

TEST REPORT

of

FCC Part 15 Subpart B&C §15.239
RSS-210 Issue 7, RSS-Gen Issue 2

FCC ID : V2B-UFM1000T

IC Certification : 7747A-UFM100T

Equipment Under Test : Digital Audio FM Transmitter Adapter System
(FM Transmitter, Audio Converter)
Model Name : UFM1000T, UFM1000R
Serial No. : N/A
Applicant : COREAUTOMATION CO., LTD.
Manufacturer : COREAUTOMATION CO., LTD.
Date of Test(s) : 2008-06-09 ~ 2008-06-20
Date of Issue : 2008-08-11

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Date

2008-08-11

Geoffrey Do

Approved By



Date

2008-08-11

Denny Ham

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1. General information

1.1 Testing laboratory

SGS Testing Korea Co., Ltd.

- Wireless Div. 2FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040

- 705, Dongchun-Dong Sooji-Gu, Yongin-Shi, Kyungki-Do, Korea.

www.electrolab.kr.sgs.com

Telephone : +82 +31 428 5700

FAX : +82 +31 427 2371

1.2 Details of applicant

Applicant : COREAUTOMATION CO., LTD.

Address : E&C Venture Dream Tower 2Bldg. 1207 197-10, Guro 3-dong, Guro-gu, Seoul
132-719 Korea

Contact Person : Hyun-Seock Han

Phone No. : 707 7012 4370

Fax No. : +82 +02 861 3869

1.3. Description of EUT

| Equipment Under Test | Digital Audio FM Transmitter Adapter System | |
|----------------------|---|-----------------|
| Kind of Product | FM Transmitter | Audio Converter |
| Model Name | UFM1000T | UFM1000R |
| Serial Number | N/A | N/A |
| Power Supply | AC 110 ~ 220 V | AC 110 ~ 220 V |
| Frequency Range | 88.1 MHz, 88.5 MHz | N/A |
| Modulation Technique | FM | N/A |
| Number of Channels | 2 | N/A |
| Operating Conditions | -20 ~ 50 | -20 ~ 50 |
| Antenna Type | Wire ANT (Connector type : BNC) | N/A |

The EUT transmitted FM modulated signals simultaneously at the operating frequencies of 88.1 MHz and 88.5 MHz once the EUT powered.

1.4. Details of modification

-N/A

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1.5. Test equipment list

| Equipment | Manufacturer | Model | Cal Due. |
|-------------------------|----------------|------------------------------|---------------|
| Signal Generator | Agilent | E4438C | May 09, 2009 |
| Spectrum Analyzer | Agilent | E4440A | May 09, 2009 |
| Spectrum Analyzer | Agilent | 8565E | Dec. 31, 2008 |
| Two-Line V-Network | R&S | ENV216 | Jan. 17, 2009 |
| Test Receiver | R&S | ESPC | Jul. 25, 2008 |
| Test Receiver | R&S | ESVS10 | Mar. 21, 2009 |
| Preamplifier | H.P. | 8447F | Sep. 17, 2008 |
| Ultra Broadband Antenna | R&S | HL562 | Oct. 02, 2009 |
| Anechoic Chamber | SY Corporation | L W H (6.5 m 3.5 m 3.5 m) | Feb. 15, 2009 |

Support equipment

| Description | Manufacturer | Model | Serial Number |
|---------------------------|------------------------------|--------------------|-----------------------------|
| XNOTE P2 (Notebook PC) | LG Electronics | LGP1 | 705KIHS004673 |
| LCD Monitor | H.P. | L1740 | CND51C7Y |
| Keyboard | Samsung Electro-Mechanics | SEM-DT35 | CNBA5900203BSE3835 M1502 |
| Mouse | Logitech Far East Ltd. | M-U48a | N/A |
| FM Radio | KETI | Studio clock radio | N/A |

Support Equipment

The EUT is connected to the Notebook PC during the tests. An audio music file at maximum volume was running continuously.

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1.6. Summary of test results

The EUT has been tested according to the following specifications:

| Applied Standard FCC Part 15 Subpart B&C §15.239 / RSS-210 Issue7, RSS-Gen Issue2 | | |
|--|---|----------|
| Standard section | Test Item | Result |
| 15.107(a) 15.207(a) RSS-Gen 7.2.2 | AC Power conducted emission | Complied |
| 15.239(a) RSS-210 Clause A2.8 | 20 dB bandwidth and 99% bandwidth | Complied |
| 15.239(b) RSS-210 Clause A2.8 | Field Strength (Fundamental) | Complied |
| 15.205(a) 15.209(a) RSS-210 Clause A2.8 RSS-210 Table 2 | Radiated Emission, Band Edge and Restricted Bands | Complied |

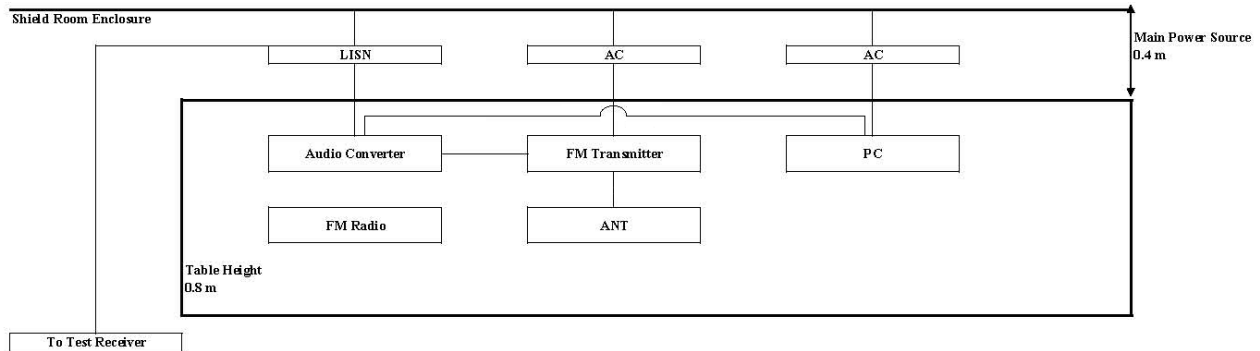
1.7 Test report revision

| Revision | Report number |
|----------|----------------------|
| 0 | F690501/RF-RTL002132 |
| 1 | F690501/RF-RTL002150 |
| 2 | F690501/RF-RTL002261 |

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2. Conducted power line test

2.1. Test setup



2.2. Limit

According to §15.107(a) for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

According to §15.207(a) for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 uH/50 ohm line impedance stabilization network (LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

| Frequency of Emission (MHz) | Conducted limit (dBμV) | |
|-----------------------------|------------------------|---------|
| | Quasi-peak | Average |
| 0.15 – 0.50 | 66-56* | 56-46* |
| 0.50 – 5.00 | 56 | 46 |
| 5.00 – 30.0 | 60 | 50 |

* Decreases with the logarithm of the frequency.

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2.3. Test procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

The test procedure is performed in a 6.5m × 3.6m × 3.6m (L×W×H) shielded room. The EUT along with its peripherals were placed on a 1.0m(W)× 1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.

The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

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2.4. Test results

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line.

Ambient temperature : 22 Relative humidity : 46 %

Frequency range : 0.15 MHz – 30 MHz

Measured Bandwidth 9 kHz

Model: UFM1000T

| Freq. (MHz) | Level(dBuV) | | Line | Limit(dBuV) | | Margin(dB) | |
|----------------|-------------|---------|------|-------------|---------|------------|---------|
| | Q-Peak | Average | | Q-Peak | Average | Q-Peak | Average |
| 0.17 | 38.10 | 20.60 | H | 64.96 | 54.96 | 26.86 | 34.36 |
| 0.28 | 37.40 | 27.10 | H | 60.97 | 50.97 | 23.42 | 23.72 |
| 0.67 | 27.00 | 16.30 | H | 56.00 | 46.00 | 29.00 | 29.70 |
| 3.42 | 32.10 | 24.80 | H | 56.00 | 46.00 | 23.90 | 21.20 |
| 9.90 | 29.50 | 22.00 | H | 60.00 | 50.00 | 30.50 | 28.00 |
| 28.42 | 30.60 | 25.30 | H | 60.00 | 50.00 | 29.40 | 24.70 |
| 0.17 | 45.60 | 33.20 | N | 64.96 | 54.96 | 19.36 | 21.76 |
| 0.28 | 36.20 | 26.90 | N | 60.97 | 50.97 | 24.62 | 23.92 |
| 0.67 | 25.80 | 20.10 | N | 56.00 | 46.00 | 30.20 | 25.90 |
| 3.42 | 33.60 | 25.10 | N | 56.00 | 46.00 | 22.40 | 20.90 |
| 9.90 | 31.20 | 20.50 | N | 60.00 | 50.00 | 28.80 | 29.50 |
| 28.42 | 31.20 | 23.50 | N | 60.00 | 50.00 | 28.80 | 26.50 |

Note ;

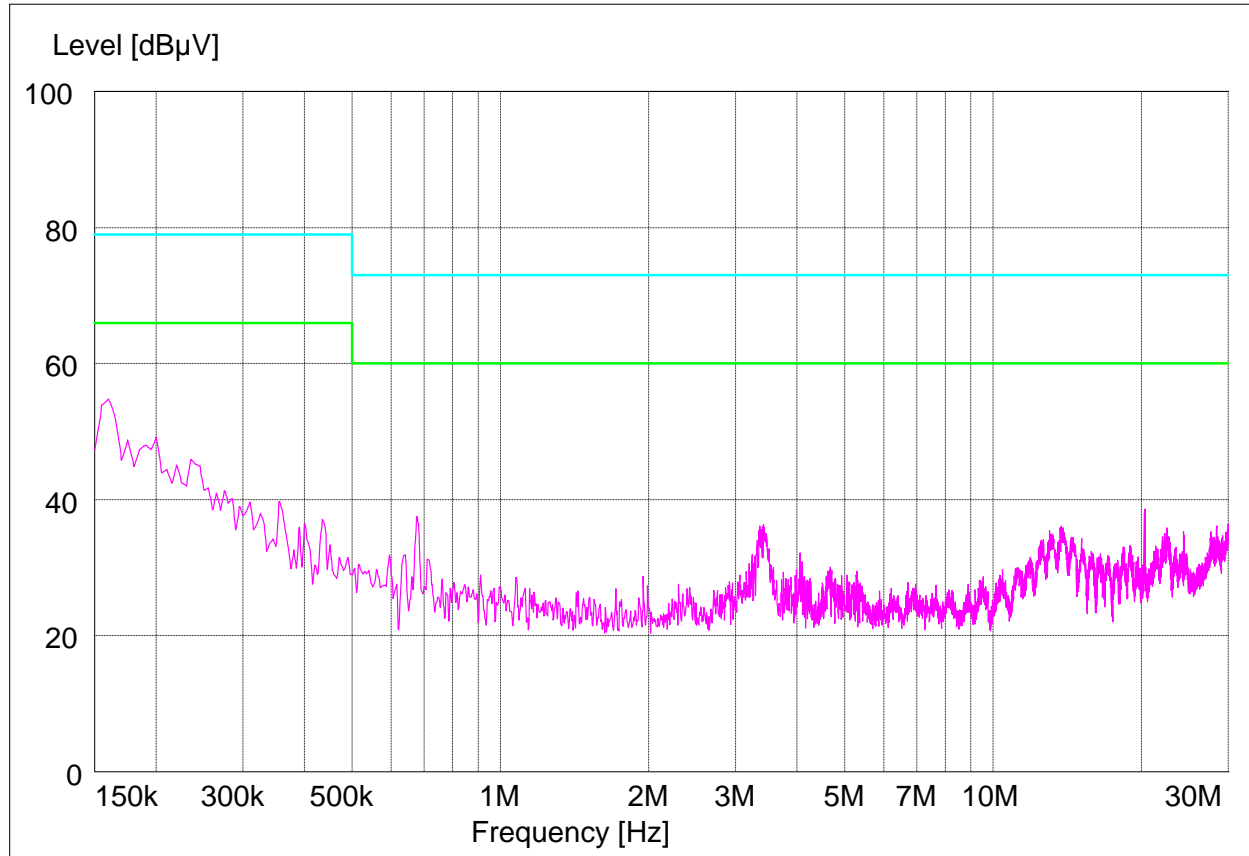
Line (H) : Hot

Line (N) : Neutral

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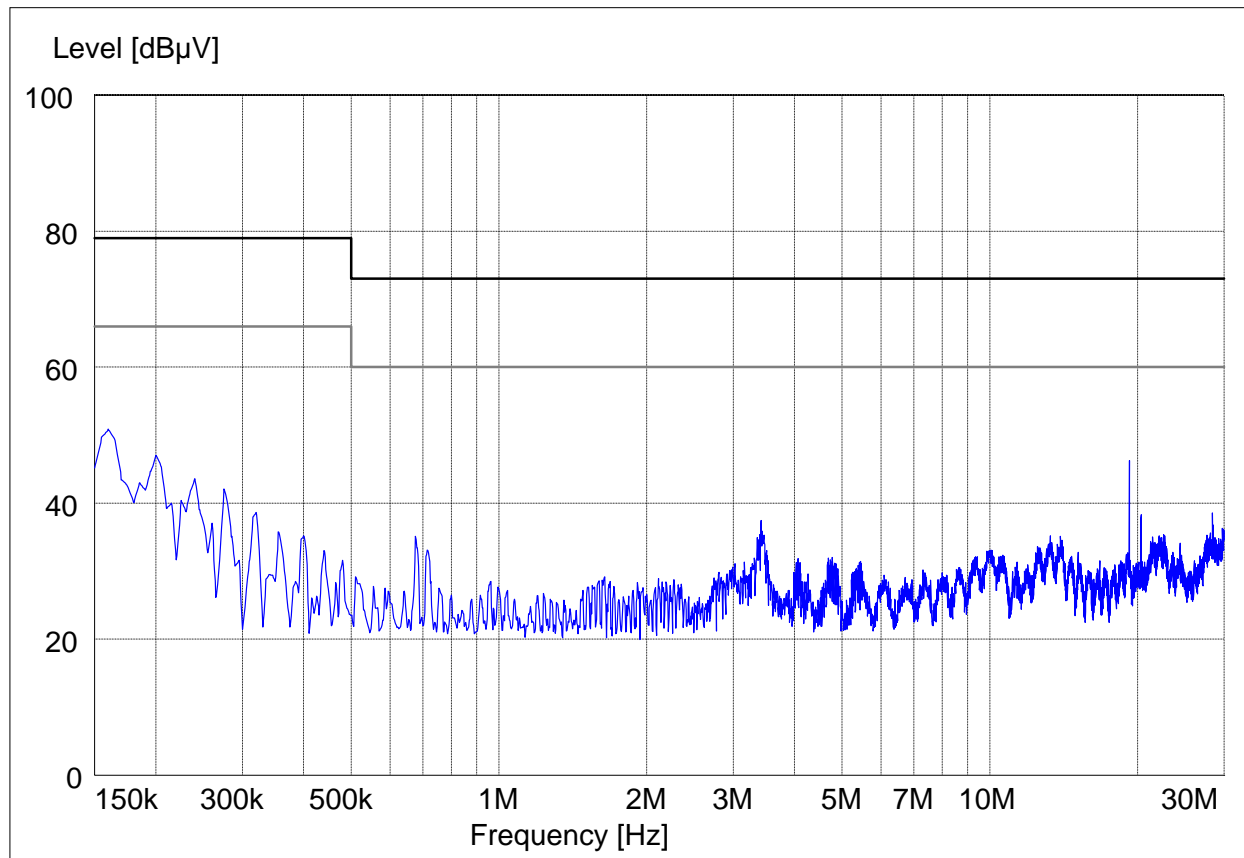
Plot of conducted power line

Test mode : (Hot)



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Test mode : (Neutral)



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Model: UFM1000R

| Freq. (MHz) | Level(dBuV) | | Line | Limit(dBuV) | | Margin(dB) | |
|----------------|-------------|---------|------|-------------|---------|------------|---------|
| | Q-Peak | Average | | Q-Peak | Average | Q-Peak | Average |
| 0.17 | 50.80 | 37.30 | H | 64.96 | 54.96 | 14.16 | 17.66 |
| 0.25 | 36.90 | 18.50 | H | 61.76 | 51.76 | 24.86 | 33.26 |
| 0.34 | 36.00 | 24.70 | H | 59.20 | 49.20 | 23.20 | 24.50 |
| 0.69 | 33.70 | 32.10 | H | 56.00 | 46.00 | 22.30 | 13.90 |
| 9.21 | 20.70 | 15.10 | H | 60.00 | 50.00 | 39.30 | 34.90 |
| 26.64 | 32.10 | 26.50 | H | 60.00 | 50.00 | 27.90 | 23.50 |
| 0.17 | 41.70 | 37.30 | N | 64.96 | 54.96 | 23.26 | 17.66 |
| 0.25 | 32.50 | 13.90 | N | 61.76 | 51.76 | 29.26 | 37.86 |
| 0.34 | 35.90 | 27.90 | N | 59.20 | 49.20 | 23.30 | 21.30 |
| 0.69 | 34.10 | 33.60 | N | 56.00 | 46.00 | 21.90 | 12.40 |
| 9.21 | 28.30 | 18.90 | N | 60.00 | 50.00 | 31.70 | 31.10 |
| 26.64 | 31.80 | 25.90 | N | 60.00 | 50.00 | 28.20 | 24.10 |

Note ;

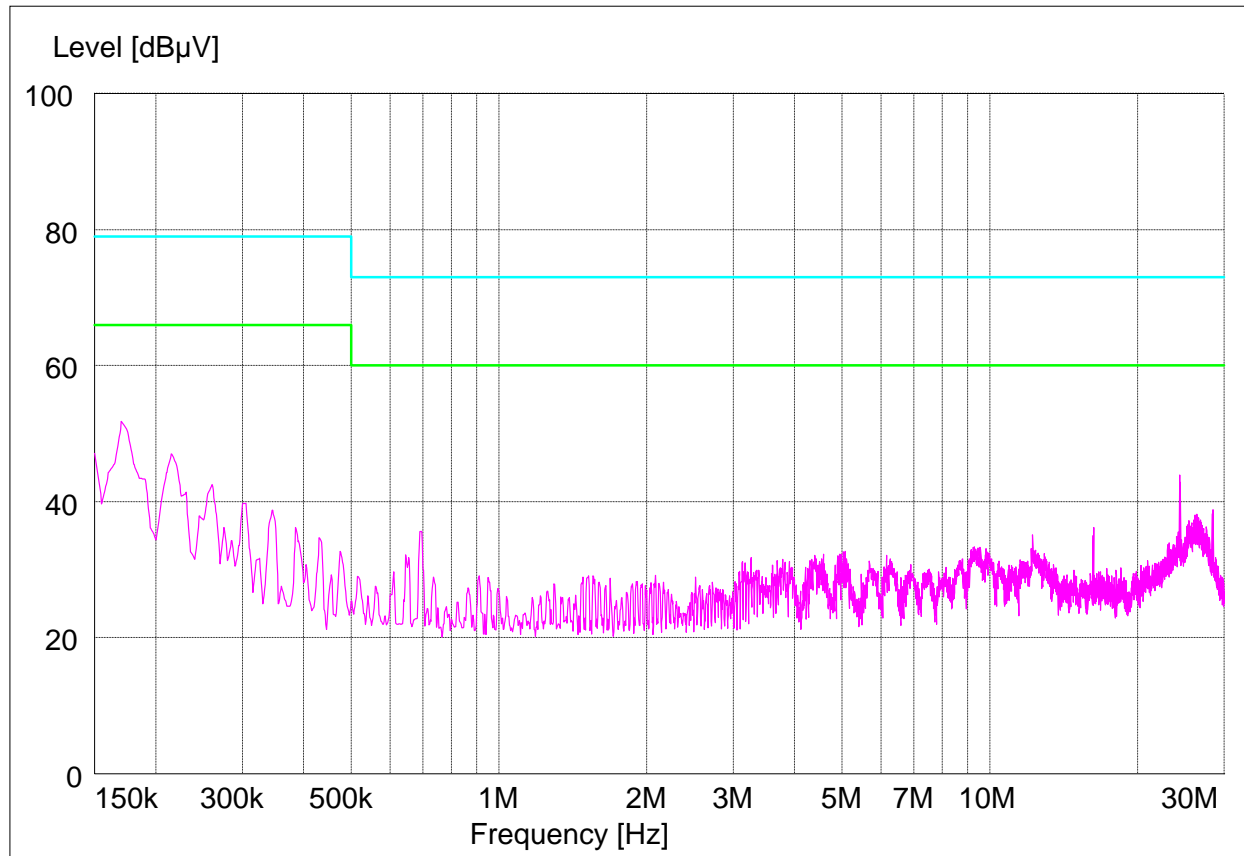
Line (H) : Hot

Line (N) : Neutral

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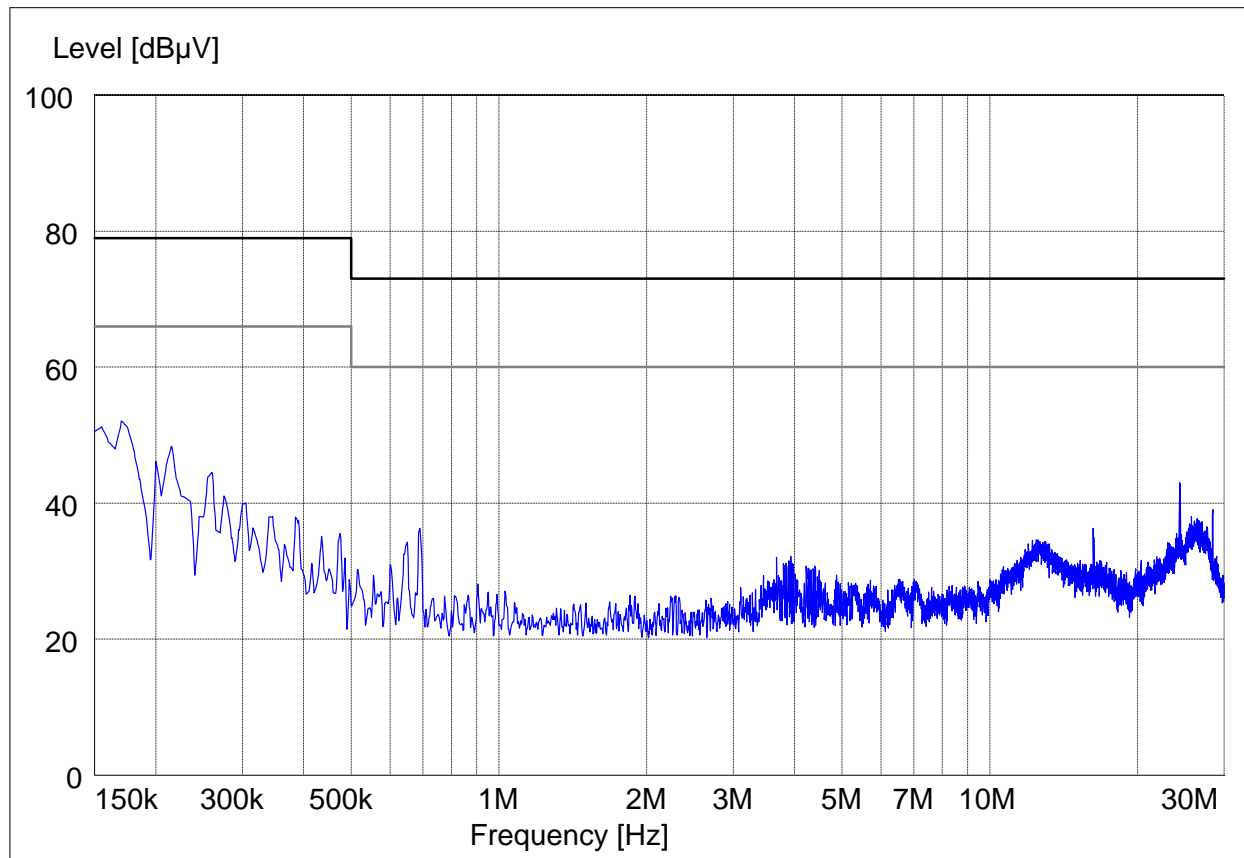
Plot of conducted power line

Test mode : (Hot)



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Test mode : (Neutral)

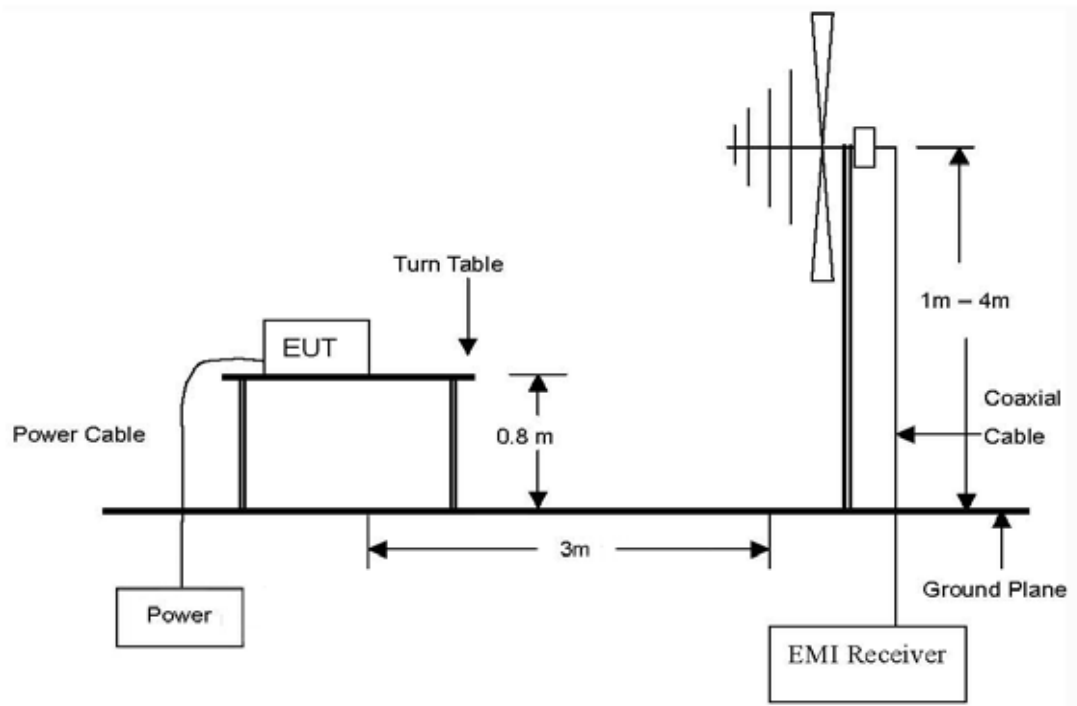


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3. Radiated emission

3.1. Test setup for radiated emission.

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



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3.2. Limit

The field strength of any emission within this band (section 15.239 frequency between 88 MHz –108 MHz) shall not exceed 250 microvolts /meter at 3 meters. (48dBV/m at 3m)

The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

The provisions in section 15.35 for limiting peak emissions apply. The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in section 15.209(Intentional Radiators general limit), as below.

| Frequency (MHz) | Distance (Meters) | Field strength (dBμV/m) | Field strength (μV/m) |
|-----------------|-------------------|-------------------------|-----------------------|
| 30 - 88 | 3 | 40.0* | 100* |
| 88 – 216 | 3 | 43.5* | 150* |
| 216 – 960 | 3 | 46.0* | 200* |
| Above 960 | 3 | 54.0 | 500 |

Note:

Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

According to §15.107(a), for an unintentional device, except for class a digital devices, the field strength of radiated emission from unintentional radiators at a distance of 3 meters shall not exceed the above table.

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3.3. Test procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

3.3.1. Test procedures for spurious radiated emissions

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.

NOTE ;

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.

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3.4. Test Result

Ambient temperature : 21 Relative humidity : 47 %

3.4.1. UFM1000T (Frequency : 88.1MHz)

| Radiated Emissions | | | Ant | Correction Factors | | Total | Limit | |
|--------------------|----------------|-------------|------|--------------------|------------------|-----------------|-------------------|-------------|
| Frequency (MHz) | Reading (dBuV) | Detect Mode | Pol. | AF (dB/m) | Amp Gain+CL (dB) | Actual (dBuV/m) | AV Limit (dBuV/m) | Margin (dB) |
| 88.10 | 62.10 | Q.P. | V | 8.48 | -26.53 | 44.05 | 48.00 | 3.95 |
| 176.20 | 54.00 | Q.P. | V | 7.83 | -25.65 | 36.18 | 43.50 | 7.32 |
| 264.30 | 54.10 | Q.P. | V | 9.91 | -24.89 | 39.12 | 46.00 | 6.88 |
| Above 300 | Not Detected | | | | | | | |

3.4.2. UFM1000T (Frequency : 88.5 MHz)

| Radiated Emissions | | | Ant | Correction Factors | | Total | Limit | |
|--------------------|----------------|-------------|------|--------------------|------------------|-----------------|-------------------|-------------|
| Frequency (MHz) | Reading (dBuV) | Detect Mode | Pol. | AF (dB/m) | Amp Gain+CL (dB) | Actual (dBuV/m) | AV Limit (dBuV/m) | Margin (dB) |
| 88.50 | 62.08 | Q.P. | V | 8.51 | -26.53 | 44.06 | 48.00 | 3.94 |
| 177.00 | 53.70 | Q.P. | V | 7.85 | -25.65 | 35.90 | 43.50 | 18.10 |
| 265.50 | 53.80 | Q.P. | V | 9.95 | -24.89 | 38.86 | 46.00 | 15.14 |
| Above 300 | Not Detected | | | | | | | |

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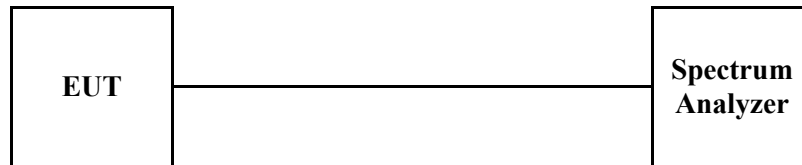
3.4.3. Model: UFM1000R

| Radiated Emissions | | | Ant | Correction Factors | | Total | Limit | |
|--------------------|----------------|-------------|------|--------------------|------------------|-----------------|-------------------|-------------|
| Frequency (MHz) | Reading (dBuV) | Detect Mode | Pol. | AF (dB/m) | Amp Gain+CL (dB) | Actual (dBuV/m) | AV Limit (dBuV/m) | Margin (dB) |
| 40.00 | 30.00 | Q.P. | V | 14.32 | -27.06 | 17.26 | 40.00 | 22.74 |
| Above 500 | Not Detected | | | | | | | |

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4. 20 dB bandwidth, 99% bandwidth and band edge

4.1. Test setup



4.2. Limit

According to §15.239(a), emissions from the intentional radiator shall be confined within a band 200kHz wide centered on the operating frequency. The 200kHz band shall lie wholly within the frequency range of 88-108MHz.

4.3. Test procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 10 kHz, VBW = RBW, Span = 500 kHz, Sweep = auto.
4. Mark the peak frequency and 20 dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

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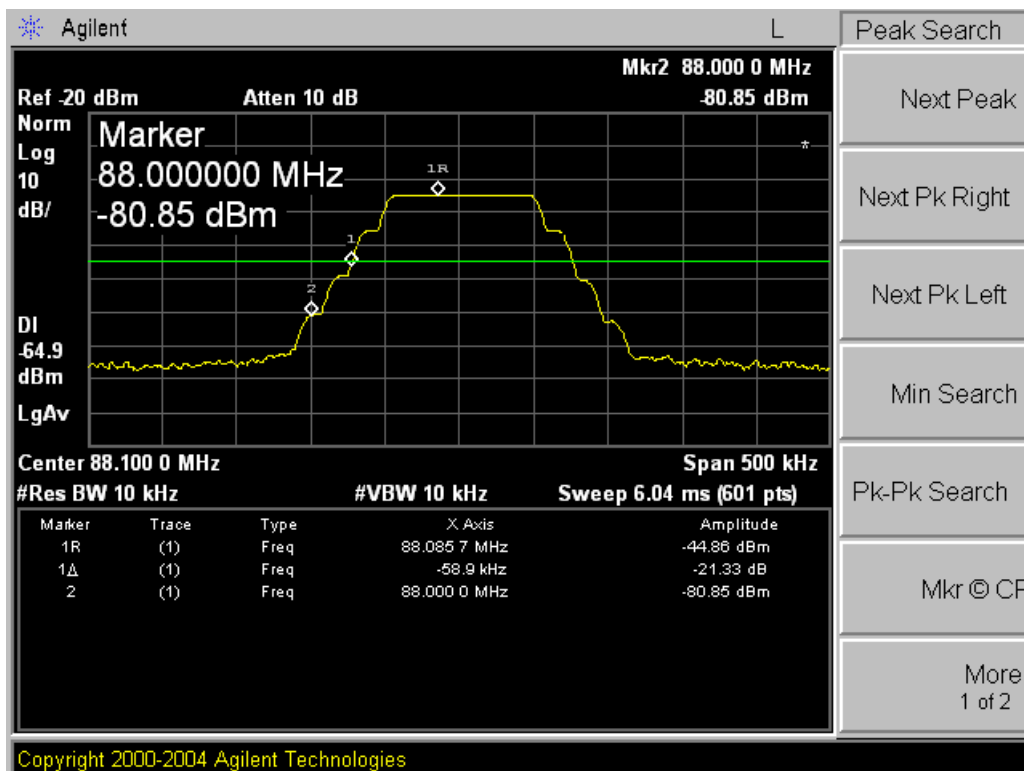
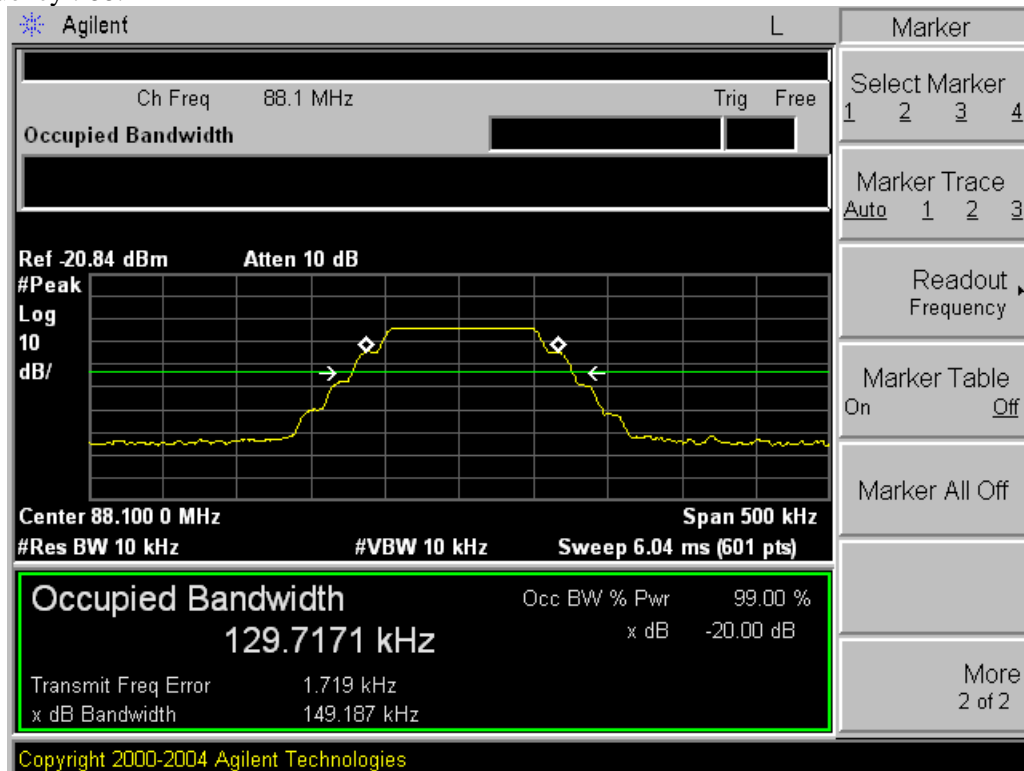
4.4. Test result of model UFM1000T

Ambient temperature : 22 Relative humidity : 46 %

| Frequency (MHz) | 20 dB Bandwidth (kHz) | 99% Bandwidth (kHz) |
|-----------------|-----------------------|---------------------|
| 88.1 | 129.72 | 149.19 |
| 88.5 | 152.98 | 133.66 |

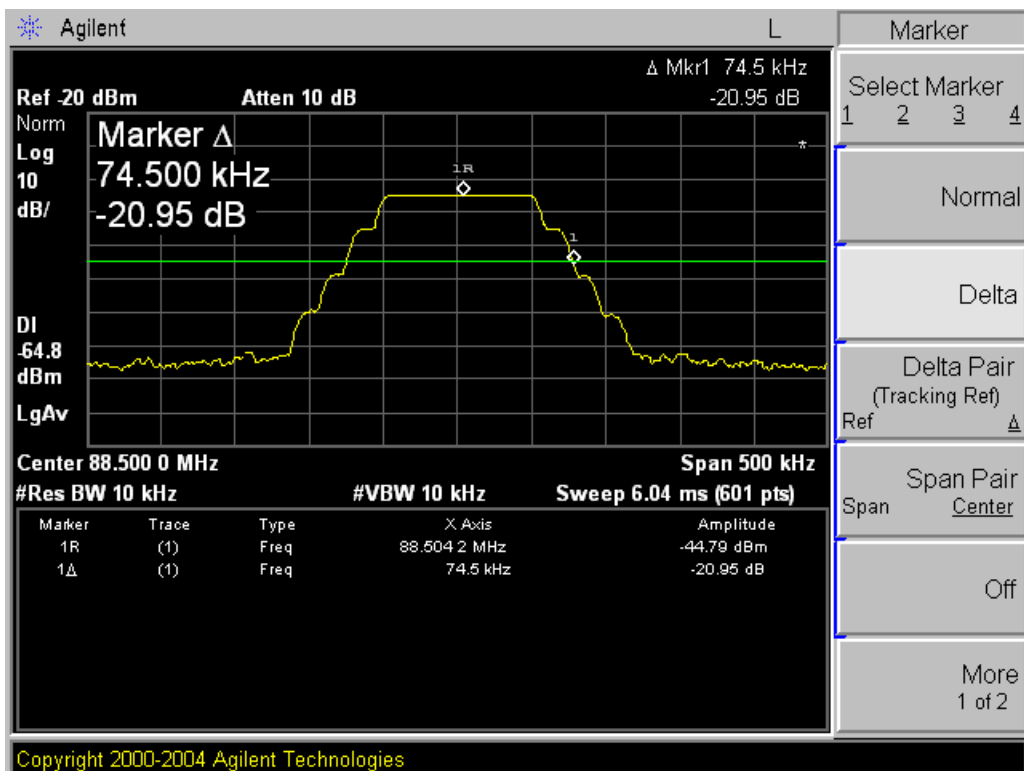
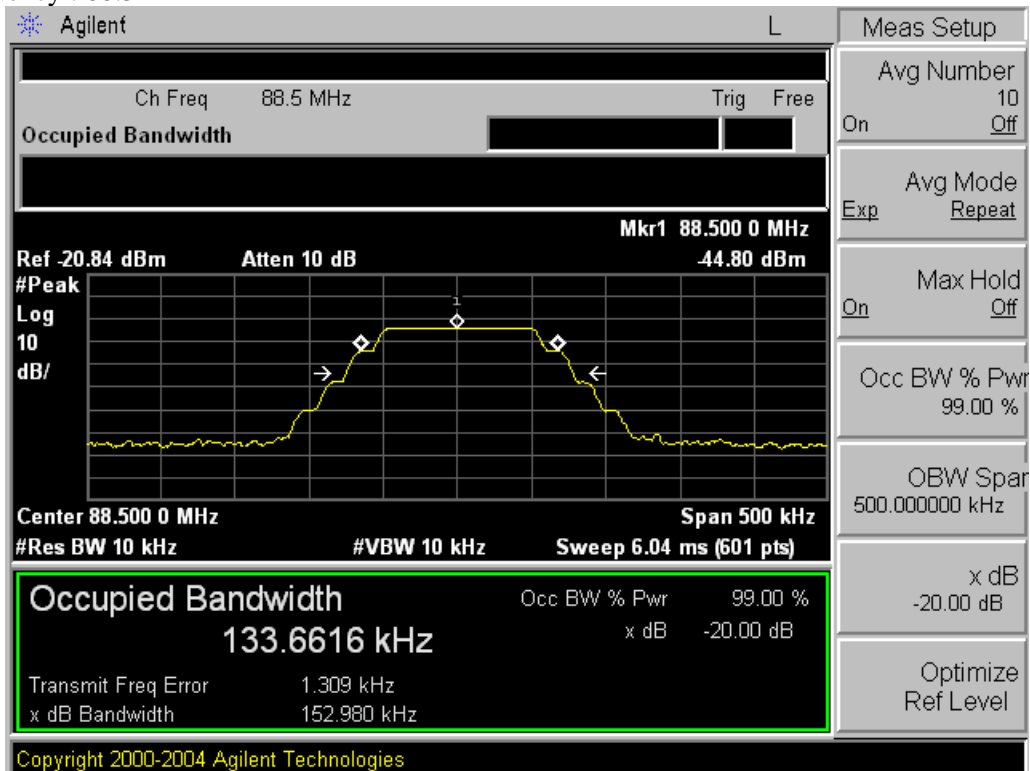
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Frequency : 88.1 MHz



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Frequency : 88.5 MHz



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