



TEST REPORT

No. I19N02705-RF-CDMA

for

Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd

smartphone

Model Name: CP3706AS

FCC ID: R38YLCP3706AS

with

Hardware Version: P1

Software Version: 3706AS.SPRINT.191220.2D

Issued Date: 2019-12-31

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 SAICT.

Test Laboratory:

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REPORT HISTORY

| Report Number | Revision | Description | Issue Date |
|----------------------|-----------------|--------------------|-------------------|
| I19N02705-RF-CDMA | Rev.0 | 1st edition | 2019-12-31 |

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1. SUMMARY OF TEST REPORT

1.1. Test Items

| | |
|---------------------|---|
| Description | smartphone |
| Model Name | CP3706AS |
| Applicant's name | Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd |
| Manufacturer's Name | Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd |

1.2. Test Standards

Please refer to "4. Reference Documents"

1.3. Test Result

Pass / Fail / Please refer to "6 Test Results"

1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road,
Futian District, Shenzhen, Guangdong, P. R. China

1.5. Project Data

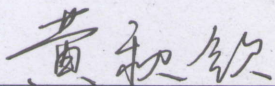
| | |
|---------------------|------------|
| Testing Start Date: | 2019-11-25 |
| Testing End Date: | 2019-12-30 |

1.6. Signature



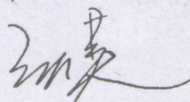
Lai Minghua

(Prepared this test report)



Huang Qiuqin

(Reviewed this test report)



Zhang Hao

(Approved this test report)

2. CLIENT INFORMATION

2.1. Applicant Information

Company Name: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
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District, Shenzhen
Contact Person: Emily zhang
Contact Email: zhangxuzhu@yulong.com
Telephone: 15089742056
Fax: /

2.2. Manufacturer Information

Company Name: Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
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District, Shenzhen
Contact Person: Emily zhang
Contact Email: zhangxuzhu@yulong.com
Telephone: 15089742056
Fax: /

3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT

(AE)

3.1. About EUT

| | |
|------------------------------|---|
| Description | smartphone |
| Model Name | CP3706AS |
| FCC ID | R38YLCP3706AS |
| Frequency Bands | CDMA800MHz(BC0);CDMA1900MHz(BC1); CDMA800MHz(BC10) |
| Antenna | Integrated |
| Extreme vol. Limits | 3.6VDC to 4.3VDC (nominal: 3.85VDC) |
| Extreme temp. Tolerance | -20°C to +50°C |
| Condition of EUT as received | No abnormality in appearance |

3.2. Internal Identification of EUT used during the test

| EUT ID* | IMEI | HW Version | SW Version | Sample Arrival Date |
|---------|-----------------|------------|-----------------------------|---------------------|
| UT09aa | 990015500002410 | P1 | 3706AS.SPRINT.1 91220.2D | 2019-11-25 |
| UT01aa | 990015570009332 | P1 | 3706AS.SPRINT.1 91220.2D | 2019-12-05 |
| UT02aa | 990015570002352 | P1 | 3706AS.SPRINT.1 91220.2D | 2019-12-05 |

*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 |
|--------|-------------|
| AE1 | Battery |
| AE2 | Charger |

AE1

| | |
|--------------|------------------|
| Model | 3706AS_CA406787G |
| Manufacturer | CosMX |
| Capacitance | 3980mAh |

AE2

| | |
|--------------|------------|
| Model | Q3W18-1U-A |
| Manufacturer | Ruide |

*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 CDMA/GSM/UMTS/LTE mobile phone with integrated antenna. It consists of normal options: lithium battery, charger. Manual and specifications of the EUT were provided to fulfil the test.

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 22 | PUBLIC MOBILE SERVICES | 10-1-18 Edition |
| FCC Part 2 | FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS | 10-1-18 Edition |
| FCC Part 24 | PERSONAL COMMUNICATIONS SERVICES | 10-1-18 Edition |
| FCC Part 90 | PRIVATE LAND MOBILE RADIO SERVICES | 10-1-18 Edition |
| FCC Part 95 | PERSONAL RADIO SERVICES | 10-1-18 Edition |
| FCC Part 97 | AMATEUR RADIO SERVICE | 10-1-18 Edition |
| FCC Part 101 | FIXED MICROWAVE SERVICES | 10-1-18 Edition |
| ANSI C63.26 | American National Standard of Procedures for Compliance Testing of Licensed Transmitters Used in Licensed Radio Service | 2015 |
| KDB971108 D01 | Power Meas License Digital Systems | v03r01 |

5. LABORATORY ENVIRONMENT

Shielded room did not exceed following limits along the RF testing:

| | |
|--------------------------|--|
| Temperature | Min. = 15 °C, Max. = 35 °C |
| Relative humidity | Min. = 15 %, Max. = 75 % |
| Shielding effectiveness | 0.014MHz-1MHz>60 dB; 1MHz-18000MHz>90 dB |
| Electrical insulation | >2 MΩ |
| Ground system resistance | < 4 Ω |

Fully-anechoic chamber did not exceed following limits along the EMC testing

| | |
|------------------------------------|---|
| Temperature | Min. = 15 °C, Max. = 35 °C |
| Relative humidity | Min. = 15 %, Max. = 75 % |
| Shielding effectiveness | 0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB |
| Electrical insulation | > 2MΩ |
| Ground system resistance | < 4 Ω |
| Voltage Standing Wave Ratio (VSWR) | ≤ 6 dB, from 1 to 18 GHz, 3 m distance |
| Uniformity of field strength | Between 0 and 6 dB, from 80 to 6000 MHz |

6. SUMMARY OF TEST RESULTS

| Abbreviations used in this clause: | | |
|------------------------------------|---------|---|
| Verdict Column | P | Pass |
| | F | Fail |
| | NA | Not applicable |
| | NM | Not measured |
| Location Column | A/B/C/D | The test is performed in test location A, B, C or D which are described in section 1.4 of this report |

CDMA 800(BC0)

| Items | List | Clause in FCC rules | Section in this report | Verdict |
|-------|--------------------------------------|---------------------|------------------------|---------|
| 1 | Output Power | 2.1046/22.913 | A.1 | P |
| 2 | Field Strength of Spurious Radiation | 2.1053/22.917 | A.2 | P |
| 3 | Frequency Stability | 2.1055/22.355 | A.3 | P |
| 4 | Occupied Bandwidth | 2.1049/22.917 | A.4 | P |
| 5 | Emission Bandwidth | 2.1049/22.917 | A.5 | P |
| 6 | Band Edge Compliance | 2.1051/22.917 | A.6 | P |
| 7 | Conducted Spurious Emission | 2.1051/22.917 | A.7 | P |
| 8 | Peak-to-Average Power Ratio | KDB971168 D01 | A.8 | P |

CDMA 1900(BC1)

| Items | List | Clause in FCC rules | Section in this report | Verdict |
|-------|--------------------------------------|-------------------------|------------------------|---------|
| 1 | Output Power | 2.1046/24.232 | A.1 | P |
| 2 | Field Strength of Spurious Radiation | 2.1053/24.238 | A.2 | P |
| 3 | Frequency Stability | 2.1055/24.235 | A.3 | P |
| 4 | Occupied Bandwidth | 2.1049/24.238 | A.4 | P |
| 5 | Emission Bandwidth | 2.1049/24.238 | A.5 | P |
| 6 | Band Edge Compliance | 2.1051/24.238 | A.6 | P |
| 7 | Conducted Spurious Emission | 2.1051/24.238 | A.7 | P |
| 8 | Peak-to-Average Power Ratio | 24.232/KDB971168 D01 | A.8 | P |

CDMA 800(BC10)

| Items | List | Clause in FCC rules | Section in this report | Verdict |
|-------|--------------------------------------|---------------------|------------------------|---------|
| 1 | Output Power | 2.1046/90.635 | A.1 | P |
| 2 | Field Strength of Spurious Radiation | 2.1053/90.691 | A.2 | P |
| 3 | Frequency Stability | 2.1055/90.213 | A.3 | P |
| 4 | Occupied Bandwidth | 2.1049 | A.4 | P |
| 5 | Emission Bandwidth | 2.1049 | A.5 | P |
| 6 | Band Edge Compliance | 2.1051/90.691 | A.6 | P |
| 7 | Conducted Spurious Emission | 2.1051/90.691 | A.7 | P |
| 8 | Peak-to-Average Power Ratio | KDB971168 D01 | A.8 | P |

7. STATEMENT

Since the information of samples in this report is provided by the client, the laboratory is not responsible for the authenticity of sample information.

This report takes measured values as criterion of test conclusion. The test conclusion meets the limit requirements.

8. TEST EQUIPMENTS UTILIZED

| NO. | Description | Type | Manufacture | Series Number | Cal Due Date |
|-----|--------------------------------------|-----------------------|----------------------|---------------|--------------|
| 1 | Test Receiver | ESR7 | R&S | 101676 | 2020-11-27 |
| 2 | BiLog Antenna | 3142E | ETS | 00224831 | 2021-05-17 |
| 3 | Horn Antenna | 3117 | ETS-lindgren | 00066577 | 2022-04-02 |
| 4 | Horn Antenna | QSH-SL-18 -26-S-20 | Q-par | 17013 | 2020-01-15 |
| 5 | Antenna | BBHA 9120D | Schwarzbeck | 1593 | 2022-12-05 |
| 6 | Antenna | VUBA 9117 | Schwarzbeck | 207 | 2020-07-16 |
| 7 | preamplifier | 83017A | Agilent | MY39501110 | / |
| 8 | Signal Generator | SMB100A | R&S | 179725 | 2020-11-27 |
| 9 | Fully Anechoic Chamber | FACT3-2.0 | ETS-Lindgren | 1285 | 2021-07-19 |
| 10 | Spectrum Analyzer | FSV40 | R&S | 101192 | 2020-05-20 |
| 11 | Universal Radio Communication Tester | CMU200 | R&S | 114545 | 2020-05-16 |
| 12 | Universal Radio Communication Tester | CMU200 | R&S | 123210 | 2020-12-13 |
| 13 | Spectrum Analyzer | FSU | R&S | 101506 | 2020-12-13 |
| 14 | Temperature Chamber | SH-241 | ESPECs | 92007516 | 2020-10-15 |
| 15 | DC Power Supply | U3606A | Agilent Technologies | MY50450012 | 2020-11-13 |

Test software

| Item | Name | Vesion |
|----------|-------|------------------|
| Radiated | EMC32 | Version 10.01.00 |

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

FCC: CFR Part 2.1046, 22.913, 24.232, 90.635.

A.1.1 Summary

During the process of testing, the EUT was controlled via R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER to ensure max power transmission and proper modulation.

This result contains max output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

A.1.2 Conducted

A.1.2.1 Method of Measurements

The EUT was set up for the max output power with pseudo random data modulation.

These measurements were done at 3 frequencies, 824.7MHz, 836.52MHz and 848.31MHz for CDMA800 BC0 band; 1851.25 MHz, 1880.0 MHz and 1908.75 MHz for CDMA1900 BC1 band (bottom, middle and top of operational frequency range); and 2 frequencies 817.9 MHz and 823.1 MHz for CDMA BC10 (bottom and top of operational frequency range) for 1x RTT and 1xEVDO.

A1.2.2 Measurement results

CDMA800 BC0

| Channel | Frequency(MHz) | Channel power(dBm) | | |
|---------|----------------|--------------------|--------|-------|
| | | 1x RTT | 1xEVDO | |
| | | | Rel0 | RevA |
| 1013 | 824.70 | 23.63 | 23.79 | 23.81 |
| 384 | 836.52 | 23.67 | 23.95 | 23.94 |
| 777 | 848.31 | 23.59 | 23.77 | 23.81 |

Note: Expanded measurement uncertainty is U = 0.49dB, k = 1.96

CDMA1900 BC1

| Channel | Frequency(MHz) | Channel power(dBm) | | |
|---------|----------------|--------------------|--------|-------|
| | | 1x RTT | 1xEVDO | |
| | | | Rel0 | RevA |
| 25 | 1851.25 | 23.88 | 24.18 | 24.23 |
| 600 | 1880.00 | 23.94 | 24.15 | 24.18 |
| 1175 | 1908.75 | 23.81 | 24.06 | 24.09 |

Note: Expanded measurement uncertainty is U = 0.49dB, k = 1.96

CDMA 800 BC10

Measurement result

| Channel | Frequency(MHz) | Channel power(dBm) | | |
|---------|----------------|--------------------|--------|-------|
| | | 1xRTT | 1xEVDO | |
| | | | Rel0 | RevA |
| 476 | 817.9 | 23.62 | 23.68 | 23.72 |
| 684 | 823.1 | 23.66 | 23.84 | 23.86 |

Note: Expanded measurement uncertainty is U = 0.49dB, k = 1.96

A.1.3 Radiated

A.1.3.1 Description

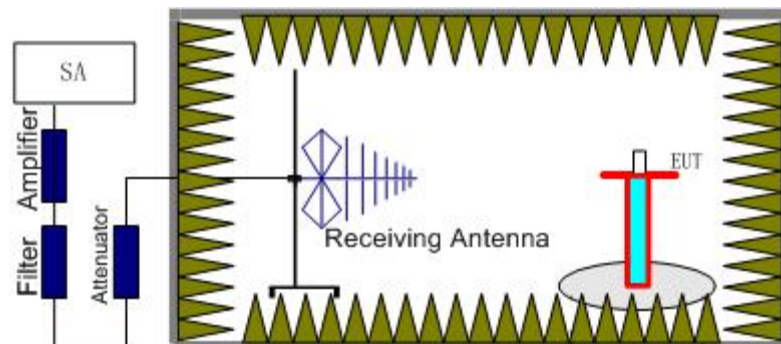
This is the test for the maximum radiated power from the EUT.

Rule Part 24.232(c) 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."

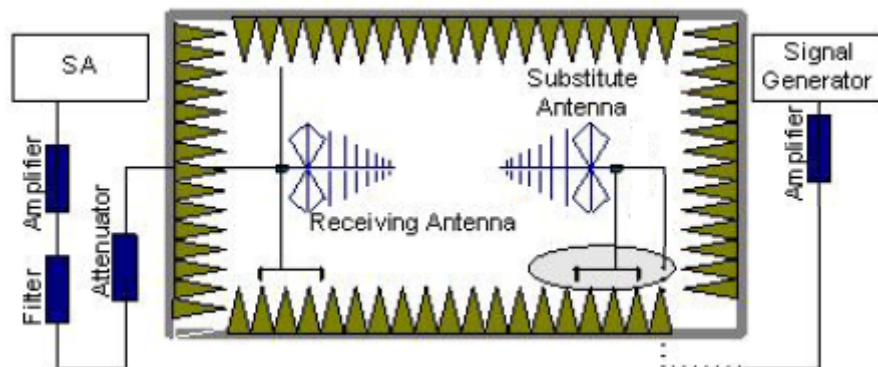
Rule Part 22.913(a) specifies "The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts." Rule Part 90.635(b) specifies "The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw)."

A.1.3.2 Method of Measurement

1. For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, EUT was placed on a 80 cm high non-conductive stand at a 3 meter test distance from the receive antenna. For radiated measurements performed at frequencies above 1 GHz, EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. Receiving antenna was placed on the antenna mast 3 meters from the EUT. For emission measurements. The receiving antenna shall be varied from 1 m to 4 m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna.

The cable loss (P_{cl}), the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.

The measurement results are obtained as described below:

$$\text{Power(EIRP)} = P_{Mea} - P_{Ag} - P_{cl} + G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dB}$.

CDMA800 BC0-ERP 22.913(a)

Limits

| | Burst Peak ERP (dBm) |
|-----------|----------------------|
| CDMA 1X | ≤38.45dBm (7W) |
| CDMA EVDO | ≤38.45dBm (7W) |

Measurement result

CDMA 1X

| Frequency(MHz) | P _{Mea} (dBm) | P _{cl} (dB)+ P _{Ag} (dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|----------------|------------------------|---|-------------------------|--------------------|----------|------------|--------------|
| 824.70 | -13.16 | -33.60 | -0.30 | 2.15 | 17.99 | 38.45 | H |
| 836.52 | -11.26 | -33.50 | -0.30 | 2.15 | 19.79 | 38.45 | H |
| 848.31 | -12.46 | -33.50 | -0.30 | 2.15 | 18.59 | 38.45 | H |

CDMA EVDO

| Frequency(MHz) | P _{Mea} (dBm) | P _{cl} (dB)+ P _{Ag} (dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|----------------|------------------------|---|-------------------------|--------------------|--------------|--------------|--------------|
| 824.70 | -9.18 | -33.60 | -0.30 | 2.15 | 21.97 | 38.45 | H |
| 836.52 | -9.21 | -33.50 | -0.30 | 2.15 | 21.84 | 38.45 | H |
| 848.31 | -9.86 | -33.50 | -0.30 | 2.15 | 21.19 | 38.45 | H |

Frequency: 824.70MHz

Peak ERP(dBm)=P_{Mea}(-9.18dBm)-(P_{cl}+P_{Ag})(-33.60dB)+G_a(-0.30dB)-2.15dB=21.97dBm

ANALYZER SETTINGS: RBW = VBW = 5MHz

Note: The maximum value of expanded measurement uncertainty for this test item is U =

2.90dB(30MHz-3GHz)/3.50dB(3GHz-18GHz)/3.90dB(18GHz-26.5GHz), k = 2

Note: Both of Vertical and Horizontal polarizations are evaluated, but only the worst case is recorded in this report.

CDMA1900 BC1-EIRP 24.232(c)

Limits

| | Burst Peak ERP (dBm) |
|-----------|----------------------|
| CDMA 1X | ≤33dBm (2W) |
| CDMA EVDO | ≤33dBm (2W) |

Measurement result

CDMA 1X

| Frequency(MHz) | P _{Mea} (dBm) | P _{cl} (dB)+ P _{Ag} (dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|----------------|------------------------|--|----------------------|--------------|--------------|--------------|
| 1851.25 | -12.38 | -29.30 | 10.00 | 26.92 | 38.45 | H |
| 1880.00 | -15.75 | -29.30 | 10.00 | 23.55 | 38.45 | H |
| 1908.75 | -19.17 | -29.30 | 10.00 | 20.13 | 38.45 | H |

CDMA EVDO

| Frequency(MHz) | P _{Mea} (dBm) | P _{cl} (dB)+ P _{Ag} (dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|----------------|------------------------|--|----------------------|-----------|------------|--------------|
| 1851.25 | -13.19 | -29.30 | 10.00 | 26.11 | 38.45 | H |
| 1880.00 | -15.57 | -29.30 | 10.00 | 23.73 | 38.45 | H |
| 1908.75 | -28.34 | -29.30 | 10.00 | 19.69 | 38.45 | H |

Frequency: 1851.25MHz

Peak EIRP(dBm)=P_{Mea}(-12.38dBm)-(P_{cl}+P_{Ag})(-29.30dB)+G_a(10dB) =26.92dBm

ANALYZER SETTINGS: RBW = VBW = 5MHz

Note: The maximum value of expanded measurement uncertainty for this test item is U =

2.90dB(30MHz-3GHz)/3.50dB(3GHz-18GHz)/3.90dB(18GHz-26.5GHz), k = 2

Note: Both of Vertical and Horizontal polarizations are evaluated, but only the worst case is recorded in this report.

CDMA800 BC10-ERP 90.635(b)

Limits

| | Burst Peak ERP (dBm) |
|-----------|----------------------|
| CDMA 1X | ≤50dBm (100W) |
| CDMA EVDO | ≤50dBm (100W) |

Measurement result

CDMA 1X

| Frequency(MHz) | P _{Mea} (dBm) | P _{cl} (dB)+ P _{Ag} (dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|----------------|------------------------|---|-------------------------|--------------------|----------|------------|--------------|
| 817.90 | -13.16 | -33.60 | -0.30 | 2.15 | 17.99 | 38.45 | H |
| 823.10 | -11.26 | -33.50 | -0.30 | 2.15 | 19.79 | 38.45 | H |

CDMA EVDO

| Frequency(MHz) | P _{Mea} (dBm) | P _{cl} (dB)+ P _{Ag} (dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|----------------|------------------------|---|-------------------------|--------------------|----------|------------|--------------|
| 817.90 | -9.21 | -33.50 | -0.30 | 2.15 | 21.84 | 38.45 | H |
| 823.10 | -9.86 | -33.50 | -0.30 | 2.15 | 21.19 | 38.45 | H |

Frequency: 823.10MHz

Peak ERP(dBm)=P_{Mea}(-9.18dBm)-(P_{cl}+P_{Ag})(-33.60dB)+G_a(-0.30dB)-2.15dB=21.97dBm

ANALYZER SETTINGS: RBW = VBW = 5MHz

Note: The maximum value of expanded measurement uncertainty for this test item is U =

2.90dB(30MHz-3GHz)/3.50dB(3GHz-18GHz)/3.90dB(18GHz-26.5GHz), k = 2

Note: Both of Vertical and Horizontal polarizations are evaluated, but only the worst case is recorded in this report.

A.2 FIELD STRENGTH OF SPURIOUS RADIATION

Reference

FCC: CFR Part 2.1053, 22.917, 24.238, 90.691.

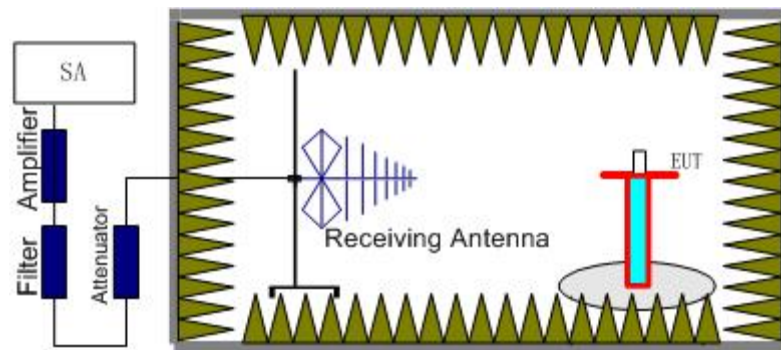
A.2.1 Measurement Method

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 CFR Part 24.238, Part 22.917 and Part 90.691.

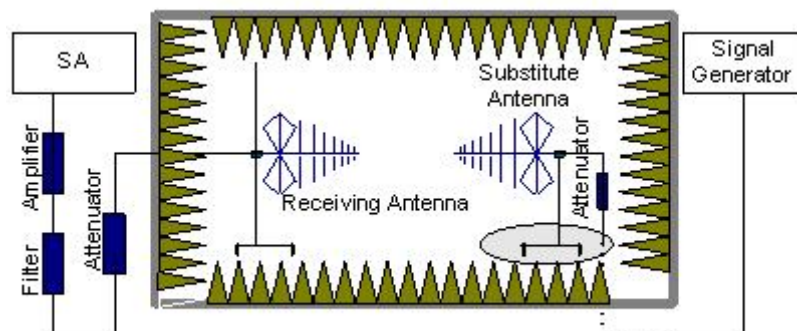
The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of CDMA800 BC0, CDMA1900 BC1 and CDMA 800 BC10.

The procedure of radiated spurious emissions is as follows:

1. For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, EUT was placed on a 80 cm high non-conductive stand at a 3 meter test distance from the receive antenna. For radiated measurements performed at frequencies above 1 GHz, EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. Receiving antenna was placed on the antenna mast 3 meters from the EUT. For emission measurements. The receiving antenna shall be varied from 1 m to 4 m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.

A amplifier should be connected in for the test.

The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.

The measurement results are obtained as described below:

$$\text{Power(EIRP)} = P_{Mea} - P_{pl} + G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dB}$.

A.2.2 Measurement Limit

Part 22.917(a), 24.238(a) and 90.691 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ 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 CDMA800 BC0 band (824.7MHz, 836.52MHz, 848.31MHz) and CDMA1900 BC1 band (1851.25 MHz, 1880.0 MHz and 1908.75 MHz), and only at the upper and lower carrier frequencies of the CDMA800 BC10 (817.9MHz and 823.1MHz). 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 CDMA800 BC0, CDMA1900 BC1 and CDMA800 BC10 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.

A.2.4 Measurement Results Table

| Frequency | Channel | Frequency Range | Result |
|--------------|---------|-----------------|--------|
| CDMA800 BC0 | Low | 30MHz-10GHz | Pass |
| | Middle | 30MHz-10GHz | Pass |
| | High | 30MHz-10GHz | Pass |
| CDMA1900 BC1 | Low | 30MHz-20GHz | Pass |
| | Middle | 30MHz-20GHz | Pass |
| | High | 30MHz-20GHz | Pass |
| CDMA800 BC10 | Low | 30MHz-10GHz | Pass |
| | Middle | 30MHz-10GHz | Pass |
| | High | 30MHz-10GHz | Pass |

A.2.5 Sweep Table

| Working Frequency | Subrange (GHz) | RBW | VBW | Sweep time (s) |
|-------------------|----------------|--------|--------|----------------|
| 800MHz(BC0) | 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 |
| | 8~10 | 1 MHz | 3 MHz | 3 |
| 1900MHz(BC1) | 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 |
| 800MHz(BC10) | 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 |
| | 8~10 | 1 MHz | 3 MHz | 3 |

The worst case:

CDMA800 BC0 Channel 1013/824.7MHz

| Frequency(MHz) | P _{Mea} (dBm) | Path loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|----------------|------------------------|-----------|-------------------|---------------|------------|--------------|
| 2899.47 | -41.25 | 1.00 | 11.40 | -33.00 | -13.00 | V |
| 4882.50 | -66.56 | 1.40 | 12.60 | -57.51 | -13.00 | V |
| 5548.00 | -66.41 | 1.30 | 13.20 | -56.66 | -13.00 | V |
| 6436.50 | -64.24 | 1.60 | 12.80 | -55.19 | -13.00 | V |
| 7169.00 | -62.24 | 1.80 | 11.90 | -54.29 | -13.00 | H |
| 8725.50 | -62.02 | 1.90 | 11.50 | -54.57 | -13.00 | V |

CDMA800 BC0 Channel 384/836.52MHz

| Frequency(MHz) | P _{Mea} (dBm) | Path loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|----------------|------------------------|-----------|-------------------|---------------|------------|--------------|
| 2892.53 | -41.75 | 1.00 | 11.40 | -33.50 | -13.00 | H |
| 5033.00 | -66.38 | 1.30 | 12.60 | -57.23 | -13.00 | H |
| 5892.00 | -65.76 | 1.50 | 13.40 | -56.01 | -13.00 | H |
| 6972.00 | -63.05 | 1.80 | 11.90 | -55.10 | -13.00 | V |
| 8348.00 | -63.29 | 1.80 | 12.40 | -54.84 | -13.00 | H |
| 9528.50 | -61.78 | 2.10 | 11.90 | -54.13 | -13.00 | V |

CDMA800 BC0 Channel 777/848.31MHz

| Frequency(MHz) | P _{Mea} (dBm) | Path loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|----------------|------------------------|-----------|-------------------|---------------|------------|--------------|
| 2901.33 | -41.18 | 1.00 | 11.40 | -32.93 | -13.00 | V |
| 5270.50 | -66.01 | 1.60 | 13.20 | -56.56 | -13.00 | H |
| 6071.00 | -65.69 | 1.60 | 13.40 | -56.04 | -13.00 | V |
| 6914.00 | -62.84 | 1.80 | 11.90 | -54.89 | -13.00 | V |
| 8137.50 | -61.96 | 2.20 | 11.50 | -54.81 | -13.00 | V |
| 9202.00 | -62.44 | 2.10 | 12.00 | -54.69 | -13.00 | H |

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.90dB(30MHz-3GHz)/3.50dB(3GHz-18GHz)/3.90dB(18GHz-26.5GHz), k = 2

CDMA1900 BC1 Channel 25/1851.25MHz

| Frequency(MHz) | P _{Mea} (dBm) | Path loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|----------------|------------------------|-----------|-------------------|----------------|------------|--------------|
| 2883.47 | -41.93 | 1.00 | 11.40 | -31.53 | -13.00 | H |
| 9491.00 | -61.91 | 2.10 | 11.90 | -52.11 | -13.00 | V |
| 10794.00 | -59.30 | 2.40 | 11.00 | -50.70 | -13.00 | V |
| 12720.00 | -58.00 | 2.70 | 13.70 | -47.00 | -13.00 | H |
| 14176.50 | -57.44 | 2.50 | 12.30 | -47.64 | -13.00 | H |
| 16790.00 | -55.32 | 2.90 | 13.20 | -45.02 | -13.00 | V |

CDMA1900 BC1 Channel 600/1880.00MHz

| Frequency(MHz) | P _{Mea} (dBm) | Path loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|----------------|------------------------|-----------|-------------------|----------------|------------|--------------|
| 2951.20 | -41.07 | 1.00 | 11.40 | -30.67 | -13.00 | H |
| 9304.00 | -61.10 | 2.00 | 11.90 | -51.20 | -13.00 | V |
| 11047.50 | -58.96 | 2.30 | 11.00 | -50.26 | -13.00 | H |
| 12609.50 | -59.26 | 2.70 | 13.70 | -48.26 | -13.00 | H |
| 14790.50 | -58.17 | 2.70 | 13.00 | -47.87 | -13.00 | H |
| 17040.00 | -55.39 | 2.90 | 13.20 | -45.09 | -13.00 | V |

CDMA1900 BC1 Channel 1175/1908.75MHz

| Frequency(MHz) | P _{Mea} (dBm) | Path loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|----------------|------------------------|-----------|-------------------|----------------|------------|--------------|
| 2925.87 | -41.09 | 1.00 | 11.40 | -30.69 | -13.00 | H |
| 9608.00 | -61.39 | 2.20 | 11.90 | -51.69 | -13.00 | V |
| 10898.50 | -59.74 | 2.40 | 11.00 | -51.14 | -13.00 | V |
| 12750.00 | -59.42 | 2.70 | 13.70 | -48.42 | -13.00 | V |
| 14479.50 | -57.21 | 2.60 | 11.90 | -47.91 | -13.00 | V |
| 17002.00 | -55.30 | 2.90 | 13.20 | -45.00 | -13.00 | V |

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.90dB(30MHz-3GHz)/3.50dB(3GHz-18GHz)/3.90dB(18GHz-26.5GHz), k = 2

CDMA800 BC10 Channel 476/817.90MHz

| Frequency(MHz) | P _{Mea} (dBm) | Path loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|----------------|------------------------|-----------|-------------------|---------------|------------|--------------|
| 2899.47 | -41.25 | 1.00 | 11.40 | -33.00 | -13.00 | V |
| 4882.50 | -66.56 | 1.40 | 12.60 | -57.51 | -13.00 | V |
| 5548.00 | -66.41 | 1.30 | 13.20 | -56.66 | -13.00 | V |
| 6436.50 | -64.24 | 1.60 | 12.80 | -55.19 | -13.00 | V |
| 7169.00 | -62.24 | 1.80 | 11.90 | -54.29 | -13.00 | H |
| 8725.50 | -62.02 | 1.90 | 11.50 | -54.57 | -13.00 | V |

CDMA800 BC10 Channel 684/823.10MHz

| Frequency(MHz) | P _{Mea} (dBm) | Path loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|----------------|------------------------|-----------|-------------------|---------------|------------|--------------|
| 2892.53 | -41.75 | 1.00 | 11.40 | -33.50 | -13.00 | H |
| 5033.00 | -66.38 | 1.30 | 12.60 | -57.23 | -13.00 | H |
| 5892.00 | -65.76 | 1.50 | 13.40 | -56.01 | -13.00 | H |
| 6972.00 | -63.05 | 1.80 | 11.90 | -55.10 | -13.00 | V |
| 8348.00 | -63.29 | 1.80 | 12.40 | -54.84 | -13.00 | H |
| 9528.50 | -61.78 | 2.10 | 11.90 | -54.13 | -13.00 | V |

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.90dB(30MHz-3GHz)/3.50dB(3GHz-18GHz)/3.90dB(18GHz-26.5GHz), k = 2

A.3 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 22.355, 24.235, 90.213.

A.3.1 Method of Measurement

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -20°C.
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on channel 384 for CDMA800 BC0, channel 600 for CDMA1900 BC1 and 476 for CDMA800 BC10, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -20°C to +50°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50°C.
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10°C decrements from +50°C to -20°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

A.3.2 Measurement Limit

A.3.2.1 For Hand carried battery powered equipment

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.6VDC and 4.3VDC, with a nominal voltage of 3.85VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress.

A.3.2.2 For equipment powered by primary supply voltage

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the

fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. For Part 90.213, the frequency stability of the transmitter shall be maintained within ± 2.5 ppm of the center frequency. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

A.3.3 Measurement results

CDMA800 BC0

Frequency Error vs Voltage

| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
|------------|---------------------|----------------------|
| 3.6 | 23 | 0.027 |
| 3.85 | 26 | 0.031 |
| 4.3 | 31 | 0.037 |

Frequency Error vs Temperature

| temperature(°C) | Frequency error(Hz) | Frequency error(ppm) |
|-----------------|---------------------|----------------------|
| -20 | 17 | 0.020 |
| -10 | 25 | 0.030 |
| 0 | 26 | 0.031 |
| 10 | 36 | 0.043 |
| 20 | 38 | 0.045 |
| 30 | 24 | 0.029 |
| 40 | 19 | 0.023 |
| 50 | 15 | 0.018 |

Expanded measurement uncertainty is 10Hz, $k = 2$

CDMA1900 BC1

Frequency Error vs Voltage

| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
|------------|---------------------|----------------------|
| 3.6 | 19 | 0.010 |
| 3.85 | 14 | 0.007 |
| 4.3 | 11 | 0.006 |

Frequency Error vs Temperature

| temperature(°C) | Frequency error(Hz) | Frequency error(ppm) |
|-----------------|---------------------|----------------------|
| -20 | 21 | 0.011 |
| -10 | 35 | 0.019 |
| 0 | 25 | 0.013 |
| 10 | 22 | 0.012 |
| 20 | 18 | 0.010 |
| 30 | 27 | 0.014 |
| 40 | 24 | 0.013 |
| 50 | 11 | 0.006 |

Expanded measurement uncertainty is 10Hz, $k = 2$

CDMA800 BC10

Frequency Error vs Voltage

| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
|------------|---------------------|----------------------|
| 3.6 | 26 | 0.032 |
| 3.85 | 33 | 0.040 |
| 4.3 | 23 | 0.028 |

Frequency Error vs Temperature

| temperature(°C) | Frequency error(Hz) | Frequency error(ppm) |
|-----------------|---------------------|----------------------|
| -20 | 11 | 0.013 |
| -10 | 14 | 0.017 |
| 0 | 17 | 0.021 |
| 10 | 27 | 0.033 |
| 20 | 29 | 0.035 |
| 30 | 35 | 0.043 |
| 40 | 38 | 0.046 |
| 50 | 29 | 0.035 |

Expanded measurement uncertainty is 10Hz, $k = 2$

A.4 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049, 22.917, 24.238.

A.4.1 Occupied Bandwidth Results

Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the CDMA frequency bands. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

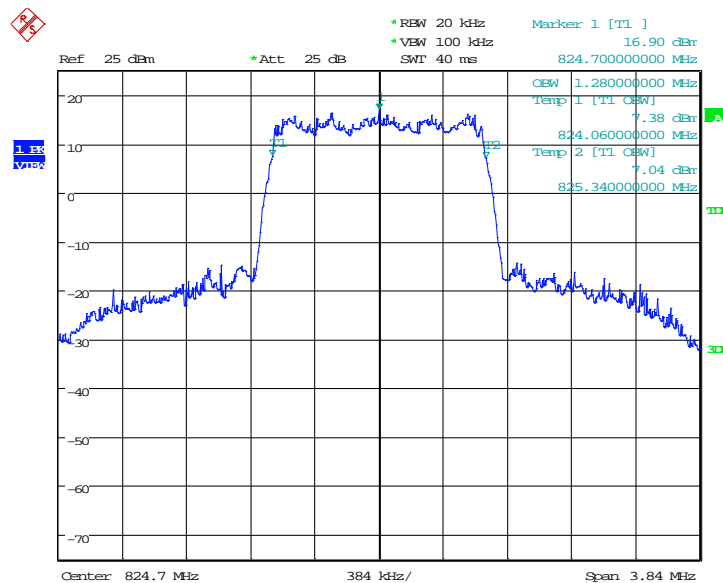
The EUT was set up for the max output power with pseudo random data modulation. Use the Occupied Bandwidth function of SA to measure the 99% bandwidth.

CDMA800 BC0 (99% BW)

| Channel | Occupied Bandwidth (99% BW)(MHz) |
|---------|----------------------------------|
| 1013 | 1.28 |
| 384 | 1.27 |
| 777 | 1.29 |

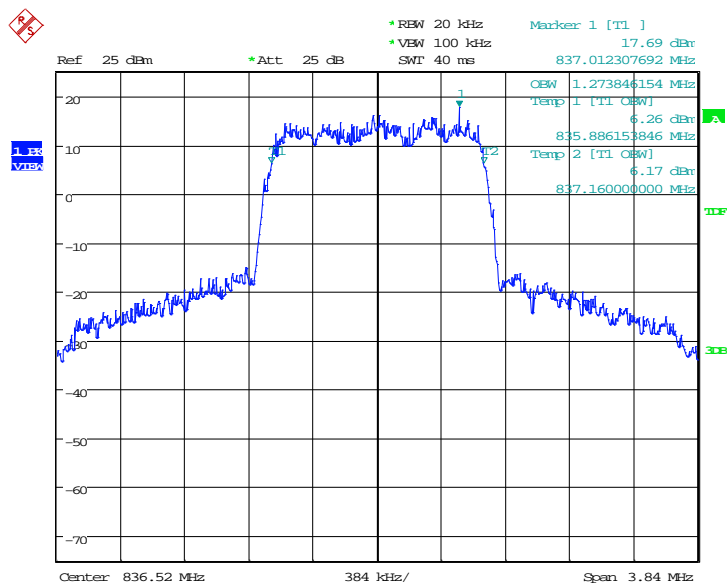
CDMA800 BC0

Channel 1013-Occupied Bandwidth (99% BW)



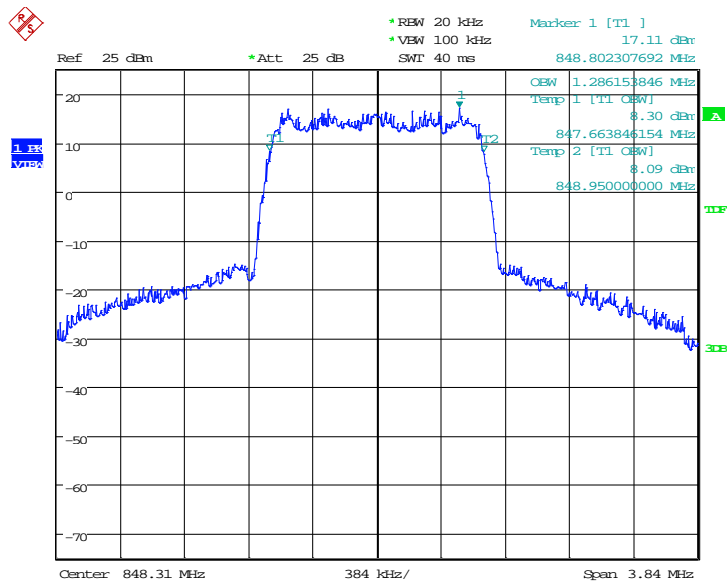
Date: 17.DEC.2019 19:19:06

Channel 384-Occupied Bandwidth (99% BW)



Date: 17.DEC.2019 19:19:53

Channel 777-Occupied Bandwidth (99% BW)



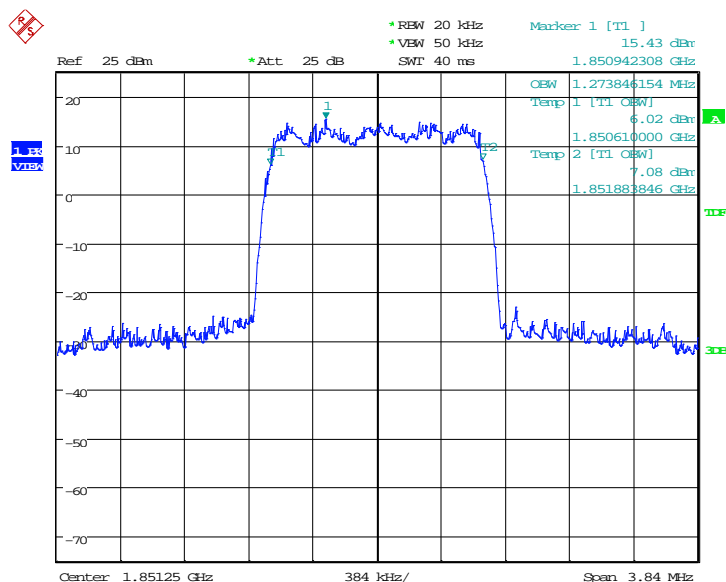
Date: 17.DEC.2019 19:20:34

CDMA1900 BC1 (99% BW)

| Channel | Occupied Bandwidth (99% BW)(MHz) |
|---------|----------------------------------|
| 25 | 1.27 |
| 600 | 1.28 |
| 1175 | 1.28 |

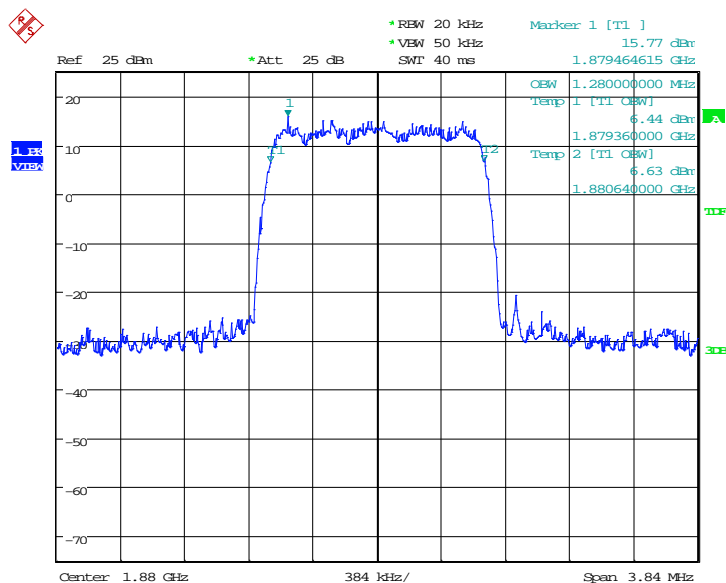
CDMA1900 BC1

Channel 25-Occupied Bandwidth (99% BW)



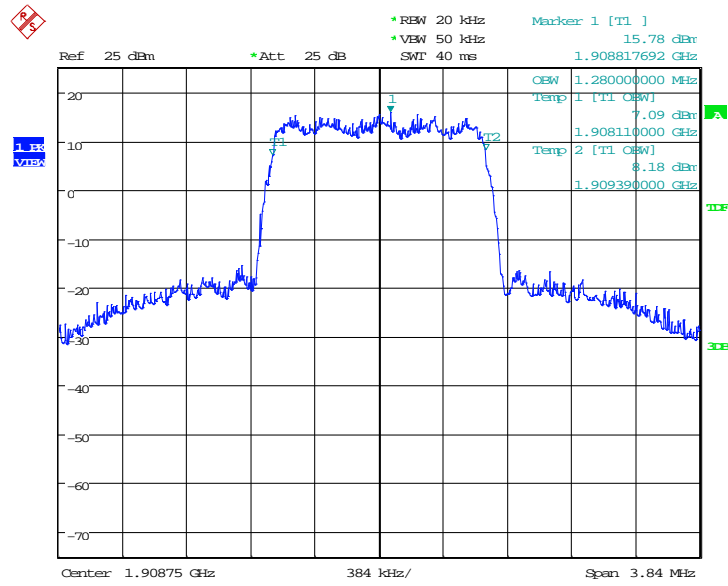
Date: 17.DEC.2019 20:26:03

Channel 600-Occupied Bandwidth (99% BW)



Date: 17.DEC.2019 20:26:38

Channel 1175-Occupied Bandwidth (99% BW)



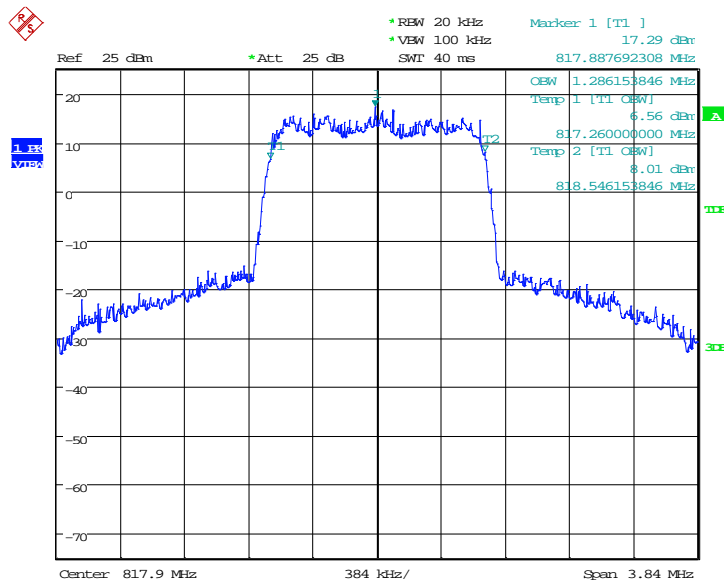
Date: 17.DEC.2019 20:28:20

CDMA800 BC10 (99% BW)

| Channel | Occupied Bandwidth (99% BW)(MHz) |
|---------|----------------------------------|
| 476 | 1.29 |
| 684 | 1.29 |

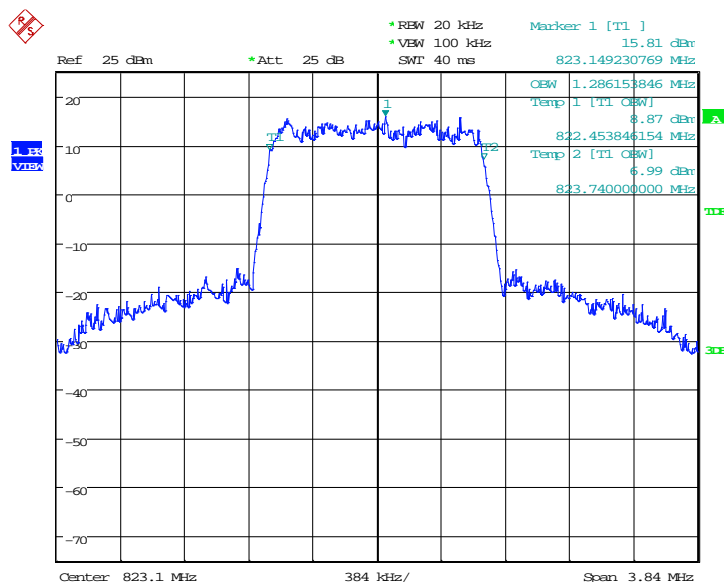
CDMA800 BC10

Channel 476-Occupied Bandwidth (99% BW)



Date: 17.DEC.2019 18:38:00

Channel 684-Occupied Bandwidth (99% BW)



Date: 17.DEC.2019 18:38:45

Note: Expanded measurement uncertainty is $U = 3428\text{Hz}$, $k = 2$

A.5 EMISSION BANDWIDTH

Reference

FCC: CFR Part 2.1049, 22.917, 24.238.

A.5.1 Emission Bandwidth Results

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Similar to conducted emissions; Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the CDMA frequency band. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

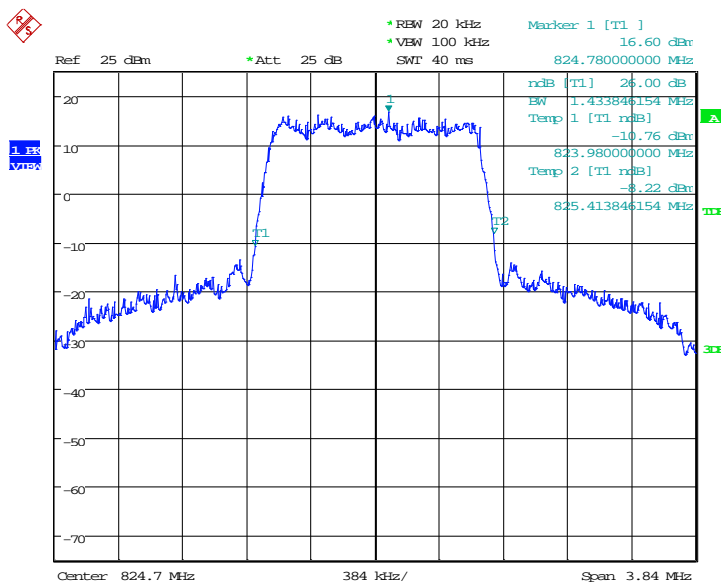
The EUT was set up for the max output power with pseudo random data modulation. Use the Occupied Bandwidth function of SA to measure the 26dBc bandwidth.

CDMA800 BC0 (-26dBc BW)

| Channel | Emission Bandwidth (-26dBc BW)(MHz) |
|---------|-------------------------------------|
| 1013 | 1.43 |
| 384 | 1.43 |
| 777 | 1.44 |

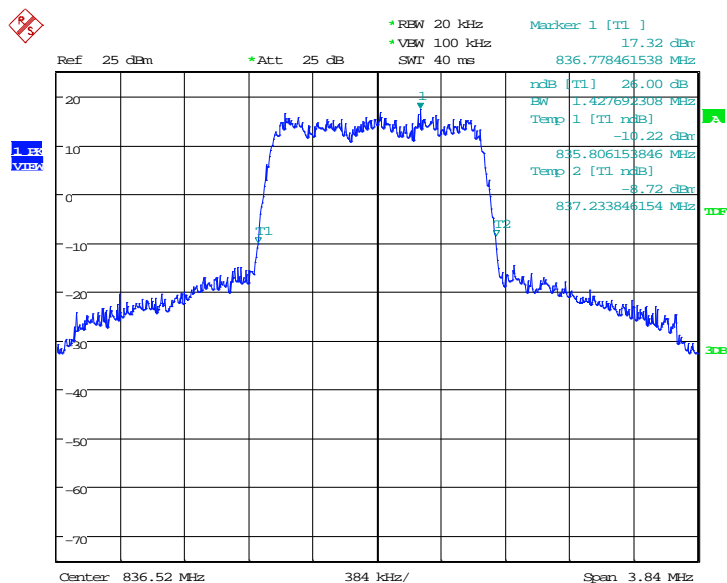
CDMA800 BC0

Channel 1013-Occupied Bandwidth (-26dBc BW)



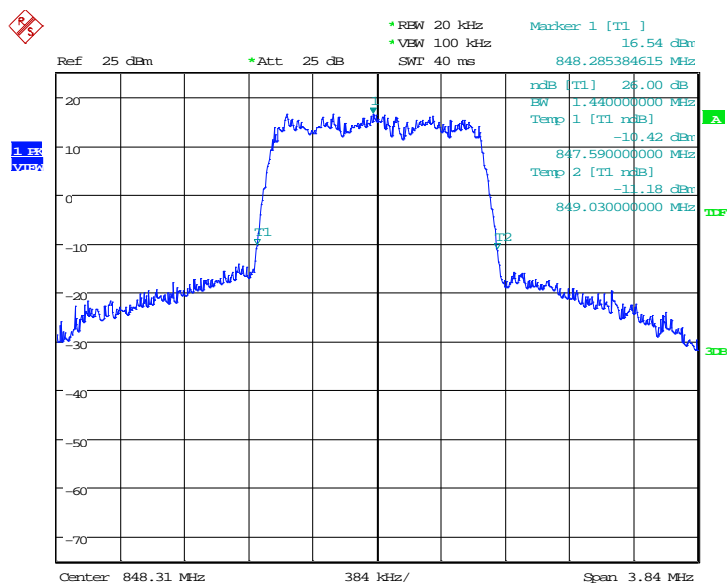
Date: 17.DEC.2019 19:22:13

Channel 384-Occupied Bandwidth (-26dBc BW)



Date: 17.DEC.2019 19:21:38

Channel 777-Occupied Bandwidth (-26dBc BW)



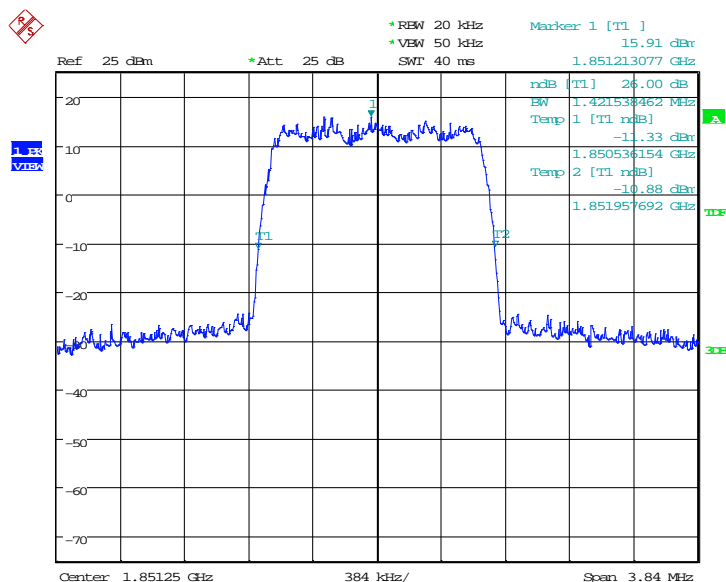
Date: 17.DEC.2019 19:21:02

CDMA1900 BC1 (-26dBc BW)

| Channel | Emission Bandwidth (-26dBc BW)(MHz) |
|---------|-------------------------------------|
| 25 | 1.42 |
| 600 | 1.42 |
| 1175 | 1.43 |

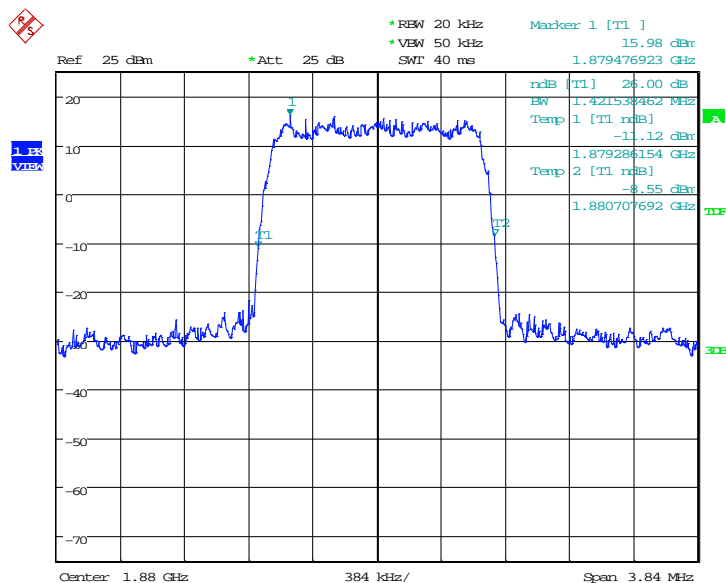
CDMA1900 BC1

Channel 25-Occupied Bandwidth (-26dBc BW)



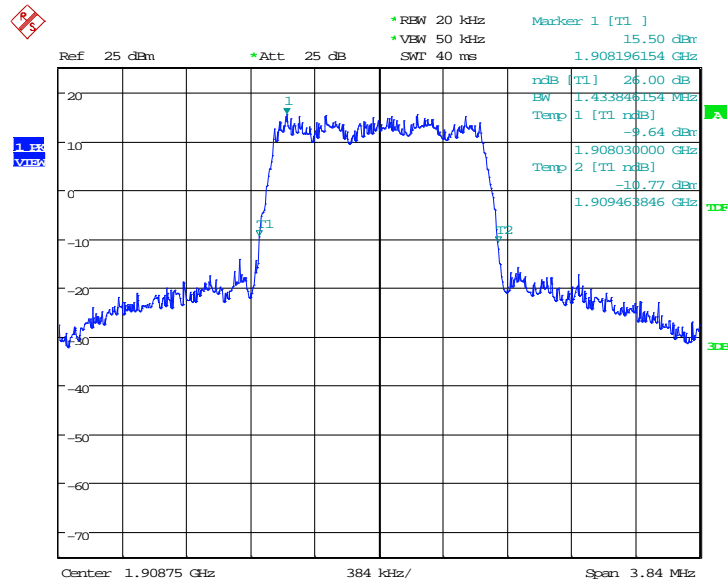
Date: 17.DEC.2019 20:32:22

Channel 600-Occupied Bandwidth (-26dBc BW)



Date: 17.DEC.2019 20:31:43

Channel 1175-Occupied Bandwidth (-26dBc BW)



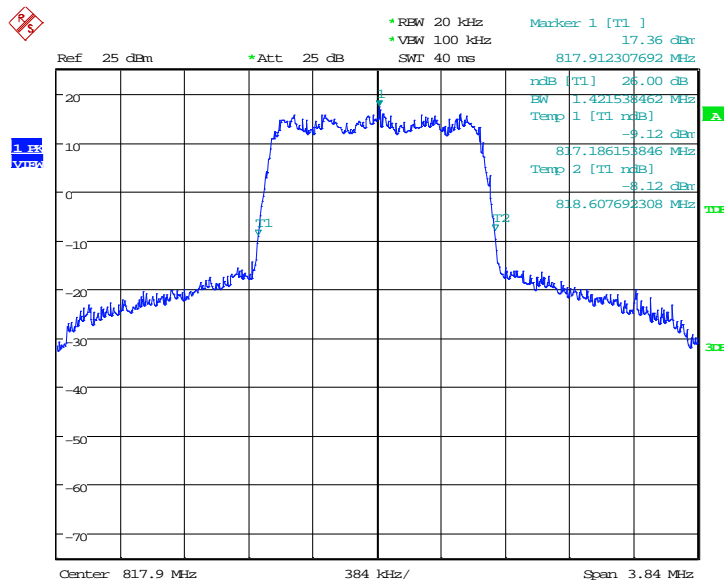
Date: 17.DEC.2019 20:29:20

CDMA800 BC10 (-26dBc BW)

| Channel | Emission Bandwidth (-26dBc BW)(MHz) |
|---------|-------------------------------------|
| 476 | 1.42 |
| 684 | 1.43 |

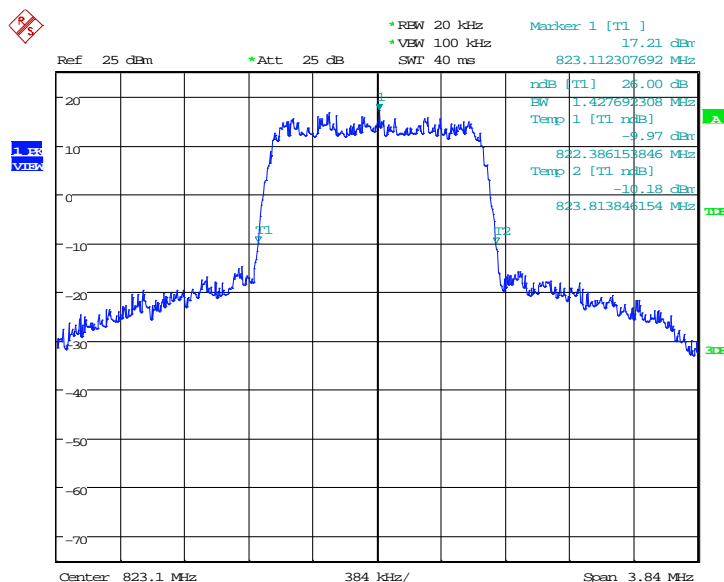
CDMA800 BC10

Channel 476-Occupied Bandwidth (-26dBc BW)



Date: 17.DEC.2019 18:39:52

Channel 684-Occupied Bandwidth (-26dBc BW)



Date: 17.DEC.2019 18:39:10

Note: Expanded measurement uncertainty is $U = 3428\text{Hz}$, $k = 2$

A.6 BAND EDGE COMPLIANCE

Reference

FCC: CFR Part 2.1051, 22.917, 24.238, 90.691.

Measurement limit

On any frequency outside frequency band of the CDMA spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least $43+10\log(P)$ dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

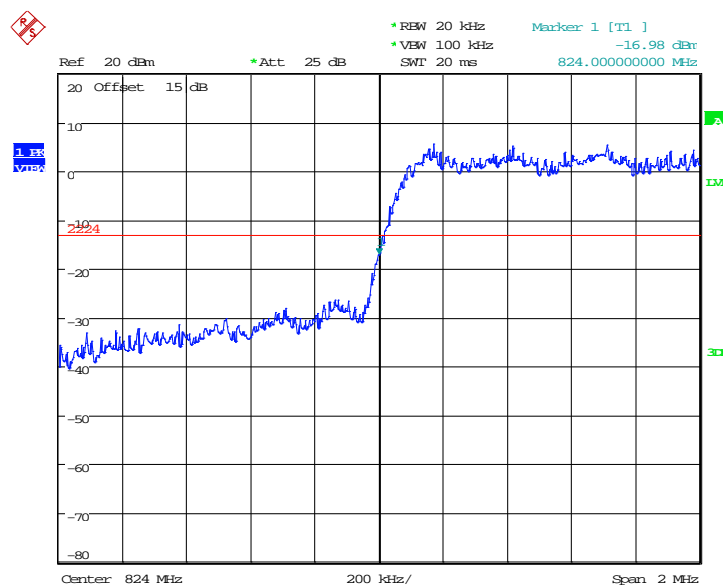
For any frequency removed from the EA licensee’s frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116\log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

For any frequency removed from the EA licensee’s frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10\log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

Only worst case result is given below

CDMA800 BC0

BAND EDGE BLOCK-Channel 1013



Date: 17.DEC.2019 19:29:19

Ref 20 dBm Att 25 dB RBW 20 kHz VBW 100 kHz SWT 20 ms Marker 1 [T1] -16.48 dBm 849.000000000 MHz

20 Offset 15 dB

10

0

-10

-20

-30

-40

-50

-60

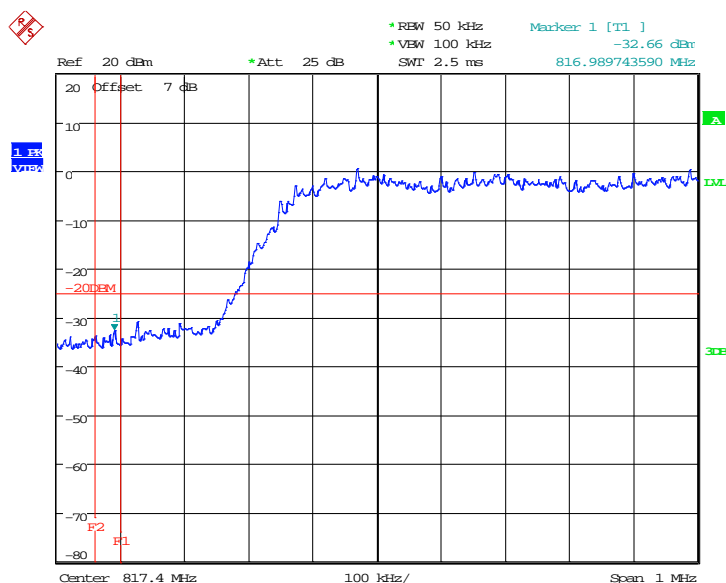
-70

-80

Center 849 MHz 200 kHz/ Span 2 MHz

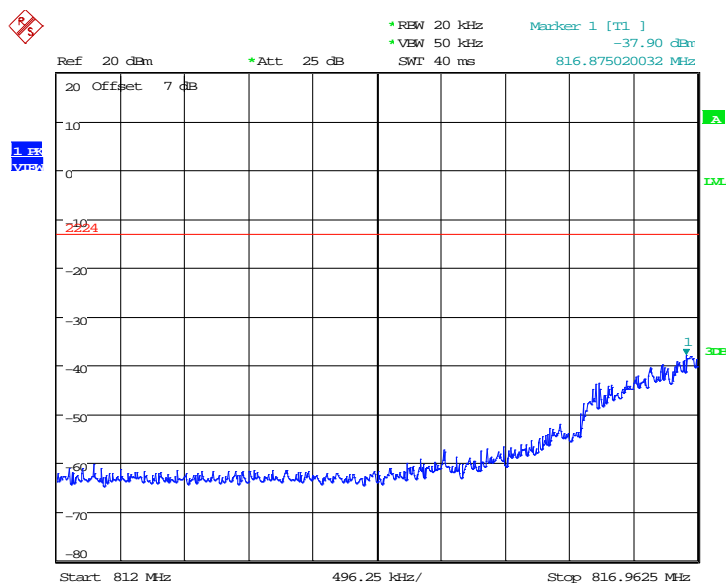
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CDMA800 BC10
Channel 476- BAND EDGE



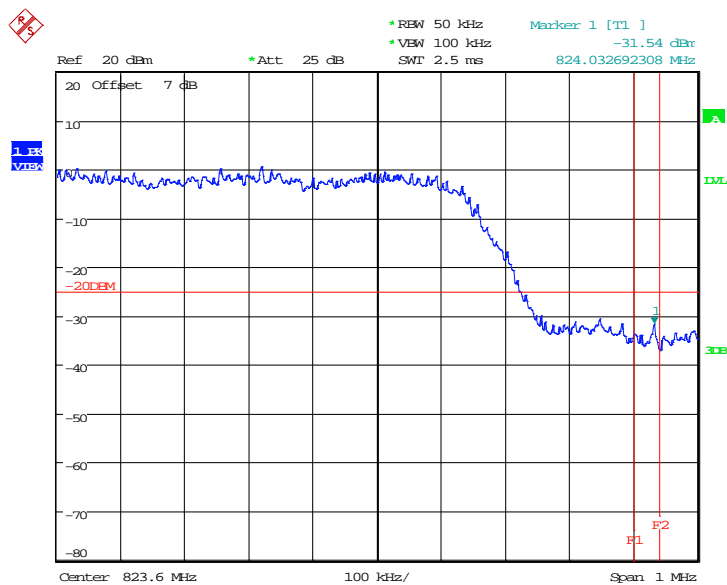
Date: 17.DEC.2019 18:59:09

Channel 476- Outer Extended BAND EDGE



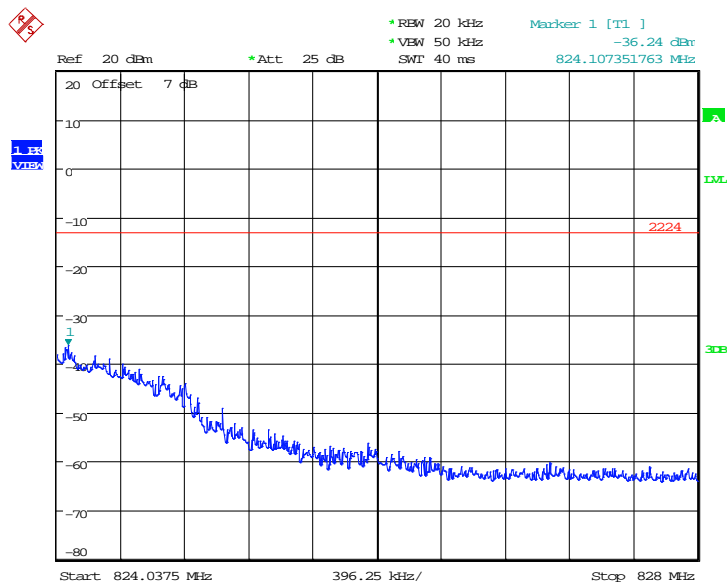
Date: 17.DEC.2019 19:03:10

Channel 684- BAND EDGE



Date: 17.DEC.2019 19:07:27

Channel 684- Outer Extended BAND EDGE



Date: 17.DEC.2019 19:04:34

Note: Expanded measurement uncertainty is $U = 0.49\text{dB}(100\text{kHz}-2\text{GHz})/1.21\text{dB}(2\text{GHz}-26.5\text{GHz})$, $k = 1.96$

A.7 CONDUCTED SPURIOUS EMISSION

Reference

FCC: CFR Part 2.1051, 22.917, 24.238, 90.691.

A.7.1 Measurement Method

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1051 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

CDMA800 BC0 Transmitter

| Channel | Frequency (MHz) |
|---------|-----------------|
| 1013 | 824.70 |
| 384 | 836.52 |
| 777 | 848.31 |

CDMA1900 BC1 Transmitter

| Channel | Frequency (MHz) |
|---------|-----------------|
| 25 | 1851.25 |
| 600 | 1880.00 |
| 1175 | 1909.75 |

CDMA800 BC10 Transmitter

| Channel | Frequency (MHz) |
|---------|-----------------|
| 476 | 817.90 |
| 684 | 823.10 |

A. 7.2 Measurement Limit

Part 24.238, Part 22.917 and 90.691 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ 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. 7.3 Measurement result

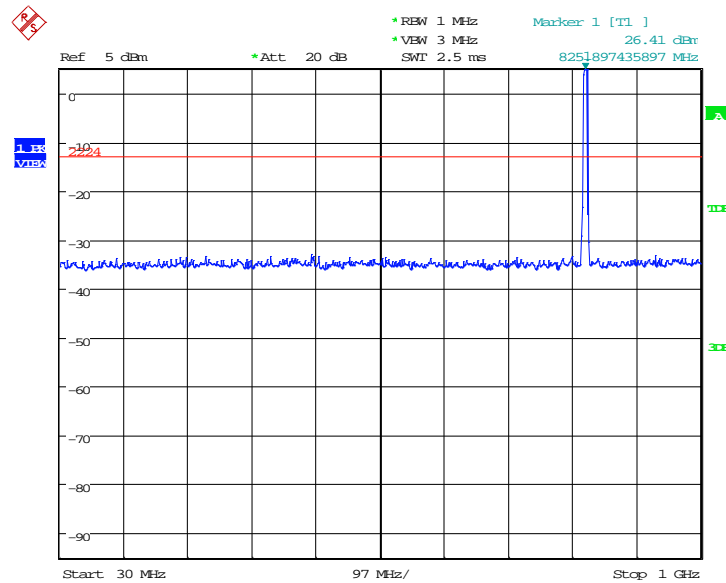
Only worst case result is given below

CDMA800 BC0

Channel 1013: 30MHz –1GHz

Spurious emission limit –13dBm.

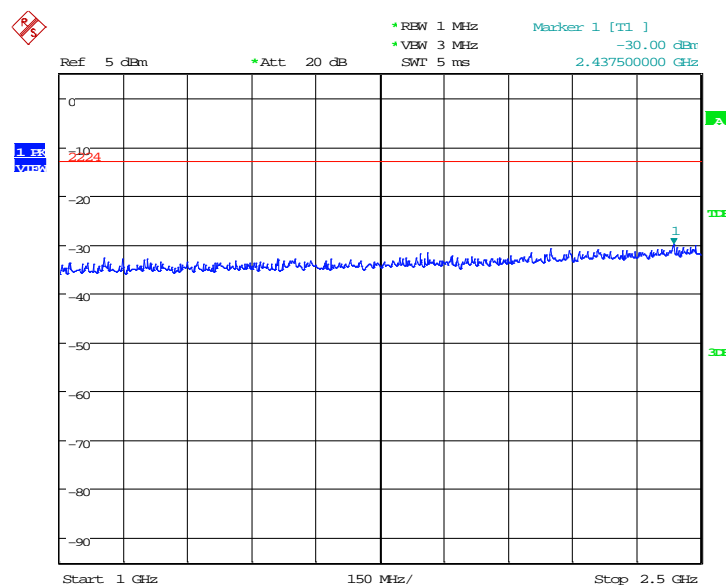
NOTE: peak above the limit line is the carrier frequency.



Date: 17.DEC.2019 19:30:51

Channel 1013: 1GHz – 2.5GHz

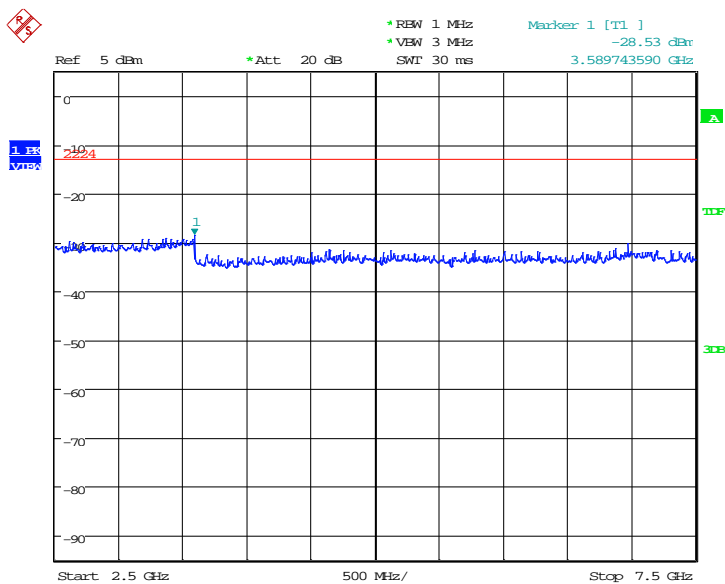
Spurious emission limit –13dBm.



Date: 17.DEC.2019 19:33:32

Channel 1013: 2.5GHz –7.5GHz

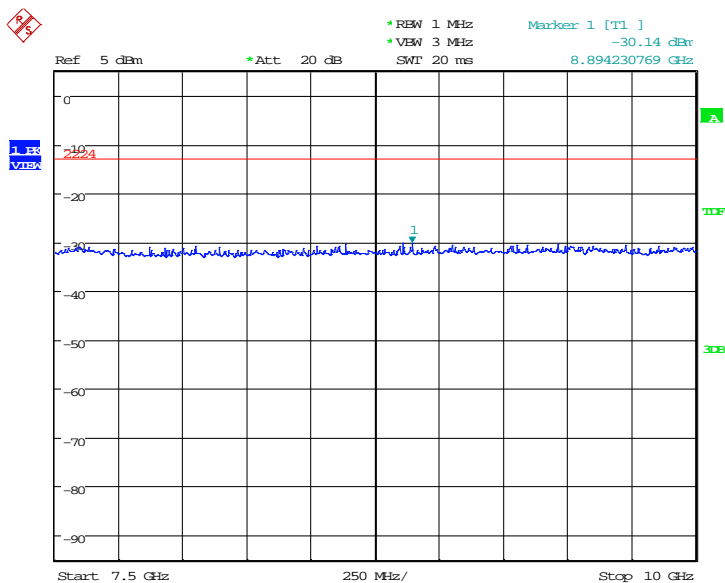
Spurious emission limit –13dBm.



Date: 17.DEC.2019 19:33:58

Channel 1013: 7.5GHz – 10GHz

Spurious emission limit –13dBm.

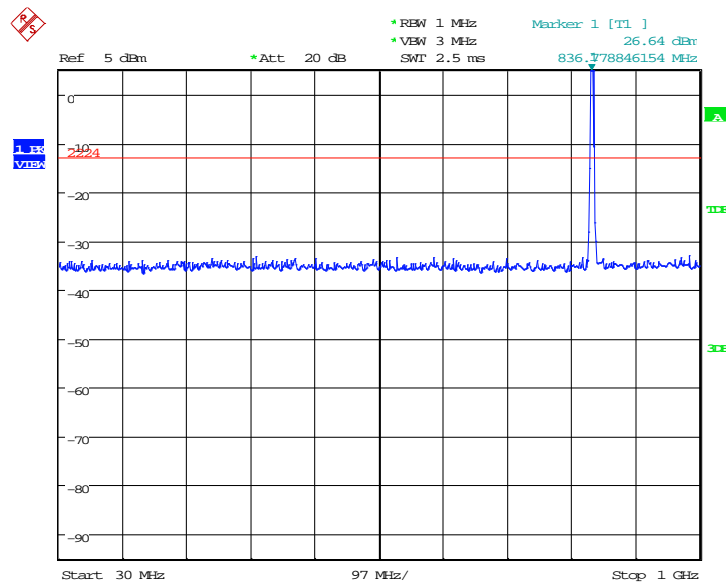


Date: 17.DEC.2019 19:47:39

Channel 384: 30MHz –1GHz

Spurious emission limit –13dBm.

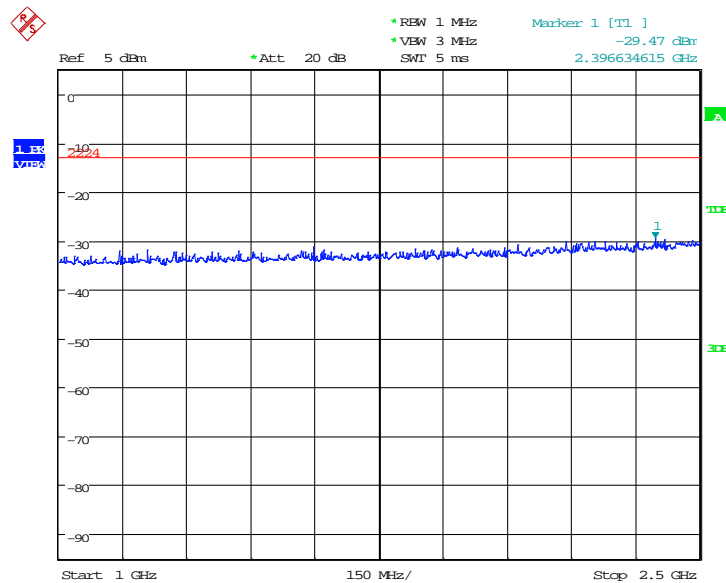
NOTE: peak above the limit line is the carrier frequency.



Date: 17.DEC.2019 19:31:12

Channel 384: 1GHz – 2.5GHz

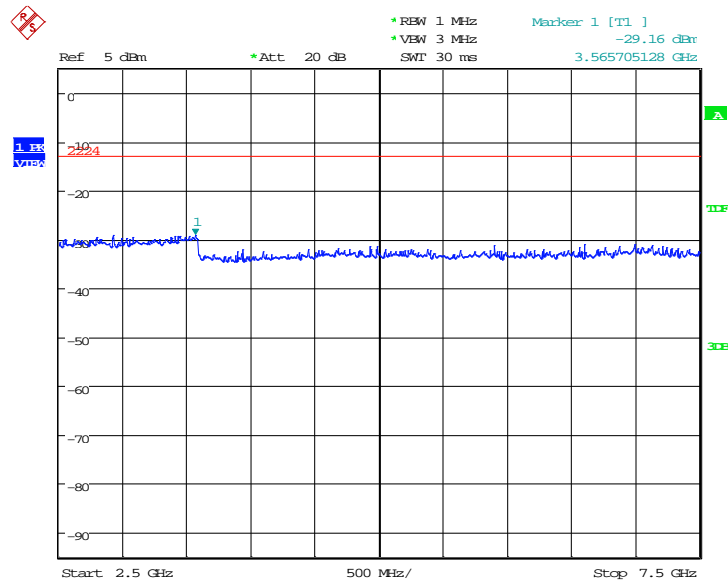
Spurious emission limit –13dBm.



Date: 17.DEC.2019 19:33:12

Channel 384: 2.5GHz –7.5GHz

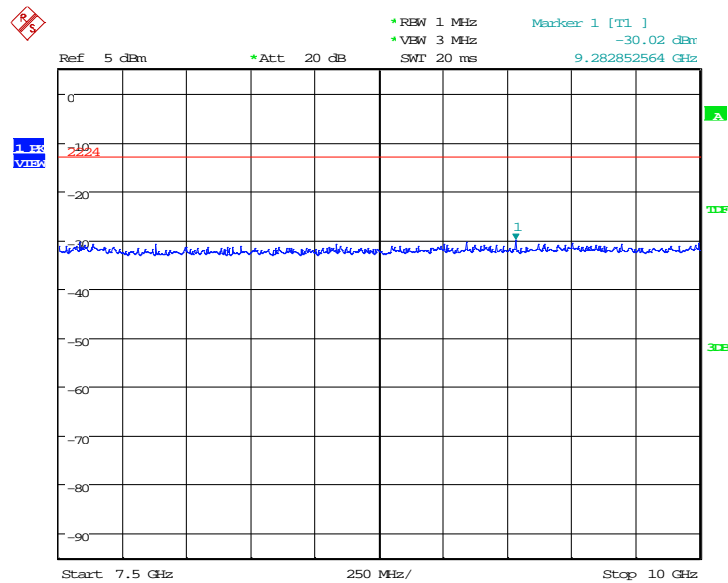
Spurious emission limit –13dBm.



Date: 17.DEC.2019 19:34:33

Channel 384: 7.5GHz – 10GHz

Spurious emission limit –13dBm.

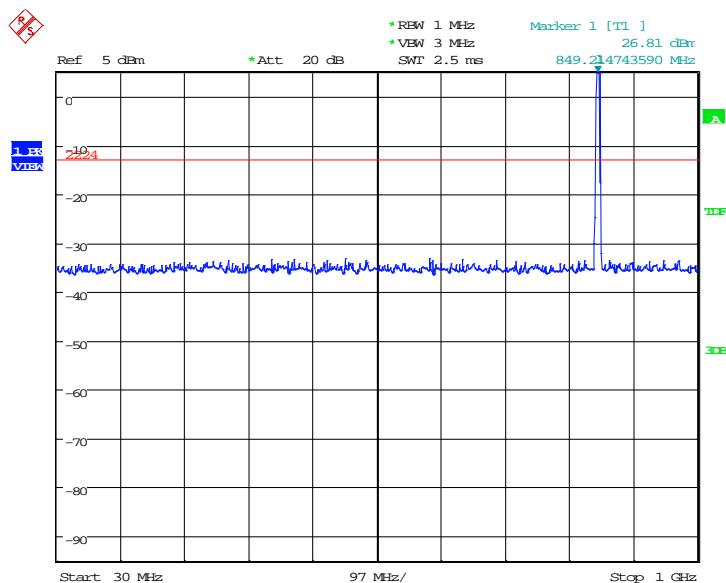


Date: 17.DEC.2019 19:44:37

Channel 777: 30MHz –1GHz

Spurious emission limit –13dBm.

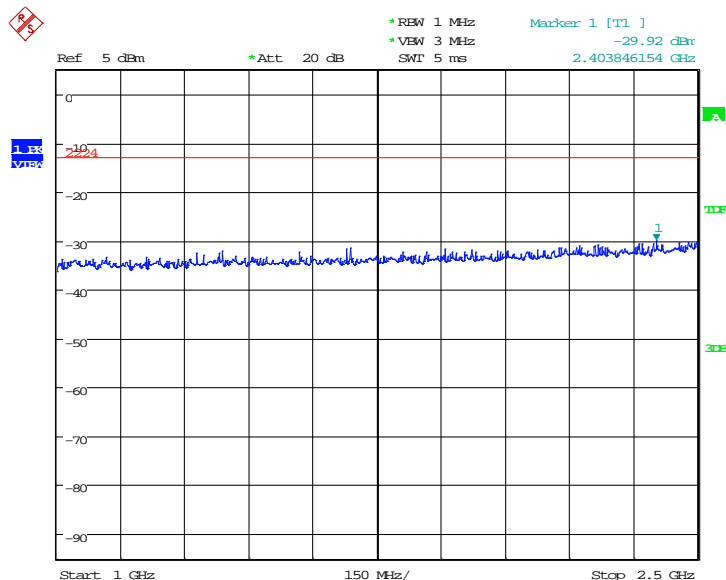
NOTE: peak above the limit line is the carrier frequency.



Date: 17.DEC.2019 19:31:30

Channel 777: 1GHz – 2.5GHz

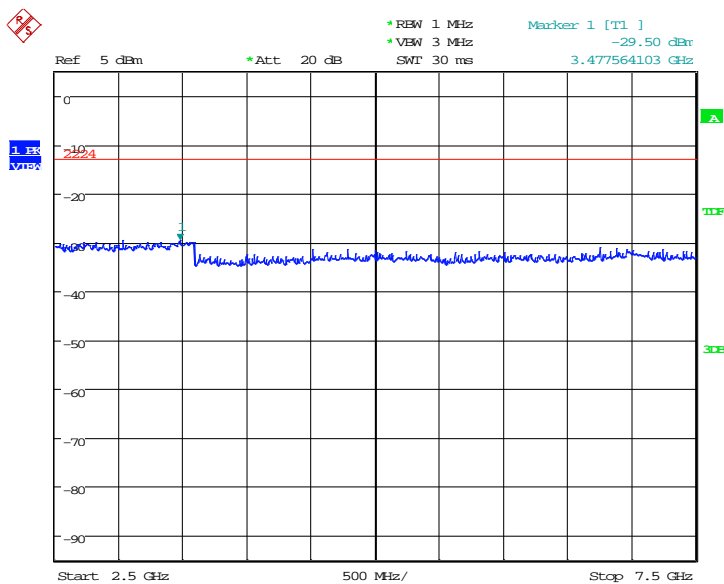
Spurious emission limit –13dBm.



Date: 17.DEC.2019 19:31:58

Channel 777: 2.5GHz –7.5GHz

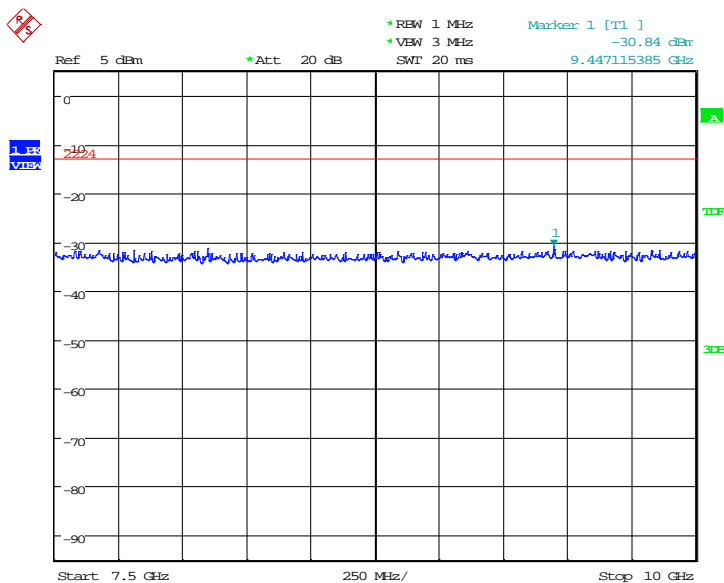
Spurious emission limit –13dBm.



Date: 17.DEC.2019 19:35:02

Channel 777: 7.5GHz – 10GHz

Spurious emission limit –13dBm.

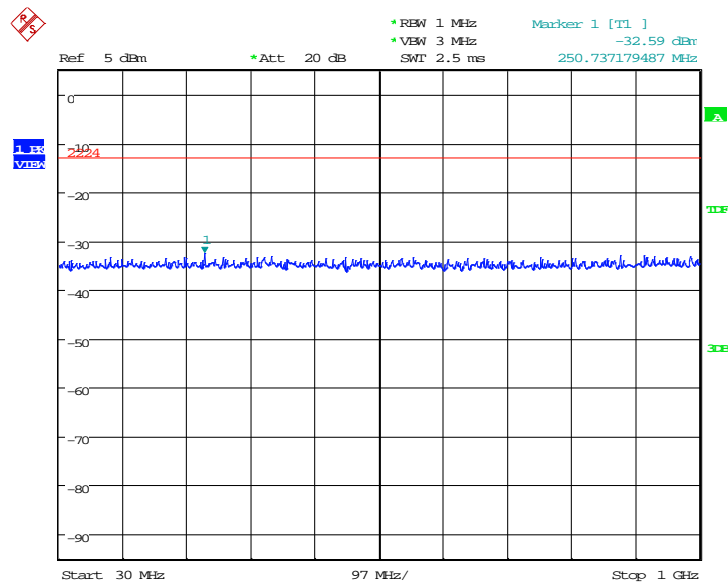


Date: 17.DEC.2019 19:42:46

CDMA1900 BC1

Channel 25: 30MHz – 1GHz

Spurious emission limit –13dBm.

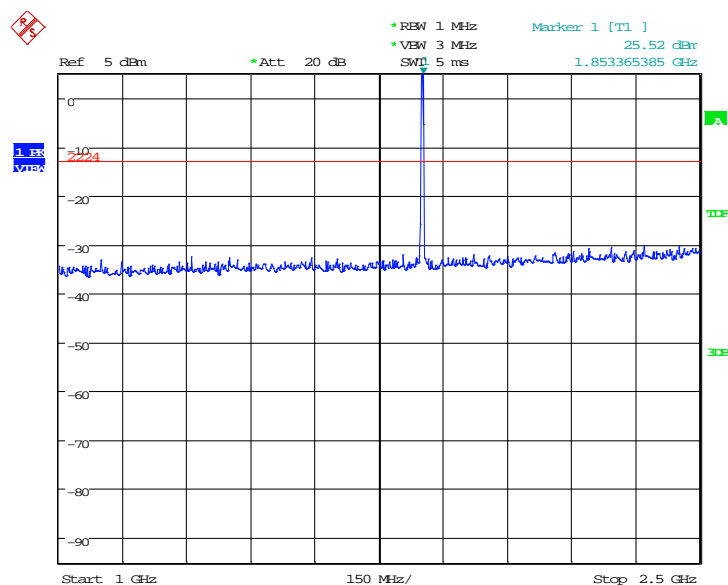


Date: 17.DEC.2019 20:37:04

Channel 25: 1GHz – 2.5GHz

Spurious emission limit –13dBm.

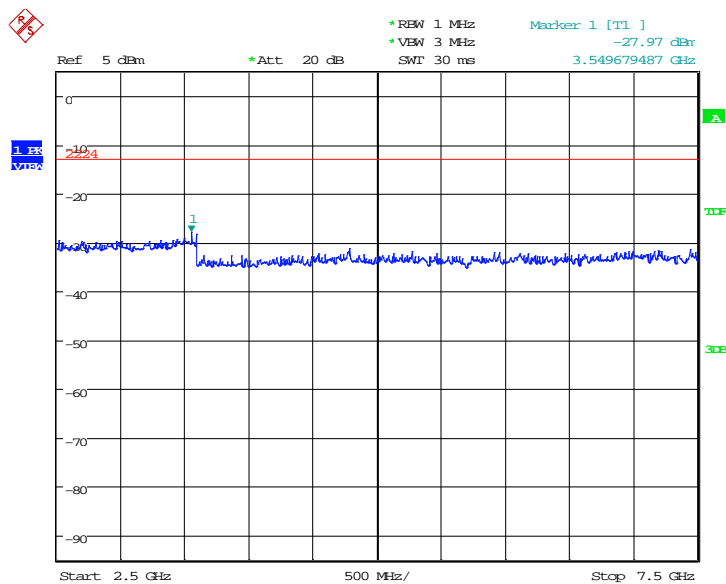
NOTE: peak above the limit line is the carrier frequency.



Date: 17.DEC.2019 20:38:51

Channel 25: 2.5GHz – 7.5GHz

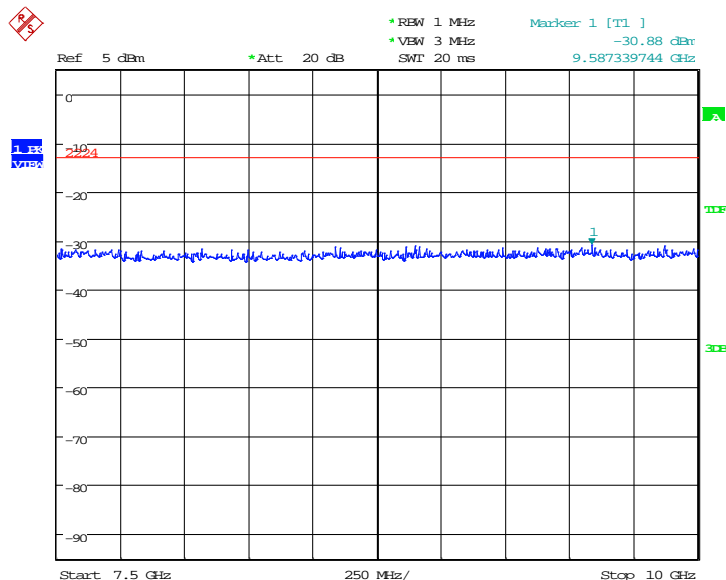
Spurious emission limit –13dBm.



Date: 17.DEC.2019 20:39:13

Channel 25: 7.5GHz –10GHz

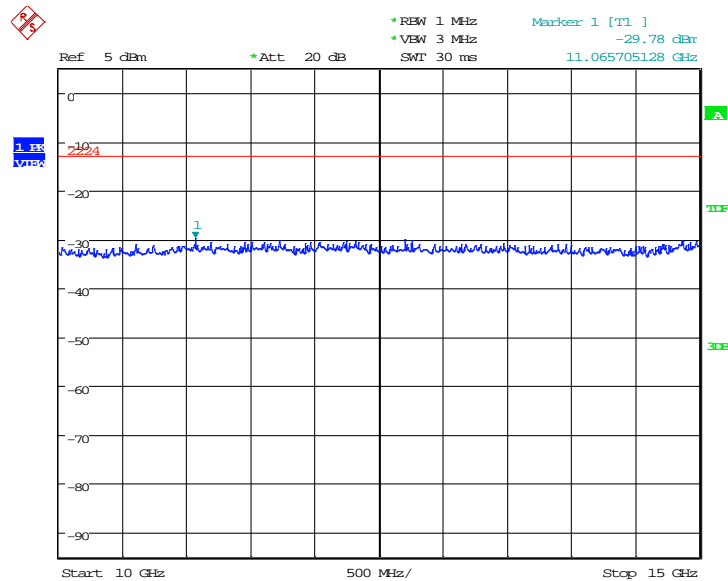
Spurious emission limit –13dBm.



Date: 17.DEC.2019 20:41:13

Channel 25: 10GHz –15GHz

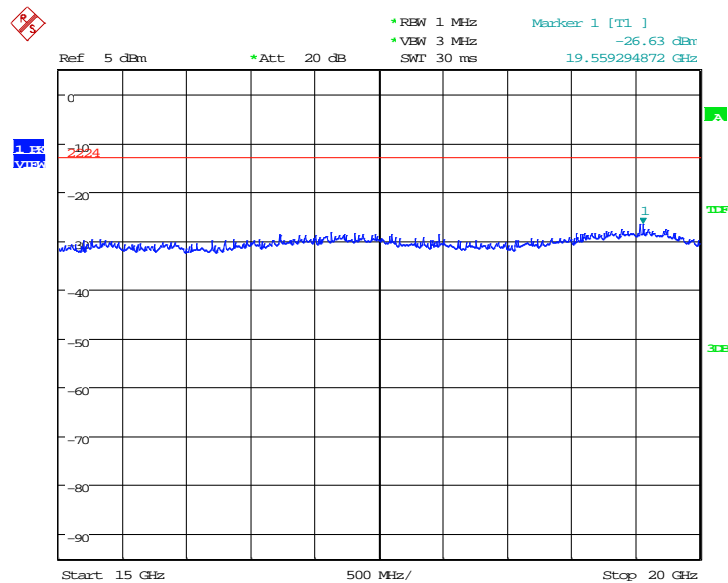
Spurious emission limit -13dBm .



Date: 17.DEC.2019 20:41:37

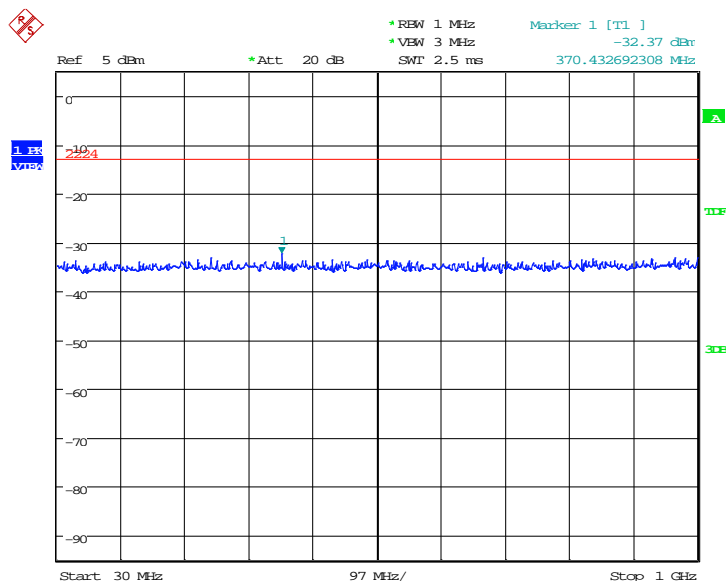
Channel 25: 15GHz –20GHz

Spurious emission limit -13dBm .



Date: 17.DEC.2019 20:45:47

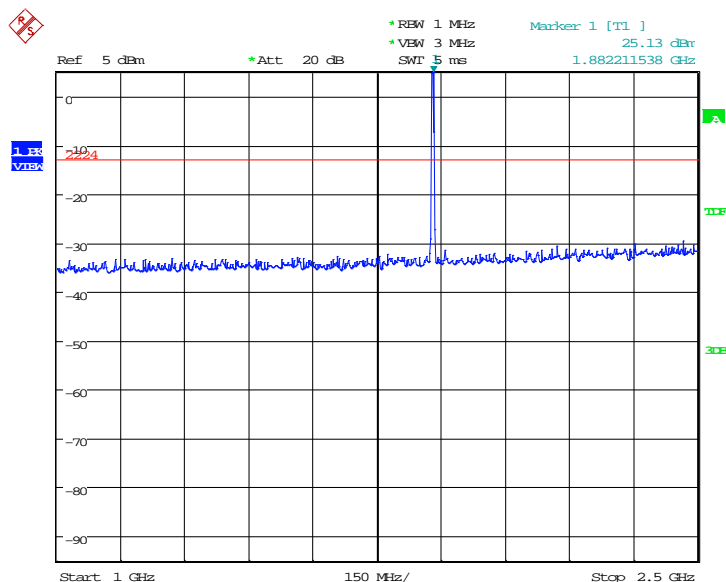
Channel 600: 30MHz – 1GHz
Spurious emission limit –13dBm



Date: 17.DEC.2019 20:37:34

Channel 600: 1GHz –2.5GHz
Spurious emission limit –13dBm

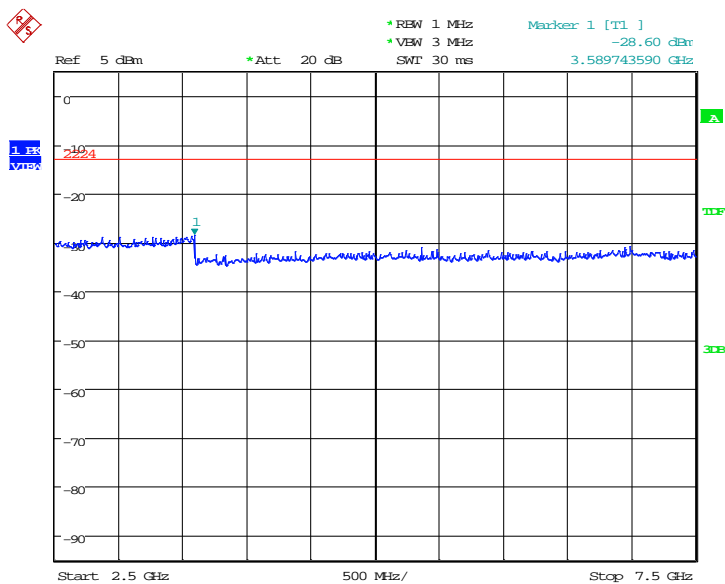
NOTE: peak above the limit line is the carrier frequency.



Date: 17.DEC.2019 20:38:37

Channel 600: 2.5GHz –7.5GHz

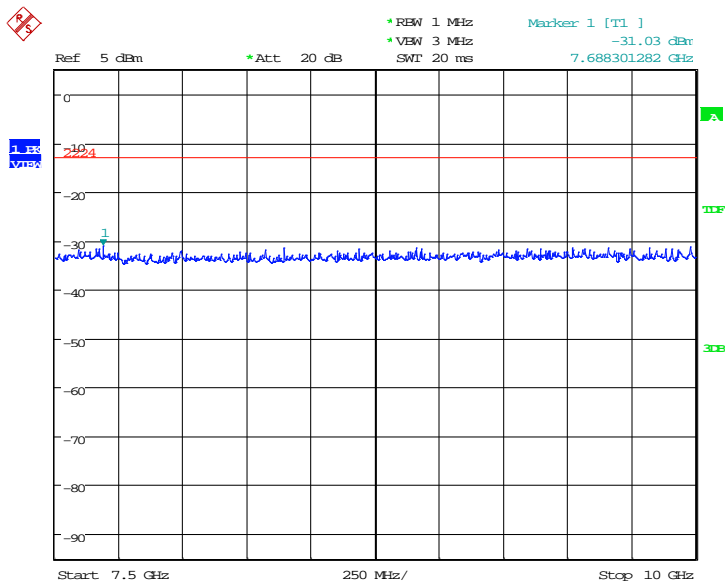
Spurious emission limit –13dBm



Date: 17.DEC.2019 20:39:54

Channel 600: 7.5GHz –10GHz

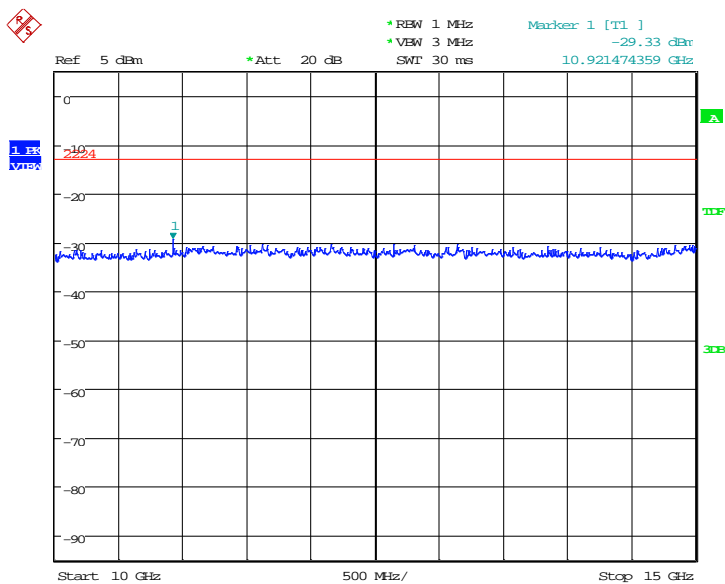
Spurious emission limit –13dBm



Date: 17.DEC.2019 20:40:50

Channel 600: 10GHz –15GHz

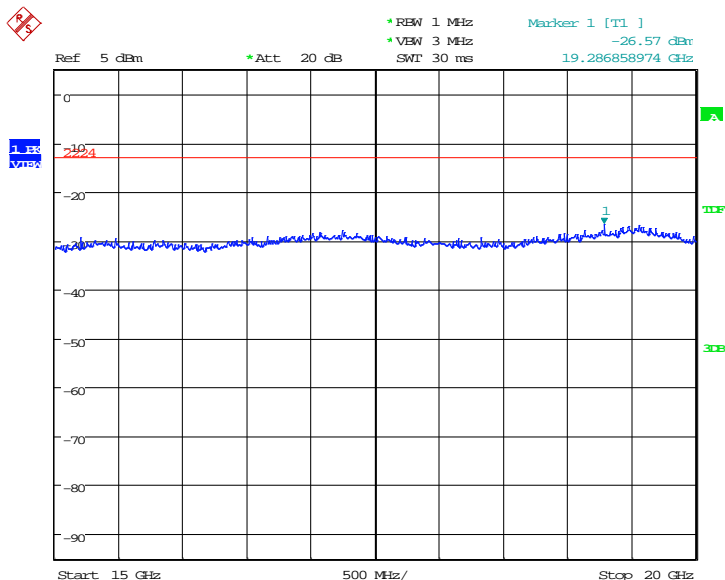
Spurious emission limit –13dBm.



Date: 17.DEC.2019 20:41:58

Channel 600: 15GHz –20GHz

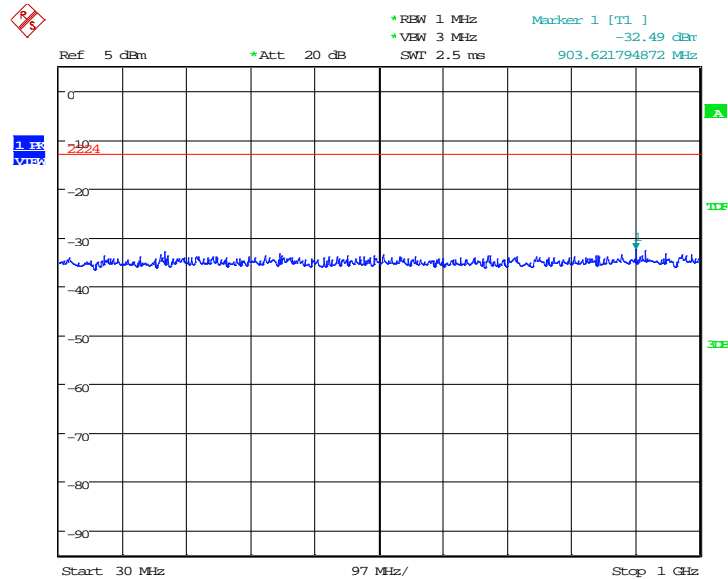
Spurious emission limit –13dBm.



Date: 17.DEC.2019 20:45:19

Channel 1175: 30MHz – 1GHz

Spurious emission limit –13dBm.

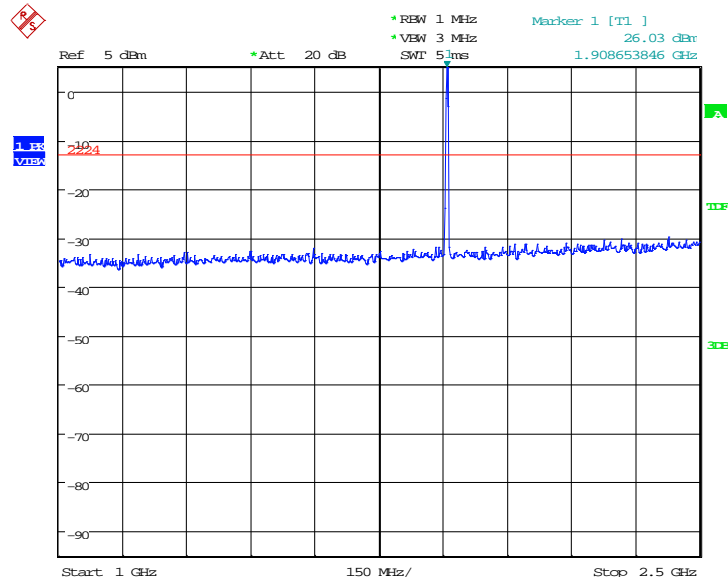


Date: 17.DEC.2019 20:37:56

Channel 1175: 1GHz – 2.5GHz

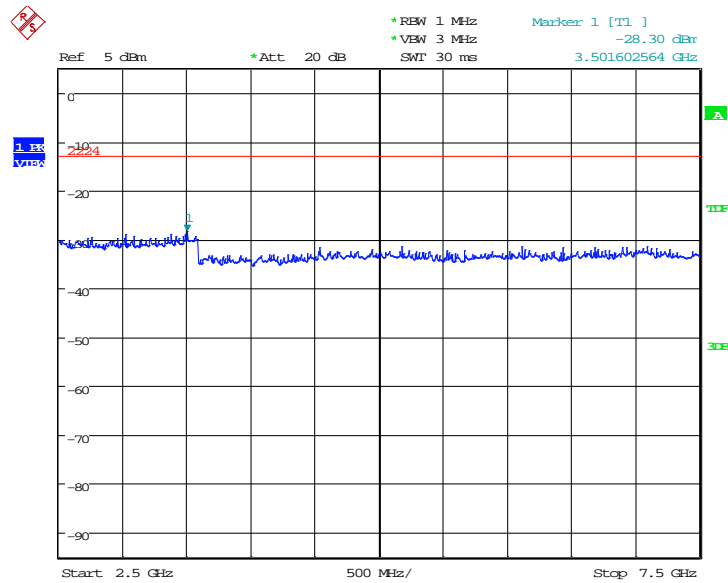
Spurious emission limit –13dBm.

NOTE: peak above the limit line is the carrier frequency.



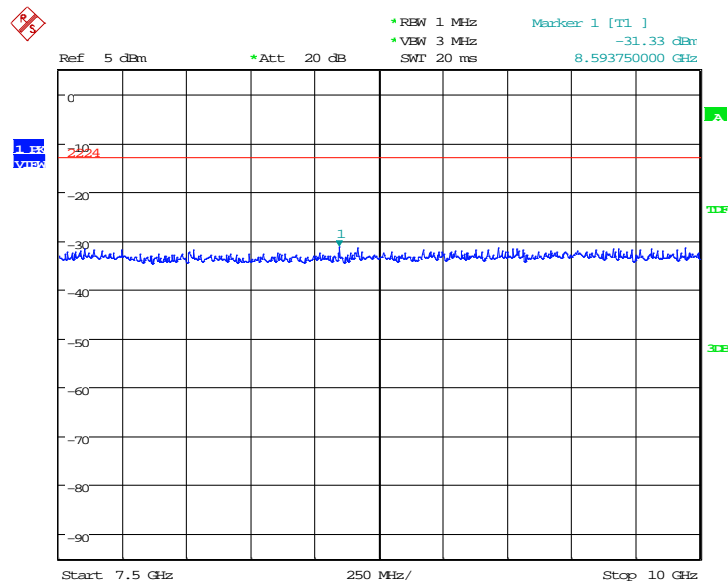
Date: 17.DEC.2019 20:38:21

Channel 1175: 2.5GHz – 7.5GHz
Spurious emission limit –13dBm.



Date: 17.DEC.2019 20:40:12

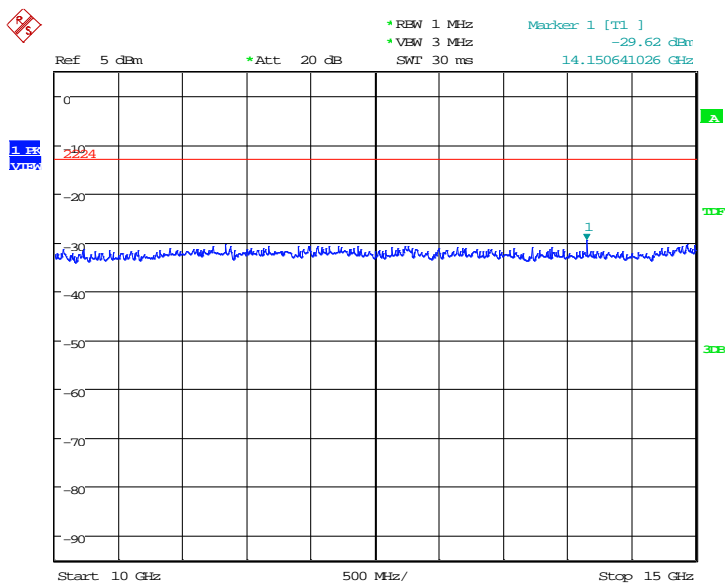
Channel 1175: 7.5GHz – 10GHz
Spurious emission limit –13dBm.



Date: 17.DEC.2019 20:40:34

Channel 1175: 10GHz –15GHz

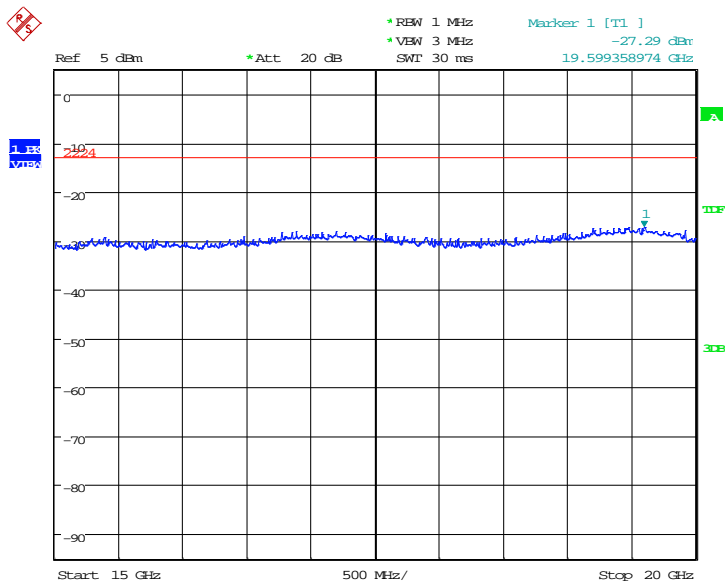
Spurious emission limit –13dBm.



Date: 17.DEC.2019 20:42:17

Channel 1175: 15GHz –20GHz

Spurious emission limit –13dBm.



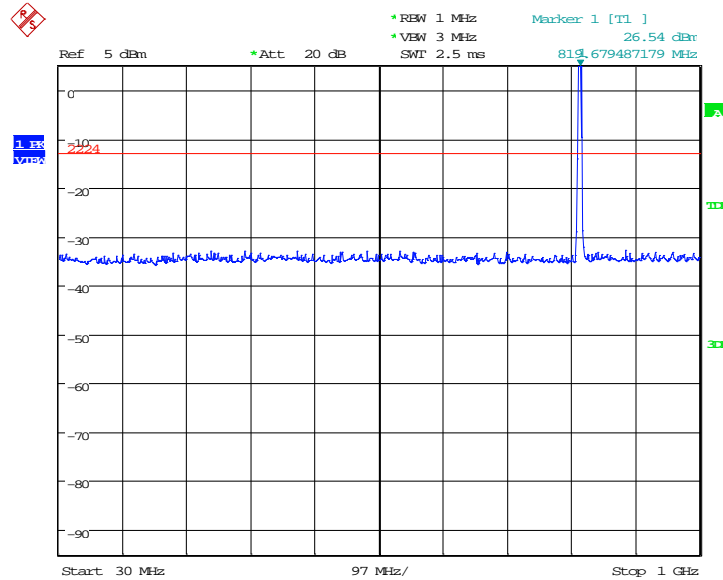
Date: 17.DEC.2019 20:43:44

CDMA800 BC10

Channel 476: 30MHz –1GHz

Spurious emission limit –13dBm.

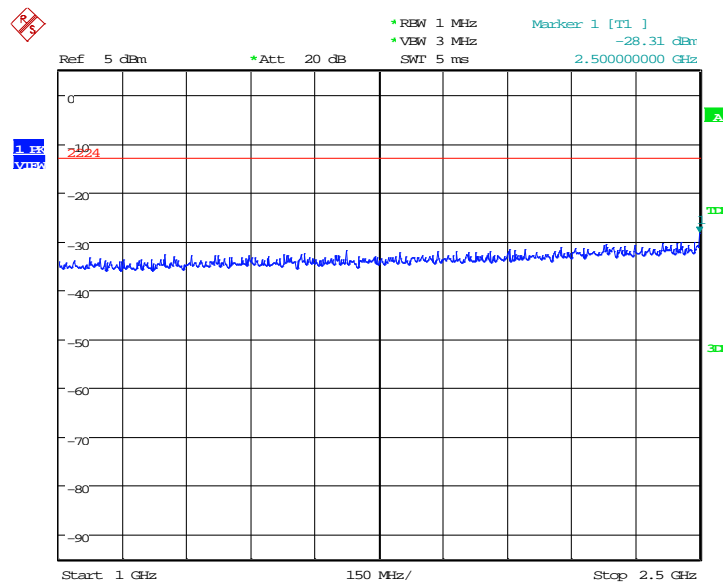
NOTE: peak above the limit line is the carrier frequency.



Date: 17.DEC.2019 18:43:36

Channel 476: 1GHz – 2.5GHz

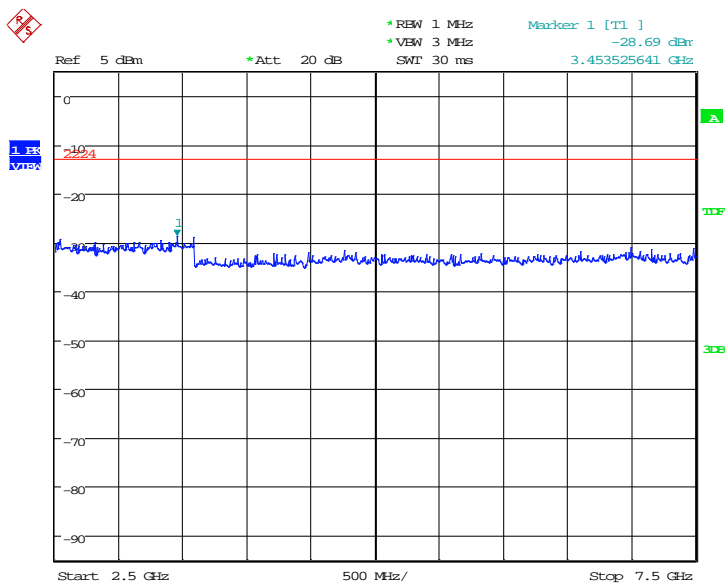
Spurious emission limit –13dBm.



Date: 17.DEC.2019 18:45:37

Channel 476: 2.5GHz –7.5GHz

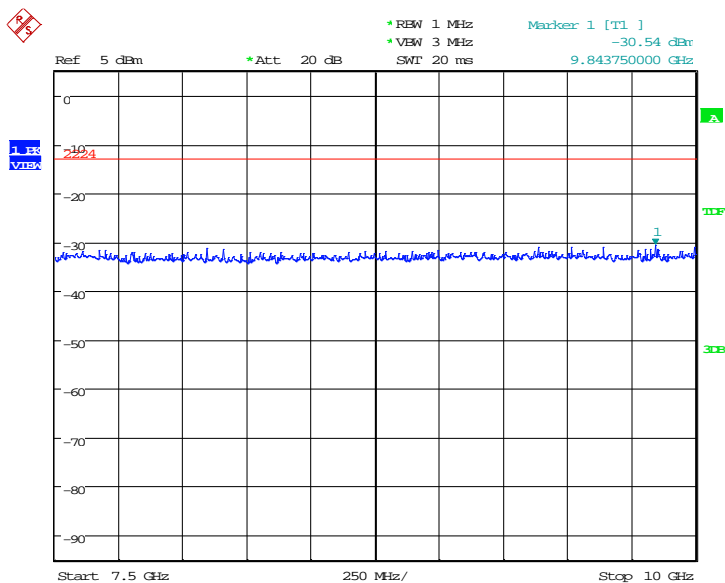
Spurious emission limit –13dBm.



Date: 17.DEC.2019 18:46:02

Channel 476: 7.5GHz – 10GHz

Spurious emission limit –13dBm.

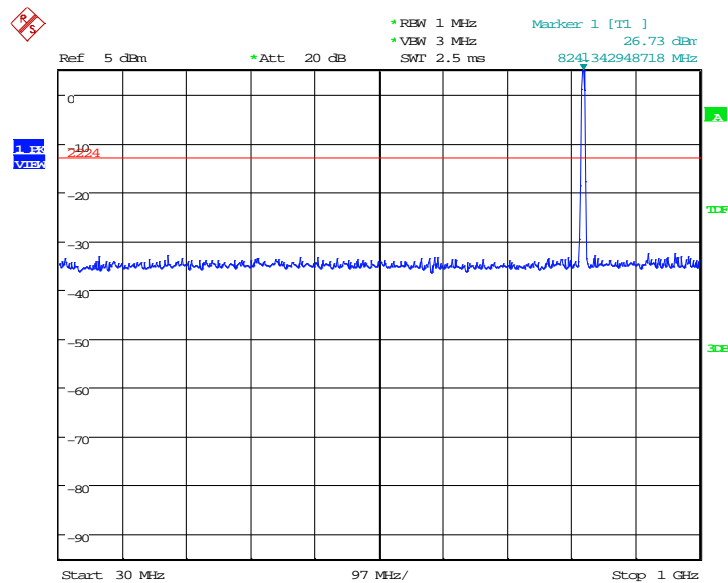


Date: 17.DEC.2019 18:47:10

Channel 684: 30MHz –1GHz

Spurious emission limit –13dBm.

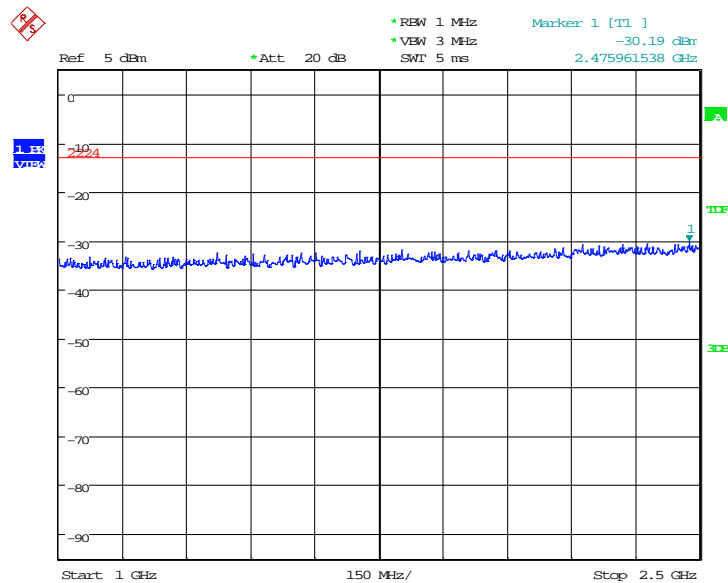
NOTE: peak above the limit line is the carrier frequency.



Date: 17.DEC.2019 18:44:50

Channel 684: 1GHz – 2.5GHz

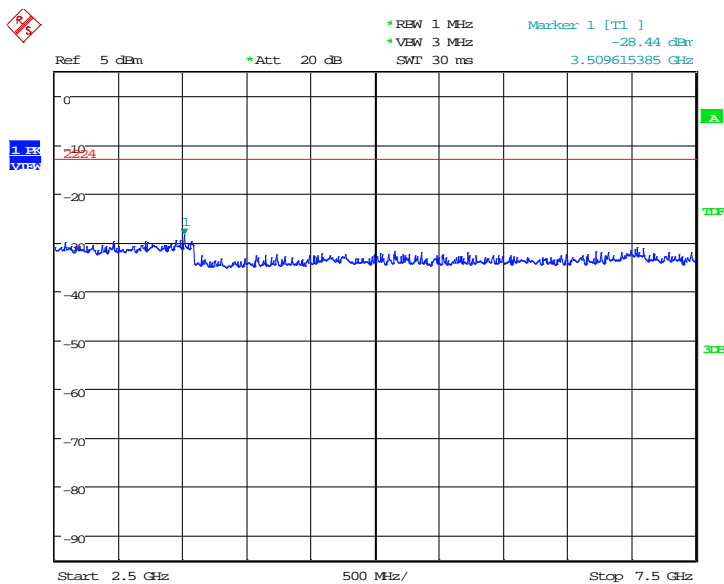
Spurious emission limit –13dBm.



Date: 17.DEC.2019 18:45:14

Channel 684: 2.5GHz –7.5GHz

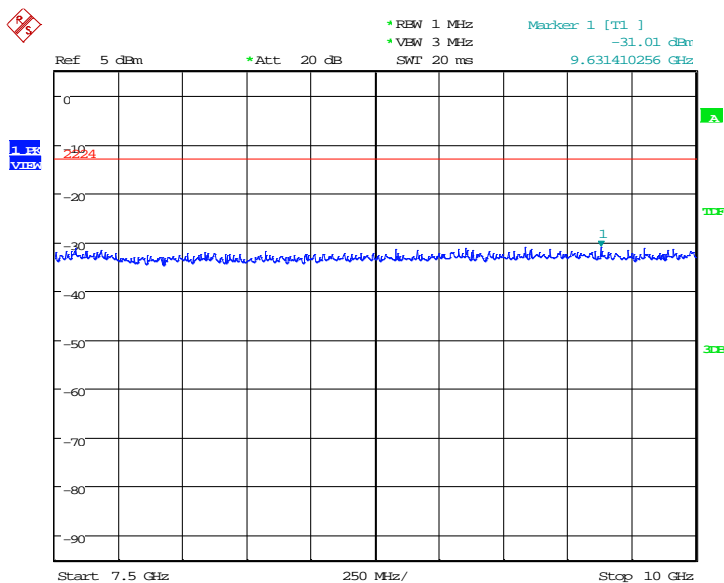
Spurious emission limit –13dBm.



Date: 17.DEC.2019 18:46:21

Channel 384: 7.5GHz – 10GHz

Spurious emission limit –13dBm.



Date: 17.DEC.2019 18:46:45

Note: Expanded measurement uncertainty is $U = 0.49\text{dB}(100\text{KHz}-2\text{GHz})/1.21\text{dB}(2\text{GHz}-26.5\text{GHz})$, $k = 1.96$

A.8 PEAK-TO-AVERAGE POWER RATIO

Reference

FCC: CFR Part 24.232, KDB971168 D01.

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

- a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
- b) Set resolution/measurement bandwidth \geq signal's occupied bandwidth;
- c) Set the number of counts to a value that stabilizes the measured CCDF curve;
- d) Set the measurement interval to 1 ms
- e) Record the maximum PAPR level associated with a probability of 0.1%

A.8.1 Measurement limit

not exceed 13 dB

A.8.2 Measurement results

Only worst case result is given below

CDMA800 BC0

| Channel | Frequency(MHz) | PAPR(dB) |
|---------|----------------|----------|
| 1013 | 824.70 | 7.55 |
| 384 | 836.52 | 6.49 |
| 777 | 848.31 | 7.95 |

CDMA1900 BC1

| Channel | Frequency(MHz) | PAPR(dB) |
|---------|----------------|----------|
| 25 | 1851.25 | 7.93 |
| 600 | 1880.00 | 8.08 |
| 1175 | 1908.75 | 7.62 |

CDMA800 BC10

| Channel | Frequency(MHz) | PAPR(dB) |
|---------|----------------|----------|
| 476 | 817.9 | 7.92 |
| 684 | 823.1 | 7.74 |

Note: Expanded measurement uncertainty is $U = 0.48$, $k = 2$

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

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