# FCC Part 22H & 24E
# Measurement and Test Report

**For**

**Shenzhen Ruifenghuizhi Technology Co., Ltd.**

**Room 607B, East Block, NanFang Building, Futian District, Shenzhen, China.**

**FCC ID: 2ABEYRF-V16**

| | |
|---|---|
| **FCC Rules:** | FCC Part 22H, FCC Part 24E |
| **Product Description:** | Mini GPS & SOS Communicator |
| **Tested Model:** | RF-V16 |
| **Report No.:** | STR13118314I-1 |
| **Tested Date:** | 2013-11-27 to 2013-12-09 |
| **Issued Date:** | 2013-12-11 |
| **Tested By:** | Susan Su / Engineer |
| **Reviewed By:** | Lahm Peng / EMC Manager |
| **Approved & Authorized By:** | Jandy so / PSQ Manager |

**Prepared By:**

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# 1. GENERAL INFORMATION

## 1.1 Product Description for Equipment Under Test (EUT)

**Client Information**

| | |
|---|---|
| Applicant: | Shenzhen Ruifenghuizhi Technology Co., Ltd. |
| Address of applicant: | Room 607B, East Block, NanFang Building, Futian District, Shenzhen, China. |
| Manufacturer: | Shenzhen Ruifenghuizhi Technology Co., Ltd. |
| Address of manufacturer: | Room 607B, East Block, NanFang Building, Futian District, Shenzhen, China. |

| **General Description of EUT** | |
|---|---|
| Product Name: | Mini GPS & SOS Communicator |
| Trade Name: | ReachFar |
| Model No.: | RF-V16 |
| Adding Model: | / |
| Hardware Version: | G19B-V1.0 |
| Software Version: | BPLGUInfoCustomAppSrcP_ MT6252_S01_MAUI_10A_W11_08_MP_V1 |
| IMEI: | 860084010196635 |
| Rated Voltage: | DC 3.7V Li-ion Battery (Model:603030) |
| Power Adapter Model: | HRS050050 (Input: AC100-240V; Output: DC5V, 500mA) |
| | |
| *Note: The test data is gathered from a production sample provided by the manufacturer.* | |

| **Technical Characteristics of EUT** | |
|---|---|
| Support Band: | GSM850/PCS1900 |
| GPRS Class: | Class 12 |
| Frequency range: | GSM/GPRS 850: 824~849MHz<br>GSM/GPRS 1900: 1850~1910MHz |
| Max. RF Power(Conducted): | GSM850: 32.49dBm<br>GSM1900: 30.52dBm |
| Max. RF Power(ERP/EIRP): | GSM850: 31.63dBm<br>GSM1900: 30.06dBm |
| Network Protocol: | GSM/GPRS |
| Modulation: | GMSK |
| Type of Emission: | GSM(GSM850): 260KGXW<br>GPRS(GSM850): 259KG7W<br>GSM(PCS1900): 275KGXW<br>GPRS(PCS1900): 259KG7W |
| Type of Antenna: | Integral Antenna |
| Antenna Gain: | GSM850: -1.0dBi<br>GSM1900: -2.0dBi |
| Device Category: | Portable Device |

## 1.2 Test Standards

The following report is prepared on behalf of the Shenzhen Ruifenghuizhi Technology Co., Ltd. in accordance with FCC Part 2 subpart J, FCC Part 22 subpart H and FCC Part 24 subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 2 subpart J, FCC Part 22 subpart H and FCC Part 24 subpart E of the Federal Communication Commissions rules.

***Maintenance of compliance*** is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

## 1.3 Test Methodology

All measurements contained in this report were conducted with TIA/EIA 603-C: 2004 and ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

## 1.4 Test Facility

- **FCC – Registration No.: 934118**
  Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 994117.

- **Industry Canada (IC) Registration No.: 11464A**
  The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

- **CNAS Registration No.: L4062**
  Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101)

## 1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

| **Test Mode List** | | |
|---|---|---|
| Test Mode | Description | Remark |
| TM1 | GSM 850 | Low, Middle, High Channels |
| TM2 | GPRS 850 | Low, Middle, High Channels |
| TM3 | GSM 1900 | Low, Middle, High Channels |
| TM4 | GPRS 1900 | Low, Middle, High Channels |

| **Testing Configure** | | | |
|---|---|---|---|
| Support Band | Support Standard | Channel Frequency | Channel Number |
| GSM 850 | GSM/GPRS | 824.2 MHz | 128 |
| | | 836.6 MHz | 190 |
| | | 848.8 MHz | 251 |
| PCS 1900 | GSM/GPRS | 1850.2 MHz | 512 |
| | | 1880.0 MHz | 661 |
| | | 1909.8 MHz | 810 |
| Note: the transmitter has been tested on the communications mode of GSM, GPRS compliance test and record the worst case. | | | |

| **Special Cable List and Details** | | | |
|---|---|---|---|
| Cable Description | Length (m) | Shielded/Unshielded | With / Without Ferrite |
| USB Cable | 0.8 | Unshielded | Without Ferrite |

| **Auxiliary Equipment List and Details** | | | |
|---|---|---|---|
| Description | Manufacturer | Model | Serial Number |
| / | / | / | / |

# 2. SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test Item | Result |
|---|---|---|
| § 1.1307, § 2.1093 | RF Exposure | Compliant |
| § 22.913 (a), § 24.232 (c) | RF Output Power | Compliant |
| § 22.917 (b), § 24.238 (b) | Emission Bandwidth | Compliant |
| § 22.917 (a), § 24.238 (a) | Spurious Emissions at Antenna Terminal | Compliant |
| § 22.917 (a), § 24.238 (a) | Spurious Radiation Emissions | Compliant |
| § 22.917 (a), § 24.238 (a) | Out of Band Emissions | Compliant |
| § 22.355, § 24.235 | Frequency Stability | Compliant |

# 3. RF Exposure

## 3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

## 3.2 Test Result

This product complied with the requirement of the RF exposure, please see the SAR report.

# 4. RF Output Power

## 4.1 Standard Applicable

According to §22.913(a)(2), The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

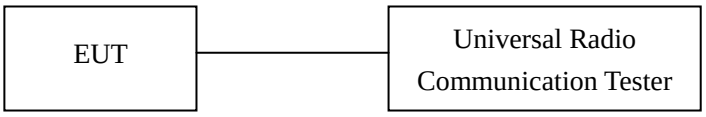
According to §24.232 (c), no any case may the peak output power of mobile or portable station transmitter exceed 2 Watt EIRP.

## 4.2 Test Equipment List and Details

| Description | Manufacturer | Model | Serial Number | Cal. Date | Due. Date |
|---|---|---|---|---|---|
| Spectrum Analyzer | Rohde & Schwarz | FSP | 836079/035 | 2013-05-07 | 2014-05-06 |
| Pre-amplifier | Agilent | 8447F | 3113A06717 | 2013-05-07 | 2014-05-06 |
| Pre-amplifier | Compliance Direction | PAP-0118 | 24002 | 2013-05-07 | 2014-05-06 |
| Trilog Broadband Antenna | SCHWARZBECK | VULB9163 | 9163-333 | 2013-04-20 | 2014-04-19 |
| Horn Antenna | ETS | 3117 | 00086197 | 2013-04-20 | 2014-04-19 |
| Universal Radio Communication Tester | Rohde & Schwarz | CMU200 | 112012 | 2013-05-07 | 2014-05-06 |
| Signal Generator | R&S | SMR20 | 100047 | 2013-05-07 | 2014-05-06 |

## 4.3 Test Procedure

Conducted output power test method:




Radiated power test method:

1.The setup of EUT is according with per TIA/EIA Standard 603C and ANSI C63.4-2003 measurement procedure.

2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.

4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

## 4.4 Environmental Conditions

| | |
|---|---|
| Temperature: | 24 °C |
| Relative Humidity: | 54% |
| ATM Pressure: | 1011 mbar |

## 4.5 Summary of Test Results/Plots

Radiated Power

ERP For GSM Mode GSM850

| Frequency | Substitude SG | Height | Table | Polar | Cable loss | Antenna Gain | Corrected Ampl. | FCC Part 22H Limit |
|---|---|---|---|---|---|---|---|---|
| MHz | dBm | Meter | Degree | H / V | dB | dB | dBm | dBm |
| Low Channel | | | | | | | | |
| 824.2 | 31.08 | 1.5 | 0 | H | 1.5 | 0 | 29.58 | 38.45 |
| 824.2 | 33.13 | 1.5 | 0 | V | 1.5 | 0 | 31.63 | 38.45 |
| Middle Channel | | | | | | | | |
| 836.6 | 28.64 | 1.5 | 0 | H | 1.5 | 0 | 28.14 | 38.45 |
| 836.6 | 31.69 | 1.5 | 0 | V | 1.5 | 0 | 30.19 | 38.45 |
| High Channel | | | | | | | | |
| 848.8 | 29.46 | 1.5 | 0 | H | 1.5 | 0 | 27.96 | 38.45 |
| 848.8 | 32.13 | 1.5 | 0 | V | 1.5 | 0 | 30.63 | 38.45 |

EIRP For GSM Mode PCS1900

| Frequency | Substitude SG | Height | Table | Polar | Cable loss | Antenna Gain | Corrected Ampl. | FCC Part 24E Limit |
|---|---|---|---|---|---|---|---|---|
| MHz | dBm | Meter | Degree | H / V | dB | dB | dBm | dBm |
| Low Channel | | | | | | | | |
| 1850.2 | 21.57 | 1.5 | 0 | H | 1.9 | 7.7 | 27.37 | 33 |
| 1850.2 | 24.26 | 1.5 | 0 | V | 1.9 | 7.7 | 30.06 | 33 |
| Middle Channel | | | | | | | | |
| 1880.0 | 20.74 | 1.5 | 0 | H | 1.9 | 7.7 | 26.54 | 33 |
| 1880.0 | 23.52 | 1.5 | 0 | V | 1.9 | 7.7 | 29.32 | 33 |
| High Channel | | | | | | | | |
| 1909.8 | 19.88 | 1.5 | 0 | H | 1.9 | 7.7 | 25.68 | 33 |
| 1909.8 | 22.32 | 1.5 | 0 | V | 1.9 | 7.7 | 28.12 | 33 |

ERP For GPRS Mode GSM850

| Frequency | Substitude SG | Height | Table | Polar | Cable loss | Antenna Gain | Corrected Ampl. | FCC Part 22H Limit |
|---|---|---|---|---|---|---|---|---|
| MHz | dBm | Meter | Degree | H / V | dB | dB | dBm | dBm |
| Low Channel | | | | | | | | |
| 824.2 | 28.95 | 1.5 | 0 | H | 1.5 | 0 | 27.45 | 38.45 |
| 824.2 | 32.35 | 1.5 | 0 | V | 1.5 | 0 | 30.85 | 38.45 |
| Middle Channel | | | | | | | | |
| 836.6 | 28.48 | 1.5 | 0 | H | 1.5 | 0 | 26.98 | 38.45 |
| 836.6 | 31.50 | 1.5 | 0 | V | 1.5 | 0 | 30.00 | 38.45 |
| High Channel | | | | | | | | |
| 848.8 | 28.46 | 1.5 | 0 | H | 1.5 | 0 | 26.96 | 38.45 |
| 848.8 | 31.98 | 1.5 | 0 | V | 1.5 | 0 | 30.48 | 38.45 |

EIRP For GPRS Mode PCS1900

| Frequency | Substitude SG | Height | Table | Polar | Cable loss | Antenna Gain | Corrected Ampl. | FCC Part 24E Limit |
|---|---|---|---|---|---|---|---|---|
| MHz | dBm | Meter | Degree | H / V | dB | dB | dBm | dBm |
| Low Channel | | | | | | | | |
| 1850.2 | 20.89 | 1.5 | 0 | H | 1.9 | 7.7 | 26.69 | 33 |
| 1850.2 | 23.76 | 1.5 | 0 | V | 1.9 | 7.7 | 29.56 | 33 |
| Middle Channel | | | | | | | | |
| 1880.0 | 18.07 | 1.5 | 0 | H | 1.9 | 7.7 | 25.89 | 33 |
| 1880.0 | 20.09 | 1.5 | 0 | V | 1.9 | 7.7 | 28.73 | 33 |
| High Channel | | | | | | | | |
| 1909.8 | 18.64 | 1.5 | 0 | H | 1.9 | 7.7 | 24.44 | 33 |
| 1909.8 | 21.37 | 1.5 | 0 | V | 1.9 | 7.7 | 27.17 | 33 |

Max. Conducted Output Power

For Cellular Band

| Test Mode | Channel | Frequency (MHz) | Output Power (dBm) | FCC Part 22.913 Limit (dBm) |
|---|---|---|---|---|
| GSM850 | Low Channel | 824.2 | 32.49 | 38.45 |
| | Middle Channel | 836.6 | 32.47 | 38.45 |
| | High Channel | 848.8 | 32.41 | 38.45 |
| PCS1900 | Low Channel | 1850.2 | 30.52 | 33 |
| | Middle Channel | 1880.0 | 30.25 | 33 |
| | High Channel | 1909.8 | 29.81 | 33 |

For GPRS Mode Conducted peak output power

| Band | Channel | Frequency (MHz) | Output Power(dBm) | | | |
|---|---|---|---|---|---|---|
| | | | Slot 1 | Slot 2 | Slot 3 | Slot 4 |
| GSM850 | 128 | 824.2 | 32.62 | 31.98 | 30.37 | 29.22 |
| | 190 | 836.6 | 32.60 | 31.94 | 30.30 | 29.15 |
| | 251 | 848.8 | 32.56 | 31.90 | 30.23 | 29.08 |
| PCS1900 | 512 | 1850.2 | 30.59 | 30.02 | 28.38 | 27.17 |
| | 661 | 1880.0 | 30.36 | 29.66 | 27.93 | 26.78 |
| | 810 | 1909.8 | 29.86 | 29.12 | 27.25 | 26.17 |

# 5. Emission Bandwidth

## 5.1 Standard Applicable

According to §22.917(b), 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.

According to §24.238(b), 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.

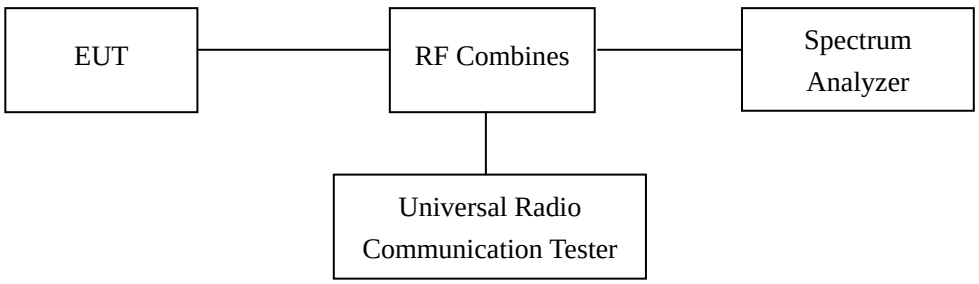
## 5.2 Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Cal. Date | Due. Date |
|---|---|---|---|---|---|
| Aglient | Spectrum Analyzer | E4402B | US41192821 | 2013-05-07 | 2014-05-06 |
| Rohde & Schwarz | Universal Radio Communication Tester | CMU200 | 112012 | 2013-05-07 | 2014-05-06 |

## 5.3 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the 26dB bandwidth was recorded.

Test Configuration for the emission bandwidth testing:




## 5.4 Environmental Conditions

| | |
|---|---|
| Temperature: | 25 °C |
| Relative Humidity: | 54% |
| ATM Pressure: | 1011 mbar |

## 5.5 Summary of Test Results/Plots

For Cellular Band

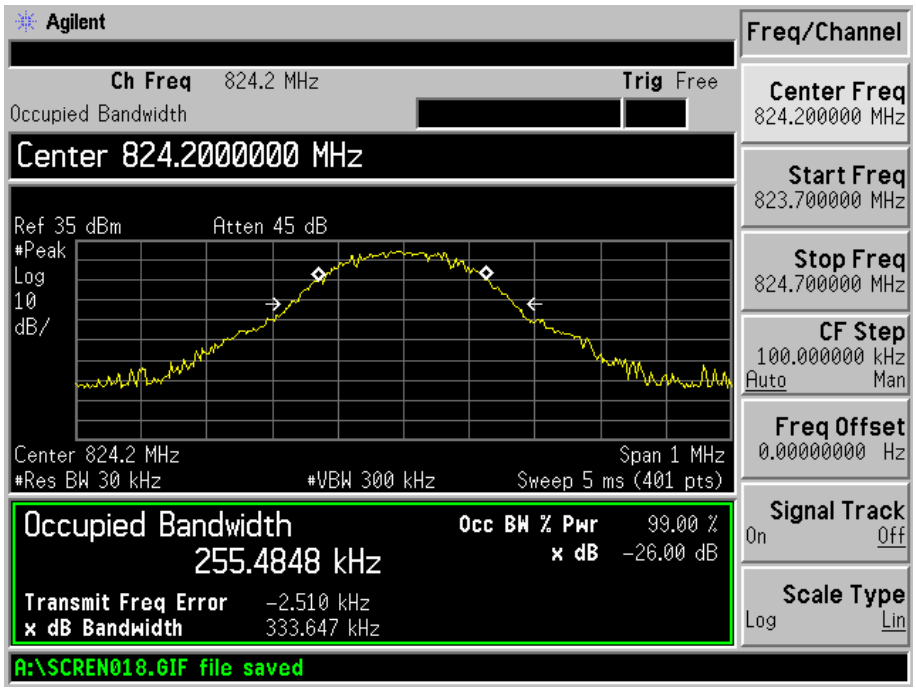
| Test Mode | Channel | Frequency (MHz) | 99% Emission Bandwidth (kHz) | 26 dB Emission Bandwidth (kHz) |
|---|---|---|---|---|
| GSM | 128 | 824.2 | 255.4848 | 333.647 |
| | 190 | 836.6 | 256.1707 | 340.556 |
| | 251 | 848.8 | 259.9119 | 328.917 |
| GPRS | 128 | 824.2 | 259.4392 | 333.744 |
| | 190 | 836.6 | 253.3283 | 338.358 |
| | 251 | 848.8 | 252.1330 | 339.634 |

For PCS Band

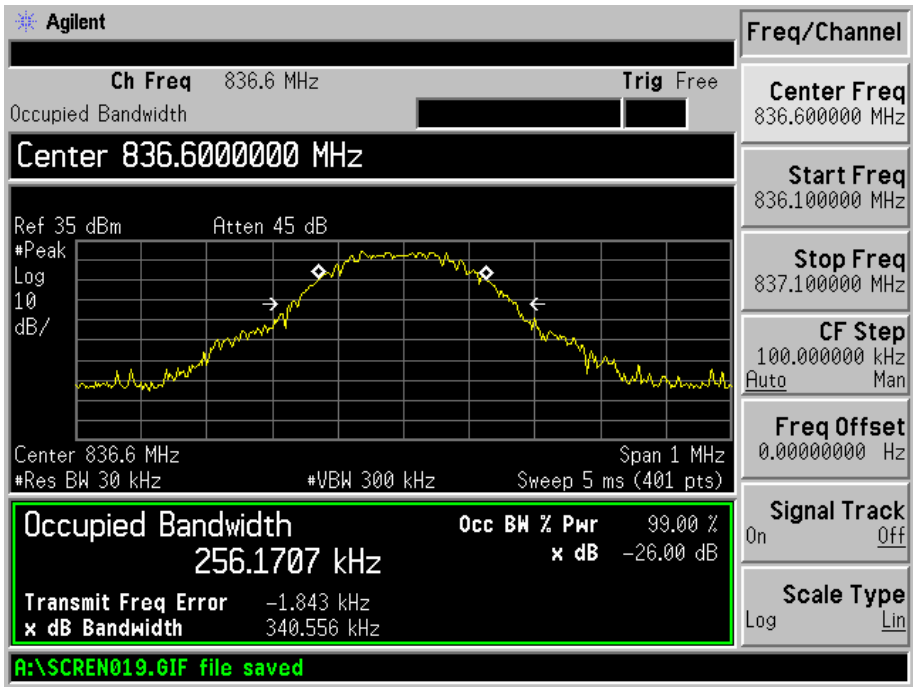
| Test Mode | Channel | Frequency (MHz) | 99% Emission Bandwidth (kHz) | 26 dB Emission Bandwidth (kHz) |
|---|---|---|---|---|
| GSM | 512 | 1850.2 | 262.5044 | 338.956 |
| | 661 | 1880.0 | 272.9586 | 396.782 |
| | 810 | 1909.8 | 274.6029 | 397.557 |
| GPRS | 512 | 1850.2 | 259.3355 | 327.174 |
| | 661 | 1880.0 | 255.7174 | 342.343 |
| | 810 | 1909.8 | 258.2467 | 339.846 |

*Please refer to the following test plots:*

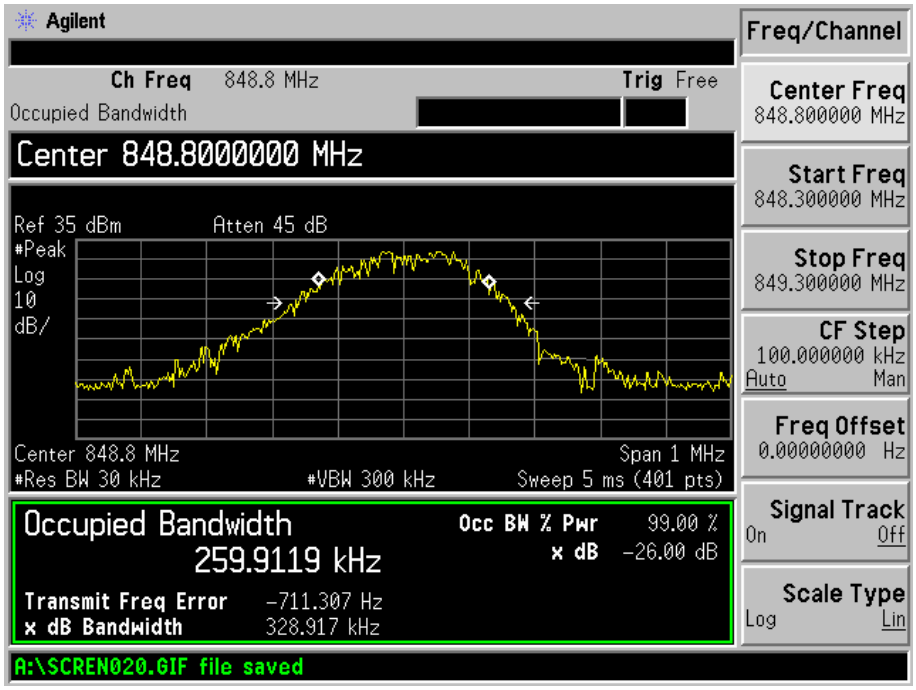
For Cellular Band
GSM Low Channel



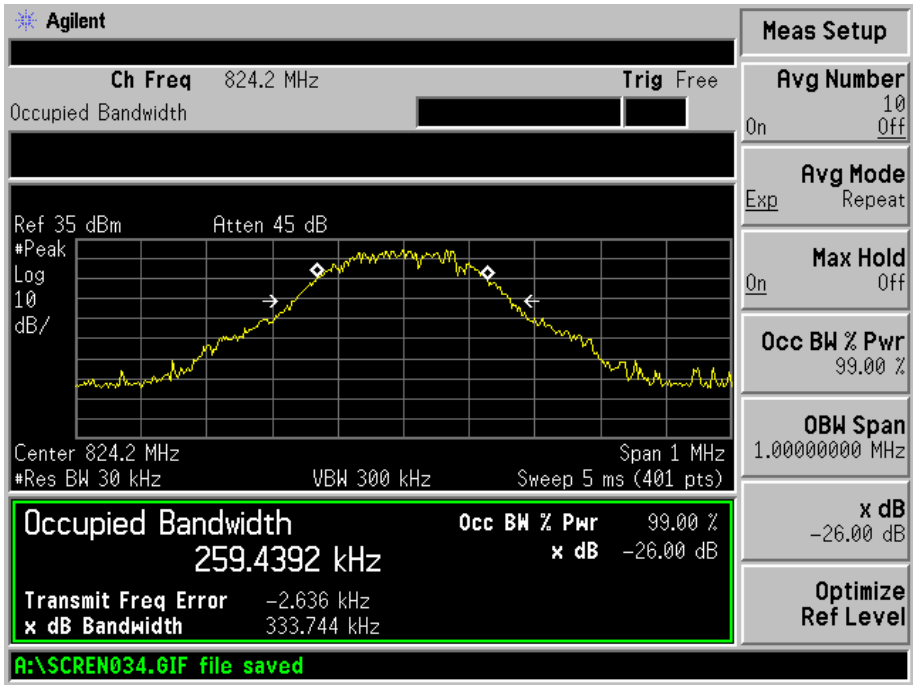

GSM Middle Channel



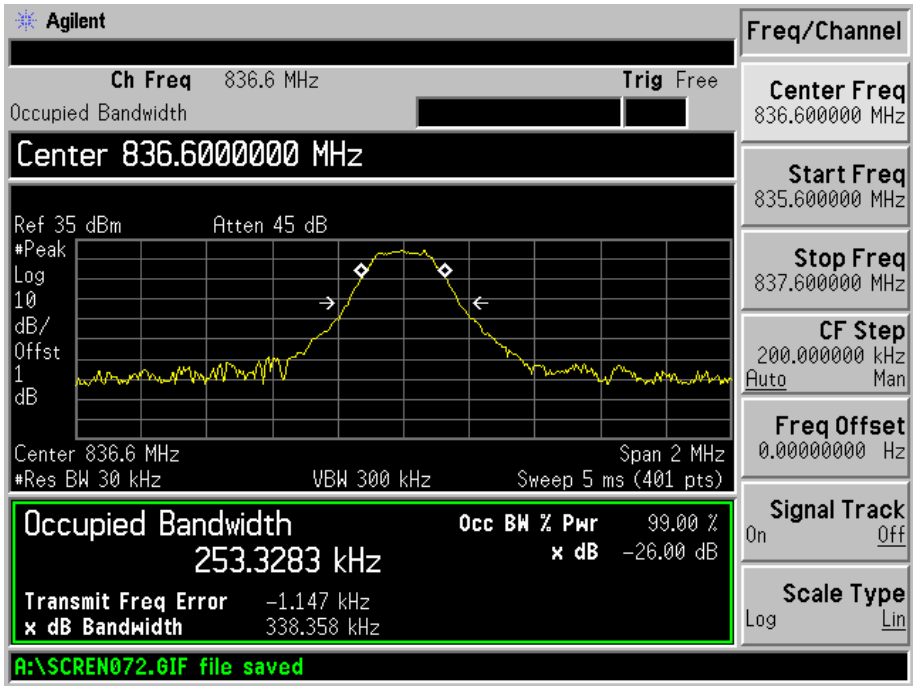
GSM High channel



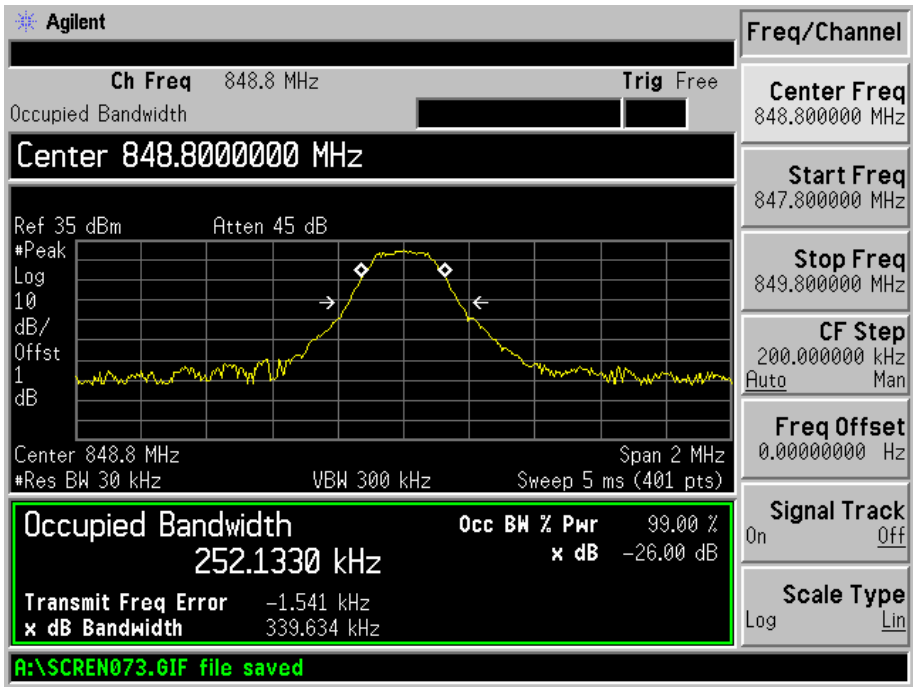

GPRS Low Channel



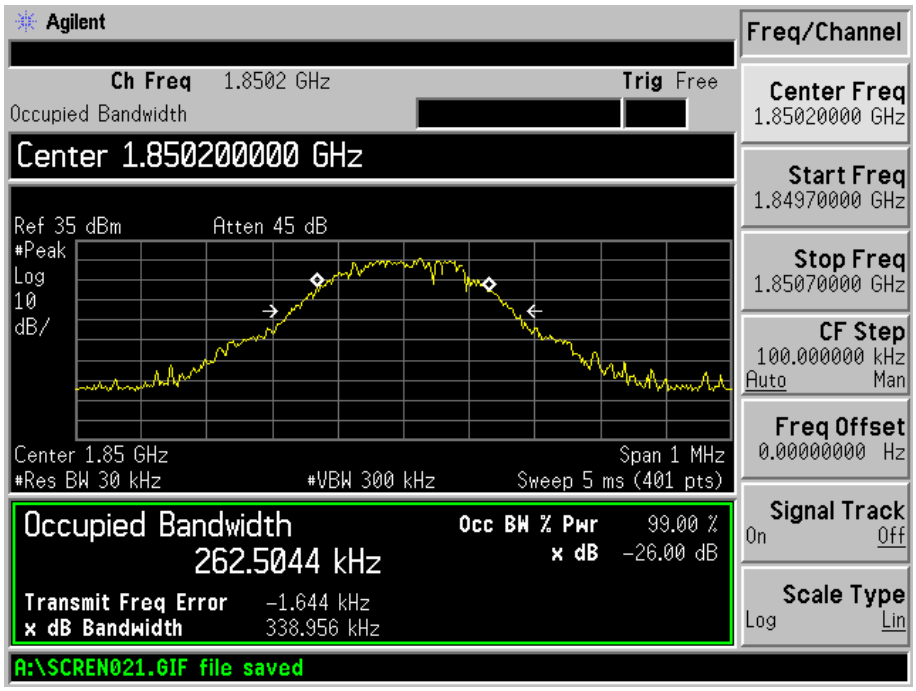
GPRS Middle Channel



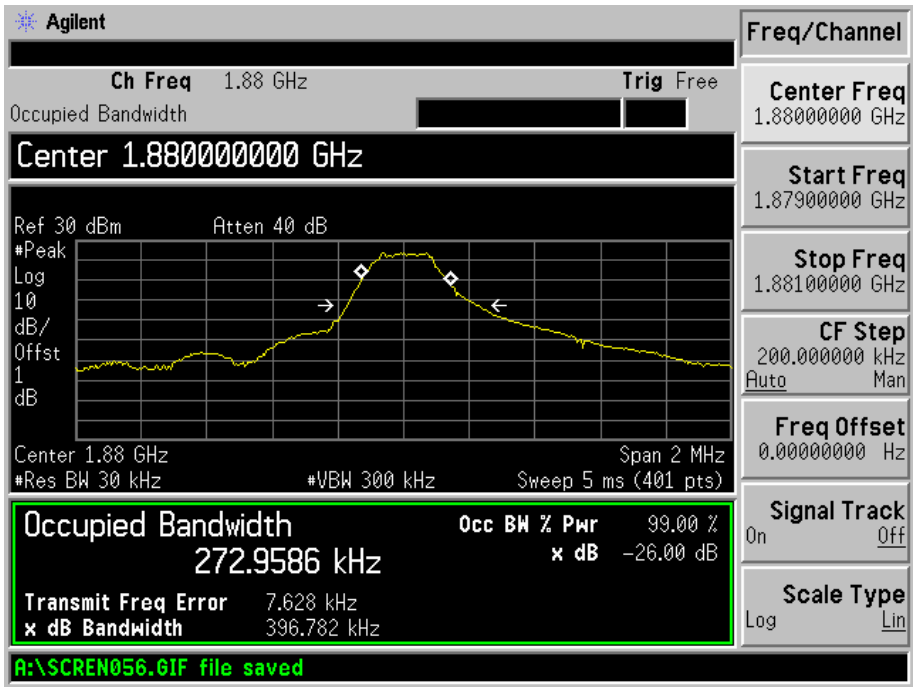

GPRS High Channel



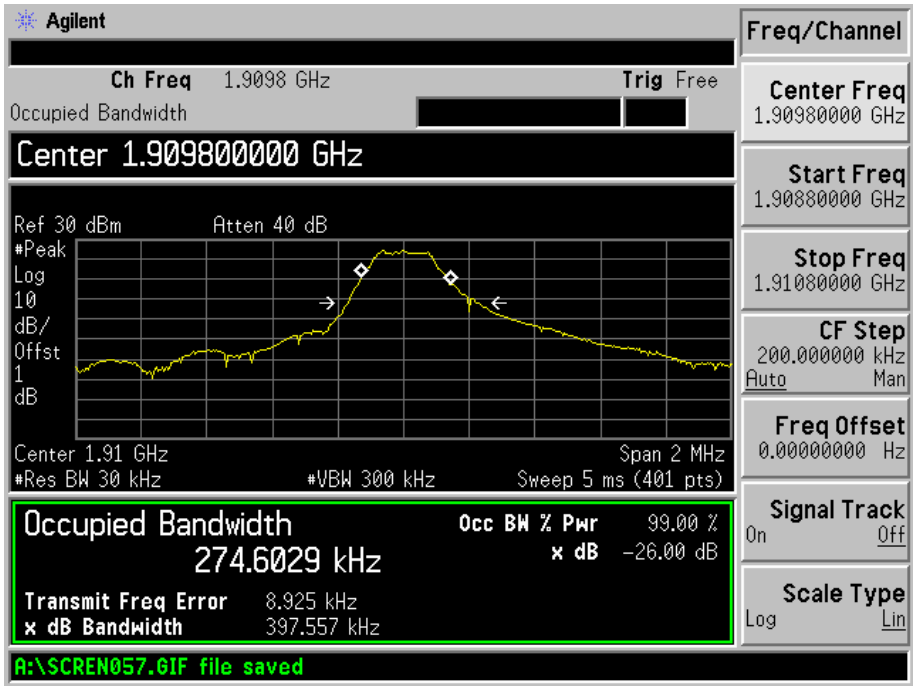
For PCS Band
GSM Low Channel



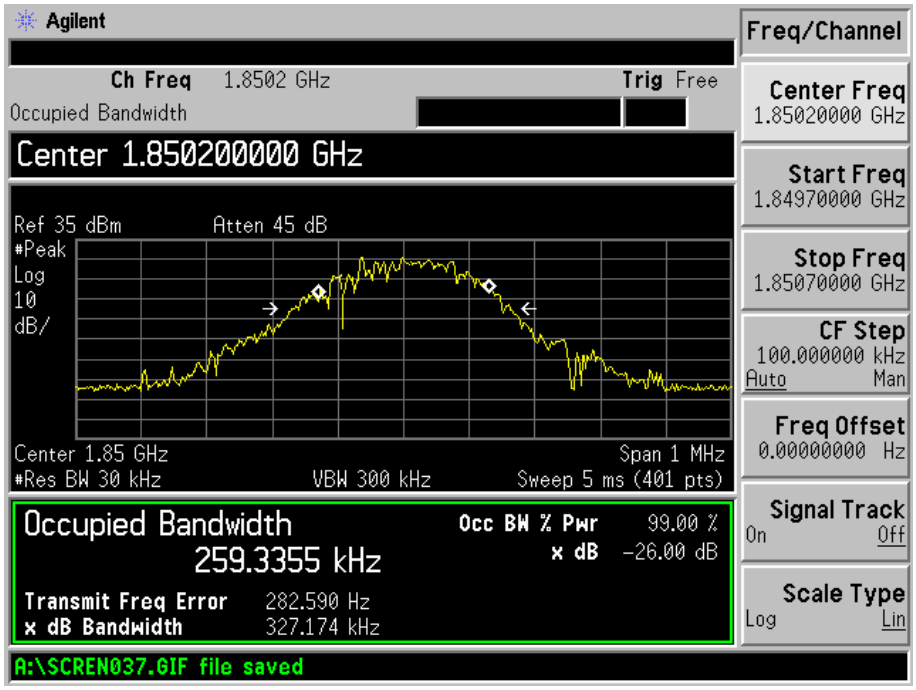

GSM Middle Channel



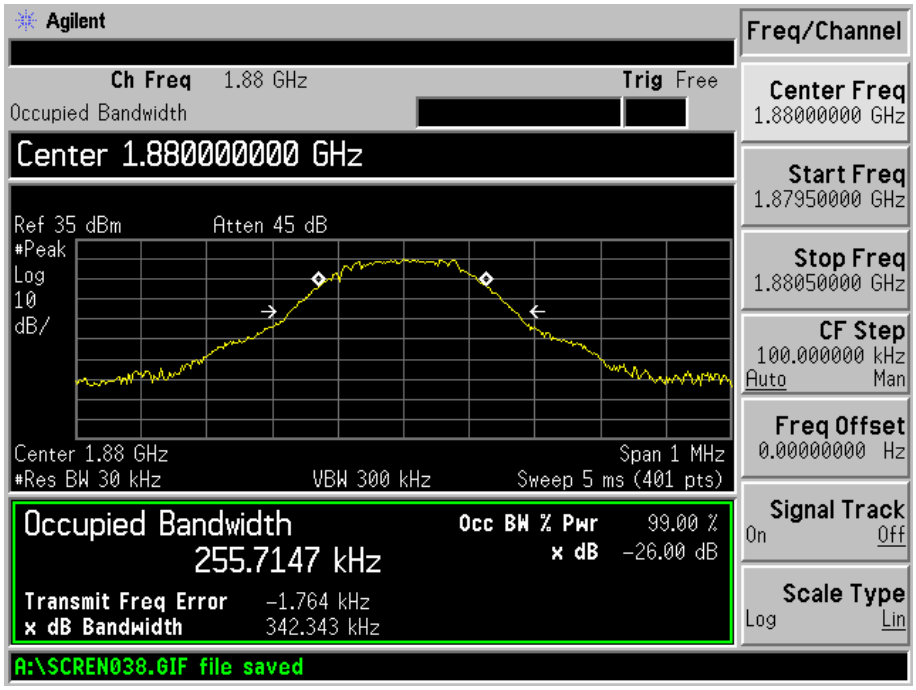
GSM High channel



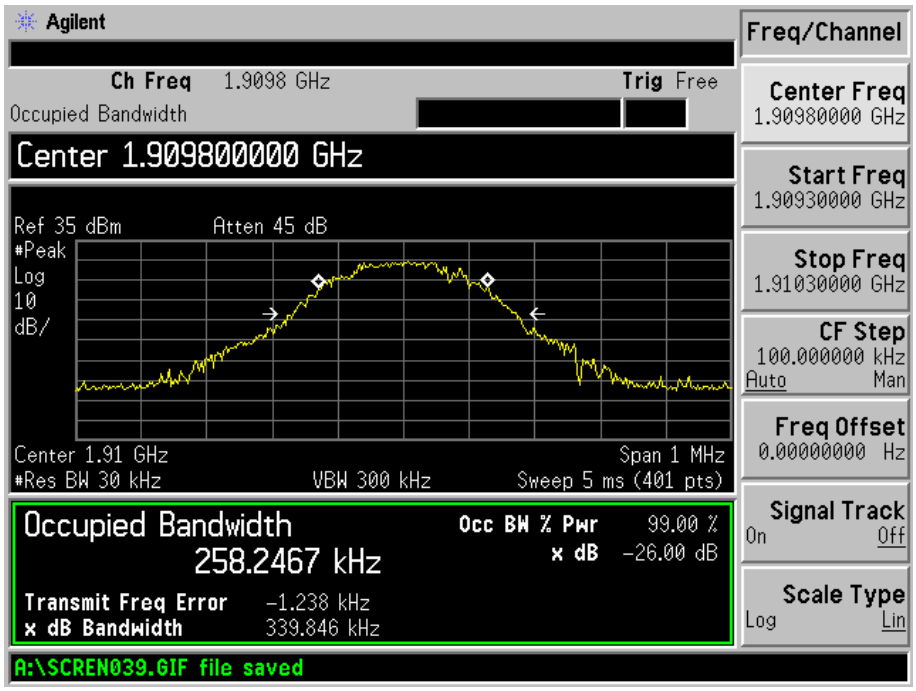

GPRS Low Channel



GPRS Middle Channel




GPRS High Channel



# 6. Out of Band Emissions at Antenna Terminal

## 6.1 Standard Applicable

According to §22.917(a), the power of any emissions 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.

According to §24.238(a), the power of any emissions 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.

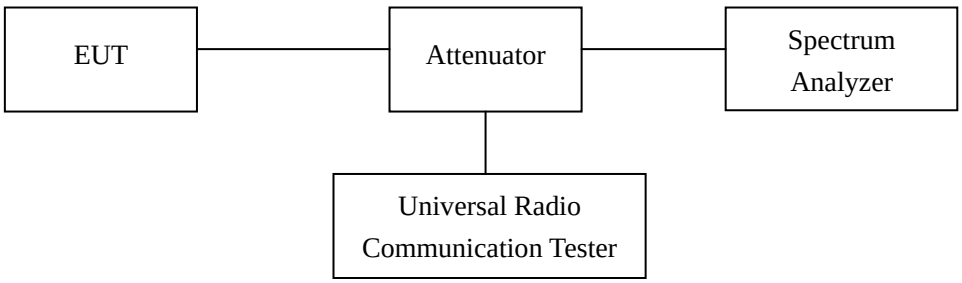
## 6.2 Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Cal. Date | Due. Date |
|---|---|---|---|---|---|
| Aglient | Spectrum Analyzer | E4402B | US41192821 | 2013-05-07 | 2014-05-06 |
| Rohde & Schwarz | Spectrum Analyzer | FSP | 836079/035 | 2013-05-07 | 2014-05-06 |
| Rohde & Schwarz | Universal Radio Communication Tester | CMU200 | 112012 | 2013-05-07 | 2014-05-06 |

## 6.3 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to $10^{th}$ harmonic.

Test Configuration for the out of band emissions testing:



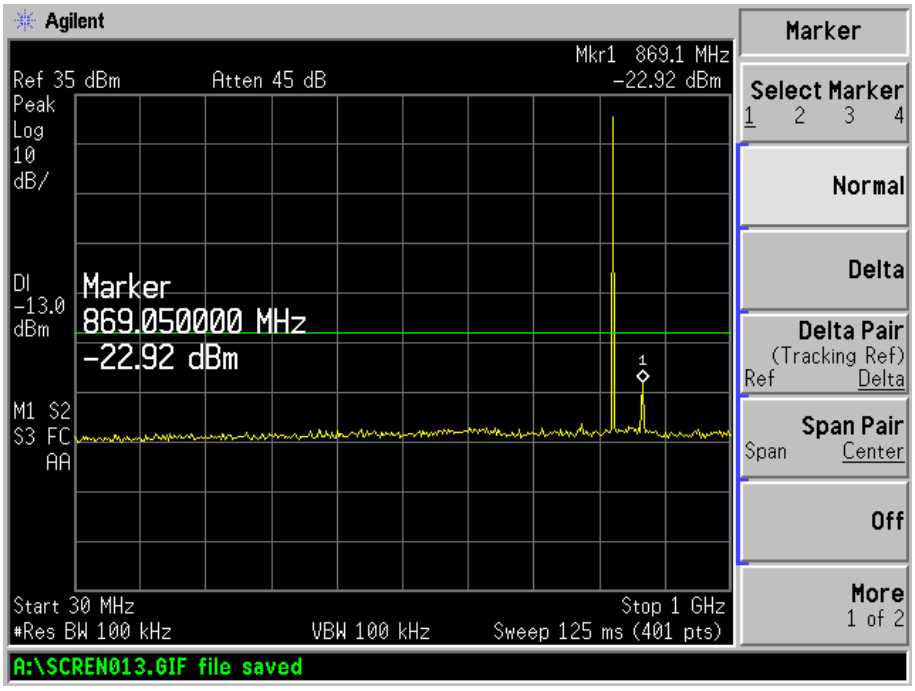

## 6.4 Environmental Conditions

| | |
|---|---|
| Temperature: | 25 °C |
| Relative Humidity: | 53% |
| ATM Pressure: | 1018 mbar |

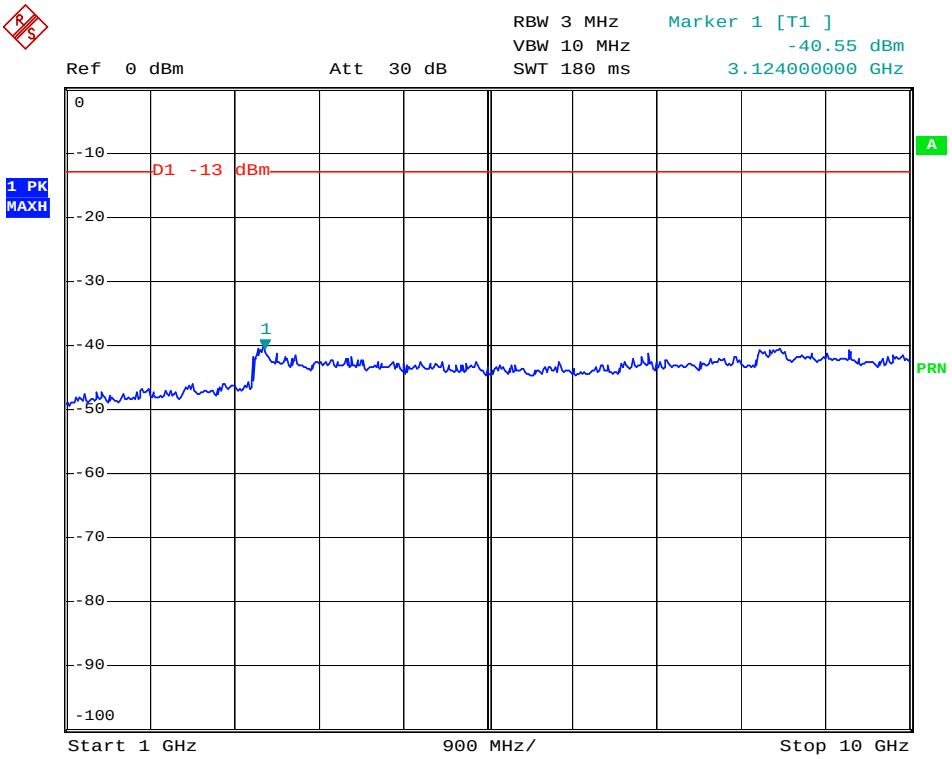
## 6.5 Summary of Test Results/Plots

*Please refer to the following test plots* For Cellular Band

GSM Low Channel 30MHz to 1GHz

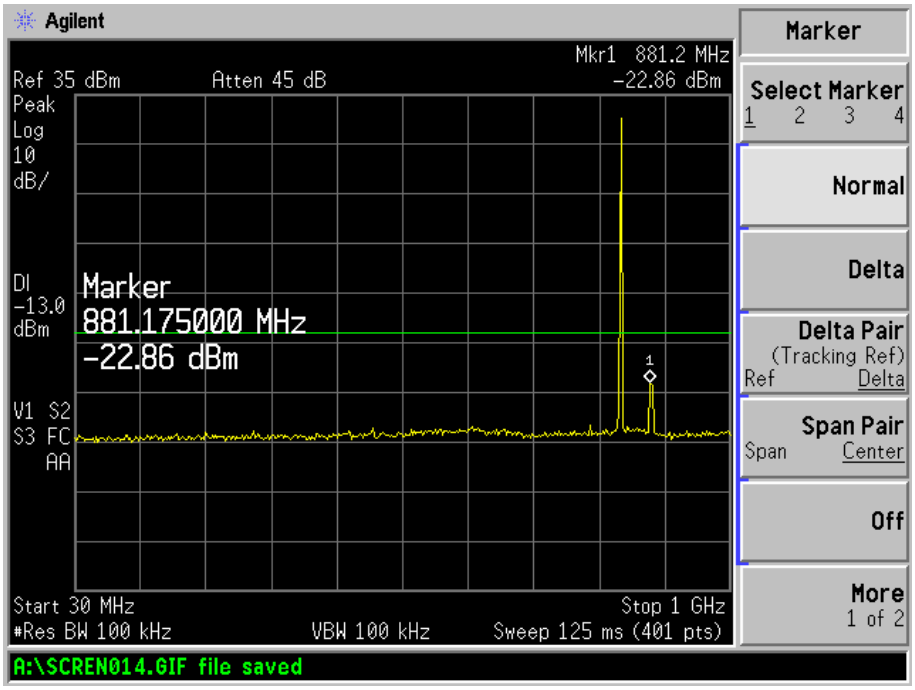



Above 1GHz

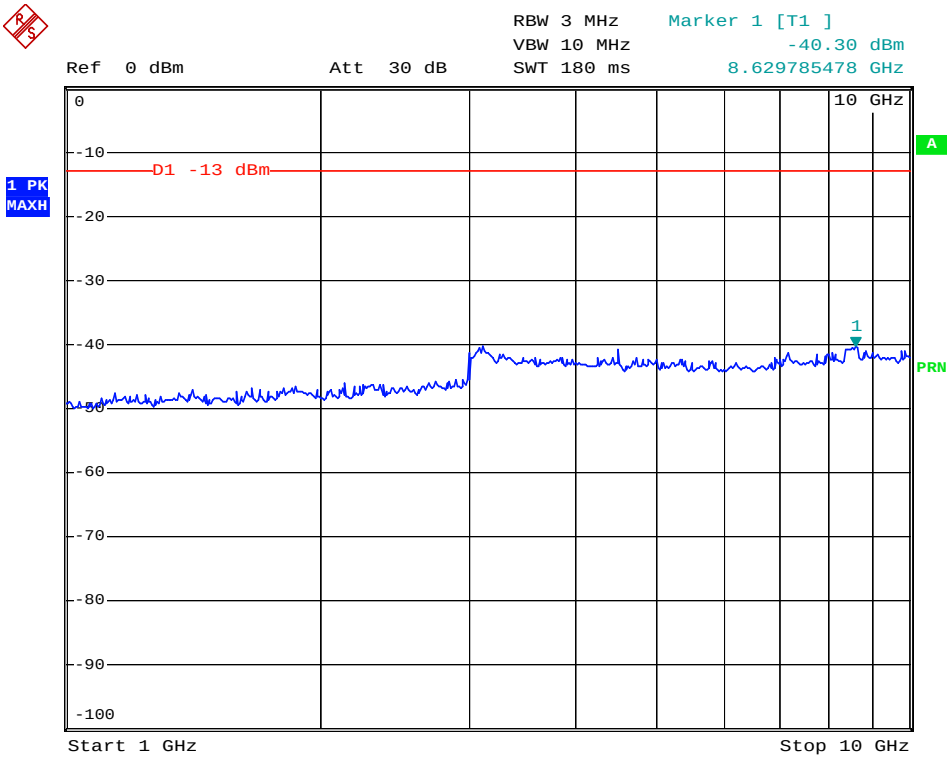


GSM Middle Channel

30MHz to 1GHz

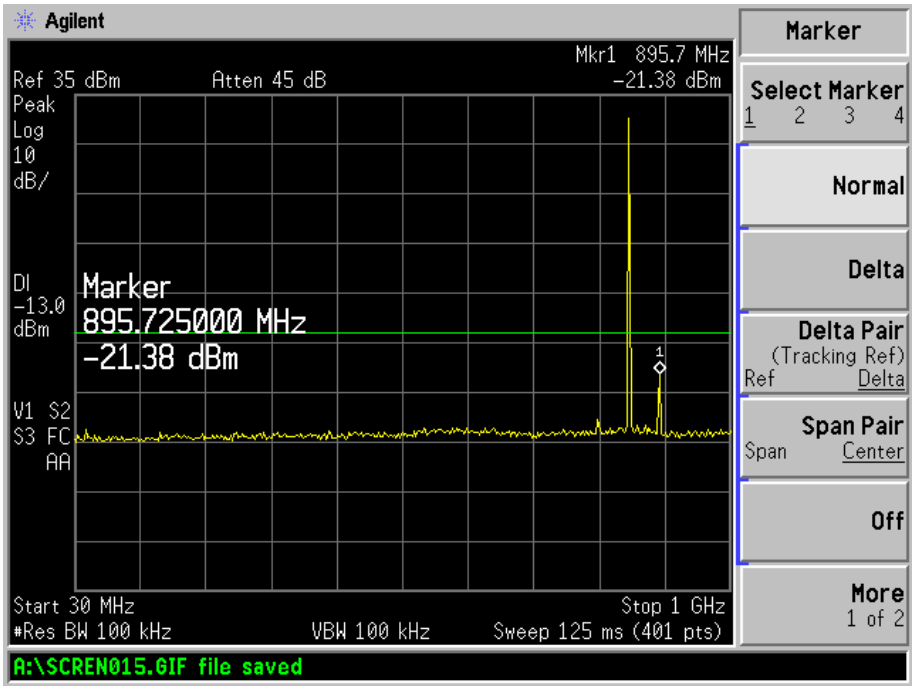



Above 1GHz

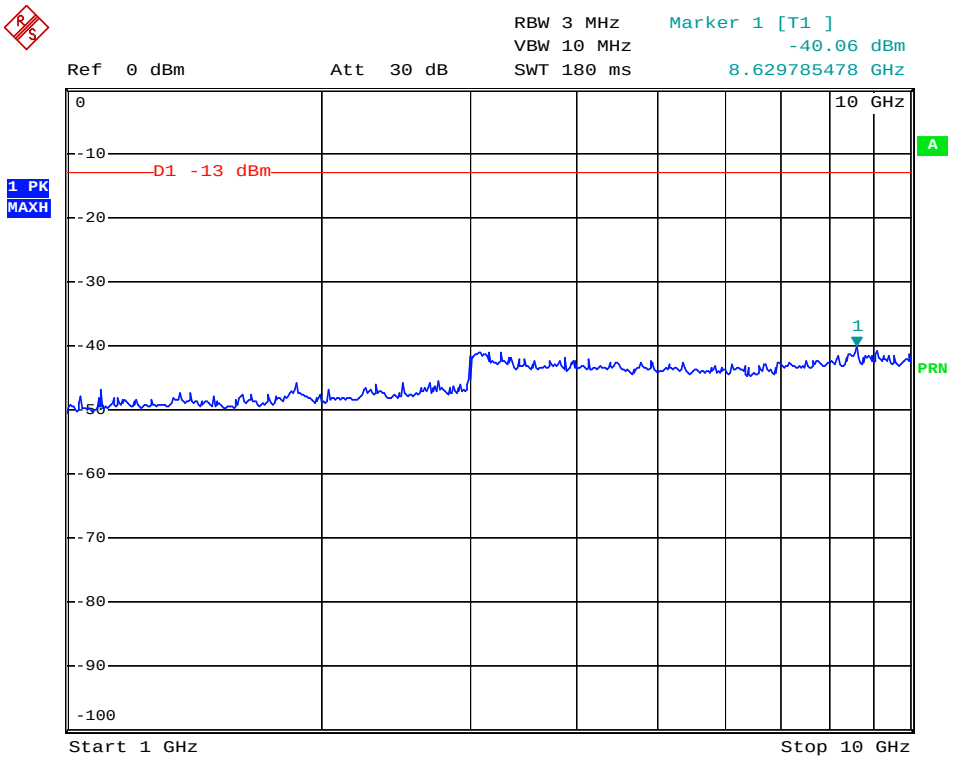


GSM High Channel

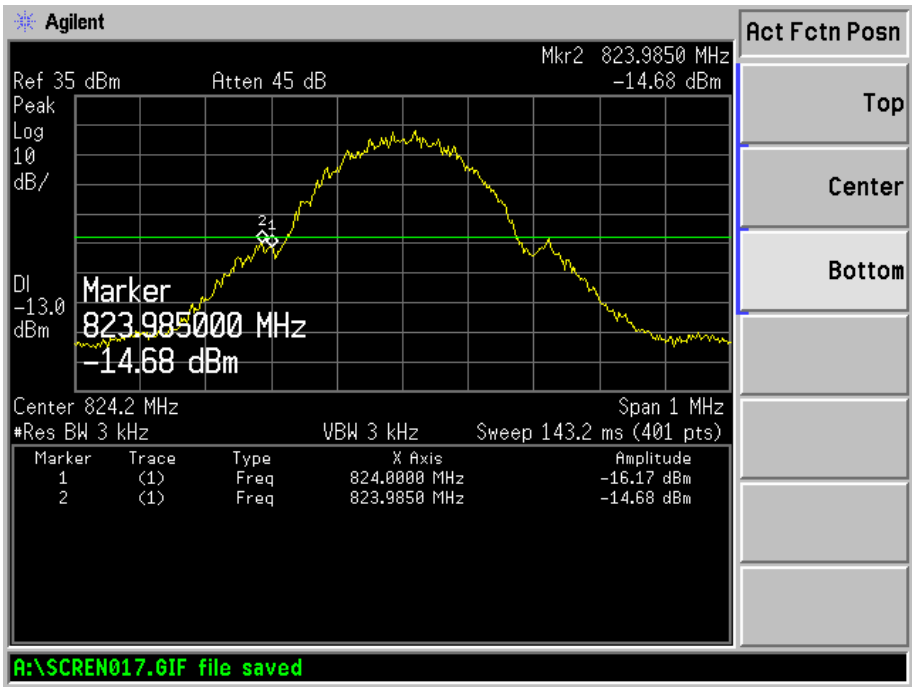
30MHz to 1GHz



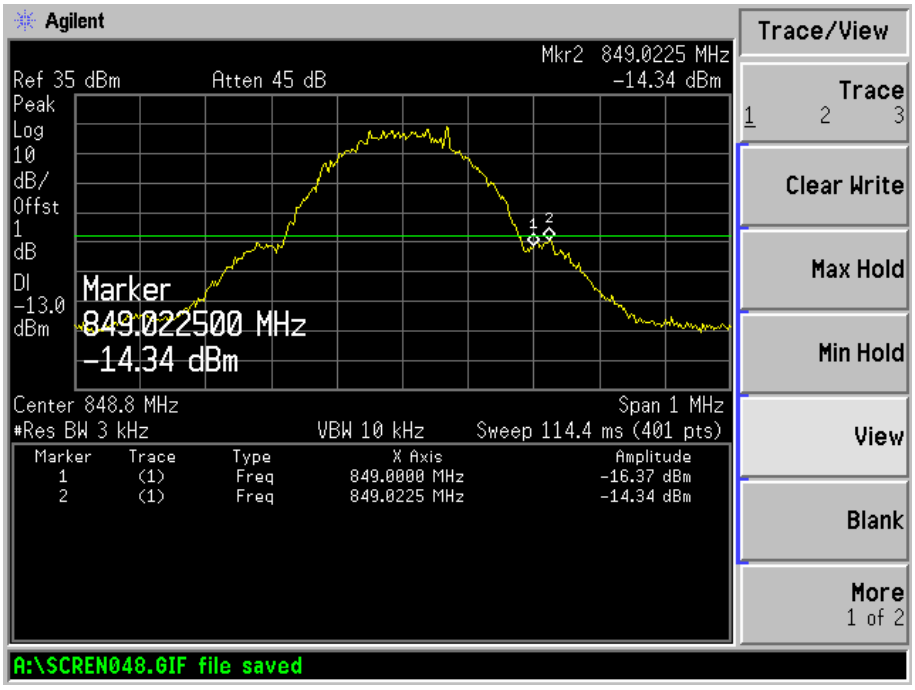

Above 1GHz



GSM Low Band Emission

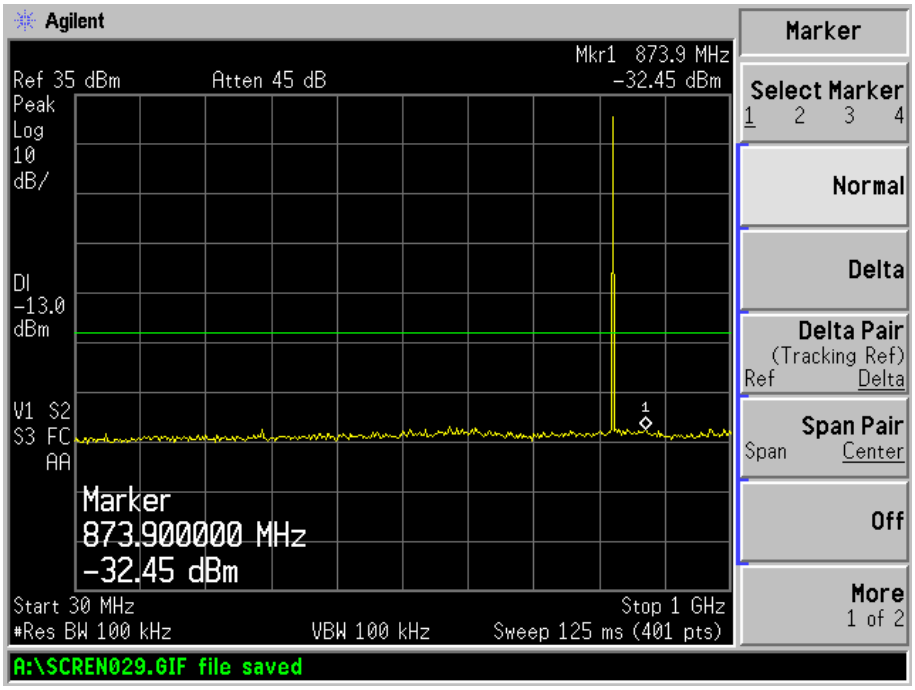



GSM High Band Emission

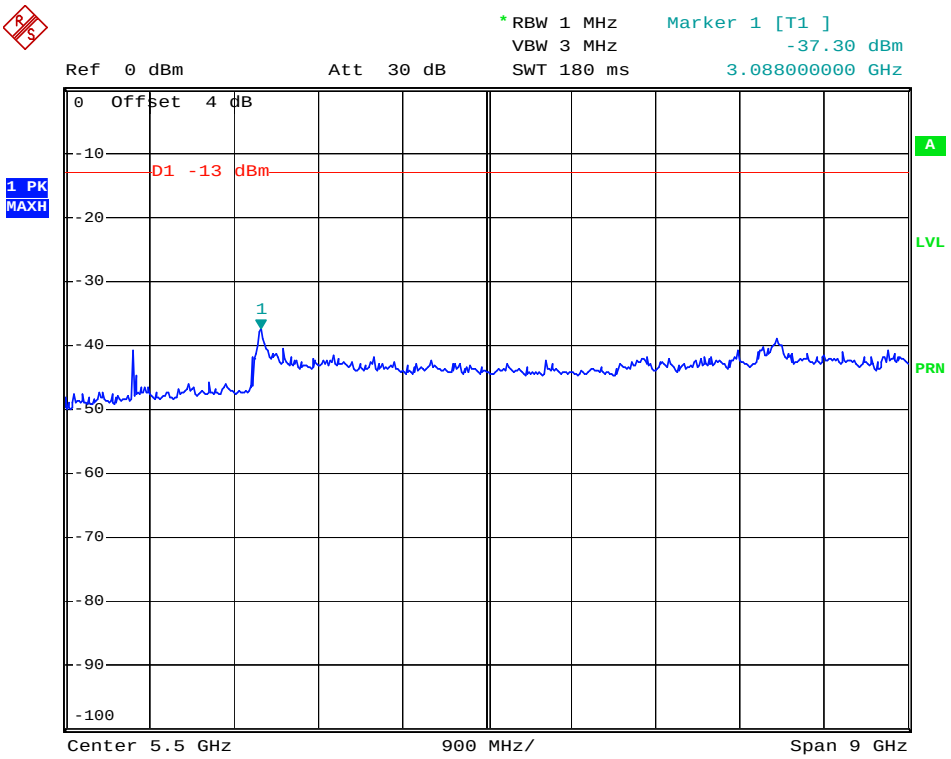


GPRS Low Channel

30MHz to 1GHz

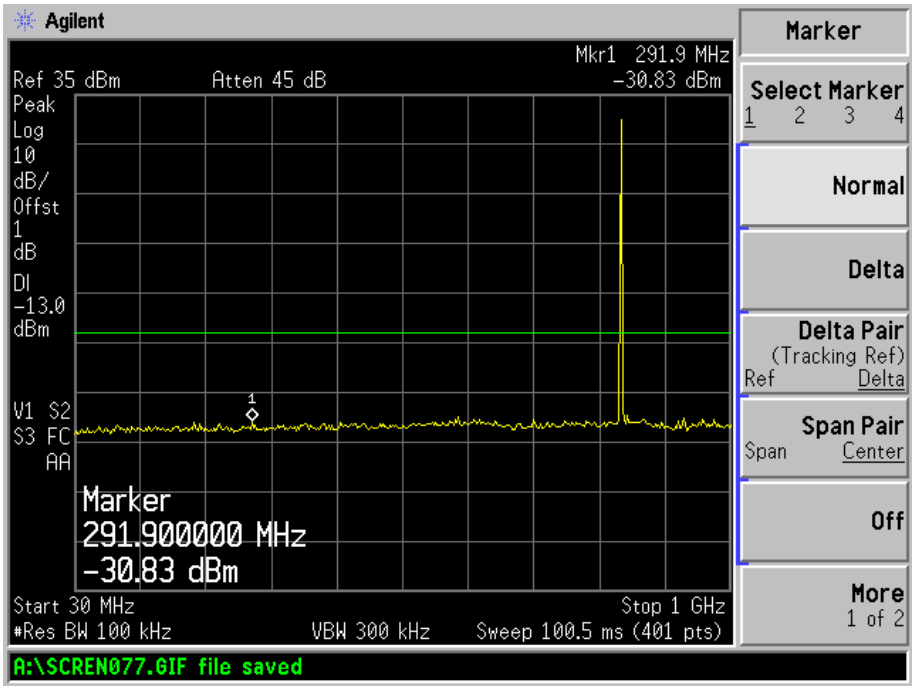



Above 1GHz

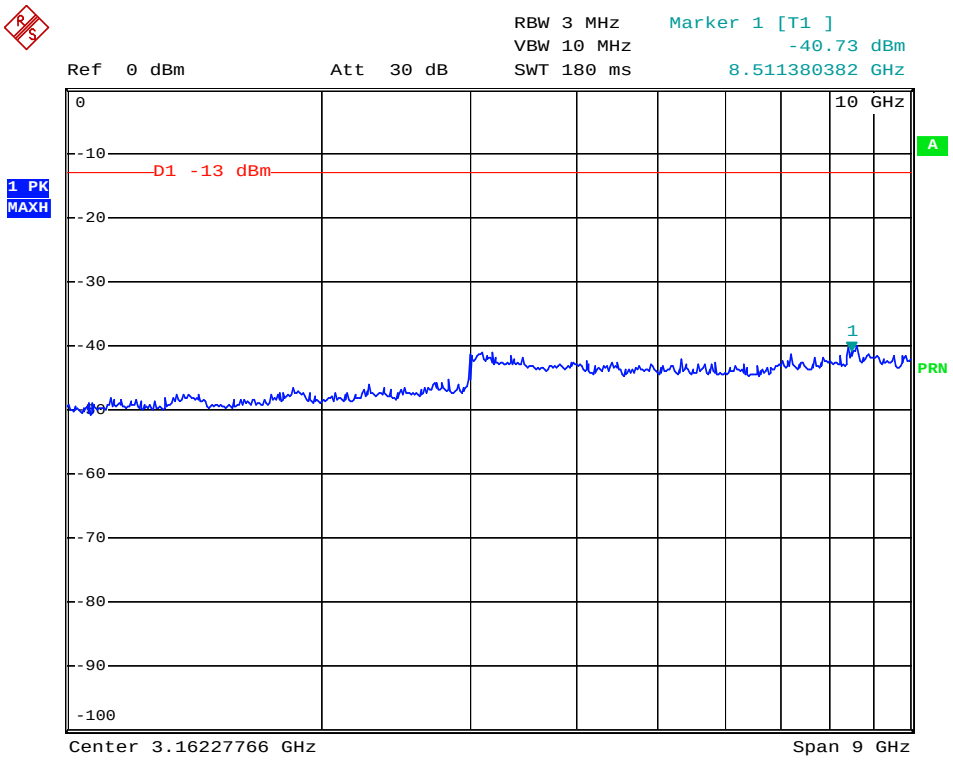


GPRS Middle Channel

30MHz to 1GHz

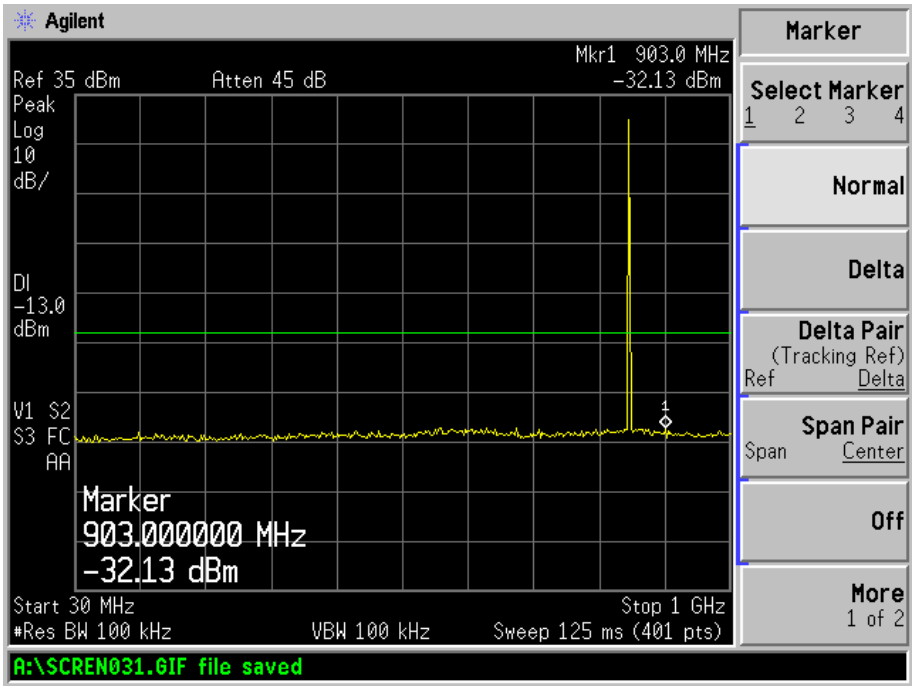



Above 1GHz

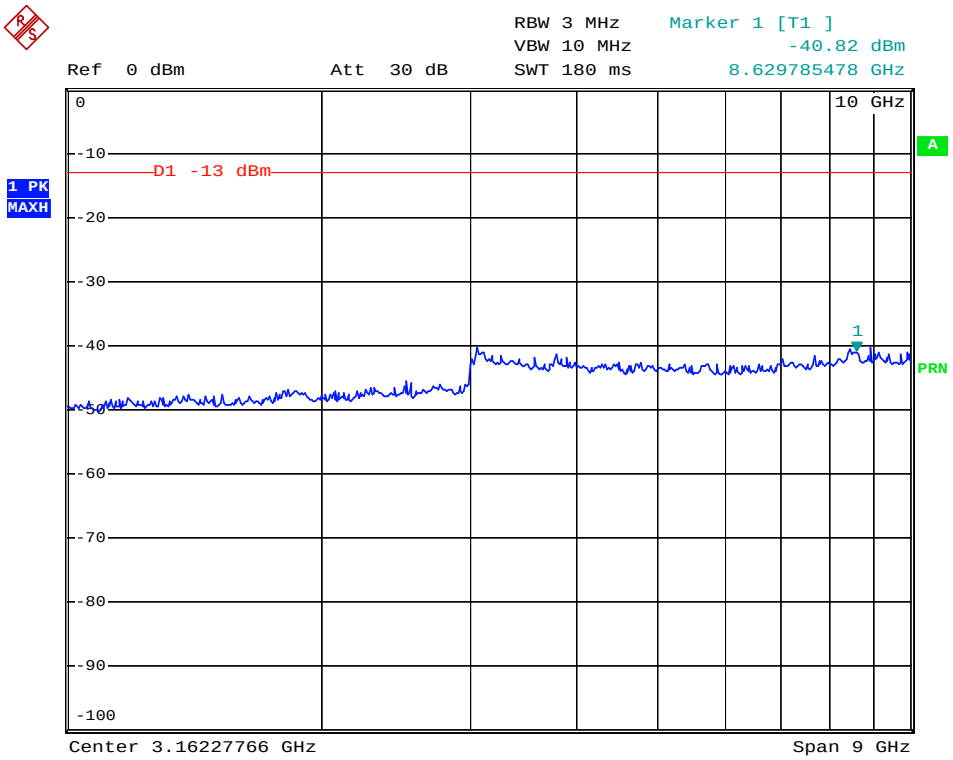


GPRS High Channel

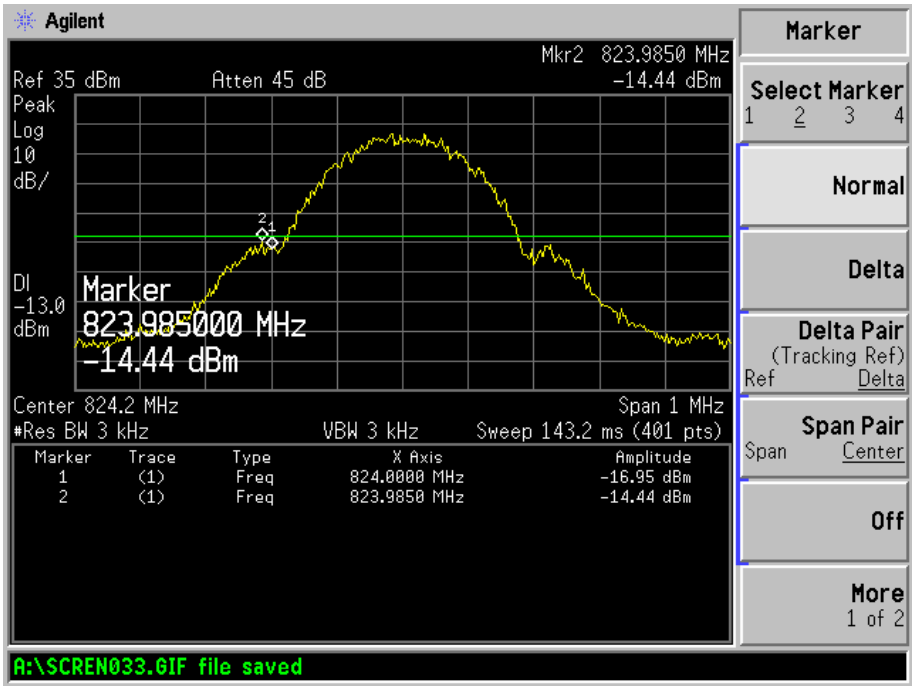
30MHz to 1GHz



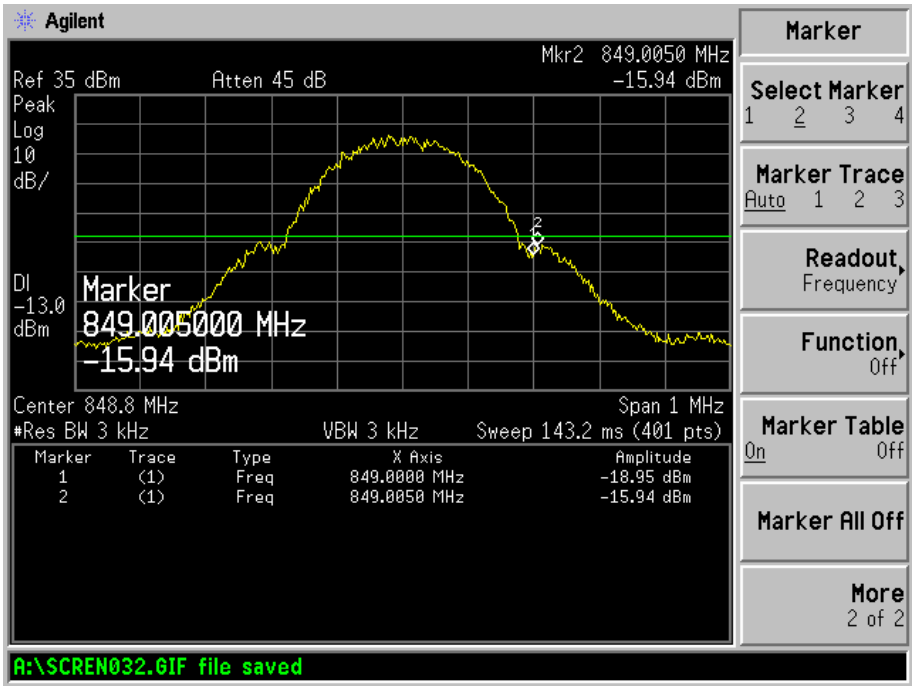

Above 1GHz



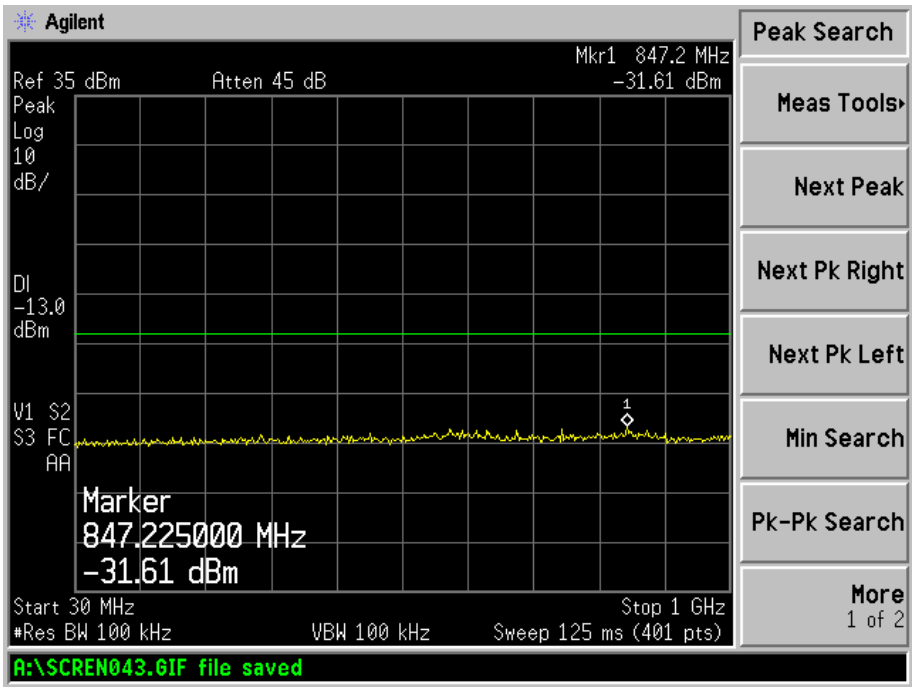
GPRS Low Band Emission



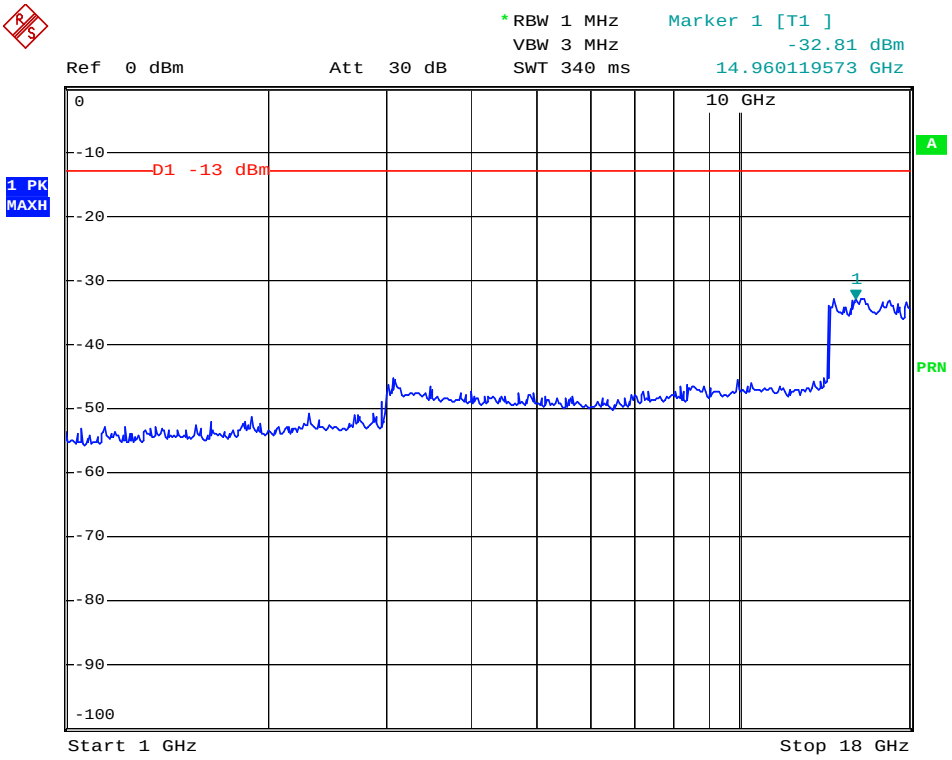

GPRS High Band Emission



For PCS Band
GSM Low Channel
30MHz to 1GHz

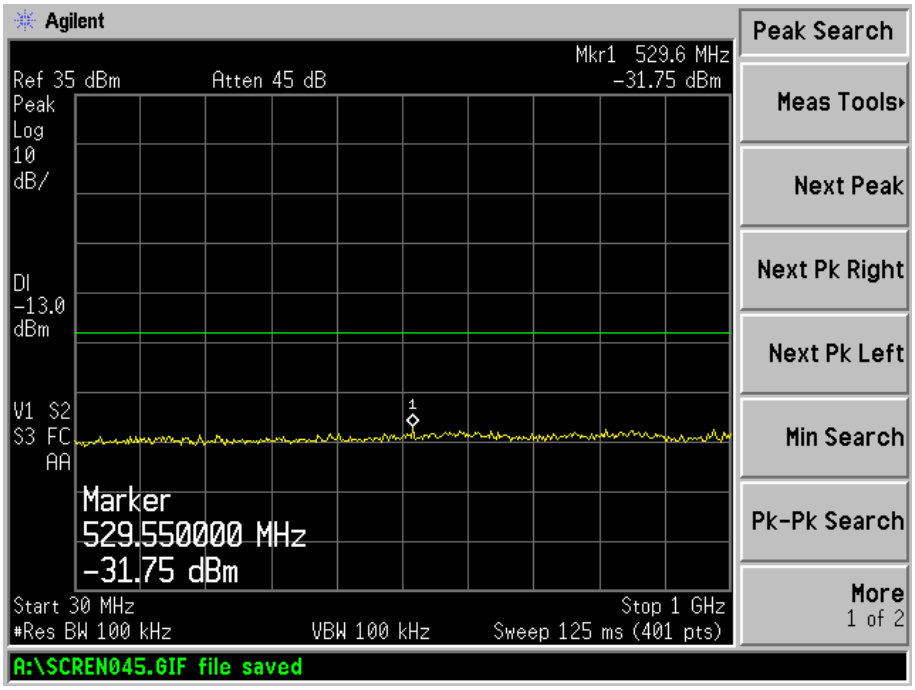



Above 1GHz

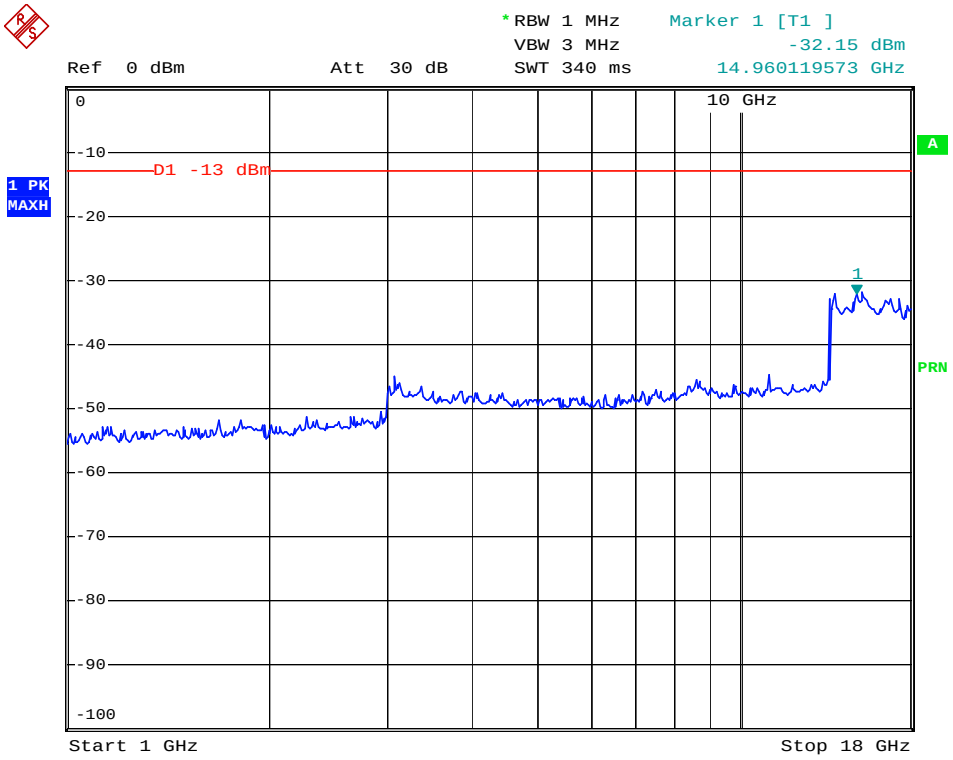


GSM Middle Channel

30MHz to 1GHz

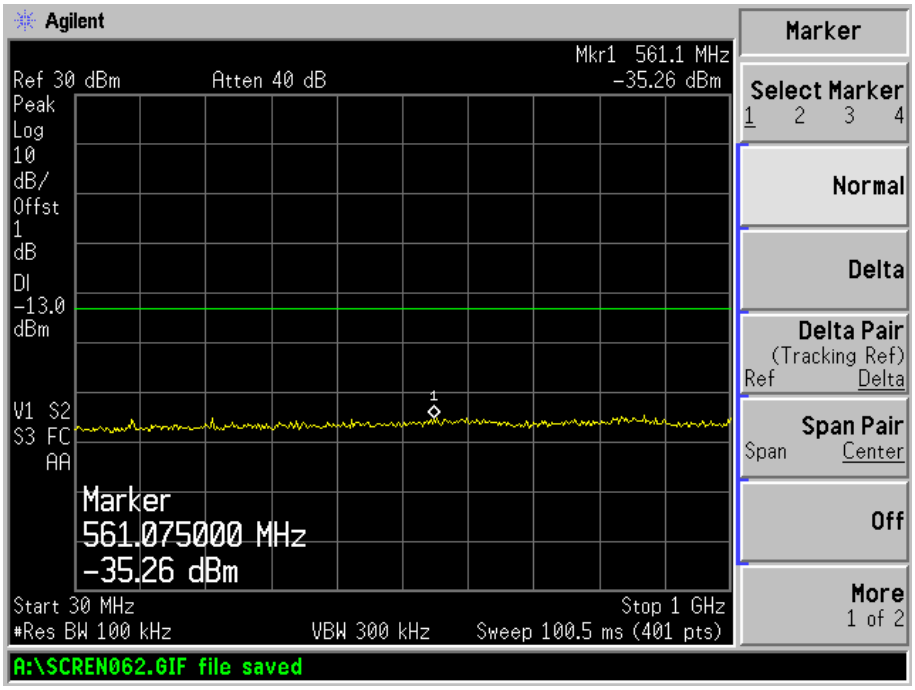



Above 1GHz

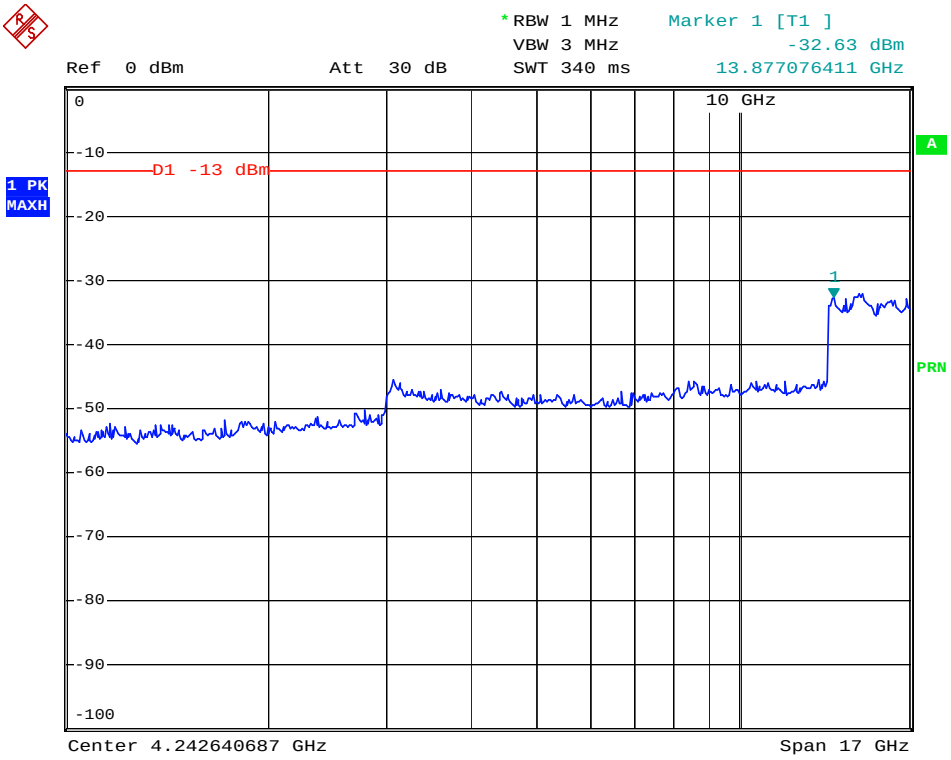


GSM High Channel

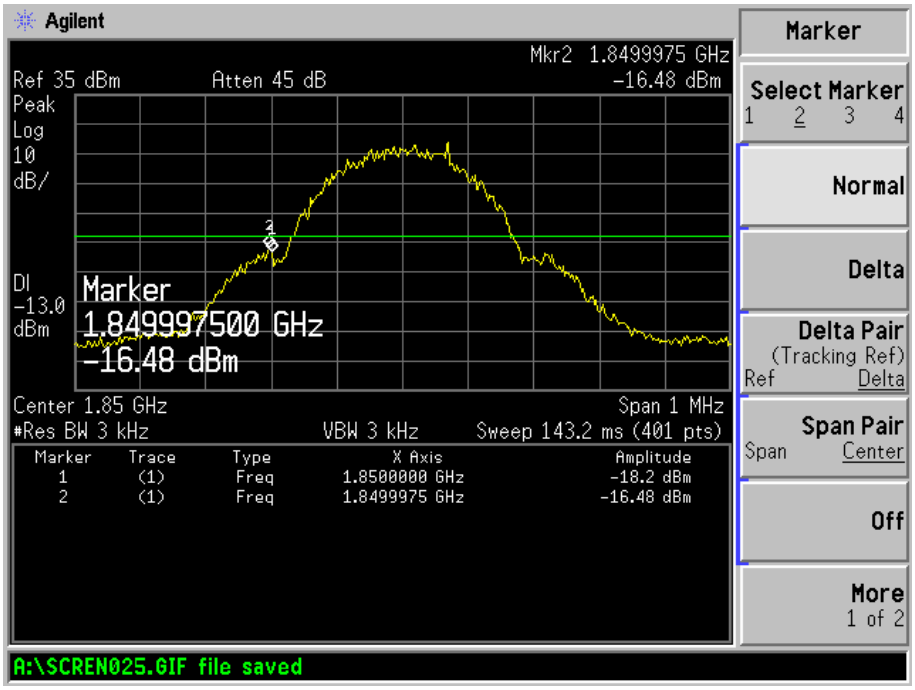
30MHz to 1GHz



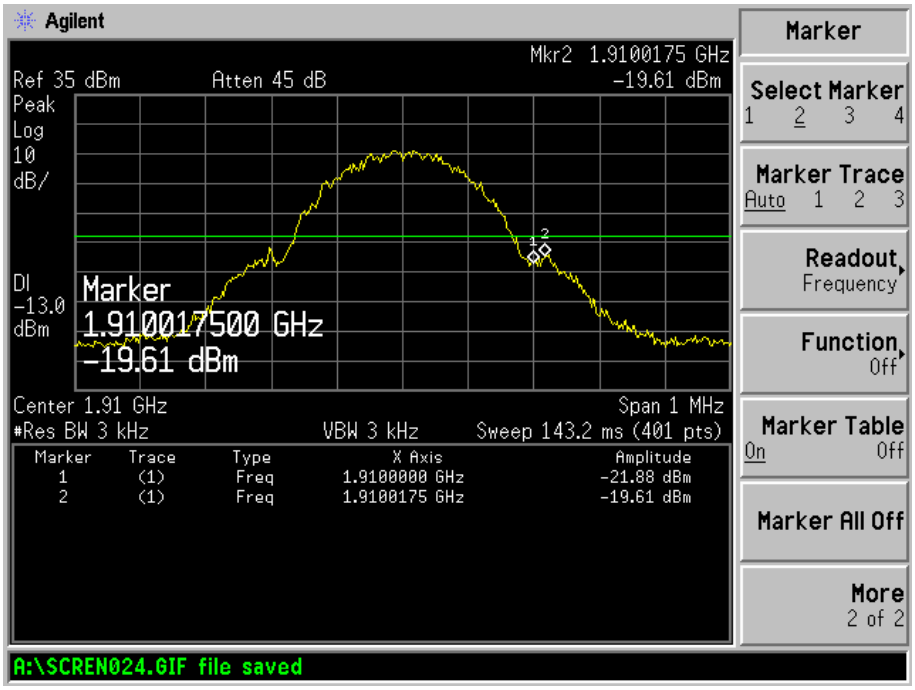

Above 1GHz



GSM Low Band Emission

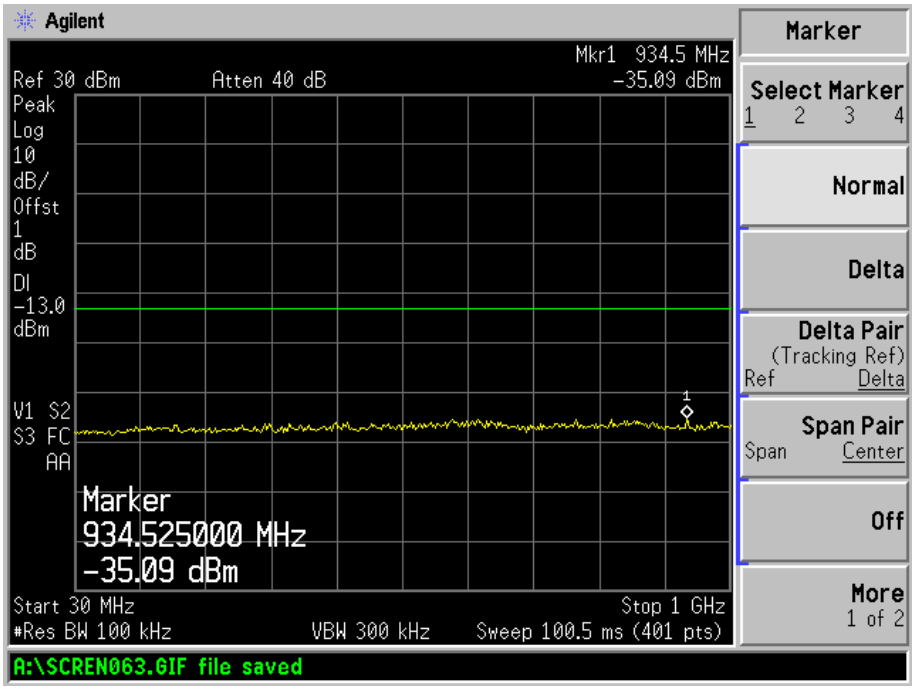



GSM High Band Emission

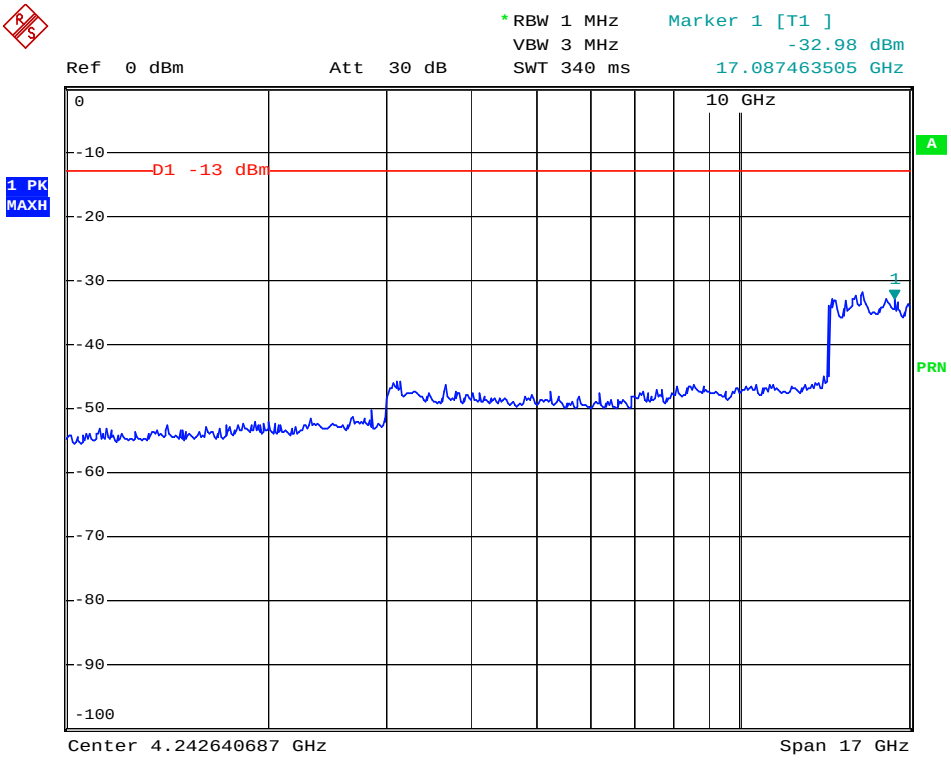


GPRS Low Channel

30MHz to 1GHz

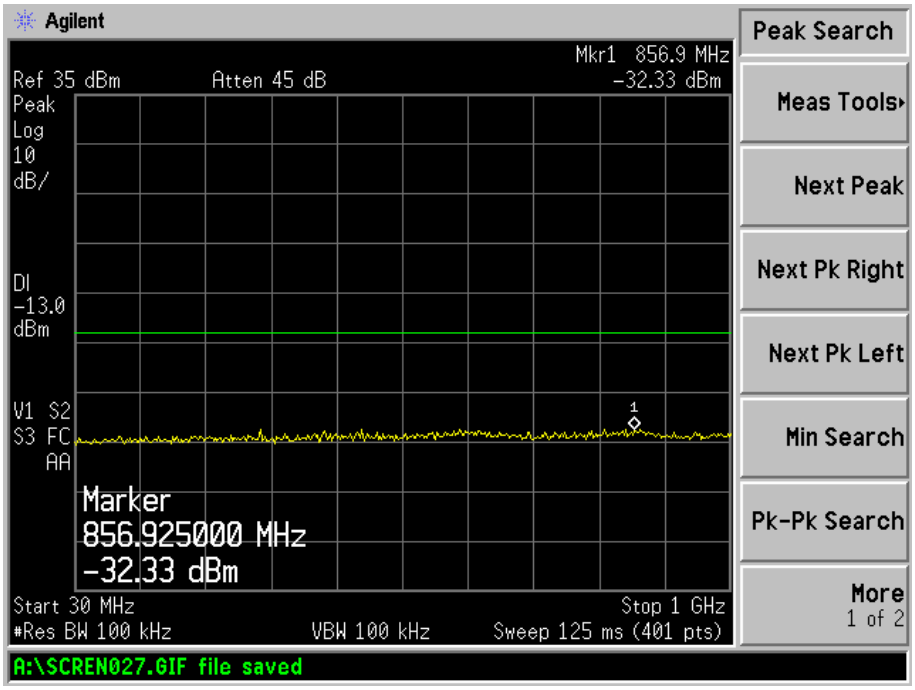



Above 1GHz

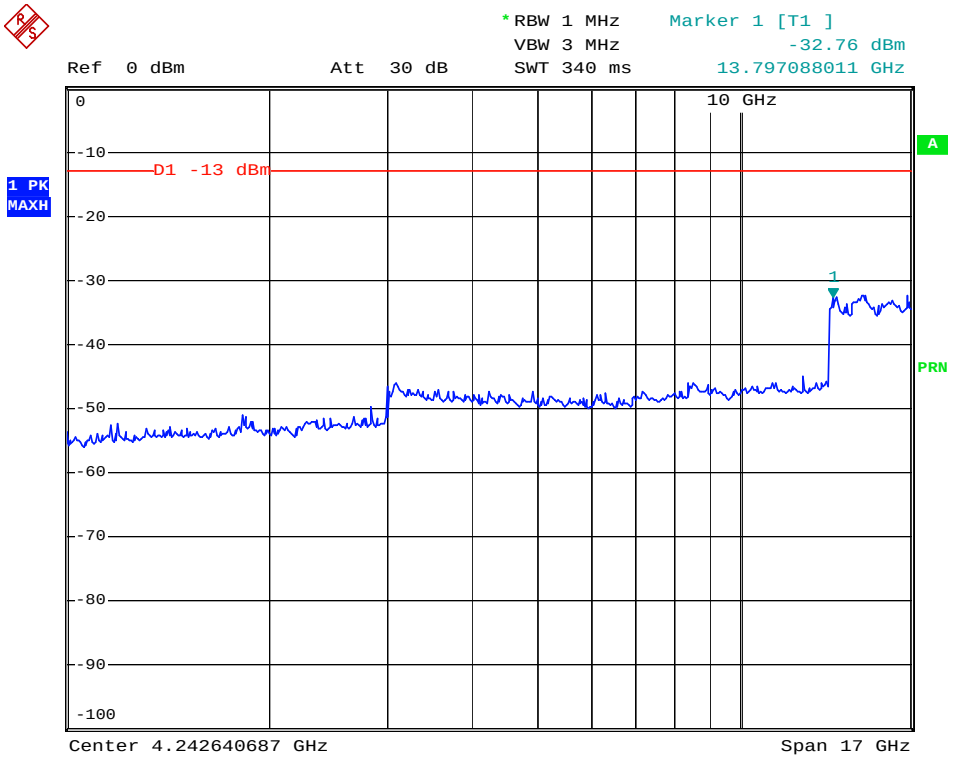


GPRS Middle Channel

30MHz to 1GHz

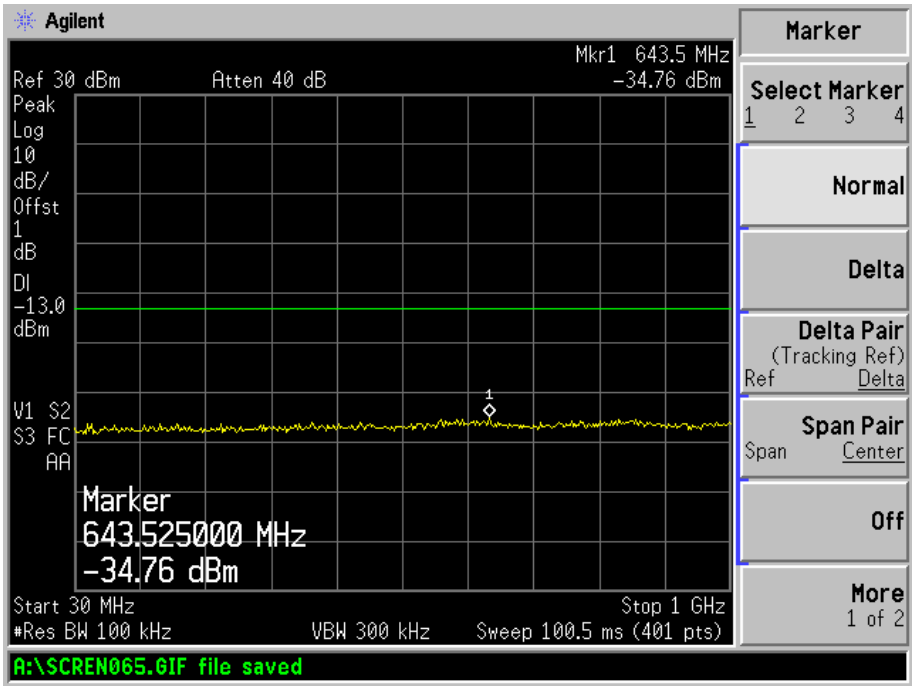



Above 1GHz

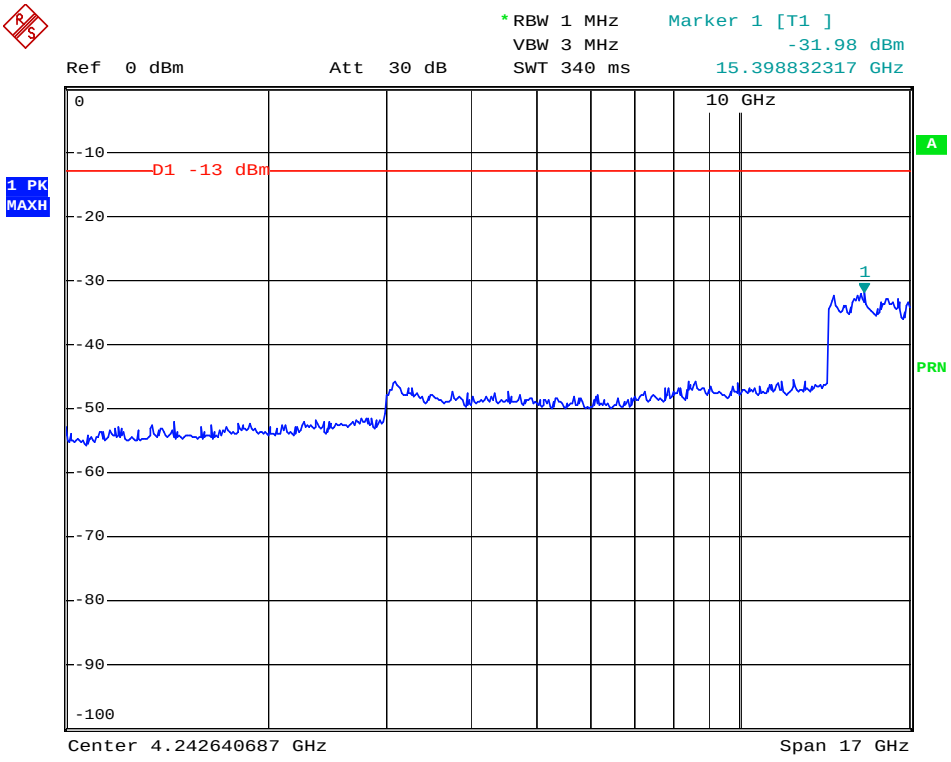


GPRS High Channel

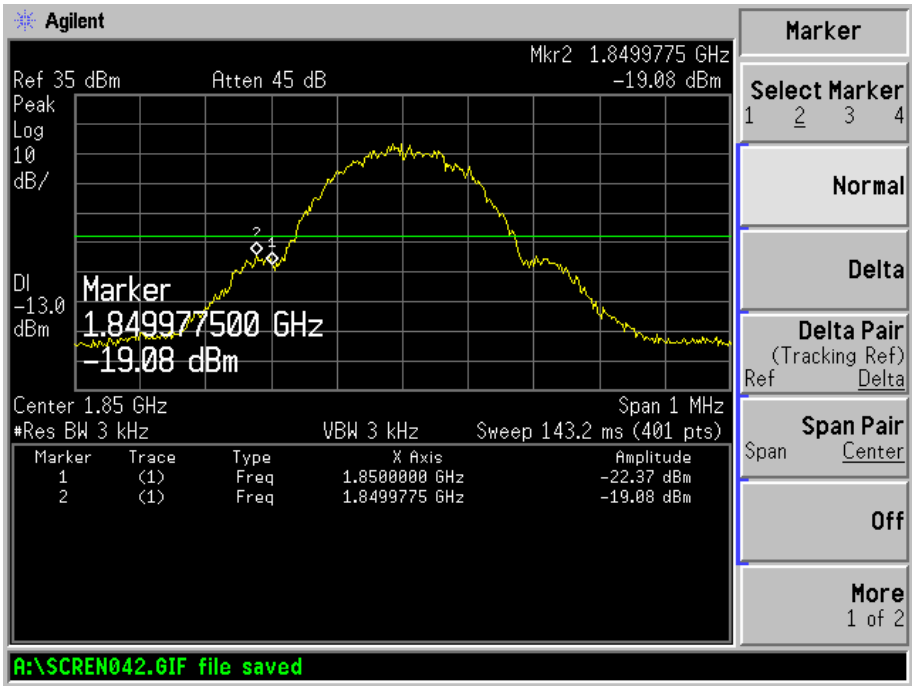
30MHz to 1GHz



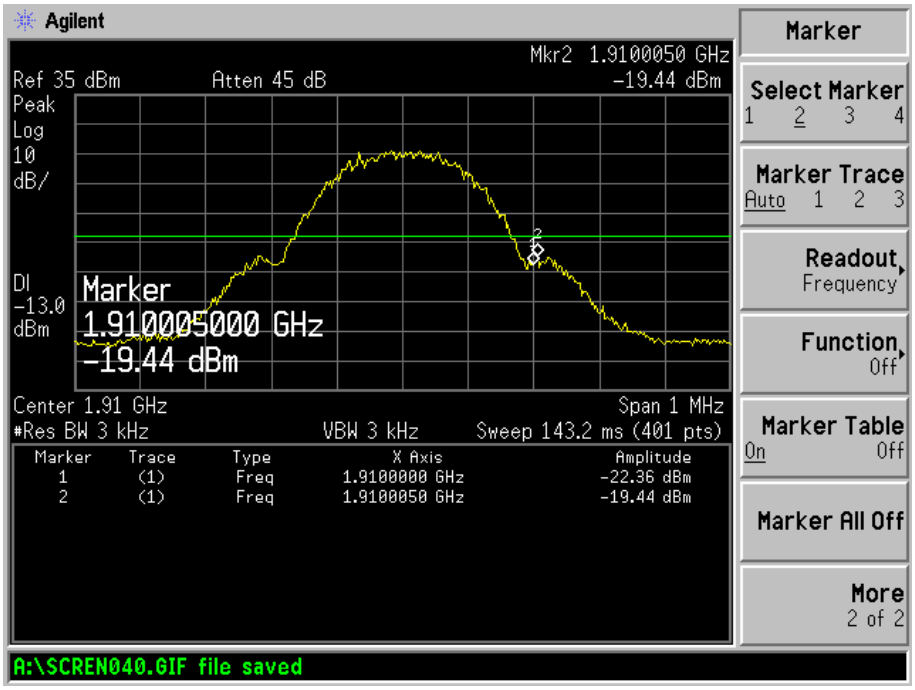

Above 1GHz



GPRS Low Band Emission




GPRS High Band Emission



# 7. Spurious Radiated Emissions

## 7.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±5.20 dB.

## 7.2 Standard Applicable

According to §22.917(a), the power of any emissions 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.

According to §24.238(a), the power of any emissions 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.

## 7.3 Test Equipment List and Details

| Description | Manufacturer | Model | Serial Number | Cal. Date | Due. Date |
|---|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSP | 836079/035 | 2013-05-07 | 2014-05-06 |
| Pre-amplifier | Agilent | 8447F | 3113A06717 | 2013-05-07 | 2014-05-06 |
| Pre-amplifier | Compliance Direction | PAP-0118 | 24002 | 2013-05-07 | 2014-05-06 |
| Trilog Broadband Antenna | SCHWARZBECK | VULB9163 | 9163-333 | 2013-04-20 | 2014-04-19 |
| Horn Antenna | ETS | 3117 | 00086197 | 2013-04-20 | 2014-04-19 |
| Horn Antenna | ETS | 3116B | 00088203 | 2013-04-20 | 2014-04-19 |
| Loop Antenna | SCHWARZECK | HFRA 5165 | 9365 | 2013-04-20 | 2014-04-19 |
| Universal Radio Communication Tester | Rohde & Schwarz | CMU200 | 112012 | 2013-05-07 | 2014-05-06 |
| Signal Generator | R&S | SMR20 | 100047 | 2013-05-07 | 2014-05-06 |

## 7.4 Test Procedure

1. The setup of EUT is according with per TIA/EIA Standard 603C and ANSI C63.4-2003 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious attenuation limit in dB =43+10 $Log_{10}$ (power out in Watts)

## 7.5 Environmental Conditions

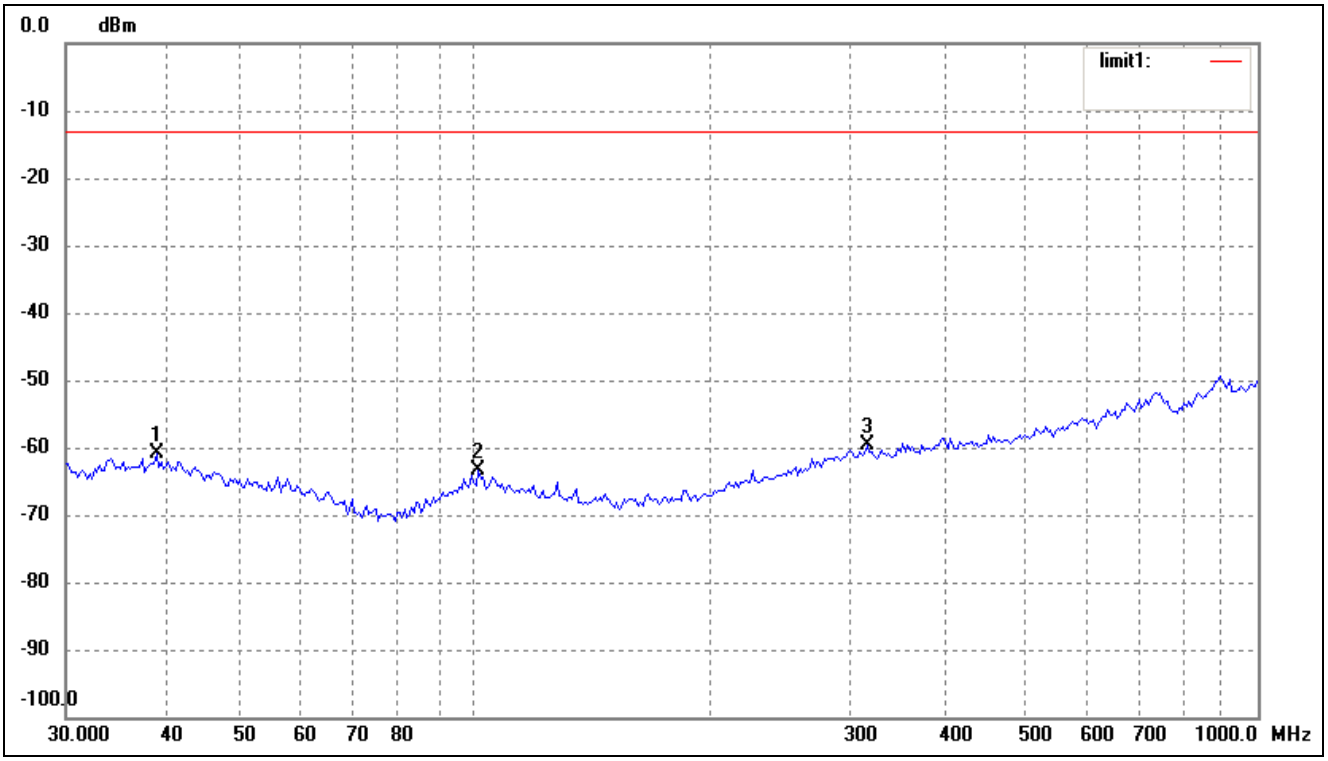
| | |
|---|---|
| Temperature: | 25 °C |
| Relative Humidity: | 52% |
| ATM Pressure: | 1012 mbar |

## 7.6 Summary of Test Results/Plots

According to the data below, the FCC Part 22.917 and 24.238 standards, and had the worst margin of:

*Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*

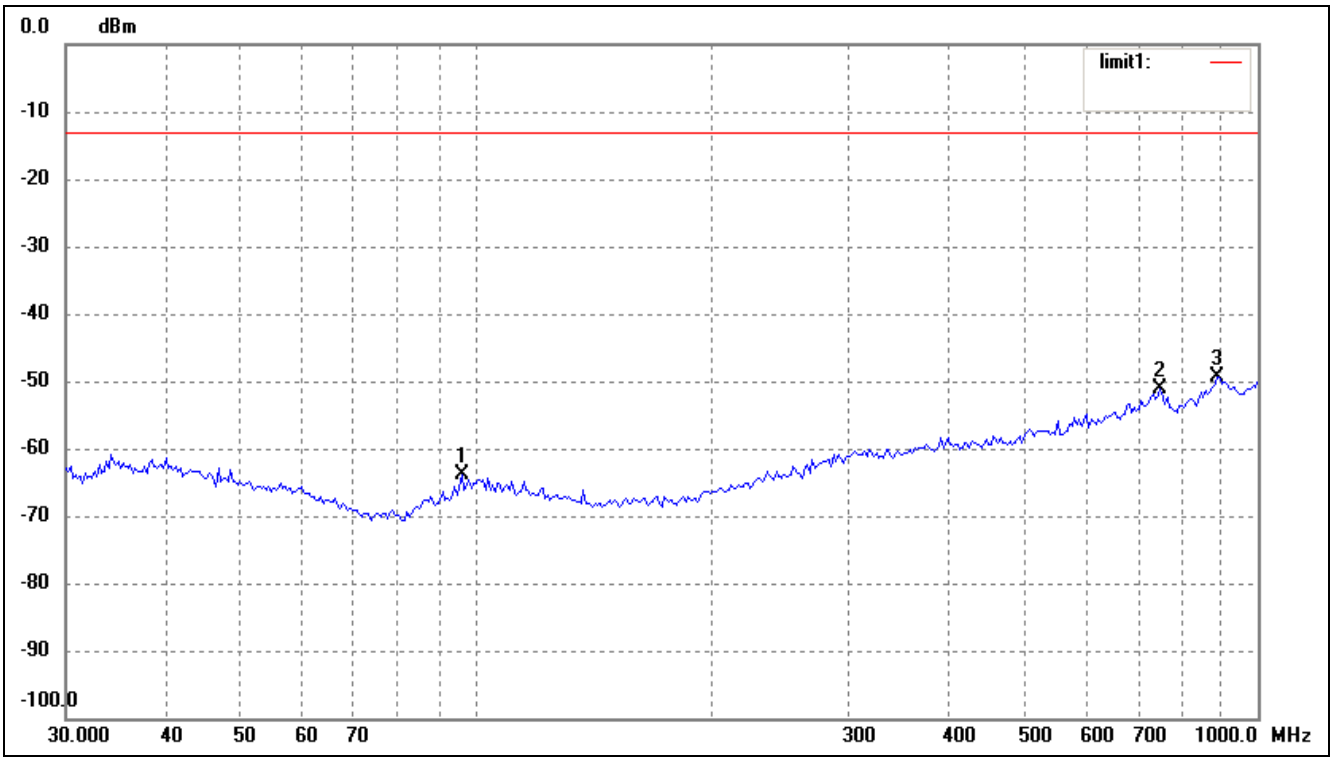
*Spurious Emission From 30MHz to 1GHz*
*For Cellular Band_GSM Mode Low channel*
*Horizontal:*




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 39.1616 | -82.13 | 21.34 | -60.79 | -13.00 | -47.79 | ERP |
| 2 | 100.9340 | -81.91 | 18.55 | -63.36 | -13.00 | -50.36 | ERP |
| 3 | 316.5890 | -81.88 | 22.24 | -59.64 | -13.00 | -46.64 | ERP |

*Remarks: Result = Reading + Correct Factor*

*Vertical:*

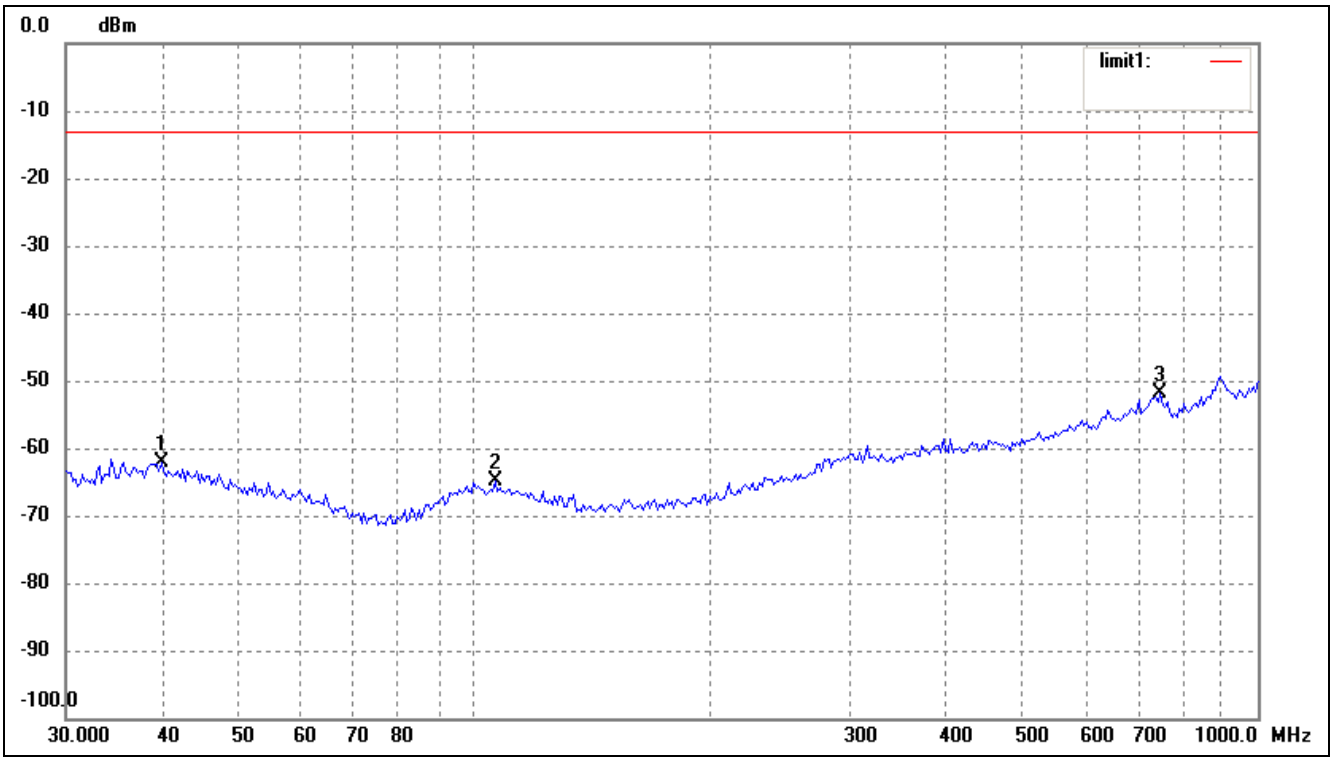



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 96.0986 | -81.53 | 17.67 | -63.86 | -13.00 | -50.86 | ERP |
| 2 | 750.1083 | -80.64 | 29.58 | -51.06 | -13.00 | -38.06 | ERP |
| 3 | 887.6099 | -80.34 | 30.95 | -49.39 | -13.00 | -36.39 | ERP |

*Remarks: Result = Reading + Correct Factor*

*For Cellular Band_GSM Mode Middle channel*

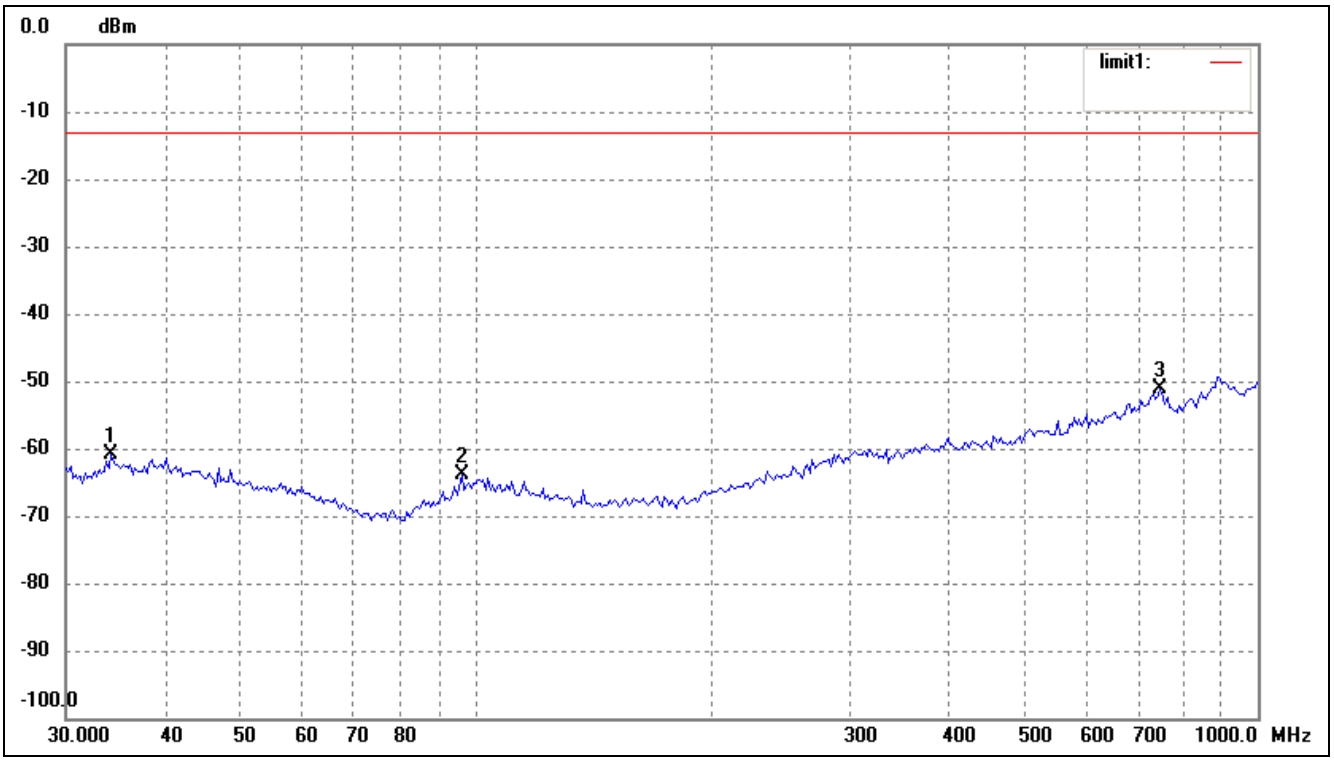
*Horizontal:*




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 39.7147 | -83.58 | 21.44 | -62.14 | -13.00 | -49.14 | ERP |
| 2 | 106.0126 | -82.89 | 18.04 | -64.85 | -13.00 | -51.85 | ERP |
| 3 | 750.1083 | -81.50 | 29.58 | -51.92 | -13.00 | -38.92 | ERP |

*Remarks: Result = Reading + Correct Factor*

*Vertical:*

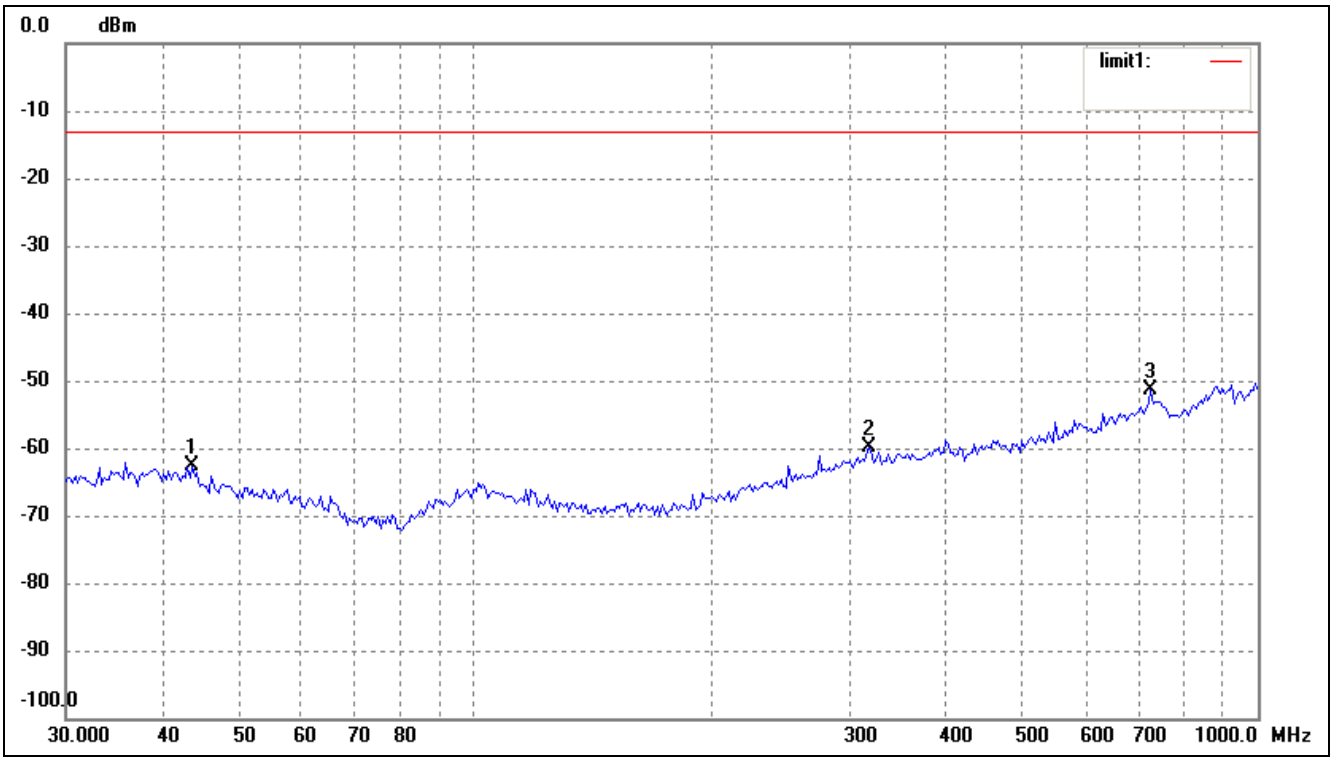



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 34.2760 | -81.32 | 20.56 | -60.76 | -13.00 | -47.76 | ERP |
| 2 | 96.0986 | -81.53 | 17.67 | -63.86 | -13.00 | -50.86 | ERP |
| 3 | 750.1083 | -80.64 | 29.58 | -51.06 | -13.00 | -38.06 | ERP |

*Remarks: Result = Reading + Correct Factor*

*For Cellular Band_GSM Mode High channel*

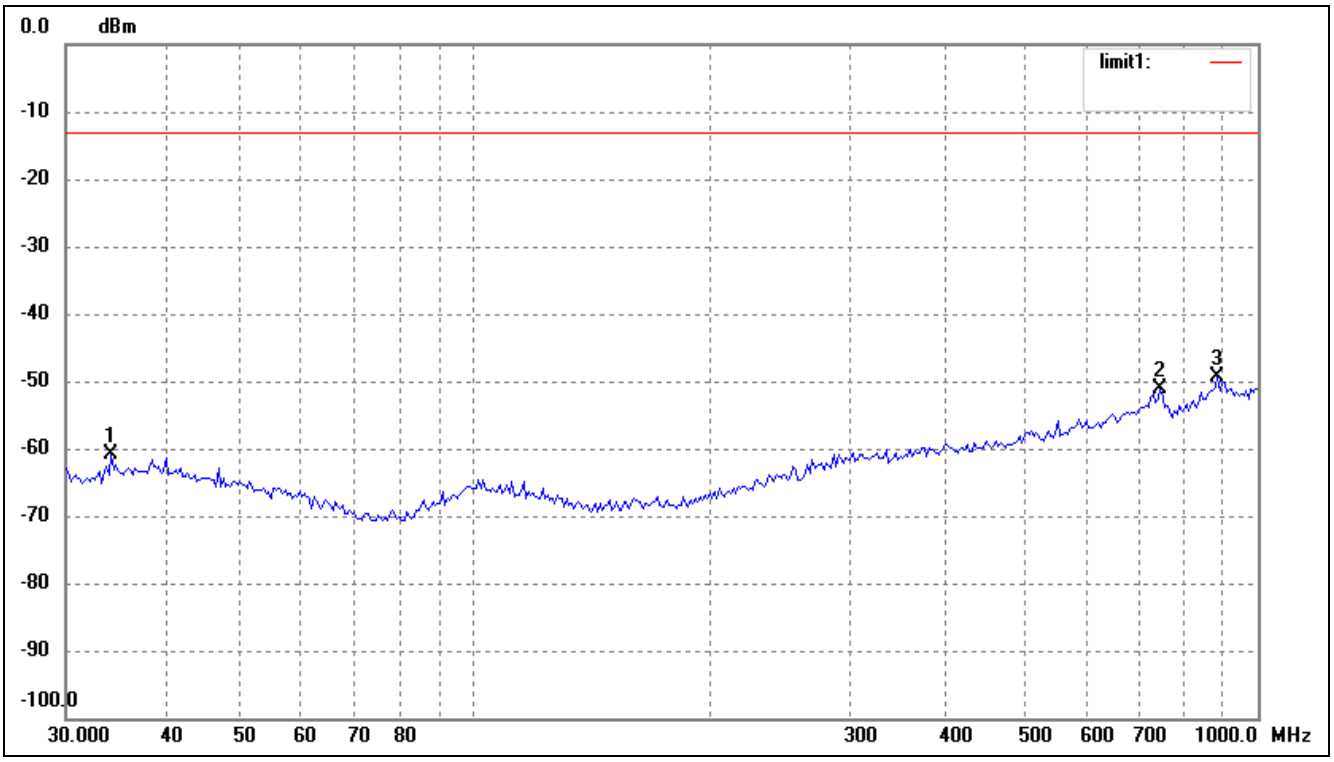
*Horizontal:*




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 43.5057 | -82.93 | 20.41 | -62.52 | -13.00 | -49.52 | ERP |
| 2 | 318.8170 | -82.02 | 22.26 | -59.76 | -13.00 | -46.76 | ERP |
| 3 | 729.3583 | -80.51 | 29.11 | -51.40 | -13.00 | -38.40 | ERP |

*Remarks: Result = Reading + Correct Factor*

*Vertical:*

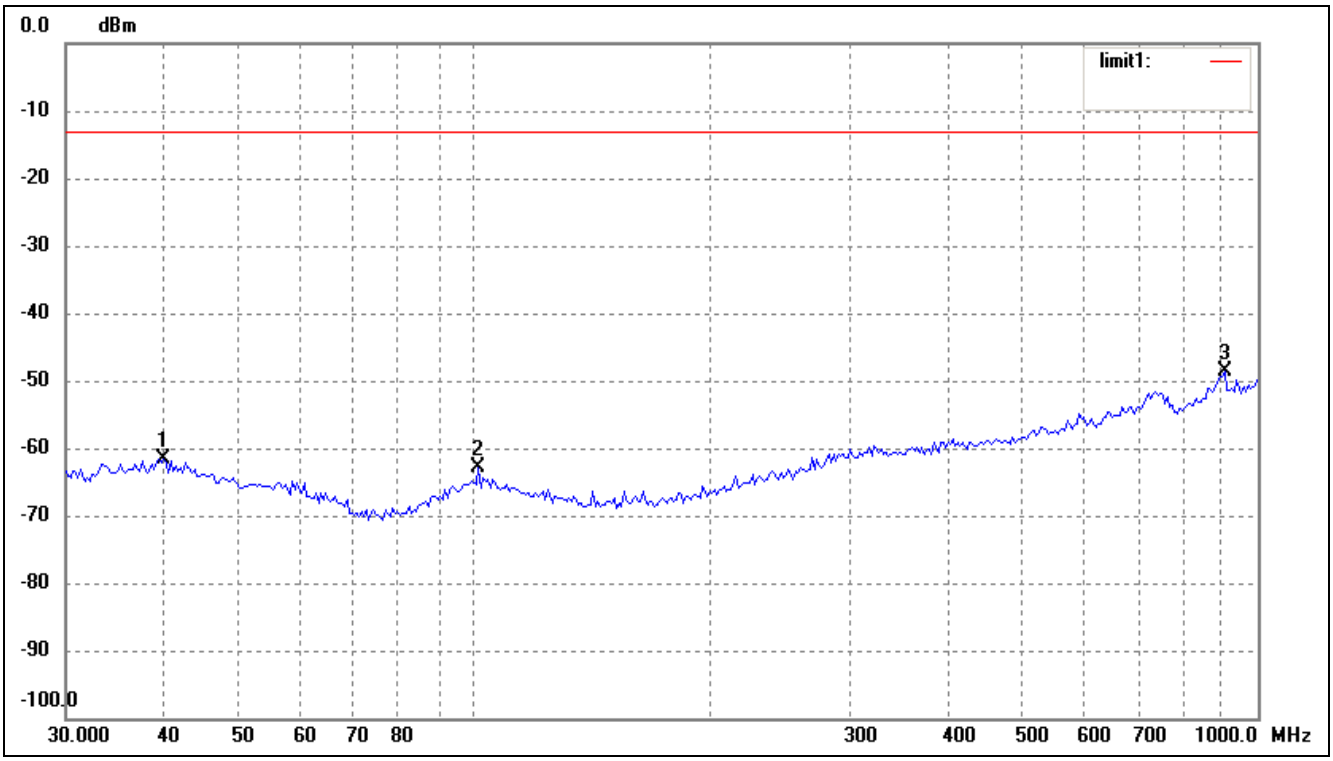



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 34.2760 | -81.32 | 20.56 | -60.76 | -13.00 | -47.76 | ERP |
| 2 | 750.1083 | -80.64 | 29.58 | -51.06 | -13.00 | -38.06 | ERP |
| 3 | 887.6099 | -80.34 | 30.95 | -49.39 | -13.00 | -36.39 | ERP |

*Remarks: Result = Reading + Correct Factor*

*For Cellular Band_GPRS Mode Low channel*

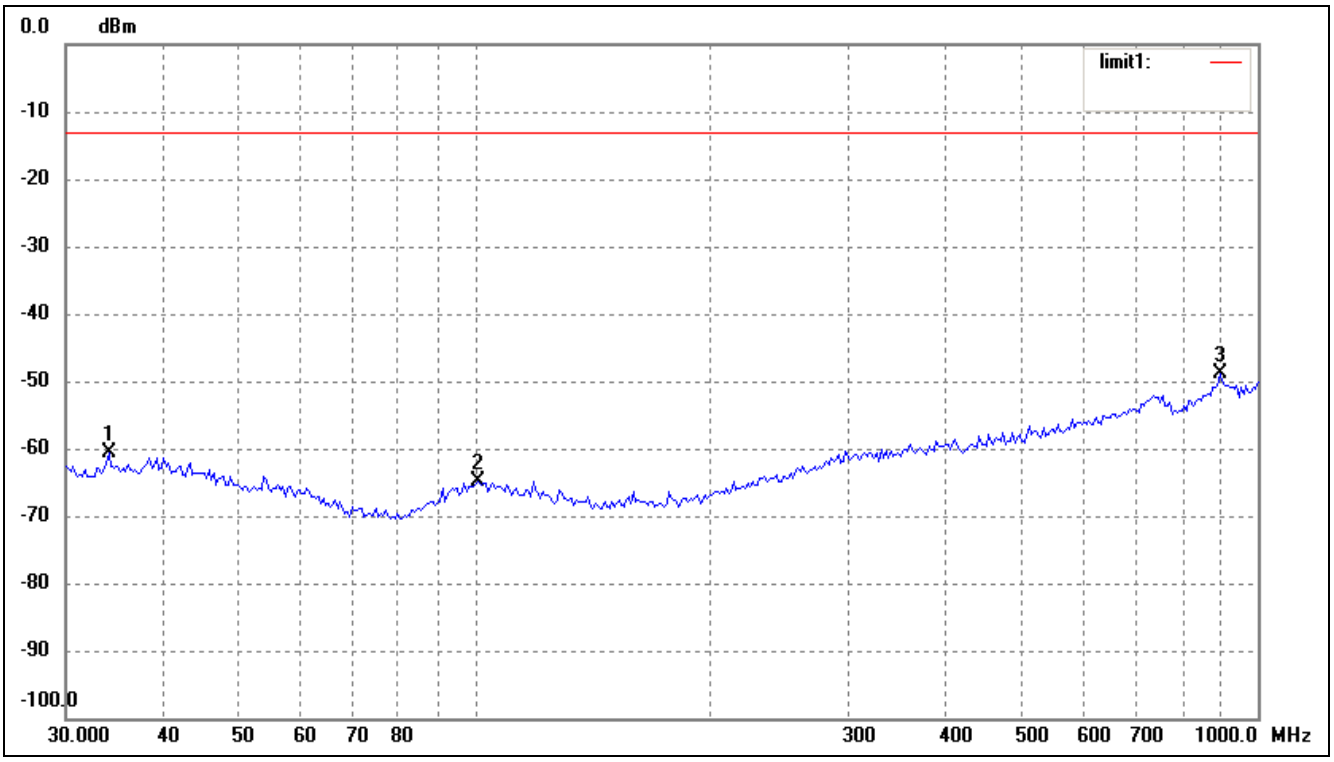
*Horizontal:*




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 39.9942 | -83.15 | 21.48 | -61.67 | -13.00 | -48.67 | ERP |
| 2 | 100.9340 | -81.53 | 18.55 | -62.98 | -13.00 | -49.98 | ERP |
| 3 | 906.4824 | -79.46 | 30.95 | -48.51 | -13.00 | -35.51 | ERP |

*Remarks: Result = Reading + Correct Factor*

*Vertical:*

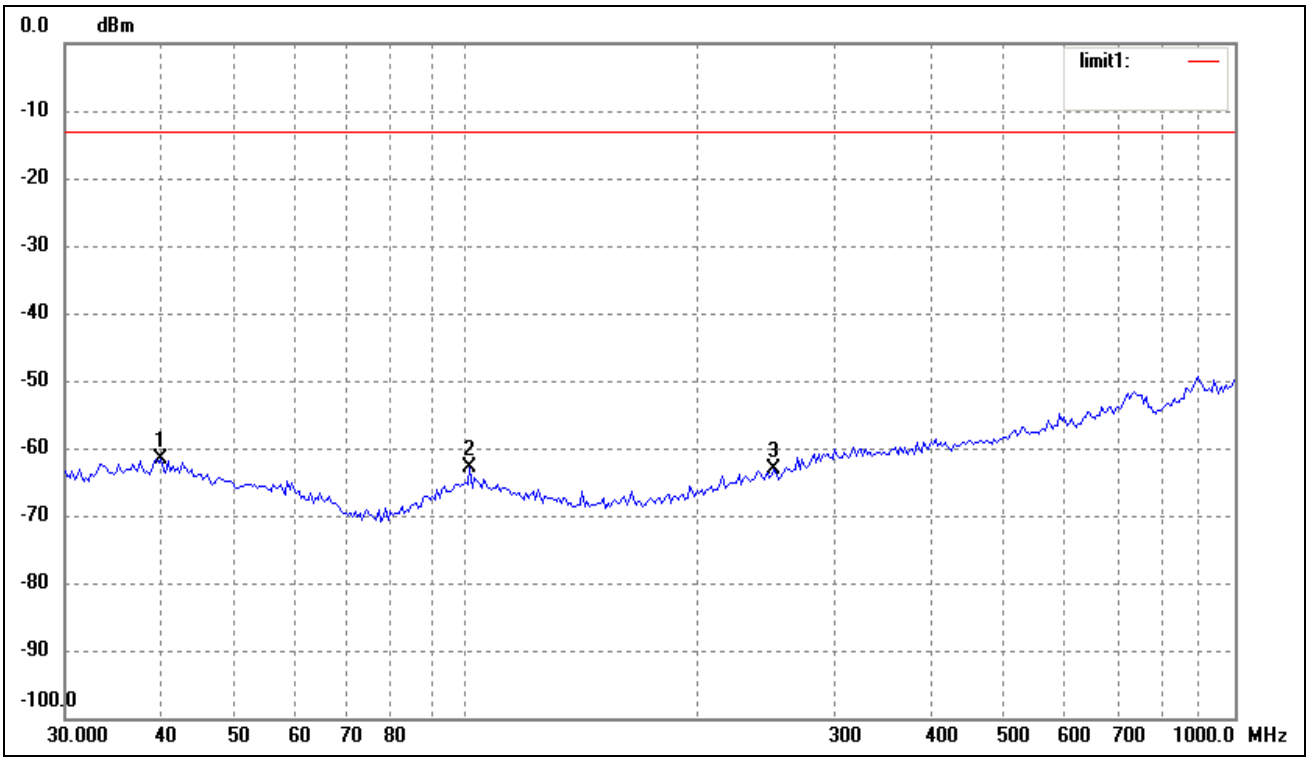



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 34.0365 | -81.12 | 20.52 | -60.60 | -13.00 | -47.60 | ERP |
| 2 | 100.9340 | -83.38 | 18.55 | -64.83 | -13.00 | -51.83 | ERP |
| 3 | 893.8567 | -80.01 | 31.07 | -48.94 | -13.00 | -35.94 | ERP |

*Remarks: Result = Reading + Correct Factor*

*For Cellular Band_GPRS Mode Middle channel*

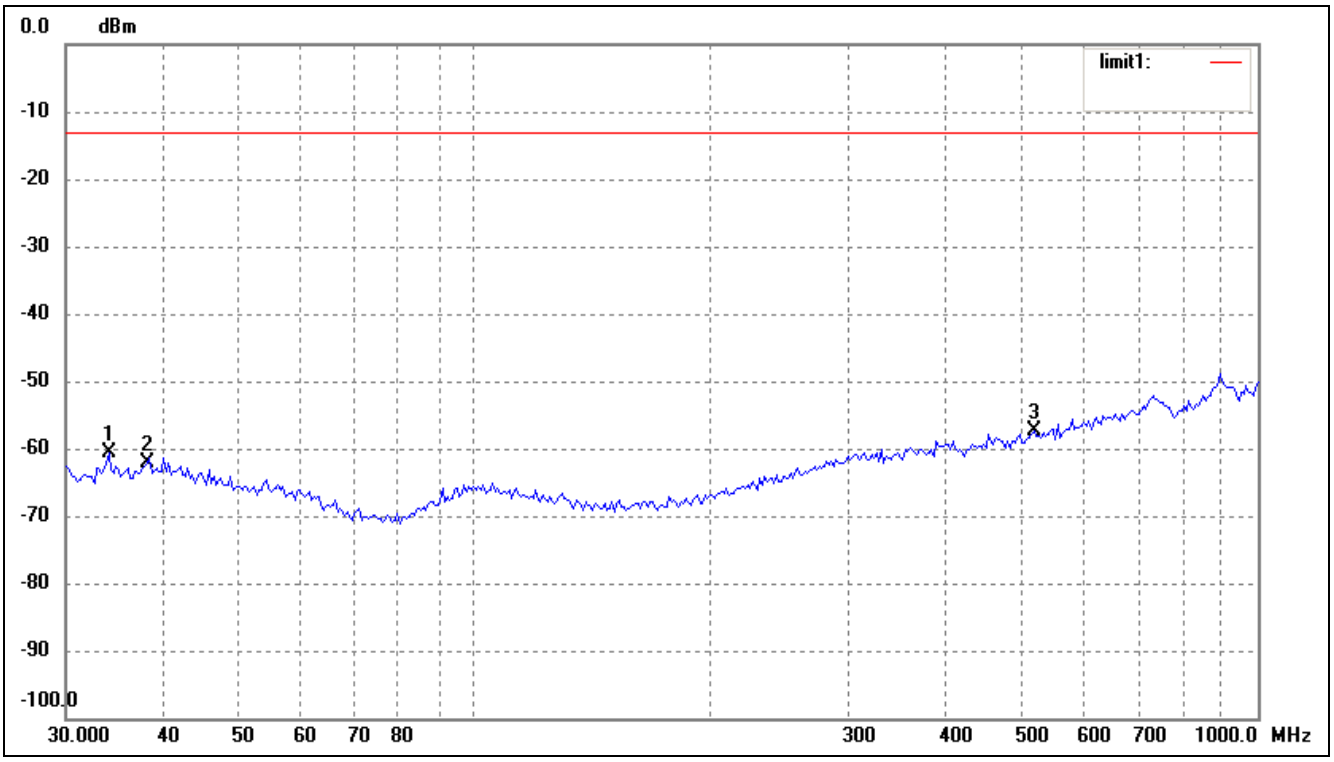
*Horizontal:*




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 39.9942 | -83.15 | 21.48 | -61.67 | -13.00 | -48.67 | ERP |
| 2 | 100.9340 | -81.53 | 18.55 | -62.98 | -13.00 | -49.98 | ERP |
| 3 | 251.1804 | -82.25 | 19.14 | -63.11 | -13.00 | -50.11 | ERP |

*Remarks: Result = Reading + Correct Factor*

*Vertical:*

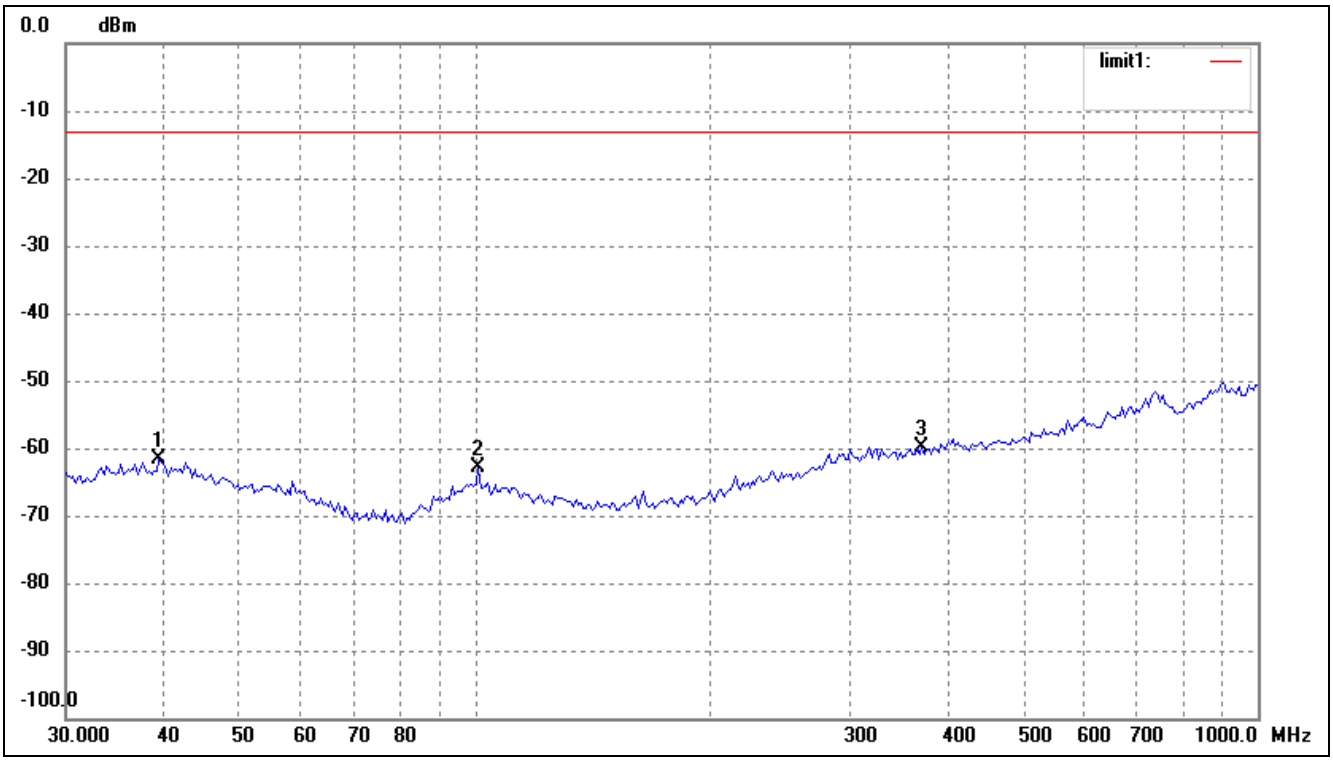



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 34.0365 | -81.12 | 20.52 | -60.60 | -13.00 | -47.60 | ERP |
| 2 | 38.0783 | -83.22 | 21.17 | -62.05 | -13.00 | -49.05 | ERP |
| 3 | 517.2480 | -81.99 | 24.62 | -57.37 | -13.00 | -44.37 | ERP |

*Remarks: Result = Reading + Correct Factor*

*For Cellular Band_GPRS Mode High channel*

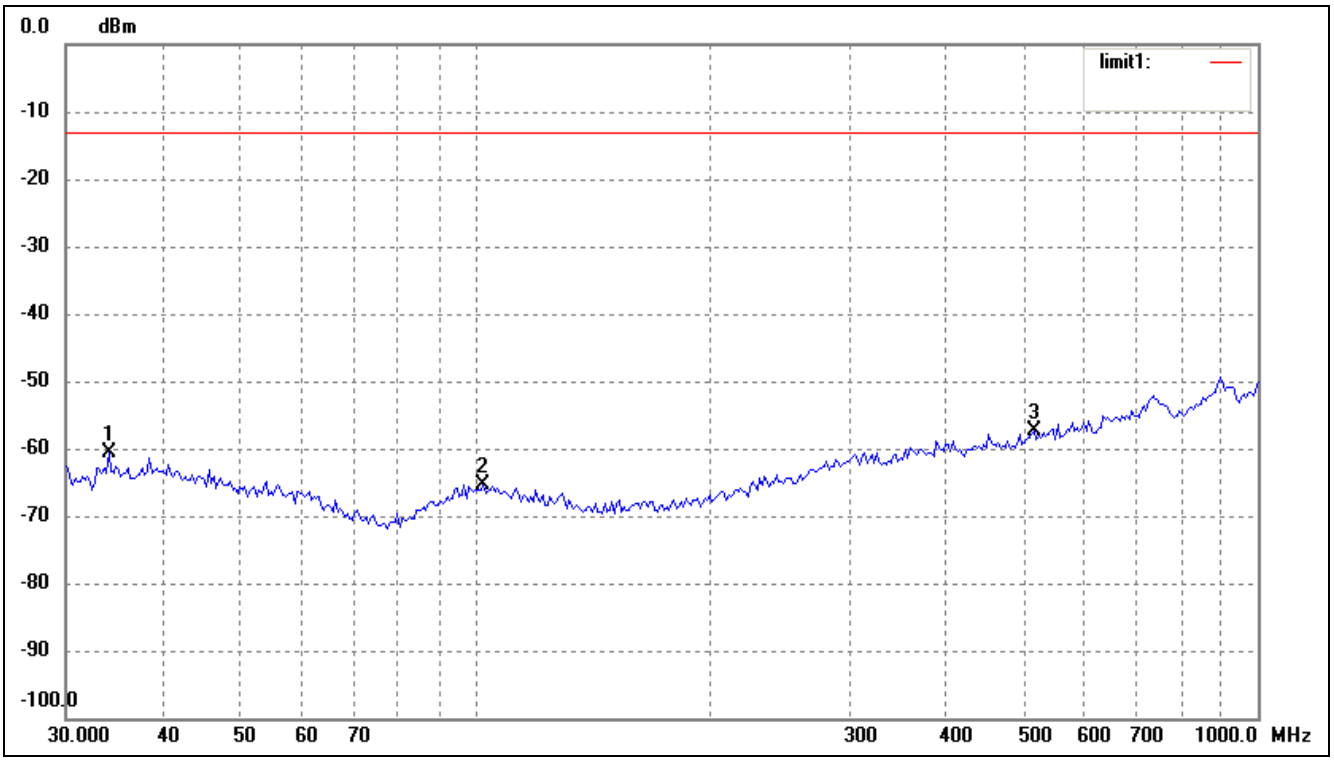
*Horizontal:*




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 39.4372 | -83.12 | 21.40 | -61.72 | -13.00 | -48.72 | ERP |
| 2 | 100.9340 | -81.53 | 18.55 | -62.98 | -13.00 | -49.98 | ERP |
| 3 | 372.0045 | -82.26 | 22.45 | -59.81 | -13.00 | -46.81 | ERP |

*Remarks: Result = Reading + Correct Factor*

*Vertical:*

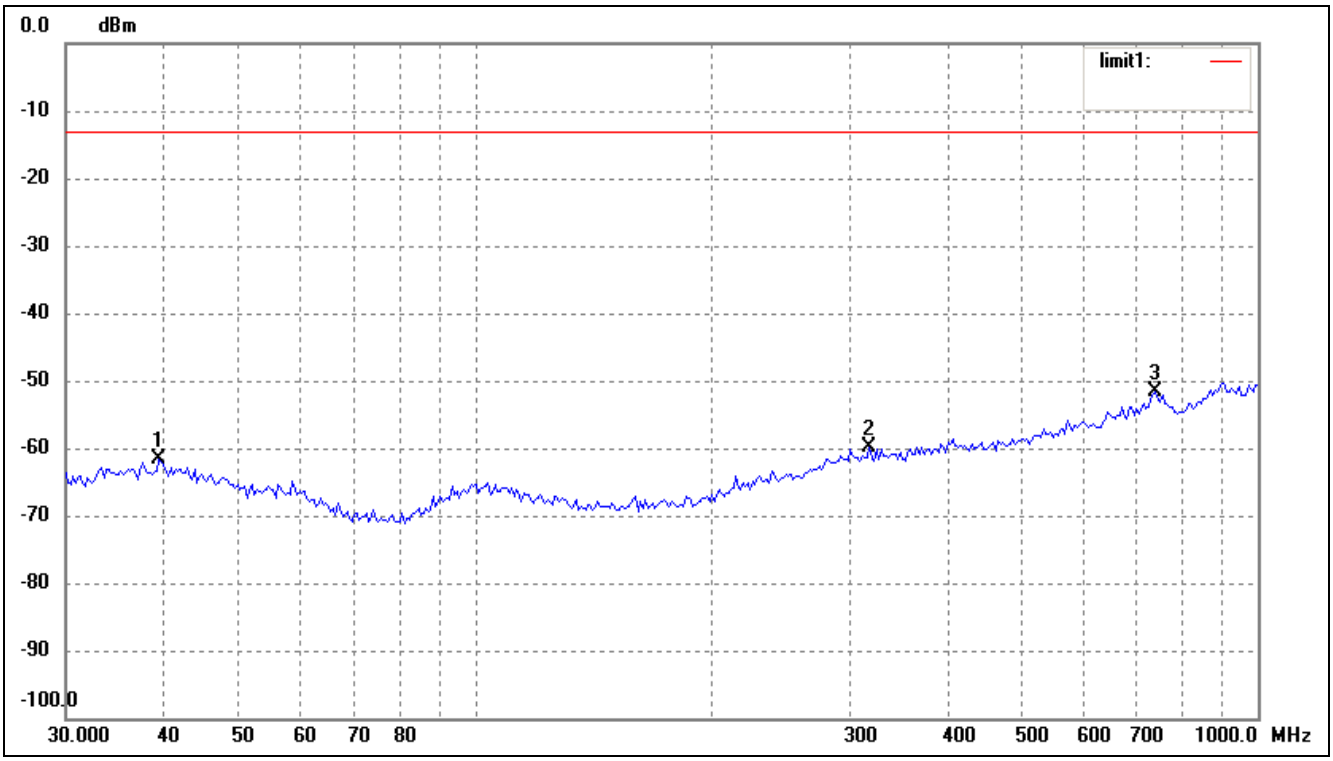



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 34.0365 | -81.12 | 20.52 | -60.60 | -13.00 | -47.60 | ERP |
| 2 | 102.3597 | -83.79 | 18.41 | -65.38 | -13.00 | -52.38 | ERP |
| 3 | 517.2480 | -81.99 | 24.62 | -57.37 | -13.00 | -44.37 | ERP |

*Remarks: Result = Reading + Correct Factor*

*For PCS Band_GSM Mode Low Channel*

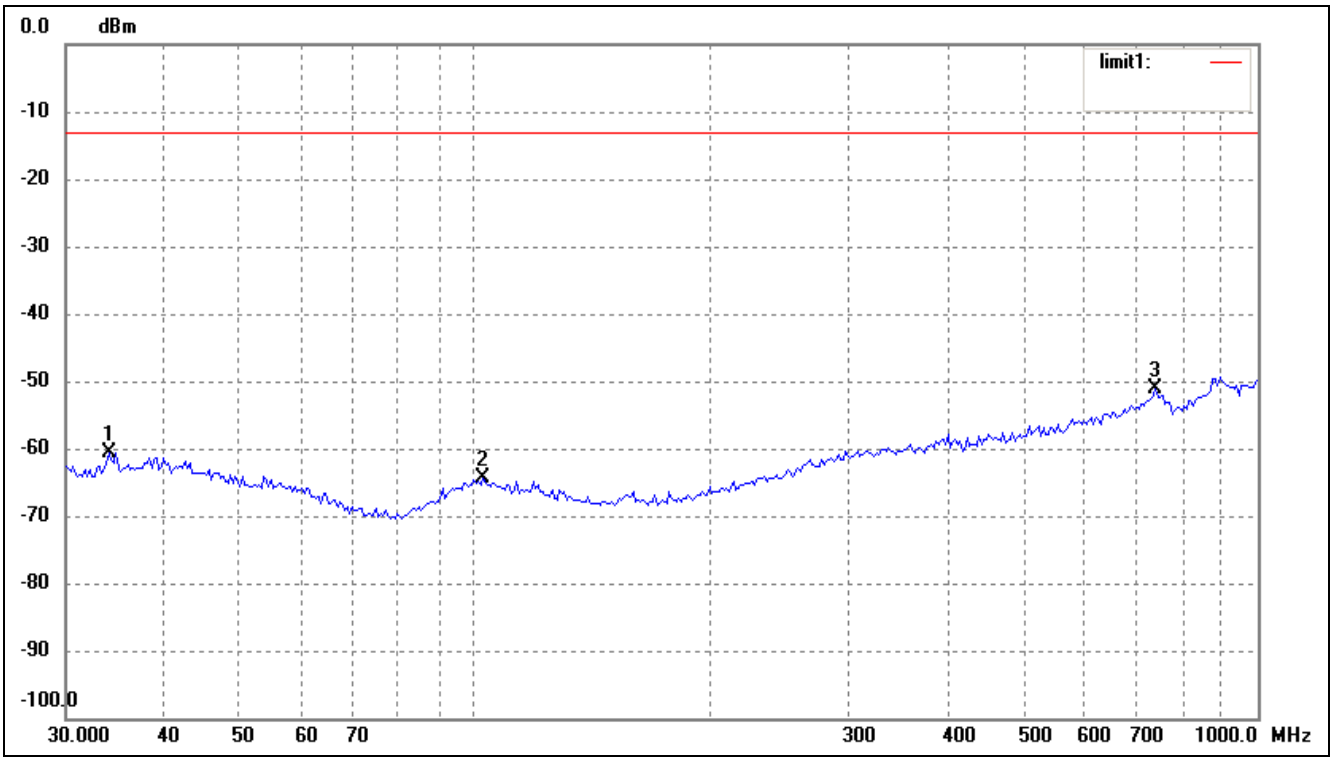
*Horizontal:*




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 39.4372 | -83.12 | 21.40 | -61.72 | -13.00 | -48.72 | ERP |
| 2 | 318.8170 | -82.12 | 22.26 | -59.86 | -13.00 | -46.86 | ERP |
| 3 | 739.6605 | -81.53 | 29.87 | -51.66 | -13.00 | -38.66 | ERP |

*Remarks: Result = Reading + Correct Factor*

*Vertical:*

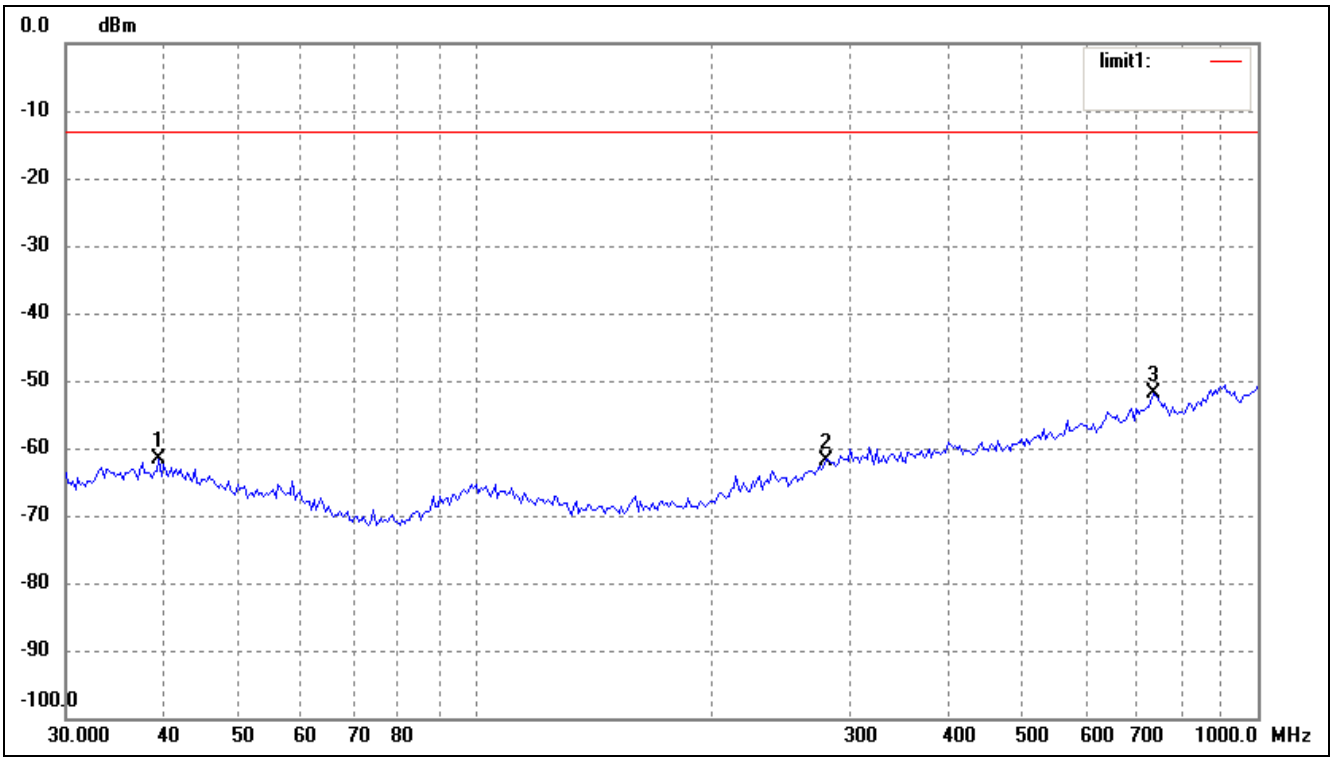



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 34.0365 | -81.12 | 20.52 | -60.60 | -13.00 | -47.60 | ERP |
| 2 | 102.3597 | -82.77 | 18.41 | -64.36 | -13.00 | -51.36 | ERP |
| 3 | 739.6605 | -80.87 | 29.87 | -51.00 | -13.00 | -38.00 | ERP |

*Remarks: Result = Reading + Correct Factor*

*For PCS Band_GSM Mode Middle Channel*

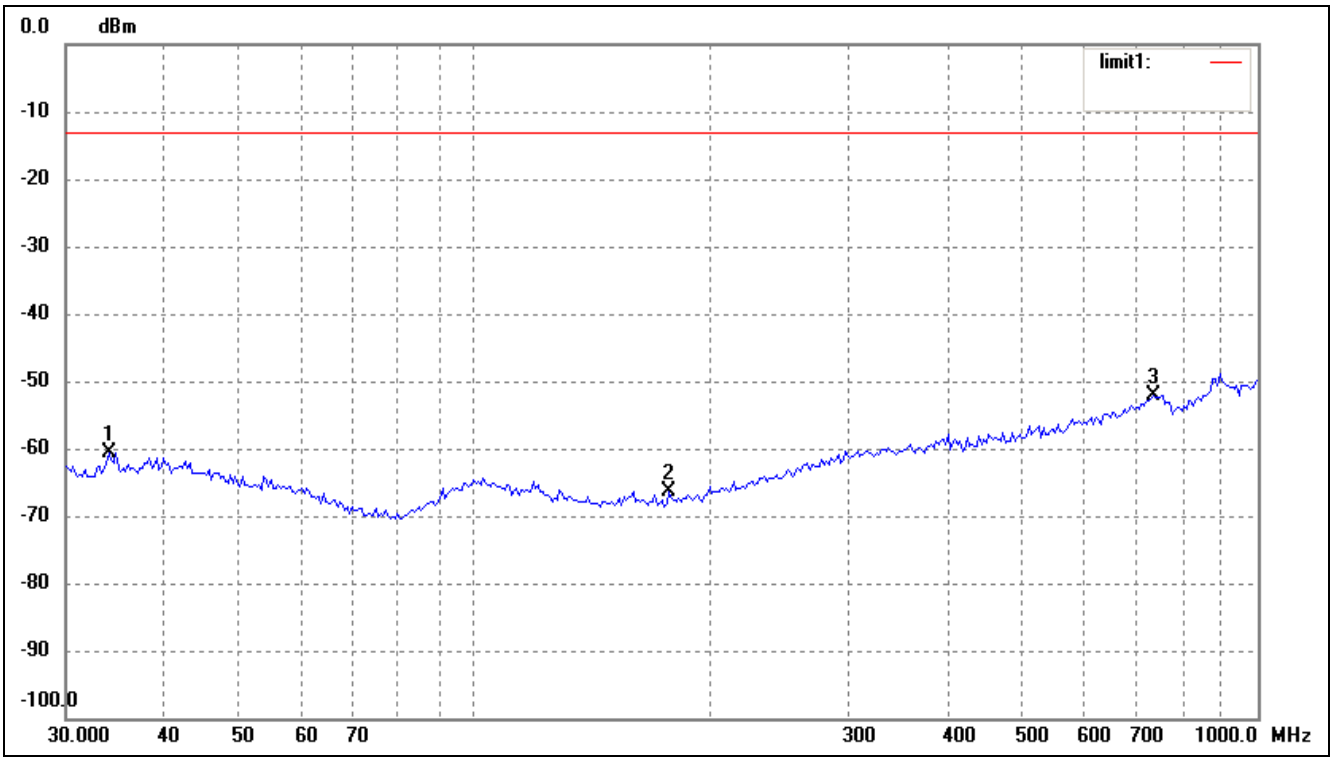
*Horizontal:*




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 39.4372 | -83.12 | 21.40 | -61.72 | -13.00 | -48.72 | ERP |
| 2 | 281.0075 | -82.84 | 21.09 | -61.75 | -13.00 | -48.75 | ERP |
| 3 | 734.4913 | -81.46 | 29.48 | -51.98 | -13.00 | -38.98 | ERP |

*Remarks: Result = Reading + Correct Factor*

*Vertical:*

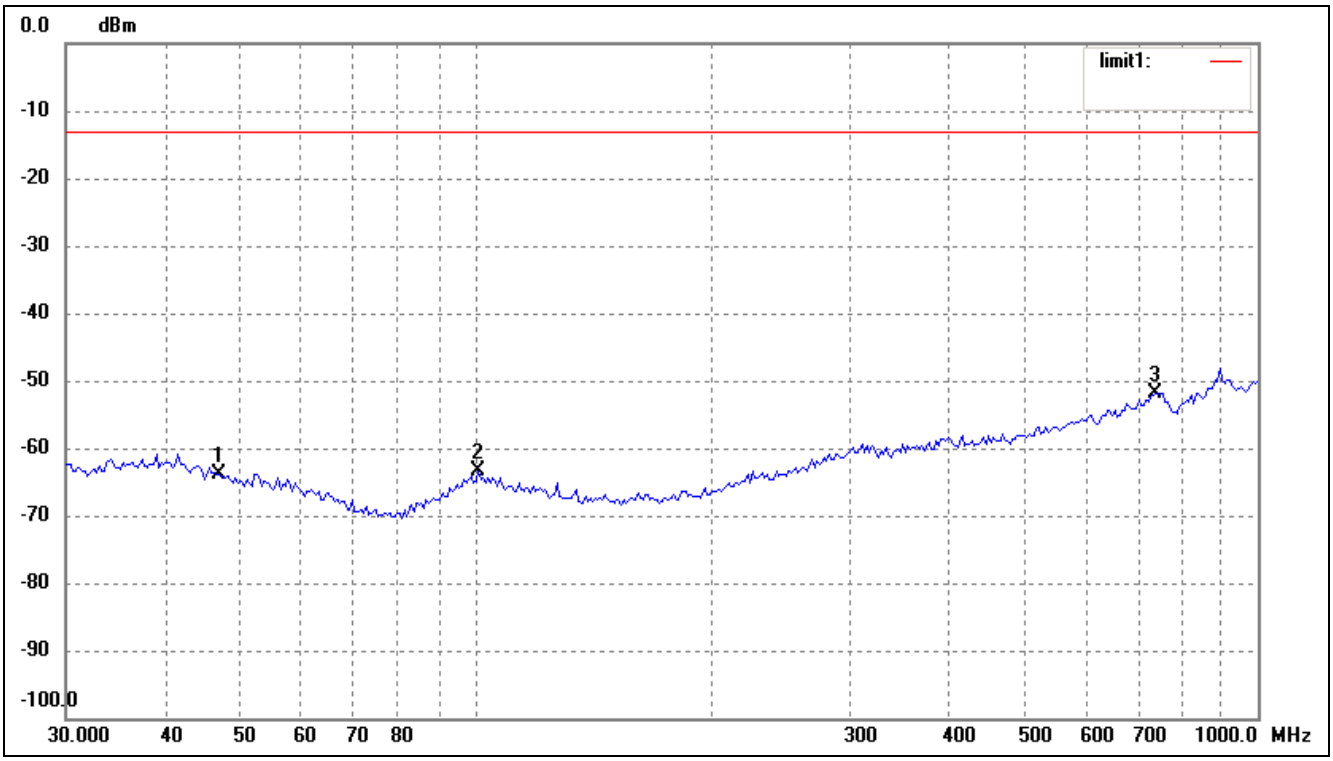



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 34.0365 | -81.12 | 20.52 | -60.60 | -13.00 | -47.60 | ERP |
| 2 | 176.8878 | -81.99 | 15.53 | -66.46 | -13.00 | -53.46 | ERP |
| 3 | 734.4913 | -81.50 | 29.48 | -52.02 | -13.00 | -39.02 | ERP |

*Remarks: Result = Reading + Correct Factor*

*For PCS Band_GSM Mode High Channel*

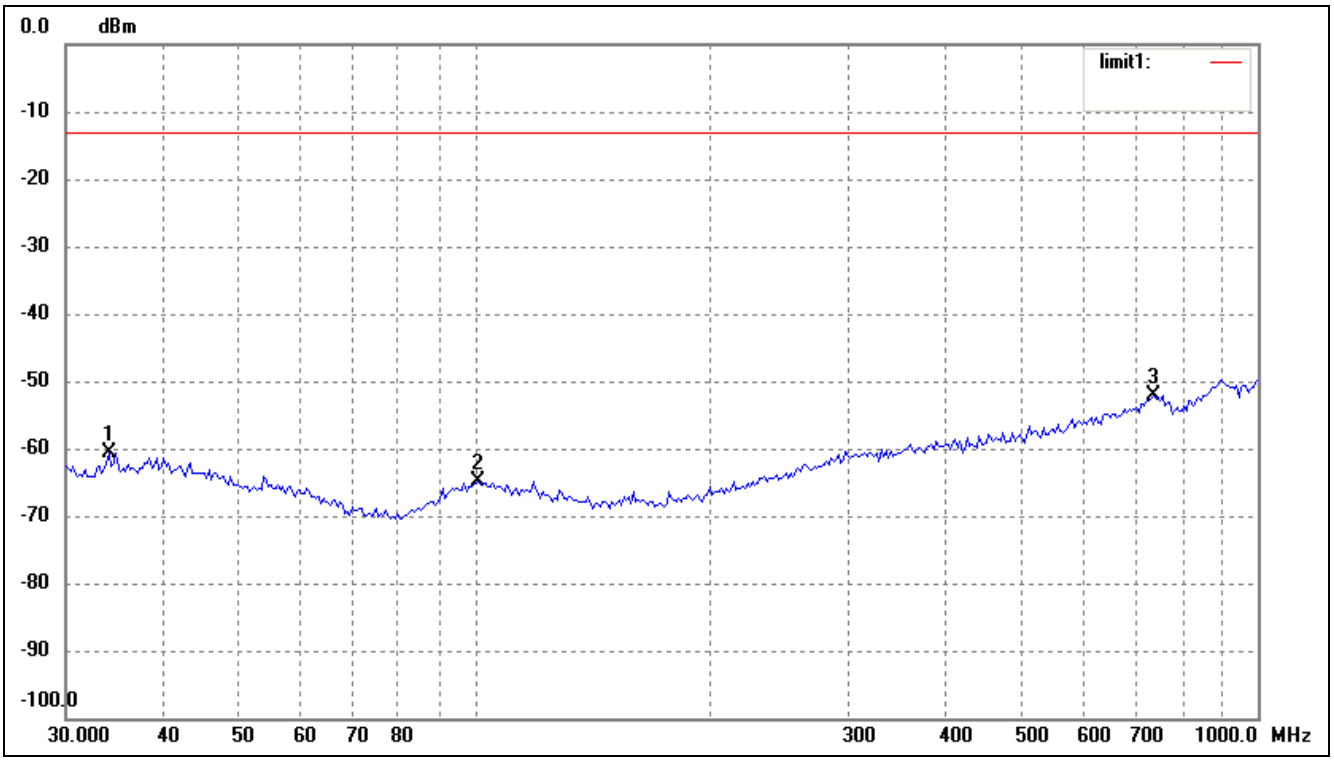
*Horizontal:*




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 46.9948 | -83.22 | 19.34 | -63.88 | -13.00 | -50.88 | ERP |
| 2 | 100.9340 | -81.91 | 18.55 | -63.36 | -13.00 | -50.36 | ERP |
| 3 | 739.6605 | -81.63 | 29.87 | -51.76 | -13.00 | -38.76 | ERP |

*Remarks: Result = Reading + Correct Factor*

*Vertical:*

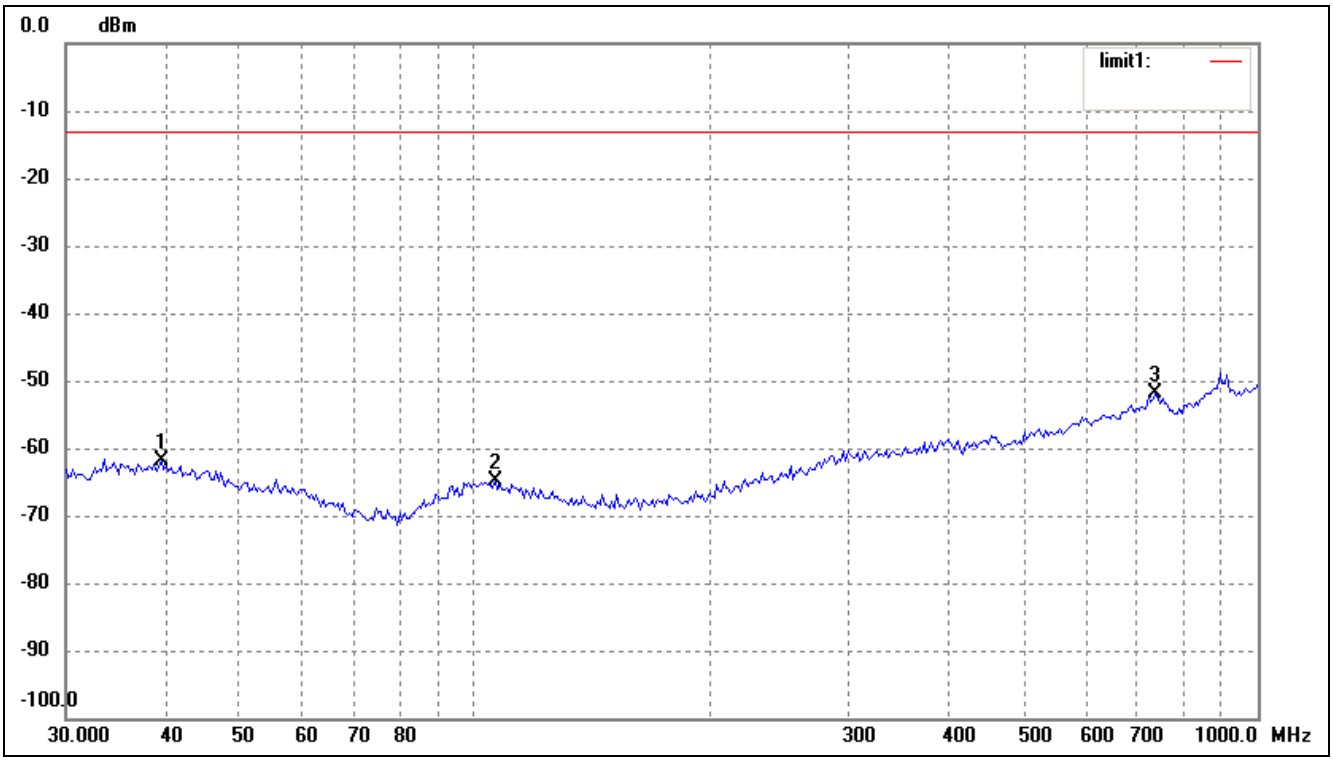



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 34.0365 | -81.12 | 20.52 | -60.60 | -13.00 | -47.60 | ERP |
| 2 | 100.9340 | -83.38 | 18.55 | -64.83 | -13.00 | -51.83 | ERP |
| 3 | 734.4913 | -81.50 | 29.48 | -52.02 | -13.00 | -39.02 | ERP |

*Remarks: Result = Reading + Correct Factor*

*For PCS Band_GPRS Mode Low Channel*

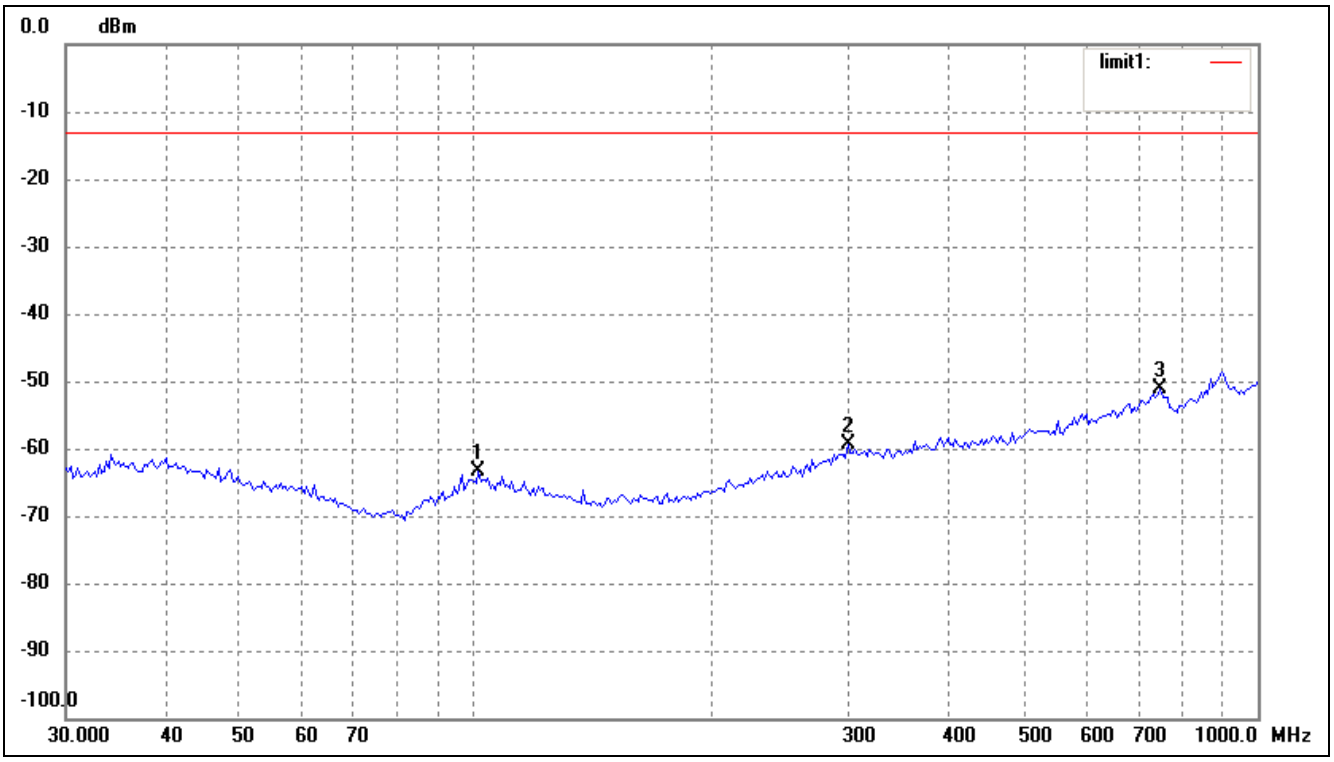
*Horizontal:*




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 39.7147 | -83.43 | 21.44 | -61.99 | -13.00 | -48.99 | ERP |
| 2 | 106.0126 | -83.03 | 18.04 | -64.99 | -13.00 | -51.99 | ERP |
| 3 | 739.6605 | -81.83 | 29.87 | -51.96 | -13.00 | -38.96 | ERP |

*Remarks: Result = Reading + Correct Factor*

*Vertical:*

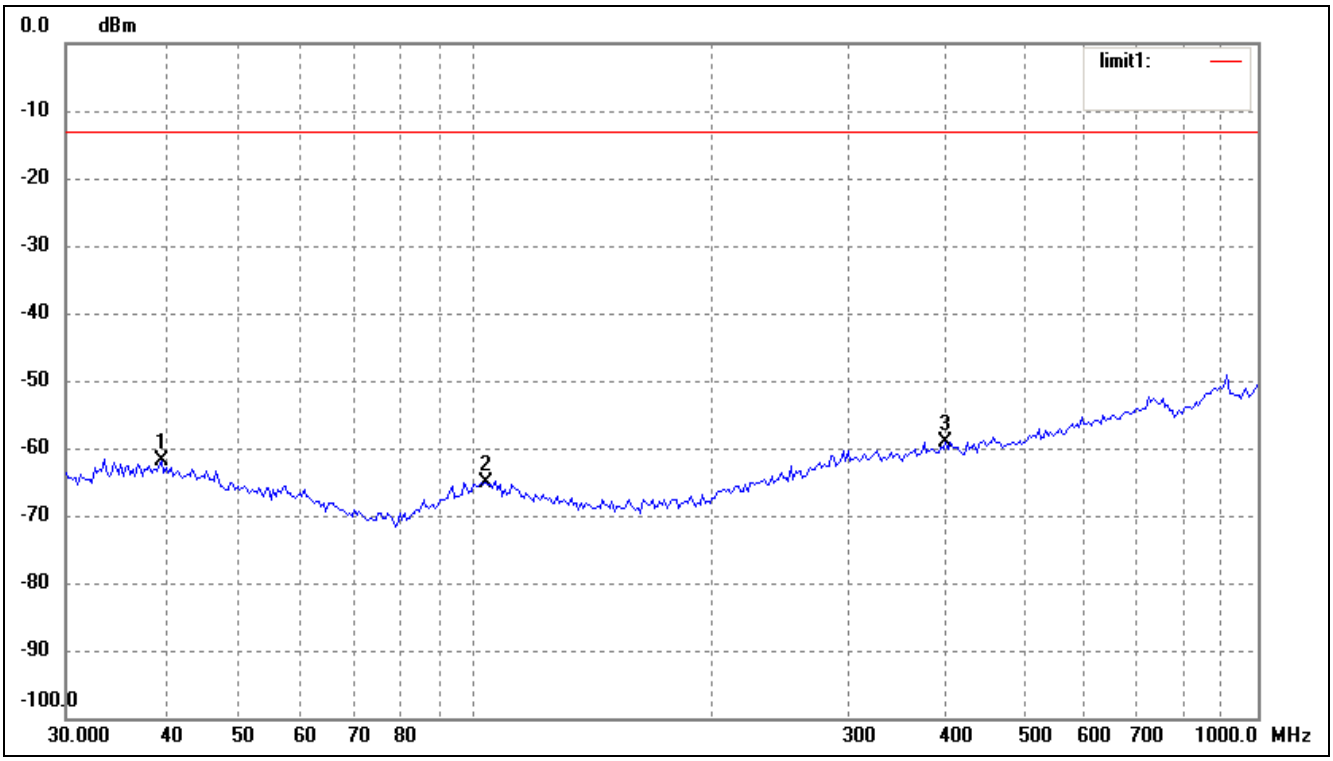



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 100.9340 | -81.96 | 18.55 | -63.41 | -13.00 | -50.41 | ERP |
| 2 | 299.3158 | -81.21 | 21.95 | -59.26 | -13.00 | -46.26 | ERP |
| 3 | 750.1083 | -80.64 | 29.58 | -51.06 | -13.00 | -38.06 | ERP |

*Remarks: Result = Reading + Correct Factor*

*For PCS Band_GPRS Mode Middle Channel*

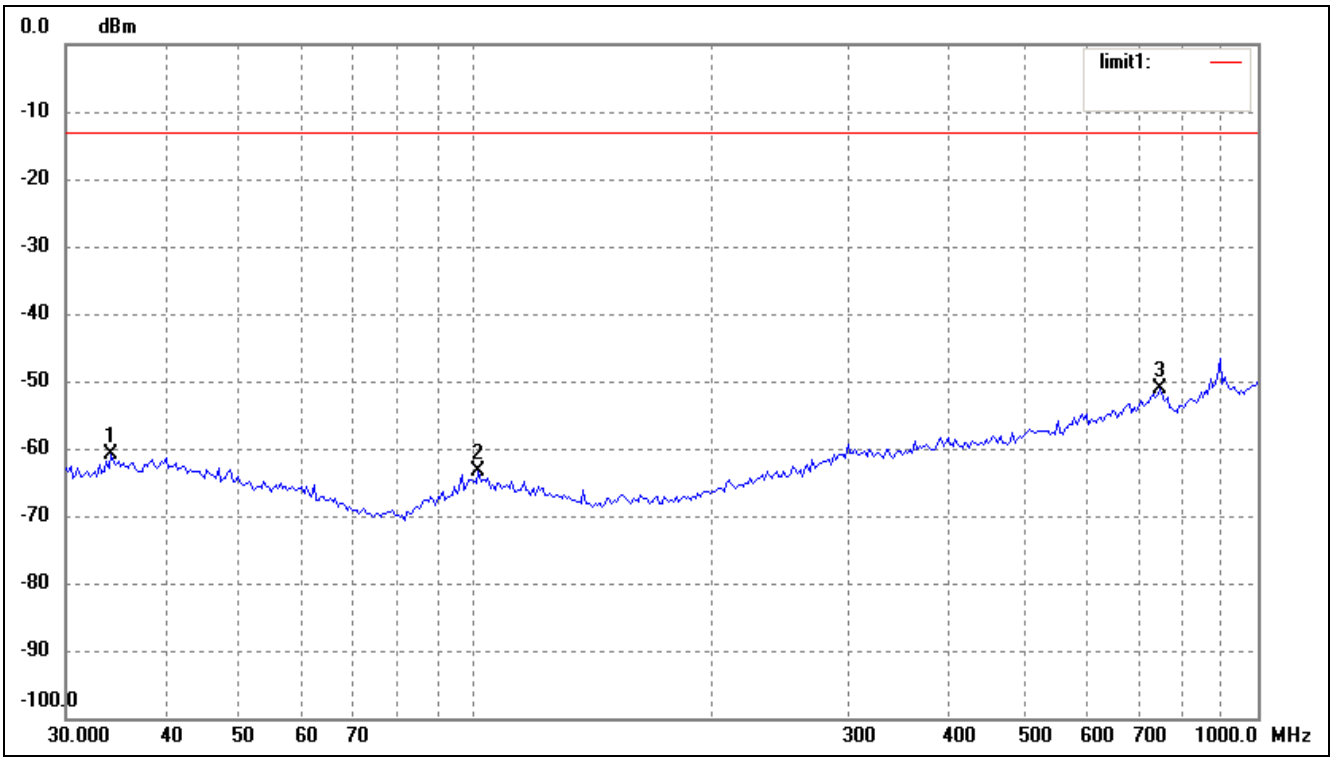
*Horizontal:*




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 39.7147 | -83.43 | 21.44 | -61.99 | -13.00 | -48.99 | ERP |
| 2 | 103.0800 | -83.37 | 18.34 | -65.03 | -13.00 | -52.03 | ERP |
| 3 | 399.0302 | -82.48 | 23.30 | -59.18 | -13.00 | -46.18 | ERP |

*Remarks: Result = Reading + Correct Factor*

*Vertical:*

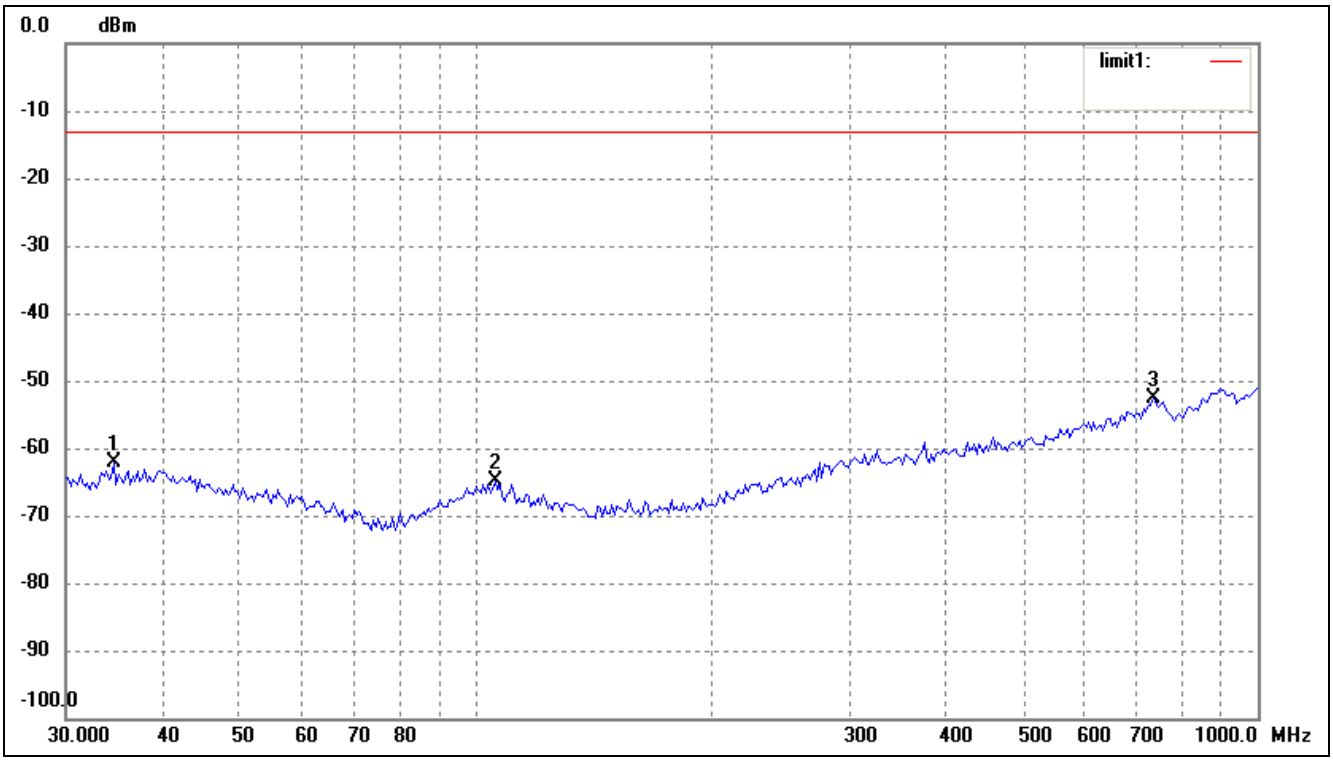



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 34.2760 | -81.32 | 20.56 | -60.76 | -13.00 | -47.76 | ERP |
| 2 | 100.9340 | -81.96 | 18.55 | -63.41 | -13.00 | -50.41 | ERP |
| 3 | 750.1083 | -80.64 | 29.58 | -51.06 | -13.00 | -38.06 | ERP |

*Remarks: Result = Reading + Correct Factor*

*For PCS Band_GPRS Mode High Channel*

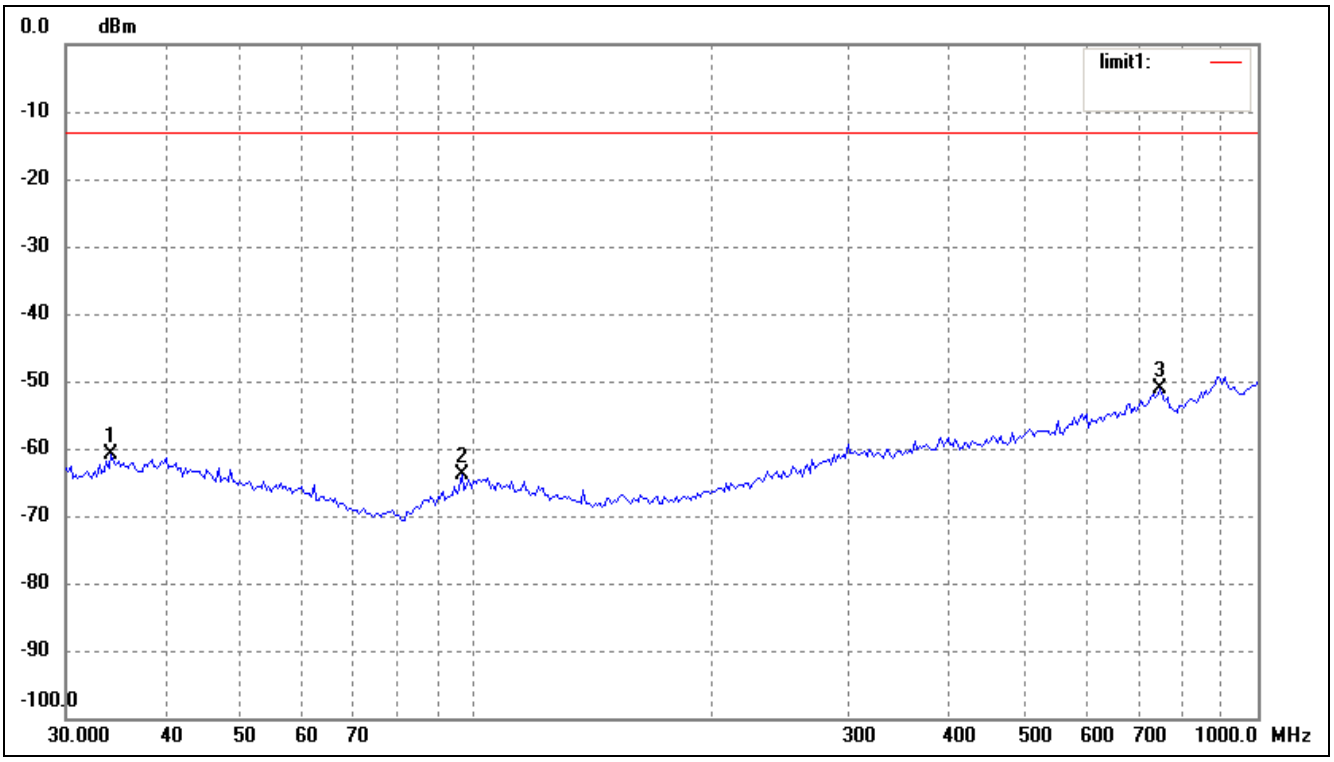
*Horizontal:*




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 34.5173 | -82.72 | 20.60 | -62.12 | -13.00 | -49.12 | ERP |
| 2 | 106.0126 | -83.03 | 18.04 | -64.99 | -13.00 | -51.99 | ERP |
| 3 | 734.4913 | -82.14 | 29.48 | -52.66 | -13.00 | -39.66 | ERP |

*Remarks: Result = Reading + Correct Factor*

*Vertical:*




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBm) | Factor(dB) | (dBm) | (dBm) | (dB) | |
| 1 | 34.2760 | -81.32 | 20.56 | -60.76 | -13.00 | -47.76 | ERP |
| 2 | 96.0986 | -81.53 | 17.67 | -63.86 | -13.00 | -50.86 | ERP |
| 3 | 750.1083 | -80.64 | 29.58 | -51.06 | -13.00 | -38.06 | ERP |

*Remarks: Result = Reading + Correct Factor*

*Spurious Emissions Above 1GHz*

*For Cellular Band_GSM Mode*

| Frequency | Reading | Correct | Result | Limit | Margin | Polar |
|---|---|---|---|---|---|---|
| (MHz) | (dBm) | dB | (dBm) | (dBm) | (dB) | H/V |
| Low Channel (824.2MHz) | | | | | | |
| 1648.4 | -48.6 | -1.84 | -50.44 | -13.00 | -37.44 | H |
| 2472.6 | -45.79 | 0.02 | -45.77 | -13.00 | -32.77 | H |
| 1648.4 | -44.82 | -1.84 | -46.66 | -13.00 | -33.66 | V |
| 2472.6 | -43.72 | 0.02 | -43.70 | -13.00 | -30.70 | V |
| Middle Channel (836.6MHz) | | | | | | |
| 1673.2 | -48.2 | -1.70 | -49.90 | -13.00 | -36.90 | H |
| 2509.8 | -45.98 | 0.10 | -45.88 | -13.00 | -32.88 | H |
| 1673.2 | -48.14 | -1.70 | -49.84 | -13.00 | -36.84 | V |
| 2509.8 | -46.62 | 0.10 | -46.52 | -13.00 | -33.52 | V |
| High Channel (848.8MHz) | | | | | | |
| 1697.6 | -44.78 | -1.55 | -46.33 | -13.00 | -33.33 | H |
| 2546.4 | -45.61 | 0.38 | -45.23 | -13.00 | -32.23 | H |
| 1697.6 | -44.85 | -1.55 | -46.40 | -13.00 | -33.40 | V |
| 2546.4 | -44.83 | 0.38 | -44.45 | -13.00 | -31.45 | V |

*For Cellular Band_GPRS Mode*

| Frequency | Reading | Correct | Result | Limit | Margin | Polar |
|---|---|---|---|---|---|---|
| (MHz) | (dBm) | dB | (dBm) | (dBm) | (dB) | H/V |
| Low Channel (824.2MHz) | | | | | | |
| 1648.4 | -44.59 | -1.84 | -46.43 | -13.00 | -33.43 | H |
| 2472.6 | -44.73 | 0.02 | -44.71 | -13.00 | -31.71 | H |
| 1648.4 | -47.72 | -1.84 | -49.56 | -13.00 | -36.56 | V |
| 2472.6 | -44.94 | 0.02 | -44.92 | -13.00 | -31.92 | V |
| Middle Channel (836.6MHz) | | | | | | |
| 1673.2 | -44.63 | -1.70 | -46.33 | -13.00 | -33.33 | H |
| 2509.8 | -44.69 | 0.10 | -44.59 | -13.00 | -31.59 | H |
| 1673.2 | -44.7 | -1.70 | -46.40 | -13.00 | -33.40 | V |
| 2509.8 | -44.55 | 0.10 | -44.45 | -13.00 | -31.45 | V |
| High Channel (848.8MHz) | | | | | | |
| 1697.6 | -44.47 | -1.55 | -46.02 | -13.00 | -33.02 | H |
| 2546.4 | -46.25 | 0.38 | -45.87 | -13.00 | -32.87 | H |
| 1697.6 | -48.7 | -1.55 | -50.25 | -13.00 | -37.25 | V |
| 2546.4 | -47.47 | 0.38 | -47.09 | -13.00 | -34.09 | V |

*For PCS Band_GSM Mode*

| Frequency | Reading | Correct | Result | Limit | Margin | Polar |
|---|---|---|---|---|---|---|
| (MHz) | (dBm) | dB | (dBm) | (dBm) | (dB) | H/V |
| Low Channel (1850.2MHz) | | | | | | |
| 3700.4 | -52.48 | 5.92 | -46.56 | -13.00 | -33.56 | H |
| 5550.6 | -55.15 | 10.24 | -44.91 | -13.00 | -31.91 | H |
| 3700.4 | -52.49 | 5.92 | -46.57 | -13.00 | -33.57 | V |
| 5550.6 | -54.64 | 10.24 | -44.40 | -13.00 | -31.40 | V |
| Middle Channel (1880MHz) | | | | | | |
| 3760.0 | -55.48 | 6.11 | -49.37 | -13.00 | -36.37 | H |
| 5640.0 | -55.6 | 10.17 | -45.43 | -13.00 | -32.43 | H |
| 3760.0 | -55.35 | 6.11 | -49.24 | -13.00 | -36.24 | V |
| 5640.0 | -54.79 | 10.17 | -44.62 | -13.00 | -31.62 | V |
| High Channel (1909.8MHz) | | | | | | |
| 3819.6 | -52.53 | 6.28 | -46.25 | -13.00 | -33.25 | H |
| 5729.4 | -54.45 | 10.11 | -44.34 | -13.00 | -31.34 | H |
| 3819.6 | -55.83 | 6.28 | -49.55 | -13.00 | -36.55 | V |
| 5729.4 | -55.19 | 10.11 | -45.08 | -13.00 | -32.08 | V |

*For PCS Band_GPRS Mode*

| Frequency | Reading | Correct | Result | Limit | Margin | Polar |
|---|---|---|---|---|---|---|
| (MHz) | (dBm) | dB | (dBm) | (dBm) | (dB) | H/V |
| Low Channel (1850.2MHz) | | | | | | |
| 3700.4 | -52.15 | 5.92 | -46.23 | -13.00 | -33.23 | H |
| 5550.6 | -54.08 | 10.24 | -43.84 | -13.00 | -30.84 | H |
| 3700.4 | -54.96 | 5.92 | -49.04 | -13.00 | -36.04 | V |
| 5550.6 | -56.79 | 10.24 | -46.55 | -13.00 | -33.55 | V |
| Middle Channel (1880MHz) | | | | | | |
| 3760.0 | -51.85 | 6.11 | -45.74 | -13.00 | -32.74 | H |
| 5640.0 | -54.51 | 10.17 | -44.34 | -13.00 | -31.34 | H |
| 3760.0 | -55 | 6.11 | -48.89 | -13.00 | -35.89 | V |
| 5640.0 | -56.82 | 10.17 | -46.65 | -13.00 | -33.65 | V |
| High Channel (1909.8MHz) | | | | | | |
| 3819.6 | -52.79 | 6.28 | -46.51 | -13.00 | -33.51 | H |
| 5729.4 | -55.91 | 10.11 | -45.80 | -13.00 | -32.80 | H |
| 3819.6 | -55.85 | 6.28 | -49.57 | -13.00 | -36.57 | V |
| 5729.4 | -56.36 | 10.11 | -46.25 | -13.00 | -33.25 | V |

*Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 10$^{th}$ Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

# 8. Frequency Stability

## 8.1 Standard Applicable

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Cellular Band

| Frequency range (MHz) | Base, fixed (ppm) | Mobile ≤3 watts (ppm) | Mobile ≤3 watts (ppm) |
|---|---|---|---|
| 25 to 50 | 20.0 | 20.0 | 50.0 |
| 50 to 450 | 5.0 | 5.0 | 50.0 |
| 450 to 512 | 2.5 | 5.0 | 5.0 |
| 821 to 896 | 1.5 | 2.5 | 2.5 |
| 928 to 929 | 5.0 | N/A | N/A |
| 929 to 960 | 1.5 | N/A | N/A |
| 2110 to 2220 | 10.0 | N/A | N/A |

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

## 8.2 Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Cal. Date | Due. Date |
|---|---|---|---|---|---|
| Aglient | Spectrum Analyzer | E4402B-ESA | US41192821 | 2013-05-07 | 2014-05-06 |
| Rohde & Schwarz | Universal Radio Communication | CMU200 | 112012 | 2013-05-07 | 2014-05-06 |
| GONGWEN | Moisture Test Chamber | GDS-150 | SEMT-0013 | 2013-05-07 | 2014-05-06 |

## 8.3 Test Procedure

According to §2.1055, the following test procedure was performed.
The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.
The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode

| Temperature: | Supply Voltage |
|---|---|
| 20°C | 85-115% of declared nominal voltage |
| -30°C to +50°C | Normal |

## 8.4 Environmental Conditions

| | |
|---|---|
| Temperature: | 20°C |
| Relative Humidity: | 54% |
| ATM Pressure: | 1011 mbar |

## 8.5 Summary of Test Results/Plots

For Cellular Band GSM Mode

| Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm | | | |
|---|---|---|---|
| Environment Temperature (°C) | Power Supplied (VDC) | Frequency Measure with Time Elapsed | |
| | | MCF (Hz) | Error (ppm) |
| 50 | 3.7 | -79 | -0.0994 |
| 40 | 3.7 | -57 | -0.0681 |
| 30 | 3.7 | -50 | -0.0598 |
| 20 | 3.7 | -33 | -0.0394 |
| 10 | 3.7 | -30 | -0.0359 |
| 0 | 3.7 | -42 | -0.0502 |
| -10 | 3.7 | -48 | -0.0574 |
| -20 | 3.7 | -52 | -0.0622 |
| -30 | 3.7 | -55 | -0.0657 |

For PCS Band GSM Mode

| Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm | | | |
|---|---|---|---|
| Environment Temperature (°C) | Power Supplied (VDC) | Frequency Measure with Time Elapsed | |
| | | MCF (Hz) | Error (ppm) |
| 50 | 3.7 | -78 | -0.0415 |
| 40 | 3.7 | -68 | -0.0360 |
| 30 | 3.7 | -55 | -0.0293 |
| 20 | 3.7 | -47 | -0.0250 |
| 10 | 3.7 | -48 | -0.0255 |
| 0 | 3.7 | -53 | -0.0282 |
| -10 | 3.7 | -58 | -0.0309 |
| -20 | 3.7 | -57 | -0.0303 |
| -30 | 3.7 | -63 | -0.0335 |

For Cellular Band GPRS Mode

| Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm | | | |
|---|---|---|---|
| Environment Temperature (°C) | Power Supplied (VDC) | Frequency Measure with Time Elapsed | |
| | | MCF (Hz) | Error (ppm) |
| 50 | 3.7 | -88 | -0.1053 |
| 40 | 3.7 | -60 | -0.0718 |
| 30 | 3.7 | -55 | -0.0658 |
| 20 | 3.7 | -36 | -0.0431 |
| 10 | 3.7 | -32 | -0.0383 |
| 0 | 3.7 | -36 | -0.0431 |
| -10 | 3.7 | -45 | -0.0538 |
| -20 | 3.7 | -60 | -0.0718 |
| -30 | 3.7 | -63 | -0.0754 |

For PCS Band GPRS Mode

| Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm | | | |
|---|---|---|---|
| Environment Temperature (°C) | Power Supplied (VDC) | Frequency Measure with Time Elapsed | |
| | | MCF (Hz) | Error (ppm) |
| 50 | 3.7 | -69 | -0.0367 |
| 40 | 3.7 | -67 | -0.0356 |
| 30 | 3.7 | -46 | -0.0245 |
| 20 | 3.7 | -35 | -0.0186 |
| 10 | 3.7 | -40 | -0.0160 |
| 0 | 3.7 | -39 | -0.0207 |
| -10 | 3.7 | -44 | -0.0234 |
| -20 | 3.7 | -58 | -0.0309 |
| -30 | 3.7 | -56 | -0.0298 |

So, Frequency Stability Versus Input Voltage is:

| Reference Frequency(Middle Channel): GSM 836.6MHz, Limit: 2.5ppm | | | |
|---|---|---|---|
| Environment Temperature (°C) | Power Supplied (VDC) | Frequency Measure with Time Elapsed | |
| | | Frequency (Hz) | Error (ppm) |
| 20 | 3.3 | -33 | -0.0394 |
| | 3.7 | -33 | -0.0394 |
| | 4.2 | -38 | -0.0455 |
| Reference Frequency(Middle Channel): GSM 1880 MHz, Limit: 2.5ppm | | | |
| Environment Temperature (°C) | Power Supplied (VDC) | Frequency Measure with Time Elapsed | |
| | | Frequency (Hz) | Error (ppm) |
| 20 | 3.3 | -52 | -0.0277 |
| | 3.7 | -47 | -0.0250 |
| | 4.2 | -49 | -0.0261 |
| Reference Frequency(Middle Channel): GPRS 836.6MHz, Limit: 2.5ppm | | | |
| Environment Temperature (°C) | Power Supplied (VDC) | Frequency Measure with Time Elapsed | |
| | | Frequency (Hz) | Error (ppm) |
| 20 | 3.3 | -38 | -0.0455 |
| | 3.7 | -36 | -0.0431 |
| | 4.2 | -39 | -0.0467 |
| Reference Frequency(Middle Channel): GPRS 1880 MHz, Limit: 2.5ppm | | | |
| Environment Temperature (°C) | Power Supplied (VDC) | Frequency Measure with Time Elapsed | |
| | | Frequency (Hz) | Error (ppm) |
| 20 | 3.3 | -33 | -0.0176 |
| | 3.7 | -35 | -0.0186 |
| | 4.2 | -38 | -0.0202 |

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