Certification of Compliance

CFR 47 Part 15 Subpart C / Operation in the band 88-108 MHz
DXX-Part15 Subpart C Low Power License/Radio communication Device

Test Report File No.	05-IST-0079	**Date of Issue**	Jan. 29, 2005
Model	**GFT-42E**		
FCC ID	SXASBT400		
Kind of Product	FM TRANSMITTER		
Applicant	SEOBONG ELECTRONICS CO.,LTD.		
Address	# 889 banyeo-Dong, Heawoondae-Gu, Busan, Korea		
Manufacturer	SEOBONG ELECTRONICS CO.,LTD.		
Address	# 889 banyeo-Dong, Heawoondae-Gu, Busan, Korea		

Test Result **(*)Positive** **( ) Negative**

Reviewed By

S.J. Cho / General Manager of EMC

Approved By

J.H. Lee / Chief

- Investigations requested : Measurement relevant to clauses of F.C.C rules and regulations, Part 15 Subpart C – Operation in the band 88-108MHz
- The test report with appendix consists of 14 pages.
- The test result only responds to the tested sample.
- It is not allowed to copy this report even partly without the allowance of IST EMC Laboratory.
- This equipment as for has been shown to be capable of continued 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 2001.

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INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd. (Yongin Lab., ***Filed to FCC***)
San 21-8, Goan-Ri, Baekam-Myun, Yongin-City
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TEL : +82 31 323 3012 FAX : +82 31 323 3014

ENVIRONMENTAL CONDITIONS

Temperature	0 ℃
Humidity	41 %
Atmospheric pressure	1014 mbar

POWER SUPPLY SYSTEM USED

Product Information

Frequency used:	106.7, 106.9, 107.1, 107.5, 107.7, 107.9 (㎒)
Voltage	1.5 V(1EA) MAX. 130mA
Batttery	1 AAA Size Battery
Keeping temperature	-30℃ ~ 80℃
Size(WxHxD)/ Weight	64.0mm×23.0mm×24.0mm/23g (except for battery)
Case	Plastic
File Transfering Speed	Loop type of antenna adhered to inside PCB
Noise Ratio	0 dB
Noise Ratio	Size : 1.7 X 3.7mm, copper material with 1.0mm interval
Output impedance	75 Ω

Type of Radio Waves F3E

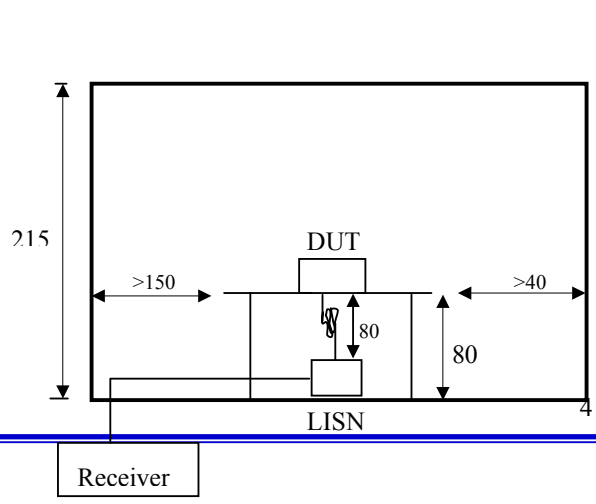
DESCRIPTIONS OF TEST

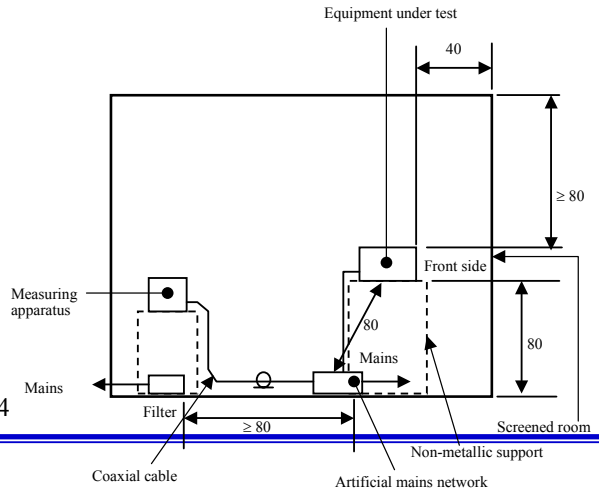
Conducted Emissions:

The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50Ω/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 an bandwidth of 10KHz or for "quasi-peak" within a bandwidth of 9KHz.

- Procedure of Test

The line-conducted facility is located in a shielded room. The wooden table 80cm height is placed 40cm away from the vertical wall and 1.5m away from the other wall of the shielded room. The LISNs are bonded to bottom of the shielded room. The EUT is located on the wooden table with distance more than 80cm from the LISN and powered from the powered LISN .The peripheral equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cutting 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 this supply lines will be connected to the appropriate LISN. All interconnecting cables more than 1m were shortened by non-inductive bundling 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 conditions. The RF output of the LISN was connected to the R/S receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was re-measured using Quasi-Peak detector and average detector by manual measurement or final measurement program of R&S, after scanned by automatic Peak mode for frequency range from 0.15 to 30MHz. The bandwidth of the receiver was set to 10kHz. The EUT, peripheral equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.





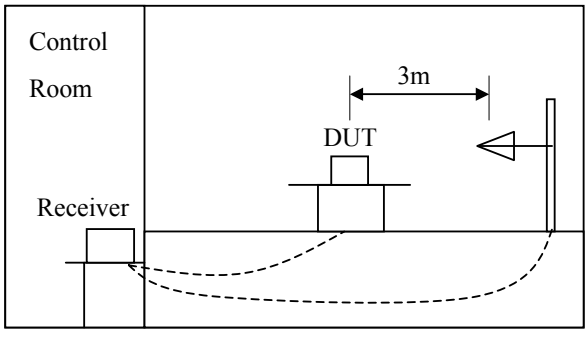
DESCRIPTION OF TEST

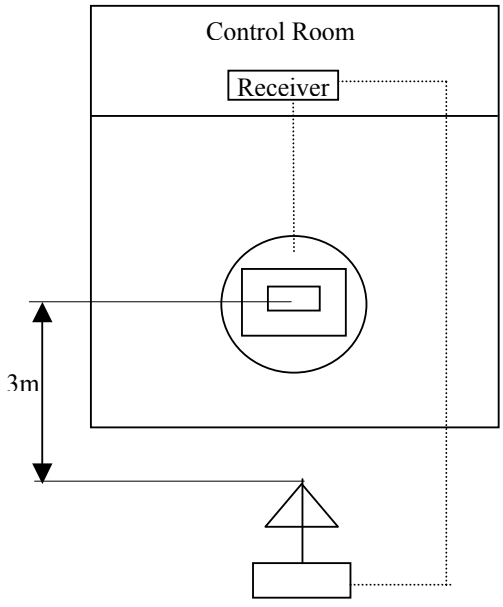
Radiated Emissions:

The measurement was performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120KHz.

- Procedure of Test

Preliminary measurements were made at 3 meter using bi-conical and log-periodic antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30MHz to 230MHz using bi-conical antenna and 230 to 1000MHz using log-periodic antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3 or 10 meters test distance using Bi-log antenna, Bi-conical antenna, Log-periodic antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuations. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral 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 by manual. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were configured as same in chamber, were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission.





SUMMARY

☐ Conducted Emission

The requirements are ○ MET ○ Not MET

Minimum limit margin

Maximum limit exceeding

Remarks :

☒ Radiated Emission

The requirements are ● MET ○ Not MET

Minimum limit margin(Fundamental frequency)3.5dB at 106.7MHz(AV)

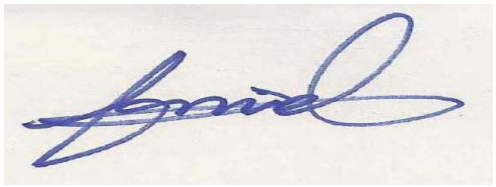
Maximum limit exceeding

Remarks : FM Transmitting Mode

Spurious

Radiated Output Power & Occupied Bandwidth

Reported By



C.W. Kim / EMC Engineer

Note :

☒ means the test is applicable, ☐ is not applicable.

TEST CONDITIONS AND DATA

Radiated Emission

[Applicable]

◆ Test Equipment Used

The test equipment used is calibrated in regular for every year.

Model Name	Manufacturer	Descriptions	Calibration Date	Serial Number
ESVP	Rohde & Schwarz	Test Receiver	Jul. 15, 2004	861744/004
VULB 9160	Schwarzbeck	Antenna	Jul. 19, 2004	3048

◆ Auxiliary Equipment Used

Model Name	Manufacturer	Descriptions	FCC Compliance information
CA-F300	CMTECH CO.,LTD.	MP3PLAYER	DoC

◆ Test Program FM Transmitting

◆ Test Area Open Area Test Site #2

Note :

Radiated Emission Measurements

Occupied bandwidth according to 15.239(a)

This test was performed to demonstrate that the emissions from the EUT are confined within the band of 200KHz wide centered on the operating frequency. The 200KHz band shall lie wholly within the frequency range 88-108MHz.

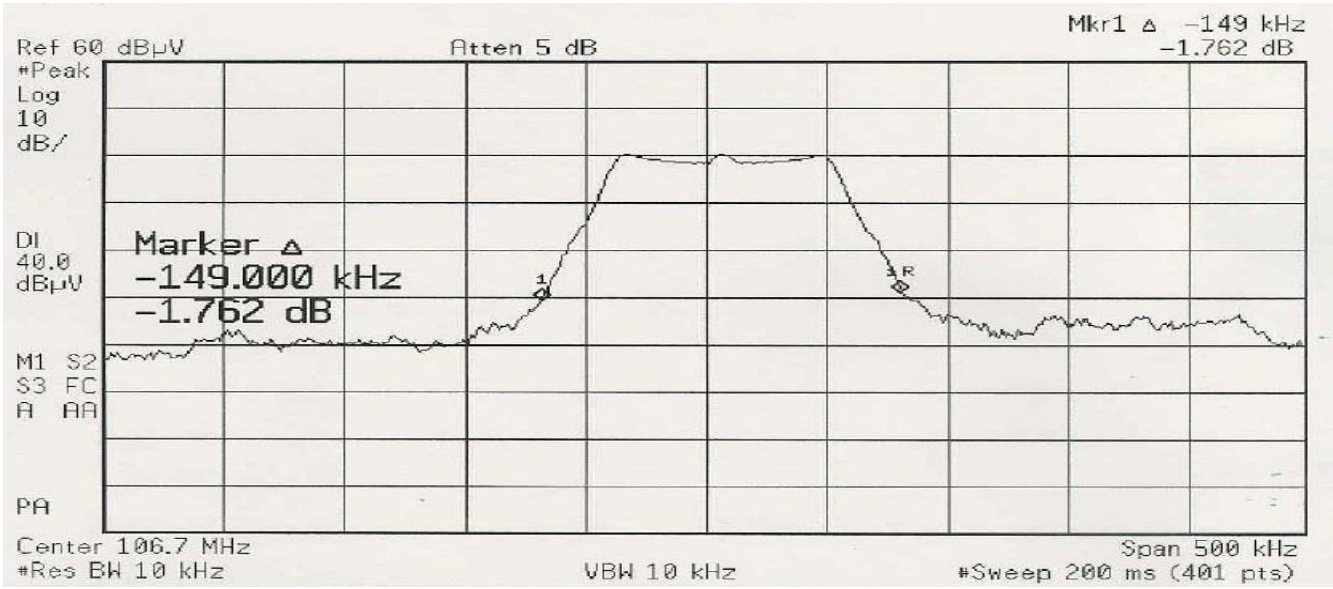
ANSI C63.4-2001 Section 13.1.7, Occupied Bandwidth Measurements. The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if a typical. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce worst-case (i.e., the widest) bandwidth.

The measurements were performed at three channel: low(106.7MHz),middle(107.5MHz), and High(107.9MHz). The spectrum trace data around transmitter fundamental frequency was Obtained with the spectrum analyzer in "Max Hold" mode. The measured results are less than 200KHz. The bandwidth value was determined between the two points of 26dB down from the reference level. The measured spectrum of the signal is shown in Figure 1. Form the plot we see that in the worst case, the bandwidth is 153.0KHz at 107.9MHz.

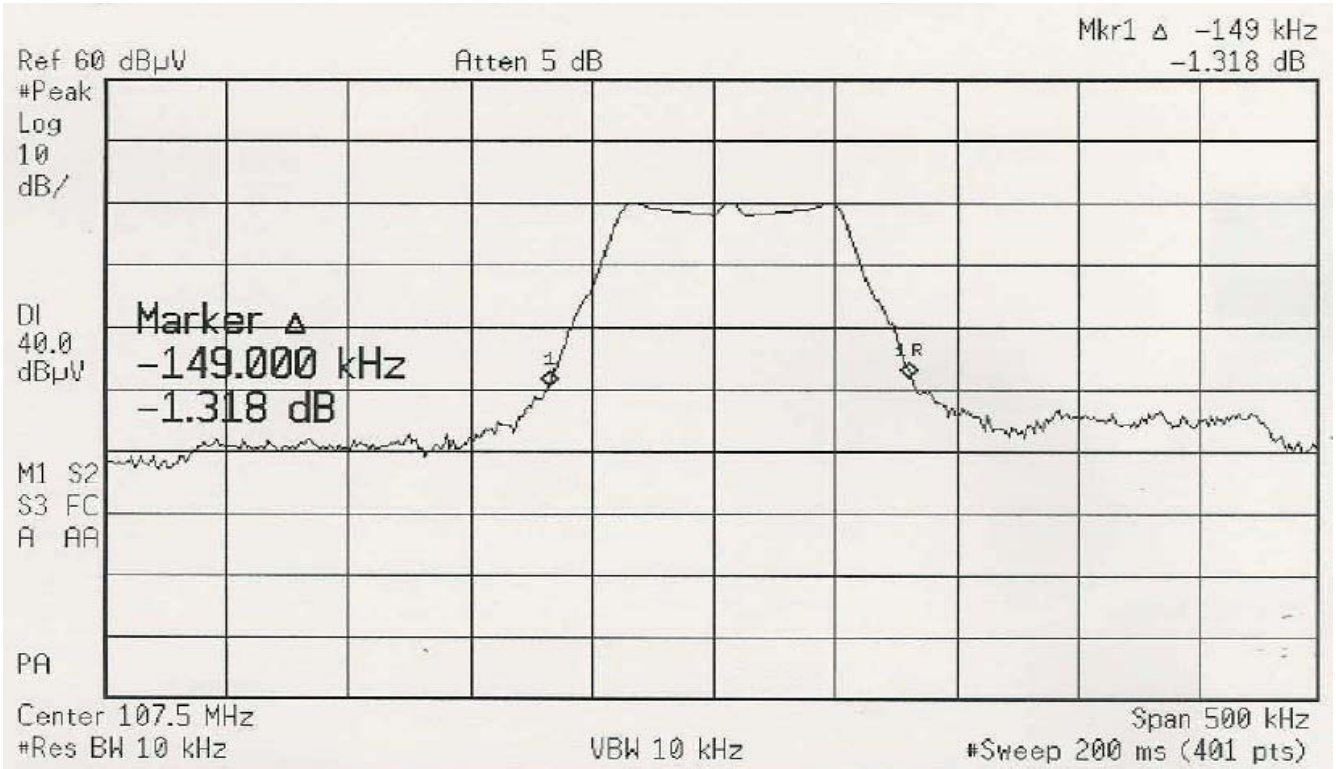
Center frequency (MHz)	Measured occupied bandwidth (KHz)	Pass/fail
106.7	149.0	Pass
107.5	149.0	Pass
107.9	153.0	pass

Occupied bandwidth measurement results

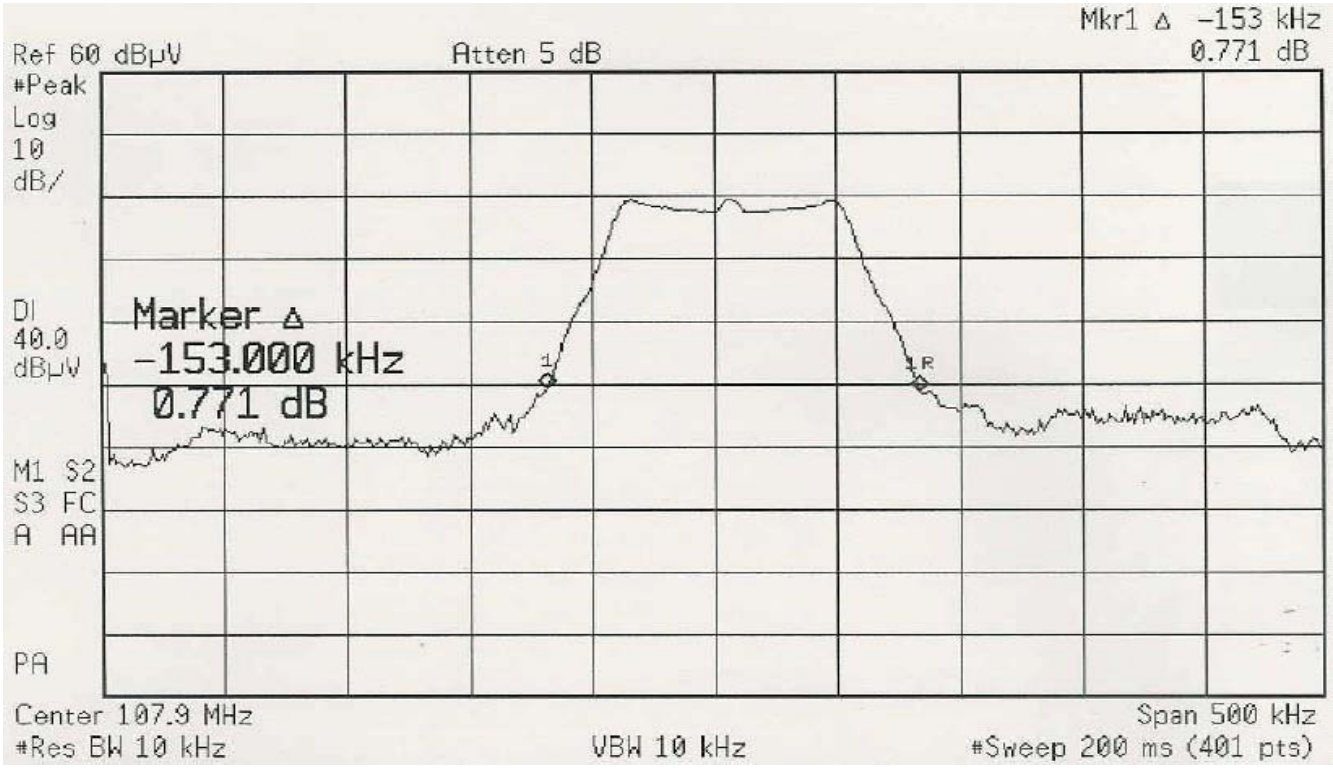
Figure 1:Occupied bandwidth measurement results



low channel(106.7MHz)



middle channel(107.5MHz)



high channel(107.9MHz)

Field strength of emissions according to 15.239(b)

According to 15.239(b), the field strength of emissions from intentional Radiation under these frequency bands shall not exceed the following:

Fundamental frequency (MHz)	Field strength of Fundamental at 3m distance	
	uV/meter	dBuV/meter
88-108	250	48

Freq. (MHz)	Reading (dBuV/m)	C.Loss (dB)	Ant. Factor (dBuV/m)	Azimuth (°)	Ant. Height (cm)	Pol. (H/V)	Limits (dBuV/m)AV	Result (dB) AV	Margin [dB]
FM Transmitting									
106.7	37.6(PK)	2.3	10.0	180	220	H	68.0	49.9	18.1
106.7	32.2(AV)	2.3	10.0	180	220	H	48.0	44.5	3.5
107.5	38.5(PK)	2.3	10.1	180	220	H	68.0	50.9	17.1
107.5	23.0(AV)	2.3	10.1	180	220	H	48.0	35.4	12.6
107.9	38.6(PK)	2.3	10.1	180	220	H	68.0	51.0	17.0
107.9	22.7(AV)	2.3	10.1	180	220	H	48.0	35.1	12.9

Note : 106.7~ 107.9MHz-(Fundamental) .

Out of band radiated emissions test according to 15.239(b)

This test performed to measure Radiated emissions on frequencies outside of the specified 200KHz band and also to verify the EUT full compliance with 15.209,as following:

Other frequency (MHz)	Field Strength Fundamental at 3m distance	
	uV/meter	dBuV/meter
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above960	500	54.0

Freq. (MHz)	Reading (dBuV/m)	C.Loss (dB)	Ant. Factor (dBuV/m)	Azimuth (°)	Ant. Height (cm)	Pol. (H/V)	Limits (dBuV/m)AV	Result (dB) AV	Margin [dB]
FM Transmitting									
114.0	9.6(QP)	2.4	10.8	180	200	H	43.5	22.8	20.7
114.5	13.7(QP)	2.4	10.8	180	200	H	43.5	26.9	16.6
122.7	12.2(QP)	2.6	11.5	180	200	H	43.5	26.3	17.2
129.2	14.7(QP)	2.7	12.0	180	200	H	43.5	29.4	14.1
137.9	2.4(QP)	2.8	12.5	180	200	H	43.5	17.7	25.8
181.3	0.4(QP)	3.2	11.0	180	200	H	43.5	14.6	28.9
229.0	0.8(QP)	3.6	10.0	180	200	H	46.0	14.4	31.6
267.1	2.8(QP)	3.9	11.4	180	200	H	46.0	18.1	27.9
300.0	3.1(QP)	4.3	12.5	180	200	H	46.0	19.9	26.1

Note : 30.0~ 1000.0MHz-(Spurious/Other Frequency) .

The radiated emissions measurements were performed in the anechoic chamber at 3 meters measuring distance in the frequency range of 30MHz to 1GHz. The EUT was placed on the top of the 0.8 meter high, 1 x 1.5 meter non-metallic table. The spectrum was scanned from 30 to 1000 MHz using the Bi-Log antenna .To find the maximum radiation measuring antenna height was changed and the turntable was rotated 360˚. The antenna polarization was changed from vertical to horizontal. The quasi-peak detector with resolution bandwidth of 120KHz was used.

Figure 2: Radiated emission measurement results

Characteristics of Device;

1, Apply Audio signal 1KHz 400mV into Audio mp3 file to mp3player of the FM transmitter .

2, Select the frequency to transmit(Channel 1:106.7MHz, Channel 2:107.5MHz, Channel 3:107.9MHz) then search the Car FM Radio to receiver the concern frequency.

Antenna requirement

1, Standard Applicable

According to 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.

2, Antenna Construction

The antenna is permanently mounted on **PCB**, no consideration of replacement.

Figure 2: Radiated emission measurement results