

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

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SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNKI-DO, 467-701, KOREA
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TEST REPORT

Manufacture;
INNATOR CO., LTD.

**SFL Kwang Myoung BD 1029-21 Hongea-Dong, Dong
An-Gu, Ahnyang-Shi, Gyeonggi-Do, KOREA**

Date of Issue : August 11, 2006

Test Report No.: HCT-F06-0802

**Test Site: HYUNDAI CALIBRATION & CERTIFICATION
TECHNOLOGIES CO., LTD.**

HCT FRN : 0005-8664-21

EUT TYPE:

MODEL :

FCC ID :

**USB Drive
XDRIVE MINI
RNNXDRIVEMINI**

Rule Part(s):

Part 15 & 2

Equipment Class:

Digital Device

Standard(s):

FCC Class B: 2003

EUT Type:

USB Drive

Model(s):

XDRIVE MINI

This equipment has been shown to be in 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 attest to the accuracy of data. All measurements reported herein were performed by me 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.



Report prepared by
: Seong Yong KIM
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Approved by
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TABLE OF CONTENTS

	PAGE
REPORT COVER	1
TABLE OF CONTENTS	2
1.1 SCOPE	3
2.1 INTRODUCTION (SITE DESCRIPTION)	4
3.1 PRODUCTION INFORMATION	5
4.1 DESCRIPTION OF TESTS (CONDUCTED)	6
4.3 DESCRIPTION OF TESTS (RADIATED)	7
5.1 LIST OF SUPPORT EQUIPMENT	8
6.1 TEST DATA (CONDUCTED)	11-15
7.1 TEST DATA (RADIATED)	16
10.1 TEST SOFTWARE USED	19
11.1 CONCLUSION	20

ATTACHMENT A: **FCC ID LABEL & LOCATION**

ATTACHMENT B: **EXTERNAL PHOTOGRAPHS**

ATTACHMENT C: **BLOCK DIAGRAM**

ATTACHMENT D: **TEST SETUP PHOTOGRAPHS**

ATTACHMENT E: **USER'S MANUAL**

ATTACHMENT F: **INTERNAL PHOTOGRAPHS**

MEASUREMENT REPORT

1.1 Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

Applicant Name: INNATOR CO., LTD.

Address: 5FL Kwang Myoung BD 1029-21 Hongea-Dong, Dong An-Gu,
Ahnyang-Shi, Gyeonggi-Do, KOREA

- Model : **XDRIVE MINI**
- Equipment Class: **FCC Class B Digital Device**
- EUT Type: **USB Drive**
- Power Cord: **Unshielded**
- Rule Part(s): **FCC Part 15 Subpart B**
- Test Procedure(s): **ANSI C63.4 (2003)**
- Dates of Tests: **August 9, 2006 ~ August 11, 2006**
- Place of Tests: 254-1,MAEKOK-RI,HOBUP-MYUN,ICHON-SI,KYOUNGKI-DO,467-701,KOREA

2.1 INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSIC63.4-2003) was used in determining radiated and conducted emissions emanating from **INNATOR CO., LTD. USB Drive, Model: XDRIVE MINI**

The open area test site and conducted measurement facility used to collect the radiated data are located at the 254-1, MAEKOK-RI, HOBUP-MYUN, ICHON-SI, KYOUNGKI-DO, 467-701, KOREA. The site is constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 05, 2006 (Confirmation Number: EA90661)

3.1 PRODUCT INFORMATION

3.2 Equipment Description

Equipment Under Test (EUT) is the **INNATOR CO., LTD. USB Drive**

Model: **XDRIVE MINI**

Connectivity: **INTER FACE : USB Specification 2.0/1.1**

Storage Capacity: 256MB/ 512MB/1GB/ 2GB/ 4GB/128MB

RATE : READ 16MB/S, WRITE 13MB/S

SIZE: 43.7 mm

CERTIFICATE: FCC,CE,MIC

POWER: USB Bus-Power

OA : Windows 98/SE/ME/2000/2003/XP/CE/, Mac VER.9.0, Linux VER.2.4

※Description

	Capacity	Model Differences
Basic Model	UBJG (128MB)	Worst Case
Multiple Model	UBJG (256MB) UBJG (512MB) UBJG (1GB) UBJG (2GB) UBJG (4GB)	Only type designation by a memory size of the EUT.

EMI Suppression Devices:

None

4.1 Description of Tests(Conducted & Radiated)

4.2 Powerline Conducted Emission (150kHz- 30MHz)

The power line conducted RFI measurements were performed according to CISPR 22.

The EUT was placed on a non-conducting 1.0 by 1.5 meter table which is 0.8 meters in height and 0.40 meters away from the vertical wall of the shielded enclosure. Power to the EUT is provided through a Rohde & Schwarz 50 Ω / 50 uH Line Impedance Stabilization Network (LISN) and the support equipment through a separate Solar 50 Ω / 50 uH Line- Conducted Test Facility LISN. Sufficient time for the EUT, support equipment, and test equipment were allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME. The spectrum was scanned from 150kHz to 30 MHz. Each maximum EME was measured using an EMI receiver. The detector function of the receiver was set to CISPR quasi- peak and average mode with the bandwidth set to 9 kHz. Each emission was maximized consistent with the typical applications by varying the configuration of the test sample. Interface cables were connected to the available interface ports of the test unit. The effect of varying the position of cables was investigated to find the configuration that produces maximum Diagram emission. Excess cable lengths were bundled at the centre with 30- 40cm. in length. The worst-case configuration is noted in the test report and the photographs are attached. Each EME reported was calibrated using the Rohde & Schwarz SMX signal generator and are listed on Table 1. RFI Conducted FCC Class B

RFI CONDUCTED	FCC CLASS B Limits dB(uV/m)	
	CISPR 22 Quasi-Peak	CISPR 22 Average
150kHz - 0.5MHz	66-56*	56-46*
0.5MHz - 5MHz	56	46
5MHz - 30MHz	60	50

*Limits decreases linearly with the logarithm of frequency

Table 1. FCC CLASS B Conducted Emission Limits

4.3 Description of Tests(Radiated)

Radiated Emissions

Preliminary measurements were made indoors at 3 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The spectrum was scanned from 30 to 1000 MHz using Tri-log antenna, and above 1 GHz using linearly polarized horn antennas. Final measurements were made outdoors at 10-meter test range using Dipole antennas and EMI receiver. For frequencies above 1 GHz, horn antennas were used. Sufficient time for the EUT, support equipment, and test equipment were allowed in order for them to warm up to their normal operating condition. The EMI receiver detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120 kHz. The EUT, support equipment, and interconnecting cables were arranged to the configuration that produces the maximum EME emission found during preliminary scan. 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. Horizontal and vertical antenna polarizations were checked. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/ or support equipment, and powering the monitor the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission.

ITE Radiated Limits			
Frequency (MHz)	FCC Limit @ 3m. Quasi- Peak dB[μ V/m]	FCC Limit @ 10m.* Quasi – Peak dB [μ V/m]	CISPR Limit @ 10m. Quasi-Peak dB [μ V/m]
30-88	40.0	29.5	30.0
88-216	43.5	33.0	30.0
216-230	46.0	35.6	30.0
230-960	46.0	35.6	37.0
960-1000	54.0	43.5	37.0
> 1000	54.0	43.5	
* Limit extrapolated 20 dB/decade			

Table 2. Radiated Class B limits @ 10-meters

5.1 Support Equipment Used

DEVICE TYPE	MANUFACTURER	MODEL NUMBER	FCC ID / DoC	CONNECTED TO
USB Drive	INNATOR , Inc.	XDRIVE MINI	RNNXDRIVEMINI	PC
PC	H.P	HP Pavilion 700	DOC	EUT
Monitor	DELL	1704FPTt	DOC	PC
Mouse	Radio Shack	FSUGMZE3	DOC	PC
Key Board	DELL	SK-8115	DOC	PC
Printer	H.P	C4569A	DOC	PC
Mouse	Logitech	M-BT96a	DOC	PC

5.2 Cable Description

		Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
EUT	USB	N/A	N/A	-
PC	USB	N/A	Y	D(1.8)
	USB	N/A	Y	D(1.8)
	Serial	N/A	Y	D(1.8)
	AC IN	N	N/A	P(1.8)
	Parallel	N/A	Y	D(1.8)
	D-Sub	N/A	Y	D(1.8)
	Printer	AC IN	N	P(1.8)
Monitor	AC IN	N	N/A	P(1.8)

The marked "(D)" means the Data Cable and "(P)" means the Power Cable.

5.3 Noise Suppression Parts on Cable. (I/O CABLE)

		Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	USB	N/A	N/A	N/A	N/A
PC	USB(mouse)	N	N/A	Y	PC End
	USB(key board)	N	N/A	Y	PC End
	Serial(mouse)	N	N/A	Y	PC End
	Parallel(printer)	N	N/A	Y	PC End
	D-Sub(monitor)	Y	Monitor Both	Y	Monitor Both

5-4. PRELIMINARY TEST

5-4.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
1.5 Mb/s	
12 Mb/s	
480 Mb/s=60 MB/s Real Test (13 MB/s)	X

5-4.2 Radiated Emission Test

During Preliminary Test, the Following operation mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
1.5 Mb/s	
12 Mb/s	
480 Mb/s=60 MB/s Real Test (13 MB/s)	X

6.1 CONDUCTED TEST DATA

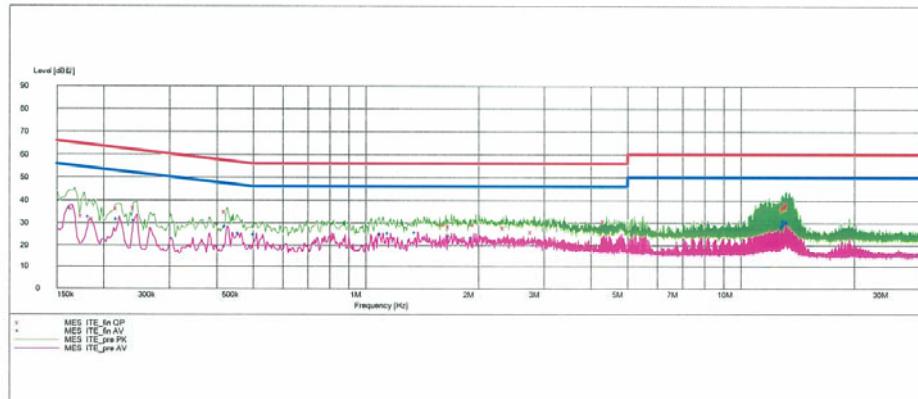
HCT

EMC TEST LAB

EUT: XDRIVE MINI
 Manufacturer: INNATOR CO., LTD.
 Operating Condition: NORMAL
 Test Site: SHIELD ROOM
 Operator: SY-KIM
 Test Specification: CISPR 22 CLASS B
 Comment: H

SCAN TABLE: "CISPR 22 Voltage"

Short Description:	CISPR 22 Voltage					
Start	Stop	Step	Detector	Meas.	IF	Transducer
Frequency	Frequency	Width			Time	Bandw.
150.1 kHz	500.0 kHz	2.5 kHz	MaxPeak	10.0 ms	9 kHz	None
Average						
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
Average						
5.0 MHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
Average						



MEASUREMENT RESULT: "ITE_fin_QP"

8/9/2006 2:33PM

Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dB μ V	dB	dB μ V	dB		
0.167600	36.40	10.1	65	28.6	---	---
0.177600	33.20	10.1	65	31.4	---	---
0.190100	31.70	10.1	64	32.4	---	---
0.220100	36.40	10.1	63	26.4	---	---
0.245100	36.70	10.1	62	25.2	---	---
0.427600	34.90	10.1	57	22.3	---	---
1.640000	29.10	10.2	56	26.9	---	---
1.695000	28.40	10.2	56	27.6	---	---
1.975000	29.20	10.3	56	26.8	---	---
2.375000	27.70	10.3	56	28.3	---	---
2.815000	25.90	10.2	56	30.1	---	---
4.405000	30.70	10.3	56	25.3	---	---
13.105000	36.10	10.5	60	23.9	---	---
13.160000	37.20	10.5	60	22.8	---	---
13.215000	37.20	10.5	60	22.8	---	---
13.375000	36.80	10.5	60	23.2	---	---
13.430000	37.40	10.5	60	22.6	---	---
13.485000	38.60	10.5	60	21.4	---	---

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MEASUREMENT RESULT: "ITE_fin AV"

8/9/2006 2:33PM

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.165100	36.50	10.1	55	18.7	---	---
0.185100	32.70	10.1	54	21.6	---	---
0.220100	31.60	10.1	53	21.2	---	---
0.245100	31.10	10.1	52	20.9	---	---
0.427600	28.40	10.1	47	18.9	---	---
0.465100	25.20	10.1	47	21.4	---	---
0.510000	24.80	10.1	46	21.2	---	---
1.110000	25.00	10.1	46	21.0	---	---
1.165000	25.30	10.1	46	20.7	---	---
1.375000	25.60	10.2	46	20.4	---	---
1.695000	24.20	10.2	46	21.8	---	---
1.945000	23.20	10.3	46	22.8	---	---
13.050000	27.80	10.5	50	22.2	---	---
13.105000	28.80	10.5	50	21.2	---	---
13.160000	30.60	10.5	50	19.4	---	---
13.215000	29.10	10.5	50	20.9	---	---
13.430000	30.50	10.5	50	19.5	---	---
13.485000	30.10	10.5	50	19.9	---	---

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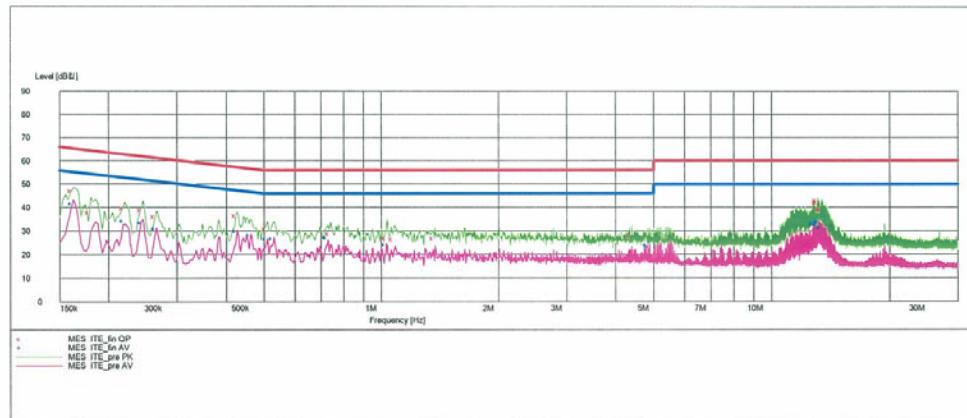
HCT

EMC TEST LAB

EUT: XDRIVE MINI
 Manufacturer: INNATOR CO.,LTD.
 Operating Condition: NORMAL
 Test Site: SHIELD ROOM
 Operator: SY-KIM
 Test Specification: CISPR 22 CLASS B
 Comment: N

SCAN TABLE: "CISPR 22 Voltage"

Short Description: CISPR 22 Voltage						
Start Frequency	Stop Frequency	Step Width	Detector	Meas.	IF Time	Transducer Bandw.
150.1 kHz	500.0 kHz	2.5 kHz	MaxPeak	10.0 ms	9 kHz	None
Average						
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
Average						
5.0 MHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
Average						


MEASUREMENT RESULT: "ITE_fin_QP"

8/9/2006 2:37PM

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.162600	47.30	10.1	65	18.1	---	---
0.180100	37.90	10.1	65	26.5	---	---
0.220100	39.80	10.1	63	23.0	---	---
0.245100	39.10	10.1	62	22.9	---	---
0.265100	36.20	10.1	61	25.0	---	---
0.427600	36.60	10.1	57	20.7	---	---
0.510000	30.90	10.1	56	25.1	---	---
0.740000	29.00	10.2	56	27.0	---	---
1.035000	27.10	10.1	56	28.9	---	---
1.080000	26.60	10.1	56	29.4	---	---
1.375000	26.90	10.2	56	29.1	---	---
4.405000	27.90	10.3	56	28.1	---	---
13.095000	42.20	10.5	60	17.8	---	---
13.150000	43.20	10.5	60	16.8	---	---
13.205000	42.30	10.5	60	17.7	---	---
13.365000	38.90	10.5	60	21.1	---	---
13.420000	39.20	10.5	60	20.8	---	---
13.475000	39.40	10.5	60	20.6	---	---

8/9/2006 2:37PM HCT EMC LAB

MEASUREMENT RESULT: "ITE_fin AV"

8/9/2006 2:37PM

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.162600	41.60	10.1	55	13.8	---	---
0.220100	34.30	10.1	53	18.5	---	---
0.245100	33.40	10.1	52	18.5	---	---
0.265100	30.90	10.1	51	20.4	---	---
0.427600	29.70	10.1	47	17.6	---	---
0.462600	28.20	10.1	47	18.4	---	---
0.510000	26.60	10.1	46	19.4	---	---
0.530000	26.70	10.1	46	19.3	---	---
0.730000	27.10	10.2	46	18.9	---	---
1.030000	24.10	10.1	46	21.9	---	---
4.835000	24.00	10.3	46	22.0	---	---
4.890000	23.20	10.3	46	22.8	---	---
12.825000	32.90	10.5	50	17.1	---	---
13.095000	32.50	10.5	50	17.5	---	---
13.150000	33.50	10.5	50	16.5	---	---
13.205000	33.80	10.5	50	16.2	---	---
13.420000	31.20	10.5	50	18.8	---	---
13.475000	31.50	10.5	50	18.5	---	---

8/9/2006 2:37PM HCT EMC LAB

NOTES:

1. All modes(13 MB/s) of operation were investigated, and the worst-case emissions are reported.
2. The conducted limits are listed on Table 1 (Page 7).
3. Line H = Hot Line N = Neutral

** Measurements using CISPR quasi-peak mode.

7.1 RADIATED TEST DATA

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
48.1	9.0	12.3	1.5	V	22.8	30.0	7.2
96.2	14.1	8.8	2.2	V	25.1	30.0	4.9
121.1	7.3	11.4	2.4	H	21.1	30.0	8.9
153.1	6.6	12.9	2.8	V	22.3	30.0	7.7
178.8	8.2	11.5	3.0	V	22.7	30.0	7.4
208.2	8.5	9.7	3.3	H	21.5	30.0	8.5
241.9	13.7	11.1	3.5	H	28.3	37.0	8.7
288.6	13.9	12.7	3.9	V	30.5	37.0	6.5
324.8	12.0	13.6	4.1	V	29.7	37.0	7.3
366.0	12.0	14.6	4.4	H	31.0	37.0	6.0
437.5	8.8	16.4	4.8	V	30.0	37.0	7.0
498.3	8.9	17.3	5.1	V	31.3	37.0	5.7

Radiated Measurements at 10.-meters.

NOTES:

1. All modes(13 MB/s)of operation were investigated, and the worst-case emissions are reported.
2. The radiated limits are listed on Table 2 (Page 7).
3. The EUT was test up to 1 GHz and no significant emission was found.

*** Measurements using CISPR quasi-peak mode. Above 1GHz, peak detector function mode is used using a resolution bandwidth of 1MHz and a video bandwidth of 1MHz. The peak level complies with the average limit. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

8.1 Sample Calculations

$$\text{dB } \mu\text{V} = 20 \log_{10}(\mu\text{V})$$

$$\text{dB } \mu\text{V} = \text{dBm} + 107$$

8.2 Example 1:

@ 13.485 MHz

Class B limit	= 60.0 dB μV
Reading	= 38.60 dB μV (calibrated level)

Margin	= 60.0 - 38.60 = 21.4 dB μV
	= 21.4dB below limit

8.3 Example 2:

@ 96.2 MHz

Class B limit	= 30 dB $\mu\text{V}/\text{m}$
Reading	= 14.1 dB $\mu\text{V}/\text{m}$ (calibrated level)
Antenna Factor + Cable Loss	= 11.0 dB
Total	= 25.1 dB $\mu\text{V}/\text{m}$

Margin	= 25.1 - 30 = -4.9 dB $\mu\text{V}/\text{m}$
	= 4.9dB below limit

9.1 Test Equipment

<u>Type</u>	<u>Manufacture</u>	<u>Model Number</u>	<u>CAL Due Date</u>
EMI Test Receiver	Rohde & Schwarz	ESCI40	2007.11.16
EMI Test Receiver	Rohde & Schwarz	ESCI	2007.08.24
LISN	Rohde & Schwarz	ESH2-Z5	2007.04.26
Attenuator	Rohde & Schwarz	ESH3-Z6	2007.04.11
TRILOG Antenna	Schwarzbeck	9160	2007.04.17
Antenna Position Tower	HD	MA240	N/A
Turn Table	EMCO	1050	N/A
Power Analyzer	Voltech	PM 3300	2007.03.22
Reference Network Impedance	Voltech	IEC 555	N/A
AC Power Source	PACIFIC	Magnetic Module	N/A
AC Power Source	PACIFIC	360-AMX	2007.01.05
Controller	HD GmbH	HD 100	N/A
SlideBar	HD GmbH	KMS 560	N/A
PULSE LIMITER	Rohde & Schwarz	ESH3-Z2	2007.11.16

10.1 Test Software Used

Normal test mode.

NOTE: This is a sample of the basic program used during the test. However, during testing, a different software program may be used; whichever determines the worst-case condition. In addition, the program used also depends on the number and type of devices being tested.

11.1 Conclusion

The data collected shows that the **INNATOR CO., LTD. USB Drive, Model: XDRIVE MINI** complies with §15.107 and §15.109 of the FCC Rules.