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Ke Mei Ou Lab Corp.
**FEDERAL COMMUNICATIONS COMMISSION**
Registration Number: 125782
**INDUSTRY CANADA**
Registration Number: IC4986

# *FCC TEST REPORT*

Under
FCC Part 90, Paragraph 90.210: 2004

Prepared For :

## Unier Technology Co., Ltd.

5F, Huahan Innovation Park, Building D, Keyuan Road, Shenzhen, China

| |
|---|
| **FCC ID: UTLF8** |
| **EUT: Two-Way Radio** |
| **Model: F8** |

December 13, 2006

| |
|---|
| **Report Type:** Original Report |
| **Test Engineer:** Jacky Huang |
| **Test Date:** November16, 2006 |
|  |
| **Review By:** _____ Apollo Liu / Manager |

## TABLE OF CONTENTS

# 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.**
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Site on File with the Federal Communications Commission – United Sates
Registration Number: 125782
For 3 & 10 meter OATS

Site Listed with Industry Canada of Ottawa, Canada
Registration Number: IC4986
For 3 & 10 meter OATS

## 1. 3 Details of Applicant

**Name : Unier Technology Co., Ltd.**
**Address : 5F, Huahan Innovation Park, Building D, Keyuan Road, Shenzhen.**
**Contact : N/A**
**Tel : N/A**
**Fax : N/A**

## 1. 4 Application Details

| | |
|---|---|
| Date of Receipt of Application | : November 9, 2006 |
| Date of Receipt of Test Item | : November 9, 2006 |
| Date of Test | : November 16~November 27, 2006 |

## 1. 5 Test Item

| | |
|---|---|
| Manufacturer | : See Applicant |
| Trade Name | : N/A |
| Model No. | : F1, F3, F6, F8, F5, F4 |
| Description | : Two –Way Radio |

## Additional Information

| | |
|---|---|
| Frequency | : 450MHz~470MHz |
| RF Power | : 3.79W |
| 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: 2004 |
|---|

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

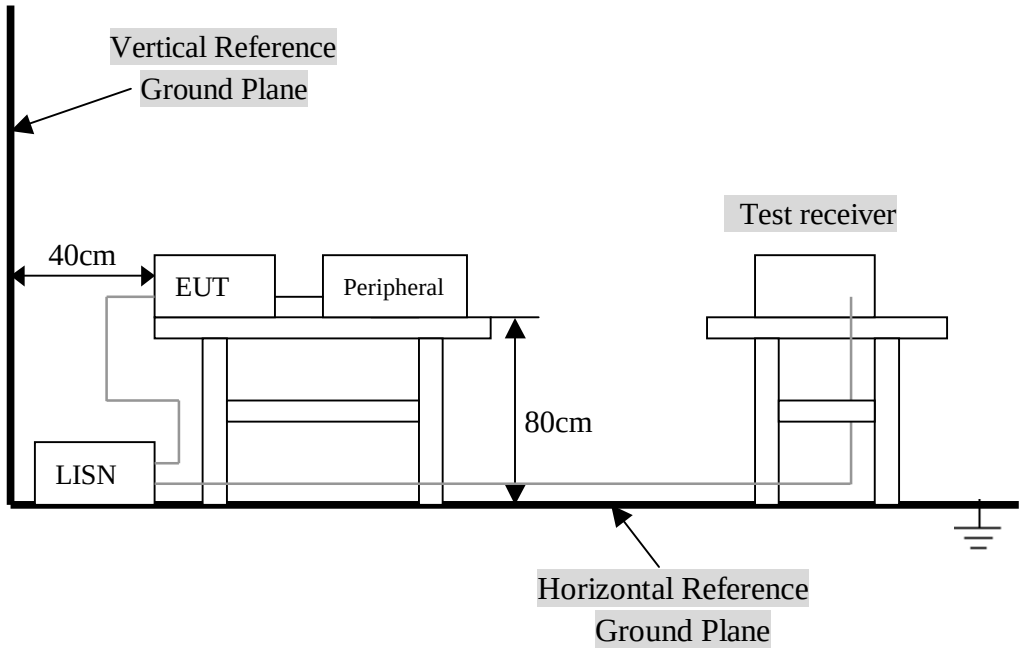
### 3.1.1 Test Equipment

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 - 2003. 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 C63.4-2003. EUT was used DC 7.2V. The operation frequency is from 450MHz~470MHz. 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 |
|---|---|---|---|
| Two-Way Radio | Unier Technology Co., Ltd. | F8 | UTLF8 |

## 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

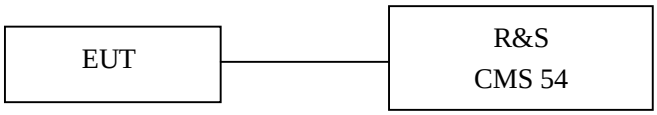
### 3.2.1 Test Equipment

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 bellow:
If the power output is adjustable, measurements shall be made for the highest and lowest power levels.
Measurement with R&S CMS54 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 | : CH Low ~ CH High |
| Test Item | : RF Output Power | Temperature | : 25 ℃ |
| Test Voltage | : DC 7.2V (External Power Supply) | Humidity | : 56%RH |
| Test Result | : **PASS** | | |

**CH Low**

| Freq. (MHz) | Measurement (dBm/Watt) | FCC Limit (Watt) |
|---|---|---|
| 450.000 | 35.79/3.79 | Varies |

**CH Middle**

| Freq. (MHz) | Measurement (dBm/Watt) | FCC Limit (Watt) |
|---|---|---|
| 460.000 | 35.78/3.78 | Varies |

**CH High**

| Freq. (MHz) | Measurement (dBm/Watt) | FCC Limit (Watt) |
|---|---|---|
| 470.000 | 35.78/3.78 | 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 FM deviation meter directly without any attenuation. The internal audio signal generator of CMS54 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 CMS54 and the values calculated as:

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

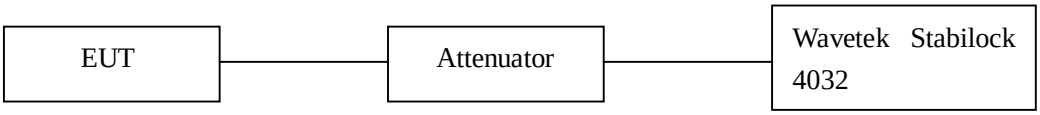
b. Audio Low-Pass Filter Response: The CMS54 was used a signal generator and as receiver. The audio input was adjusted to obtain 20% of maximum rated system deviation at 1 kHz and recorded as $LEV_{REF}$. This input level was not changed when the audio frequency was turned between 1000 Hz and 50000 Hz. The received audio level ($LEV_{FREQ}$) was recorded from CMS54 and the values calculated as:

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

and noted down in the diagram.

c. Modulation Limiting: The RF output of the transceiver was connected 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 ± 5kHz 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 ± 5kHz.

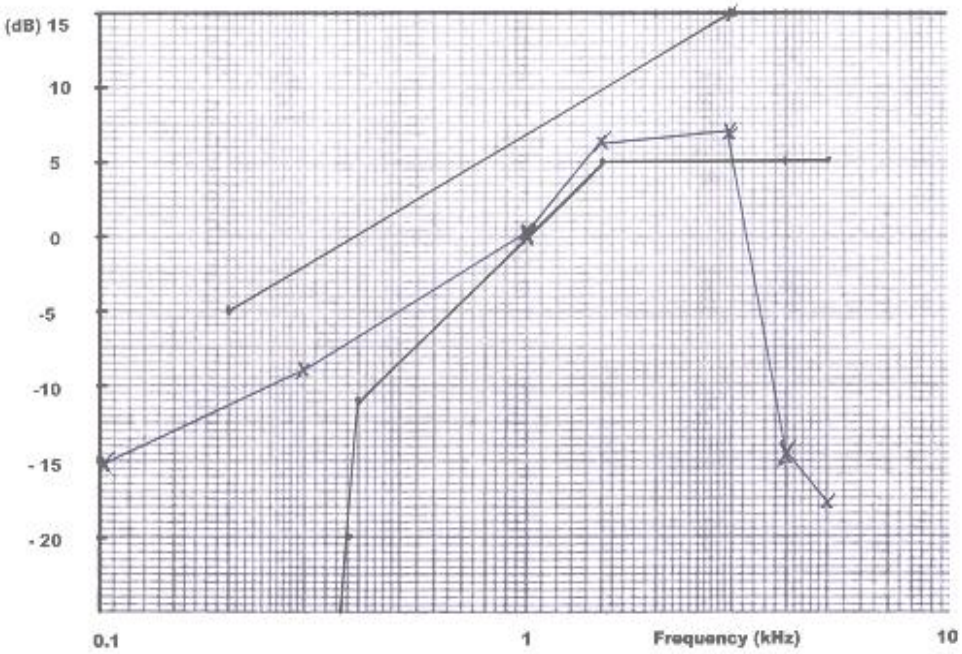
(e) Coast station transmitters operated in the 156~162 MHz band must be equipped with an audio low-pass filter. The filter must be installed between the modulation limiter and the modulated radio frequency stage. At frequencies between 3 kHz and 20kHz it must have an attenuation greater than at 1kHz 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:

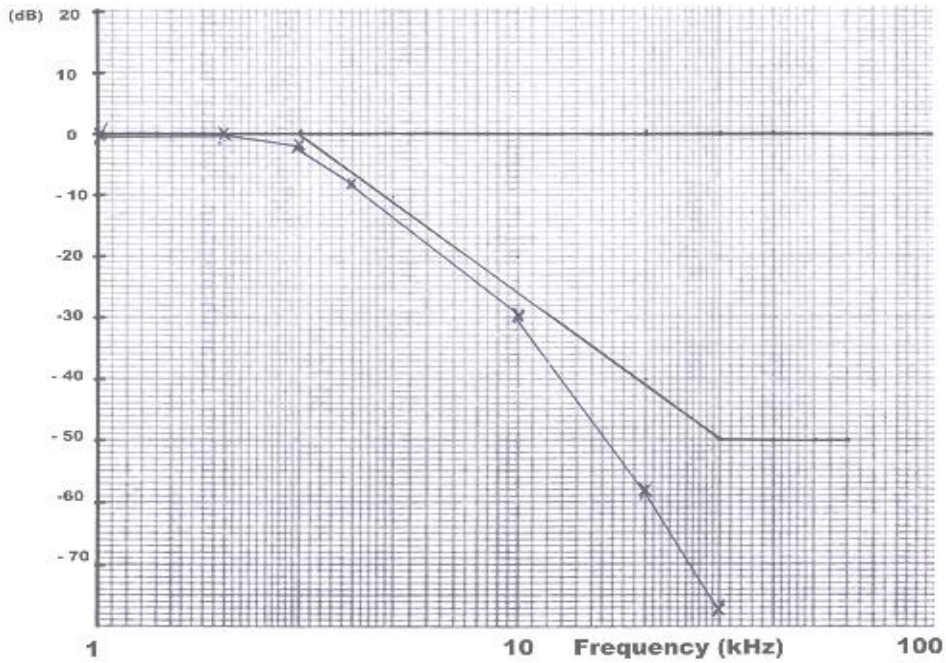
Transmitters utilizing analog emissions that are equipped with an audio low-pass filter must meet the emission limitations must meet proper emissions mask of 90.210.

## 3.3.7 Modulation Characteristics Test Result

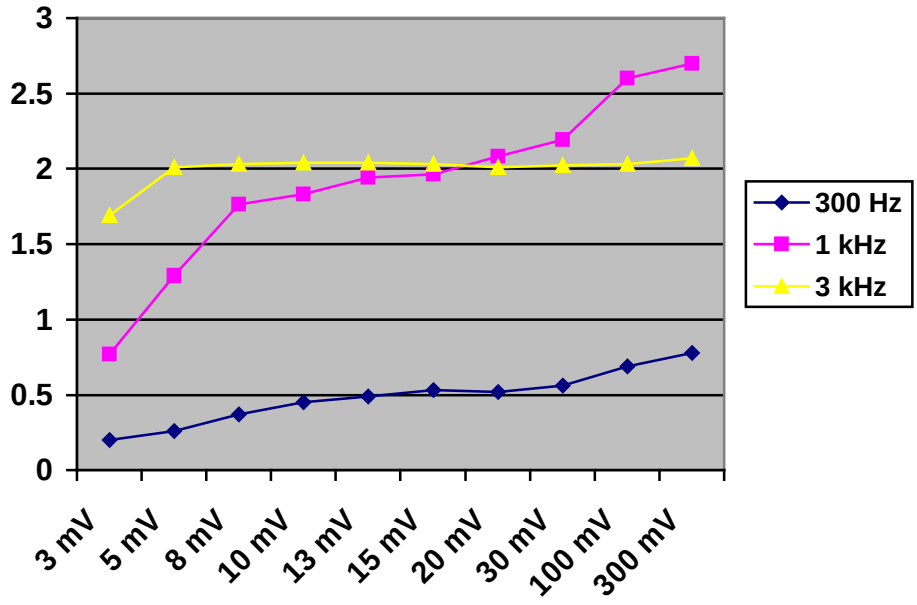
Audio Frequency Response



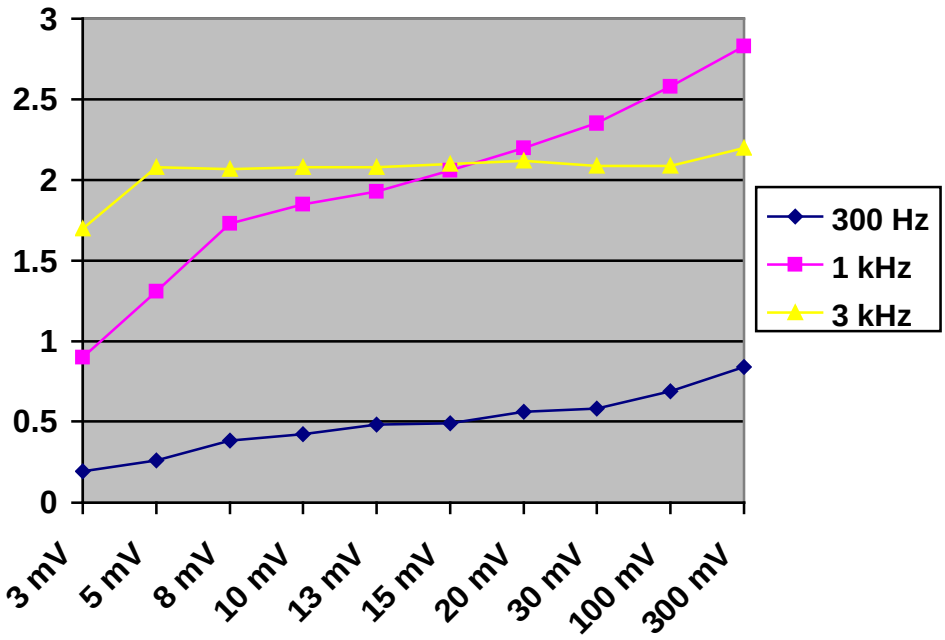

Audio Low-Pass Filter Response



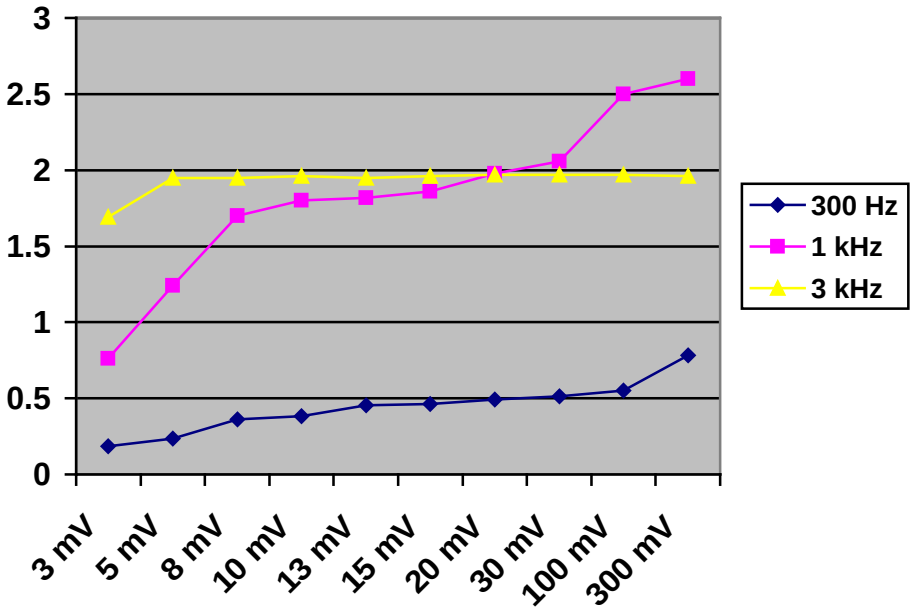
| | | | |
|---|---|---|---|
| Product | : Two-Way Radio | Test Mode | : CH Low |
| Test Item | : Modulation Characteristics | Temperature | : 25 ℃ |
| Test Voltage | : DC 7.2V (External Power Supply) | Humidity | : 56%RH |
| Test Result | : **PASS** | | |




| | | | |
|---|---|---|---|
| Product | : Two-Way Radio | Test Mode | : CH Middle |
| Test Item | : Modulation Characteristics | Temperature | : 25 ℃ |
| Test Voltage | : DC 7.2V (External Power Supply) | Humidity | : 56%RH |
| Test Result | : **PASS** | | |



| | | | |
|---|---|---|---|
| Product | : Two-Way Radio | Test Mode | : CH High |
| Test Item | : Modulation Characteristics | Temperature | : 25 ℃ |
| Test Voltage | : DC 7.2V (External Power Supply) | Humidity | : 56%RH |
| Test Result | : **PASS** | | |



# 3. 4 Occupied Bandwidth

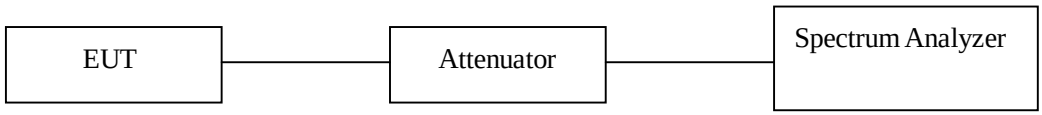
## 3.4.1 Test Equipment

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 ± 5kHz 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 (Pwatts) = 43 + 10 log (3.98) = 49.0 dB
Middle: 43 + 10 log (Pwatts) = 43 + 10 log (4.59) = 49.6 dB
High: 43 + 10 log (Pwatts) = 43 + 10 log (4.78) = 49.8 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 form 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 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:

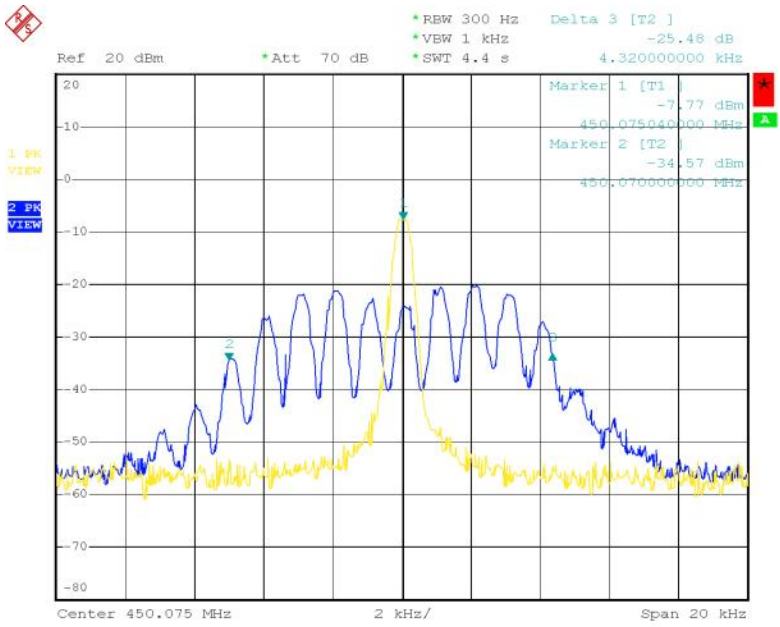
Low: 50 + 10 log (Pwatts) = 50 + 10 log (3.98) = 56.0 dB
Middle: 50 + 10 log (Pwatts) = 50 + 10 log (4.59) = 56.6 dB
High: 50 + 10 log (Pwatts) = 50 + 10 log (4.78) = 56.8 dB

**Emission Designator**
The necessary bandwidth calculation for this unit is as follows:
$B_N$ = 2M +2DK, (M = 3kHz), (D = 2.2kHz), (K = 1)
$B_N$ = 2(3kHz) + 2(2.2kHz)(1)
$B_N$ = 10.4kHz
Then $B_N$ equates to 10k4

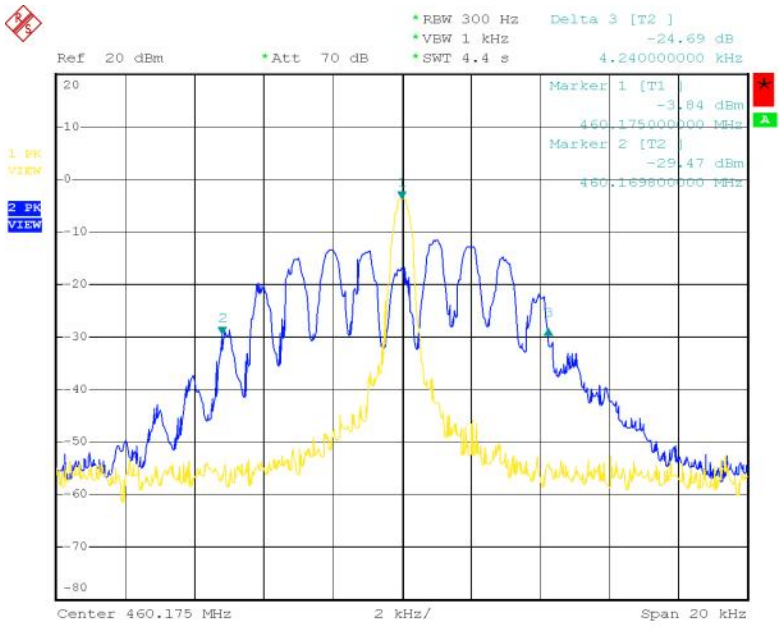
## 3.4.7 Occupied Bandwidth Test Result

| | | | |
|---|---|---|---|
| Product | : Two-Way Radio | Test Mode | : CH Low ~ CH High |
| Test Item | : Occupied Bandwidth | Temperature | : 25 ℃ |
| Test Voltage | : DC 7.2V (External Power Supply) | Humidity | : 56%RH |
| Test Result | : **PASS** | | |

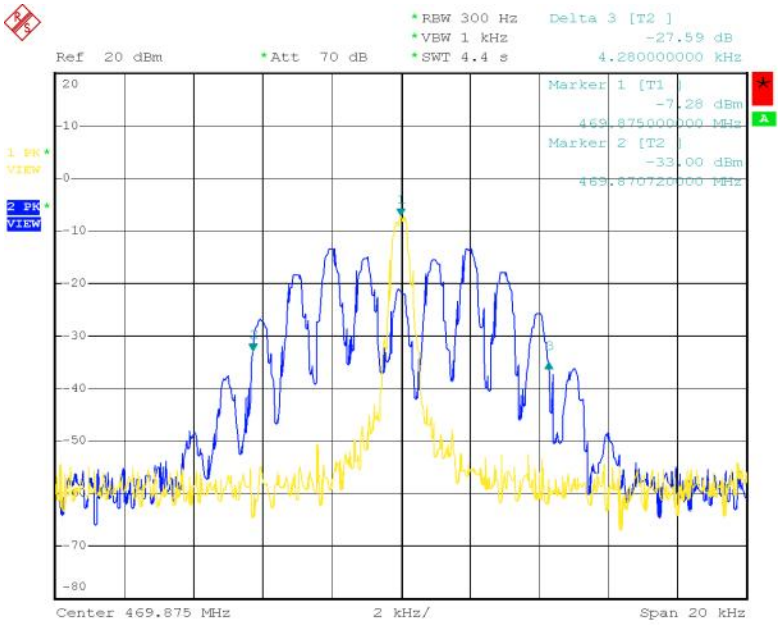
**CH Low**




**CH Middle**



**CH High**


*RBW 300 Hz
*VBW 1 kHz
*SWT 4.4 s
Delta 3 [T2 ]
-27.59 dB
4.280000000 kHz
Ref 20 dBm
*Att 70 dB
Marker 1 [T1 ]
-7.28 dBm
469.875000000 MHz
Marker 2 [T2 ]
-33.00 dBm
469.870720000 MHz
1 PK VIEW
2 PK VIEW
20
10
0
-10
-20
-30
-40
-50
-70
-80
Center 469.875 MHz
2 kHz/
Span 20 kHz

## 3. 5 Radiated Spurious Emission

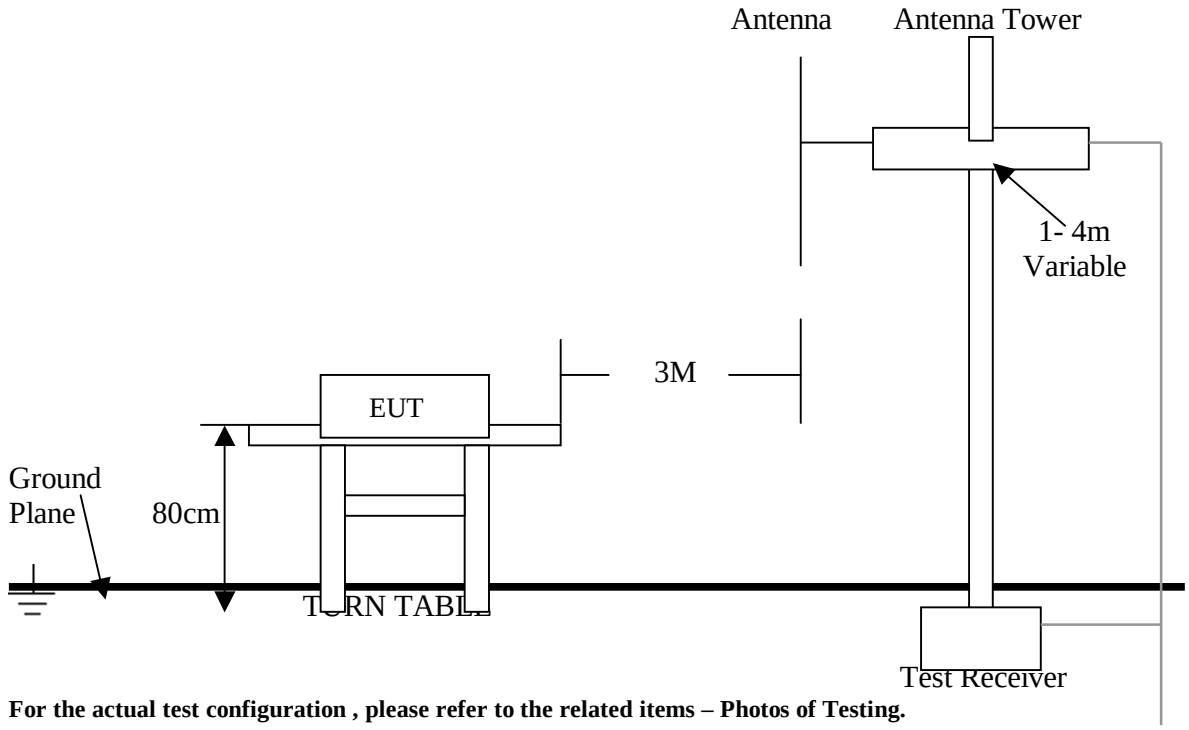
### 3.5.1 Test Equipment

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 (Pwatts) = 43 + 10 log (3.98) = 49.0 dB
Middle: 43 + 10 log (Pwatts) = 43 + 10 log (4.59) = 49.6 dB
High: 43 + 10 log (Pwatts) = 43 + 10 log (4.78) = 49.8 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 (Pwatts) = 50 + 10 log (3.98) = 56.0 dB
Middle: 50 + 10 log (Pwatts) = 50 + 10 log (4.59) = 56.6 dB
High: 50 + 10 log (Pwatts) = 50 + 10 log (4.78) = 56.8 dB
Note: In general, the worse case attenuation requirement shown above was applied.

## 3.5.7 Radiated Spurious Emission Test Result

| | | | |
|---|---|---|---|
| Product | : Two-Way Radio | Test Mode | : CH Low ~ CH High |
| Test Item | : Radiated Spurious Emission | Temperature | : 25 ℃ |
| Test Voltage | : DC 7.2V (External Power Supply) | Humidity | : 56%RH |
| Test Result | : **PASS** | | |

**CH Low**

| Frequency (MHz) | HORIZ / VERT | Level in dBm |
|---|---|---|
| - | V | - |
| - | H | - |
| - | V | - |
| - | H | - |
| - | V | - |
| - | H | - |
| - | V | - |
| - | H | - |
| - | V | - |
| - | H | - |

**CH Middle**

| Frequency (MHz) | HORIZ / VERT | Level in dBm |
|---|---|---|
| - | V | - |
| - | H | - |
| - | V | - |
| - | H | - |
| - | V | - |
| - | H | - |
| - | V | - |
| - | H | - |
| - | V | - |
| - | H | - |

**CH High**

| Frequency (MHz) | HORIZ / VERT | Level in dBm |
|---|---|---|
| - | V | - |
| - | H | - |
| - | V | - |
| - | H | - |
| - | V | - |
| - | H | - |
| - | V | - |
| - | H | - |
| - | V | - |
| - | H | - |

Note: "-" means that the emission level is too low to be measured or at least 20 dB down than the limit.

## 3. 6 Spurious Emission on Antenna Port

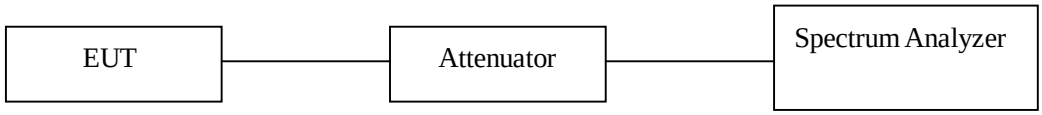
### 3.6.1 Test Equipment

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 $10^{th}$. 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

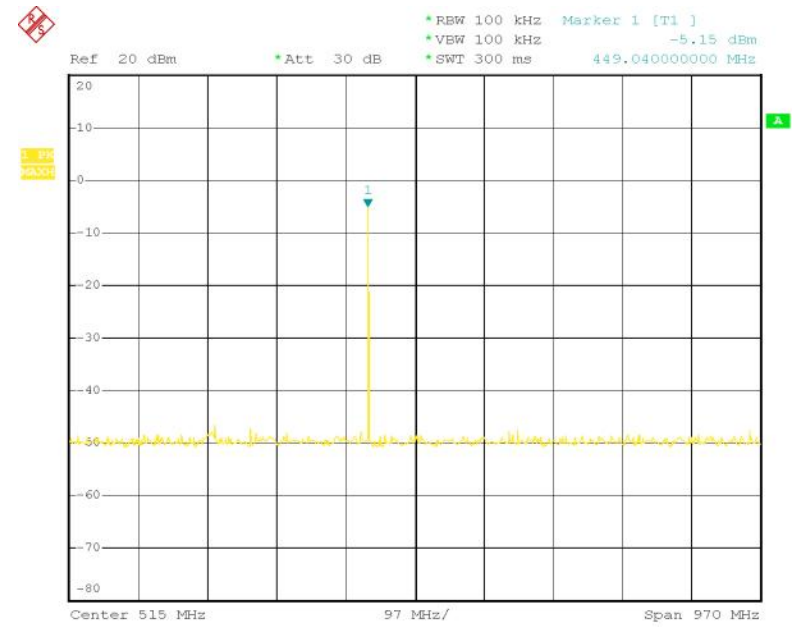
FCC Part 22.359, 74.462, 80.211 and 90.210 (25 kHz bandwidth only):
On any frequency removed from the center of the assigned channel by more than 250 percent at least:
Low: 43 + 10 log (Pwatts) = 43 + 10 log (3.98) = 49.0 dB
Middle: 43 + 10 log (Pwatts) = 43 + 10 log (4.59) = 49.6 dB
High: 43 + 10 log (Pwatts) = 43 + 10 log (4.78) = 49.8 dB

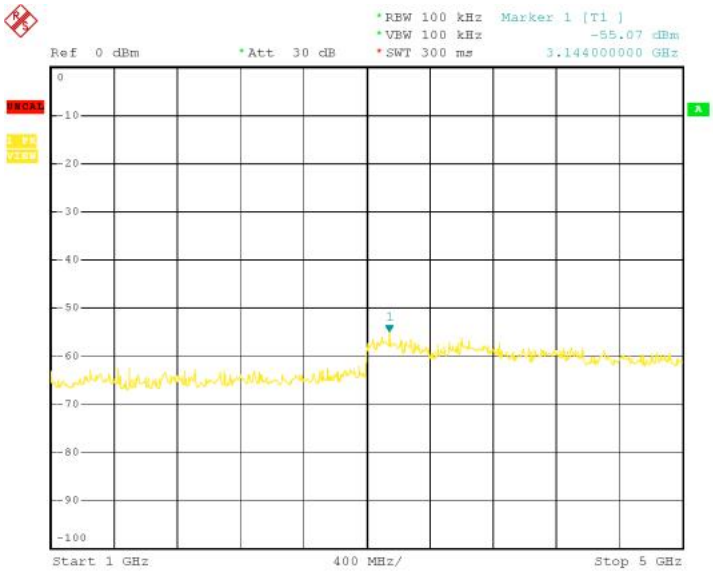
FCC Part 90.210 (12.5 kHz Bandwidth only):
On any frequency removed from the center of the authorized bandwidth by a displacement frequency ($f_d$ in kHz) of more than 12.5 kHz at least:
Low: 50 + 10 log (Pwatts) = 50 + 10 log (3.98) = 56.0 dB
Middle: 50 + 10 log (Pwatts) = 50 + 10 log (4.59) = 56.6 dB
High: 50 + 10 log (Pwatts) = 50 + 10 log (4.78) = 56.8 dB
Note: In general, the worse case attenuation requirement shown above was applied.

### 3.6.7 Spurious Emission on Antenna Port Test Result

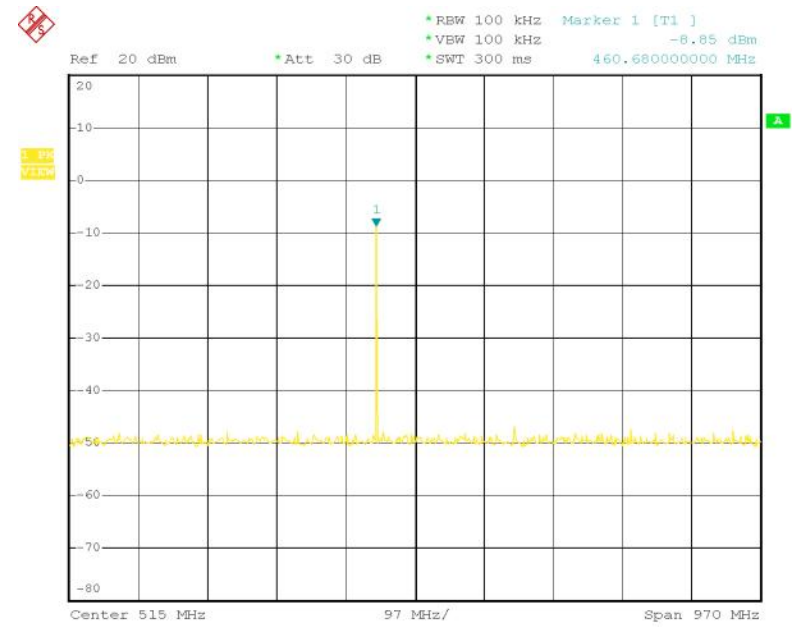
| | | | |
|---|---|---|---|
| Product | : Two-Way Radio | Test Mode | : CH Low ~ CH High |
| Test Item | : Spurious Emission on Antenna Port | Temperature | : 25 ℃ |
| Test Voltage | : DC 7.2V (External Power Supply) | Humidity | : 56%RH |
| Test Result | : **PASS** | | |

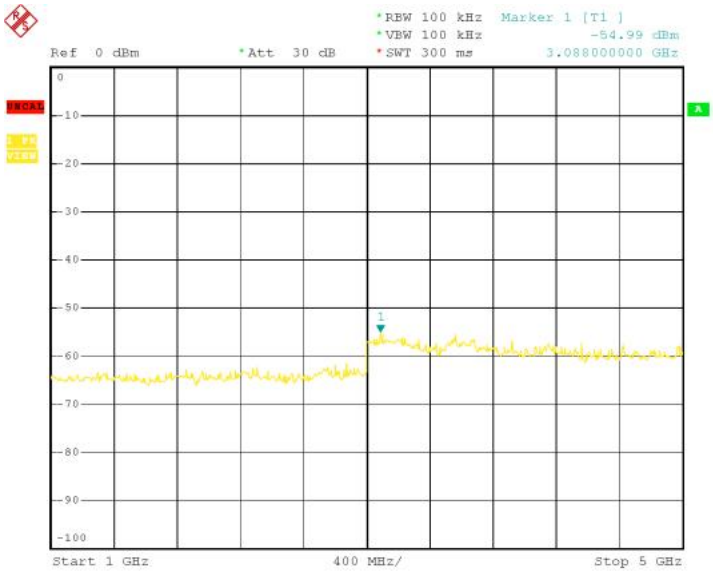
**CH Low**


*RBW 100 kHz
Marker 1 [T1 ]
*VBW 100 kHz
-5.15 dBm
Ref 20 dBm
*Att 30 dB
*SWT 300 ms
449.040000000 MHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1
A
Center 515 MHz
97 MHz/
Span 970 MHz

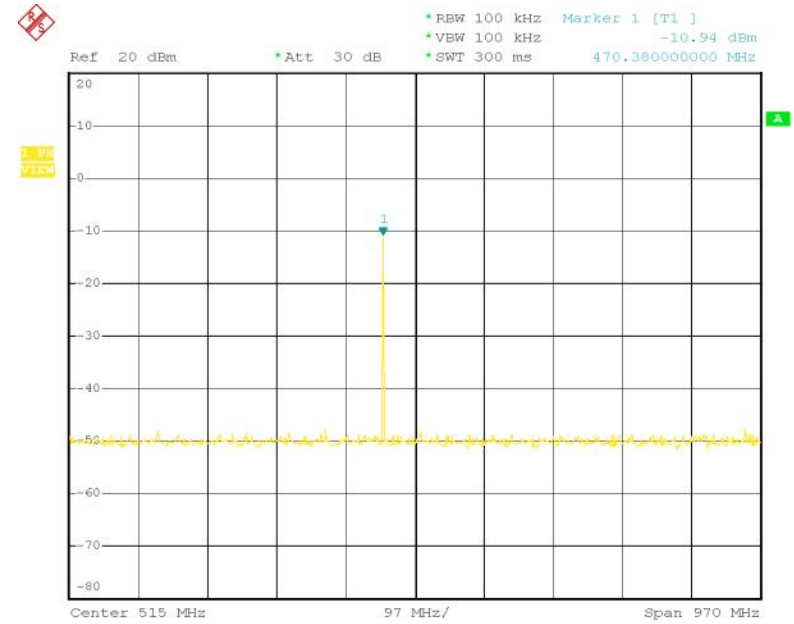

*RBW 100 kHz
Marker 1 [T1 ]
*VBW 100 kHz
-55.07 dBm
Ref 0 dBm
*Att 30 dB
*SWT 300 ms
3.144000000 GHz
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
1
A
Start 1 GHz
400 MHz/
Stop 5 GHz

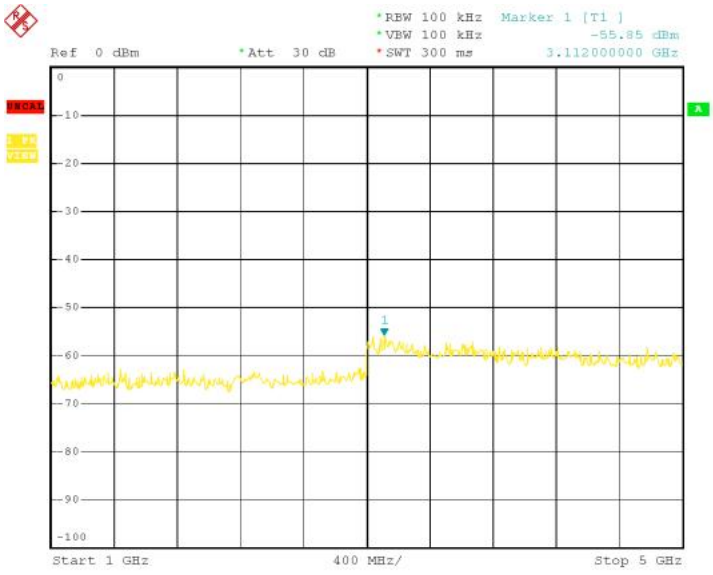
**CH Middle**


*RBW 100 kHz
Marker 1 [T1 ]
*VBW 100 kHz
-8.85 dBm
Ref 20 dBm
*Att 30 dB
*SWT 300 ms
460.680000000 MHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 515 MHz
97 MHz/
Span 970 MHz


*RBW 100 kHz
Marker 1 [T1 ]
*VBW 100 kHz
-54.99 dBm
Ref 0 dBm
*Att 30 dB
*SWT 300 ms
3.088000000 GHz
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 1 GHz
400 MHz/
Stop 5 GHz

**CH High**


*RBW 100 kHz
Marker 1 [T1 ]
*VBW 100 kHz
-10.94 dBm
Ref 20 dBm
*Att 30 dB
*SWT 300 ms
470.380000000 MHz
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 515 MHz
97 MHz/
Span 970 MHz


*RBW 100 kHz
Marker 1 [T1 ]
*VBW 100 kHz
-55.85 dBm
Ref 0 dBm
*Att 30 dB
*SWT 300 ms
3.112000000 GHz
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 1 GHz
400 MHz/
Stop 5 GHz

## 3. 7 Frequency Stability

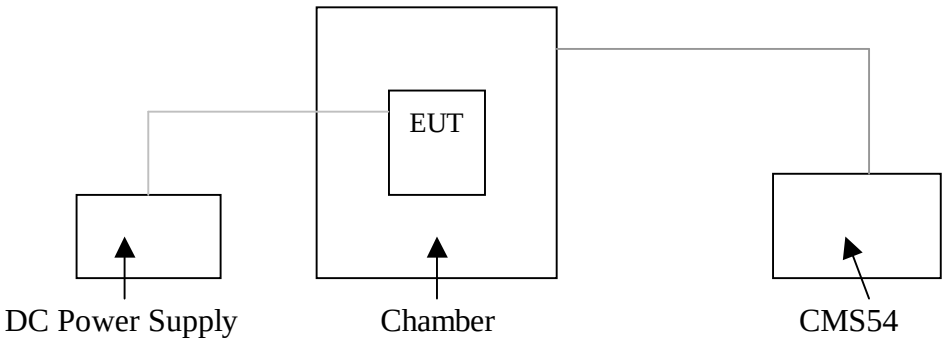
### 3.7.1 Test Equipment

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 CMS54. 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 ≤ 3 Watts
FCC Part 74.464:
0.0005% (5 ppm) for > 3 Watts, 0.005% (50 ppm) for ≤ 3 Watts
FCC Part 80.209:
5.0 ppm for Coast Stations > 3 Watts, 10 ppm for ≤ 3 Watts
FCC Part 90.213:
For operating band within 421~512 MHz and output power > 2 watts, the frequency stability limit is 2.5 ppm

## 3.7.7 Frequency Stability Test Result

**Frequency stability versus temperature**

| Environment Temperature (℃) | Power Supplied Vdc | Difference to 450.075MHz | Difference to 460.175MHz | Difference to 469.875MHz |
|---|---|---|---|---|
| 60 | 7.2V | 450.0756 | 460.1757 | 469.8755 |
| 50 | 7.2V | 450.0756 | 460.1757 | 469.8755 |
| 40 | 7.2V | 450.0755 | 460.1755 | 469.8753 |
| 30 | 7.2V | 450.0753 | 460.1754 | 469.8753 |
| 20 | 7.2V | 450.0750 | 460.1750 | 469.8750 |
| 10 | 7.2V | 450.0750 | 460.1750 | 469.8750 |
| 0 | 7.2V | 450.0750 | 460.1750 | 469.8748 |
| -10 | 7.2V | 450.0746 | 460.1748 | 469.8748 |
| -20 | 7.2V | 450.0746 | 460.1748 | 469.8748 |
| -30 | 7.2V | 450.0746 | 460.1748 | 469.8748 |

Note: Power measurement by -30℃ on 7.2V was 4.92W

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

| Reference Frequency: 150 MHz | | Limit: 2.5 ppm | | | | | |
|---|---|---|---|---|---|---|---|
| Environment Temperature (℃) | Power Supplied (Vdc) | Frequency measured with time elapsed | | | | | |
| | | 2 minute | | 5 minute | | 10 minute | |
| | | (MHz) | (ppm) | (MHz) | (ppm) | (MHz) | (ppm) |
| 25 | End-Point | 450.0750 | 0.0000 | 450.0746 | -0.8887 | 450.0746 | -0.8887 |

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

| Reference Frequency: 162 MHz | | Limit: 2.5 ppm | | | | | |
|---|---|---|---|---|---|---|---|
| Environment Temperature (℃) | Power Supplied (Vdc) | Frequency measured with time elapsed | | | | | |
| | | 2 minute | | 5 minute | | 10 minute | |
| | | (MHz) | (ppm) | (MHz) | (ppm) | (MHz) | (ppm) |
| 25 | End-Point | 460.1750 | 0.0000 | 460.1748 | -0.4346 | 460.1748 | -0.4346 |

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

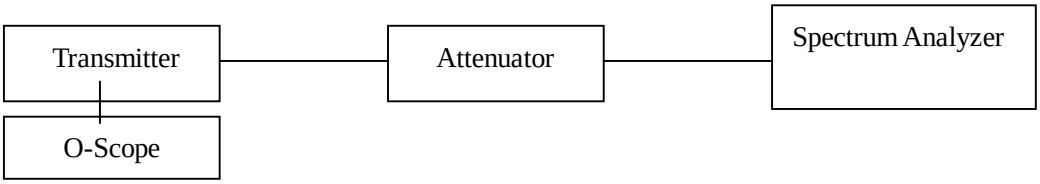
| Reference Frequency: 174 MHz | | Limit: 2.5 ppm | | | | | |
|---|---|---|---|---|---|---|---|
| Environment Temperature (℃) | Power Supplied (Vdc) | Frequency measured with time elapsed | | | | | |
| | | 2 minute | | 5 minute | | 10 minute | |
| | | (MHz) | (ppm) | (MHz) | (ppm) | (MHz) | (ppm) |
| 25 | End-Point | 469.8750 | 0.0000 | 469.8748 | -0.4256 | 469.8748 | -0.4256 |

## 3. 8 Transient Frequency Behavior (FCC Section 90.214)

### 3.8.1 Test Procedure

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

### 3.8.2 Test Setup




### 3.8.3 Configuration of The EUT

Same as section 3.1.4 of this report

### 3.8.4 EUT Operating Condition

Same as section 3.1.5 of this report

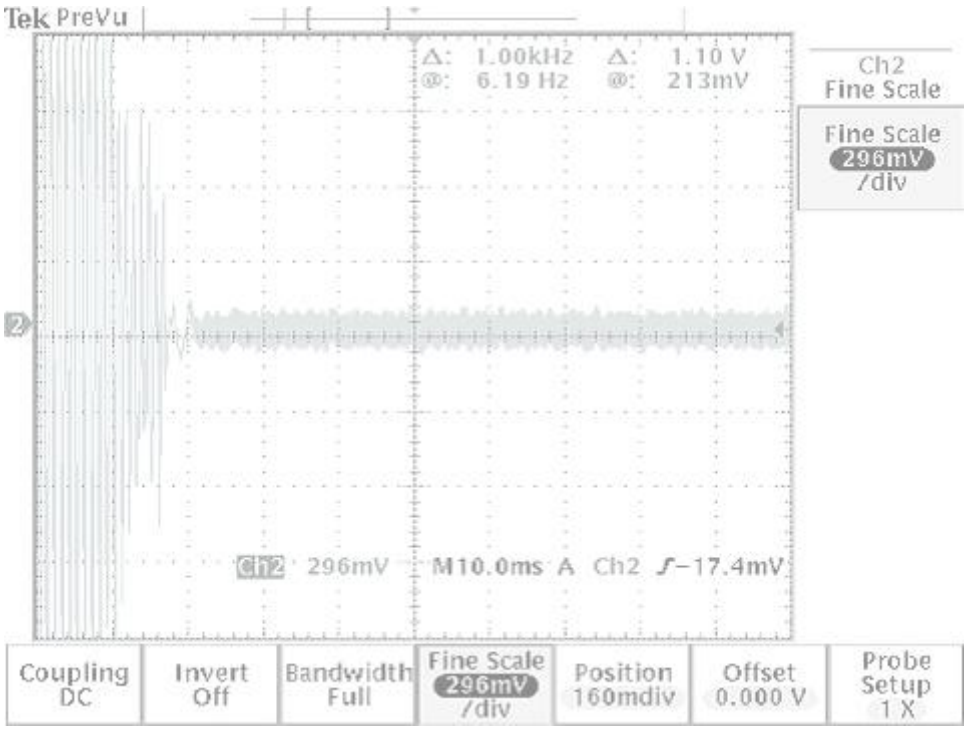
### 3.8.5 Limit

| 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 |

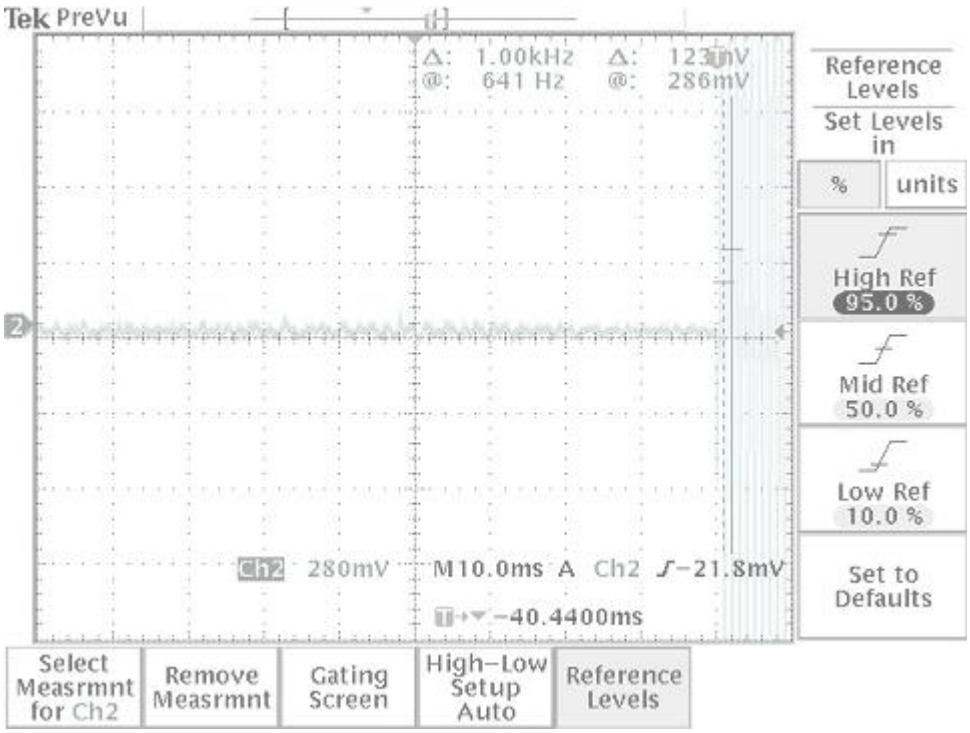
| Transient Behavior for Equipment Designed to Operate on 12.5 kHz Channels | | | |
|---|---|---|---|
| Time Intervals | Maximum Frequency Difference (kHz) | Frequency Range | |
| | | 138-174 MHz | 406.1-470 MHz |
| $t_1$ | ± 12.5 | 5 mS | 10 mS |
| $t_2$ | ± 6.25 | 20 mS | 25 mS |
| $t_3$ | ± 12.5 | 5 mS | 10 mS |

## 3.8.6 Transient Frequency Behavior Test Result

**Transient Frequency Behavior Increasing Magnitude**



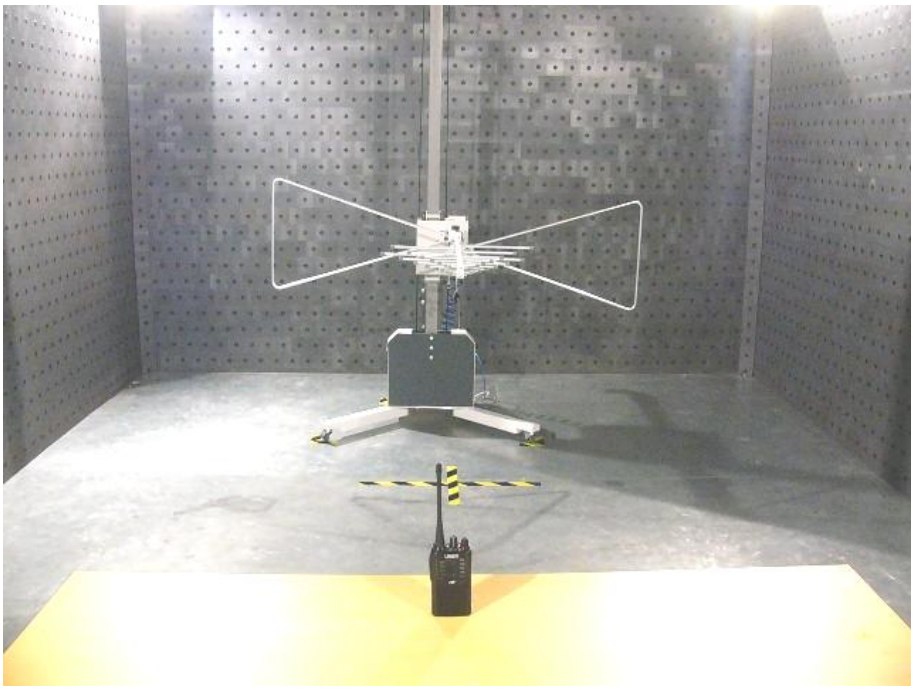

**Transient Frequency Behavior Decreasing Magnitude**



# 4. Photos of Testing

## 4. 1 EUT Test Photographs

Radiated emission test view



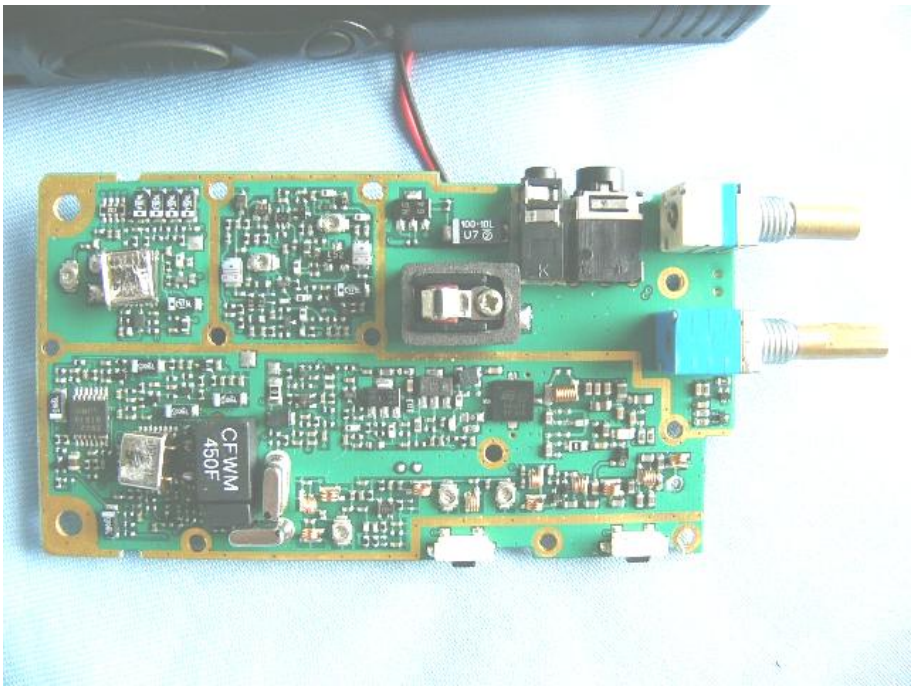
## 4. 2 EUT Detailed Photographs

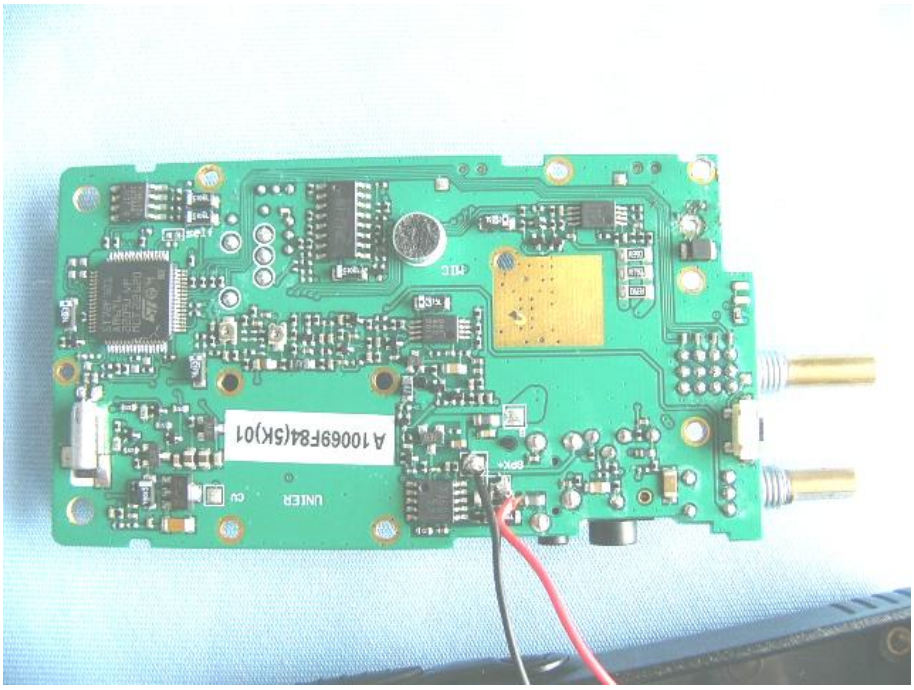
EUT top view


EUT bottom view


EUT inside whole view

Main board component side



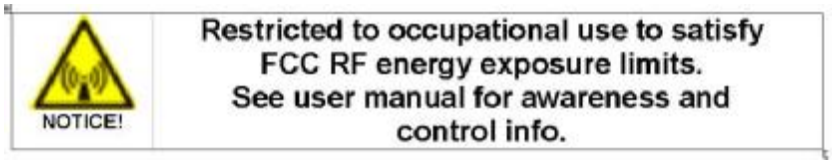
# 5. FCC ID Label

**FCC ID: UTLF8**

**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. .

**Unier Mark**
**Model: F8**
**Two-Way Radio , Made in China**
**FCC ID: UTLF8**
**This device complies with Part 90 of the FCC Rules. Operation is subject to the condition that device does not cause harmful interference.**
**Restricted to occupational use to satisfy FCC RF exposure limits. See user manual for operation requirements.**




## 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 ID Label 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, 2006 | July 06, 2007 |
| EMI Test Receiver | Rohde & Schwarz | ESPI3 | 100180 | Oct.18, 2006 | Oct.18, 2007 |
| Spectrum Analyzer | Rohde & Schwarz | FSP40 | 100273 | Sep. 18, 2006 | Sep. 18, 2007 |
| Signal Generator | FLUKE | PM5418+Y/C | LO747012 | Feb.10, 2006 | Feb.10, 2007 |
| Signal Generator | FLUKE | PM5418TX | LO738007 | Feb.10, 2006 | Feb.10, 2007 |
| Loop Antenna | SCHWARZBECK | FMZB1516 | 113 | Jan. 30, 2006 | Jan. 30, 2007 |
| Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 872096/16 | Jan. 30, 2006 | Jan. 30, 2007 |
| Trilog-Super Broadband Antenna | SCHWARZBECK | VULB9161 | 9161-4079 | Sep.18, 2006 | Sep.18, 2007 |
| Trilog-Super Broadband Antenna | SCHWARZBECK | VULB9161 | 9161-4080 | Sep.18, 2006 | Sep.18, 2007 |
| Broad-Band Horn Antenna | SCHWARZBECK | BBHA 9120D | 9120D-564 | Sep.18, 2006 | Sep.18, 2007 |
| Broad-Band Horn Antenna | SCHWARZBECK | BBHA 9120D | 9120D-565 | Sep.18, 2006 | Sep.18, 2007 |
| Ultra Broadband Antenna | Rohde & Schwarz | HL 562 | 100110 | June.05, 2006 | June.05, 2007 |
| AMN | Rohde & Schwarz | ESH3-Z5 | 100196 | Oct. 23,2006 | Oct. 23, 2007 |
| AMN | Rohde & Schwarz | ESH3-Z5 | 100197 | Oct. 23,2006 | Oct. 23, 2007 |
| Pulse Limiter | Rohde & Schwarz | ESH3-Z2 | N/A | N/A | N/A |
| Absorbing Clamp | Rohde & Schwarz | MDS-21 | N/A | Oct. 29,2006 | Oct. 29,2007 |
| KMO Shielded Room | KMO | KMO-001 | N/A | N/A | N/A |
| EMI Test Receiver | Rohde & Schwarz | ESCS30 | 100003 | Feb. 27, 2006 | Feb.27, 2007 |
| Coaxial Cable with N-Connectors | SCHWARZBECK | AK9515H | 95549 | Sep.18, 2006 | Sep.18, 2007 |
| Power Meter | Rohde & Schwarz | NRVD | 100041 | Feb.10, 2006 | Feb.10, 2007 |
| Radio Communication Test Set | Rohde & Schwarz | CMS 54 | 846621/024 | Feb.10, 2006 | Feb.10, 2007 |
| Modulation Analyzer | Hewlett-Packard | 8901B | 2303A00362 | Feb.10, 2006 | Feb.10, 2007 |
| Communication Analyzer | Wavetek Stabilock | 4032 | N/A | Feb. 01, 2006 | Feb.01, 2007 |
| Storage Oscilloscope | Tektronix | TDS3052 | N/A | Feb. 01, 2006 | Feb.01, 2007 |
| Scanner Receiver | Yaesu | VR-500 | 2G300051 | Feb. 01, 2006 | Feb.01, 2007 |
| Attenuator | Schwarzbeck | 20dB | N/A | Feb. 01, 2006 | Feb.01, 2007 |
| Attenuator | Rohde & Schwarz | 10dB | N/A | Feb. 01, 2006 | Feb.01, 2007 |
| SOHO Telephone Switching System | IKE | 2000-108C | N/A | Feb.10, 2006 | Feb.10, 2007 |
| Temperature Chamber | TABAI | PSL-4GTW | N/A | Feb.10, 2006 | Feb.10, 2007 |
| 3m Semi-Anechoic Chamber | Albatross Projects | 9mX6mX6m | N/A | Feb.10, 2006 | Feb.10, 2007 |