FCC EVALUATION REPORT FOR CERTIFICATION

Applicant : VANNS Tech Co., Ltd.
#307, Inno Plaza, GERI, 1-1L, 13B, Gumi National Industrial Zone 4th Bongsan-ri, Sandong-myeon, Gumi-si, Gyeongsangbuk-do, Republic of Korea
Attn: Mr. Sang-Yun Ban / CTO

Date of Issue : September 7, 2009
Order Number: GETEC-C1-09-189
Test Report Number: GETEC-E3-09-106
Test Site: Gumi College EMC Center
FCC Registration Number: (100749)

FCC ID.: WS4VTUF-MP3S

Applicant: VANNS Tech Co., Ltd.

Rule Part(s)	**: FCC Part 15 Subpart B**
Equipment Class	**: Class B computing device peripheral (JBP)**
EUT Type	**: MP3 player flat panel mobile speaker**
Type of Authority	**: Certification**
Model Name	**: VTUF-MP3S**
Trade Name	**: UFO**

This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the vest of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested by,

Jae-Hoon Jeong, Senior Engineer
GUMI College EMC center

Reviewed by,

Tae-Sig Park, Technical Manager
GUMI College EMC center

CONTENTS

Scope: *Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and / or unintentional radiators for compliance with technical rules and regulations of the Federal Communications Commission.*

1. General Information

Applicant: VANNS Tech Co., Ltd.
Applicant Address: #307, Inno Plaza, GERI, 1-1L, 13B, Gumi National Industrial Zone 4th Bongsan-ri, Sandong-myeon, Gumi-si, Gyeongsangbuk-do, Republic of Korea.
Manufacturer: VANNS Tech Co., Ltd.
Manufacturer Address: #307, Inno Plaza, GERI, 1-1L, 13B, Gumi National Industrial Zone 4th Bongsan-ri, Sandong-myeon, Gumi-si, Gyeongsangbuk-do, Republic of Korea.
Contact Person: Mr. Sang-Yun Ban/ CTO
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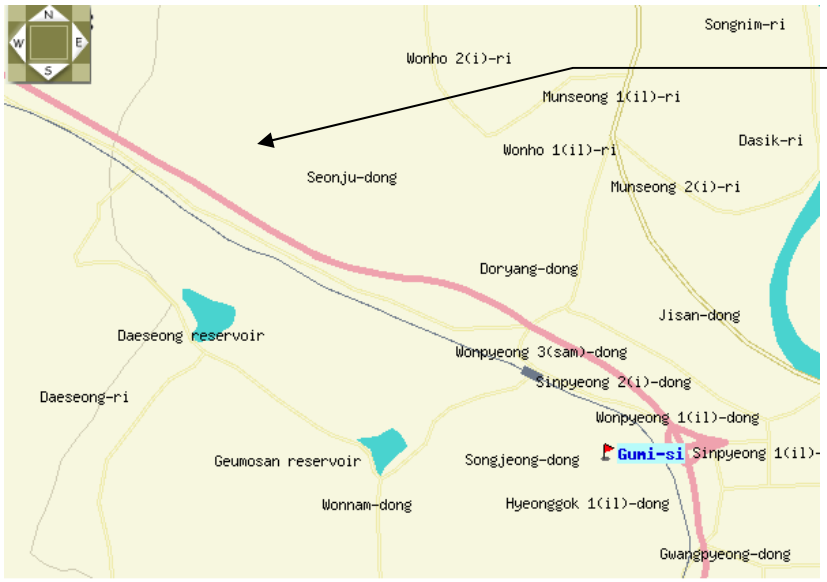
FCC ID.	WS4VTUF-MP3S
EUT Type	MP3 Player flat panel mobile speaker
Model Name	VTUF-MP3S
Trade Name	UFO
Serial Number	Prototype
Rule Part(s)	FCC Part 15 Subpart B
Type of Authority	Certification
Test Procedure(s)	ANSI C63.4 (2003)
Dates of Test	August 21, 2009
Place of Test	**Gumi College EMC Center** (FCC Registration Number: 100749) 407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.
Test Report Number	GETEC-E3-09-106
Dates of Issue	September 7, 2009

2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ASNI C63.4-2003) was used in determining radiated and conducted emissions emanating from **VANNS Tech Co., Ltd. MP3 player flat panel mobile speaker (Model Name: VTUF-MP3S)**

These measurement tests were conducted at **Gumi College EMC Center**.
The site address is 407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.
This test site is one of the highest point of Gumi 1 college at about 200 km away from Seoul city and 40 km away from Daegu city. It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures. The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.4 on October 19, 1992



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407, Bugok-dong, Gumi-si,
Gyeongbuk 730-711, Korea.
Tel: +82-54-440-1195
Fax: +82-54-440-1199

Fig 1. The map above shows the Gumi College in vicinity area.

3. Product Information

3.1 Description of EUT

The Equipment under Test (EUT) is the **VANNS Tech Co., Ltd. MP3 player flat panel mobile speaker (Model Name: VTUF-MP3S) FCC ID.: WS4VTUF-MP3S**

Memory	: 512 MB ~ 4 GB
Supported file type	: MP3- 64 kbps ~ 320 Kbps , WMA, ASF- 32 kbps ~ 334 kbps WAV- Sample frequency 44.1 kHz, OGG
Window system support	: WINDOWS2000, WINDOW XP, VISTA
Output	: Max 2 W (mix stereo)
Output frequency range	: 20 Hz ~ 20 kHz
Size	: 90 mm * 42 mm
Weight	: 130 g
Charging time	: 2 Hour
Battery	: DC 3.7 V, 500 mA, Lithium polymer
Play time	: External speaker mode- 5 Hours [Volume 25/ MP3 128 kbps] Earphone mode- 15 Hours [Volume 15/ MP3 128 kbps]
Highest Frequency (Used in the device)	: 24 MHz

3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID
Notebook PC	SAMSUNG	NT-Q45	S/N: CNBA4300168AI00682D5800 FCC ID: DoC
Notebook PC adapter	DELTA ELECTRONICS INC.	ADP-60ZH A	S/N:CNBA4400243ABZ0483B0683 FCC ID: N/A
USB mouse	SAMSUNG	M-U48a	S/N:LZA04870121 FCC ID: N/A
Earphone	SAMSUNG	EP-370	S/N: N/A FCC ID: DoC

See "Appendix D – Test Setup Photographs" for actual system test set-up

3.2.2 Used Cable(s)

Cable Name	Condition	Description
24 pin USB cable	Connected to the EUT and Notebook PC	1.8 m shielded with two ferrite cores
Earphone	Connected to the EUT and Earphone	0.5 m unshielded
Audio	Connected to the EUT and Notebook PC	1.2 m unshielded

3.3 Modification Item(s)

- None

4. Description of tests

4.1 Test Condition

The EUT was installed, arranged and operated in a manner that is most representative of equipment as typically used. The measurements were carried out while varying operating modes and cable positions within typically arrangement to determine maximum emission level.
The representative and worst test mode(s) were noted in the test report.

- Test Voltage / Frequency : AC 120 V / 60 Hz (Battery DC 3.7 V, 500 mA)

- Test Mode(s)

  -. Download mode & charging mode
  : Operated data downloading-erasing at internal flash memory with an EMC software and charging mode with connected to the USB port of the PC simultaneously.

  -. Play mode
  : Continuous playback of 1 kHz audio file.

4.2 Conducted Emission

The Line conducted emission test facility is inside a 4 m × 8 m × 2.5 m shielded enclosure.
The EUT was placed on a non-conducting 1.0 m by 1.5 m table, which is 0.8 m in height and 0.4 m away from the vertical wall of the shielded enclosure.
The EUT is powered from the Rohde & Schwarz LISN (ESH2-Z5) and the support equipment is powered from the Rohde & Schwarz LISN (ESH3-Z5). Powers to the LISN are filtered by high-current high insertion loss power line filter.
Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.
The RF output of the LISN was connected to the EMI test receiver (Rohde & Schwarz, ESCS30).
The EMI test receiver was scanned from 150 kHz to 30 MHz with 20 ms sweep time to determine the frequency producing the maximum EME from the EUT. The frequency producing the maximum level was re-examined using Quasi-Peak mode of the EMI test receiver.
The bandwidth of Quasi-peak mode was set to 9 kHz. Each emission was maximized consistent with typical applications by varying the configuration of the test sample. Interface cables were connected to the available interface ports of the test unit. The effect of varying the position of cables was investigated to find the configuration that produces maximum diagram emission. Excess cable lengths were bundled at center with 30 cm ~ 40 cm.
Each EME reported was calibrated using the R/S signal generator

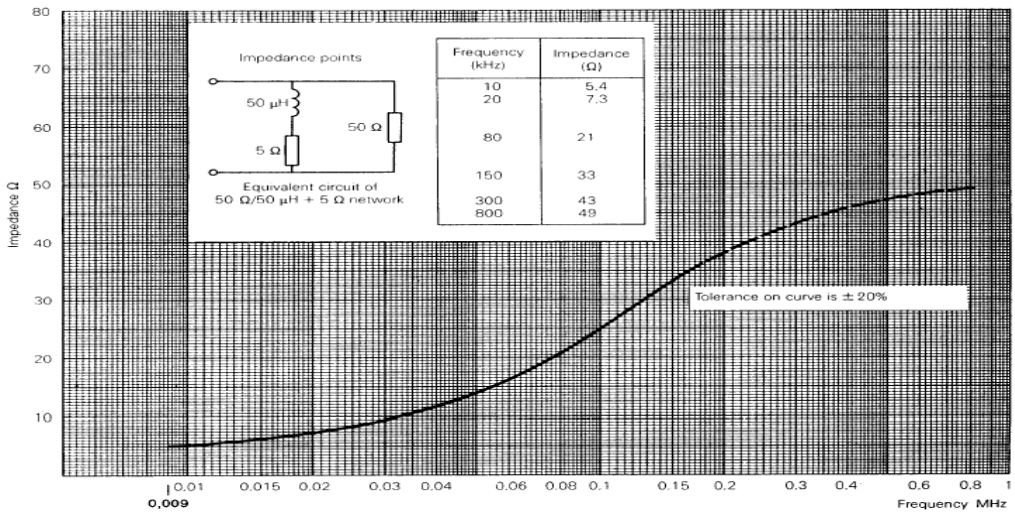


Fig 2. Impedance of LISN

4.3 Radiated Emission

Preliminary measurements were conducted 3 m semi anechoic chamber using broadband antennas to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The technology configuration, mode of operation and turntable azimuth with respect to antenna was note for each frequency found.

The spectrum was scanned from 30 MHz to 1 000 MHz using bicornical log antenna (Schwarzbeck, VULB9160). Above 1 GHz, horn antenna (Schwarzbeck, BBHA9120D) was used.

Final measurements were made outdoors at 3 m /10 m test range.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during pre-scan measurements was re-examined and investigated using EMI test receiver. The detector function was set to CISPR quasi-peak mode average mode and the bandwidth of the receiver was set to 120 kHz or 1 MHz depending on the frequency or type of signal.

The EUT, support equipment and interconnecting cables were reconfigured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8 m high non-metallic 1.0 m × 1.5 m table.

The turntable containing the test sample was rotated; the antenna height was varied 1 to 4 meter and stopped at the azimuth or height producing the maximum emission.

Each EME reported was calibrated using the R/S signal generator

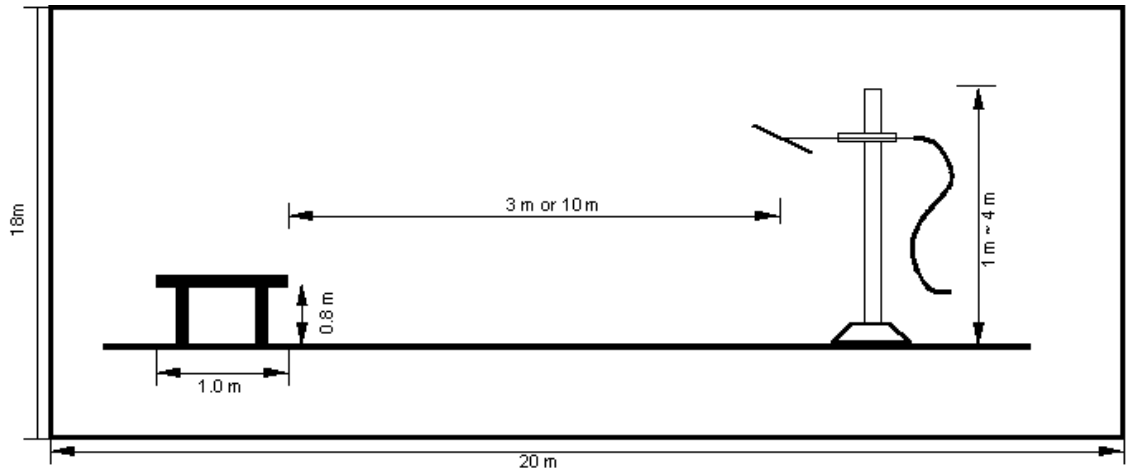


Fig 3. Dimensions of Open Site Test Area

5. Conducted Emission

5.1 Operating Environment

Temperature : 26 ℃
Relative Humidity : 62 % R.H.

5.2 Test Set-up

The conducted emission measurements were performed in the shielded room.
The EUT was placed on wooden table, 0.8 m heights above the floor, 0.4 m from the reference ground plane (GRP) wall and 0.8 m from AMN.
AMN is bonded on horizontal reference ground plane.
The ground plane, which was electrically bonded to the shield room, ground system and all power lines entering the shield room, were filtered.

5.3 Measurement Uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement.”
The measurement uncertainty was given with a confidence of 95 %.

Test Items	Uncertainty	Remark
Conducted emission (9 kHz ~ 150 kHz)	± 2.97 dB	Confidence levels of 95 % (k=2)
Conducted emission (150 kHz ~ 30 MHz)	± 4.05 dB	Confidence levels of 95 % (k=2)

5.4 Limit

RFI Conducted	FCC Limit(dB) Class B	
Freq. Range	Quasi-Peak	Average
150 kHz ~ 0.5 MHz	66 ~ 56*	56 ~ 46*
0.5 MHz ~ 5 MHz	56	46
5 MHz ~ 30 MHz	60	50
*Limits decreases linearly with the logarithm of frequency.		

5.5 Test Equipment used

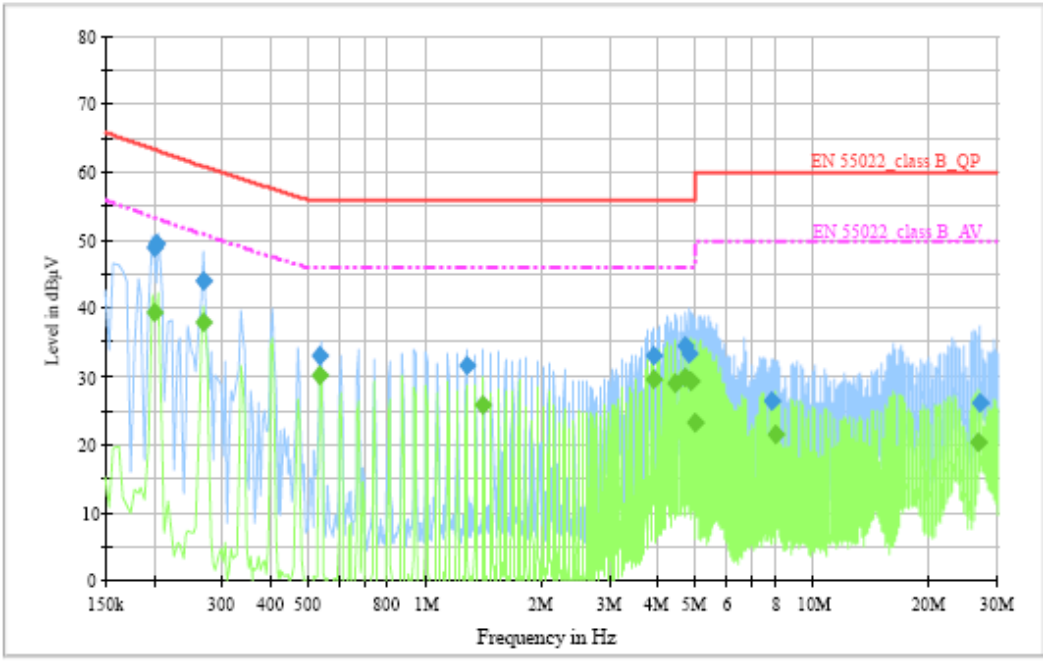
	Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ -	ESCS30	Rohde & Schwarz	EMI test receiver	839809/003	12. 13. 2009
■ -	ESH3-Z5	Rohde & Schwarz	LISN	838979/020	12. 12. 2009
☐ -	ESH2-Z5	Rohde & Schwarz	LISN	829991/009	12. 12. 2009
☐ -	ISN T8	TESEQ. GmbH	ISN	24568	10. 16. 2009

5.6 Test data for Conducted Emission

-. Test Date : August 21, 2009
-. Resolution Bandwidth : 9 kHz
-. Frequency Range : 0.15 MHz ~ 30 MHz

♦ **Operating condition: Download mode**

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

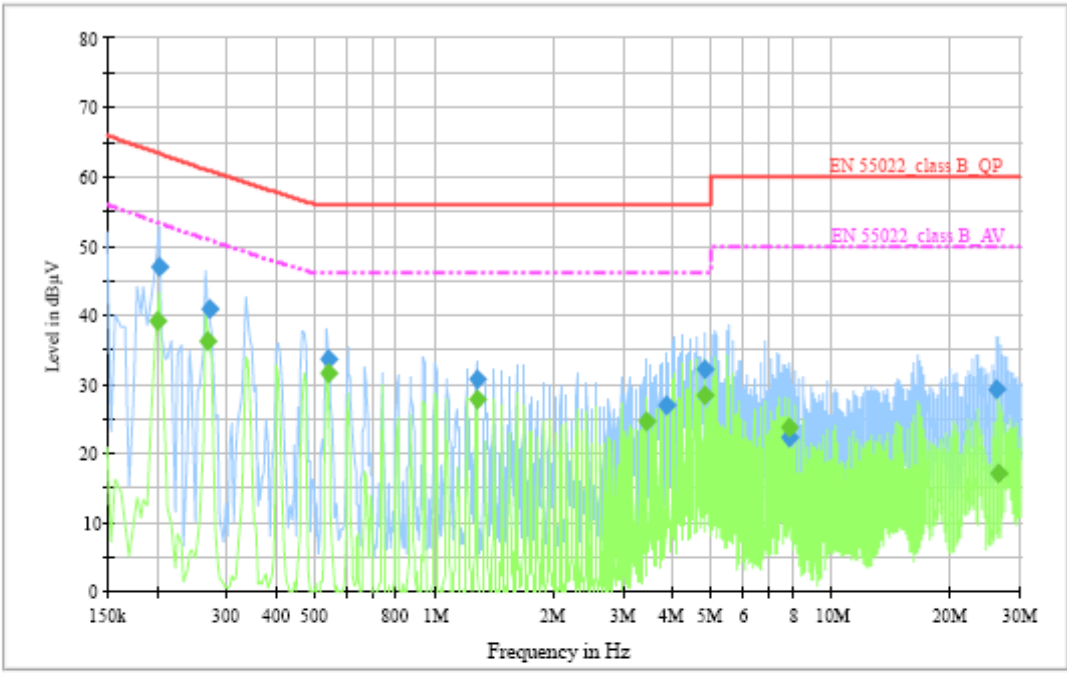
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.200000	49.0	1000.000	9.000	GND	L1	9.9	14.5	63.5	
0.202000	49.6	1000.000	9.000	GND	L1	9.9	13.8	63.4	
0.268000	44.0	1000.000	9.000	GND	L1	10.0	17.0	61.0	
0.536000	33.1	1000.000	9.000	GND	L1	10.0	22.9	56.0	
1.280000	31.6	1000.000	9.000	GND	L1	10.0	24.4	56.0	
3.904000	33.1	1000.000	9.000	GND	L1	10.2	22.9	56.0	
4.712000	34.5	1000.000	9.000	GND	L1	10.2	21.5	56.0	
4.784000	33.2	1000.000	9.000	GND	L1	10.2	22.8	56.0	
7.816000	26.3	1000.000	9.000	GND	L1	10.3	33.7	60.0	
27.108000	26.0	1000.000	9.000	GND	L1	11.0	34.0	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.200000	39.5	1000.000	9.000	GND	L1	9.9	13.9	53.4	
0.268000	37.8	1000.000	9.000	GND	L1	10.0	13.1	50.9	
0.536000	30.3	1000.000	9.000	GND	L1	10.0	15.7	46.0	
1.412000	25.9	1000.000	9.000	GND	L1	10.0	20.1	46.0	
3.908000	29.5	1000.000	9.000	GND	L1	10.2	16.5	46.0	
4.448000	28.8	1000.000	9.000	GND	L1	10.2	17.2	46.0	
4.712000	29.7	1000.000	9.000	GND	L1	10.2	16.3	46.0	
4.848000	29.2	1000.000	9.000	GND	L1	10.2	16.8	46.0	
4.988000	23.2	1000.000	9.000	GND	L1	10.2	22.8	46.0	
8.016000	21.5	1000.000	9.000	GND	L1	10.3	28.5	50.0	
26.740000	20.3	1000.000	9.000	GND	L1	11.0	29.7	50.0	

< Fig 4. Conducted emission result (Live line)>

Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.204000	47.1	1000.000	9.000	GND	N	9.9	16.2	63.3	
0.272000	40.9	1000.000	9.000	GND	N	10.0	20.0	60.9	
0.540000	33.6	1000.000	9.000	GND	N	10.0	22.4	56.0	
1.280000	30.7	1000.000	9.000	GND	N	10.0	25.3	56.0	
3.840000	26.9	1000.000	9.000	GND	N	10.2	29.1	56.0	
4.776000	32.1	1000.000	9.000	GND	N	10.2	23.9	56.0	
7.816000	22.2	1000.000	9.000	GND	N	10.3	37.8	60.0	
26.188000	29.4	1000.000	9.000	GND	N	10.8	30.6	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.200000	39.3	1000.000	9.000	GND	N	9.9	14.1	53.4	
0.268000	36.3	1000.000	9.000	GND	N	10.0	14.6	50.9	
0.540000	31.6	1000.000	9.000	GND	N	10.0	14.4	46.0	
1.280000	27.8	1000.000	9.000	GND	N	10.0	18.2	46.0	
3.432000	24.6	1000.000	9.000	GND	N	10.1	21.4	46.0	
4.776000	28.5	1000.000	9.000	GND	N	10.2	17.5	46.0	
7.804000	23.8	1000.000	9.000	GND	N	10.3	26.2	50.0	
26.508000	17.0	1000.000	9.000	GND	N	10.8	33.0	50.0	

< Fig 5. Conducted emission result (Neutral line)>

6. Radiated Emission

6.1 Operating Environment

Temperature : 29 ℃
Relative Humidity : 56 % R.H.

6.2 Test Set-up

A preliminary scan with peak mode was performed in the semi anechoic chamber and found frequency for open area test site.
The formal radiated emission was measured at 3 m / 10 m distance open area 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.

6.3 Measurement Uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement”.
The measurement uncertainty was given with a confidence of 95 %.

Test Items	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 3 m, Vertical)	± 3.54 dB	Confidence levels of 95 % (k=2)
Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)	± 3.49 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)	± 3.85 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal)	± 3.76 dB	Confidence levels of 95 % (k=2)
Radiated emission (30 MHz ~ 300 MHz, 10 m, Vertical)	± 3.21 dB	Confidence levels of 95 % (k=2)
Radiated emission (30 MHz ~ 300 MHz, 10 m, Horizontal)	± 3.32 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Vertical)	± 3.77 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Horizontal)	± 3.84 dB	Confidence levels of 95 % (k=2)

6.4 Limit

Frequency (MHz)	FCC Limit @ 3 m. dB μV/m	CISPR Limit @ 10 m. dB μV/m
30 ~ 88	40.0	30.0
88 ~ 216	43.5	30.0
216 ~ 230	46.0	30.0
230 ~ 960	46.0	37.0
960 ~ 1 000	54.0	37.0
> 1 000	54.0	No Specified limit

6.5 Test Equipment used

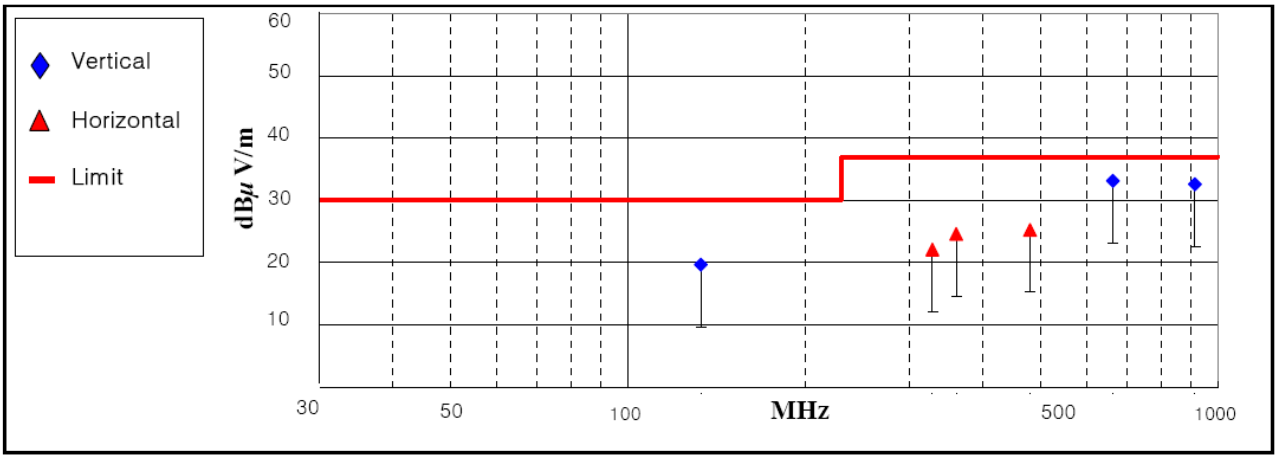
	Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ -	ESCS30	Rohde & Schwarz	EMI test receiver	839809/003	12. 13. 2009
■ -	HK116	Rohde & Schwarz	Biconical ANT	832639/007	12. 28. 2009
■ -	HL223	Rohde & Schwarz	Log-periodic antenna	835998/004	12. 28. 2009
□ -	BBHA9120D	Schwarzbeck	Horn ANT	207	12. 26. 2009
■ -	HD100	HD GmbH	Position Controller	100/692/01	N/A
■ -	DS415S	HD GmbH	Turntable	415/657/01	N/A
■ -	MA240	HD GmbH	Antenna Mast	240/565/01	N/A
□ -	AFS 44 00101800-25-10P-44	MITEQ	Preamplifier	1258943	11. 11. 2009

6.6 Test data for Radiated Emission

-. Test Date : August 21, 2009
-. Resolution bandwidth : 120 kHz
-. Frequency range : 30 MHz ~ 1 000 MHz
-. Measurement distance : 10 m
-. Note : The highest frequency of the internal source of the EUT is less than 108 MHz; the measurement shall only be made up to 1GHz.

♦ Operating Condition: Download mode & charging mode
Detector mode: Quasi- peak detector mode

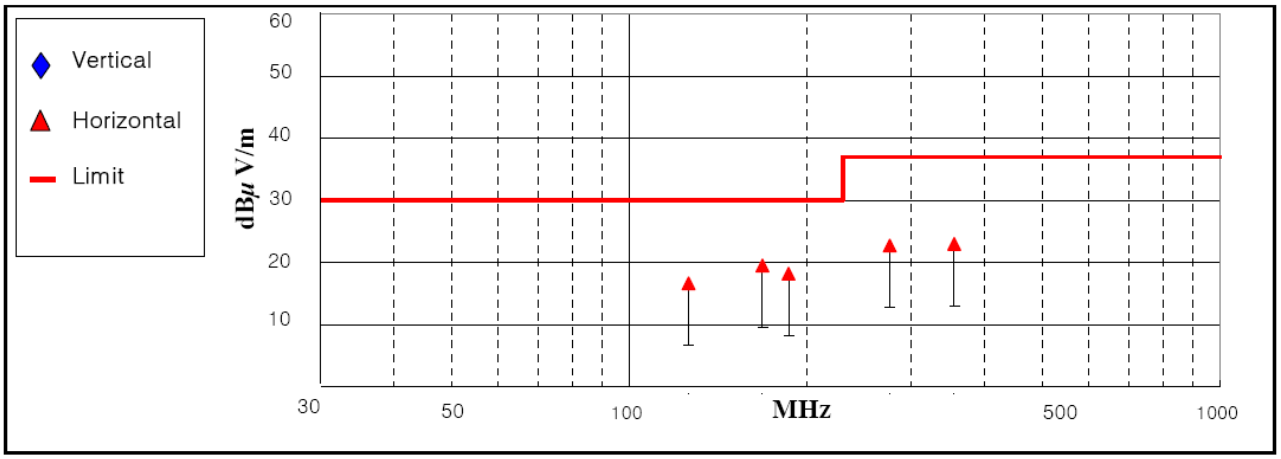
Frequency (MHz)	Measurement Level				Limit (dBμV/m)	Margin (dB)	Positioning System		
	Reading Value(dBμV)	Antenna Factor(dB/m)	Cable Loss(dB)	Test Result (dBμV/m)			Pol. (H/V)	Height (cm)	Angle (°)
132.85	5.21	11.03	3.42	19.66	30.00	10.34	V	140	240
328.07	1.96	13.59	6.57	22.12	37.00	14.88	H	103	102
360.03	2.56	14.52	7.54	24.62	37.00	12.38	H	100	31
480.05	1.21	16.74	7.28	25.23	37.00	11.77	H	111	192
663.91	5.48	19.70	7.97	33.15	37.00	3.85	V	105	133
914.35	1.25	21.72	9.61	32.58	37.00	4.42	V	202	282



< Fig 6. Radiated emission result (30 MHz ~ 1 000 MHz)>

♦ Operating Condition: Play mode
Detector mode: Quasi- peak detector mode

Frequency (MHz)	Measurement Level				Limit (dBμV/m)	Margin (dB)	Positioning System		
	Reading Value(dBμV)	Antenna Factor(dB/m)	Cable Loss(dB)	Test Result (dBμV/m)			Pol. (H/V)	Height (cm)	Angle (°)
125.99	2.47	10.87	3.31	16.65	30.00	13.35	H	201	110
168.01	3.41	12.33	3.82	19.56	30.00	10.44	H	216	95
186.11	1.15	13.01	4.06	18.22	30.00	11.78	H	205	90
276.05	1.29	16.29	5.18	22.76	37.00	14.24	H	110	276
354.77	1.19	14.39	7.43	23.01	37.00	13.99	H	117	160



< Fig 7. Radiated emission result (30 MHz ~ 1 000 MHz)>

7. Sample Calculations

$$dB\mu V = 20 \text{ Log }_{10}(\mu V/m)$$
$$dB\mu V = dBm + 107$$
$$\mu V = 10^{(dB\mu V/20)}$$

7.1 Example 1 :

■ **20.3 MHz**

Class B Limit	**= 250 μV = 48 dBμV**
Reading	**= 39.2 dBμV**
$10^{(39.2dB\mu V/20)}$	**= 91.2 μV**
Margin	**= 48 dBμV - 39.2 dBμV**
	= 8.8 dB

7.2 Example 2 :

■ **66.7 MHz**

Class B Limit	**= 100 μV/m = 40.0 dBμV/m**
Reading	**= 31.0 dBμV**
Antenna Factor + Cable Loss = 5.8 dB	
Total	**= 36.8 dBμV/m**
Margin	**= 40.0 dBμV/m – 36.8 dBμV/m**
	= 3.2 dB

8. Recommendation & Conclusion

The data collected shows that the **VANNS Tech Co., Ltd. MP3 Player flat panel mobile speaker (Model Name: VTUF-MP3S)** was complies with §15.107 and 15.109 of the FCC Rules.