

Test Report

TEST PROCEDURES AND TEST SITE DESCRIPTION

MEASUREMENT ITEMS

- 5-1 Field Strength of Spurious Radiated Emission
- 5-2 Power Line Conducted Emissions

NOTE: Measurements in Scan Mode vs. Non-Scan Mode

The measurement data reported in the original file represented a non-scan mode for both of power line conducted emission and spurious radiated emission because no emission level exceeded that of the levels in the scan mode.

In scan mode, the receiver only stays at a particular frequency for as short as 20 ms in certain channels as the scanning interval may change depending on the number of the memorized channels. This means that true emission levels may change along with the number of the memorized channels in the scanning mode due to changes in the duty cycle of the emission level.

Therefore, we measured the device where each memorized channel was scanned for 3 different points of frequencies in each receiver coverage range as shown in the original file and we confirm that no emission level exceeds the level reported from the ones measured in the non-scan mode.

5-1 Field Strength of Spurious Radiated Emission

Test Procedure:

The measurements were performed in accordance with the ANSI C63.4-1992. Field Strength measurements of radiated spurious emissions were made at the open test site of a 3 meter range maintained by Uniden Corporation in Japan. Complete description and measurement data of this test site have been placed on file with the Commission.

The radio frequency spectrum was scanned in the range of 30 MHz to 10 GHz in accordance with the section 15.33(b) of the FCC Rules. The frequency below 1 GHz, the measurement was carried out by using CISPR quasi-peak detector, Rohde Schwartz EUS-2 Test Receiver or the Spectrum Analyzer in accordance with the sections 15.33(a) and 15.35(a). The frequency above 1 GHz, the measurement was carried out by using the Hewlett Packard 8566B Spectrum Analyzer in accordance with the section 15.35(b).

A bilog antenna CBL6111 was used to cover the range from 30 MHz to 1000 MHz. Narrowband tuned dipole antennas were used over the entire 25 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna was used.

For each spurious or harmonic frequency, the antenna was raised and lowered to obtain a maximum reading on the Spectrum Analyzer with antenna horizontally polarized. Then the turntable, on which the equipment under test was placed, was rotated a minimum of 360 degrees to further increase the reading on the Spectrum Analyzer. This procedure was repeated with the antenna vertically polarized. The unit under test was placed in its normal operating position on a turntable approximately 1 meter in height, with a normal power lead.

In order to convert the measured emission levels into field strength in dBuV/m, the actual field strength (E_f) is determined by algebraically adding the measured emission level (E_m) and the antenna correction factor (ACF) including the cable loss at the appropriate frequency.

$$E_f \text{ [dBuV/m]} = E_m \text{ [dBuV/m]} + \text{ACF [dB]}$$

FCC Limits:

| Frequency | Field Strength at 3 meter |
|---------------|---------------------------|
| 30 - 88 MHz | 40 dBuV/m (100 uV/m) |
| 88 - 216 MHz | 43.5 dBuV/m (150 uV/m) |
| 216 - 960 MHz | 46 dBuV/m (200 uV/m) |
| Above 960 MHz | 54 dBuV/m (500 uV/m) |

Test Results: Refer to the attached test reports. All emissions not reported were more than 20 dB below the limits.

5-2 Power Line Conducted Emissions

Test Procedure:

The measurements were performed in accordance with the ANSI C63.4-1992. During the measurements, a standard voltage source is fed into the unit under test through a power line impedance stabilization network.

FCC Limit:

The radio frequency voltage that is conducted back into the AC power line on any frequencies within the band from 450kHz to 30MHz shall not exceed 250uV (48 dBuV).

Test Results: Refer to the attached test reports. All emissions not reported were more than 20 dB below the limits.

5-3 -38dB of Image rejection 15.121 (b)

FCC Limit:

Scanning receivers shall reject any signals from the Cellular Radiotelephone Service frequency bands that are at least 38 dB based upon a 12 dB SINAD measurement, which is considered the threshold where a signal can be clearly discerned from any interference that may be present.

Test Results: Refer to the attached test reports.

5-1 Test Result: Field Strength of Radiated Emissions

| Tuned Frequency (MHz) | Emission Frequency (MHz) | Reading with amplifier (dBuV) | Level without amplifier (dBuV) | Pol. | ACF (dB) | Field Strength (dBuV/m) | FCC Limit (dBuV/m) | MARGIN (dB) |
|---|--------------------------|-------------------------------|--------------------------------|------|----------|-------------------------|--------------------|-------------|
| (1) Test Results (29.000 - 54.000 MHz Band) | | | | | | | | |
| 29.000 | - | | - | - | - | - | - | >20 |
| 40.840 | - | | - | - | - | - | - | >20 |
| 54.000 | 75.400 | 44.4 | 9.4 | V | 10.6 | 20.0 | 40.0 | 20.0 |
| | 226.200 | 47.7 | 12.7 | V | 13.6 | 26.3 | 46.0 | 19.7 |
| (2) Test Results (108.000 - 136.975 MHz Band) | | | | | | | | |
| 108.000 | 129.400 | 52.4 | 17.4 | V | 12.9 | 30.3 | 43.5 | 13.2 |
| | 258.800 | 51.8 | 16.8 | V | 15.0 | 31.8 | 46.0 | 14.2 |
| | 517.600 | 38.5 | 3.5 | V | 23.5 | 27.0 | 46.0 | 19.0 |
| | 647.000 | 41.8 | 6.8 | V | 26.0 | 32.8 | 46.0 | 13.2 |
| | 776.400 | 42.6 | 7.6 | V | 26.5 | 34.1 | 46.0 | 11.9 |
| | 905.800 | 40.2 | 5.2 | H | 27.8 | 33.0 | 46.0 | 13.0 |
| 127.175 | 148.575 | 58.4 | 23.4 | V | 12.7 | 36.1 | 43.5 | 7.4 |
| | 297.150 | 49.6 | 14.6 | H | 17.5 | 32.1 | 46.0 | 13.9 |
| | 445.725 | 42.1 | 7.1 | H | 22.1 | 29.2 | 46.0 | 16.8 |
| | 594.300 | 43.5 | 8.5 | H | 26.2 | 34.7 | 46.0 | 11.3 |
| | 742.875 | 43.2 | 8.2 | V | 26.2 | 34.4 | 46.0 | 11.6 |
| | 891.450 | 41.2 | 6.2 | H | 27.8 | 34.0 | 46.0 | 12.0 |
| 135.975 | 158.375 | 61.8 | 26.8 | V | 12.7 | 39.5 | 43.5 | 4.0 |
| | 316.750 | 45.9 | 10.9 | H | 18.0 | 28.9 | 46.0 | 17.1 |
| | 475.125 | 45.4 | 10.4 | H | 22.7 | 33.1 | 46.0 | 12.9 |
| | 633.500 | 43.7 | 8.7 | H | 26.0 | 34.7 | 46.0 | 11.3 |
| | 791.875 | 41.3 | 6.3 | V | 26.8 | 33.1 | 46.0 | 12.9 |
| | 950.250 | 38.3 | 3.3 | H | 29.5 | 32.8 | 46.0 | 13.2 |
| (3) Test Results (137.000 - 174.000 MHz Band) | | | | | | | | |
| 137.000 | 115.600 | 49.3 | 14.3 | V | 12.7 | 27.0 | 43.5 | 16.5 |
| | 231.200 | 50.8 | 15.8 | H | 13.7 | 29.5 | 46.0 | 16.5 |
| | 693.600 | 52.5 | 17.0 | H | 25.6 | 42.6 | 46.0 | 3.4 |
| 162.400 | 141.000 | 54.2 | 19.2 | V | 12.7 | 31.9 | 43.5 | 11.6 |
| | 282.000 | 49.3 | 14.3 | H | 16.5 | 30.8 | 46.0 | 15.2 |
| | 423.000 | 39.6 | 4.6 | V | 21.4 | 26.0 | 46.0 | 20.0 |
| | 564.000 | 40.3 | 5.3 | H | 25.5 | 30.8 | 46.0 | 15.2 |
| | 705.000 | 47.7 | 12.7 | H | 25.6 | 38.3 | 46.0 | 7.7 |
| | 846.000 | 40.8 | 5.8 | V | 27.3 | 33.1 | 46.0 | 12.9 |
| | 987.000 | 40.8 | 5.8 | V | 27.3 | 33.1 | 46.0 | 12.9 |
| 174.000 | 152.600 | 55.8 | 20.8 | V | 12.7 | 33.5 | 43.5 | 10.0 |
| | 305.200 | 49.6 | 14.6 | H | 17.5 | 32.1 | 46.0 | 13.9 |
| | 457.800 | 42.1 | 7.1 | H | 22.1 | 29.2 | 46.0 | 16.8 |
| | 610.400 | 45.3 | 10.3 | H | 26.0 | 36.3 | 46.0 | 9.7 |
| | 763.000 | 42.6 | 7.6 | V | 26.5 | 34.1 | 46.0 | 11.9 |
| | 915.600 | 41.4 | 6.4 | H | 28.0 | 34.4 | 46.0 | 11.6 |

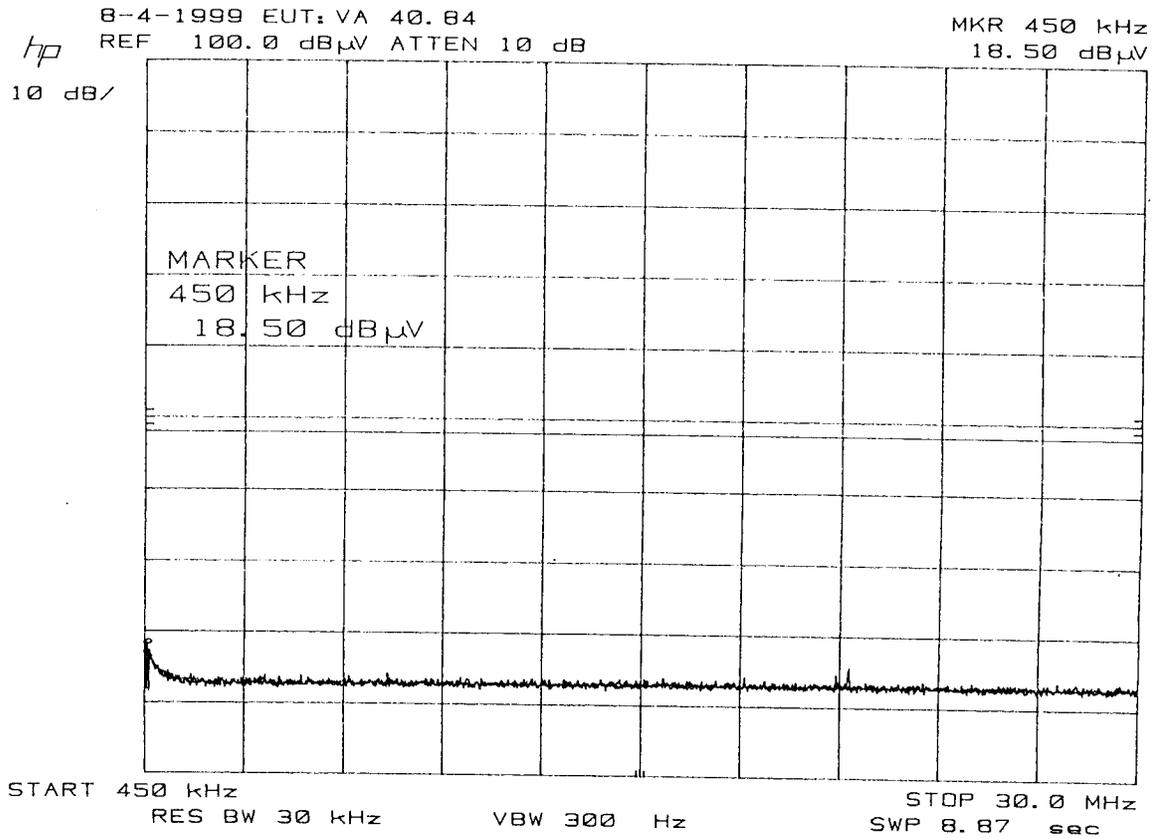
| (4) Test Results (406.000 - 512.000 MHz Band) | | | | | | | | |
|---|---------|------|------|---|------|------|------|------|
| 406.000 | 128.200 | 51.1 | 16.1 | V | 12.9 | 29.0 | 43.5 | 14.5 |
| | 256.400 | 49.3 | 14.3 | V | 14.9 | 29.2 | 46.0 | 16.8 |
| | 384.600 | 56.0 | 21.0 | V | 20.5 | 41.5 | 46.0 | 4.5 |
| | 641.000 | 41.1 | 6.1 | V | 25.7 | 31.8 | 46.0 | 14.2 |
| | 769.200 | 42.6 | 7.6 | V | 26.5 | 34.1 | 46.0 | 11.9 |
| 453.250 | 143.950 | 50.3 | 15.3 | V | 12.7 | 28.0 | 43.5 | 15.5 |
| | 287.900 | 45.8 | 10.8 | V | 16.2 | 27.0 | 46.0 | 19.0 |
| | 431.850 | 53.1 | 18.1 | H | 22.4 | 40.5 | 46.0 | 5.5 |
| | 575.800 | 39.1 | 4.1 | V | 25.5 | 29.6 | 46.0 | 16.5 |
| | 719.750 | 44.3 | 9.3 | H | 25.7 | 35.0 | 46.0 | 11.0 |
| | 863.700 | 40.6 | 5.6 | V | 27.8 | 33.4 | 46.0 | 12.6 |
| 512.000 | 163.533 | 61.1 | 26.1 | V | 12.6 | 38.7 | 43.5 | 4.8 |
| | 327.067 | 45.6 | 10.6 | V | 18.3 | 28.9 | 46.0 | 17.1 |
| | 490.600 | 47.4 | 12.4 | H | 23.3 | 35.7 | 46.0 | 10.3 |
| | 654.133 | 45.0 | 10.0 | H | 25.8 | 35.8 | 46.0 | 10.2 |
| | 817.667 | 42.6 | 7.6 | V | 26.8 | 34.4 | 46.0 | 11.6 |
| | 981.200 | 38.9 | 3.9 | V | 30.4 | 34.3 | 54.0 | 19.7 |

Note: Other emissions not reported were more than 20dB below the FCC limits.

5-2 Test Result: Power Line Conducted Emissions

| Tuned Frequency (MHz) | Emission Frequency (MHz) | Measured Level (dBuV) |
|---|--------------------------|-----------------------|
| <p>NO EMISSIONS EXCEED 20dB BELOW THE FCC LIMIT. (See attached example for 40.84MHz reception.)</p> | | |

All emissions not reported were more than 20 dB below the limit.



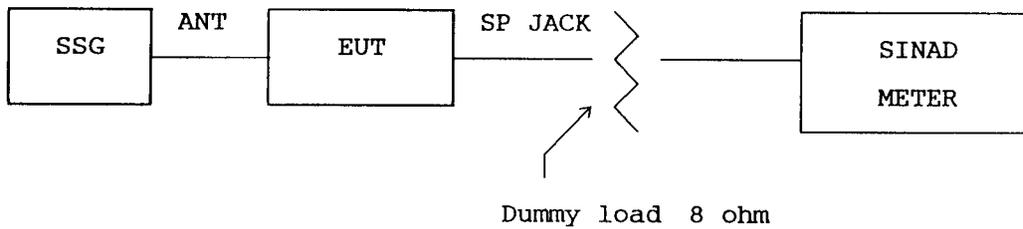
5-3 Test Result: Cellular image rejection

15.121(b)

Rationale:

In order for determine image(spurious) rejection characteristics on scanning receiver, use of one SSG method would be suitable rather than two or three SSG method since cellular image reception would be considered as unwanted reception solely at outside of cellular band.

Test set-up:



Conditions:

AF Signal : 1 kHz
 Deviation : +/- 3kHz (for frequency modulation)
 Modulation : 60 % (for amplitude modulation)
 Test frequencies: 824.01MHz, 849.00MHz, 869.01MHz and 894.00MHz

A) Preliminary check against image reception

A-1) Disable the output signal of SSG. Disconnect dummy load and set the EUT with "unsquelched" to confirm noise signal on speaker.

A-2) Set the EUT with "squelched fully" to prevent audio signal. This is in tight squelch position.

A-3) Set the frequency of SSG to cellular band, and apply 50dBuV of RF output to EUT. Note that 50dBuV signal level corresponds approx. 50dB above the tight squelch sensitivity of 0dBuV (not, receiving sensitivity). This is approx. 12dB (= 50 - 38) above the FCC limitation.

A-4) Enable EUT and search the cellular frequencies on the all of receiving range. If no detection is found, EUT will surely be complied as much as 50dB of image rejection, therefore, further investigation will not be needed.

A-5) List the all of detected frequencies if EUT detects them, and the following steps shall be taken to determine the actual image rejection characteristics individually.

REJECTION

B) Determination of actual image rejection characteristics

B-1) Based on preliminary investigation, both of EUT and SSG shall be set to the frequency at which obtained in A-5) in the above.

Connect the dummy load and set the squelch volume of EUT to unsquelched for obtaining the audio signal.

B-2) Adjust and record the RF output of SSG to obtain 12dB SINAD on EUT. SSG level at which obtaining the 12dB SINAD is receiving sensitivity of EUT (not, tight squelch sensitivity).

B-3) Adjust the frequency of SSG to the corresponded cellular frequency associated with A-5. Adjust and record the RF output of SSG to obtain 12dB SINAD on EUT.

B-4) Image rejection ratio is obtained as differences between B-2) and B-3).

C) TEST DATA

Spec. : At least 38dB

| Image/sprious (Frequency stopped on EUT) (MHz) | Cellular Frequency (MHz) | Ratio (dB) |
|--|-----------------------------|---------------|
| | | |
| | | |
| Note: As EUT detected no frequency over the receiving ranges, EUT will surely be complied as much as 50dB of image rejection, therefore, further investigation will not be needed. | | |
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Note: All data not reported were more than 50 dB above the FCC limit.