

FCC TEST REPORT

Under
FCC Part 90, Paragraph 90.210: 2002

Prepared For :

Kirisun Electronics (Shenzhen) Co., Ltd.

Bldg, H-2, East Industrial Zone of Overseas Chinese Town, Nanshan Dist.
Shenzhen, China

FCC ID: Q5EPT220802

EUT: FM Handheld Transceiver

Model: PT2208

November 18, 2003

Report Type: Original Report

Test Engineer: Peter Lin

Test Date: October 16, 2003

Review By: 

Apollo Liu / Manager

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1. General Information

1.1 Notes

The test results of this report relate exclusively to the test item specified in 1.5. The KMO Lab does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the KMO Lab.

1.2 Testing Laboratory

Ke Mei Ou Laboratory Co., Ltd.

7A, Jiaxiangge, Jiahuixincheng, No.3027, Shennan Rd., Futian, Shenzhen, Guangdong, P.R.China.

Tel: +86 755 83642690 Fax: +86 755 83297077

Email: kmolab@tom.com

Internet: www.kmolab.com

1.3 Details of Applicant

Name : Kirisun Electronics (Shenzhen) Co., Ltd.
Address : Bldg, H-2, East Industrial Zone of Overseas Chinese Town, Nanshan Dist. Shenzhen, China.
Contact : Cheryl Zhu / Manager
Tel : + 86 755 26931798
Fax : N/A

1.4 Application Details

Date of Receipt of Application : August 11, 2003
Date of Receipt of Test Item : October 13, 2003
Date of Test : October 16~November 15, 2003

1.5 Test Item

Manufacturer : See Applicant
Trade Name : Kirisun
Model No. : PT2208
Description : FM Handheld Transceiver

Additional Information

Frequency : 150MHz~174MHz
RF Power : 5W
Number of Channels : 16
Power Supply : DC 7.2V
Dimension : 55mm x 115mm x 32mm
Weight : 240 g with battery and antenna

1. 6 Test Standards

FCC Part 90, Paragraph 90.210: 2002

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

2. Technical Test Results

2.1 Summary of Test Results

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.107	AC Line Conducted Emission	N/A	Owing to the DC operation of EUT, this test item is not performed.
FCC 2.1046 & 90.205(h)	RF Output Power	PASS	Complies
FCC 2.1047 & 90.207 & 90.210(b)	Modulation Characteristics	PASS	Complies
FCC 2.1049 & 90.209(b)(5) & 90.210(b)	Occupied Bandwidth	PASS	Complies
FCC 2.1053 & 90.210(b)	Radiated Spurious Emission	PASS	Complies.
FCC 2.1051 & 90.210(b)	Spurious Emission on Antenna Port	PASS	Complies.
FCC 2.1055 & 90.213	Frequency Stability Vs. Temperature Vs. Voltage	PASS	Complies.
FCC Section 90.214	Transient Frequency Behavior	PASS	Complies.

2.2 EUT Modifications

No modification by Ke Mei Ou Laboratory Co., Ltd.

3. Technical Characteristics Test

3.1 Conducted Emission Test

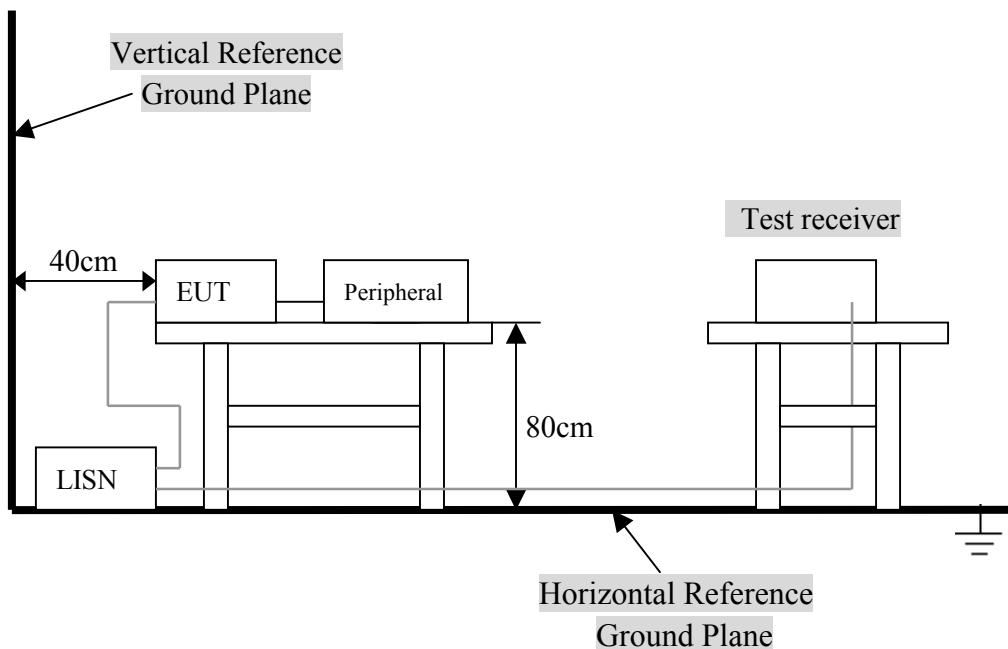
3.1.1 Test Equipment

Please refer to Section 6 this report.

3.1.2 Test Procedure

The EUT was tested according to ANSI C63.4 - 2001. The frequency spectrum from 0.15 MHz to 30 MHz was investigated. The LISN used was 50 ohm / 50 uHenry as specified by section 5.1 of ANSI C63.4 - 2001. cables and peripherals were moved to find the maximum emission levels for each frequency.

3.1.3 Test Setup



For the actual test configuration, Please refer to the related items– Photos of Testing.

3.1.4 Configuration of the EUT

Prepared in accordance with the requirements of the FCC Rules and Regulations Part 2. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer or receiver was off throughout evaluation process. Interconnecting cables were manipulated as necessary to maximize emissions. The EUT was configured according to ANSI C63.4-2001. EUT was used DC 7.2V. The operation frequency is from 150MHz~174MHz. Enable the signal transmitted from the external antenna from EUT to receiver. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A. EUT

Device	Manufacturer	Model #	FCC ID
FM Handheld Transceiver	Kirisun Electronics (Shenzhen) Co., Ltd.	PT2208	Q5EPT220802

B. Internal Devices

Device	Manufacturer	Model #	FCCID / DoC
N/A			

C. Peripherals

Device	Manufacturer	Model # Serial #	FCC ID/ DoC	Cable
N/A				

3.1.5 EUT Operating Condition

Operating condition is according to ANSI C63.4 - 2001.

- A. Setup the EUT and simulators as shown on follow.
- B. Enable RF signal and confirm EUT active.
- C. Modulate output capacity of EUT up to specification.

3.1.6 Conducted Power Line Emission Limits

FCC Part 15 Paragraph 15.107 (dBuV)		
Frequency Range (MHz)	Class A QP/AV	Class B QP/AV
0.15 – 0.5	79/66	66-56/56-46
0.5 – 5.0	73/60	56/46
5.0 - 30	73/60	60/50

NOTE : In the above table, the tighter limit applies at the band edges.

3.1.7 Conducted Power Line Test Result

Owing to the DC operation of EUT, this test item is not performed.

3.2 RF Output Power

3.2.1 Test Equipment

Please refer to section 6 this report.

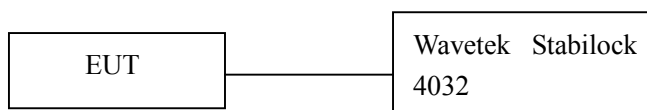
3.2.2 Test Procedure

Measurements shall be made to establish the radio frequency power delivered by the transmitter the standard output termination. The power output shall be monitored and recorded and no adjustment shall be made to the transmitter after the test has begun, except as noted below:

If the power output is adjustable, measurements shall be made for the highest and lowest power levels.

Measurement with Wavetek Stabilock 4032 conducted, external power supply with 7.2V stabilized supply voltage.

3.2.3 Test Setup



The EUT was directly connected to a RF Communication Test Set.

3.2.4 Configuration of The EUT

Same as section 3.1.4 of this report

3.2.5 EUT Operating Condition

Same as section 3.1.5 of this report

3.2.6 Limit

FCC Part 22:

<150 Watts

FCC Part 74.461:

Power delivered to antenna must be < 100 Watts

FCC Part 80.125:

Maximum power at the input terminal to the antenna is 50 Watts

FCC Part 90.925:

Power dependent upon station's antenna HATT and required service area and may be from 1 to 500 Watts.

3.2.7 RF Output Power Test Result

Product	: FM Handheld Transceiver	Test Mode	: CH1-150MHz
Test Item	: RF Output Power	Temperature	: 25 °C
Test Voltage	: DC 7.2V (External Power Supply)	Humidity	: 56%RH
Test Result	: PASS		

CH1

Freq. (MHz)	Measurement (dBm/Watt)	FCC Limit (Watt)
149.999	36.00/3.98	Varies

Product	: FM Handheld Transceiver	Test Mode	: CH2-162MHz
Test Item	: RF Output Power	Temperature	: 25 °C
Test Voltage	: DC 7.2V (External Power Supply)	Humidity	: 56%RH
Test Result	: PASS		

CH2

Freq. (MHz)	Measurement (dBm/Watt)	FCC Limit (Watt)
161.999	36.62/4.59	Varies

Product	: FM Handheld Transceiver	Test Mode	: CH3-174MHz
Test Item	: RF Output Power	Temperature	: 25 °C
Test Voltage	: DC 7.2V (External Power Supply)	Humidity	: 56%RH
Test Result	: PASS		

CH3

Freq. (MHz)	Measurement (dBm/Watt)	FCC Limit (Watt)
173.999	36.79/4.78	Varies

3.3 Modulation Characteristics

3.3.1 Test Equipment

Please refer to section 6 this report.

3.3.2 Test Procedure

a. Audio frequency response: The RF output of the transceiver was connected to HP8920 directly without any attenuation. The internal audio signal generator of HP8920 was coupled into the external microphone input jack of EUT. The audio input was adjusted to obtain 20% of maximum rated system deviation at 1 kHz and recorded as DEV_{REF} . This input level was not changed when the audio frequency was turned between 100 Hz and 5000 Hz. The deviation (DEV_{FREQ}) was recorded from HP8920 and the values calculated as:

$$20 \cdot \log_{10} [DEV_{FREQ}/DEV_{REF}]$$

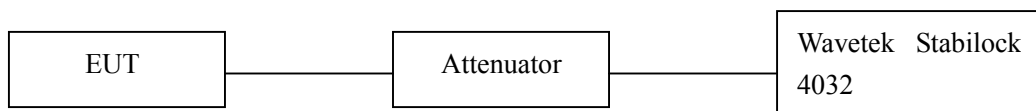
b. Audio Low-Pass Filter Response: The HP8920 was used a signal generator and as receiver. The audio input was adjusted to obtain 20% of maximum rated system deviation at 1 kHz and recorded as LEV_{REF} . This input level was not changed when the audio frequency was turned between 1000 Hz and 50000 Hz. The received audio level (LEV_{FREQ}) was recorded from HP8920 and the values calculated as:

$$LEV_{FREQ} - LEV_{REF}$$

and noted down in the diagram.

c. The RF output of the transceiver was connected trough attenuator to Wavetek Stabilock 4032 directly without any attenuation. The internal audio signal generator of Wavetek Stabilock 4032 was coupled into the external microphone input jack of EUT. The audio input was than varied at several significant frequency points and the result recorded. Later on was this result verified by measuring the spectrum of each channel with different audio input levels.

3.3.3 Test Setup



3.3.4 Configuration of The EUT

Same as section 3.1.4 of this report

3.3.5 EUT Operating Condition

Same as section 3.1.5 of this report

3.3.6 Limit

FCC Part 22:

None

FCC Part 74.463:

Each new remote pickup broadcast station with a power output in excess of 3 watts shall be equipment with a device which will automatically prevent modulation in excess of the limits. If frequency modulation is employed, the emissions shall conform to the emission requirements of 74.462.

FCC Part 80.213:

(a) When phase of frequency modulation is used in the 156~162 MHz and 216~220 MHz bands, the peak modulation must be maintained between 75 and 100 percent. A frequency deviation of ± 5 kHz is defined as 100 percent peak modulation.

(b) Transmitters using F3E emission must have a modulation limiter to prevent any modulation over 100 percent.

(d) Ship and coast station transmitters operating in the 156~162 MHz and 216~220MHz bands must be capable of proper operation with a frequency deviation of ± 5 kHz.

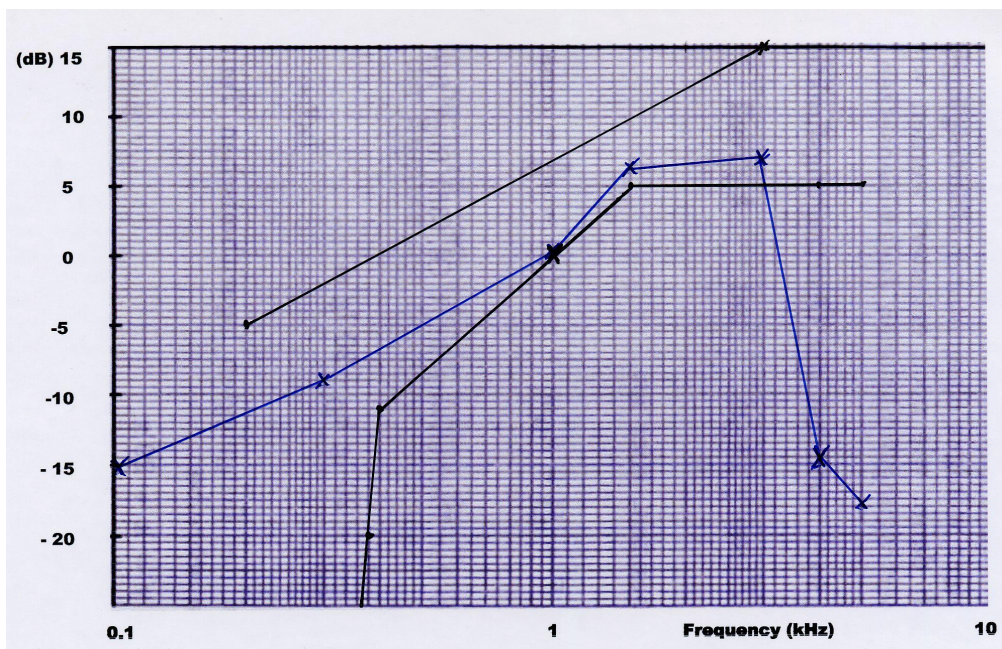
(e) Coast station transmitters operated in the 156~162 MHz band must be equipped with an audio low-pass filter. The filter must be installed between the modulation limiter and the modulated radio frequency stage. At frequencies between 3 kHz and 20kHz it must have an attenuation greater than at 1kHz by at least $60 \log(f/3)$ dB. At frequencies above 20kHz the attenuation must be at least 50 dB greater than at 1kHz.

FCC Part 90.205:

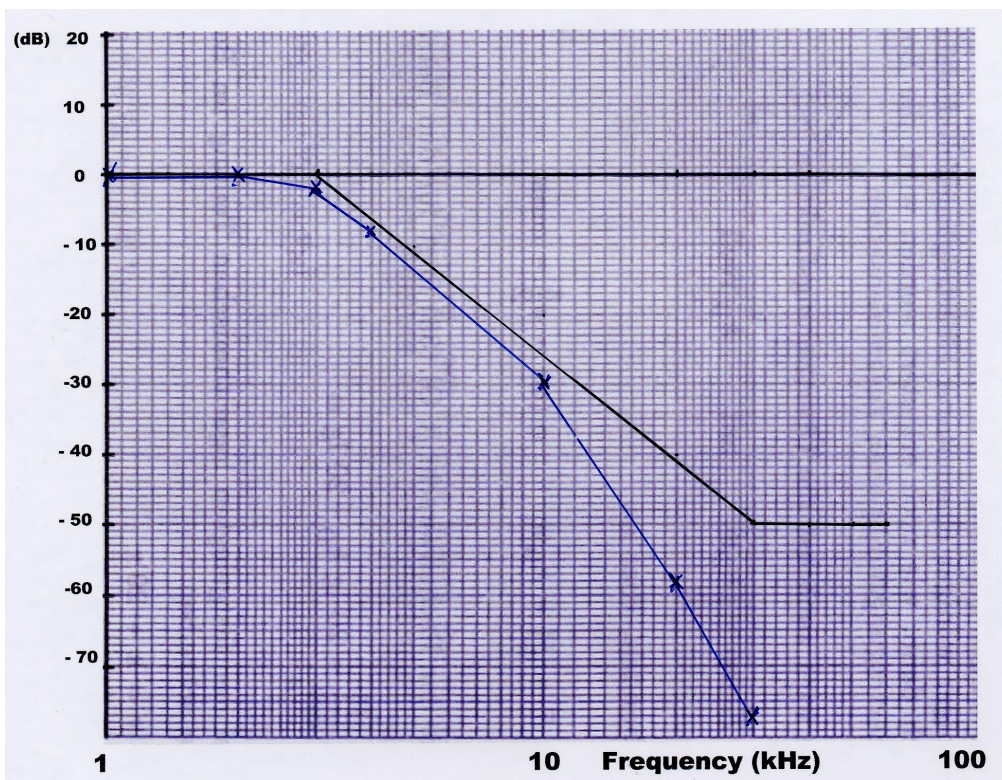
Transmitters utilizing analog emissions that are equipped with an audio low-pass filter must meet the emission limitations must meet proper emissions mask of 90.210.

3.3.7 Modulation Characteristics Test Result

Audio Frequency Response

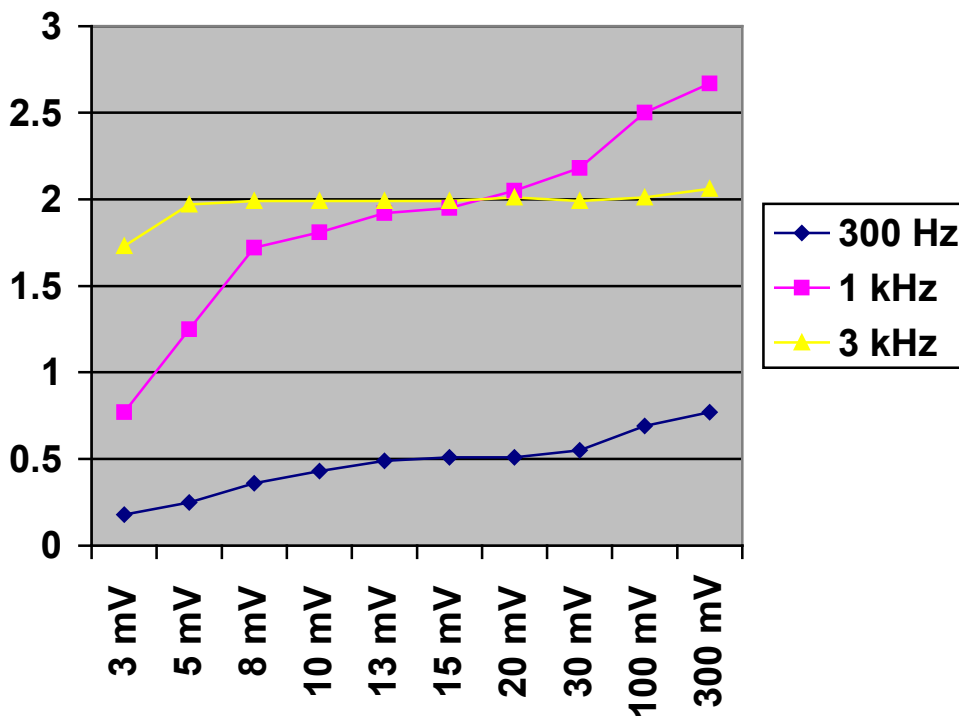


Audio Low-Pass Filter Response



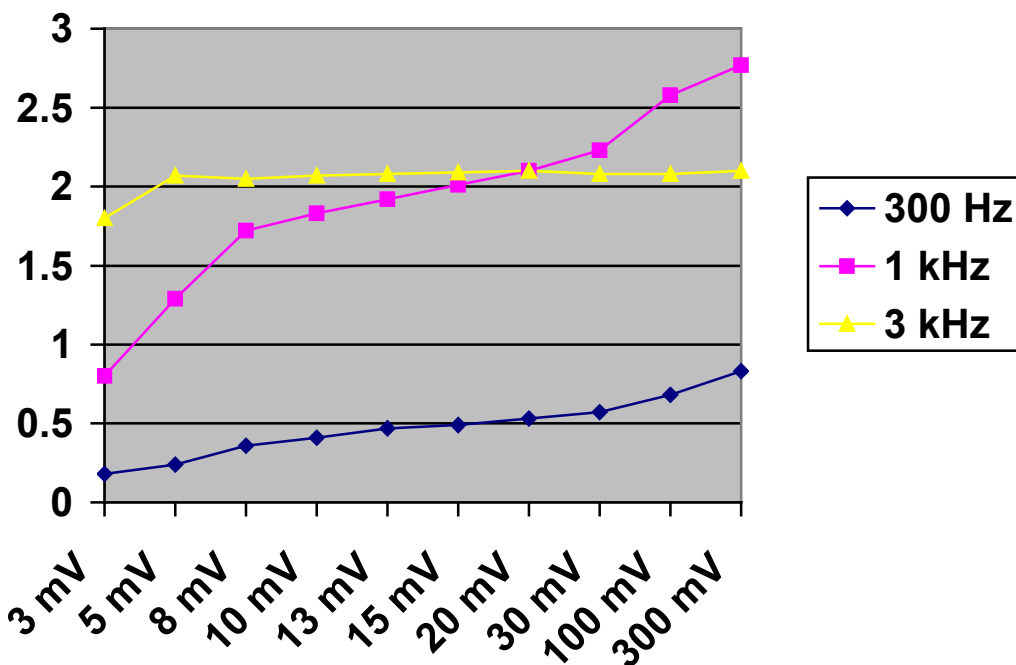
Product : FM Handheld Transceiver Test Mode : CH1-150MHz
 Test Item : Modulation Characteristics Temperature : 25 °C
 Test Voltage : DC 7.2V (External Power Supply) Humidity : 56%RH
 Test Result : **PASS**

Channel 1: 150MHz	300 Hz	1 kHz	3 kHz
3 mV	0.18	0.77	1.73
5 mV	0.25	1.25	1.97
8 mV	0.36	1.72	1.99
10 mV	0.43	1.81	1.99
13 mV	0.49	1.92	1.99
15 mV	0.51	1.95	1.99
20 mV	0.51	2.05	2.01
30 mV	0.55	2.18	1.99
100 mV	0.69	2.50	2.01
300 mV	0.77	2.67	2.06



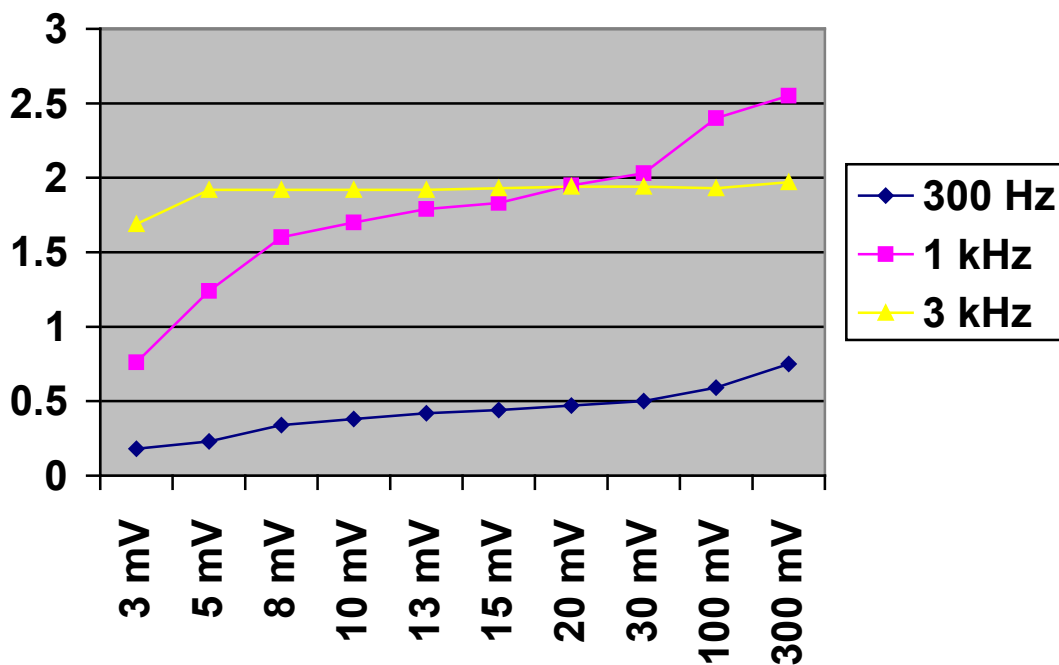
Product : FM Handheld Transceiver Test Mode : CH2-162MHz
 Test Item : Modulation Characteristics Temperature : 25 °C
 Test Voltage : DC 7.2V (External Power Supply) Humidity : 56%RH
 Test Result : **PASS**

Channel 2: 162MHz	300 Hz	1 kHz	3 kHz
3 mV	0.18	0.80	1.80
5 mV	0.24	1.29	2.07
8 mV	0.36	1.72	2.05
10 mV	0.41	1.83	2.07
13 mV	0.47	1.92	2.08
15 mV	0.49	2.01	2.09
20 mV	0.53	2.10	2.10
30 mV	0.57	2.23	2.08
100 mV	0.68	2.58	2.08
300 mV	0.83	2.77	2.10



Product : FM Handheld Transceiver Test Mode : CH3-174MHz
 Test Item : Modulation Characteristics Temperature : 25 °C
 Test Voltage : DC 7.2V (External Power Supply) Humidity : 56%RH
 Test Result : **PASS**

Channel 3: 174MHz	300 Hz	1 kHz	3 kHz
3 mV	0.18	0.76	1.69
5 mV	0.23	1.24	1.92
8 mV	0.34	1.60	1.92
10 mV	0.38	1.70	1.92
13 mV	0.42	1.79	1.92
15 mV	0.44	1.83	1.93
20 mV	0.47	1.95	1.94
30 mV	0.50	2.03	1.94
100 mV	0.59	2.40	1.93
300 mV	0.75	2.55	1.97



3.4 Occupied Bandwidth

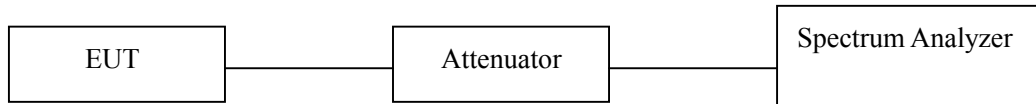
3.4.1 Test Equipment

Please refer to section 6 this report.

3.4.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer with sufficient attenuation. The RBW was set to 300Hz and the spectrum was recorded ± 5 kHz from the carrier frequency. The audioinput was set to 0 to get the unmodulated carrier, in second step 27mV Audio signal with 1kHz was applied over audio input connector, the resulting picture is print out for channel 1, 2 and 3. RBW 300Hz, VBW 1kHz, SWP 4.37s, SPAN 20kHz.

3.4.3 Test Setup



3.4.4 Configuration of The EUT

Same as section 3.1.4 of this report

3.4.5 EUT Operating Condition

Same as section 3.1.5 of this report

3.4.6 Limit

FCC Part 22.359, 74.462, 80.211 and 90.210 (25kHz bandwidth only):

For any frequency removed from the center of the assigned channel by more than 50 percent up to and including 100 percent of the authorized bandwidth, at least 25 dB.

On any frequency removed from the center of the assigned channel by more than 100 percent up to and including 250 percent, at least 35 dB.

On any frequency removed from the center of the assigned channel by more than 250 percent at least:

Low: $43 + 10 \log (P_{\text{watts}}) = 43 + 10 \log (3.98) = 49.0 \text{ dB}$

Middle: $43 + 10 \log (P_{\text{watts}}) = 43 + 10 \log (4.59) = 49.6 \text{ dB}$

High: $43 + 10 \log (P_{\text{watts}}) = 43 + 10 \log (4.78) = 49.8 \text{ dB}$

The Resolution bandwidth was 300 Hz or greater for measuring up to 250kHz from the edge of the authorized frequency segment, and 30 kHz greater for measuring more than 250 kHz from the authorization frequency segment.

FCC Part 90.210 (12.5 kHz Bandwidth only):

For any frequency removed from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0 , 0 dB.

On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz, at least 7.27 ($f_d - 2.88 \text{ kHz}$)dB.

On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz at least:

Low: $50 + 10 \log (P_{\text{watts}}) = 50 + 10 \log (3.98) = 56.0 \text{ dB}$

Middle: $50 + 10 \log (P_{\text{watts}}) = 50 + 10 \log (4.59) = 56.6 \text{ dB}$

High: $50 + 10 \log (P_{\text{watts}}) = 50 + 10 \log (4.78) = 56.8 \text{ dB}$

Emission Designator

The necessary bandwidth calculation for this unit is as follows:

$B_N = 2M + 2DK$, ($M = 3\text{kHz}$), ($D = 2.1\text{kHz}$), ($K = 1$)

$B_N = 2(3\text{kHz}) + 2(2.1\text{kHz})(1)$

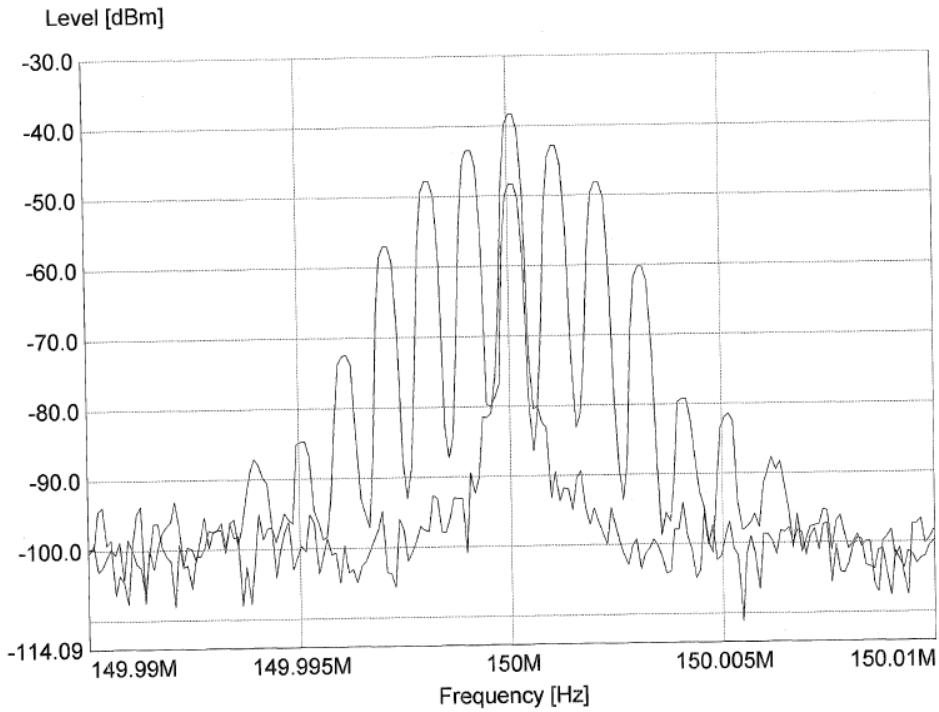
$B_N = 10.2\text{kHz}$

Then B_N equates to 10k2

3.4.7 Occupied Bandwidth Test Result

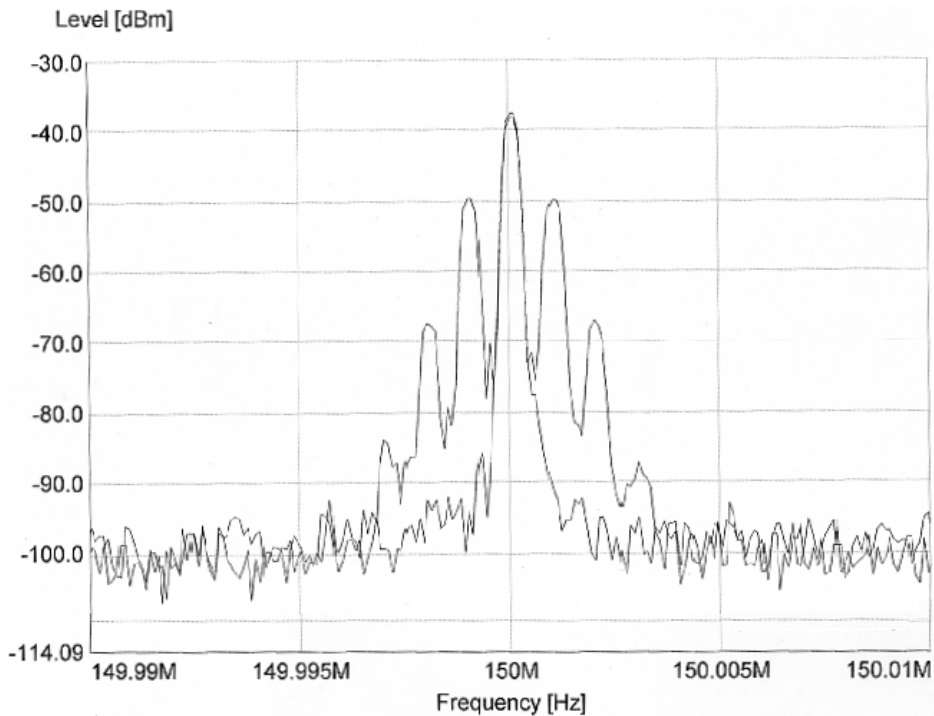
Product	: FM Handheld Transceiver	Test Mode	: CH1-150MHz
Test Item	: Occupied Bandwidth	Temperature	: 25 °C
Test Voltage	: DC 7.2V (External Power Supply)	Humidity	: 56%RH
Test Result	: PASS		

CH1: Wide Bandwidth



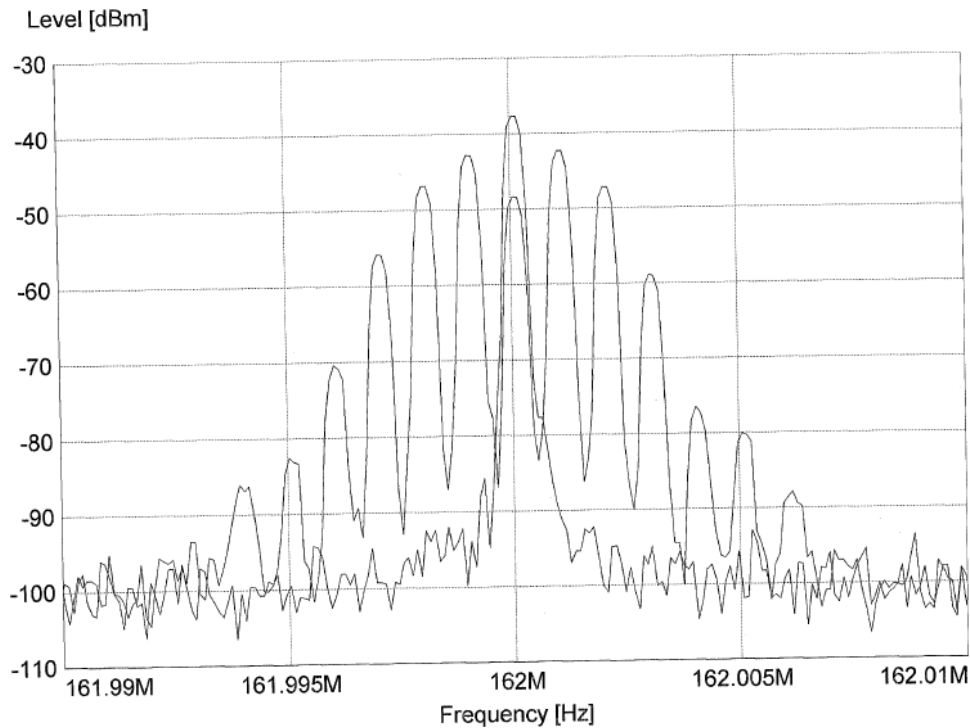
27 mV

CH1: Narrow Bandwidth

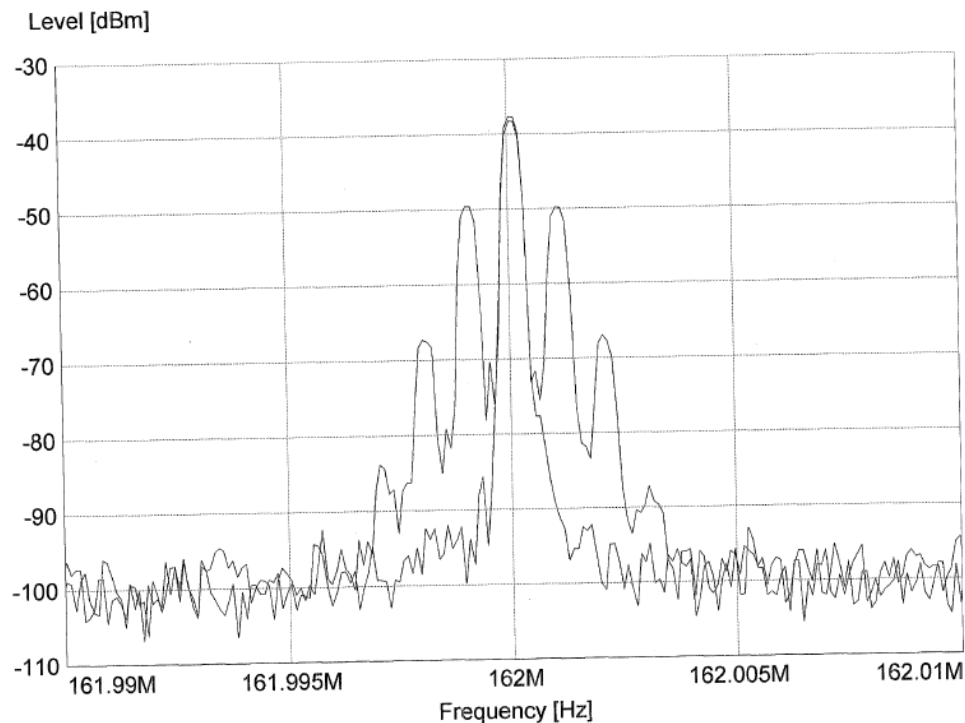


Product	: FM Handheld Transceiver	Test Mode	: CH2-162MHz
Test Item	: Occupied Bandwidth	Temperature	: 25 °C
Test Voltage	: DC 7.2V (External Power Supply)	Humidity	: 56%RH
Test Result	: PASS		

CH2: Wide Bandwidth



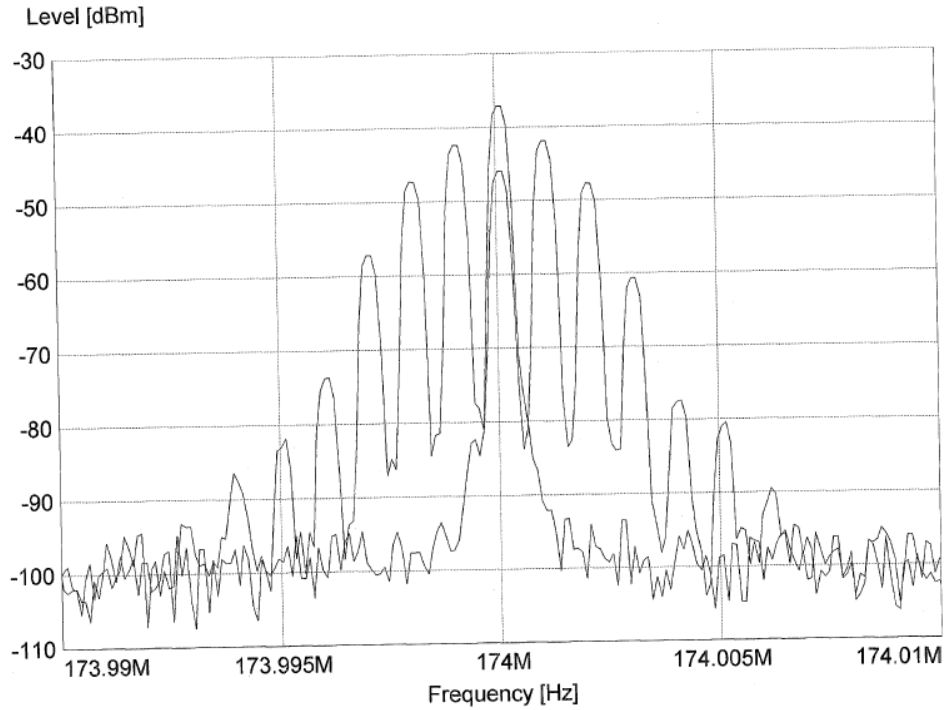
CH2: Narrow Bandwidth



input Level: 3mV

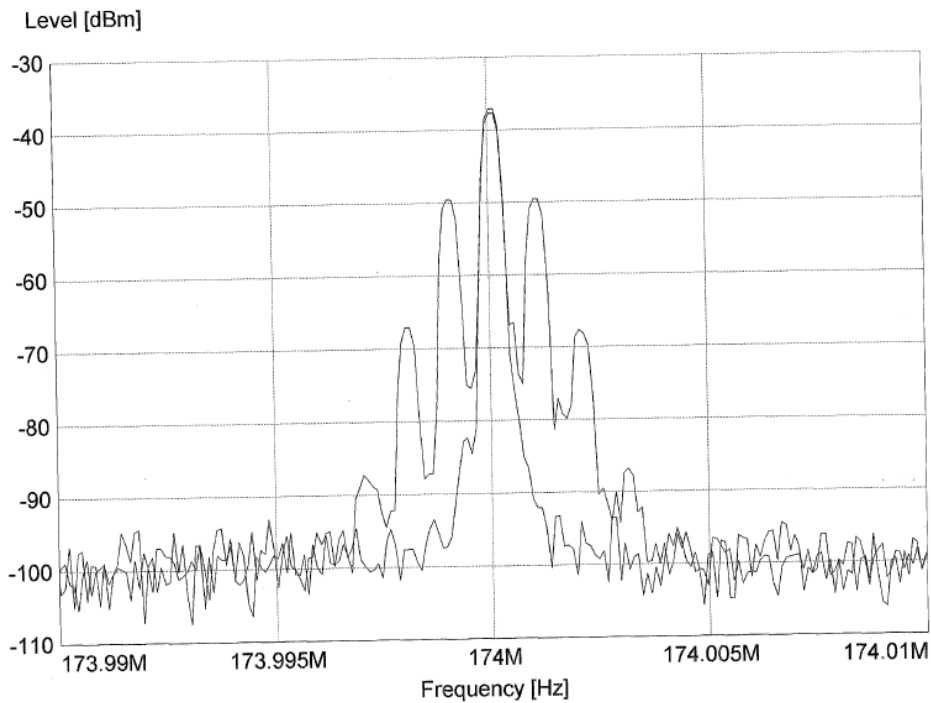
Product	: FM Handheld Transceiver	Test Mode	: CH3-174MHz
Test Item	: Occupied Bandwidth	Temperature	: 25 °C
Test Voltage	: DC 7.2V (External Power Supply)	Humidity	: 56%RH
Test Result	: PASS		

CH3: Wide Bandwidth



27 mV

CH3: Narrow Bandwidth



3 mV

3.5 Radiated Spurious Emission

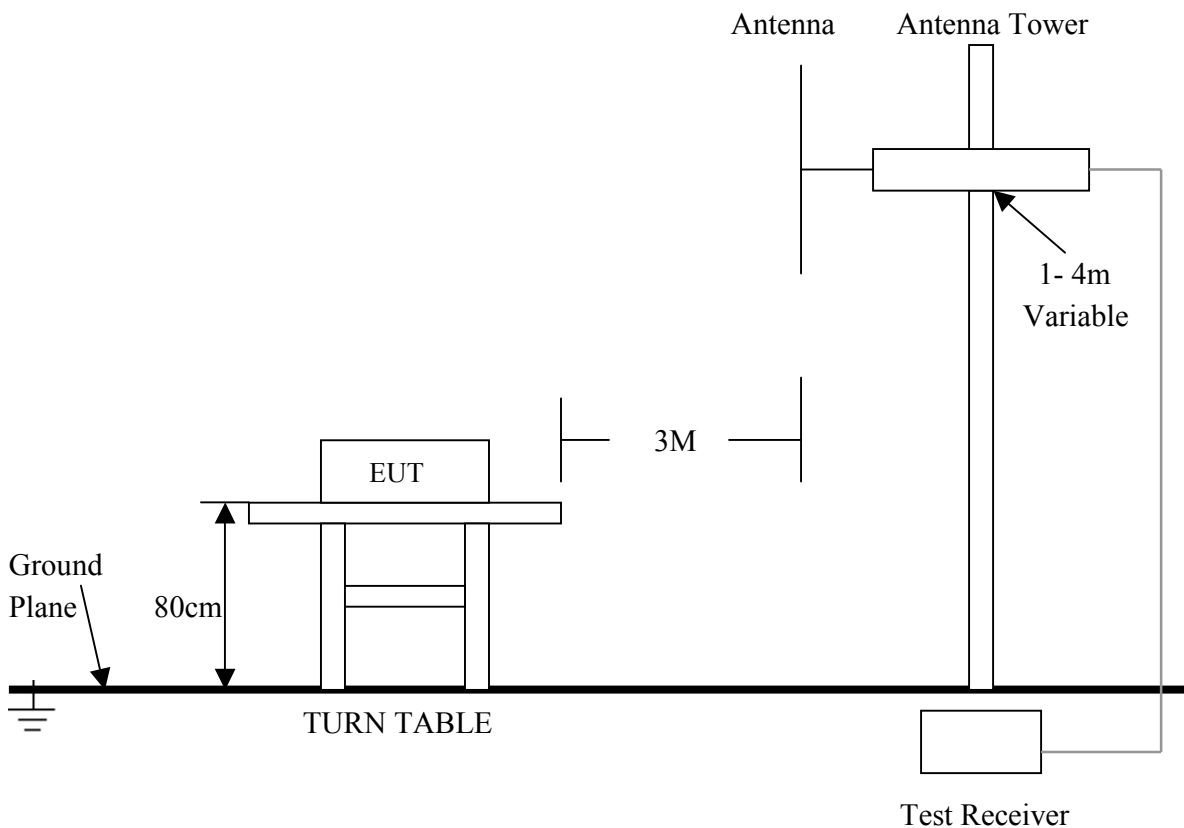
3.5.1 Test Equipment

Please refer to section 6 this report.

3.5.2 Test Procedure

The transmitter was placed on a wooden turntable and was transmitting in a non radiating dummy load which was directly connected to the antenna connector. The battery was replaced by monitored voltage source. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna was height and polarization as well as the EUT azimuth where varied in orders to identify the maximum level of emission from the EUT. The test was performed by placing the EUT on 3 orthogonal axis. The frequency range up to tenth harmonic of the fundamental frequency was investigated. All tests was performed for the lower, the middle and the highest frequency.

3.5.3 Test Setup



For the actual test configuration , please refer to the related items – Photos of Testing.

3.5.4 Configuration of The EUT

Same as section 3.1.4 of this report

3.5.5 EUT Operating Condition

Same as section 3.1.5 of this report

3.5.6 Limit

FCC Part 22.359, 74.462, 80.211 and 90.210 (25 kHz bandwidth only):

On any frequency removed from the center of the assigned channel by more than 250 percent at least:

Low: $43 + 10 \log (\text{Pwatts}) = 43 + 10 \log (3.98) = 49.0 \text{ dB}$

Middle: $43 + 10 \log (\text{Pwatts}) = 43 + 10 \log (4.59) = 49.6 \text{ dB}$

High: $43 + 10 \log (\text{Pwatts}) = 43 + 10 \log (4.78) = 49.8 \text{ dB}$

FCC Part 90.210 (12.5 kHz Bandwidth only):

On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz at least:

Low: $50 + 10 \log (\text{Pwatts}) = 50 + 10 \log (3.98) = 56.0 \text{ dB}$

Middle: $50 + 10 \log (\text{Pwatts}) = 50 + 10 \log (4.59) = 56.6 \text{ dB}$

High: $50 + 10 \log (\text{Pwatts}) = 50 + 10 \log (4.78) = 56.8 \text{ dB}$

Note: In general, the worse case attenuation requirement shown above was applied.

3.5.7 Radiated Spurious Emission Test Result

Product : FM Handheld Transceiver Test Mode : CH1-150MHz
 Test Item : Radiated Spurious Emission Temperature : 25 °C
 Test Voltage : DC 7.2V (External Power Supply) Humidity : 56%RH
 Test Result : **PASS**

CH1

Frequency (MHz)	HORIZ / VERT	Level in dBm
299.799	V	-68.25
299.799	H	-55.51
450.400	V	-52.43
450.400	H	51.51
600.300	V	-53.70
599.599	H	-58.06
749.699	V	-39.54
750.400	H	-44.15
900.002	V	-44.36
900.002	H	-51.36
1049.098	V	-50.67
1049.098	H	-51.08

Product : FM Handheld Transceiver Test Mode : CH2-162MHz
 Test Item : Radiated Spurious Emission Temperature : 25 °C
 Test Voltage : DC 7.2V (External Power Supply) Humidity : 56%RH
 Test Result : **PASS**

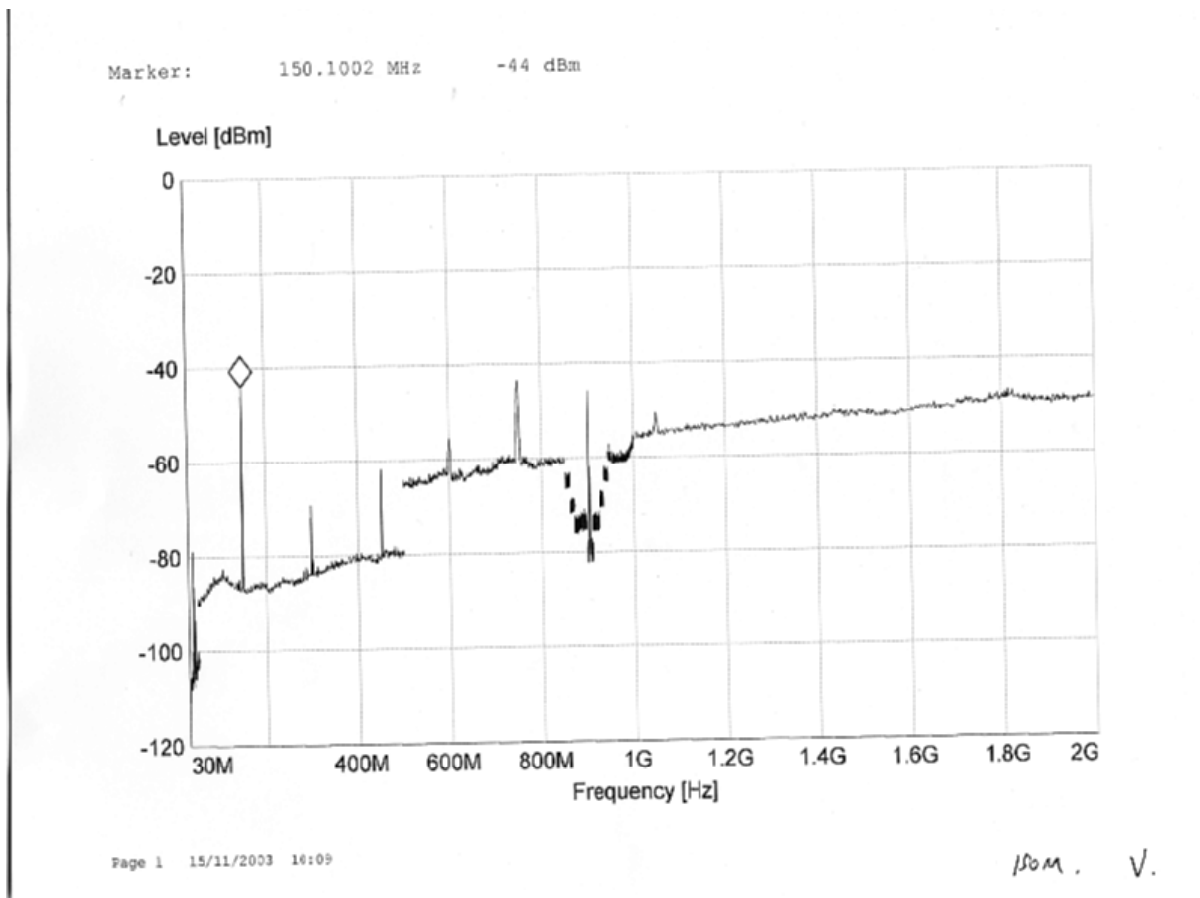
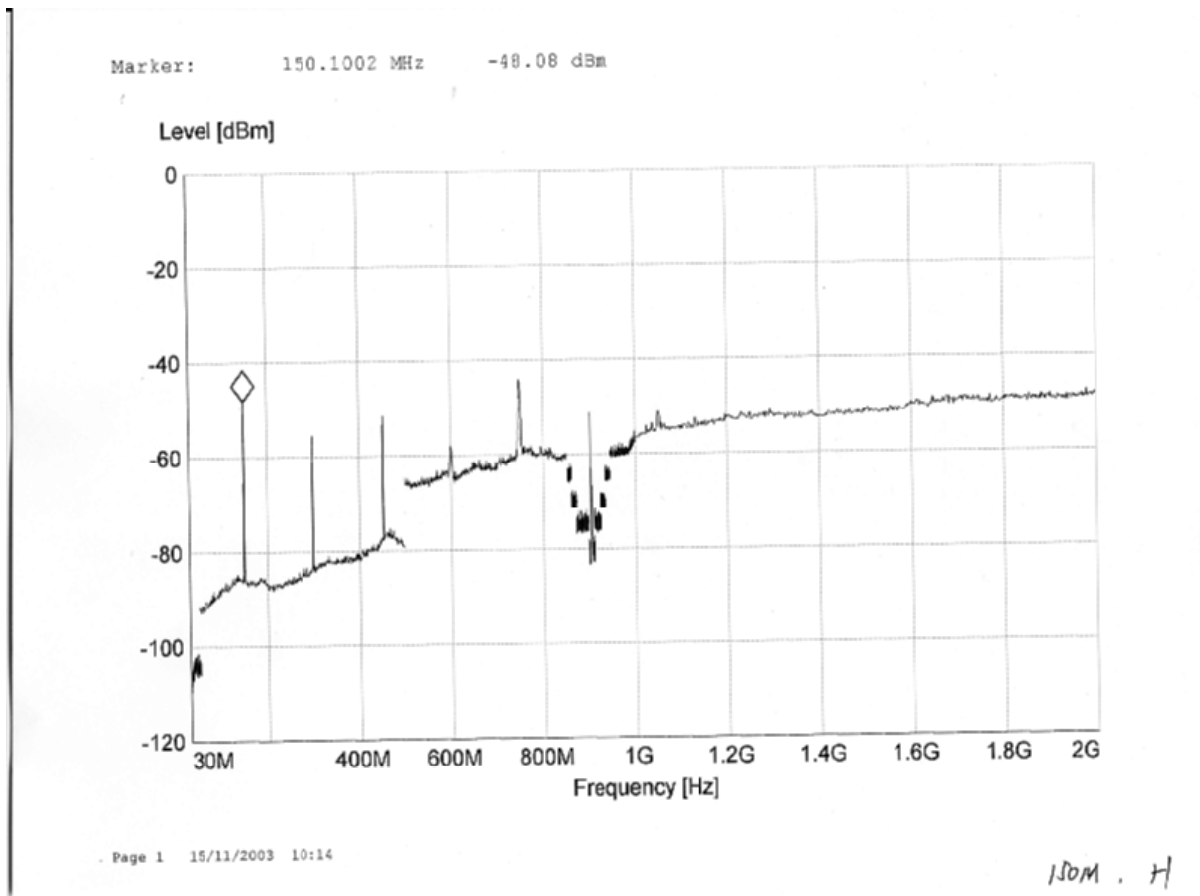
CH2

Frequency (MHz)	HORIZ / VERT	Level in dBm
324.148	V	-46.37
324.148	H	-46.73
486.472	V	-60.42
486.472	H	-52.59
647.995	V	-51.41
648.697	H	-49.42
810.721	V	-50.87
810.020	H	-47.18
901.956	V	-62.93
902.006	H	-63.52

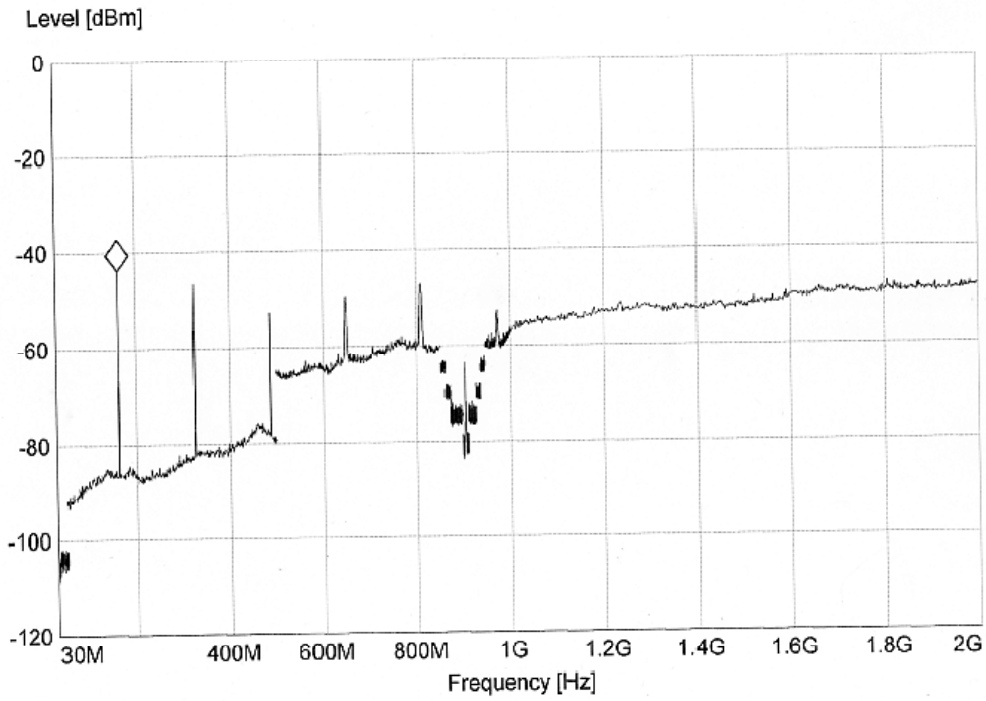
Product : FM Handheld Transceiver Test Mode : CH3-174MHz
 Test Item : Radiated Spurious Emission Temperature : 25 °C
 Test Voltage : DC 7.2V (External Power Supply) Humidity : 56%RH
 Test Result : **PASS**

CH3

Frequency (MHz)	HORIZ / VERT	Level in dBm
348.499	V	-41.25
348.496	H	-50.63
521.743	V	-60.25
521.042	H	-56.83
696.392	V	-50.34
695.691	H	-49.28
869.979	V	-52.48
870.000	H	-48.78
1043.486	V	-51.48
-	H	-



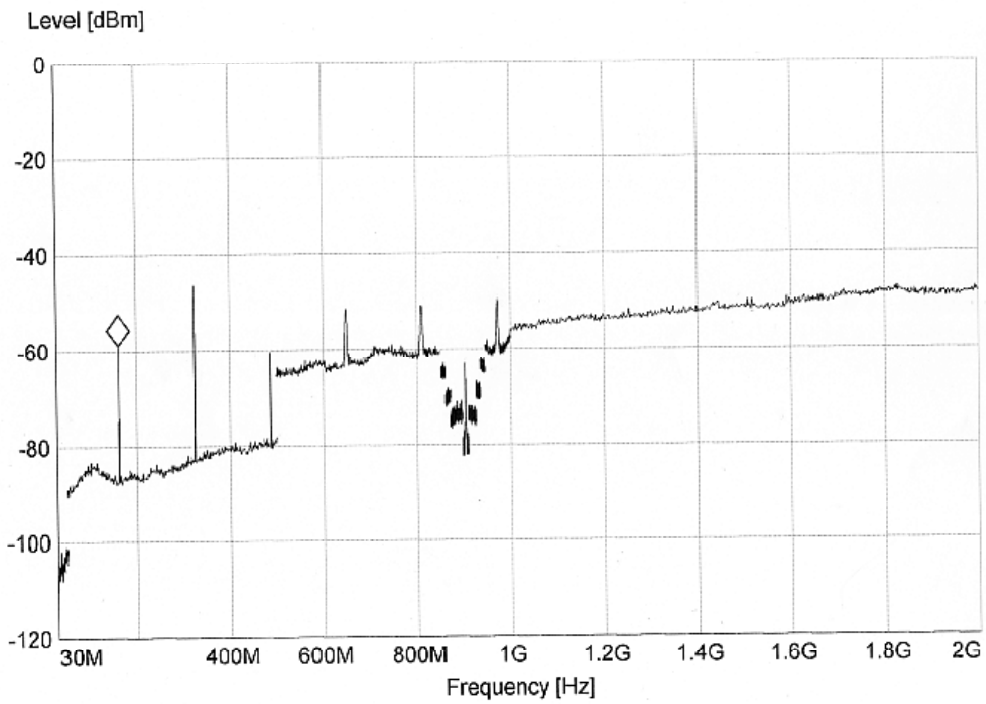
Marker: 161.823647 MHz -43.79 dBm



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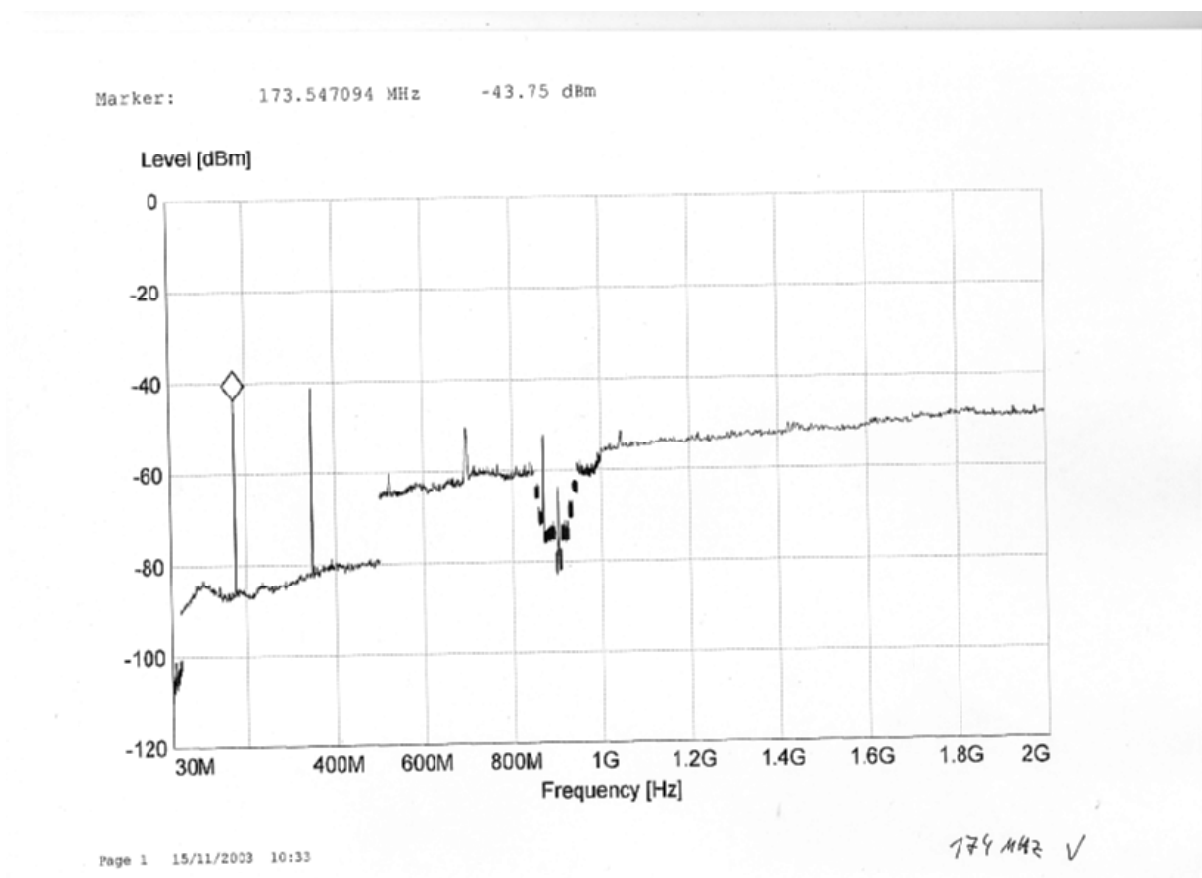
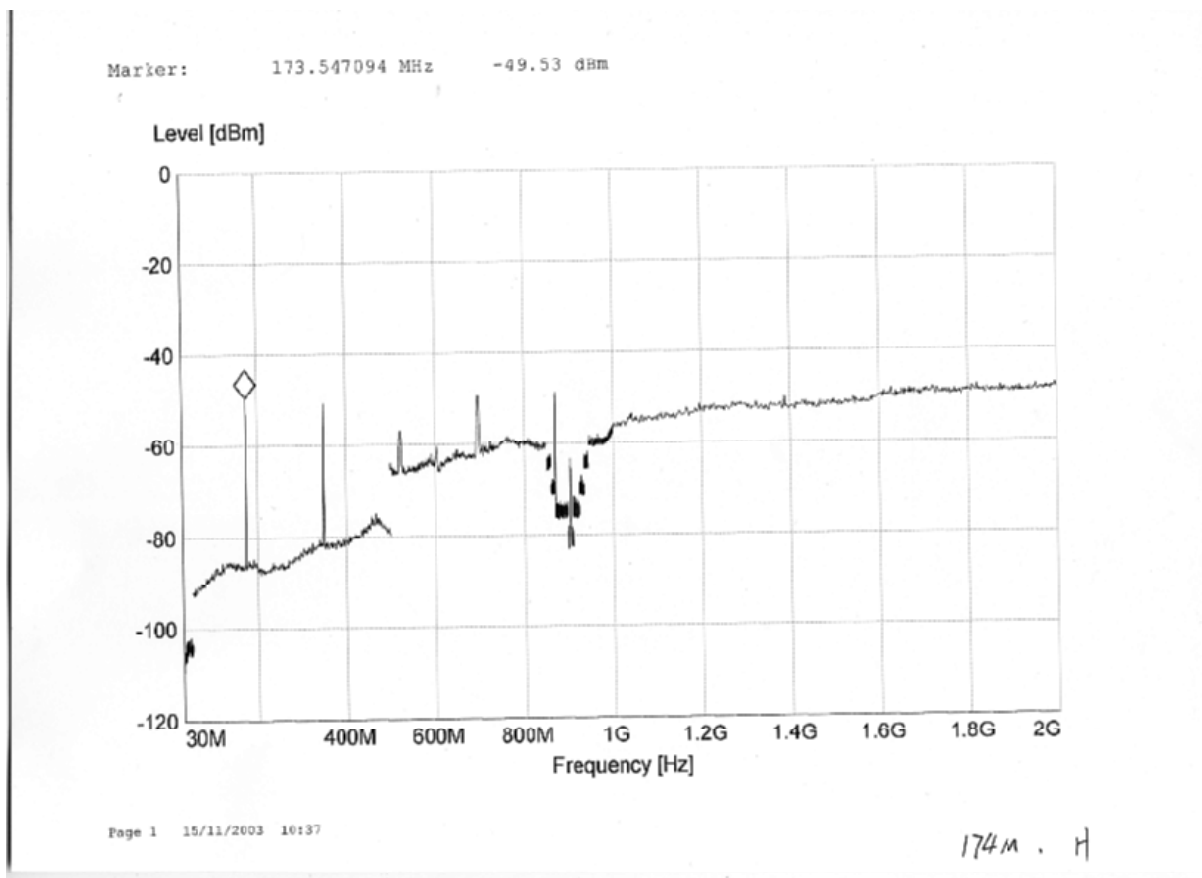
162M. H.

Marker: 161.823647 MHz -58.73 dBm



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162M. V.



3.6 Spurious Emission on Antenna Port

3.6.1 Test Equipment

Please refer to section 6 this report.

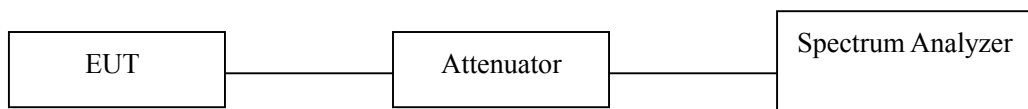
3.6.2 Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set to 100 kHz. Sufficient scans were take to show any out of band emission up to 10th. Harmonic for the lower, the middle and the highest frequency range.

RBW 100kHz, VBW 100kHz, SPAN 1.9GHz, attenuation was set totally to 72.88dB, therefore in result no spurious emission to see anymore.

The audio input was set to 0 to get the unmodulated carrier, the resulting picture is print out for channel 1, 2 and 3.

3.6.3 Test Setup



3.6.4 Configuration of The EUT

Same as section 3.1.4 of this report

3.6.5 EUT Operating Condition

Same as section 3.1.5 of this report

3.6.6 Limit

FCC Part 22.359, 74.462, 80.211 and 90.210 (25 kHz bandwidth only):

On any frequency removed from the center of the assigned channel by more than 250 percent at least:

Low: $43 + 10 \log(\text{Pwatts}) = 43 + 10 \log(3.98) = 49.0 \text{ dB}$

Middle: $43 + 10 \log(\text{Pwatts}) = 43 + 10 \log(4.59) = 49.6 \text{ dB}$

High: $43 + 10 \log(\text{Pwatts}) = 43 + 10 \log(4.78) = 49.8 \text{ dB}$

FCC Part 90.210 (12.5 kHz Bandwidth only):

On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz at least:

Low: $50 + 10 \log(\text{Pwatts}) = 50 + 10 \log(3.98) = 56.0 \text{ dB}$

Middle: $50 + 10 \log(\text{Pwatts}) = 50 + 10 \log(4.59) = 56.6 \text{ dB}$

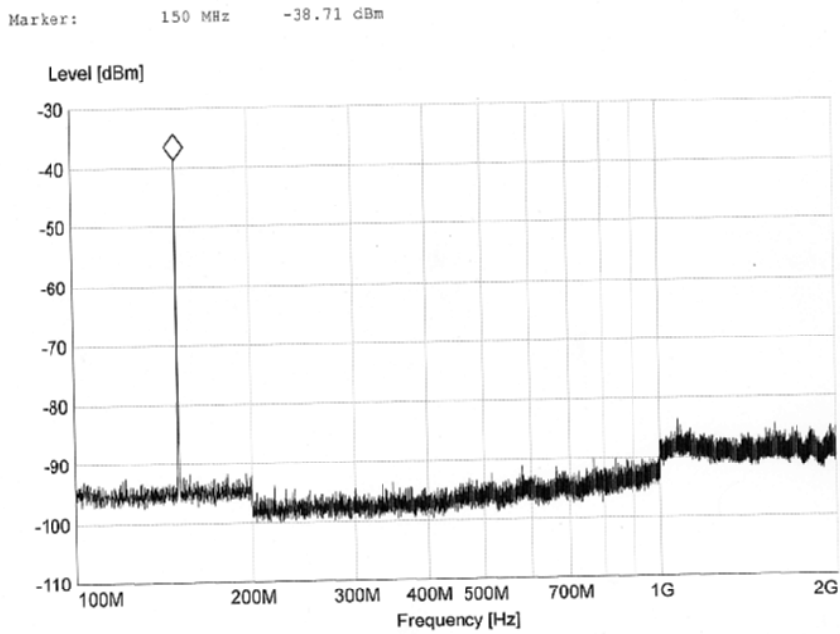
High: $50 + 10 \log(\text{Pwatts}) = 50 + 10 \log(4.78) = 56.8 \text{ dB}$

Note: In general, the worse case attenuation requirement shown above was applied.

3.6.7 Spurious Emission on Antenna Port Test Result

Product	: FM Handheld Transceiver	Test Mode	: CH1-150MHz
Test Item	: Spurious Emission on Antenna Port	Temperature	: 25 °C
Test Voltage	: DC 7.2V (External Power Supply)	Humidity	: 56%RH
Test Result	: PASS		

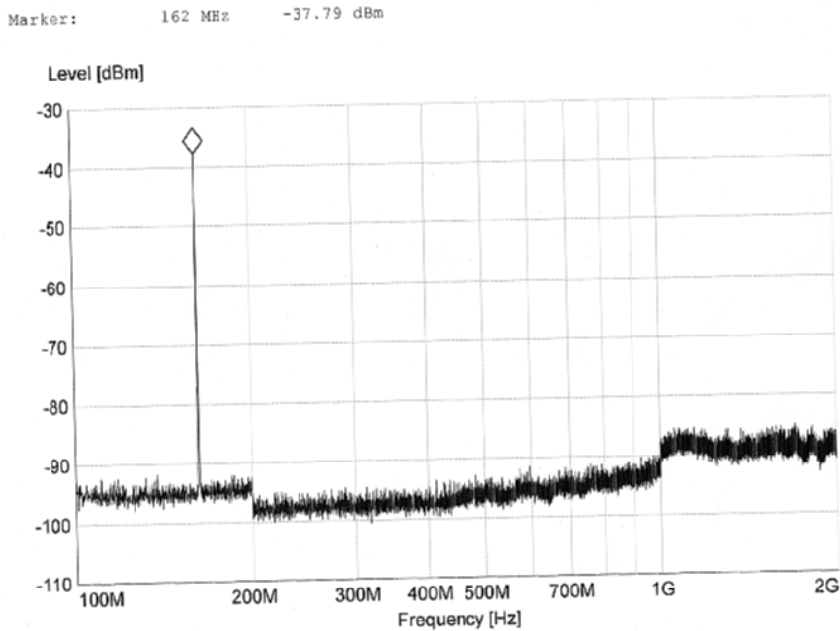
CH1



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Product	: FM Handheld Transceiver	Test Mode	: CH2-162MHz
Test Item	: Spurious Emission on Antenna Port	Temperature	: 25 °C
Test Voltage	: DC 7.2V (External Power Supply)	Humidity	: 56%RH
Test Result	: PASS		

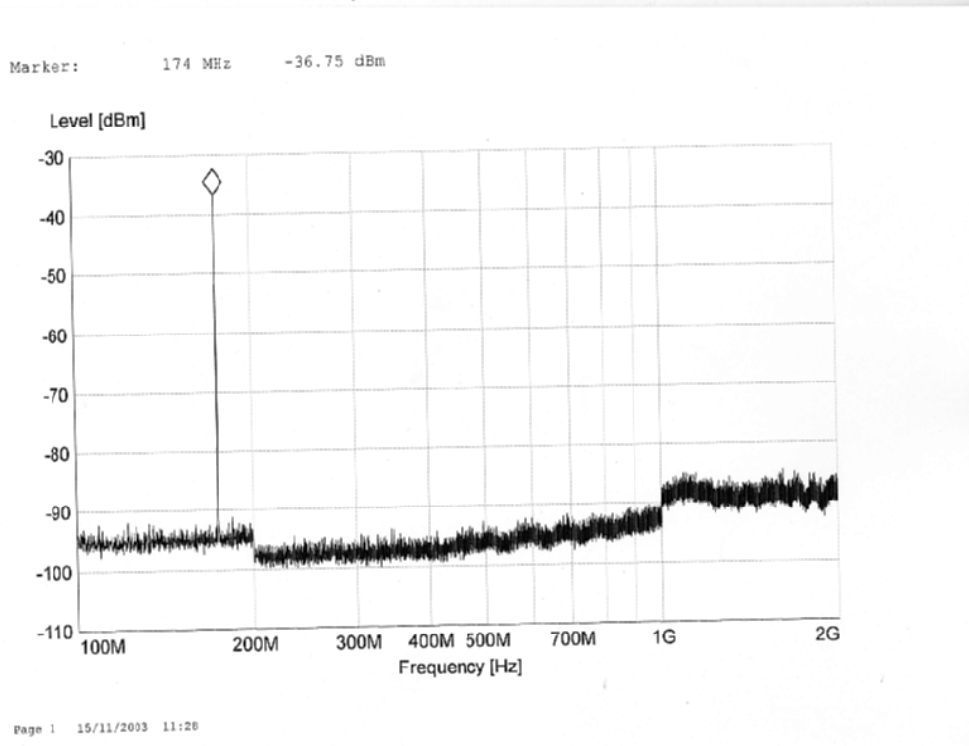
CH2



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Product	: FM Handheld Transceiver	Test Mode	: CH3-174MHz
Test Item	: Spurious Emission on Antenna Port	Temperature	: 25 °C
Test Voltage	: DC 7.2V (External Power Supply)	Humidity	: 56%RH
Test Result	: PASS		

CH3



3.7 Frequency Stability

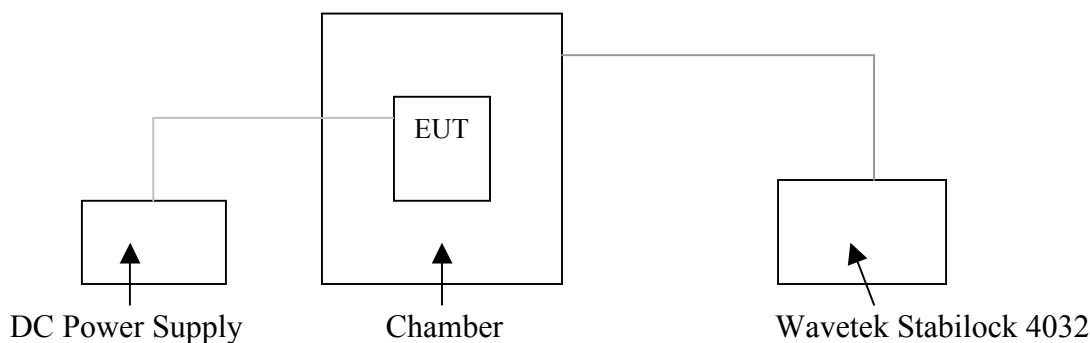
3.7.1 Test Equipment

Please refer to section 6 this report.

3.7.2 Test Procedure

The EUT was set in the climate chamber and connected to an external DC power supply. The RF output was directly connected to Wavetek Stabilock 4032. The coupling loss of the additional cables was recorded and taken in account for all the measurements. After temperature stabilization (approx. 20 min for each stage), the frequency for the lower, the middle and the highest frequency range was recorded. For Frequency stability Vs. Voltage the EUT was connected to an DC power supply and the voltage was adjusted in the required ranges. The result was recorded.

3.7.3 Test Setup



3.7.4 Configuration of The EUT

Same as section 3.1.4 of this report

3.7.5 EUT Operating Condition

Same as section 3.1.5 of this report

3.7.6 Limit

FCC Part 22.355:

5.0 ppm for Mobile > 3 Watts, 50 ppm for \leq 3 Watts

FCC Part 74.464:

0.0005% (5 ppm) for > 3 Watts, 0.005% (50 ppm) for \leq 3 Watts

FCC Part 80.209:

5.0 ppm for Coast Stations > 3 Watts, 10 ppm for \leq 3 Watts

FCC Part 90.213:

5.0 ppm for > 2 Watts

3.7.7 Frequency Stability Test Result

Frequency stability versus temperature

Environment Temperature (°C)	Power Supplied Vdc	Difference to 150MHz in Hz	Difference to 162MHz in Hz	Difference to 174MHz in Hz
60	7.2V	+105	+108	+112
50	7.2V	+88	+87	+91
40	7.2V	+53	+56	+60
30	7.2V	+24	+25	+27
20	7.2V	0	0	+5
10	7.2V	0	0	0
0	7.2V	0	0	0
-10	7.2V	-27	-30	-31
-20	7.2V	-59	-61	-62
-30	7.2V	-105	-105	-110

Note: Power measurement by -30°C on 7.2V was 4.91W

Frequency stability versus end-point supplied voltage (5.7Vdc)

Reference Frequency: 150 MHz		Limit: 0.0005%					
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute (MHz) (%)		5 minute (MHz) (%)		10 minute (MHz) (%)	
25	End-Point	150.000	PASS	149.999	PASS	149.999	PASS

Frequency stability versus end-point supplied voltage (5.7Vdc)

Reference Frequency: 162 MHz		Limit: 0.0005%					
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute (MHz) (%)		5 minute (MHz) (%)		10 minute (MHz) (%)	
25	End-Point	162.000	PASS	161.999	PASS	161.998	PASS

Frequency stability versus end-point supplied voltage (5.7Vdc)

Reference Frequency: 174 MHz		Limit: 0.0005%					
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute (MHz) (%)		5 minute (MHz) (%)		10 minute (MHz) (%)	
25	End-Point	174.000	PASS	173.999	PASS	173.999	PASS

3.8 Transient Frequency Behavior (FCC Section 90.214)

3.8.1 Test Equipment

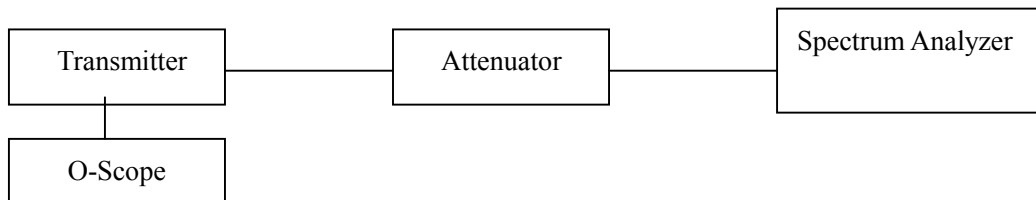
Please refer to section 6 this report.

3.8.2 Test Procedure

ANSI/TIA/EIA-603-1992, section 2.2.19

As signal generator was HP8920 used. The frequency was set to the measured channel and the EUT was coupled directly with the signal generator to together. With attenuators was the output power adjusted to exactly the same value on the output of the coupling network. This value was measured with Tektronix TT3052 oscilloscope. The output was connected to a Yaesu VR-500 All Band Receiver. The VR-500 was set to “Wideband FM” which means, the input filter is set to 25 kHz bandwidth. From the Yaesu VR-500 the demodulated audio signal was given on digital storage oscilloscope TT3052. The trigger was set to measure and react on the period time of the received 1 kHz signal on the peak of this signal. When the 1 kHz is disturbed, the signal is recorded and displayed on the TT3052. The HP8920 was set to the same channel as the EUT with an frequency deviation of on channel distance. The modulation signal is 1 kHz. The digital storage oscilloscope allows catching the wanted event precisely. For each channel this procedure was repeated.

3.8.3 Test Setup



3.8.4 Configuration of The EUT

Same as section 3.1.4 of this report

3.8.5 EUT Operating Condition

Same as section 3.1.5 of this report

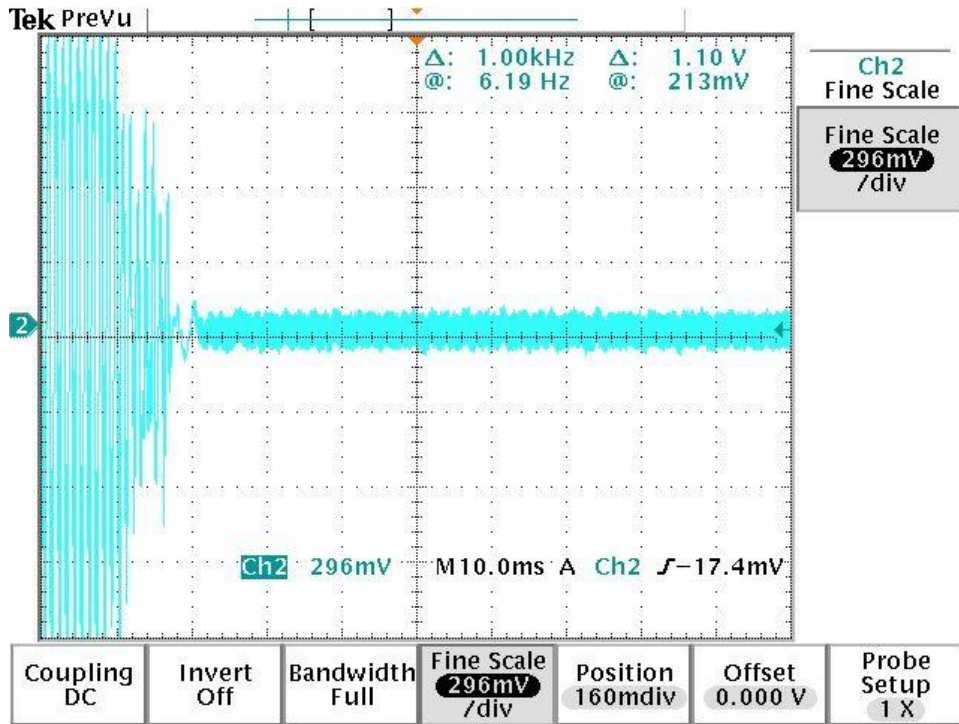
3.8.6 Limit

Transient Behavior for Equipment Designed to Operate on 25 kHz Channels			
Time Intervals	Maximum Frequency Difference (kHz)	Frequency Range	
		138-174 MHz	406.1-470 MHz
t ₁	± 25	5 mS	10 mS
t ₂	± 12.5	20 mS	25 mS
t ₃	± 25	5 mS	10 mS

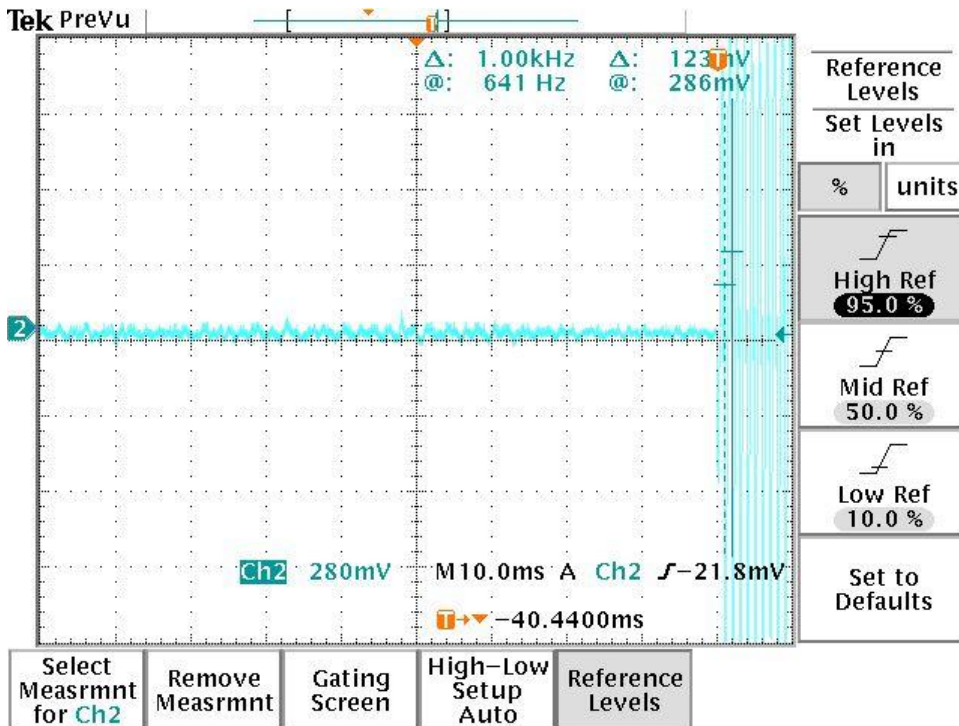
Transient Behavior for Equipment Designed to Operate on 12.5 kHz Channels			
Time Intervals	Maximum Frequency Difference (kHz)	Frequency Range	
		138-174 MHz	406.1-470 MHz
t ₁	± 12.5	5 mS	10 mS
t ₂	± 6.25	20 mS	25 mS
t ₃	± 12.5	5 mS	10 mS

3.8.7 Transient Frequency Behavior Test Result

Transient Frequency Behavior Increasing Magnitude



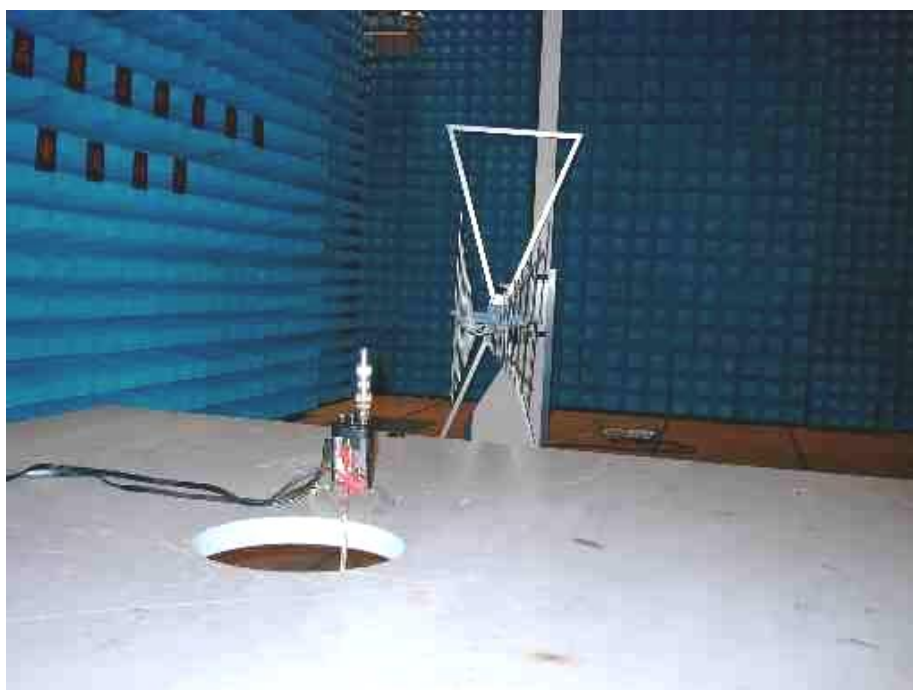
Transient Frequency Behavior Decreasing Magnitude



4. Photos of Testing

4.1 EUT Test Photographs

Radiated emission test view



4.2 EUT Detailed Photographs

EUT top view



EUT bottom view

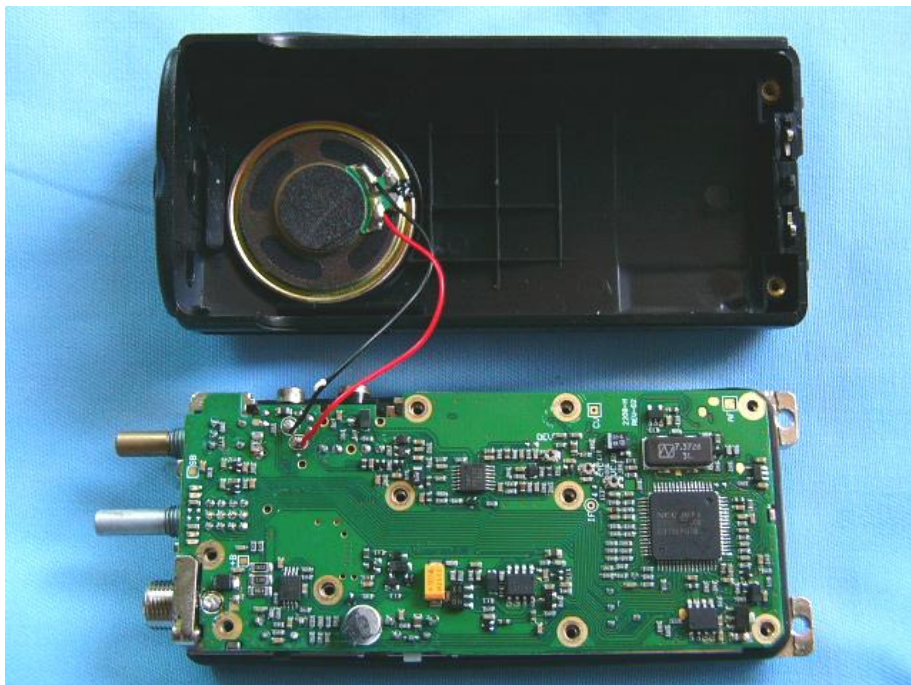




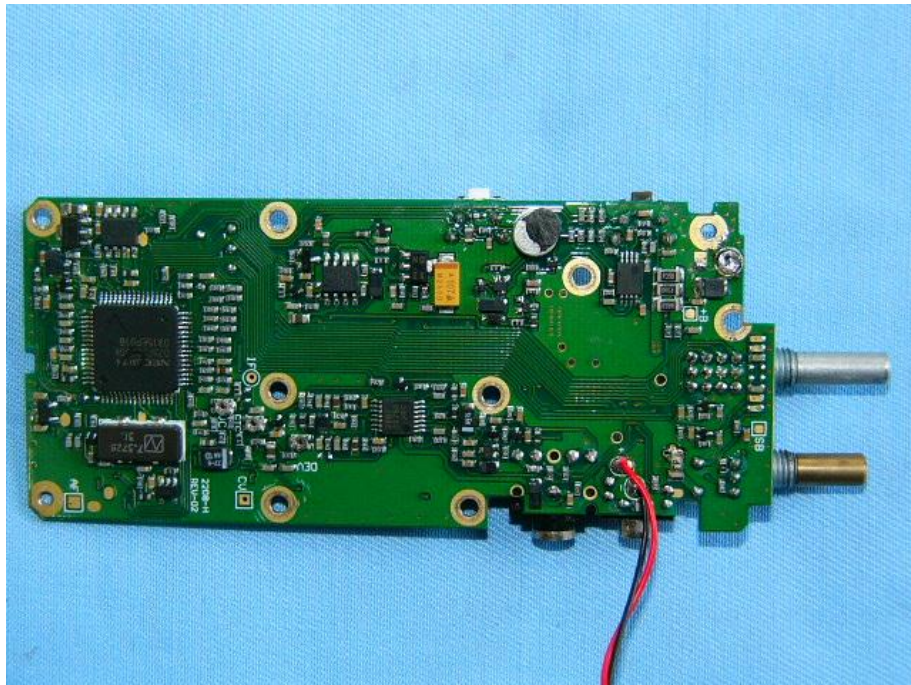
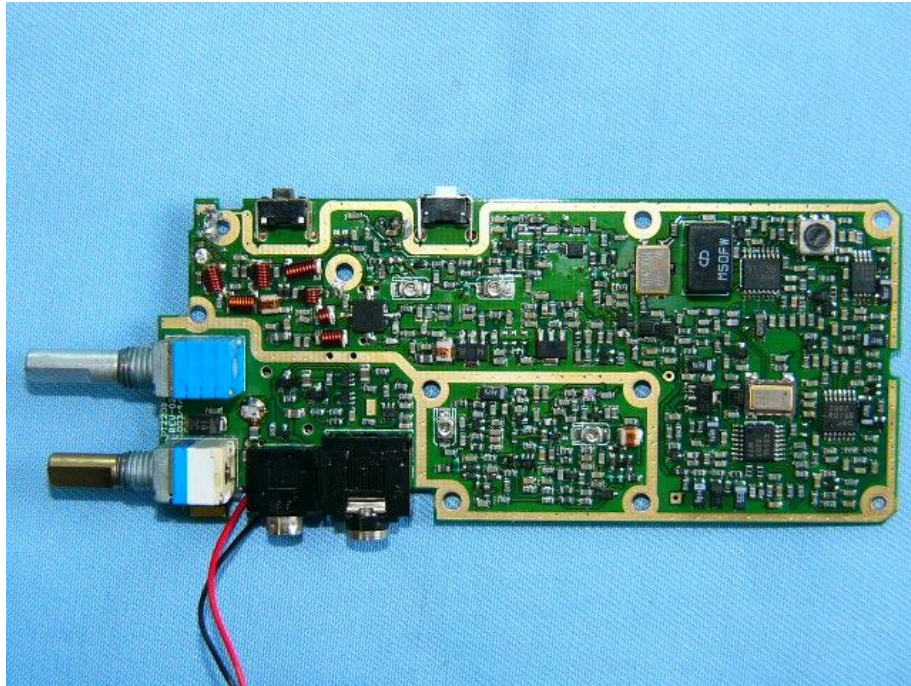


EUT inside whole view





Main board component side



5. FCC ID Label

FCC ID: Q5EPT220802

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that device does not cause harmful interference.

The FCC identifier is marked in the product label And the RF exposure caution label is attached on the rear side of the cabinet. The user notice and warning statement are described in the user manual. .

Proposed Label Location on EUT

The label shown above shall be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time purchase. (Labeling requirements per 2.925)
EUT Bottom View/Proposed FCC Mark Location



6. Test Equipment

The following test equipments were used during the radiated & conducted emission test:

Equipment/ Facilities	Manufacturer	Model #	Serial No.	Date of Cal.	Due Date
Turntable	KMO	KSZ001T	200306	NCR	NCR
Antenna Tower	KMO	KSZ002AT	200307	NCR	NCR
OATS	KMO	KSZSITE001	N/A	July 06, 2003	July 06, 2004
EMI Test Receiver	Rohde & Schwarz	ESPI3	100180	Oct.18, 2003	Oct.18, 2004
Signal Generator	Rohde & Schwarz	SMT03	100059	Feb.01, 2003	Feb.01, 2004
Bilog Antenna	Chase	CBL6111C	2576	Feb.01, 2003	Feb.01, 2004
Ultra Broadband Antenna	Rohde & Schwarz	HL 562	100110	June.05, 2003	June.05, 2004
AMN	Rohde & Schwarz	ESH3-Z5	100196	Oct. 23,2003	Oct. 23, 2004
AMN	Rohde & Schwarz	ESH3-Z5	100197	Oct. 23,2003	Oct. 23, 2004
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	N/A	N/A	N/A
KMO Shielded Room	KMO	KMO-001	N/A	N/A	N/A
EMI Test Receiver	Rohde & Schwarz	ESCS30	100003	Feb. 27, 2003	Feb.27, 2004
AMN	Rohde & Schwarz	ESH3-Z5	100002	Feb. 01, 2003	Feb.01, 2004
LISN	Kyoritsu	KNW-407	8-1441-8	Feb. 23, 2003	Feb.23, 2004
EMI Test Receiver	Rohde & Schwarz	ESI26	838786/013	Feb. 01, 2003	Feb.01, 2004
Communication Analyzer	Wavetek Stabilock	4032	N/A	Feb. 01, 2003	Feb.01, 2004
Storage Oscilloscope	Tektronix	TTS3052	N/A	Feb. 01, 2003	Feb.01, 2004
Signal Generator	HP	HP5902B	US35010135	Feb. 01, 2003	Feb.01, 2004
Scanner Receiver	Yaesu	VR-500	2G300051	Feb. 01, 2003	Feb.01, 2004
Attenuator	Schwarzbeck	20dB	N/A	Feb. 01, 2003	Feb.01, 2004
Attenuator	Rohde & Schwarz	10dB	N/A	Feb. 01, 2003	Feb.01, 2004
Bilog Antenna	Chase	CBL6112B	2591	Feb. 01, 2003	Feb.01, 2004
Horn Antenna	Rohde & Schwarz	HF906	100014	Feb. 01, 2003	Feb.01, 2004
Radio Communication Test Set	IFR	2955B	100015	Feb 01, 2003	Feb 01, 2004
Multifunction Synthesizer	Hewlett-Packard	8904A	100016	Feb 01, 2003	Feb 01, 2004
Temperature Chamber	TABAI	PSL-4GTW	N/A	Feb 06,2003	Feb 06, 2004
3m Semi-Anechoic Chamber	Albatross Projects	9mX6mX6m	N/A	Feb. 01, 2003	Feb.01, 2004