FCCID:S79FD-4000

Certification of Compliance

CFR 47 Part 15 Subpart C

Test Report File No. : 06-IST-0392 **Date of Issue** : Oct 02, 2006

Model(s)	:	**FD-4000**
Kind of Product	:	Digital Door Lock
FCC ID	:	S79FD-4000
Applicant	:	FIRSTECH I&C CO.,LTD.
Address	:	#1506,B1 B-dong, Woolim Lion's Valley, 371-28, Gasan-dong Geumcheon-gu, Seoul,Korea
Manufacturer	:	FIRSTECH I&C CO.,LTD.
Address	:	#1506,B1 B-dong, Woolim Lion's Valley, 371-28, Gasan-dong Geumcheon-gu, Seoul,Korea
Registration Number		468536

Test Result ■ **Positive** ☐ **Negative**

Reviewed By

S.J.CHO / EMC Group Manager

Approved By

J.H.LEE / Chief

Comment(s)

- Investigations requested : Measurement to the relevant clauses of FCC rules and regulations Part 15 Subpart C.
- The test report with appendix consists of 16 pages.
- The test result only responds to the tested sample.
- This equipment as for has been shown to be capable of continued compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4: 2003 I assume full responsibility for accuracy and completeness of these data.

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Note:

INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd. ***(FCC Filing Lab.)***
80, Jeil-Ri, Yangji-Myun, Yongin-City
Kyonggi-Do, 449-860, Korea
TEL : +82 31 333 9018 FAX : +82 31 333 9019

ENVIRONMENTAL CONDITIONS

Temperature	20 ℃
Humidity	43 %
Atmospheric pressure	1013 mbar

POWER SUPPLY SYSTEM USED

Power supply system	DC 6V(Built-in AA Size Battery 8EA) (Refer to the product information)

PRODUCT INFORMATION

The Equipment Under Test(EUT) is Digital Door Lock of FIRSTECH I&C CO.,LTD.
(FCC ID : S79FD-4000)

a)Type of EUT	Digital Door Lock
b)Model No.	FD-4000
c)Working Frequency	13.56MHz(1 channel)
d)Power Supply	DC 6V(Built-in AA Size Battery 8EA)

- EMC suppression device is not used during the test.
- Please refer to user's manual.

DESCRIPTION OF TEST

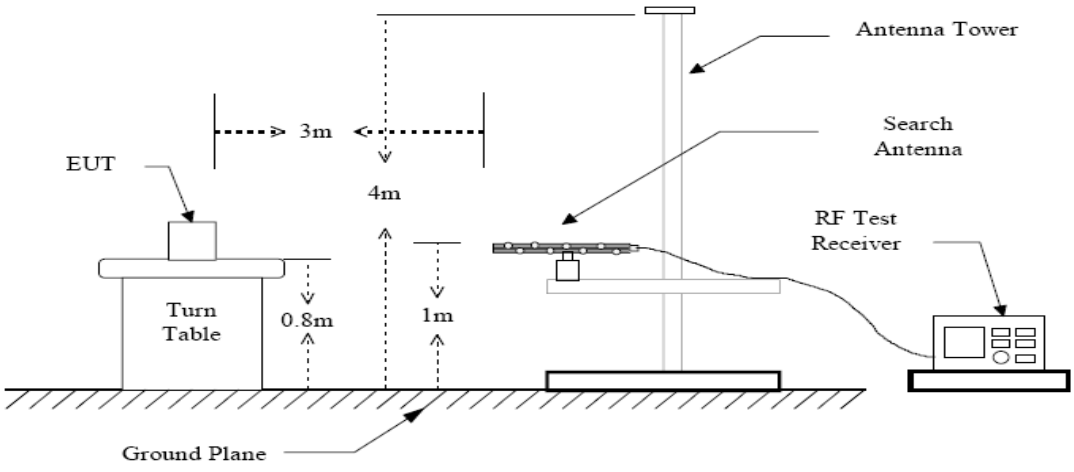
Radiated Emissions(30MHz~1000MHz):

The measurement was performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120KHz.

-Procedure of Test

Preliminary measurements were made at 3 meter using bi-log antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30MHz to 1000MHz using bi-log antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using bi-log antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuation. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission.

Figure 1 : Frequencies measured below 1 GHz configuration



Radiated Emissions Test,9kHz to 30MHz(Magnetic Field Test)

1. The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions at a distance of 3 meters according to Section 15.31(f)(2).
2. The EUT was placed on the top of the 0.8-meter height, 1 x 1.5 meter non-metallic table.
3. Emissions from the EUT are maximized by adjusting the orientation of the Loop antenna and rotating the EUT on the turntable. Manipulating the system cables also maximizes EUT emissions if applicable.
4. To obtain the final measurement 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 with specified bandwidth.

Measurement Uncertainty Calculations

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994).

1) Radiated disturbance

$U_{c,minus}$ = -1.85, $U_{c,plus}$ = 1.71

U = -3.70 / +3.42 (k=2, 95.45% confidence level)

2) Conducted disturbance

$U_{c,minus}$ = −2.6048, $U_{c,plus}$ = 2.2775

U = -5.21 / +4.55 (k=2, 95.45% confidence level)

Equipment Under Test

EUT Type :

☐ Table-Top. ☐ Floor-Standing.

☐ Table-Top and Floor-Standing(Combination).

■ Built-in

EUT Operating Mode(s):

The equipment under test was operated during the measurement under following conditions :

☐ Standby Mode

■ Operational Condition : Continue TX Mode

Configuration of the equipment under test :

Following peripheral devices and interface cables were connected during the measurement :

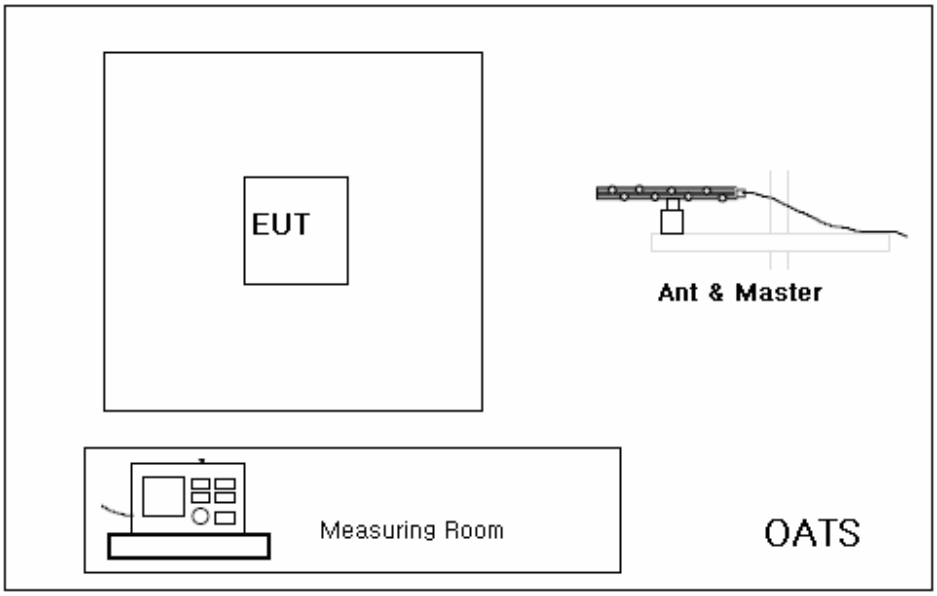
Equipment	Type	Brand	Serial No.

Connecting Interface Cables :

Unshielded POWER cable(without ferrite core) :

Note :

Test Set-Up Configuration



Radiated Emissions

SUMMARY

Emissions

■ Radiated Electric Field Emission-15.225(a)

Test result ● MET ○ Not MET

Frequency (MHz)	Field Strength of Fundamental uV/m	Field Strength of Fundamental dBuV/m(30m)	Field Strength of Fundamental dBuV/m(3m)
13.553 - 13.567	15,848	83.9	123.9

■ Radiated Electric Field Emission-15.225(b)(c)

Test result ● MET ○ Not MET

Frequency (MHz)	Field Strength of Fundamental uV/m	Field Strength of Fundamental dBuV/m(30m)	Field Strength of Fundamental dBuV/m(3m)
13.110 - 13.410	106	40.5	80.5
13.410 - 13.553	334	50.4	90.4
13.567 - 13.710	334	50.4	90.4
13.710 - 14.010	106	40.5	80.5

■ Radiated Electric Field Emission-15.225(d)

Test result ● MET ○ Not MET

Frequency (MHz)	Field Strength of Fundamental uV/m	Field Strength of Fundamental dBuV/m(3m)
1.705 - 30.0	30	49.5
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	600	54

■ Frequency Stability -15.225(e)

Test result ● MET ○ Not MET

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of -20 degrees 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. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Date

Begin of Testing : Sep 02, 2006
End of Testing : Oct 02, 2006

Prepared By

C.W.Kim / Project Engineer

Note :

- ■ means the test is applicable,
- □ is not applicable.

Radiated Electric Field Emission-15.225(a)

[Applicable]

◆ Test Equipment Used

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESCS30	Test Receiver	Rohde & Schwarz	Jan. 12, 2006	828985/023
VULB 9160	Antenna	Schwarzbeck	Jul. 14, 2006	3047
R3132	Spectrum analyzer	advantest	Sep. 08, 2006	110101565
HFH2-Z2	Loop Antenna	Rohde & Schwarz	Oct. 10, 2006	892665/035

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

Peak = Reading + Corrected Factor

Where

Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program

◆ Test Date Sep. 02 ~ 20, 2006

◆ Test Area Open site, Shield Room(4.2 X 7.5 X 4.5)
Testing was performed at a test distance of 3 m.

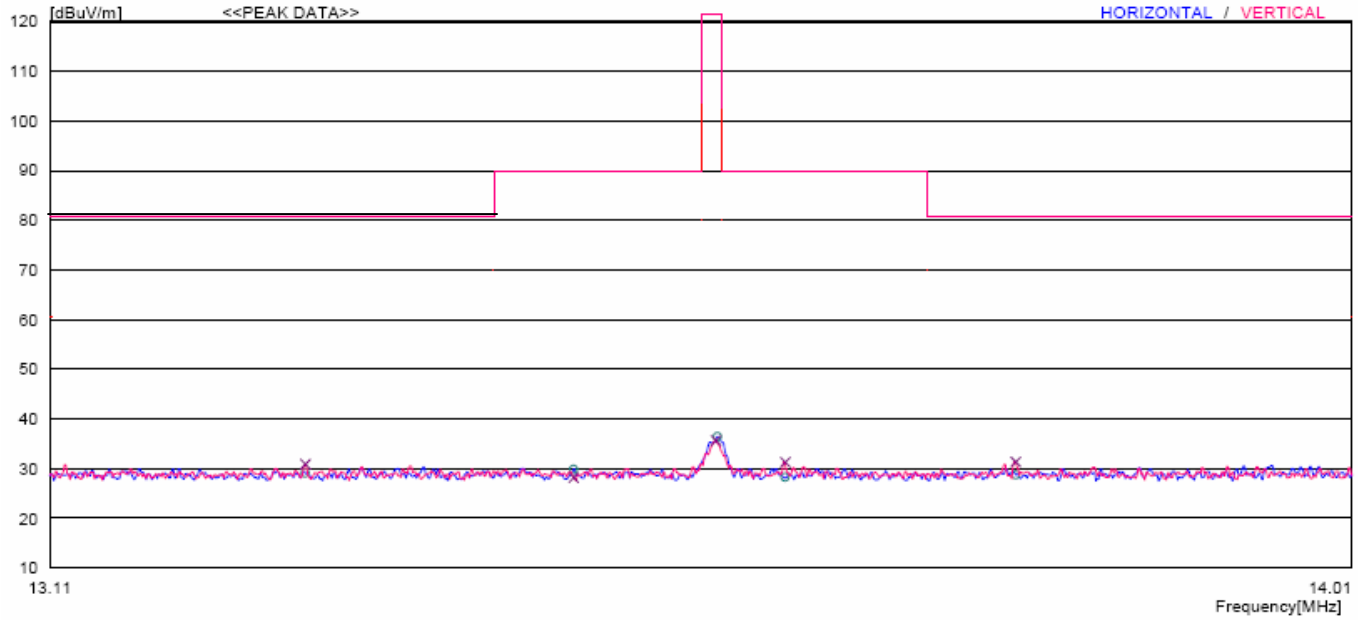
Note : The equipment used is calibrated in regular for every year.

Radiated Electric Field Emission-15.225(a)

Frequency(MHz)	Field Strength of Fundamental uV/m	Field Strength of Fundamental dBuV/m(30m)	Field Strength of Fundamental dBuV/m(3m)
13.553 - 13.567	15,848	83.9	123.9

[Applicable]

Freq. [MHz]	Reading [dBuV]	Height [m]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
13.56	18.1	1	18.3	0.6	H	37	123.9	-86.9
13.56	17.3	1	18.3	0.6	V	36.2	123.9	-87.7



Note :

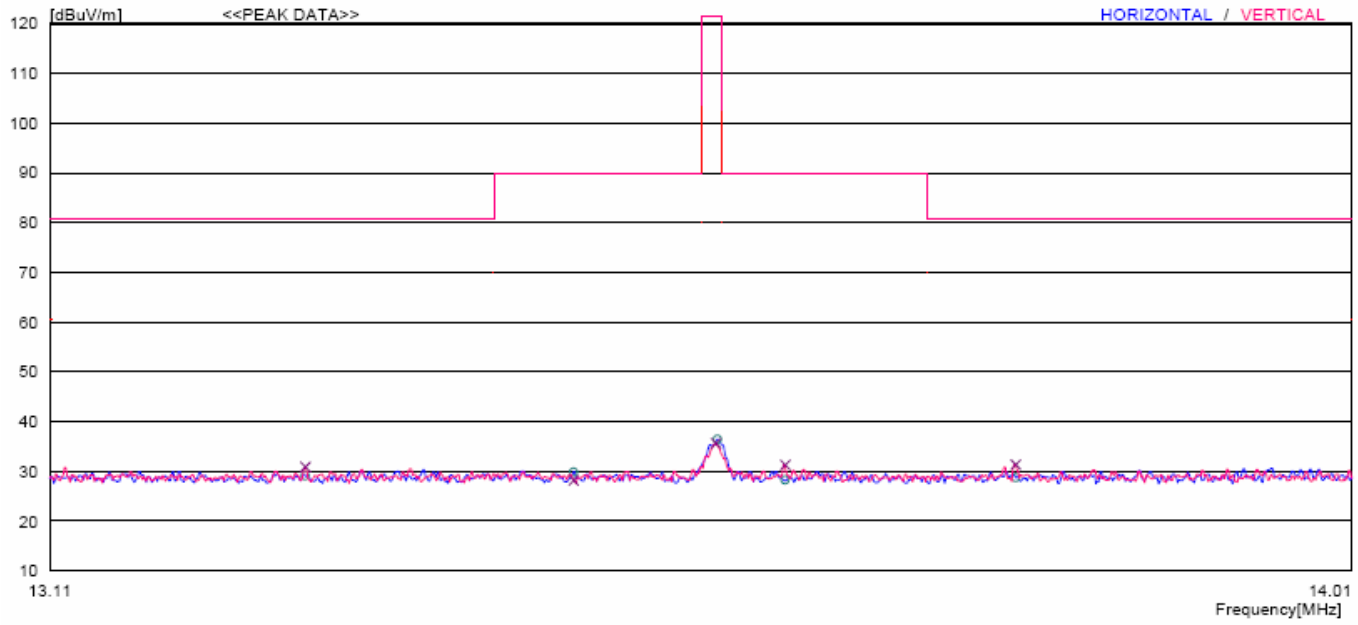
Radiated Electric Field Emission-15.225(b)(c)

Frequency (MHz)	Field Strength of Fundamental uV/m	Field Strength of Fundamental dBuV/m(30m)	Field Strength of Fundamental dBuV/m(3m)
13.110 - 13.410	106	40.5	80.5
13.410 - 13.553	334	50.4	90.4
13.567 - 13.710	334	50.4	90.4
13.710 - 14.010	106	40.5	80.5

[Applicable]

Freq. [MHz]	Reading [dBuV]	Height [m]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
13.282	12.6	1	18.3	0.6	V	31.5	80.5	-49.0
13.465	11.5	1	18.3	0.6	H	30.4	90.4	-60.0
13.611	13.0	1	18.3	0.6	V	31.9	90.4	-58.5
13.772	13.1	1	18.3	0.6	V	32	80.5	-48.5

Note :



Radiated Electric Field Emission-15.225(d)

Frequency (MHz)	Field Strength of Fundamental uV/m	Field Strength of Fundamental dBuV/m(3m)
1.705 – 30.0	30	49.5
30 – 88	100	40
88 – 216	150	43.5
216 - 960	200	46
Above 960	600	54

[Applicable]

Freq. [MHz]	Reading [dBuV]	Height [m]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
108.5	16.5	1	9.4	2.1	V	28.0	43.5	-15.5
135.6	20.0	1	10.9	2.5	V	33.4	43.5	-10.1
149.1	15.3	1	12.2	2.8	V	30.3	43.5	-13.2
162.7	21.9	1	13.1	2.9	V	37.9	43.5	-5.6
176.3	7.5	1	11.2	3.2	H	21.9	43.5	-21.6
189.8	11.2	1	9.2	3.0	V	23.4	43.5	-20.1
244.1	6.4	1	10.4	3.8	V	20.6	46.0	-25.4
257.0	5.3	1	11.0	4.0	V	20.3	46.0	-25.7
271.2	5.2	1	11.6	4.0	V	20.8	46.0	-25.2

Frequency Stability -15.225(e)

◆ Test Equipment Used

Name	Type	Manufacturer	Calibration. Date	Serial Number
5348A	Frequency counter	HP	Dec. 12, 2005	3009A01264
PL-4SP	Temp&Humi Chamber	TABAI	Jul. 19, 2006	44VH0266

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of -20 degrees 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. For battery operated equipment, the equipment tests shall be performed using a new battery

[Applicable]

Table 1 : Frequency Tolerance

Reference Frequency : 13.5600 MHz, Limit : within ± 1356 Hz

Environment Temperature [°C]	Power Supplied [Vdc]	Carrier Frequency Measured with Time Elapsed							
		STARTUP		2 minutes		5 minutes		10 minutes	
		[MHz]	Err[Hz]	[MHz]	Err[Hz]	[MHz]	Err[Hz]	[MHz]	Err[Hz]
+50	6	1355321	-679	1355325	-675	1355322	-678	1355320	-680
+40	6	1355361	-639	1355365	-635	1355360	-640	1355356	-644
+30	6	1355412	-588	1355413	-587	1355415	-585	1355409	-591
+20	6	1355488	-512	1355490	-510	1355492	-508	1355483	-517
+10	6	1355545	-455	1355543	-457	1355550	-450	1355540	-460
0	6	1355589	-411	1355593	-407	1355585	-415	1355583	-417
-10	6	1355618	-382	1355620	-380	1355614	-386	1355612	-388
-20	6	1355607	-393	1355604	-396	1355601	-399	1355658	-342

Table 2 : Frequency Tolerance

Reference Frequency : 13.5600 MHz, Limit : within ± 1356 Hz

Power Supplied [Vdc]	Carrier Frequency Measured with Time Elapsed							
	STARTUP		2 minutes		5 minutes		10 minutes	
	[MHz]	Err[Hz]	[MHz]	Err[Hz]	[MHz]	Err[Hz]	[MHz]	Err[Hz]
85 %	1355521	-479	1355518	-482	1355515	-485	1355514	-486
100 %	1355521	-479	1355518	-482	1355515	-485	1355514	-486
115 %	1355521	-479	1355518	-482	1355515	-485	1355514	-486

Err[Hz] = Measured carrier frequency (MHz) – Reference Frequency (13.56 MHz)

ANTENNA REQUIREMENT

1 Standard Applicable

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.

2 Antenna Construction

The antenna is permanently mounted on PCB, no consideration of replacement.

Appendix A. The Photos of Test Setup

Radiated Emissions - Front View

Radiated Emissions- Rear View

Appendix A. The Photos of Test Setup(Shield Room)

Radiated Emissions - Front View

Radiated Emissions- Rear View

Appendix B. The Photos of Equipment Under Test

Front View

Rear View