

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT AND INDUSTRY CANADA RSS-210

OF

Product Name: Bluetooth in-car Speakerphone

Brand Name: Plantronics

Model Name: K100

Model Differences: N/A

IC: 457A-K100

FCC ID: AL8-K100

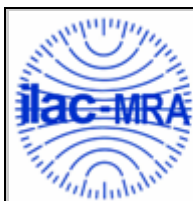
Report No.: EF/2010/70005

Rule Part: §15.239
RSS-210 issue 7:2007, Annex 2 A2.8

Issue Date: Jul. 27, 2010

Prepared for: Plantronics, Inc.
345 Encinal Street, Santa Cruz, CA95060 USA

Prepared by: SGS Taiwan Ltd.
Electronics & Communication Laboratory
No. 134, Wu Kung Rd., Wuku Industrial Zone,
Taipei County, Taiwan.



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VERIFICATION OF COMPLIANCE

Applicant: Plantronics, Inc.
345 Encinal Street, Santa Cruz, CA95060 USA

Equipment Under Test: Bluetooth in-car Speakerphone

Brand Name: Plantronics

Model No.: K100

Model Difference: N/A

IC: 457A-K100

FCC ID: AL8-K100

File Number: EF/2010/70005

Date of test: Jul. 15, 2010 ~ Jul. 26, 2010

Date of EUT Received: Jul. 15, 2010

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.239 and IC RSS 210 issue 7: 2007 Annex 2 A2.8.

The test results of this report relate only to the tested sample identified in this report.

Test By: Bondi Liu **Date** Jul. 27, 2010

Bondi Liu / Engineer

Prepared By: Tiffany Kao **Date** Jul. 27, 2010

Tiffany Kao / Clerk

Approved By: Arno Hsieh **Date** Jul. 27, 2010

Arno Hsieh / Asst. Supervisor

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Version

| Version No. | Date | Description |
|-------------|---------------|------------------------------|
| 00 | Jul. 27, 2010 | Initial creation of document |
| | | |
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1. GENERAL INFORMATION

1.1 Product Description

General:

| | | |
|-------------------|---|--|
| Product Name | Bluetooth in-car Speakerphone | |
| Brand Name | Plantronics | |
| Model Name | K100 | |
| Model Difference | N/A | |
| Hardware Version: | R6 | |
| Software Version: | Rev 0.019 | |
| Power Supply | 1. 3.7Vdc re-chargeable battery or 5Vdc from car charge | |
| | Battery: | Model: 423350, Supplier: TCL |
| | Car charge: | Model Name: SIL050050C-CLA , Supplier: SUNSTRONG |

Bluetooth:

| | |
|---------------------|---|
| Bluetooth Ver.sion | <input type="checkbox"/> V1.1 (GFSK) <input type="checkbox"/> V1.2 (GFSK) <input type="checkbox"/> V2.0 (GFSK) <input type="checkbox"/> V2.0 + EDR (GFSK + $\pi/4$ DQPSK + 8DPSK) <input checked="" type="checkbox"/> V2.1 + EDR (GFSK + $\pi/4$ DQPSK + 8DPSK) |
| Frequency Range | 2402 – 2480MHz |
| Channel number | 79 channels max. |
| Rated Power | 4.07 dBm (Peak) |
| Modulation type | Frequency Hopping Spread Spectrum |
| Antenna Designation | Printed Antenna, 2.65dBi. |
| Type of Emission | 1M19FXD |

The EUT is compliance with Bluetooth 2.1 Standard.

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FM Transmitter:

| | |
|----------------------|-------------------------|
| Operating Frequency | 88.3 – 89.9 MHz |
| Transmit Power | 47.16 dBuV/m |
| Modulation Technique | Frequency Modulation |
| Number of Channels | 5, channel step: 400KHz |
| Operating Mode | Point-to-Point |
| Antenna Type | Monopole Antenna |

The EUT is compliance with FM 88MHz -108MHz Standard.
This test report applies for FM transmitter.

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1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: AL8-K100 filing to comply with Section 15.239 of the FCC Part 15, Subpart C Rules. And IC: 457A-K100 filing to comply with Industry Canada RSS-210 issue 7: 2007 Annex 2 A2.8.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003) and RSS-Gen: 2007.. Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-4

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

1.5 Special Accessories

Not available for this EUT intended for grant.

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2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. the Tx frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 and 13 and Subclause 8.3.1.2 of ANSI C63.4-2003.9

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2.4 Limitation

(1) Conducted Emission

According to section 15.207(a) Conducted Emission Limits is as following.

| Frequency range MHz | Limits dB (uV) | |
|------------------------|-------------------|----------|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56 | 56 to 46 |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

Note

- 1.The lower limit shall apply at the transition frequencies
- 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

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(2) Radiated Emission

- a. Emission from the intentional radiator shall be confined with a band 200kHz wide centered on the operation frequency. The 200kHz band shall lie wholly within the frequency range of 88-108 MHz.
- b. The field strength of any emission within the permitted 200kHz band shall not exceed 250 micro volts/meter at 3 meters. (48dBμV 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.
- c. The field strength of any emissions radiated on any frequency outside of the specified 200kHz band shall not exceed the general radiated emission limits in section Part 15.209 and RSS-210 2.7 Table 2 (Intentional Radiators general limit).as below.

| Frequency (MHz) | Field strength μV/m | Distance (m) | Field strength at 3m dBμV/m |
|-----------------|---------------------|--------------|-----------------------------|
| 1.705-30 | 30 | 30 | 69.54 |
| 30-88 | 100 | 3 | 40 |
| 88-216 | 150 | 3 | 43.5 |
| 216-960 | 200 | 3 | 46 |
| Above 960 | 500 | 3 | 54 |

- Remark:
- 1. Emission level in dBuV/m=20 log (uV/m)
 - 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
 - 3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205 and RSS-210 2.7 Table 1
 - 4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of ξ15.205 and RSS-210 2.7 Table 1, then the general radiated emission limits in ξ 15.209 and RSS-210 2.7 Table 2 apply.

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2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

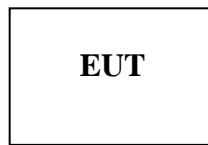


Table 2-1 Equipment Used in Tested System

| Item | Equipment | Mfr/Brand | Model/ Type No. | Series No. | Data Cable | Power Cord |
|------|-----------|-----------|--------------------|------------|------------|------------|
| 1. | N/A | | | | | |

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3. Summary of Test Results

| Description Of Test | Remark |
|----------------------|----------|
| Conducted Emission | Complied |
| Radiated Emission | Complied |
| 20dB & 99% Bandwidth | Complied |

4. Description of test modes

The frequency 88.3 MHz and 89.9 MHz are chosen with 1kHz audio signal for full testing. And the EUT stay in continuous transmitting mode.

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5. Conducted Emissions Test (Not applicable in the report)

5.1 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

5.2 Test SET-UP (Block Diagram of Configuration)

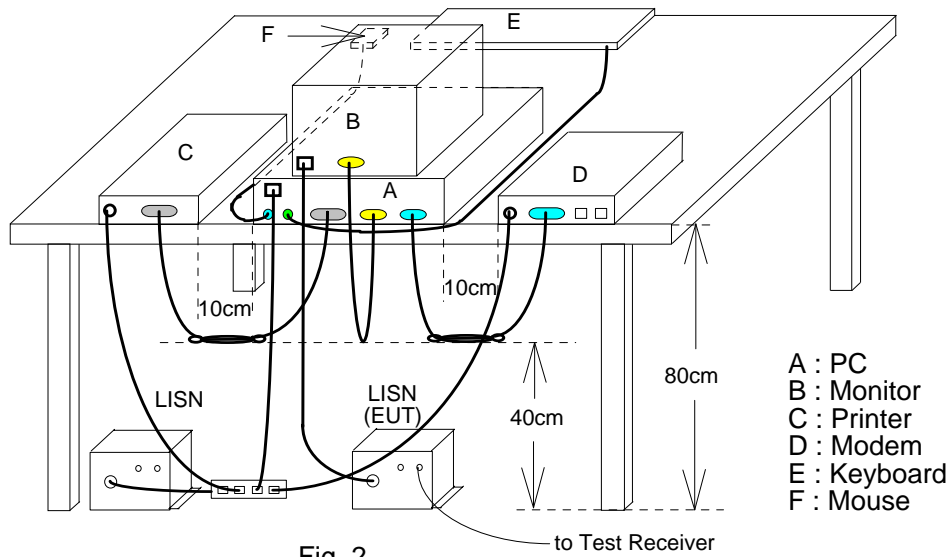


Fig. 2

5.3 Measurement Equipment Used:

| Conducted Emission Test Site | | | | | |
|------------------------------|------------|-------------------------|---------------|------------|------------|
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL DUE. |
| EMI Test Receiver | R&S | ESCS30 | 828985/004 | 09/15/2009 | 09/14/2010 |
| LISN | Rolf-Heine | NNB-2/16Z | 99012 | 02/02/2010 | 02/01/2011 |
| LISN | FCC | FCC-LISN-50/250-25-2-01 | 04034 | 02/02/2010 | 02/01/2011 |
| Coaxial Cables | N/A | WK CE Cable | N/A | 11/28/2009 | 11/27/2010 |

5.4 Measurement Result:

N/A, the power supply is 5Vdc from car charger.

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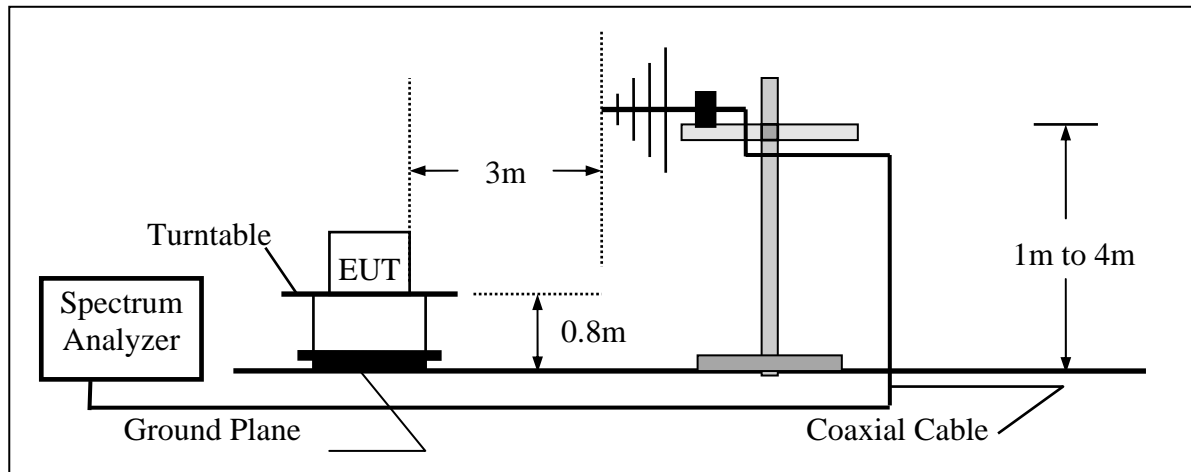
6. Radiated Emission Test

6.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

6.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



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6.3 Measurement Equipment Used:

| 966 Chamber | | | | | |
|-------------------|--------------|---------------------|---------------|------------|------------|
| EQUIPMENT TYPE | MFR | MODEL NUMBER | SERIAL NUMBER | LAST CAL. | CAL DUE. |
| Spectrum Analyzer | R&S | FSP 40 | 100034 | 02/12/2010 | 02/11/2011 |
| Bilog Antenna | SCHWAZBECK | VULB9160 | 3136 | 11/19/2009 | 11/18/2010 |
| Horn antenna | SCHWAZBECK | BBHA 9120D | 309/320 | 03/09/2009 | 03/08/2011 |
| Pre-Amplifier | Agilent | 8447D | 1937A02834 | 11/28/2009 | 11/27/2010 |
| Pre-Amplifier | Agilent | 8449B | 3008A01973 | 01/05/2010 | 01/04/2011 |
| Turn Table | HD | DT420 | N/A | N.C.R | N.C.R |
| Antenna Tower | HD | MA240-N | 240/657 | N.C.R | N.C.R |
| Controller | HD | HD100 | N/A | N.C.R | N.C.R |
| Low Loss Cable | HUBER+SUHNER | SUCOFLEX 104PEA-10M | 10m | 01/05/2010 | 01/04/2011 |
| Low Loss Cable | HUBER+SUHNER | SUCOFLEX 104PEA-3M | 3m | 01/05/2010 | 01/04/2011 |

6.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

| | | |
|-------|------------------------|--|
| Where | FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| | RA = Reading Amplitude | AG = Amplifier Gain |
| | AF = Antenna Factor | |

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6.5 Measurement Result

Operation Mode: Transmitting Mode Test Date : Jul. 26, 2010
Fundamental Frequency: 88.3 MHz Test By: Bondi
Temperature : 25 °C Pol: Vertical
Humidity : 65 %

| Freq. (MHz) | Ant.Pol. H/V | Detector | | | Actual FS (dBuV/m) | Limit@3m (dBuV/m) | Safe Margin (dB) | Note |
|----------------|-----------------|--------------------|-------------------|----------------|-----------------------|----------------------|------------------------|------|
| | | Mode (PK/AV/QP) | Reading (dBuV) | Factor (dB) | | | | |
| 88.30 | V | Peak | 65.46 | -30.55 | 34.91 | 48.00 | -13.09 | F |
| 88.00 | V | Peak | 47.88 | -30.58 | 17.30 | 40.00 | -22.70 | E |
| 88.20 | V | Peak | 50.24 | -30.58 | 19.66 | 43.50 | -23.84 | E |
| 88.40 | V | Peak | 50.33 | -30.55 | 19.78 | 43.50 | -23.72 | E |
| 101.78 | V | Peak | 55.42 | -30.15 | 25.27 | 48.00 | -22.73 | H |
| 143.49 | V | Peak | 46.85 | -27.19 | 19.66 | 43.50 | -23.84 | H |
| 176.60 | V | Peak | -- | -- | -- | 43.50 | -- | |
| 264.90 | V | Peak | 47.61 | -29.44 | 18.17 | 46.00 | -27.83 | H |
| 353.20 | V | Peak | -- | -- | -- | 46.00 | -- | |
| 441.50 | V | Peak | -- | -- | -- | 46.00 | -- | |
| 529.80 | V | Peak | -- | -- | -- | 46.00 | -- | |
| 531.49 | V | Peak | 45.23 | -24.10 | 21.13 | 46.00 | -24.87 | H |
| 618.10 | V | Peak | -- | -- | -- | 46.00 | -- | |
| 657.59 | V | Peak | 44.28 | -21.72 | 22.56 | 46.00 | -23.44 | H |

Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz .
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of SPA 30MHz to 1GHz was 100KHz. VBW= 300KHz

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Operation Mode: Transmitting Mode
Fundamental Frequency: 88.3 MHz
Temperature : 25 °C
Humidity : 65 %

Test Date : Jul. 26, 2010
Test By: Bondi
Pol: Horizontal

| Freq. (MHz) | Ant.Pol. H/V | Detector | | Actual FS (dBuV/m) | Limit @3m (dBuV/m) | Safe Margin (dB) | Note | |
|----------------|-----------------|--------------------|-------------------|-----------------------|-----------------------|------------------------|--------|---|
| | | Mode (PK/AV/QP) | Reading (dBuV) | | | | | |
| 88.30 | H | Peak | 77.57 | -30.55 | 47.02 | 48.00 | -0.98 | F |
| 88.00 | H | Peak | 53.69 | -30.58 | 23.11 | 40.00 | -16.89 | E |
| 88.20 | H | Peak | 58.32 | -30.58 | 27.74 | 43.50 | -15.76 | E |
| 88.40 | H | Peak | 58.94 | -30.55 | 28.39 | 43.50 | -15.11 | E |
| 177.44 | H | Peak | 58.43 | -29.27 | 29.16 | 43.50 | -14.34 | H |
| 264.90 | H | Peak | 60.44 | -29.44 | 31.00 | 46.00 | -15.00 | H |
| 353.20 | H | Peak | -- | -- | -- | 46.00 | -- | |
| 441.50 | H | Peak | -- | -- | -- | 46.00 | -- | |
| 529.80 | H | Peak | 59.99 | -24.13 | 35.86 | 46.00 | -10.14 | H |
| 575.14 | H | Peak | 57.40 | -23.23 | 34.17 | 46.00 | -11.83 | H |
| 618.10 | H | Peak | 56.03 | -22.37 | 33.66 | 46.00 | -12.34 | H |
| 657.59 | H | Peak | -- | -- | -- | 46.00 | -- | |
| 706.09 | H | Peak | 53.16 | -21.05 | 32.11 | 46.00 | -13.89 | H |

Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz °
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of SPA 30MHz to 1GHz was 100KHz, VBW=300KHz.

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Operation Mode: Transmitting Mode
Fundamental Frequency: 89.9 MHz
Temperature : 25 °C
Humidity : 65 %

Test Date : Jul. 26, 2010
Test By: Bondi
Pol: Vertical

| Freq. (MHz) | Ant.Pol. H/V | Detector | | Factor (dB) | Actual FS (dBuV/m) | Limit@3m (dBuV/m) | Safe Margin (dB) | Note |
|----------------|-----------------|--------------------|-------------------|----------------|-----------------------|----------------------|------------------------|------|
| | | Mode (PK/AV/QP) | Reading (dBuV) | | | | | |
| 89.90 | V | Peak | 64.99 | -30.55 | 34.44 | 48.00 | -13.56 | F |
| 89.80 | V | Peak | 52.45 | -30.55 | 21.90 | 43.50 | -21.60 | E |
| 90.00 | V | Peak | 53.88 | -30.55 | 23.33 | 43.50 | -20.17 | E |
| 108.00 | V | Peak | 46.59 | -29.57 | 17.02 | 43.50 | -26.48 | E |
| 101.78 | V | Peak | 52.99 | -30.15 | 22.84 | 48.00 | -25.16 | H |
| 179.80 | V | Peak | -- | -- | -- | 43.50 | -- | |
| 269.70 | V | Peak | 48.94 | -29.31 | 19.63 | 46.00 | -26.37 | H |
| 359.60 | V | Peak | -- | -- | -- | 46.00 | -- | |
| 449.50 | V | Peak | -- | -- | -- | 46.00 | -- | |
| 475.23 | V | Peak | 45.23 | -24.86 | 20.37 | 46.00 | -25.63 | H |
| 539.40 | V | Peak | 45.89 | -23.97 | 21.92 | 46.00 | -24.08 | H |
| 618.79 | V | Peak | 44.84 | -22.37 | 22.47 | 46.00 | -23.53 | H |
| 629.30 | V | Peak | -- | -- | -- | 46.00 | -- | |
| 719.20 | V | Peak | -- | -- | -- | 46.00 | -- | |

Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz .
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of SPA 30MHz to 1GHz was 100KHz. VBW= 300KHz

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Operation Mode: Transmitting Mode
Fundamental Frequency: 89.9 MHz
Temperature : 25 °C
Humidity : 65 %

Test Date : Jul. 26, 2010
Test By: Bondi
Pol: Horizontal

| Freq. (MHz) | Ant.Pol. H/V | Detector | | Actual FS (dBuV/m) | Limit@3m (dBuV/m) | Safe Margin (dB) | Note | |
|----------------|-----------------|--------------------|-------------------|-----------------------|----------------------|------------------------|--------|---|
| | | Mode (PK/AV/QP) | Reading (dBuV) | | | | | |
| 89.90 | H | Peak | 77.71 | -30.55 | 47.16 | 48.00 | -0.84 | F |
| 89.80 | H | Peak | 55.24 | -30.55 | 24.69 | 43.50 | -18.81 | E |
| 90.00 | H | Peak | 55.78 | -30.55 | 25.23 | 43.50 | -18.27 | E |
| 108.00 | H | Peak | 45.38 | -29.57 | 15.81 | 43.50 | -27.69 | E |
| 179.38 | H | Peak | 59.53 | -29.37 | 30.16 | 43.50 | -13.34 | H |
| 269.70 | H | Peak | 60.49 | -29.31 | 31.18 | 46.00 | -14.82 | H |
| 359.60 | H | Peak | -- | -- | -- | 46.00 | -- | |
| 449.50 | H | Peak | -- | -- | -- | 46.00 | -- | |
| 539.40 | H | Peak | 33.59 | -10.45 | 23.14 | 46.00 | -22.86 | H |
| 575.14 | H | Peak | 55.12 | -23.23 | 31.89 | 46.00 | -14.11 | H |
| 629.30 | H | Peak | 56.18 | -22.16 | 34.02 | 46.00 | -11.98 | H |
| 719.20 | H | Peak | 50.56 | -20.87 | 29.69 | 46.00 | -16.31 | H |

Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz .
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of SPA 30MHz to 1GHz was 100KHz, VBW=300KHz.

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7. 20dB & 99% Occupied Bandwidth

7.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation
3. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 10KHz, Span =500KHz.
4. Set SPA Max hold. Mark peak, -20dB and use 99% Bandwidth of Spectrum Analyzer.

7.2 Test SET-UP (Block Diagram of Configuration)

Same as 4.2 Radiated Emission Measurement.

7.3 Measurement Equipment Used:

Same as 4.2 Radiated Emission Measurement.

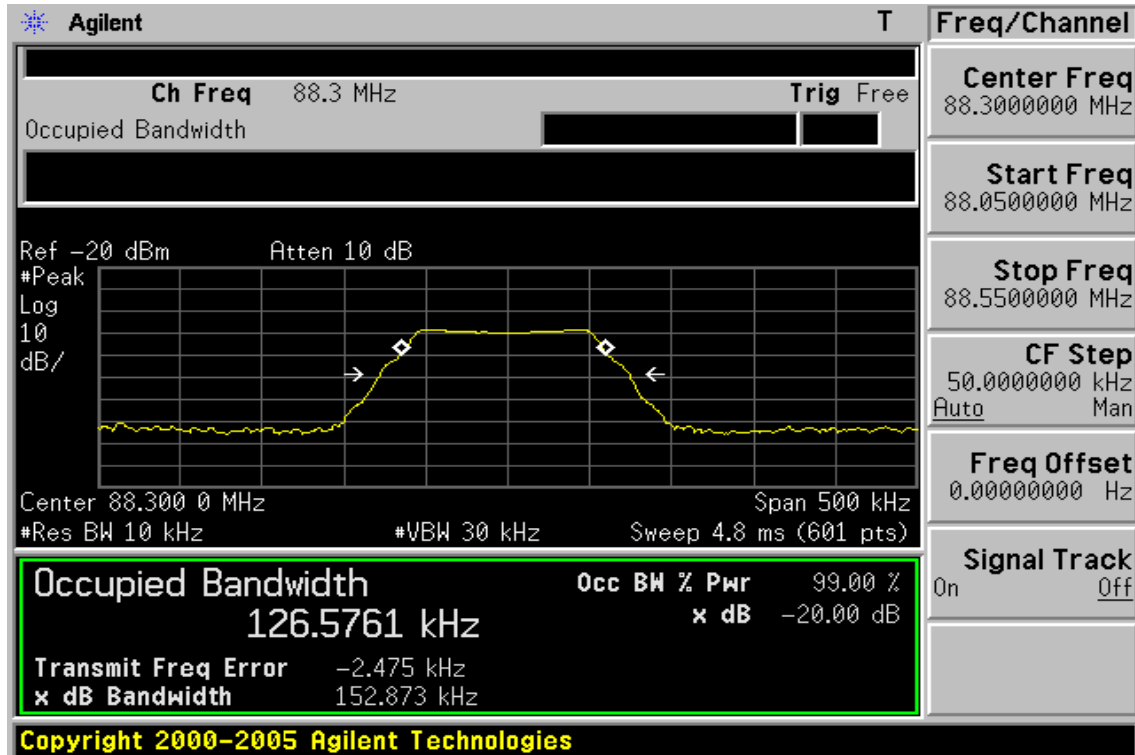
7.4 Measurement Results

Please refer to next page for test plots.

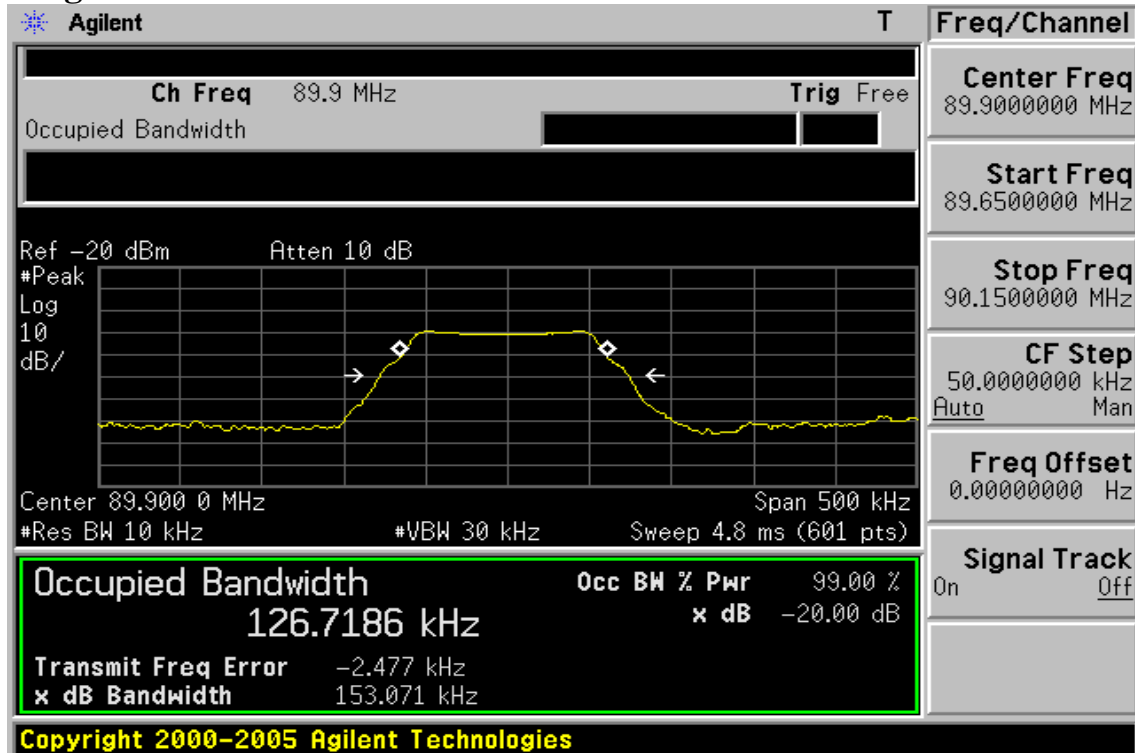
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CH Low



CH High



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