

# FCC PART PART 24E



## Measurement and Test Report

For

**ARS Global Guiding, Inc.**

**225 S. LAKE AVE., SUITE 545 PASADENA, CA 91101**

**FCC ID: YA2ARS3000A**

<b>Report Concerns:</b> Original Report	<b>Equipment Type:</b> Auto Remote service Unit
<b>Model:</b>	<u>ARS-3000A</u>
<b>Report No.:</b>	<u>STR10038090I-1</u>
<b>Test/Witness Engineer:</b>	
<b>Test Date:</b>	<u>2010-04-06 to 2010-04-14</u>
<b>Issue Date:</b>	<u>2010-04-16</u>
<b>Prepared By:</b>	<p><b>SEM.Test Compliance Service Co., Ltd</b> 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C. (518101)</p>
<b>Approved &amp; Authorized By:</b>	 <hr/> Jandy So / PSQ Manager

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by SEM.Test Compliance Service Co., Ltd.

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## 1. GENERAL INFORMATION

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

#### Client Information

Applicant: ARS Global Guiding, Inc.  
Address of applicant: 225 S.LAKE AVE., SUITE 545 PASADENA, CA91101

Manufacturer: MIT ELECTRONIC CO., LTD.  
Address of manufacturer: Wuzhishan Road YTETDZ. Yantai, P.R.China

#### General Description of E.U.T

Items	Description
EUT Description:	Auto Remote Service Unit
Trade Name:	/
Model No.:	ARS-3000A
Rated Voltage:	DC12V
Frequency range:	Tx: 1850.20 ~ 1909.8 MHz (PCS 1900 band) Rx: 1930.20 ~ 1989.8 MHz (PCS 1900 band)
RF Output Power:	29.82dBm
Cellular Phone Protocol:	PCS 1900MHz, GPRS Class12 1900MHz
Type of Emission:	250KGXW ,/ 250KG7W
Type of Antenna:	Integral Antenna
Size:	26.5X10.1X8.5cm

*Note: The test data is gathered from a production sample, provided by the manufacturer.*

### 1.2 Test Standards

The following report is prepared on behalf of the ARS Global Guiding, Inc. in accordance with FCC Part 2 subpart J and FCC Part 24 subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 2 subpart J 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 Related Submittal(s)/Grant(s)

No Related Submittal(s).

## 1.4 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.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted with Low Channel, Middle Channel and High Channel, accordingly in reference to the Operating Instructions.

## 1.5 Test Facility

- **FCC – Registration No.: 994117**

SEM.Test Compliance Services 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.: 7673A**

The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

## 1.6 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components.

## 1.7 Accessories Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

## 1.8 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
Power Cable	1.2	Unshielded	Without Core
I/O Cable	3.0	Shielded	With Core
AV Cable	4.0	Unshielded	Without Core

## 2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 1.1307 § 2.1093	RF Exposure	Compliant
§ 15.207	Conducted Emission	N/A
§ 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**

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#### **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 comply with the requirement of the RF exposure, please see the RF Exposure evaluation 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.

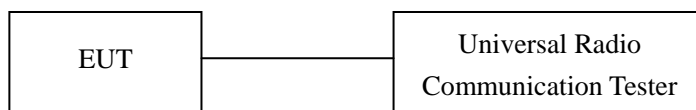
### 4.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Rohde & Schwarz	FSEA20	DE25181	2009-08-12	2010-08-11
Positioning Controller	C&C	CC-C-1F	N/A	2009-08-12	2010-08-11
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2009-07-21	2010-07-20
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2009-07-21	2010-07-20
RF Switch	EM	EMSW18	SW060023	2009-08-12	2010-08-11
Amplifier	Agilent	8447F	3113A06717	2009-08-12	2010-08-11
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2009-08-12	2010-08-11
EMI Test Receiver	Rohde & Schwarz	ESPI	25498514	2009-08-12	2010-08-11
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	112012	2009-08-12	2010-08-11

**Statement of Traceability:** All calibrations have been performed per the NVLAP requirements traceable to the NIST.

### 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

Conducted output power

For PCS Band

Test Mode	Channel	Frequency (MHz)	Output Power (dBm)	FCC Part 24.232 Limit (dBm)
GSM	Low Channel	1850.2	28.59	33
	Middle Channel	1880.0	29.32	33
	High Channel	1909.8	29.82	33
GPRS	Low Channel	1850.2	29.32	33
	Middle Channel	1880.0	29.30	33
	High Channel	1909.8	29.81	33



## EIRP for PCS band GSM mode

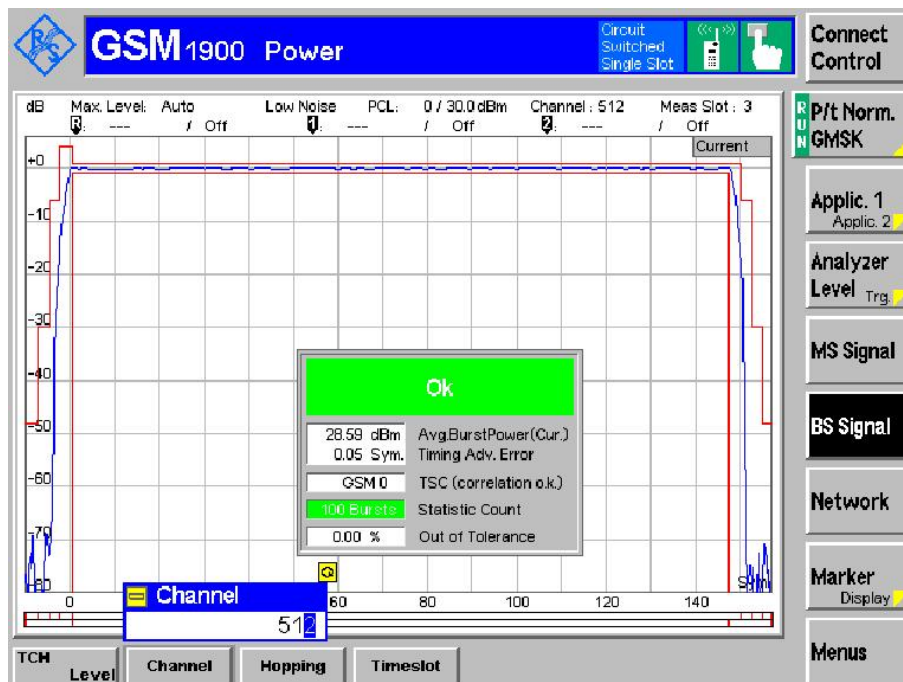
Frequency	Substitute SG Reading	Height	Table	Polar	Cable loss	Antenna Gain	Emission Level	Margin	FCC Part 24 Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm	dBm
Low Channel									
1850.2	32.55	1	180	H	3.2	7.85	27.9	-5.1	33
1850.2	33.35	1	196	V	3.2	7.85	28.7	-4.3	33
Middle Channel									
1880	32	1.2	360	H	3.3	7.8	27.5	-5.5	33
1880	33.4	1.2	25	V	3.3	7.8	28.9	-4.1	33
High Channel									
1909.8	32.58	1	25	H	3.4	7.78	28.2	-4.8	33
1909.8	33.08	1	25	V	3.4	7.78	28.7	-4.3	33

## EIRP for PCS band GPRS mode

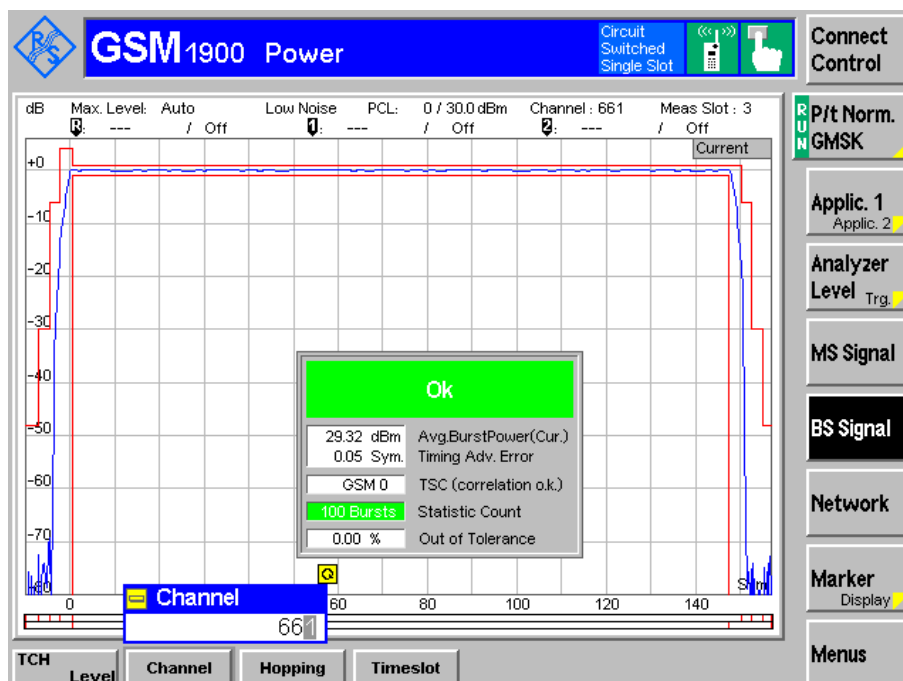
Frequency	Substitute SG Reading	Height	Table	Polar	Cable loss	Antenna Gain	Corrected Ampl.	Emission Level	FCC Part 24 Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm	dBm
Low Channel									
1850.2	32.35	1.5	180	H	3.2	7.85	27.7	-5.3	33
1850.2	33.15	1.5	196	V	3.2	7.85	28.5	-4.5	33
Middle Channel									
1880	31.8	1	0	H	3.3	7.8	27.3	-5.7	33
1880	32.7	1	10	V	3.3	7.8	28.2	-4.8	33
High Channel									
1909.8	31.48	1	253	H	3.4	7.78	27.1	-5.9	33
1909.8	32.78	1	254	V	3.4	7.78	28.4	-4.6	33

Please refer to the following test plots:

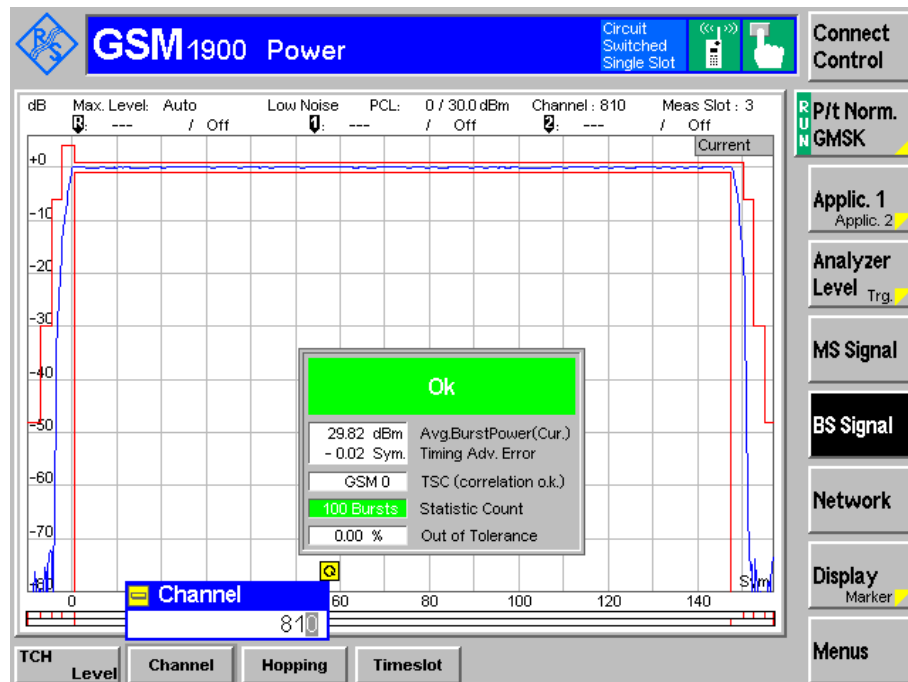
## GSM Low Channel



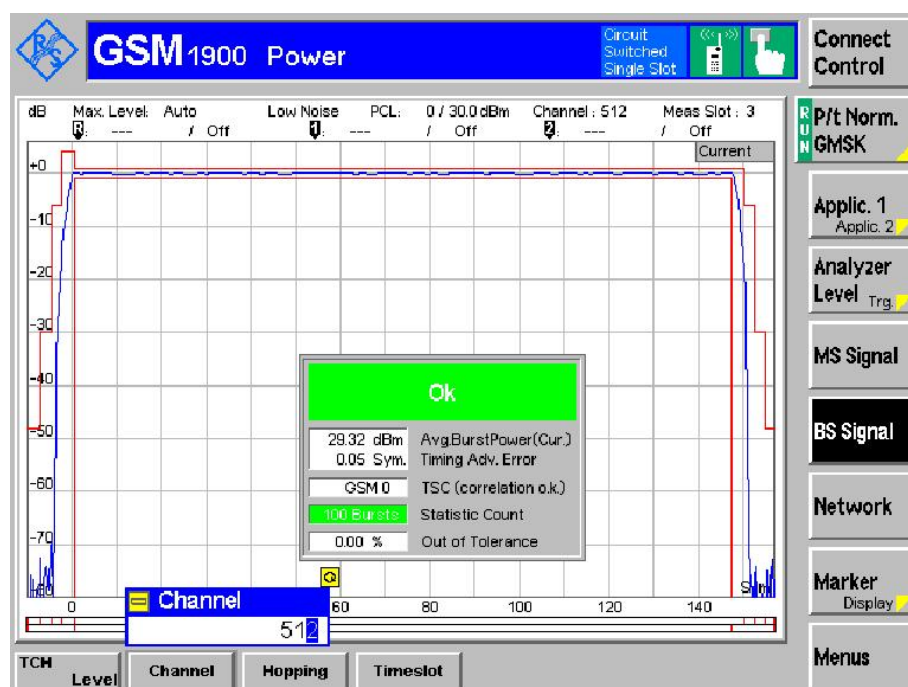
## GSM Middle Channel



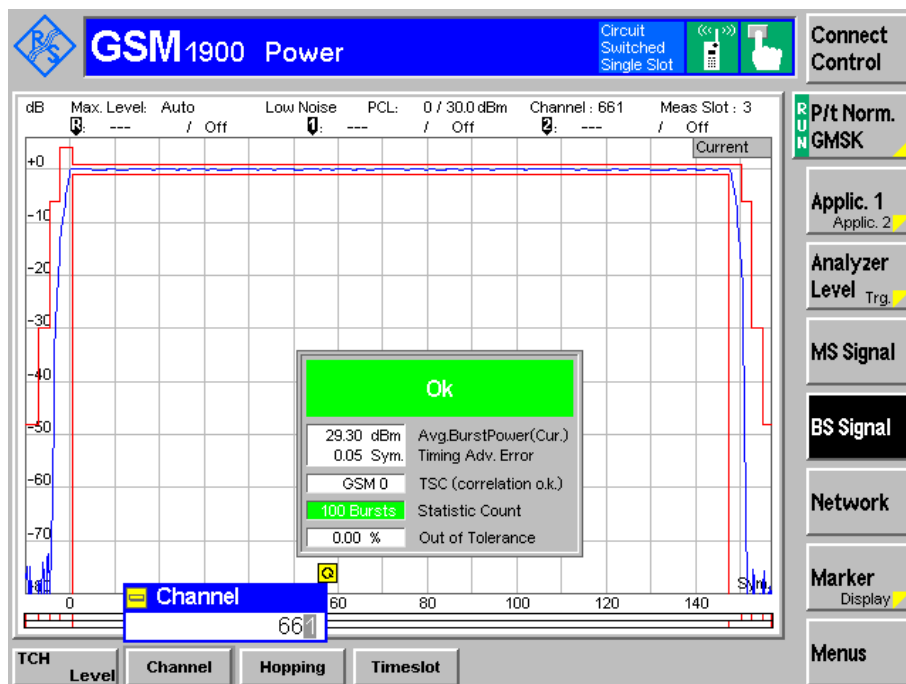
## GSM Middle Channel



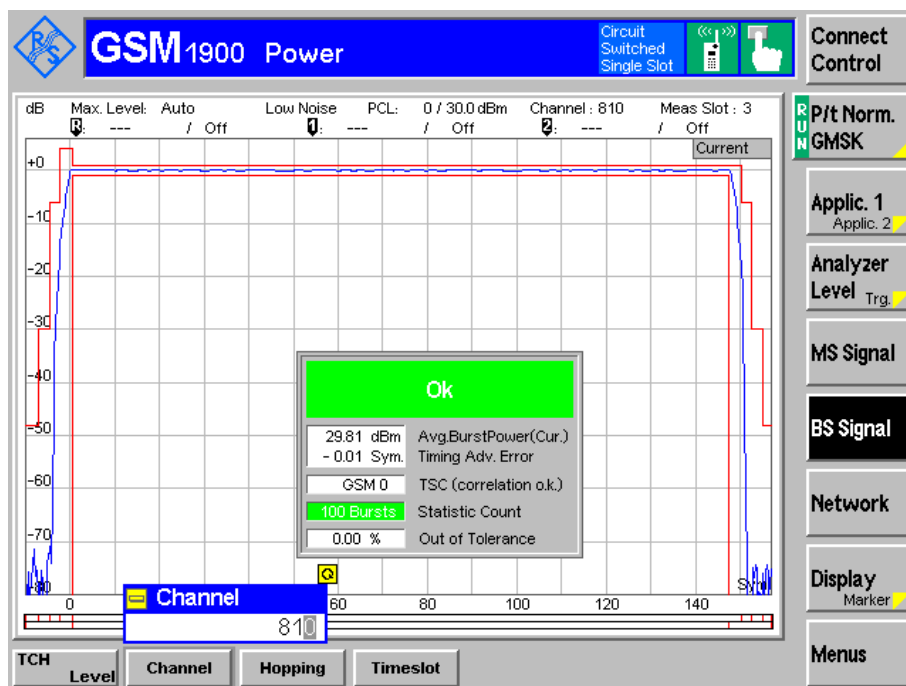
## GPRS Low Channel



## GPRS Middle Channel



## GPRS High Channel



## 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

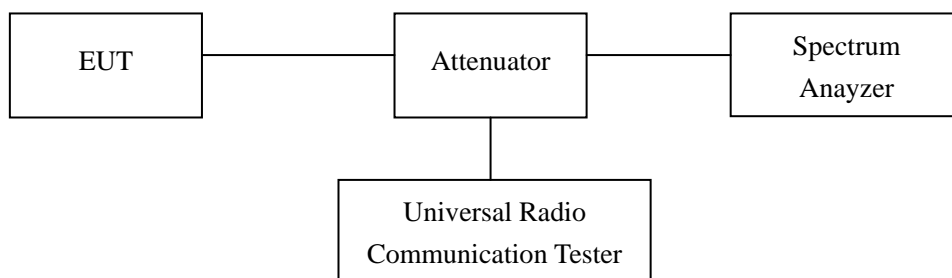
Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B	US41192821	2009-08-12	2010-08-11
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	112012	2009-08-12	2010-08-11

**Statement of Traceability:** All calibrations have been performed per the NVLAP requirements traceable to the NIST.

### 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 PCS Band

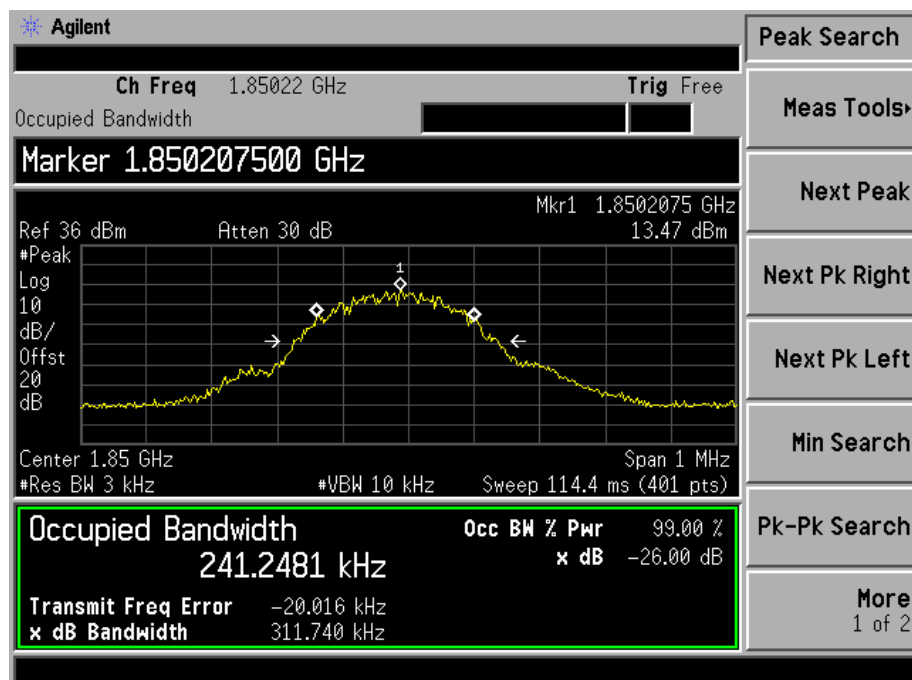
Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
512	1850.2	241.2481	311.740
661	1880.0	243.2865	311.140
810	1909.8	244.0412	313.163

For GPRS Band

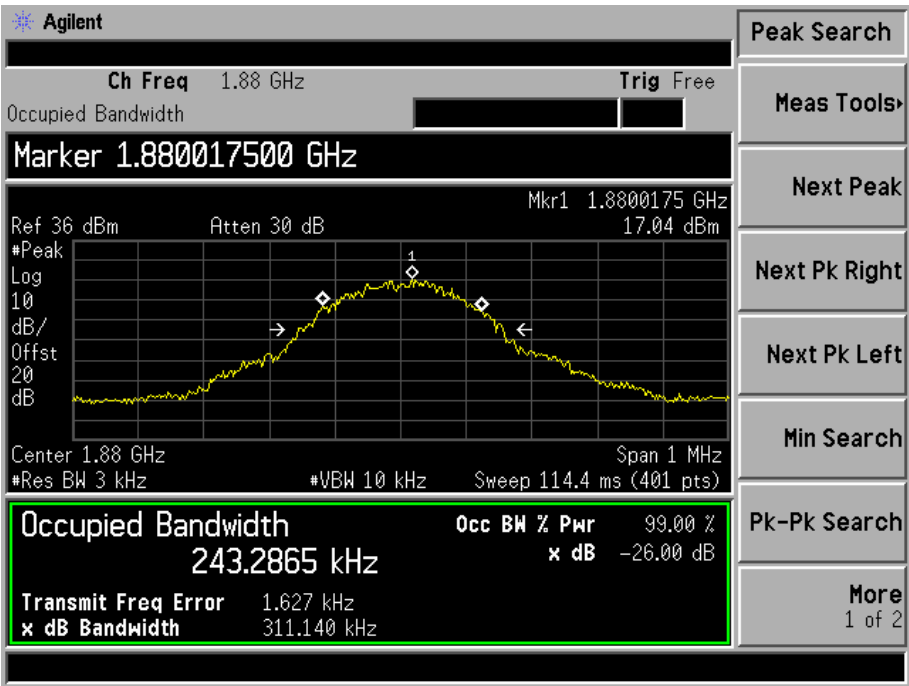
Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
512	1850.2	242.0412	311.155
661	1880.0	243.5621	311.140
810	1909.8	242.4830	312.585

Please refer to the following test plots:

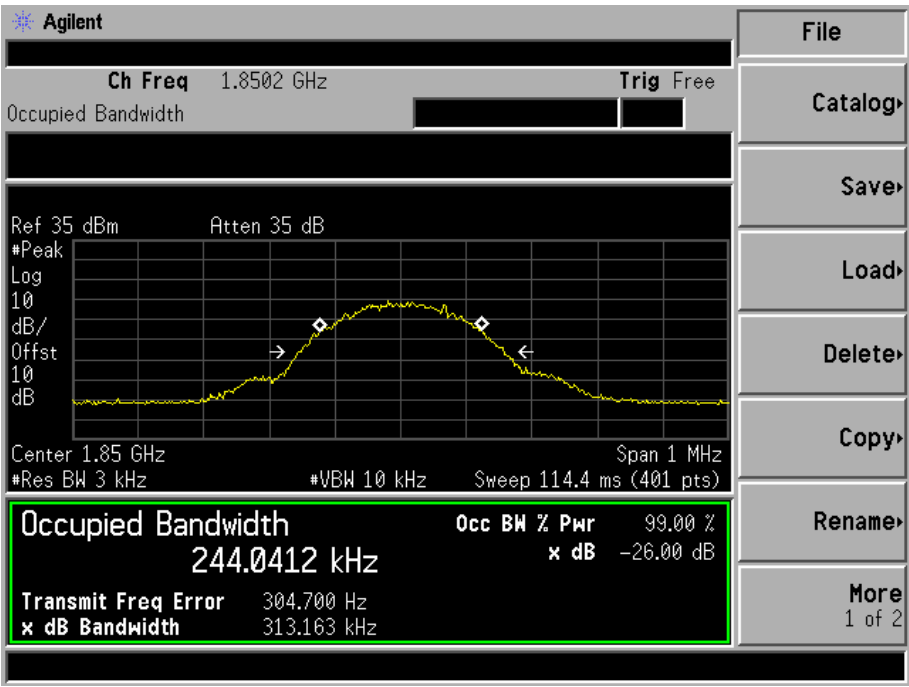
GSM Low Channel



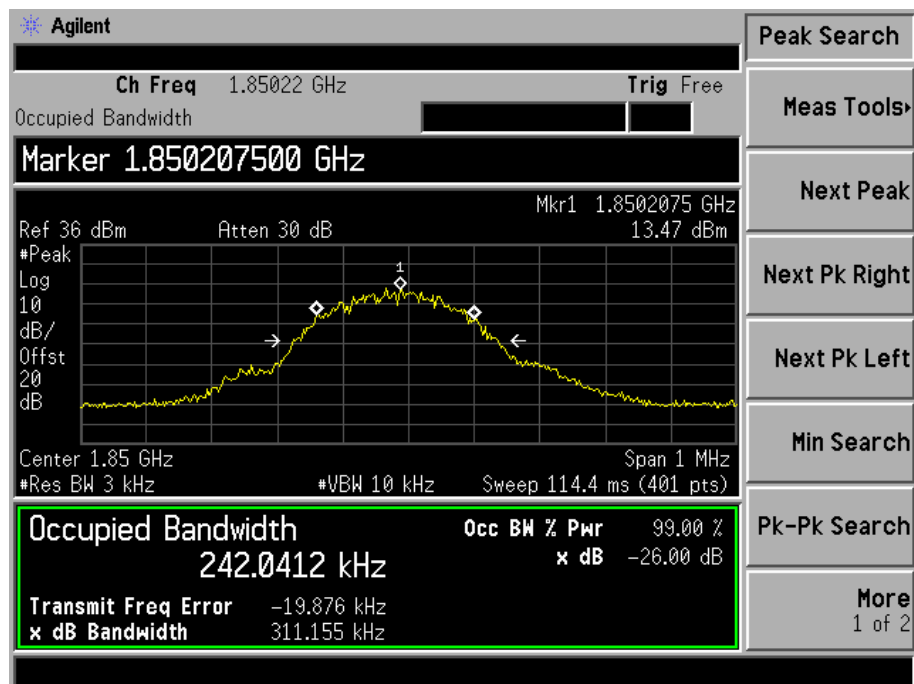
GSM Middle Channel



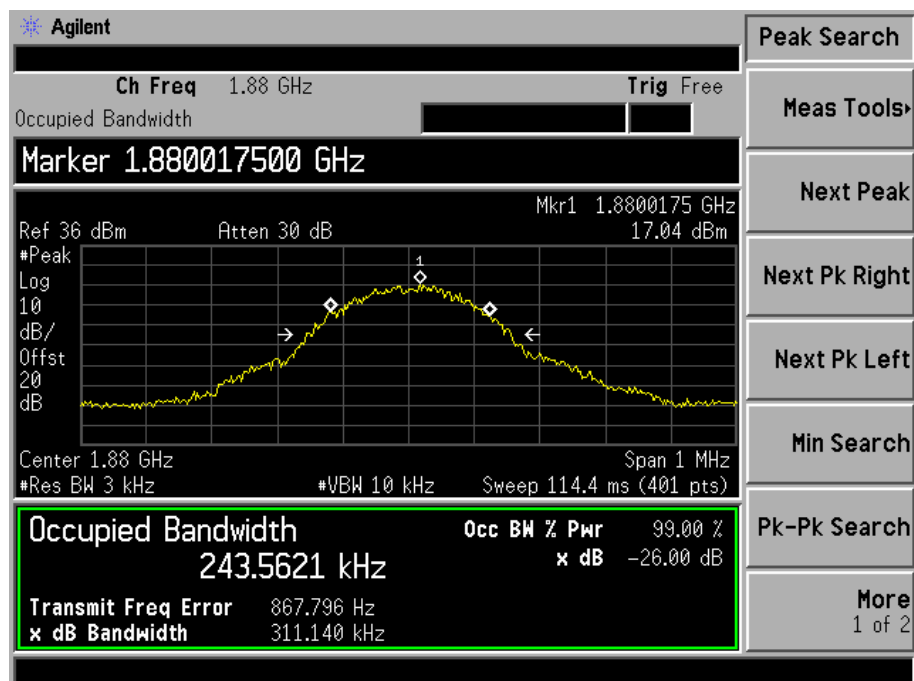
GSM High channel



## GPRS Low Channel

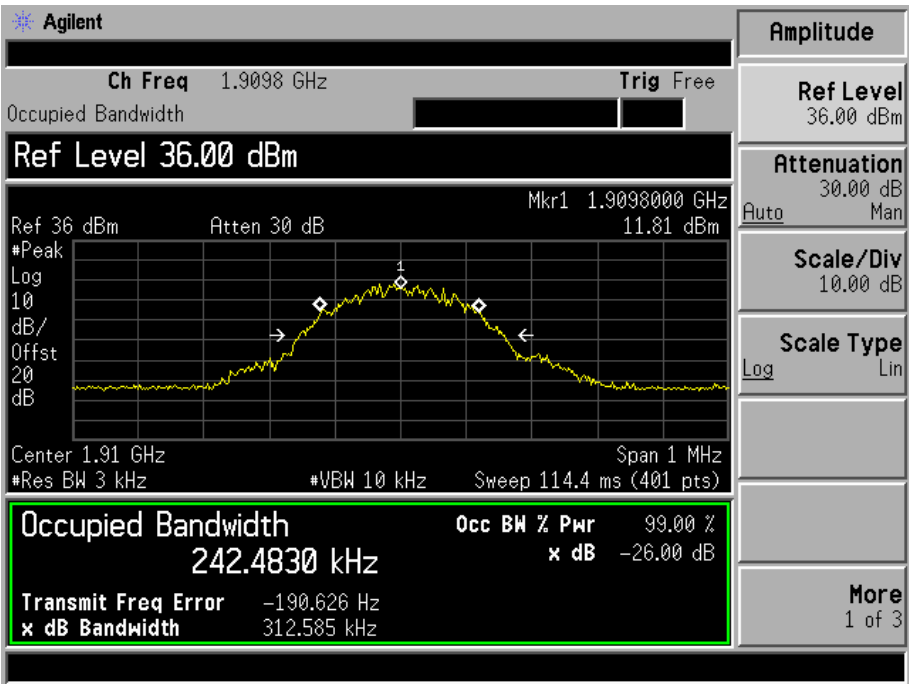


## GPRS Middle Channel





GSM High Channel



## 6. OUT OF BAND EMISSION AT ANTENNA TERMINAL

### 6.1 Standard Applicable

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

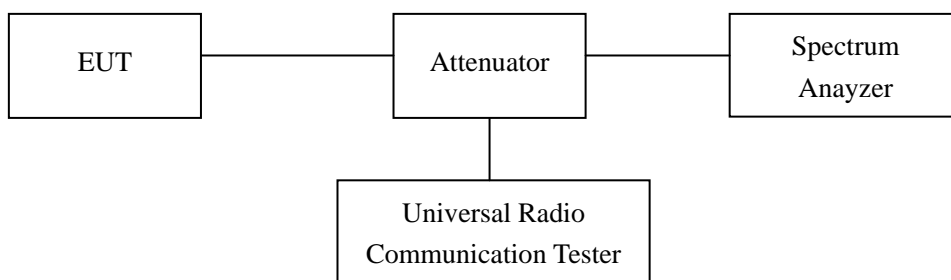
Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B	US41192821	2009-08-12	2010-08-11
Rohde & Schwarz	Spectrum Analyzer	FSP	836079/035	2009-08-12	2010-08-11
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	112012	2009-08-12	2010-08-11

**Statement of Traceability:** All calibrations have been performed per the NVLAP requirements traceable to the NIST.

### 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<sup>th</sup> harmonic.

Test Configuration for the out of band emissions testing:



### 6.4 Environmental Conditions

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

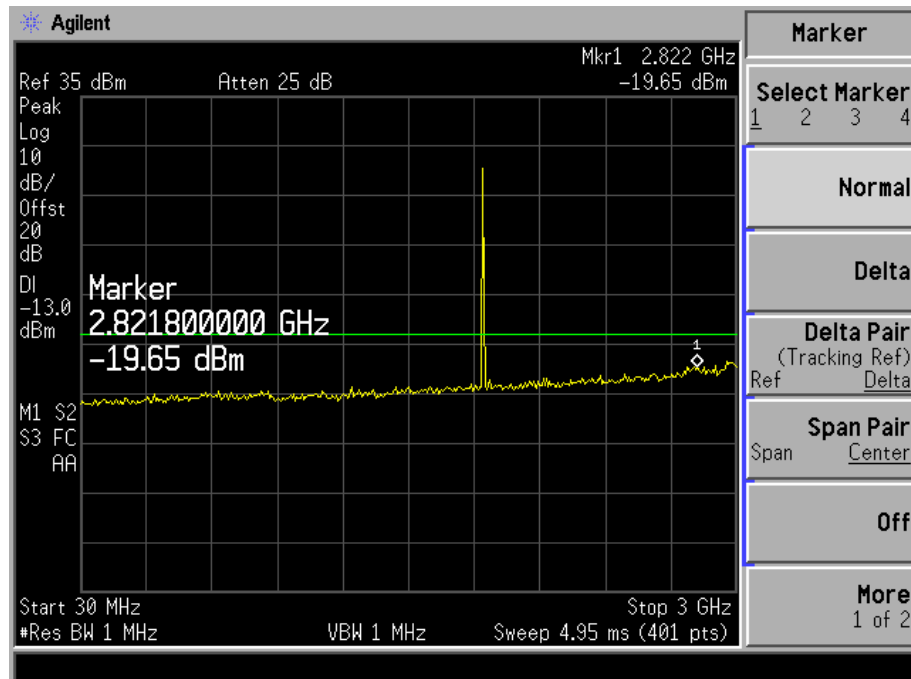
## 6.5 Summary of Test Results/Plots

Please refer to the following test plots

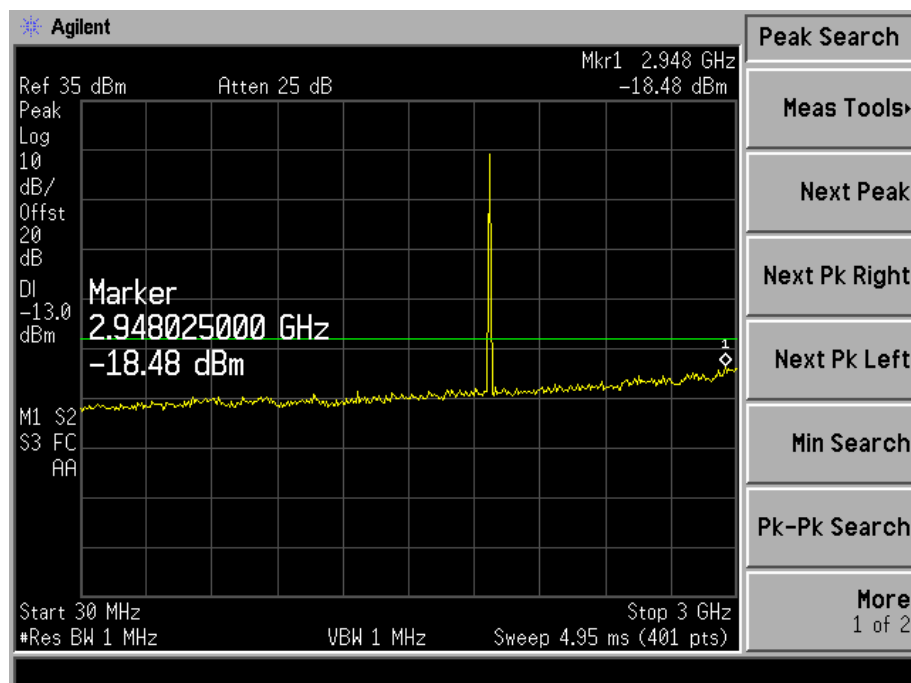
For PCS Band GSM Mode

From 30MHz to 1000MHz

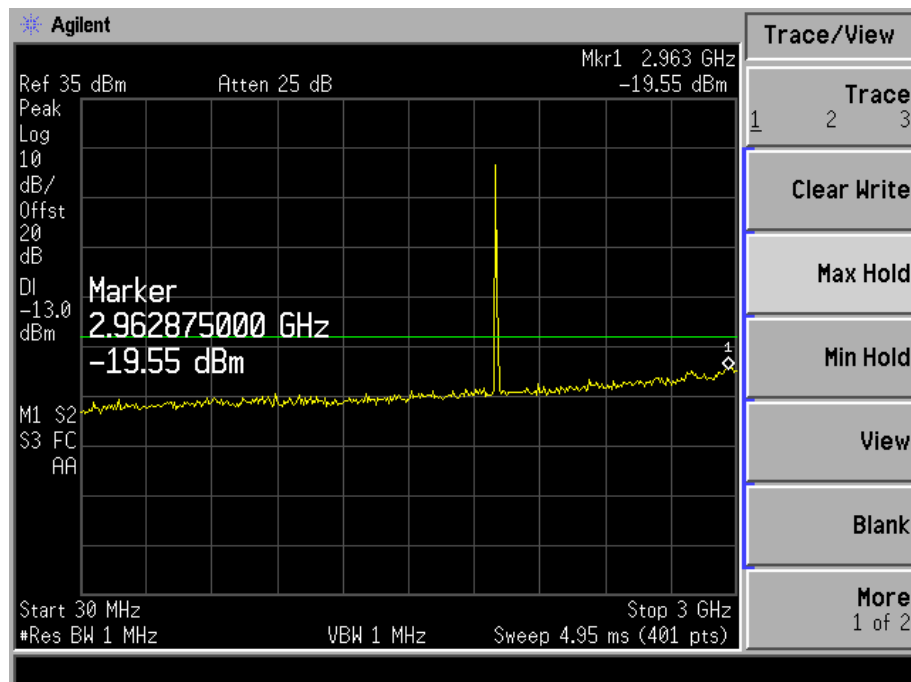
Low Channel



Middle Channel

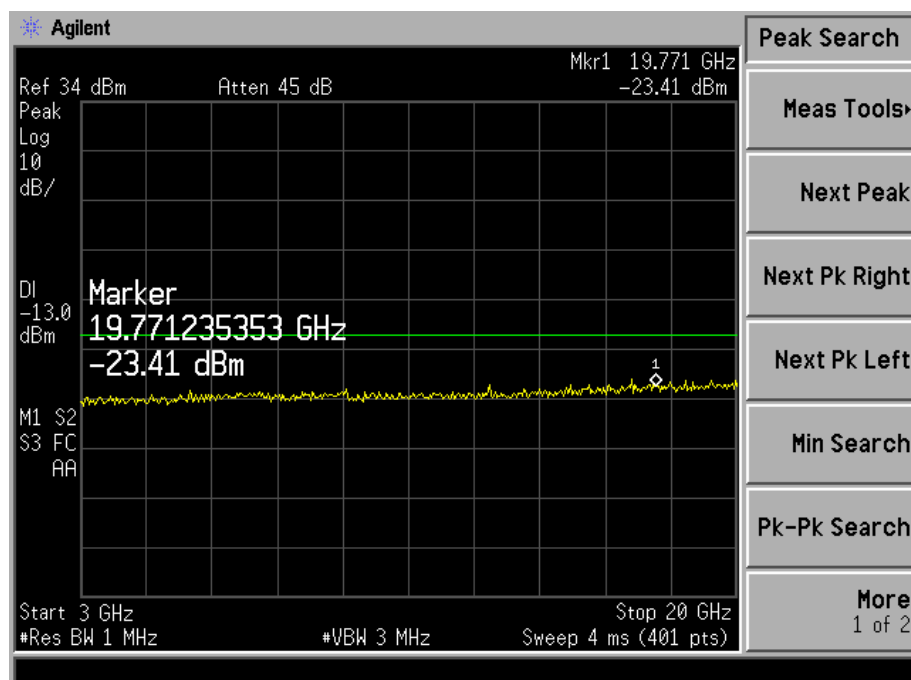


## High Channel

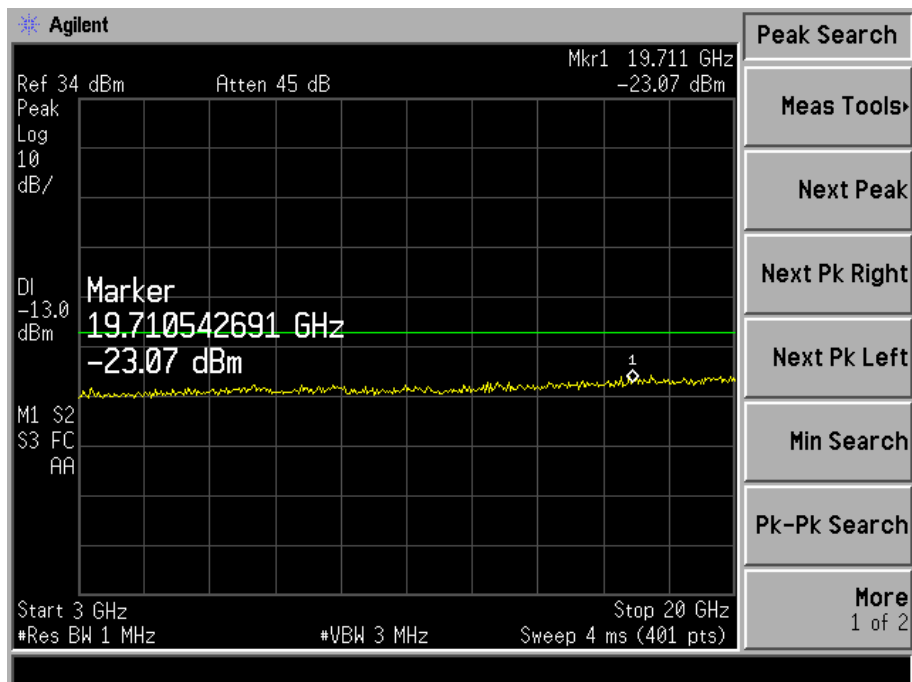


## Above 1GHz

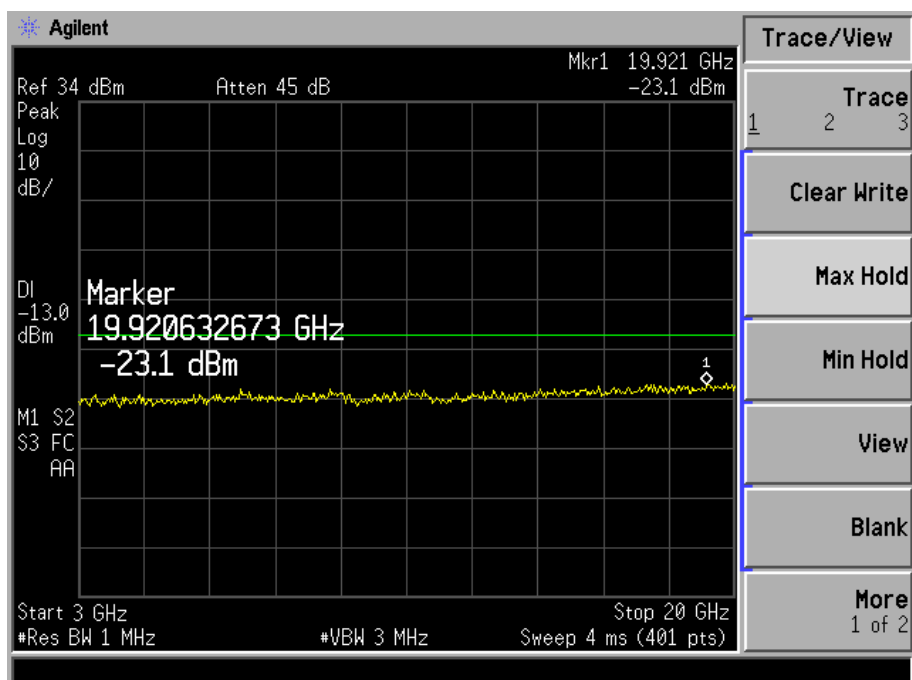
## Low Channel



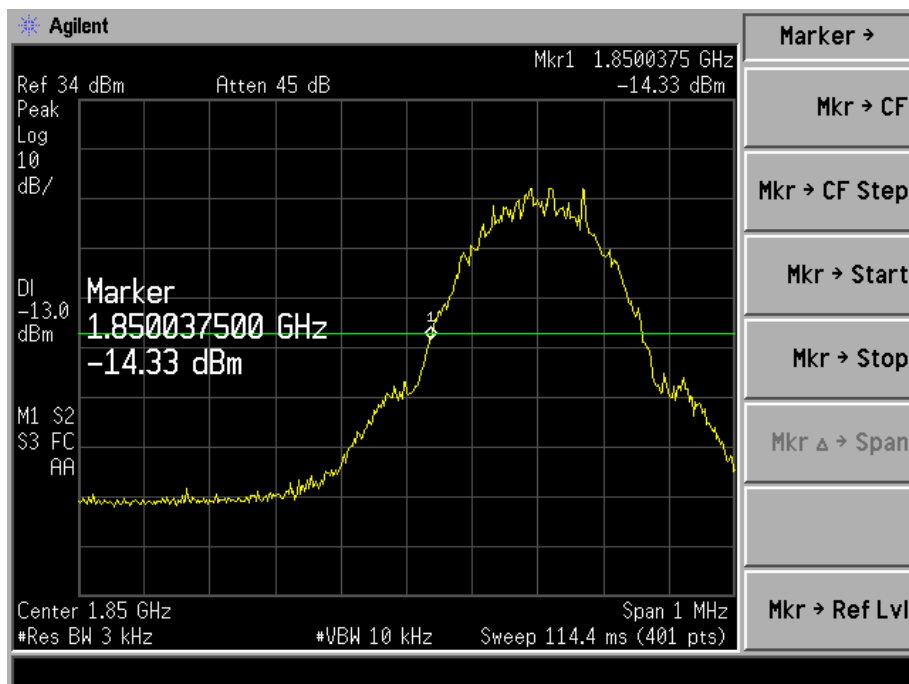
## Middle Channel



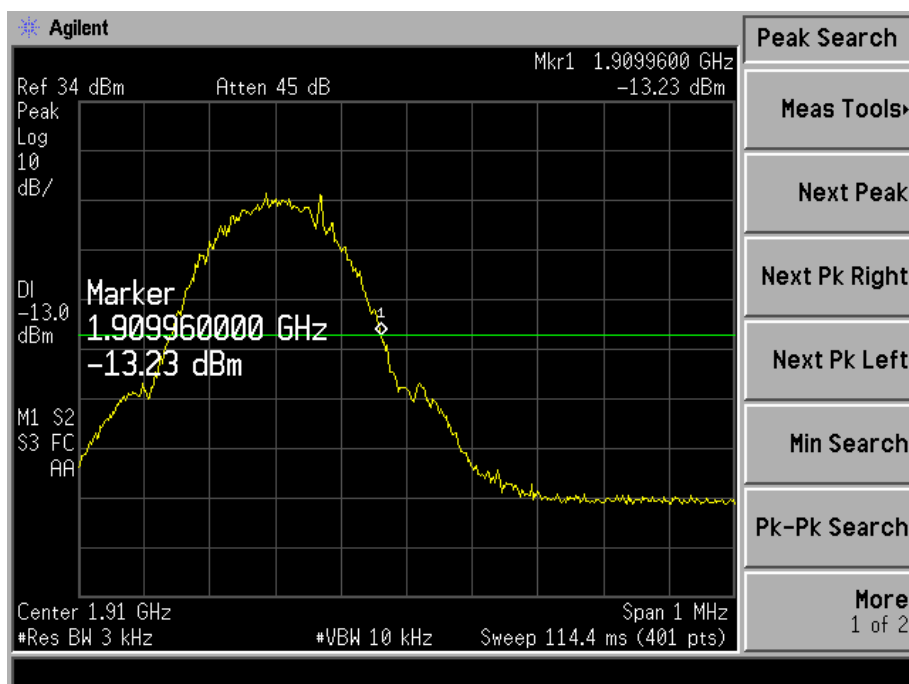
## High Channel



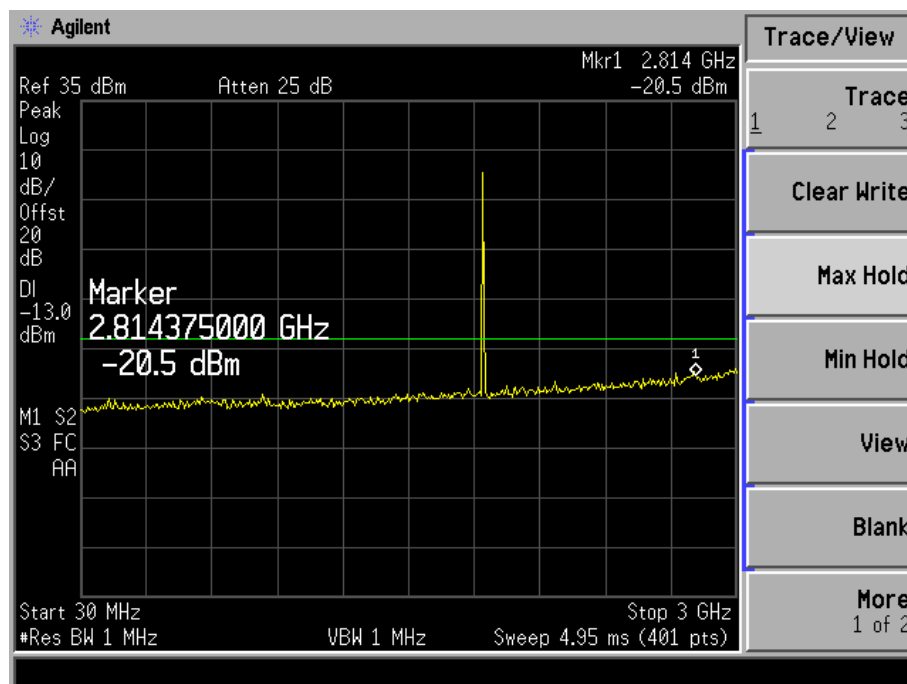
## GSM Low band Emission



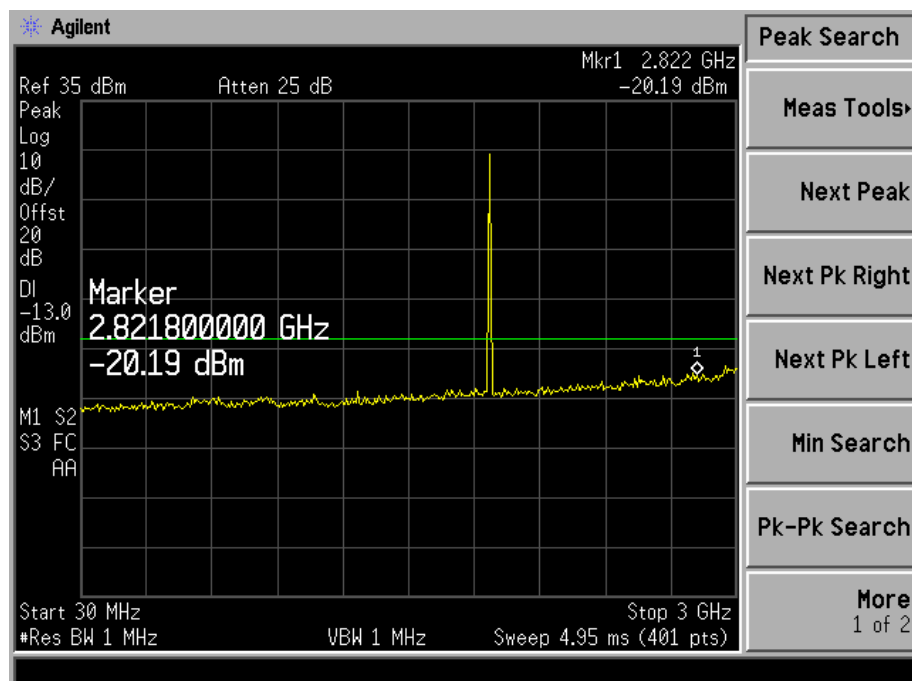
## GSM High band Emission



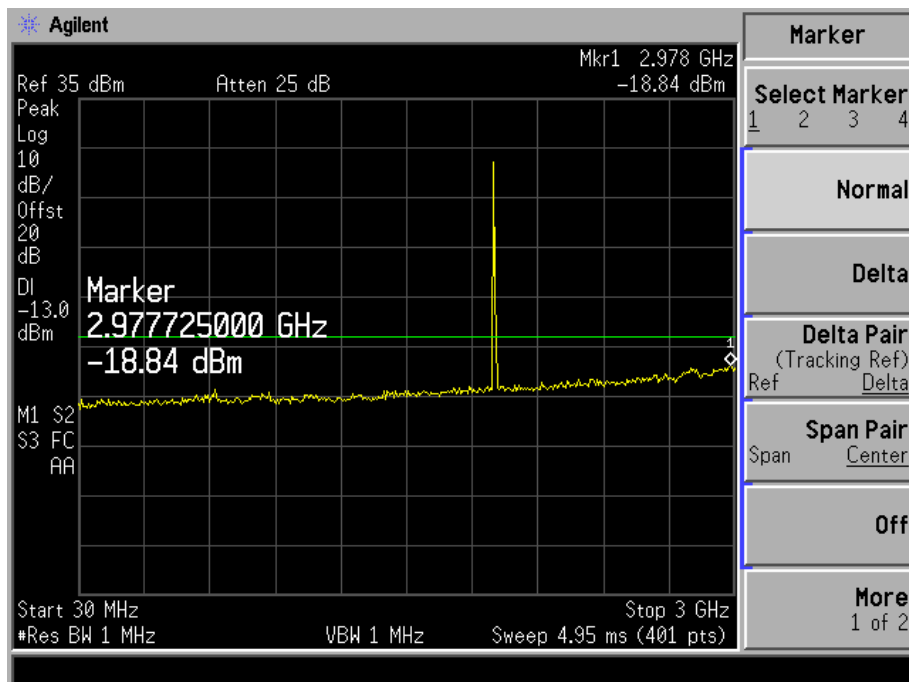
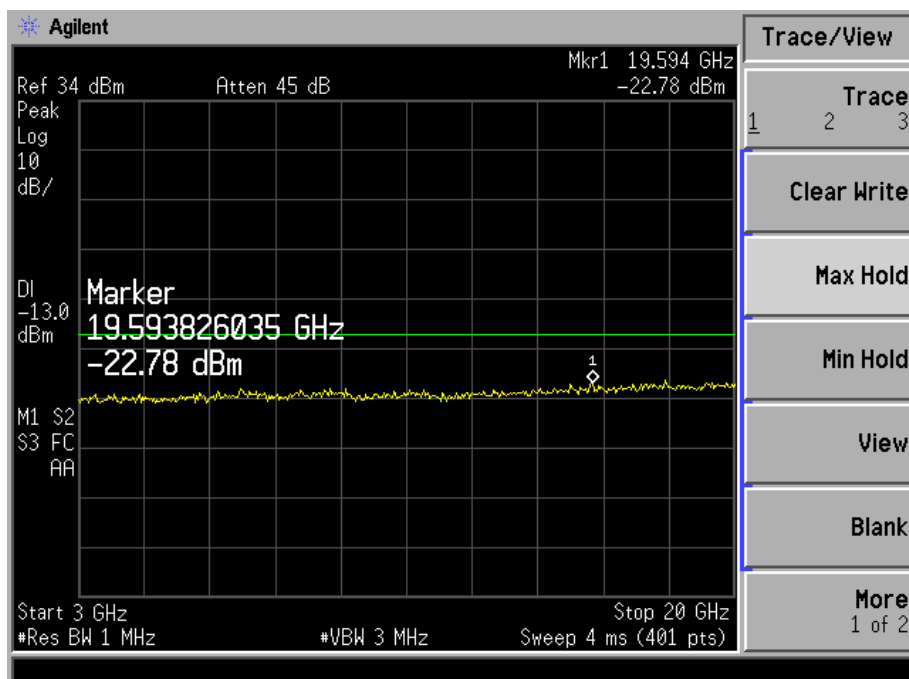
For PCS Band GPRS Mode  
From 30MHz to 1000MHz  
Low Channel



Middle Channel

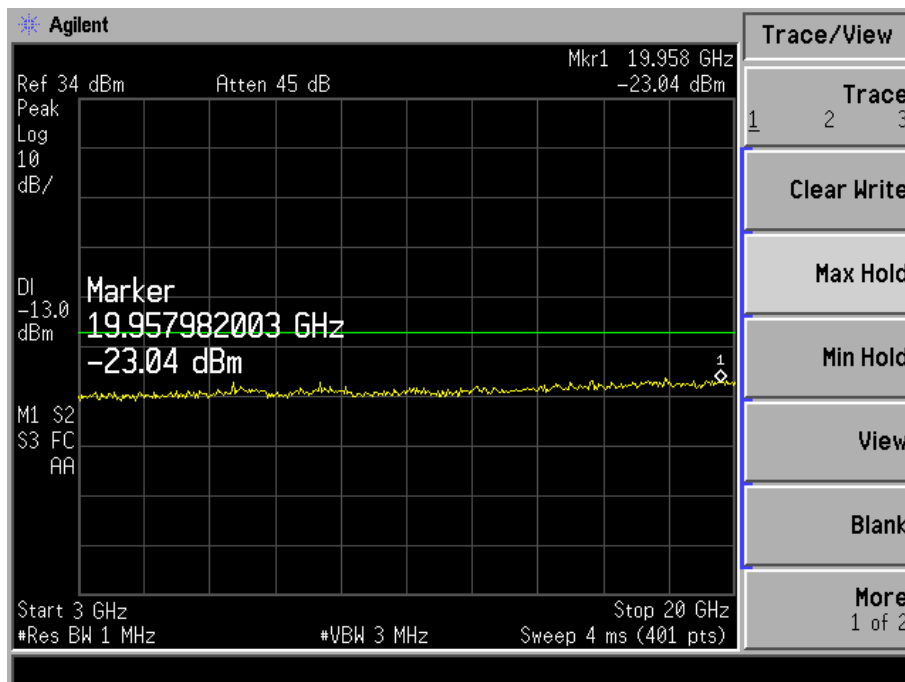


## High Channel

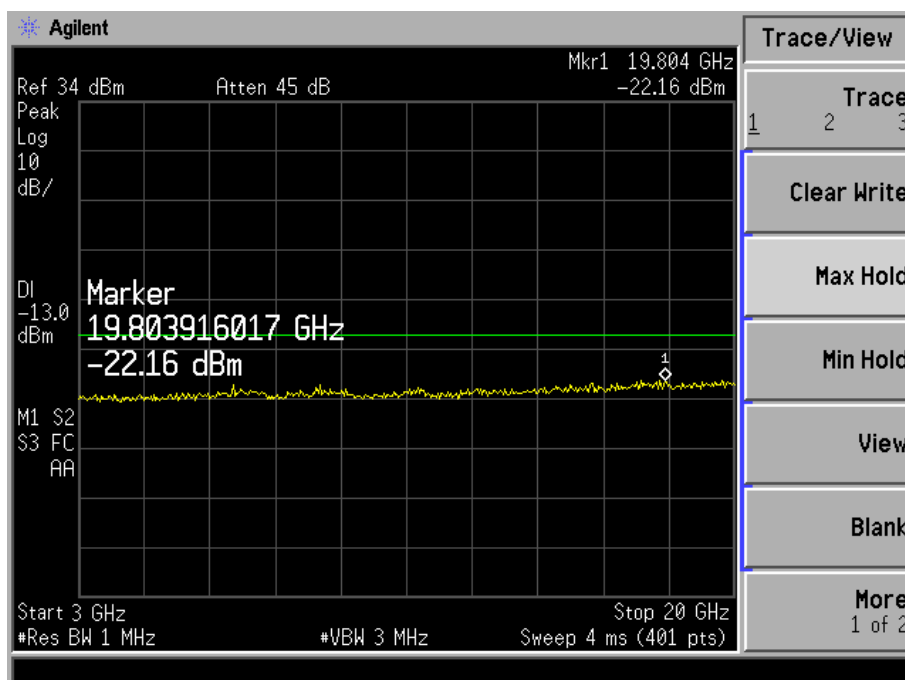
Above 1GHz  
Low Channel



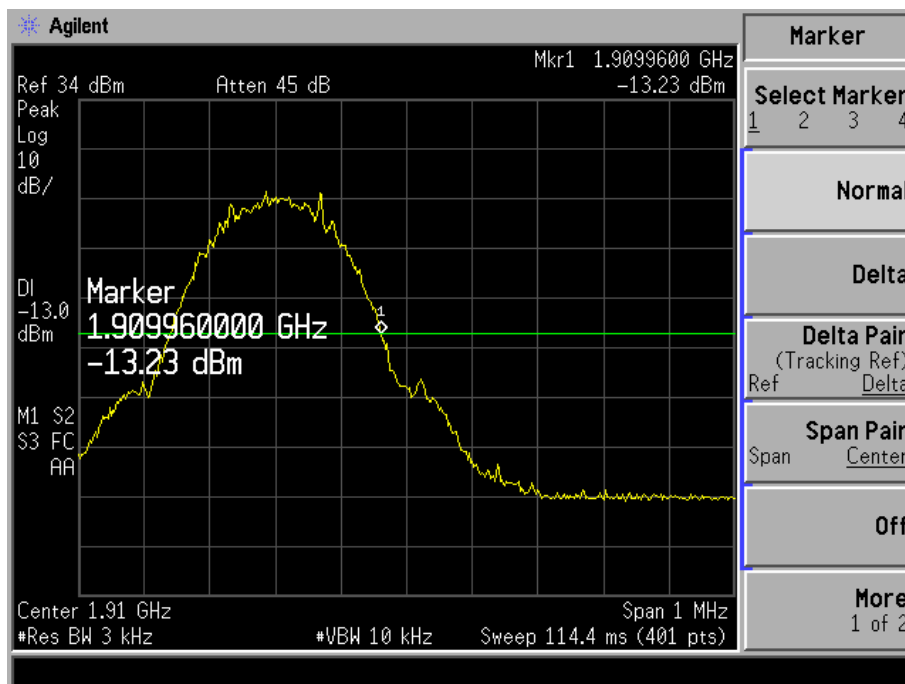
## Middle Channel



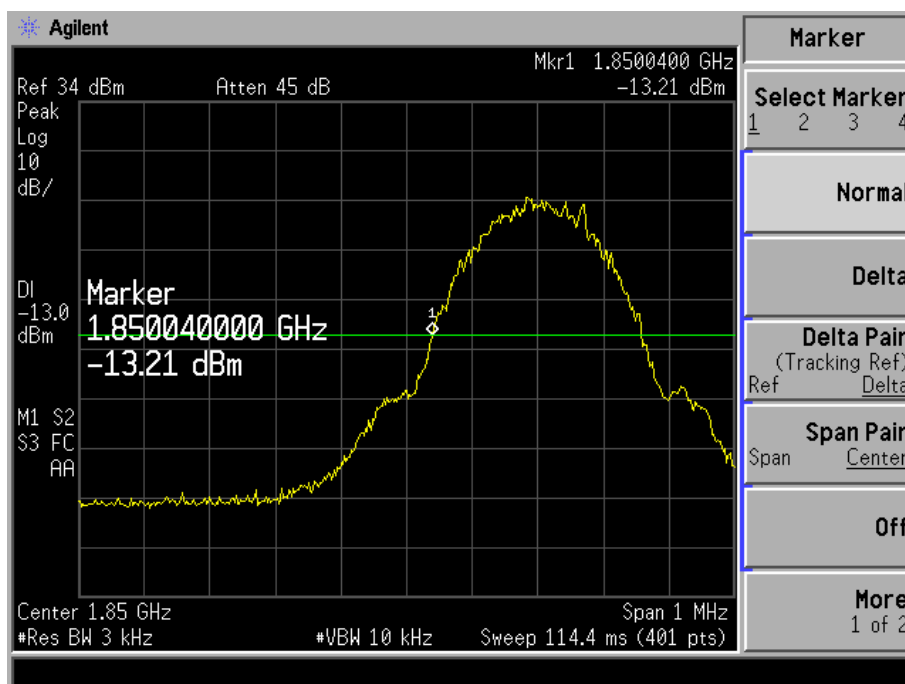
## High Channel



## GPRS Low band Emission



## GPRS High band Emission



## 7. SPURIOUS RADIATION 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  $\pm 3.0$  dB.

### 7.2 Standard Applicable

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	Rohde & Schwarz	FSEA20	DE25181	2009-08-12	2010-08-11
Positioning Controller	C&C	CC-C-1F	N/A	2009-08-12	2010-08-11
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2009-07-21	2010-07-20
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2009-07-21	2010-07-20
RF Switch	EM	EMSW18	SW060023	2009-08-12	2010-08-11
Amplifier	Agilent	8447F	3113A06717	2009-08-12	2010-08-11
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2009-08-12	2010-08-11
EMI Test Receiver	Rohde & Schwarz	ESPI	25498514	2009-08-12	2010-08-11
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	112012	2009-08-12	2010-08-11

**Statement of Traceability:** All calibrations have been performed per the NVLAP requirements traceable to the NIST.

### 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

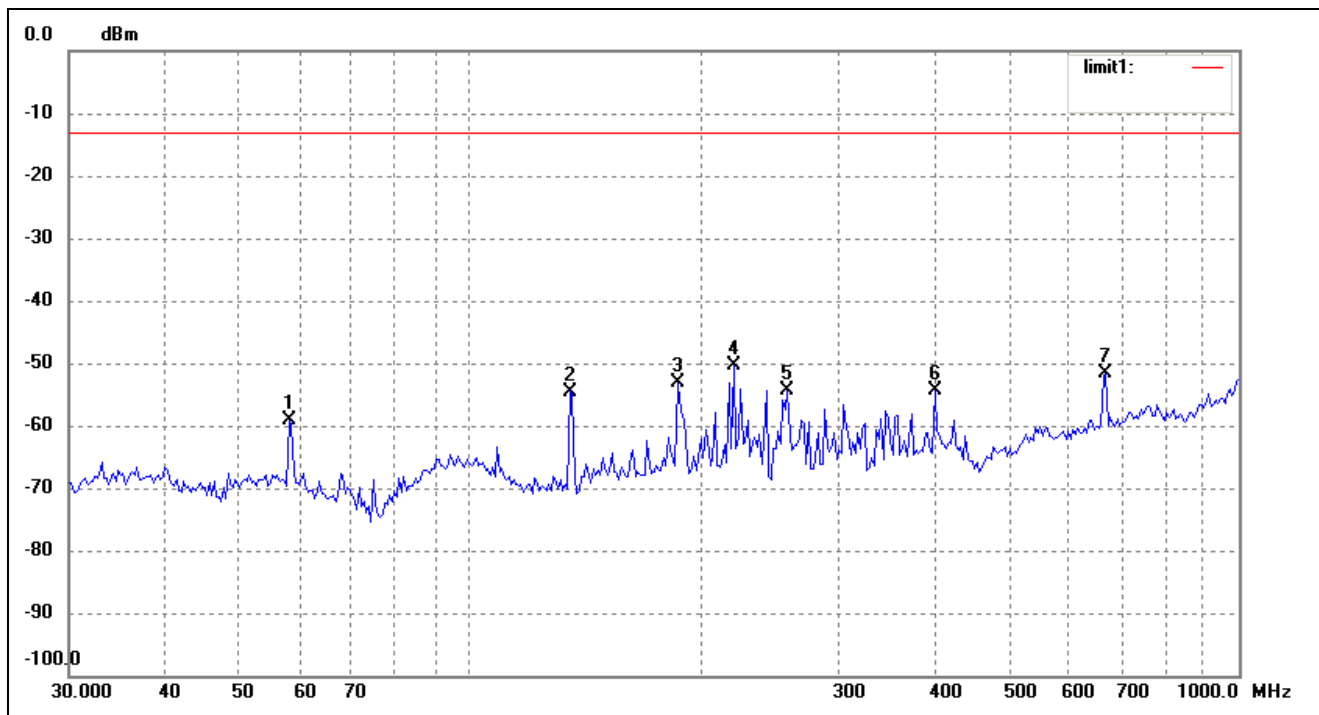
Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

## 7.6 Summary of Test Results/Plots

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

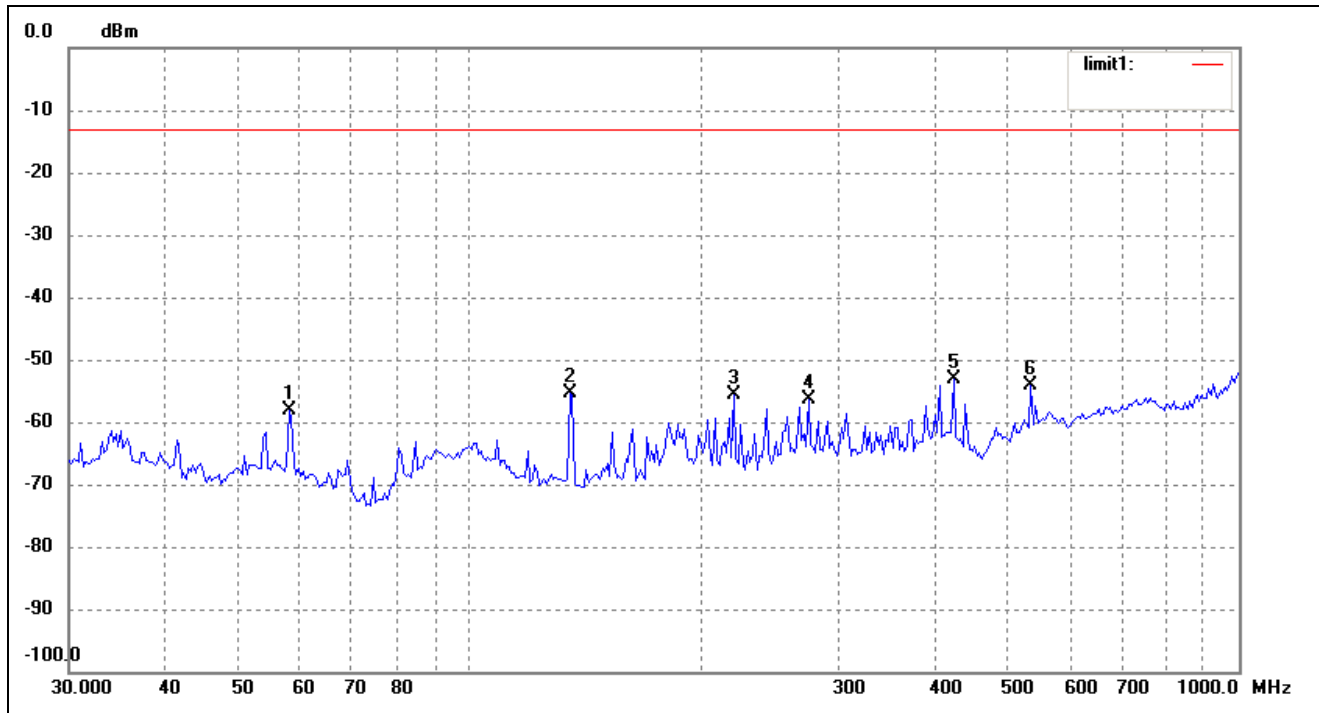
**-15.8dBm at 3760 MHz in the Horizontal polarization for Middle Channel, 30 MHz to 25 GHz.**

*For PCS Band Horizontal below 1000MHz*



No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	57.9993	-80.89	21.68	-59.21	-13.00	-46.21	EIRP
2	134.5592	-73.94	19.44	-54.50	-13.00	-41.50	EIRP
3	185.7882	-75.03	21.89	-53.14	-13.00	-40.14	EIRP
4	219.8449	-71.66	21.24	-50.42	-13.00	-37.42	EIRP
5	258.3264	-78.26	23.91	-54.35	-13.00	-41.35	EIRP
6	401.8385	-80.16	25.69	-54.47	-13.00	-41.47	EIRP
7	670.4893	-81.64	29.94	-51.70	-13.00	-38.70	EIRP

Vertical below 1000MHz



No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	57.9993	-79.87	21.68	-58.19	-13.00	-45.19	EIRP
2	134.5592	-74.72	19.44	-55.28	-13.00	-42.28	EIRP
3	219.8449	-76.89	21.24	-55.65	-13.00	-42.65	EIRP
4	275.1570	-79.99	23.61	-56.38	-13.00	-43.38	EIRP
5	425.0280	-79.37	26.15	-53.22	-13.00	-40.22	EIRP
6	535.7073	-82.12	28.05	-54.07	-13.00	-41.07	EIRP

*Above 1000MHz*

Frequency	SG Reading	Height	Polar	Cable loss	Antenna Gain	Corrected Ampl.	EN300440 Limit	EN300440 Margin
MHz	dBm	Meter	H / V	dB	dB	dBm	dBm	dB
Middle Channel , 1-20GHz								
3760	-29.6	1.5	H	4.8	7.5	-32.3	-13	-19.3
3760	-26.1	1.5	V	4.8	7.5	-28.8	-13	-15.8
5640	-34	1.5	H	5.2	8.9	-37.7	-13	-24.7
5640	-27.2	1.5	V	5.2	8.9	-30.9	-13	-17.9
7520	-36.7	1.5	H	6.3	9.3	-39.7	-13	-26.7
7520	-31.1	1.5	V	6.3	9.3	-34.1	-13	-21.1
9400	-39.6	1.5	H	6.9	9.7	-42.4	-13	-29.4
9400	-36.8	1.5	V	6.9	9.7	-39.6	-13	-26.6
11280	-30.5	1.5	H	7.5	10.5	-33.5	-13	-20.5
11280	-38.6	1.5	V	7.5	10.5	-41.6	-13	-28.6

*Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 7<sup>th</sup> Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.*

## 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	2009-08-12	2010-08-11
Rohde & Schwarz	Universal Radio Communication	CMU200	112012	2009-08-12	2010-08-11
GONGWEN	Moisture Test Chamber	GDS-150	SEMT-0013	2009-08-12	2010-08-11
LW	DC Power Supply	APR-3003	N/A	2009-08-12	2010-08-11

**Statement of Traceability:** All calibrations have been performed per the NVLAP requirements traceable to the NIST.

### 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 PCS Band

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	12	-31	-0.01649
40	12	-35	-0.01862
30	12	-38	-0.02021
20	12	-39	-0.02074
10	12	-42	-0.02234
0	12	-38	-0.02021
-10	12	-25	-0.0133
-20	12	-36	-0.01915
-30	12	-41	-0.02181



So, Frequency Stability Versus Input Voltage is:

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	10V	-43	-0.02287
	12V	-39	-0.02074
	7.8V Endpoint	-55	-0.02926

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