FCC Part 22H & 24E & 27
Measurement and Test Report

For

Spark Technology Labs Inc.

680 Davenport Rd., Unit D, Waterloo, Canada N2V 2C3

FCC ID: 2AA5OCH3G

FCC Rules:	FCC Part 22H, FCC Part 24E, FCC Part 27
Product Description:	GPS TRACKER
Tested Model:	CH3G
Report No.:	STRD1606043I-1
Tested Date:	2016-06-18 to 2016-07-10
Issued Date:	2016-07-15
Tested By:	Irving Liu / Engineer
Reviewed By:	Silin Chen / EMC Manager
Approved & Authorized By:	Jandy So / PSQ Manager

Prepared By:

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Spark Technology Labs Inc.
Address of applicant:	680 Davenport Rd., Unit D, Waterloo, Canada N2V 2C3
Manufacturer:	DBJ Technologies（Zhuhai）Co.,Ltd.
Address of manufacturer:	First Floor, Block 1, Manufacture Center, No.1 Software Road, Zhuhai, Guangdong, China

General Description of EUT:	
Product Name:	GPS TRACKER
Brand Name:	CloudHawk
Model No.:	CH3G
Rated Voltage:	DC 3.8V Li-ion Battery
Battery:	5200mAh
Device Category:	Mobile Device
Note: The test data is gathered from a production sample provided by the manufacturer. For more information see the following datasheet	

Technical Characteristics of EUT:	
2G	
Support Networks:	GPRS
Support Band:	GSM850/PCS1900
Uplink Frequency:	GPRS 850: 824~849MHz GPRS 1900: 1850~1910MHz
Downlink Frequency:	GPRS 850: 869~894MHz GPRS 1900: 1930~1990MHz
Max RF Output Power:	GPRS 850: 32.33dBm, GPRS 1900: 29.04dBm
Type of Emission:	GPRS850: 254KGXW, GPRS1900: 254KGXW
Type of Modulation:	GFSK
Type of Antenna:	Integral Antenna
Antenna Gain:	GSM850: -2dBi; GSM1900: -1.5dBi
GPRS Class:	Class 12
3G	
Support Networks:	WCDMA, HSDPA, HSUPA
Support Band:	WCDMA Band 2, WCDMA Band 4, WCDMA Band 5
Uplink Frequency:	WCDMA Band 2: 1850~1910MHz WCDMA Band 4: 1710~1755MHz WCDMA Band 5: 824~849MHz
Downlink Frequency:	WCDMA Band 2: 1930~1990MHz WCDMA Band 4: 2110~2155MHz WCDMA Band 5: 869~894MHz
RF Output Power:	WCDMA Band 2: 22.69dBm, WCDMA Band 4: 22.64dBm WCDMA Band 5: 22.59dBm
Type of Emission:	WCDMA Band 2: 4M25F9W WCDMA Band 4: 4M23F9W WCDMA Band 5: 4M19F9W
Type of Modulation:	BPSK
Antenna Type:	Integral Antenna
Antenna Gain:	WCDMA Band 2: -1.5dBi, WCDMA Band 4: -2dBi, WCDMA Band 5: -2dBi

1.2 Test Standards

The following report is prepared on behalf of the Spark Technology Labs Inc. in accordance with FCC Part 2 subpart J, FCC Part 22 subpart H and FCC Part 24 subpart E and FCC Part 27 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 and FCC Part 27 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 ANSI/TIA-603-D: 2010 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. The measurement guide KDB 971168 D01 Power Meas License Digital Systems v02r02 shall be performed also.

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 2nd Road, Bao'an District, Shenzhen, P.R.C (518101)

1.5 EUT Setup and Test Mode

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

Test Mode List		
Test Mode	Description	Remark
TM1	GPRS 850	Low, Middle, High Channels
TM2	GPRS 1900	Low, Middle, High Channels
TM3	WCDMA Band 5	Low, Middle, High Channels
TM4	HSDPA Band 5	Low, Middle, High Channels
TM5	HSUPA Band 5	Low, Middle, High Channels
TM6	WCDMA Band 4	Low, Middle, High Channels
TM7	HSDPA Band 4	Low, Middle, High Channels
TM8	HSUPA Band 4	Low, Middle, High Channels
TM9	WCDMA Band 2	Low, Middle, High Channels
TM10	HSDPA Band 2	Low, Middle, High Channels
TM11	HSUPA Band 2	Low, Middle, High Channels

Testing Configure			
Support Band	Support Standard	Channel Frequency	Channel Number
GSM 850	GPRS	824.2 MHz	128
		836.6 MHz	190
		848.8 MHz	251
PCS 1900	GPRS	1850.2 MHz	512
		1880.0 MHz	661
		1909.8 MHz	810
WCDMA Band 5	WCDMA/HSDPA/HSUPA	826.4 MHz	4132
		836.6 MHz	4183
		846.6 MHz	4233
WCDMA Band 4	WCDMA/HSDPA/HSUPA	1712.4 MHz	1312
		1732.4 MHz	1412
		1752.6 MHz	1513
WCDMA Band 2	WCDMA/HSDPA/HSUPA	1852.4 MHz	9262
		1880.0 MHz	9400
		1907.6 MHz	9538
Note: the transmitter has been tested on the communications mode of GSM, GPRS, EDGE, 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
/	/	/	/

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

Special Cable List and Details

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

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Frequency Stability	Conducted	2.3%
Transmitter Spurious Emissions	Radiated	±5.1dB
Transmitter Spurious Emissions	Conducted	±0.42dB

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
SEMT-1075	Communication Tester	Rohde & Schwarz	CMW500	148650	2016-06-04	2017-06-03
SEMT-1034	GSM Tester	Rohde & Schwarz	CMU200	104036	2016-06-04	2017-06-03
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2016-06-04	2017-06-03
SEMT-1079	Spectrum Analyzer	Agilent	N9020A	US47140102	2016-06-04	2017-06-03
SEMT-1080	Signal Generator	Agilent	83752A	3610A01453	2016-06-04	2017-06-03
SEMT-1081	Vector Signal Generator	Agilent	N5182A	MY47070202	2016-06-04	2017-06-03
SEMT-1028	Power Divider	Weinschel	1506A	PM204	2016-06-04	2017-06-03
SEMT-1082	Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2016-06-04	2017-06-03
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2016-06-04	2017-06-03
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2016-06-04	2017-06-03
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2016-06-04	2017-06-03
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2016-06-04	2017-06-03
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2016-06-04	2017-06-03
SEMT-1068	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2016-06-04	2017-06-03
SEMT-1042	Horn Antenna	ETS	3117	00086197	2016-06-04	2017-06-03
SEMT-1121	Horn Antenna	ETS	3116B	00088203	2016-06-04	2017-06-03

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), §27.50(d)	RF Output Power	Compliant
§ 24.51, § 27.50	Peak-to-average Ratio (PAR) of Transmitter	Compliant
§ 22.917 (b), § 24.238 (b), § 27.53	Emission Bandwidth	Compliant
§ 22.917 (a), § 24.238 (a), § 27.53(h)	Spurious Emissions at Antenna Terminal	Compliant
§ 22.917 (a), § 24.238 (a), § 27.53(h)	Spurious Radiation Emissions	Compliant
§ 22.917 (a), § 24.238 (a), § 27.53(h)	Out of Band Emissions	Compliant
§ 22.355, § 24.235, § 27.54	Frequency Stability	Compliant

3. RF Exposure

3.1 Standard Applicable

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

3.2 Test Result

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

4. RF Output Power

4.1 Standard Applicable

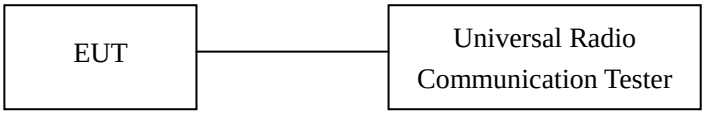
According to §22.913(a)(2), The ERP of mobile and portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

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.

According to §27.50(d)(4), Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

4.2 Test Procedure

Conducted output power test method:



Radiated power test method:

1.The setup of EUT is according with per ANSI/TIA Standard 603D 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

Max. Radiated Power

ERP For GPRS Mode GSM850

Frequency	Substitude 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	29.15	1.5	0	H	1.5	0	27.65	38.45
824.2	28.16	1.5	0	V	1.5	0	26.66	38.45
Middle Channel								
836.6	27.98	1.5	0	H	1.5	0	26.48	38.45
836.6	28.65	1.5	0	V	1.5	0	27.15	38.45
High Channel								
848.8	29.66	1.5	0	H	1.5	0	28.16	38.45
848.8	30.05	1.5	0	V	1.5	0	28.55	38.45

EIRP For GPRS Mode PCS1900

Frequency	Substitude 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	18.25	1.5	0	H	1.9	7.7	24.05	33.00
1850.2	19.66	1.5	0	V	1.9	7.7	25.46	33.00
Middle Channel								
1880.0	17.98	1.5	0	H	1.9	7.7	23.78	33.00
1880.0	20.14	1.5	0	V	1.9	7.7	25.94	33.00
High Channel								
1909.8	18.65	1.5	0	H	1.9	7.7	24.45	33.00
1909.8	19.66	1.5	0	V	1.9	7.7	25.46	33.00

ERP For WCDMA Mode Band 5

Frequency	Substitude 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	20.99	1.5	0	H	1.5	0	19.49	38.45
826.4	21.79	1.5	0	V	1.5	0	20.29	38.45
Middle Channel								
836.4	20.99	1.5	0	H	1.5	0	19.49	38.45
836.4	21.64	1.5	0	V	1.5	0	20.14	38.45
High Channel								
846.6	21.14	1.5	0	H	1.5	0	19.64	38.45
846.6	21.85	1.5	0	V	1.5	0	20.35	38.45

ERP For HSDPA Mode Band 5

Frequency	Substitude 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	20.61	1.5	0	H	1.5	0	19.11	38.45
826.4	21.41	1.5	0	V	1.5	0	19.91	38.45
Middle Channel								
836.4	20.55	1.5	0	H	1.5	0	19.05	38.45
836.4	21.20	1.5	0	V	1.5	0	19.70	38.45
High Channel								
846.6	20.62	1.5	0	H	1.5	0	19.12	38.45
846.6	21.33	1.5	0	V	1.5	0	19.83	38.45

ERP For HSUPA Mode Band 5

Frequency	Substitude 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	20.63	1.5	0	H	1.5	0	19.13	38.45
826.4	21.43	1.5	0	V	1.5	0	19.93	38.45
Middle Channel								
836.4	20.59	1.5	0	H	1.5	0	19.09	38.45
836.4	21.24	1.5	0	V	1.5	0	19.74	38.45
High Channel								
846.6	20.66	1.5	0	H	1.5	0	19.16	38.45
846.6	21.37	1.5	0	V	1.5	0	19.87	38.45

EIRP For WCDMA Mode Band 4

Frequency	Substitude SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 27 Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
1712.4	14.56	1.5	0	H	1.8	7.7	20.46	30.00
1712.4	15.65	1.5	0	V	1.8	7.7	21.55	30.00
Middle Channel								
1732.4	14.66	1.5	0	H	1.8	7.7	20.56	30.00
1732.4	15.85	1.5	0	V	1.8	7.7	21.75	30.00
High Channel								
1752.6	13.54	1.5	0	H	1.8	7.7	19.44	30.00
1752.6	15.85	1.5	0	V	1.8	7.7	21.75	30.00

EIRP For HSDPA Mode Band 4

Frequency	Substitude SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 27 Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
1712.4	13.89	1.50	0.00	H	1.80	7.70	19.79	30.00
1712.4	14.58	1.50	0.00	V	1.80	7.70	20.48	30.00
Middle Channel								
1732.4	13.87	1.50	0.00	H	1.80	7.70	19.77	30.00
1732.4	14.68	1.50	0.00	V	1.80	7.70	20.58	30.00
High Channel								
1752.6	15.42	1.50	0.00	H	1.80	7.70	21.32	30.00
1752.6	14.22	1.50	0.00	V	1.80	7.70	20.12	30.00

EIRP For HSUPA Mode Band 4

Frequency	Substitude SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 27 Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
1712.4	13.54	1.50	0.00	H	1.80	7.70	19.44	30.00
1712.4	14.78	1.50	0.00	V	1.80	7.70	20.68	30.00
Middle Channel								
1732.4	14.23	1.50	0.00	H	1.80	7.70	20.13	30.00
1732.4	14.25	1.50	0.00	V	1.80	7.70	20.15	30.00
High Channel								
1752.6	14.85	1.50	0.00	H	1.80	7.70	20.75	30.00
1752.6	13.96	1.50	0.00	V	1.80	7.70	19.86	30.00

EIRP For WCDMA Mode Band 2

Frequency	Substitude 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	13.69	1.5	0	H	1.9	7.7	19.49	33
1852.4	14.71	1.5	0	V	1.9	7.7	20.51	33
Middle Channel								
1880.0	13.29	1.5	0	H	1.9	7.7	19.09	33
1880.0	14.27	1.5	0	V	1.9	7.7	20.07	33
High Channel								
1907.6	13.07	1.5	0	H	1.9	7.7	18.87	33
1907.6	14.09	1.5	0	V	1.9	7.7	19.89	33

EIRP For HSDPA Mode Band 2

Frequency	Substitude 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	12.72	1.5	0	H	1.9	7.7	18.52	33
1852.4	13.74	1.5	0	V	1.9	7.7	19.54	33
Middle Channel								
1880.0	12.21	1.5	0	H	1.9	7.7	18.01	33
1880.0	13.19	1.5	0	V	1.9	7.7	18.99	33
High Channel								
1907.6	12.23	1.5	0	H	1.9	7.7	18.03	33
1907.6	13.25	1.5	0	V	1.9	7.7	19.05	33

EIRP For HSUPA Mode Band 2

Frequency	Substitude 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	13.06	1.5	0	H	1.9	7.7	18.86	33
1852.4	14.08	1.5	0	V	1.9	7.7	19.88	33
Middle Channel								
1880.0	12.22	1.5	0	H	1.9	7.7	18.02	33
1880.0	13.20	1.5	0	V	1.9	7.7	19.00	33
High Channel								
1907.6	12.13	1.5	0	H	1.9	7.7	17.93	33
1907.6	13.15	1.5	0	V	1.9	7.7	18.95	33

Note: Result = Substitude - 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)
GPRS(1 Slot)	Low Channel	824.2	32.33	38.45
	Middle Channel	836.6	32.26	38.45
	High Channel	848.8	32.21	38.45

For PCS Band (GSM1900)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
GPRS(1 Slot)	Low Channel	1850.2	29.04	33.0
	Middle Channel	1880.0	28.04	33.0
	High Channel	1909.8	28.05	33.0

For WCDMA Band 5

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
WCDMA	Low Channel	826.4	22.59	38.45
	Middle Channel	836.6	22.58	38.45
	High Channel	846.6	22.45	38.45
HSDPA	Low Channel	826.4	21.79	38.45
	Middle Channel	836.6	21.76	38.45
	High Channel	846.6	21.65	38.45
HSUPA	Low Channel	826.4	21.73	38.45
	Middle Channel	836.6	21.75	38.45
	High Channel	846.6	21.60	38.45

For WCDMA Band 4

Test Mode	Channel	Frequency (MHz)	Output Power (dBm)	FCC Part 27.50 Limit (dBm)
WCDMA	Low Channel	1712.4	22.61	30.0
	Middle Channel	1733.4	22.37	30.0
	High Channel	1752.6	22.64	30.0
HSUPA	Low Channel	1712.4	21.93	30.0
	Middle Channel	1733.4	21.60	30.0
	High Channel	1752.6	21.97	30.0
HSDPA	Low Channel	1712.4	21.89	30.0
	Middle Channel	1733.4	21.58	30.0
	High Channel	1752.6	21.93	30.0

For WCDMA Band 2

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
WCDMA	Low Channel	1852.4	22.69	33.00
	Middle Channel	1880.0	22.47	33.00
	High Channel	1907.6	22.02	33.00
HSDPA	Low Channel	1852.4	21.88	33.00
	Middle Channel	1880.0	21.75	33.00
	High Channel	1907.6	21.53	33.00
HSUPA	Low Channel	1852.4	21.83	33.00
	Middle Channel	1880.0	21.81	33.00
	High Channel	1907.6	21.64	33.00

5. Peak-to-average Ratio (PAR) of Transmitter

5.1 Standard Applicable

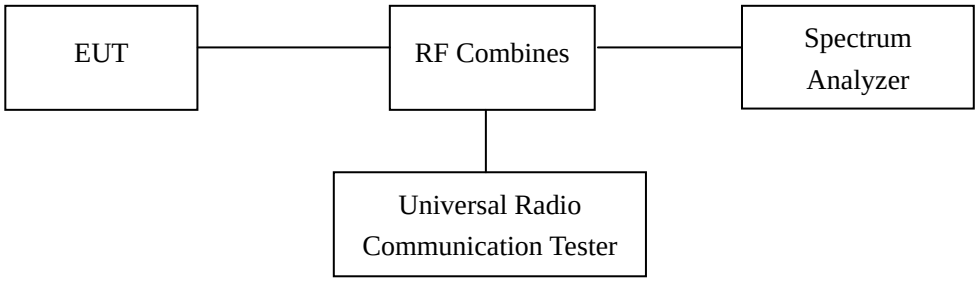
According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in 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.

According to §27.50(B), the peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

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. Record the maximum PAPR level associated with a probability of 0.1%.

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

Only the worst case was selected to record

For PCS Band

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GPRS (1 Slot)	Low Channel	1850.2	9.55	13
	Middle Channel	1880.0	9.59	13
	High Channel	1909.8	9.4	13

For WCDMA Band 4

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
WCDMA	Low Channel	1712.4	3.93	13
	Middle Channel	1732.4	3.00	13
	High Channel	1752.6	3.85	13
HSDPA	Low Channel	1712.4	3.74	13
	Middle Channel	1732.4	3.79	13
	High Channel	1752.6	3.74	13
HSUPA	Low Channel	1712.4	3.69	13
	Middle Channel	1732.4	3.73	13
	High Channel	1752.6	3.73	13

For WCDMA Band 2

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
WCDMA	Low Channel	1852.4	3.90	13
	Middle Channel	1880.0	3.20	13
	High Channel	1907.6	3.78	13
HSDPA	Low Channel	1852.4	3.68	13
	Middle Channel	1880.0	3.89	13
	High Channel	1907.6	3.65	13
HSUPA	Low Channel	1852.4	3.61	13
	Middle Channel	1880.0	3.99	13
	High Channel	1907.6	3.67	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.

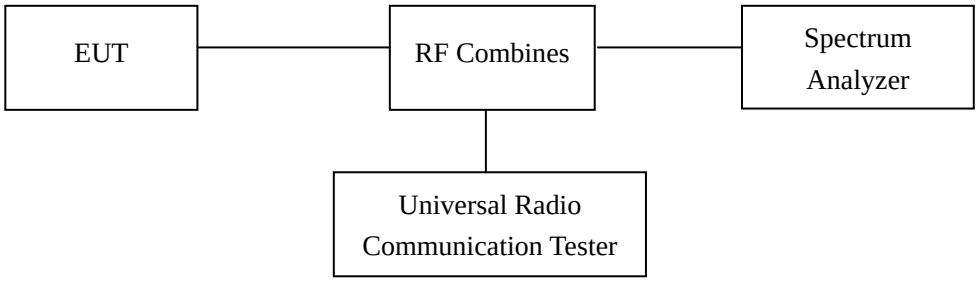
According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §27.53, 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 10kHz for GSM mode and 100kHz for WCDMA mode, VBW shall be at least 3 times the RBW, 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

6.4 Summary of Test Results/Plots

For Cellular Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GPRS	128	824.2	252.2779	338.446
	190	836.6	253.8871	336.364
	251	848.8	252.1412	333.761

For PCS Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GPRS	512	1850.2	252.3580	337.266
	661	1880.0	250.7912	336.769
	810	1909.8	253.5724	339.608

For Band 5

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	4132	826.4	4.1591	4.689
	4183	836.6	4.1875	4.744
	4233	846.6	4.1740	4.739
HSDPA	4132	826.4	4.1608	4.693
	4183	836.6	4.1642	4.683
	4233	846.6	4.1579	4.671
HSUPA	4132	826.4	4.1544	4.694
	4183	836.6	4.1572	4.692
	4233	846.6	4.1563	4.674

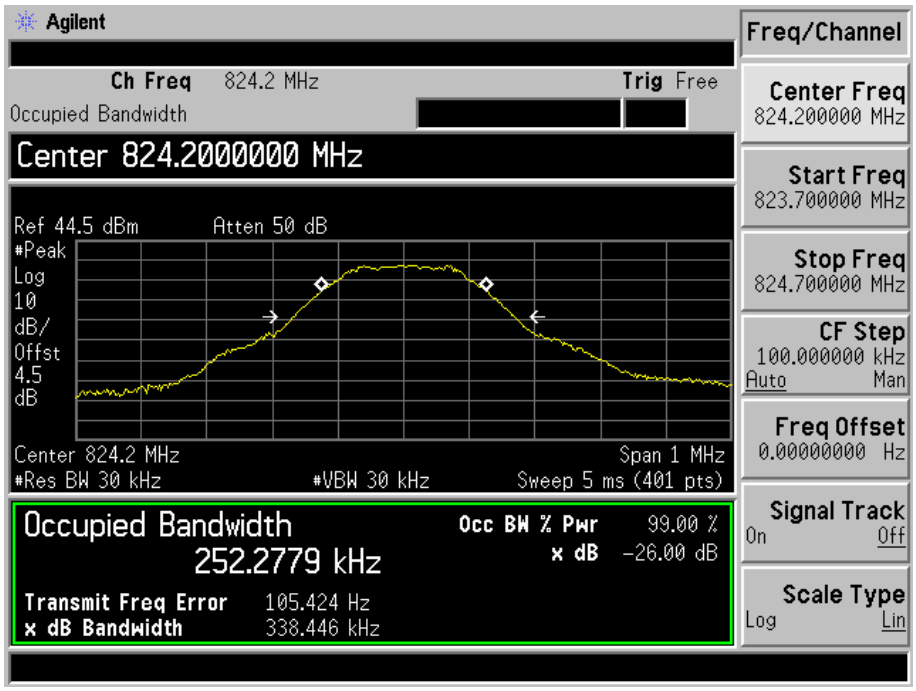
For Band 4

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	1312	1712.4	4.2090	4.813
	1412	1732.4	4.1887	4.731
	1513	1752.6	4.2207	4.772
HSDPA	1312	1712.4	4.2129	4.778
	1412	1732.4	4.1726	4.728
	1513	1752.6	4.1948	4.755
HSUPA	1312	1712.4	4.2267	4.997
	1412	1732.4	4.1739	4.711
	1513	1752.6	4.2093	4.706

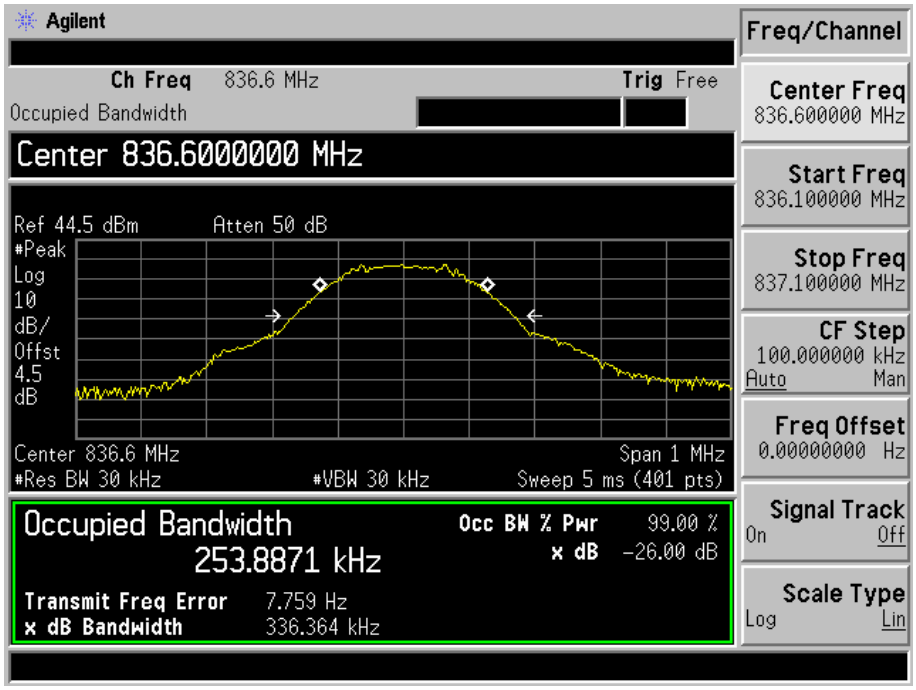
For Band 2

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	9262	1852.4	4.2542	6.335
	9400	1880.0	4.1815	4.701
	9538	1907.6	4.1820	4.706
HSDPA	9262	1852.4	4.2237	5.324
	9400	1880.0	4.1685	4.690
	9538	1907.6	4.1711	4.702
HSUPA	9262	1852.4	4.2065	5.010
	9400	1880.0	4.1715	4.694
	9538	1907.6	4.1712	4.713

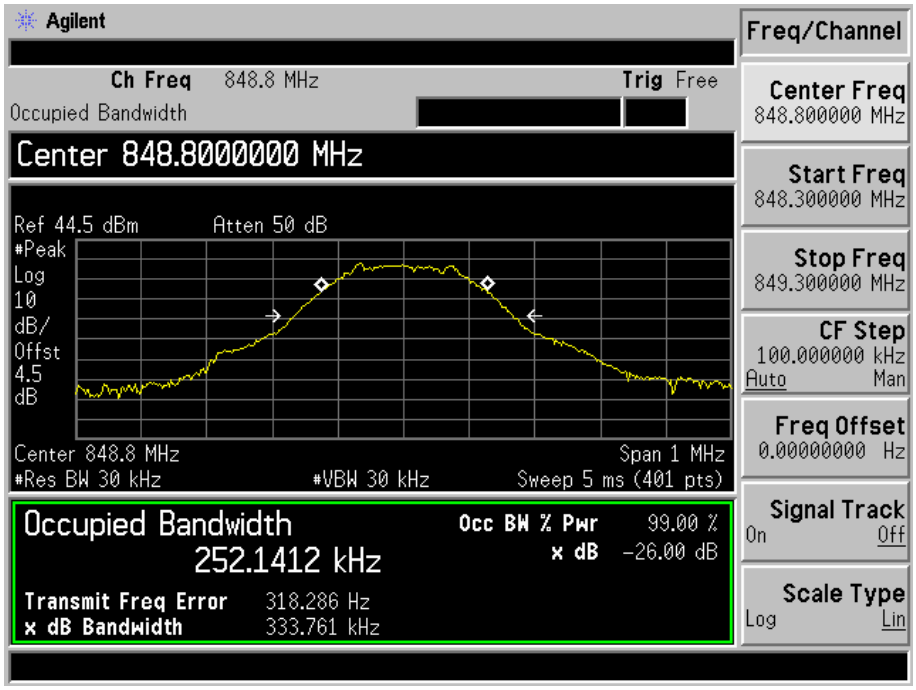
For Cellular Band
GPRS Low Channel



GPRS Middle Channel

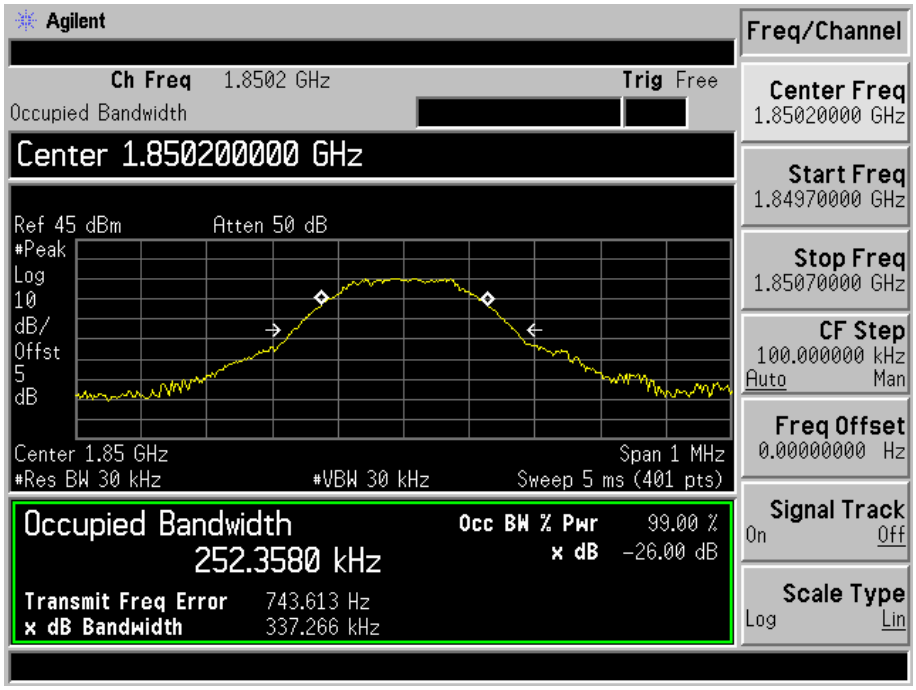


GPRS High Channel

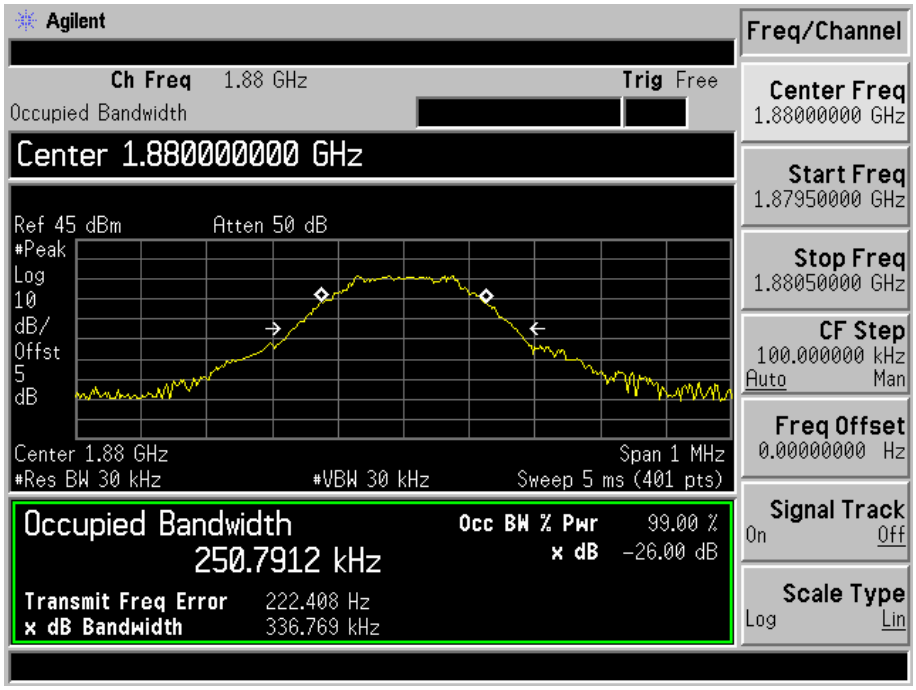


For PCS Band

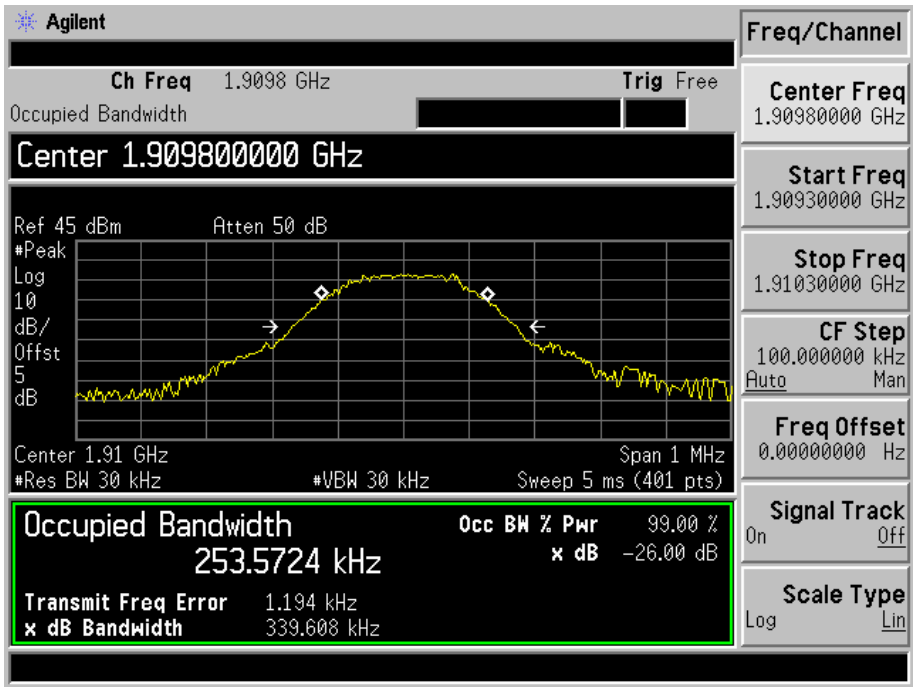
GPRS Low Channel



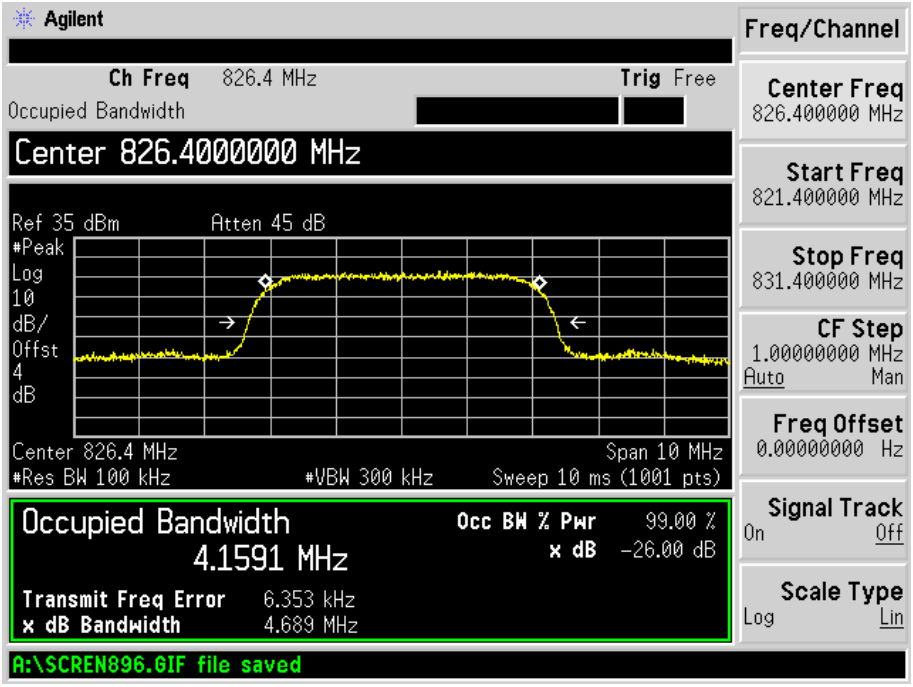
GPRS Middle Channel



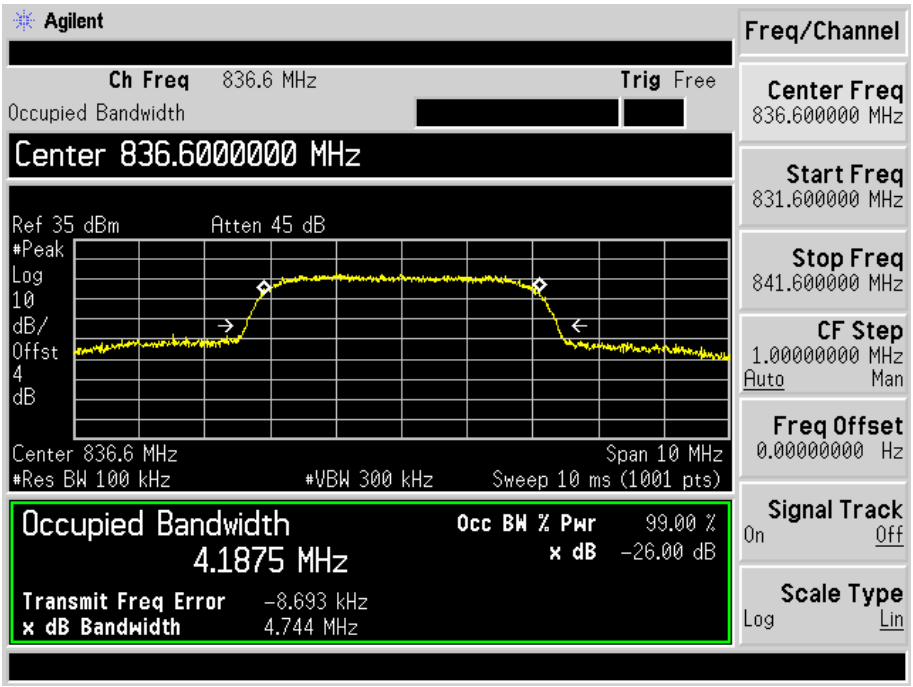
GPRS High Channel



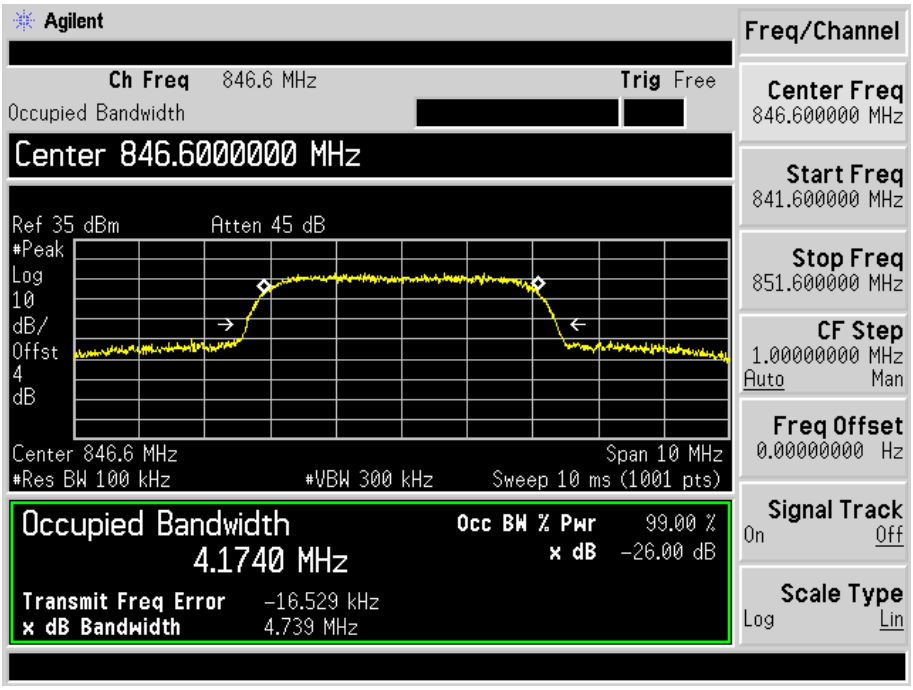
For Band V
WCDMA Low Channel



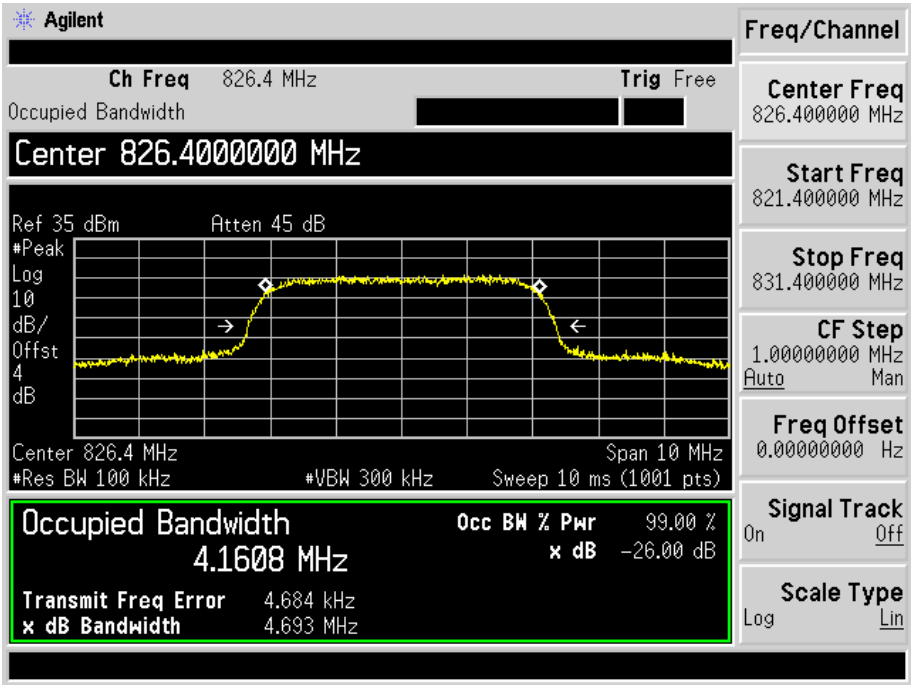
WCDMA Middle Channel



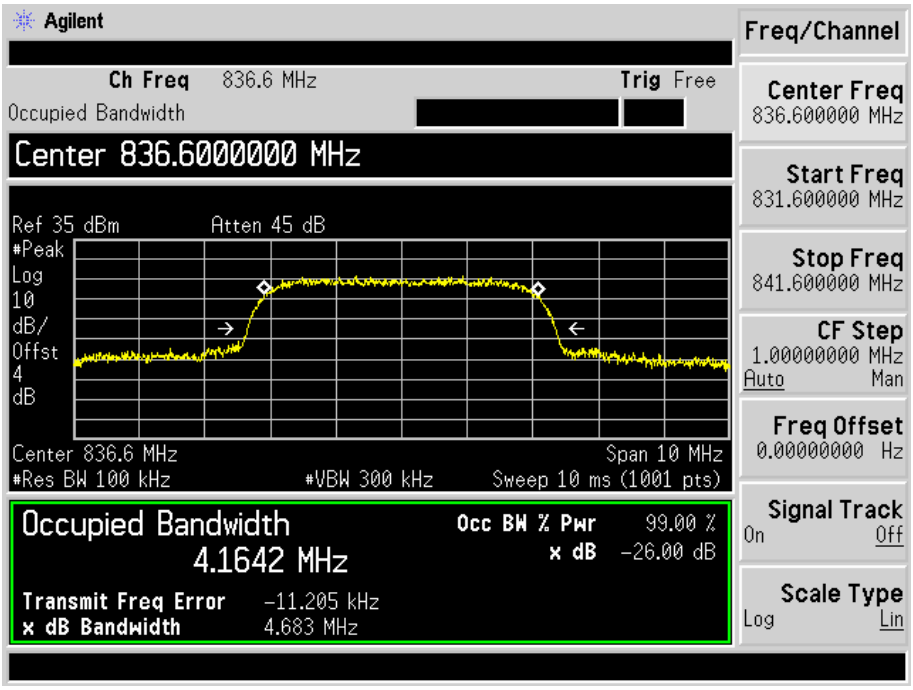
WCDMA High Channel



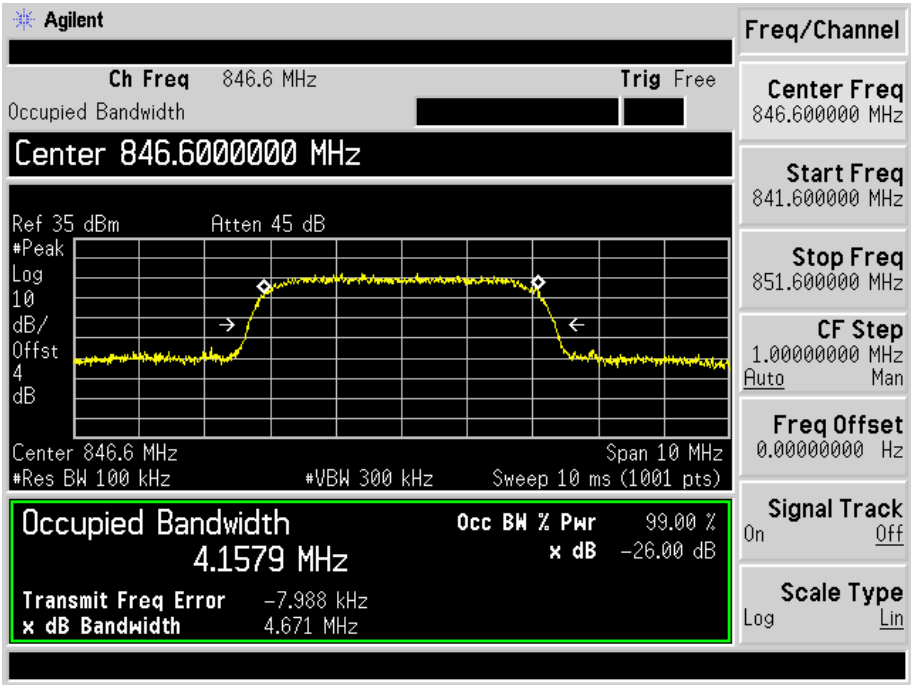
HSDPA Low Channel



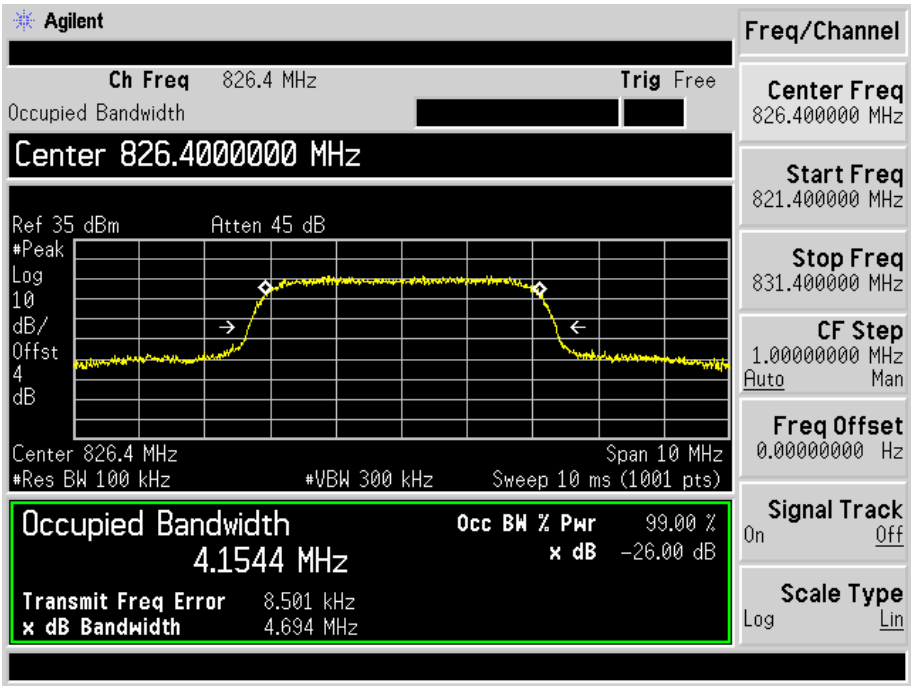
HSDPA Middle Channel



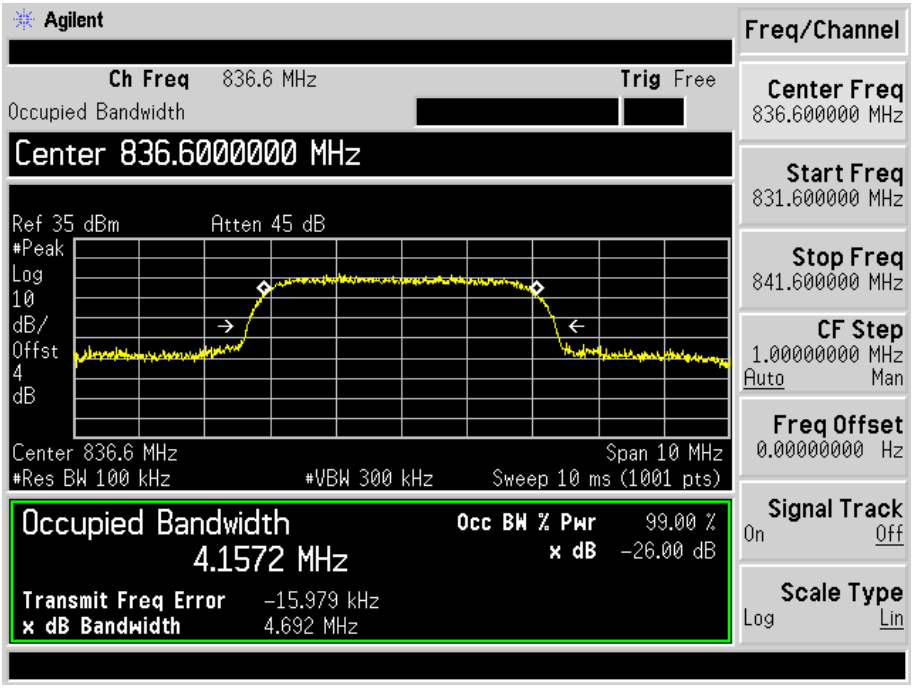
HSDPA High Channel



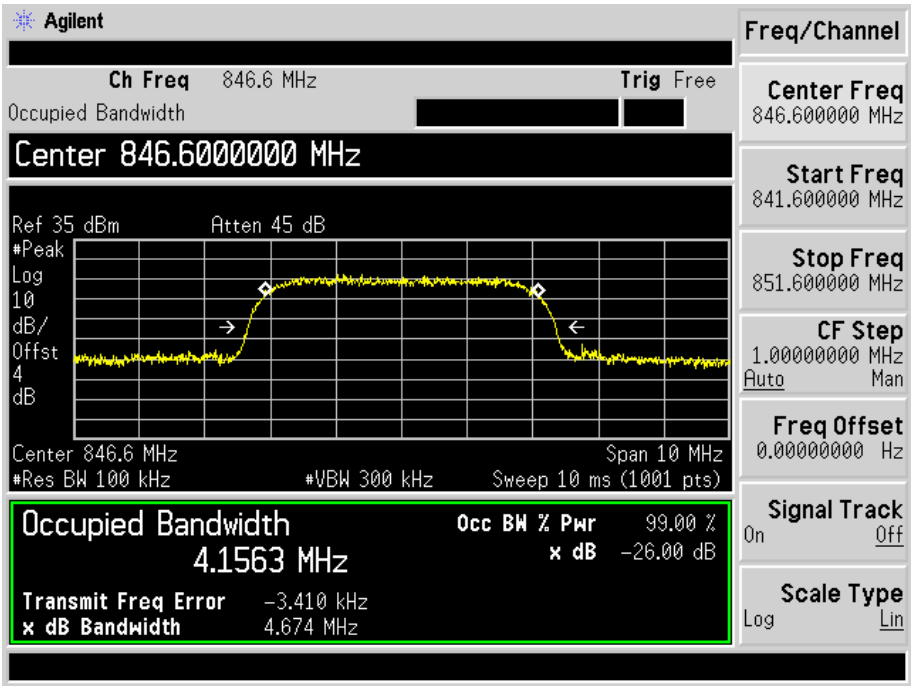
HSUPA Low Channel



HSUPA Middle Channel

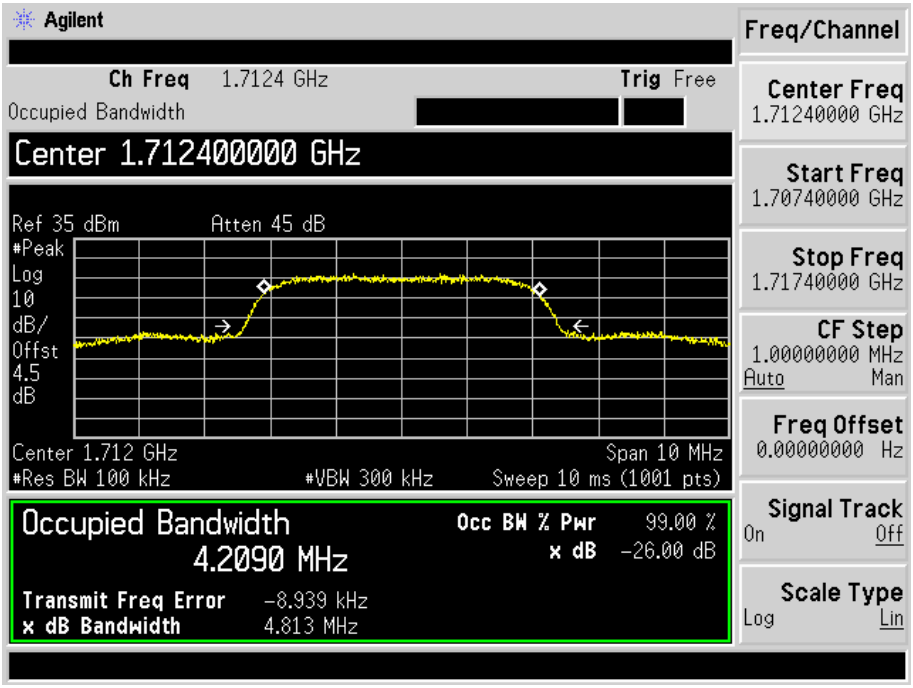


HSUPA High Channel

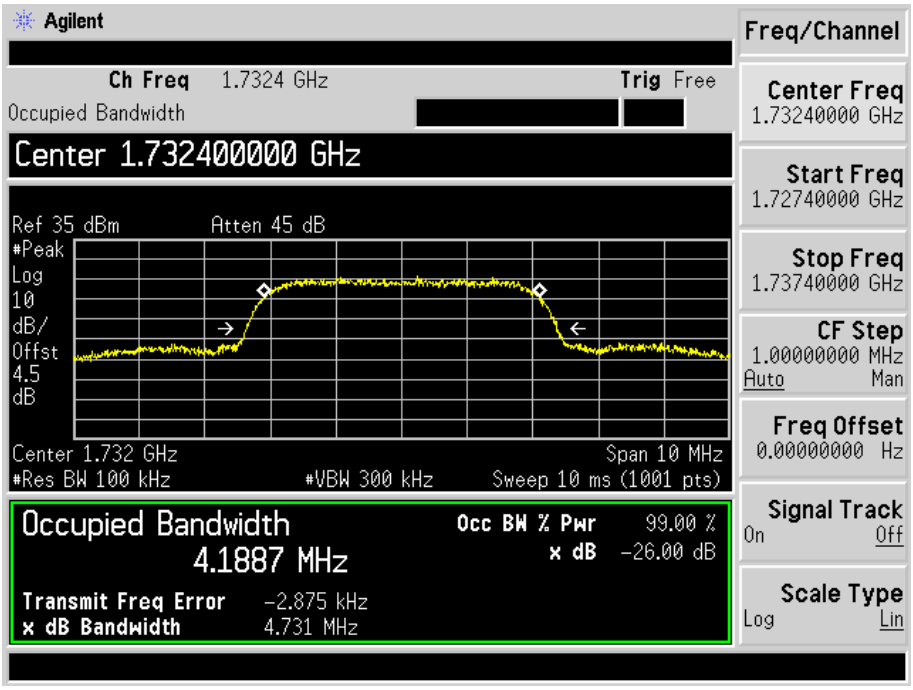


For Band IV

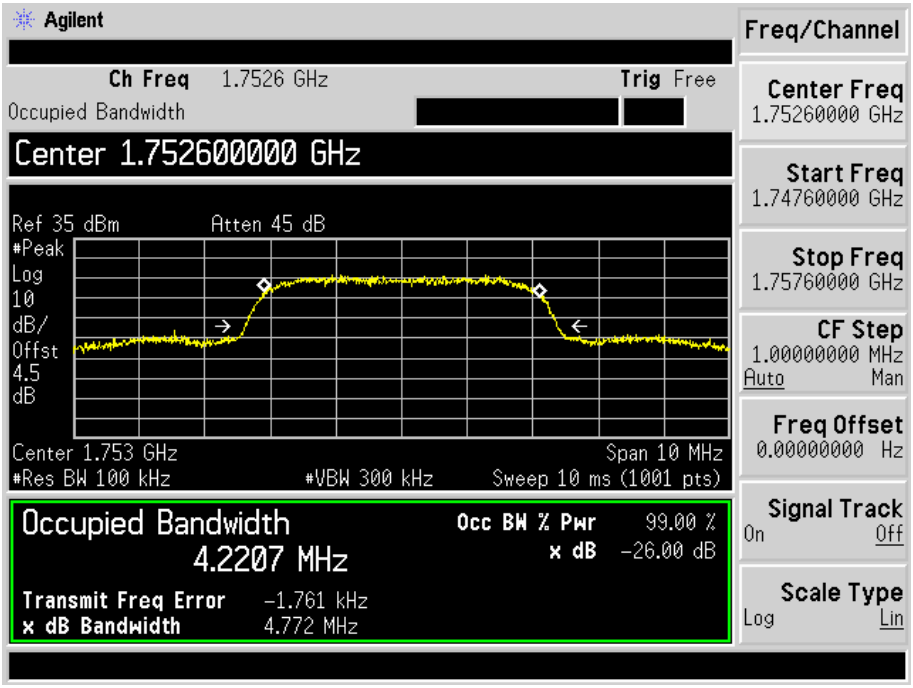
WCDMA Low Channel



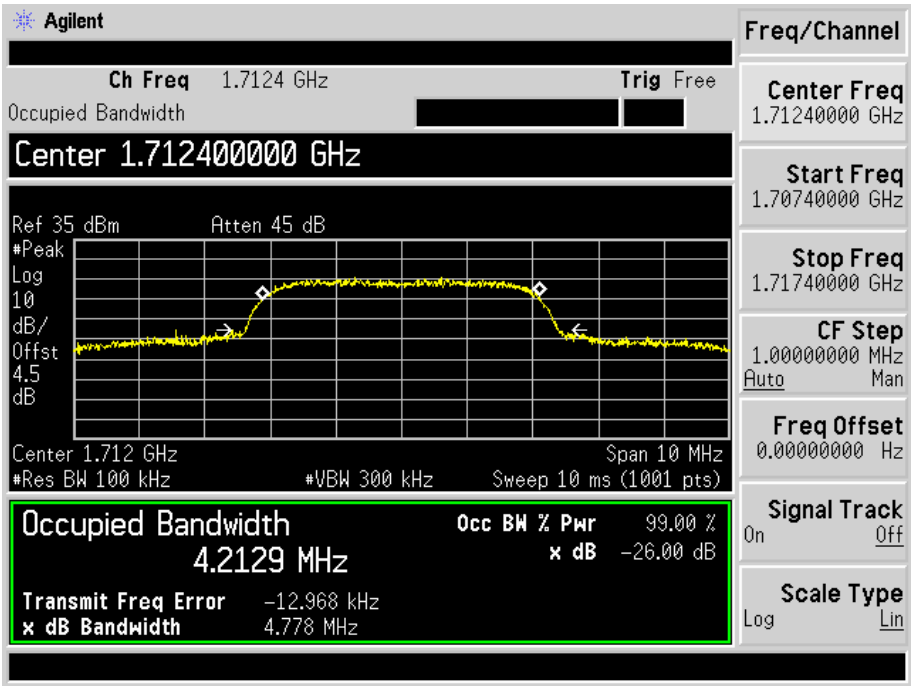
WCDMA Middle Channel



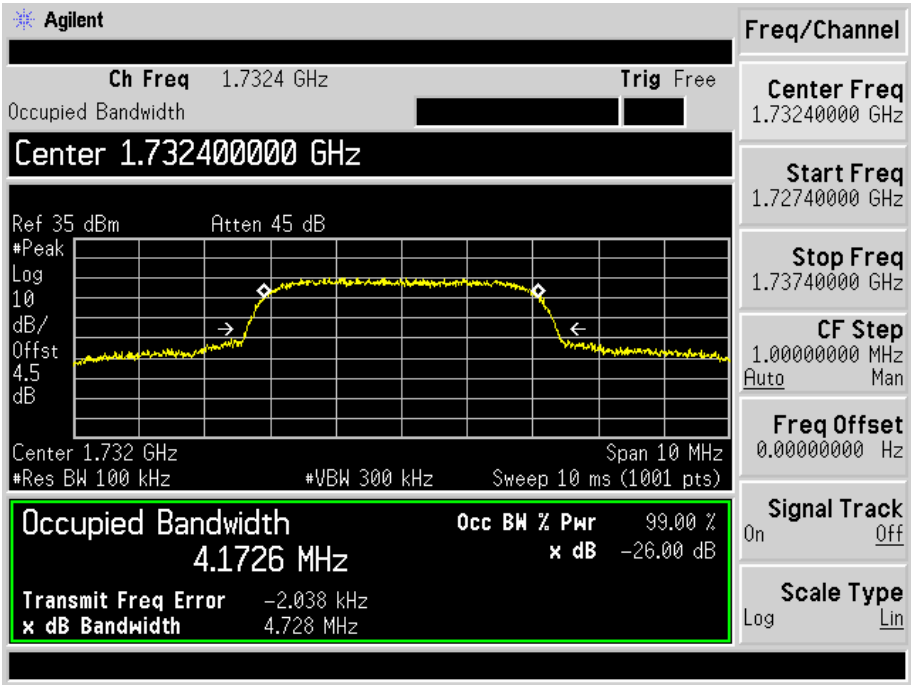
WCDMA High Channel



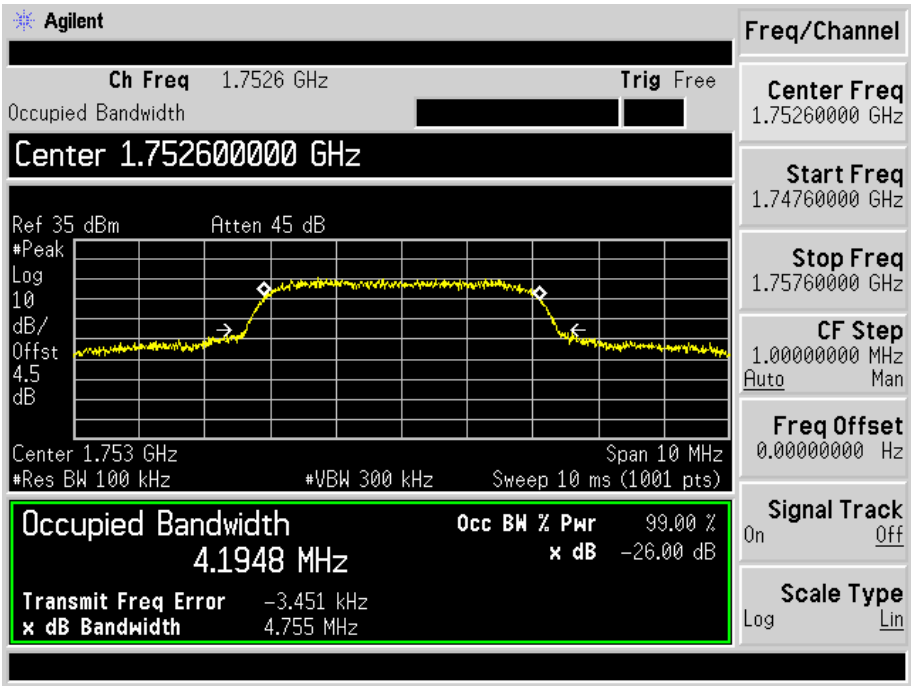
HSDPA Low Channel



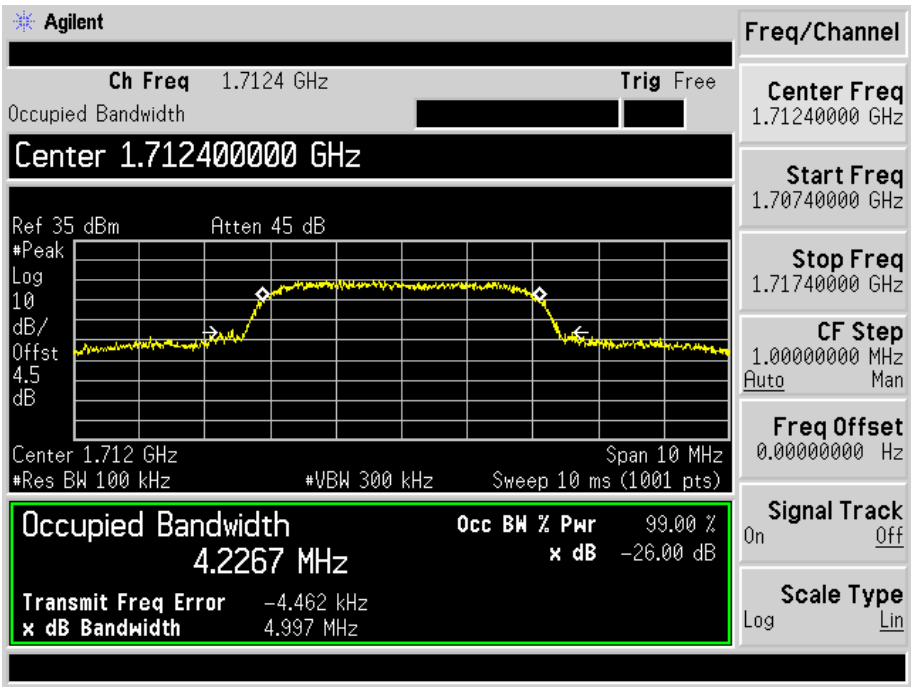
HSDPA Middle Channel



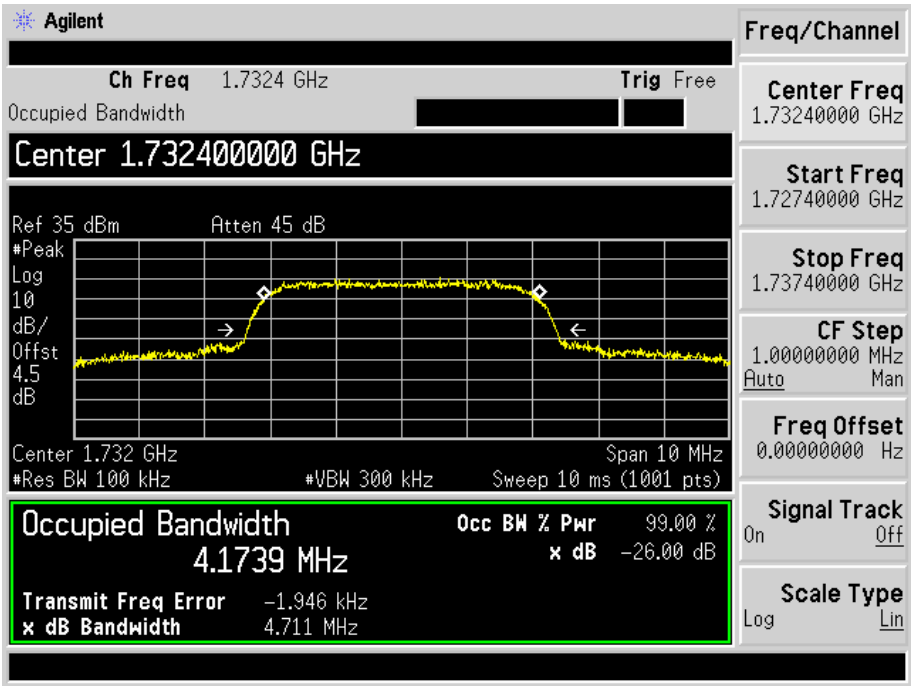
HSDPA High Channel



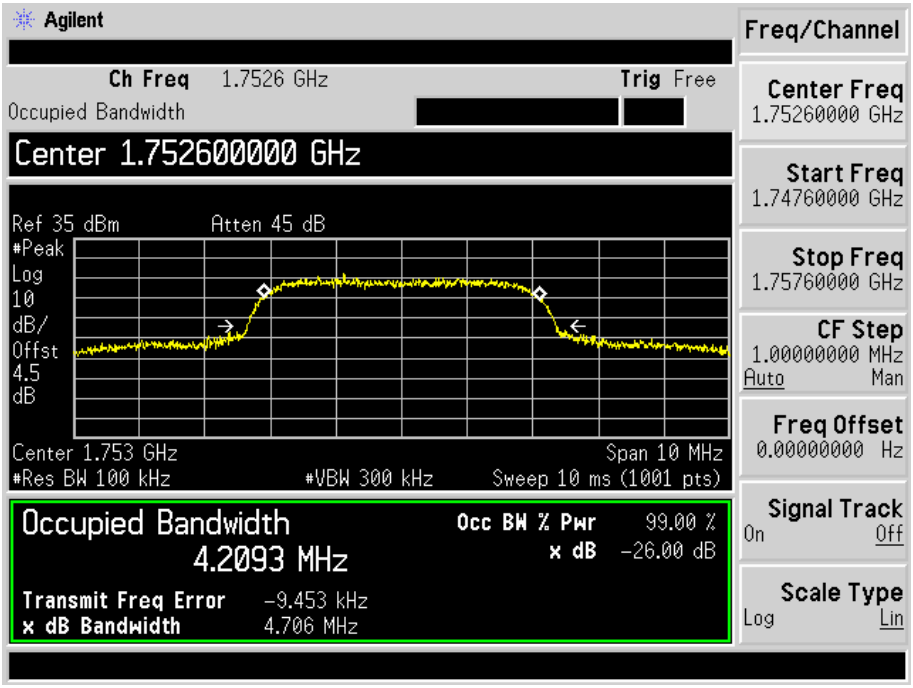
HSUPA Low Channel



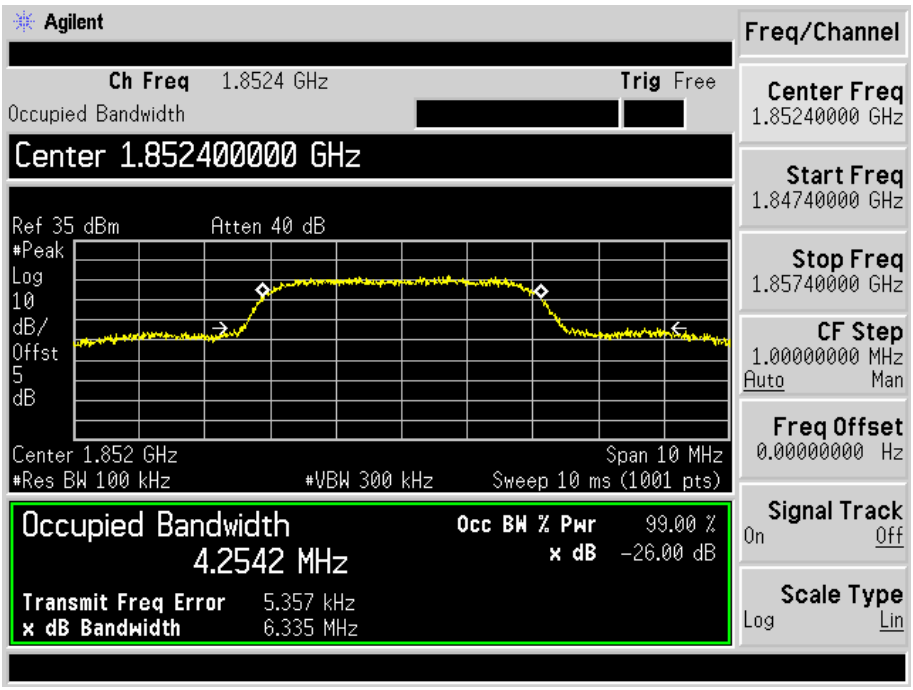
HSUPA Middle Channel



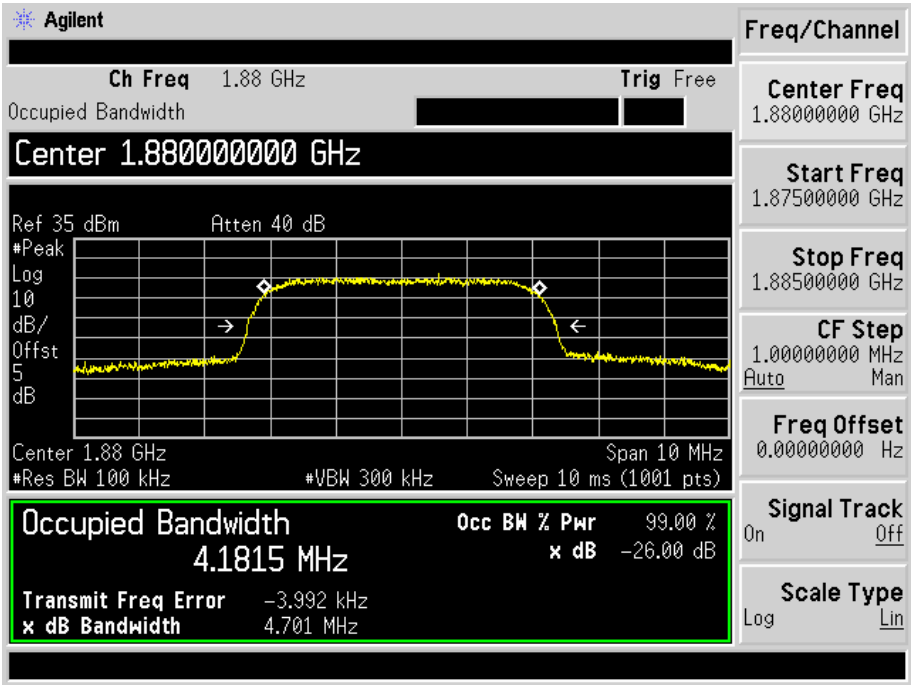
HSUPA High Channel



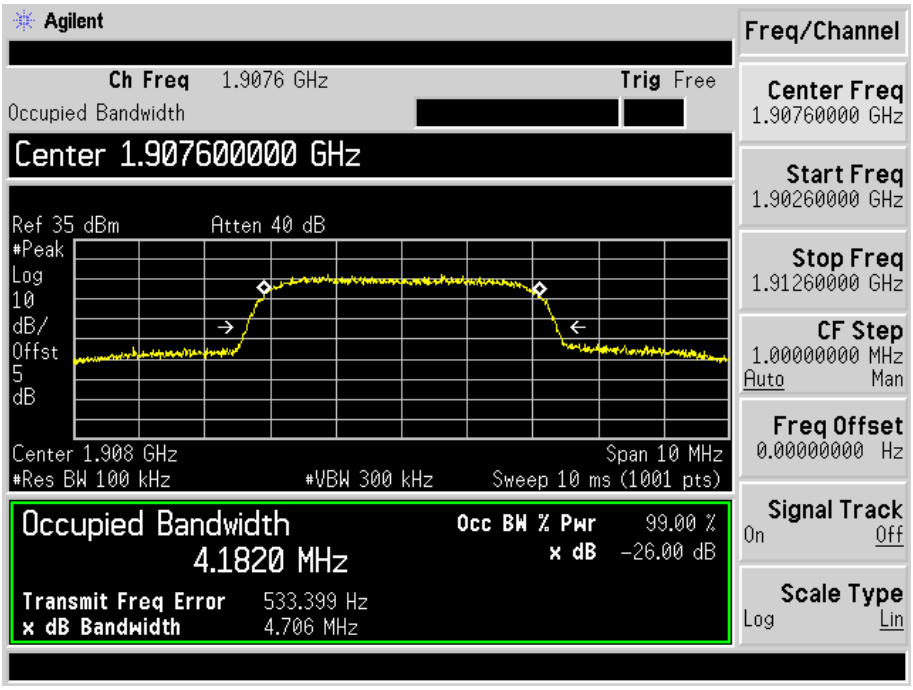
For Band II
WCDMA Low Channel



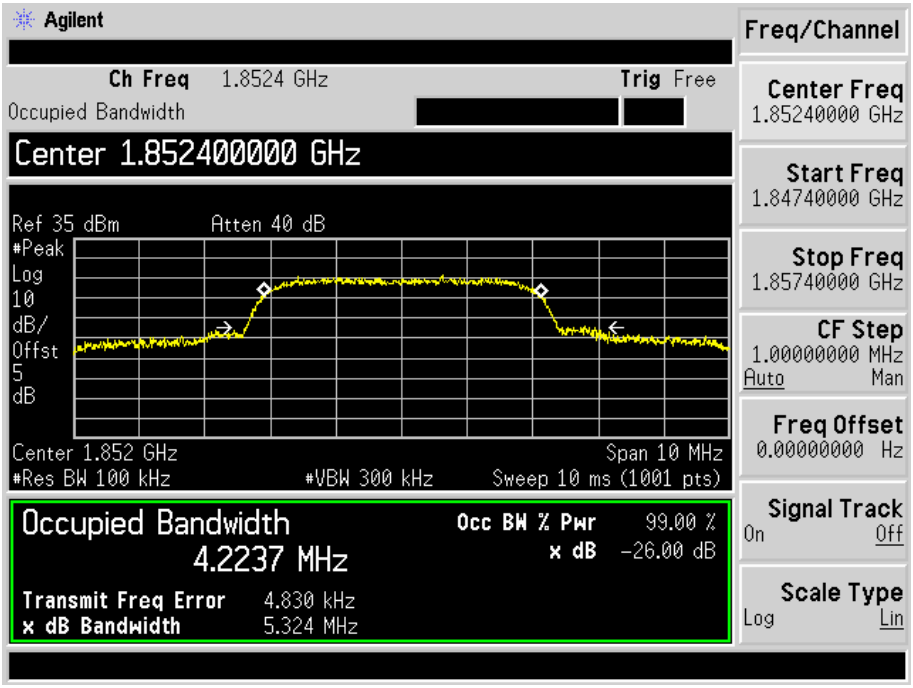
WCDMA Middle Channel



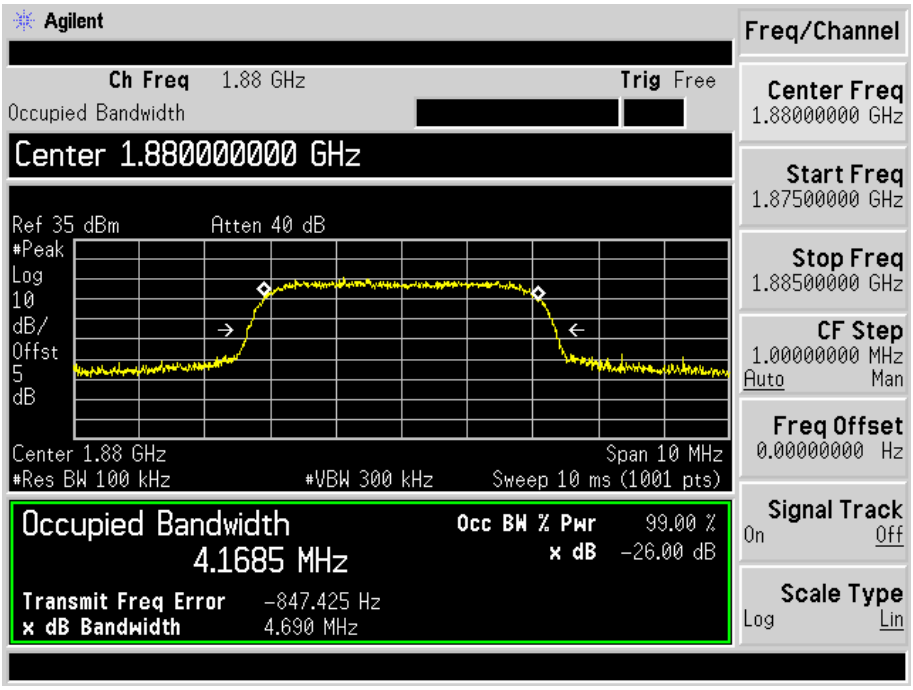
WCDMA High Channel



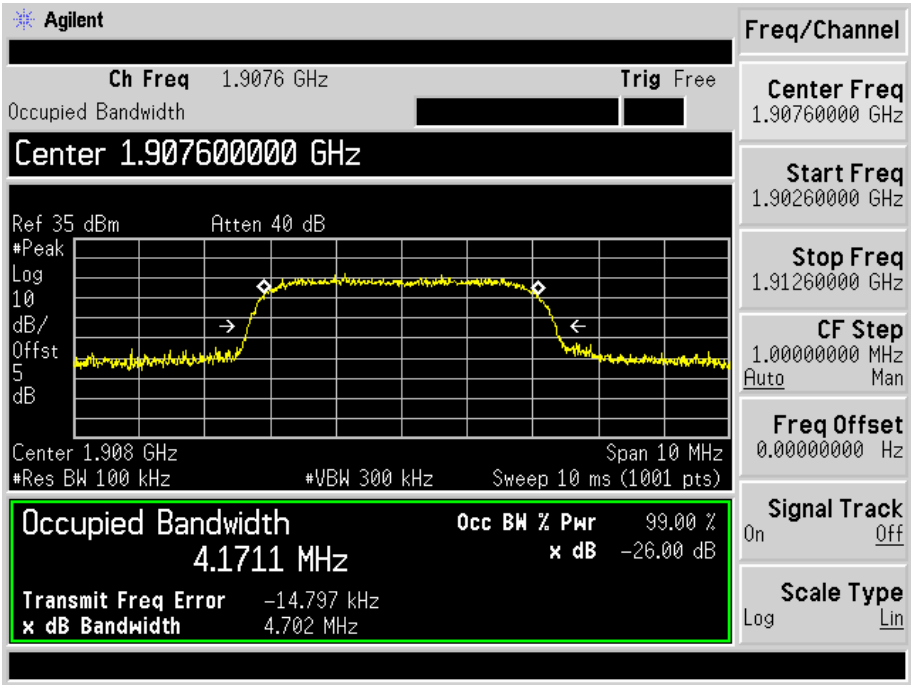
HSDPA Low Channel



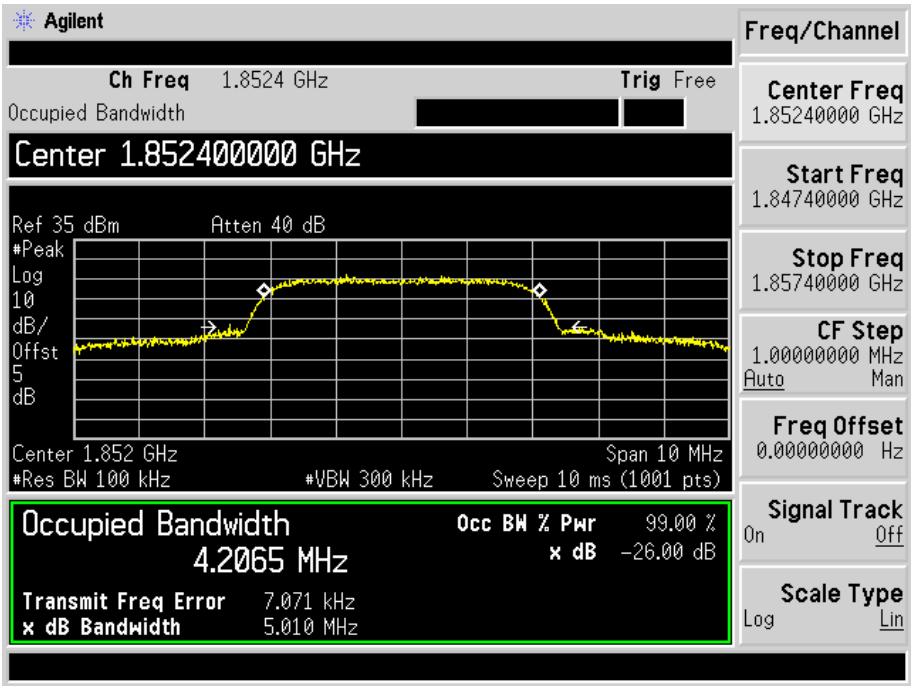
HSDPA Middle Channel



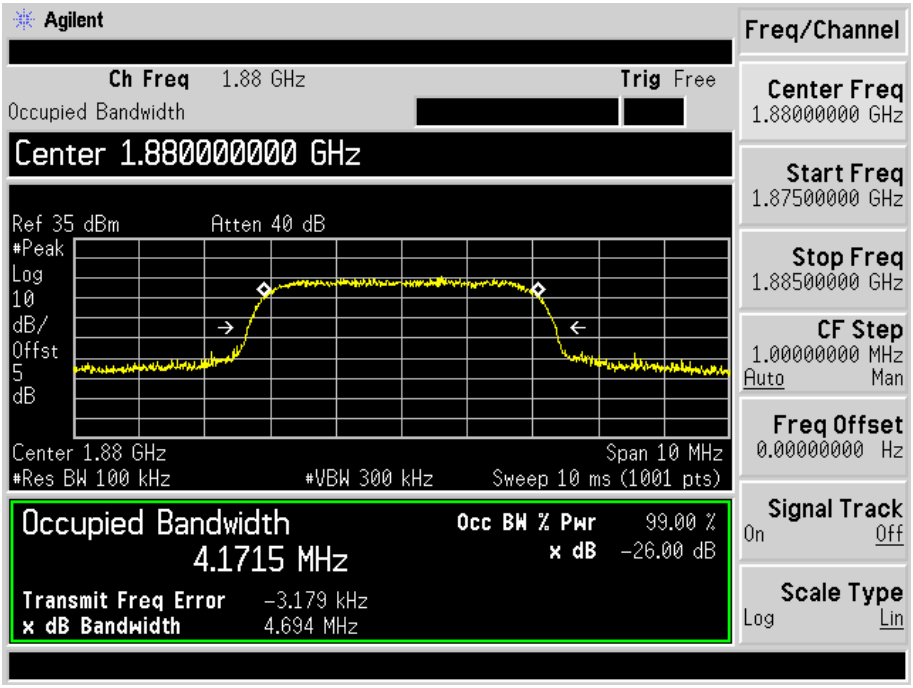
HSDPA High Channel



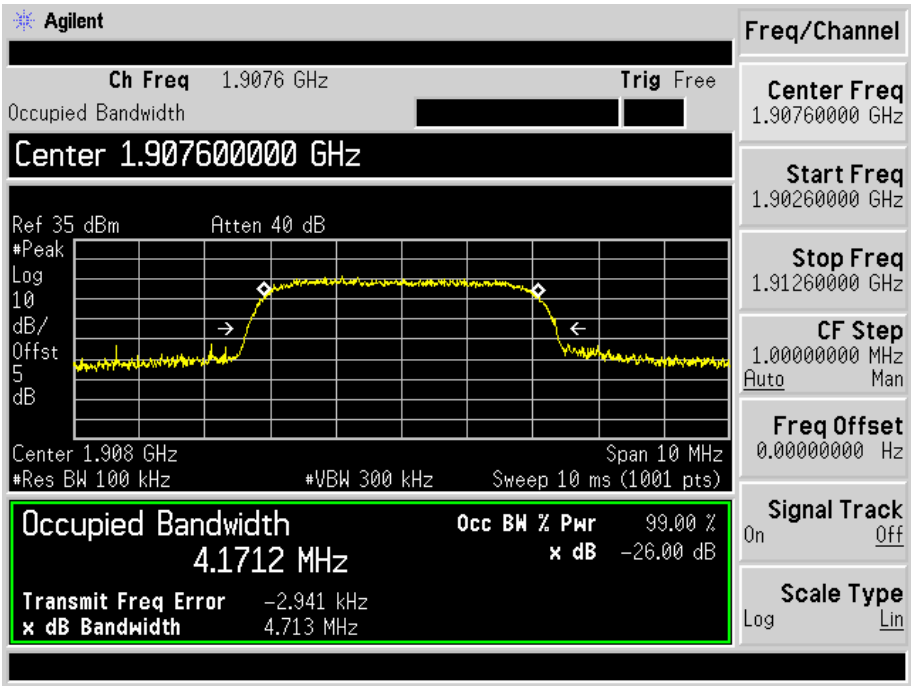
HSUPA Low Channel



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.

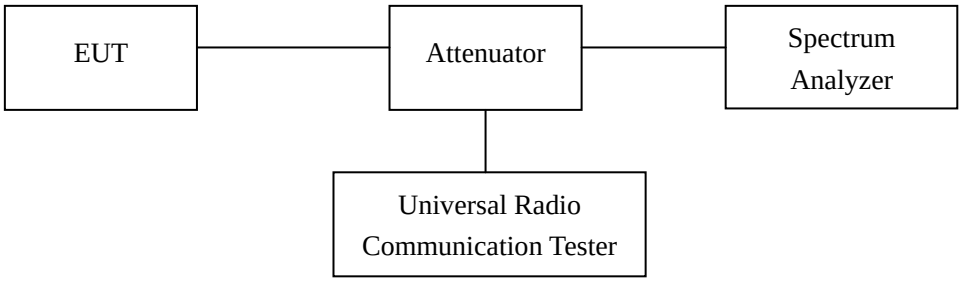
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to §27.53 (h), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (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 10th harmonic.

Test Configuration for the out of band emissions testing:

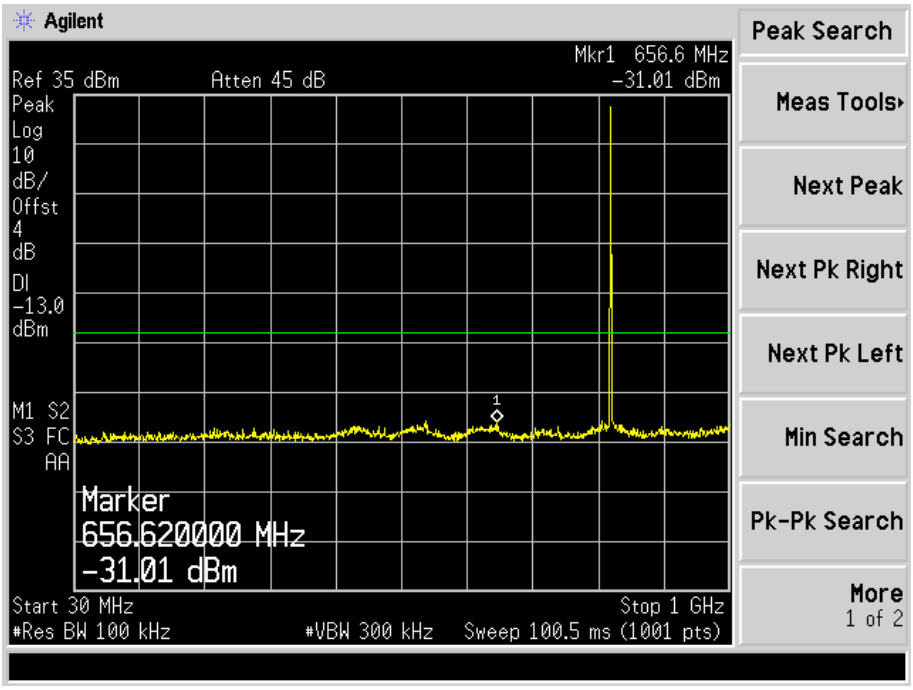


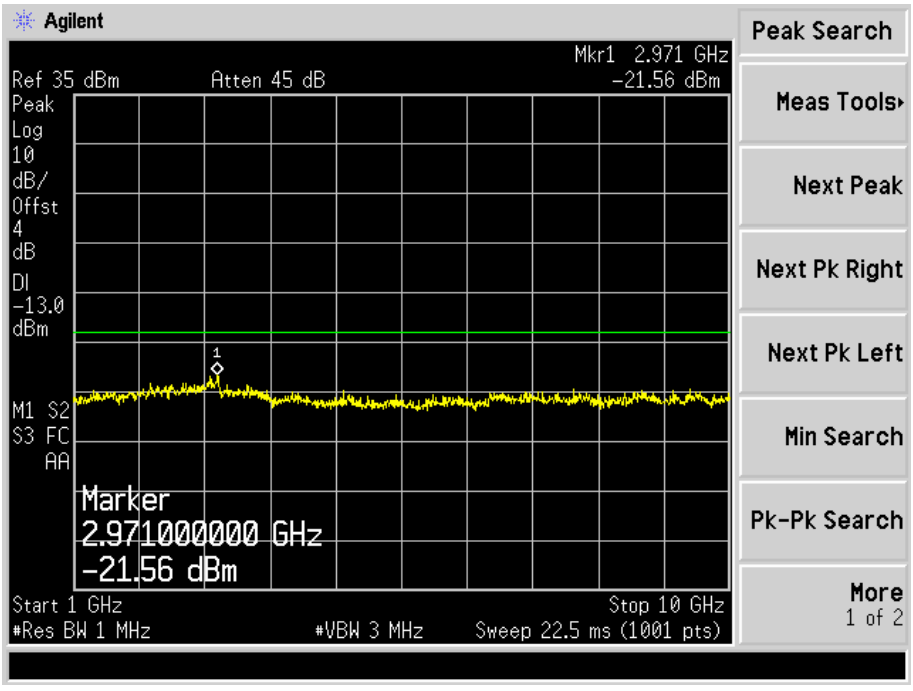
7.3 Environmental Conditions

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

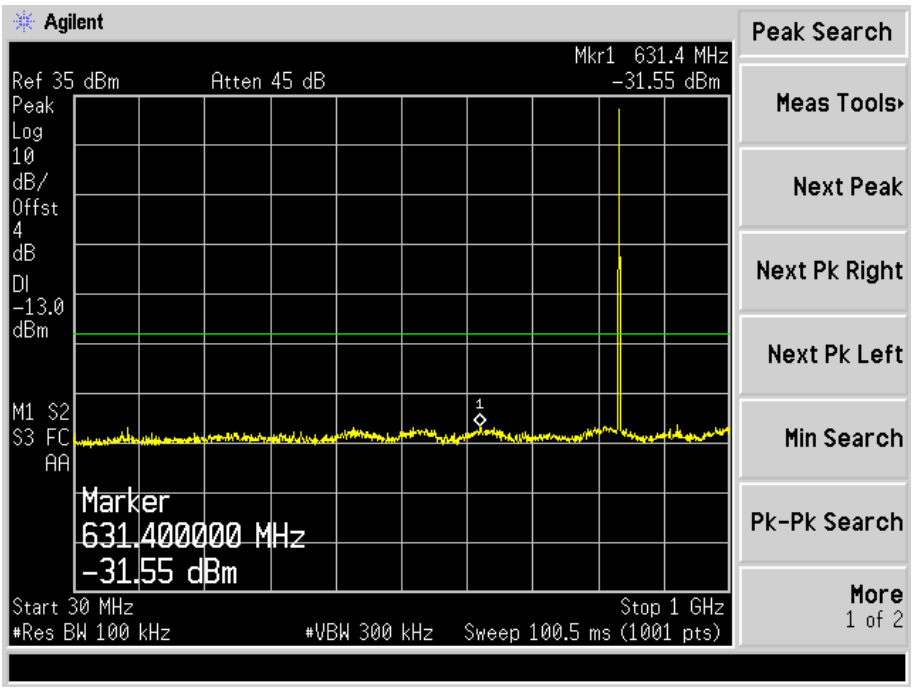
7.4 Summary of Test Results/Plots

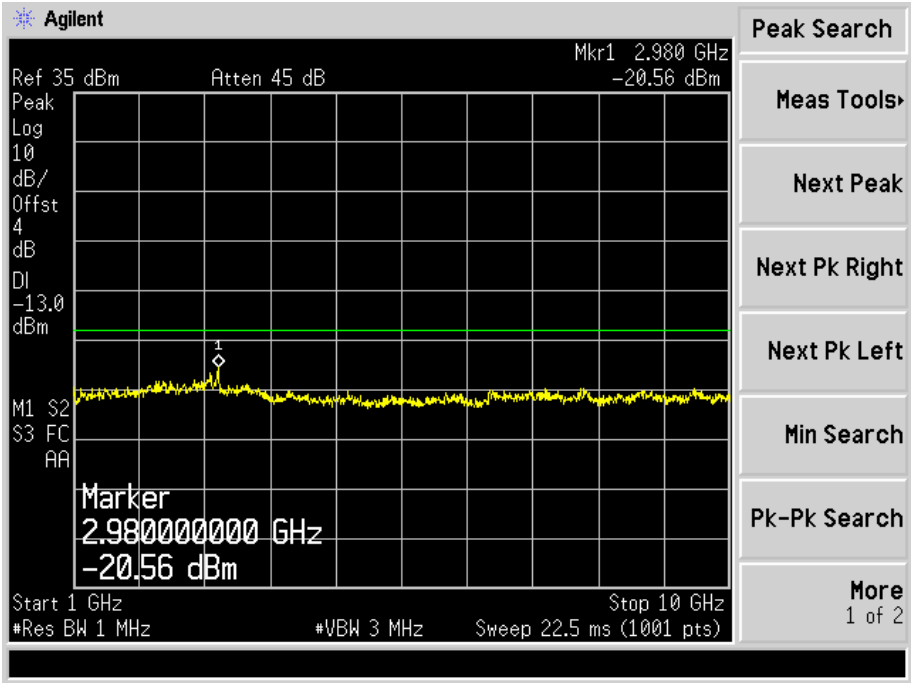
Please refer to the following test plots For Cellular Band
GPRS Low Channel



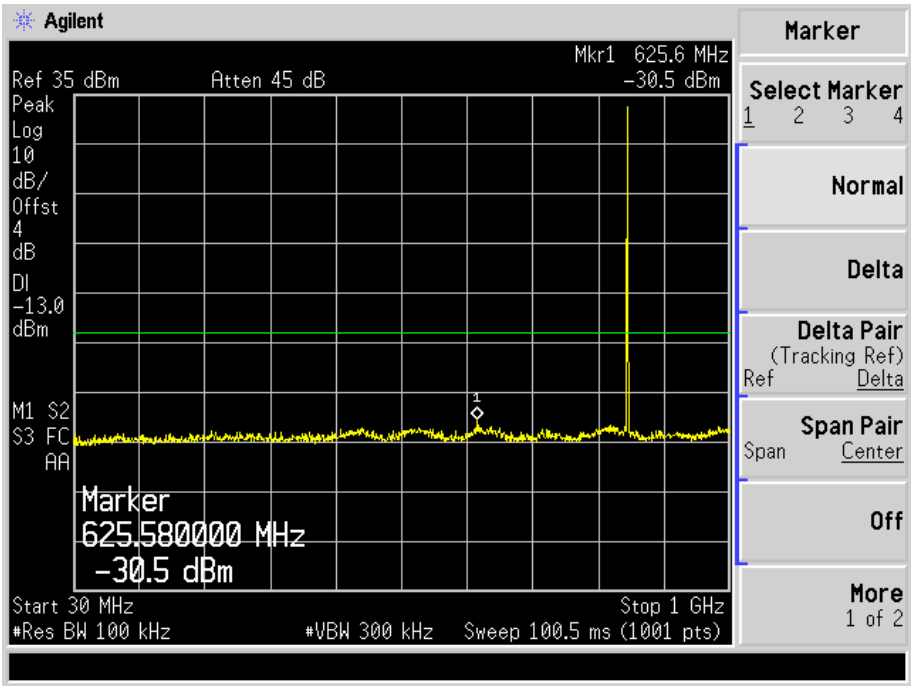


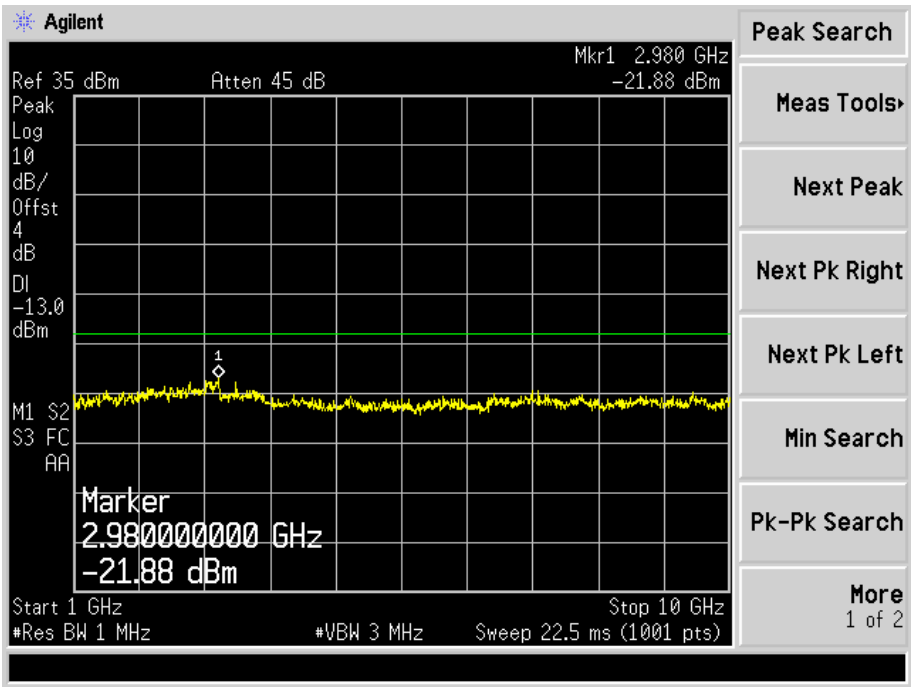
GPRS Middle Channel



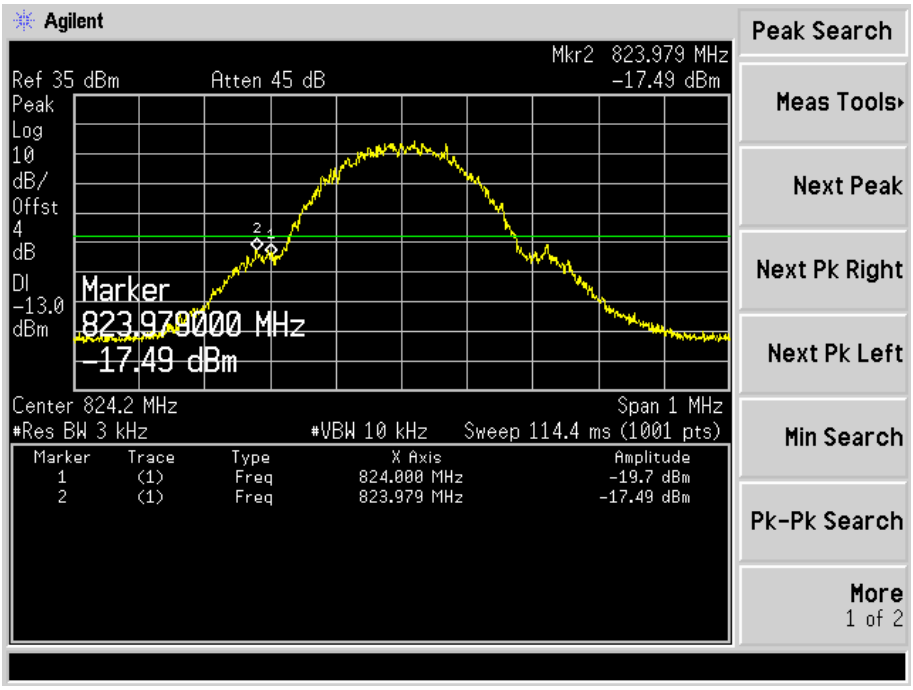


GPRS High Channel

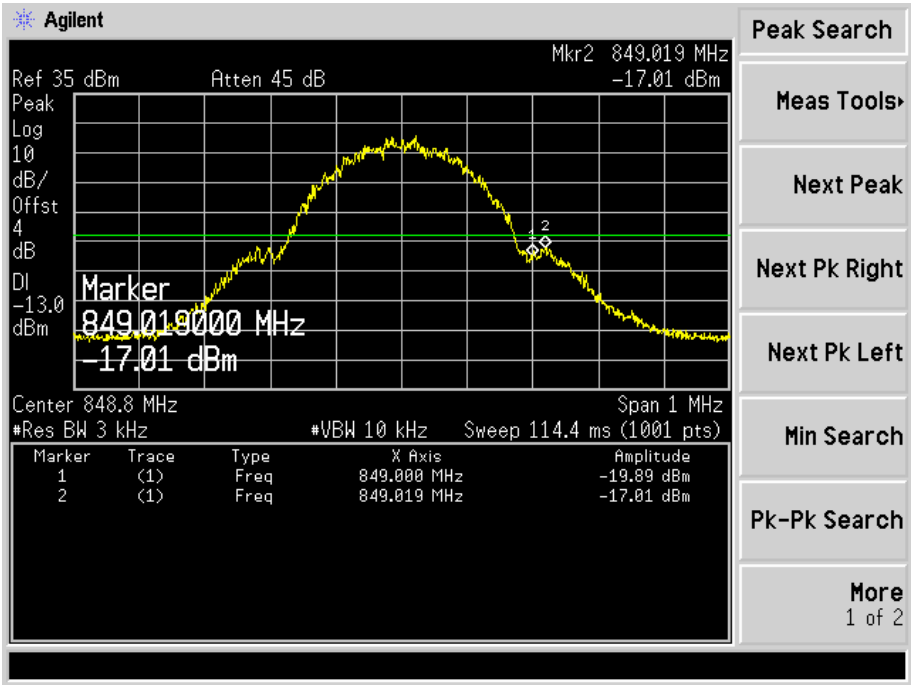




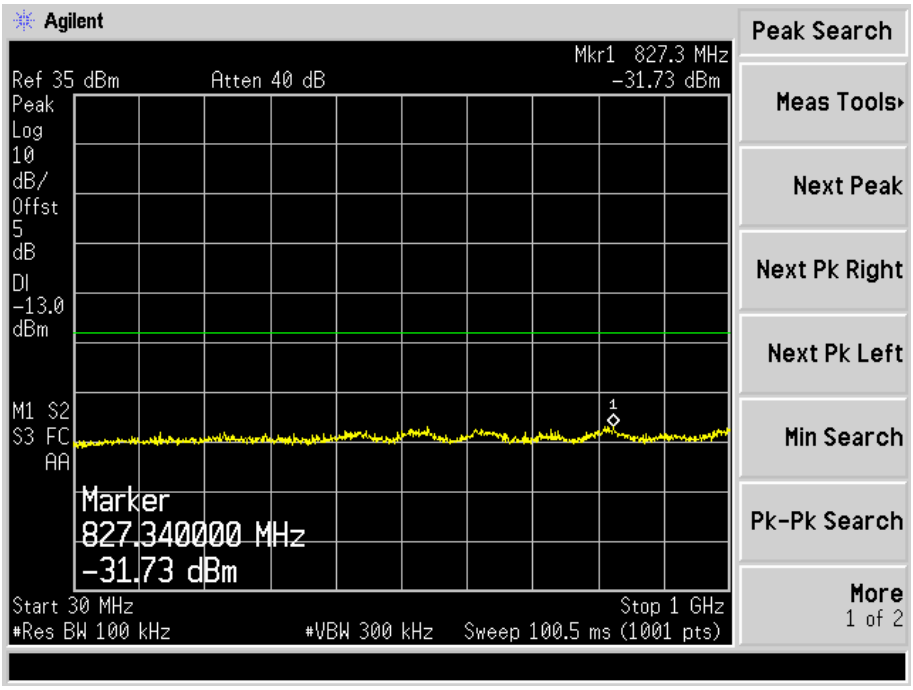
GPRS Low Band Emission

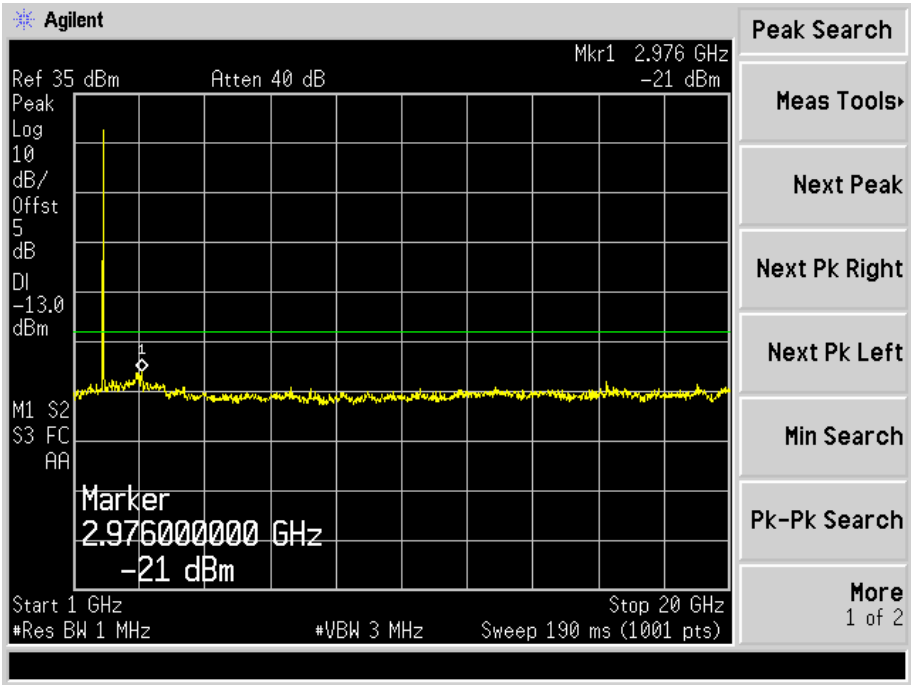


GPRS High Band Emission

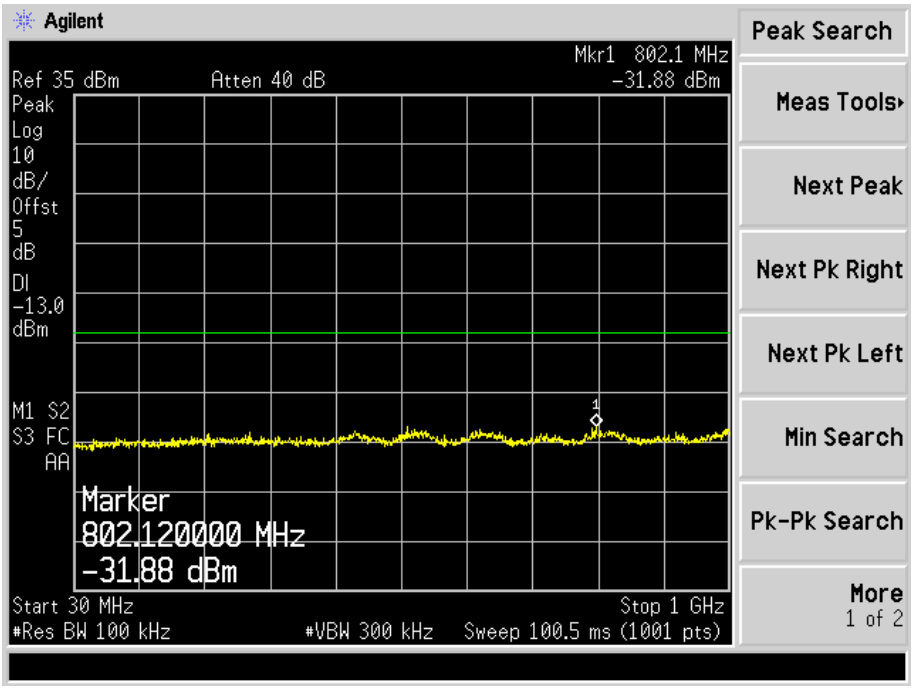


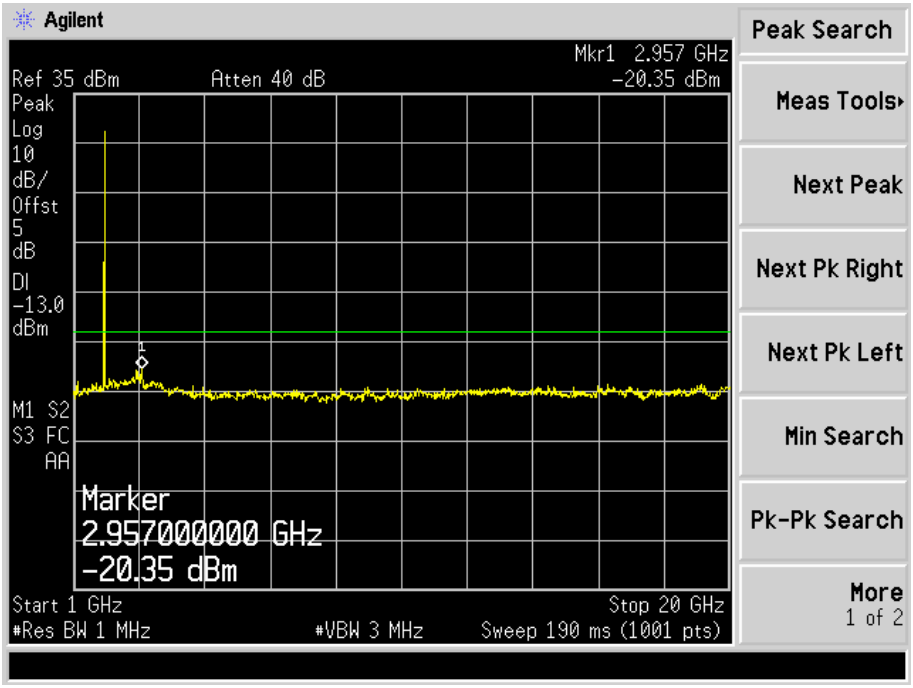
For PCS Band
GPRS Low Channel



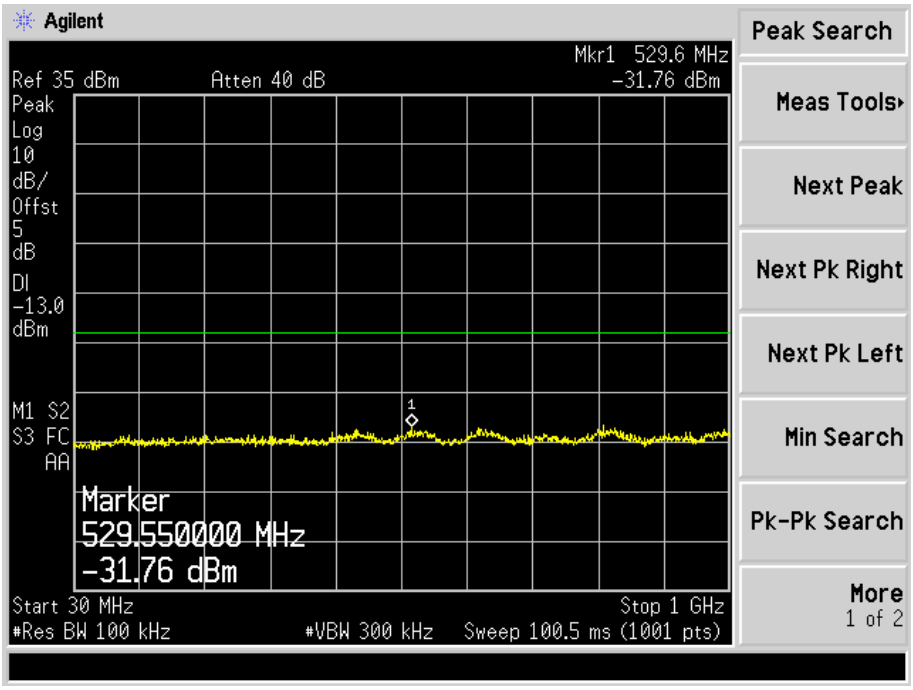


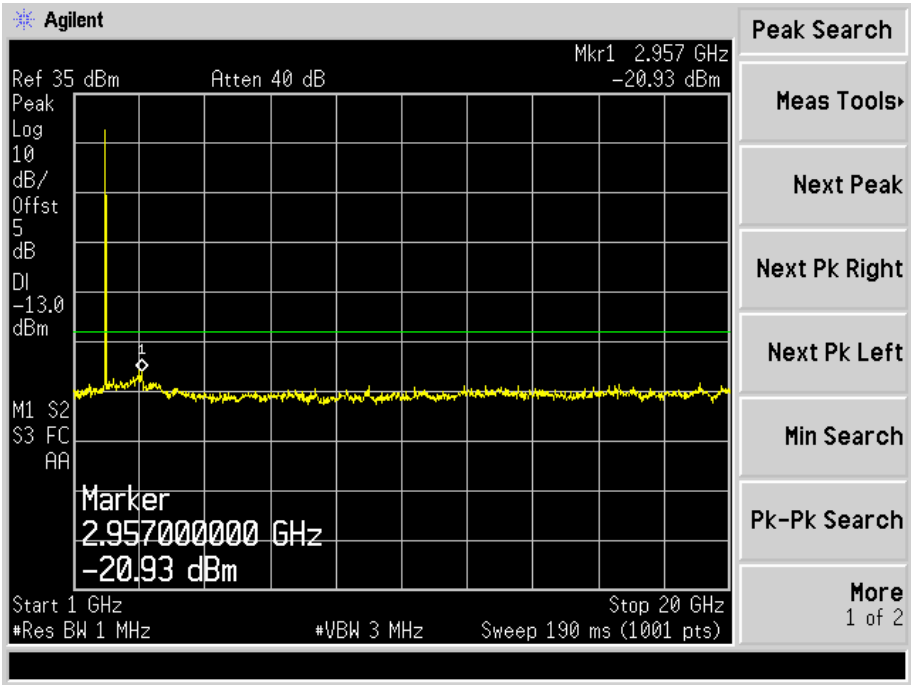
GPRS Middle Channel



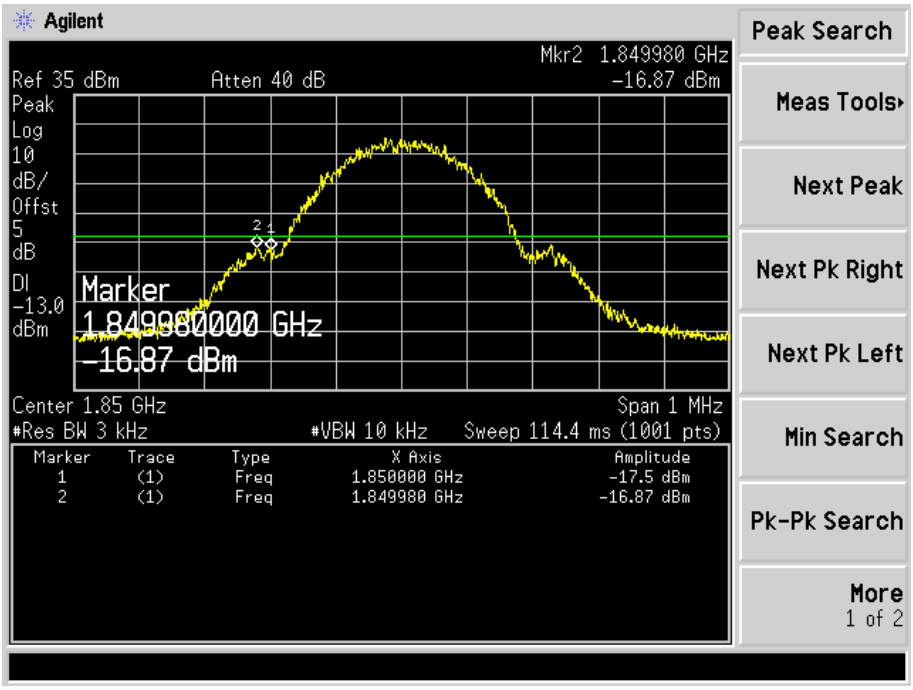


GPRS High Channel

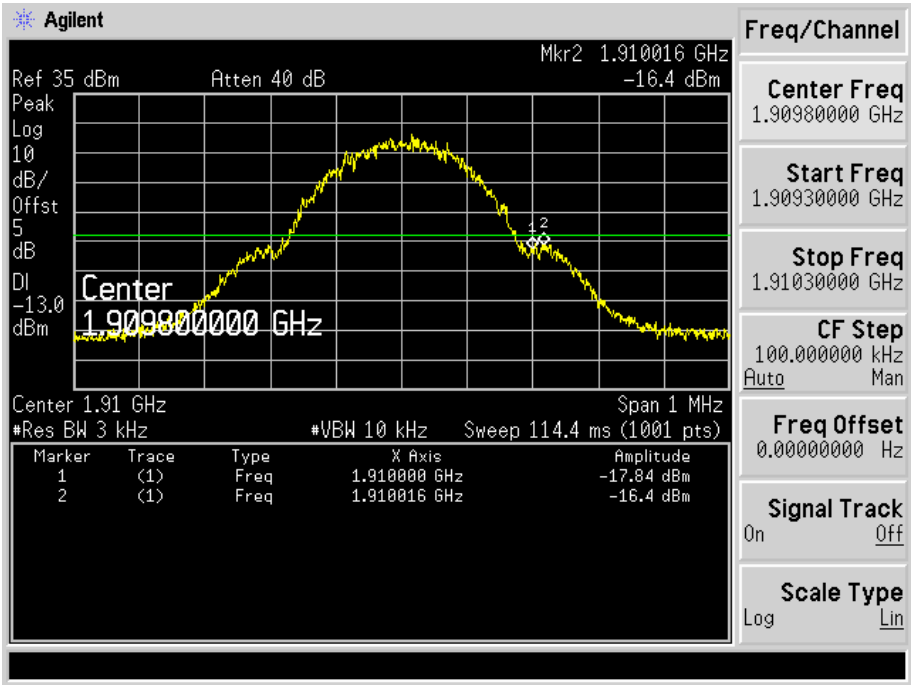




GPRS Low Band Emission

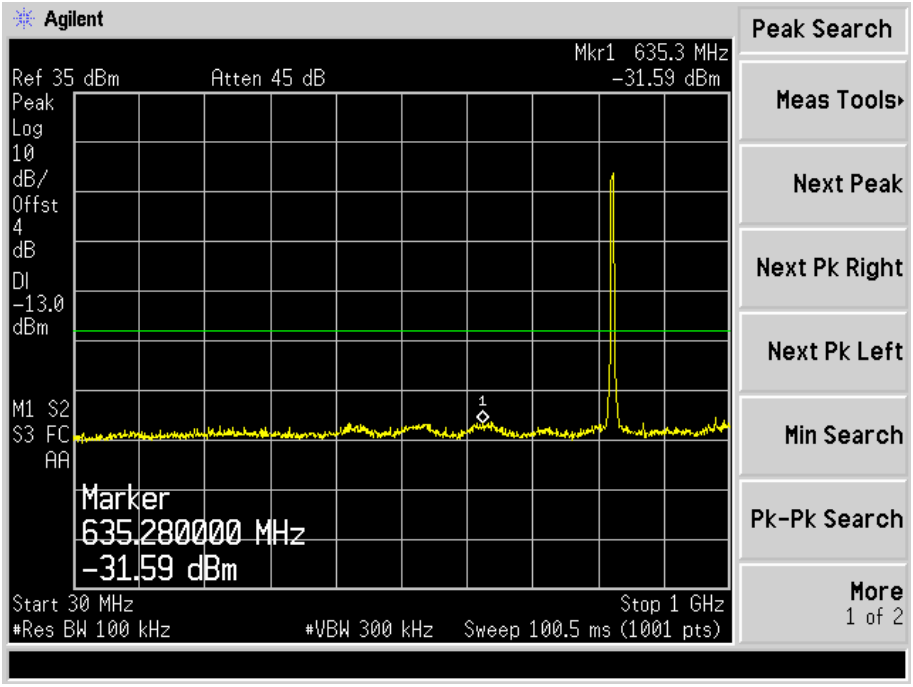


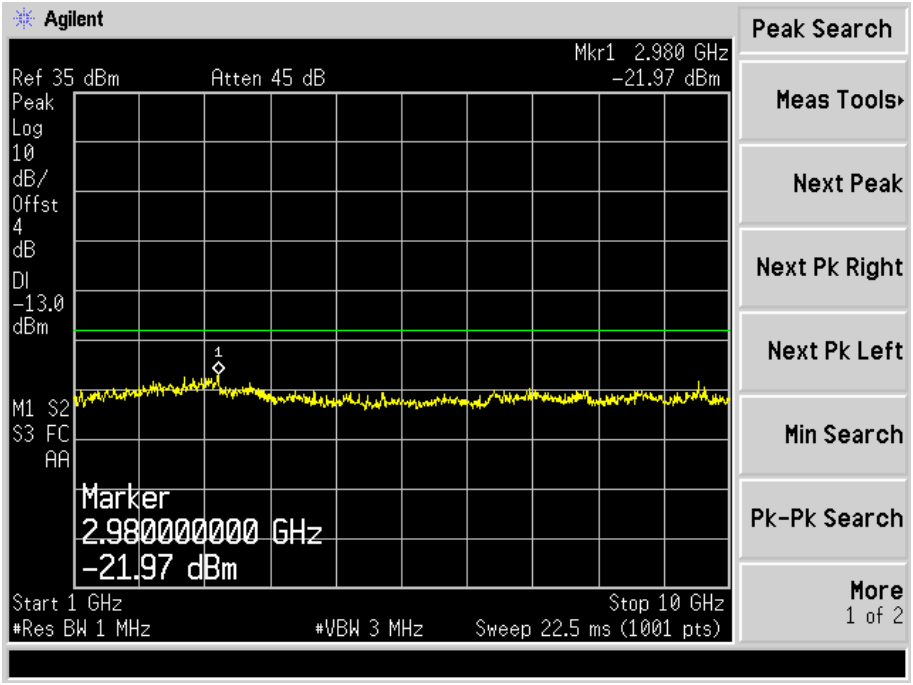
GPRS High Band Emission



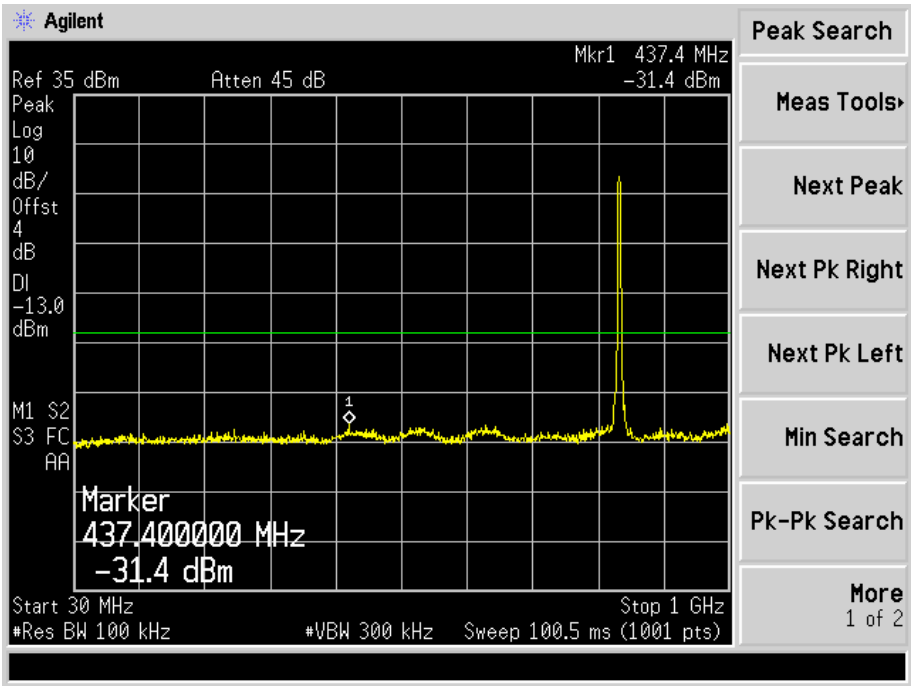
For Band V

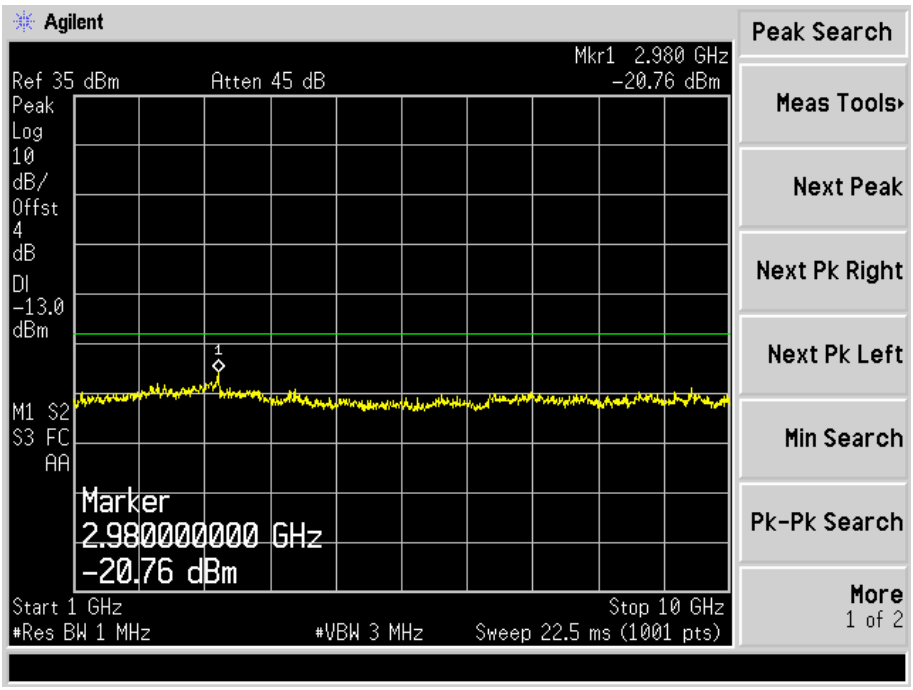
WCDMA Low Channel



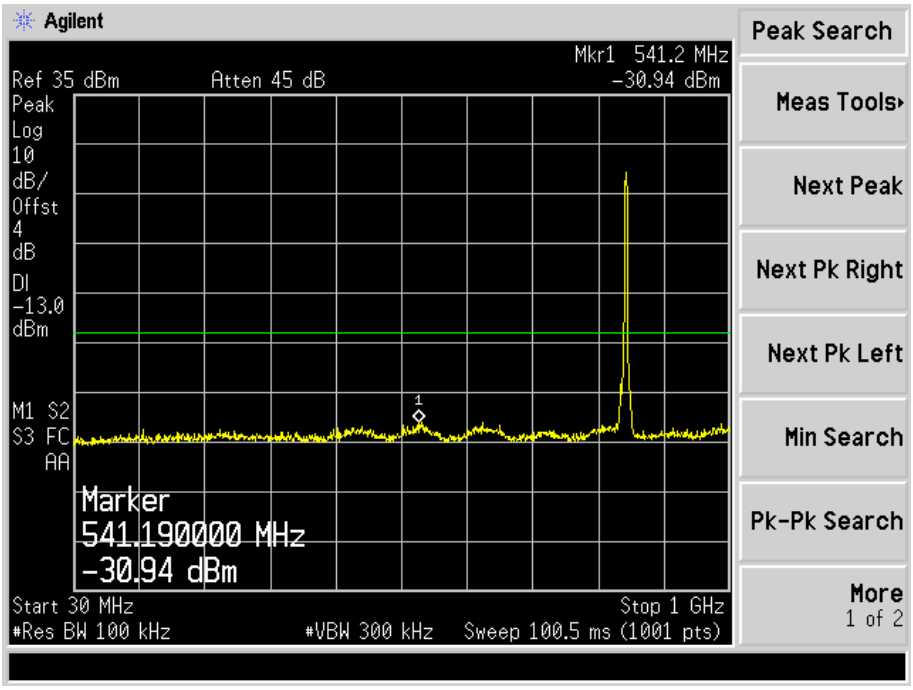


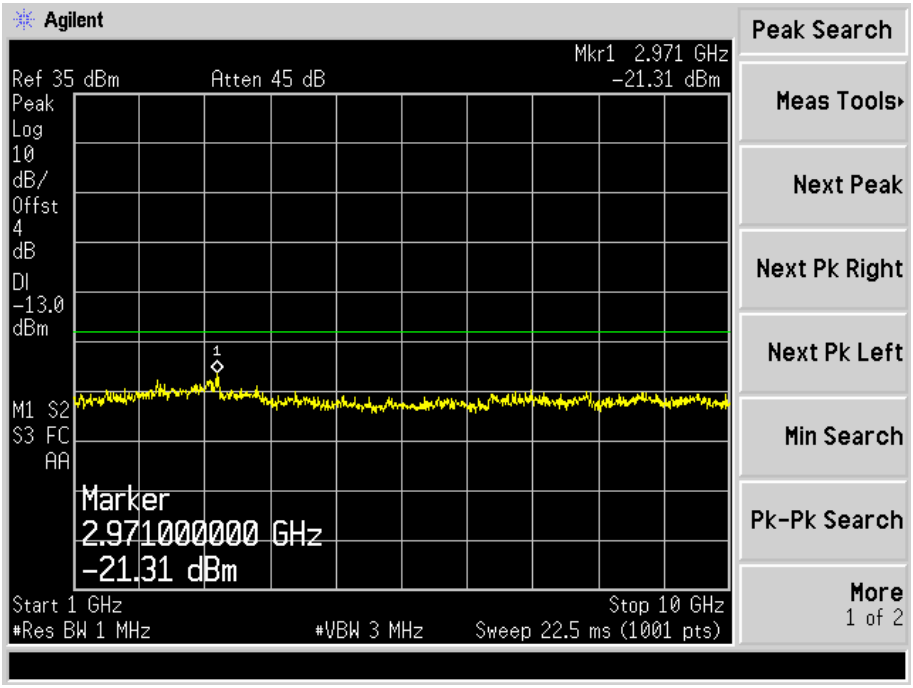
WCDMA Middle Channel



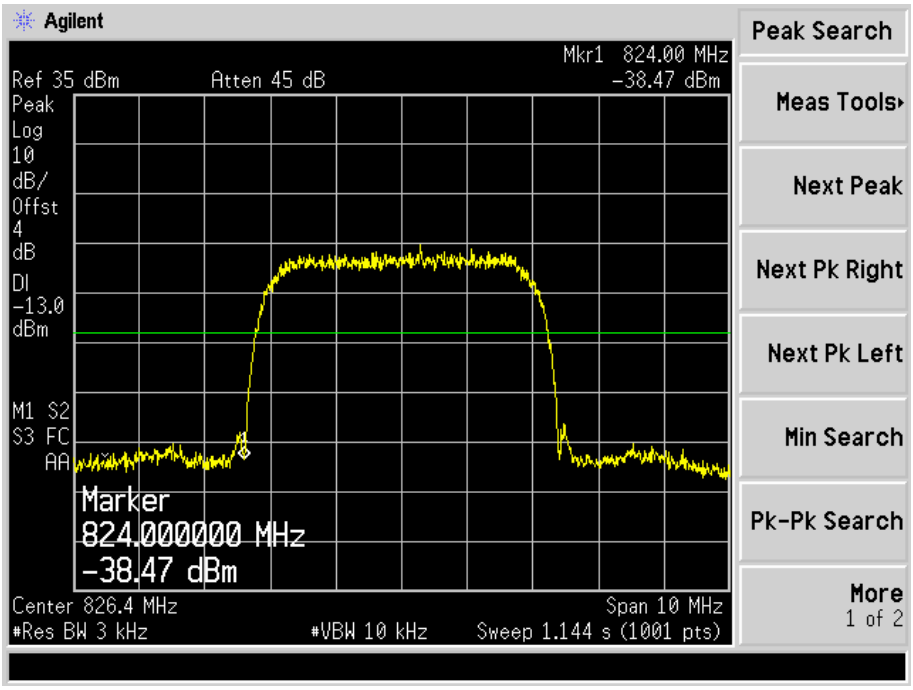


WCDMA High Channel

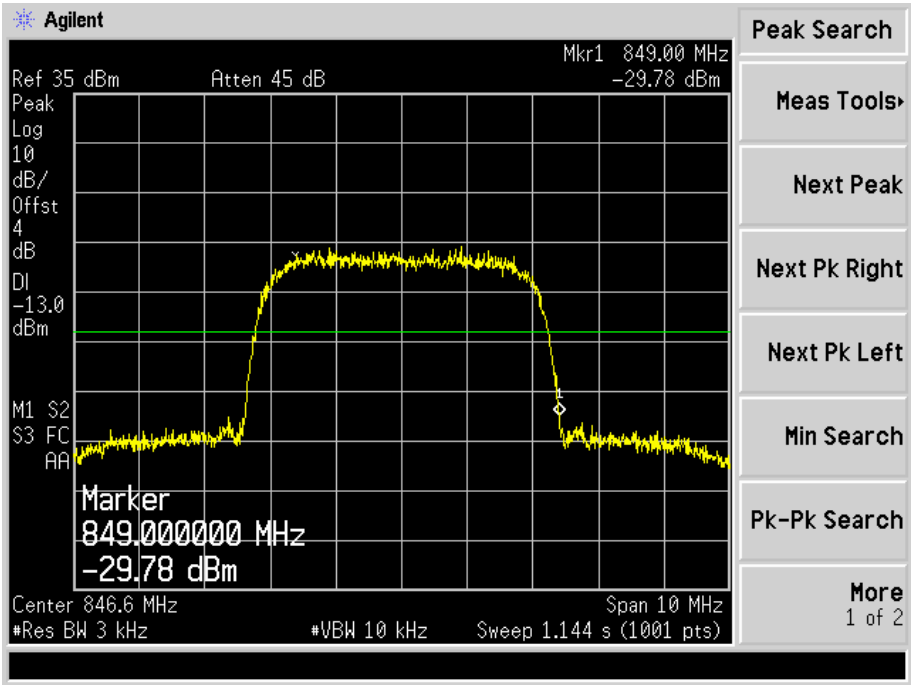




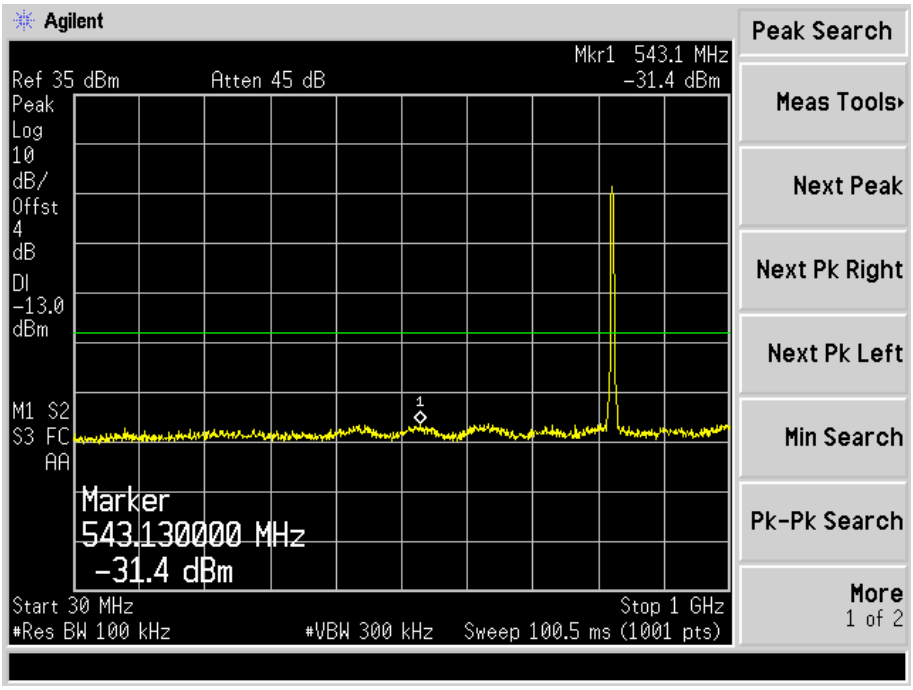
WCDMA Low Band Spurious Emission

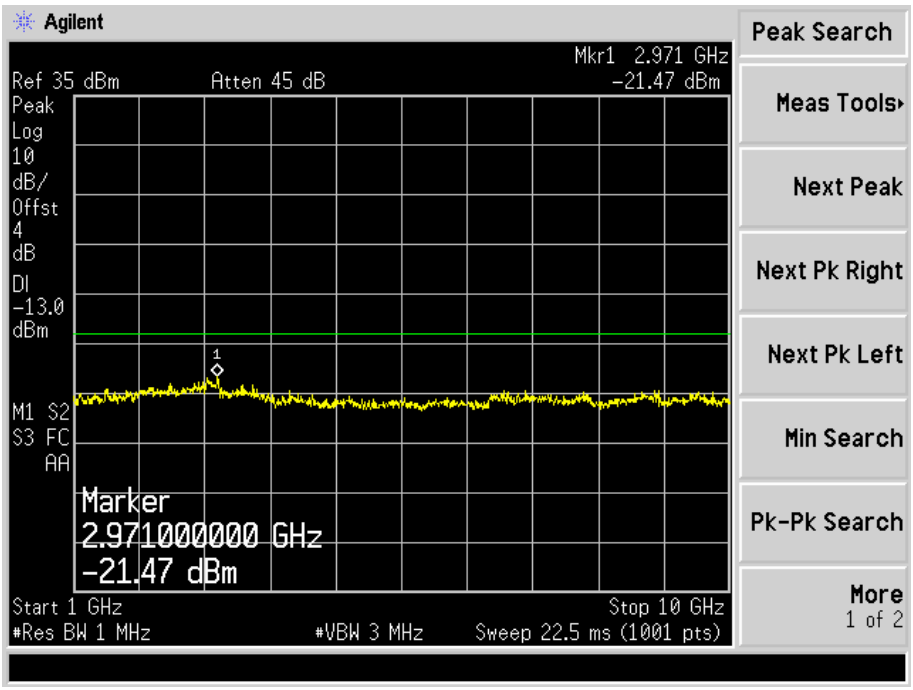


WCDMA High Band Spurious Emission

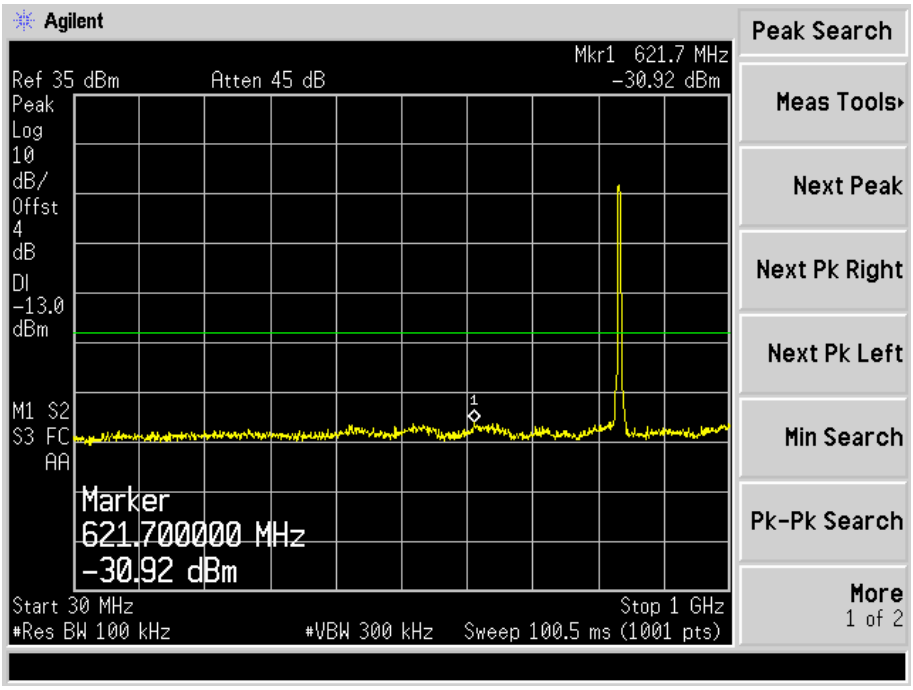


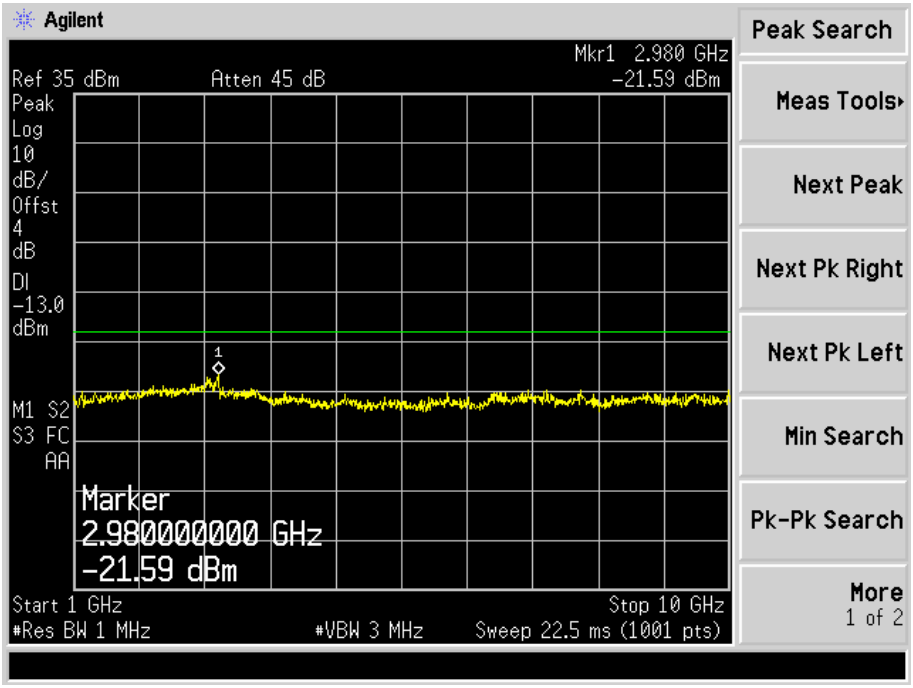
HSDPA Low Channel



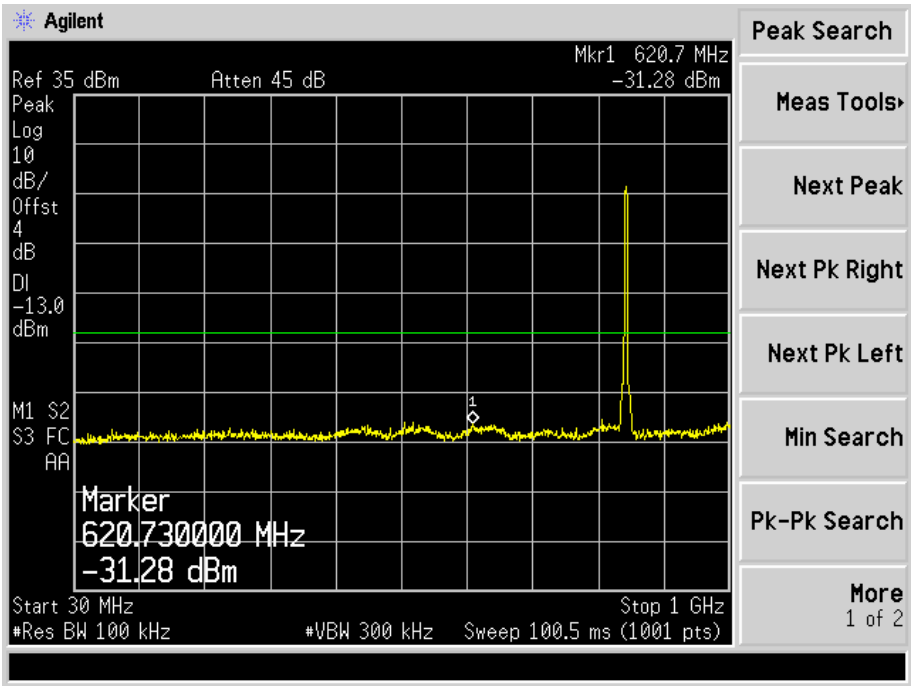


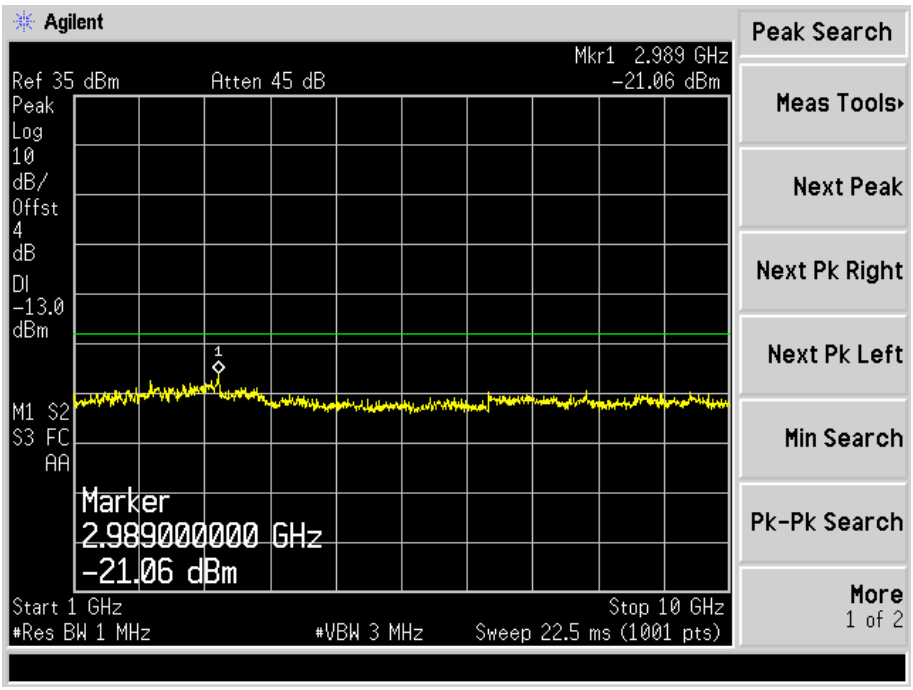
HSDPA Middle Channel



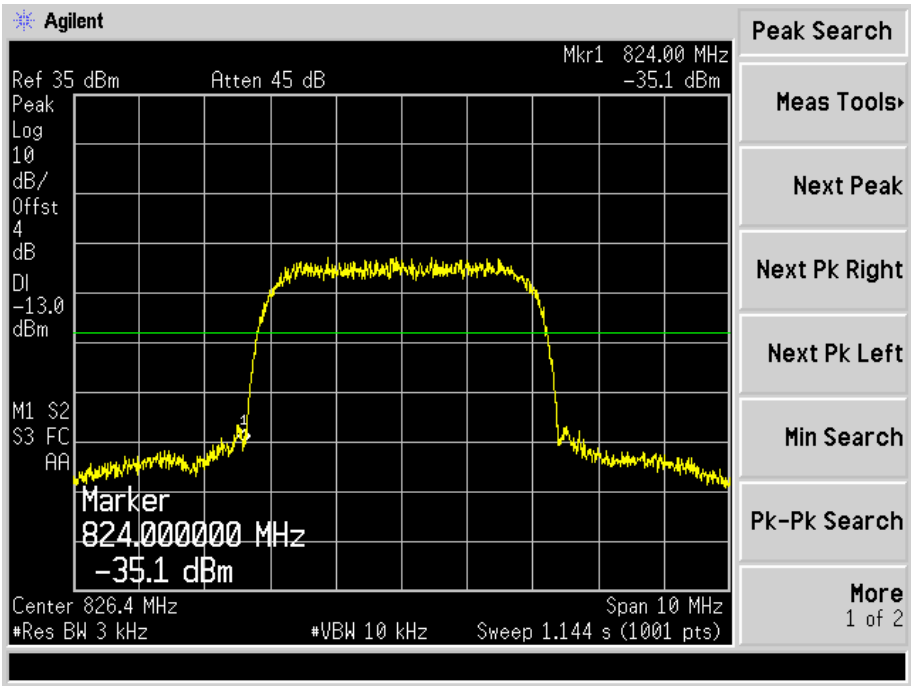


HSDPA High Channel

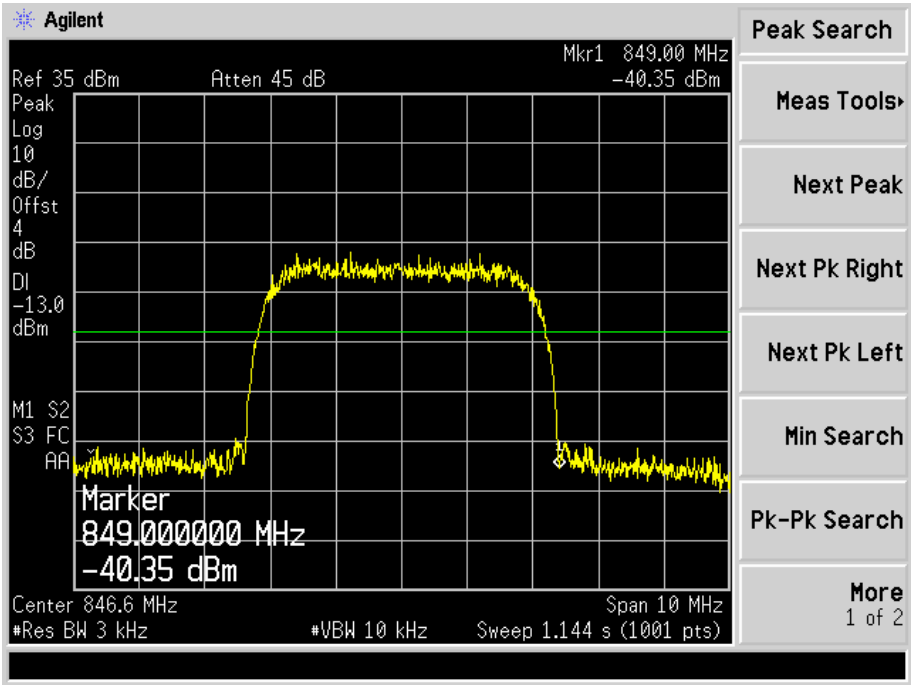




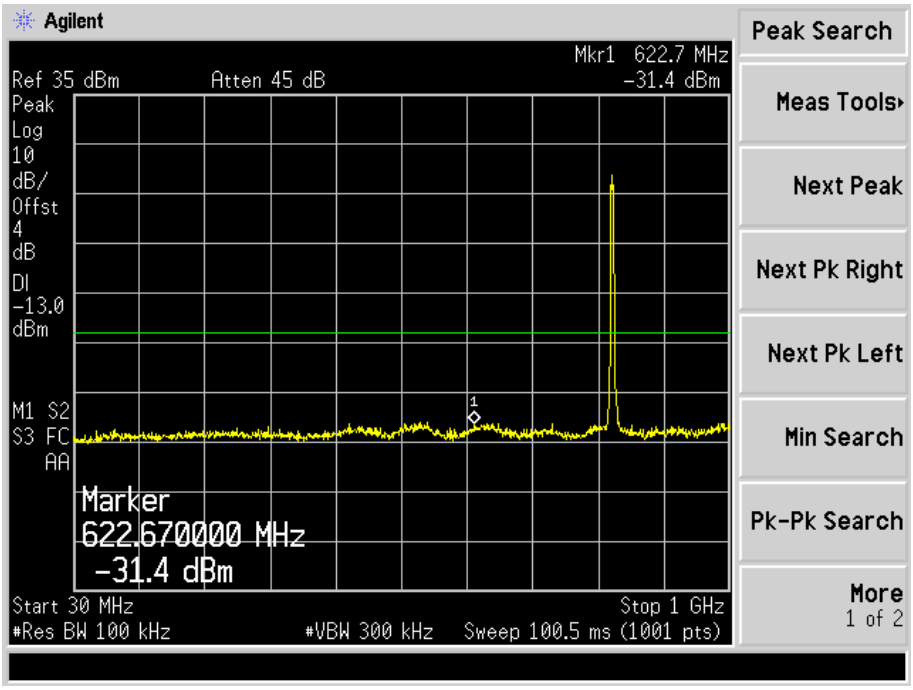
HSDPA Low Band Spurious Emission

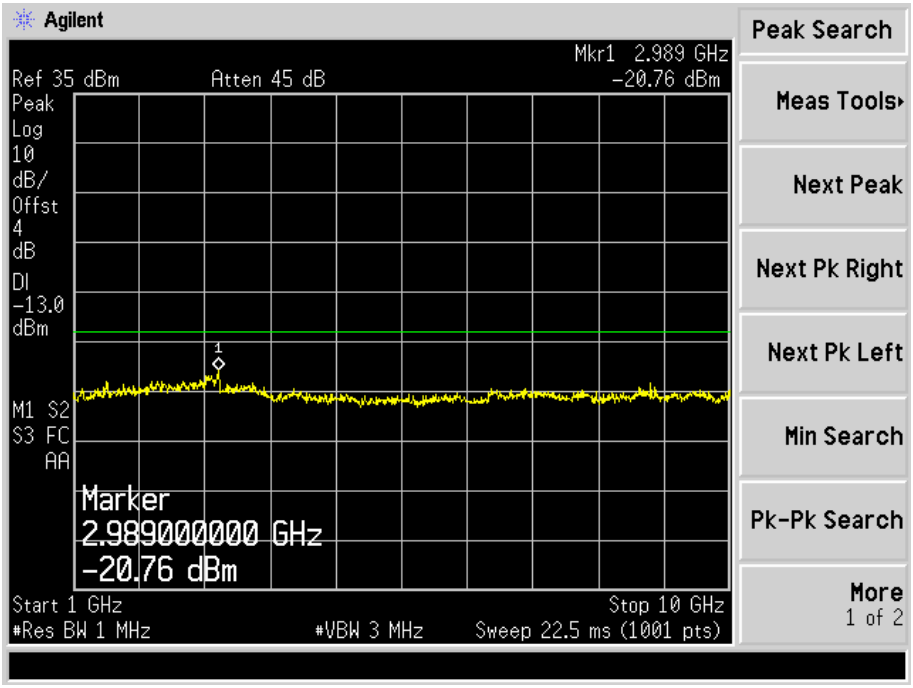


HSDPA High Band Spurious Emission

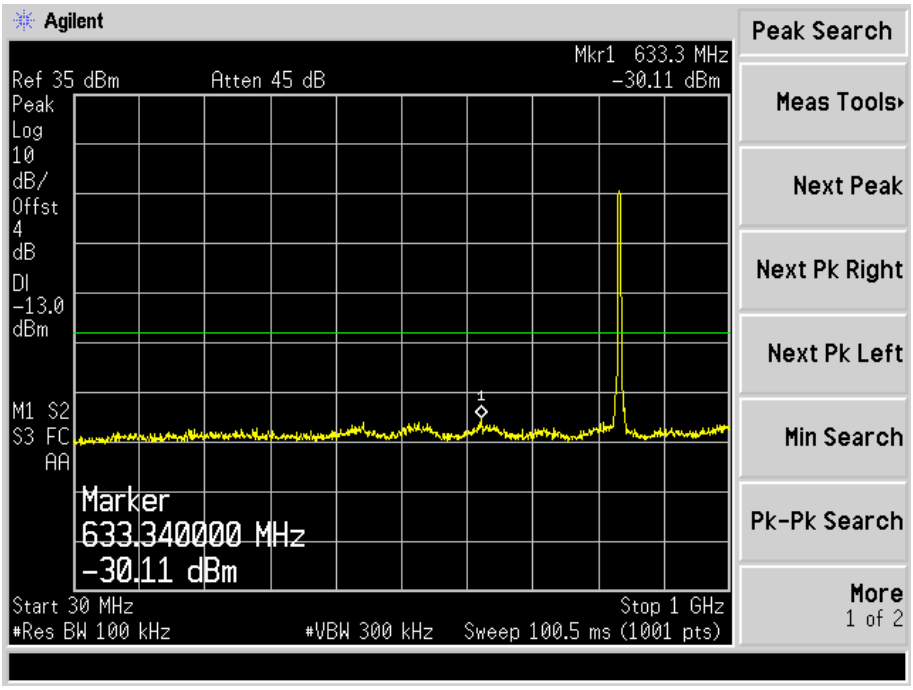


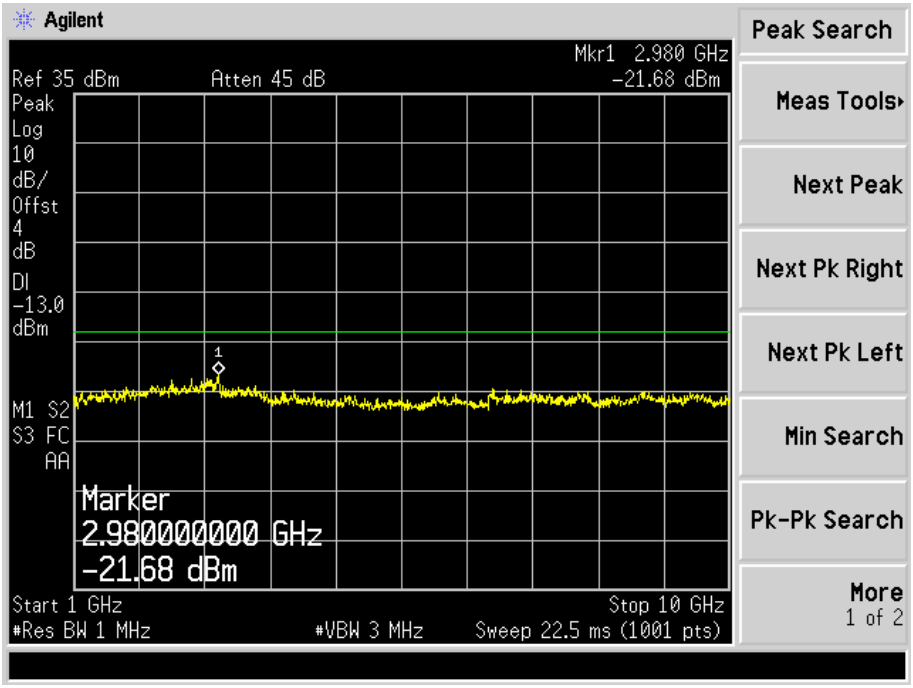
HSUPA Low Channel



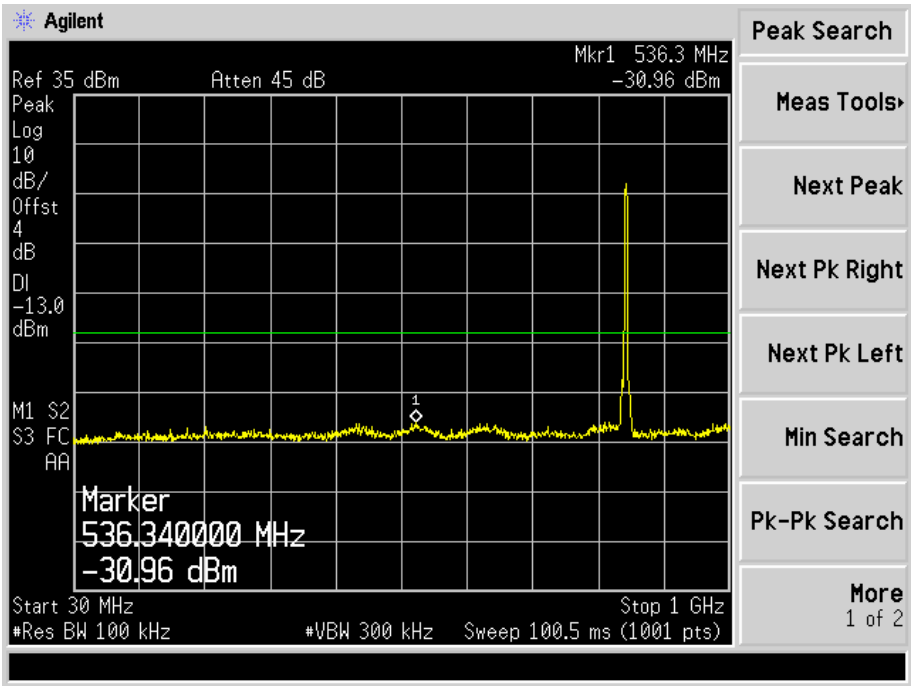


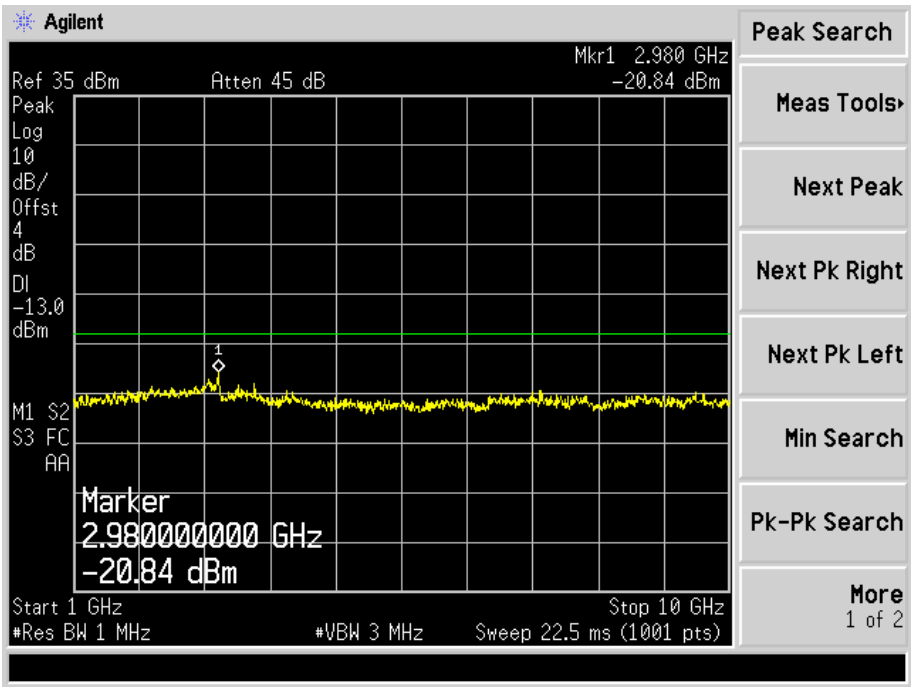
HSUPA Middle Channel



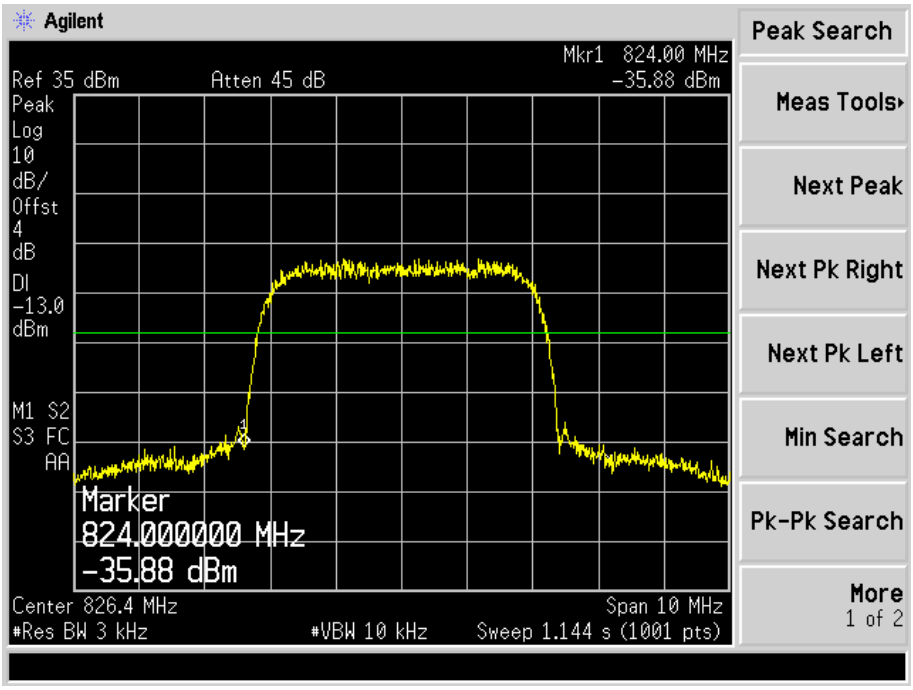


HSUPA High Channel

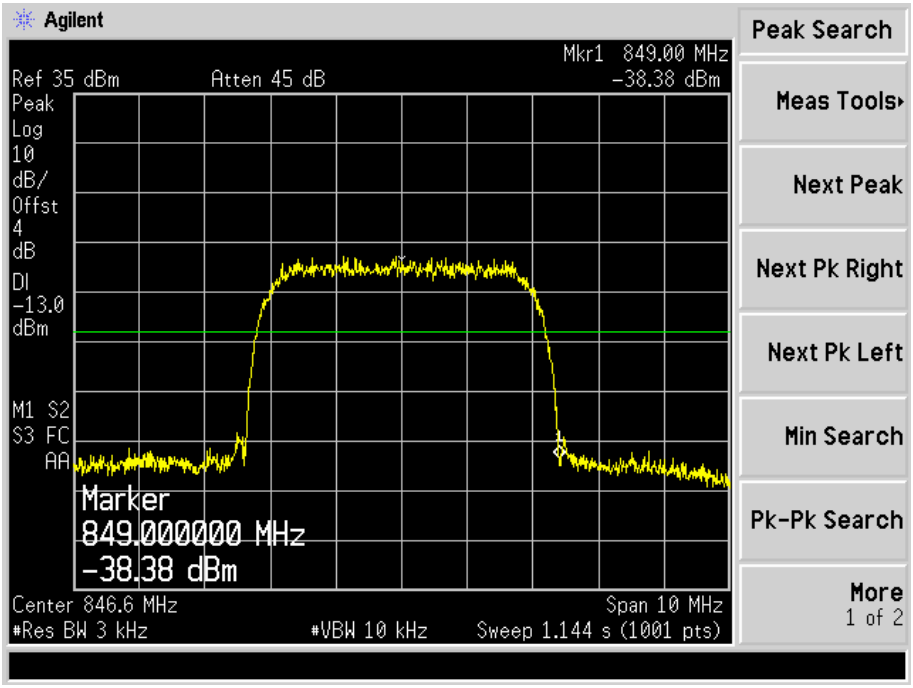




HSUPA Low Band Spurious Emission

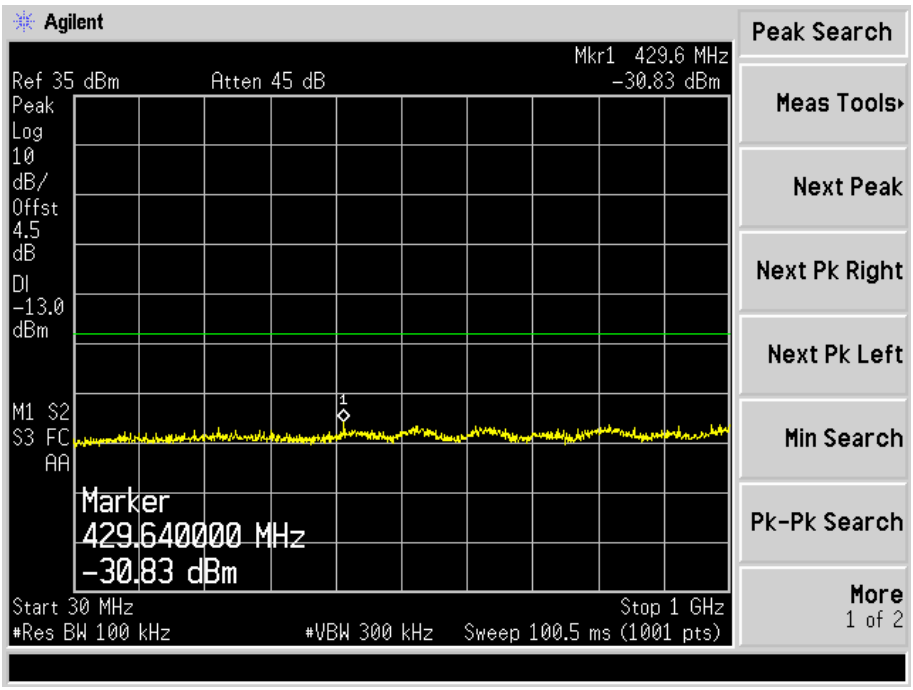


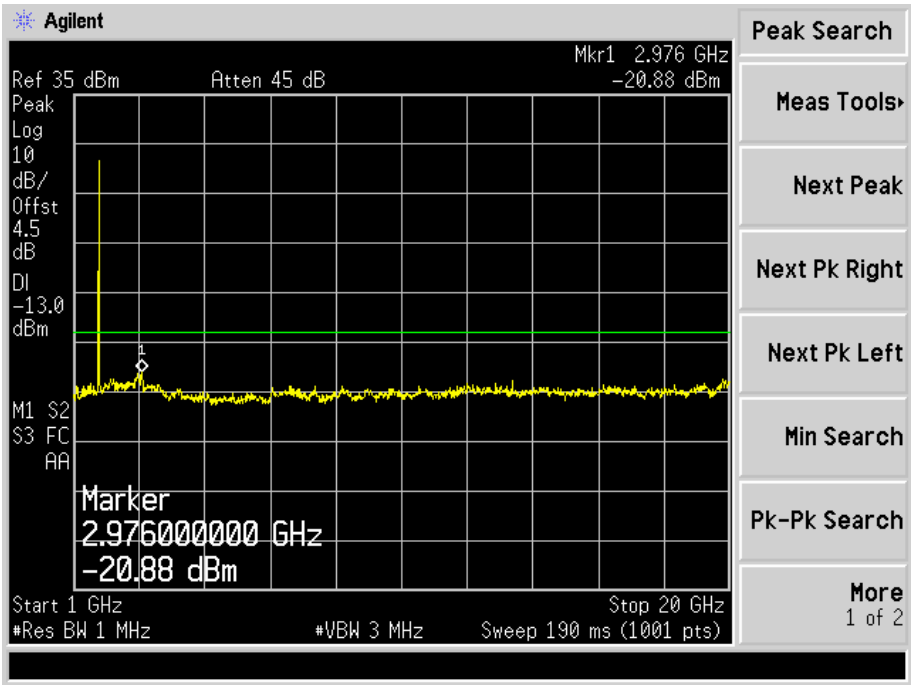
HSUPA High Band Spurious Emission



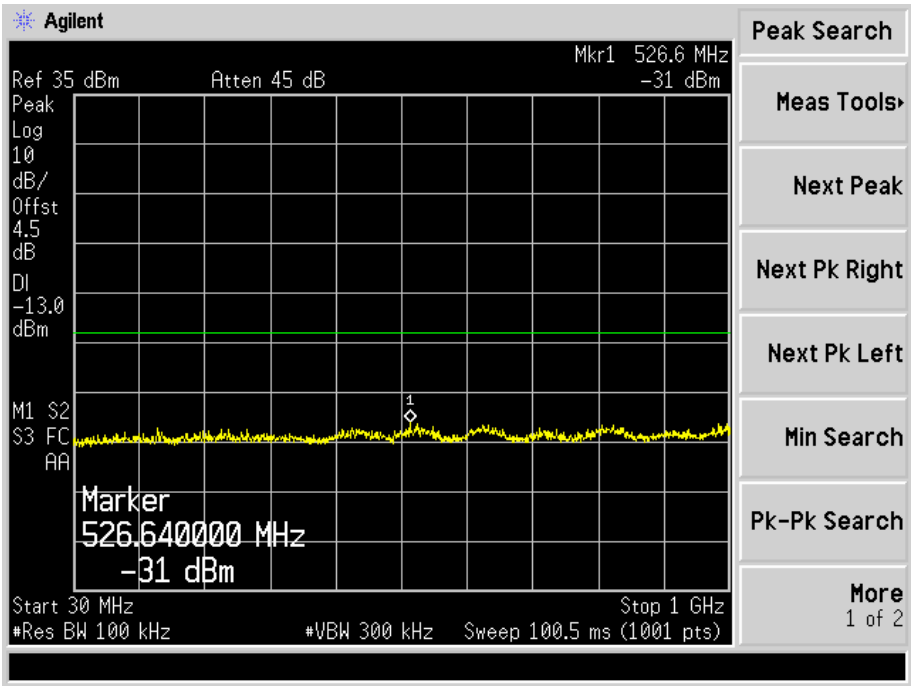
For Band IV

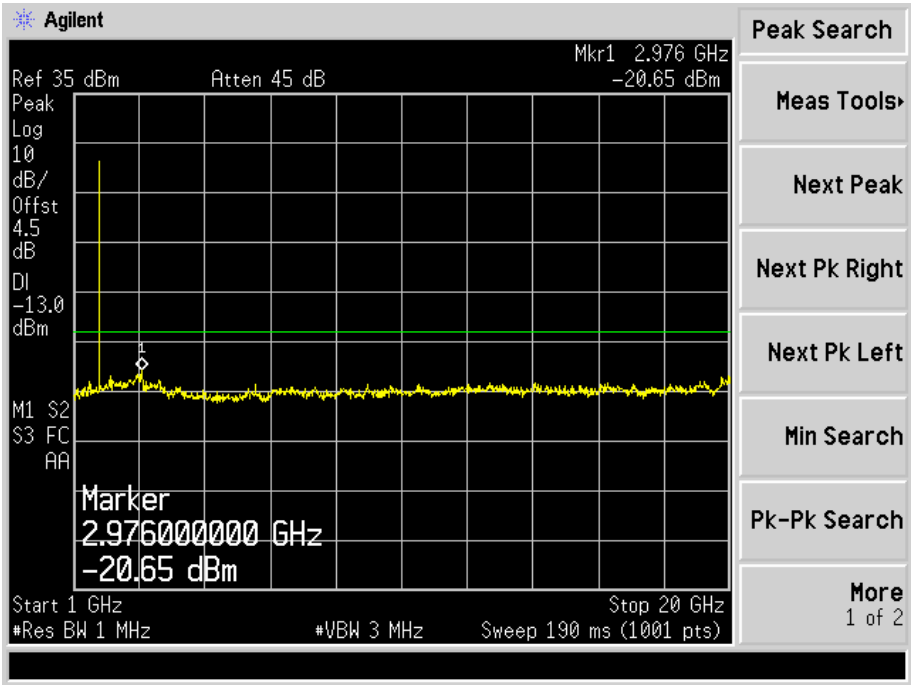
WCDMA Low Channel



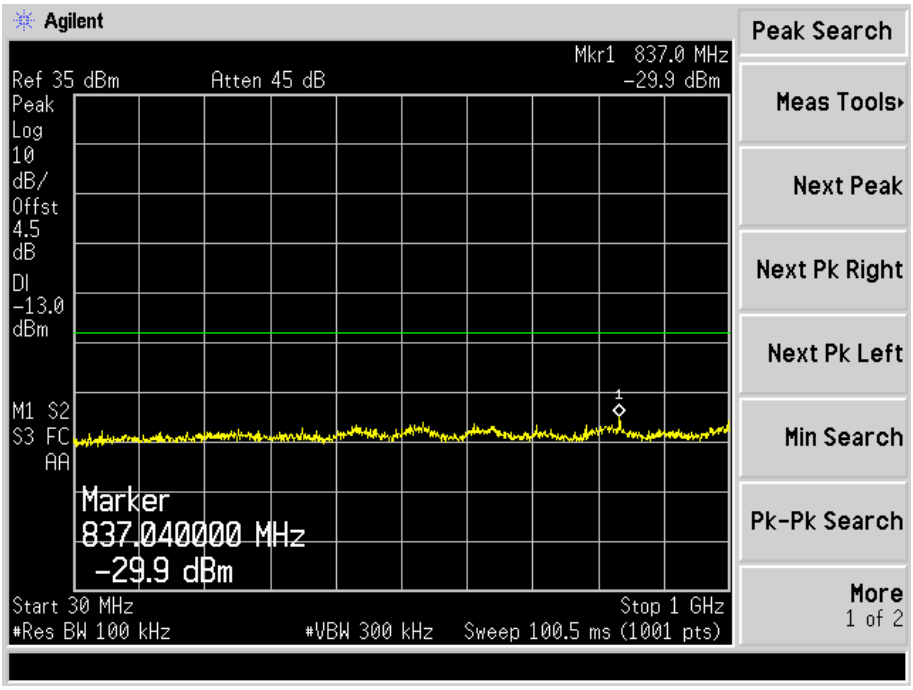


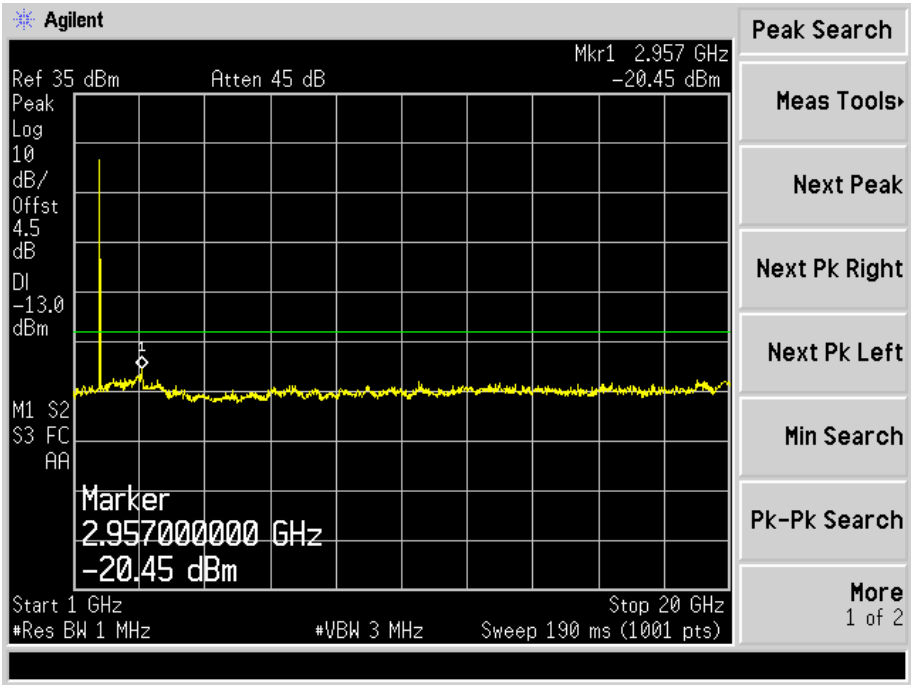
WCDMA Middle Channel



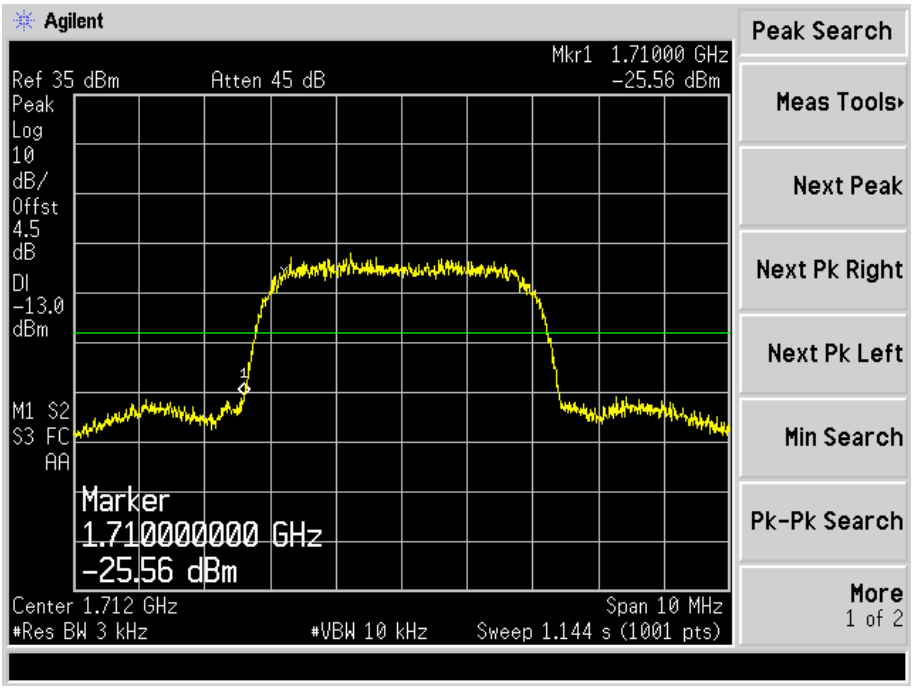


WCDMA High Channel

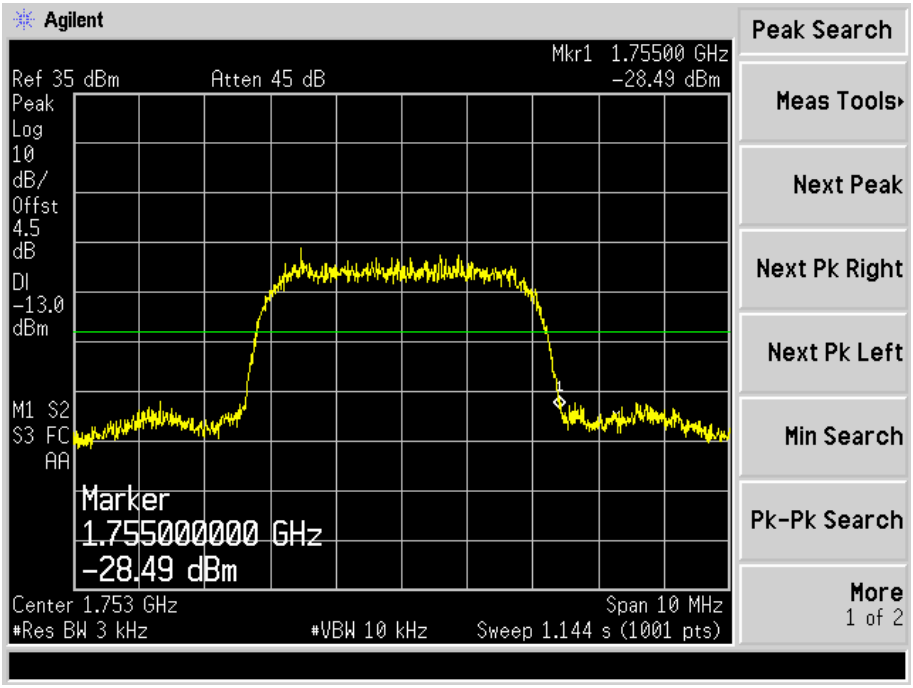




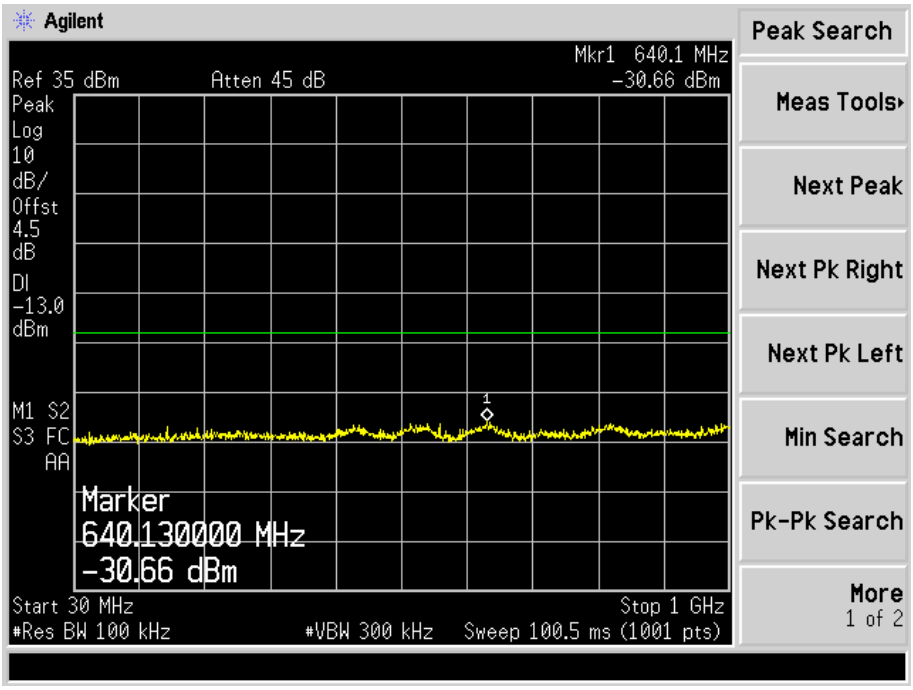
WCDMA Low Band Spurious Emission

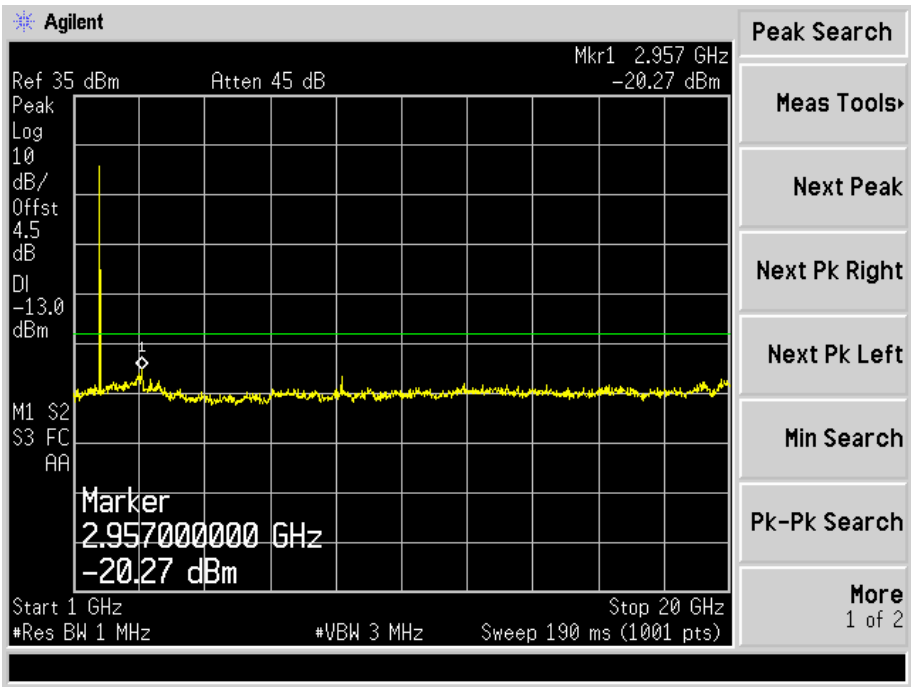


WCDMA High Band Spurious Emission

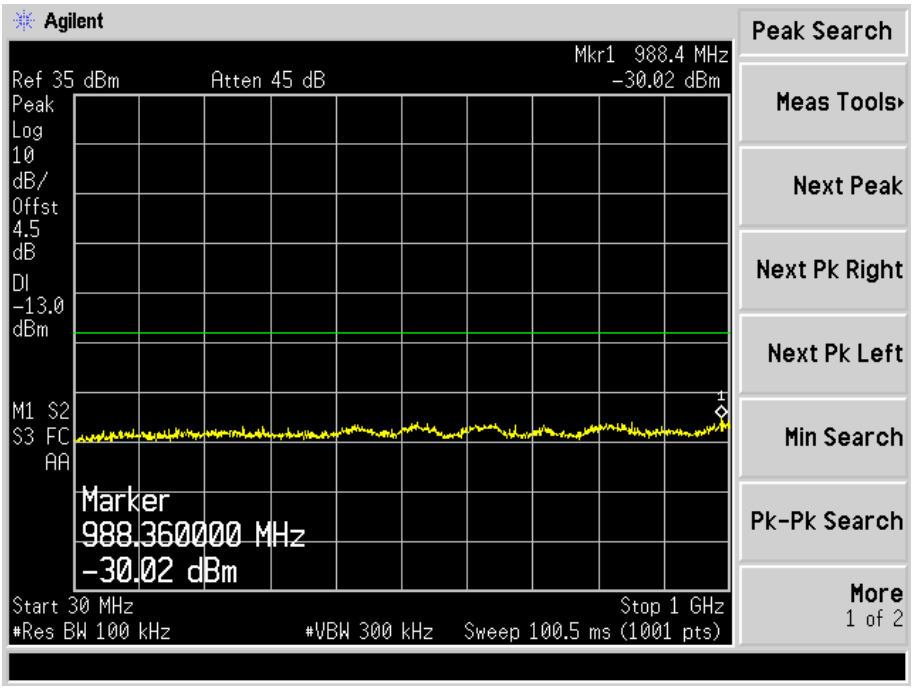


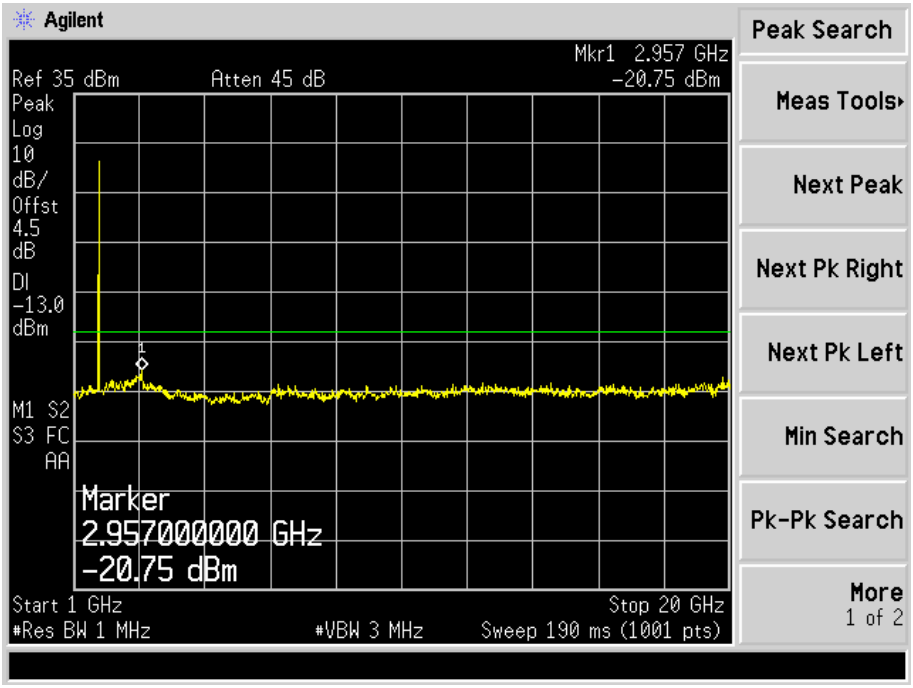
HSDPA Low Channel



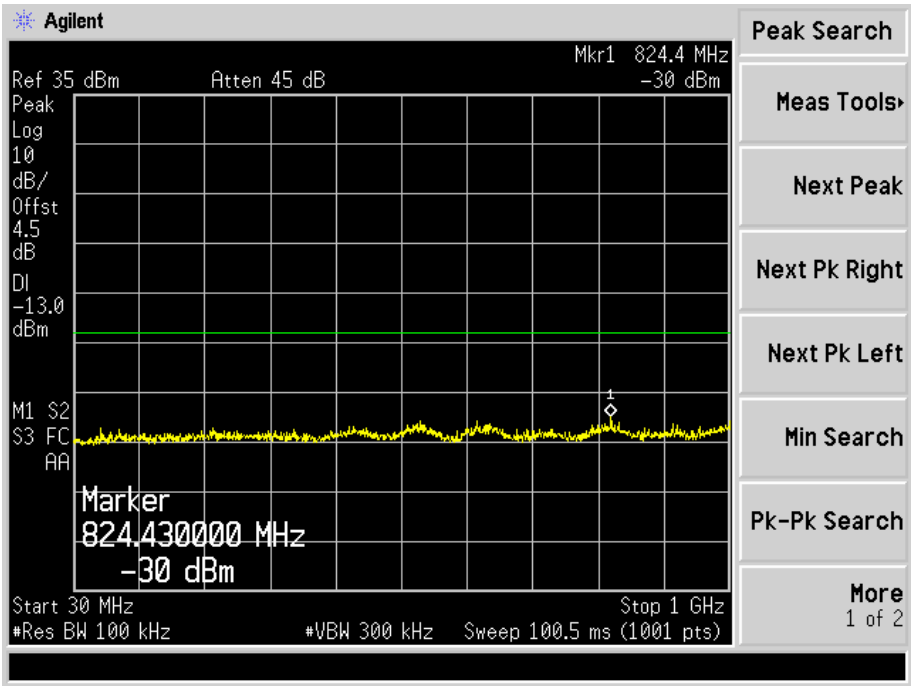


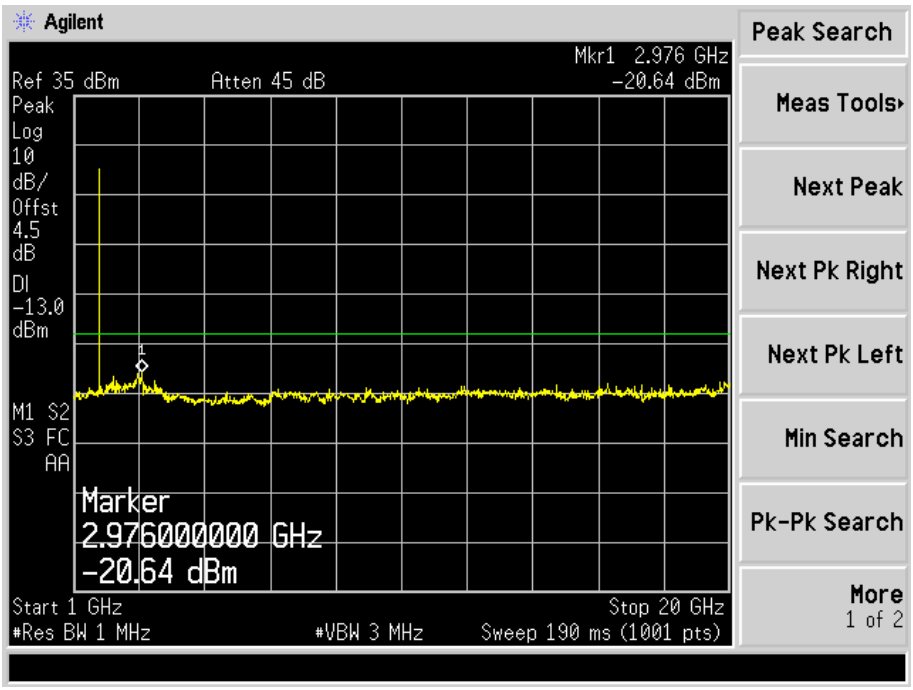
HSDPA Middle Channel



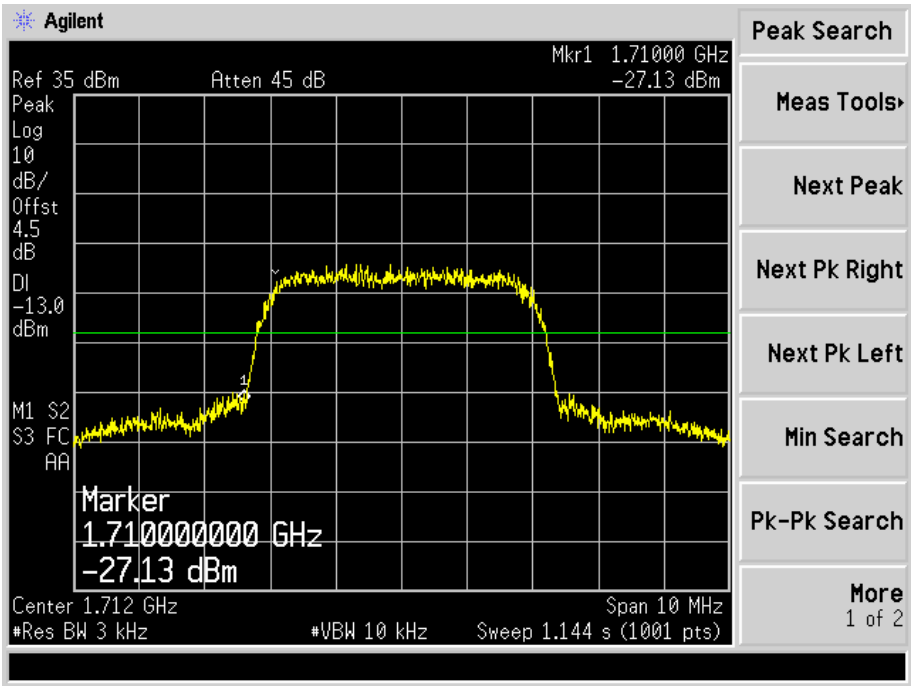


HSDPA High Channel

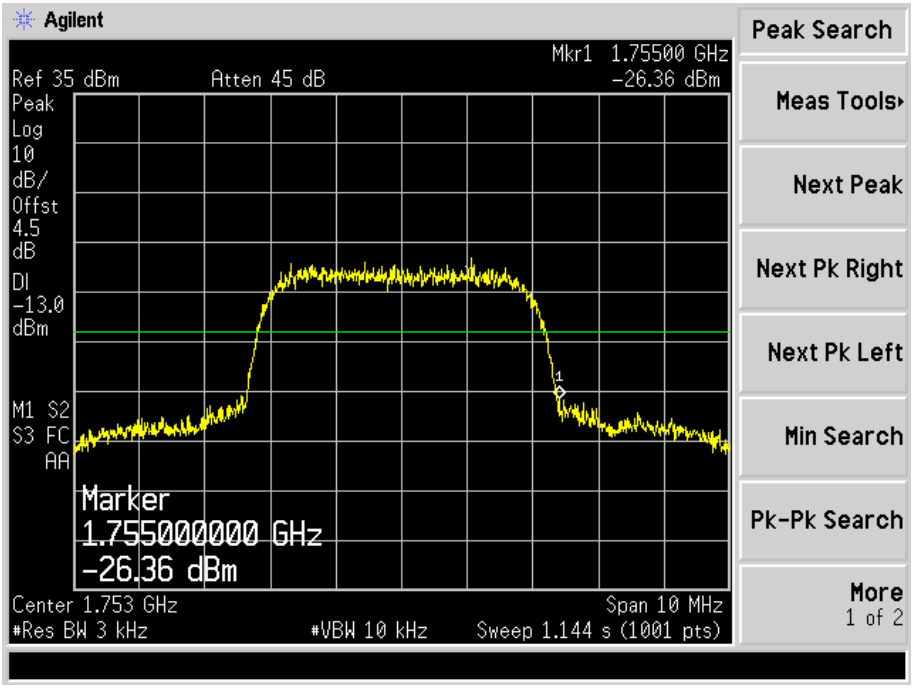




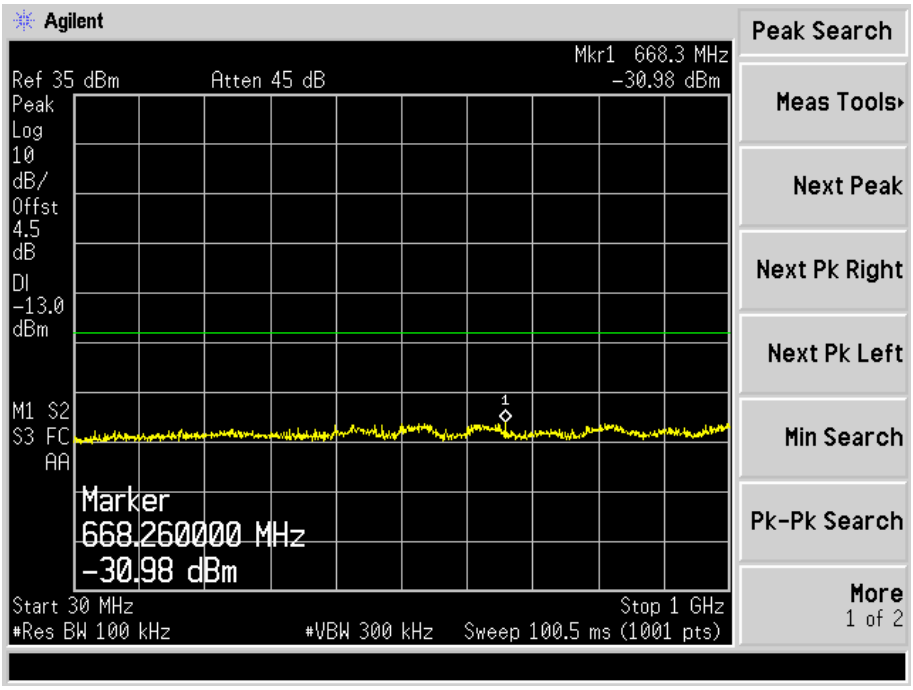
HSDPA Low Band Spurious Emission

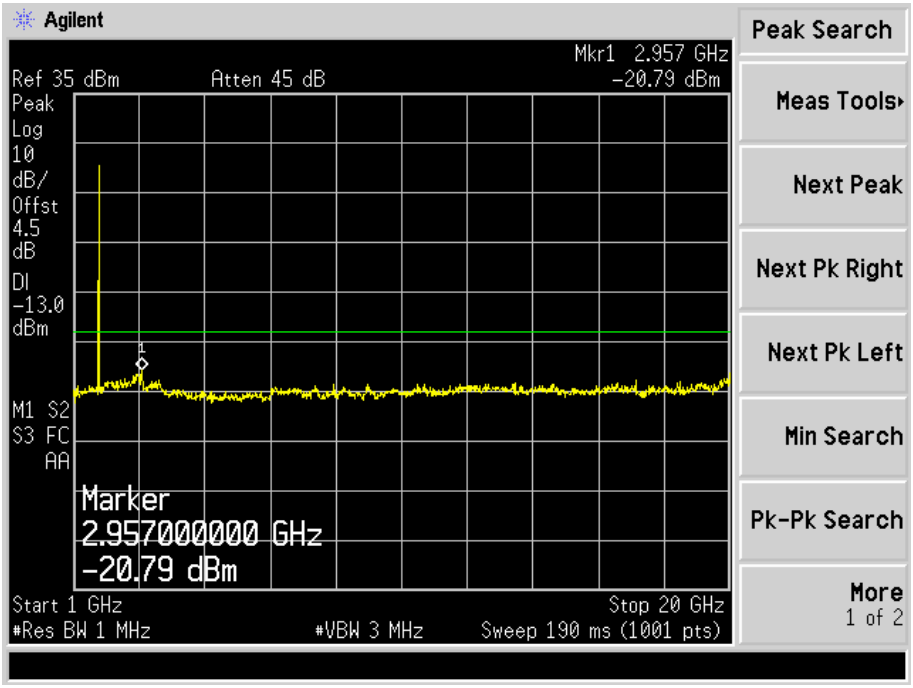


HSDPA High Band Spurious Emission

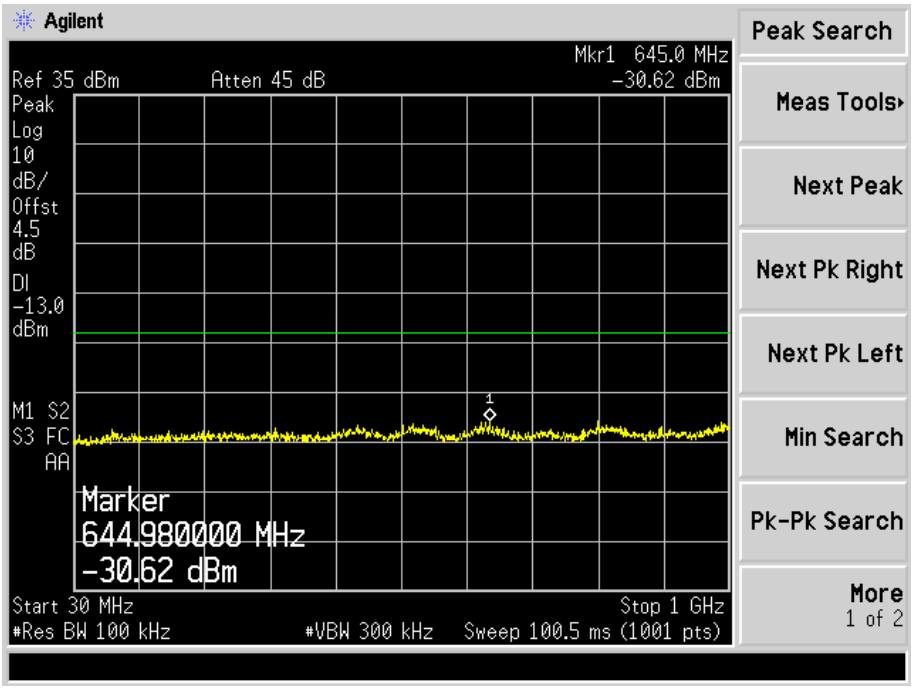


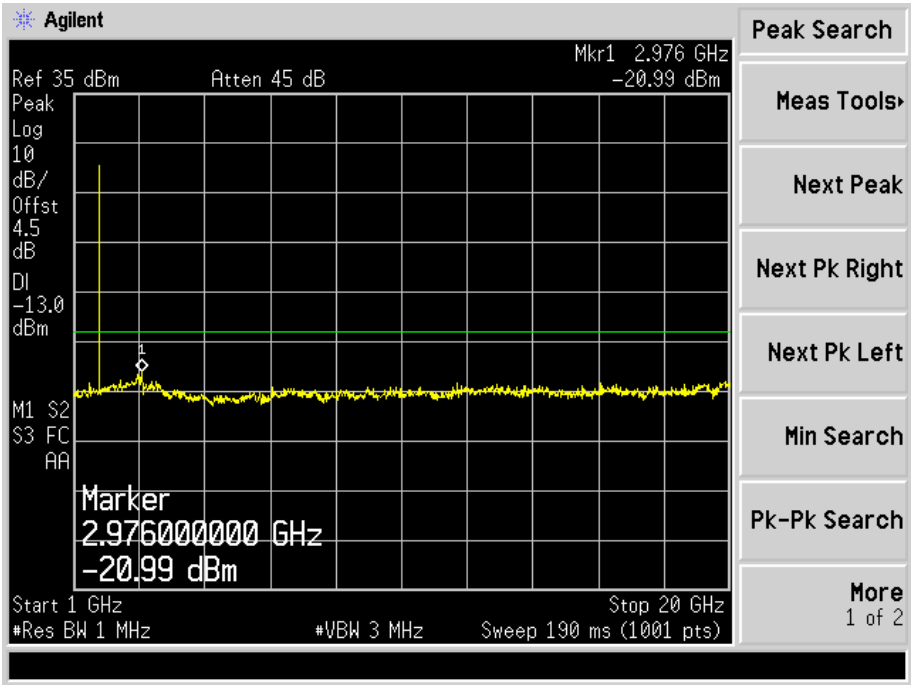
HSUPA Low Channel



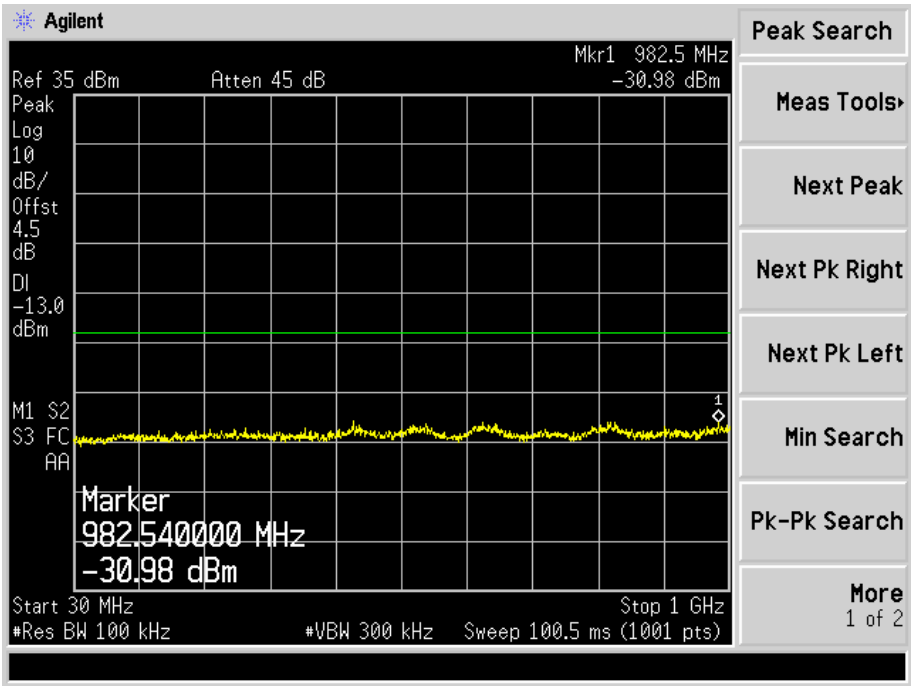


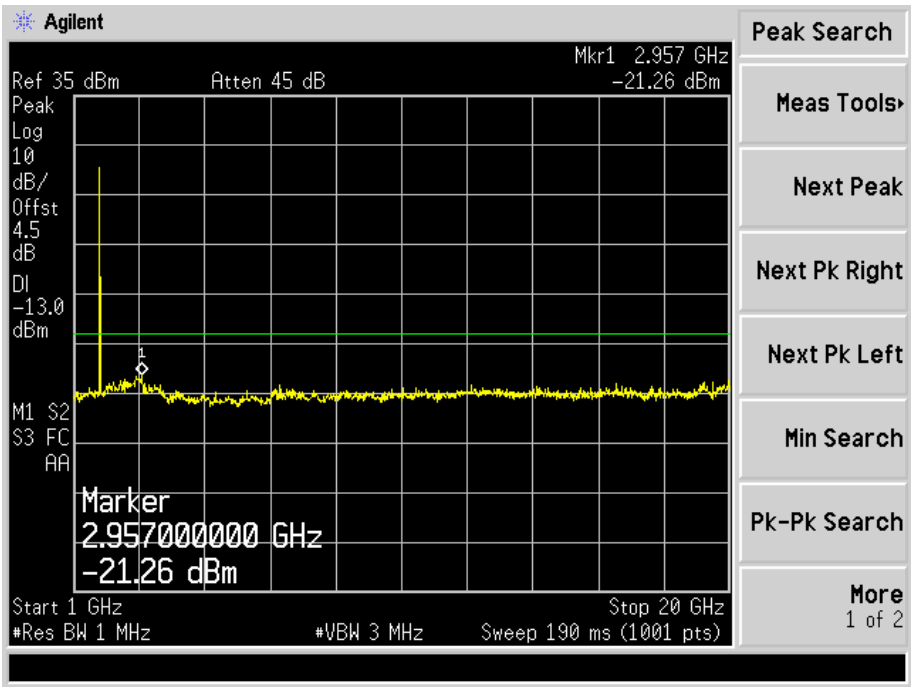
HSUPA Middle Channel



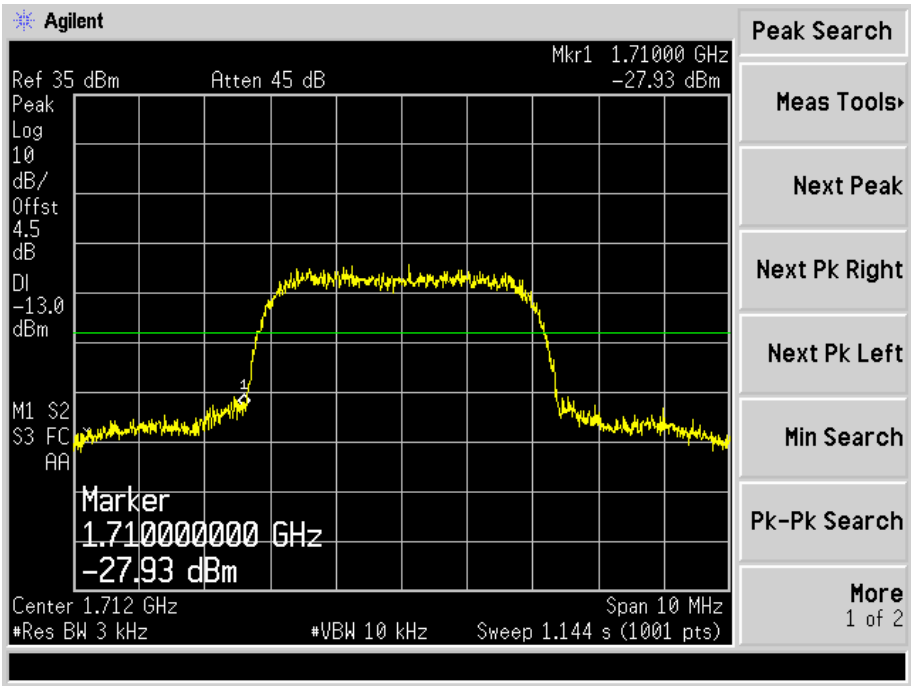


HSUPA High Channel

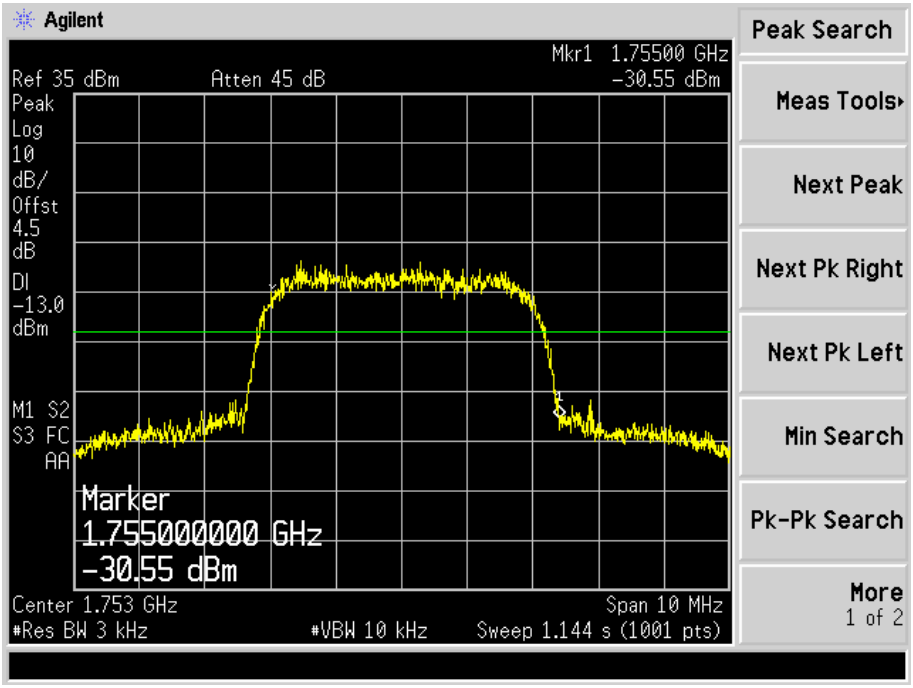




HSUPA Low Band Spurious Emission

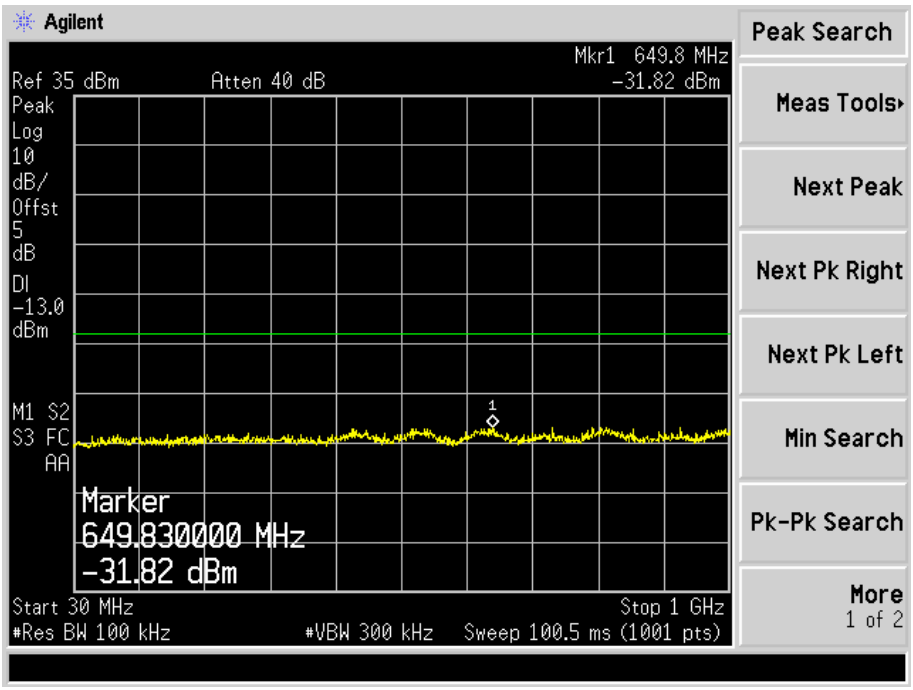


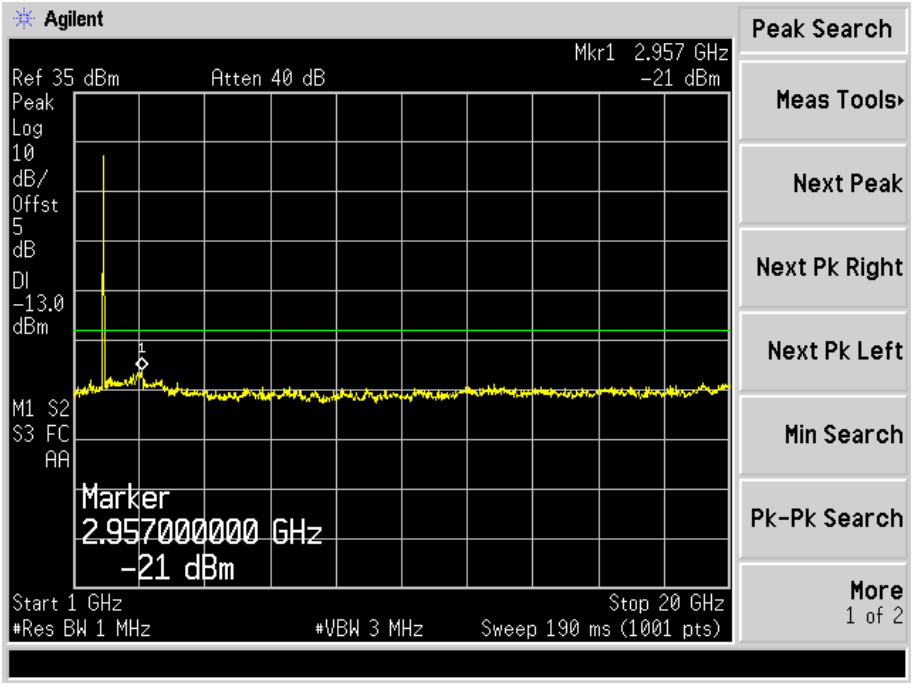
HSUPA High Band Spurious Emission



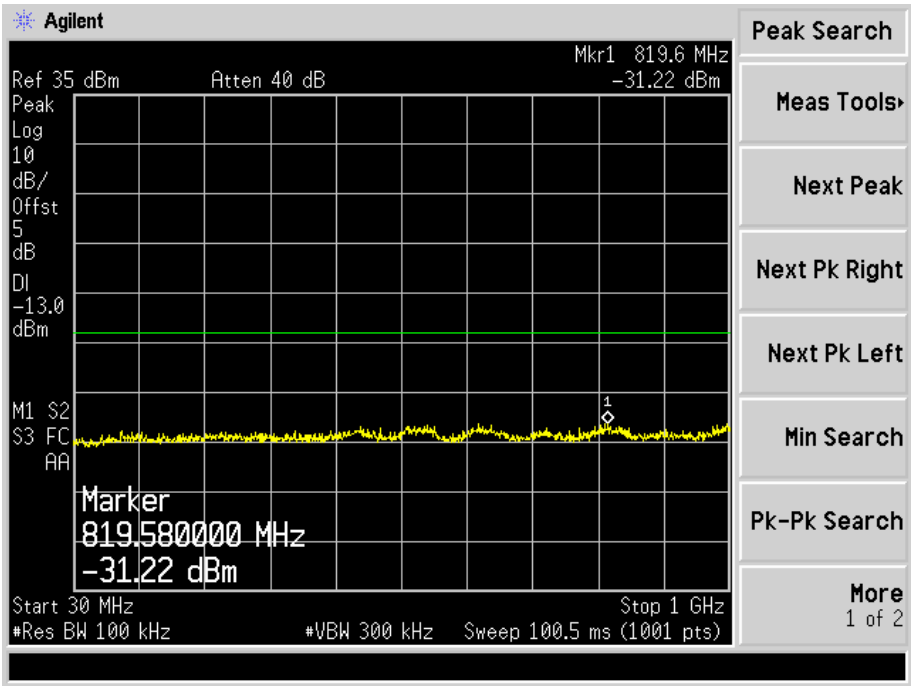
For Band II

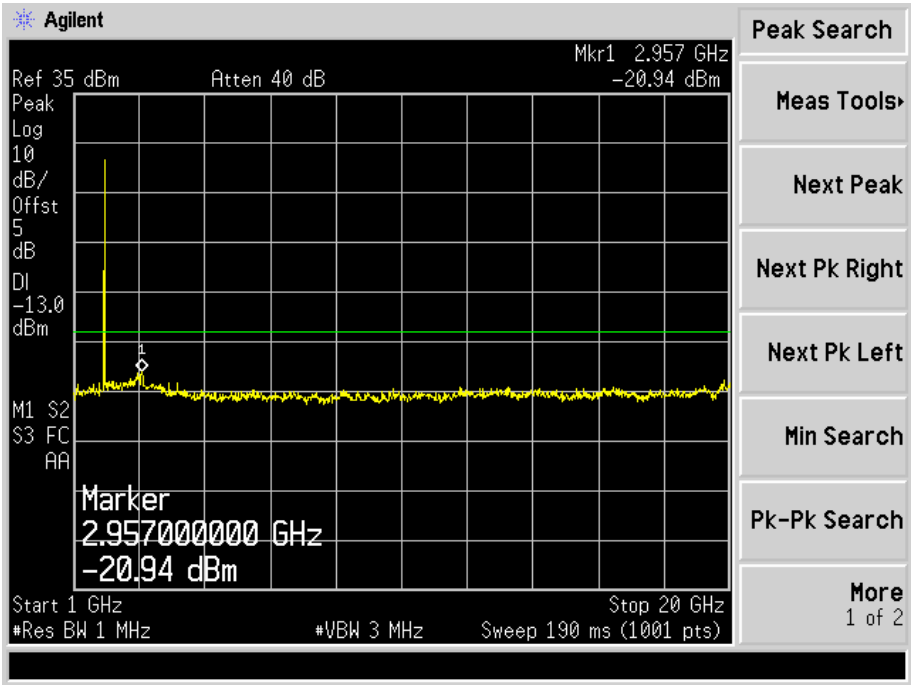
WCDMA Low Channel



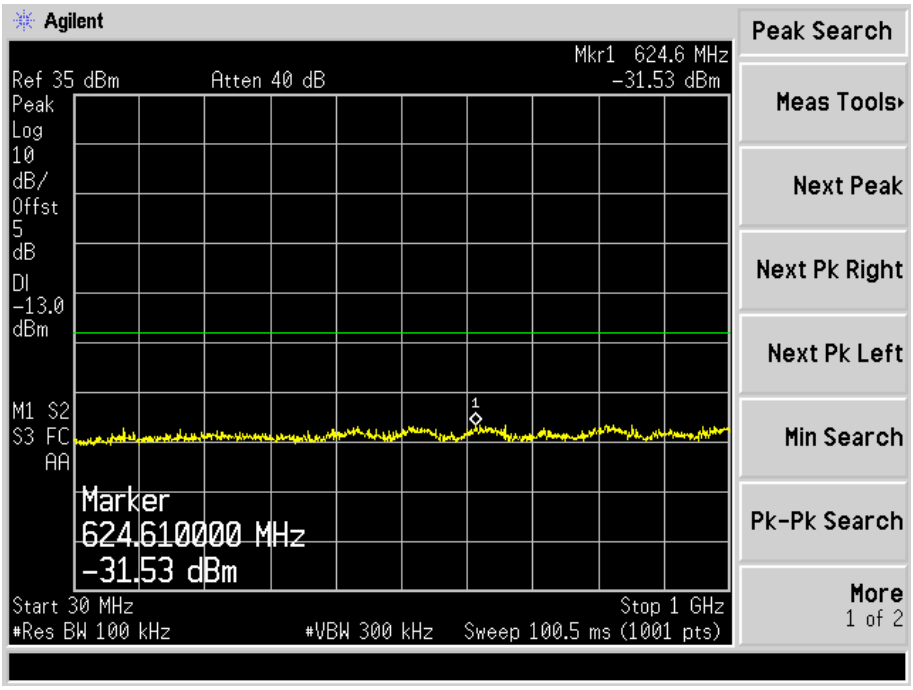


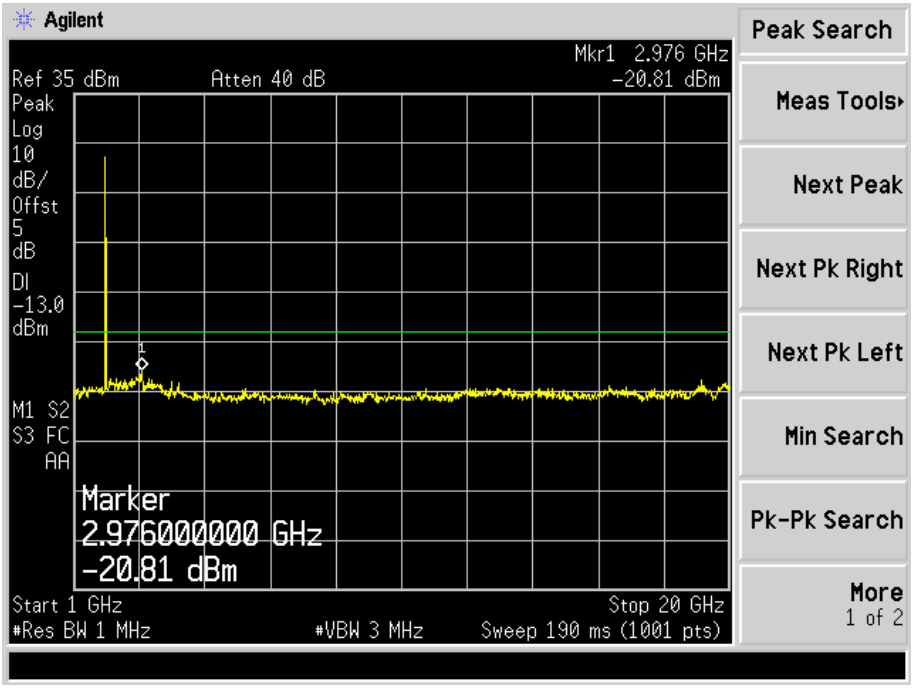
WCDMA Middle Channel



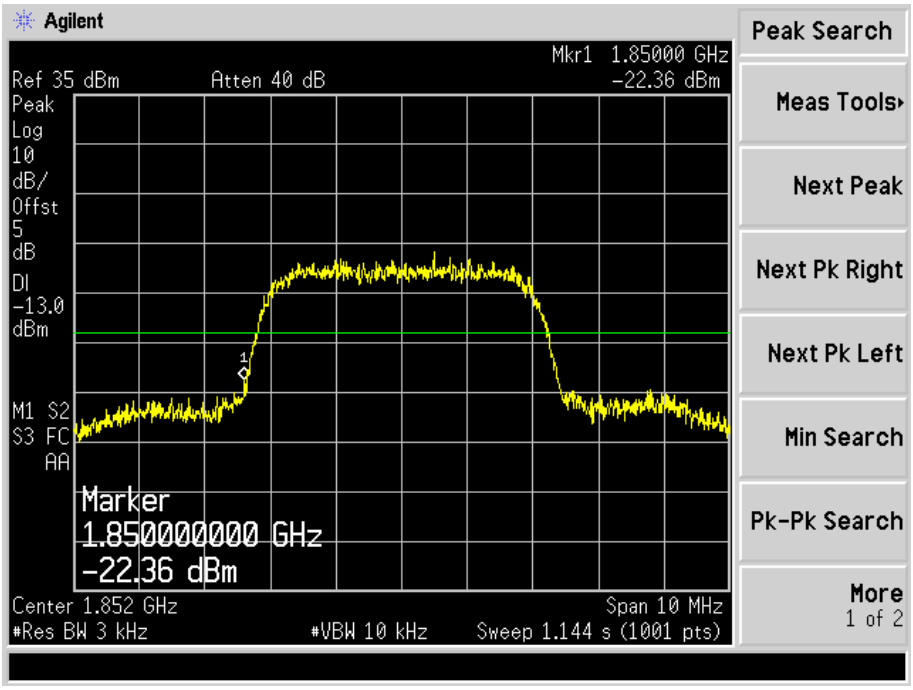


WCDMA High Channel

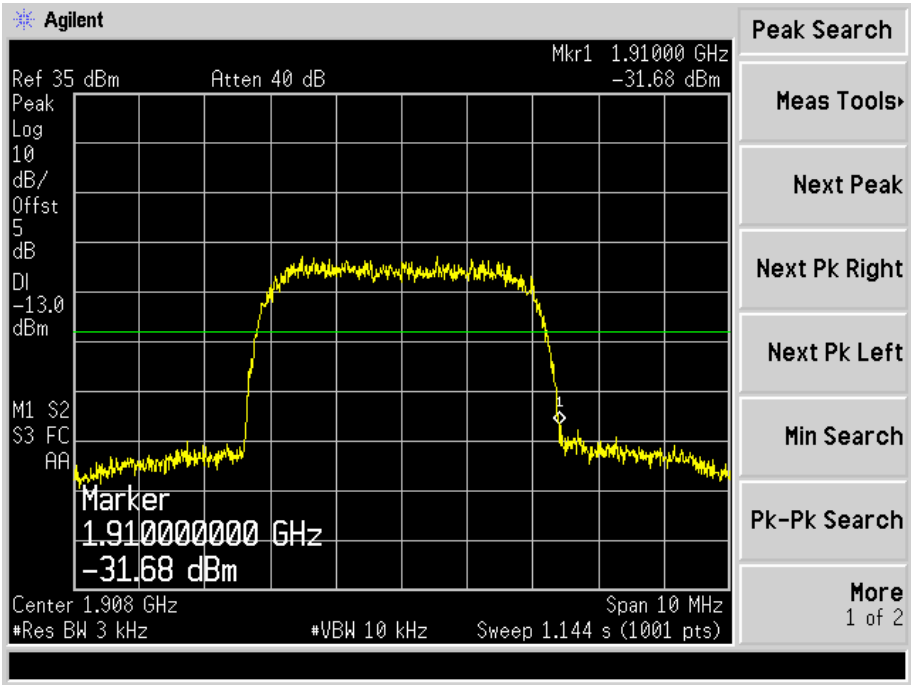




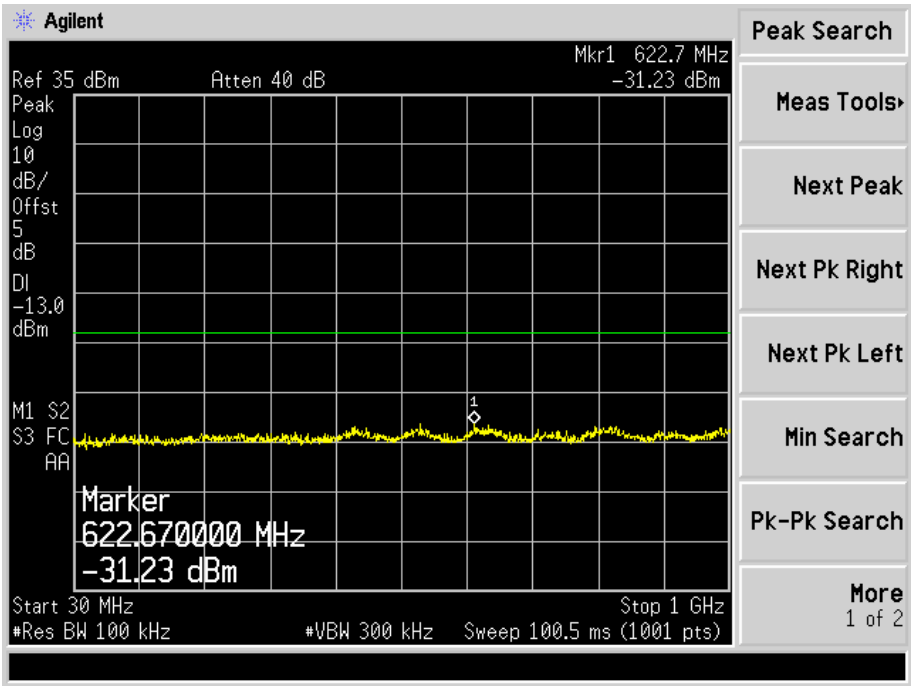
WCDMA Low Band Spurious Emission

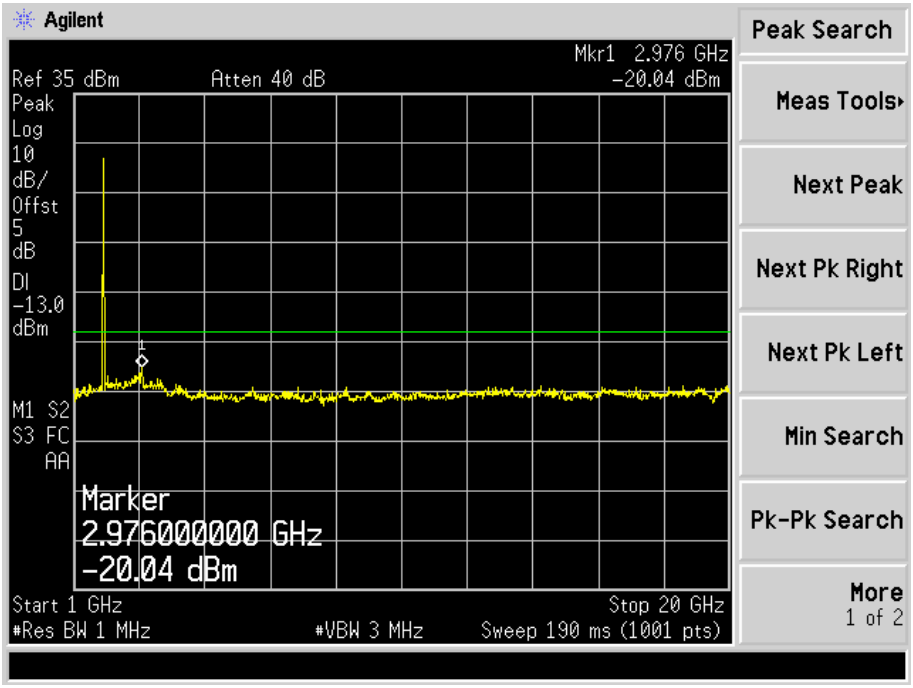


WCDMA High Band Spurious Emission

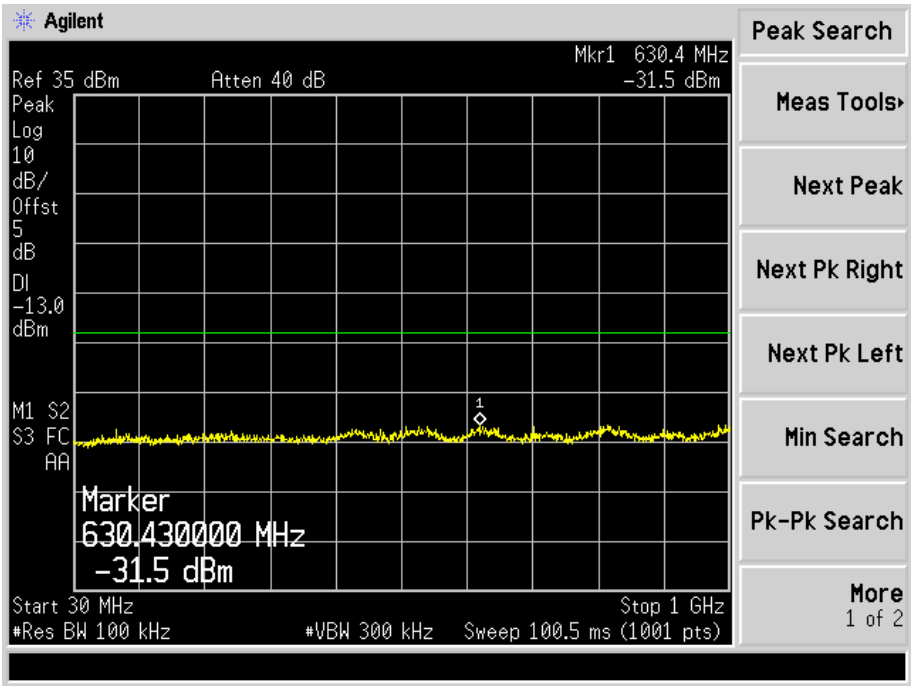


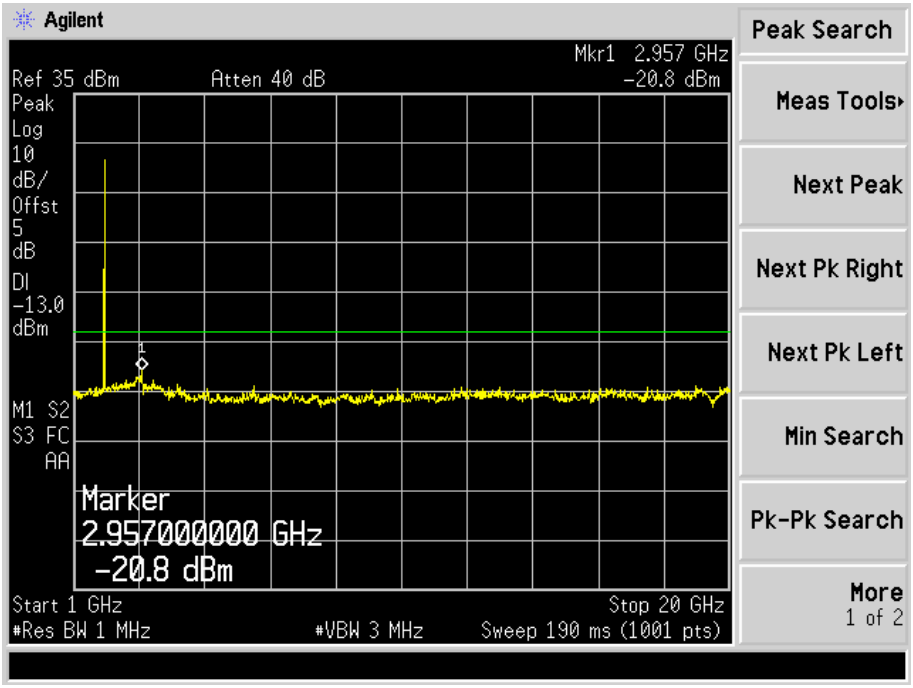
HSDPA Low Channel



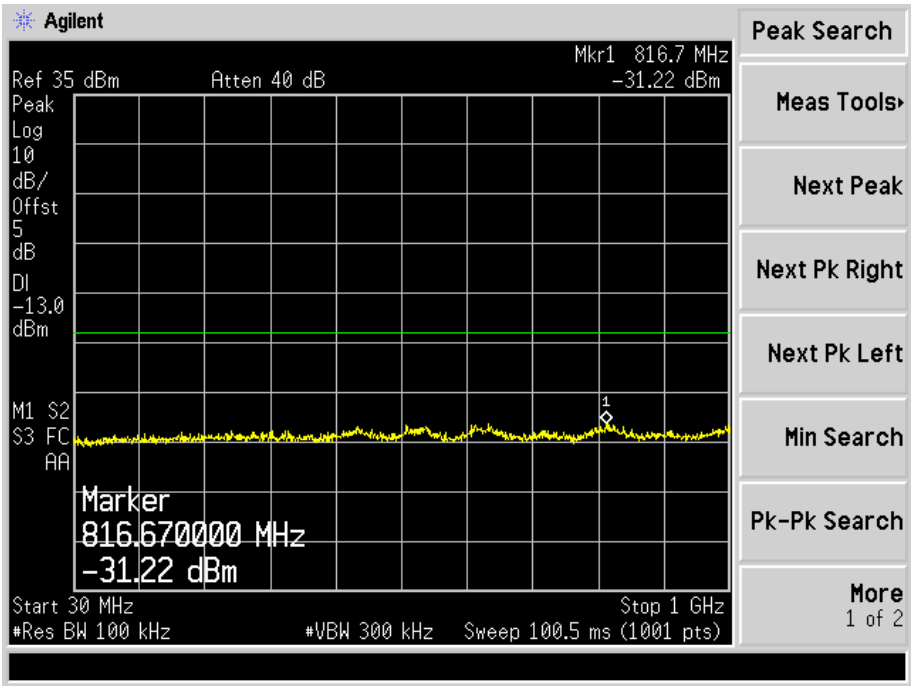


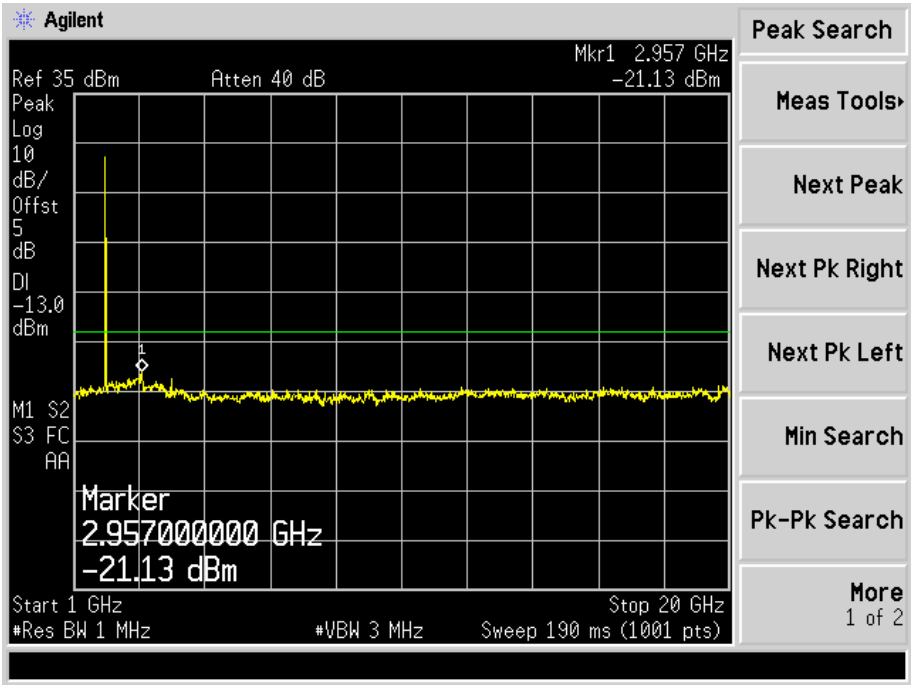
HSDPA Middle Channel



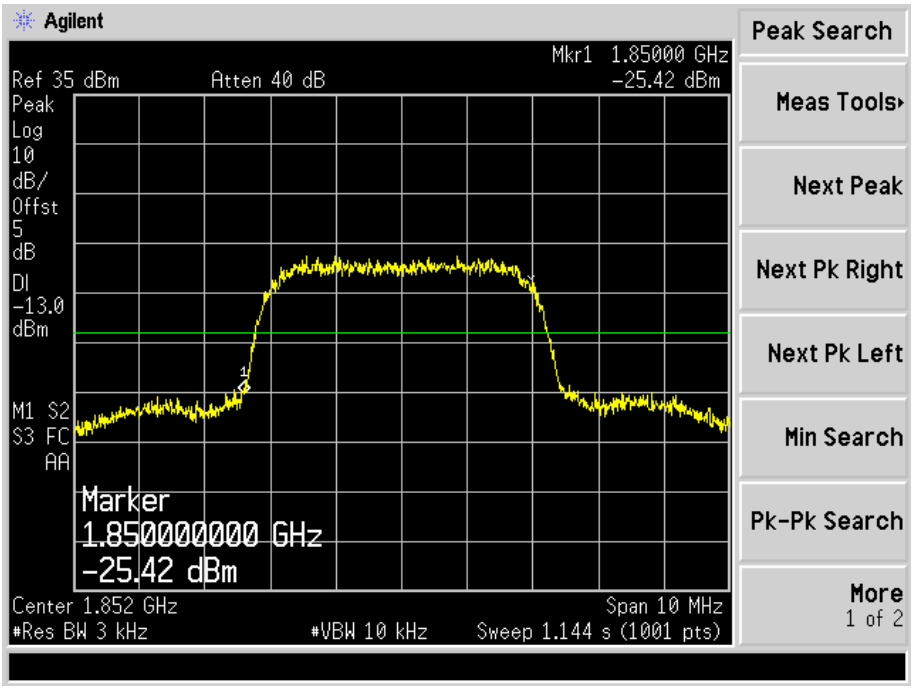


HSDPA High Channel

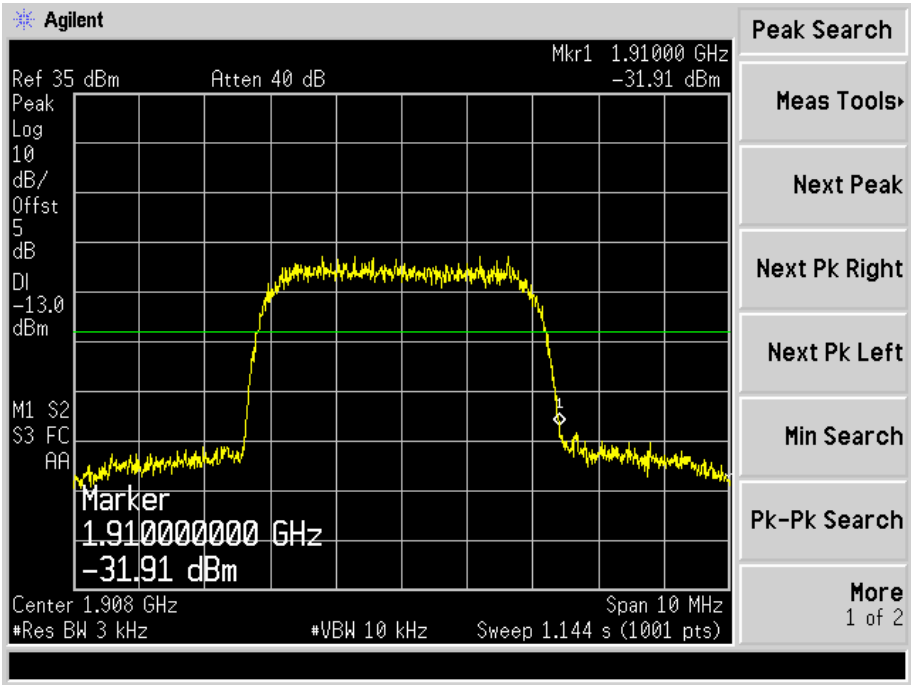




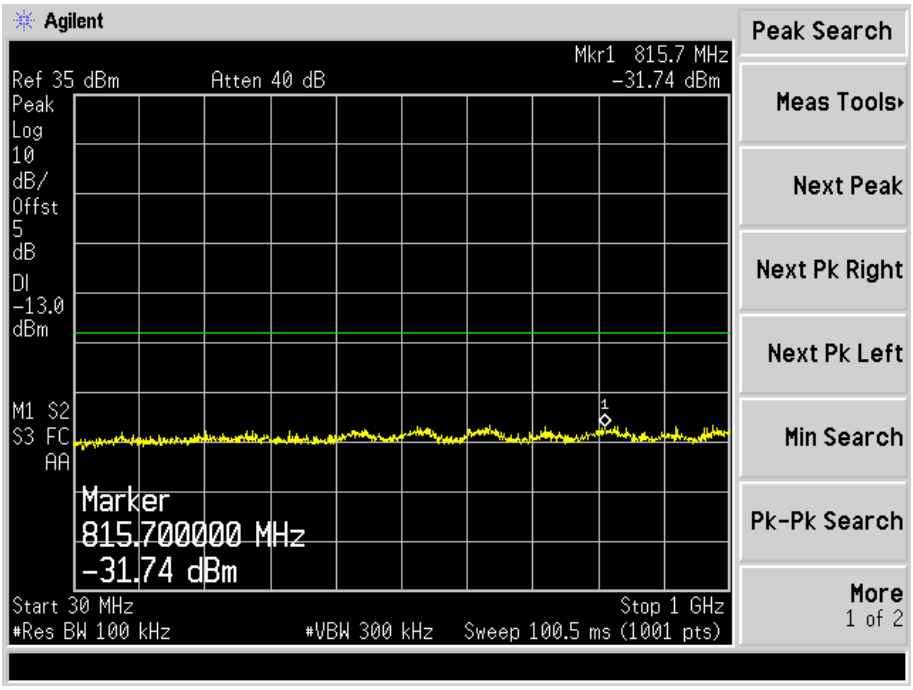
HSDPA Low Band Spurious Emission

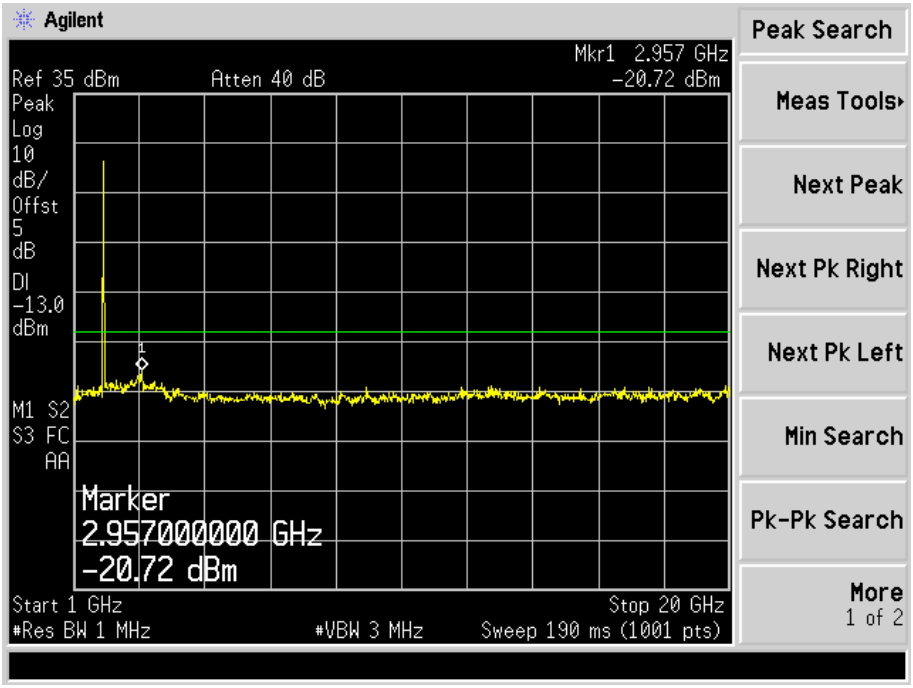


HSDPA High Band Spurious Emission

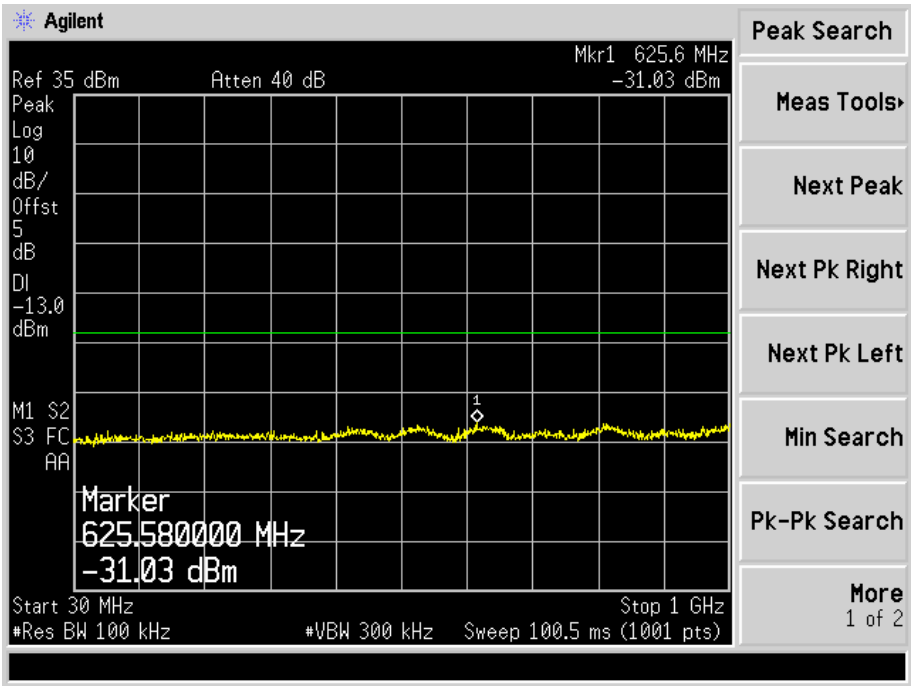


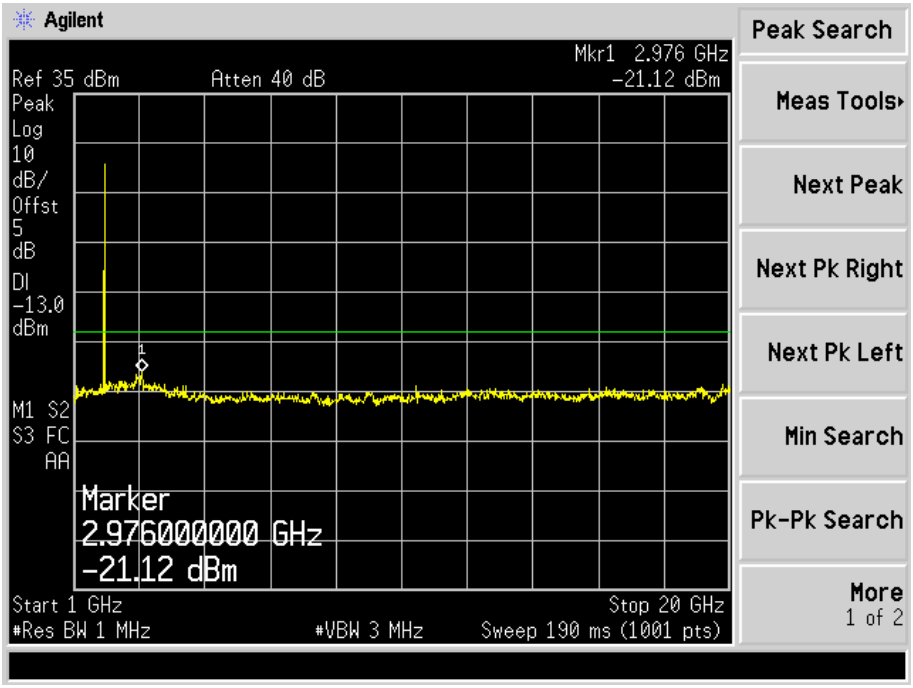
HSUPA Low Channel



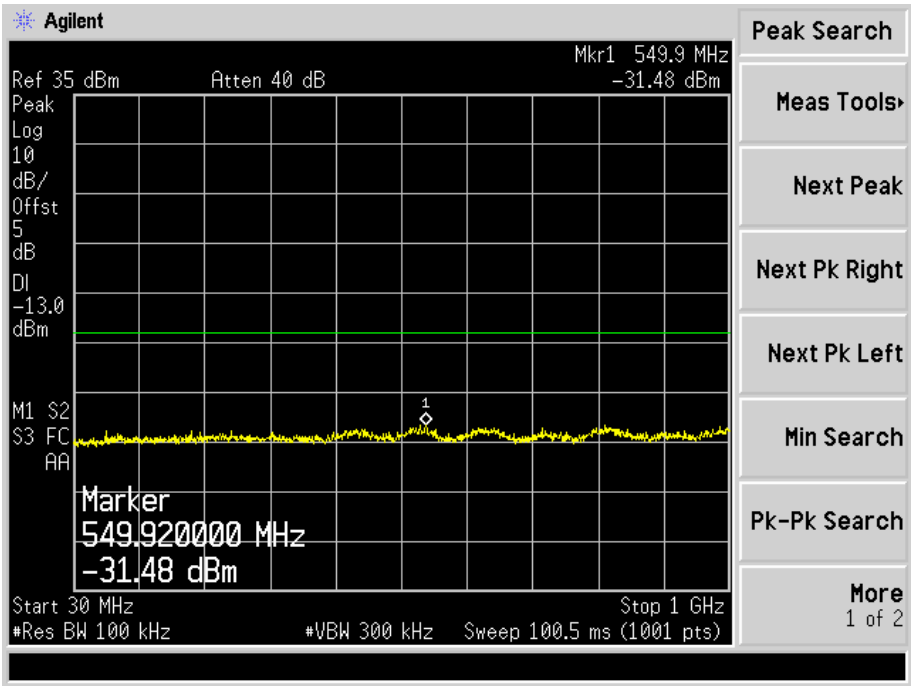


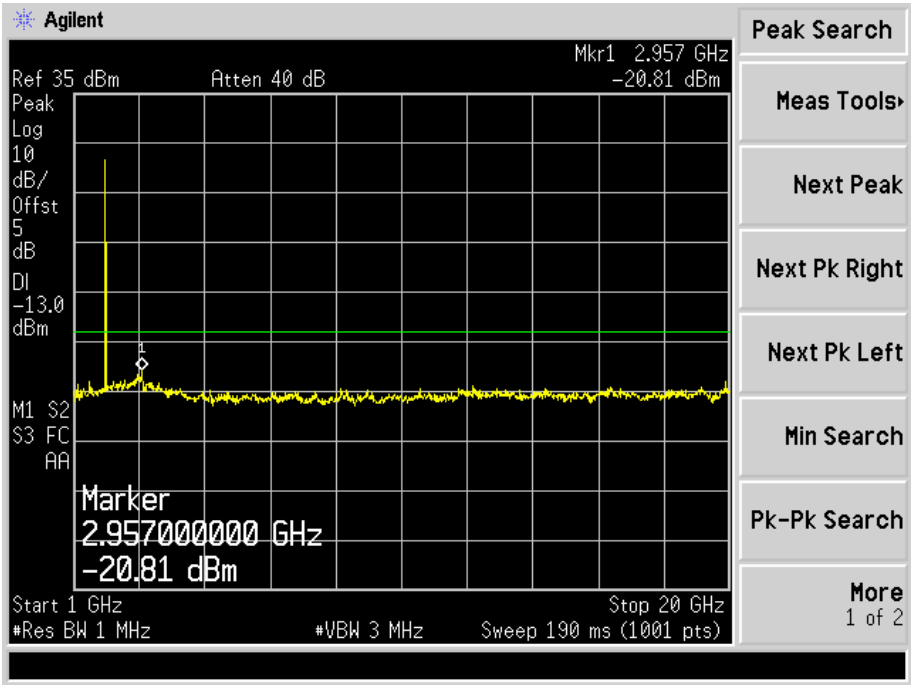
HSUPA Middle Channel



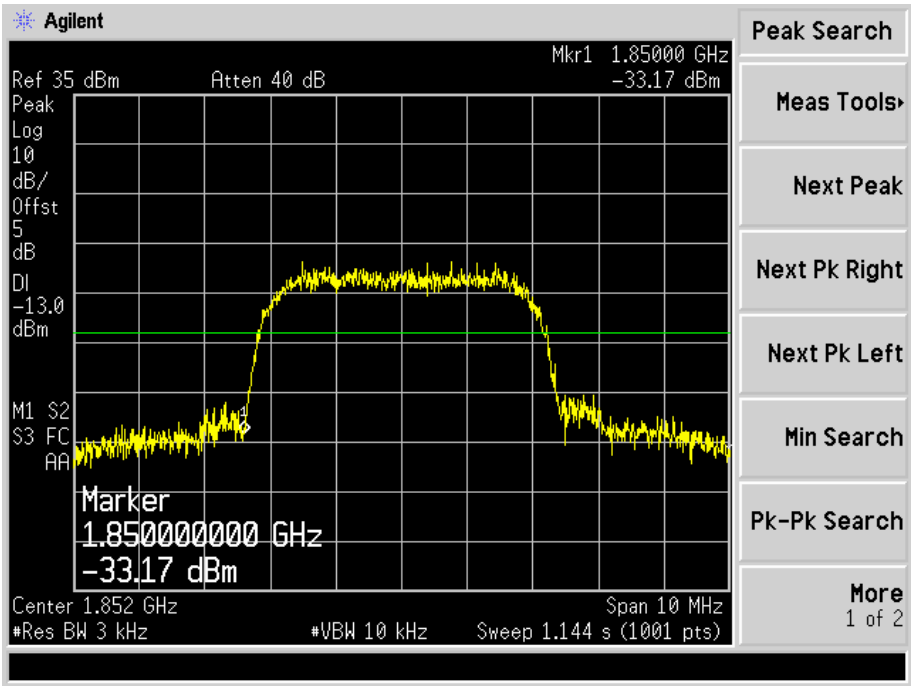


HSUPA High Channel

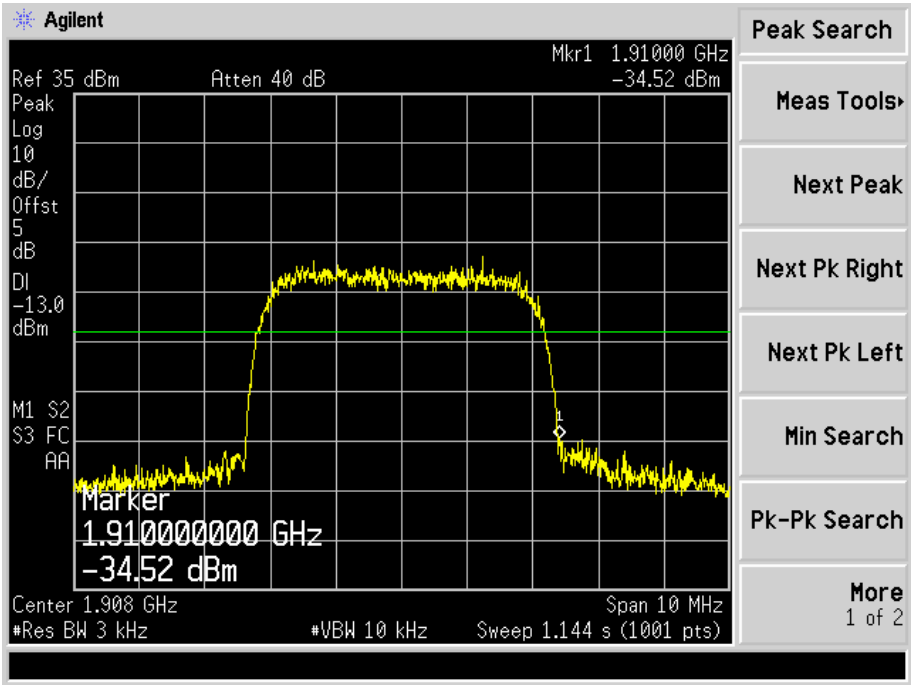




HSUPA Low Band Spurious Emission



HSUPA High Band Spurious Emission



8. Spurious Radiated Emissions

8.1 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.

According to §27.53 (h), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

8.2 Test Procedure

1. The setup of EUT is according with per ANSI/TIA Standard 603D and ANSI C63.10-2013 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)

8.3 Environmental Conditions

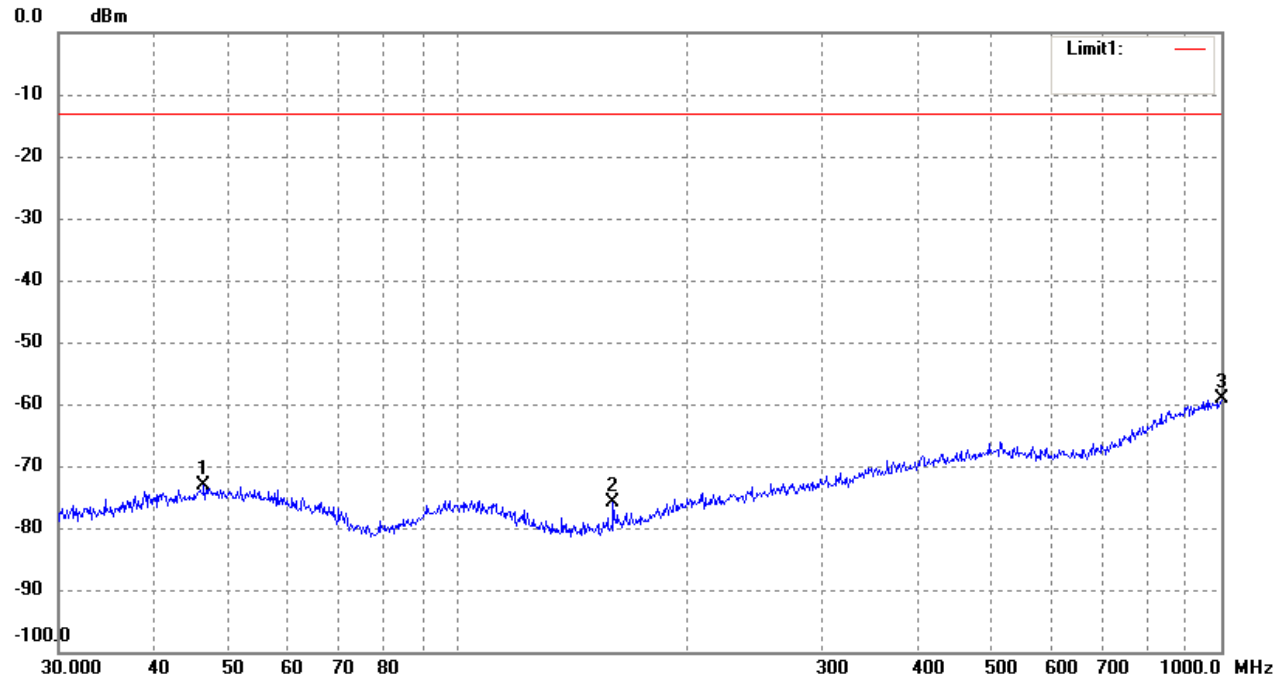
Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

8.4 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:

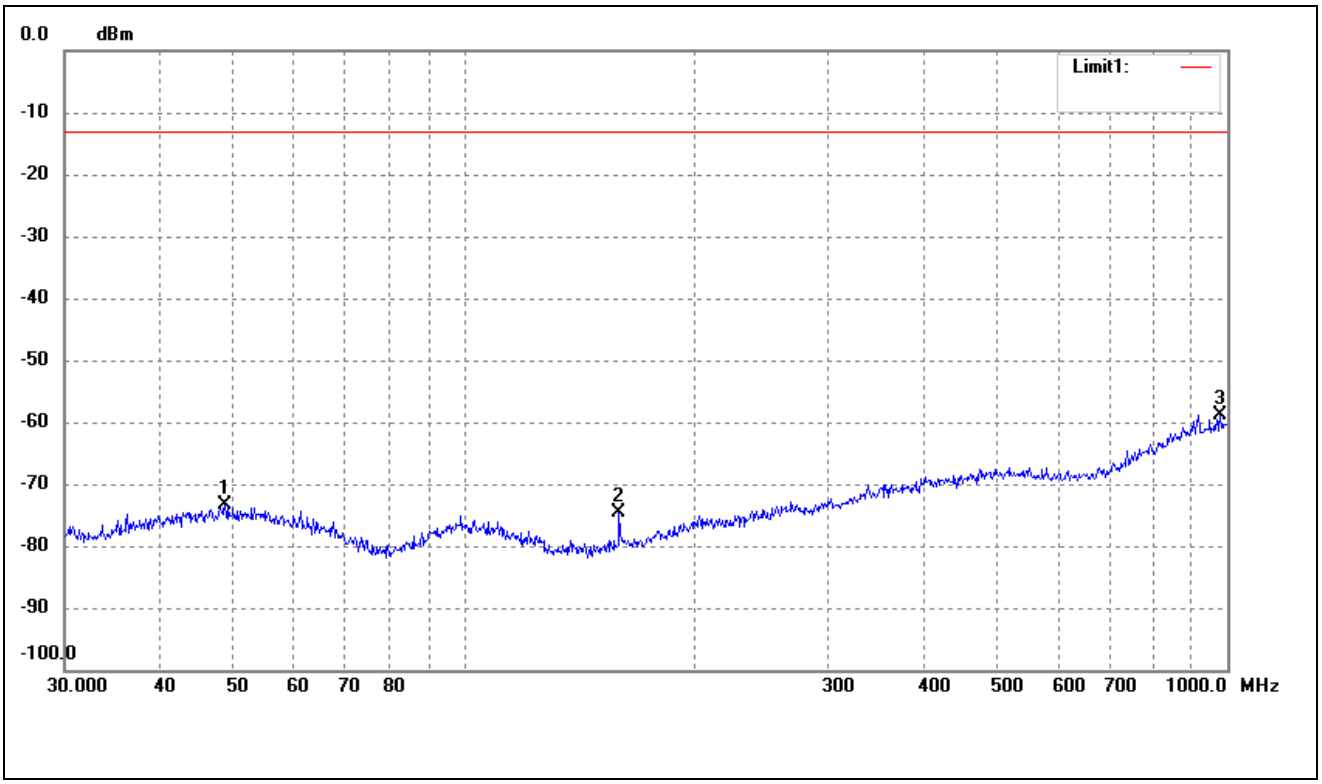
Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Spurious Emission From 30MHz to 1GHz
For Cellular Band_GPRS850 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

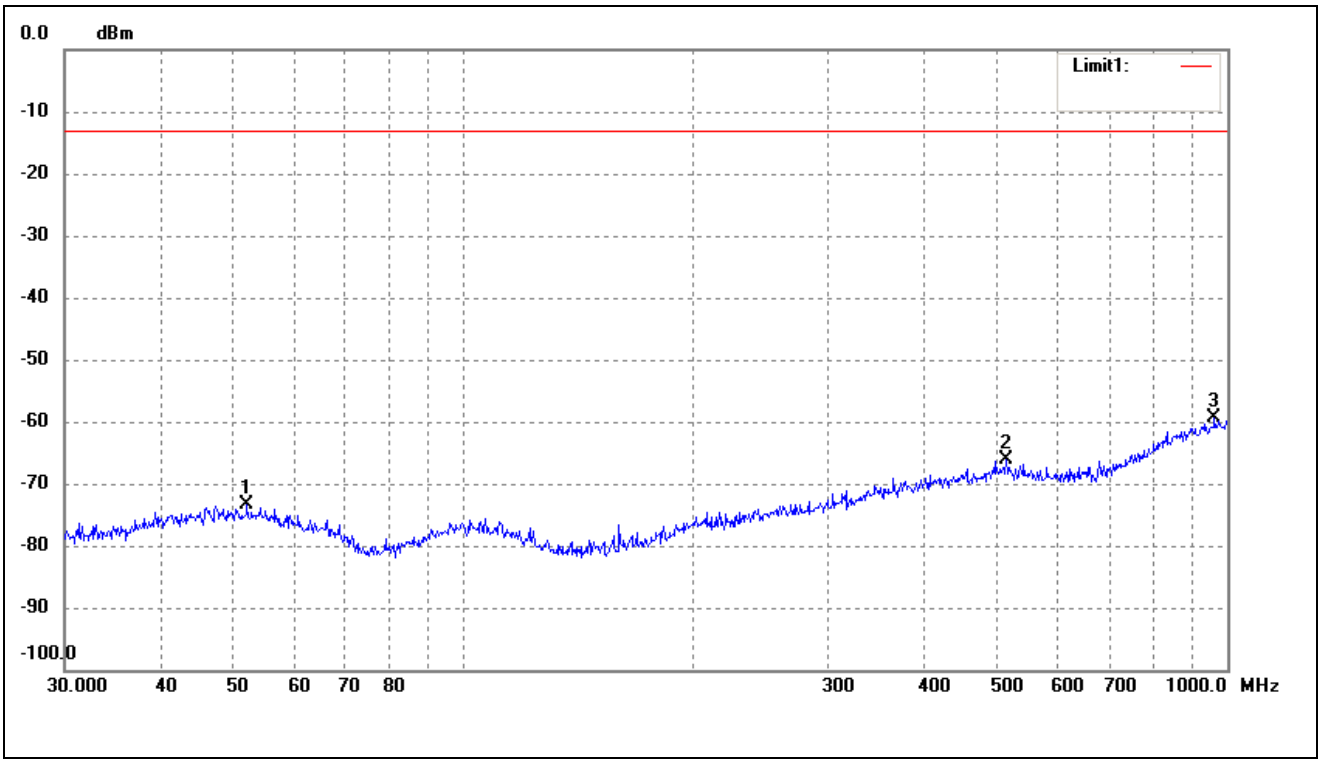
Vertical:



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

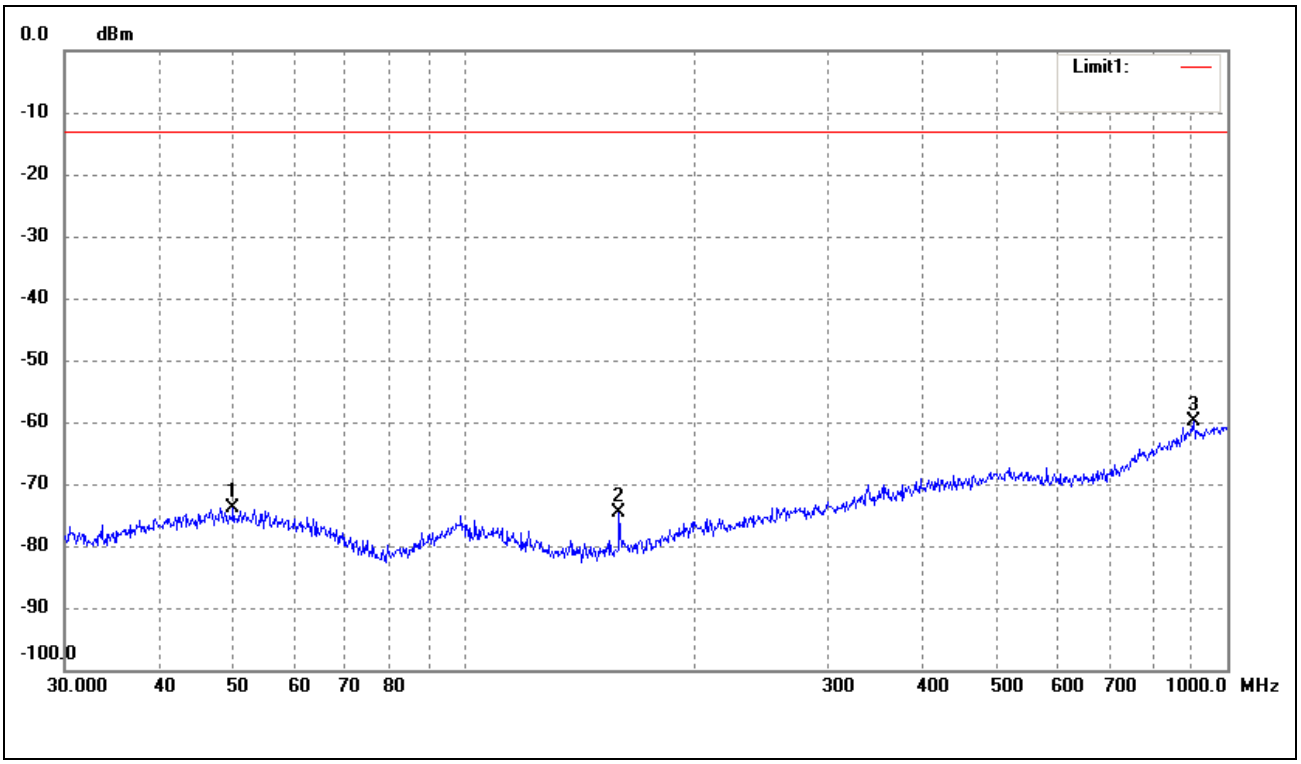
For PCS Band_GPRS1900 Mode

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:

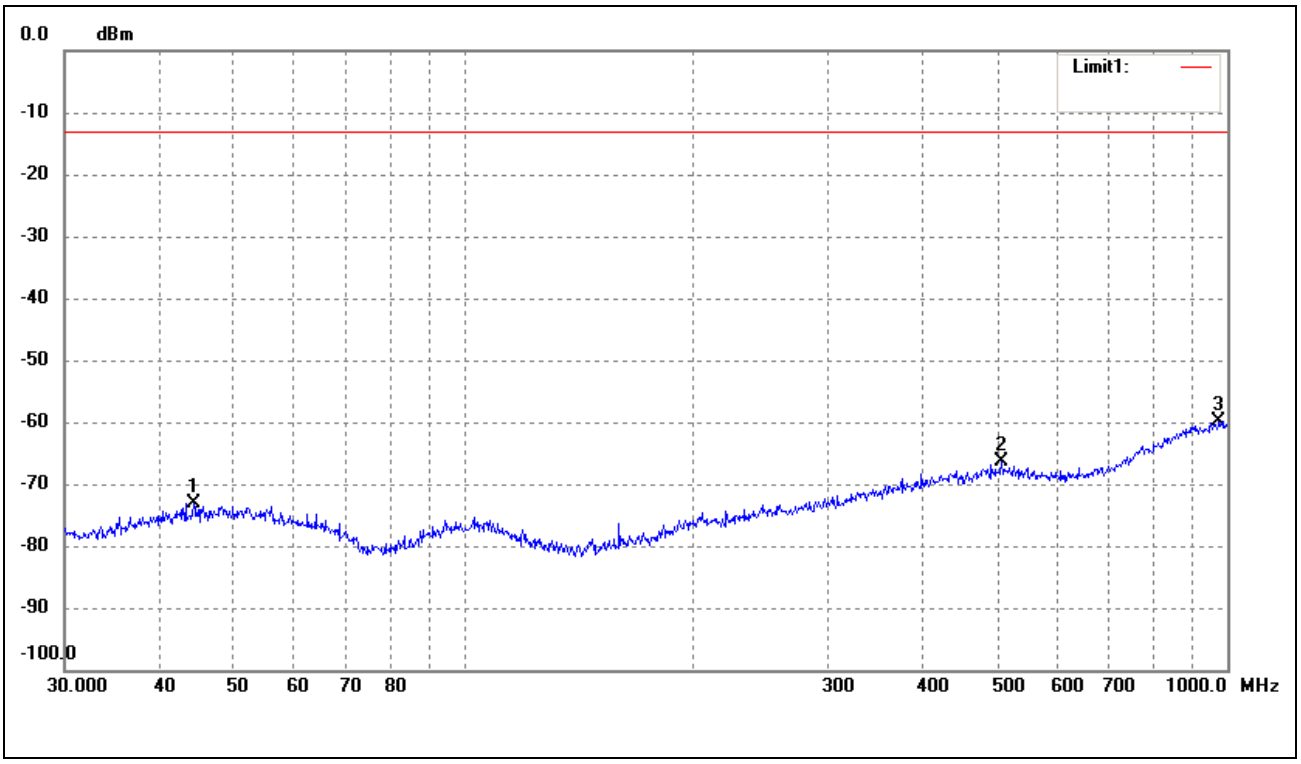


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	49.8814	-78.20	4.36	-73.84	-13.00	-60.84	ERP
2	159.7844	-74.16	-0.55	-74.71	-13.00	-61.71	ERP
3	903.3094	-76.99	17.22	-59.77	-13.00	-46.77	ERP

Spurious Emission From 30MHz to 1GHz

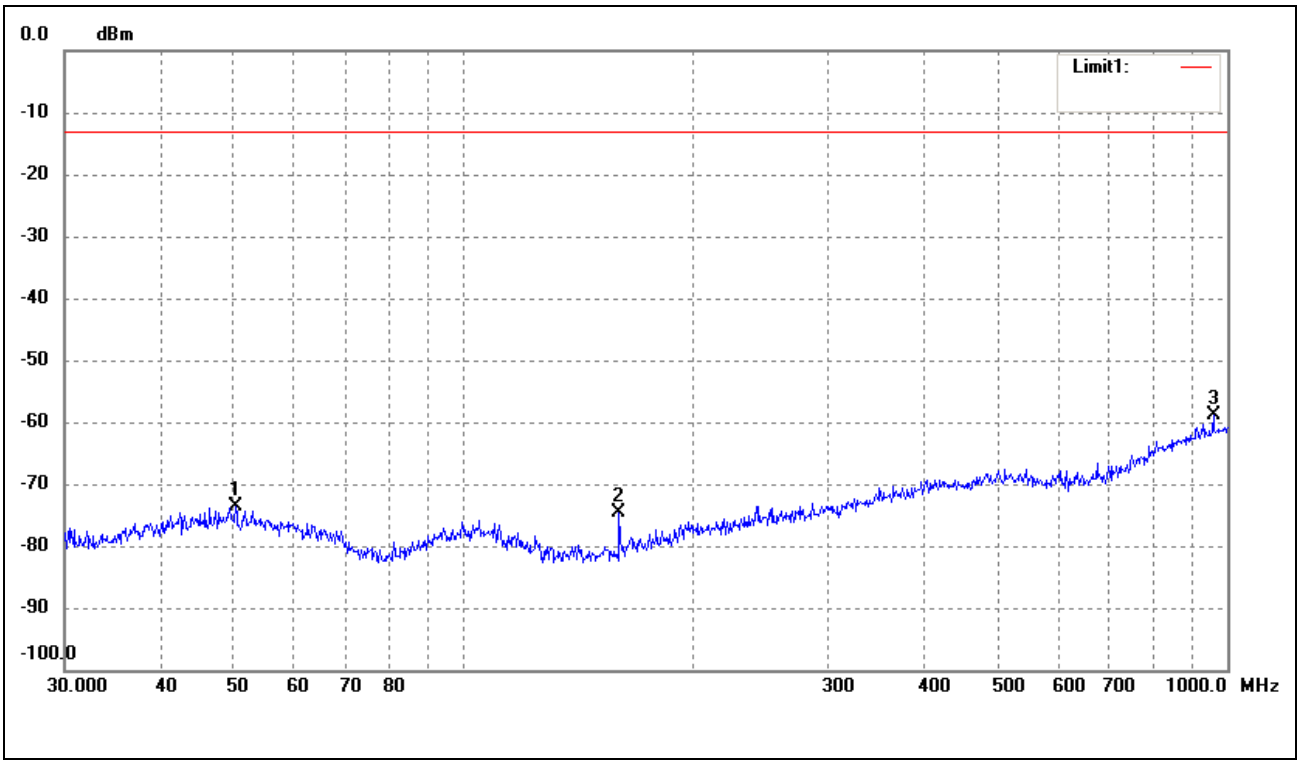
For band V Mode

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:

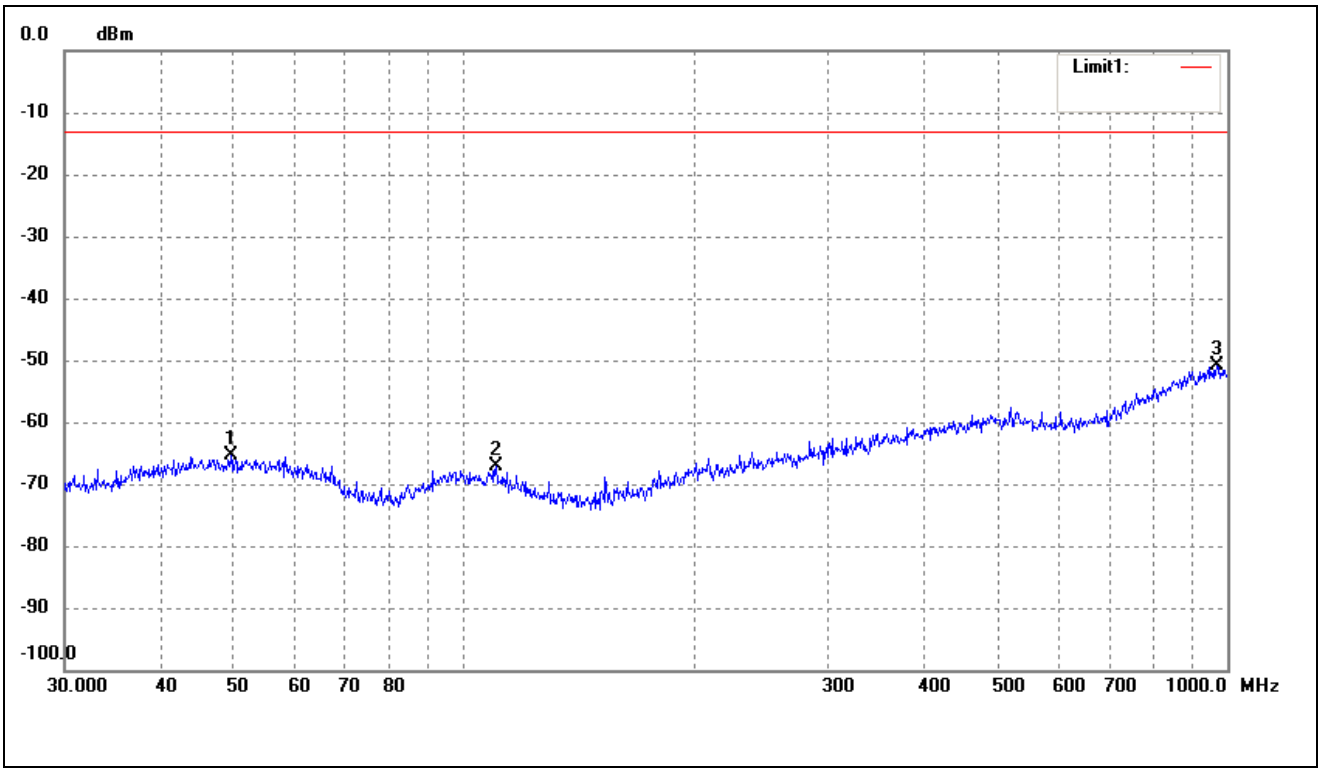


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	50.2325	-78.06	4.33	-73.73	-13.00	-60.73	ERP
2	159.7844	-74.09	-0.55	-74.64	-13.00	-61.64	ERP
3	958.7943	-76.62	17.86	-58.76	-13.00	-45.76	ERP

Spurious Emission From 30MHz to 1GHz

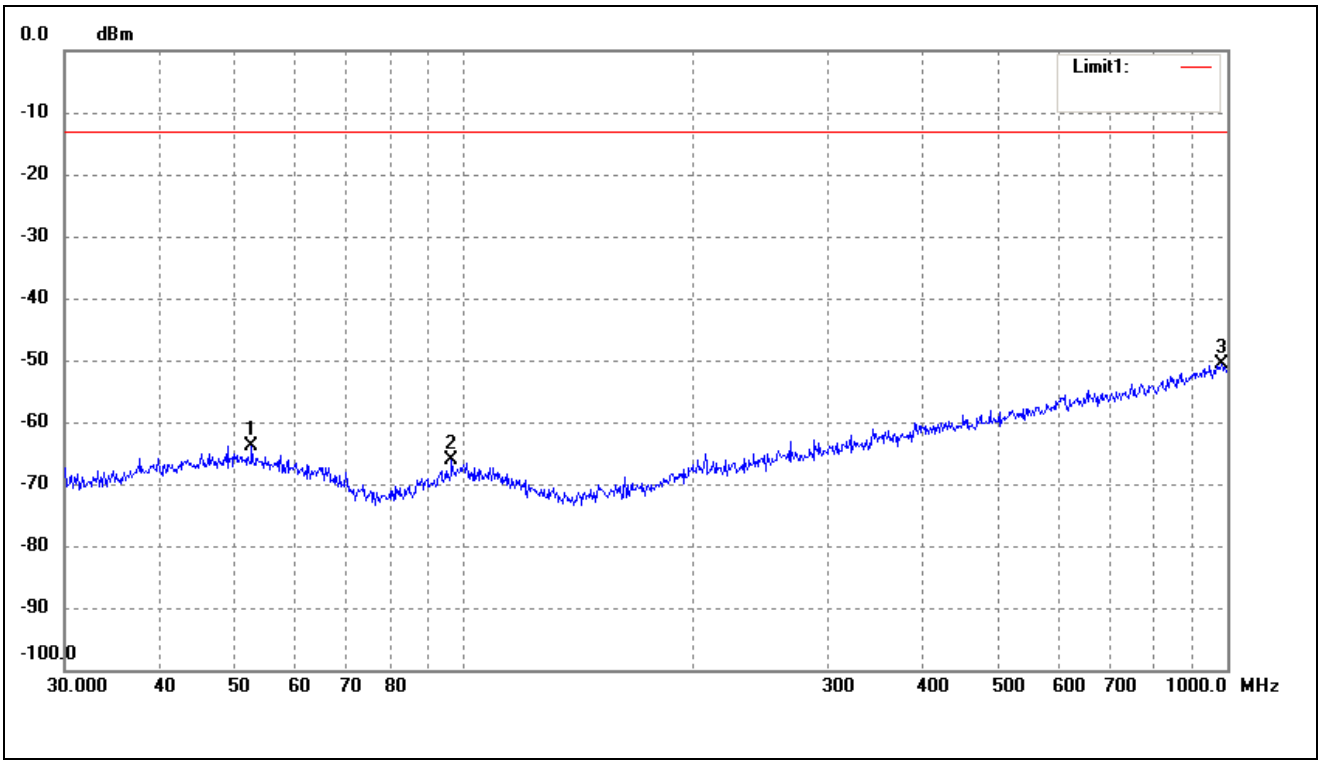
For band IV Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	49.5328	-69.71	4.35	-65.36	-13.00	-52.36	ERP
2	110.1816	-69.27	2.17	-67.10	-13.00	-54.10	ERP
3	968.9338	-68.86	18.01	-50.85	-13.00	-37.85	ERP

Vertical:

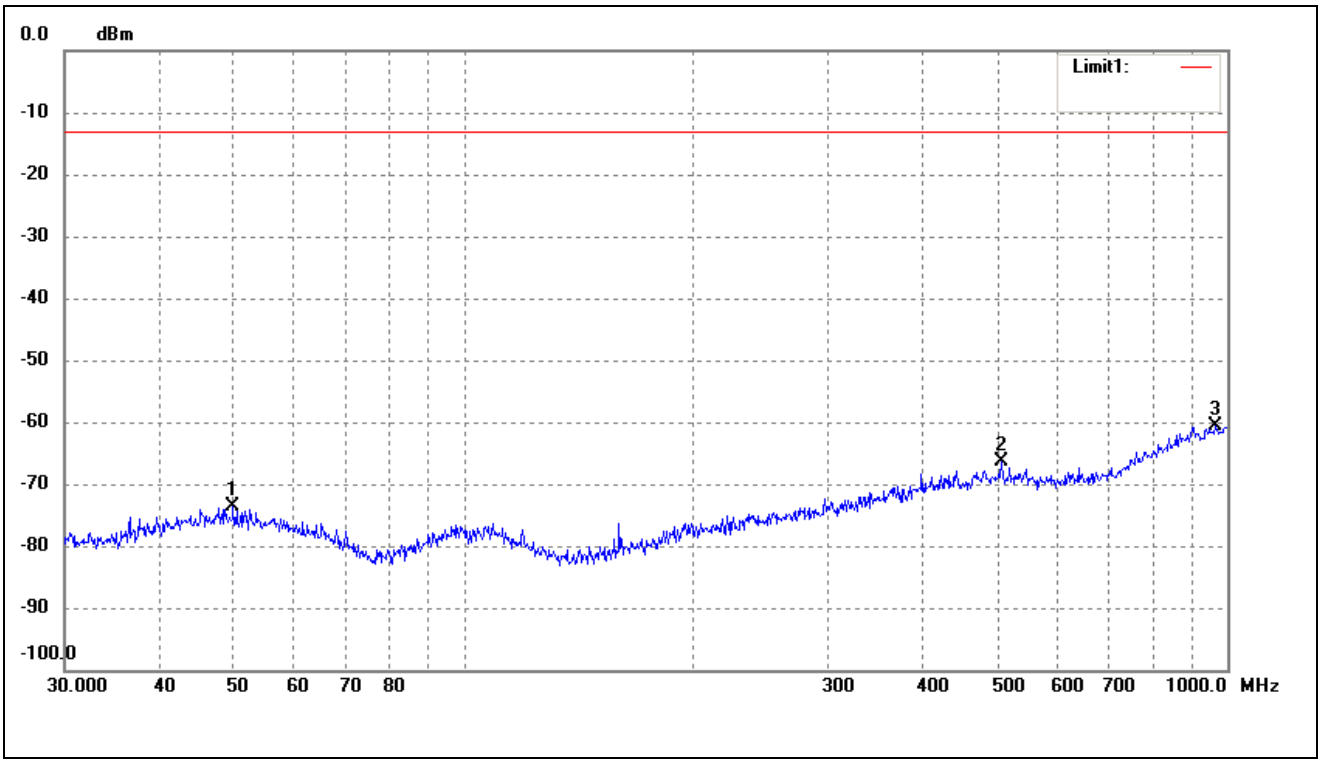


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	52.7600	-67.91	4.07	-63.84	-13.00	-50.84	ERP
2	96.4362	-67.90	1.81	-66.09	-13.00	-53.09	ERP
3	982.6200	-68.92	18.22	-50.70	-13.00	-37.70	ERP

Spurious Emission From 30MHz to 1GHz

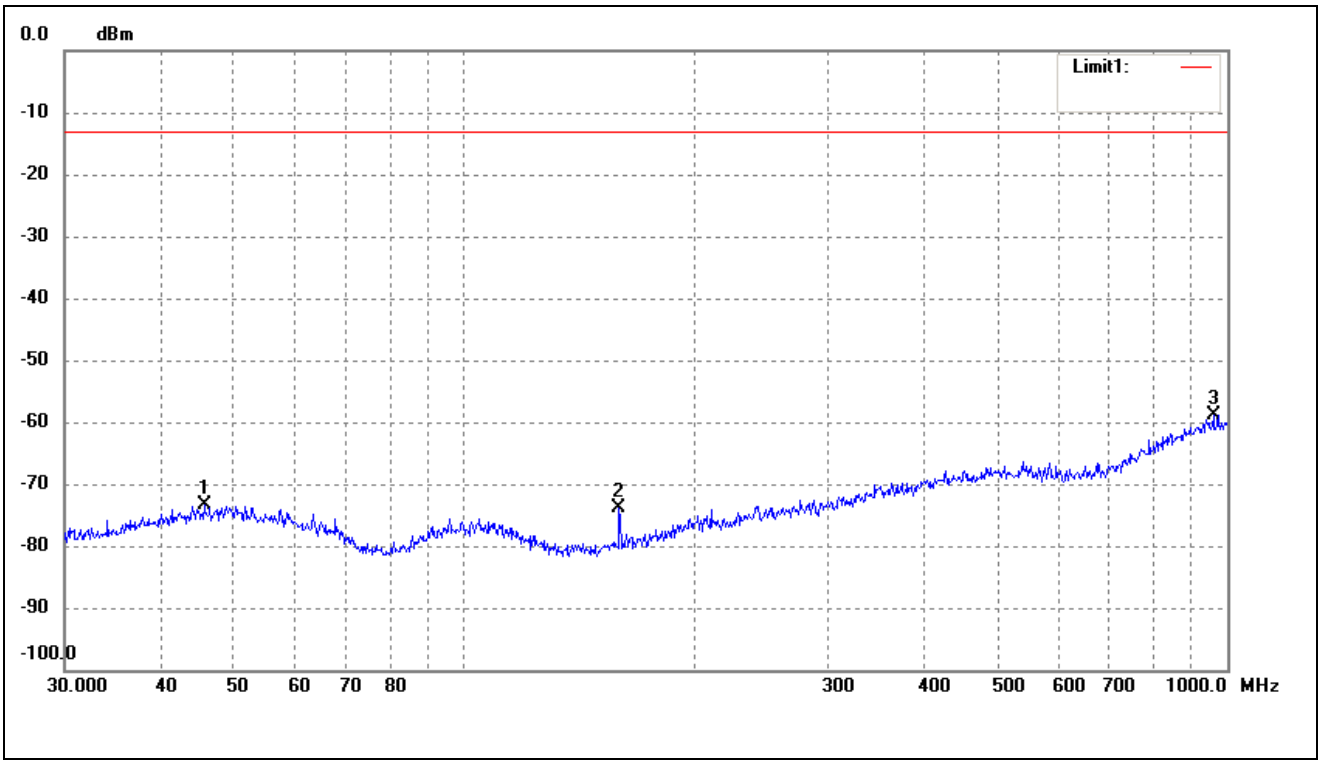
For band II Mode

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	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
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	-76.62	17.86	-58.76	-13.00	-45.76	ERP

Spurious Emissions Above 1GHz

For Cellular Band_GPRS850 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_GPRS1900 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 4 Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (1712.4MHz)						
3424.8	-58.21	9.87	-48.34	-13.00	-35.34	H
5137.2	-58.73	13.02	-45.71	-13.00	-32.71	H
3424.8	-57.18	9.87	-47.31	-13.00	-34.31	V
5137.2	-58.41	13.02	-45.39	-13.00	-32.39	V
Middle Channel (1732.4MHz)						
3464.8	-57.44	9.96	-47.48	-13.00	-34.48	H
5197.2	-57.93	13.32	-44.61	-13.00	-31.61	H
3464.8	-58.39	9.96	-48.43	-13.00	-35.43	V
5197.2	-59.42	13.32	-46.10	-13.00	-33.10	V
High Channel (1752.6MHz)						
3505.2	-56.52	10.03	-46.49	-13.00	-33.49	H
5257.8	-59.54	14.03	-45.51	-13.00	-32.51	H
3505.2	-57.02	10.03	-46.99	-13.00	-33.99	V
5257.8	-58.46	14.03	-44.43	-13.00	-31.43	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 3th 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.

According to §27.54 The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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	DC 3.3-4.2V declared by manufacturer
-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 GPRS Mode

Reference Frequency(Middle Channel): 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.8	62	0.0741
40	3.8	55	0.0657
30	3.8	44	0.0526
20	3.8	34	0.0406
10	3.8	26	0.0311
0	3.8	35	0.0418
-10	3.8	41	0.0490
-20	3.8	47	0.0562
-30	3.8	50	0.0598

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	3.8	-32	-0.0170
40	3.8	-21	-0.0112
30	3.8	-18	-0.0096
20	3.8	-29	-0.0154
10	3.8	-28	-0.0149
0	3.8	-36	-0.0191
-10	3.8	-44	-0.0234
-20	3.8	-47	-0.0250
-30	3.8	-52	-0.0277

For WCDMA Band 5 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	3.8	-51	-0.0610
40	3.8	-43	-0.0514
30	3.8	-34	-0.0407
20	3.8	-31	-0.0371
10	3.8	-41	-0.0490
0	3.8	-39	-0.0466
-10	3.8	-43	-0.0514
-20	3.8	-55	-0.0658
-30	3.8	-56	-0.0670

For WCDMA Band 4 Mode

Reference Frequency(Middle Channel): 1732.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.8	72	0.0416
40	3.8	59	0.0341
30	3.8	55	0.0317
20	3.8	64	0.0369
10	3.8	50	0.0289
0	3.8	39	0.0225
-10	3.8	85	0.0491
-20	3.8	68	0.0393
-30	3.8	58	0.0335

For WCDMA Band 2 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	3.8	-42	-0.0223
40	3.8	-35	-0.0186
30	3.8	-51	-0.0271
20	3.8	-34	-0.0181
10	3.8	-42	-0.0223
0	3.8	-35	-0.0186
-10	3.8	-54	-0.0287
-20	3.8	-52	-0.0277
-30	3.8	-56	-0.0298

For HSDPA Band 5 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	3.8	-52	-0.0622
40	3.8	-44	-0.0526
30	3.8	-36	-0.0430
20	3.8	-42	-0.0502
10	3.8	-44	-0.0526
0	3.8	-56	-0.0670
-10	3.8	-43	-0.0514
-20	3.8	-56	-0.0670
-30	3.8	-62	-0.0741

For HSDPA Band 4 Mode

Reference Frequency(Middle Channel): 1732.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.8	63	0.0364
40	3.8	50	0.0289
30	3.8	46	0.0266
20	3.8	55	0.0317
10	3.8	41	0.0237
0	3.8	30	0.0173
-10	3.8	76	0.0439
-20	3.8	59	0.0341
-30	3.8	49	0.0283

For HSDPA Band 2 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	3.8	-62	-0.0330
40	3.8	-55	-0.0293
30	3.8	-45	-0.0240
20	3.8	-52	-0.0277
10	3.8	-67	-0.0356
0	3.8	-72	-0.0383
-10	3.8	-75	-0.0383
-20	3.8	-45	-0.0240
-30	3.8	-56	-0.0298

For HSUPA Band 5 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	3.8	-75	-0.0896
40	3.8	-67	-0.0801
30	3.8	-52	-0.0622
20	3.8	-45	-0.0538
10	3.8	-42	-0.0502
0	3.8	-42	-0.0502
-10	3.8	-52	-0.0622
-20	3.8	-68	-0.0813
-30	3.8	-58	-0.0693

For HSUPA Band 4 Mode

Reference Frequency(Middle Channel): 1732.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.8	73	0.0421
40	3.8	60	0.0346
30	3.8	56	0.0323
20	3.8	65	0.0375
10	3.8	51	0.0294
0	3.8	40	0.0231
-10	3.8	86	0.0496
-20	3.8	69	0.0398
-30	3.8	56	0.0323

For HSUPA Band 2 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	3.8	71	0.0378
40	3.8	58	0.0309
30	3.8	54	0.0287
20	3.8	63	0.0335
10	3.8	49	0.0261
0	3.8	38	0.0202
-10	3.8	84	0.0447
-20	3.8	67	0.0356
-30	3.8	54	0.0287

So, Frequency Stability Versus Input Voltage is:

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	26	0.0311
	3.8	34	0.0406
	4.3	35	0.0418
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	-36	-0.0191
	3.8	-29	-0.0154
	4.3	-28	-0.0149

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	-44	-0.0526
	3.8	-31	-0.0371
	4.3	-46	-0.0550
Reference Frequency(Middle Channel): WCDMA1732.4MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	41	0.0218
	3.8	64	0.0369
	4.3	51	0.0271
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	-34	-0.0407

	3.8	-34	-0.0181
	4.3	-39	-0.0466
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	42	0.0223
	3.8	-42	-0.0502
	4.3	34	0.0181
Reference Frequency(Middle Channel): HSDPA 1732.4MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	-45	-0.0538
	3.8	55	0.0317
	4.3	-32	-0.0383
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	-51	-0.0271
	3.8	-52	-0.0277
	4.3	-48	-0.0255
Reference Frequency(Middle Channel): HSUPA 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	-42	-0.0502
	3.8	-45	-0.0538
	4.3	-52	-0.0622
Reference Frequency(Middle Channel): HSUPA 1732.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	56	0.0323
	3.8	65	0.0375
	4.3	60	0.0346

Reference Frequency(Middle Channel): HSUPA 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	67	0.0356
	3.8	63	0.0335
	4.3	58	0.0309

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