

EMI TEST REPORT

Test report No. : EMC- FCC- 0094

Type of equipment : HDD DIGITAL AUDIO PLAYER

Model No. : YP-910

FCC ID. : A3LYP910

Applicant : SAMSUNG ELECTRONICS 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 C63.4-1992

Radiated Emissions Measurement : ANSI C63.4-1992

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: 2003.9.8~9.15

Issued date: 2003 . 9. 15

Tested by: J. S. Kim
Kim, Jung-Soo

Approved by: M. S. Chung
Chung, Min-Seok

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1. Client information

Applicant: SAMSUNG ELECTRONICS CO., LTD.
Address: 416, Maetan-3Dong, Paldal-Gu, Suwon City, Kyungki-Do,
Korea
Telephone number: 82-31-200-5922
Facsimile number: 82-31-200-5938

Manufacturer: BLUETEK CO.,LTD.
Address: 16, MAETAN-3DONG, PALDAL-GU, SUWON CITY,
GYEONGGI-DO, KOREA 442-742
Telephone number: 82-31-200-5960
Facsimile number: 82-31-200-4309
Contact person: O Won Seo / Manager (ssafety@samsung.co.kr)

2. Laboratory information

Address

EMC compliance Ltd.

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

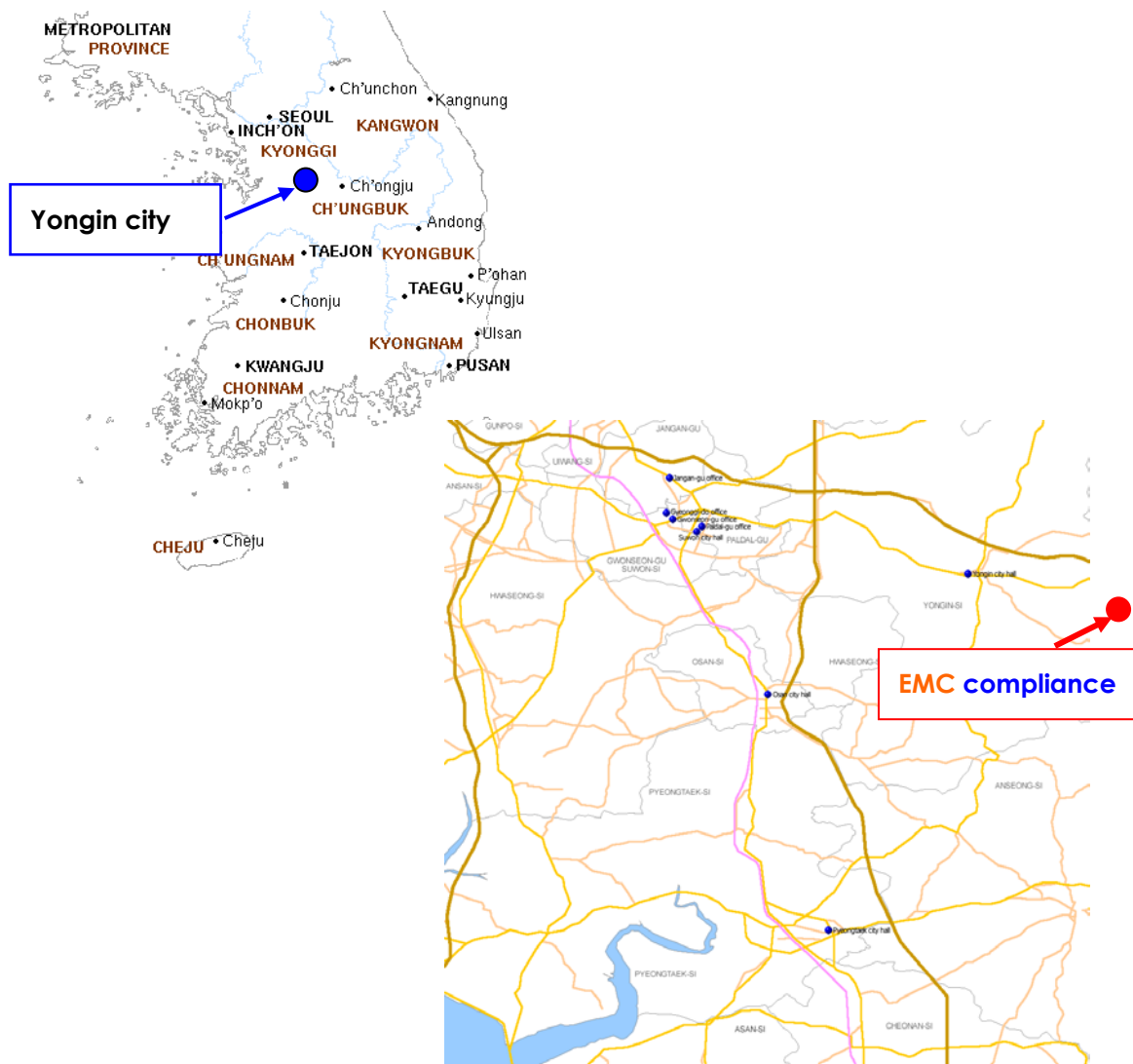
Telephone Number : 82 31 336 9919

Facsimile Number : 82 31 336 4767

FCC Filing No. : 793334

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

SITE MAP



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

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3. TEST SYSTEM CONFIGURATION

3.1 Operation Environment

	Temperature	Humidity	Pressure
OATS :	28 °C	72 %	1014 hPa
Shielded room :	23 °C	58 %	1014 hPa

Test site

These testing were performed following locations;

OATS (3m, 10m): Radiated emission

Shielded room : Conducted 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

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

4. Description of EUT

4.1 Product Description

Manufactured by:	SAMSUNG ELECTRONICS CO., LTD.
Address:	416, Maetan-3Dong, Paldal-Gu, Suwon City, Kyungki-Do, Korea
Type of equipment:	HDD DIGITAL AUDIO PLAYER
Model:	YP-910
Serial Number:	N/A
Power source:	110VAC, 60Hz (with adapter)

4.2 Peripherals

Description	Model / Part #	Serial Number	Manufacture
PC	EVO	6F28JYFZ7096	COMPAQ
Monitor	325900-B22/K	H1CK800333	COMPAQ
Printer	EPSON STYLUS C60	DR5K025464	
Keyboard	KB-9963	B28AC0NGANB1DI	COMPAQ
Mouse #1	OK-720	N/A	A4Tech
Mouse #2	M-S69	F466B0MN3NG1CI2	COMPAQ
Headset	Stereo LS1 Headset	N/A	Microsoft

4.3 Used cables

EUT Port	Type	Shield (Y/N)	Length (m)	Connection point 1	Connection point 2
VGA out	D-Sub	Y	1.8	PC	Monitor
Printer	Parallel	Y	2.0		Printer
PS/2	PS/2	Y	1.2		Keyboard
PS/2	PS/2	Y	1.2		Mouse #2
Console	Serial	Y	1.2		Mouse #1
MIC	P-Jack	N	0.8		Headset
USB	USB	Y	1.2	EUT	PC
USB	USB	Y	0.12		Adapter
Earphone	P-Jack	N	2.2		Earphone

4.4 Operating conditions

Operating : 1. MP3 file play mode.

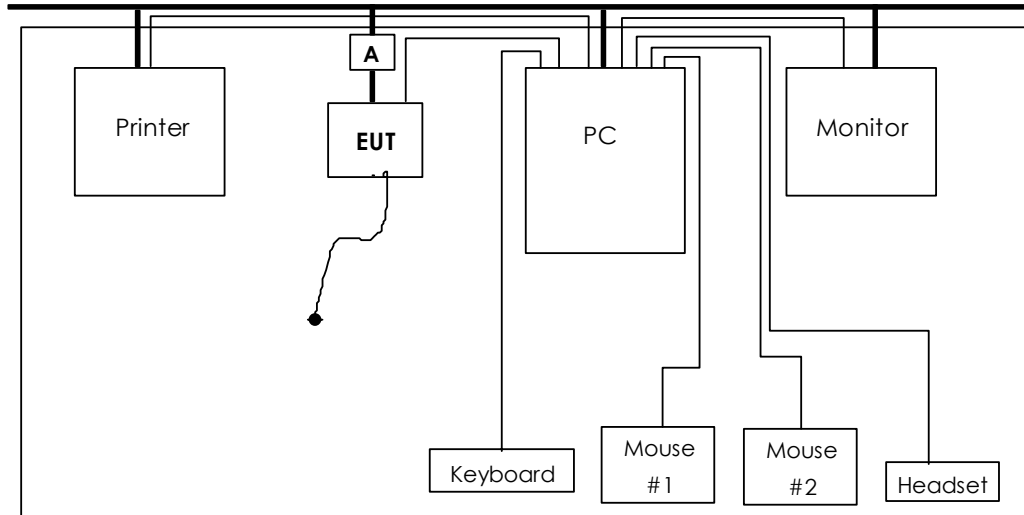
2. FM Tuner and transmitter mode.

3. Data up & down load 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.

4.5 EUT 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) - ANSI C63.4 – 1992

FCC Part 15 Subpart C (Class B) - ANSI C63.4 – 1992

Test items	Test methods	Result
Conducted emission	ANSI C63.4-1992	Pass
Radiated Electric Field emission	ANSI C63.4-1992	Pass
Intentional radiator 200kHz bandwidth	ANSI C63.4-1992	Pass
Intentional radiator field strength of radiation	ANSI C63.4-1992	Pass
Intentional radiator field strength of spurious	ANSI C63.4-1992	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	ESVS10	82786/006	R&S	04.05.13	X
L.I.S.N.	ESH3-Z5	100267	R&S	04.06.17	X
	L3-32A	0120J20305	PMM	04.04.03	X
Test site	Shield room	-	-	-	X

6.1.3 Measurement uncertainty

Conducted emission measurement : ± 2.4 (K=2)

6.1.4 Test data

[Test Mode : FM transmitter mode]

Frequency	Correction		Line	Quasi-peak			Average		
	Factor			Limit	Reading	Result	Limit	Reading	Result
	[MHz]	LISN		Cable	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.165	0.06	0.2	H	65.21	47.25	47.51	55.21	35.94	36.20
0.198	0.05	0.2	H	63.69	45.35	45.60	53.69	38.95	39.20
0.393	0.06	0.3	N	58.00	42.64	43.00	48.00	32.73	33.09
0.396	0.06	0.3	H	57.94	43.69	44.05	47.94	35.28	35.64
0.663	0.07	0.2	N	56.00	41.30	41.57	46.00	28.82	29.09
0.717	0.07	0.2	H	56.00	45.29	45.56	46.00	37.95	38.22
0.783	0.07	0.2	N	56.00	46.24	46.51	46.00	32.60	32.87
3.640	0.14	0.5	N	56.00	41.53	42.17	46.00	30.56	31.20
3.890	0.14	0.5	N	56.00	41.45	42.09	46.00	30.97	31.61
3.970	0.14	0.5	H	56.00	42.78	43.42	46.00	34.23	34.87
4.200	0.14	0.5	H	56.00	42.09	42.73	46.00	33.35	33.99
5.600	0.20	0.5	H	60.00	35.16	35.86	50.00	27.84	28.54

- Note. QP = Quasi-Peak, AV= Average
- Loss = LISN Loss + Cable Loss
- Measurement time : 1 s

[Test Mode : MP3 Play mode]

Frequency	Correction		Line	Quasi-peak			Average		
	Factor			Limit	Reading	Result	Limit	Reading	Result
[MHz]	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.399	0.06	0.3	H	57.87	37.37	37.73	47.87	29.44	29.80
0.714	0.07	0.2	H	56.00	40.40	40.67	46.00	34.74	35.01
0.720	0.07	0.2	N	56.00	40.75	41.02	46.00	29.94	30.21
0.759	0.07	0.2	H	56.00	40.93	41.20	46.00	32.38	32.65
0.777	0.07	0.2	N	56.00	40.38	40.65	46.00	29.32	29.59
1.485	0.09	0.3	H	56.00	34.16	34.55	46.00	24.69	25.08
3.320	0.11	0.4	H	56.00	33.76	34.27	46.00	27.55	28.06
4.490	0.14	0.5	H	56.00	35.58	36.22	46.00	29.16	29.80

- Note. QP = Quasi-Peak, AV= Average
- Loss = LISN Loss + Cable Loss
- Measurement time : 1 s

[Test Mode : Data UP/Down load mode]

Frequency	Correction		Line	Quasi-peak			Average		
	Factor			Limit	Reading	Result	Limit	Reading	Result
[MHz]	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.159	0.06	0.2	H	65.52	47.80	48.06	55.52	39.87	40.13
0.480	0.06	0.3	H	56.00	38.36	38.72	46.00	22.86	23.22
3.550	0.14	0.5	H	56.00	38.99	39.63	46.00	23.33	23.97
3.610	0.14	0.5	H	56.00	39.27	39.91	46.00	22.00	22.64
3.680	0.14	0.5	H	56.00	39.39	40.03	46.00	21.90	22.54
3.760	0.14	0.5	H	56.00	39.01	39.65	46.00	23.78	24.42
3.820	0.14	0.5	H	56.00	38.96	39.60	46.00	22.03	22.67

- Note. QP = Quasi-Peak, AV= Average
- Loss = LISN Loss + Cable Loss
- Measurement time : 1 s

6.1.5. Result

Complied

6.2 Radiated Electric Field Emission

6.2.1 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.

6.2.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Test receiver	ESVS10	827864/006	R&S	04.05.13	X
Spectrum	SA-9270A	01080005	LG	04.05.10	X
TRILOG Broadband antenna	VULB 9160	3138	SCHWARZBECK	04.03.26	X
Antenna Mast	A109	N/A	DEAIL	-	X
Turn Table	TS14	N/A	DEAIL	-	X
10m OATS	-	-	EMC Compliance	-	X

6.2.3 Measurement uncertainty

Radiated Emission measurement : (K=2)

30-300 MHz ; 3 m: ± 3.67 , 10 m: ± 4.4

300-1000 MHz ; 3 m: $+4.6/-2.92$, 10 m: $+2.94/-2.88$

6.2.4 Test data

[Test mode : MP3 file play mode]

Frequency	Reading	Pol.	Height	angle	Correction		Limits	Result	Margin
					Factor				
[MHz]	[dBuV/m]		[m]		Antenna	Cable	[dBuV/m]	[dBuV/m]	[dB]
168.02	5.4	H	4.0	4	12.37	2.80	30.0	20.57	9.43
168.01	7.1	V	1.1	89	12.37	2.80	30.0	22.27	7.73
288.02	9.8	H	4.0	306	12.74	4.10	37.0	26.64	10.36

* Receiving Antenna Mode : *Horizontal, Vertical*

* IF Bandwidth : 120kHz

* Note : Reading = Test Receiver meter,

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

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

[Test mode : File upload/download mode]

Frequency	Reading	Pol.	Height	angle	Correction		Limits	Result	Margin
					Factor				
[MHz]	[dBuV/m]		[m]		Antenna	Cable	[dBuV/m]	[dBuV/m]	[dB]
75.82	10.6	V	1.0	51	8.81	2.10	30.0	21.51	8.49
153.65	3.3	H	4.0	336	12.84	2.70	30.0	18.84	11.16
208.26	11.9	H	2.3	85	9.75	3.20	30.0	24.85	5.15
264.00	9.9	H	4.0	267	11.90	3.70	37.0	25.50	11.50
479.99	10.0	H	2.7	205	17.23	5.50	37.0	32.73	4.27
480.02	10.9	V	1.0	251	17.25	5.50	37.0	33.65	3.35
720.83	6.3	H	1.7	329	21.19	7.20	37.0	34.69	2.31
959.99	2.3	V	1.2	155	24.27	8.00	37.0	34.57	2.43

* Receiving Antenna Mode : *Horizontal, Vertical*

* IF Bandwidth : 120kHz

* 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 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.

6.3.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Test receiver	ESVS10	827864/006	R&S	04.05.13	X
Spectrum	SA-9270A	01080005	LG	04.05.10	X
TRILOG Broadband antenna	VULB 9160	3138	SCHWARZBECK	04.03.26	X
Antenna Mast	A109	N/A	DEAIL	-	X
Turn Table	TS14	N/A	DEAIL	-	X
3m OATS	-	-	EMC Compliance	-	X

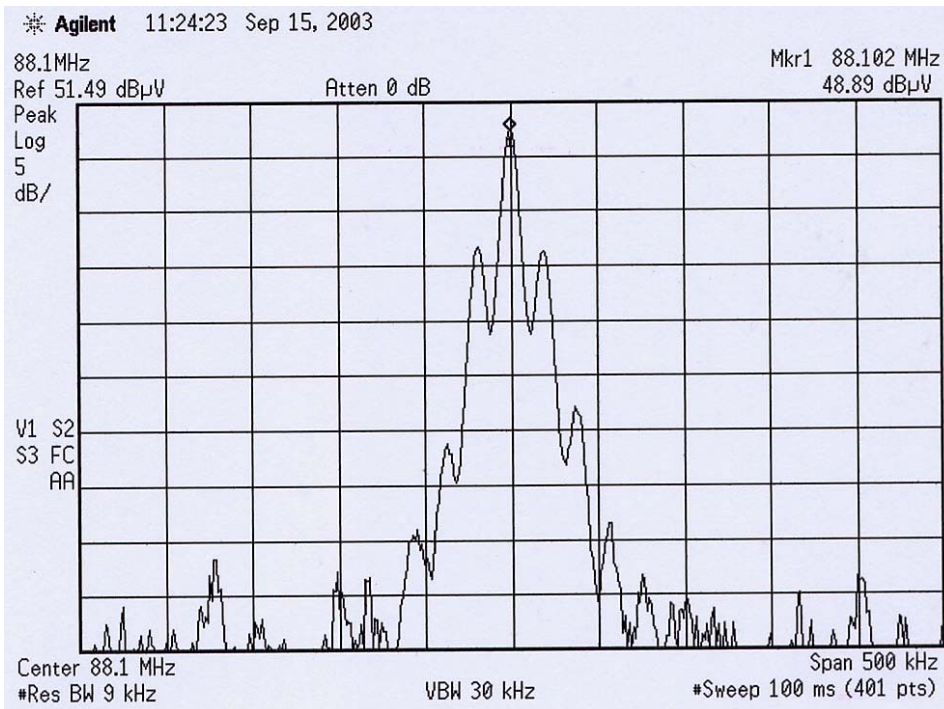
6.3.3 Instrument Settings

RES BW : 9 kHz

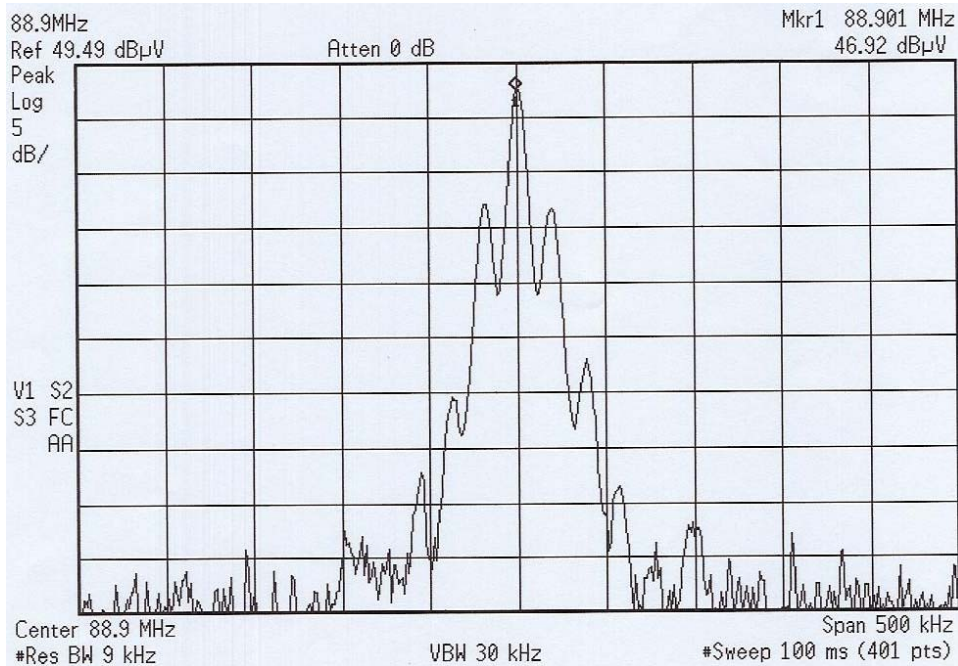
VBW : 30 kHz

6.3.4 Test data

88.1MHz



88.9MHz



6.3.5 Result

Complied

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

TEL: 82 31 336 9919 FAX: 82 31 336 4767

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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 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.

6.4.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next Cal. date	Used
Test receiver	ESVS10	827864/006	R&S	04.05.13	X
Spectrum	SA-9270A	01080005	LG	04.05.10	X
TRILOG Broadband antenna	VULB 9160	3138	SCHWARZBECK	04.03.26	X
Antenna Mast	A109	N/A	DEAIL	-	X
Turn Table	TS14	N/A	DEAIL	-	X
3m OATS	-	-	EMC Compliance	-	X

6.4.3 Measurement uncertainty

Radiated Emission measurement : (K=2)

30-300 MHz ; 3 m: ± 3.67 , 10 m: ± 4.4

300-1000 MHz ; 3 m: $+4.6/-2.92$, 10 m: $+2.94/-2.88$

6.4.4 Test data

Frequency	Reading	Pol.	Height	angle	Correction		Limits	Result	Margin
					Factor				
[MHz]	[dBuV/m]		[m]		Antenna	Cable	[dBuV/m]	[dBuV/m]	[dB]
88.10	34.4	H	3.7	303	7.99	1.80	48.0	44.19	3.81
88.90	33.8	H	3.7	311	7.99	1.80	48.0	43.59	4.41

* Receiving Antenna Mode : *Horizontal, Vertical*

* IF Bandwidth : 120kHz

* Note : Reading = Test Receiver meter,

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

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

6.4.5 Result

Complied

6.5 Radiated Electric Field Emission

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	04.05.13	X
Spectrum	SA-9270A	01080005	LG	04.05.10	X
TRILOG Broadband antenna	VULB 9160	3138	SCHWARZBECK	04.03.26	X
Antenna Mast	A109	N/A	DEAIL	-	X
Turn Table	TS14	N/A	DEAIL	-	X
3m OATS	-	-	EMC Compliance	-	X

6.5.3 Measurement uncertainty

Radiated Emission measurement : (K=2)

30-300 MHz ; 3 m: ± 3.67 , 10 m: ± 4.4

300-1000 MHz ; 3 m: $+4.6/-2.92$, 10 m: $+2.94/-2.88$

6.5.4 Test data

Frequency	Reading	Pol.	Height	angle	Correction		Limits	Result	Margin
					Factor				
[MHz]	[dBuV/m]		[m]		Antenna	Cable	[dBuV/m]	[dBuV/m]	[dB]
142.39	10.0	V	1.0	179	12.41	2.20	43.5	24.61	18.89
264.01	26.2	V	1.0	209	11.90	3.10	46.0	41.20	4.80
264.01	21.7	H	4.0	239	11.90	3.10	46.0	36.70	9.30
312.01	9.2	H	3.9	355	13.35	3.60	46.0	26.15	19.85
312.01	11.7	V	1.0	182	13.35	3.60	46.0	28.65	17.35
887.04	4.6	V	1.0	259	23.11	6.00	46.0	33.71	12.29

* Receiving Antenna Mode : *Horizontal, Vertical*

* IF Bandwidth : 120kHz

* Note : Reading = Test Receiver meter,

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

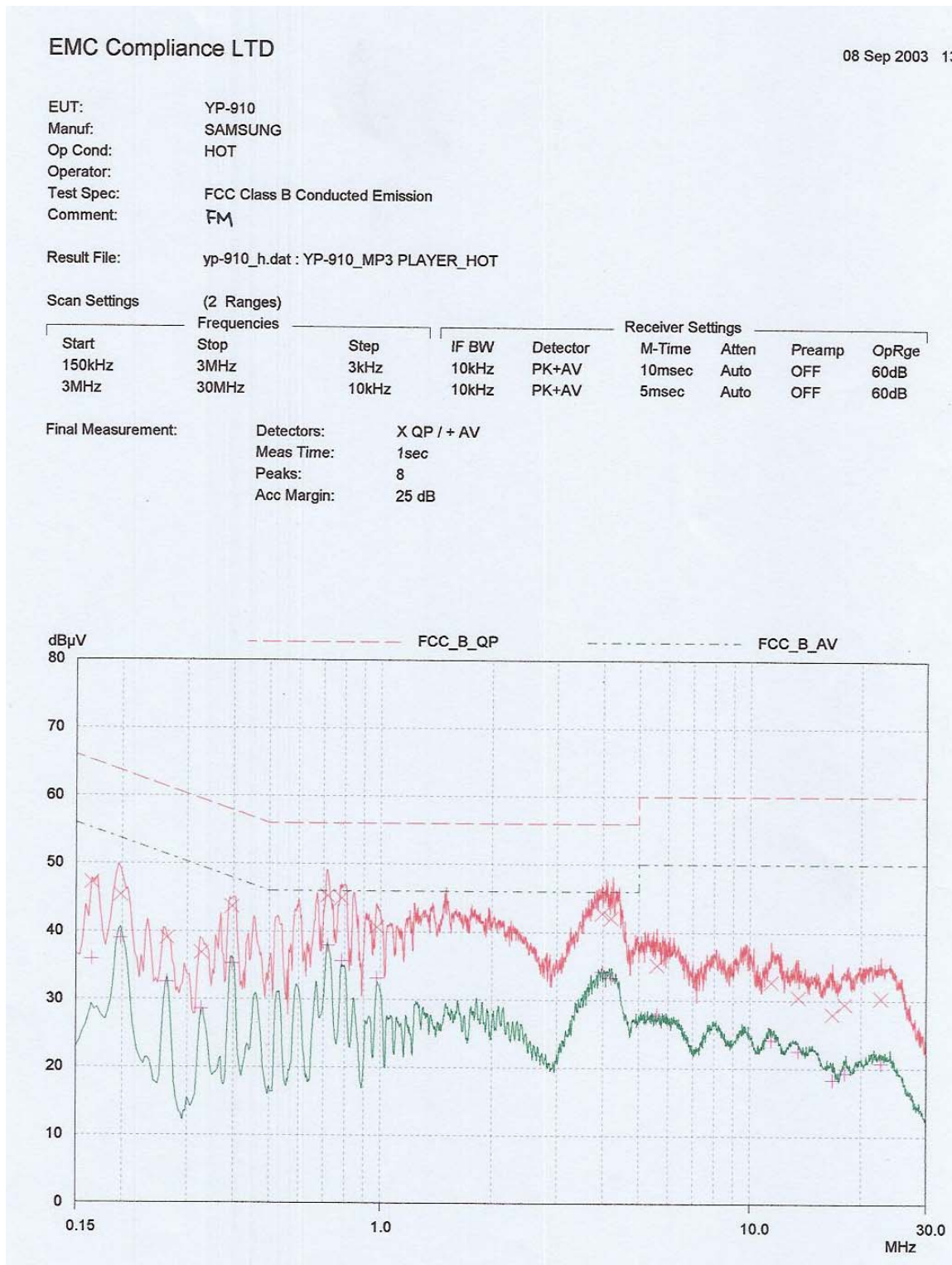
* Result = Field Strength (Antenna factor + Cable factor + Reading)

6.5.5 Result

Complied

7. Test graph

[Test mode : FM transmitter mode]



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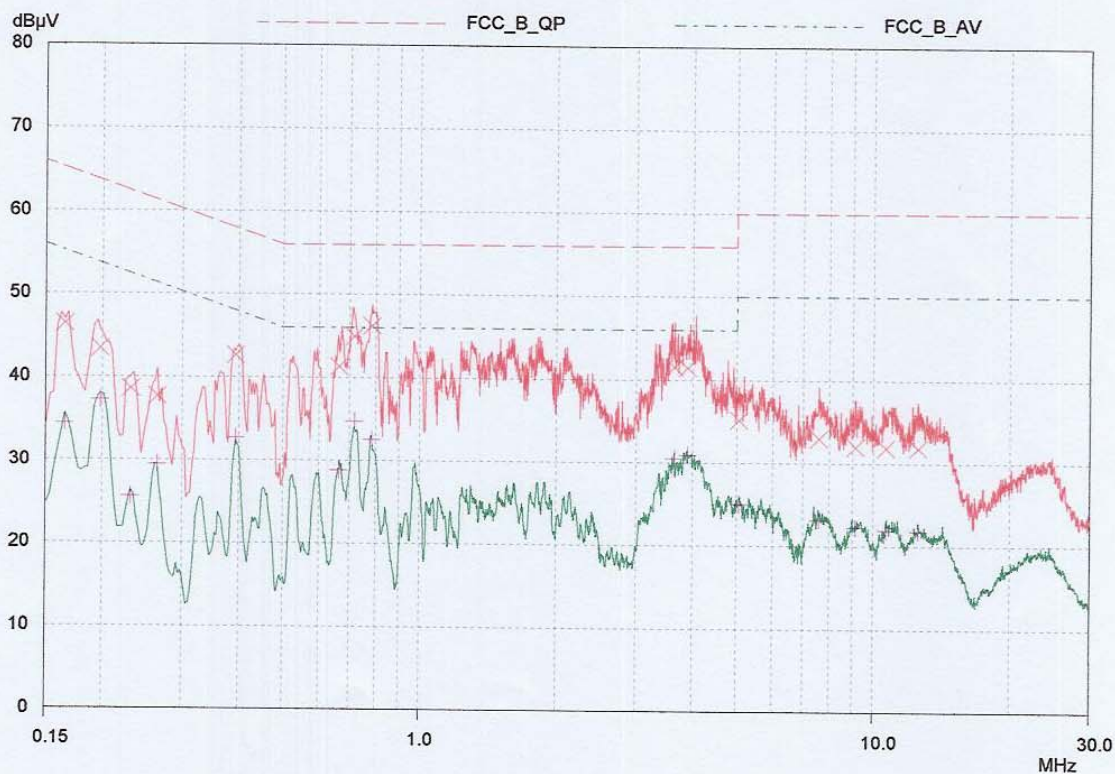
EUT: YP-910
Manuf: SAMSUNG
Op Cond: NEUTRAL
Operator:
Test Spec: FCC Class B Conducted Emission
Comment: FM

Result File: YP-910_n.dat : YP-910_MP3 PLAYER_NEUTRAL

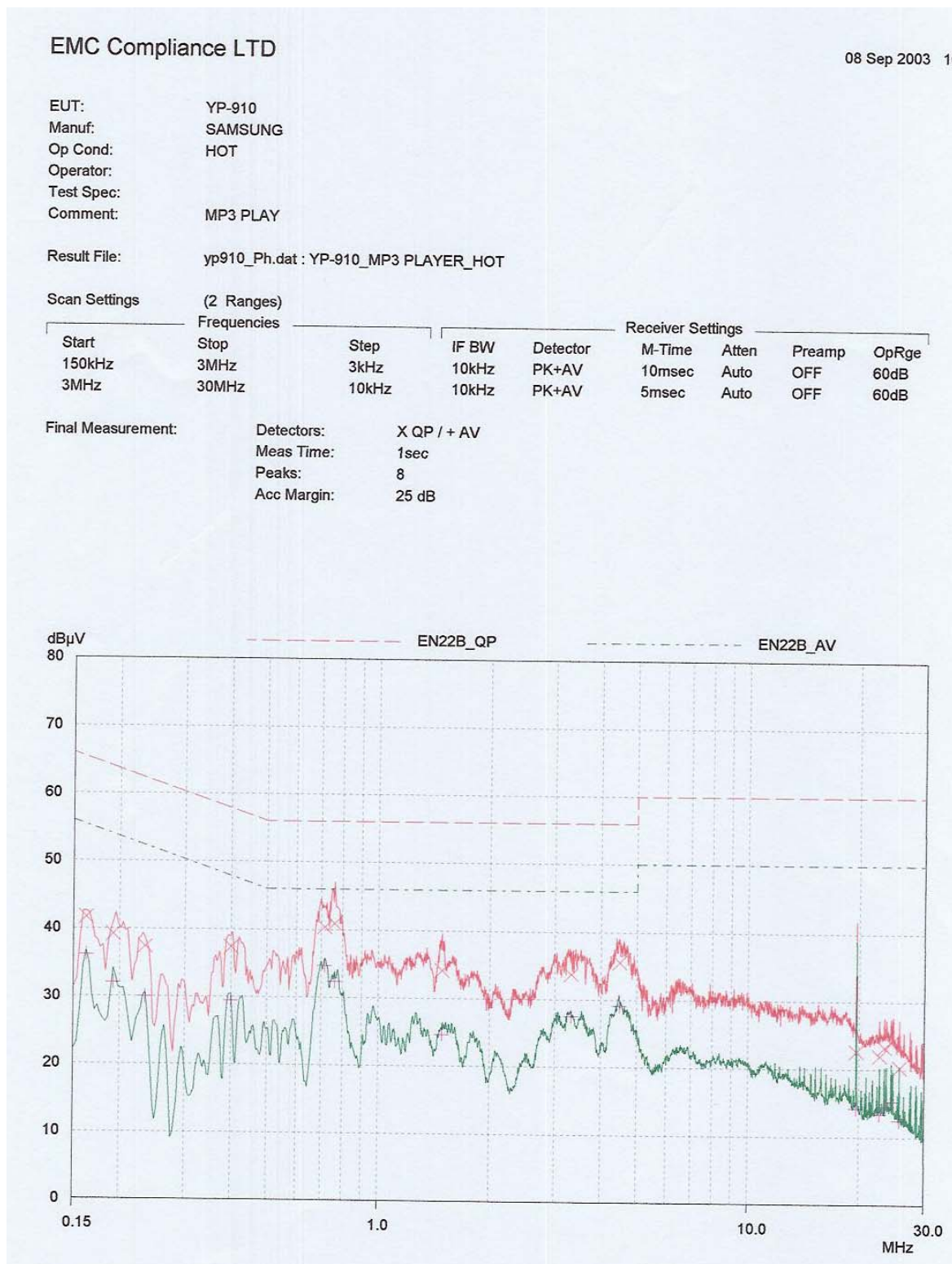
Scan Settings (2 Ranges)

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



[Test mode : Data Up/download mode]



EMC Compliance LTD

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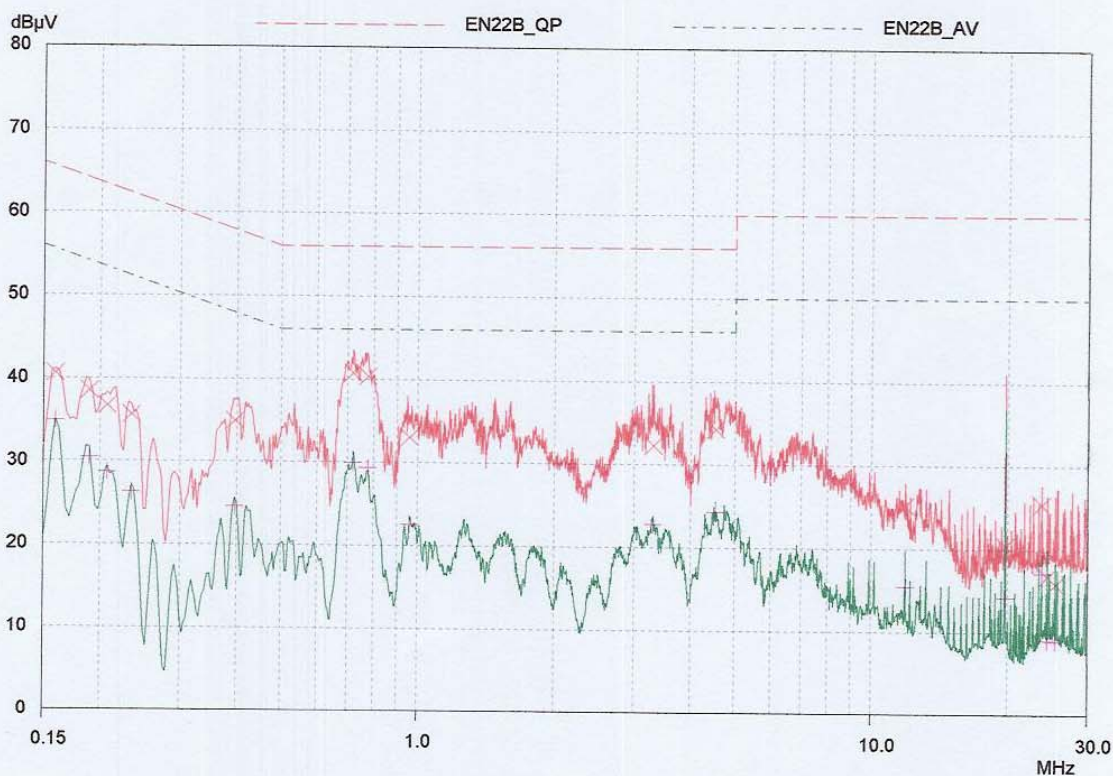
EUT: YP-910
Manuf: SAMSUNG
Op Cond: NEUTRAL
Operator:
Test Spec:
Comment: MP3 PLAY

Result File: yp910_Pn.dat : YP-910_MP3 PLAYER_NEUTRAL

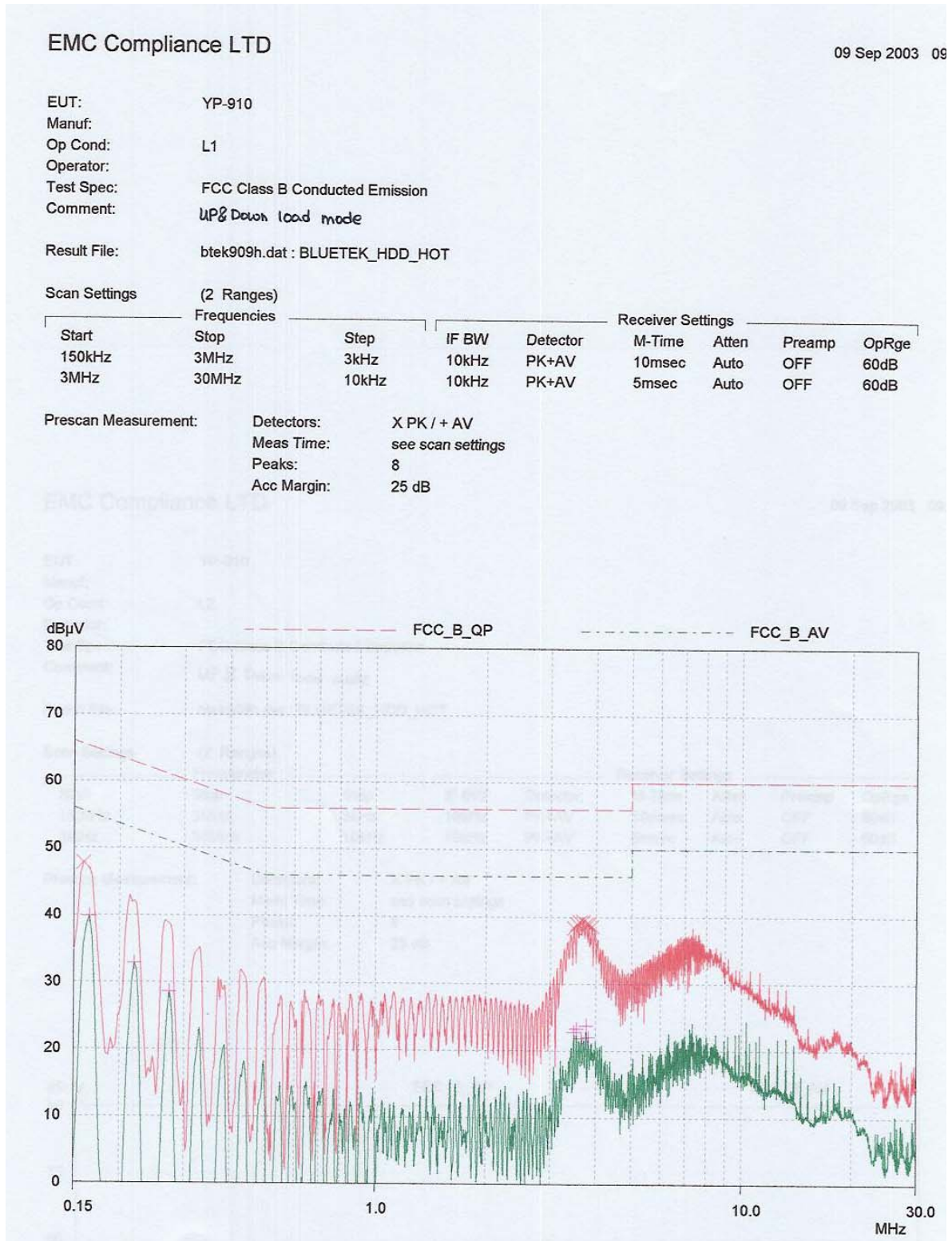
Scan Settings (2 Ranges)

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



[Test mode : MP3 play mode]



EMC Compliance LTD

09 Sep 2003 09

EUT: YP-910
 Manuf:
 Op Cond: L2
 Operator:
 Test Spec: FCC Class B Conducted Emission
 Comment: UP & Down load mode
 Result File: btek909h.dat : BLUETEK_HDD_HOT

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

Prescan Measurement: Detectors: X PK / + AV
 Meas Time: see scan settings
 Peaks: 8
 Acc Margin: 25 dB

