EMC TEST REPORT

Project No.	**LBE20153222**	**Revision No.**	1
Applicant	**Name of organization**	Samsung Electronics Co., Ltd.	
	Address	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-742, Republic of Korea	
	Date of application	2015.05.13	
EUT Equipment Under Test	**Type of device**	Sound Bar-computer multimedia	
	Equipment authorization	☐ Declaration of Conformity ☐ Certification ☒ Verification	
	Kind of product	**SOUND BAR**	
	Model No.	**SPU10**	
		Variant Model	-
	Manufacturer	Tianjin Samsung Electronics Co., LTD. Weisi Rd. Micro-Electronic Industrial Park,Jingang Rd. Xiqing Dist, Tianjin,300385 China No.20 Jiangtai Road, the West Zone of TEDA ,Tianjin, People's Republic of China	
Applied Standards		47 CFR Part 15, Subpart B class B	
		ANSI C63.4-2009	
Test Period		2015.05.14 – 2015.05.18	
Issued date		2015.05.28	

Test result : **Complied**

The equipment under test has found to be compliant with the applied standards.
(Refer to the attached test result for more detail.)

Tested by : Jianlong Gao	**Reviewed by :** Zhongyuan Gao

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1. Summary of test results

1.1 Revision history

No.	Revised detailed information
Issue 0	There are no revisions and this version is basic test report.
Issue 1	Update the test information and data

1.2 Emission

The EUT has been tested according to the following specifications:

Test type	Applied standard	Result
Conducted emission	47 CFR Part 15, Subpart B ANSI C63.4-2009	Complied
Radiated emission		Complied

2. General Information

2.1 Test facility

CSQAL is LOCATED ON Block D, 17-19 ,MIP Fourth Road, Jingang Highway, Tianjin China
All testing are performed in Semi-anechoic chambers conforming to the site attenuation Characteristics defined by ANSI C63.4, CISPR 22, 16-1 and 16-2. and Shielded rooms.

CSQAL is operated as testing laboratory in accordance with the requirements of ISO/IEC 17025:2005.

2.2 Accreditation and listing

Laboratory Qualifications		Remarks
	FCC(Federal Communications Commission)	Number: 745469
	Korea Communications Commission Radio Research Agency	Accredited : KR0148
	KC（Korean Testing Laboratory）	KTL-002/SMT
	VCCI (Voluntary Control Council for Interference by Information Technology Equipment)	Member No: 271
	CNAS（China National Accreditation Service for Conformity Assessment）	L5281
	NVLAP(National Voluntary Laboratory Accreditation Program)	CODE: 500036-0

3. Test Setup configuration

3.1 Cable description & Peripherals

The type(s) of cables which were connected to the ports (of the EUT) are as follows:

No.	From the port of EUT	To	Length[m]	Ferrite Core. [Y/N]
1	USB	EUT	0.78	Y
2	AUX IN	EUT	1.50	Y
3	Earphone	EUT	2.2	Y
4	HDMI	PC-Monitor	1.5	Y
5	VGA	PC-Monitor	1.5	Y

The peripherals which were connected to EUTduring the test are as follows:

Item	Model No.	Serial No.	Manufacturer	Note
LCD Monitor	*S22E45***	-	SAMSUNG	EUT
PC	X152998	255CKKN31140702028	-	-
Printer	ML-2545/XAA	Z6FJBACB600011N	SAMSUNG	-
USB Keyboard	SK-8185	OY526K	Dell	-
USB Mouse	SNJ-B138	Z164146	Dell	-

3.2 EUT operating mode(s)

To achieve compliance applied standard specification, the following mode(s) were made during compliance testing:

Operating Mode 1	USB PLAY
Operating Mode 1	AUX IN

3.3 EUT Description

The following features describe EUT represented by this report:

Specifications	
Model Name	SPU10
Product Type	Sound bar-PC Multimedia
Size (WxDxH)	400 x 46.5 x 50 mm
Weight	555 g
Speaker Type	Active
RMS	2.5W
Frequency Response	150Hz ~ 20kHz (-6dB)
Channel	2Chanel. Stereo
Operating Voltage	5V DC
Operating Temperature	+5℃ ~+35℃
Operating Humidity	10% ~ 75%
Storage Temperature	-30℃ ~+60℃
Storage Humidity	0% ~ 95%
Speaker System	
Sound Pressure Level	80 dB± 3dB (1W, 0.5m)
Unit Size(WxDxH)	90 x 30 x 28.5mm : Oval Type
Impedance	8ohm
Enclosure Type	Bass Reflex Type
Direction	Down-Firing
Material of Grill	Steel
Function and Connection	
Control	1. Power on/off, 2. Volume3. L/R Switch
Power on/off	Side LED
Accessories	1. Manual 2. USB Cable
Input & Output	1. USB Input 2. Headphone Output(mini-phone stereo 3.5mm) 3. Audio Line Input(mini-phone stereo 3.5mm)

3.4 Details of Sampling

Customer selected, single unit.

3.5 Standard test signal for EUT

The standard test signal for television receivers and for other equipment with video signal input/output and an RF modulator is a standard television color bar signal according to ITU-R BT 471-1. The modulation of the video and the audio signals on the RF carrier was according to the system for which the equipment is intended.
The wanted signal is a vision carrier modulated by a complete video waveform including a color burst together with an unmodulated sound carrier of the correct relative amplitude and frequency.

3.6 Measurement uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus: (According to CISPR 16-4 and UKAS Lab 34.)

Test type			Measurement uncertainty (C.L. 95%, k = 2)
Disturbance voltage at the mains terminals			3.0 dB
Radiated Disturbance	Horizontal	30 MHz - 1 GHz	4.4 dB
	Vertical	30 MHz - 1 GHz	4.4 dB
	Horizontal	1GHz - 6 GHz	3.8 dB
	Vertical	1GHz - 6 GHz	3.8 dB

4. Results of individual test

4.1 Conducted emission

The mains lead arranged to follow the shortest possible path between the receiver and artificial mains network on the ground. The EUT tuned to a standard test signal as defined in rules.
A TV Signal generator is connected to the receiver for this purpose and to give a noise-free picture, the input signal was sufficiently strong.

Limits of Conducted Emission

Frequency range Limits MHz	Limits dB(μV)	
	Quasi-peak	Average
0.15 to 0.50	**66 to 56** a	**56 to 46** a
0.50 to 5	**56**	**46**
5 to 30	**60**	**50**
a Decreasing linearly with the logarithm of the frequency		

Including the worst-case data points for each tested configuration.

4.1.1 Test instrumentation

Test instrumentations which were used in the Conducted disturbance test are as follows;

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Measuring receiver	ESCI	R&S	101027	2015.03.02	12
L.I.S.N	ENV216	R&S	101123	2014.08.18	12
L.I.S.N	ENV216	R&S	101059	2014.08.18	12

4.1.2 Photograph of the test Configuration

(Front)

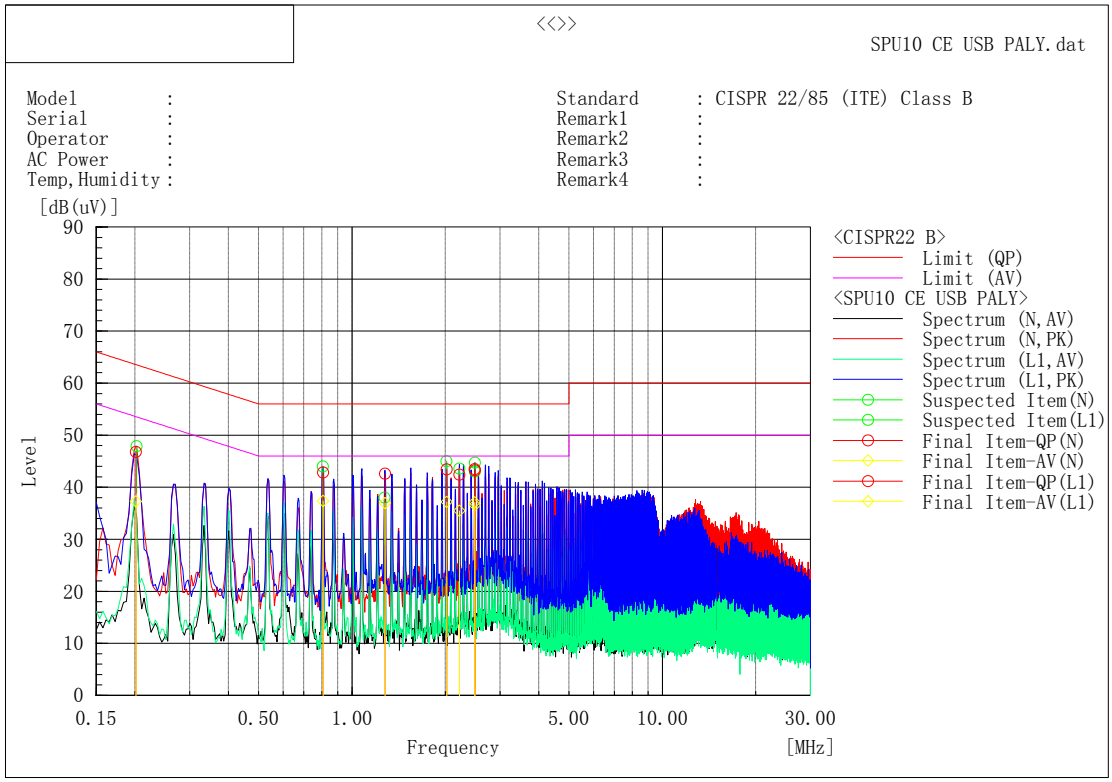
(Rear)

4.1.3 Test result

Test date	2015.05.14		Test engineer		Jianlong Gao	
Climate condition	Ambient temperature	23±1℃	Relative humidity	32±0 %	Atmospheric pressure	101±0 kPa
Test place	Shielded Room #2					

4.1.4 Test data

■ Operating Mode: USB PLAY



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	2.22001	32.5	25.6	9.9	42.4	35.5	56.0	46.0	13.6	10.5	
2	2.48934	33.3	26.6	9.9	43.2	36.5	56.0	46.0	12.8	9.5	
3	0.20149	36.8	27.3	10.0	46.8	37.3	63.5	53.5	16.7	16.2	

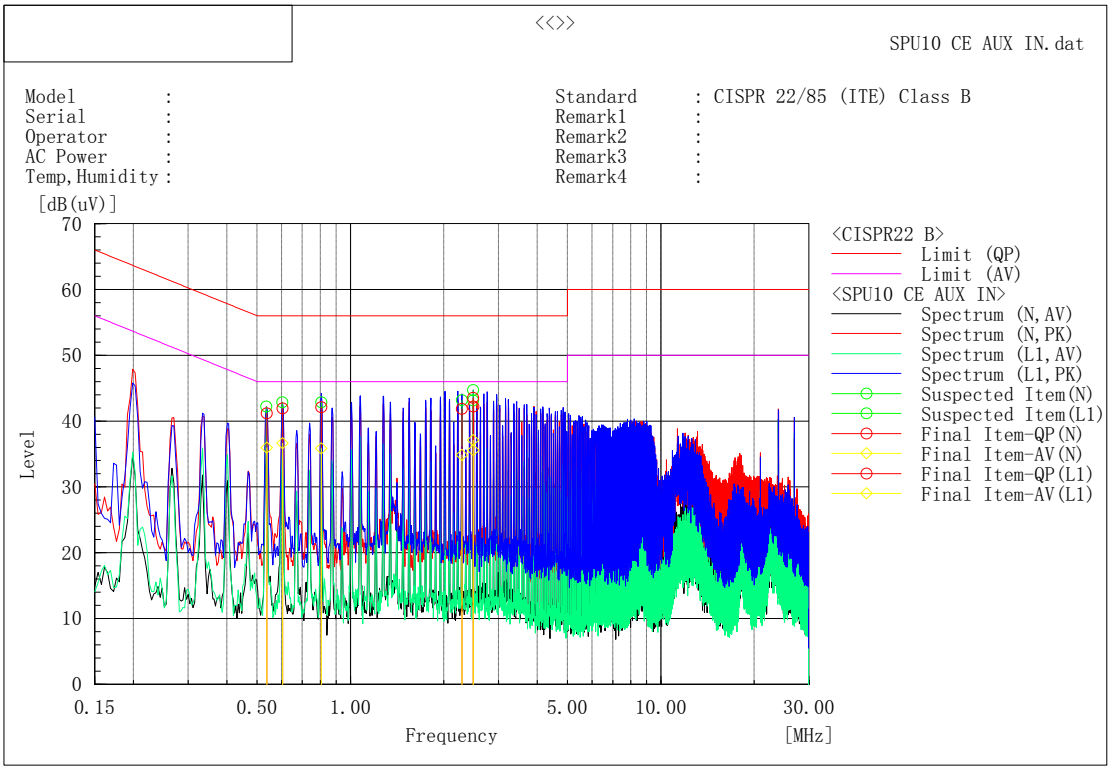
--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.80808	32.8	27.3	10.0	42.8	37.3	56.0	46.0	13.2	8.7	
2	2.01905	33.5	27.3	9.9	43.4	37.2	56.0	46.0	12.6	8.8	
3	2.48813	33.6	27.2	9.9	43.5	37.1	56.0	46.0	12.5	8.9	
4	1.27845	32.7	27.0	9.9	42.6	36.9	56.0	46.0	13.4	9.1	

Note) Result (Quasi-Peak and/or Average) = Reading (Quasi-Peak and/or Average) + c.f (LISN Insertion Loss + Cable Loss)

Margin = Limit – Level (Quasi-Peak and/or Average)

■ Operating Mode: AUX IN



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	2.28612	31.9	24.9	9.9	41.8	34.8	56.0	46.0	14.2	11.2	
2	2.48942	32.3	25.7	9.9	42.2	35.6	56.0	46.0	13.8	10.4	
3	0.80662	32.1	25.8	10.0	42.1	35.8	56.0	46.0	13.9	10.2	

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]	Remark
1	0.60525	31.9	26.6	10.0	41.9	36.6	56.0	46.0	14.1	9.4	
2	2.48845	33.6	27.2	9.9	43.5	37.1	56.0	46.0	12.5	8.9	
3	0.53792	31.1	25.8	10.1	41.2	35.9	56.0	46.0	14.8	10.1	

Note) Result (Quasi-Peak and/or Average) = Reading (Quasi-Peak and/or Average) + c.f (LISN Insertion Loss + Cable Loss)

Margin = Limit – Level (Quasi-Peak and/or Average)

4.2 Radiated emission

Starting with the front of the receiver under test facing the measuring antenna, the measuring antenna is adjusted for horizontal polarization measurement and its height varied between 1 m and 4 m until the maximum reading is obtained. The receiver under test is then rotated about its centre until the maximum meter reading is obtained, after which the measuring antenna height is again varied between 1 m and 4 m and the maximum reading noted.
The procedure is repeated for vertical polarization of the measuring antenna, the height being varied from 1m to 4 m in this case.
Including the worst-case data points for each tested configuration.

Limits of Radiated Emission

Frequency (MHz)	Limit values dB(μV/m) Quasi-peak
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960	54

Measurements above 1GHz were performed at an antenna to EUT distance of 3 meters and elevated 1 meter to 4 meter in FAC. Both vertical and horizontal antenna polarizations were measured.
Above GHz, peak detector function mode was used with resolution bandwidth of 1 MHz and a video bandwidth of 1 MHz. If the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.

Limits for radiated disturbance of ITE at a measuring distance of 3 m

Frequency range Limits MHz	Class B Limits dB(μV/m)	
	Peak	Average
Above 1 000	**74**	**54**

4.2.1 Test instrumentation

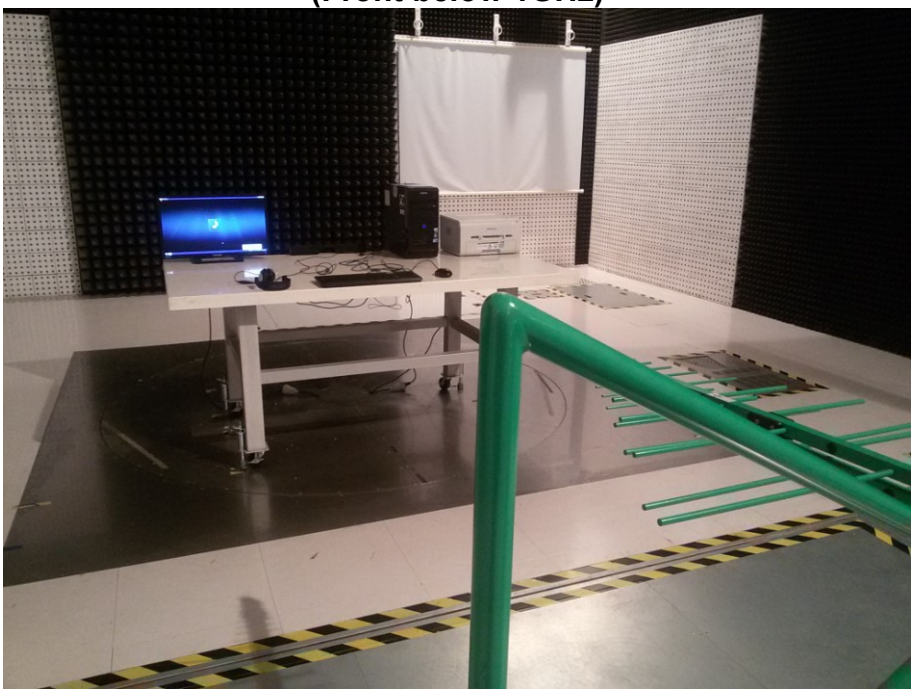
Test instrumentations which were used in the Radiated disturbance are as follows:

30MHz~1GHz

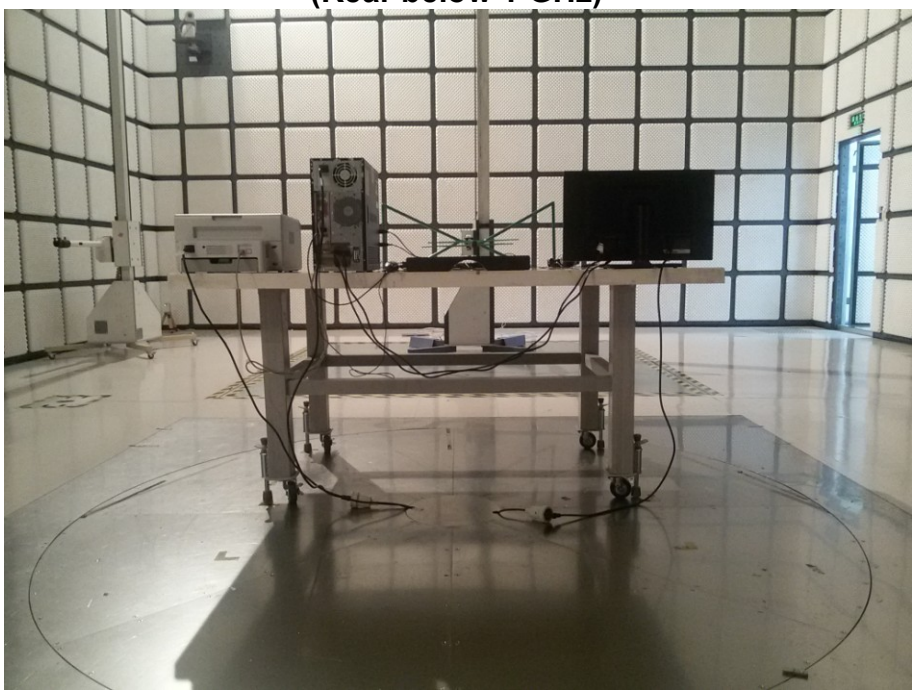
Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Test Software	EP5/RE	TOYO	V 4.7.10	N/A	N/A
Bi-con Antenna	CBL6112D	SCHAFFNER	29069	2015-03-16	24
EMI Receiver	ESCI	R&S	101026	2015-03-02	12
AMPLIFIER	310N	SONOMA	300911	2014-07-05	12
Ant Mast	MA4000	INNCO	-	N/A	N/A
Mast Controller	CO2000	INNCO	-	N/A	N/A
RF Selector	NS4900N	TOYO	-	N/A	N/A

4.3.2 Photograph of the test Configuration

(Front below 1GHz)



(Rear below 1 GHz)

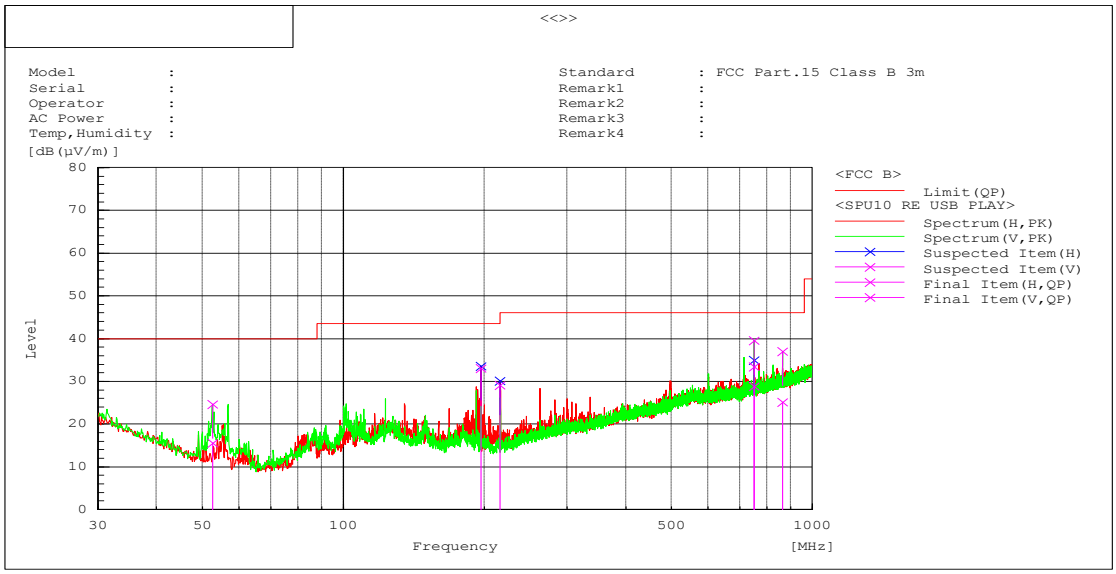


4.3.3 Test results

Test date	2015.05.18		Test engineer		Jianlong Gao	
Climate condition	Ambient temperature	23±1℃	Relative humidity	33±0%	Atmospheric pressure	101±0 kPa
Test place	3m Semi-Anechoic Chamber					

4.3.4 Test data

■ Operating mode: USB PLAY

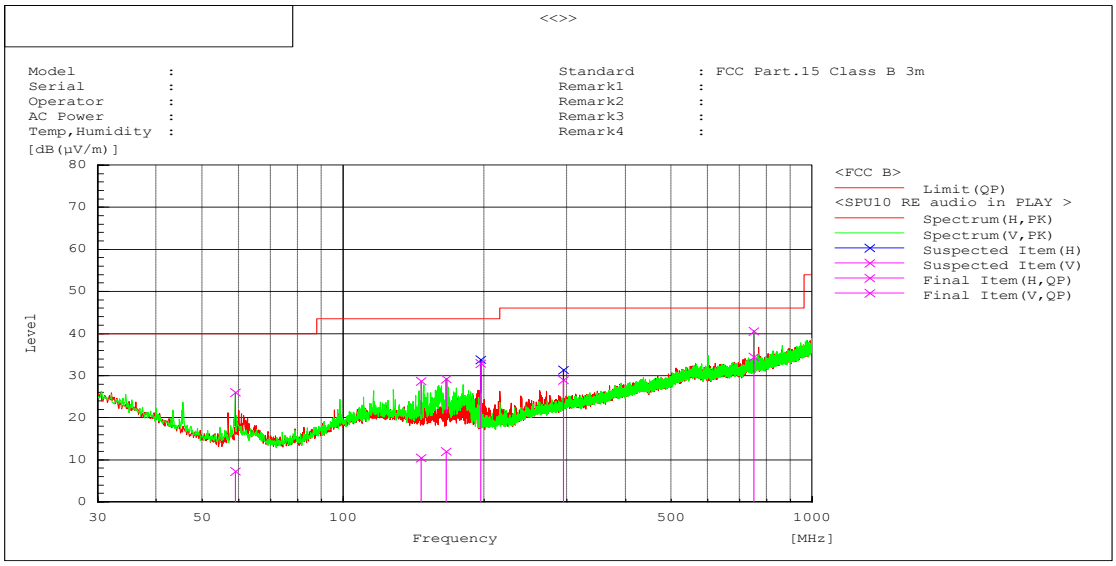


Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit QP [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [°]	Remark
1	196.598	H	46.0	-13.0	33.0	43.5	10.5	225.0	143.8	
2	750.104	H	27.7	1.1	28.8	46.0	17.2	206.0	61.1	
3	215.998	H	41.7	-12.6	29.1	43.5	14.4	113.0	64.1	
4	52.553	V	32.0	-16.4	15.6	40.0	24.4	100.0	6.8	
5	750.104	V	32.3	1.1	33.4	46.0	12.6	122.0	12.5	
6	862.624	V	22.3	2.9	25.2	46.0	20.8	200.0	20.4	

* Receiving antenna mode : Horizontal, Vertical
* Test distance : 3 m (RF Semi Anechoic Chamber)
* Result = Reading + c.f (Antenna factor + Cable loss- Amp Gain)
* Margin = Limit – Result

■ Operating mode: AUX IN



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(µV)]	c.f [dB(1/m)]	Result QP [dB(µV/m)]	Limit QP [dB(µV/m)]	Margin QP [dB]	Height [cm]	Angle [°]	Remark
1	196.598	H	45.9	-13.0	32.9	43.5	10.6	206.0	353.5	
2	294.931	H	36.9	-8.0	28.9	46.0	17.1	100.0	168.0	
3	58.858	V	24.8	-17.5	7.3	40.0	32.7	332.0	353.8	
4	750.104	V	33.3	1.1	34.4	46.0	11.6	109.0	17.9	
5	165.679	V	24.5	-12.5	12.0	43.5	31.5	116.0	39.2	
6	146.885	V	22.3	-11.9	10.4	43.5	33.1	200.0	9.9	

* Receiving antenna mode : Horizontal, Vertical
* Test distance : 3 m (RF Semi Anechoic Chamber)
* Result = Reading + c.f (Antenna factor + Cable loss- Amp Gain)
* Margin = Limit – Result

Appendix A – EUT photography

(Front)

(Rear)

(Up)

(Down)

(Right)

(Left)

(Panel)

(Main Board)

(MAIN Board)