

# Test Report

## TEST PROCEDURES AND TEST SITE DESCRIPTION

FCC ID: AMWUB331

MODEL: 20-426

DATE: 10-1-04

### MEASUREMENT ITEMS

5-1 Field Strength of Spurious Radiated Emission

5-2 Power Line Conducted Emissions

5-3 Cellular image rejection

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

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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 the 10th harmonic in accordance with the section 15.33(a) of the FCC Rules. The frequency below 1 GHz, the measurement was carried out by using CISPR quasi-peak detector, AGILENT E7400A the Spectrum Analyzer in accordance with the sections 15.33(a) and 15.35(a). The frequency above 1 GHz, using the AGILENT E7400A Spectrum Analyzer in accordance with the section 15.35(b) carried out the measurement.

A bilog antenna CBL6112A was used to cover the range from 30 MHz to 1000 MHz. Narrowband tuned dipole antennas were used over the entire 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna EMCO 3115 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.

For testing small and/or handheld product, the measurement was performed in 3 orthogonal planes (X, Y, Z). This procedure was repeated with the antenna vertically polarized. The equipment under test was connected with all of placed in its normal operating position on a turntable approximately 0.8 meter in height.

During the measurement, full-featured accessory cables were connected with the equipment under test.

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.  $E_f$  [dBuV/m] =  $E_m$  [dBuV/m] + ACF [dB]

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

### 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 150kHz to 30MHz shall not exceed the following limitation.

#### REQUIREMENTS:

FREQUENCY(MHz)	LEVEL (dBuV)	
0.150-0.50	66 to 56 QP	56 to 46 Ave
0.50-5.0	56 QP	46 Ave
5.0-30.0	60 QP	50 Ave

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

### 5-3 Cellular image rejection

See test result.

## 5-1 Test Result: Field Strength of Radiated Emissions

Tuned Frequency (MHz)	Emission Frequency (MHz)	FSM Reading (dBuV)	Amplifier Gain (dB)	Measured Level (dBuV)	Pol.	ACF (dB)	Field Strength (dBuV/m)	FCC Limit (dBuV/m)	MARGIN (dB)
(1) Test Results (25.000 - 54.000 MHz Band)									
25.005	811.4000	46.0	29.1	16.9	V	19.3	36.2	46.0	9.8
40.840	843.0000	44.5	29.1	15.4	H	19.3	34.7	46.0	11.3
49.900	861.2000	44.5	29.1	15.4	H	19.3	34.7	46.0	11.3
	861.2000	45.7	29.1	16.6	V	19.3	35.9	46.0	10.1
	1291.8000	41.1	29.0	12.1	V	24.4	36.5	54.0	17.5
(2) Test Results (108.000 - 137.000 MHz Band)									
108.500	739.7000	43.3	29.1	14.2	V	18.8	33.0	46.0	13.0
127.175	---	'---	'---	'---	'---	'---	'---	'---	'---
135.500	739.7000	43.7	29.1	14.6	V	18.8	33.4	46.0	12.6
	1032.4000	41.7	29.1	12.6	V	23.9	36.5	54.0	17.5
(3) Test Results (137.000 - 174.000 MHz Band)									
138.150	'---	'---	'---	'---	'---	'---	'---	'---	'---
162.400	543.1000	42.7	29.2	13.5	V	18.3	31.8	46.0	14.2
	1086.2000	44.8	29.1	15.7	V	23.9	39.6	54.0	14.4
173.225	553.9000	43.1	29.2	13.9	V	18.3	32.2	46.0	13.8
(4) Test Results (400.000 - 512.000 MHz Band)									
406.8750	787.6000	45.5	29.1	16.4	H	18.8	35.2	46.0	10.8
	787.6000	49.1	29.2	19.9	V	18.8	38.7	46.0	7.3
	1109.6250	44.7	29.1	15.6	H	23.9	39.5	54.0	14.5
	1109.6250	44.9	29.1	15.8	V	23.9	39.7	54.0	14.3
453.2500	834.0000	50.7	29.1	21.6	H	19.3	40.9	46.0	5.1
	834.0000	52.5	29.1	23.4	V	19.3	42.7	46.0	3.3
511.9125	892.7000	46.9	29.0	17.9	H	19.3	37.2	46.0	8.8
	892.7000	48.2	29.0	19.2	V	19.3	38.5	46.0	7.5
(5) Test Results (806.000 - 1300.000 MHz Band)									
806.0000	850.6000	46.4	29.1	17.3	V	19.3	36.6	46.0	9.4
	1479.4000	42.9	29.0	13.9	H	24.8	38.7	54.0	15.3
857.2000	739.7000	44.1	29.2	14.9	H	18.8	33.7	46.0	12.3
	1109.5500	41.7	29.1	12.6	V	23.9	36.5	54.0	17.5
954.9125	574.2000	46.6	29.2	17.4	V	18.3	35.7	46.0	10.3
	1148.4000	44.9	29.1	15.8	V	23.9	39.7	54.0	14.3
1299.9125	919.2000	45.3	29.0	16.3	H	19.9	36.2	46.0	9.8
	919.2000	46.0	29.0	17.0	V	19.9	36.9	46.0	9.1

## Note:

- 1) Other emissions not reported were more than 20dB below the FCC limits.
- 2) During the measurement, full-featured accessory cables (RS232C connector, EXT speaker and AC adopter) were connected with the equipment under test.

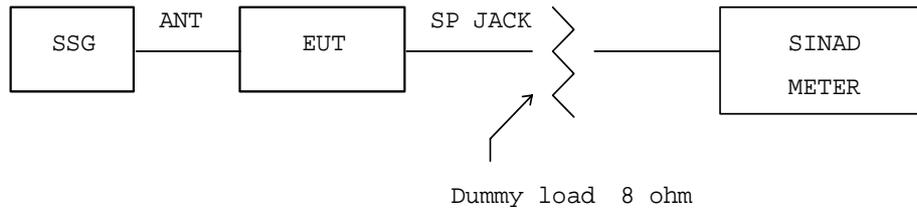
5-3 Test Result: Cellular image rejection

15.121(b)

## Rationale:

In order for measuring image(spurious) rejection ratio 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, 836.52MHz, 849.00MHz  
 869.01MHz, 881.52MHz, 894.00MHz

## A) Initial screening

- A-1) Disable the output signal of SSG. Disconnect dummy load and enable the EUT to confirm the presence of audio noise on speaker.
- A-2) Set the EUT with "Squelched Threshold" to prevent audio signal.
- A-3) Set the frequency of SSG to cellular band, and apply 60dBuV of RF output to EUT. Note that 60dBuV signal level corresponds approx. 66dB above the "Squelched Threshold" sensitivity of -6dBuV (not, receiving sensitivity). This is approx. 28dB (= 66 - 38) above the FCC limit.
- A-4) Enable EUT and search the cellular frequencies on the all of receiving range.
- 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 ratio individually.
- A-6) Repeat the above procedure for remaining frequencies.
- A-7) Go to Part B of the test.

B) Measuring the image rejection ratio

- B-1) Based on Initial screening, 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).

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C) Test Data

Spec. : At least 38dB

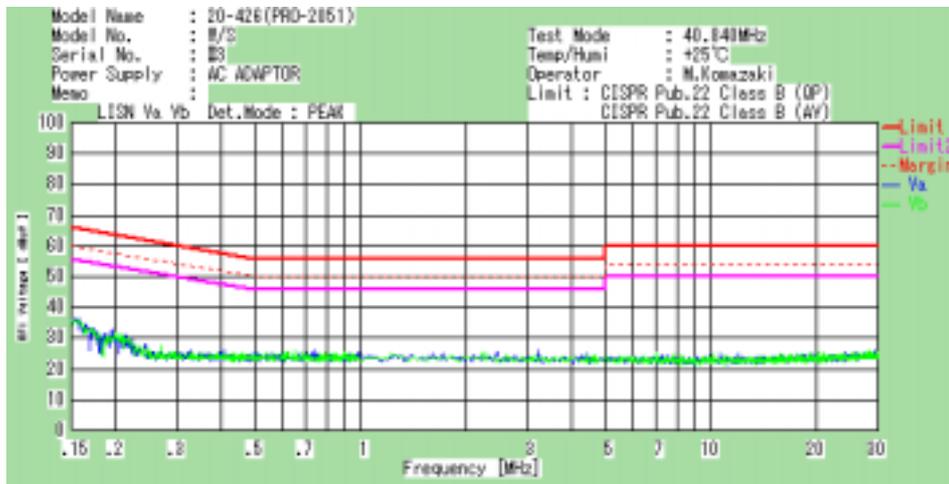
UB331Z (20-426:PRO-2051)

Cellular Frequency (MHz)	Image/spurious (Frequency stopped on EUT) (MHz)	Image Rjection Ratio (dB)
824.01	1268.9875	54.9
	1299.9750	66.0
836.52	858.2125	60.3
	858.2250	58.7
	912.9625	68.2
	1262.6750	56.4
849.00	29.2000	55.7
	819.8000	56.5
	849.9000	55.6
	854.4250	54.0
	1242.9000	58.9
	1256.1000	55.5
	1276.5000	63.6
	1282.5000	67.9
869.01	910.4875	60.4
	1246.4875	55.9
881.52	120.2750	59.8
	120.2875	64.7
	903.2125	59.2
	903.2250	57.4
	1240.1750	58.2
894.00	44.2000	52.9
	849.8000	56.5
	852.9000	69.7
	894.9000	57.3
	899.4250	55.5
	915.7000	56.4
	1291.5000	64.3

5-2 Test Result: Power Line Conducted Emissions

Tuned Frequency (MHz)	Emission Frequency (MHz)	Measured Level (dBuV)
40.8400	NO EMISSIONS EXCEED 20dB BELOW THE FCC LIMIT.	
127.1750	NO EMISSIONS EXCEED 20dB BELOW THE FCC LIMIT.	
162.4000	NO EMISSIONS EXCEED 20dB BELOW THE FCC LIMIT.	
453.2500	NO EMISSIONS EXCEED 20dB BELOW THE FCC LIMIT.	
857.2000	NO EMISSIONS EXCEED 20dB BELOW THE FCC LIMIT.	
1299.9125	NO EMISSIONS EXCEED 20dB BELOW THE FCC LIMIT.	

All emissions not reported were more than 20 dB below the limit.  
 (See attached example for 40.8400MHz reception.)



LIST OF MEASUREMENT EQUIPMENTS

ENG-NO	TEST EQUIPMENT	TYPE	MFR	SERIAL NO.	Last Calibratation
1287	AMPLIFIER	AFS30010040020	MITEQ	138315	N/A
2022	MICROWAVE PREAMPLIFIER	8349B	ADVANTEST	3205A04450	N/A
1294	ANTENNA(BILOG)	CBL6112A	CHASE	2350	N/A
1602	ANTENNA(DI POLE)	3120-B1	EMCO	0075	11-Jul-03
1603	ANTENNA(DI POLE)	3120-B2	EMCO	0076	11-Jul-03
1604	ANTENNA(DI POLE)	3120-B3	EMCO	0076	11-Jul-03
1560	ANTENNA(HORN) (18GHz)	3115	EMCO	2167	N/A
N/A	ANTENNA(HORN) (24GHz)	94287.24	NIPPON KOSYUHA	60.1	N/A
1388	LISN	KNW407	KYOURITSU	8-833-21	N/A
0682	POWER SUPPLY	AA300	TAKASAGO	31783013	N/A
0857	SPECTRUM ANALYZER (13GHz)	E7400A	AGILENT	US40240145	27-May-04
0205	SPECTRUM ANALYZER (8.4GHz)	R3265	ADVANTEST	25060158	N/A
1008	SPECTRUM ANALYZER (40GHz)	8564E	ADVANTEST	3425A00182	02-May-04