Korea EMC Laboratory Co., Ltd.

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Report Ref. No :

KEL08-F02066

KEL
Korea EMC Laboratory

TEST REPORT

1. Client
- Name : KPC, Inc.
- Address : #830, Research Center for Industry Co-Operation, Dong-A Univ 840, Hadan2-Dong, Saha-Gu, Busan 604-714, Korea
- Date of Receipt : Feb. 28, 2008

2. Name of Product / Model : UHF Band RFID Tag / KT902
(Low power transceiver – RX verified)

3. Manufacturer /Country of Origin : KPC, Inc. / KOREA

4. Date of Test : Feb. 28, 2008 ~ Mar. 10, 2008

5. Test Regulation : FCC Title 47, Part 15 Subpart C § 15.240

6. Equipment Class : DXT– Part 15 Low Power Transceiver, Rx verified

7. FCC ID : T5A-KT902

8. Testing Environment
- Environment : Temperature : (20.3 ± 1.0) ℃, Relative Humidity : (40. ± 3.0) % R.H.
- Location : ■ In Laboratory □ In Chamber □ On Site Test

9 Test Results : ☒ Pass ☐ Fail

Affirmation	Tested by Name : Bong-Ok Ko (Signature)	Technical Manager Name : Su-Gil Moon (Signature)

Mar. 10, 2008

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DESCRIPTION Page

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 15.240 for Low Power Transceiver, Rx verified. 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 EMC LABORATORY CO., LTD. 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.

1.1 Labelling Requirement(Section 15.19)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

1.1-1 Location of Label : User' guide manual

1.1-2 How Applied : Printed

1.2 Information to User(Section 15.21)

The following or similar statements were provided in the manual for user instruction. Please refer page 3 of the attached manual for details.

CAUTION : Any changes or modifications in construction of this device which are Not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

1.3 Special Accessories (Section 15.27)

1.3-1 Were the special Accessories provided? [ ] yes, [■] no
1.3-2 If yes, details for the special accessories are as follows :
1.3-3 If yes, were the appropriate instructions provided on the first page of the text concerned with the device? [ ] yes, [ ] no
1.3-4 Are these accessories provided of the type which can be readily obtained from multiple retail outlets? [ ] yes, [ ] no
And therefore does the manual specify what additional components or accessories are required to used in order to comply with the Rules? [ ] yes, [ ] no

1.4 Antenna Requirement
The Antenna is integral to the device.

2. TEST FACILITY

Location : Korea EMC Laboratory Co., Ltd.
390 Bora-dong, Giheung-gu, Yongin-si, Gyeunggi-do, Republic of Korea
(Zip Code : 446-904)

Site : - 3 m/10 m Open Area Testing Site No.1
- 3 m Semi-Anechoic Chamber No.1
- Shielded Room No.1

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

2.1 List of Test Equipment

Equipment	Manufacturer	Model #	Serial #	Use
Spectrum Analyzer	Advantest	R3273	110600584	☒
Spectrum Analyzer & EMI Test Receiver	Rohde&Schwarz	ESU40	100027	☒
Modulation Analyzer	H.P	8901B	3438A05241	☐
Audio Analyzer	H.P	8903B	3011A08331	☐
Frequency Counter	EIP Microwave	28B	9205-004723	☐
CDMA Mobile Station Test Set	H.P	8924C	US37261566	☐
Digital Oscilloscope	Tecktronics	TDS380	B011855	☐
Digital Multimeter	Fluke	8842A	6585251	☐
Test Receiver	Rohde&Schwarz	ESVS10	825120/006	☐
Test Receiver	Rohde&Schwarz	ESCS30	100054	☐
Signal Generator	H.P	E4421A	US37230495	☐
Function Generator	H.P	33120A	US36030957	☐
Dual Directional Coupler	H.P	778D	14903	☐
L.I.S.N (for E.U.T)	SCHWARZBECK	NSLK8128	8128144	☐
L.I.S.N (for Peripheral)	Kyoritsu	KNW-407	8-8833-14	☐
Pre-amplifier	H.P	8447E	2434A02093	☒
Pre-amplifier	A.H Systems, Inc.	PAM-0118	2641	☒
Power Meter	Agilent	E4416A	GB41290751	☐
Power Sensor	Agilent	E9323A	US40410488	☐
Active Loop Antenna	EMCO	6507	1435	☐
Bi-Log Antenna	Schwarzbeck	VULB9160	3121	☐
Bi-Log Antenna	Schwarzbeck	VULB9160	3049	☒
Double Ridge Horn Antenna	A.H Systems, Inc.	SAS-571	500	☒
DC Power Supply	H.P	E3611A	KR41808575	☐
Temperature/Humidity Chamber	HANYOUNG	HY-LTH2	A33-051216	☐
Temperature/Humidity Chamber	HANYOUNG	HY-LTH-3	A34-970616	☐
Attenuator	H.P	8498A	1801A04842	☐
Attenuator	H.P	8491A	30907	☐

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

Type of equipment	UHF Band RFID Tag(Low Power Transceiver-RX Verified)
Power Source	DC 3.6 V (Lithium Battery)
Oscillating Method	PLL
Transmit Frequency	433.92 MHz
Antenna Type	Integral
Type of Modulation	FSK
IF frequency	307.2 KHz
Air protocol	ISO/IEC 18000-7
Interface Ports	N / A

4. TEST CONDITIONS

4.1 Condition of Test Setup

For the testing of the Radiation emission, the EUT was set for the modulated continuous transmission mode by software. During the testing of the Time between periodic transmission, the EUT transmits periodically.

4.2 List of Peripherals

Equipment Type	FCC ID	Manufacture	Model	Serial No.
None				

4.3 Type of Used Cables

Cable	Length	Type of shield	Manufacturer	Remark
None				

5. RADIATED EMISSION MEASUREMENT (Section 15.209 & 15.240)

5.1 Test Procedure

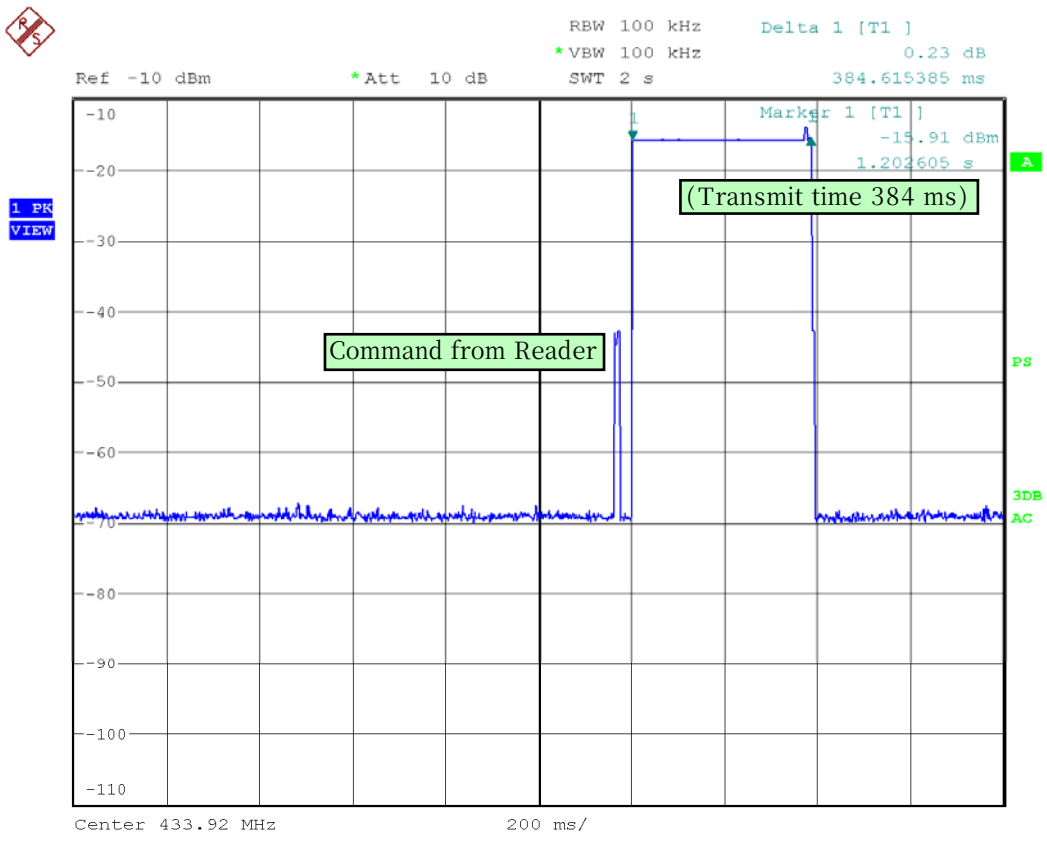
The final measurement of radiated field strength was carried out in a 3 m Semi-Anechoic Chamber that was listed up at FCC according to the “Radiated Emissions Testing” procedure specified by ANSI C63.4.

Based on the test results in the preliminary test, measurement was made in the same test set up and configuration which produced maximum emission level. The receiving antenna was installed at 3-meter distance from the EUT, and was connected to an EMI receiver or spectrum analyzer with a RF amplifier. The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 30 MHz to 1000 MHz using the Bi-Log antenna. Above 1 GHz, linearly polarized double ridge horn antenna was used. The turntable was rotated through 360 degrees and receiving antenna height was varied from 1 to 4 meters above the ground plane to read maximum emission level.

To obtain the final test data, 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

5.2 Photograph for the test configuration

5.3 Dwell time plot



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5.4 Measurement Data

Measurement Data

- Resolution Bandwidth :

[■] Peak (3 dB Bandwidth : 100 kHz for below 1 GHz, 1 MHz for above 1 GHz)

[■] Average (3 dB Bandwidth : 100 kHz for below 1 GHz, 1 MHz for above 1 GHz)

- Measurement Distance : 3 Meter
- Measurement Frequency : 30 MHz ~ 3000 MHz

Field strength

Frequency (MHz)	D.M.	Pol. (V/H)	AH/TA (m)/(°)	Reading (dBuV)	Amp Gain (dB)	AF + CL (dB/m)	Actual (dBuV/m)		Limit (dBuV/m)	Margin (dB)
							(dBuV/m)	(uV/m)		
433.92	P	H	1 / 359	86.6	27.1	18.6	78.1	8035.2	94.8	-16.7
433.92	A	H	1 / 359	85.2	27.1	18.6	76.7	6839.1	80.8	-4.1
867.84	P	H	1 / 140	30.5	27.6	26.6	29.5	29.8	46	-16.5
1301.76	P	H	1/ 69	34.5	38.2	27.9	24.2	16.2	74	-57.8
1301.76	P	H	1/ 69	22.1	38.2	27.9	11.8	3.8	54	-50.2

Note :

D.M. = Detector Mode(P: Peak, Q: Quasi-Paek, A: Average)
H = Horizontal, V = Vertical Polarization.
AH= Antenna Height, TA=Table Angle
AF / CL = Antenna Factor and Cable Loss.
Resolution Bandwidth: 120 kHz for ranges below 1 GHz, 1 MHz for ranges over 1 GHz.
The frequency range was scanned from 30 MHz to 5 GHz.

Margin (dB) = Limit – Actual
[Actual = Reading – Amp Gain + AF + CL]

Note ;

(1) Fundamental emissions from the intentional radiators were not located within any of frequency bands described in section 15.205(a) listed below ;

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.1775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	
13.36-13.41			

The field strength of emissions appearing within above frequency bands did not exceed the limits shown in section 15.209. At frequency equal to or less than 1000MHz, compliance with the limits section 15.209 was demonstrated using measurement employing a CISPR quasi-peak detector. Above 1000MHz, demonstrated based on the average value of the measured emissions.

(2) If the intentional radiator was operated under the radiated emission limits of the general requirements of section 15.209, it's fundamental emissions were not located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-860MHz.

(3) The level of any unwanted emissions from an intentional radiator did not exceed the level of the fundamental emission.

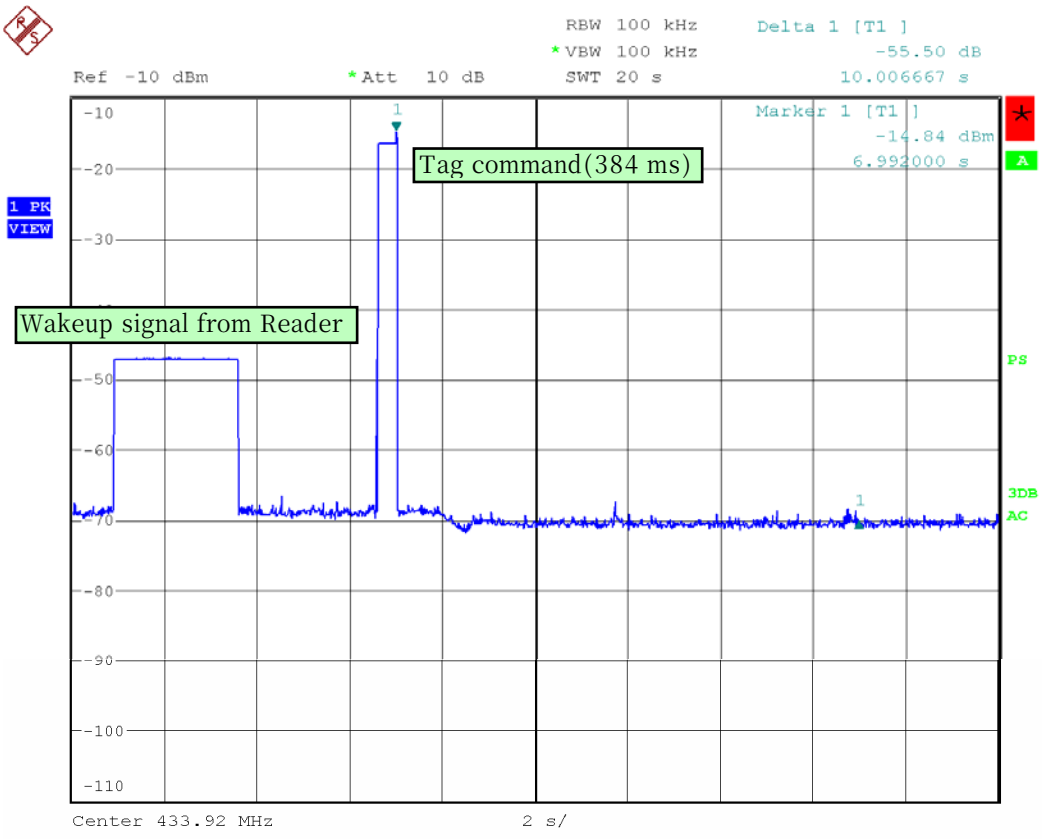
(4) Radiated and spurious emissions were checked from 30MHz to 3GHz. And all other emissions not reported on data were more than 20 dB below the permitted level.

5.5 Duration of Transmissions (Section 15.240(b))

1. Description

The Tag is triggerd by a reader to send transmissions under 15.240(b).
The maximum transmit time is 384 ms.
The client declare that a silent period is longer than 10s.

2. Operation plot



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