

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

For

**Bak USA Technologies Corp.**

**425 Michigan Avenue, Buffalo, New York 14203, USA**

**FCC ID: 2AEY7-S8A001**

**FCC Rules:** FCC Part 22H, FCC Part 24E, FCC Part 27

**Product Description:** Seal

**Tested Model:** 8

**Report No.:** STR16058017I-1

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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

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

#### Client Information

Applicant: Bak USA Technologies Corp.  
Address of applicant: 425 Michigan Avenue, Buffalo, New York 14203, USA

Manufacturer: Shenzhen Wisky Technology Co.,LTD.  
Address of manufacturer: 5th Floor,W2-A Building,Hi-tech Park South 1st Road,  
Nanshan District,Shenzhen

General Description of EUT:	
Product Name:	Seal
Brand Name:	/
Model No.:	8
Hardware version:	T01-V1.1-0113
Software version:	Windows 10
IMEI:	826259502002440
Adapter Model:	SAP050200CN-C
	INPUT:100-240V,50/60Hz,0.6A; OUTPUT:DC5V,2A
Rated Voltage:	DC 3.7V Li-ion Battery
Device Category:	Portable Device
<i>Note: The test data is gathered from a production sample provided by the manufacturer.</i>	

<b>Technical Characteristics of EUT:</b>	
<b>2G</b>	
Support Networks:	GPRS,EDGE
Support Band:	GPRS,EDGE 850/ GPRS,EDGE 1900
Uplink Frequency:	GPRS,EDGE 850: 824~849MHz GPRS,EDGE 1900: 1850~1910MHz
Downlink Frequency:	GPRS/EDGE 850: 869~894MHz GPRS/EDGE 1900: 1930~1990MHz
Max RF Output Power:	GPRS850: 32.07dBm, GPRS1900: 28.88dBm
Type of Emission:	GPRS850: 251KGXW, GPRS1900: 246KGXW EDGE850: 258KG7W, EDGE1900: 257KG7W
Type of Modulation:	GMSK, 8PSK
Type of Antenna:	Integral Antenna
Antenna Gain:	GPRS,EDGE 850: 1.1dBi; GPRS,EDGE 1900: -1.5dBi
GPRS/EDGE Class:	Class 12
<b>3G</b>	
Support Networks:	WCDMA, HSDPA, HSUPA
Support Band:	WCDMA Band 2, WCDMA Band 4, WCDMA Band 5
Uplink Frequency:	WCDMA Band 2: 1850~1910MHz WCDMA Band 4: 1710~1755MHz WCDMA Band 5: 824~849MHz
Downlink Frequency:	WCDMA Band 2: 1930~1990MHz WCDMA Band 4: 2110~2155MHz WCDMA Band 5: 869~894MHz
RF Output Power:	WCDMA Band 2: 22.49dBm, WCDMA Band 4: 24.42dBm WCDMA Band 5: 24.66dBm
Type of Emission:	WCDMA Band 2: 4M10F9W WCDMA Band 4: 4M12F9W WCDMA Band 5: 4M11F9W
Type of Modulation:	BPSK
Antenna Type:	Integral Antenna
Antenna Gain:	WCDMA Band 2: -1.5dBi, WCDMA Band 4: -0.9dBi, WCDMA Band 5: 1.1dBi

## 1.2 Test Standards

The following report is prepared on behalf of the Bak USA Technologies Corp. in accordance with FCC Part 2 subpart J, FCC Part 22 subpart H and FCC Part 24 subpart E and FCC Part 27 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 2 subpart J, FCC Part 22 subpart H and FCC Part 24 subpart E and FCC Part 27 of the Federal Communication Commissions rules.

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

## 1.3 Test Methodology

All measurements contained in this report were conducted with ANSI/TIA-603-D: 2010 and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. The measurement guide KDB 971168 D01 Power Meas License Digital Systems v02r02 shall be performed also.

## 1.4 Test Facility

- **FCC – Registration No.: 934118**

Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

- **Industry Canada (IC) Registration No.: 11464A**

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

- **CNAS Registration No.: L4062**

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101)

## 1.5 EUT Setup and Test Mode

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

Test Mode List		
Test Mode	Description	Remark
TM1	GPRS 850	Low, Middle, High Channels
TM2	EDGE 850	Low, Middle, High Channels
TM3	GPRS 1900	Low, Middle, High Channels
TM4	EDGE 1900	Low, Middle, High Channels
TM5	WCDMA Band 5	Low, Middle, High Channels
TM6	HSDPA Band 5	Low, Middle, High Channels
TM7	HSUPA Band 5	Low, Middle, High Channels
TM8	WCDMA Band 4	Low, Middle, High Channels
TM9	HSDPA Band 4	Low, Middle, High Channels
TM10	HSUPA Band 4	Low, Middle, High Channels
TM11	WCDMA Band 2	Low, Middle, High Channels
TM12	HSDPA Band 2	Low, Middle, High Channels
TM13	HSUPA Band 2	Low, Middle, High Channels

Testing Configure			
Support Band	Support Standard	Channel Frequency	Channel Number
GSM 850	GPRS/EDGE	824.2 MHz	128
		836.6 MHz	189
		848.8 MHz	251
PCS 1900	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 4	WCDMA/HSDPA/HSUPA	1712.4 MHz	1312
		1732.4 MHz	1412
		1752.6 MHz	1513
WCDMA Band 2	WCDMA/HSDPA/HSUPA	1852.4 MHz	9262
		1880.0 MHz	9400
		1907.6 MHz	9538

Note: the transmitter has been tested on the communications mode of GSM, GPRS, 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
DC Cable	1.0	Unshielded	Without Ferrite

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

Special Cable List and Details

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

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
Conducted Emissions	Conducted	± 2.88dB
Transmitter Spurious Emissions	Radiated	± 5.1dB

1.7 Test Equipment List and Details

Kind of Equipment	Manufacturer	Type	S/N	Cal Date	Due Date
Equipment list of < Shenzhen SEM.Test Technology Co., Ltd.>					
Test SIM card	-		-	N/A	
GSM Tester	Rohde & Schwarz	CMU200	104036	2015-06-17	2016-06-16
Spectrum Analyzer	Agilent	E4407B	MY41440400	2015-06-17	2016-06-16
Spectrum Analyzer	Agilent	N9020A	US47140102	2015-06-17	2016-06-16
Signal Generator	Agilent	83752A	3610A01453	2015-06-17	2016-06-16
Vector Signal Generator	Agilent	N5182A	MY47070202	2015-06-17	2016-06-16
Power Divider	Weinschel	1506A	PM204	2015-06-17	2016-06-16
Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2015-06-17	2016-06-16
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2015-06-17	2016-06-16
Amplifier	Agilent	8447F	3113A06717	2015-06-17	2016-06-16
Amplifier	C&D	PAP-1G18	2002	2015-06-17	2016-06-16
Loop Antenna	Schwarz beck	FMZB 1516	9773	2015-06-17	2016-06-16
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2015-06-17	2016-06-16
Horn Antenna	ETS	3117	00086197	2015-06-17	2016-06-16
Horn Antenna	ETS	3116B	00088203	2015-06-17	2016-06-16

## 2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 1.1307, § 2.1093	RF Exposure	Compliant
§ 22.913 (a), § 24.232 (c), §27.50(d)	RF Output Power	Compliant
§ 24.51, § 27.50	Peak-to-average Ratio (PAR) of Transmitter	Compliant
§ 22.917 (b), § 24.238 (b), § 27.53	Emission Bandwidth	Compliant
§ 22.917 (a), § 24.238 (a), § 27.53(h)	Spurious Emissions at Antenna Terminal	Compliant
§ 22.917 (a), § 24.238 (a), § 27.53(h)	Spurious Radiation Emissions	Compliant
§ 22.917 (a), § 24.238 (a), § 27.53(h)	Out of Band Emissions	Compliant
§ 22.355, § 24.235, § 27.54	Frequency Stability	Compliant



### **3. RF Exposure**

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#### **3.1 Standard Applicable**

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

#### **3.2 Test Result**

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

## 4. RF Output Power

### 4.1 Standard Applicable

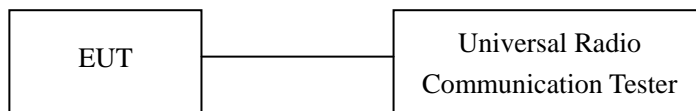
According to §22.913(a)(2), The ERP of mobile and portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

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

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

### 4.2 Test Procedure

Conducted output power test method:



Radiated power test method:

- 1.The setup of EUT is according with per ANSI/TIA Standard 603D and ANSI C63.4-2014 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

### 4.3 Environmental Conditions

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

### 4.4 Summary of Test Results/Plots

#### Max. Radiated Power

ERP For GPRS Mode GSM 850

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
824.2	25.64	1.5	0	H	1.5	0	24.14	38.45
824.2	26.37	1.5	0	V	1.5	0	24.87	38.45
Middle Channel								
836.4	26.48	1.5	0	H	1.5	0	24.98	38.45
836.4	25.16	1.5	0	V	1.5	0	23.66	38.45
High Channel								
848.8	24.98	1.5	0	H	1.5	0	23.48	38.45
848.8	23.98	1.5	0	V	1.5	0	22.48	38.45

EIRP For GPRS Mode PCS 1900

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	DBm	dBm
Low Channel								
1850.2	14.96	1.5	0	H	1.9	7.7	20.76	33.00
1850.2	15.62	1.5	0	V	1.9	7.7	21.42	33.00
Middle Channel								
1880.0	16.51	1.5	0	H	1.9	7.7	22.31	33.00
1880.0	16.33	1.5	0	V	1.9	7.7	22.13	33.00
High Channel								
1909.8	15.35	1.5	0	H	1.9	7.7	21.15	33.00
1909.8	14.98	1.5	0	V	1.9	7.7	20.78	33.00

## ERP For EDGE Mode GSM850

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
824.2	21.35	1.5	0	H	1.5	0	19.85	38.45
824.2	20.16	1.5	0	V	1.5	0	18.66	38.45
Middle Channel								
836.6	23.02	1.5	0	H	1.5	0	21.52	38.45
836.6	20.64	1.5	0	V	1.5	0	19.14	38.45
High Channel								
848.8	20.17	1.5	0	H	1.5	0	18.67	38.45
848.8	23.98	1.5	0	V	1.5	0	22.48	38.45

## EIRP For EDGE Mode PCS1900

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	DBm	dBm
Low Channel								
1850.2	19.68	1.5	0	H	1.9	7.7	25.48	33.00
1850.2	18.96	1.5	0	V	1.9	7.7	24.76	33.00
Middle Channel								
1880.0	15.31	1.5	0	H	1.9	7.7	21.11	33.00
1880.0	13.19	1.5	0	V	1.9	7.7	18.99	33.00
High Channel								
1909.8	16.43	1.5	0	H	1.9	7.7	22.23	33.00
1909.8	13.25	1.5	0	V	1.9	7.7	19.05	33.00

## ERP For WCDMA Mode Band 5

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	22.06	1.5	0	H	1.5	0	20.56	38.45
826.4	23.05	1.5	0	V	1.5	0	21.55	38.45
Middle Channel								
836.6	19.98	1.5	0	H	1.5	0	18.48	38.45
836.6	20.04	1.5	0	V	1.5	0	18.54	38.45
High Channel								
846.6	19.44	1.5	0	H	1.5	0	17.94	38.45
846.6	20.65	1.5	0	V	1.5	0	19.15	38.45

## ERP For HSDPA Mode Band 5

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	21.03	1.5	0	H	1.5	0	19.53	38.45
826.4	21.68	1.5	0	V	1.5	0	20.18	38.45
Middle Channel								
836.6	19.54	1.5	0	H	1.5	0	18.04	38.45
836.6	20.78	1.5	0	V	1.5	0	19.28	38.45
High Channel								
846.6	20.84	1.5	0	H	1.5	0	19.34	38.45
846.6	19.85	1.5	0	V	1.5	0	18.35	38.45

ERP For HSUPA Mode Band 5

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	20.01	1.5	0	H	1.5	0	18.51	38.45
826.4	20.87	1.5	0	V	1.5	0	19.37	38.45
Middle Channel								
836.6	19.65	1.5	0	H	1.5	0	18.15	38.45
836.6	21.07	1.5	0	V	1.5	0	19.57	38.45
High Channel								
846.6	19.46	1.5	0	H	1.5	0	17.96	38.45
846.6	20.85	1.5	0	V	1.5	0	19.35	38.45

EIRP For WCDMA Mode Band 4

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 27 Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
1712.4	14.36	1.5	0	H	1.8	7.7	20.26	30.00
1712.4	12.96	1.5	0	V	1.8	7.7	18.86	30.00
Middle Channel								
1732.4	14.36	1.5	0	H	1.8	7.7	20.26	30.00
1732.4	13.68	1.5	0	V	1.8	7.7	19.58	30.00
High Channel								
1752.6	13.26	1.5	0	H	1.8	7.7	19.16	30.00
1752.6	11.96	1.5	0	V	1.8	7.7	17.86	30.00

EIRP For HSDPA Mode Band 4

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 27 Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
1712.4	13.62	1.50	0.00	H	1.80	7.70	19.52	30.00
1712.4	11.96	1.50	0.00	V	1.80	7.70	17.86	30.00
Middle Channel								
1732.4	13.24	1.50	0.00	H	1.80	7.70	19.14	30.00
1732.4	11.36	1.50	0.00	V	1.80	7.70	17.26	30.00
High Channel								
1752.6	12.22	1.50	0.00	H	1.80	7.70	18.12	30.00
1752.6	10.94	1.50	0.00	V	1.80	7.70	16.84	30.00

EIRP For HSUPA Mode Band 4

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 27 Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
1712.4	11.69	1.50	0.00	H	1.80	7.70	17.59	30.00
1712.4	10.98	1.50	0.00	V	1.80	7.70	16.88	30.00
Middle Channel								
1732.4	11.25	1.50	0.00	H	1.80	7.70	17.15	30.00
1732.4	10.96	1.50	0.00	V	1.80	7.70	16.86	30.00
High Channel								
1752.6	11.35	1.50	0.00	H	1.80	7.70	17.25	30.00
1752.6	11.21	1.50	0.00	V	1.80	7.70	17.11	30.00

EIRP For WCDMA Mode Band 2

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	DBm	dBm
Low Channel								
1852.4	15.32	1.5	0	H	1.9	7.7	21.12	33
1852.4	13.66	1.5	0	V	1.9	7.7	19.46	33
Middle Channel								
1880.0	13.68	1.5	0	H	1.9	7.7	19.48	33
1880.0	14.65	1.5	0	V	1.9	7.7	20.45	33
High Channel								
1907.6	15.32	1.5	0	H	1.9	7.7	21.12	33
1907.6	14.79	1.5	0	V	1.9	7.7	20.59	33

EIRP For HSDPA Mode Band 2

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	DBm	dBm
Low Channel								
1852.4	12.68	1.5	0	H	1.9	7.7	18.48	33
1852.4	13.58	1.5	0	V	1.9	7.7	19.38	33
Middle Channel								
1880.0	15.35	1.5	0	H	1.9	7.7	21.15	33
1880.0	16.49	1.5	0	V	1.9	7.7	22.29	33
High Channel								
1907.6	12.98	1.5	0	H	1.9	7.7	18.78	33
1907.6	13.71	1.5	0	V	1.9	7.7	19.51	33



## EIRP For HSUPA Mode Band 2

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	DBm	dBm
Low Channel								
1852.4	11.85	1.5	0	H	1.9	7.7	17.65	33
1852.4	12.58	1.5	0	V	1.9	7.7	18.38	33
Middle Channel								
1880.0	11.86	1.5	0	H	1.9	7.7	19.45	33
1880.0	14.07	1.5	0	V	1.9	7.7	21.65	33
High Channel								
1907.6	11.19	1.5	0	H	1.9	7.7	16.99	33
1907.6	11.01	1.5	0	V	1.9	7.7	16.81	33

Note: Result = Substitute - Cable loss + Antenna Gain

**Max. Conducted Output Power**

For Cellular Band (GSM850)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
GPRS(1 Slot)	Low Channel	824.2	31.77	38.45
	Middle Channel	836.6	31.1	38.45
	High Channel	848.8	32.07	38.45
EDGE(1 Slot)	Low Channel	824.2	27.96	38.45
	Middle Channel	836.6	27.78	38.45
	High Channel	848.8	27.51	38.45

For PCS Band (GSM1900)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
GPRS(1 Slot)	Low Channel	1850.2	28.74	33.0
	Middle Channel	1880.0	28.88	33.0
	High Channel	1909.8	28.75	33.0
EDGE(1 Slot)	Low Channel	1850.2	25.23	33.0
	Middle Channel	1880.0	25.33	33.0
	High Channel	1909.8	25.16	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	24.12	38.45
	Middle Channel	836.6	24.28	38.45
	High Channel	846.6	24.66	38.45
HSDPA	Low Channel	826.4	22.47	38.45
	Middle Channel	836.6	22.85	38.45
	High Channel	846.6	23.52	38.45
HSUPA	Low Channel	826.4	22.37	38.45
	Middle Channel	836.6	22.39	38.45
	High Channel	846.6	22.42	38.45

## For WCDMA Band 4

Test Mode	Channel	Frequency (MHz)	Output Power (dBm)	FCC Part 27.50 Limit (dBm)
WCDMA	Low Channel	1712.4	24.42	30.0
	Middle Channel	1733.4	23.75	30.0
	High Channel	1752.6	23.77	30.0
HSDPA	Low Channel	1712.4	23.23	30.0
	Middle Channel	1733.4	22.48	30.0
	High Channel	1752.6	21.05	30.0
HSUPA	Low Channel	1712.4	21.78	30.0
	Middle Channel	1733.4	21.19	30.0
	High Channel	1752.6	20.45	30.0

For WCDMA Band 2

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
WCDMA	Low Channel	1852.4	22.30	33.00
	Middle Channel	1880.0	22.40	33.00
	High Channel	1907.6	22.49	33.00
HSDPA	Low Channel	1852.4	20.34	33.00
	Middle Channel	1880.0	21.58	33.00
	High Channel	1907.6	22.00	33.00
HSUPA	Low Channel	1852.4	22.17	33.00
	Middle Channel	1880.0	22.26	33.00
	High Channel	1907.6	22.18	33.00

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

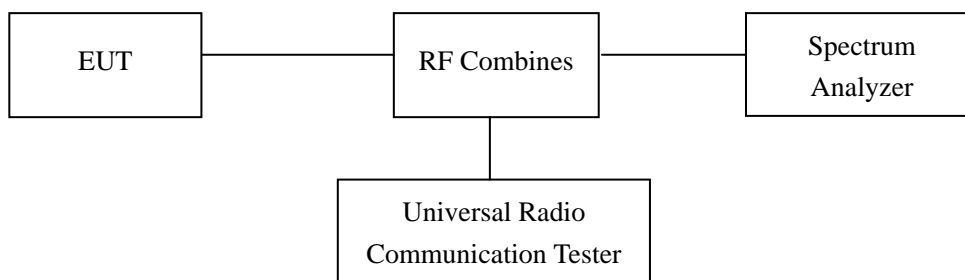
### 5.1 Standard Applicable

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.

### 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

For PCS Band

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GPRS (1 Slot)	Low Channel	1850.2	9.58	13
	Middle Channel	1880.0	9.68	13
	High Channel	1909.8	9.67	13
EDGE (1 Slot)	Low Channel	1850.2	12.61	13
	Middle Channel	1880.0	12.44	13
	High Channel	1909.8	12.03	13

For WCDMA Band 4

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
WCDMA	Low Channel	1712.4	3.10	13
	Middle Channel	1732.4	3.14	13
	High Channel	1752.6	3.08	13
HSDPA	Low Channel	1712.4	4.37	13
	Middle Channel	1732.4	4.39	13
	High Channel	1752.6	4.21	13
HSUPA	Low Channel	1712.4	5.28	13
	Middle Channel	1732.4	5.43	13
	High Channel	1752.6	5.49	13

## For WCDMA Band 2

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
WCDMA	Low Channel	1852.4	2.98	13
	Middle Channel	1880.0	3.06	13
	High Channel	1907.6	3.10	13
HSDPA	Low Channel	1852.4	4.44	13
	Middle Channel	1880.0	4.34	13
	High Channel	1907.6	5.25	13
HSUPA	Low Channel	1852.4	6.34	13
	Middle Channel	1880.0	5.21	13
	High Channel	1907.6	6.30	13

## For WCDMA Band 5

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
WCDMA	Low Channel	826.4	3.45	13
	Middle Channel	836.6	3.55	13
	High Channel	846.6	3.22	13
HSDPA	Low Channel	826.4	4.02	13
	Middle Channel	836.6	4.31	13
	High Channel	846.6	4.35	13
HSUPA	Low Channel	826.4	5.03	13
	Middle Channel	836.6	4.68	13
	High Channel	846.6	4.66	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.

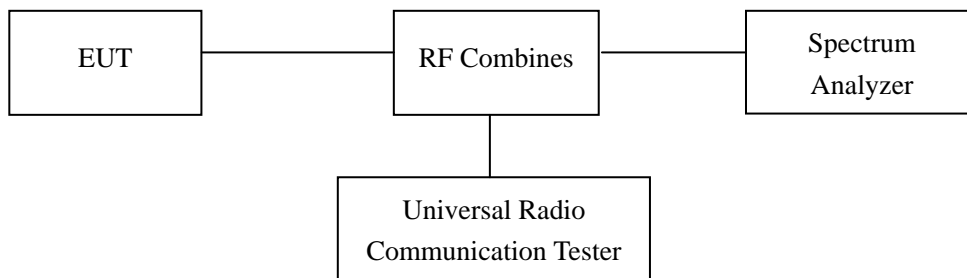
According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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 (GSM850)

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GPRS	128	824.2	247.27	322.3
	190	836.4	250.60	323.5
	251	848.8	250.36	323.7
EDGE	128	824.2	242.59	313.3
	190	836.4	258.22	312.5
	251	848.8	243.68	304.1

For PCS Band(PCS1900)

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GPRS	512	1850.2	245.93	311.6
	661	1880.0	239.32	308.7
	810	1909.8	243.85	315.6
EDGE	512	1850.2	251.95	323.5
	661	1880.0	252.70	317.2
	810	1909.8	256.83	318.7

## For Band 5

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	4132	826.4	4.1013	4.659
	4183	836.6	4.0627	4.642
	4233	846.6	4.0419	4.629
HSDPA	4132	826.4	4.0796	4.645
	4183	836.6	4.0592	4.625
	4233	846.6	4.0288	4.585
HSUPA	4132	826.4	4.1108	4.637
	4183	836.6	4.0512	4.630
	4233	846.6	4.0423	4.636

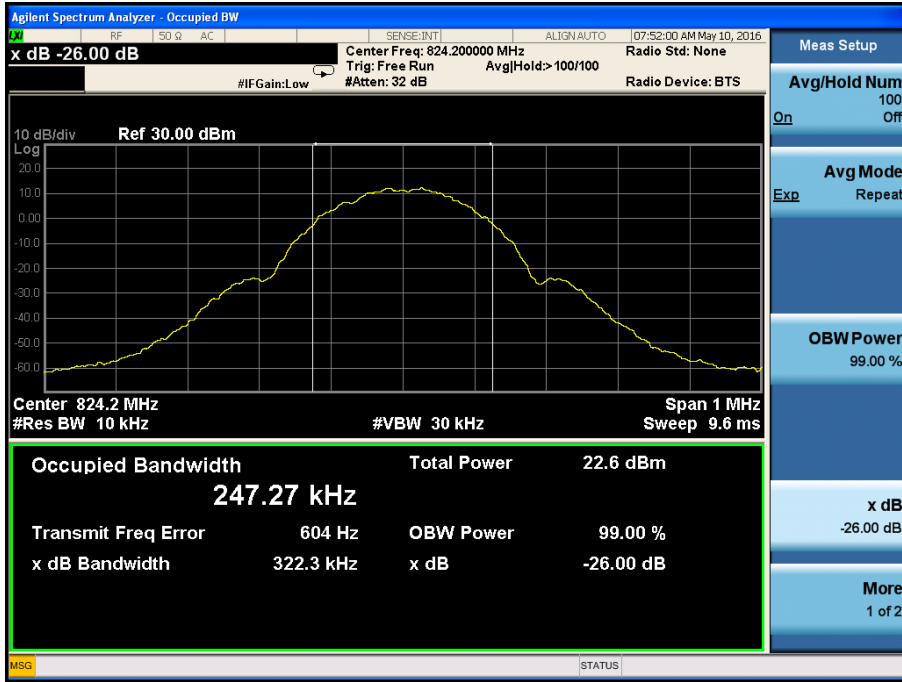
## For Band 4

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	1312	1712.4	4.0838	4.667
	1412	1732.4	4.0675	4.667
	1513	1752.6	4.0882	4.669
HSDPA	1312	1712.4	4.1170	4.716
	1412	1732.4	4.1107	4.709
	1513	1752.6	4.0977	4.712
HSUPA	1312	1712.4	4.0862	4.683
	1412	1732.4	4.0900	4.694
	1513	1752.6	4.0854	4.688

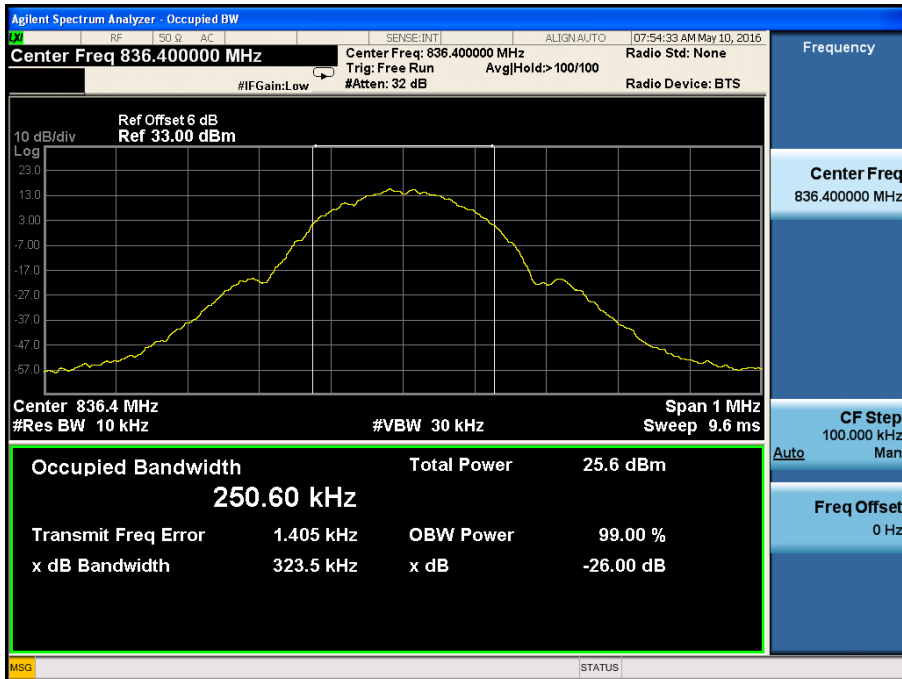
For Band 2

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	9262	1852.4	4.0775	4.702
	9400	1880.0	4.0895	4.662
	9538	1907.6	4.0820	4.678
HSDPA	9262	1852.4	4.1011	4.620
	9400	1880.0	4.0807	4.627
	9538	1907.6	4.0913	4.661
HSUPA	9262	1852.4	4.0854	4.652
	9400	1880.0	4.0899	4.642
	9538	1907.6	4.0882	4.687

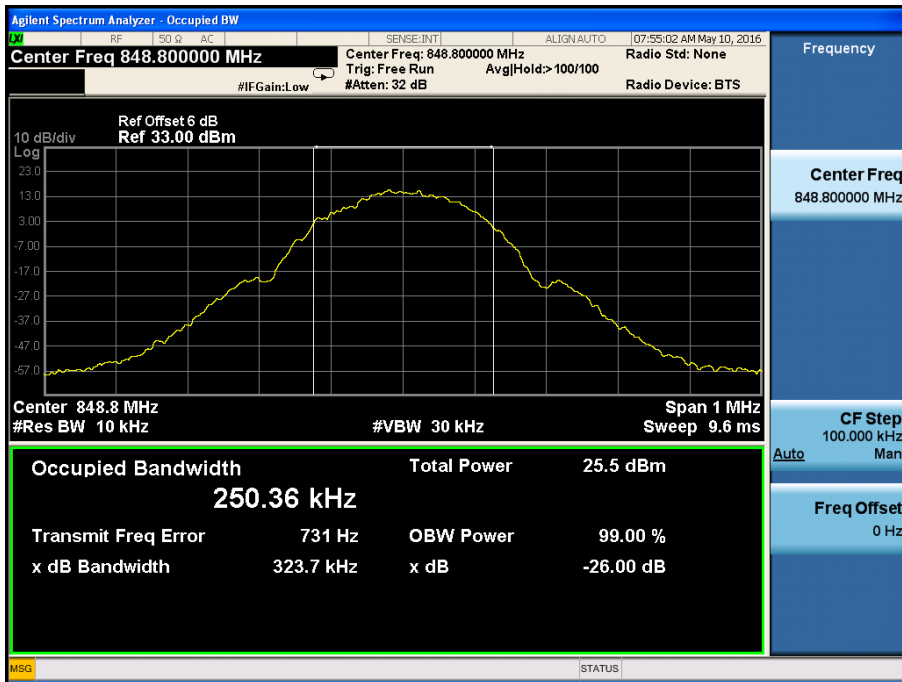
For Cellular Band (GPRS 850)  
Low Channel



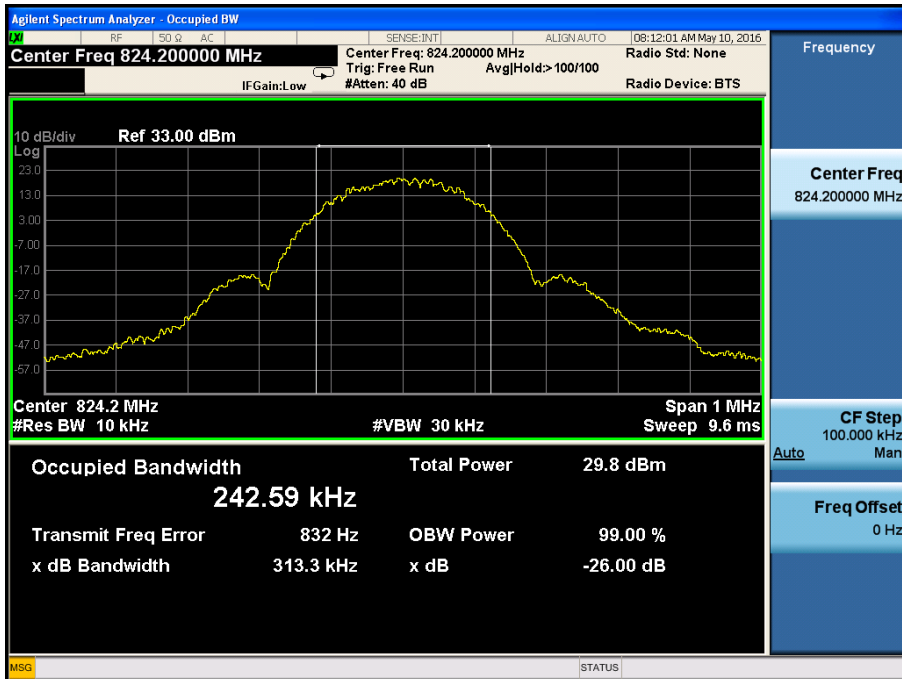
Middle Channel



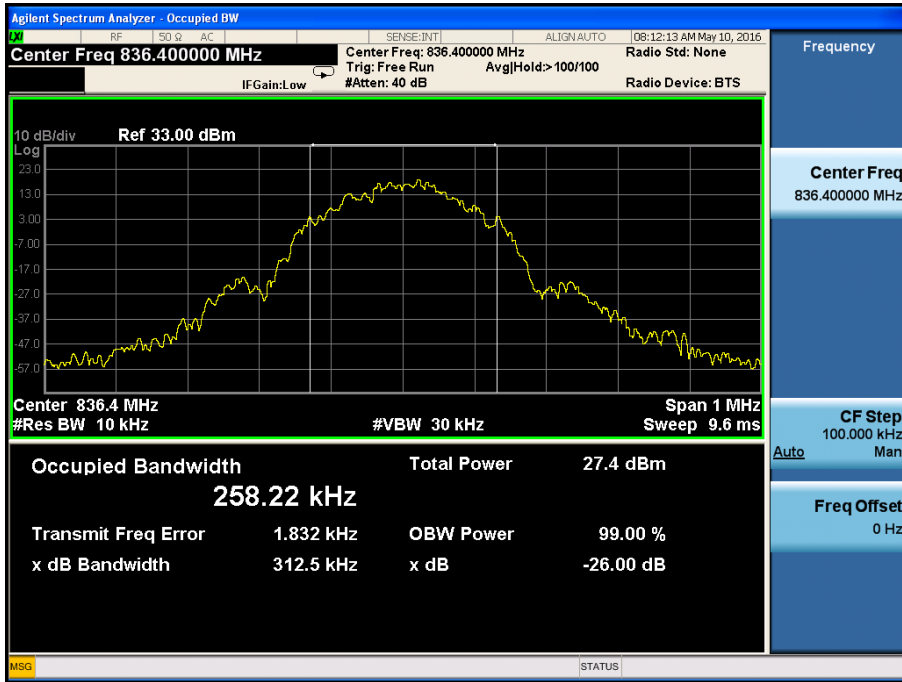
GSM High channel



For EDGE 850  
Low Channel



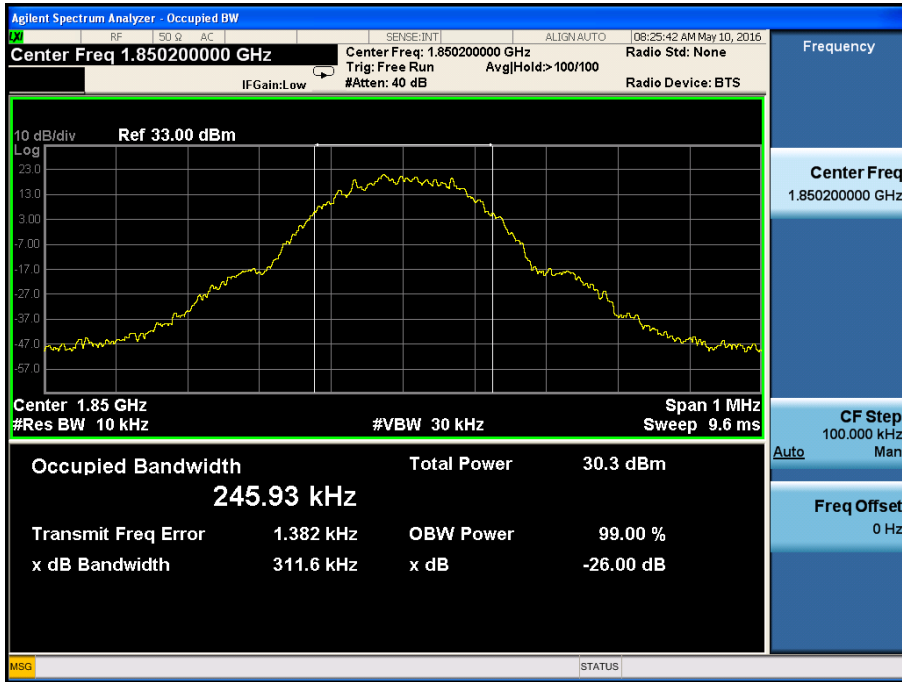
Middle Channel



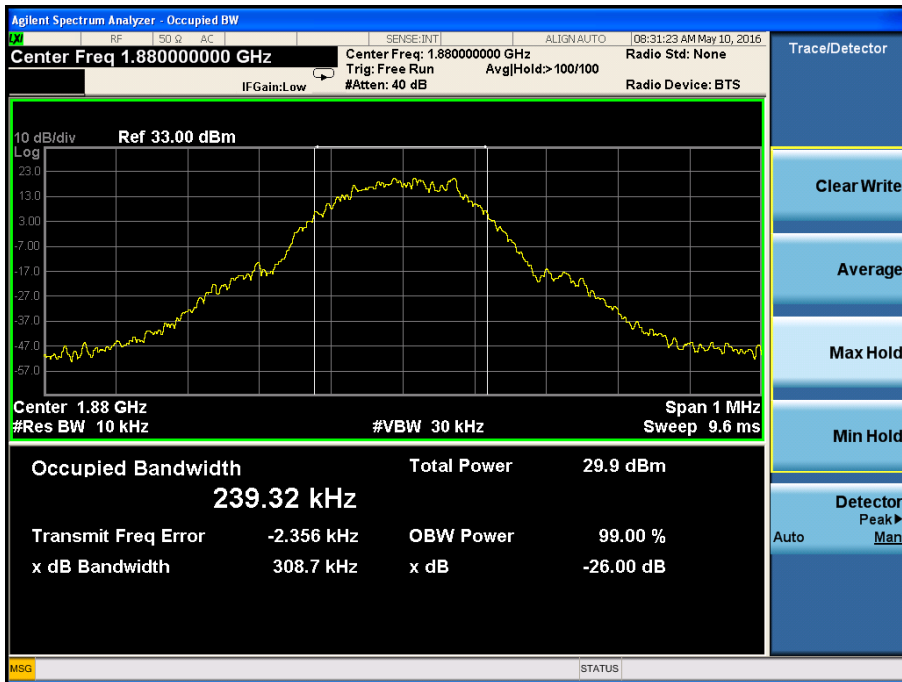
High Channel



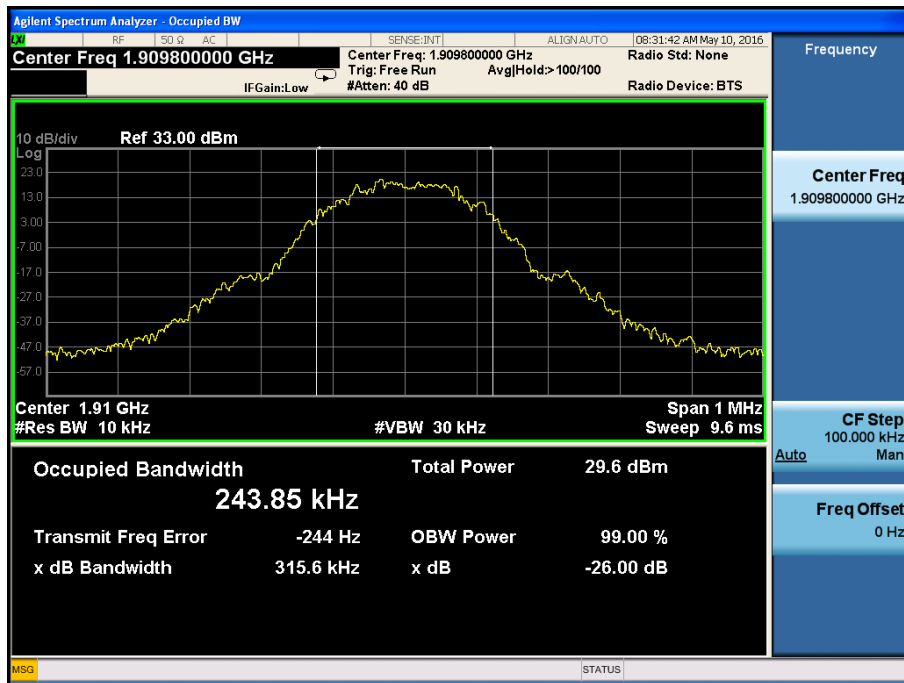
For GPRS 1900  
Low Channel



Middle Channel

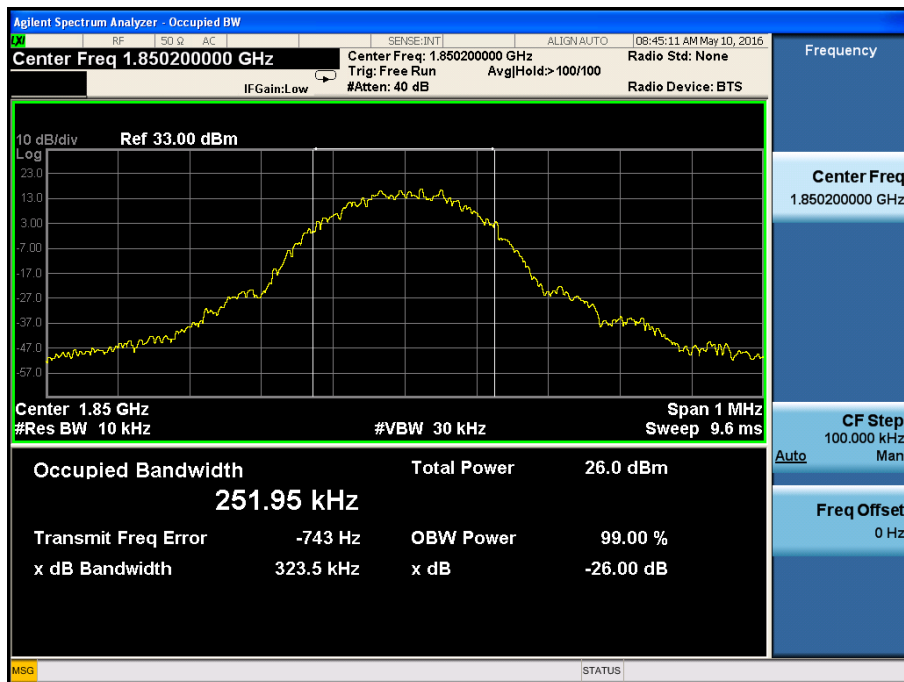


High channel



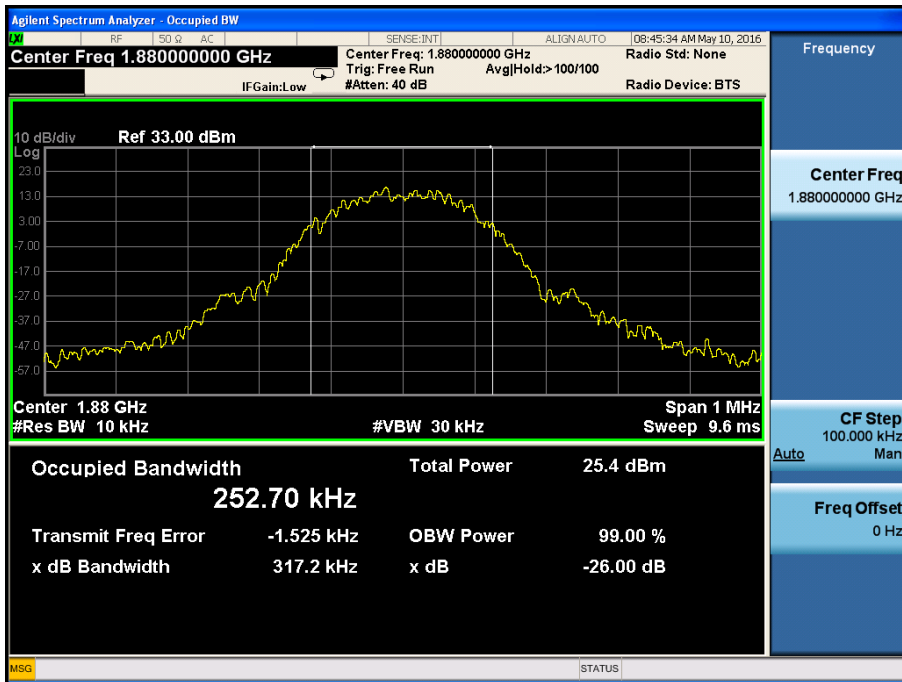
For EDGE 1900

Low Channel

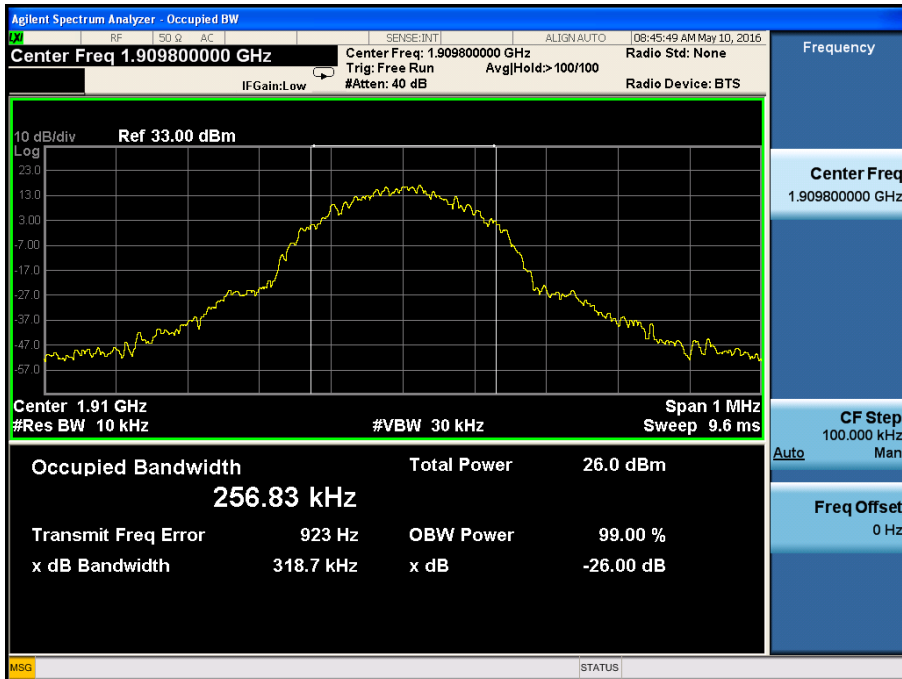




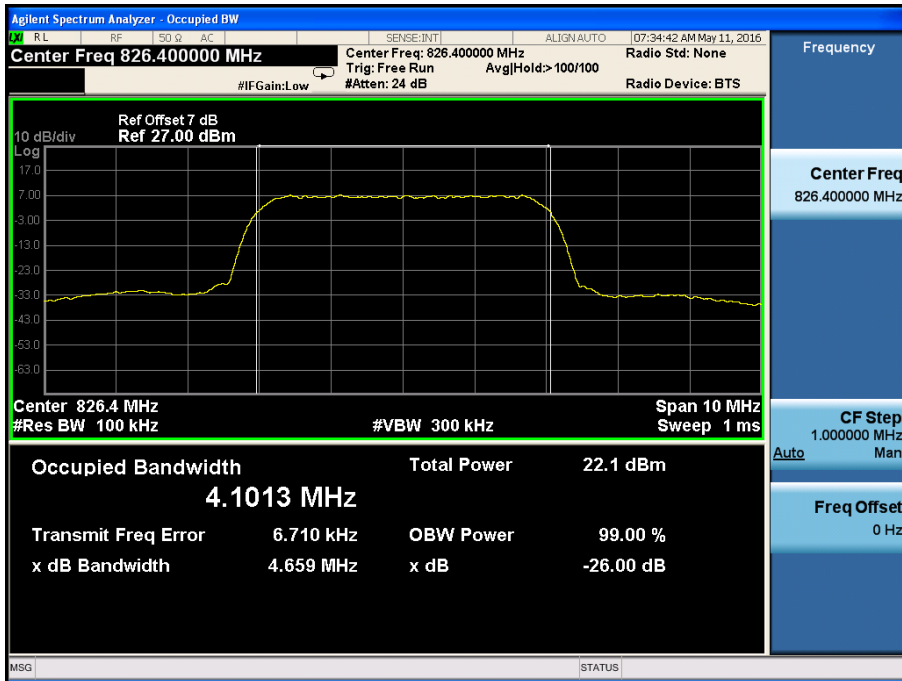
Middle Channel



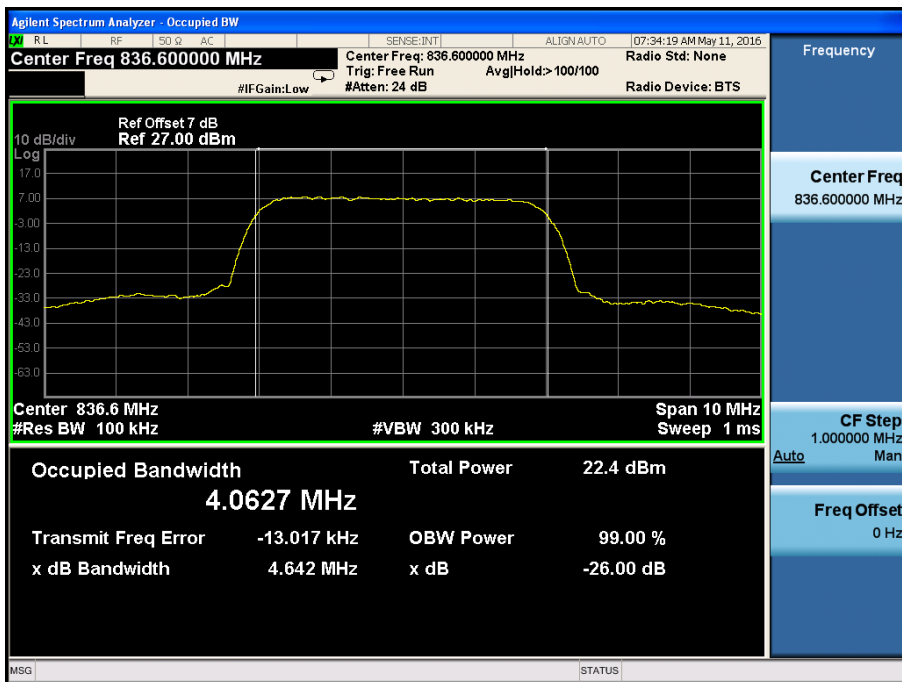
High Channel



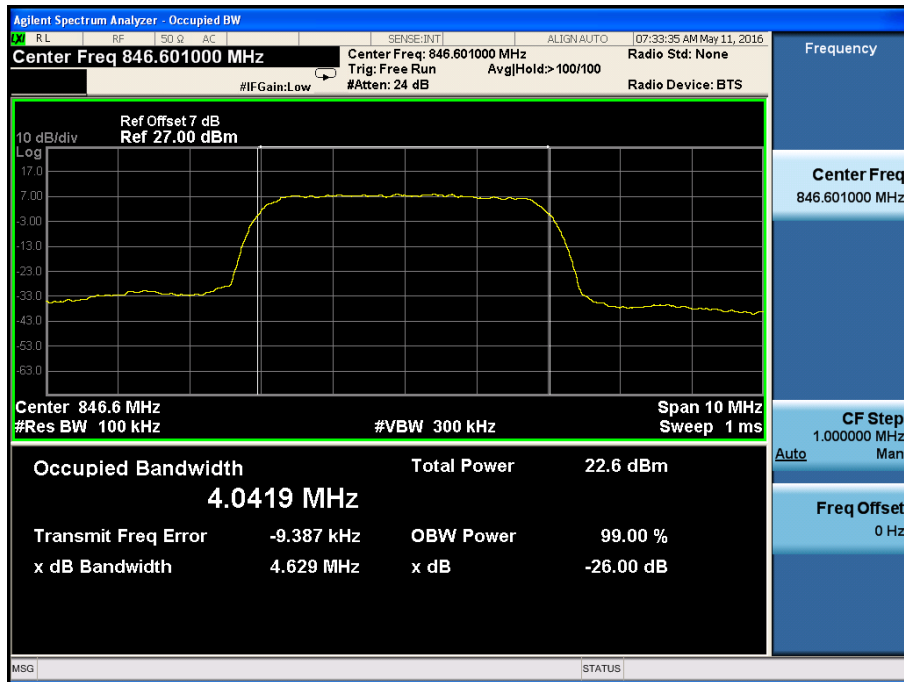
For Band V  
WCDMA Low Channel



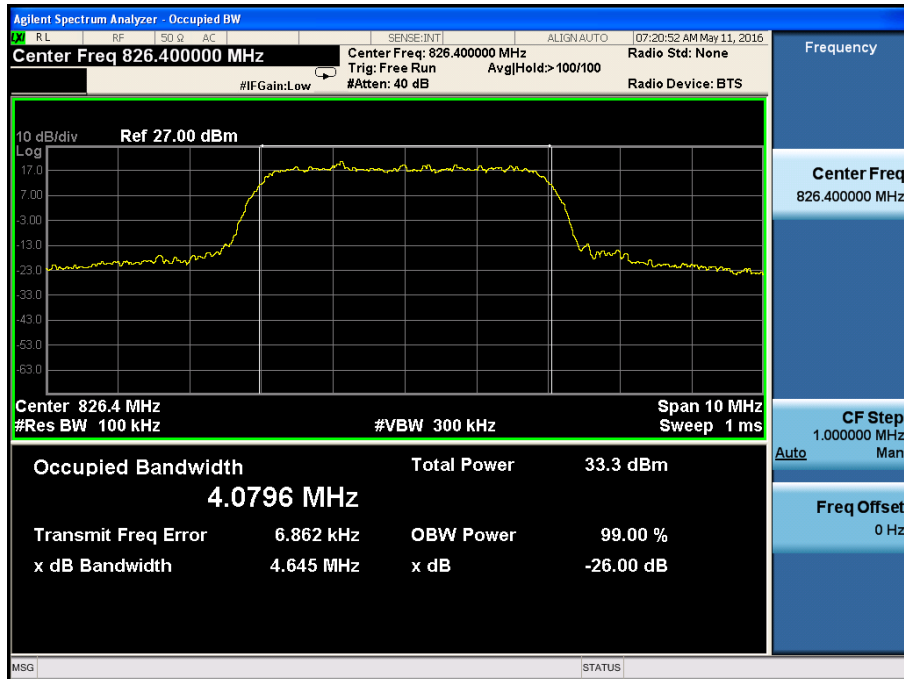
WCDMA Middle Channel



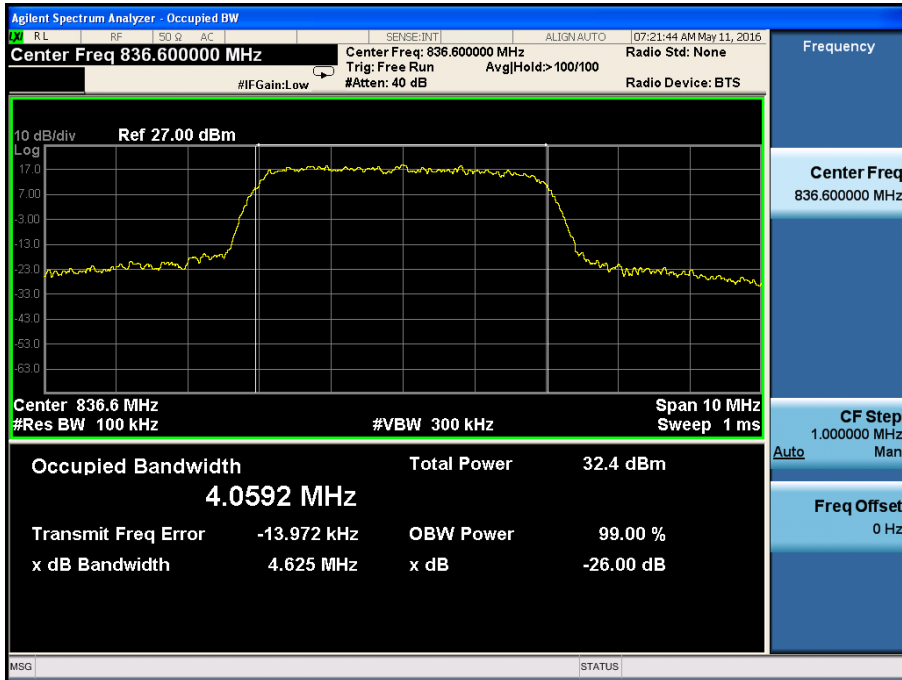
WCDMA High Channel



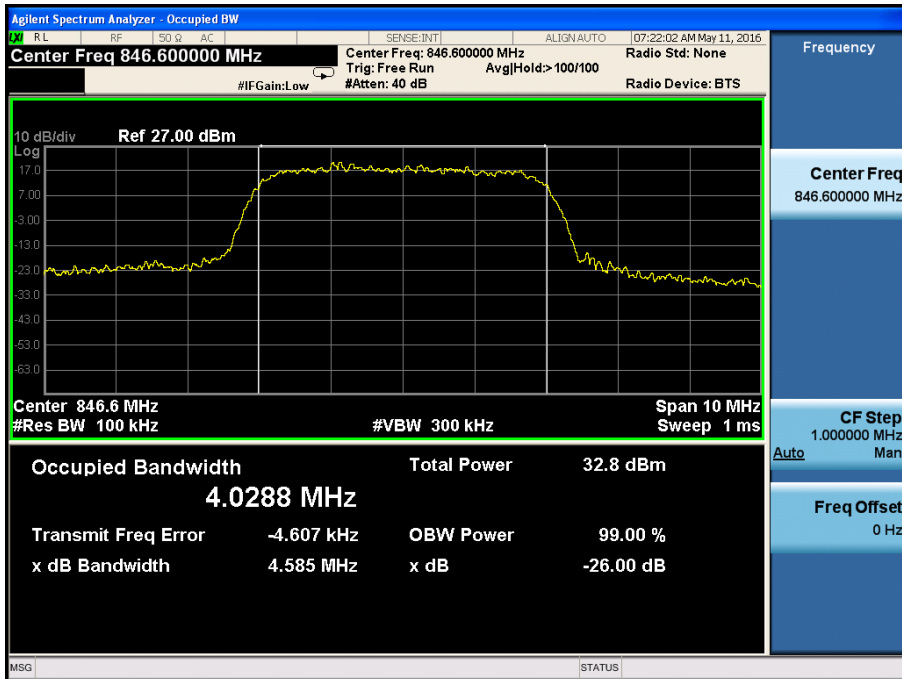
HSDPA Low Channel



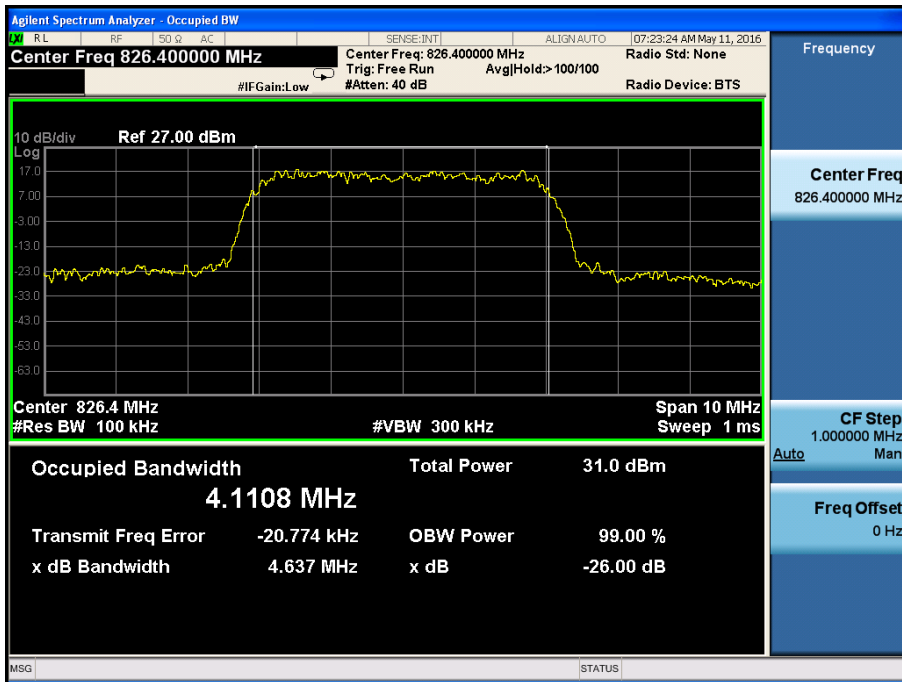
HSDPA Middle Channel



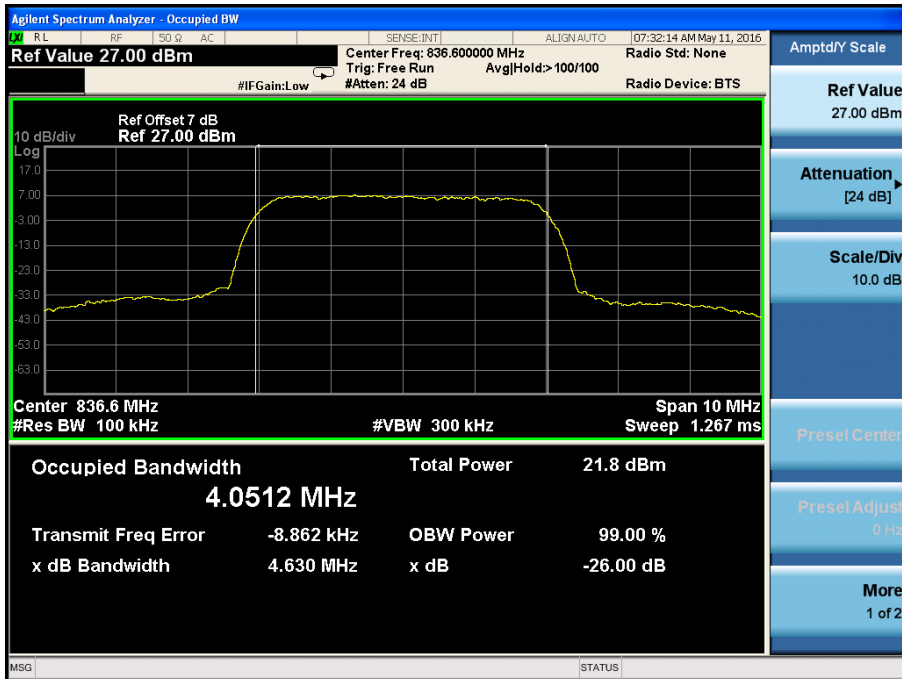
HSDPA High Channel



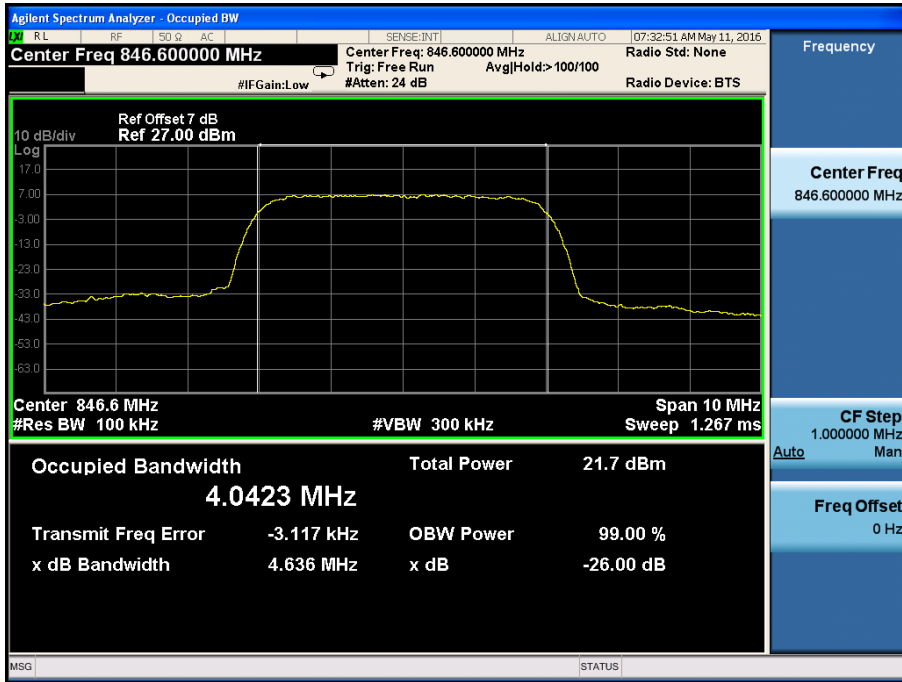
HSUPA Low Channel



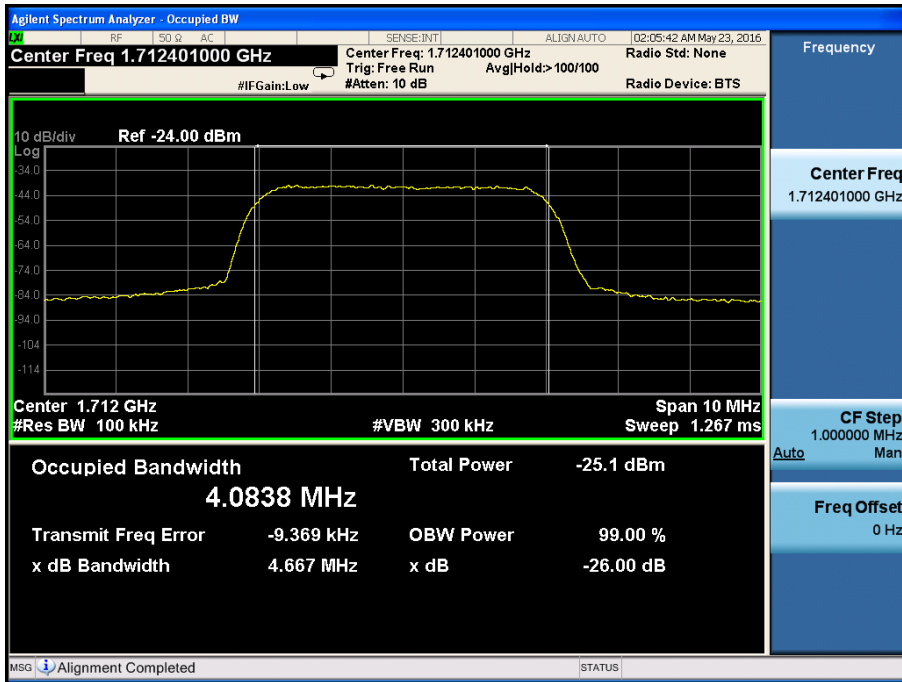
HSUPA Middle Channel



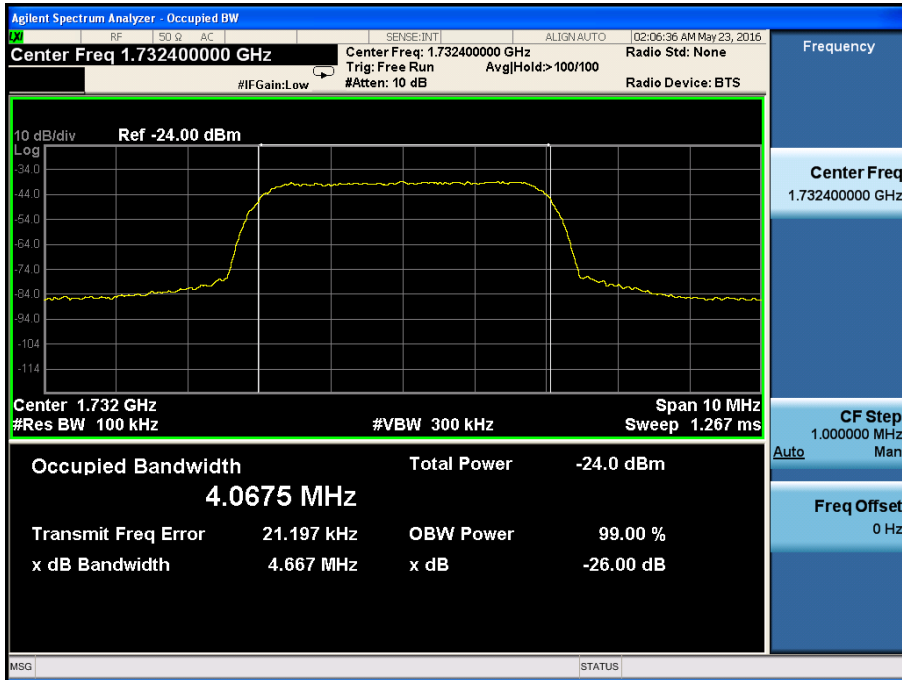
HSUPA High Channel



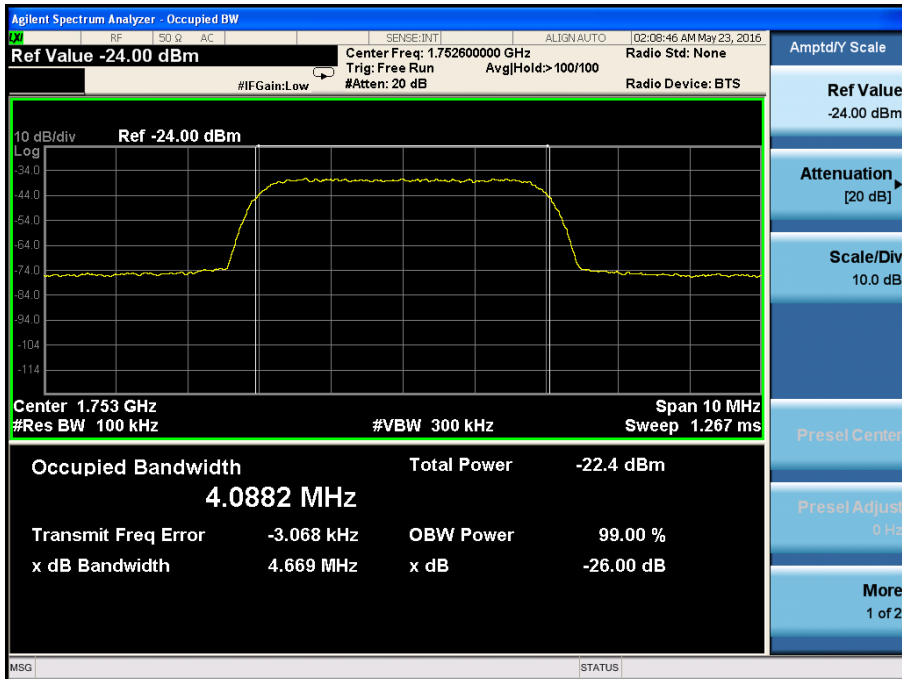
For Band IV  
WCDMA Low Channel



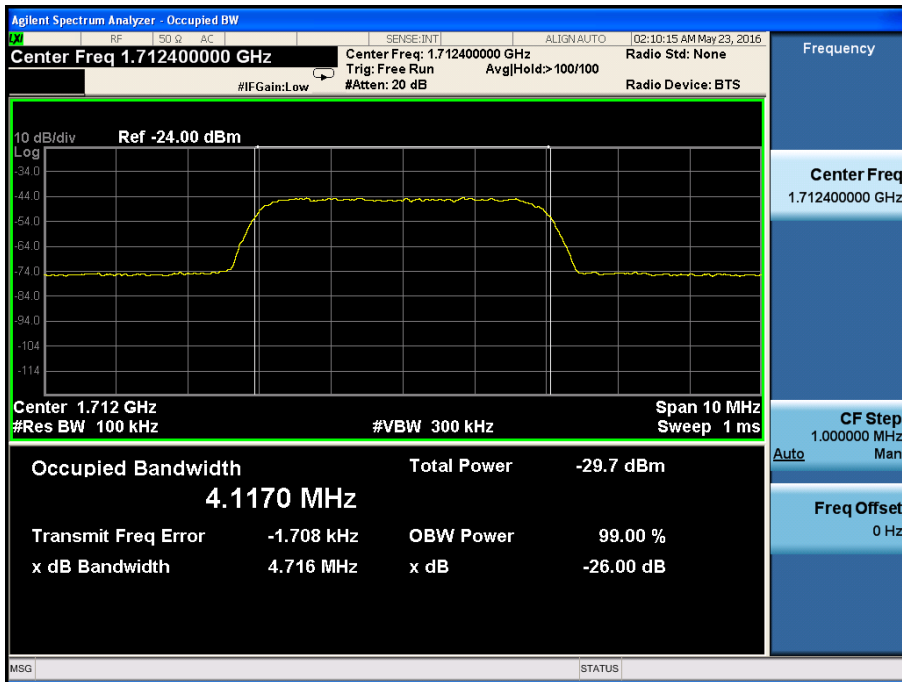
WCDMA Middle Channel



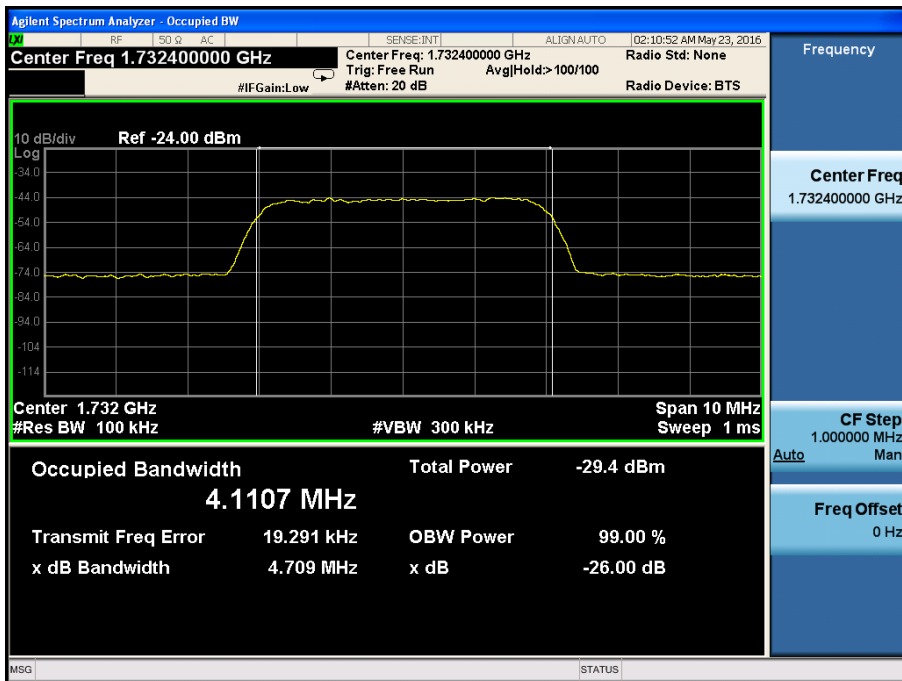
WCDMA High Channel



HSDPA Low Channel

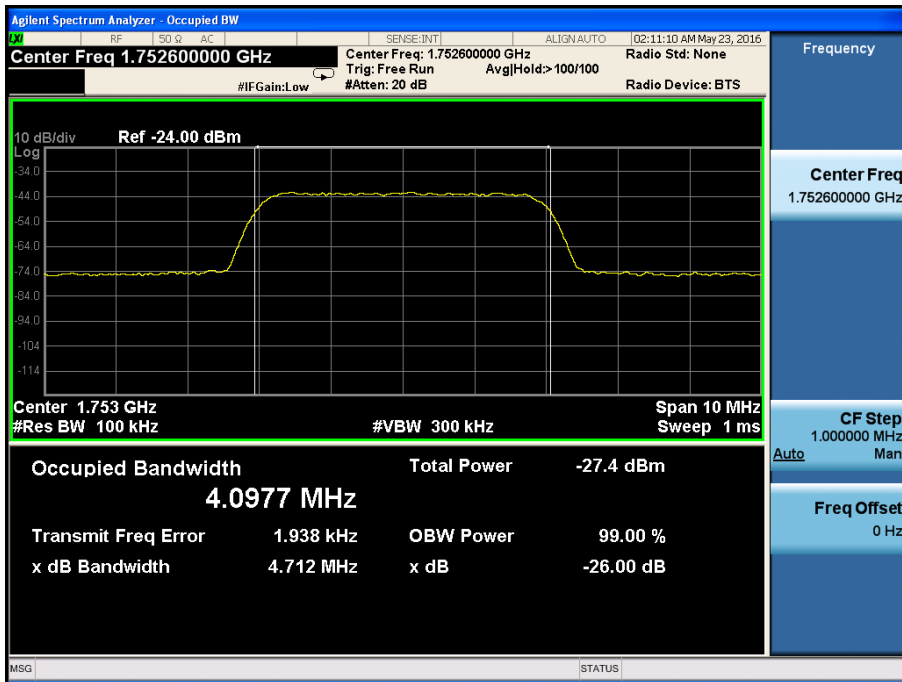


HSDPA Middle Channel

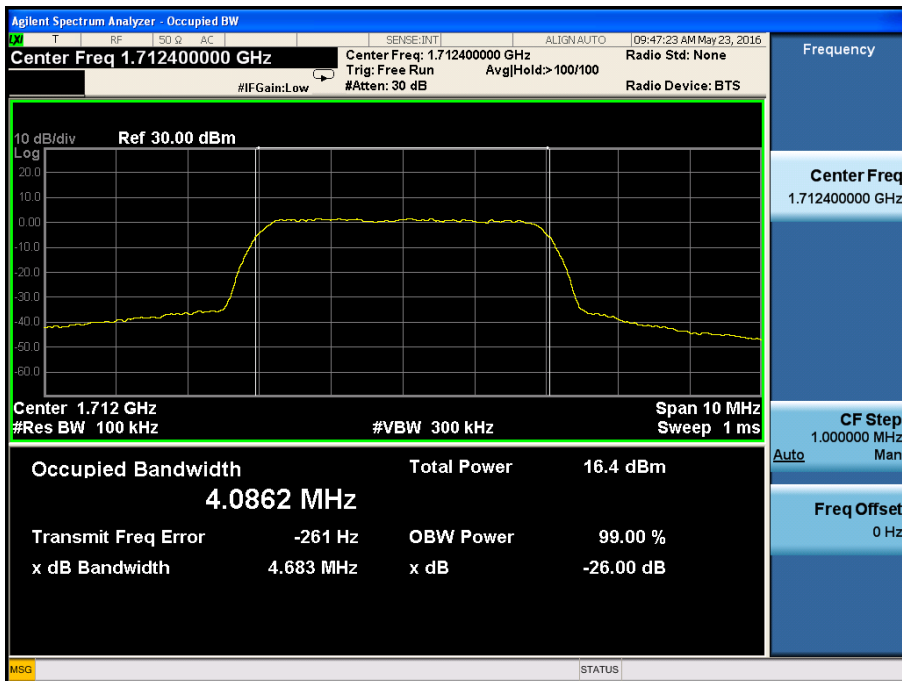




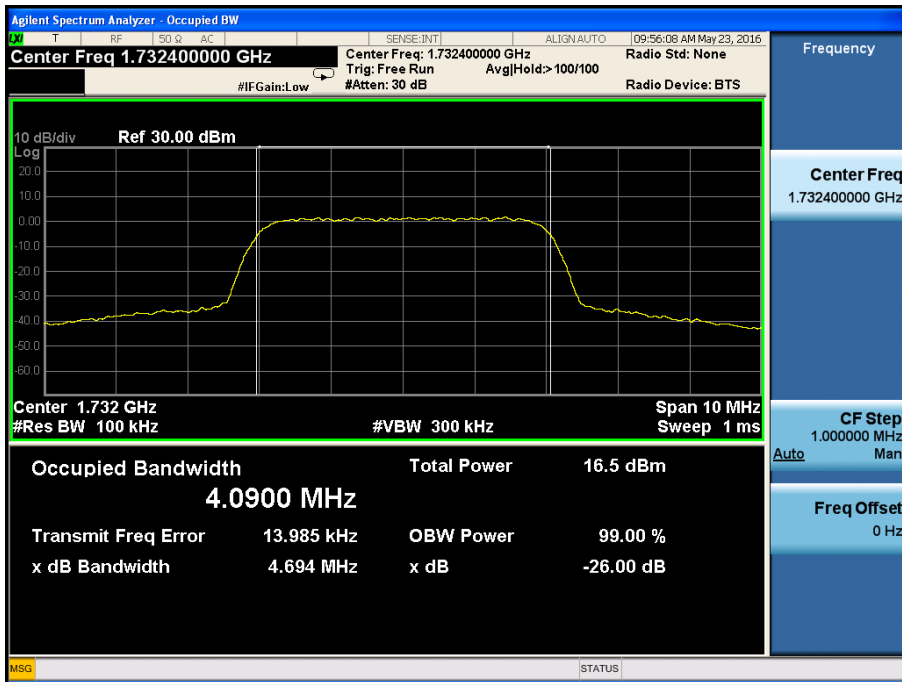
HSDPA High Channel



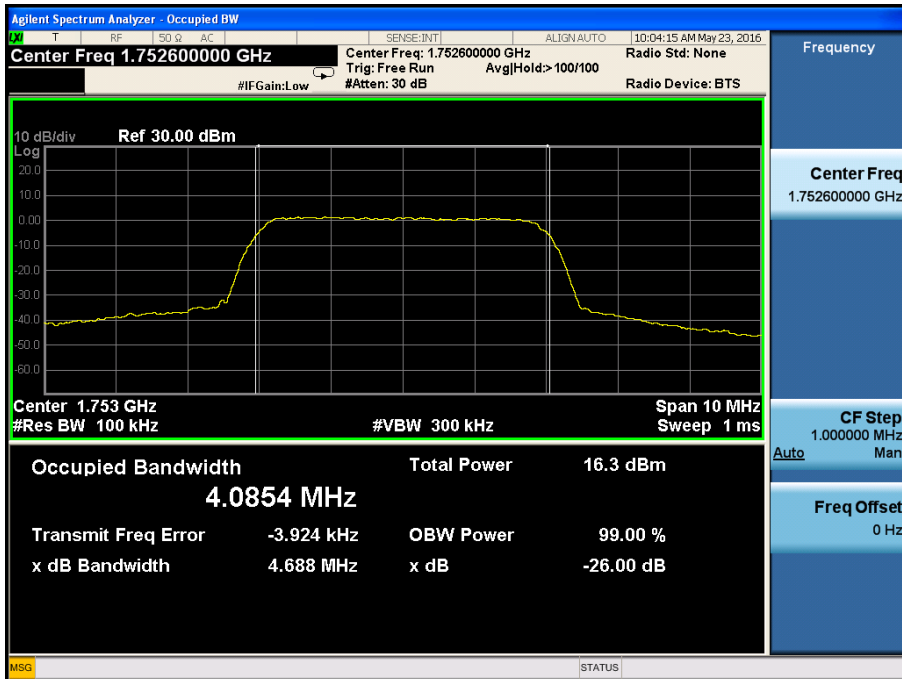
HSUPA Low Channel



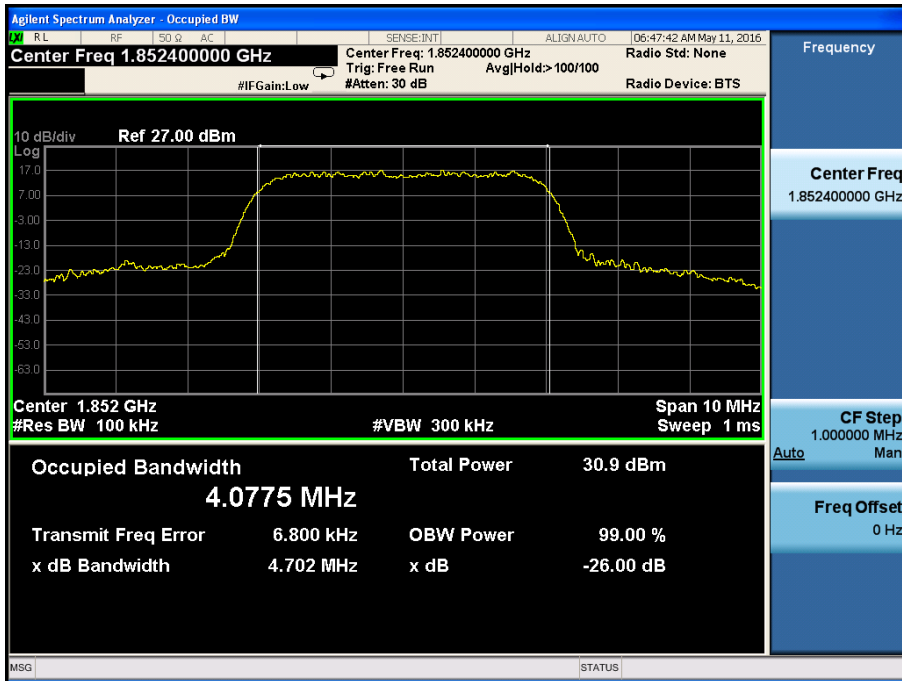
HSUPA Middle Channel



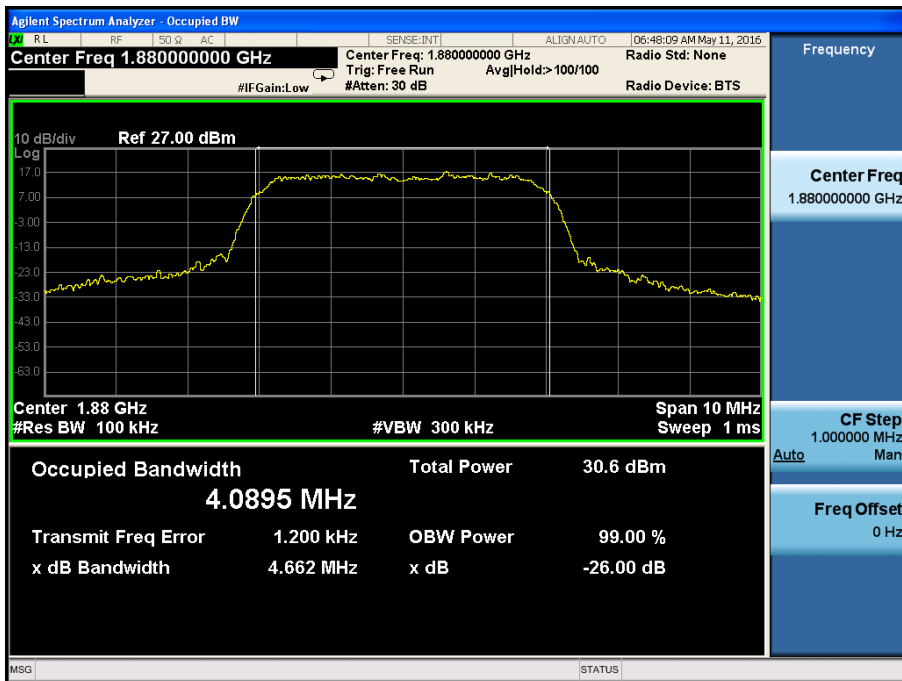
HSUPA High Channel



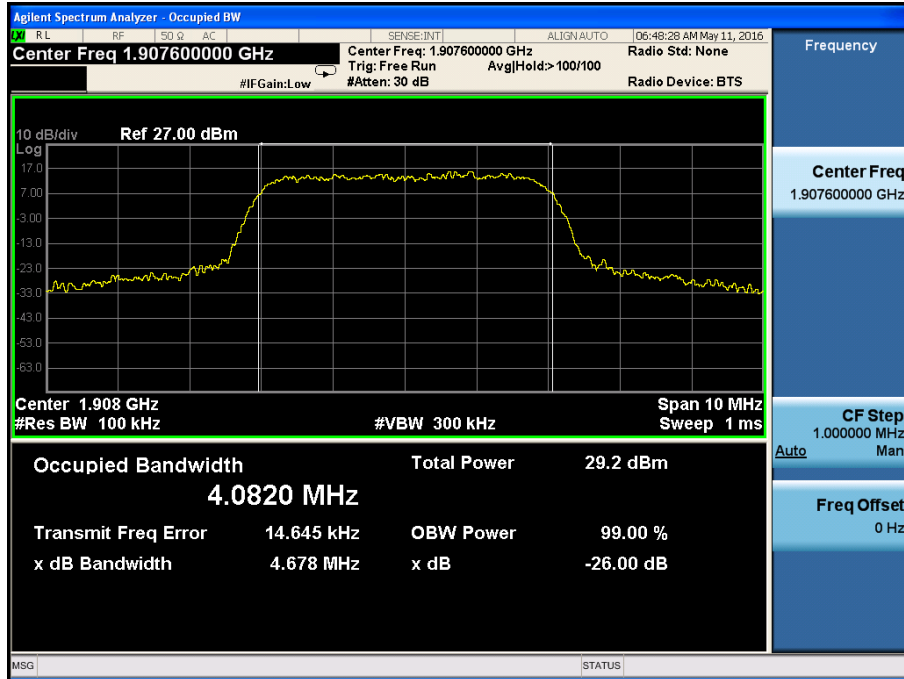
For Band II  
WCDMA Low Channel



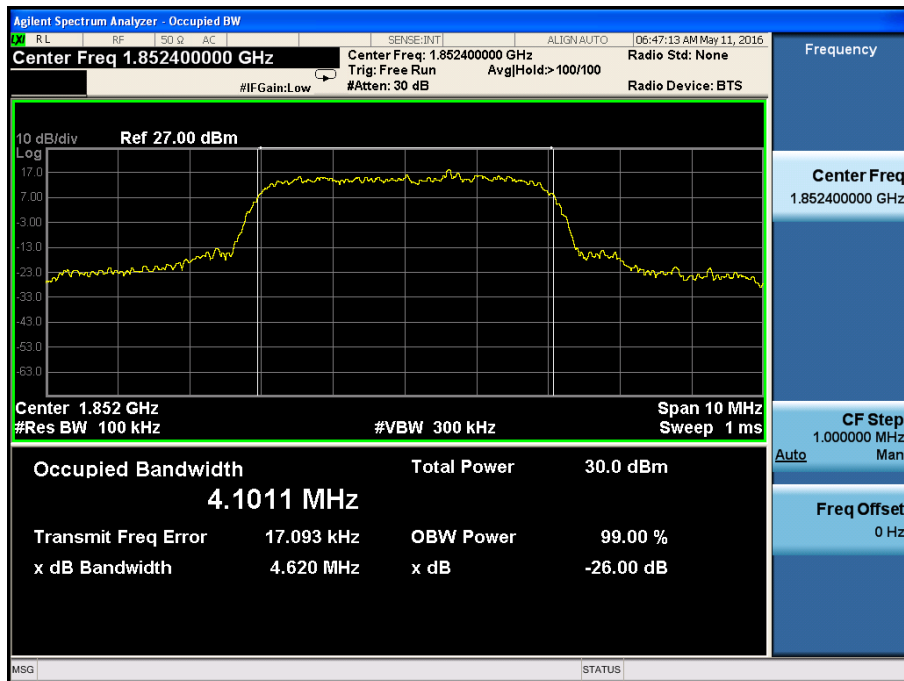
WCDMA Middle Channel



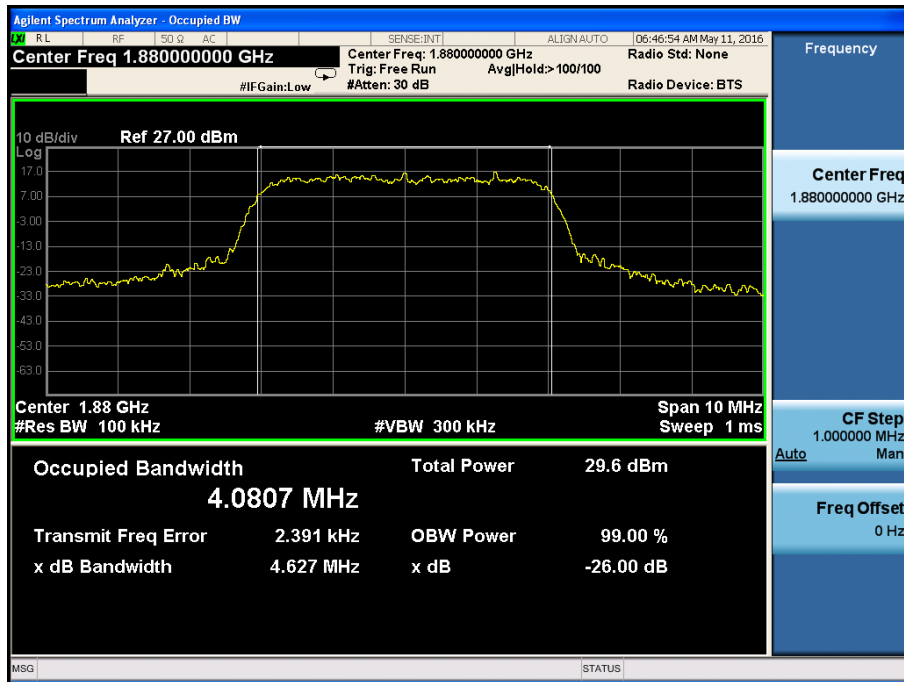
WCDMA High Channel



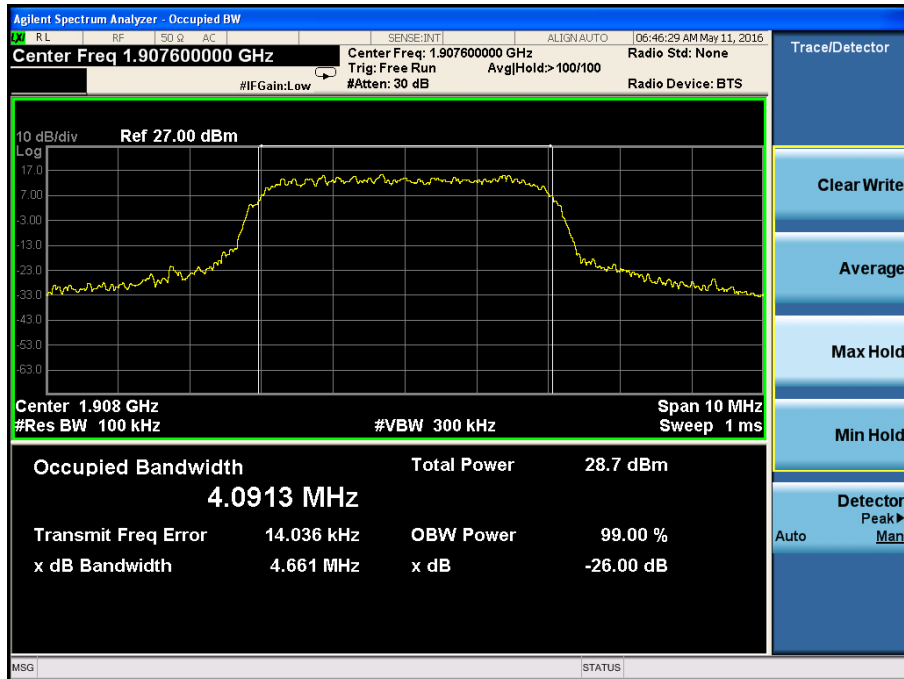
HSDPA Low Channel



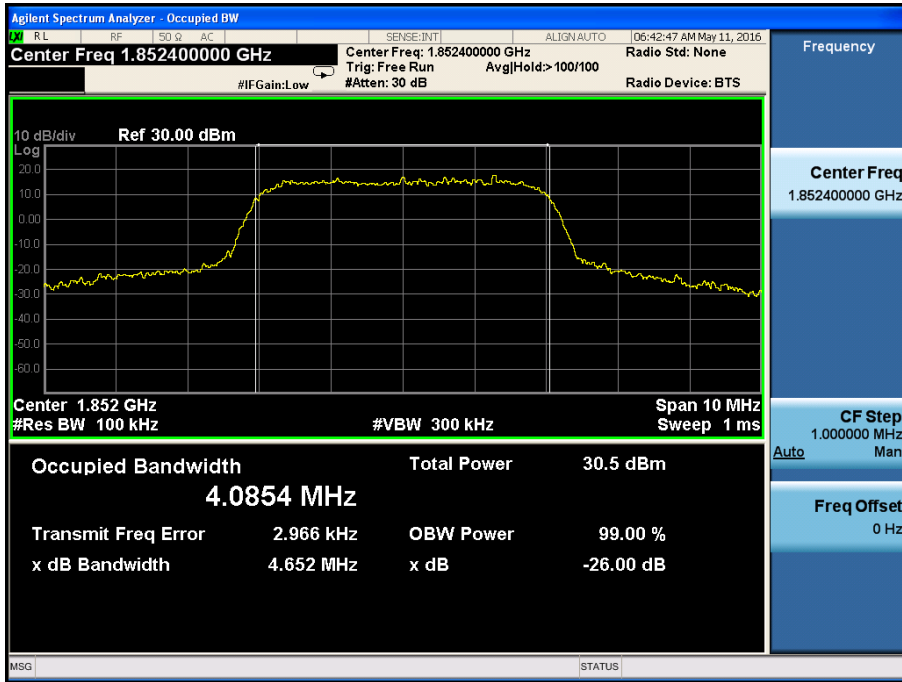
HSDPA Middle Channel



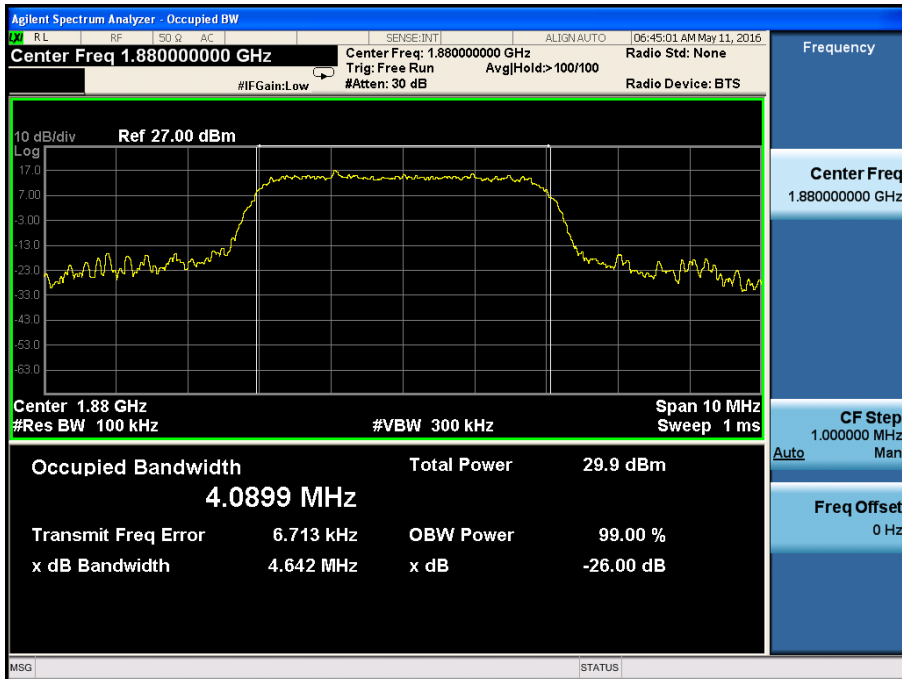
HSDPA High Channel



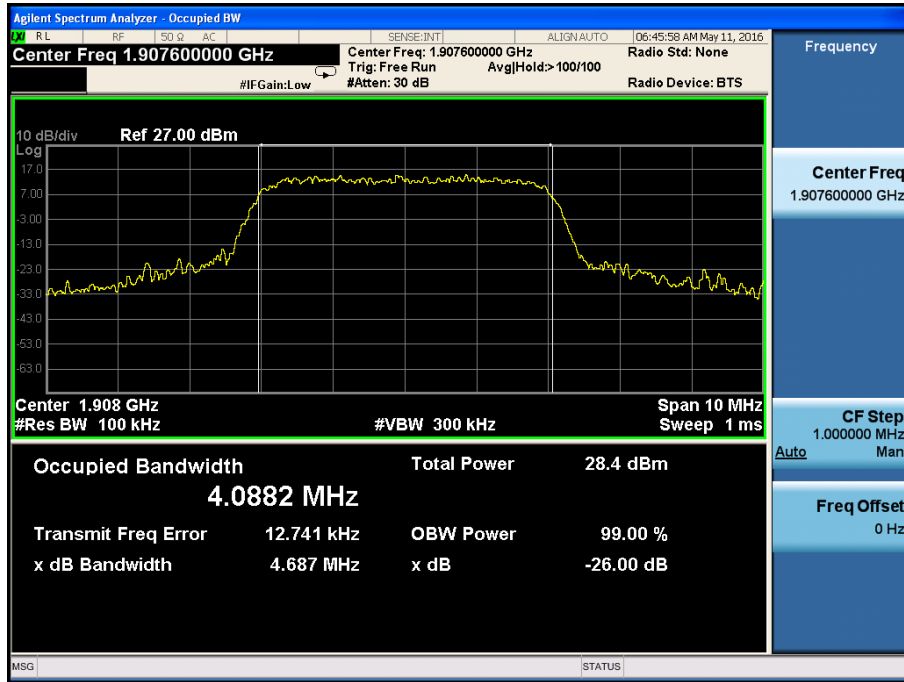
HSUPA Low Channel



HSUPA Middle Channel



HSUPA High Channel



## 7. Out of Band Emissions at Antenna Terminal

### 7.1 Standard Applicable

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

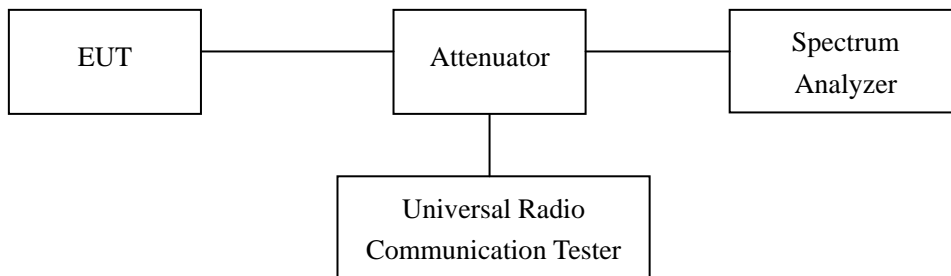
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

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

### 7.2 Test Procedure

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

Test Configuration for the out of band emissions testing:



### 7.3 Environmental Conditions

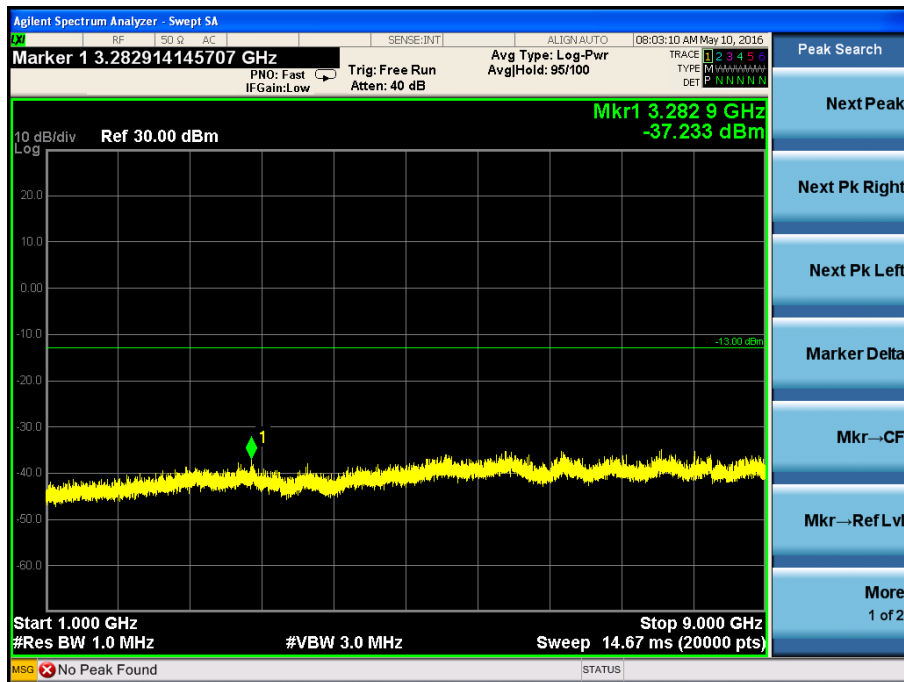
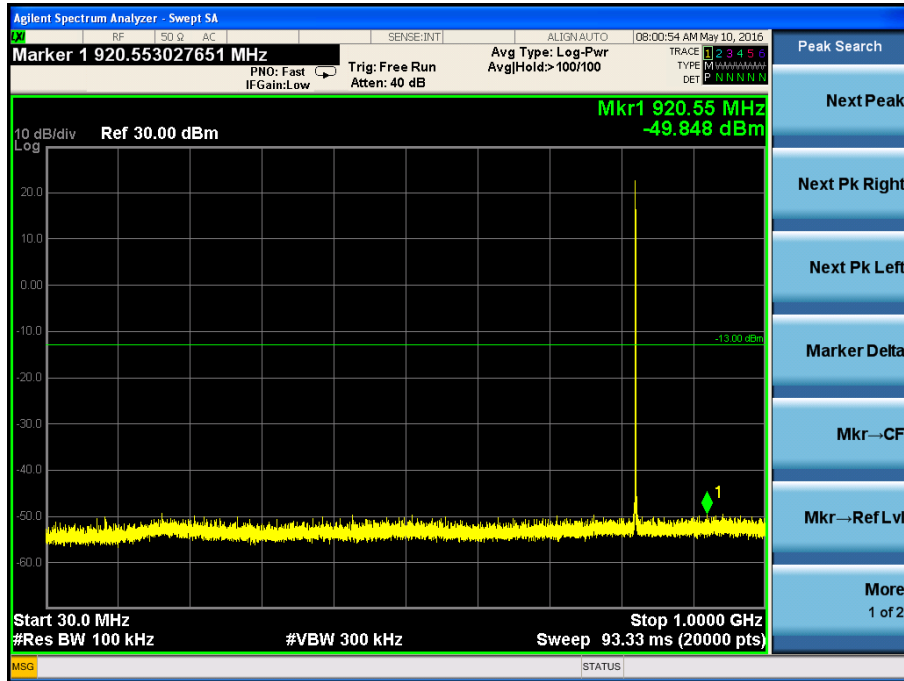
Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar



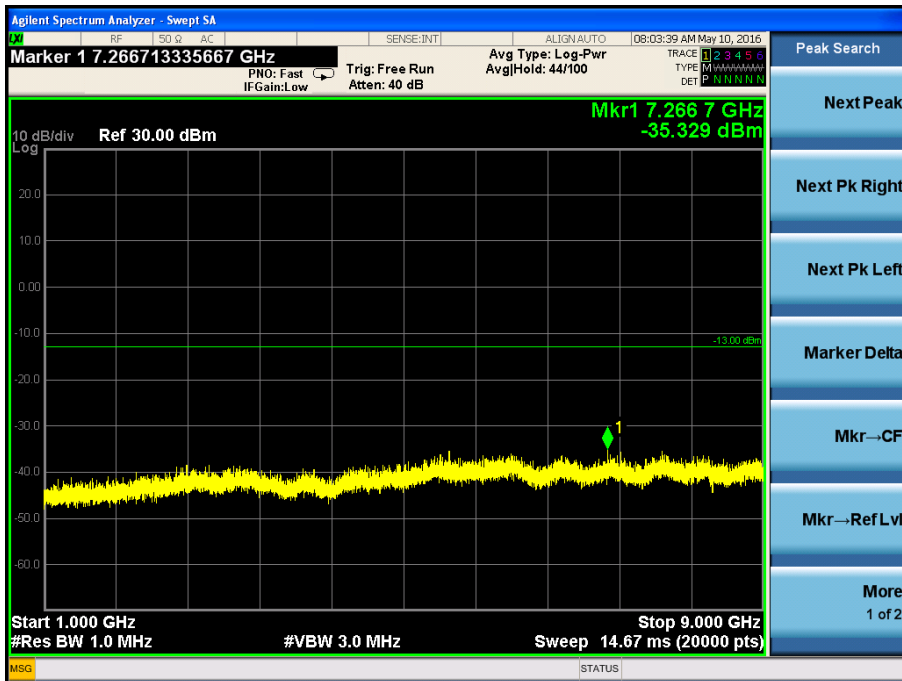
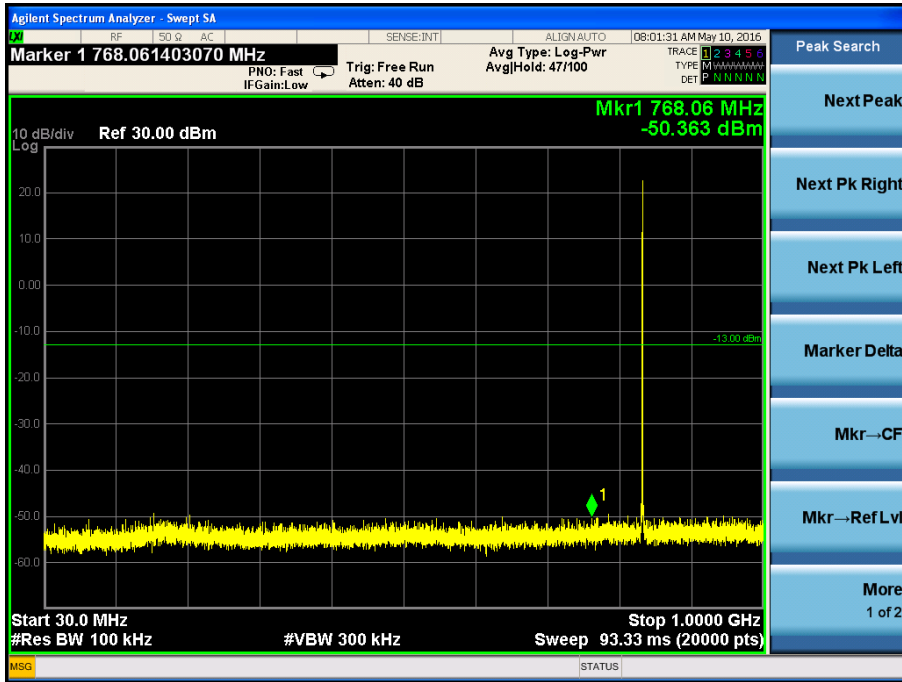
### 7.4 Summary of Test Results/Plots

Please refer to the following test plots For Cellular Band

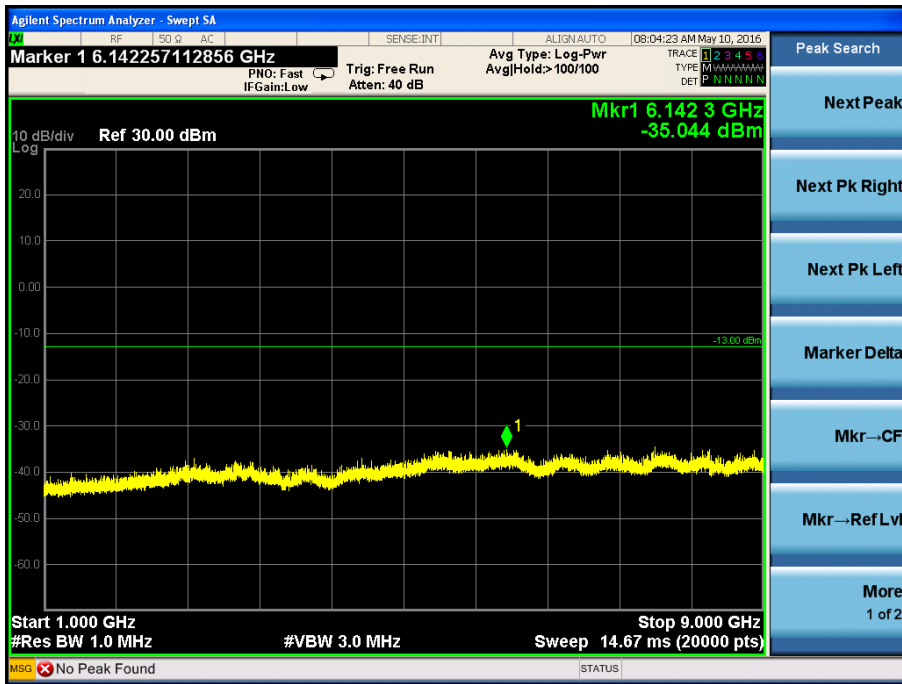
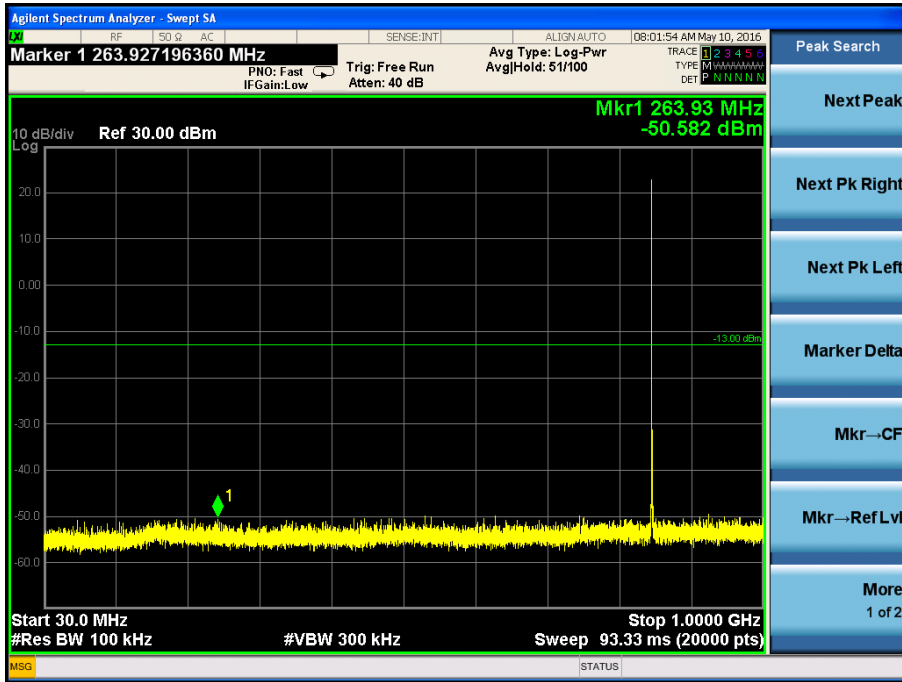
GPRS 850 Low Channel



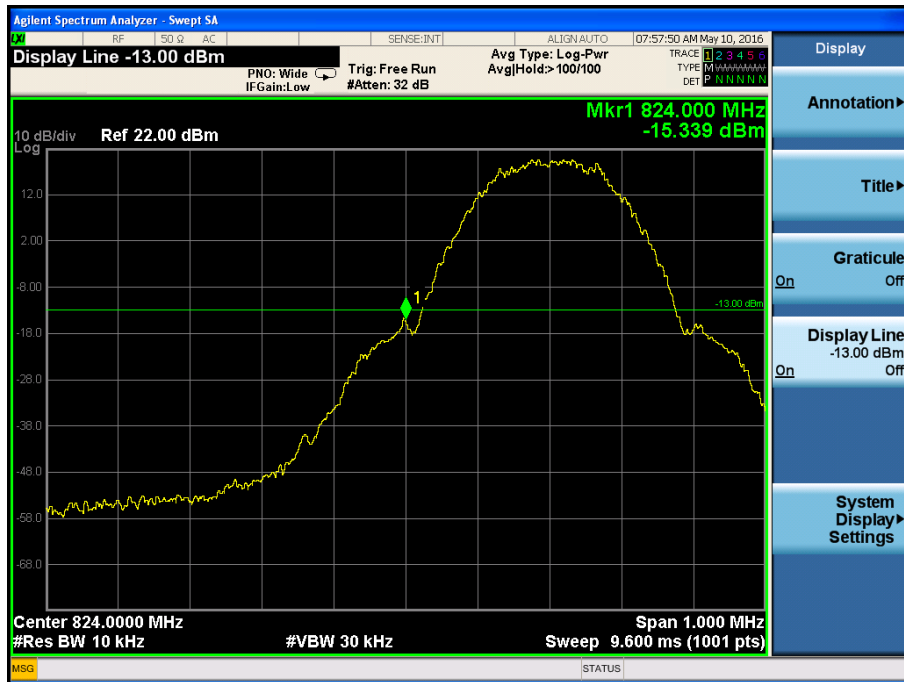
Middle Channel



High Channel



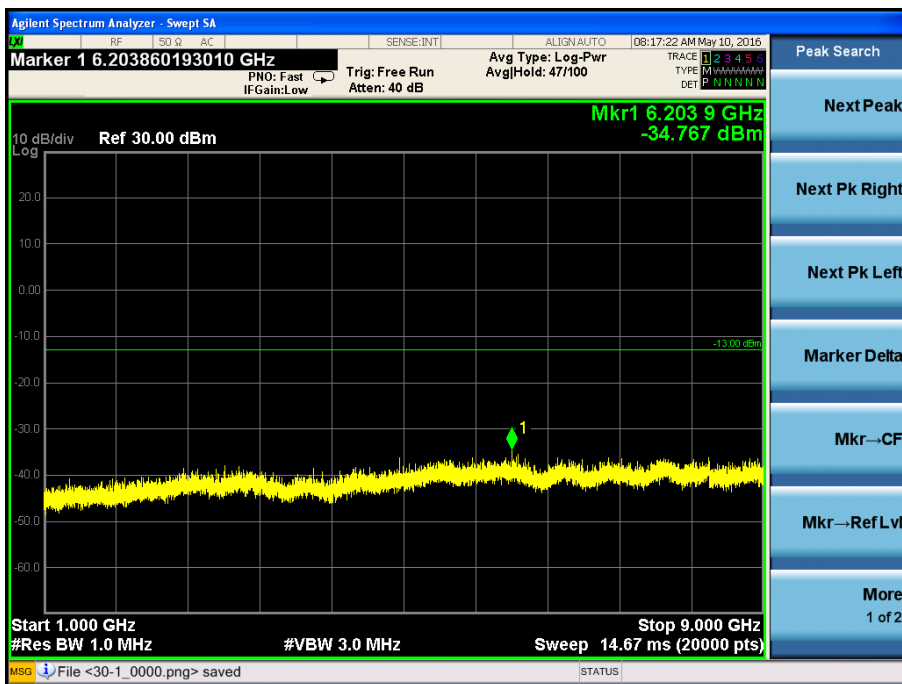
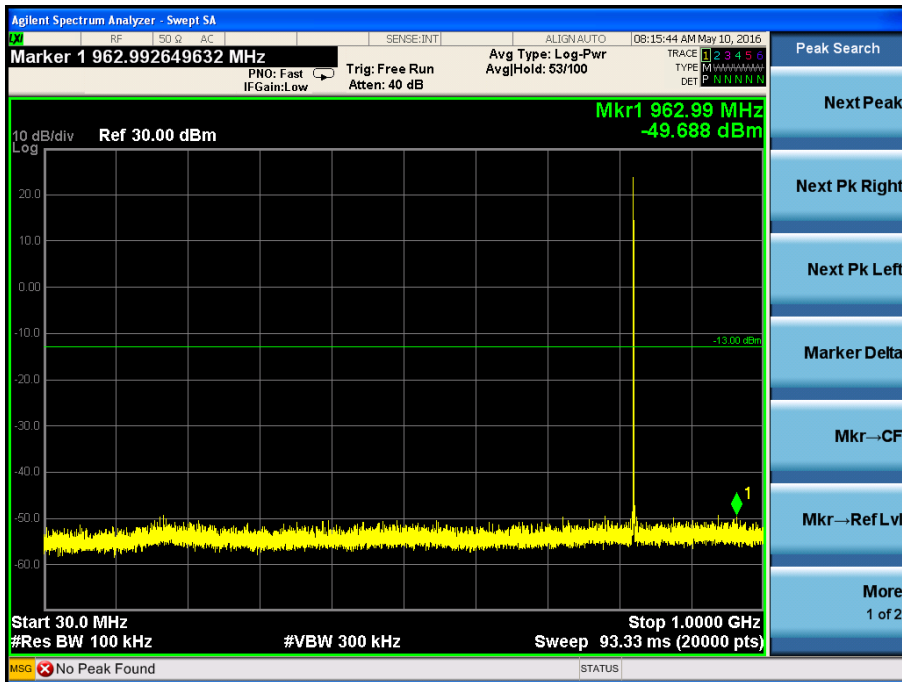
GPRS 850 Low Band Emission



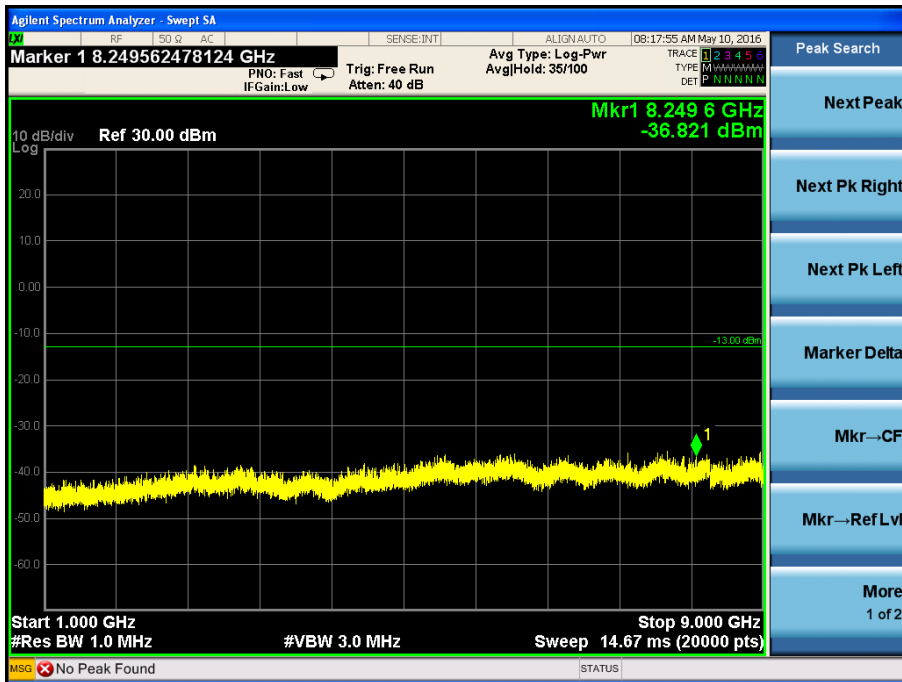
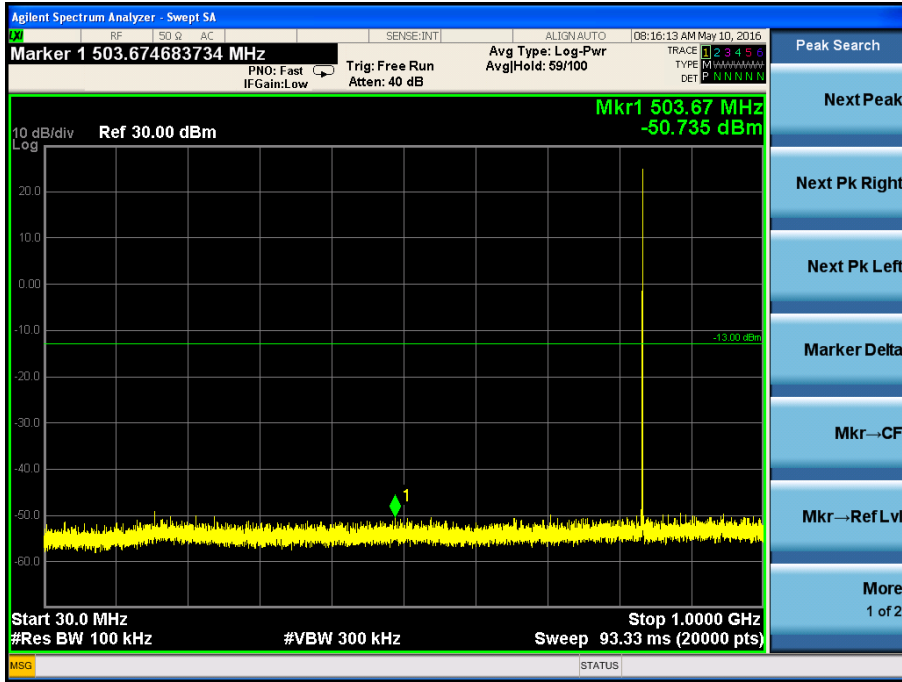
High Band Emission



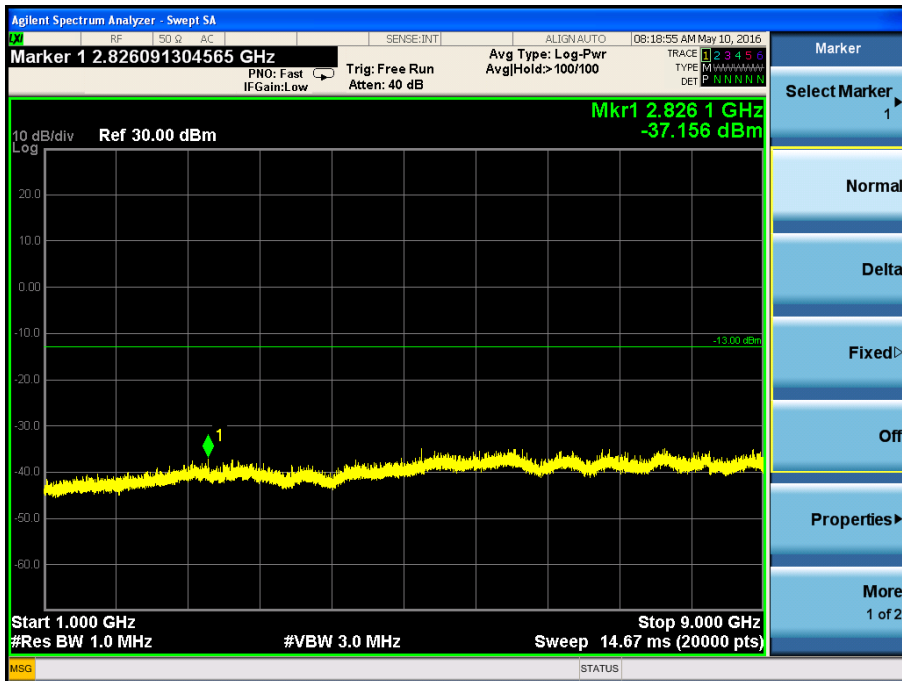
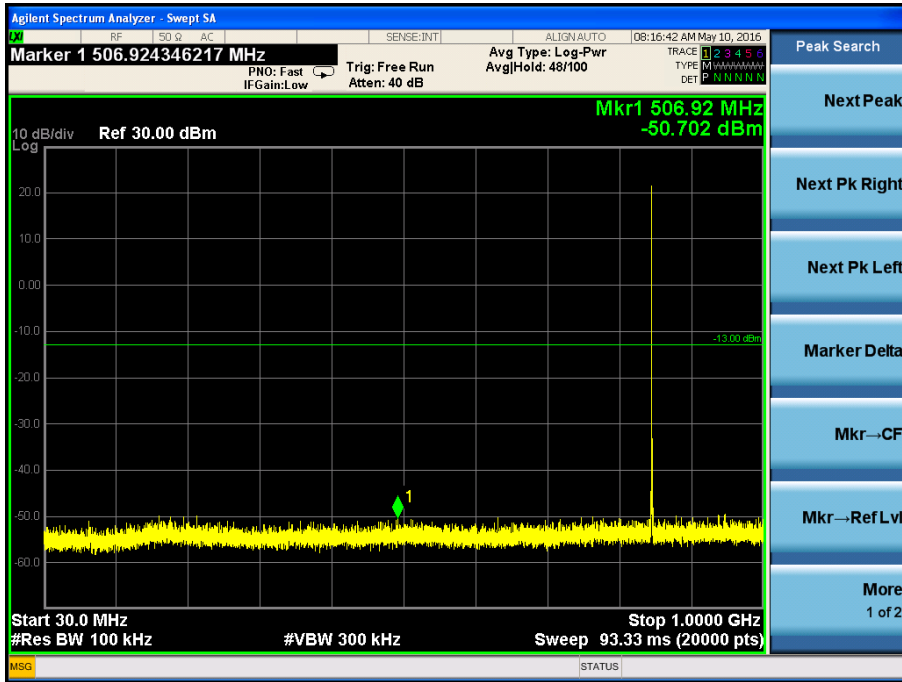
EDGE 850 Low Channel



Middle Channel



High Channel



EDGE 850 Low Band Emission

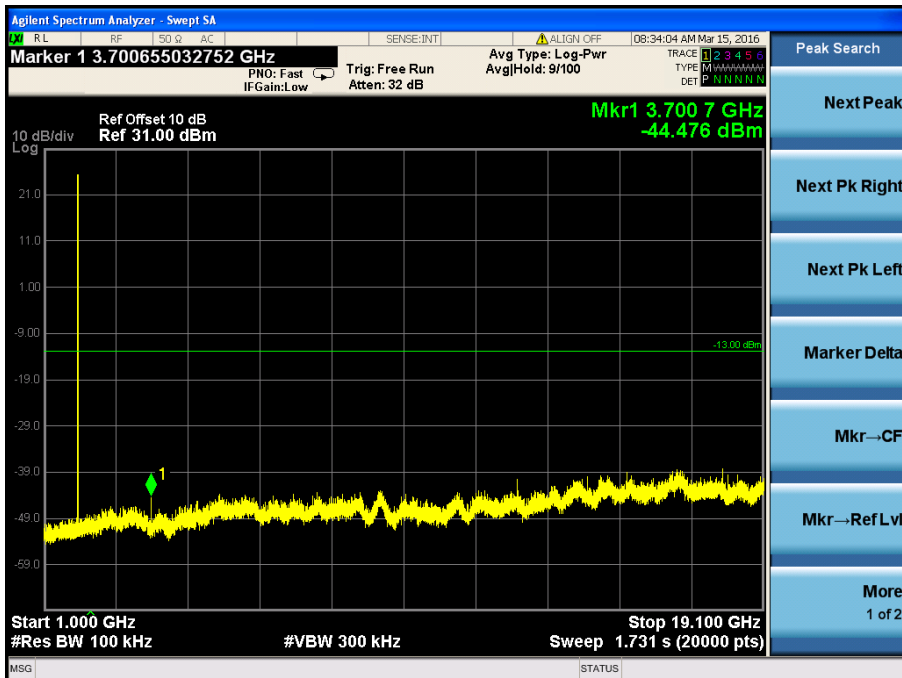
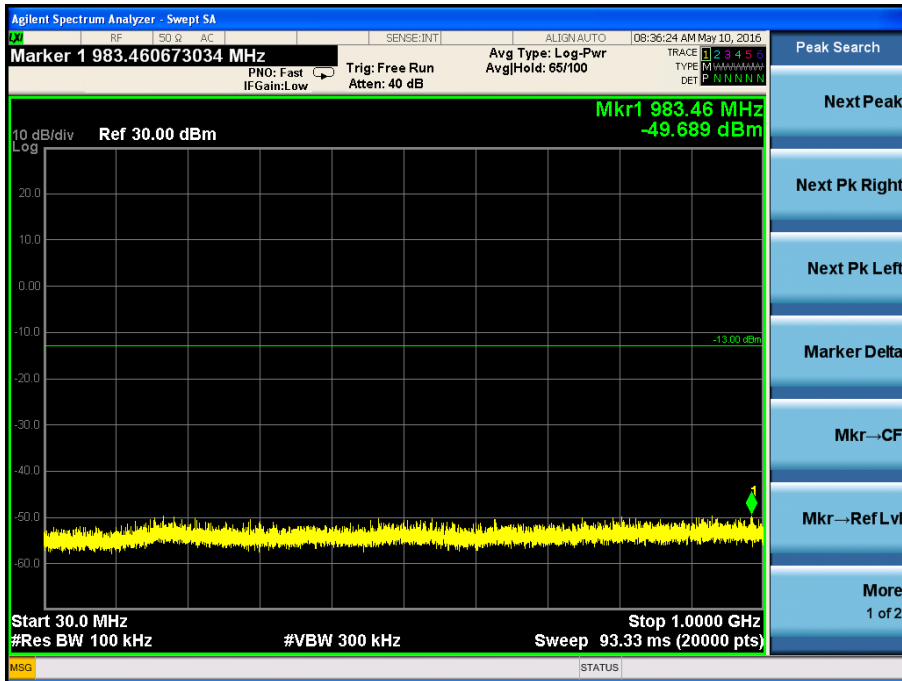


High Band Emission

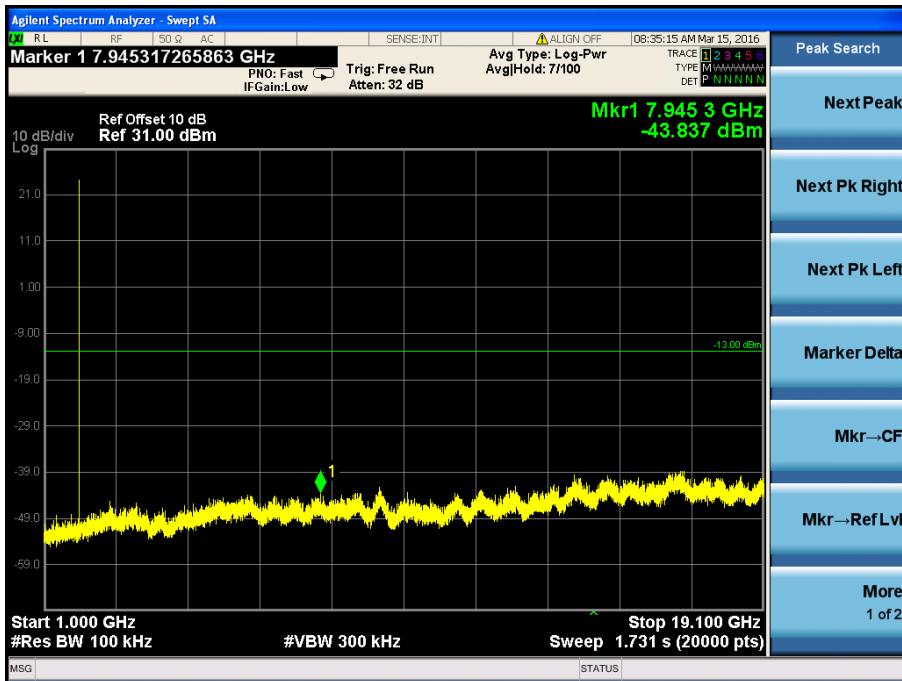
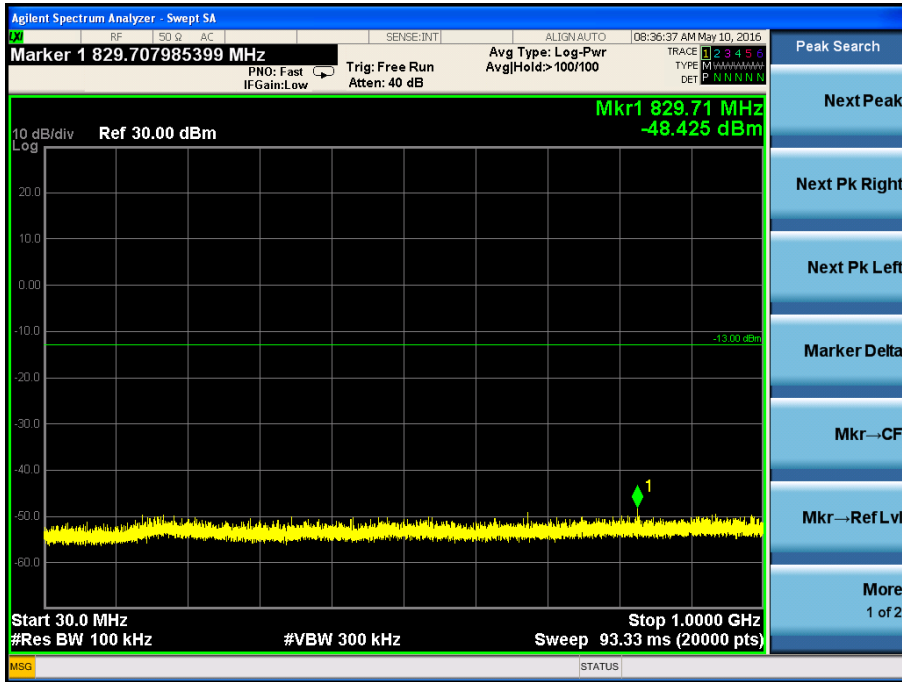




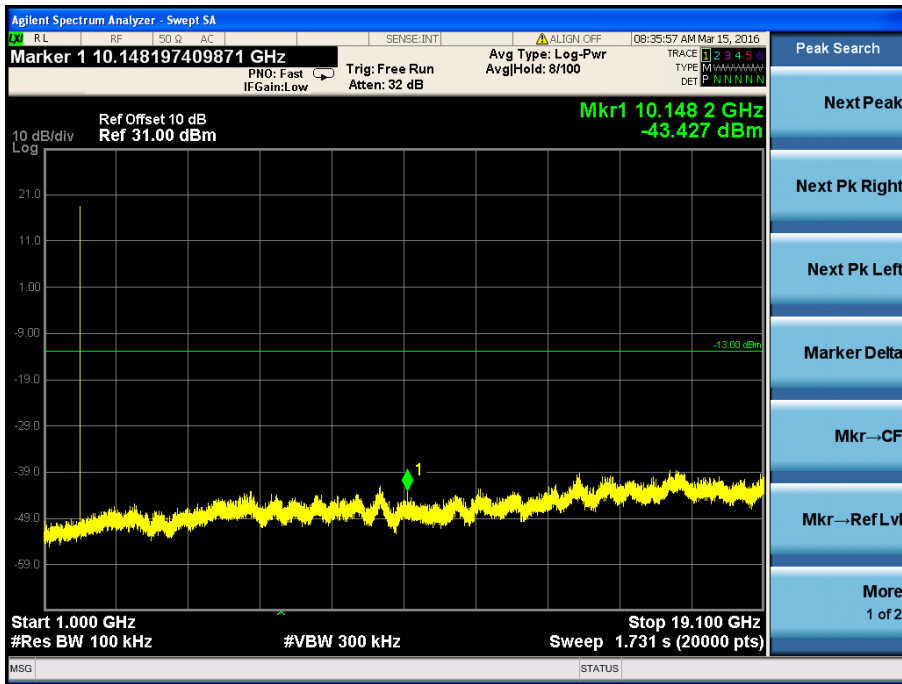
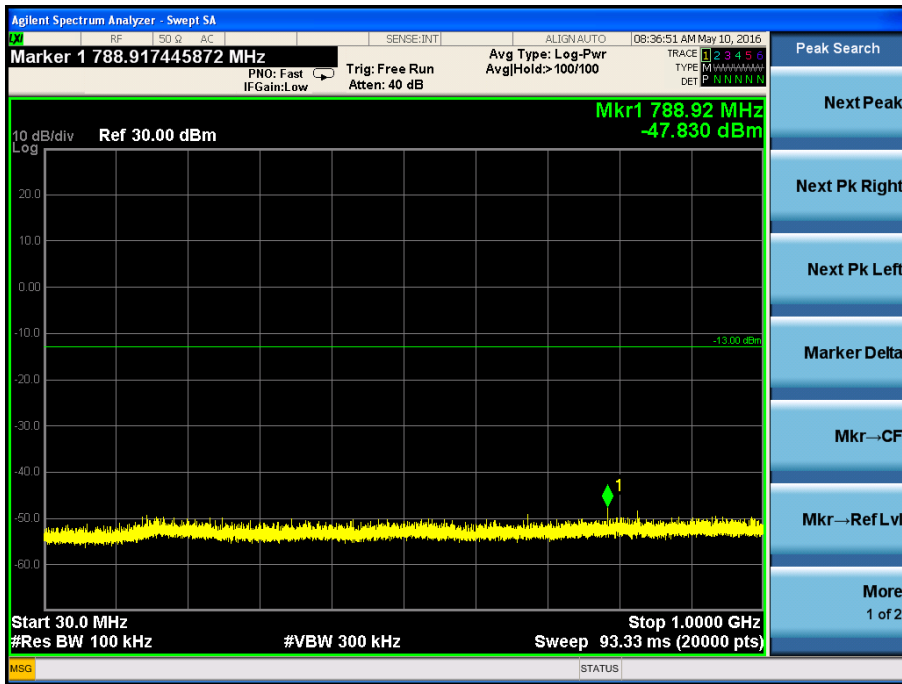
For PCS Band  
GPRS Low Channel



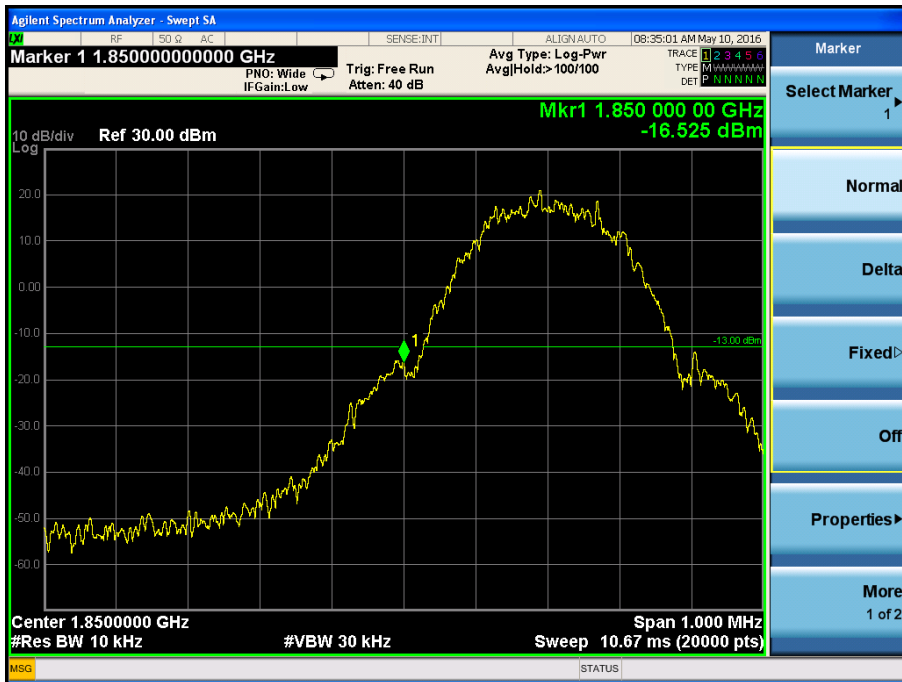
Middle Channel



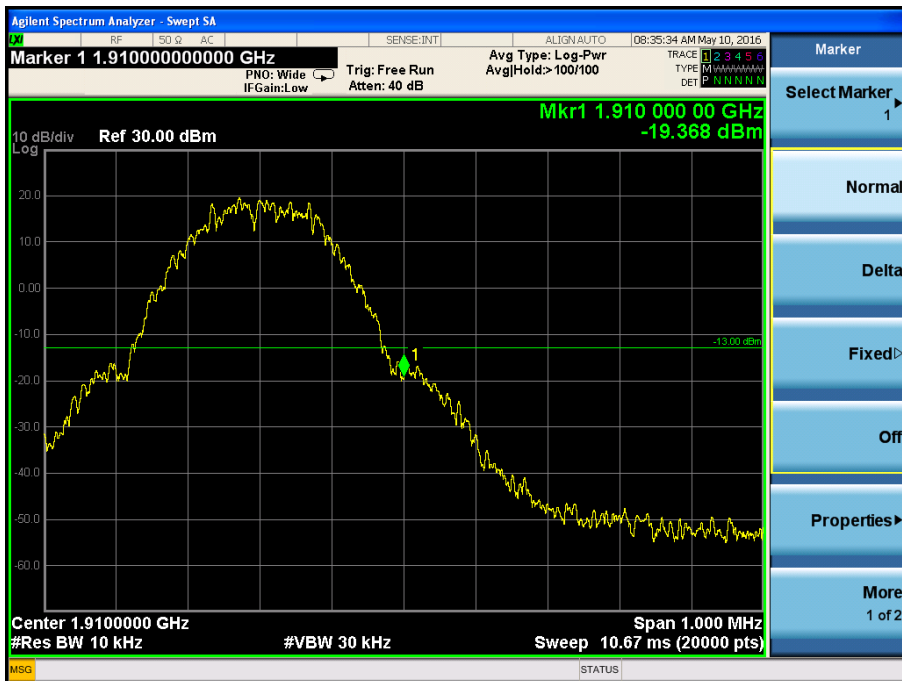
High Channel



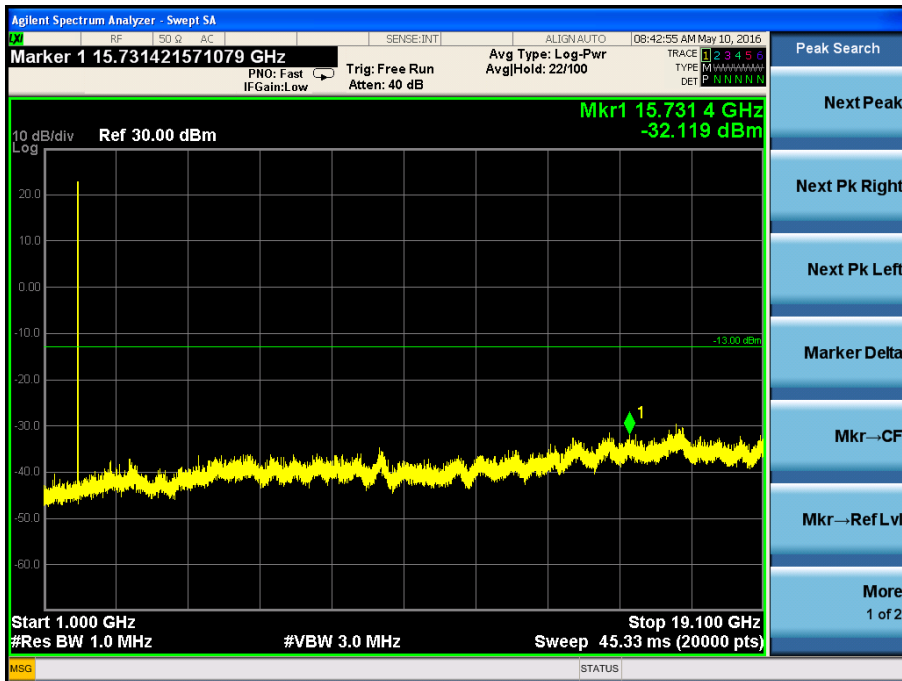
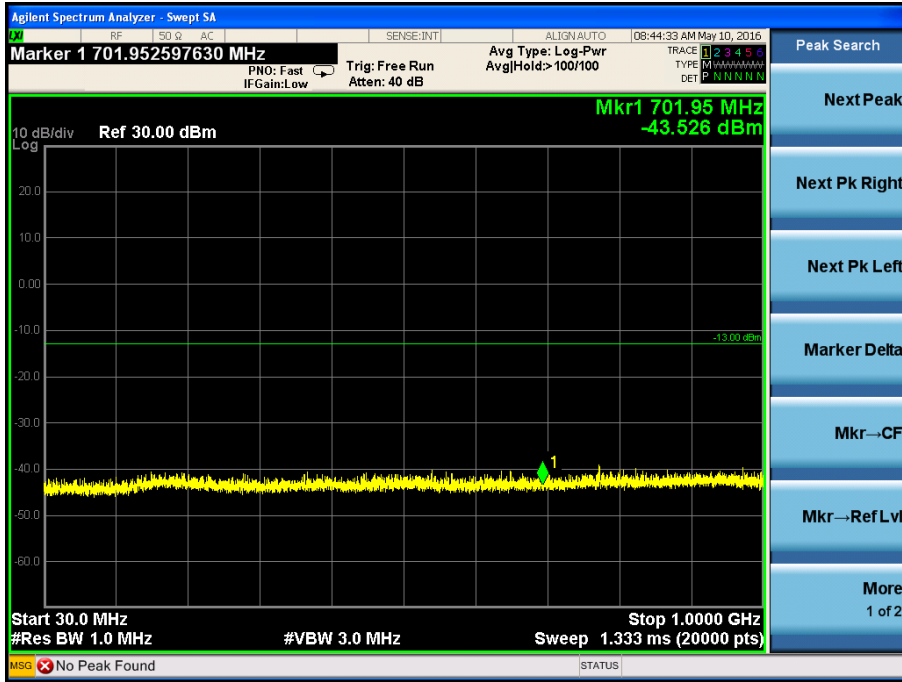
### GPRS Low Band Emission



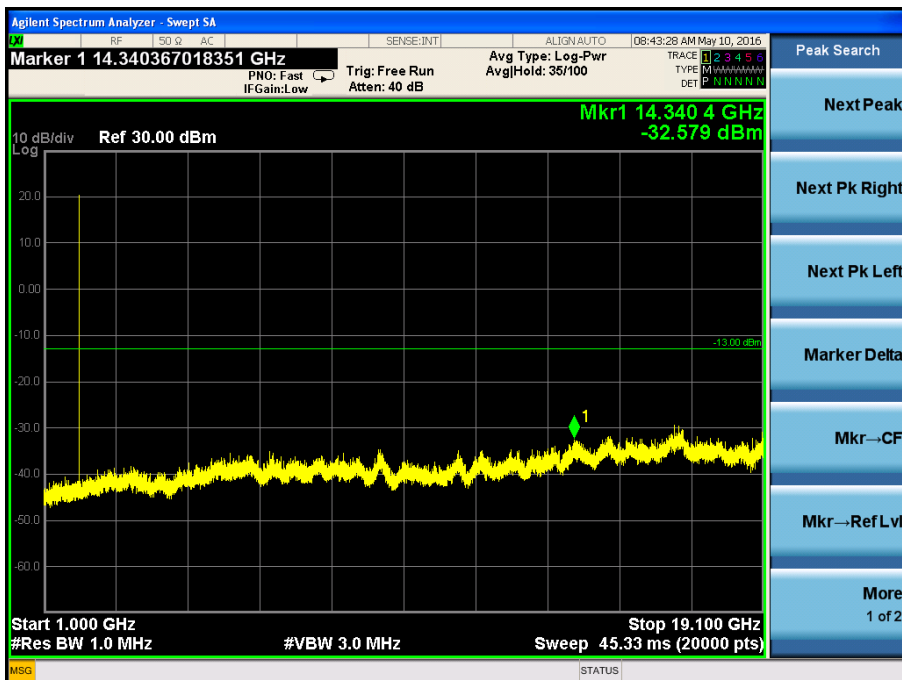
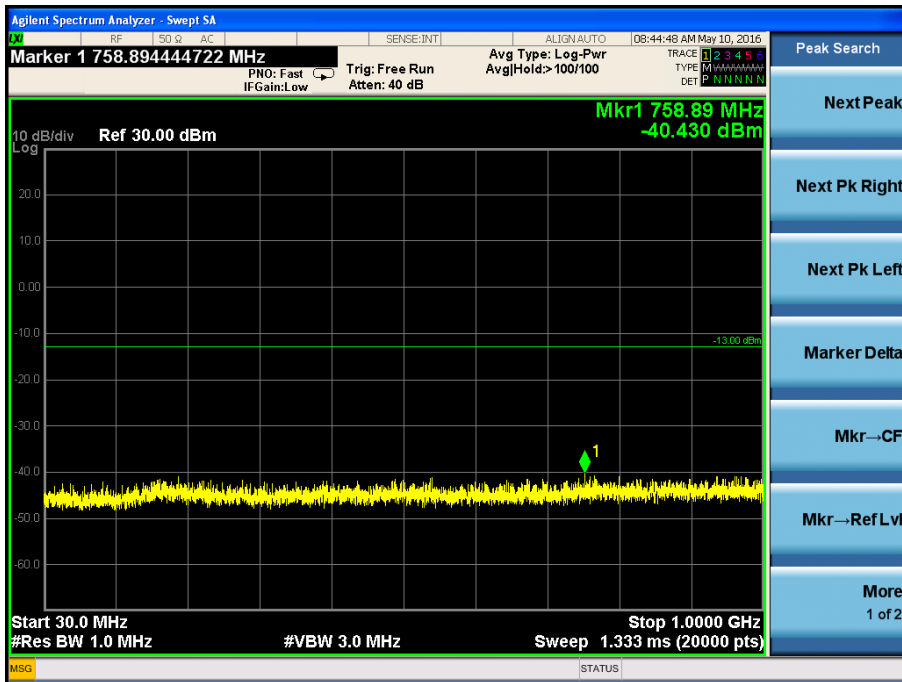
### GPRS High Band Emission



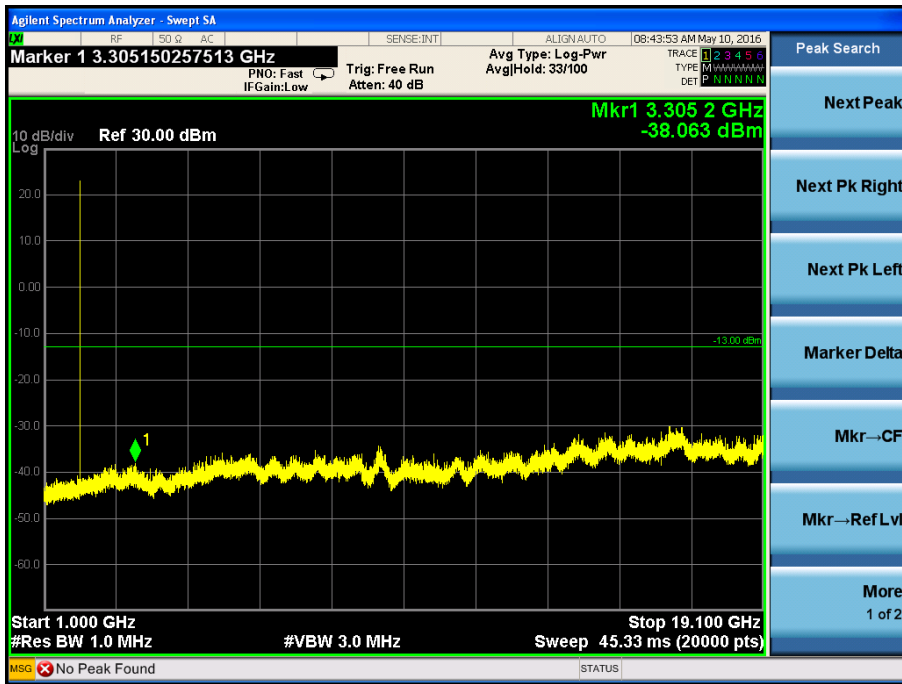
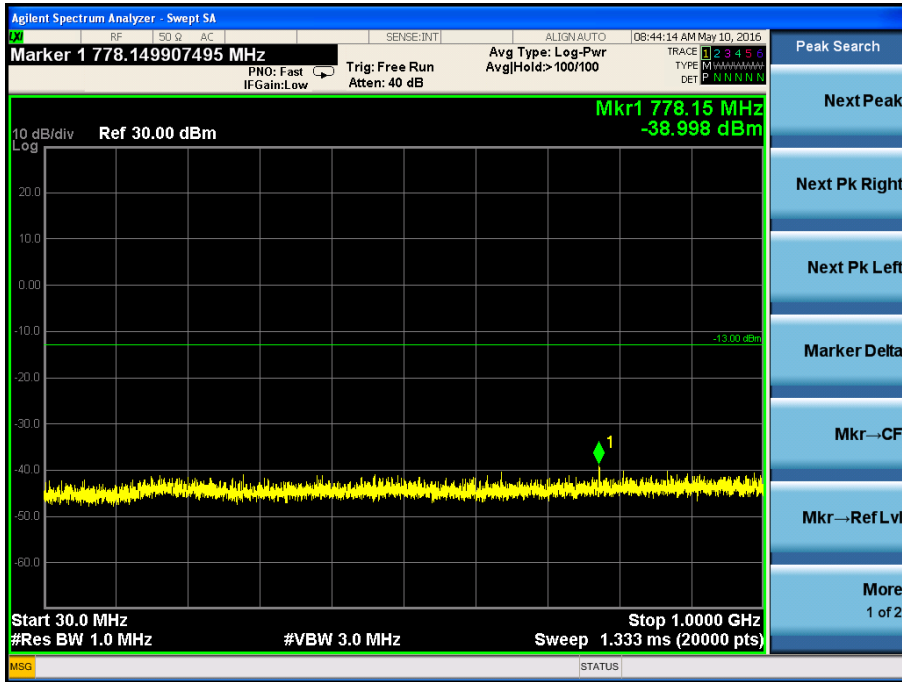
EDGE 1900 Low Channel



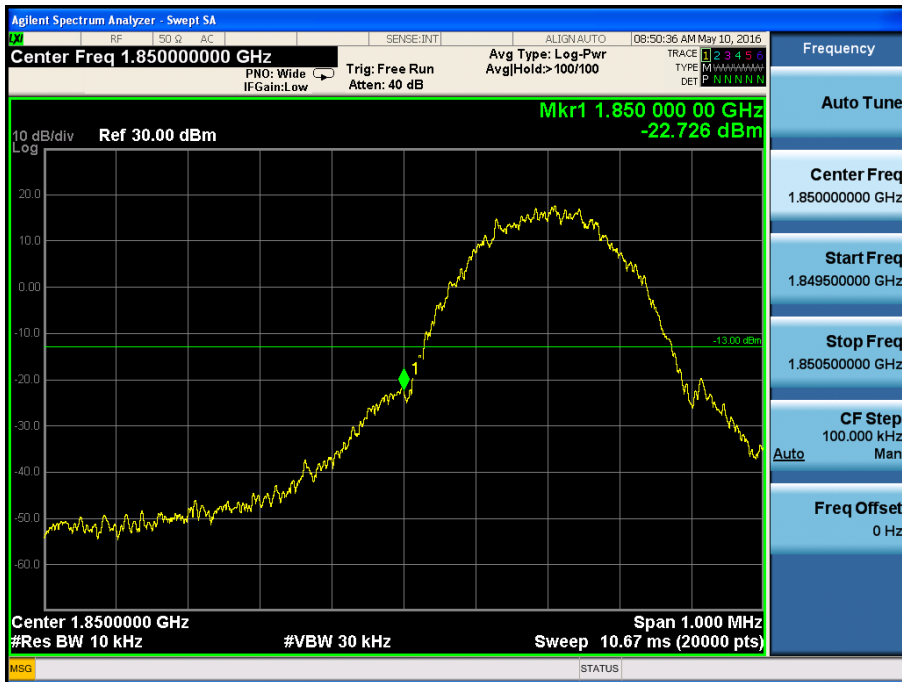
Middle Channel



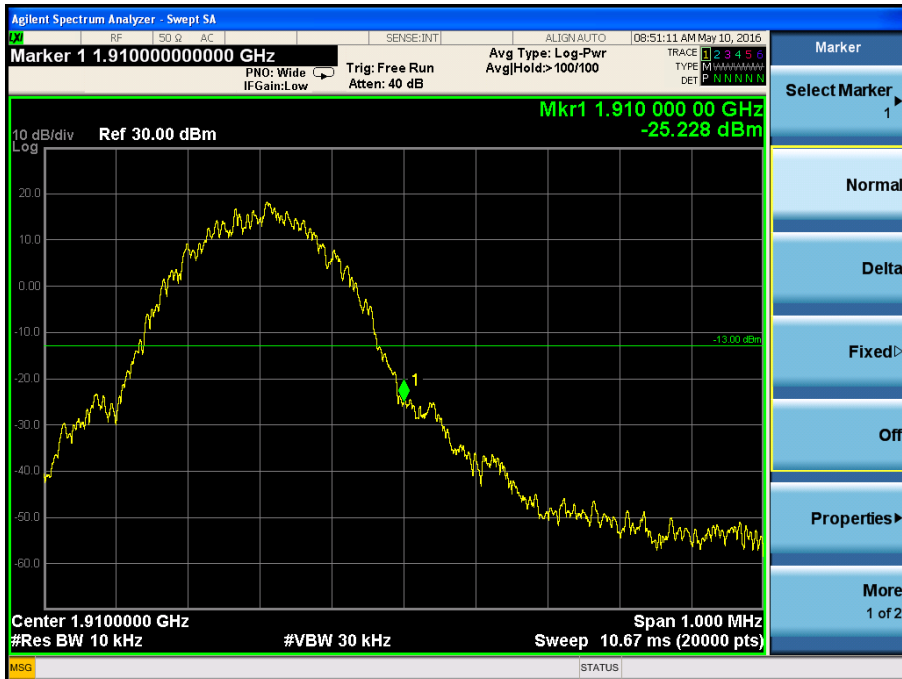
High Channel



Low Band Emission

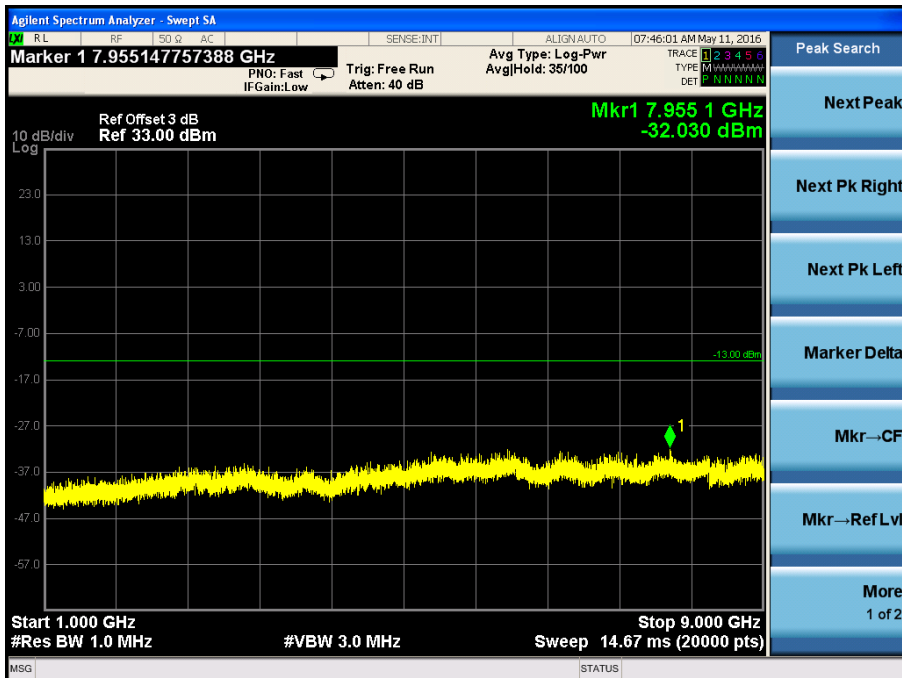
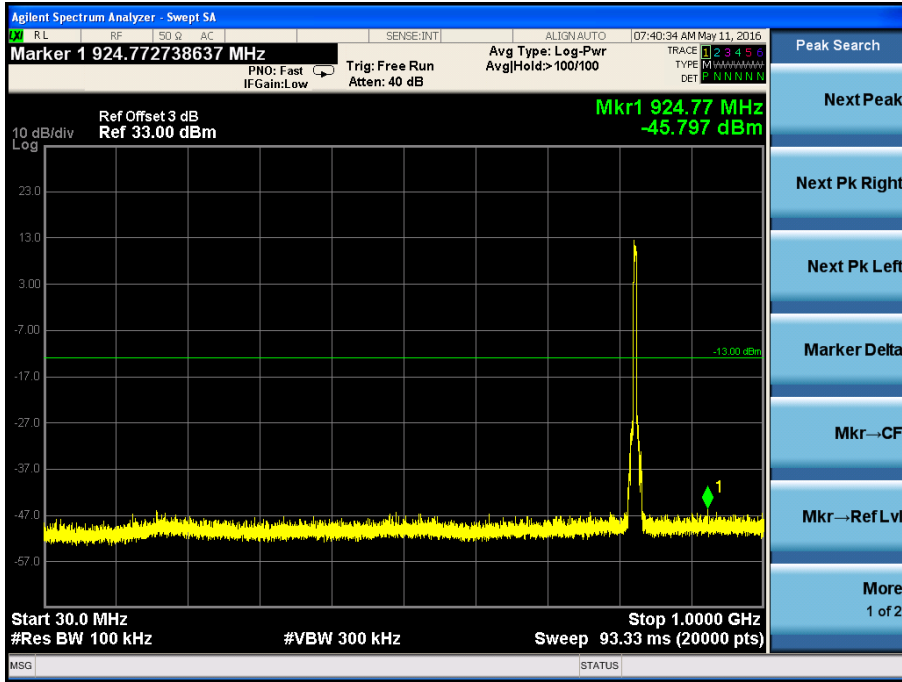


High Band Emission

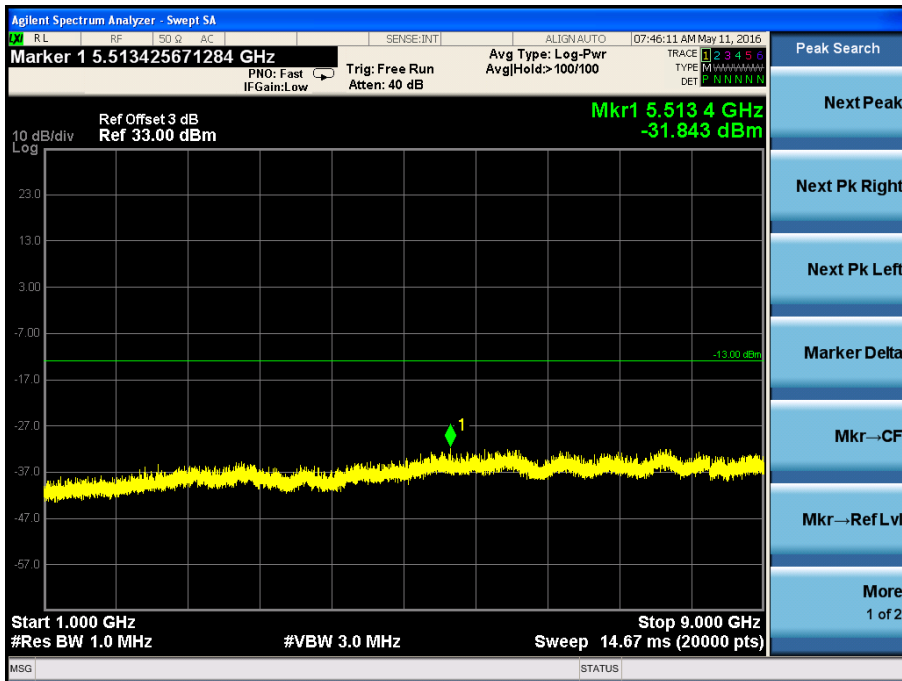
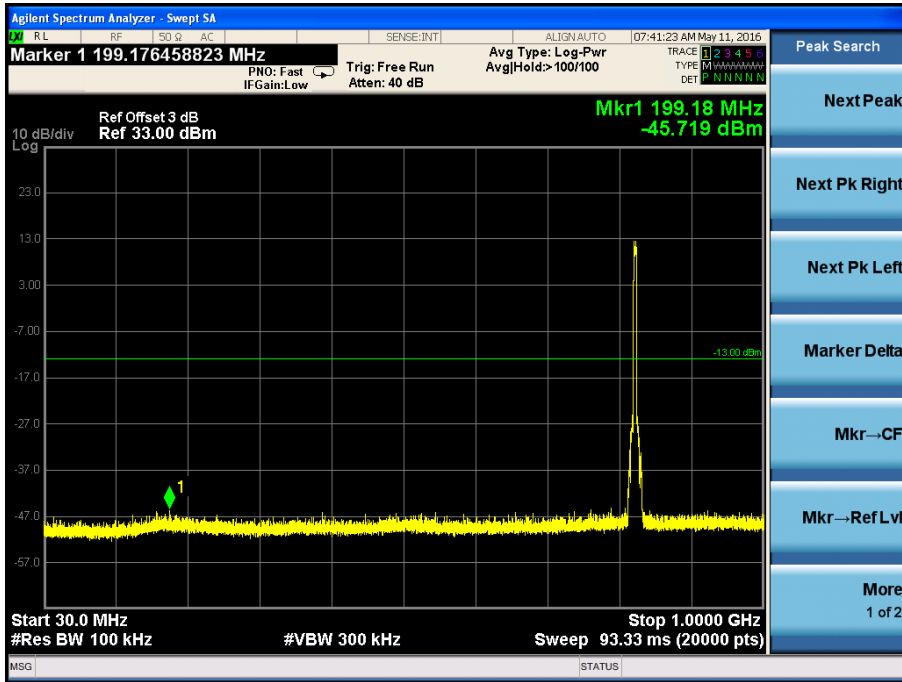




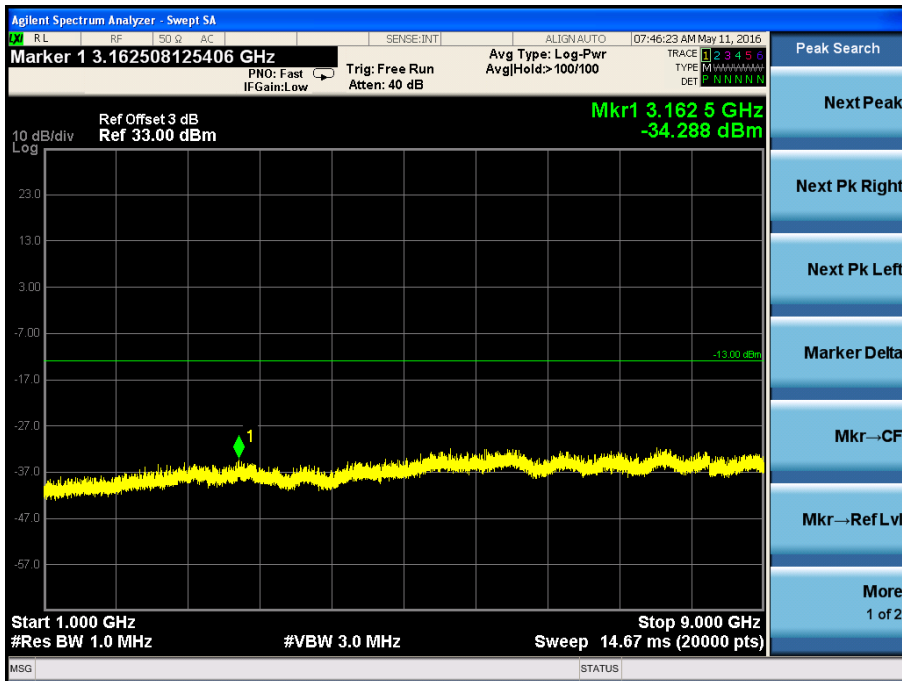
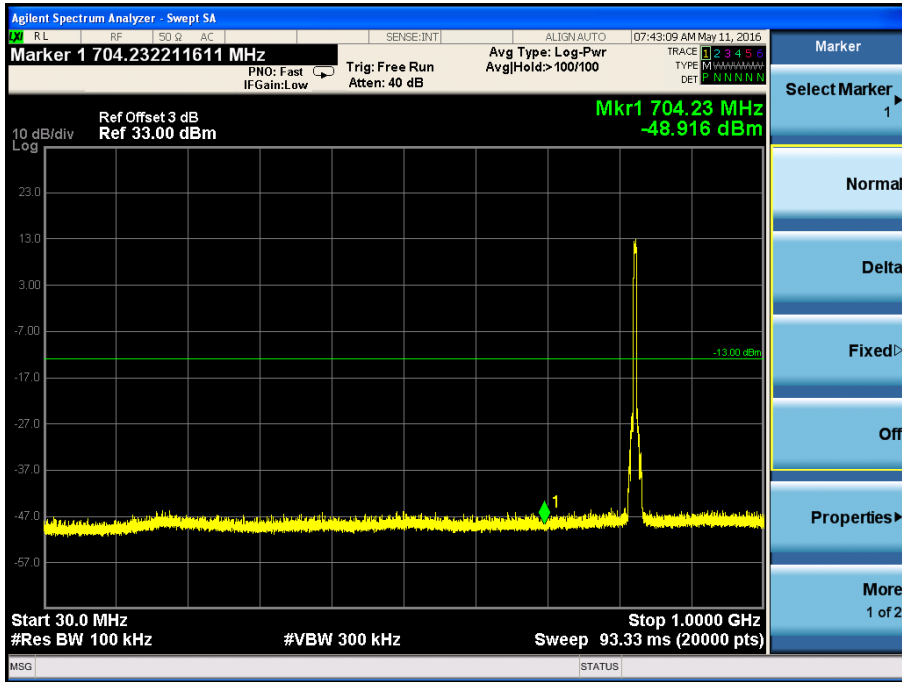
**For Band V**  
WCDMA Low Channel



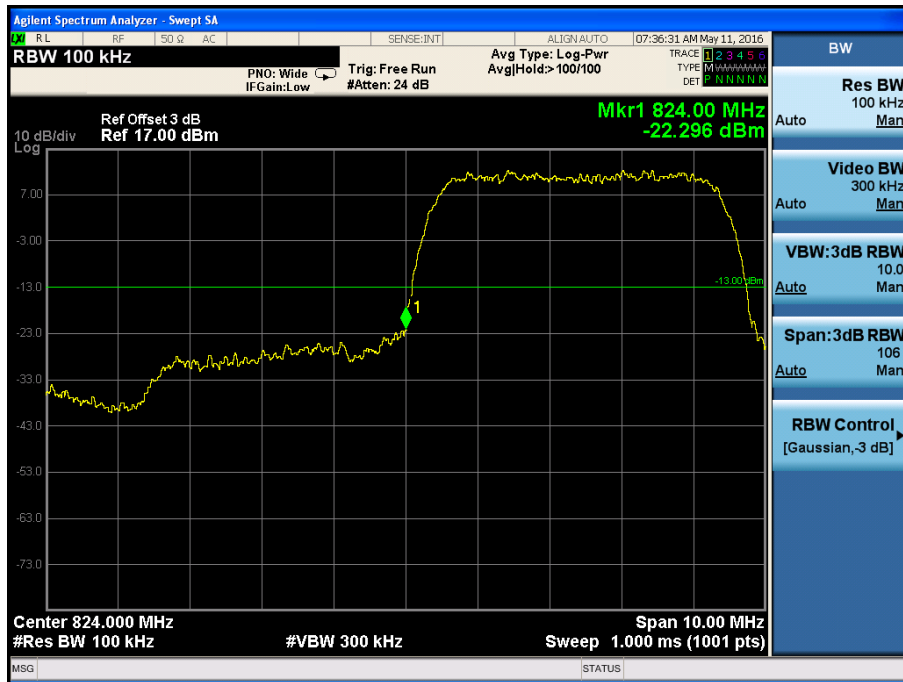
WCDMA Middle Channel



WCDMA High Channel



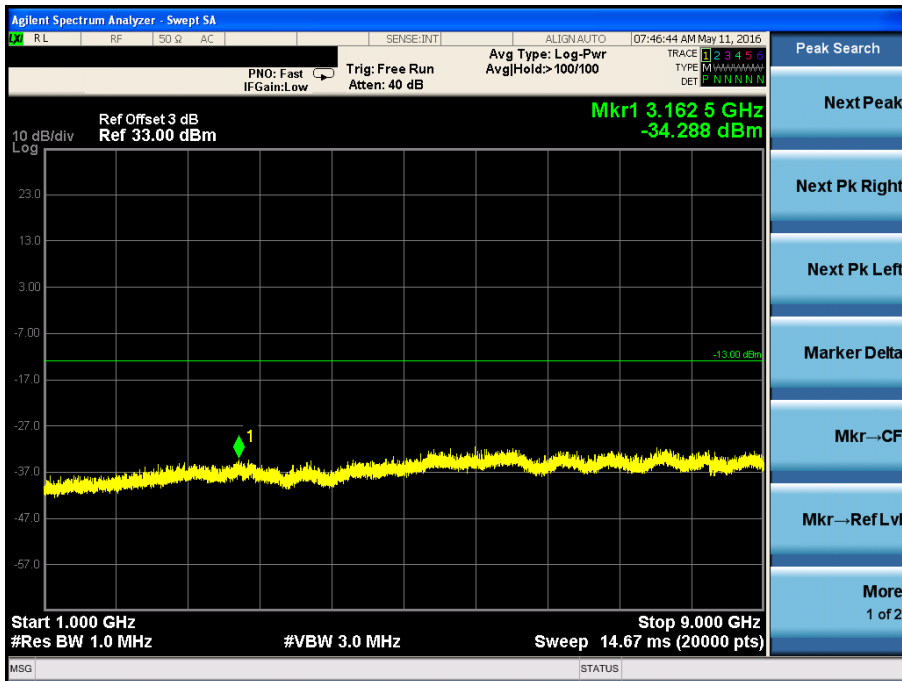
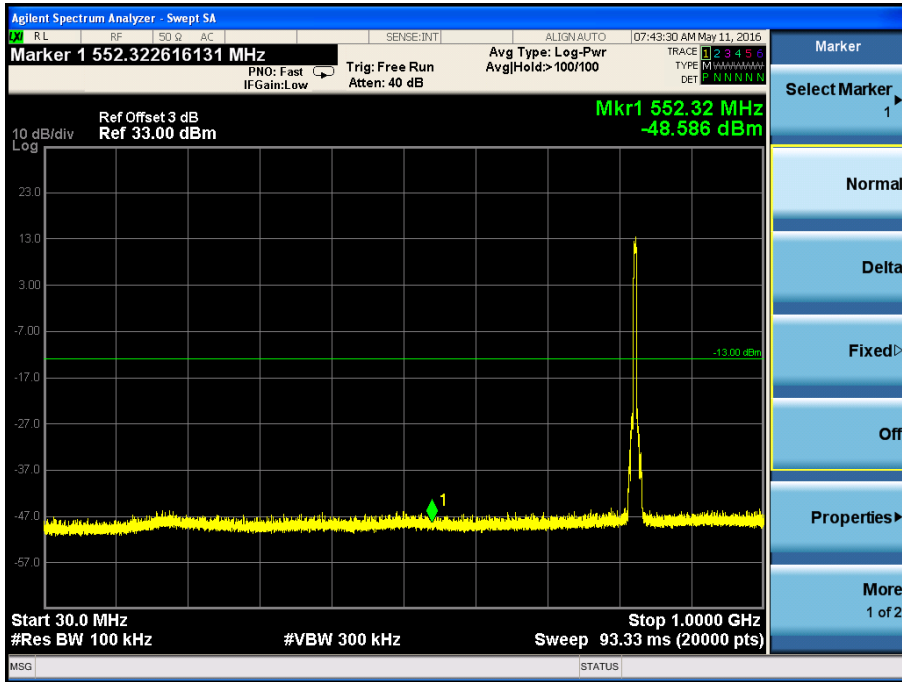
## WCDMA Low Band Spurious Emission



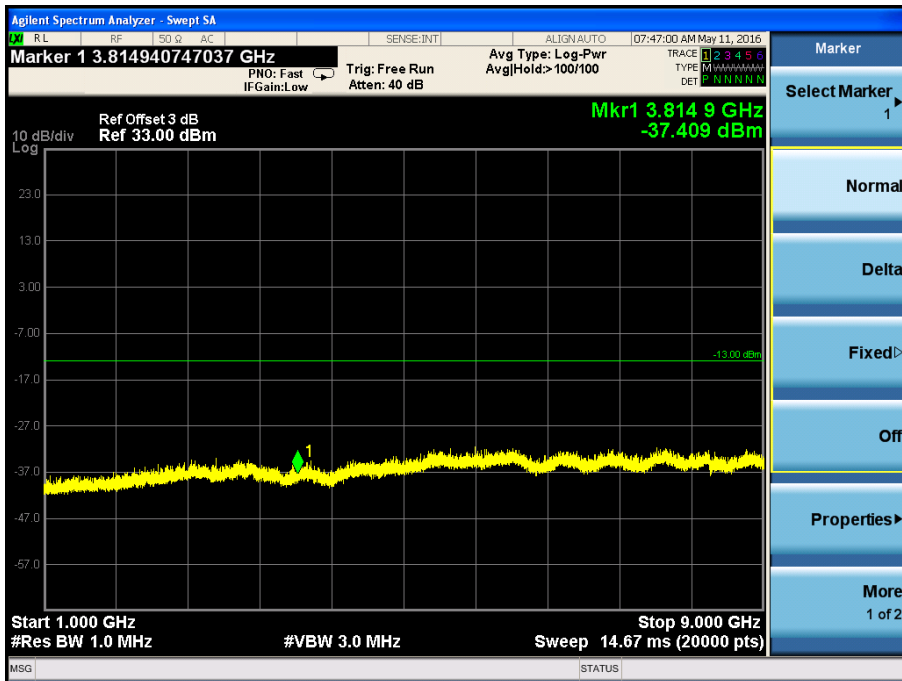
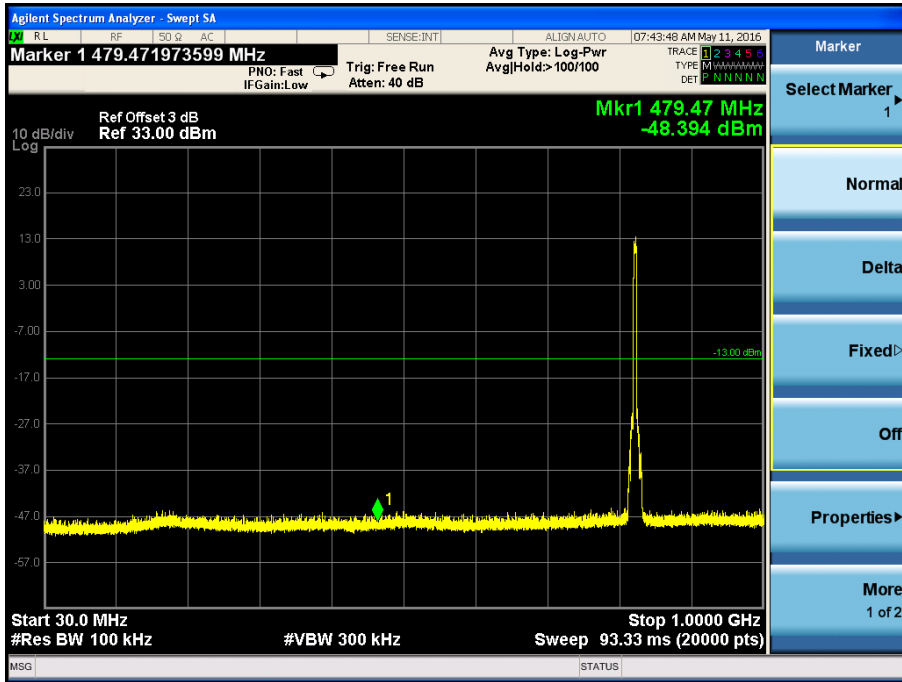
## WCDMA High Band Spurious Emission



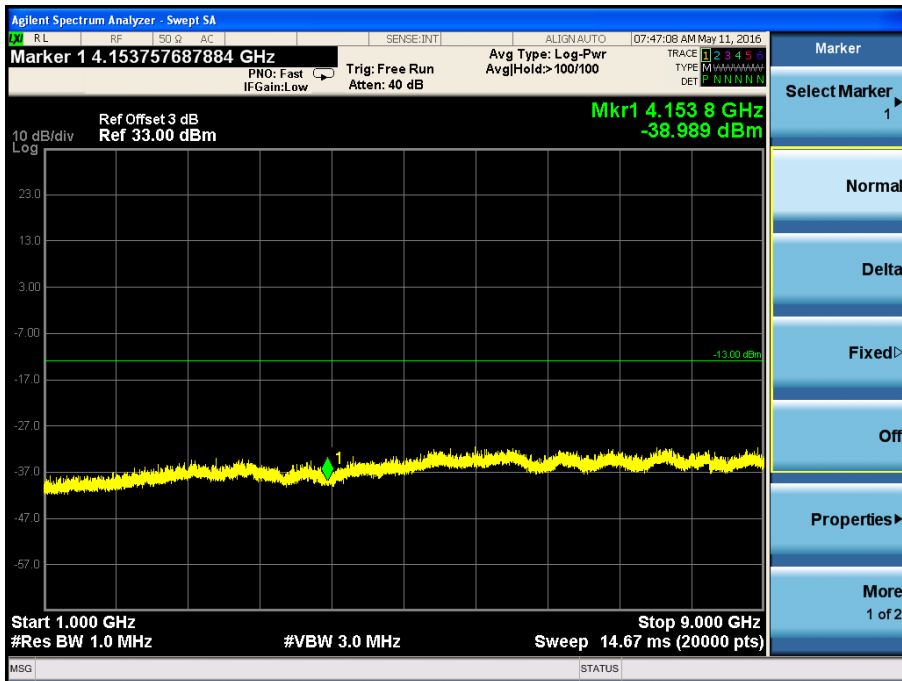
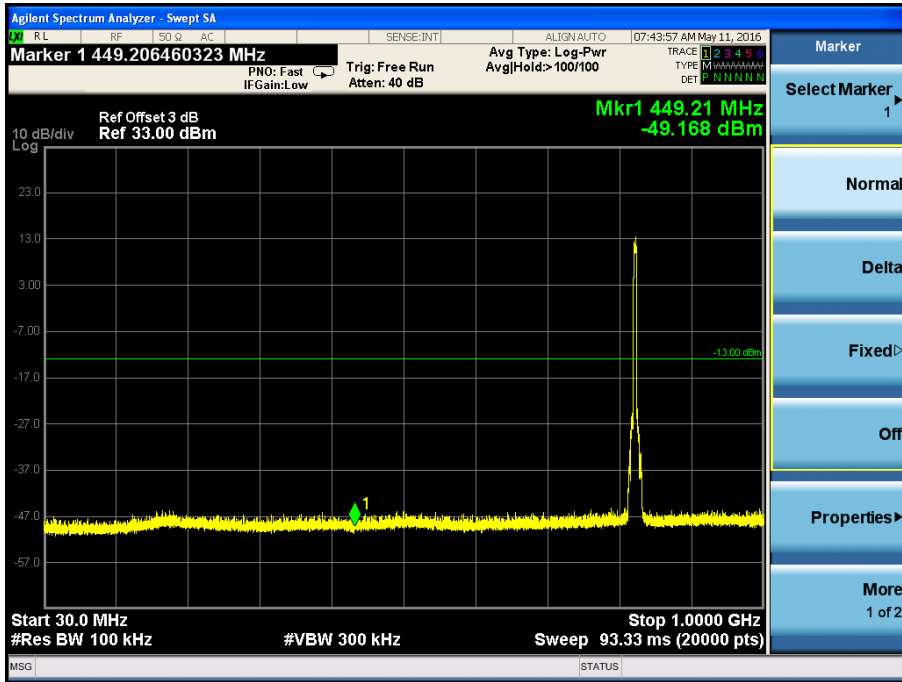
HSDPA Low Channel



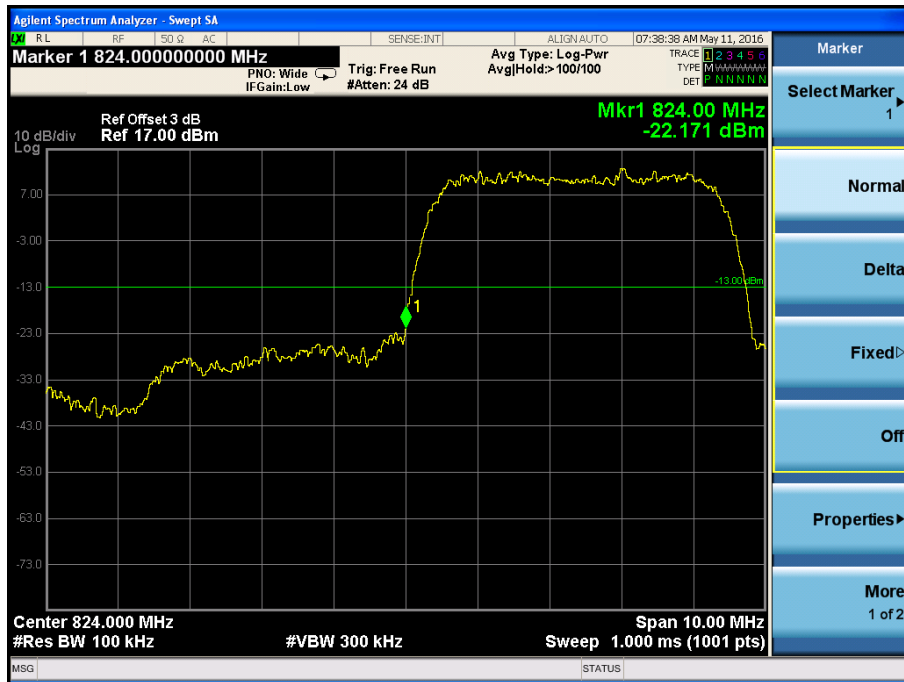
HSDPA Middle Channel



HSDPA High Channel



### HSDPA Low Band Spurious Emission

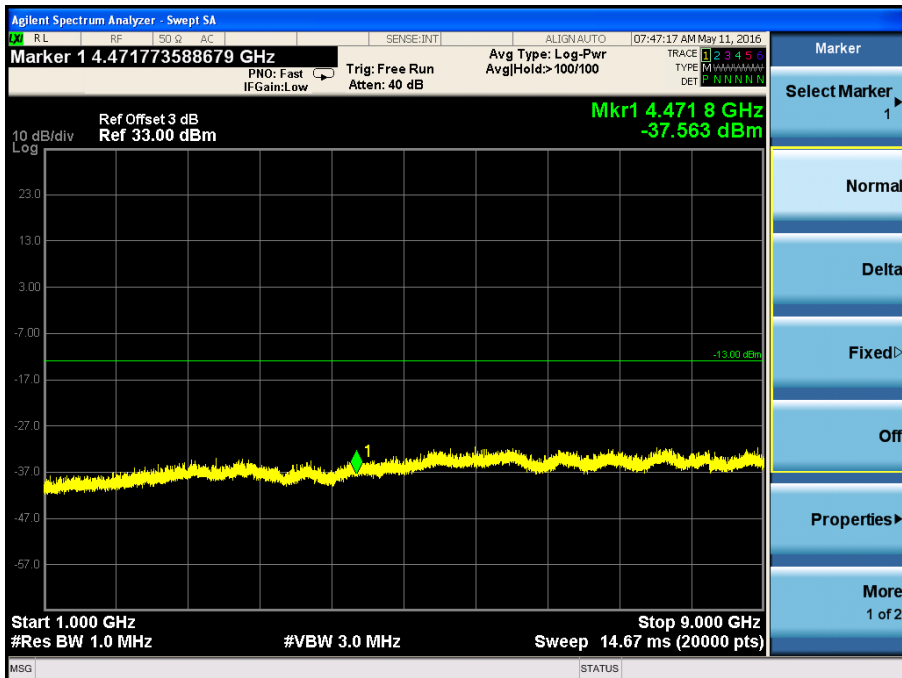
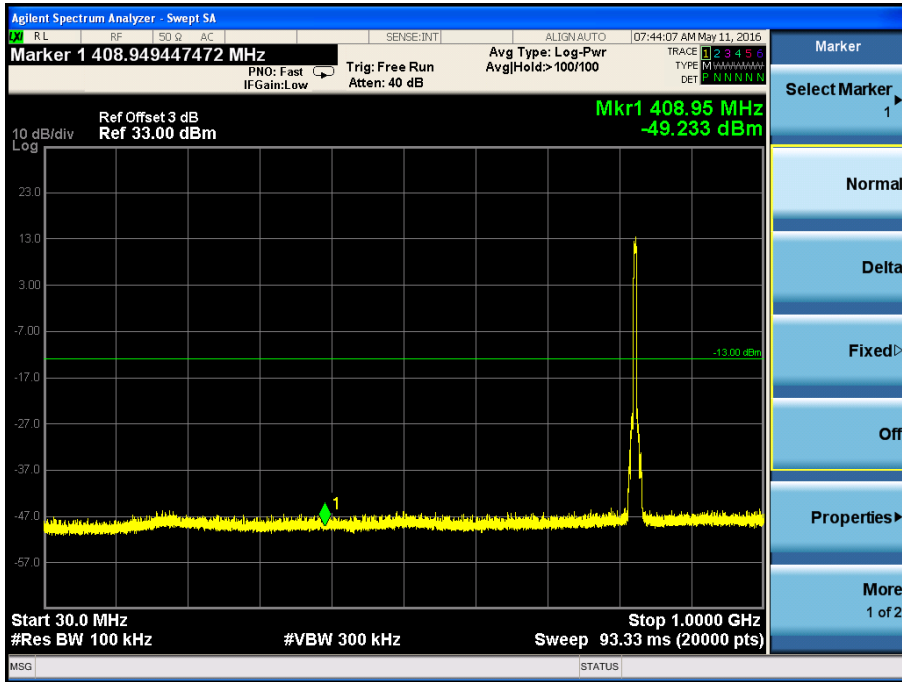


### HSDPA High Band Spurious Emission

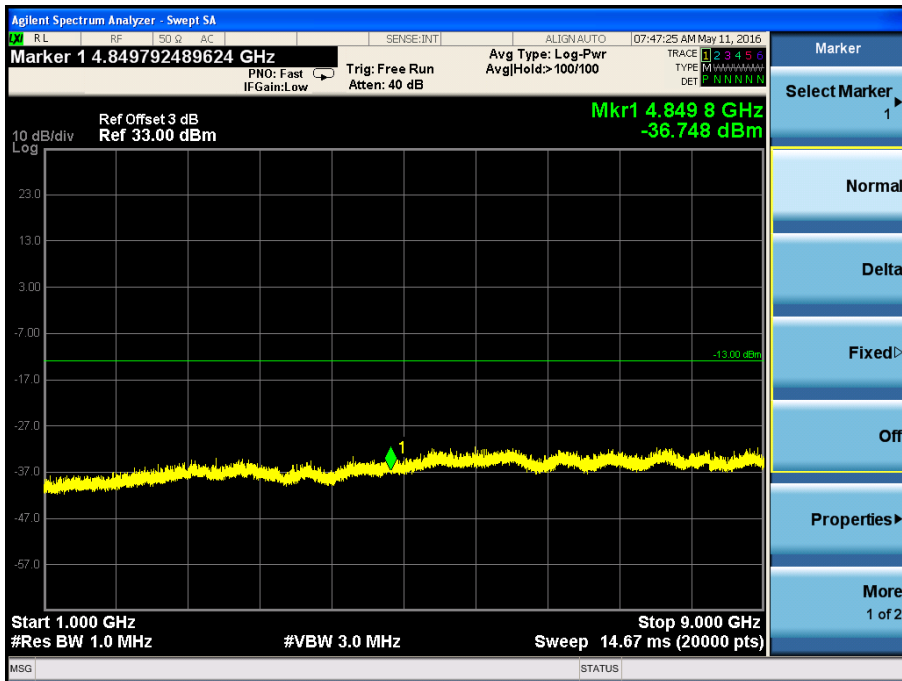
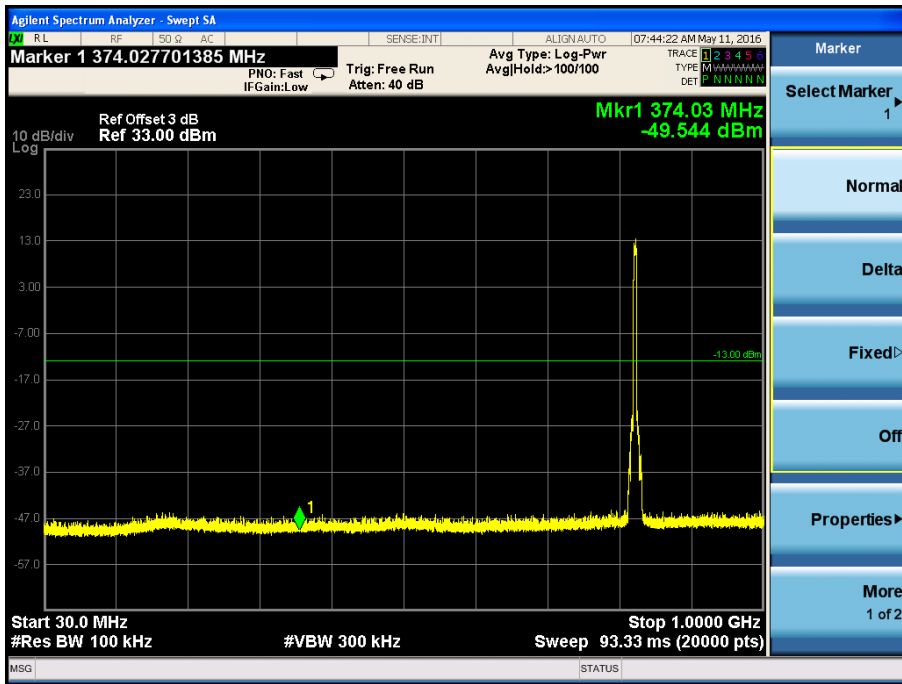




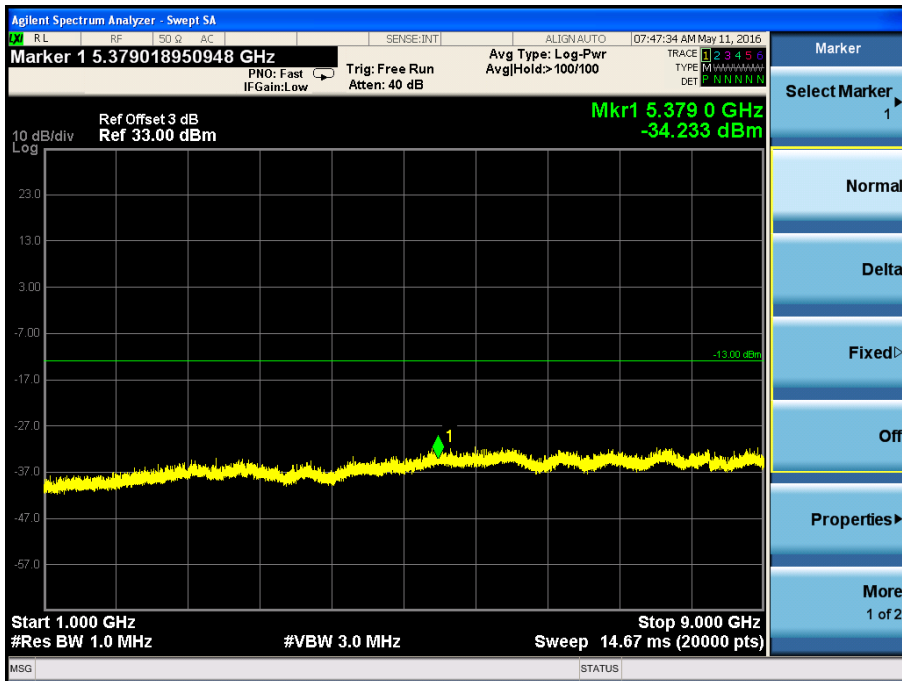
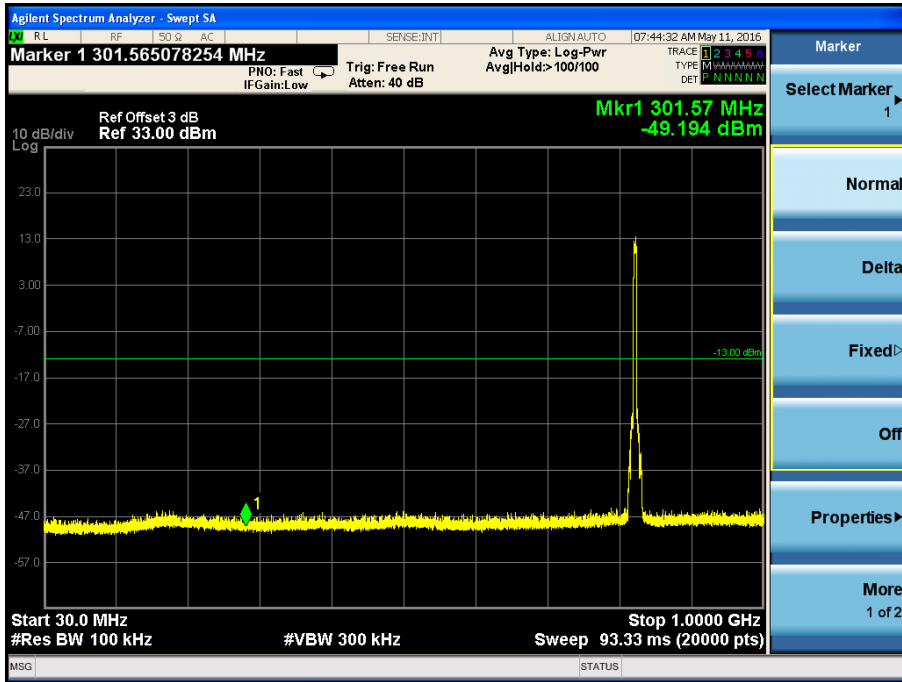
HSUPA Low Channel



HSUPA Middle Channel



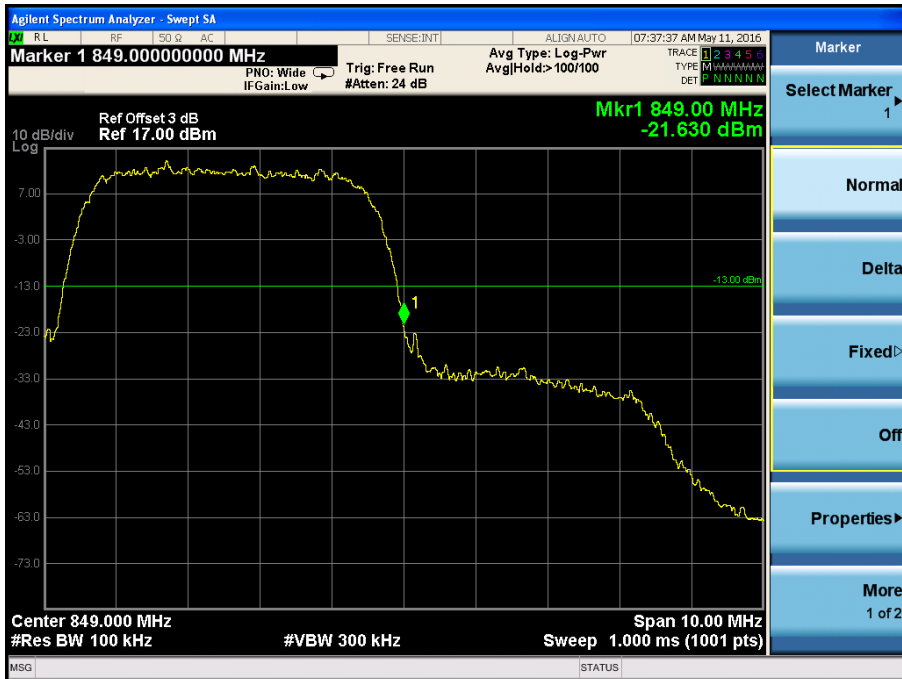
### HSUPA High Channel



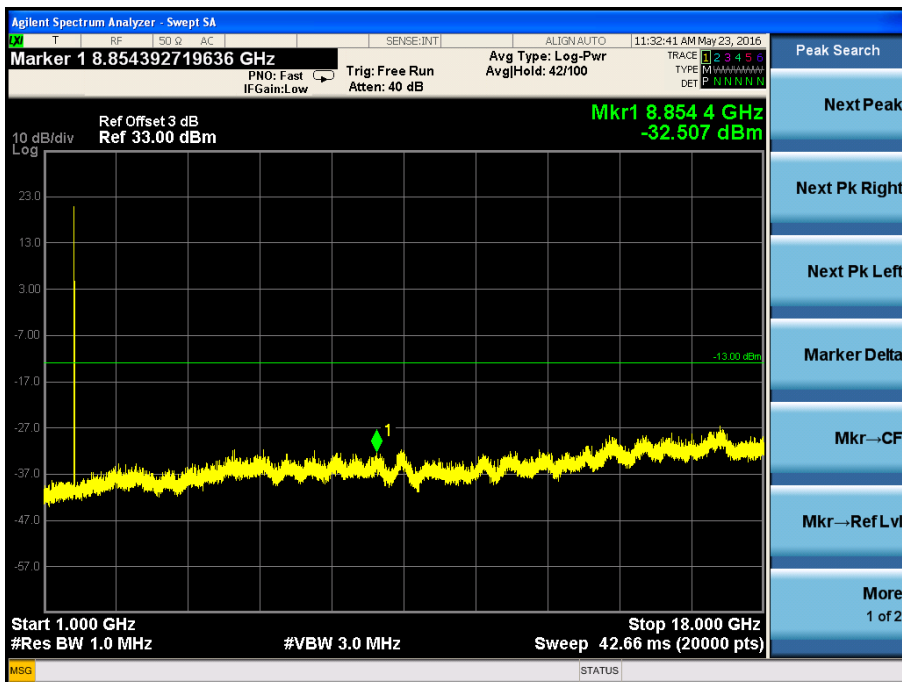
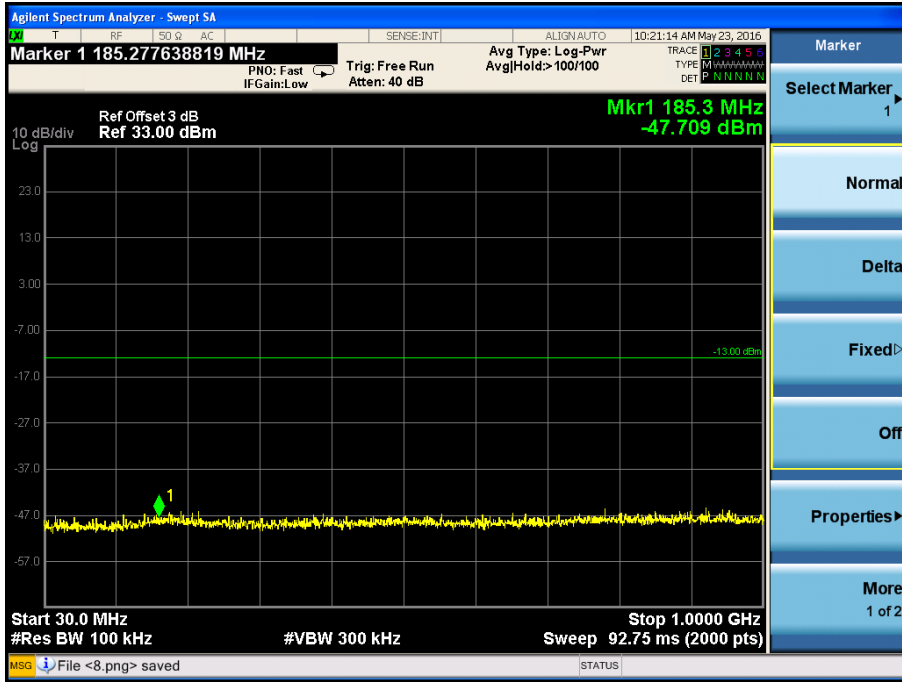
### HSUPA Low Band Spurious Emission



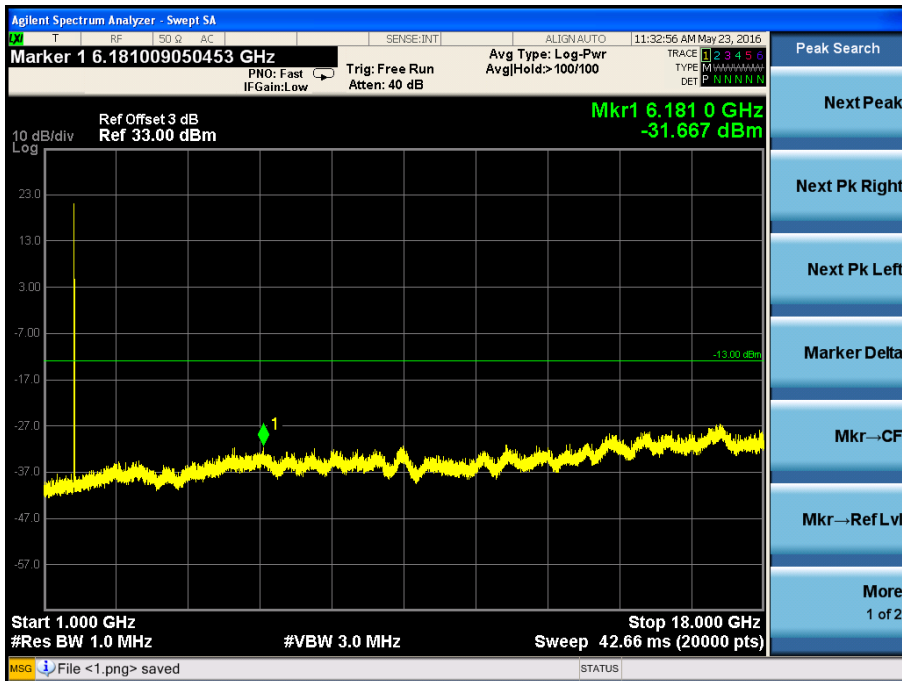
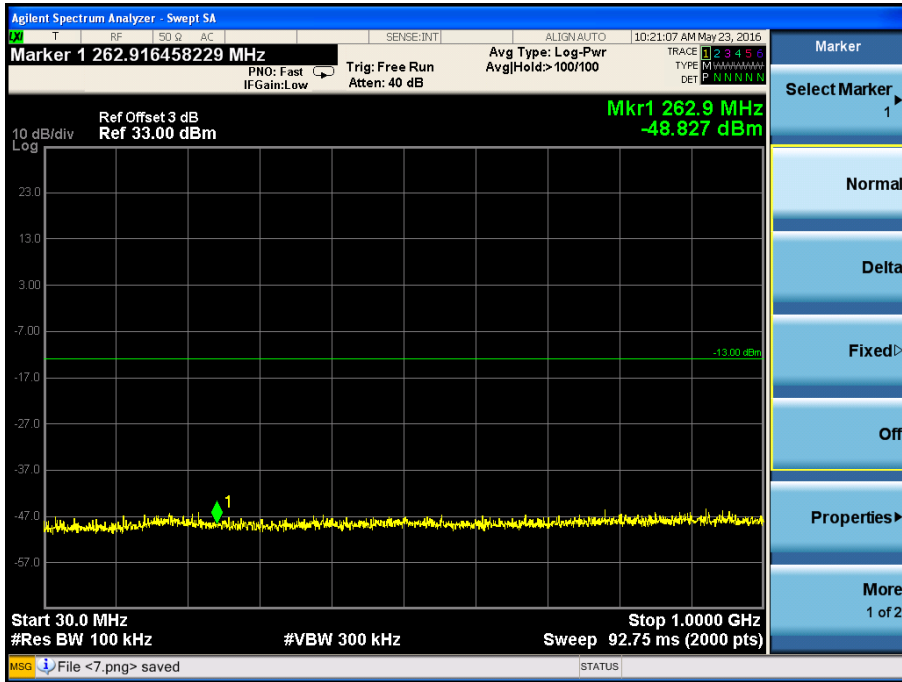
### HSUPA High Band Spurious Emission



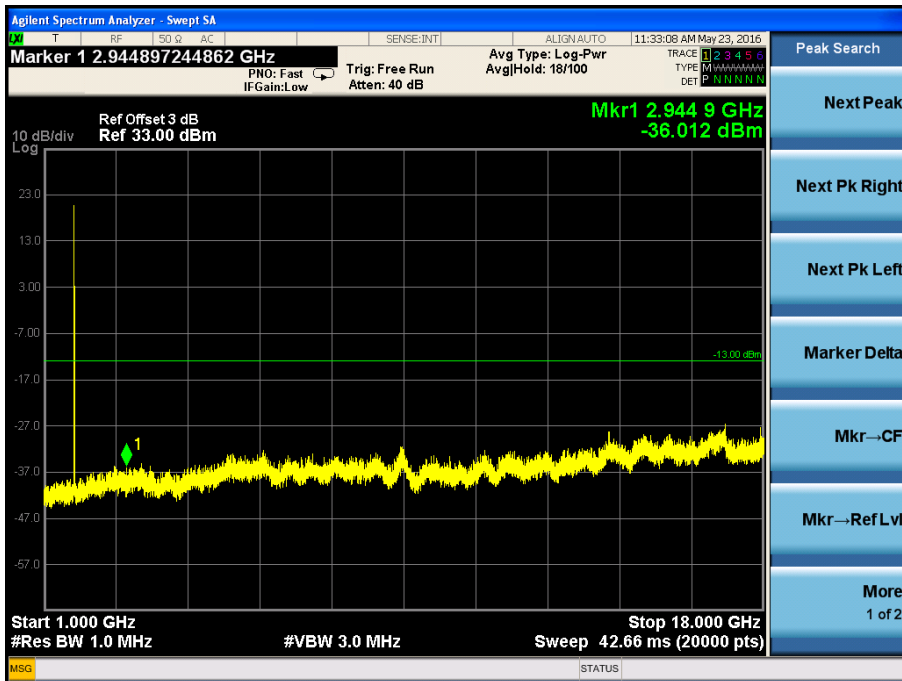
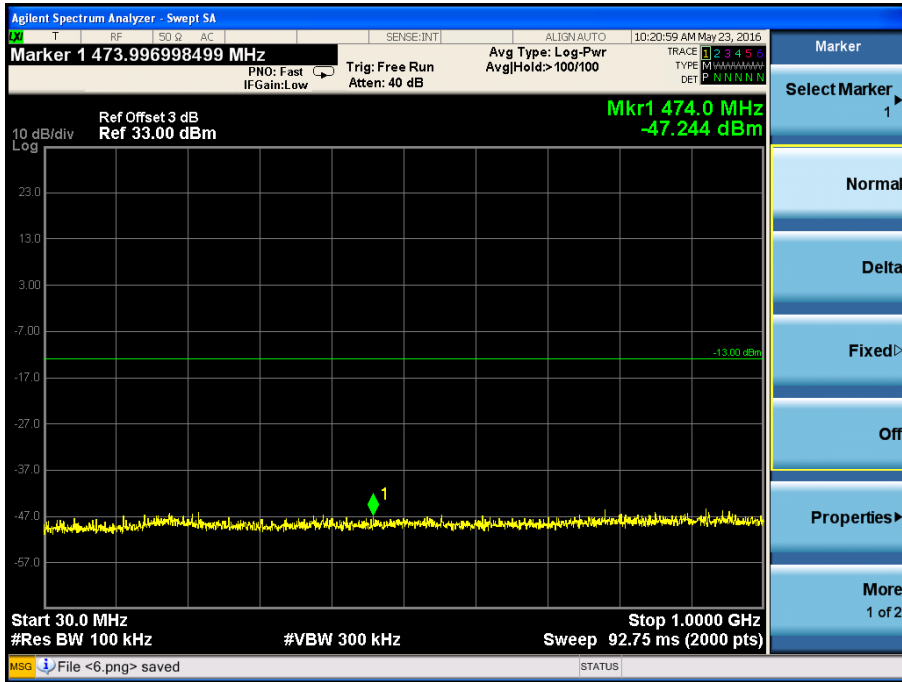
**For Band IV**  
WCDMA Low Channel



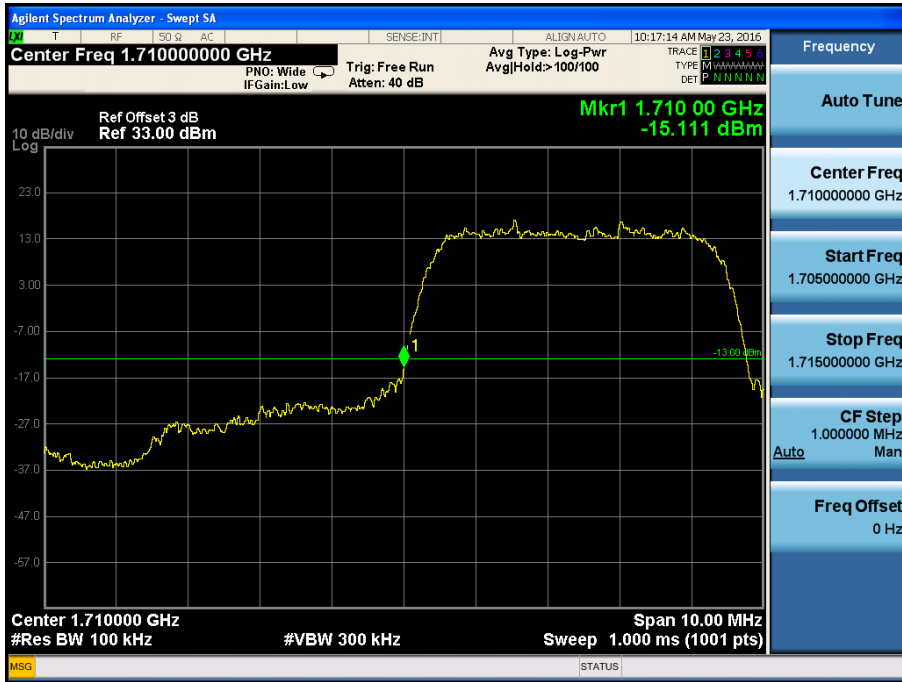
WCDMA Middle Channel



WCDMA High Channel



WCDMA Low Band Spurious Emission

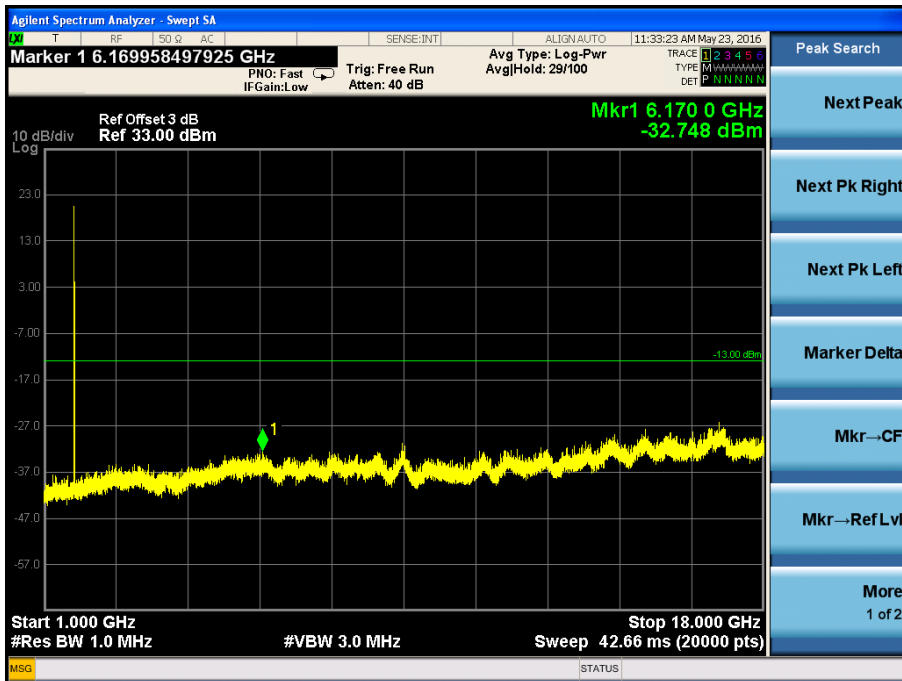
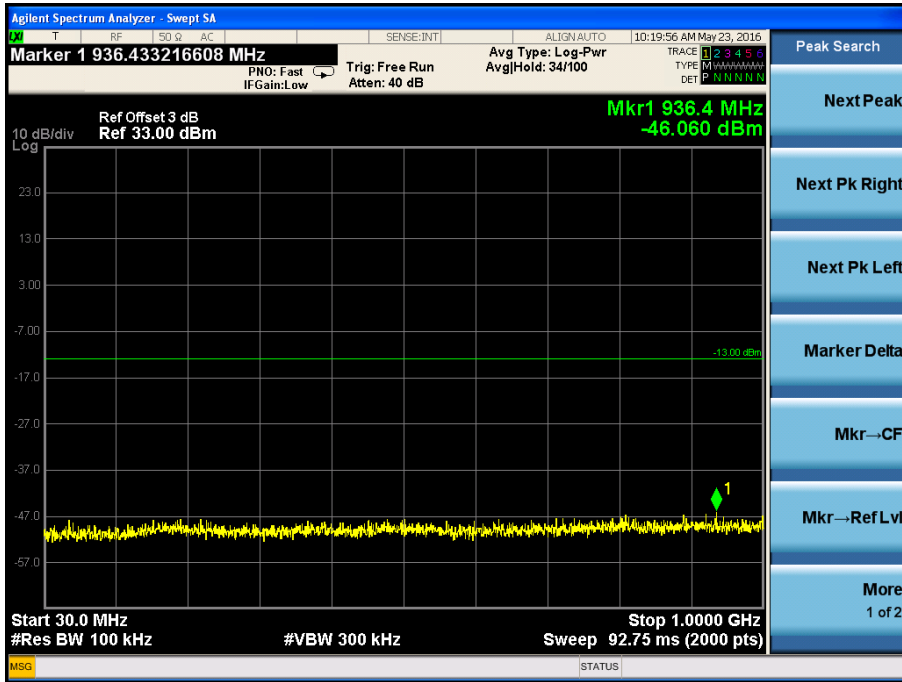


WCDMA High Band Spurious Emission

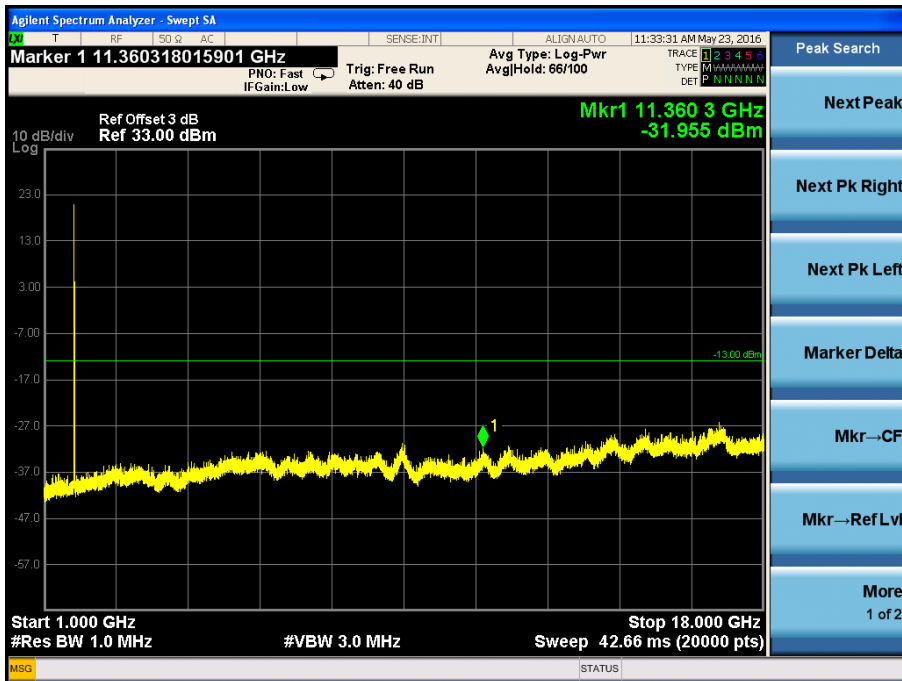
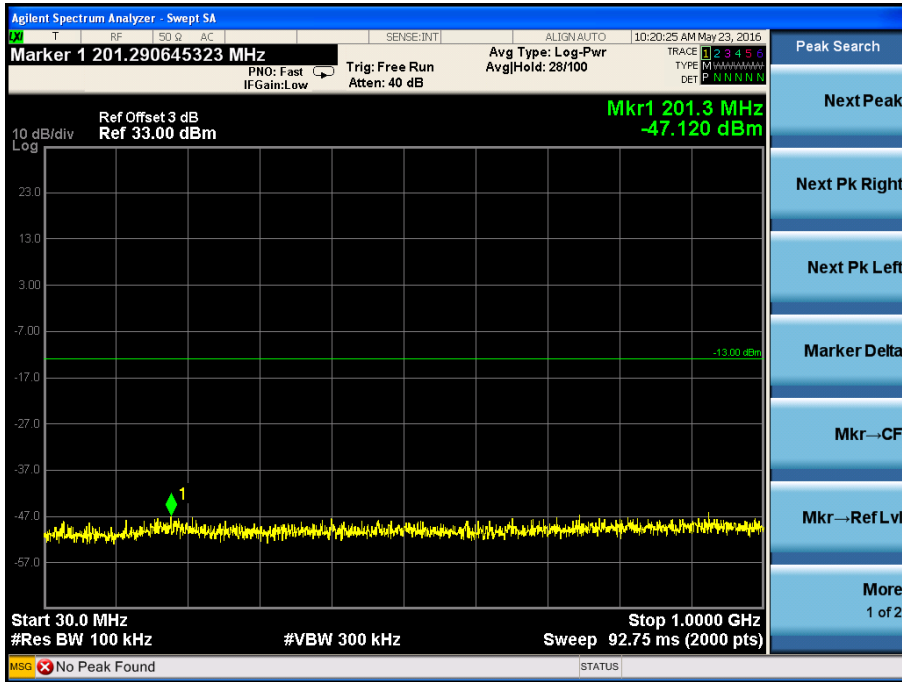




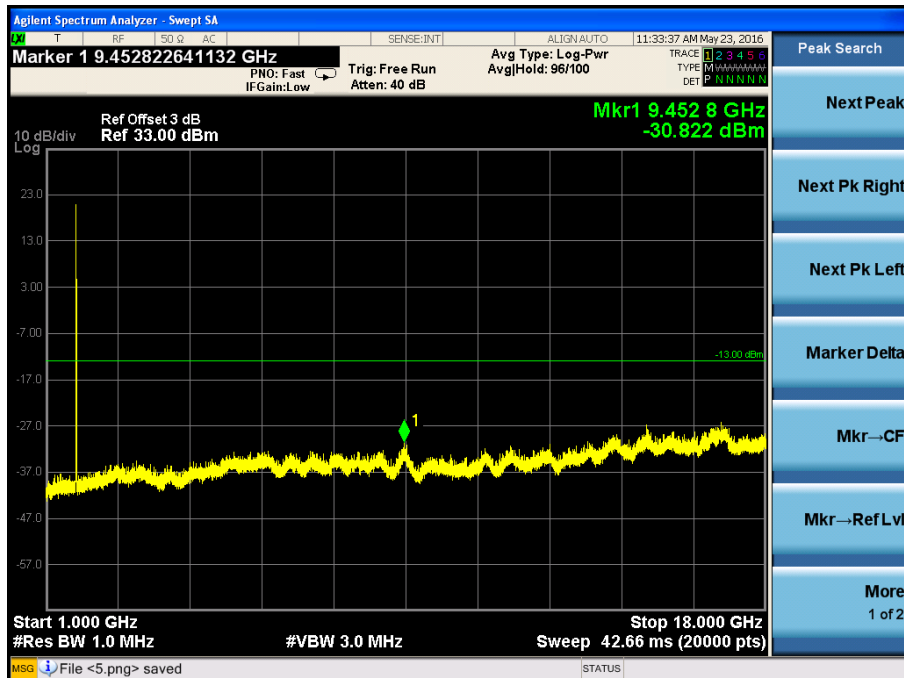
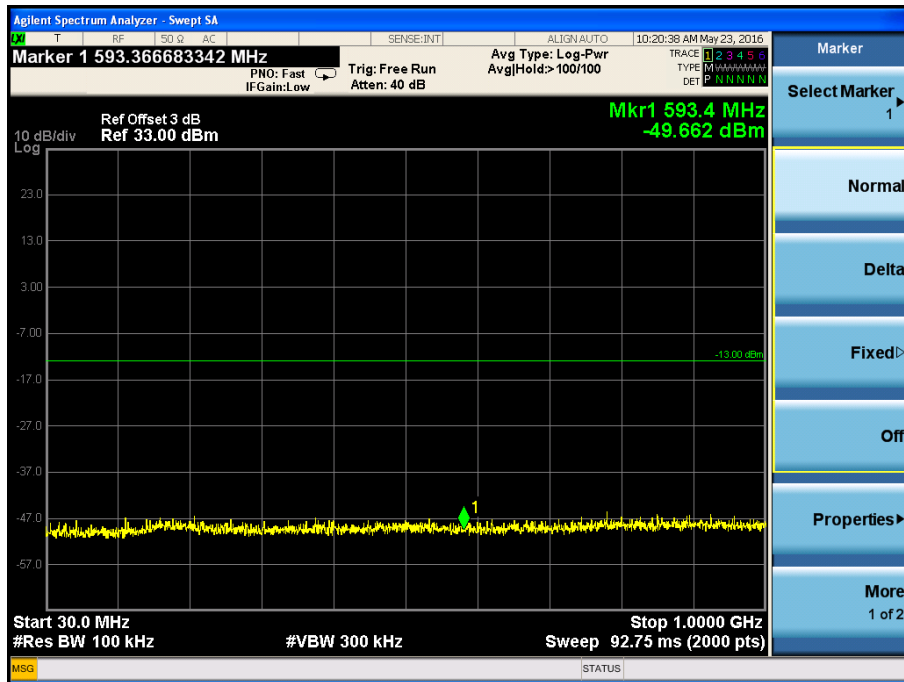
HSDPA Low Channel



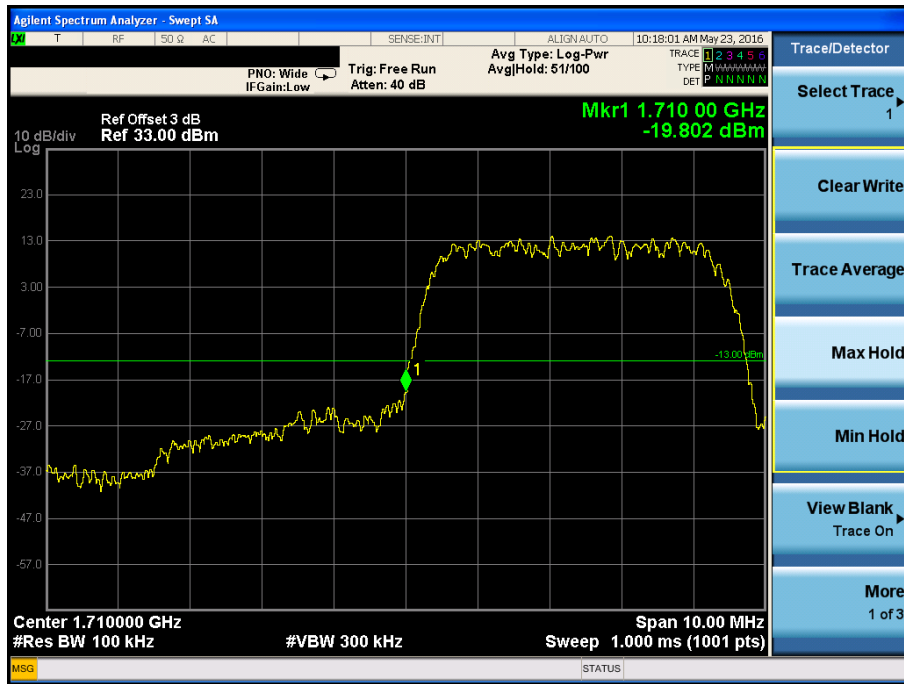
HSDPA Middle Channel



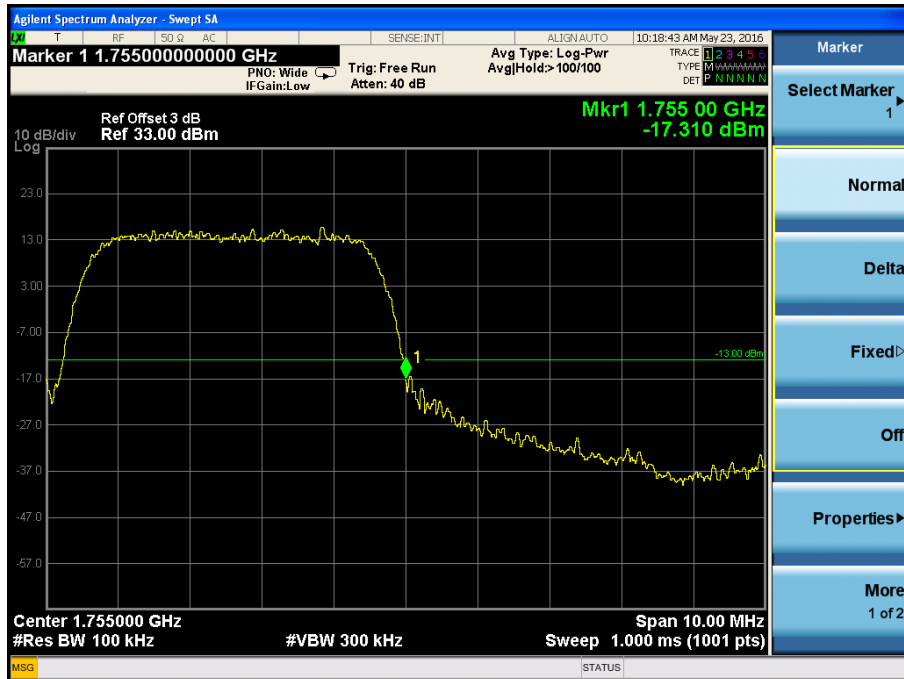
HSDPA High Channel



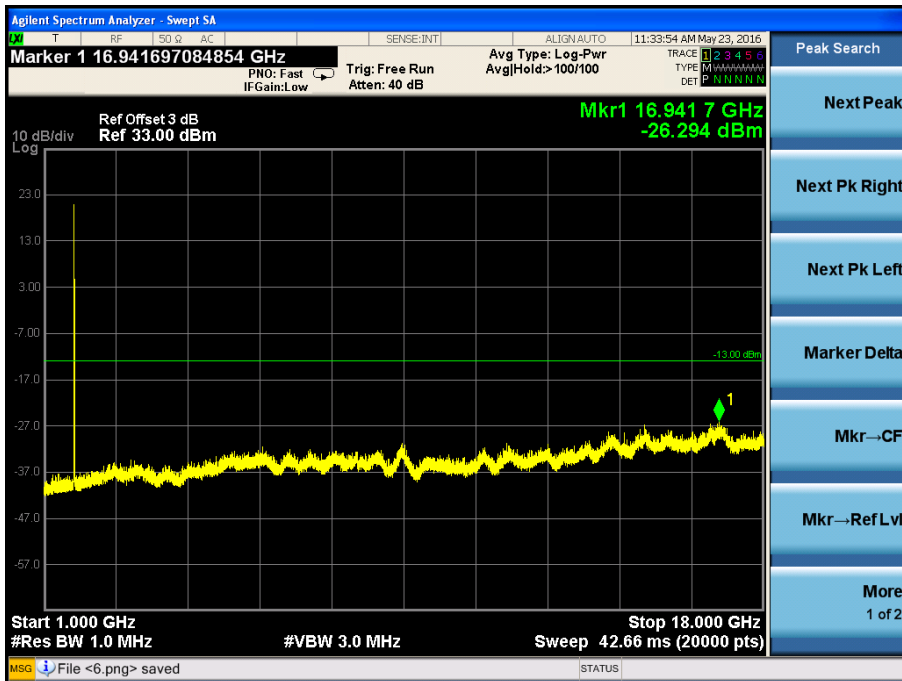
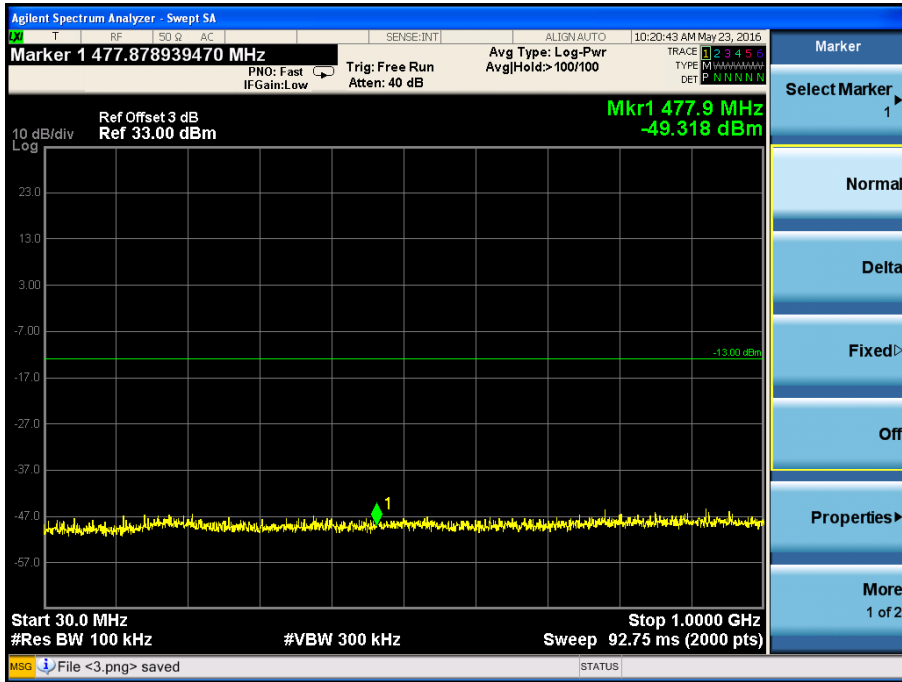
### HSDPA Low Band Spurious Emission



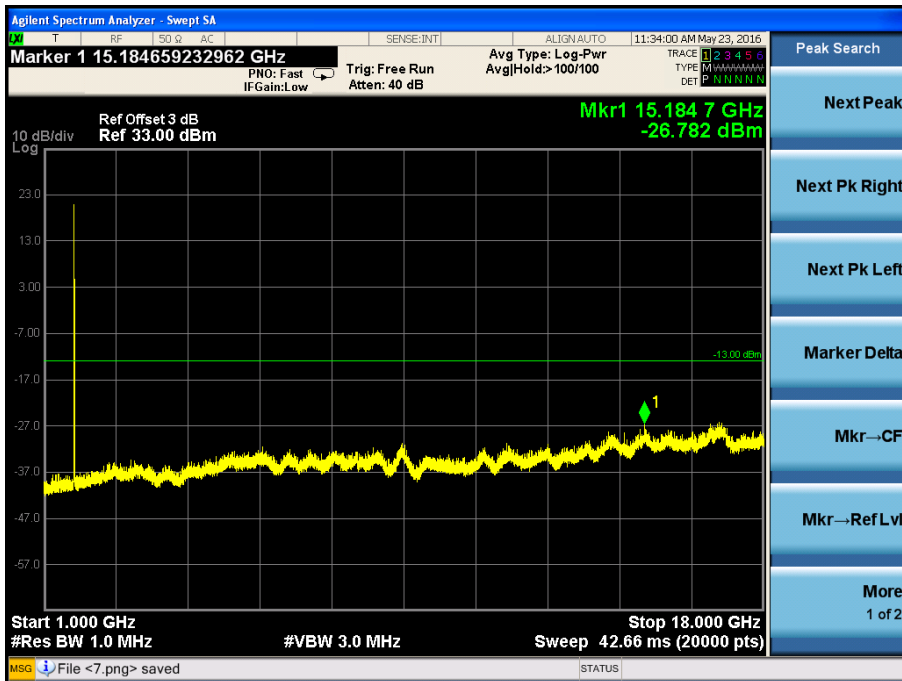
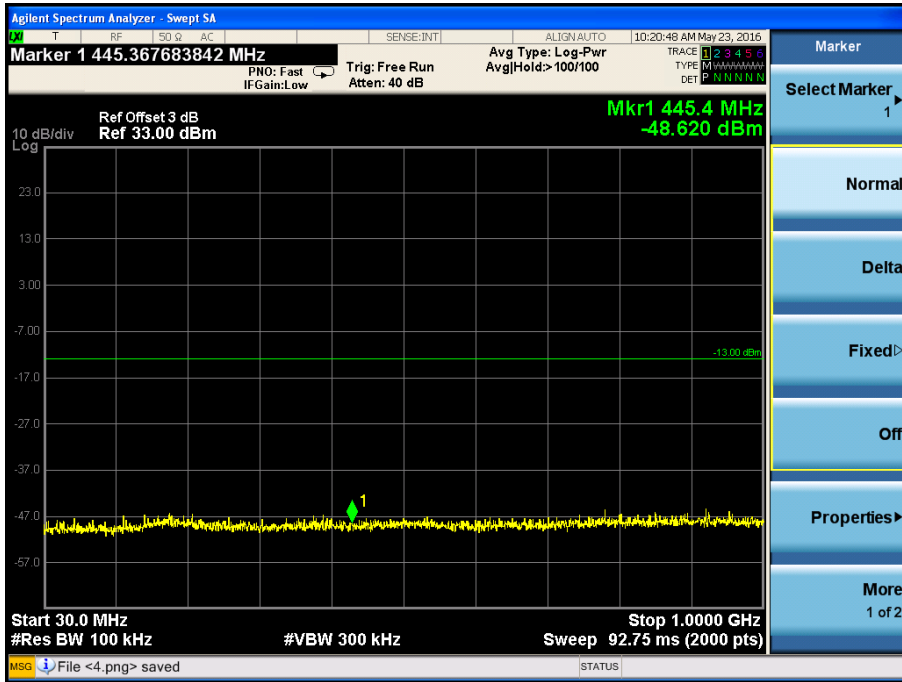
### HSDPA High Band Spurious Emission



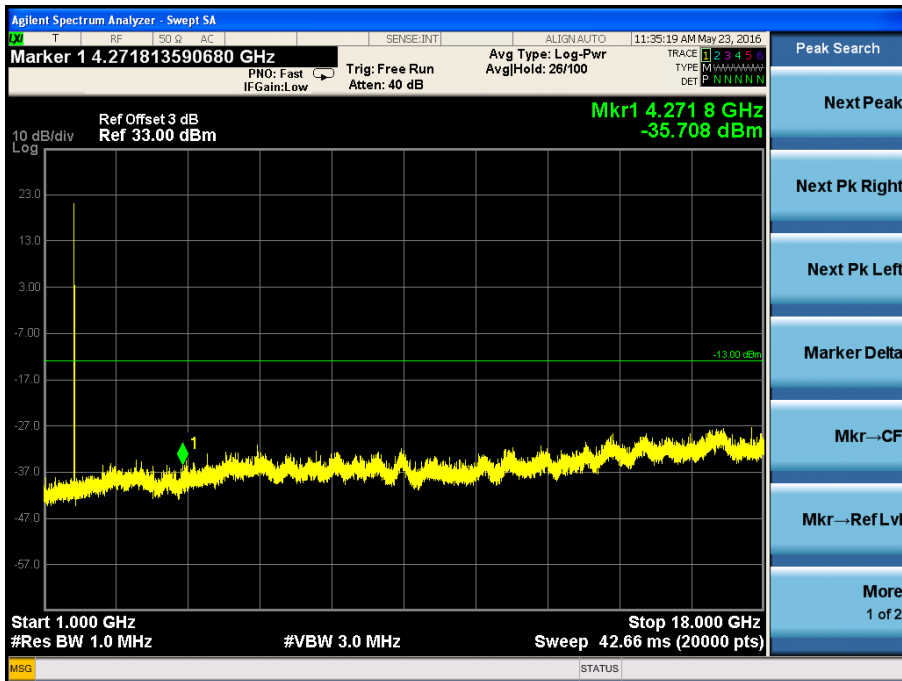
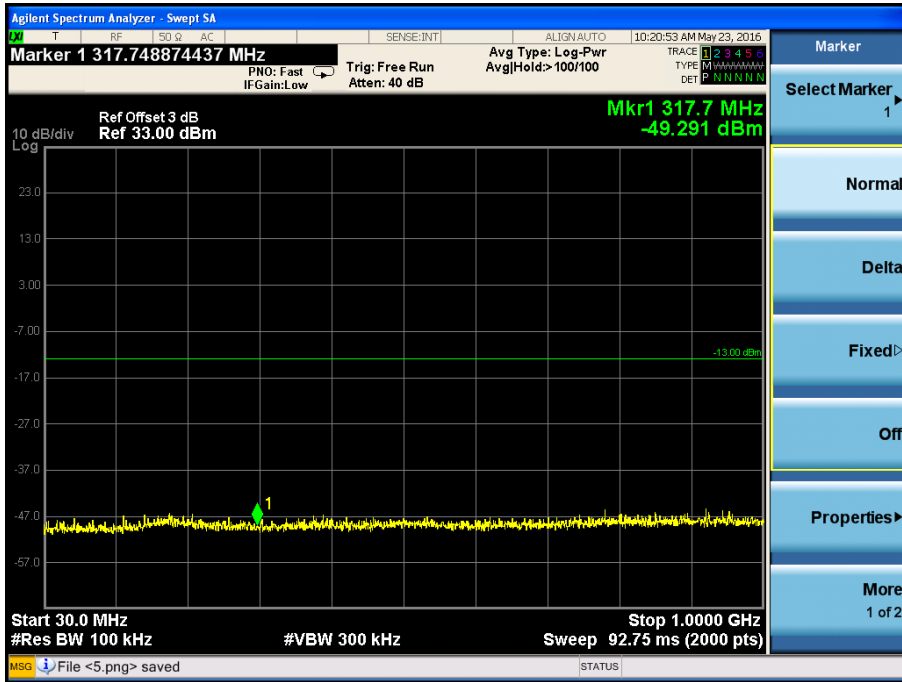
HSUPA Low Channel



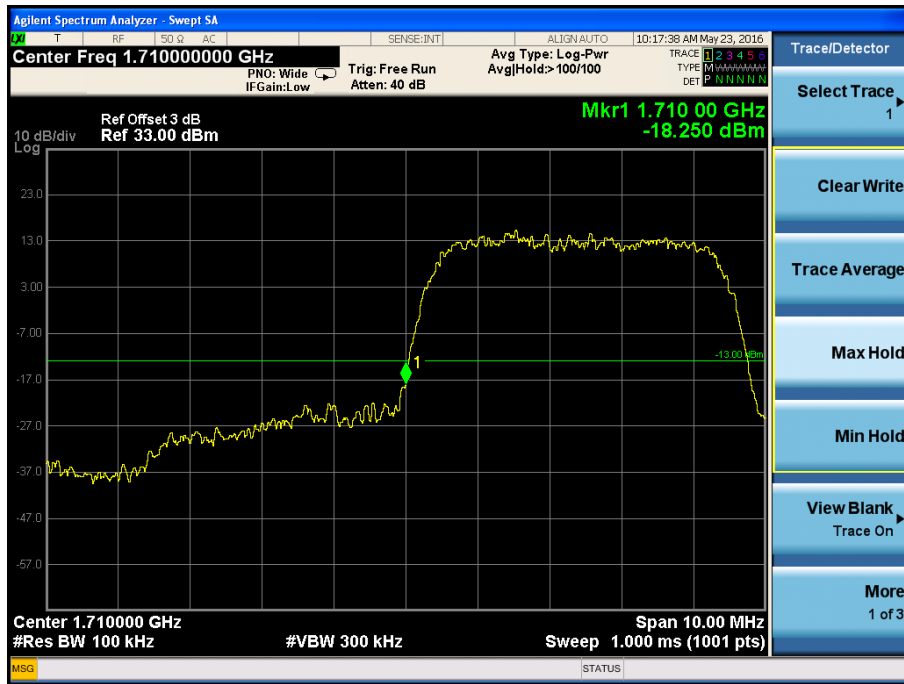
HSUPA Middle Channel



HSUPA High Channel



### HSUPA Low Band Spurious Emission

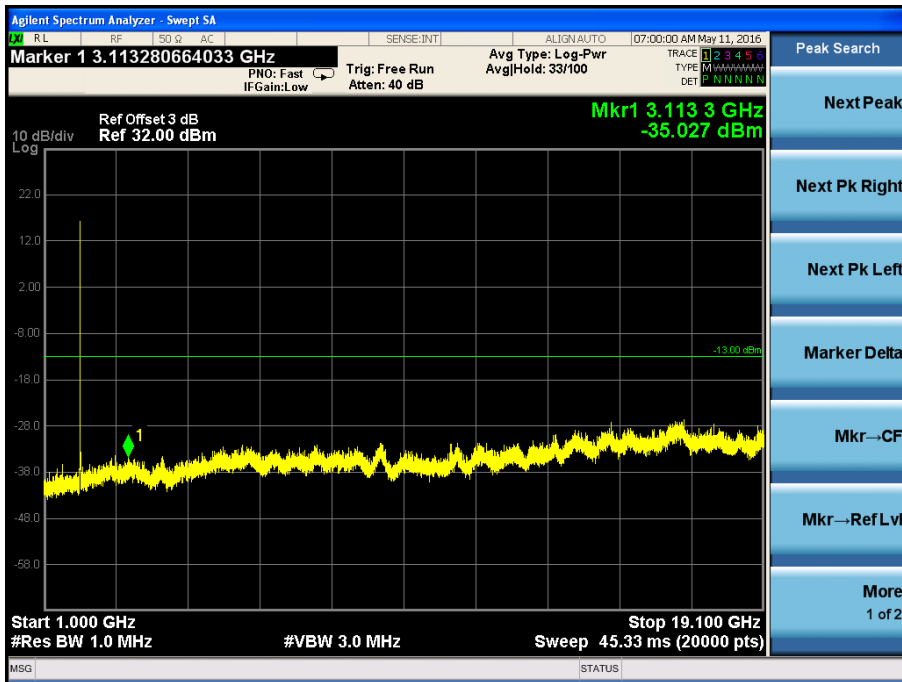
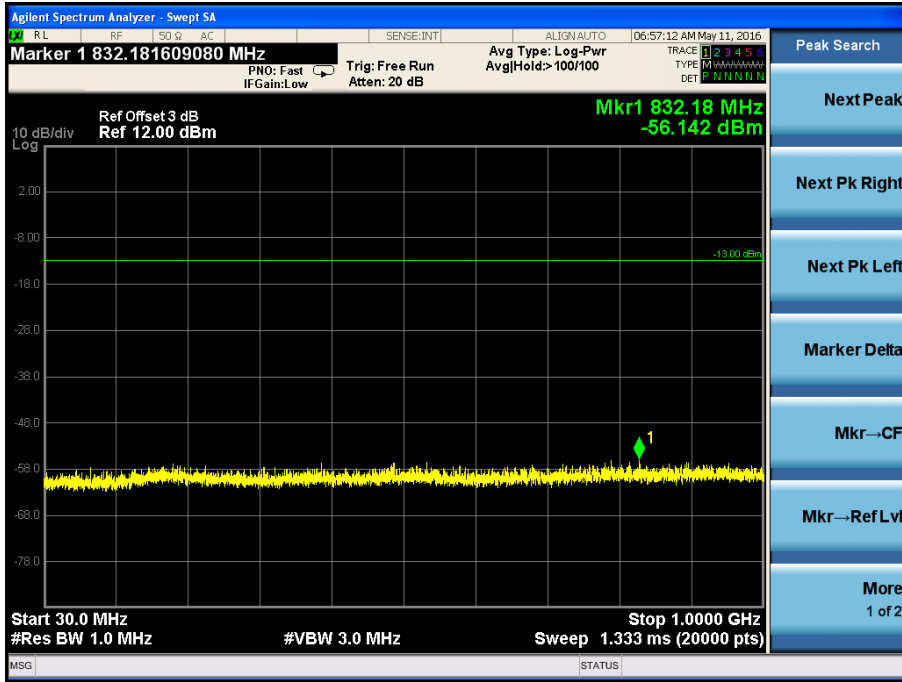


### HSUPA High Band Spurious Emission

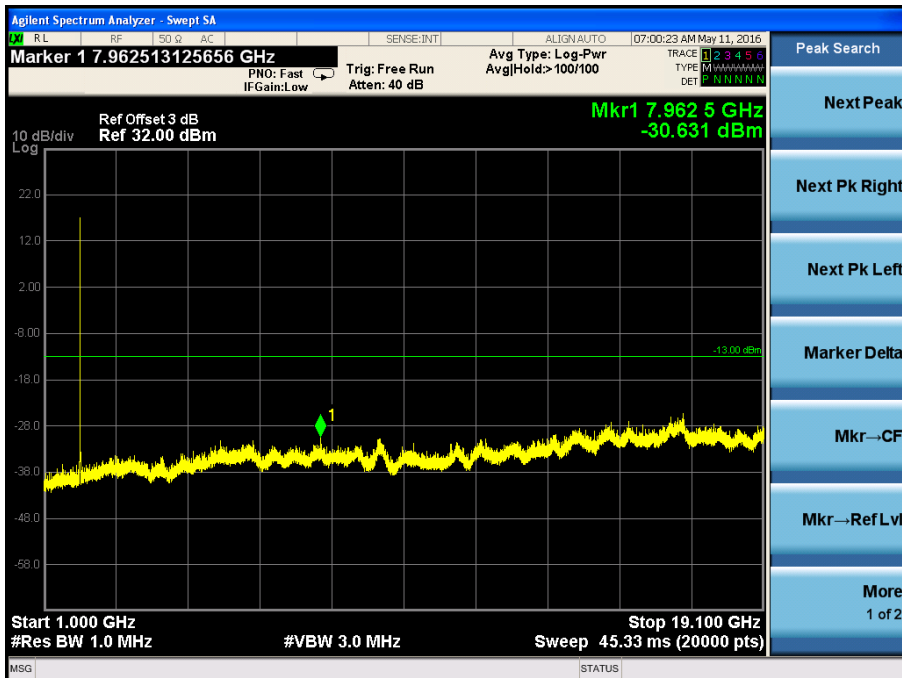
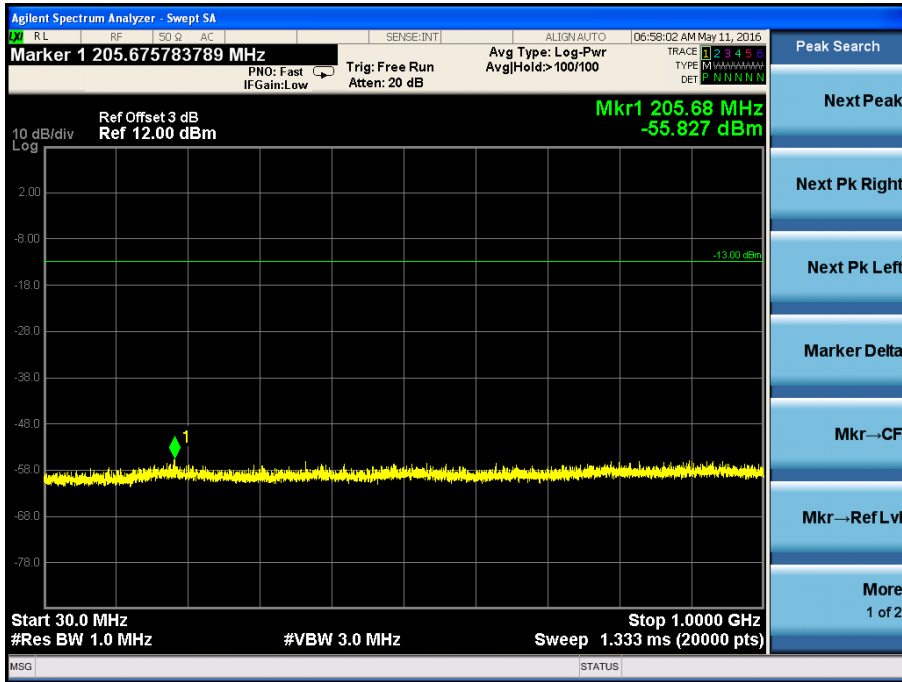




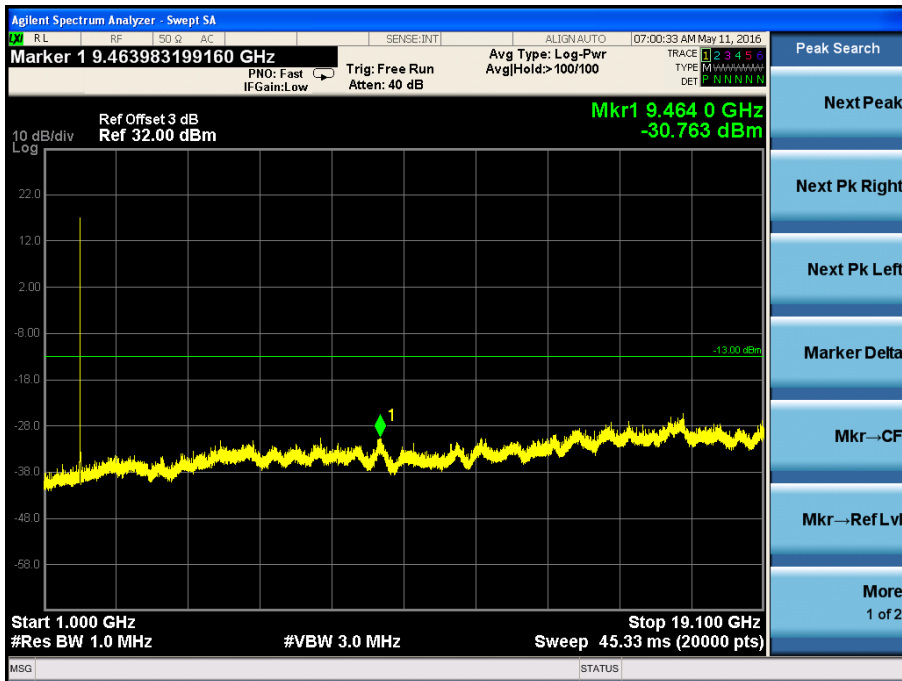
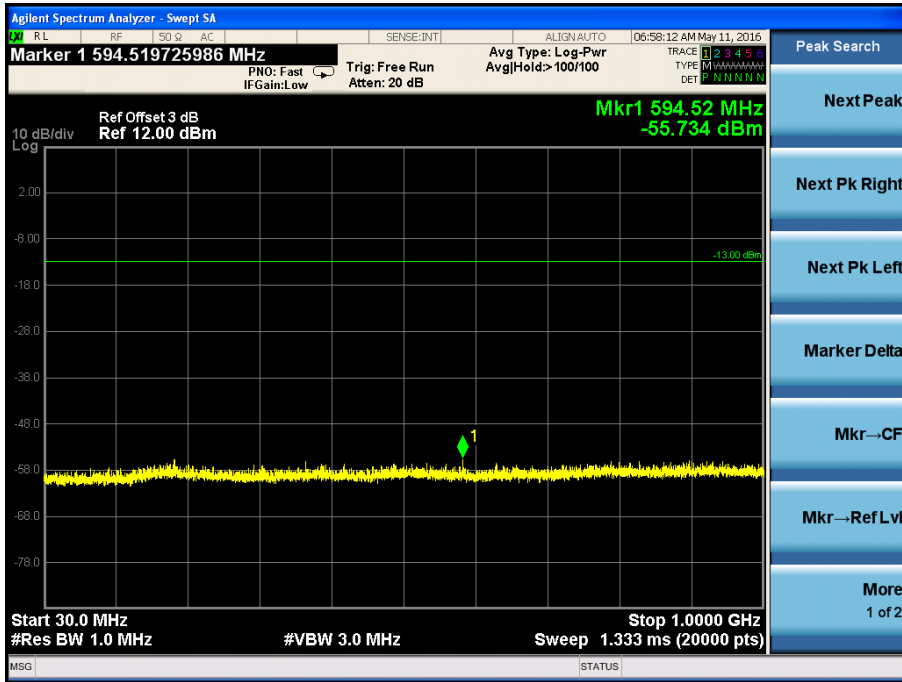
**For Band II**  
WCDMA Low Channel



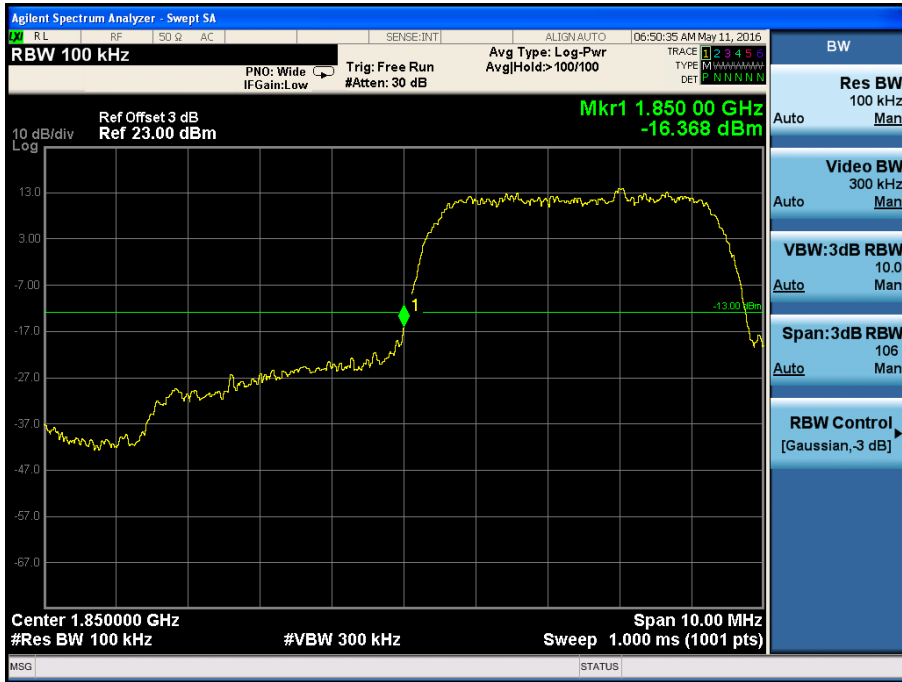
WCDMA Middle Channel



WCDMA High Channel



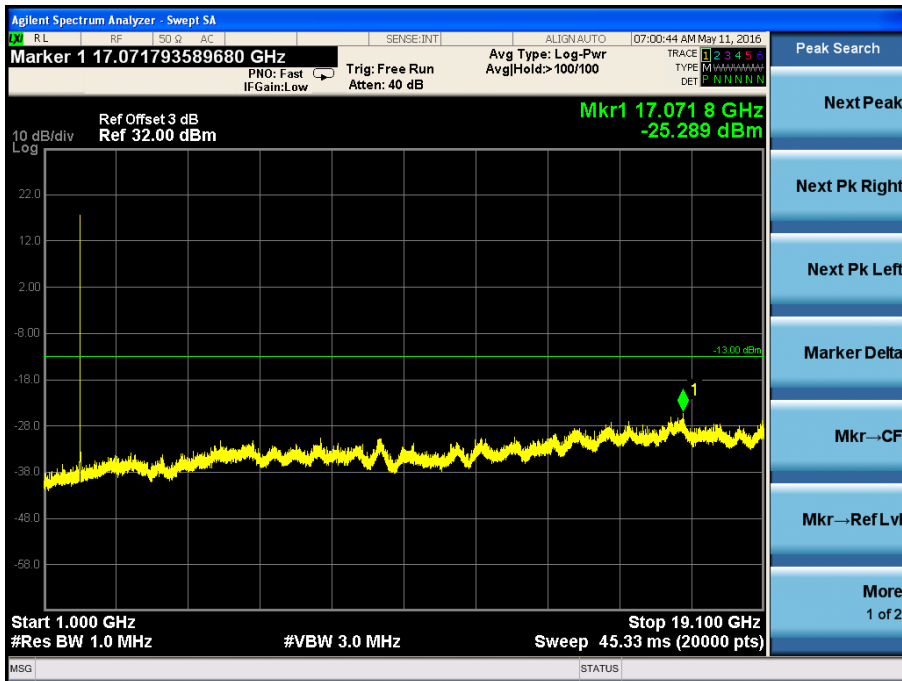
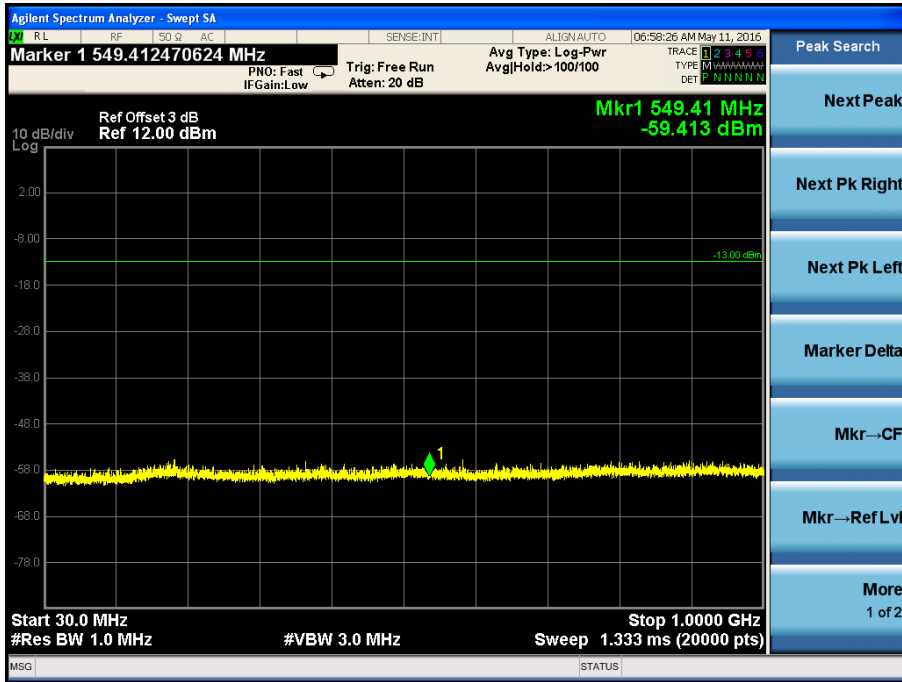
WCDMA Low Band Spurious Emission



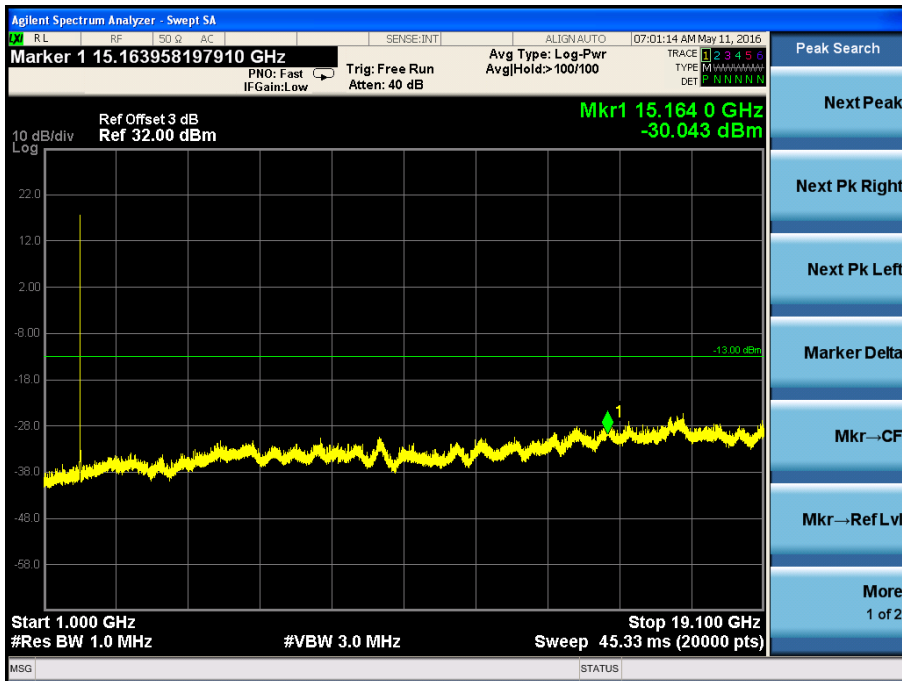
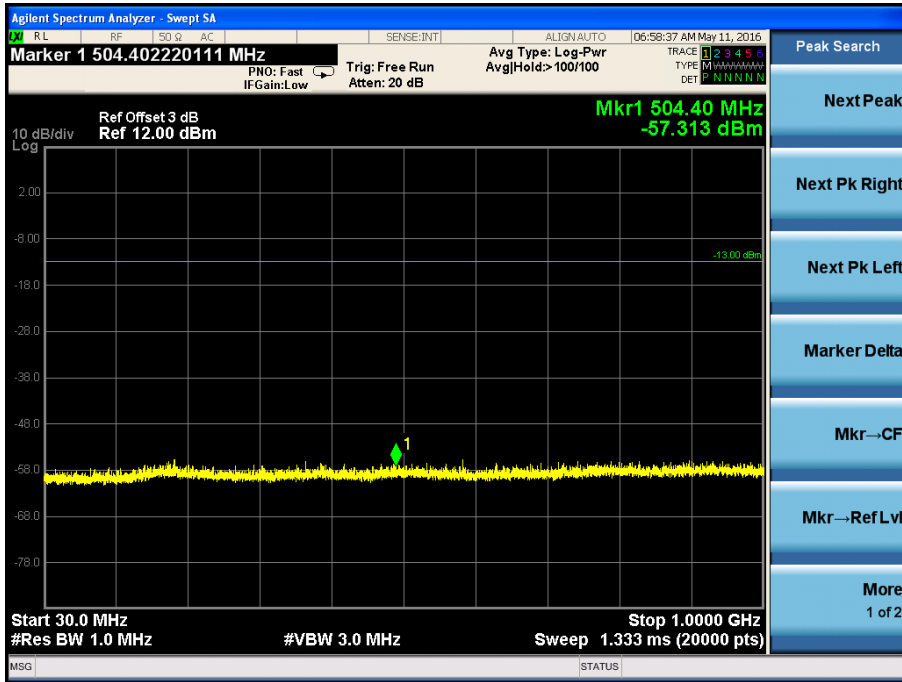
WCDMA High Band Spurious Emission



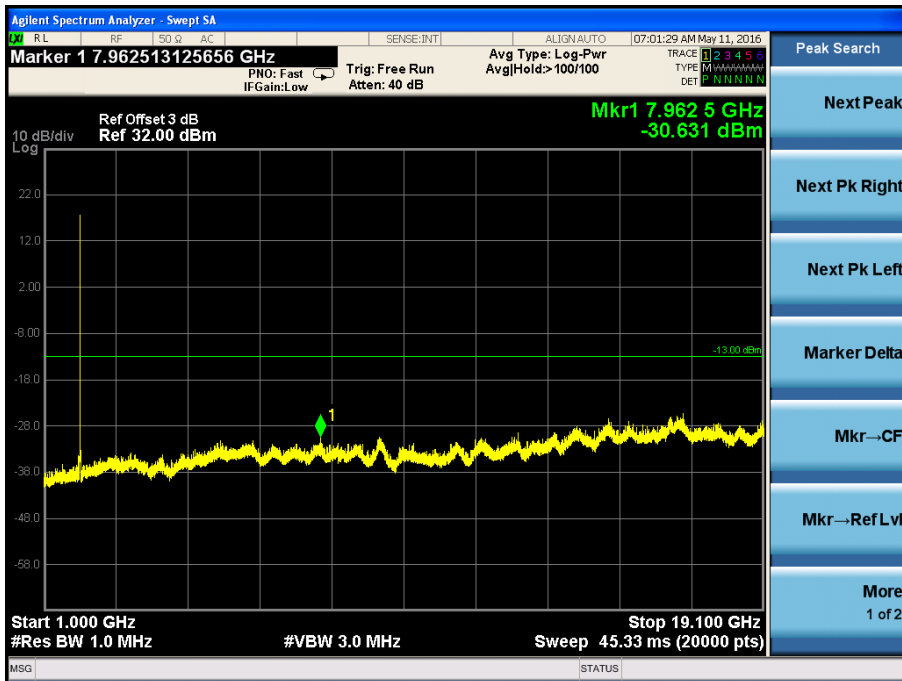
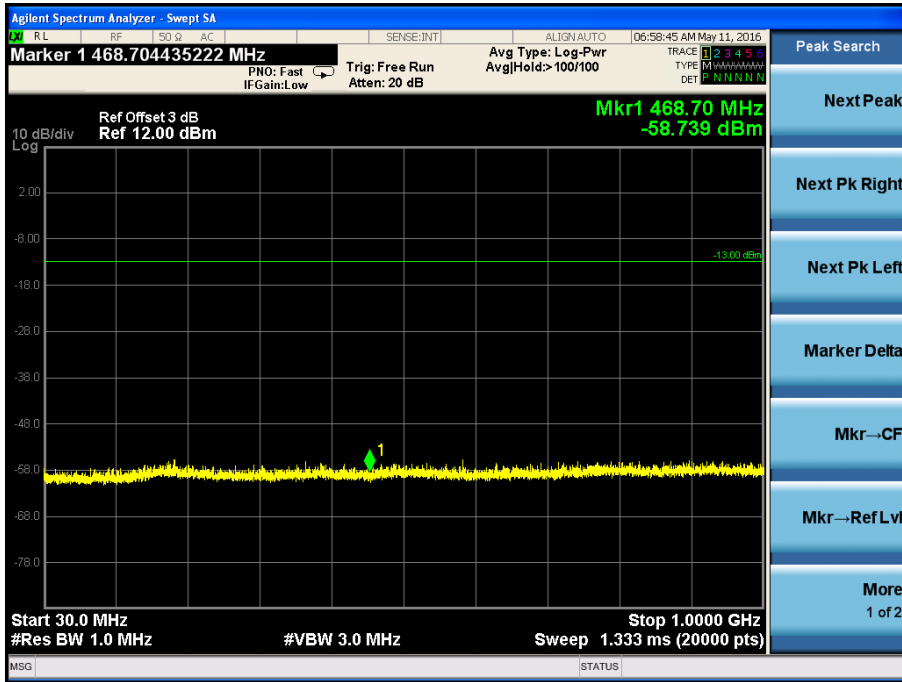
HSDPA Low Channel



HSDPA Middle Channel



HSDPA High Channel



### HSDPA Low Band Spurious Emission

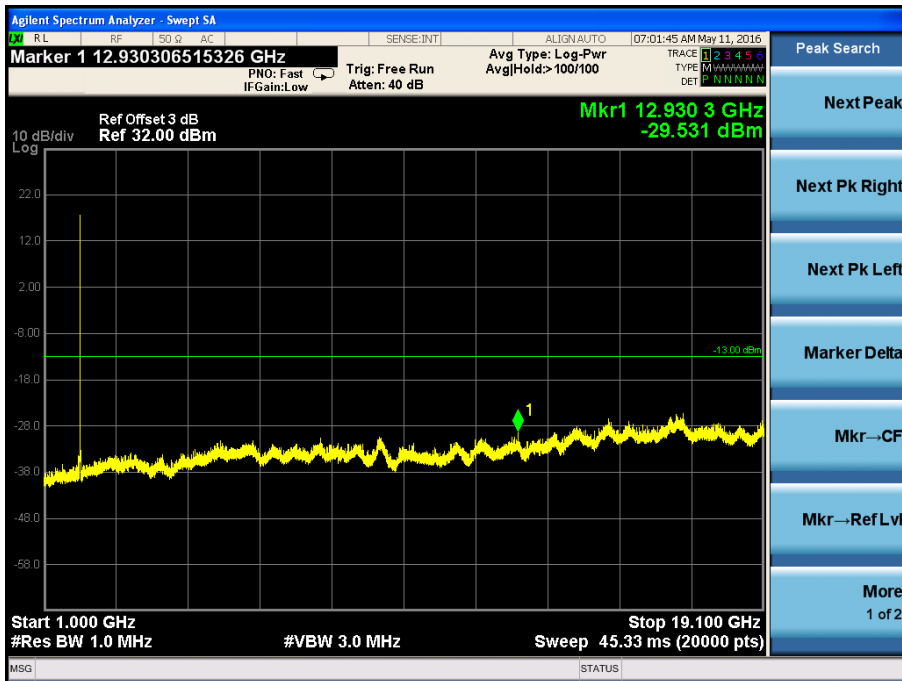
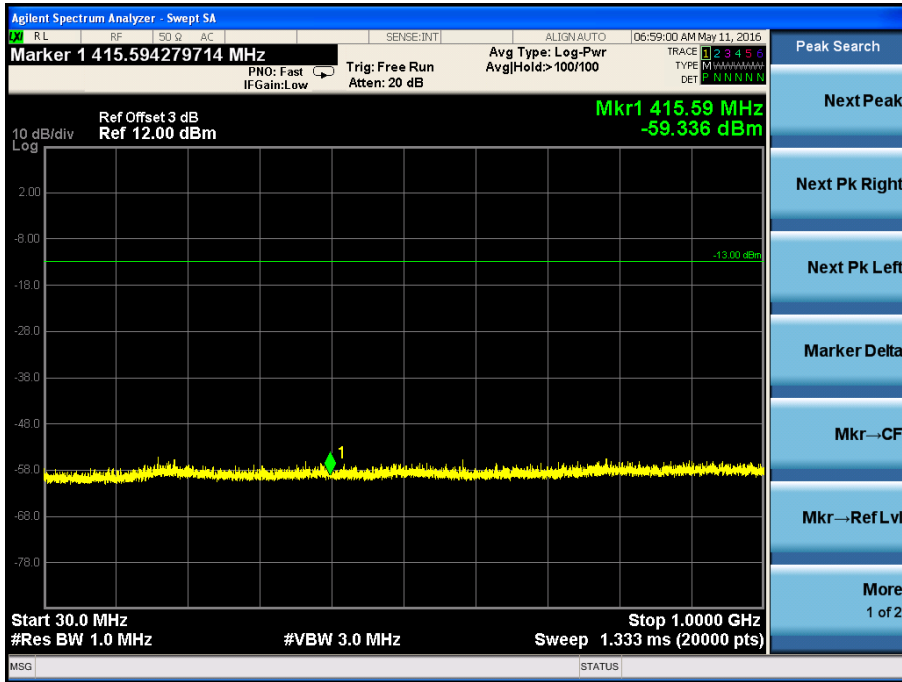


### HSDPA High Band Spurious Emission

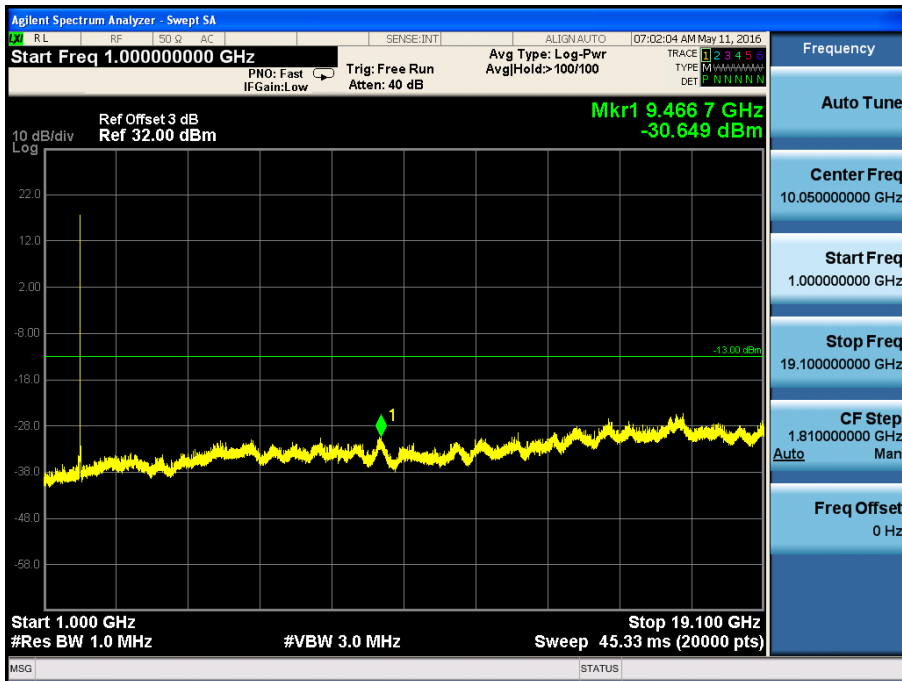
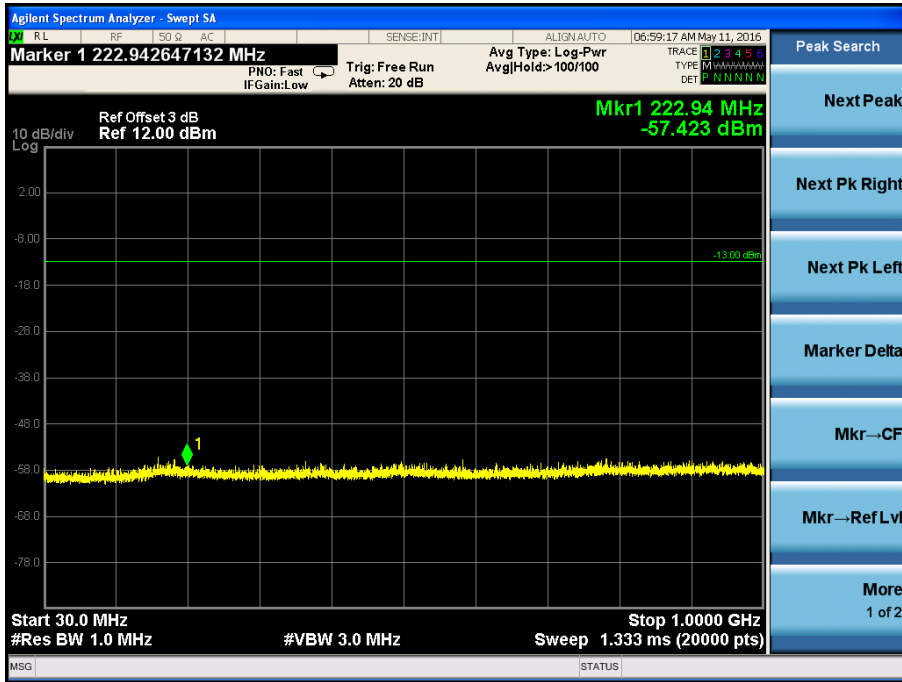




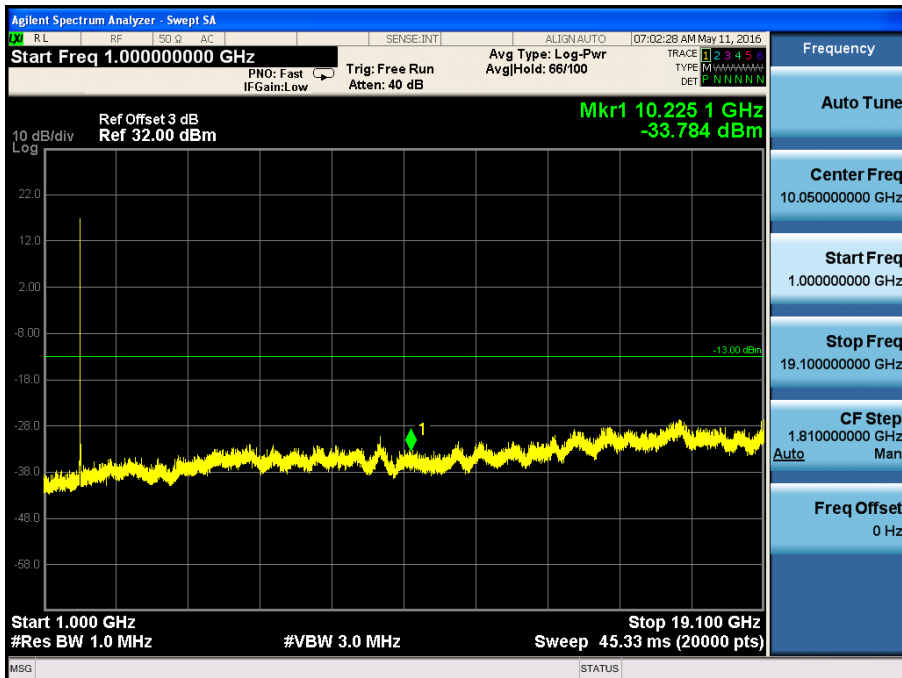
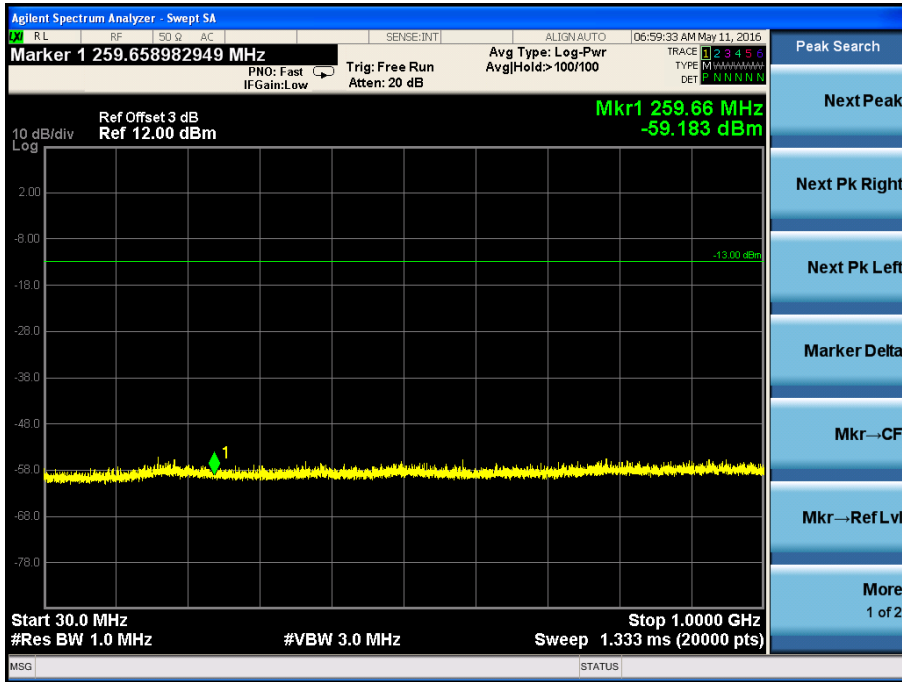
HSUPA Low Channel



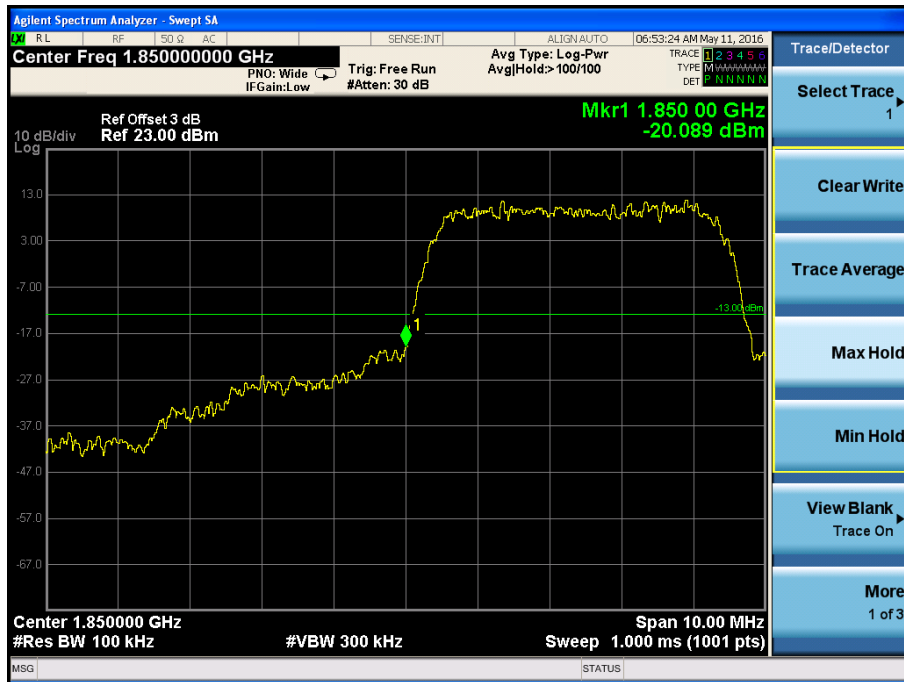
HSUPA Middle Channel



HSUPA High Channel



### HSUPA Low Band Spurious Emission



### HSUPA High Band Spurious Emission



## 8. Spurious Radiated Emissions

### 8.1 Measurement Uncertainty

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

### 8.2 Standard Applicable

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

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

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  $43 + 10 \log_{10}(P)$  dB.

### 8.3 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.

$$\text{Spurious attenuation limit in dB} = 43 + 10 \log_{10}(\text{power out in Watts})$$

### 8.4 Environmental Conditions

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

### 8.5 Summary of Test Results/Plots

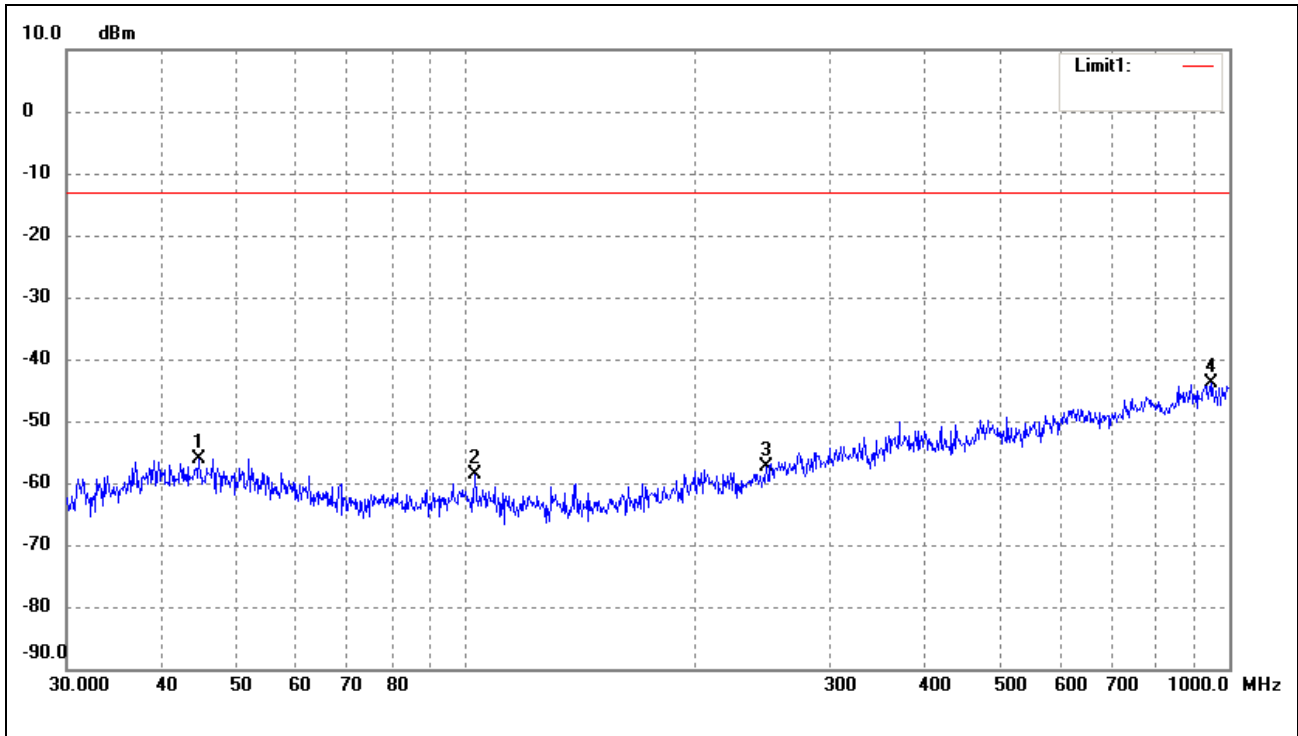
According to the data below, the FCC Part 22.917 and 24.238 standards, and had the worst margin of:

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

For GPRS 850 Mode

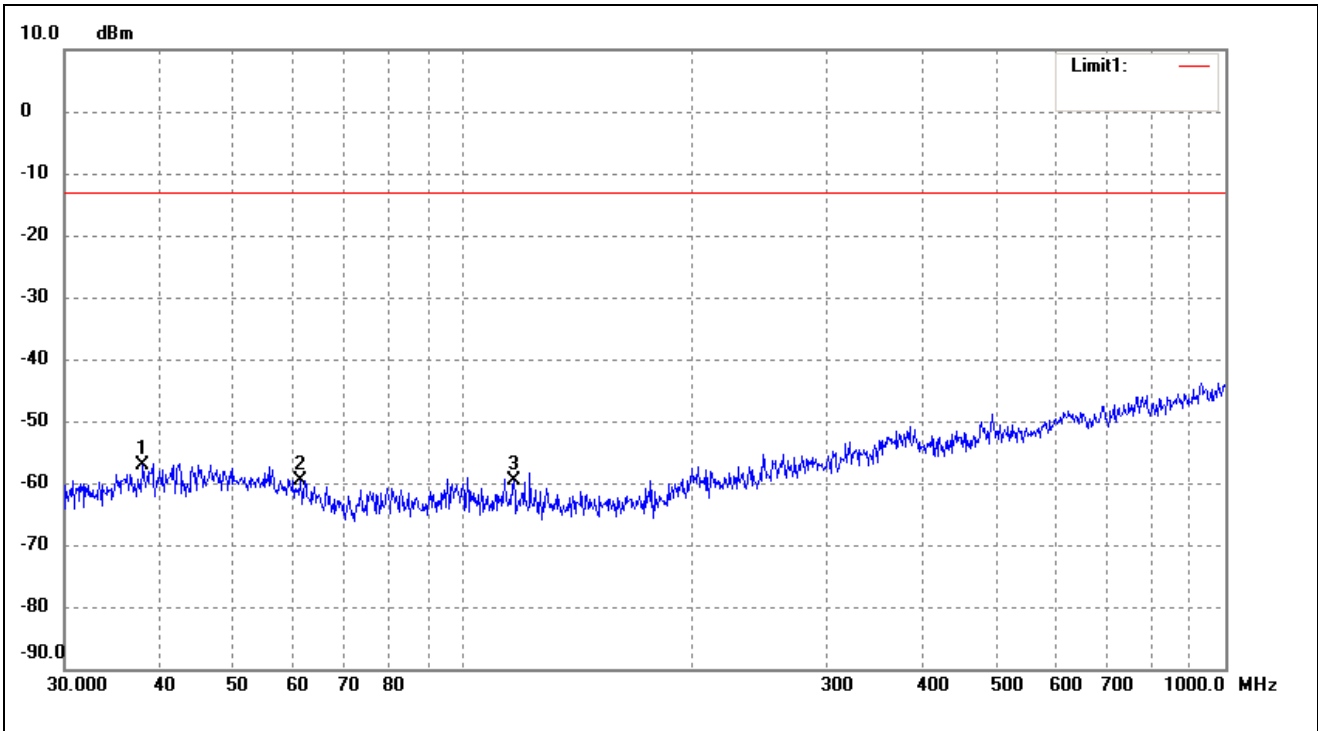
Spurious Emission From 30MHz to 1GHz

Horizontal:



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	44.7434	-59.92	3.83	-56.09	-13.00	-43.09	ERP
2	102.7192	-59.55	0.83	-58.72	-13.00	-45.72	ERP
3	247.6819	-61.38	4.02	-57.36	-13.00	-44.36	ERP
4	948.7610	-59.57	15.77	-43.80	-13.00	-30.80	ERP

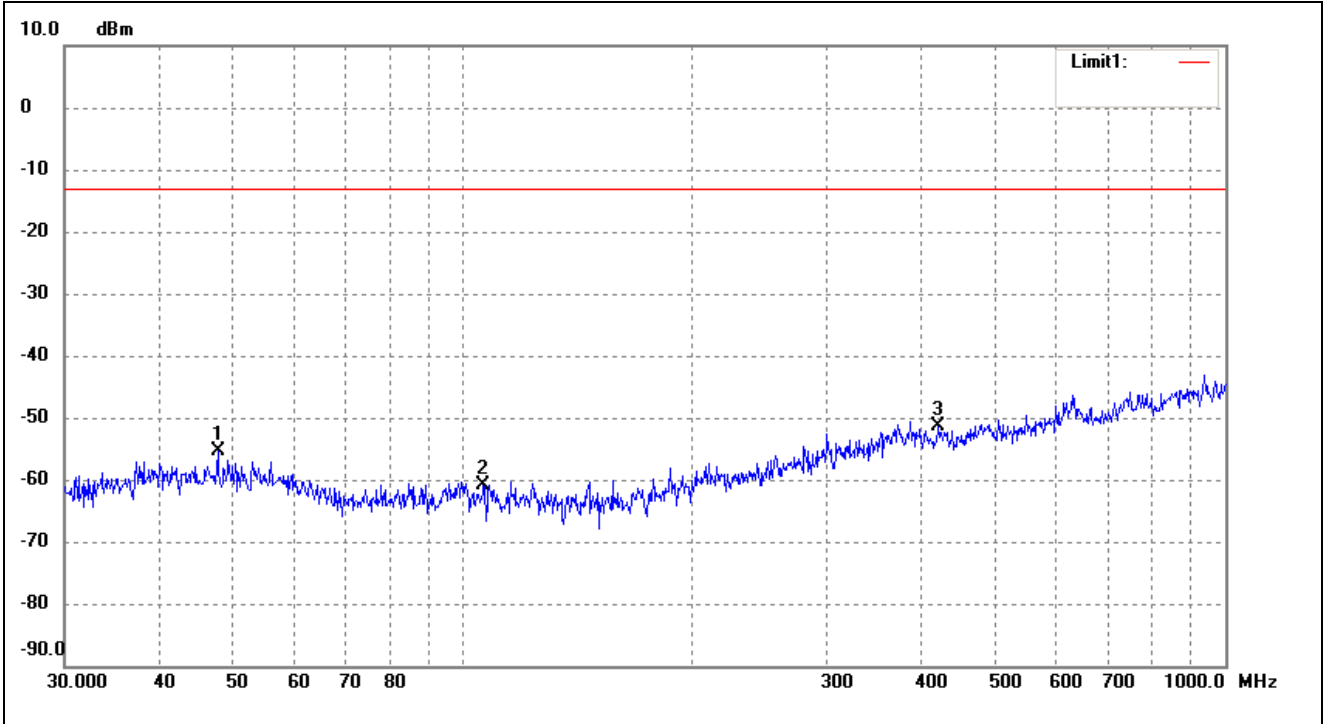
Vertical:



No.	Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	37.9450	-60.62	3.57	-57.05	-13.00	-44.05	ERP
2	61.1316	-61.41	1.86	-59.55	-13.00	-46.55	ERP
3	116.5401	-60.04	0.46	-59.58	-13.00	-46.58	ERP

For PCS Band\_GSM1900 Mode

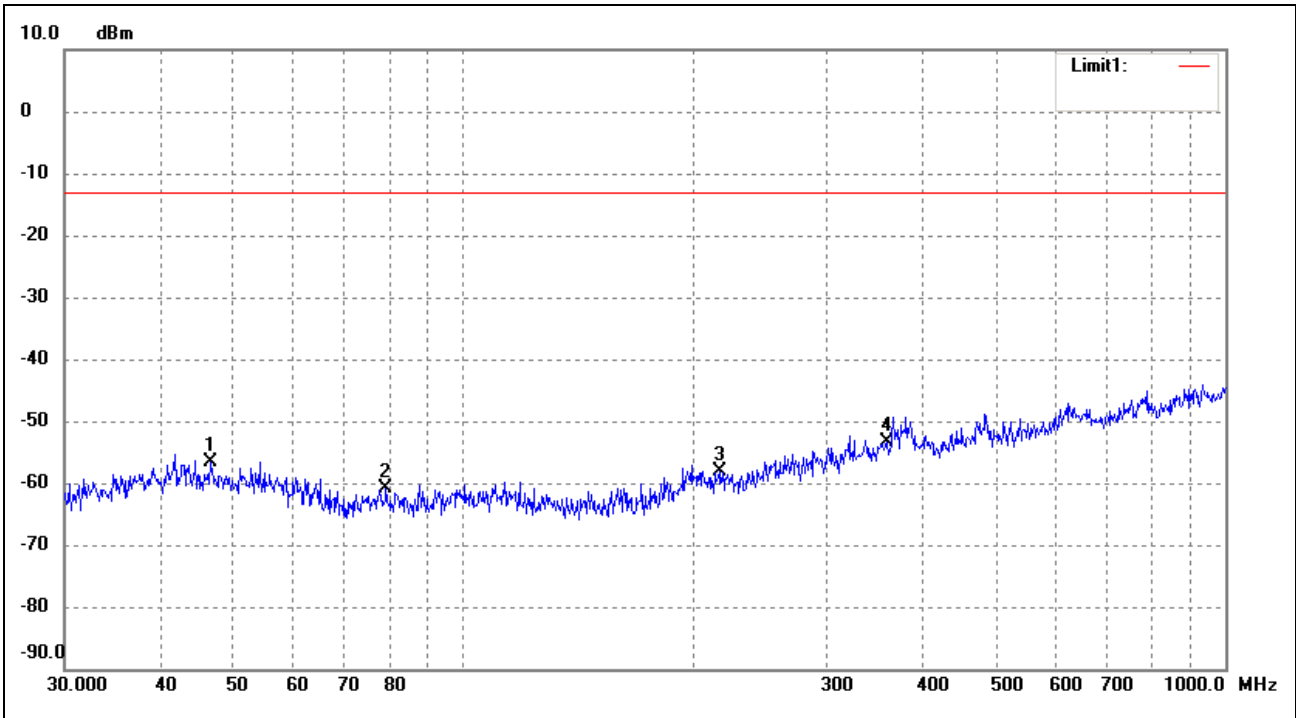
Horizontal:



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	47.6586	-59.12	3.63	-55.49	-13.00	-42.49	ERP
2	106.3850	-61.56	0.73	-60.83	-13.00	-47.83	ERP
3	420.5803	-59.77	8.32	-51.45	-13.00	-38.45	ERP



Vertical:

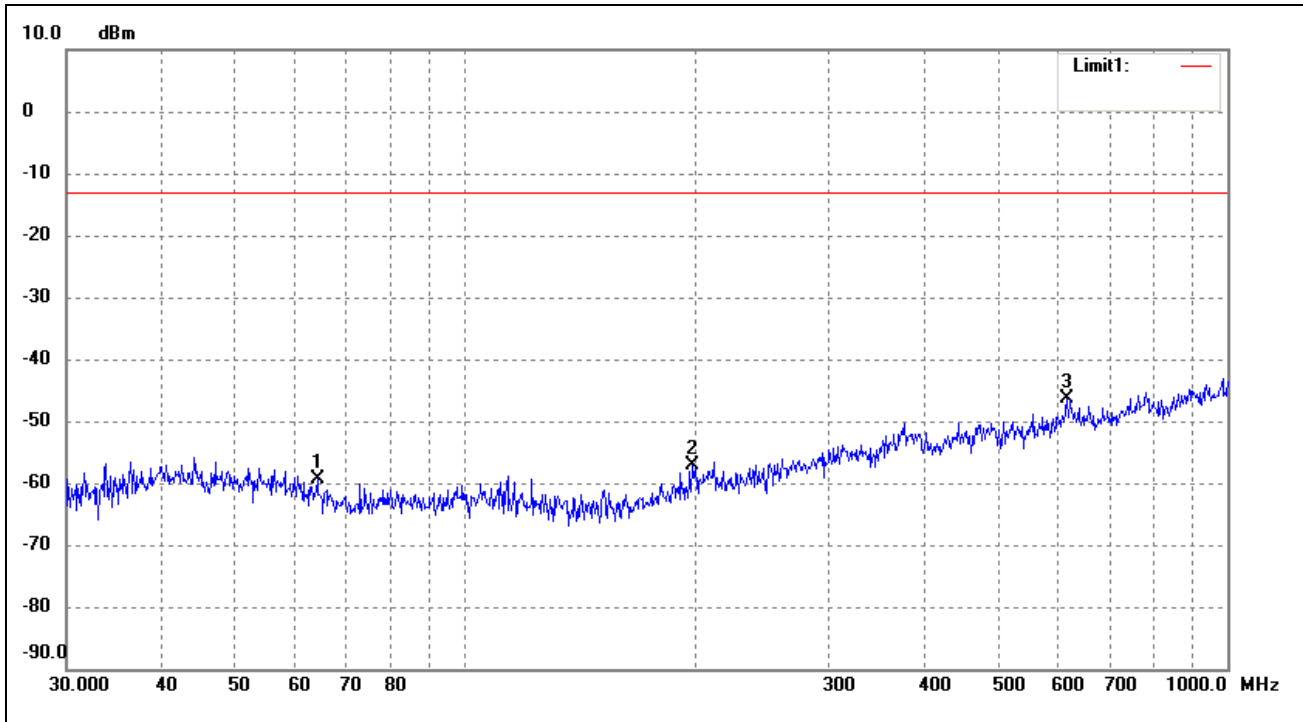


No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	46.6664	-60.32	3.70	-56.62	-13.00	-43.62	ERP
2	79.2426	-60.55	-0.25	-60.80	-13.00	-47.80	ERP
3	216.7828	-61.17	2.99	-58.18	-13.00	-45.18	ERP
	359.1860	-61.93	8.48	-53.45	-13.00	-40.45	ERP

Spurious Emission From 30MHz to 1GHz

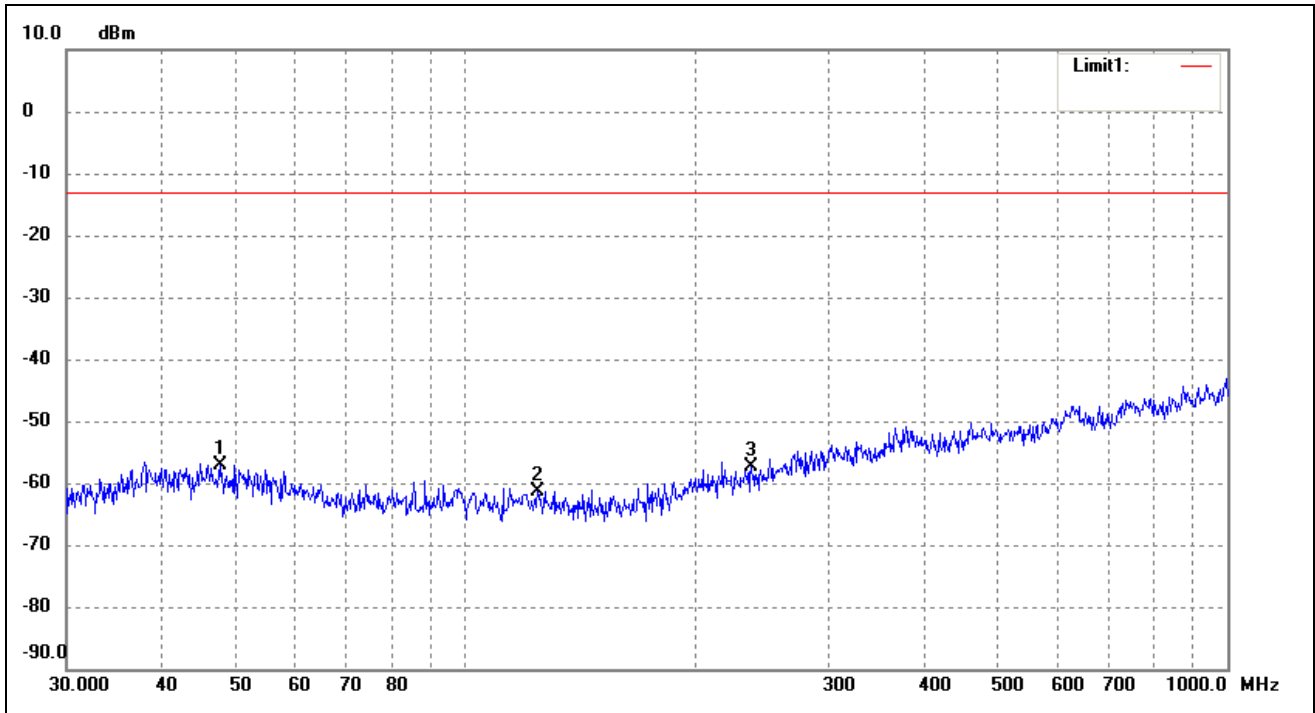
For band V Mode

Horizontal:



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	44.2752	63.9828	-60.34	0.93	-13.00	-59.41	ERP
2	506.4791	198.5880	-60.04	2.95	-13.00	-57.09	ERP
3	975.7529	616.3718	-59.05	12.79	-13.00	-46.26	ERP

Vertical:

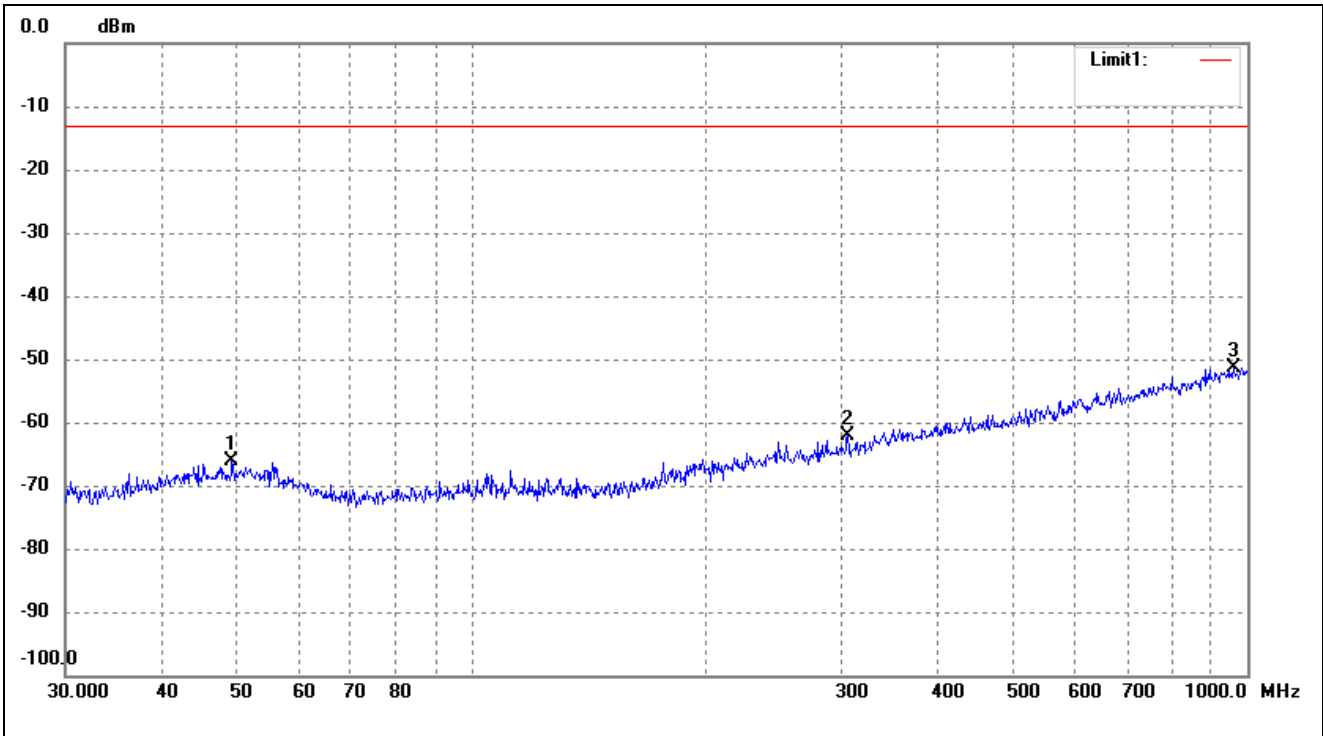


No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	47.6586	-60.86	3.63	-57.23	-13.00	-44.23	ERP
2	124.5690	-61.59	0.11	-61.48	-13.00	-48.48	ERP
3	237.4760	-60.67	3.41	-57.26	-13.00	-44.26	ERP

Spurious Emission From 30MHz to 1GHz

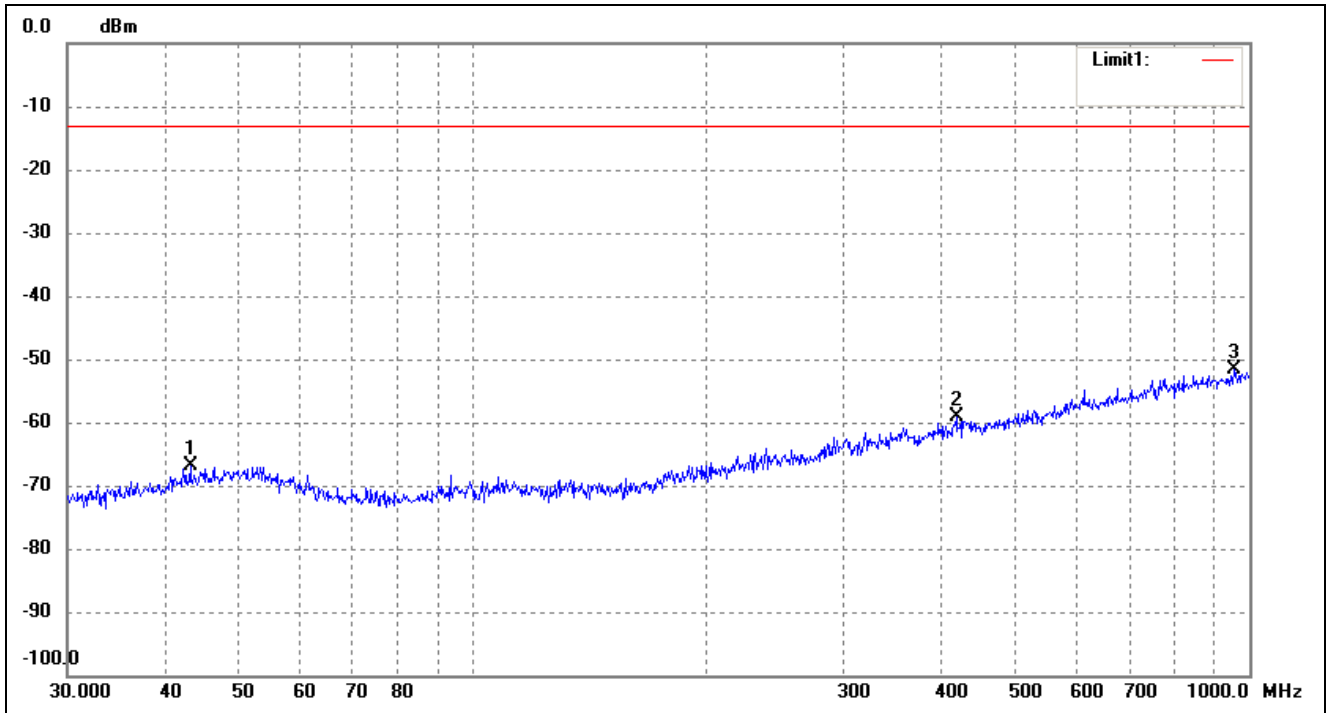
For band IV Mode

Horizontal:



No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	49.1866	-69.42	3.33	-66.09	-13.00	-53.09	ERP
2	305.6800	-69.07	6.93	-62.14	-13.00	-49.14	ERP
3	958.7943	-69.24	17.82	-51.42	-13.00	-38.42	ERP

Vertical:

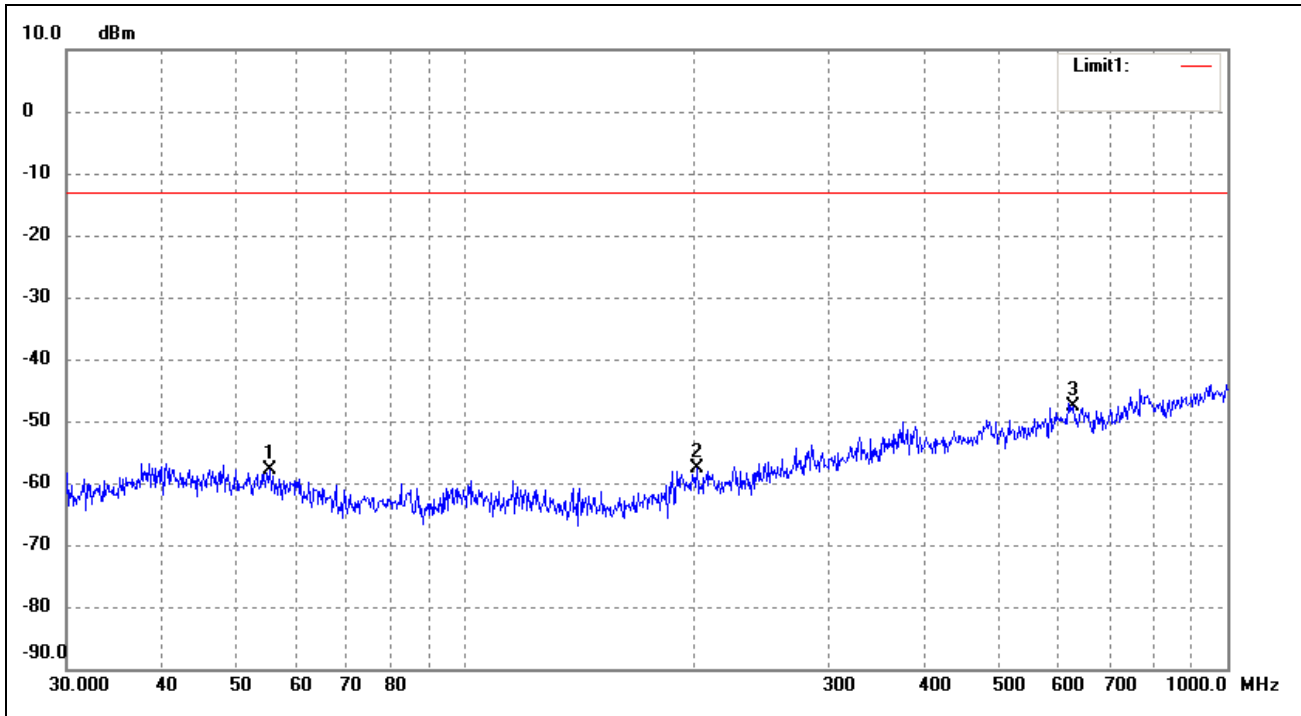


No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	43.2017	-69.32	2.44	-66.88	-13.00	-53.88	ERP
2	419.1081	-69.05	9.94	-59.11	-13.00	-46.11	ERP
3	955.4381	-69.51	17.80	-51.71	-13.00	-38.71	ERP

Spurious Emission From 30MHz to 1GHz

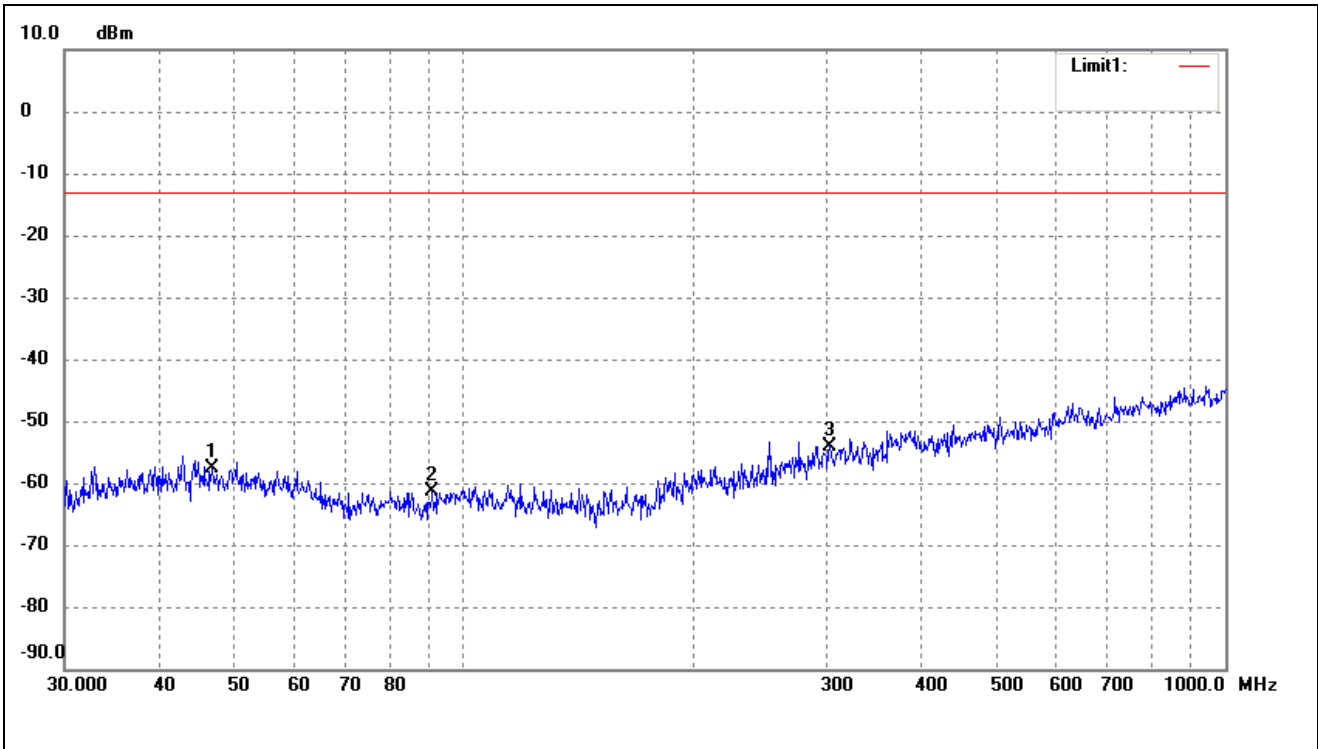
For band II Mode

Horizontal:



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	55.4147	-60.59	2.80	-57.79	-13.00	-44.79	ERP
2	201.3930	-60.85	3.14	-57.71	-13.00	-44.71	ERP
3	627.2738	-60.45	12.85	-47.60	-13.00	-34.60	ERP

Vertical:



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	45.6948	-77.65	4.34	-73.31	-13.00	-60.31	ERP
2	159.7844	-73.30	-0.55	-73.85	-13.00	-60.85	ERP
3	958.7943	-76.62	17.86	-58.76	-13.00	-45.76	ERP

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

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

*For PCS Band\_GSM1900 Mode*

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



*For Band V Mode*

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

*For Band 4 Mode*

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

*For Band II Mode*

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

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

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

## 9. Frequency Stability

### 9.1 Standard Applicable

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Cellular Band

Frequency range (MHz)	Base, fixed (ppm)	Mobile ≤3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	N/A	N/A
929 to 960	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

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

### 9.2 Test Procedure

According to §2.1055, the following test procedure was performed.

The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.

The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode

Temperature:	Supply Voltage
20°C	DC 3.3-4.2V declared by manufacturer
-30°C to +50°C	Normal

### 9.3 Environmental Conditions

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

### 9.4 Summary of Test Results/Plots

For Cellular Band GPRS Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	36	0.0430
40	3.7	52	0.0622
30	3.7	36	0.0430
20	3.7	32	0.0383
10	3.7	34	0.0406
0	3.7	36	0.0430
-10	3.7	33	0.0394
-20	3.7	29	0.0347
-30	3.7	35	0.0418

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	12	0.0064
40	3.7	10	0.0053
30	3.7	16	0.0085
20	3.7	11	0.0059
10	3.7	-11	-0.0059
0	3.7	-30	-0.0160
-10	3.7	35	0.0186
-20	3.7	28	0.0149
-30	3.7	36	0.0191

## 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	3.7	38	0.0454
40	3.7	64	0.0765
30	3.7	34	0.0406
20	3.7	67	0.0801
10	3.7	66	0.0789
0	3.7	37	0.0442
-10	3.7	48	0.0574
-20	3.7	38	0.0454
-30	3.7	60	0.0717

## For PCS Band EDGE Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-35	-0.0186
40	3.7	-40	-0.0213
30	3.7	-13	-0.0069
20	3.7	-27	-0.0144
10	3.7	-33	-0.0176
0	3.7	-18	-0.0096
-10	3.7	-19	-0.0101
-20	3.7	-36	-0.0191
-30	3.7	-17	-0.0090

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	3.7	-25	-0.0299
40	3.7	-35	-0.0418
30	3.7	-18	-0.0215
20	3.7	-35	-0.0418
10	3.7	-37	-0.0442
0	3.7	-33	-0.0394
-10	3.7	-16	-0.0191
-20	3.7	-38	-0.0454
-30	3.7	-27	-0.0323

For WCDMA Band 4 Mode

Reference Frequency(Middle Channel): 1732.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	72	0.0416
40	3.7	59	0.0341
30	3.7	55	0.0317
20	3.7	64	0.0369
10	3.7	50	0.0289
0	3.7	39	0.0225
-10	3.7	85	0.0491
-20	3.7	68	0.0393
-30	3.7	58	0.0335

## For WCDMA Band 2 Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-42	-0.0223
40	3.7	-35	-0.0186
30	3.7	-51	-0.0271
20	3.7	-34	-0.0181
10	3.7	-42	-0.0223
0	3.7	-35	-0.0186
-10	3.7	-54	-0.0287
-20	3.7	-52	-0.0277
-30	3.7	-56	-0.0298

## For HSDPA Band 5 Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-52	-0.0622
40	3.7	-44	-0.0526
30	3.7	-36	-0.0430
20	3.7	-42	-0.0502
10	3.7	-44	-0.0526
0	3.7	-56	-0.0670
-10	3.7	-43	-0.0514
-20	3.7	-56	-0.0670
-30	3.7	-62	-0.0741

## For HSDPA Band 4 Mode

Reference Frequency(Middle Channel): 1732.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	63	0.0364
40	3.7	50	0.0289
30	3.7	46	0.0266
20	3.7	55	0.0317
10	3.7	41	0.0237
0	3.7	30	0.0173
-10	3.7	76	0.0439
-20	3.7	59	0.0341
-30	3.7	49	0.0283

## For HSDPA Band 2 Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-62	-0.0330
40	3.7	-55	-0.0293
30	3.7	-45	-0.0239
20	3.7	-52	-0.0277
10	3.7	-67	-0.0356
0	3.7	-72	-0.0383
-10	3.7	-75	-0.0399
-20	3.7	-45	-0.0239
-30	3.7	-56	-0.0298



## For HSUPA Band 5 Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	-75	-0.0896
40	3.7	-67	-0.0801
30	3.7	-52	-0.0622
20	3.7	-45	-0.0538
10	3.7	-42	-0.0502
0	3.7	-42	-0.0502
-10	3.7	-52	-0.0622
-20	3.7	-68	-0.0813
-30	3.7	-58	-0.0693

## For HSUPA Band 4 Mode

Reference Frequency(Middle Channel): 1732.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	73	0.0421
40	3.7	60	0.0346
30	3.7	56	0.0323
20	3.7	65	0.0375
10	3.7	51	0.0294
0	3.7	40	0.0231
-10	3.7	86	0.0496
-20	3.7	69	0.0398
-30	3.7	56	0.0323

For HSUPA Band 2 Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	71	0.0378
40	3.7	58	0.0309
30	3.7	54	0.0287
20	3.7	63	0.0335
10	3.7	49	0.0261
0	3.7	38	0.0202
-10	3.7	84	0.0447
-20	3.7	67	0.0356
-30	3.7	54	0.0287

So, Frequency Stability Versus Input Voltage is:

Reference Frequency(Middle Channel): GPRS836.6MHz, 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	32	0.0383
	4.3	40	0.0478
Reference Frequency(Middle Channel): GPRS1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	16	0.0085
	3.7	11	0.0059
	4.3	28	0.0149
Reference Frequency(Middle Channel): EDGE 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	64	0.0765
	3.7	67	0.0801
	4.3	60	0.0717
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	-18	-0.0096
	3.7	-27	-0.0144
	4.3	-19	-0.0101
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	-37	-0.0442
	3.7	-35	-0.0418
	4.3	-38	-0.0454

Reference Frequency(Middle Channel): WCDMA1732.4MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	50	0.0289
	3.7	64	0.0369
	4.3	55	0.0317
Reference Frequency(Middle Channel): WCDMA 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	-34	-0.0407
	3.7	-34	-0.0181
	4.3	-35	-0.0186
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	-44	-0.0526
	3.7	-42	-0.0502
	4.3	-46	-0.0550
Reference Frequency(Middle Channel): HSDPA 1732.4MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	41	0.0218
	3.7	55	0.0317
	4.3	51	0.0271
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	-55	-0.0293
	3.7	-52	-0.0277
	4.3	-52	-0.0277
Reference Frequency(Middle Channel): HSUPA 836.6MHz, Limit: 2.5ppm			
Environment	Power Supplied	Frequency Measure with Time Elapsed	

Temperature (°C)	(VDC)	Frequency (Hz)	Error (ppm)
20	3.3	-42	-0.0502
	3.7	-45	-0.0538
	4.3	-42	-0.0502
Reference Frequency(Middle Channel): HSUPA 1732.4MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	51	0.0294
	3.7	65	0.0375
	4.3	60	0.0346
Reference Frequency(Middle Channel): HSUPA 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	58	0.0309
	3.7	63	0.0335
	4.3	63	0.0335

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