



Electromagnetic Emission

FCC MEASUREMENT REPORT

CERTIFICATION OF COMPLIANCE FCC PART15 CERTIFICATION

PRODUCT : Wireless Microphone
MODEL/TYPE NO : EX3800TX
FCC ID : PBNEX3800TX
TRADE NAME : ENTER TECH

APPLICANT : ENTER TECH CO., LTD.
Samhwa Bldg. 401-5, Hwagok-7dong, Gangseo-gu,
Seoul, 157-887, Korea
Attn. : S. H. Yoo / Director of Research Dept.

FCC CLASSIFICATION : DXX Part 15 Low Power Communication Device Transmitter
FCC RULE PART(S) : FCC Part 15 Subpart C Section 15.249
FCC PROCEDURE : Certification
DATES OF TEST : August 20 ~25, 2003
DATES OF ISSUE : September 25, 2003
TEST REPORT No. : BWS-03-RF-0014
TEST LAB. : BWS Tech., Inc. (Registration No. : 553281)

This Wireless Microphone EX3800TX has been tested in accordance with the measurement procedures specified in ANSI C63.4-2000 at the BWS TECH/EMC Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part15 Subpart C Section15.249

I attest to the accuracy of data. All measurement herein was performed by me or were made under my supervision and are correct to the best 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. 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.

K.Young Kim
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FCC TEST REPORT

Scope – Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)

1. General Information

Applicant

Company Name : ENTER TECH Co., Ltd.
Company Address : Samhwa Bldg. 401-5, Hwagok-7dong, Gangseo-gu, Seoul, 157-887, Korea
Phone/Fax : Phone : +82-2-2605-0884 Fax : +82-2-2691-5354

Manufacturer

Company Name : ENTER TECH Co., Ltd.
Company Address : 156-7, Ojeong-dong, Ojeong-gu, Bucheon-si, Kyunggi-do, 421-814, Korea.
Phone/Fax : Phone : +82-32-673-1671 Fax : +82-32-673-0868

- **EUT Type** : Wireless Microphone
- **Model Number** : EX3800TX
- **FCC Identifier** : PBNEX3800TX
- **S/N** : Prototype
- **Freq. Range** : 902.8 MHz ~ 906.4 MHz
- **Channel** : 902.8 / 903.2 / 903.6 / 904.0 / 904.4 / 904.8 / 905.2 / 905.6 / 906.0 / 906.4 MHz (10ch)
- **Modulation Method** : FM
- **RF Power Output** : 10 mW
- **FCC Classification** : DXX : Part 15 Low Power Communication Device Transmitter
- **FCC Rule Part(s)** : Part 15 Subpart C Section 15.249
- **Test Procedure** : ANSI C63.4-2000
- **Dates of Tests** : August 20 ~ 25, 2003
- **Place of Tests** : BWS TECH Inc.
EMC Testing Lab (FCC Registration Number : 553281)
294-9, Jungdae-Dong, Kwangju-Si,
Kyunggi-Do, 464-080, Korea
TEL: +82 31 762 0124 FAX: +82 31 762 0126
- **Test Report No.** : BWS-03-RF-0014

2. Description of Test Facility

The measurement test for radiated and conducted emission test were conducted at the open area test site of BWS TECH Inc. facility located at 294-9, Jungdae-Dong, Kwangju-Si, Kyunggi-Do, Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-2000 and CISPR Publication 16. The BWS TECH measurement facility has been filed to the Commission with the FCC for 3 and 10-meter site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-1992 and registered to the Federal Communications Commission (Registration Number : 553281).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C.63.4-2000) was used in determining radiated and conducted emissions from the Enter Tech Co., Ltd. 900 MHz Wireless Microphone Model : EX3800TX.

3. Product Information

3.1 Equipment Description

The Equipment Under Test (EUT) is the Enter Tech Co., Ltd. 900MHz Wireless Microphone Transmitter model: X3800TX(FCC ID: PBNEX3800TX). The transmitter modulate an external audio signal from the mic by using the FM modulation and transmit 900MHz carrier to the receiver.

The power is supplied from the internal battery(Two 1.5V AA size).

3.2 General Specification

- TX Carrier Freq.	902.8 MHz ~ 906.4 MHz
- No. of Channel	10 Ch
- Channel Spacing	400 kHz
- RF Output Power	10 mW
- Freq. Stability	$\pm 50\text{ppm}(-10^{\circ} \sim +50^{\circ})$
- Modulation method	FM
- Power Requirement	DC 3.0V (1.5V AA Battery x 2)

4. Description of Tests

4.1 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with section 11, "Measurement of Information Technology Equipment" of ANSI C63.4-2000. The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50 Ω /50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" within a bandwidth of 9KHz.

The line-conducted emission test is conducted inside a shielded anechoic chamber room with 1m x 1.5m x 0.8m wooden table, which is placed 40cm away from the vertical wall, and 1.5m away from the sidewall of the chamber room. Two LISNs are bonded to the shielded room. The EUT is powered from the PMM LISN and the support equipment is powered from the another Koritsu LISN. Power to the LISNs is filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and these supply lines will be connected to the EMCO LISN. All interconnecting cables more than 1m were shortened by non-inductive bundling (serpentine fashion) to a 1m length. Sufficient time for the 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 R3261A Spectrum Analyzer to determine the frequency producing the max. Emission from the EUT. The frequency producing the max. Level was reexamined using the detector function set to the CISPR Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0.45 to 30MHz. The bandwidth of the Spectrum Analyzer was set to 9KHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was maximized by switching power lines, varying the mode of operation or resolution, clock or data exchange speed, if applicable, whichever determined the worst-case emission. Each emission reported was calibrated using self-calibrating mode.

Photographs of the worst-case emission can be seen in photographs of conducted emission test setup.

4.2 Radiated Emission Measurement

Preliminary measurements were made at indoors 3meter semi EMC Anechoic Chamber using broadband antennas, broadband amplifier, and spectrum analyzer to determine the emission frequencies producing the maximum EME.

Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configurations, mode of operation, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 1000MHz using biconilog antenna and above 1000MHz, linearly polarized double ridge horn antennas were used. Above 1GHz, linearly polarized double ridge horn antennas were used. The measurements were performed with three frequencies, which were selected as bottom, middle, and top frequency in the operating band. Emission level from the EUT with various configurations was examined on the spectrum analyzer connected with the RF amplifier and plotted graphically.

Final measurements were made outdoors open site at 3-meter test range using biconical and log periodic, Horn antenna. The output from the antenna was connected, via a preselector or a preamplifier, to the input of the EMI Measuring Receiver and Spectrum analyzer (for above 25GHz). The detector function was set to the quasi-peak or peak mode as appropriate. The measurement bandwidth on the Field strength receiver was set to at least 120kHz (1MHz for measurement above 1GHz), with all post-detector filtering no less than 10 times the measurement bandwidth. 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 preliminary measurement was examined and investigated as the same set up and configuration which produced the maximum emission The EUT, support equipment and interconnecting cables were configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1m x 1.5 meter table. The turntable containing the system was rotated and the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission.

Varying the mode of operating frequencies of the EUT maximized each emission. The system was tested in all the three orthogonal planes and changing the polarity of the antenna. The worst-case emissions are recorded in the data tables. If necessary, the radiated emission measurement could be performed at a closer distance to ensure higher accuracy and the results were extrapolated to the specified distance using an inverse linear distance extrapolation factor (20dB/decade) as per section 15.31(f).

Photographs of the worst-case emission test setup can be seen in Appendix A.

5. Test Condition

5.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the EUT and the supported equipments were installed to meet FCC requirement and operated in a manner, which tends to maximize its emission level in a typical application.

Radiated Emission Test

Preliminary radiated emission tests were conducted using the procedure in ANSI C63.4/2000 Clause 8.3.1.1 to determine the worst operating condition. Final radiated emission tests were conducted at 3-meter open field test site. To complete the test configuration required by the FCC, the EUT was tested in all three orthogonal planes. All testing was performed with internal battery.

5.2 EUT operation

The EUT was set to the normal transmitting mode in the operating band (Low, Mid, High) with internal audio signal source during all the testing in a manner similar to a typical use.

6. TEST RESULTS

6.1 Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

FCC Rule Parts	Measurement Required	Result
15.207	Conducted Emission	☐ Pass ☐ Fail ☒ n/a
15.249(a)	Radiated Emissions of Carrier Frequency	☒ Pass ☐ Fail ☐ n/a
15.249(a)	Radiated Emissions of Carrier Harmonics	☒ Pass ☐ Fail ☐ n/a
15.249(d)/15.209	Out-of-Band Radiated Emissions	☒ Pass ☐ Fail ☐ n/a

The data collected shows that the Enter Tech Co., Ltd. 900MHz Wireless Microphone transmitter **EX3800TX** complies with technical requirements of the Part 15.207, 15,209 and 15.249 of the FCC Rules.

Note : Modification to EUT

The device tested is not modified anything, mechanical or circuits to improve EMI status during a measurement. No EMI suppression device(s) was added and/or modified during testing.

EUT : 900MHz Wireless Microphone EX3800TX
Limit apply to : FCC Part15 Subpart C Section 15.207
Test Date :
Operating Condition :
Environment Condition : Humidity Level : 37 %RH, Temperature : 15°C
Result : ☐ Pass ☐ Fail ☒ n/a

Tabulated Conducted Emission Test Data

Freq [MHz]	Correcton		Phase [H/N]	Quasi-Peak Mode			Average Mode		
	AMN	C.L		Limit	Reading	Emission Level	Limit	Reading	Emission Level
				[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
				56.00			46.00		
				60.00			50.00		

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6.3 Radiated Emissions of RF Carrier frequency

EUT : 900MHz Wireless Microphone EX3800TX
Limit apply to : FCC Part15 Subpart C Section 15.249(a)
Test Date : August 20, 2003
Operating Condition : RF transmit
Environment Condition : Humidity Level : 37 %RH, Temperature : 15°C
Result : Passed by - 3.28 dB

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Measurement Distance : 3 meters

Detector mode : Peak mode

Freq. [GHz]	Reading [dBμV]	ANT.Pol. [H/V]	Ant. Factor [dB]	Cable Loss [dB]	Pre-amp. [dB]	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin
902.8	61.42	H	23.4	5.83	0.0	90.65	93.98	3.33
904.4	61.24	H	23.4	5.83	0.0	90.47	93.98	3.51
906.4	61.47	H	23.4	5.83	0.0	90.70	93.98	3.28

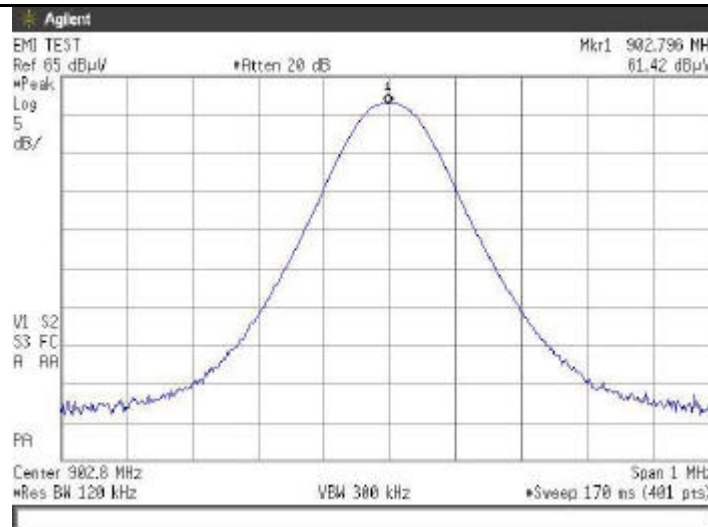
NOTES :

1. H : Horizontal polarization , V : Vertical polarization
2. Emission Level = Reading + Antenna factor + Cable loss-preamplifier gain
3. Measurement was performed at 3 operating channels.
4. The EUT was positioned with three(3) orthogonal plane and the Horizontal plane was the worst case emission.

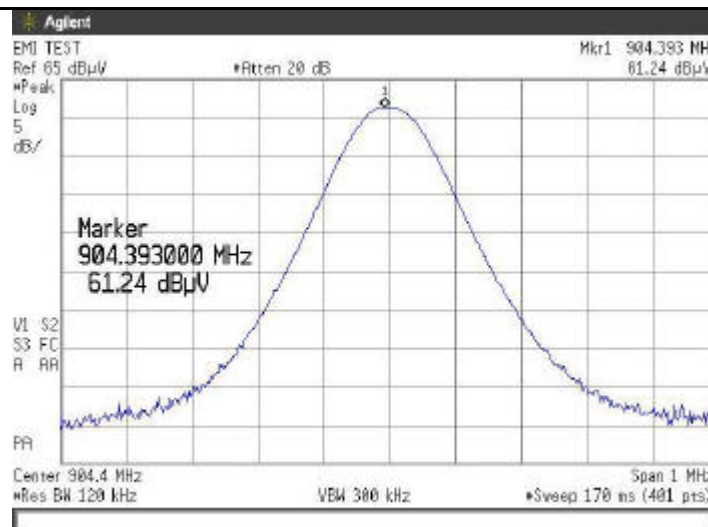
Tested by Choi, Chang Young

Plots of Radiated Emissions of Carrier

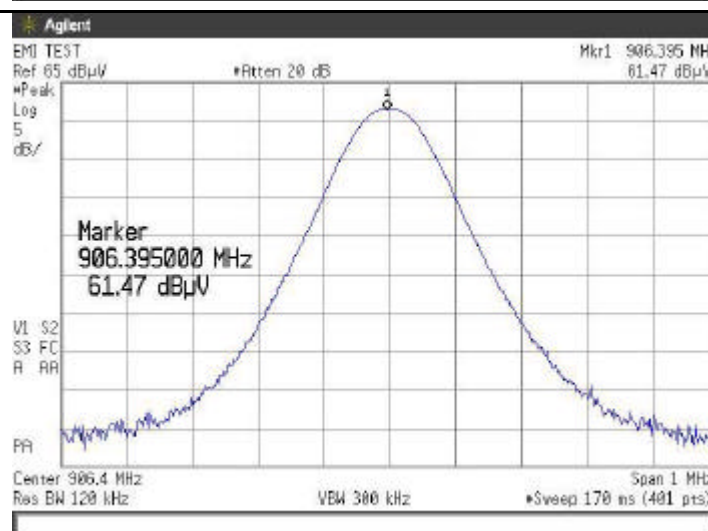
Ch.1



Ch.5



Ch.10



6.4 Radiated Emissions of RF Carrier Harmonics

EUT : 900MHz Wireless Microphone EX3800TX
Limit apply to : FCC Part15 Subpart C Section 15.249(a)
Test Date : August 20, 2003
Operating Condition : Ch 1 : 902.8 MHz RF transmit
Environment Condition : Humidity Level : 37 %RH, Temperature : 15°C
Result : Passed by - 11.00 dB

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Measurement Distance : 3 meters

Detector mode : Peak mode

Freq. [GHz]	Reading [dBμV]	ANT.Pol. [H/V]	Ant. Factor [dB]	Cable Loss [dB]	Pre-amp. [dB]	Emission Level [dBμV / m]	Limit [dBμV / m]	Margin
1.8056	52.33	H	25.14	0.5	30	47.97	73.98	26.01
2.7084	46.19	H	27.91	4.0	30	48.10	73.98	25.88
3.6112	-	-	-	-	-	-	73.98	-

Detector mode : Average mode

Freq. [GHz]	Reading [dBμV]	ANT.Pol. [H/V]	Ant. Factor [dB]	Cable Loss [dB]	Pre-amp. [dB]	Emission Level [dBμV / m]	Limit [dBμV / m]	Margin
1.8056	47.34	H	25.14	0.5	30	42.98	53.98	11.00
2.7084	38.95	H	27.91	4.0	30	40.86	53.98	13.12
3.6112	-	-	-	-	-	-	53.98	-

NOTES :

1. H : Horizontal polarization , V : Vertical polarization
2. Emission Level = Reading + Antenna factor + Cable loss - preamplifier gain
3. Measurement was performed at 3 operating channel.
4. The EUT was positioned with three(3) orthogonal plane and the Horizontal plane was the worst case emission.

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Radiated Emissions of RF Carrier Harmonics

EUT : 900MHz Wireless Microphone EX3800TX
Limit apply to : FCC Part15 Subpart C Section 15.249(a)
Test Date : August 20, 2003
Operating Condition : Ch 5 : 904.4 MHz RF transmit
Environment Condition : Humidity Level : 35 %RH, Temperature : 16°C
Result : Passed by - 5.96dB

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Measurement Distance : 3 meters

Detector mode : Peak mode

Freq. [GHz]	Reading [dBμV]	ANT.Pol. [H/V]	Ant. Factor [dB]	Cable Loss [dB]	Pre-amp. [dB]	Emission Level [dBμV / m]	Limit [dBμV / m]	Margin
1.8088	53.29	H	25.14	0.5	30	48.93	73.98	25.05
2.7132	46.31	H	27.91	4.0	30	48.22	73.98	25.26
3.6176	-	-	-	-	-	-	73.98	-

Detector mode : Average mode

Freq. [GHz]	Reading [dBμV]	ANT.Pol. [H/V]	Ant. Factor [dB]	Cable Loss [dB]	Pre-amp. [dB]	Emission Level [dBμV / m]	Limit [dBμV / m]	Margin
1.8088	47.99	H	25.14	0.5	30	43.63	53.98	10.35
2.7132	38.90	H	27.91	4.0	30	40.81	53.98	13.17
3.6176	-	-	-	-	-	-	53.98	-

NOTES :

1. H : Horizontal polarization , V : Vertical polarization
2. Emission Level = Reading + Antenna factor + Cable loss-preamplifier gain
3. Measurement was performed at 3 operating channel.
4. The EUT was positioned with three(3) orthogonal plane and the Horizontal plane was the worst case emission.

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Radiated Emissions of RF Carrier Harmonics

EUT : 900MHz Wireless Microphone EX3800TX
Limit apply to : FCC Part15 Subpart C Section 15.249(a)
Test Date : August 20, 2003
Operating Condition : Ch 10 : 906.4 MHz RF transmit
Environment Condition : Humidity Level : 35 %RH, Temperature : 16°C
Result : Passed by - 9.36 dB

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Measurement Distance : 3 meters

Detector mode : Peak mode

Freq. [GHz]	Reading [dBμV]	ANT.Pol. [H/V]	Ant. Factor [dB]	Cable Loss [dB]	Pre-amp. [dB]	Emission Level [dBμV / m]	Limit [dBμV / m]	Margin
1.8128	53.21	H	25.14	0.5	30	48.85	73.98	25.13
2.7182	46.72	H	27.91	4.0	30	48.63	73.98	25.35
3.6246	-	-	-	-	-	-	73.98	-

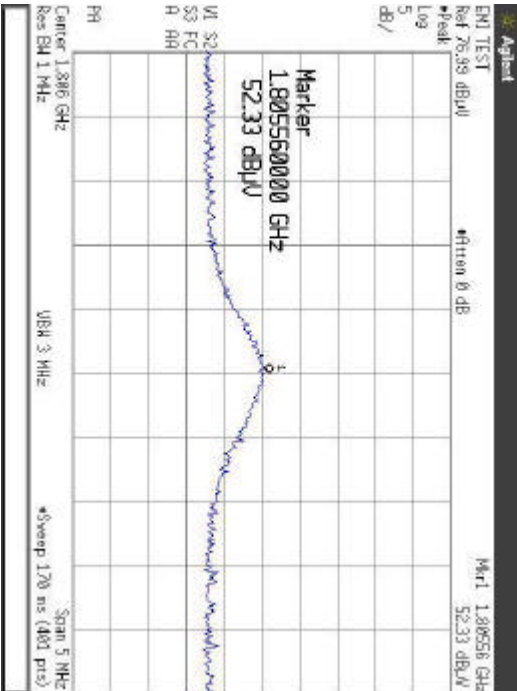
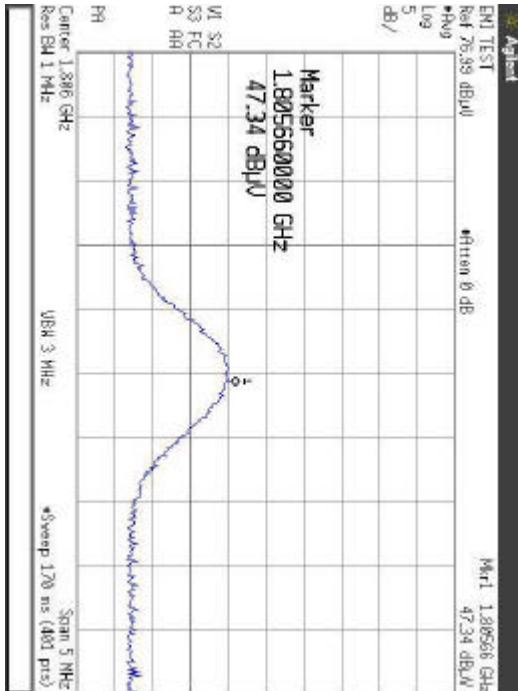
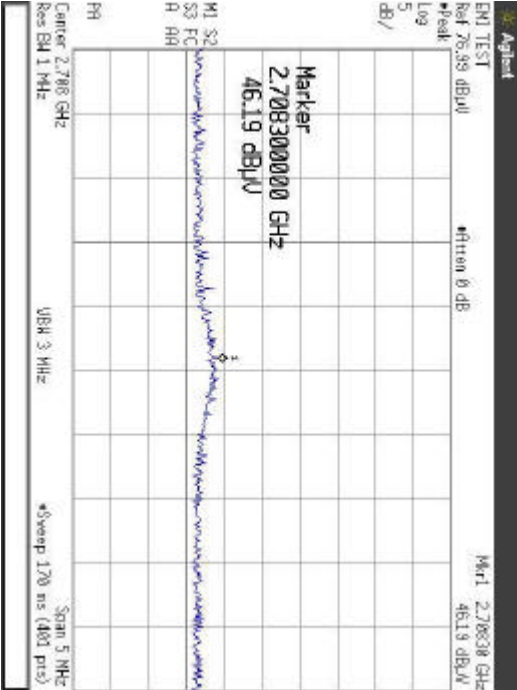
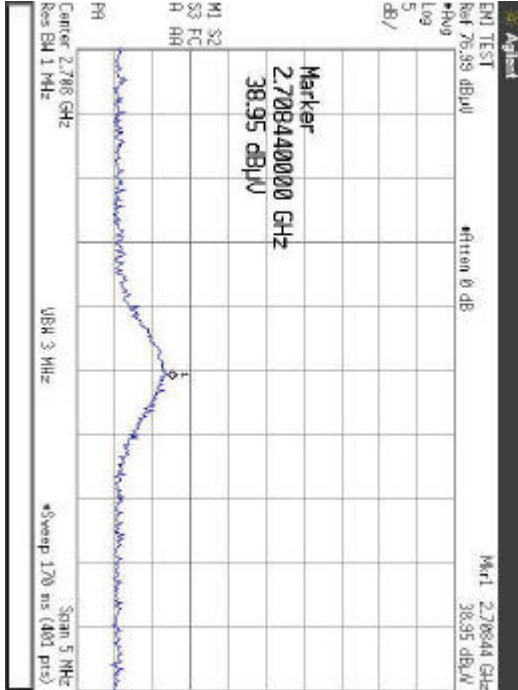
Detector mode : Average mode

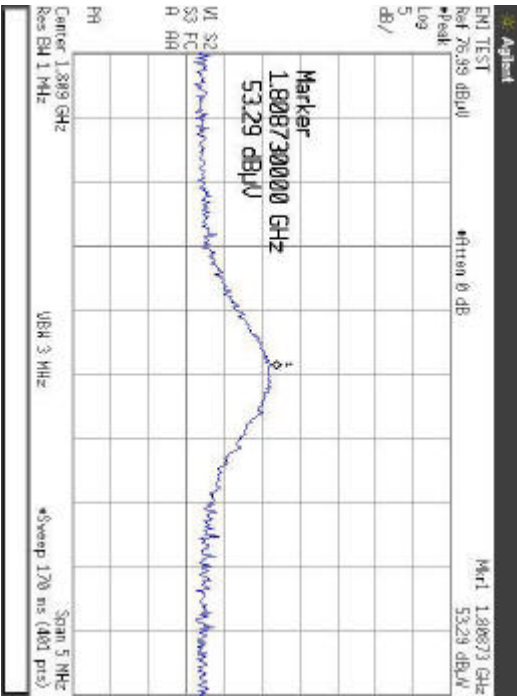
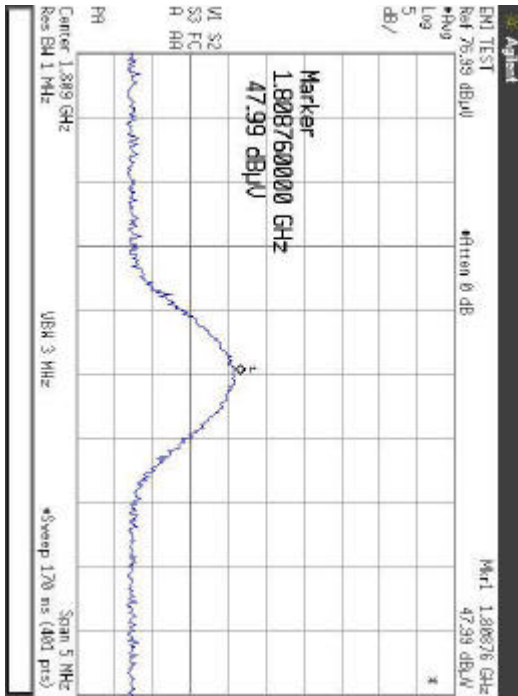
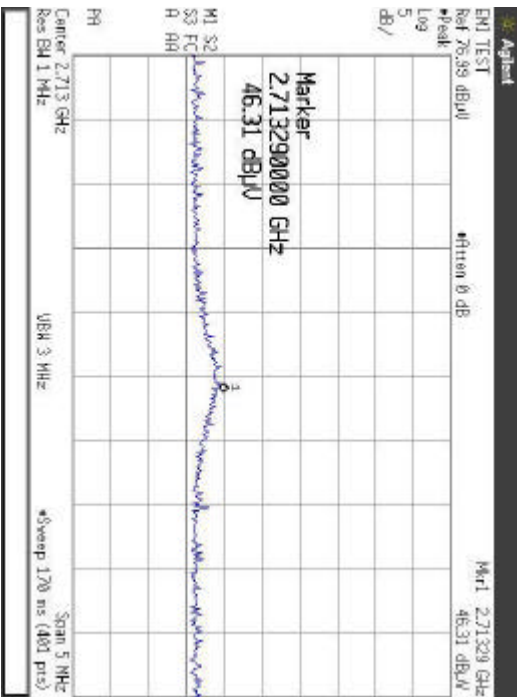
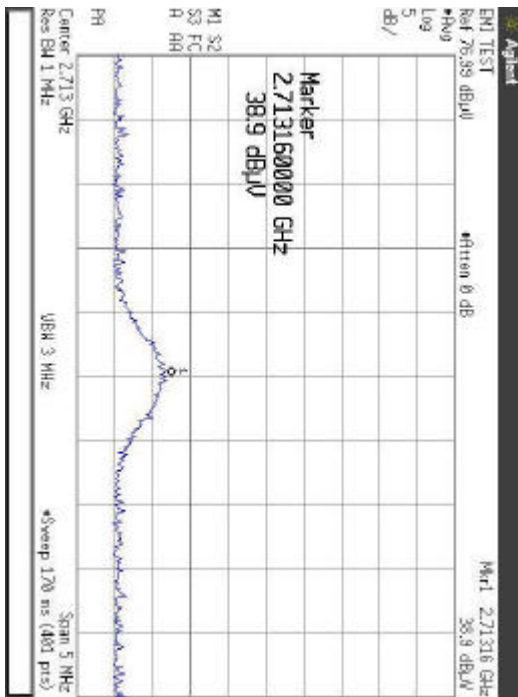
Freq. [GHz]	Reading [dBμV]	ANT.Pol. [H/V]	Ant. Factor [dB]	Cable Loss [dB]	Pre-amp. [dB]	Emission Level [dBμV / m]	Limit [dBμV / m]	Margin
1.8128	48.98	H	25.14	0.5	30	44.62	53.98	9.36
2.7182	37.28	H	27.91	4.0	30	39.19	53.98	14.79
3.6246	-	-	-	-	-	-	53.98	-

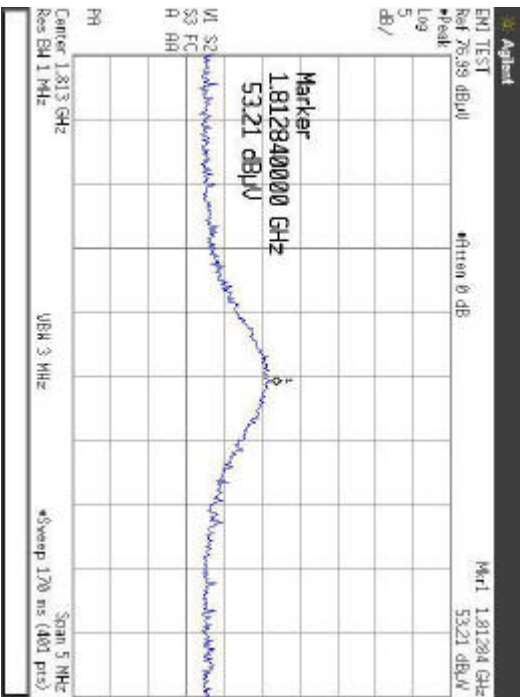
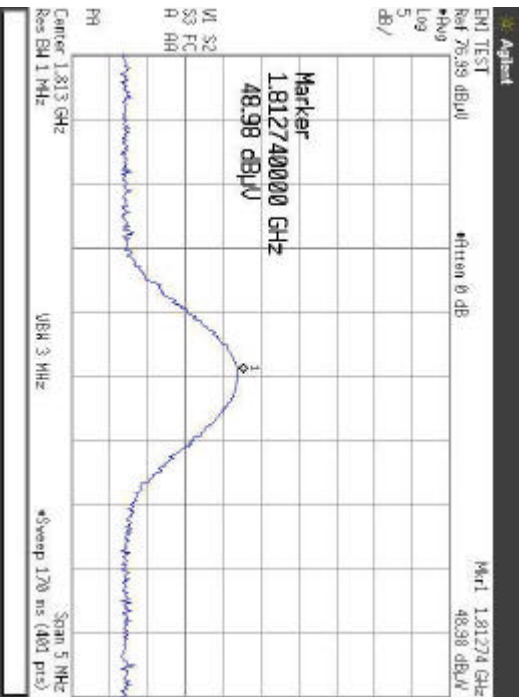
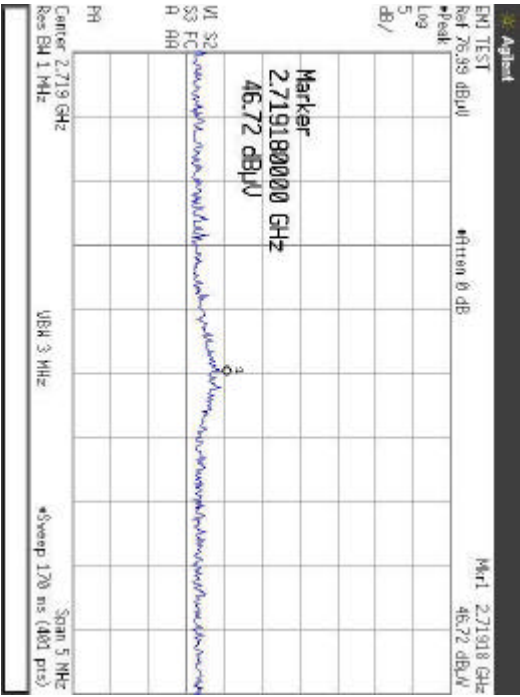
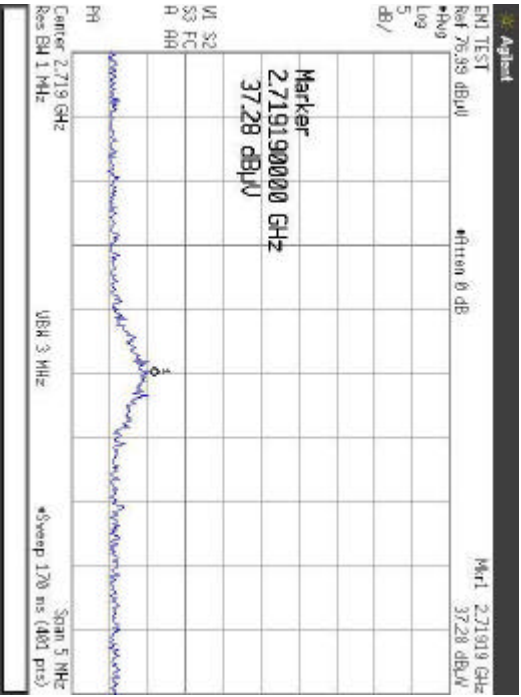
NOTES :

1. H : Horizontal polarization , V : Vertical polarization
2. Emission Level = Reading + Antenna factor + Cable loss-preamplifier gain
3. Measurement was performed at 3 operating channel.
4. The EUT was positioned with three(3) orthogonal plane and the Horizontal plane was the worst case emission.

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Plots of Harmonics Emission (Ch 1 : 902.8 MHz)	
	Peak Average
2 nd	
	
3 rd	
	

Plots of Harmonics Emission (Ch 5 : 904.4 MHz)	
	Peak Average
2 nd	 
3 rd	 

Plots of Harmonics Emission (Ch 10 : 906.4 MHz)	
	Peak Average
2 nd	 EMI TEST Ref 76.99 dBμV •Peak Log 5 dB/ Marker 1.812840000 GHz 53.21 dBμV PR Center 1.813 GHz Res BW 1 MHz Span 5 MHz VBW 3 MHz •Sweep 120 ns (400 pps)  EMI TEST Ref 76.99 dBμV •Avg Log 5 dB/ Marker 1.812740000 GHz 48.98 dBμV PR Center 1.813 GHz Res BW 1 MHz Span 5 MHz VBW 3 MHz •Sweep 120 ns (400 pps)
3 rd	 EMI TEST Ref 76.99 dBμV •Peak Log 5 dB/ Marker 2.719180000 GHz 46.72 dBμV PR Center 2.719 GHz Res BW 1 MHz Span 5 MHz VBW 3 MHz •Sweep 120 ns (400 pps)  EMI TEST Ref 76.99 dBμV •Avg Log 5 dB/ Marker 2.719190000 GHz 37.28 dBμV PR Center 2.719 GHz Res BW 1 MHz Span 5 MHz VBW 3 MHz •Sweep 120 ns (400 pps)

6.5 Out-of-band Radiated Emissions

EUT : 900MHz Wireless Microphone EX3800TX
Limit apply to : FCC Part15 Subpart C Section 15.249(d)/ 15.209
Test Date : August 20, 2003
Operating Condition : Ch 10 : 906.4 MHz RF transmit
Environment Condition : Humidity Level : 35 %RH, Temperature : 16°C
Result : Passed by - 1.66 dB

Radiated Emission Test Data

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Detector mode : CISPR Quasi-Peak mode (6dB Bandwidth : 120 kHz)

Measurement Distance : 3 meters

Frequency [MHz]	Reading [dBμV]	Polarization (*H/**V)	Ant. Factor [dB]	Cable Loss [dB]	Pre-amp. [dB]	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
30							40.0	
-								
-								
88							43.5	
-								
-								
216							46.0	
-								
240	25.45	V	18.34	2.16	22	23.95	46.0	22.05
504	27.86	V	17.53	5.28	22	28.67	46.0	17.33
-								
960							54.0	
-								
-								
-								

NOTES :

- * H : Horizontal polarization , ** V : Vertical polarization
- Emission Level = Reading + Antenna factor + Cable loss
- Margin value = Limit - Emission Level
- All other emissions not reported were more than 25dB below the permitted limit.

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7. ANTENNA REQUIREMENT

7.1 Antenna Requirement

According to the section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to be complied.

7.2 Antenna Construction

The antenna used for the EUT is so designed that antenna is designed as permanently incorporated to the main PCB and can not be separated. There is no external antenna port so that the user could not use or attach the antenna with this device.

8. Sample Calculation and Other Information

8.1 Sample Calculations

$$\text{dB}\mu\text{V} = 20 \log_{10} (\mu\text{V} / \text{m})$$

$$\mu\text{V} = 10^{(\text{dB}\mu\text{V} / 20)}$$

EX. 1.

@ 2,470 MHz Radiated Emissions limit(Average)= 50 mV / m = 94 dB μ V / m

Reading = 48.17 dB μ V (calibrated level)

Antenna factor + Cable Loss = 38.93 dB

Total = 87.10 dB μ V / m

$10^{(37.62 / 20)} = \mu\text{V}$

Margin = 87.10 – 94 = -6.90

6.90 dB ; below limit

EX. 2.

@ 123.96 MHz Radiated Emissions limit (Quasi-peak) =150 μ V / m = 43.5 dB μ V

Reading = 26.40 dB μ V(calibrated level)

Antenna factor + Cable Loss = 15.44 dB

Total = 41.84 dB μ V / m

$10^{(40.29 / 20)} = \mu\text{V} / \text{m}$

Margin = 41.84 – 43.5 = -1.66 dB

1.66 dB ; below limit

8.2. Measurement Uncertainty

Measurement uncertainty of RFI Voltage Measurement test was estimated at ± 3.51 dB(k=2)

Measurement uncertainty of RFI Field Strength Measurement test was estimated at ± 4.34 dB (k=2)

9. TEST EQUIPMENTS LIST

The listing below denotes the test equipments utilized for the test(s).

<u>Test Equipment</u>	<u>Manufacture</u>	<u>Model Number</u>	<u>Serial Number</u>	<u>Cal.Due date</u>
Signal Analyzer	PMM	PMM9000	3100570602	08 / 16 / 03
EMC Analyzer	HP	E7403A	US39150108	02 / 27 / 04
Spectrum Analyzer	ADVANTEST	E7403A	61720002	08 / 22 / 03
Spectrum Analyzer	HP	8563E	3611A05046	05 / 14 / 04
Preamplifier	HP	8447E	2945A02712	08 / 19 / 03
Preamplifier	HP	8449B	3008A00809	11 / 12 / 03
Biconical Antenna	SWALZBECK	BBA9106	N / A	09 / 12 / 03
Log Periodic Antenna	CHAFFNER	UPA6109	N / A	09 / 12 / 03
Horn Antenna	SCHAFFNER	BBHA 9120 D	N / A	06 / 20 / 04
Horn Antenna	SCHAFFNER	BBHA 9170	N / A	06 / 20 / 04
Plotter	HP	7475A	007475A	N / A
Shield Room	SEMITECH	000815	N / A	
7m x 4m x 4m				
Turn Table	JAEMC	JAC-2	N / A	N / A
Antenna Mast	Dae-il EMC	JAC-1	N / A	N / A
Artificial Mains	PMM	L3-25	1110K70403	10 / 02 / 03
Network				
Artificial Mains	KYORITSU	KNW-242C	8-920-20	08 / 31 / 03
Network				
Antenna Turntable	JAEMC	JAC-2	N / A	N / A
Controller				