

EMC TEST REPORT

Reference No. : G-44-2015-00882

Applicant : Kornix Technology Corp.

Equipment Under Test (EUT):

Product Name: GPS Mouse Receiver

Model Name: KGM1544

Applied Standards : ETSI EN 301 489-1 V1.9.2:2011

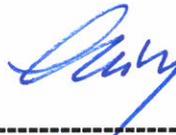
ETSI EN 301 489-3 V1.6.1:2013

Date of Receipt : March 17, 2015

Date of Test : March 30, 2015 ~ April 02, 2015

Date of Issue : April 06, 2015

Test Results : Complied

Tested by	:	 ----- Emily Lee
Reviewed by	:	 ----- Paul Kang

Remarks :

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Contents

1. General Information.....	5
1.1 Client Information.....	5
1.2 Test Laboratory.....	5
1.3 General Information of E.U.T.	5
1.4 Operating Modes and Conditions.....	6
1.4.1 Monitoring Method	6
1.5 Auxiliary Equipments	6
1.6 Cable List.....	6
1.7 System Configurations.....	6
1.8 Test System Layout	7
1.9 Modifications.....	7
1.10 Applicable Standards for Testing	8
1.11 Summary of Test Results.....	8
2. Emission Test.....	9
2.1 Test Results.....	9
2.2 Test Method and Limits.....	9
2.2.1 Test Method	9
2.2.2 Test Limits.....	9
2.3 Conducted Emission	11
2.3.1 Test Equipments	11
2.3.2 Test Site.....	11
2.3.3 Environment Conditions and data	12
2.4 Radiated Emission	13
2.4.1 Test Equipments	13
2.4.2 Test Site.....	13
2.4.3 Environment Conditions and data	14
2.5 Photographs of Conducted Emission at the Mains Terminal	16
2.6 Photographs of Radiated Emission (10m method below 1 GHz).....	17
2.7 Photographs of Radiated Emission (3m method above 1 GHz)	18
3. Harmonics & Flicker	19
3.1 Test Results.....	19
3.2 Test Equipments	19
3.3 Test Site.....	19
3.4 Harmonics Test Data	19
3.5 Flicker Test Data.....	20

3.6 Photograph of Harmonics & Flicker	20
4. Immunity Test.....	21
4.1 Test Results	21
4.2 Performance Criteria.....	21
4.3 Electrostatic Discharge	23
4.3.1 Test Equipments	23
4.3.2 Test Site.....	23
4.3.3 Environment Conditions	23
4.3.4 Performance Criterion : B / TR.....	23
4.3.5 Test Points	23
4.3.6 Test Results	23
4.3.7 Test Points	24
4.3.8 Photograph of Electrostatic Discharge	25
4.4 Radiated RF Electromagnetic Field	26
4.4.1 Test Equipments	26
4.4.2 Test Site.....	26
4.4.3 Environment Conditions	26
4.4.4 Performance Criterion: A / CR	26
4.4.5 Test Results	27
4.4.6 Photograph of Radiated RF Electromagnetic Field.....	27
4.5 Fast Transients/Burst.....	28
4.5.1 Test Equipments	28
4.5.2 Test Site.....	28
4.5.3 Environment Conditions	28
4.5.4 Performance Criterion : B / TR.....	28
4.5.5 Test Results	28
4.5.6 Photograph of Fast Transients/Burst	29
4.6 Surges	30
4.6.1 Test Equipments	30
4.6.2 Test Site.....	30
4.6.3 Environment Conditions	30
4.6.4 Performance Criterion : B / TR.....	30
4.6.5 Test Results	30
4.6.6 Photograph of Surges	31
4.7 Conducted Immunity	32
4.7.1 Test Equipments	32
4.7.2 Test Site.....	32
4.7.3 Environment Conditions	32

4.7.4 Performance Criterion: A / CR	32
4.7.5 Test Results	32
4.7.6 Photograph of Conducted Immunity (CDN).....	33
4.8 Voltage Dips and Interruptions.....	34
4.8.1 Test Equipments	34
4.8.2 Test Site.....	34
4.8.3 Environment Conditions	34
4.8.4 Performance Criterion : B / C / TR / CR	34
4.8.5 Test Results	34
4.8.6 Photograph of Voltage Dips and Interruptions	35
5. Photographs of EUT	36
Appendix A : Conducted Emission at the Mains Terminal	39
Appendix B : Radiated Emission (3 m Scan Data)	40
Appendix C : Radiated Emission (3 m Scan Data)	40
Appendix D : Harmonics on AC Mains	41
Appendix E : Flickers on AC Mains	46

1. General Information

1.1 Client Information

Applicant : Kornix Technology Corp.
 Address of Applicant : Room 1106, Gasan Digital Empire Building 1130, Beoman Ro, Geumchen Gu, Seoul, Republic of Korea

Manufacturer : Kornix Technology Corp.
 Address of Manufacturer : Room 1106, Gasan Digital Empire Building 1130, Beoman Ro, Geumchen Gu, Seoul, Republic of Korea

1.2 Test Laboratory

Name and Address : SGS Korea Co., Ltd.
 Giheung 1 Laboratory : 35, Giheungdanji-ro 121beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
 Giheung 2 Laboratory : 23, Giheungdanji-ro 24beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea
 Gunpo Laboratory : 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, 435-040 Republic of Korea
 Phone : + 82 31 428 5700
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1.3 General Information of E.U.T.

Product Name	GPS Mouse Receiver
Model Name	KGM1544
Serial No.	-
EMI Classification	Class B
Test Voltage	230V d.c., 50Hz
SRD Classification	Primary function type III, Device Type 3

1.4 Operating Modes and Conditions

Operating mode	Operating condition
GPS Receive mode	Communication with GPS Signal Generator

1.4.1 Monitoring Method

- Operating Status was Monitored by eyes.

1.5 Auxiliary Equipments

Description	Model	Serial No.	Manufacturer
GPS Signal Generator	GS50	607492	Welnavigate Inc.
Notebook Computer	PCG-71S14P	54300397 0000466	Sony Corporation
Test Jig	-	-	KORNIX TECHNOLOGY

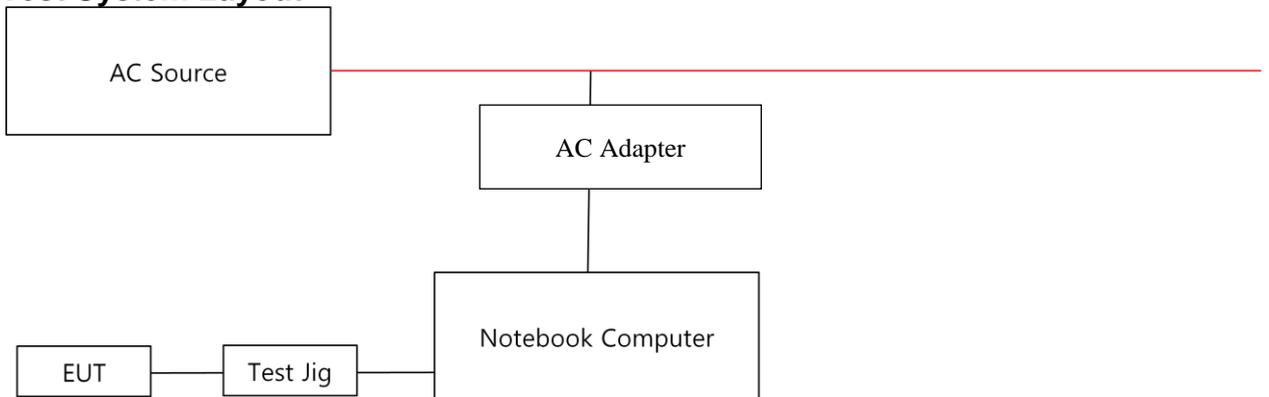
1.6 Cable List

Start		END		Cable Spec.	
Name	I/O Port	Name	I/O Port	Length	Shield
Notebook Computer	USB	Test Jig	USB port	1.7	Shield
	DC IN	AC ADAPTER	DC OUT	1.5	Unshield
AC ADAPTER	AC IN	AC Source	-	1.5	Unshield
Test Jig	J1 port	EUT	-	1.0	Unshield

1.7 System Configurations

Description	Model	Serial No.	Manufacturer
Main Board	KSM 1328TBS4	K150100142	KORNIX

1.8 Test System Layout



1.9 Modifications

There was no modified item during the test.

1.10 Applicable Standards for Testing

Standards	Status	Deviation
ETSI EN 301 489-1 V1.9.2:2011	Applicable	No Deviation
ETSI EN 301 489-3 V1.6.1:2013	Applicable	No Deviation
EN 61000-3-2:2006/A2:2009	Applicable	No Deviation
EN 61000-3-3:2013	Applicable	No Deviation
EN 61000-4-2:2009	Applicable	No Deviation
EN 61000-4-3:2006/A1:2008/A2:2010	Applicable	No Deviation
EN 61000-4-4:2004/A1:2010	Applicable	No Deviation
EN 61000-4-5:2006	Applicable	No Deviation
EN 61000-4-6:2009	Applicable	No Deviation
EN 61000-4-11:2004	Applicable	No Deviation

1.11 Summary of Test Results

Test Item	Standards	Results
Conducted Emission	EN 55022:2010/AC:2011	Complied
Radiated Emission	EN 55022:2010/AC:2011	Complied
Harmonics	EN61000-3-2:2006/A2:2009	Complied
Flicker	EN61000-3-3:2013	Complied
Electrostatic Discharge	EN 61000-4-2:2009	Complied
Radiated Immunity	EN 61000-4-3:2006/A1:2008/A2:2010	Complied
Fast Transients	EN61000-4-4:2004/A1:2010	Complied
Surges	EN61000-4-5:2006	Complied
Conducted Immunity	EN61000-4-6:2009	Complied
Voltage dips and Interruptions	EN61000-4-11:2004	Complied

Note : Test methods of all test items are performed according to the basic standards in this table.

EMISSION

2.1 Test Results

Test Items	Standards	Test Results
Conducted Emission	EN 55022:2010/AC:2011	Complied
Radiated Emission	EN 55022:2010/AC:2011	Complied

2.2 Test Method and Limits

2.2.1 Test Method

Test Items	Measuring Frequency Range	RBW	Measuring Distance
Conducted Emission	0.15 MHz ~ 30 MHz	9 kHz	-
Radiated Emission	30 MHz ~ 1 GHz	120 kHz	10 m
	Above 1 GHz	1 MHz	3 m

2.2.2 Test Limits

-Conducted Emission Limits

Frequency Range	Limits(dB(μ V))		Class
	Quasi-peak	Average	
0.15 MHz ~ 0.5 MHz	79	66	Class A
0.5 MHz ~ 30 MHz	73	60	
0.15 MHz ~ 0.5 MHz	66 to 56	56 to 46	Class B
0.5 MHz ~ 5 MHz	56	46	
5 MHz ~ 30 MHz	60	50	

Note : The lower limit shall apply at the transition frequencies. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

-Radiated Emission Limits below 1 GHz

Frequency Range	Limits(dB(μ V/m))		Class
	Quasi-peak		
30 MHz ~ 230 MHz	40		Class A
230 MHz ~ 1 GHz	47		
30 MHz ~ 230 MHz	30		Class B
230 MHz ~ 1 GHz	37		

-Radiated Emission Limits above 1 GHz

Frequency Range	Limits(dB(μ V/m))		Class
	Average	Peak	
1 GHz ~ 3 GHz	56	76	Class A
3 GHz ~ 6 GHz	60	80	
1 GHz ~ 3 GHz	50	70	Class B
3 GHz ~ 6 GHz	54	74	

2.3 Conducted Emission

The initial preliminary exploratory scans were performed over the measuring frequency range(0.15 MHz to 30 MHz) at mains port using a max hold mode incorporating a Peak detector and/or Average detector and using the software of EMC32(Version V9.12.00 from R&S) at mains port. The final test data was measured using a Quasi-Peak detector and Average detector at mains port and Quasi-Peak detector at antenna port.

2.3.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Last Cal. Date
Two-Line V- Network	Test Receiver	R & S	100834	2014.12.25
Test Receiver	ESCI 7	R & S	100911	2014.12.24

Note : The calibration period of every equipment is 1 year.

2.3.2 Test Site

Shield Room in Gunpo Laboratory

2.3.3 Environment Conditions and data

- Conducted Emission at the mains port

Temperature: 20.5 °C ~ 21.0 °C

Humidity: 32.0 %R.H. ~ 33.0 %R.H.

Atmospheric Pressure: 101.5 kPa

Test Date: April 01, 2015

Freq (MHz)	Line (+/-)	Level (dB μ V)		CL (dB)	LISN (dB)	Result (dB μ V)		Limit (dB μ V)		Margin (dB)	
		Q/P	A/V			Q/P	A/V	Q/P	A/V	Q/P	A/V
0.16	N	40.8	24.7	0.0	9.7	50.5	34.4	65.5	55.5	15.0	21.1
0.23	N	35.9	12.0	0.0	9.7	45.6	21.7	62.3	52.3	16.7	30.6
0.23	H	39.4	11.8	0.0	9.6	49.0	21.4	62.3	52.3	13.3	30.9
11.45	H	36.7	13.4	0.1	9.7	46.5	23.2	60.0	50.0	13.5	26.8
26.23	H	30.0	24.5	0.2	9.7	39.9	34.4	60.0	50.0	20.1	15.6
27.26	N	28.1	22.9	0.2	10.0	38.3	33.1	60.0	50.0	21.7	16.9

Measurement Uncertainty : ± 3.21 dB (The confidential level is about 95%, $k=2$)

Note : • Line (H) : Hot
 • CL: Cable Loss
 • Result = Level + CL + LISN
 • Line (N) : Neutral
 • LISN : LISN Factor
 • Margin = Limit – Result

See Appendix A (Conducted Emission)

2.4 Radiated Emission

The initial preliminary exploratory scans were performed at 3 m distance over the measuring frequency range(30 MHz to 6 GHz) using a max hold mode incorporating a Peak detector and using the software of EP5RE(Version Ver3.10.20 from TOYO). The final test data was measured using a Quasi-Peak detector below 1 GHz at 10 m distance and a Peak and Average detector above 1 GHz at 3 m distance. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency.

2.4.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Last Cal. Date
Horn Antenna	HF906	R & S	100326	2013.12.10
Signal Conditioning Unit	SCU 18	R & S	10117	2014.12.26
Test Receiver	ESU26	R & S	100109	2014.03.03
EMI TEST RECEIVER (SICT)	ESU8	R&S	100128	2015.02.05
BILOG ANTENNA (SICT)	CBL6112D	TESEQ	25232	2013.10.24
AMPLIFIER	8447D	HP	2727A05297	2014.07.11
10m Open Area Test Site	-	-	-	-

Note : Only the calibration period of Antennas is 2 years but the period of every equipment is 1 year.

2.4.2 Test Site

10 m Open Area Test Site in Giheung 2 Laboratory (Below 1 GHz)

3 m Semi-Anechoic Chamber in Gunpo Laboratory (Above 1 GHz)

2.4.3 Environment Conditions and data

Below 1 GHz (10 m method)

Temperature: 10.1 °C ~ 11.0 °C

Humidity: 20.0 %R.H. ~ 22.0 %R.H.

Atmospheric Pressure: 101.5 kPa

Test Date: March 30, 2015

Freq. (MHz)	Level (dB μ V)	Pol. (H/V)	A (°)	H (cm)	AF (dB)	CL (dB)	Amp. (dB)	F/S (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
130.56	33.5	V	105	100	12.0	2.8	25.6	22.6	30.0	7.4
178.73	37.9	H	227	200	9.4	3.1	25.4	25.0	30.0	5.0
182.61	37.8	H	227	200	9.3	3.1	25.4	24.8	30.0	5.2
184.59	39.0	H	260	200	9.3	3.1	25.4	26.1	30.0	3.9
190.45	38.9	H	227	200	9.3	3.1	25.3	26.0	30.0	4.0
195.30	39.2	H	177	100	9.3	3.1	25.3	26.3	30.0	3.7
199.23	37.4	V	100	100	9.3	3.1	25.3	24.5	30.0	5.5
204.08	39.8	H	264	200	9.6	3.2	25.3	27.2	30.0	2.8
210.95	35.3	V	341	200	10.0	3.3	25.3	23.3	30.0	6.7
212.89	34.6	V	307	200	10.1	3.3	25.3	22.8	30.0	7.2
428.47	28.9	H	134	100	16.5	5.3	26.2	24.5	37.0	12.5

Measurement Uncertainty (Horizontal) : ± 5.58 dB (The confidential level is about 95%, $k=2$)

Measurement Uncertainty (Vertical) : ± 5.50 dB (The confidential level is about 95%, $k=2$)

Note: • AF = Antenna Factor • CL = Cable Loss • F/S = Field Strength
 • Pol.(H) = Horizontal • Pol.(V) = Vertical • Amp. = Amplifier Gain
 • Margin = Limit – F/S • F/S = Level + AF + CL – Amp.
 • A : Angle • H : Height

See Appendix B (Radiated Emission)

Above 1 GHz (3 m method)

Temperature: 23.1 °C ~ 23.3 °C

Humidity: 30.0 %R.H. ~ 31.0 %R.H.

Atmospheric Pressure: 100.0 kPa

Test Date: March 30, 2015

Freq. (MHz)	Level (dB μ V)	Pol. (H/V)	A (°)	H (cm)	AF (dB)	CL (dB)	Amp. (dB)	F/S (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
Peak Detector										
1995.42	55.0	H	14	100	27.6	11.2	42.9	50.9	70.0	19.1
1996.67	60.6	V	93	100	27.6	11.3	42.9	56.6	70.0	13.4
Average Detector										
1995.42	34.3	H	14	100	27.6	11.2	42.9	30.2	50.0	19.8
1996.67	36.9	V	93	100	27.6	11.3	42.9	32.9	50.0	17.1

Measurement Uncertainty (Horizontal) : ± 5.73 dB (The confidential level is about 95%, $k=2$)

Measurement Uncertainty (Vertical) : ± 5.85 dB (The confidential level is about 95%, $k=2$)

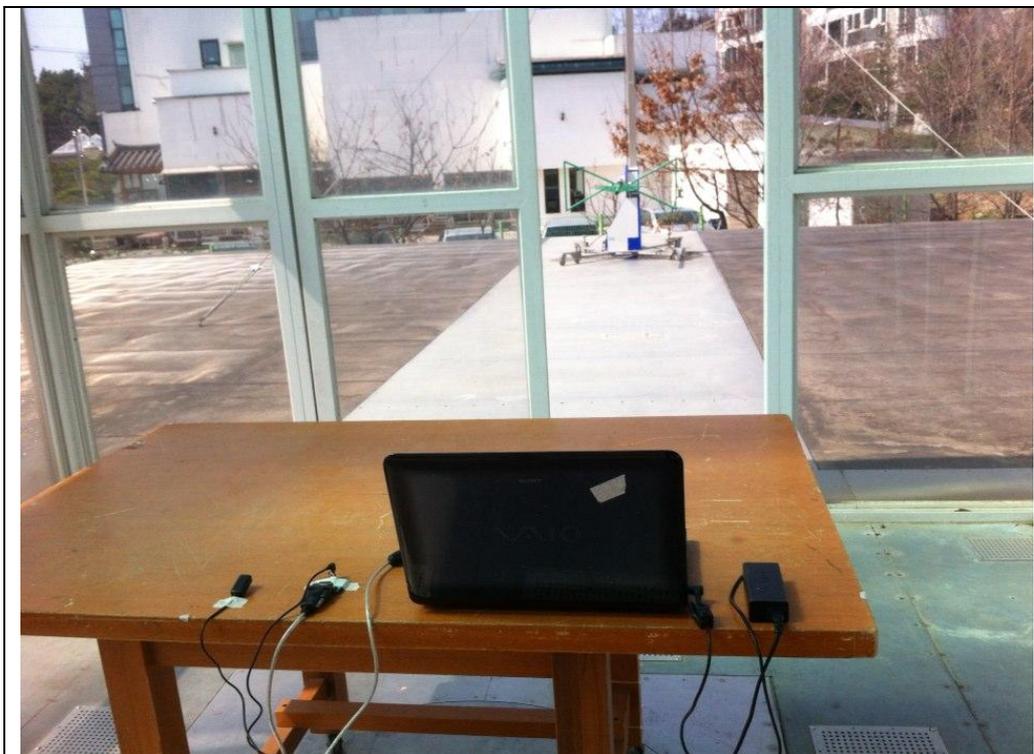
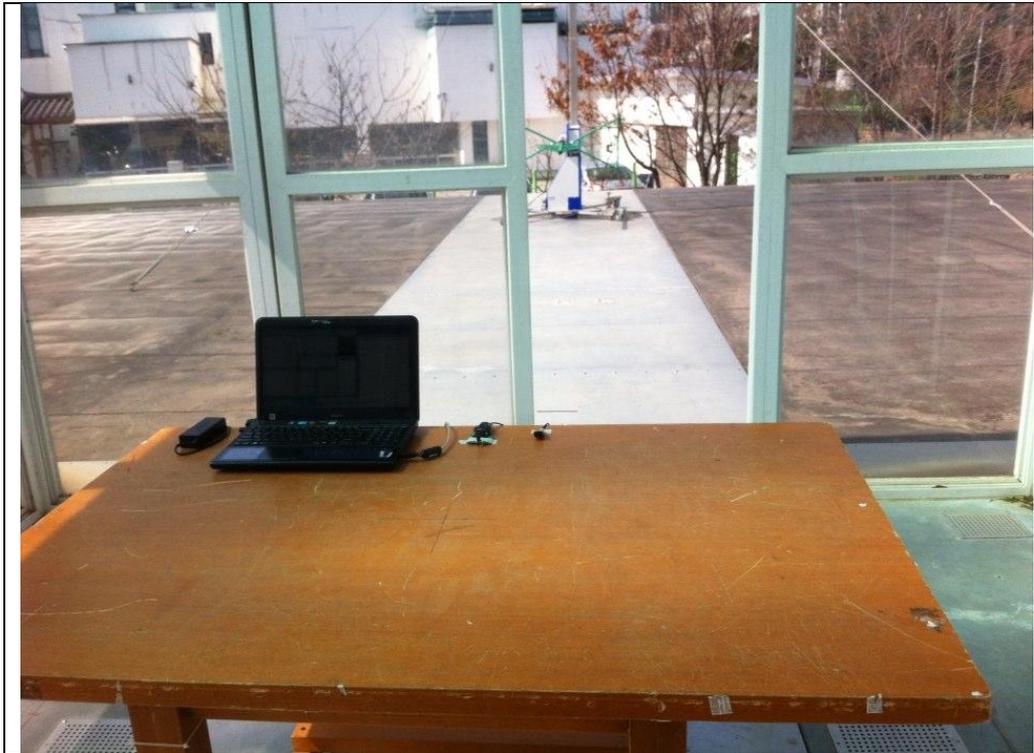
- Note:
- AF = Antenna Factor
 - Pol.(H) = Horizontal
 - Margin = Limit – F/S
 - A : Angle
 - CL = Cable Loss
 - Pol.(V) = Vertical
 - F/S = Level + AF + CL – Amp.
 - H : Height
 - F/S = Field Strength
 - Amp. = Amplifier Gain

See Appendix C (Radiated Emission)

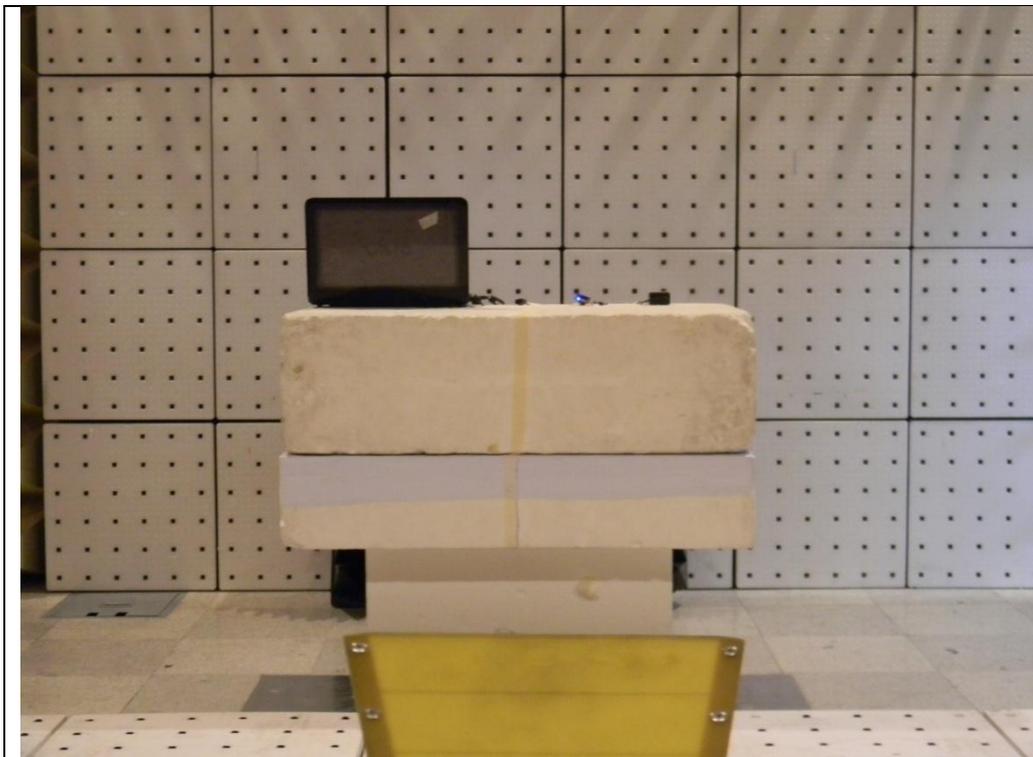
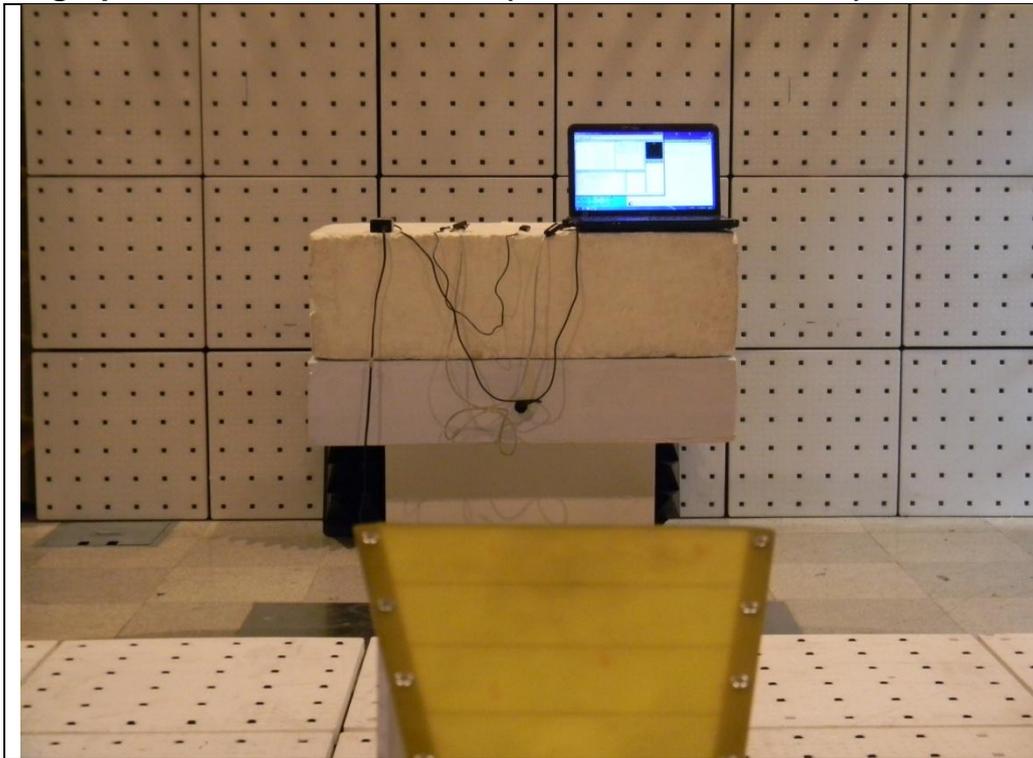
2.5 Photographs of Conducted Emission at the Mains Terminal



2.6 Photographs of Radiated Emission (10m method below 1 GHz)



2.7 Photographs of Radiated Emission (3m method above 1 GHz)



Harmonics & Flicker

3.1 Test Results

Test Items	Basic Standards	Test Results
Harmonics	EN 61000-3-2:2006/A2:2009	Complied
Flicker	EN 61000-3-3:2013	Complied

3.2 Test Equipments

Equipment	Model	Manufacturer	S/N	Last Cal. Date
H/F Analyzer	DPA 500	EM TEST	V0508100155	2014.05.05
AC Source	ACS 500	EM TEST	V0508100156	2014.05.05

Note : The calibration period of every equipment is 1 year.

3.3 Test Site

Harmonics & Flicker Site in Gunpo Laboratory

3.4 Harmonics Test Data

The measurement was conducted with an automatic harmonics analyzing system, Measured were all harmonics up to order 40.

Temperature: 24.1 °C ~ 24.2 °C

Humidity: 21.0 %R.H

Atmospheric Pressure: 101.0 kPa

Test Date: March 30, 2015

See Appendix D (Harmonics on AC Mains)

3.5 Flicker Test Data

The measurement was conducted with an automatic flicker system, Measured were all Flicker up to order 12.

Temperature: 24.1 °C ~ 24.4 °C

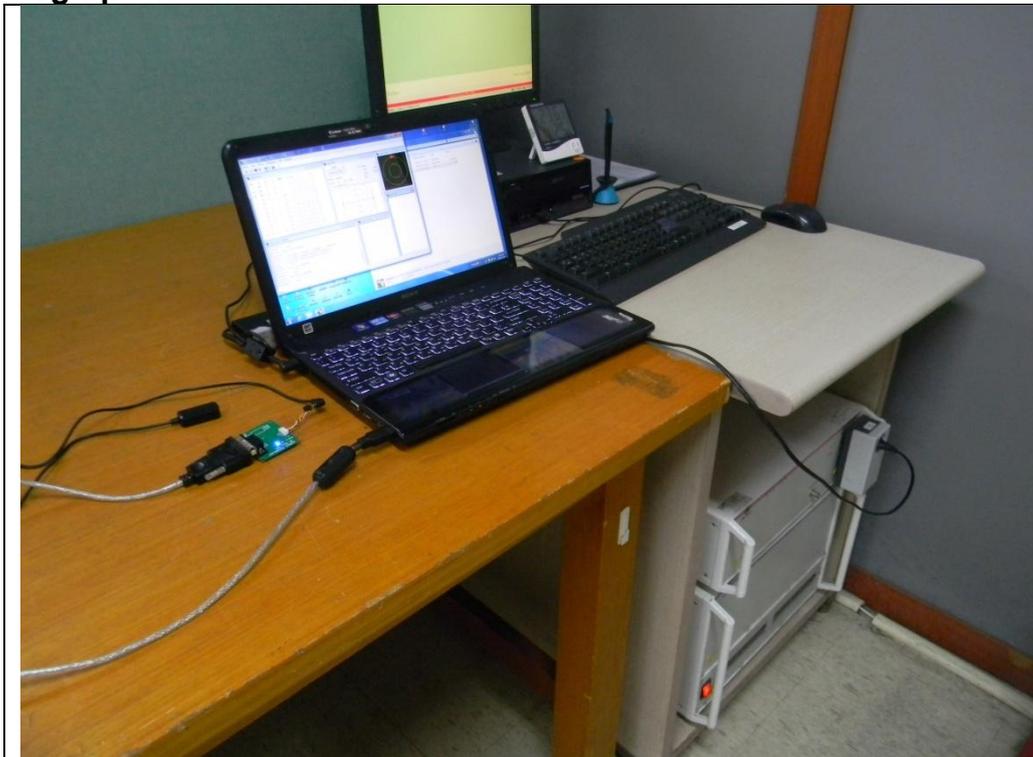
Humidity: 21.0 %R.H ~ 22.0 %R.H

Atmospheric Pressure: 101.0 kPa

Test Date: March 30, 2015

See Appendix E (Flicker on AC Mains)

3.6 Photograph of Harmonics & Flicker



IMMUNITY

4.1 Test Results

Test Items	Standards	Test Results
Electrostatic Discharge	EN 61000-4-2:2009	Complies A / TR
Radiated Immunity	EN 61000-4-3:2006/A1:2008/A2:2010	Complies A / CR
Fast Transients	EN 61000-4-4:2004/A1:2010	Complies A / TR
Surges	EN 61000-4-5:2006	Complies A / TR
Conducted Immunity	EN 61000-4-6:2009	Complies A / CR
Voltage dips and Interruptions	EN 61000-4-11:2004	Complies A / CR/ TR

4.2 Performance Criteria

Performance Requirements of Device Types

Device Type 1		
Criteria	During test	After test
A	Operate as intended No loss of function For equipment with primary function type II the minimum performance shall be 12 dB SINAD No unintentional responses	Operate as intended For equipment with primary function type II the communication link shall be maintained No loss of function. No degradation of performance No loss of stored data or user programmable functions
B	May be loss of function (one or more) No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions
Device Type 2		
Criteria	During test	After test
A	Operate as intended No loss of function For equipment with primary function type II the minimum performance shall be 6 dB SINAD No unintentional responses	Operate as intended For equipment with primary function type II the communication link shall be maintained No loss of function. No degradation of performance No loss of stored data or user programmable functions
B	May be loss of function (one or more) No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions
Device Type 3		
Criteria	During test	After test
A and B	May be loss of function (one or more) No unintentional responses	Operate as intended, for equipment with primary function type II the communication link may be lost, but shall be recoverable by user No degradation of performance Lost functions shall be self-recoverable

Continuous Phenomena(CT)

For equipment with primary function type I or II including ancillary equipment tested on a stand alone basis, the performance criteria A of the applicable class as given in the above table shall apply. For equipment with primary function type II or type III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence. Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

Transient Phenomena(TT)

For equipment with primary function type I or II, including ancillary equipment tested on a stand alone basis, the performance criteria B of the applicable class as given in the above table shall apply, except for power interruptions exceeding a certain time the performance criteria deviations are specified in the special conditions. For equipment with primary function type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

Continuous Phenomena(CR)

For equipment with primary function type I or II, including ancillary equipment tested on a stand alone basis, the performance criteria A of the applicable class as given in the above table shall apply. For equipment with primary function type II or III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

Transient Phenomena(TR)

For equipment with primary function type I or II, including ancillary equipment tested on a stand alone basis, the performance criteria B of the applicable class as given in clause 6.3 shall apply, except for power interruptions exceeding a certain time the performance criteria deviations are specified in the special conditions. For equipment with primary function type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

4.3 Electrostatic Discharge

4.3.1 Test Equipments

Description	Model	Manufacturer	S/N	Last Cal. Date
ESD Simulator	ESS-2000	NoiseKen	ESS0746780	2014.12.29
HCP/VCP	-	-	-	-

Note : The calibration period of every equipment is 1 year.

4.3.2 Test Site

Shield Room in Gunpo Laboratory

4.3.3 Environment Conditions

Temperature : 24.1 °C ~ 24.6 °C

Humidity : 32.0 %R.H. ~ 32.4 %R.H.

Atmospheric Pressure : 100.0 kPa

Test Date : March 30, 2015

4.3.4 Performance Criterion : B / TR

4.3.5 Test Points

No.	Test Points	No.	Test Points
1	HCP/ VCP	3	Port
2	Enclosure		

4.3.6 Test Results

Direct Application											
No.	Discharge Method	Number of Discharge	Level(kV)								Results
			+2	-2	+4	-4	+6	-6	+8	-8	
2	AIR	≥10 times	A	A	A	A	-	-	A	A	Complies A / TR
3	AIR	≥10 times	A	A	A	A	-	-	A	A	Complies A / TR
Indirect Application											
No.	Discharge Method	Number of Discharge	Level(kV)								Results
			+2	-2	+4	-4	+6	-6	+8	-8	
1	Contact	≥10 times	A	A	A	A	-	-	-	-	Complies A / TR

Complies A / TT : The EUT normally operates during and after the test.
 No Intentional transmission.

4.3.7 Test Points



- Front View



- Rear View



4.3.8 Photograph of Electrostatic Discharge



4.4 Radiated RF Electromagnetic Field

4.4.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Last Cal. Date
Hybrid Log Periodic Antenna	HLP-2603	EMC AUTOMATION	080100	2015.03.13
Signal Generator	SML03	R & S	102135	2015.01.22
Voltage Sensor	URV5-Z2	R & S	100234, 100235	2014.12.26
Milli voltmeter	URV5	R & S	100240	2014.12.26
Amplifier	60S1G3	AR	311982	2015.03.13
Amplifier	250W100A	AR	312240	2015.03.13
Dual Directional Coupler	DC6180M1	AR	311719	2014.11.27
Dual Directional Coupler	DC7144M1	AR	311903	2014.11.27

Note : The calibration period of every equipment is 1 year.

4.4.2 Test Site

RS Chamber in Gunpo Laboratory

4.4.3 Environment Conditions

Temperature: 23.8 °C ~ 24.0 °C
 Humidity: 33.0 %R.H. ~ 34.0 %R.H.
 Atmospheric Pressure: 101.5 kPa

Test Date: March 31, 2015

4.4.4 Performance Criterion: A / CR

4.4.5 Test Results

Frequency (MHz)	Position	Polarity	Field Strength	Modulation	Frequency Step	Dwell Time	Results
80 ~ 1,000, 1,400 ~ 2,700	Front	Horizontal, Vertical	3 V/m	80%AM (1 kHz)	1 %	3 s	Complies A / CR
80 ~ 1,000, 1,400 ~ 2,700	Rear	Horizontal, Vertical	3 V/m	80%AM (1 kHz)	1 %	3 s	Complies A / CR
80 ~ 1,000, 1,400 ~ 2,700	Left	Horizontal, Vertical	3 V/m	80%AM (1 kHz)	1 %	3 s	Complies A / CR
80 ~ 1,000, 1,400 ~ 2,700	Right	Horizontal, Vertical	3 V/m	80%AM (1 kHz)	1 %	3 s	Complies A / CR

Complies A / CR : The EUT normally operates during and after the test.

4.4.6 Photograph of Radiated RF Electromagnetic Field



4.5 Fast Transients/Burst

4.5.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Last Cal. Date
Motion Driven AC Source	MV2616	EM TEST	V0508100161	2014.06.18
Ultra-Compact Simulator	UCS 500-M	EM TEST	V0508100159	2014.06.18

Note : The calibration period of every equipment is 1 year.

4.5.2 Test Site

Immunity Test Site in Gunpo Laboratory

4.5.3 Environment Conditions

Temperature : 22.2 °C ~ 22.4 °C

Humidity : 34.0 %R.H.

Atmospheric Pressure : 100.0 kPa

Test Date : April 02, 2015

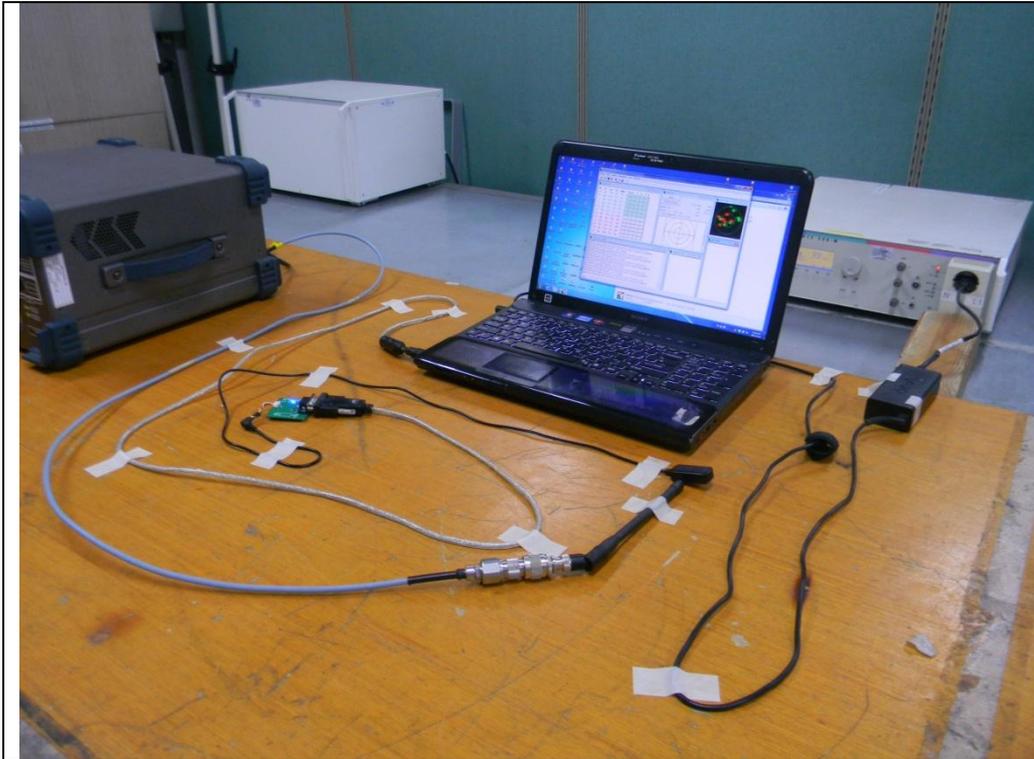
4.5.4 Performance Criterion : B / TR

4.5.5 Test Results

Test Point	Polarity	Coupling	Repetition	Pulse (ns)	Duration	Test Level (kV)	Results
L1-L2	+/-	Direct	5 kHz	5/50	≥ 60 s	1.0	Complies A / TR

Complies A / TR : The EUT normally operates during and after the test.

4.5.6 Photograph of Fast Transients/Burst



4.6 Surges

4.6.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Last Cal. Date
Motion Driven AC Source	MV2616	EM TEST	V0508100161	2014.06.18
Ultra-Compact Simulator	UCS 500-M	EM TEST	V0508100159	2014.06.18

Note : The calibration period of every equipment is 1 year.

4.6.2 Test Site

Immunity Test Site in Gunpo Laboratory

4.6.3 Environment Conditions

Temperature : 22.2 °C ~ 22.5 °C

Humidity : 34.0 %R.H. ~ 35.0 %R.H.

Atmospheric Pressure : 100.0 kPa

Test Date : April 02, 2015

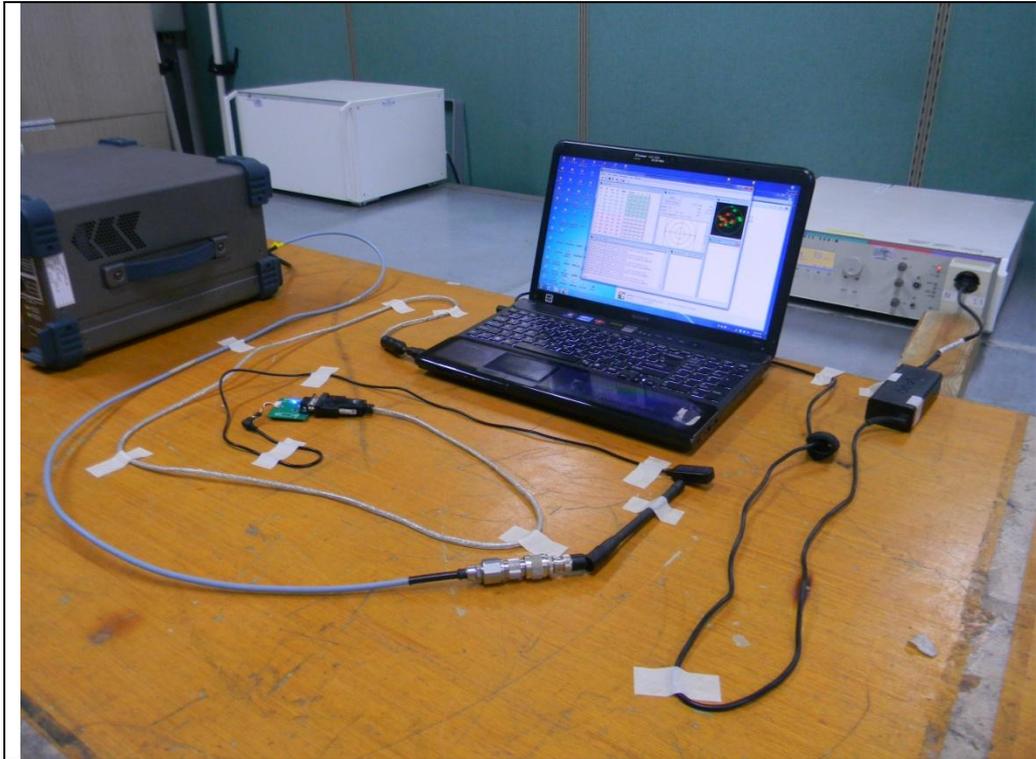
4.6.4 Performance Criterion : B / TR

4.6.5 Test Results

Test Point	Polarity	Coupling	Pulse (μ s)	Number of Surges	Repetition	Phase Angle(°)	Test Level (kV)	Results
L1-L2	+/-	Direct	1.2/50	5	≤ 60 s	0, 90, 180, 270	0.5, 1.0	Complies B / TR

Complies A / TR : The EUT normally operates during and after the test.

4.6.6 Photograph of Surges



4.7 Conducted Immunity

4.7.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Last Cal. Date
Power Line Coupling Decoupling Network	FCC-801-M2-16A	FCC	04001	2014.09.29
Amplifier	150A250	AR	312201	2015.01.06
Dual Directional Coupler	DC2600M2	AR	311978	2014.11.27
Signal Generator	SML03	R & S	102135	2015.01.22
Voltage Sensor	URV5-Z2	R & S	100234, 100235	2014.12.26
Milli voltmeter	URV5	R & S	100240	2014.12.26
Attenuator	300-A-FFN-06	BIRD Electronics Corporation	0433	2014.12.17

4.7.2 Test Site

Immunity Test Site in Gunpo Laboratory

4.7.3 Environment Conditions

Temperature: 23.5 °C ~ 24.0 °C

Humidity: 32.0 %R.H. ~ 33.0 %R.H.

Atmospheric Pressure: 101.5 kPa

Test Date: March 31, 2015

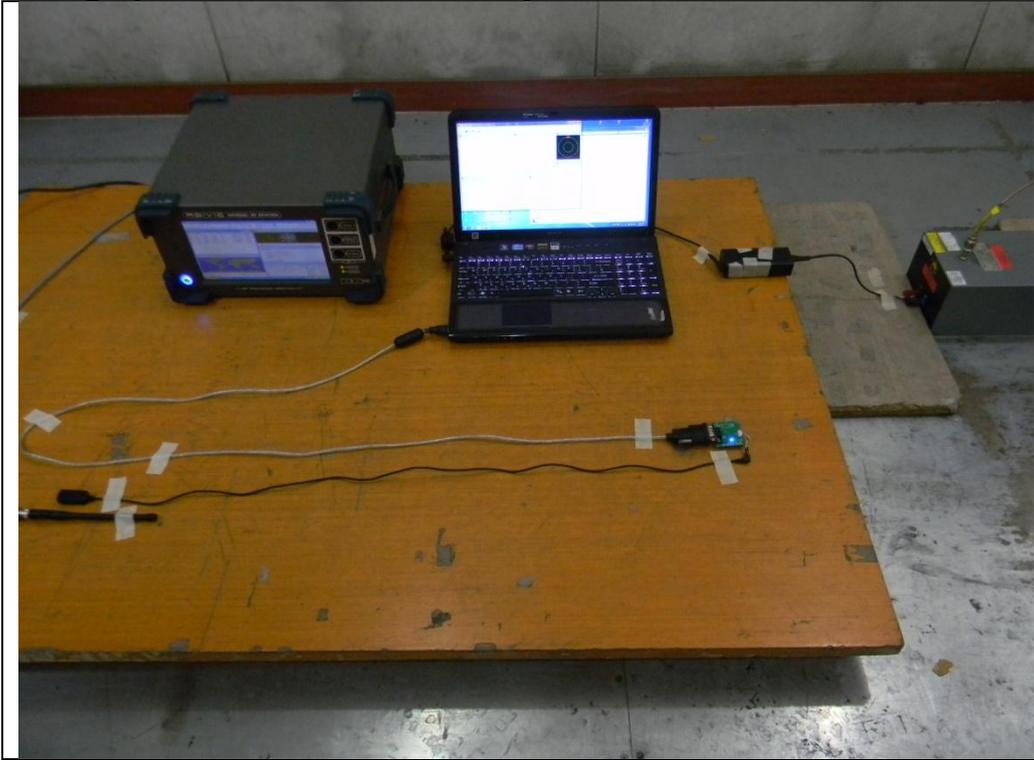
4.7.4 Performance Criterion: A / CR

4.7.5 Test Results

Frequency (MHz)	Test Point	Coupling	Voltage Level	Modulation	Frequency Step	Dwell Time	Results
0.15 ~ 80	AC IN	CDN (M2)	3 V	80% AM(1 kHz)	1 %	3 s	Complies A / CR

Complies A / CR : The EUT normally operates during and after the test.

4.7.6 Photograph of Conducted Immunity



4.8 Voltage Dips and Interruptions

4.8.1 Test Equipments

Description	Model No.	Manufacturer	S/N	Last Cal. Date
Motion Driven AC Source	MV2616	EM TEST	V0508100161	2014.06.18
Ultra-Compact Simulator	UCS 500-M	EM TEST	V0508100159	2014.06.18

Note : The calibration period of every equipment is 1 year.

4.8.2 Test Site

Immunity Test Site in Gunpo Laboratory

4.8.3 Environment Conditions

Temperature : 22.2°C ~ 22.4 °C
 Humidity : 34.0 %R.H. ~ 35.0 %R.H.
 Atmospheric Pressure : 100.0 kPa

Test Date : April 02, 2015

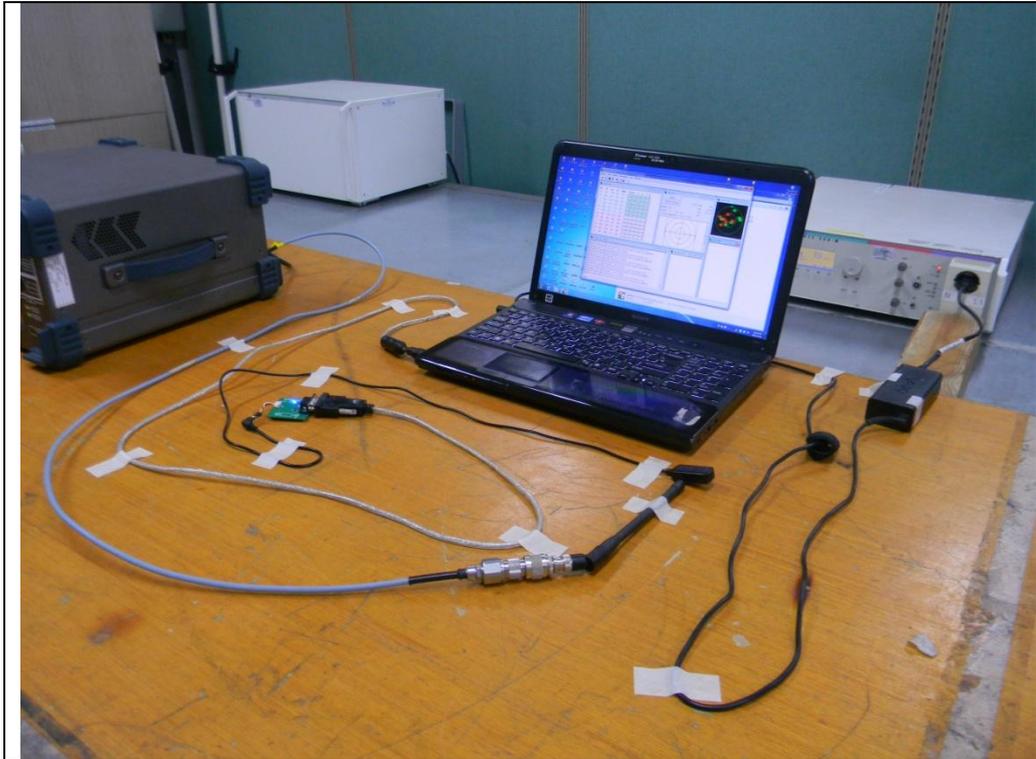
4.8.4 Performance Criterion : B / C / TR / CR

4.8.5 Test Results

Test Level % U_T	Voltage Dip/Int. % U_T	Duration ms/Cycle	Results
< 5 %	> 95 %	5,000 ms	Complies A / TR
70 %	30 %	25 ms	Complies A / CR
60 %	40 %	100 ms	Complies A / TR / CR

Complies A / TR / CR : The EUT normally operates during and after test

4.8.6 Photograph of Voltage Dips and Interruptions



5. Photographs of EUT

- Front View



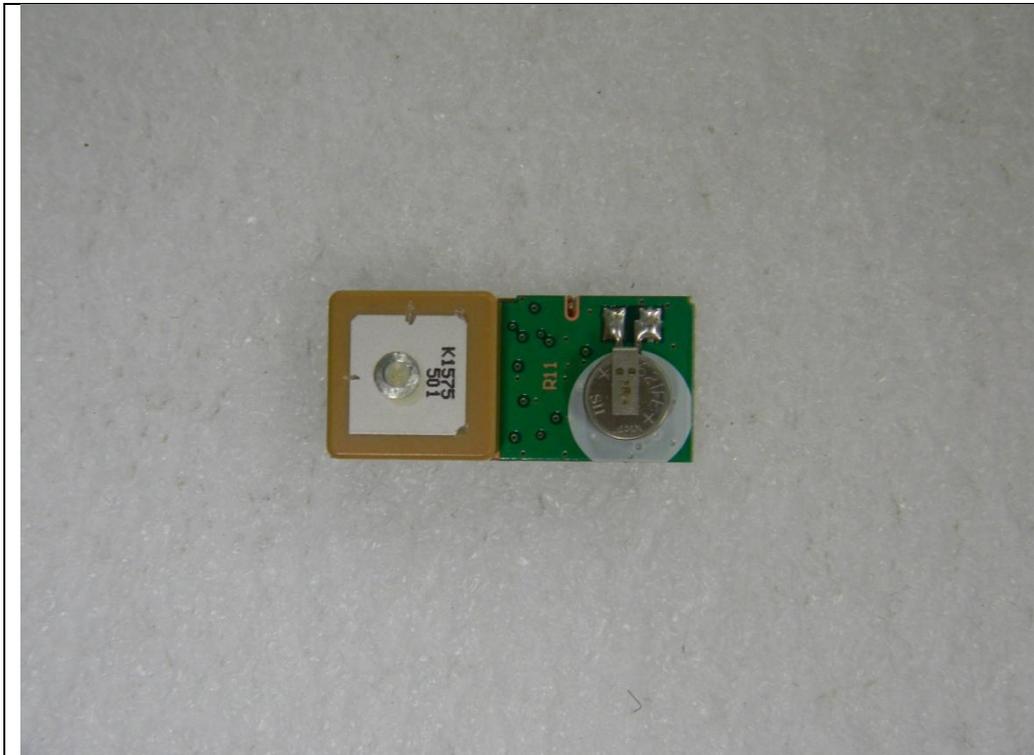
- Rear View



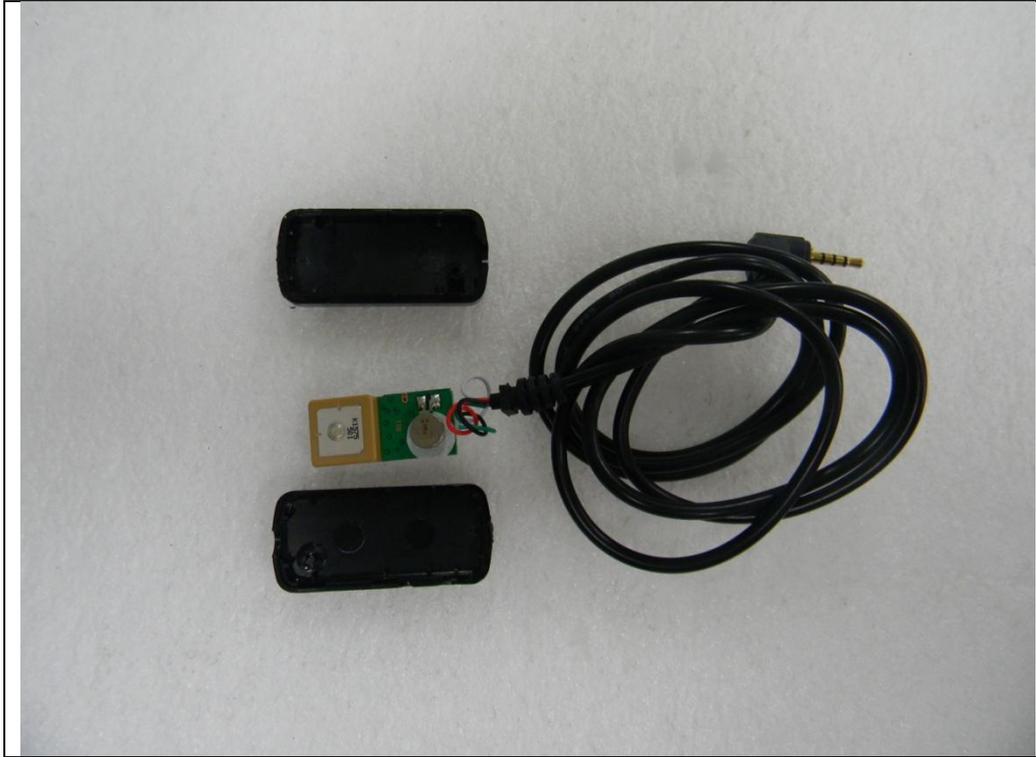
● Top View of Main Board



● Bottom View of Main Board

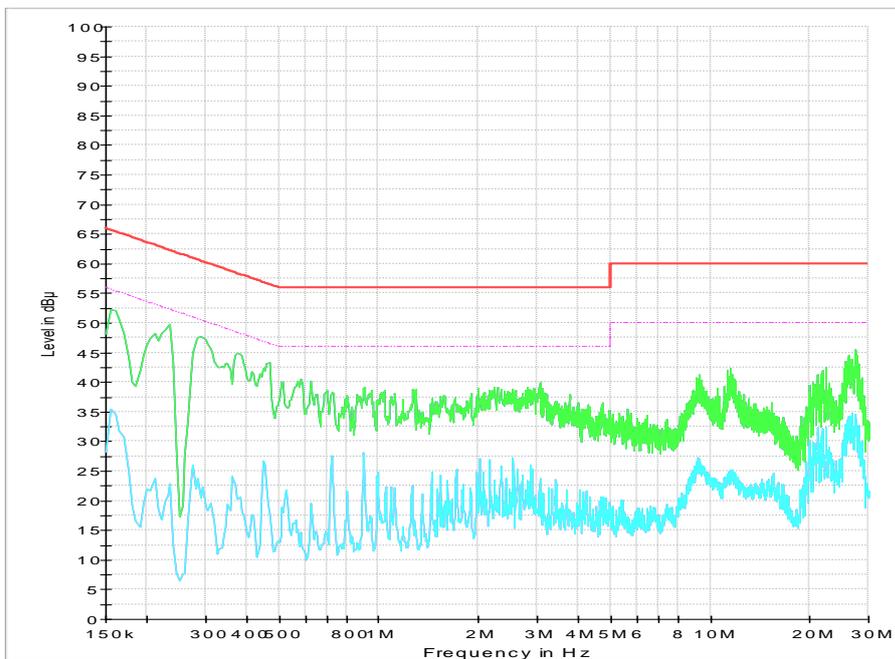


● Inside

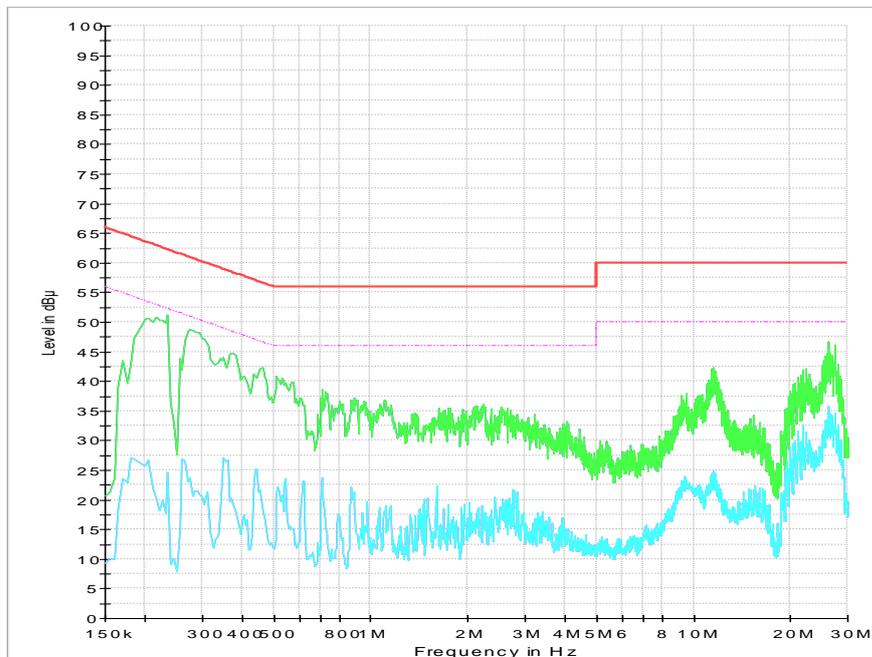


Appendix A : Conducted Emission at the Mains Terminal

(N)

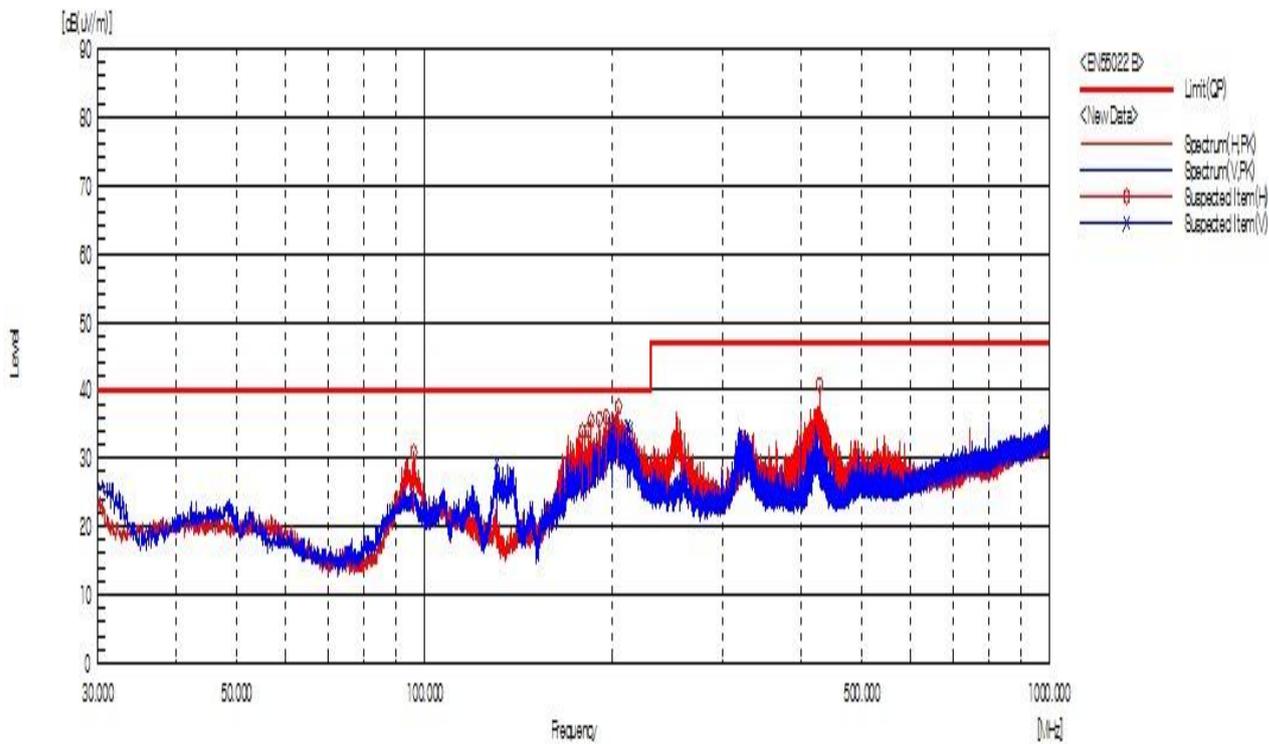


(L)



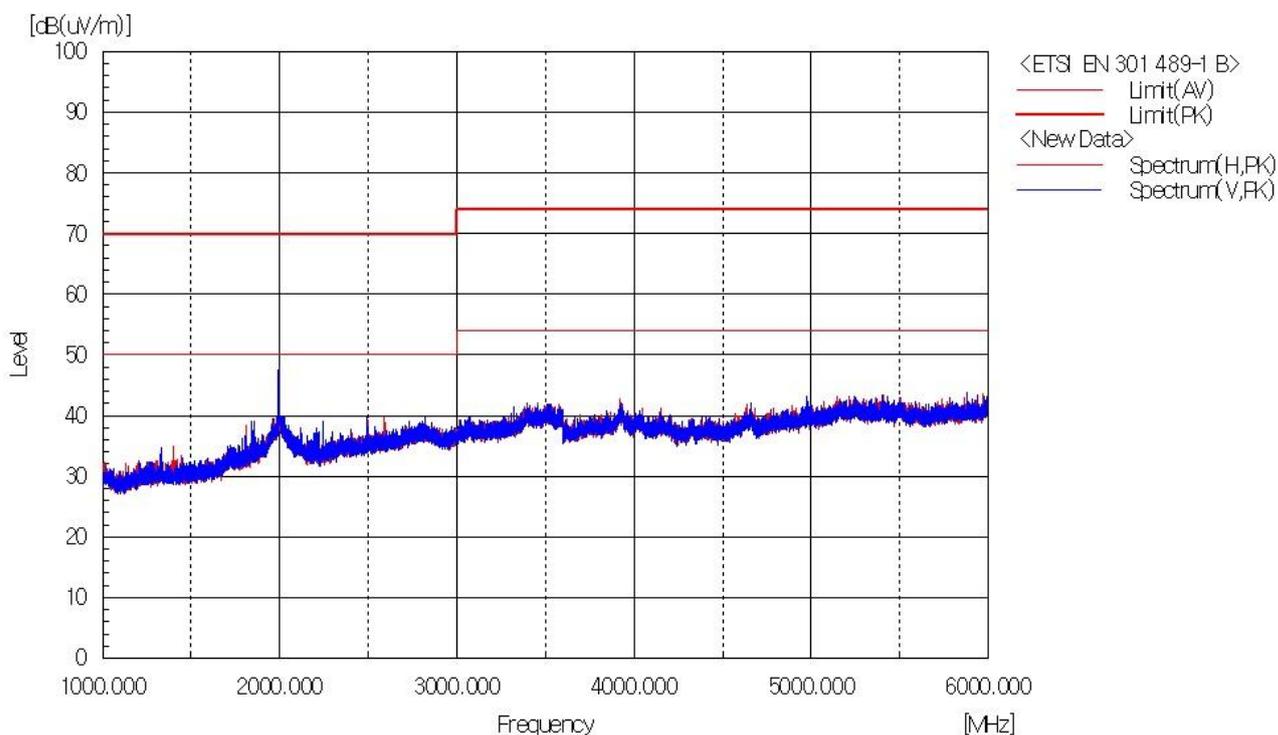
Appendix B : Radiated Emission (3 m Scan Data)

Below 1 GHz



Appendix C : Radiated Emission (3 m Scan Data)

Above 1 GHz



Appendix D : Harmonics on AC Mains

Report title:	G-44-2015-00882
Company Name:	SGS Korea Co.Ltd.
Date of test:	17:56 30.Mar 2015
Measurement file name:	Harmonics_3_2_Ed4_kornix.rsd
Tester:	J.M.LEE
Standard used:	EN/IEC 61000-3-2 Ed.4 Quasi-stationary Equipment class A <= 150% of the limit
Observation time:	150s
Windows width:	10 periods - (EN/IEC 61000-4-7 Edition 2002 + A1:2008)
Customer:	Kornix Technology Corp.
E. U. T.:	GPS Mouse Receiver (model: KGM1544)
Temperature :	(24.1~24.2)°C
Humidity :	(21.0)% R.H
Atmosphere	101.0kpa

Test Result	
E. U. T.:	PASS
Power Source:	PASS

E. U. T. Result

Check harmonics 2..40 [exception odd 21..39]:

Harmonic(s) > 150%:	
Order (n):	None
Harmonic(s) with average > 100%:	
Order (n):	None

Check odd harmonics 21..39:

All Partial Odd Harmonics below partial limits.	
Harmonic(s) > 150%:	
Order (n):	None
Harmonic(s) with average > 150%:	
Order (n):	None

Power Source Result

First dataset out of limit:	
DS (time):	None
Harmonic(s) out of limit:	
Order (n):	None

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	204.206E-3			
2	2.120E-3			PASS
3	94.556E-3	4.111	2.30	PASS
4	1.678E-3			PASS
5	12.248E-3	1.074	1.14	PASS
6	1.081E-3			PASS
7	2.228E-3			PASS
8	1.013E-3			PASS
9	3.922E-3			PASS
10	951.087E-6			PASS
11	907.818E-6			PASS
12	946.161E-6			PASS
13	1.311E-3			PASS
14	1.329E-3			PASS
15	1.403E-3			PASS
16	818.062E-6			PASS
17	1.024E-3			PASS
18	1.216E-3			PASS
19	1.056E-3			PASS
20	722.612E-6			PASS
21	1.119E-3			PASS
22	795.655E-6			PASS
23	1.159E-3			PASS
24	767.257E-6			PASS
25	824.750E-6			PASS
26	698.963E-6			PASS
27	1.160E-3			PASS
28	745.615E-6			PASS
29	722.070E-6			PASS
30	707.965E-6			PASS
31	792.771E-6			PASS
32	949.860E-6			PASS
33	749.753E-6			PASS
34	705.484E-6			PASS
35	723.307E-6			PASS
36	864.269E-6			PASS
37	896.076E-6			PASS
38	782.209E-6			PASS
39	847.181E-6			PASS
40	709.858E-6			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

Maximum harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	206.927E-3			
2	2.680E-3			PASS
3	96.186E-3	2.788	3.45	PASS
4	2.142E-3			PASS
5	12.969E-3	0.758	1.71	PASS
6	1.237E-3			PASS
7	2.703E-3			PASS
8	1.146E-3			PASS
9	4.252E-3			PASS
10	1.233E-3			PASS
11	1.059E-3			PASS
12	1.065E-3			PASS
13	1.848E-3			PASS
14	1.481E-3			PASS
15	1.818E-3			PASS
16	933.013E-6			PASS
17	1.151E-3			PASS
18	1.325E-3			PASS
19	1.266E-3			PASS
20	831.863E-6			PASS
21	1.262E-3			PASS
22	892.483E-6			PASS
23	1.319E-3			PASS
24	882.335E-6			PASS
25	968.245E-6			PASS
26	895.671E-6			PASS
27	1.293E-3			PASS
28	856.393E-6			PASS
29	820.917E-6			PASS
30	816.256E-6			PASS
31	872.485E-6			PASS
32	1.080E-3			PASS
33	882.190E-6			PASS
34	808.696E-6			PASS
35	825.815E-6			PASS
36	1.068E-3			PASS
37	1.053E-3			PASS
38	896.909E-6			PASS
39	960.040E-6			PASS
40	840.772E-6			PASS

Harmonic currents less than 0.6% of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

Maximum harmonic voltage results

Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	231.68	100.731		
2	50.18E-3	0.022	0.2	PASS
3	115.36E-3	0.050	0.9	PASS
4	19.41E-3	0.008	0.2	PASS
5	30.40E-3	0.013	0.4	PASS
6	15.67E-3	0.007	0.2	PASS
7	66.78E-3	0.029	0.3	PASS
8	18.72E-3	0.008	0.2	PASS
9	14.74E-3	0.006	0.2	PASS
10	29.73E-3	0.013	0.2	PASS
11	89.05E-3	0.039	0.1	PASS
12	22.65E-3	0.010	0.1	PASS
13	40.19E-3	0.017	0.1	PASS
14	20.07E-3	0.009	0.1	PASS
15	61.35E-3	0.027	0.1	PASS
16	19.91E-3	0.009	0.1	PASS
17	60.84E-3	0.026	0.1	PASS
18	20.58E-3	0.009	0.1	PASS
19	33.05E-3	0.014	0.1	PASS
20	20.54E-3	0.009	0.1	PASS
21	66.42E-3	0.029	0.1	PASS
22	25.94E-3	0.011	0.1	PASS
23	28.03E-3	0.012	0.1	PASS
24	21.76E-3	0.009	0.1	PASS
25	62.65E-3	0.027	0.1	PASS
26	19.85E-3	0.009	0.1	PASS
27	49.78E-3	0.022	0.1	PASS
28	19.25E-3	0.008	0.1	PASS
29	47.67E-3	0.021	0.1	PASS
30	17.59E-3	0.008	0.1	PASS
31	51.60E-3	0.022	0.1	PASS
32	16.46E-3	0.007	0.1	PASS
33	37.12E-3	0.016	0.1	PASS
34	15.40E-3	0.007	0.1	PASS
35	49.56E-3	0.022	0.1	PASS
36	14.40E-3	0.006	0.1	PASS
37	27.30E-3	0.012	0.1	PASS
38	15.03E-3	0.007	0.1	PASS
39	38.97E-3	0.017	0.1	PASS
40	12.95E-3	0.006	0.1	PASS

Appendix E : Flickers on AC Mains

Report title:	G-44-2015-00882
Company Name:	SGS Korea Co.Ltd.
Date of test:	15:50 30.Mar 2015
Tester:	J.M.LEE
Standard used:	EN/IEC 61000-3-3 Ed.3 Flicker
Short time (Pst):	10 min
Observation time:	120 min (12 Flicker measurements)
Flickermeter:	230V / 50Hz according IEC 61000-4-15 Ed.2
Flicker Impedance:	Zref (IEC 60725)
Customer:	Kornix Technology Corp.
E. U. T.:	GPS Mouse Receiver (model: KGM1544)
Temperature :	(24.1~24.4)°C
Humidity :	(21.0~22.0)% R.H
Atmosphere	101.0kpa

Test Result	PASS
-------------	------

Maximum Flicker results

	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.038	4.00	PASS
dt [s]	0.000	0.50	PASS

Detail Flicker data

Flicker measurement 1	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.037	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 2	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.037	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 3	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.038	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 4	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.037	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 5	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.038	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 6	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.036	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 7	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.037	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 8	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.036	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 9	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.038	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 10	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.037	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 11	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.036	4.00	PASS
dt [s]	0.000	0.50	PASS

Flicker measurement 12	EUT values	Limit	Result
Pst	0.028	1.00	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.037	4.00	PASS
dt [s]	0.000	0.50	PASS

No partial calculation (average odd harmonics [21..39] < 100%)

