

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LICENSED TRANSMITTER

Test Report No. : W153R-D024

AGR No. : A152A-137

Applicant : BLUEBIRD INC.
Address : (Dogok-dong, SEI Tower13,14)39, Eonjuro30-gil, Gangnam-gu, Seoul, South Korea

Manufacturer : BLUEBIRD INC.
Address : (Dogok-dong, SEI Tower13,14)39, Eonjuro30-gil, Gangnam-gu, Seoul, South Korea

Type of Equipment : Premium Enterprise Tablet

FCC ID. : SS4ET100

Model Name : ET100

Serial number : N/A

Total page of Report : 21 pages (including this page)

Date of Incoming : February 12, 2015

Date of issue : March 30, 2015

SUMMARY

The equipment complies with the regulation; **FCC Part 22 Subpart H**

This test report only contains the result of a single test of the sample supplied for the examination.

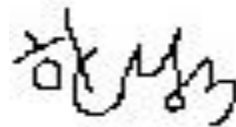
It is not a generally valid assessment of the features of the respective products of the mass-production.

Prepared by:



Jae-Ho, Lee / Chief Engineer
ONETECH Corp.

Approved by:



Sung-Ik, Han/ Managing Director
ONETECH Corp.

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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
W153R-D024	March 30, 2015	Initial Issue	All

1. VERIFICATION OF COMPLIANCE

APPLICANT : BLUEBIRD INC.
 ADDRESS : (Dogok-dong, SEI Tower13,14)39, Eonjuro30-gil, Gangnam-gu, Seoul, South Korea
 CONTACT PERSON : Jaeho, Lee / Research Engineer
 TELEPHONE NO : +82-70-7730-8210
 FCC ID : SS4ET100
 MODEL NAME : ET100
 SERIAL NUMBER : N/A
 DATE : March 30, 2015

EQUIPMENT CLASS	PCB-PCS Licensed Transmitter
EQUIPMENT DESCRIPTION	Premium Enterprise Tablet
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2009
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC Part 22 Subpart H
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
22.913(a.2)	Radiated Power (ERP/EIRP)	Met the Limit / PASS
2.1053, 22.917(c)	Band Edge	Met the Limit / PASS
2.1053, 22.917(a)	Field strength of Spurious Radiation	Met the Limit / PASS

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original Grant

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in section 2.1.

2.5 Test Methodology

Radiated testing was performed according to the procedures in EIA/TIA-603-C: 2004 was performed at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 301-14, Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862 Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-4617/ G-666/ T-1842 IC (Industry Canada) – Registration No. Site# 3736-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation No. 85

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

3. GENERAL INFORMATION

3.1 Product Description

The BLUEBIRD INC., Models ET100 (referred to as the EUT in this report) are Premium Enterprise Tablet. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Premium Enterprise Tablet
LIST OF EACH OSC. or CRY. FREQ.(FREQ. >= 1 MHz)	27.12 MHz, 26 M, 25 MHz , 12 MHz, 8 MHz
EMISSION DESIGNATOR	GPRS, HSDPA, HSUPA
OPERATING FREQUENCY	GPRS : 824.2 MHz ~ 848.8 MHz
	HSDPA : 826.4 MHz ~ 846.6 MHz
	HSUPA : 826.4 MHz ~ 846.6 MHz
ANTENNA TYPE	WWAN, WLAN : PiFA BT : Chip antenna NFC : PCB antenna
USED AC/DC ADAPTER	Output: DC 12 V, 4.17 A Model No: KPL-050F Manufacturer: Ningbo ISO Electronic Co., Ltd.
EXTERNAL CONNECTOR	DC IN, Micro SD slot, USIM slot, USB port, AUX port

3.2 Alternative type(s)/model(s); also covered by this test report.

-. None

3.3 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	FCC ID	Description	Connected to
ET100	BLUEBIRD INC.	-	Premium Enterprise Tablet (EUT)	Adaptor
KPL-050F	Ningbo ISO Electronic Co., Ltd	-	Adaptor	EUT
E5515C	Agilent	-	WIRELESS COMMUNICATIONS TEST	EUT

3.4 Mode of operation during the test

The EUT was received signal form signal generator and then each modulation was configured for maximum signal gain and bandwidth. The EUT was operated in a manner representative of the typical usage of the equipment. During all testing, system components were manipulated within the confines of typical usage to maximize each emission. The applicant does not supply antenna(s) with the system, so the dummy loads were connected to the RF output ports on the EUT for radiated spurious emission testing.

For the above testing, following frequencies per channel were selected for each modulation.

- Mode

Modulation	Channel	Frequency	Modulation	Channel	Frequency	Modulation	Channel	Frequency
GPRS	Low	824.2	HSDPA	Low	826.4	HSUPA	Low	826.4
	Middle	836.6		Middle	836.6		Middle	836.6
	High	848.8		High	846.6		High	846.6

4. EUT MODIFICATIONS

-. None

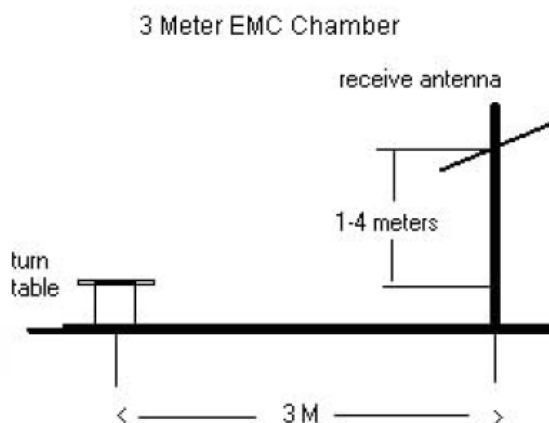
5. RADIATED POWER (ERP/EIRP)

5.1 Operating environment

Temperature : 24 °C
Relative humidity : 50 % R.H.

5.2 Test set-up

The EUT and measurement equipment were set up as shown in the diagram below



5.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
□ -	ESCI	Rohde & Schwarz	EMI Test Receiver	101012	Nov. 03, 2014(1Y)
■ -	ESU	Rohde & Schwarz	EMI Test Receiver	100261	Apr. 29, 2014(1Y)
□ -	8564E	HP	Spectrum Analyzer	3650A00756	Apr. 28, 2014(1Y)
□ -	FSP	Rohde & Schwarz	Spectrum Analyzer	100017	Oct. 16, 2014(1Y)
■ -	310N	Sonoma Instrument	AMPLIFIER	312544	Apr. 28, 2014(1Y)
■ -	FSV30	Rohde & Schwarz	Signal Analyzer	101372	Apr. 28, 2014(1Y)
■ -	SCU-18	Rohde & Schwarz	Signal Conditioning Unit	102209	Jun. 12, 2014(1Y)
■ -	MA240	HD GmbH	Antenna Master	N/A	N/A
■ -	HD100	HD GmbH	Position Controller	N/A	N/A
■ -	DS420S	HD GmbH	Turn Table	N/A	N/A
■ -	HFH2-Z2	Rohde & Schwarz	Loop Antenna	879 285/26	Dec. 09, 2014(2Y)
■ -	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-255	May 02, 2014(2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Sep. 05, 2013(2Y)
■ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	N/A
■ -	83051A	Agilent	Microwave System Preamplifier	3950M00201	Apr. 30, 2014(1Y)
■	E5515C	Agilent	WIRELESS COMMUNICATIONS TEST	GB44350208	Mar. 10, 2015 (1Y)

All test equipment used is calibrated on a regular basis.

5.4 Test result

-. Test Date : March 27, 2015
-. Result : PASSED

5.4.1 Operating Mode: GPRS

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
824.2	131.65	25.69	1.67	V	1.75	25.61	38.45	12.84
Test Data for Middle Channel								
836.6	130.58	24.90	1.72	V	1.76	24.86	38.45	13.59
Test Data for High Channel								
848.8	131.95	26.55	1.62	V	1.77	26.40	38.45	12.05

5.4.2 Operating Mode: HSDPA

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
826.4	123.31	21.12	1.68	V	1.75	21.05	38.45	17.40
Test Data for Middle Channel								
836.6	124.35	22.45	1.72	V	1.76	22.41	38.45	16.04
Test Data for High Channel								
846.6	125.98	24.39	1.65	V	1.77	24.27	38.45	14.18

5.4.3 Operating Mode: HSUPA

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
Test Data for Low Channel								
826.4	122.43	20.24	1.68	V	1.75	20.17	38.45	18.28
Test Data for Middle Channel								
836.6	123.83	21.93	1.72	V	1.76	21.89	38.45	16.56
Test Data for High Channel								
846.6	125.63	24.04	1.65	V	1.77	23.92	38.45	14.53



Tested by: Jun-Hui, Lee / Senior Engineer

6. BAND EDGE MEASUREMENT

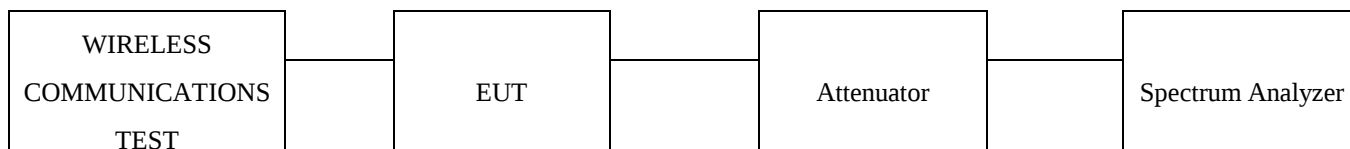
6.1 Operating environment

Temperature : 25 °C
Relative humidity : 50 % R.H.

6.2 Test set-up

The RF signal from the signal generator(s) was injected to the EUT and the amplified RF signal at the output of the EUT was connected to the power meter or spectrum analyzer. The test was performed at three frequencies (low, middle, and high channels) at each band using all applicable modulation.

The resolution bandwidth and video bandwidth of the spectrum analyzer was set according to the regulation and sufficient scans were taken to show any out of band emissions.



6.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ - E5515C	Agilent	WIRELESS COMMUNICATIONS TEST	GB44350208	Mar. 10, 2015 (1Y)
■ - FSV30	Rohde & Schwarz	Signal Analyzer	101372	Apr. 28, 2014(1Y)

All test equipment used is calibrated on a regular basis.

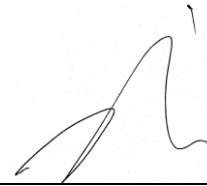
6.4 Test data

-. Test Date : March 27, 2015

-. Result : PASSED

Modulation	Channel	Measured Frequency (MHz)	Max. Measured Value (dBm)	Limit (dBm)	Margin (dB)
GPRS	Low	823.99	-20.35	-13.00	7.35
	High	849.09	-21.24		8.24
HSDPA	Low	823.98	-24.03		11.03
	High	849.11	-24.56		11.56
HSUPA	Low	823.96	-24.18		11.18
	High	849.08	-25.67		12.67

According to Part 22H, out of band emission shall be attenuated by $43 + 10 \log (P)$ dBc, equates to -13.0dBm.



Tested by: Jun-Hui, Lee / Senior Engineer

7. FIELD STRENGTH OF SPURIOUS RADIATION

7.1 Operating environment

Temperature : 25 °C
Relative humidity : 50 % R.H.

7.2 Test set-up

The radiated emissions measurements were on the 3 m, open-field test site. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to up to 10th harmonic of the fundamental frequency was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. The test was performed by placing the EUT on 3-orthogonal axis. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

The maximum radiated emission was recorded and used as reference for the effective radiated power measurement. The EUT was then replaced by a tuned dipole antenna or Horn antenna and was oriented for vertical polarization and then the length was adjusted to correspond to the frequency of the transmitter. The substitution antenna was connected to a signal generator with a coaxial cable. The receiving antenna height was raised and lowered again through the specified range of height until maximum signal level is detected by the measuring receiver. The signal to the substitution antenna was adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the EUT radiated power measured, corrected for the change of input attenuation setting of the measuring receiver. The signal generator level was recorded and corrected by the power loss in the cable between the signal generator and substitution antenna and further corrected for the gain of the dipole antenna or horn antenna used relative to an ideal tuned dipole antenna. The measurement was repeated with the test antenna and the substitution antenna oriented for horizontal polarization. The measure of the effective radiated power is the larger of the two levels recorded.

7.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
□ -	ESCI	Rohde & Schwarz	EMI Test Receiver	101012	Nov. 03, 2014(1Y)
■ -	ESU	Rohde & Schwarz	EMI Test Receiver	100261	Apr. 29, 2014(1Y)
□ -	8564E	HP	Spectrum Analyzer	3650A00756	Apr. 28, 2014(1Y)
□ -	FSP	Rohde & Schwarz	Spectrum Analyzer	100017	Oct. 16, 2014(1Y)
■ -	310N	Sonoma Instrument	AMPLIFIER	312544	Apr. 28, 2014(1Y)
■ -	FSV30	Rohde & Schwarz	Signal Analyzer	101372	Apr. 28, 2014(1Y)
■ -	SCU-18	Rohde & Schwarz	Signal Conditioning Unit	102209	Jun. 12, 2014(1Y)
■ -	MA240	HD GmbH	Antenna Master	N/A	N/A
■ -	HD100	HD GmbH	Position Controller	N/A	N/A
■ -	DS420S	HD GmbH	Turn Table	N/A	N/A
■ -	HFH2-Z2	Rohde & Schwarz	Loop Antenna	879 285/26	Dec. 09, 2014(2Y)
■ -	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-255	May 02, 2014(2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Sep. 05, 2013(2Y)
■ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	N/A
■ -	83051A	Agilent	Microwave System Preamplifier	3950M00201	Apr. 30, 2014(1Y)

All test equipment used is calibrated on a regular basis.

7.4 Test data for radiated emission

7.4.1 Operating Mode: GPRS

- . Test Date : March 27, 2014
- . Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)
- . Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)
- . Frequency range : 30 MHz ~ 20 GHz
- . Measurement distance : 3 m
- . Result : PASSED

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
57.16	31.60	-82.47	1.01	V	0.38	-81.84	-13.00	68.84
251.16	41.90	-74.61	1.48	H	0.91	-74.04	-13.00	61.04
274.44	45.80	-69.96	1.43	H	0.96	-69.48	-13.00	56.48
399.57	43.20	-69.59	0.87	H	1.18	-69.91	-13.00	57.91
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical

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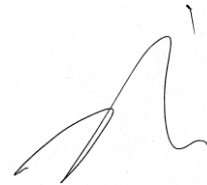
Tested by: Jun-Hui, Lee / Senior Engineer

7.4.1.1 Test Data for Below 30 MHz

Humidity Level : 50 % R.H. Temperature: 25 °C
Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
Frequency range : 9 kHz ~ 30 MHz
Measurement distance : 3 m
Limits apply to : FCC CFR 47, PART 22, SUBPART H, SECTION 22.917(a)
Result : PASSED

EUT : Premium Enterprise Tablet Date: March 27, 2015
Detector : CISPR Quasi-Peak (Resolution Bandwidth: 9 kHz)

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.									



Tested by: Jun-Hui, Lee / Senior Engineer

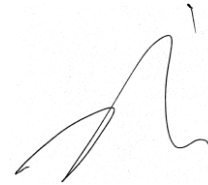
7.4.2 Operating Mode: HSDPA

- . Test Date : November 10, 2014
- . Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)
- . Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)
- . Frequency range : 30 MHz ~ 20 GHz
- . Measurement distance : 3 m
- . Result : PASSED

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
124.09	42.30	-74.24	1.74	V	0.62	-73.11	-13.00	60.11
213.33	40.30	-76.06	1.54	V	0.84	-75.37	-13.00	62.37
276.38	48.20	-67.52	1.43	H	0.96	-67.05	-13.00	54.05
401.51	46.80	-66.00	0.91	H	1.19	-66.28	-13.00	53.28
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical



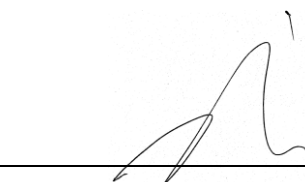
Tested by: Jun-Hui, Lee / Senior Engineer

7.4.2.1 Test Data for Below 30 MHz

Humidity Level : 50 % R.H. Temperature: 25 °C
Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
Frequency range : 9 kHz ~ 30 MHz
Measurement distance : 3 m
Limits apply to : FCC CFR 47, PART 24, SUBPART E, SECTION 24.238(a)
Result : PASSED

EUT : Premium Enterprise Tablet Date: March 27, 2015
Detector : CISPR Quasi-Peak (Resolution Bandwidth: 9 kHz)

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.									



Tested by: Jun-Hui, Lee / Senior Engineer

7.4.3 Operating Mode: HSUPA

- . Test Date : November 10, 2014
- . Resolution bandwidth : 120 kHz (below 1 GHz), 1 MHz (above 1 GHz)
- . Video bandwidth : 300 kHz (below 1 GHz), 3 MHz (above 1 GHz)
- . Frequency range : 30 MHz ~ 20 GHz
- . Measurement distance : 3 m
- . Result : PASSED

Frequency (MHz)	Spectrum Reading (dBμV)	Generator Reading (dBm)	Ant. Gain (dBi)	Ant. Pol. (H/V)	Cable Loss (dB)	Total (dBm)	Limit (dBm)	Margin (dB)
100.81	39.40	-78.03	2.25	V	0.57	-76.35	-13.00	63.35
213.33	39.70	-76.66	1.54	V	0.84	-75.97	-13.00	62.97
276.38	43.80	-71.92	1.43	H	0.96	-71.45	-13.00	58.45
401.51	45.90	-66.90	0.91	H	1.19	-67.18	-13.00	54.18
Other frequencies have margin more than 40 dB.								

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical



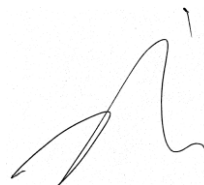
Tested by: Jun-Hui, Lee / Senior Engineer

7.4.3.1 Test Data for Below 30 MHz

Humidity Level : 50 % R.H. Temperature: 25 °C
Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
Frequency range : 9 kHz ~ 30 MHz
Measurement distance : 3 m
Limits apply to : FCC CFR 47, PART 24, SUBPART E, SECTION 24.238(a)
Result : PASSED

EUT : Premium Enterprise Tablet Date: March 27, 2015
Detector : CISPR Quasi-Peak (Resolution Bandwidth: 9 kHz)

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.									



Tested by: Jun-Hui, Lee / Senior Engineer