FCC Part 22H & 24E
Measurement and Test Report

For

Cyrus Technology GmbH

Hergelsbendenstrasse 49, 52080 Aachen, Germany

FCC ID: 2AI3KCS22SA

FCC Rules:	FCC Part 22H, FCC Part 24E
Product Description:	Rugged Phone
Tested Model:	CS22SA
Report No.:	STR17128217I-1
Sample Receipt Date:	2017-12-19
Tested Date:	2017-12-20 to 2018-01-09
Issued Date:	2018-01-10
Tested By:	Jason Su/ 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: Cyrus Technology GmbH
Address of applicant: Hergelsbendenstrasse 49, 52080 Aachen, Germany

Manufacturer: Cyrus Technology GmbH
Address of manufacturer: Hergelsbendenstrasse 49, 52080 Aachen, Germany

General Description of EUT:	
Product Name:	Rugged Phone
Brand Name:	CYRUS
Model No.:	CS22SA
Hardware version:	L808F-MB
Software version:	CS22_V1.01_2017_12_28
Rated Voltage:	DC 3.8V by Battery
Battery: 4000mAh	
Power Adapter:	Model: Y733-20 Input:AC100-240V 50/60Hz 0.3A Output: DC5V 2000mA
Device Category:	Portable Device
The EUT Main board support GSM850/900/DCS1800/PCS1900, WCDMA Band 2/5, LTE Band 2/4/7/13/17 function. It is intended for speech, Multimedia Message Service (MMS) transmission. It is equipped with GPRS/EDGE class 12 for GSM850/900/DCS1800/PCS1900, GPS, FM, Bluetooth and Wi-Fi functions. For more information see the following datasheet	
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT:	
2G	
Support Networks:	GSM, GPRS, EDGE
Support Band:	GSM850/PCS1900
Uplink Frequency:	GSM/GPRS/EDGE 850: 824~849MHz GSM/GPRS/EDGE 1900: 1850~1910MHz
Downlink Frequency:	GSM/GPRS/EDGE 850: 869~894MHz GSM/GPRS/EDGE 1900: 1930~1990MHz
RF Output Power:	GSM850: 32.64dBm, GSM1900: 30.28dBm EDGE850: 27.65dBm, EDGE1900: 25.65dBm
Type of Emission:	GSM850: 246KGXW, GSM1900: 257KGXW EDGE850: 244KG7W, EDGE1900: 252KG7W
Type of Modulation:	GMSK, 8PSK
Type of Antenna:	Integral Antenna
Antenna Gain:	GSM850: -0.65dBi; GSM1900: 1.12dBi
GPRS/EDGE Class:	Class 12
3G	
Support Networks:	WCDMA, HSDPA, HSUPA
Support Band:	WCDMA Band 2, WCDMA Band 5
Uplink Frequency:	WCDMA Band 2: 1850~1910MHz WCDMA Band 5: 824~849MHz
Downlink Frequency:	WCDMA Band 2: 1930~1990MHz WCDMA Band 5: 869~894MHz
RF Output Power:	WCDMA Band 2: 23.10dBm, WCDMA Band 5: 23.72dBm
Type of Emission:	WCDMA Band 2: 4M22F9W WCDMA Band 5: 4M23F9W
Type of Modulation:	BPSK
Antenna Type:	Integral Antenna
Antenna Gain:	WCDMA Band 2: -0.65dBi, WCDMA Band 5: 1.12dBi

1.2 Test Standards

The following report is prepared on behalf of the Cyrus Technology GmbH 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 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.: 125990

Shenzhen SEM Test Technology Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration Of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

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.

1.5 EUT Setup and Test Mode

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

Test Mode List		
Test Mode	Description	Remark
TM1	GSM 850	Low, Middle, High Channels
TM2	GPRS 850	Low, Middle, High Channels
TM3	EDGE 850	Low, Middle, High Channels
TM4	GSM 1900	Low, Middle, High Channels
TM5	GPRS 1900	Low, Middle, High Channels
TM6	EDGE 1900	Low, Middle, High Channels
TM7	WCDMA Band 5	Low, Middle, High Channels
TM8	HSDPA Band 5	Low, Middle, High Channels
TM9	HSUPA Band 5	Low, Middle, High Channels
TM10	WCDMA Band 2	Low, Middle, High Channels
TM11	HSDPA Band 2	Low, Middle, High Channels
TM12	HSUPA Band 2	Low, Middle, High Channels

Testing Configure			
Support Band	Support Standard	Channel Frequency	Channel Number
GSM 850	GSM/GPRS/EDGE	824.2 MHz	128
		836.6 MHz	190
		848.8 MHz	251
PCS 1900	GSM/GPRS/EDGE	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 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
USB-C Cable	1.0	Shielded	Without Core
Earphone	1.2	Unshielded	Without Core

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E445	/

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	Conducted	±0.42dB
Transmitter Spurious Emissions	Radiated	30-200MHz ±4.52dB
		0.2-1GHz ±5.56dB
		1-6GHz ±3.84dB
		6-18GHz ±3.92dB

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	2017-06-12	2018-06-11
SEMT-1034	GSM Tester	Rohde & Schwarz	CMU200	104036	2017-06-12	2018-06-11
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2017-06-12	2018-06-11
SEMT-1079	Spectrum Analyzer	Agilent	N9020A	US47140102	2017-06-12	2018-06-11
SEMT-1080	Signal Generator	Agilent	83752A	3610A01453	2017-06-12	2018-06-11
SEMT-1081	Vector Signal Generator	Agilent	N5182A	MY47070202	2017-06-12	2018-06-11
SEMT-1028	Power Divider	Weinschel	1506A	PM204	2017-06-12	2018-06-11
SEMT-1082	Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2017-06-12	2018-06-11
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2017-06-12	2018-06-11
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2017-06-12	2018-06-11
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2017-06-12	2018-06-11
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2017-06-12	2018-06-11
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2017-06-08	2018-06-07
SEMT-1068	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2017-06-08	2018-06-07
SEMT-1042	Horn Antenna	ETS	3117	00086197	2017-06-08	2018-06-07
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2017-06-08	2018-06-07
SEMT-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2017-08-15	2018-08-14
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2017-08-15	2018-08-14
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2017-06-12	2018-06-11
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2017-03-09	2018-03-08

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 Ratio (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

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

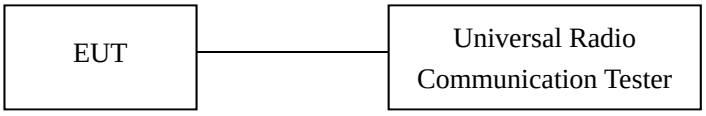
According to §22.913(a)(2), The ERP of mobile and portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

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.

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 GSM 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	31.94	1.5	0	H	1.5	0	30.44	38.45
824.2	31.28	1.5	0	V	1.5	0	29.78	38.45
Middle Channel								
836.4	29.82	1.5	0	H	1.5	0	28.32	38.45
836.4	30.88	1.5	0	V	1.5	0	29.38	38.45
High Channel								
848.8	31.52	1.5	0	H	1.5	0	30.02	38.45
848.8	30.24	1.5	0	V	1.5	0	28.74	38.45

EIRP For GSM 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	23.33	1.5	0	H	1.9	7.7	29.13	33.00
1850.2	21.19	1.5	0	V	1.9	7.7	26.99	33.00
Middle Channel								
1880.0	21.31	1.5	0	H	1.9	7.7	27.11	33.00
1880.0	22.85	1.5	0	V	1.9	7.7	28.65	33.00
High Channel								
1909.8	23.53	1.5	0	H	1.9	7.7	29.33	33.00
1909.8	21.8	1.5	0	V	1.9	7.7	27.6	33.00

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	28.3	1.5	0	H	1.5	0	26.8	38.45
824.2	28.37	1.5	0	V	1.5	0	26.87	38.45
Middle Channel								
836.6	27.78	1.5	0	H	1.5	0	26.28	38.45
836.6	28.66	1.5	0	V	1.5	0	27.16	38.45
High Channel								
848.8	27.5	1.5	0	H	1.5	0	26	38.45
848.8	28.67	1.5	0	V	1.5	0	27.17	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	18.21	1.5	0	H	1.9	7.7	24.01	33.00
1850.2	17.92	1.5	0	V	1.9	7.7	23.72	33.00
Middle Channel								
1880.0	17.86	1.5	0	H	1.9	7.7	23.66	33.00
1880.0	19.92	1.5	0	V	1.9	7.7	25.72	33.00
High Channel								
1909.8	17.89	1.5	0	H	1.9	7.7	23.69	33.00
1909.8	19.5	1.5	0	V	1.9	7.7	25.3	33.00

ERP For EDGE 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	25.85	1.5	0	H	1.5	0	24.35	38.45
824.2	26.83	1.5	0	V	1.5	0	25.33	38.45
Middle Channel								
836.6	24.85	1.5	0	H	1.5	0	23.35	38.45
836.6	26.82	1.5	0	V	1.5	0	25.32	38.45
High Channel								
848.8	26.11	1.5	0	H	1.5	0	24.61	38.45
848.8	26.73	1.5	0	V	1.5	0	25.23	38.45

EIRP For EDGE 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	17.02	1.5	0	H	1.9	7.7	22.82	33.00
1850.2	17.23	1.5	0	V	1.9	7.7	23.03	33.00
Middle Channel								
1880.0	18.43	1.5	0	H	1.9	7.7	24.23	33.00
1880.0	18.91	1.5	0	V	1.9	7.7	24.71	33.00
High Channel								
1909.8	17.06	1.5	0	H	1.9	7.7	22.86	33.00
1909.8	18.14	1.5	0	V	1.9	7.7	23.94	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	21.43	1.5	0	H	1.5	0	19.93	38.45
826.4	21.75	1.5	0	V	1.5	0	20.25	38.45
Middle Channel								
836.6	21.11	1.5	0	H	1.5	0	19.61	38.45
836.6	22.24	1.5	0	V	1.5	0	20.74	38.45
High Channel								
846.6	21.51	1.5	0	H	1.5	0	20.01	38.45
846.6	22.22	1.5	0	V	1.5	0	20.72	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	21.71	1.5	0	H	1.5	0	20.21	38.45
826.4	22.52	1.5	0	V	1.5	0	21.02	38.45
Middle Channel								
836.6	21.5	1.5	0	H	1.5	0	20.00	38.45
836.6	22.77	1.5	0	V	1.5	0	21.27	38.45
High Channel								
846.6	21.28	1.5	0	H	1.5	0	19.78	38.45
846.6	22.15	1.5	0	V	1.5	0	20.65	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	20.82	1.5	0	H	1.5	0	19.32	38.45
826.4	21.81	1.5	0	V	1.5	0	20.31	38.45
Middle Channel								
836.6	21.26	1.5	0	H	1.5	0	19.76	38.45
836.6	21.15	1.5	0	V	1.5	0	19.65	38.45
High Channel								
846.6	21.12	1.5	0	H	1.5	0	19.62	38.45
846.6	21.99	1.5	0	V	1.5	0	20.49	38.45

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	14.41	1.5	0	H	1.9	7.7	20.21	33
1852.4	14.92	1.5	0	V	1.9	7.7	20.72	33
Middle Channel								
1880.0	13.51	1.5	0	H	1.9	7.7	19.31	33
1880.0	14.63	1.5	0	V	1.9	7.7	20.43	33
High Channel								
1907.6	13.54	1.5	0	H	1.9	7.7	19.34	33
1907.6	14.67	1.5	0	V	1.9	7.7	20.47	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	14.07	1.5	0	H	1.9	7.7	19.87	33
1852.4	14.53	1.5	0	V	1.9	7.7	20.33	33
Middle Channel								
1880.0	14.19	1.5	0	H	1.9	7.7	19.99	33
1880.0	15.43	1.5	0	V	1.9	7.7	21.23	33
High Channel								
1907.6	13.49	1.5	0	H	1.9	7.7	19.29	33
1907.6	14.74	1.5	0	V	1.9	7.7	20.54	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	15.12	1.5	0	H	1.9	7.7	20.92	33
1852.4	15.53	1.5	0	V	1.9	7.7	21.33	33
Middle Channel								
1880.0	15.15	1.5	0	H	1.9	7.7	20.95	33
1880.0	13.41	1.5	0	V	1.9	7.7	19.21	33
High Channel								
1907.6	13.58	1.5	0	H	1.9	7.7	19.38	33
1907.6	14.92	1.5	0	V	1.9	7.7	20.72	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)
GSM	Low Channel	824.2	32.61	38.45
	Middle Channel	836.6	32.64	38.45
	High Channel	848.8	32.62	38.45
GPRS(1 Slot)	Low Channel	824.2	31.94	38.45
	Middle Channel	836.6	31.94	38.45
	High Channel	848.8	31.92	38.45
EDGE(1 Slot)	Low Channel	824.2	27.65	38.45
	Middle Channel	836.6	27.63	38.45
	High Channel	848.8	27.60	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	30.27	33.0
	Middle Channel	1880.0	30.25	33.0
	High Channel	1909.8	30.28	33.0
GPRS(1 Slot)	Low Channel	1850.2	30.26	33.0
	Middle Channel	1880.0	30.26	33.0
	High Channel	1909.8	30.27	33.0
EDGE(1 Slot)	Low Channel	1850.2	25.65	33.0
	Middle Channel	1880.0	25.57	33.0
	High Channel	1909.8	25.33	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	23.68	38.45
	Middle Channel	836.6	23.72	38.45
	High Channel	846.6	23.65	38.45
HSDPA	Low Channel	826.4	22.70	38.45
	Middle Channel	836.6	22.70	38.45
	High Channel	846.6	22.74	38.45
HSUPA	Low Channel	826.4	22.69	38.45
	Middle Channel	836.6	22.72	38.45
	High Channel	846.6	22.76	38.45

For WCDMA Band 2

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
WCDMA	Low Channel	1852.4	23.10	33.00
	Middle Channel	1880.0	22.98	33.00
	High Channel	1907.6	23.03	33.00
HSDPA	Low Channel	1852.4	22.05	33.00
	Middle Channel	1880.0	22.04	33.00
	High Channel	1907.6	22.24	33.00
HSUPA	Low Channel	1852.4	22.06	33.00
	Middle Channel	1880.0	22.00	33.00
	High Channel	1907.6	22.26	33.00

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

5.1 Standard Applicable

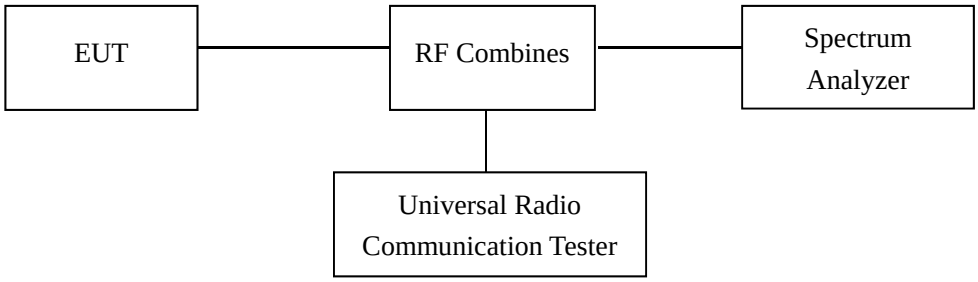
According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in 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)
GSM	512	1850.2	5.65	13
GPRS(1 Slot)	512	1850.2	6.08	13
EDGE(1 Slot)	512	1850.2	4.98	13

For WCDMA Band 2

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
WCDMA	9400	1880	6.78	13
HSDPA	9400	1880	7.04	13
HSUPA	9400	1880	6.88	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.

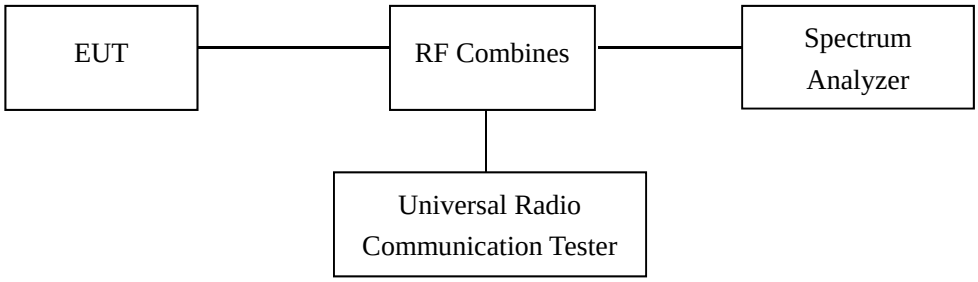
According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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)
GSM	128	824.2	245.5221	319.703
	190	836.6	242.6018	318.470
	251	848.8	244.5133	315.950
GPRS	128	824.2	249.0183	312.753
	190	836.6	246.2578	314.869
	251	848.8	245.5568	316.643
EDGE	128	824.2	244.3603	315.032
	190	836.6	243.4015	317.221
	251	848.8	242.3395	313.460

For PCS Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM	512	1850.2	246.1708	321.829
	661	1880.0	248.3114	325.660
	810	1909.8	254.3758	323.742
GPRS	512	1850.2	251.2657	325.332
	661	1880.0	256.5182	328.580
	810	1909.8	249.7776	322.671
EDGE	512	1850.2	245.3408	322.296
	661	1880.0	251.9200	319.664
	810	1909.8	250.6568	321.669

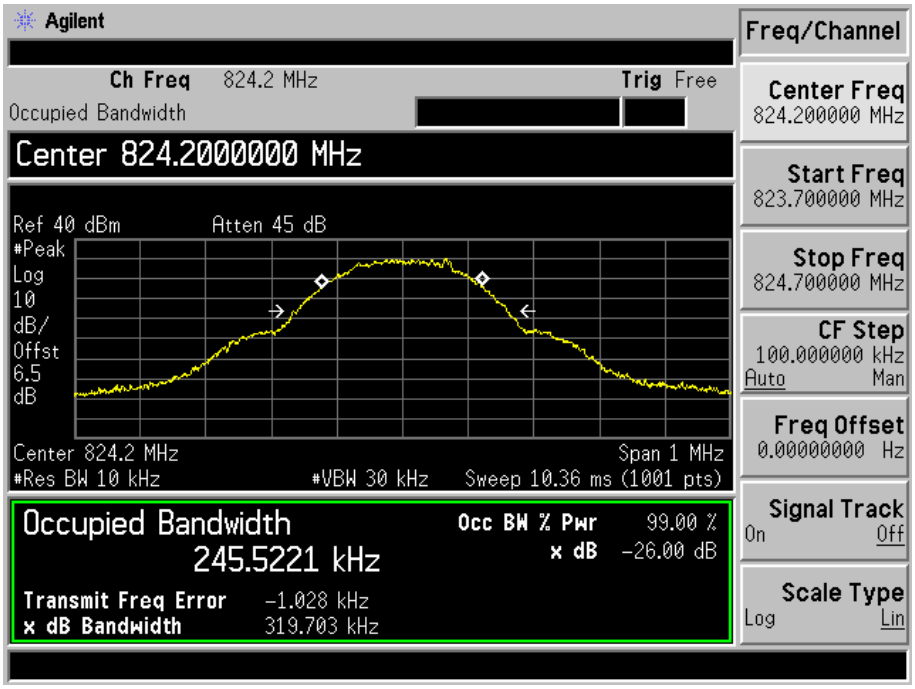
For Band 5

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	4132	826.4	4.1934	4.854
	4183	836.6	4.2260	4.865
	4233	846.6	4.2094	4.869
HSDPA	4132	826.4	4.2098	4.854
	4183	836.6	4.2367	4.854
	4233	846.6	4.2128	4.882
HSUPA	4132	826.4	4.2055	4.889
	4183	836.6	4.2150	4.873
	4233	846.6	4.2241	4.877

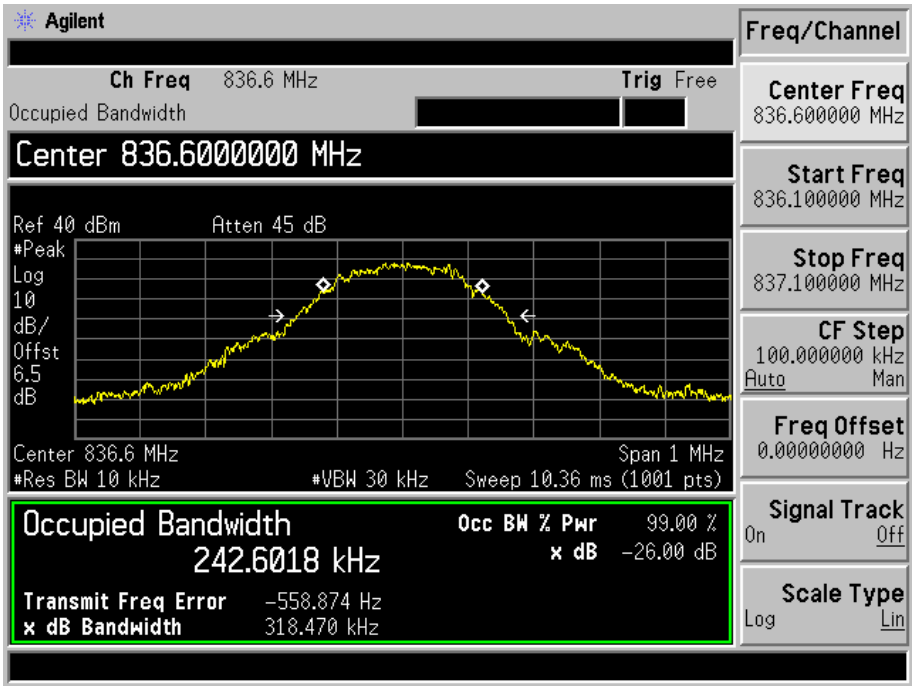
For Band 2

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	9262	1852.4	4.2070	4.866
	9400	1880.0	4.2094	4.870
	9538	1907.6	4.2176	4.873
HSDPA	9262	1852.4	4.2229	4.869
	9400	1880.0	4.2066	4.873
	9538	1907.6	4.2188	4.886
HSUPA	9262	1852.4	4.2296	4.830
	9400	1880.0	4.2214	4.877
	9538	1907.6	4.2194	4.841

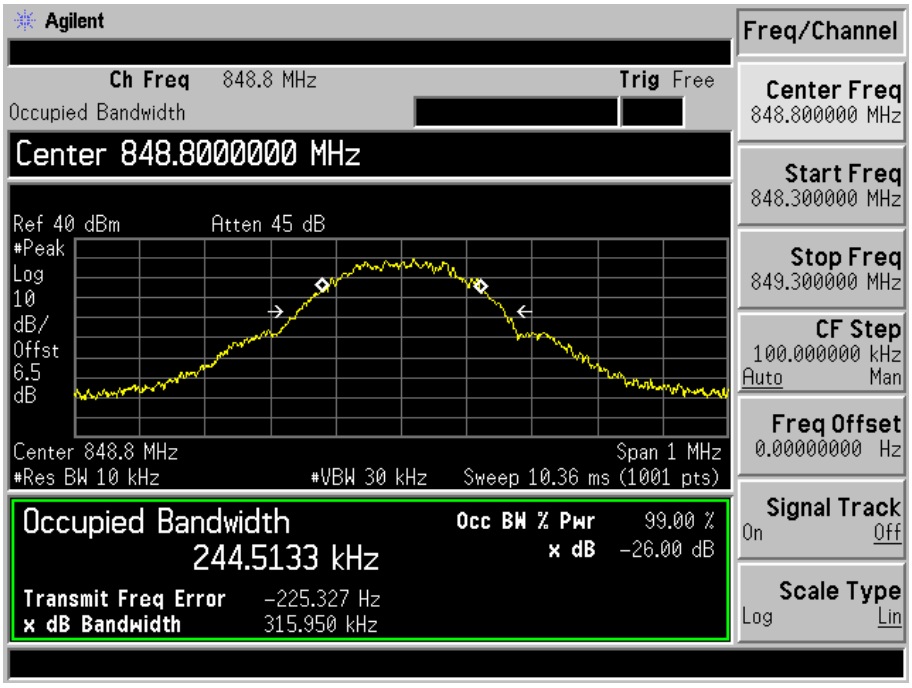
For Cellular Band
GSM Low Channel



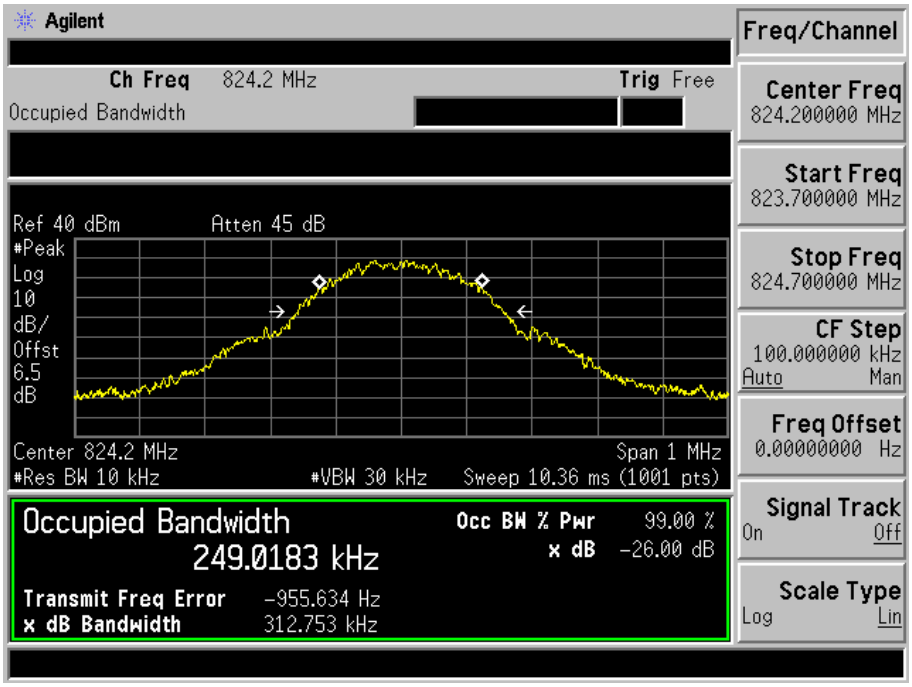
GSM Middle Channel



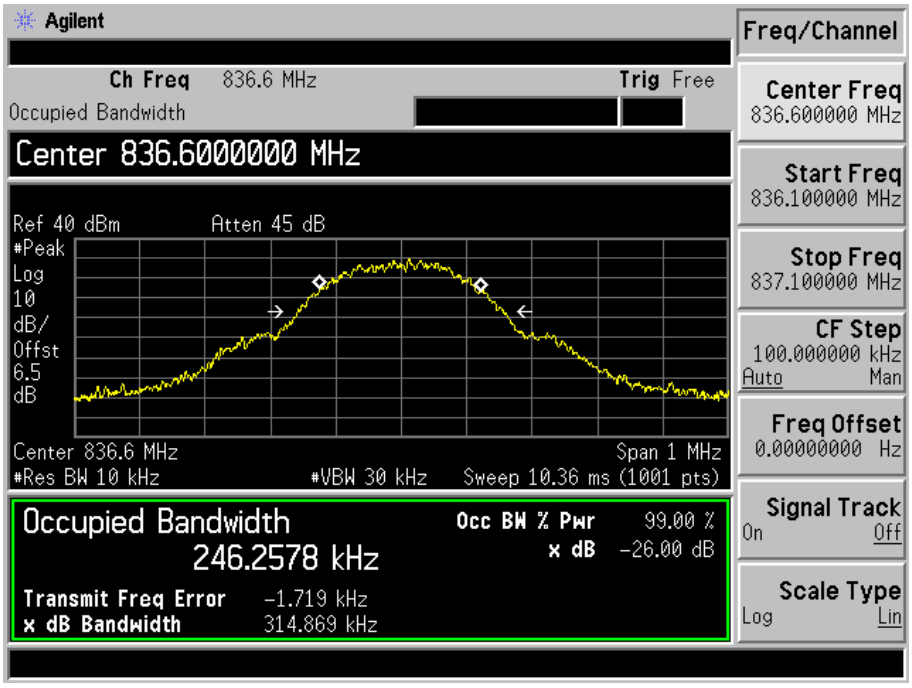
GSM High channel



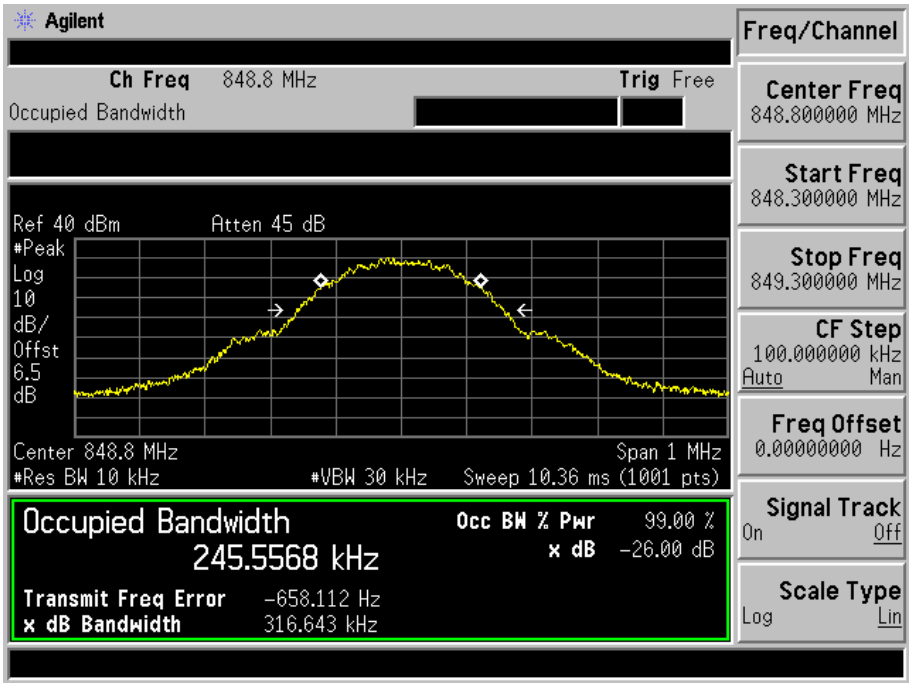
GPRS Low Channel



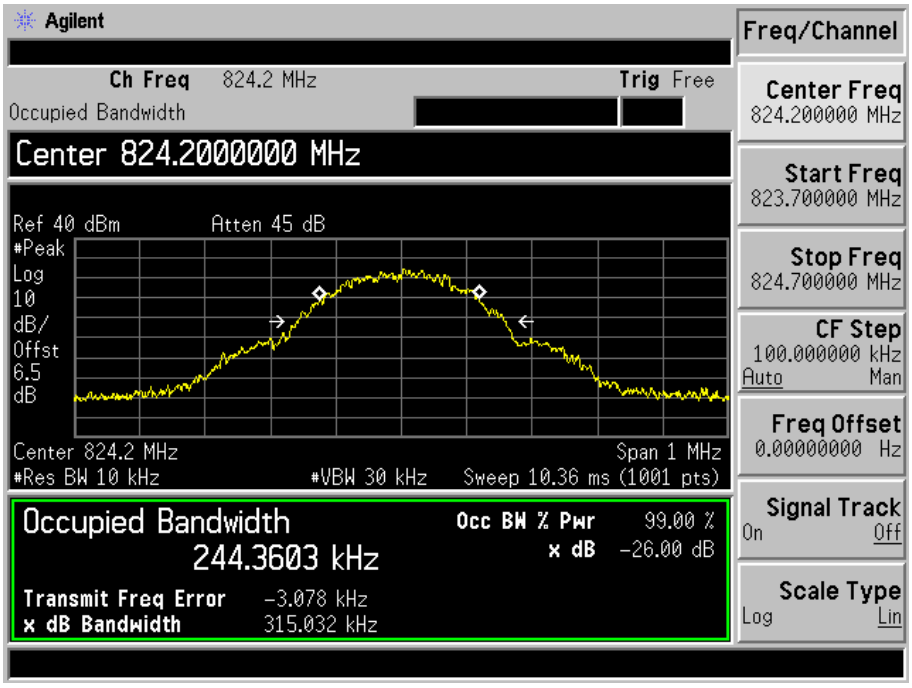
GPRS Middle Channel



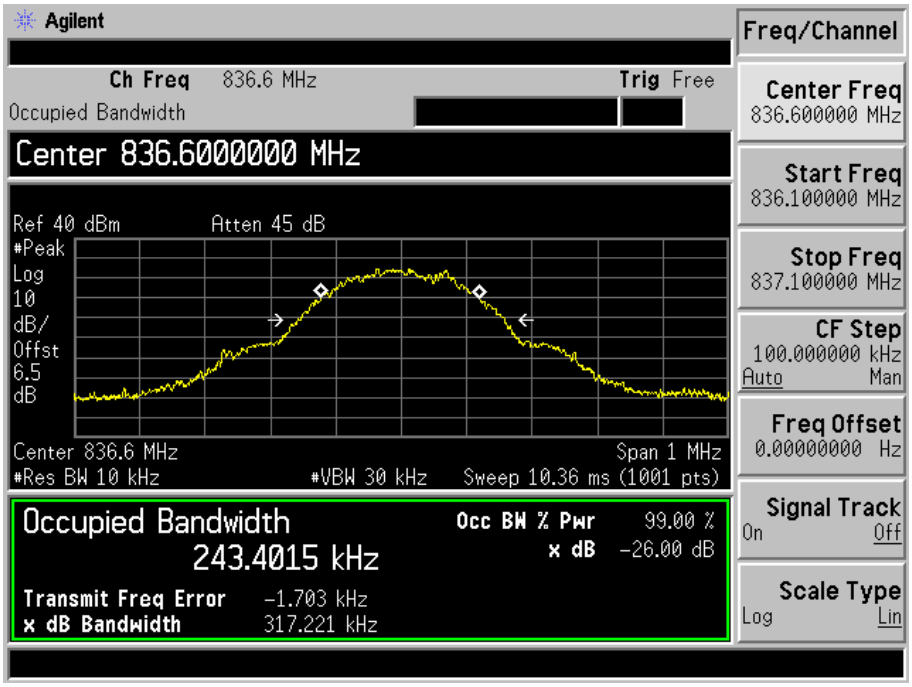
GPRS High Channel



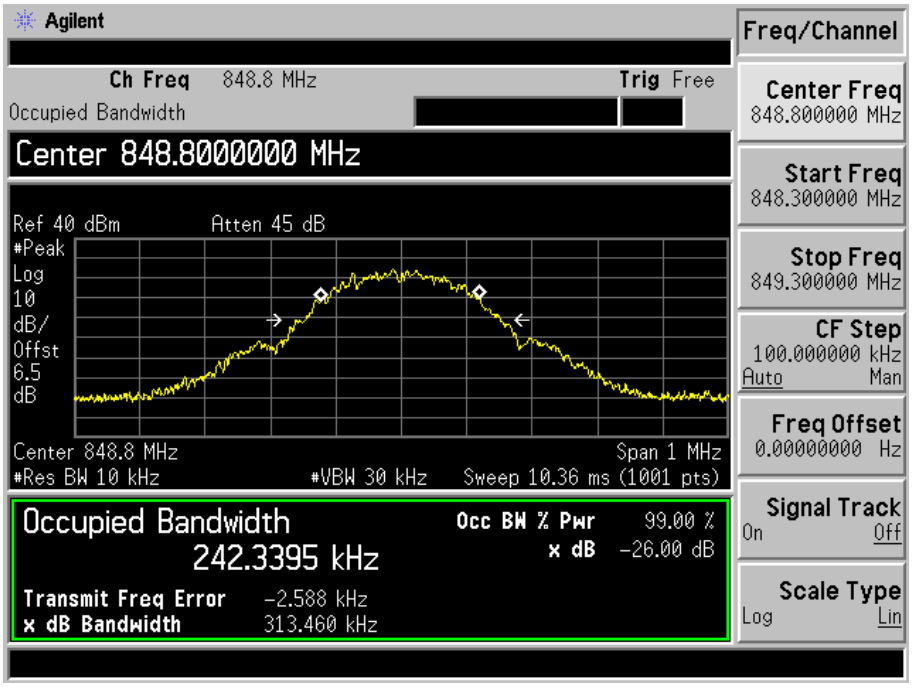
EDGE Low Channel



EDGE Middle Channel

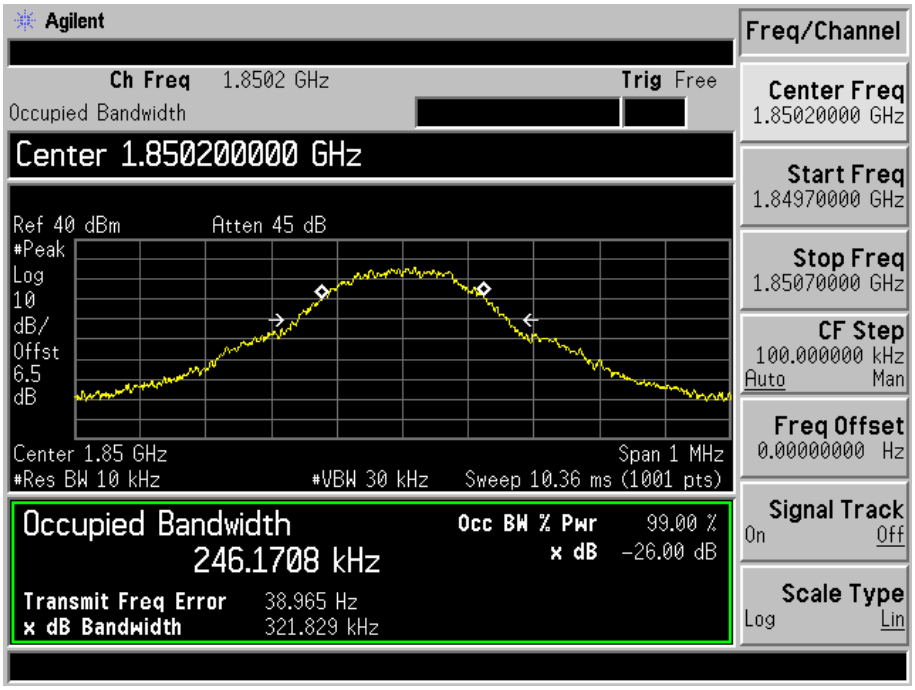


EDGE High Channel

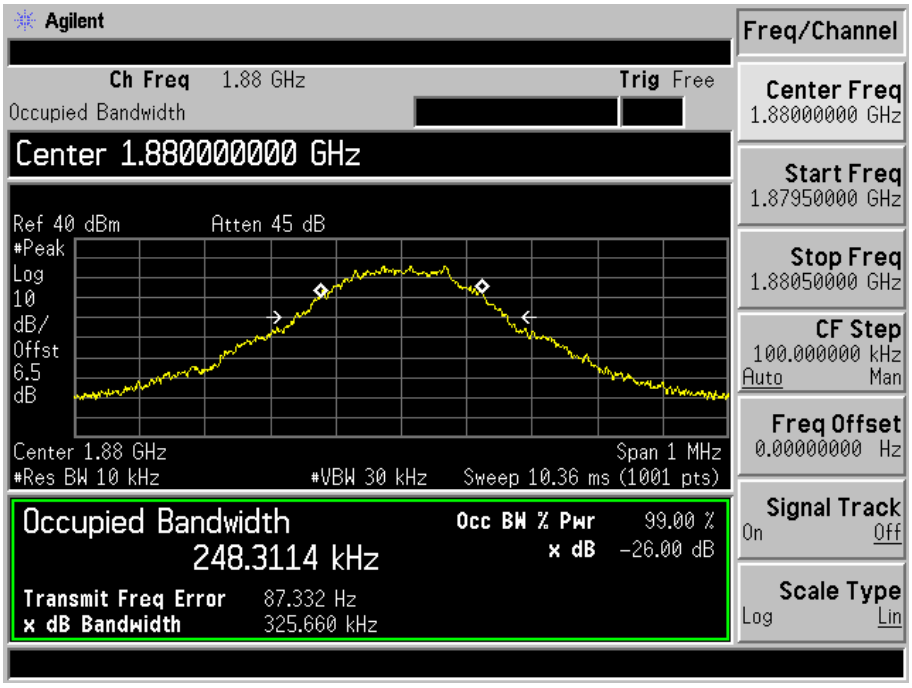


For PCS Band

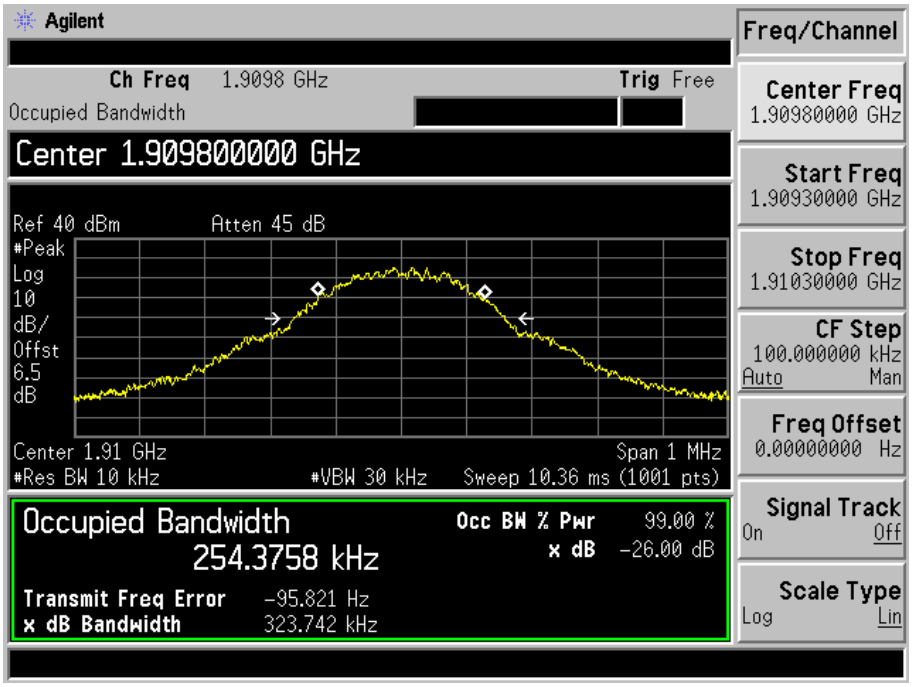
GSM Low Channel



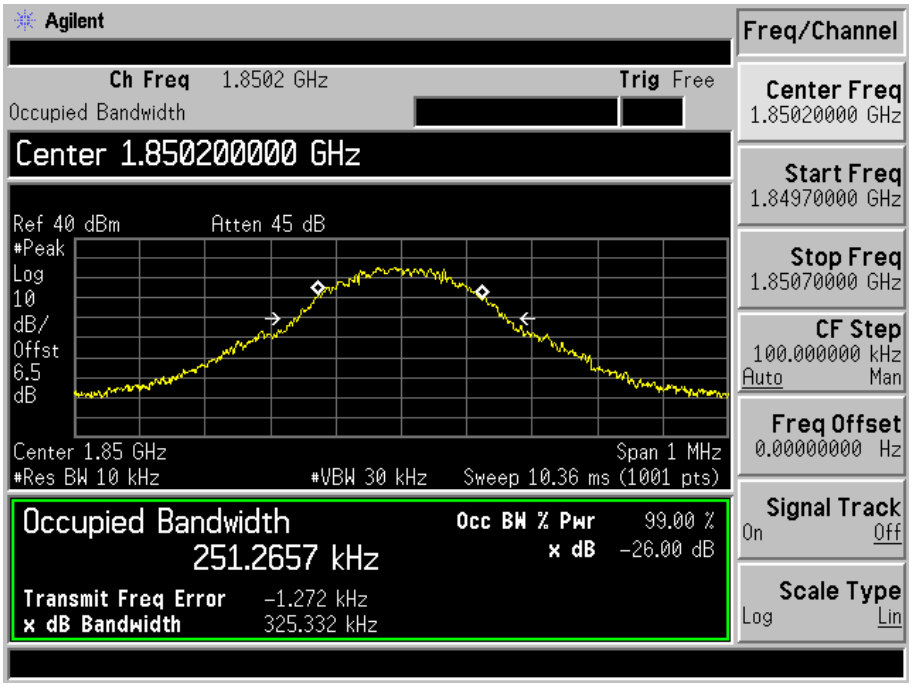
GSM Middle Channel



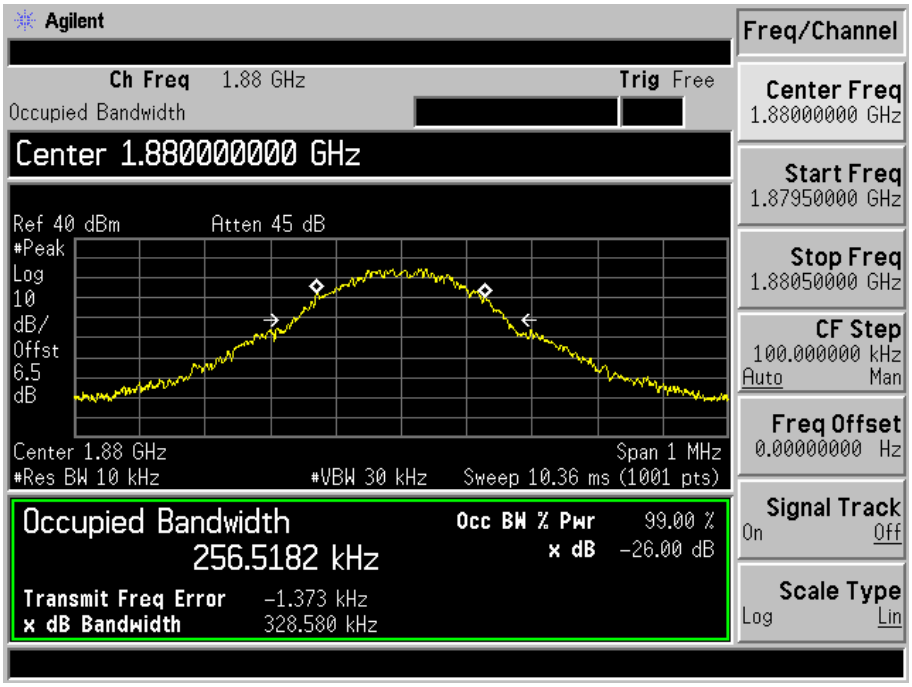
GSM High channel



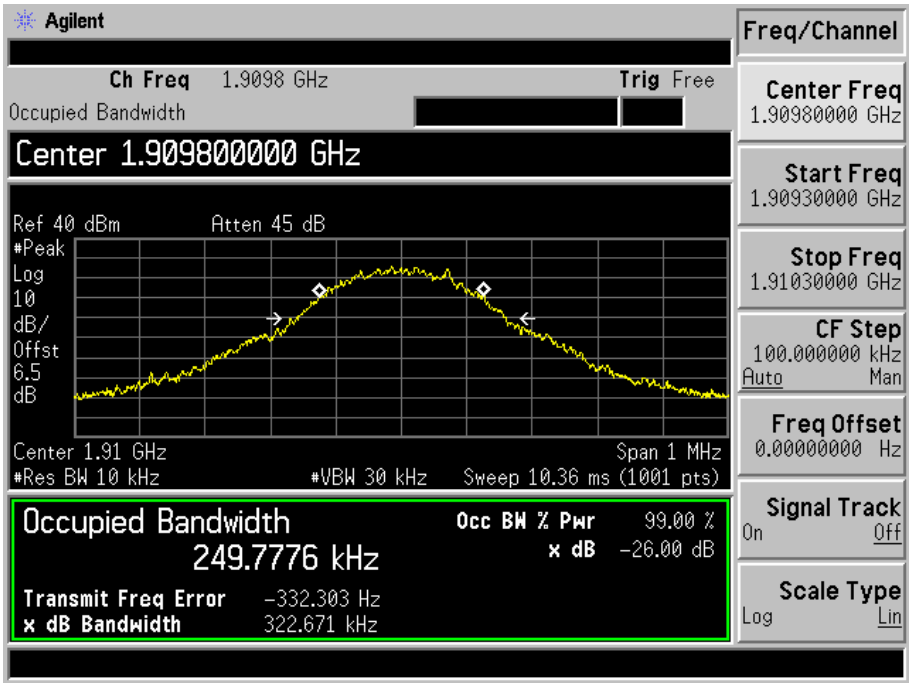
GPRS Low Channel



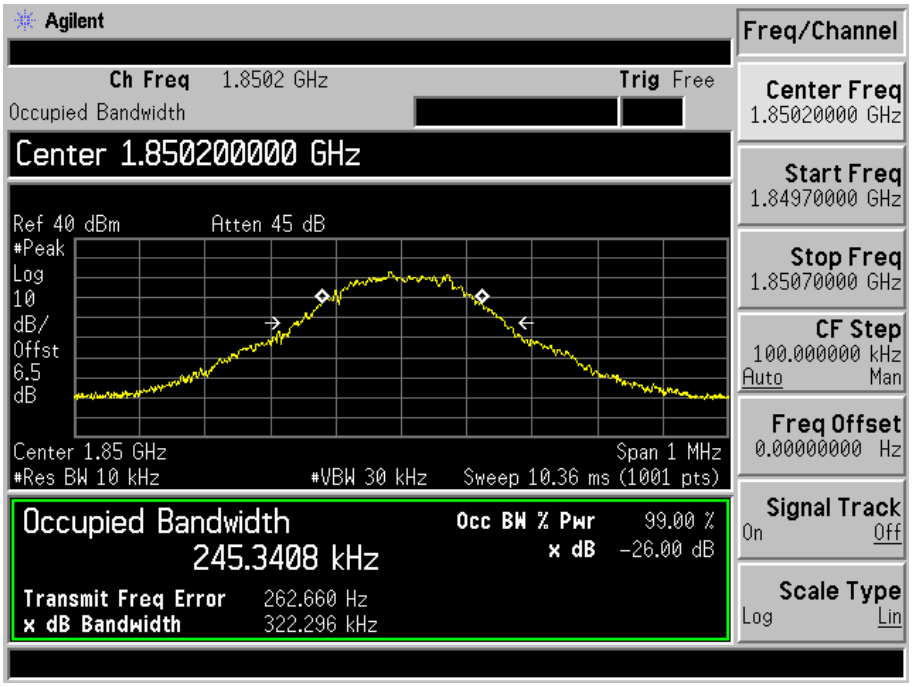
GPRS Middle Channel



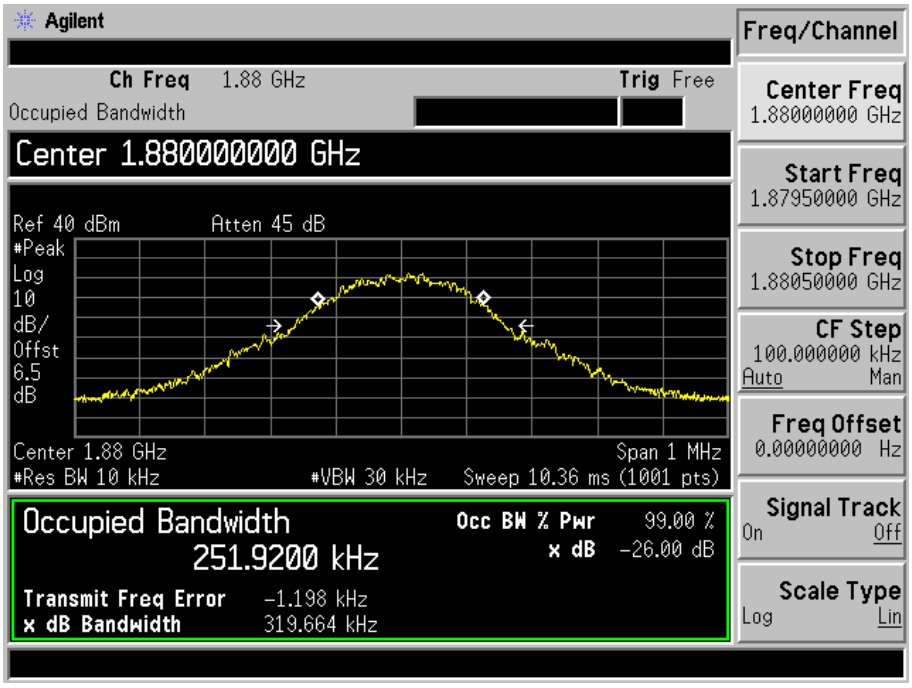
GPRS High Channel



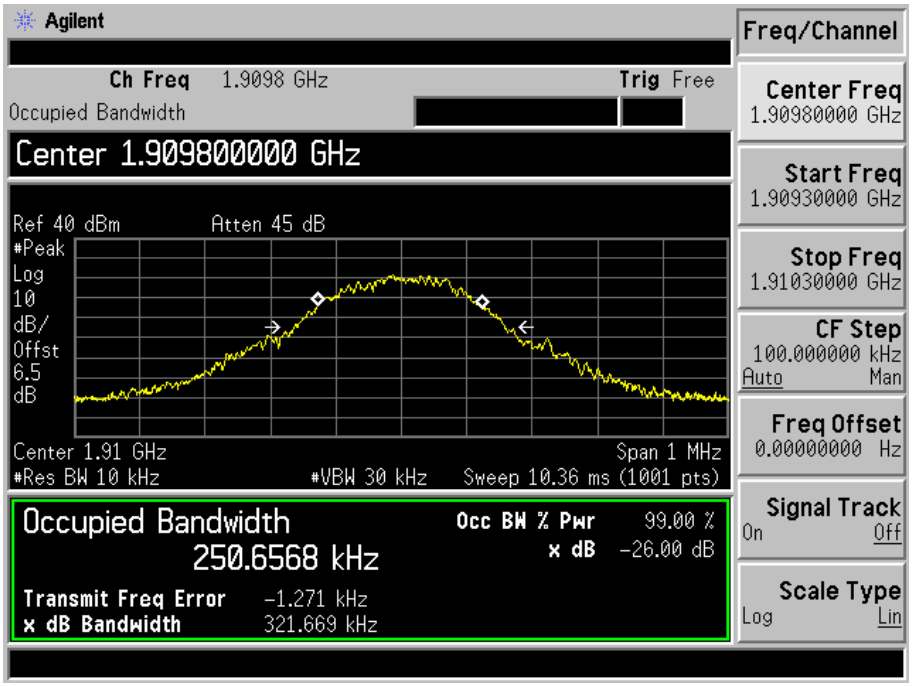
EDGE Low Channel



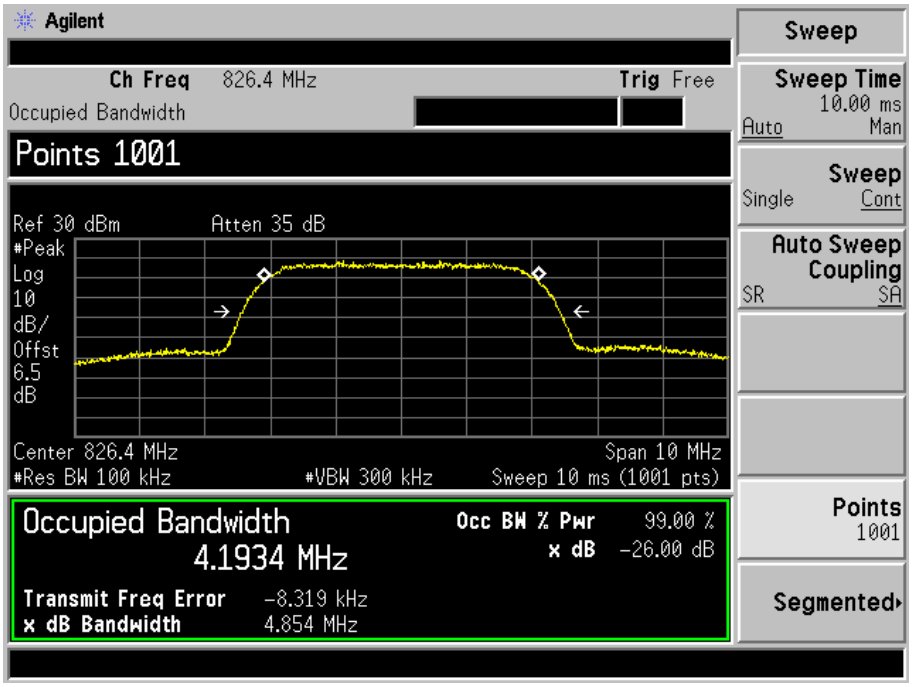
EDGE Middle Channel



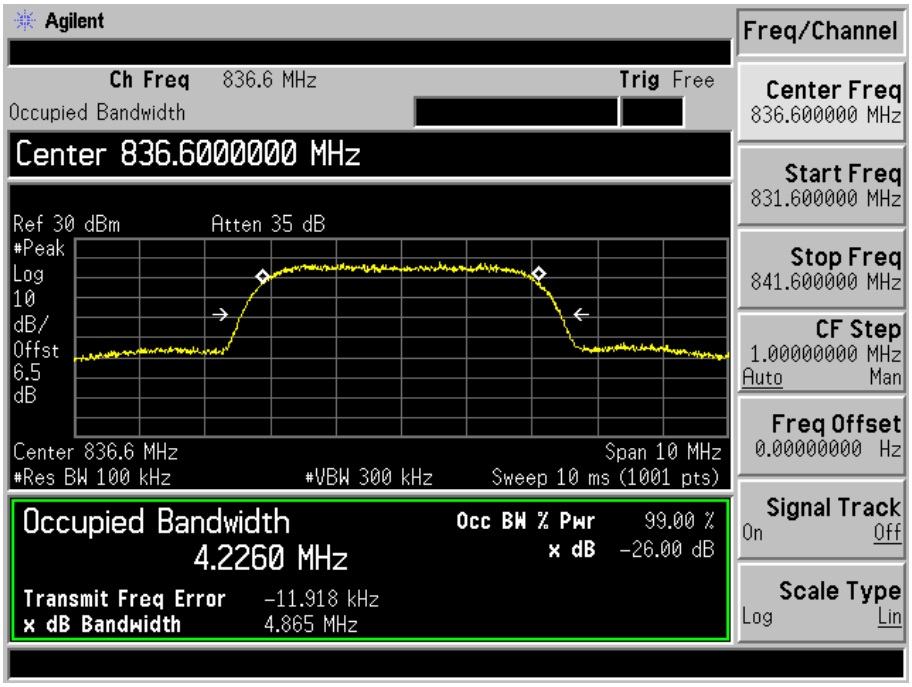
EDGE High Channel



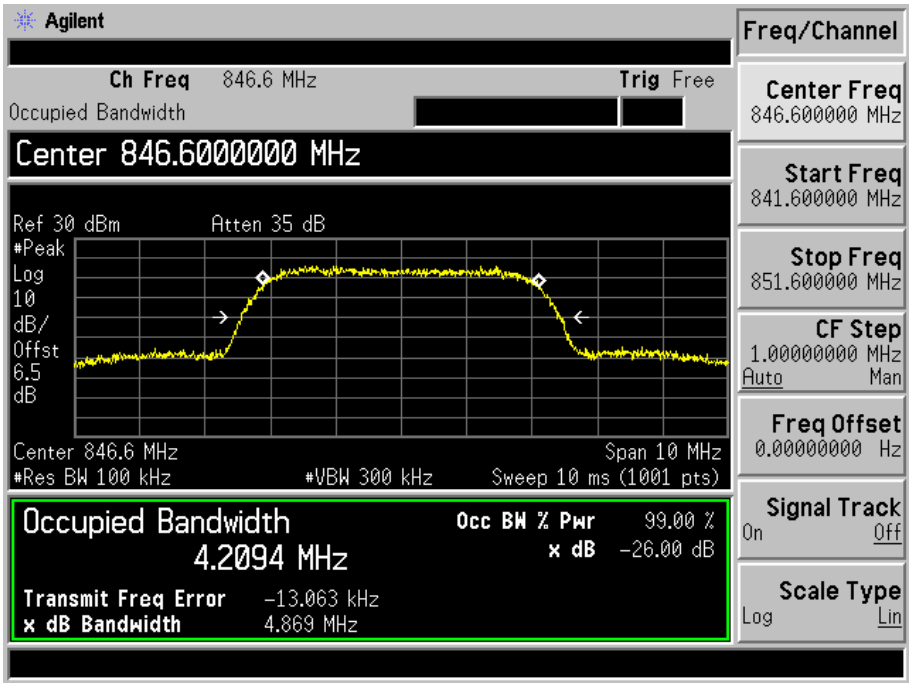
For Band V
WCDMA Low Channel



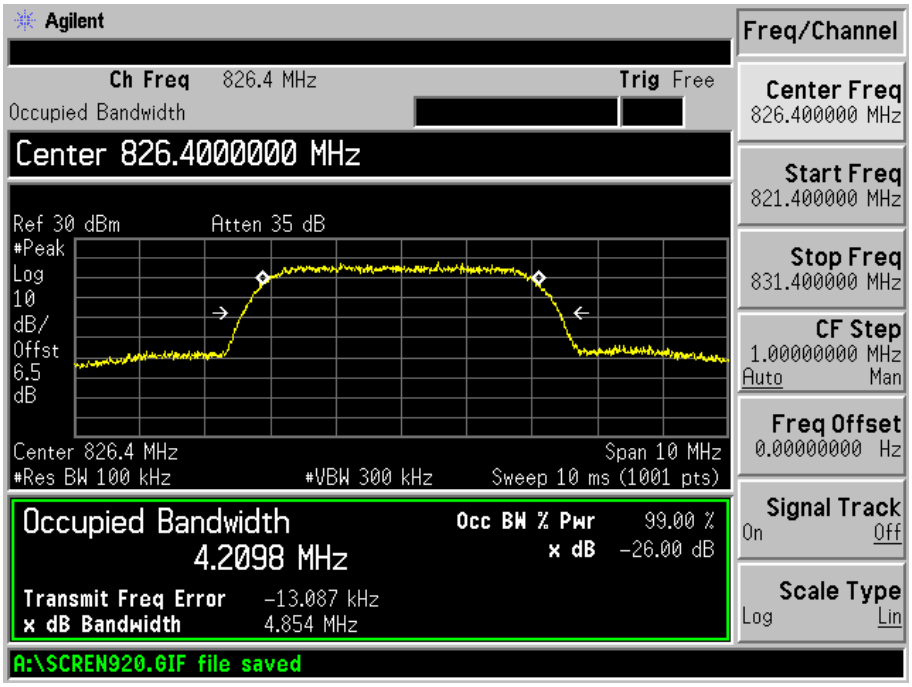
WCDMA Middle Channel



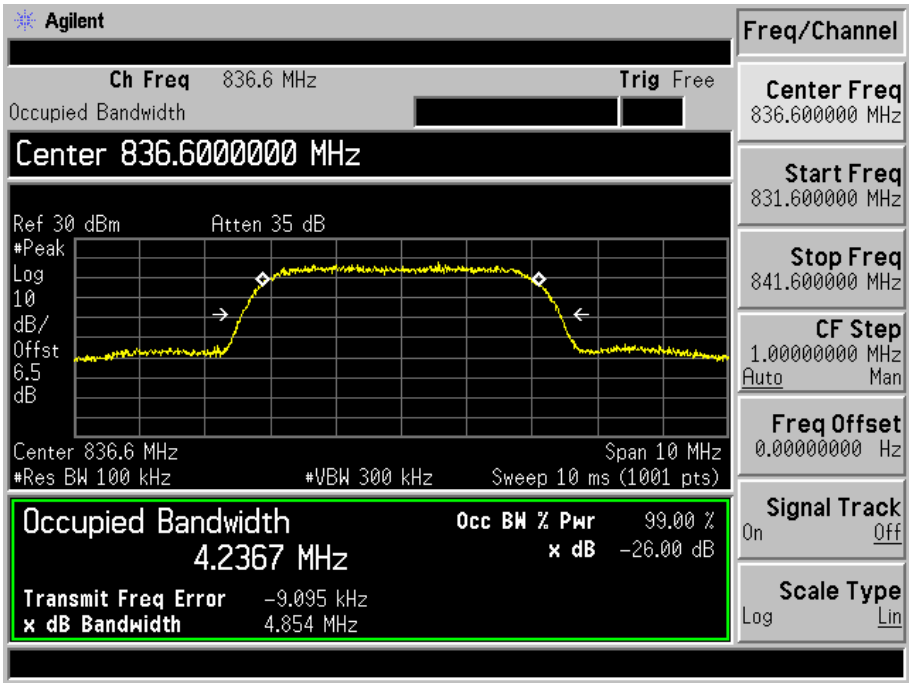
WCDMA High Channel



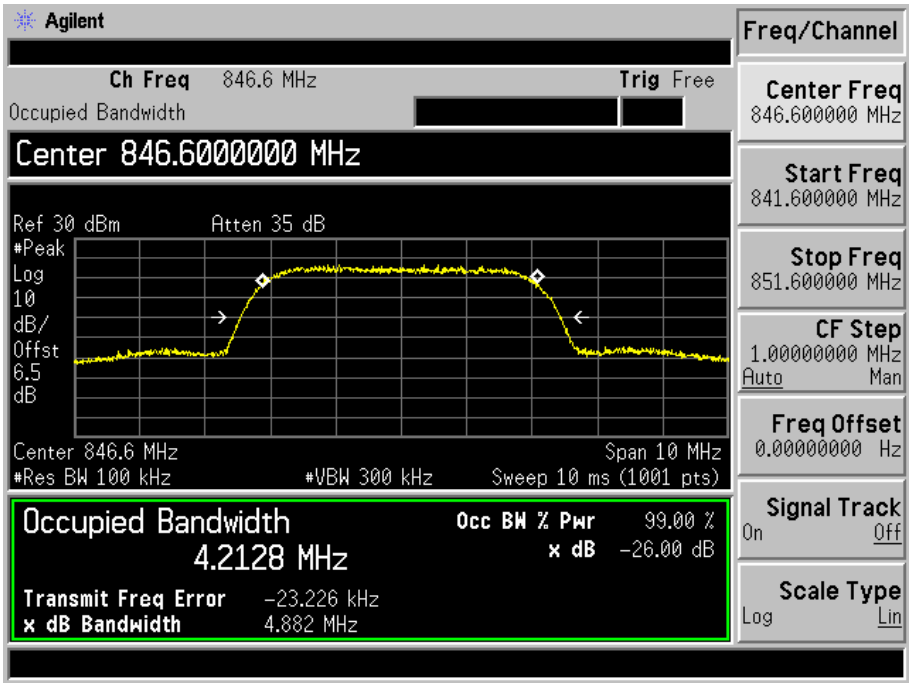
HSDPA Low Channel



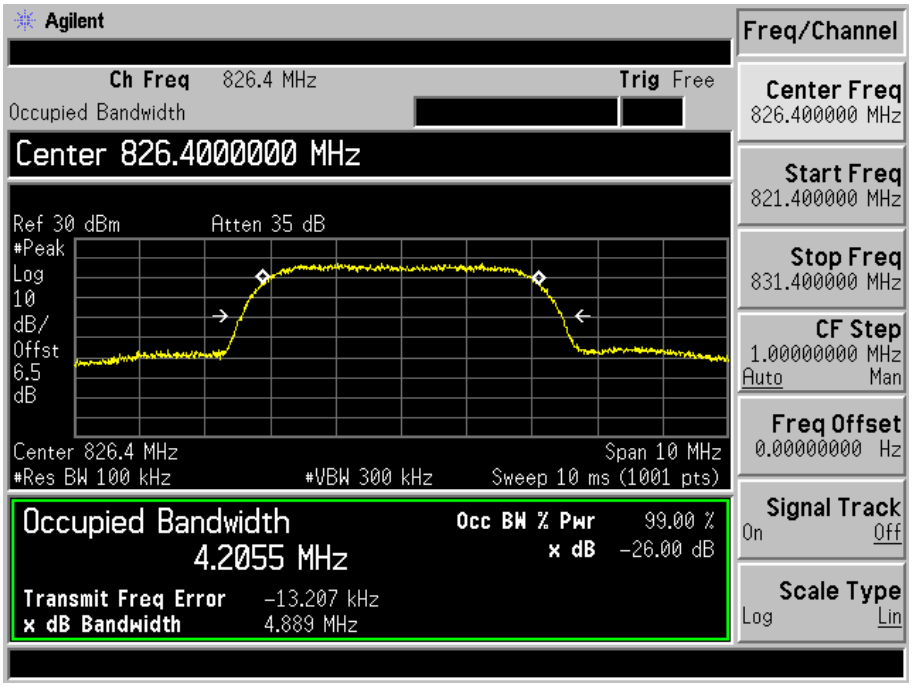
HSDPA Middle Channel



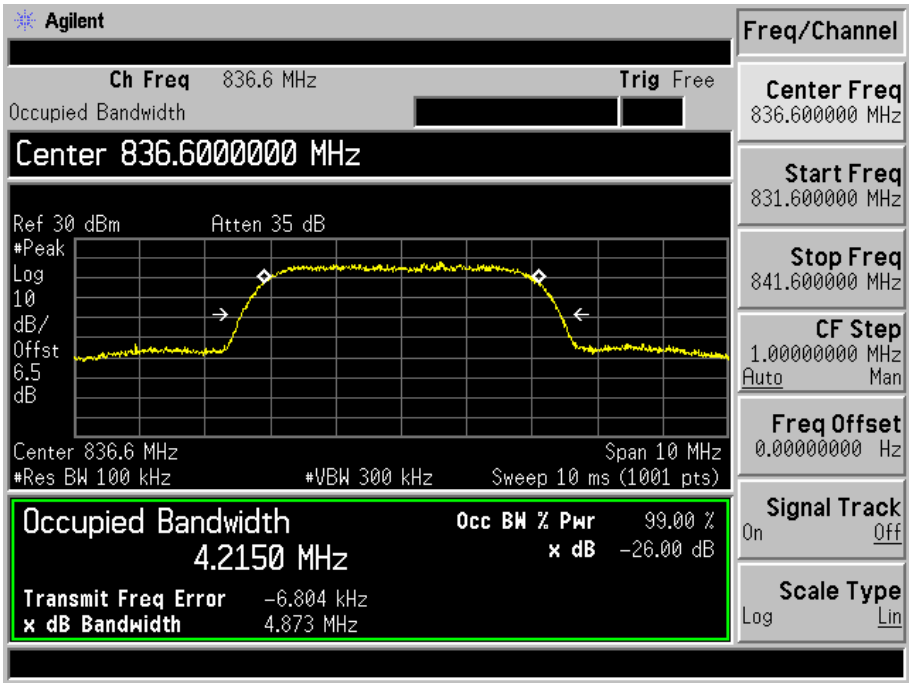
HSDPA High Channel



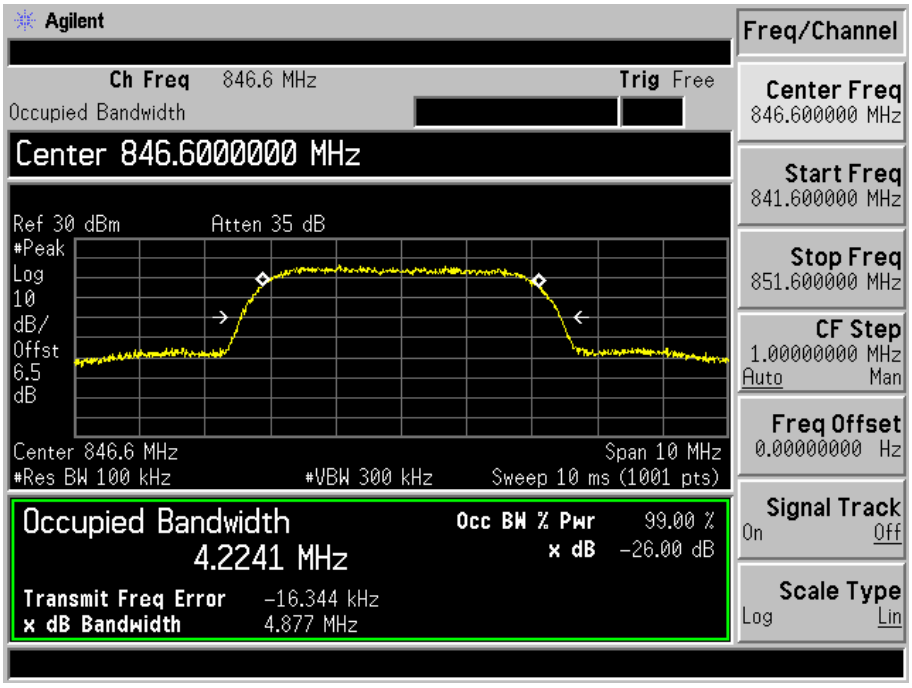
HSUPA Low Channel



HSUPA Middle Channel

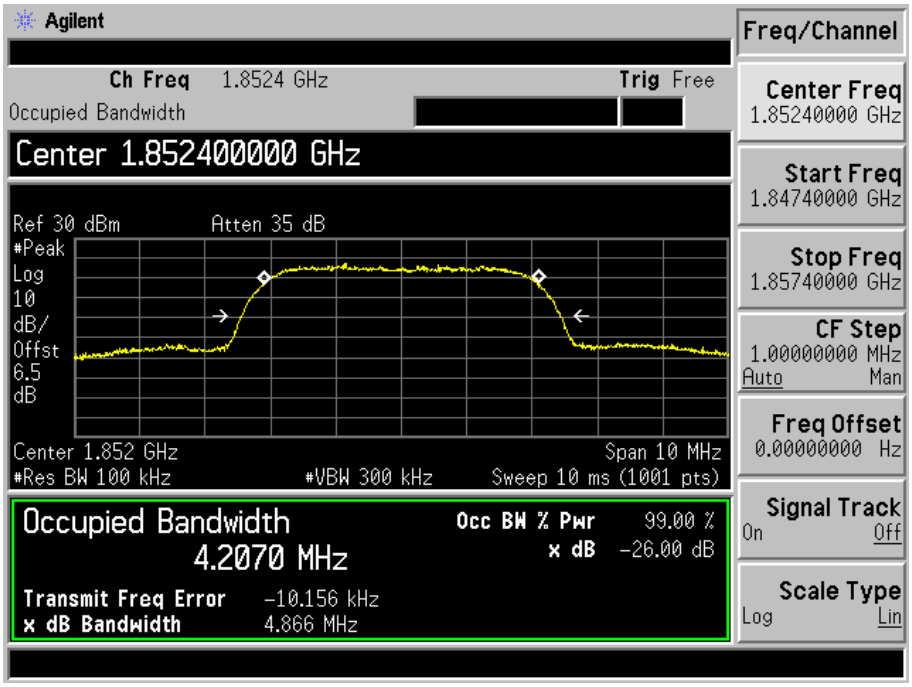


HSUPA High Channel

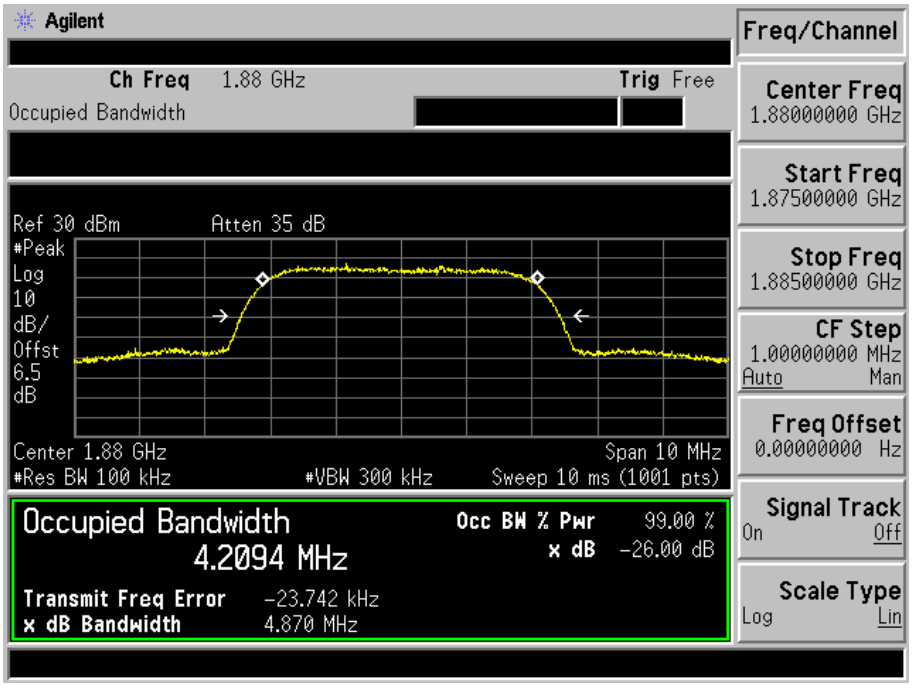


For Band II

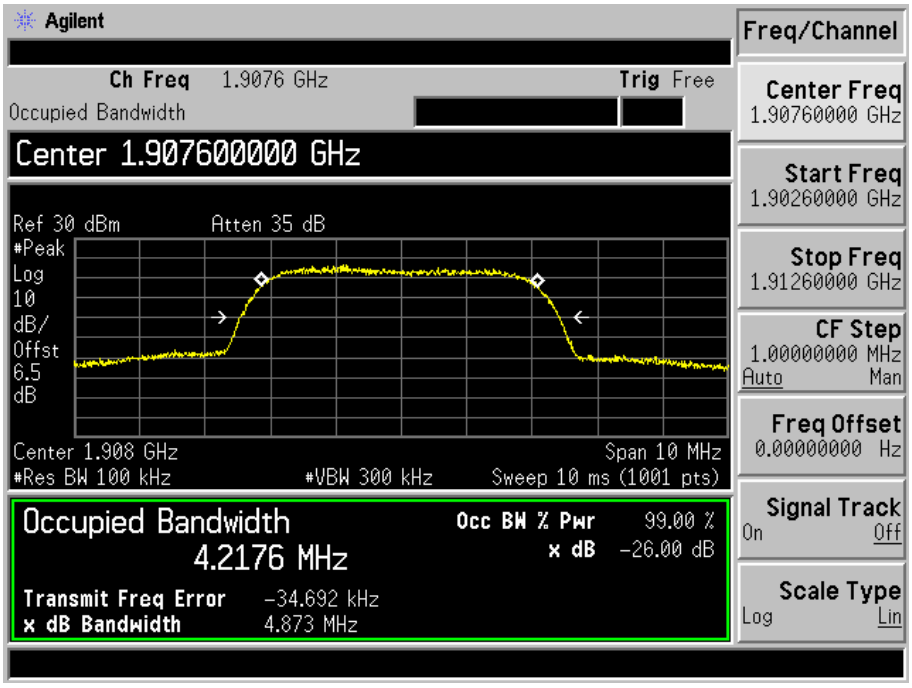
WCDMA Low Channel



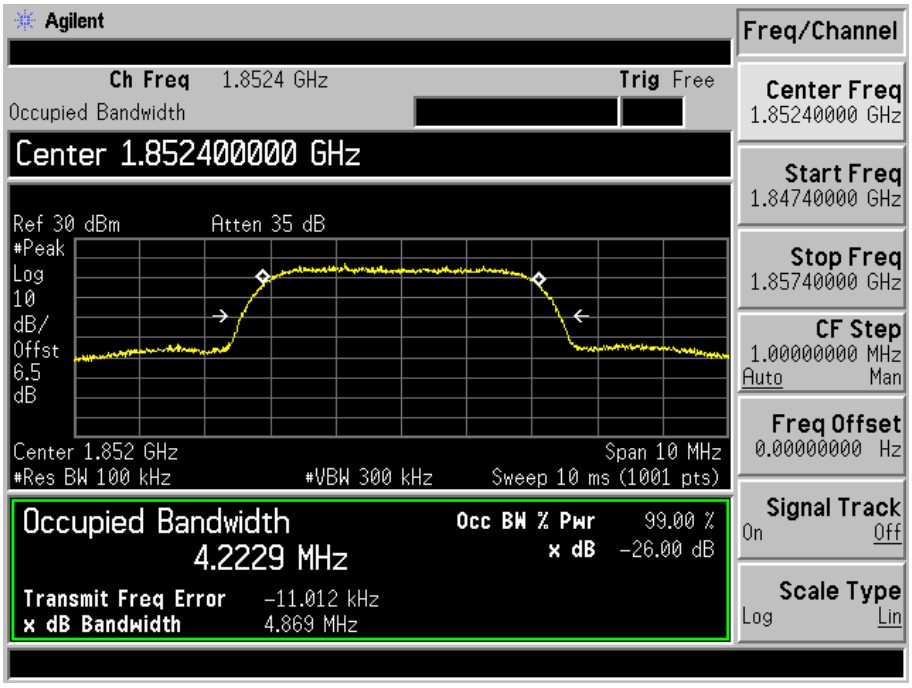
WCDMA Middle Channel



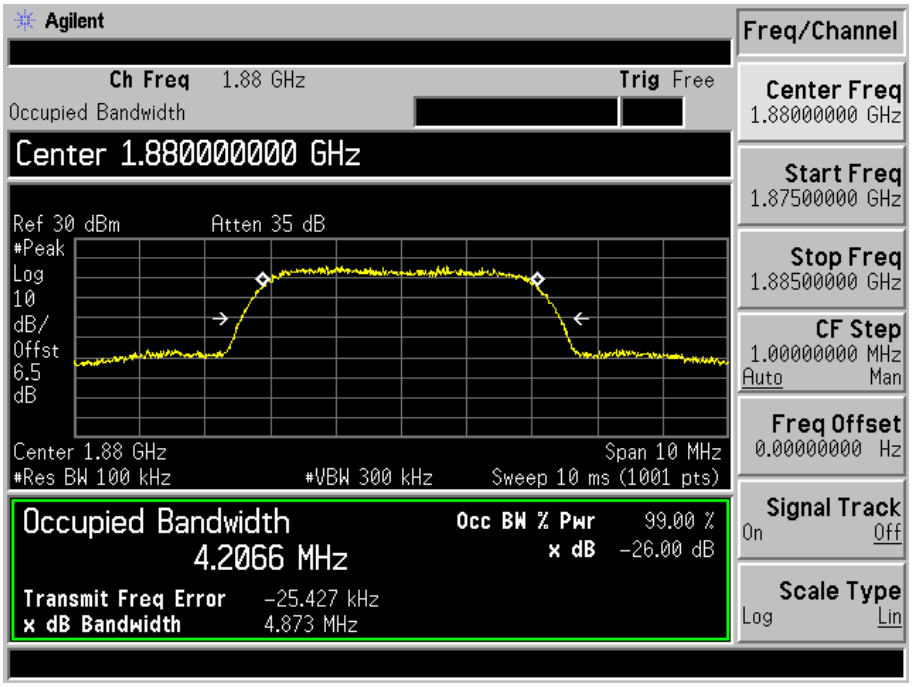
WCDMA High Channel



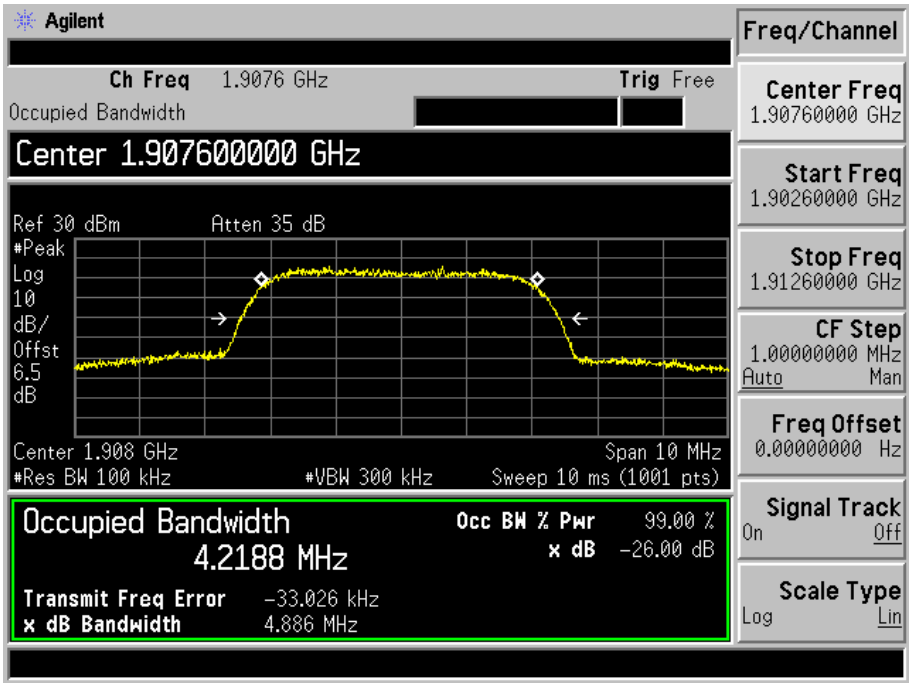
HSDPA Low Channel



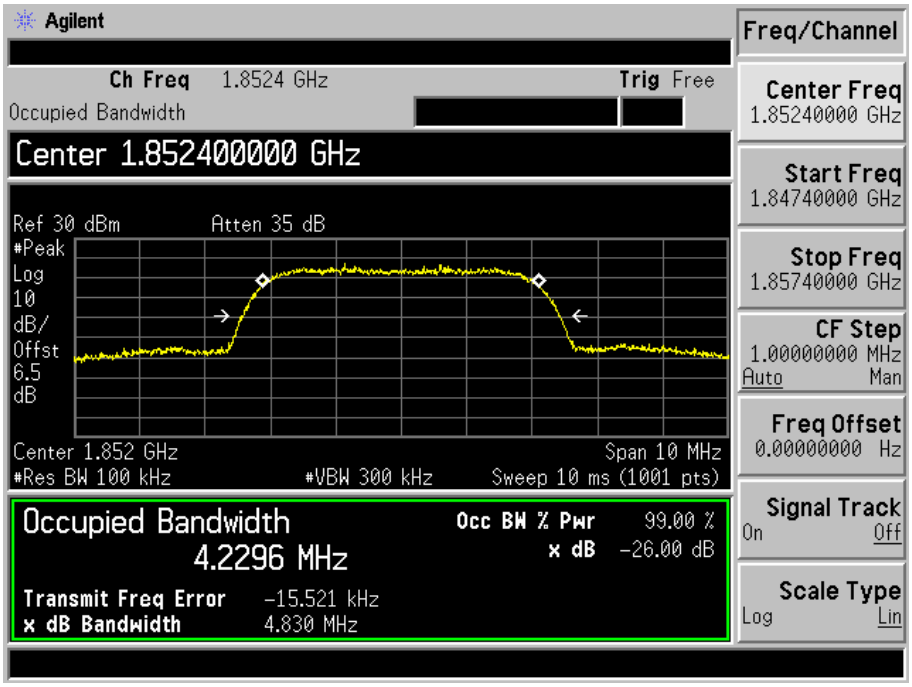
HSDPA Middle Channel



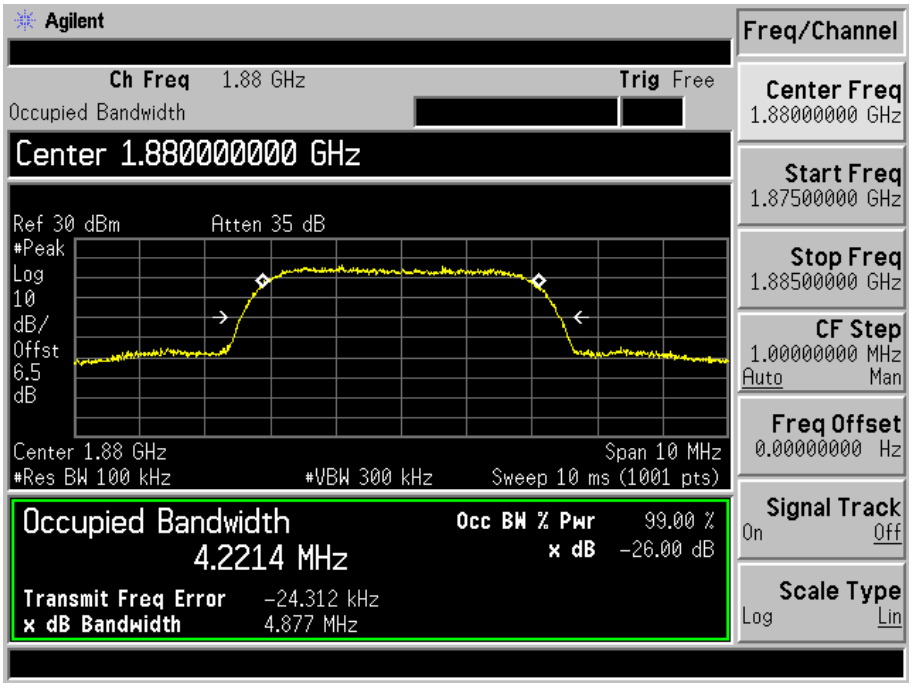
HSDPA High Channel



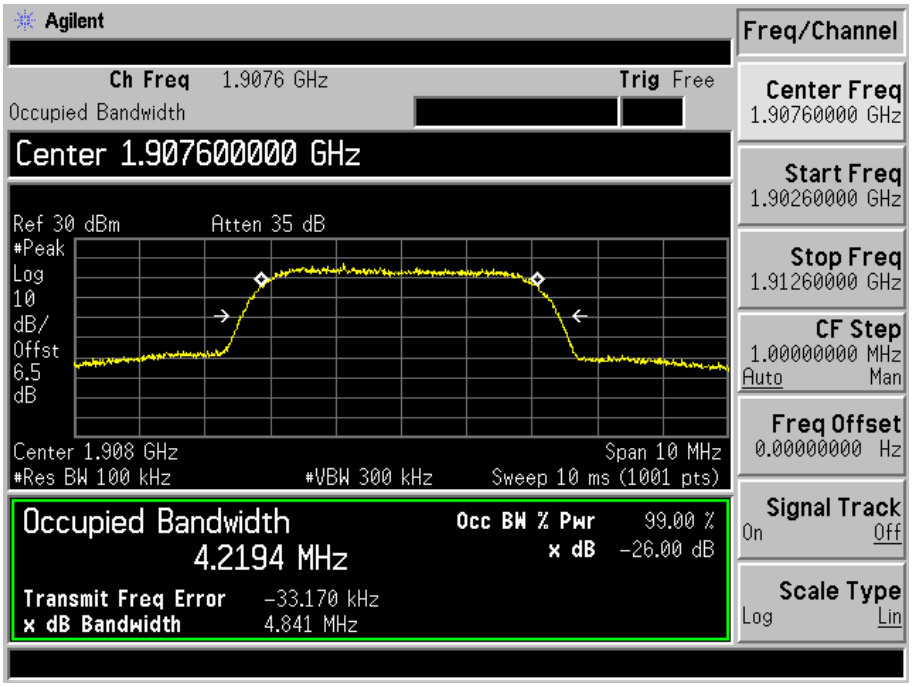
HSUPA Low Channel



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.

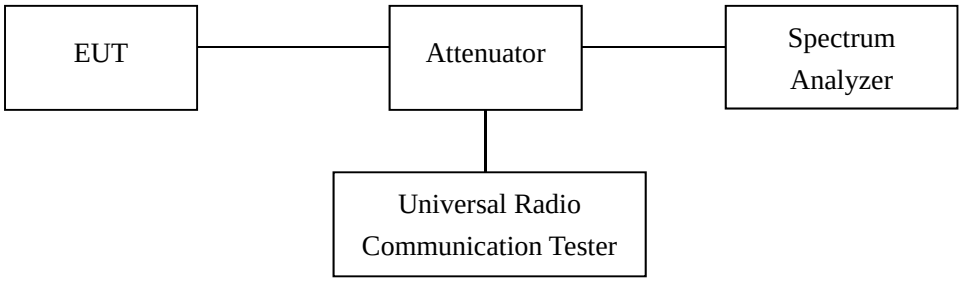
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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

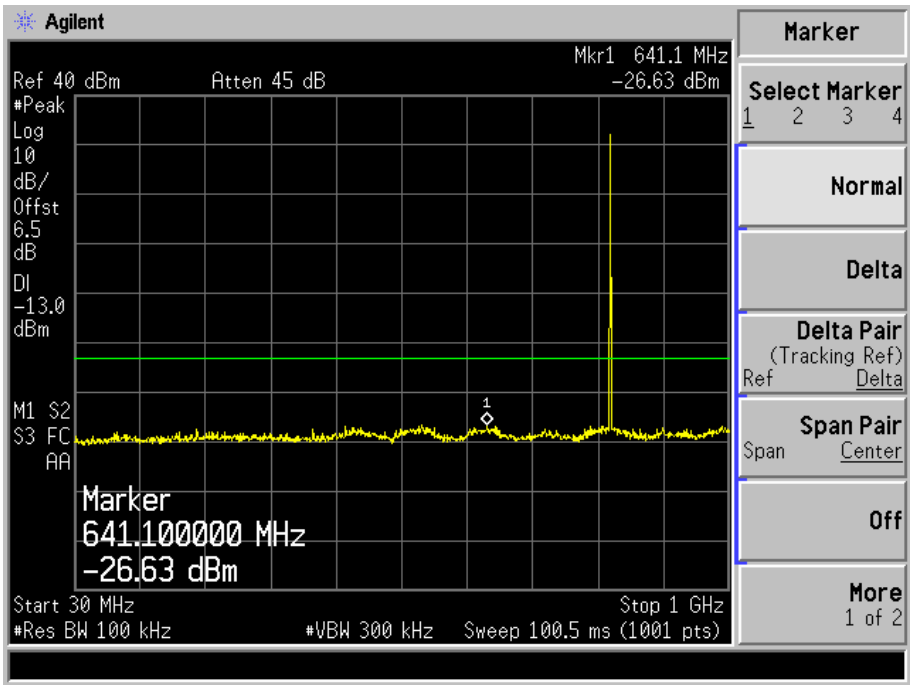
Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

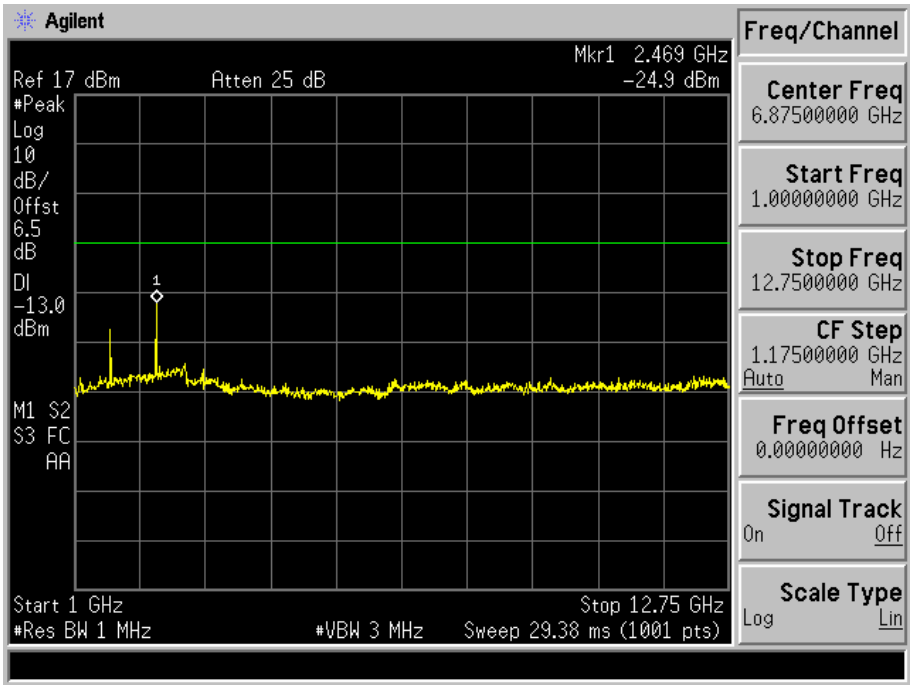
7.4 Summary of Test Results/Plots

Please refer to the following test plots For Cellular Band

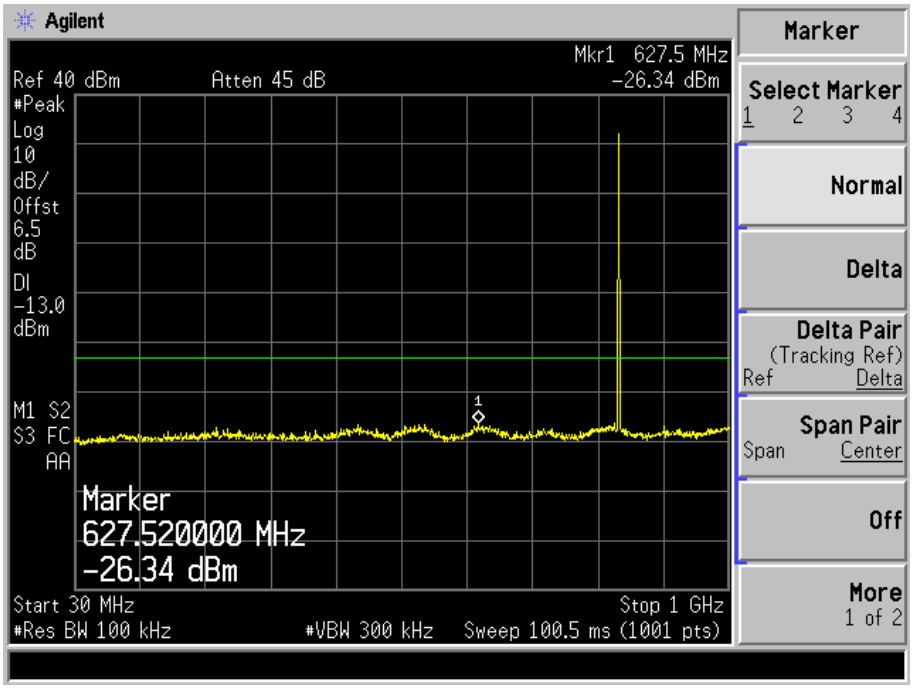
Please refer to the following test plots For Cellular Band

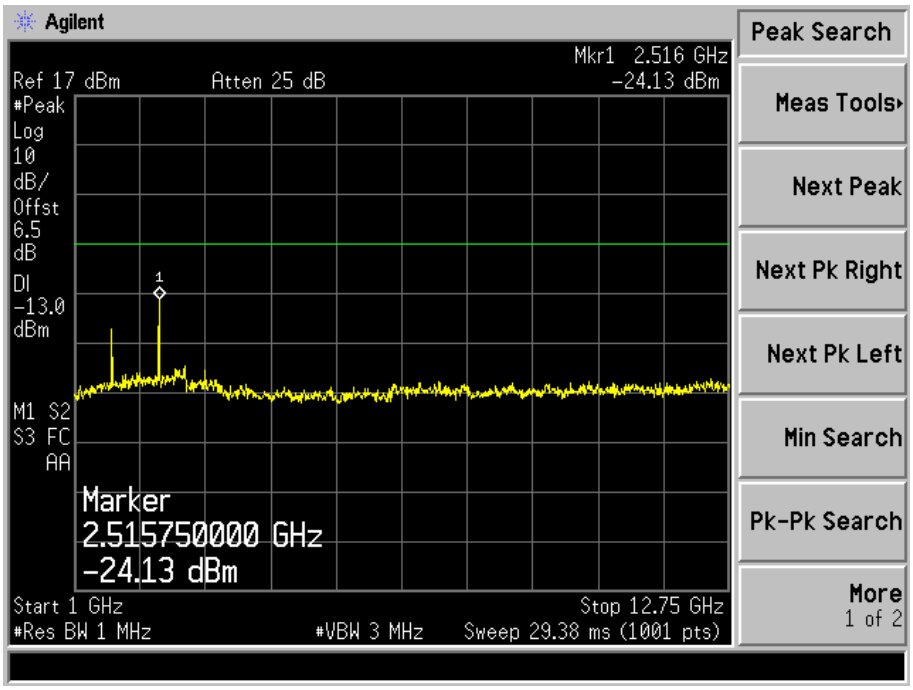
GSM Low Channel



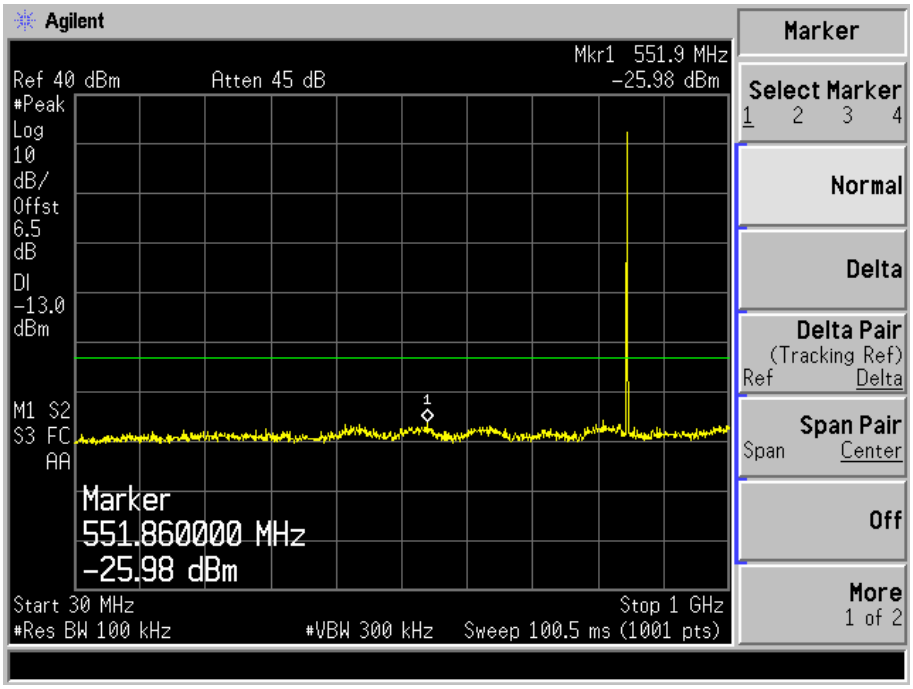


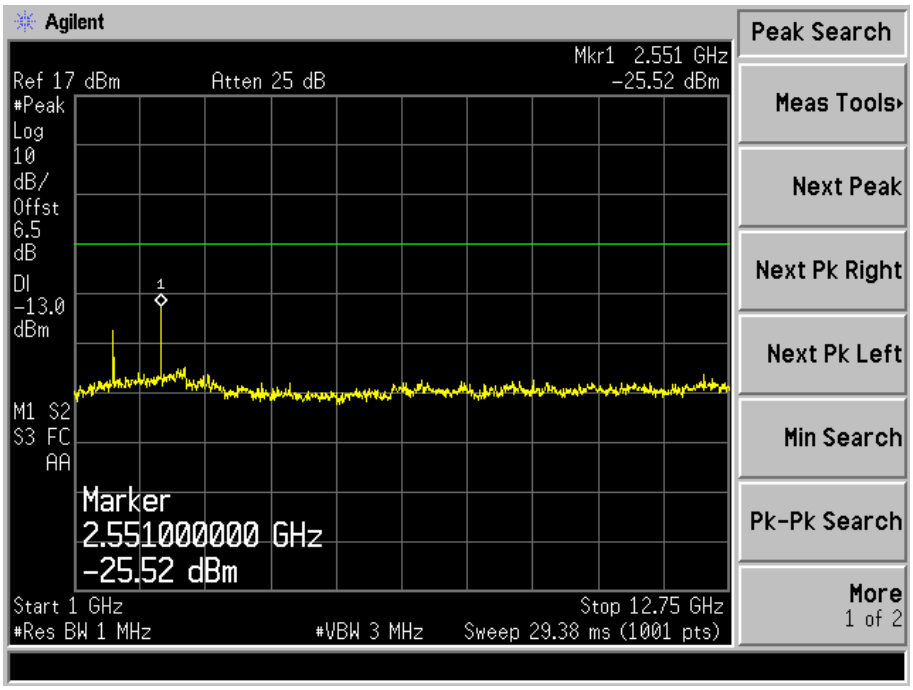
GSM Middle Channel



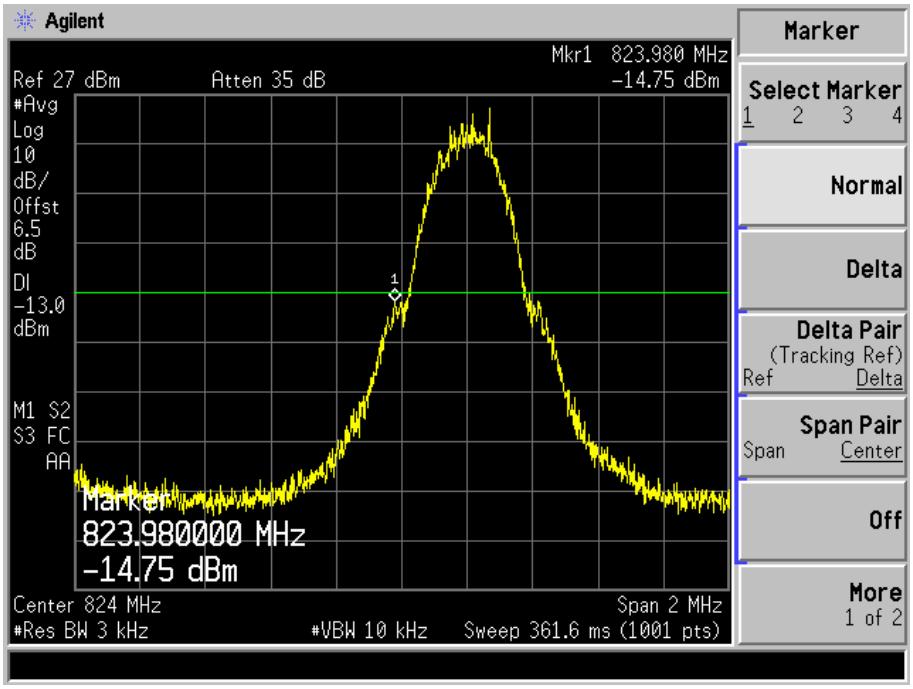


GSM High Channel

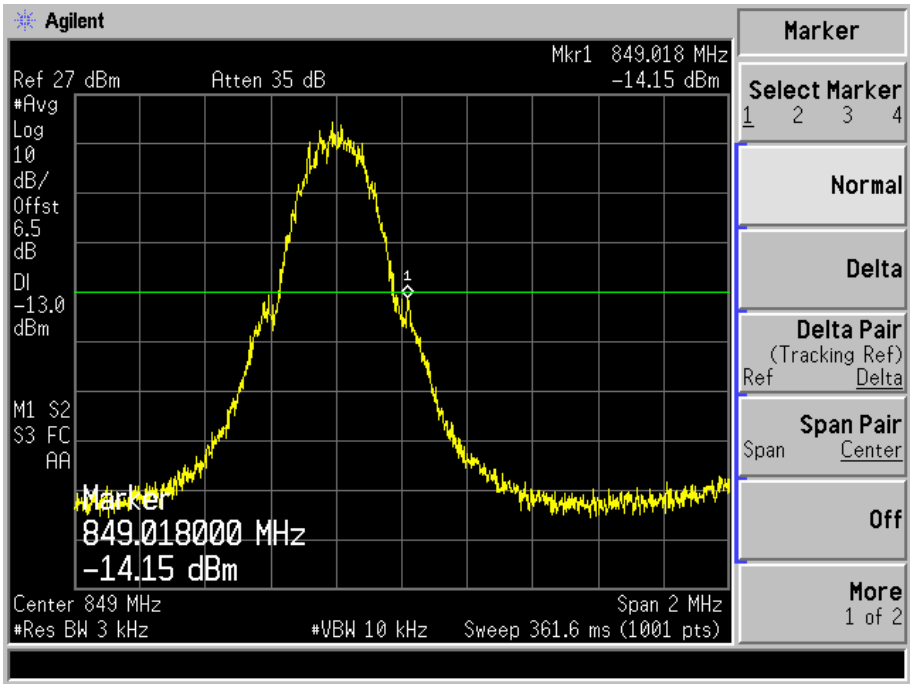




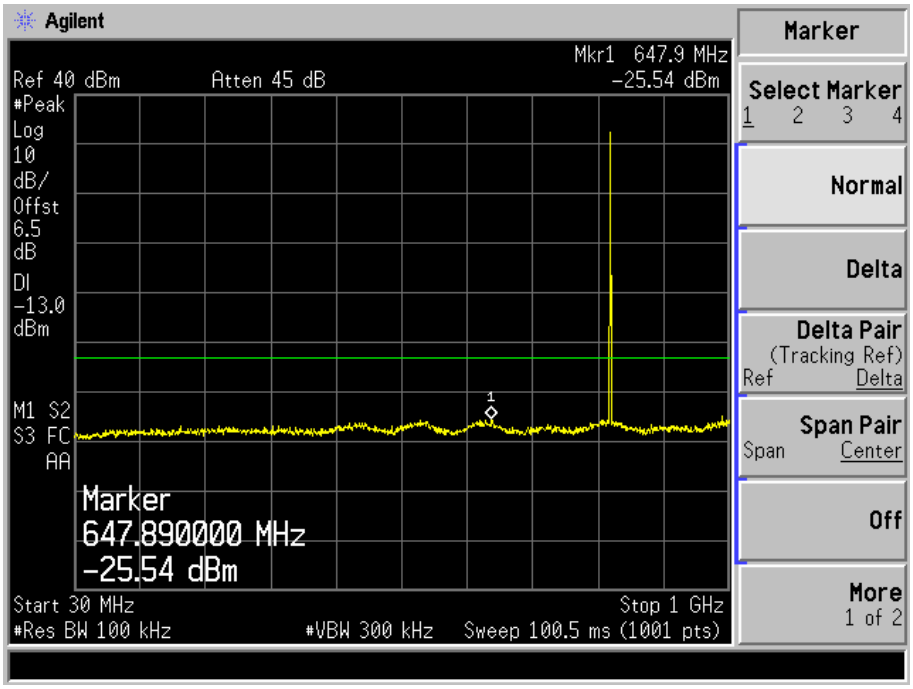
GSM Low Band Emission

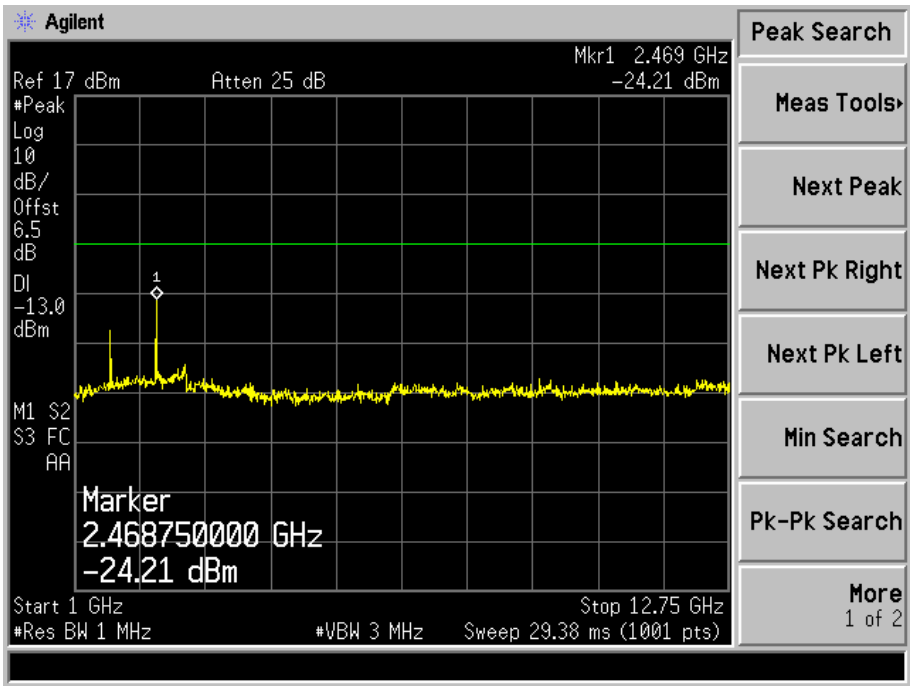


GSM High Band Emission

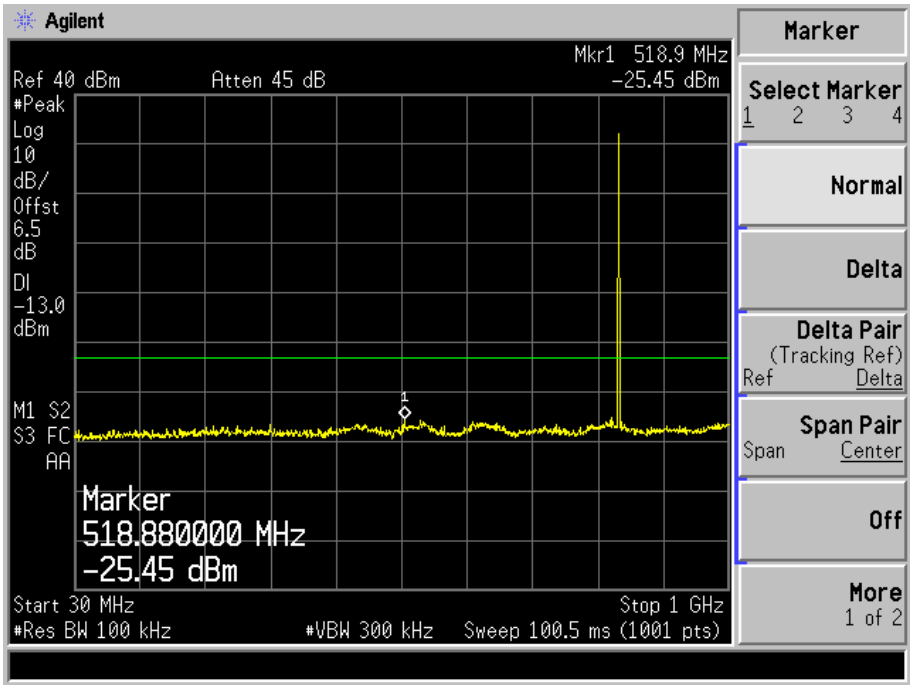


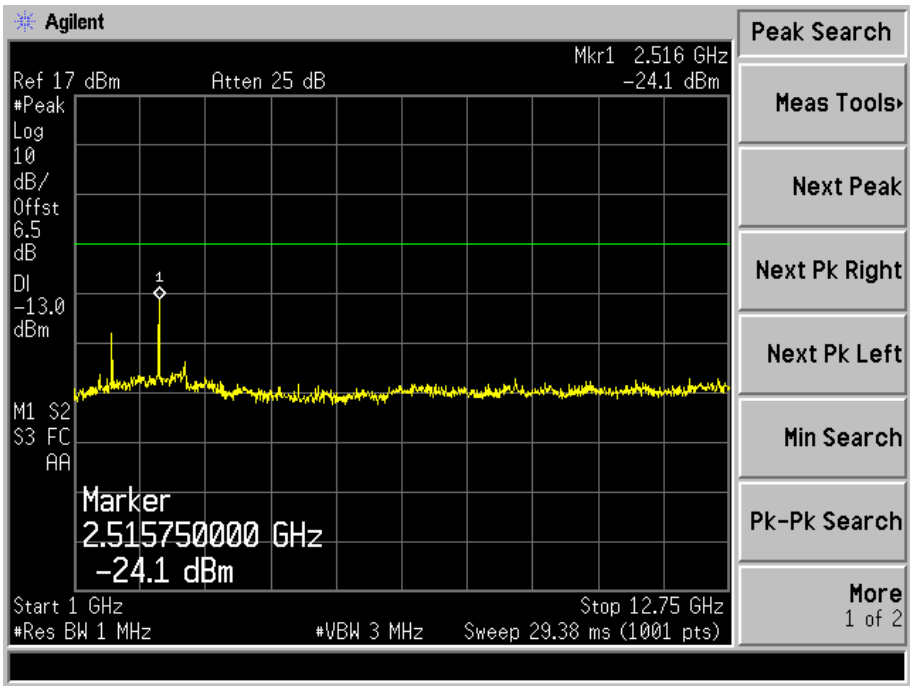
GPRS Low Channel



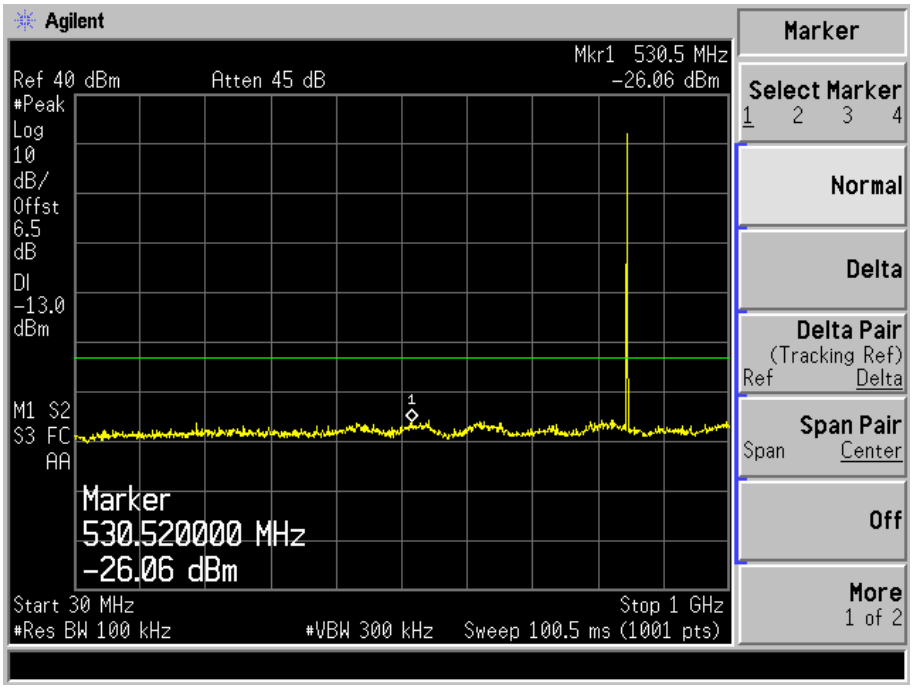


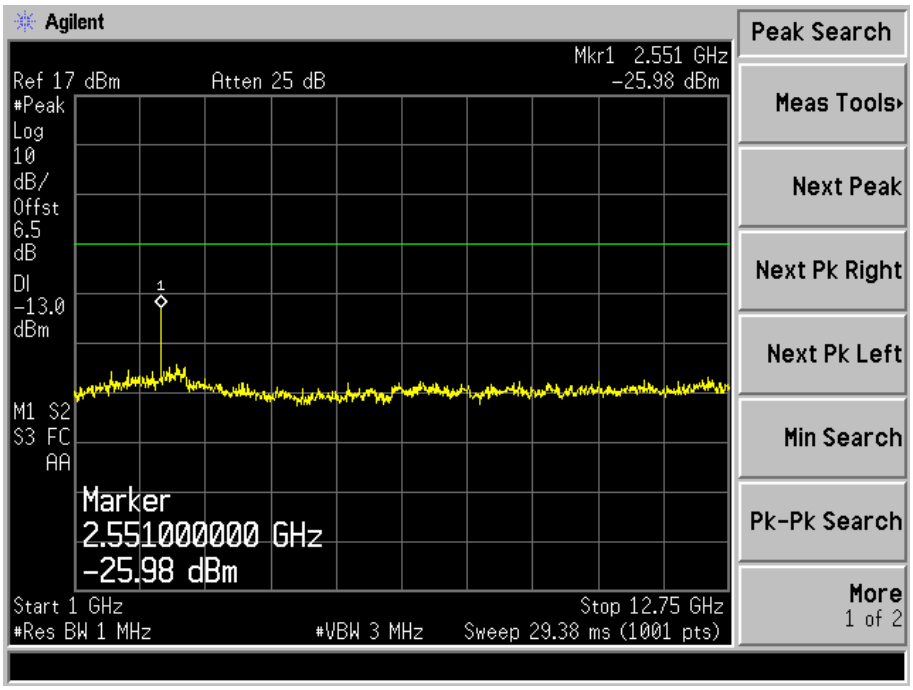
GPRS Middle Channel



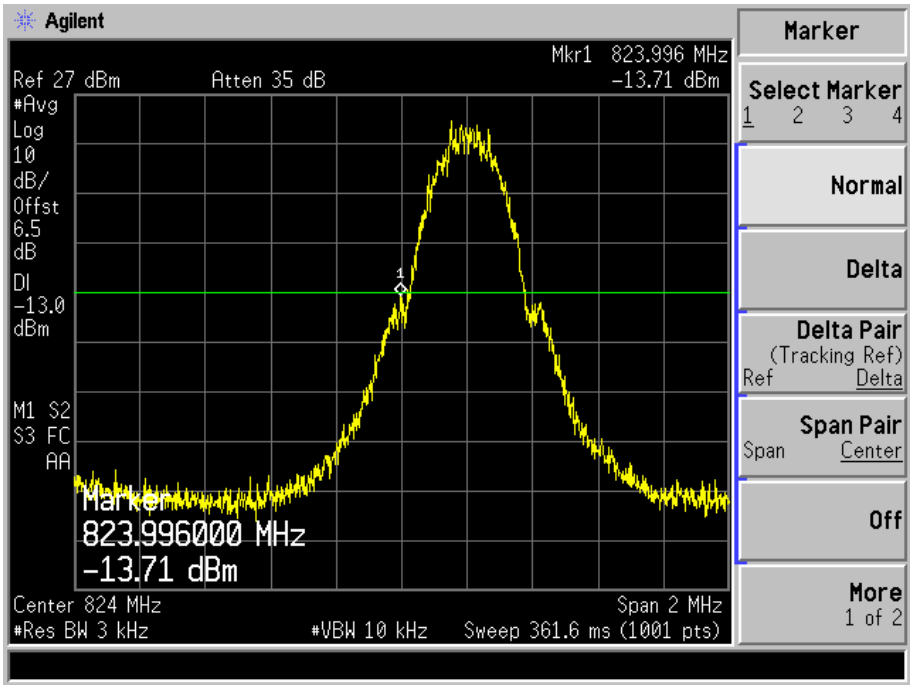


GPRS High Channel

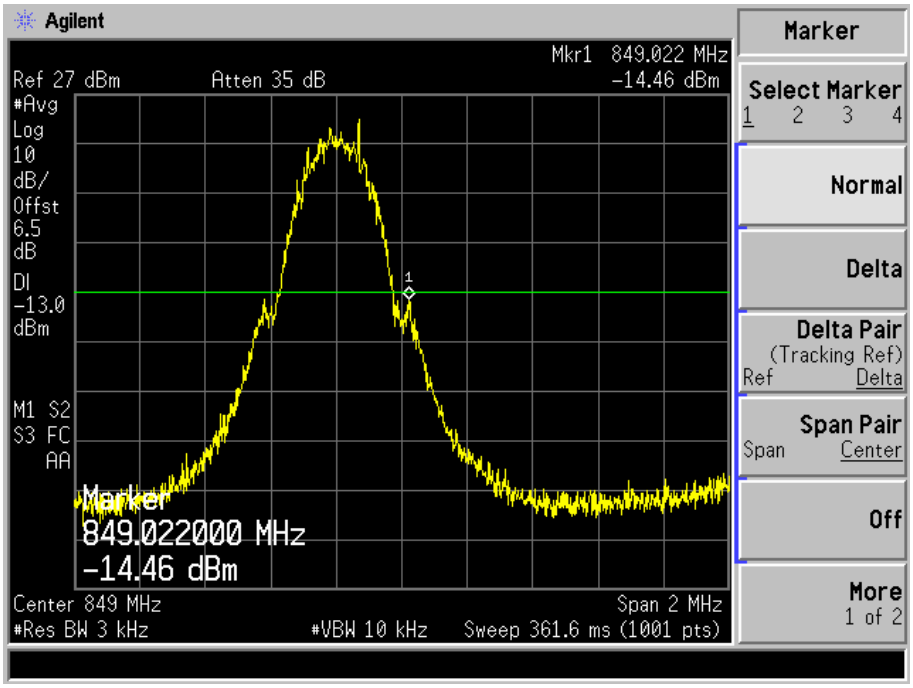




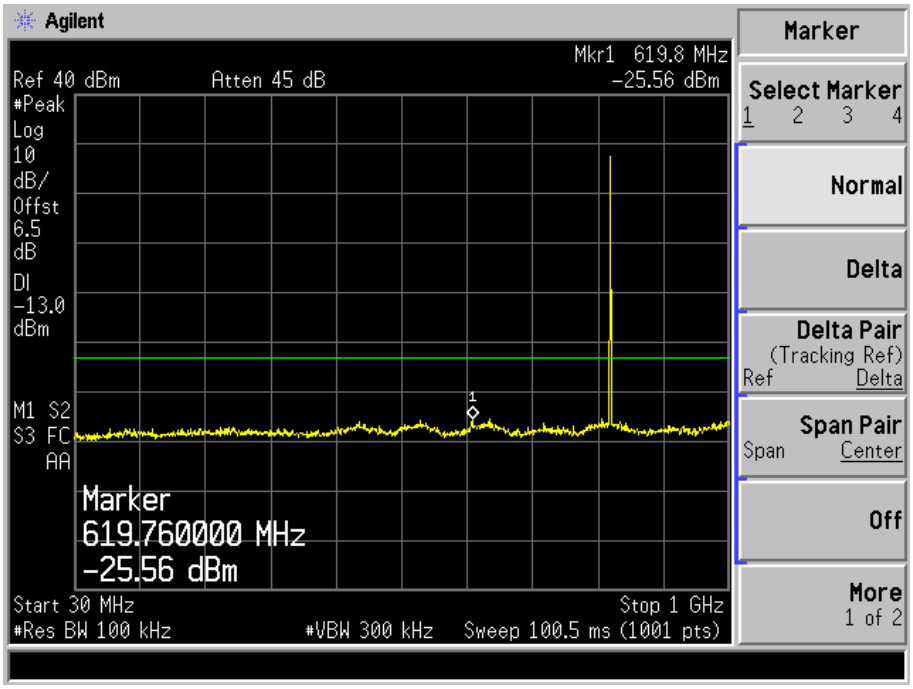
GPRS Low Band Emission

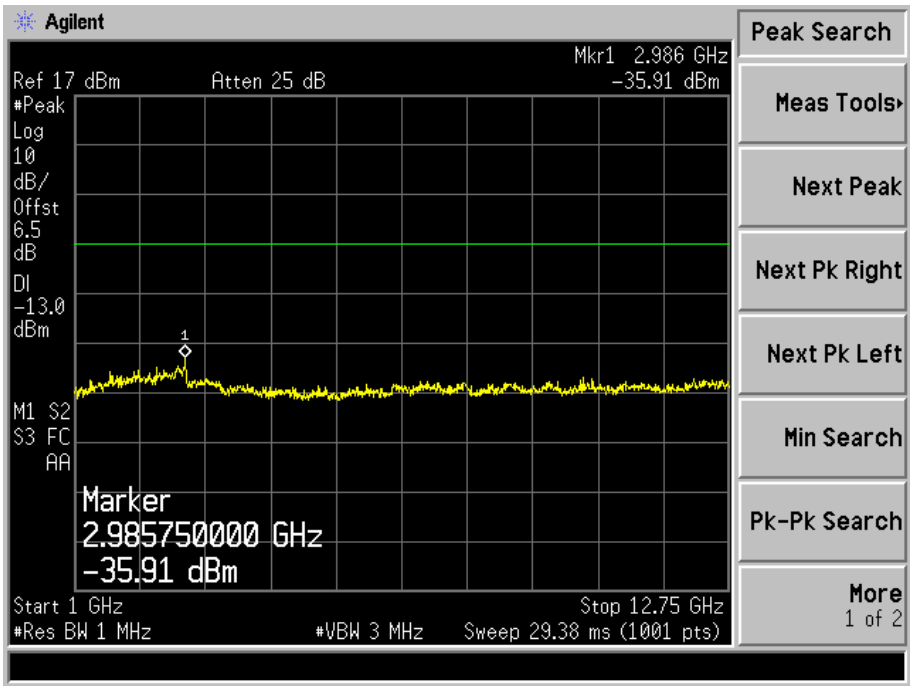


GPRS High Band Emission

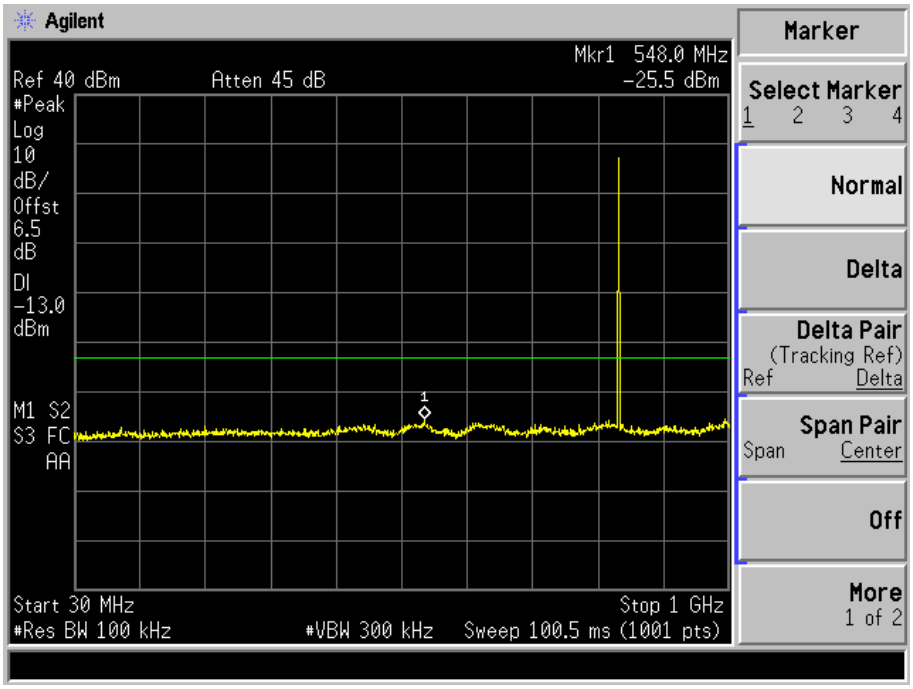


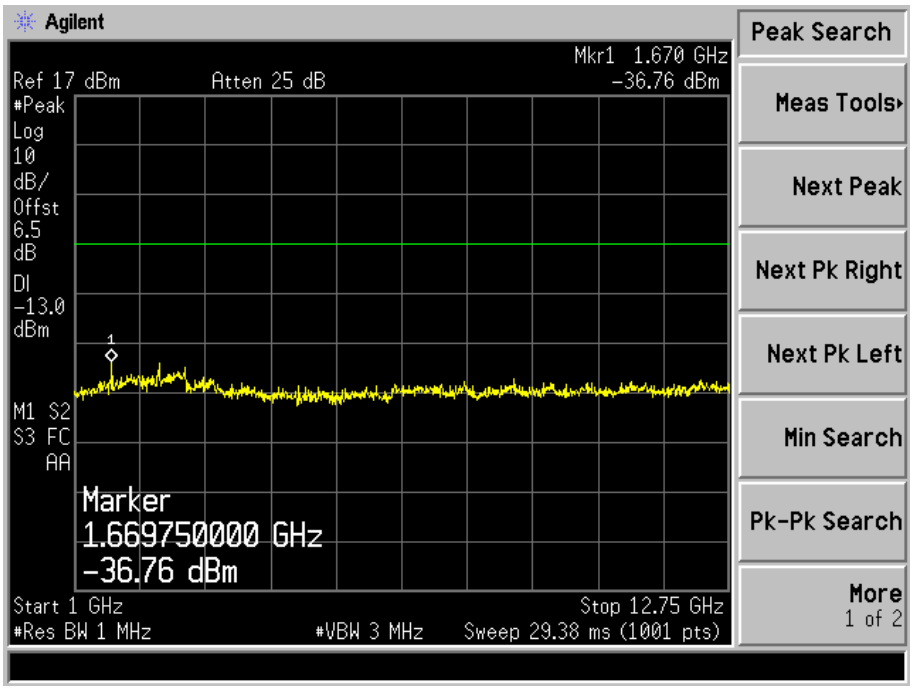
EDGE Low Channel



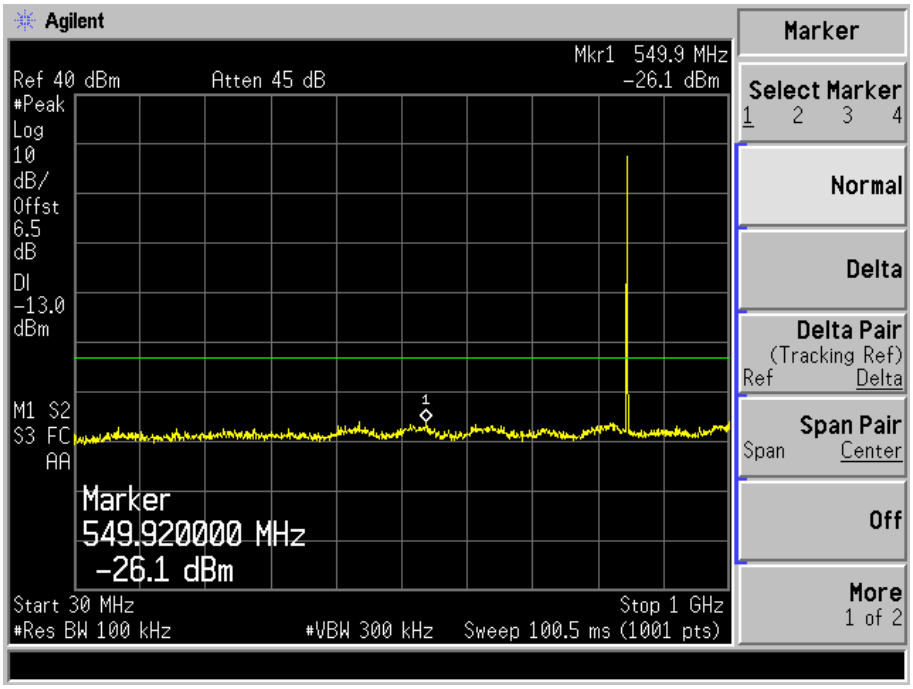


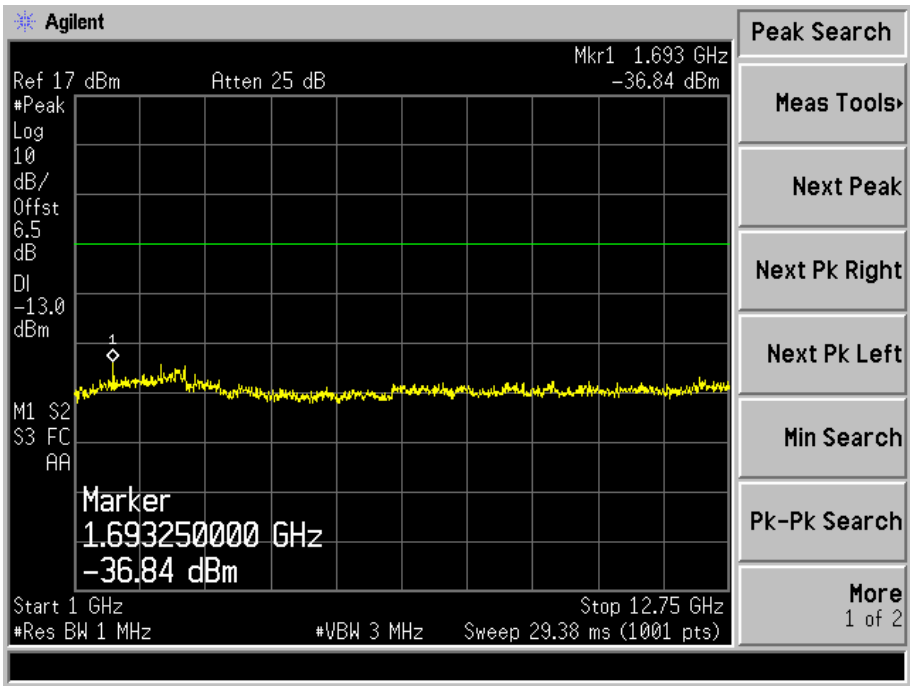
EDGE Middle Channel



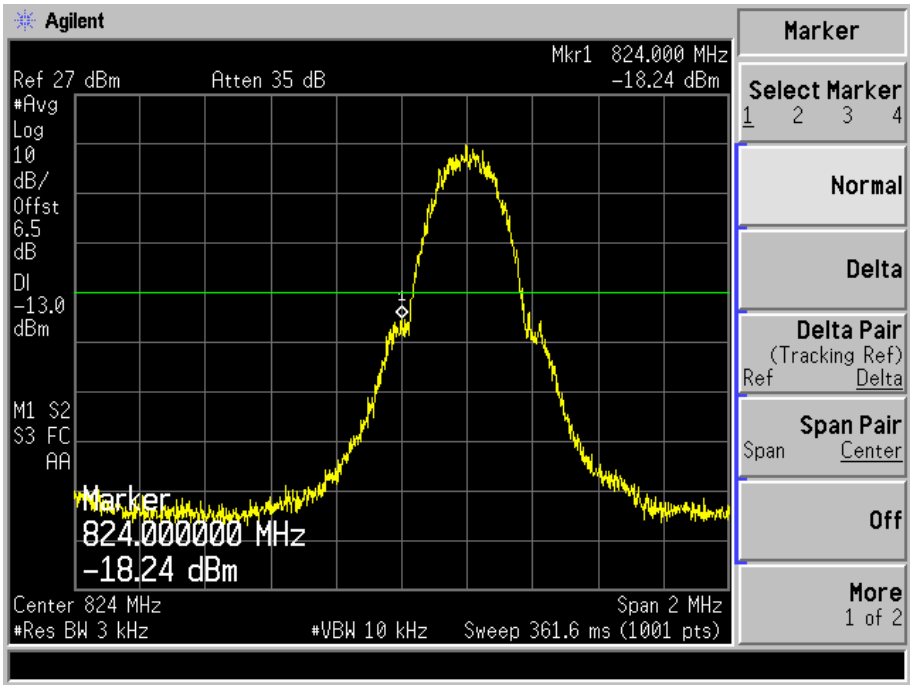


EDGE High Channel

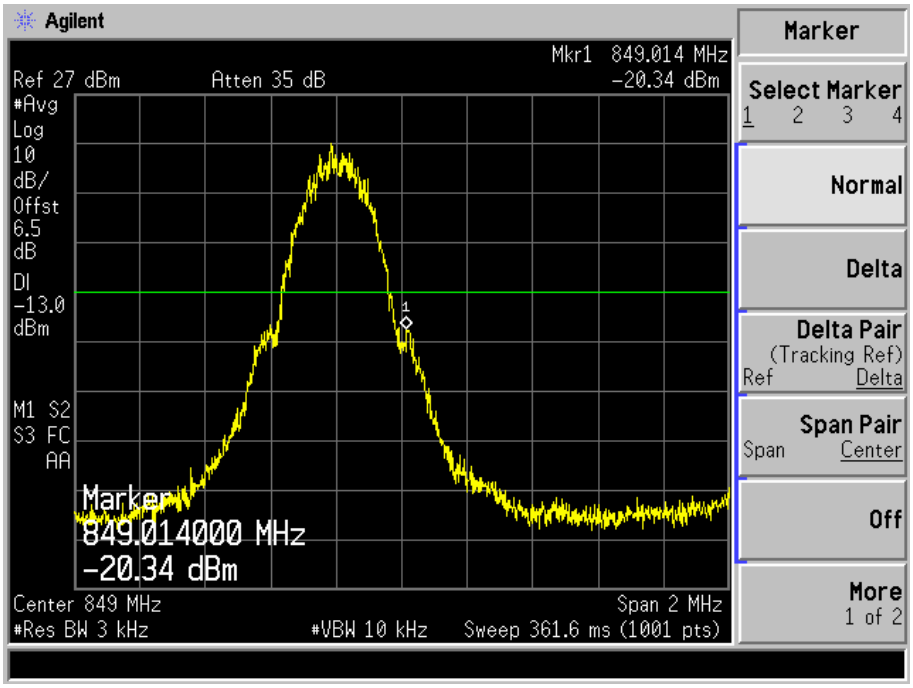




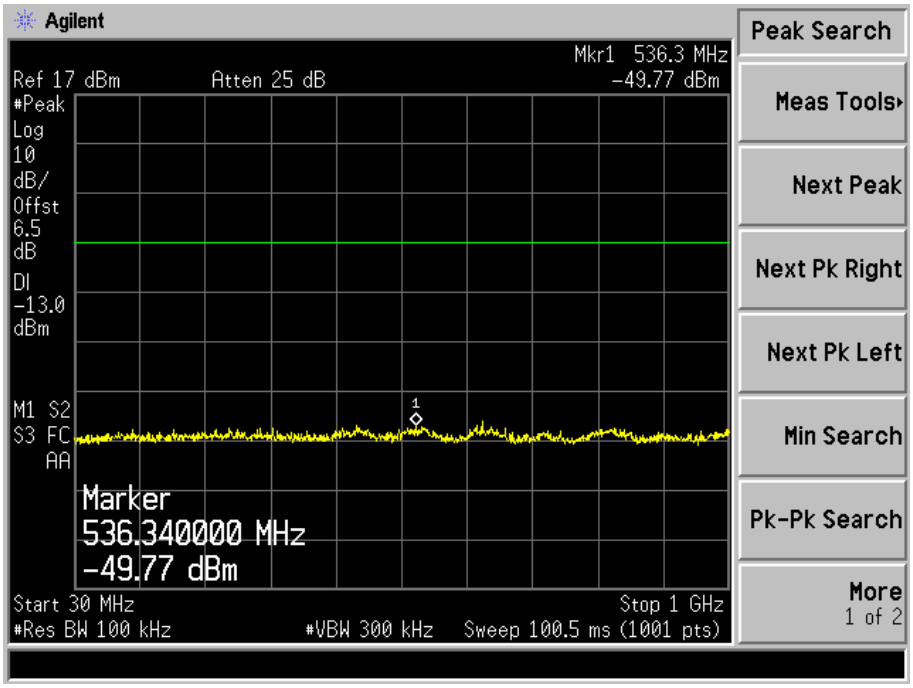
EDGE Low Band Emission

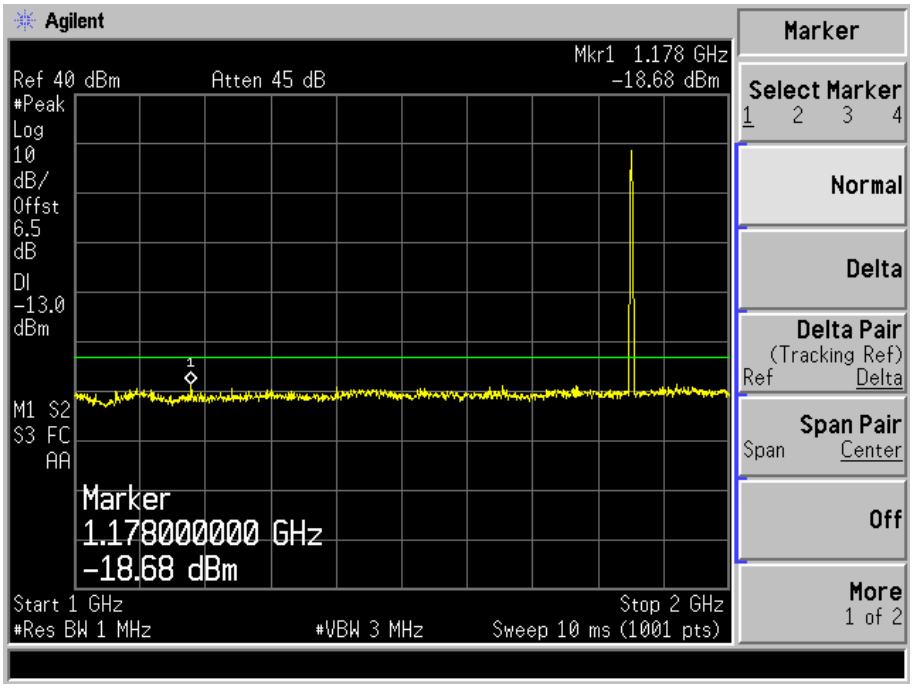


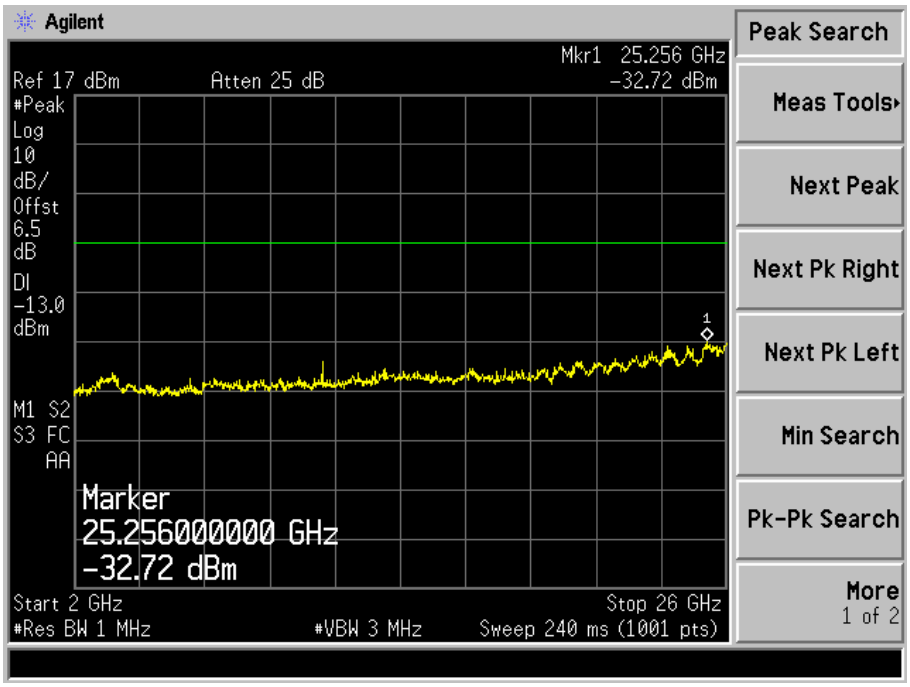
EDGE High Band Emission



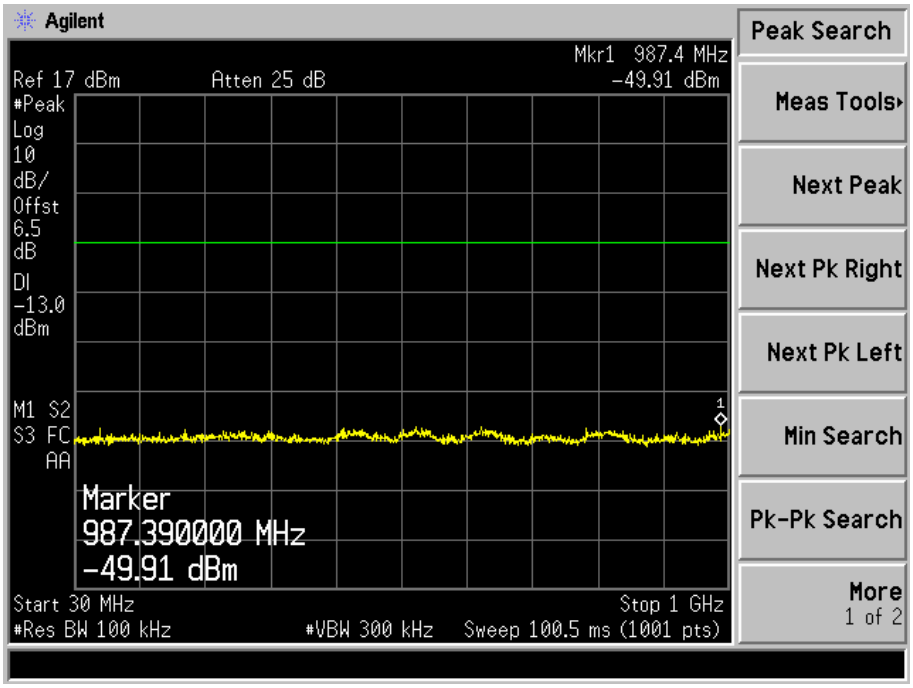
For PCS Band
GSM Low Channel

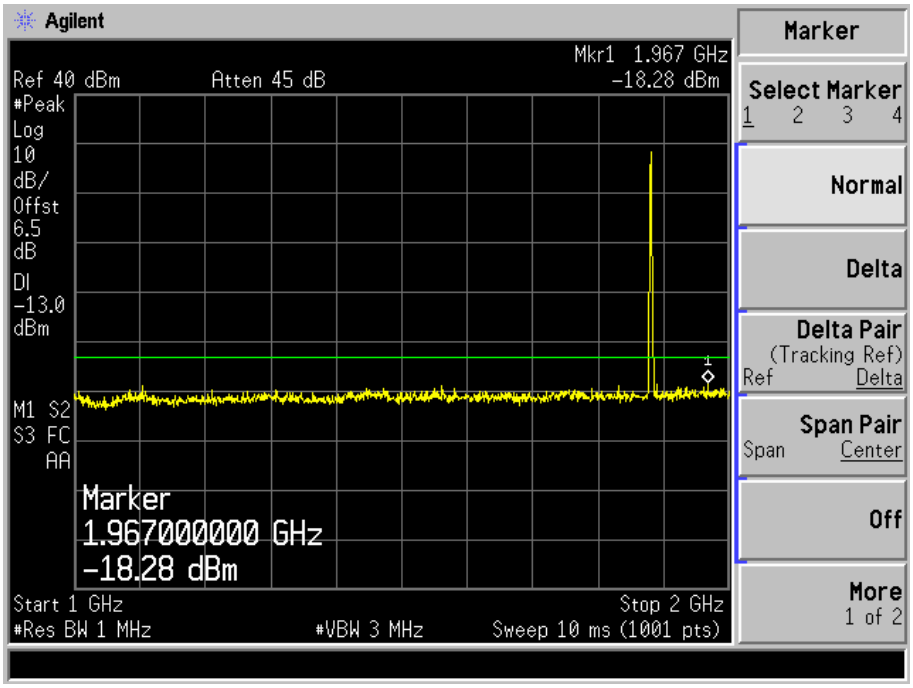


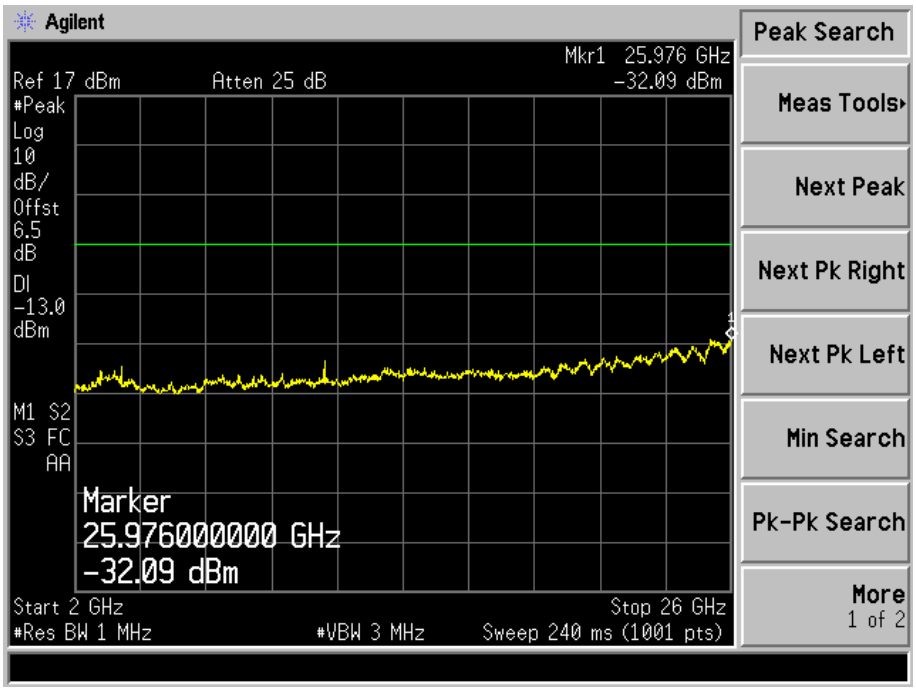




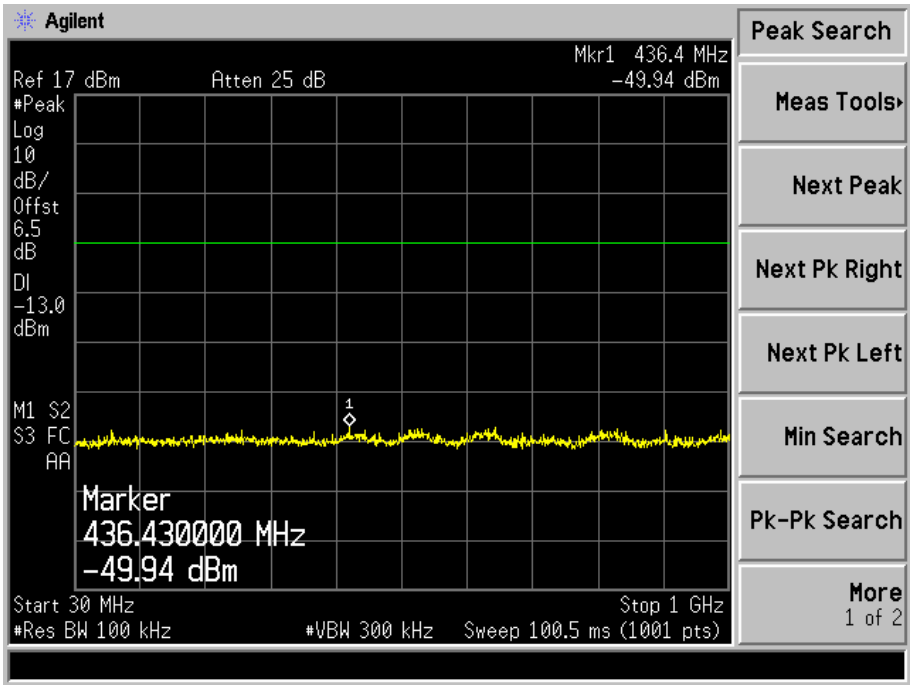
GSM Middle Channel

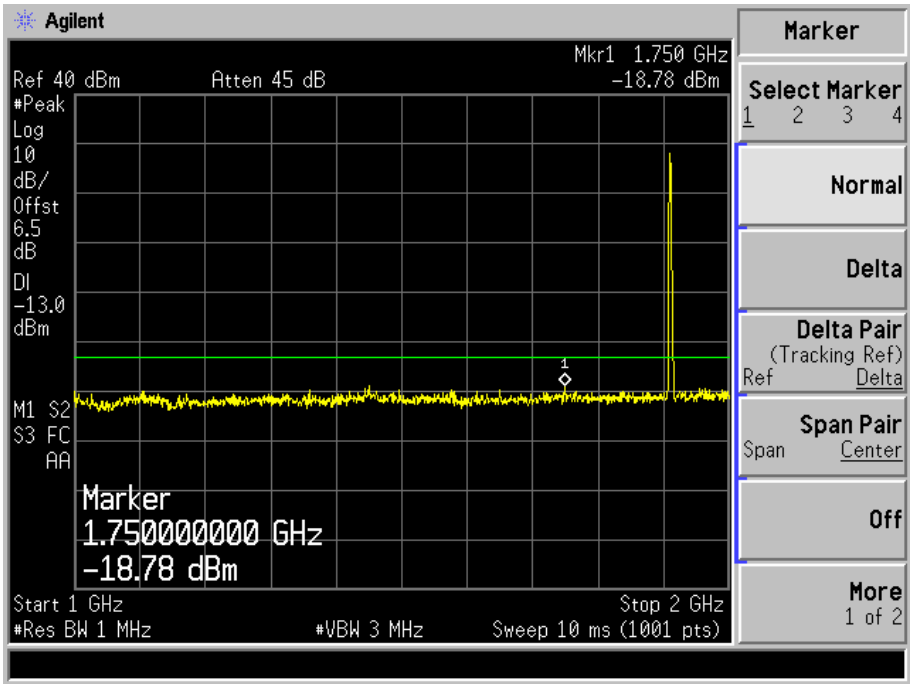


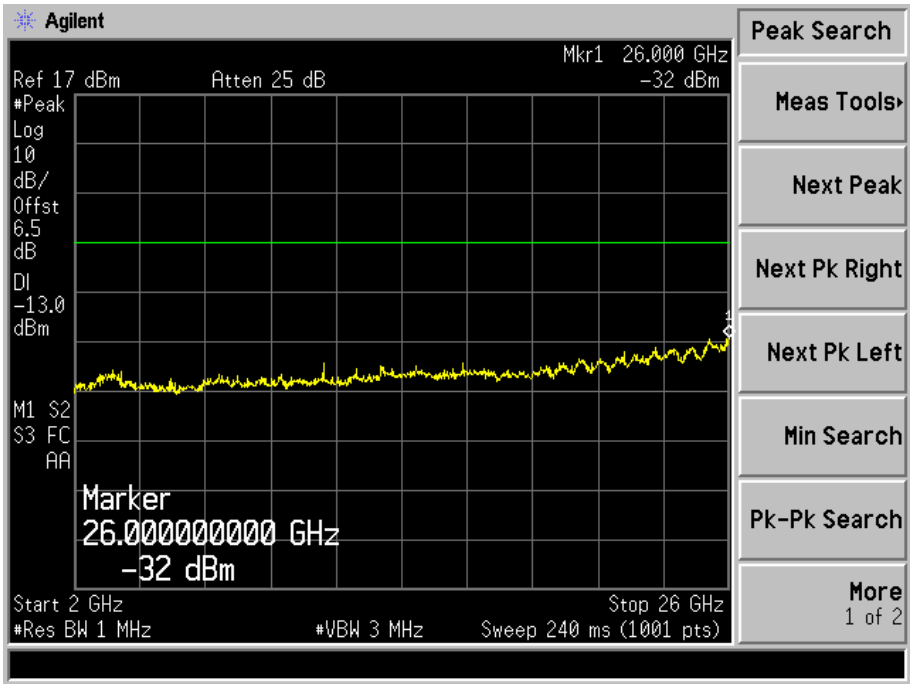

Agilent
Mkr1 1.967 GHz
Ref 40 dBm
Atten 45 dB
-18.28 dBm
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
1.967000000 GHz
-18.28 dBm
Start 1 GHz
Stop 2 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 10 ms (1001 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent
Mkr1 25.976 GHz
Ref 17 dBm
Atten 25 dB
-32.09 dBm
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
25.976000000 GHz
-32.09 dBm
Start 2 GHz
Stop 26 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 240 ms (1001 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

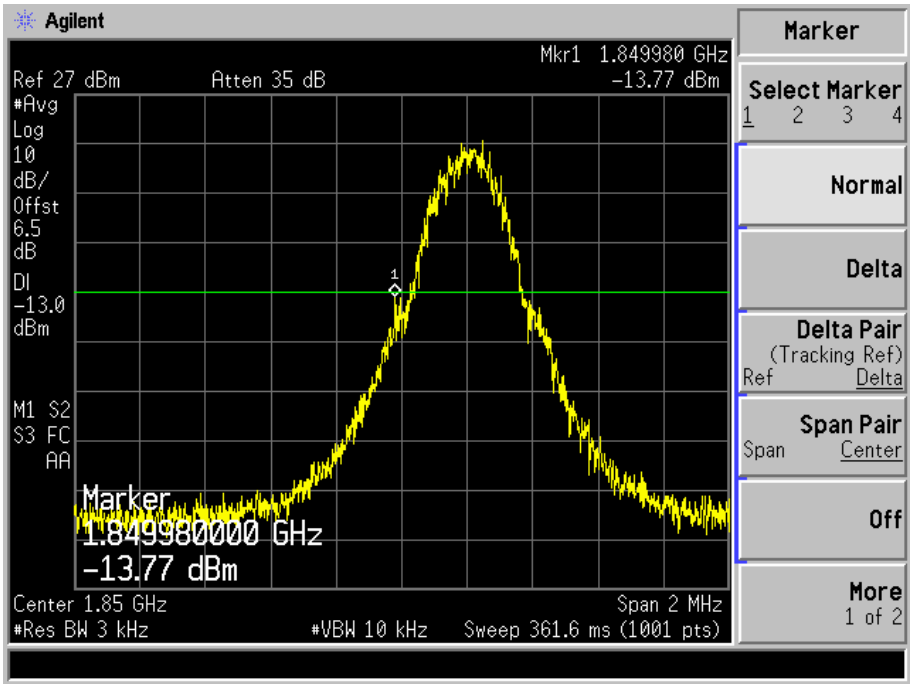
GSM High Channel



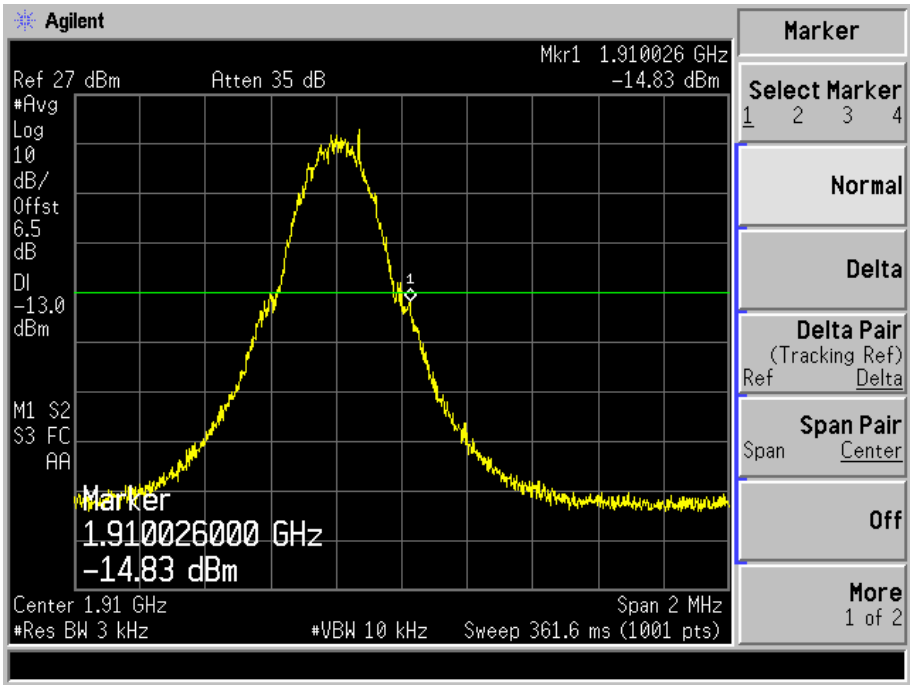




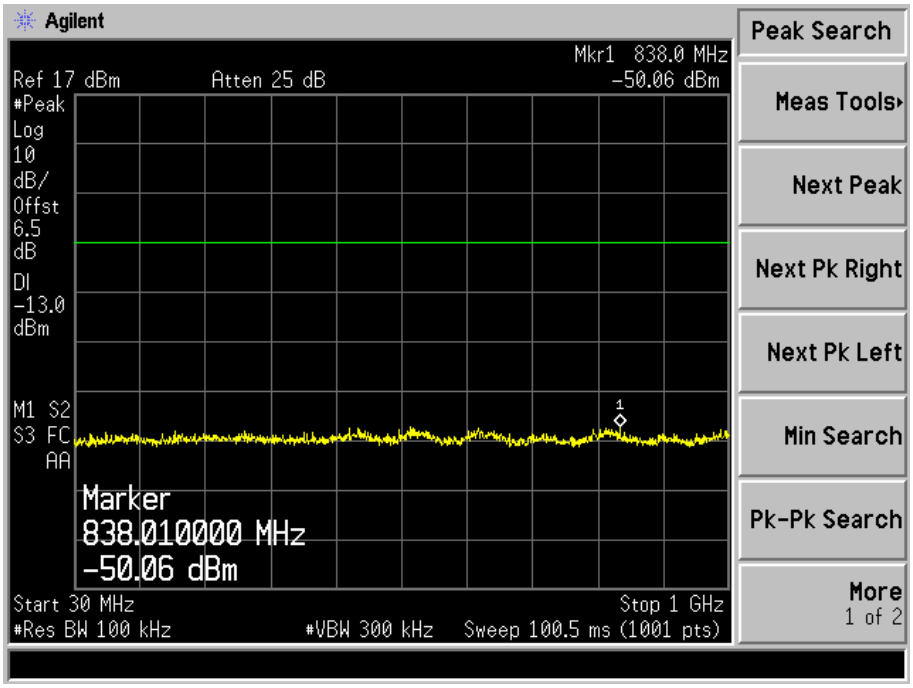
GSM Low Band Emission

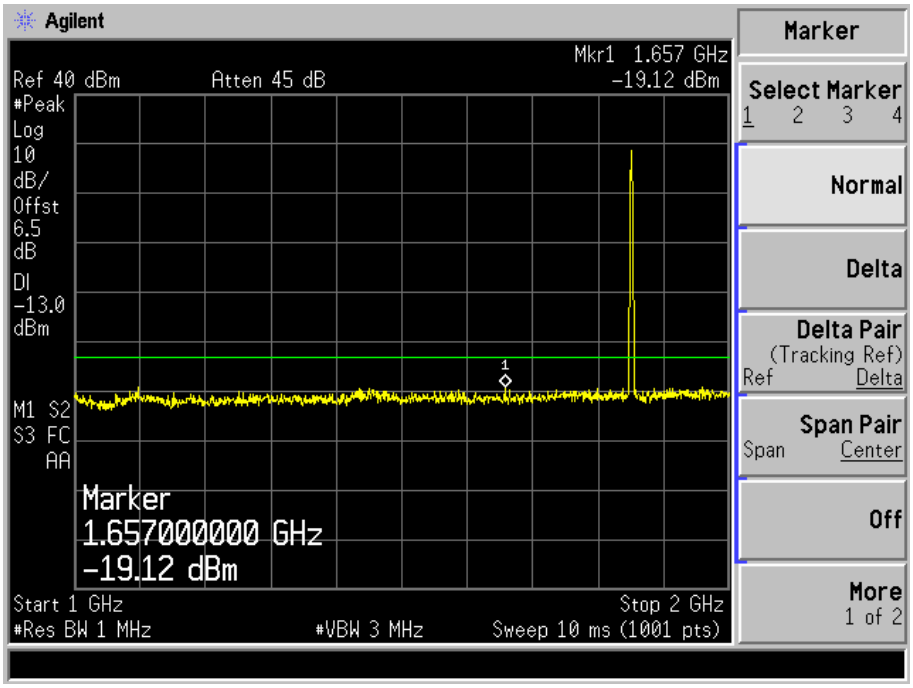


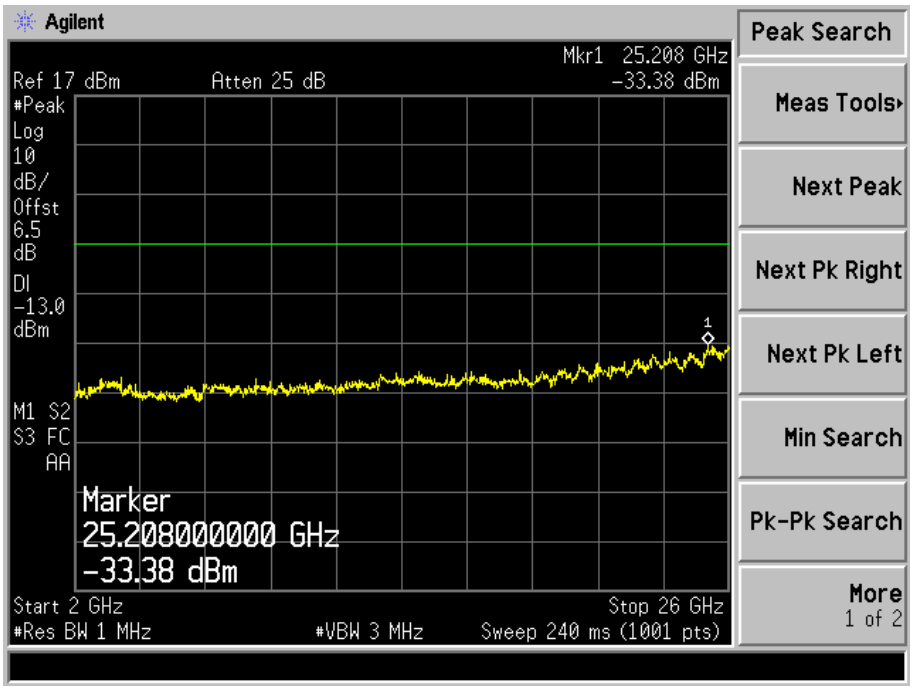
GSM High Band Emission



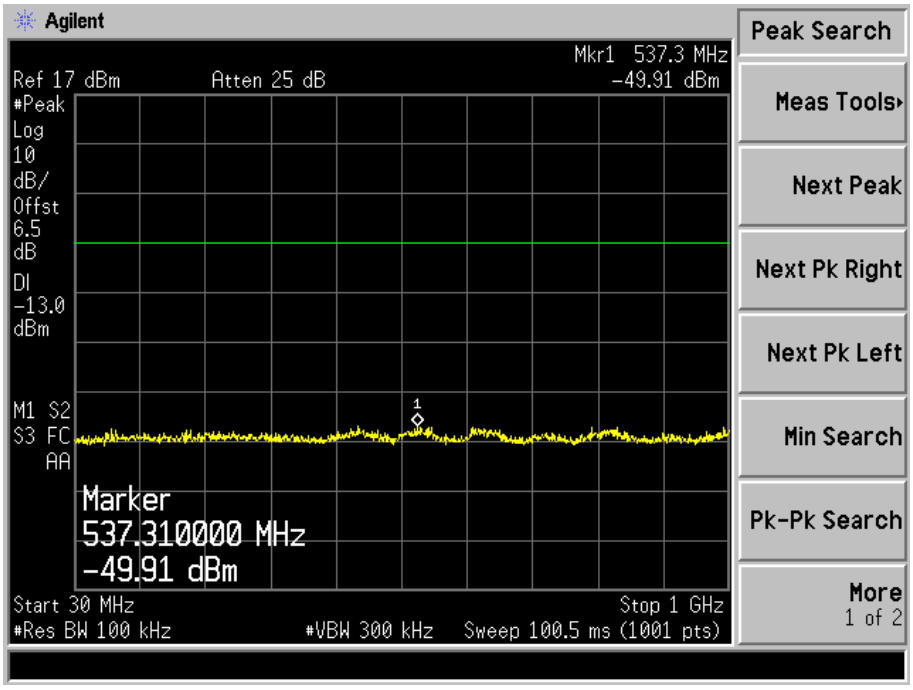
GPRS Low Channel

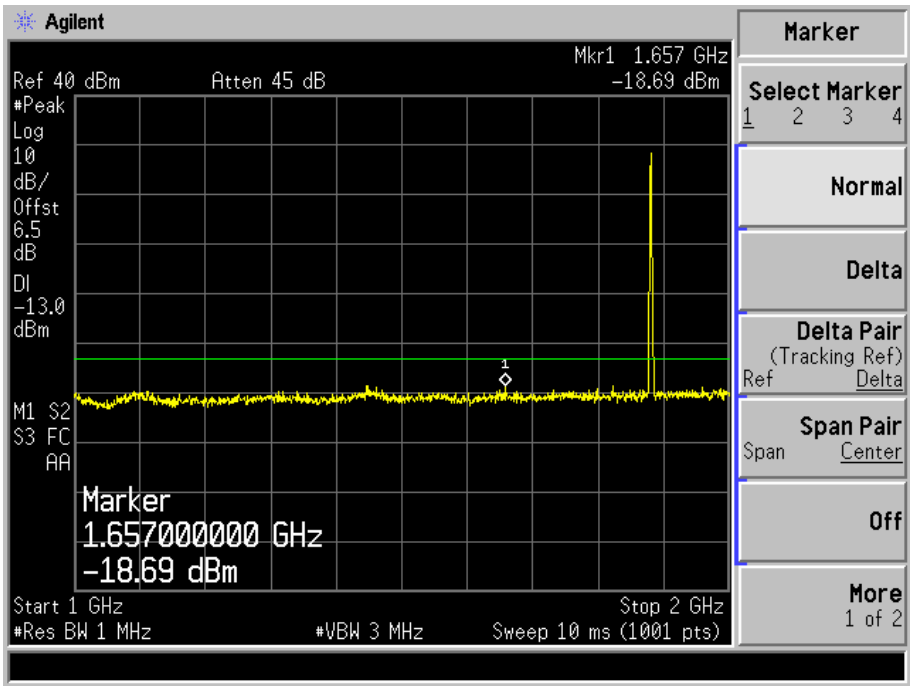


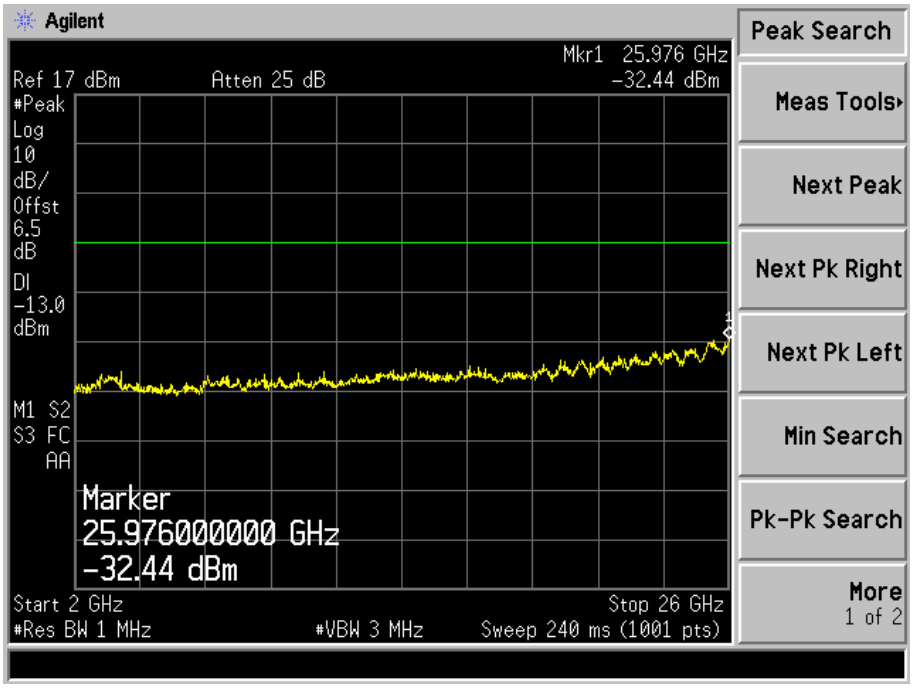

Agilent
Mkr1 1.657 GHz
Ref 40 dBm
Atten 45 dB
-19.12 dBm
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
1.657000000 GHz
-19.12 dBm
Start 1 GHz
Stop 2 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 10 ms (1001 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent
Mkr1 25.208 GHz
Ref 17 dBm
Atten 25 dB
-33.38 dBm
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
25.208000000 GHz
-33.38 dBm
Start 2 GHz
Stop 26 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 240 ms (1001 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

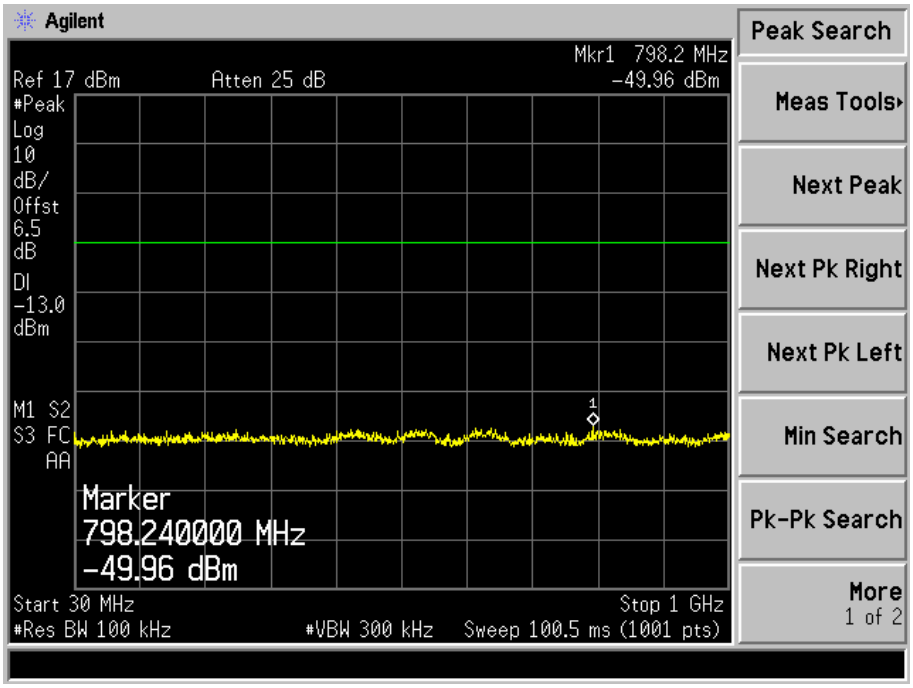
GPRS Middle Channel

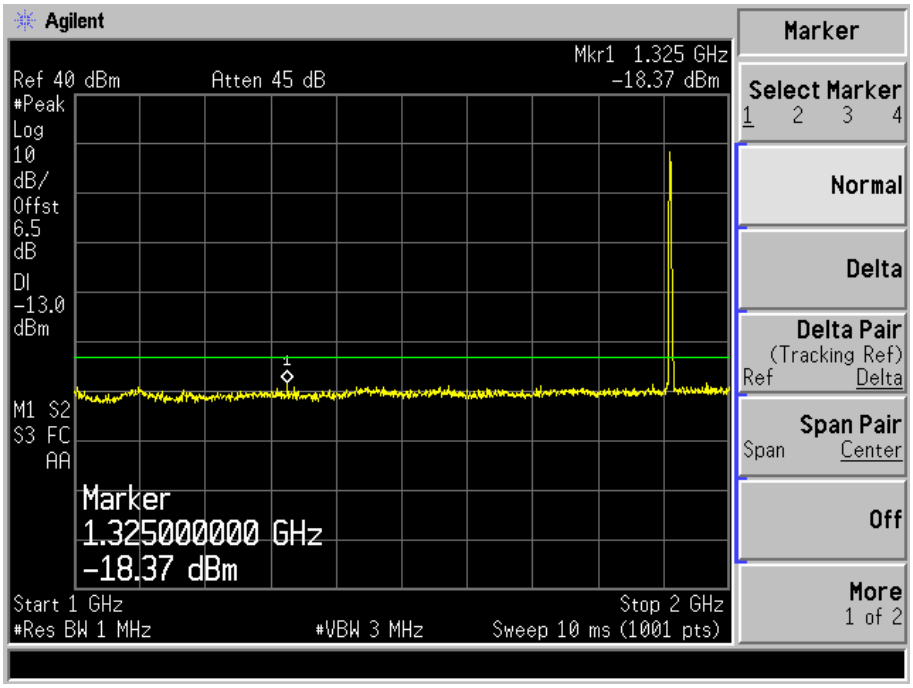


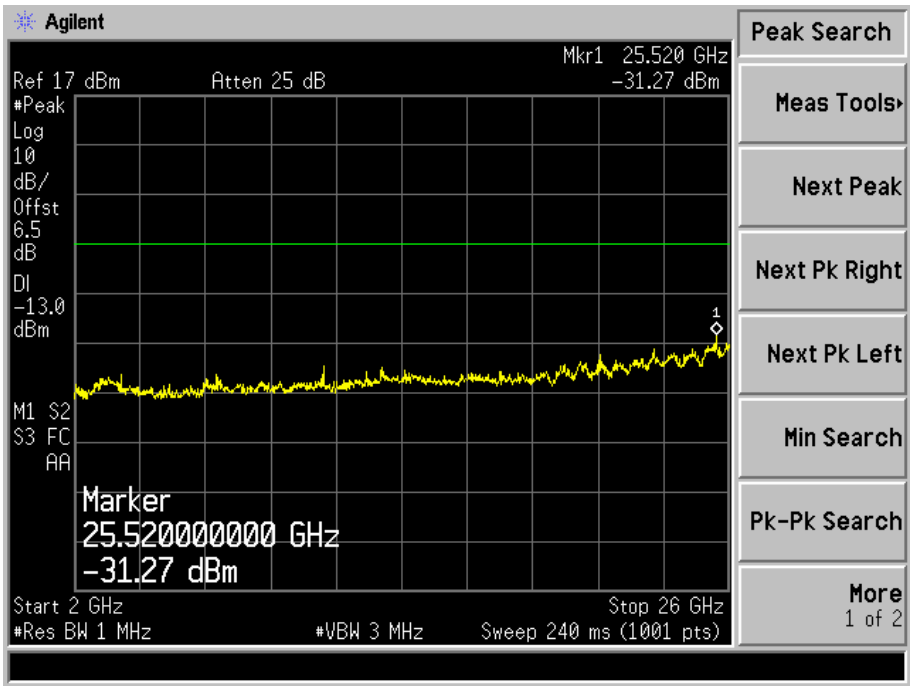




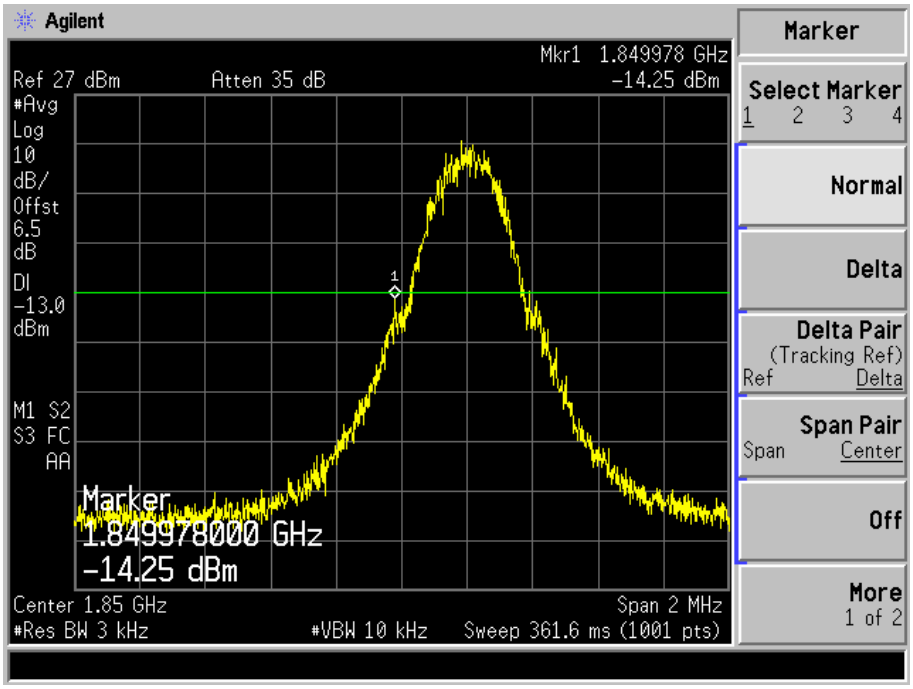
GPRS High Channel



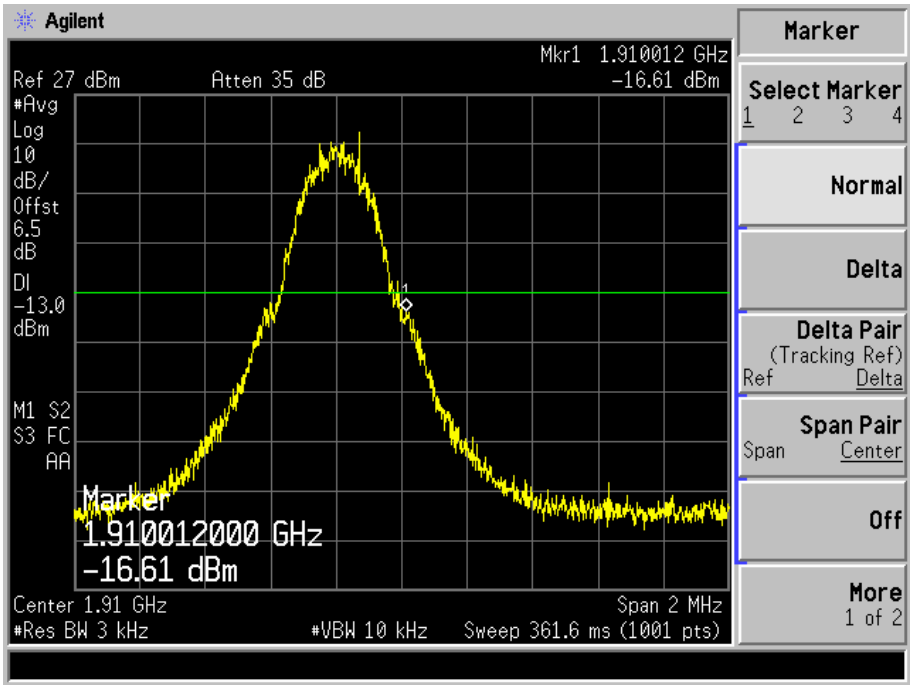

Agilent
Mkr1 1.325 GHz
Ref 40 dBm
Atten 45 dB
-18.37 dBm
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
1.325000000 GHz
-18.37 dBm
Start 1 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 2 GHz
Sweep 10 ms (1001 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent
Mkr1 25.520 GHz
Ref 17 dBm
Atten 25 dB
-31.27 dBm
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
25.520000000 GHz
-31.27 dBm
Start 2 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 26 GHz
Sweep 240 ms (1001 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

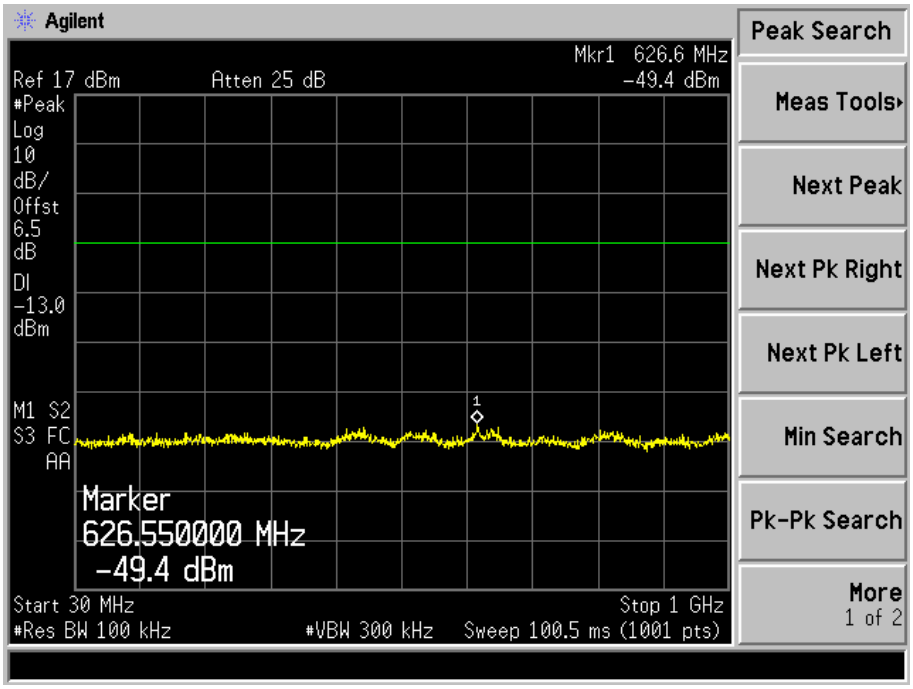
GPRS Low Band Emission

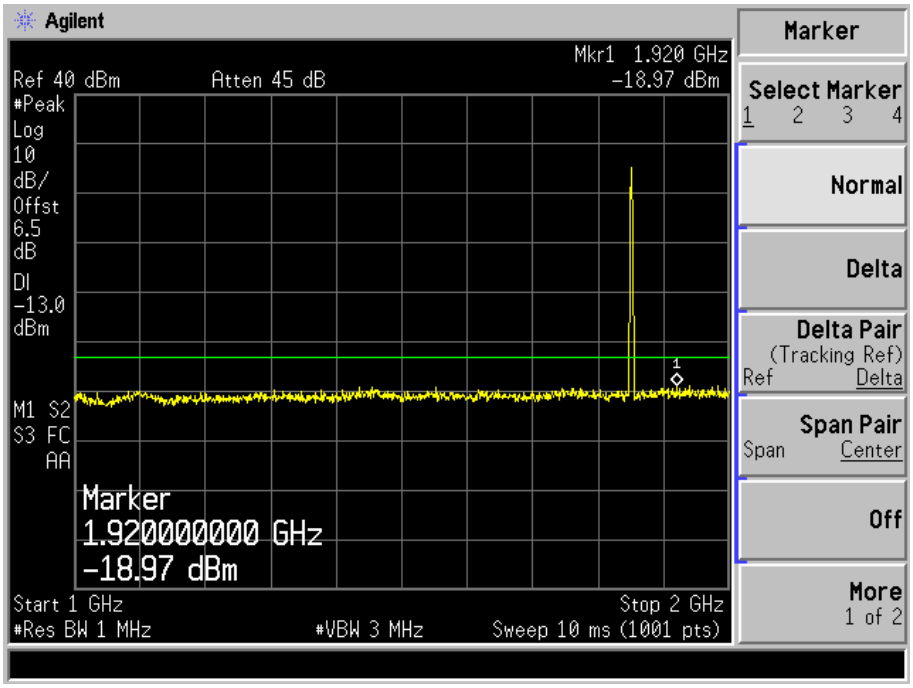


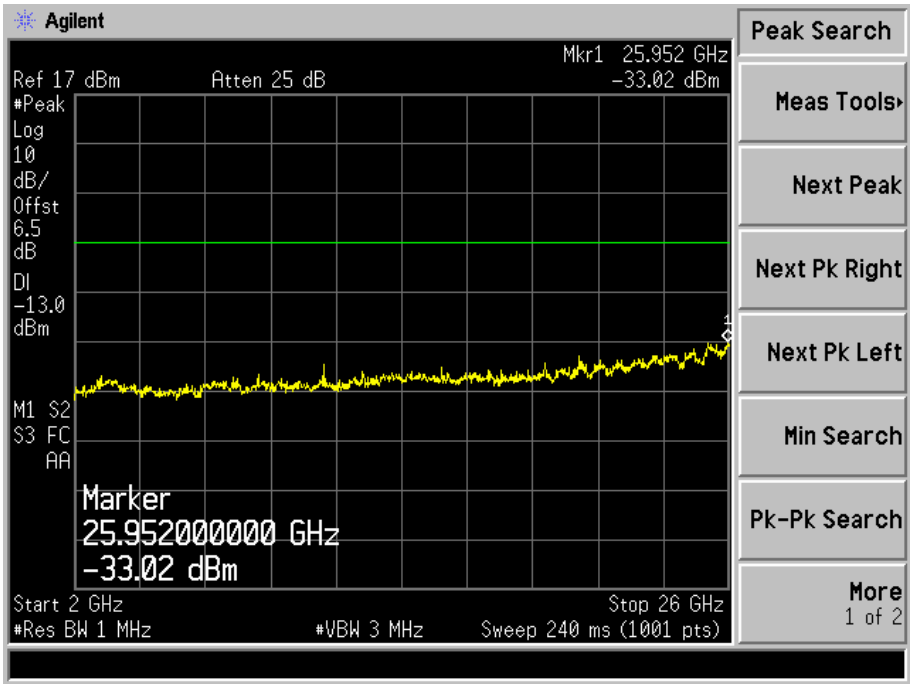
GPRS High Band Emission



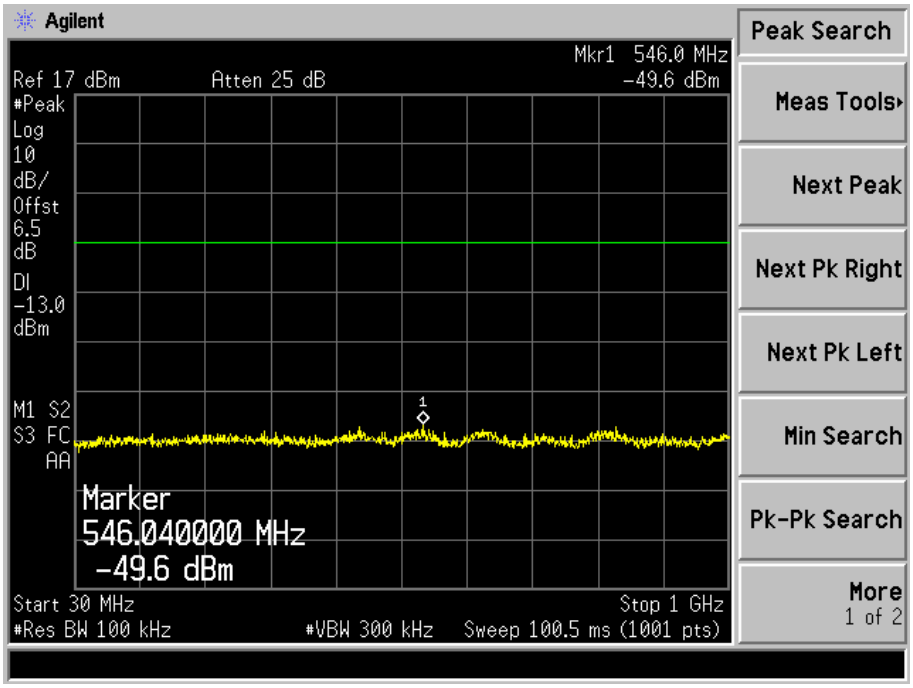
EDGE Low Channel

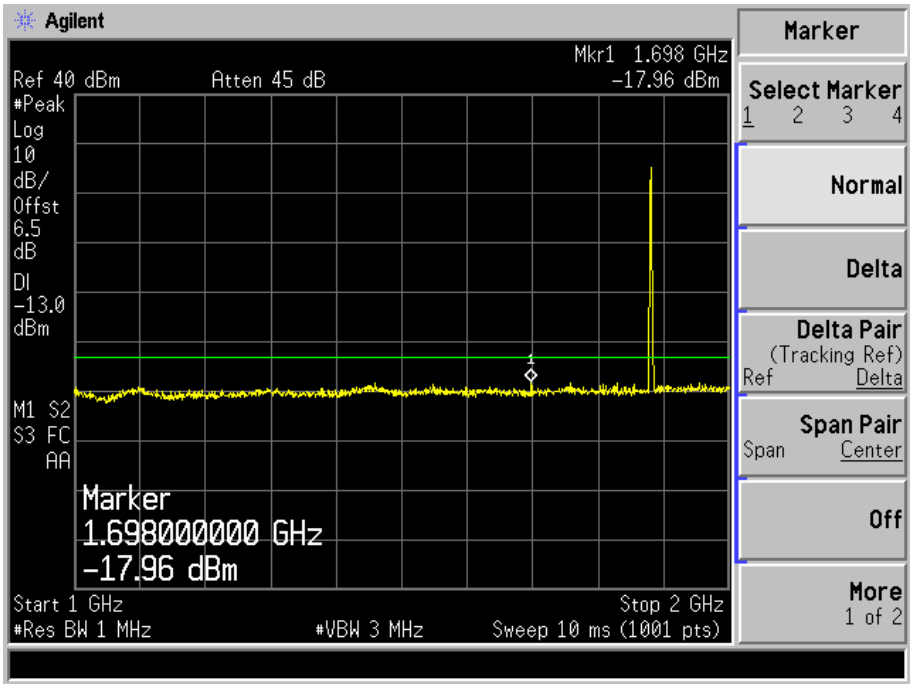


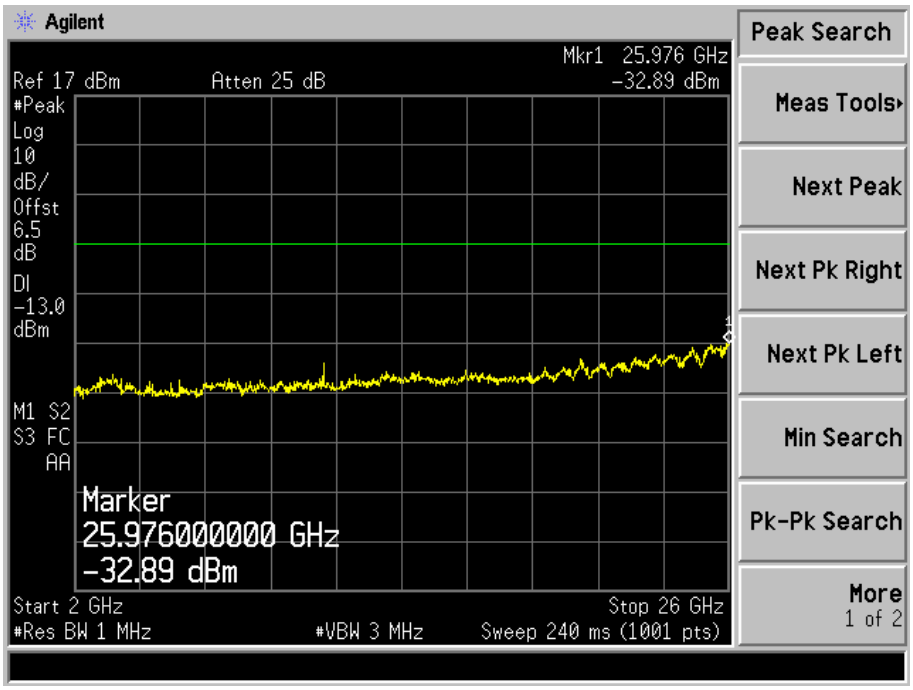




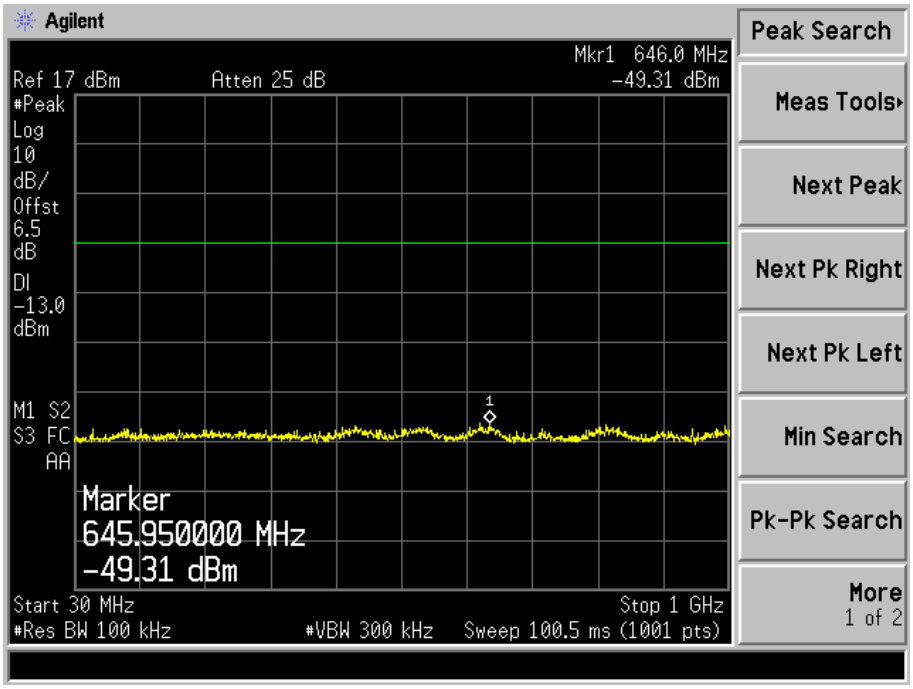
EDGE Middle Channel

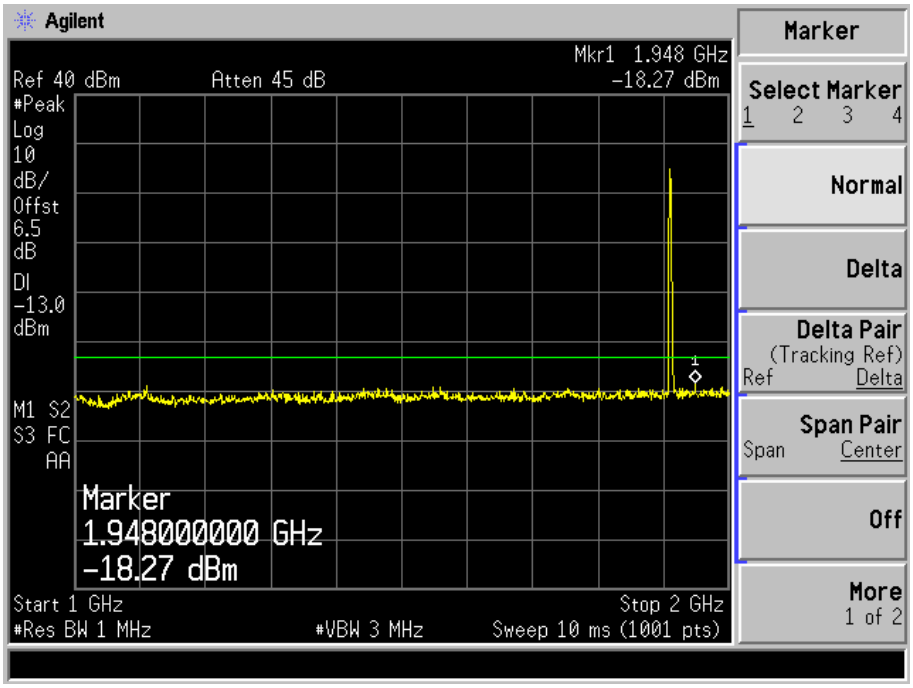


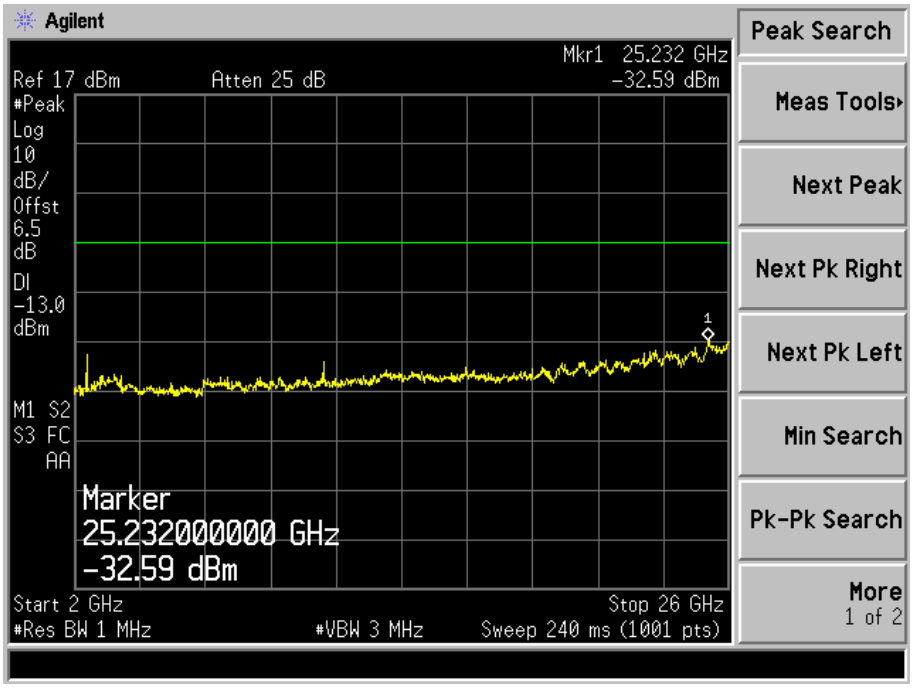

Agilent
Mkr1 1.698 GHz
-17.96 dBm
Ref 40 dBm
Atten 45 dB
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
1.698000000 GHz
-17.96 dBm
Start 1 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 2 GHz
Sweep 10 ms (1001 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent
Mkr1 25.976 GHz
-32.89 dBm
Ref 17 dBm
Atten 25 dB
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
25.976000000 GHz
-32.89 dBm
Start 2 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 26 GHz
Sweep 240 ms (1001 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

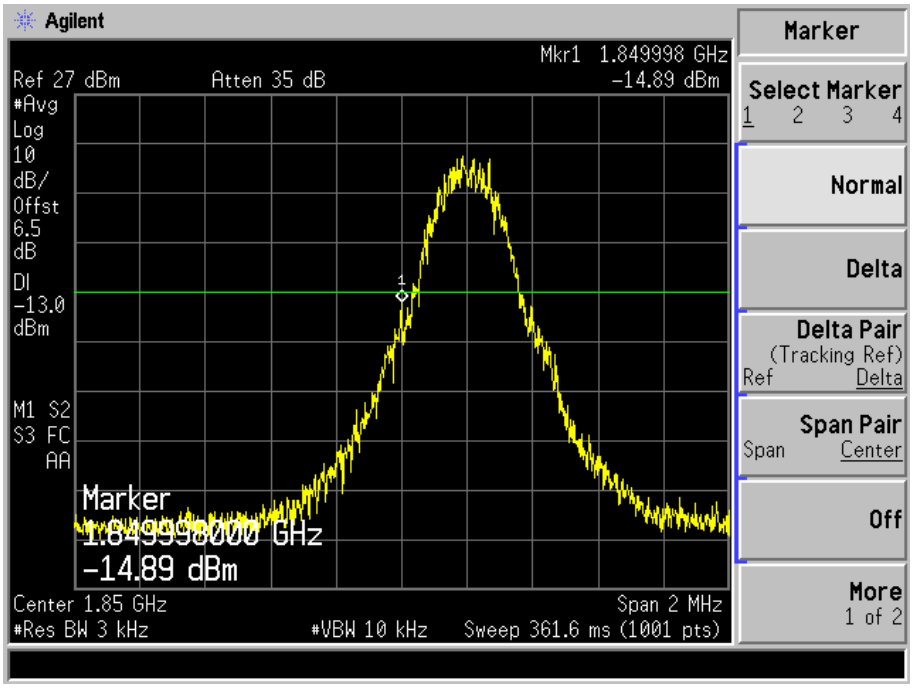
EDGE High Channel



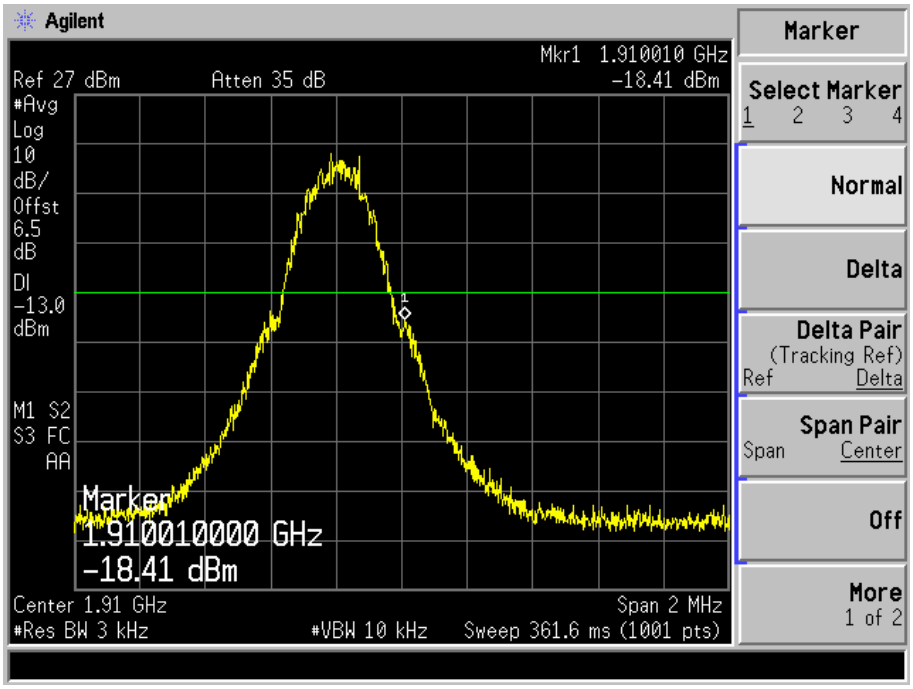




EDGE Low Band Emission

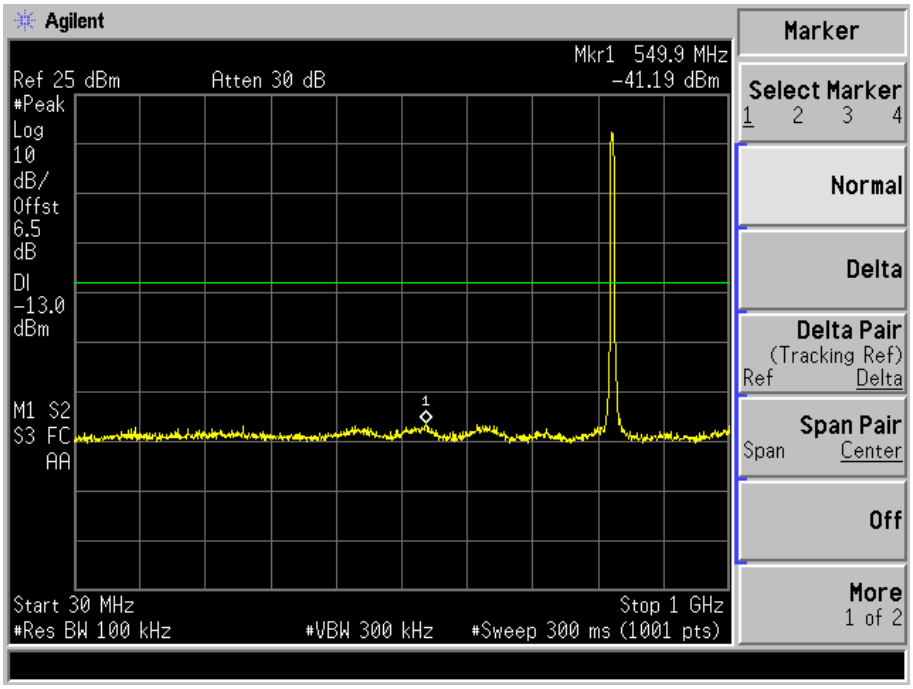


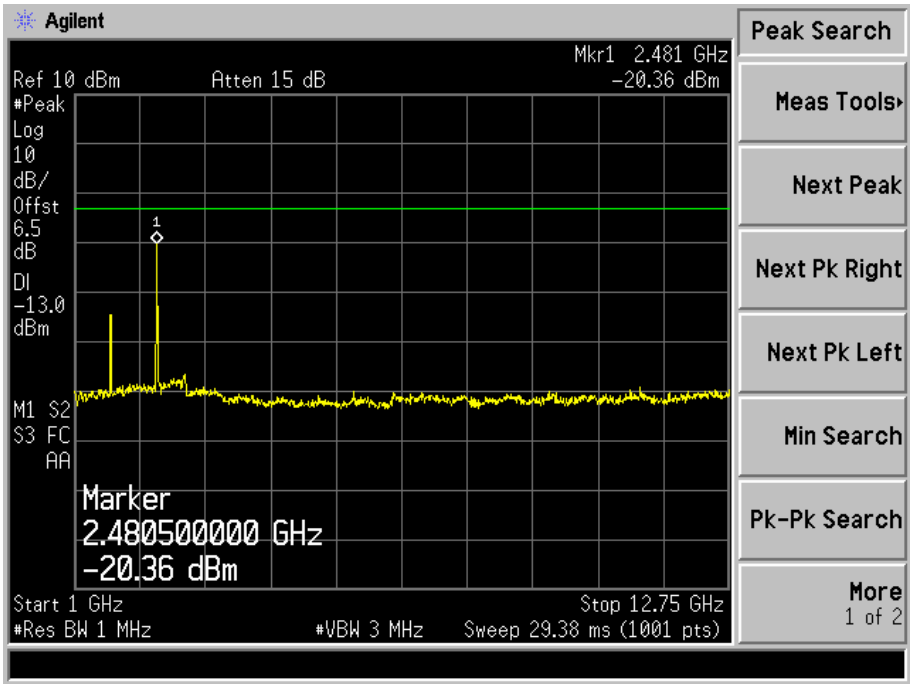
EDGE High Band Emission



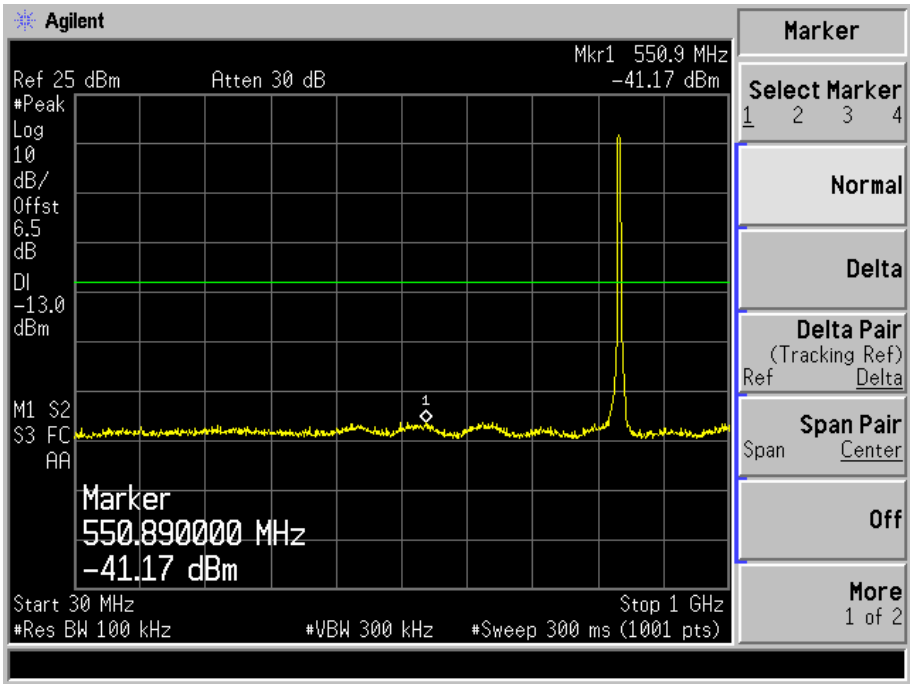
For Band V

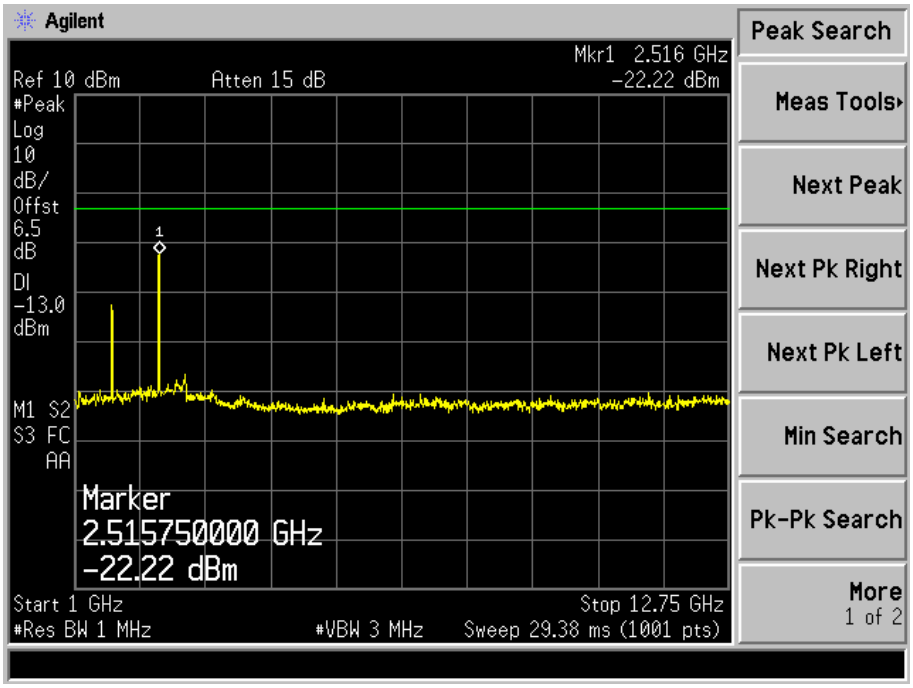
WCDMA Low Channel



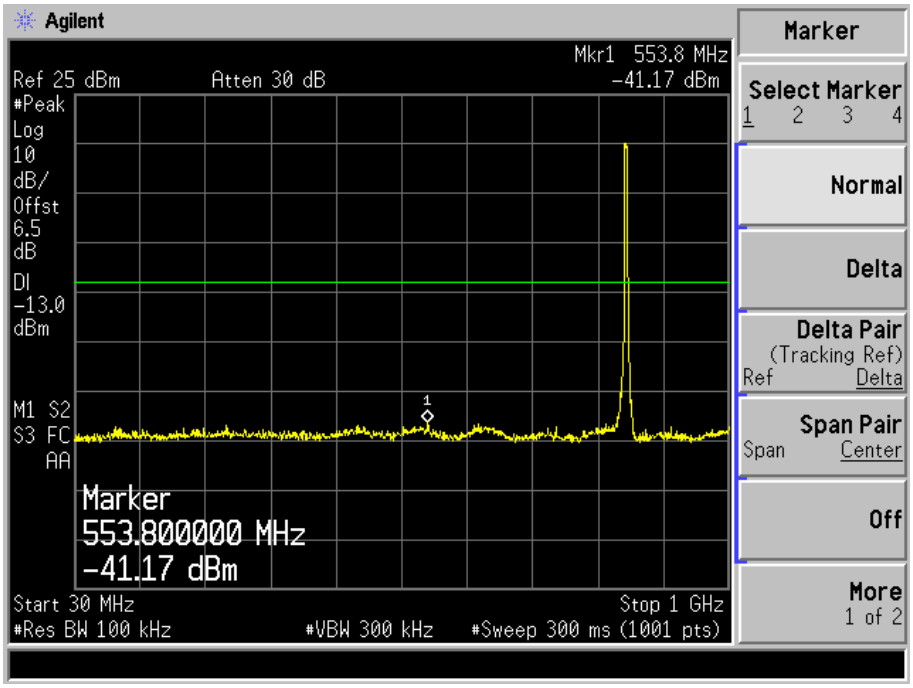


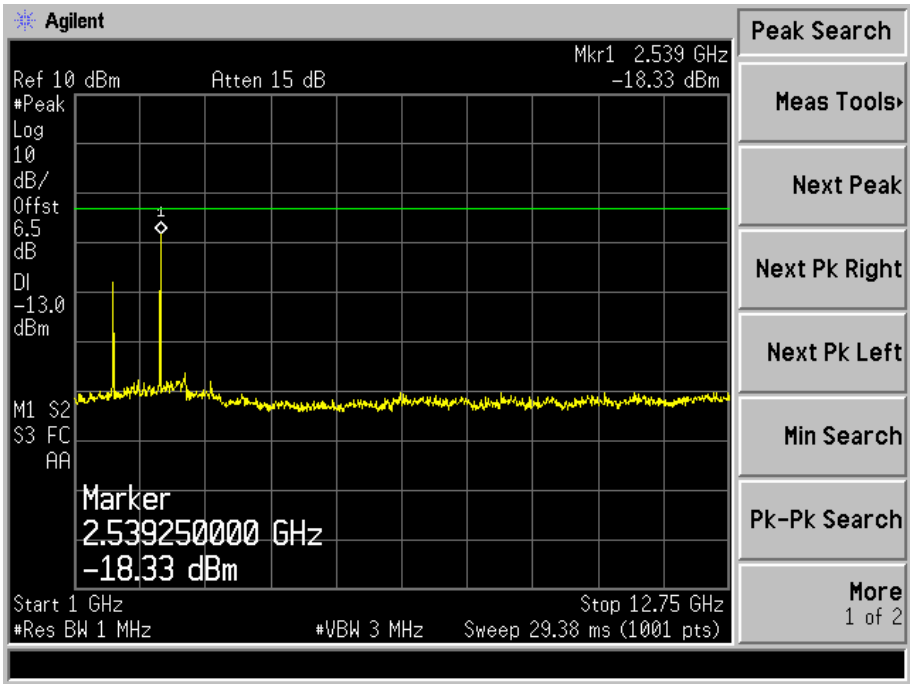
WCDMA Middle Channel



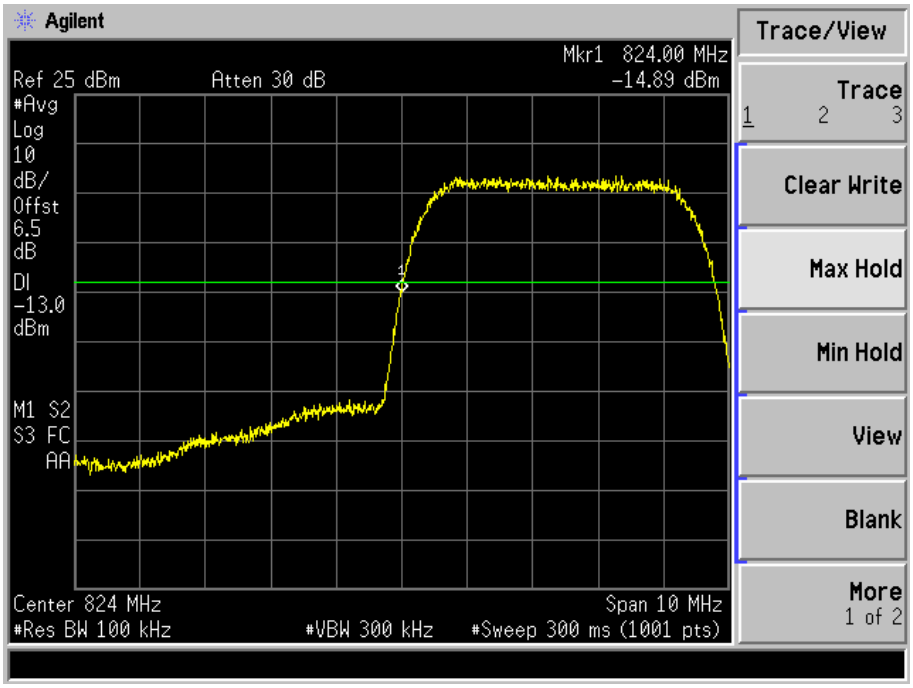


WCDMA High Channel

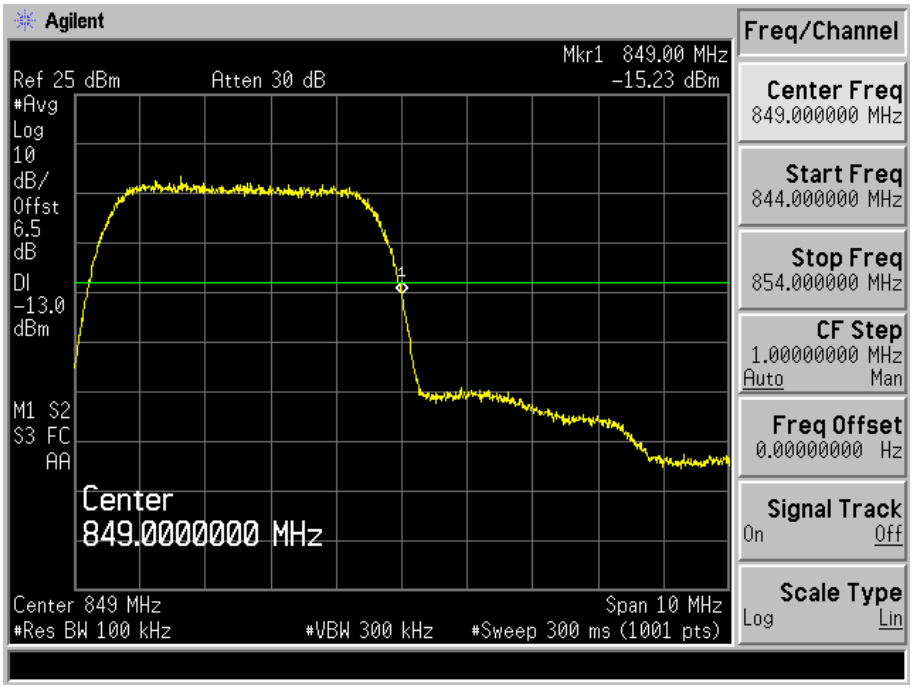




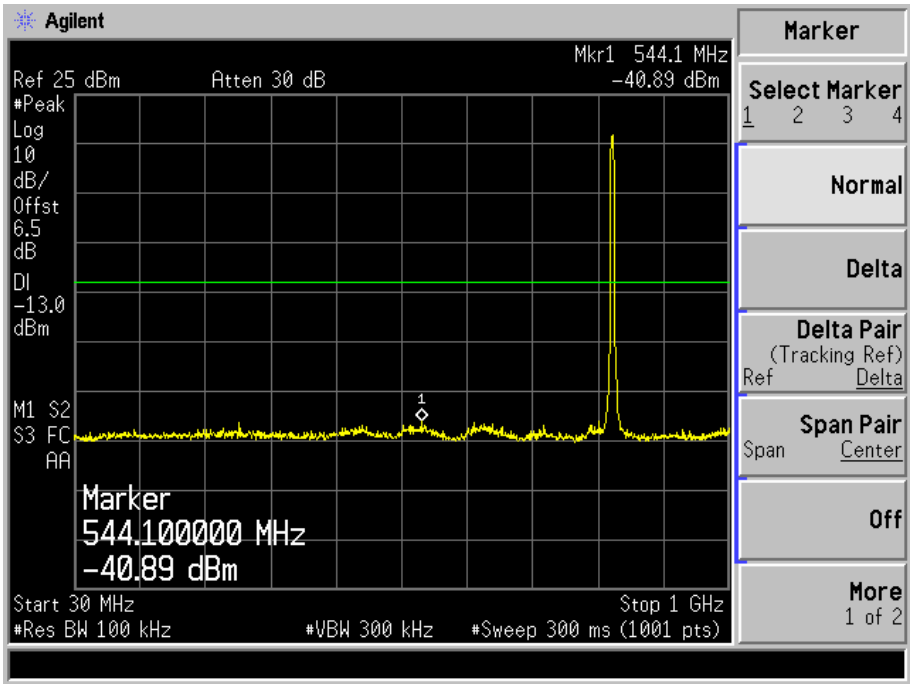
WCDMA Low Band Spurious Emission

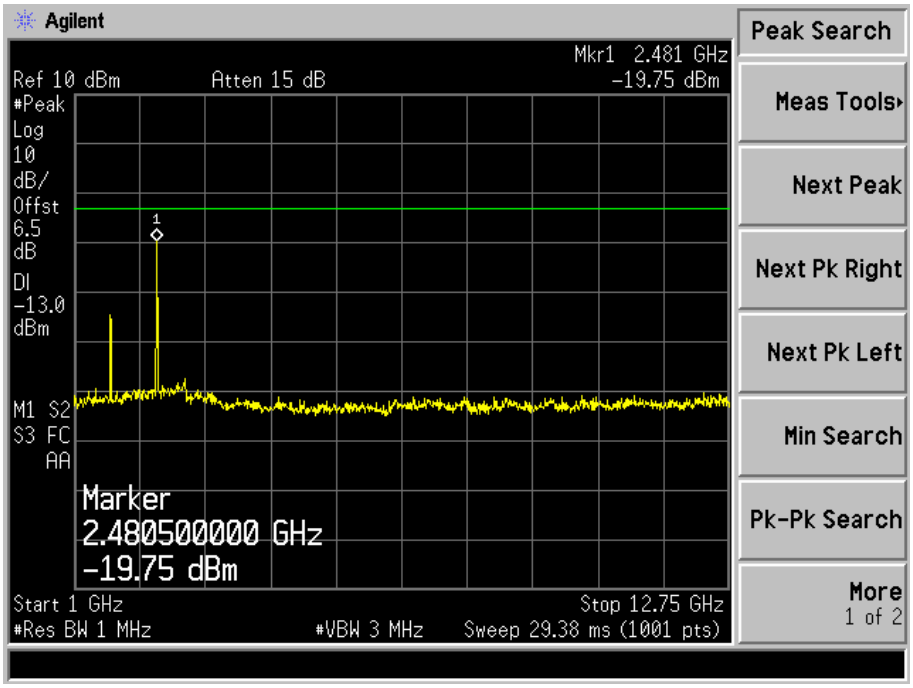


WCDMA High Band Spurious Emission

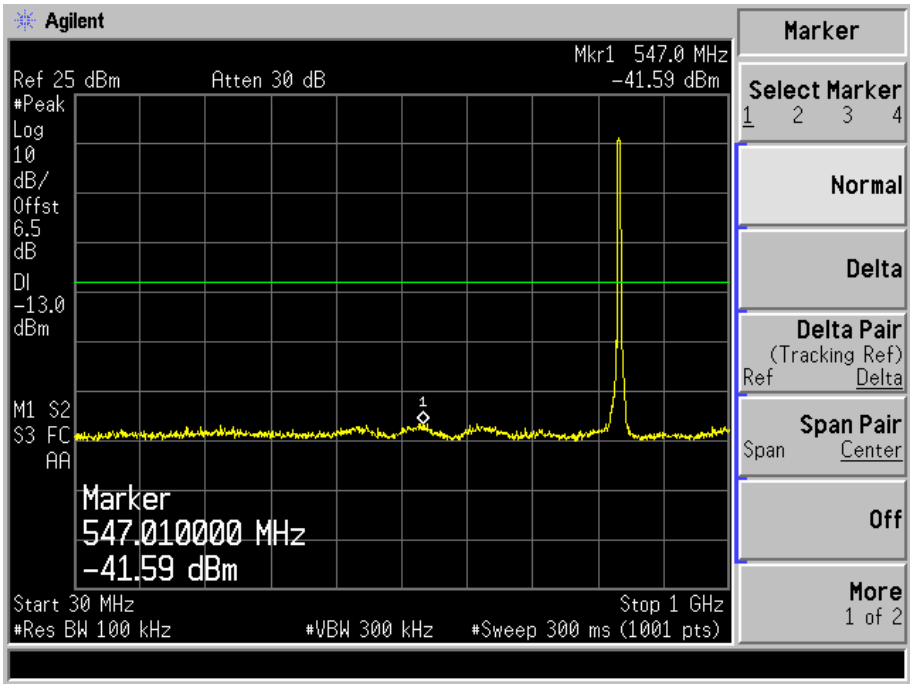


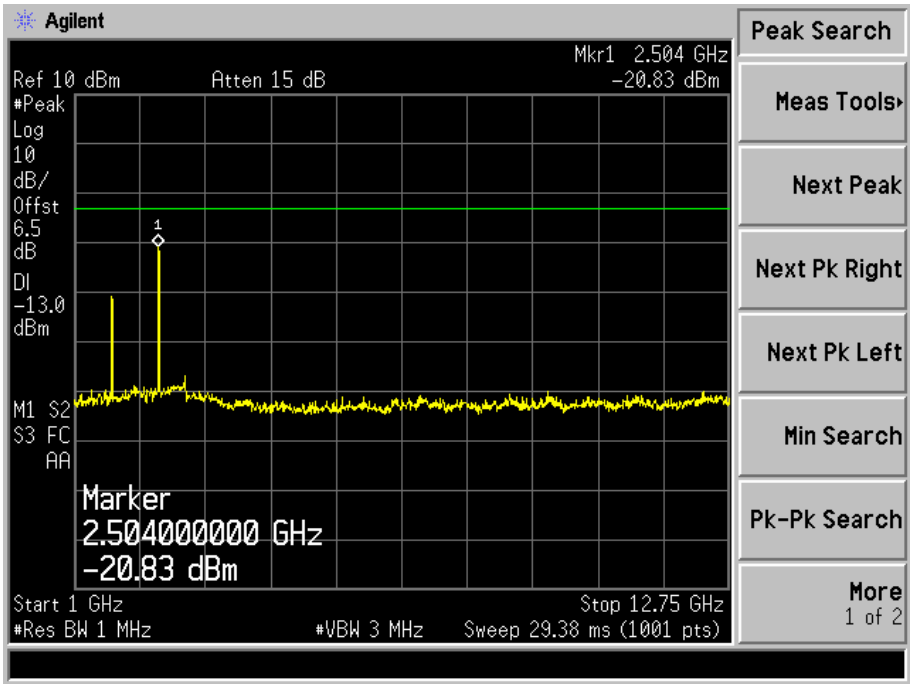
HSDPA Low Channel



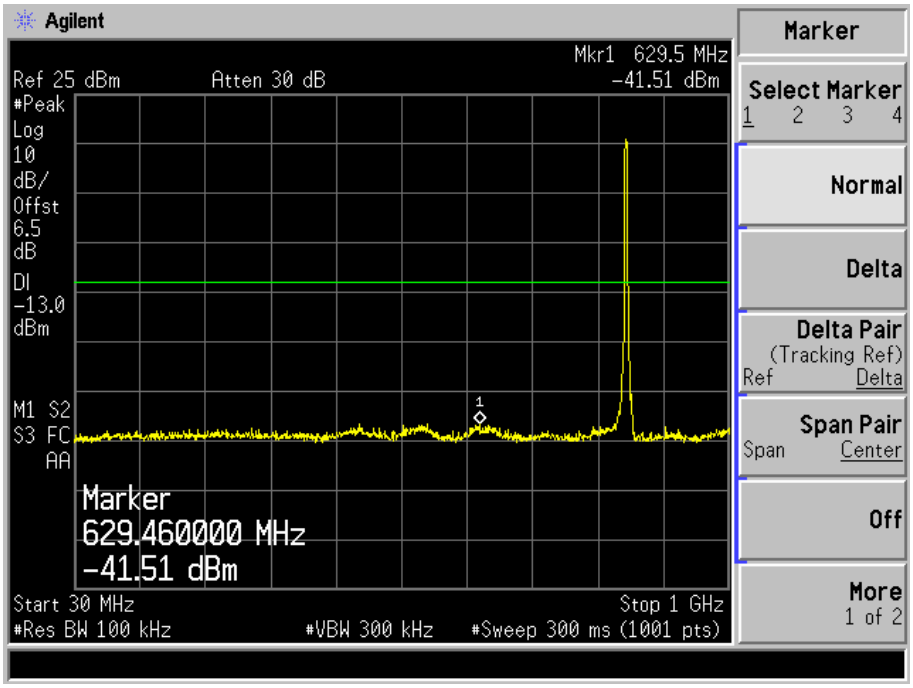


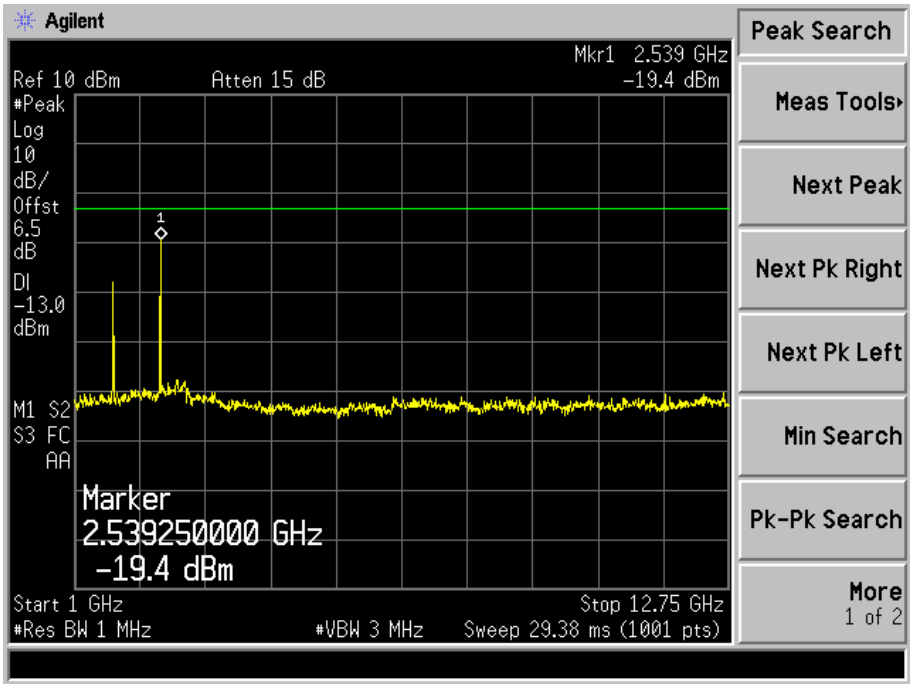
HSDPA Middle Channel



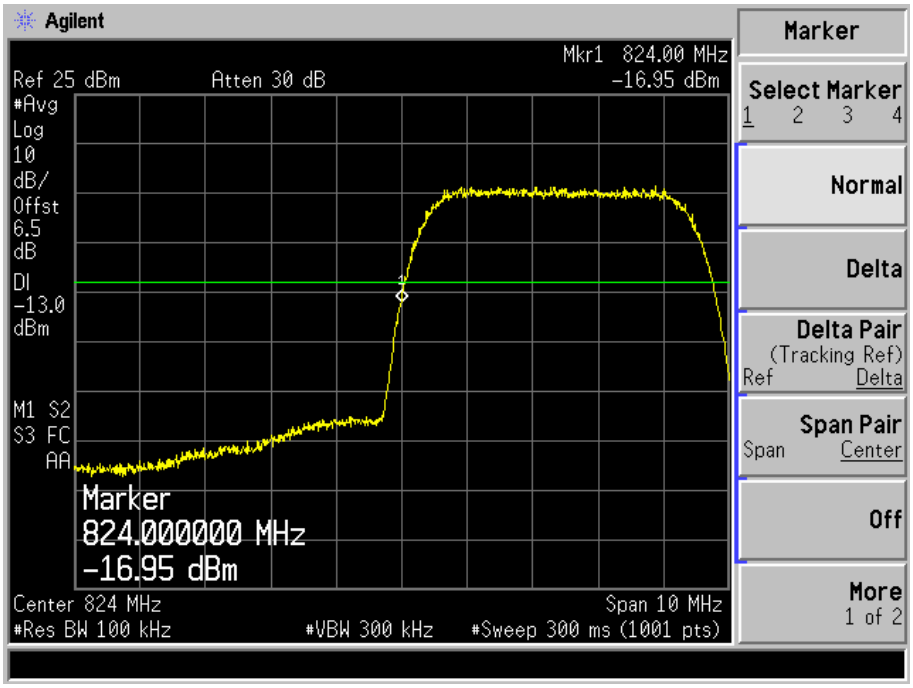


HSDPA High Channel

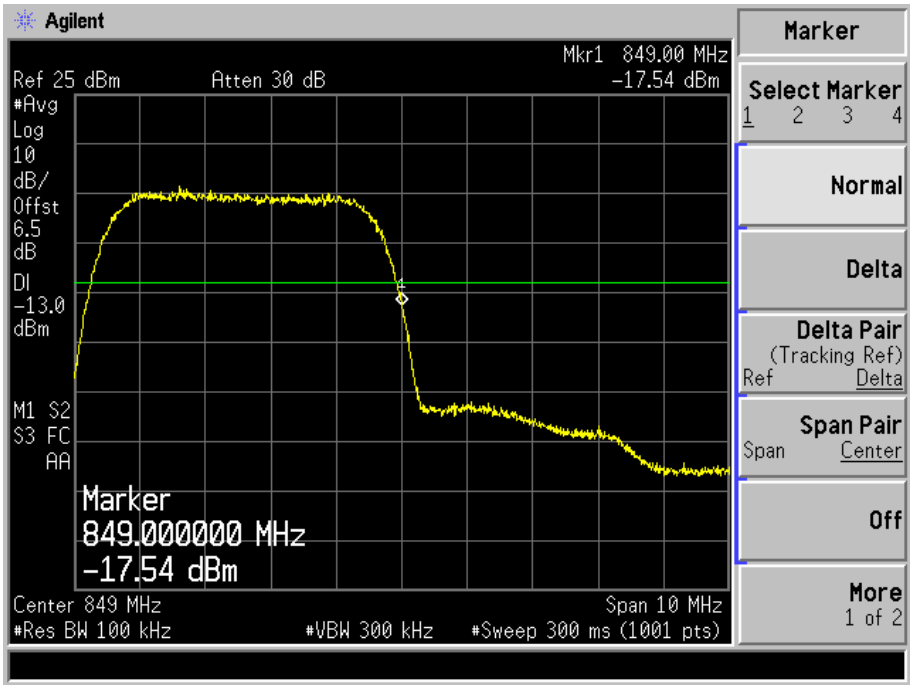




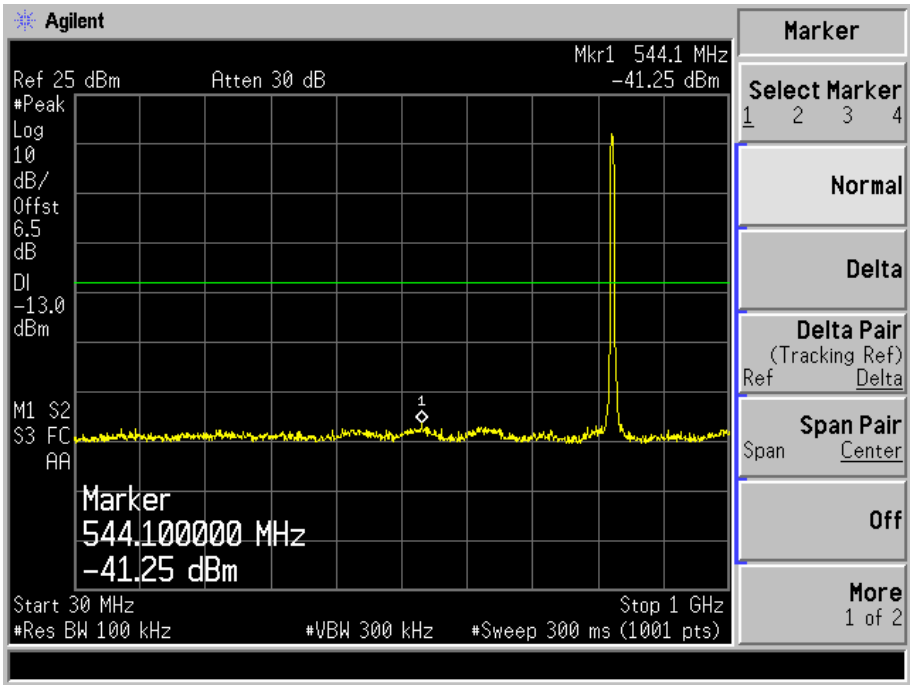
HSDPA Low Band Spurious Emission

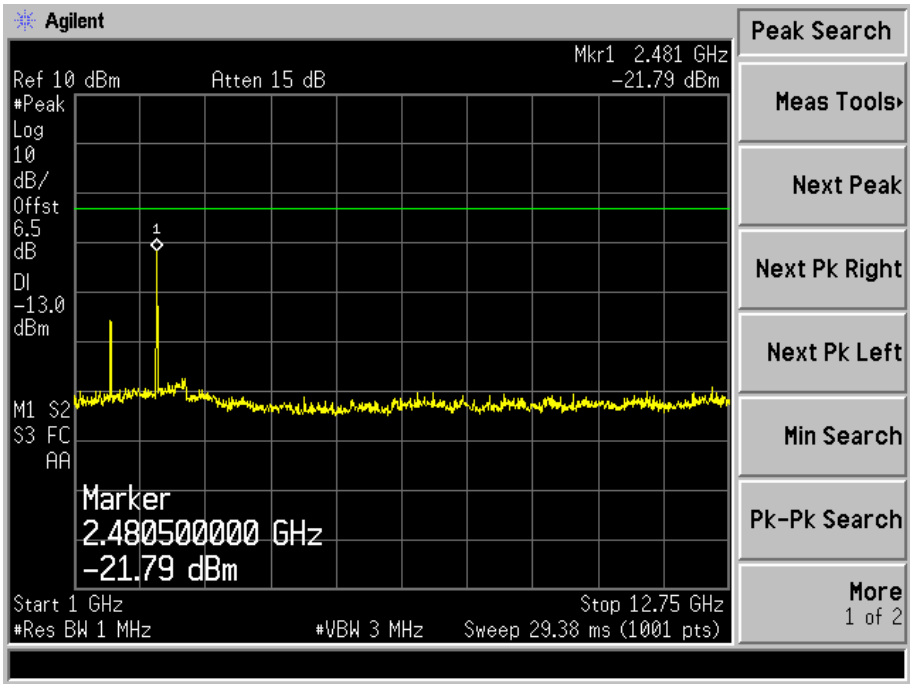


HSDPA High Band Spurious Emission

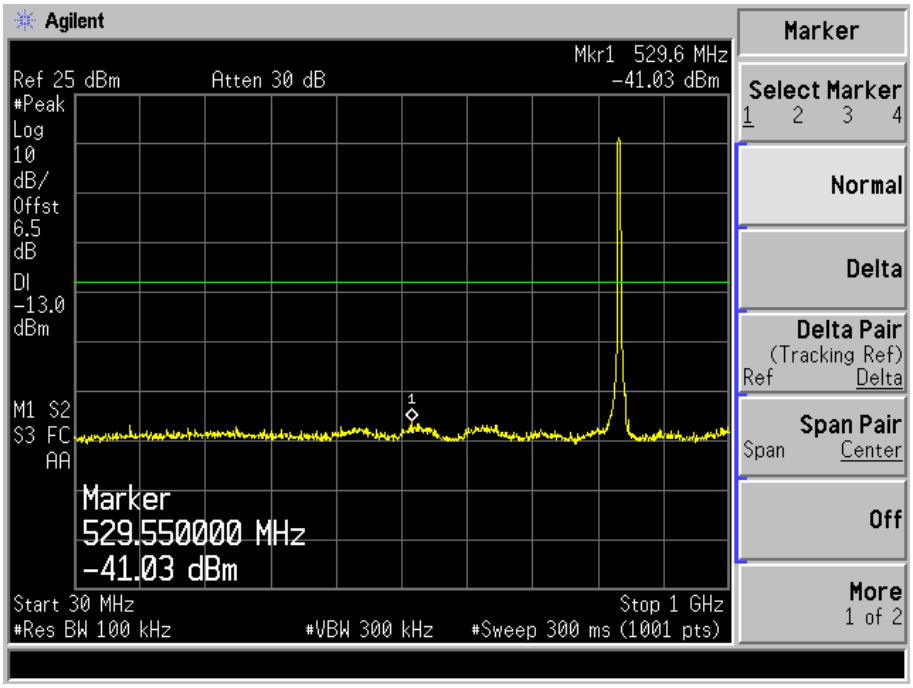


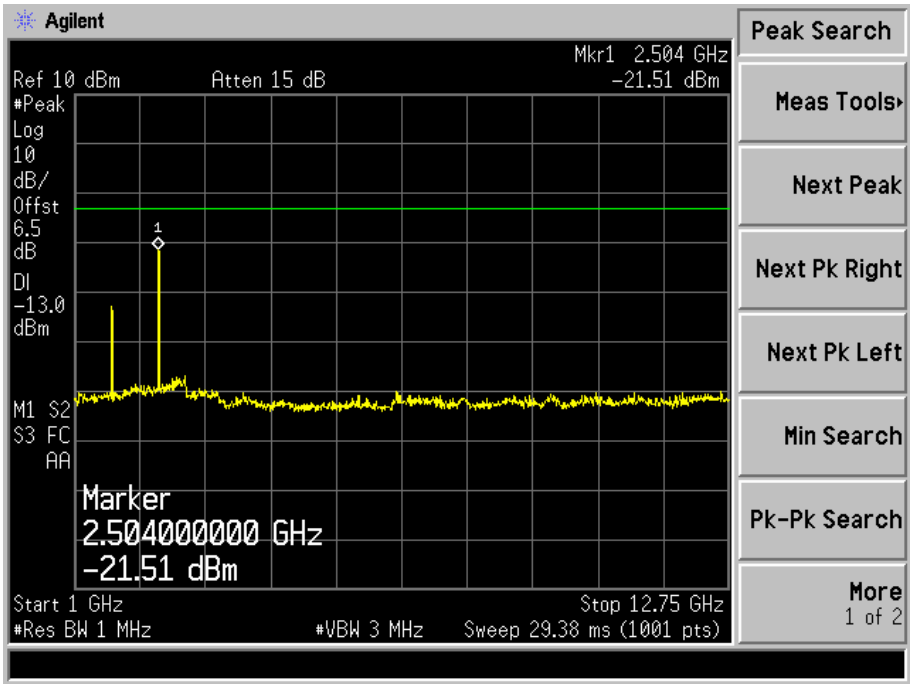
HSUPA Low Channel



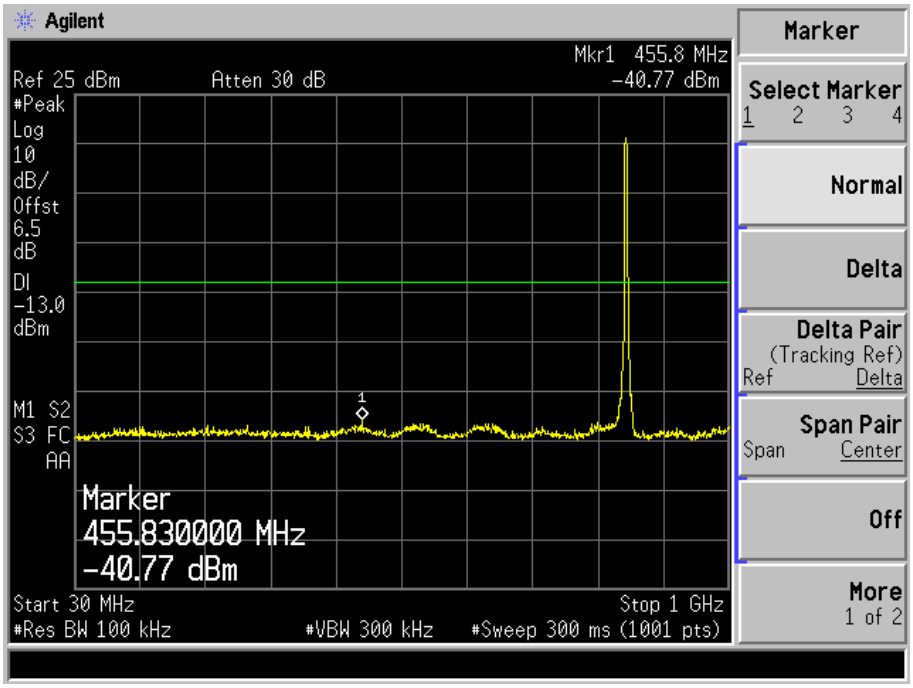


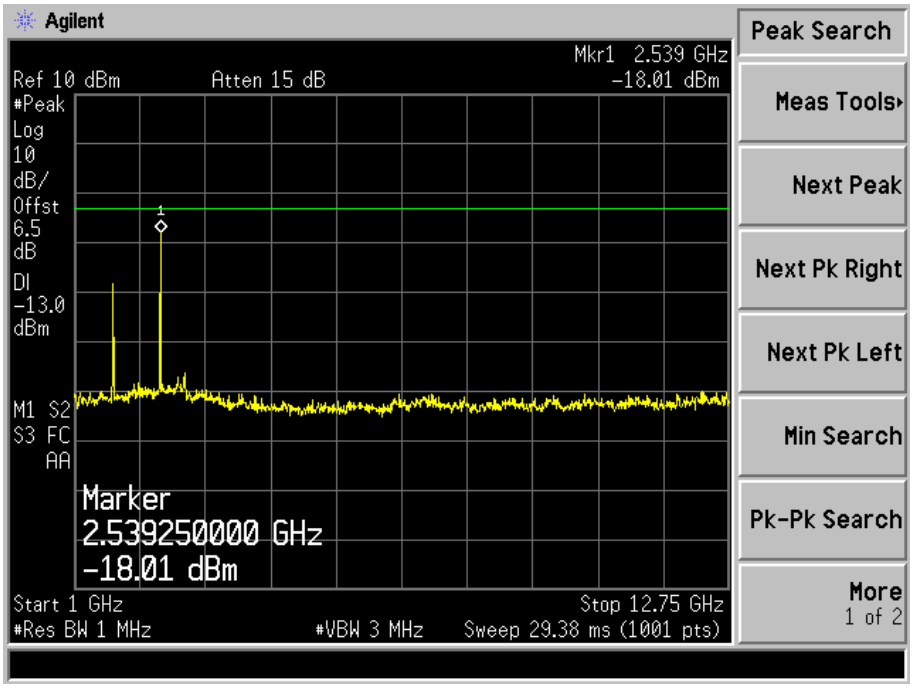
HSUPA Middle Channel



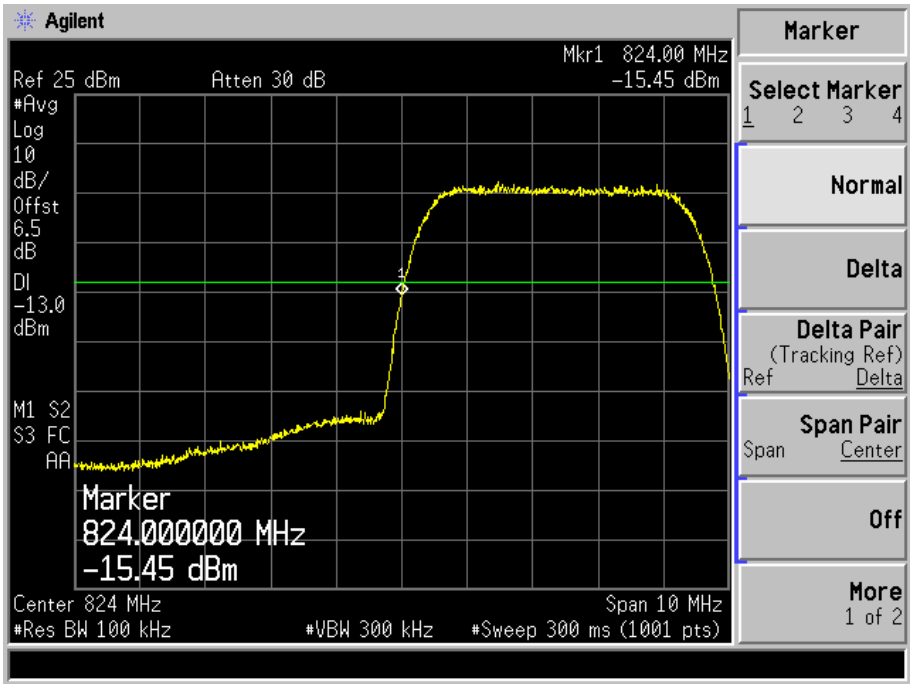


HSUPA High Channel

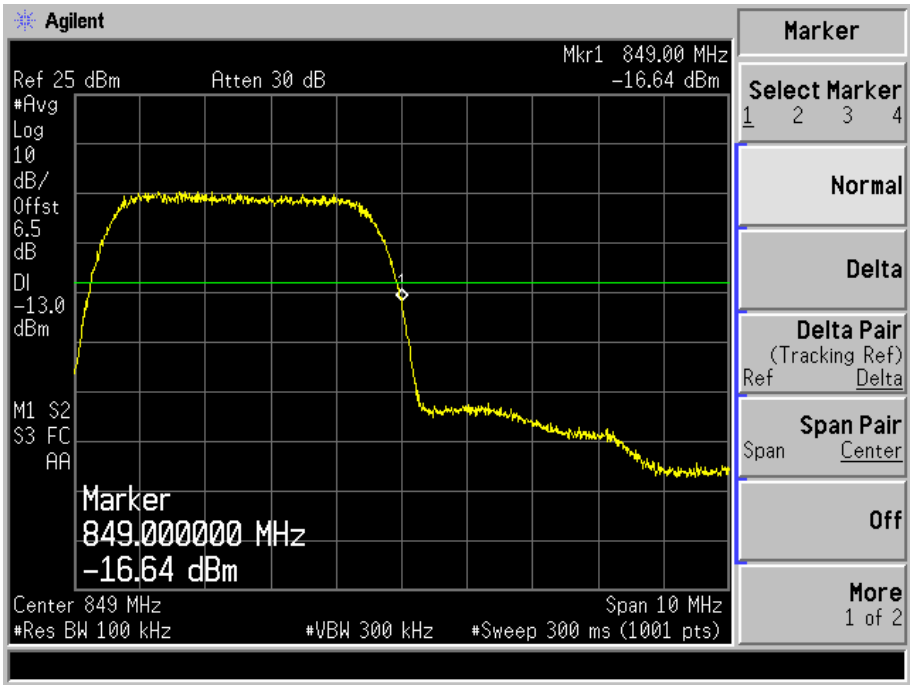




HSUPA Low Band Spurious Emission

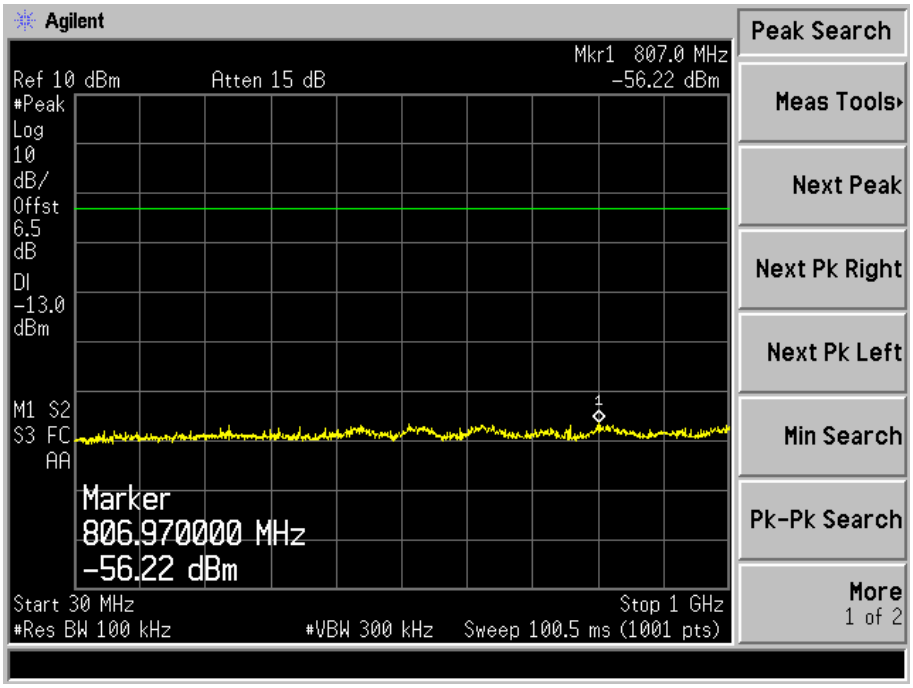


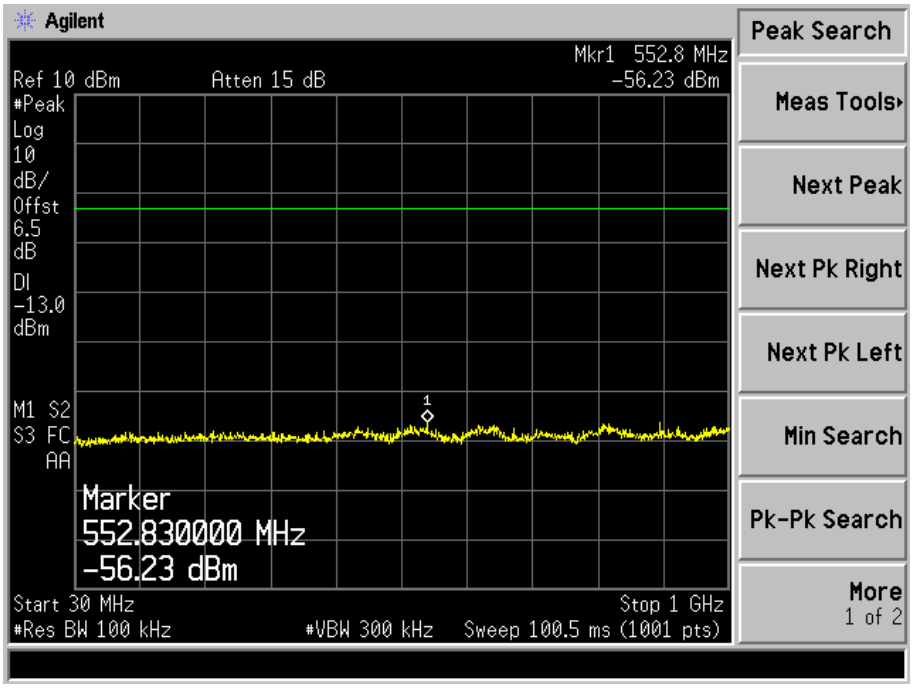
HSUPA High Band Spurious Emission

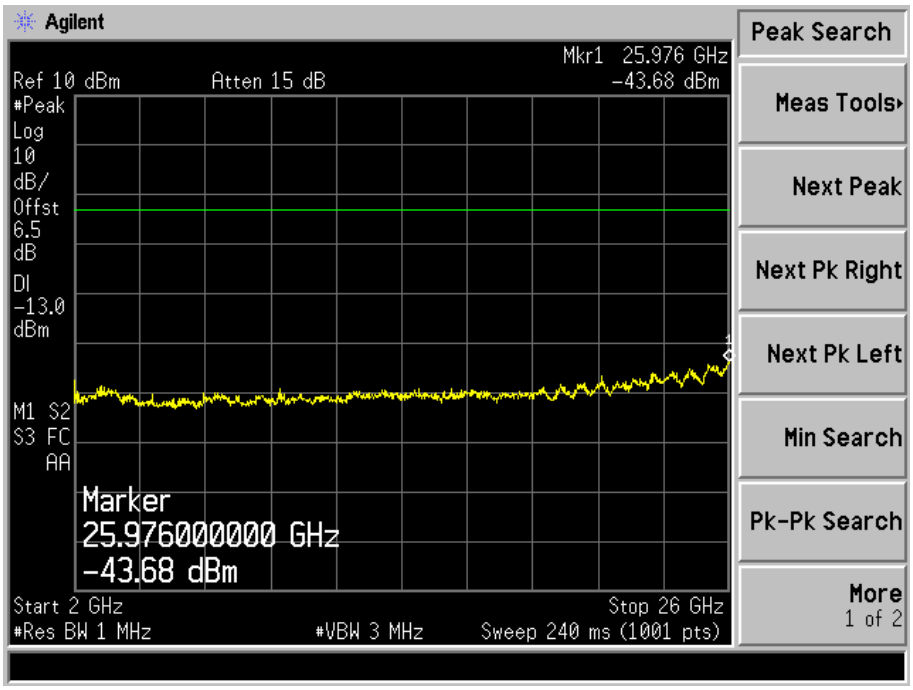


For Band II

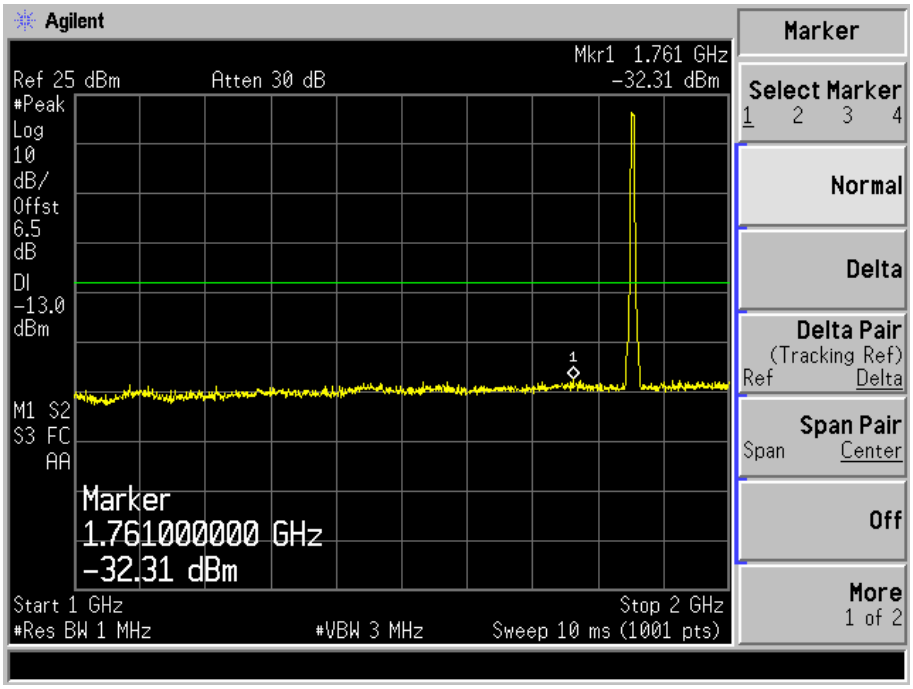
WCDMA Low Channel

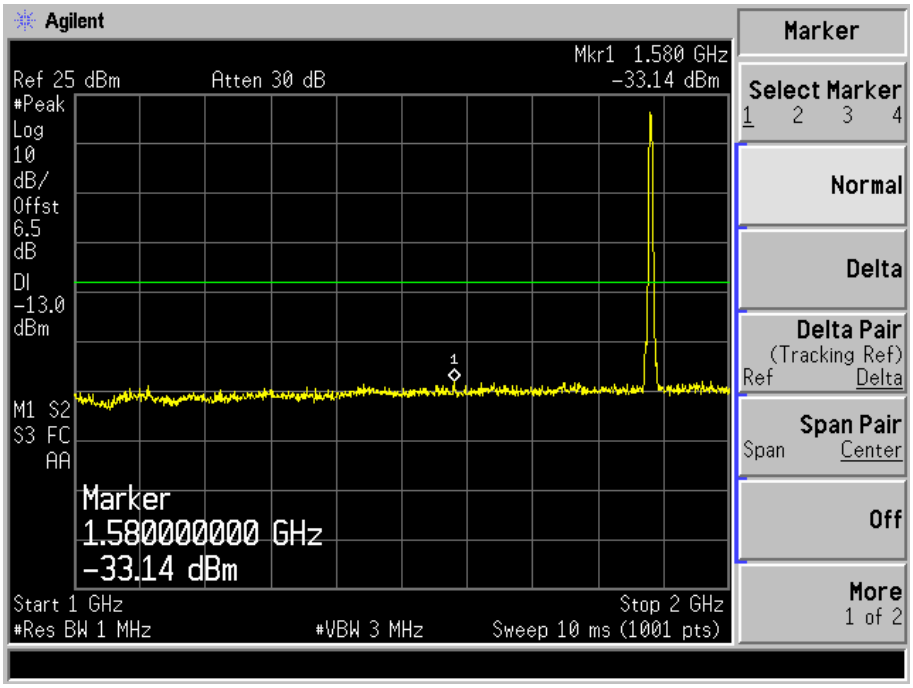


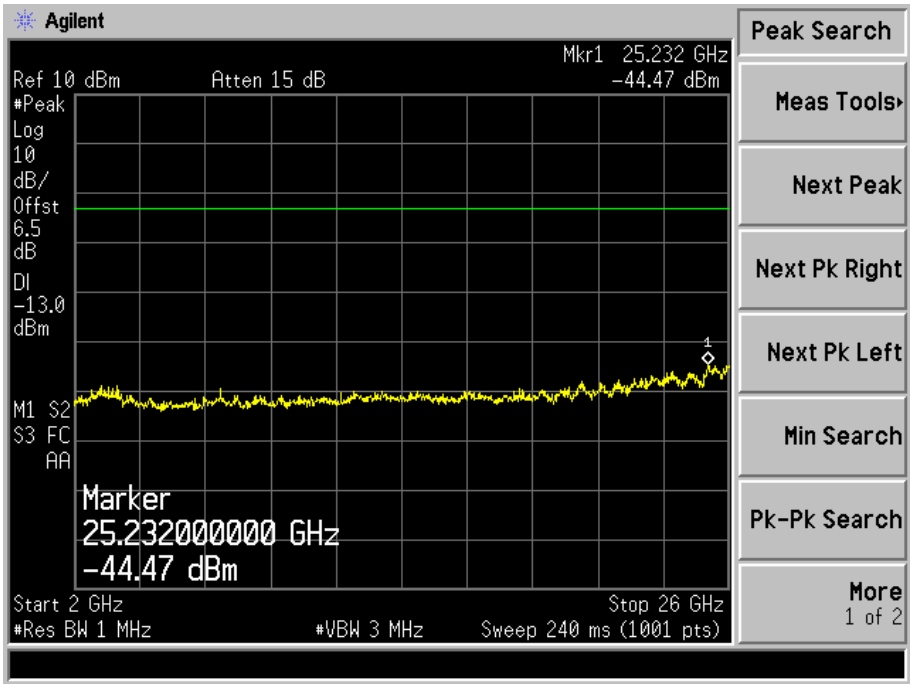

Agilent
Mkr1 552.8 MHz
Ref 10 dBm
Atten 15 dB
-56.23 dBm
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
552.830000 MHz
-56.23 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1 GHz
Sweep 100.5 ms (1001 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2


Agilent
Mkr1 25.976 GHz
Ref 10 dBm
Atten 15 dB
-43.68 dBm
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
25.976000000 GHz
-43.68 dBm
Start 2 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 26 GHz
Sweep 240 ms (1001 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

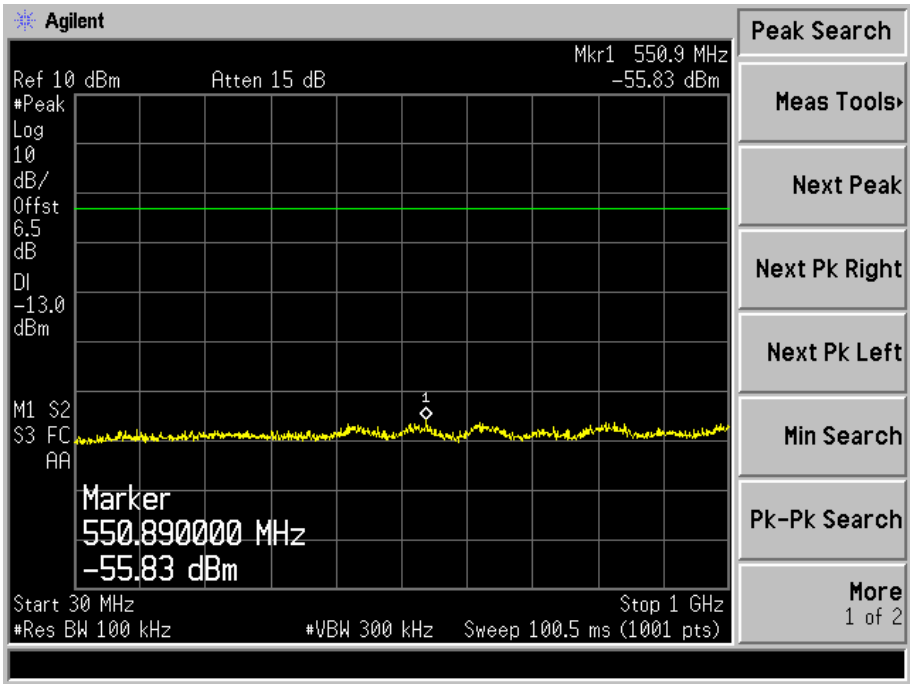
WCDMA Middle Channel

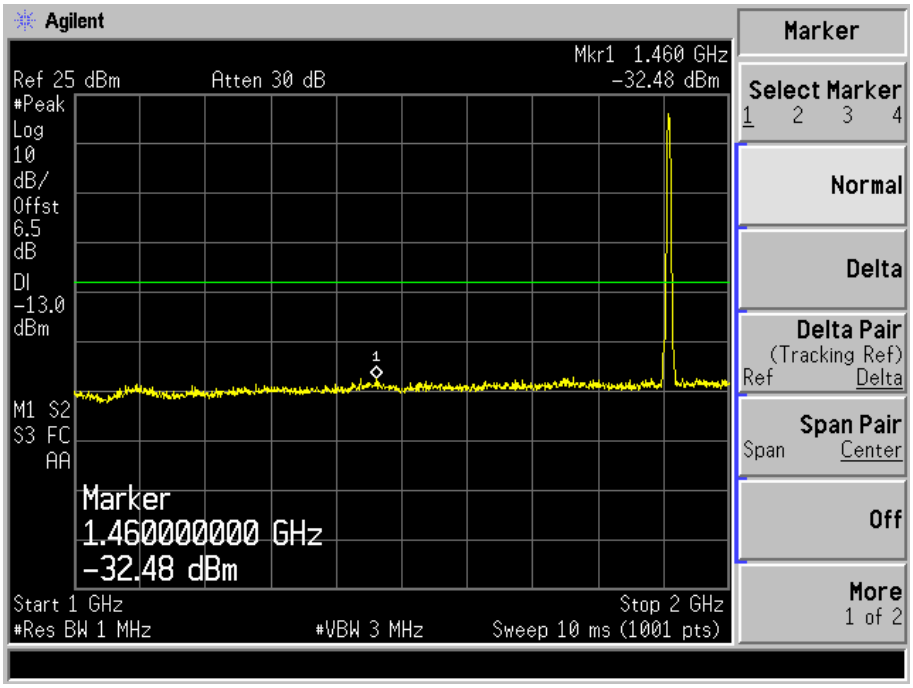


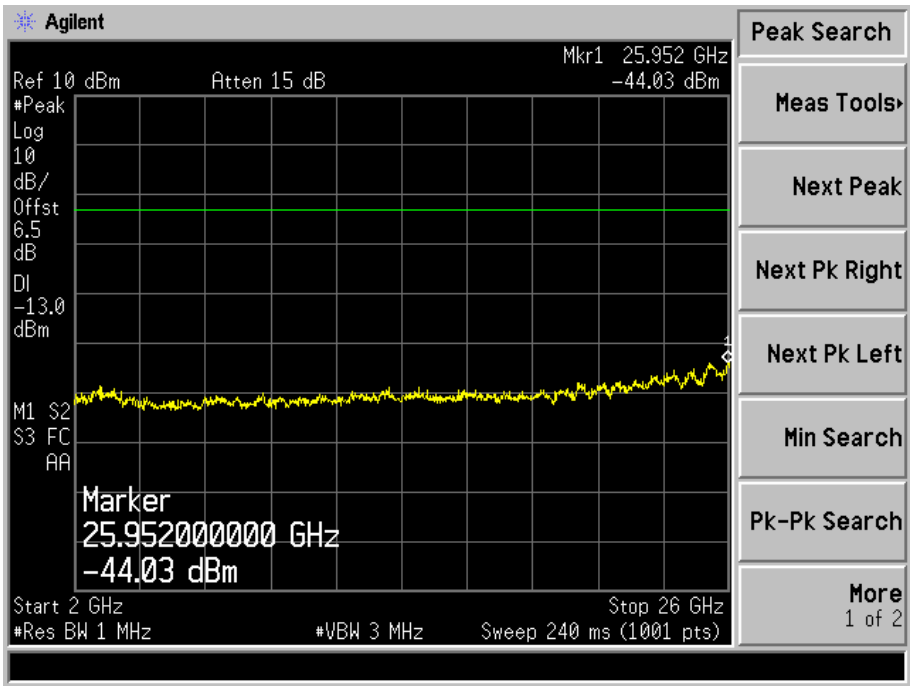




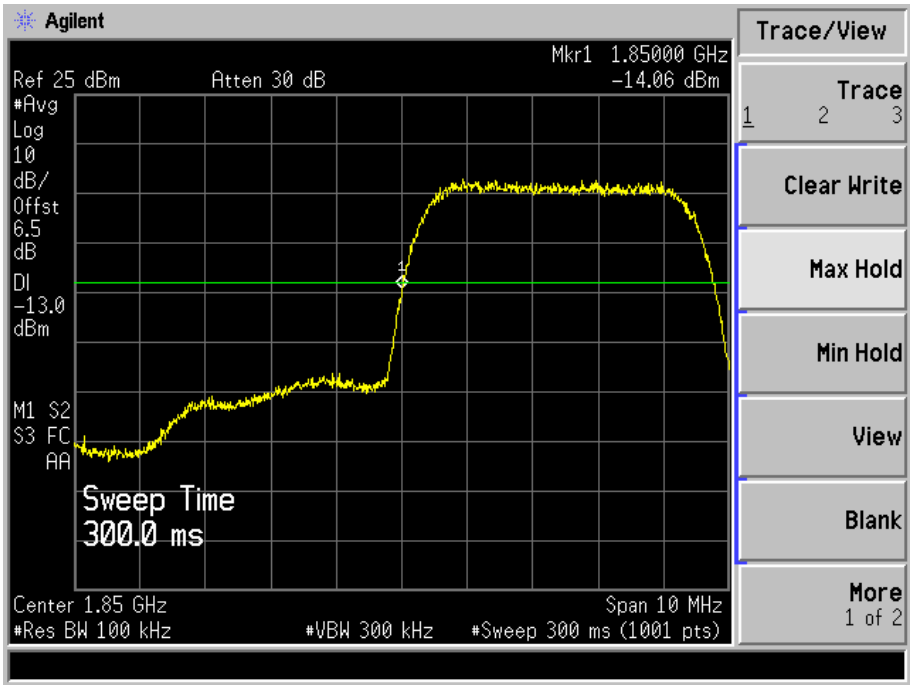
WCDMA High Channel



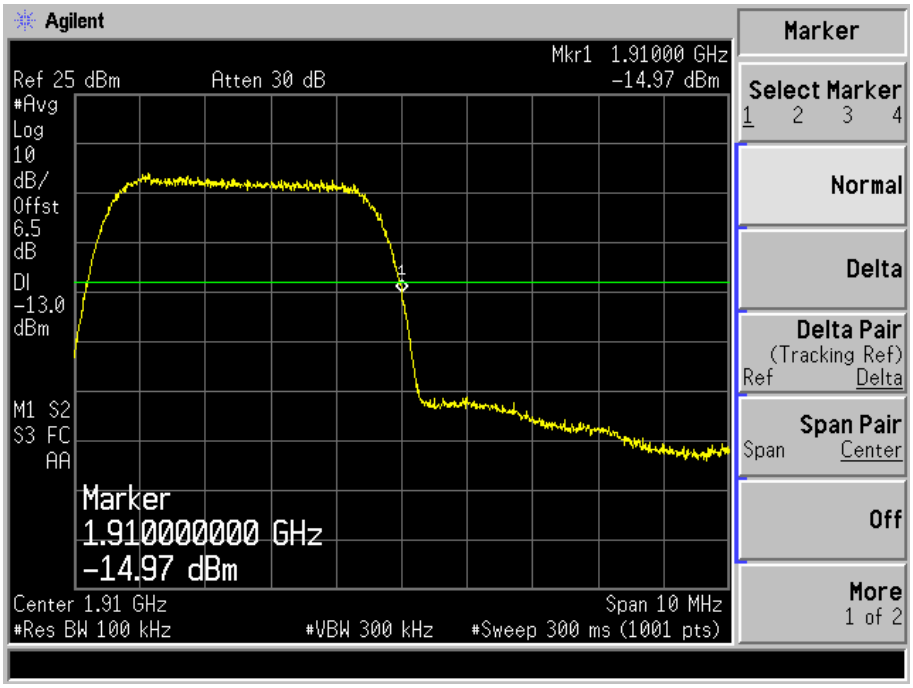

Agilent
Mkr1 1.460 GHz
-32.48 dBm
Ref 25 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
1.460000000 GHz
-32.48 dBm
Start 1 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 2 GHz
Sweep 10 ms (1001 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent
Mkr1 25.952 GHz
-44.03 dBm
Ref 10 dBm
Atten 15 dB
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
25.952000000 GHz
-44.03 dBm
Start 2 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 26 GHz
Sweep 240 ms (1001 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

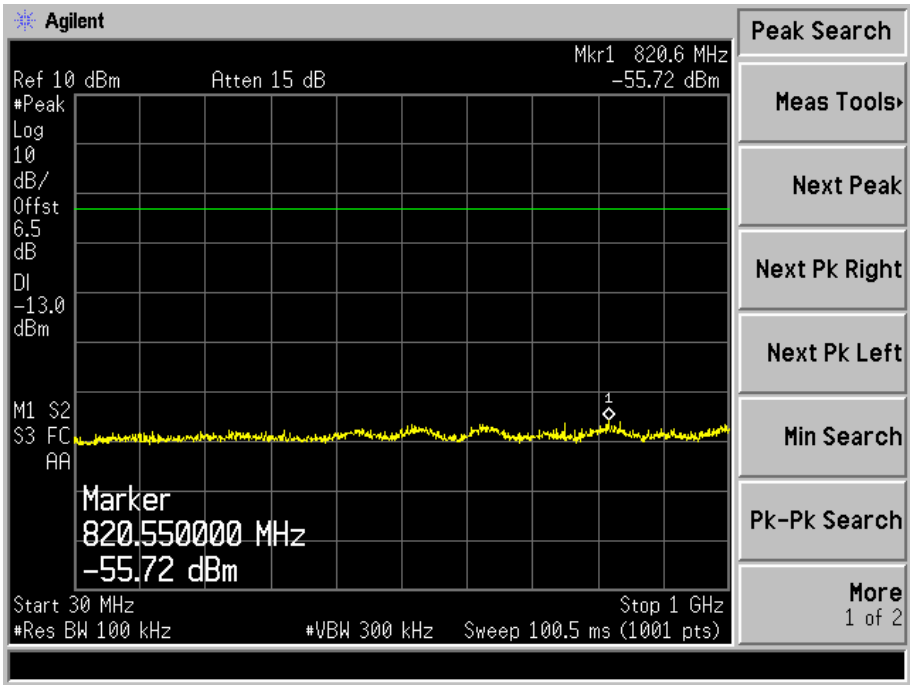
WCDMA Low Band Spurious Emission

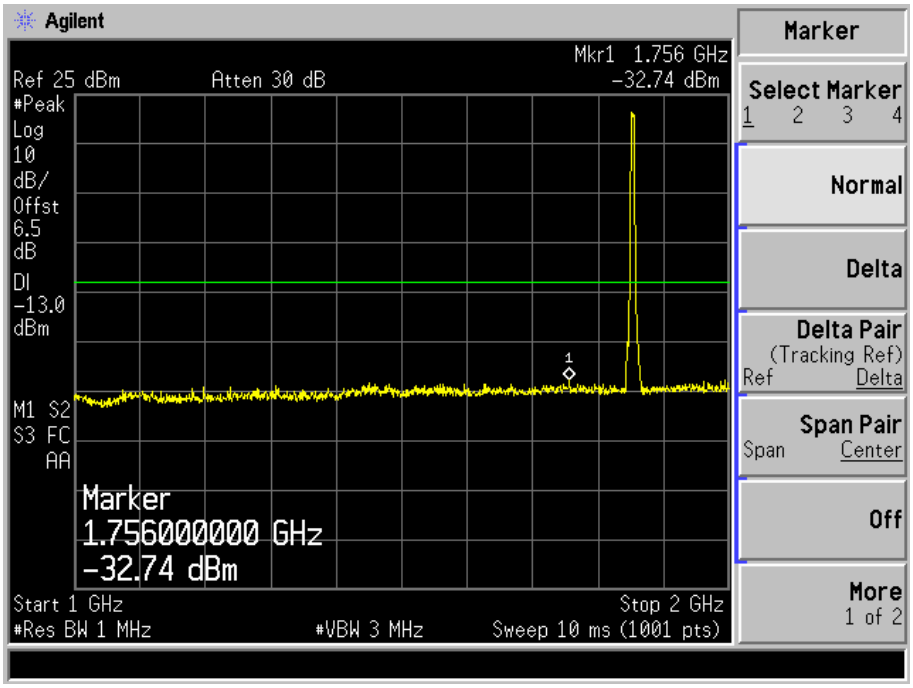


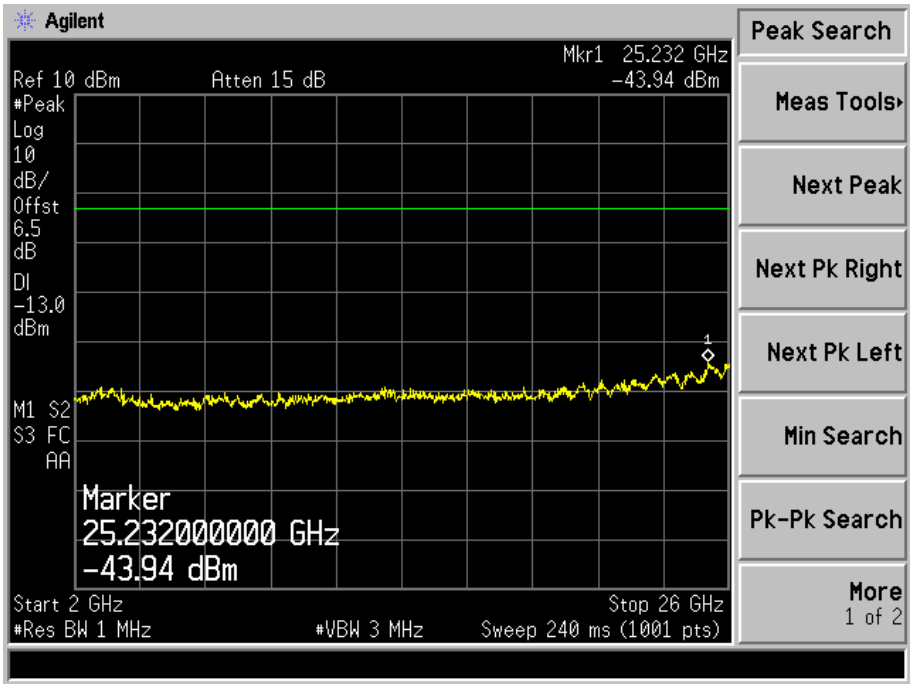
WCDMA High Band Spurious Emission



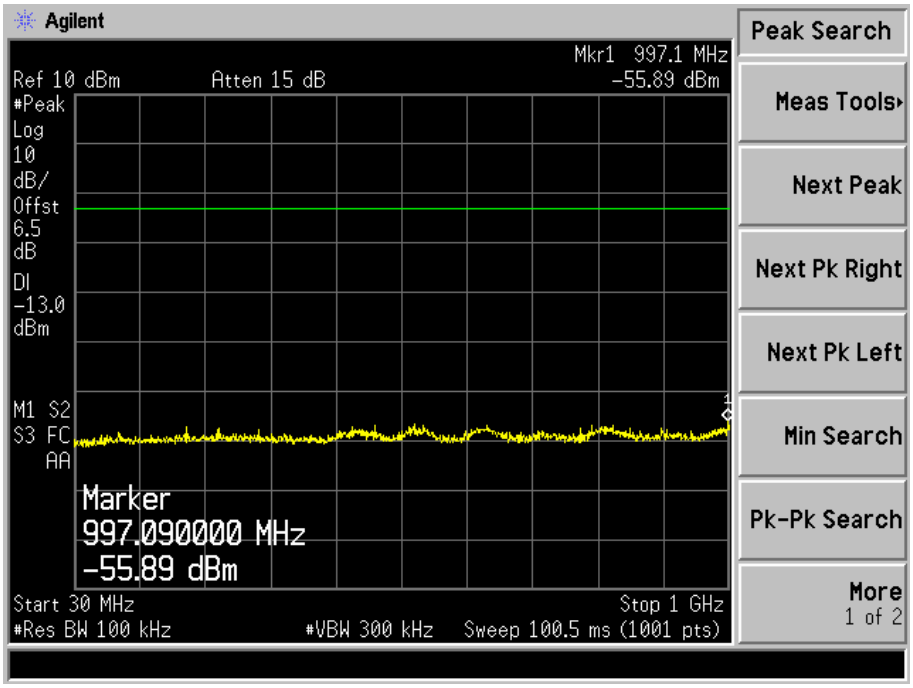
HSDPA Low Channel

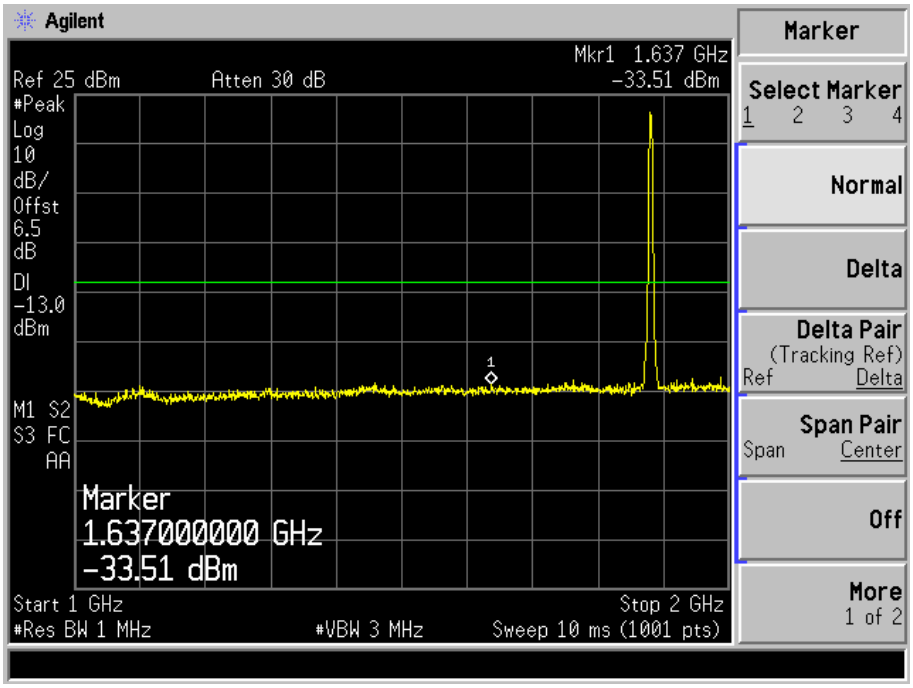


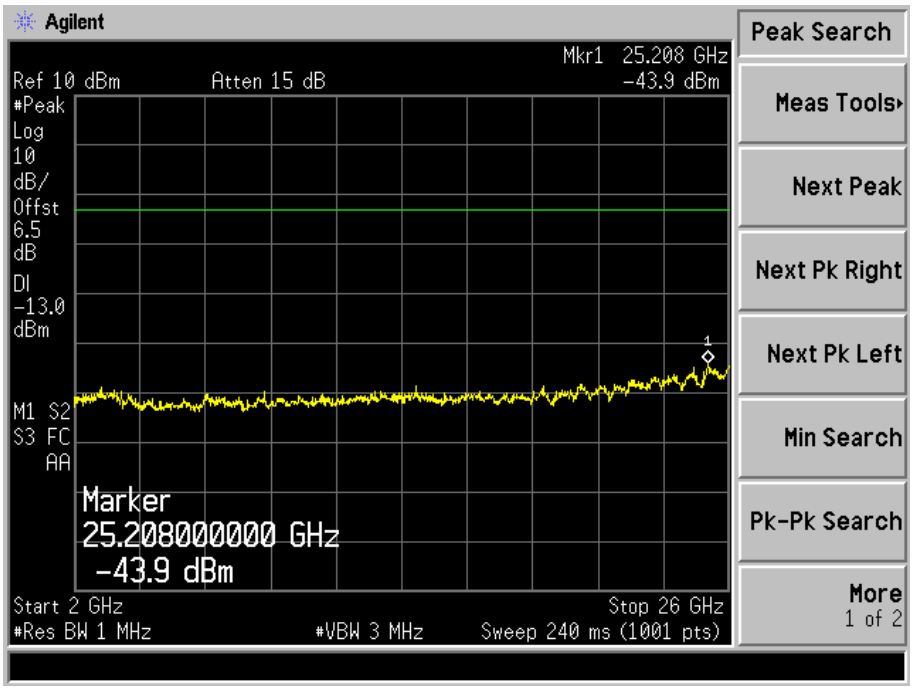




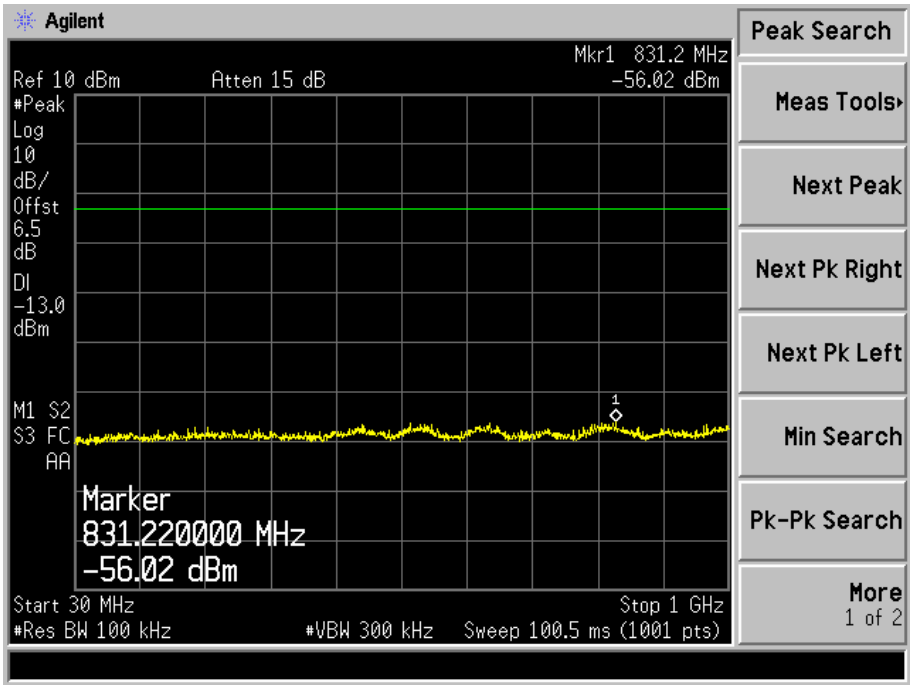
HSDPA Middle Channel

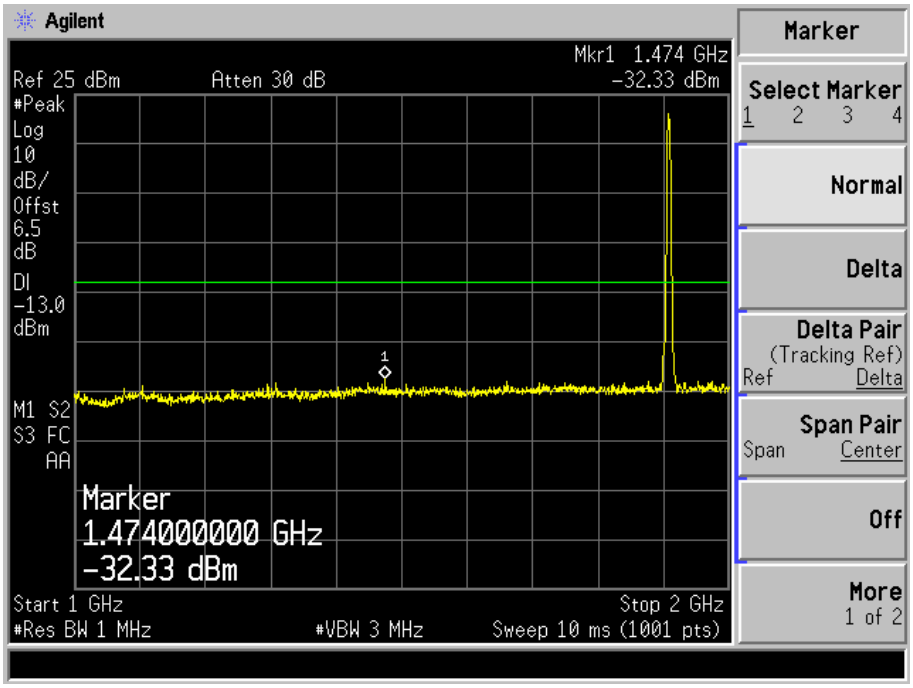


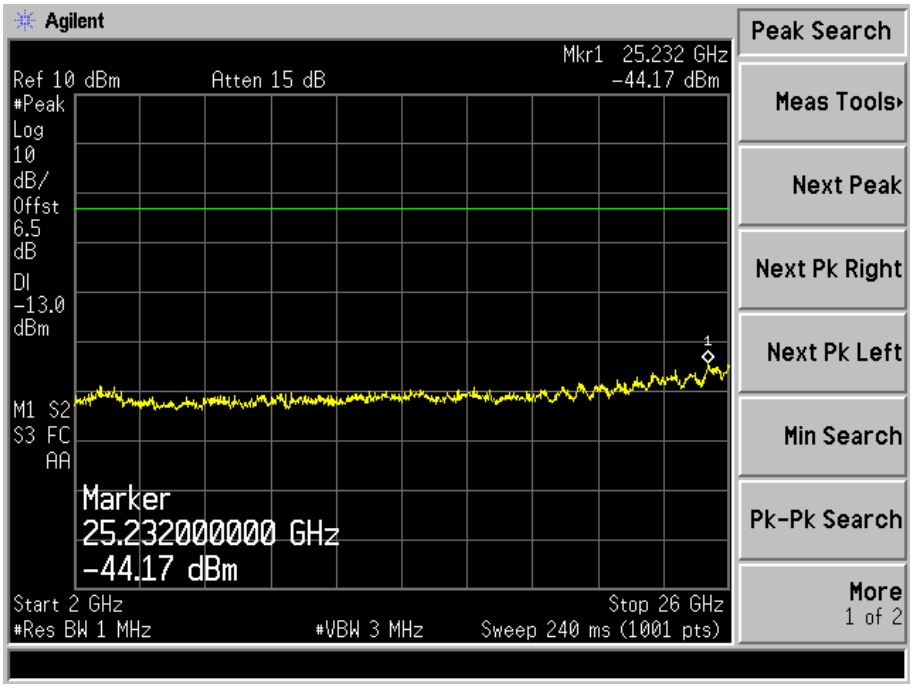

Agilent
Mkr1 1.637 GHz
-33.51 dBm
Ref 25 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
1.637000000 GHz
-33.51 dBm
Start 1 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 2 GHz
Sweep 10 ms (1001 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent
Mkr1 25.208 GHz
-43.9 dBm
Ref 10 dBm
Atten 15 dB
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
25.208000000 GHz
-43.9 dBm
Start 2 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 26 GHz
Sweep 240 ms (1001 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

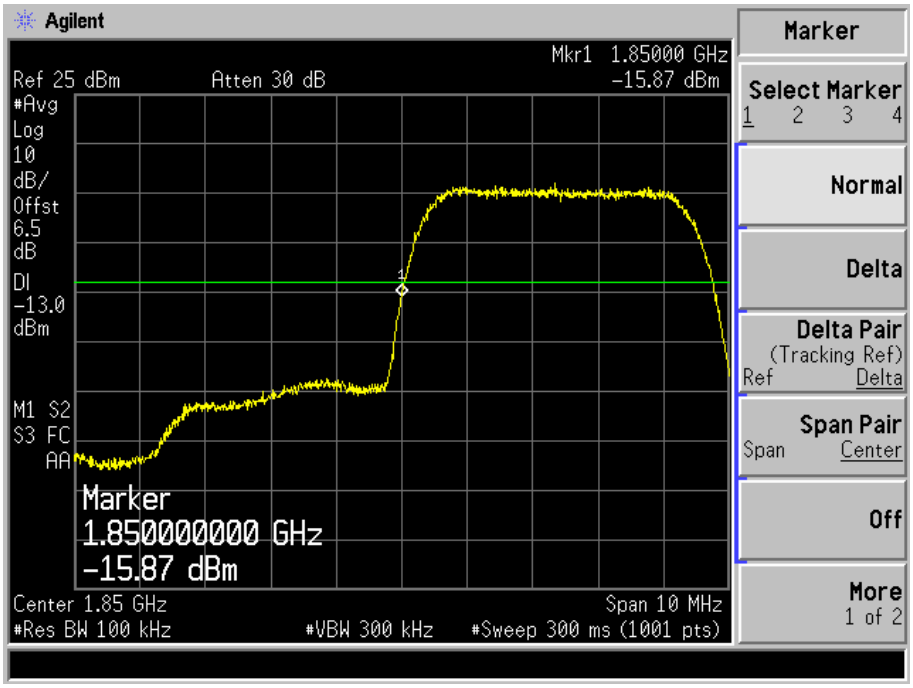
HSDPA High Channel



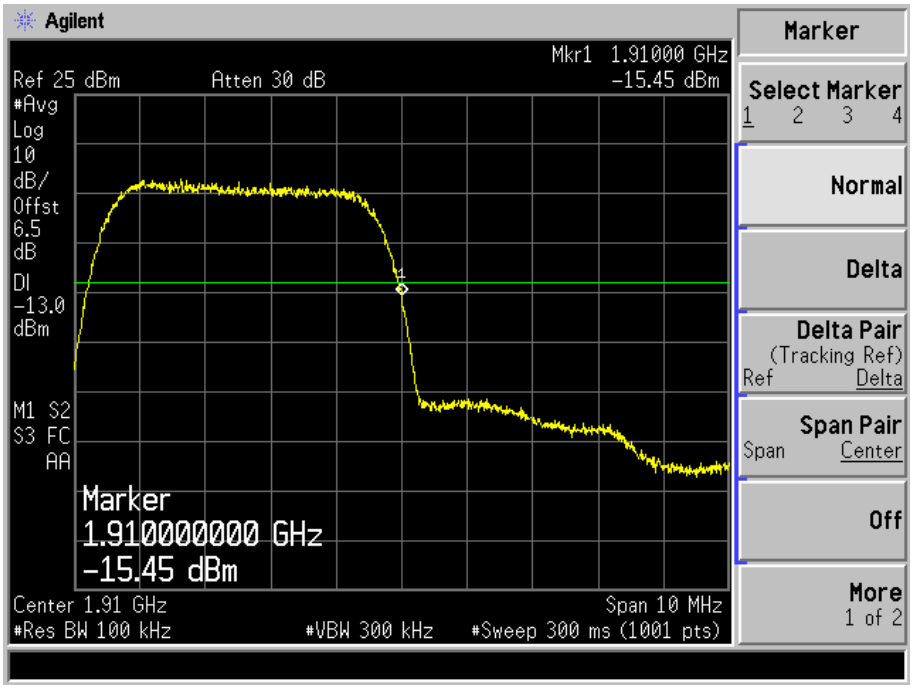




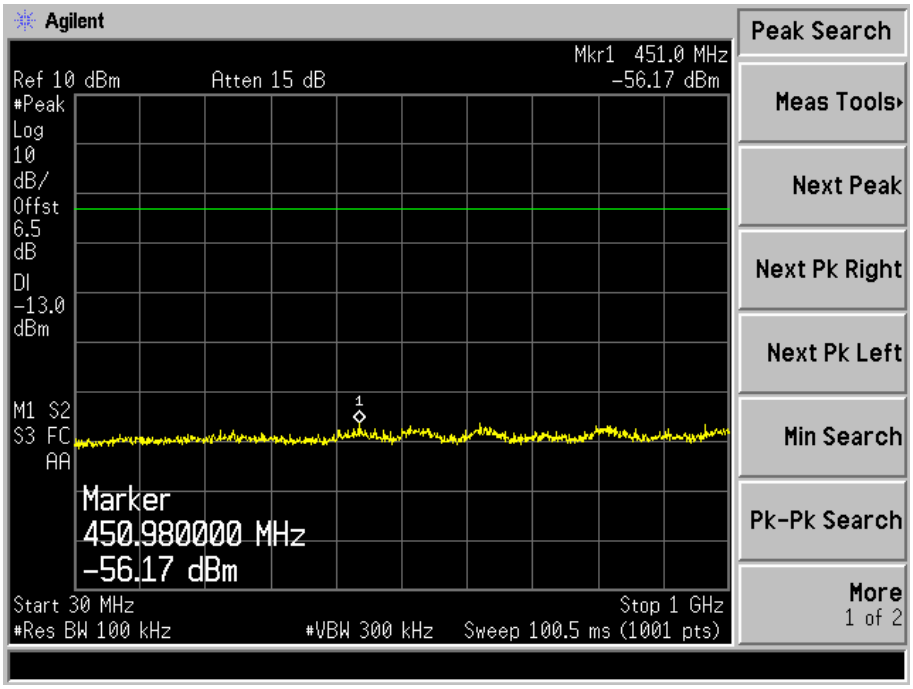
HSDPA Low Band Spurious Emission

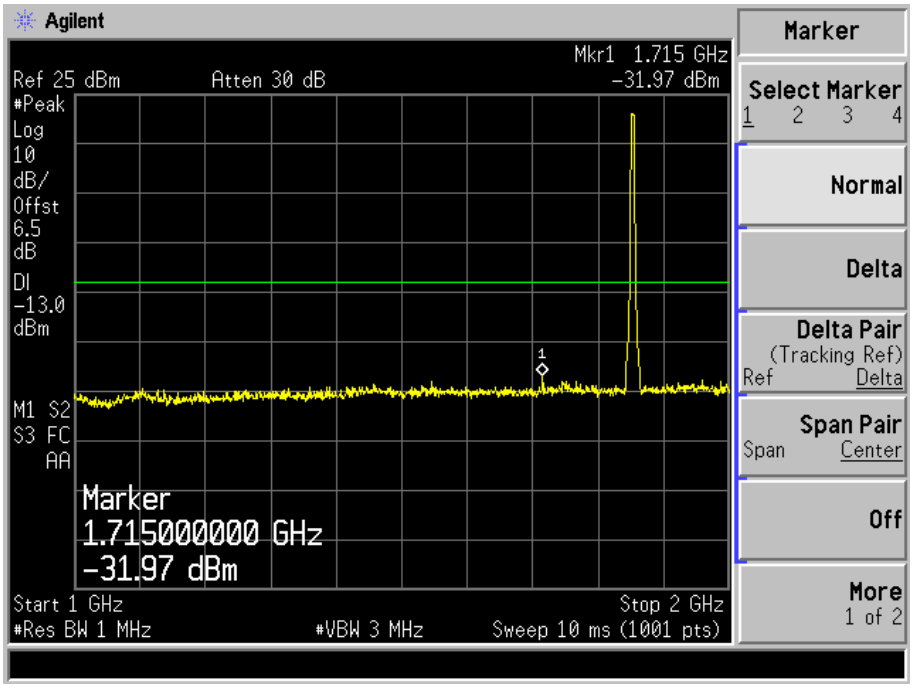


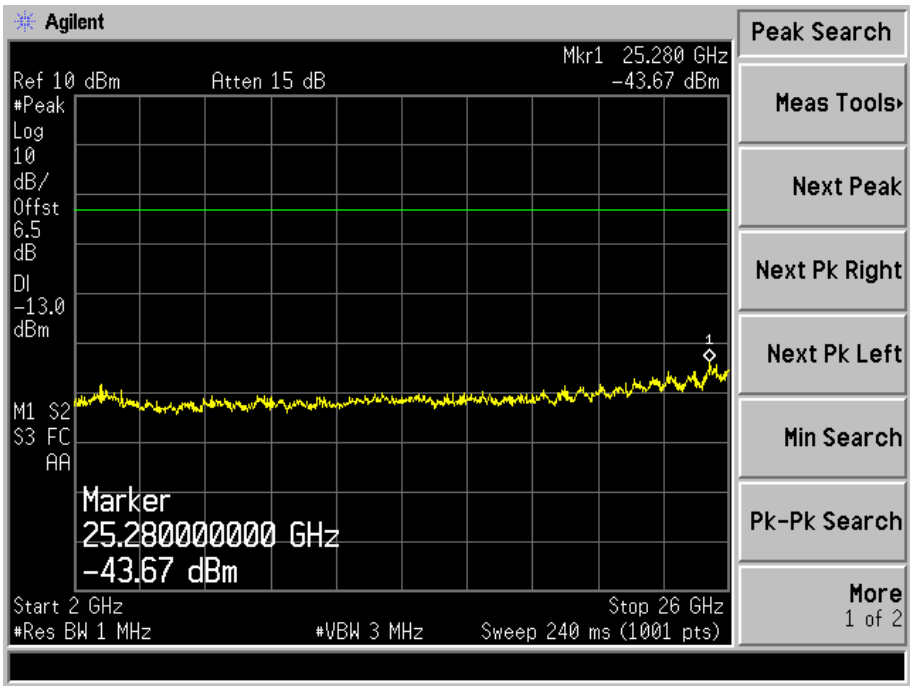
HSDPA High Band Spurious Emission



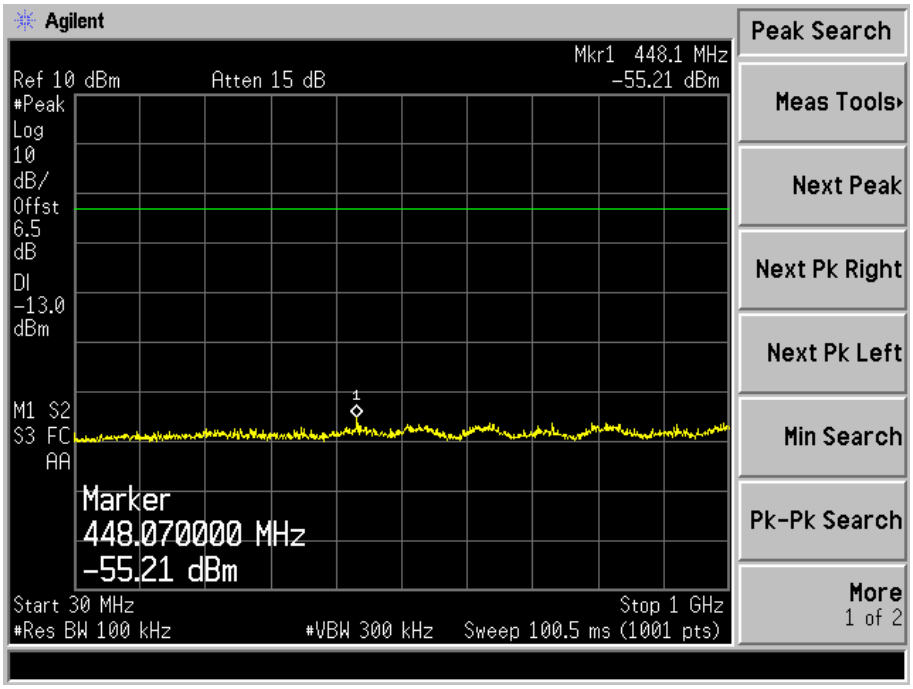
HSUPA Low Channel

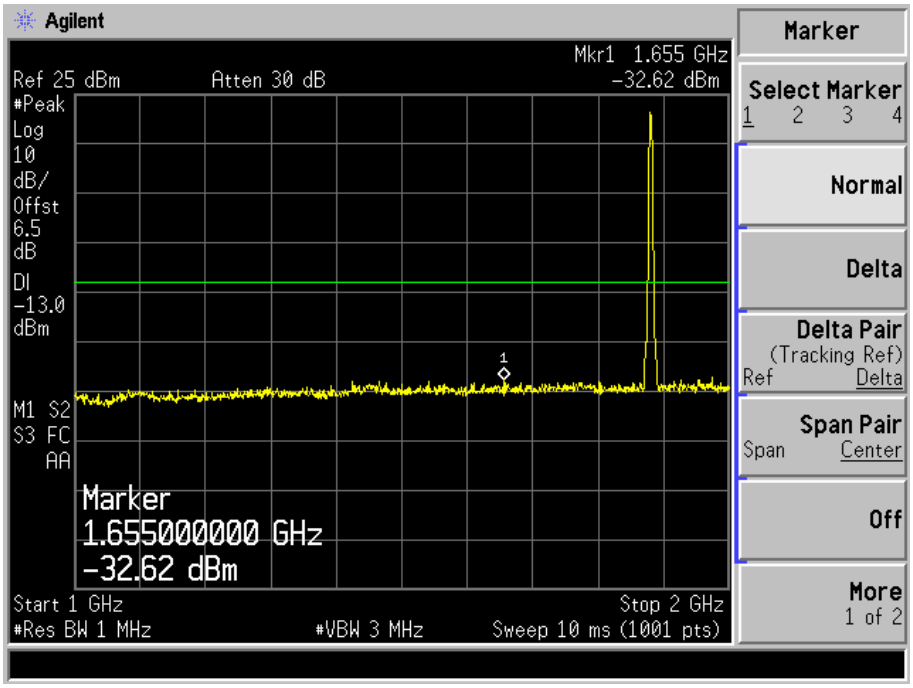


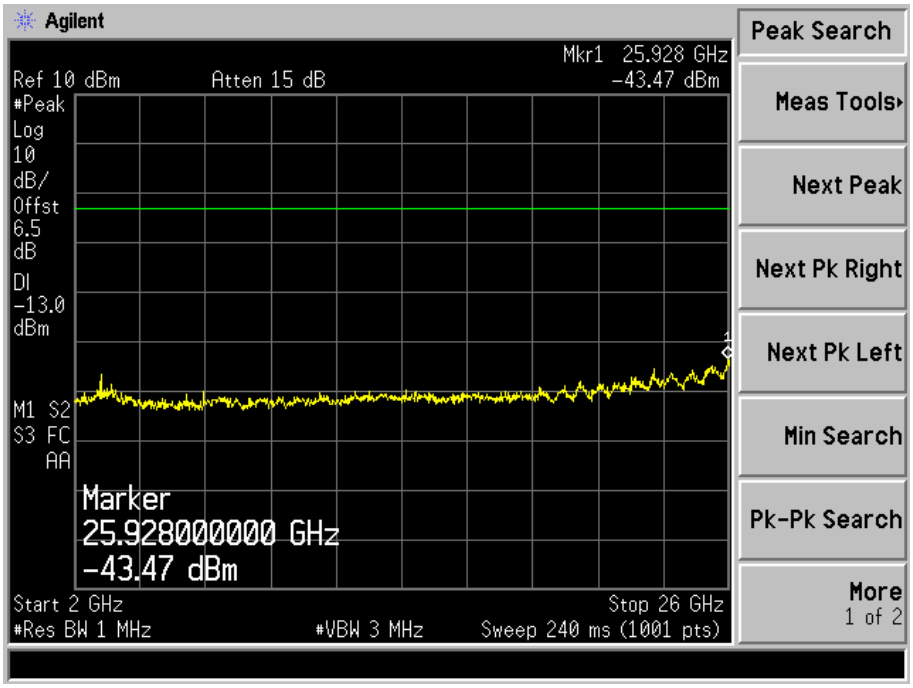

Agilent
Mkr1 1.715 GHz
-31.97 dBm
Ref 25 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
1.715000000 GHz
-31.97 dBm
Start 1 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 2 GHz
Sweep 10 ms (1001 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent
Mkr1 25.280 GHz
-43.67 dBm
Ref 10 dBm
Atten 15 dB
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
25.280000000 GHz
-43.67 dBm
Start 2 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 26 GHz
Sweep 240 ms (1001 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

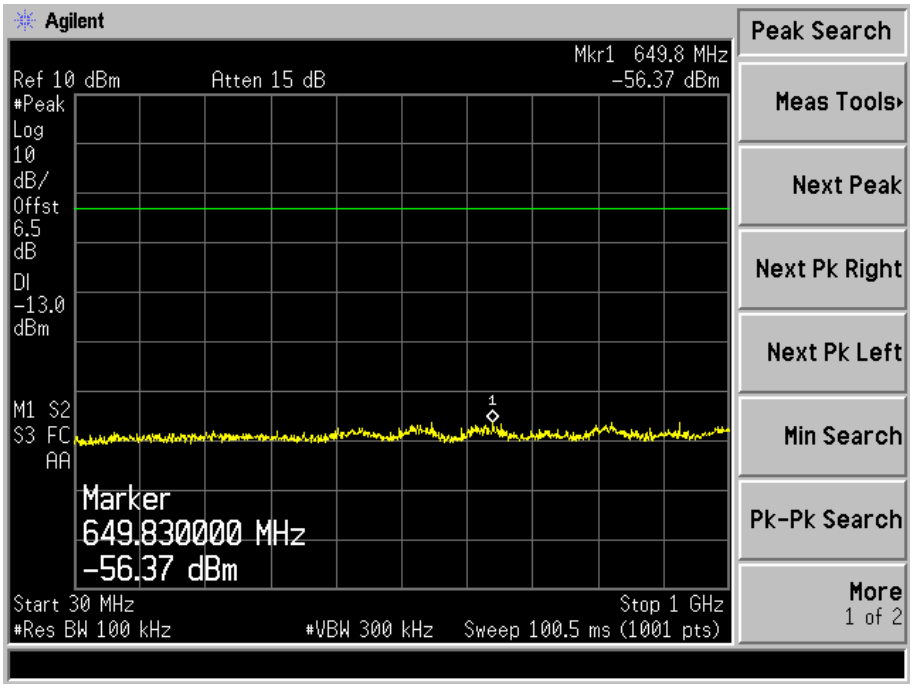
HSUPA Middle Channel

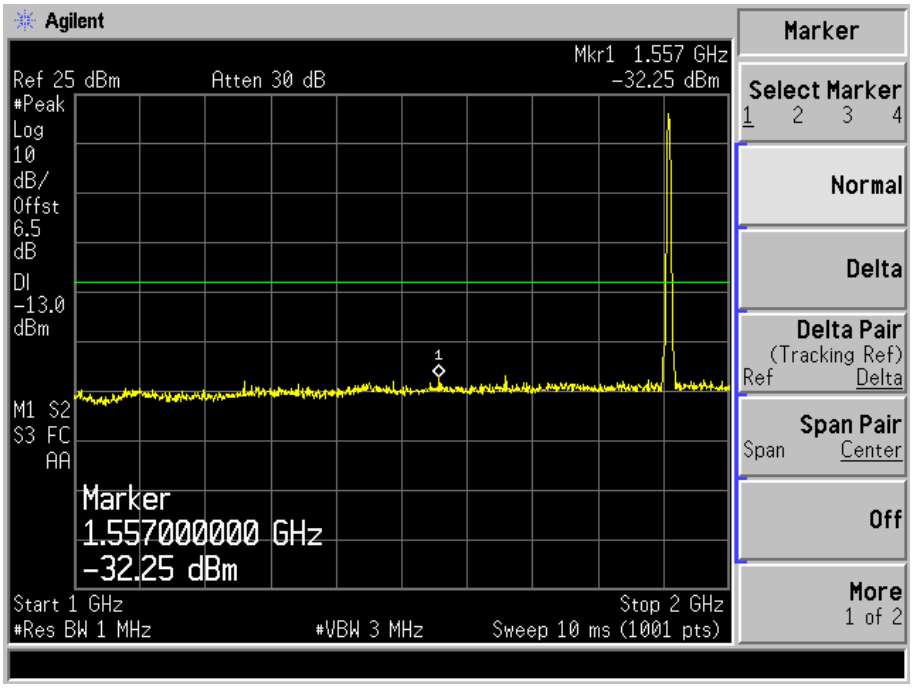


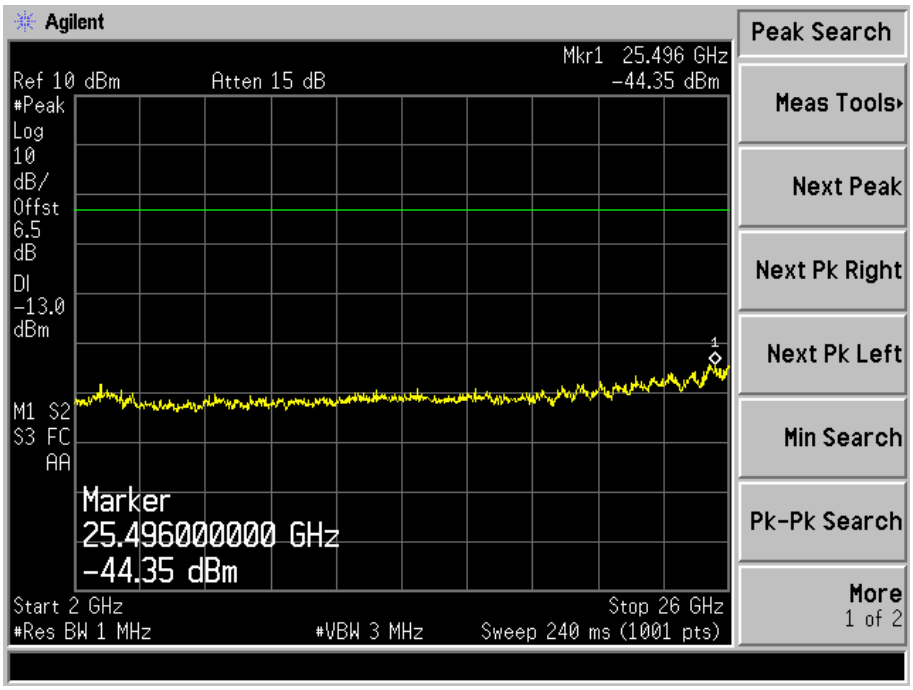




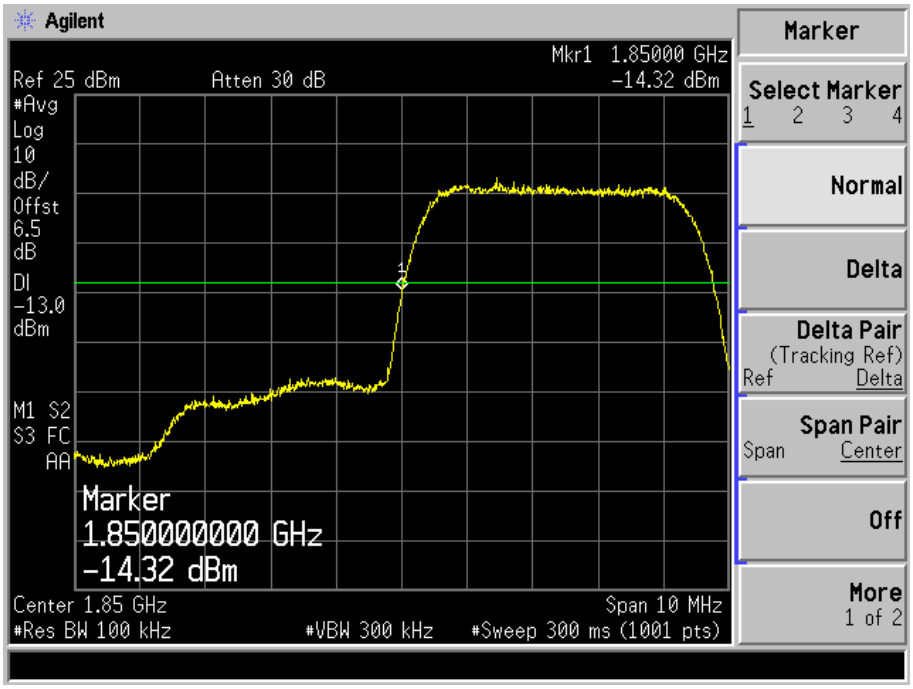
HSUPA High Channel



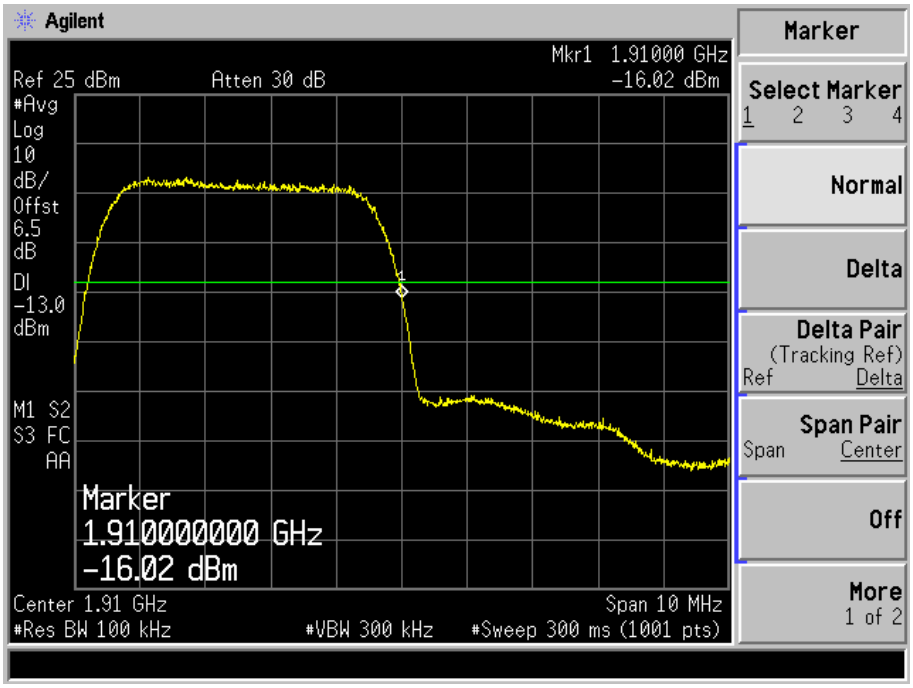

Agilent
Mkr1 1.557 GHz
-32.25 dBm
Ref 25 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
1.557000000 GHz
-32.25 dBm
Start 1 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 2 GHz
Sweep 10 ms (1001 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Delta
Span Pair
Span Center
Off
More
1 of 2


Agilent
Mkr1 25.496 GHz
-44.35 dBm
Ref 10 dBm
Atten 15 dB
#Peak
Log
10
dB/
Offst
6.5
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Marker
25.496000000 GHz
-44.35 dBm
Start 2 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 26 GHz
Sweep 240 ms (1001 pts)
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More
1 of 2

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 C63.4-2014 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.

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

8.3 Environmental Conditions

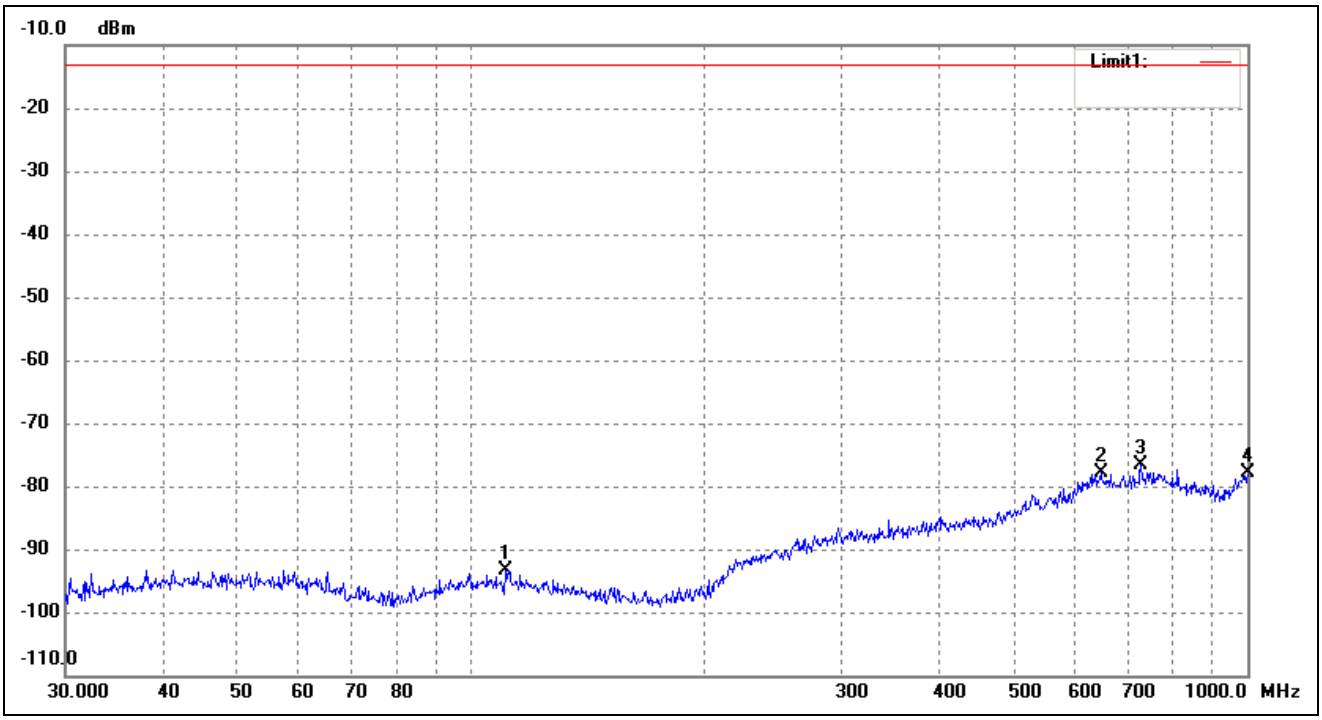
Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

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:

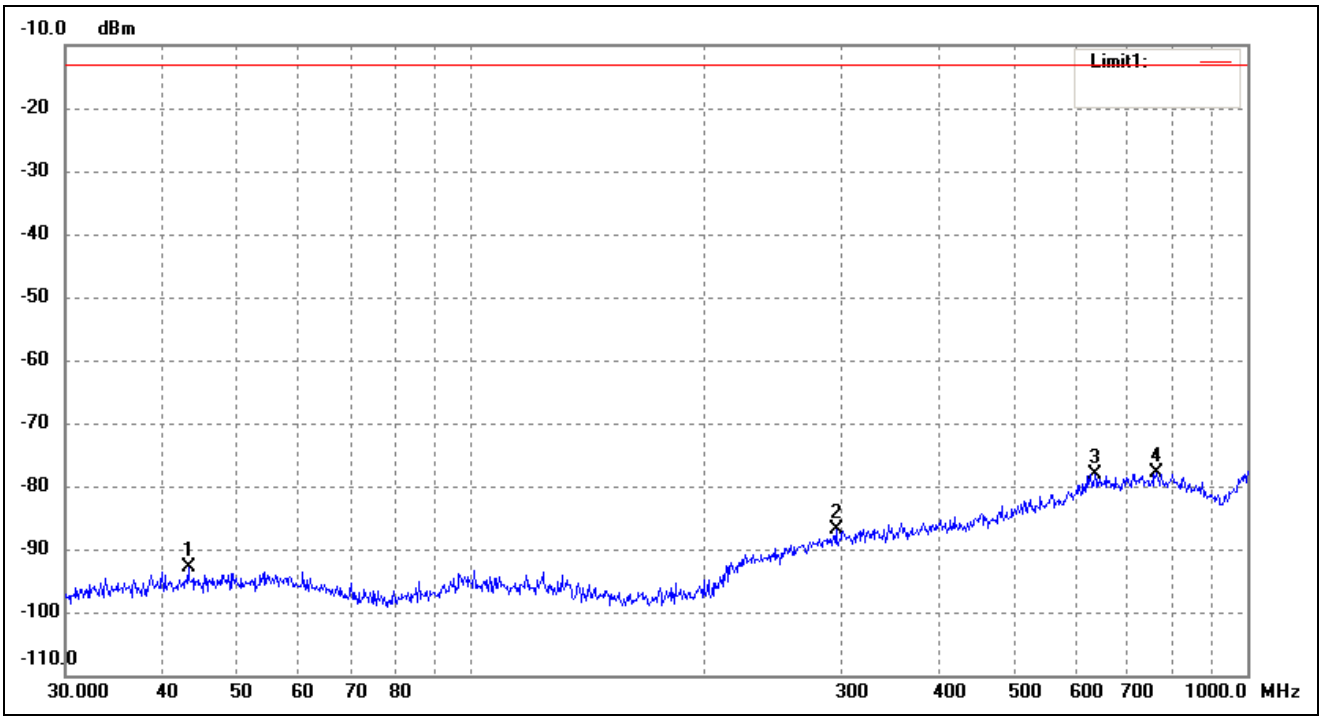
Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Spurious Emission From 30MHz to 1GHz
For Cellular Band_ GSM850 Mode
Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	110.5687	-88.57	-4.82	-93.39	-13.00	-80.39	ERP
2	647.3856	-88.49	10.61	-77.88	-13.00	-64.88	ERP
3	729.3583	-88.02	11.28	-76.74	-13.00	-63.74	ERP
4	1000.0000	-90.47	12.52	-77.95	-13.00	-64.95	ERP

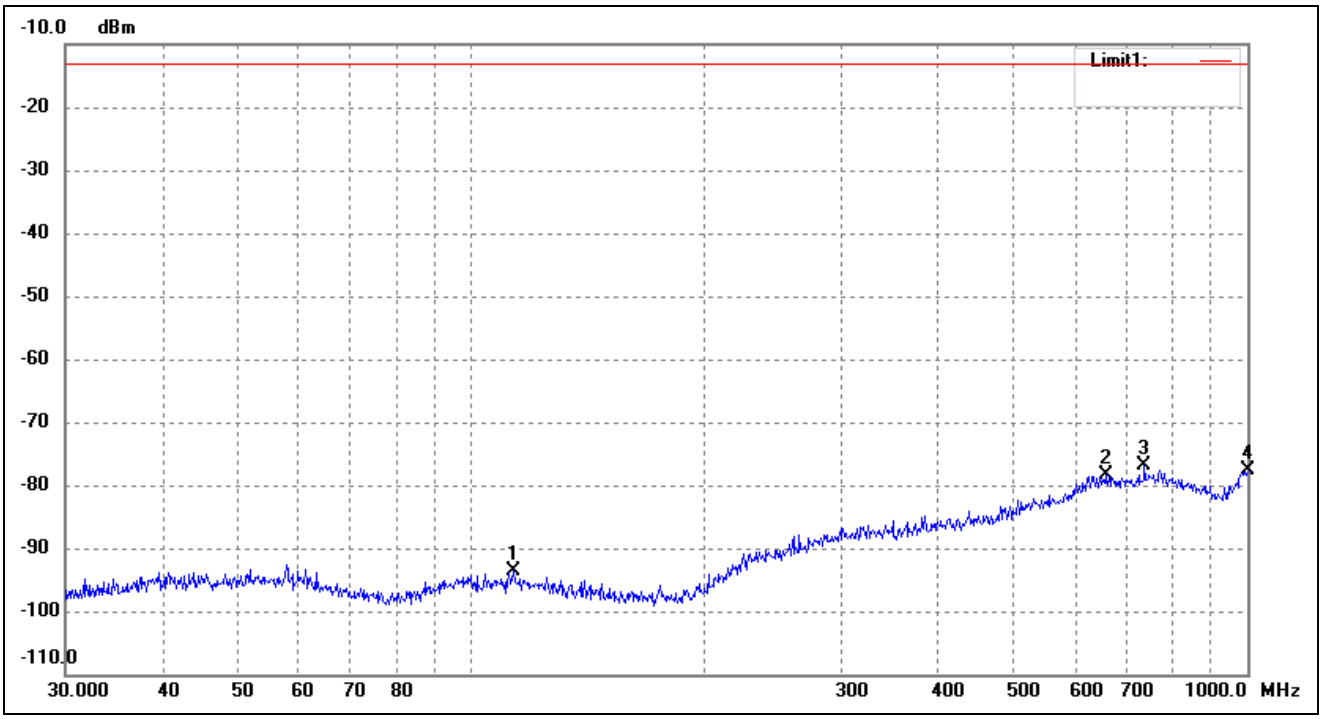
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	43.2017	-88.26	-4.69	-92.95	-13.00	-79.95	ERP
2	295.1469	-88.85	2.05	-86.80	-13.00	-73.80	ERP
3	636.1340	-88.75	10.65	-78.10	-13.00	-65.10	ERP
4	763.3757	-88.86	11.02	-77.84	-13.00	-64.84	ERP

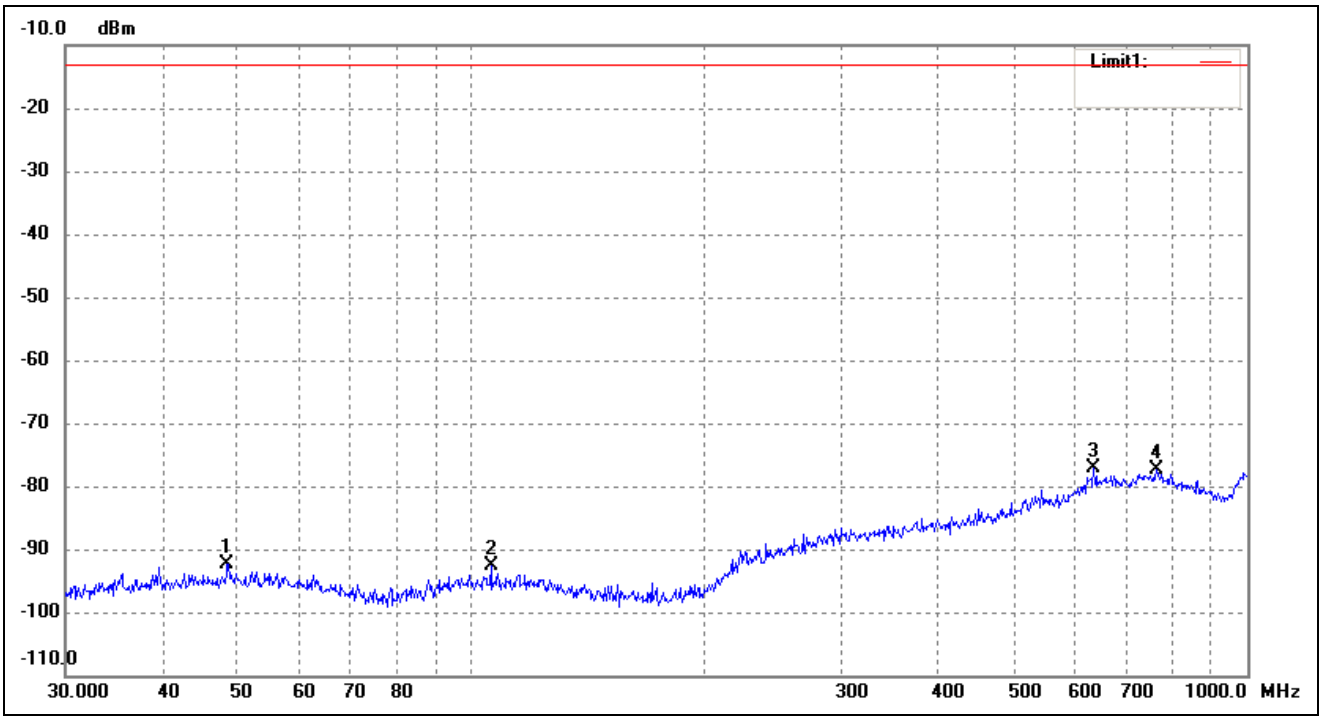
For Cellular Band_ GSM1900 Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	113.3163	-88.80	-4.83	-93.63	-13.00	-80.63	ERP
2	656.5300	-88.76	10.39	-78.37	-13.00	-65.37	ERP
3	737.0714	-88.73	11.78	-76.95	-13.00	-63.95	ERP
4	1000.0000	-90.13	12.52	-77.61	-13.00	-64.61	ERP

Vertical:

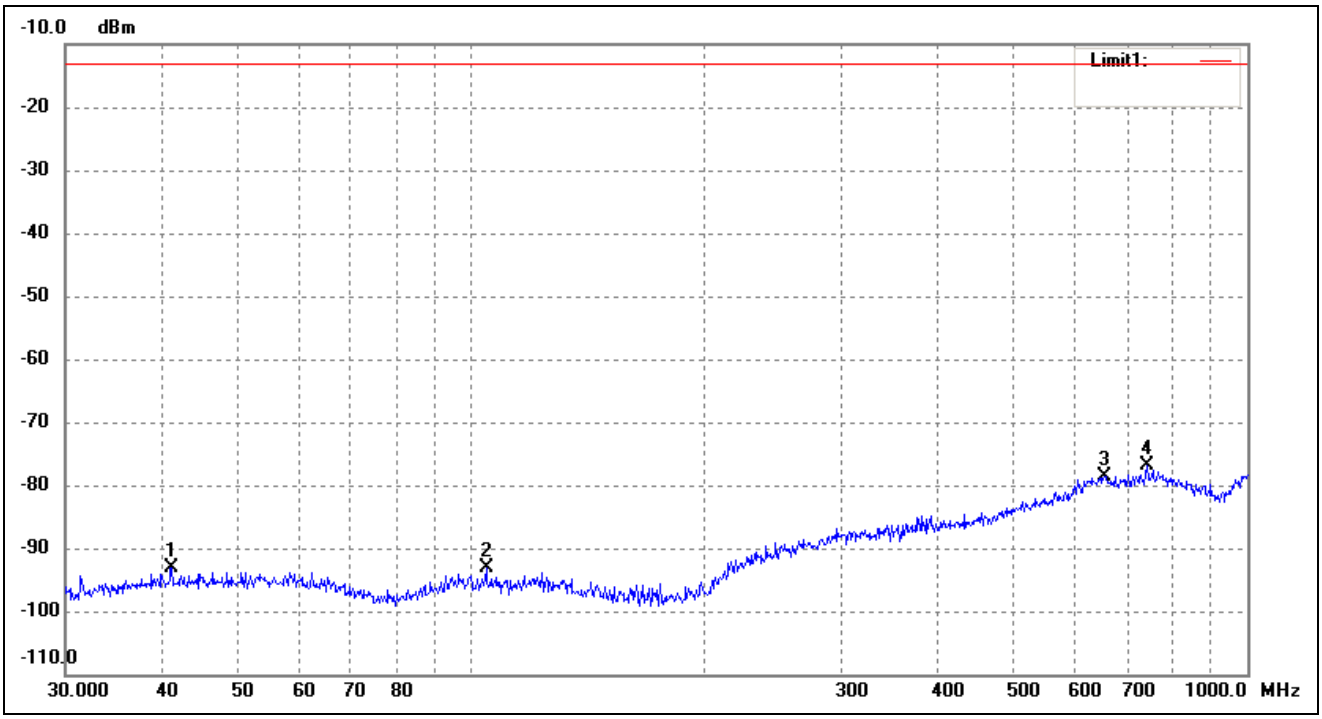


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	48.5016	-87.60	-4.73	-92.33	-13.00	-79.33	ERP
2	106.0126	-87.90	-4.80	-92.70	-13.00	-79.70	ERP
3	633.9073	-87.70	10.59	-77.11	-13.00	-64.11	ERP
4	763.3757	-88.45	11.02	-77.43	-13.00	-64.43	ERP

Note: Margin= (Reading+ Correct)- Limit

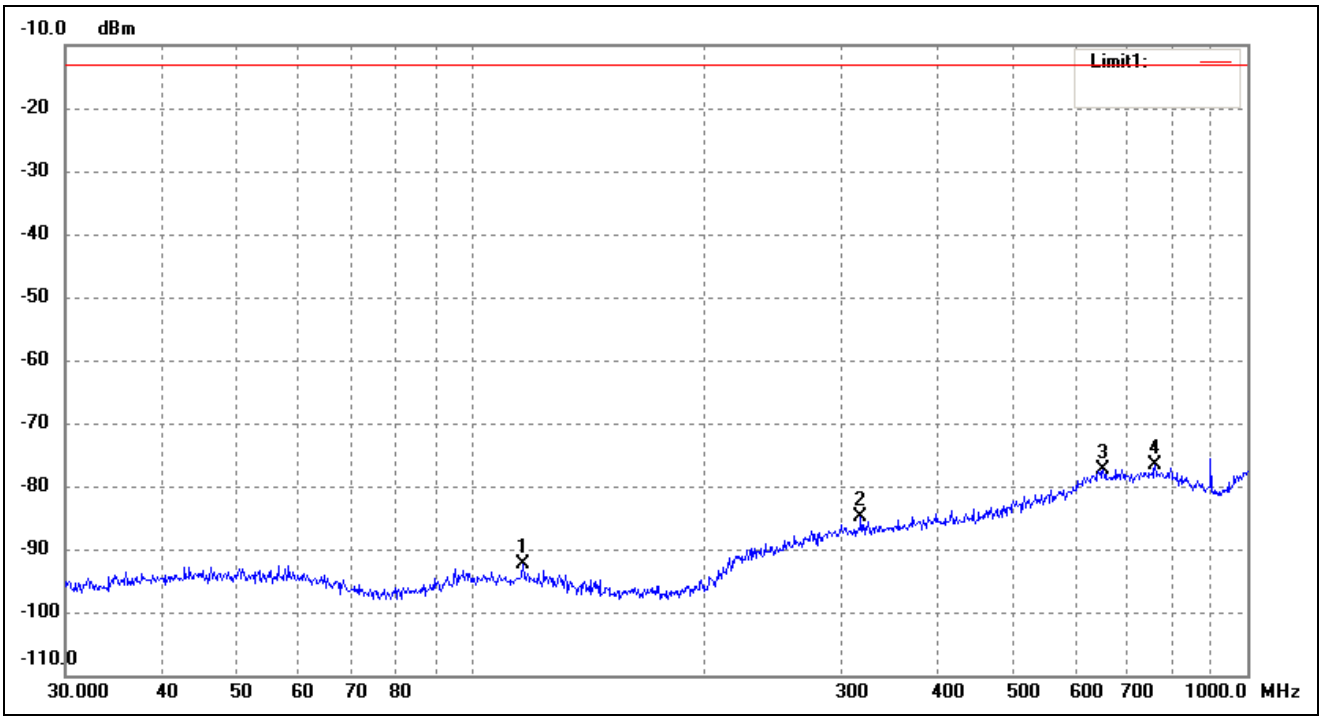
For band 5 Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	41.1320	-88.36	-4.72	-93.08	-13.00	-80.08	ERP
2	104.5361	-88.24	-4.81	-93.05	-13.00	-80.05	ERP
3	654.2318	-89.11	10.42	-78.69	-13.00	-65.69	ERP
4	742.2587	-88.67	11.89	-76.78	-13.00	-63.78	ERP

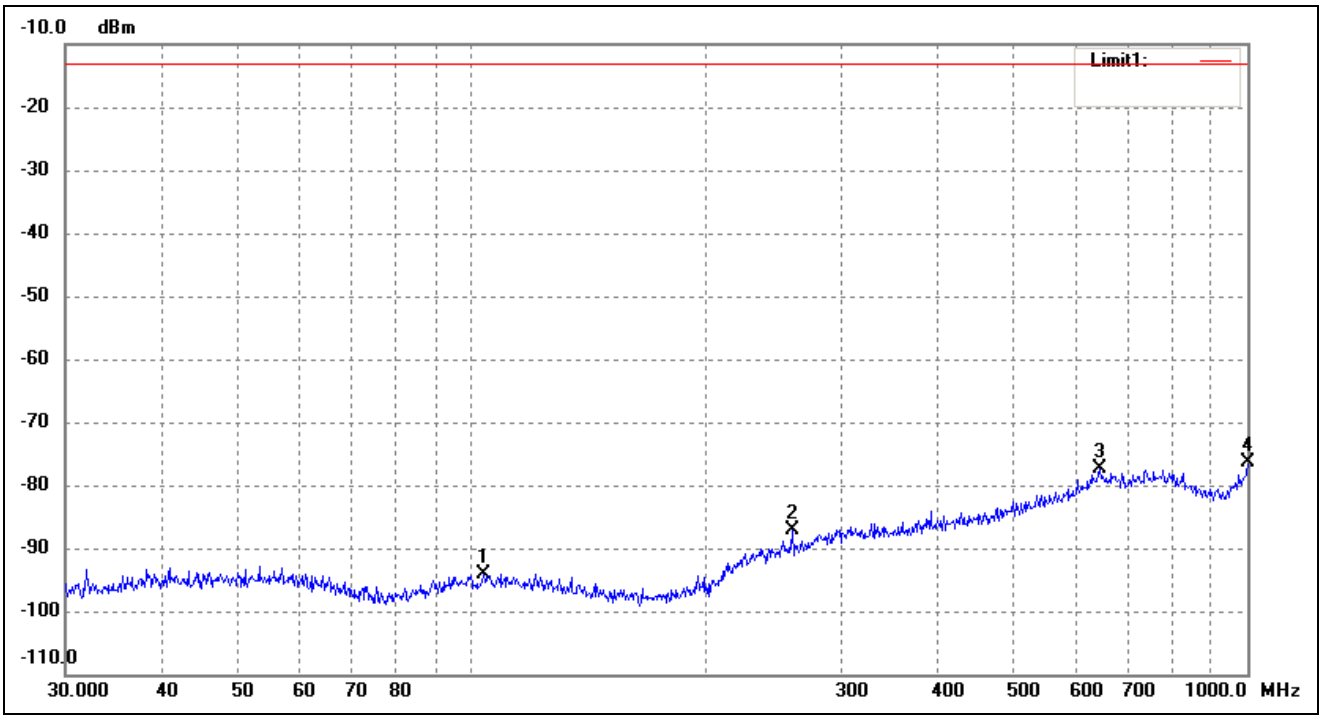
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	116.5401	-87.55	-4.86	-92.41	-13.00	-79.41	ERP
2	317.7011	-87.40	2.44	-84.96	-13.00	-71.96	ERP
3	651.9417	-87.79	10.48	-77.31	-13.00	-64.31	ERP
4	760.7036	-87.83	11.16	-76.67	-13.00	-63.67	ERP

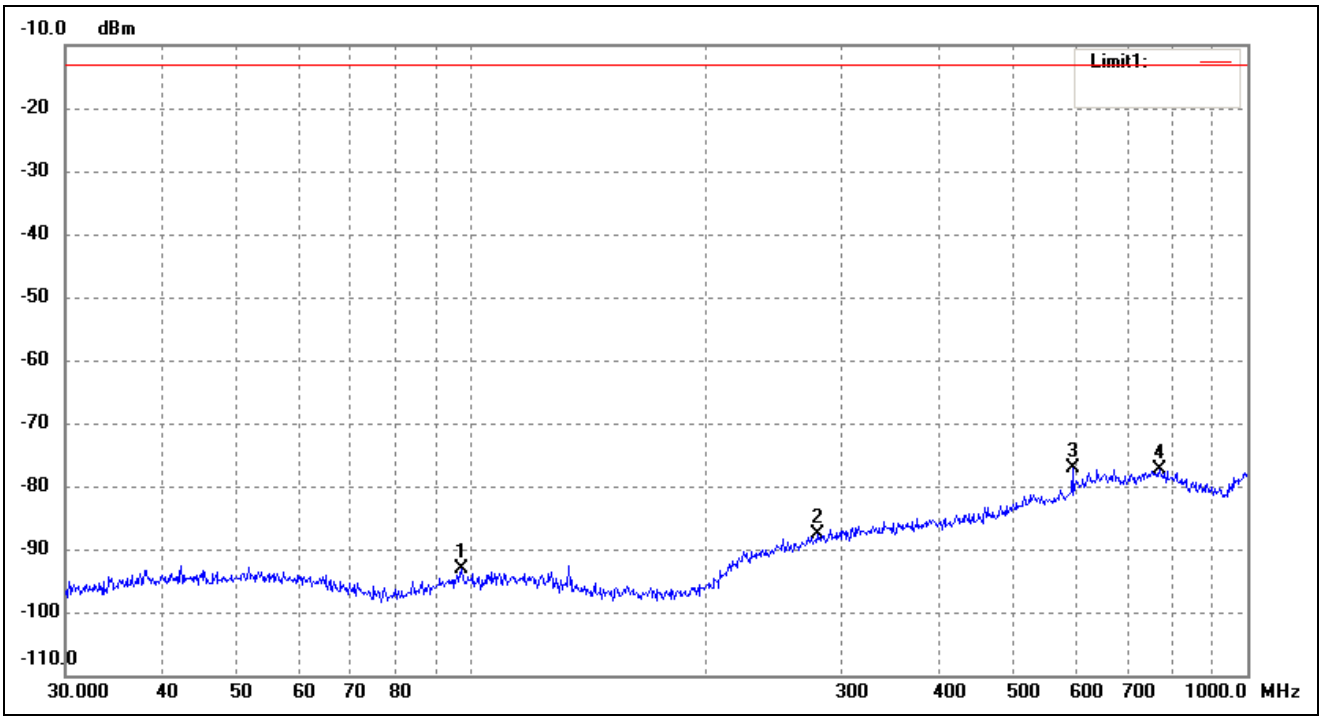
For band 2 Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	103.8055	-89.38	-4.80	-94.18	-13.00	-81.18	ERP
2	259.2338	-87.16	0.00	-87.16	-13.00	-74.16	ERP
3	645.1195	-87.95	10.65	-77.30	-13.00	-64.30	ERP
4	1000.0000	-88.98	12.52	-76.46	-13.00	-63.46	ERP

Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	97.1148	-87.98	-5.18	-93.16	-13.00	-80.16	ERP
2	279.0436	-89.11	1.37	-87.74	-13.00	-74.74	ERP
3	595.1329	-87.86	10.64	-77.22	-13.00	-64.22	ERP
4	771.4486	-87.98	10.51	-77.47	-13.00	-64.47	ERP

Note: Margin= (Reading+ Correct)- 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	-29.15	4.94	-24.21	-13	-11.21	H
2472.6	-36.82	8.46	-28.36	-13	-15.36	H
1648.4	-29.2	4.94	-24.26	-13	-11.26	V
2472.6	-39.08	8.46	-30.62	-13	-17.62	V
Middle Channel (836.6MHz)						
1673.2	-28.82	5.11	-23.71	-13	-10.71	H
2509.8	-35.25	8.54	-26.71	-13	-13.71	H
1673.2	-27.72	5.11	-22.61	-13	-9.61	V
2509.8	-41.07	8.54	-32.53	-13	-19.53	V
High Channel (848.8MHz)						
1697.6	-28.73	5.29	-23.44	-13	-10.44	H
2546.4	-37.18	8.59	-28.59	-13	-15.59	H
1697.6	-26.23	5.29	-20.94	-13	-7.94	V
2546.4	-40.01	8.59	-31.42	-13	-18.42	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	-33.55	10.54	-23.01	-13	-10.01	H
5550.6	-38.77	13.37	-25.4	-13	-12.4	H
3700.4	-32.44	10.54	-21.9	-13	-8.9	V
5550.6	-39.73	13.37	-26.36	-13	-13.36	V
Middle Channel (1880MHz)						
3760.0	-32.49	10.64	-21.85	-13	-8.85	H
5640.0	-40.52	13.54	-26.98	-13	-13.98	H
3760.0	-33.41	10.64	-22.77	-13	-9.77	V
5640.0	-39.89	13.54	-26.35	-13	-13.35	V
High Channel (1909.8MHz)						
3819.6	-30.23	10.74	-19.49	-13	-6.49	H
5729.4	-39.07	13.71	-25.36	-13	-12.36	H
3819.6	-30.11	10.74	-19.37	-13	-6.37	V
5729.4	-39.76	13.71	-26.05	-13	-13.05	V

For Band 5 Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (826.4MHz)						
1652.8	-28.17	4.94	-23.23	-13	-10.23	H
2479.2	-34.05	8.46	-25.59	-13	-12.59	H
1652.8	-29.68	4.94	-24.74	-13	-11.74	V
2479.2	-38.66	8.46	-30.2	-13	-17.2	V
Middle Channel (836.6MHz)						
1672.8	-27.17	5.11	-22.06	-13	-9.06	H
2509.2	-34.42	8.54	-25.88	-13	-12.88	H
1672.8	-27.74	5.11	-22.63	-13	-9.63	V
2509.2	-38.03	8.54	-29.49	-13	-16.49	V
High Channel (846.6MHz)						
1693.2	-27.31	5.29	-22.02	-13	-9.02	H
2539.8	-35.46	8.59	-26.87	-13	-13.87	H
1693.2	-26.59	5.29	-21.3	-13	-8.3	V
2539.8	-39.92	8.59	-31.33	-13	-18.33	V

For Band 2 Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (1852.4MHz)						
3704.8	-33.28	10.17	-23.11	-13	-10.11	H
5557.2	-39.69	14.69	-25	-13	-12	H
3704.8	-30.75	10.17	-20.58	-13	-7.58	V
5557.2	-41.98	14.69	-27.29	-13	-14.29	V
Middle Channel (1880MHz)						
3760.8	-30.22	10.26	-19.96	-13	-6.96	H
5640.0	-39.97	14.78	-25.19	-13	-12.19	H
3760.8	-30.56	10.26	-20.3	-13	-7.3	V
5640.0	-39.28	14.78	-24.5	-13	-11.5	V
High Channel (1907.6MHz)						
3815.2	-31.68	10.59	-21.09	-13	-8.09	H
5722.8	-38.38	15.03	-23.35	-13	-10.35	H
3815.2	-33.04	10.59	-22.45	-13	-9.45	V
5722.8	-40.09	15.03	-25.06	-13	-12.06	V

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

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

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 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	3.8	52	0.0616
40	3.8	45	0.0542
30	3.8	35	0.0423
20	3.8	32	0.0377
10	3.8	27	0.0322
0	3.8	22	0.0257
-10	3.8	28	0.0331
-20	3.8	33	0.0395
-30	3.8	38	0.0460

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	3.8	51	0.0270
40	3.8	41	0.0217
30	3.8	35	0.0184
20	3.8	30	0.0160
10	3.8	25	0.0135
0	3.8	22	0.0115
-10	3.8	25	0.0135
-20	3.8	33	0.0176
-30	3.8	41	0.0217

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	54	0.0644
40	3.8	46	0.0552
30	3.8	38	0.0451
20	3.8	32	0.0386
10	3.8	25	0.0294
0	3.8	20	0.0239
-10	3.8	25	0.0303
-20	3.8	31	0.0368
-30	3.8	37	0.0441

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	63	0.0336
40	3.8	54	0.0286
30	3.8	49	0.0262
20	3.8	45	0.0241
10	3.8	38	0.0200
0	3.8	30	0.0160
-10	3.8	35	0.0188
-20	3.8	42	0.0225
-30	3.8	46	0.0245

For Cellular Band EDGE 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	0.0745
40	3.8	58	0.0690
30	3.8	48	0.0579
20	3.8	42	0.0497
10	3.8	38	0.0451
0	3.8	34	0.0405
-10	3.8	38	0.0460
-20	3.8	44	0.0524
-30	3.8	48	0.0579

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	3.8	74	0.0393
40	3.8	64	0.0340
30	3.8	53	0.0282
20	3.8	48	0.0258
10	3.8	42	0.0221
0	3.8	35	0.0184
-10	3.8	40	0.0213
-20	3.8	48	0.0254
-30	3.8	52	0.0278

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	68	0.0818
40	3.8	56	0.0671
30	3.8	48	0.0570
20	3.8	42	0.0497
10	3.8	36	0.0432
0	3.8	31	0.0368
-10	3.8	35	0.0414
-20	3.8	41	0.0487
-30	3.8	46	0.0552

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	65	0.0348
40	3.8	53	0.0282
30	3.8	45	0.0237
20	3.8	38	0.0200
10	3.8	33	0.0176
0	3.8	28	0.0151
-10	3.8	32	0.0172
-20	3.8	40	0.0213
-30	3.8	47	0.0250

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	66	0.0791
40	3.8	57	0.0680
30	3.8	50	0.0598
20	3.8	44	0.0524
10	3.8	37	0.0441
0	3.8	31	0.0368
-10	3.8	38	0.0451
-20	3.8	42	0.0497
-30	3.8	45	0.0542

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	61	0.0323
40	3.8	57	0.0303
30	3.8	51	0.0270
20	3.8	45	0.0237
10	3.8	38	0.0200
0	3.8	34	0.0180
-10	3.8	42	0.0221
-20	3.8	47	0.0250
-30	3.8	52	0.0274

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	71	0.0846
40	3.8	56	0.0671
30	3.8	50	0.0598
20	3.8	46	0.0552
10	3.8	41	0.0487
0	3.8	36	0.0432
-10	3.8	42	0.0506
-20	3.8	49	0.0588
-30	3.8	54	0.0644

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	58	0.0311
40	3.8	46	0.0245
30	3.8	39	0.0209
20	3.8	33	0.0176
10	3.8	29	0.0155
0	3.8	24	0.0127
-10	3.8	31	0.0164
-20	3.8	37	0.0196
-30	3.8	42	0.0225

So, Frequency Stability Versus Input Voltage is:

Reference Frequency(Middle Channel): GSM 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	33	0.0395
	3.8	27	0.0322
	4.3	40	0.0478
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	40	0.0213
	3.8	30	0.0160
	4.3	45	0.0237
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	43	0.0515
	3.8	33	0.0395
	4.3	45	0.0542
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	35	0.0188
	3.8	22	0.0115
	4.3	29	0.0155

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	31	0.0368
	3.8	16	0.0193
	4.2	29	0.0349
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	48	0.0258
	3.8	34	0.0180
	4.3	45	0.0237
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	25	0.0294
	3.8	15	0.0184
	4.3	26	0.0313
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	32	0.0168
	3.8	23	0.0123
	4.3	38	0.0205
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	32	0.0377
	3.8	21	0.0248
	4.3	30	0.0359

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	39	0.0209
	3.8	25	0.0135
	4.3	40	0.0213
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	29	0.0349
	3.8	16	0.0193
	4.3	22	0.0267
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	28	0.0151
	3.8	18	0.0094
	4.3	28	0.0151

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