Underwriters Laboratories Inc.

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Project: 12CA25156
File: MC16222
Report: 12CA25156-FCC
Date: May 10, 2012
Model: AMM240WTD

Electromagnetic Compatibility Test Report

For

LCD Color Medical Monitor

ADVAN INT'L CORP
47817 Fremont Blvd. Fremont CA 94538 U.S.A.

Summary of Test Results:

The following tests were performed on a sample submitted for evaluation of compliance 47 CFR Part 15.107 (a) / 47 CFR Part 15.109 (g) 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	-	-
***Note:** No modifications were made to the EUT in order to achieve and maintain compliance to the standards described in this report.				

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.

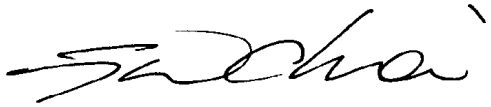
The equipment under test has

☐ Met the technical requirements

☒ Met the technical requirements under the limited condition

☐ Not met the technical requirements

Tested by
Sung Hoon Baek, Senior Project Engineer
UL Verification Services – 3014ASEO
UL Korea Ltd.
May 10, 2012



Reviewed by
Jeawoon Choi, WiSE Engineering Leader
UL Verification Services – 3014ASEO
UL Korea Ltd.
May 10, 2012

Test Report Details

Test report No:	12CA25156-CE
File No:	MC16222
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, Yuban-Dong, Cheoin-Gu, Yongin-Si, Kyunggi-Do, 449-080, Korea The test facility was deemed to have the environment and capabilities necessary to perform the tests included in the test package.
Applicant:	ADVAN INT'L CORP 47817 Fremont Blvd. Fremont CA 94538 U.S.A.
Manufacturer:	ADVAN INT'L CORP 47817 Fremont Blvd. Fremont CA 94538 U.S.A.
Factory:	D&T Inc. Daedeok Valley, 59-9, Jang Dong, Yuseong Gu, Daejeon, Korea, 305-343
Applicant Contact:	Jun Ho Jang
Phone:	82-2-703-5197
E-mail:	andyjang@advancorp.com
Product Type:	LCD COLOR MEDICAL MONITOR
Model Number:	AMM240WTD
FCC ID:	QVXAMM240WTD
Trademark:	N/A
Product standards:	FCC Part 15 Subpart B
Test Procedure:	ANSI C63.4 : 2009
Sample Serial Number:	N/A
Sample Receive Date:	April 06, 2012
Testing Start Date:	April 12, 2012
Date Testing Complete:	May 7, 2012
Test Report Date:	May 7, 2012
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 Equipment Description:

Description:
Auto - Scanning with digital control LCD color medical monitor

1.2 Details of Equipment Under Test (EUT):

Equipment Configuration:				
No.	Product Type	Manufacturer	Model	Comments
1	LCD Color Medical Monitor	ADVAN INT'L CORP.	AMM240WTD	N/A
2	Power Supply Unit	BridgePower Corp.	BPM150S24F10.	Two Ferrite core,
3	Extension power cord (optional)	BridgePower Corp.	1501047002 (5ft), 1501047 (15ft), 1501047001 (75ft)	Two Ferrite core
4	Hospital-grade AC Power cord	N/A	N/A	-
5	DVI Cable	-	-	Two Ferrite core, 1.8m
6	VGA Cable	-	-	Two Ferrite core
7	Composite Video BNC Jack Cable	-	-	1.8m
8	Super Video Cable	-	-	1.8m

1.3 Technical Data:

Item		Description
LCD Panel	Description	24.1Inch(61.13cm) diagonal
	Resolution	1920 x 1200 @ 60hz
	Display color	1,073,741,824 colors
	Pixel Pitch	0.270 mm x 0.270 mm
Brightness	Brightness	280 cd/m2
Contrast	Contrast	700 : 1
Display Size		518.4mm x 324.0mm)
Scanning Frequency	Horizontal	31.47~79.98Khz
	Vertical	50~85Hz

Input / Output		Input	Output
		1 x DVI 1 x D-SUB 1 x Y-C 1 x C-Video/SOG 2 x SDI 1 x R/Pr, G/Y, B/Pb, H/CS,VS	1 x Y-C 1 x C-Video 1 x SDI 1 x R/Pr, G/Y, B/Pb, H/CS,VS
Temperature	Operating	32° ~ 95°F (0° - 35°C)	
	Storage	-4° ~ 140°F (-20° - 60°C)	
Power Source	Monitor	DC 24V 6.25A	
	AC-Adaptor	AC 100~240V 50/60Hz	
Unit Dimension		598(W) x 382.9(H) x 111.5(D) (mm) - Without stand	

1.4 EUT Internal operating Frequency

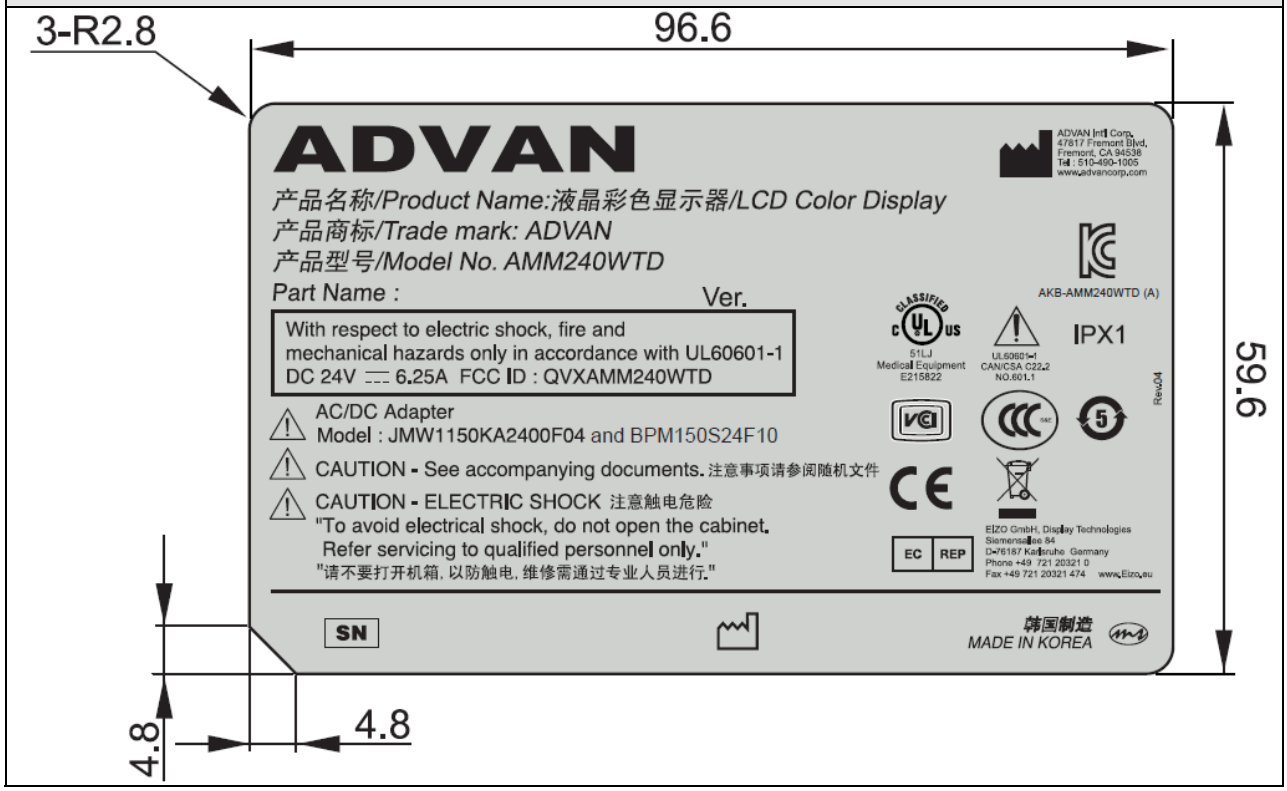
Frequency (MHz)	Description	Frequency (MHz)	Description
77MHz	Display Frequency	10.00MHz	CPLD Clock
11.0592MHz	U-Com Frequency	27.00MHz	System Clock
324.00MHz	Memory Clock	-	-

1.5 Technical descriptions and documents:

No.	Document Title and Description
1	AMM240WTD User Manual
***Note:** The manufacturer provided the following document.	

1.6 Equipment Marking Plate of Product:

Product Label



2. TEST CONDITION

2.1 Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	LCD Color Medical Monitor	ADVAN INT'L CORP.	AMM240WTD	-
EUT	Power Supply Unit	BridgePower Corp.	BPM150S24F10	Two Ferrite core,
EUT	Extension power cord (optional)	BridgePower Corp.	1501047002 (5ft), 1501047 (15ft), 1501047001 (75ft)	Two Ferrite core
AE	PC	DELL	VOSTRO220	DVI, DSUB Source
AE	Mouse	LOGITECH	M-SBF96	-
AE	Keyboard	MONITEREY INTERNATIONAL CORP.	SKG-210PB	-
AE	HDMI to 3G SDI Scaler	Gefen	N/A	HD-SDI Source
AE	HDMI to 3G SDI Scaler Adapter	N/A	HK-H5-A05	Connected with HDMI to 3G SDI Scaler
***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 In	I/O	1.8 m	Shielded	29 pin DVI-I, Two Ferrite core
3	VGA In	I/O	1.8 m	Shielded	15 pin D-Sub, Two Ferrite core
4	SDI In, Out	I/O	1.8 m	Shielded	BNC type
5	S-Video In, Out	I/O	1.8 m	Shielded	S-Video Cable
6	C-Video In, Out	I/O	1.8 m	Shielded	BNC type
7	Component (Y/Pb/Pr) In	I/O	1.8 m	Shielded	5 Port BNC type
*** 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 ***** RS-232 port is used for service purpose only. No user interface port.					

2.3 Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Comments
Rated	100-240Vac	2.5A	-	50-60Hz	Rated of Power Supply
1	120Vac	-	-	60Hz	-

2.4 Test Operating Mode:

Mode #	Mode	Comments
1	DVI Mode	Worst case condition
2	VGA Mode	-
3	HD-SDI In/Out Mode	Worst case condition
4	S-VIDEO Mode	-
5	C-Video / SOG Mode	-
6	Component (Y/Pb/Pr) Mode/ Analog RGBS Mode	-

*** Note:**
1. All the configuration described above has been investigated during the preliminary testing and selected two cases as worst-case condition for final measurements.
2. EUT have been performed under continuous displaying "H" Patten for configuration Modes of 1 to 2
3. EUT has been performed under continuous displaying "Color Bar" Patten for configuration Modes of 3 to 6.

2.5 Modes of Video Resolution:

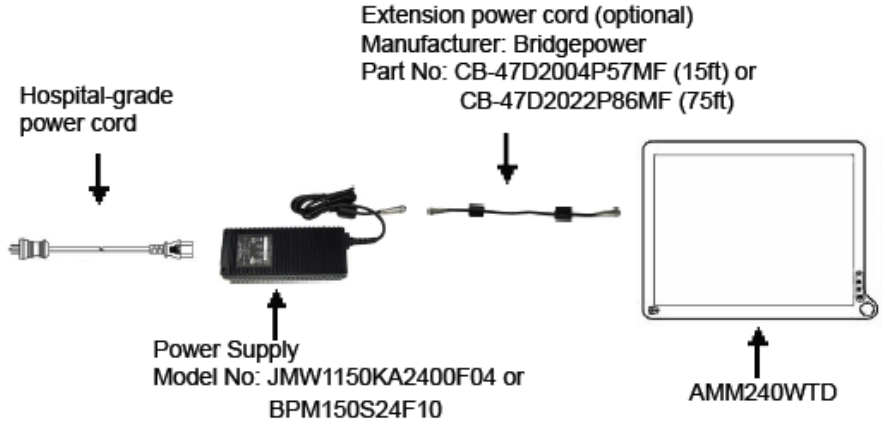
Mode #		Resolution	Comments
1	DVI Mode	800 * 600 @ 60Hz	-
2		1024 * 768 @ 60Hz	-
3		1920 * 1200 @ 60Hz	Worst case condition (Range of Brightness: 100, Range of contrast: 100 And range of backlight: 100.
4	HD-SDI In/Out Mode	1080i	Worst case condition (Range of Brightness: 100, Range of contrast: 100 And range of backlight: 100.

*** Note:** Video resolution where it refers from above is representative worst case.

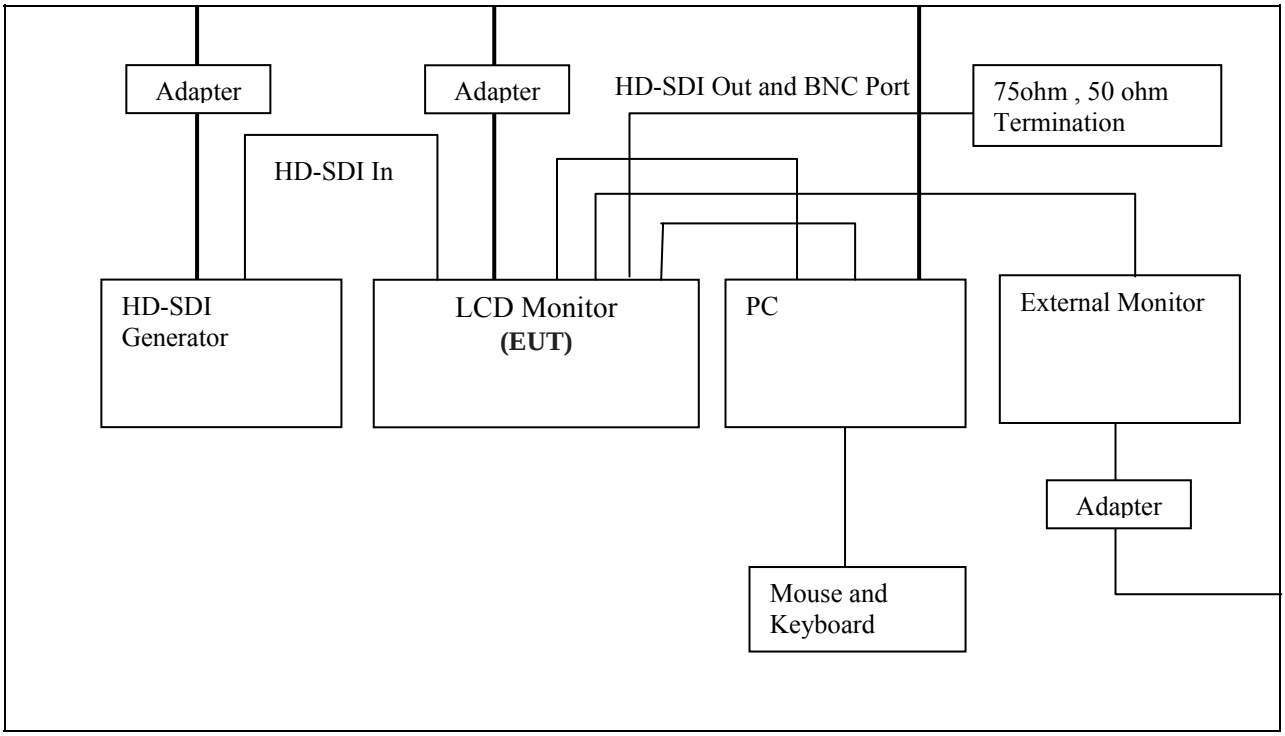
2.6 Used D.C. Extension Cable for Test:

No.	Cable Length	Preliminary Test	Comment
1	5ft	DVI and HD-SDI In/Out Mode	-
2	15ft		
3	75ft		Worst case condition

*** Note:** Radiated emission and conducted emission test were performed for all extension power cable during the preliminary testing and selected worst-case condition (75ft) for final measurements.



2.7 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.				
Basic Standard	FCC Part 15				
Parameters recorded during the test	Laboratory Ambient Temperature	21 °C			
	Relative Humidity	38.0 %			
-	Frequency range on each side of line	Measurement Point			
Fully configured sample scanned over the following frequency range	150 kHz to 30 MHz	AC Input port of EUT			

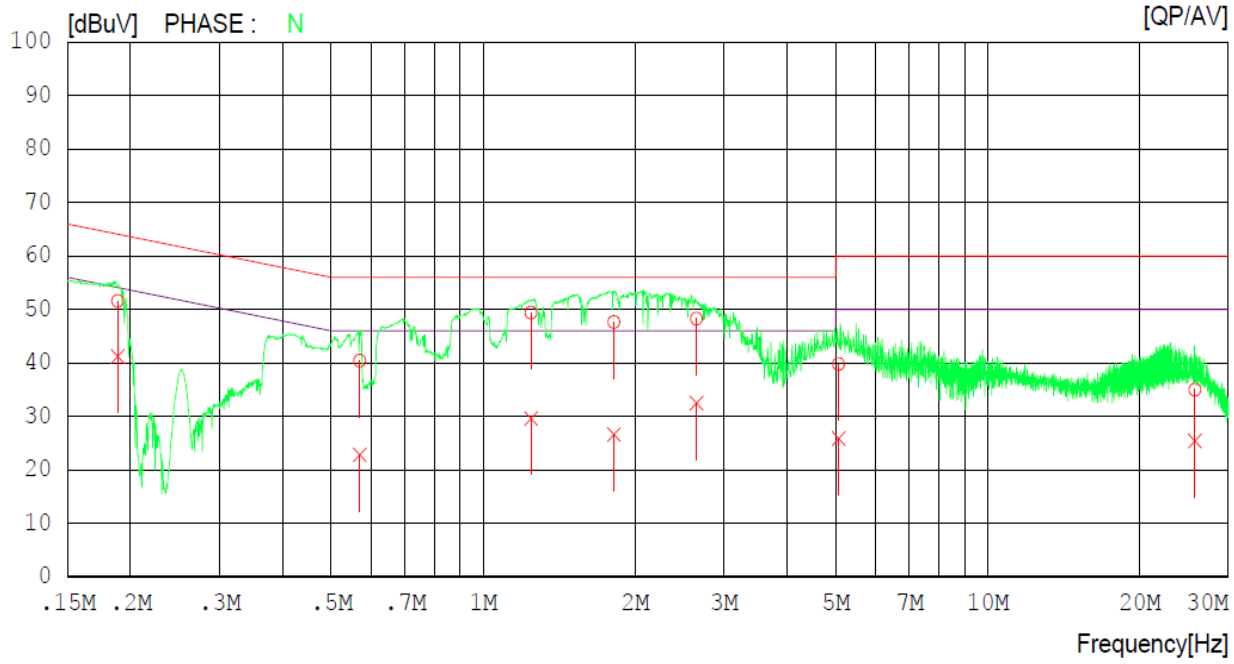
Limits - Class B				
Frequency (MHz)	Limit (dBµV)			
	Quasi-Peak	Result	Average	Result
0.15 to 0.50	66 to 56	**Pass**	56 to 46	**Pass**
0.50 to 5	56	**Pass**	46	**Pass**
5 to 30	60	**Pass**	50	**Pass**

EUT Configuration Settings:		
Power Interface Mode # (See Section 2.3)	EUT Operation Mode # (See 2.4)	EUT Configurations Mode # (See Section 2.7)
1	1, 3	1

Conducted Emissions Test Equipment used:					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	R&S	ESCI	100364	2012-03-06	2013-03-06
LISN (EUT)	R&S	ESH2-Z5	828739/006	2011-09-30	2012-09-30
LISN(Ancillary)	TTI	LISN1600	197204	2011-07-02	2012-07-02
50 Ohm terminator	TME	CT-01	N/A	2012-01-09	2013-01-09

Figure 1. Graphical representation of conducted emissions, DVI Mode

Hot Line



Neutral Line

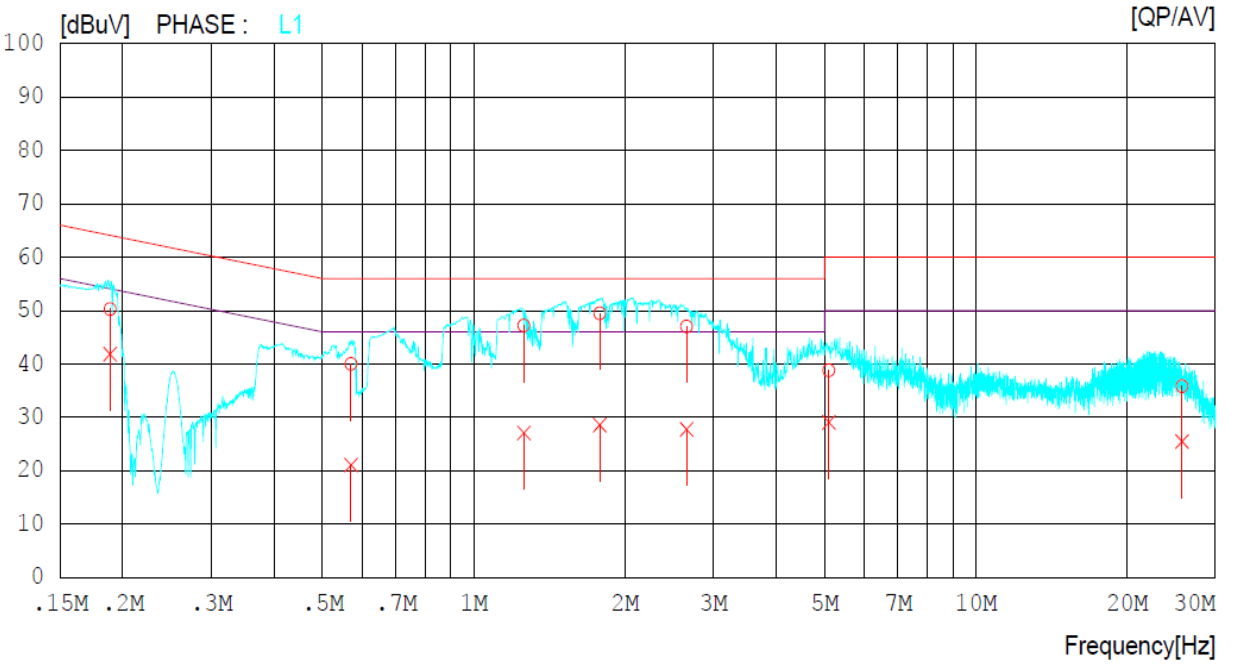
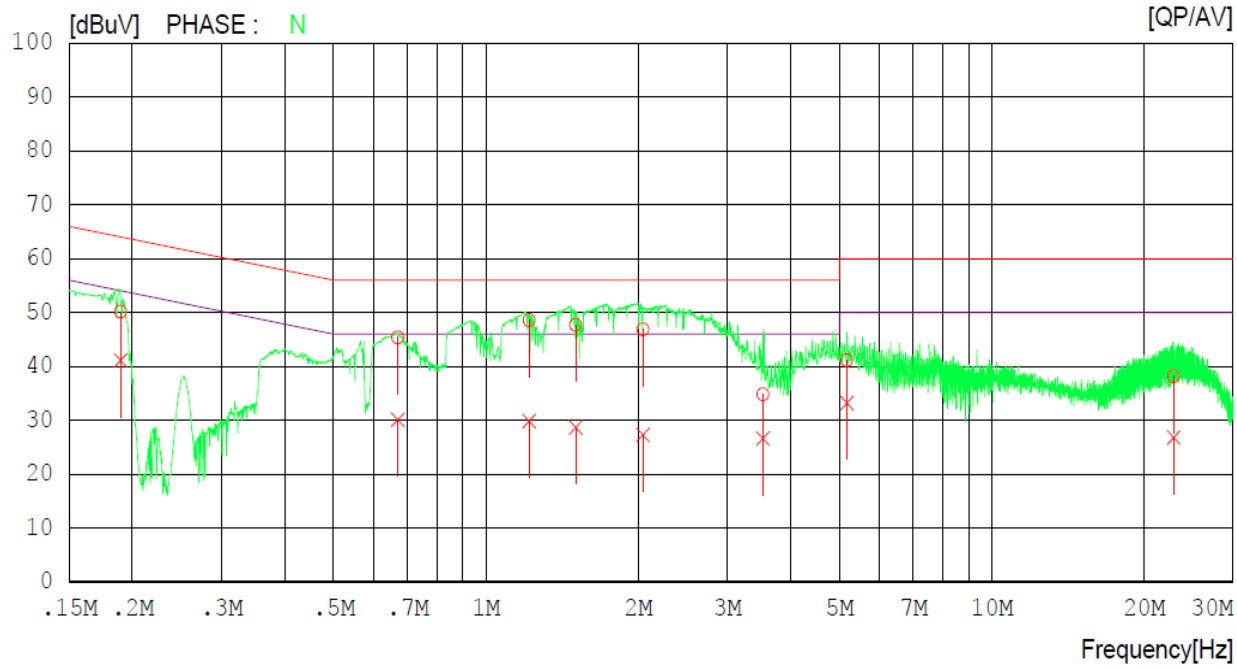


Table 1. Test data for conducted emission, DVI Mode

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	0.18865	51.4	41.0	0.2	51.6	41.2	64.1	54.1	12.5	12.9	N
2	0.56938	40.2	22.6	0.2	40.4	22.8	56.0	46.0	15.6	23.2	N
3	1.24500	49.1	29.3	0.3	49.4	29.6	56.0	46.0	6.6	16.4	N
4	1.81600	47.4	26.3	0.3	47.7	26.6	56.0	46.0	8.3	19.4	N
5	2.64900	48.0	32.2	0.3	48.3	32.5	56.0	46.0	7.7	13.5	N
6	5.06500	39.4	25.4	0.4	39.8	25.8	60.0	50.0	20.2	24.2	N
7	25.76200	33.7	24.1	1.3	35.0	25.4	60.0	50.0	25.0	24.6	N
8	0.18871	50.1	41.7	0.2	50.3	41.9	64.1	54.1	13.8	12.2	L1
9	0.56966	39.8	20.9	0.2	40.0	21.1	56.0	46.0	16.0	24.9	L1
10	1.25900	46.9	26.8	0.3	47.2	27.1	56.0	46.0	8.8	18.9	L1
11	1.78350	49.2	28.3	0.3	49.5	28.6	56.0	46.0	6.5	17.4	L1
12	2.65550	46.7	27.5	0.3	47.0	27.8	56.0	46.0	9.0	18.2	L1
13	5.09850	38.4	28.7	0.4	38.8	29.1	60.0	50.0	21.2	20.9	L1
14	25.76150	34.5	24.2	1.3	35.8	25.5	60.0	50.0	24.2	24.5	L1

Figure 2. Graphical representation of conducted emissions, HD-SDI Mode

Hot Line



Neutral Line

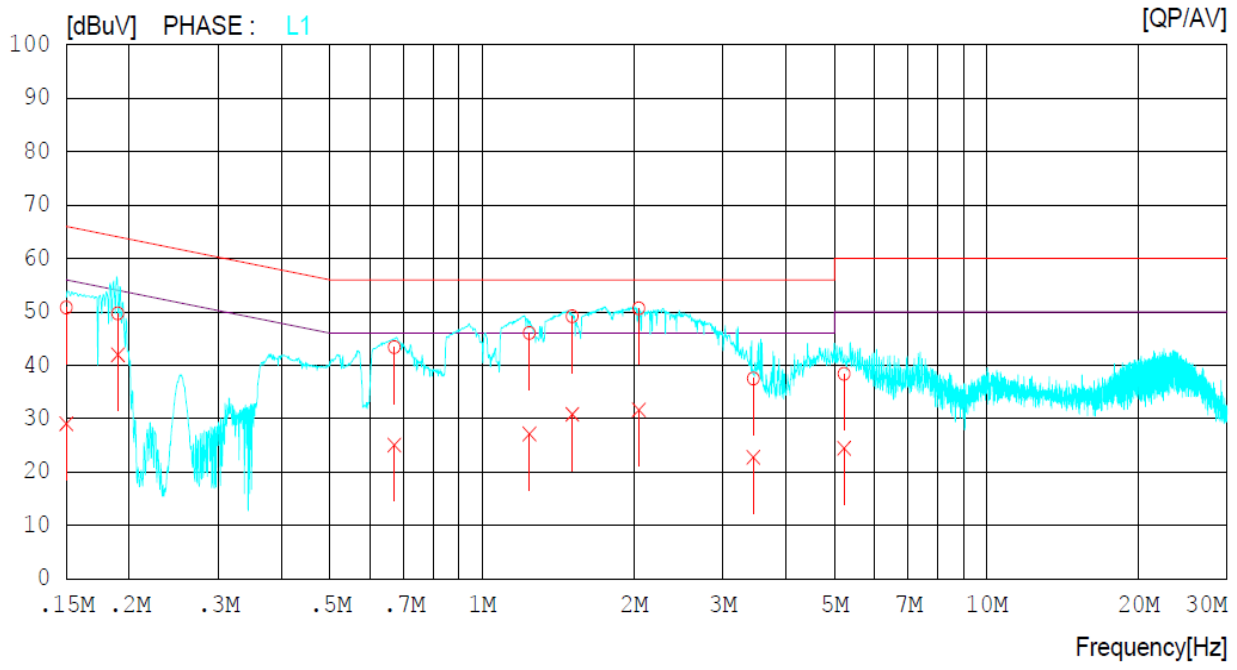


Table 2. Test data for conducted emission, HD-SDI Mode

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	0.18969	50.0	40.9	0.2	50.2	41.1	64.1	54.1	13.9	13.0	N
2	0.66940	45.2	29.9	0.2	45.4	30.1	56.0	46.0	10.6	15.9	N
3	1.21750	48.3	29.5	0.3	48.6	29.8	56.0	46.0	7.4	16.2	N
4	1.50450	47.4	28.4	0.3	47.7	28.7	56.0	46.0	8.3	17.3	N
5	2.04450	46.6	27.0	0.3	46.9	27.3	56.0	46.0	9.1	18.7	N
6	3.52750	34.4	26.2	0.4	34.8	26.6	56.0	46.0	21.2	19.4	N
7	5.17400	40.8	32.8	0.4	41.2	33.2	60.0	50.0	18.8	16.8	N
8	22.89350	37.0	25.6	1.2	38.2	26.8	60.0	50.0	21.8	23.2	N
9	0.15001	50.5	28.8	0.3	50.8	29.1	66.0	56.0	15.2	26.9	L1
10	0.18975	49.5	41.8	0.2	49.7	42.0	64.0	54.0	14.3	12.0	L1
11	0.67033	43.2	24.9	0.2	43.4	25.1	56.0	46.0	12.6	20.9	L1
12	1.24200	45.7	26.9	0.3	46.0	27.2	56.0	46.0	10.0	18.8	L1
13	1.51050	48.9	30.5	0.3	49.2	30.8	56.0	46.0	6.8	15.2	L1
14	2.04650	50.3	31.4	0.3	50.6	31.7	56.0	46.0	5.4	14.3	L1
15	3.45150	37.1	22.4	0.4	37.5	22.8	56.0	46.0	18.5	23.2	L1
16	5.22150	38.0	24.1	0.4	38.4	24.5	60.0	50.0	21.6	25.5	L1

3.2 RADIATED DISTURBANCE

TEST: Limits for radiated disturbance					
Method	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. The measurements (above 1 GHz) were made 3 m distance test site. The EUT was placed on a non-conductive turntable approximately 0.8 m above the ground plane. The turntable with EUT was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna. The measurements were conducted with Average and Peak value.				
Basic Standards	FCC Part 15				
Parameters recorded during the test	Laboratory Ambient Temperature	21.2 °C			
	Relative Humidity	39.0 %			
-	Frequency range	Measurement Point			
Fully configured sample scanned over the following frequency range	30 MHz – 1.0 GHz	10 meter measurement distance			
	1.0 GHz ~ 2.0 GHz	3 meter measurement distance			
Limits – Class B					
Frequency (MHz)	Limit (dBμV/m)				
	Quasi-Peak		**Results**		
30 to 230	30 at 10m		Pass		
230 to 1000	37 at 10m		Pass		
-	Average	Peak	-		
Above 1000	54	74	Pass		
EUT Configuration Settings:					
Power Interface Mode # (See Section 2.3)	EUT Operation Mode # (See 2.4)	EUT Configurations Mode # (See Section 2.7)			
1	1, 3	1			
Radiated Emissions Test Equipment:					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Receiver	R/S	ESU	100014	2012-03-08	2013-03-08
Bilog Antenna	Schaffner	CBL6112B	2737	2010-07-14	2012-07-14

Amplifier	H/P	8447E	2945A02865	2012-01-09	2013-01-09
Horn antenna	Schaffner	BBHA9120A	556	2011-06-14	2012-06-14
Amplifier	TSJ	MLA-00108-B02-36	1518831	2012-01-09	2013-01-09

Graphical representation of DVI Mode, 30 MHz to 1000 MHz

DVI Mode

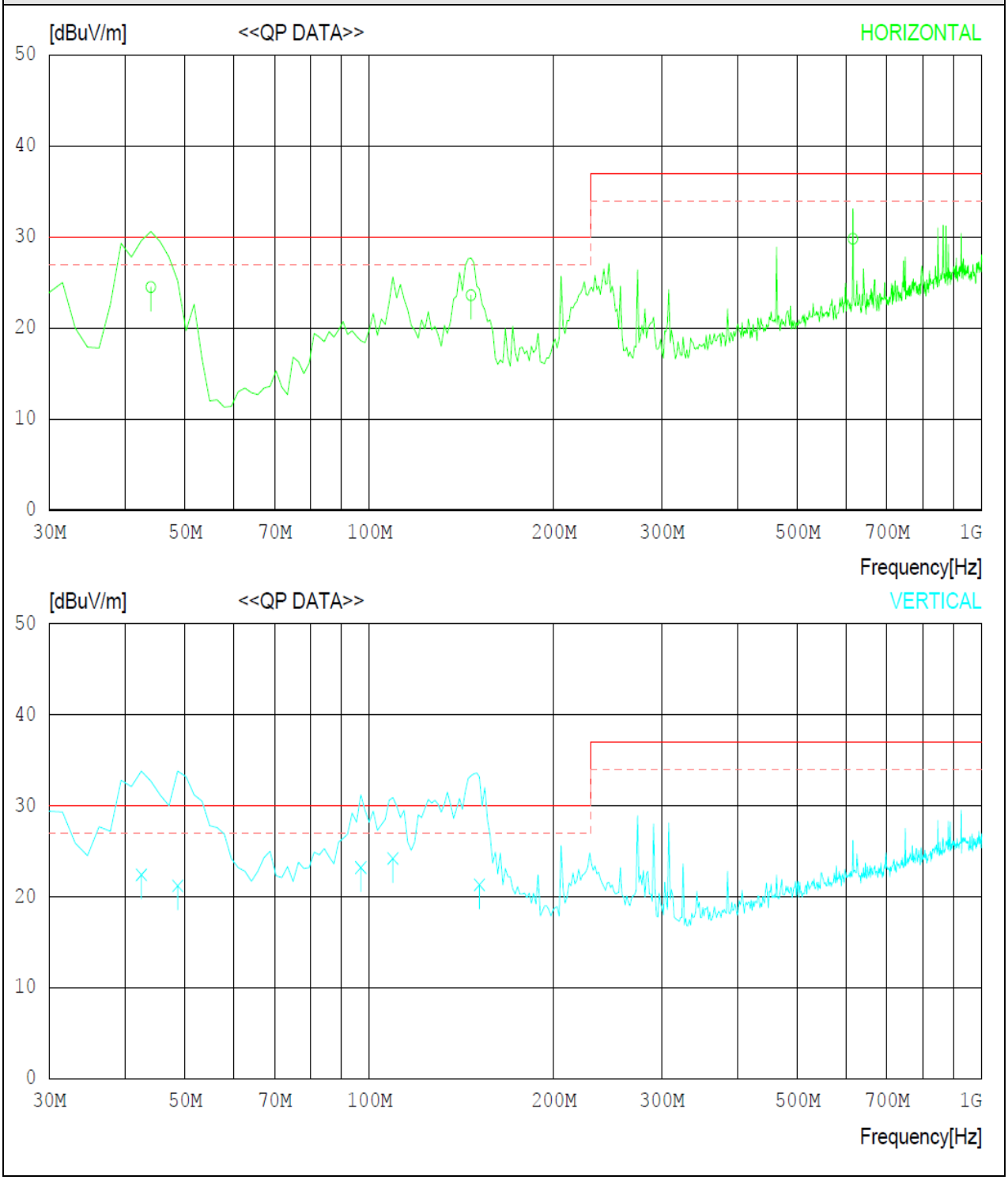


Table 3. Radiated emission Test data of DVI Mode

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	616.041	31.2	18.8	4.4	24.6	29.8	37.0	7.2	100	216
2	43.990	32.2	14.1	1.1	22.9	24.5	30.0	5.5	400	358
3	146.587	34.2	10.6	1.9	23.1	23.6	30.0	6.4	400	240
--- Vertical ------										
4	42.436	30.2	14.0	1.1	22.9	22.4	30.0	7.6	400	1
5	48.654	32.1	10.7	1.2	22.8	21.2	30.0	8.8	100	334
6	96.843	34.2	10.2	1.6	22.8	23.2	30.0	6.8	100	248
7	109.279	34.2	11.1	1.7	22.8	24.2	30.0	5.8	100	358
8	151.250	32.1	10.4	1.9	23.1	21.3	30.0	8.7	100	345

Figure 3. Graphical representation, 1 GHz to 6 GHz_ Peak

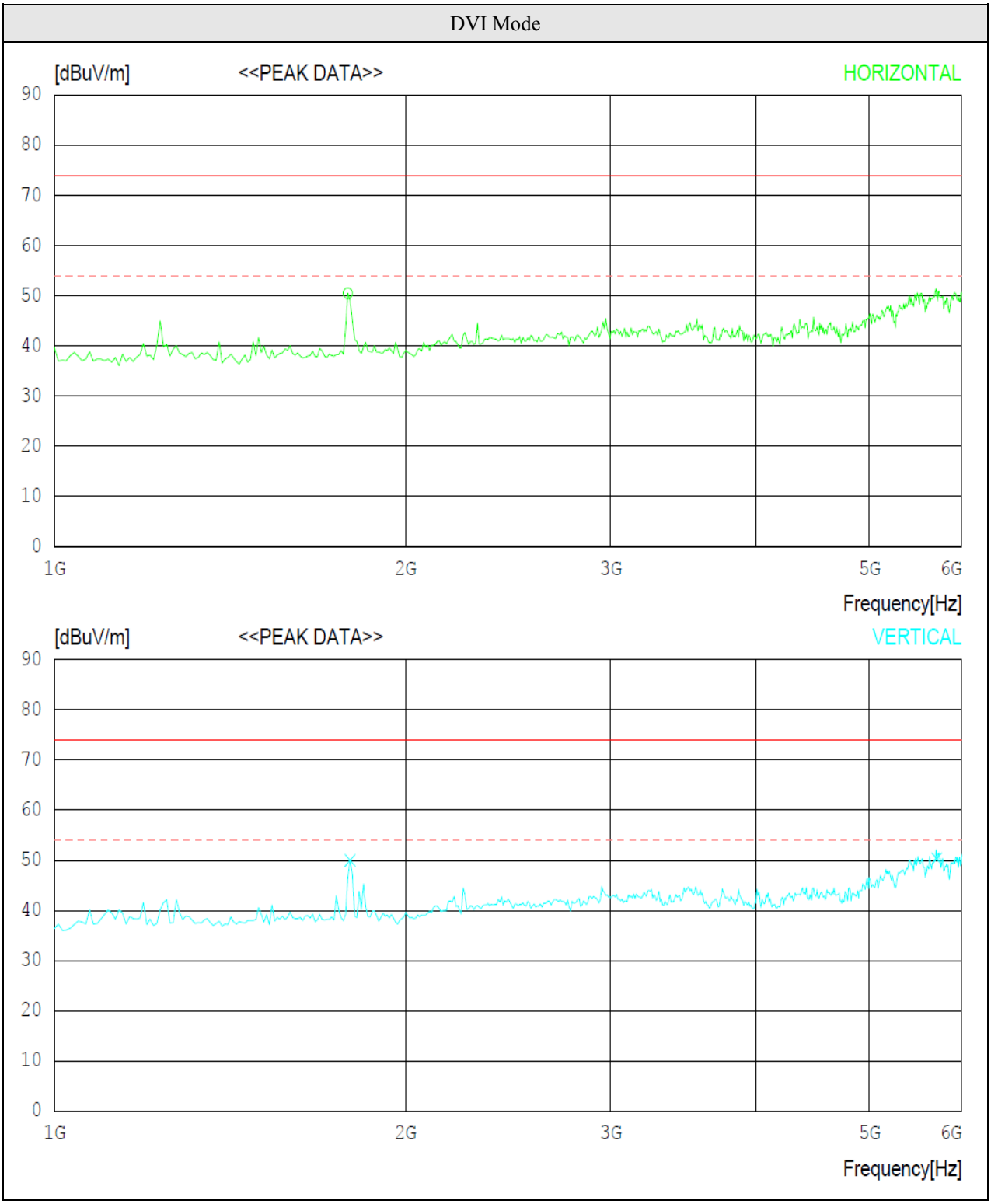


Table 4. Radiated emission Test data of DVI Mode

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	1785.256	62.7	24.8	5.0	42.0	50.5	74.0	23.5	100	158
--- Vertical ------										
2	1793.269	62.1	24.9	5.0	42.0	50.0	74.0	24	100	1
3	5711.543	45.9	34.1	10.4	40.1	50.3	74.0	23.7	100	1

Figure 4. Graphical representation, 1 GHz to 6 GHz_ AV

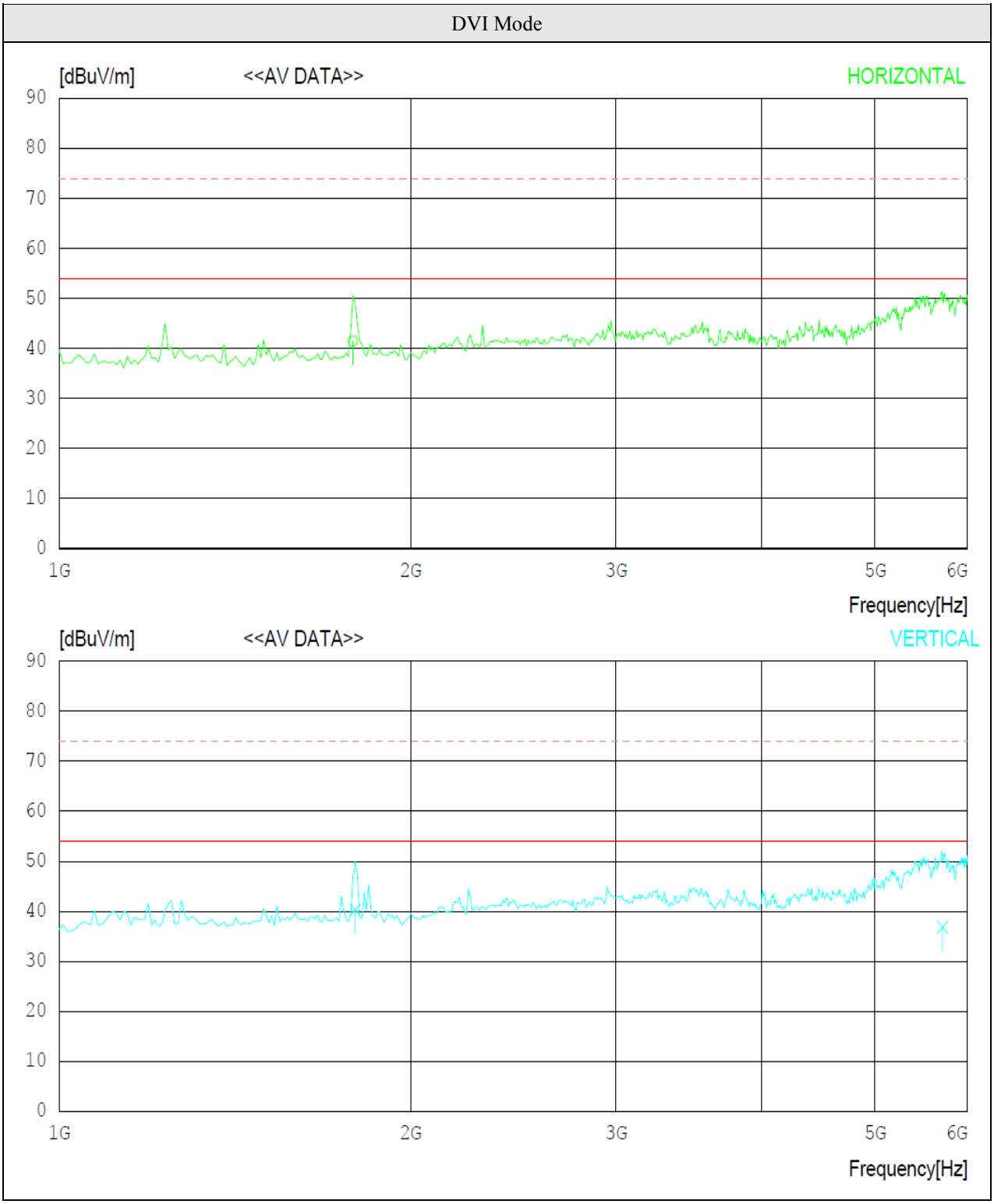


Table 5. Radiated emission Test data of DVI Mode

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	1785.256	53.7	24.8	5.0	42.0	41.5	54.0	12.5	100	158
--- Vertical ------										
2	1793.269	52.4	24.9	5.0	42.0	40.3	54.0	13.7	100	1
3	5711.543	32.4	34.1	10.4	40.1	36.8	54.0	17.2	100	1

Figure 5. Graphical representation, 30 MHz to 1000 MHz

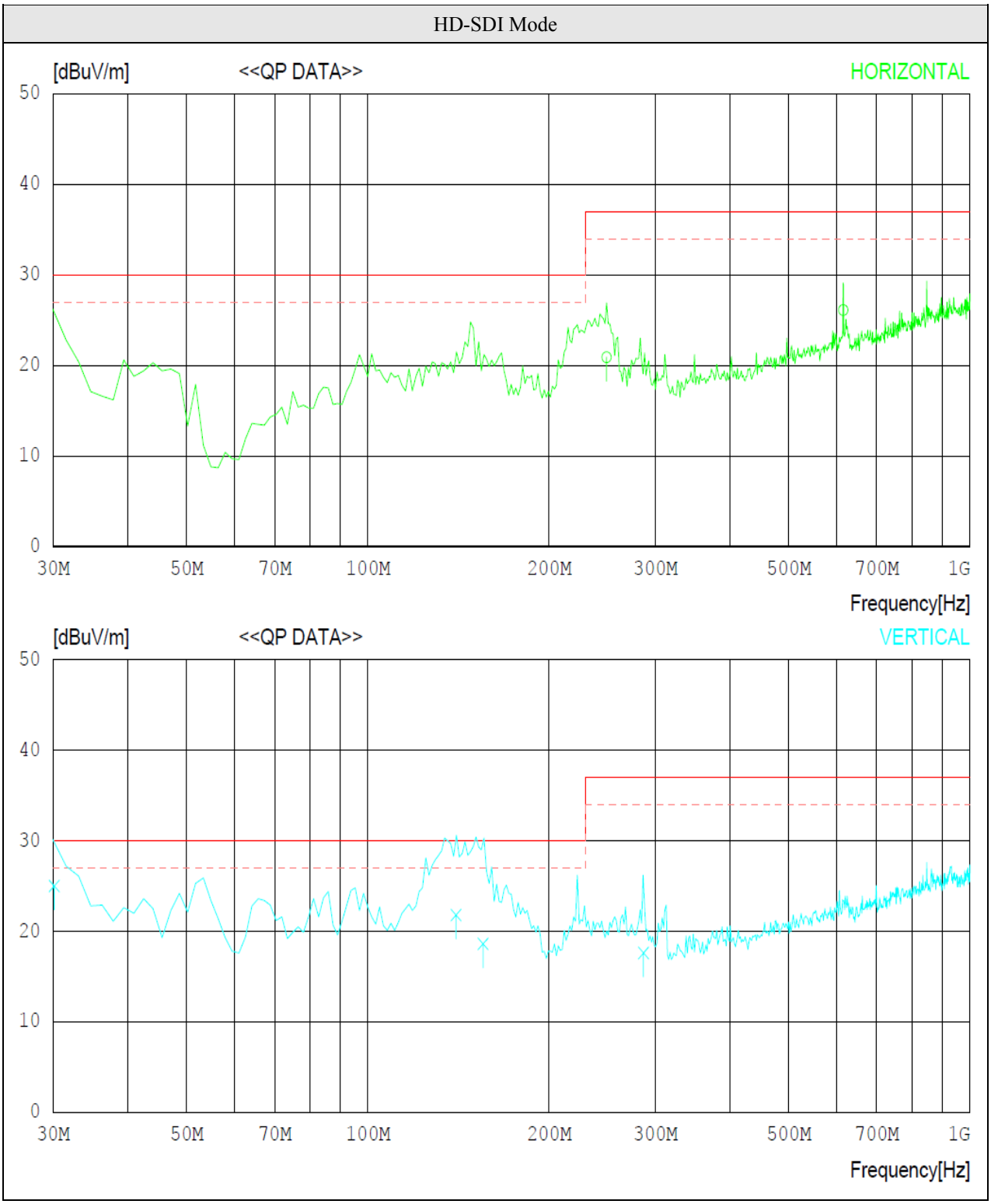


Table 6. Radiated emission Test data of HD-SDI Mode

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	249.183	28.9	13.0	2.6	23.6	20.9	37.0	16.1	400	318
2	616.041	27.5	18.8	4.4	24.6	26.1	37.0	10.9	100	1
--- Vertical ------										
3	30.144	29.8	17.4	1.0	23.2	25.0	30.0	5.0	400	1
4	140.144	31.9	11.0	1.9	23.0	21.8	30.0	8.2	100	358
5	155.384	29.4	10.3	2.0	23.1	18.6	30.0	11.4	100	43
6	286.961	24.9	13.6	2.9	23.8	17.6	37.0	19.4	400	1

Figure 6. Graphical representation, 1 GHz to 6 GHz_ Peak

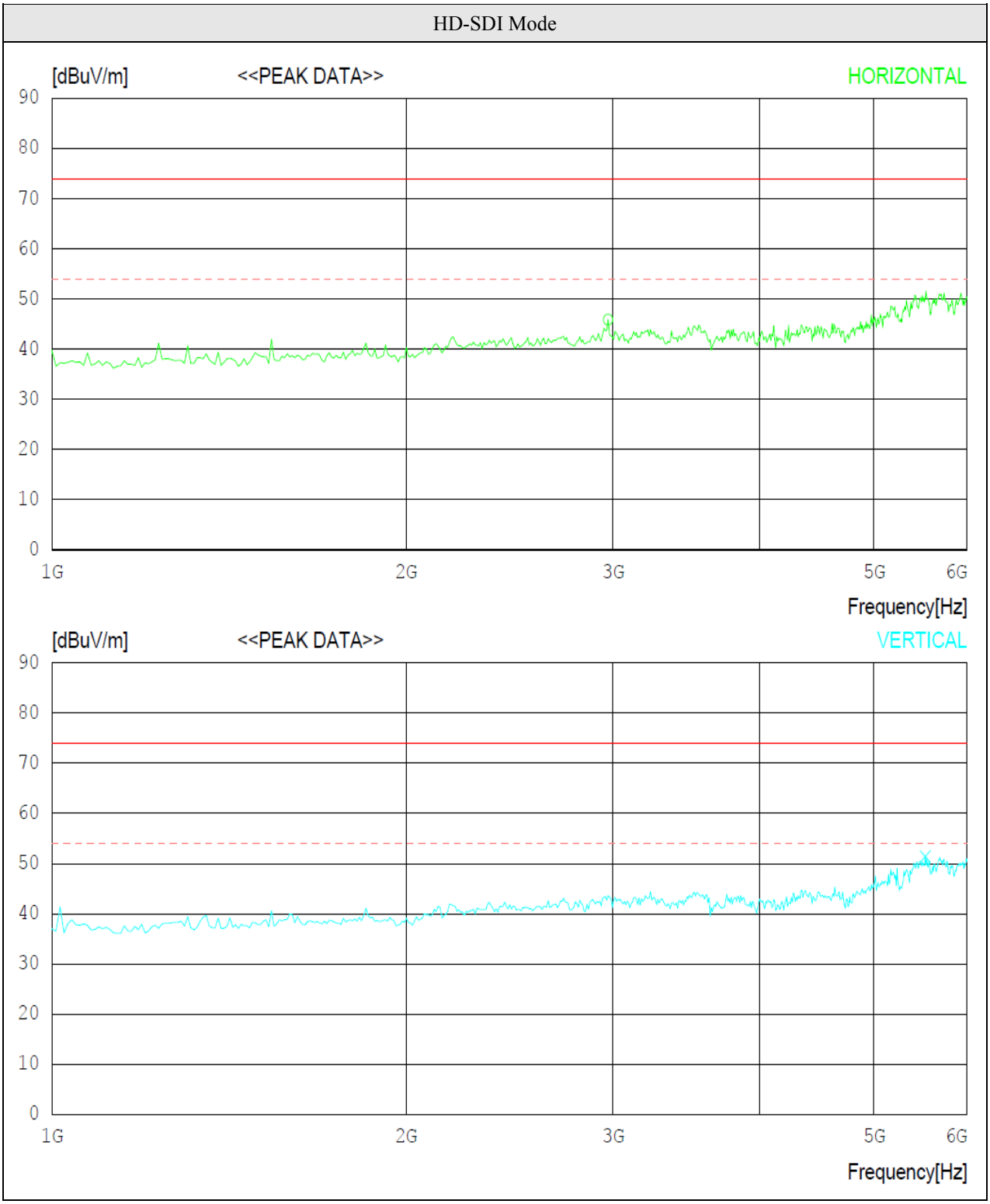


Table 7. Radiated emission Test data of HD-SDI Mode

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	2971.167	52.6	28.7	6.7	42.1	45.9	74.0	28.1	100	240
--- Vertical ------										
2	5527.251	47.0	35.4	9.4	40.4	51.4	74.0	22.6	100	183

Figure 7. Graphical representation, 1 GHz to 6 GHz_ AV

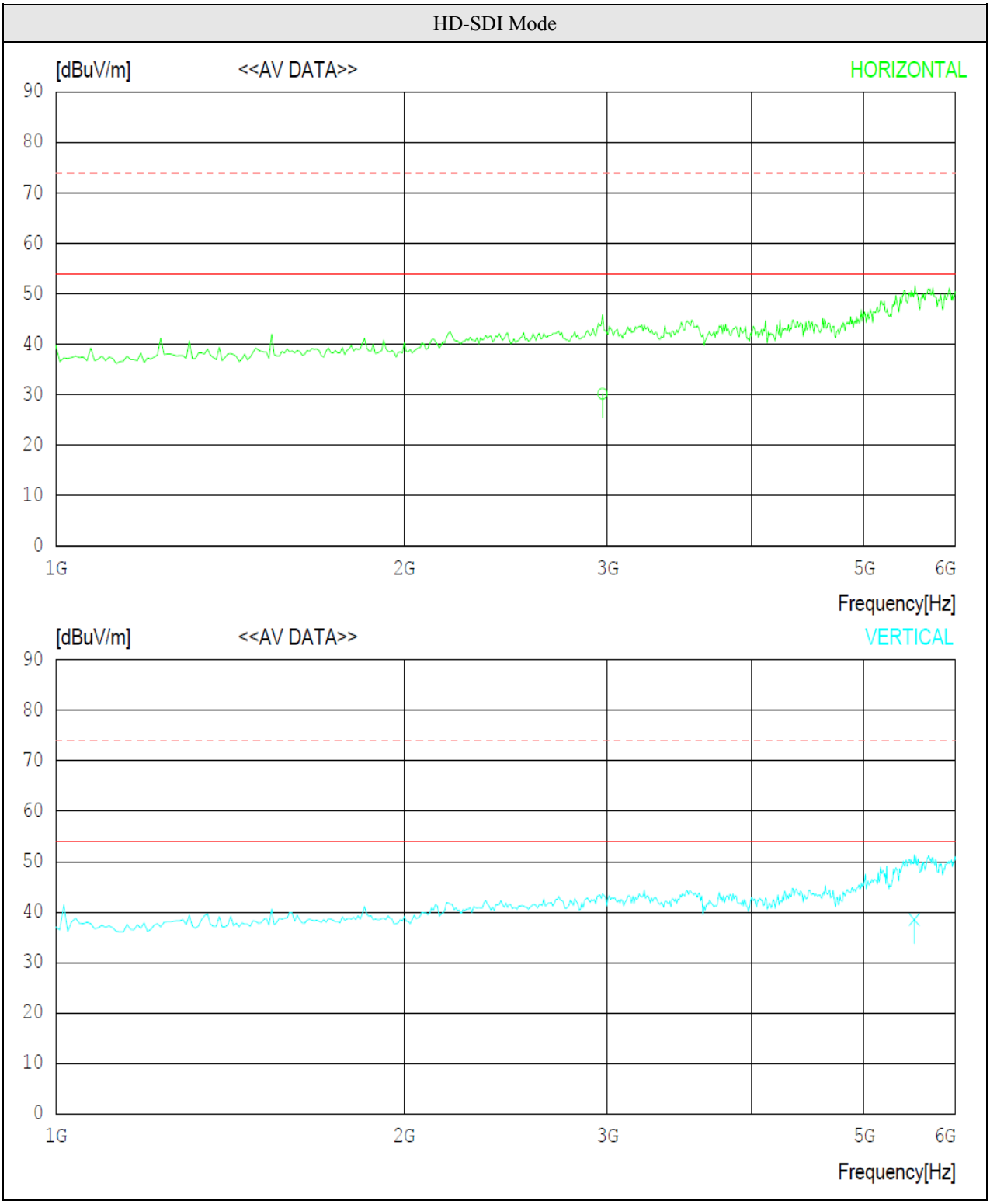


Table 8. Radiated emission Test data of HD-SDI Mode

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	2971.167	36.9	28.7	6.7	42.1	30.2	54.0	23.8	100	240
--- Vertical ------										
2	5527.251	34.1	35.4	9.4	40.4	38.5	54.0	15.5	100	183