



FCC TEST REPORT

Model No. : RF TRANSMITTER
Test Report No.:BWS-02-WF-0001

BWS Tech., Inc.

294-9, Jungdae-Dong, Gwangju-City, Gyeoeonggi-do 464-080 Korea
TEL: 82 31 764 0125 FAX: 82 31 764 0126

FCC EMI TEST REPORT

Date of Test : April 25, 2002
Test Report No : BWS-02-WF-0001
Test Site : BWS Tech, Inc. (Registration No. : 553281)

Trade Name : N/A
Manufacturer : KSCOM CO., LTD
Address : DongYoung Venturestel 302, 202-4, Anyang-7dong, Manan-Gu,
Anyang-City, Kyounggi-Do, Korea

Contact Person : Jong-Chul Ham
Tel No. : 82-31-449-4301
Fax No. : 82-31-449-4326

Product : FM Transmitter
Model : RF TRANSMITTER

FCC Rule Part(s) : FCC Part 15 Subpart C
Classification : N/A

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2000 (Note Codes: #19, 28).

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 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.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

TaeHyun Nam
President-BWS Tech, Inc.
<http://www.approvalspecialists.co.kr>



FCC TEST REPORT

Model No. : RF TRANSMITTER
Test Report No.:BWS-02-WF-0001

TABLE OF CONTENTS	PAGE
1. Description of device	3
1.1 General	3
1.2 EUT Description	3
2. Test facility	4
3. Summary of results	4
3.1 Electromagnetic Emission	4
3.2 Modifications to the EUT	4
4. Tested system details	5
4.1 Peripherals and Others	5
4.2 Type of Cables Used	5
4.3 System layout on EUT and peripherals	5
5. Test result	6
5.1 RFI Voltage Measurement	6
5.2 RFI Field Strength Measurement	6
5.3 Minimum Margin	10
5.4 Sample Calculations	10



FCC TEST REPORT

Model No. : RF TRANSMITTER
Test Report No.:BWS-02-WF-0001

1. DESCRIPTION OF DEVICE

1.1 General

Responsible Party	KSCOM CO., LTD
Contact Person	Jong-Chul Ham Tel No. : 82-31-449-4301 Fax No. : 82-31-449-4326
Manufacturer	KSCOM CO., LTD DongYoung Venturestel 302, 202-4, Anyang-7dong, Manan-Gu, Anyang-City, Kyounggi-Do, Korea

- **Trade name** N/A
- **Model name** RF TRANSMITTER
- **EUT Type** FM Transmitter
- **Classification** N/A
- **Tx Frequency** 88.1/88.5/88.9/89.3 MHz
- **Clock Speed** Main Clock : 38 kHz
- **Rule Part(s)** FCC Part 15 Subpart C § 15.239
- **Test Procedure(s)** ANSI C63.4 (2000)
- **Date of Tests** April 25, 2002
- **Place of Tests** BWS Tech., Inc.

1.2 EUT Description

For Use of Add-On FM Transmitter, music will be hear by CAR & radio you can hear MP3 file in your CAR

Note.

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Note.

Please refer to the duties and responsibilities of the Responsible Party attached.



FCC TEST REPORT

Model No. : RF TRANSMITTER
Test Report No.:BWS-02-WF-0001

2. TEST FACILITY

The open field test site and conducted measurement facility used for this measurement, is located following address. This site was fully described in a report dated Dec. 26, 2001 that was submitted to the FCC. Our site and facility had been accepted in a letter dated Dec. 26, 2001(Registration No. : 553281) :

BWS Tech, Inc.

Address : 294-9, Jungdae-Dong, Gwangju-City, Gyeonggi-Do 464-080 Korea

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 Dec. 08, 2000.

3. SUMMARY OF RESULTS

3.1 Electromagnetic Emission

RFI Voltage Measurement **N/A**

RFI Field Strength Measurement **PASS**

Although the measured emissions indicate that the EUT complies with the required limits, some measurement are close to these limits.

When the uncertainty of measurement is considered, there is some possibility that the EUT may not be compliant.

3.2 Modifications to the EUT : **None**

4. TESTED SYSTEM DETAILS

4.1 Peripherals and Others :

Description	Model Name	Serial No.	Manufacturer	FCC ID
EUT	RF TRANSMITTER	-	KSCOM CO.,LTD	-
Sound Source (MP3)	MP GIO	-	KSCOM CO.,LTD	-

4.2 Type of Cables Used:

Device from	Device to	Type of Cable	Length	Type of shield
-	-	-	-	-

4.3 System layout on EUT and peripherals

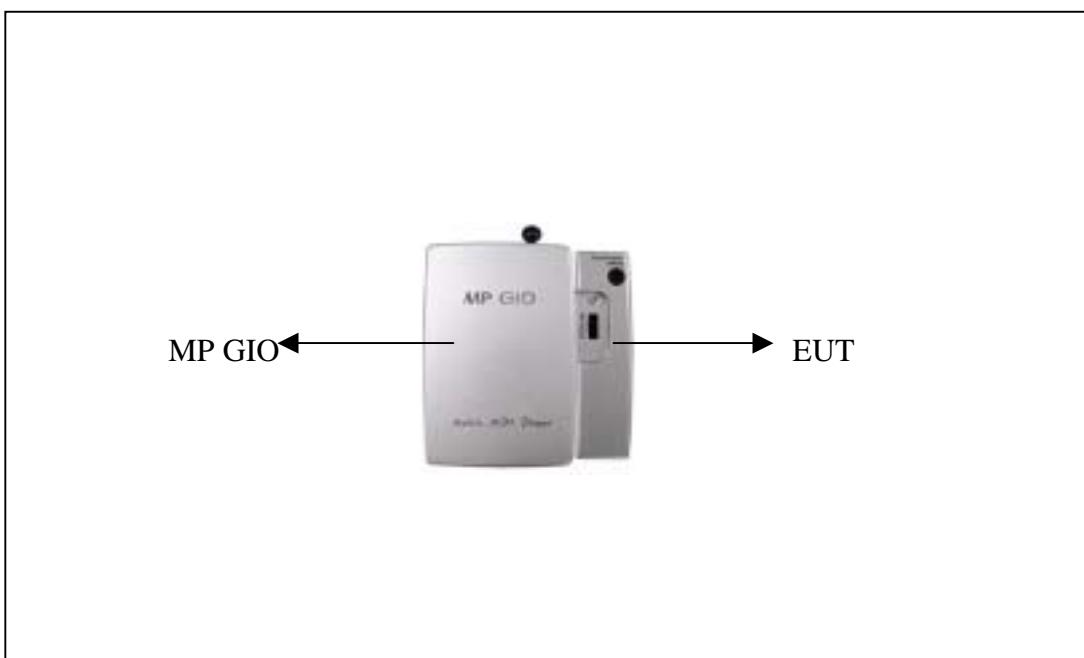


Figure 4-1 System layout



5. TEST RESULT

5.1 RFI Voltage Measurement N/A

5.2 RFI Field Strength Measurement

5.2.1 Measurement Instrumentation Used

(30MHz ~ 1000MHz)

Signal Analyzer (PMM9000/3100J70602/PMM/10 Oct. 2001/Oct. 2002)

Spectrum Analyzer (R3261/61720002/Advantest/25 Aug. 2001/Aug. 2002)

Biconical antenna (BC01/0020J70501/PMM/10 Oct. 2001/Oct. 2002)

Log periodic antenna (LP01/0020J70501/PMM/10 Oct. 2001/Oct. 2002)

Coaxial cable (RG213U/---/MARLOW/---)

(Over 1000MHz)

Pre-amplifier (8449B/3008A00682)HP/02 Jun. 2001/Jun. 2002)

Spectrum Analyzer (8563E/3450A02895)HP/25 Jun. 2001/Jun. 2002)

Horn Antenna (BBHA9120D/0501/SCHWARZBECK/23 Mar. 2001/Mar. 2002)

Coaxial cable (Sucoflex 104/---/SUCOFLEX/---)

5.2.2 Measurement Procedure

Final test was performed according to **ANSI C63.4 (2000)** at the open field site .
Deviations from the standard were none.

The EUT was placed in a 0.8 m high table along with the peripherals. The turn table was separated from the antenna with the distance of 3 meter. Cables were placed in a position to produce maximum emissions as determined by experimentation, and operation mode was selected for maximum.

The frequencies and amplitudes of maximum emission were measured at varying azimuths, antenna heights and antenna polarities. **We measured device in normal operation mode.**
We reported at maximum emission levels.



FCC TEST REPORT

Model No. : RF TRANSMITTER
Test Report No.:BWS-02-WF-0001

5.2.3 Operation Modes

EUT was tested according to the specifications given by the manufacturer, and exercised in the most unfavorable manner.

5.2.4 Measurement Uncertainty

Measurement uncertainty of RFI Field Strength Measurement test was estimated at ± 3.5 dB($k=2$)

5.2.5 Test Data

RFI Field Strength Measurement Results(30 MHz to 10 GHz)

Testing mode : **Radiated Power Output**
Test procedure : **ANSI C63.4 (2000)**

Date of measurement : **April 25, 2002**
Temperature : **21°C**
Humidity : **43 %**

Frequency (MHz)	Level (dBuV)	Antenna Polarity (H/V)	Factor (dB)	Loss (dB)	Level (dBuV/m)	Level (uV/m)	Limit (uV/m)	Margin (dB)
88.10	36.27	V	7.93	1.82	46.02	199.99	250	1.94
89.30	35.55	V	7.87	1.83	45.25	183.02	250	2.71

Table 1. Radiated Measurements at 3meters.

According to 15.239 the field strength of emissions from intentional radiators operated under these frequency bands shall not exceed the following

a. 15.239(e)

Fundamental frequency (MHz)	Field strength of fundamental (Microvolts/Meter)
88-108	250

AFCL = Antenna Factor and Cable Loss

Measurements using CISPR quasi-peak mode. Above 1 GHz, peak detector function mode is using a resolution bandwidth of 1 MHz and a video bandwidth of 1 MHz.

The peak level complies with the average limit. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

Tested by **Hyung-Seok Lee**



FCC TEST REPORT

Model No. : RF TRANSMITTER
Test Report No.:BWS-02-WF-0001

Testing mode : **Emissions test (Low Channel)**
Date of measurement : **April 25, 2002**

Test procedure : **ANSI C63.4 (2000)**
Temperature : **22°C**
Humidity : **43 %**

Frequency (MHz)	Level (dBuV)	Antenna Pplarity (H/V)	Factor (dB)	Loss (dB)	Level (dBuV/m)	Level (uV/m)	Limit (uV/m)	Margin (dB)
176.20	22.09	V	13.35	2.76	38.20	81.36	150	5.32
264.30	20.12	V	12.57	3.47	36.16	64.27	200	9.86
352.40	19.86	H	15.07	3.99	38.92	88.34	200	7.10
440.50	15.71	V	16.67	4.55	36.93	70.21	200	9.09
528.60	13.65	H	18.24	5.09	36.98	70.67	200	9.04
616.70	10.38	H	19.84	5.49	35.71	61.05	200	10.31
704.80	8.88	H	21.63	5.93	36.44	66.43	200	9.58
792.90	5.07	H	23.06	6.35	34.48	52.97	200	11.54
881.00	5.35	H	24.47	6.73	36.55	67.24	200	9.47
969.10	3.86	H	24.80	7.04	35.70	60.98	500	18.30

Table 1. Radiated Measurements at 3meters.

Testing mode : **Emissions test (High Channel)**
Test procedure : **ANSI C63.4 (2000)**

Date of measurement : **April 25, 2002**
Temperature : **22°C**
Humidity : **43 %**

Frequency (MHz)	Level (dBuV)	Antenna Pplarity (H/V)	Factor (dB)	Loss (dB)	Level (dBuV/m)	Level (uV/m)	Limit (uV/m)	Margin (dB)
176.20	21.98	V	13.35	2.76	38.09	80.27	150	5.43
264.30	20.26	V	12.57	3.47	36.30	65.38	200	9.72
352.40	20.18	H	15.07	3.99	39.34	92.71	200	6.68
440.50	16.38	V	16.67	4.55	37.60	75.89	200	8.42
528.60	13.87	V	18.24	5.09	37.20	72.52	200	8.82
616.70	10.27	H	19.84	5.49	35.60	60.27	200	10.42
704.80	9.26	H	21.63	5.93	36.82	69.38	200	9.20
792.90	4.71	H	23.06	6.35	34.12	50.87	200	11.90
881.00	5.72	H	24.47	6.73	36.92	70.20	200	9.10
969.10	3.43	H	24.80	7.04	35.27	58.03	500	18.70

Table 2. Radiated Measurements at 3meters.



FCC TEST REPORT

Model No. : RF TRANSMITTER
Test Report No.:BWS-02-WF-0001

Field strength limits are at the distance of 3 meter, emissions radiated outside of the specified band, shall be according to the general radiated limits in 15.209, as following table:

b. 15.209(a)

Fundamental frequency (MHz)	Field strength of fundamental (Microvolts/Meter)
30-88	100
88-216	150
216-960	200
Above 960	500

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Testing mode : **Bandwidth test**

Test procedure : **ANSI C63.4 (2000)**

Date of measurement : **April 25, 2002**

Temperature : **23°C**

Humidity : **43 %**

Frequency (MHz)	Antenna Polarity (H/V)	Bandwidth (kHz)	Limit (kHz)	Margin (kHz)
88.10	V	125.40	200	125.20
89.30	V	127.70	200	125.70

Table 1. Bandwidth Measurements

c.15.239(c)

Fundamental frequency (MHz)	Bandwidth of the emission (kHz)
88-108	200

Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108MHz.

Tested by **Hyung-Seok Lee**



FCC TEST REPORT

Model No. : RF TRANSMITTER
Test Report No.:BWS-02-WF-0001

5.3 Minimum Margin

Radiated emission

RF TRANSMITTER **TX mode** **88.1 MHz**

5.4 SAMPLE CALCULATIONS

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

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

EX. 1.

$$@ 88.1 \text{ MHz} \quad \text{limit} = 250 \mu\text{V}/\text{m} = 47.96 \text{ dB}\mu\text{V}/\text{m}$$

Reading = 36.27 dB μ V(calibrated level)

Antenna factor + Cable Loss = 9.75 dB

Total = 46.02 dB μ V/m

(46.02/20)

10 = 199.99 μ V/m

Margin = 47.96 - 46.02 = 1.94 dB

1.94 dB ; below limit