# FCC MEASUREMENT REPORT

## CERTIFICATION OF COMPLIANCE

| | | |
|---|---|---|
| PRODUCT | : | UHF READER |
| MODEL/TYPE NO | : | CPR-303US |
| FCC ID | : | XICCPR-303US |
| TRADE NAME | : | U PASS |
| APPLICANT | : | U Pass Co., Ltd.<br>NO. 509. Daeryung Post Tower 3, 182-4, Guro-Gu, Seoul, 152-847 Korea |
| RULE PART(S) | : | FCC Part 15C |
| FCC PROCEDURE | : | Certification |
| DATES OF TEST | : | September 1 to 24, 2009 |
| DATES OF ISSUE | : | September 24, 2009 |
| TEST REPORT No. | : | BWS-09-RF-0009 |
| TEST LAB. | : | BWS TECH Inc. (Registration No. : 553281) |

This **UHF READER CPR-303US** has been tested in accordance with the measurement procedures specified in ANSI C63.4-2003 and ANSI/TIA-603-C-2004 at the BWS TECH/EMC Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part 15.

I attest to the accuracy of data. All measurement herein was performed by me or were made under my supervision. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. The results of testing in this report apply to the product/system, which was tested only. Other similar equipment may not necessarily produce the same results due to production tolerance and measurement uncertainties.

September 24, 2009
(Date)

Reviewed by **HyunSup, Jin**

September 24, 2009
(Date)

Reviewed by **TaeHyun, Nam**

**BWS TECH Inc.**
**www.bws.co.kr**
**#611-1 Maesan-Ri, Mohyeon-Myeon, Yongin-Si, Gyeonggi-Do, 449-853 Korea**
**TEL: +82 31 333 5997 FAX: +82 31 333 0017**

# TABLE OF CONTENTS

# FCC TEST REPORT

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

## 1. General Information

### Applicant

| | |
|---|---|
| **Company Name** | U Pass Co., Ltd. |
| **Company Address** | NO. 509. Daeryung Post Tower 3, 182-4, Guro-Gu, Seoul, 152-847 Korea |
| **Phone/Fax** | Phone : 82-2-488-8807 Fax :82-2-488-8277 |

### Manufacturer

| | |
|---|---|
| **Company Name** | U Pass Co., Ltd. |
| **Company Address** | NO. 509. Daeryung Post Tower 3, 182-4, Guro-Gu, Seoul, 152-847 Korea |
| **Phone/Fax** | Phone : 82-2-488-8807 Fax :82-2-488-8277 |

- **EUT Type** UHF READER
- **Model Number** CPR-303US
- **FCC Identifier** XIC-CPR303US
- **S/N** Prototype
- **FCC Rule Part(s)** FCC Part 15C
- **Frequency** 902~928 MHz
- **Modulation Method** PR-ASK
- **Emission Designator** N/A
- **RF Power Output** 30 dBm
- **Channel** 50
- **Dates of Tests** December 1 to 4, 2008
- **Place of Tests** BWS TECH Inc.(FCC Registration Number : 553281)
  #611-1 Maesan-Ri, Mohyeon-Myeon, Yongin-Si, Gyeonggi-Do, 449-853 Korea
  TEL: +82 31 333 5997 FAX: +82 31 333 0017
- **Test Report No.** BWS-09-RF-0009

## 2. Description of Test Facility

The measurement for radiated and conducted emission test were conducted at the open area test site of BWS TECH Inc. facility located at #611-1 Maesan-Ri, Mohyeon-Myeon, Yongin-Si, Gyeonggi-Do, 449-853 Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-2003 and CISPR Publication 16. The BWS TECH measurement facility has been filed to the Commission with the FCC for 3 and 10-meter site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-2003 and registered to the Federal Communications Commission (Registration Number : 553281 ).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C.63.4-2003) was used in determining radiated and conducted emissions from the U Pass Co., Ltd. UHF READER Model : **CPR-303US**.

# 3. Product Information

## 3.1 General Specification

| Reader Specifications | |
|---|---|
| Operation Frequency | 902 ~ 928 MHz |
| Operation Tag | ISO 18000 – 6A,6B,6C |
| RF Output | 1 W |
| Modulation | PR-ASK |
| An Antenna Type | Circular |
| Hopping Channel | 50 Channel |
| Read Range | 4~5m |
| Channel bamd width | 500 kHz@1FA |
| Operation Voltage | DC 24V(external powersupply) |
| Current | 0.5A |
| Size | 235x255x55 (mm) |
| Height | 1.5Kg |
| LAN | RJ-45<br>Protocol:TCP/IP |
| **Antenna Specifications** | |
| Form | Micro Fatch Array |
| Gain | < 6dBi |
| Polarization | Circular |
| 3dB Beamwidth | 20degee(E-plane) |
| Impedance | 50 Ohm |
| Size | 220x220x13(mm) |

# 4. Summery of The Test Result

| No. | Test case | FCC reference | Test Method | Verdict |
|---|---|---|---|---|
| 1 | RF Output Power | 15.247(b)(2) | 2.1046 | Pass |
| 2 | E.R.P. | 15.247(b)(2) | Pass | Pass |
| 3 | 20dB Bandwidth | 15.247(a)(1)(i) | 2.1049 | Pass |
| 4 | Spurious RF conducted emissions | 15.247 | Pass | Pass |
| 5 | 900MHz Band Edge | 15.247(d) | Pass | Pass |
| 6 | Number of hopping channels | 15.247(a)(1)(i) | Pass | Pass |
| 7 | Channel Spacing | 15.247(a)(1) | Pass | Pass |
| 8 | Channel Dwell Time | 15.247(a)(1) | Pass | Pass |
| 9 | Radiated Spurious emissions | 15.247(d),15.35(b),15.209 | Pass | Pass |
| 10 | Line Conducted Emissions | 15.207 | Pass | Pass |

# 5. TEST DATA

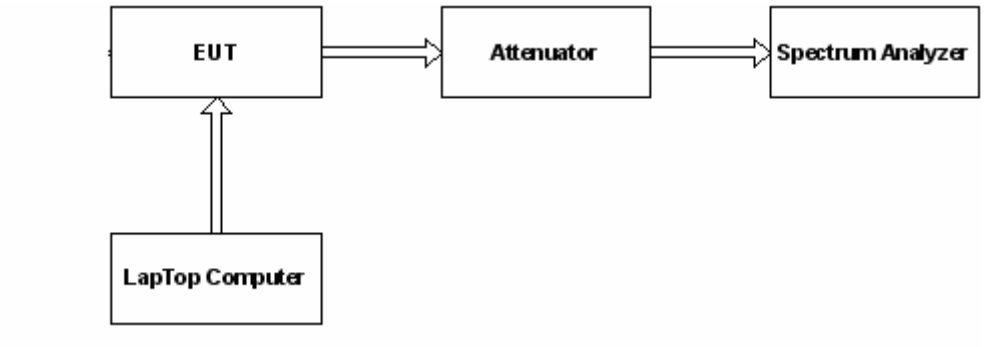
## 5.1 RF Output Power

### 5.1.1 Method of Measurement

The test was configured as shown in the RF conducted bench top test setup.
The unit was sequentially tuned to the test channels(Low, Mid and High)and configured to transmit random data. The RF transmit power was then measured on the spectrum analyzer.

Given that the channel BW is approximately 20MHz, the RBW and VBW was set to encompass the entire bandwidth of the channel and thus measure the total channel power. The RBW and VBW were set as follows: RBW 1MHz, VBW 1MHz, and the detector is PK model.

### 5.2.2 Measurement Set-Up




### 5.2.3 Test Result

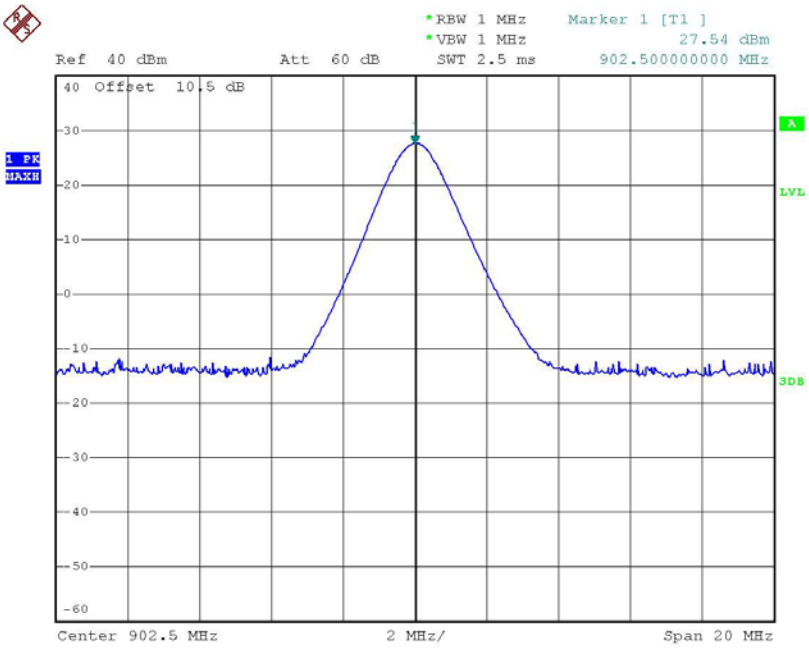
| Channel | Frequency(MHz) | RF output Power(dBm) |
|---|---|---|
| Low | 902.5 | 27.54 |
| Mid | 914.5 | 28.59 |
| High | 927.0 | 28.99 |

### 5.2.4 Limit

≤ 30dBm

## Plots of RF Output Power

### 1. Low Channel

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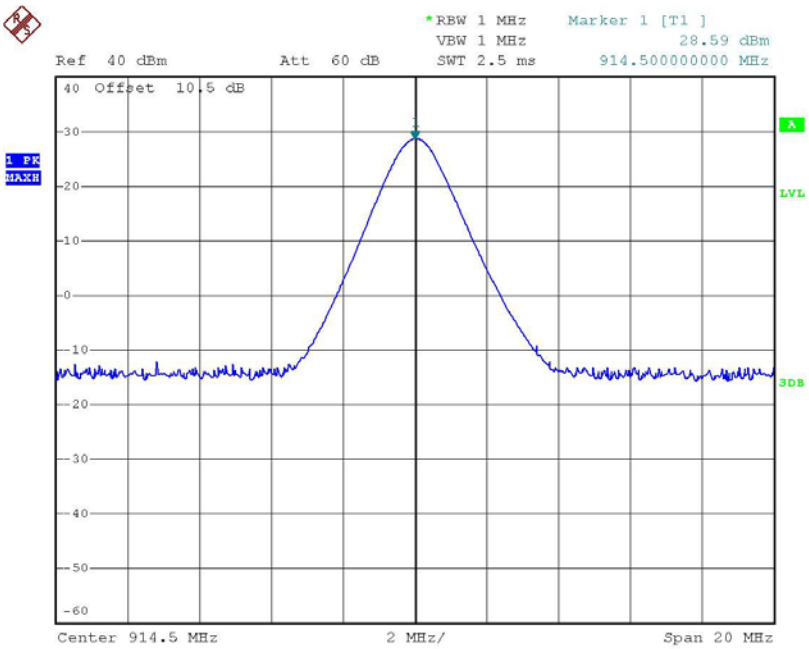
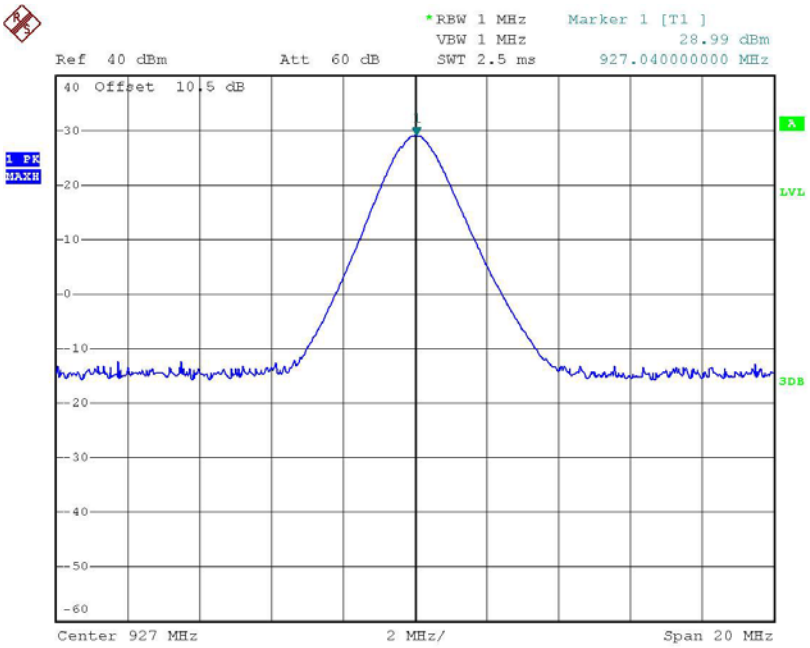
### 2. Middle Channel




Date: 21.SEP.2009 17:23:05

### 3.high Channel

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## 5.2 Effective Radiated Power

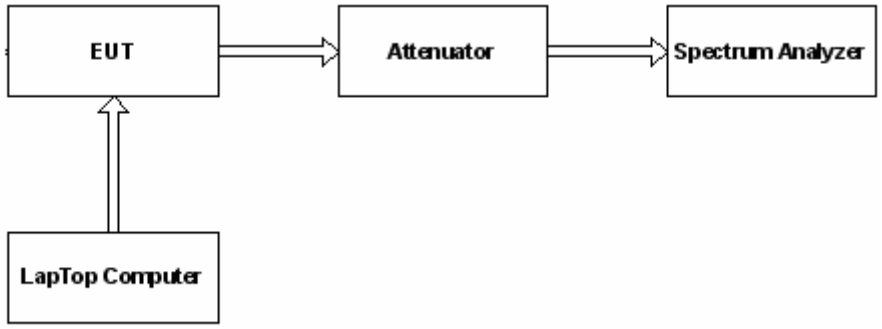
### 5.2.1 Method of Measurement

Step 1:
The measurement is carried out in the semi –anechoic chamber. EUT was placed on a 0.8 meters high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The output power of the cell signal of the tester was in a maximum value. A peak detector is used, while RBW and VBW are both set to 1 MHz. During the measurement, the highest emission was recorded from analyzer power level from the 360 Degrees rotation of the turntable and the test antenna moved up and down over a range from 1 to 4 Meters in both horizontally and vertically polarized orientations.

Step 2:
A dipole antenna shall be substituted in place of the EUT. The antenna will be driven by a signal generator with a known power S.G. applied through a Tx cable. Then the maximum Analyzer reading is recorded while the antenna was moving up and down. The E.R.P. /E.I.R.P. of the EUT can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of spectrum analyzer or receiver.
The correction factor (in dB)=S.G.-Tx Cable loss + Substitution antenna gain – Analyzer reading -2.15. Then the EUT's E.R.P. was calculated with the correction factor, E.R.P.=LVL + Correction factor.

### 5.2.2 Measurement Set-Up

Step 1.




### 5.2.3 Test Result

| Channel | Frequency (MHz) | Power (dBm) | Antenna gain (dBi) | E.R.P. (dBm) |
|---|---|---|---|---|
| Low | 902.5 | 27.54 | 5.91 | 33.45 |
| Mid | 914.5 | 28.59 | 5.91 | 34.50 |
| High | 927.0 | 28.99 | 5.91 | 34.90 |

### 5.2.4 Limits

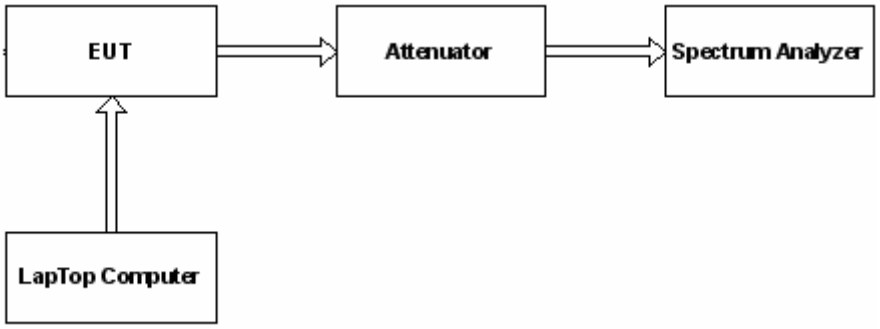
≤ 36dBm

## 5.3 20dB Bandwidth

### 5.3.1 Method of Measurement

The 20dB bandwidth was measured on the low middle and high channels of the 900 MHz band using the conducted RF test setup. The spectrum analyzer was configured for MAX HOLD and the trace allowed to stabilize. A peak search with the frequency and the level was performed, then we got the “Delta 2” and “Delta 3”, and they were both located the points at -20dB below the peak.
With these we tested the “20dB Bandwidth”.

### 5.3.2 Measurement Set-Up




### 5.3.3 Test Result

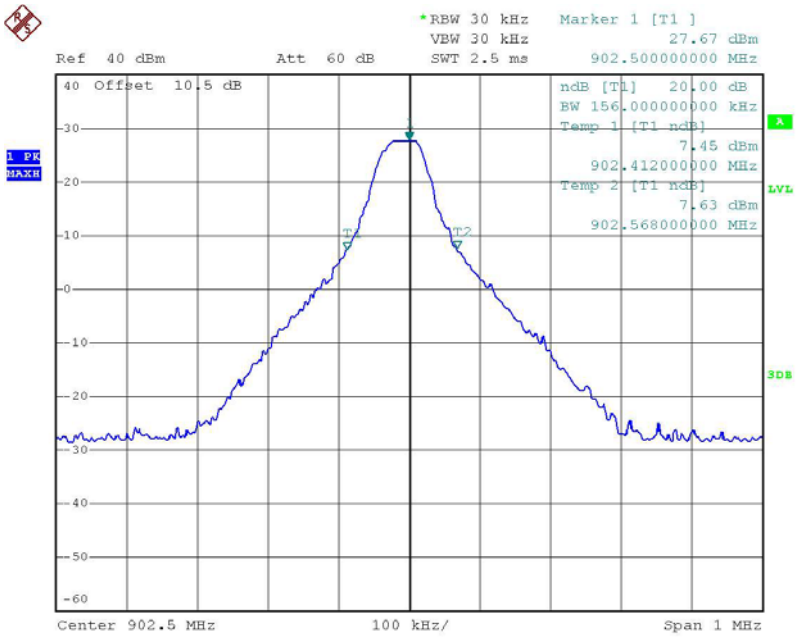
| Channel | Frequency (MHz) | Delta 2 (kHz) | Delta 3 (kHz) | 20dB BW (kHz) |
|---|---|---|---|---|
| Low | 902.5 | 88 | 68 | 156 |
| Mid | 914.5 | 100 | 72 | 172 |
| High | 927.0 | 108 | 76 | 184 |

### 5.3.4 Limits

≤ 250kHz

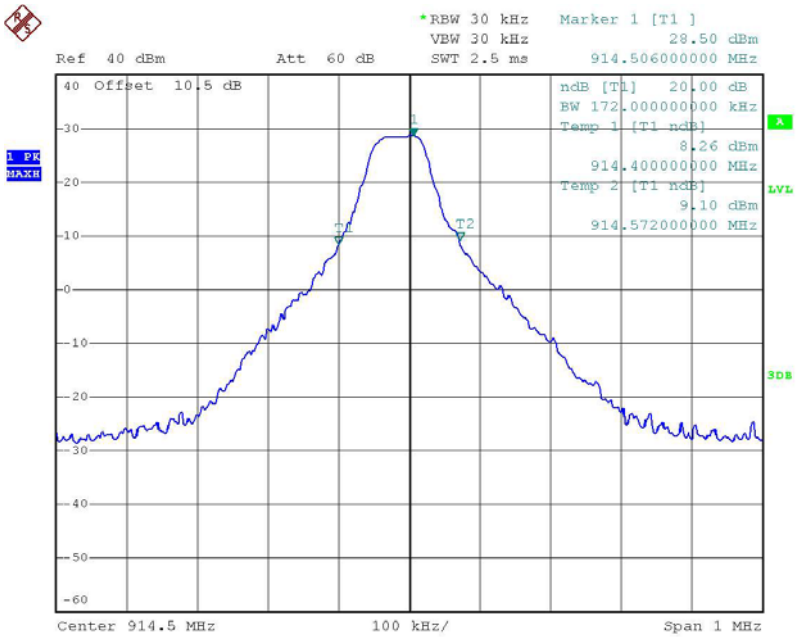
# Plots of 20dB Bandwidth

## 1. Low Channel



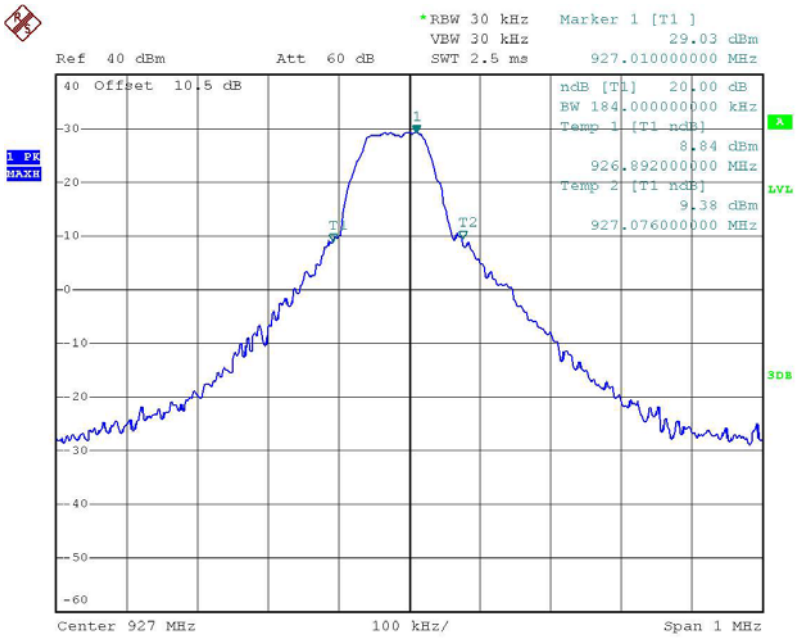

Date: 21.SEP.2009 17:31:08

## 2. Middle Channel




Date: 21.SEP.2009 17:36:25

### 3. High Channel



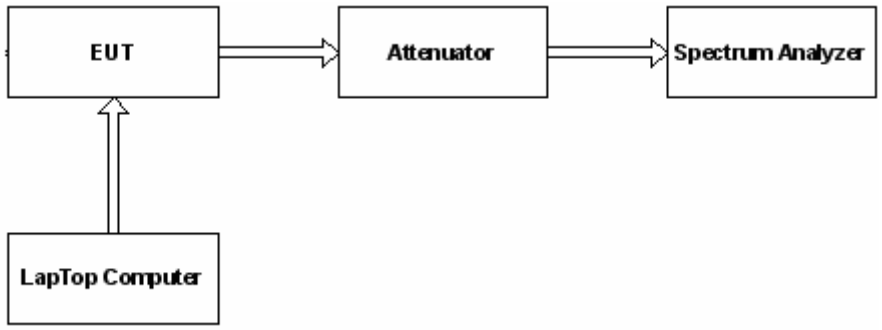

Date: 21.SEP.2009 17:27:20

## 5.4 Spurious RF conducted emissions

### 5.4.1 Method of Measurement

The test was configured as shown in the RF conducted bench top test setup.
The units was sequentially tuned to the test channels (Low, Mid, and High)and configured to transmit random data. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to 10GHz (higher than the 10$^{th}$ harmonic of the carrier). The peak detector is used on spectrum analyzer.
The spurious Emissions at antenna terminals was measured on the low middle and high channels of the 900 MHz band using the conducted RF test setup.

### 5.4.2 Measurement Set-Up




### 5.4.3 Test Results

Refer to the following next pages figures

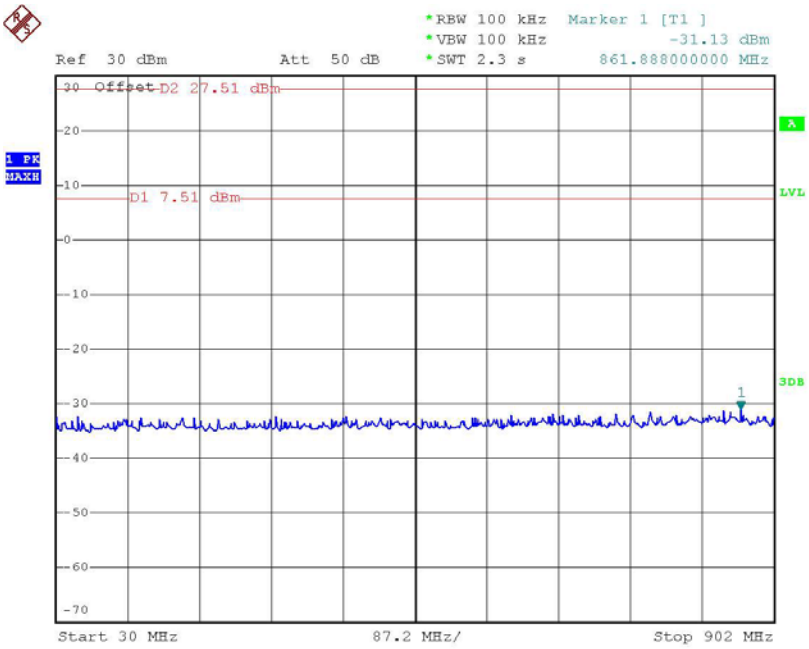
### 5.4.4 Limits

FCC Specification: Part 15.109(f)
In any 500 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 500kHz bandwidth within the band that contains the highest level of the desired power.

## Plots of Spurious Emissions

**1. Low Channel**

### 1.1 30MHz~902MHz

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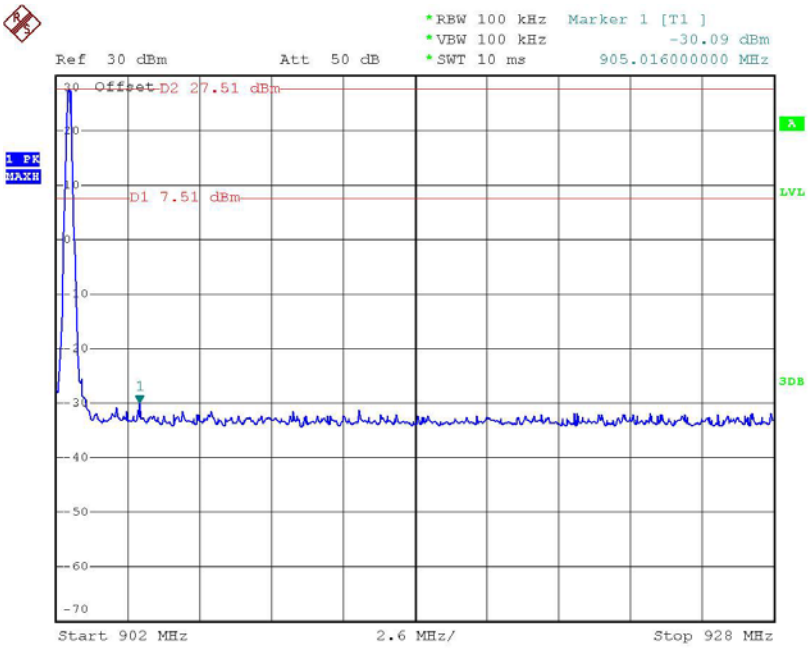
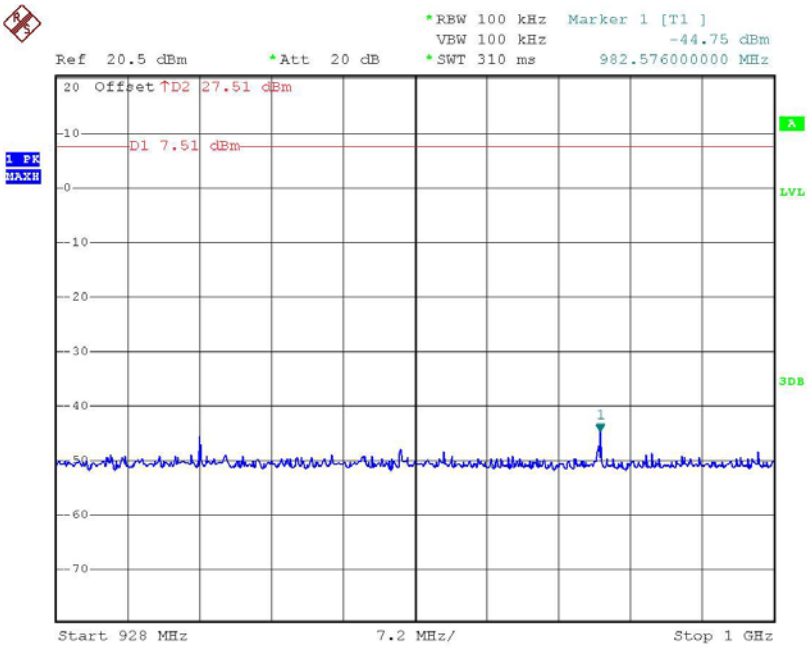
### 1.2 902MHz~928MHz




Date: 21.SEP.2009 18:03:34

### 1.3 928MHz~1GHz

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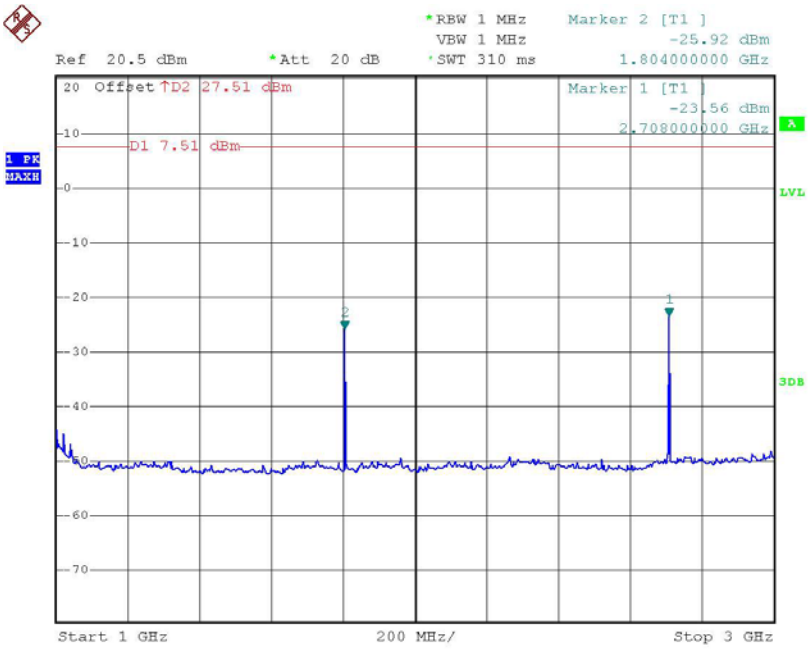
### 1.4 1GHz~3GHz

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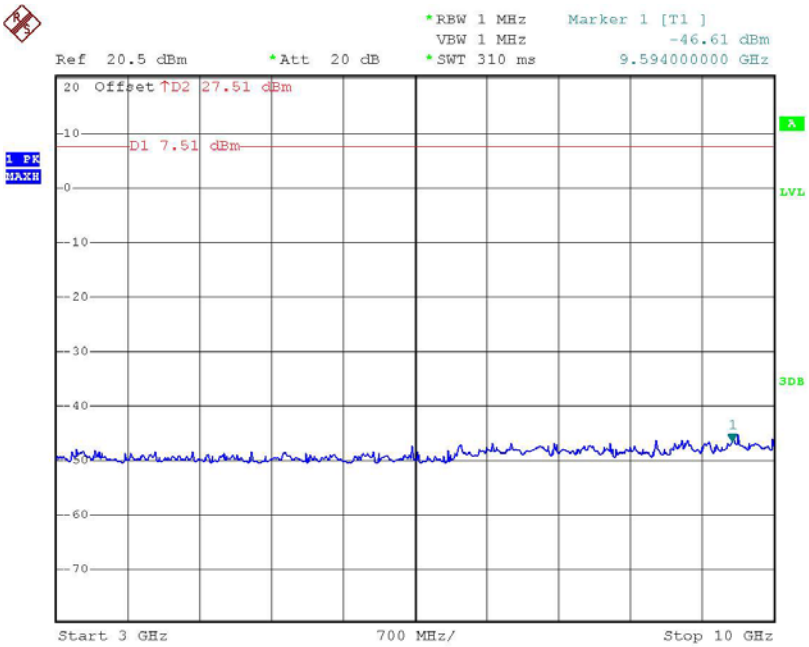
### 1.5 3GHz~10GHz

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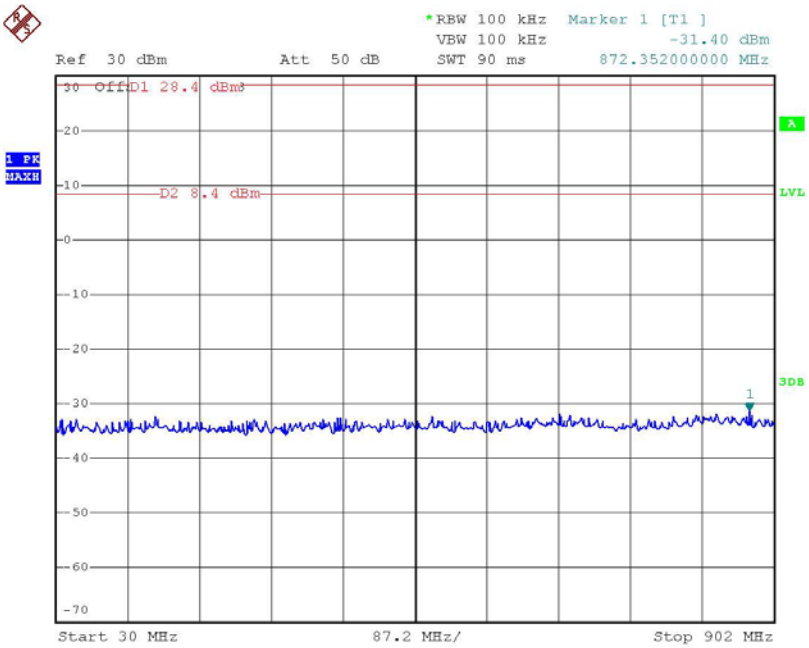
## 2. Middle Channel

### 2.1 30MHz~902MHz

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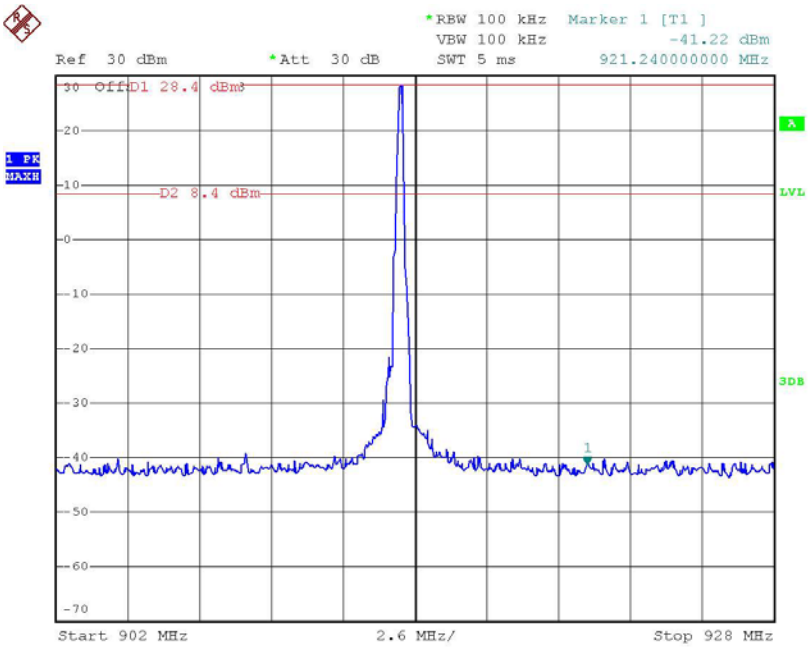
### 2.2 902MHz~928MHz

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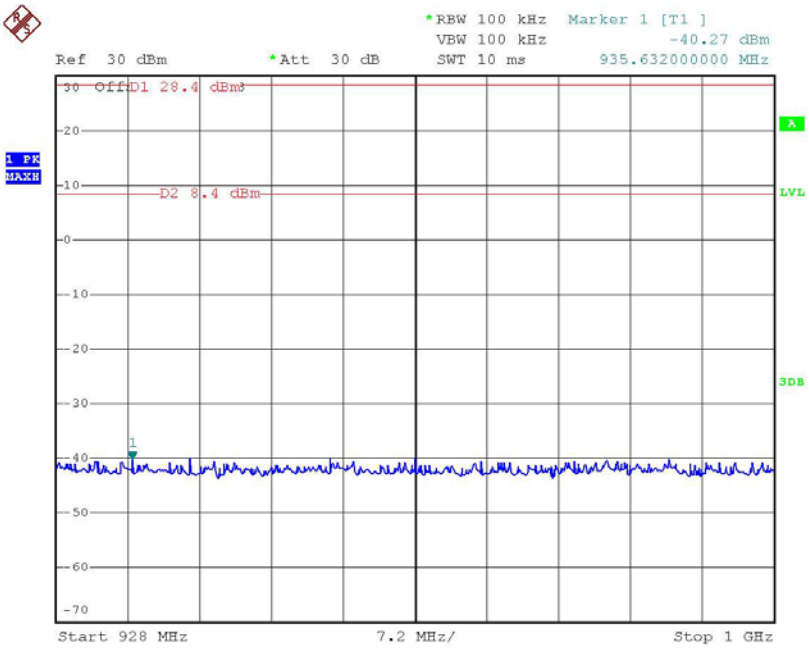
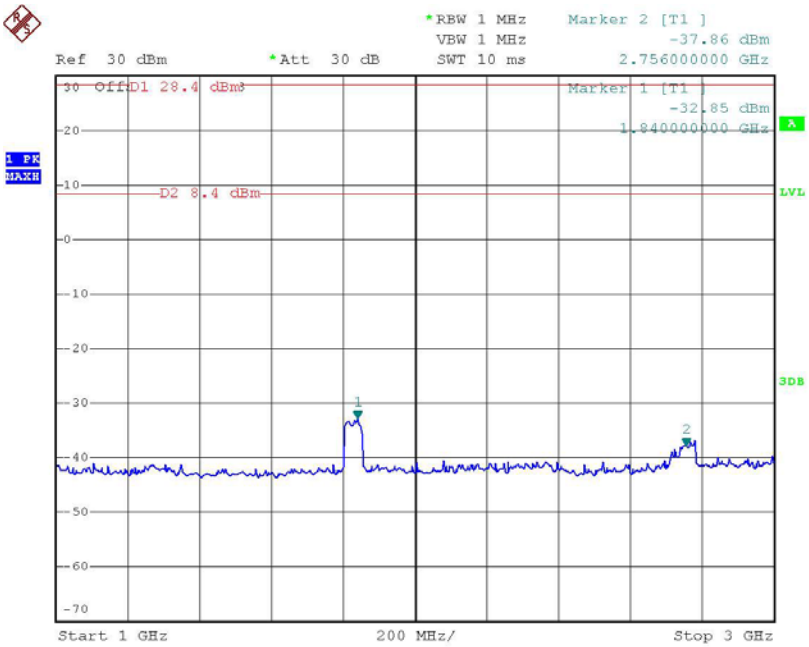
## 2.3 928MHz~1GHz




Date: 21.SEP.2009 18:10:39

## 2.4 1GHz~3GHz

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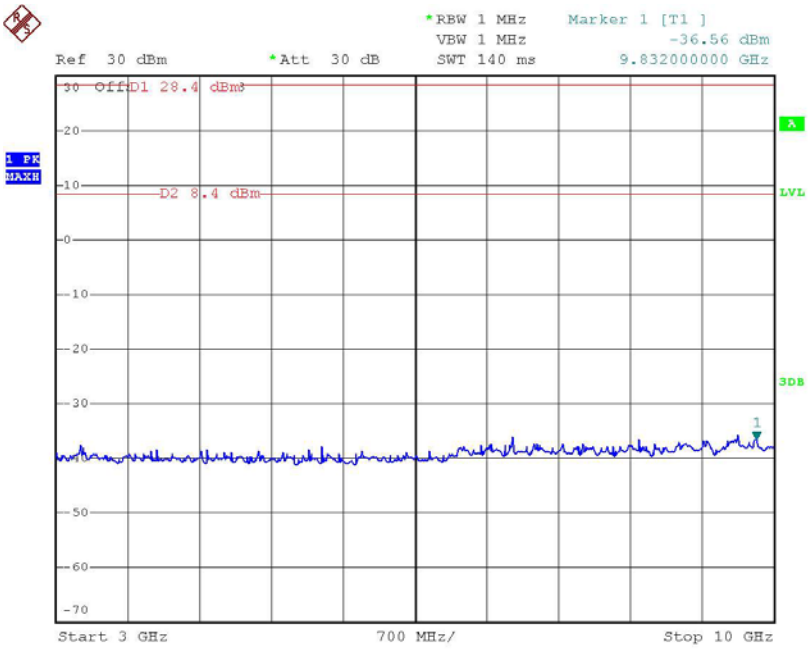
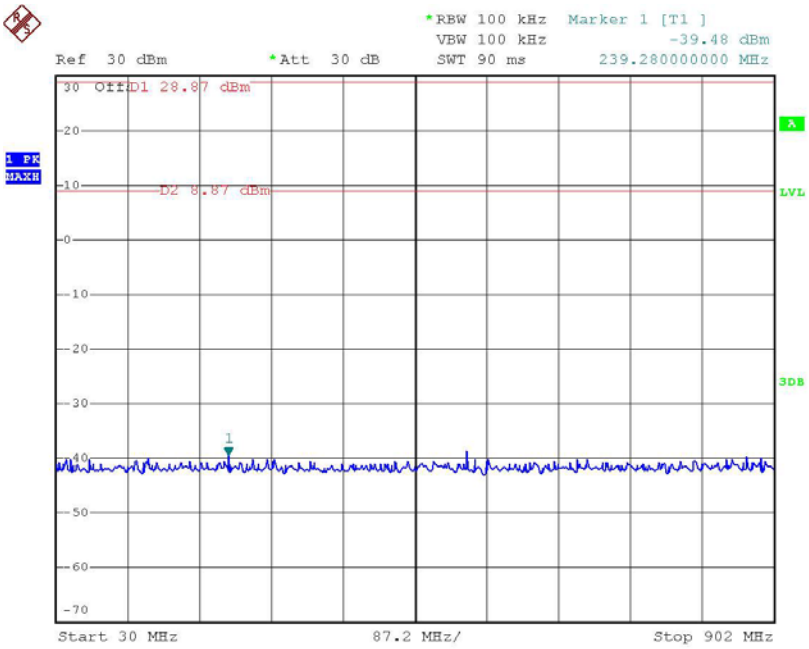
## 2.5 3GHz~10GHz




Date: 21.SEP.2009 18:11:42

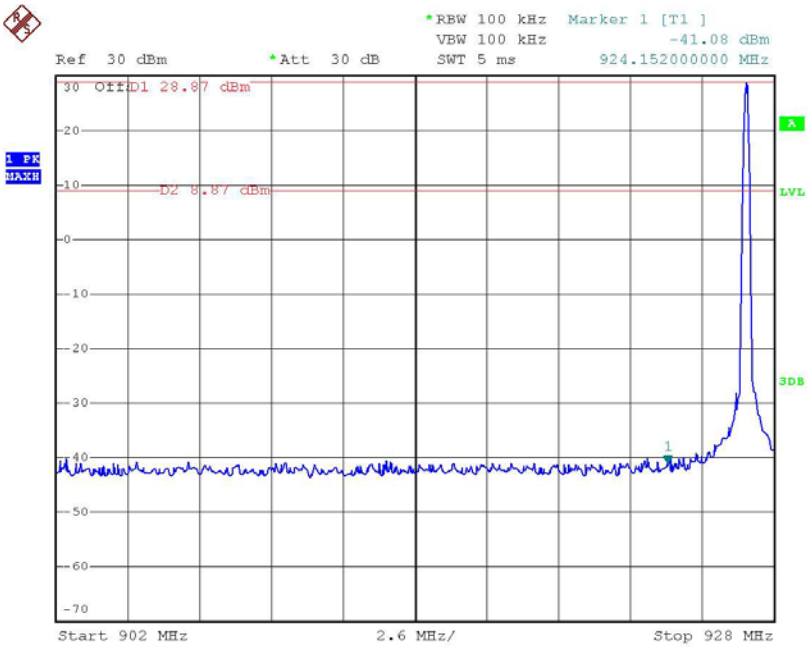
## 3. High Channel

### 3.1 30MHz~902MHz



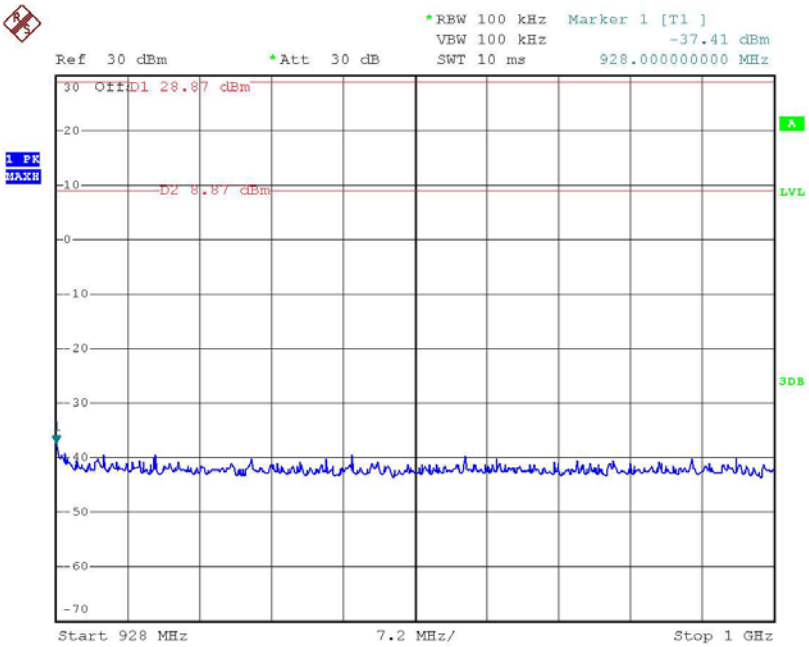

Date: 21.SEP.2009 18:12:19

### 3.2 902MHz~928MHz




Date: 21.SEP.2009 18:12:38

### 3.3 928MHz~1GHz

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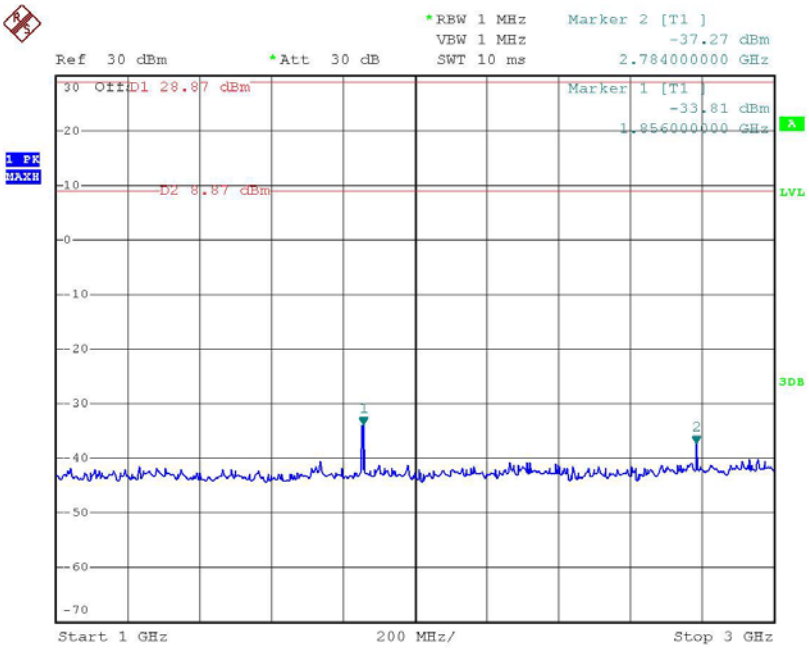
### 3.4 1GHz~3GHz

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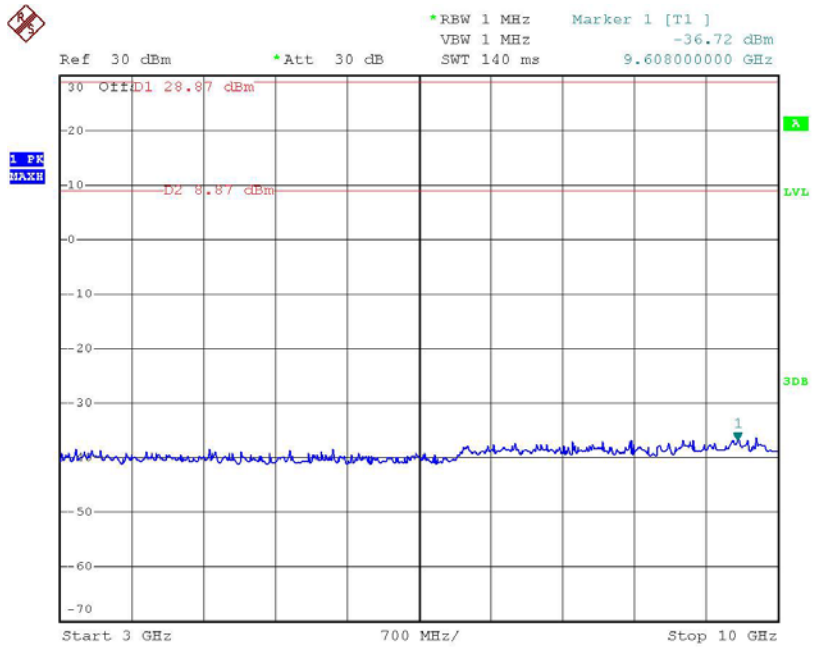
### 3.5 3GHz~10GHz



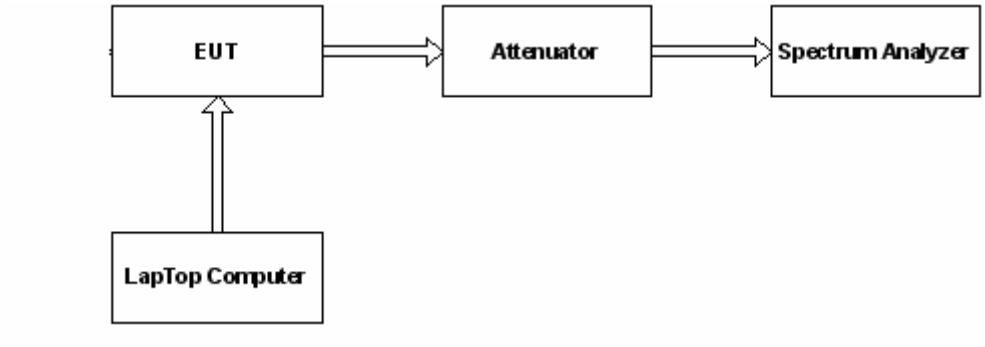

Date: 21.SEP.2009 18:13:31

## 5.5 900 MHz Band Edge

### 5.5.1 Method of Measurement

The test setup was configured as shown in the conducted test setup. The EUT was configured to continuously transmit random data on the low, and then the high test channel. The span of the analyzer was centered on the 902 and 928 MHz band edge respectively.
The RBW & VBW were set to 100 kHz. The trace was allowed to stabilize then a Peak-search and a marker delta measurement to the band edge was performed to verify that the RF power at the band edge was at least 20 dB below the peak of the fundamental level.

### 5.5.2 Measurement Set-Up

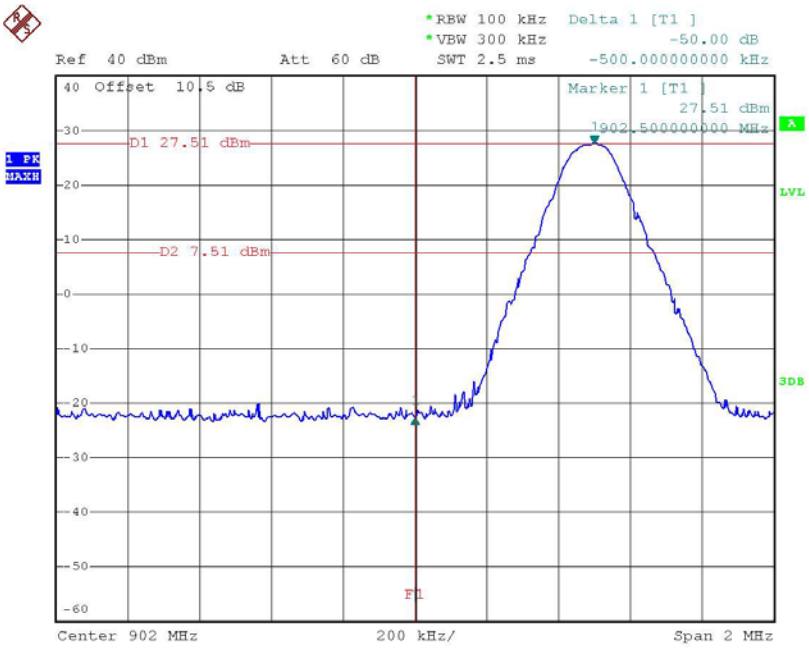



### 5.5.3 Test Results

| Frequency (MHz) | Level (dBc) | Limits (dBc) |
|---|---|---|
| 902 | -50.00 | -20.00 |
| 928 | -51.11 | -20.00 |

## Plots of Band Edge

### 1. Low Channel

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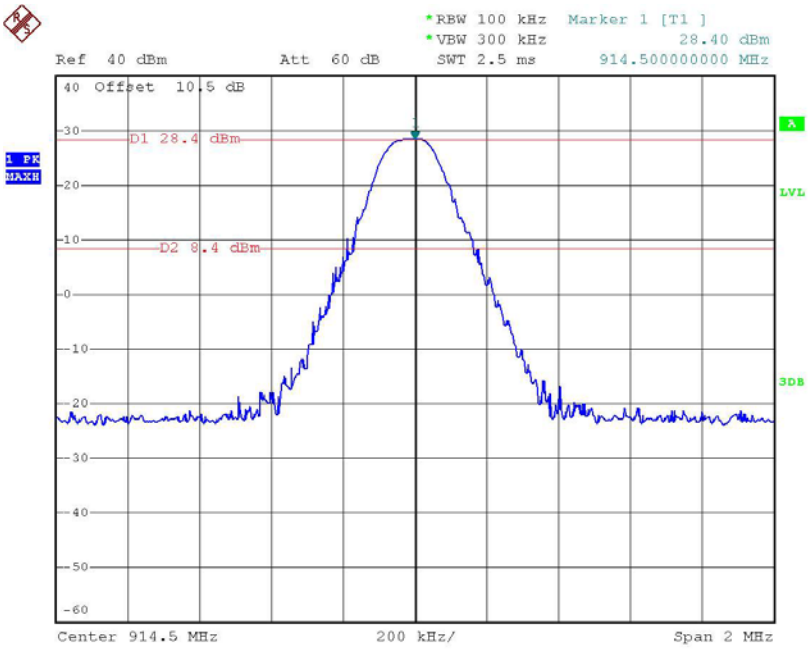
### 2. Middle Channel

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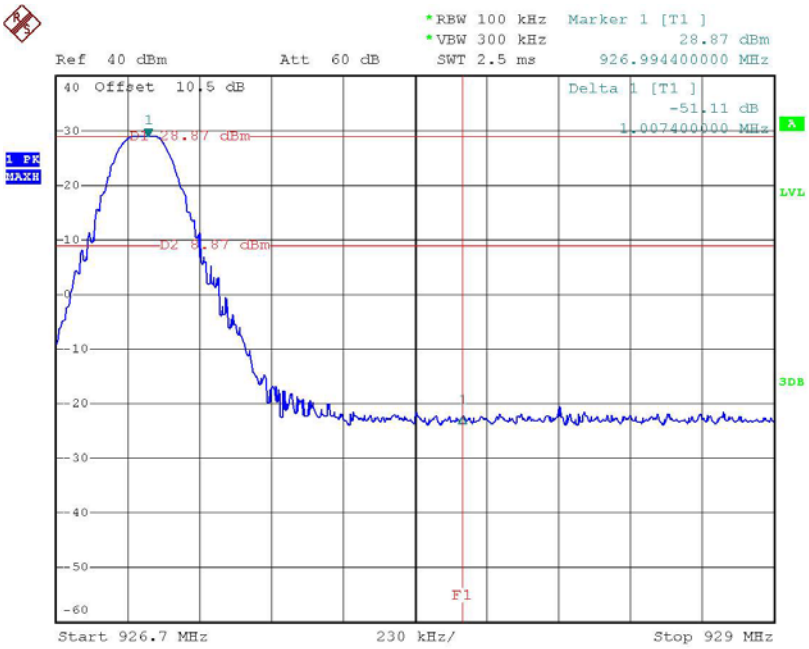
### 3.High Channel

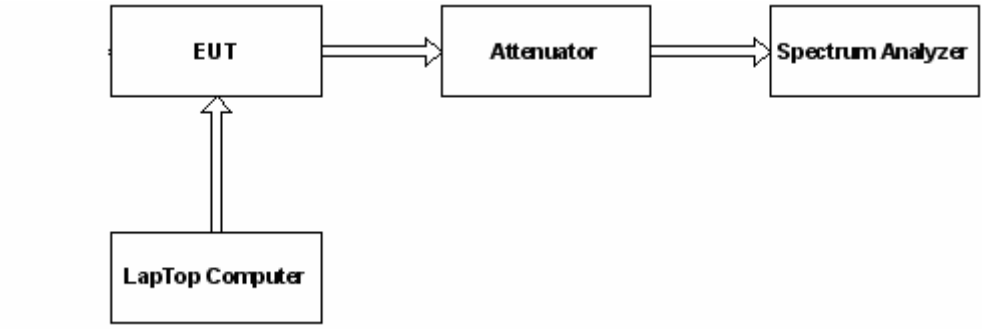


## 5.6 Number of hopping Channels

### 5.6.1 Method of Measurement

The test setup is as shown in the Conducted RF bench setup. The EUT was configured to hop Sequentially through all of its channels. The spectrum analyzer was set to MAX HOLD to capture the number of hopping channels. The entire 902~928 MHz band was examined in three sub-bands, 902~910 MHz, 910~920MHz and 920~928MHz.

### 5.6.2 Measurement Set-Up



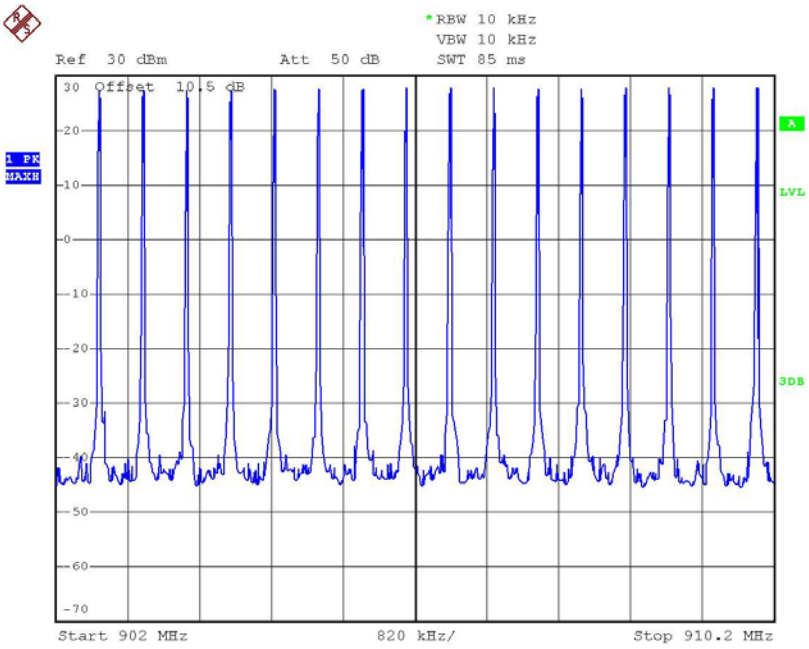

### 5.6.3 Test Results

All 50 hopping channels were recorded.

| Frequency range (MHz) | Num of Channels |
|---|---|
| 902~910.2 | 16 |
| 910.2~920.2 | 20 |
| 920.2~928 | 14 |

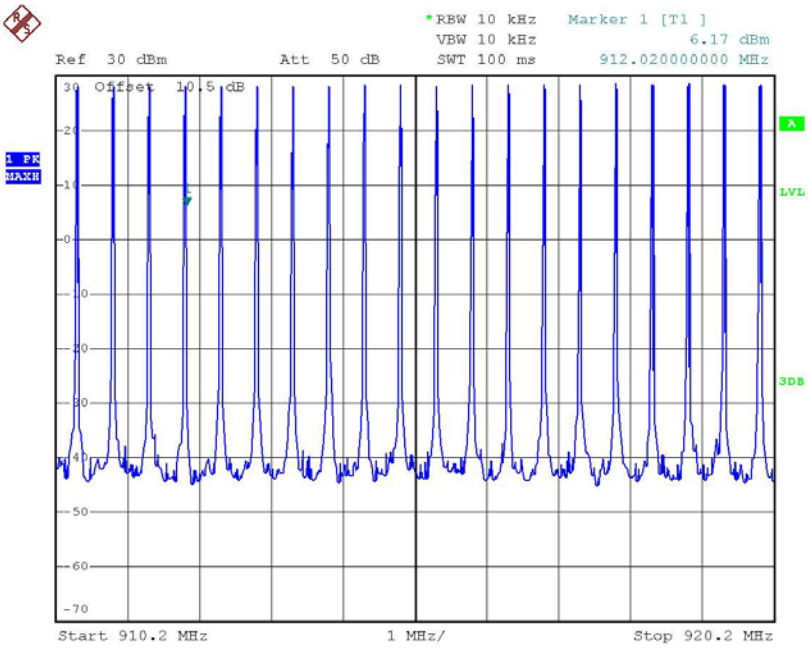
## Plots of Hopping Channel

### 1. 902~910.2MHz



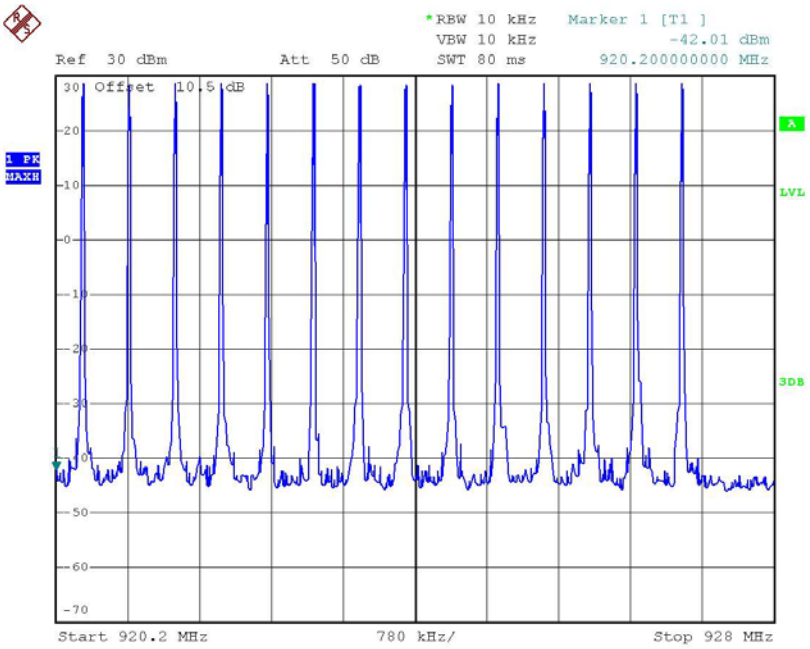

Date: 21.SEP.2009 18:15:22

### 2. 910.2~920.2MHz




Date: 21.SEP.2009 18:16:51

### 3. 920.2~928MHz

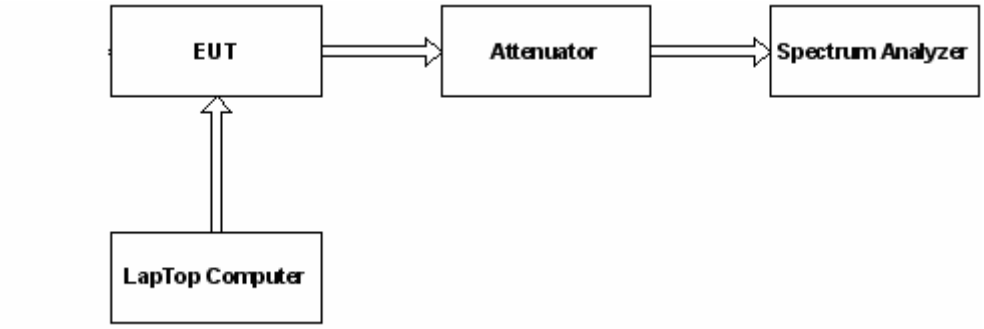


## 5.7 Channel Spacing

### 5.7.1 Method of Measurement

The test setup is as shown in the Conducted RF bench setup. The EUT was configured to hop sequentially through all of its channels. The spectrum analyzer was set to MAX HOLD to capture a few of the sequential channel frequencies. The spectrum analyzer markers were used to determine the channel spacing.

### 5.7.2 Measurement Set-Up

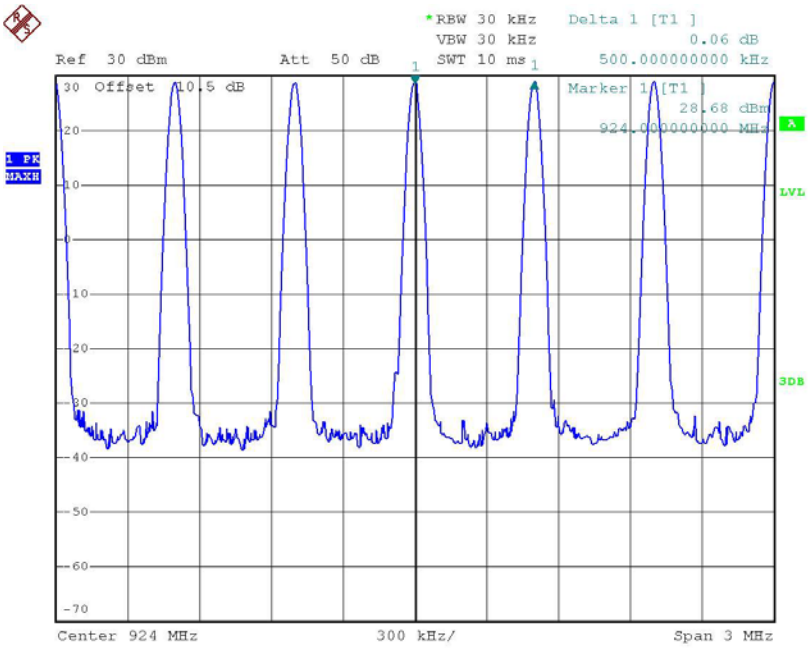



### 5.7.3 Test Results

The specification requires that the channel spacing be greater than the measured 20dB BW. The 20dB BW. The 20dB BW was measured at a maximum of 184 kHz.

Channel spacing result measured was 500kHz.

**Plots of Channel Spacing**



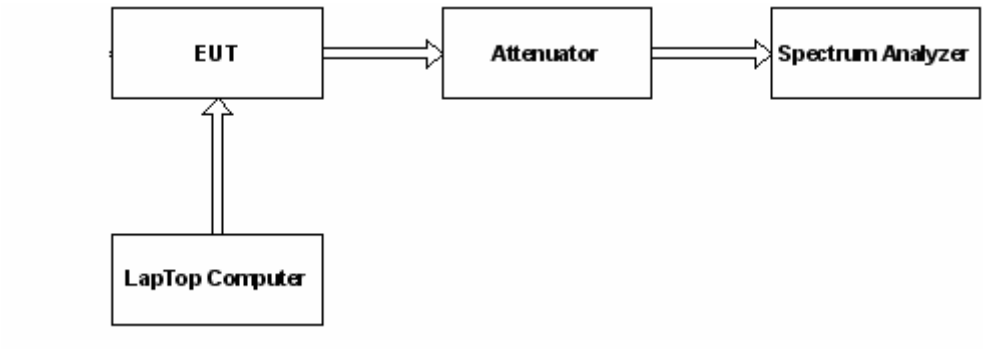

Date: 21.SEP.2009 18:19:27

## 5.8 Channel Dwell Time

### 5.8.1 Method of Measurement

The test setup is as shown in the Conducted RF bench setup. The EUT was configured to hop Sequentially through all of its channels. Random data packets were transmitted over the link at a fixed packet size.
The spectrum analyzer was used to determined the transmission time for each packet firstly, And then the LOW, MID and High channel were monitored with the spectrum analyzer on zero Span and set to 20s sweep time. RBW was set to 1MHz to prevent hits on adjacent channels Appearing as hits on the test channel.

### 5.8.2 Measurement Set-Up



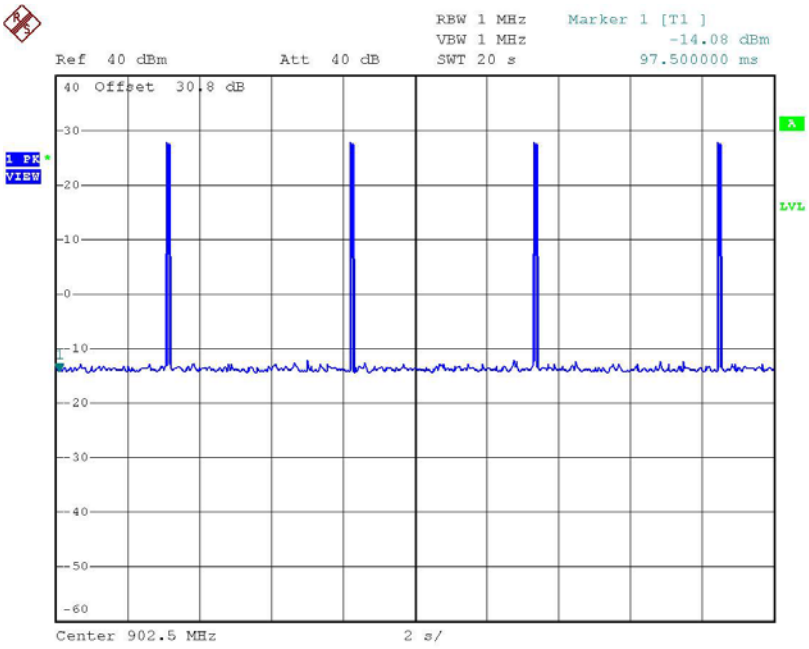

### 5.8.3 Test Results

There was only 4 packets in 20s on each channel (LOW,MID and HIGH),
So we get the results. 0.096sx4times=0.384s

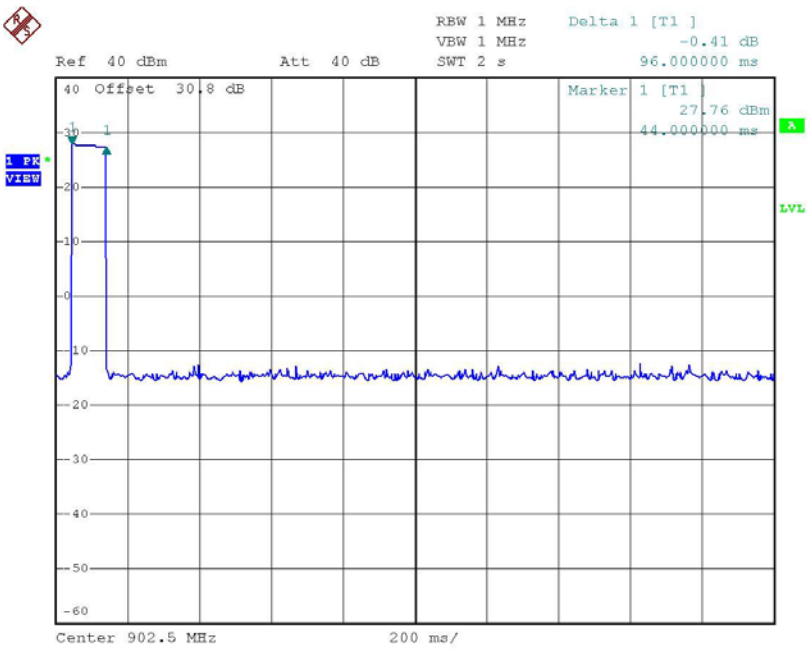
| Limits(ms) | Frequency(MHz) | Channel Dwell Time(ms) | Result |
|---|---|---|---|
| 400 | 902.5 | 384 | Pass |
| 400 | 914.5 | 384 | Pass |
| 400 | 927.0 | 384 | Pass |

## Plots of Dwell Time

### 1. Low Channel

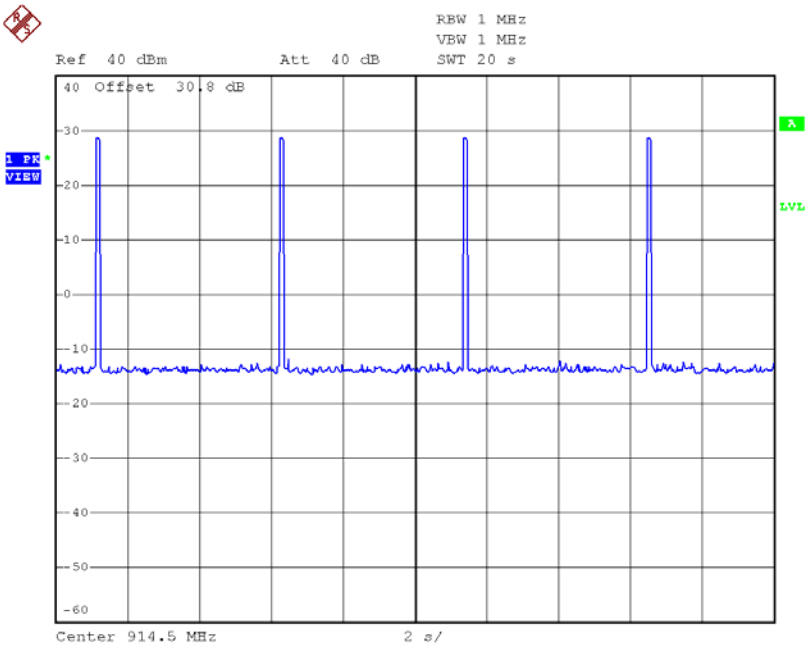



Date: 5.OCT.2009 15:58:16

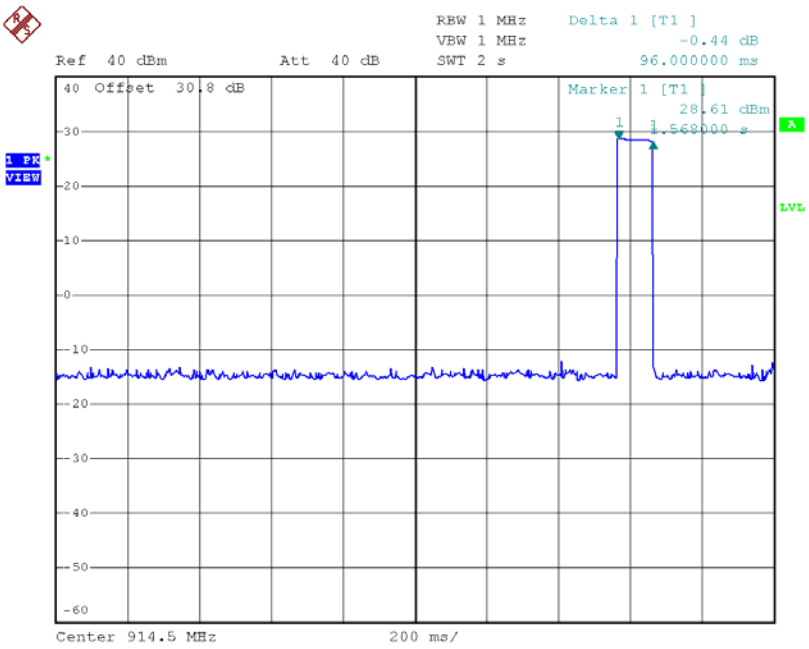



Date: 5.OCT.2009 16:02:42

## 2. Middle Channel

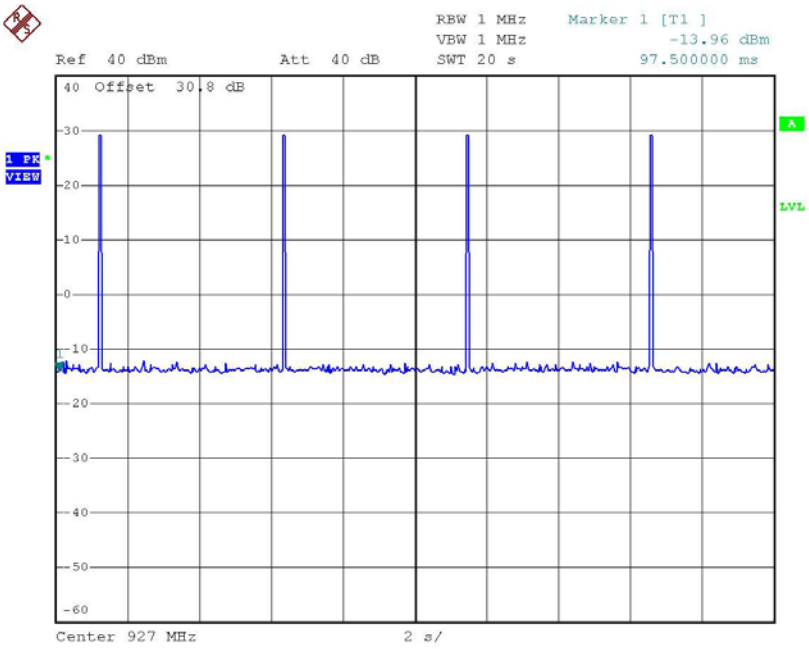



Date: 5.OCT.2009 16:12:19

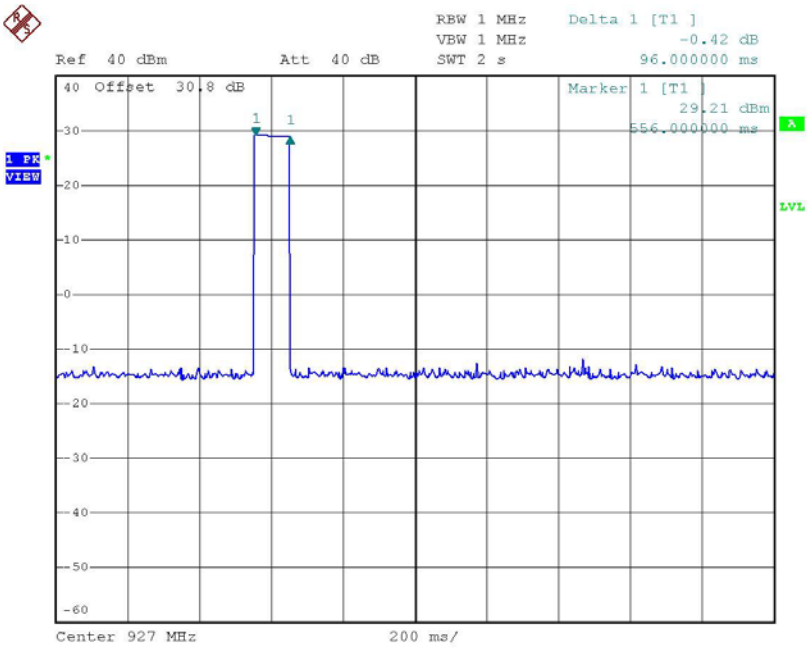



Date: 5.OCT.2009 16:11:20

### 3. High Channel




Date: 5.OCT.2009 15:59:54



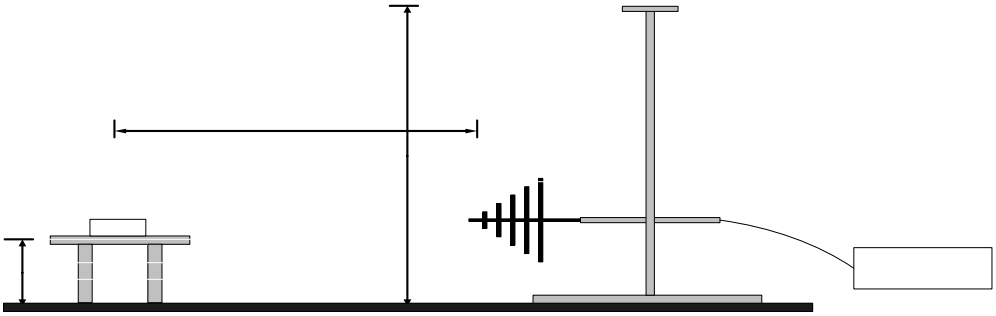

Date: 5.OCT.2009 16:01:07

## 5.9 Spurious radiated emissions

### 5.9.1 Method of Measurement

The test set-up was made in accordance to the general provisions of ANSI C63.4-2003.
The equipment Under Test(EUT) was set up on a non-conductive table in the semi-anechoic Chamber. The test was performed at the distance of 3m between the EUT and receiving antenna.
The radiated emissions measurements were made in a typical installation configuration.
Then start the test software. Sweep the whole frequency band through the range from 30MHz to 1GHz or above, using receive bilog antenna or horn antenna.
During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna Shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna.
The data of cable loss and antenna factor has been calibrated in full testing frequency range before The testing.

### 5.9.2 Measurement Set-Up



### 5.9.3 Test Results

There was only one packets in 20s on each channel (LOW,MID and HIGH),
So we get the results.

| Frequency [MHz] | Reading [dBμV] | Polarization [*H/**V] | Ant.Factor [dB] | Cable Loss [dB] | Limit [dBμV/m] | Emission Level [dBμV/m] | Margin [dB] |
|---|---|---|---|---|---|---|---|
| 48.01 | 18.61 | V | 12.24 | 1.56 | 39.10 | 32.41 | -6.69 |
| 72.00 | 20.23 | V | 10.15 | 1.86 | 39.10 | 32.24 | -6.86 |
| 98.48 | 15.98 | H | 9.70 | 2.19 | 43.50 | 27.87 | -15.63 |
| 143.32 | 8.88 | H | 13.05 | 2.63 | 43.50 | 24.56 | -18.94 |
| 183.35 | 20.14 | H | 11.71 | 3.01 | 43.50 | 34.86 | -8.64 |
| 192.02 | 16.89 | V | 10.88 | 3.08 | 43.50 | 30.85 | -12.65 |
| 300.01 | 14.40 | H | 13.41 | 3.88 | 46.40 | 31.69 | -14.71 |
| 336.05 | 14.67 | H | 14.27 | 4.07 | 46.40 | 33.01 | -13.39 |
| 450.00 | 13.54 | V | 16.92 | 4.77 | 46.40 | 35.23 | -11.17 |
| 550.00 | 15.95 | H | 18.62 | 5.34 | 46.40 | 39.91 | -6.49 |
| 650.01 | 5.88 | H | 20.37 | 5.87 | 46.40 | 32.12 | -14.28 |
| 750.00 | 4.35 | H | 22.20 | 6.50 | 46.40 | 33.05 | -13.35 |

### 5.9.4 Limits

FCC Part 15, Subpart C, 15.277(d)
…In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits
specified in Section 15.209(a) (see Section 15.205(c)).

FCC Part 15, Subpart C, 15.209, Radiated Emission Limits

| Frequency Range (MHz) | Class B Limits (dBuV/m) |
|---|---|
| 30 - 88 | 40.0 |
| 88 - 216 | 43.5 |
| 216 - 960 | 46.0 |
| above 960 | 54.0 |

15.35(b)
…, there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit….
Used conversion factor: Limit (dBuV/m) = 20 log(Limit(uV/m)1uV/m)

## 5.10 Power Line Conducted Emission

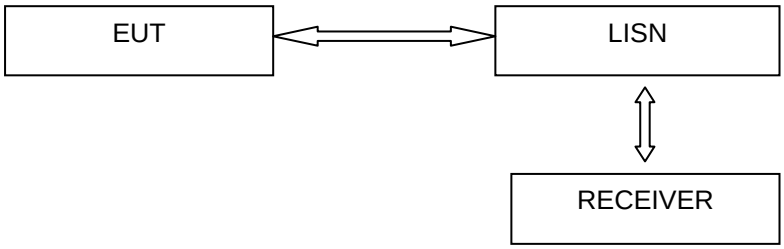
### 5.10.1 Specification

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 kHz on the 24 DC power and return leads of the EUT according to the methods defined in FCC Part 15.207. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 3.1.5. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position producing maximum conducted emissions.

### 5.10.2 Method of Measurement

The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 3.1.5. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position producing maximum conducted emissions

### 5.10.3 Measurement Set-Up




### 5.10.4 Limit

| Frequency Range (MHz) | Limit (dBuV) | |
|---|---|---|
| | Quasi-Peak | Average |
| 0.15 ~ 0.5 | 66-56 | 56-46 |
| 0.5 ~ 5 | 56 | 46 |
| 5 ~ 30 | 60 | 50 |

### 5.10.5 Test Result

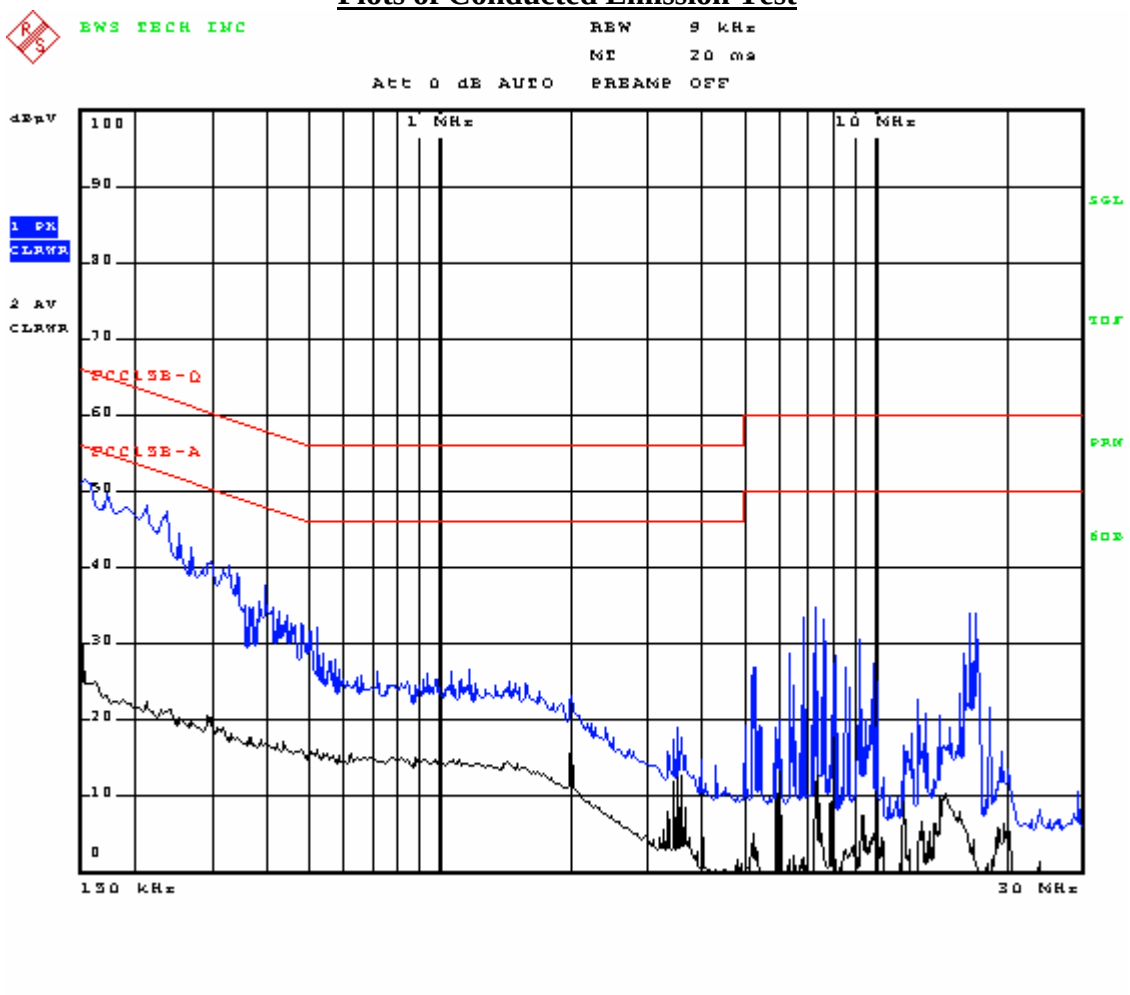
Frequency Range of Test : 150 kHz to 30 MHz
Test Standard : FCC Part 15.207
Test Date : September 10, 2009
Temperature/Humidity : 24 °C/ 41 %

### 5.10.6 Conducted Emission Test Data

| Freq [MHz] | Correcton | | Phase [H/N] | Quasi-Peak Mode | | | | Average Mode | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AMN | C.L | | Limit | Reading | Emission Level | Margin | Limit | Reading | Emission Level | Margin |
| | | | | [dBuV] | [dBuV] | [dBuV] | [dBuV] | [dBuV] | [dBuV] | [dBuV] | [dBuV] |
| 0.154 | 0.06 | 0.03 | N | 66.00 | 51.51 | 51.60 | -14.40 | 56.00 | | | |
| 0.362 | 0.08 | 0.24 | N | 37.63 | 42.03 | 42.35 | 4.72 | 27.63 | | | |
| 1.166 | 0.04 | 0.42 | H | 56.00 | 26.63 | 27.09 | -28.91 | 46.00 | | | |
| 3.518 | 0.03 | 0.68 | H | | 19.06 | 19.77 | -36.23 | | | | |
| 7.862 | 0.06 | 1.00 | N | 60.00 | 38.74 | 39.80 | -20.20 | 50.00 | | | |
| 16.134 | 0.07 | 1.22 | H | | 41.04 | 42.33 | -17.67 | | | | |

Notes:
1. All modes of operation were investigated and the worst-case emissions are reported.
See the plots in next 2 pages.
2. Line N = (Neutral), Line H = (Hot)
3. Measurement uncertainty estimated at ±1.38 dB.
The measurement uncertainty is given with a confidence of 95.45 % with the coverage factor, k=2
4.The detail plot data is refer to 6.1.

## Plots of Conducted Emission Test

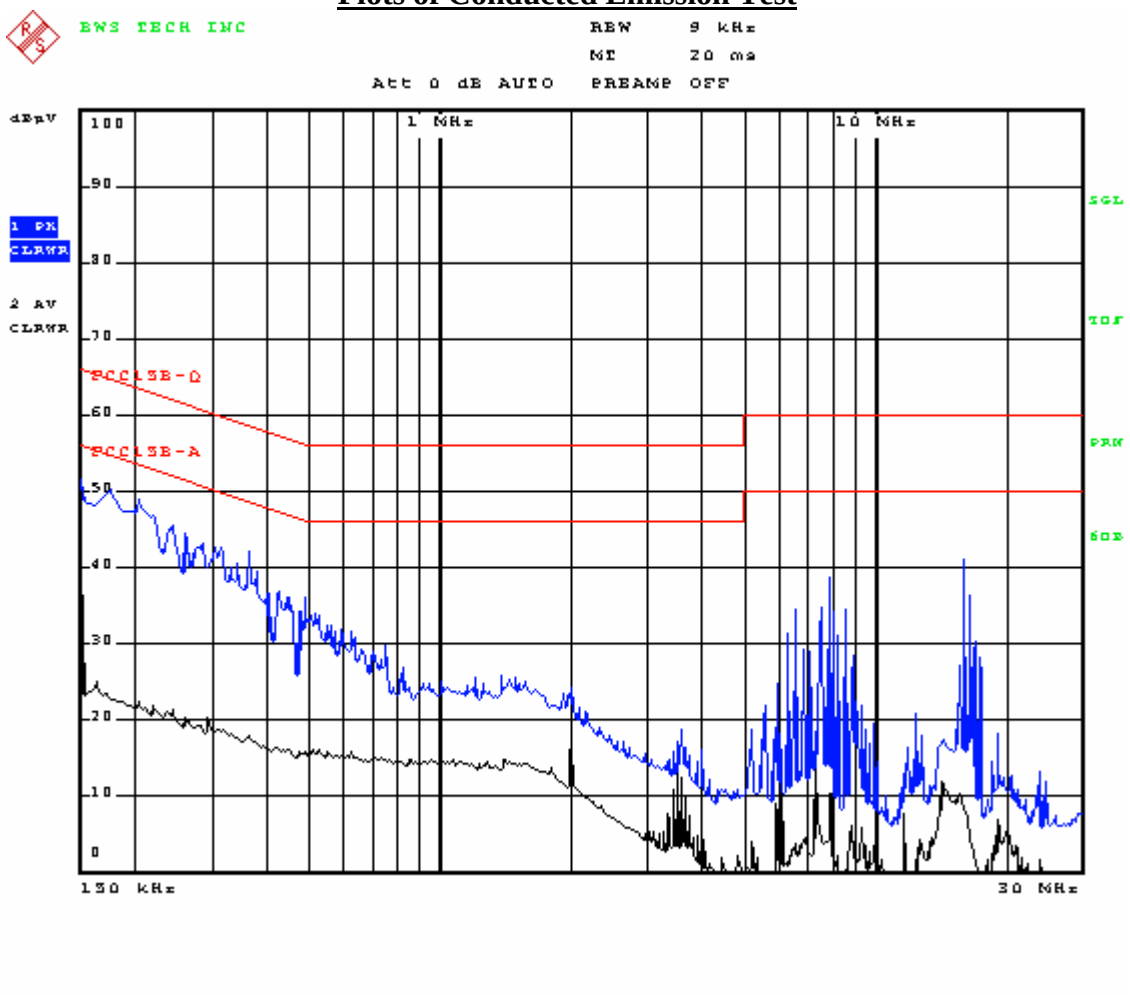



**Test Model: CPR-303US**

**Test Mode: HOT**

**Classification: FCC Part15 Subpart B Section 15.207(a) Class B**

## Plots of Conducted Emission Test




**Test Model: CPR-303US**

**Test Mode: NEUTRAL**

**Classification: FCC Part15 Subpart B Section 15.207(a) Class B**

# 6. TEST EQUIPMENTS LIST

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

| EQUIPMENT | | MODEL | MANUFACTURE | SERIAL NUMBER | Calibration Due date |
|---|---|---|---|---|---|
| 1 | Receiver | ESVS30 | Rohde & Schwarz | 832854/010 | 10/07/25 |
| 2 | Spectrum analyzer | FSP7 | Rohde & Schwarz | 100001 | 09/10/30 |
| 3 | Spectrum analyzer | N9020A | Agilent | US46220101 | 09/10/07 |
| 4 | Signal Generator | GT9000 | Gigatronics | 9604010 | 09/10/30 |
| 5 | Frequency Counter | R5372 | Advantest | 41855204 | 09/10/29 |
| 6 | Shield Room (7m x 4m x 3m) | N/A | SJEMC | 0004 | N/A |
| 7 | Turn Table | OSC-30 | N/A | BWS-01 | N/A |
| 8 | Antenna Mast | JAC-3 | Dail EMC | N/A | N/A |
| 9 | Temperature & Humidity chanber | EN-GLMP-54 | Enex | N/A | 10/01/30 |
| 10 | Bilog Antenna | VULB9160 | Schwarzbeck | VULB9160-3122 | 10/01/24 |
| 11 | Bilog Antenna | VULB9161 | Schwarzbeck | VULB9161-4067 | 09/11/19 |
| 12 | Bilog Antenna | VULB9161 | Schwarzbeck | VULB9161-4068 | 09/12/11 |
| 13 | Horn Antenna | BBHA 9120 D | Schwarzbeck | BBHA 9120 D 234 | 10/12/18 |
| 14 | Horn Antenna | BBHA 9170 | Schwarzbeck | BBHA9170157 | 10/03/15 |
| 15 | Power Meter | E4418A | Agilent | GB38272621 | 09/10/29 |
| 16 | Power Sensor | E9301B | Agilent | US40010238 | 09/10/29 |
| 17 | Power supply | IPS-30B03DD | Interact | 42052 | 09/10/30 |
| 18 | Bandreject filter | 3TNF-800/1000-0.2 N/N | K&L Microwave | 441 | 10/02/06 |
| 19 | Attenuator | 33-30-33 | WEINSCHEL | 116594 | 09/10/30 |