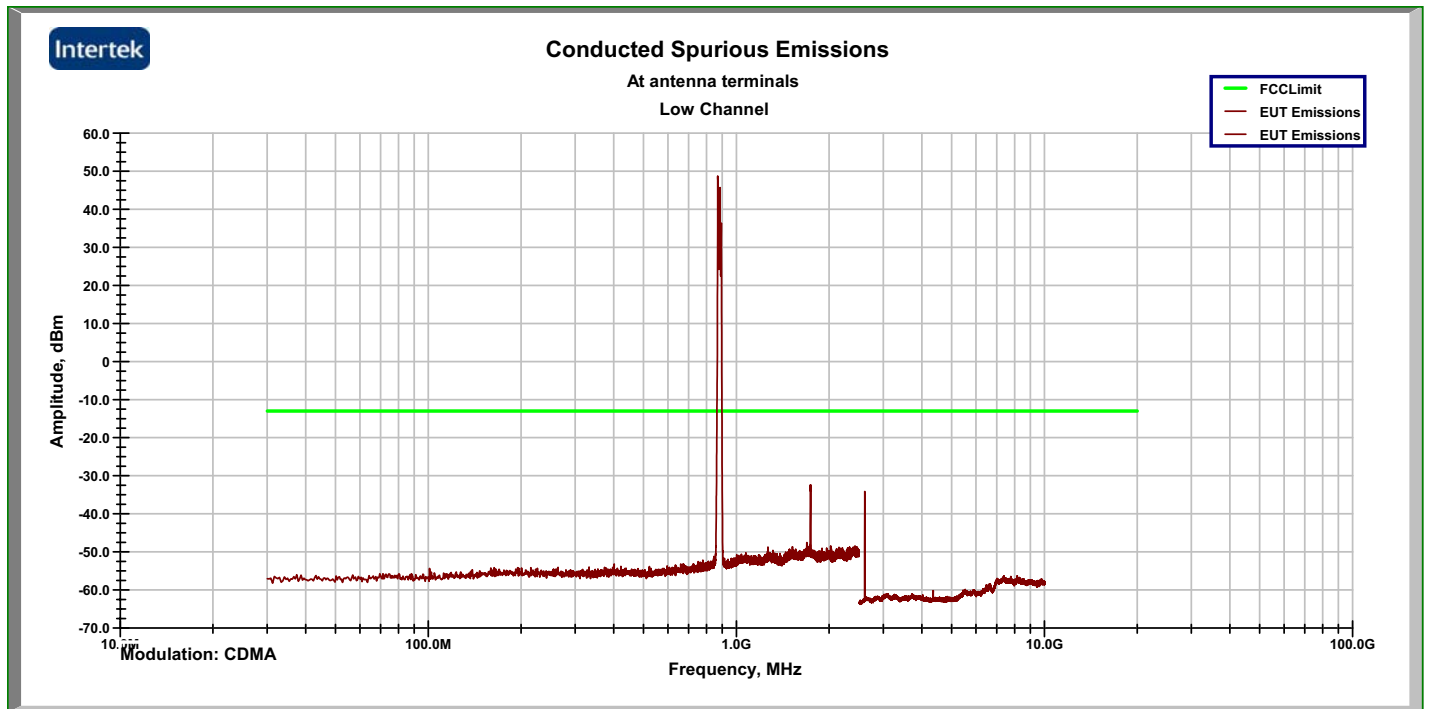
Plot:



GSM Edge - High Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

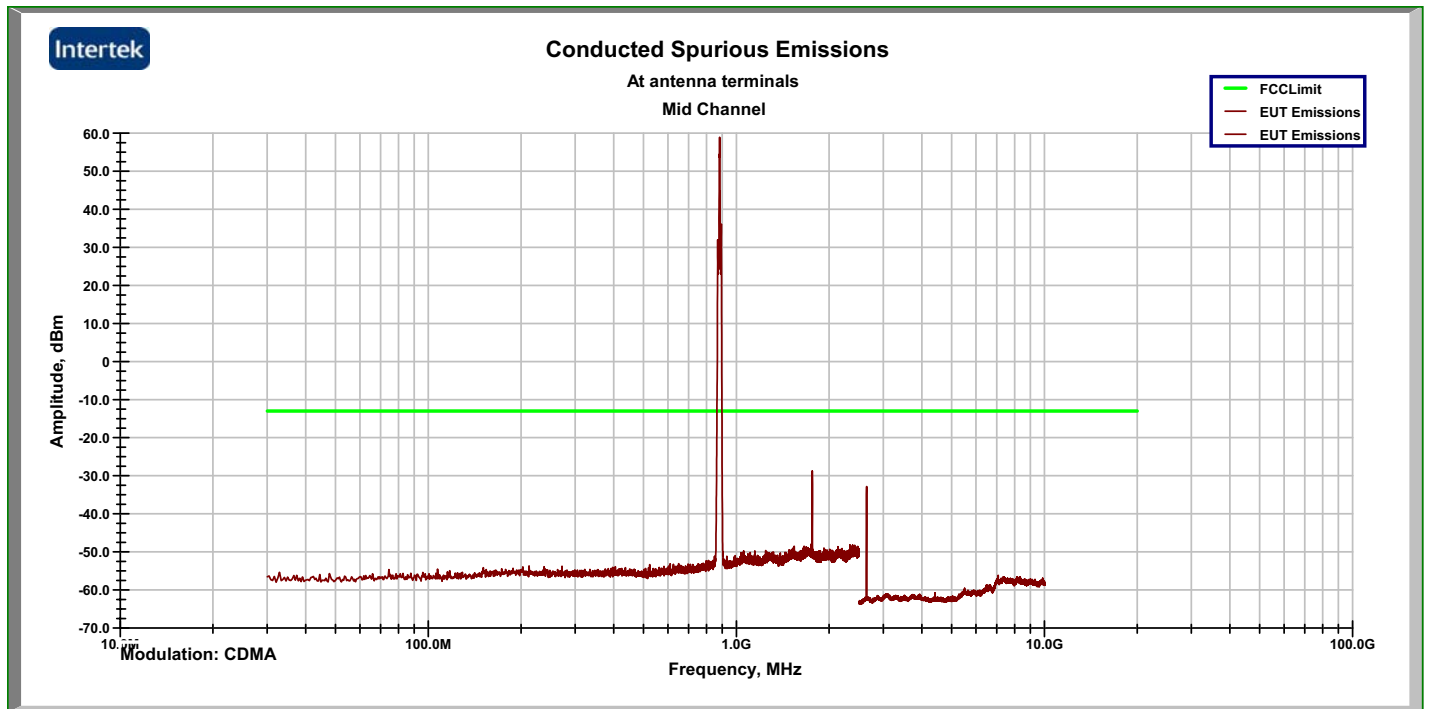
Plot:



CDMA - Low Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

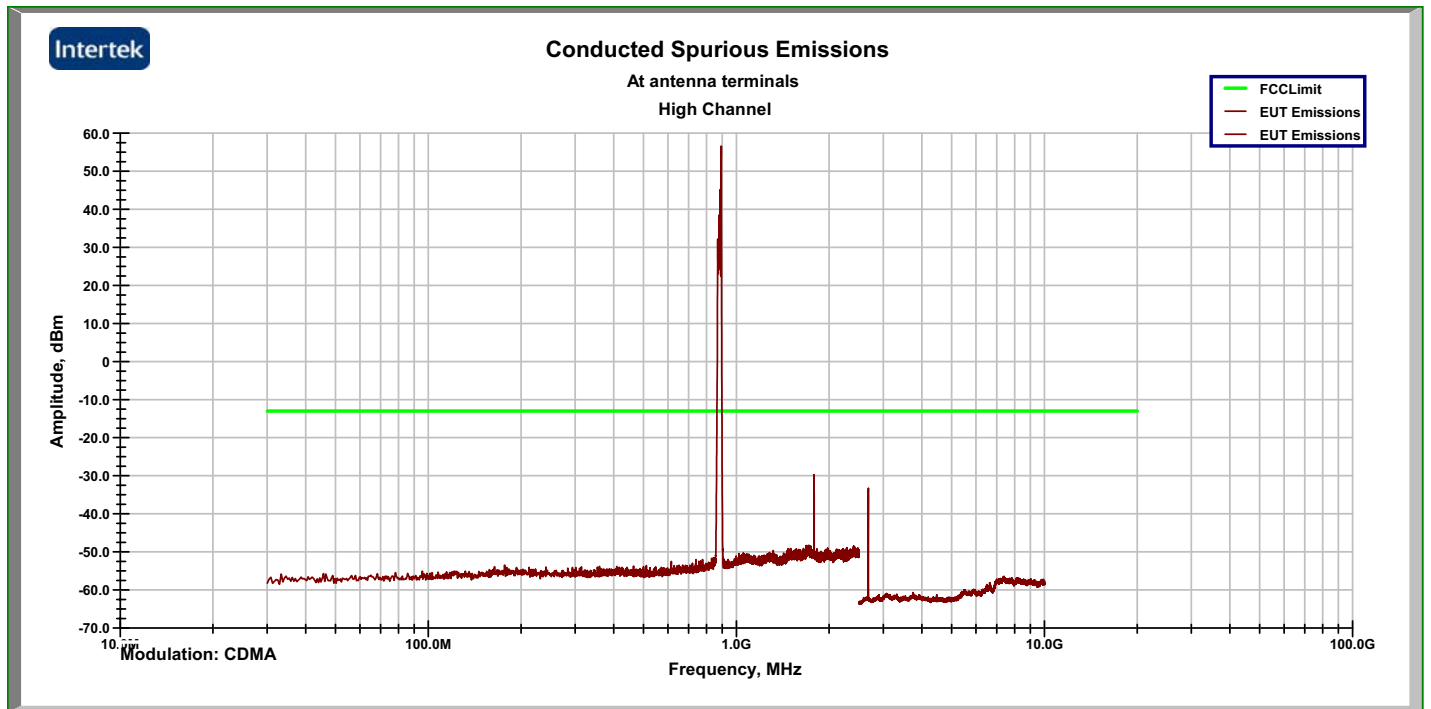
Plot:



CDMA - Mid Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

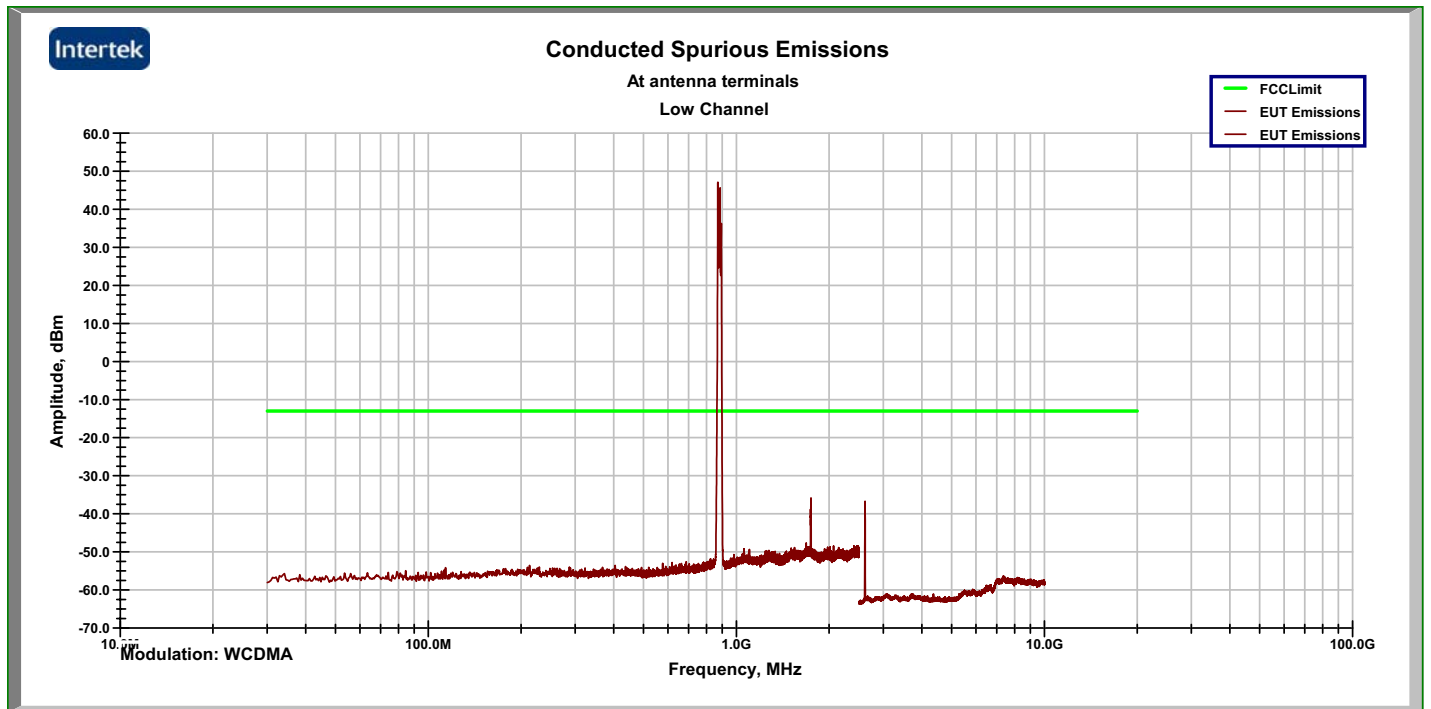
Plot:



CDMA - High Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

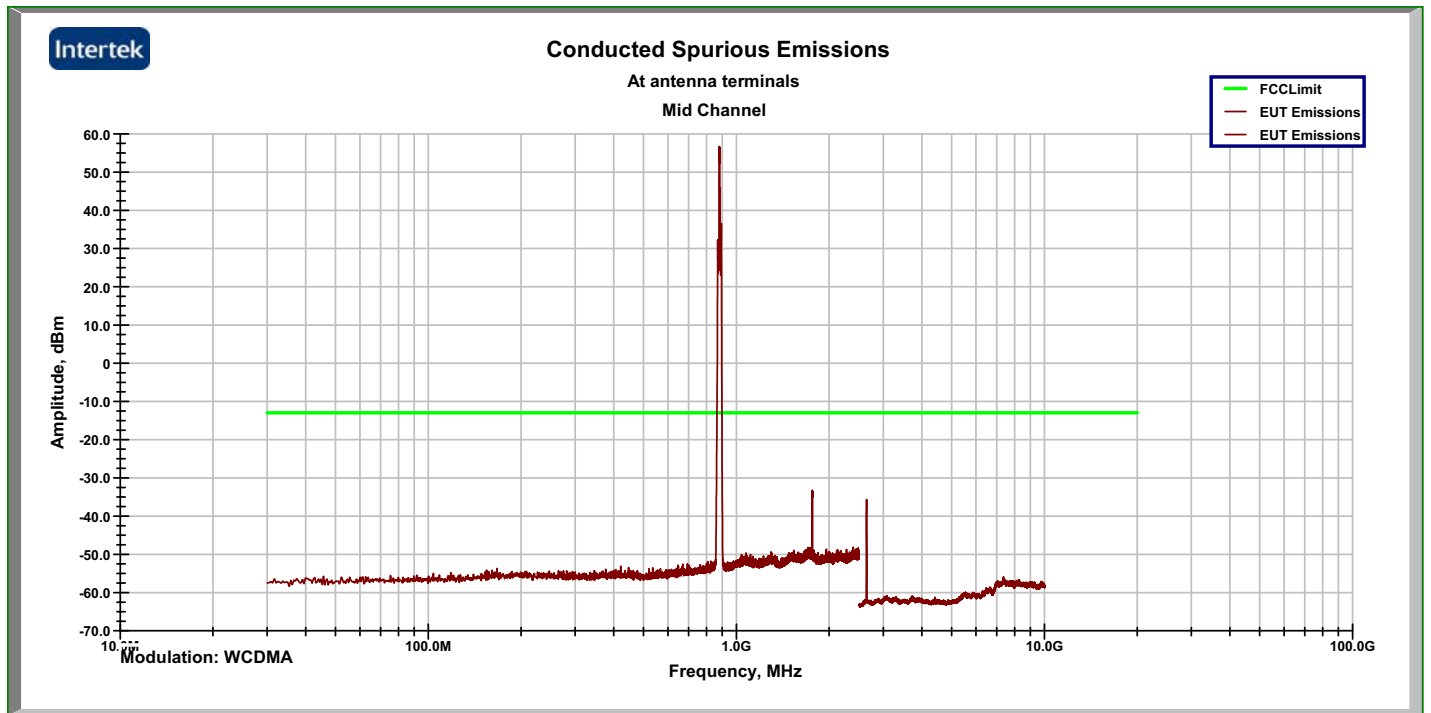
Plot:



WCDMA - Low Channel

8.0 Spurious emissions at antenna terminals (FCC Part 2.1051)

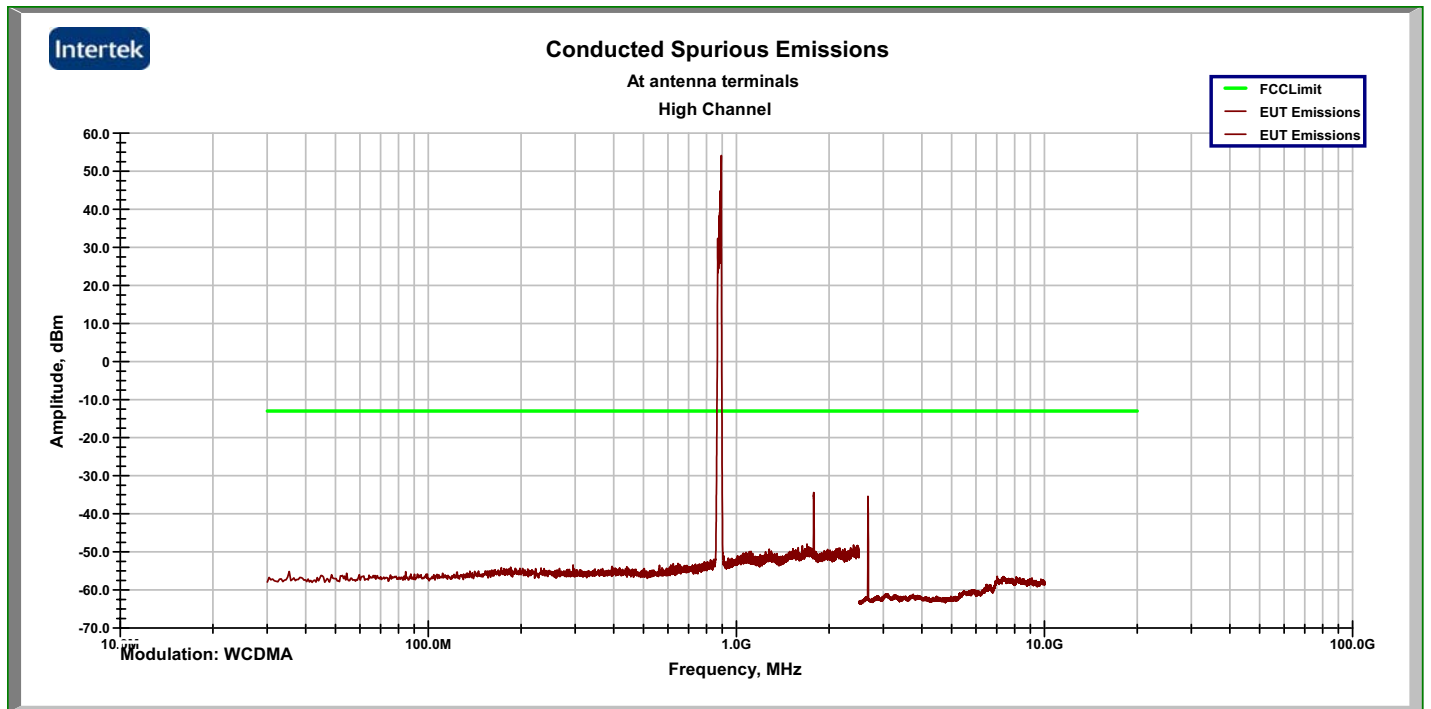
Plot:



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.

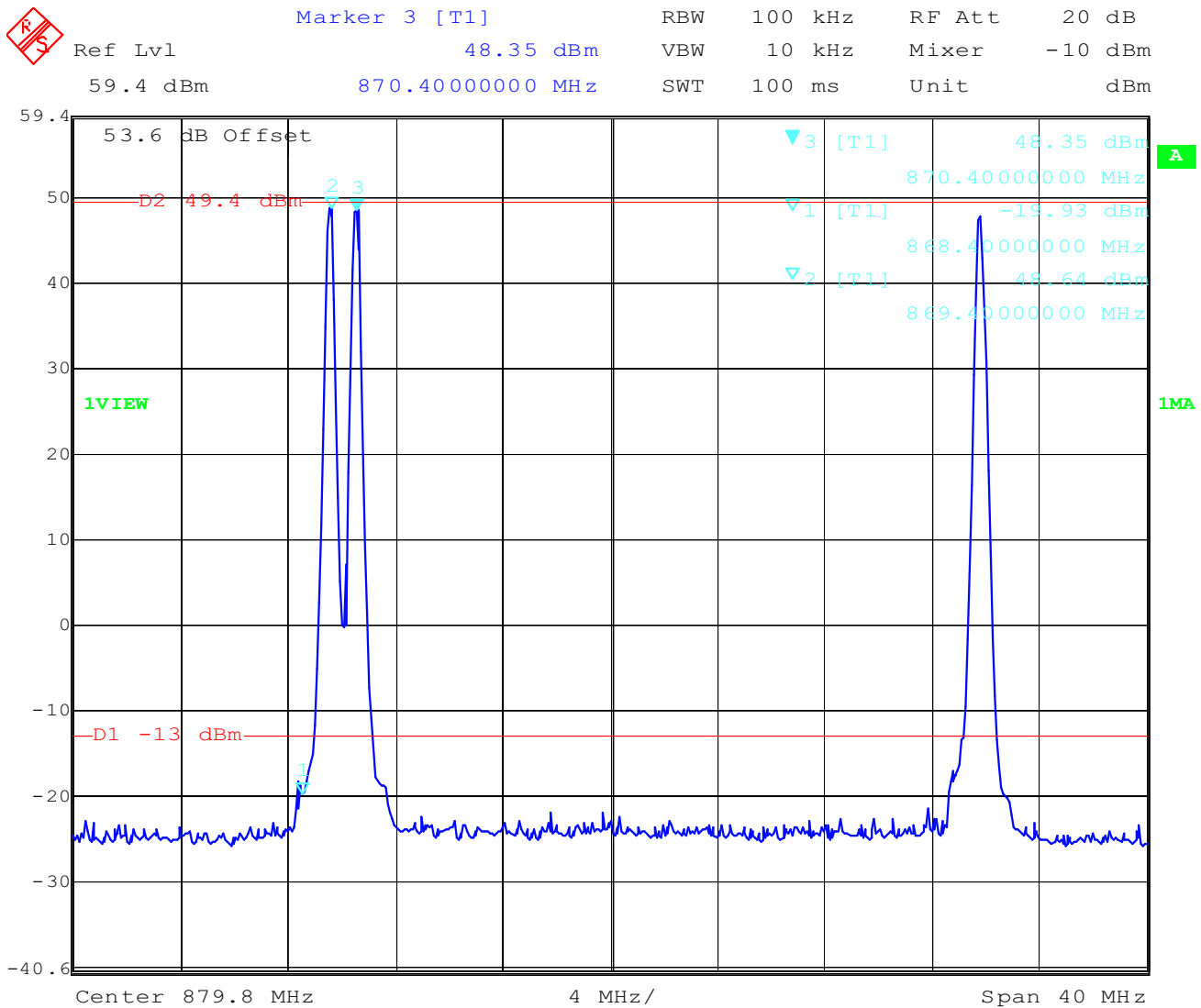
Test Equipment Used:

| 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:

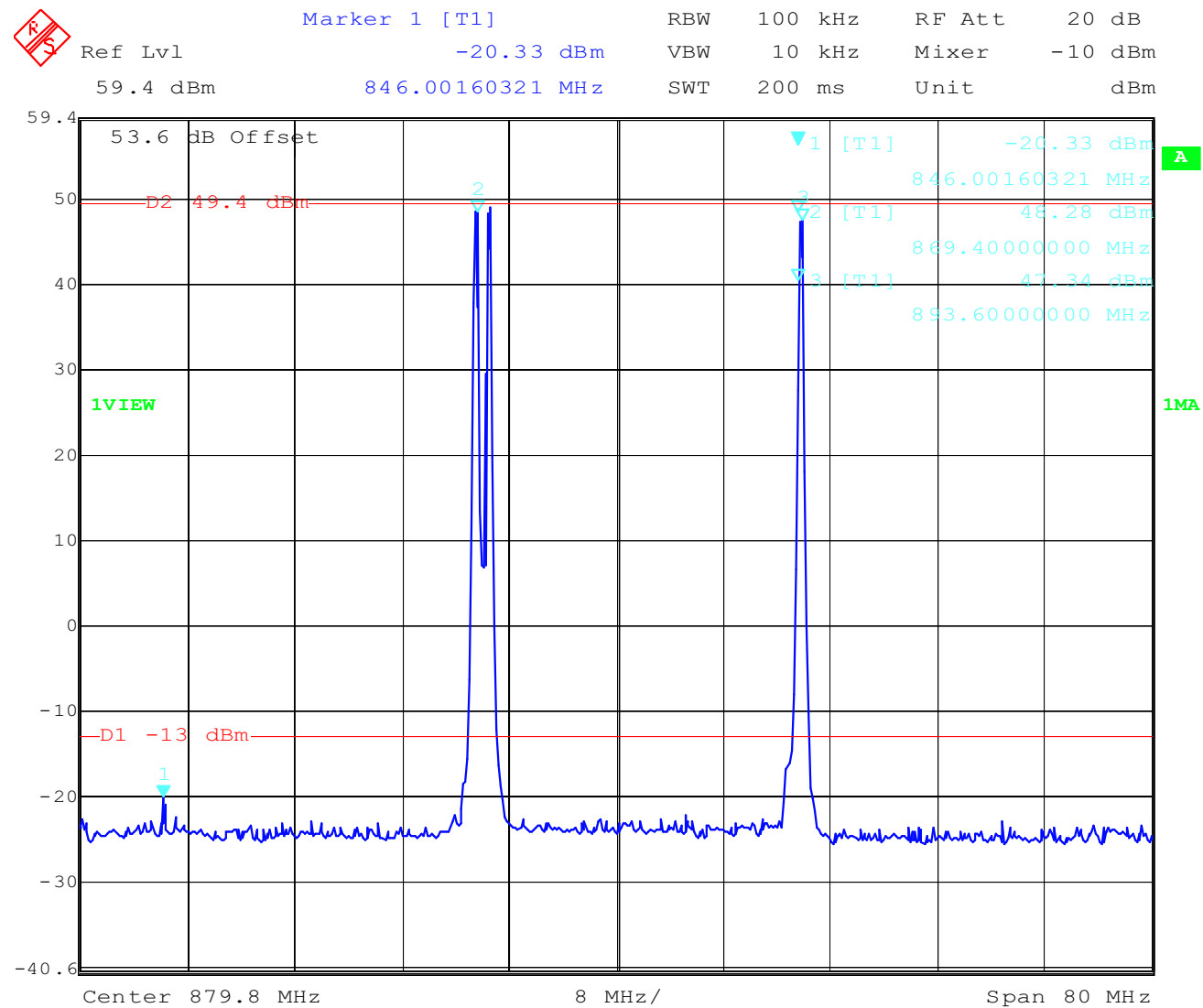


Date: 9.SEP.2008 12:16:31

Intermodulation - GSM

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

Photo:

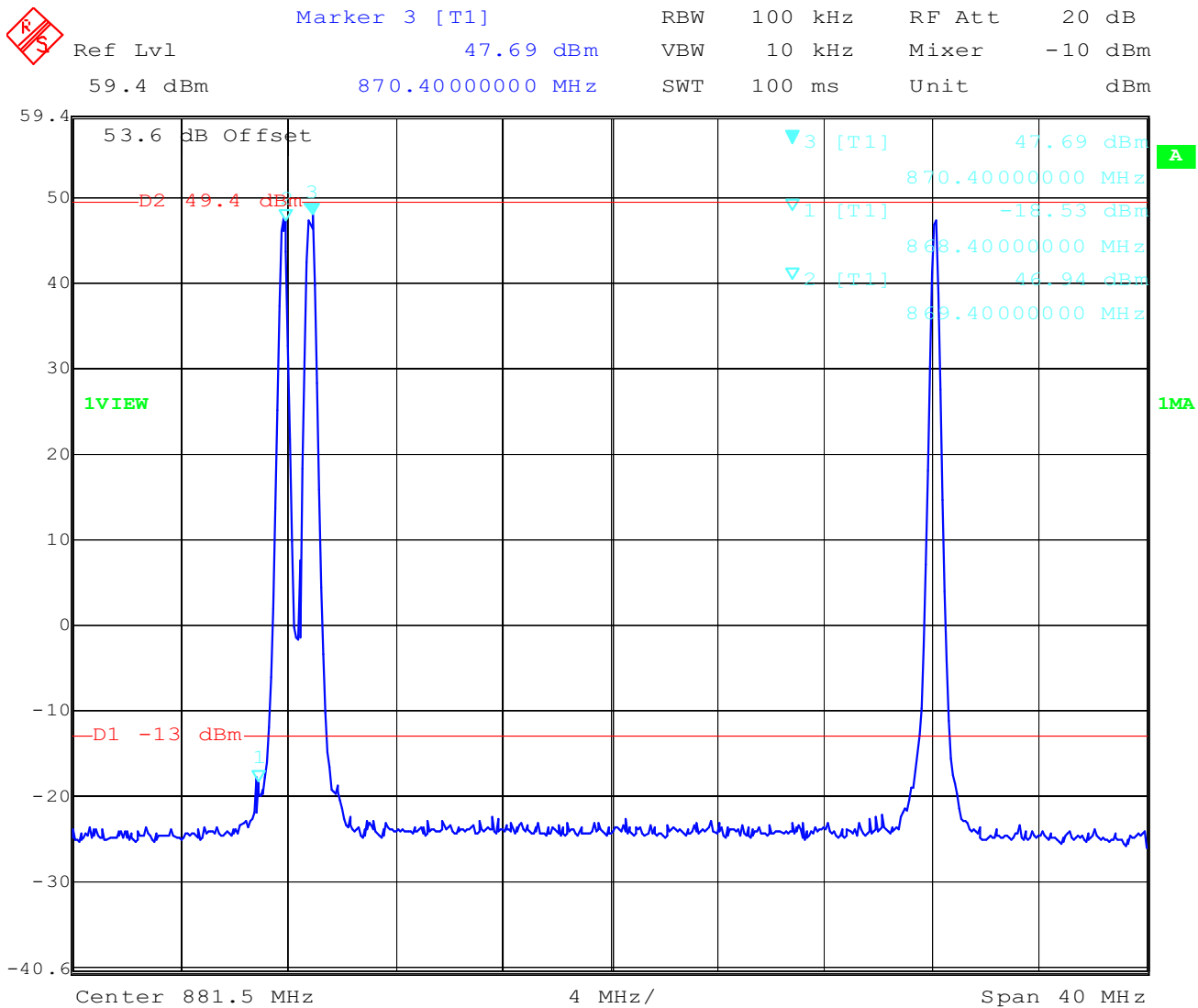


Date: 9.SEP.2008 12:18:38

Intermodulation - GSM

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

Photo:

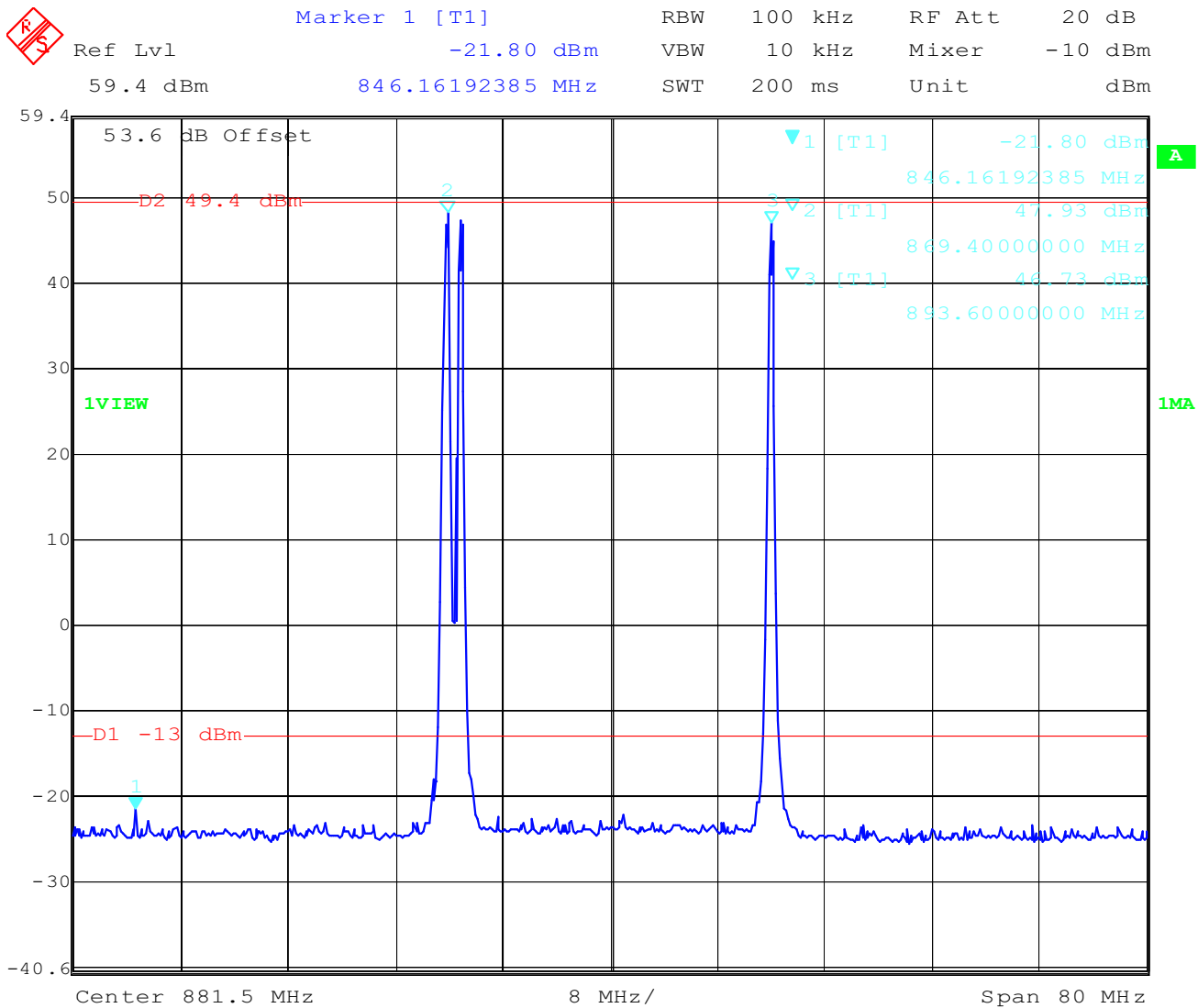


Date: 9.SEP.2008 12:31:21

Intermodulation - GSM Edge

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

Photo:

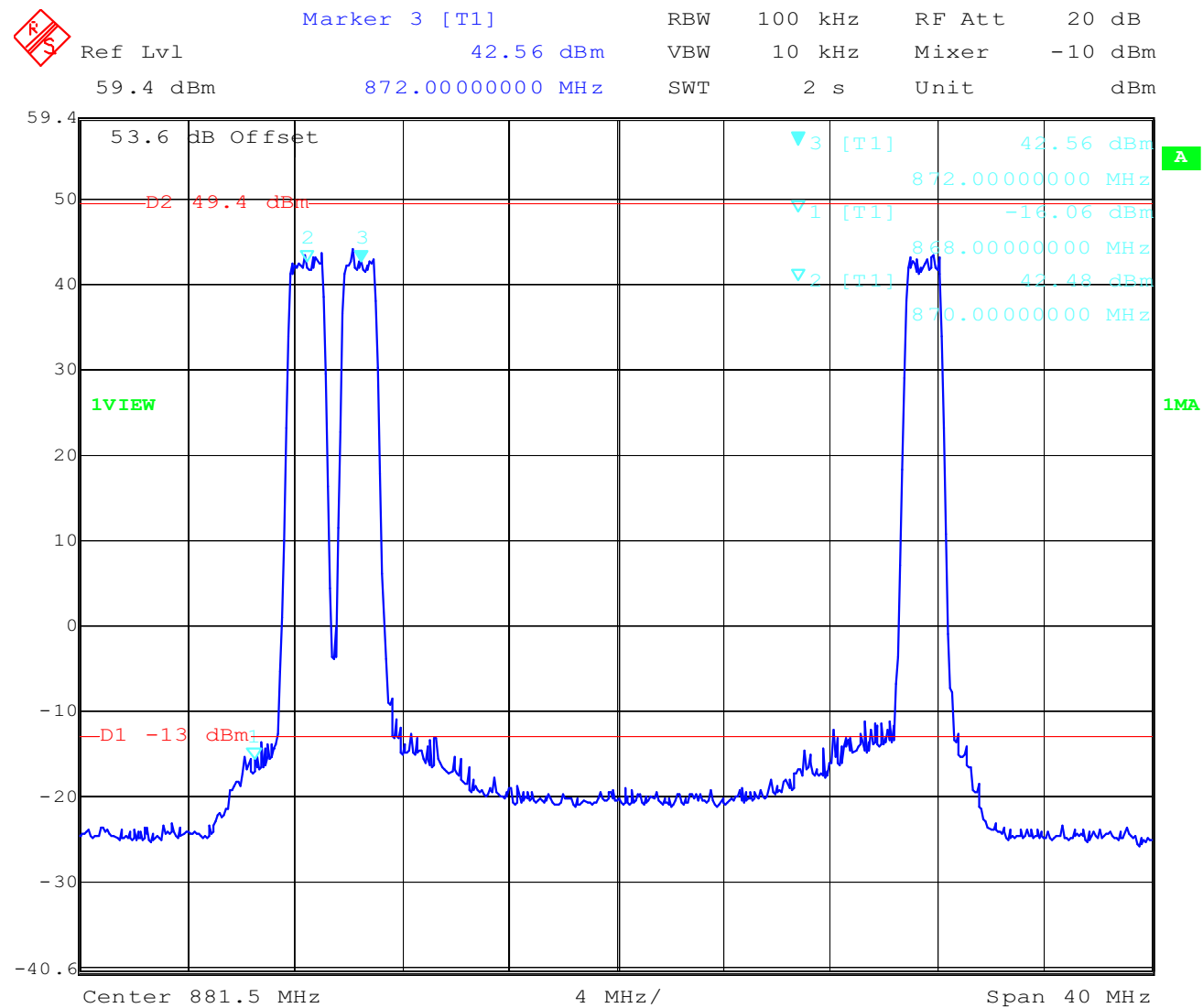


Date: 9.SEP.2008 12:32:32

Intermodulation - GSM Edge

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

Photo:

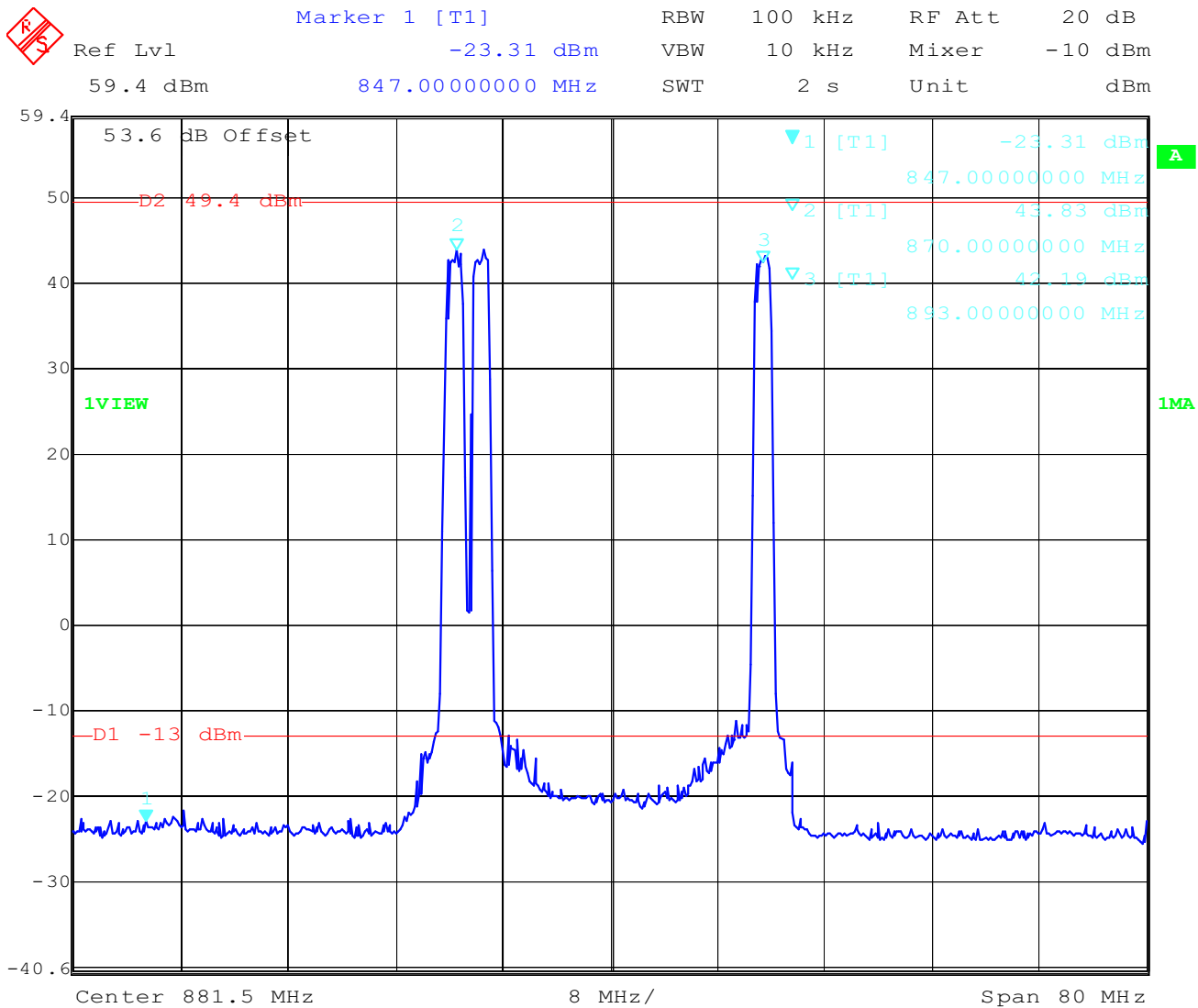


Date: 9.SEP.2008 13:22:07

Intermodulation - CDMA

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

Photo:

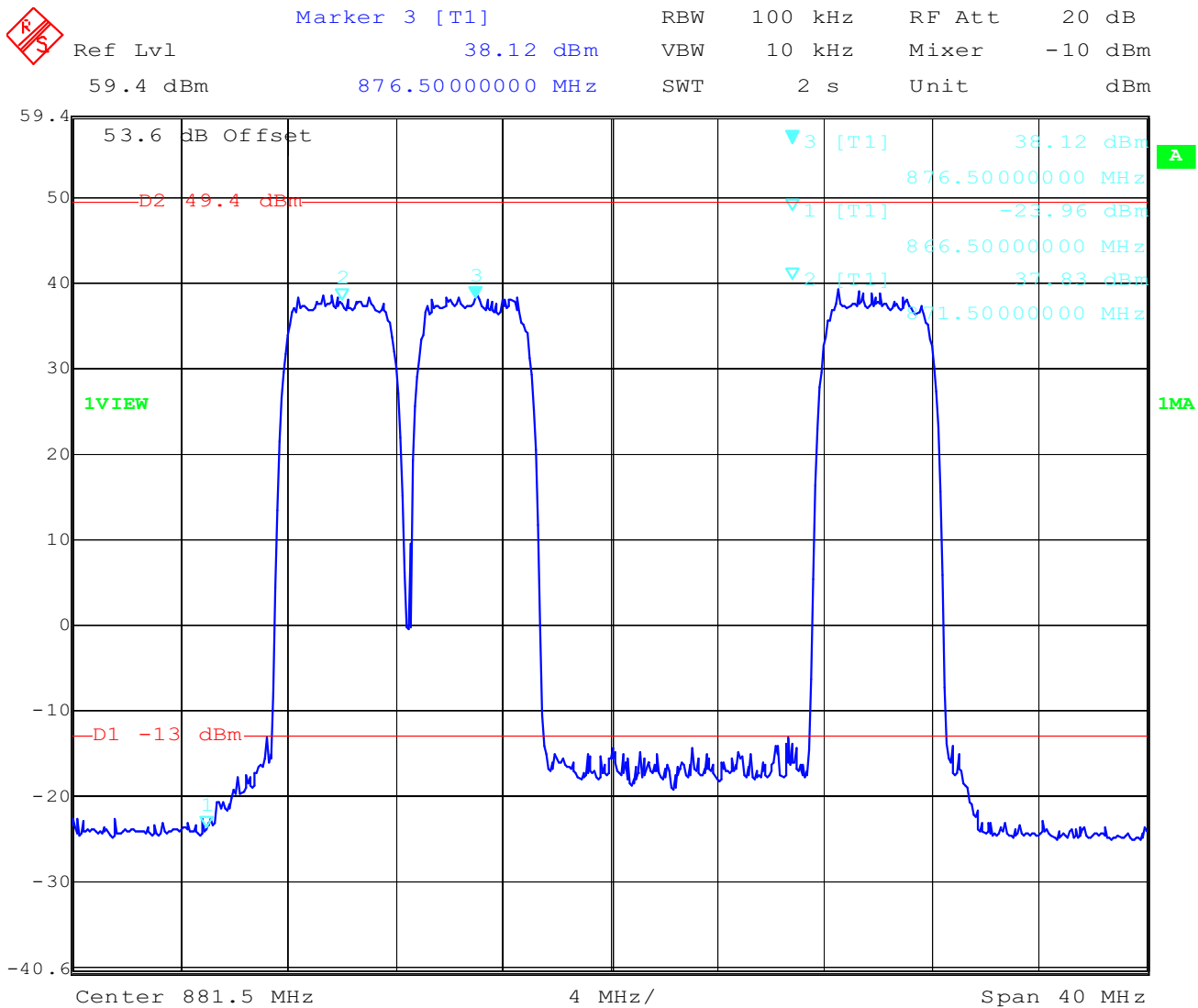


Date: 9.SEP.2008 13:23:16

Intermodulation - CDMA

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

Photo:

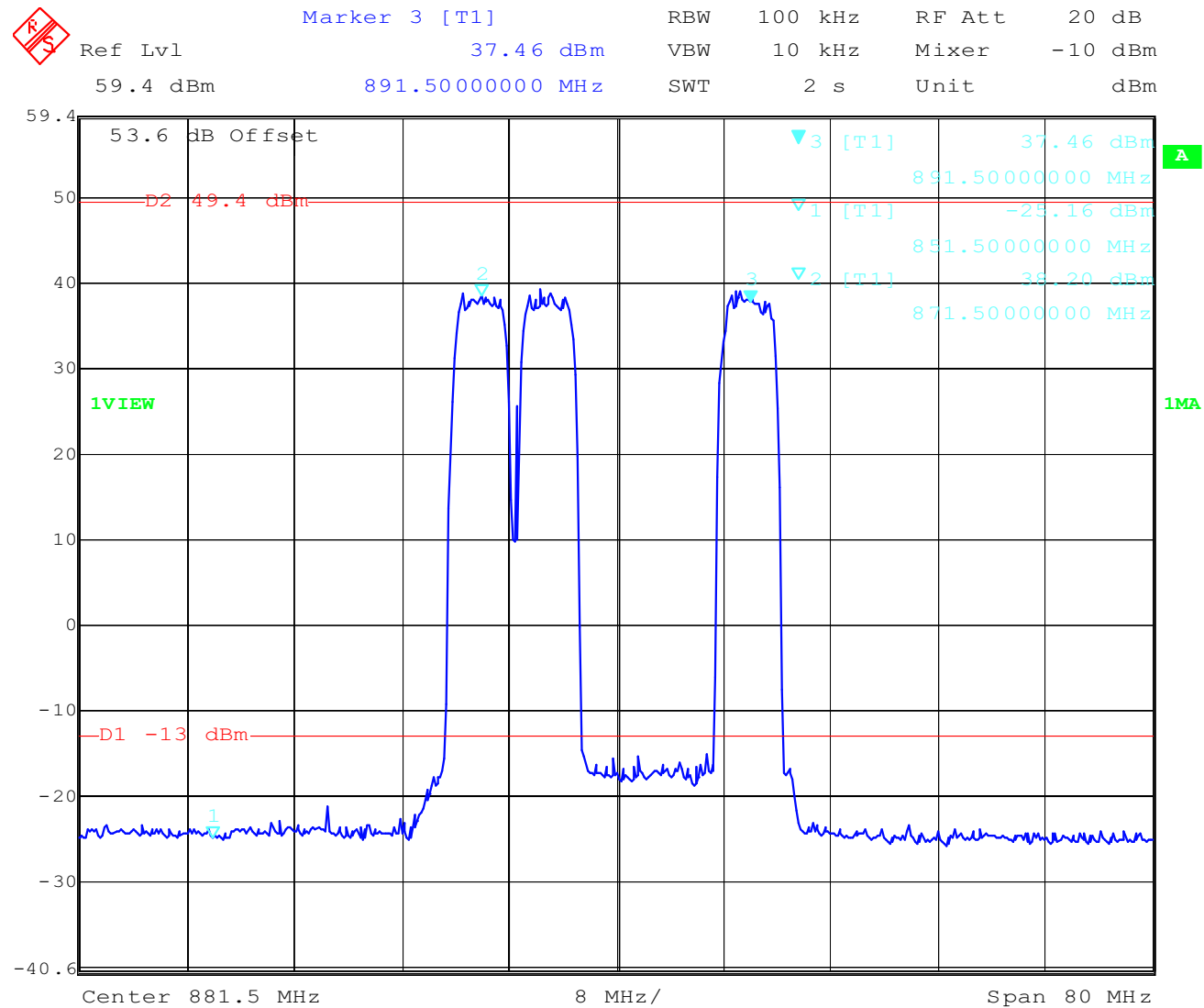


Date: 9.SEP.2008 12:48:15

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.

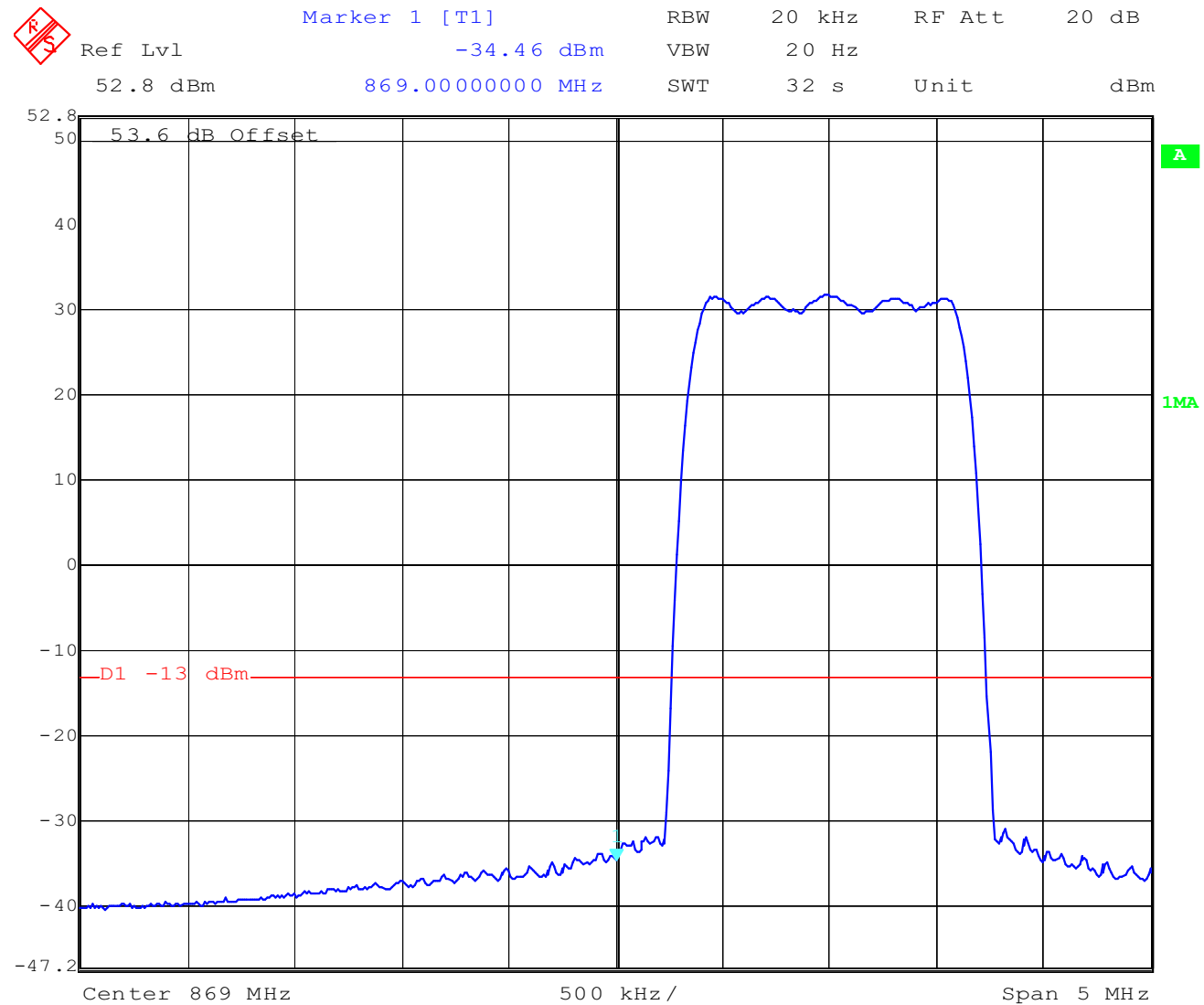
Test Equipment Used:

| 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:

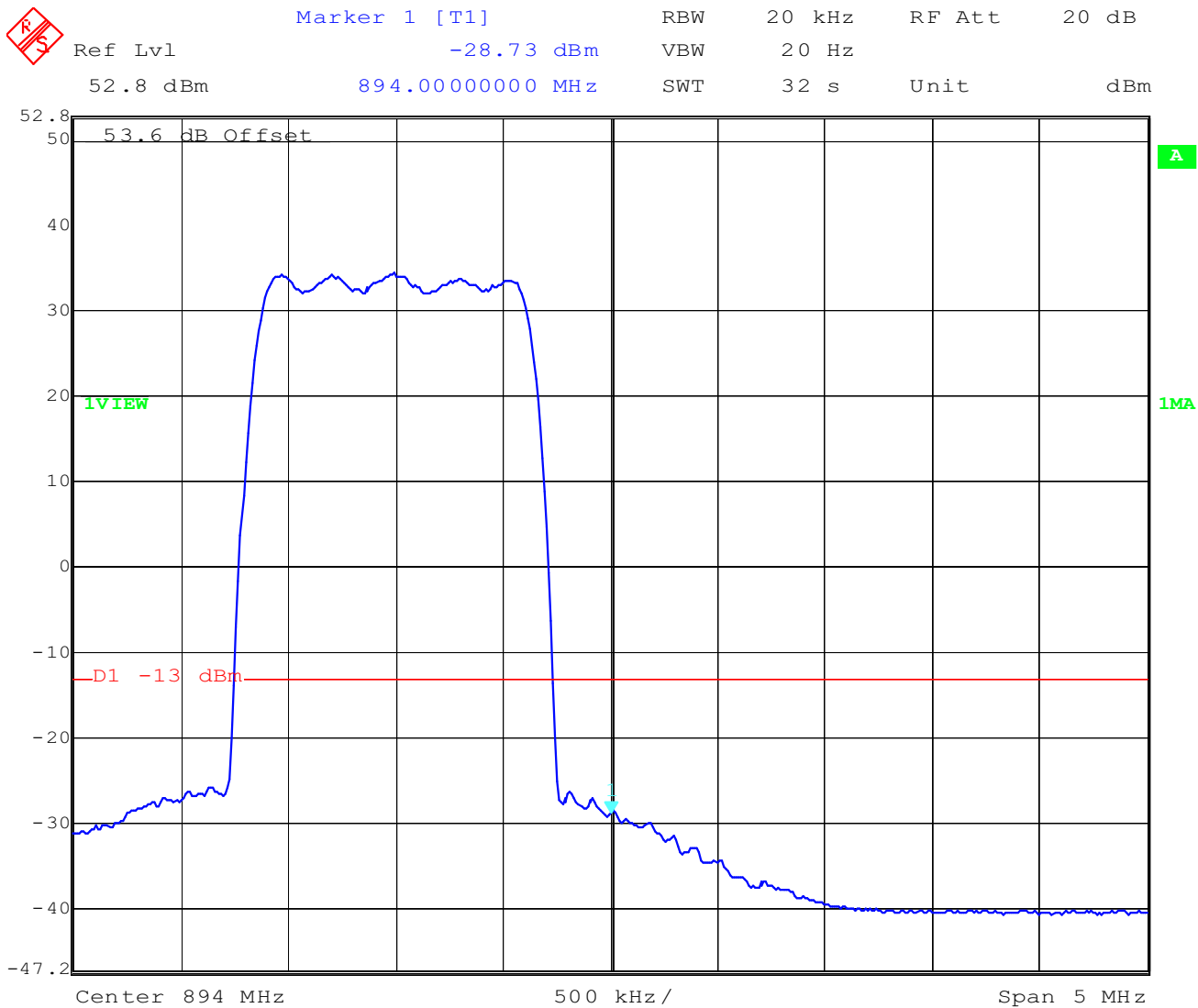


Date: 10.SEP.2008 08:06:34

CDMA - Low Channel

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

Photo:

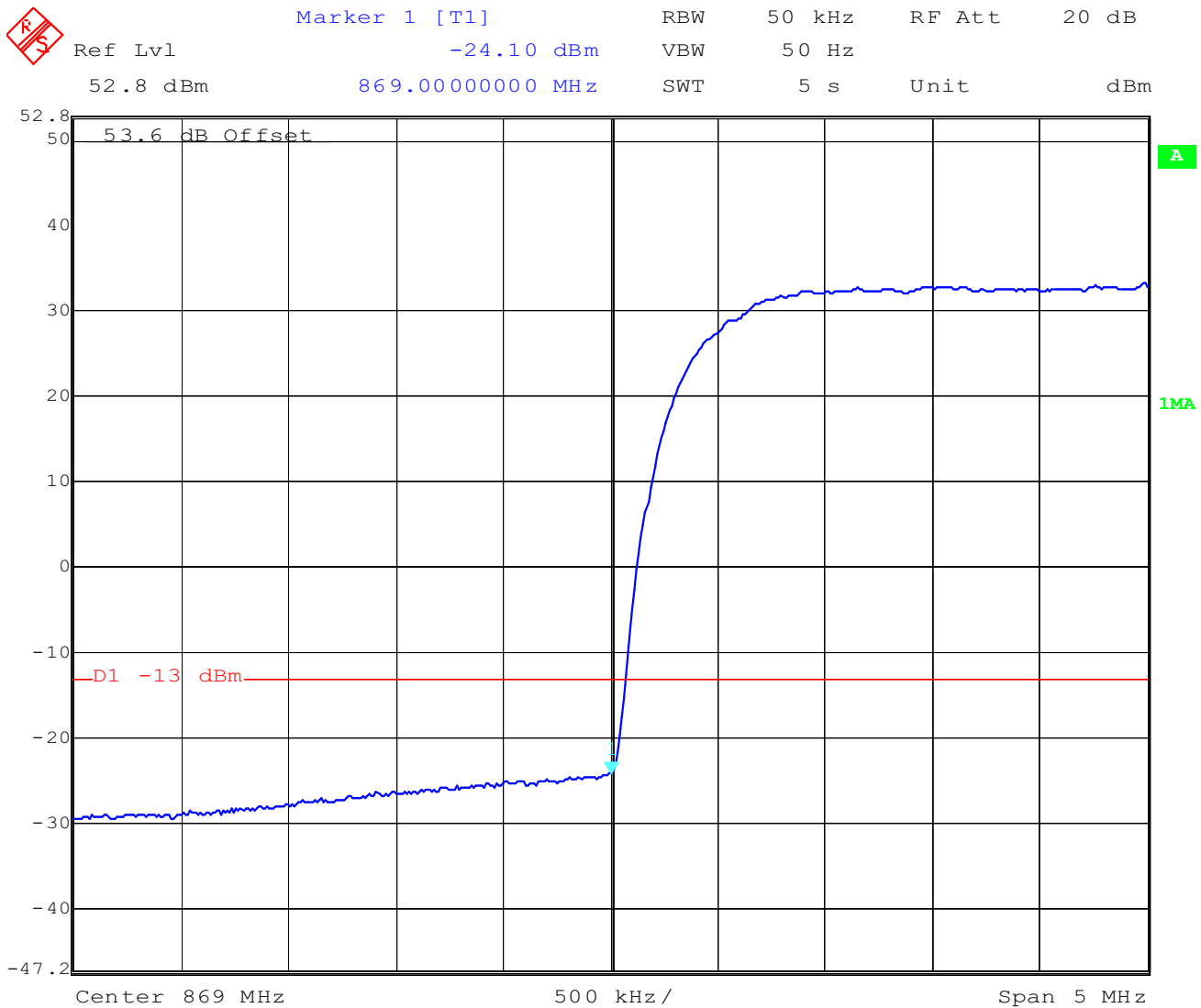


Date: 10.SEP.2008 08:14:05

CDMA - High Channel

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

Photo:

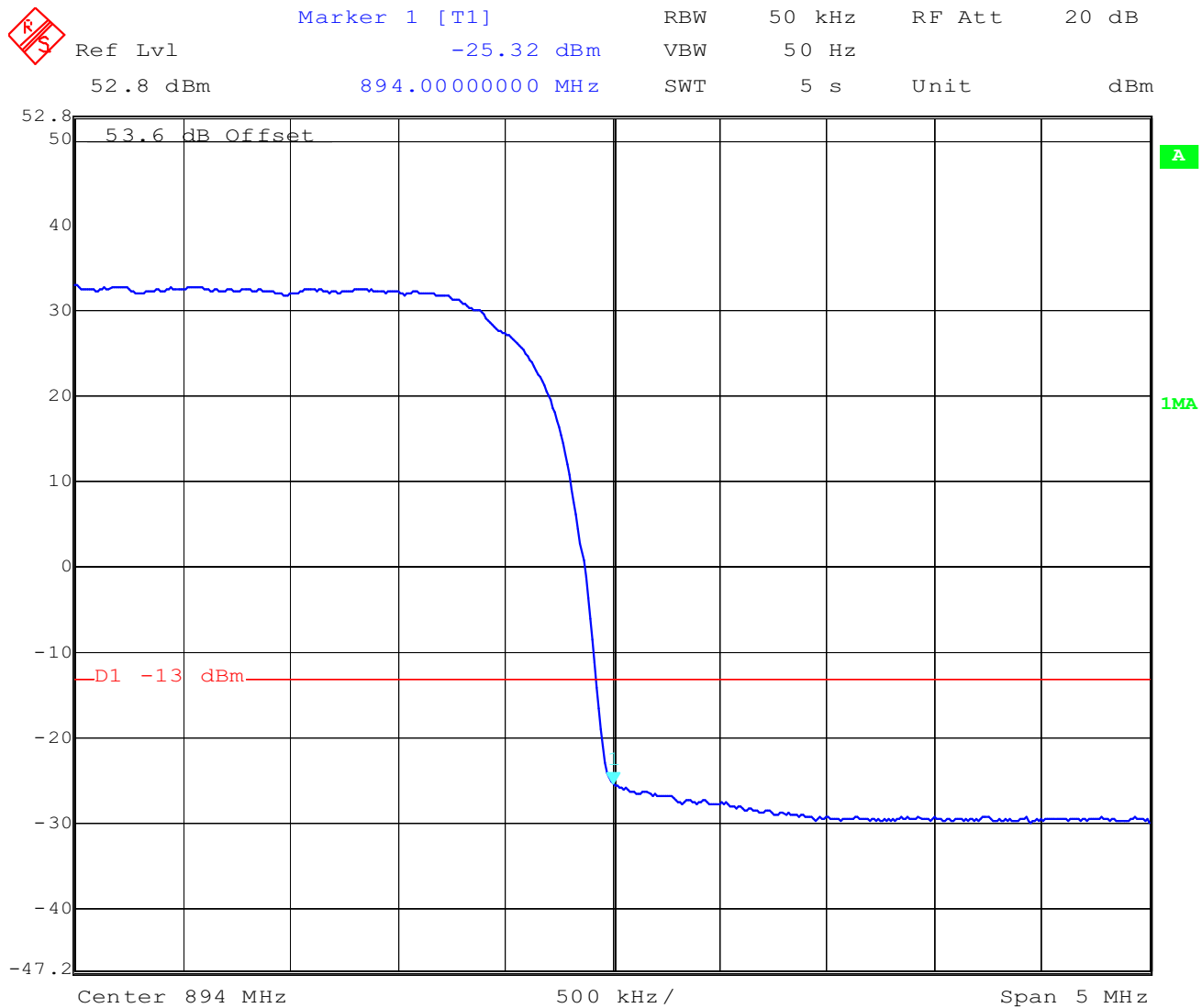


Date: 10.SEP.2008 08:21:06

WCDMA - Low Channel

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

Photo:

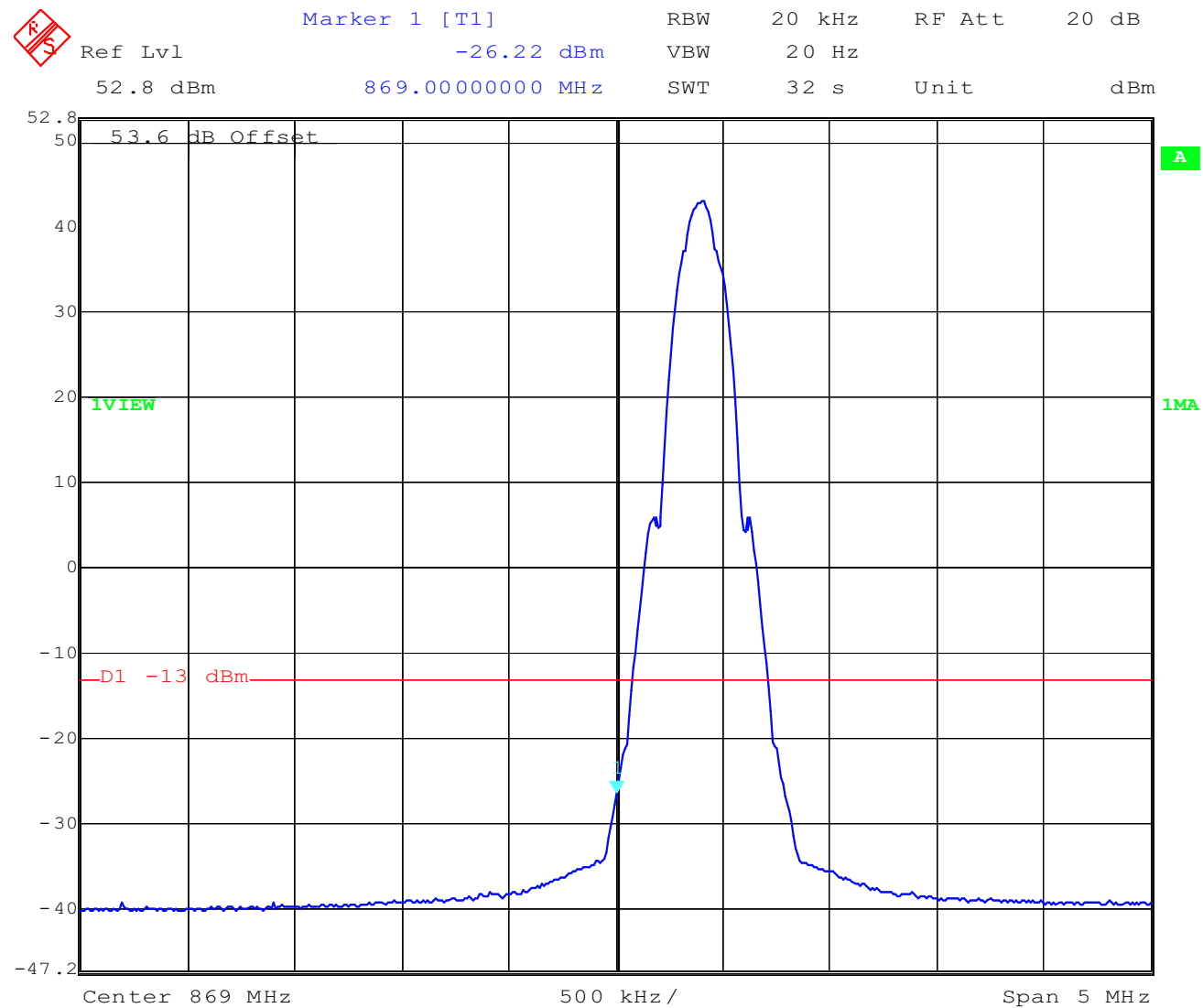


Date: 10.SEP.2008 08:18:12

WCDMA - High Channel

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

Photo:

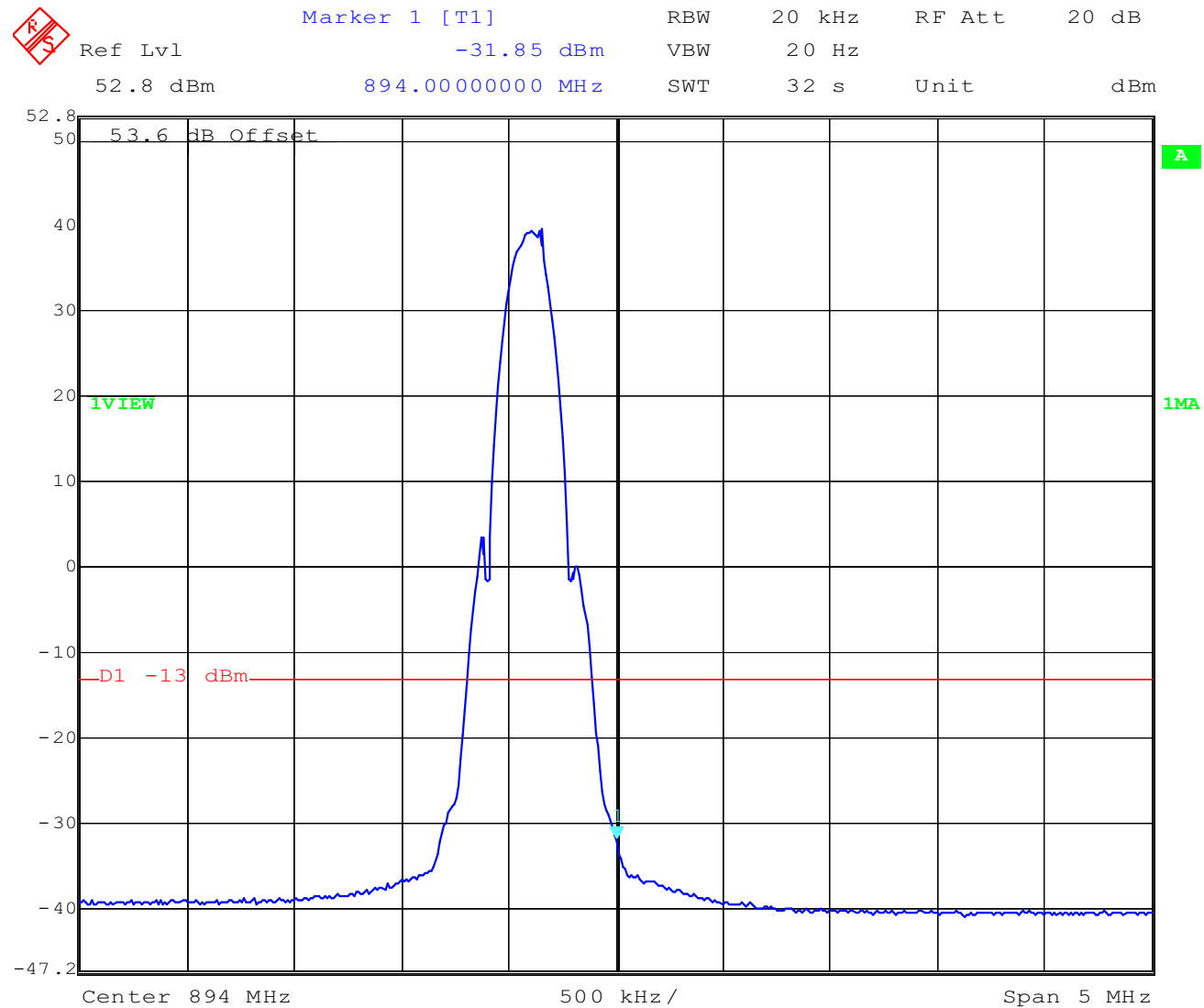


Date: 10.SEP.2008 08:58:44

GSM - Low Channel

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

Photo:

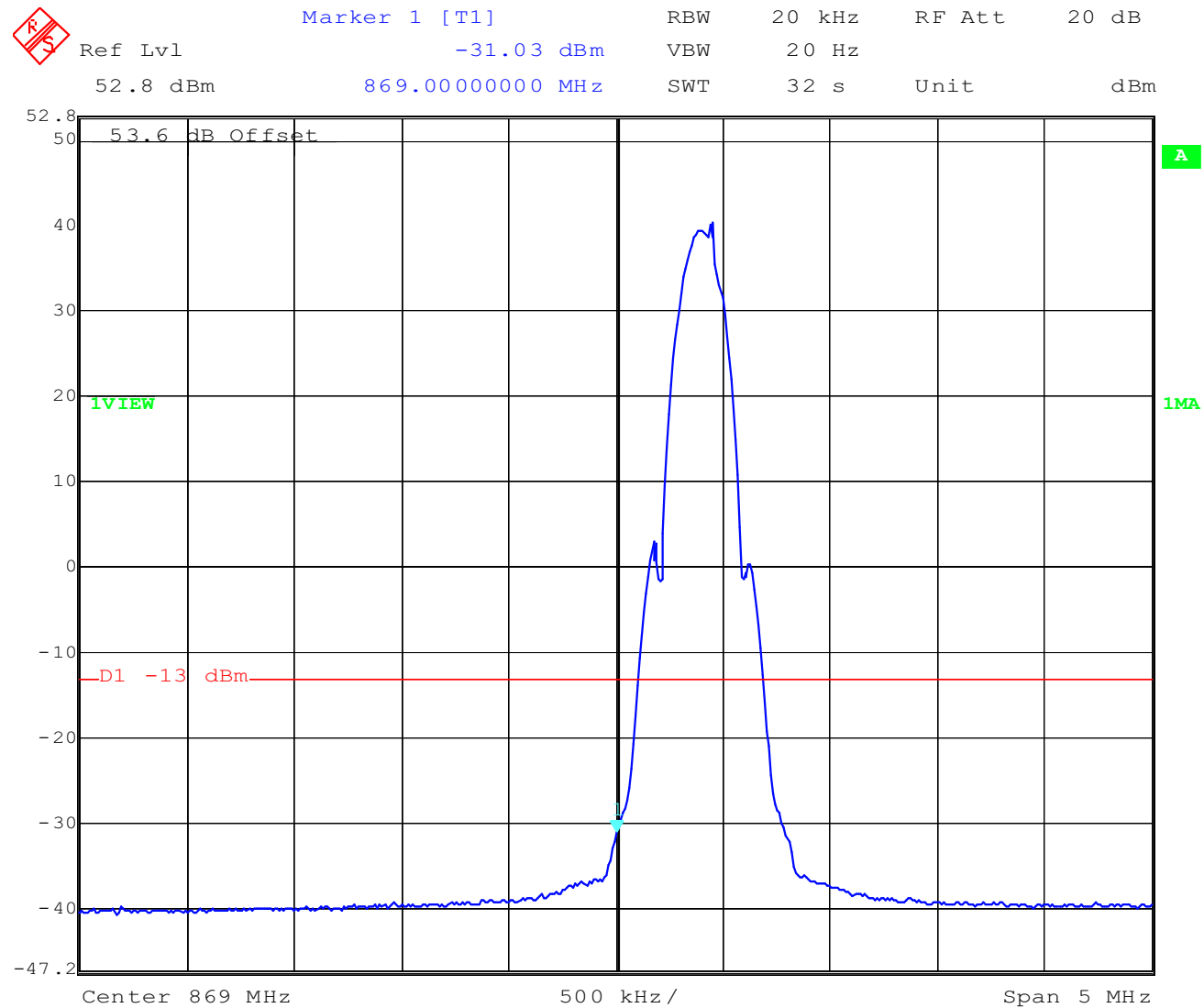


Date: 10.SEP.2008 08:54:19

GSM Edge - High Channel

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

Photo:

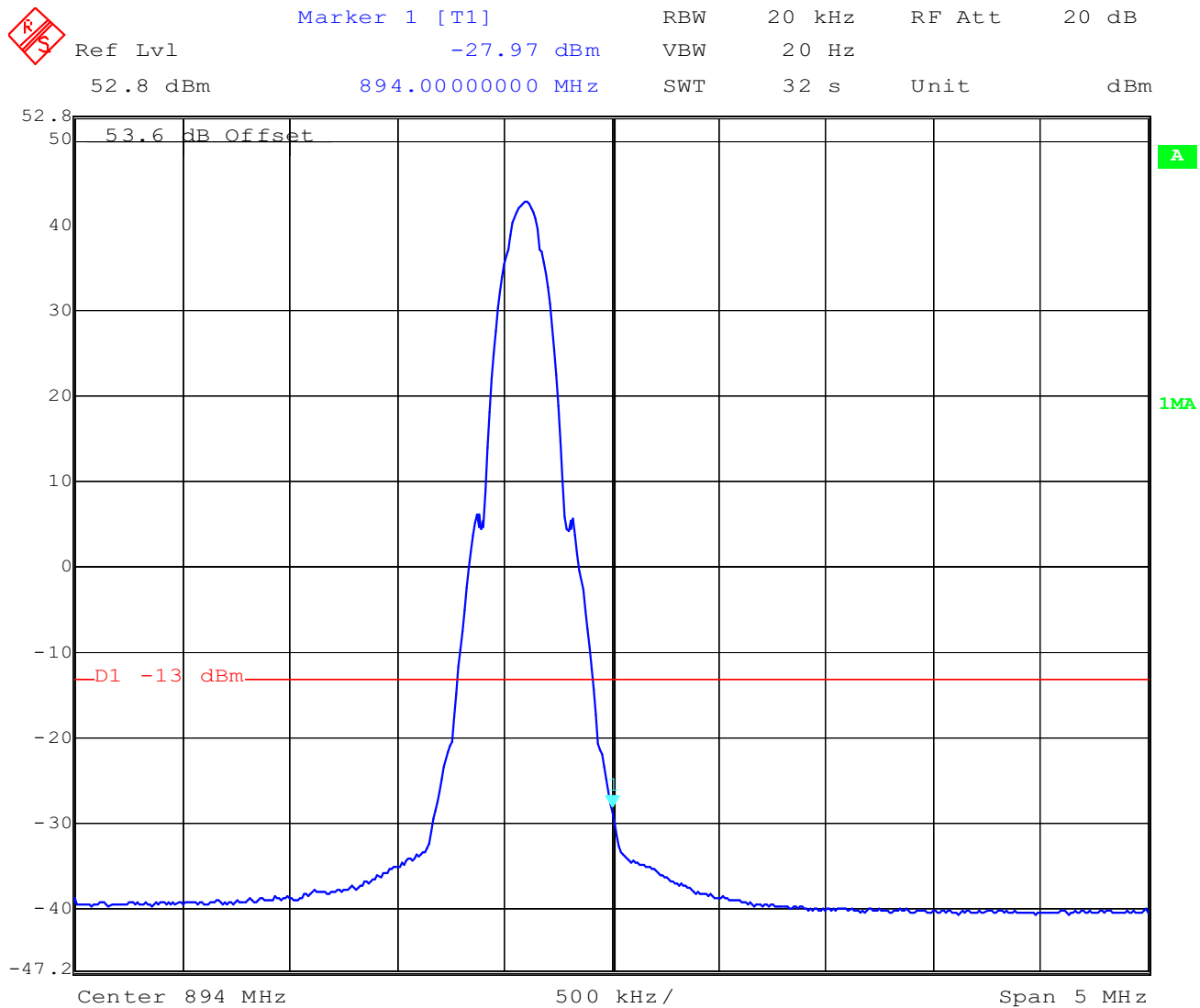


Date: 10.SEP.2008 08:56:47

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.

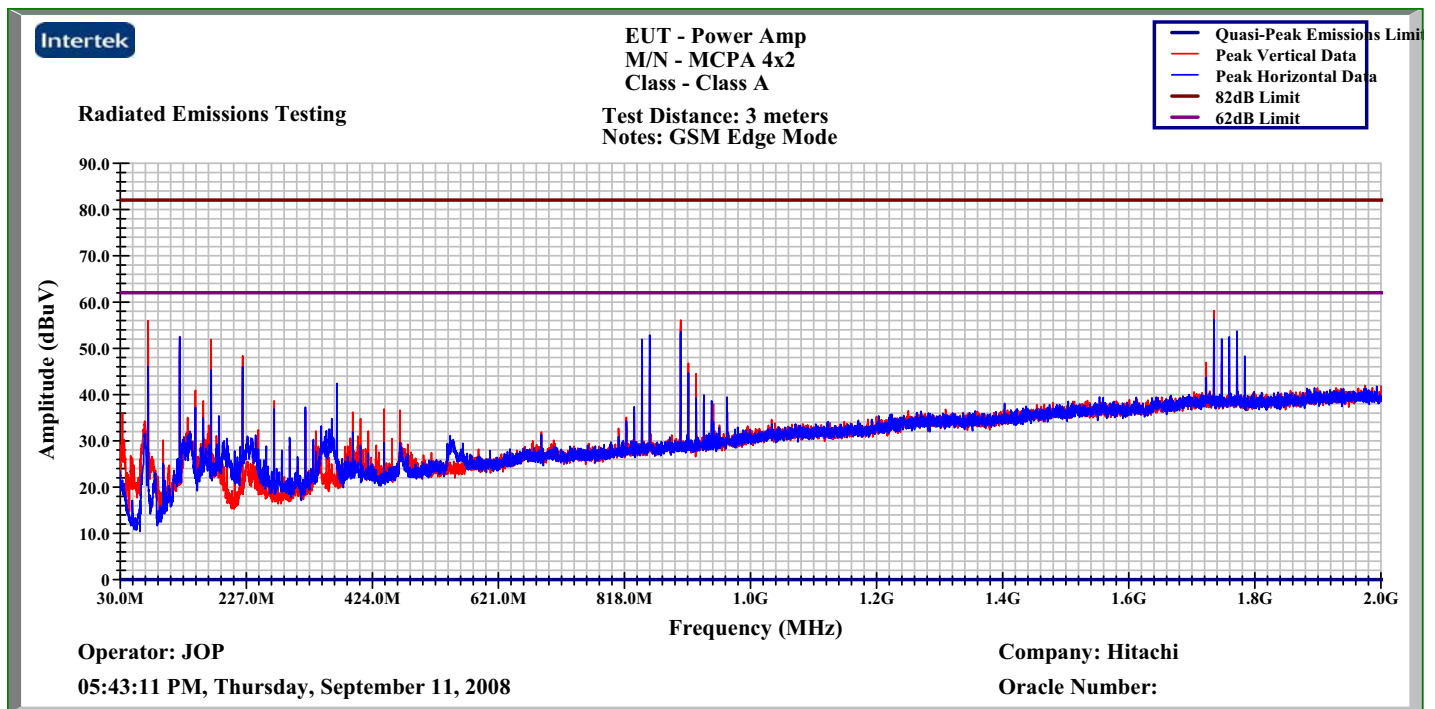
+/- 3.85 dB

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)

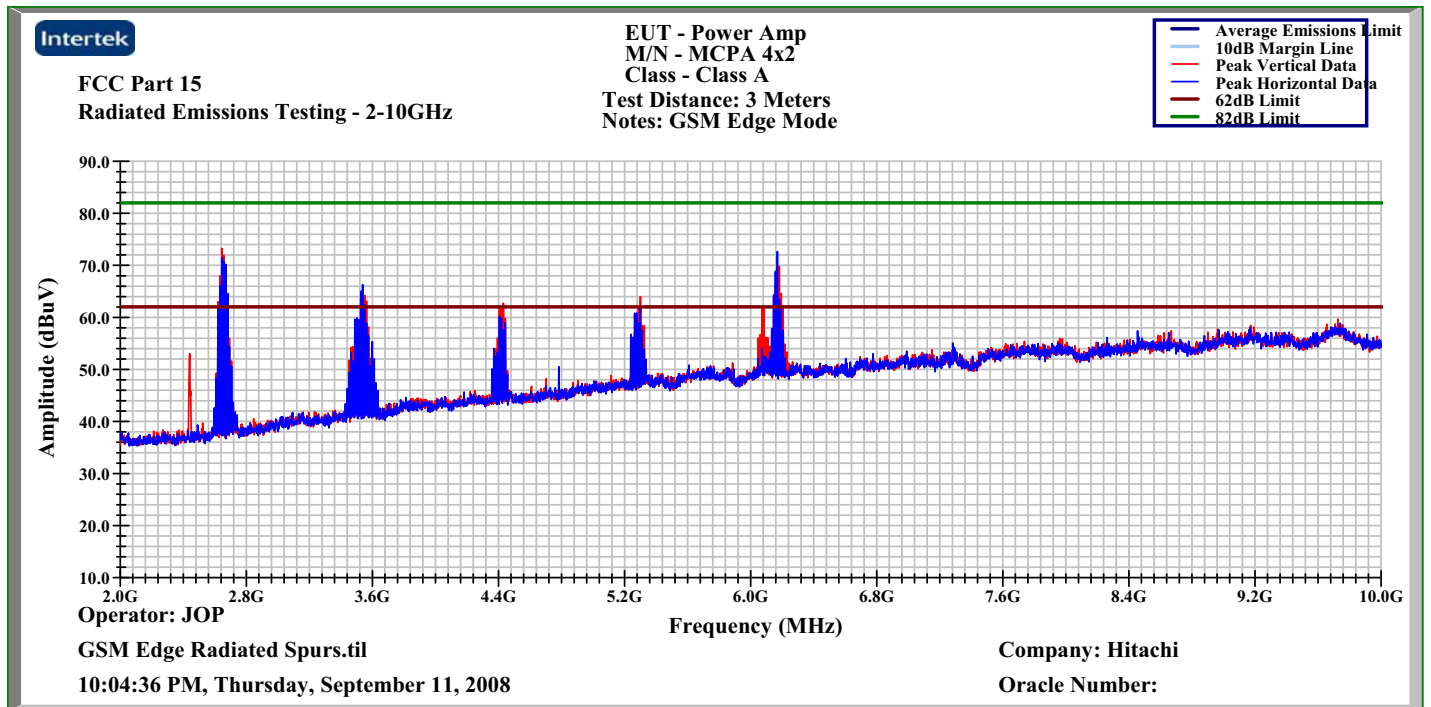
Plot:



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 | I | 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/1M/1.6Hz |
| v | 2632.350 | 60.2 | 28.5 | 8.6 | 40.9 | 56.4 | 82.2 | -25.9 | AV/1M/1.6Hz |
| v | 2644.500 | 69.7 | 28.5 | 8.6 | 40.9 | 65.9 | 82.2 | -16.4 | AV/1M/1.6Hz |
| v | 2656.500 | 66.8 | 28.5 | 8.6 | 40.9 | 63.0 | 82.2 | -19.3 | AV/1M/1.6Hz |
| h | 2668.625 | 67.7 | 28.6 | 8.6 | 40.9 | 64.0 | 82.2 | -18.3 | AV/1M/1.6Hz |
| v | 2680.800 | 61.2 | 28.6 | 8.6 | 40.9 | 57.5 | 82.2 | -24.8 | AV/1M/1.6Hz |
| GSM EDGE | | | | | | | | | |
| v | 2602.250 | 58.1 | 28.5 | 8.6 | 40.9 | 54.3 | 82.2 | -27.9 | AV/1M/1.6Hz |
| v | 2632.350 | 62.5 | 28.5 | 8.6 | 40.9 | 58.7 | 82.2 | -23.6 | AV/1M/1.6Hz |
| v | 2644.500 | 67.3 | 28.5 | 8.6 | 40.9 | 63.5 | 82.2 | -18.8 | AV/1M/1.6Hz |
| v | 2656.500 | 68.3 | 28.5 | 8.6 | 40.9 | 64.5 | 82.2 | -17.8 | AV/1M/1.6Hz |
| h | 2668.625 | 66.7 | 28.6 | 8.6 | 40.9 | 63.0 | 82.2 | -17.9 | AV/1M/1.6Hz |
| h | 2680.800 | 58.2 | 28.6 | 8.6 | 40.9 | 54.5 | 82.2 | -27.8 | AV/1M/1.6Hz |
| CDMA | | | | | | | | | |
| v | 2644.650 | 63.8 | 28.5 | 8.6 | 40.9 | 60.0 | 82.2 | -22.3 | AV/1M/1.6Hz |
| h | 2656.000 | 63.5 | 28.6 | 8.6 | 40.9 | 59.8 | 82.2 | -22.5 | AV/1M/1.6Hz |
| v | 2656.000 | 62.5 | 28.5 | 8.6 | 40.9 | 58.7 | 82.2 | -23.6 | AV/1M/1.6Hz |
| h | 2667.500 | 65.4 | 28.6 | 8.6 | 40.9 | 61.7 | 82.2 | -24.8 | AV/1M/1.6Hz |
| v | 2667.500 | 60.3 | 28.5 | 8.6 | 40.9 | 56.5 | 82.2 | -25.8 | AV/1M/1.6Hz |
| h | 2679.000 | 57.0 | 28.6 | 8.6 | 40.9 | 53.3 | 82.2 | -29.0 | AV/1M/1.6Hz |
| WCDMA | | | | | | | | | |
| v | 2645.290 | 58.3 | 28.5 | 8.6 | 40.9 | 54.5 | 82.2 | -24.8 | AV/1M/1.6Hz |
| h | 2657.000 | 60.2 | 28.6 | 8.6 | 40.9 | 56.5 | 82.2 | -25.8 | AV/1M/1.6Hz |
| v | 2657.000 | 58.3 | 28.5 | 8.6 | 40.9 | 54.5 | 82.2 | -27.8 | AV/1M/1.6Hz |
| h | 2670.000 | 59.2 | 28.6 | 8.6 | 40.9 | 55.5 | 82.2 | -26.8 | AV/1M/1.6Hz |
| v | 2670.000 | 59.3 | 28.5 | 8.6 | 40.9 | 55.5 | 82.2 | -26.8 | AV/1M/1.6Hz |
| h | 2680.800 | 54.5 | 28.6 | 8.6 | 40.9 | 50.8 | 82.2 | -31.5 | AV/1M/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 | | |