

FCC TEST REPORT

Test report No.: EMC- FCC- R0015
FCC ID: WYJENA-9000
Type of equipment: Bluetooth Hand free Kit
Model Name: ENA-9000
Brand Name: -
Applicant: EZNEX Inc.
FCC Rule Part(s): FCC Part 15 Subpart C 2008
Section 15.239
Frequency Range: 88.1 MHz ~ 107.9 MHz
Test result: Complied

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.

The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of test: August 3, 2009 ~ August 20, 2009

Issued date: August 31, 2009

Tested by:
KIM, CHANG MIN

Approved by:
YOO, SUNG YOUNG

[Contents]

1. Client information	3
2. Laboratory information	4
3. Description of E.U.T.....	5
3.1 Basic description	5
3.2 General description	5
3.3 Test frequency	6
4. Summary of test results	7
4.1 Standards & results	7
4.2 Uncertainty	7
5. Test results	8
5.1 Antenna Requirement	8
5.2 Field Strength of Fundamental and Emissions within permitted band	9
5.3 Occupied channel bandwidth.....	12
5.4 Radiated Emissions.....	17
5.5 Conducted Emission- N/A	21
6. Test equipment used for test	22

Appendix 1 Test setup photos

Appendix 2 External photos of EUT

Appendix 3 Internal photos of EUT

Appendix 4 Block diagram

Appendix 5 Schematics

Appendix 6 User manual

Appendix 7 Part list

Appendix 8 Layout diagram

1. Client information

Applicant: EZNEXT Inc.
Address: 2F, Songlim Bldg. 290-4. Yatap-dong.
Bundang-gu. Sungnam-city, Kyonggi-Do, KOREA
Telephone number: +82-31-702-1542
Facsimile number : +82-31-702-1543
Contact person: kyoungwoong.kim/ Manager

Manufacturer: EZNEXT Inc.
Address: 2F, Songlim Bldg. 290-4. Yatap-dong.
Bundang-gu. Sungnam-city, Kyonggi-Do, KOREA
Telephone number: +82-31-702-1542
Facsimile number : +82-31-702-1543
Contact person: kyoungwoong.kim/ Manager

2. Laboratory information

Address

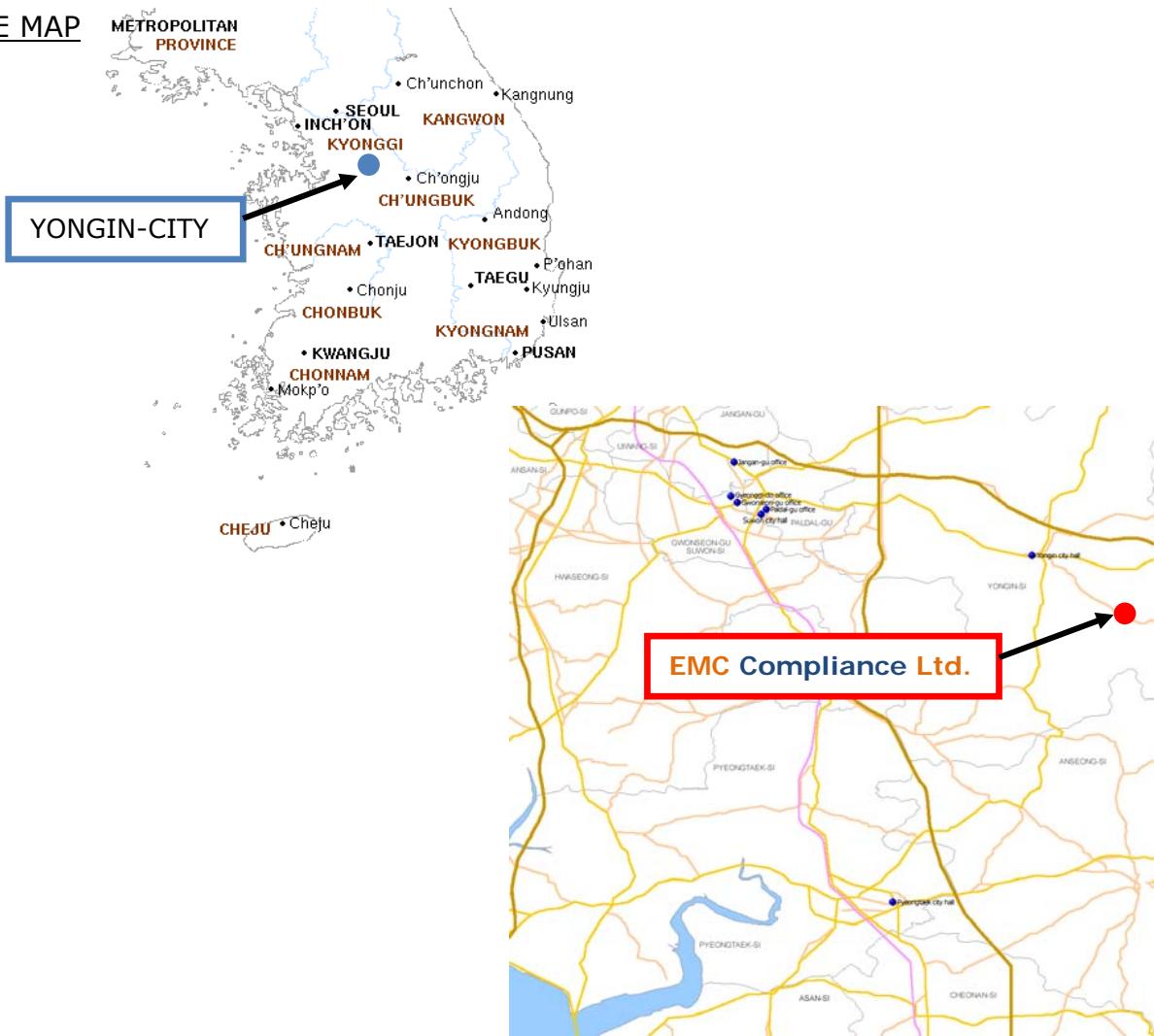
EMC Compliance Ltd.
82-1, JEIL-RI, YANGJI-MYUN, CHURINGU, YONGIN-CITY, KYUNGKI-DO,
KOREA 449-825

Telephone Number: 82 31 336 9919 Facsimile Number: 82 31 336 4767

Certificate

CBTL Testing Laboratory, KOLAS NO.: 231
FCC Filing No.: 793334
VCCI Registration No.: C-1713, R-1606, T-258

SITE MAP



3. Description of E.U.T.

3.1 Basic description

Applicant :	EZNEXT Inc.
Address of Applicant:	2F, Songlim Bldg. 290-4. Yatap-dong, Bundang-gu, Sungnam-city, Kyonggi-Do, KOREA
Manufacturer:	EZNEXT Inc.
Address of Manufacturer:	2F, Songlim Bldg. 290-4. Yatap-dong, Bundang-gu, Sungnam-city, Kyonggi-Do, KOREA
Type of equipment:	Stand-alone radio equipment
Basic Model:	ENA-9000
Brand name:	-
Serial number:	Proto Type

3.2 General description

Device Category	Band II LPD
Frequency Range	88.1 MHz ~ 107.9 MHz
Type of Modulation	FM
Number of Channels	199 channels
Channel spacing	100 kHz
Type of Antenna	Integral (PCB pattern antenna)
Transmit Power	< 50 nW
Duty cycle(x)	Up to 100%
Power supply	DC 12 ~ 24 V (DC 3.7 V (Li-ion Battery))
Extreme Power supply**	Nominal Voltage : DC 24 V
Operating temperature**	0 °C ~ 60 °C*
Dimension	94(H) x 50(W) x 19(T) mm
Weight	3.2 oz

3.3 Test frequency

	Frequency
Low frequency	88.1 MHz
Middle frequency	98.0 MHz
High frequency	107.9 MHz

4. Summary of test results

4.1 Standards & results

Rule Reference	Parameter	Report Section	Test Result
15.203	Antenna Requirement	5.1	C
15.239	Field strength of Fundamental and Emissions within permitted band	5.2	C
15.239	Occupied channel bandwidth	5.3	C
15.209	Radiated Emissions	5.4	C
15.207	Conducted Emissions	5.5	N/A*

Note: C=complies

NC= Not complies

NT=Not tested

NA=Not Applicable

*The test is not applicable since the EUT is not the device that is designed to be connected to the public utility(AC) power line.

4.2 Uncertainty

Measurement Item	Combined Standard Uncertainty U_c	Expanded Uncertainty $U = KU_c (K = 2)$
Conducted RF power	± 0.272 dB	± 0.544 dB
Radiated disturbance	± 1.943 dB	± 3.886 dB
Conducted disturbance	± 1.265 dB	± 2.53 dB

5. Test results

5.1 Antenna Requirement

5.1.1 Regulation

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.

5.1.2 Result

-Complied

The transmitter has an integral PCB pattern antenna.

5.2 Field Strength of Fundamental and Emissions within permitted band

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 Section 15.35 for limiting peak emissions apply.

5.2.2 Measurement Procedure

The field strength of emissions from intentional radiators operated within the bands 88 ~108MHz was measured in accordance with FCC Part §15.239. The test set-up was made according to ANSI C 63.4:2003. The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in an OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Span = 1 MHz

RBW = 120 kHz

Sweep = auto

VBW = 300 kHz

Detector function = Peak & Average

Trace = max hold

5.2.3 Test Result

-Complied

Operating Condition: Transmit the audio signal (modulated signal)

- DC 3.7V

Frequency [MHz]	Receiver Bandwidth [kHz]	Reading [dB(µV)]	Pol. [V/H]	ATT [dB]	Amp Gain [dB]	AF [dB(1/m)]	CL [dB]	Limit [dB(µV/m)]	Result [dB(µV/m)]	Margin [dB]
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Peak DATA.

88.1	120	33.1	V	-	-	7.88	1.79	68.0	42.77	25.23
97.9	120	34.9	V	-	-	8.90	1.88	68.0	45.68	22.32
107.9	120	35.1	V	-	-	10.00	1.98	68.0	47.08	20.92

Average DATA.

88.1	120	31.4	V	-	-	7.88	1.79	48.0	41.07	6.93
97.9	120	34.3	V	-	-	8.90	1.88	48.0	45.08	2.92**
107.9	120	33.8	V	-	-	10.00	1.98	48.0	45.78	2.22**

- DC 5V

Frequency [MHz]	Receiver Bandwidth [kHz]	Reading [dB(µV)]	Pol. [V/H]	ATT [dB]	Amp Gain [dB]	AF [dB(1/m)]	CL [dB]	Limit [dB(µV/m)]	Result [dB(µV/m)]	Margin [dB]
--------------------	--------------------------------	---------------------	---------------	-------------	---------------------	-----------------	------------	---------------------	----------------------	----------------

Peak DATA.

88.1	120	30.6	V	-	-	7.88	1.79	68.0	40.27	27.73
97.9	120	29.5	V	-	-	8.90	1.88	68.0	40.28	27.72
107.9	120	28.0	V	-	-	10.00	1.98	68.0	39.98	28.02

Average DATA.

88.1	120	28.2	V	-	-	7.88	1.79	48.0	37.87	10.13
97.9	120	28.0	V	-	-	8.90	1.88	48.0	38.78	9.22
107.9	120	25.8	V	-	-	10.00	1.98	48.0	37.78	10.22

Operating Condition: Transmit the audio signal (modulated signal)

- DC 24V

Frequency [MHz]	Receiver Bandwidth [kHz]	Reading [dB(µV)]	Pol. [V/H]	ATT [dB]	Amp Gain [dB]	AF [dB(1/m)]	CL [dB]	Limit [dB(µV/m)]	Result [dB(µV/m)]	Margin [dB]
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Peak DATA.

88.1	120	30.6	V	-	-	7.88	1.79	68.0	40.27	27.73
97.9	120	33.4	V	-	-	8.90	1.88	68.0	44.18	23.82
107.9	120	32.3	V	-	-	10.00	1.98	68.0	44.28	23.72

Average DATA.

88.1	120	27.4	V	-	-	7.88	1.79	48.0	37.07	10.93
97.9	120	31.7	V	-	-	8.90	1.88	48.0	42.48	5.52
107.9	120	29.9	V	-	-	10.00	1.98	48.0	41.88	6.12

Margin (dB) = Limit – Actual

[Result1 = Reading – Amp Gain + Attenuator + AF + CL]

1. H = Horizontal, V = Vertical Polarization

2. ATT = Attenuation (10dB pad and/or Insertion Loss of HPF), AF/CL = Antenna Factor and Cable Loss

* The spurious emission at the frequency does not fall in the restricted bands.

** The measured result is within the test standard limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95 % level of confidence. However, the result indicates that compliance is more probable than non-compliance.

NOTE: All emissions not reported were more than 20 dB below the specified limit or in the noise floor.

5.3 Occupied channel bandwidth

5.3.1 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.

5.3.2 Measurement Procedure

ANSI C63.4-2003 Section 13.1.7, Occupied Bandwidth Measurements. The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce worst-case (i.e., the widest) bandwidth. The occupied bandwidth measurements were made using a typical audio file from the typical MP3 player with the maximum volume setting. The measurements were performed at three channels, low (88.1 MHz), middle (97.7 MHz) and high (107.9 MHz). The spectrum trace data around fundamental frequency of the EUT was obtained with the spectrum analyzer in "Max Hold" mode. The bandwidth value was determined between the two points of 20 dB down from the reference level.

The spectrum analyzer is set to:

Span = 500 kHz

RBW = 10 kHz

Sweep = auto

VBW = 10 kHz

Detector function = Peak

Trace = max hold

5.3.3 Test Result

- Complied

- DC 3.7V

Channel	Center frequency(MHz)	Limit(kHz)	Result(kHz)
Low	88.1 MHz	200 kHz	188.3 kHz
Middle	98.0 MHz	200 kHz	185.8 kHz
High	107.9 MHz	200 kHz	184.5 kHz

- DC 5V

Channel	Center frequency(MHz)	Limit(kHz)	Result(kHz)
Low	88.1 MHz	200 kHz	185.8 kHz
Middle	98.0 MHz	200 kHz	185.8 kHz
High	107.9 MHz	200 kHz	187.0 kHz

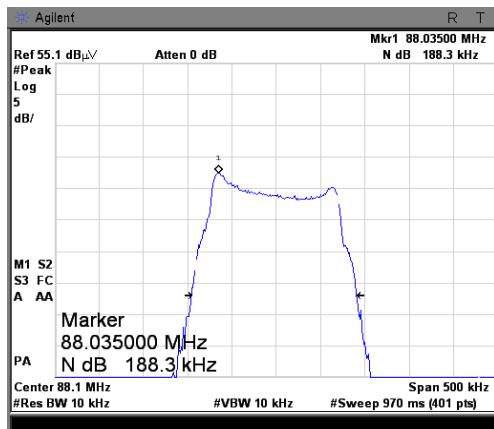
- DC 24V

Channel	Center frequency(MHz)	Limit(kHz)	Result(kHz)
Low	88.1 MHz	200 kHz	188.3 kHz
Middle	98.0 MHz	200 kHz	185.8 kHz
High	107.9 MHz	200 kHz	188.3 kHz

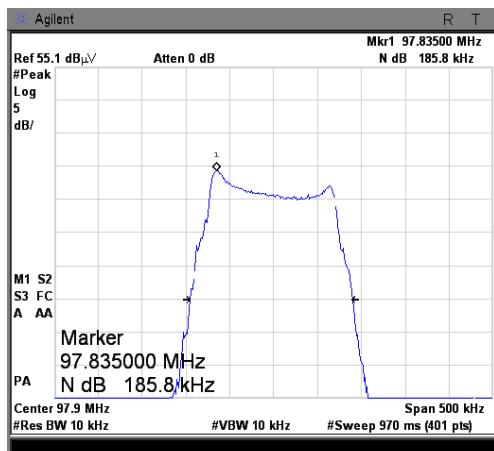
5.3.4 Test Plot

Figure 2. Plot of the Occupied bandwidth (DC 3.7V)

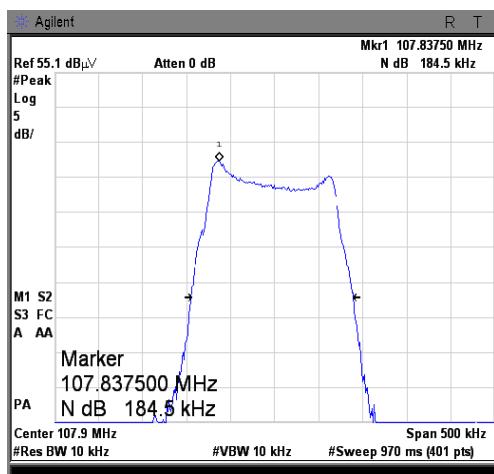
Lowest Channel
(88.1 MHz)



Middle Channel
(97.9 MHz)



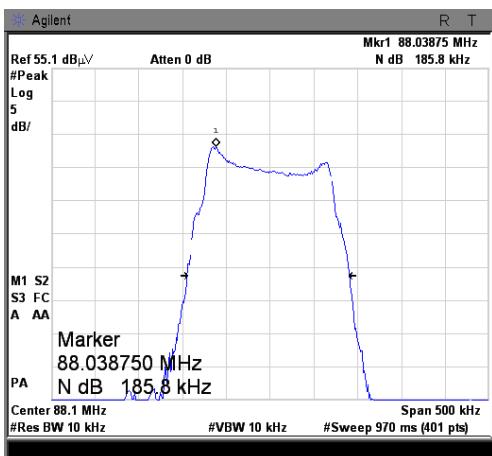
Highest Channel
(107.9 MHz)



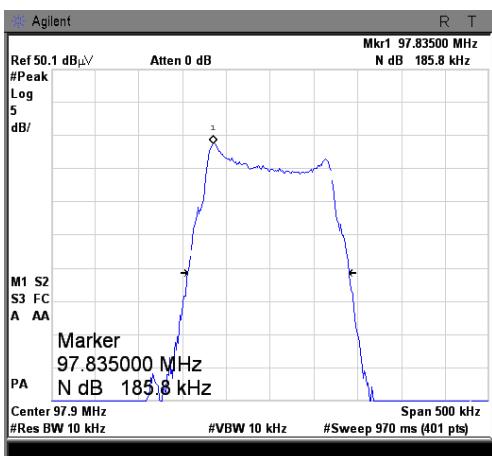
5.3.4 Test Plot

Figure 2. Plot of the Occupied bandwidth (DC 5V)

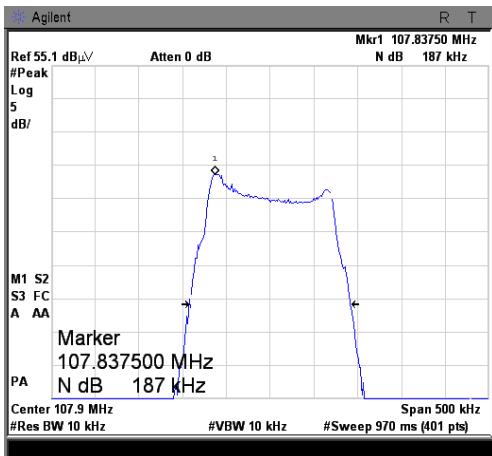
Lowest Channel
(88.1 MHz)



Middle Channel
(97.9 MHz)



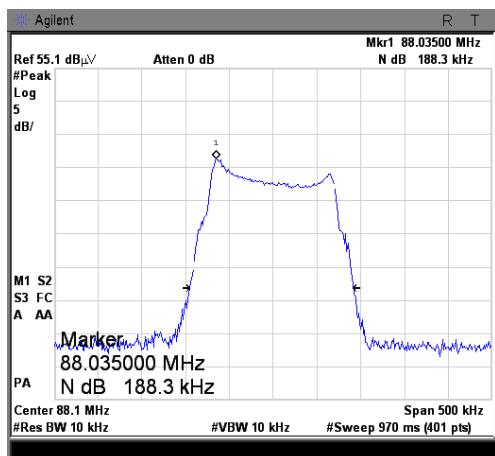
Highest Channel
(107.9 MHz)



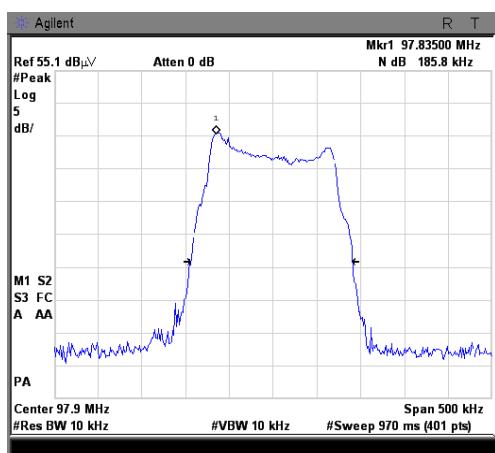
5.3.4 Test Plot

Figure 2. Plot of the Occupied bandwidth (DC 24V)

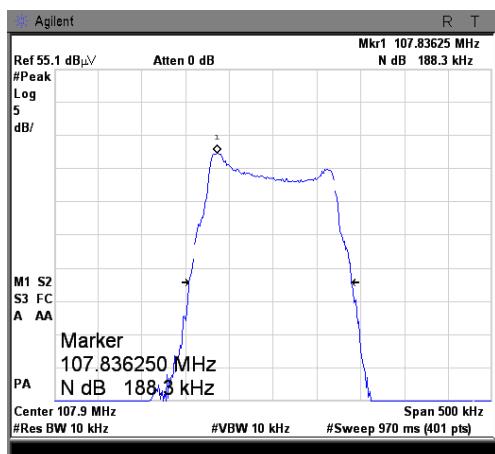
Lowest Channel
(88.1 MHz)



Middle Channel
(97.9 MHz)



Highest Channel
(107.9 MHz)



5.4 Radiated Emissions

5.4.1 Regulation

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

According to §15.209(a), for an intentional device, the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Field strength (μ V/m @ 3m)	Field strength (dB μ V/m @ 3m)
30–88	100	40.0
88–216	150	43.5
216–960	200	46.0
Above 960	500	54.0

According to §15.109(a), for an unintentional device, except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the above table.

** The emission limits shown in the above table are based on measurement instrumentation employing a CISPR quasi-peak detector and above 1000 MHz are based on the average value of measured emissions.

Trace = max hold

5.4.2 Measurement Procedure

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Range = 30 MHz ~ 10th harmonic.
RBW = 100 kHz (30MHz ~ 1 GHz)
= 1 MHz (1 GHz ~ 10th harmonic)
VBW \geq RBW
Span = 100 MHz
Detector function = QP & PK & AV
Trace = max hold Sweep = auto

5.4.3 Test Result

-Complied

Operating Condition: Transmit the audio signal (modulated signal)

- DC 3.7V

Frequency [MHz]	Receiver Bandwidth [kHz]	Reading [dB(μV)]	Pol.	ATT [dB]	Amp Gain [dB]	AF [dB(1/m)]	CL [dB]	Limit [dB(μV/m)]	Result [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. (88.1MHz)										
Quasi-Peak DATA. (98.0MHz)										
No Spurious Radiated Emissions Found										
Quasi-Peak DATA. (107.9MHz)										

- DC 5V

Frequency [MHz]	Receiver Bandwidth [kHz]	Reading [dB(μV)]	Pol.	ATT [dB]	Amp Gain [dB]	AF [dB(1/m)]	CL [dB]	Limit [dB(μV/m)]	Result [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. (88.1MHz)										
191.99	120	13.0	V	-	-	11.10	2.61	43.5	26.71	16.79
195.49	120	10.3	V	-	-	11.10	2.65	43.5	24.05	19.45
224.00	120	13.7	V	-	-	11.75	2.91	46.0	28.36	17.64
255.99	120	12.1	V	-	-	12.62	3.09	46.0	27.81	18.19
Quasi-Peak DATA. (98.0MHz)										
191.97	120	10.3	V	-	-	11.10	2.61	43.5	24.01	19.49
255.98	120	15.0	V	-	-	12.62	3.09	46.0	30.71	15.29
Quasi-Peak DATA. (107.9MHz)										
191.99	120	15.2	H	-	-	11.10	2.61	43.5	28.91	14.59
196.03	120	11.4	H	-	-	11.10	2.66	43.5	25.16	18.34

5.4.3 Test Result

-Complied

Operating Condition: Transmit the audio signal (modulated signal)

- DC 24V

Frequency [MHz]	Receiver Bandwidth [kHz]	Reading [dB(µV)]	Pol. [V/H]	ATT [dB]	Amp Gain [dB]	AF [dB(1/m)]	CL [dB]	Limit [dB(µV/m)]	Result [dB(µV/m)]	Margin [dB]
Quasi-Peak DATA. (88.1MHz)										
192.01	120	18.4	V	-	-	11.10	2.61	43.5	32.12	11.38
195.50	120	12.3	V	-	-	11.10	2.65	43.5	26.05	17.45
255.99	120	16.1	V	-	-	12.62	3.09	46.0	31.81	14.19
Quasi-Peak DATA. (98.0MHz)										
192.00	120	18.5	V	-	-	11.10	2.61	43.5	32.21	11.29
256.00	120	17.4	V	-	-	12.65	3.09	46.0	33.14	12.86
Quasi-Peak DATA. (107.9MHz)										
191.99	120	16.0	H	-	-	11.10	2.61	43.5	29.71	13.79
196.03	120	12.2	H	-	-	11.10	2.66	43.5	25.96	17.54
224.00	120	15.3	H	-	-	11.75	2.91	46.0	29.96	16.04

Margin (dB) = Limit – Actual

[ResultI = Reading – Amp Gain + Attenuator + AF + CL]

1. H = Horizontal, V = Vertical Polarization
2. ATT = Attenuation (10dB pad and/or Insertion Loss of HPF), AF/CL = Antenna Factor and Cable Loss

* The spurious emission at the frequency does not fall in the restricted bands.

** The measured result is within the test standard limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the 95 % level of confidence. However, the result indicates that compliance is more probable than non-compliance.

NOTE: All emissions not reported were more than 20 dB below the specified limit or in the noise floor.

5.5 Conducted Emission- N/A

5.5.1 Regulation

According to §15.207(a), for an intentional 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 frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization 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 terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50

* Decreases with the logarithm of the frequency.

According to §15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

5.9.2 Measurement Procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50 Ω /50 μ H LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 kHz or to QUASI-PEAK and AVERAGE within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

6. Test equipment used for test

	Description	Manufacture	Model No.	Serial No.	Next Cal Date.
□	Temp & humidity chamber	taekwang	TK-04	TK001	09.12.11
□	Temp & humidity chamber	taekwang	TK-500	TK002	09.09.06
■	Power Meter	Agilent	E4416A	GB41292365	09.10.30
■	Frequency Counter	HP	5351B	3049A01295	09.10.30
■	Spectrum Analyzer	Agilent	E4407B	US39010142	09.10.30
■	Spectrum Analyzer	R & S	FSP40	100209	09.10.30
■	Signal Generator	HP	E4432B	GB39340611	09.10.30
□	Modulation Analyzer	HP	8901B	3538A05527	09.11.07
□	Audio Analyzer	HP	8903B	3729A19213	09.01.07
□	Audio Analyzer	HP	8903B	3729A18248	09.10.30
□	AC Power Supply	KIKUSUI	PCR2000W	GB001619	09.10.30
■	DC Power Supply	Tektronix	PS2520G	TW50517	10.02.17
□	DC Power Supply	Tektronix	PS2521G	TW53135	09.10.30
□	Dummy Load	BIRD	8141	7560	-
□	Dummy Load	BIRD	8401-025	799	-
■	EMI Test Receiver	R&S	ESCI	100001	10.08.18
■	Attenuator	HP	8494A	2631A09825	09.11.03
■	Attenuator	HP	8496A	3308A16640	09.11.03
■	Attenuator	R&S	RBS1000	D67079	09.11.04
□	Attenuator	BIRD	50-A-MFN-20	0403002	09.11.03
■	Attenuator	HP	11581A	29738	09.01.10
■	Power sensor	Agilent	E9321A	US40390422	09.11.03
□	Power sensor	Agilent	E9325A		09.11.03
□	LOOP Antenna	EMCO	EMCO6502	9205-2745	11.05.22
■	BILOG Antenna	Schwarzbeck	VULB 9160	3138	10.02.21
■	HORN Antenna	ETS	3115	00062589	09.12.26
□	Power Divider	HP	11636A	05441	10.08.21
■	Signal Generator	HP	E4421B	GB40052295	09.10.30
□	Power Divider	Weinschel	1580-1	NX375	10.08.21
□	Power Divider	Weinschel	1580-1	NX380	10.08.21
□	Power Divider	Weinschel	1594	671	10.08.21
□	Test Receiver	R&S	ESHS10	843276/003	10.05.29
□	LISN	R&S	ESH3-Z5	100267	10.07.06
□	LISN	PMM	L2-16A	0000J10705	-