EMI TEST REPORT

Test report No.:	**EMC- FCC- 0219**
Type of equipment:	**DIGITAL AUDIO PLAYER**
Model Name:	**EZMP-4100**
	FCC ID : Q9JEZMP-4100T
Applicant:	**EZMAX 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: 2005. 01. 25 **Issued date: 2005 . 01. 27**

Tested by PARK, SEUNG-SOO **Approved by:** CHUNG, MIN-SEOK

EMC Compliance Ltd.
82-1 JEIL-RI, YANGJI-MYUN, YONGIN-CITY, KYUNGGI-DO 449-825, KOREA
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[Contents]

1. Client information

Applicant : EZMAX Co.,Ltd.

Address : #504 Hanlim HumanTower B/D1-40 Geumjeong-Dong

Gunpo city Kyunggi-D0, Korea

Telephone number :+82-31-479-7184

Facsimile number :+82-31-479-7188

Contact Person: NAM HO HEE

Manufacturer : EZMAX Co.,Ltd.

Address : #504 Hanlim HumanTower B/D1-40 Geumjeong-Dong

Gunpo city Kyunggi-D0, 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

KOLAS NO.:231

SITE MAP

3. Test system configuration

3.1 Operation Environment

		Temperature	Humidity	Pressure
OATS	:	5°C	38 %	1002 hPa
Shielded room	:	23 °C	32 %	1002 hPa

Test site

These testing were performed following locations;

Shielded Room : Conducted Emission,
Intentional radiator 200kHz Bandwidth

OATS (10m) : Radiated Emission
Intentional radiator Field Strength of Radiation
Intentional radiator Field Strength of Spurious

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 = 22dBuV/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 = 32dBuV

4. Description of EUT

4.1 Product description

Applicant/ Factory	EZMAX Co.,Ltd.
Address of Applicant:	#504 Hanlim HumanTower B/D1-40 Geumjeong-Dong Gunpo city Kyunggi-D0, Korea
Type of equipment :	MP3 Player
Model Name:	EZMP-4100
Serial No.:	N/A
Power rating :	3.7V, 480mA

4.2 Peripherals

Description	Model / Part #	Serial number	Manufacture
PC	MP10	910992FT201127	SAMSUNG
Monitor	CT1810	MP02215088	CORNEA
Printer	EPSON STYLUS C60	DR5K014977	EPSON
Keyboard	EJ-610	40219925	JOOYON
PS/2 Mouse	MF-48A	HCA20918641	SAMSUNG
Serial Mouse	SWW-23	N/A	A4Tech
Headset	C-322	N/A	LABTEC

4.3 Operating conditions

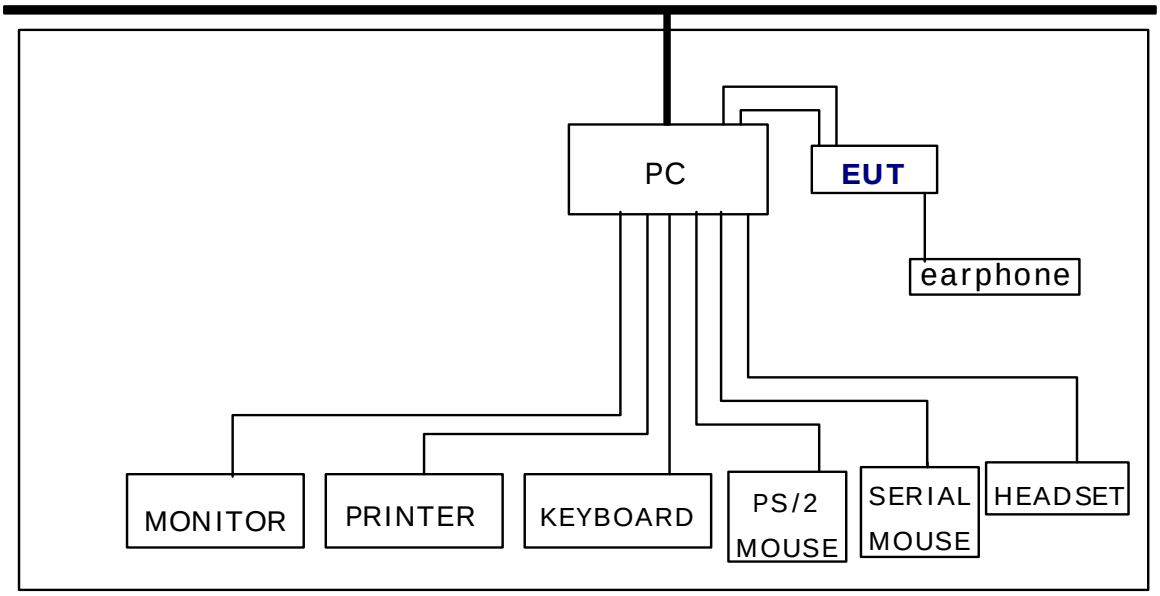
Operating : 1. File up/download mode
2. FM transmitter mode
3. Line in REC (recording mode)
4. FM tuner mode.

- 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	2.0	Shield
	PS/2	KEYBOARD	PS/2	1.8	Shield
	PS/2	PS/2 MOUSE	PS/2	1.6	Shield
	SERIAL	SERIAL MOUSE	SERIAL	1.8	Shield
	SPEAKER,MIC	HEADSET	P-JACK	2.0	Unshield
EUT	USB	PC	USB	1.2	Shield
	LINE-IN	PC	LINE-IN	1.0	Unshield
	Earphone	-	Open Cable	1.5	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

6.1 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 0.8 m above the reference ground plane.

The rear of table was located 0.4 m to the vertical conducted 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	☒
	L2-16A	0000J10705	PMM	05.11.20	☒
Test site	Shield room	-	-	-	☒

6.1.3 Measurement uncertainty

Conducted emission measurement : (k=2, 95%)

9kHz-150 kHz : ±3.48

150kHz-300 MHz : ±3.05

6.1.4 Test data

[Recording mode]

Frequency	Correction Factor		Line	Quasi-peak			Average		
				Limit	Reading	Result	Limit	Reading	Result
[MHz]	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.156	0.03	0.2	N	65.67	56.40	56.63	55.67	48.15	48.38
0.237	0.03	0.2	H	62.20	42.63	42.86	52.20	34.37	34.60
0.252	0.03	0.2	N	61.69	39.62	39.85	51.69	37.17	37.40
0.300	0.09	0.2	N	60.24	38.91	39.20	50.24	36.09	36.38
0.381	0.10	0.2	N	58.26	38.26	38.56	48.26	33.65	33.95
0.507	0.09	0.3	H	56.00	47.05	47.44	46.00	40.82	41.21
0.513	0.10	0.3	N	56.00	49.06	49.46	46.00	42.50	42.90
0.546	0.10	0.3	N	56.00	47.63	48.03	46.00	42.43	42.83
0.549	0.10	0.3	H	56.00	46.03	46.43	46.00	41.31	41.71
0.672	0.10	0.2	N	56.00	40.95	41.25	46.00	35.48	35.78
12.230	0.52	0.5	H	60.00	36.95	37.97	50.00	31.24	32.26
12.620	0.61	0.5	H	60.00	40.40	41.51	50.00	35.17	36.28
13.710	0.60	0.5	H	60.00	38.94	40.04	50.00	27.88	28.98
15.530	0.81	0.5	N	60.00	43.21	44.52	50.00	33.09	34.40
18.260	0.88	0.5	N	60.00	37.93	39.31	50.00	31.20	32.58

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

[Up/Down mode]

Frequency	Correction Factor		Line	Quasi-peak			Average		
				Limit	Reading	Result	Limit	Reading	Result
[MHz]	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.156	0.03	0.2	N	65.67	47.05	47.28	55.67	49.05	49.28
0.192	0.03	0.2	N	63.95	49.06	49.29	53.95	45.40	45.63
0.210	0.03	0.2	N	63.21	47.63	47.86	53.21	46.90	47.13
0.231	0.03	0.2	N	62.41	46.03	46.26	52.41	47.07	47.30
0.237	0.03	0.2	H	62.20	56.40	56.63	52.20	41.36	41.59
0.513	0.10	0.3	N	56.00	40.95	41.35	46.00	42.50	42.90
0.546	0.09	0.3	N	56.00	36.95	37.34	46.00	39.92	40.31
0.549	0.10	0.3	H	56.00	42.63	43.03	46.00	40.39	40.79
0.765	0.11	0.3	H	56.00	39.62	40.03	46.00	32.30	32.71
3.590	0.16	0.5	H	56.00	38.91	39.57	46.00	35.17	35.83
12.530	0.61	0.5	N	60.00	40.40	41.51	50.00	24.16	25.27
12.560	0.53	0.5	H	60.00	38.26	39.29	50.00	20.04	21.07
13.310	0.53	0.5	N	60.00	38.94	39.97	50.00	24.27	25.30
18.400	0.88	0.5	N	60.00	43.21	44.59	50.00	19.92	21.30
19.570	0.93	0.5	N	60.00	37.93	39.36	50.00	20.90	22.33

- 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	ESVD	841729/010	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, 95%)
30-300 MHz ; 3 m: ±3.56, 10 m: ±3.50
300-1000 MHz ; 3 m: ±4.47, 10 m: ±2.64

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			
Recording mode									
32.32	13.3	V	1.0	24	12.30	0.54	40.0	26.14	13.86
221.89	15.1	H	4.0	320	10.82	1.80	46.0	27.72	18.28
547.10	11.6	V	2.3	86	17.85	3.67	46.0	33.12	12.88
558.98	10.9	V	2.3	94	18.12	3.78	46.0	32.80	13.20
571.05	7.4	V	2.5	102	18.42	3.91	46.0	29.73	16.27
Up/Down mode									
37.32	9.5	V	1.0	174	12.52	0.60	40.0	22.62	17.38
75.50	11.7	V	1.0	176	9.87	0.70	40.0	22.27	17.73
112.00	6.8	V	1.0	154	10.46	1.14	43.5	18.40	25.10
154.00	4.7	V	1.5	183	13.89	1.47	43.5	20.06	23.44
205.43	8.6	V	2.3	209	10.48	1.65	43.5	20.73	22.78
264.00	11.5	H	2.5	199	12.27	2.00	46.0	25.77	20.23
300.00	9.3	V	1.3	32	13.19	2.20	46.0	24.69	21.31
324.00	6.8	V	1.0	243	13.74	2.40	46.0	22.94	23.06
331.00	4.2	H	2.2	187	13.89	2.40	46.0	20.49	25.51
485.00	3.2	H	1.5	98	16.93	3.18	46.0	23.31	22.69
731.20	1.4	V	2.4	167	20.78	4.70	46.0	26.88	19.12
765.30	2.6	V	2.3	34	21.39	5.01	46.0	28.99	17.01
PLAY mode									
241.01	21.0	H	3.9	56	11.73	1.91	46.0	34.64	11.36
246.00	22.7	H	4.0	321	11.84	1.93	46.0	36.47	9.53
336.01	20.2	V	1.0	89	14.00	2.40	46.0	36.60	9.40

* Receiving Antenna Mode : *Horizontal, Vertical*

* 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]

Tuned Fre. [MHz]	Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	angle	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
						Antenna	Cable			
87.5	196.40	19.5	H	4.0	118	9.81	2.50	43.5	31.81	20.19
98	217.40	11.3	H	3.8	142	10.11	2.80	46.0	24.21	27.79
108	237.40	16.2	H	3.2	119	11.00	2.90	46.0	30.10	25.90
	474.80	10.9	H	3.6	123	17.07	4.50	46.0	32.47	23.53
OTHER	176.02	9.6	H	4.0	169	11.98	2.40	43.5	23.98	16.02
	236.01	15.6	H	3.6	197	10.96	2.90	46.0	29.46	17.54

* Receiving Antenna Mode : *Horizontal, Vertical*

* 3 m OATS

* *Note : Reading = Test Receiver meter,*

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

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

6.2.5 Result

Complied

6.3 Intentional radiator 200kHz Bandwidth

6.3.1 Used equipments

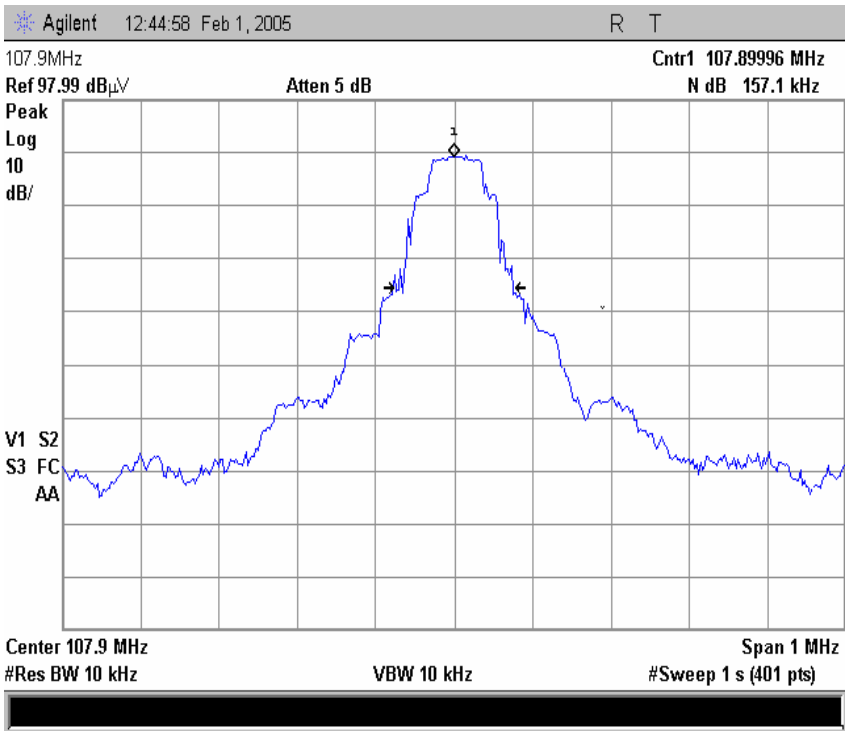
Equipment	Model no.	Serial no.	Makers	Next cal. date	Used
EMC Analyzer	E7401A	US38460066	Agilent	05.04.07	☒

6.3.2 Instrument Settings

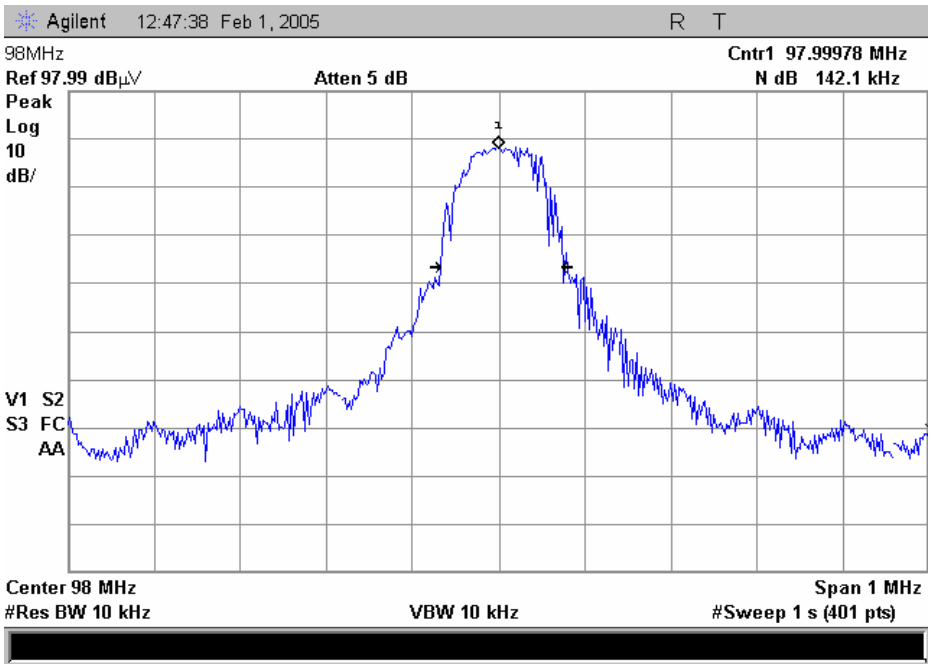
RES BW : 10 kHz
VBW : 10 kHz

6.3.3 Test data

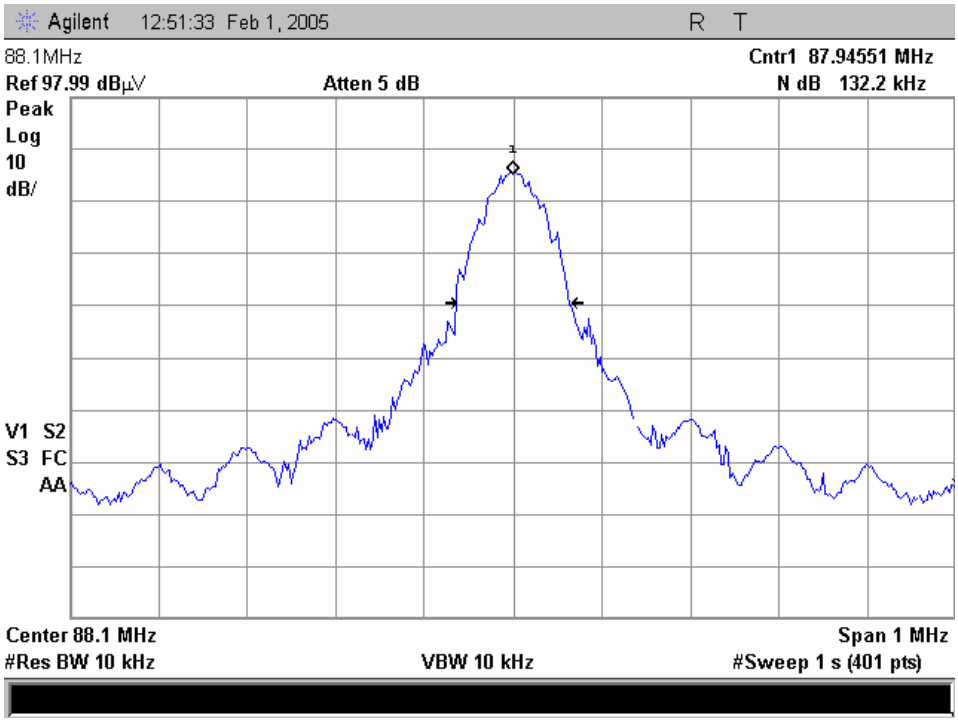
[107.9MHz]



[98 MHz]



[88.1MHz



6.3.4 Result

Complied

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	ESVD	841729/010	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, 95%)
30-300 MHz ; 3 m: ±3.56, 10 m: ±3.50
300-1000 MHz ; 3 m: ±4.47, 10 m: ±2.64

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	37.7	h	3.8	116	9.05	0.82	68.0	47.57	20.43
98.00	36.5	h	3.5	108	10.04	0.98	68.0	47.52	20.48
107.90	36.1	h	2.9	109	10.12	1.04	68.0	47.26	20.74

[Average]

Frequency	Reading	Pol.	Height	angle	Correction Factor		Limits	Result	Margin
[MHz]	[dBuV/m]		[m]		Antenna	Cable	[dBuV/m]	[dBuV/m]	[dB]
88.10	36.5	h	3.8	116	9.05	0.82	48.0	46.37	1.63
98.00	35.7	h	3.5	108	10.04	0.98	48.0	46.76	1.24
107.90	35.8	h	2.9	109	10.12	1.04	48.0	46.92	1.08

* 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	ESVD	841729/010	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)95%
30-300 MHz ; 3 m: ±3.56, 10 m: ±3.50
300-1000 MHz ; 3 m: ±4.47, 10 m: ±2.64

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			
209.51	29.3	H	1.8	200	10.55	1.69	43.5	41.54	1.96
221.60	30.9	H	2.4	184	10.82	1.80	46.0	43.52	2.48
228.90	31.1	H	3.6	110	11.22	1.84	46.0	44.18	1.82
318.59	27.5	H	2.9	67	13.60	2.38	46.0	43.50	2.50
323.42	26.7	H	1.7	347	13.72	2.40	46.0	42.77	3.23
330.68	27.1	H	2.1	108	13.87	2.40	46.0	43.40	2.60
335.60	28.1	H	3.3	122	13.98	2.40	46.0	44.51	1.49

* 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

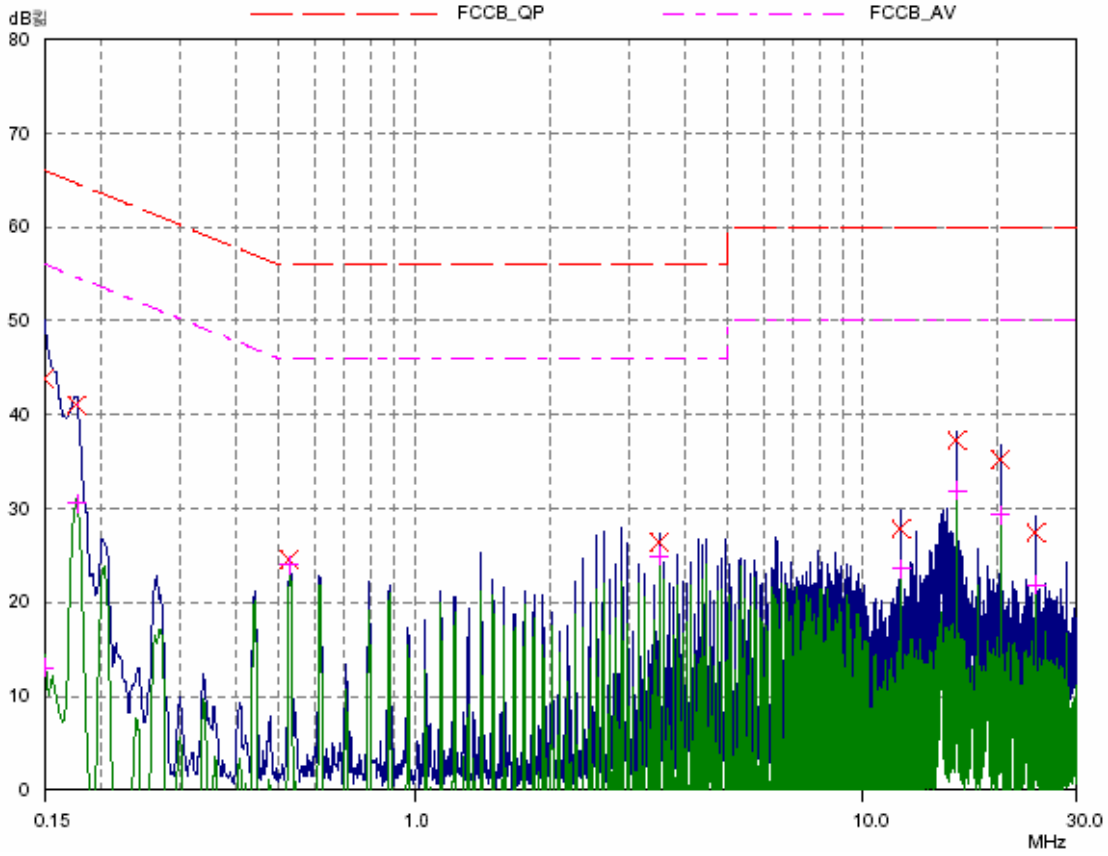
EUT: MP3
Manuf: MURO
Op Cond: H
Operator:
Test Spec: FCC Class B Conducted Emission
Comment:

Result File: mp3h.dat : MP3_MURO

Scan Settings (2 Ranges)

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



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