FCC EVALUATION REPORT FOR CERTIFICATION

KOREA Standard Technology

Test report No.: KST-FCC-070077

Applicant's Name	**:**	**Bioinsec Co., Ltd.**
Applicant's Address	**:**	**3F, Taerim Building, 197-24, Guro3-dong Guro-gu, Seoul 152-848, Korea**
Manufacturer's Name	**:**	**Bioinsec Co., Ltd.**
Manufacturer's Address	**:**	**3F, Taerim Building, 197-24, Guro3-dong Guro-gu, Seoul 152-848, Korea**

EUT's:

FCC ID	**:**	**VUL-BKS-4800HP**
Product Name	**:**	**Fingerprint Access Controller**
Model Number(s)	**:**	**BKS-4800HP(CFN-3000HP)**
Product Options	**:**	**Request for a multilist model name(CFM-3000HP) by manufacturer**
Category	**:**	**FCC Part 15 subpart C, Section 15.207,15.209**

Supplementary Information

The device bearing the brand name and FCC ID specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with measurement procedures specified in ANSI C63.4-2003.

I attest to the accuracy of data and all measurements reported herein were performed by or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Test Date : November 23, 2007	**Issued Date : November 27, 2007**
Tested by: 	**Approved by:** 

Contents

1. General Description

1) FCC ID	VUL-BKS-4800HP
2) Purpose of test	FCC Certification
3) FCC Rules Section	FCC Parts15 Subpart C, Section 15.207, 15.209
4) Test result	Compliant to specification
5) Equipment under test	RFID(Radio frequency identification for 125KHz
6) Kind of equipment	Fingerprint Access Controller
7) Equipment Model Name:	BKS-4800HP(CFM-3000HP)
8) Equipment Serial No	Prototype
9) Utilisation	Identification and data transmission for fingerprint
10) ITU emission Code	A1D
11) Antenna description	Internal Loop antenna
12) Modulation Method	Continuous carrier
13) Fundamental Frequency	125KHz
14) Channel spacing	Not applicable
15) Number of Channel	1(one)
16) Communication Type	One way Type
17) Weight	350g
18) Dimension	155(W) x 3(H) x 155(D) mm
19) Operatin temperature	-20℃~ +70℃
20) Power Source	DC 12V (Adaptor)

2. Test Facility

The open area field test site and conducted measurement facility are used for these testing, where are located following address and drawing. This site was fully described in a report dated November 14, 2002. that was submitted to the FCC.

KOSTEC CO., LTD. (Korea Standard Technology)

▣ Head office & Test Lab ;

180-254, Annyung-Dong, Hwasung-shi, Kyunggi-do, Korea 445-380

Telephone Number : +82-31-222-4251
Facsimile Number : +82-31-222-4252

MIC(Ministry of Information and Communication) Number : **KR0041**

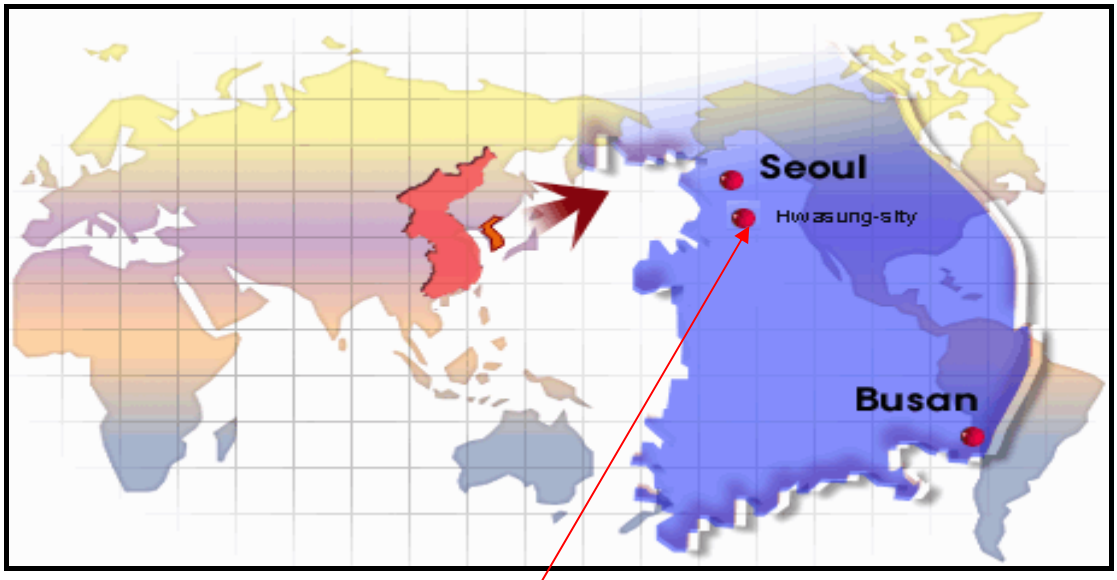
FCC Filing Number. : **525762**

VCCI Membership Number : **2005**

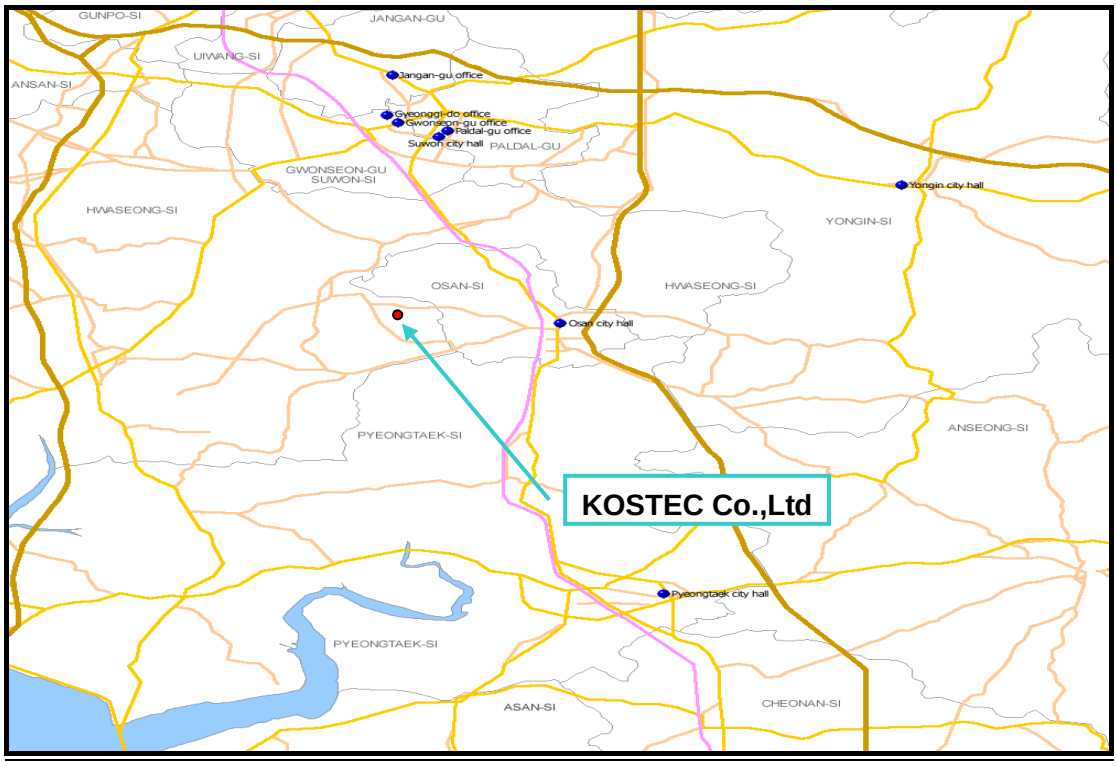
VCCI Registration Number : **R-1657 / C-1763**

3. MAP

Korea



Hwasung-shi (open area test site)



4. TEST SYSTEM CONFIGURATION

■ Operation Environment

Ambienty	Temperature (°C)	Humidity (%)	Pressure (hPa)
10m Open area test site	19	51	1015
Shielded room	24	43	1015

Test site

These testing were performed following locations ;

-. Conducted Emission ……. Shield room

-. Radiated Emission ……. 10m Open area test site:

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.
The factors contributing to uncertainties are test receiver, Cable loss, Antenna factor calibration, Antenna directivity, Antenna factor variation with height, Antenna phase center variation, Antenna frequency interpolation, measurement distance variation, Site imperfection, mismatch, and system repeatability.
Based on NIS 80,81, The measurement uncertainty level with a 95 % confidence level were applied.

Sample calculation :

Part 15.207 – Powerline Conducted emission

The conducted emission is calculated by adding the LISN Factor, cable loss from the measured reading.
The sample calculation is as follows table:

Frequency(KHz)	Level(dBuV)	Line(Pol)	Loss(dB)	Result(dBuV)	Limit(dBuV)	Margin(dB)
224.125	23.0	-	2.0	25.0	56.0	31.0

⦿ **Result(dBuV) = Level(dBuV)+Loss(dB)**

* Level(dBuV) = Test receiver reading value
* Line(Pol) = Live and Neutral port
* Loss(dB) = LISN insertion Loss + Cable Loss
* Result(dBuV) = Measurement Value
* Limit(dBuV) = Value specified by FCC Part 15.207
* Margin(dB) = Limit-Result

Part 15.209 – Radiated emission

The field strength emission is calculated by adding the Antenna factor, cable loss from the measured reading. The sample calculation is as following table
:

Frequency (KHz)	Reading (dBuV)	P (H/V)	H (m)	A(˚)	Antenna (dB/m)	Cable loss (dB)	Result (dBuV/m)	Limit (dBuV/m)
250	13.0	H	2.5	150	24.0	0.5	37.5	40.0

⊙**Result(dBuV/m) = Reading(dBuV) + Antenna(dB/m) + Cable loss(dB) – Distance factor(dB)**

* Result(dBuV/m) = Measurement value
* Reading(dBuV) = Test receiver reading value
* P(H/V)= Antenna Polarization, H(m)=Antenna Height, A(˚)=Turn table Angle
* Antenna(dB/m) = Antenna factor, Cable loss(dB) = Used cable loss
* Distance factor = Extrapolation factor @ 40dB/Decade from 3m to 30m, as per Part 15.31f(2)
  (If Measurement distance is 3m and Mandatory requirement distance is 30m at less than 30MHz
  Extrapolation factor(dB)=40log(MRD/MD)
  @ MRD:Mandatory requirement distance, MD: Measurement distance
* Limit(dBuV) = Value Specified by FCC Part 15.209

5. Description of E.U.T

■ Product Description

Manufactured By:	Bioinsec Co., Ltd.
Address:	3F, Taerim Building, 197-24, Guro3-dong Guro-gu, Seoul 152-848, Korea.
Model:	BKS-4800HP(CFN-3000HP)
Serial Number:	Prototype

■ Configuration of EUT

Description	Manufacturer	Model/Part #	Serial Number
Main controller board	Bioinsec Company	BKS-4800	None
LCD	Bioinsec Company	None	None
LED board	Bioinsec Company	None	None
RF Oscillation board	Bioinsec Company	None	None
Antenna board	Bioinsec Company	None	None
Sensor board	Bioinsec Company	None	None
Adaptor	Dream Electronics	DEP-1220A	None

■ EUT Used cables

Cable Type	Shield	Length (m)	Ferrite	Connector	Connection Point 1	Connection Point 2
DC IN (2Pin Connector)	No	2.0	No	2Pin Connector type	EUT	Adaptor
RJ11	No	1.6	No	RJ45	EUT	PC
RJ45	No	1.2	No	D-Sub (Serial)	EUT	PC

Operating Conditions :

The operating mode/system were as follows in details:
After setting, the DC IN port of EUT connected to AC/DC adaptor and also RJ-45 port and RJ11 port of EUT connected to PC. After that, the EUT was tested in state of control on the PC of EUT with "Biokey Manager" program. And also, the EUT was tested with "ping test" between EUT and PC.
And it is radiated emission in transmission mode.

■ Peripherals

No	Description	Manufacturer	Model/Part #	Serial Number
1	Fingerprint Access Controller	Bioinsec Company	BKS-4800HP	Prototype
2	PC	Dell Inc.	DIMENSION 4700	8VKSD1S
3	LCD Monitor	Dell Inc.	E153FPb	CN-0U4938-46633-53P-101L
4	Keyboard	LG	LK3800	None
5	Mouse	MONTEREY INTERNATIONAL CORP.	SMH-120C	TAKY562806E
6	Adaptor	Dream Electronics	DEP-1220A	None

6. Summary of test results

Please refer to see as follow Table

-. Modification to the E.U.T : None

Test Item	Standard	Limit	Result Value	Test Result
Conducted power line emission	Part 15.207	Refer to Clause 7.1 Test data		Pass
Radiated spurious emission	Part 15.209	Refer to Clause 7.2 Test data(1,2)		Pass

*** Spurious and radiation emission from this product is compliant to Part 15.205**

7. TEST RESULTS

7.1 Conducted emission

Measurement procedure

The measurements were performed in a shielded room. EUT was placed on a non-metallic table height of 0.4m above the reference ground plane. They were folded back and forth forming a bundle 30Cm to 40Cm long and were hanged at a 40Cm height to the ground plane.
Each EUT power lead, except ground (safety) lead, were individually connected through a LISN to input power source. Both lines of power cord, hot and neutral, were measured.

■ Used equipment

Equipment Name	Model Name.	Serial No.	Manufacturer	Due cal.
Test receiver	ESPI3	100109	Rohde & Schwarz	2008.03.03
L.I.S.N.	ESH3-Z5	100147	Rohde & Schwarz	2008.08.06

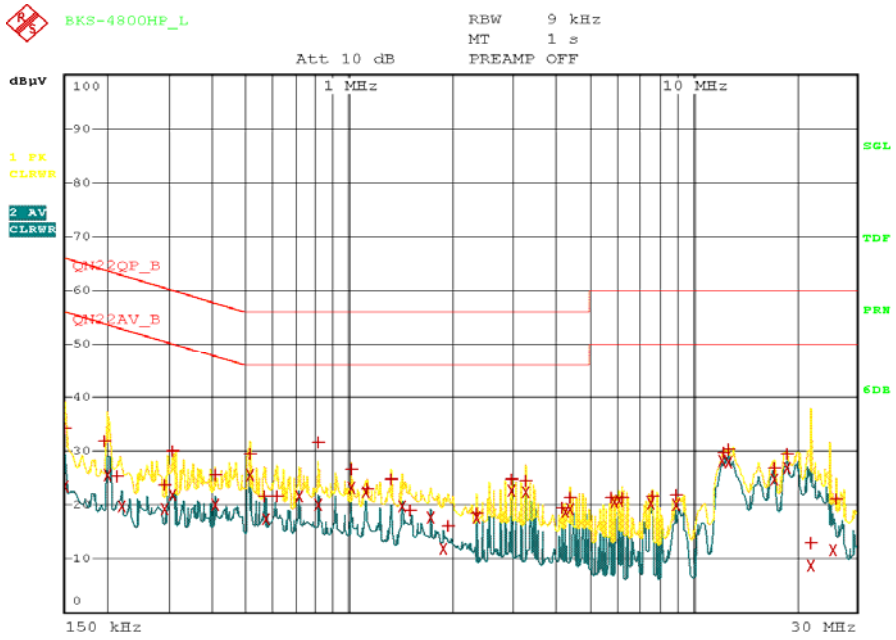
■ Test graphs

■ Test data ..... FCC Part 15.207

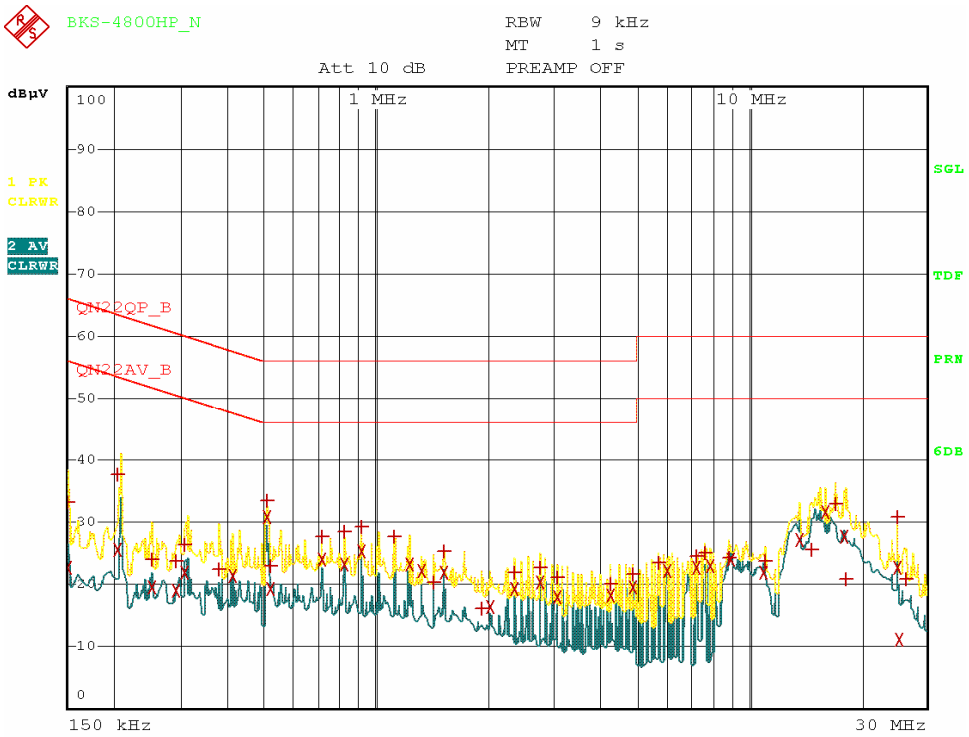
Frequency (KHz)	Level(dBμV)		LINE (Pol)	Loss (dB)	Limit(dBμV)		Margin(dBμV)	
	QP	AV			QP	AV	QP	AV
0.150	34.17	23.40	L	0.08	66.00	56.00	31.75	32.52
0.250	23.98	19.50	N	0.29	61.76	51.76	37.49	31.97
0.406	25.60	20.11	L	0.29	57.73	46.00	31.84	25.60
1.530	25.33	22.02	N	0.44	56.00	46.00	30.23	23.54
3.266	24.44	22.37	L	0.62	56.00	46.00	30.94	23.01
4.898	21.72	19.66	N	0.68	56.00	46.00	33.60	25.66
5.714	23.56	22.17	N	0.75	60.00	50.00	35.69	27.08
8.878	24.33	24.13	N	1.24	60.00	50.00	34.43	24.63
25.002	30.79	22.66	N	2.32	60.00	50.00	26.89	25.02

⊙ **Measurement uncertainty : ±2.4 dB (Confidency 95%, K=2)**

* Leve(dBμV) = Test receiver reading value
* Line(Pol) = Live and Neutral
* Loss(dB) = LISN insertion Loss + Cable Loss
* Limit(dBμV) = Value specified by FCC Part 15.207
* Margin(dB) =Limt(dBμV)- [Leve(dBμV)+ Loss(dB)]



[LIVE LINE]



[NEUTRAL LINE]

7.2 Radiated Emission

Measurement procedure

According to the test method ANSI63.4:2003, radiated emission pretest was performed at 3m distances in a semi-anechoic chamber for searching correct frequency. The final test was done at a 3m or 10m open area test site with a quasi-peak detector.
EUT was placed on a non-metallic table height of 0.8m above the reference ground plane.
Cables connected to EUT were fixed to cause maximum emission.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.
The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

■ Used equipment

Equipment Name	Model Name.	Serial No.	Manufacturer	Due cal.
Test receiver	ESCS30	100111	Rohde & Schwarz	2008.03.07
Ultra broadband antenna	HL562	100075	Rohde & Schwarz	2008.03.23
Loop Antenna	6502	9203-0493	EMCO	2008.06.15
Antenna Mast	AT14	none	Daeil EMC	-
Turn Table	TT15	none	Daeil EMC	-
10m Open area test site	None	none	KOSTEC Lab	-
3m Anechoice Chamber	none	none	FRANCONIA	-

■ Test data(1) ..... FCC Part 15.209 〈30MHz

Frequency (MHz)	Reading (dBuV)	H (m)	Antenna (dB/m)	Cable Loss (dB)	Distance (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
0.125	40.10	1.50	11.22	0.30	-80	-28.38	25.67	54.05
0.250	35.45	1.50	11.22	0.30	-40	6.97	19.65	12.68
1.000	24.50	1.50	10.18	1.20	-40	-4.12	27.60	31.72
2.000	22.54	1.50	10.18	1.50	-40	-5.78	21.58	27.36
6.000	17.84	1.50	9.93	1.90	-40	-10.33	29.54	39.87
25.470	10.50	1.50	8.18	2.50	-40	-18.82	29.54	48.36

Reading = Test receiver reading, H=Antenna Height
Antenna = Loop antenna factor, Cable loss = Used cable loss, Result = Reading + Antenna + Cable loss-Distance factor

⊙ **Notes**:

-. Extrapolation factor @40dB/decade from 300m to 30m, as per Part 15.31f(2)
-. Measurements 〈490KHz @3m, as per Part 15.31f(2)
-. Measurements 〈1705KHz @3m, as per Part 15.31f(2)
-. Measurements 〈30MHz @3m, as per Part 15.31f(2)
-. Receiver detector 〈30MHz=CISPR, Quasi-Peak(Avg.110KHz~490KHz), 10KHz bandwidth
-. Test site Open area test site @3m

■ **Test data(2)** ..... FCC Part 15.209 〉30MHz

Freq (MHz)	Reading (dBuV)	P (H/V)	H (m)	A (°)	Antenna (dB/m)	Cable Loss (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
35.15	14.98	H	1.80	120	16.80	2.10	32.05	40.0	7.95
51.23	11.34	V	1.65	145	6.85	2.78	20.63	40.0	19.37
59.87	9.89	H	2.15	100	3.60	3.26	19.79	40.0	20.21
84.56	9.02	V	1.90	135	8.43	3.40	20.40	43.5	23.10
165.47	8.79	H	1.85	115	7.40	4.40	19.86	43.5	23.64
198.57	6.87	H	1.75	100	7.26	5.02	18.61	43.5	24.89
216~960	Nil emission							-20dB below Limit	
Above 960	Nil emission							-20dB below Limit	

Reading = Test receiver reading, P= Antenna Polarization, H=Antenna Height, A=Turn table angle
Antenna = Antenna factor, Cable loss = Used cable loss, Result = Reading + Antenna + Cable loss

⊙ Measurement uncertainty : 30- 300 MHz = + 3.96 dB / -4.04 dB(Confidency 95%, k=2)
300-1000 MHz = + 3.04 dB / -3.00 dB(Confidency 95%, k=2)

⊙ Notes:

-. Receiver detector 〈1GHz=CISPR, Quasi-Peak, 120KHz bandwidth

-. Test site Open area test site @3m