FCC Part 22H & 24E
Measurement and Test Report

For

Inspero Inc.

Yanqi Street No. 31, Yanqi Economic Development Zone, Huairou District,

Beijing

FCC ID: 2AHJ6-HEARABLE

FCC Rules:	FCC Part 22H, FCC Part 24E
Product Description:	VINCI Hearable
Tested Model:	Hearable 1.0
Report No.:	STR16028058I-1
Tested Date:	2016-02-27 to 2016-03-06
Issued Date:	2016-03-14
Tested By:	Irving Liu / Engineer
Reviewed By:	Silin Chen / EMC Manager
Approved & Authorized By:	Jandy So / PSQ Manager

Prepared By:

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Inspero Inc.
Address of applicant:	Yanqi Street No. 31, Yanqi Economic Development Zone, Huairou District, Beijing
Manufacturer:	Inspero Inc.
Address of manufacturer:	Yanqi Street No. 31, Yanqi Economic Development Zone, Huairou District, Beijing

General Description of EUT:	
Product Name:	VINCI Hearable
Brand Name:	VINCI
Model No.:	Hearable 1.0
Model:TS-C051	Model:TS-C051
	INPUT:100-240V,50/60Hz,0.15A; OUTPUT:5V,1A
Hardware version:	vinci 1.0
Software version:	vinci 0.9
Rated Voltage:	DC 3.7V Li-ion Battery
Battery:	2000mAh
Device Category:	Portable Device
The EUT Main board support GPRS 850/900/ GPRS 1800/ GPRS 1900, WCDMA Band 1/5 function. It is intended for Multimedia Message Service (MMS) transmission. It is equipped with GPRS class 12 for GPRS 850/900/ GPRS 1800/ GPRS 1900, GPS and Wi-Fi functions. For more information see the following datasheet	
Note: The test data is gathered from a production sample provided by the manufacturer.	

Technical Characteristics of EUT:	
2G	
Support Networks:	GPRS
Support Band:	GPRS850/ GPRS1900
Uplink Frequency:	GPRS850: 824~849MHz GPRS1900: 1850~1910MHz
Downlink Frequency:	GPRS850: 869~894MHz GPRS1900: 1930~1990MHz
Max RF Output Power:	GPRS850: 32.04dBm, GPRS1900:29.61dBm
Type of Modulation:	GMSK, 8PSK
Type of Antenna:	Integral Antenna
Antenna Gain:	-3dBi
GPRS Class:	Class 12
3G	
Support Networks:	WCDMA, HSDPA, HSUPA
Support Band:	WCDMA Band 5
Uplink Frequency:	WCDMA Band 5: 824~849MHz
Downlink Frequency:	WCDMA Band 5: 869~894MHz
RF Output Power:	WCDMA Band 5: 22.33dBm
Type of Modulation:	BPSK
Antenna Type:	Integral Antenna
Antenna Gain:	-3dBi

1.2 Test Standards

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

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

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

1.3 Test Methodology

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

1.4 Test Facility

- **FCC – Registration No.: 934118**
  Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 934118.

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

- **CNAS Registration No.: L4062**
  Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101)

1.5 EUT Setup and Test Mode

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

Test Mode List		
Test Mode	Description	Remark
TM1	GPRS 850	Low, Middle, High Channels
TM2	GPRS 1900	Low, Middle, High Channels
TM3	WCDMA Band 5	Low, Middle, High Channels
TM4	HSDPA Band 5	Low, Middle, High Channels
TM5	HSUPA Band 5	Low, Middle, High Channels

Testing Configure			
Support Band	Support Standard	Channel Frequency	Channel Number
GSM 850	GPRS	824.2 MHz	128
		836.6 MHz	190
		848.8 MHz	251
PCS 1900	GPRS	1850.2 MHz	512
		1880.0 MHz	661
		1909.8 MHz	810
WCDMA Band 5	WCDMA/HSDPA/HSUPA	826.4 MHz	4132
		836.6 MHz	4183
		846.6 MHz	4233
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	0.8	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
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Frequency Stability	Conducted	2.3%
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
Broadband Antenna	Schwarz beck	VULB9163	9163-332	2015-06-17	2016-06-16
Horn Antenna	ETS	3117	00086197	2015-06-17	2016-06-16
Horn Antenna	ETS	3117	00086168	2015-06-17	2016-06-16
Horn Antenna	ETS	3116B	00088203	2015-06-17	2016-06-16
Horn Antenna	ETS	3116B	00088221	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

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

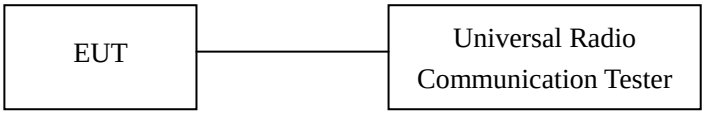
According to §22.913(a)(2), The ERP of mobile and portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

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 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	32.15	1.5	0	H	1.5	0	30.65	38.45
824.2	32.44	1.5	0	V	1.5	0	30.94	38.45
Middle Channel								
836.6	30.89	1.5	0	H	1.5	0	29.39	38.45
836.6	30.87	1.5	0	V	1.5	0	29.37	38.45
High Channel								
848.8	30.55	1.5	0	H	1.5	0	29.05	38.45
848.8	29.88	1.5	0	V	1.5	0	28.38	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	19.66	1.5	0	H	1.9	7.7	25.46	33.00
1850.2	20.66	1.5	0	V	1.9	7.7	26.46	33.00
Middle Channel								
1880.0	21.05	1.5	0	H	1.9	7.7	26.85	33.00
1880.0	22.36	1.5	0	V	1.9	7.7	28.16	33.00
High Channel								
1909.8	23.02	1.5	0	H	1.9	7.7	28.82	33.00
1909.8	22.19	1.5	0	V	1.9	7.7	27.99	33.00

ERP For WCDMA Mode Band 5

Frequency	Substitude SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	21.89	1.5	0	H	1.5	0	20.39	38.45
826.4	20.87	1.5	0	V	1.5	0	19.37	38.45
Middle Channel								
836.6	23.54	1.5	0	H	1.5	0	22.04	38.45
836.6	21.05	1.5	0	V	1.5	0	19.55	38.45
High Channel								
846.6	21.68	1.5	0	H	1.5	0	20.18	38.45
846.6	20.89	1.5	0	V	1.5	0	19.39	38.45

ERP For HSDPA Mode Band 5

Frequency	Substitude SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	21.69	1.5	0	H	1.5	0	20.19	38.45
826.4	20.14	1.5	0	V	1.5	0	18.64	38.45
Middle Channel								
836.6	22.36	1.5	0	H	1.5	0	20.86	38.45
836.6	20.98	1.5	0	V	1.5	0	19.48	38.45
High Channel								
846.6	21.69	1.5	0	H	1.5	0	20.19	38.45
846.6	20.18	1.5	0	V	1.5	0	18.68	38.45

ERP For HSUPA Mode Band 5

Frequency	Substitude SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	22.84	1.5	0	H	1.5	0	21.34	38.45
826.4	19.98	1.5	0	V	1.5	0	18.48	38.45
Middle Channel								
836.6	20.57	1.5	0	H	1.5	0	19.07	38.45
836.6	20.12	1.5	0	V	1.5	0	18.62	38.45
High Channel								
846.6	21.88	1.5	0	H	1.5	0	20.38	38.45
846.6	20.78	1.5	0	V	1.5	0	19.28	38.45

Note: Result = Substitude - Cable loss + Antenna Gain

Max. Conducted Output Power

For Cellular Band (GSM850)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
GPRS(1 Slot)	Low Channel	824.2	31.98	38.45
	Middle Channel	836.6	32.04	38.45
	High Channel	848.8	32.04	38.45

For PCS Band (GSM1900)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
GPRS(1 Slot)	Low Channel	1850.2	29.90	33.0
	Middle Channel	1880.0	29.61	33.0
	High Channel	1909.8	29.36	33.0

For WCDMA Band 5

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
WCDMA	Low Channel	826.4	22.18	38.45
	Middle Channel	836.6	22.24	38.45
	High Channel	846.6	22.16	38.45
HSDPA	Low Channel	826.4	21.19	38.45
	Middle Channel	836.6	21.25	38.45
	High Channel	846.6	21.68	38.45
HSUPA	Low Channel	826.4	21.64	38.45
	Middle Channel	836.6	21.62	38.45
	High Channel	846.6	21.78	38.45

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

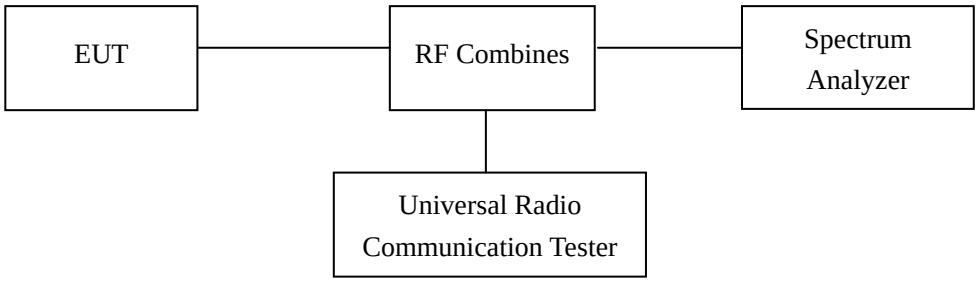
5.1 Standard Applicable

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

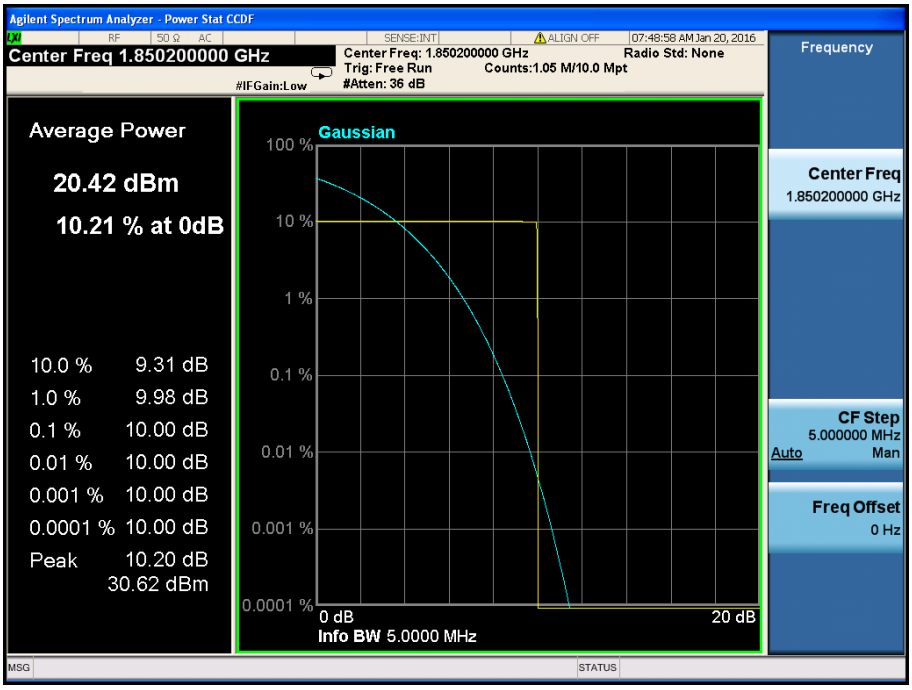
Temperature:	25 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.4 Summary of Test Results

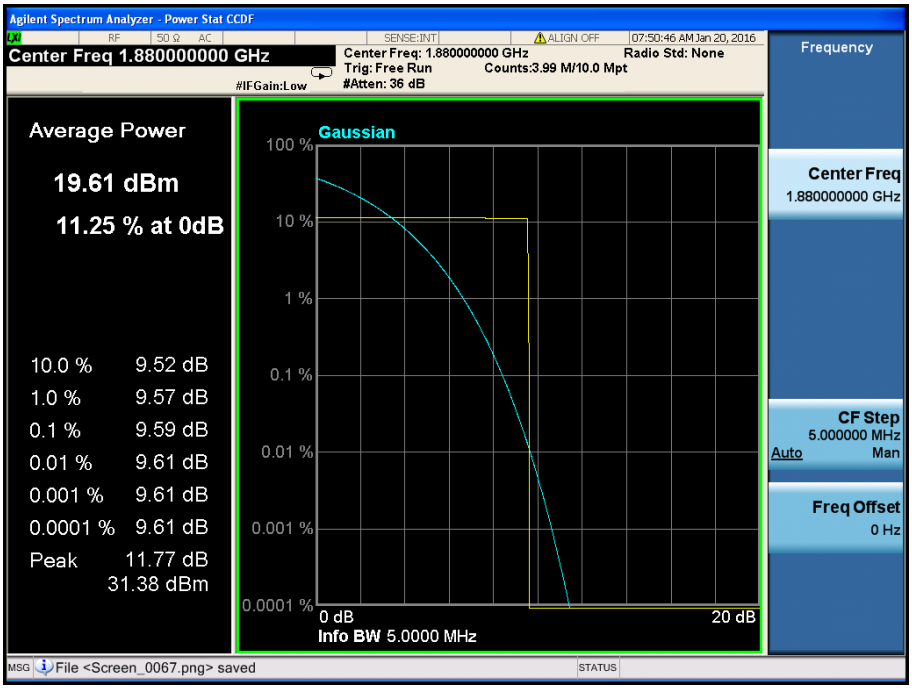
For PCS Band

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GPRS (1 Slot)	512	1850.2	10.00	13
	661	1880.0	9.61	13
	810	1909.8	9.37	13

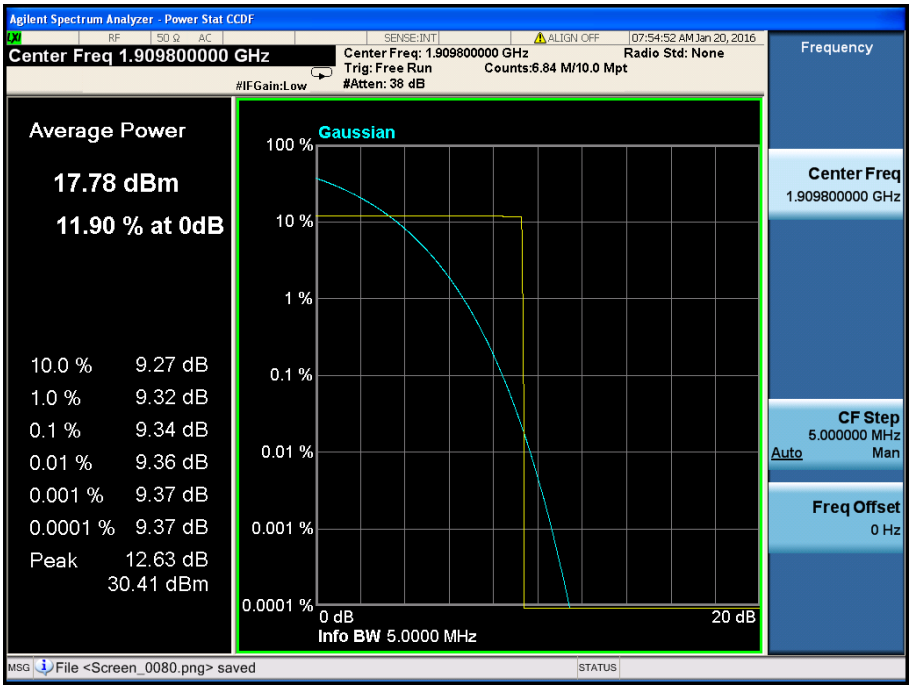
GPRS Low Channel:



GPRS Middle Channel:



GPRS High Channel:



6. Emission Bandwidth

6.1 Standard Applicable

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

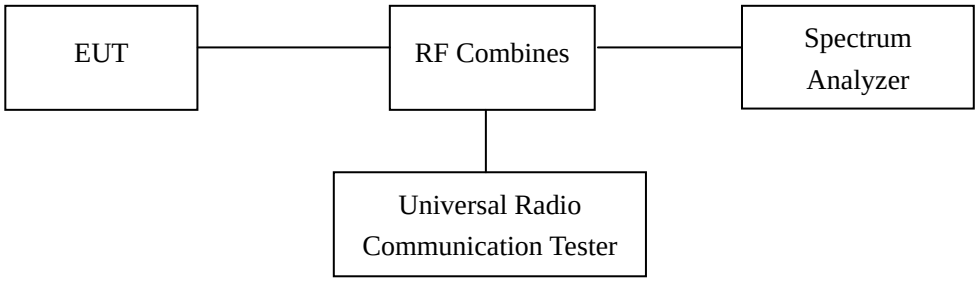
According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §27.53, The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

6.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 10kHz for GSM mode and 100kHz for WCDMA mode, VBW shall be at least 3 times the RBW, and the 26dB bandwidth was recorded.

Test Configuration for the emission bandwidth testing:



6.3 Environmental Conditions

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

6.4 Summary of Test Results/Plots

For Cellular Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GPRS	128	824.2	244.80	320.4
	190	836.6	243.96	318.5
	251	848.8	242.52	317.7

For PCS Band

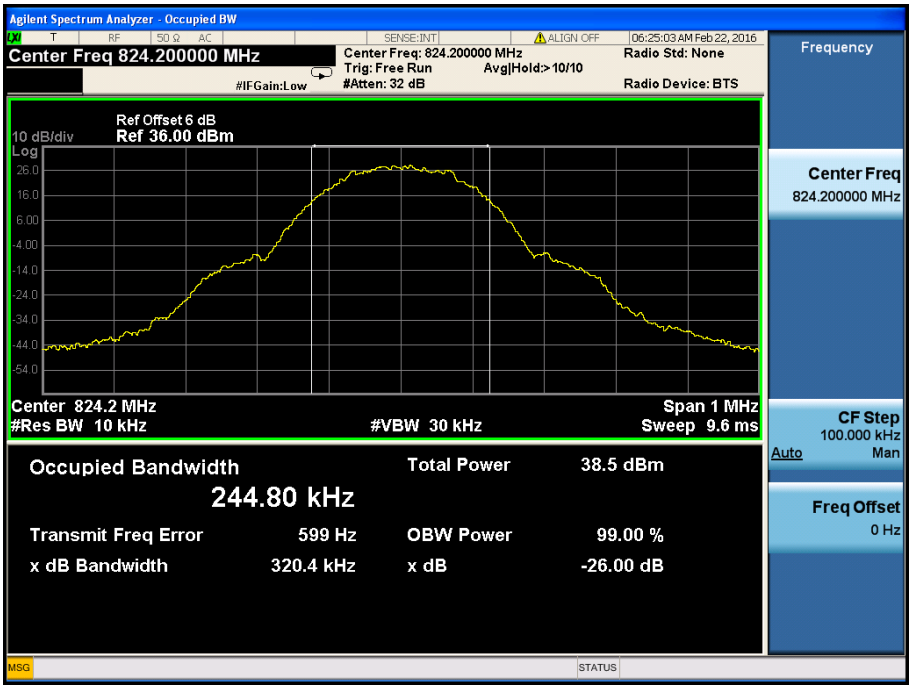
Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GPRS	512	1850.2	244.05	318.2
	661	1880.0	244.04	316.5
	810	1909.8	247.95	317.8

For Band 5

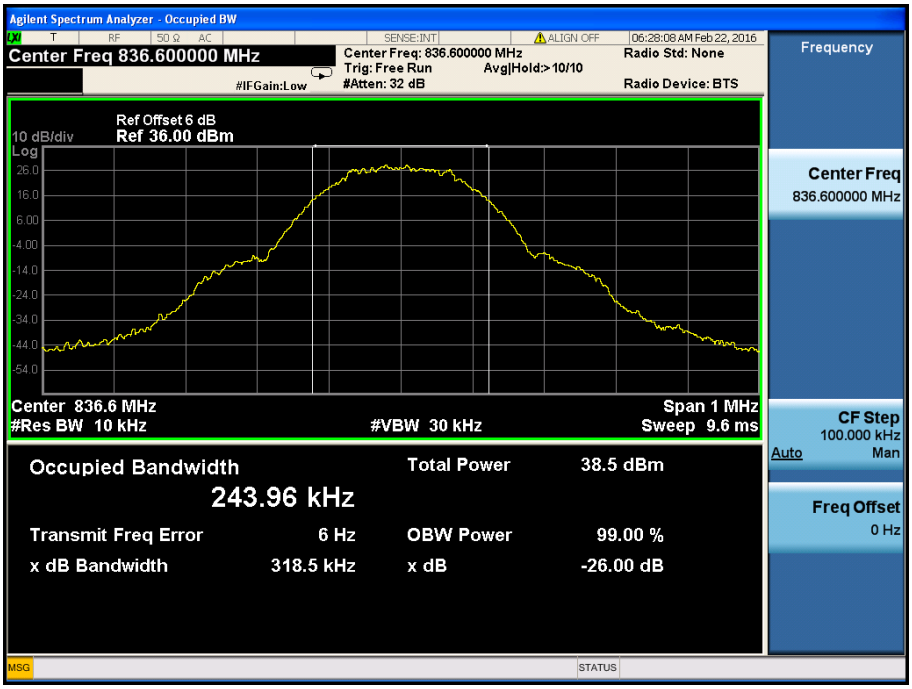
Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	4132	826.4	4.1610	4.666
	4183	836.6	4.6420	4.680
	4233	846.6	4.1552	4.674
HSDPA	4132	826.4	4.1621	4.657
	4183	836.6	4.1697	4.645
	4233	846.6	4.1380	4.660
HSUPA	4132	826.4	4.1639	4.659
	4183	836.6	4.652	4.1621
	4233	846.6	4.1435	4.652

For Cellular Band

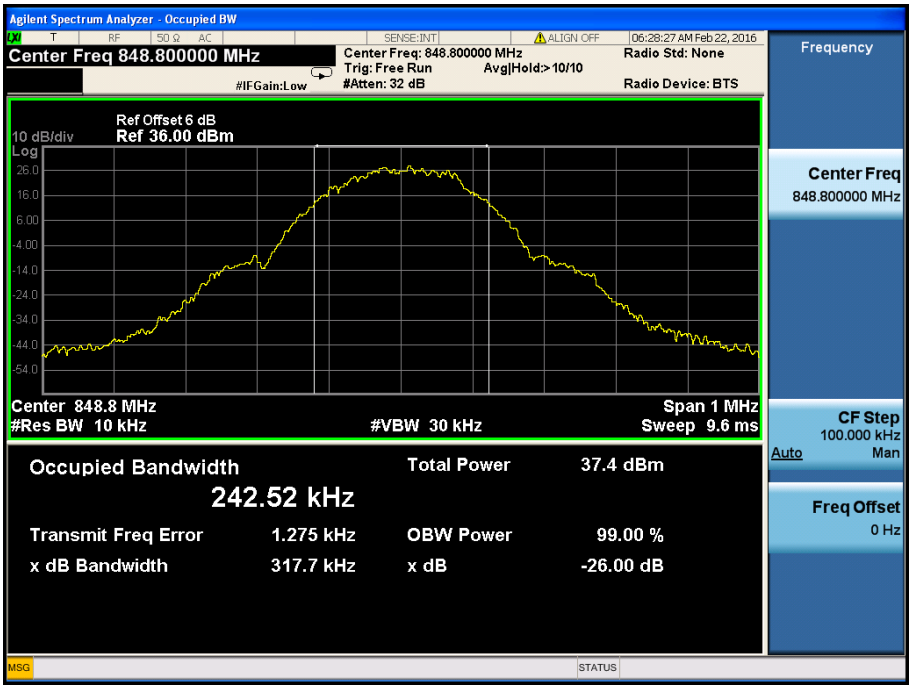
GPRS850 Low Channel



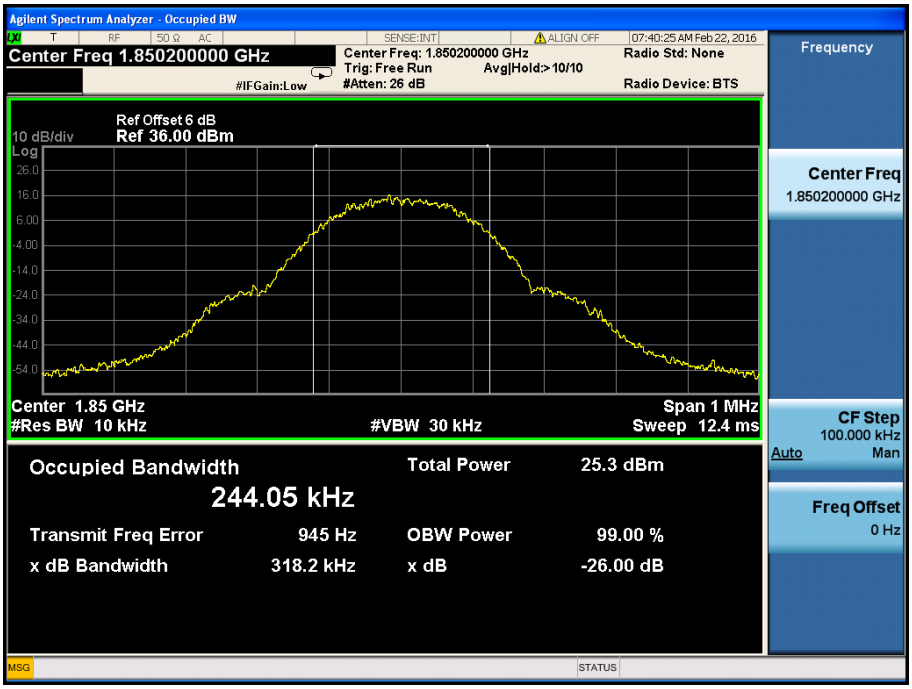
GPRS850 Middle Channel



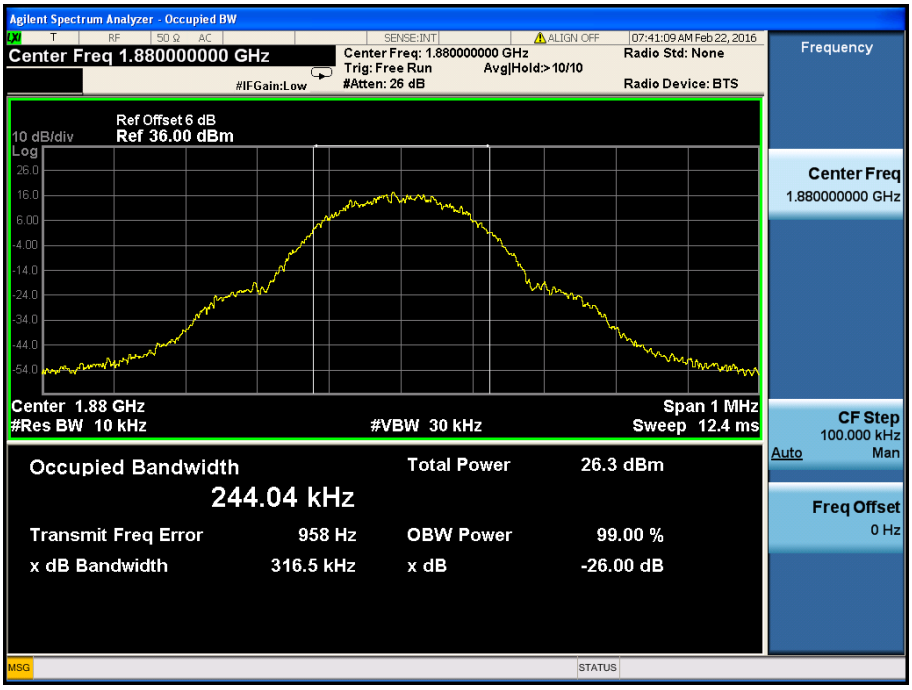
GPRS850 High channel



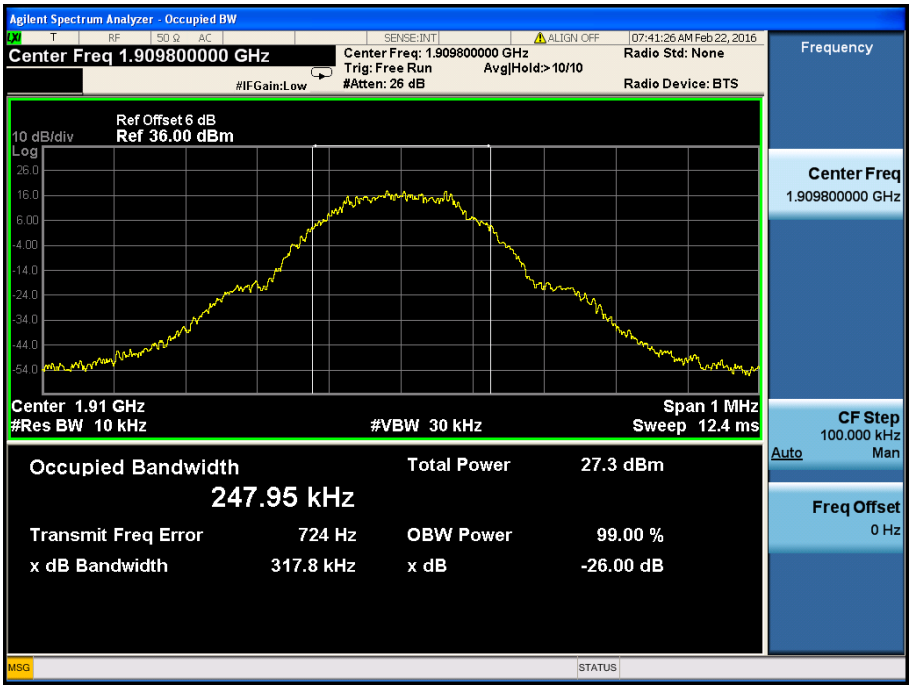
GPRS 1900 Low Channel



GPRS1900 Middle Channel

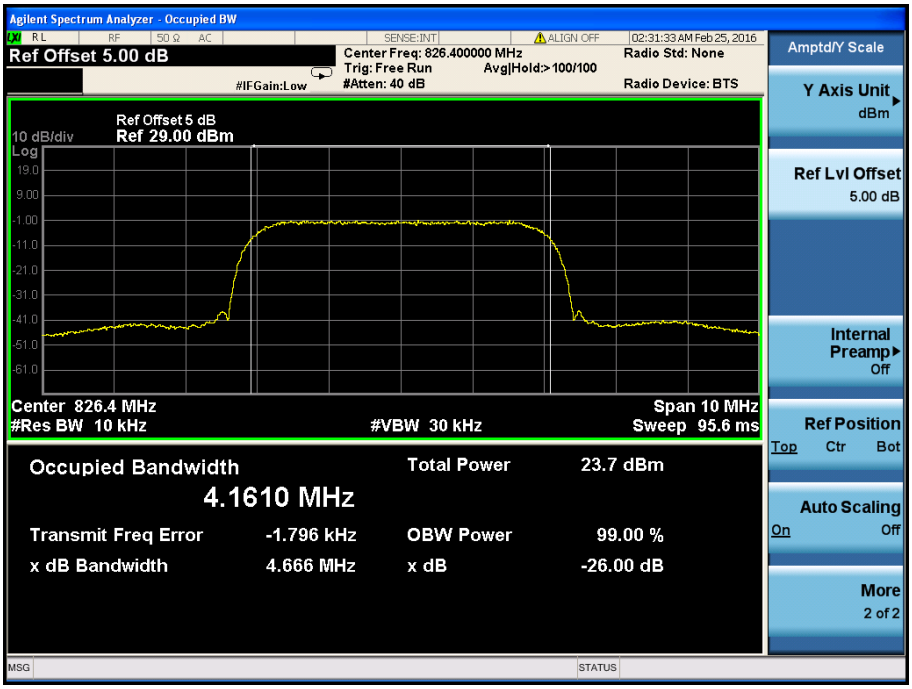


GPRS 1900 High Channel

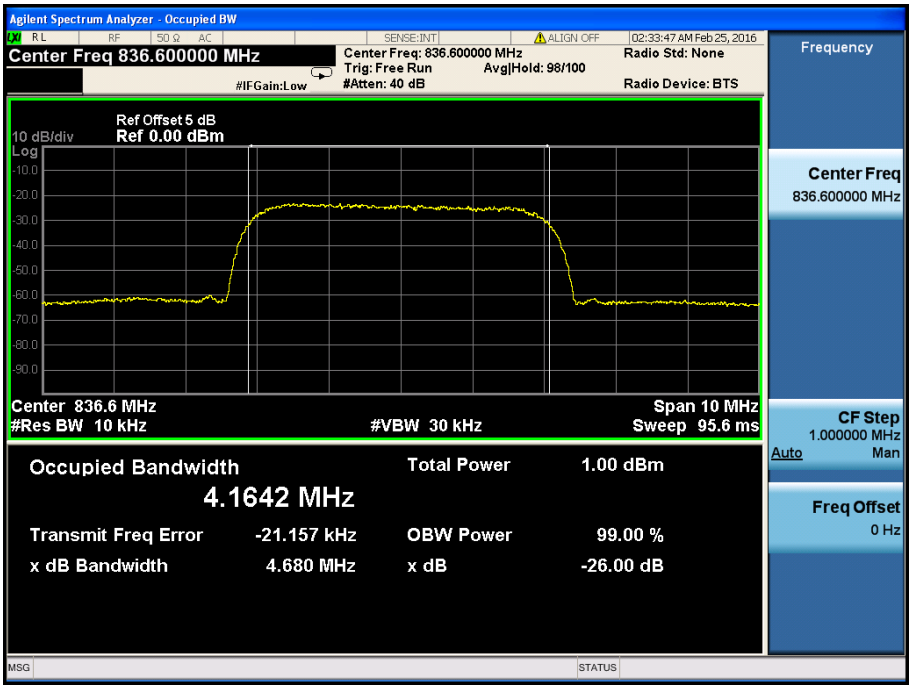


For Band V

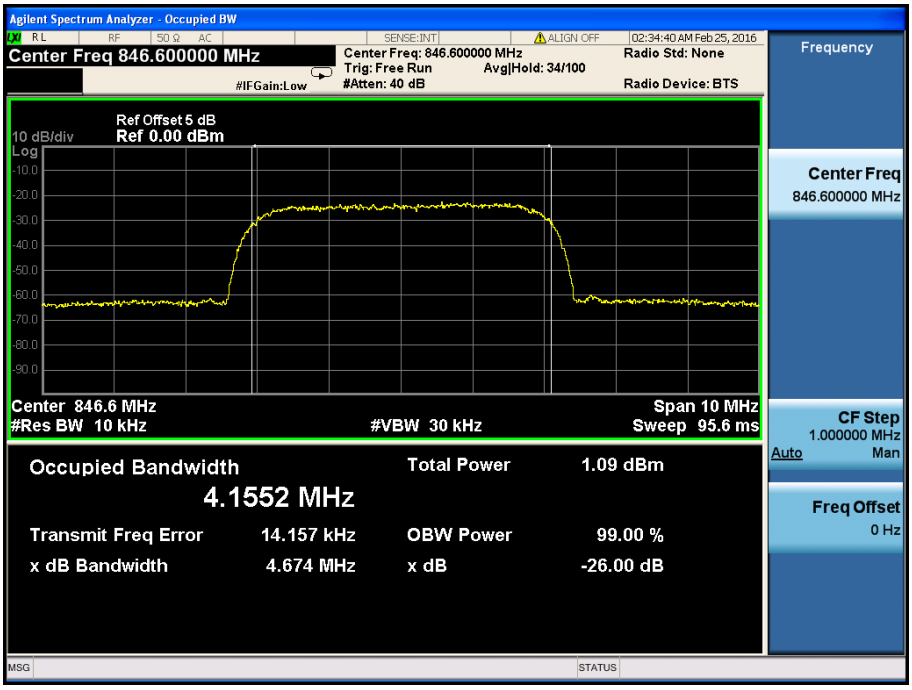
WCDMA Low Channel



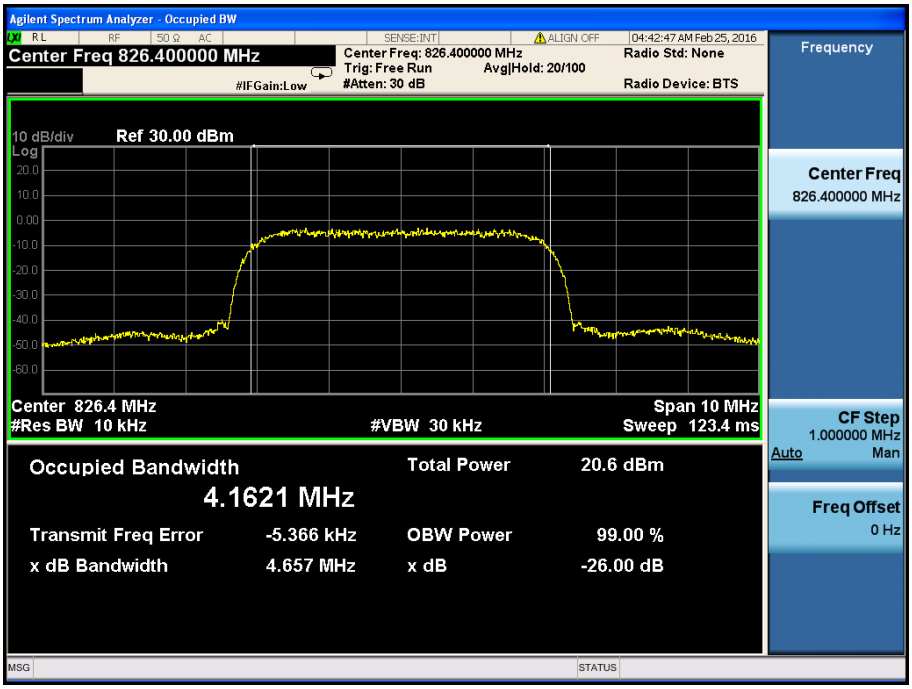
WCDMA Middle Channel



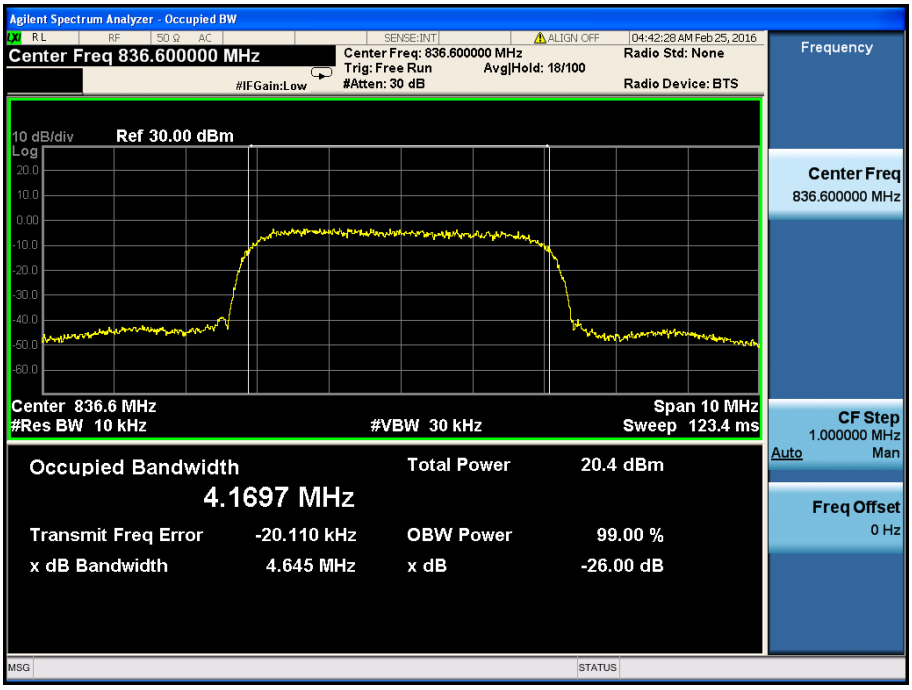
WCDMA High Channel



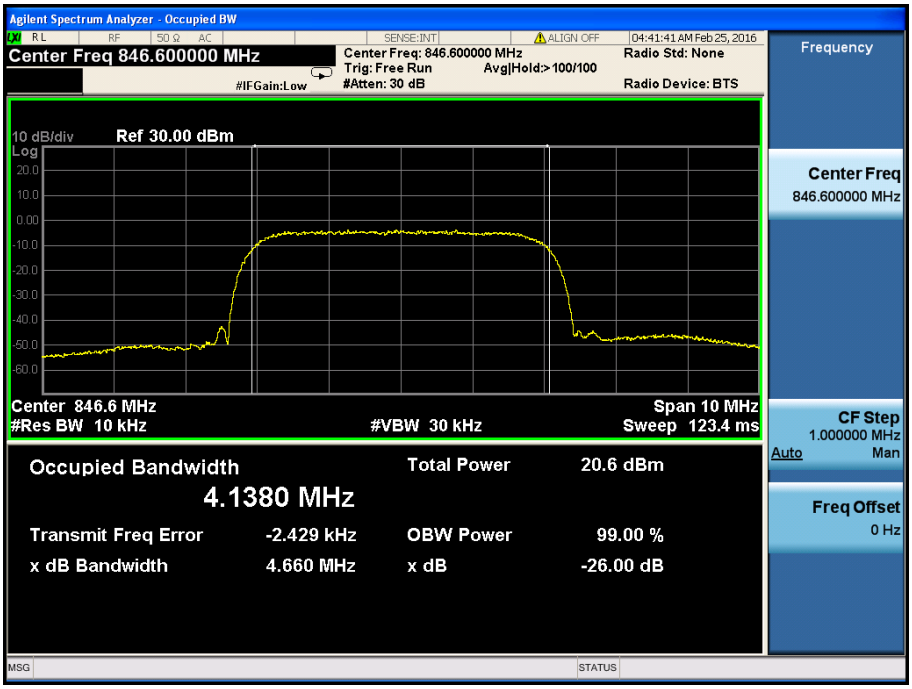
HSDPA Low Channel



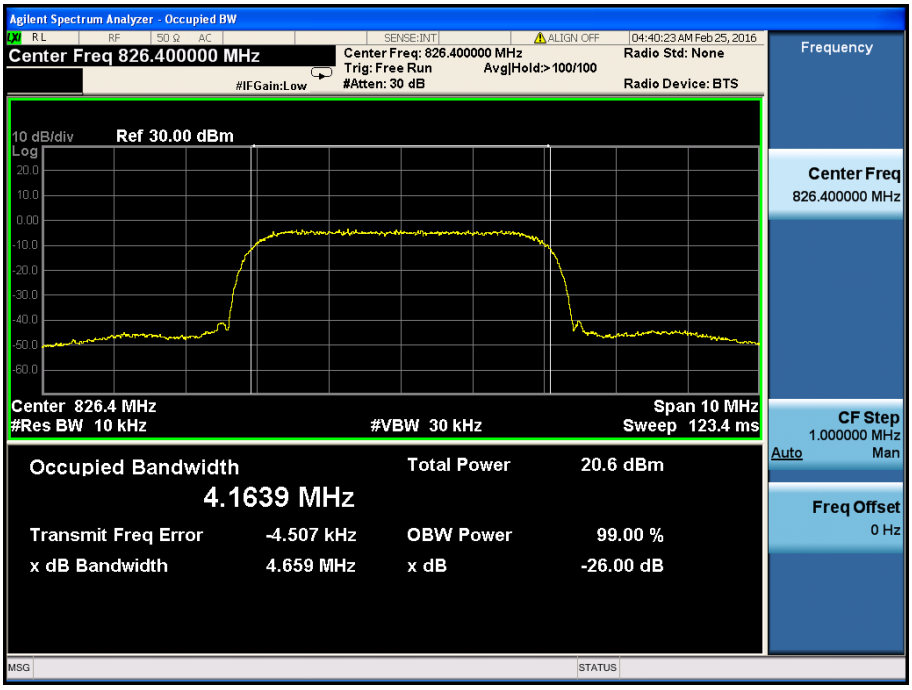
HSDPA Middle Channel



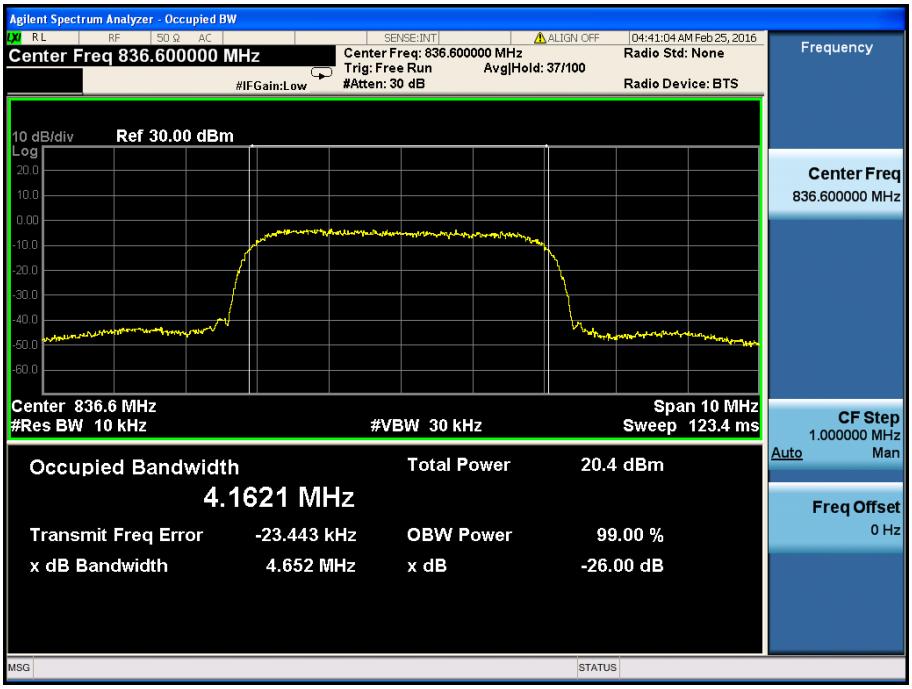
HSDPA High Channel



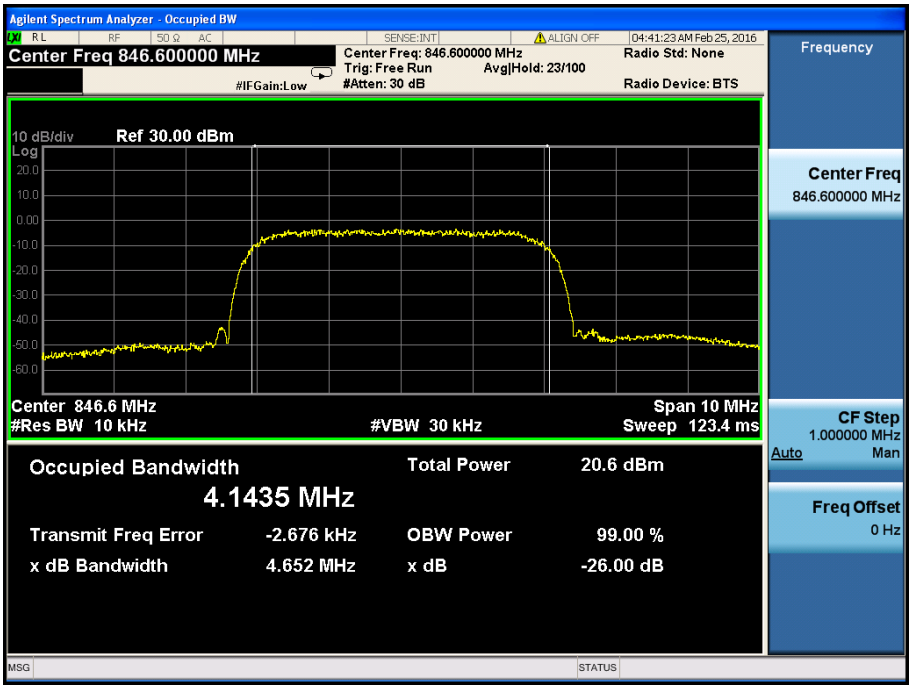
HSUPA Low Channel



HSUPA Middle Channel



HSUPA High Channel



7. Out of Band Emissions at Antenna Terminal

7.1 Standard Applicable

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

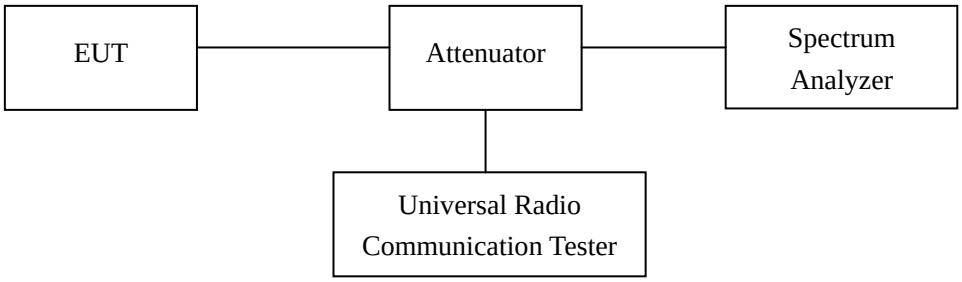
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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

7.2 Test Procedure

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

Test Configuration for the out of band emissions testing:



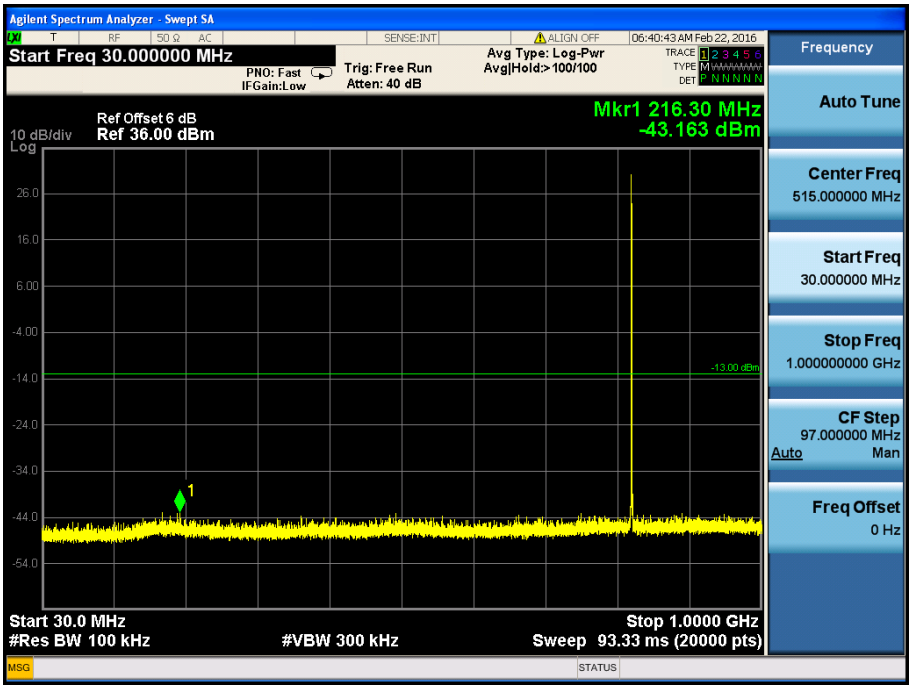
7.3 Environmental Conditions

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

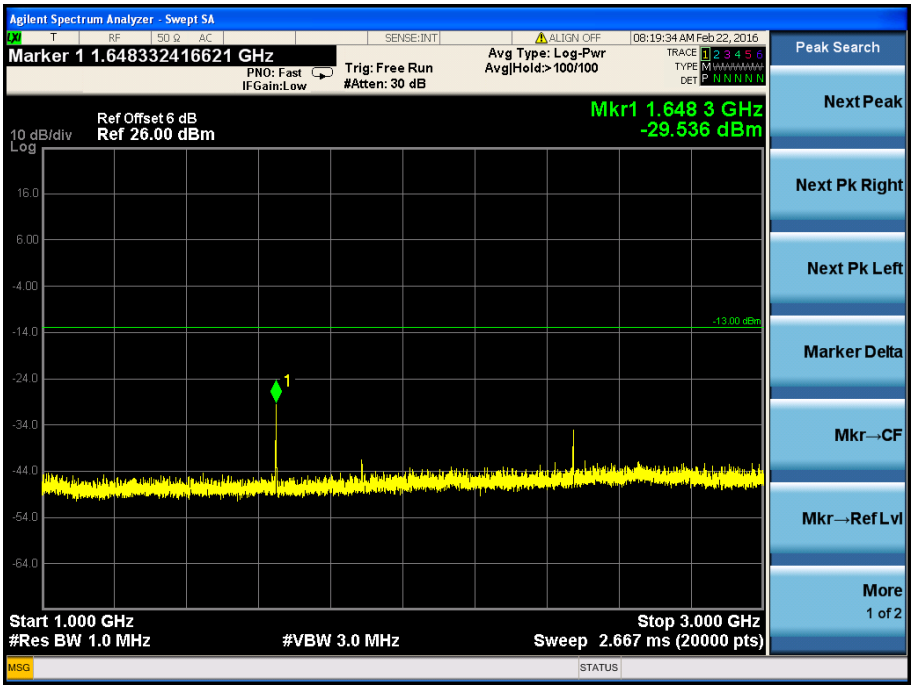
7.4 Summary of Test Results/Plots

Please refer to the following test plots For Cellular Band

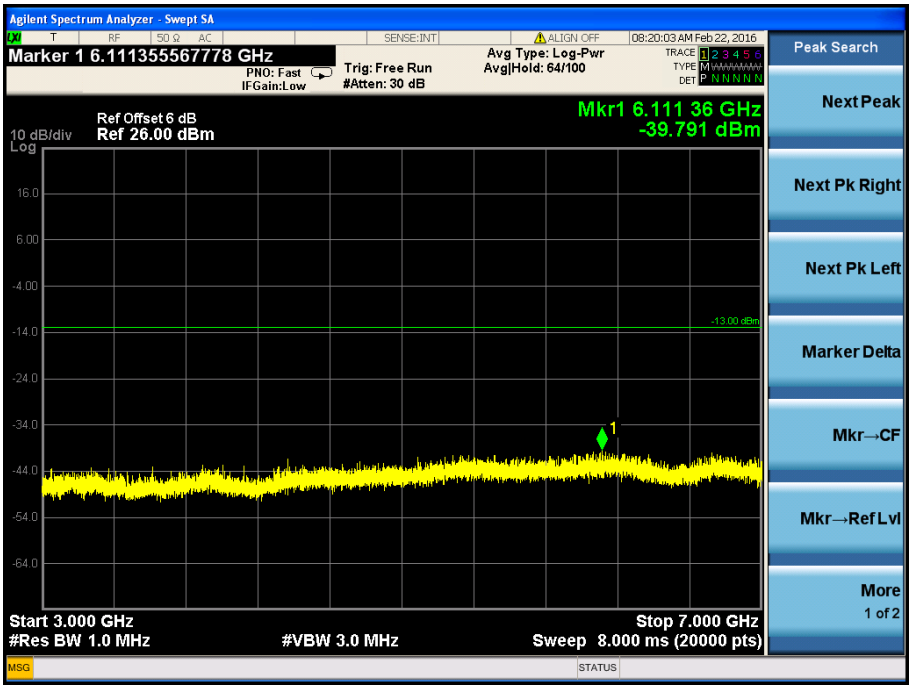
GPRS 850 Low Channel
(30MHz-1GHz)



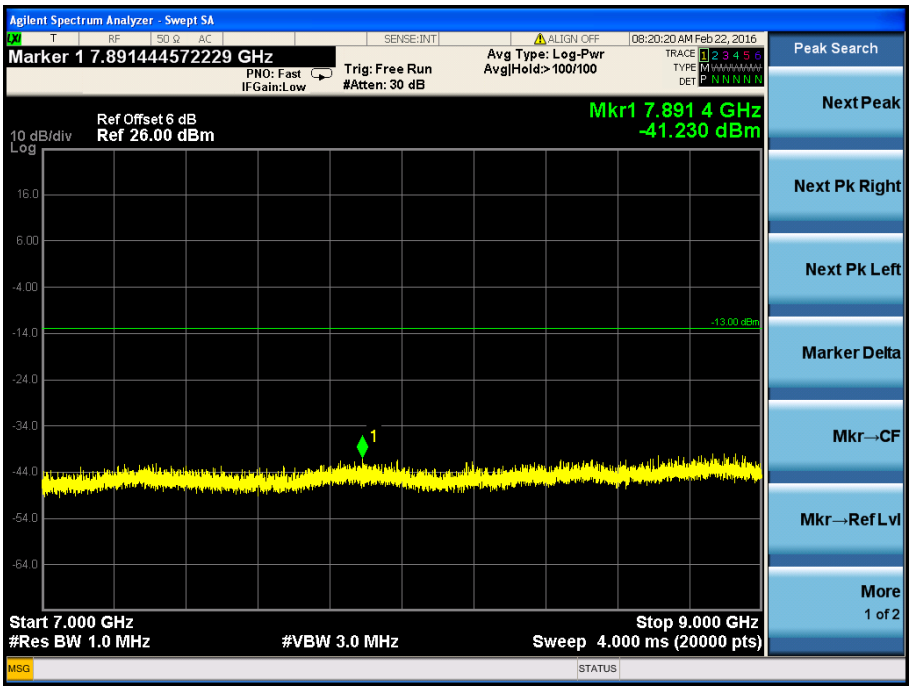
(1GHz -3GHz)



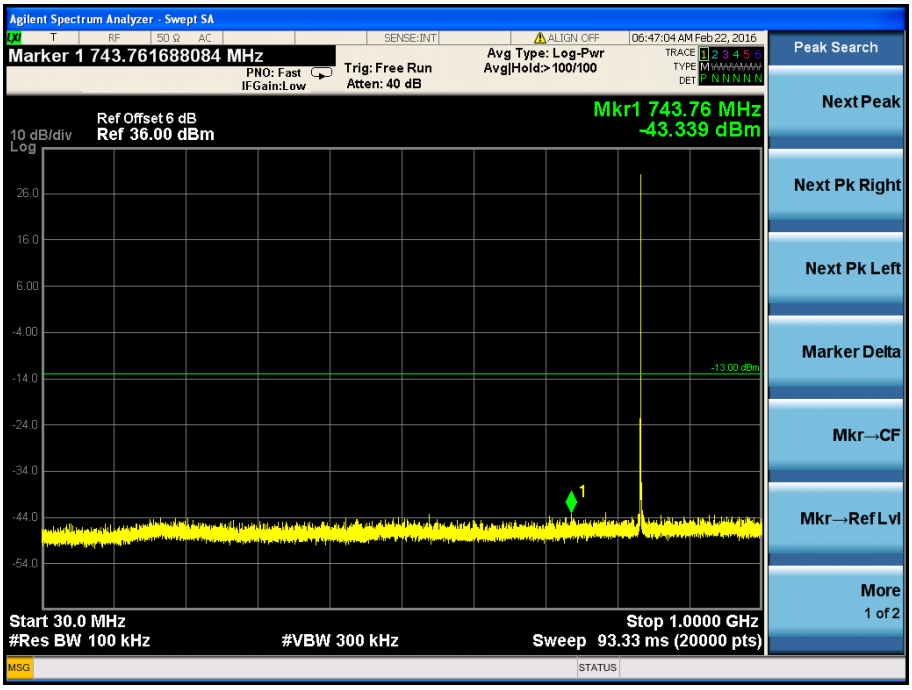
(3GHz -7GHz)



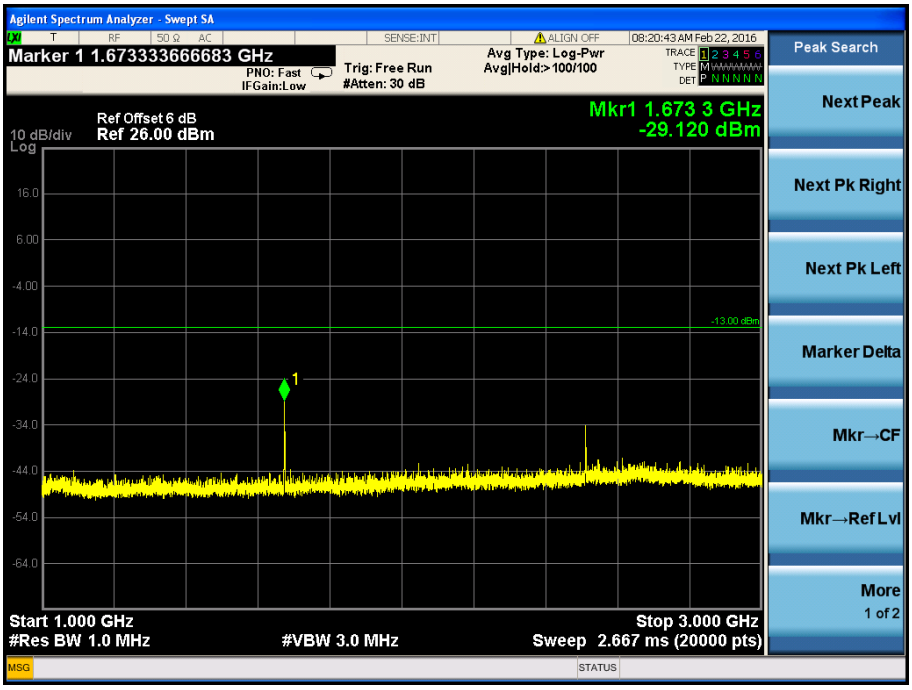
(7GHz -9GHz)



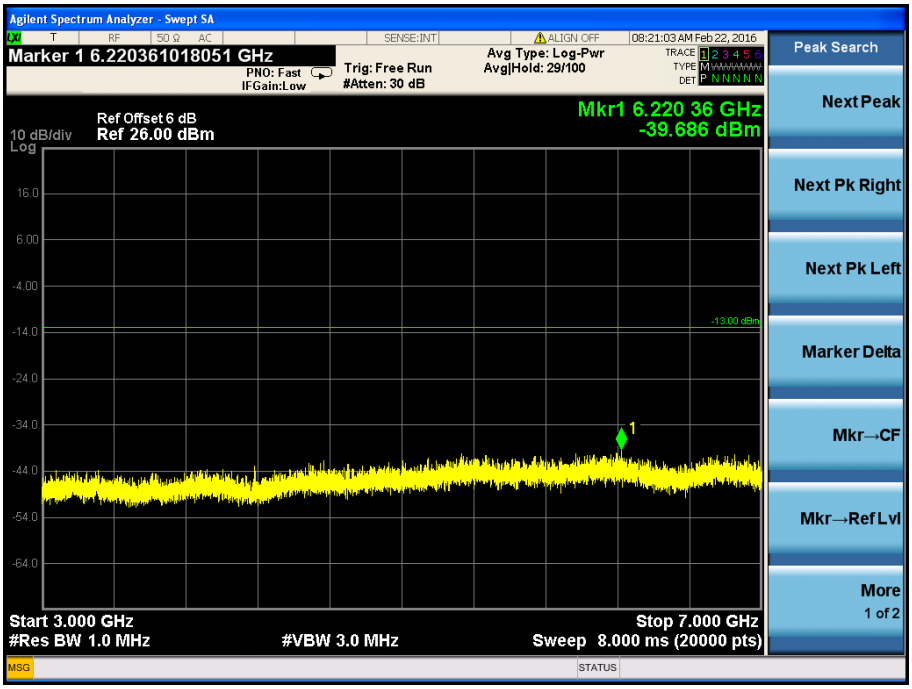
GPRS 850 Middle Channel
(30MHz-1GHz)



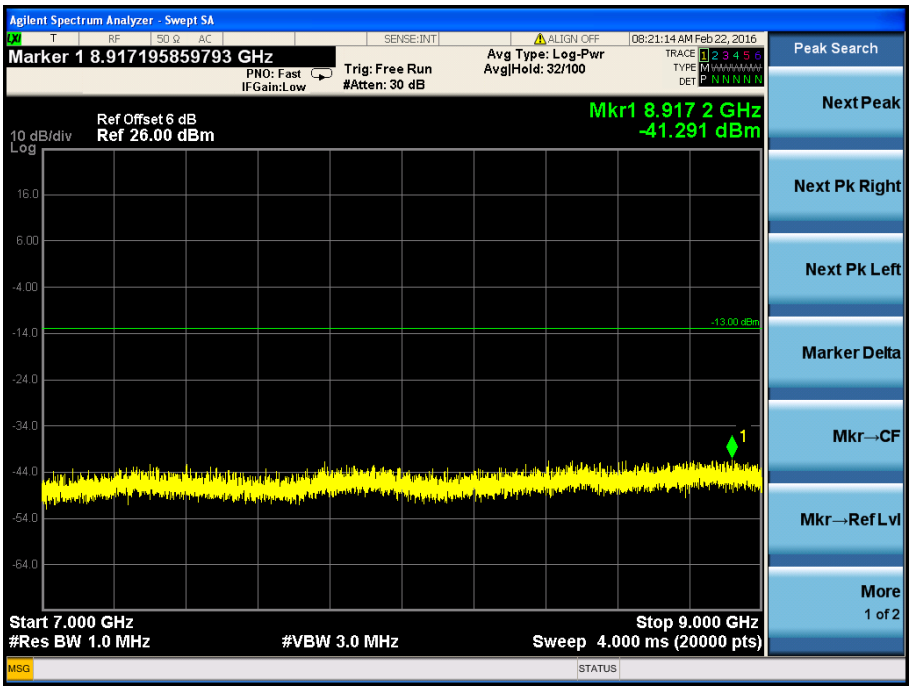
(1GHz -3GHz)



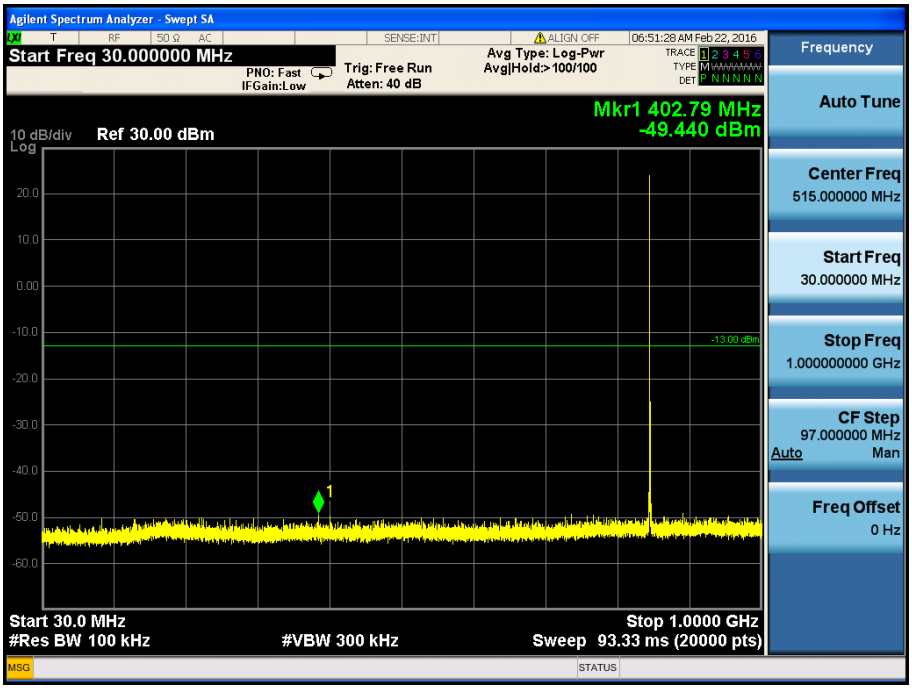
(3GHz -7GHz)



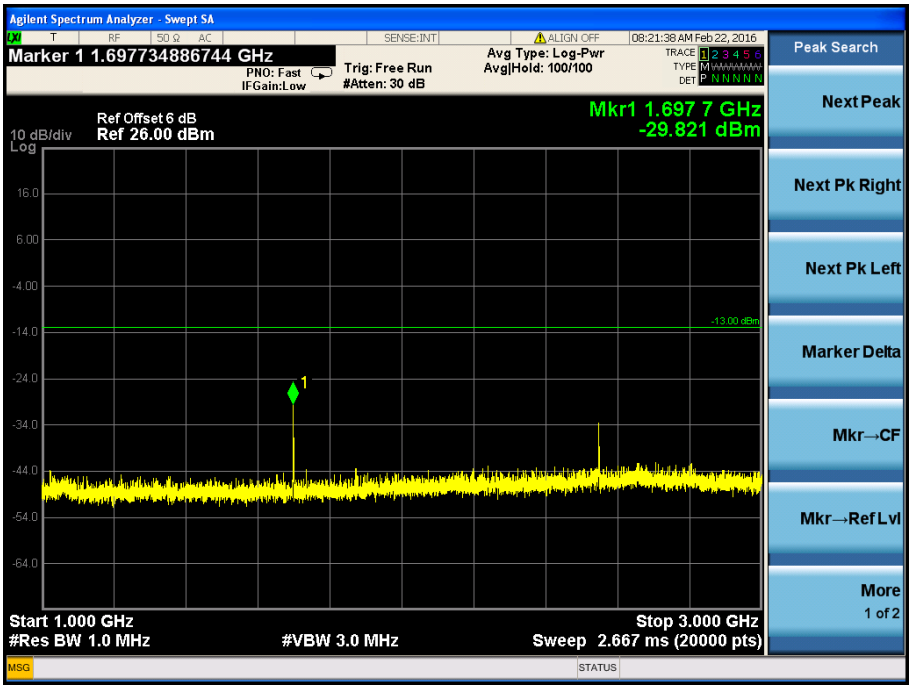
(7GHz -9GHz)



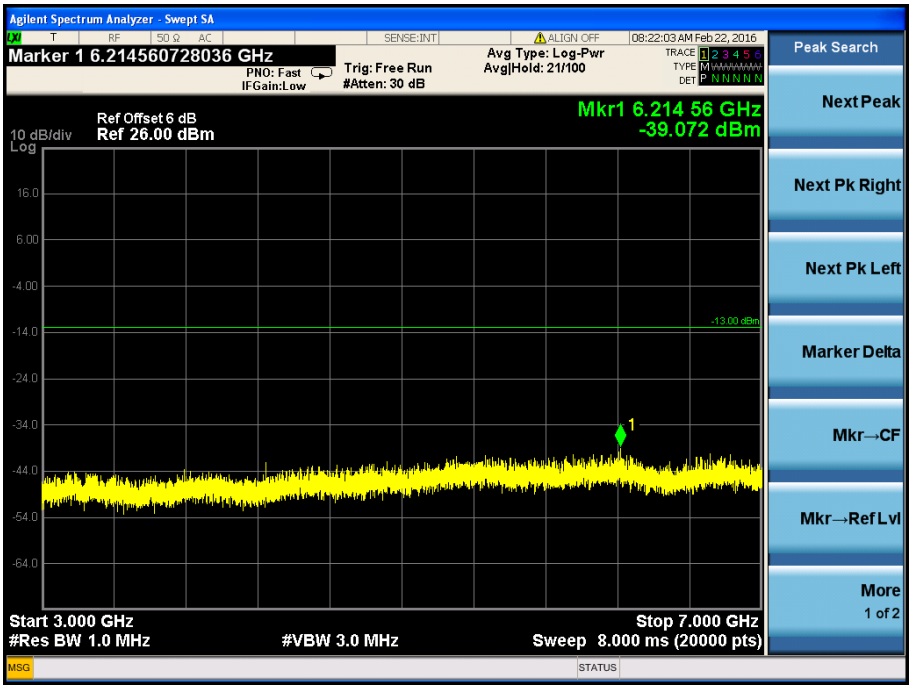
GPRS 850 High Channel
(30MHz -1GHz)



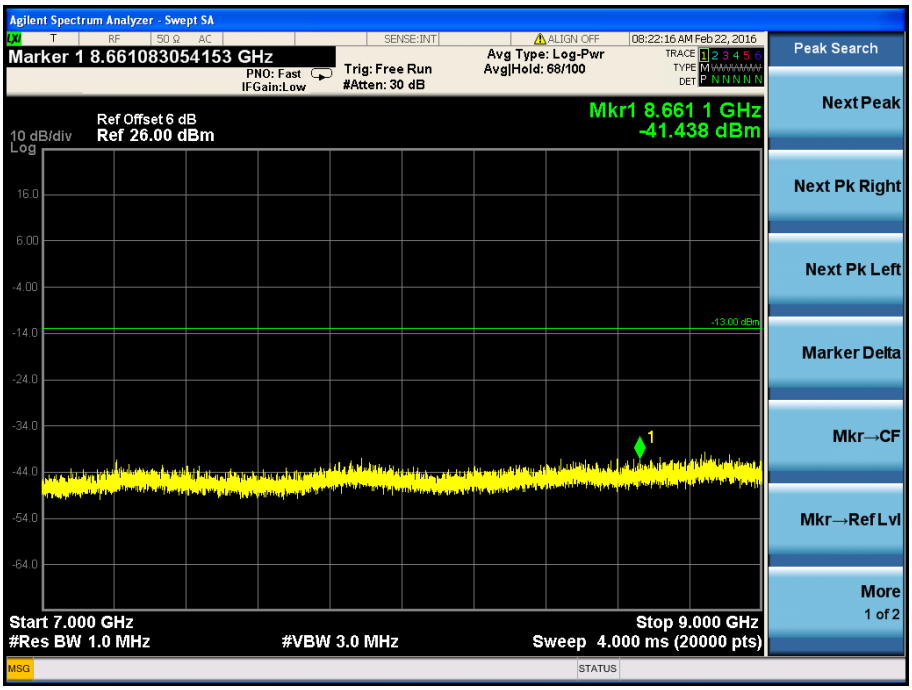
(1GHz -3GHz)



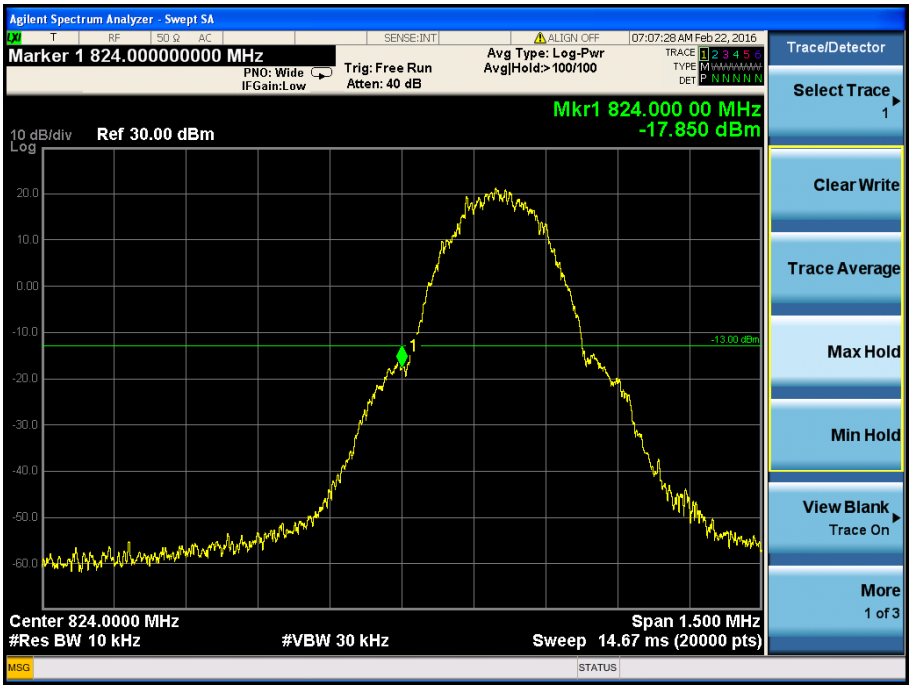
(3GHz -7GHz)



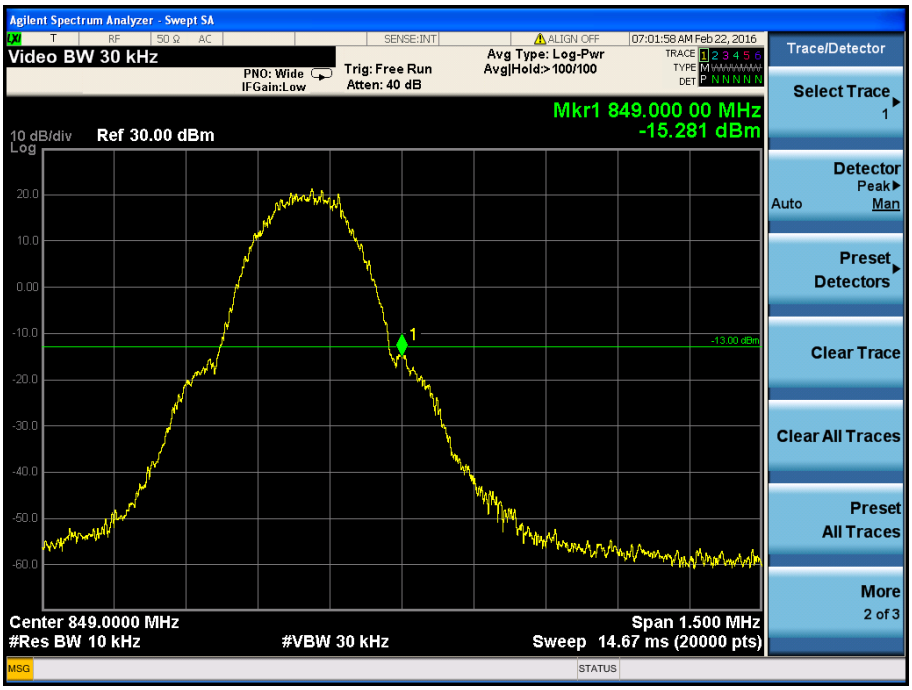
(7GHz -9GHz)



GPRS 850 Low Band Emission

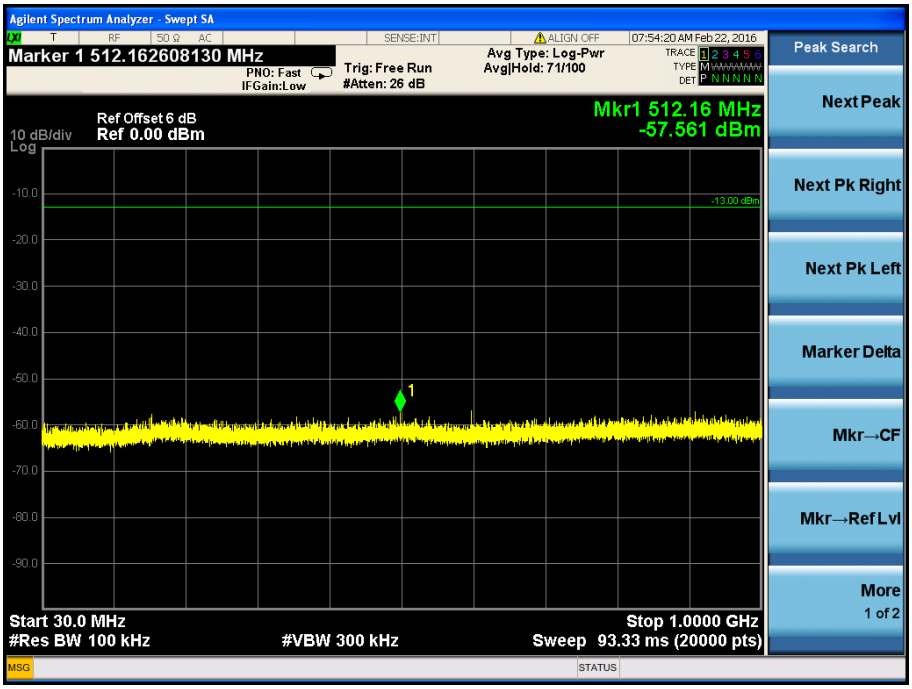


GPRS 850 High Band Emission

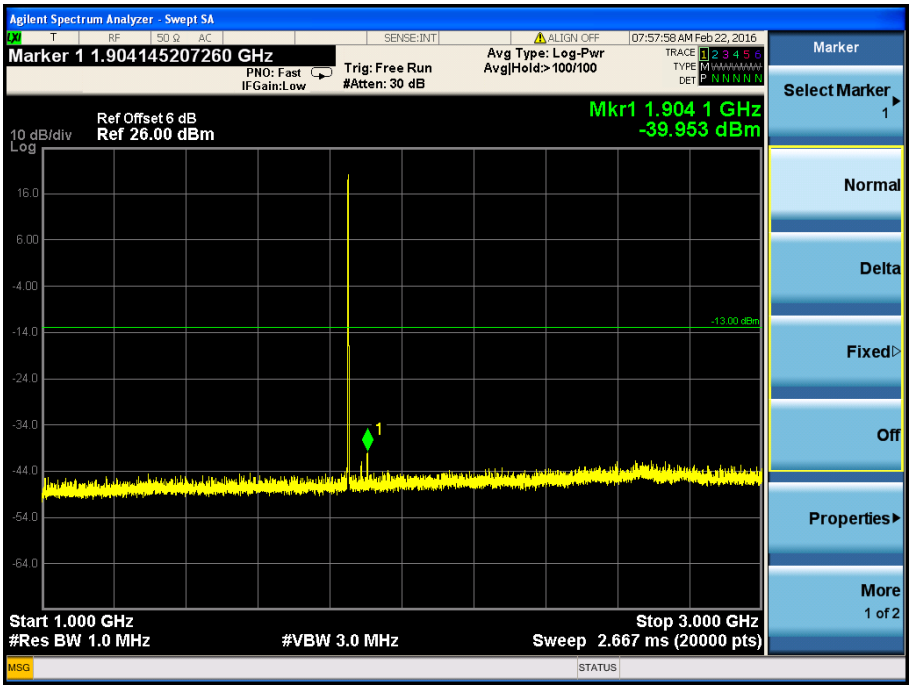


GPRS 1900 Low Channel

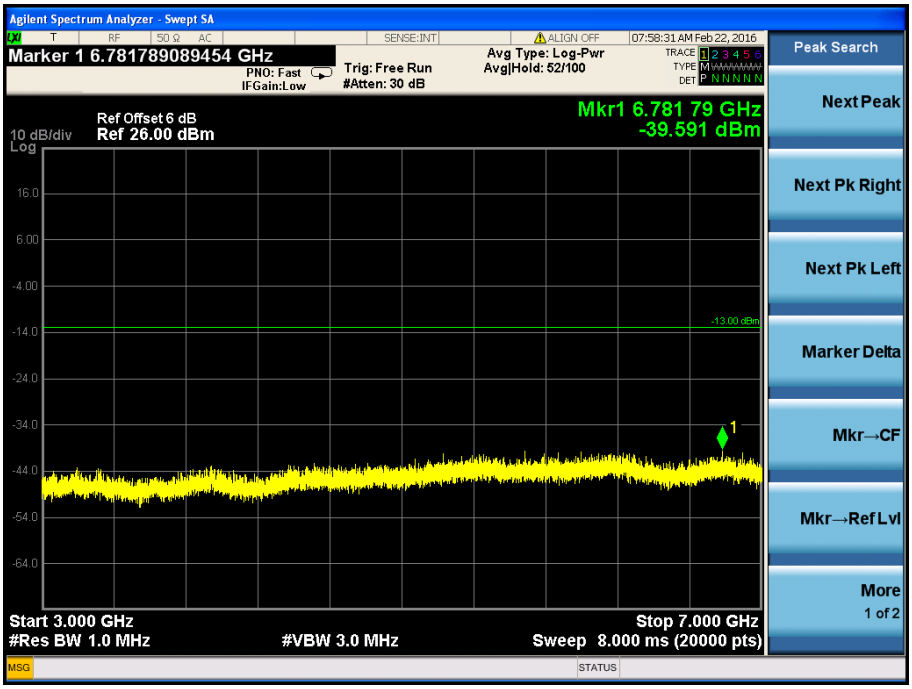
(30MHz-1GHz)



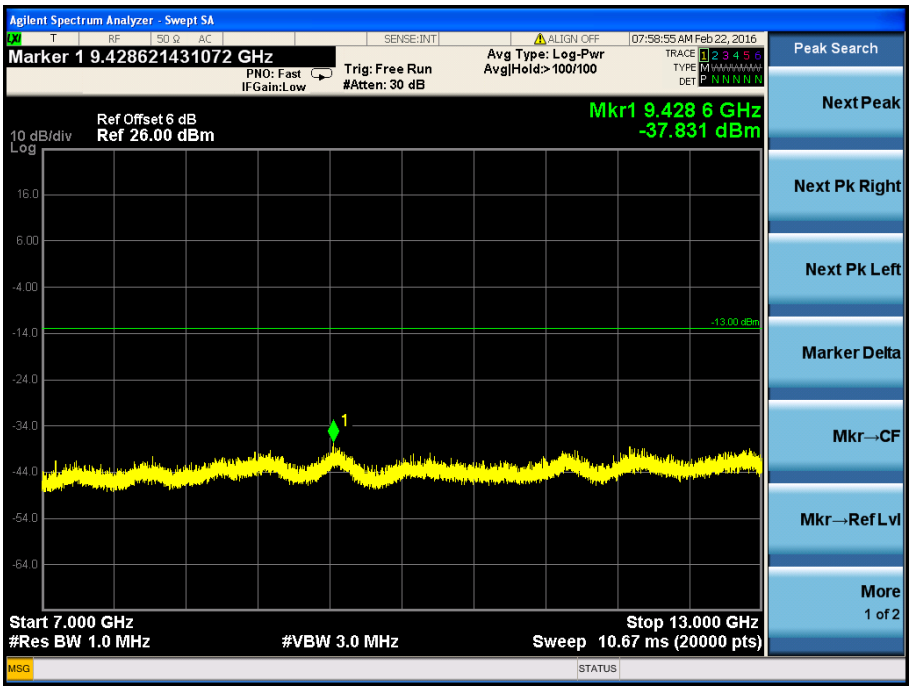
(1GHz -3GHz)



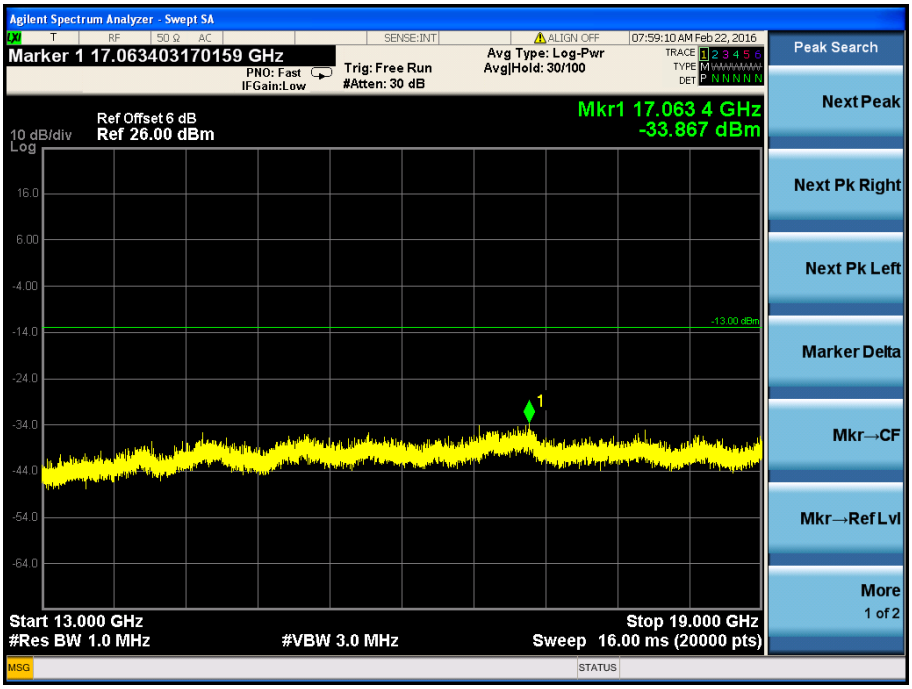
(3GHz -7GHz)



(7GHz -13GHz)

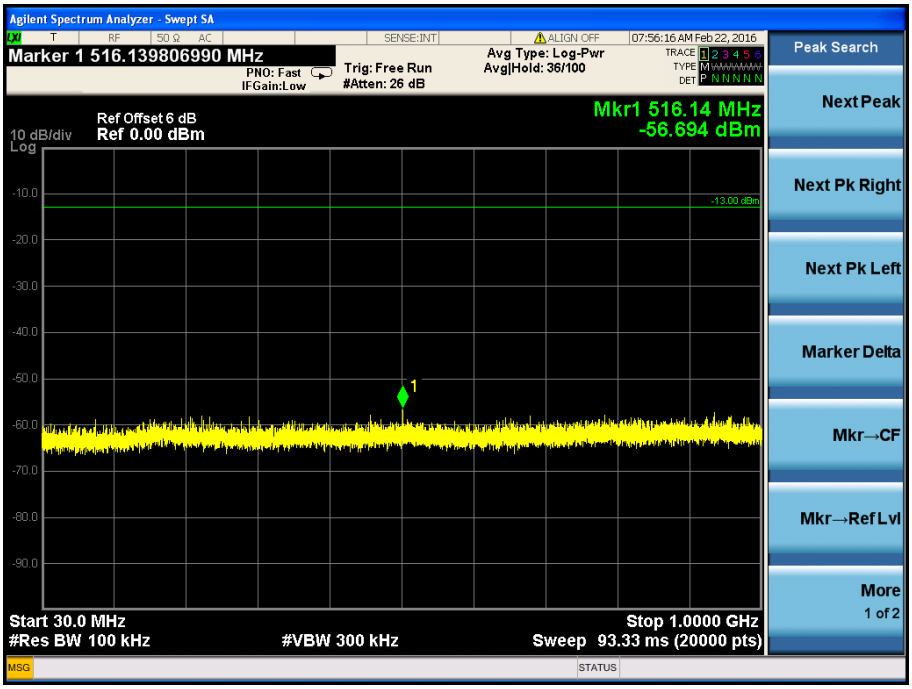


(13GHz -19GHz)

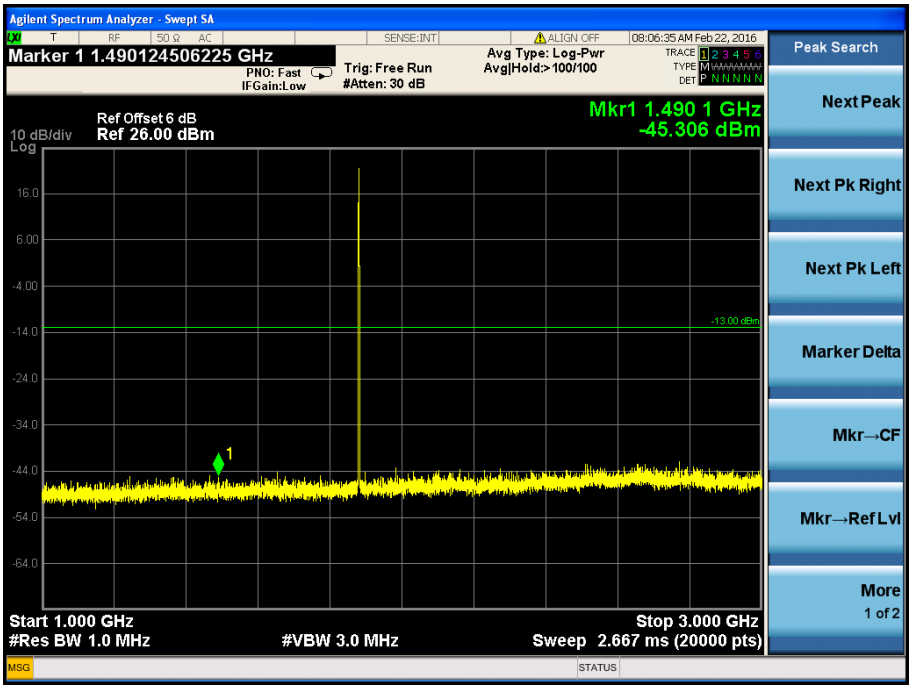


GPRS 1900 Middle Channel

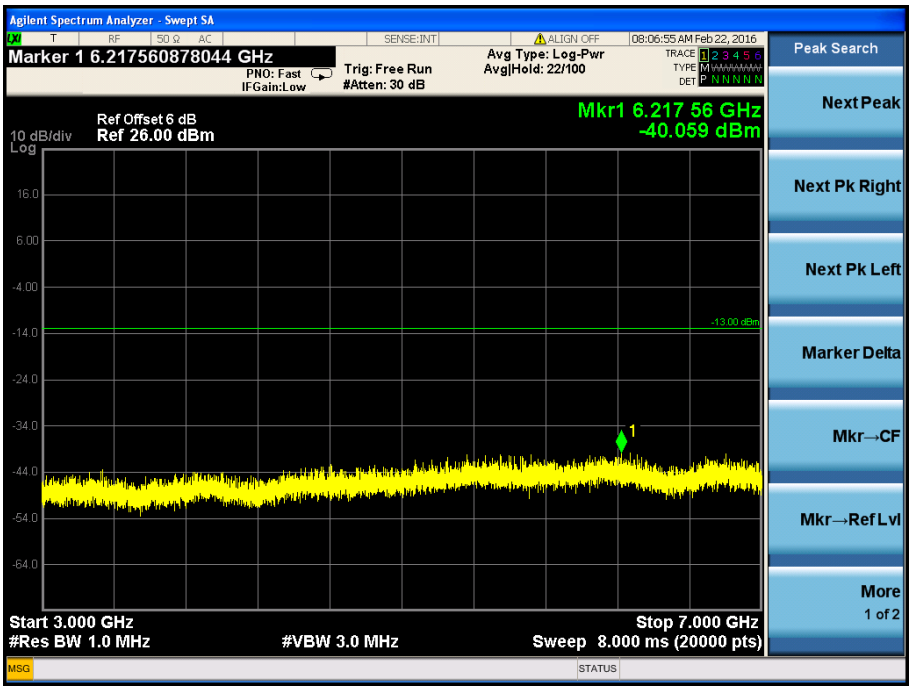
(30MHz -1GHz)



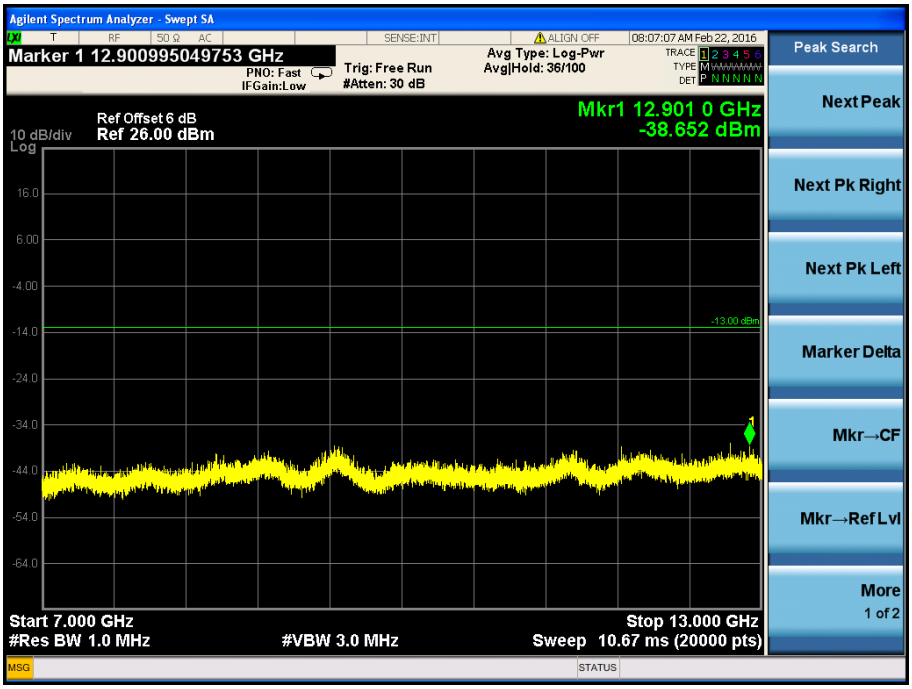
(1GHz -3GHz)



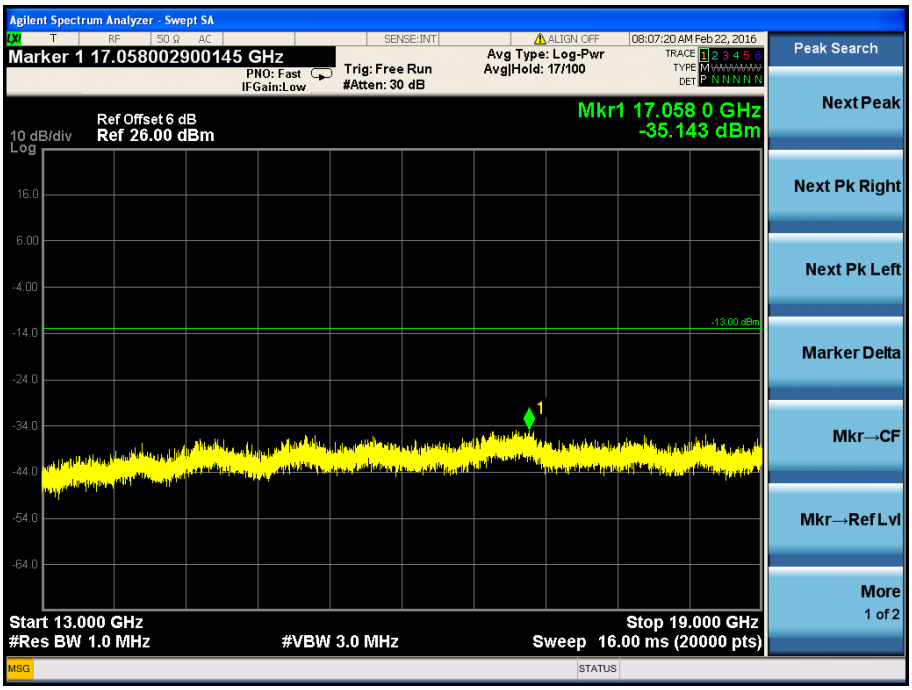
(3GHz -7GHz)



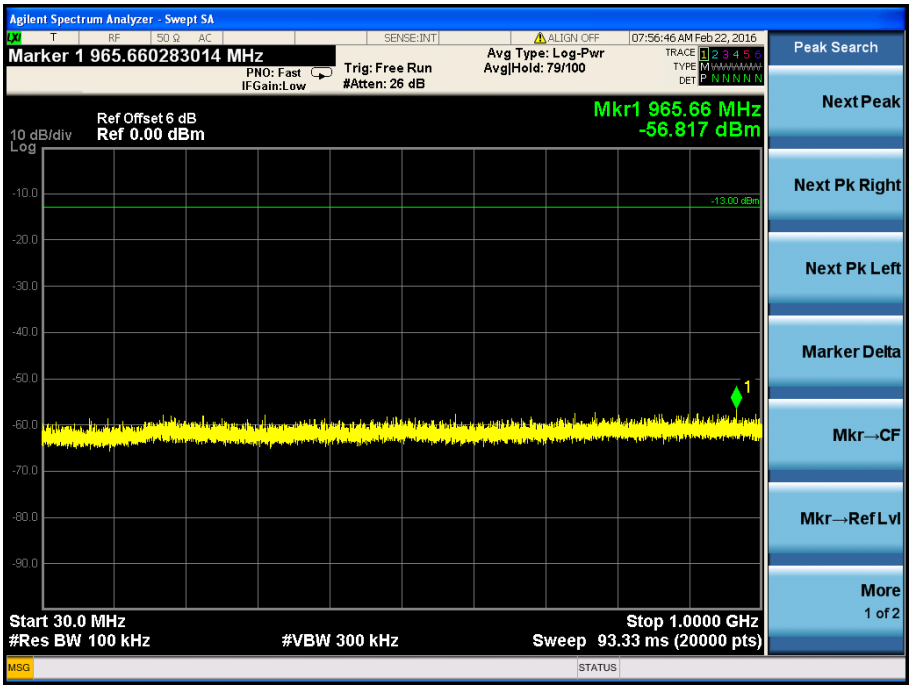
(7GHz -13GHz)



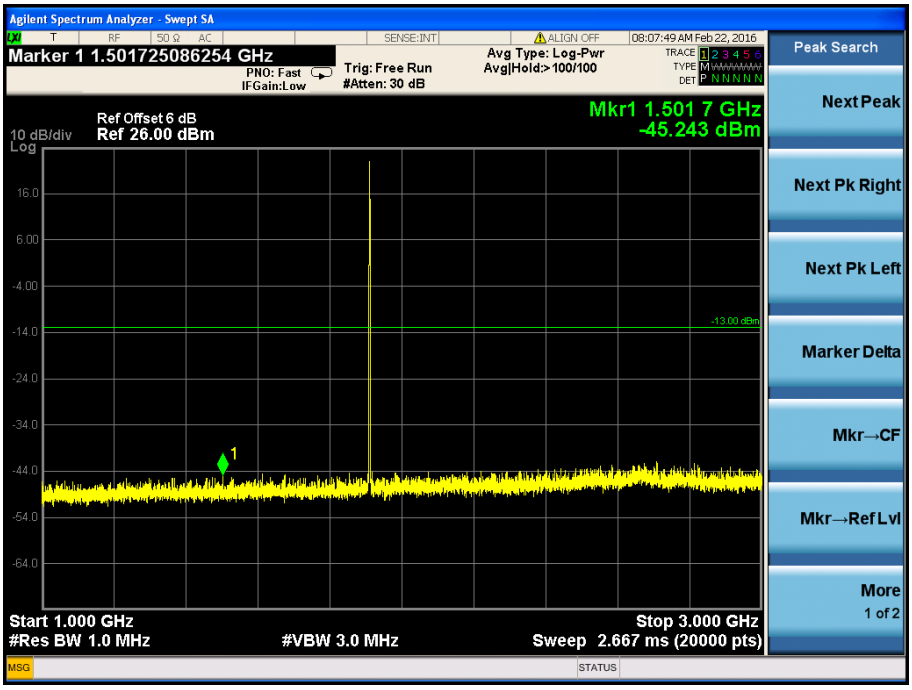
(13GHz -19GHz)



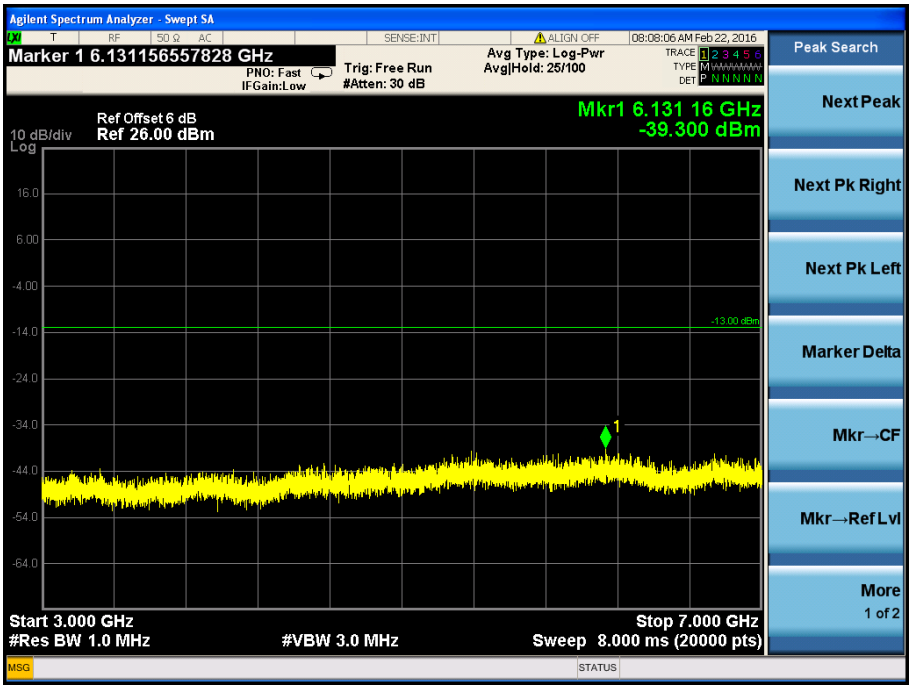
GPRS 1900 High Channel
(30MHz -1GHz)



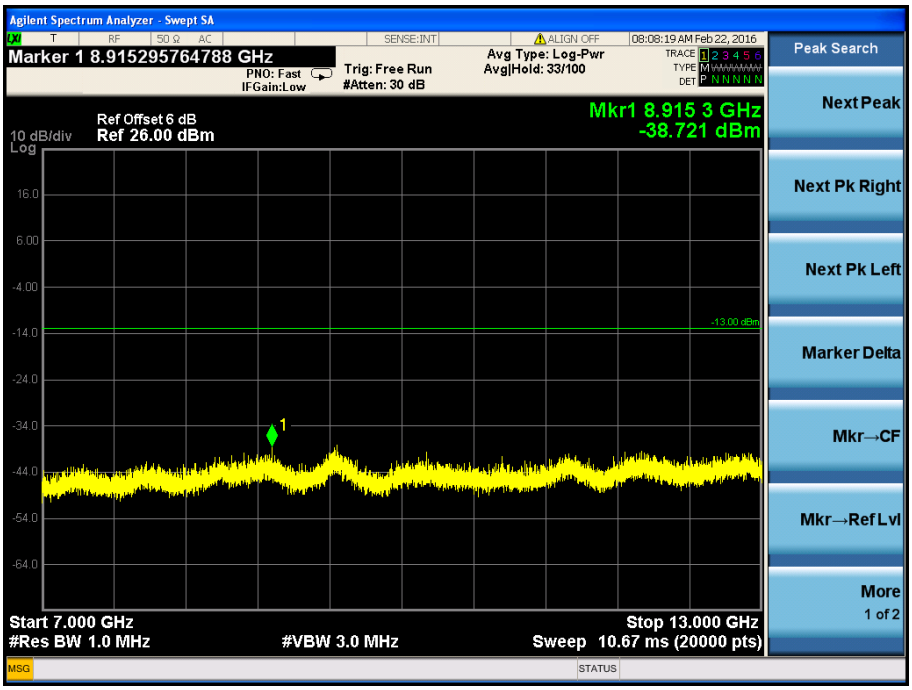
(1GHz -3GHz)



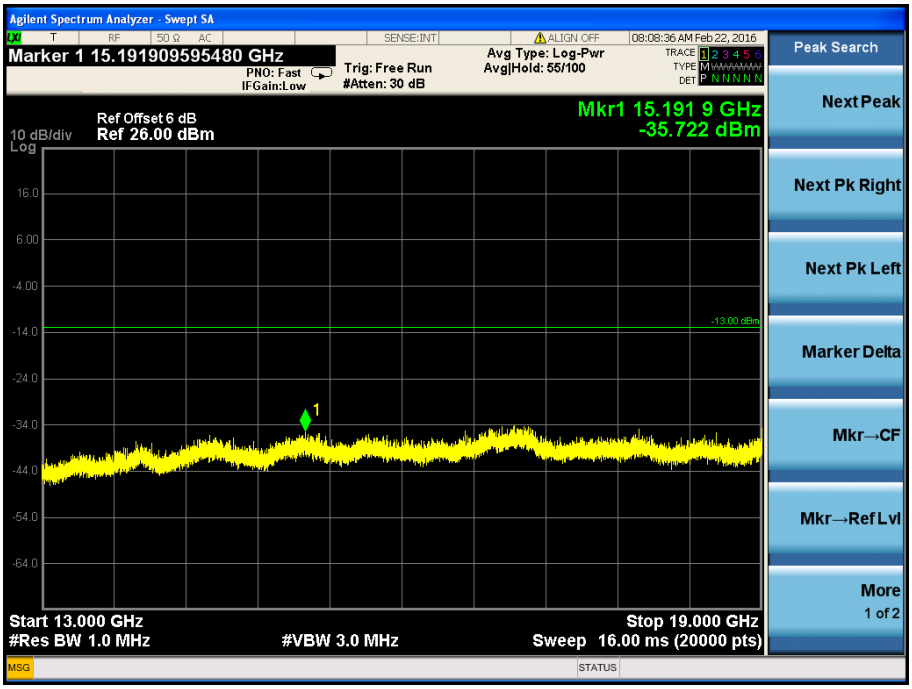
(3GHz -7GHz)



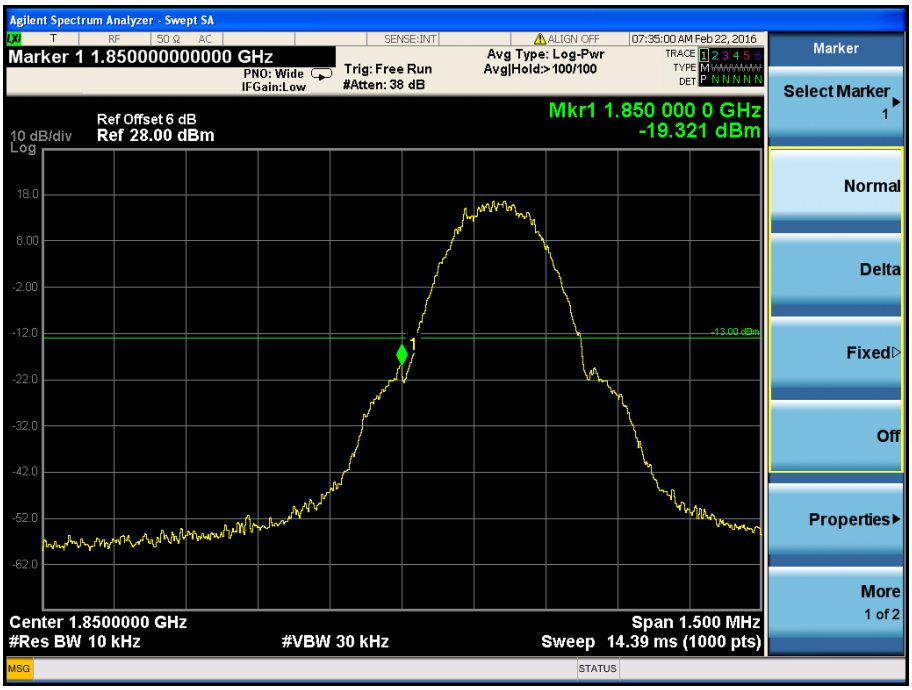
(7GHz -13GHz)



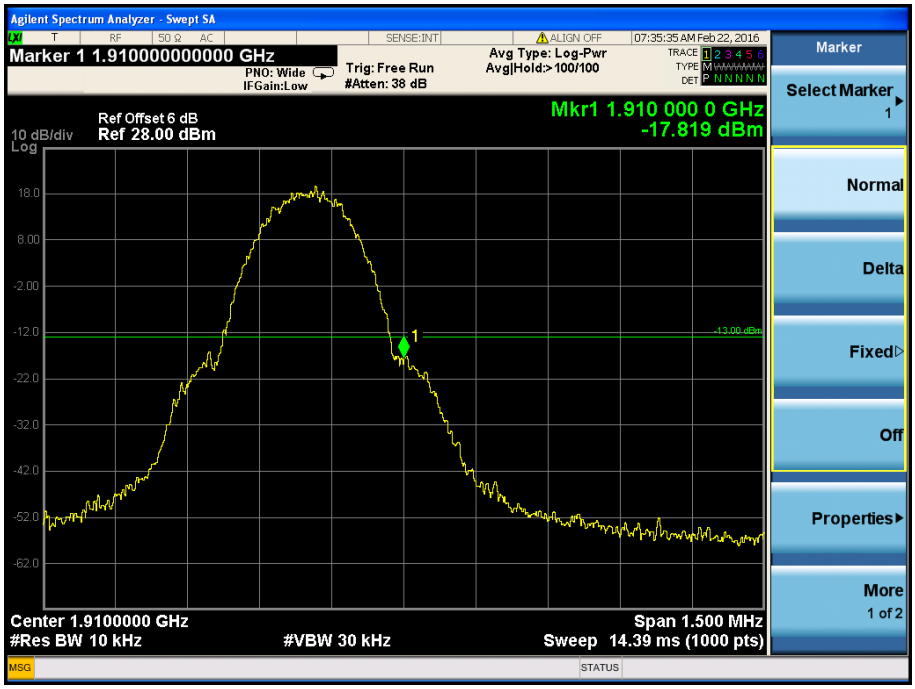
(13GHz -19GHz)



GPRS 1900 Low Band Emission

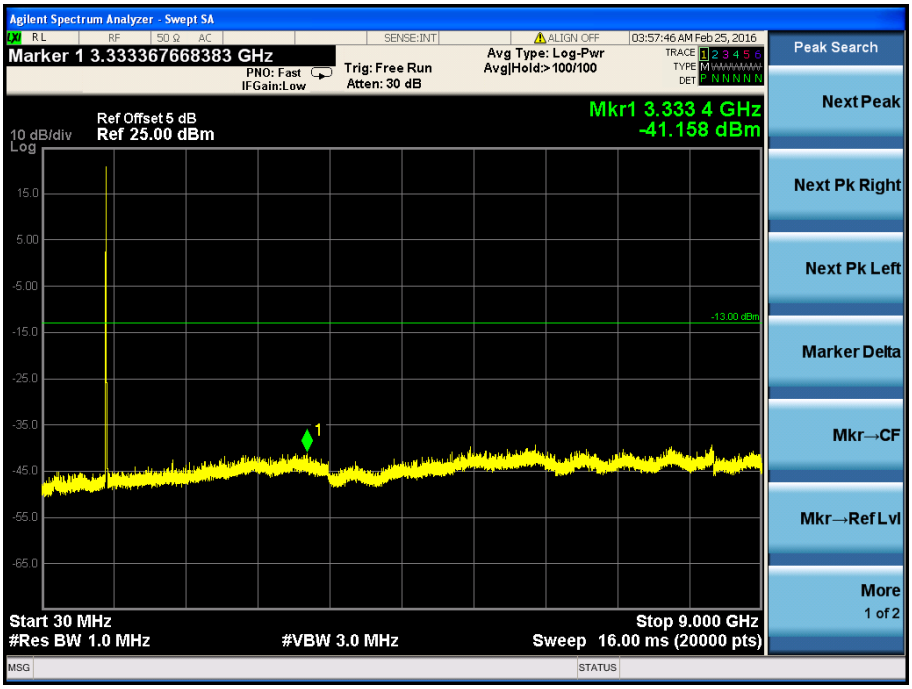


GPRS 1900 High Band Emission

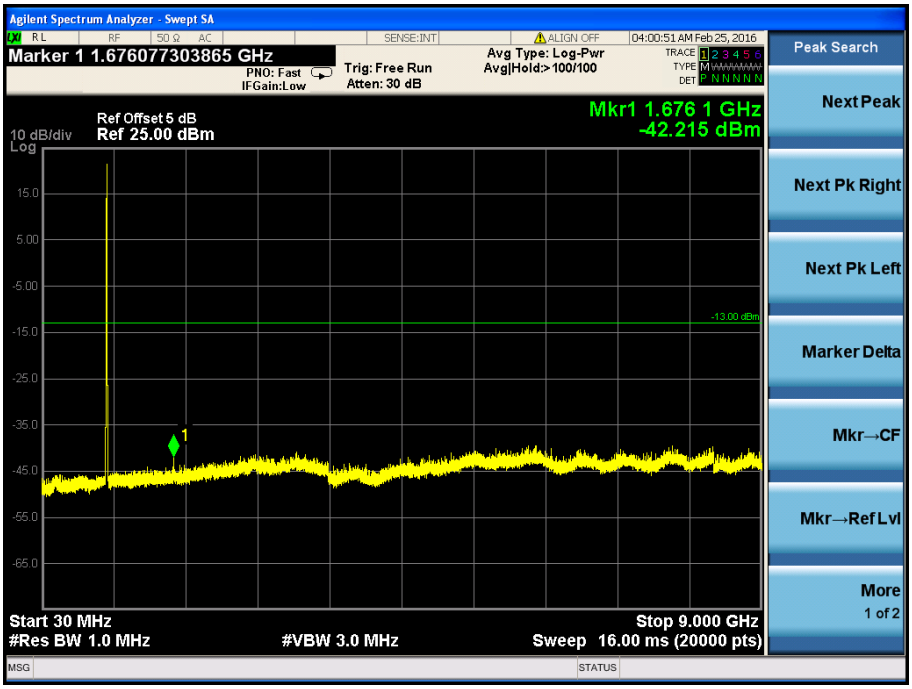


For Band V

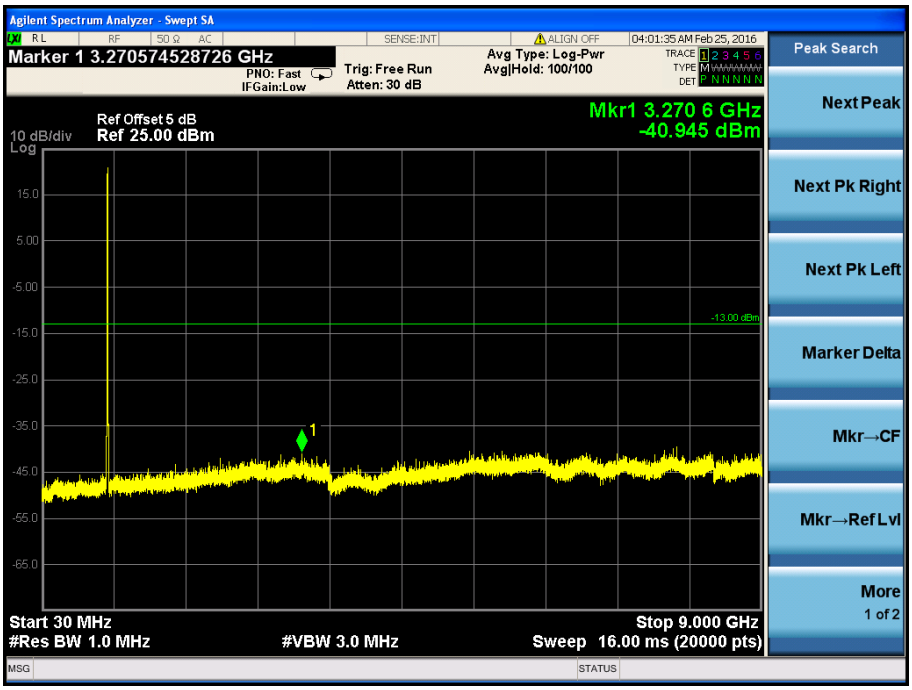
WCDMA Low Channel



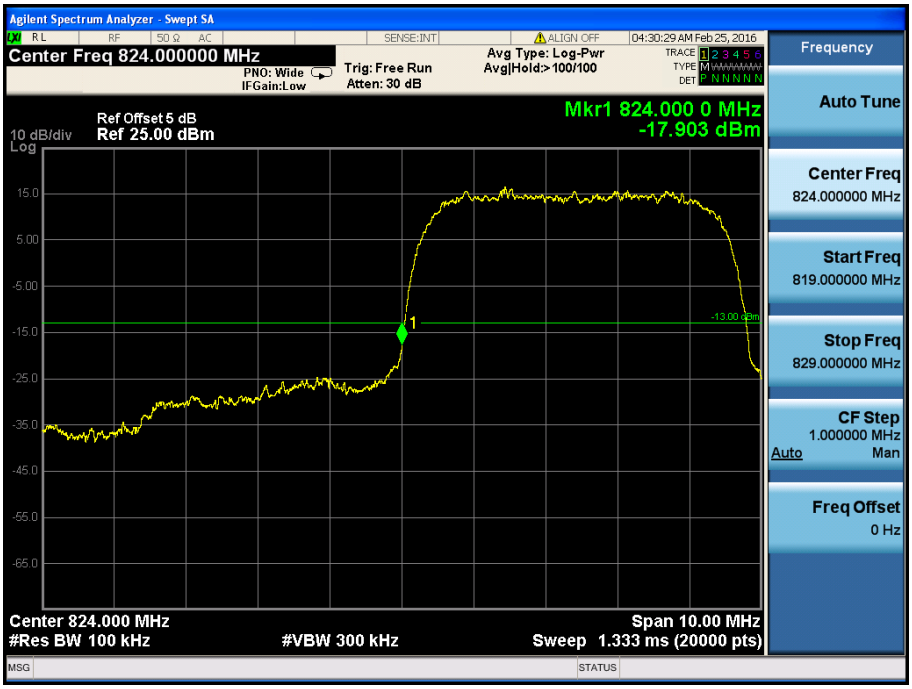
WCDMA Middle Channel



WCDMA High Channel

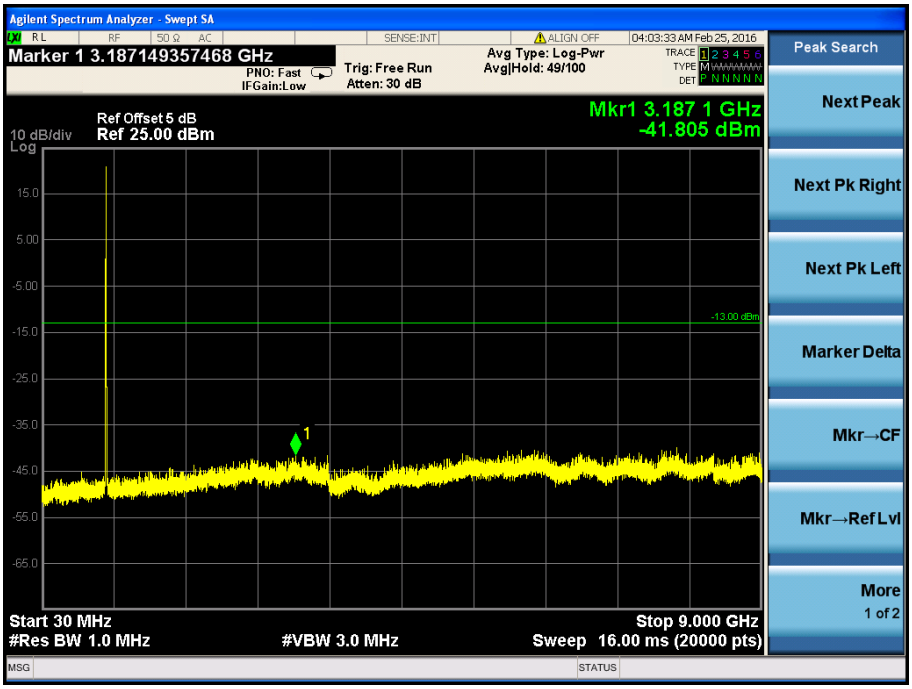


WCDMA Low Band Spurious Emission

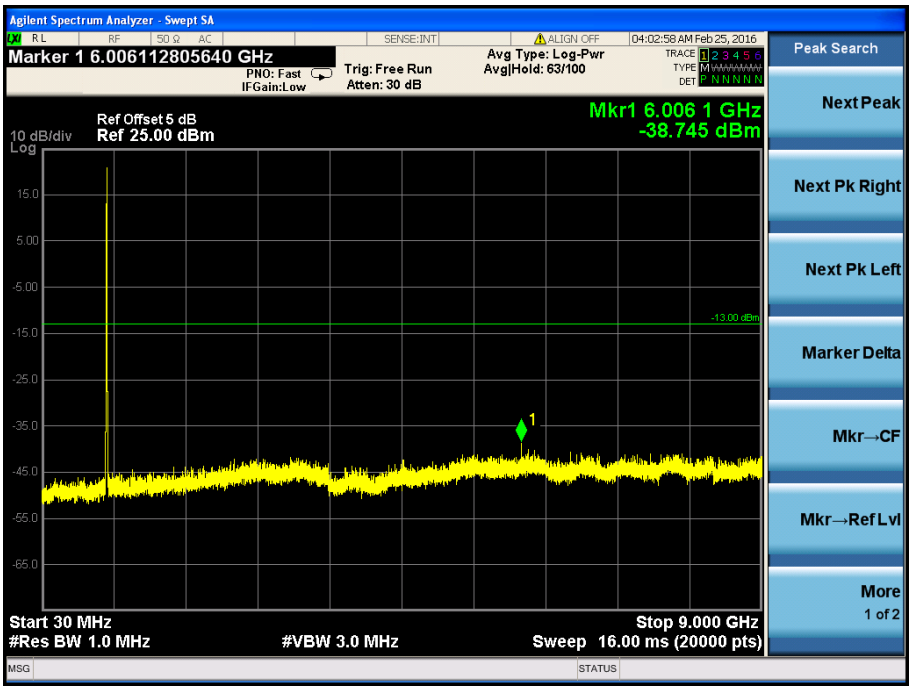


WCDMA High Band Spurious Emission

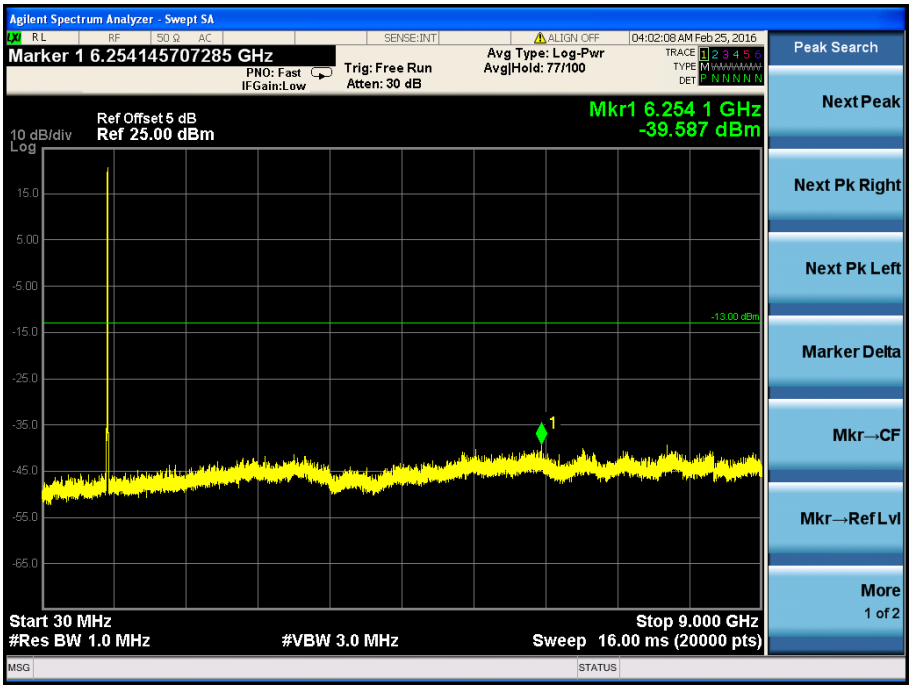
HSDPA Low Channel



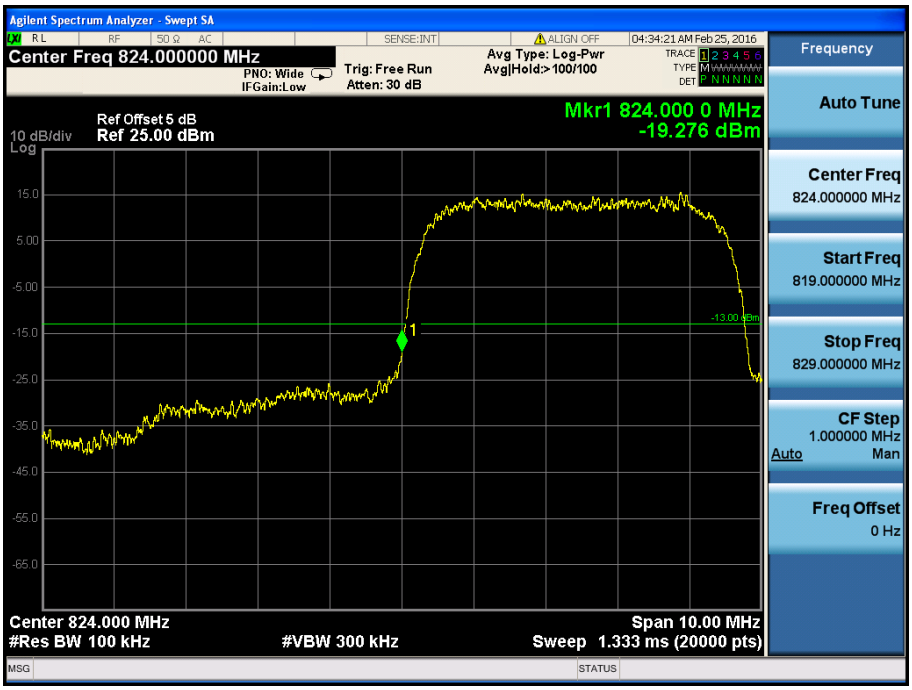
HSDPA Middle Channel



HSDPA High Channel

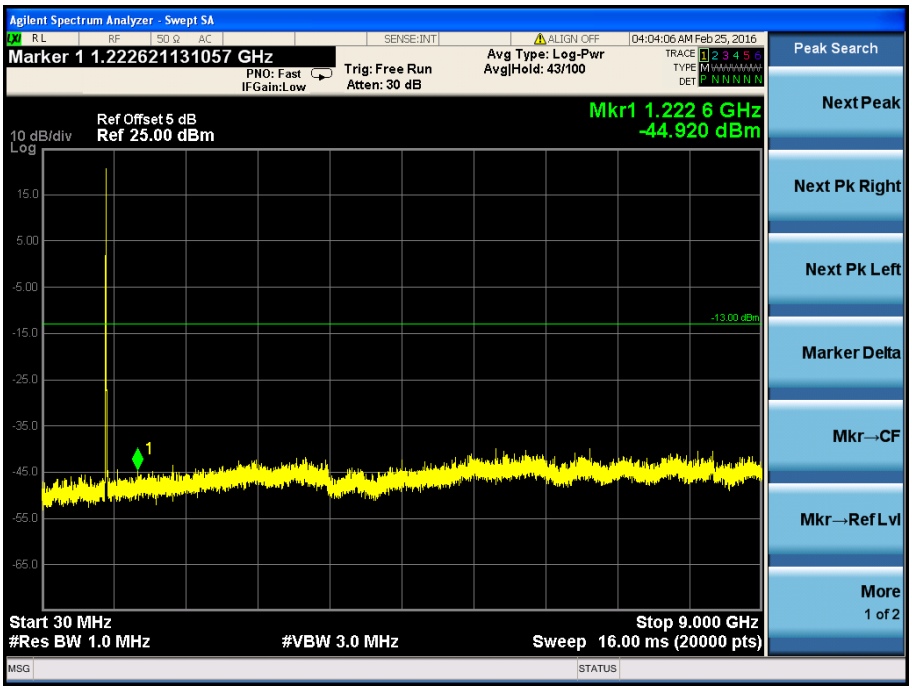


HSDPA Low Band Spurious Emission

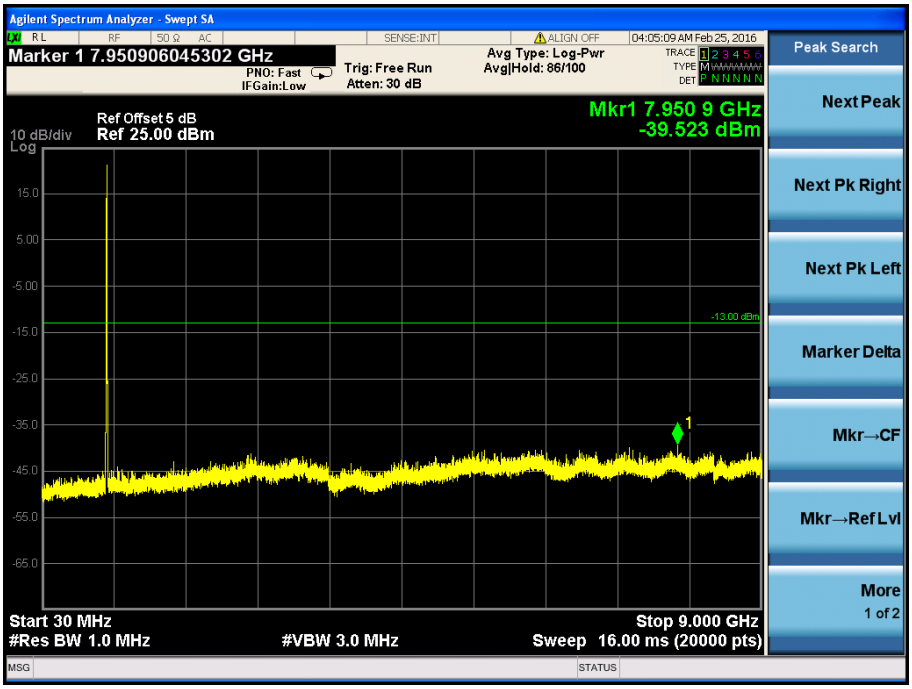


HSDPA High Band Spurious Emission

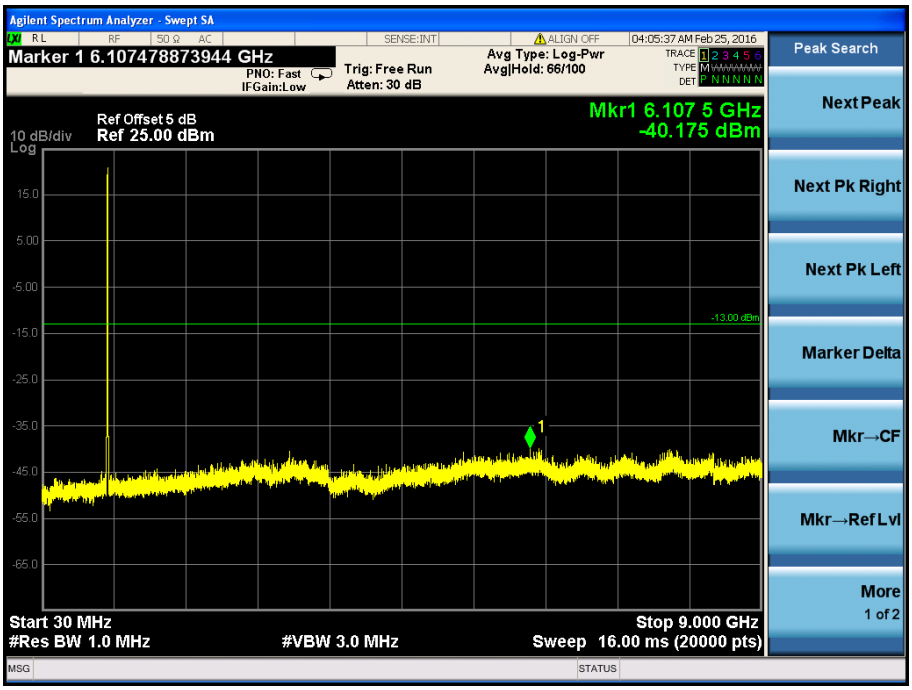
HSUPA Low Channel



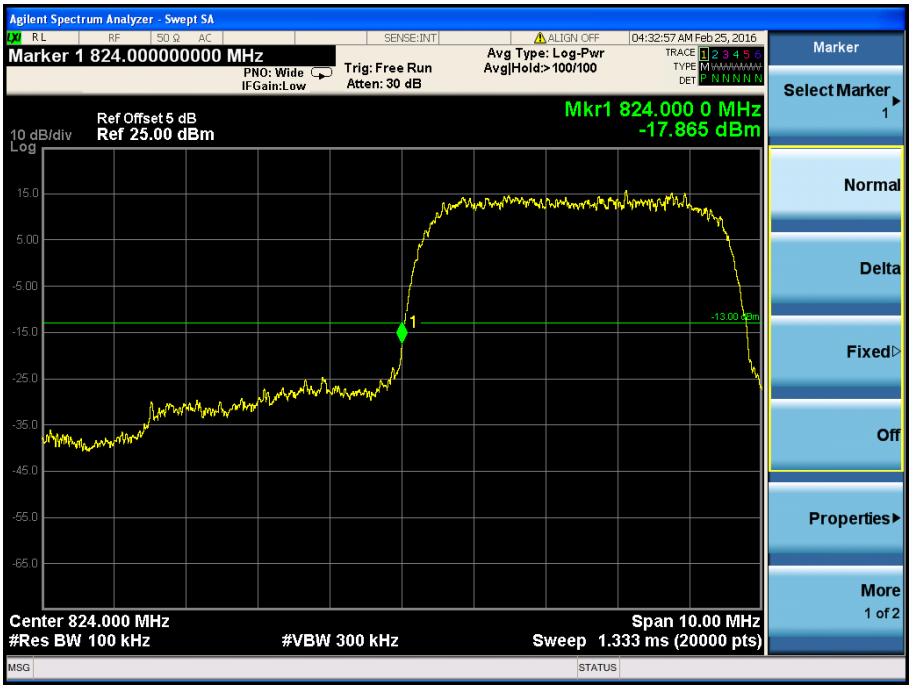
HSUPA Middle Channel



HSUPA High Channel



HSUPA Low Band Spurious Emission



HSUPA High Band Spurious Emission

8. Spurious Radiated Emissions

8.1 Standard Applicable

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

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

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

8.2 Test Procedure

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

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

8.3 Environmental Conditions

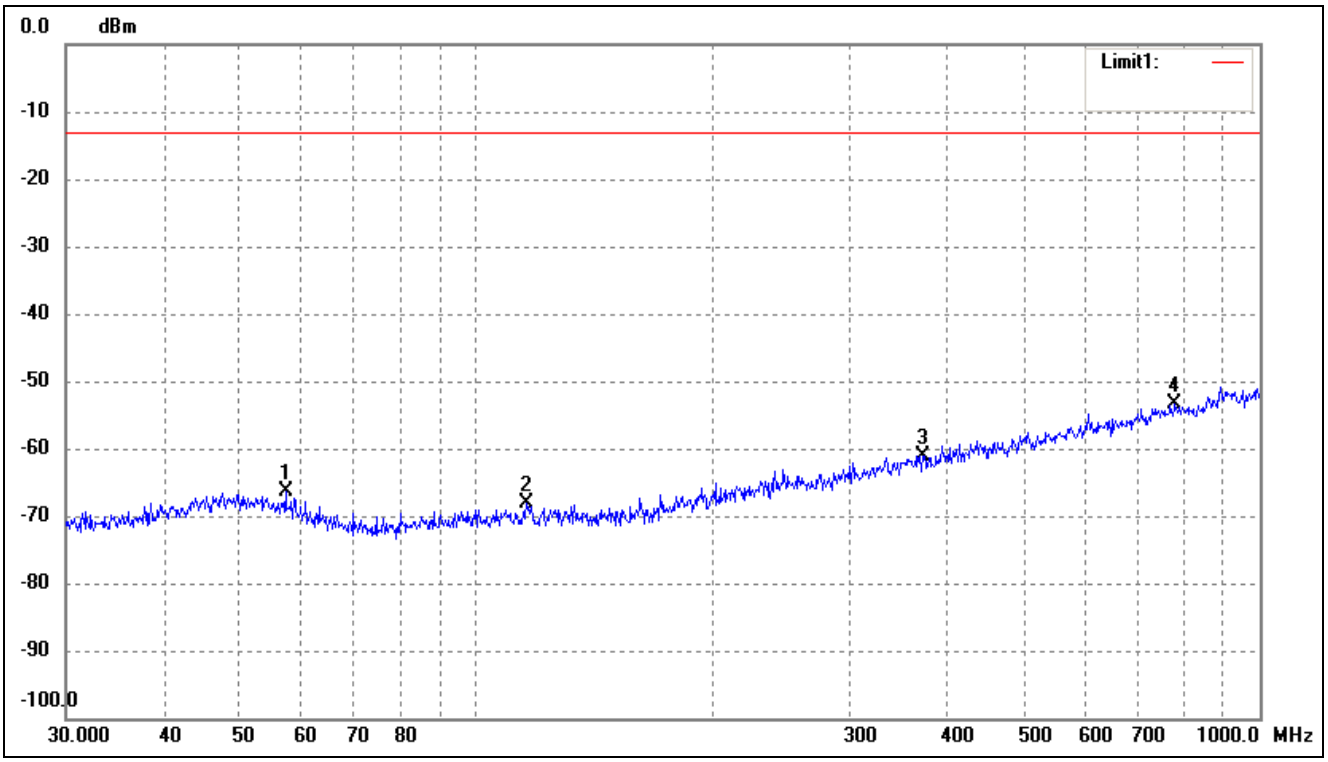
Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

8.4 Summary of Test Results/Plots

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

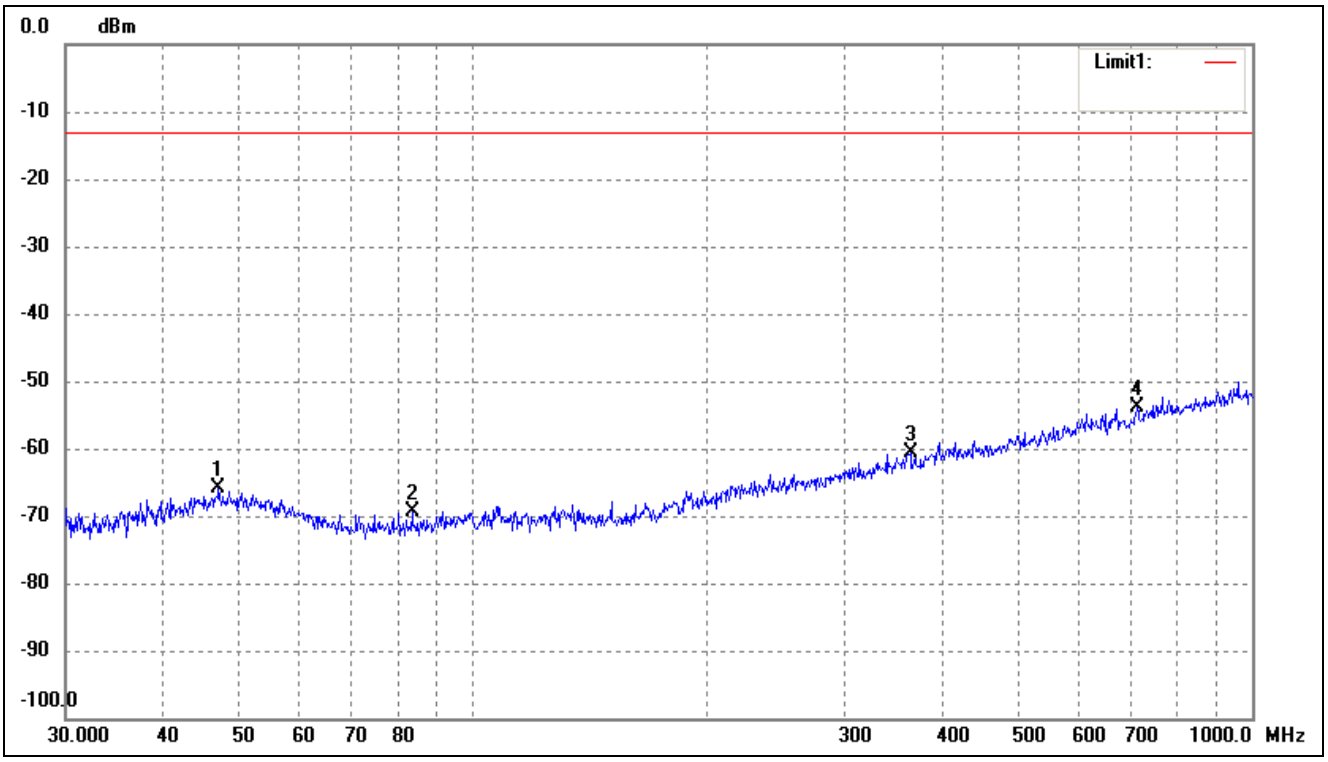
Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

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



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	Factor(dB)	(dBm)	(dBm)	(dB)	
1	57.1914	-68.26	1.95	-66.31	-13.00	-53.31	ERP
2	116.1321	-69.48	1.25	-68.23	-13.00	-55.23	ERP
3	372.0045	-69.75	8.67	-61.08	-13.00	-48.08	ERP
4	779.6068	-69.37	15.92	-53.45	-13.00	-40.45	ERP

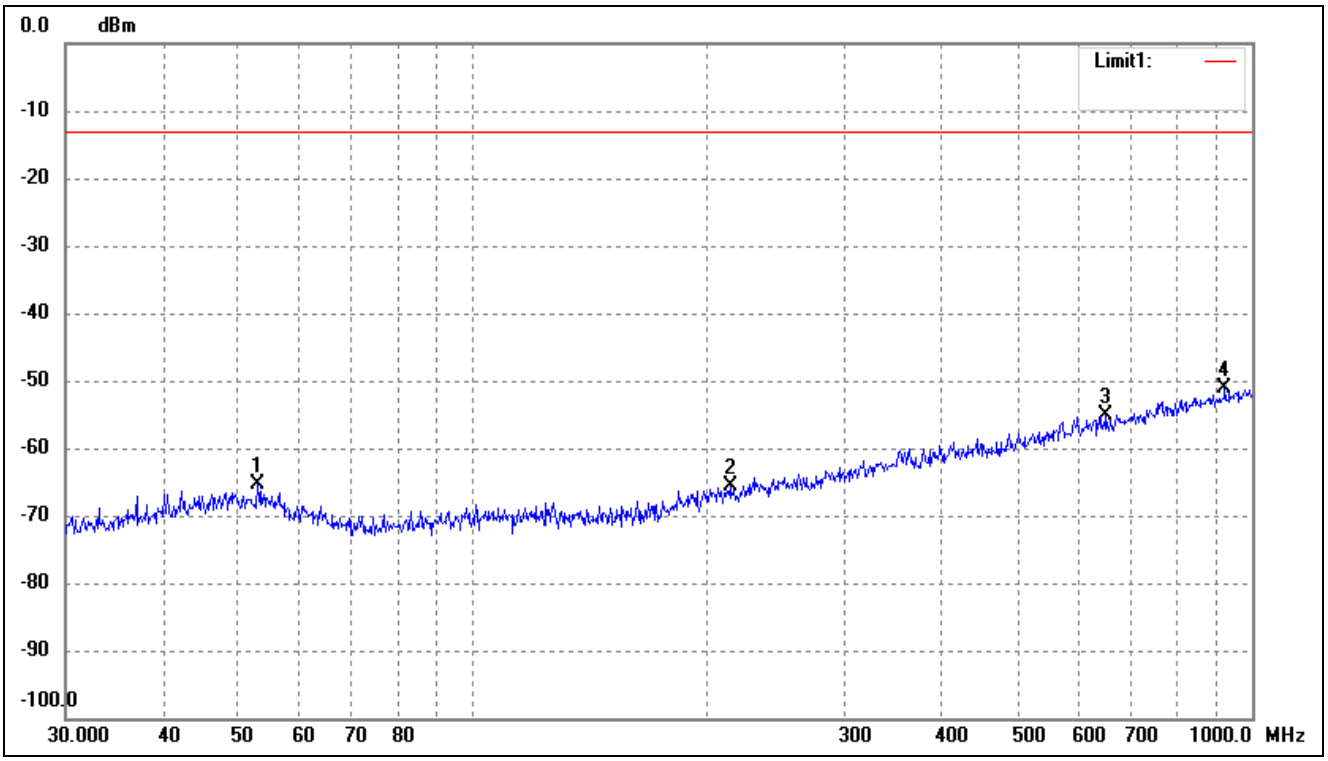
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	Factor(dB)	(dBm)	(dBm)	(dB)	
1	47.1599	-68.78	3.03	-65.75	-13.00	-52.75	ERP
2	83.5222	-69.10	-0.38	-69.48	-13.00	-56.48	ERP
3	364.2595	-69.19	8.64	-60.55	-13.00	-47.55	ERP
4	711.6734	-68.69	14.83	-53.86	-13.00	-40.86	ERP

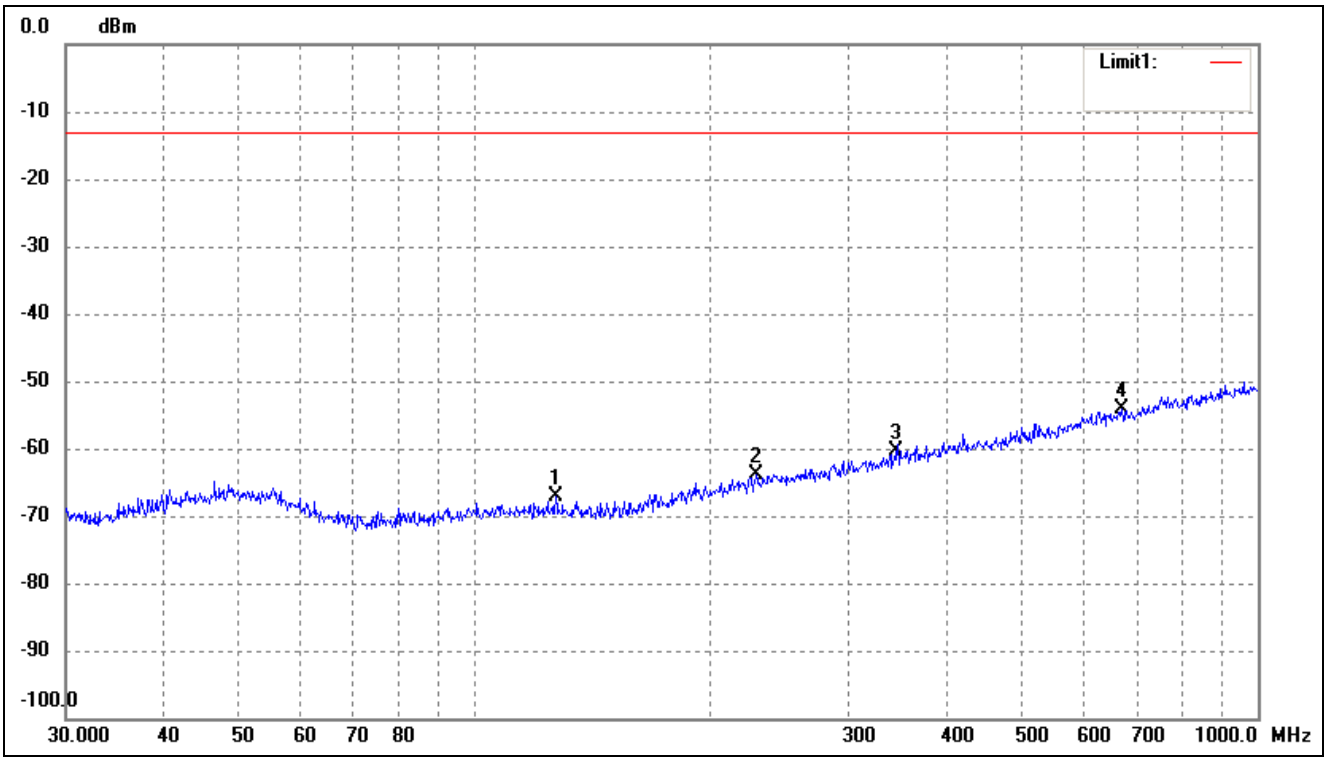
For Cellular Band_ GSM1900 Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	Factor(dB)	(dBm)	(dBm)	(dB)	
1	52.9453	-68.21	2.83	-65.38	-13.00	-52.38	ERP
2	213.7634	-69.85	4.16	-65.69	-13.00	-52.69	ERP
3	649.6597	-69.15	14.03	-55.12	-13.00	-42.12	ERP
4	922.5157	-68.71	17.59	-51.12	-13.00	-38.12	ERP

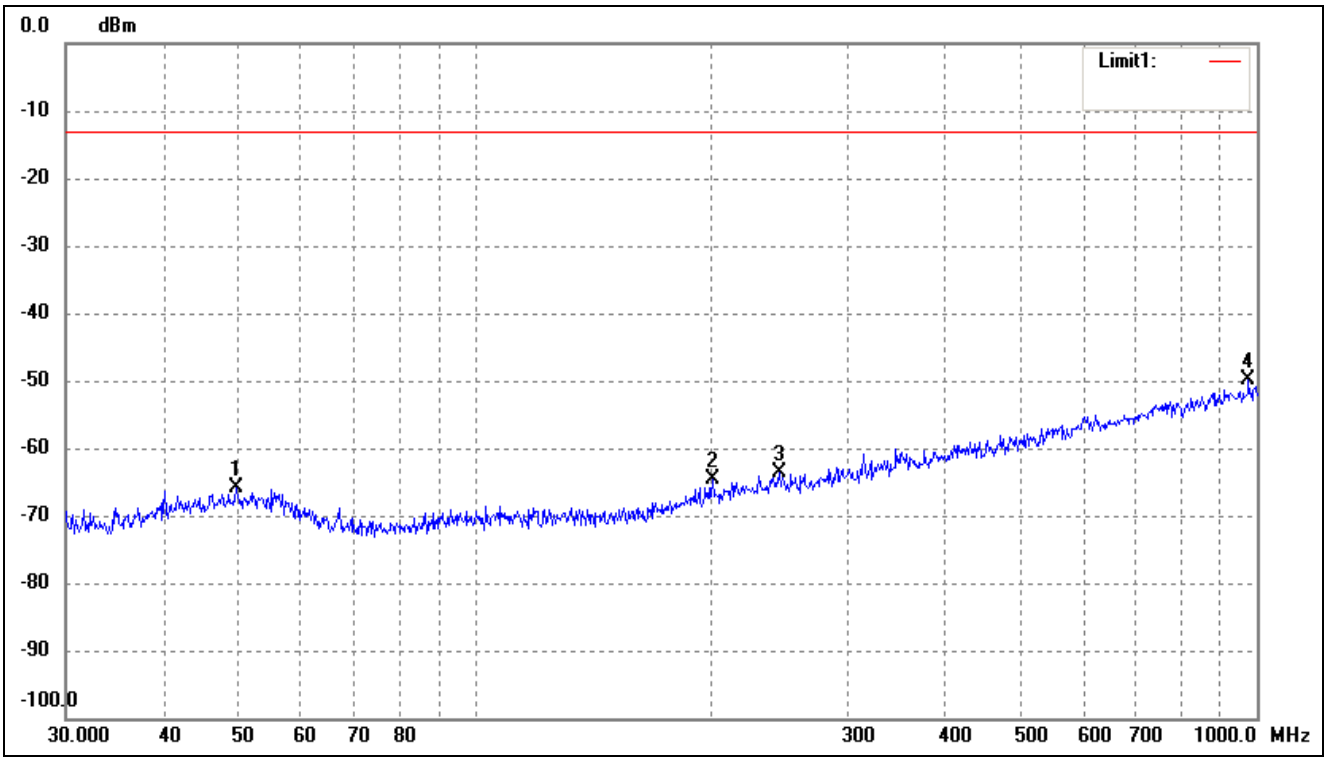
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	Factor(dB)	(dBm)	(dBm)	(dB)	
1	126.7723	-68.26	1.12	-67.14	-13.00	-54.14	ERP
2	228.4904	-68.71	4.95	-63.76	-13.00	-50.76	ERP
3	344.3855	-68.71	8.42	-60.29	-13.00	-47.29	ERP
4	670.4893	-68.41	14.30	-54.11	-13.00	-41.11	ERP

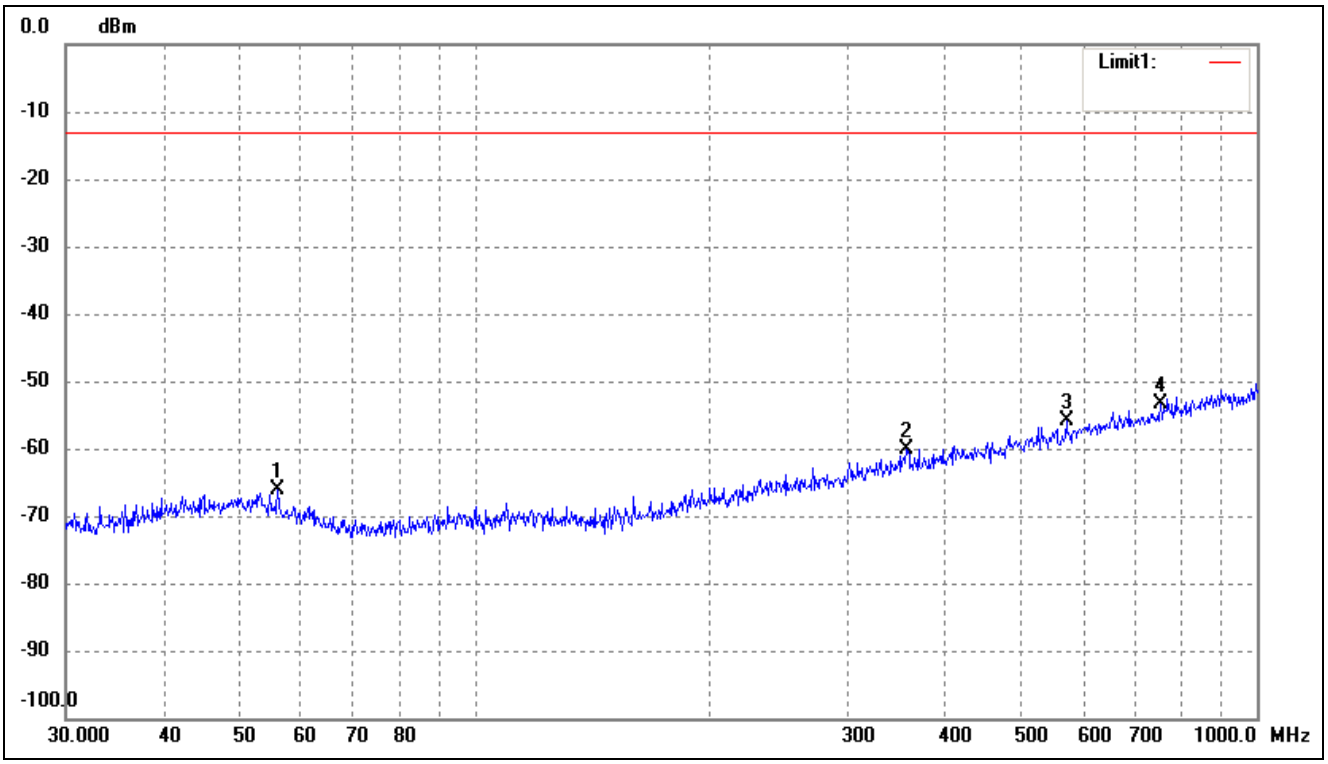
For band 5 Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	Factor(dB)	(dBm)	(dBm)	(dB)	
1	49.5328	-69.36	3.38	-65.98	-13.00	-52.98	ERP
2	201.3930	-68.35	3.68	-64.67	-13.00	-51.67	ERP
3	245.0900	-69.10	5.50	-63.60	-13.00	-50.60	ERP
4	975.7529	-67.86	18.00	-49.86	-13.00	-36.86	ERP

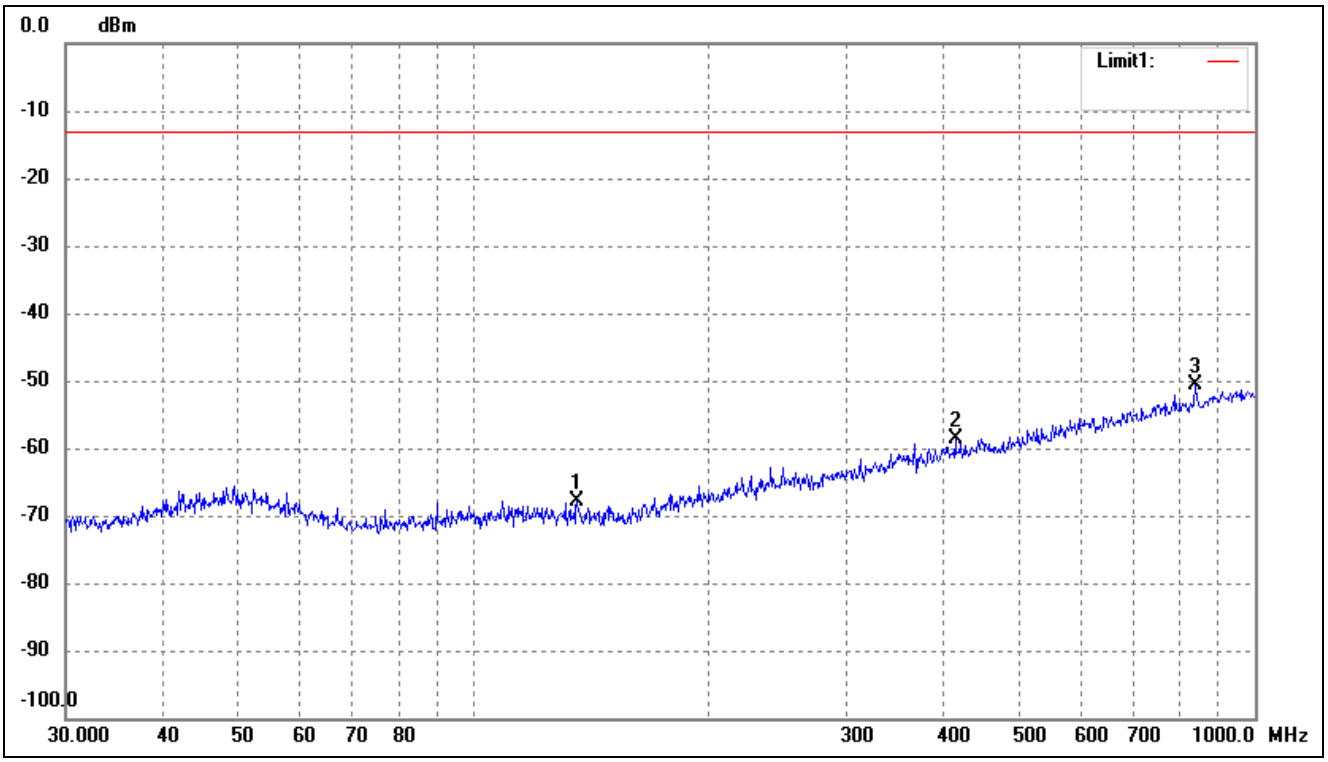
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	56.0007	-68.39	2.19	-66.20	-13.00	-53.20	ERP
2	356.6758	-68.73	8.66	-60.07	-13.00	-47.07	ERP
3	570.6100	-68.44	12.59	-55.85	-13.00	-42.85	ERP
4	752.7432	-69.08	15.68	-53.40	-13.00	-40.40	ERP

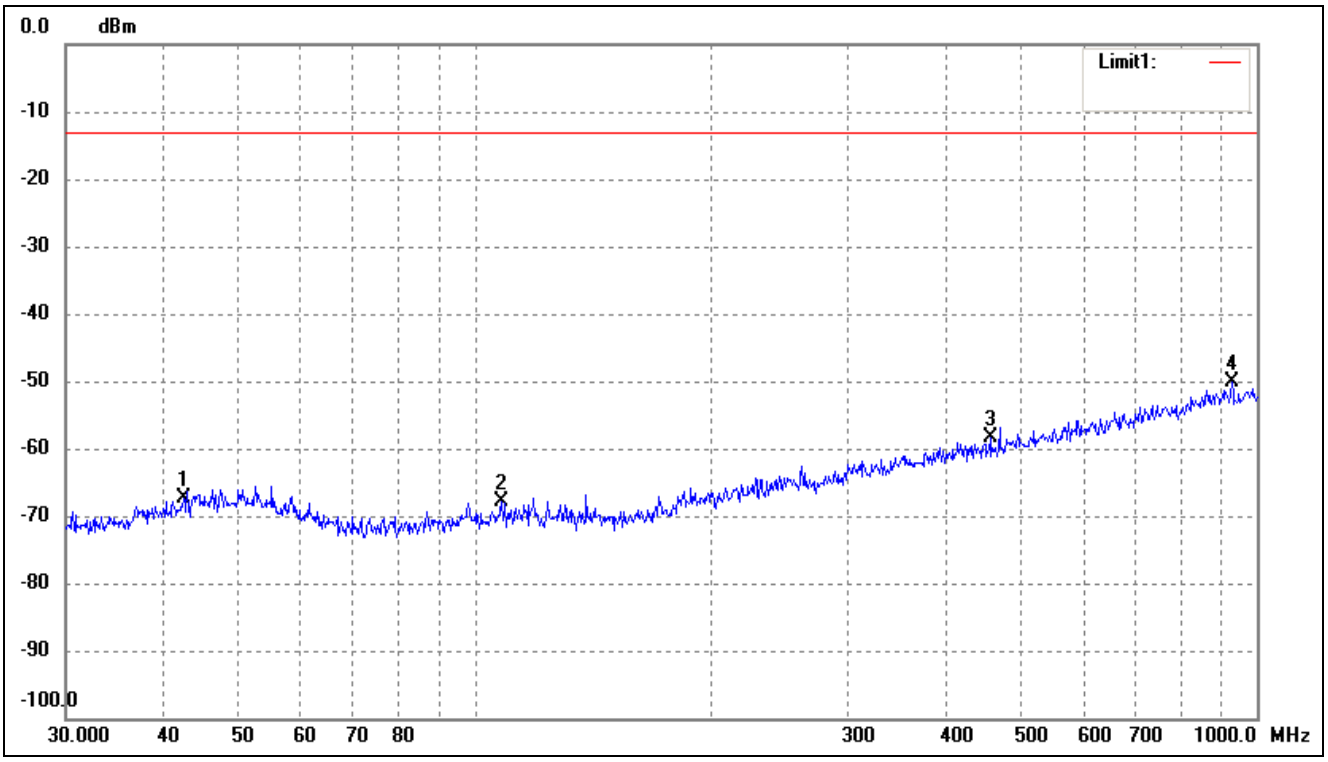
For band 2 Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	135.5062	-68.93	0.98	-67.95	-13.00	-54.95	ERP
2	413.2706	-68.33	9.83	-58.50	-13.00	-45.50	ERP
3	839.1818	-67.22	16.50	-50.72	-13.00	-37.72	ERP

Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	Factor(dB)	(dBm)	(dBm)	(dB)	
1	42.4508	-69.64	2.34	-67.30	-13.00	-54.30	ERP
2	108.2667	-69.17	1.21	-67.96	-13.00	-54.96	ERP
3	455.9058	-68.80	10.32	-58.48	-13.00	-45.48	ERP
4	929.0082	-67.64	17.61	-50.03	-13.00	-37.03	ERP

Note: Margin= (Reading+ Correct)- Limit

Spurious Emissions Above 1GHz

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
GSM850 Mode-Low Channel (worst case)						
1648.4	-49.46	4.94	-44.52	-13.00	-31.52	H
2472.6	-51.46	8.46	-43.00	-13.00	-30.00	H
1648.4	-50.06	4.94	-45.12	-13.00	-32.12	V
2472.6	-53.71	8.46	-45.25	-13.00	-32.25	V
GSM1900 Mode-Low Channel (worst case)						
3700.4	-54.90	10.54	-44.36	-13.00	-31.36	H
5550.6	-57.62	13.37	-44.25	-13.00	-31.25	H
3700.4	-53.90	10.54	-43.36	-13.00	-30.36	V
5550.6	-57.62	13.37	-44.25	-13.00	-31.25	V
Band 5 Mode-Low Channel (worst case)						
1652.8	-58.19	4.94	-53.25	-13	-40.25	H
2479.2	-58.71	8.46	-50.25	-13	-37.25	H
1652.8	-57.16	4.94	-52.22	-13	-39.22	V
2479.2	-58.39	8.46	-49.93	-13	-36.93	V
Band 2 Mode-Low Channel (worst case)						
3704.8	-57.55	10.17	-47.38	-13	-34.38	H
5557.2	-58.11	14.69	-43.42	-13	-30.42	H
3704.8	-58.61	10.17	-48.44	-13	-35.44	V
5557.2	-58.84	14.69	-44.15	-13	-31.15	V

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

Testing is carried out with frequency rang 9kHz to 20GHz, which above 3th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
The measurements greater than 20dB below the limit from 9kHz to 30MHz.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 of nominal voltage declared by manufacturer
-30°C to +50°C	Normal

9.3 Environmental Conditions

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

9.4 Summary of Test Results/Plots

For Cellular Band GPRS Mode

Reference Frequency(Middle Channel): 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	58	0.0693
40	3.7	51	0.0610
30	3.7	38	0.0454
20	3.7	21	0.0251
10	3.7	21	0.0251
0	3.7	16	0.0191
-10	3.7	22	0.0263
-20	3.7	32	0.0383
-30	3.7	43	0.0514

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	47	0.0562
40	3.7	34	0.0406
30	3.7	26	0.0311
20	3.7	14	0.0074
10	3.7	13	0.0155
0	3.7	30	0.0359
-10	3.7	41	0.0490
-20	3.7	53	0.0634
-30	3.7	67	0.0801

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	69	0.0825
40	3.7	65	0.0777
30	3.7	60	0.0717
20	3.7	09	0.0108
10	3.7	63	0.0753
0	3.7	57	0.0681
-10	3.7	42	0.0502
-20	3.7	53	0.0634
-30	3.7	50	0.0598

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	67	0.0801
40	3.7	63	0.0753
30	3.7	58	0.0693
20	3.7	56	0.0669
10	3.7	61	0.0729
0	3.7	55	0.0657
-10	3.7	40	0.0478
-20	3.7	51	0.0610
-30	3.7	48	0.0574

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	71	0.0849
30	3.7	66	0.0789
20	3.7	20	0.0239
10	3.7	69	0.0825
0	3.7	63	0.0753
-10	3.7	48	0.0574
-20	3.7	59	0.0705
-30	3.7	56	0.0669

So, Frequency Stability Versus Input Voltage is:

Reference Frequency(Middle Channel): GPRS 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	39	0.0466
	3.7	21	0.0251
	4.3	37	0.0442
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	34	0.0181
	3.7	14	0.0074
	4.3	22	0.0117

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	09	0.0108
	4.3	27	0.0323
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	V	0.0645
	3.7	56	0.0669
	4.3	57	0.0681
Reference Frequency(Middle Channel): HSUPA 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	52	0.0622
	3.7	20	0.0239
	4.3	43	0.0514

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