TEST REPORT

1. Applicant
   Name : UBIMATE
   Address : 3F, 363-7, Songnae-dong, Sosa-gu, Bucheon-city, Gyeonggi-do, Korea
   FCC ID : ZDWC4I

2. Products
   Name : FM Transmitter
   Model/Type : C4i / Low Power Communication Device Transmitter
   Manufacturer : UBIMATE
3. Test Standard : 47 CFR FCC Part 15 Subpart C

4. Test Method : ANSI C63.4-2003
5. Test Result : Positive
6. Dates of Test : March 23, 2011 to March 25, 2011
7. Date of Issue : March 28, 2011
8. Test Laboratory : Korea Standard Quality Laboratories
   FCC Designation Number : KR0024

Tested by

YoungRyul, Jo
Test Engineer:

Approved by

SungBum, Hong
Compliance Engineer:

Korea Standard Quality Laboratories
Testing Laboratories for EMC and Safety Compliance
www.ksqlab.com #102, Jangduk-Dong, Hwasung-City, Kyunggi-Do, KOREA

TABLE OF CONTENTS

1. GENERAL

These tests were performed using the test procedure outlined in ANSI C63.4, 2003 for intentional radiators, and in accordance with the limits set forth in FCC Part 15.247 and RSS-210 Issue 7 – Category I Equipment, Annex 8. The EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards.

We attest to the accuracy of data. All measurements reported herein were performed by Korea Standard Quality Laboratories and were made under Chief Engineer''s supervision.
We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

2. TEST SITE

Korea Standard Quality Laboratories

2.1 Location

#102, Jangduk Dong, Hwasung City, Kyunggi Do, South Korea
(FCC Designation Number : KR0024)

This test site is in compliance with ISO/IEC 17025 for general requirements for the competence of testing and calibration laboratories.

2.2 Test Date

Date of Test: March 23, 2011 to March 25, 2011

2.3 Test Environment

See each test item''s description.

3. DESCRIPTION OF THE EQUIPMENT UNDER TEST

The product specification described herein was obtained from the product data sheet or user''s manual.

3.1 Rating and Physical Characteristics

Model	C4i
Power source	DC 5.0 V
Transmit Frequency	88.1 ~ 107.9 MHz
Antenna Type	Pattern Antenna
Type of Modulation	FM Stereo
Size	115(L) x 65(W) x 79(H)mm
Weight	50g without accessories

3.2 Equipment Modifications

None.

3.3 Submitted Documents

Block diagram
Schematic diagram
External photos
Test setup photos
Part List
Tune up Procedure
Label Location
User manual

4. MEASUREMENT CONDITIONS

4.1 Description of test configuration

The measurement test for radiated and conducted emission test was conducted at the Korea Standard Quality Laboratories. The site is constructed in conformance with the requirements of the ANSI C63.4-2003 and CISPR Publication 16. The Korea Standard Quality Laboratories has site descriptions on file with the FCC for 3 m and 10 m site configurations. Detailed description of test facility was found to be in compliance with FCC Rules according to the ANSI C63.4-2003 and registered to the Federal Communications Commission (FCC Registration Number : KR0024). The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2003) was used in determining radiated and conducted emissions from the CNAPS Model: C4i

4.2 Channel list

Unit(MHz)							
88.1	90.6	93.1	95.6	98.1	100.6	103.1	105.6
88.2	90.7	93.2	95.7	98.2	100.7	103.2	105.7
88.3	90.8	93.3	95.8	98.3	100.8	103.3	105.8
88.4	90.9	93.4	95.9	98.4	100.9	103.4	105.9
88.5	91.0	93.5	96.0	98.5	101.0	103.5	106.0
88.6	91.1	93.6	96.1	98.6	101.1	103.6	106.1
88.7	91.2	93.7	96.2	98.7	101.2	103.7	106.2
88.8	91.3	93.8	96.3	98.8	101.3	103.8	106.3
88.9	91.4	93.9	96.4	98.9	101.4	103.9	106.4
89.0	91.5	94.0	96.5	99.0	101.5	104.0	106.5
89.1	91.6	94.1	96.6	99.1	101.6	104.1	106.6
89.2	91.7	94.2	96.7	99.2	101.7	104.2	106.7
89.3	91.8	94.3	96.8	99.3	101.8	104.3	106.8
89.4	91.9	94.4	96.9	99.4	101.9	104.4	106.9
89.5	92.0	94.5	97.0	99.5	102.0	104.5	107.0
89.6	92.1	94.6	97.1	99.6	102.1	104.6	107.1
89.7	92.2	94.7	97.2	99.7	102.2	104.7	107.2
89.8	92.3	94.8	97.3	99.8	102.3	104.8	107.3
89.9	92.4	94.9	97.4	99.9	102.4	104.9	107.4
90.0	92.5	95.0	97.5	100.0	102.5	105.0	107.5
90.1	92.6	95.1	97.6	100.1	102.6	105.1	107.6
90.2	92.7	95.2	97.7	100.2	102.7	105.2	107.7
90.3	92.8	95.3	97.8	100.3	102.8	105.3	107.8
90.4	92.9	95.4	97.9	100.4	102.9	105.4	107.9
90.5	93.0	95.5	98.0	100.5	103.0	105.5	

5. TEST AND MEASUREMENT

5.1 Summary of Test Reaults

Requirement	CFR 47 Section	Report Section	Test Result
Conducted Emission	15.207	5.1	PASS
Spurious Emissions	15.209(a)	5.2	PASS
Radiated Emissions of Field Strength	15.239(b)	5.3	PASS
Out-of-band Radiated Emissions	15.239(c), 15.209(a)	5.4	PASS
Occupied Bandwidth Measurement	15.239(a)	5.5	PASS

The data collected shows that the CNAPS / FM Transmitter / F4me complied with technical requirements of the Part 15.239 of the FCC Rules.

The equipment is not modified anything, mechanical or circuits to improve EMI status during a measurement. No EMI suppression device(s) was added and/or modified during testing.

5.2. RADIATED EMISSIONS OF FIELD STRENGTH

5.2.1 Regulation

According to §15.239(b), The field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microvolts/ meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

5.2.2 Radiated emissions of field strength limits

Frequencies [MHz]	15.239 Field Strength of Fundamental Limits [dB(uV/m)]@3 m
88.0 - 108.0	48 (Average)
	68 (Peak)

5.2.3 Test result : PASS

Table 2 : Measured values of the Radiated emissions of field strength

Frequency [MHz]	Reading [dB(㎶)]	Polarization (*H/**V)	Ant. Factor [dB]	Cable Loss [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak mode							
88.1	30.78	H	7.69	1.69	40.16	68	27.84
98.0	28.85	H	7.06	1.81	37.72	68	30.28
107.9	32.76	H	7.2	1.94	41.90	68	26.10
Average mode							
88.1	29.97	H	7.69	1.69	39.35	48	8.65
98.0	27.85	H	7.06	1.81	36.72	48	11.28
107.9	32.12	H	7.2	1.94	41.26	48	6.74

NOTES: 1. * H : Horizontal polarization, ** V : Vertical polarization
2. Result = Reading + Antenna factor + Cable loss
3. Margin value = Limit - Result
4. Measurement was performed at three frequencies as bottom, middle and top of the operating frequency range.
5. The EUT was tested in all the three orthogonal planes and the worst-case emission was vertical axes.

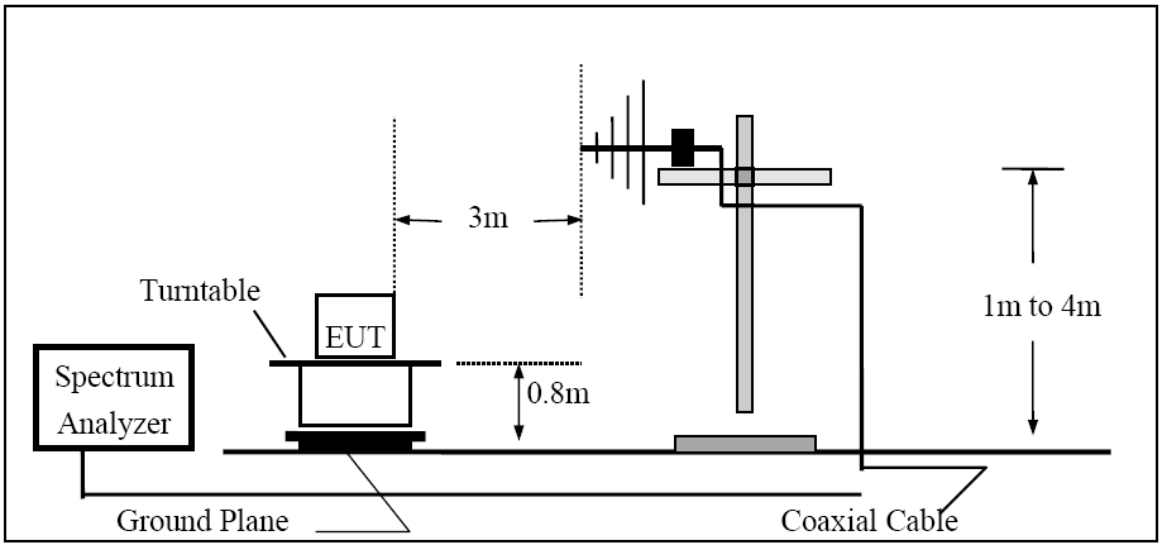
5.3. OUT-OF-BAND RADIATED EMISSIONS

5.3.1 Regulation

According to §15.239(c), The field strength of any emissions radiated on any frequency out-side of the specified 200 kHz band shall not exceed the general radiated emission limits in §15.209.

According to §15.209(a),Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

5.3.2 Test Setup Layout



5.3.3 Out-of-band radiated emissions limits

Frequencies [MHz]	Field Strength [μV/m]	Measurement Distance [m]
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emis-sions 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 sec-tions of this part, e.g., §§15.231 and 15.241.

5.3.4 Test Procedure

1. The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions in an anechoic chamber at a distance of 3 meters for above 30 MHz, and at 1 meter distance for below 30 MHz.
2. The EUT was placed on the top of the 0.8-meter height, 1 × 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360°.
3. The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 kHz to 30 MHz using the loop antenna, from 30 to 1000 MHz using the Trilog broadband antenna, and from 1 GHz to tenth harmonic of the highest fundamental frequency using the horn antenna.
4. To obtain the final measurement data, the EUT was arranged on a turntable situated on a 4 × 4 meter at the Open Area Test Site. The EUT was tested at a distance 3 meters.
5. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.
6. The EUT is situated in three orthogonal planes (if appropriate)
7. The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT.
8. If the emission on which a radiated measurement must be made is located at the edge of the authorized band of operation, then the alternative “marker-delta” method may be employed.

5.3.5 Test result : **PASS**

Table 2 : Measured values of the Out-of-band radiated emissions

Frequency (MHz)	Amplitude (dBuV/m)	Polar. (H/V)	Ant.Factor (dB)	Cable Loss (dB)	Emission Level		Applicable Limit		Margin (dB)
					(dBμV/m)	(uV/m)	(dBμV/m)	(uV/m)	
68.46	17.55	V	9.07	1.47	28.09	25.38	40	100.0	11.91
99.56	19.15	H	7.06	1.81	28.02	25.18	40	100.0	11.98
120.00	18.06	H	6.14	2.11	26.31	20.68	43.5	150.0	17.19
168.00	17.33	V	9.90	2.41	29.64	30.34	43.5	150.0	13.86
192.00	19.25	H	8.62	2.71	30.58	33.81	43.5	150.0	12.92
216.00	16.62	V	9.90	2.95	29.47	29.75	46	200.0	16.53
299.82	19.45	H	13.02	3.74	36.21	64.64	46	200.0	9.79
336.00	16.87	H	14.08	4.11	35.06	56.62	46	200.0	10.94
374.70	16.29	V	15.42	4.52	36.23	64.79	46	200.0	9.77
428.04	8.91	V	16.84	4.89	30.64	34.04	46	200.0	15.36
527.46	9.65	H	18.70	5.07	33.42	46.88	46	200.0	12.58
612.48	9.23	V	19.81	5.38	34.42	52.60	46	200.0	11.58

1. Margin (dB) = Limit − Emission Level
2. H = Horizontal, V = Vertical Polarization

5.4 OCCUPIED BANDWIDTH MEASUREMENT

5.4.1 Regulation

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

5.4.2 Test Condition

- The occupied bandwidth shall be no wider than 200 kHz of the center frequency of the equipment operating within 107.30 MHz to 107.90 MHz. The bandwidth is determined at the points 20 dB down from the modulated carrier.
- Spectrum analyzer settings

Resolution bandwidth: 10 kHz, Video bandwidth: 30 kHz, Frequency span: 200 kHz

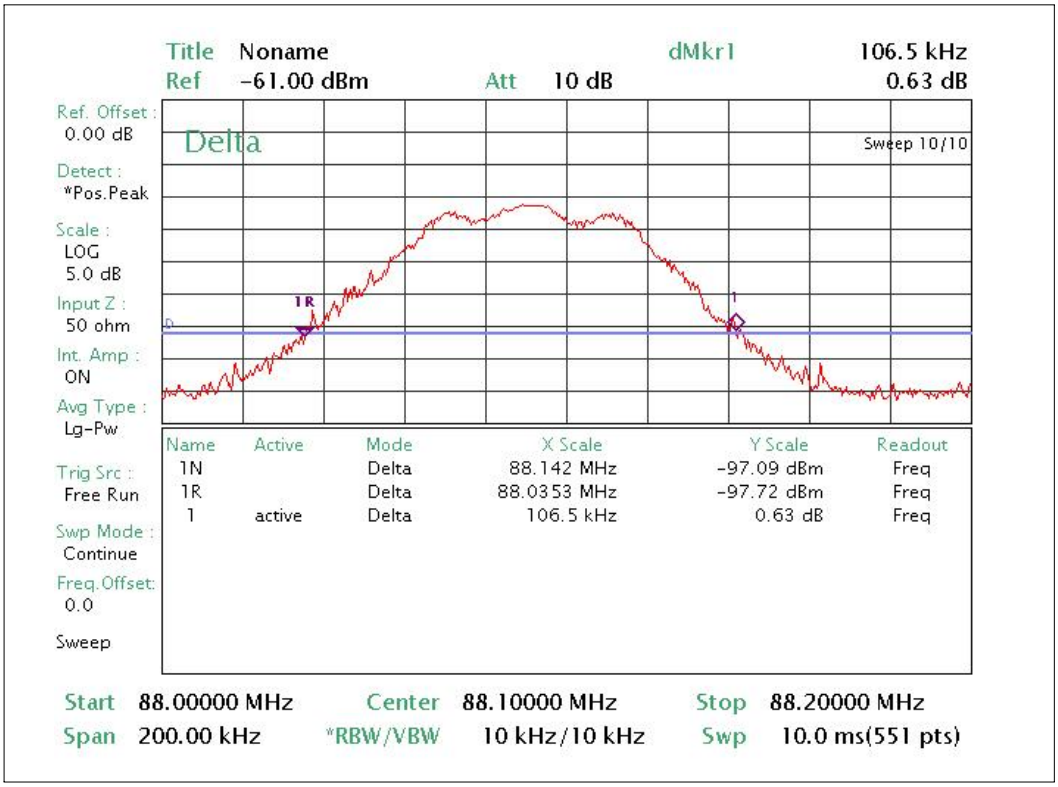
5.4.3 Test result : PASS

Table 3 : Measured values of the occupied bandwidth

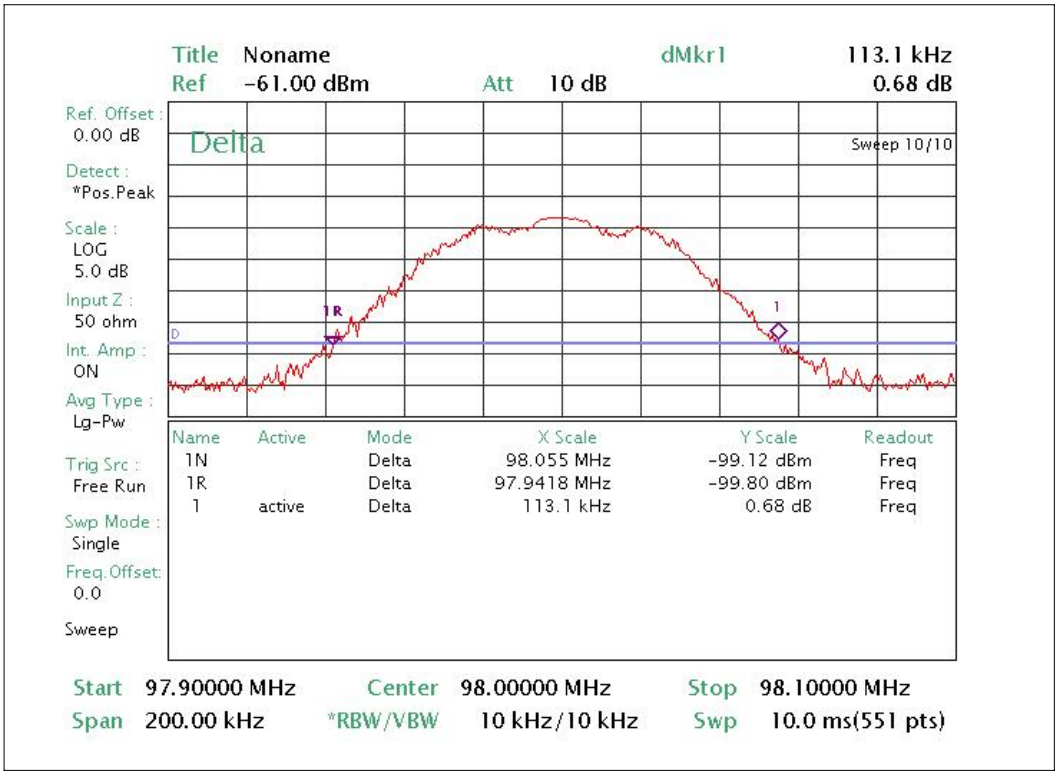
Center Frequency [MHz]	Measured occupied bandwidth [kHz]	Limit [kHz]	Result
88.1	106.5	200	Pass
98.0	113.1	200	Pass
107.9	106.2	200	Pass

Figure 1. Plot of the Carrier occupied bandwidth

88.1MHz



98.0 MHz



107.9 MHz

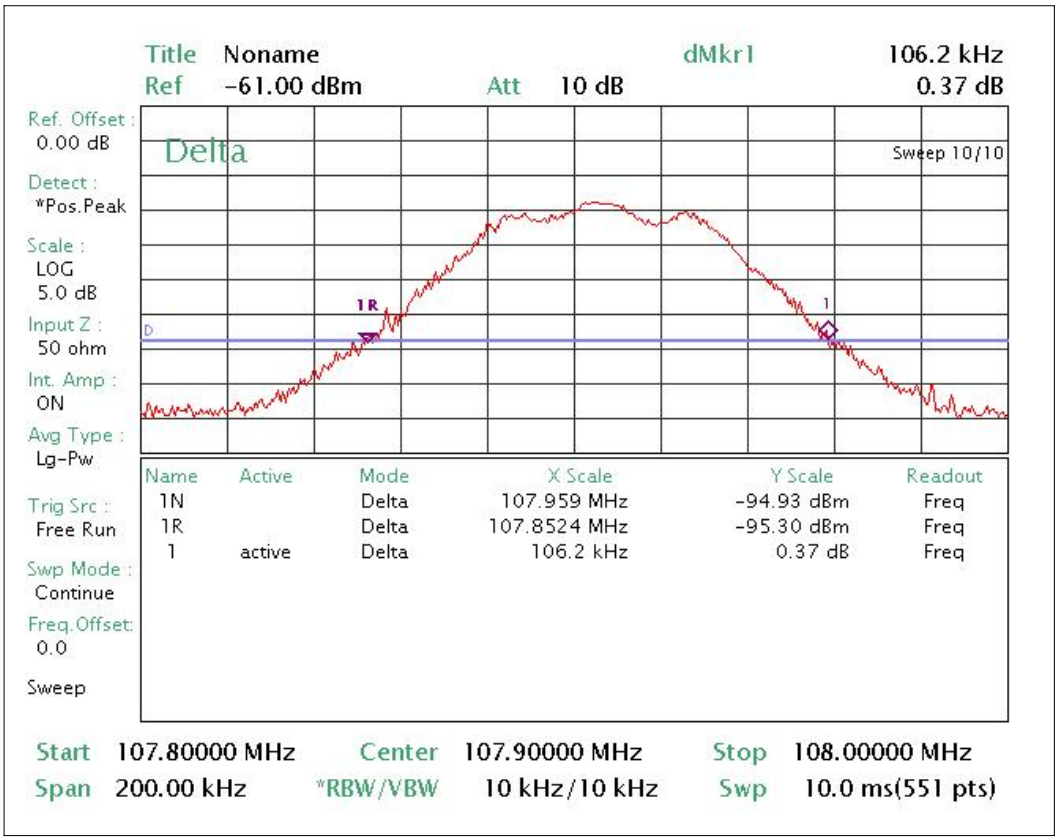
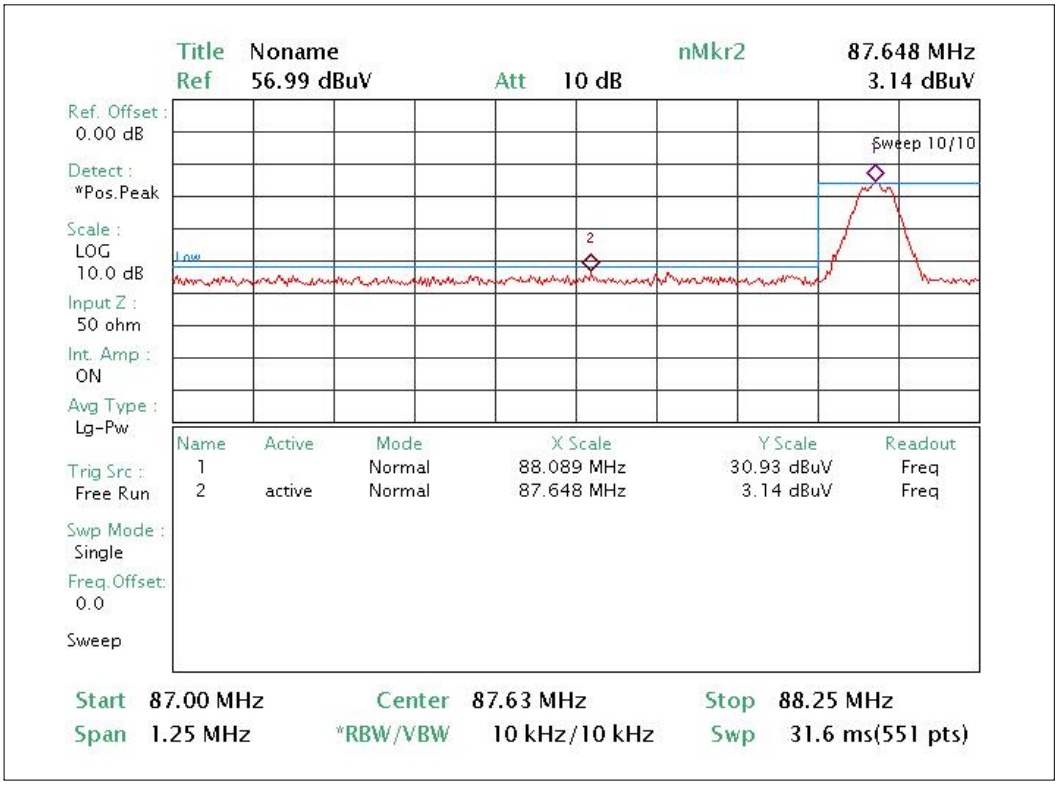
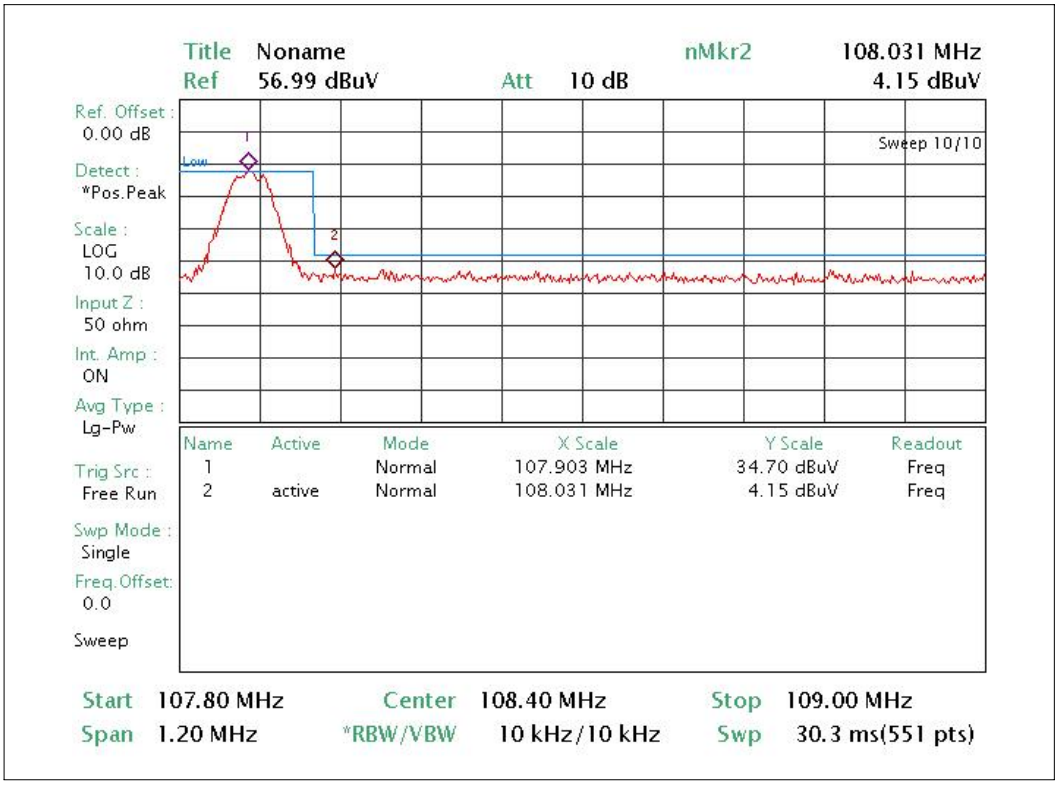

Title Noname
dMkr1 106.2 kHz
Ref -61.00 dBm
Att 10 dB
0.37 dB
Ref. Offset : 0.00 dB
Delta
Sweep 10/10
Detect : *Pos.Peak
Scale : LOG 5.0 dB
Input Z : 50 ohm
Int. Amp : ON
Avg Type : Lg-Pw
Trig Src : Free Run
Swp Mode : Continue
Freq.Offset: 0.0
Sweep
1R
1
D
Name Active Mode X Scale Y Scale Readout
1N Delta 107.959 MHz -94.93 dBm Freq
1R Delta 107.8524 MHz -95.30 dBm Freq
1 active Delta 106.2 kHz 0.37 dB Freq
Start 107.80000 MHz
Center 107.90000 MHz
Stop 108.00000 MHz
Span 200.00 kHz
*RBW/VBW 10 kHz/10 kHz
Swp 10.0 ms(551 pts)

Figure 2. Plot of the radiated band edge emissions.

88.1MHz Below



107.9 MHz above



5.5. CONDUCTED EMISSIONS

5.5.1 Regulation

According to §15.207(a), Except as shown in paragraphs (b) and (c) of this section, for an inten-tional 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 fre-quencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabiliza-tion 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 ter-minal. The lower limit applies at the boundary between the frequency ranges.

5.5.2. Conducted emissions limits

Frequency (MHz)	Quasi Peak [dB(uV)]	Average [dB(uV)]
0.15 - 0.5	66 - 56	56 - 46
0.5 - 5.0	56	46
5.0 - 30.0	60	50

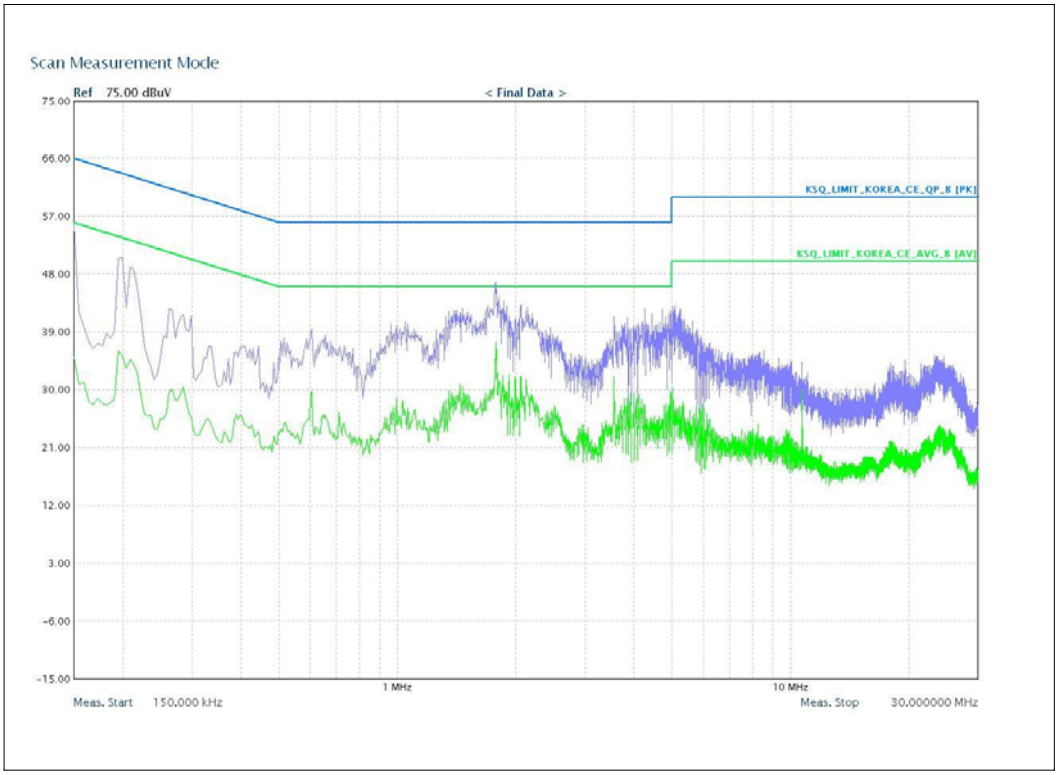
5.5.3. Test result : **PASS**

Table 4 : Measured values of the Conducted Emissions						
Frequency (MHz)	Amplitude (dBuV)	Phase Hot/Neutral	Detector QP/AV/PK	Applicable Limit		Quasi-peak Margin (dB)
				Quasi-peak (dBuV)	Average (dBuV)	
0.19	46.32	N	QP	64.03	54.03	17.72
0.21	43.29	H	QP	63.20	53.20	19.91
0.25	37.50	H	QP	64.75	54.75	27.26
0.26	39.55	N	QP	61.43	51.43	21.88
0.39	32.55	N	QP	58.06	48.06	25.51
0.41	31.94	H	QP	57.64	47.64	25.71
0.60	35.71	H	QP	56.00	46.00	20.29
1.33	36.95	N	QP	56.00	46.00	19.06
1.77	41.74	N	QP	56.00	46.00	14.27
1.78	43.31	H	QP	56.00	46.00	12.69
3.56	38.04	H	QP	56.00	46.00	17.96
4.24	35.97	N	QP	56.00	46.00	20.04
5.08	36.22	H	QP	60.00	50.00	23.79
5.91	36.43	N	QP	60.00	50.00	23.57
10.69	32.86	N	QP	60.00	50.00	27.14
10.70	33.67	H	QP	60.00	50.00	26.33
23.86	31.27	H	QP	60.00	50.00	28.73
24.13	32.77	N	QP	60.00	50.00	27.23

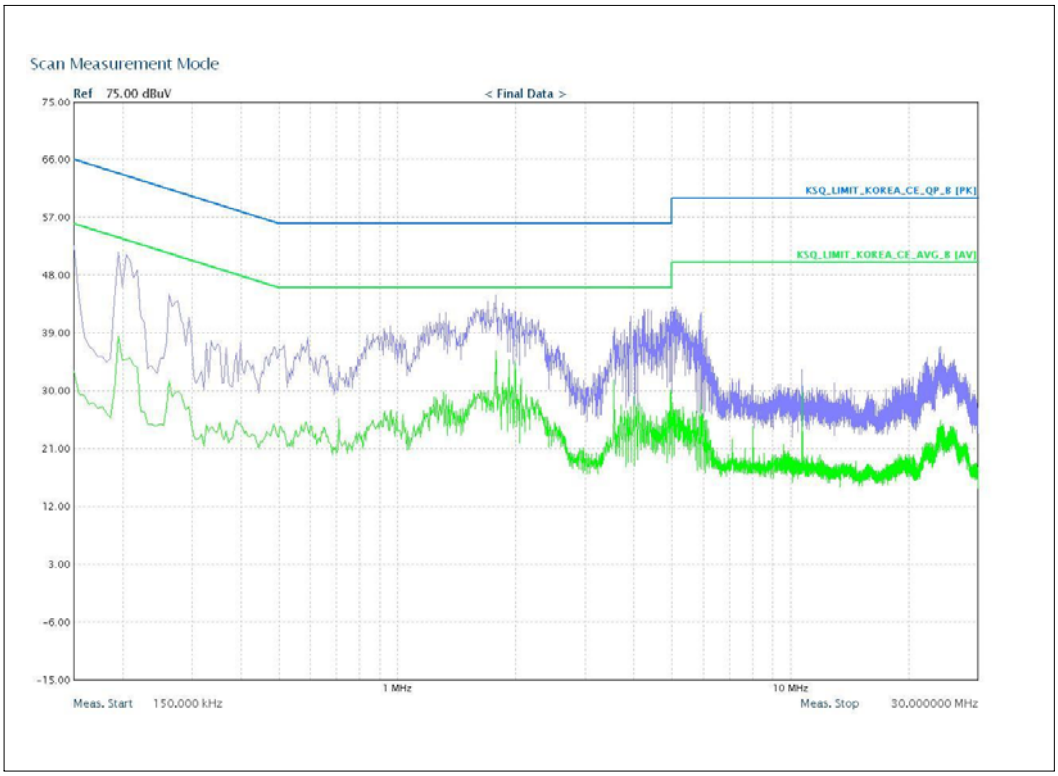
PK = Peak; QP = Quasi-peak; AV = Average

Figure 2. Plot of the Conducted Emissions

Polarization: HOT

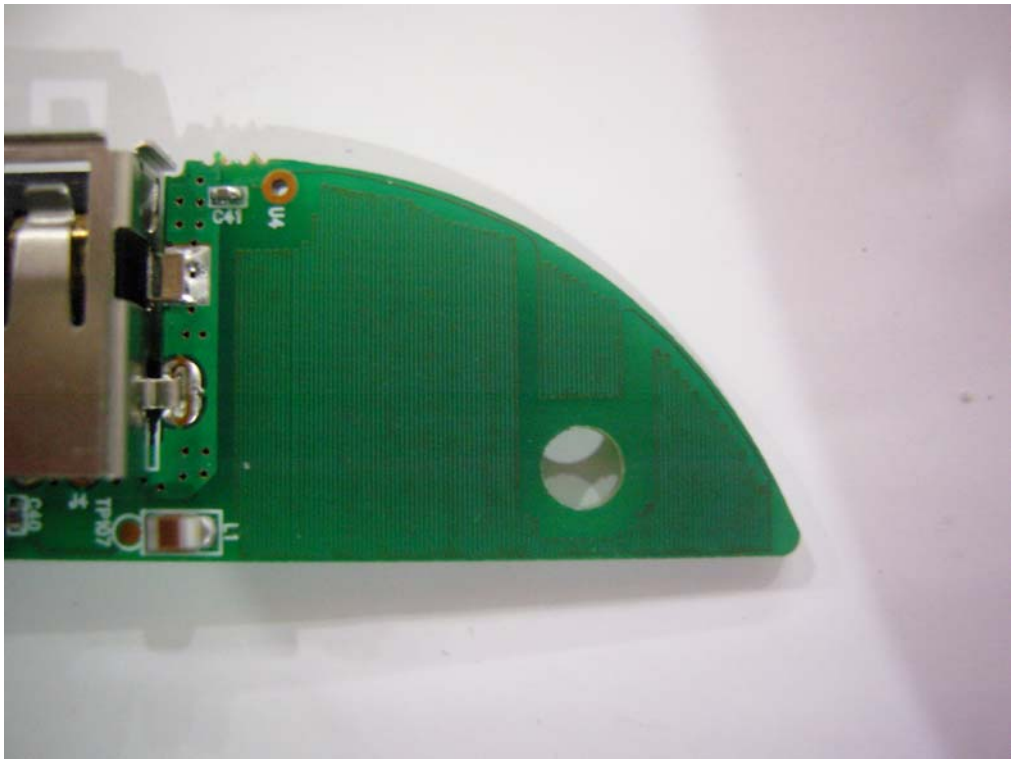


Polarization: NEUTRAL



5.6 ANTENNA REQUIREMENT

According to §15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.



APPENDIX

TEST EQUIPMENT USED FOR TESTS

No.	Description	Manufacturer	Model No.	Specifications	Next Cal. Data	Used equipment
1	EMI Test Receiver	LIG Nex1	LSA-265	3Hz~26.5GHz	11.12.18	■
2	Dipole ANT	ElectroMetrics	TDA-30/1-4	30~1GHz	12.03.23	□
3	Biconical ANT	ElectroMetrics	BIA-30S	30~300MHz	12.03.23	■
4	Log periodic ANT	ElectroMetrics	LPA-30	0.2~1GHz	12.03.23	■
5	Bilog Antenna	Schaffner-Chase EMC Ltd.	CBL6140A	50V, 5A	12.05.07	■
6	Turn Table	KEI	KEI-TURN	1500×1000×800	N/A	□
7	Turn Table	KEI	KEI-TURN	1500×1000×800	N/A	■
8	Loop ANT.	Com-Power	AL-130	9kHz~30MHz	11.03.24	□
9	Spectrum Analyzer	LIG Nex1	ISA-265	1kHz~26.5GHz	11.05.20	■
10	Function Generator	Agilent	33120A	15MHz sine&square	11.06.09	□
11	Frequency Counter	HP	5350B	10Hz~20GHz	11.06.09	□
12	Modulation Analyzer	Agilent	8901B	10MHz~1.3GHz	11.06.09	□
13	Audio Analyaer	Agilent	8903B	20Hz~100kHz	11.06.09	□
14	Attenuator	Agilent	8494B	0~11dB, 18GHz	11.06.09	□
15	Attenuator	Agilent	8496B	0~110dB, 18GHz	11.06.09	□
16	Attenuator	Agilent	8495B	0~70dB, 18GHz	11.06.09	□
17	Attenuator	TAE SUNG	SMA-1	6dB	11.09.02	□
18	Attenuator	TAE SUNG	SMA-2	6dB	11.09.02	□
19	Power Meter	Agilent	E4418B	100kHz~110GHz, 0.0001uW~25100mW	11.06.09	■
20	Power Sensor	HP	8485A	50MHz~26.5GHz	11.06.09	■
21	Vibration Tester	Gana	GNV-400	10~60Hz, 0~4mm	11.09.09	□
22	RF Cable	Gigalane	SMS-LL280-SMS -1.5M	1.5m	N/A	■
23	Temp & Humidity Chamber	Seoksan Tech	SE-CT-02	-40~150℃, 30~98%	11.06.09	■
24	Signal Generator	Leader Electronics	3220	100kHz~1.3GHz	11.06.09	■
25	Oscilloscope	Tektronix	TDS-350	200MHz	11.09.02	□
26	Drop Tester	Self-made	KSQ-01	150cm	N/A	□
27	Pre Amplifier	GTC	GA-1825A	0.1~18GHz	11.06.09	■
28	Continuous operation tester	GTC	CT-100	Local Control	N/A	□
29	CW Generator	HP	83711B	1~20GHz	11.06.09	■
30	POWER DIVIDER	Agilent	11636B	26.5GHz	11.06.09	□
31	Power Sensor	Agilent	8482B	100kHz ~ 4.2GHz	11.06.09	□
32	Attenuator	Winswell	53-30-33	dc-2.5GHz, 500W	11.06.09	□
33	DC Power Supply	Hanil	HPS-505A	50V, 5A	11.09.02	□
34	Slidacs	Hanchang	5KV	5kW, 300V	11.09.02	□
35	Termination	Kwang Yeok	KYTE-NJ-150W	150W	11.09.02	□
36	Band-limited filter	MITECH	KSQ-02	600Ω	11.09.02	□
37	Signal Generator	WILTRON	6759B	10MHz ~ 26.5GHz	11.09.02	□
38	Digital Multimeter	DONG HWA	DM-300A	AC/DC 500V Max,320mA Max	11.09.02	■
39	Horn ANT.	SCHWARZBECK	BBHA 9120D	700MHz ~ 18GHz	11.09.23	■
40	DC Power Supply	ALINCO	DM-340MW	15V, 30A	11.09.02	■

APPENDIX

1. EUT photo