# TEST REPORT

## No. 2010TAR002

**for**

**Nokia (China) investment CO.LTD.**

**GSM/TD mobile phone**

**Model Name: RM-636**

**FCC ID : QTLRM-636**

**with**

**Hardware Version: 4000**

**Software Version: 10.1.5**

**Issued Date: Jan 12th, 2010**

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of TMC Beijing.

**Test Laboratory:**

***DAR accreditation (DIN EN ISO/IEC 17025): No. DAT-P-114/01-01***

***FCC 2.948 Listed: No.733176***

***IC O.A.T.S listed: No.6629A-1***

TMC Beijing, Telecommunication Metrology Center of Ministry of Industry and Information Technology

No. 52, Huayuan Bei Road, Haidian District, Beijing, P. R. China 100083.

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# CONTENTS

# 1. Test Laboratory

## 1.1. Testing Location

| | |
|---|---|
| Company Name: | TMC Beijing, Telecommunication Metrology Center of MII |
| Address: | No 52, Huayuan beilu, Haidian District, Beijing,P.R.China |
| Postal Code: | 100083 |
| Telephone: | 00861062303288 |
| Fax: | 00861062304793 |

## 1.2. Testing Environment

| | |
|---|---|
| Normal Temperature: | 15-35℃ |
| Relative Humidity: | 20-75% |

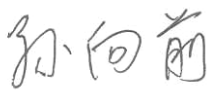
## 1.3. Project data

| | |
|---|---|
| Testing Start Date: | Jan 3th,2010 |
| Testing End Date: | Jan 14th,2010 |

## 1.4. Signature

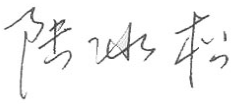
**Zi Xiaogang**

**(Prepared this test report)**



**Sun Xiangqian**

**(Reviewed this test report)**



**Lu Bingsong**

**Deputy Director of the laboratory**

**(Approved this test report)**

# 2. Client Information

## 2.1. Applicant Information

| | |
|---|---|
| Company Name: | Nokia (China) investment CO.LTD. |
| Address /Post: | Building 2,No.5 Donghuan Zhonglu,Beijing Economic and Technological Development Area. Beijing,100176, P.R.China |
| City: | Beijing |
| Postal Code: | 100176 |
| Country: | China |
| Telephone: | 0086 10 87111332 |
| Fax: | 0086 10-87114664 |

## 2.2. Manufacturer Information

| | |
|---|---|
| Company Name: | BYD Precision Manufacturer Co.,Ltd. Beijing Branch |
| Address /Post: | No.1, Kechuang Dong 5 Jie, Tongzhou District Beijing, 101111, P.R. China |
| City: | Beijing |
| Postal Code: | 101111 |
| Country: | China |
| Telephone: | 0086-10-58018888-71158 |
| Fax: | 0086-10-58018888-73000 |

# 3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

## 3.1. About EUT

| | |
|---|---|
| Description | GSM/TD mobile phone |
| Model Name | RM-636 |
| FCC ID | QTLRM-636 |
| Frequency | PCS 1900MHz |
| Antenna | Internal |
| Power supply | Battery or Charger (AC Adaptor) |
| Output power | 27.67 dBm maximum EIRP measured for PCS1900 |
| Extreme vol. Limits | 3.4VDC to 4.2VDC (nominal: 3.8VDC) |
| Extreme temp. Tolerance | -30°C to +50°C |

Note:Components list, please refer to documents of the manufacturer; it is also included in the original test record of Telecommunication Metrology Center of MIIT of People's Republic of China.

## 3.2. Internal Identification of EUT used during the test

| EUT ID* | SN or IMEI | HW Version | SW Version |
|---|---|---|---|
| N02 | 004401109494266 | 4000 | 10.1.5 |

*EUT ID: is used to identify the test sample in the lab internally.

## 3.3. Internal Identification of AE used during the test

| AE ID* | Description | SN |
|---|---|---|
| AE1 | Battery | / |
| AE2 | Travel Adapter | / |
| AE3 | Headset | / |

AE1

| | |
|---|---|
| Model | BL-6F |
| Manufacturer | Nokia |
| Capacitance | 1200mAh |
| Nominal Voltage | 3.7V |

AE2

| | |
|---|---|
| Model | AC-8C |
| Manufacturer | Nokia |
| Length of DC line | 120cm |

AE3

| | |
|---|---|
| Model | WH-102 |
| Manufacturer | Nokia |

*AE ID: is used to identify the test sample in the lab internally.

### 3.4. General Description

The Equipment Under Test (EUT) is a model of GSM/TD mobile phone with integrated antenna. It consists of Hand Telephone Set and normal options: lithium battery, charger and headset.
Manual and specifications of the EUT were provided to fulfil the test.
Samples undergoing test were selected by the Client.

## 4. Reference Documents

### 4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

| Reference | Title | Version |
|---|---|---|
| FCC Part 24 | PERSONAL COMMUNICATIONS SERVICES | V 10.1.09 |
| ANSI/TIA-603-C | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards | 2004 |
| ANSI C63.4 | Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz | 2003 |

## 5. LABORATORY ENVIRONMENT

**Semi-anechoic chamber** (23 meters × 17meters × 10meters) did not exceed following limits along the EMC testing:

| | |
|---|---|
| Temperature | Min. = 15 ℃, Max. = 30 ℃ |
| Relative humidity | Min. = 30 %, Max. = 60 % |
| Shielding effectiveness | > 110 dB |
| Electrical insulation | > 10 kΩ |
| Ground system resistance | < 0.5 Ω |
| Normalised site attenuation (NSA) | < ±3.2 dB, 10 m distance, from 30 to 1000 MHz |
| Uniformity of field strength | Between 0 and 6 dB, from 80 to 2000 MHz |

**Control room** did not exceed following limits along the EMC testing:

| | |
|---|---|
| Temperature | Min. = 15 ℃, Max. = 35 ℃ |
| Relative humidity | Min. =30 %, Max. = 60 % |
| Shielding effectiveness | > 110 dB |
| Electrical insulation | > 10 kΩ |
| Ground system resistance | < 0.5 Ω |

**Conducted chamber** did not exceed following limits along the EMC testing:

| | |
|---|---|
| Temperature | Min. = 15 ℃, Max. = 30 ℃ |
| Relative humidity | Min. = 30 %, Max. = 60 % |
| Shielding effectiveness | > 110 dB |
| Electrical insulation | > 10 kΩ |
| Ground system resistance | < 0.5 Ω |

**Fully-anechoic chamber** (6.8 meters × 3.08 meters × 3.53 meters) did not exceed following limits along the EMC testing:

| | |
|---|---|
| Temperature | Min. = 15 ℃, Max. = 30 ℃ |
| Relative humidity | Min. = 30 %, Max. = 60 % |
| Shielding effectiveness | > 110 dB |
| Electrical insulation | > 10 kΩ |
| Ground system resistance | < 0.5 Ω |
| Uniformity of field strength | Between 0 and 6 dB, from 80 to 2000 MHz |

## 6. SUMMARY OF TEST RESULTS

| Items | List | Clause in FCC rules | Verdict |
|---|---|---|---|
| 1 | Output Power | 24.232(b) | P |
| 2 | Emission Limit | 2.1051/24.238 | P |

## 7. Test Equipments Utilized

| NO. | NAME | TYPE | SERIES NUMBER | PRODUCER | CAL DUE DATE |
|---|---|---|---|---|---|
| 1 | Test Receiver | ESS | 847151/015 | R&S | 2010-10-30 |
| 2 | Test Receiver | ESI40 | 831564/002 | R&S | 2010-2-11 |
| 3 | BiLog Antenna | 3142B | 9908-1403 | EMCO | 2010-1-16 |
| 4 | BiLog Antenna | 3142B | 9908-1405 | EMCO | 2010-9-19 |
| 5 | Signal Generator | SMT06 | 831285/005 | R&S | 2010-12-26 |
| 6 | Signal Generator | SMP04 | 100070 | R&S | 2010-4-20 |
| 7 | LISN | ESH2-Z5 | 829991/012 | R&S | 2010-8 |
| 8 | Spectrum Analyzer | FSU26 | 200030 | R&S | 2010-6-18 |
| 9 | Universal Radio Communication Tester | CMU200 | 100680 | R&S | 2010-8-23 |
| 10 | Dual-Ridge Waveguide Horn Antenna | 3115 | 9906-5827 | EMCO | 2010-3 |
| 11 | Dual-Ridge Waveguide Horn Antenna | 3115 | 9906-5831 | EMCO | 2010-3 |
| 12 | Dual-Ridge Waveguide Horn Antenna | 3116 | 2663 | EMCO | 2010-3 |
| 13 | Dual-Ridge Waveguide Horn Antenna | 3116 | 2661 | EMCO | 2010-3 |
| 14 | Climatic chamber | PL-2G | 343074 | ESPEC | 2010-5-15 |

# ANNEX A: MEASUREMENT RESULTS

## A.1 OUTPUT POWER (§24.232(b))

### A.1.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMU-200) to ensure max power transmission and proper modulation.
This result contains peak output power and EIRP measurements for the EUT.
In all cases, output power is within the specified limits.

### A.1.2 Radiated

#### A.1.2.1 Description

This is the test for the maximum radiated power from the EUT.
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

#### A.1.2.2 Method of Measurement

The measurements procedures in TIA-603C-2004 are used.

1. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power ($P_{in}$) is applied to the input of the dipole, and the power received ($P_{r)}$ at the chamber's probe antenna is recorded.
2. The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established as $A_{Rpl}$=Pin - Pr. The $A_{Rpl}$ is the attenuation of “reference path loss”, and including the gain of receive antenna, the cable loss and the air loss.
   The measurement results are obtained as described below:
   Power(EIRP)=$P_{Mea}$+$A_{Rpl}$
3. The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.
4. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.
5. The EUT is then put into continuously transmitting mode at its maximum power level.
6. Power mode measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 24.232 (b) and (c). The "reference path loss" from Step1 is added to this result.
7. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (Pin).
8. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.
9. The test system should be checked before test by a standard comb signal source. The signal

source put on the position, instead of the EUT. The test result should be compared with the test result before. If the test result is similar with the initial one, then the test system can work stably.

**PCS1900-EIRP 24.232(b)**

**Limits**

| | Power Step | Burst Peak EIRP (dBm) |
|---|---|---|
| GSM | 0 | ≤33dBm (2W) |
| GPRS | 3 | ≤33dBm (2W) |
| EGPRS | 5 | ≤33dBm (2W) |

**Measurement result**

**GSM**

| Frequency(MHz) | Power Step | Peak EIRP(dBm) | $A_{Rpl}$ (dBm) | $P_{Mea}$(dBm) | Polarization |
|---|---|---|---|---|---|
| 1850.2 | 0 | 25.67 | 47.59 | -21.92 | Vertical |
| 1880.0 | 0 | 25.74 | 47.91 | -22.17 | Vertical |
| 1909.8 | 0 | **26.34** | 48.21 | -21.87 | Vertical |

**GPRS**

| Frequency(MHz) | Power Step | Peak EIRP(dBm) | $A_{Rpl}$ (dBm) | $P_{Mea}$(dBm) | Polarization |
|---|---|---|---|---|---|
| 1850.2 | 3 | 26.79 | 47.11 | -20.32 | Horizontal |
| 1880.0 | 3 | 27.11 | 47.37 | -20.26 | Horizontal |
| 1909.8 | 3 | **27.67** | 47.54 | -19.87 | Horizontal |

**EGPRS**

| Frequency(MHz) | Power Step | Peak EIRP(dBm) | $A_{Rpl}$ (dBm) | $P_{Mea}$(dBm) | Polarization |
|---|---|---|---|---|---|
| 1850.2 | 5 | **23.95** | 47.11 | -23.16 | Horizontal |
| 1880.0 | 5 | 23.32 | 47.37 | -24.05 | Horizontal |
| 1909.8 | 5 | 22.44 | 47.54 | -25.10 | Horizontal |

Frequency**:** 1909.8MHz

Peak EIRP(dBm)= $P_{Mea}$(-19.87dBm)+ $A_{Rpl}$ (47.54dBm) = 27.67 dBm

**ANALYZER SETTINGS: RBW = VBW = 3MHz**

## A.2 EMISSION LIMT (§2.1051/§24.238)

### A.2.1 Measurement Method

The measurements procedures in TIA-603C-2004 are used.

The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the PCS1900 band.

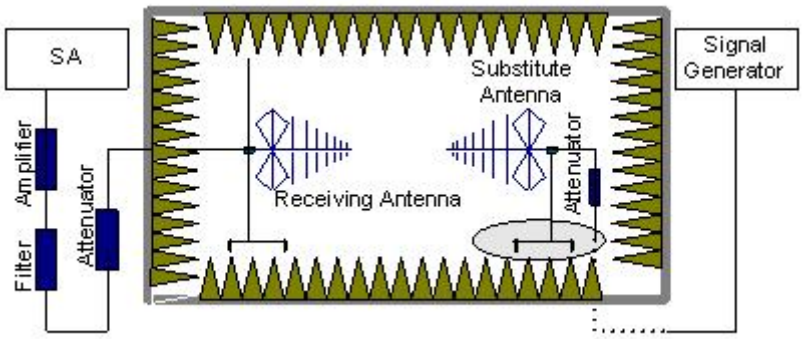
**The procedure of radiated spurious emissions is as follows:**

a) Pre-calibration

With pre-calibration method, the Radiated Spurious Emissions(RSE) is calculated as,

RSE=Rx（dBuV）+CL（dB）+SA（dB）+Gain（dBi）-107（dBuV to dBm）

The SA is calibrated using following setup.

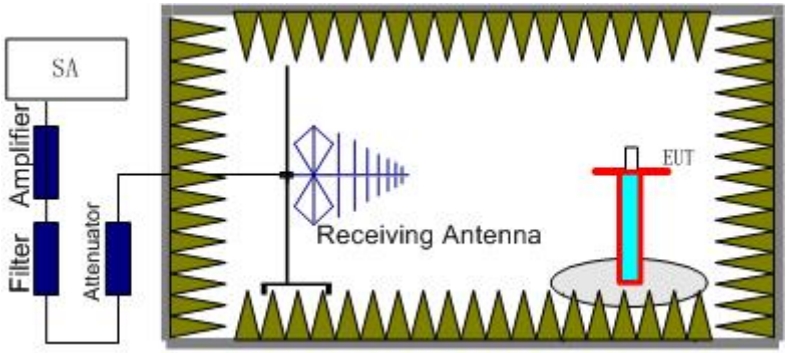



b) System check

The test system was checked before test by a standard comb signal source. The signal source put on the position, instead of the EUT. The test result should be compared with the test result before. If the test result is similar with the initial one, then the test system can work stably.

c) EUT test

EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the test item for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the test item and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1MHz bandwidth.




**A.2.2 Measurement Limit**

Sec. 24.238 Emission Limits.

(a) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

**A.2.3 Measurement Results**

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the PCS band (1850.2 MHz, 1880 MHz and 1909.8 MHz) . It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the PCS1900 ,GSM850 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established and the $A_{Rpl}$ is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss and the air loss.

The measurement results are obtained as described below:

Power=$P_{Mea}$+$A_{Rpl}$

**A.2.4 Sweep Table**

| Working Frequency | Subrange (GHz) | RBW | VBW | Sweep time (s) |
|---|---|---|---|---|
| 1900MHz | 0.03~1 | 100KHz | 300KHz | 10 |
| | 1-2 | 1 MHz | 3 MHz | 2 |
| | 2~5 | 1 MHz | 3 MHz | 3 |
| | 5~8 | 1 MHz | 3 MHz | 3 |
| | 8~11 | 1 MHz | 3 MHz | 3 |
| | 11~14 | 1 MHz | 3 MHz | 3 |
| | 14~18 | 1 MHz | 3 MHz | 3 |
| | 18~20 | 1 MHz | 3 MHz | 2 |

**GSM Mode Channel 512/1850.2MHz**

| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ (dBm) | $P_{Mea}$(dBm) | Limit（dBm） | Polarity |
|---|---|---|---|---|---|
| 11101 | -33.2 | 14.8 | -48.0 | -13 | Vertical |
| 17877.6 | -26.5 | 16.6 | -43.1 | -13 | Vertical |

**GSM Mode Channel 661/1880.0MHz**

| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ (dBm) | $P_{Mea}$(dBm) | Limit（dBm） | Polarity |
|---|---|---|---|---|---|
| 10118 | -35.3 | 13.4 | -48.7 | -13 | Vertical |
| 17851.8 | -26.1 | 16.6 | -42.7 | -13 | Horizontal |

**GSM Mode Channel 810/1909.8MHz**

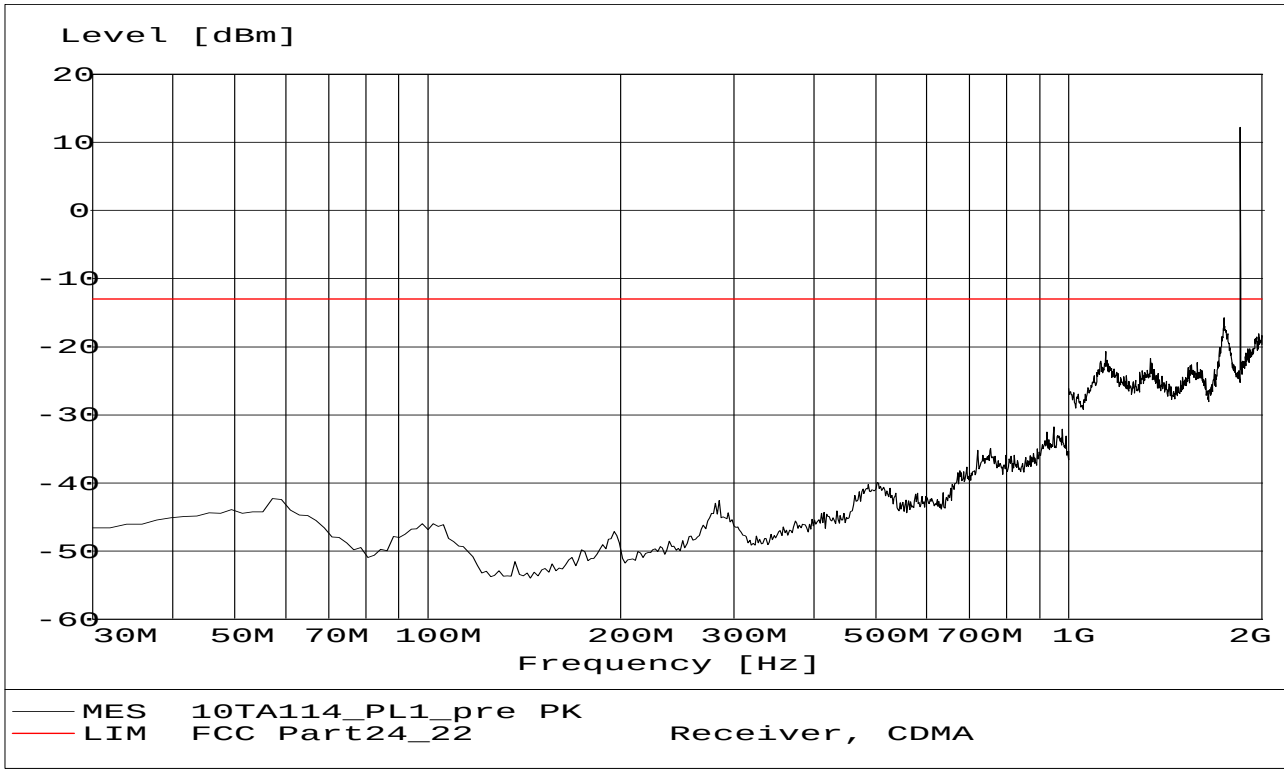
| Frequency(MHz) | Power(dBm) | $A_{Rpl}$ (dBm) | $P_{Mea}$(dBm) | Limit（dBm） | Polarity |
|---|---|---|---|---|---|
| 7204.5 | -37.4 | 8.5 | -45.9 | -13 | Horizontal |
| 17862.6 | -26.1 | 17.1 | -43.2 | -13 | Horizontal |

**PCS 1900**

**A.2.3.1 RADIATED SPURIOUS EMISSIONS-Channel 512: 30MHz – 2GHz**

**Radiated spurious emission limit :-13dBm.**

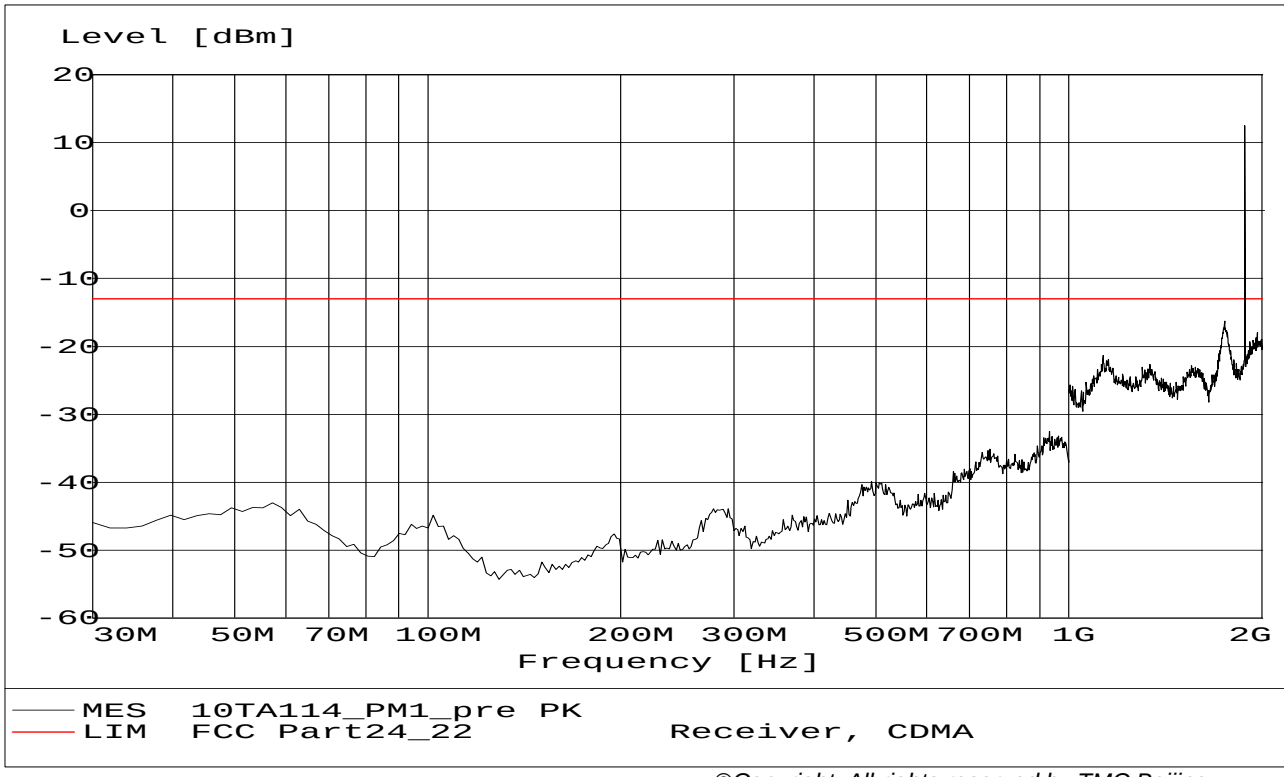
**NOTE: peak above the limit line is the Carrier frequency @ ch-512**




**A.2.3.2 RADIATED SPURIOUS EMISSIONS-Channel 661: 30MHz – 2GHz**

**Radiated spurious emission limit :-13dBm.**

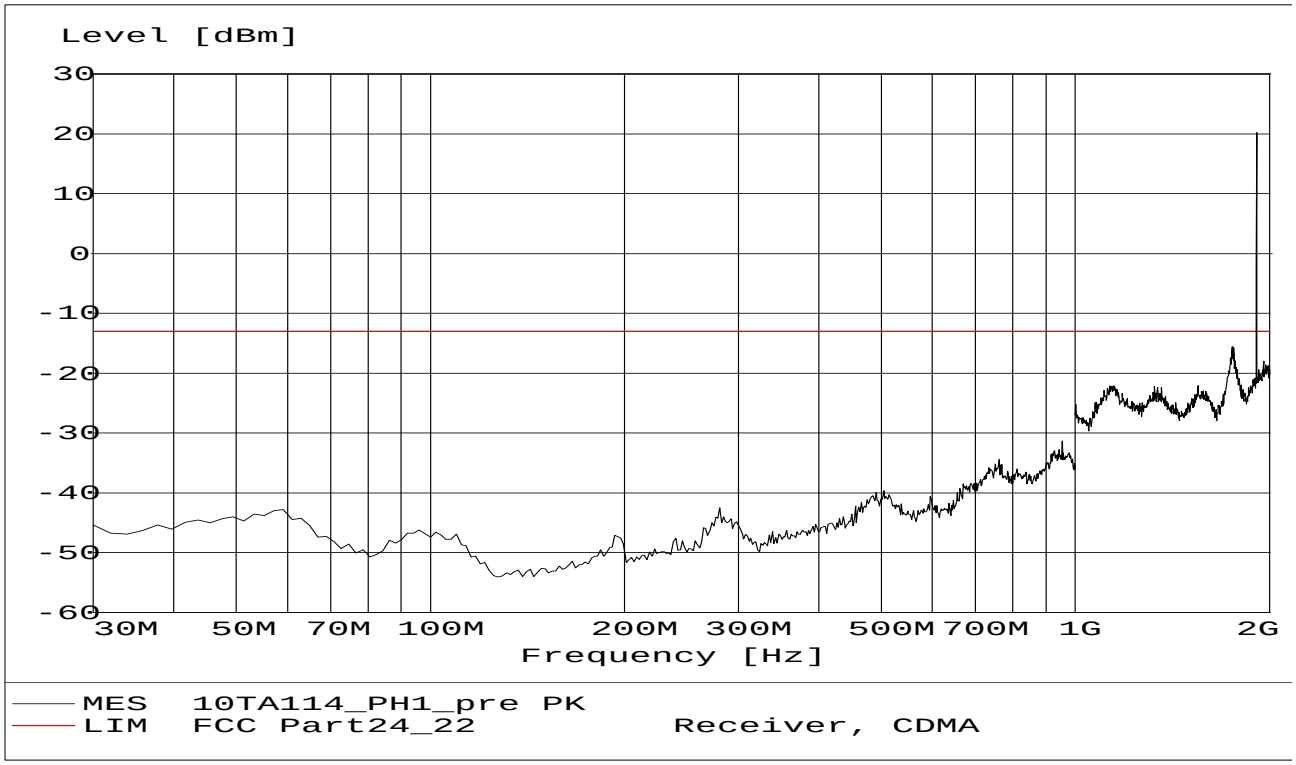
**NOTE: peak above the limit line is the Carrier frequency @ ch-661**



**A.2.3.3 RADIATED SPURIOUS EMISSIONS-Channel 810: 30MHz – 2GHz**

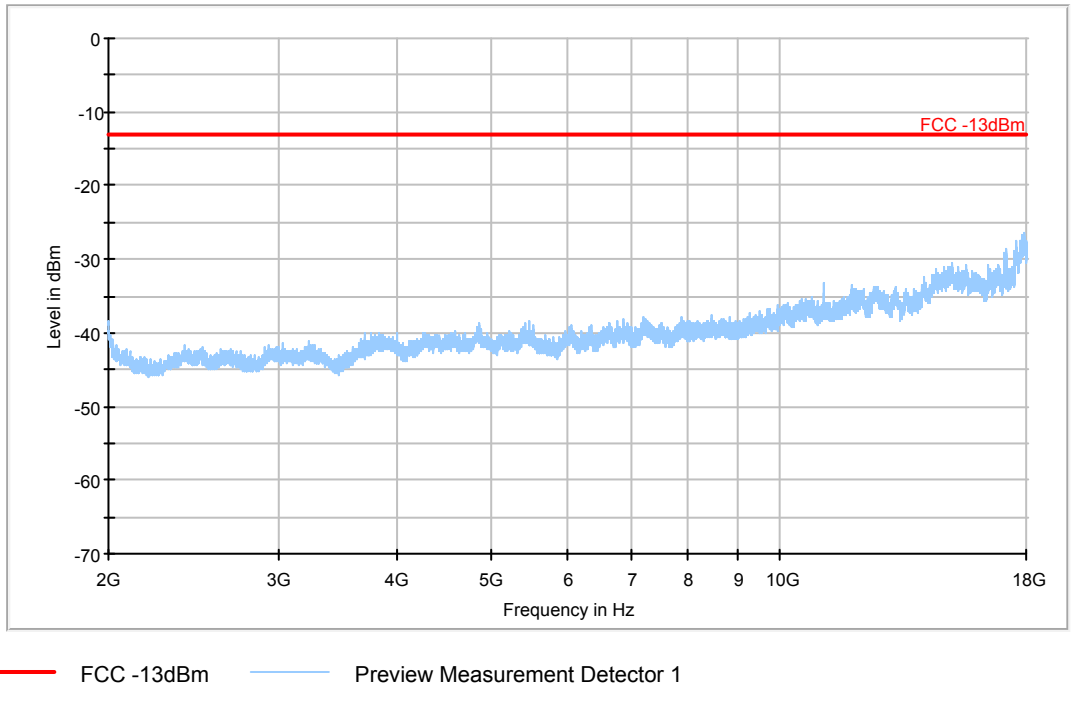
**Radiated spurious emission limit :-13dBm.**

**NOTE: peak above the limit line is the Carrier frequency @ ch-810**



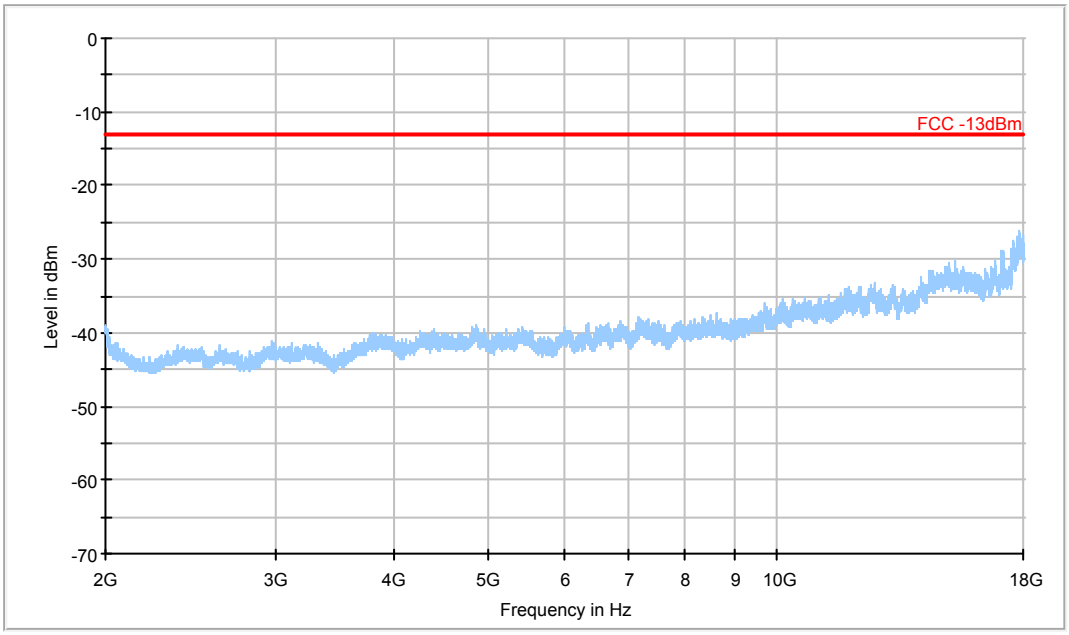

**A.2.3.4 RADIATED SPURIOUS EMISSIONS-Channel 512: 2GHz – 18GHz**

**Radiated spurious emission limit :-13dBm.**



### A.2.3.5 RADIATED SPURIOUS EMISSIONS-Channel 661: 2GHz – 18GHz

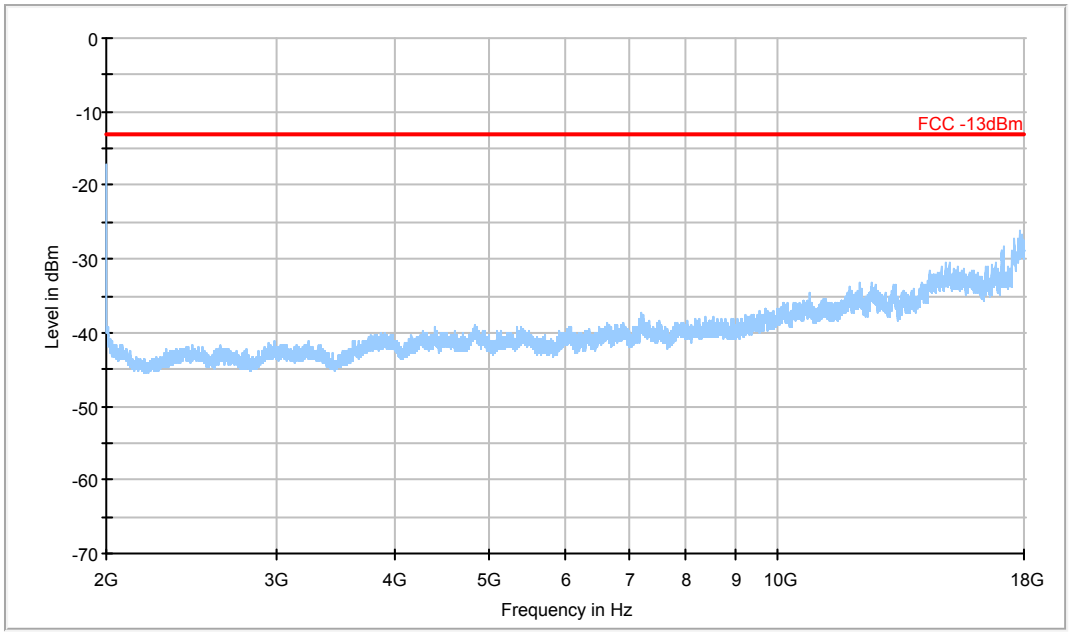
**Radiated spurious emission limit :-13dBm.**




FCC -13dBm  Preview Measurement Detector 1

### A.2.3.6 RADIATED SPURIOUS EMISSIONS-Channel 810: 2GHz – 18GHz

**Radiated spurious emission limit :-13dBm.**

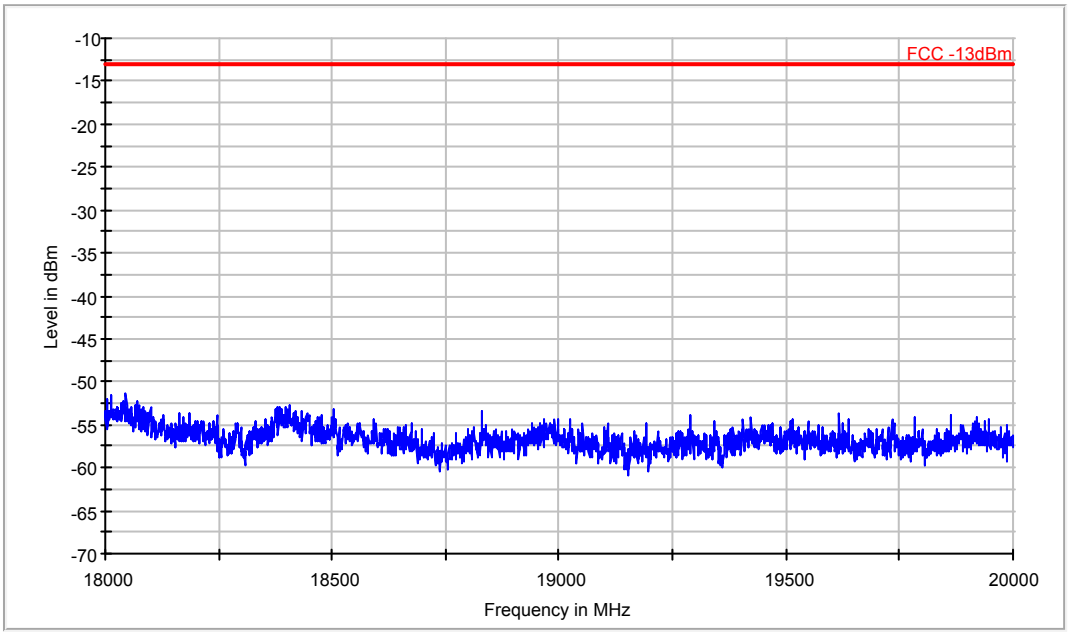



FCC -13dBm  Preview Measurement Detector 1

**A.2.3.7 Radiated spurious emission (18GHz-20GHz)**

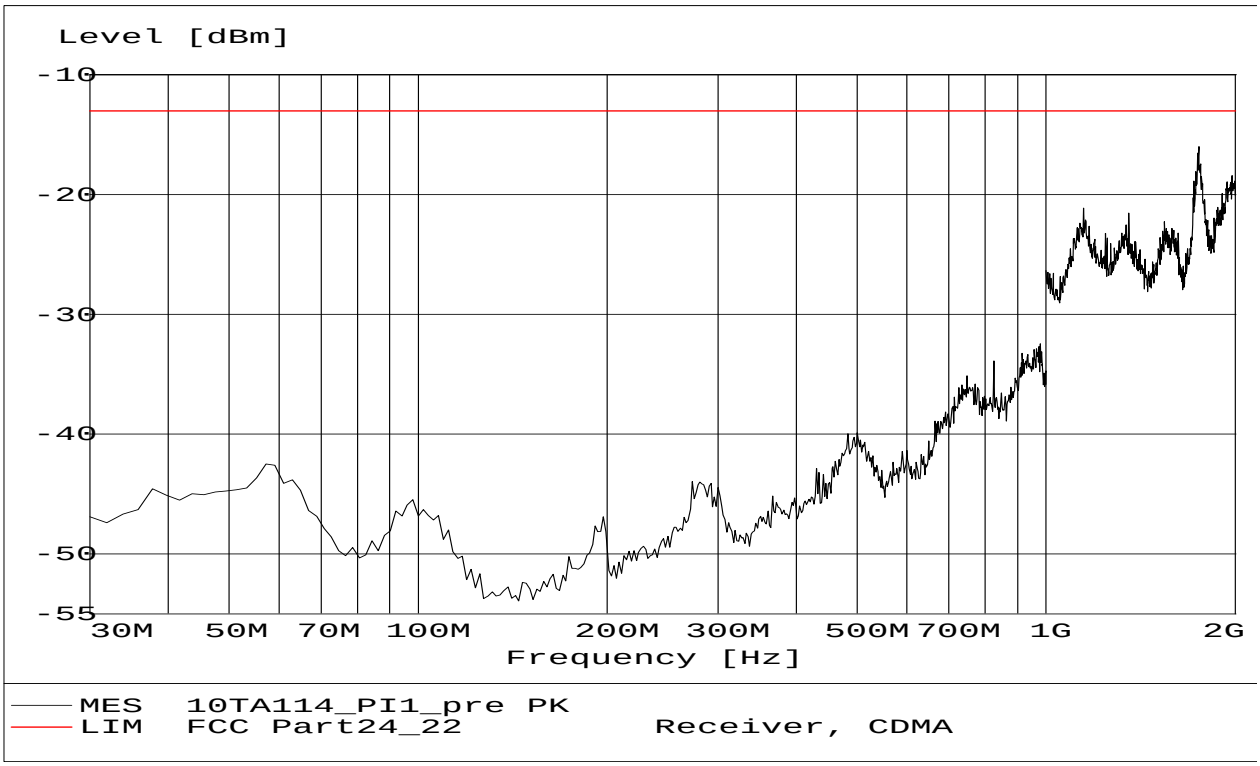
**Radiated spurious emission limit :-13dBm.**

**Note: This plot is valid for low, mid & high channels. It is same as the floor noise.**



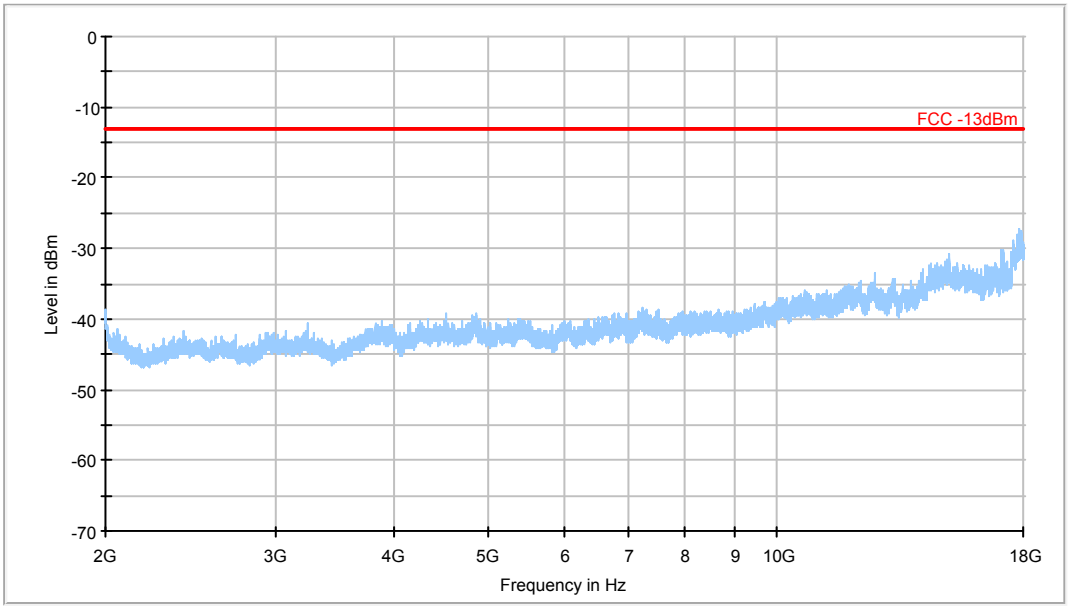

**A.2.3.8 RADIATED SPURIOUS EMISSIONS-EUT in Idle Mode: 30MHz – 2GHz**

**Radiated spurious emission limit :-13dBm.**




**A.2.3.9 RADIATED SPURIOUS EMISSIONS-EUT in Idle Mode: 2GHz – 18GHz**

**Radiated spurious emission limit :-13dBm.**

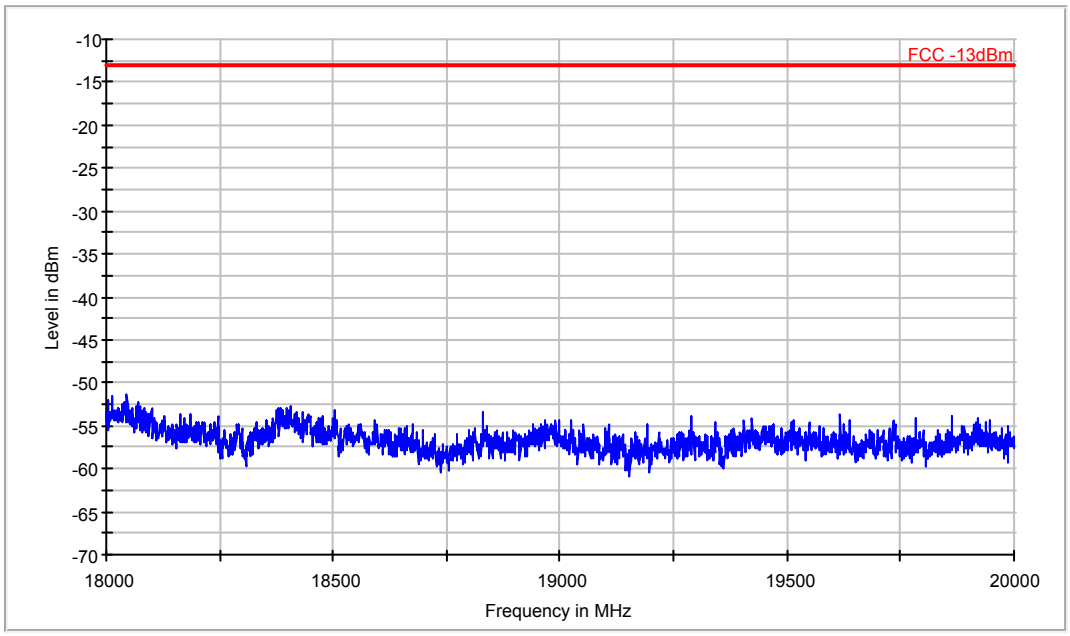



FCC -13dBm  Preview Measurement Detector 1

**A.2.3.10 RADIATED SPURIOUS EMISSIONS-EUT in Idle Mode: 18GHz – 20GHz**

**Radiated spurious emission limit :-13dBm.**

**Note: It is same as the floor noise.**




Preview Measurement Detector 1  FCC -13dBm

*****END OF REPORT*****