Underwriters Laboratories Inc.

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Project: 13CA16688
File: MC15677
Report: 13CA16688-FCC
Date: April 18, 2013
Model: FS-A4206F

Electromagnetic Compatibility Test Report

For

LCD Monitor

D&T Inc.
(JANG-DONG,(DAEDEOK VALLEY)) 26-121 GAJEONGBUK-RO YUSEONG-GU DAEJEON 305-343 KOREA

Summary of Test Results:

The following tests were performed on a sample submitted for evaluation of compliance with Part 15 Subpart B Section 15.107(a) / Part 15 Subpart B Section 15.109 (a) Class B				
Test #	Test Name Test Requirement/Specification	Compliant	Not Compliant	See Remark
1	AC Power line Conducted Emission Test	X	-	-
2	Radiated Emission Test	X	-	-

Conclusion:

The tests listed in the Summary of Testing section of this report have been performed as a witness testing and the results recorded by UL Korea Ltd. in accordance with the procedures stated in each test requirement and specification. The test list was determined by the Applicant as being applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

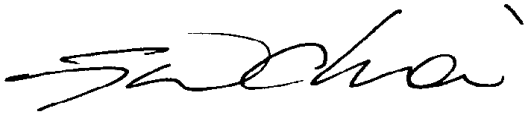
The equipment under test has

☐ Met the technical requirements

☒ Met the technical requirements under the limited condition

☐ Not met the technical requirements

Witness Tested by
Sung Hoon Baek, WiSE Engineering Lead
UL Verification Services- 3014ASEO
UL Korea Ltd.
April 19, 2013



Reviewed by
Jeawoon Choi, WiSE Engineering Leader
UL Verification Services- 3014ASEO
UL Korea Ltd.
April 19, 2013

Test Report Detail

Test Report No:	13CA16688-FCC
File No:	MC15677
Tests Performed By:	UL Korea Ltd. 33rd FL. GFC Bldg. 737 Yeoksam-dong, Kangnam-ku, Seoul, 135-984, Korea
Test Site:	DIGITAL EMC CO., LTD. 683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080
Applicant:	D&T Inc. (JANG-DONG,(DAEDEOK VALLEY)) 26-121 GAJEONGBUK-RO YUSEONG-GU DAEJEON 305-343 KOREA
Manufacturer:	D&T Inc. (JANG-DONG,(DAEDEOK VALLEY)) 26-121 GAJEONGBUK-RO YUSEONG-GU DAEJEON 305-343 KOREA
Applicant Contact:	Mr. Kyutae Park
Phone:	82-42-360-8000
E-mail:	ktpark@dntinc.co.kr
Product Type:	LCD Monitor
Model Number:	FS-A4206F
Multiple Model Name	N/A
Product standards:	Part 15 Subpart B Section 15.107 (a) / Part 15 Subpart B Section 15.109 (a) Class B
Test Procedure	ANSI C63.4 : 2009
Sample Serial Number:	N/A
Sample Receive Date:	April 01, 2013
Testing Start Date:	April 01, 2013
Date Testing Complete:	April 19, 2013
Test Report Date:	April 19, 2013
Overall Results:	**Pass**

UL Korea Ltd. reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. UL Korea Ltd. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from UL Korea Ltd. issued reports.

REPORT DIRECTORY

1. GENERAL PRODUCT DESCRIPTION

1.1. Report Revision History

Revision Date	Description	Remarks
-	Original	-

1.2. Equipment Description

Description:
LCD Monitor

1.3. Details of Test Equipment (EUT)

Equipment Configuration:				
No.	Product Type	Manufacturer	Model	Comments
1	LCD Monitor	D&T Inc.	FS-A4206F	N/A
2	DVI cable	N/A	N/A	N/A
3	Serial cable	N/A	N/A	N/A

1.4. EUT Internal operating frequency

Frequency (MHz)	Description	Frequency (MHz)	Description
148.5	Display Clock Frequency	192.0	Memory Clock frequency
74.25	LVDS clock frequency	27.0	Image processor operation x-tal frequency
12.0	FRC operation x-tal frequency	7.3728	u-COM operation x-tal frequency

1.5. Details information of Multi-listing model:

Model name	Description:
N/A	N/A
***Note:** The manufacturer has declared to all the multiple model names into the basic model without any further evaluation by UL.	

1.6. Technical Data:

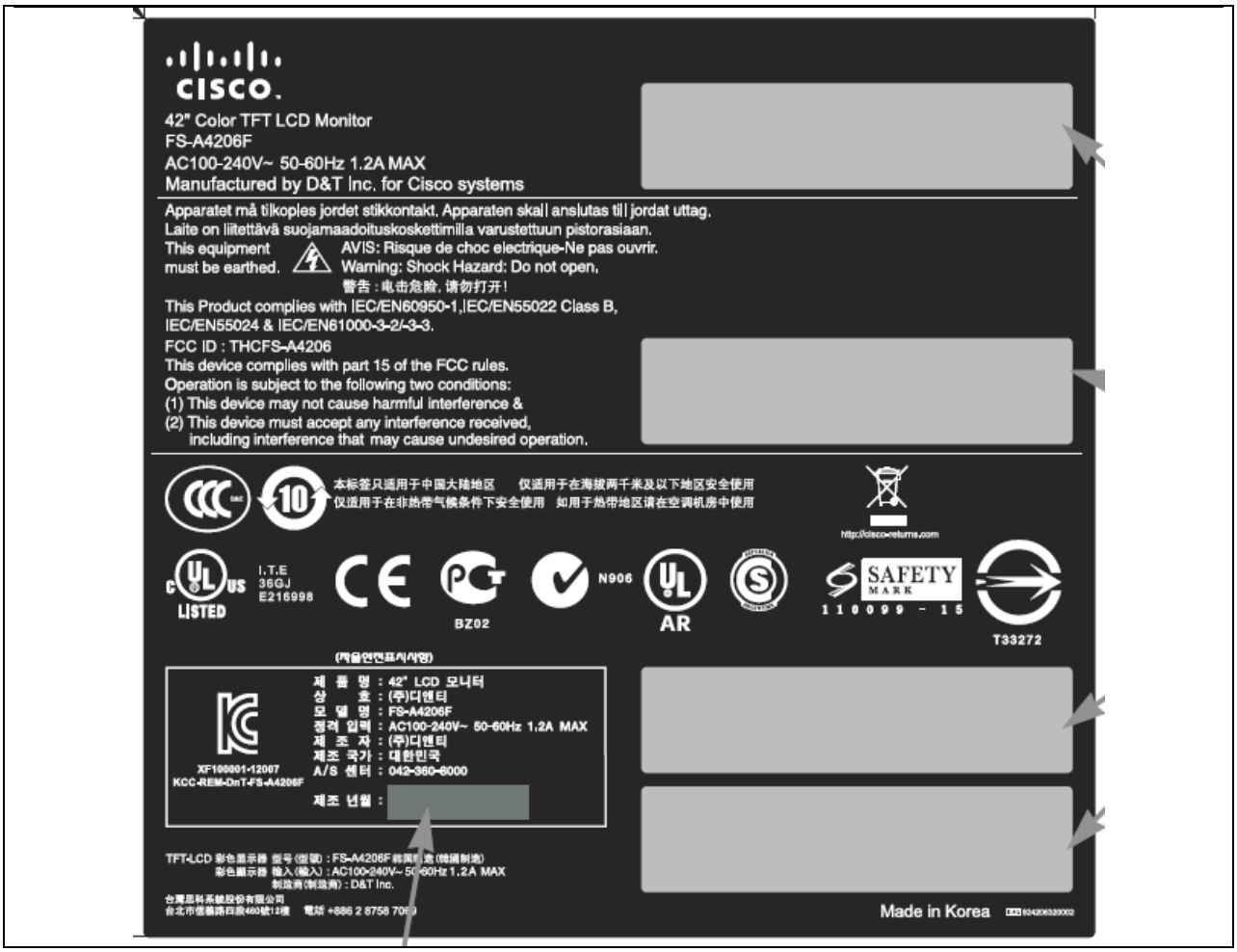
Specification

Model	FS-A4206F	
LCD PANEL	Type	A-si TFT Active matrix
	Display area	930.4(H) mm X 523.26(V) mm
	Maximum Resolution	1920X1080@60Hz
	Pixel pitch	0.4845(H)mm X 0.4845(V)mm
	Display colors	1073.7M (RGB 10-bit data)
	Contrast Ratio(Typ.)	1300:1
	Viewing Angle(Typ.)	89/89/89/89
	Response Time(Typ.)	12ms
	Luminance(Typ.)	360cd/m2
Synchronization	Horizontal Frequency	135.6 KHz
	Vertical Frequency	60 Hz
Power Consumption	Maximum	120W
	Standby Mode	Under 0.5W
Power	AC 100-240V~50-60Hz 1.2A Max	
Approval Marks	Approval Mark	UL, FCC, Mx CoC, AR-S, CE, Gost-R, SASO, CCC, South Africa, KC BSMI, Singapore safety, C-Tick, CB
Energy	Efficiency	China energy label, E-Standby
Dimension	Size and weight	992.1X43.3X585 /19Kg(23Kg)

1.7. Technical descriptions and documents:

No.	Document Title and Description
1	Project Application Letter and Specification
***Note:** The manufacturer provided the following document.	

1.8. Equipment Marking Plate:



2. TEST CONDITION

2.1. Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	LCD monitor	D& T Inc.	FS-A4206F	EUT
AE	PC	Dell Inc	VOSTRO220	S/N : G3RZKBX
AE	Keyboard	HP	KB-065	S/N : CN11163231
AE	Mouse	Microsoft CORP	1484	S/N : 352700021372
AE	Printer	EPSON	EPSON AcuLaser M1200	S/N : LWTZ181308
*** Note:** EUT - Equipment Under Test, AE - Auxiliary/Associated Equipment, SIM - Simulator (Not Subjected to Test)				

2.2. Input/ Output Ports:

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
1	Mains	AC	1.8 m	Unshielded	Hospital-grade AC Power cord
2	DVI to HDMI	I/O	1.8 m	Shielded	19 pin DVI-D
3	Serial	I/O	1.8 m	Shielded	Not user port
*** Note:** * AC = AC Power Port, DC = DC Power Port, N/E = Non-Electrical, I/O = Signal Input or Output Port (Not Involved in Process Control), TP = Telecommunication Ports					

2.3. Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Comments
Rated	100-240Vac	1.2A Max	-	50-60	-
1	120 V	-	-	50	-

2.4. EUT Operation Modes:

Mode #	Mode	Description
1	DVI mode	“H” characters scroll on the EUT monitor screen

2.5. Mode of Video resolution:

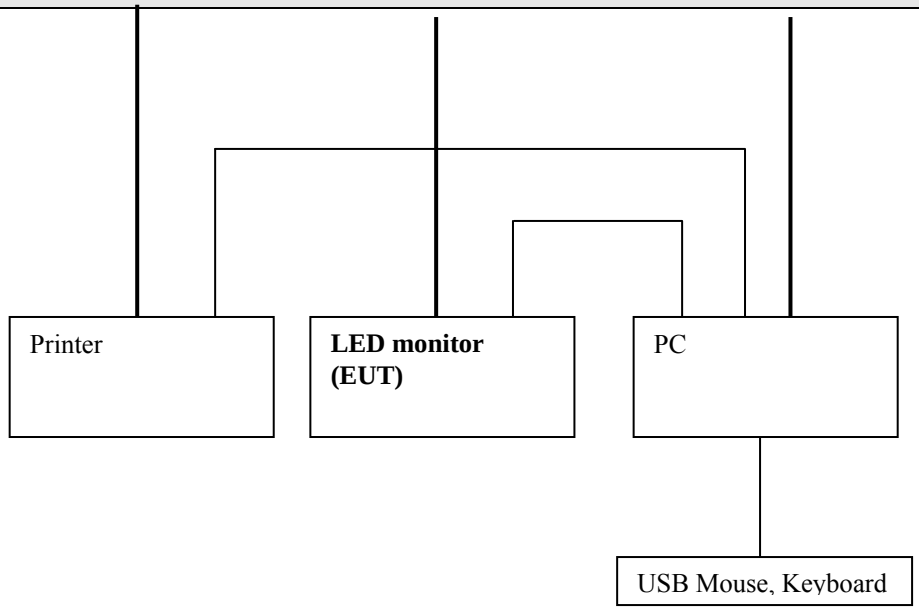
Mode #		Resolution	Comments
1	DVI Mode	640 * 480 @ 60Hz	-
2		1280 * 1024 @ 60Hz	-
3		1920 * 1200 @ 60Hz	Worst case condition (Range of Brightness: 100, Range of contrast: 100 And range of backlight: 100
***Note:** Video resolution where it refers from above is representative worst case.			

2.6. Result of Testing

No	Test requirements	Standard	Results	Verdict
1	AC Power line Conducted Emission Test	Part 15 Subpart B Section 15.107 (a) Class B	Met limit Class B	Complied
2	Radiated Emission Test	Part 15 Subpart B Section 15.109 (a) Class B	Met limit Class B	Complied
***Note:** This product has been tested in accordance with the measurement procedures specified Part 15 Subpart B Section 15.107 (a) / Part 15 Subpart B Section 15.109 (a) Class B at the **Digital EMC Co., Ltd.** Laboratory and the test results has been shown to be complied with the EMC requirements specified in the standard above.				

2.7. Test configuration

Test configuration



3. TEST CONDITION AND RESULTS

3.1. Mains Terminal Disturbance Voltage Test

TEST: Limits of mains terminal disturbance voltage					
Method	Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.				
Parameters recorded during the test		Laboratory Ambient Temperature	19 °C		
		Relative Humidity	40 %		
-		Frequency range on each side of line	Measurement Point		
Fully configured sample scanned over the following frequency range		0.15 MHz to 30 MHz	Input A.C. power ports of EUT		
Instrument settings		RBW	9kHz		
		VBW	10 kHz		
Limits - Class B					
Frequency (MHz)	Limit (dBµV)				
	Quasi-Peak	Result	Average	Result	
0.15 to 0.50	66 to 56	**Pass**	56 to 46	**Pass**	
0.50 to 5	56	**Pass**	46	**Pass**	
5 to 30	60	**Pass**	50	**Pass**	
EUT Configuration Settings:					
Power Interface Mode # (See Section 2.3)		EUT Operation Mode # (See Section 2.4)		EUT Configurations Mode # (See Section 2.7)	
1		1		1	

Conducted Emissions Test Equipment used:					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESCI	100364	2013.02.27	2014.02.27
LISN	Rohde & Schwarz	ESH2-Z5	828739/006	2012.09.18	2013.09.18
LISN	TTI	LISN1600	197204	2012.07.02	2013.07.02
50 ohm Terminator	TME	CT-01	N/A	2013.01.08	2014.01.08

Figure 1. Graphical representation of conducted emissions

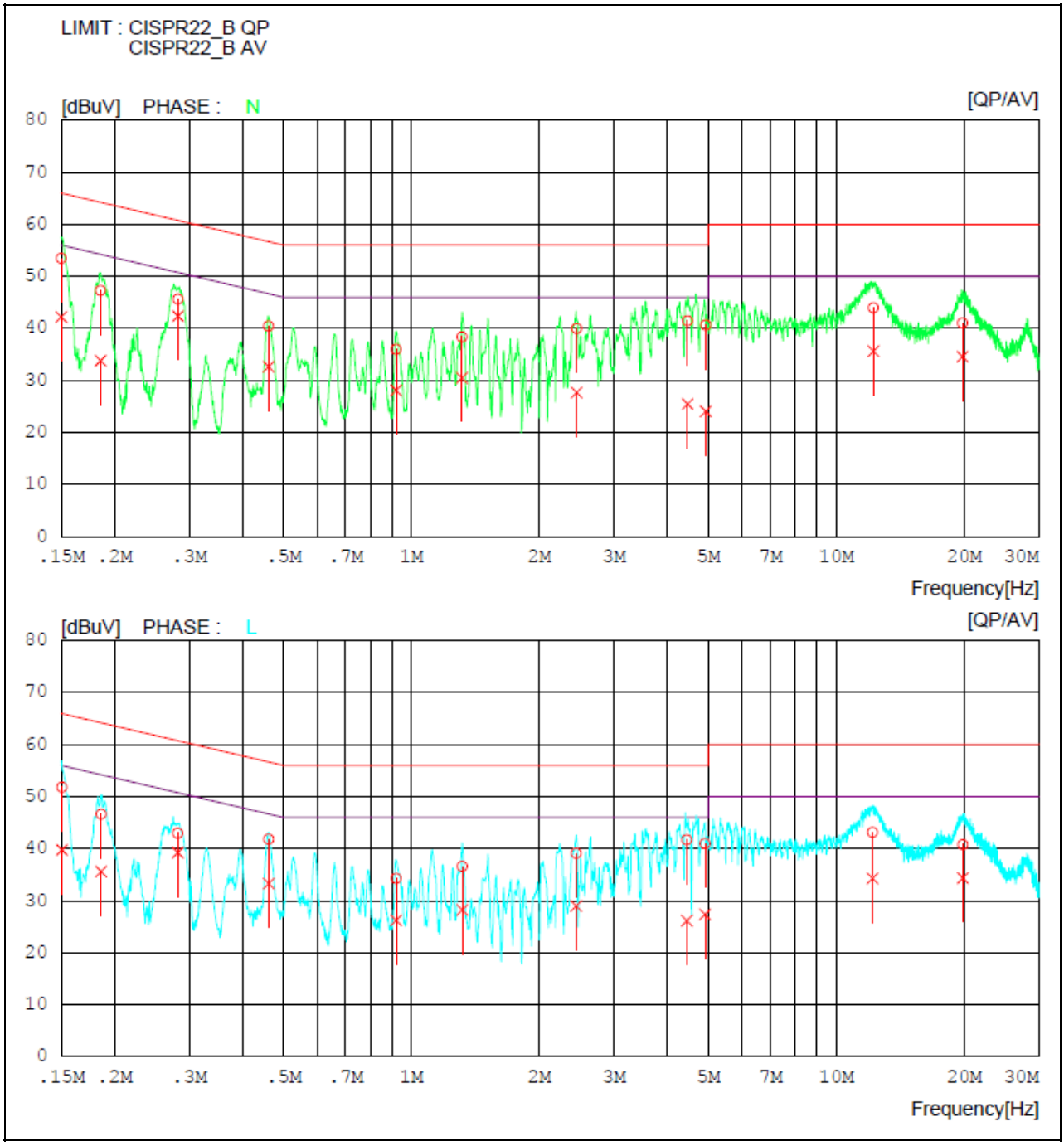


Table 1. Conducted emissions Test data

LIMIT : CISPR22_B QP
CISPR22_B AV

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15000	53.3	42.0	0.2	53.5	42.2	66.0	56.0	12.5	13.8	N
2	0.18565	47.1	33.6	0.2	47.3	33.8	64.2	54.2	16.9	20.4	N
3	0.28233	45.4	42.2	0.2	45.6	42.4	60.7	50.7	15.1	8.3	N
4	0.46135	40.2	32.4	0.2	40.4	32.6	56.7	46.7	16.3	14.1	N
5	0.92085	35.8	27.9	0.2	36.0	28.1	56.0	46.0	20.0	17.9	N
6	1.31550	38.1	30.2	0.3	38.4	30.5	56.0	46.0	17.6	15.5	N
7	2.45050	39.7	27.4	0.3	40.0	27.7	56.0	46.0	16.0	18.3	N
8	4.46950	41.2	25.2	0.3	41.5	25.5	56.0	46.0	14.5	20.5	N
9	4.93250	40.2	23.7	0.4	40.6	24.1	56.0	46.0	15.4	21.9	N
10	12.23650	43.3	34.9	0.7	44.0	35.6	60.0	50.0	16.0	14.4	N
11	19.82700	40.1	33.7	0.9	41.0	34.6	60.0	50.0	19.0	15.4	N
12	0.15056	51.6	39.6	0.2	51.8	39.8	66.0	56.0	14.2	16.2	L
13	0.18618	46.4	35.4	0.2	46.6	35.6	64.2	54.2	17.6	18.6	L
14	0.28204	42.8	39.0	0.2	43.0	39.2	60.8	50.8	17.8	11.6	L
15	0.46170	41.6	33.1	0.2	41.8	33.3	56.7	46.7	14.9	13.4	L
16	0.92086	34.1	26.0	0.2	34.3	26.2	56.0	46.0	21.7	19.8	L
17	1.31800	36.3	27.9	0.3	36.6	28.2	56.0	46.0	19.4	17.8	L
18	2.44200	38.8	28.7	0.3	39.1	29.0	56.0	46.0	16.9	17.0	L
19	4.45350	41.4	25.8	0.3	41.7	26.1	56.0	46.0	14.3	19.9	L
20	4.91250	40.6	27.0	0.4	41.0	27.4	56.0	46.0	15.0	18.6	L
21	12.17700	42.5	33.6	0.7	43.2	34.3	60.0	50.0	16.8	15.7	L
22	19.87700	39.9	33.5	0.9	40.8	34.4	60.0	50.0	19.2	15.6	L

*** Note:**

1. Margin (dB)= Limit (dBuV) - Level (dBuV)
2. If no frequencies are specified in the tables, no measurement for quasi-peak or average was necessary.

3.2. Radiated Disturbance

TEST: Limits for radiated disturbance			
Method	A pretest was performed at 3m distances in an anechoic screened enclosure, scanning the frequency range, and locating any frequencies at which EUT radiated. Frequency scans were conducted with a peak detector with horizontal and vertical polarization of the antenna. Measurements were done in the frequency range 30-1000 MHz. The main test was then conducted by measurements at each frequency found in the pretest. These measurements were done at an open area test site at 10m distances, with a quasi-peak detector. EUT was positioned on a wooden table 0.8m above the floor, at the edge of the turntable. Cables connected to EUT were fixed to cause maximum emission. A maximum emitting point for each frequency was found by turning EUT 0-360 degrees, and adjust the antenna height between 1-4m. A quasi-peak detector measurement was then done at the maximum emitting point.		
Parameters recorded during the test	Laboratory Ambient Temperature		19 °C
	Relative Humidity		40 %
-	Frequency range		Measurement Point
Fully configured sample scanned over the following frequency range	30 MHz to 1.0 GHz		3 meter measurement distance
Instrument settings	RBW: 120KHz, VBW: 300KHz		For 30MHz to 1000MHz
	RBW: 1 MHz, VBW: 3MHz		Above 1GHz

Limits – Class B			
Frequency (MHz)	Limit (dBμV/m)		
	Quasi-Peak		Results
30 to 88	39.1		**Pass**
88 to 216	43.5		**Pass**
216 to 960	46.4		**Pass**
960 to 1000	49.5		**Pass**
-	Average	Peak	-
Above 1000	54	74	**Pass**

EUT Configuration Settings:		
Power Interface Mode # (See Section 2.3)	EUT Operation Mode # (See Section 2.4)	EUT Configurations Mode # (See Section 2.7)
1	1	1

Radiated electromagnetic disturbance Test Equipment:					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESU	100014	2013.01.08	2014.01.08
Bilog Antenna	SCHAFFNER	CBL6112B	2737	2012.03.22	2014.03.22
Horn Antenna	SCHWARZBECK	BBHA9120A	322	2012.05.15	2014.05.15
Amplifier	H/P	8447E	2945A02865	2013.01.08	2014.01.08
PreAmplifier	Agilent	8449B	3008A01590	2013.02.27	2014.02.27

Figure 2. Graphical representation of Radiated emission_ 30 MHz to 1000 MHz

Horizontal/ vertical

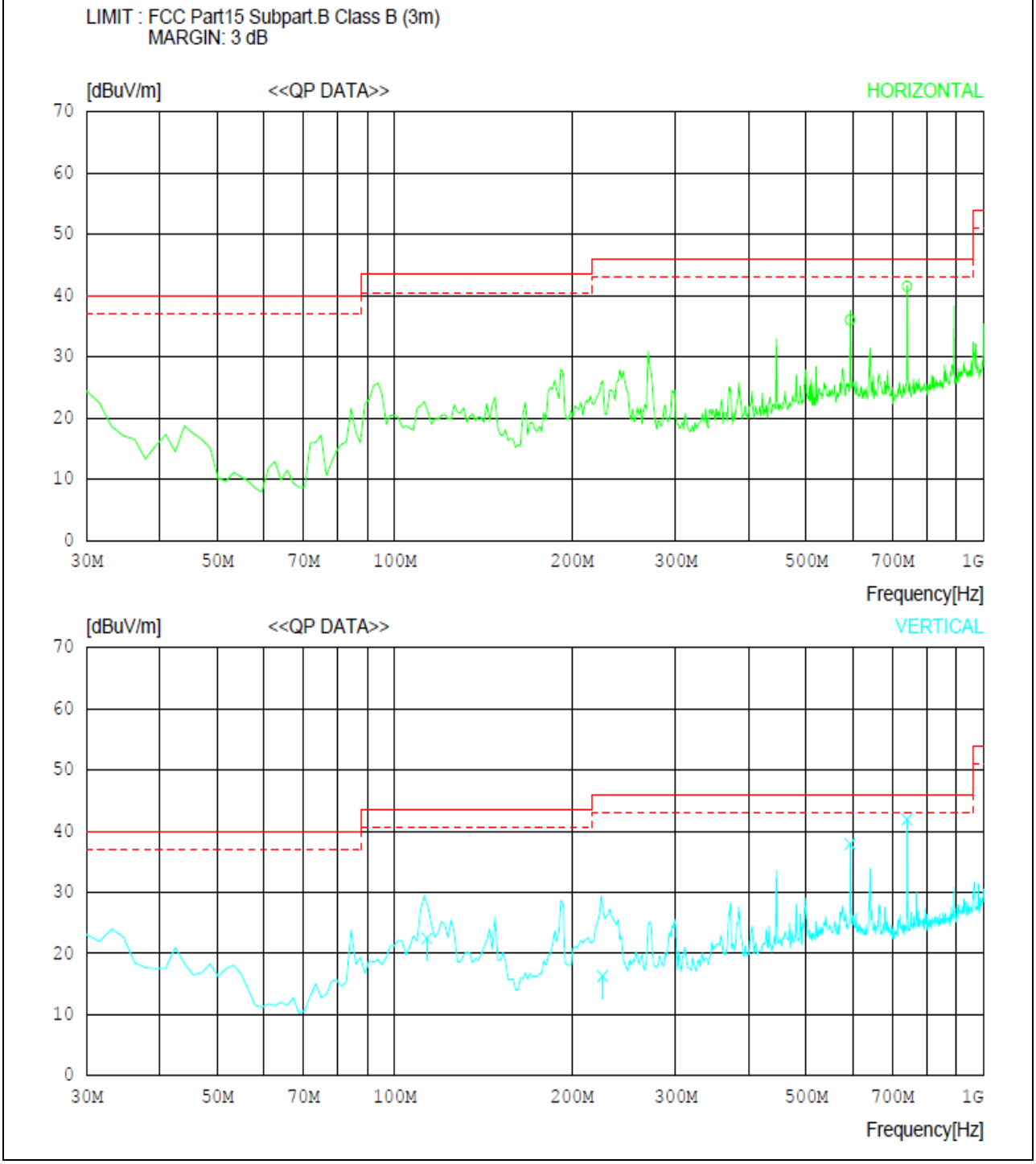


Table 2. Radiated emission Test data_30 MHz to 1000 MHz

LIMIT : FCC Part15 Subpart.B Class B (3m)
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	593.375	35.4	19.4	4.1	22.9	36.0	46.0	10.0	368	214
2	741.769	39.4	20.3	4.6	22.8	41.5	46.0	4.5	214	174
----- Vertical ------										
3	113.490	34.5	10.6	1.5	24.1	22.5	43.5	21.0	113	124
4	225.490	26.9	10.9	2.4	23.9	16.3	46.0	29.7	270	340
5	593.399	37.3	19.4	4.1	22.9	37.9	46.0	8.1	140	152
6	741.769	39.8	20.3	4.6	22.8	41.9	46.0	4.1	124	214

*** Note:**

1. Margin (dB)= Limit (dBuV) - Level (dBuV)
2. If no frequencies are specified in the tables, no measurement for quasi-peak or average was necessary.

Figure 3. Graphical representation of Radiated emission_ 1 ~ 6 GHz _ Peak

Horizontal/ vertical

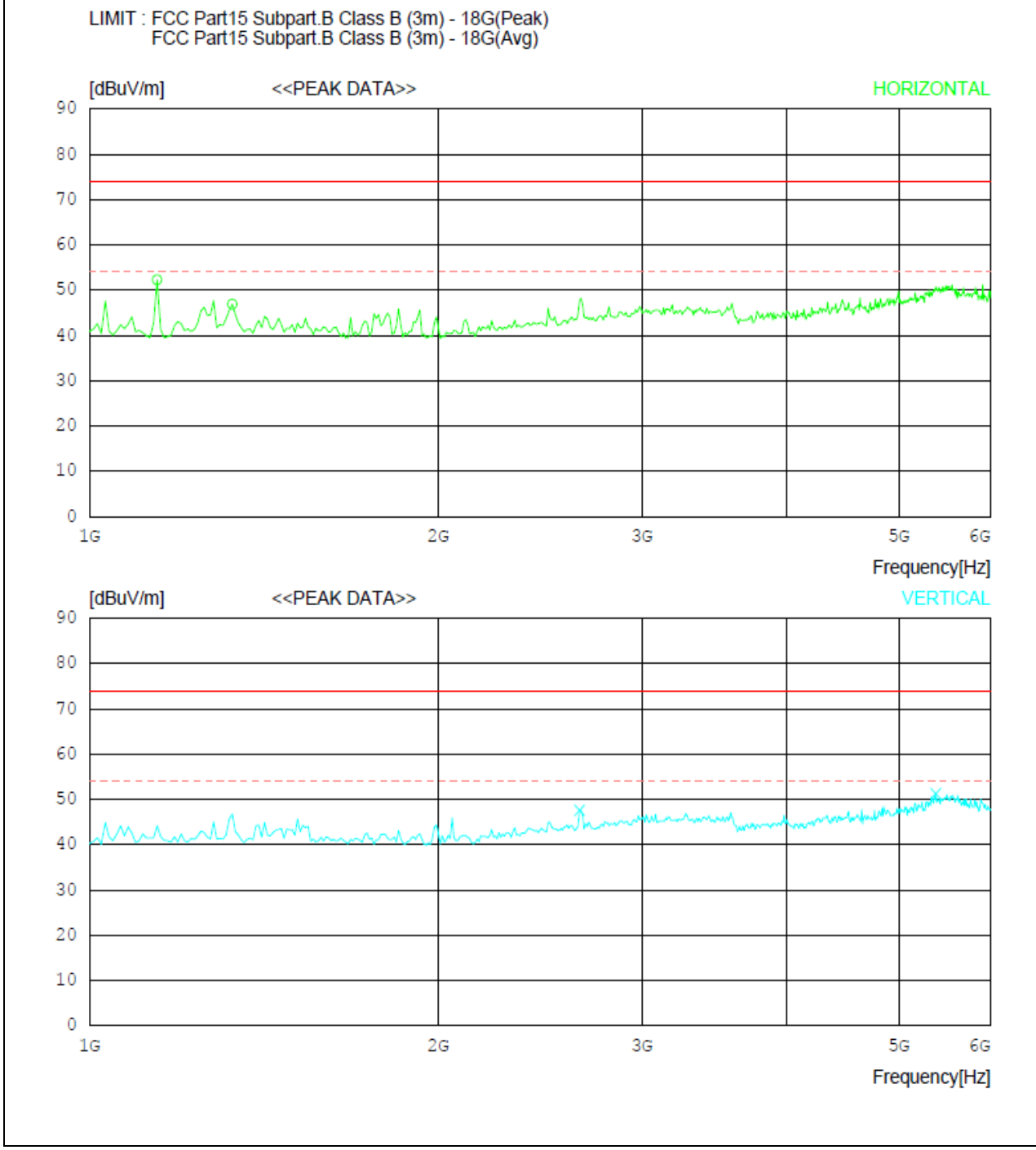


Table 3. Radiated emission Test data_ 1 ~ 6GHz _ Peak

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	1144.231	63.1	24.1	3.6	38.5	52.3	74.0	21.7	100	117
2	1328.526	56.9	24.4	3.8	38.2	46.9	74.0	27.1	100	181
----- Vertical ------										
3	2650.650	51.6	27.9	5.4	37.3	47.6	74.0	26.4	100	148
4	5383.023	45.3	34.5	7.9	36.4	51.3	74.0	22.7	100	315

*** Note:**
1. Margin (dB)= Limit (dBuV) - Level (dBuV)
2. If no frequencies are specified in the tables, no measurement for quasi-peak or average was necessary.

Figure 4. Graphical representation of Radiated emission_ 1 ~ 6 GHz _ Average

Horizontal/ vertical

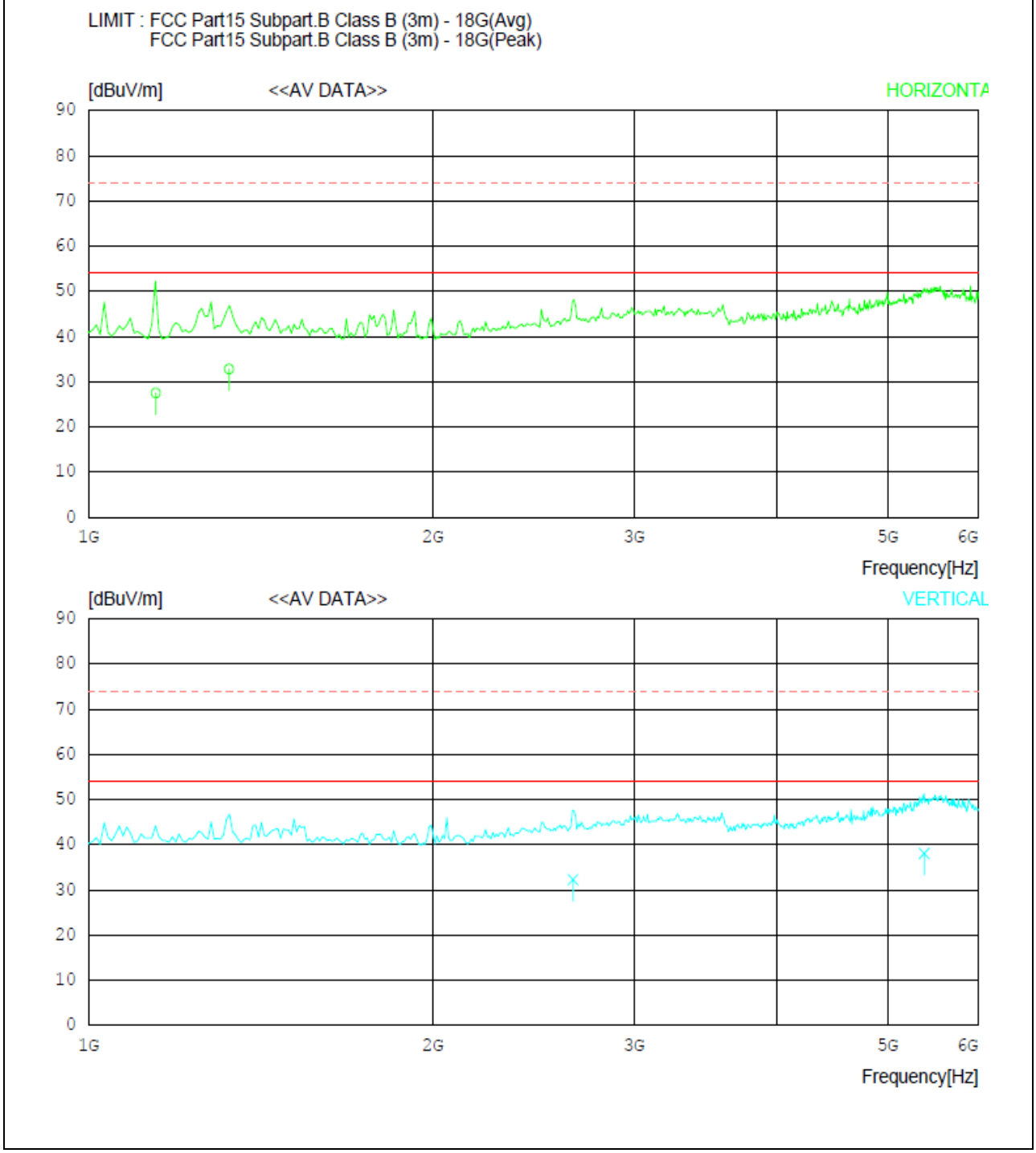


Table 4. Radiated emission Test data_1 ~ 6 GHz _ Average

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	1145.322	38.3	24.1	3.6	38.5	27.5	54.0	26.5	100	138
2	1327.529	42.8	24.4	3.8	38.2	32.8	54.0	21.2	100	134
----- Vertical ------										
3	2653.966	36.3	27.9	5.4	37.3	32.3	54.0	21.7	100	124
4	5383.889	32.1	34.5	7.9	36.4	38.1	54.0	15.9	100	271

*** Note:**
1. Margin (dB)= Limit (dBuV) - Level (dBuV)
2. If no frequencies are specified in the tables, no measurement for quasi-peak or average was necessary.

Appendix A_ Accreditations and Authorizations

Digital EMC 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	101842 678747	Test Facility list & NSA Data
	Japan	VCCI	C-1427 R-1364, R-3385 T-1442, G-338	Test Facility list & NSA Data
Certification	Korea	KC	KR0034	Test Facility list & NSA Data

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”.

Appendix B_ Measurement uncertainty

Test	Uncertainty
Radiated Emissions	U = k * Uc(xi) = ± 4.3 dB, Note [1]
Conducted Emissions	U = k * Uc(xi) = ± 3.54 dB, Note [1]
Note [1]: Measurement uncertainty is calculated in according with CISPR 16-4-2(2003-11). The measurement uncertainty is given with a confidence of 95% with the coverage factor, k=2.	