

# FCC Part 22H & 24E

## Measurement and Test Report

For

ATID Co., Ltd.

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Geumcheon-gu, Seoul, Korea

**FCC ID: VUJAT911N**

**FCC Rules:** FCC Part 22H, FCC Part 24E

**Product Description:** WCDMA wireless data terminal

**Tested Model:** AT911N

**Report No.:** STR15088054I-6

**Tested Date:** 2015-08-05 to 2015-08-28

**Issued Date:** 2015-08-28

**Tested By:** Lebron Wang / Engineer

**Reviewed By:** Lahm Peng / EMC Manager

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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 Shenzhen SEM. Test Technology Co., Ltd.

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## 1. GENERAL INFORMATION

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

#### Client Information

Applicant: ATID Co., Ltd.  
 Address of applicant: (Gasandigital2-ro, Geumcheon-gu, Seoul, Korea  
 Manufacturer: ATID Co., Ltd.  
 Address of manufacturer: (Gasandigital2-ro, Geumcheon-gu, Seoul, Korea

General Description of EUT	
Product Name:	WCDMA wireless data terminal
Brand Name:	
Model No.:	AT911N
Adding Model:	/
Hardware Version:	AT911N MAIN PCB
Software Version:	STD0110P4MXGC
IMEI:	358625050875212
Rated Voltage:	DC 3.7V Li-ion Battery
Battery capacity:	Main Battery:2200mAh Gun Battery :4400mAh
Power Adaptor:	PSAA10R-050
	Input: AC 100-240V Output: DC 5V/2A
Device Category:	Portable Device
<p><i>The EUT is GSM850/900/DCS1800/PCS1900, WCDMA Band I, II, V, VIII WCDMA wireless data terminal. The WCDMA wireless data terminal is intended for speech and Multimedia Message Service (MMS) transmission. It is equipped with GPRS/EGPRS class 10 for GSM850 and GSM1900 and Bluetooth, Wi-Fi, GPS and camera functions. For more information see the following datasheet</i></p> <p><i>Note: The test data is gathered from a production sample provided by the manufacturer.</i></p>	

<b>Technical Characteristics of EUT</b>	
<b>2G</b>	
Support Networks:	GSM, GPRS, EGPRS
Support Band:	GSM850/PCS1900
Uplink Frequency:	GSM/GPRS 850: 824~849MHz GSM/GPRS 1900: 1850~1910MHz
Downlink Frequency:	GSM/GPRS 850: 869~894MHz GSM/GPRS 1900: 1930~1990MHz
Max RF Output Power:	GSM850: 32.07dBm, GSM1900: 29.04dBm
Type of Modulation:	GMSK, 8PSK
Type of Emission:	GSM850: 256KGXW, GSM1900: 255KGXW EGPRS850: 258KG7W, EGPRS1900: 264KG7W
Type of Antenna:	Integral Antenna
Antenna Gain:	GSM850:0dBi, GSM1900: 0dBi
GPRS/EGPRS Class:	Class 10
<b>3G</b>	
Support Networks:	WCDMA, HSDPA, HSUPA
Support Band:	WCDMA Band II, WCDMA Band V,
Uplink Frequency:	WCDMA Band II: 1850~1980MHz WCDMA Band V: 824~849MHz
Downlink Frequency:	WCDMA Band II: 1930~1990MHz WCDMA Band V: 869~894MHz
Max RF Output Power:	WCDMA 850: 22.81dBm WCDMA 1900: 22.50dBm
Type of Modulation:	BPSK
Type of Emission:	WCDMA850: 4M17F8W WCDMA1900: 4M18F8W
Type of Antenna:	Integral Antenna
Antenna Gain:	WCDMA 850: 0dBi WCDMA 1900: 0dBi

## 1.2 Test Standards

The following report is prepared on behalf of the ATID 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 C63.4-2014, 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 934118.

### **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.: 11464A.

### **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 2<sup>nd</sup> 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
TM2	EGPRS 850	Low, Middle, High Channels
TM3	GSM 1900	Low, Middle, High Channels
TM4	GPRS 1900	Low, Middle, High Channels
TM4	EGPRS 1900	Low, Middle, High Channels
TM5	WCDMA Band V	Low, Middle, High Channels
TM6	HSDPA Band V	Low, Middle, High Channels
TM7	HSUPA Band V	Low, Middle, High Channels
TM8	WCDMA Band II	Low, Middle, High Channels
TM9	HSDPA Band II	Low, Middle, High Channels
TM10	HSUPA Band II	Low, Middle, High Channels

Testing Configure			
Support Band	Support Standard	Channel Frequency	Channel Number
GSM 850	GSM/GPRS/EGPRS	824.2 MHz	128
		836.4 MHz	190
		848.8 MHz	251
PCS 1900	GSM/GPRS/EGPRS	1850.2 MHz	512
		1880.0 MHz	661
		1909.8 MHz	810
WCDMA Band V	WCDMA/HSDPA/HSUPA	826.4 MHz	4132
		836.6 MHz	4183
		846.6 MHz	4233
WCDMA Band II	WCDMA/HSDPA/HSUPA	1852.4MHz	9262
		1880.0MHz	9400
		1907.6MHz	9538

Note: the transmitter has been tested on the communications mode of GSM, GPRS, EGPRS, WCDMA, HSDPA, HSUPA compliance test and record the worst case.

## EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
Adapter Cable	1.5	Unshielded	With Core
USB Cable	1.0	Unshielded	Without Core
USB Cable	1.5	Unshielded	With Core

## Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E10	LR-63C8R

## Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
Earphone	1.2	Unshielded	Without Core

## 1.6 Test Equipment List and Details

Kind of Equipment	Manufacturer	Type	S/N	Cal Date	Due Date
Equipment list of < Shenzhen SEM.Test Technology Co., Ltd.>					
Test SIM card	-		-	N/A	
GSM Tester	Rohde & Schwarz	CMU200	104036	2015-06-17	2016-06-16
Spectrum Analyzer	Agilent	E4407B	MY41440400	2015-06-17	2016-06-16
Spectrum Analyzer	Agilent	N9020A	US47140102	2015-06-17	2016-06-16
Signal Generator	Agilent	83752A	3610A01453	2015-06-17	2016-06-16
Vector Signal Generator	Agilent	N5182A	MY47070202	2015-06-17	2016-06-16
Power Divider	Weinschel	1506A	PM204	2015-06-17	2016-06-16
Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2015-06-17	2016-06-16
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2015-06-17	2016-06-16
Amplifier	Agilent	8447F	3113A06717	2015-06-17	2016-06-16
Amplifier	C&D	PAP-1G18	2002	2015-06-17	2016-06-16
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2015-06-17	2016-06-16
Horn Antenna	ETS	3117	00086197	2015-06-17	2016-06-16

## 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
§ 24.51	Peak-to-average Radio (PAR) of Transmitter	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 complied with the requirement of the RF exposure, please see the SAR report.

## 4. RF Output Power

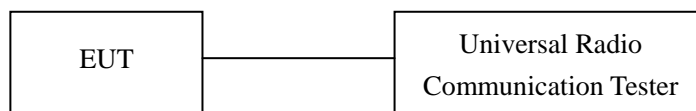
### 4.1 Standard Applicable

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

According to §24.232 (c), Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

### 4.2 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 C63.4-2014 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.

### 4.3 Environmental Conditions

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

### 4.4 Summary of Test Results/Plots

## Radiated Power

## ERP For GSM Mode GSM850

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
824.2	30.07	1.5	0	H	1.5	0	28.57	38.45
824.2	32.09	1.5	0	V	1.5	0	30.59	38.45
Middle Channel								
836.6	30.03	1.5	0	H	1.5	0	28.53	38.45
836.6	32.07	1.5	0	V	1.5	0	30.56	38.45
High Channel								
848.8	30.02	1.5	0	H	1.5	0	28.52	38.45
848.8	32.05	1.5	0	V	1.5	0	30.55	38.45

## EIRP For GSM Mode PCS1900

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	DBm	dBm
Low Channel								
1850.2	19.36	1.5	0	H	1.9	7.7	25.16	33
1850.2	22.27	1.5	0	V	1.9	7.7	28.07	33
Middle Channel								
1880.0	19.33	1.5	0	H	1.9	7.7	25.13	33
1880.0	22.21	1.5	0	V	1.9	7.7	28.01	33
High Channel								
1909.8	19.46	1.5	0	H	1.9	7.7	25.26	33
1909.8	22.51	1.5	0	V	1.9	7.7	28.31	33

## ERP For GPRS Mode GSM850

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
824.2	29.26	1.5	0	H	1.5	0	27.76	38.45
824.2	31.87	1.5	0	V	1.5	0	30.37	38.45
Middle Channel								
836.6	29.18	1.5	0	H	1.5	0	27.68	38.45
836.6	31.80	1.5	0	V	1.5	0	30.30	38.45
High Channel								
848.8	29.16	1.5	0	H	1.5	0	27.66	38.45
848.8	31.75	1.5	0	V	1.5	0	30.25	38.45

## EIRP For GPRS Mode PCS1900

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	DBm	dBm
Low Channel								
1850.2	19.22	1.5	0	H	1.9	7.7	25.02	33
1850.2	21.21	1.5	0	V	1.9	7.7	27.01	33
Middle Channel								
1880.0	18.82	1.5	0	H	1.9	7.7	24.62	33
1880.0	21.13	1.5	0	V	1.9	7.7	26.93	33
High Channel								
1909.8	18.47	1.5	0	H	1.9	7.7	24.27	33
1909.8	22.05	1.5	0	V	1.9	7.7	27.85	33

## ERP For EDGE Mode GSM850

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
824.2	25.65	1.5	0	H	1.5	0	24.15	38.45
824.2	26.86	1.5	0	V	1.5	0	25.36	38.45
Middle Channel								
836.6	25.18	1.5	0	H	1.5	0	23.68	38.45
836.6	26.41	1.5	0	V	1.5	0	24.91	38.45
High Channel								
848.8	25.55	1.5	0	H	1.5	0	24.05	38.45
848.8	26.16	1.5	0	V	1.5	0	24.66	38.45

## EIRP For EDGE Mode PCS1900

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	DBm	dBm
Low Channel								
1850.2	16.32	1.5	0	H	1.9	7.7	22.12	33
1850.2	18.56	1.5	0	V	1.9	7.7	24.36	33
Middle Channel								
1880.0	16.32	1.5	0	H	1.9	7.7	22.61	33
1880.0	18.16	1.5	0	V	1.9	7.7	23.96	33
High Channel								
1909.8	16.54	1.5	0	H	1.9	7.7	22.34	33
1909.8	18.73	1.5	0	V	1.9	7.7	24.53	33

## ERP For WCDMA Mode Band V

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	20.55	1.5	0	H	1.5	0	19.05	38.45
826.4	21.62	1.5	0	V	1.5	0	20.12	38.45
Middle Channel								
836.6	20.41	1.5	0	H	1.5	0	18.91	38.45
836.6	21.65	1.5	0	V	1.5	0	20.15	38.45
High Channel								
846.6	20.81	1.5	0	H	1.5	0	19.31	38.45
846.6	21.78	1.5	0	V	1.5	0	20.28	38.45

## ERP For HSDPA Mode Band V

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	20.74	1.5	0	H	1.5	0	19.24	38.45
826.4	21.65	1.5	0	V	1.5	0	20.15	38.45
Middle Channel								
836.6	20.55	1.5	0	H	1.5	0	19.05	38.45
836.6	21.64	1.5	0	V	1.5	0	20.14	38.45
High Channel								
846.6	20.84	1.5	0	H	1.5	0	19.34	38.45
846.6	21.74	1.5	0	V	1.5	0	20.24	38.45

## ERP For HSUPA Mode Band V

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	20.84	1.5	0	H	1.5	0	19.34	38.45
826.4	21.92	1.5	0	V	1.5	0	20.42	38.45
Middle Channel								
836.6	20.95	1.5	0	H	1.5	0	19.35	38.45
836.6	22.05	1.5	0	V	1.5	0	20.55	38.45
High Channel								
846.6	20.55	1.5	0	H	1.5	0	19.05	38.45
846.6	21.66	1.5	0	V	1.5	0	20.16	38.45

## ERP For WCDMA Mode Band II

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	DBm	dBm
Low Channel								
1852.4	14.06	1.5	0	H	1.9	7.7	19.86	33
1852.4	15.55	1.5	0	V	1.9	7.7	21.35	33
Middle Channel								
1880.0	14.01	1.5	0	H	1.9	7.7	19.81	33
1880.0	15.58	1.5	0	V	1.9	7.7	21.38	33
High Channel								
1907.6	14.25	1.5	0	H	1.9	7.7	20.05	33
1907.6	15.62	1.5	0	V	1.9	7.7	21.42	33

## ERP For HSDPA Mode Band II

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	DBm	dBm
Low Channel								
1852.4	14.12	1.5	0	H	1.9	7.7	19.92	33
1852.4	15.58	1.5	0	V	1.9	7.7	21.38	33
Middle Channel								
1880.0	14.24	1.5	0	H	1.9	7.7	20.04	33
1880.0	15.90	1.5	0	V	1.9	7.7	21.70	33
High Channel								
1907.6	13.62	1.5	0	H	1.9	7.7	19.42	33
1907.6	15.02	1.5	0	V	1.9	7.7	20.82	33

## EIRP For HSUPA Mode Band II

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	DBm	dBm
Low Channel								
1852.4	12.62	1.5	0	H	1.9	7.7	18.42	33
1852.4	14.72	1.5	0	V	1.9	7.7	20.52	33
Middle Channel								
1880.0	12.87	1.5	0	H	1.9	7.7	18.67	33
1880.0	14.66	1.5	0	V	1.9	7.7	20.46	33
High Channel								
1907.6	12.45	1.5	0	H	1.9	7.7	18.25	33
1907.6	14.78	1.5	0	V	1.9	7.7	20.58	33

Note: Result = Substitute - Cable loss + Antenna Gain



Max. Conducted Output Power

For Cellular Band (GSM850)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
GSM	Low Channel	824.2	32.07	38.45
	Middle Channel	836.4	31.69	38.45
	High Channel	848.8	31.58	38.45
GPRS(1 Slot)	Low Channel	824.2	32.34	38.45
	Middle Channel	836.4	31.85	38.45
	High Channel	848.8	31.79	38.45
EDGE(1 Slot)	Low Channel	824.2	26.42	38.45
	Middle Channel	836.6	26.26	38.45
	High Channel	848.8	26.08	38.45

For PCS Band (GSM1900)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
GSM	Low Channel	1850.2	28.46	33.0
	Middle Channel	1880.0	28.31	33.0
	High Channel	1909.8	29.04	33.0
GPRS(1 Slot)	Low Channel	1850.2	29.04	33.0
	Middle Channel	1880.0	28.57	33.0
	High Channel	1909.8	28.23	33.0
EDGE(1 Slot)	Low Channel	1850.2	25.01	33.0
	Middle Channel	1880.0	24.62	33.0
	High Channel	1909.8	23.72	33.0

## For WCDMA Band V

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
WCDMA	Low Channel	826.4	22.81	38.45
	Middle Channel	836.6	22.51	38.45
	High Channel	846.6	22.36	38.45
HSDPA	Low Channel	826.4	22.44	38.45
	Middle Channel	836.6	22.36	38.45
	High Channel	846.6	22.32	38.45
HSUPA	Low Channel	826.4	22.42	38.45
	Middle Channel	836.6	22.28	38.45
	High Channel	846.6	22.30	38.45

## For WCDMA Band II

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
WCDMA	Low Channel	1852.4	22.50	38.45
	Middle Channel	1880.0	21.77	38.45
	High Channel	1907.6	21.80	38.45
HSDPA	Low Channel	1852.4	22.97	38.45
	Middle Channel	1880.0	21.91	38.45
	High Channel	1907.6	22.52	38.45
HSUPA	Low Channel	1852.4	22.69	38.45
	Middle Channel	1880.0	21.65	38.45
	High Channel	1907.6	22.80	38.45

## 5. Peak-to-average Radio (PAR) of Transmitter

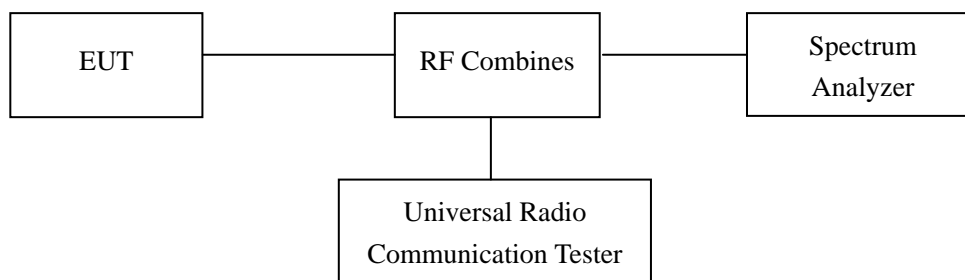
### 5.1 Standard Applicable

According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### 5.2 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 peak-to-average ratio (PAR) of the transmission was recorded.

Test Configuration for the emission bandwidth testing:



### 5.3 Environmental Conditions

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

## 5.4 Summary of Test Results

For PCS Band

Test Mode	Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)	PAR (dBc)	Limit (dBc)
GSM	512	1850.2	32.00	28.46	3.54	13
	661	1880.0	31.88	28.31	3.57	13
	810	1909.8	32.15	29.04	3.11	13
GPRS (1 Slot)	512	1850.2	31.65	29.04	2.61	13
	661	1880.0	31.32	28.57	2.75	13
	810	1909.8	32.01	28.23	3.78	13
EDGE (1 Slot)	512	1850.2	26.96	25.01	1.95	13
	661	1880.0	26.82	24.62	2.20	13
	810	1909.8	27.02	23.72	3.30	13

For WCDMA Band II

Test Mode	Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)	PAR (dBc)	Limit (dBc)
WCDMA	4132	1852.4	25.74	22.50	3.24	13
	4183	1880.0	25.38	21.77	3.61	13
	4233	1907.6	25.54	21.80	3.74	13
HSDPA	4132	1852.4	25.84	22.97	2.87	13
	4183	1880.0	24.63	21.91	2.72	13
	4233	1907.6	25.17	22.52	2.65	13
HSUPA	4132	1852.4	25.71	22.69	3.02	13
	4183	1880.0	25.47	21.65	3.82	13
	4233	1907.6	25.62	22.80	2.82	13

## 6. Emission Bandwidth

### 6.1 Standard Applicable

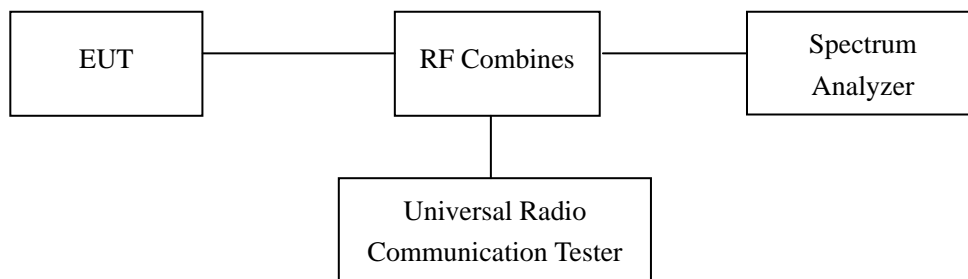
According to §22.917(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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.

### 6.2 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:



### 6.3 Environmental Conditions

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

## 6.5 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	253.6328	330.844
	190	836.6	255.7647	336.158
	251	848.8	254.5349	337.858
GPRS	128	824.2	251.5453	330.044
	190	836.6	252.6995	337.553
	251	848.8	253.2655	332.768
EDGE	128	824.2	257.9256	331.959
	190	836.6	256.3761	331.198
	251	848.8	254.9209	334.860

For PCS Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM	512	1850.2	252.4603	328.356
	661	1880.0	255.0221	334.202
	810	1909.8	248.5105	333.075
GPRS	512	1850.2	251.8461	336.372
	661	1880.0	252.4075	336.892
	810	1909.8	252.1420	334.520
EDGE	512	1850.2	253.8806	316.421
	661	1880.0	263.6890	333.912
	810	1909.8	249.0509	298.734

## For Band V

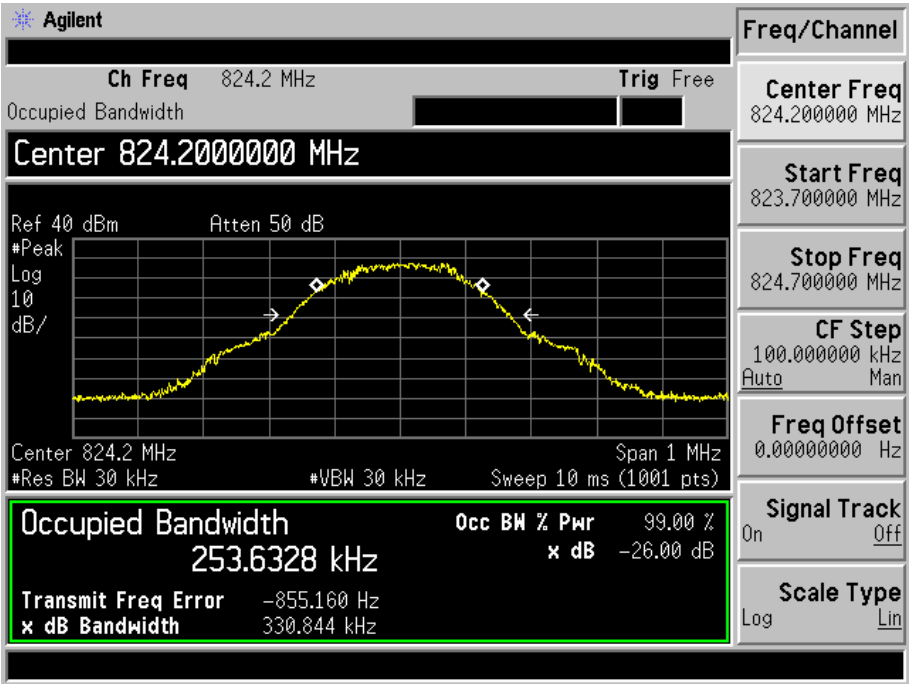
Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	4132	826.4	4.1569	4.693
	4182	836.4	4.1641	4.687
	4233	846.6	4.1637	4.660
HSDPA	4132	826.4	4.1620	4.717
	4182	836.4	4.1458	4.668
	4233	846.6	4.1680	4.678
HSUPA	4132	826.4	4.1650	4.665
	4182	836.4	4.1554	4.687
	4233	846.6	4.1583	4.702

## For Band II

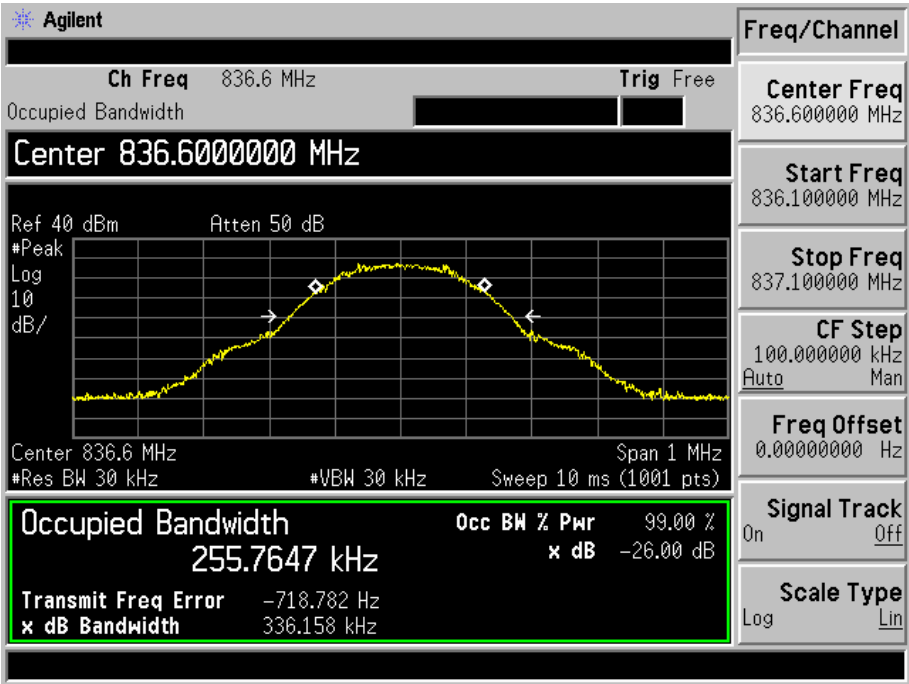
Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	9262	1852.4	4.1675	4.715
	9400	1880.0	4.1620	4.707
	9538	1907.6	4.1882	4.761
HSDPA	9262	1852.4	4.1717	4.702
	9400	1880.0	4.1611	4.696
	9538	1907.6	4.1705	4.682
HSUPA	9262	1852.4	4.1624	4.740
	9400	1880.0	4.1698	4.695
	9538	1907.6	4.1807	5.262

Please refer to the following test plots:

For Cellular Band  
GSM Low Channel

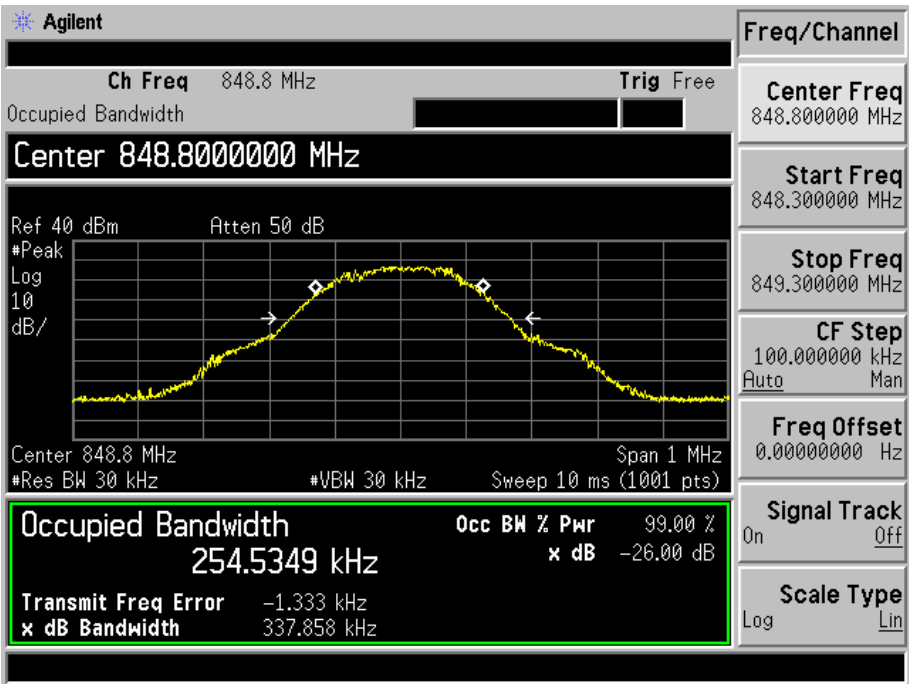


GSM Middle Channel

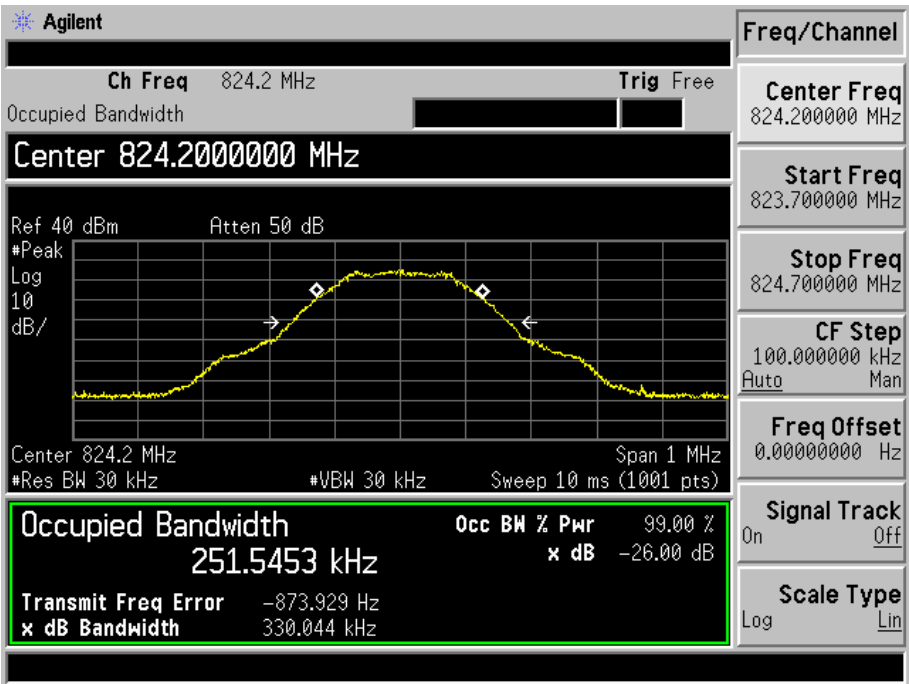




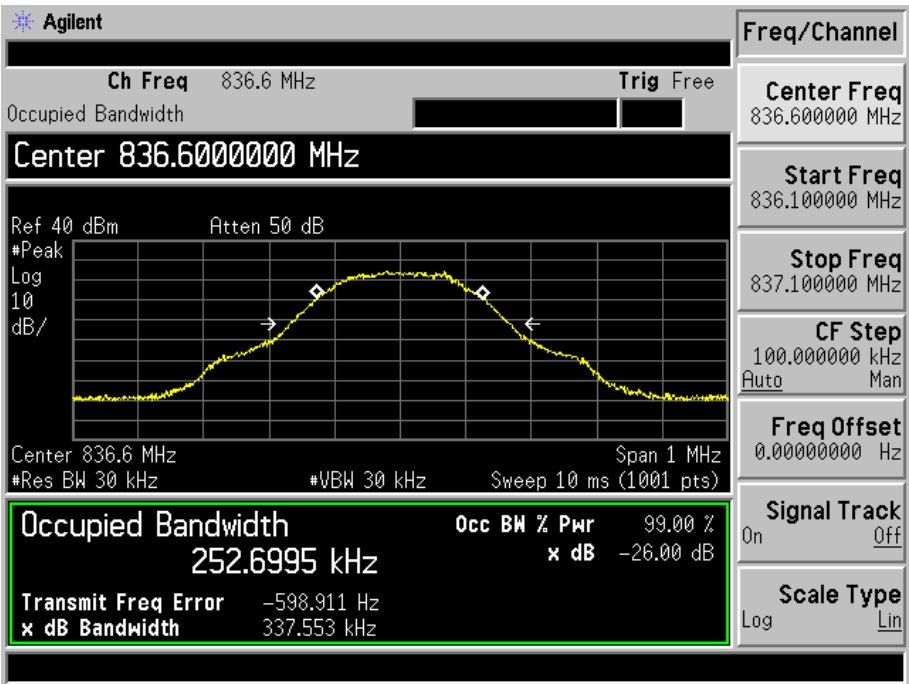
GSM High channel



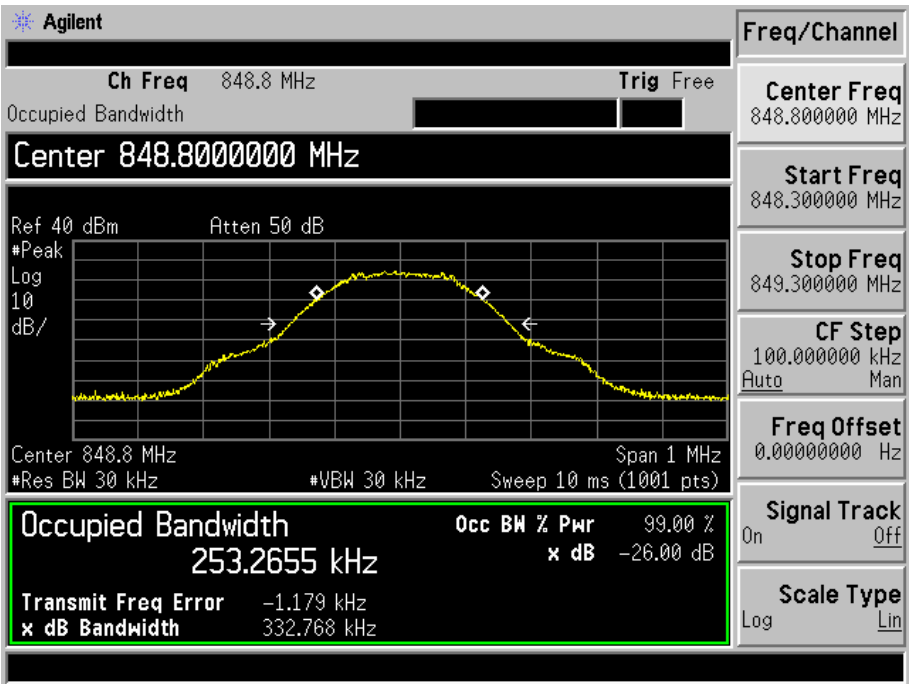
GPRS Low Channel



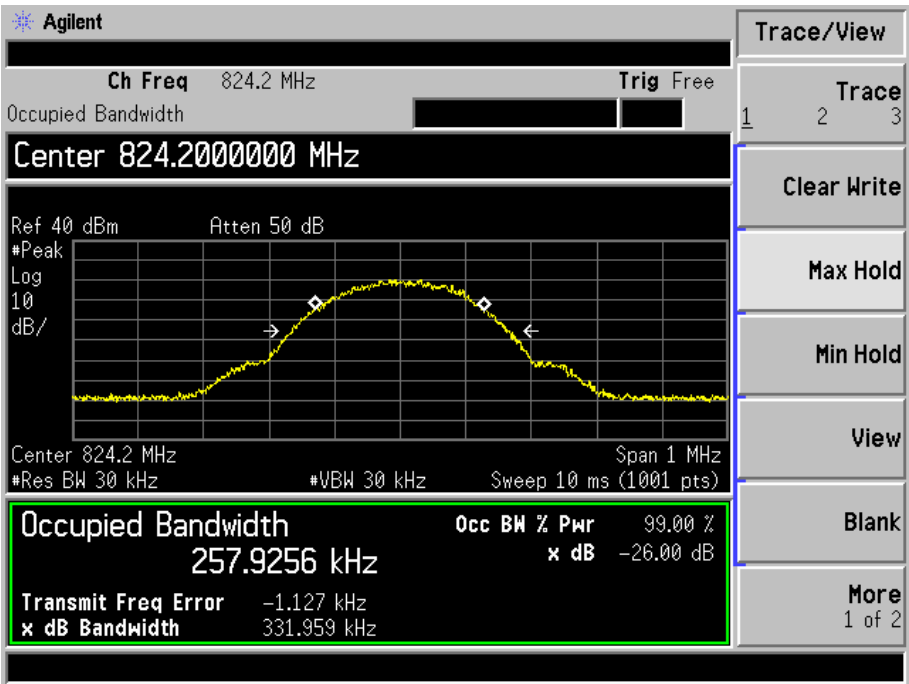
GPRS Middle Channel



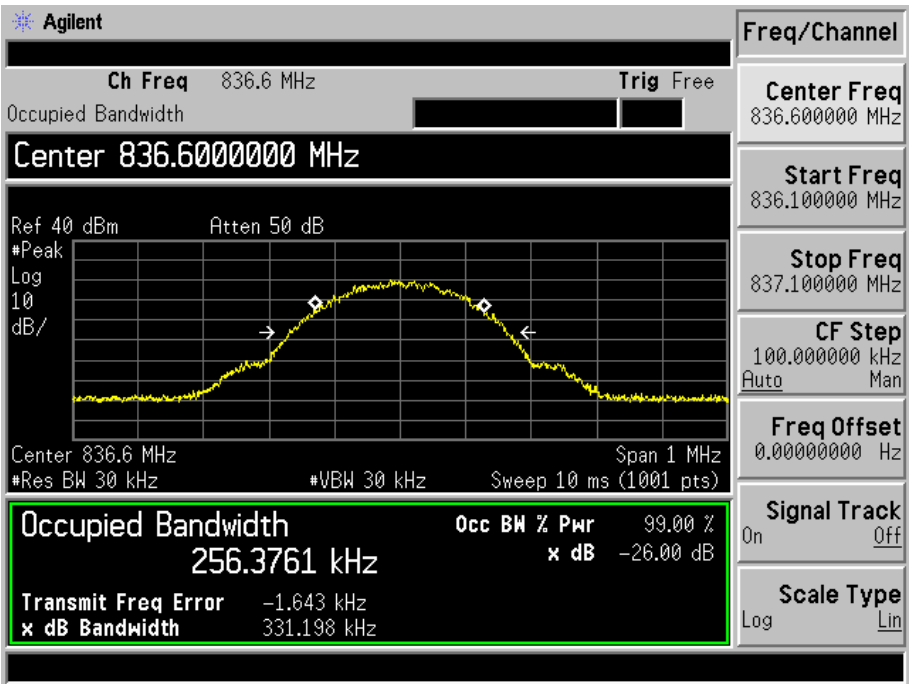
GPRS High Channel



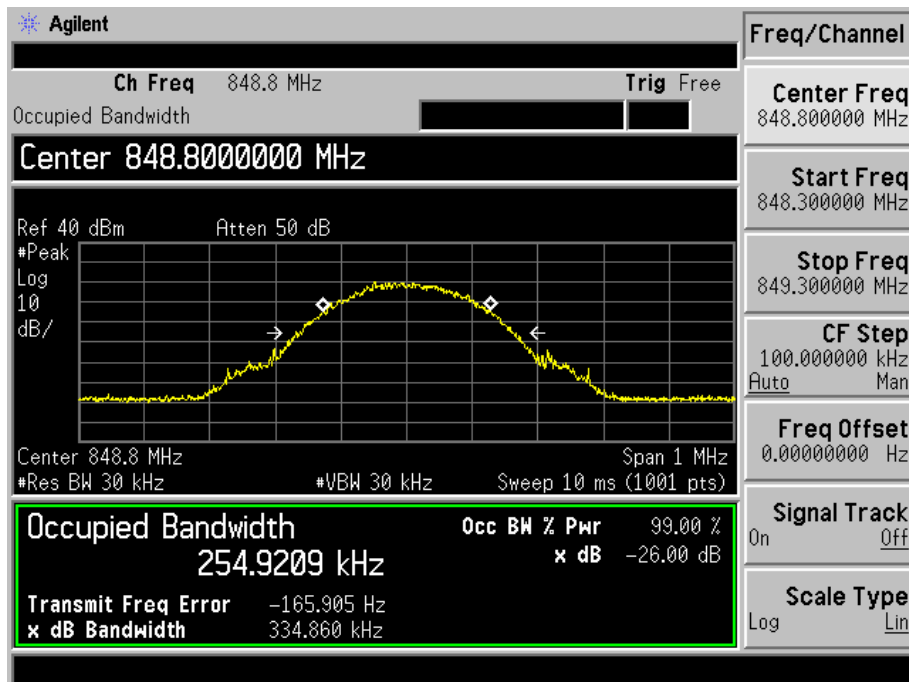
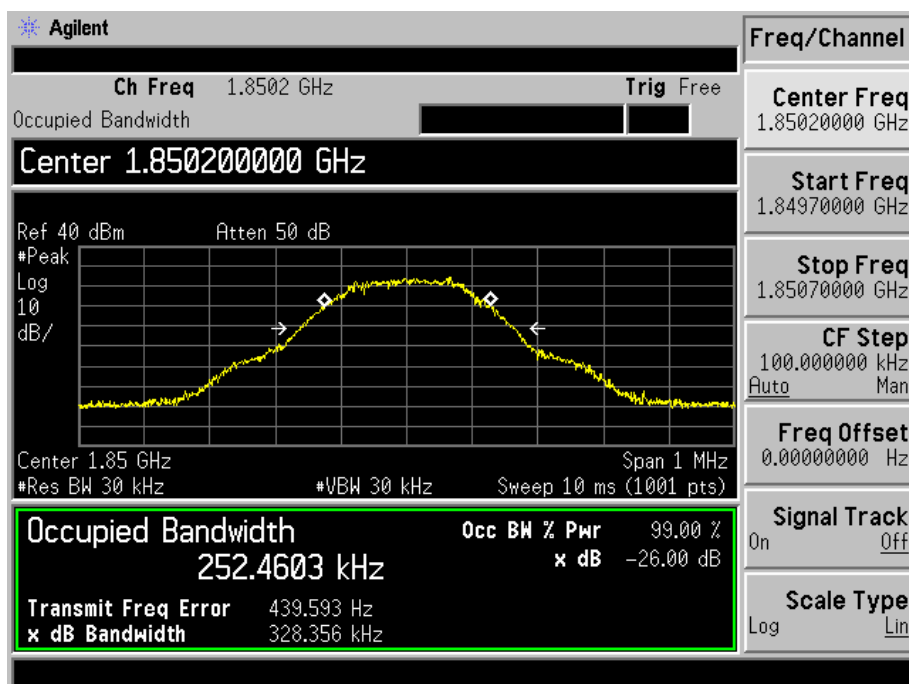
EDGE Low Channel



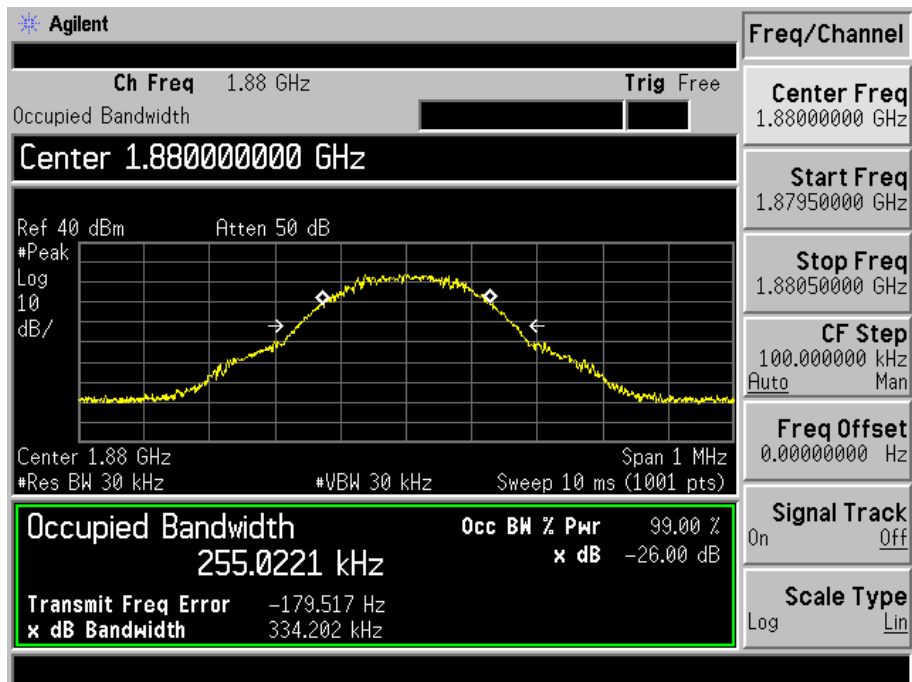
EDGE Middle Channel



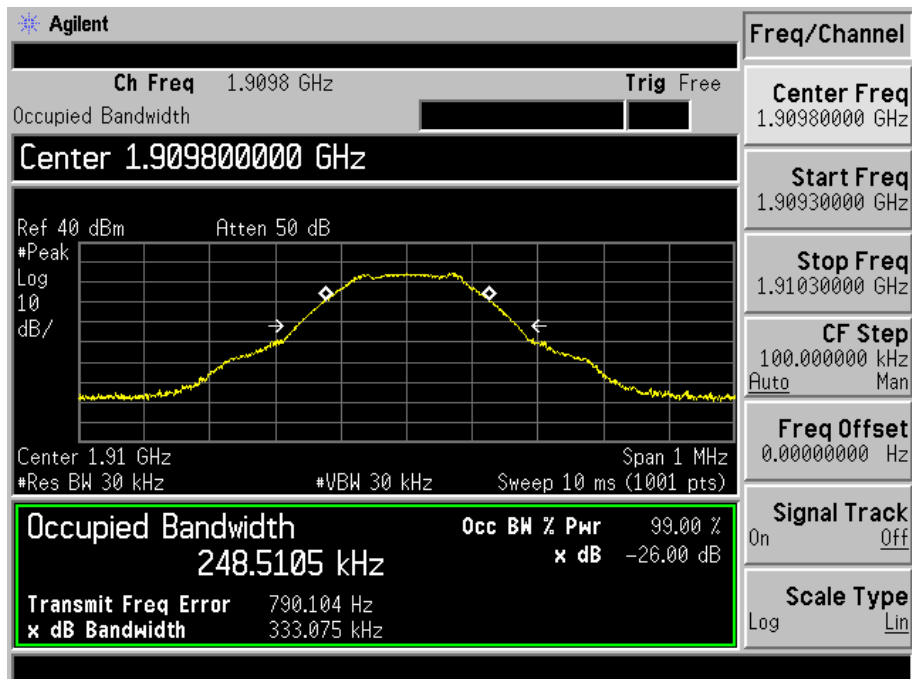
## EDGE High channel

For PCS Band  
GSM Low Channel

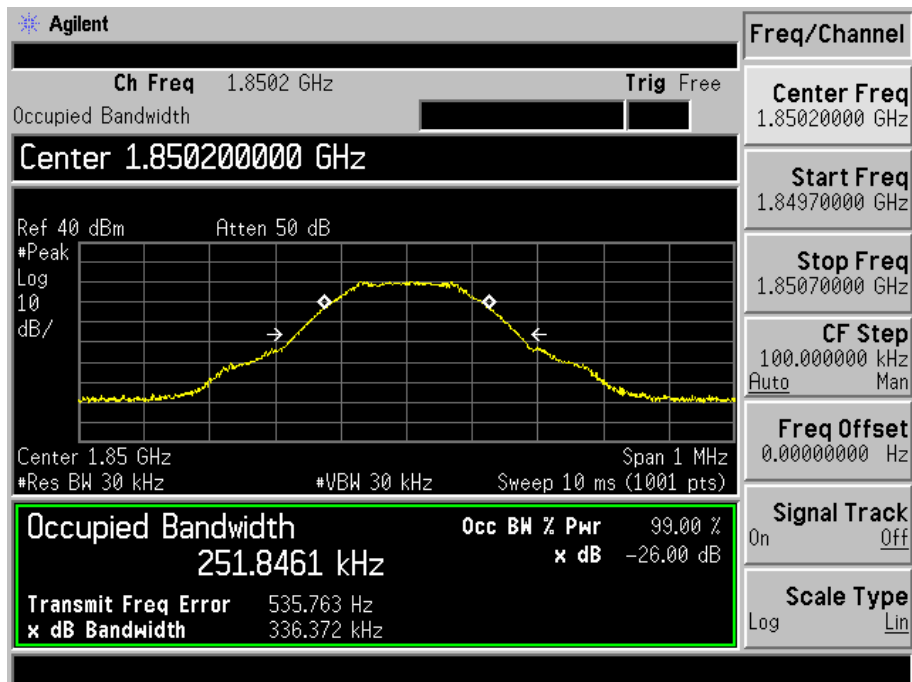
## GSM Middle Channel



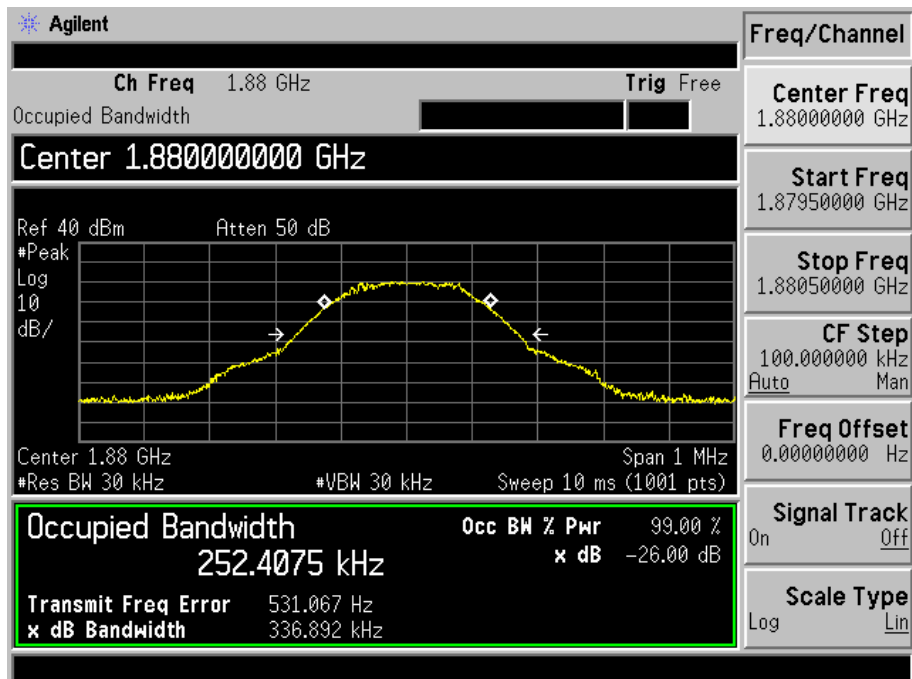
## GSM High channel



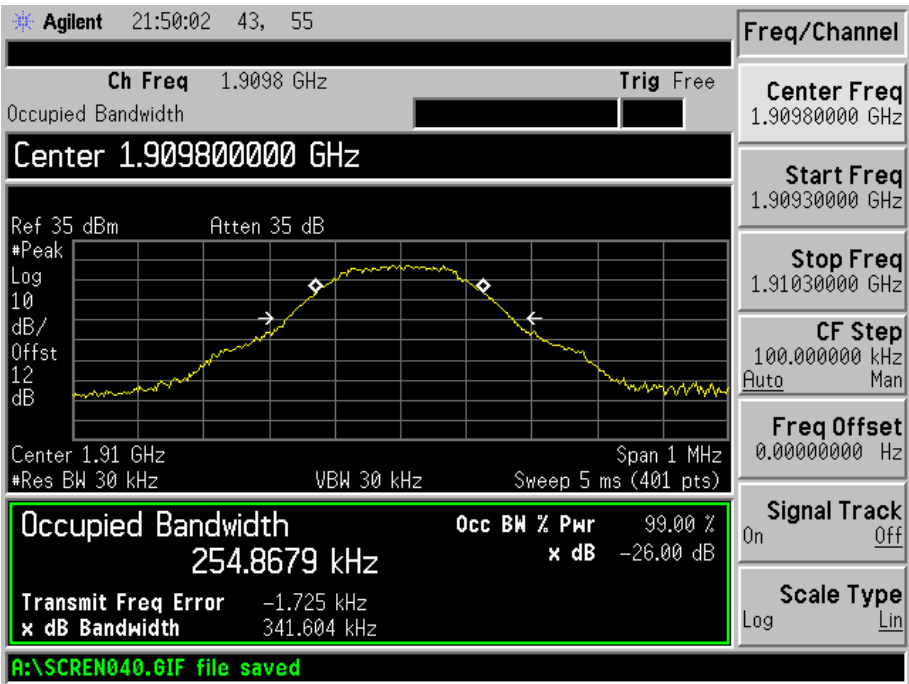
## GPRS Low Channel



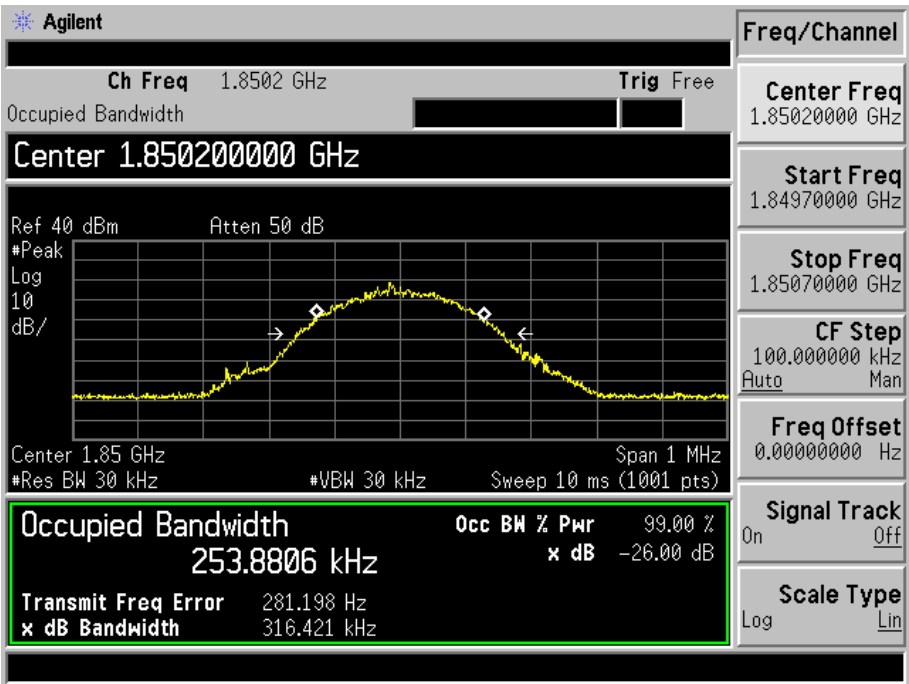
## GPRS Middle Channel



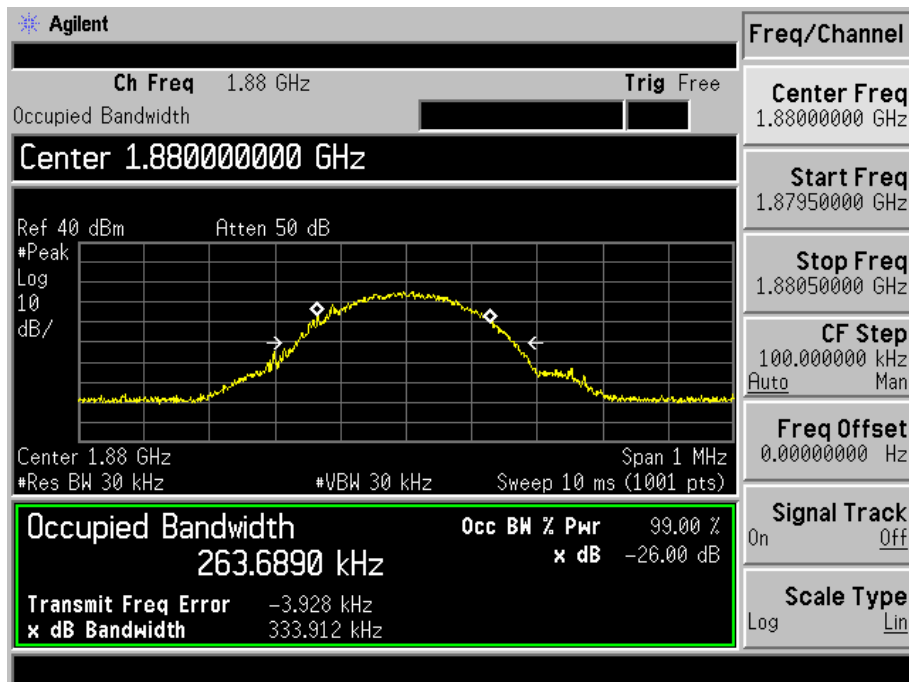
GPRS High Channel



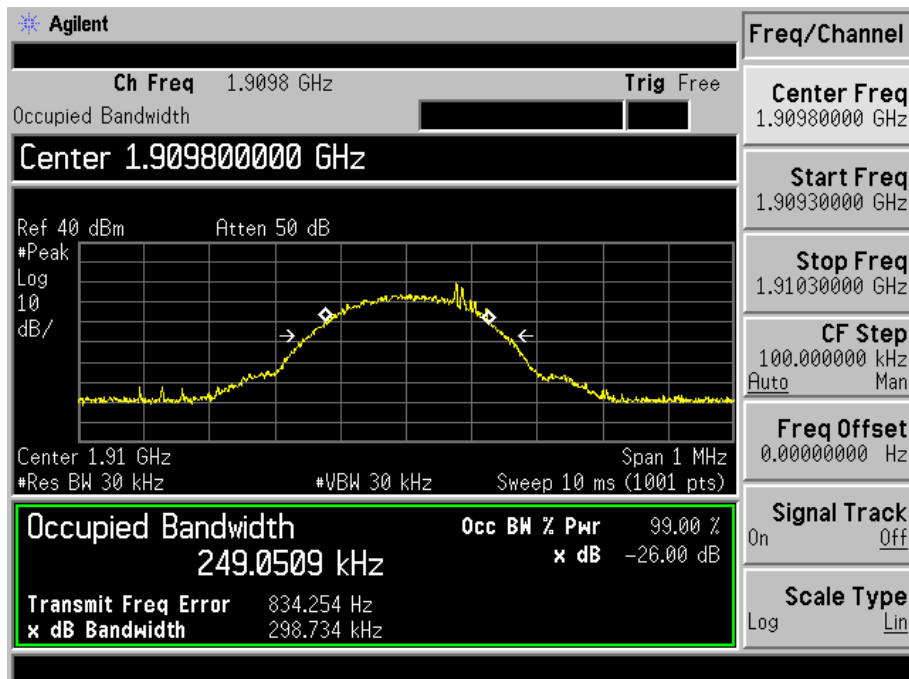
EDGE Low Channel



## EDGE Middle Channel



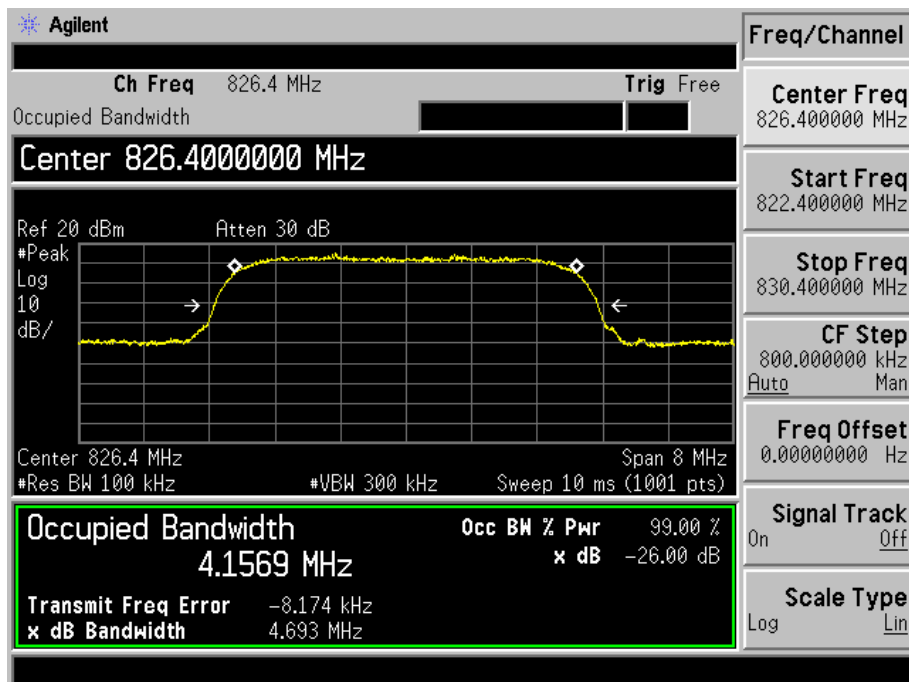
## EDGE High channel



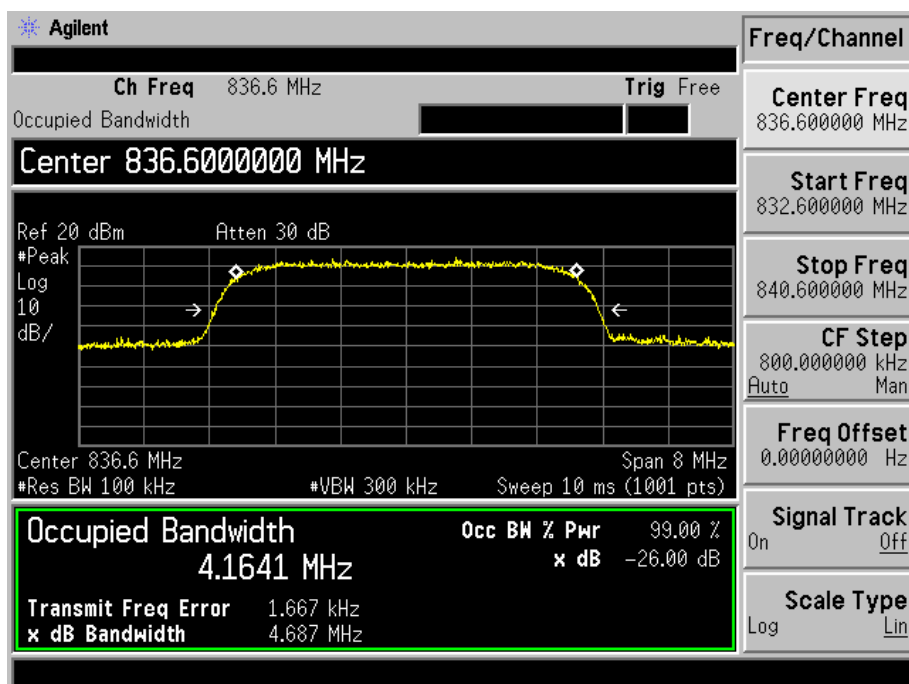


For Band V

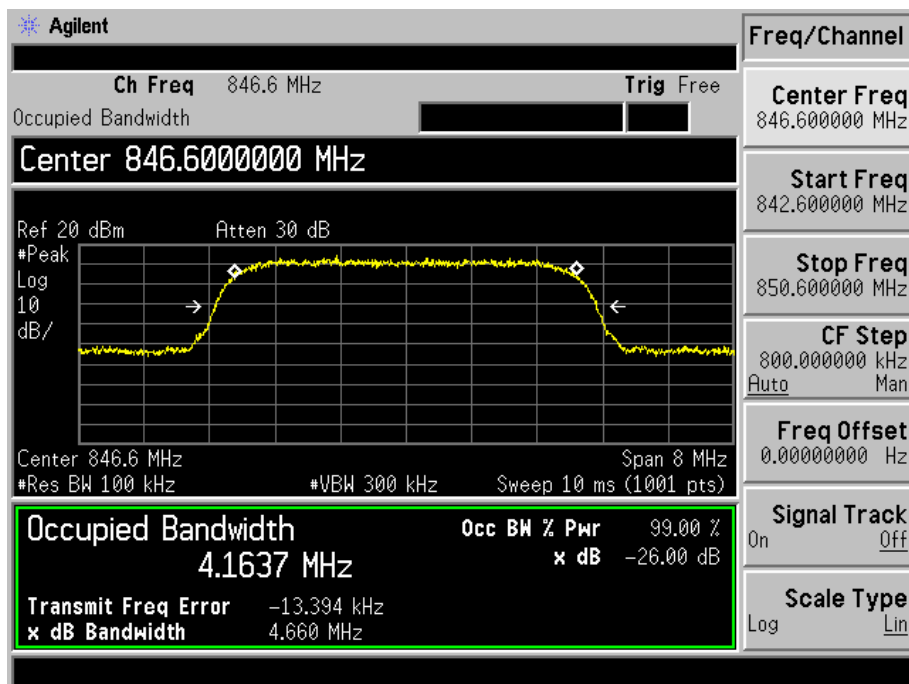
WCDMA Low Channel



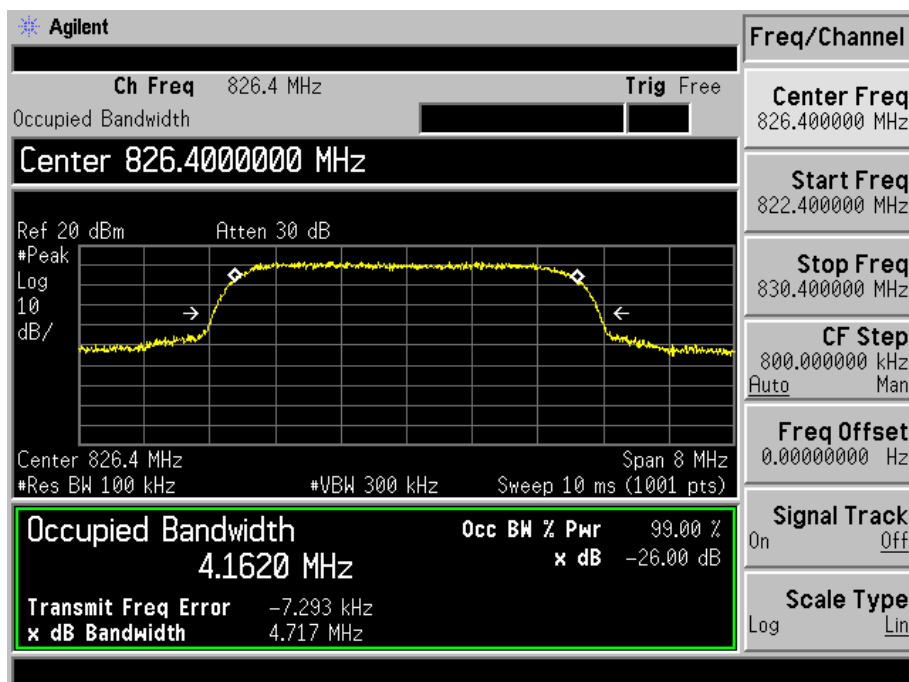
WCDMA Middle Channel



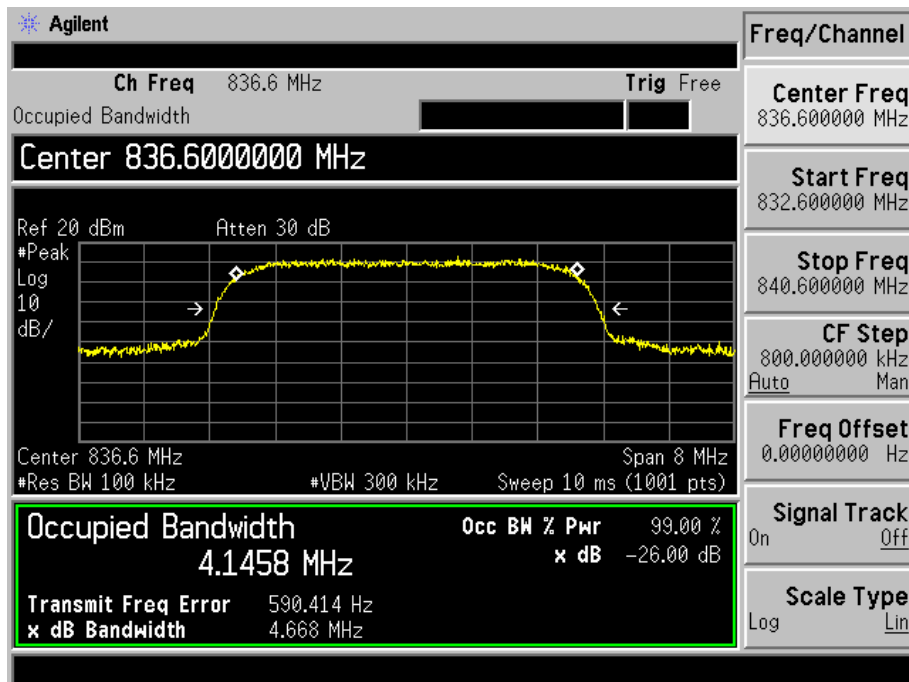
## WCDMA High Channel



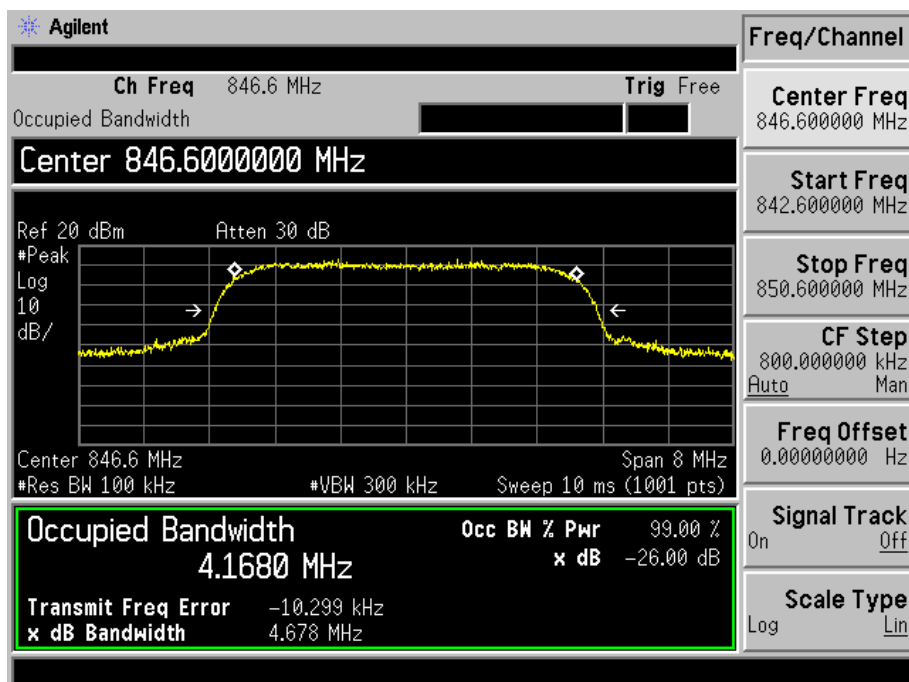
## HSDPA Low Channel



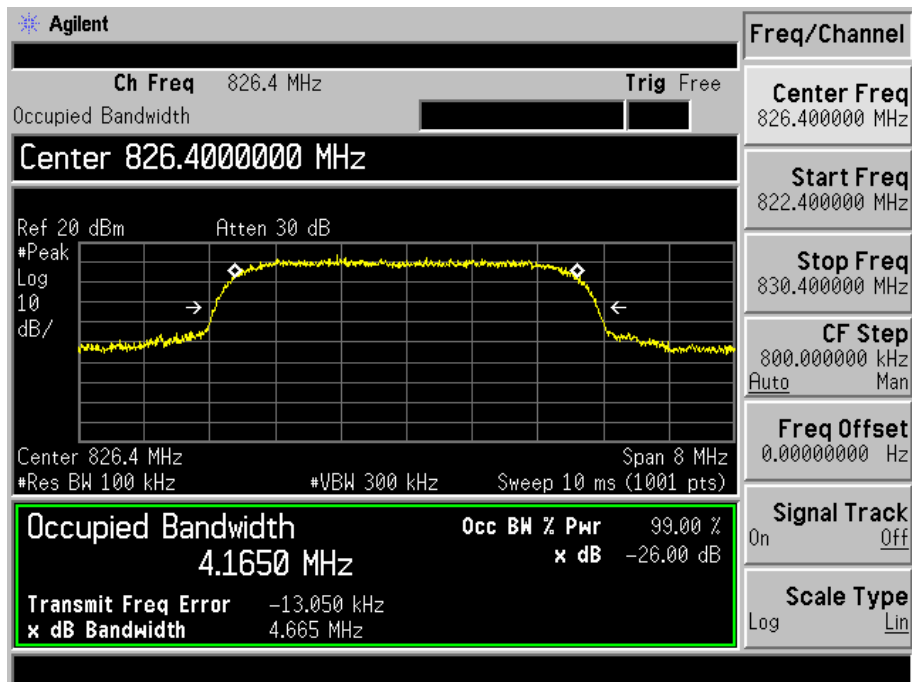
## HSDPA Middle Channel



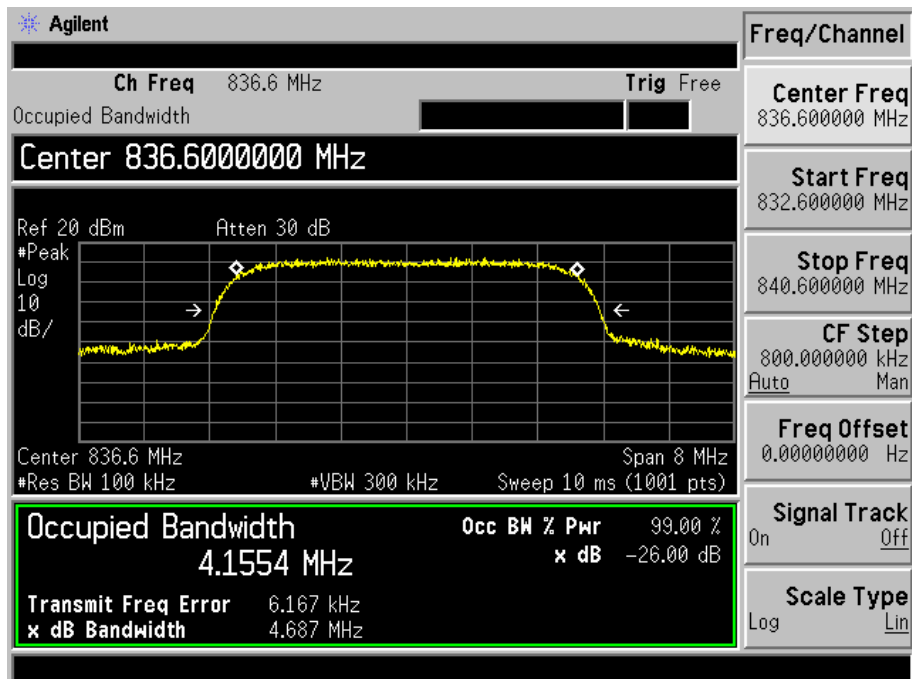
## HSDPA High Channel



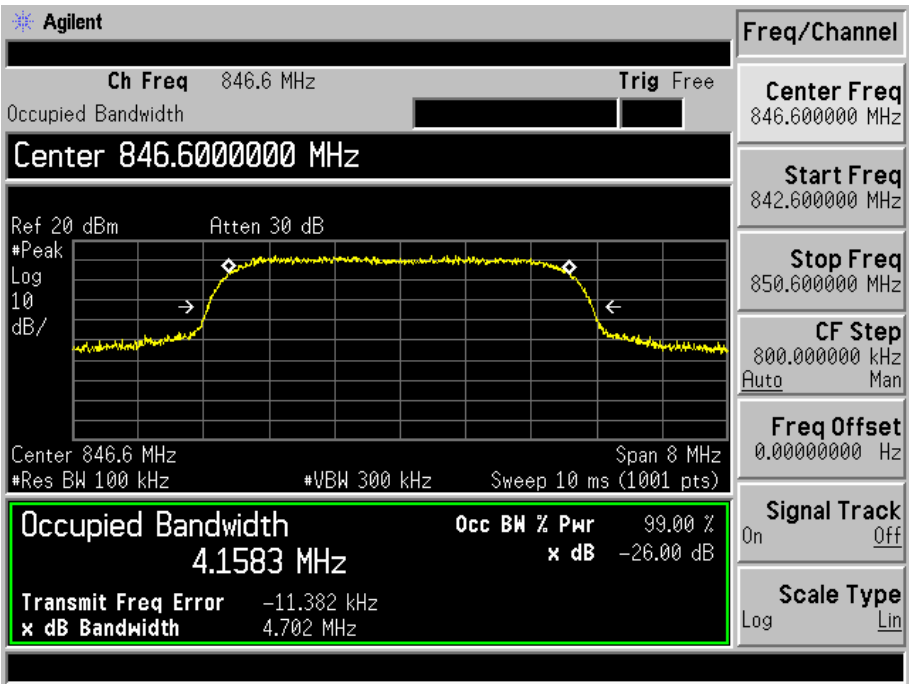
## HSUPA Low Channel



## HSUPA Middle Channel

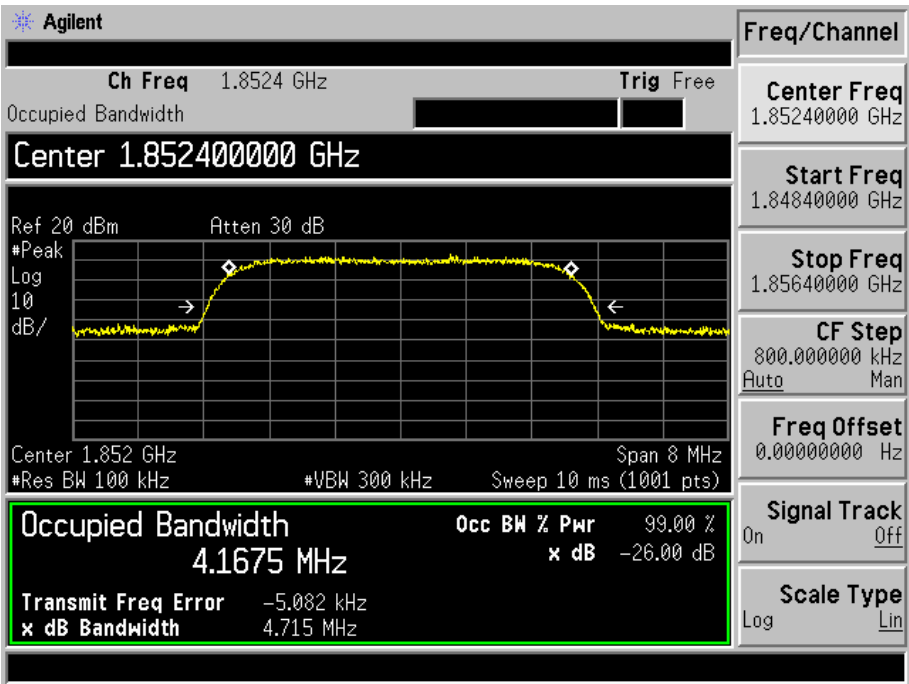


HSUPA High Channel

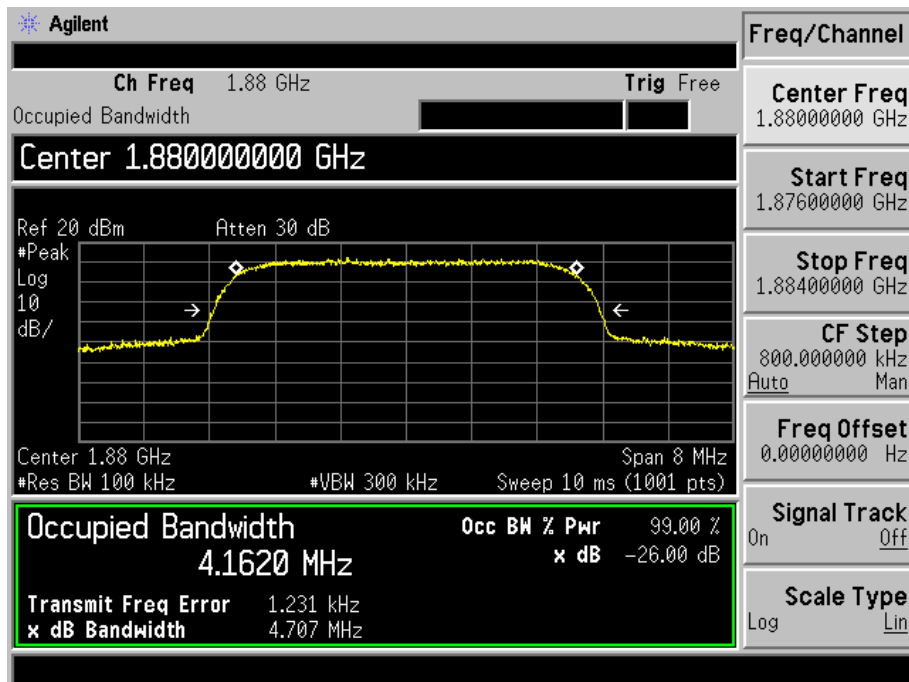


For Band II

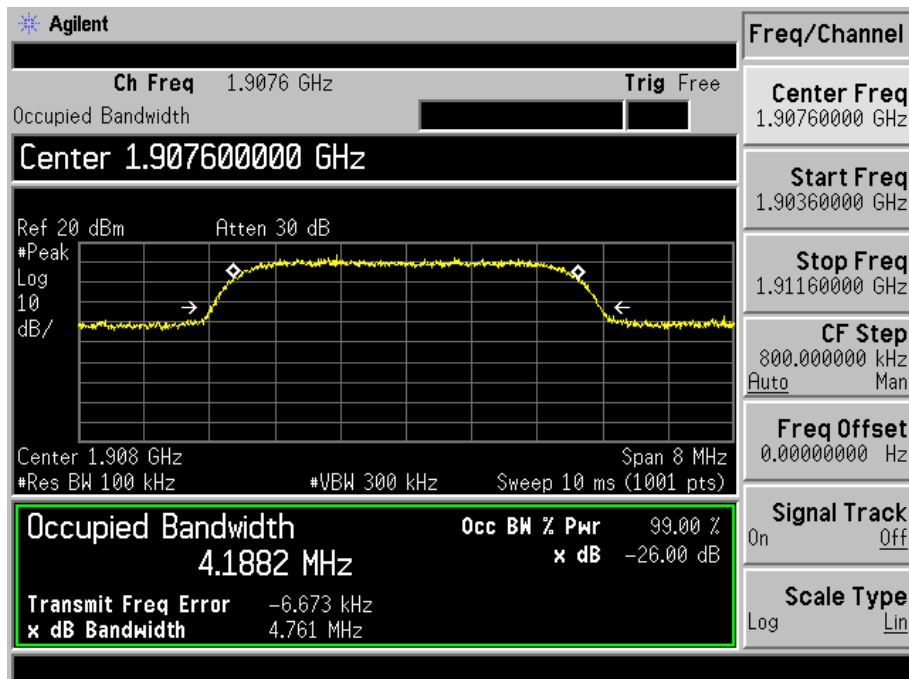
WCDMA Low Channel



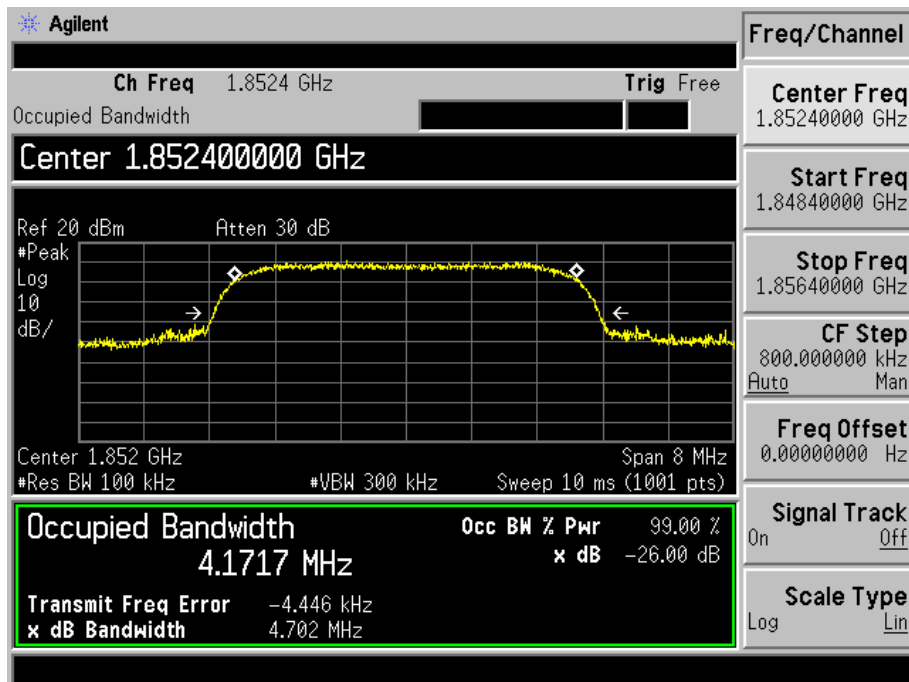
## WCDMA Middle Channel



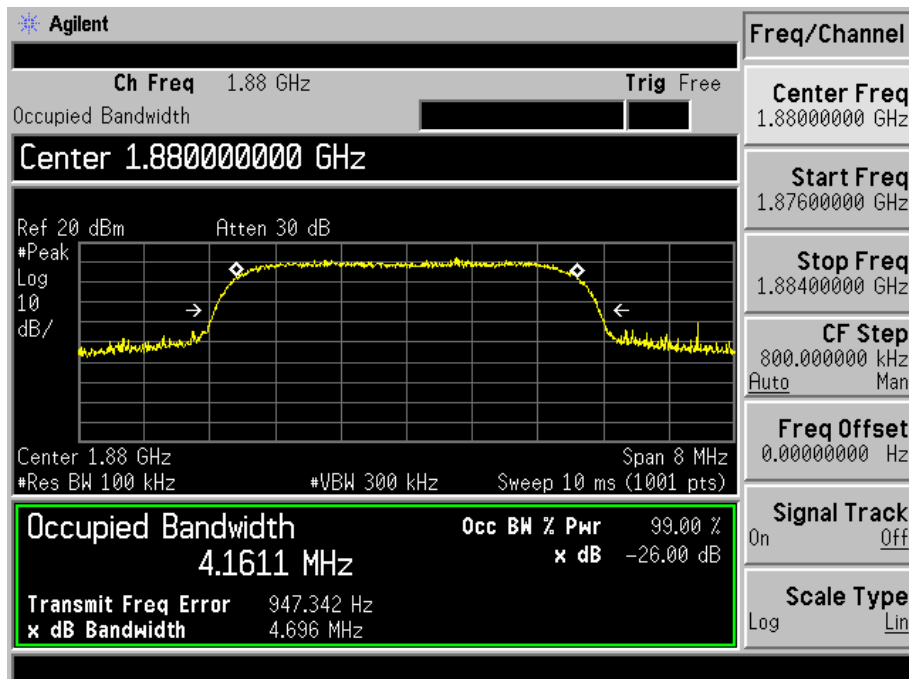
## WCDMA High Channel



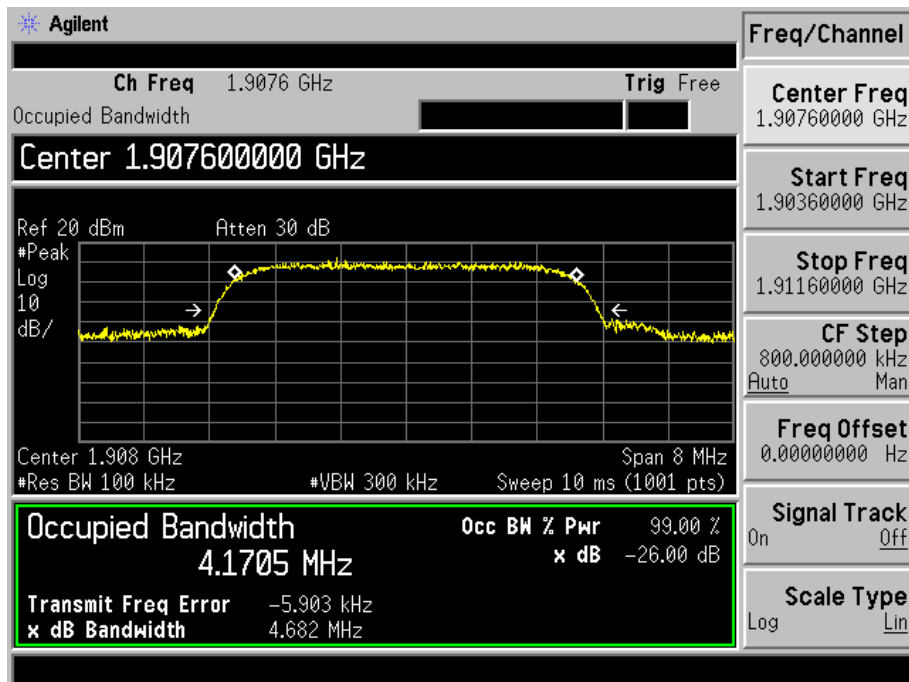
## HSDPA Low Channel



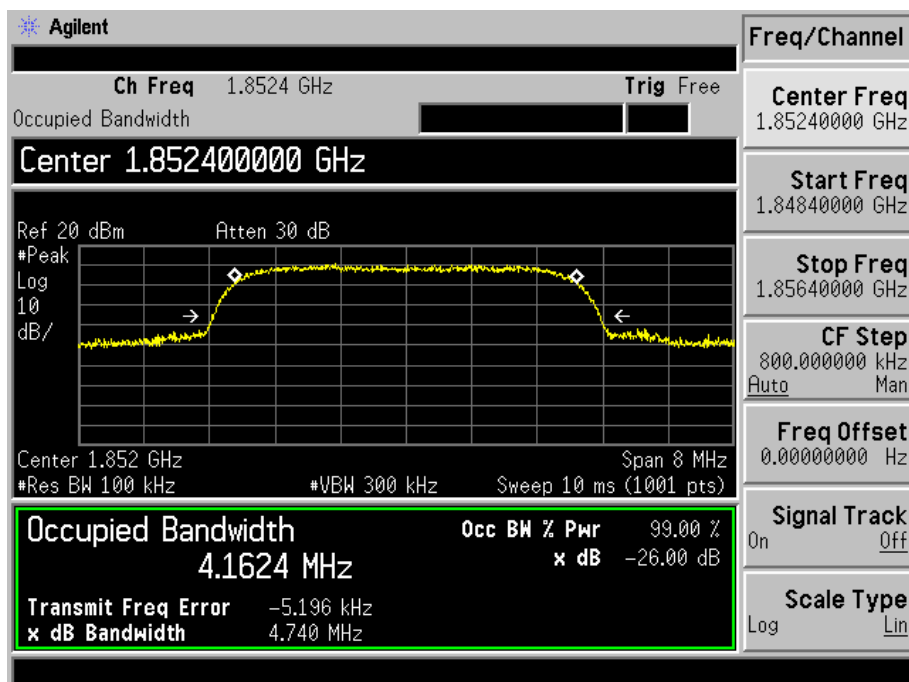
## HSDPA Middle Channel



## HSDPA High Channel

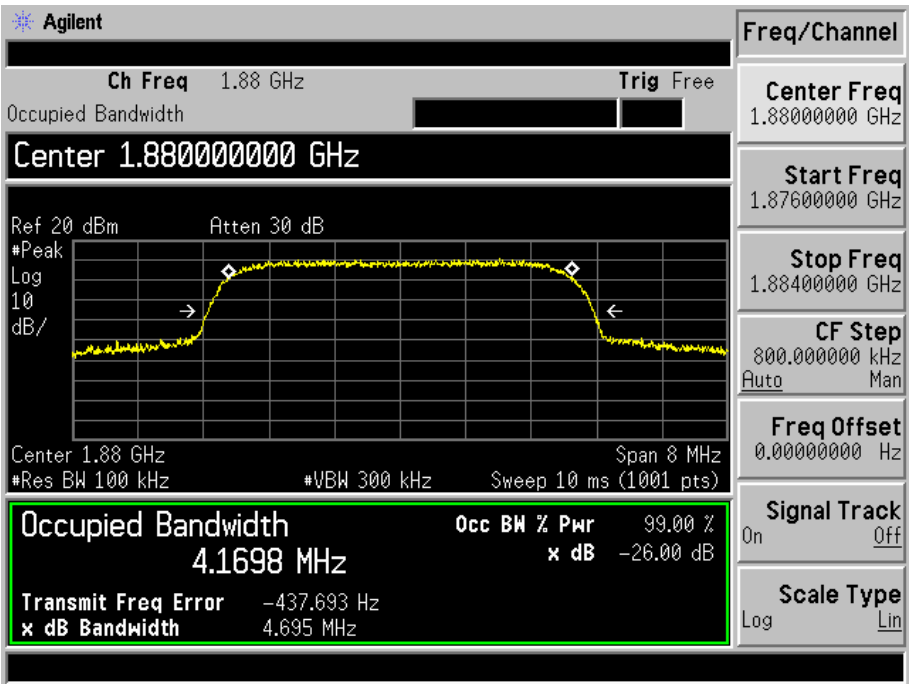


## HSUPA Low Channel

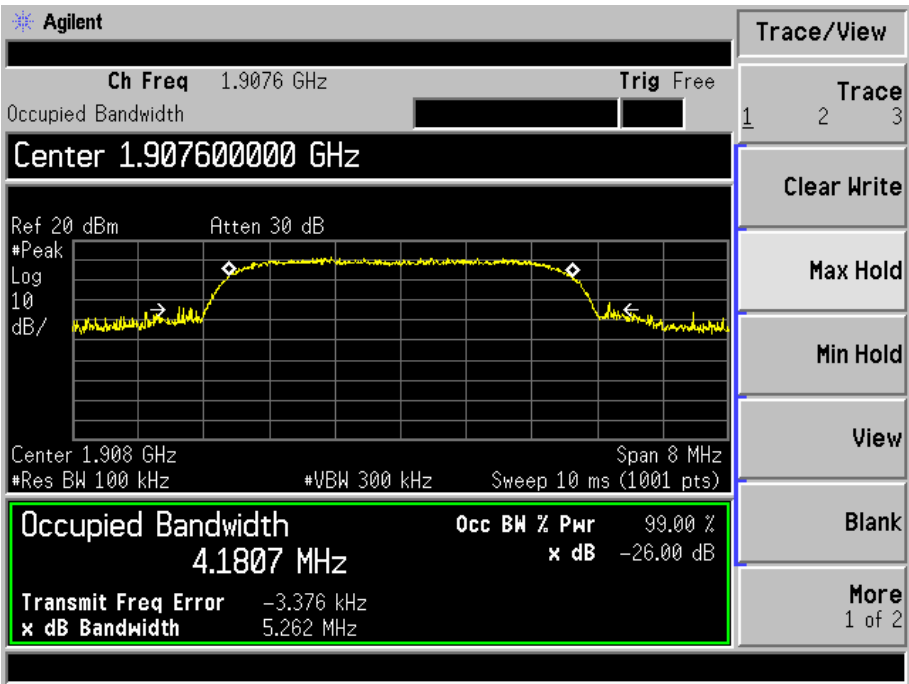




HSUPA Middle Channel



HSUPA High Channel



## 7. Out of Band Emissions at Antenna Terminal

### 7.1 Standard Applicable

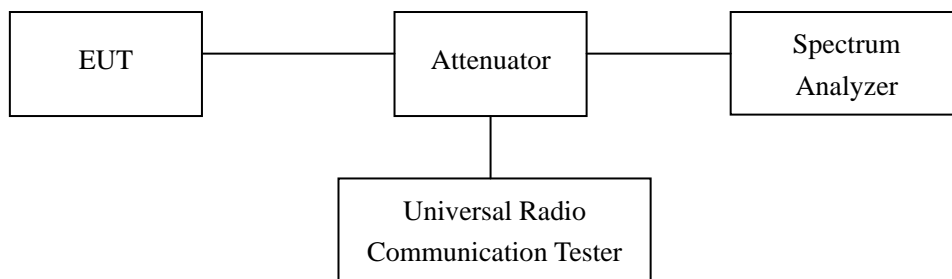
According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

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.

### 7.2 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:



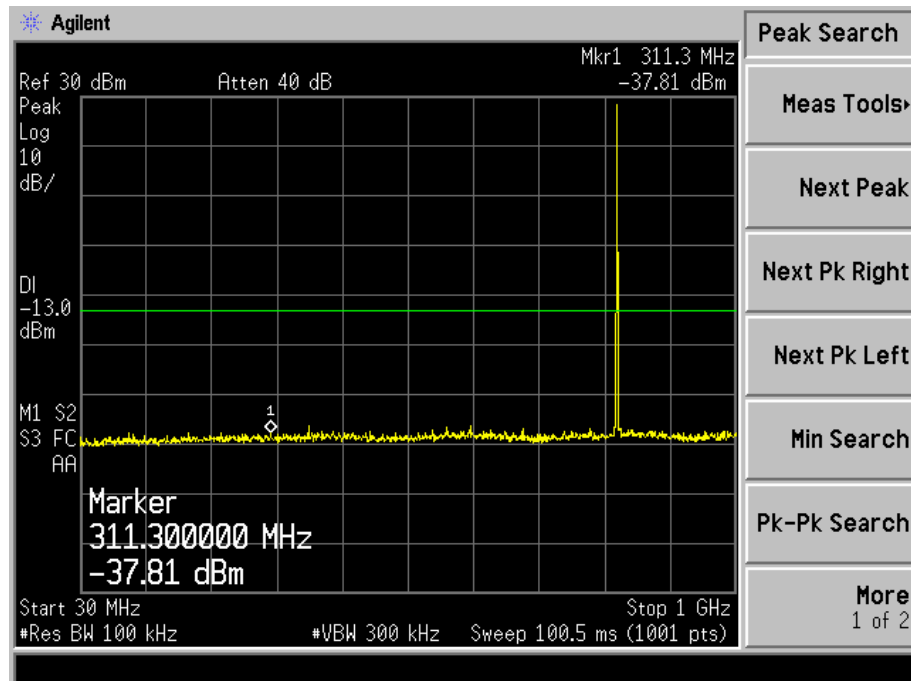
### 7.3 Environmental Conditions

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

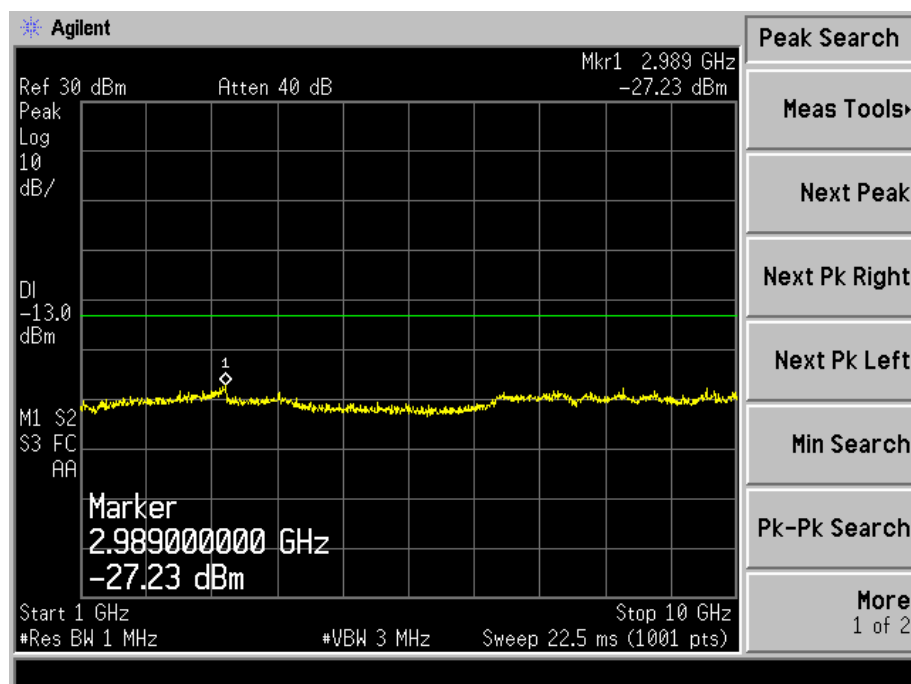
## 7.4 Summary of Test Results/Plots

Please refer to the following test plots For Cellular Band

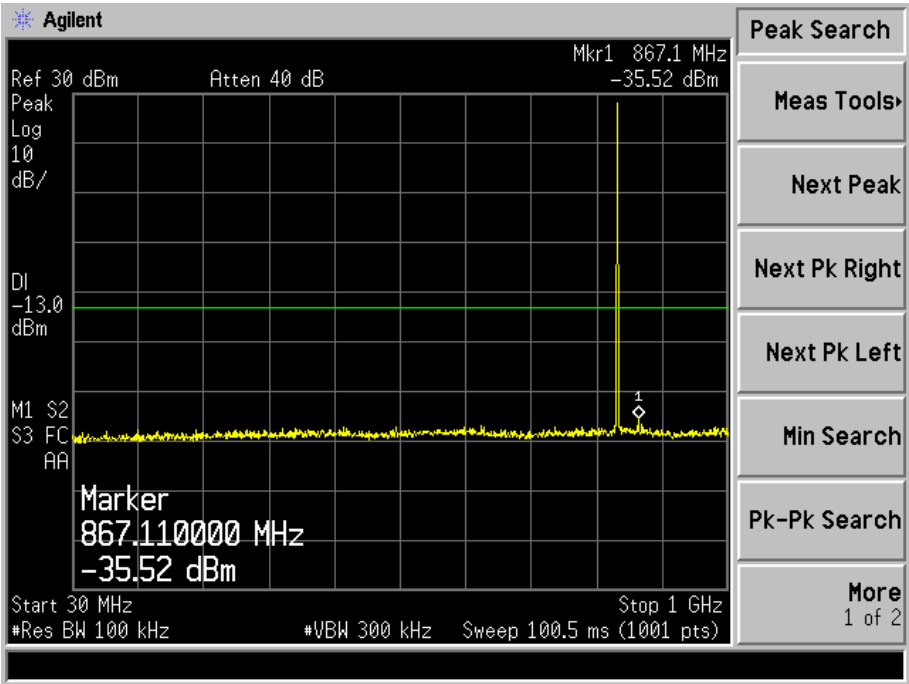
GSM Low Channel 30MHz to 1GHz



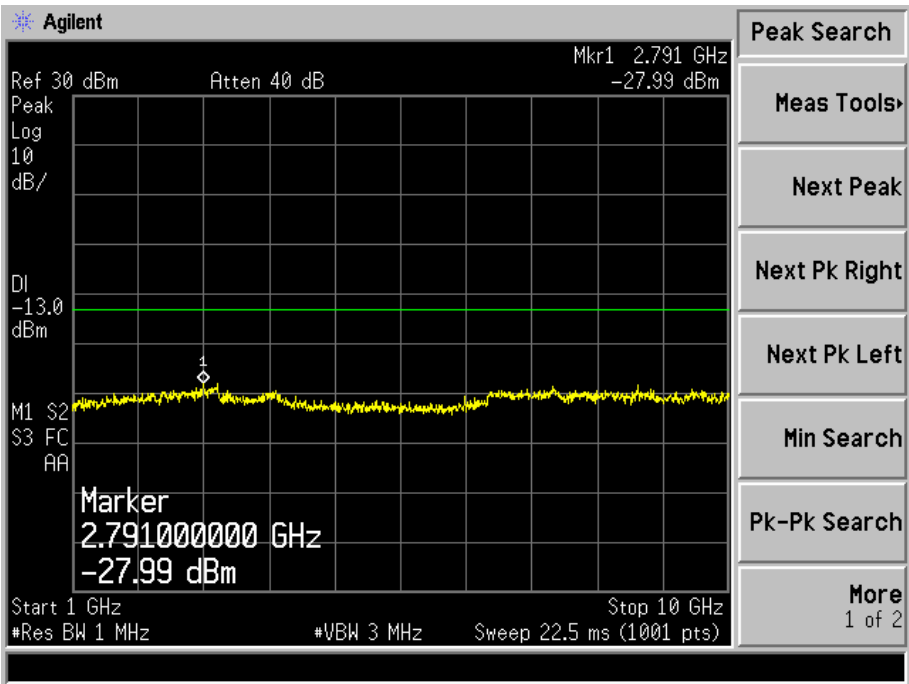
Above 1GHz



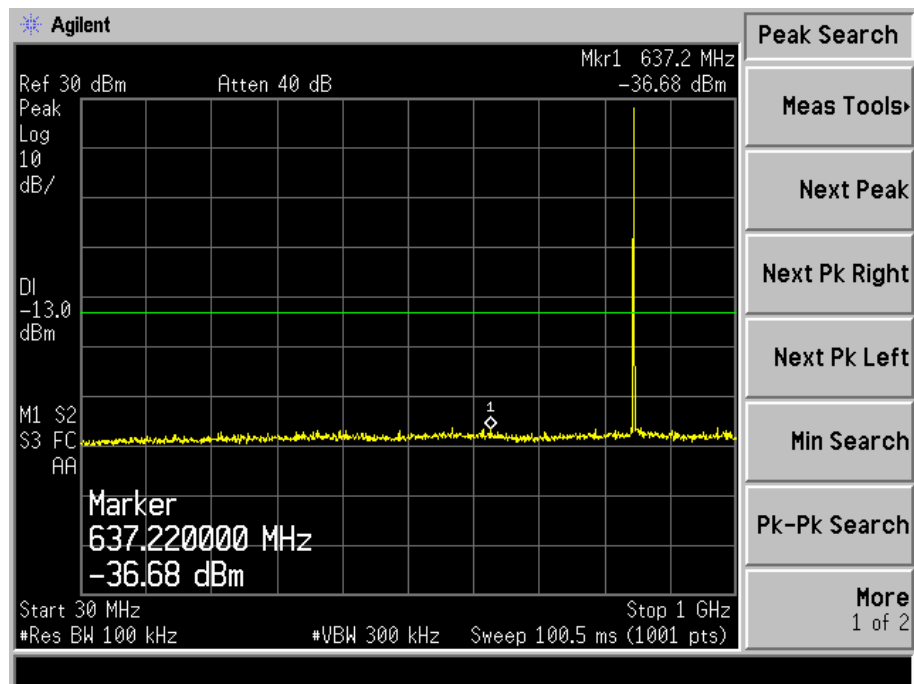
GSM Middle Channel  
30MHz to 1GHz



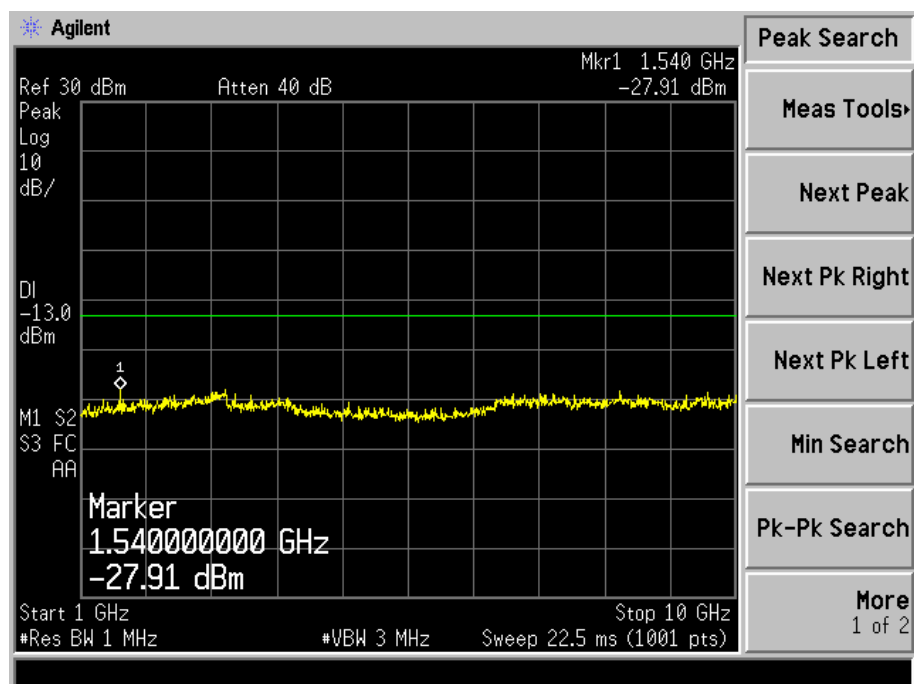
Above 1GHz



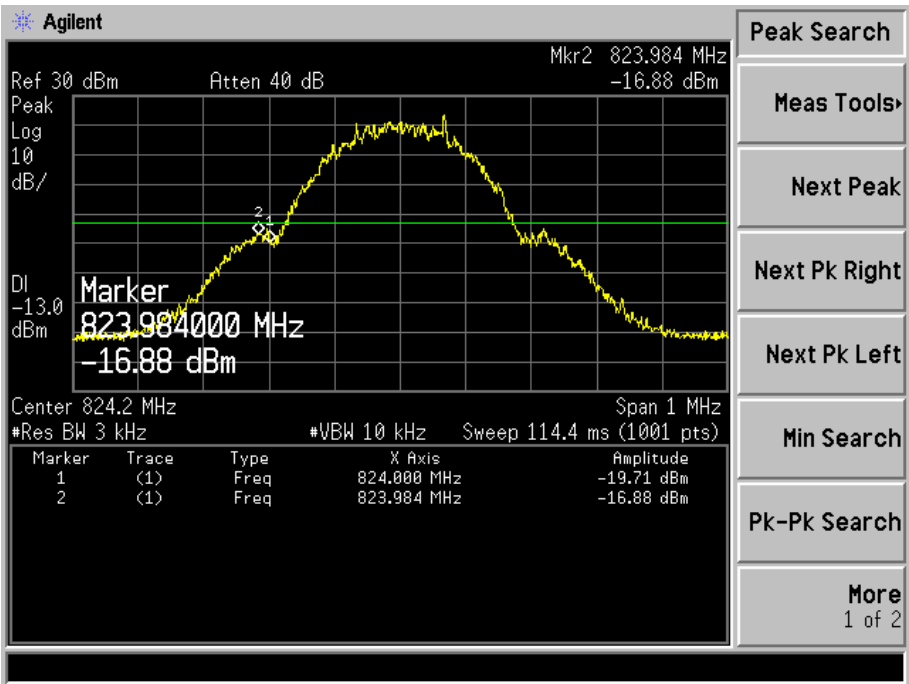
GSM High Channel  
30MHz to 1GHz



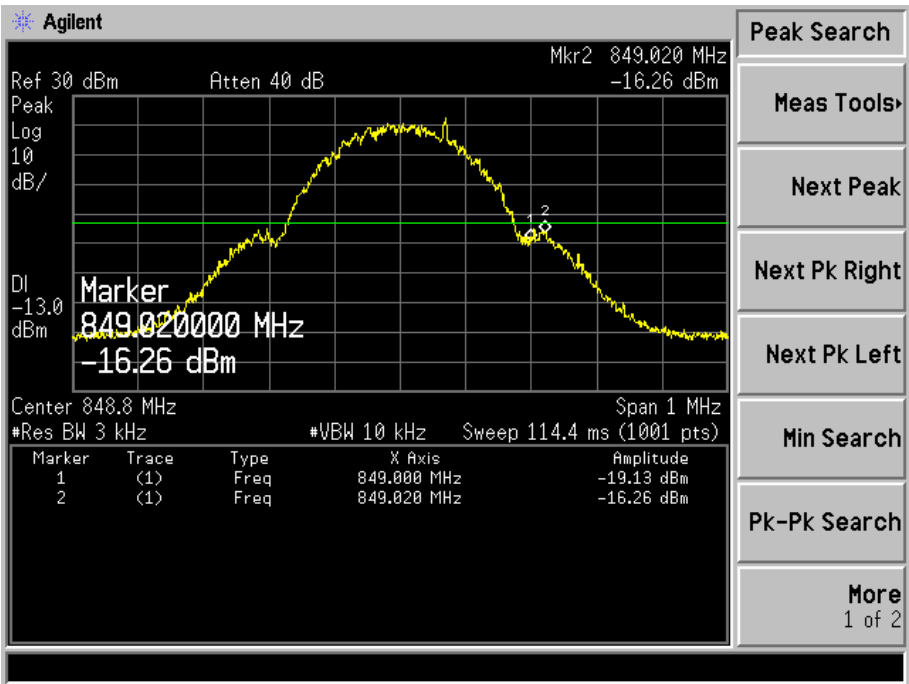
Above 1GHz



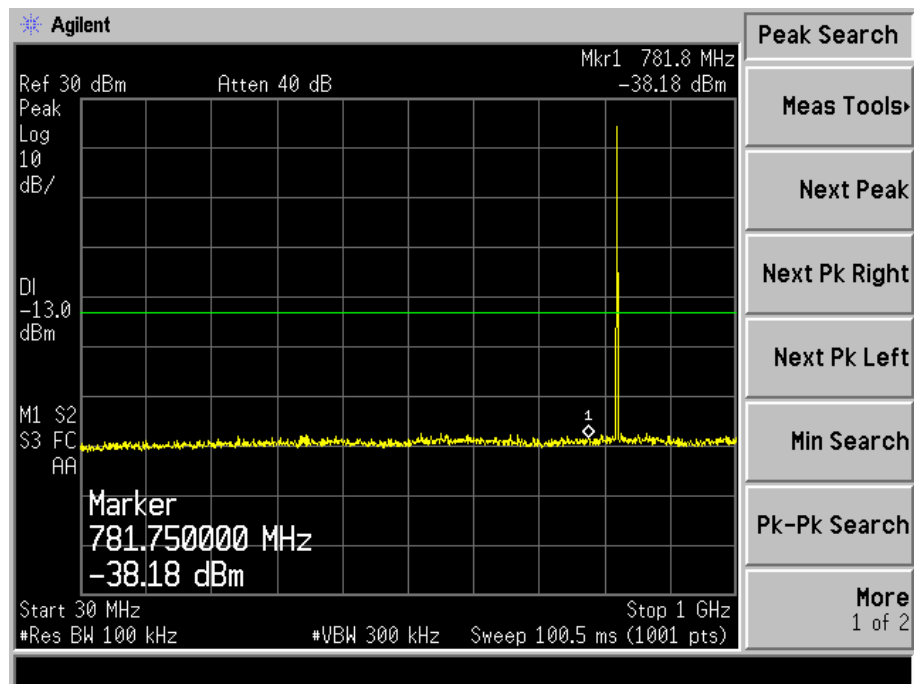
GSM Low Band Emission



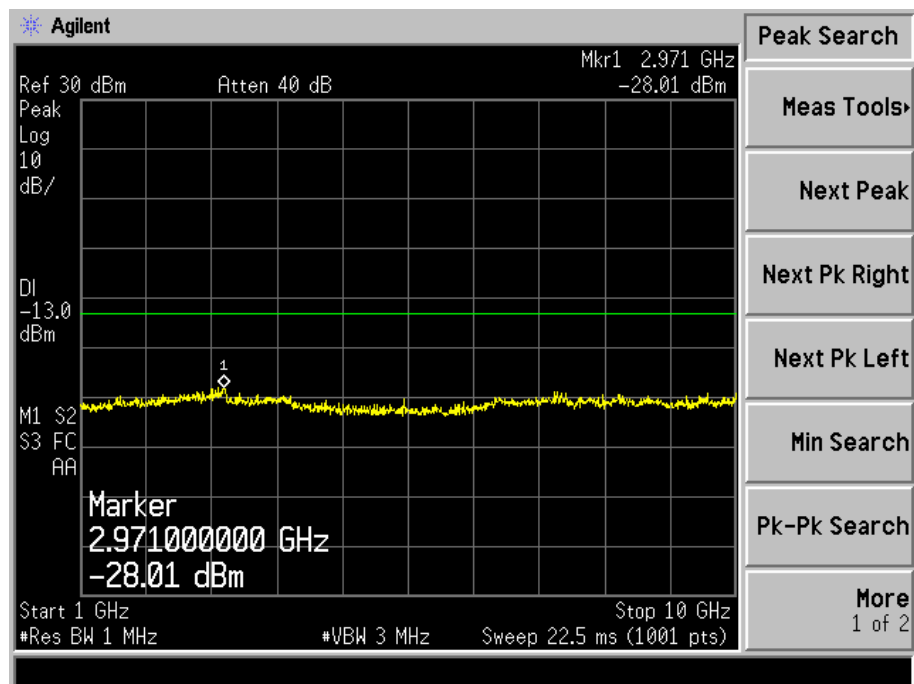
GSM High Band Emission



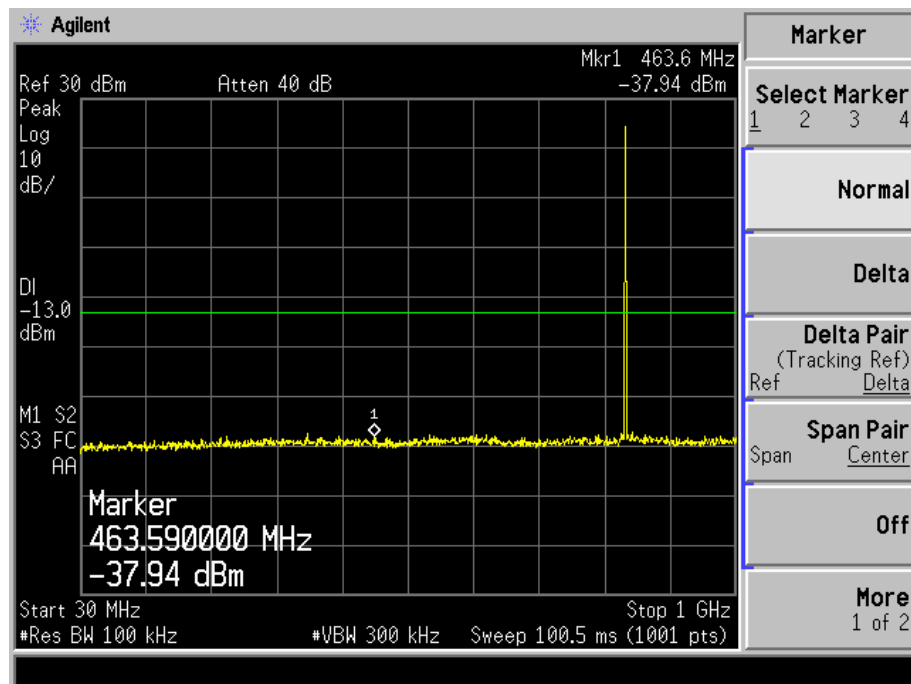
GPRS Low Channel  
30MHz to 1GHz



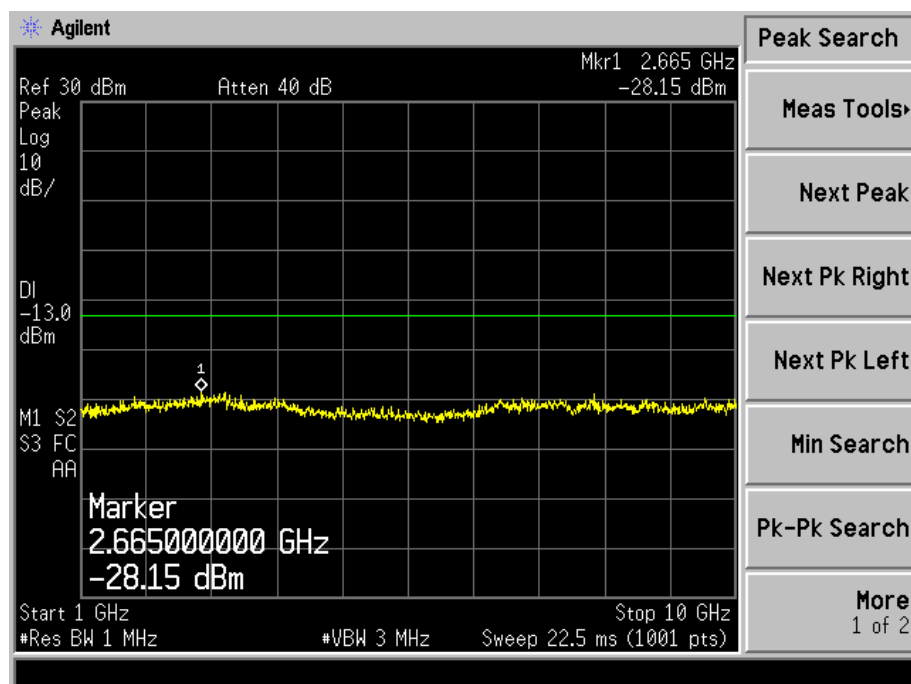
Above 1GHz



GPRS Middle Channel  
30MHz to 1GHz

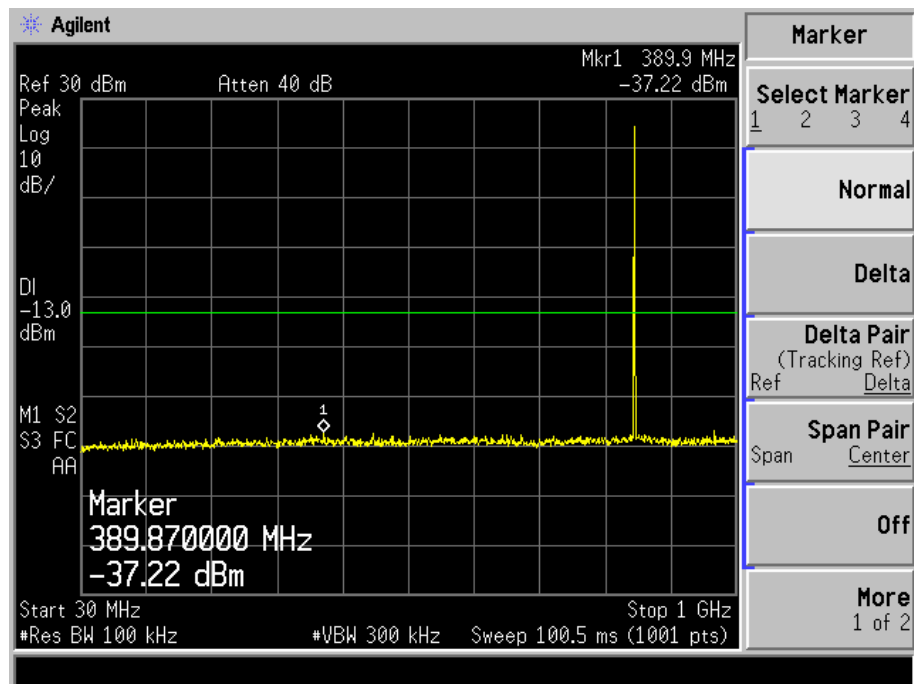


Above 1GHz

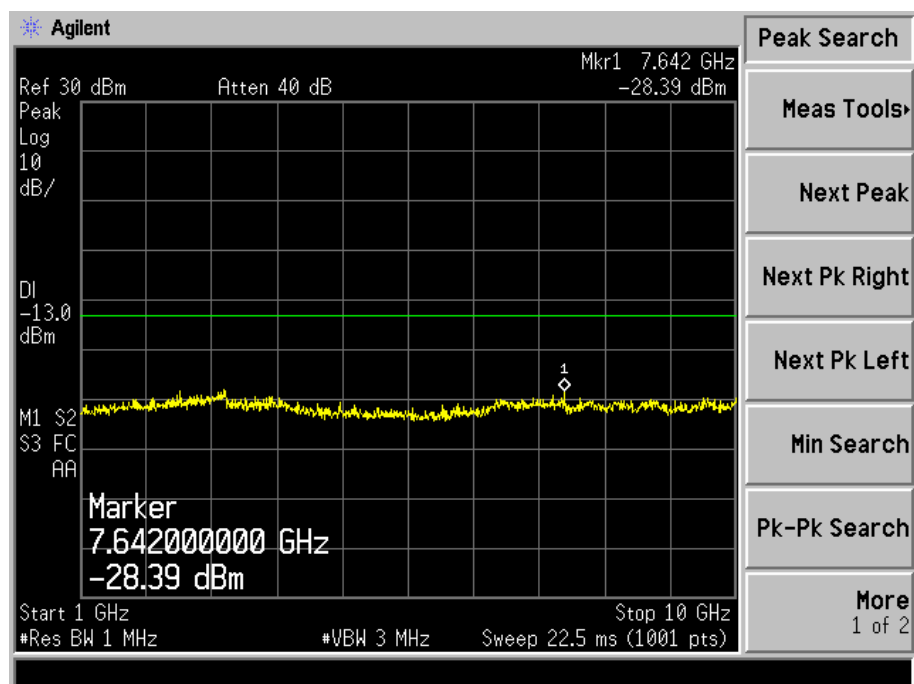




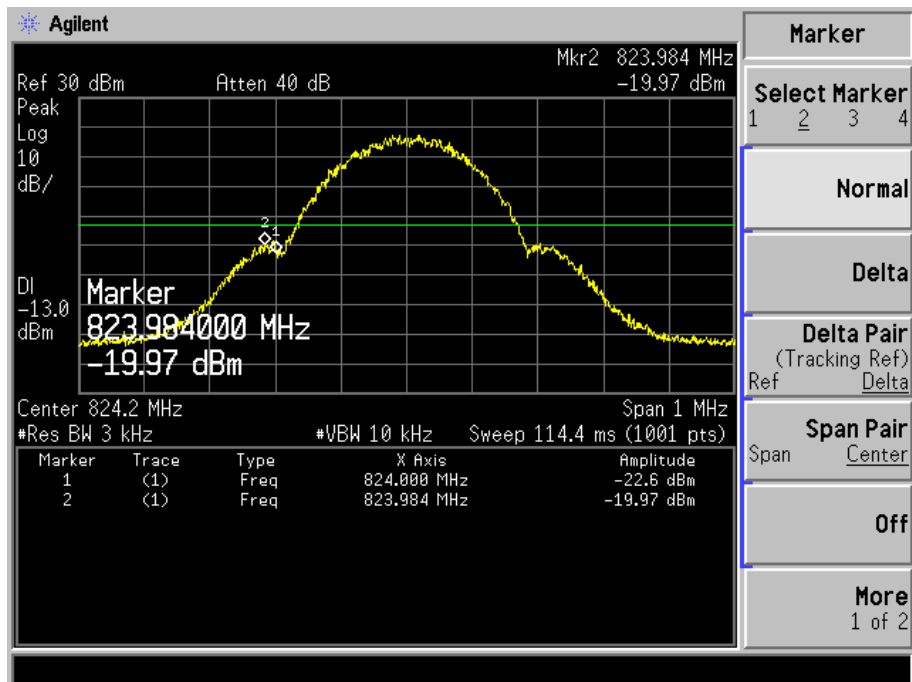
GPRS High Channel  
30MHz to 1GHz



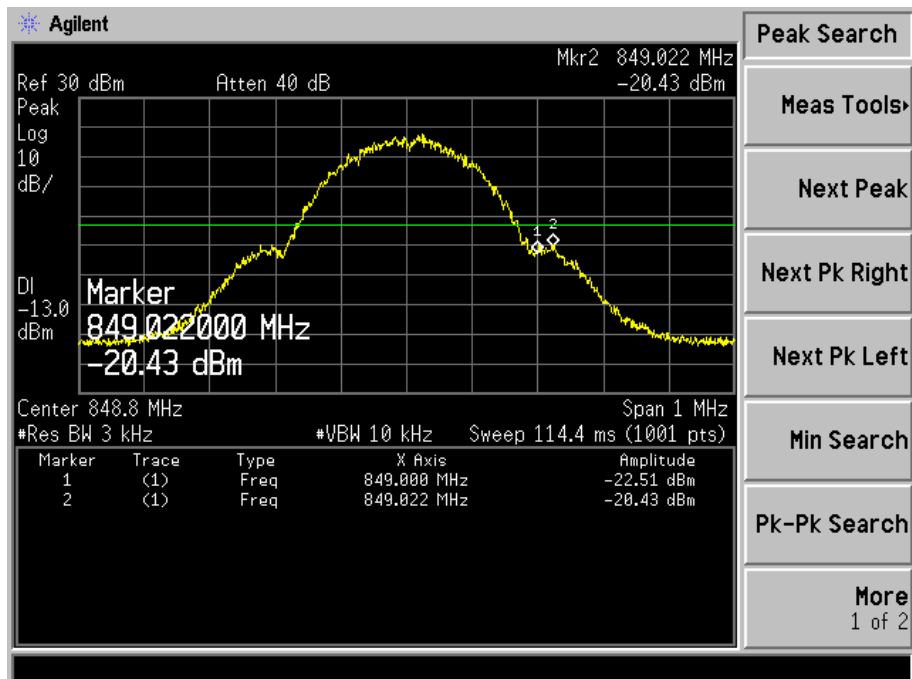
Above 1GHz



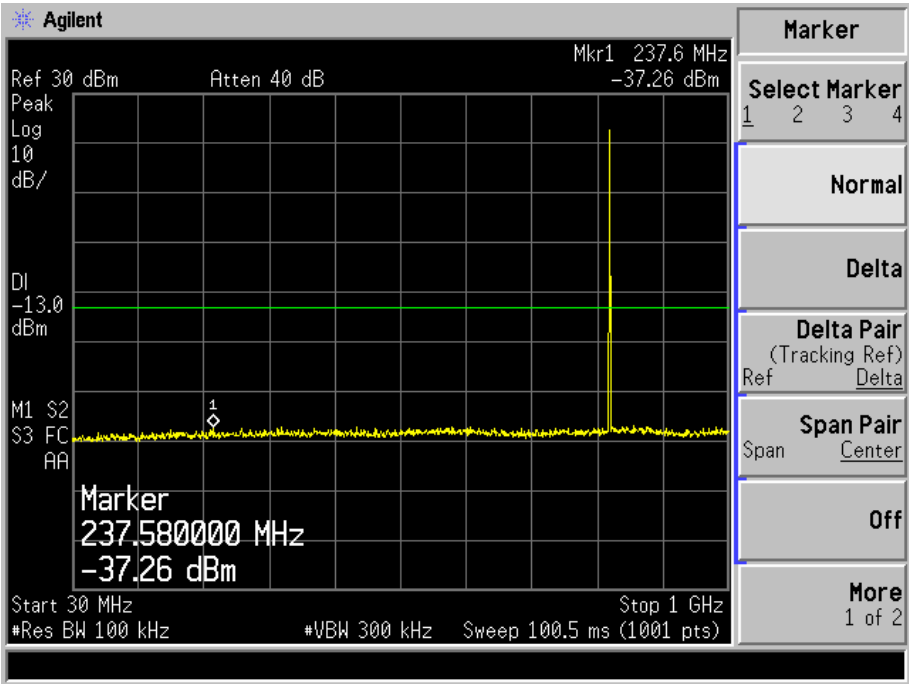
## GPRS Low Band Emission



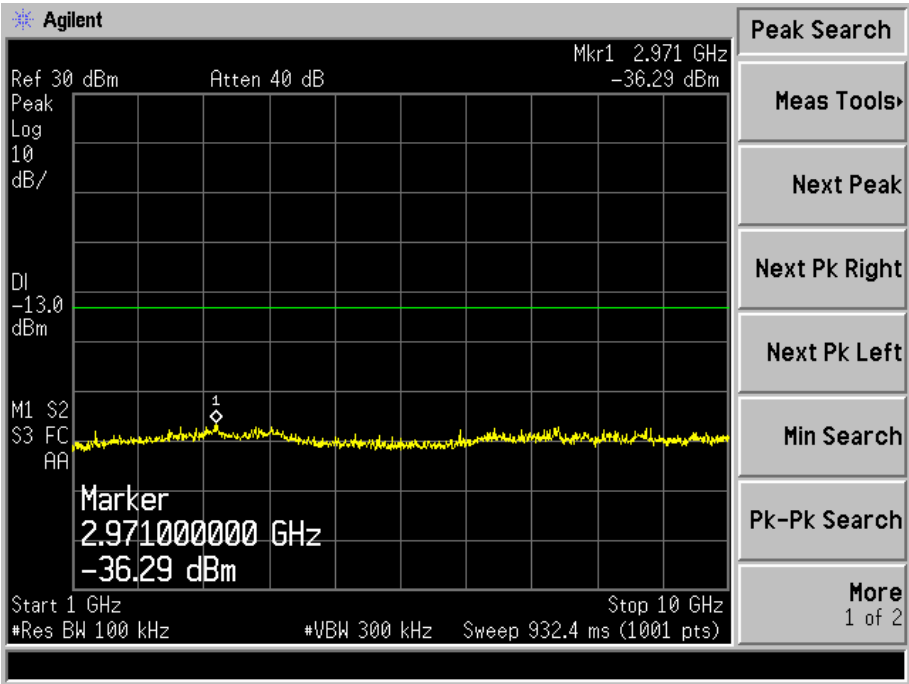
## GPRS High Band Emission



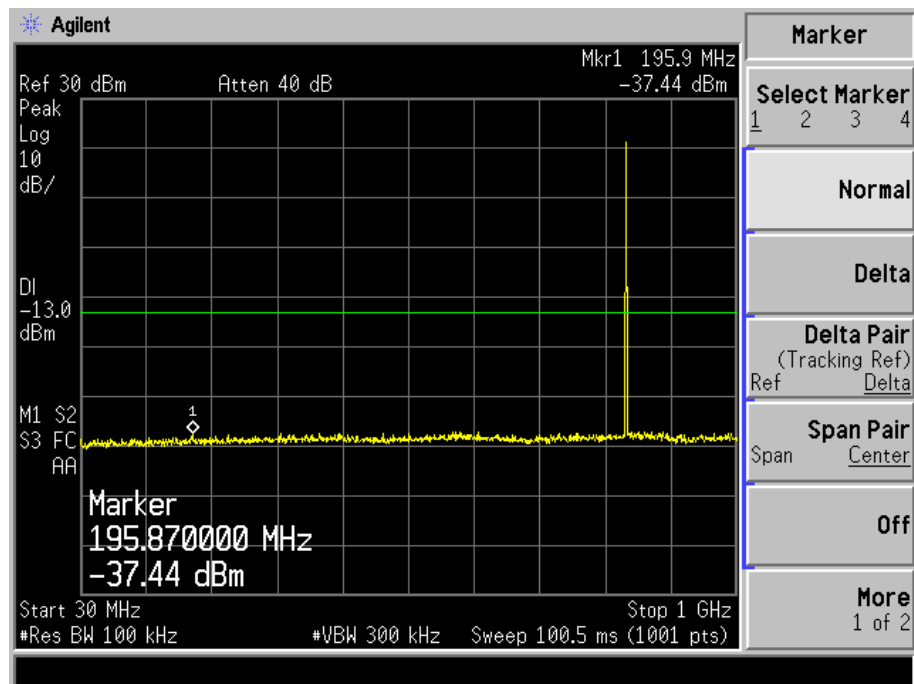
EDGE Low Channel  
30MHz to 1GHz



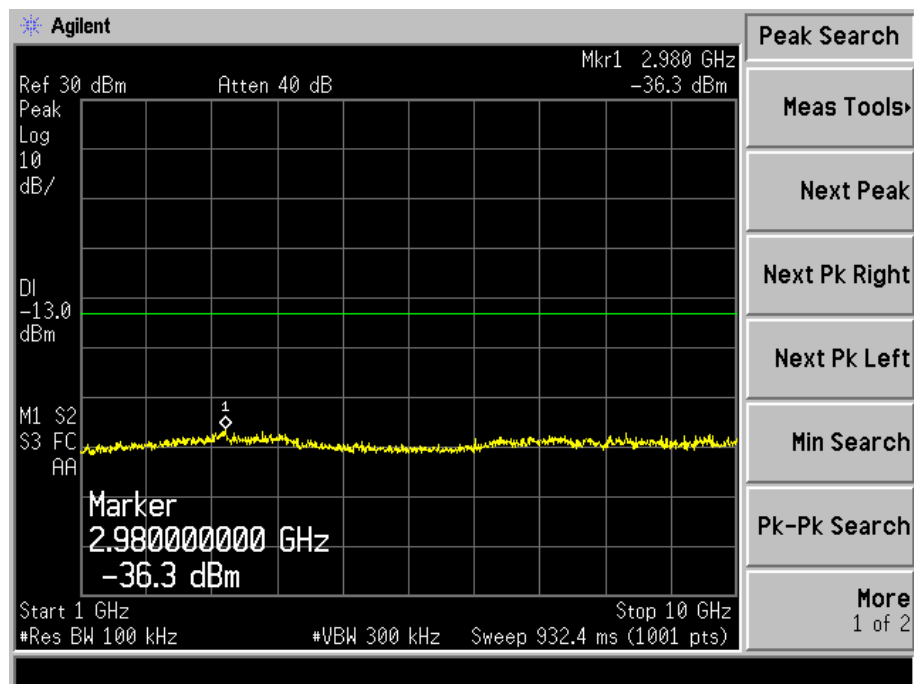
Above 1GHz



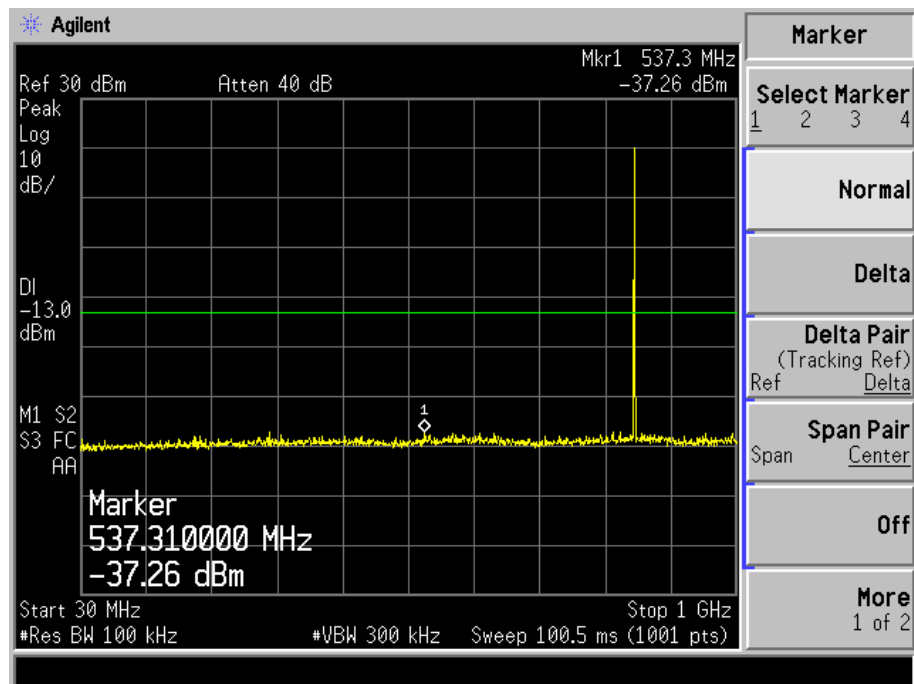
EDGE Middle Channel  
30MHz to 1GHz



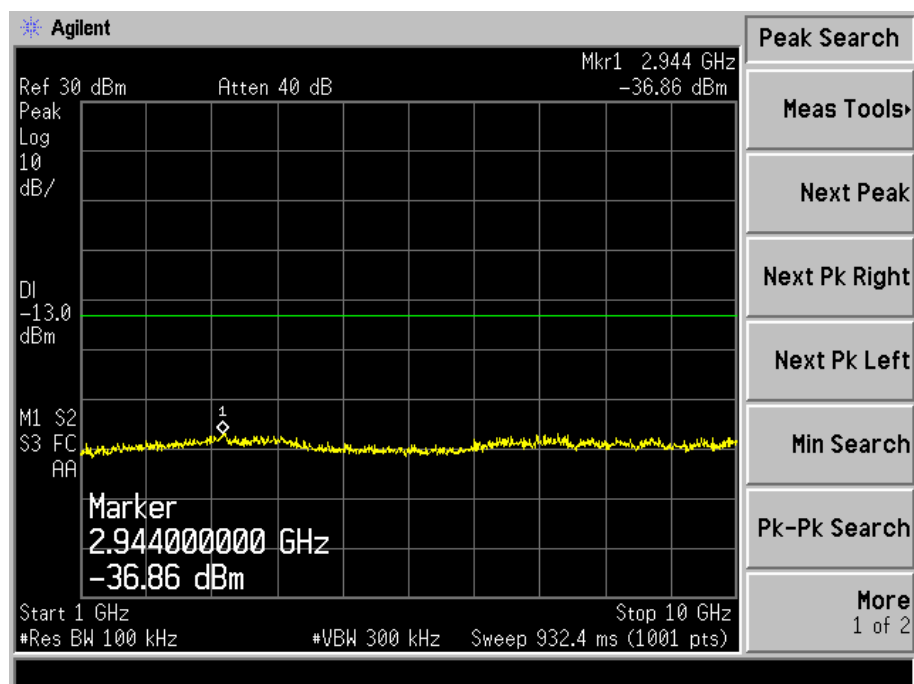
Above 1GHz



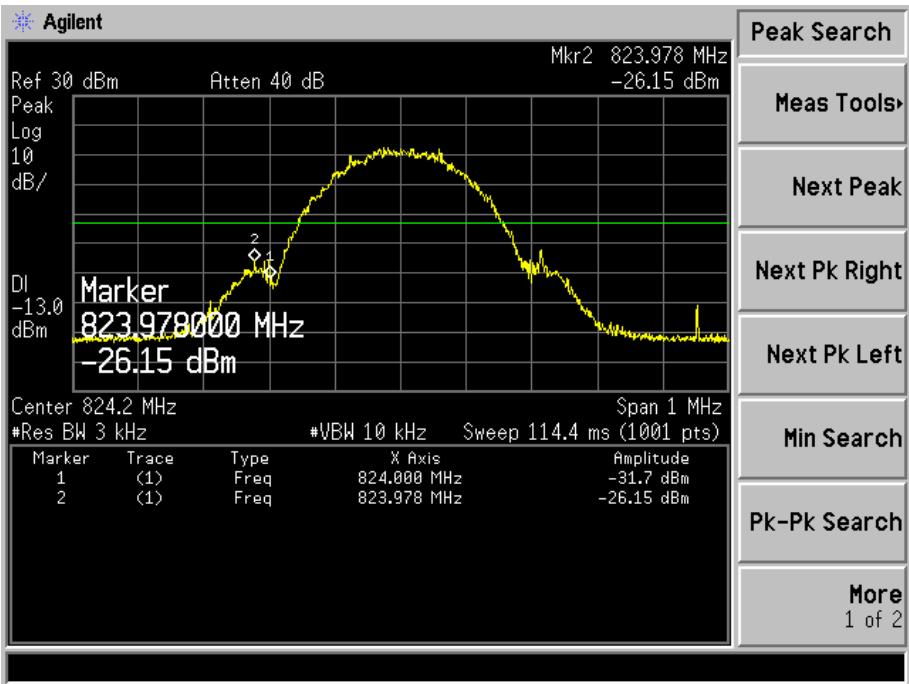
EDGE High Channel  
30MHz to 1GHz



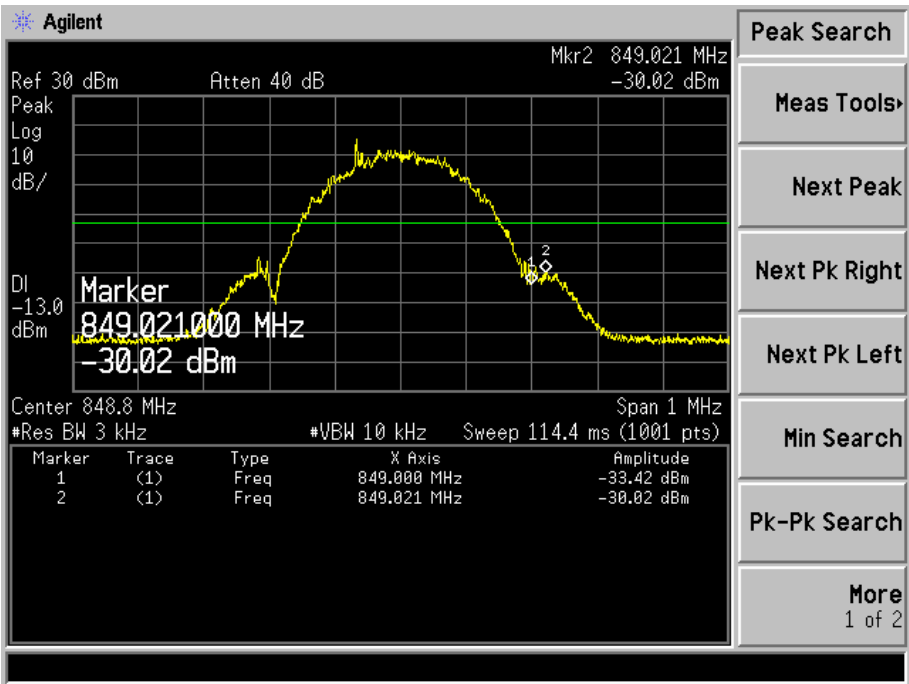
Above 1GHz



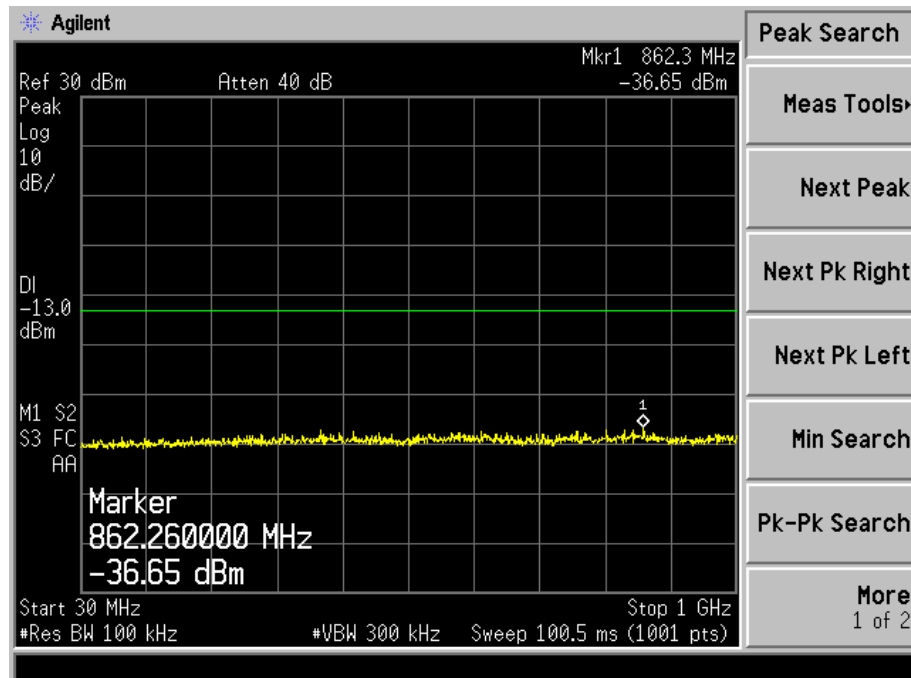
EDGE Low Band Emission



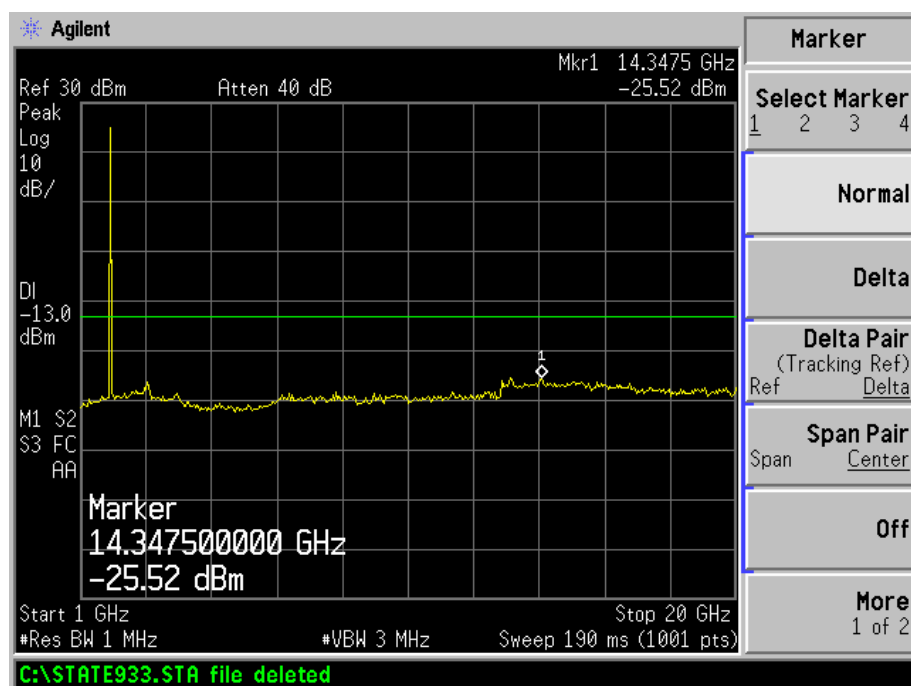
EDGE High Band Emission



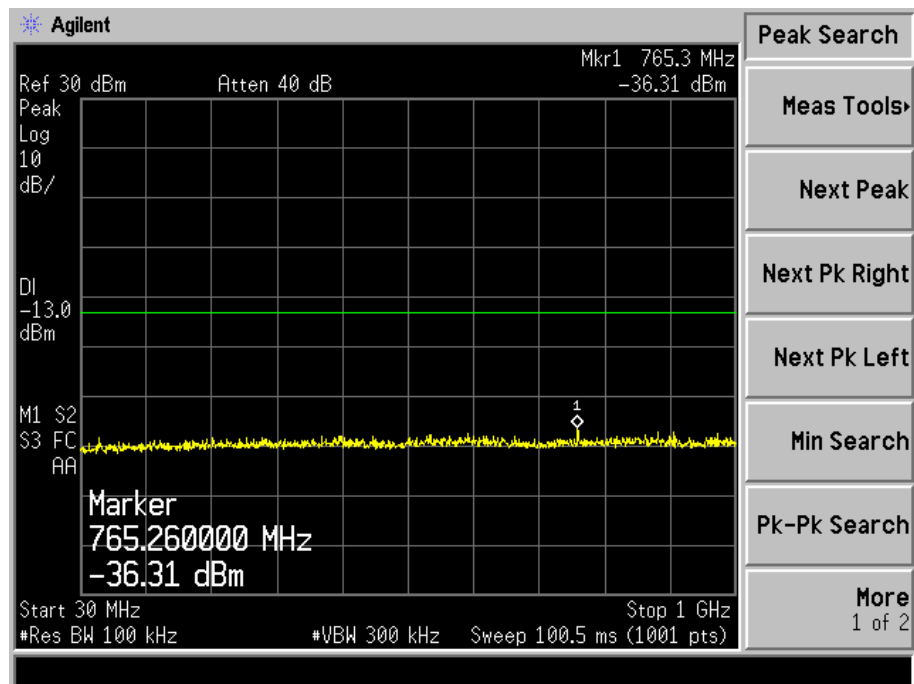
For PCS Band  
GSM Low Channel  
30MHz to 1GHz



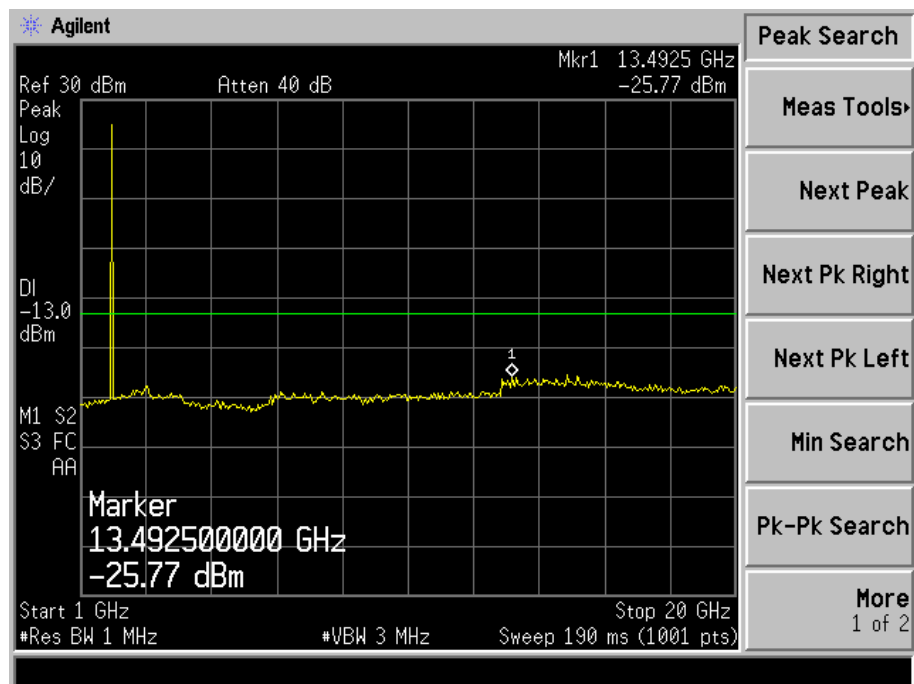
Above 1GHz



GSM Middle Channel  
30MHz to 1GHz

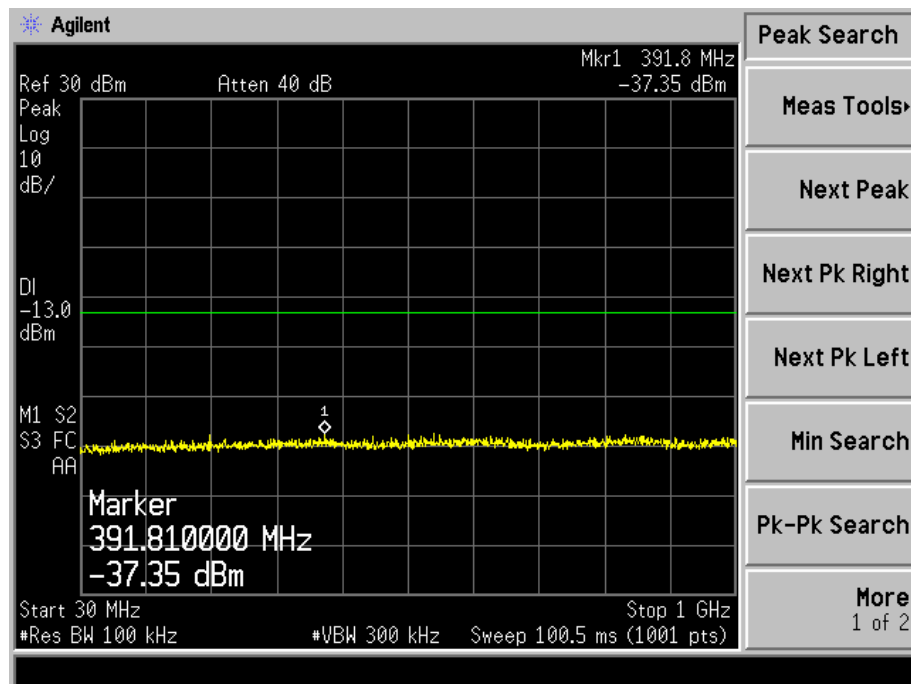


Above 1GHz

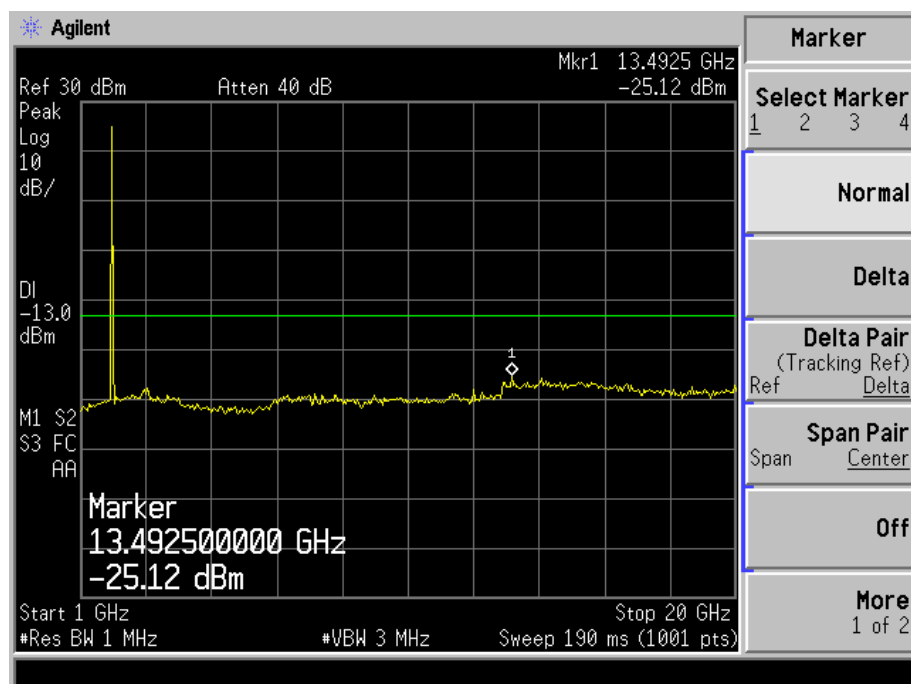




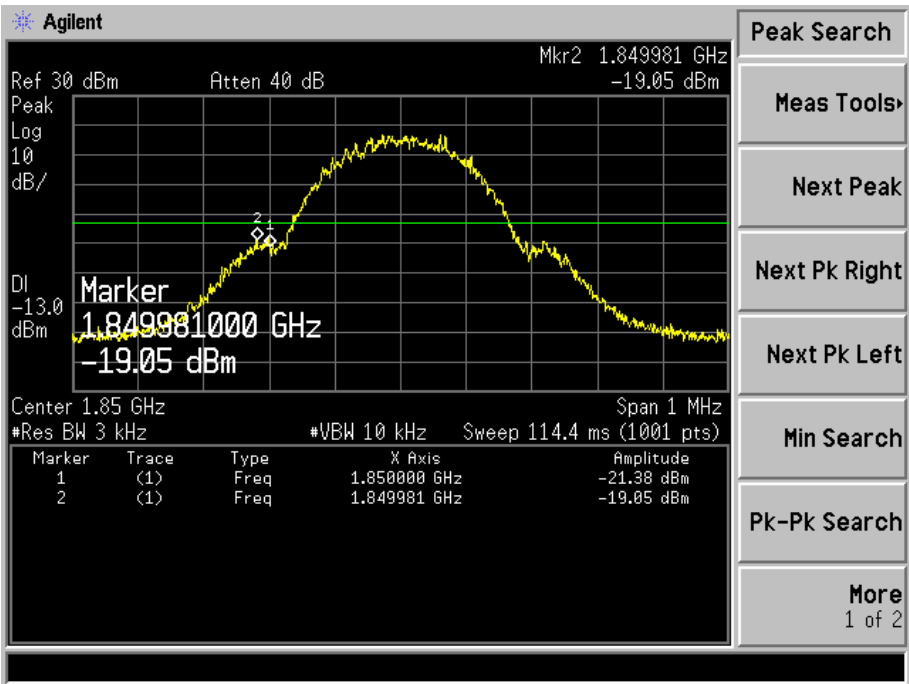
GSM High Channel  
30MHz to 1GHz



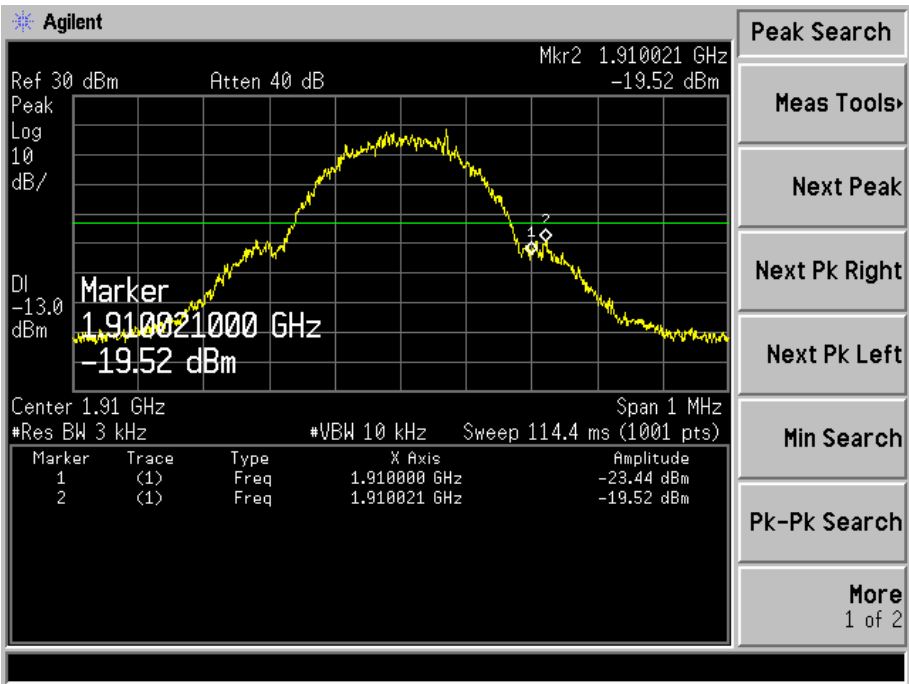
Above 1GHz



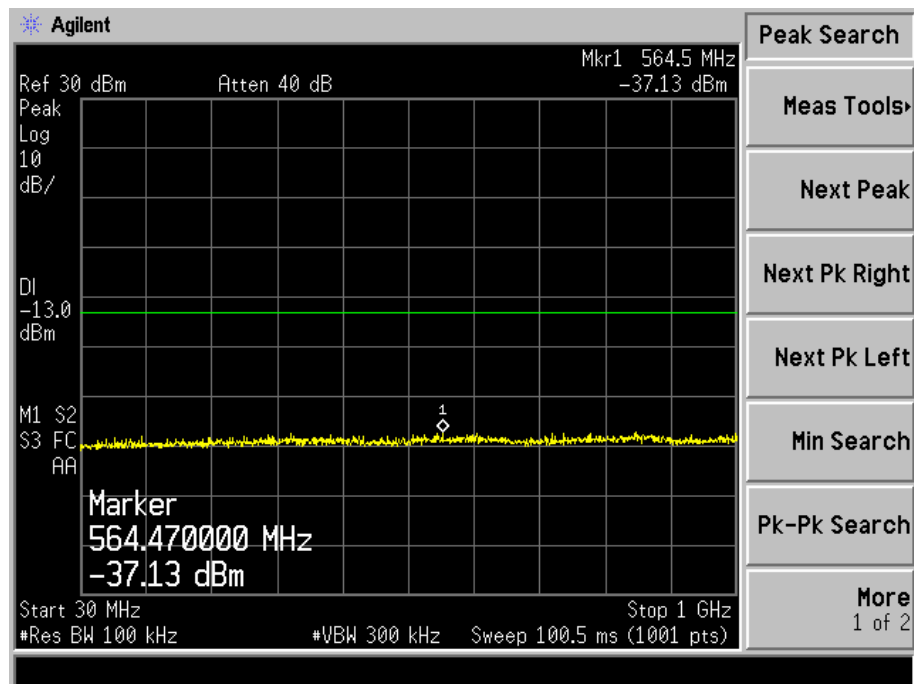
GSM Low Band Emission



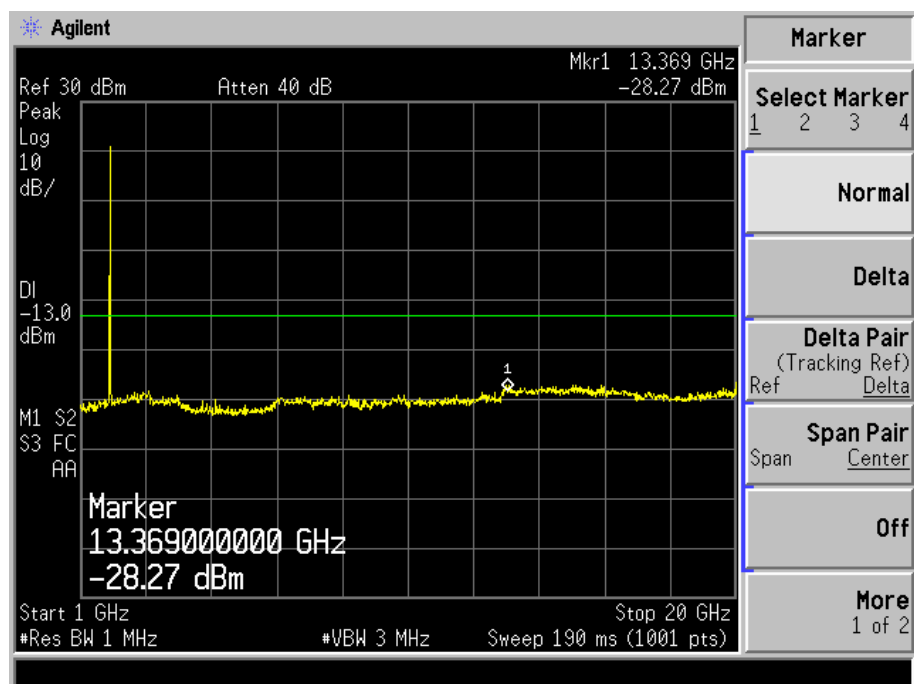
GSM High Band Emission



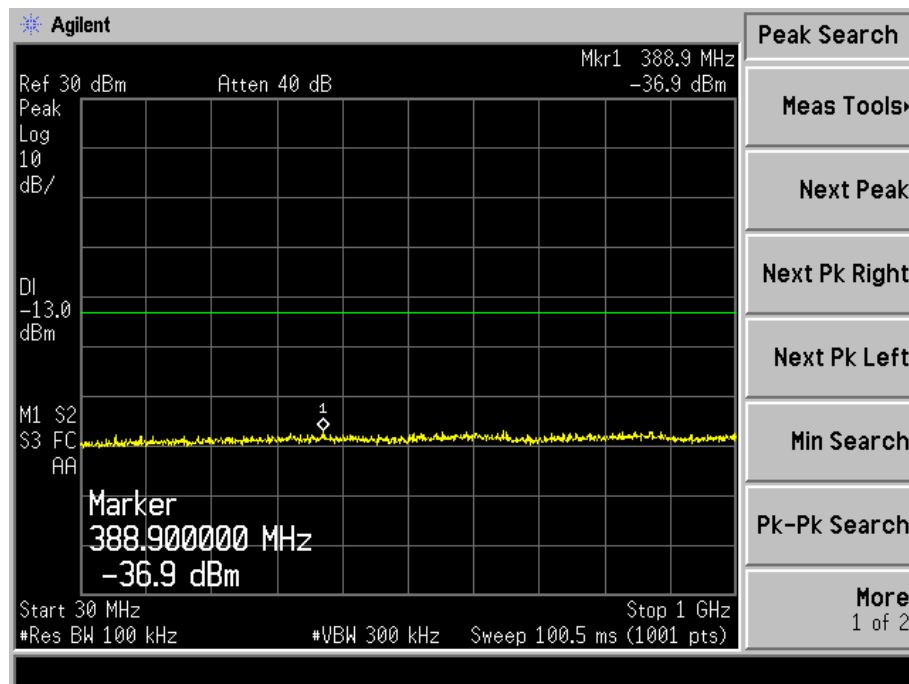
GPRS Low Channel  
30MHz to 1GHz



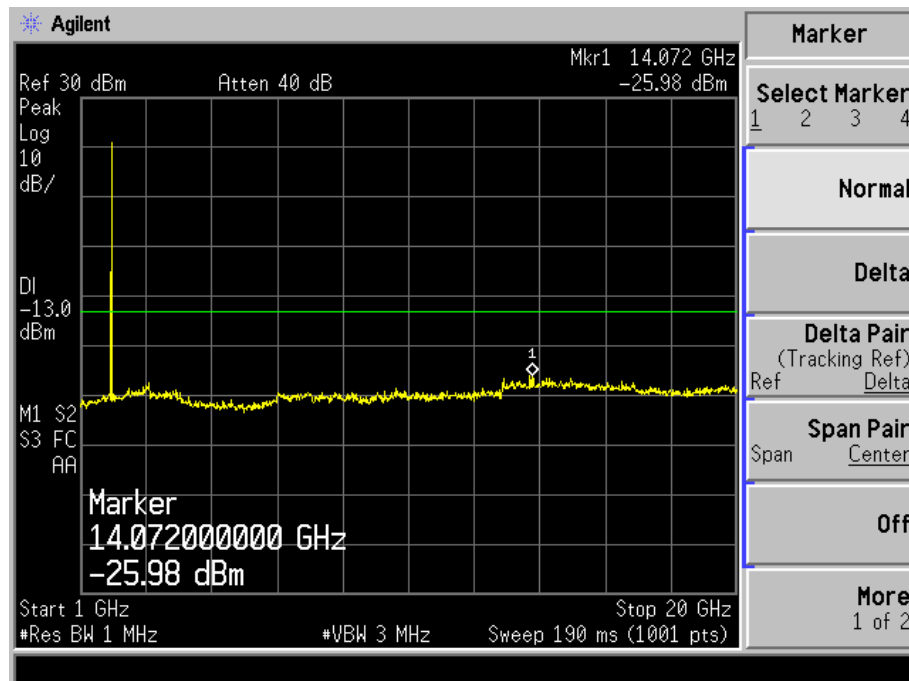
Above 1GHz



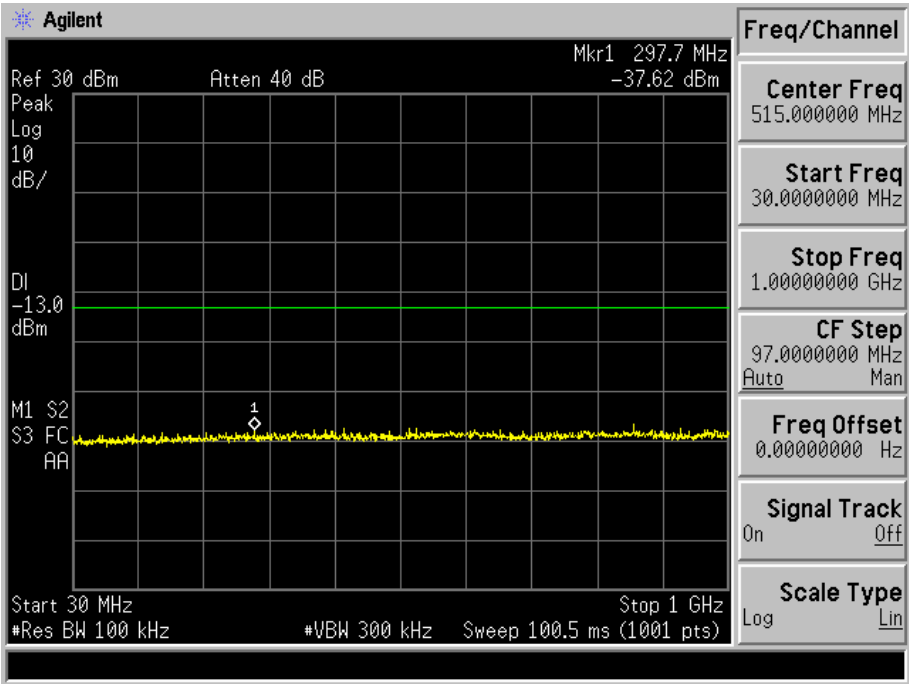
GPRS Middle Channel  
30MHz to 1GHz



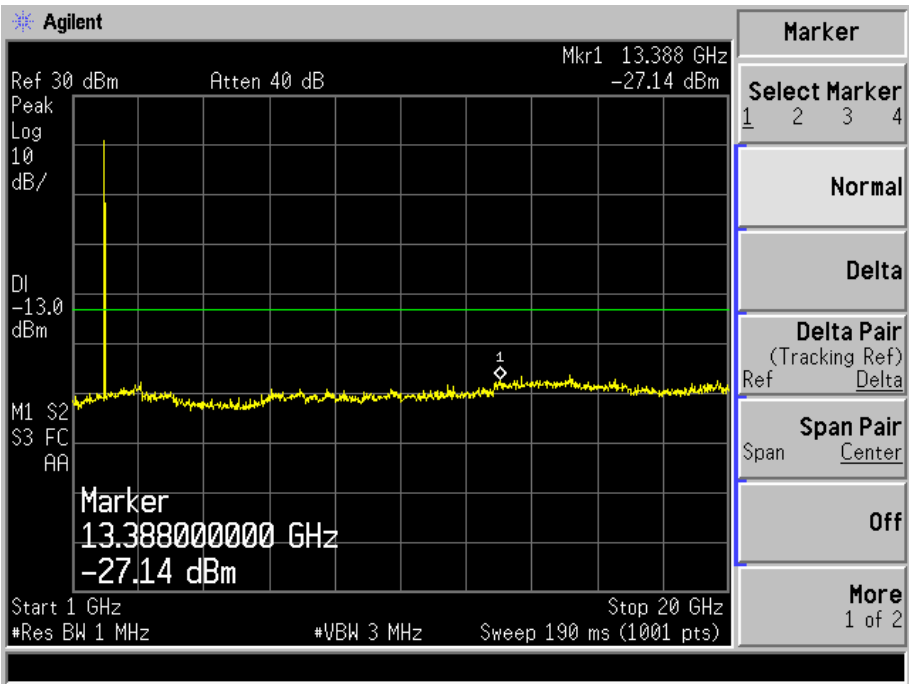
Above 1GH



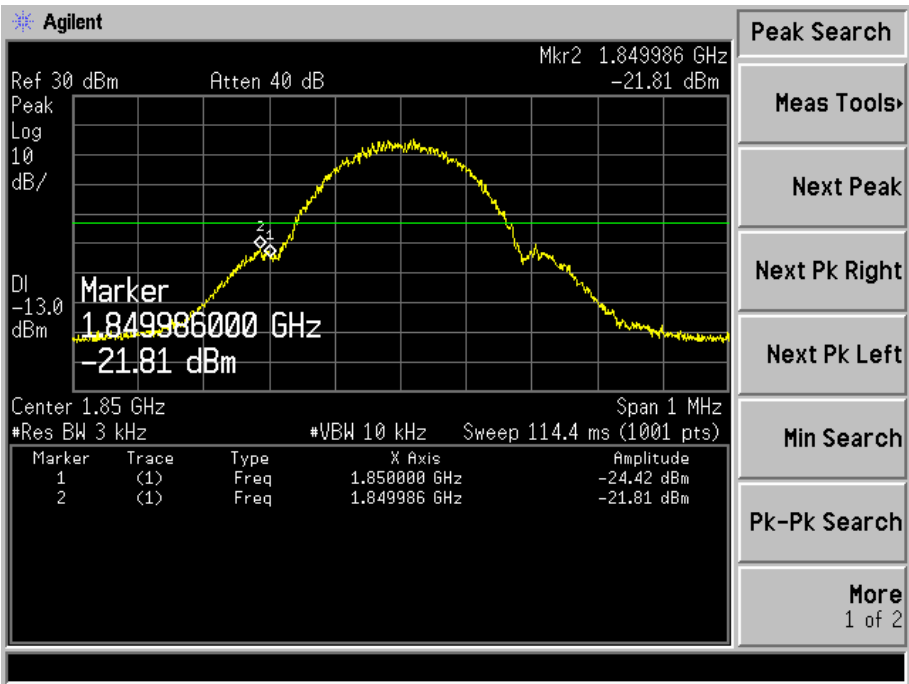
GPRS High Channel  
30MHz to 1GHz



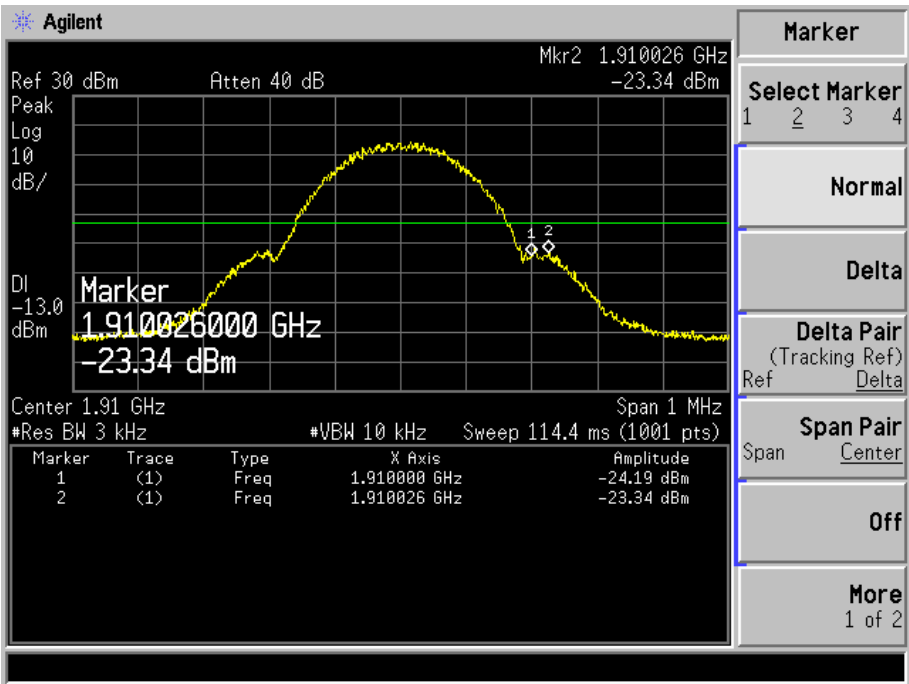
Above 1GHz



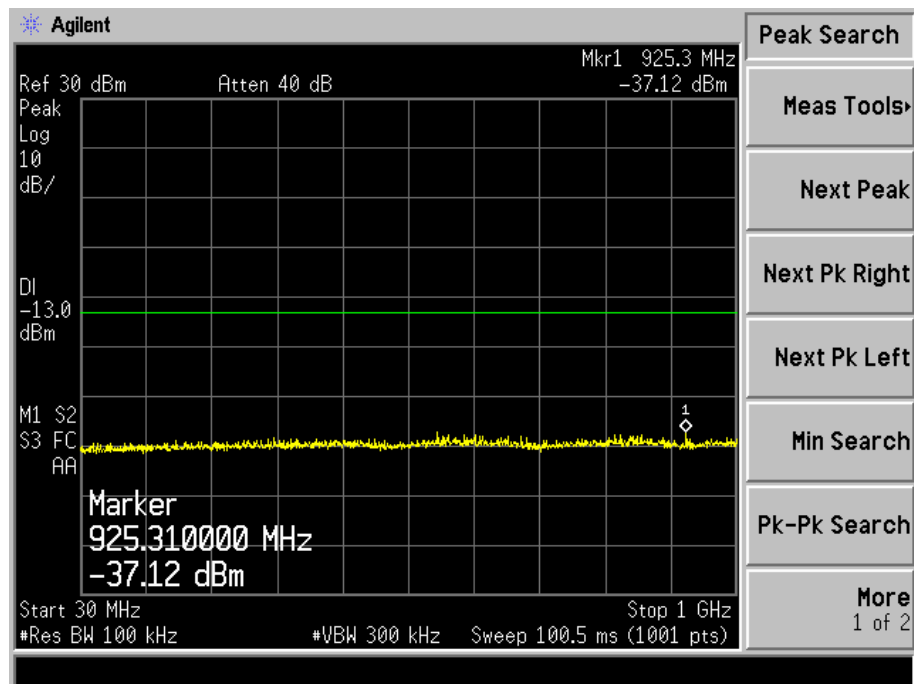
GPRS Low Band Emission



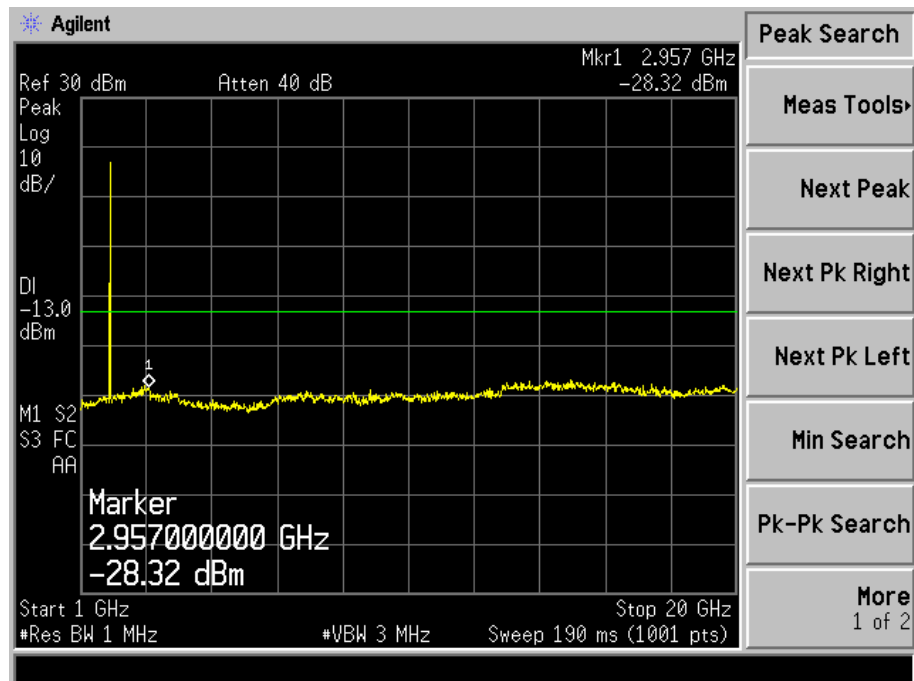
GPRS High Band Emission



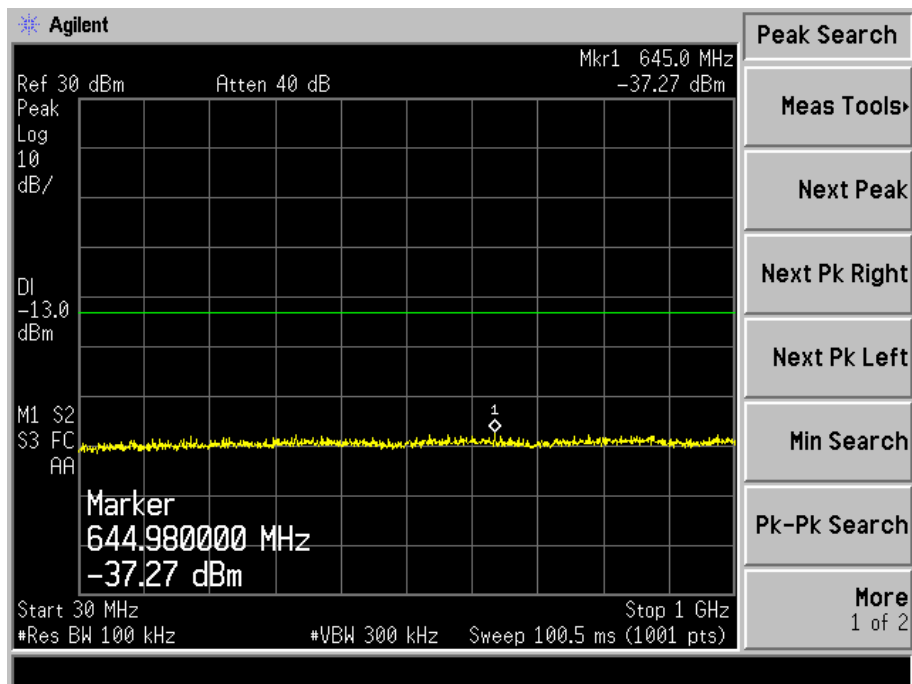
EDGE Low Channel  
30MHz to 1GHz



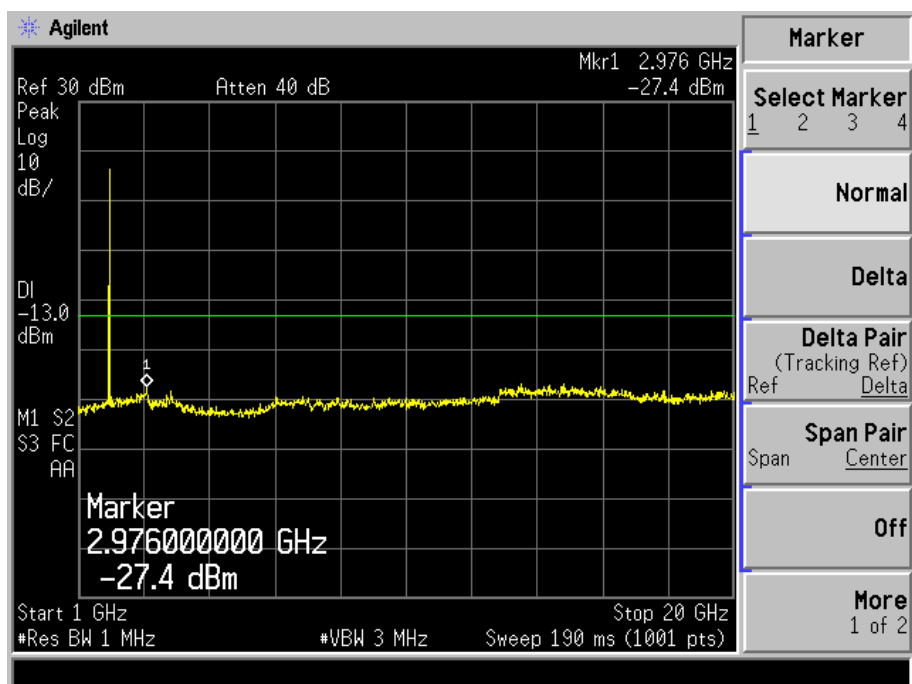
Above 1GHz



EDGE Middle Channel  
30MHz to 1GHz

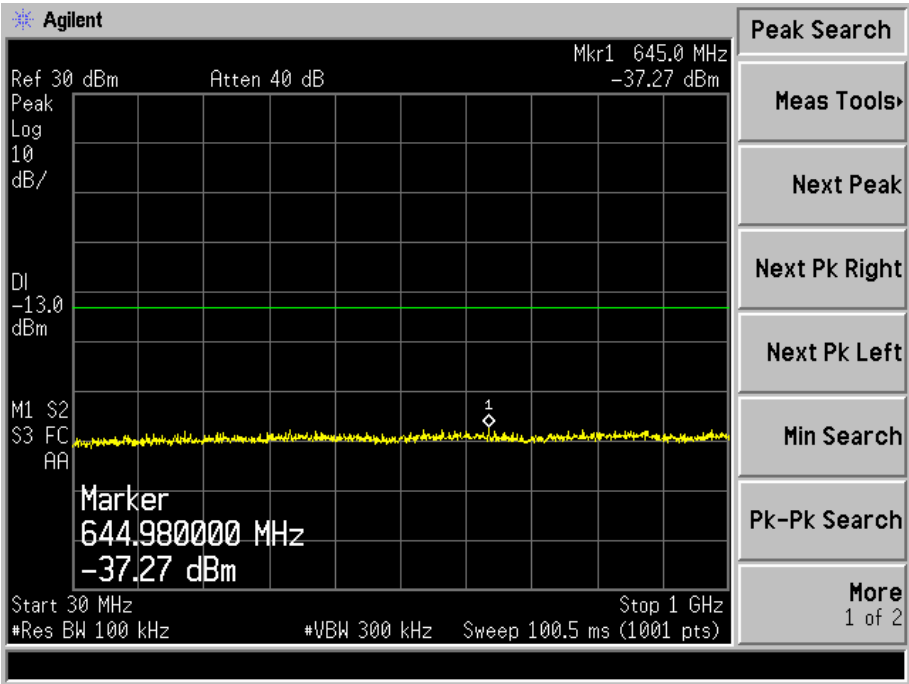


Above 1GHz

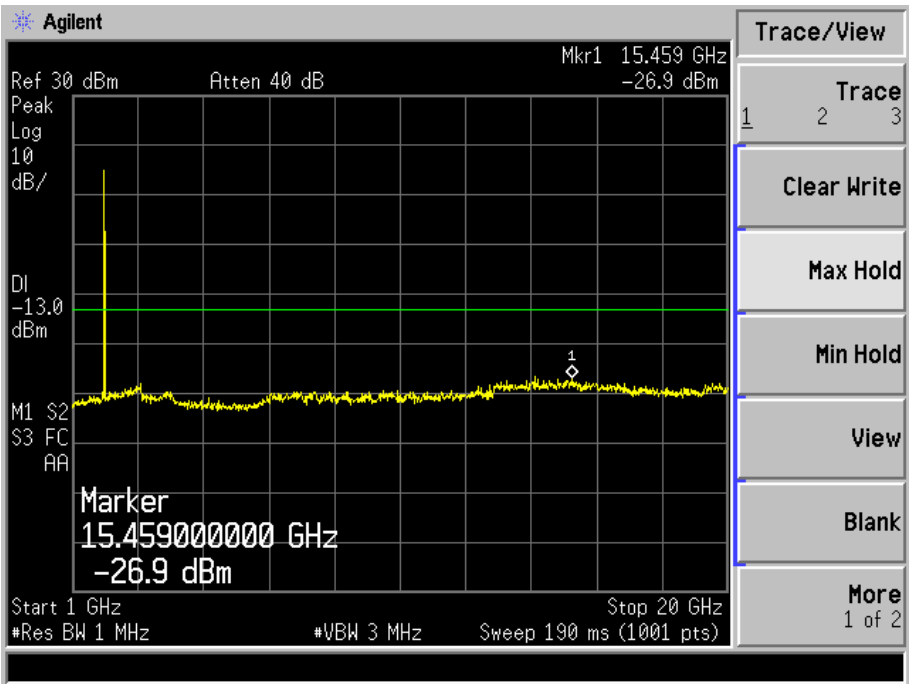




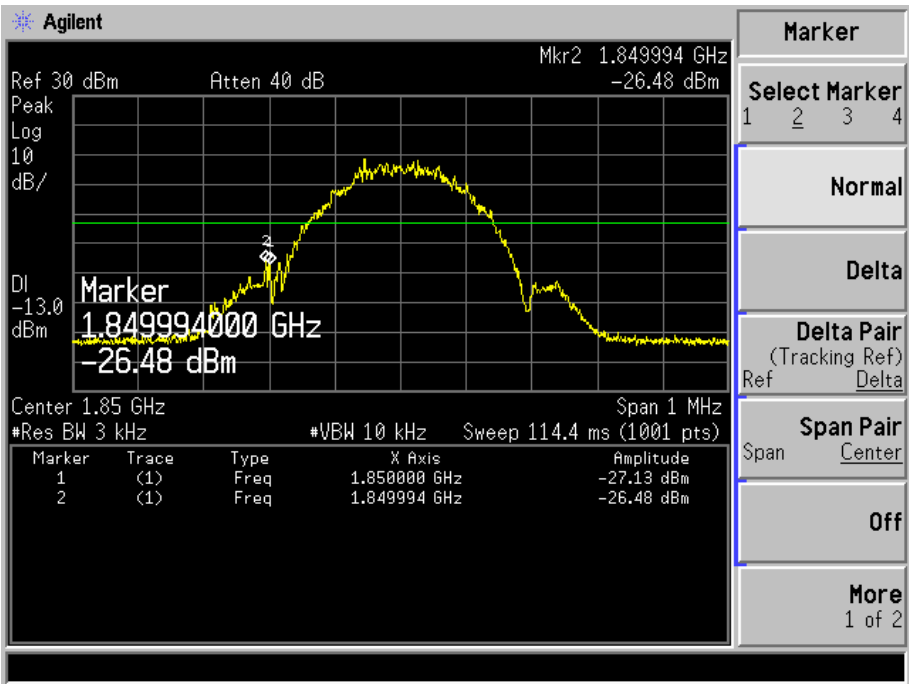
EDGE High Channel  
30MHz to 1GHz



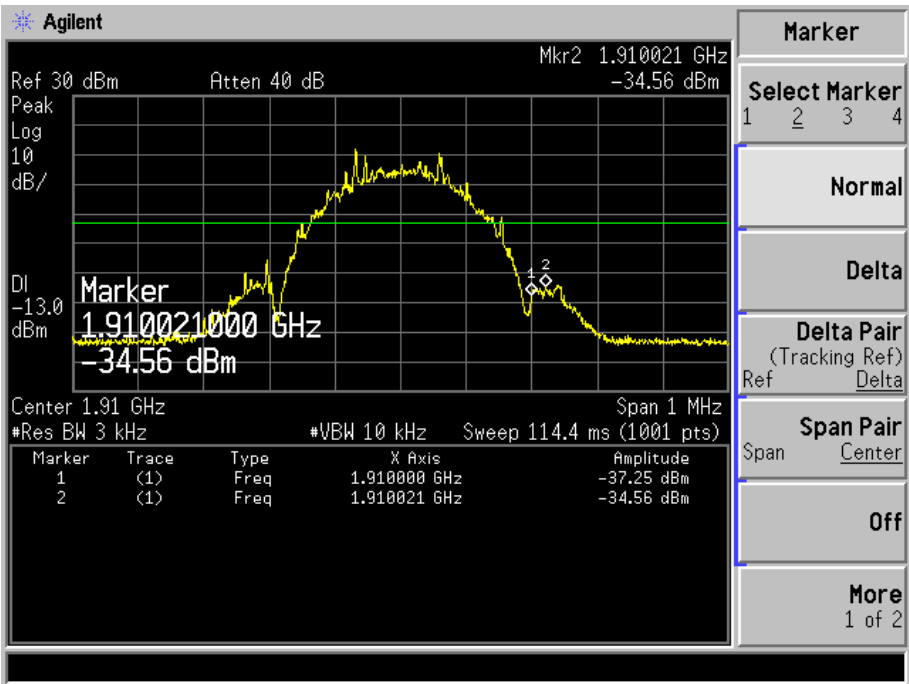
Above 1GHz



EDGE Low Band Emission



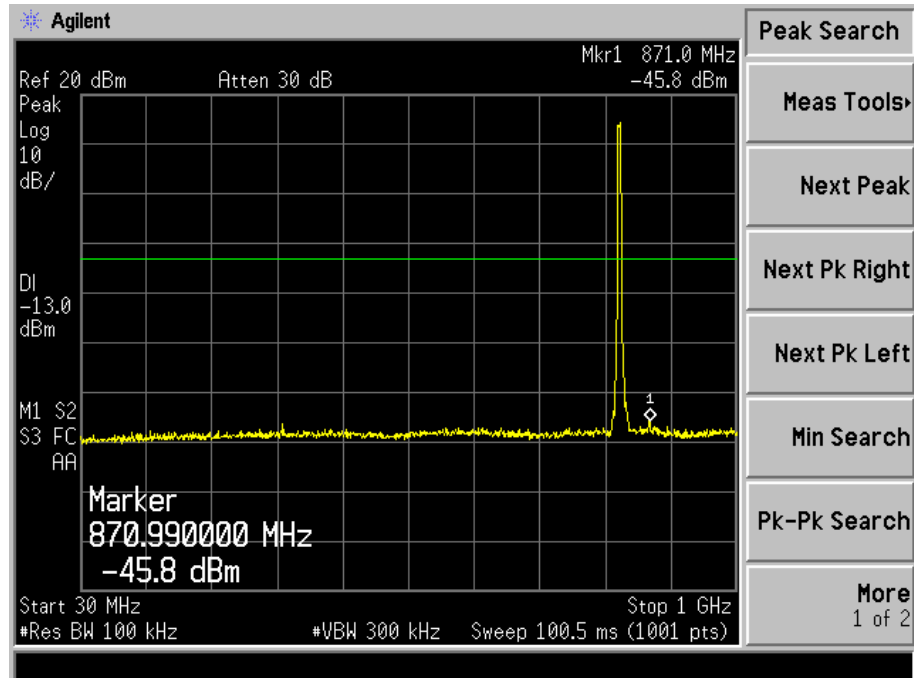
EDGE High Band Emission



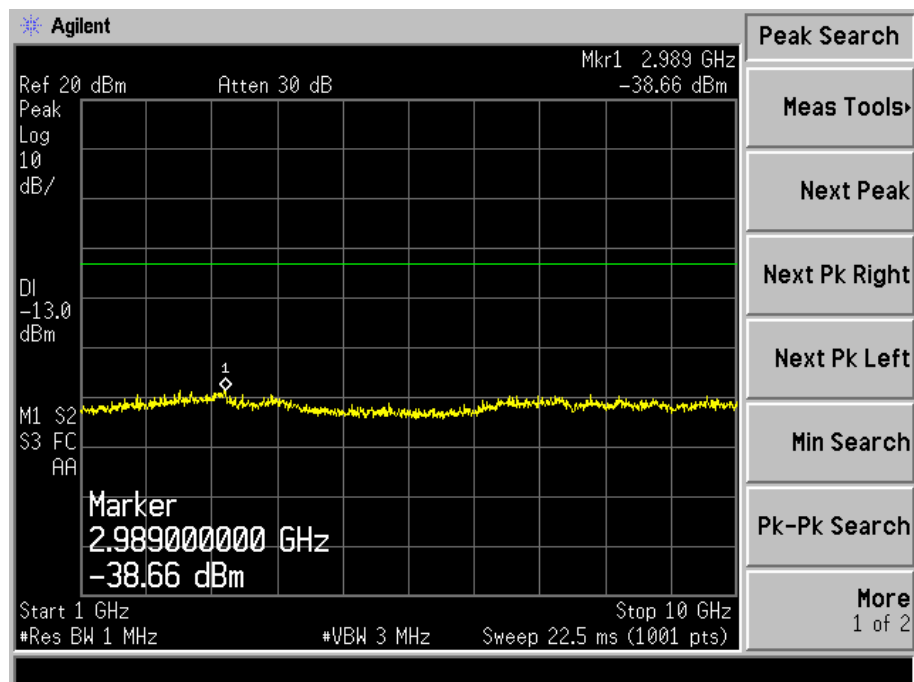
**For Band V**

WCDMA Low Channel

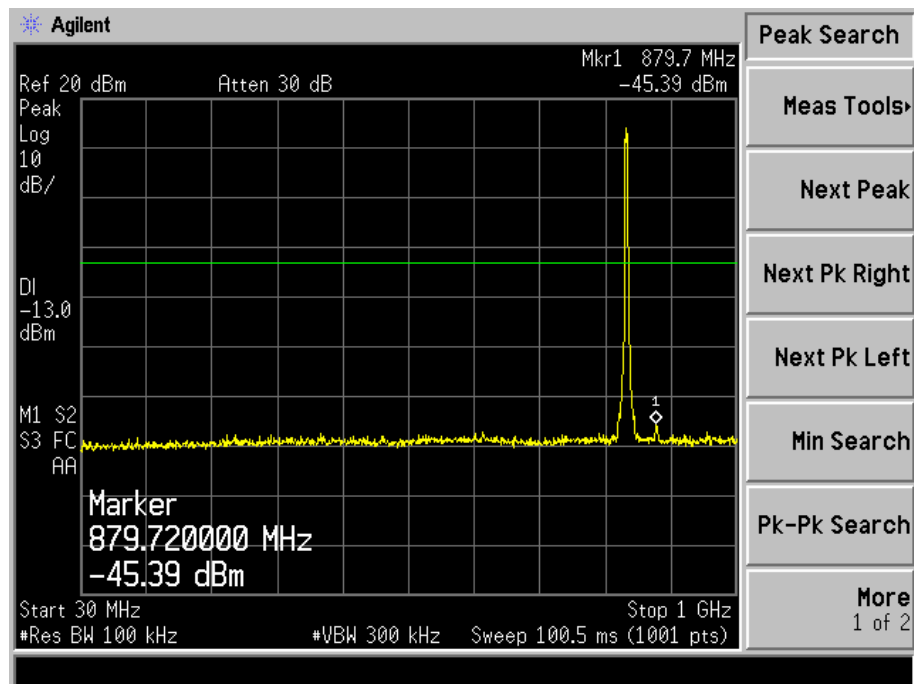
30MHz to 1GHz



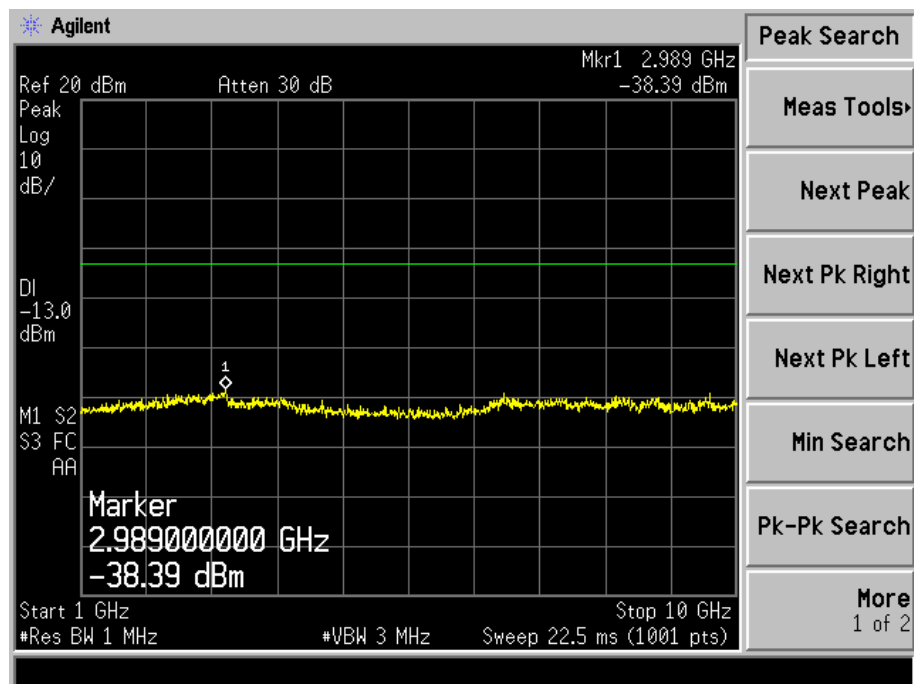
Above 1GHz



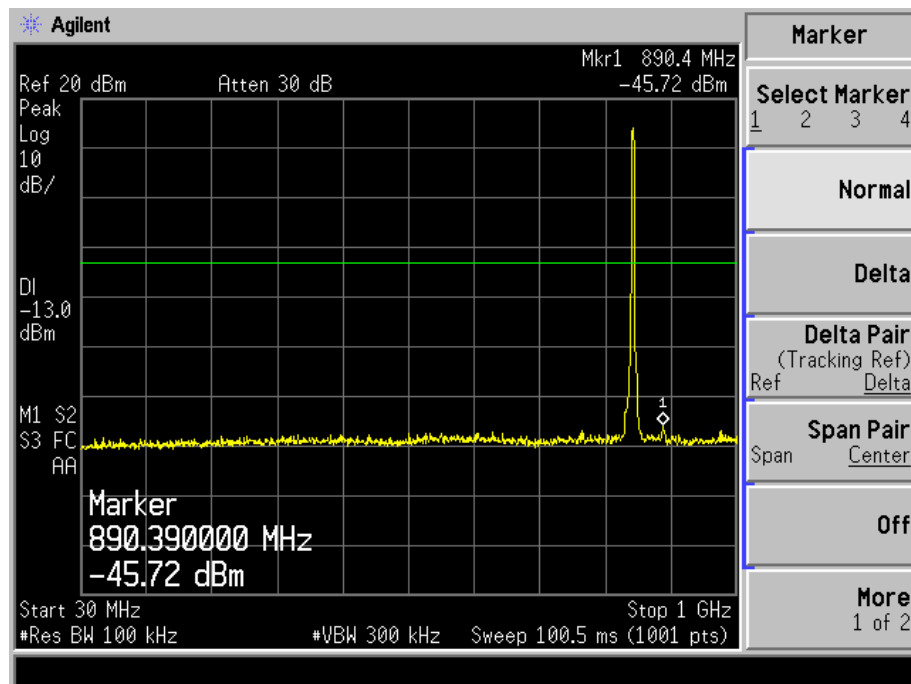
WCDMA Middle Channel  
30MHz to 1GHz



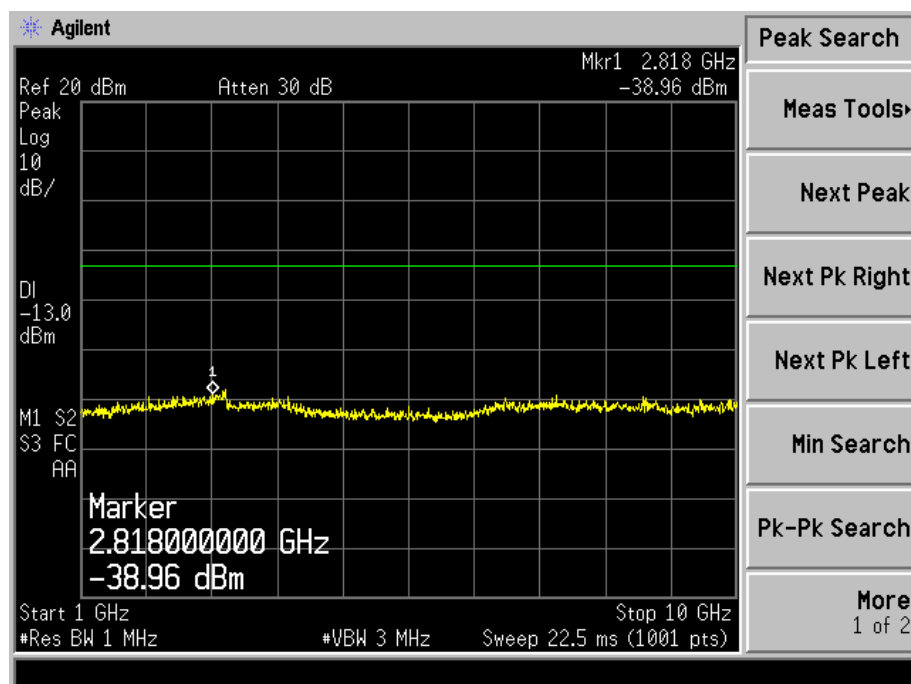
Above 1GHz



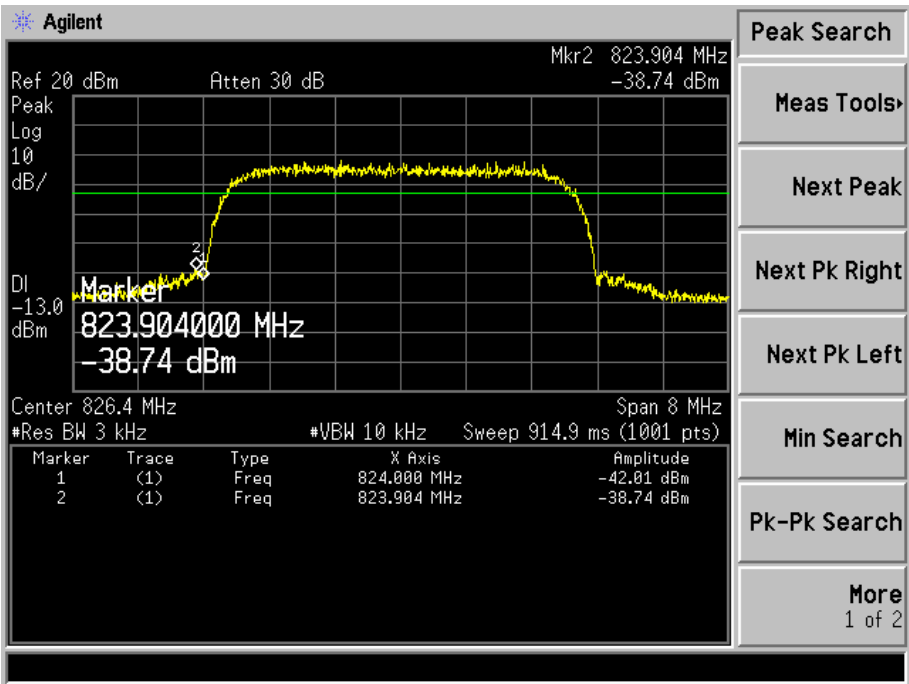
WCDMA High Channel  
30MHz to 1GHz



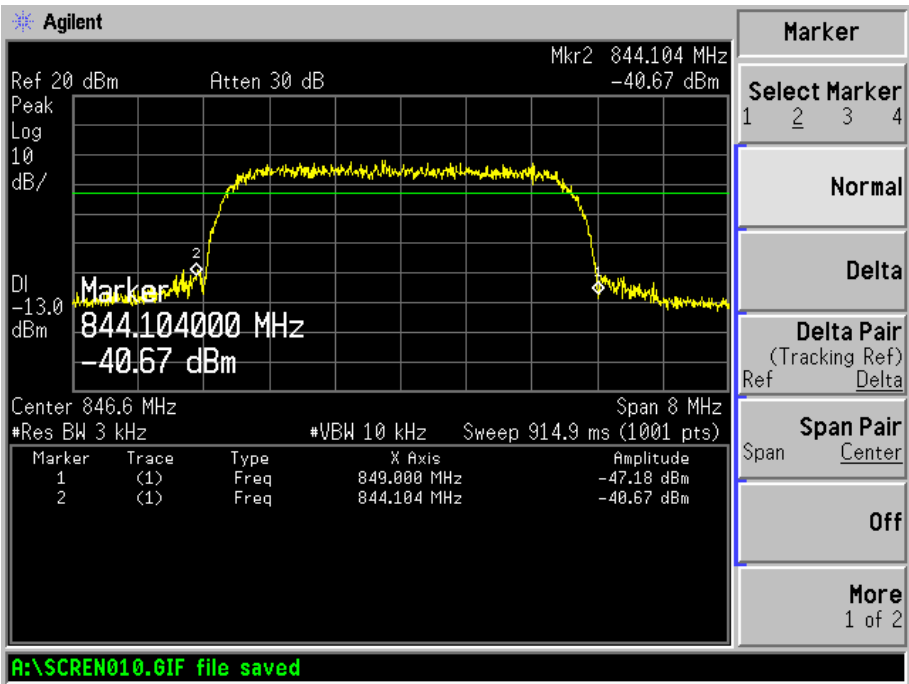
Above 1GHz



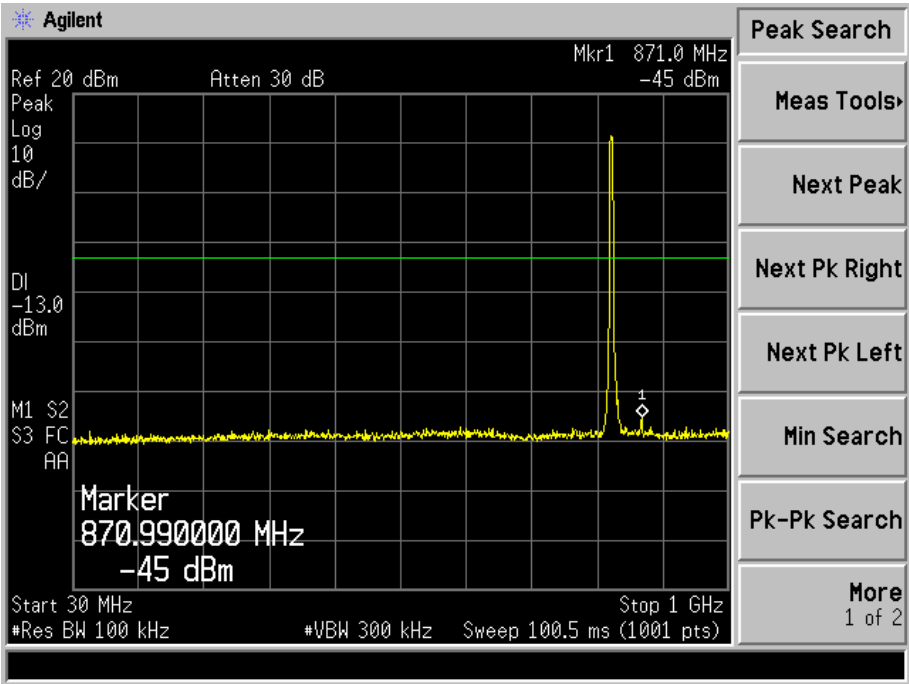
WCDMA Low Band Spurious Emission



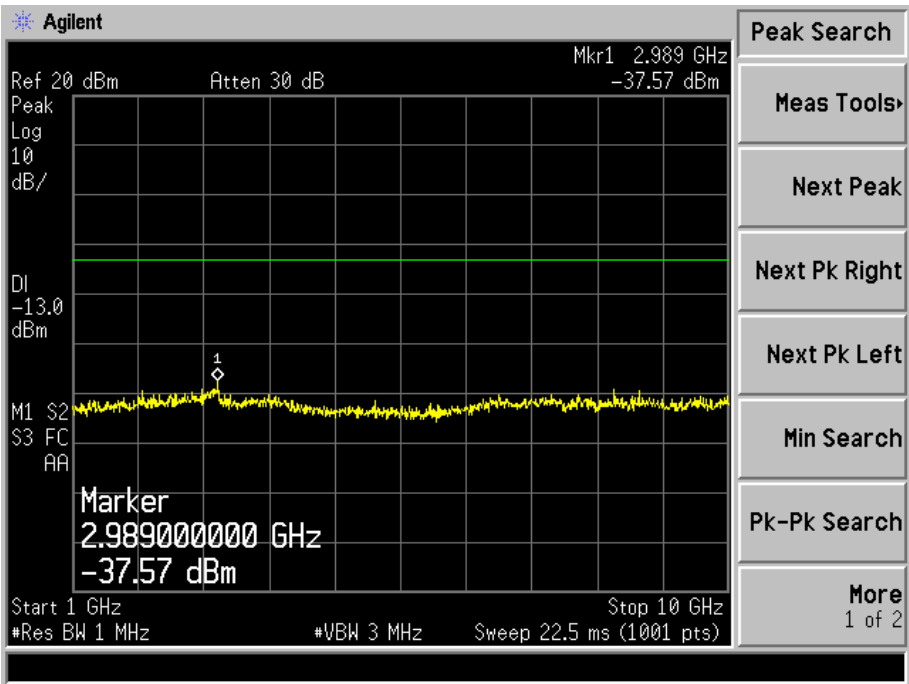
WCDMA High Band Spurious Emission



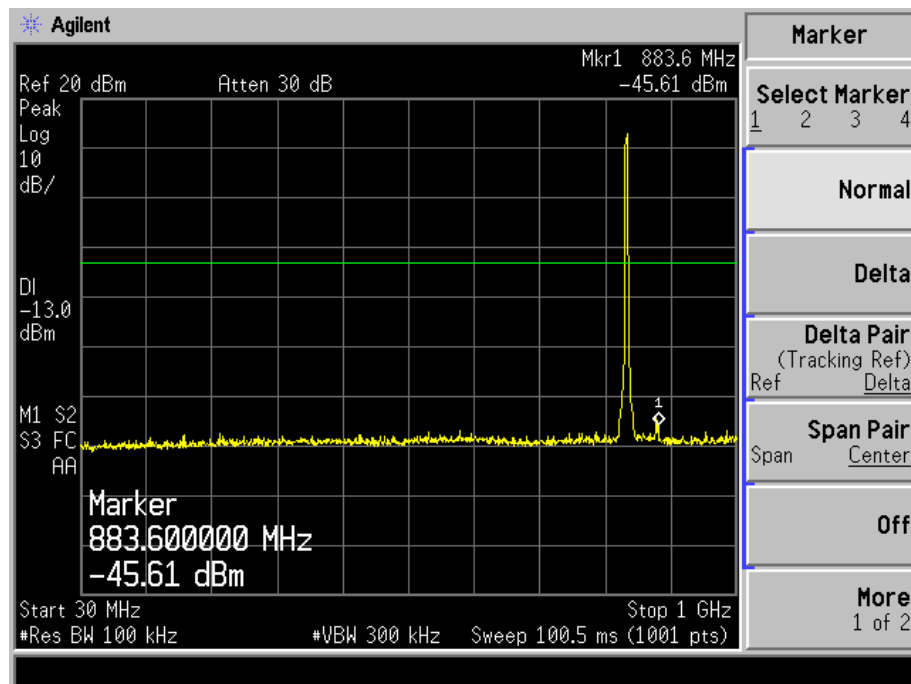
HSDPA Low Channel  
30MHz to 1GHz



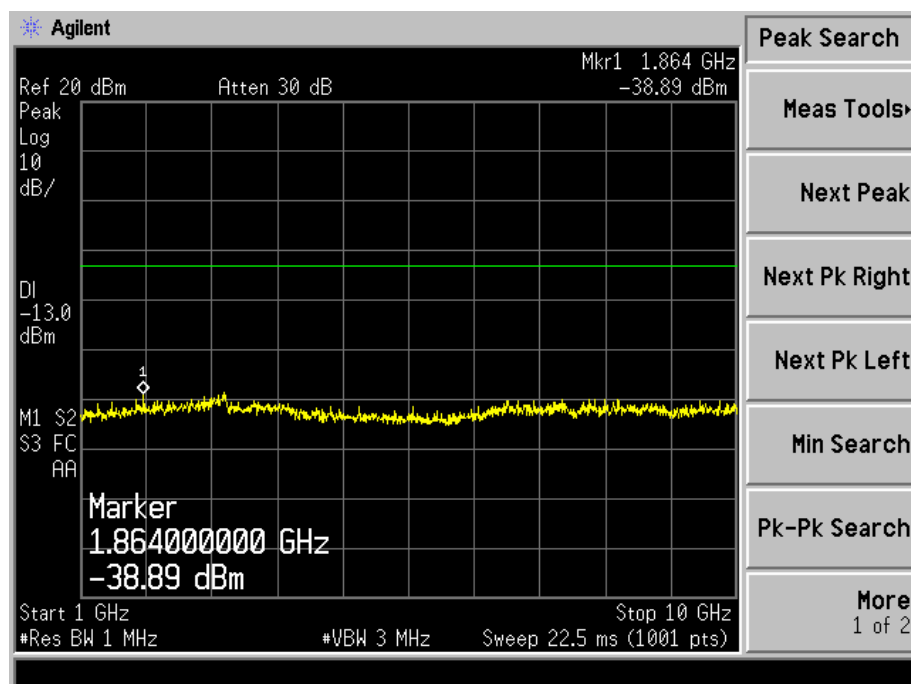
Above 1GHz



HSDPA Middle Channel  
30MHz to 1GHz

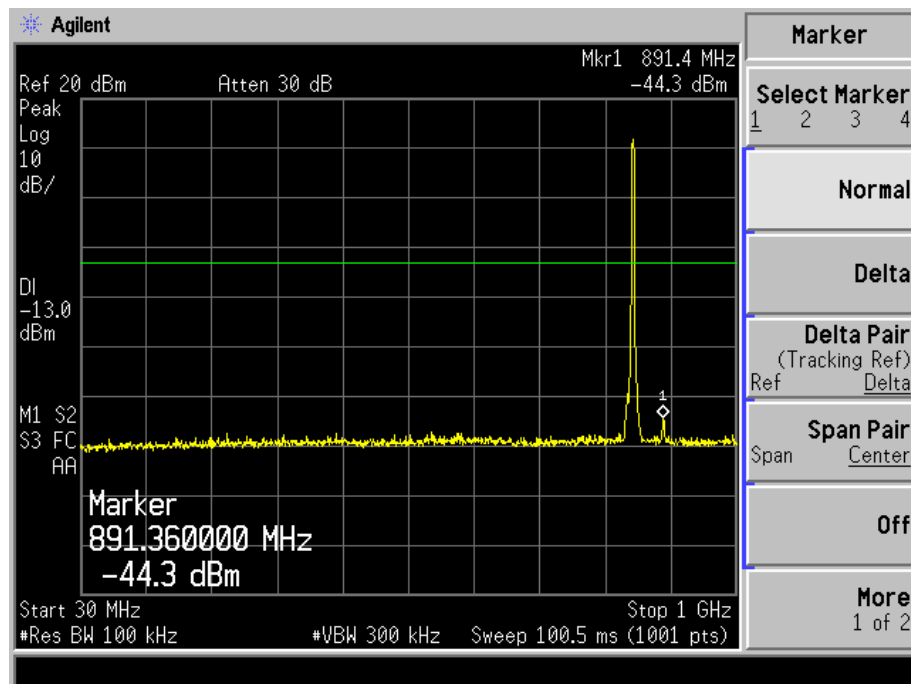


Above 1GHz

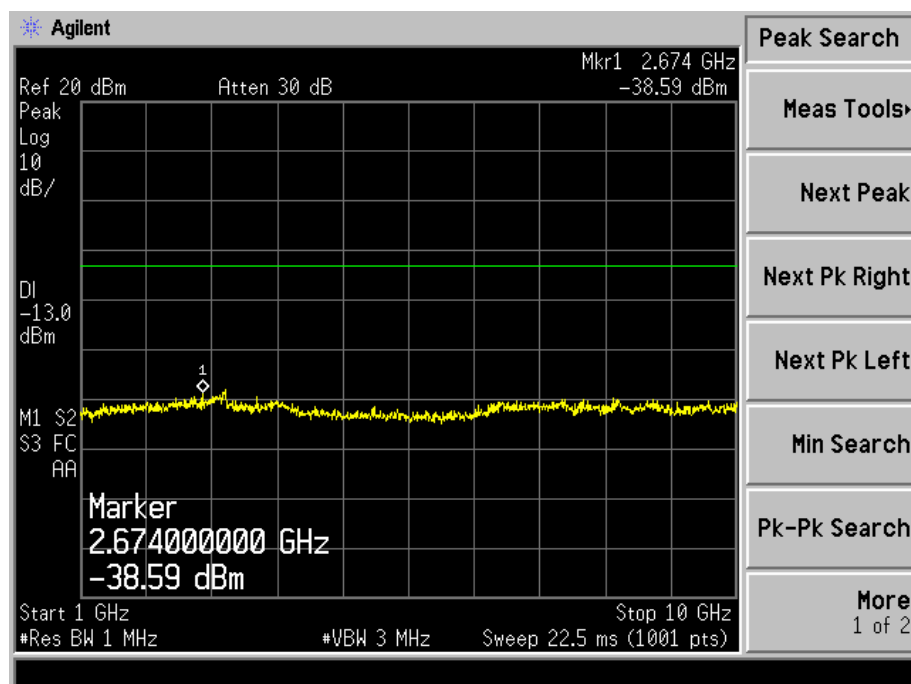




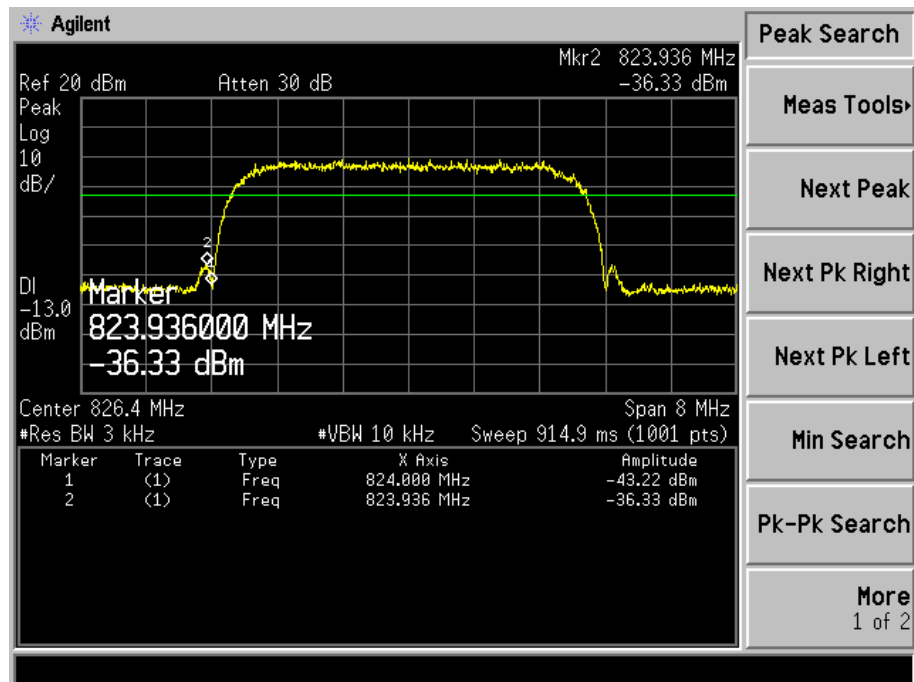
### HSDPA High Channel 30MHz to 1GHz



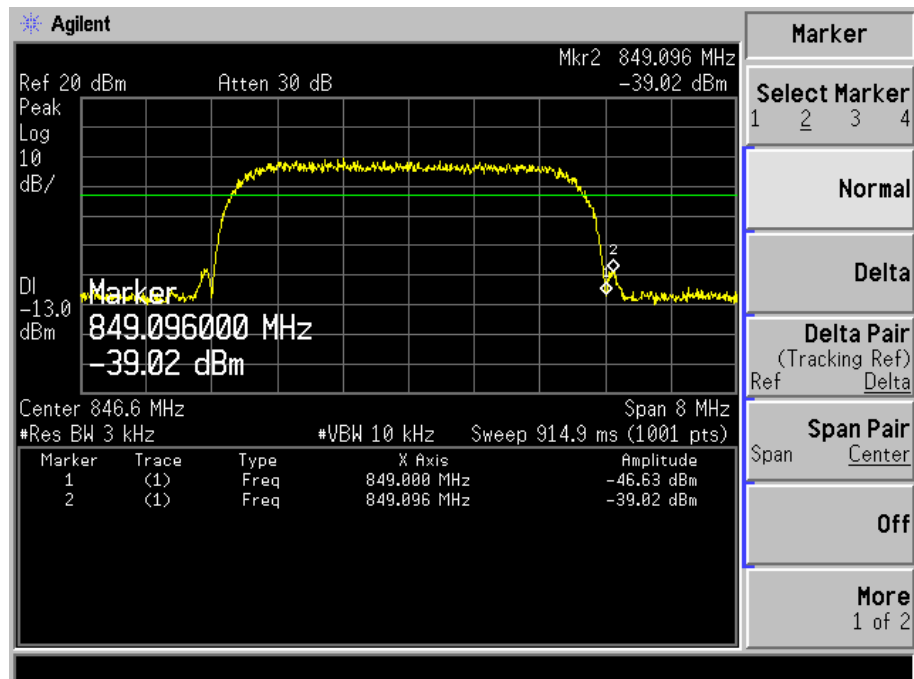
### Above 1GHz



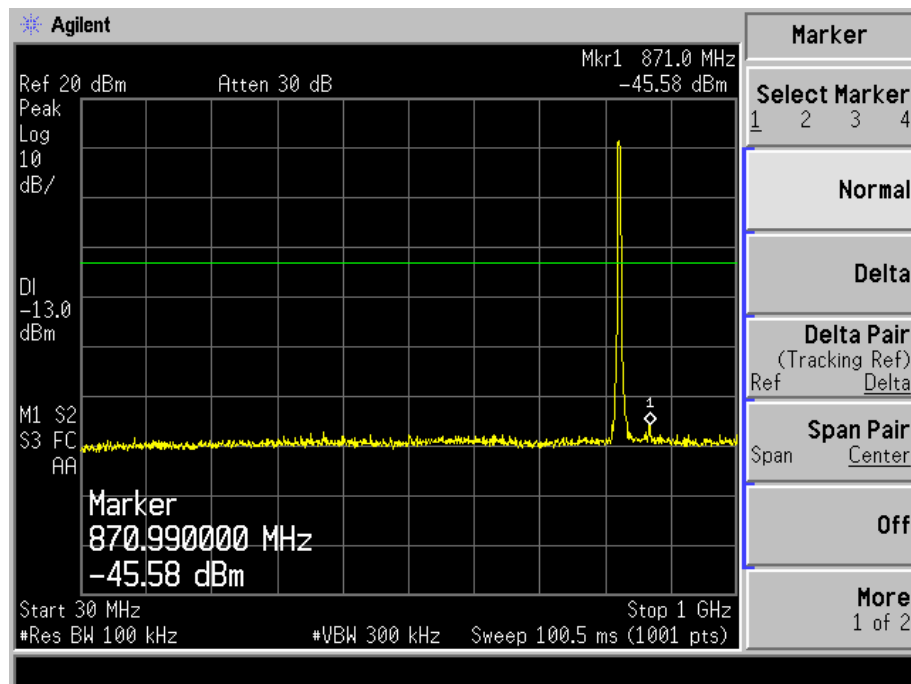
## HSDPA Low Band Spurious Emission



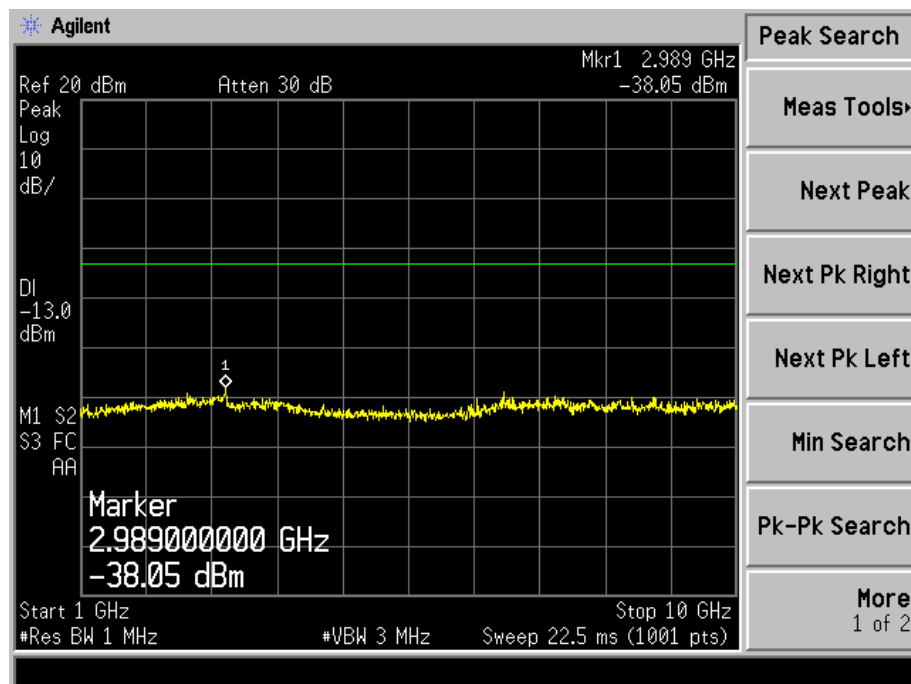
## HSDPA High Band Spurious Emission



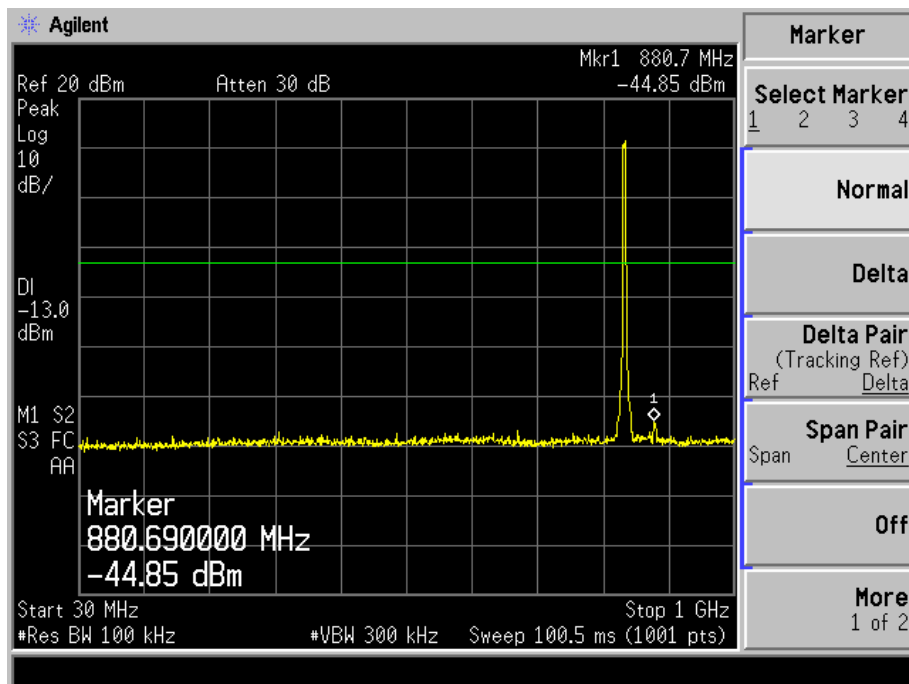
HSUPA Low Channel  
30MHz to 1GHz



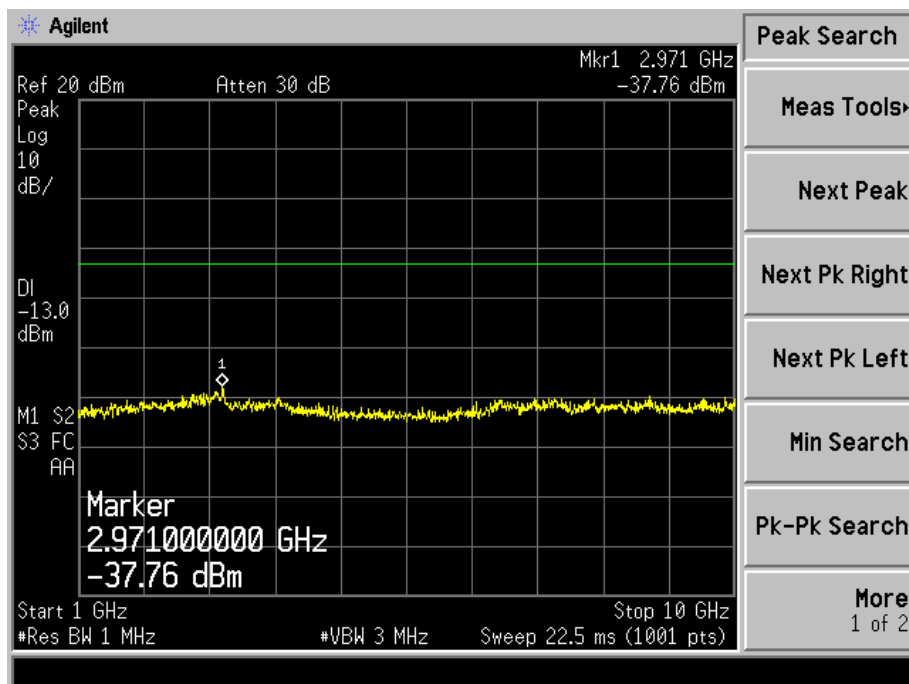
Above 1GHz



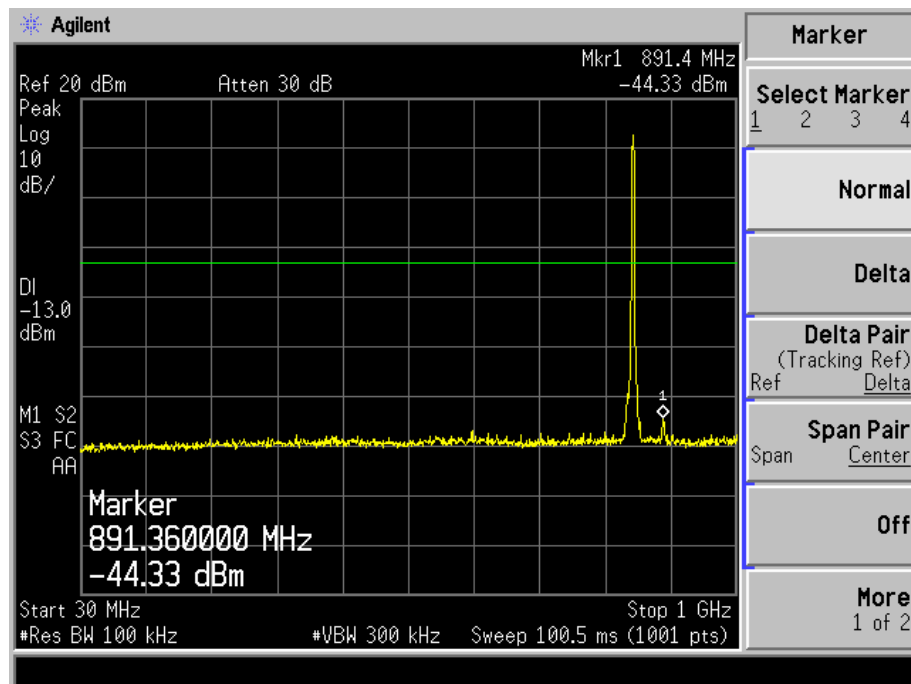
HSUPA Middle Channel  
30MHz to 1GHz



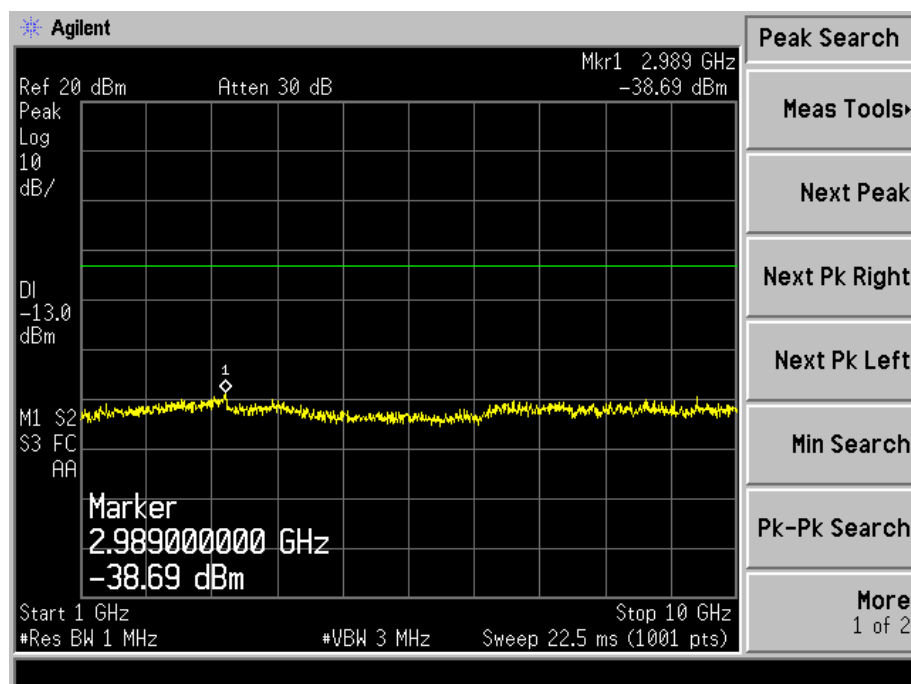
Above 1GHz



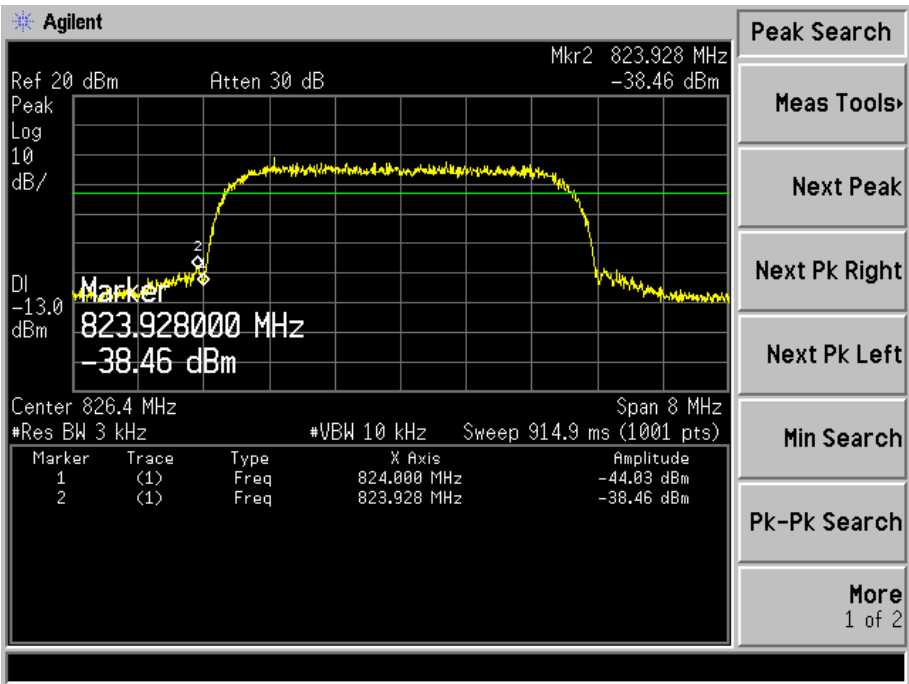
HSUPA High Channel  
30MHz to 1GHz



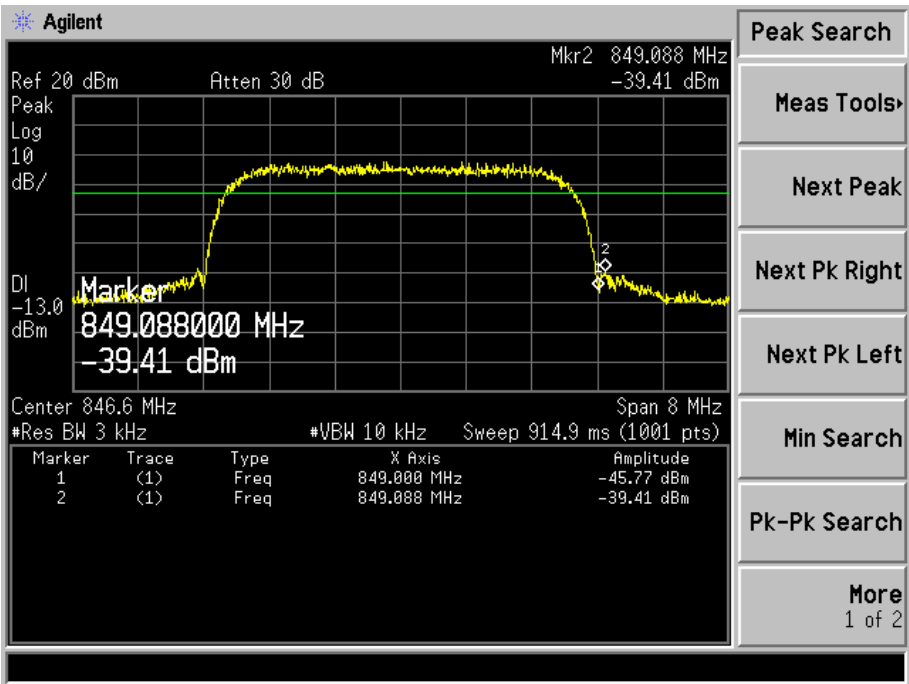
Above 1GHz



HSUPA Low Band Spurious Emission



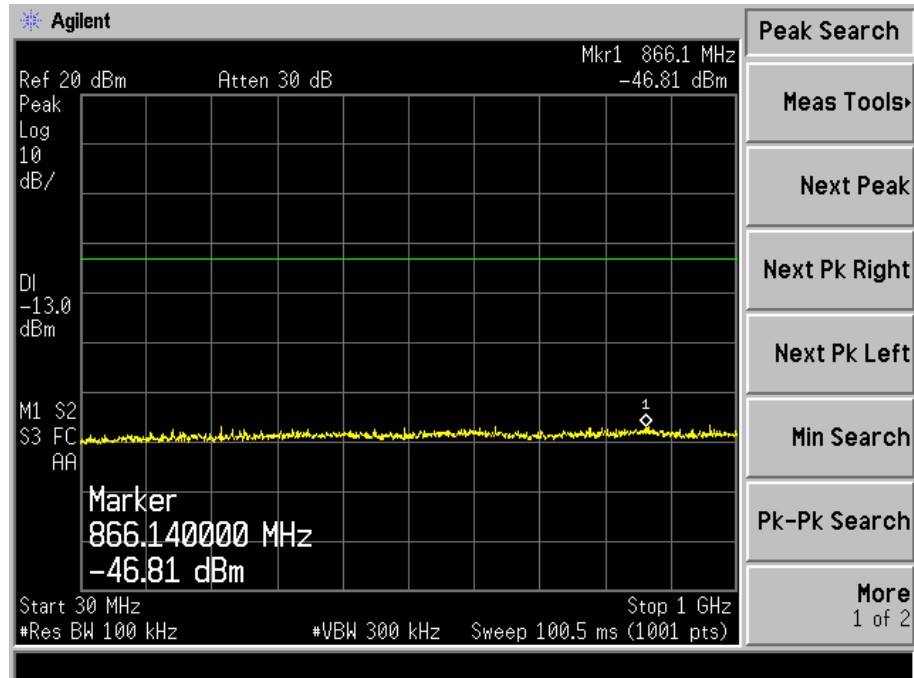
HSUPA High Band Spurious Emission



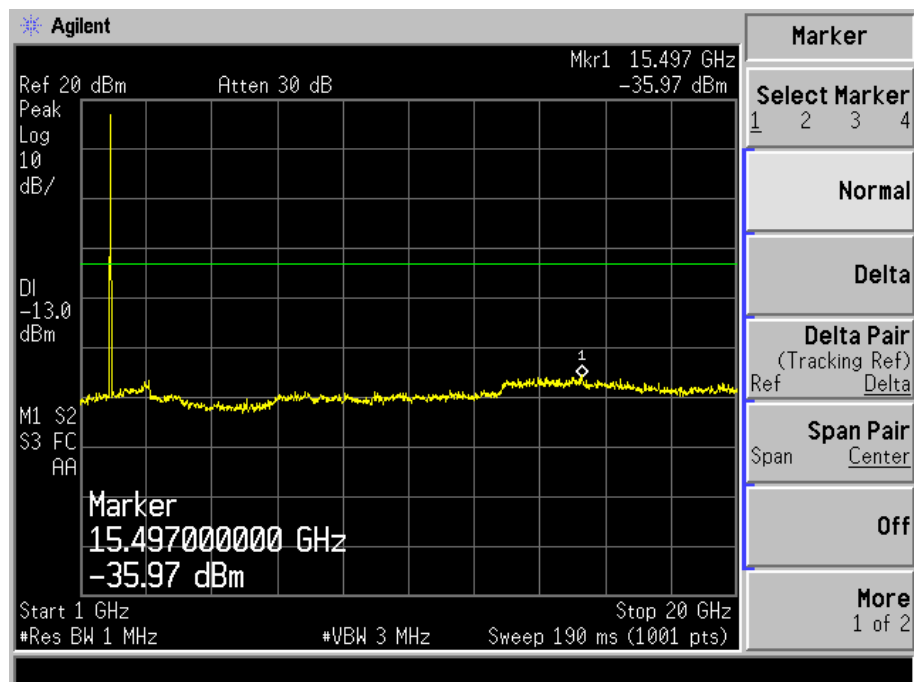
**For Band II**

WCDMA Low Channel

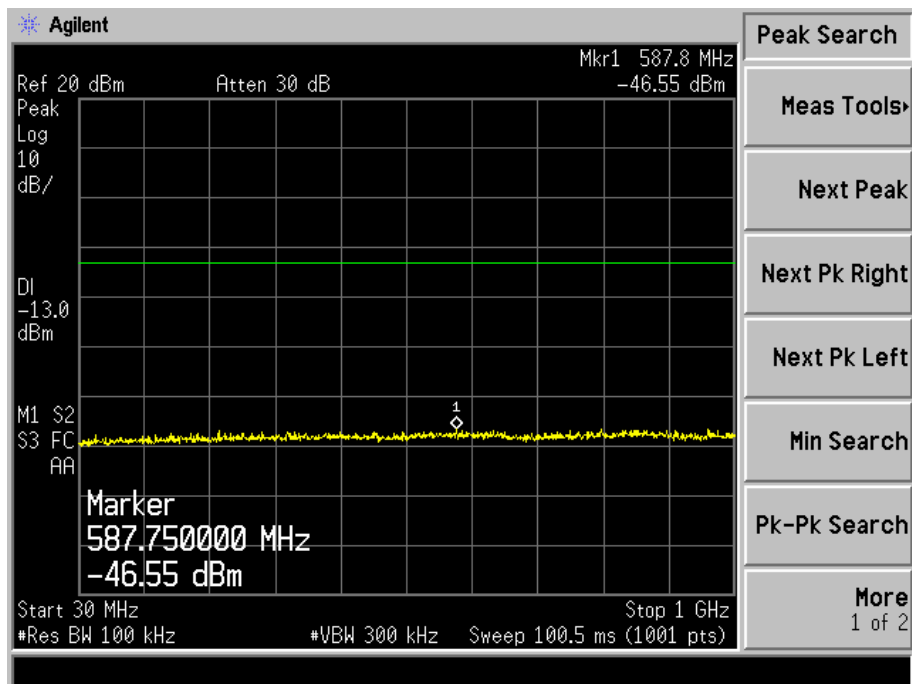
30MHz to 1GHz



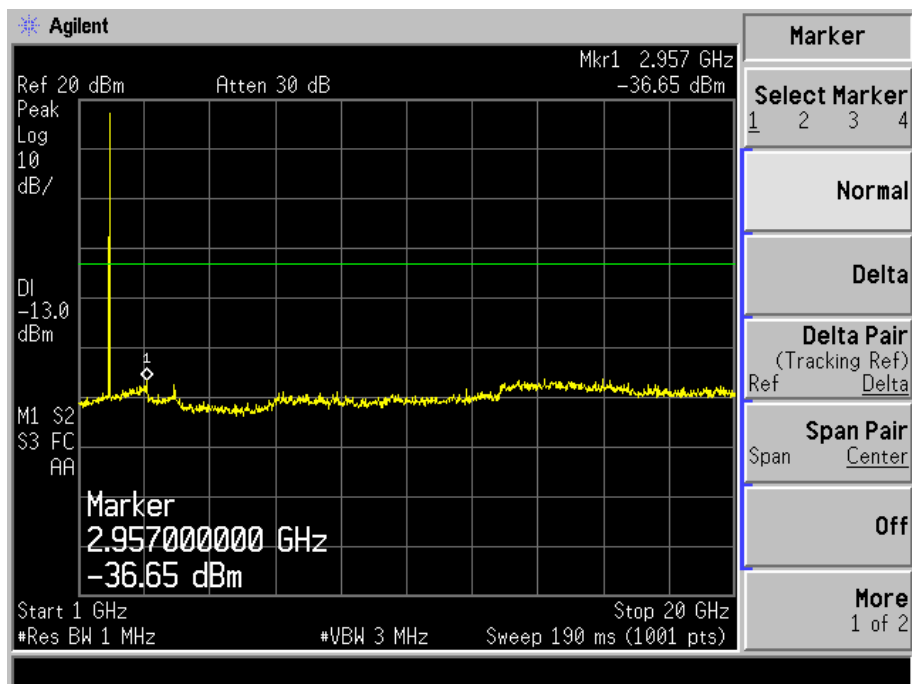
Above 1GHz



WCDMA Middle Channel  
30MHz to 1GHz

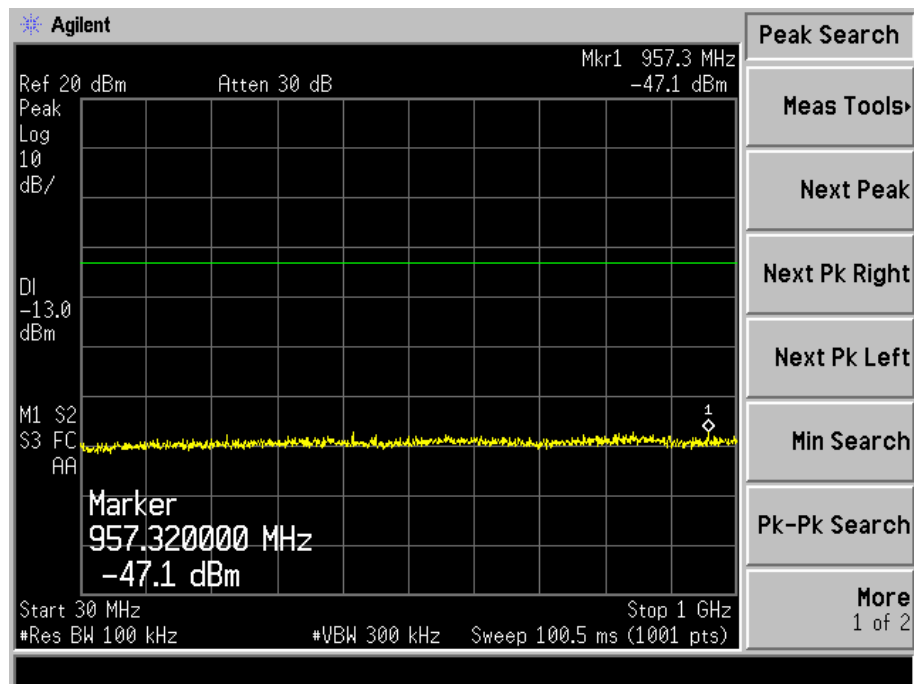


Above 1GHz

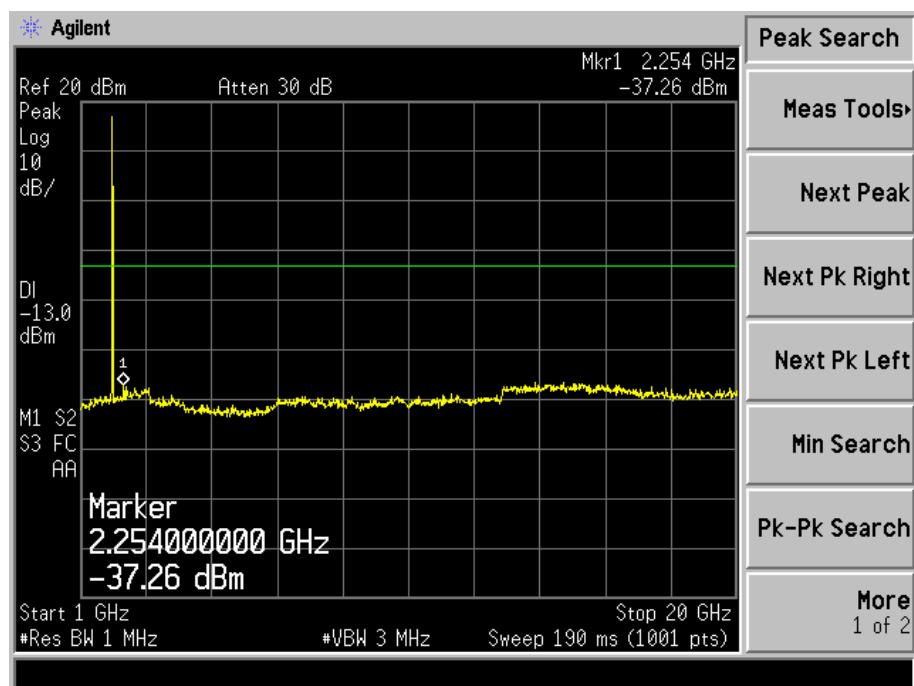




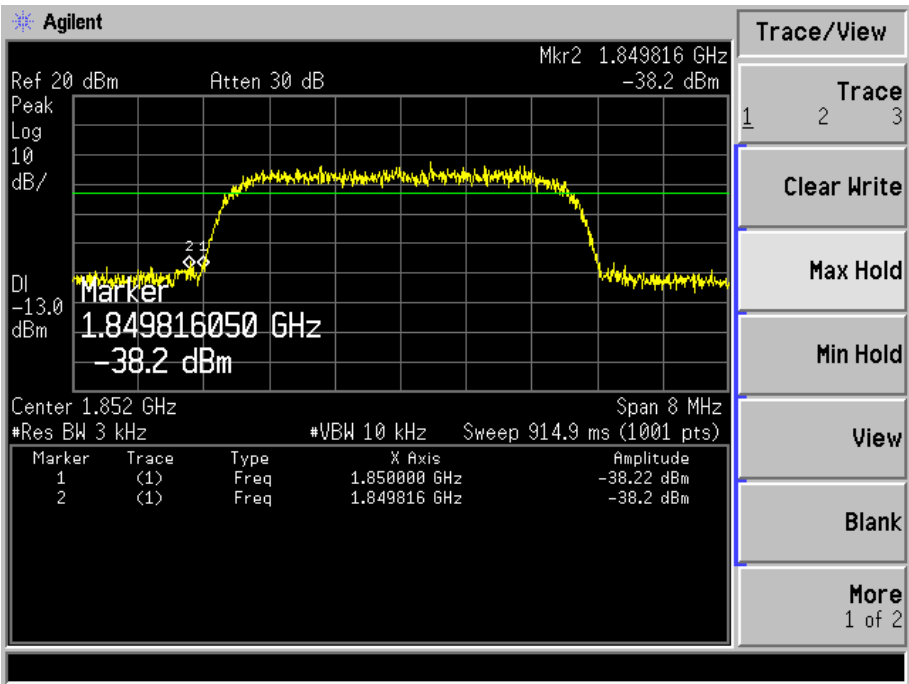
WCDMA High Channel  
30MHz to 1GHz



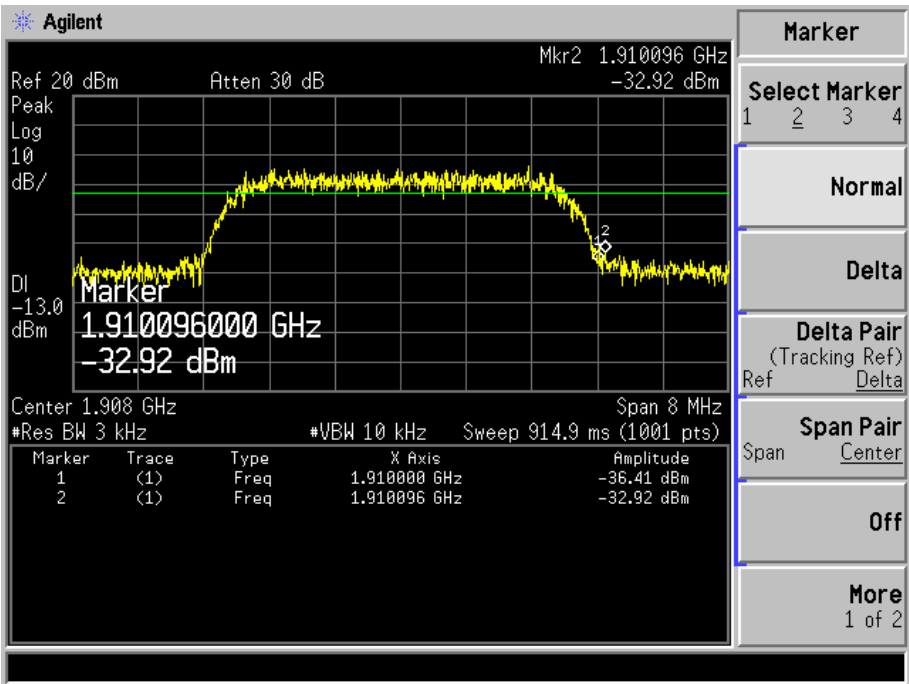
Above 1GHz



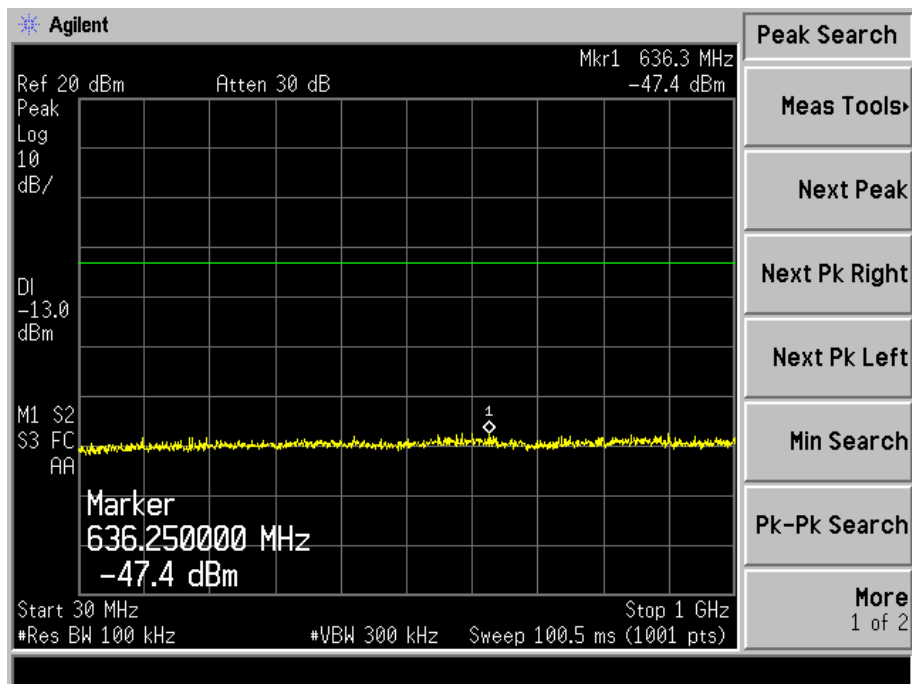
WCDMA Low Band Spurious Emission



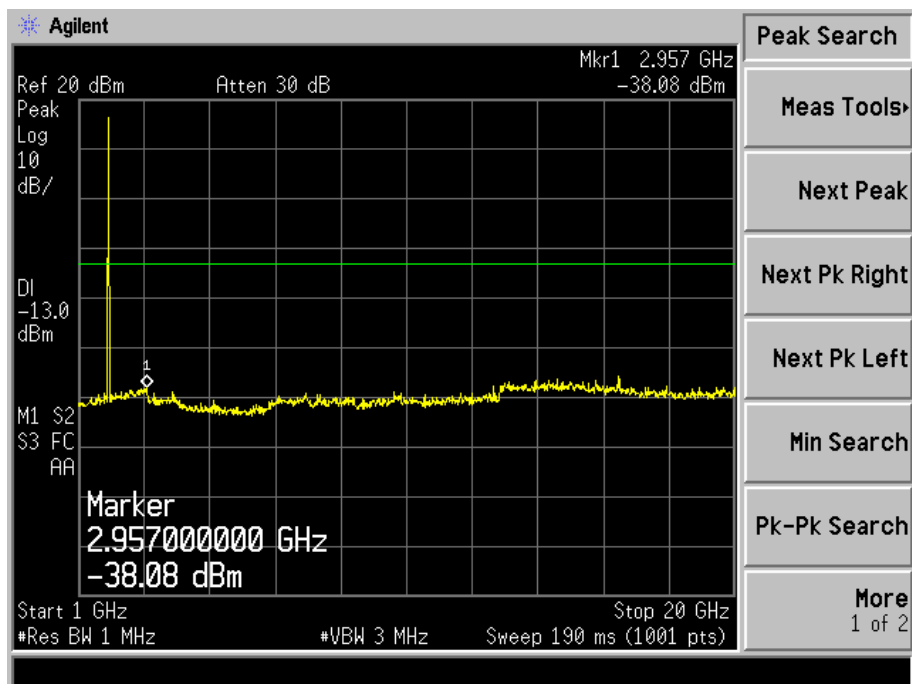
WCDMA High Band Spurious Emission



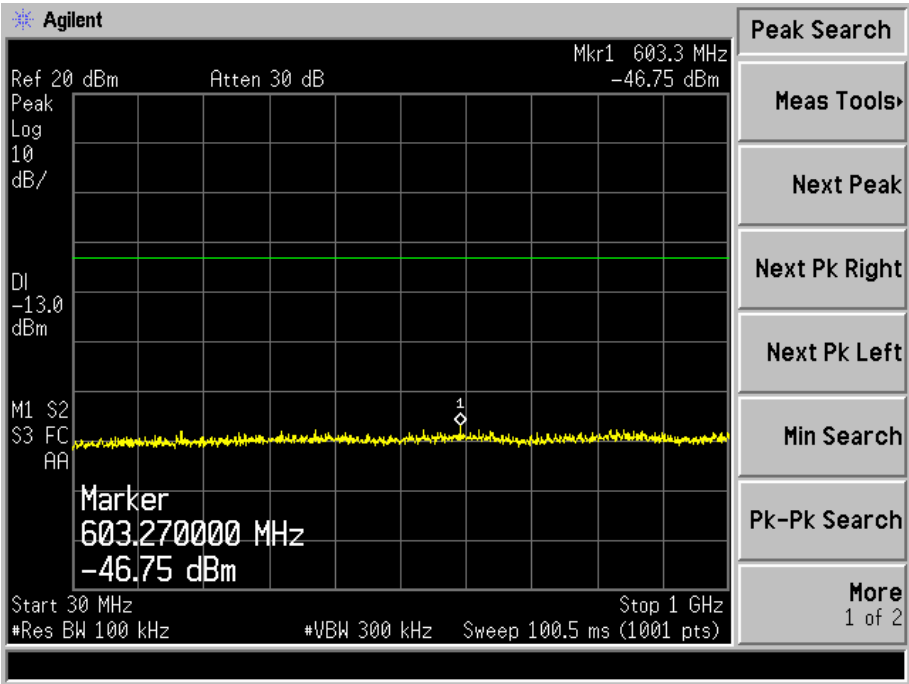
HSDPA Low Channel  
30MHz to 1GHz



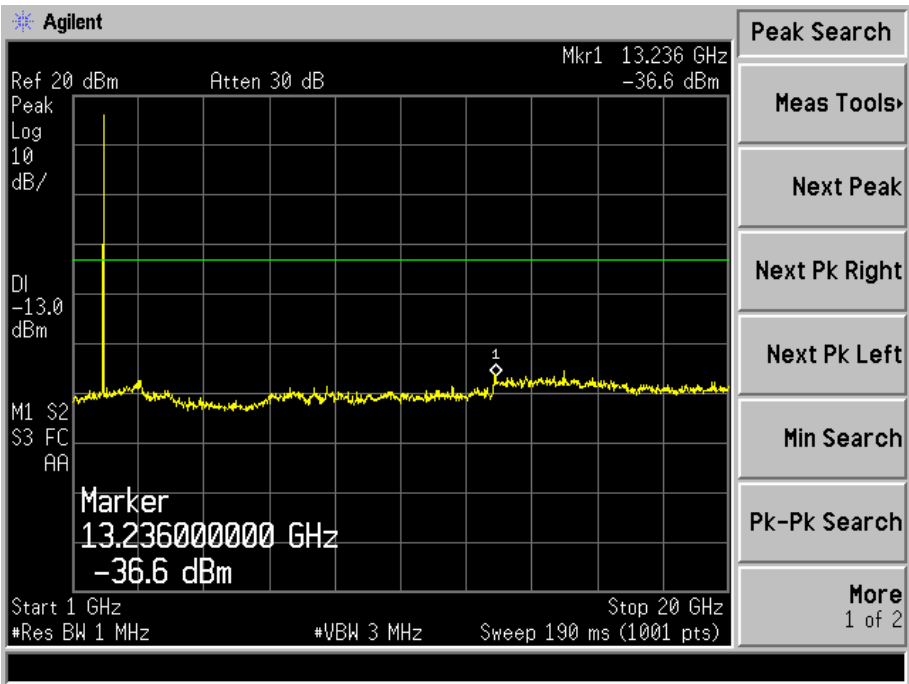
Above 1GHz



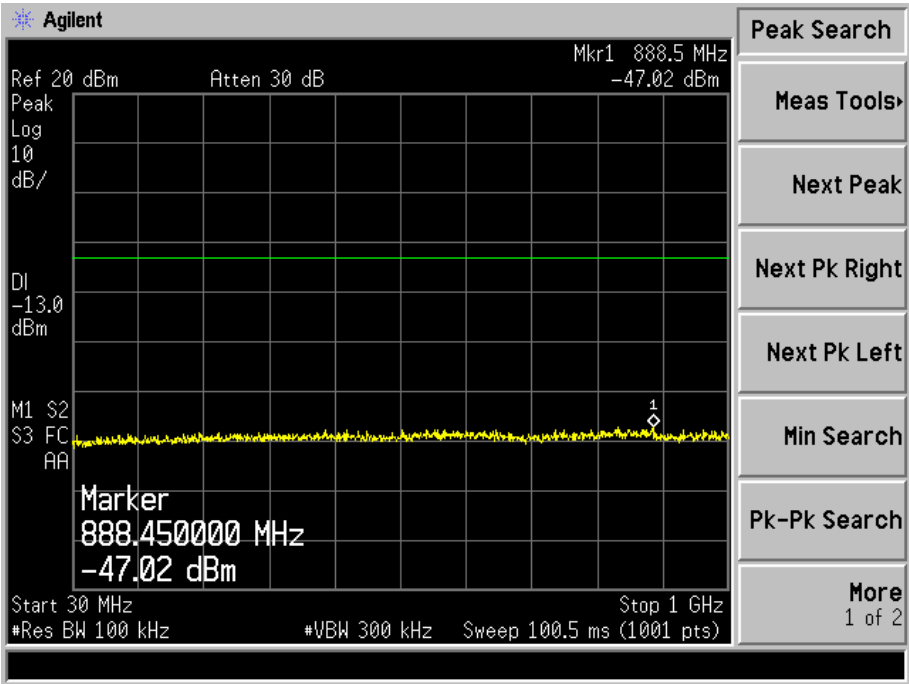
HSDPA Middle Channel  
30MHz to 1GHz



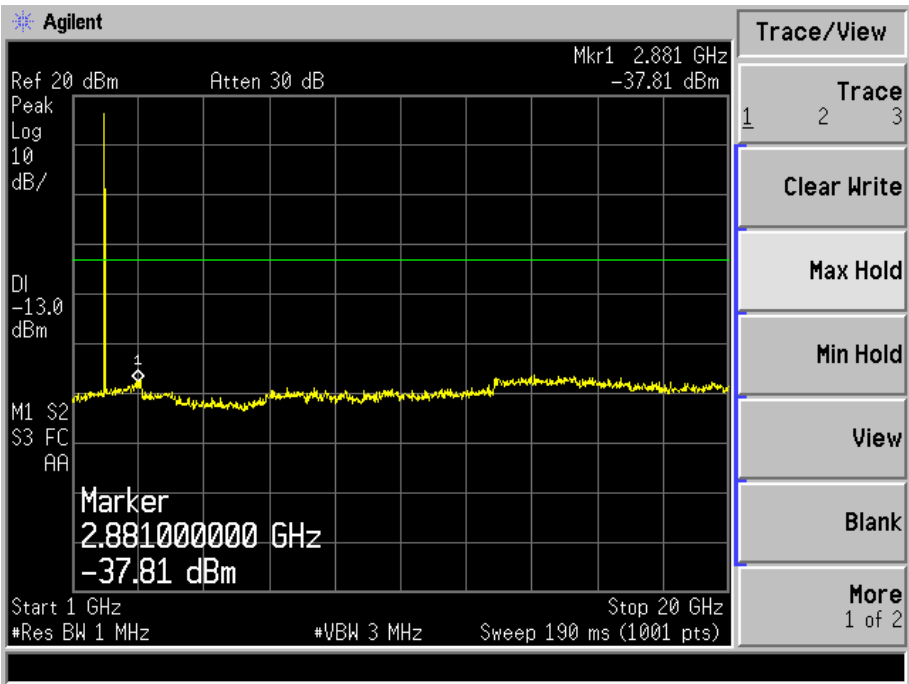
Above 1GHz



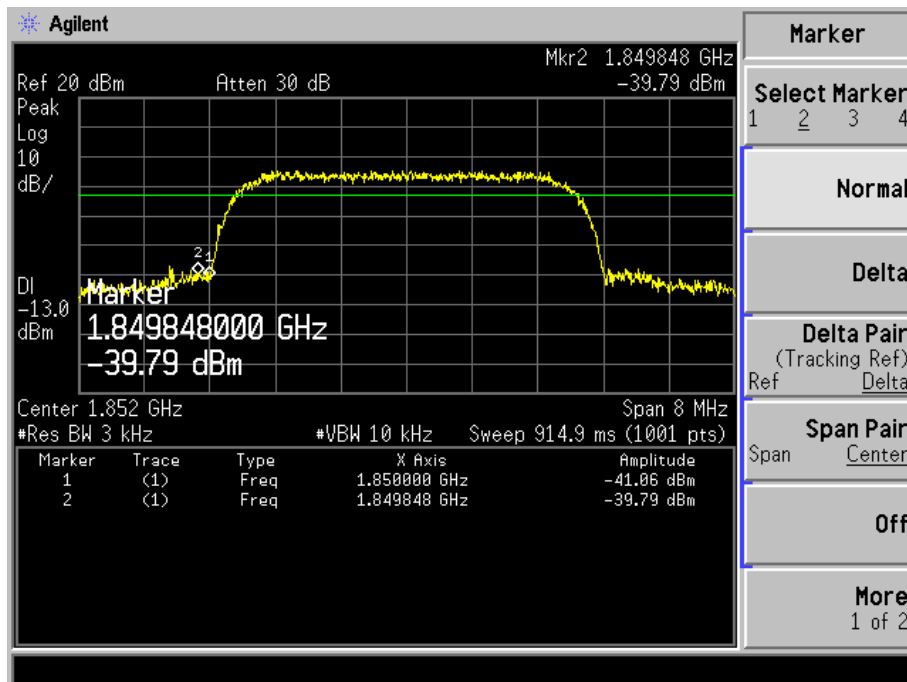
HSDPA High Channel  
30MHz to 1GHz



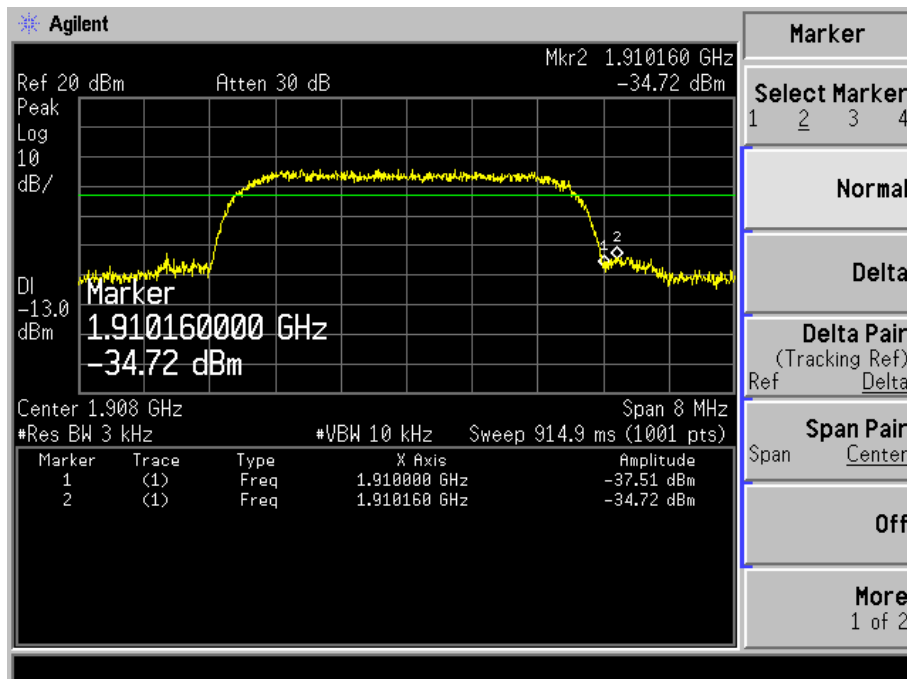
Above 1GHz



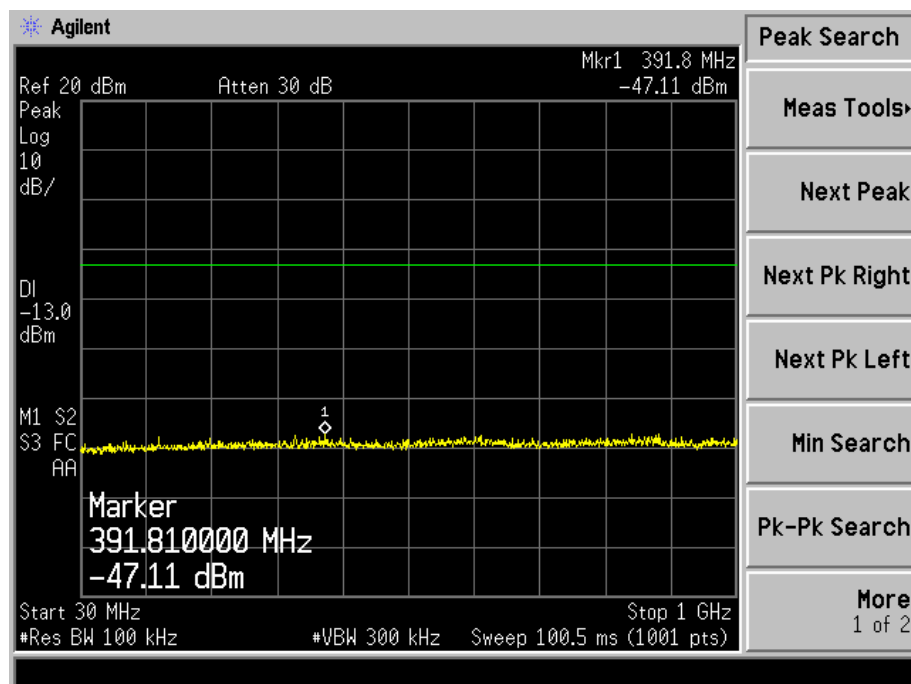
## HSDPA Low Band Spurious Emission



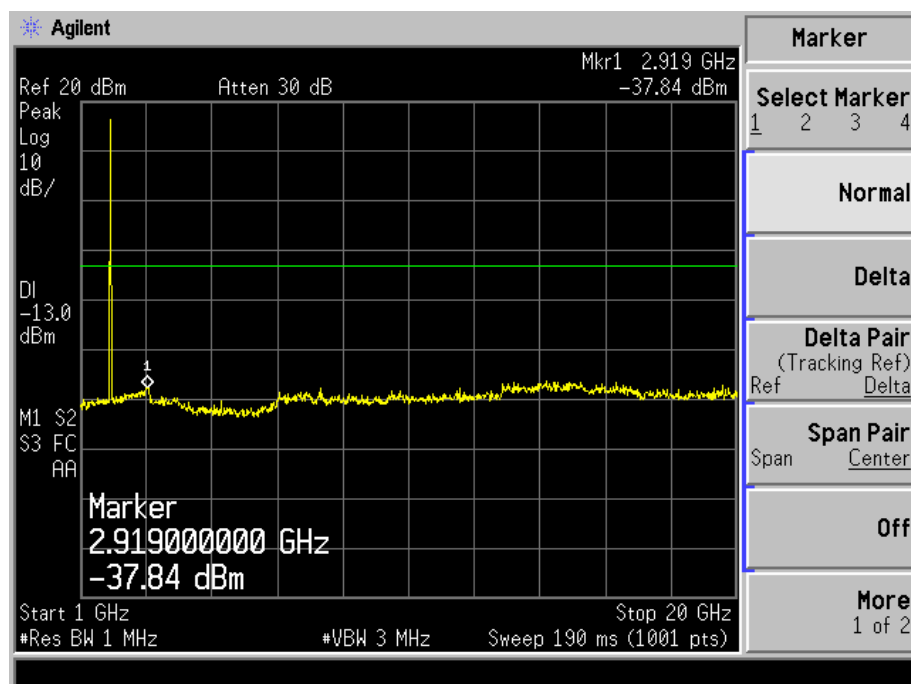
## HSDPA High Band Spurious Emission



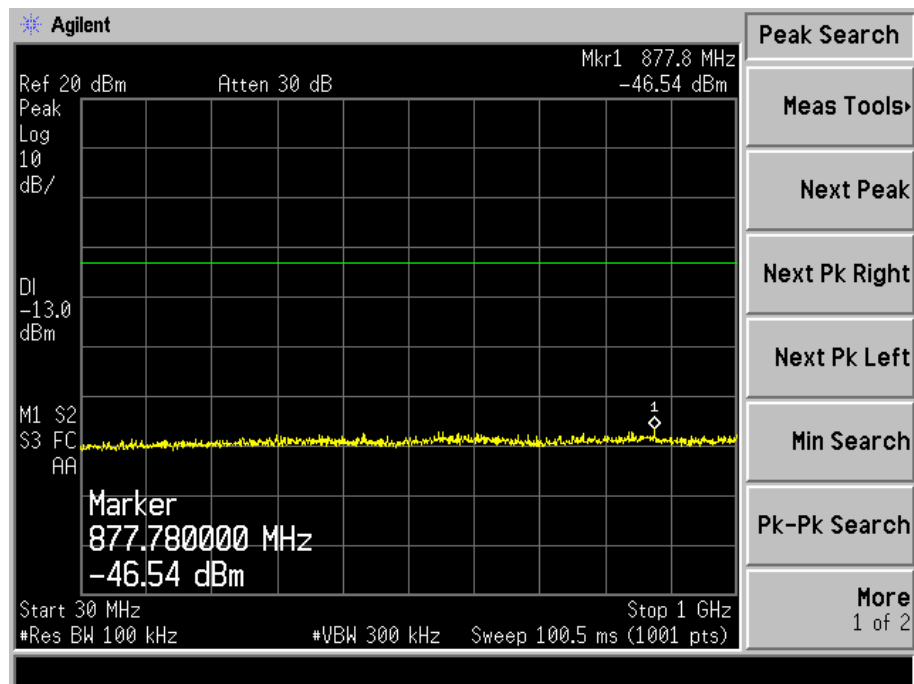
HSUPA Low Channel  
30MHz to 1GHz



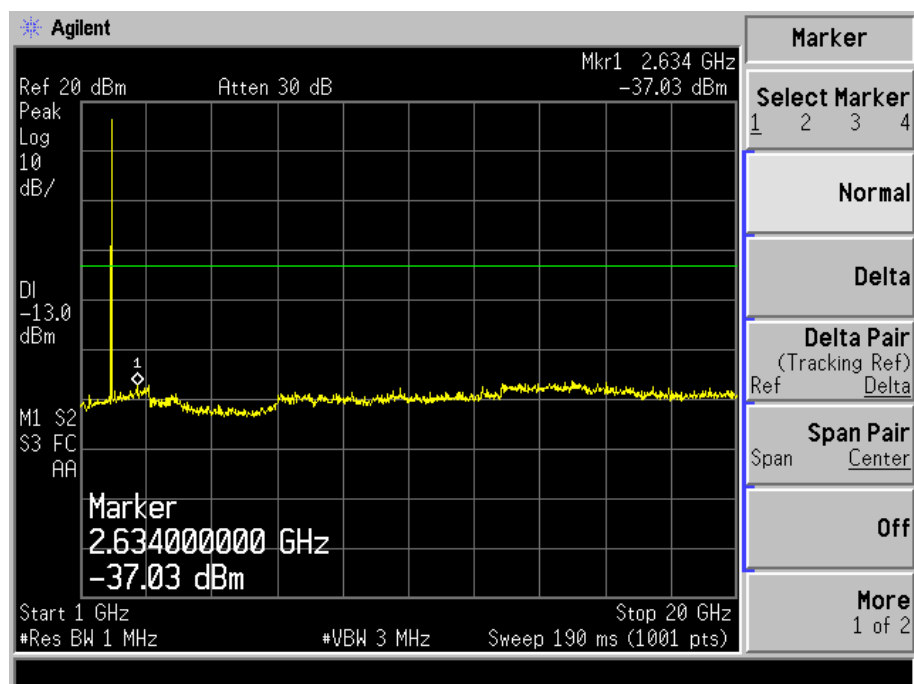
Above 1GHz



HSUPA Middle Channel  
30MHz to 1GHz

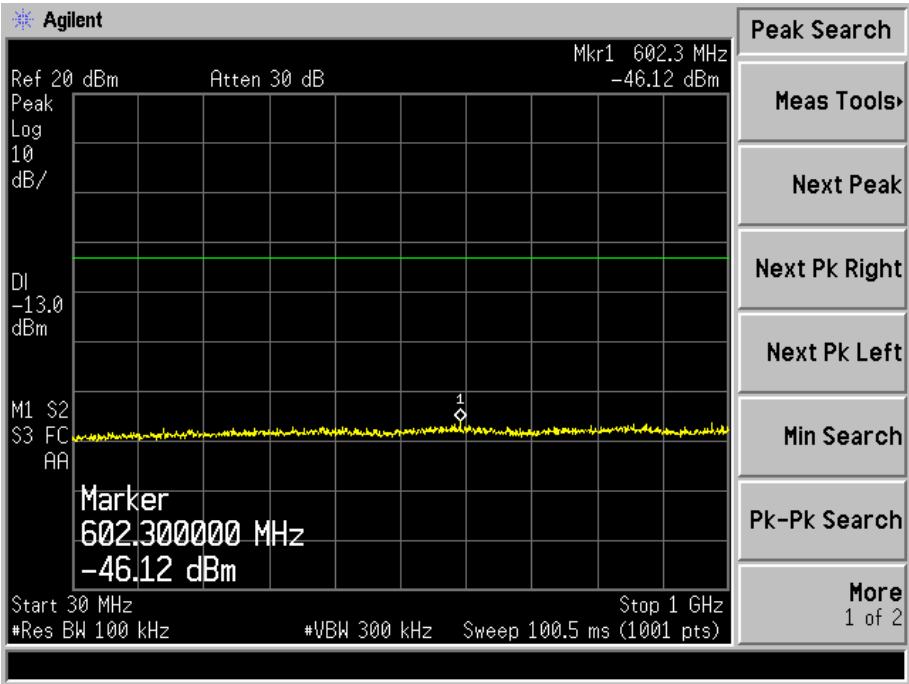


Above 1GHz

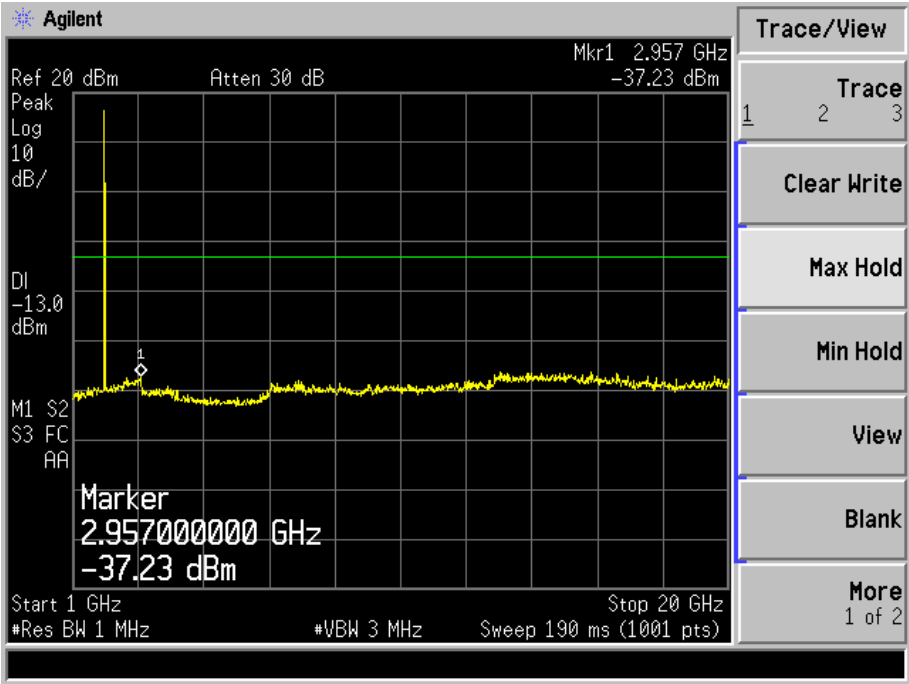




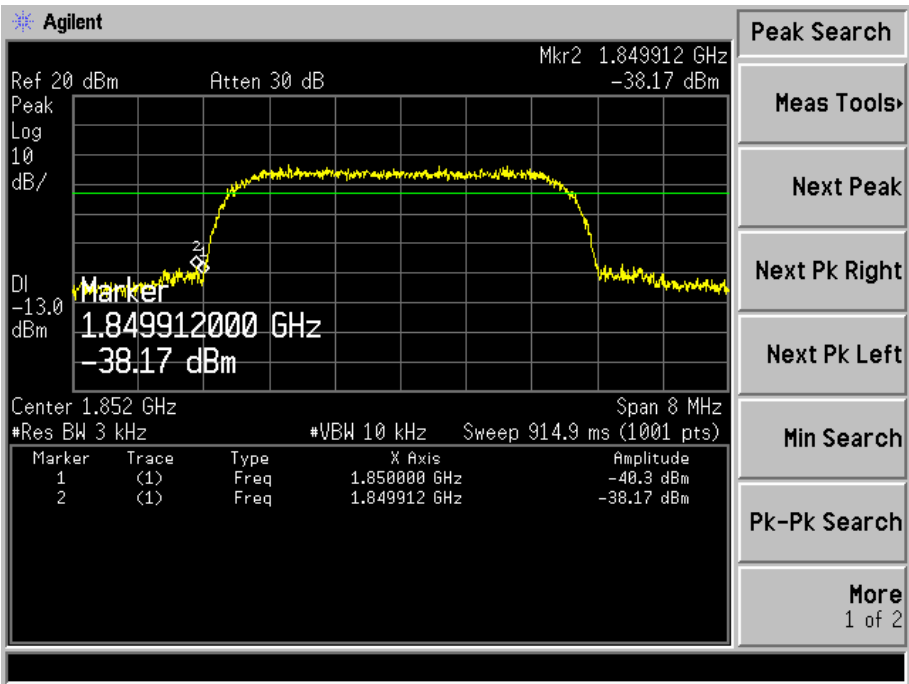
HSUPA High Channel  
30MHz to 1GHz



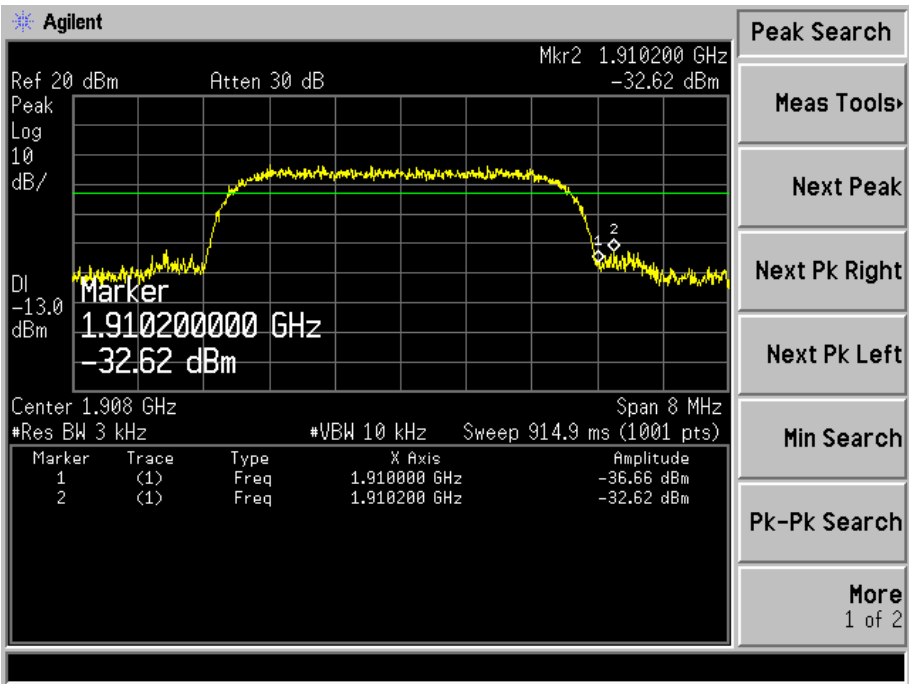
Above 1GHz



HSUPA Low Band Spurious Emission



HSUPA High Band Spurious Emission



## 8. Spurious Radiated Emissions

### 8.1 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  $\pm 5.20$  dB.

### 8.2 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.

### 8.3 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)

### 8.4 Environmental Conditions

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

### 8.5 Summary of Test Results/Plots

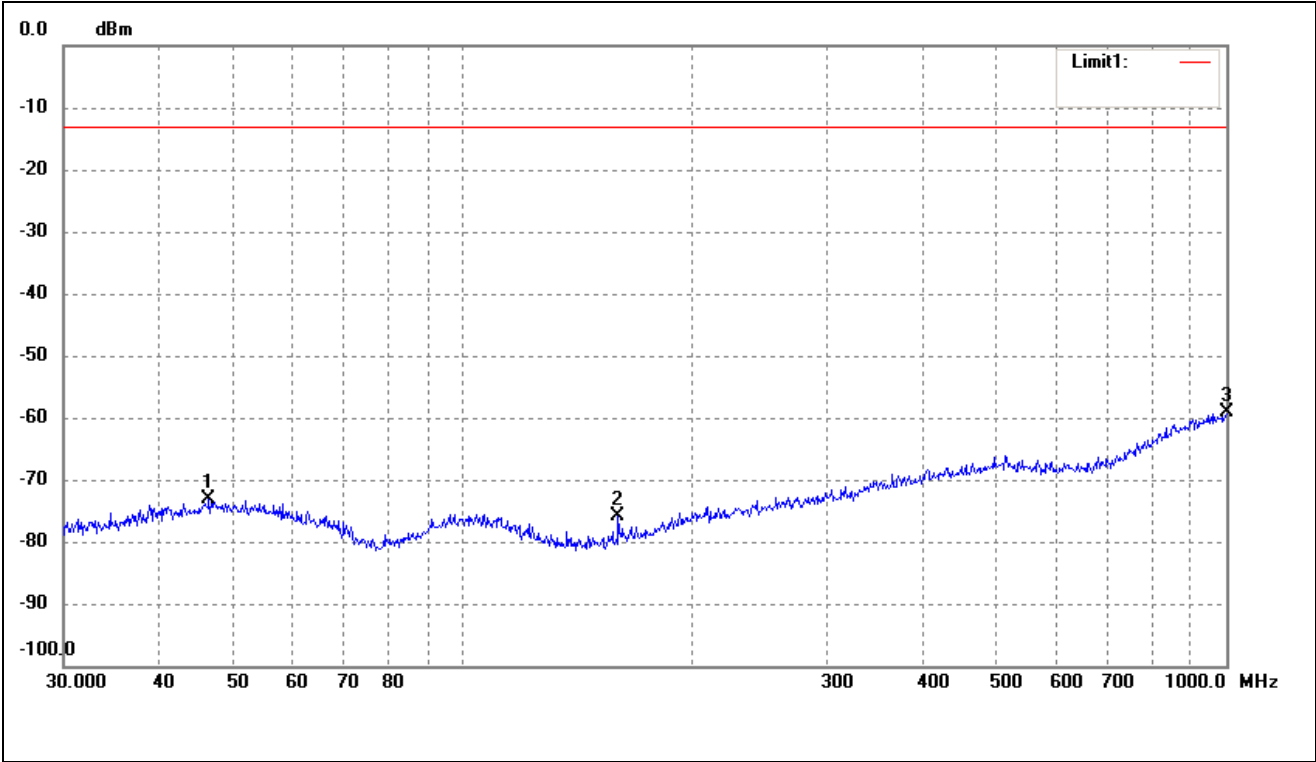
According to the data below, the FCC Part 22.917 and 24.238 standards, and had the worst margin of:

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

Spurious Emission From 30MHz to 1GHz

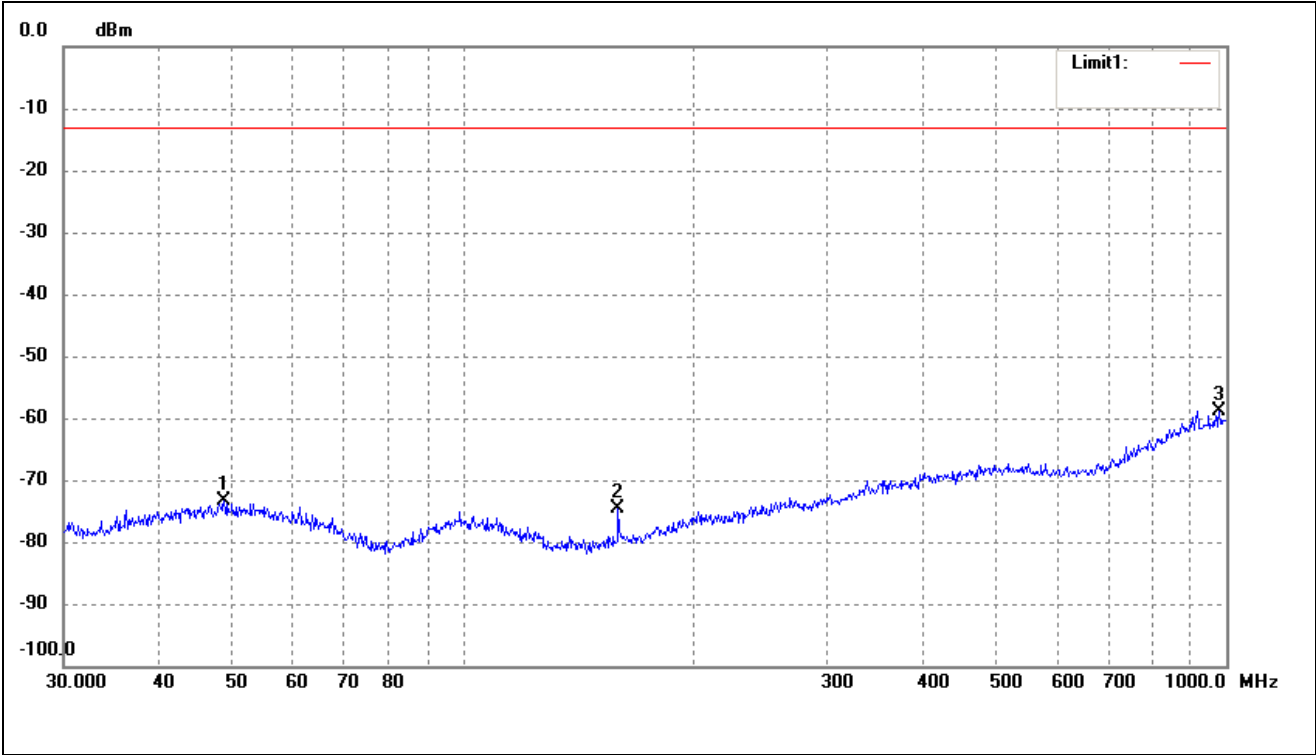
For Cellular Band\_ GSM850 Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	46.5030	-77.48	4.34	-73.14	-13.00	-60.14	ERP
2	159.7844	-75.40	-0.55	-75.95	-13.00	-62.95	ERP
3	1000.0000	-77.72	18.48	-59.24	-13.00	-46.24	ERP

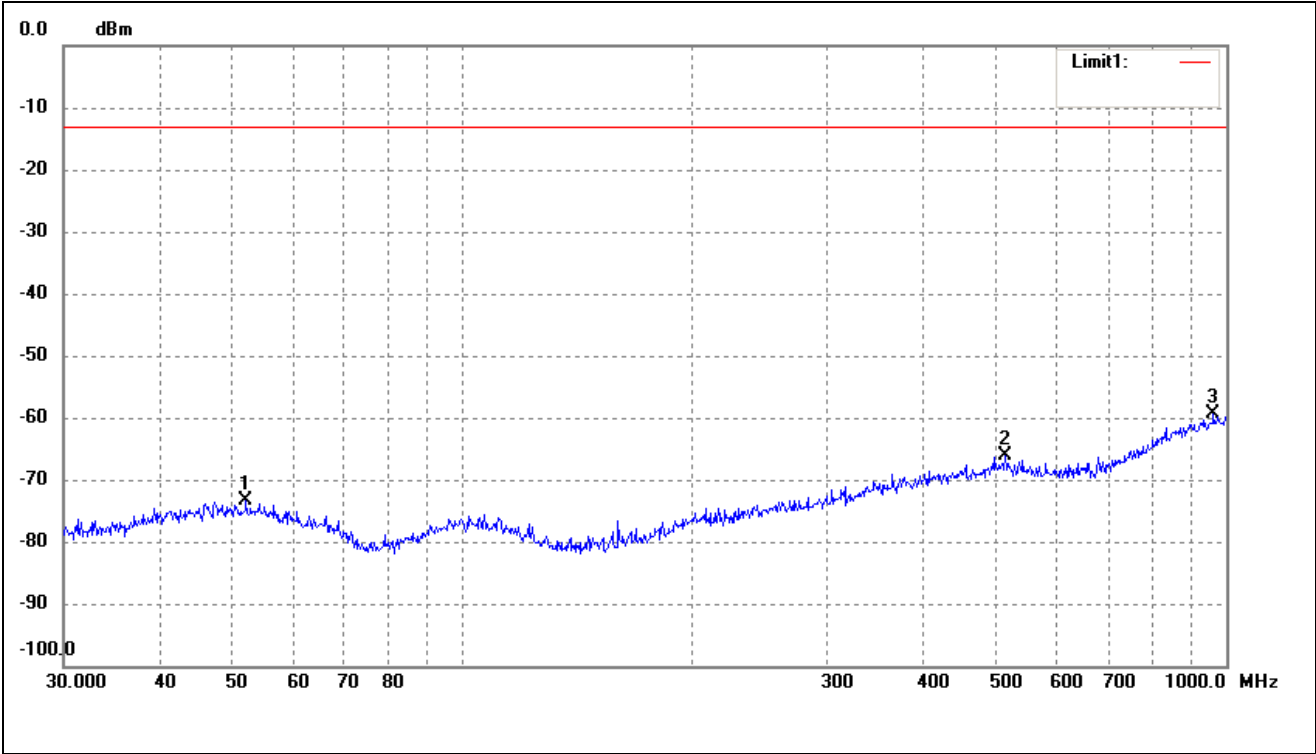
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	48.6719	-77.72	4.35	-73.37	-13.00	-60.37	ERP
2	159.7844	-74.16	-0.55	-74.71	-13.00	-61.71	ERP
3	979.1804	-77.02	18.17	-58.85	-13.00	-45.85	ERP

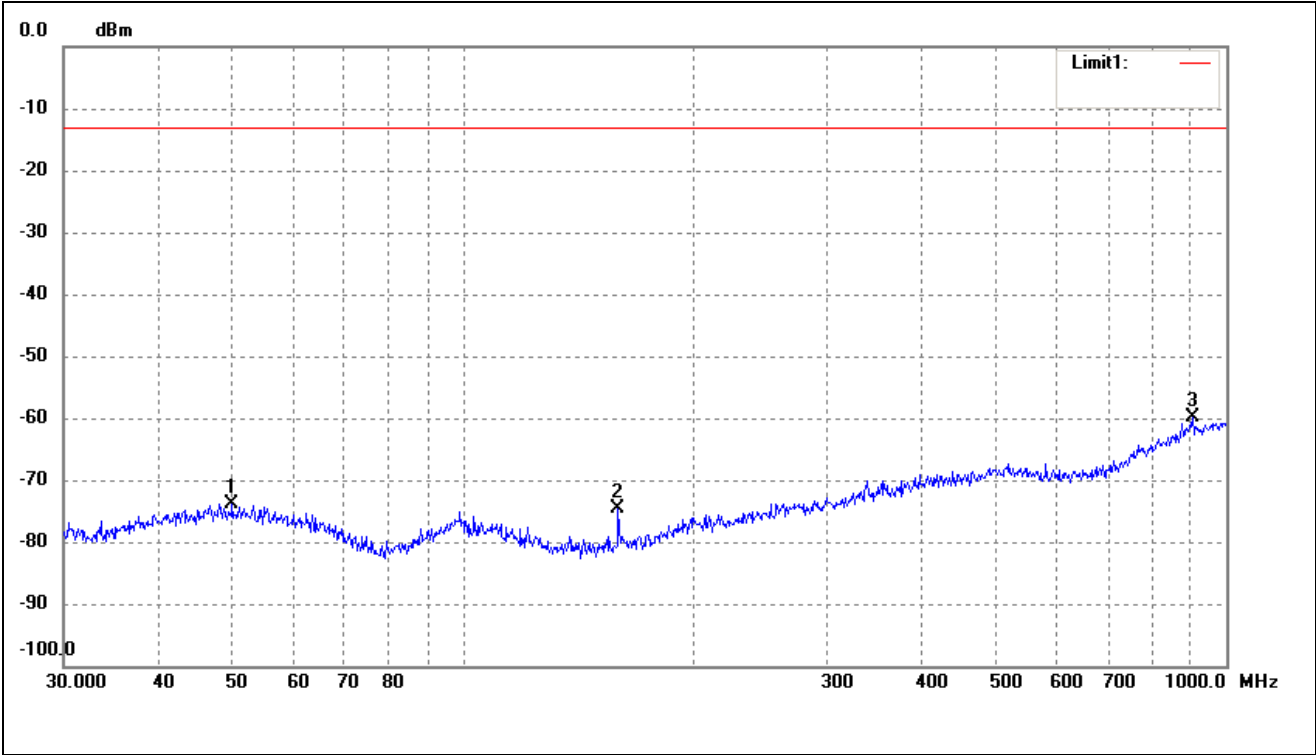
For Cellular Band\_ GSM1900 Mode

Horizontal:



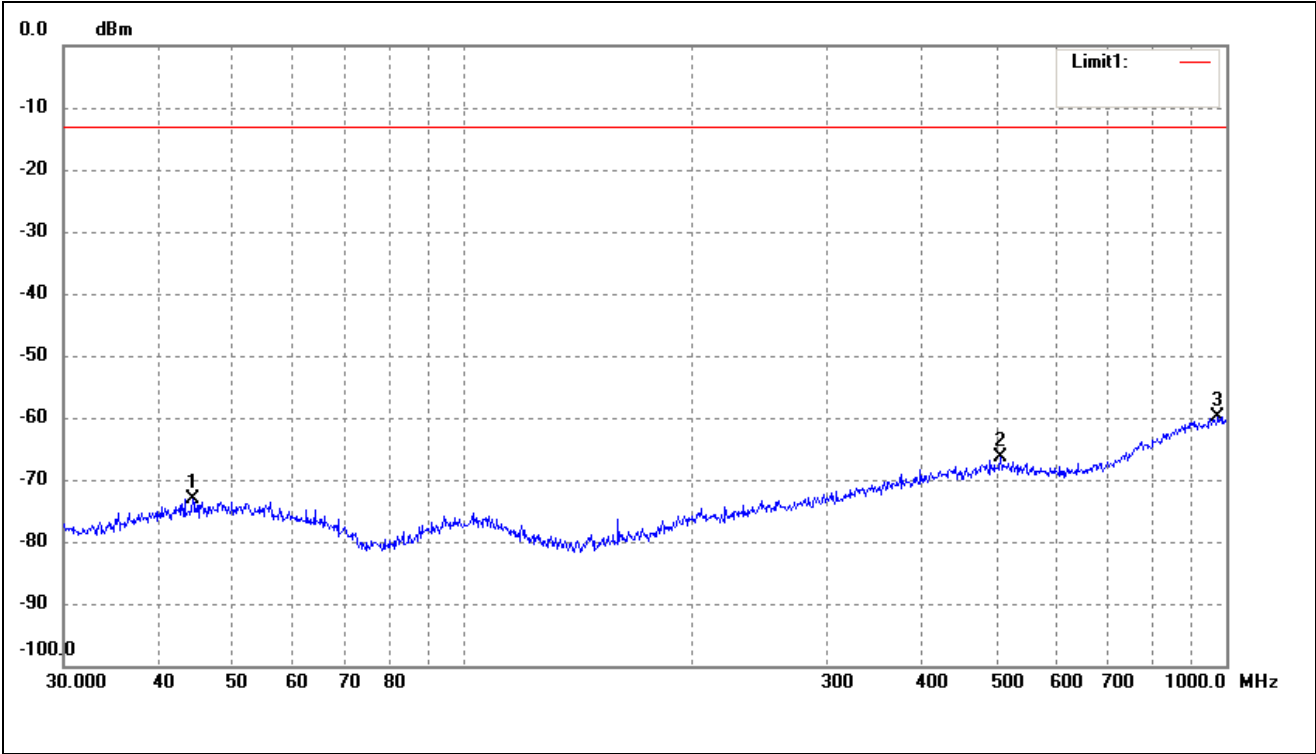
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	52.0251	-77.42	4.15	-73.27	-13.00	-60.27	ERP
2	513.6331	-76.82	10.61	-66.21	-13.00	-53.21	ERP
3	962.1623	-77.25	17.92	-59.33	-13.00	-46.33	ERP

Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	49.8814	-78.20	4.36	-73.84	-13.00	-60.84	ERP
2	159.7844	-74.16	-0.55	-74.71	-13.00	-61.71	ERP
3	903.3094	-76.99	17.22	-59.77	-13.00	-46.77	ERP

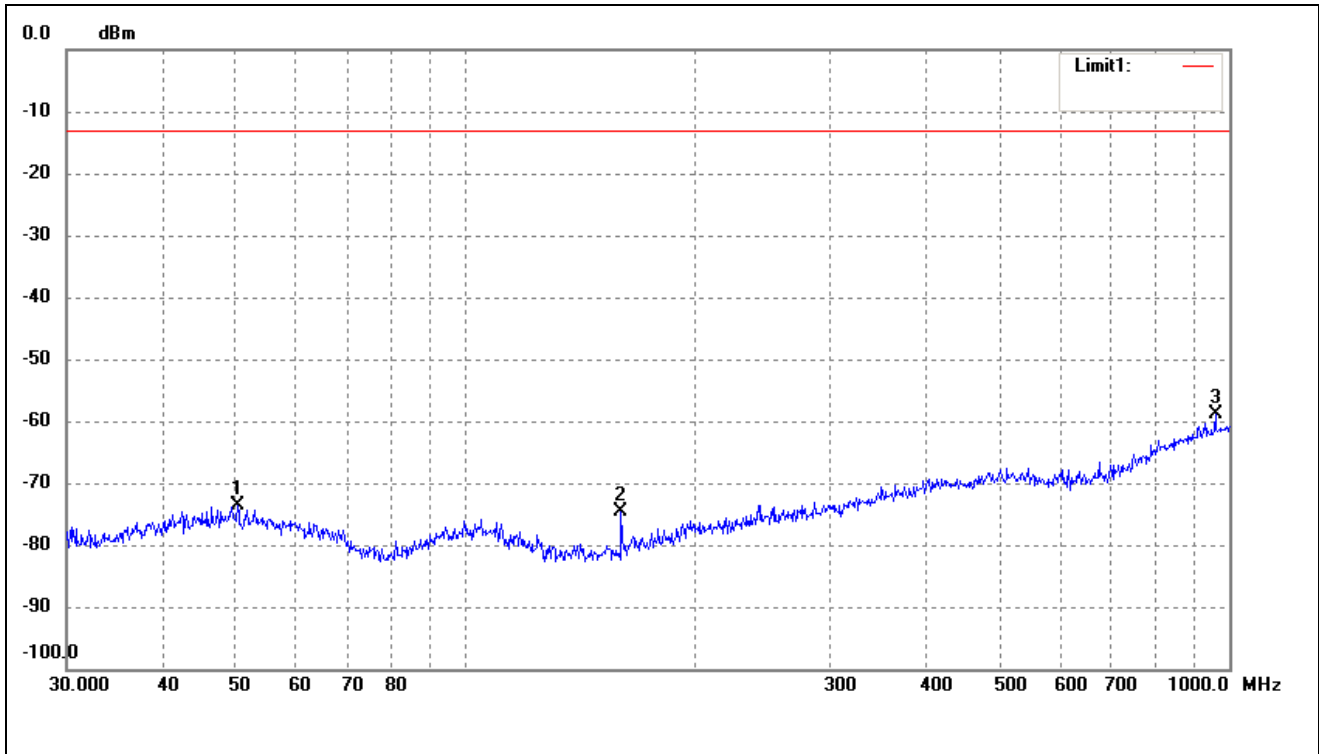
For band V Mode  
Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	44.2752	-77.36	4.19	-73.17	-13.00	-60.17	ERP
2	506.4791	-77.01	10.64	-66.37	-13.00	-53.37	ERP
3	975.7529	-77.91	18.12	-59.79	-13.00	-46.79	ERP

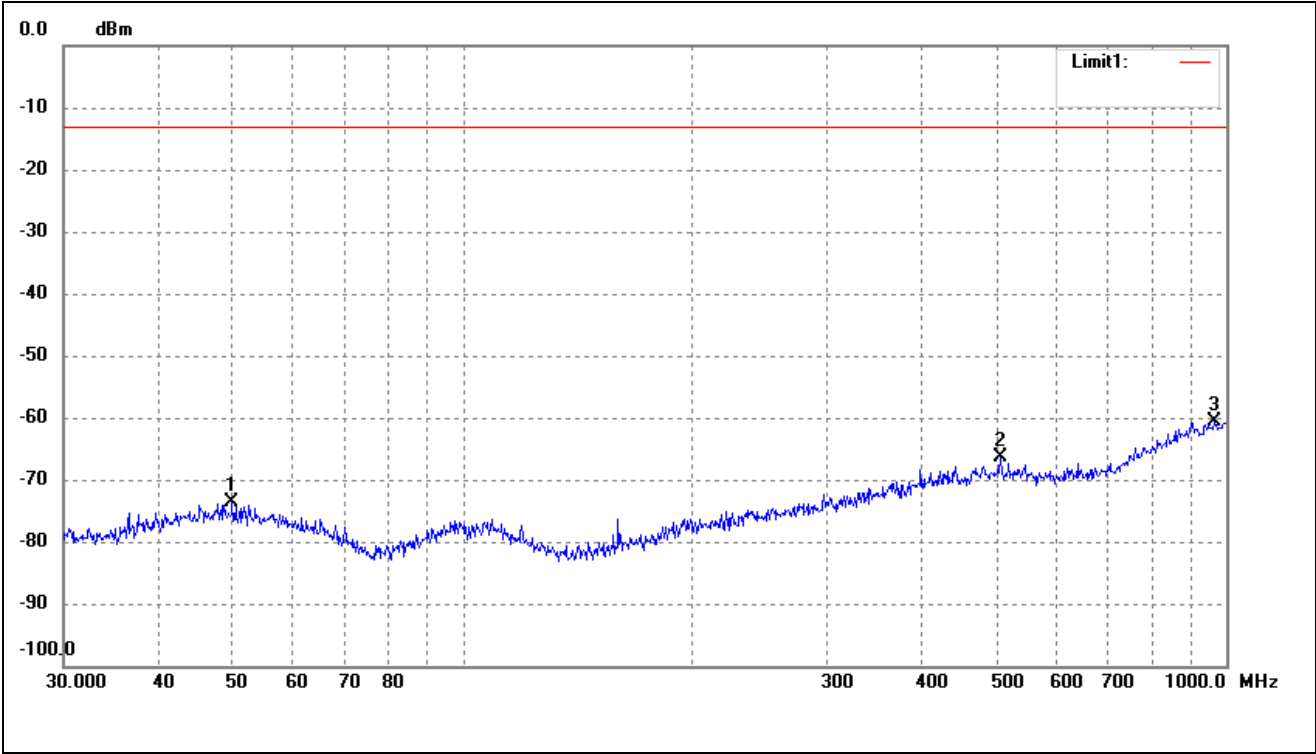


Vertical:



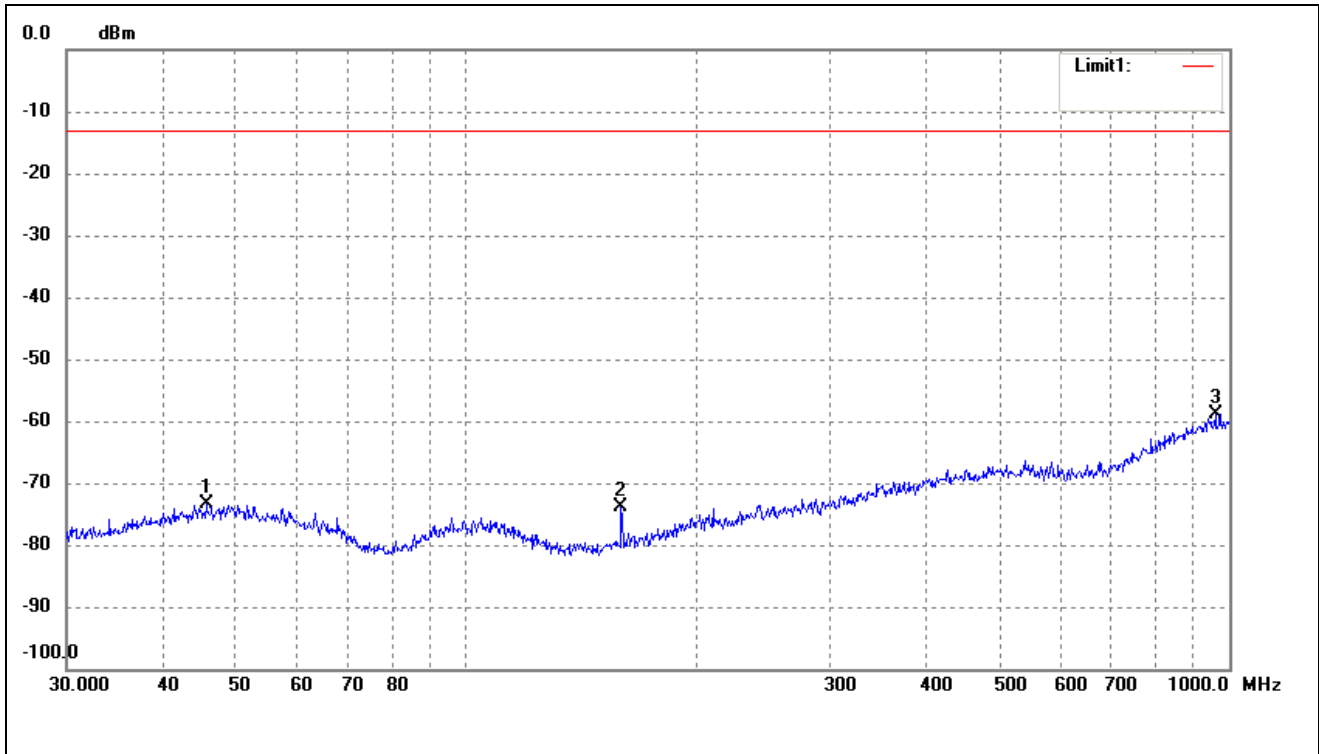
No.	Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	50.2325	-78.06	4.33	-73.73	-13.00	-60.73	ERP
2	159.7844	-74.09	-0.55	-74.64	-13.00	-61.64	ERP
3	958.7943	-76.62	17.86	-58.76	-13.00	-45.76	ERP

For band II Mode  
Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	49.8814	-78.07	4.36	-73.71	-13.00	-60.71	ERP
2	506.4791	-77.01	10.64	-66.37	-13.00	-53.37	ERP
3	965.5421	-78.64	17.96	-60.68	-13.00	-47.68	ERP

Vertical:



No.	Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	45.6948	-77.65	4.34	-73.31	-13.00	-60.31	ERP
2	159.7844	-73.30	-0.55	-73.85	-13.00	-60.85	ERP
3	958.7943	-76.60	17.86	-58.76	-13.00	-45.78	ERP

Note:  $\text{Margin} = (\text{Reading} + \text{Correct}) - \text{Limit}$

*Spurious Emissions Above 1GHz**For Cellular Band\_GSM850 Mode*

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (824.2MHz)						
1648.4	-60.69	10.25	-50.44	-13.00	-37.44	H
2472.6	-59.79	14.02	-45.77	-13.00	-32.77	H
1648.4	-60.04	10.25	-49.79	-13.00	-36.79	V
2472.6	-58.95	14.02	-44.93	-13.00	-31.93	V
Middle Channel (836.6MHz)						
1673.2	-60.02	10.14	-49.88	-13.00	-36.88	H
2509.8	-59.72	13.86	-45.86	-13.00	-32.86	H
1673.2	-59.98	10.14	-49.84	-13.00	-36.84	V
2509.8	-60.38	13.86	-46.52	-13.00	-33.52	V
High Channel (848.8MHz)						
1697.6	-60.38	14.05	-46.33	-13.00	-33.33	H
2546.4	-59.64	14.41	-45.23	-13.00	-32.23	H
1697.6	-60.36	14.05	-46.31	-13.00	-33.31	V
2546.4	-59.56	14.41	-45.15	-13.00	-32.15	V

*For PCS Band\_GSM1900 Mode*

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (1850.2MHz)						
3700.4	-59.90	13.67	-46.23	-13.00	-33.23	H
5550.6	-58.38	14.54	-43.84	-13.00	-30.84	H
3700.4	-59.25	13.67	-45.58	-13.00	-32.58	V
5550.6	-60.60	14.54	-46.06	-13.00	-33.06	V
Middle Channel (1880MHz)						
3760.0	-59.51	13.77	-45.74	-13.00	-32.74	H
5640.0	-58.69	14.35	-44.34	-13.00	-31.34	H
3760.0	-59.16	13.77	-45.39	-13.00	-32.39	V
5640.0	-58.87	14.35	-44.52	-13.00	-31.52	V
High Channel (1909.8MHz)						
3819.6	-60.28	13.77	-46.51	-13.00	-33.51	H
5729.4	-60.08	14.28	-45.8	-13.00	-32.80	H
3819.6	-59.84	13.77	-46.07	-13.00	-33.07	V
5729.4	-59.72	14.28	-45.44	-13.00	-32.44	V

*For Band V Mode*

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (826.4MHz)						
1652.8	-59.45	14.98	-44.47	-13.00	-31.47	H
2479.2	-59.97	17.02	-42.95	-13.00	-29.95	H
1652.8	-58.42	14.98	-43.44	-13.00	-30.44	V
2479.2	-59.65	17.02	-42.63	-13.00	-29.63	V
Middle Channel (836.4MHz)						
1672.8	-58.68	6.86	-51.82	-13.00	-38.82	H
2509.2	-59.17	14.62	-44.55	-13.00	-31.55	H
1672.8	-59.63	6.86	-52.77	-13.00	-39.77	V
2509.2	-60.66	14.62	-46.04	-13.00	-33.04	V
High Channel (846.6MHz)						
1693.2	-57.79	6.86	-50.93	-13.00	-37.93	H
2539.8	-60.81	15.03	-45.78	-13.00	-32.78	H
1693.2	-58.29	6.86	-51.43	-13.00	-38.43	V
2539.8	-59.73	15.03	-44.70	-13.00	-31.70	V

*For Band II Mode*

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (1852.4MHz)						
3704.8	-58.81	5.88	-52.93	-13.00	-39.93	H
5557.2	-59.37	15.37	-44.00	-13.00	-31.00	H
3704.8	-59.87	5.88	-53.99	-13.00	-40.99	V
5557.2	-60.10	15.37	-44.73	-13.00	-31.73	V
Middle Channel (1880MHz)						
3760.8	-59.29	10.17	-49.12	-13.00	-36.12	H
5640.0	-59.14	14.69	-44.45	-13.00	-31.45	H
3760.8	-58.86	10.17	-48.69	-13.00	-35.69	V
5640.0	-59.41	14.69	-44.72	-13.00	-31.72	V
High Channel (1907.6MHz)						
3815.2	-59.33	6.91	-52.42	-13.00	-39.42	H
5722.8	-59.37	15.33	-44.04	-13.00	-31.04	H
3815.2	-59.63	6.91	-52.72	-13.00	-39.72	V
5722.8	-58.96	15.33	-43.63	-13.00	-30.63	H

Note: Result=Reading+ Correct, Margin= Result- Limit

Testing is carried out with frequency rang 9kHz to 20GHz, which above 3<sup>th</sup> Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured, so the data is not display.

## 9. Frequency Stability

### 9.1 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.

### 9.2 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

### 9.3 Environmental Conditions

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

### 9.4 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	58	0.0693
40	3.7	54	0.0645
30	3.7	49	0.0586
20	3.7	47	0.0562
10	3.7	52	0.0622
0	3.7	46	0.0550
-10	3.7	-9	-0.0108
-20	3.7	-20	-0.0239
-30	3.7	-24	-0.0287

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	64	0.0340
40	3.7	61	0.0324
30	3.7	57	0.0303
20	3.7	66	0.0351
10	3.7	62	0.0330
0	3.7	66	0.0351
-10	3.7	77	0.0410
-20	3.7	72	0.0383
-30	3.7	79	0.0420

## 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	62	0.0741
40	3.7	58	0.0693
30	3.7	53	0.0634
20	3.7	51	0.0610
10	3.7	56	0.0669
0	3.7	50	0.0598
-10	3.7	-5	-0.0060
-20	3.7	-16	-0.0191
-30	3.7	-20	-0.0239

## 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	58	0.0309
40	3.7	55	0.0293
30	3.7	51	0.0271
20	3.7	60	0.0319
10	3.7	56	0.0298
0	3.7	60	0.0319
-10	3.7	71	0.0378
-20	3.7	66	0.0351
-30	3.7	73	0.0388



## For Cellular Band EDGE 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	-48	-0.0574
40	3.7	-57	-0.0681
30	3.7	-35	-0.0418
20	3.7	-46	-0.0550
10	3.7	-52	-0.0622
0	3.7	-46	-0.0550
-10	3.7	-55	-0.0657
-20	3.7	-60	-0.0717
-30	3.7	-63	-0.0753

## For PCS Band EDGE 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	62	0.0330
40	3.7	53	0.0282
30	3.7	48	0.0255
20	3.7	45	0.0239
10	3.7	48	0.0255
0	3.7	52	0.0277
-10	3.7	58	0.0309
-20	3.7	63	0.0335
-30	3.7	70	0.0372

## For WCDMA Band V Mode

Reference Frequency(Middle Channel): 836.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-46	-0.0550
40	3.7	-39	-0.0466
30	3.7	-36	-0.0430
20	3.7	-50	-0.0598
10	3.7	-31	-0.0371
0	3.7	-26	-0.0311
-10	3.7	-37	-0.0442
-20	3.7	-41	-0.0490
-30	3.7	-20	-0.0239

## For WCDMA Band II 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	53	0.0282
40	3.7	50	0.0266
30	3.7	46	0.0245
20	3.7	55	0.0293
10	3.7	51	0.0271
0	3.7	55	0.0293
-10	3.7	66	0.0351
-20	3.7	61	0.0324
-30	3.7	68	0.0362

## For HSDPA Band V Mode

Reference Frequency(Middle Channel): 836.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-68	-0.0813
40	3.7	-61	-0.0729
30	3.7	-58	-0.0693
20	3.7	-72	-0.0861
10	3.7	-53	-0.0634
0	3.7	-48	-0.0574
-10	3.7	-59	-0.0705
-20	3.7	-63	-0.0753
-30	3.7	-42	-0.0502

## For HSDPA Band II 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	59	0.0314
40	3.7	56	0.0298
30	3.7	52	0.0277
20	3.7	61	0.0324
10	3.7	57	0.0303
0	3.7	61	0.0324
-10	3.7	72	0.0383
-20	3.7	67	0.0356
-30	3.7	74	0.0394

## For HSUPA Band V Mode

Reference Frequency(Middle Channel): 836.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-54	-0.0646
40	3.7	-47	-0.0562
30	3.7	-44	-0.0526
20	3.7	-58	-0.0693
10	3.7	-39	-0.0466
0	3.7	-34	-0.0407
-10	3.7	-45	-0.0538
-20	3.7	-49	-0.0586
-30	3.7	-28	-0.0335

## For HSUPA Band II 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	61	0.0324
40	3.7	58	0.0309
30	3.7	54	0.0287
20	3.7	63	0.0335
10	3.7	59	0.0314
0	3.7	63	0.0335
-10	3.7	74	0.0394
-20	3.7	69	0.0367
-30	3.7	76	0.0404

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	72	0.0861
	3.7	68	0.0813
	4.2	63	0.0753
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	64	0.0340
	3.7	68	0.0362
	4.2	79	0.0420
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	51	0.0610
	3.7	46	0.0550
	4.2	44	0.0526
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	69	0.0367
	3.7	65	0.0346
	4.2	74	0.0394

Reference Frequency(Middle Channel): EDGE 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	64	0.0765
	3.7	62	0.0741
	4.2	67	0.0801
Reference Frequency(Middle Channel): EDGE 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	74	0.0394
	3.7	70	0.0372
	4.2	74	0.0394

Reference Frequency(Middle Channel): WCDMA 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	-55	-0.0658
	3.7	-48	-0.0574
	4.2	-45	-0.0538
Reference Frequency(Middle Channel): WCDMA 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	46	0.0245
	3.7	42	0.0223
	4.2	51	0.0271
Reference Frequency(Middle Channel): HSDPA 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	-59	-0.0705
	3.7	-40	-0.0478
	4.2	-35	-0.0418

Reference Frequency(Middle Channel): HSDPA 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	62	0.0330
	3.7	57	0.0303
	4.2	64	0.0340
Reference Frequency(Middle Channel): HSUPA 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	-45	-0.0538
	3.7	-59	-0.0705
	4.2	-40	-0.0478
Reference Frequency(Middle Channel): HSUPA1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	51	0.0271
	3.7	47	0.0250
	4.2	51	0.0271

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