



FCC EVALUATION REPORT FOR CERTIFICATION

KOREA Standard Technology

Test report No.: KST-FCC-070076

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 : VULBKS-4800M
Product Name : Fingerprint Access Controller
Model Number(s) : BKS-4800M(CFN-3000M)
Product Options : Request for a multi list model name(CFM-3000M) by
manufacturer
Category : FCC Part 15 subpart C, Section 15.207,15.209,15.225

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 22, 2007

Issued Date : November 26, 2007

Tested by:

Approved by:

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1. General Description

1) FCC ID	VULBKS-4800M
2) Purpose of test	FCC Certification
3) FCC Rules Section	FCC Parts15 Subpart C, Section 15.207, 15.209, 15.225
4) Test result	Compliant to specification
5) Equipment under test	RFID(Radio frequency identification for 13.562MHz
6) Kind of equipment	Fingerprint Access Controller
7) Equipment Model Name:	BKS-4800M(CFM-3000M)
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	13.562MHz
14) Channel spacing	Not applicable
15) Number of Channel	1(one)
16) Communication Type	Oneway 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)



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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**



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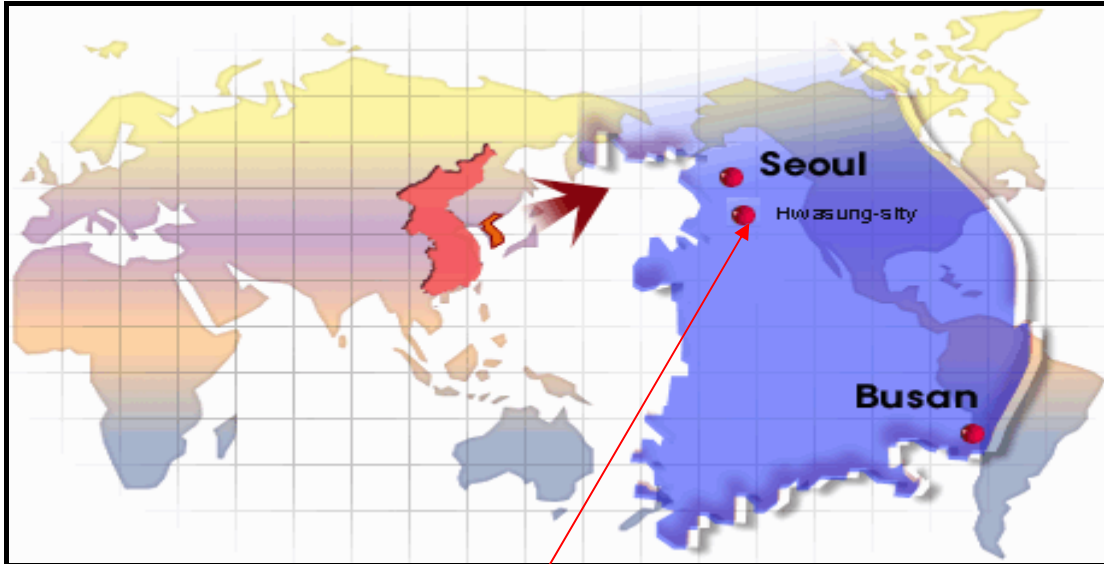
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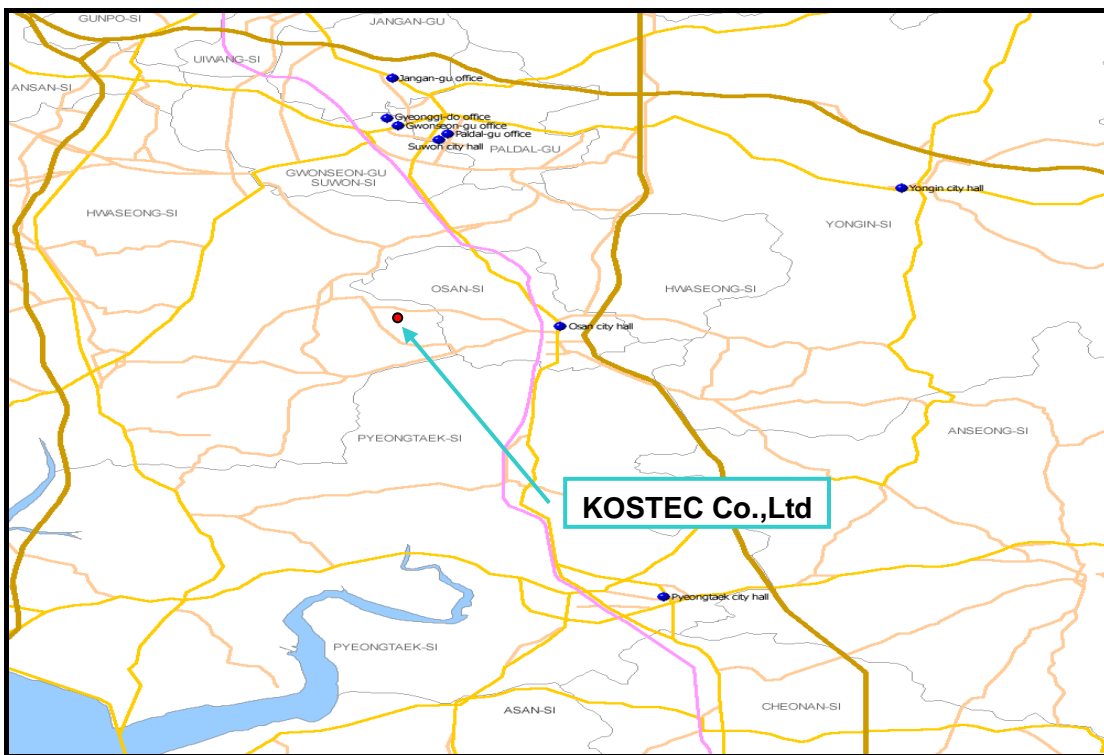
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3. MAP

Korea



Hwasung-shi (open area test site)



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4. TEST SYSTEM CONFIGURATION

■ Operation Environment

Ambiently	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(MHz)	Level(dBuV)	Line(Pol)	Loss(dB)	Result(dBuV)	Limit(dBuV)	Margin(dB)
27.124	25.0	-	2.0	27.0	56.0	29.0

◎ 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



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Part 15.209, 15.225 – 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 (MHz)	Reading (dBuV)	P (H/V)	H (m)	A(°)	Antenna (dB/m)	Cable loss (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)
27.124	15.0	H	3.5	250	20.0	1.5	-40	-3.5	29.54

$$\odot \text{Result(dBuV/m)} = \text{Reading(dBuV)} + \text{Antenna(dB/m)} + \text{Cable loss(dB)} - \text{Distance factor(dB)}$$

- * 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-4800M(CFN-3000M)
Serial Number:	Prototype

■ Configuration of EUT

Description	Manufacturer	Model/Part #	Serial Number
Main controller board	Bioinsec Company	BKS-4700	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



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■ 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-4800M	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



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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 carrier emission	Part 15.225(a)	Refer to Clause 7.2 Test data(1)		Pass
Radiated bandedge emission	Part 15.225(b),(c)	Refer to Clause 7.2 Test data(2),(3)		Pass
Radiated spurious emission	Part 15.225(d) Part 15.209	Refer to Clause 7.2 Test data(4)		Pass
Carrier frequency tolerance	Part 15.225(e)	Refer to Clause 7.3 Test data(5)		Pass

* Radiated carrier emission is not contain restrict band of operation by Section 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



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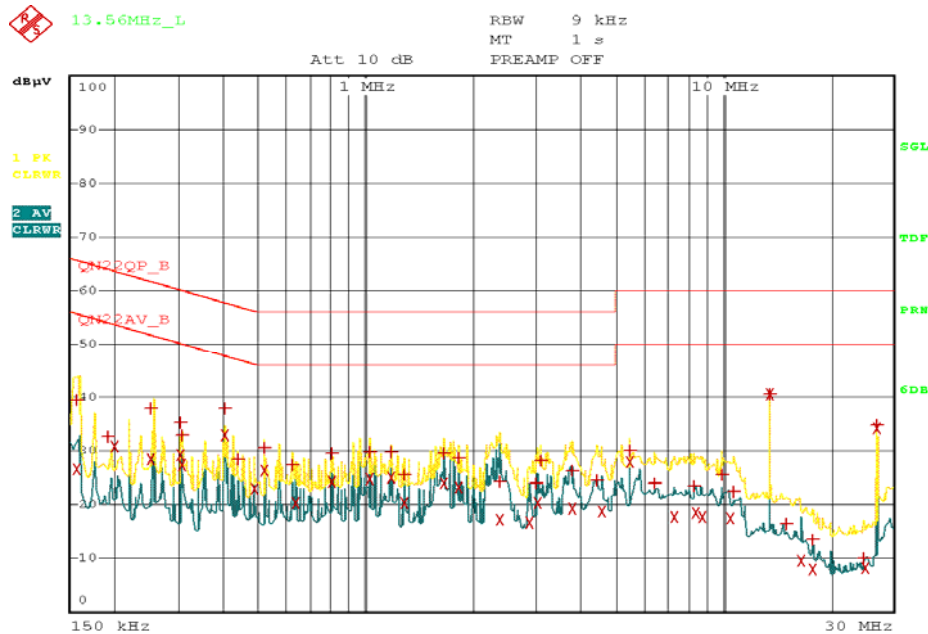
■ Test data FCC Part 15.207

Frequency (MHz)	Level(dB μ V)		LINE (Pol)	Loss (dB)	Limit(dB μ V)		Margin(dB μ V)	
	QP	AV			QP	AV	QP	AV
0.150	47.29	33.88	N	0.08	66.00	56.00	18.63	22.04
0.254	37.91	28.55	L	0.29	61.63	51.63	23.43	22.79
0.402	37.91	32.86	L	0.29	57.81	46.00	19.61	12.85
0.522	30.51	26.39	L	0.90	56.00	46.00	24.59	18.71
1.038	30.44	21.78	N	0.44	56.00	46.00	25.12	23.78
1.178	29.68	24.97	L	0.44	56.00	46.00	25.88	20.59
5.506	30.15	28.08	L	0.75	60.00	50.00	29.10	21.17
10.786	22.43	17.32	L	1.33	60.00	50.00	36.24	31.35
27.122	34.83	34.28	L	2.29	60.00	50.00	22.88	13.43

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

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

■ Test graphs



[LIVE LINE]



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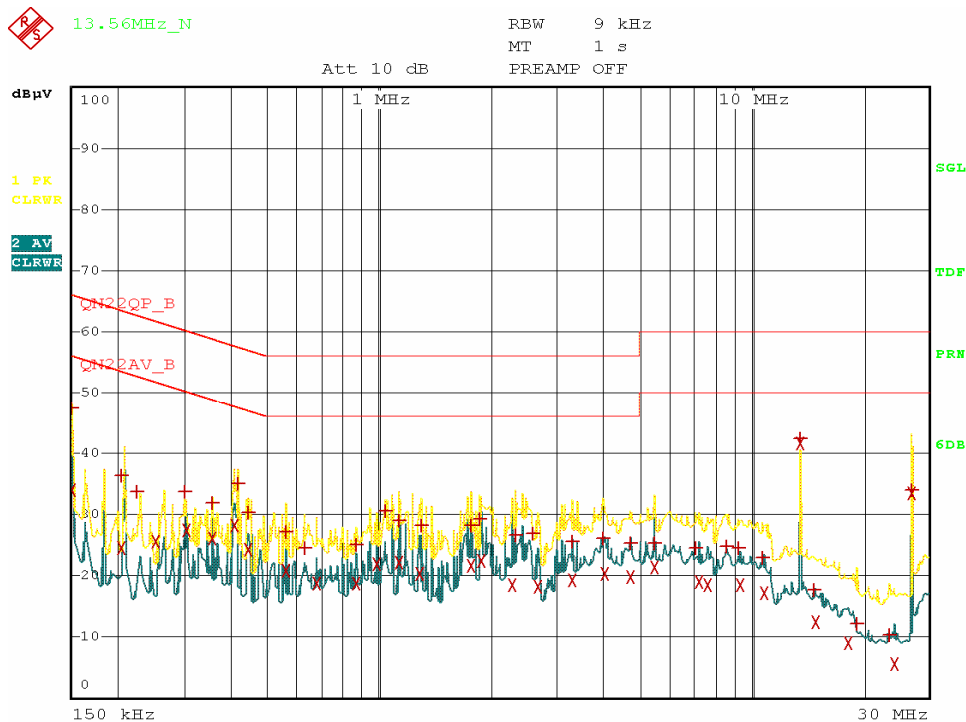
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[NEUTRAL LINE]

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 Anechoic Chamber	none	none	FRANCONIA	-



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■ Test data(1) FCC Part 15.225(a)

Frequency (MHz)	Reading (dBuV)	P (H/V)	H (m)	A (°)	Antenna (dB/m)	Cable Loss (dB)	Distance factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
13.562	48.10	V	1.50	180	9.85	2.10	-40	20.05	83.99	63.94

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-
Distance factor

○ Notes:

- Extrapolation factor @ 40dB/Decade at 30m, as per Part 15.31f(2)
- Receiver detector @fc = CISPR, Quasi-Peak, 10KHz bandwidth
- Measurements 13.562MHz @3m, as per Part 15.31f(2)
- Test site Open area test site @3m

■ Test data(2) FCC Part 15.225(b),(c)

Frequency (MHz)	Reading (dBuV)	P (H/V)	H (m)	A (°)	Antenna (dB/m)	Cable Loss (dB)	Distance factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
13.110-13.410	38.75	V	1.50	180	9.85	0.50	-40	9.10	40.50	31.40
13.410-13.553	42.26	H	1.50	210	9.85	0.50	-40	12.61	50.47	37.86
13.567-13.710	39.87	V	1.50	135	9.85	0.50	-40	10.22	50.47	40.25

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-
Distance factor

○ Notes:

- Extrapolation factor @ 40dB/Decade at 30m, as per Part 15.31f(2)
- Receiver detector @fc = CISPR, Quasi-Peak, 10KHz bandwidth
- Measurements 13.110-13.710MHz @3m, as per Part 15.31f(2)
- Test site Open area test site @3m

■ Test data(3) FCC Part 15.225(d), 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)
0.42	34.10	1.50	10.43	0.30	-80	-35.17	15.13	50.30
0.84	15.90	1.50	10.27	0.30	-40	-13.53	29.11	42.64
1.69	24.50	1.50	10.18	1.20	-40	-4.12	23.04	27.16
3.34	28.70	1.50	10.10	1.50	-40	0.30	29.54	29.24
6.78	32.20	1.50	9.93	1.90	-40	4.03	29.54	25.51
27.12	36.40	1.50	8.18	2.60	-40	7.18	29.54	22.36



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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(4)** FCC Part 15.225(d), 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)
40.69	1.24	H	1.70	135	14.10	2.50	17.84	40.00	22.16
54.25	8.26	V	1.75	160	5.07	3.02	16.35	40.00	23.65
67.81	6.94	H	2.10	110	5.70	3.22	15.86	40.00	24.14
81.37	4.78	V	2.00	90	8.25	3.40	16.43	40.00	23.57
176.31	6.43	H	2.50	120	7.88	4.48	18.79	43.52	24.73
203.43	4.12	H	1.85	105	7.42	5.07	16.61	43.52	26.91
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

7.3 Carrier Frequency tolerance

Measurement procedure

Carrier frequency tolerance was performed at Temperature & humidity chamber for searching the carrier frequency tolerance

The frequency tolerance of the carrier signal shall be maintained within +/-0.01% of the operating Frequency over a temperature variation of -20degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. and also EUT operated and tested @5,&10mins after startup



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■ Used equipment

Equipment Name	Model Name.	Serial No.	Manufacturer	Due cal.
Frequency counter	5352B	2908A00480	Agilent Technology	2008.05.23
Loop Antenna	6502	9203-0493	EMCO	2008.06.15
DC Power supply	E3610A	KR24104505	Agilent Technology	2008.05.22
Temp.&Humidity Chamber	TABAI ESPEC	90E14260	EY-101	2008.03.26

■ Test data(5) FCC Part 15.225(e)

■ Environment Condition

- Ambient temperature = +20 (°C)
- Relative humidity = 65%
- Conditions = Indoor
- Period after startup = 5min

Temperature(°C)	Voltage(%)	Measurement frequency(Hz)	Frequency tolerance(%)	Frequency tolerance(Hz)
Tnom (+20°C)	Vmin (-15%)	13.561550	0.0033	-450
	Vnom (00%)	13.561570	0.0032	-430
	Vmax (+15%)	13.561560	0.0032	-440
Tmin (-20°C)	Vnom (00%)	13.561480	0.0038	-520
Tmax (+50°C)	Vnom (00%)	13.561200	0.0059	-800
Limit	13.562MHz±0.01% = ±1356Hz(nom)			
Measurement Uncertainty	±4.3X10 ⁻⁶ = ±58.31Hz(Confidency 95%, k=2)			

■ Environment Condition

- Ambient temperature = +20 (°C)
- Relative humidity = 65%
- Conditions = Indoor
- Period after startup = 10min

Temperature(°C)	Voltage(%)	Measurement frequency(Hz)	Frequency tolerance(%)	Frequency tolerance(Hz)
Tnom (+20°C)	Vmin (-15%)	13.561700	0.0022	-300
	Vnom (00%)	13.561720	0.0021	-280
	Vmax (+15%)	13.561690	0.0023	-310
Tmin (-20°C)	Vnom (00%)	13.561540	0.0034	-460
Tmax (+50°C)	Vnom (00%)	13.561480	0.0038	-520
Limit	13.562MHz±0.01% = ±1356Hz(nom)			
Measurement Uncertainty	±4.3X10 ⁻⁶ = ±58.31Hz(Confidency 95%, k=2)			



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