

Test Report

TEST PROCEDURES AND TEST SITE DESCRIPTION

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

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 4 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, Hewlett Packard E7400A the Spectrum Analyzer in accordance with the sections 15.33(a) and 15.35(a). The frequency above 1 GHz, using the Hewlett Packard 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 ranges 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 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

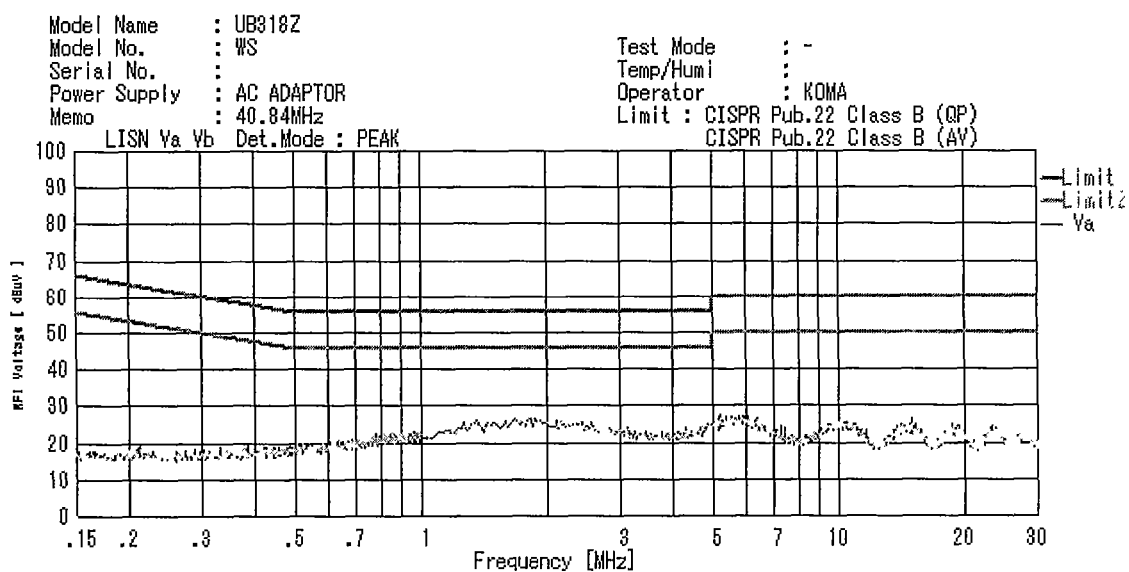
Tuned Frequency (MHz)	Emission Frequency (MHz)	FSM Reading (dBuV)	Amplifier Gain (dB)	Measured Level (dBuV)	Pol.	ACF (dB)	Field Strength (dBuV/m)	FCC Limit (dBuV/m)	MARGIN (dB)
(1) Test Results (25.000 - 54.000 MHz Band)									
30.050	821.4000	48.4	35.1	13.3	H	27.1	40.4	46.0	5.6
	821.4000	48.7	35.1	13.6	V	27.1	40.7	46.0	5.3
40.840	843.0000	47.8	35.1	12.7	H	27.2	39.9	46.0	6.1
	843.0000	48.6	35.1	13.5	V	27.2	40.7	46.0	5.3
49.900	861.2000	44.4	35.1	9.3	H	27.4	36.7	46.0	9.3
(2) Test Results (108.000 - 137.000 MHz Band)									
118.800									
127.175	1015.6000	36.2	35.1	1.1	H	31.3	32.4	54.0	13.3
135.500	516.2000	44.0	35.1	8.9	V	23.8	32.7	46.0	13.3
	1032.4000	44.6	35.1	9.5	H	31.2	40.7	54.0	13.3
(3) Test Results (137.000 - 174.000 MHz Band)									
138.150									
162.400	543.1000	44.1	35.1	9.0	V	24.7	33.7	46.0	12.3
	1086.2000	44.4	35.1	9.3	V	31.9	41.2	54.0	12.8
173.225	553.9000	44.4	35.1	9.3	H	24.9	34.2	46.0	11.8
	1107.8000	45.1	35.1	10.0	V	32.1	42.1	54.0	11.9
(4) Test Results (400.000 - 512.000 MHz Band)									
406.8750	786.7000	46.1	35.1	11.0	H	26.5	37.5	46.0	8.5
	786.7000	51.2	35.1	16.1	V	26.5	42.6	46.0	3.4
453.2500	834.0000	45.4	35.1	10.3	H	27.1	37.4	46.0	8.6
	834.0000	48.2	35.1	13.1	V	27.1	40.2	46.0	5.8
	1849.5000	56.8	35.1	21.7	H	26.3	48.0	54.0	6.0
	2959.2000	54.9	35.1	19.8	H	29.4	49.2	54.0	4.8
	2959.2000	55.3	35.1	20.2	V	29.4	49.6	54.0	4.4
511.9125	892.7000	49.1	35.1	14.0	H	27.7	41.7	46.0	4.3
	892.7000	48.1	35.1	13.0	V	27.7	40.7	46.0	5.3
	2589.5625	53.3	35.1	18.2	H	28.0	46.2	54.0	7.8
(5) Test Results (806.000 - 956.000 MHz Band)									
806.0000	850.6000	46.2	35.1	11.1	H	27.3	38.4	46.0	7.6
	850.6000	48.3	35.1	13.2	V	27.3	40.5	46.0	5.5
	2958.8000	54.9	35.1	19.8	H	29.4	49.2	54.0	4.8
857.2000	1479.4000	52.0	35.1	16.9	H	24.8	41.7	54.0	12.3
	1479.4000	54.9	35.1	19.8	V	24.8	44.6	54.0	9.4
954.9125	574.2000	44.2	35.1	9.1	V	25.5	34.6	46.0	11.4

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)
48.4000	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.	
406.8750	NO EMISSIONS EXCEED 20dB BELOW THE FCC LIMIT.	
857.2000	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.)



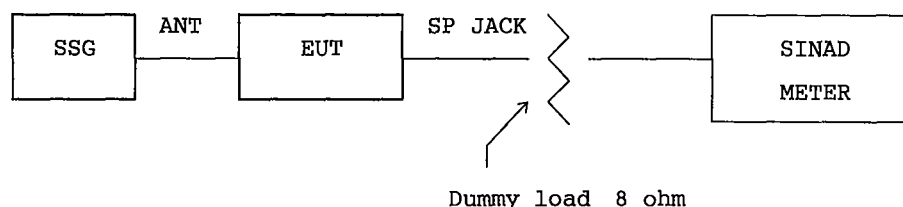
5-3 Test Result: Cellular image rejection

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.

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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).

C) Test Data

Spec. : At least 38dB

UB318Z (BCT8)

Cellular Frequency (MHz)	Image/spurious (Frequency stopped on EUT) (MHz)	Image Rjection Ratio (dB)
824.01	898.4750	69.6
	951.3000	68.4
836.52	858.2125	60.8
849.00	29.2000	51.2
	819.8000	62.0
	849.9000	58.4
	854.4250	53.2
	906.7750	69.6
869.01	910.4750	62.0
	910.4875	64.8
881.52	903.2125	60.4
894.00	44.2000	51.2
	849.8000	60.8
	849.9000	57.6
	899.4250	53.2
	915.7000	53.6

LIST OF MEASUREMENT EQUIPMENTS

ENG-NO	TEST EQUIPMENT	TYPE	MFR	SERIAL NO.	Last Calibration
1287	AMPLIFIER	AFS30010040020	MITEQ	138315	N/A
1294	ANTENNA (B I LOG)	CBL6112A	CHASE	2350	N/A
1602	ANTENNA (DIPOLE)	3120-B1	EMCO	0075	16-Jul-00
1603	ANTENNA (DIPOLE)	3120-B2	EMCO	0076	16-Jul-00
1604	ANTENNA (DIPOLE)	3120-B3	EMCO	0076	16-Jul-00
1560	ANTENNA (HORN)	3115	EMCO	2167	N/A
1388	L I S N	KNW407	KYOURITSU	8-833-21	N/A
0682	POWER SUPPLY	AA300	TAKASAGO	31783013	N/A
0857	SPECTRUM ANALYZER	E7400A	AGILENT	US40240145	18-Apr-03
0205	SPECTRUM ANALYZER	R3265	ADVANTEST	25060158	N/A