FCC Part 22H & 24E
Measurement and Test Report

For

UNISTAR TELECOM CO., LIMITED

7A01, Tianjing Building, Tian'an High-tech Plaza, Futian District,

Shenzhen, China

FCC ID: 2AC9P-F1S

FCC Rules:	FCC Part 22H, FCC Part 24E
Product Description:	Smart phone
Tested Model:	F1S
Report No.:	STR14108034I-1
Tested Date:	2014-10-12 to 2014-10-22
Issued Date:	2014-10-24
Tested By:	Silin Chen / Engineer
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM. Test Technology Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	UNISTAR TELECOM CO., LIMITED
Address of applicant:	7A01, Tianjing Building, Tian'an High-tech Plaza, Futian District, Shenzhen, China
Manufacturer:	UNISTAR TELECOM CO., LIMITED
Address of manufacturer:	7A01, Tianjing Building, Tian'an High-tech Plaza, Futian District, Shenzhen, China

General Description of EUT	
Product Name:	Smart phone
Brand Name:	KATA, UTTA, BAARNO
Model No.:	F1S
Adding Model:	U1, B2, F1, F1U, F1BS, F1SU, F1SBS, AX56
Hardware Version:	A25E_MB_V1.0_20140310
Software Version:	Kata-F1s-A25E-V1.0.1
IMEI:	862643000000456/862643000000455
Rated Voltage:	DC 3.7V Li-ion Battery
Battery:	Model: F1
	Capacitance: 1550mAh
Device Category:	Portable Device
The EUT is dual band GSM850/900/DCS1800/PCS1900, WCDMA Band I/II/V, Smart phone. The Smart phone is intended for speech and Multimedia Message Service (MMS) transmission. It is equipped with GPRS class 12 for GSM850/900/DCS180/PCS1900 and Wi-Fi, GPS, and camera functions. For more information see the following datasheet.	
Note: The test data is gathered from a production sample, provided by the manufacturer. The other model listed in the report has different appearance only of F1S without circuit and electronic construction changed, declared by the manufacturer.	

Technical Characteristics of EUT	
2G	
Support Networks:	GSM, GPRS, EGPRS(Downlink)
Support Band:	GSM850/PCS1900
Uplink Frequency:	GSM/GPRS 850: 824~849MHz GSM/GPRS 1900: 1850~1910MHz
Downlink Frequency:	GSM/GPRS 850: 869~894MHz GSM/GPRS 1900: 1930~1990MHz
Max RF Output Power:	GSM850: 32.04dBm, GSM1900: 29.53dBm
Type of Modulation:	GMSK, 8PSK
Type of Emission:	GSM(GSM850): 254KGXW GSM(PCS1900): 246KGXW
Type of Antenna:	Integral Antenna
Antenna Gain:	1.0dBi
GPRS Class:	Class 12
3G	
Support Networks:	WCDMA, HSDPA, HSUPA
Support Band:	WCDMA Band II, WCDMA Band V
Uplink Frequency:	WCDMA Band II: 1850~1980MHz WCDMA Band V: 824~849MHz
Downlink Frequency:	WCDMA Band II: 1930~1990MHz WCDMA Band V: 869~894MHz
Max RF Output Power:	WCDMA850: 22.45dBm, WCDMA1900: 22.58dBm
Type of Modulation:	BPSK
Type of Emission:	WCDMA850: 4M16F9W WCDMA1900: 4M19F9W
Type of Antenna:	Integral Antenna
Antenna Gain:	1.3dBi

1.2 Test Standards

The following report is prepared on behalf of the UNISTAR TELECOM CO., LIMITED in accordance with FCC Part 2 subpart J, FCC Part 22 subpart H and FCC Part 24 subpart E of the Federal Communication Commissions rules.

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

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

1.3 Test Methodology

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

1.4 Test Facility

- **FCC – Registration No.: 934118**
  Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 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	GSM 850	Low, Middle, High Channels
TF1S	GPRS 850	Low, Middle, High Channels
TM3	GSM 1900	Low, Middle, High Channels
TM4	GPRS 1900	Low, Middle, High Channels
TM5	WCDMA Band V	Low, Middle, High Channels
TM6	HSDPA Band V	Low, Middle, High Channels
TM7	HSUPA Band V	Low, Middle, High Channels
TM8	WCDMA Band II	Low, Middle, High Channels
TM9	HSDPA Band II	Low, Middle, High Channels
TM10	HSUPA Band II	Low, Middle, High Channels

Testing Configure			
Support Band	Support Standard	Channel Frequency	Channel Number
GSM 850	GSM/GPRS	824.2 MHz	128
		836.4 MHz	190
		848.8 MHz	251
PCS 1900	GSM/GPRS	1850.2 MHz	512
		1880.0 MHz	661
		1909.8 MHz	810
WCDMA Band V	WCDMA/HSDPA/HSUPA	826.4 MHz	4132
		836.4 MHz	4182
		846.6 MHz	4233
WCDMA Band II	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,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 Cable	1.05	Shielded	With Ferrite

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	E23	EB12648265
Adaptor	Astruml	SAPA05010EUU	/

Special Cable List and Details

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

2. SUMMARY OF TEST RESULTS

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

3. RF Exposure

3.1 Standard Applicable

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

3.2 Test Result

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

4. RF Output Power

4.1 Standard Applicable

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

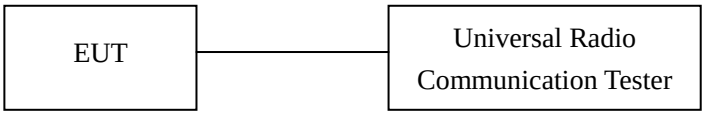
According to §24.232 (c), Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

4.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2014-05-28	2015-05-27
Pre-amplifier	Agilent	8447F	3113A06717	2014-05-28	2015-05-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2014-05-28	2015-05-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2014-05-24	2015-05-23
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-334	2014-05-24	2015-05-23
Horn Antenna	ETS	3117	00086197	2014-05-24	2015-05-23
Horn Antenna	ETS	3117	00086198	2014-05-24	2015-05-23
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	112012	2014-05-28	2015-05-27
Signal Generator	R&S	SMR20	100047	2014-05-28	2015-05-27

4.3 Test Procedure

Conducted output power test method:



Radiated power test method:

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

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

4.4 Environmental Conditions

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

4.5 Summary of Test Results/Plots

Radiated Power

ERP For GSM Mode GSM850

Frequency	Substitude SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
824.2	29.35	1.5	0	H	1.5	0	27.85	38.45
824.2	31.36	1.5	0	V	1.5	0	29.86	38.45
Middle Channel								
836.4	29.14	1.5	0	H	1.5	0	27.64	38.45
836.4	31.26	1.5	0	V	1.5	0	29.76	38.45
High Channel								
848.8	28.95	1.5	0	H	1.5	0	27.45	38.45
848.8	30.96	1.5	0	V	1.5	0	29.46	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	19.22	1.5	0	H	1.9	7.7	25.02	33
1850.2	21.21	1.5	0	V	1.9	7.7	27.01	33
Middle Channel								
1880.0	19.62	1.5	0	H	1.9	7.7	25.42	33
1880.0	21.35	1.5	0	V	1.9	7.7	27.15	33
High Channel								
1909.8	19.44	1.5	0	H	1.9	7.7	25.24	33
1909.8	21.62	1.5	0	V	1.9	7.7	27.42	33

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	28.65	1.5	0	H	1.5	0	27.15	38.45
824.2	31.50	1.5	0	V	1.5	0	30.00	38.45
Middle Channel								
836.4	29.36	1.5	0	H	1.5	0	27.86	38.45
836.4	31.74	1.5	0	V	1.5	0	30.24	38.45
High Channel								
848.8	29.56	1.5	0	H	1.5	0	28.06	38.45
848.8	31.62	1.5	0	V	1.5	0	30.12	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	19.35	1.5	0	H	1.9	7.7	25.15	33
1850.2	21.51	1.5	0	V	1.9	7.7	27.31	33
Middle Channel								
1880.0	19.44	1.5	0	H	1.9	7.7	25.24	33
1880.0	21.39	1.5	0	V	1.9	7.7	27.19	33
High Channel								
1909.8	19.29	1.5	0	H	1.9	7.7	25.09	33
1909.8	21.35	1.5	0	V	1.9	7.7	27.15	33

ERP For WCDMA Mode Band V

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	20.55	1.5	0	H	1.5	0	19.05	38.45
826.4	21.62	1.5	0	V	1.5	0	20.12	38.45
Middle Channel								
836.4	20.41	1.5	0	H	1.5	0	18.91	38.45
836.4	21.65	1.5	0	V	1.5	0	20.15	38.45
High Channel								
846.6	20.81	1.5	0	H	1.5	0	19.31	38.45
846.6	21.78	1.5	0	V	1.5	0	20.28	38.45

ERP For HSDPA Mode Band V

Frequency	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	20.74	1.5	0	H	1.5	0	19.24	38.45
826.4	21.65	1.5	0	V	1.5	0	20.15	38.45
Middle Channel								
836.4	20.55	1.5	0	H	1.5	0	19.05	38.45
836.4	21.64	1.5	0	V	1.5	0	20.14	38.45
High Channel								
846.6	20.74	1.5	0	H	1.5	0	19.24	38.45
846.6	21.84	1.5	0	V	1.5	0	20.34	38.45

ERP For HSUPA Mode Band V

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	20.84	1.5	0	H	1.5	0	19.34	38.45
826.4	21.92	1.5	0	V	1.5	0	20.42	38.45
Middle Channel								
836.4	20.65	1.5	0	H	1.5	0	19.15	38.45
836.4	21.75	1.5	0	V	1.5	0	20.25	38.45
High Channel								
846.6	20.55	1.5	0	H	1.5	0	19.05	38.45
846.6	21.66	1.5	0	V	1.5	0	20.16	38.45

EIRP For WCDMA Mode Band II

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	14.46	1.5	0	V	1.9	7.7	20.26	33
Middle Channel								
1880.0	13.45	1.5	0	H	1.9	7.7	19.25	33
1880.0	14.38	1.5	0	V	1.9	7.7	20.18	33
High Channel								
1907.6	13.54	1.5	0	H	1.9	7.7	19.34	33
1907.6	14.62	1.5	0	V	1.9	7.7	20.42	33

EIRP For HSDPA Mode Band II

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	12.95	1.5	0	H	1.9	7.7	18.75	33
1852.4	14.25	1.5	0	V	1.9	7.7	20.05	33
Middle Channel								
1880.0	13.18	1.5	0	H	1.9	7.7	18.98	33
1880.0	14.46	1.5	0	V	1.9	7.7	20.26	33
High Channel								
1907.6	13.08	1.5	0	H	1.9	7.7	18.88	33
1907.6	14.51	1.5	0	V	1.9	7.7	20.31	33

EIRP For HSUPA Mode Band II

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	12.62	1.5	0	H	1.9	7.7	18.42	33
1852.4	14.72	1.5	0	V	1.9	7.7	20.52	33
Middle Channel								
1880.0	12.87	1.5	0	H	1.9	7.7	18.67	33
1880.0	14.66	1.5	0	V	1.9	7.7	20.46	33
High Channel								
1907.6	12.45	1.5	0	H	1.9	7.7	18.25	33
1907.6	14.78	1.5	0	V	1.9	7.7	20.58	33

Note: Result = 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	32.04	38.45
	Middle Channel	836.4	31.89	38.45
	High Channel	848.8	32.01	38.45
GPRS(1 Slot)	Low Channel	824.2	32.02	38.45
	Middle Channel	836.4	31.94	38.45
	High Channel	848.8	32.08	38.45

For PCS Band (GSM1900)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
GSM	Low Channel	1850.2	29.53	33.0
	Middle Channel	1880.0	29.10	33.0
	High Channel	1909.8	28.47	33.0
GPRS(1 Slot)	Low Channel	1850.2	29.50	33.0
	Middle Channel	1880.0	29.12	33.0
	High Channel	1909.8	28.44	33.0

For WCDMA Band V

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
WCDMA	Low Channel	826.4	22.45	38.45
	Middle Channel	836.4	22.24	38.45
	High Channel	846.6	22.11	38.45
HSDPA	Low Channel	826.4	21.68	38.45
	Middle Channel	836.4	21.57	38.45
	High Channel	846.6	22.11	38.45
HSUPA	Low Channel	826.4	21.55	38.45
	Middle Channel	836.4	21.66	38.45
	High Channel	846.6	21.72	38.45

For WCDMA Band II

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
WCDMA	Low Channel	1852.4	22.24	30.0
	Middle Channel	1880.0	22.35	30.0
	High Channel	1907.6	22.58	30.0
HSDPA	Low Channel	1852.4	21.61	30.0
	Middle Channel	1880.0	21.84	30.0
	High Channel	1907.6	21.94	30.0
HSUPA	Low Channel	826.4	21.58	38.45
	Middle Channel	836.4	21.21	38.45
	High Channel	846.6	21.52	38.45

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

5.1 Standard Applicable

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

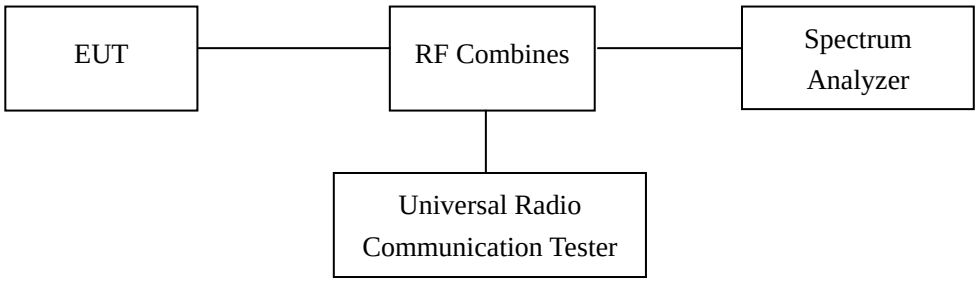
5.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B	US41192821	2014-05-28	2015-05-27
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	112012	2014-05-28	2015-05-27

5.3 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the peak-to-average ratio (PAR) of the transmission was recorded.

Test Configuration for the emission bandwidth testing:



5.4 Environmental Conditions

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

5.5 Summary of Test Results

For Cellular Band

Test Mode	Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)	PAR (dB)	Limit (dB)
GSM	128	824.2	33.29	32.04	1.25	13
	190	836.4	33.59	31.89	1.70	13
	251	848.8	33.49	32.01	1.48	13
GPRS (1 Slot)	128	824.2	33.56	32.02	1.54	13
	190	836.4	33.58	31.94	1.64	13
	251	848.8	33.47	32.08	1.39	13

For PCS Band

Test Mode	Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)	PAR	Limit
GSM	512	1850.2	32.36	29.53	2.83	13
	661	1880.0	32.15	29.10	3.05	13
	810	1909.8	31.35	28.47	2.88	13
GPRS (1 Slot)	512	1850.2	31.55	29.50	2.05	13
	661	1880.0	31.35	29.12	2.23	13
	810	1909.8	30.94	28.44	2.50	13

For WCDMA Band V

Test Mode	Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)	PAR	Limit
WCDMA	4132	826.4	24.45	22.45	2.00	13
	4182	836.4	25.54	22.24	3.3	13
	4233	846.6	25.46	22.11	3.35	13
HSDPA	4132	826.4	25.35	21.68	3.67	13
	4182	836.4	25.42	21.57	3.85	13
	4233	846.6	25.41	22.11	3.3	13
HSDPA	4132	826.4	25.35	21.55	3.8	13
	4182	836.4	25.25	21.66	3.59	13
	4233	846.6	25.15	21.72	3.43	13

For WCDMA Band II

Test Mode	Channel	Frequency (MHz)	Peak Power (dBm)	Average Power (dBm)	PAR	Limit
WCDMA	9262	1852.4	24.55	22.24	2.31	13
	9400	1880.0	24.45	22.35	2.10	13
	9538	1907.6	24.26	22.58	1.68	13
HSDPA	9262	1852.4	24.57	21.61	2.96	13
	9400	1880.0	24.67	21.84	2.83	13
	9538	1907.6	24.25	21.94	2.31	13
HSDPA	9262	1852.4	24.48	21.58	2.90	13
	9400	1880.0	24.29	21.21	3.08	13
	9538	1907.6	24.30	21.52	2.78	13

6. Emission Bandwidth

6.1 Standard Applicable

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

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

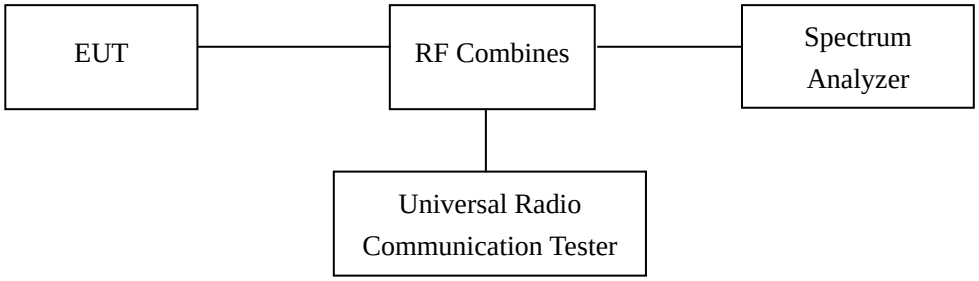
6.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B	US41192821	2014-05-28	2015-05-27
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	112012	2014-05-28	2015-05-27

6.3 Test Procedure

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

Test Configuration for the emission bandwidth testing:



6.4 Environmental Conditions

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

6.5 Summary of Test Results/Plots

For Cellular Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM	128	824.2	252.3869	341.265
	190	836.6	254.3572	339.568
	251	848.8	252.0845	339.928
GPRS	128	824.2	245.6338	307.821
	190	836.6	244.5054	315.549
	251	848.8	244.0436	312.020

For PCS Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM	512	1850.2	244.4018	308.179
	661	1880.0	242.9040	317.941
	810	1909.8	245.7871	314.006
GPRS	512	1850.2	252.6386	338.241
	661	1880.0	251.4105	341.527
	810	1909.8	253.3478	338.564

For Band V

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	4132	826.4	4.1547	4.739
	4182	836.4	4.1478	4.699
	4233	846.6	4.1602	4.727
HSDPA	4132	826.4	4.1412	4.705
	4182	836.4	4.1337	4.710
	4233	846.6	4.1629	4.718

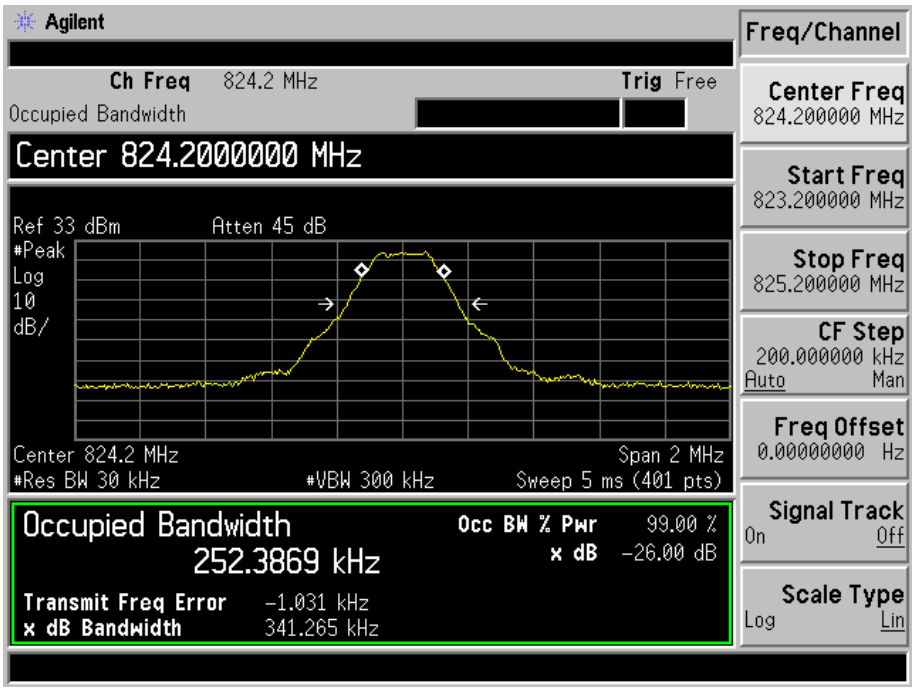
For Band II

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	9262	1852.4	4.1670	4.739
	9400	1880.0	4.1797	4.730
	9538	1907.6	4.1859	4.828
HSDPA	9262	1852.4	4.1443	4.723
	9400	1880.0	4.1695	4.707
	9538	1907.6	4.1563	4.715

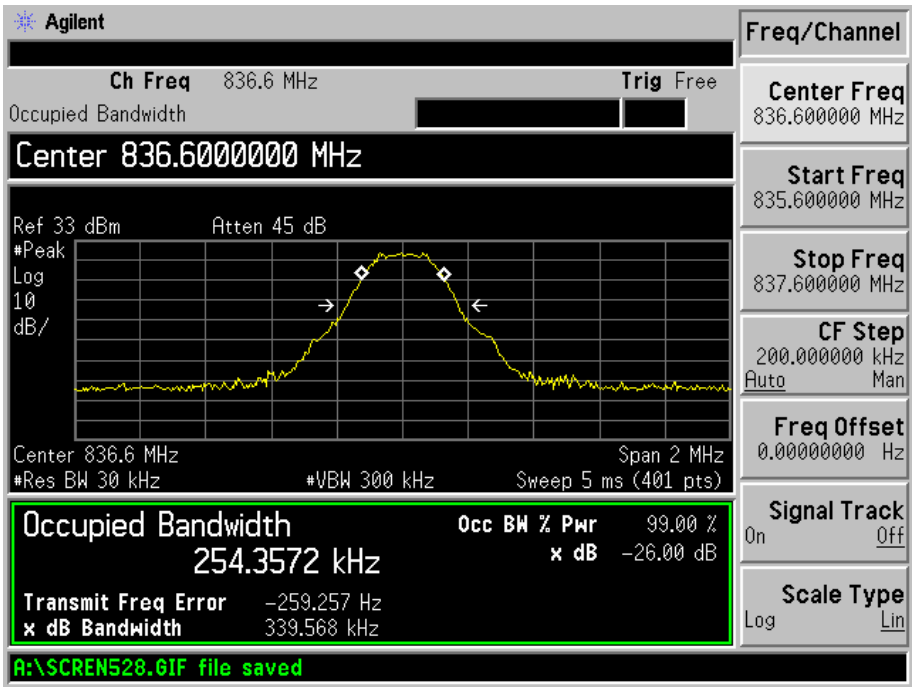
Please refer to the following test plots:

For Cellular Band

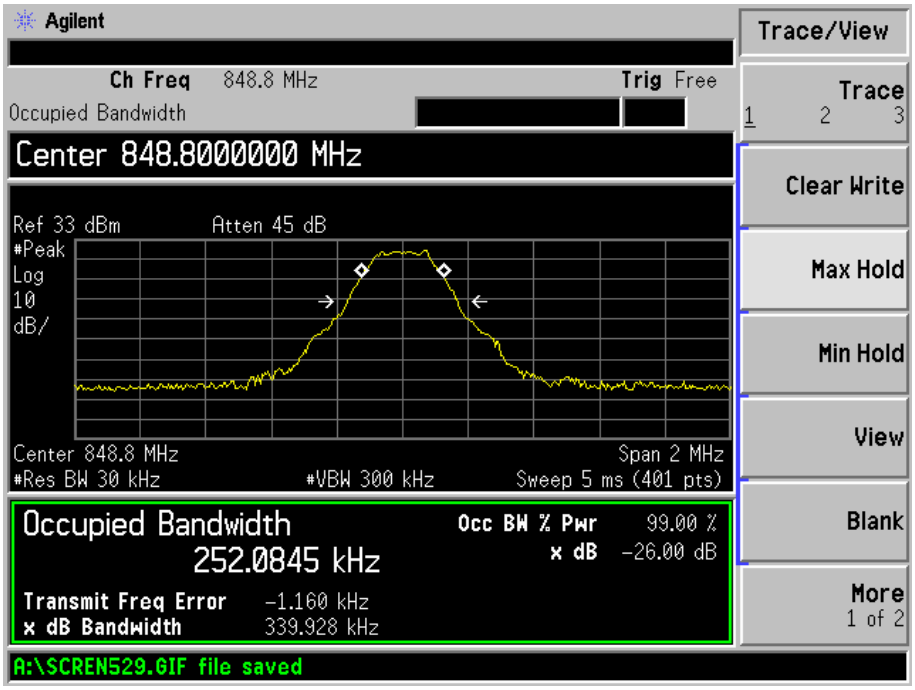
GSM Low Channel



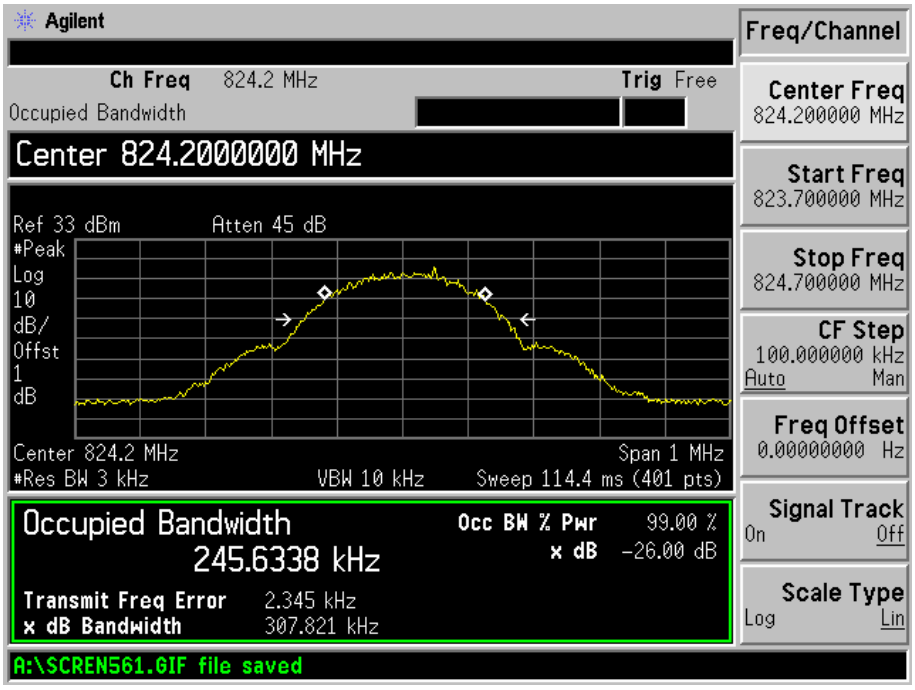
GSM Middle Channel



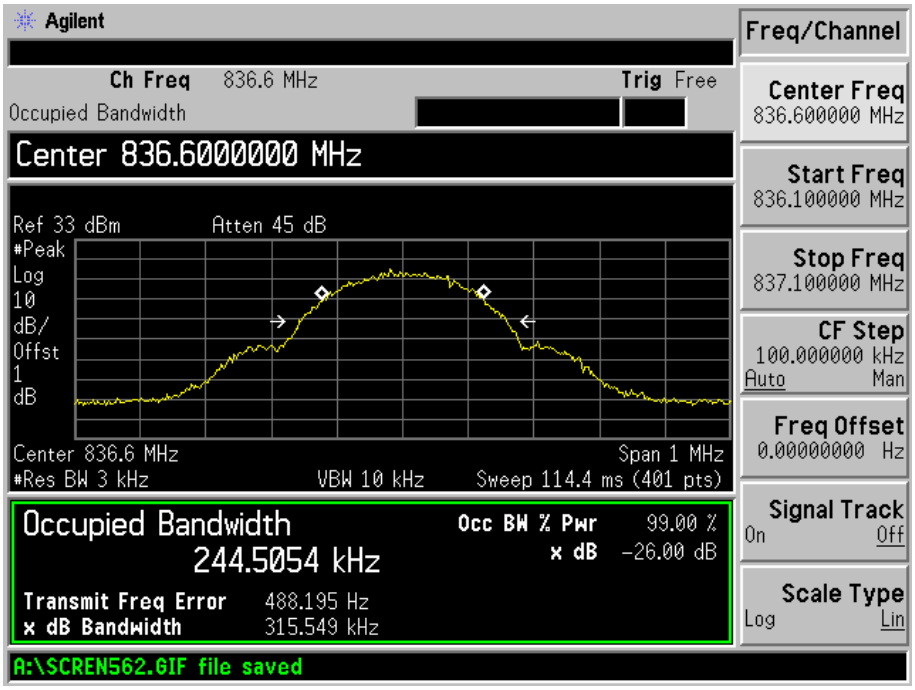
GSM High channel



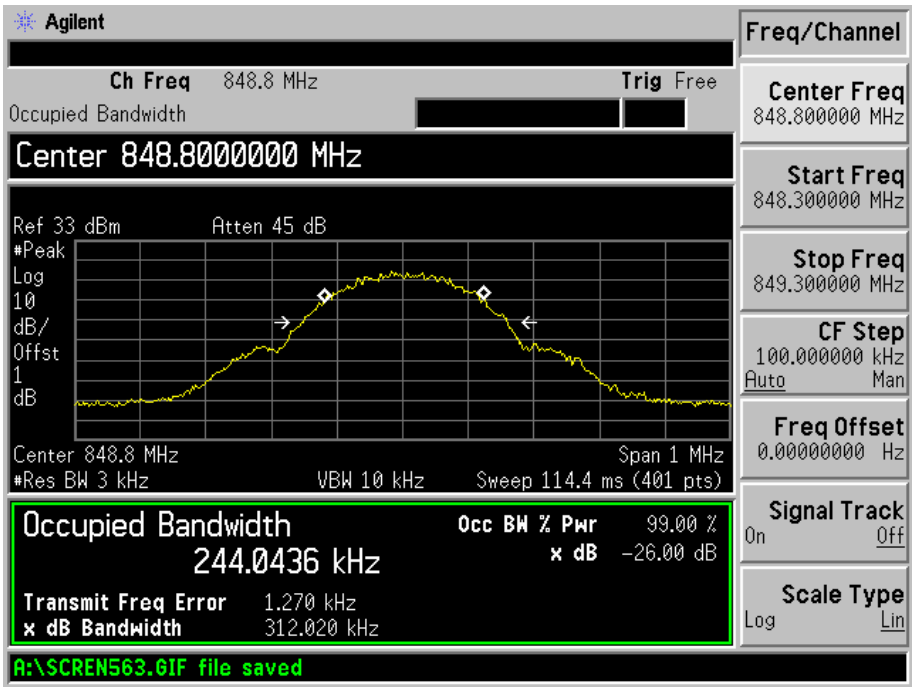
GPRS Low Channel



GPRS Middle Channel

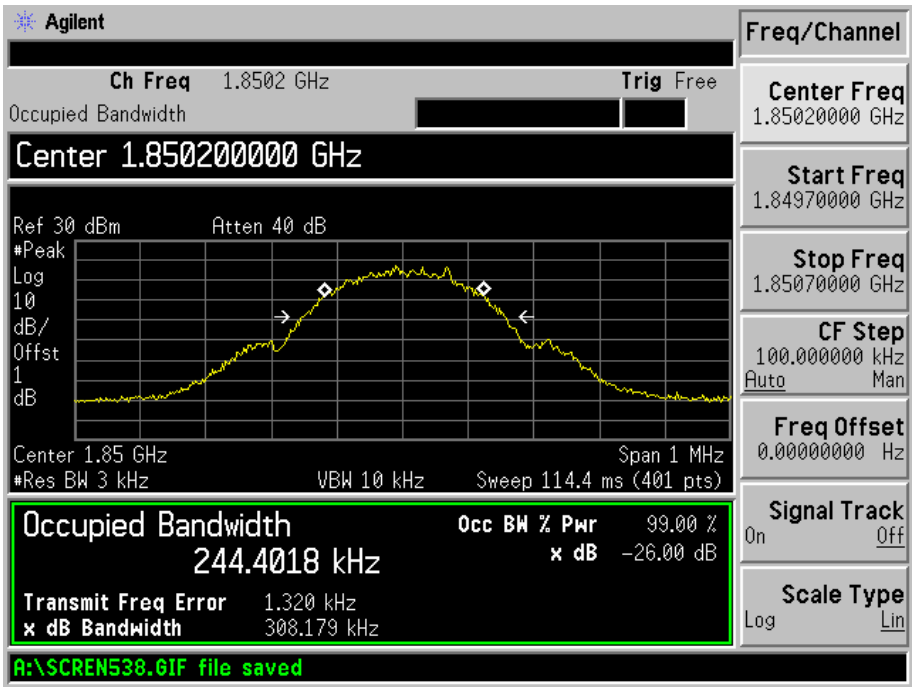


GPRS High Channel

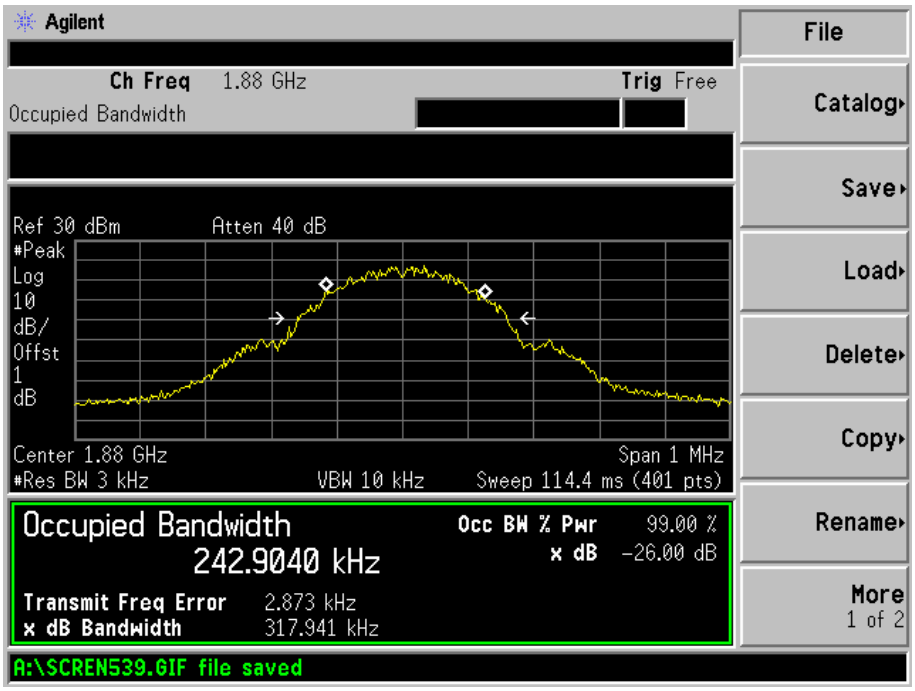


For PCS Band

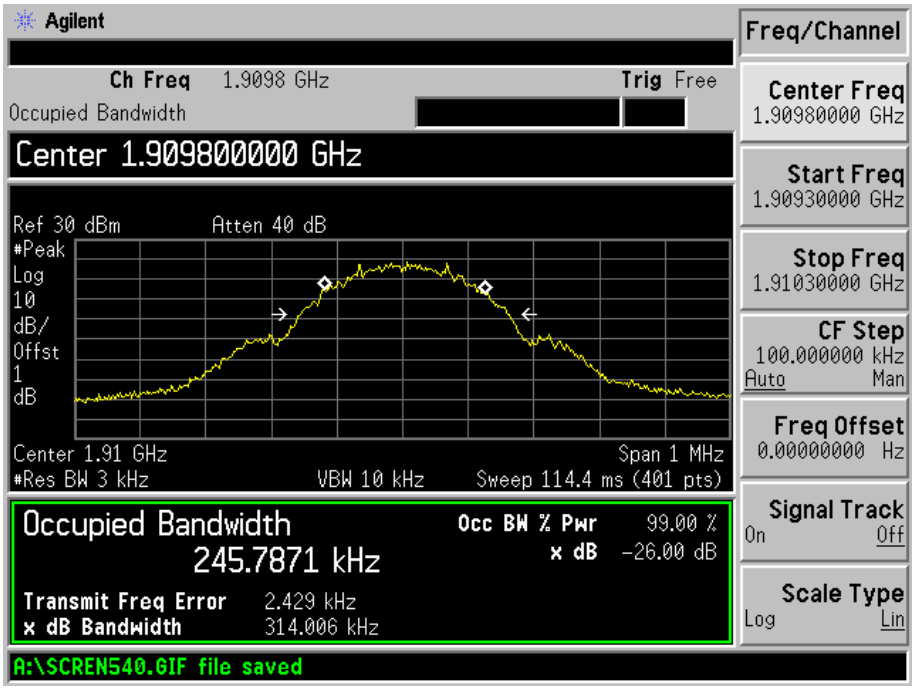
GSM Low Channel



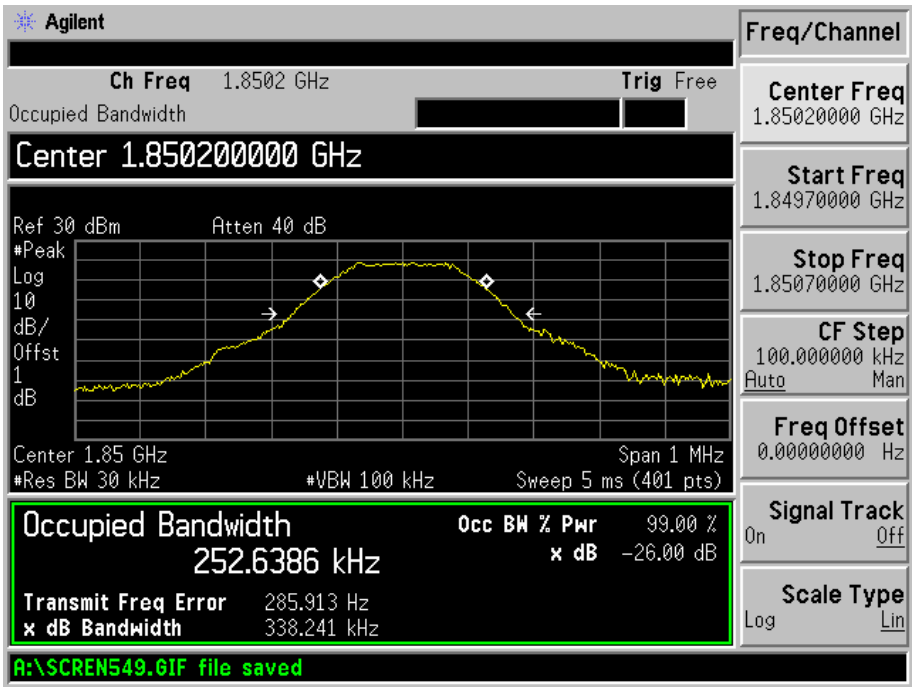
GSM Middle Channel



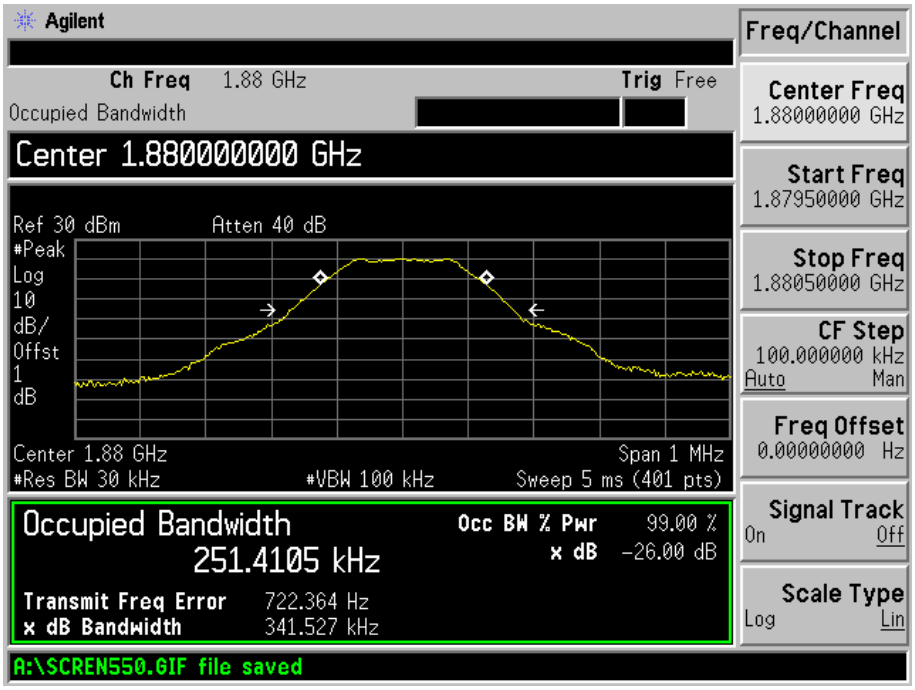
GSM High channel



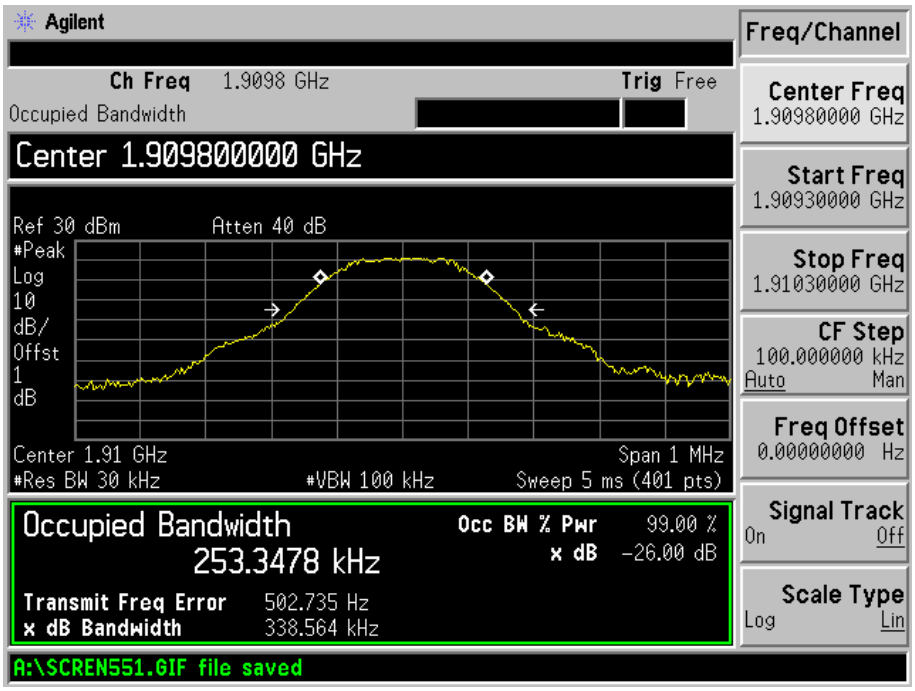
GPRS Low Channel



GPRS Middle Channel

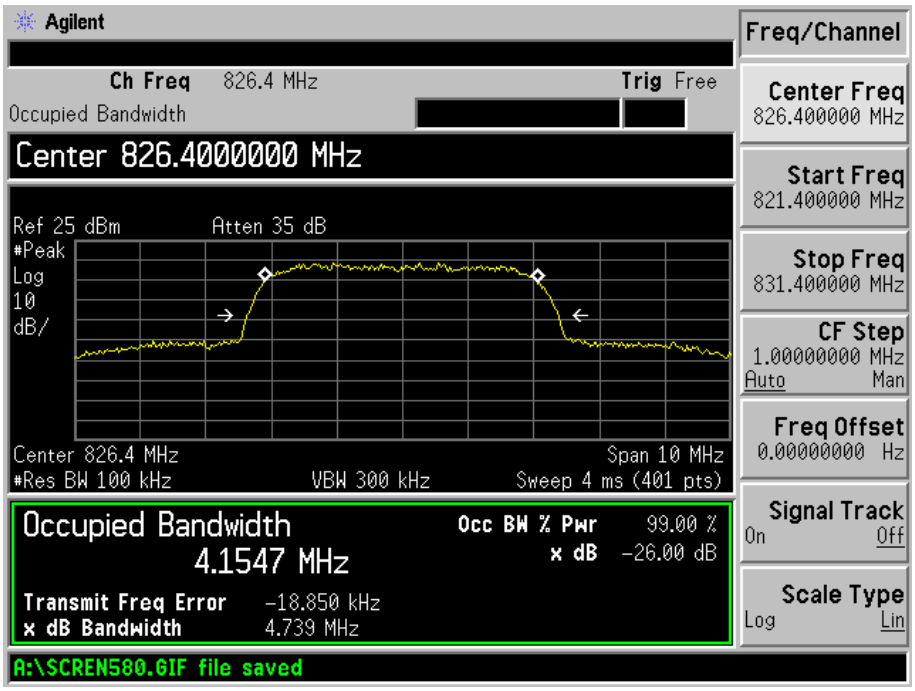


GPRS High Channel

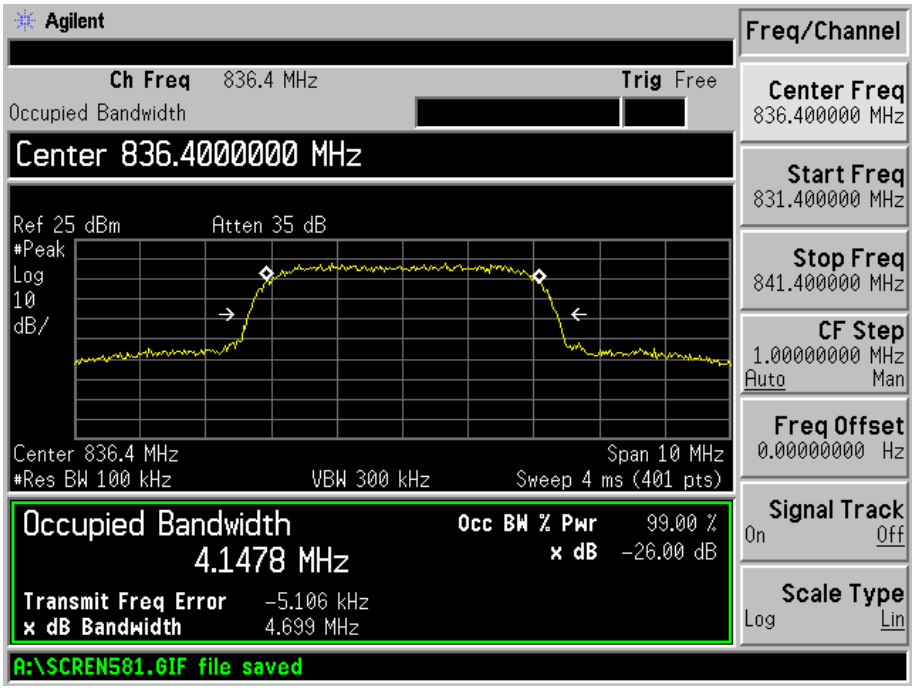


For Band V

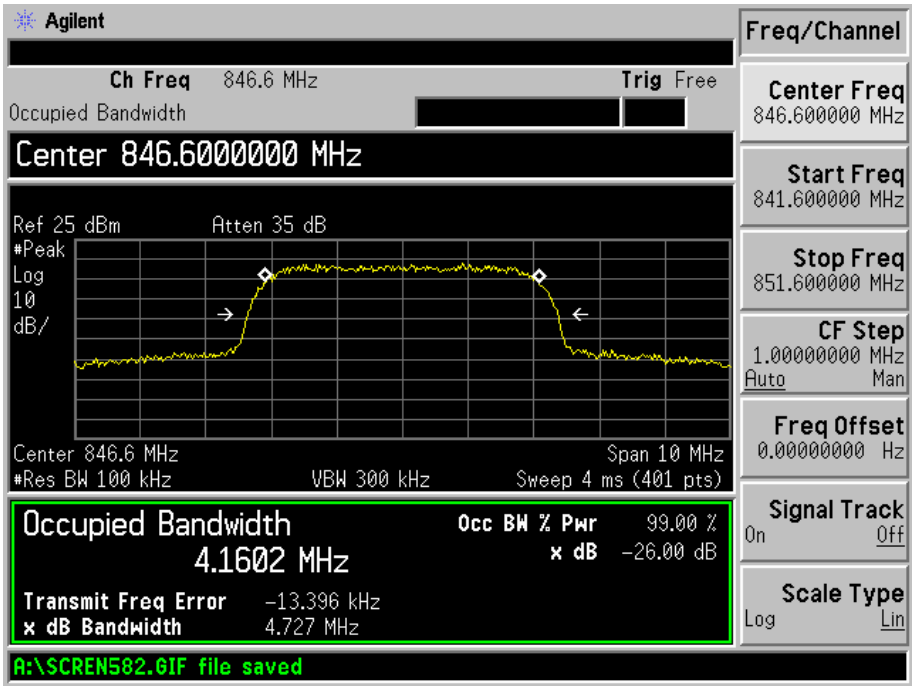
WCDMA Low Channel



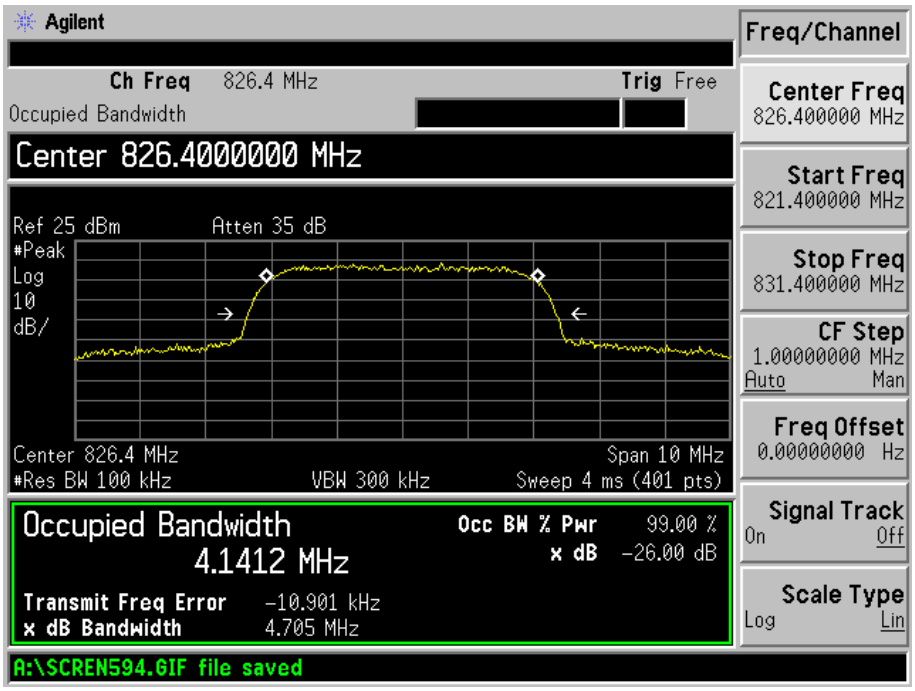
WCDMA Middle Channel



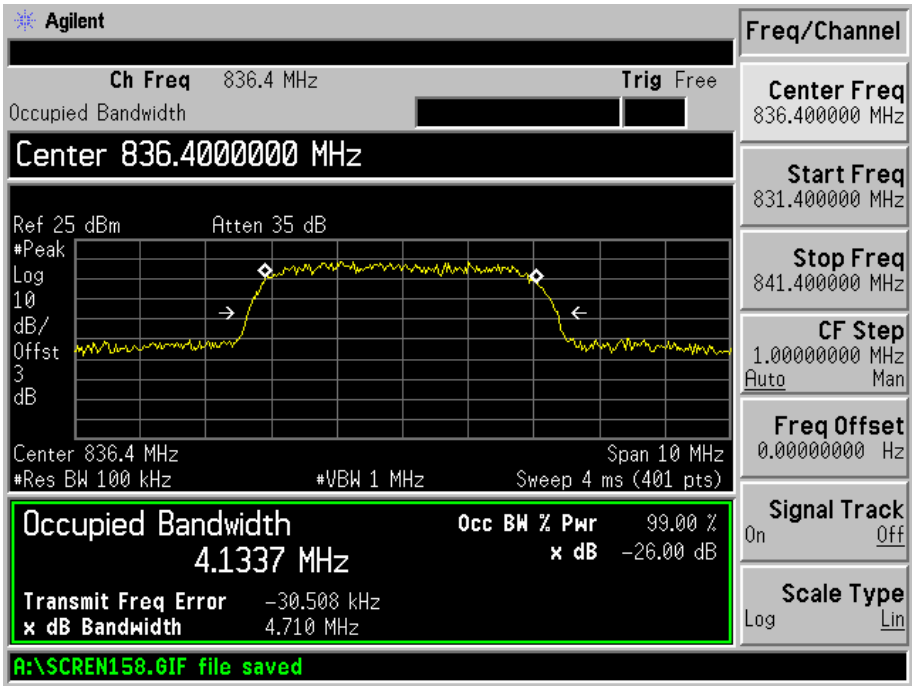
WCDMA High Channel



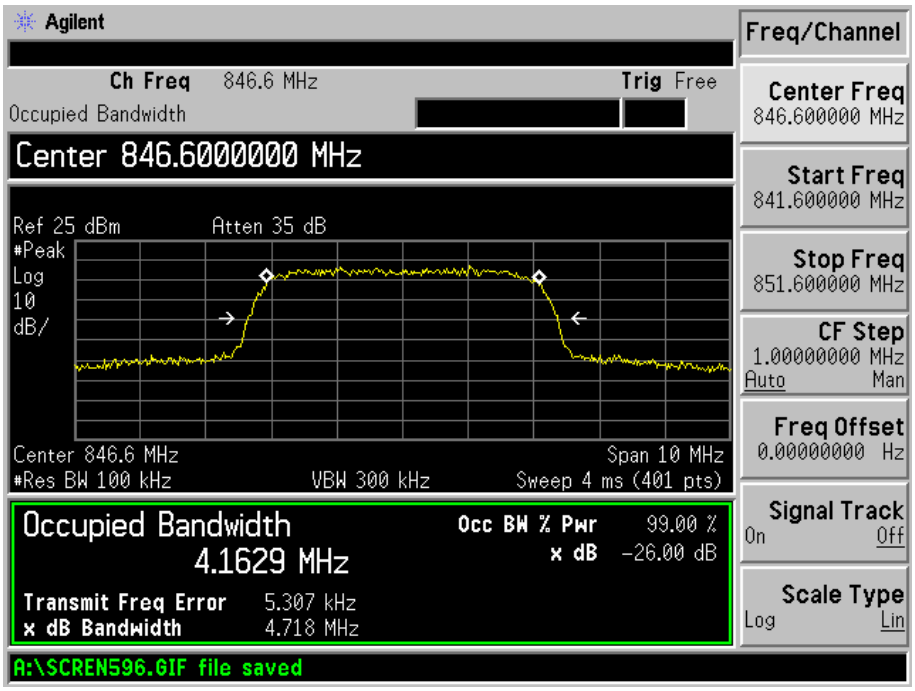
HSDPA Low Channel



HSDPA Middle Channel

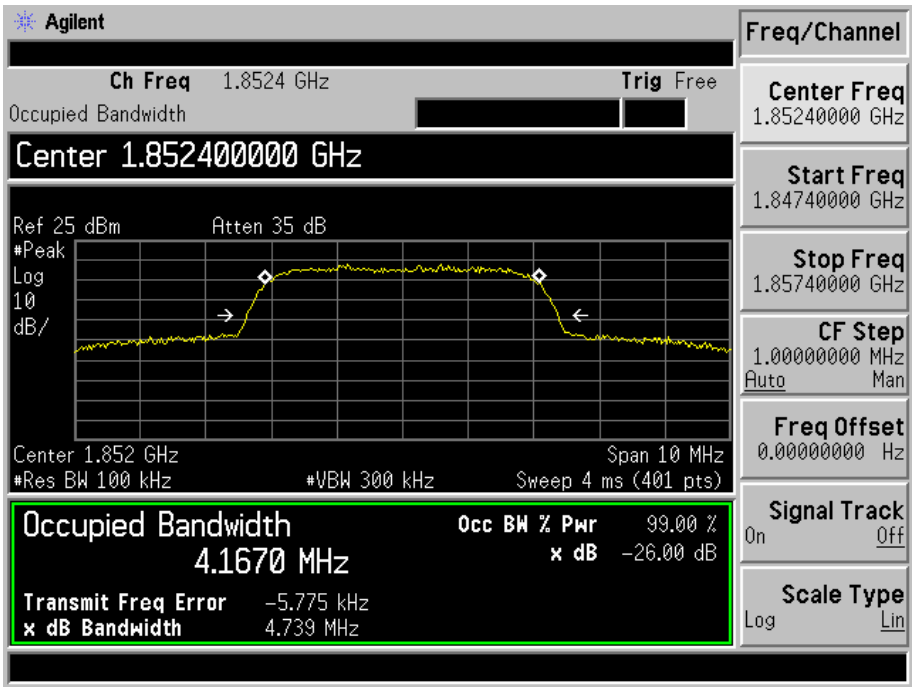


HSDPA High Channel

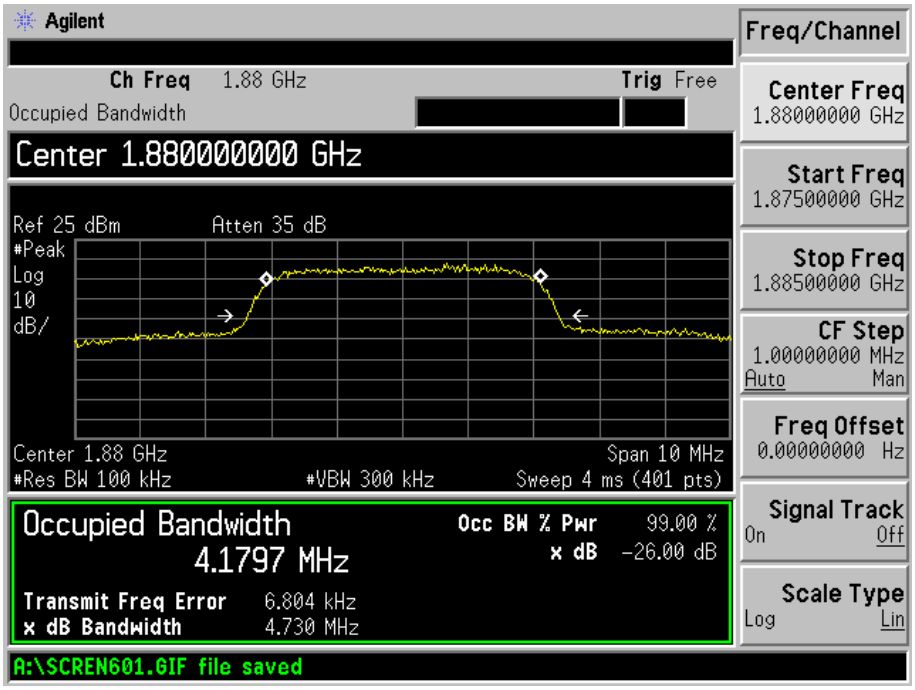


For Band II

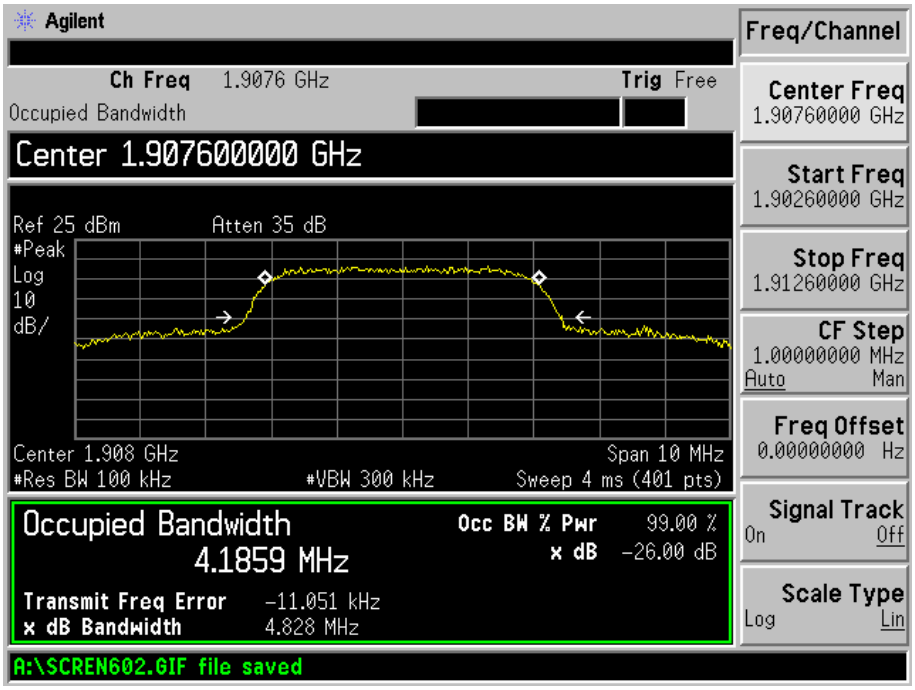
WCDMA Low Channel



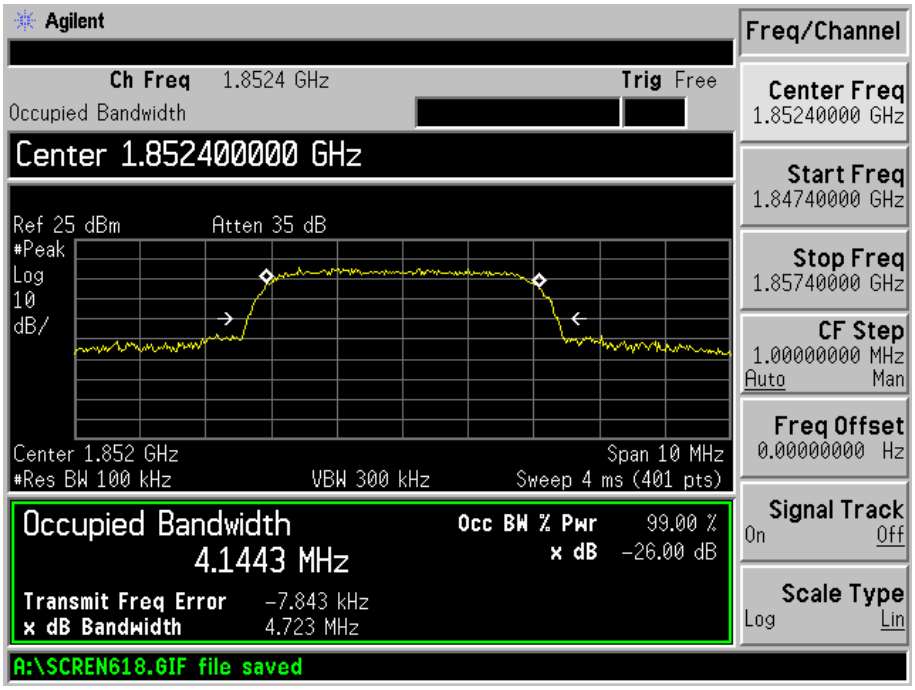
WCDMA Middle Channel



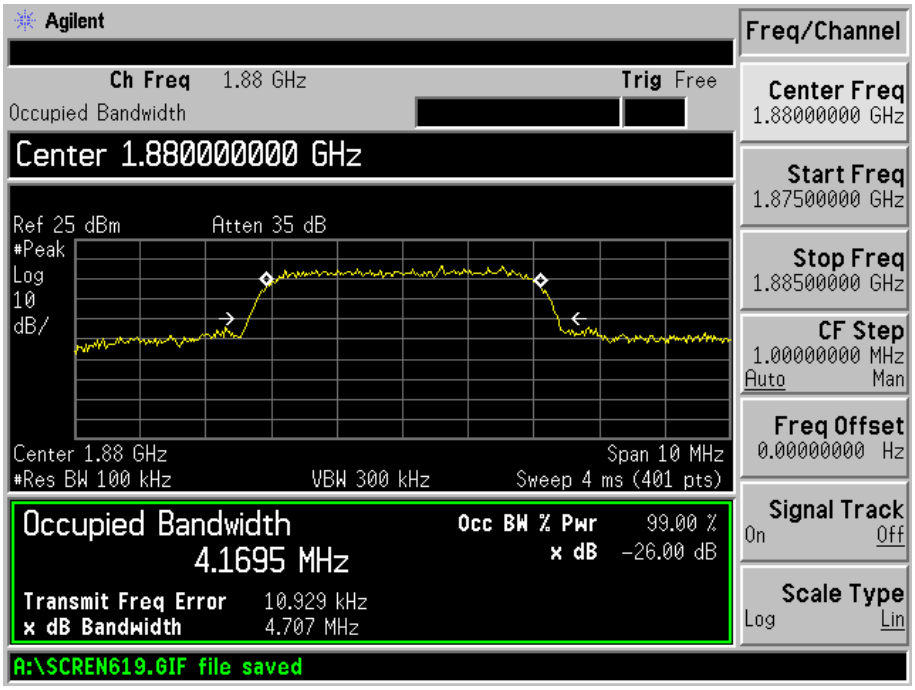
WCDMA High Channel



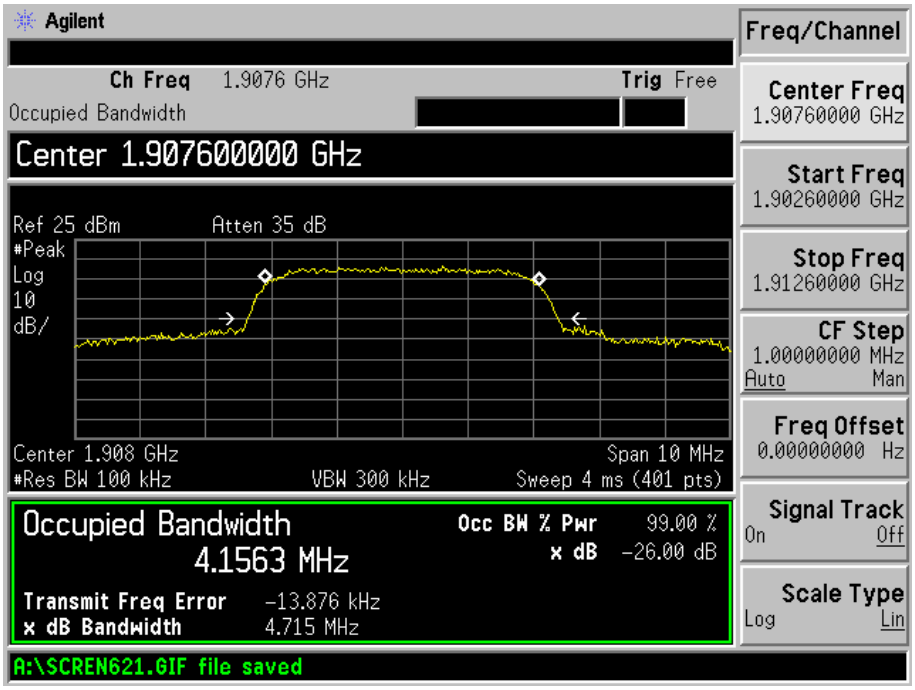
HSDPA Low Channel



HSDPA Middle Channel



HSDPA High Channel



7. Out of Band Emissions at Antenna Terminal

7.1 Standard Applicable

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

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

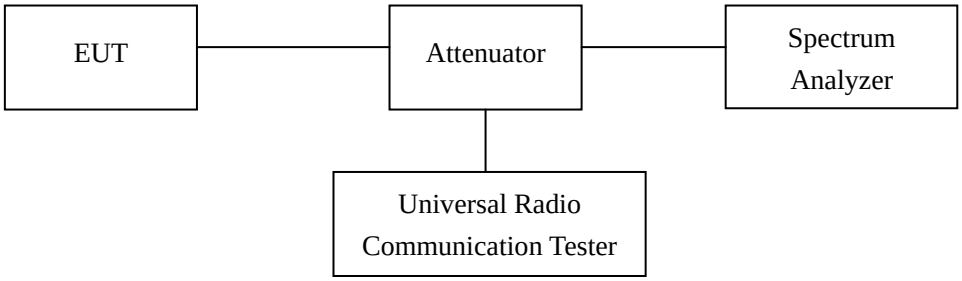
7.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B	US41192821	2014-05-28	2015-05-27
Rohde & Schwarz	Spectrum Analyzer	FSP	836079/035	2014-05-28	2015-05-27
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	112012	2014-05-28	2015-05-27

7.3 Test Procedure

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

Test Configuration for the out of band emissions testing:



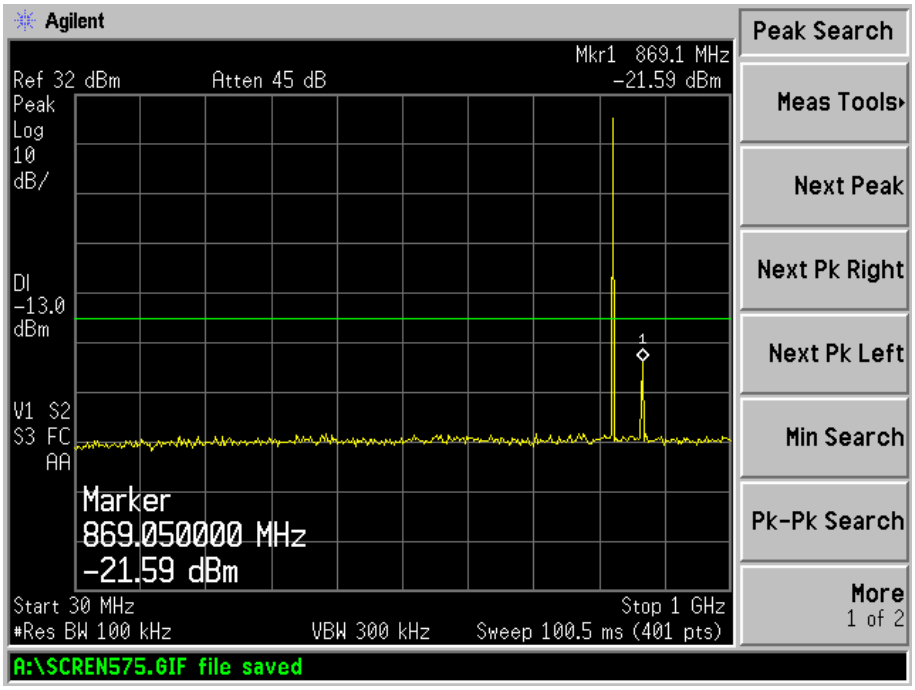
7.4 Environmental Conditions

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

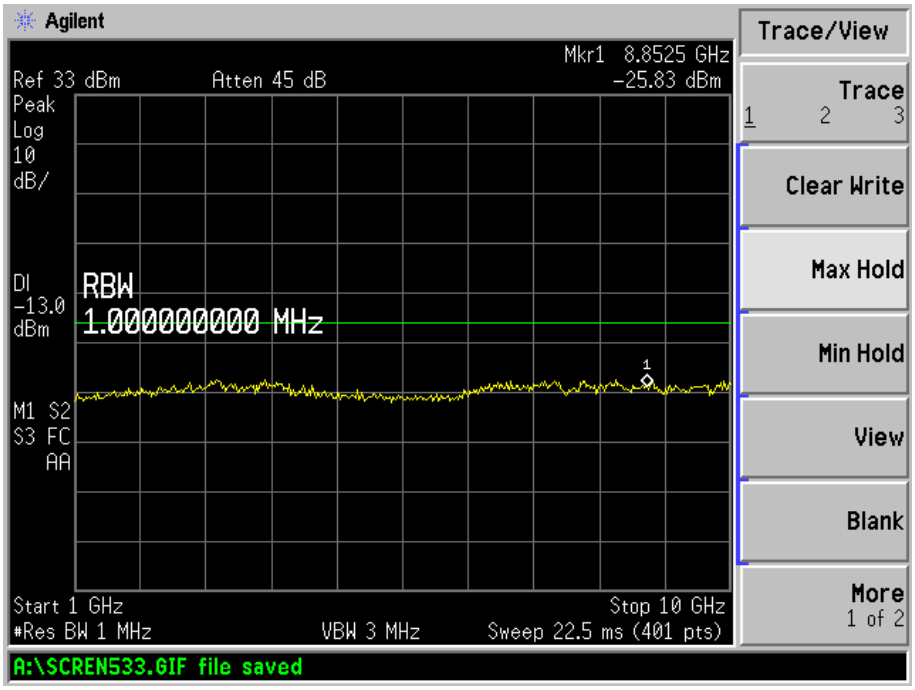
7.5 Summary of Test Results/Plots

Please refer to the following test plots For Cellular Band

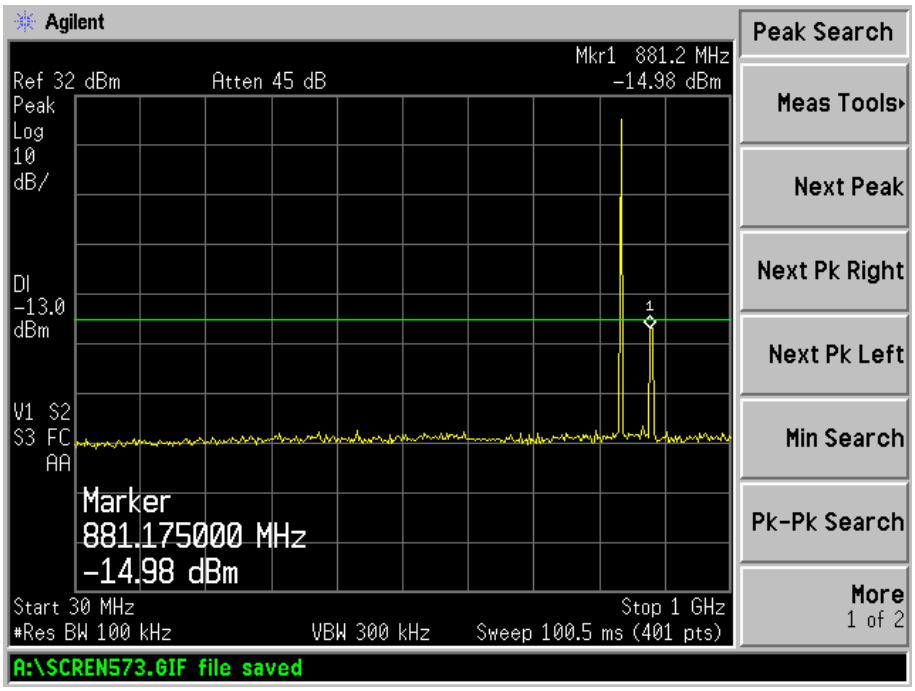
GSM Low Channel 30MHz to 1GHz



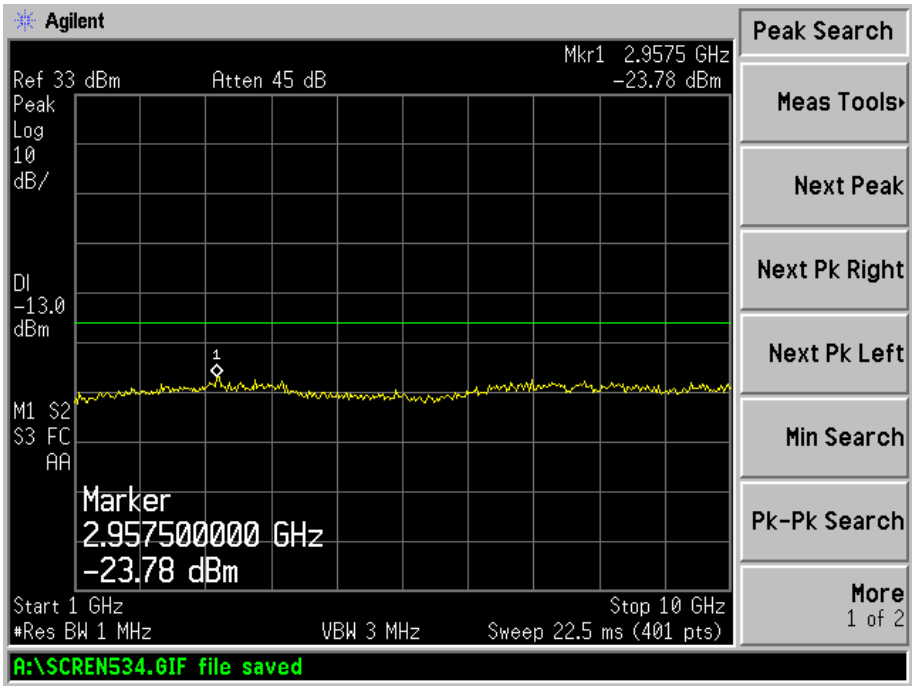
Above 1GHz



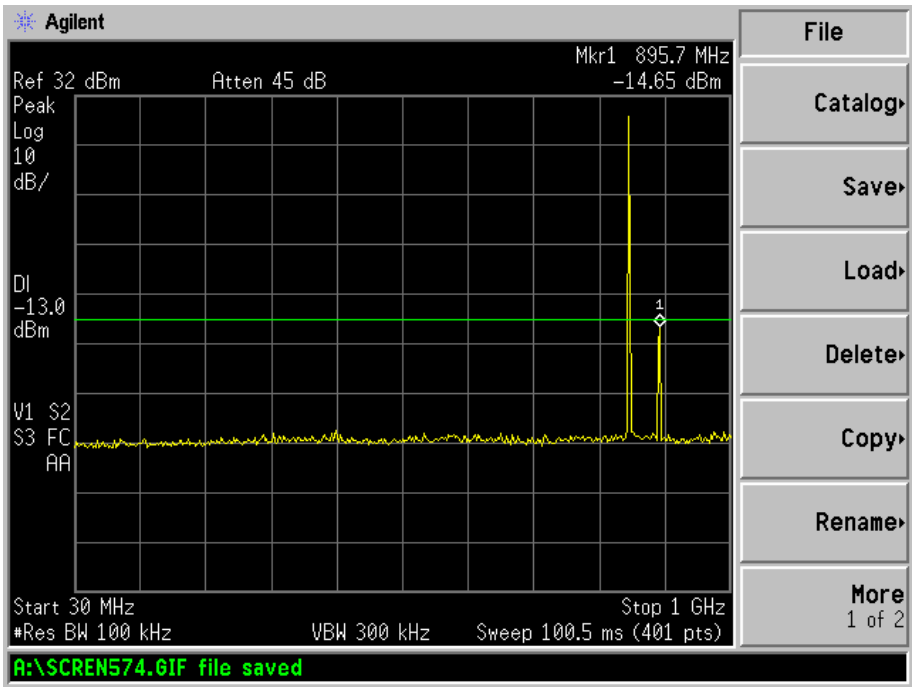
GSM Middle Channel
30MHz to 1GHz



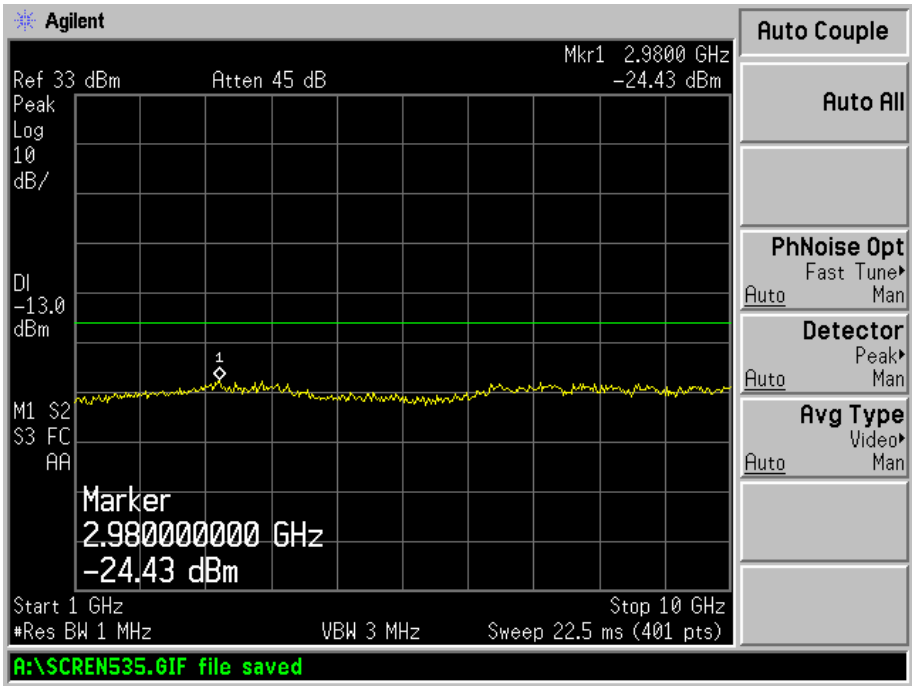
Above 1GHz



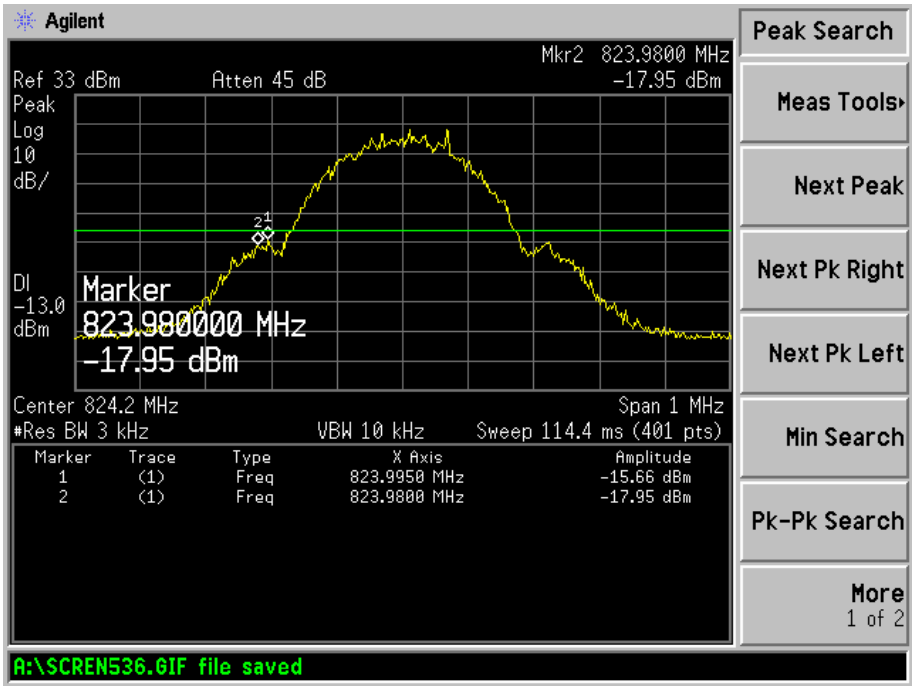
GSM High Channel
30MHz to 1GHz



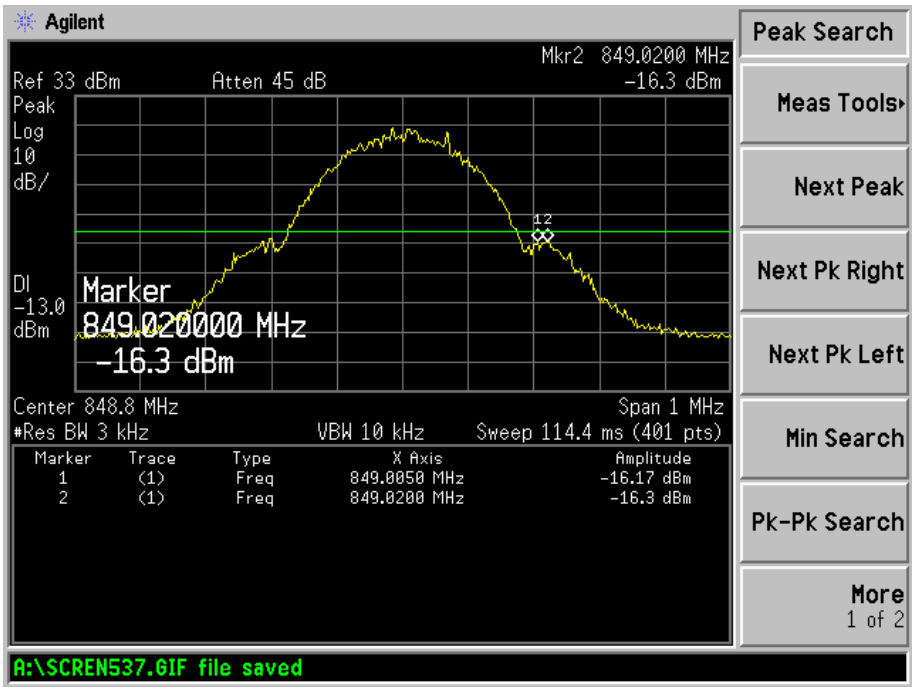
Above 1GHz



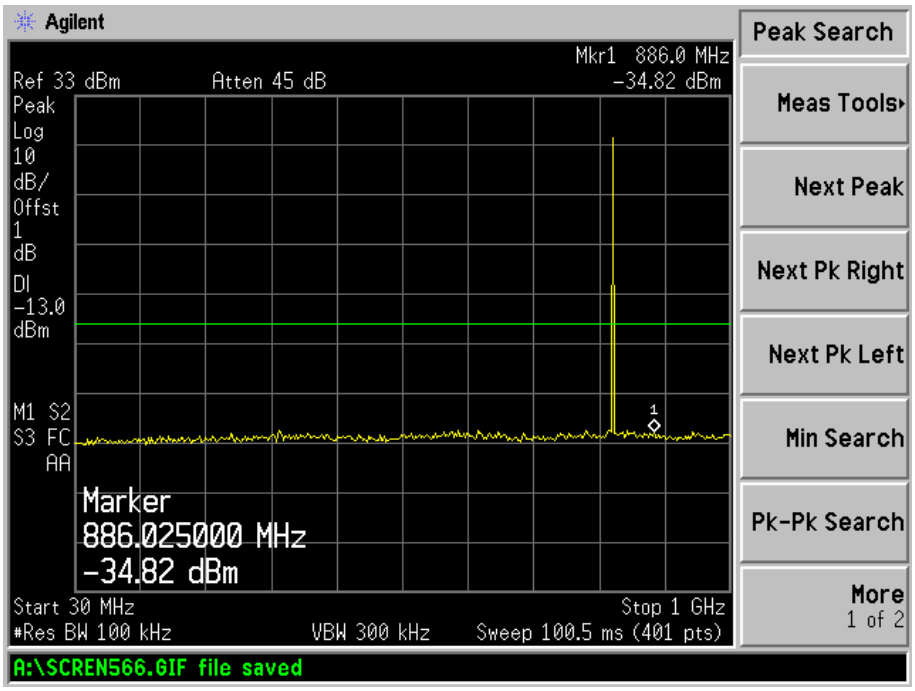
GSM Low Band Emission



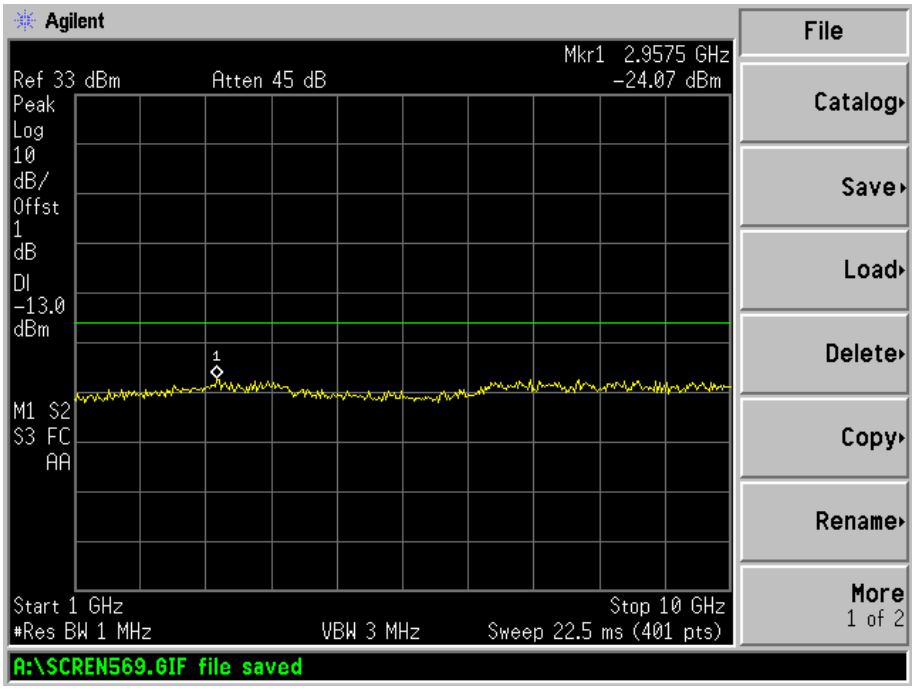
GSM High Band Emission



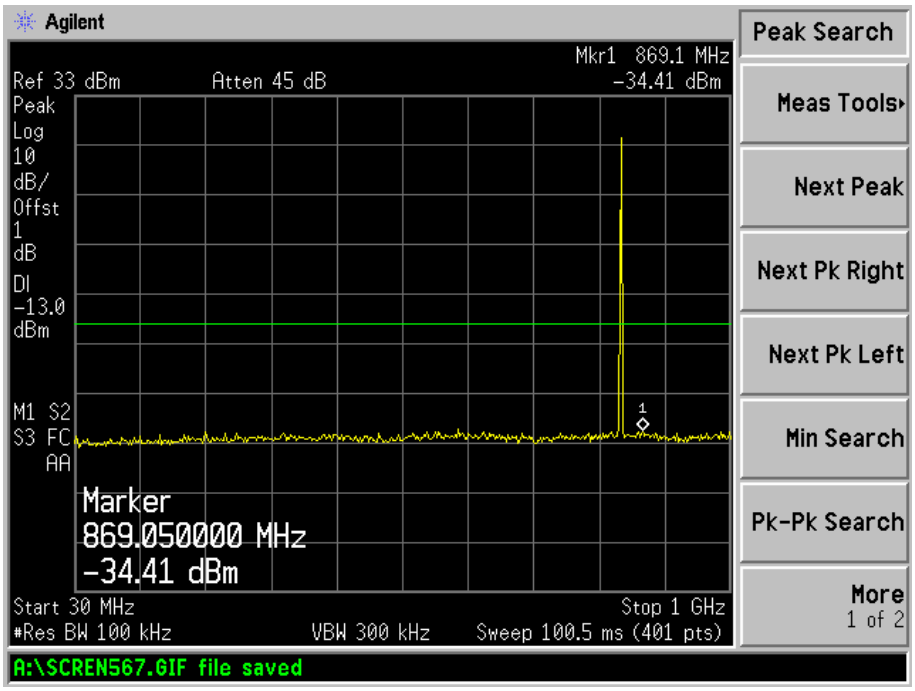
GPRS Low Channel
30MHz to 1GHz



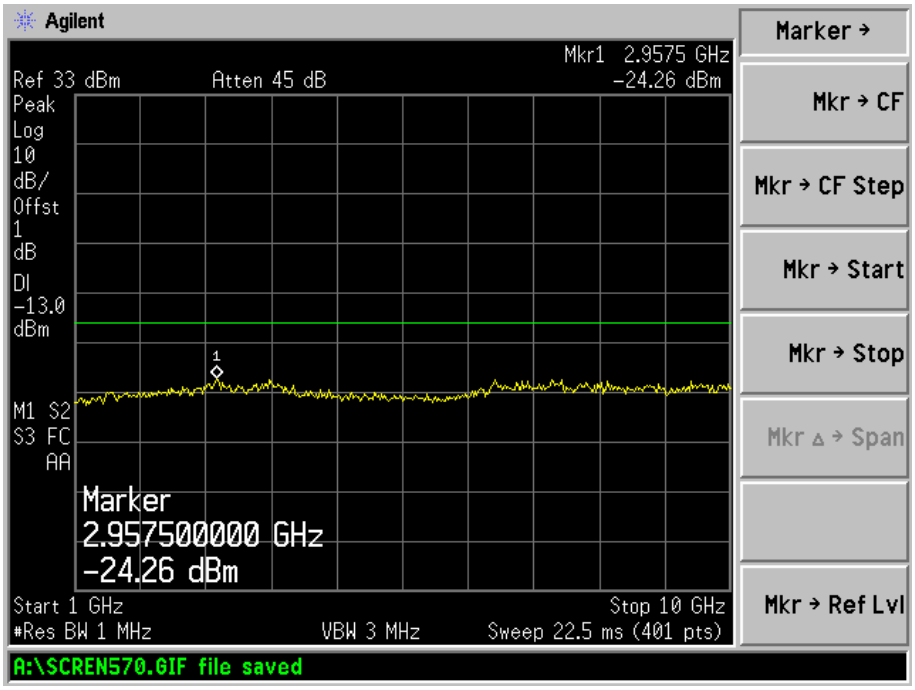
Above 1GHz



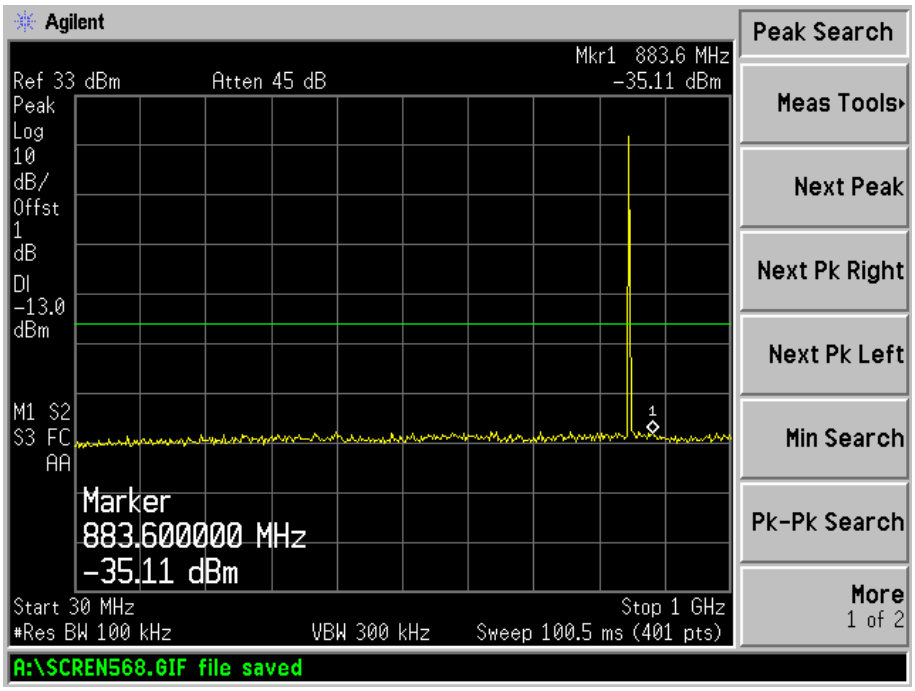
GPRS Middle Channel
30MHz to 1GHz



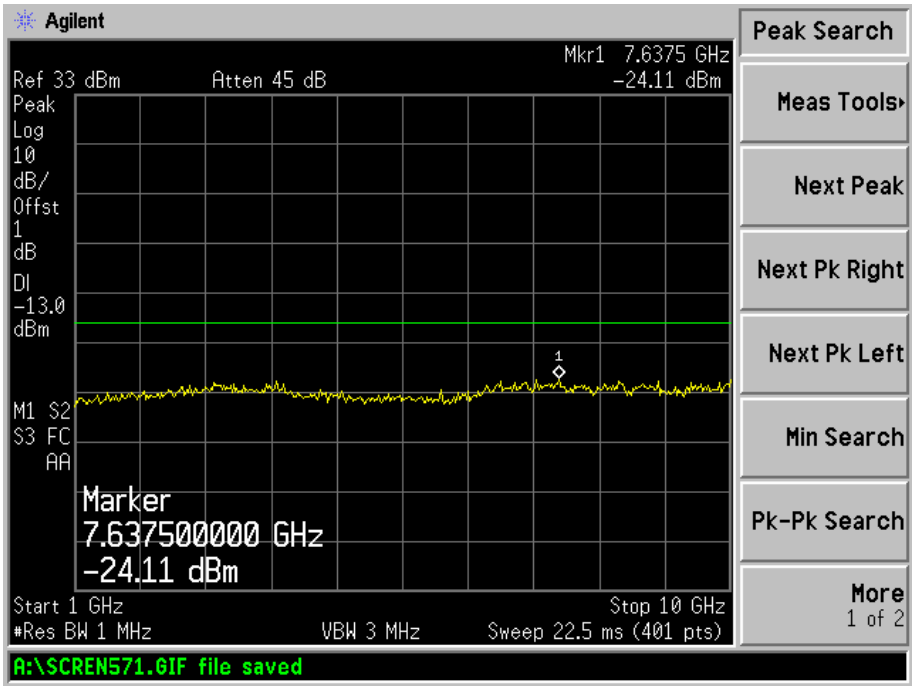
Above 1GHz



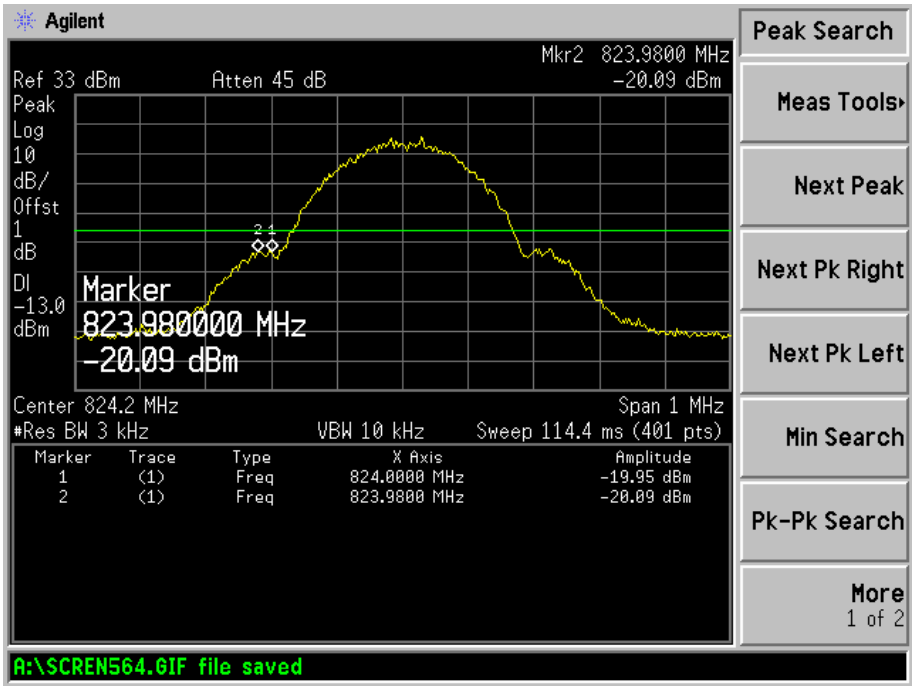
GPRS High Channel
30MHz to 1GHz



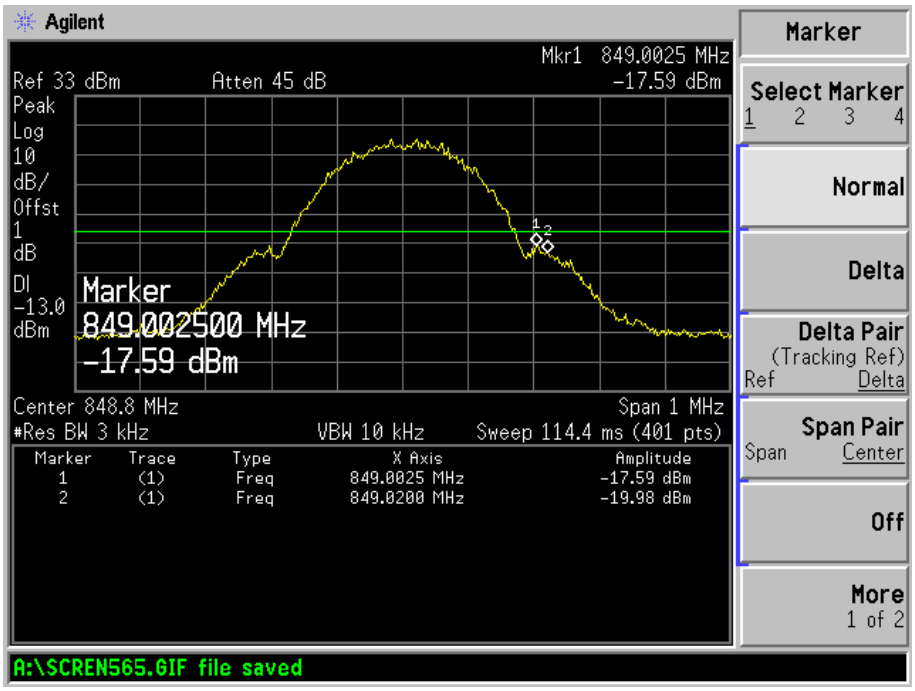
Above 1GHz



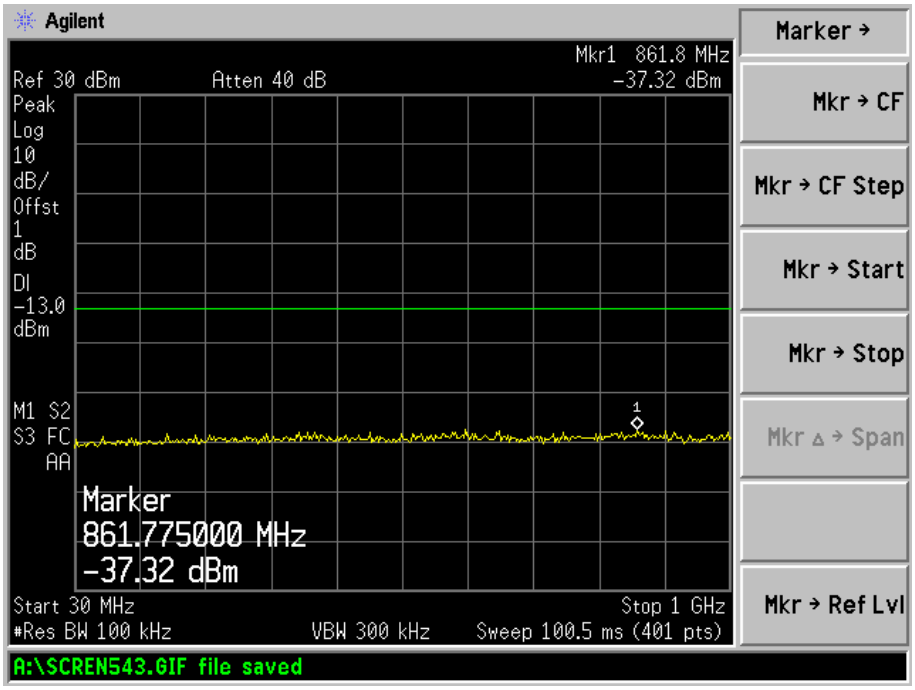
GPRS Low Band Emission



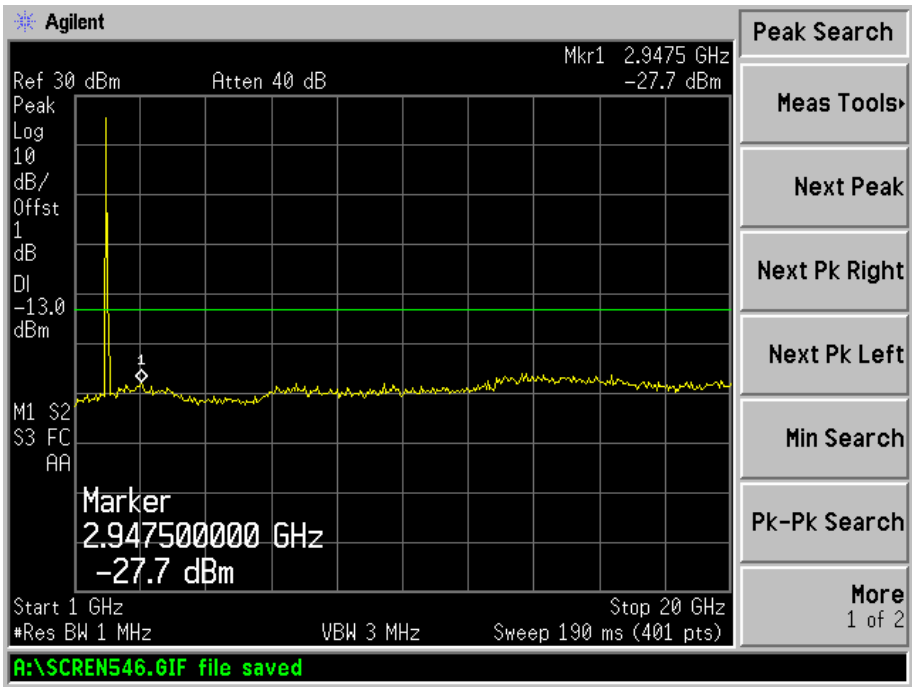
GPRS High Band Emission



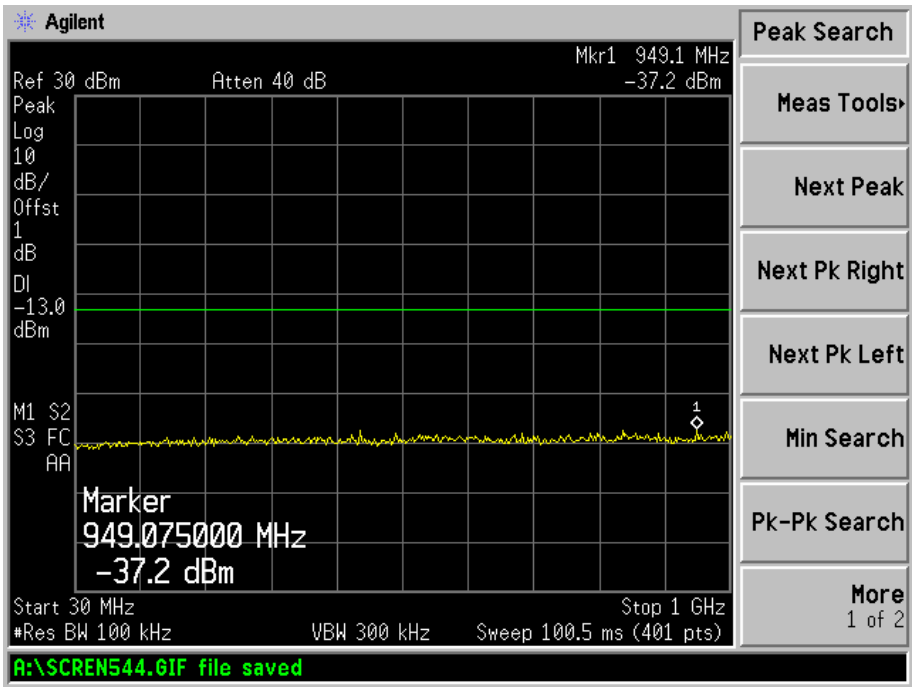
For PCS Band
GSM Low Channel
30MHz to 1GHz



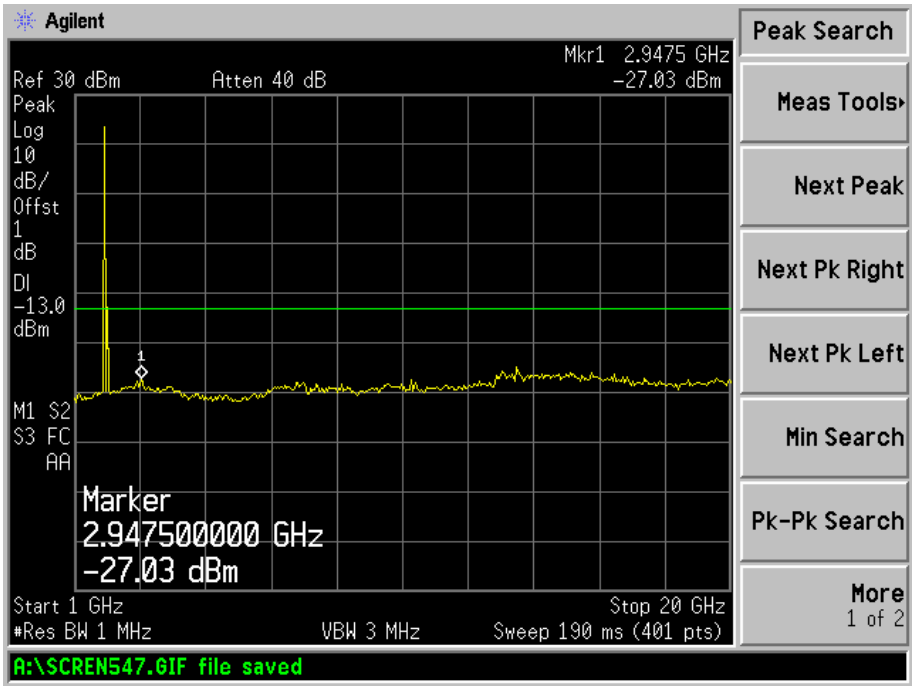
Above 1GHz



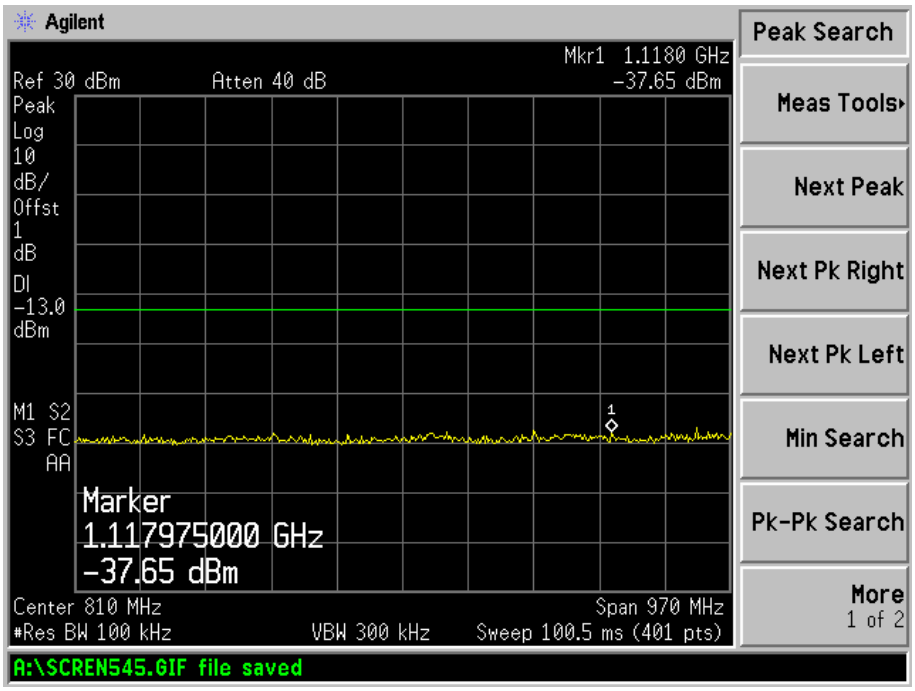
GSM Middle Channel
30MHz to 1GHz



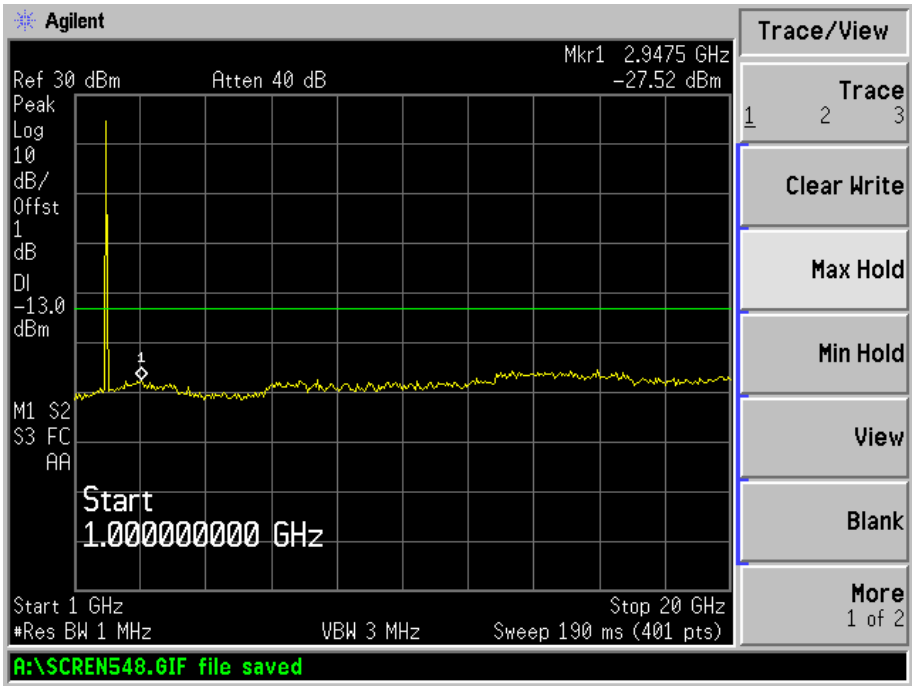
Above 1GHz



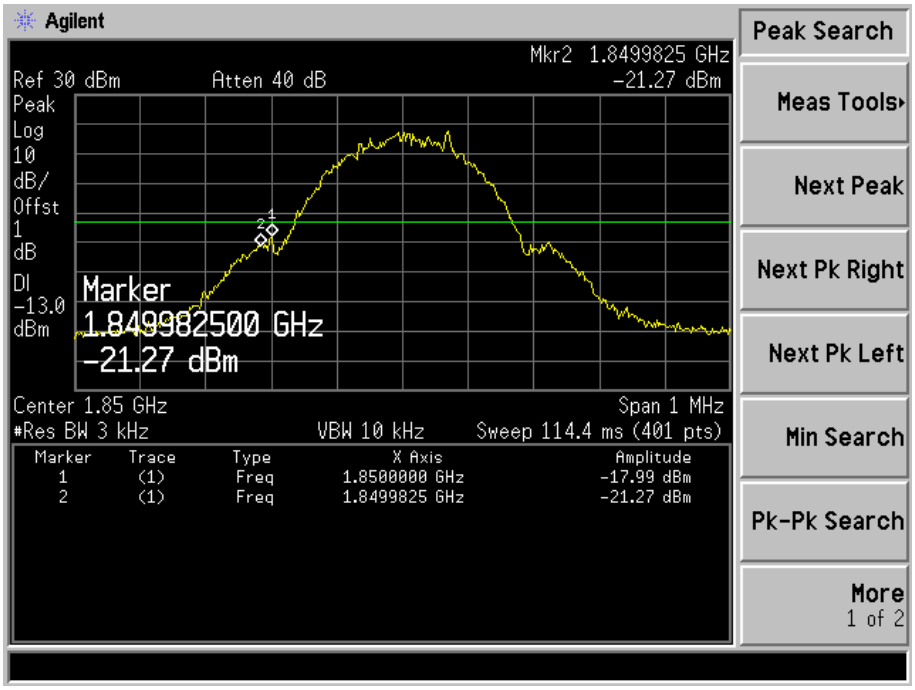
GSM High Channel
30MHz to 1GHz



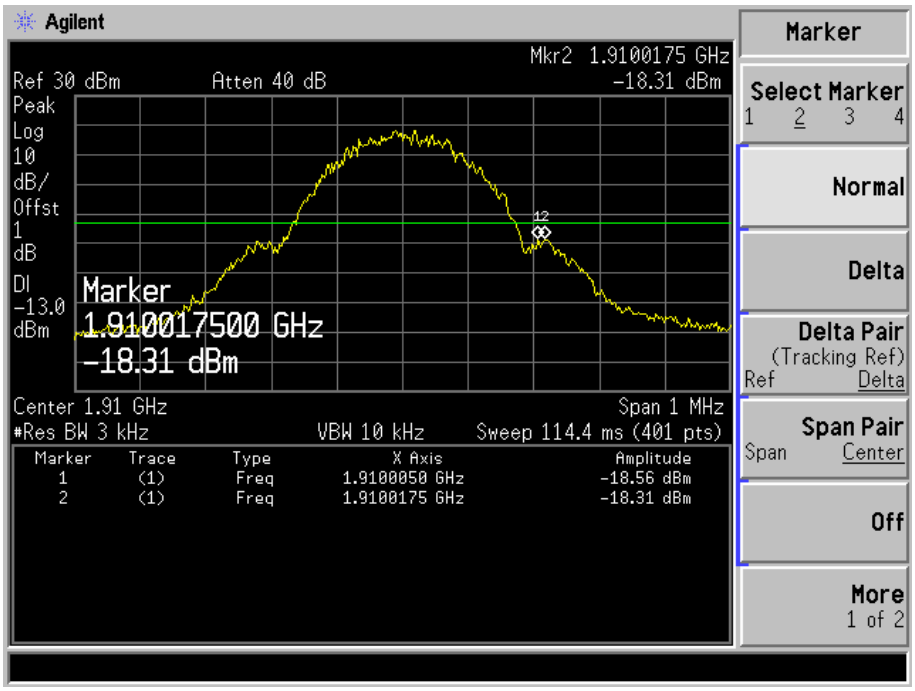
Above 1GHz



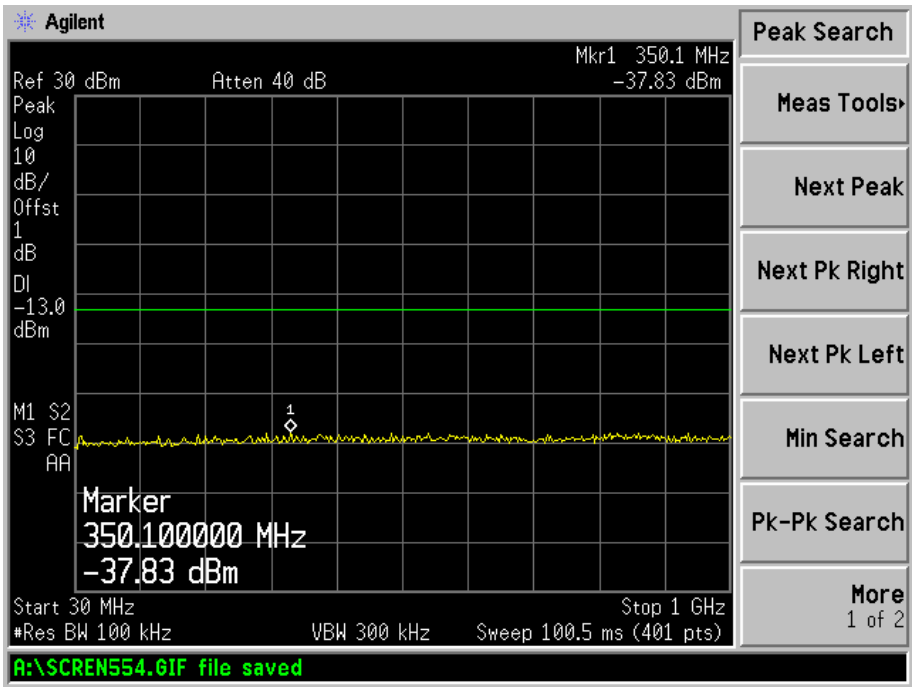
GSM Low Band Emission



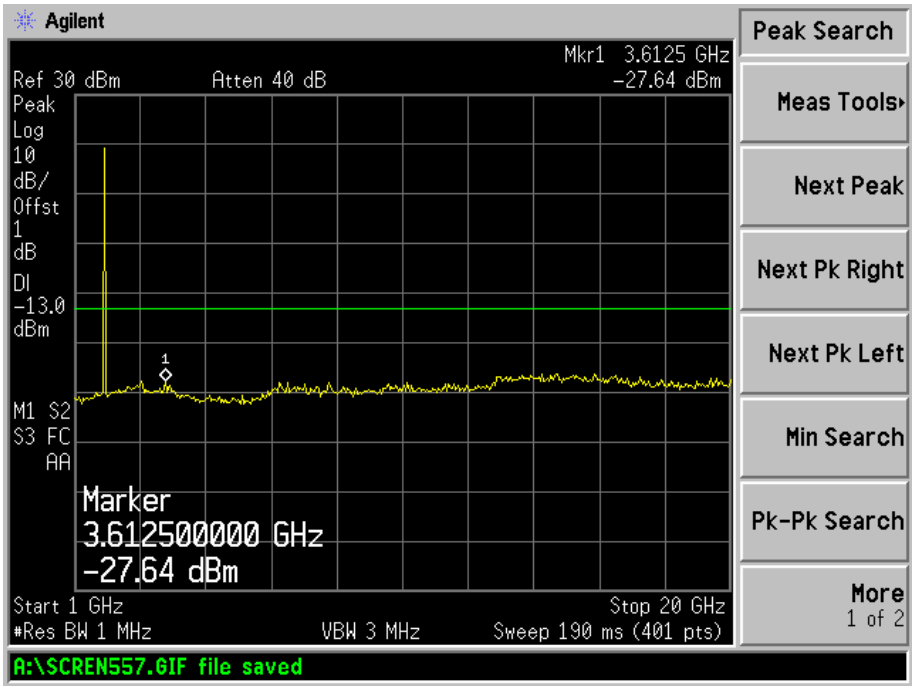
GSM High Band Emission



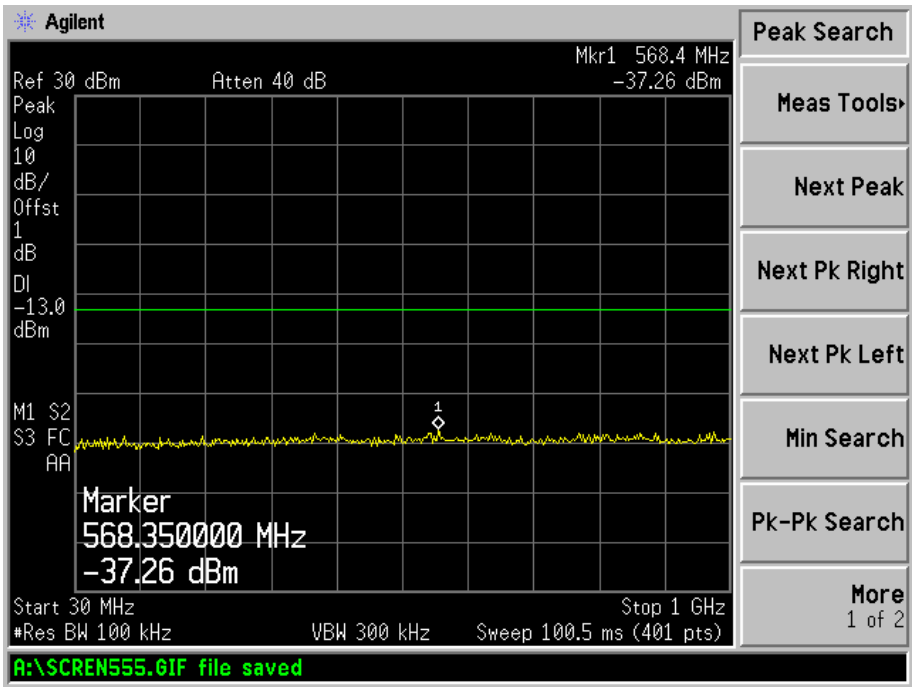
GPRS Low Channel
30MHz to 1GHz



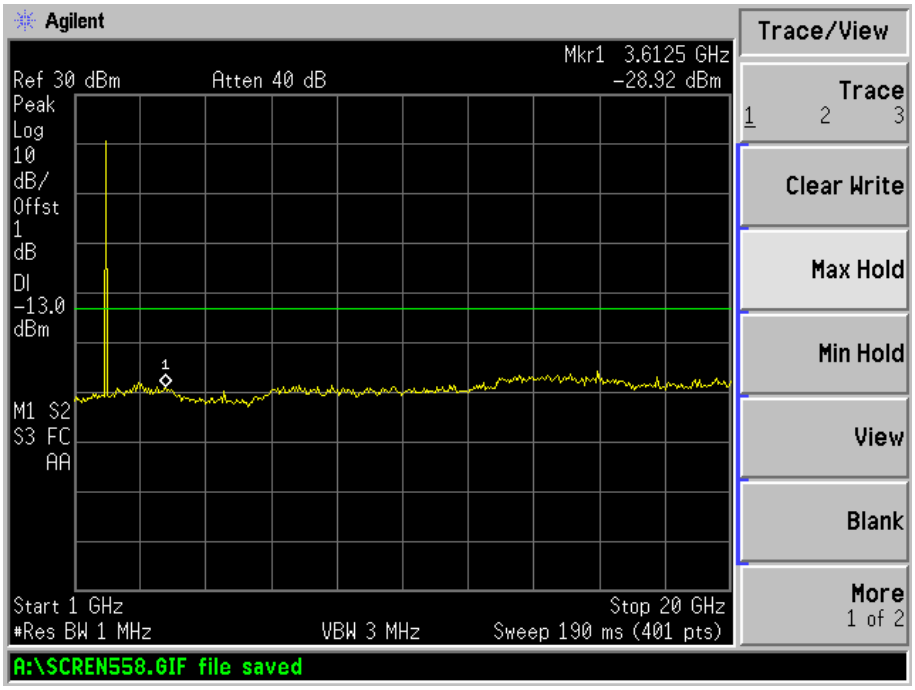
Above 1GHz



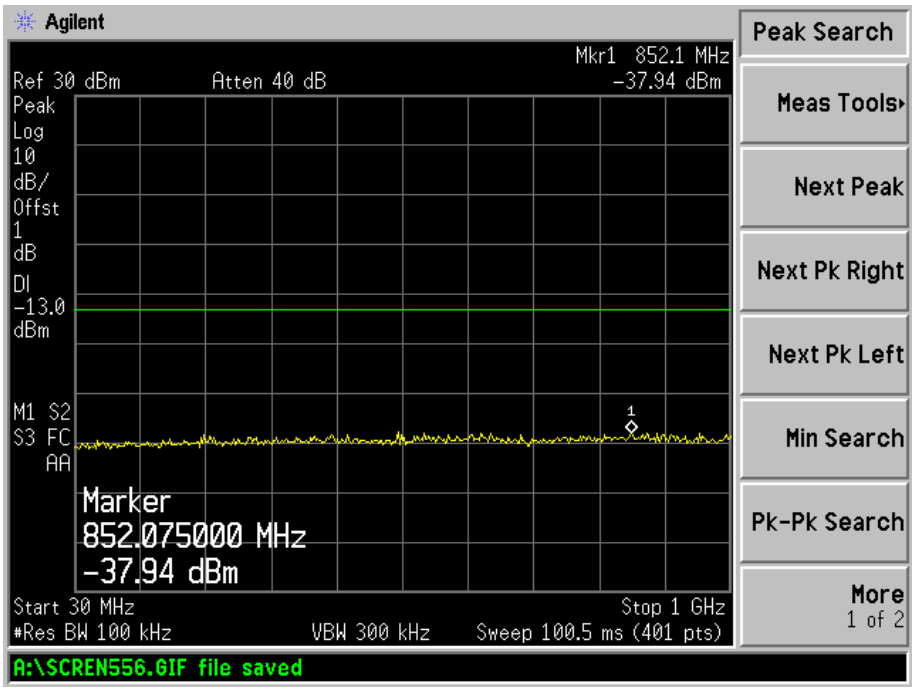
GPRS Middle Channel
30MHz to 1GHz



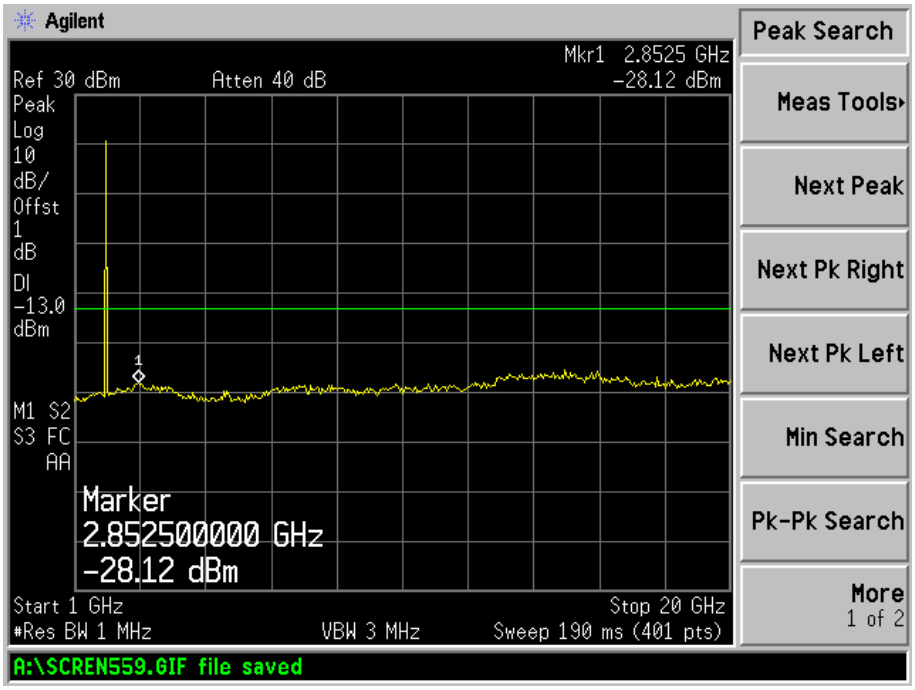
Above 1GHz



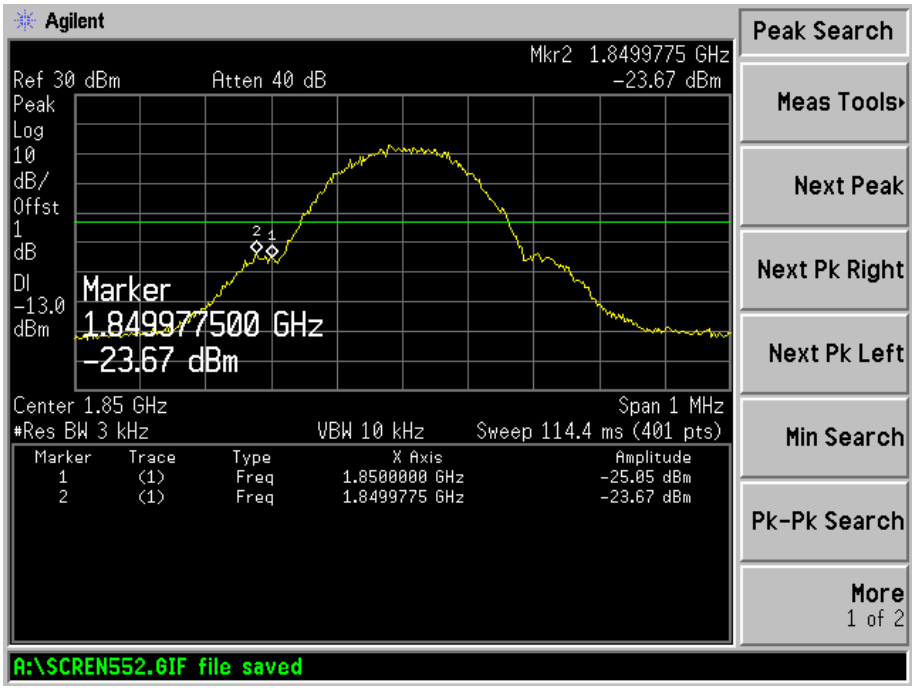
GPRS High Channel
30MHz to 1GHz



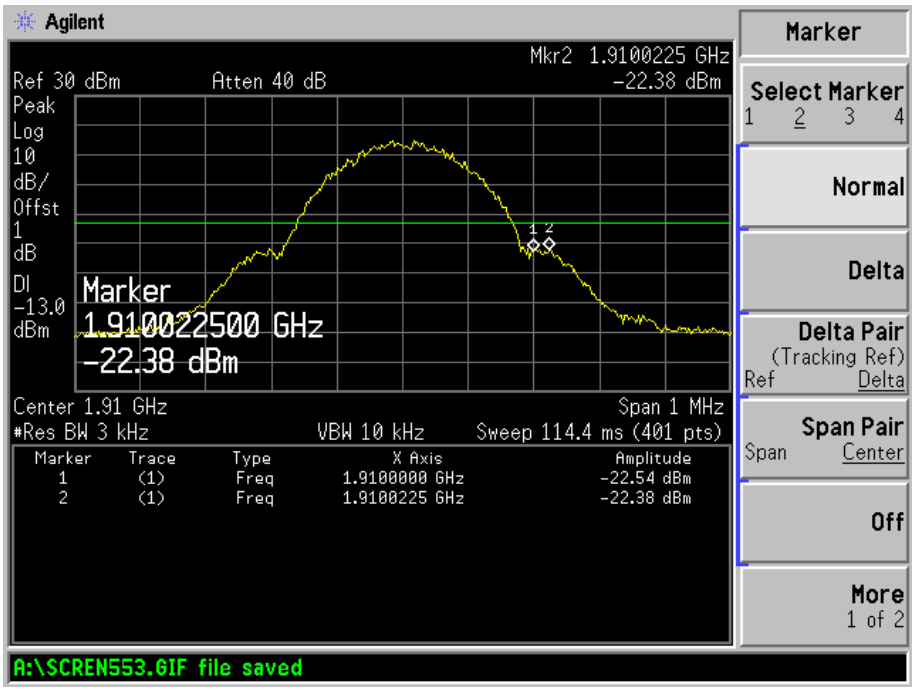
Above 1GHz



GPRS Low Band Emission



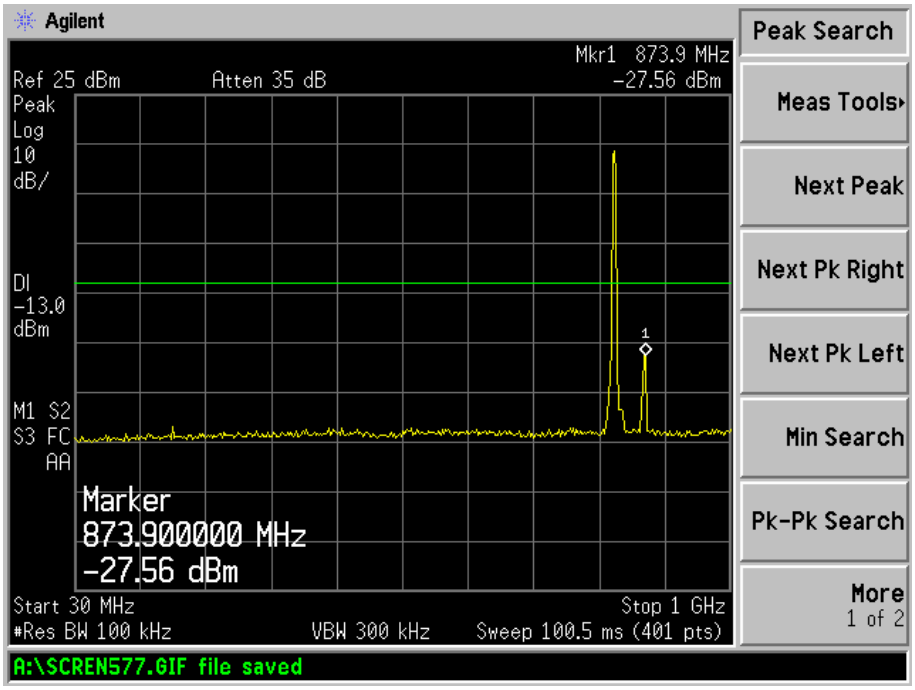
GPRS High Band Emission



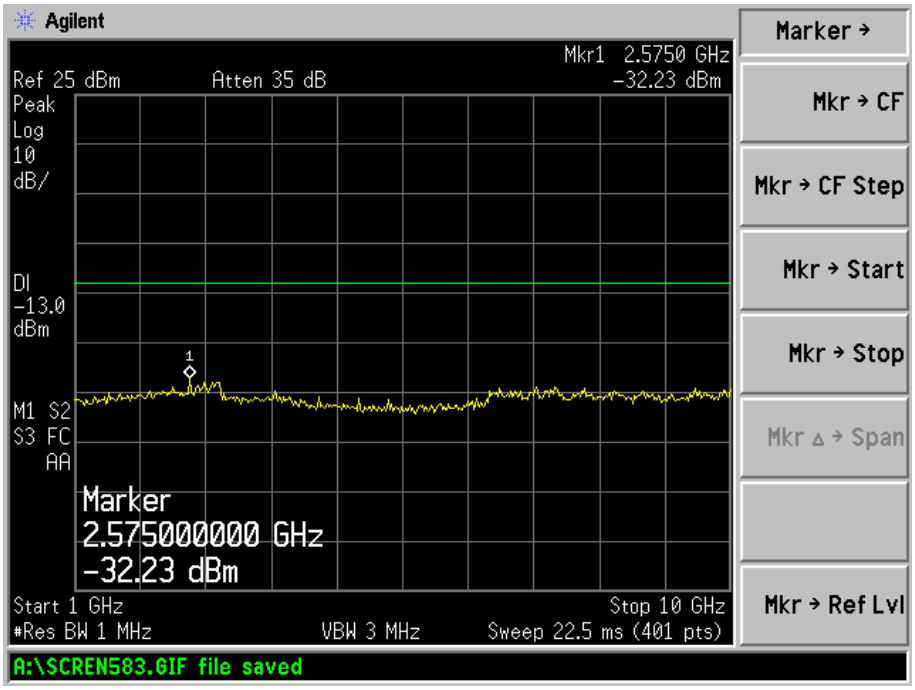
For Band V

WCDMA Low Channel

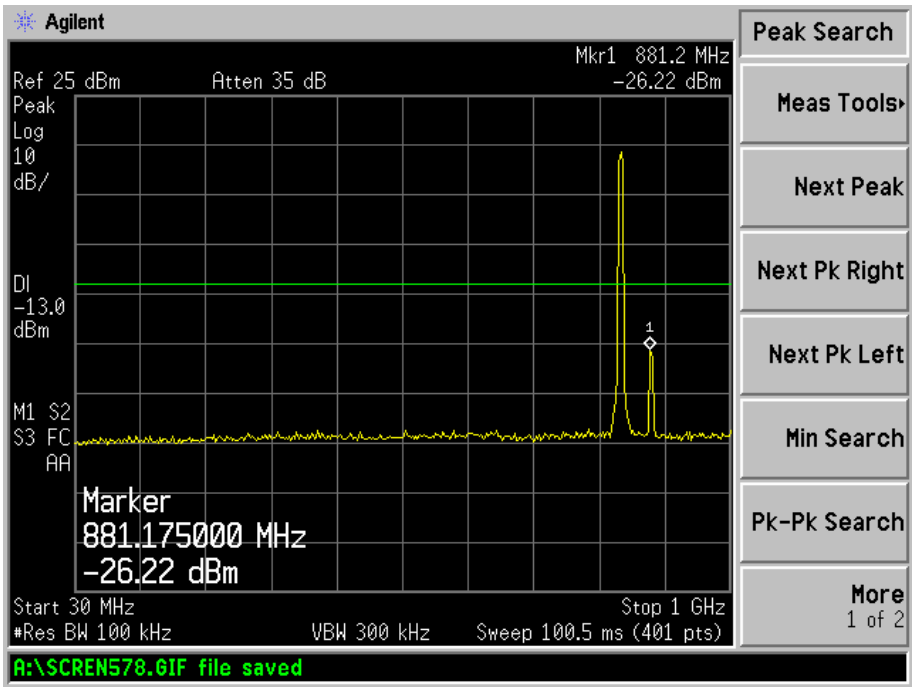
30MHz to 1GHz



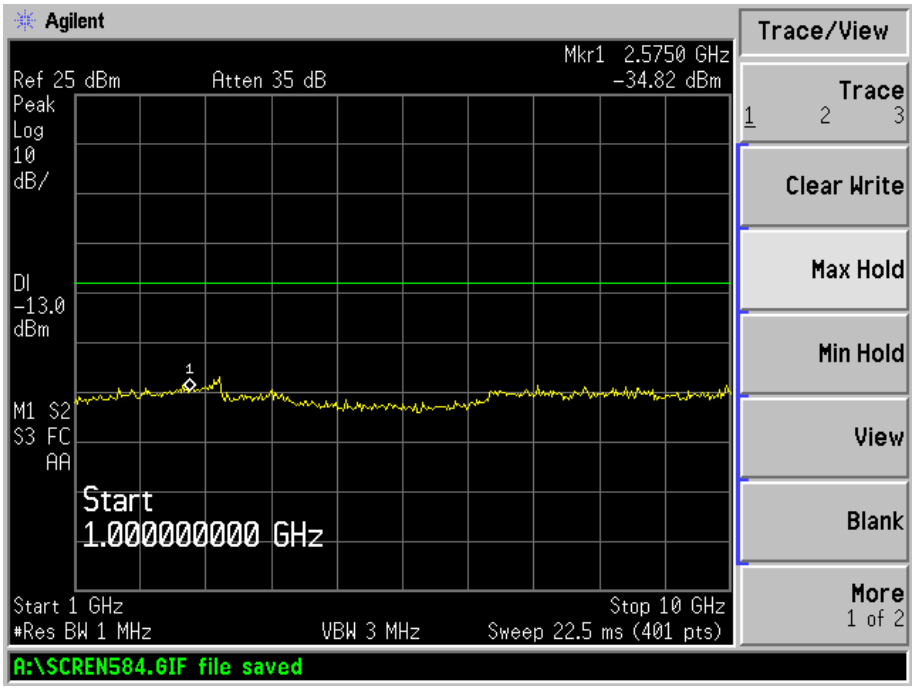
Above 1GHz



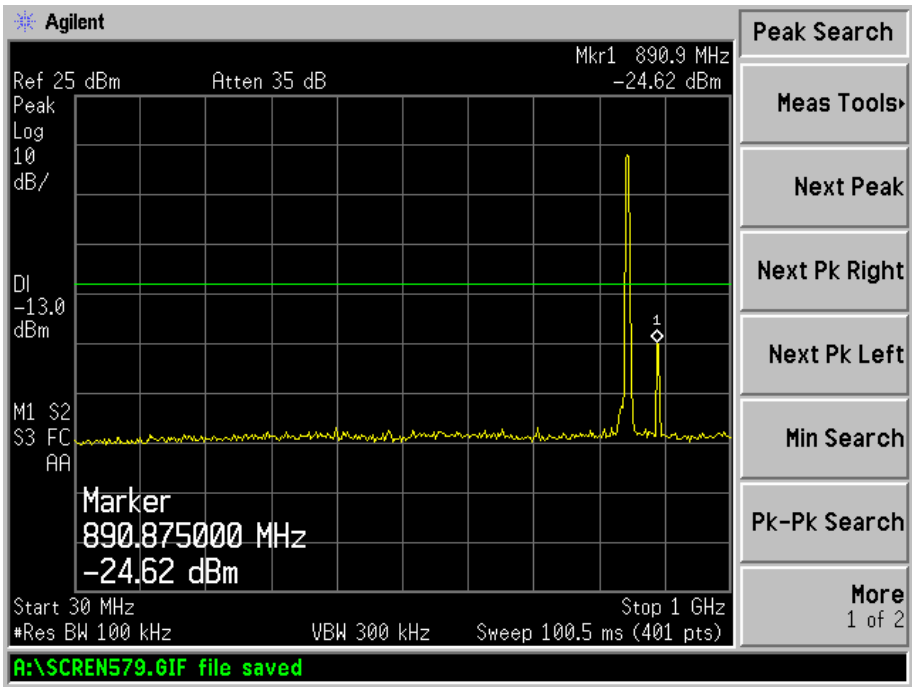
WCDMA Middle Channel
30MHz to 1GHz



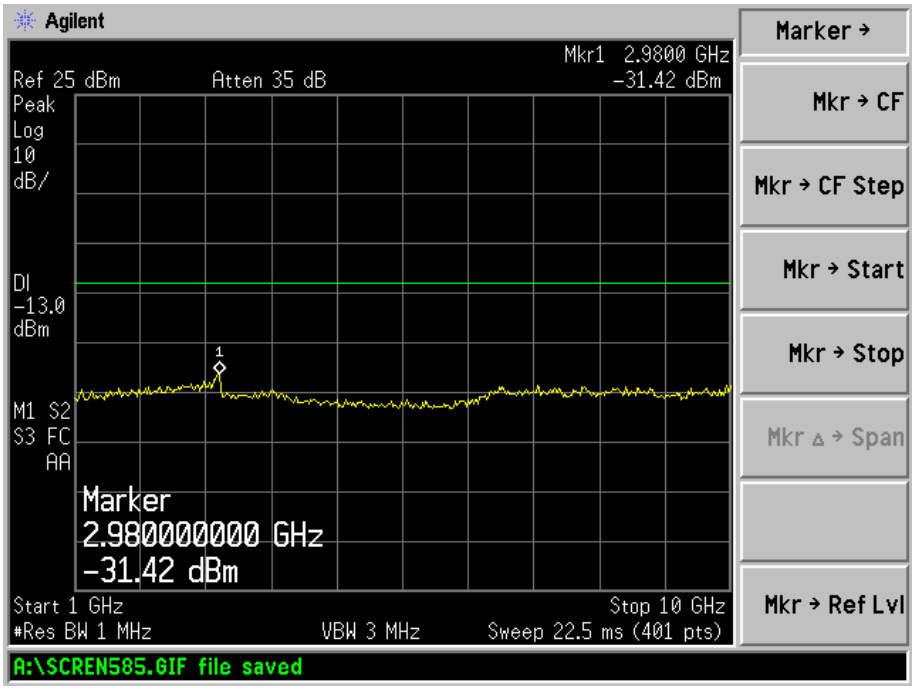
Above 1GHz



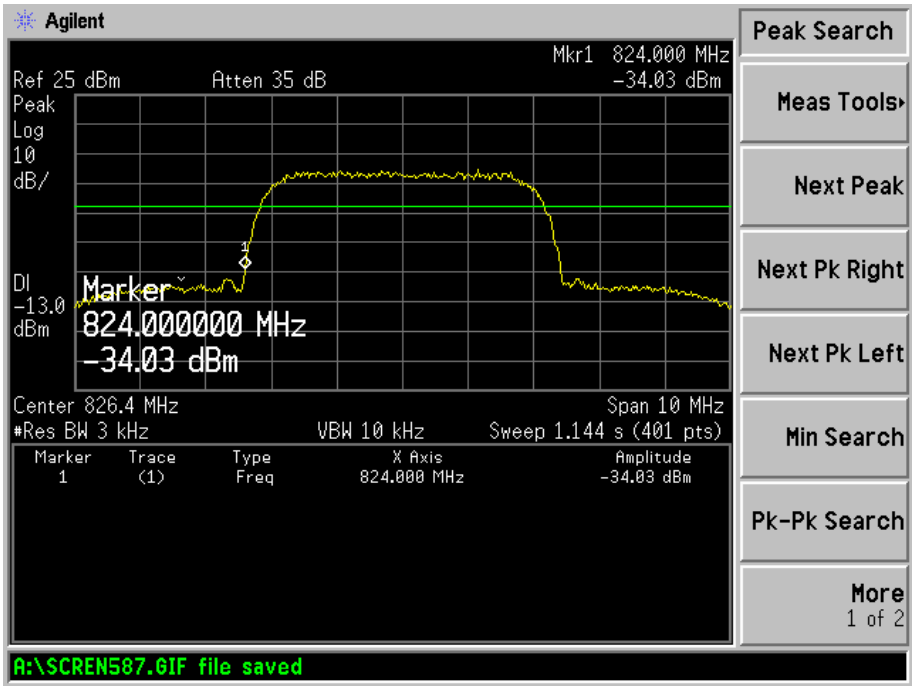
WCDMA High Channel
30MHz to 1GHz



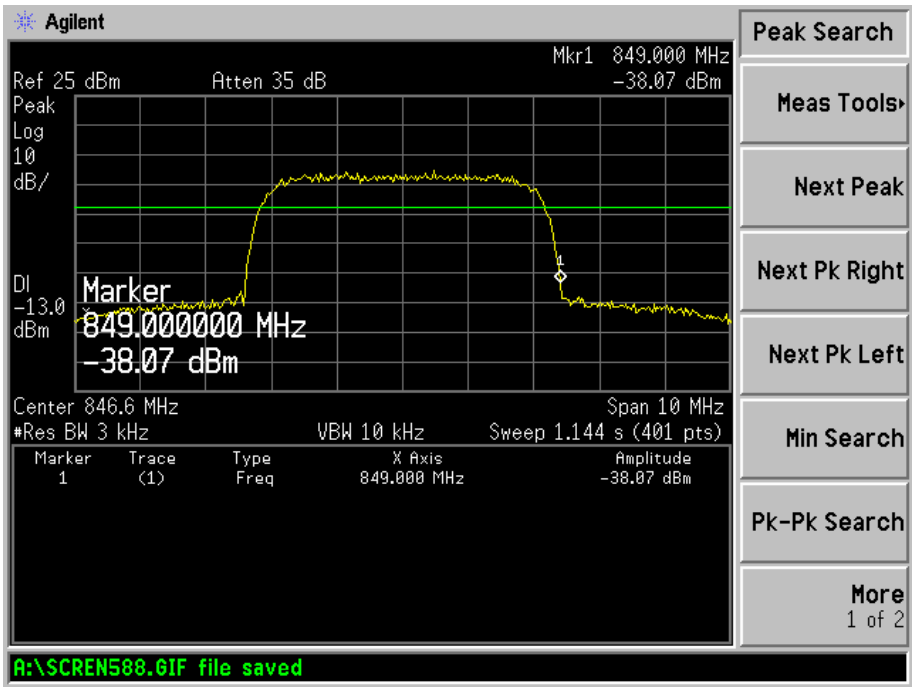
Above 1GHz



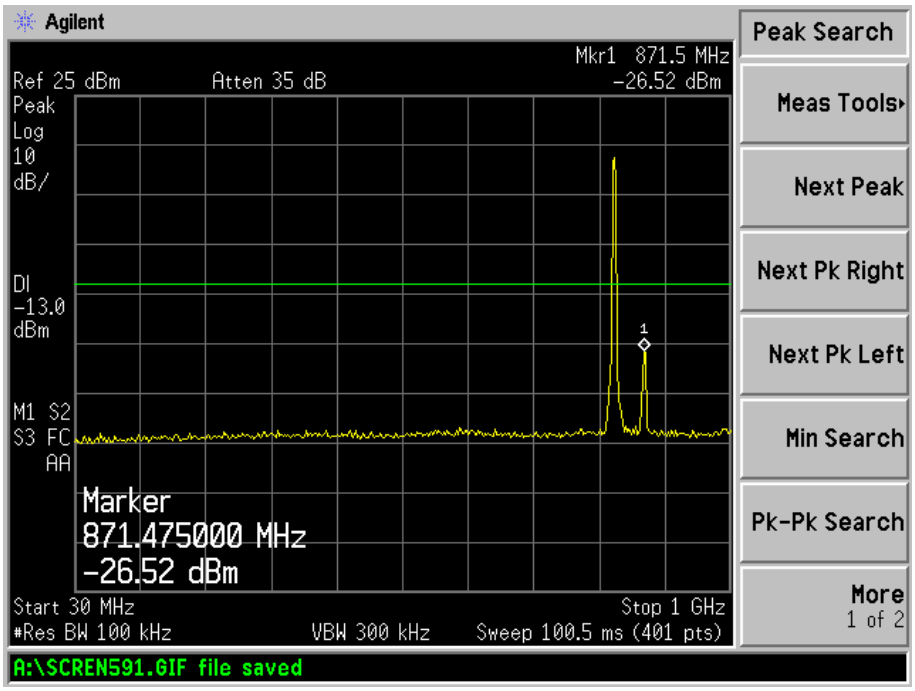
WCDMA Low Band Spurious Emission



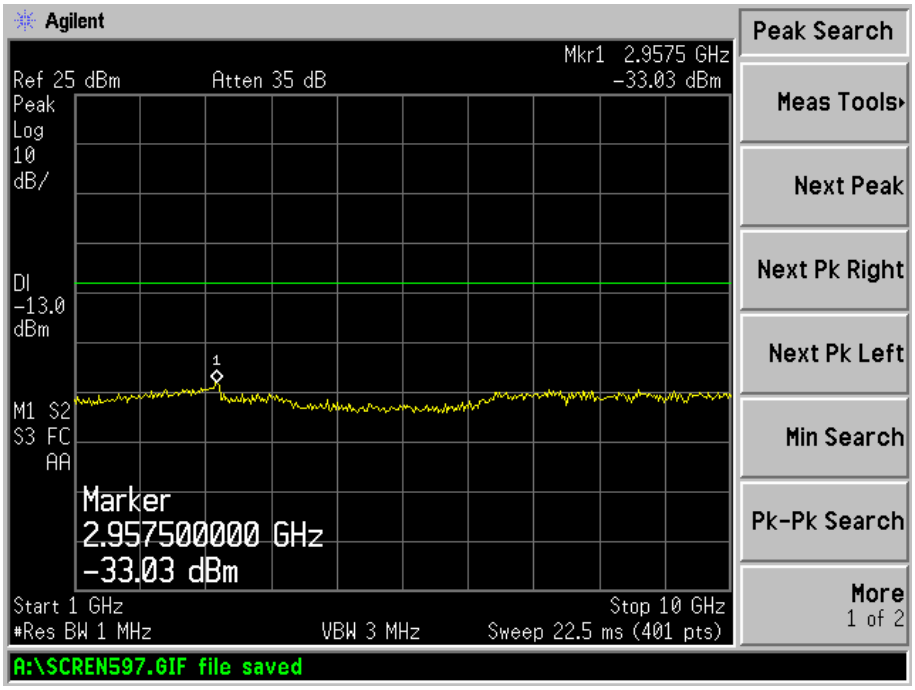
WCDMA High Band Spurious Emission



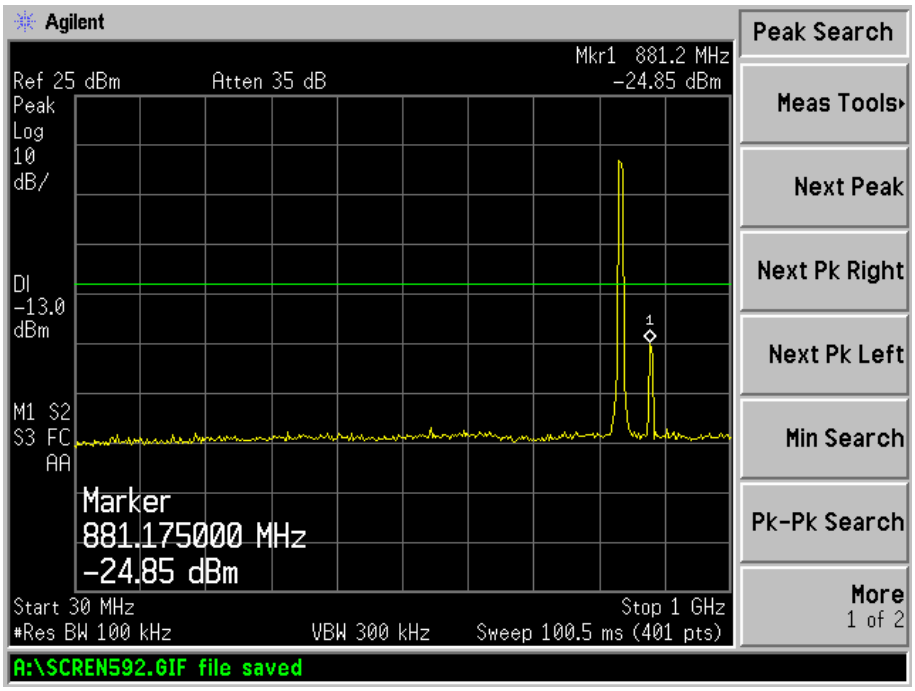
HSDPA Low Channel
30MHz to 1GHz



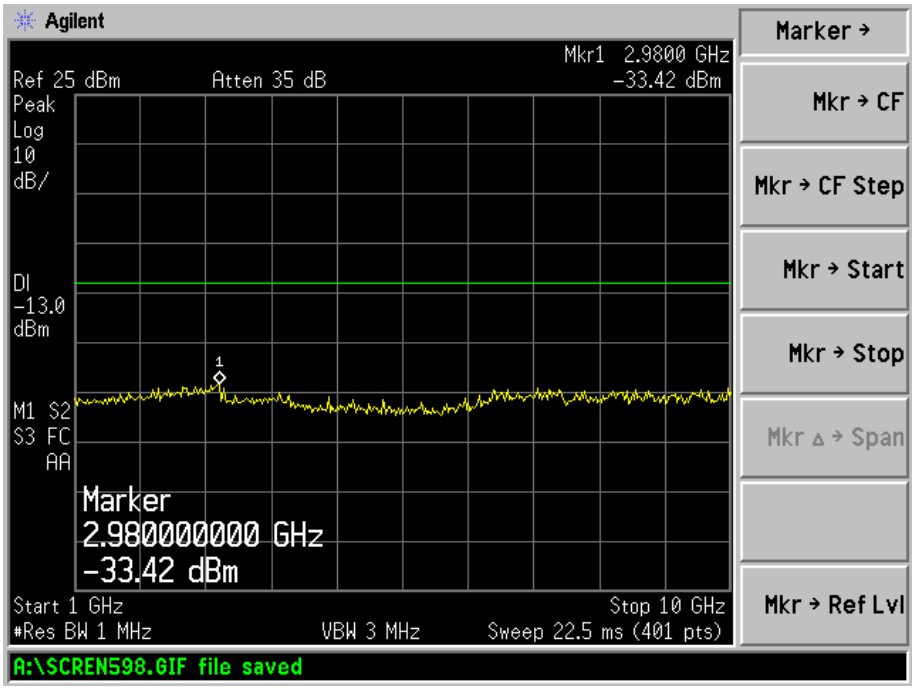
Above 1GHz



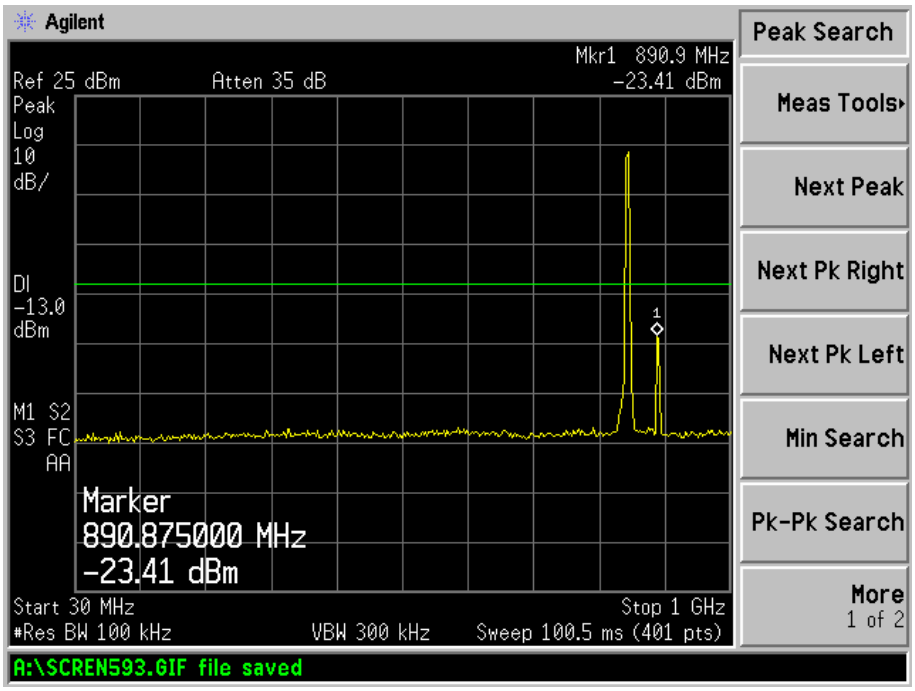
HSDPA Middle Channel
30MHz to 1GHz



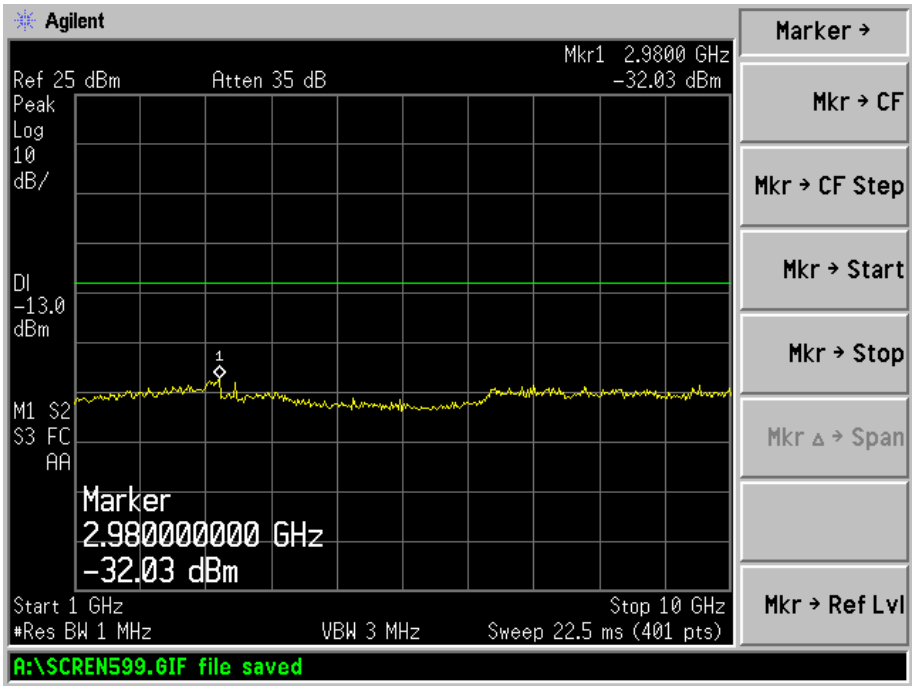
Above 1GHz



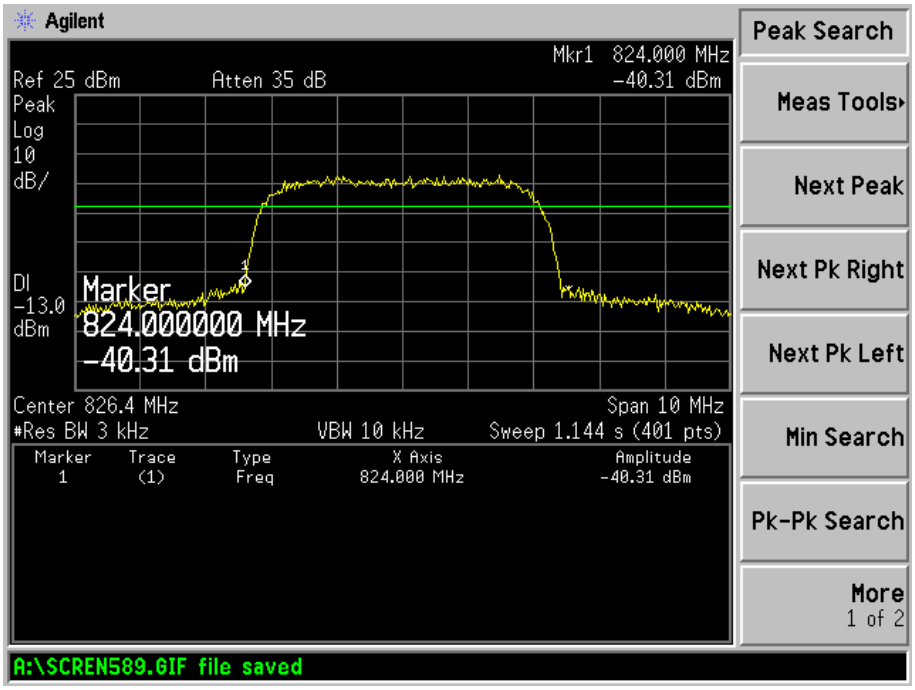
HSDPA High Channel
30MHz to 1GHz



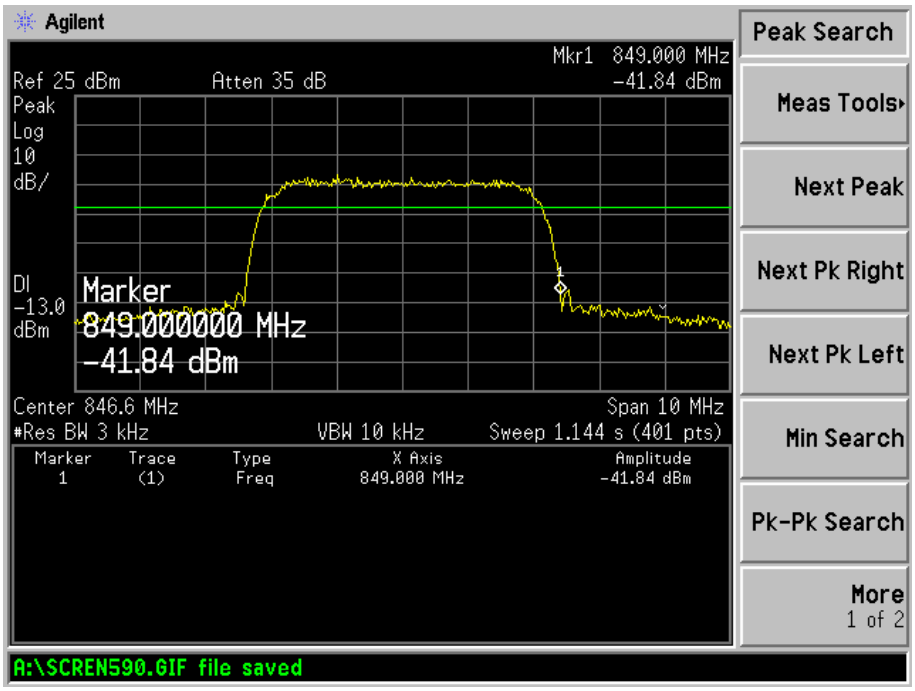
Above 1GHz



HSDPA Low Band Spurious Emission



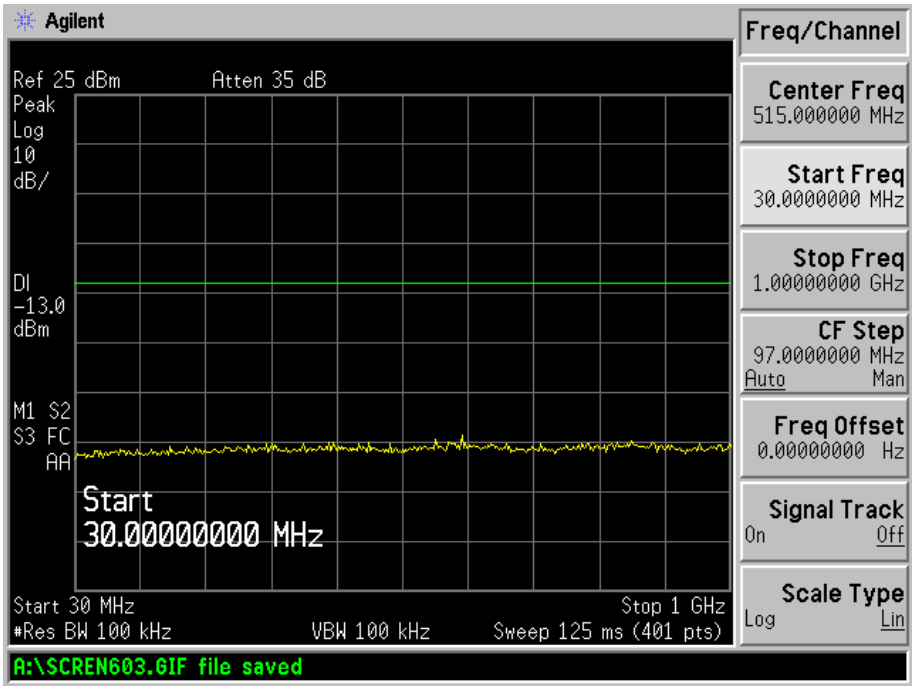
HSDPA High Band Spurious Emission



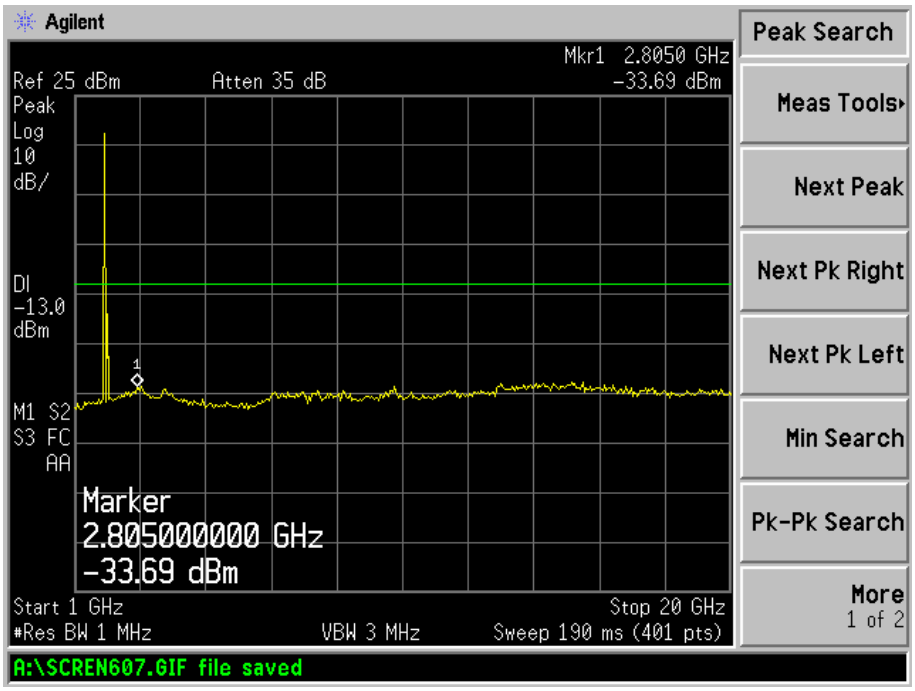
For Band II

WCDMA Low Channel

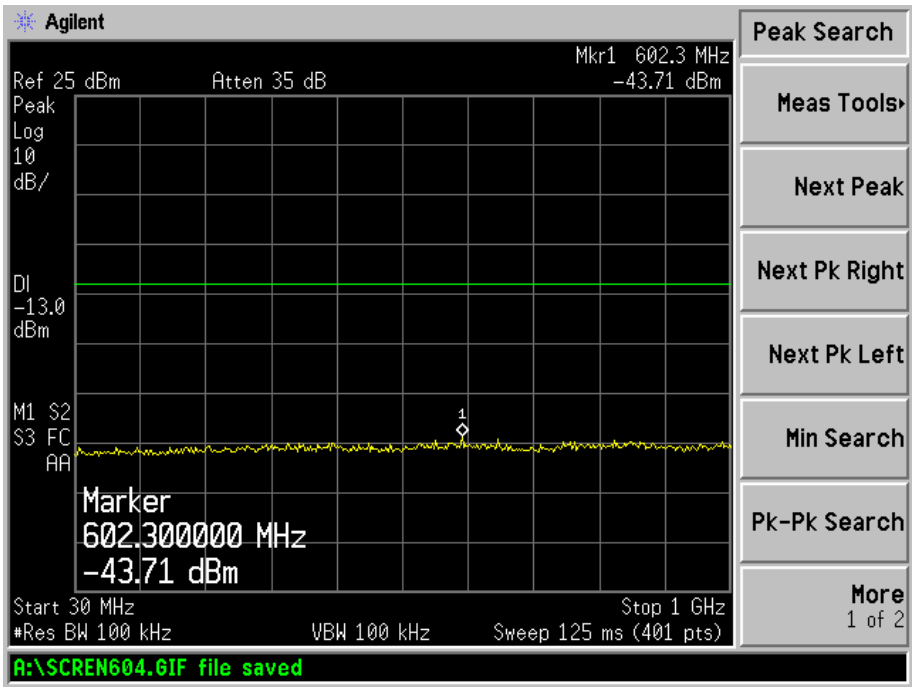
30MHz to 1GHz



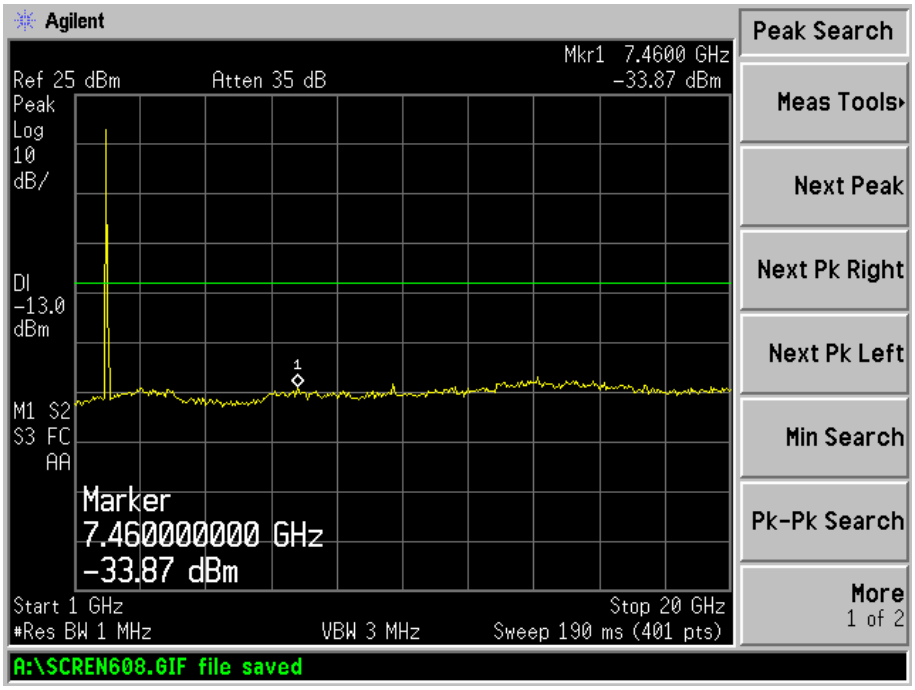
Above 1GHz



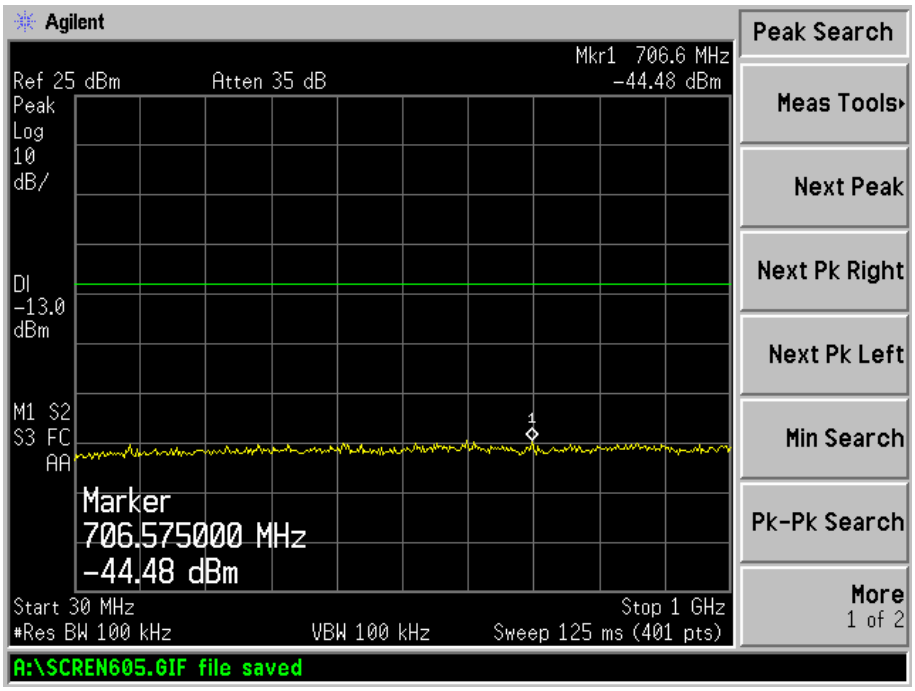
WCDMA Middle Channel
30MHz to 1GHz



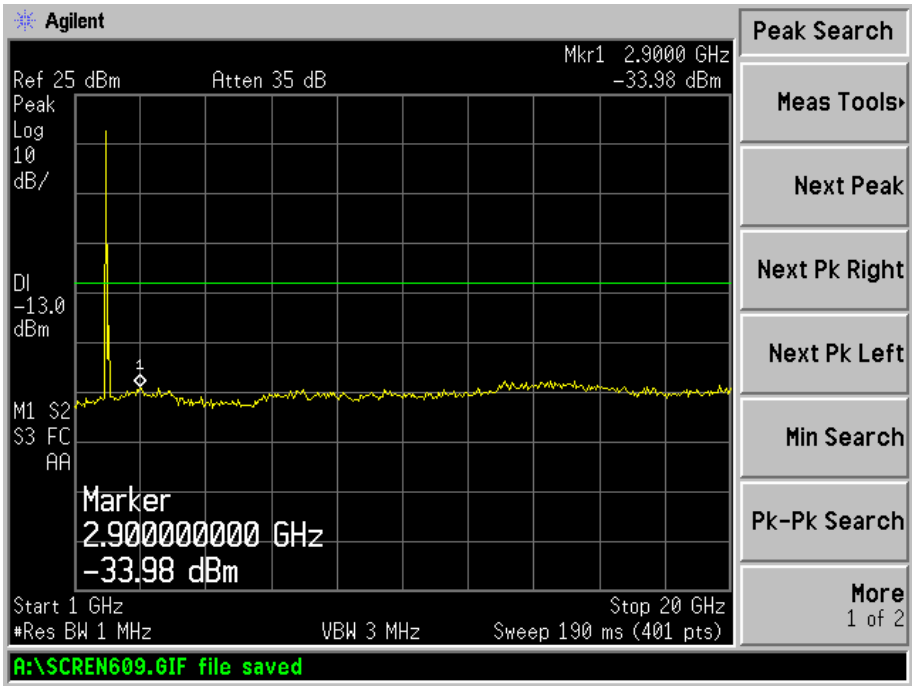
Above 1GHz



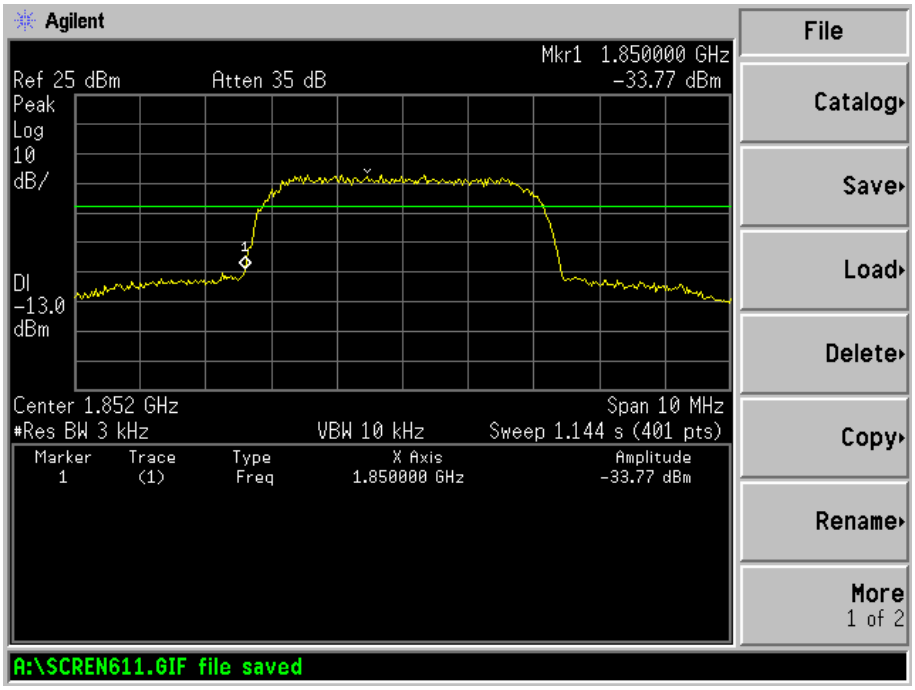
WCDMA High Channel
30MHz to 1GHz



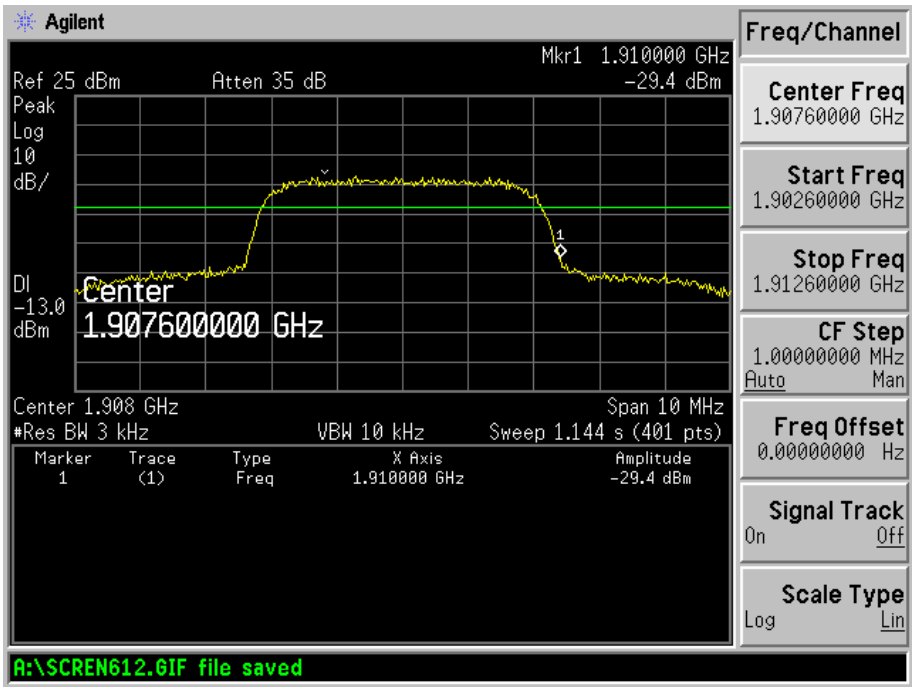
Above 1GHz



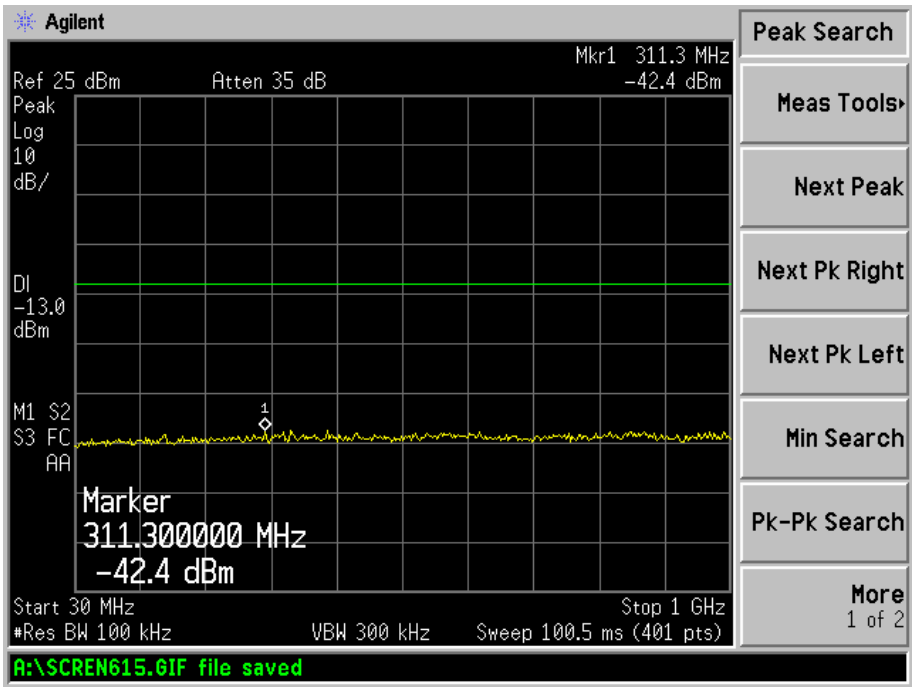
WCDMA Low Band Spurious Emission



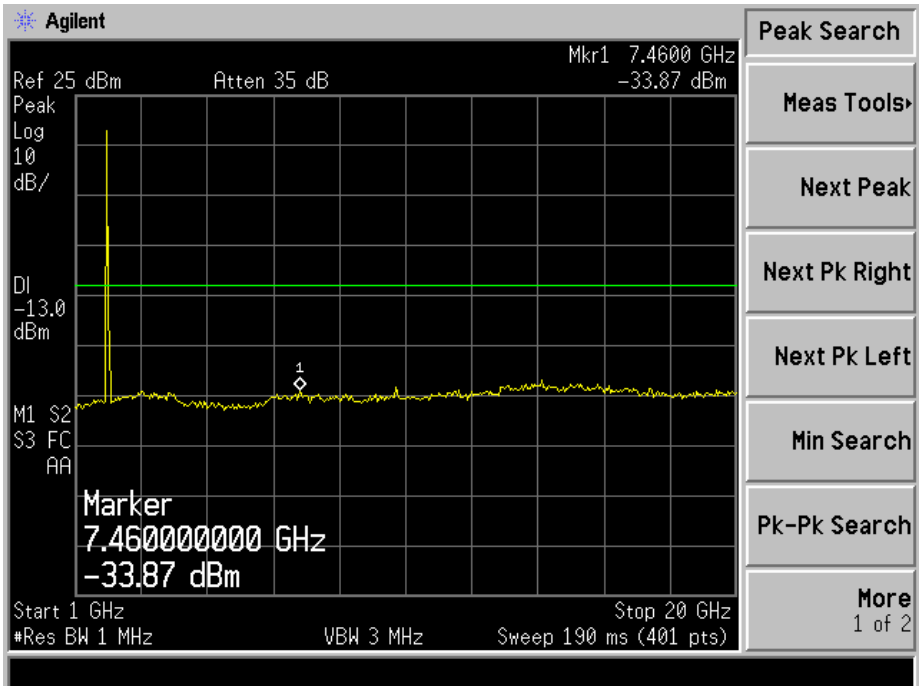
WCDMA High Band Spurious Emission



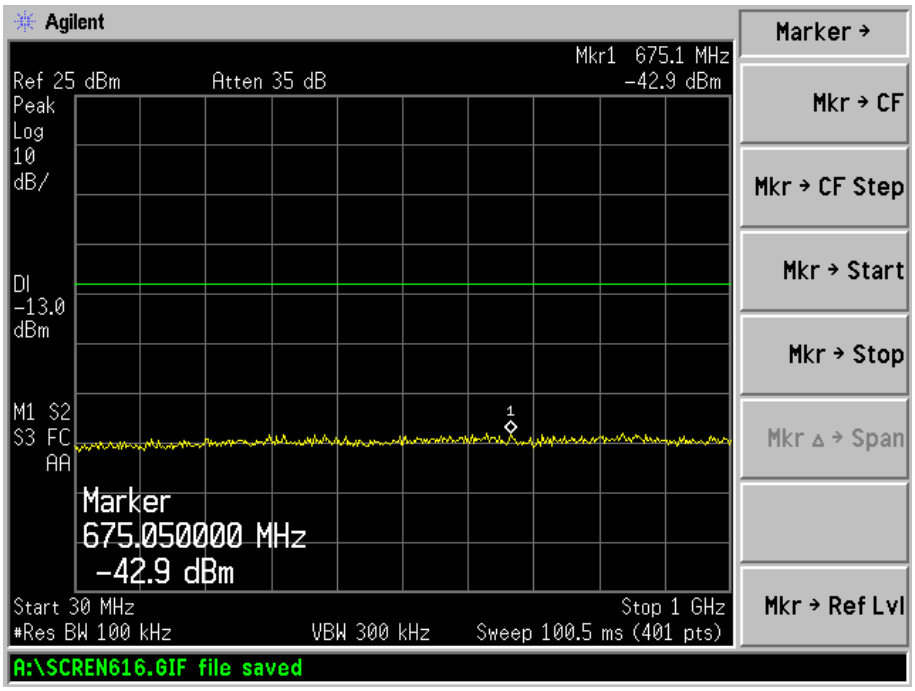
HSDPA Low Channel
30MHz to 1GHz



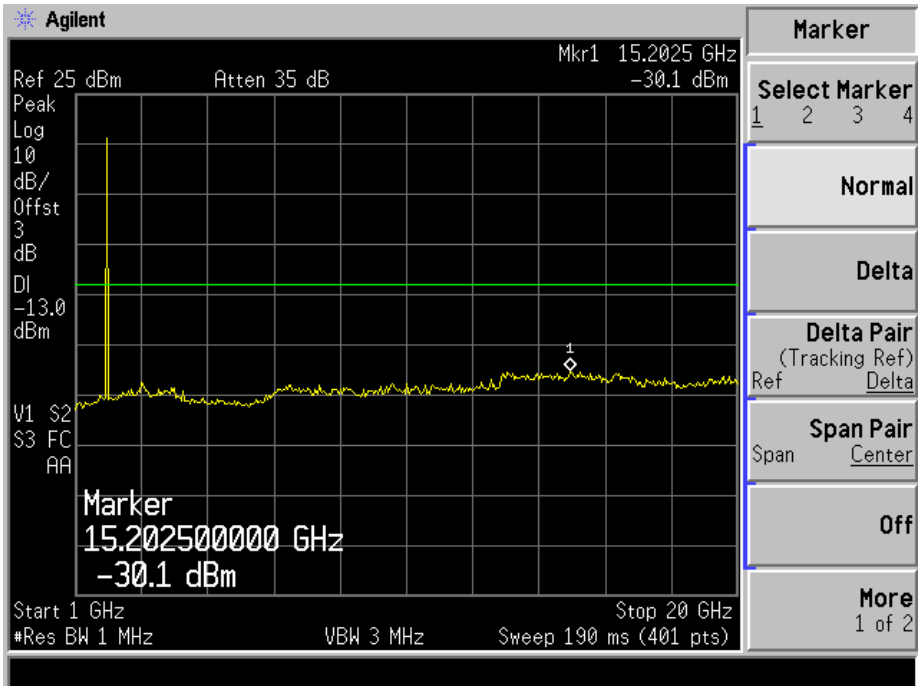
Above 1GHz



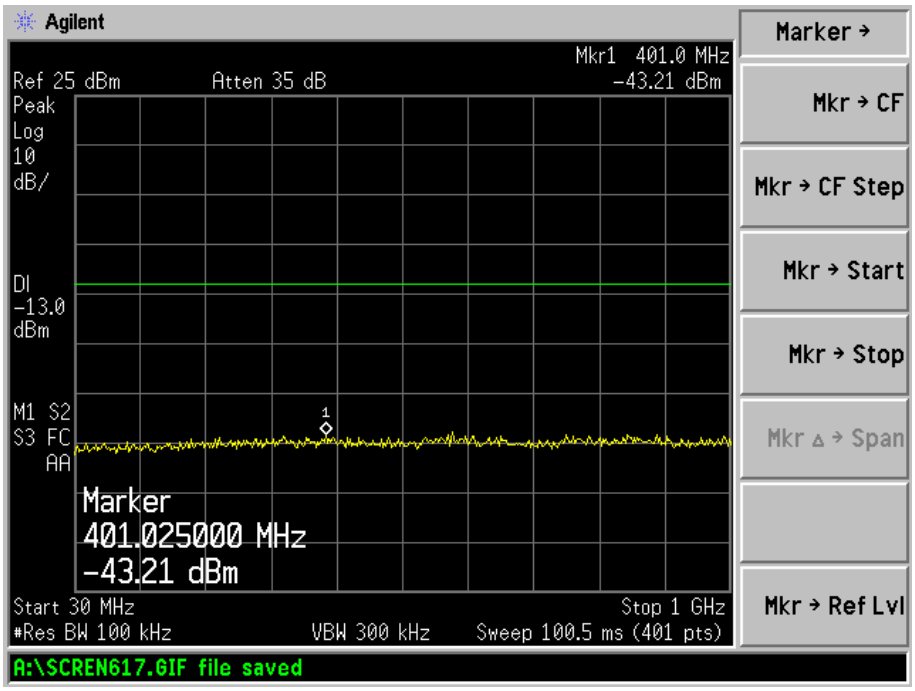
HSDPA Middle Channel
30MHz to 1GHz



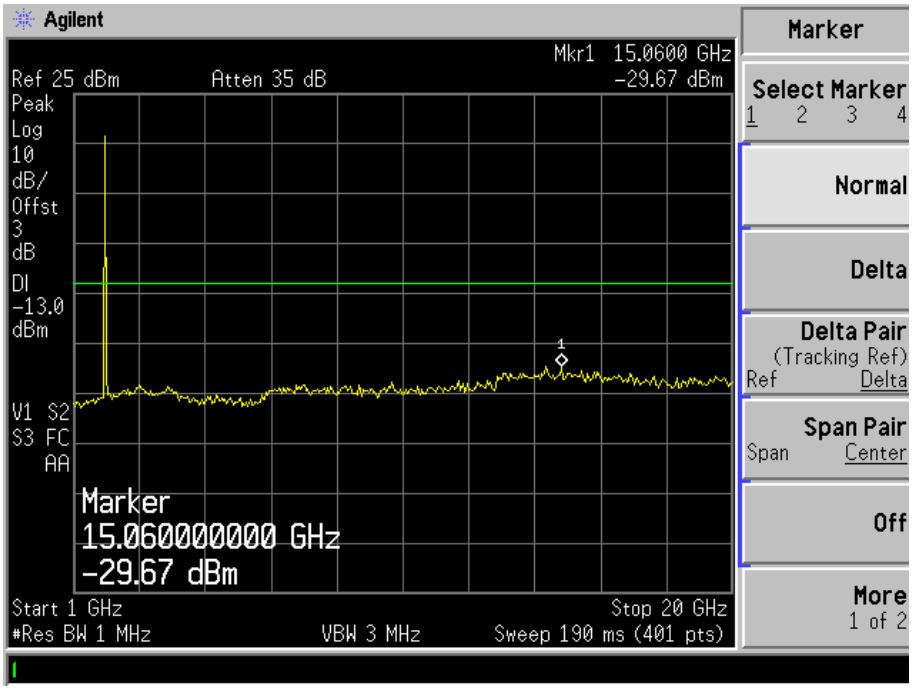
Above 1GHz



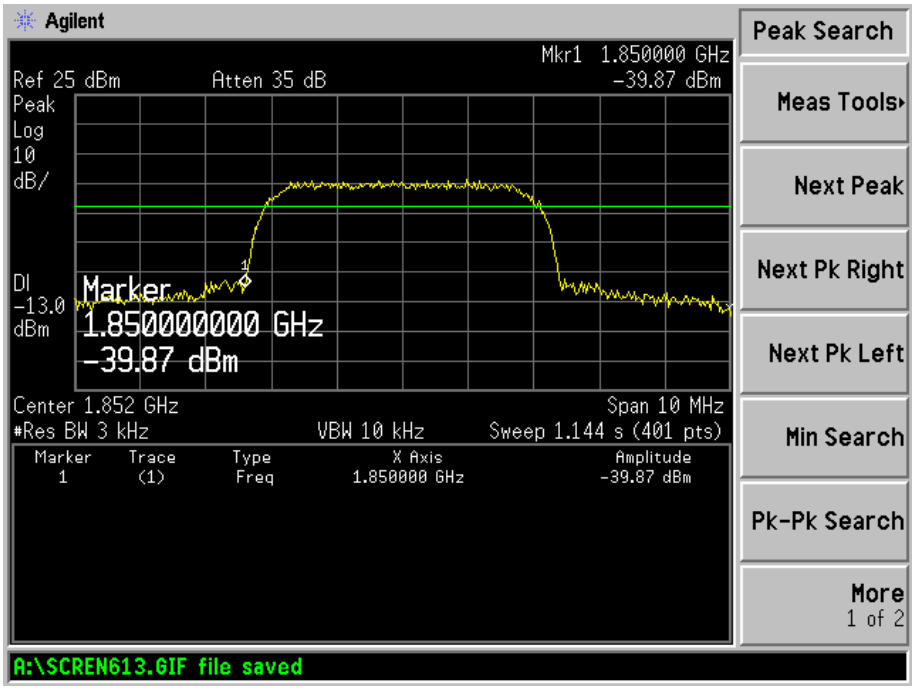
HSDPA High Channel
30MHz to 1GHz



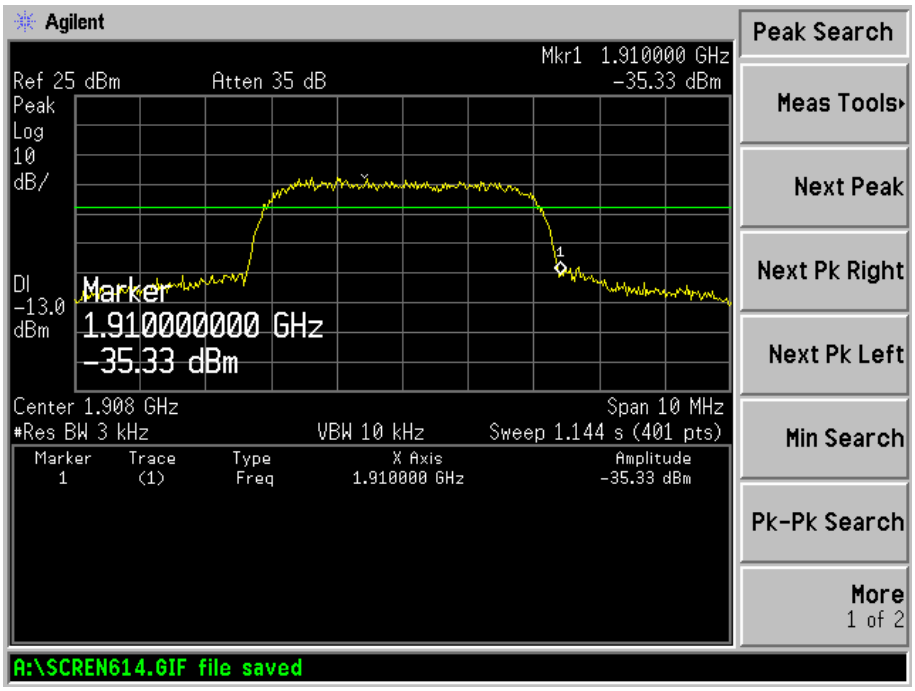
Above 1GHz



HSDPA Low Band Spurious Emission



HSDPA High Band Spurious Emission



8. Spurious Radiated Emissions

8.1 Measurement Uncertainty

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

8.2 Standard Applicable

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

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

8.3 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2014-05-28	2015-05-27
Pre-amplifier	Agilent	8447F	3113A06717	2014-05-28	2015-05-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2014-05-28	2015-05-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2014-05-24	2015-05-23
Horn Antenna	ETS	3117	00086197	2014-05-24	2015-05-23
Horn Antenna	EMCO	3116	9203-2178	2014-05-24	2015-05-23
Universal Radio Communication Tester	Rohde & Schwarz	CMU200	112012	2014-05-28	2015-05-27
Signal Generator	R&S	SMR20	100047	2014-05-28	2015-05-27

8.4 Test Procedure

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

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

8.5 Environmental Conditions

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

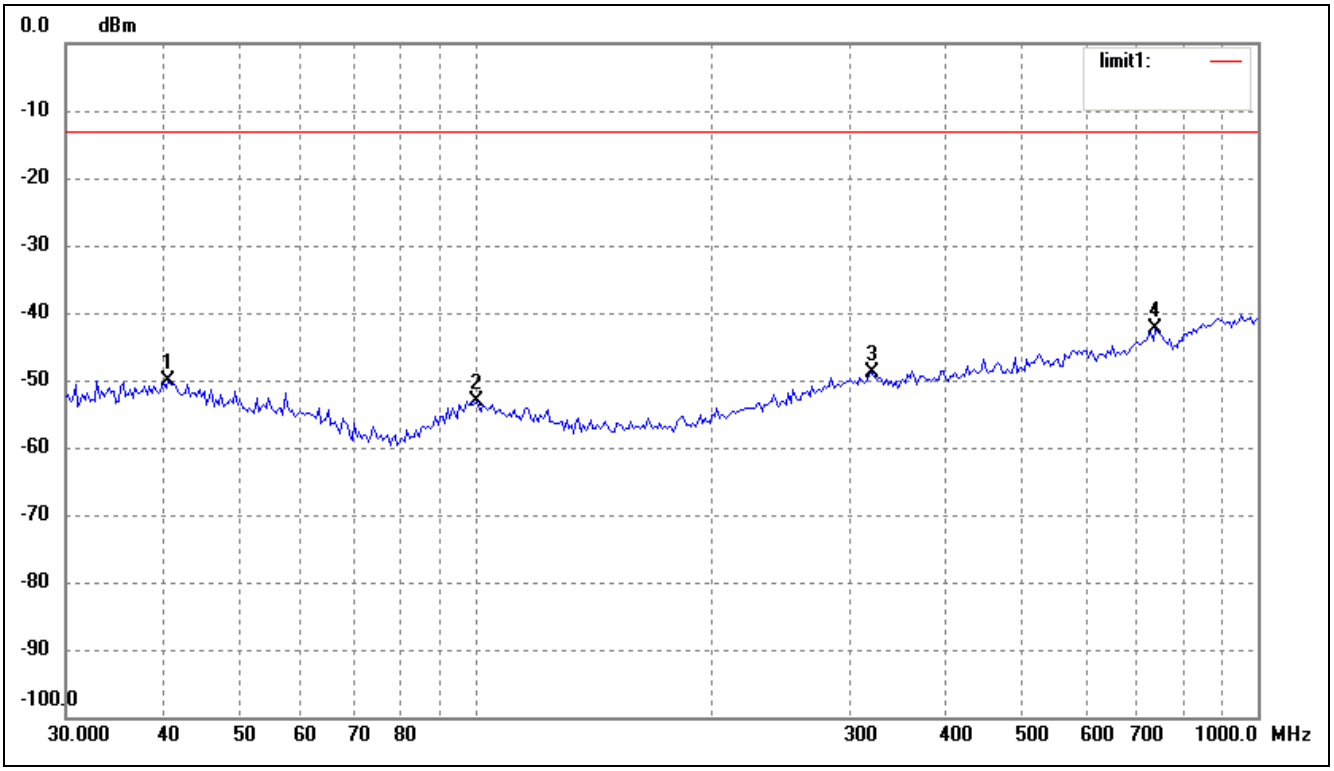
8.6 Summary of Test Results/Plots

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

-29.59 dB at **5550.6 MHz** in the **Vertical** polarization, **PCS Band GPRS** Mode, **9 kHz** to **20 GHz**, **3Meters**

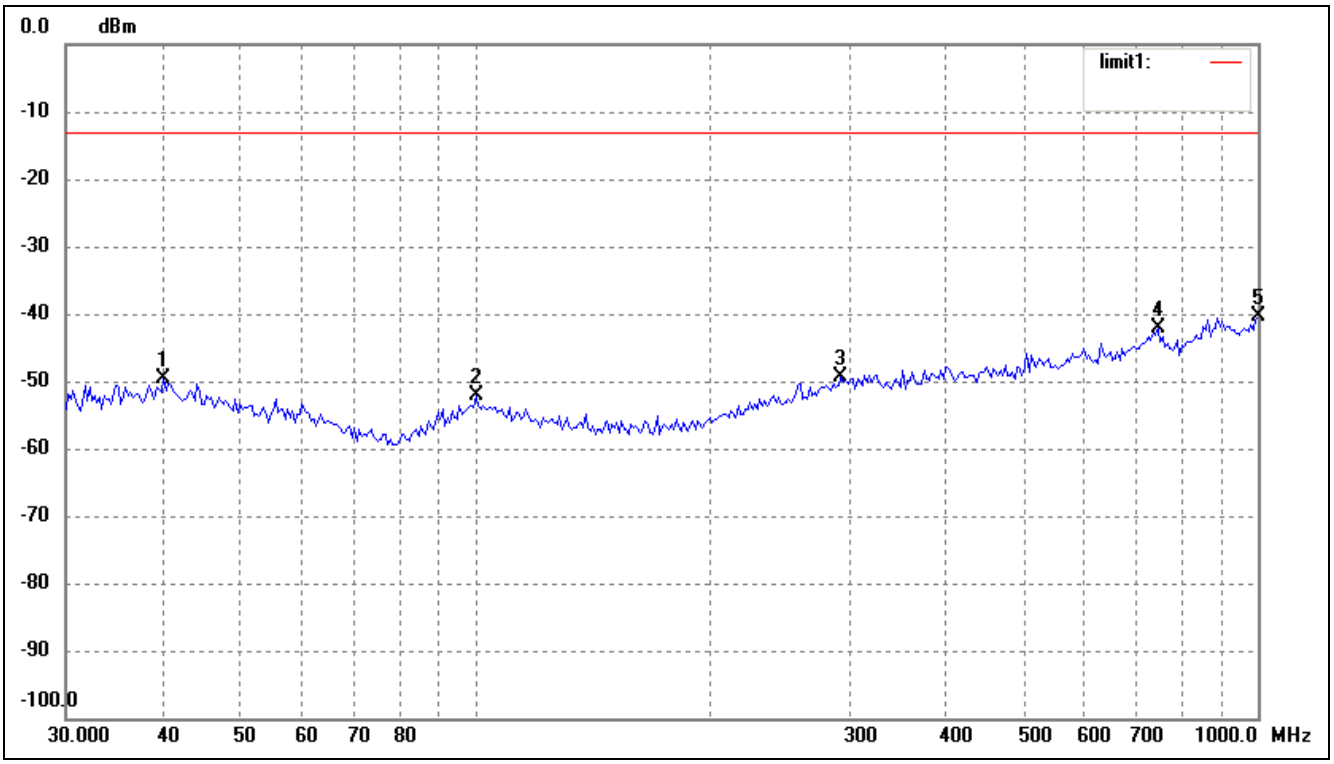
Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

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



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	40.5591	-70.51	20.41	-50.10	-13.00	-37.10	ERP
2	100.2286	-70.61	17.60	-53.01	-13.00	-40.01	ERP
3	321.0608	-69.77	20.80	-48.97	-13.00	-35.97	ERP
4	739.6605	-69.98	27.51	-42.47	-13.00	-29.47	ERP

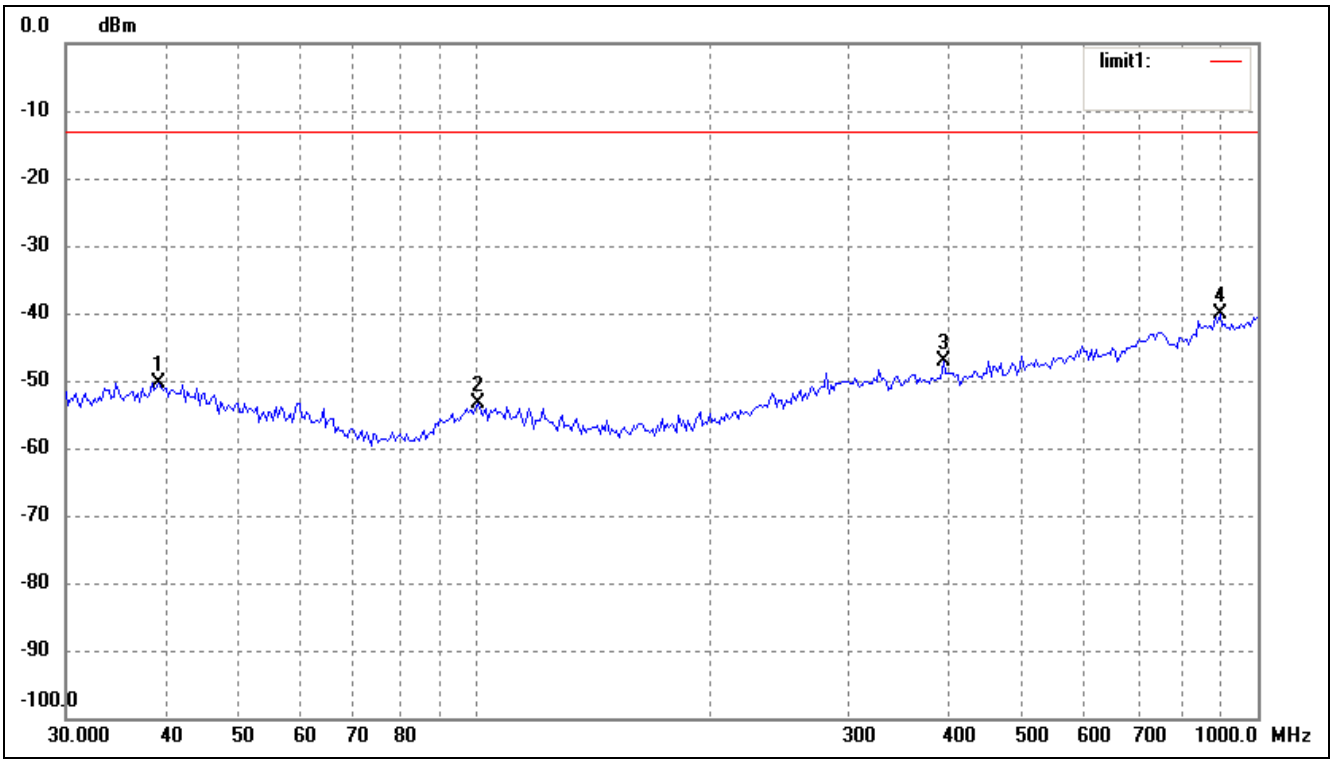
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	39.9942	-70.32	20.66	-49.66	-13.00	-36.66	ERP
2	100.2286	-69.95	17.92	-52.03	-13.00	-39.03	ERP
3	293.0842	-69.95	20.66	-49.29	-13.00	-36.29	ERP
4	744.8661	-69.34	27.10	-42.24	-13.00	-29.24	ERP
5	1000.0000	-69.49	29.05	-40.44	-13.00	-27.44	ERP

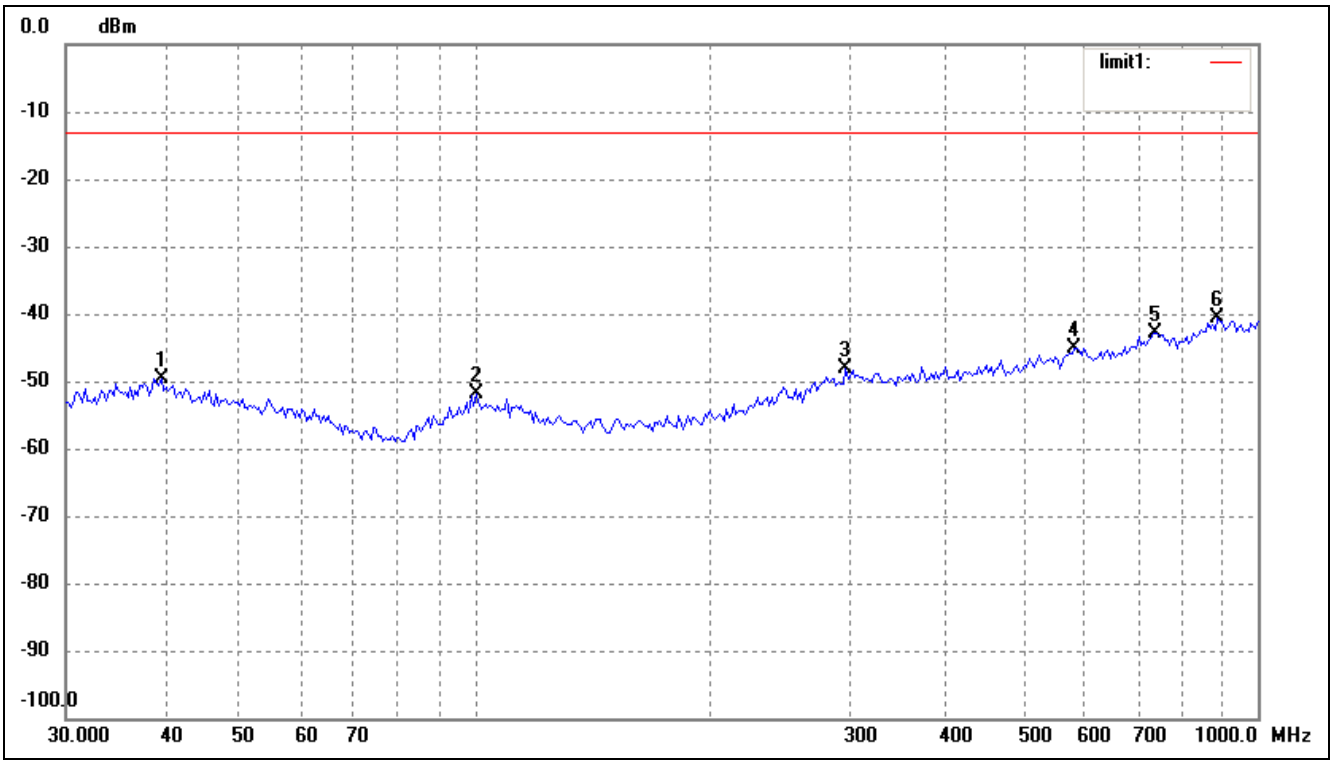
For Cellular Band_GPRS Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	39.4372	-70.80	20.50	-50.30	-13.00	-37.30	ERP
2	100.9340	-70.83	17.53	-53.30	-13.00	-40.30	ERP
3	396.2415	-68.67	21.58	-47.09	-13.00	-34.09	ERP
4	893.8567	-69.07	28.96	-40.11	-13.00	-27.11	ERP

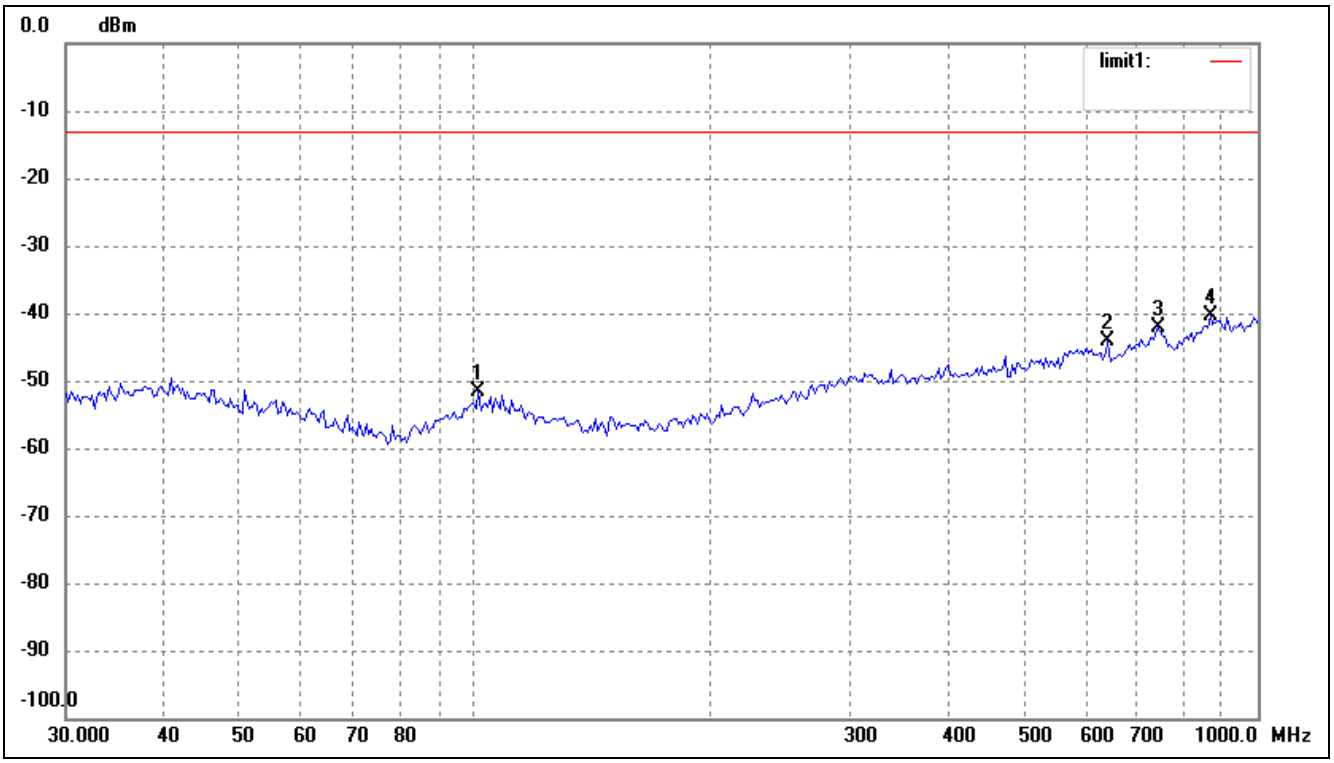
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	39.7147	-70.13	20.62	-49.51	-13.00	-36.51	ERP
2	100.2286	-69.82	17.92	-51.90	-13.00	-38.90	ERP
3	297.2241	-68.87	20.82	-48.05	-13.00	-35.05	ERP
4	582.7425	-69.49	24.40	-45.09	-13.00	-32.09	ERP
5	739.6605	-70.17	27.29	-42.88	-13.00	-29.88	ERP
6	887.6099	-69.26	28.54	-40.72	-13.00	-27.72	ERP

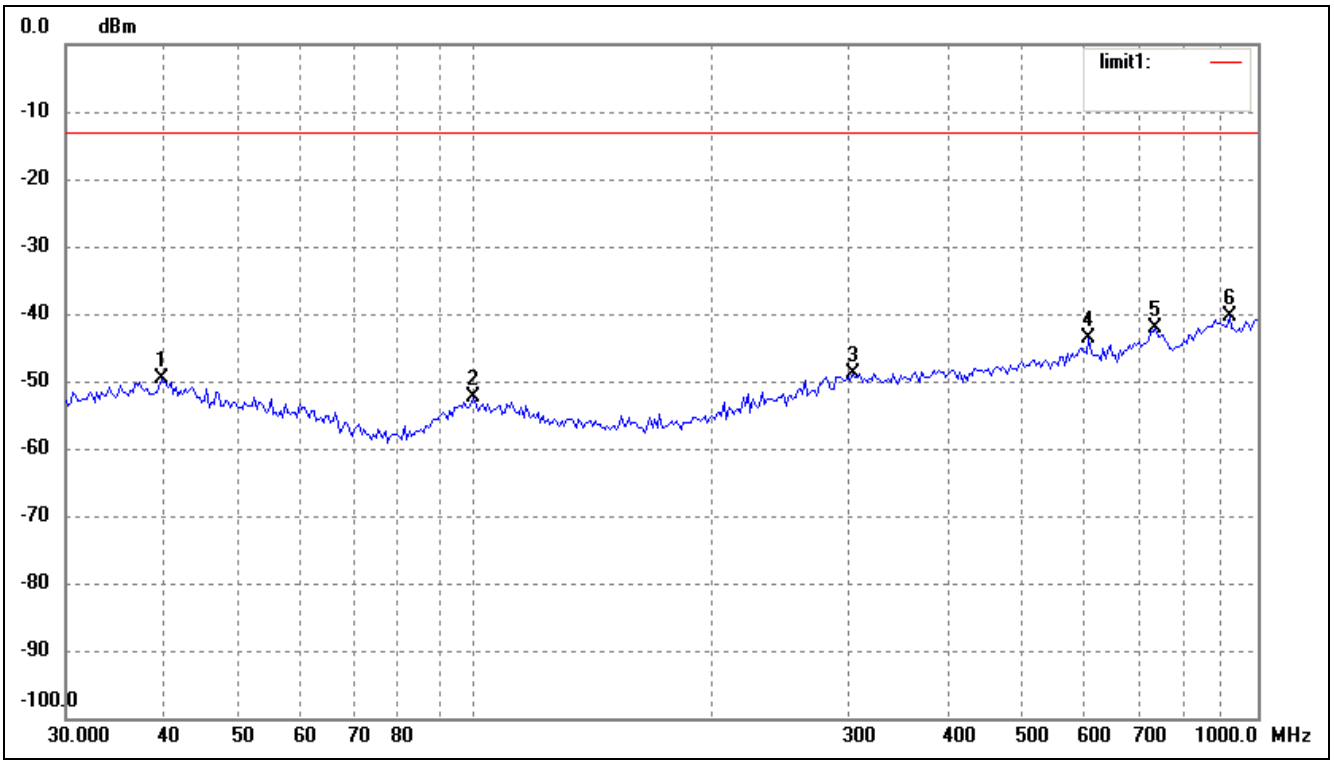
For PCS Band_GPRS Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	100.9340	-69.38	17.85	-51.53	-13.00	-38.53	ERP
2	642.8613	-68.39	24.27	-44.12	-13.00	-31.12	ERP
3	744.8661	-69.31	27.10	-42.21	-13.00	-29.21	ERP
4	869.1302	-68.71	28.26	-40.45	-13.00	-27.45	ERP

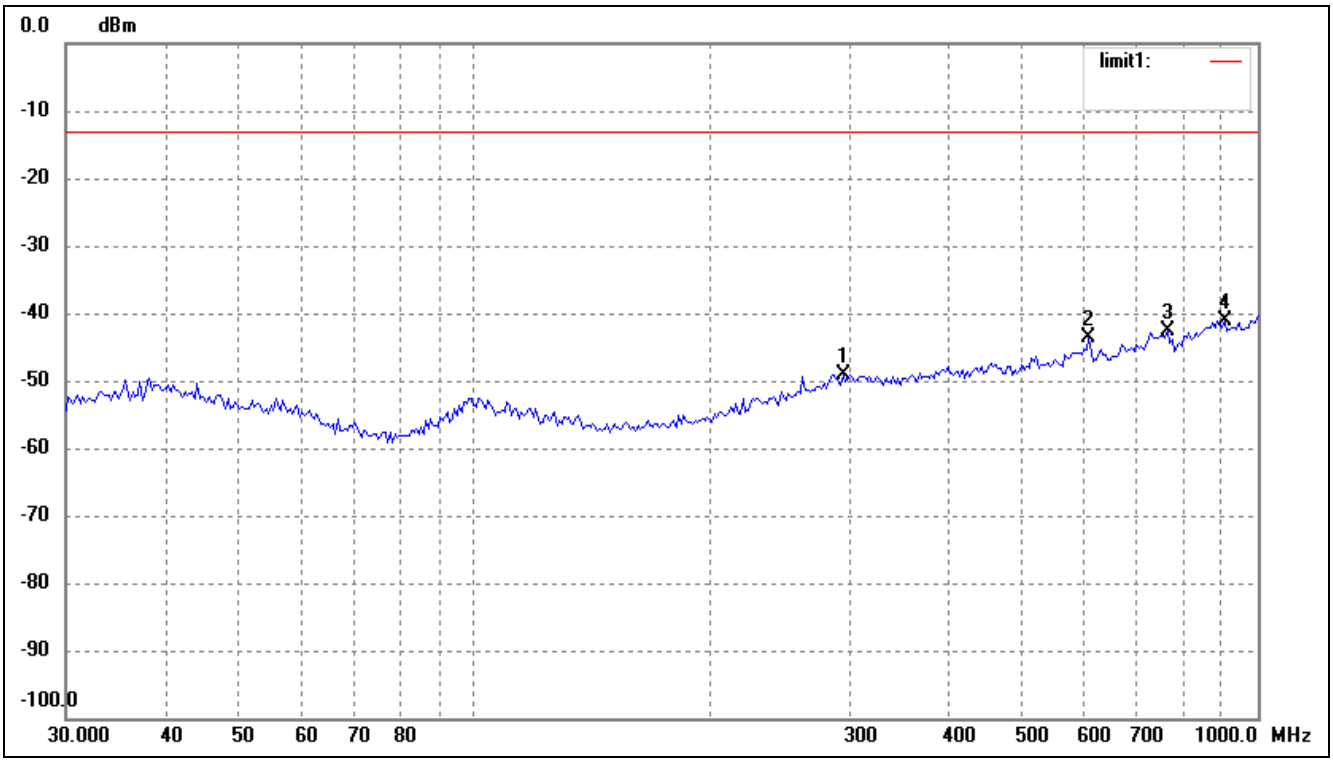
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	39.7147	-70.20	20.62	-49.58	-13.00	-36.58	ERP
2	99.5281	-70.25	17.83	-52.42	-13.00	-39.42	ERP
3	303.5437	-69.77	20.97	-48.80	-13.00	-35.80	ERP
4	607.7867	-68.21	24.47	-43.74	-13.00	-30.74	ERP
5	739.6605	-69.46	27.29	-42.17	-13.00	-29.17	ERP
6	919.2866	-68.64	28.19	-40.45	-13.00	-27.45	ERP

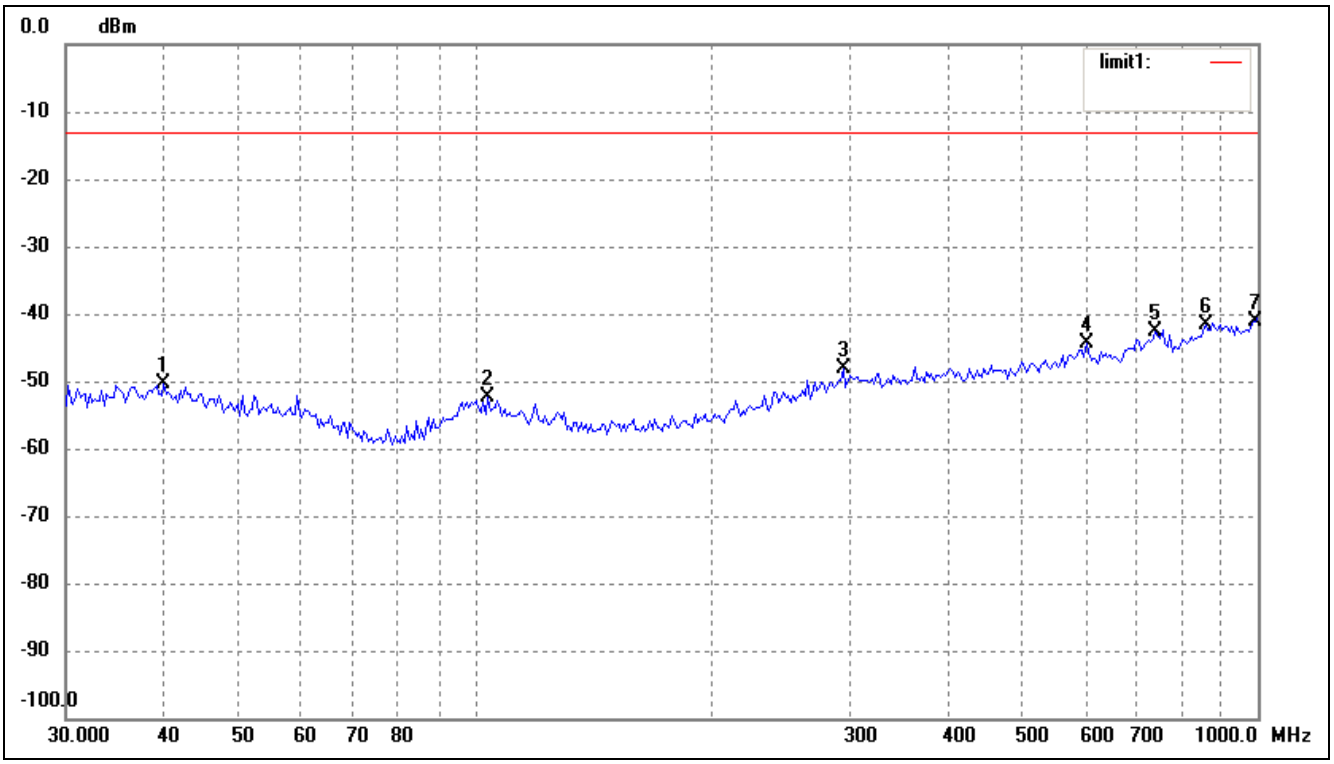
For band V WCDMA Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	295.1469	-69.76	20.75	-49.01	-13.00	-36.01	ERP
2	607.7867	-68.19	24.47	-43.72	-13.00	-30.72	ERP
3	766.0572	-68.82	26.08	-42.74	-13.00	-29.74	ERP
4	906.4824	-69.62	28.43	-41.19	-13.00	-28.19	ERP

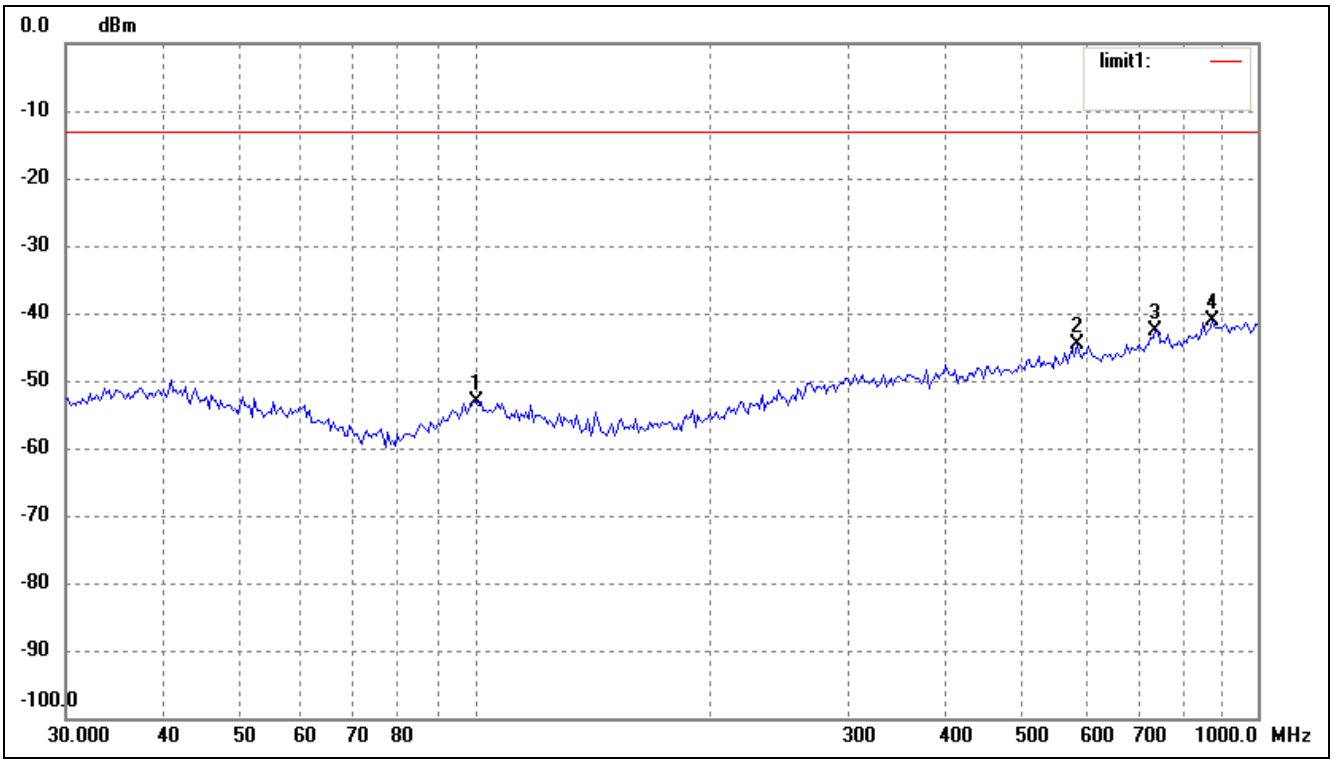
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	39.9942	-71.08	20.66	-50.42	-13.00	-37.42	ERP
2	103.8055	-70.03	17.55	-52.48	-13.00	-39.48	ERP
3	295.1469	-68.77	20.75	-48.02	-13.00	-35.02	ERP
4	603.5392	-69.16	24.77	-44.39	-13.00	-31.39	ERP
5	739.6605	-69.84	27.29	-42.55	-13.00	-29.55	ERP
6	857.0247	-69.62	27.91	-41.71	-13.00	-28.71	ERP
7	993.0114	-70.00	28.80	-41.20	-13.00	-28.20	ERP

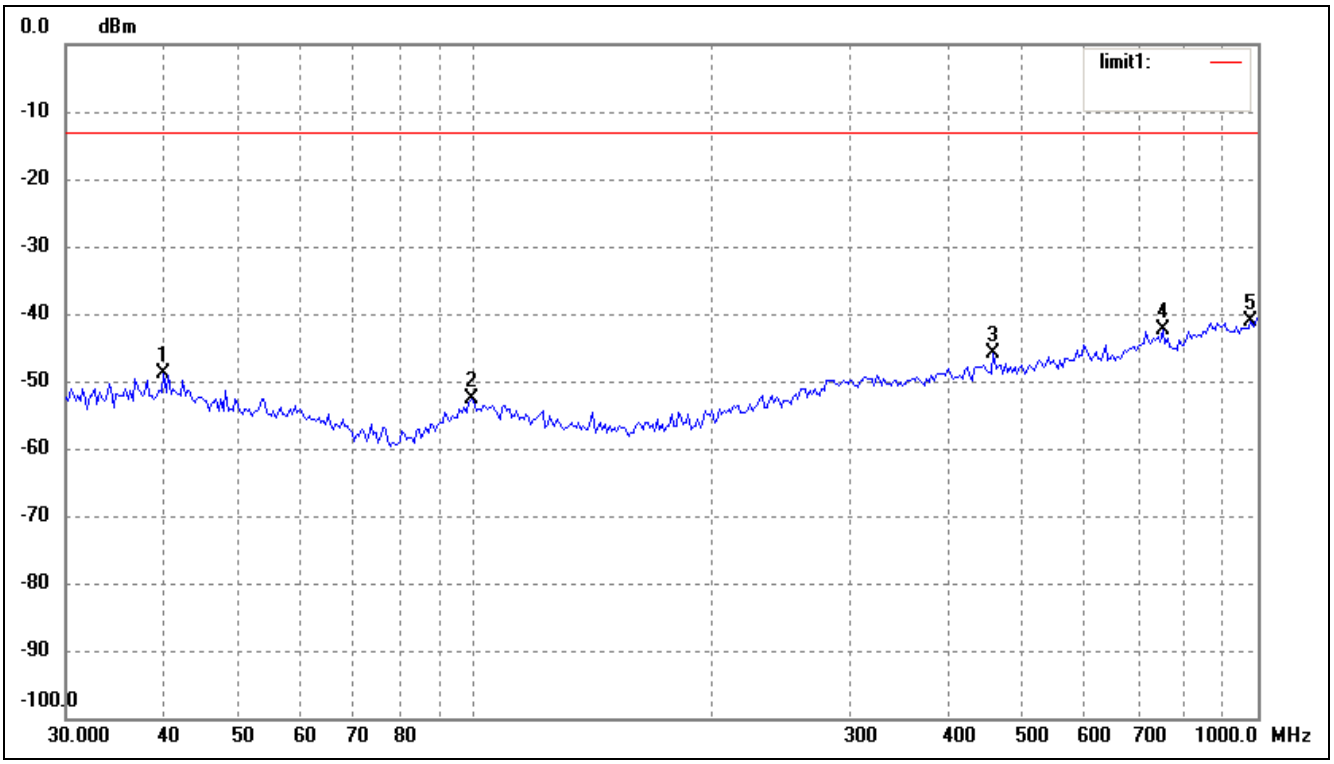
For band V HSDPA Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	100.2286	-70.98	17.92	-53.06	-13.00	-40.06	ERP
2	586.8437	-69.11	24.55	-44.56	-13.00	-31.56	ERP
3	739.6605	-69.95	27.29	-42.66	-13.00	-29.66	ERP
4	875.2470	-69.51	28.42	-41.09	-13.00	-28.09	ERP

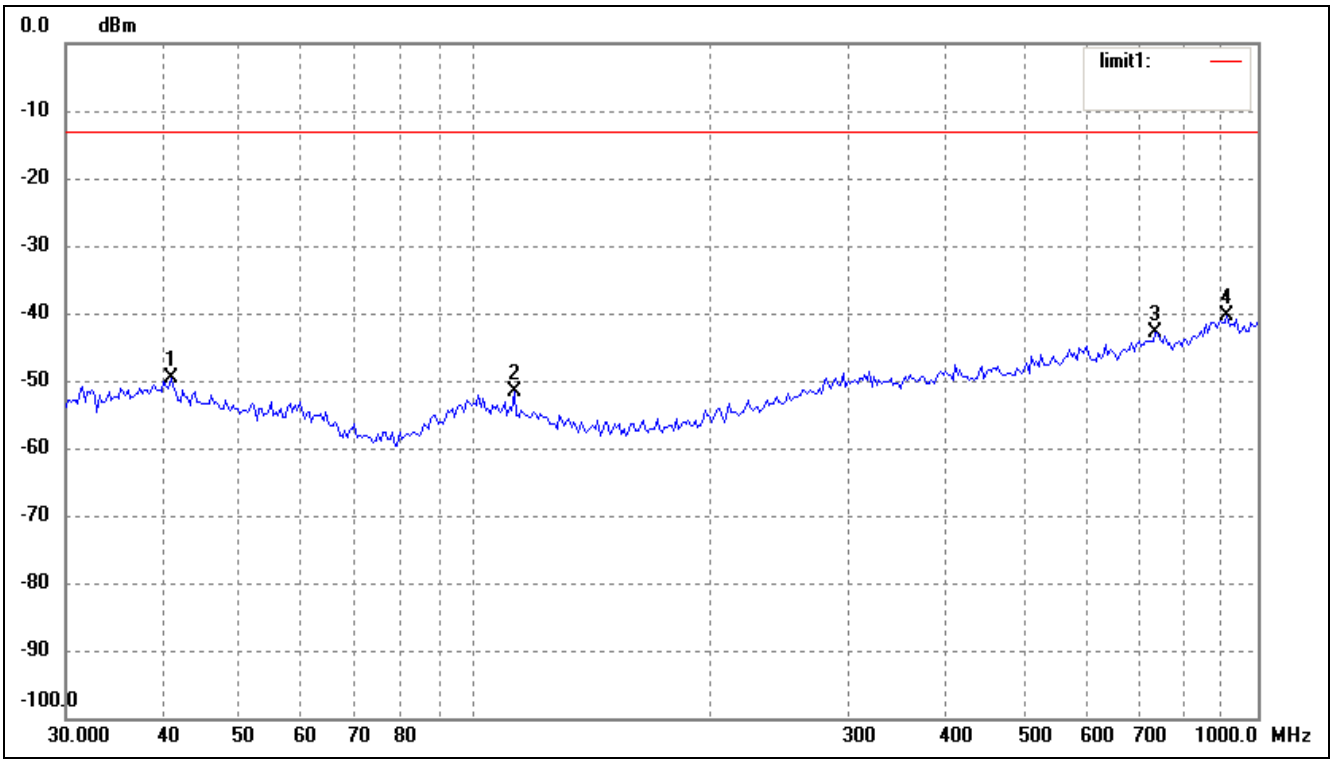
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	39.9942	-69.58	20.66	-48.92	-13.00	-35.92	ERP
2	98.8326	-70.38	17.65	-52.73	-13.00	-39.73	ERP
3	459.1144	-68.29	22.33	-45.96	-13.00	-32.96	ERP
4	755.3873	-68.99	26.64	-42.35	-13.00	-29.35	ERP
5	979.1804	-69.48	28.32	-41.16	-13.00	-28.16	ERP

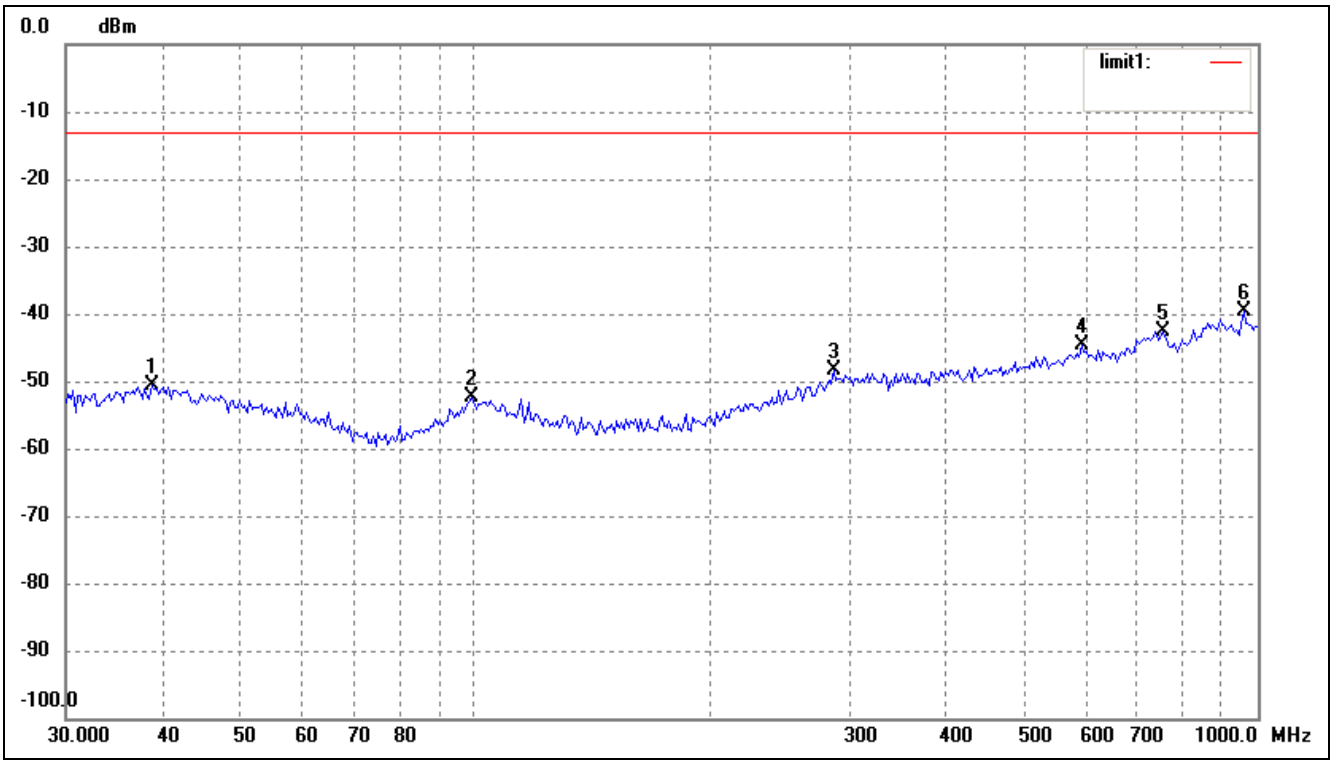
For band V HSDPA Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	40.8446	-70.10	20.42	-49.68	-13.00	-36.68	ERP
2	112.1305	-68.39	16.69	-51.70	-13.00	-38.70	ERP
3	739.6605	-70.07	27.29	-42.78	-13.00	-29.78	ERP
4	912.8620	-68.60	28.31	-40.29	-13.00	-27.29	ERP

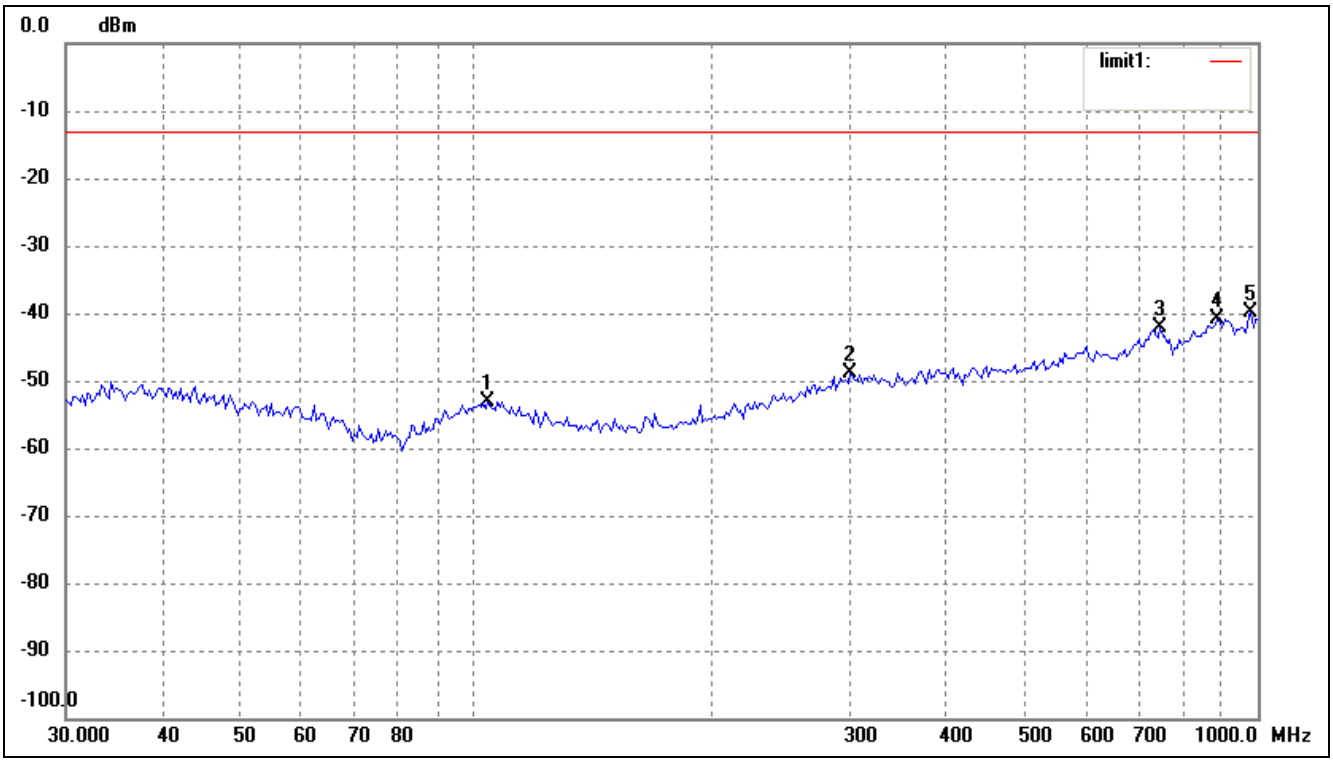
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	38.6161	-71.05	20.44	-50.61	-13.00	-37.61	ERP
2	98.8326	-70.05	17.65	-52.40	-13.00	-39.40	ERP
3	286.9823	-68.83	20.42	-48.41	-13.00	-35.41	ERP
4	595.1329	-69.51	24.84	-44.67	-13.00	-31.67	ERP
5	755.3873	-69.22	26.64	-42.58	-13.00	-29.58	ERP
6	958.7943	-67.63	28.00	-39.63	-13.00	-26.63	ERP

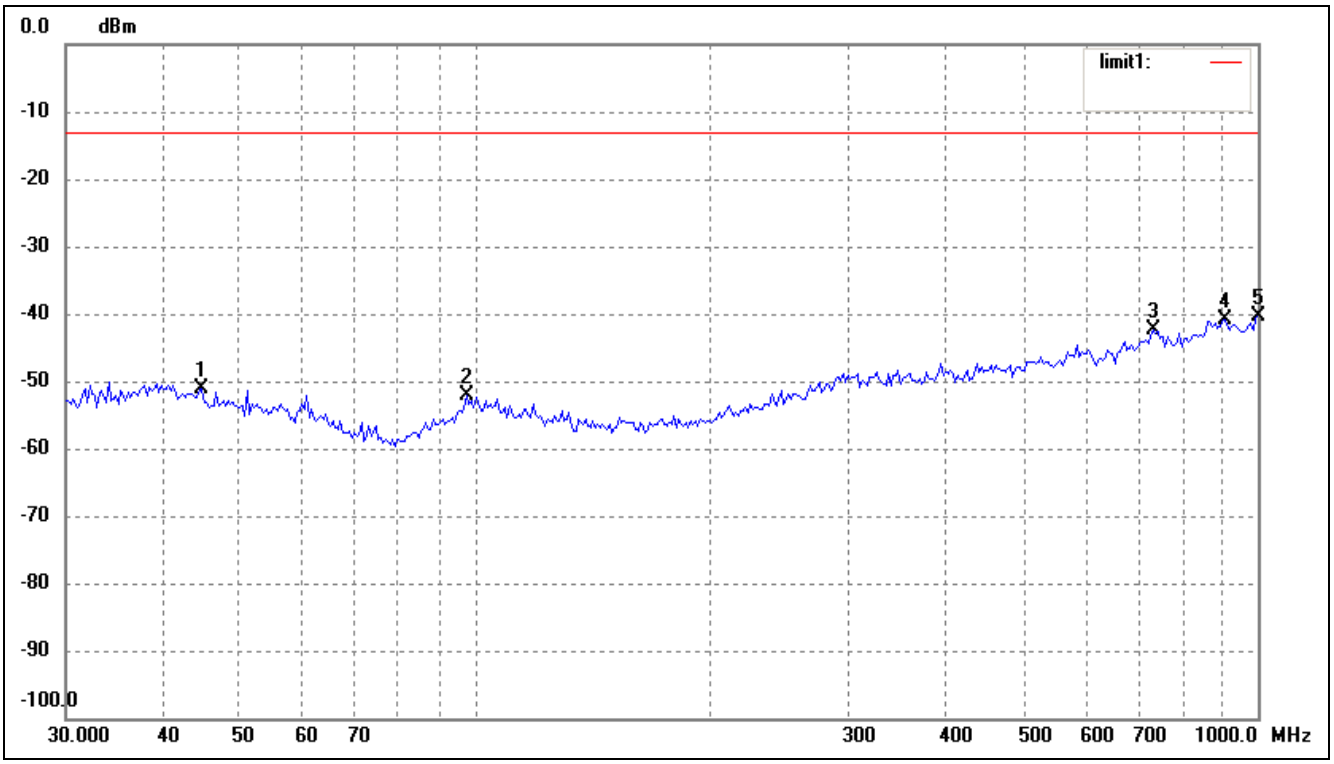
For band II WCDMA Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	103.8055	-70.55	17.55	-53.00	-13.00	-40.00	ERP
2	301.4224	-69.77	20.95	-48.82	-13.00	-35.82	ERP
3	750.1083	-69.04	26.87	-42.17	-13.00	-29.17	ERP
4	887.6099	-69.49	28.54	-40.95	-13.00	-27.95	ERP
5	979.1804	-68.19	28.32	-39.87	-13.00	-26.87	ERP

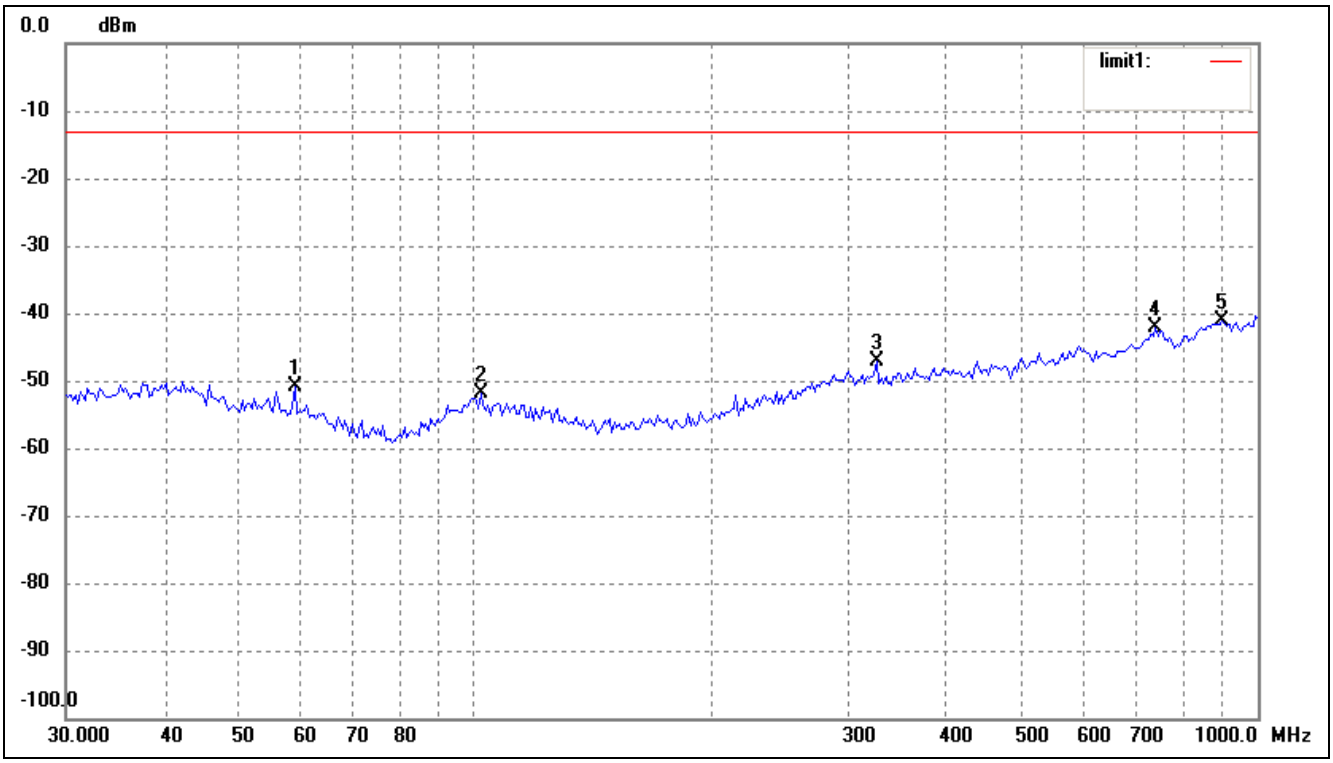
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	44.7434	-70.37	19.28	-51.09	-13.00	-38.09	ERP
2	97.4560	-69.38	17.29	-52.09	-13.00	-39.09	ERP
3	734.4913	-69.36	26.98	-42.38	-13.00	-29.38	ERP
4	906.4824	-69.24	28.43	-40.81	-13.00	-27.81	ERP
5	1000.0000	-69.35	29.05	-40.30	-13.00	-27.30	ERP

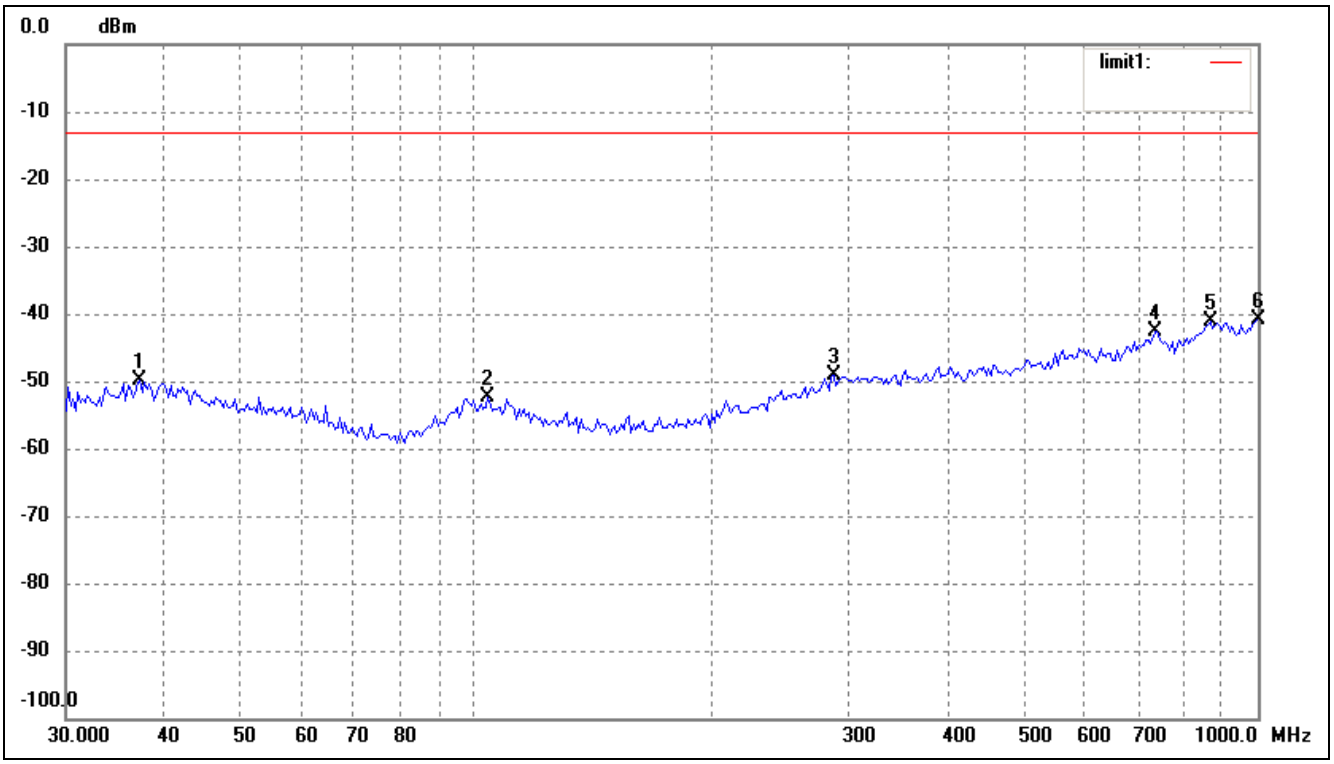
For band II HSDPA Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	58.8185	-67.99	17.02	-50.97	-13.00	-37.97	ERP
2	101.6443	-69.73	17.77	-51.96	-13.00	-38.96	ERP
3	325.5958	-68.04	20.93	-47.11	-13.00	-34.11	ERP
4	739.6605	-69.33	27.29	-42.04	-13.00	-29.04	ERP
5	900.1474	-69.78	28.55	-41.23	-13.00	-28.23	ERP

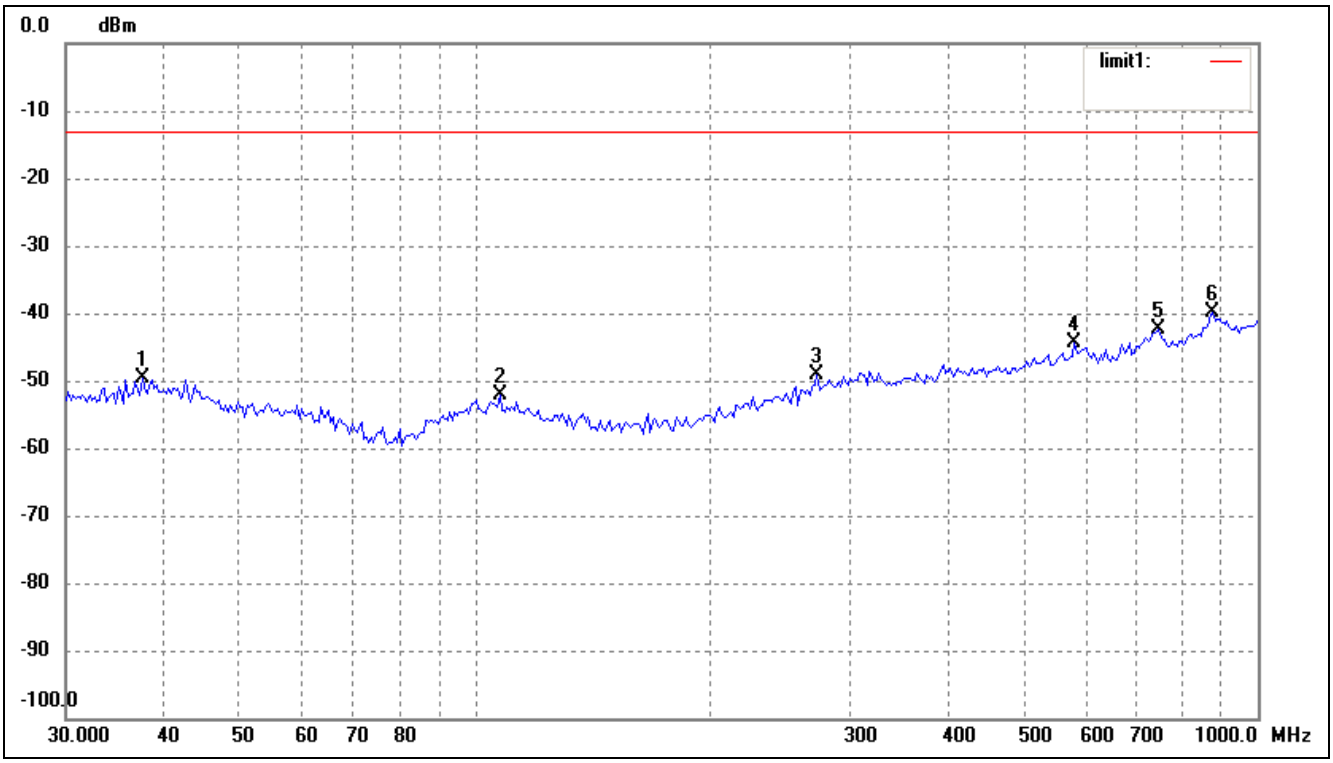
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	37.2855	-70.11	20.23	-49.88	-13.00	-36.88	ERP
2	103.8055	-69.97	17.55	-52.42	-13.00	-39.42	ERP
3	286.9823	-69.64	20.42	-49.22	-13.00	-36.22	ERP
4	739.6605	-69.80	27.29	-42.51	-13.00	-29.51	ERP
5	869.1302	-69.42	28.26	-41.16	-13.00	-28.16	ERP
6	1000.0000	-69.84	29.05	-40.79	-13.00	-27.79	ERP

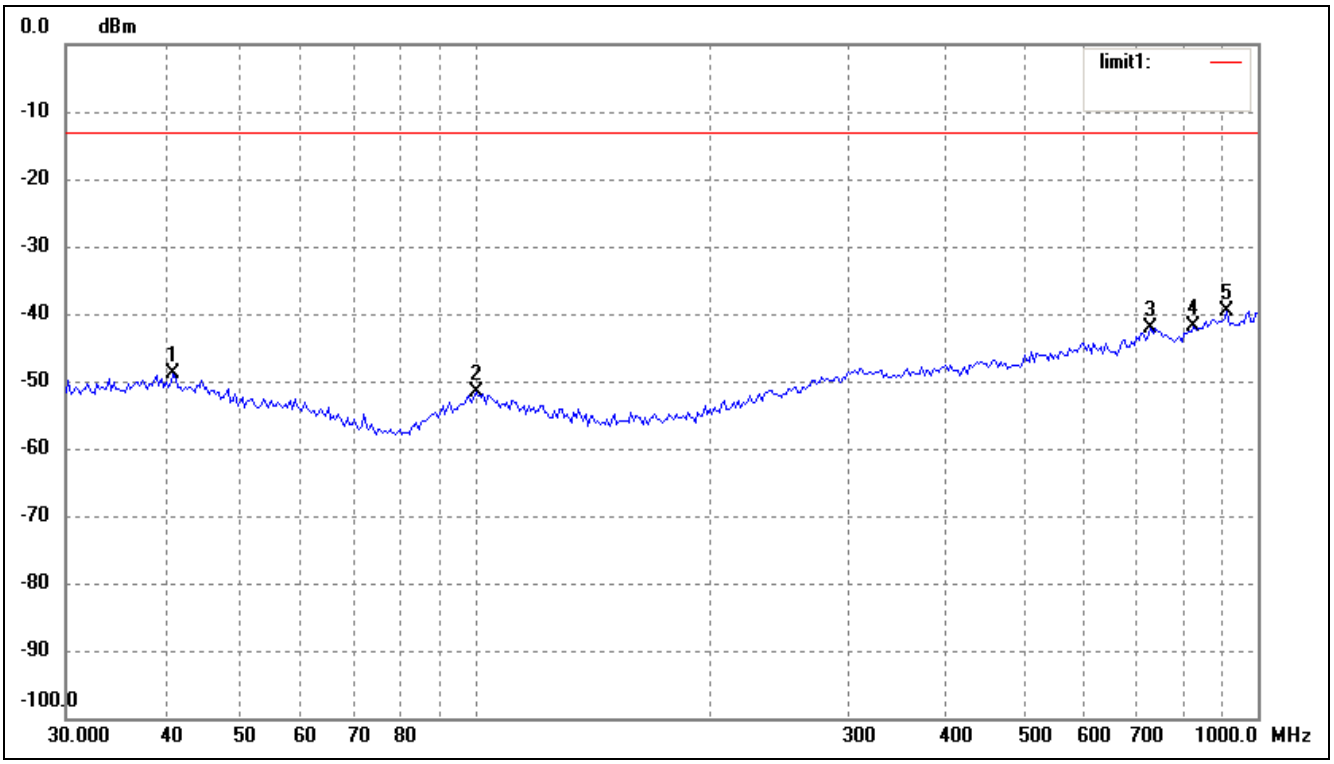
For band II HSDPA Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	37.5479	-69.79	20.27	-49.52	-13.00	-36.52	ERP
2	107.5101	-69.24	17.16	-52.08	-13.00	-39.08	ERP
3	273.2341	-68.90	19.67	-49.23	-13.00	-36.23	ERP
4	582.7425	-68.78	24.40	-44.38	-13.00	-31.38	ERP
5	744.8661	-69.59	27.10	-42.49	-13.00	-29.49	ERP
6	875.2470	-68.26	28.42	-39.84	-13.00	-26.84	ERP

Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	41.1320	-69.26	20.33	-48.93	-13.00	-35.93	ERP
2	100.2286	-69.45	17.92	-51.53	-13.00	-38.53	ERP
3	729.3583	-68.85	26.67	-42.18	-13.00	-29.18	ERP
4	827.4934	-68.75	26.91	-41.84	-13.00	-28.84	ERP
5	912.8620	-67.90	28.31	-39.59	-13.00	-26.59	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	-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	13.38	-46.66	-13.00	-33.66	V
2472.6	-58.95	15.25	-43.70	-13.00	-30.70	V
Middle Channel (836.4MHz)						
1673.2	-60.69	10.25	-50.44	-13.00	-37.44	H
2509.8	-59.79	14.02	-45.77	-13.00	-32.77	H
1673.2	-60.04	13.38	-46.66	-13.00	-33.66	V
2509.8	-58.95	15.25	-43.70	-13.00	-30.70	V
High Channel (848.8MHz)						
1697.6	-60.69	10.25	-50.44	-13.00	-37.44	H
2546.4	-59.79	14.02	-45.77	-13.00	-32.77	H
1697.6	-60.04	13.38	-46.66	-13.00	-33.66	V
2546.4	-58.95	15.25	-43.70	-13.00	-30.70	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	-57.64	-0.75	-58.39	-13.00	-45.39	H
5550.6	-59.33	6.91	-52.42	-13.00	-39.42	H
3700.4	-59.37	10.27	-49.10	-13.00	-36.10	V
5550.6	-59.25	15.25	-44.00	-13.00	-31.00	V
Middle Channel (1880.0MHz)						
3760.0	-59.45	14.98	-54.47	-13.00	-31.47	H
5640.0	-59.97	17.02	-52.95	-13.00	-29.95	H
3760.0	-59.80	15.77	-44.03	-13.00	-31.03	V
5640.0	-59.29	16.34	-42.95	-13.00	-29.95	V
High Channel (1909.8MHz)						
3819.6	-62.88	9.92	-52.96	-13.00	-39.96	H
5729.4	-67.84	13.47	-54.37	-13.00	-41.37	H
3819.6	-60.70	16.97	-43.73	-13.00	-30.73	V
5729.4	-60.05	15.46	-44.59	-13.00	-31.59	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	-69.45	14.98	-54.47	-13.00	-41.47	H
2479.2	-69.97	17.02	-52.95	-13.00	-39.95	H
1652.8	-43.42	-0.50	-43.92	-13.00	-30.92	V
2479.2	-57.65	13.77	-43.88	-13.00	-30.88	V
Middle Channel (836.4MHz)						
1673.2	-58.68	6.86	-51.82	-13.00	-38.82	H
2509.8	-69.17	14.62	-54.55	-13.00	-41.55	H
1673.2	-59.63	15.67	-43.96	-13.00	-30.96	V
2509.8	-60.66	17.01	-43.65	-13.00	-30.65	V
High Channel (846.6MHz)						
1679.6	-57.79	6.86	-50.93	-13.00	-37.93	H
2546.4	-70.81	15.03	-55.78	-13.00	-42.78	H
1679.6	-53.29	6.86	-46.43	-13.00	-33.43	V
2546.4	-59.73	13.66	-46.07	-13.00	-33.07	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	-58.49	4.02	-54.47	-13.00	-41.47	H
5557.2	-69.10	16.53	-52.57	-13.00	-39.57	H
3704.8	-44.46	-1.38	-45.84	-13.00	-32.84	V
5557.2	-59.98	16.32	-43.66	-13.00	-30.66	V
Middle Channel (1880.0MHz)						
3760.0	-56.34	-0.63	-56.97	-13.00	-43.97	H
5640.0	-68.06	10.61	-57.45	-13.00	-44.45	H
3760.0	-59.29	16.34	-42.95	-13.00	-29.95	V
5640.0	-59.35	15.33	-44.02	-13.00	-31.02	V
High Channel (1907.6MHz)						
3815.2	-68.92	15.33	-53.59	-13.00	-40.59	H
5722.8	-69.84	15.33	-54.51	-13.00	-41.51	H
3815.2	-60.05	15.46	-44.59	-13.00	-31.59	V
5722.8	-50.77	6.91	-43.86	-13.00	-30.86	V

Note: Margin= (Reading+ Correct)- 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.

9.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Aglient	Spectrum Analyzer	E4402B-ESA	US41192821	2014-05-28	2015-05-27
Rohde & Schwarz	Universal Radio Communication	CMU200	112012	2014-05-28	2015-05-27
GONGWEN	Moisture Test Chamber	GDS-150	SEMT-0013	2014-05-28	2015-05-27

9.3 Test Procedure

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

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

9.4 Environmental Conditions

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

9.5 Summary of Test Results/Plots

For Cellular Band GSM Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	33	0.0394
40	3.7	36	0.0430
30	3.7	28	0.0335
20	3.7	20	0.0239
10	3.7	-20	-0.0239
0	3.7	-22	-0.0263
-10	3.7	-25	-0.0299
-20	3.7	-32	-0.0383

For PCS Band GSM Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	57	0.0303
40	3.7	43	0.0229
30	3.7	47	0.0250
20	3.7	46	0.0245
10	3.7	44	0.0234
0	3.7	-38	-0.0202
-10	3.7	-48	-0.0255
-20	3.7	-48	-0.0255

For Cellular Band GPRS Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	44	0.0518
40	3.7	32	0.0377
30	3.7	28	0.0330
20	3.7	21	0.0247
10	3.7	21	-0.0247
0	3.7	-19	-0.0224
-10	3.7	-38	-0.0448
-20	3.7	-38	-0.0448

For PCS Band GPRS Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	44	0.0518
40	3.7	32	0.0377
30	3.7	28	0.0330
20	3.7	21	0.0247
10	3.7	21	-0.0247
0	3.7	-19	-0.0224
-10	3.7	-38	-0.0448
-20	3.7	-38	-0.0448

For WCDMA Band V Mode

Reference Frequency(Middle Channel): 836.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-50	-0.0598
40	3.7	-45	-0.0538
30	3.7	-38	-0.0454
20	3.7	-33	-0.0394
10	3.7	-38	-0.0454
0	3.7	-40	-0.0478
-10	3.7	-45	-0.0538
-20	3.7	-56	-0.0669

For WCDMA Band II Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-24	-0.0128
40	3.7	-16	-0.0085
30	3.7	-15	-0.0080
20	3.7	-10	-0.0053
10	3.7	-11	-0.0059
0	3.7	-14	-0.0074
-10	3.7	-23	-0.0122
-20	3.7	-28	-0.0149

For HSDPA Band V Mode

Reference Frequency(Middle Channel): 836.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-55	-0.0658
40	3.7	-43	-0.0514
30	3.7	-38	-0.0454
20	3.7	-40	-0.0478
10	3.7	-46	-0.0550
0	3.7	-53	-0.0634
-10	3.7	-47	-0.0562
-20	3.7	-55	-0.0658

For HSUPA Band V Mode

Reference Frequency(Middle Channel): 836.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-44	-0.0234
40	3.7	-37	-0.0197
30	3.7	-52	-0.0277
20	3.7	-33	-0.0176
10	3.7	-40	-0.0213
0	3.7	-37	-0.0197
-10	3.7	-45	-0.0239
-20	3.7	-53	-0.0282

For HSDPA Band II Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-58	-0.0335
40	3.7	-54	-0.0312
30	3.7	-42	-0.0242
20	3.7	-38	-0.0219
10	3.7	-39	-0.0225
0	3.7	-42	-0.0242
-10	3.7	-50	-0.0289
-20	3.7	-53	-0.0306

For HSUPA Band V Mode

Reference Frequency(Middle Channel): 836.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-64	-0.0765
40	3.7	-58	-0.0693
30	3.7	-47	-0.0562
20	3.7	-52	-0.0622
10	3.7	-66	-0.0789
0	3.7	-70	-0.0837
-10	3.7	-73	-0.0873
-20	3.7	-82	-0.0980

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	34	0.0406
	3.7	25	0.0299
	4.2	38	0.0454
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	-72	-0.0383
	3.7	-67	-0.0356
	4.2	-70	-0.0372
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	44	0.0526
	3.7	36	0.0430
	4.2	42	0.0502
Reference Frequency(Middle Channel): GPRS 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	-33	-0.0176
	3.7	-27	-0.0144
	4.2	-38	-0.0202

Reference Frequency(Middle Channel): WCDMA 836.4MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	-55	-0.0657
	3.7	-46	-0.0550
	4.2	-43	-0.0514
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	43	0.0229
	3.7	45	0.0239
	4.2	52	0.0277
Reference Frequency(Middle Channel): HSDPA 836.4MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	-38	-0.0454
	3.7	-33	-0.0395
	4.2	-30	-0.0359
Reference Frequency(Middle Channel): HSDPA1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	35	0.0418
	3.7	40	0.0411
	4.2	46	0.0412

Reference Frequency(Middle Channel): HSUPA 836.4MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	-46	-0.0245
	3.7	-40	-0.0213
	4.2	-38	-0.0202
Reference Frequency(Middle Channel): HSUPA1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	-38	-0.0202
	3.7	-33	-0.0176
	4.2	-42	-0.0223

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