

EMI TEST REPORT

Test report No.: EMC- FCC- 0191

Type of equipment: MP3 Digital Music Player

Model Name: LDP-600

FCC ID : RL4LDP600

Applicant: Muro Co.,Ltd

Factory: S.CAM CO.,LTD

Test standards: FCC part 15 subpart B (Class B)
FCC part 15 subpart C

Test Procedure and Items :

AC Power Line Conducted Emissions Measurement: ANSI C63.4:2001
Radiated Emissions Measurement : ANSI C63.4:2001

Test result : Complied

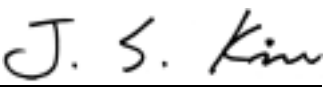
The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.

The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of test: 2004. 09. 17~30

Issued date: 2004 . 09. 30

Tested by :

Handwritten signature of J. S. Kim in black ink.

Kim, Jung-Soo

Approved by:

Handwritten signature of M. S. Chung in black ink.

Chung, Min-Seok

EMC Compliance Ltd.

82-1 JEIL-RI, YANGJI-MYUN, YONGIN-CITY, KYUNGGI-DO 449-825, KOREA
TEL: 82 31 336 9919 FAX : 82 31 336 4767

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1. Client information

Applicant : Muro Co.,Ltd

Address : Hongha B/D 301, 878 Shinkil7-Dong, Yungdungpo-ku, Seoul,
Korea 150-854

Telephone number : + 82-2-842-8052

Facsimile number : + 82-2-842-8051

Contact Person: HA, SEUNG-RYONG

Manufacturer : S.CAM CO.,LTD

Address : 35, Buk-ri, Namsa-myon, Youngin city, Gyeonggi-do, Korea

2. Laboratory information

Address

EMC compliance Ltd.

82-1, JEIL-RI, YANGJI-MYUN, YOUNGIN-CITY, KYUNGGI-DO, KOREA

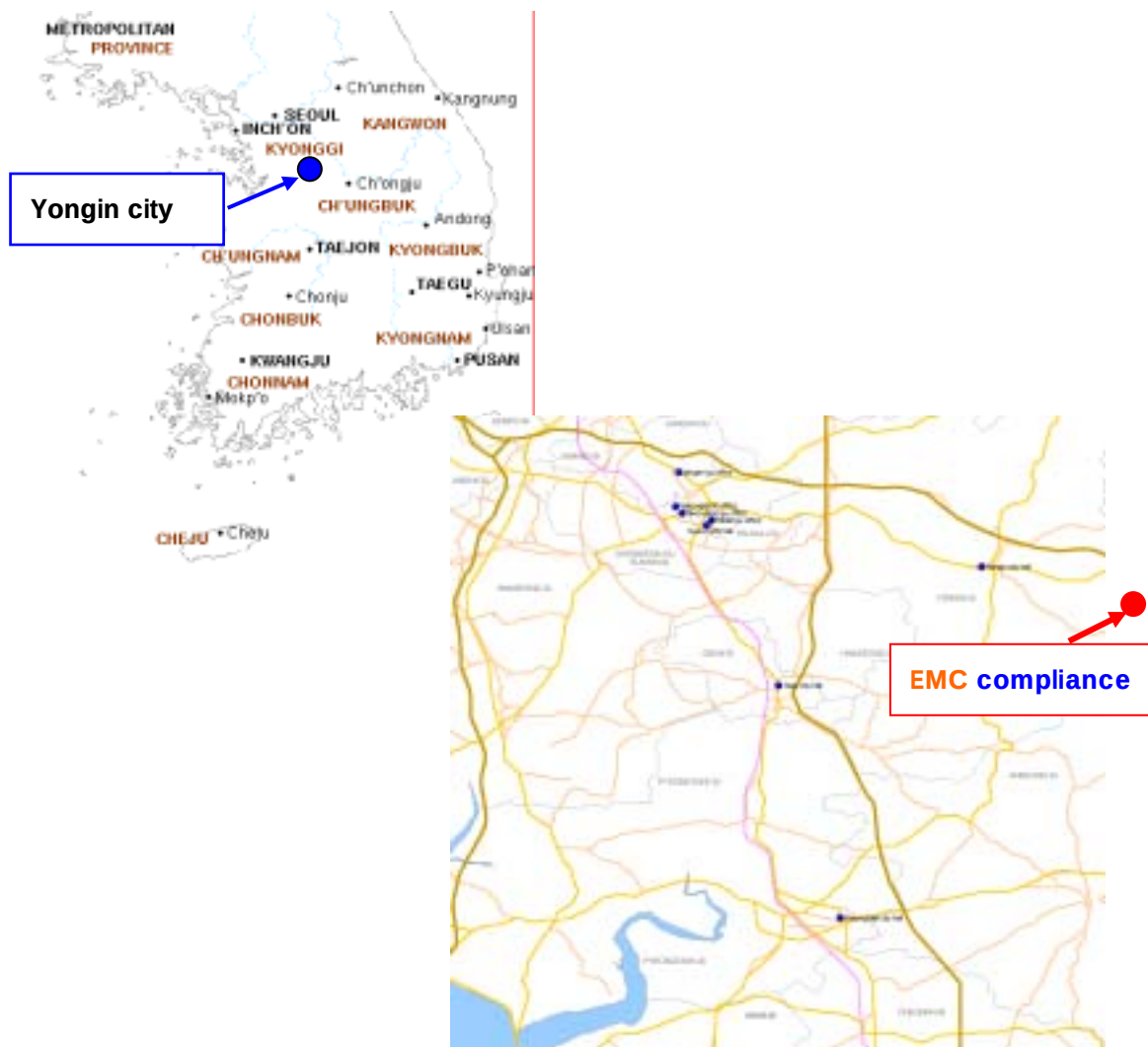
Telephone Number : 82 31 336 9919

Facsimile Number : 82 31 336 4767

FCC Filing No. : 793334

VCCI Registration No. : C-1713, R-1606

SITE MAP



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3. Test system configuration

3.1 Operation Environment

	Temperature	Humidity	Pressure
OATS :	21 °C	57 %	1001 hPa
Shielded room :	24 °C	47 %	1001 hPa

Test site

These testing were performed following locations;

OATS (3m) : Radiated emission

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMI. The factors contributing to uncertainties are test receiver, Cable Loss, antenna factor calibration, Antenna directivity, antenna factor Variation with height, antenna phase center variation, antenna Frequency interpolation, measurement distance variation, Site imperfection, mismatching, and system repeatability.

Based on NIS 80, 81, the measurement uncertainty level with a 95% confidence level was applied.

3.3 Sample calculation

Radiated emission

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.

The sample calculation is as follows :

$$FS = MR + AF + CL + AT - AG$$

MR = Meter Reading / AF = Antenna Factor / CL = Cable Loss

AP = Antenna Pad / AG=Amplifier Gain /

If MR is 30dB, AF 12dB, CL 5dB, AP 10dB, AG 35dB

The result (MR) is

$$30 + 12 + 5 + 10 - 35 = 22\text{dBuV/m}$$

Conducted emission

The field strength is calculated by adding the LISN factor, cable loss to the measured reading.

The sample calculation is as follows :

$$FS = MR + LF + CL$$

MR = Meter Reading

LF = LISN Factor

CL = Cable Loss

If MR is 30dB, LISN Factor 1dB, CL 1dB

The result (FS) is

$$30 + 1 + 1 = 32\text{dBuV}$$

4. Description of EUT

4.1 Product description

Applicant:	Muro Co.,Ltd
Address of Applicant:	Hongha B/D 301, 878 Shinkil7-Dong, Yungdungpo-ku, Seoul, Korea 150-854
Factory:	S.CAM CO.,LTD
Address of Factory	35, Buk-ri, Namsa-myon, Youngin city, Gyeonggi-do, Korea
Type of equipment :	MP3 Digital Music Player
Basic Model :	LDP-600
Serial No.:	N/A
Power rating :	DC 3.7V (Li-Ionpolymer)

4.2 Peripherals

Description	Model / Part #	Serial number	Manufacture
PC	Presario S6500KR	KRJ41103C7	COMPAQ
Monitor	PN17LT	P225HVDT403008	SAMSUNG
Printer	EPSON STYLUS C60	DR5K014977	EPSON
Keyboard	KB-9963	B28AC0NGANB1DI	COMPAQ
PS/2 Mouse	M-S69	F466B0MN3NG1CH0	COMPAQ
Serial Mouse	SWW-23	N/A	A4Tech
Headset	Stereo LS1 HEADSET	N/A	Microsoft

4.3 Operating conditions

Operating : 1. File up/download mode via USB

2. FM transmitter mode

3. Line in REC (recording mode)

4. FM tuner mode.

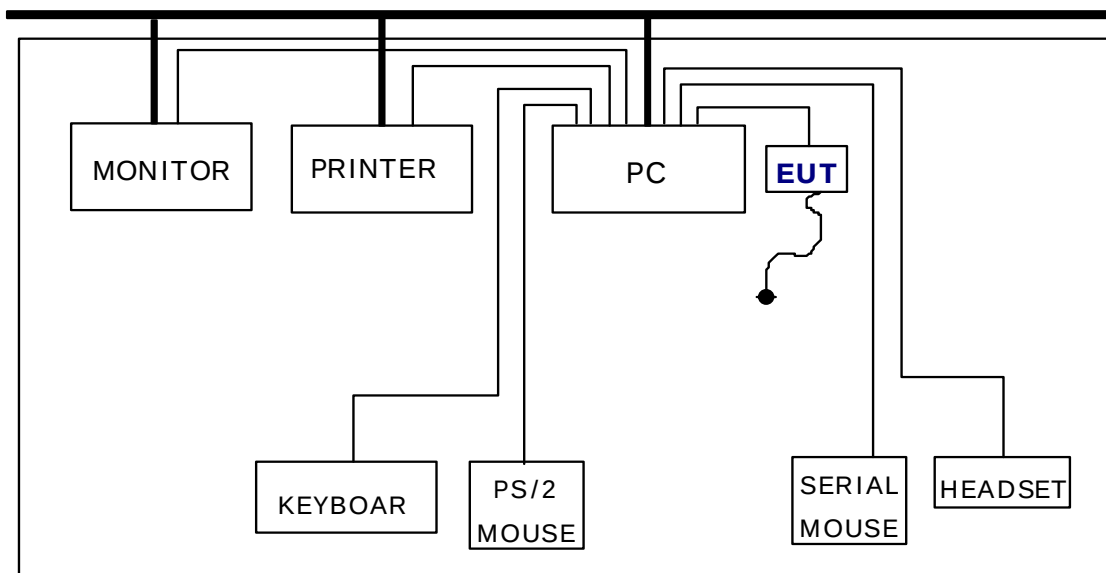
- The system was configured in typical fashion (as a customer would normally use it) for testing.

- The test program used during radiated testing was designed to exercise the various system components in a manner similar to typical use.

4.4 Used cables

Start		END		Cable Spec.	
Name	I / O Port	Name	I / O Port	Length	Shield
PC	VGA	MONITOR	D-SUB	1.5	Shield
	PARALLEL	PRINTER	PARALLEL	1.8	Shield
	PS/2	KEYBOARD	PS/2	2.0	Shield
	PS/2	PS/2 MOUSE	PS/2	1.8	Shield
	SERIAL	SERIAL MOUSE	SERIAL	1.6	Shield
	SPEAKER,MIC	HEADSET	P-JACK	2.0	Unshield
EUT	USB	PC	USB	1.2	Shield
	EAR	Earphone	-	1.4	Unshield

4.5 E.U.T. test configuration



5. Summary of test results

5.1 Modification to the E.U.T.

- None

5.2 Standards & results

FCC part 15 subpart B (Class B)

FCC Part 15 Subpart C

ANSI C63.4 – 2001

Test items	Test methods	Result
Radiated Electric Field emission	ANSI C63.4	Pass
FM tuner	ANSI C63.4	Pass
Intentional radiator 200kHz bandwidth	ANSI C63.4	Pass
Intentional radiator field strength of radiation	ANSI C63.4	Pass
Intentional radiator field strength of spurious	ANSI C63.4	Pass

6. Test results

6.1 Conducted emission

6.1.1 Measurement procedure

Mains

The measurements were performed in a shielded room.

EUT was placed on a non-metallic table height of 0.1m above the reference ground plane.

The rear of tabletop was located 0.4m to the vertical conducted plane.

All other surfaces of tabletop were at least 0.8m away from any other grounded conducting surface.

Cables were folded back and forth forming a bundle 0.3m to 0.4m long and were hanged at a 0.4m height to the ground plane.

Each EUT power lead, except ground (safety) lead, was individually connected through a LISN to input power source.

Both lines of power cord, hot and neutral were measured.

6.1.2 Used equipments

Equipment	Model	Serial no.	Makers	Next Cal. date	Used
Test receiver	ESHS10	843276/003	R&S	05.05.13	☒
L.I.S.N.	ESH3-Z5	100267	R&S	05.06.14	☒
	L3-32A	0120J20305	PMM	05.04.03	☒
Test site	Shield room	-	-	-	☒

6.1.3 Measurement uncertainty

Conducted emission measurement : (k=2)

9kHz-150 kHz : ± 3.48

150kHz-300 MHz : ± 3.05

6.1.4 Test data

Frequency [MHz]	Correction Factor		Line	Quasi-peak			Average		
	LISN	Cable		Limit [dBuV]	Reading [dBuV]	Result [dBuV]	Limit [dBuV]	Reading [dBuV]	Result [dBuV]
0.150	0.03	0.2	N	66.00	44.09	44.32	56.00	13.25	13.48
0.177	0.03	0.2	N	64.63	42.59	42.82	54.63	31.32	31.55
0.528	0.09	0.3	H	56.00	24.61	25.00	46.00	23.97	24.36
3.520	0.15	0.5	H	56.00	26.38	27.03	46.00	24.95	25.60
12.180	0.52	0.5	H	60.00	27.90	28.92	50.00	23.56	24.58
16.240	0.81	0.5	H	60.00	37.25	38.56	50.00	31.91	33.22
20.300	0.93	0.5	H	60.00	35.27	36.70	50.00	29.35	30.78
24.360	0.96	0.7	N	60.00	27.92	29.58	50.00	22.28	23.94

- Note. QP = Quasi-Peak, AV= Average
- LINE(N) : Neutral, LINE(H) : Hot
- Loss = LISN Loss + Cable Loss
- Measurement time : 1 s

6.1.5. Result

Complied

6.2 Radiated emission

6.2.1 Measurement procedure

A pretest was performed at 3m distance in a semi-anechoic chamber for searching correct frequency. The final test was done at a 10m open area test site with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.1m above the reference ground plane. Cables were folded back and forth forming a bundle 0.3m to 0.4m long and were hanged at a 0.4m height to the ground plane. Cables connected to EUT were fixed to cause maximum emission. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

6.2.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next cal. date	Used
Test receiver	ESVS10	827864/006	R&S	05.05.14	☒
TRILOG Broadband Ant.	VULB 9160	3138	SCHWARZBECK	05.04.10	☒
Antenna Mast	A109	N/A	DEAIL	-	☒
Turn Table	TS14	N/A	DEAIL	-	☒
10m OATS	-	-	EMC Compliance	-	☒

6.2.3 Measurement uncertainty

Radiated Emission measurement : (K=2)
30-300 MHz ; 3 m: ± 3.56 , 10 m: ± 3.50
300-1000 MHz ; 3 m: ± 4.47 , 10 m: ± 2.64

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6.2.4 Test data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	angle	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
					Antenna	Cable			
[USB mode]									
32.02	13.0	H	1.0	178	11.01	0.84	30.0	24.85	5.15
143.75	8.9	H	4.0	0	13.22	2.03	30.0	24.15	5.85
199.68	7.1	h	3.4	296	9.46	2.39	30.0	18.96	11.04
199.98	4.6	V	1.0	150	9.46	2.39	30.0	16.46	13.54
200.00	11.6	H	3.0	107	9.35	2.40	30.0	23.35	6.65
202.83	6.6	h	4.0	315	9.44	2.42	30.0	18.46	11.54
336.08	2.4	H	2.0	295	13.68	3.48	37.0	19.56	17.44
[Record mode]									
42.30	6.3	v	1.0	176	11.59	0.86	30.0	18.75	11.25
[MP3 Play(1kHz signal) mode]									
127.26	6.8	v	1.0	208	11.83	1.93	30.0	20.56	9.44

*10 m OATS

* Note : Reading = Test Receiver meter,

P= Polarization → POL H = Horizontal, POL V = Vertical

* Result = Field Strength (Antenna factor + Cable factor + Reading)

[Test mode : FM Tuner]

Tuner Freq. [MHz]	Local Oscillator	Frequency [MHz]	Reading [dBuV]	Pol.	Height [m]	Angle	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dBuV/m]
							Ant.	Cable			
87.5	Fundamental	98.20	-	-	-	-	-	-	-	-	-
98	Fundamental	108.70	-	-	-	-	-	-	-	-	-
108	Fundamental	118.70	-	-	-	-	-	-	-	-	-
Other Frequency		32.20	12.5	H	1.0	172	11.01	1.20	40.0	24.71	15.29
		42.23					11.59	1.40	40.0	19.89	20.11

* Receiving Antenna Mode : P= Polarization → POL H = Horizontal, POL V = Vertical

* IF Bandwidth : 120kHz

* Note : Reading = Test Receiver meter

* Result = Field Strength (Antenna factor + Cable factor + Reading)

6.2.5. Result

Complied

6.3 Intentional radiator 200kHz Bandwidth

6.3.1 Used equipments

Equipment	Model no.	Serial no.	Makers	Next cal. date	Used
EMC Analyzer	E7401A	US38460066	Agilent	05.04.07	☒

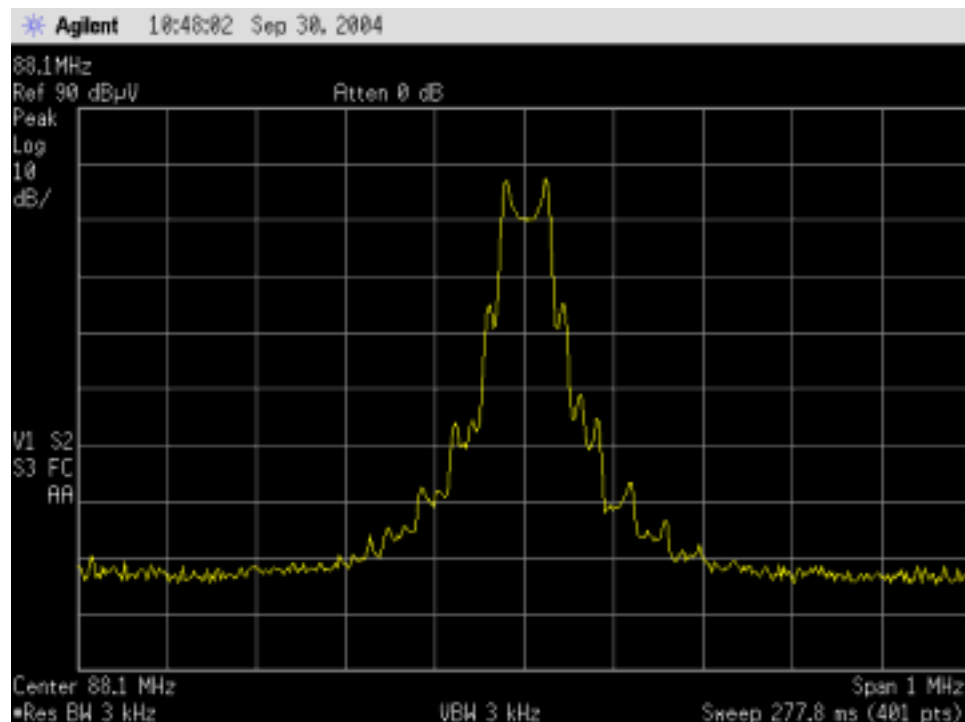
6.3.2 Instrument Settings

RES BW : 10 kHz

VBW : 10 kHz

6.3.3 Test data

[88 MHz]

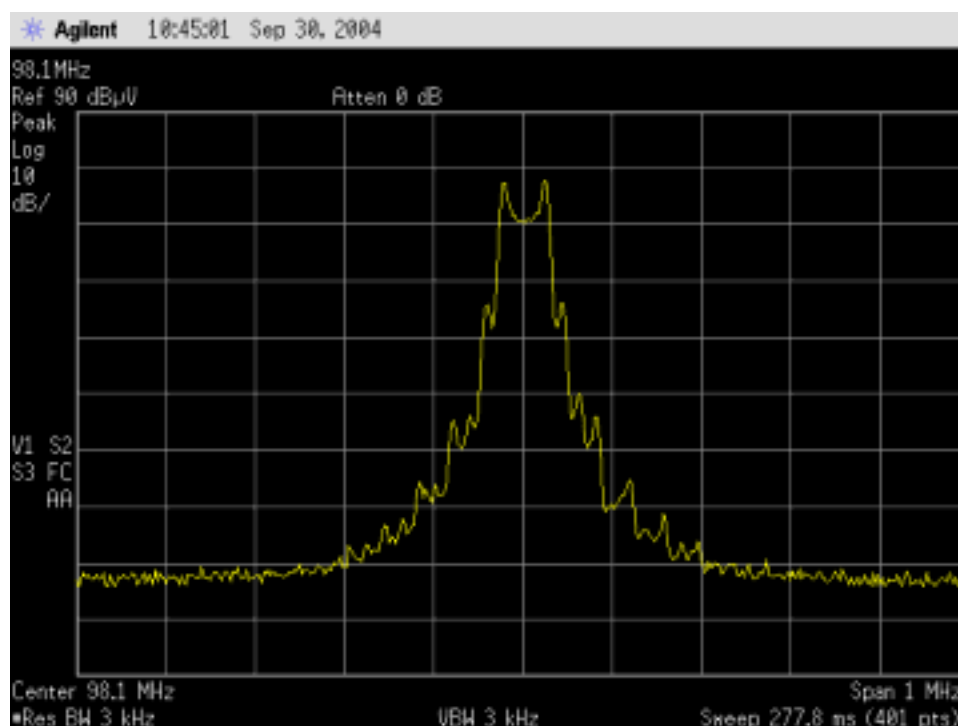


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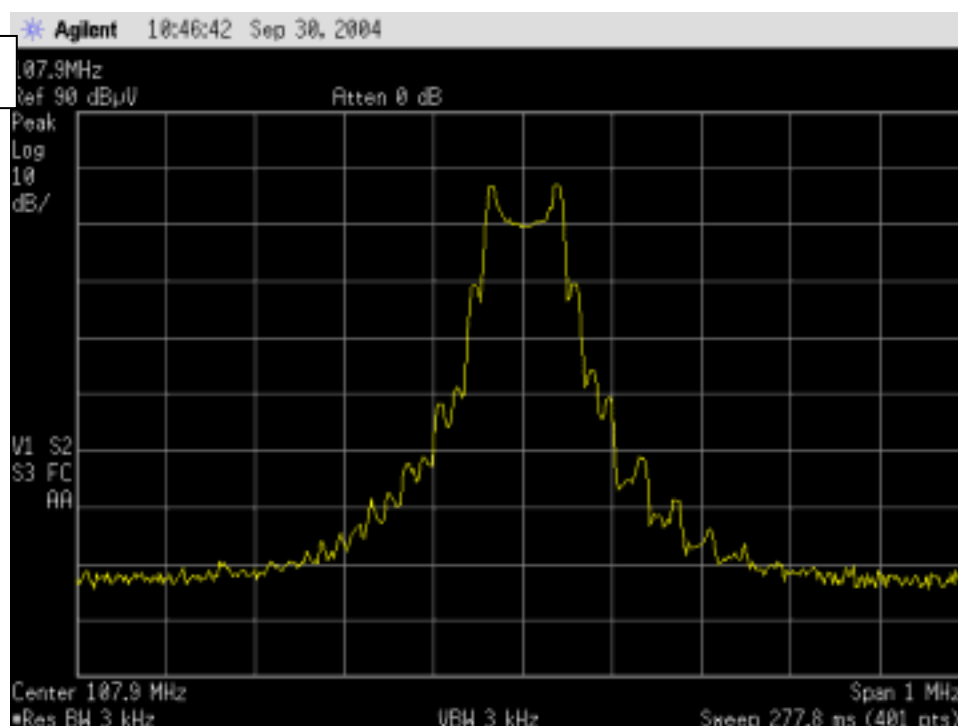
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[98 MHz]



[107.9 MHz]



6.3.4 Result

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6.4 Intentional radiator Field Strength of Radiation

6.4.1 Measurement procedure

The test was done at a 3m open area test site with an average detector. EUT was placed on a non-metallic table height of 0.8m above the reference ground plane.

They were folded back and forth forming a bundle 0.3m to 0.4m long and were hanged at a 0.4m height to the ground plane.

Cables connected to EUT were fixed to cause maximum emission.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

6.4.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next cal. date	Used
Test receiver	ESVS10	827864/006	R&S	05.05.14	☒
TRILOG Broadband Ant.	VULB 9160	3138	SCHWARZBECK	05.04.10	☒
Antenna Mast	A109	N/A	DEAIL	-	☒
Turn Table	TS14	N/A	DEAIL	-	☒
10m OATS	-	-	EMC Compliance	-	☒

6.4.3 Measurement uncertainty

Radiated Emission measurement : (K=2)

30-300 MHz ; 3 m: ± 3.56 , 10 m: ± 3.50

300-1000 MHz ; 3 m: ± 4.47 , 10 m: ± 2.64

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6.4.4 Test data

[Peak]

Frequency	Reading	Pol.	Height	angle	Correction Factor		Limits	Result	Margin
[MHz]	[dBuV/m]		[m]		Antenna	Cable	[dBuV/m]	[dBuV/m]	[dB]
88.10	39.9	H	2.3	102	7.62	0.82	68.0	48.34	19.66
98.00	37.5	H	3.3	100	8.68	0.98	68.0	47.16	20.84
107.90	37.1	H	2.9	120	9.69	1.04	68.0	47.83	20.17

[Average]

Frequency	Reading	Pol.	Height	angle	Correction Factor		Limits	Result	Margin
[MHz]	[dBuV/m]		[m]		Antenna	Cable	[dBuV/m]	[dBuV/m]	[dB]
88.10	36.2	H	2.3	102	7.62	0.82	48.0	44.64	3.36
98.00	35.3	H	3.3	100	8.68	0.98	48.0	44.96	3.04
107.90	33.8	H	2.9	120	9.69	1.04	48.0	44.53	3.47

- * Receiving Antenna Mode : P= Polarization → POL H = Horizontal, POL V =Vertical
- * IF Bandwidth : 120kHz
- * Note : Reading = Test Receiver meter,
- * Result = Field Strength (Antenna factor + Cable factor + Reading)

6.4.5 Result

Complied

6.5 Intentional radiator Field Strength of Spurious

6.5.1 Measurement procedure

The test was done at a 3m open area test site with a quasi-peak detector. EUT was placed on a non-metallic table height of 0.8m above the reference ground plane.

They were folded back and forth forming a bundle 0.3m to 0.4m long and were hanged at a 0.4m height to the ground plane.

Cables connected to EUT were fixed to cause maximum emission.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

6.5.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next cal. date	Used
Test receiver	ESVS10	827864/006	R&S	05.05.14	☒
TRILOG Broadband Ant.	VULB 9160	3138	SCHWARZBECK	05.04.10	☒
Antenna Mast	A109	N/A	DEAIL	-	☒
Turn Table	TS14	N/A	DEAIL	-	☒
10m OATS	-	-	EMC Compliance	-	☒

6.5.3 Measurement uncertainty

Radiated Emission measurement : (K=2)

30-300 MHz ; 3 m: ±3.56, 10 m: ±3.50

300-1000 MHz ; 3 m: ±4.47, 10 m: ±2.64

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6.5.4 Test data

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	angle	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
					Antenna	Cable			
176.20	12.7	H	2.4	101	11.98	1.50	43.5	26.18	17.32
215.80	13.4	H	3.1	118	10.02	1.75	43.5	25.17	18.33
352.30	11.0	H	2.2	100	13.87	2.52	46.0	27.39	18.61

* Receiving Antenna Mode : P= Polarization → POL H= Horizontal, POL V = Vertical

* IF Bandwidth : 120kHz

* Note : Reading = Test Receiver meter,

* Result = Field Strength (Antenna factor + Cable factor + Reading)

6.5.5 Result

Complied

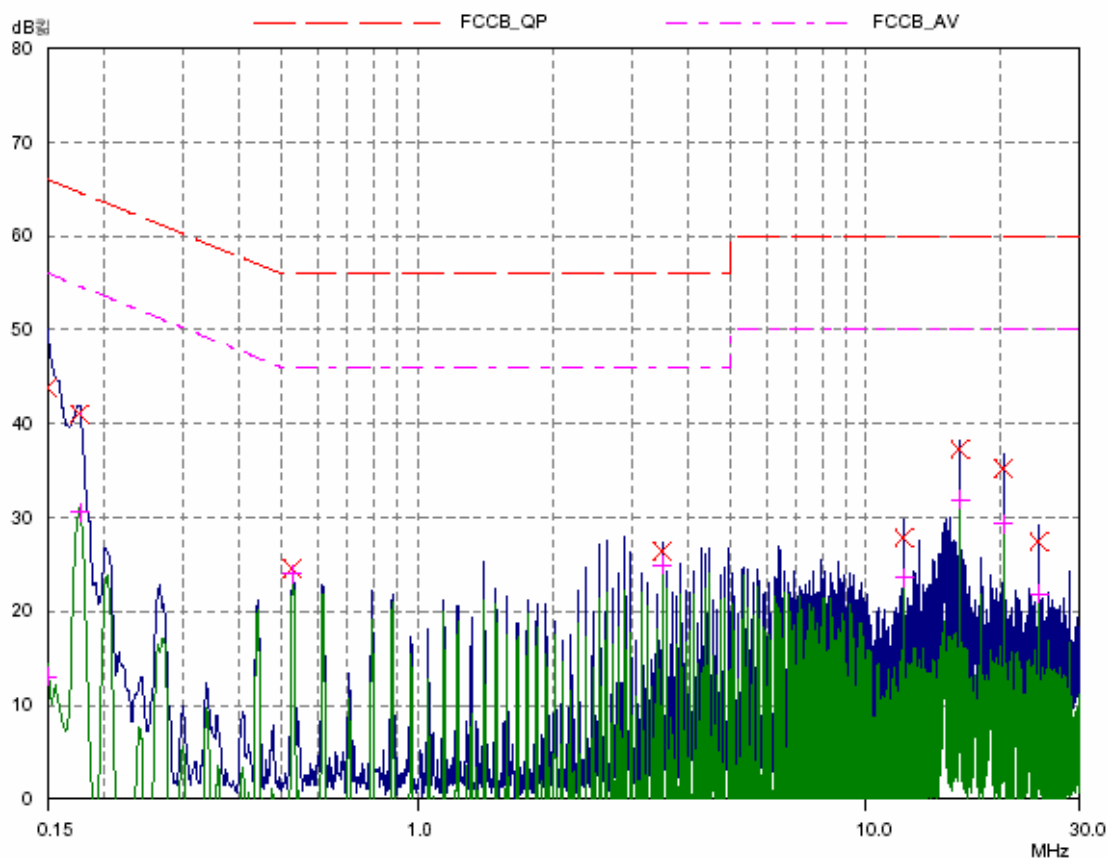
7. Test graphs

EUT: MP3
Manuf: MURO
Op Cond: H
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

Result File: mp3h.dat : MP3_MURO

Scan Settings			(2 Ranges)		Receiver Settings			
Frequencies			IF BW	Detector	M-Time	Atten	Preamp	OpRge
Start	Stop	Step	10kHz	PK+AV	10msec	Auto	OFF	60dB
150kHz	3MHz	3kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB
3MHz	30MHz	10kHz						

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB



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EUT: MP3
Manuf: MURO
Op Cond: N
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

Result File: mp3n.dat : MP3_MURO

Scan Settings			(2 Ranges)						
			Frequencies			Receiver Settings			
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB	
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB	

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB

