EMC TEST REPORT

Test item	: SD MultiCare Analyzer
Model No.	: 03MA20
Order No.	: DTNC1510-05396
Date of receipt	: 2015-10-30
Test duration	: 2015-08-27 ~ 2015-09-03
Date of Issue	: 2015-10-30

Applicant : SD Biosensor, Inc.
C-4th&5th Floor Digital Empire Building 980-3, Yeo Suwon-si, Kyonggi-do, Korea 449-813

Test laboratory : DT&C Co., Ltd.
42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935

Test specification : ANSI C 63.4:2009
FCC Part 15 Subpart B
(Class B All other devices)

Test environment : Temperature : (24 ~ 25)°C,
Humidity : (48 ~ 49) % R.H.

Test result : ☒ Comply ☐ Not Comply

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose.
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Tested by:

Engineer
YongKi Kim

Reviewed by:

Technical Manager
MyungJin Song

PRESIDENT OF DT&C Co., Ltd.

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1. General Remarks

This report contains the result of tests performed by:

DT&C Co., Ltd.

Address : 42, Yurim-ro 154beon-gil, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, Korea, 449-935

http://www.dtnc.net

Tel: +82-31-321-2664 Fax: +82-31-321-1664

2. Test Laboratory

DT&C Co., Ltd. has been accredited / filed / authorized by the agencies listed in the following table;

Certificate	Nation	Agency	Code	Mark
Accreditation	Korea	KOLAS	393	ISO/IEC 17025
Site Filing	USA	FCC	KR0034 101842 678747, 596748, 804488, 165783	Accredited 2.948 Listed
	Canada	IC	5740A-1 5740A-2	Registered
	Japan	VCCI	C-1427 R-1364, R-3385, R-4076, R-4180, T-1442, G-338, G754, G-815	Registered
Certification	Korea	KC	KR0034	Designation
	Germany	TUV	CARAT 13 11 86721 001	ISO/IEC 17025

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competent of calibration and testing laboratory”.

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3. General Information of EUT

Kind of Equipment	SD MultiCare Analyzer
Model Name	03MA20
Add Model Name	None
Serial No.	None
Type of Sample Tested	Pre-Production
Supplied Power for Test	120 V, 60 Hz
Applicant	SD Biosensor, Inc. C-4th&5th Floor Digital Empire Building 980-3, Yeo Suwon-si, Kyonggi-do, Korea 449-813
Manufacturer	SD Biosensor, Inc. C-4th&5th Floor Digital Empire Building 980-3, Yeo Suwon-si, Kyonggi-do, Korea 449-813
Factory	SD Biosensor, Inc. C-4th&5th Floor Digital Empire Building 980-3, Yeo Suwon-si, Kyonggi-do, Korea 449-813

Related Submittal(s) / Grant(s)

Original submittal only.

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4. Test Summary

4.1 Applied standards and test results

Test Items	Applied Standards	Results
Conducted Disturbance	ANSI C63.4:2009	**C**
Radiated Disturbance	ANSI C63.4:2009	**C**
C=Comply N/C=Not Comply N/T=Not Tested N/A=Not Applicable		

The data in this test report are traceable to the national or international standards.

4.2 Test environment and conditions

Test Items	Test date (YYYY-MM-DD)	Temp (℃)	Humidity (% R.H.)
Conducted Disturbance	2015-08-27	25	49
Radiated Disturbance	2015-09-03	24	48

4.3 Test result Summary

(1) Conducted Emission

Frequency [MHz]	Phase	Result [dBμV]	Detector	Limit [dBμV]	Margin [dB]
0.41904	**N**	**34.4**	Average	**47.5**	**13.1**

(2) Radiated Emission

Frequency [MHz]	Pol.	Result [dB(μV/m)]	Detector	Limit [dB(μV/m)]	Margin [dB]
47.824	**H**	**24.1**	Quasi-Peak	**30.0**	**5.9**

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5. Test Set-up and operation mode

5.1 Principle of Configuration Selection

Emission : The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

5.2 Test Operation Mode

- The EUT is connected to the PC through the USB continuously receiving the Data.

5.3 Support Equipment Used

Unit	Model No.	Serial No.	Manufacturer	CABLE				Back shell	FCC ID
				Connect type	Length (m)	shield	With Ferrite		
PC	OPTI PLEX 330	F92QFBX	DELL	Power D-Sub Stereo Parallel USB USB RS232 LAN USB USB	1.8 1.8 2.0 2.0 2.0 2.0 2.0 10.0 0.5 1.6	Non-shield shield Non-shield shield Non-shield Non-shield Non-shield Non-shield Non-shield Non-shield	O X X X X X X X X X	Plastic Plastic Plastic Plastic Plastic Plastic Plastic Plastic Plastic Plastic	DOC
Head Set	COV903	N/A	COSY	Stereo	2.0	Non-shield	X	Plastic	DOC
RPrinter	SRP-770	N/A	Bixolon	Power RS232 Parallel	1.8 2.0 2.0	Non-shield Non-shield shield	X X X	Plastic Plastic Plastic	DOC
Keyboard	SK-8115	CN-ODJ321-71616-83J-09J9	YET FOUNDATE Ltd.	USB	2.0	Non-shield	X	Plastic	DOC
Mouse	1094	X817158-002	Microsoft	USB	2.0	Non-shield	X	Plastic	DOC
LCD Monitor	U2312HMT	CN-036N7K-74445-199-440L	Dell	Power D-Sub	2.0 1.8	Non-shield shield	X X	Plastic Plastic	DOC
External HDD	9ZR8N1-500	NA0H4ANH	Seagate	USB	0.5	Non-shield	X	Plastic	DOC
Mobile Printer	SPP-R200	SDKQTKA11050155	BIXOLON	Printer	1.15	Non-shield	X	Plastic	DOC
Barcode Scanner	TSK-750	T732A125937	TECHSCAN	USB	1.8	shield	X	Plastic	DOC

NOTE

- See “APPENDIX 2 Photographs” for actual system test setup

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6. Test Results : Emission

6.1 Conducted Disturbance

6.1.1 Measurement Procedure

In the range of 0.15 MHz to 30 MHz, the conducted disturbance was measured and set-up was made accordance with **ANSI C63.4.**

If the EUT is table top equipment, it was placed on a wooden table with a height of 0.8 m above the reference ground plane and 0.4 m from the conducting wall of the shielded room.

Also if the EUT is floor-standing equipment, it was placed on a non-conducted support with a height up to 0.15 m above the reference ground plane.

Connect the EUT's power source lines to the PC power through the LISN. All the other peripherals are connected to the 2nd LISN, if any.

Unused measuring port of the LISN was resistively terminated by 50 ohm terminator.

The measuring port of the LISN for EUT was connected to spectrum analyzer.

Using conducted emission test software, the emissions were scanned with peak detector mode.

After scanning over the frequency range, suspected emissions were selected to perform final measurement. When performing final measurement, the receiver was used which has Quasi-Peak detector and CISPR Average detector.

For (0.15 ~ 30) MHz frequency range, Quasi-Peak detector with 10 kHz RBW and 30 kHz VBW was used. By varying the configuration of the test sample and the cable routing it was attempted to maximize the emission.

For further description of the configuration refer to the picture of the test set-up.

6.1.2 Limit for Conducted Disturbance

(1) Conducted disturbance at mains ports.

Frequency range (MHz)	Limits dB(μV)			
	Quasi-peak		Average	
	Class A	Class B	Class A	Class B
0.15 to 0.50	79	66 to 56	66	56 to 46
0.50 to 5	73	56	60	46
5 to 30		60		50
Note 1 The lower limit shall apply at the transition frequencies. Note 2 The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

Note) 1. Emission Level = Reading Value + Correction Factor.
2. Correction Factor = Cable Loss + Insertion Loss of LISN
3. Margin = Limit - Emission level

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Test Result

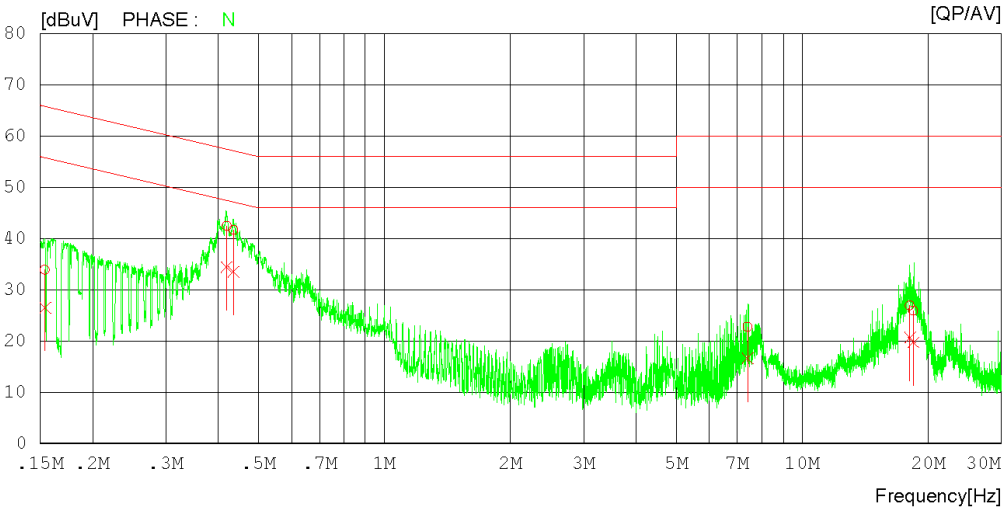
Results of Conducted Emission

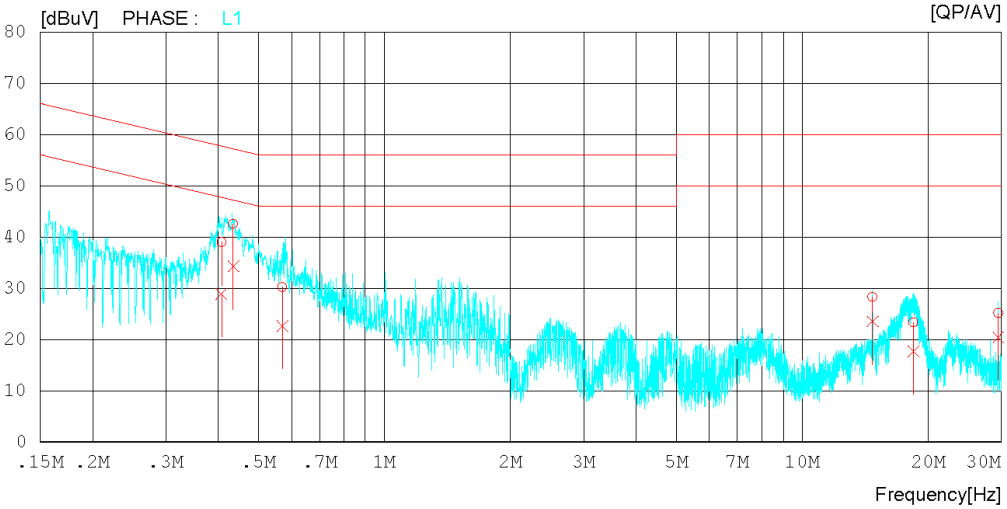
DT&C
Date : 2015-08-27

Order No.	:	DTNC1510-05396	Referrence No.	:	
Type	:		Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi.	:	25 'C 49 % R.H.
Test Condition	:		Operator	:	

Memo : PC Link

LIMIT : CISPR22_B QP
CISPR22_B AV





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Results of Conducted Emission

DT&C
Date : 2015-08-27

Order No.	:	DTNC1510-05396	Referrence No.	:	
Type	:		Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi.	:	25 'C 49 % R.H.
Test Condition	:		Operator	:	

Memo : PC Link

LIMIT : CISPR22_B QP
CISPR22_B AV

NO	FREQ	READING		C.FACTOR	RESULT		LIMIT		MARGIN		PHASE
		QP	AV		QP	AV	QP	AV	QP	AV	
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.41904	41.6	33.6	0.8	42.4	34.4	57.5	47.5	15.1	13.1	N
2	0.43557	40.8	32.6	0.8	41.6	33.4	57.1	47.1	15.5	13.7	N
3	18.09960	26.3	20.1	0.6	26.9	20.7	60.0	50.0	33.1	29.3	N
4	18.48720	25.6	19.4	0.3	25.9	19.7	60.0	50.0	34.1	30.3	N
5	0.15400	32.1	24.7	1.8	33.9	26.5	65.8	55.8	31.9	29.3	N
6	7.40655	22.4	16.3	0.3	22.7	16.6	60.0	50.0	37.3	33.4	N
7	0.40724	38.1	28.0	0.9	39.0	28.9	57.7	47.7	18.7	18.8	L1
8	0.43444	41.6	33.4	0.9	42.5	34.3	57.2	47.2	14.7	12.9	L1
9	0.56953	29.5	22.0	0.7	30.2	22.7	56.0	46.0	25.8	23.3	L1
10	14.75070	28.1	23.3	0.2	28.3	23.5	60.0	50.0	31.7	26.5	L1
11	18.46871	23.1	17.5	0.2	23.3	17.7	60.0	50.0	36.7	32.3	L1
12	29.49508	24.8	20.1	0.3	25.1	20.4	60.0	50.0	34.9	29.6	L1

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6.2 Radiated Disturbance

6.2.1 Measurement Procedure

The radiated disturbance was measured and set-up was made accordance with **ANSI C63.4.**

If the EUT is tabletop equipment, it was placed on a wooden table with a height of 0.8 m above the reference ground plane and 3 m or 10 m away from the interference receiving antenna in the **10m semi-anechoic chamber.**

Also if the EUT is floor-standing equipment, it was placed on a non-conducted support with a height up to 0.15 m above the reference ground plane.

Rotate the EUT from (0 - 360)° and position the receiving antenna at heights from (1 - 4) m above the reference ground plane continuously to determine associated with higher emission levels and record them.

The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

For below 1 GHz frequency range, Quasi-Peak detector with
(RBW = 100 kHz, VBW = 300 kHz, SWEEP TIME = AUTO, TRACE = MAX HOLD, SWEEP POINT = 8001) was used.

For above 1 GHz frequency range, Peak detector with
(RBW = 1 MHz, VBW = 1 MHz, SWEEP TIME = AUTO, TRACE = MAX HOLD and SWEEP POINT = 8001) and
CISPR Average detector with
(RBW = 1 MHz, VBW = 10 Hz, SWEEP TIME = AUTO, TRACE = MAX HOLD and SWEEP POINT = 8001) were used.

For further description of the configuration refer to the picture of the test set-up.

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6.2.2 Limit for Radiated Disturbance

- The test frequency range of Radiated Disturbance measurements are listed below.

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 108	1 000
108 – 500	2 000
500 – 1 000	5 000
Above 1 000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

(1) Limit for Radiated Emission below 1 000 MHz

Frequency range (MHz)	Class A Equipment (10 m distance)	Class B Equipment (3 m distance)
	Quasi-peak (dBμV/m)	Quasi-peak (dBμV/m)
30 to 88	39.1	40
88 to 216	43.5	43.5
216 to 960	46.4	46
960 to 1 000	49.5	54

Note 1 The lower limit shall apply at the transition frequency.
Note 2 Additional provisions may be required for cases where interference occurs.
Note 3 According to 15.109(g), as an alternative to the radiated emission limit shown above, digital devices may be shown to comply with the standards(CISPR), Pub. 22 shown as below.

Frequency range (MHz)	Class A Equipment (10 m distance)	Class B Equipment (10 m distance)
	Quasi-peak (dBμV/m)	Quasi-peak (dBμV/m)
30 to 230	40	30
230 to 1 000	47	37

(2) Limits for Radiated Emission above 1 000 MHz at a measuring distance of 3 m

Frequency (GHz)	Class A Equipment		Class B Equipment	
	Peak (dBμV/m)	Average (dBμV/m)	Peak (dBμV/m)	Average (dBμV/m)
1 to 40	80	60	74	54

Note)1. Emission Level = Reading Value + loss - gain + Ant Factor
2. Margin = Limit - Emission level
3. Loss = Cable loss, Gain = Amp gain, Ant Factor = Antenna Factor

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Test Result

< 30 MHz ~ 1 GHz >

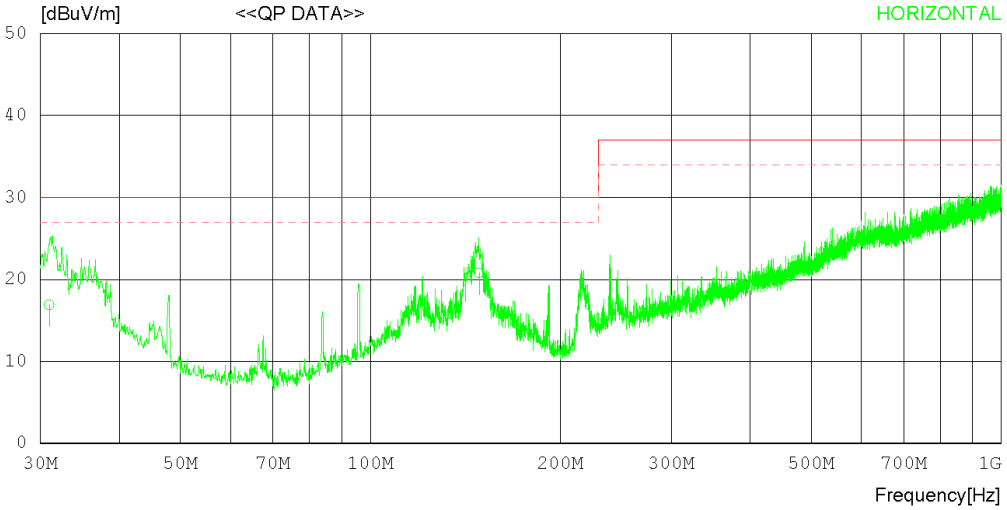
RADIATED EMISSION

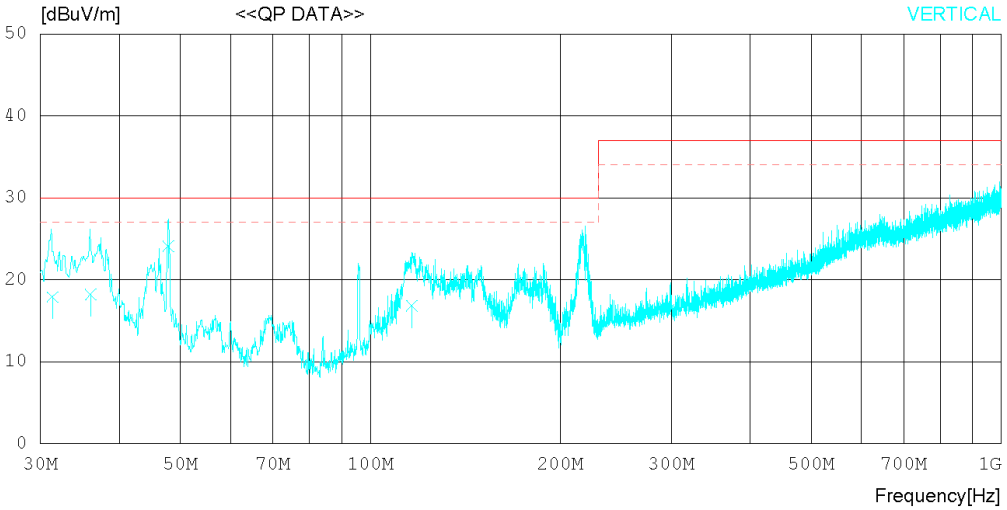
Date : 2015-09-03

Order No.	:	DTNC1510-05396	Reference No.	:	
Model No.	:		Power Supply	:	120 V 50 Hz
Serial No.	:		Temp/Humi	:	24 'C 48 % R.H.
Test Condition	:		Operator	:	

Memo : PC Link

LIMIT : CISPR Pub.22 Class B (10m)
MARGIN: 3 dB





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RADIATED EMISSION

Date : 2015-09-03

Order No.	:	DTNC1510-05396	Reference No.	:	
Model No.	:		Power Supply	:	120 V 50 Hz
Serial No.	:		Temp/Humi	:	24 'C 48 % R.H.
Test Condition	:		Operator	:	

Memo : PC Link

LIMIT : CISPR Pub.22 Class B (10m)
MARGIN: 3 dB

No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	30.973	20.1	18.1	1.3	22.6	16.9	30.0	13.1	400	360
2	148.650	30.4	10.6	2.8	23.0	20.8	30.0	9.2	300	47
----- Vertical ------										
3	36.014	24.0	15.5	1.3	22.6	18.2	30.0	11.8	200	0
4	47.824	35.5	9.6	1.6	22.6	24.1	30.0	5.9	400	0
5	31.338	21.3	17.9	1.3	22.6	17.9	30.0	12.1	300	171
6	116.299	25.0	12.0	2.6	22.8	16.8	30.0	13.2	100	360

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< (1 ~ 6) GHz _ Peak >

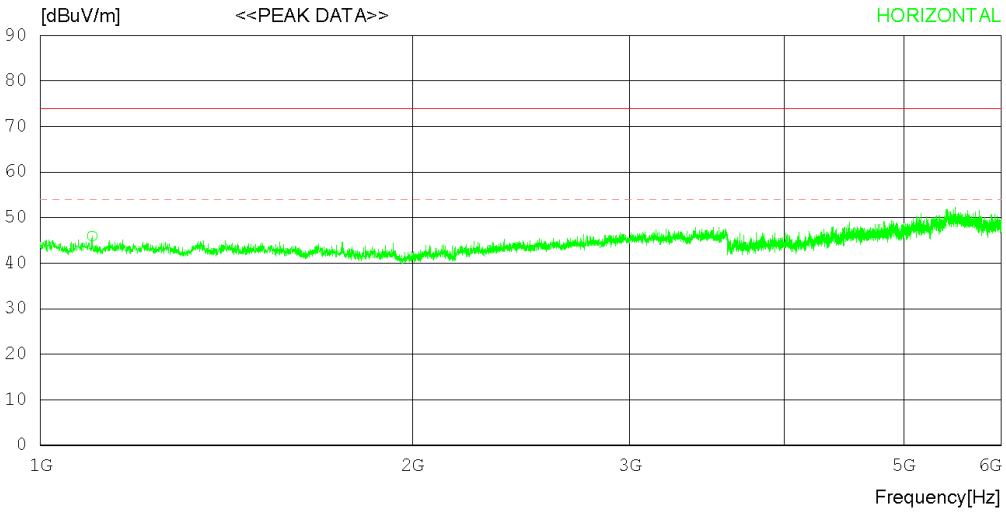
RADIATED EMISSION

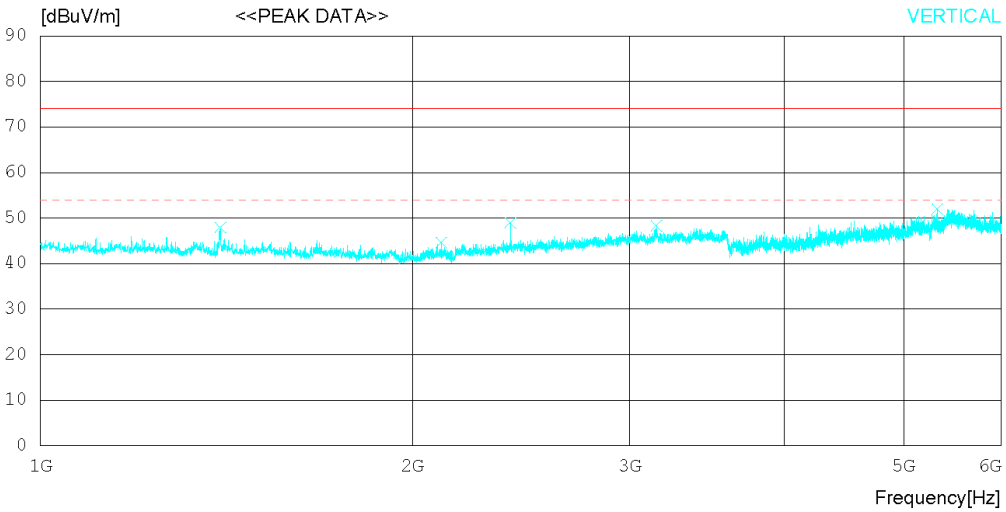
Date : 2015-09-03

Order No.	:	DTNC1510-05396	Reference No.	:	
Model No.	:		Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi	:	24 'C 48 % R.H.
Test Condition	:		Operator	:	

Memo : PC Link

LIMIT : FCC Part15 Subpart.B Class B (3m) - 18G(Peak)
FCC Part15 Subpart.B Class B (3m) - 18G(Avg)





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RADIATED EMISSION

Date : 2015-09-03

Order No.	:	DTNC1510-05396	Reference No.	:	
Model No.	:		Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi	:	24 'C 48 % R.H.
Test Condition	:		Operator	:	

Memo : PC Link

LIMIT : FCC Part15 Subpart.B Class B (3m) - 18G(Peak)
FCC Part15 Subpart.B Class B (3m) - 18G(Avg)

No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1101.250	51.5	24.2	10.5	40.3	45.9	74.0	28.1	100	358
----- Vertical ------										
2	1398.125	52.8	25.1	9.8	39.8	47.9	74.0	26.1	100	1
3	2111.875	49.3	26.0	8.2	38.9	44.6	74.0	29.4	100	82
4	2401.250	52.0	27.3	8.4	38.8	48.9	74.0	25.1	100	151
5	3154.375	49.1	29.1	8.7	38.6	48.3	74.0	25.7	100	1
6	5324.375	45.3	34.0	10.4	37.8	51.9	74.0	22.1	100	197

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< (1 ~ 6) GHz _ Average >

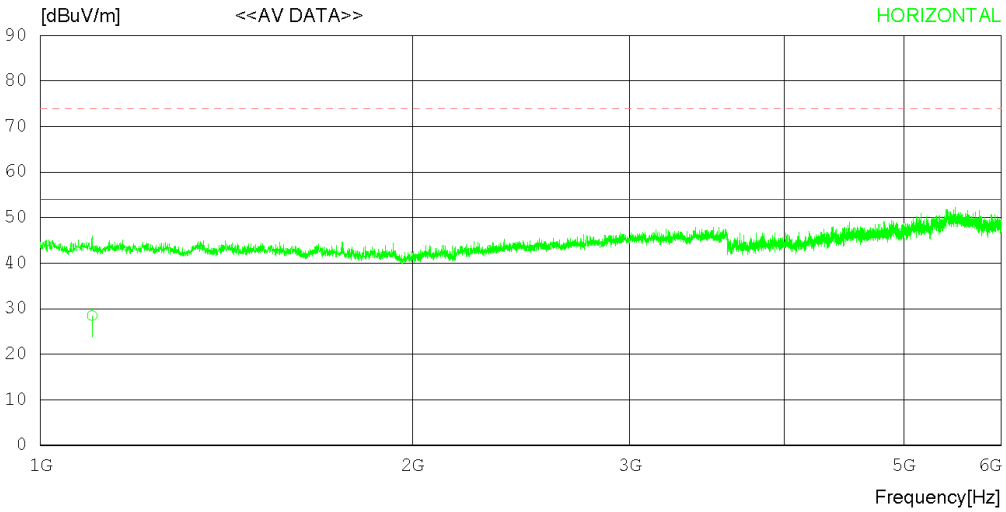
RADIATED EMISSION

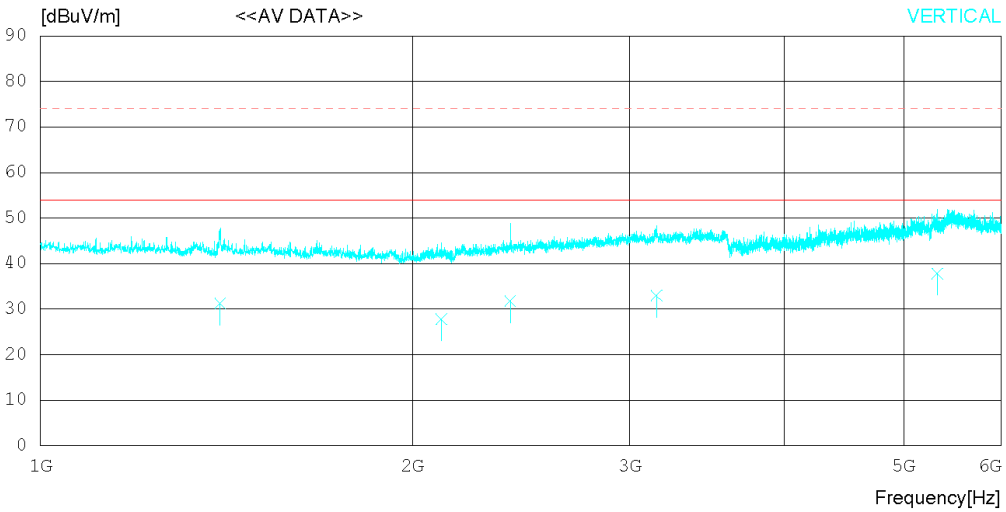
Date : 2015-09-03

Order No.	:	DTNC1510-05396	Reference No.	:	
Model No.	:		Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi	:	24 'C 48 % R.H.
Test Condition	:		Operator	:	

Memo : PC Link

LIMIT : FCC Part15 Subpart.B Class B (3m) - 18G(Avg)
FCC Part15 Subpart.B Class B (3m) - 18G(Peak)





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RADIATED EMISSION

Date : 2015-09-03

Order No.	:	DTNC1510-05396	Reference No.	:	
Model No.	:		Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi	:	24 'C 48 % R.H.
Test Condition	:		Operator	:	

Memo : PC Link

LIMIT : FCC Part15 Subpart.B Class B (3m) - 18G(Avg)
FCC Part15 Subpart.B Class B (3m) - 18G(Peak)

No.	FREQ [MHz]	READING AV [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	1101.158	34.1	24.2	10.5	40.3	28.5	54.0	25.5	100	0
----- Vertical ------										
2	1397.961	36.1	25.1	9.8	39.8	31.2	54.0	22.8	100	360
3	2401.097	34.9	27.3	8.4	38.8	31.8	54.0	22.2	100	151
4	5323.995	31.2	34.0	10.4	37.8	37.8	54.0	16.2	100	197
5	2112.060	32.5	26.0	8.2	38.9	27.8	54.0	26.2	100	99
6	3153.824	33.8	29.1	8.7	38.6	33.0	54.0	21.0	100	360

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Appendix 1

List of Test and Measurement Instruments

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To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment is identified by the Test Laboratory.

1. Conducted Disturbance

Name of Instrument		Model No.	Manufacturer	Serial No.	Cal. Date	Next Cal. Date
☒	MEASUREMENT SOFTWARE	EMI-C VER. 2.00.0143	TSJ	N/A	N/A	N/A
☐	SPECTRUM ANALYZER	8591E	H/P	3649A05889	N/A	N/A
☐	LISN	KNW-407	KYORITSU	8-317-8	2015.01.07	2016.01.07
☐	LISN	ESH2-Z5	ROHDE & SCHWARZ	828739/006	2014.09.11	2015.09.11
☒	EMI TEST RECEIVER	ESCI	ROHDE & SCHWARZ	100364	2015.02.25	2016.02.25
☒	ARTIFICIAL MAINS NETWORK	PMM L2-16B	NARDA S.T.S. / PMM	000WX20305	2015.06.26	2016.06.26
☒	LISN	LISN1600	TTI	197204	2015.06.26	2016.06.26
☒	50 OHM TERMINATOR	CT-01	TME	N/A	2015.01.06	2016.01.06
☐	ISN	T8	TESEQ GMBH	24815	2015.01.07	2016.01.07
☐	LISN (DC)	NNBM8125	SCHWARZBECK	8125-821	2014.09.12	2015.09.12
☐	LISN (DC)	NNBM8125	SCHWARZBECK	8125-1390	2014.09.12	2015.09.12

2. Radiated Disturbance

Name of Instrument		Model No.	Manufacturer	Serial No.	Cal. Date	Next Cal. Date
☒	MEASUREMENT SOFTWARE	EMI-R VER. 2.00.0121	TSJ	N/A	N/A	N/A
☒	EMI TEST RECEIVER	ESU	ROHDE & SCHWARZ	100014	2015.01.06	2016.01.06
☒	BILOG ANTENNA	CBL6112B	SCHAFFNER	2737	2014.12.10	2016.12.10
☒	HORN ANTENNA	BBHA9120A	SCHWARZBECK	322	2014.05.12	2016.05.12
☒	AMPLIFIER	8447E	H/P	2945A02865	2015.01.06	2016.01.06
☒	PRE AMPLIFIER	8449B	AGILENT	3008A01590	2015.02.25	2016.02.25
☐	SPECTRUM ANALYZER	E4411B	AGILENT	US41062735	2015.06.25	2016.06.25
☐	AMPLIFIER	8447D	AGILENT	2443A03690	2015.06.25	2016.06.25
☐	EMI TEST RECEIVER	ESCI	ROHDE & SCHWARZ	100364	2015.02.25	2016.02.25
☐	AMPLIFIER	MLA-100K01-B01-26	TSJ	1252741	2015.02.25	2016.02.25

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Appendix 2

Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
2015-10-30	Changed Manufacturer & Factory	YongKi Kim	MyungJin Song

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