FCC 47 CFR PART 22 SUBPART H AND PART 24 SUBPART E & INDUSTRY CANADA RSS-132 & RSS-133

TEST REPORT

for

Cellular Wi-Fi Router

MODEL: H8951-PHF

Brand: Hongdian

Test Report Number:

C151224Z01

Issued Date: January 11, 2016

Issued for

Hongdian Corporation
F14-16,Headquarters Economic Center, Zhonghaixin Science&Tech Park, Bulan Road, Longgang District, Shenzhen, China

Issued by:

Compliance Certification Services (Shenzhen) Inc.
No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd.,
Guan Lan Town, Baoan District, Shenzhen, China
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TESTING CERT #2861.01

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	January 11, 2016	Initial Issue	ALL	Sinphy Xie

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1 TEST CERTIFICATION

Product	Cellular Wi-Fi Router
Model	H8951-PHF, H8951, H7920, H7921, H8922, H8922S for FCC H8951-PHF for IC
Brand	Hongdian
Tested	December 24, 2015~January 8, 2016
Applicant	**Hongdian Corporation** F14-16,Headquarters Economic Center, Zhonghaixin Science&Tech Park, Bulan Road, Longgang District, Shenzhen, China
Manufacturer	**Hongdian Corporation** F14-16,Headquarters Economic Center, Zhonghaixin Science&Tech Park, Bulan Road, Longgang District, Shenzhen, China

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR PART 22 SUBPART H AND PART 24 SUBPART E & IC RSS-132 Issue 3: January 2013 and IC RSS-133 Issue 6: January 2013	No non-compliance noted

We hereby certify that:

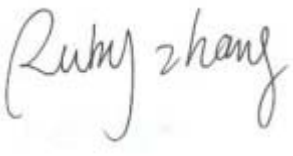
Compliance Certification Services (Shenzhen) Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

Sunday Hu
Supervisor of RF Dept.
Compliance Certification Service (Shenzhen) Inc.

Reviewed by:



Ruby Zhang
Supervisor of Report Dept.
Compliance Certification Service (Shenzhen) Inc.

2 EUT DESCRIPTION

Product	Cellular Wi-Fi Router
Model	**H8951-PHF, H8951, H7920, H7921, H8922, H8922S for FCC** **H8951-PHF for IC**
Brand	Hongdian
Model Discrepancy	N/A
Identify Number	C151224Z01
Received Date	December 24, 2015
Power Supply	12Vdc power supplied by adapter
Frequency Range	GPRS / EDGE 850MHz: 824 ~ 849 MHz GPRS / EDGE 1900MHz: 1850 ~ 1910 MHz WCDMA Band II: 1852.4 ~ 1907.6 MHz WCDMA Band V: 826.4 ~ 846.6 MHz
Transmit Power (ERP & EIRP Power)	GPRS 850: 25.27 dBm GPRS 1900: 24.12 dBm EDGE 850: 25.99 dBm EDGE 1900: 20.90 dBm WCDMA Band II: 22.98 dBm WCDMA Band V: 25.35 dBm
Modulation Technique	GPRS: GMSK EDGE: 8PSK WCDMA: Quadrature Phase Shift Keying (QPSK) with Root-raised cosine pulse shaping filters (roll off = 0.22)
Type of Emission	GPRS 850: 246KGXW GPRS 1900: 244KGXW EDGE 850: 238KG7W EDGE 1900: 238KG7W WCDMA Band II: 4M18F9W WCDMA Band V: 4M16F9W
Antenna Specification	Sucker antenna with 3dBi gain (Max)
Temperature Range	-30°C ~ +70°C
Hardware Version	V21
Software Version	S305E

Remark: *The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*

3 TEST METHODOLO1GY

Both conducted and radiated testing were performed according to the procedures document on chapter 13 of ANSI C63.4: 2014, TIA/EIA-603-D: 2010 and FCC CFR 47, Part 2 and Part 22 Subpart H & Part 24 Subpart E.

The tests documented in this report were performed in accordance with IC RSS-132, SPSR503, RSS-133, SPSR510 and ANSI C63.4 and TIA/EIA-603-D.

3.1. EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2. EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

3.3. GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4: 2014. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4: 2014.

3.4. DESCRIPTION OF TEST MODES

The EUT (model: H8951-PHF) had been tested under operating condition.
EUT staying in continuous transmitting mode was programmed.
After verification, all tests carried out are with the worst-case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode and receiving radiated spurious emission above 1GHz, which worst case was in CH Mid mode only.

For GSM/EDGE

Test Mode	Test Modes Description
GSM/TM1	GSM system, GPRS, GMSK modulation
GSM/TM2	GSM system, EDGE, 8PSK modulation

For UMTS

Test Mode	Test Modes Description
UMTS/TM3	WCDMA system, QPSK modulation
UMTS/TM4	HSDPA system, QPSK modulation
UMTS/TM5	HSUPA system, QPSK modulation

Note:

1. As WCDMA, HSDPA and HSUPA with the same emission designator, test result recorded in this report at the worst case UMTS/TM1 only after exploratory scan
2. As GSM and GPRS with the same emission designator, test result recorded in this report at the worst case GSM/TM1 only after exploratory scan.

Test frequency list

Test Mode	TX/RX	RF Channel		
		Low(L)	Middle (M)	High (H)
GSM850	TX	Channel 128	Channel 190	Channel 251
		824.2 MHz	836.6 MHz	848.8 MHz
	RX	Channel 128	Channel 190	Channel 251
		869.2 MHz	881.6 MHz	893.8 MHz
Test Mode	TX/RX	RF Channel		
		Low(L)	Middle (M)	High (H)
GSM1900	TX	Channel 512	Channel 661	Channel 810
		1850.2 MHz	1880.0 MHz	1909.8 MHz
	RX	Channel 512	Channel 661	Channel 810
		1930.2 MHz	1960.0 MHz	1989.8 MHz

Test Mode	TX/RX	RF Channel		
		Low(L)	Middle (M)	High (H)
WCDMA Band V	TX	Channel 4132	Channel 4183	Channel 4233
		826.4 MHz	836.6 MHz	846.6 MHz
	RX	Channel 4357	Channel 4407	Channel 4458
		871.4 MHz	881.4 MHz	891.6 MHz
Test Mode	TX/RX	RF Channel		
		Low(L)	Middle (M)	High (H)
WCDMA Band II	TX	Channel 9262	Channel 9400	Channel 9538
		1852.4 MHz	1880.0 MHz	1907.6 MHz
	RX	Channel 9662	Channel 9800	Channel 9938
		1932.4 MHz	1960.0 MHz	1987.6 MHz

3.5. Summary Results

3.5.1. Cellular Band (824-849MHz paired with 869-894MHz)

Test Item	IC Rule No.	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	RSS-132 Section 5.4	§2.1046, §22.913	FCC: ERP ≤ 7W IC: ERP ≤ 11.5W	Pass
Peak-Average Ratio	RSS-132 Section 5.4	N/A	Limit≤13dB	Pass
Modulation Characteristics	RSS-132 Section 5.2	§2.1047	Digital modulation	N/A
Bandwidth	RSS-Gen Section 6.6	§2.1049	OBW: No limit. EBW: No limit.	Pass
Band Edges Compliance	RSS-132 Section 5.5	§2.1051, §22.917	≤-13dBm/1%*EBW, in 1MHz bands immediately outside and adjacent to The frequency block.	Pass
Spurious Emission at Antenna Terminals	RSS-132 Section 5.5	§2.1051, §22.917	≤ -13dBm/1MHz, From 1MHz to 10th harmonics but outside authorized operating frequency ranges.	Pass
Field Strength of Spurious Radiation	RSS-132 Section 5.5	§2.1053, §22.917	≤ -13dBm/1MHz.	Pass
Frequency Stability	RSS-132 Section 5.3	§2.1055, §22.355	≤ ±2.5ppm.	Pass
Receiver Spurious Emissions	RSS-132 Section 5.6	N/A	Meet RSS-Gen Class B Emission Limit	Pass
NOTE 1: For the verdict, the “N/A” denotes “not applicable”, the “N/T” de notes “not tested”.				

3.5.2. PCS Band (1850-1915MHz paired with 1930-1995MHz)

Test Item	IC Rule No.	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	RSS-133 Section 6.4	§2.1046, §24.232	FCC: EIRP ≤ 2W IC: EIRP ≤ 2W	Pass
Peak-Average Ratio	RSS-133 Section 6.4	§2.1046, §24.232	Limit≤13dB	Pass
Modulation Characteristics	RSS-133 Section 6.2	§2.1047	Digital modulation	N/A
Bandwidth	RSS-Gen Section 6.6	§2.1049	OBW: No limit. EBW: No limit.	Pass
Band Edges Compliance	RSS-133 Section 6.5	§2.1051, §24.238	≤-13dBm/1%*EBW, in 1MHz bands immediately outside and adjacent to The frequency block.	Pass
Spurious Emission at Antenna Terminals	RSS-133 Section 6.5	§2.1051, §24.238	≤ -13dBm/1MHz, From 1MHz to 10th harmonics but outside authorized operating frequency ranges.	Pass
Field Strength of Spurious Radiation	RSS-133 Section 6.5	§2.1053, §22.917	≤ -13dBm/1MHz.	Pass
Frequency Stability	RSS-133 Section 6.3	§2.1055, §24.235	≤ ±2.5ppm.	Pass
Receiver Spurious Emissions	RSS-133 Section 6.6	N/A	Meet RSS-Gen Class B Emission Limit	Pass
NOTE 1: For the verdict, the “N/A” denotes “not applicable”, the “N/T” de notes “not tested”.				

4 FACILITIES AND ACCREDITATIONS

4.1. FACILITIES

All measurement facilities used to collect the measurement data are located at

No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd., Guan Lan Town, Baoan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4: 2014 and CISPR Publication 22.

4.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

USA	**A2LA**
China	**CNAS**

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

USA	**FCC**
Japan	**VCCI(C-3478, R-3135, T-652, G-10624)**
Canada	**INDUSTRY CANADA**

Copies of granted accreditation certificates are available for downloading from our web site, http://www.ccssz.com

4.3. MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
Powerline Conducted Emission	+/- 1.2575
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0138
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9483
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5975
3M Semi Anechoic Chamber / 8G~18G	+/- 2.6112
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7389
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9683

Remark: *This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.*

5 SETUP OF EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

5.2. SUPPORT EQUIPMENT

No.	Equipment	Model No.	Serial No.	FCC	Brand	Data Cable	Power Cord
1	Notebook	E335	R9-WN1EF	DoC	Thinkpad	N/A	Unshielded, 1.80m

6 FCC PART 22 & 24 REQUIREMENTS & INDUSTRY CANADA RSS-132 & RSS-133

6.1. 99% BANDWIDTH

.6.1.1. LIMIT

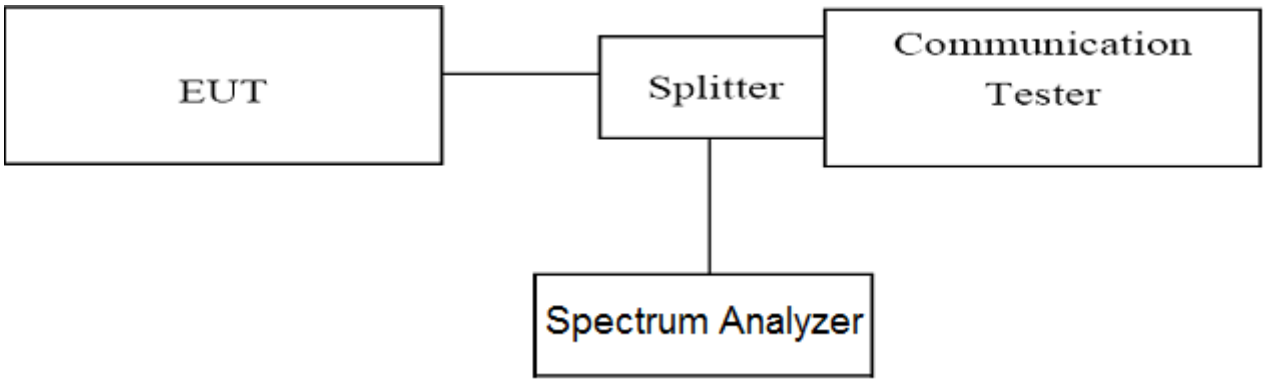
None; for reporting purposes only.

.6.1.2. MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	10/25/2015	10/24/2016
Cable	HuberSuhner	SUCOFLEX104PEA	N/A	N/A	N/A

Remark: *Each piece of equipment is scheduled for calibration once a year.*

.6.1.3. TEST CONFIGURATION



.6.1.4. TEST PROCEDURE

1. The EUT was set up for the max output power with pseudo random data modulation;
2. The Occupied bandwidth and Emission Bandwidth were measured with Agilent Spectrum Analyzer N9010A (peak);
3. Set RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW
4. Set SPA Max hold and View, Set 99% Occupied Bandwidth/ Set -26dBc Occupied Bandwidth
5. These measurements were done at 3 frequencies (Low, middle and high of operational frequency range)

.6.1.5. TEST RESULTS

No non-compliance noted.

TEST DATA

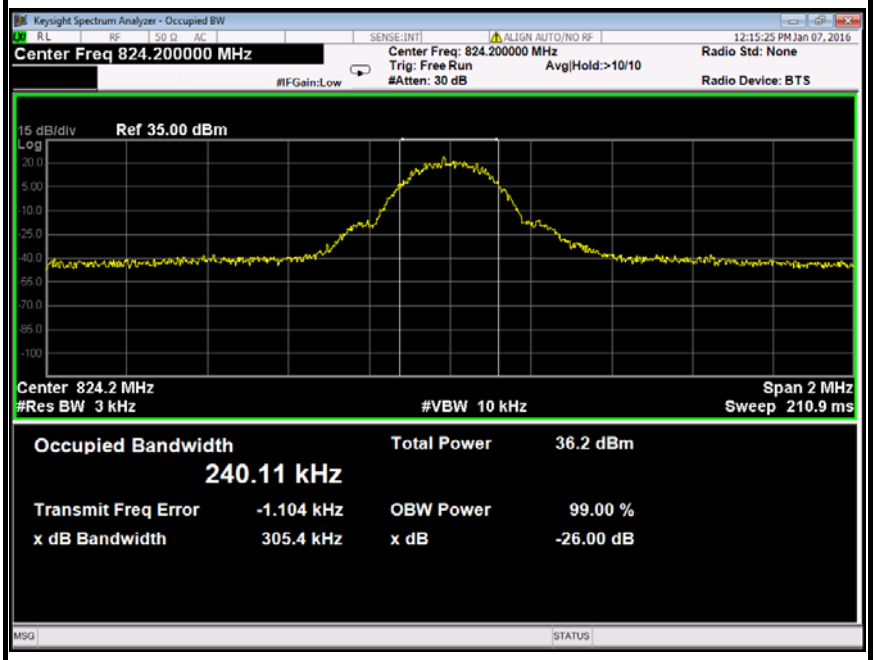
Test Mode	Channel	Frequency (MHz)	Occupied Bandwidth (99% BW) (kHz)	Emission Bandwidth (-26 dBc BW) (kHz)	Verdict
GSM/TM1 /GPRS850	128	824.2	240.11	305.40	PASS
	190	836.6	246.67	311.50	PASS
	251	848.8	246.85	313.90	PASS
GSM/TM2 /EDGE850	128	824.2	244.75	297.70	PASS
	190	836.6	245.73	313.70	PASS
	251	848.8	242.97	311.80	PASS
GSM/TM1 /GPRS1900	512	1850.2	243.77	316.90	PASS
	661	1880.0	246.49	306.20	PASS
	810	1908.8	243.06	309.90	PASS
GSM/TM2 /EDGE1900	512	1850.2	243.25	311.10	PASS
	661	1880.0	242.93	314.70	PASS
	810	1908.8	244.75	310.90	PASS
UMTS/TM3/ WCDMA Band V	4132	826.40	4176.30	4761.00	PASS
	4183	836.60	4196.50	4789.00	PASS
	4233	846.60	4164.40	4742.00	PASS
UMTS/TM3/ WCDMA Band II	9262	1852.40	4162.70	4724.00	PASS
	9400	1880.00	4163.20	4729.00	PASS
	9538	1907.60	4163.40	4739.00	PASS

Remark:

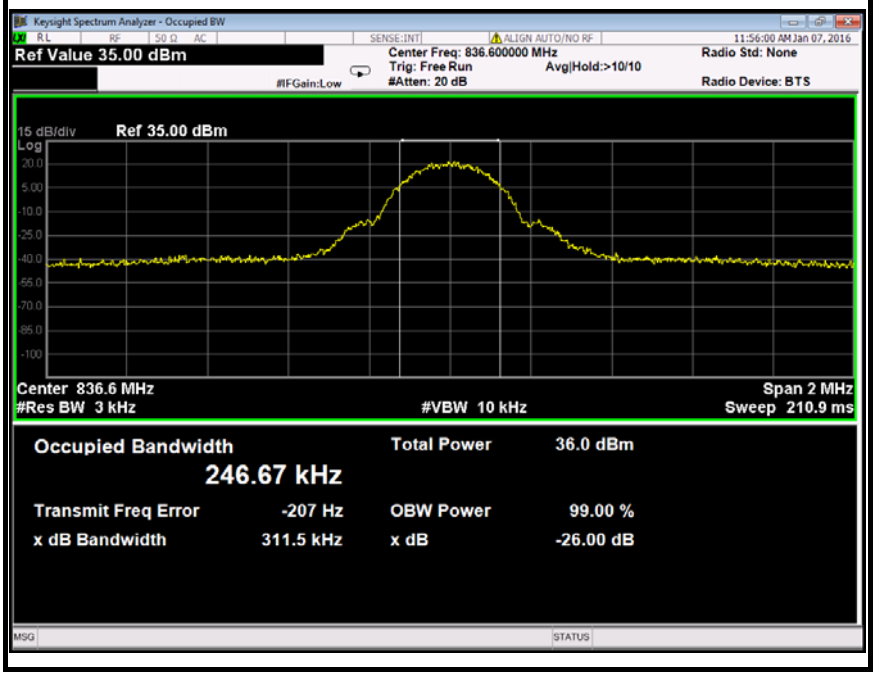
1. *Test results including cable loss;*
2. *please refer to following plots;*

TEST PLOT

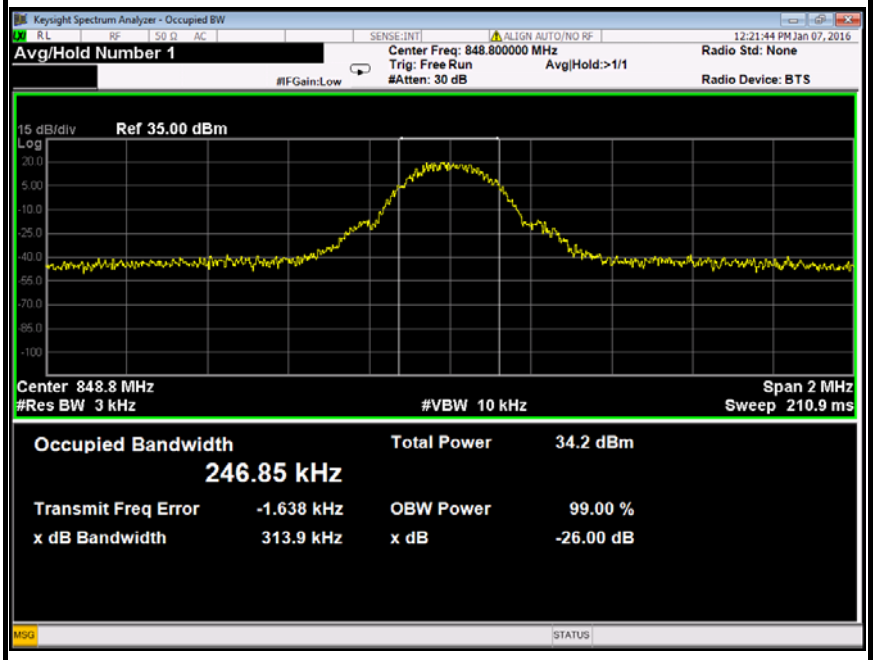
GPRS 850 (CH Low)



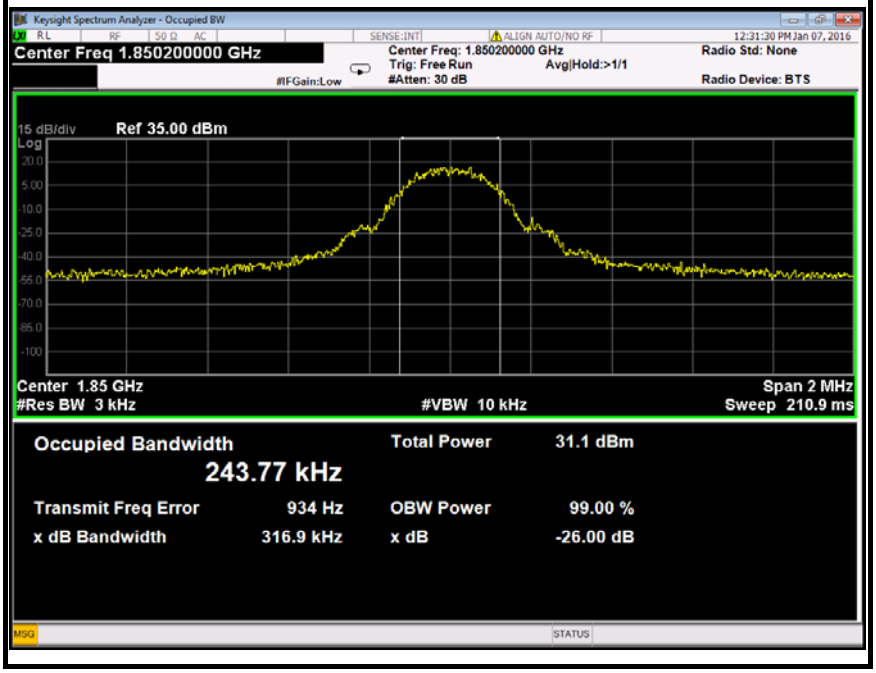
GPRS 850 (CH Mid)



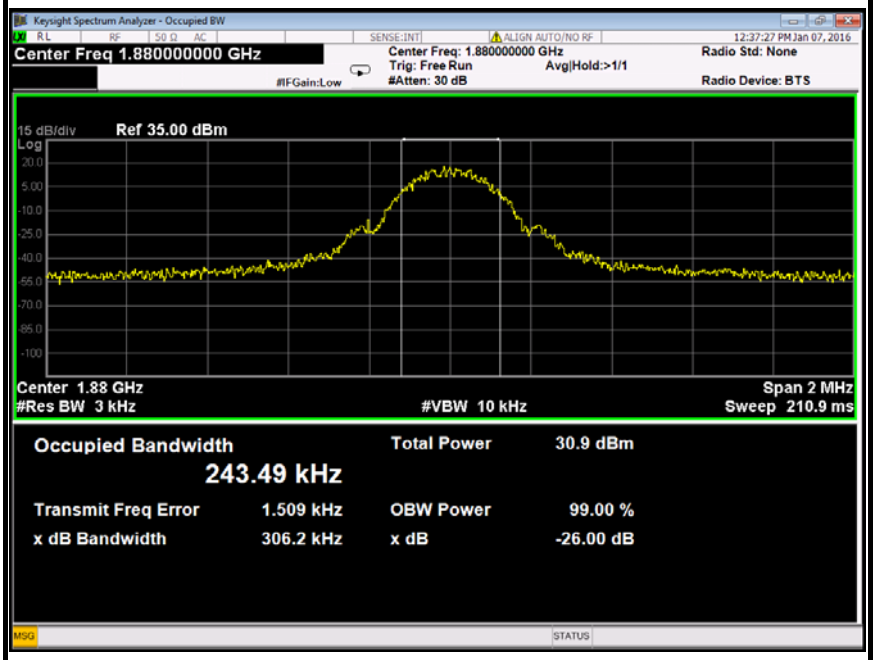
GPRS 850 (CH High)



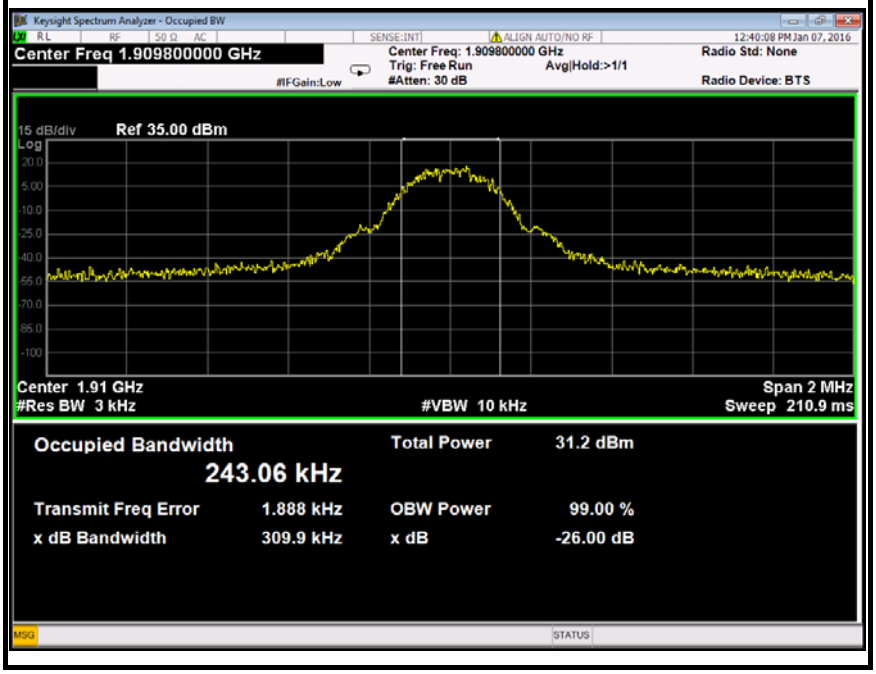
GPRS 1900 (CH Low)



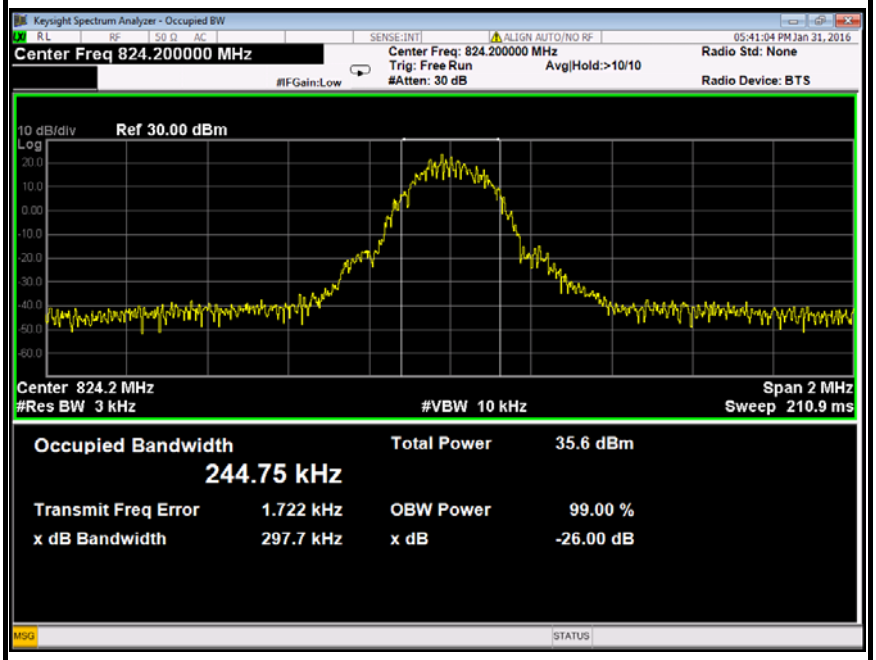
GPRS 1900 (CH Mid)



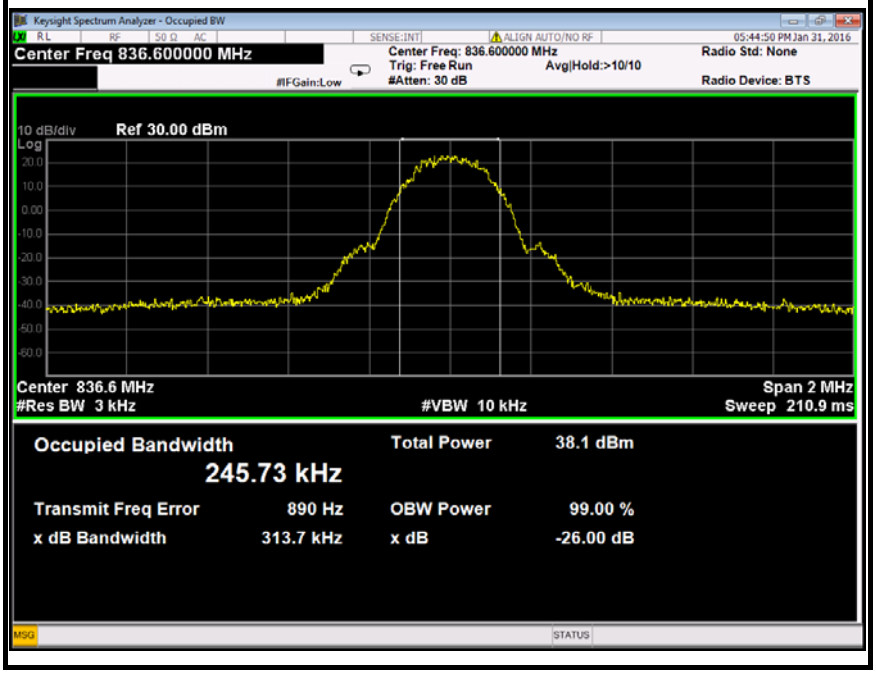
GPRS 1900 (CH High)



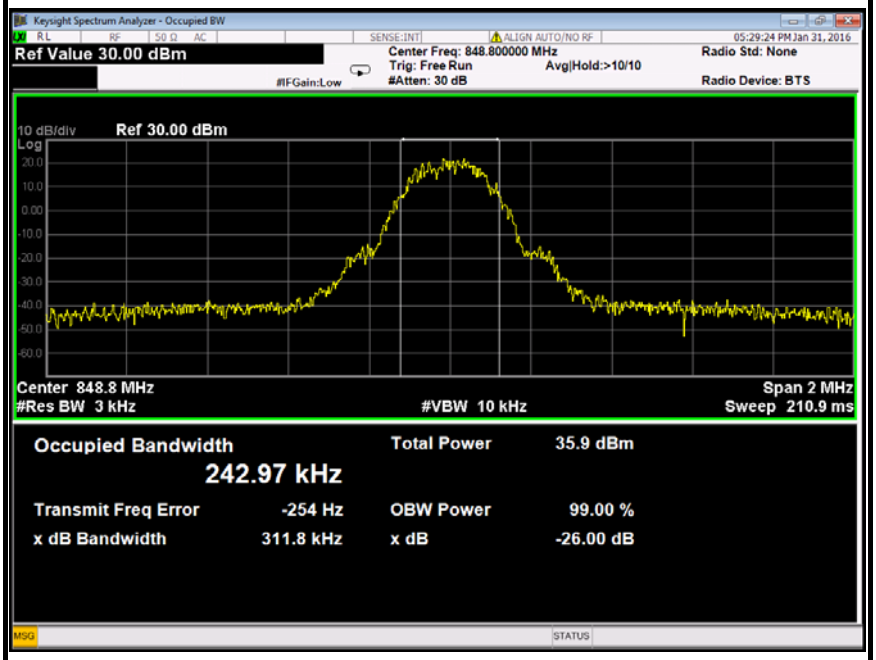
EDGE 850 (CH Low)



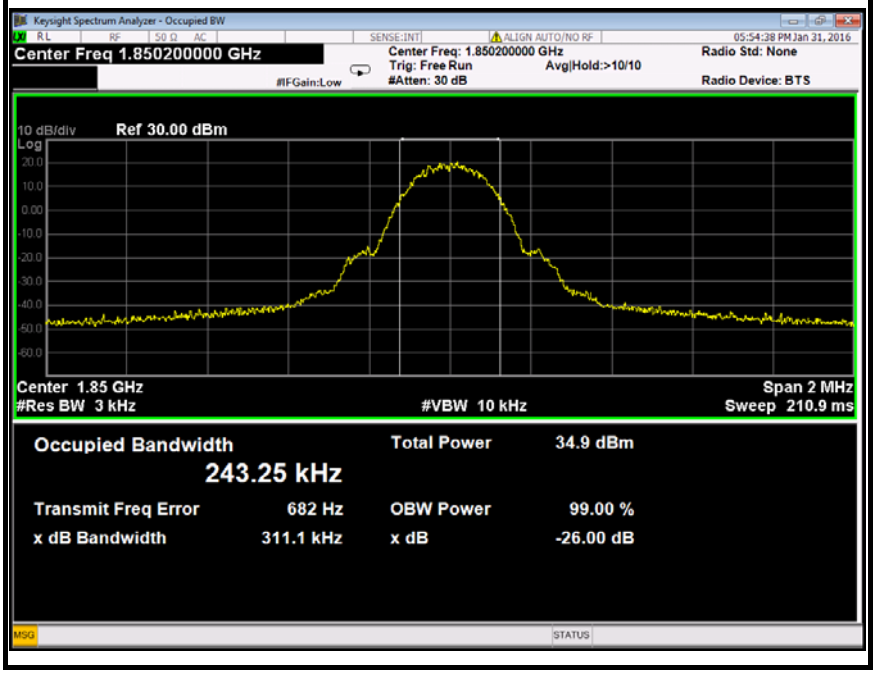
EDGE 850 (CH Mid)



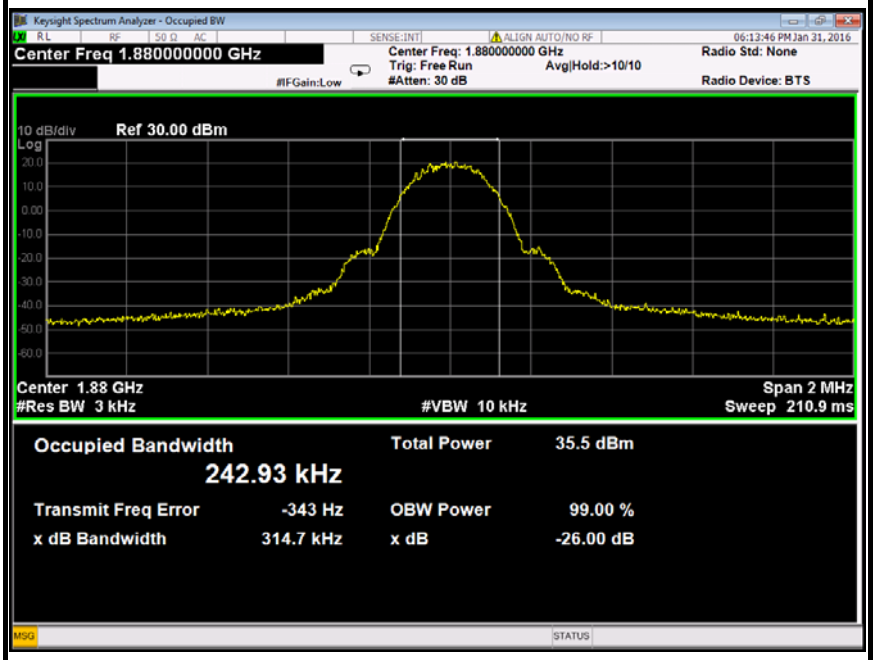
EDGE 850 (CH High)



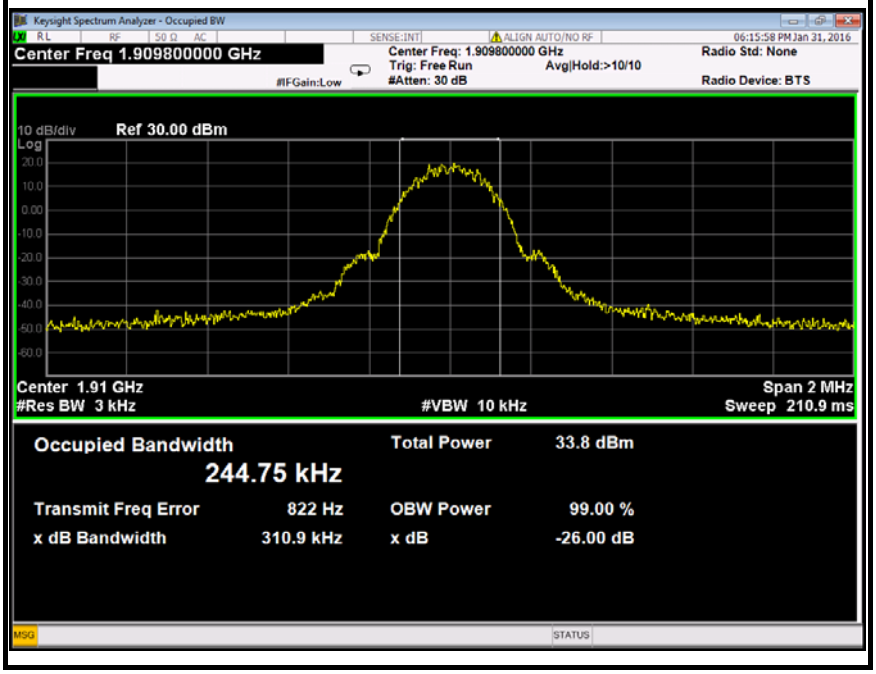
EDGE 1900 (CH Low)



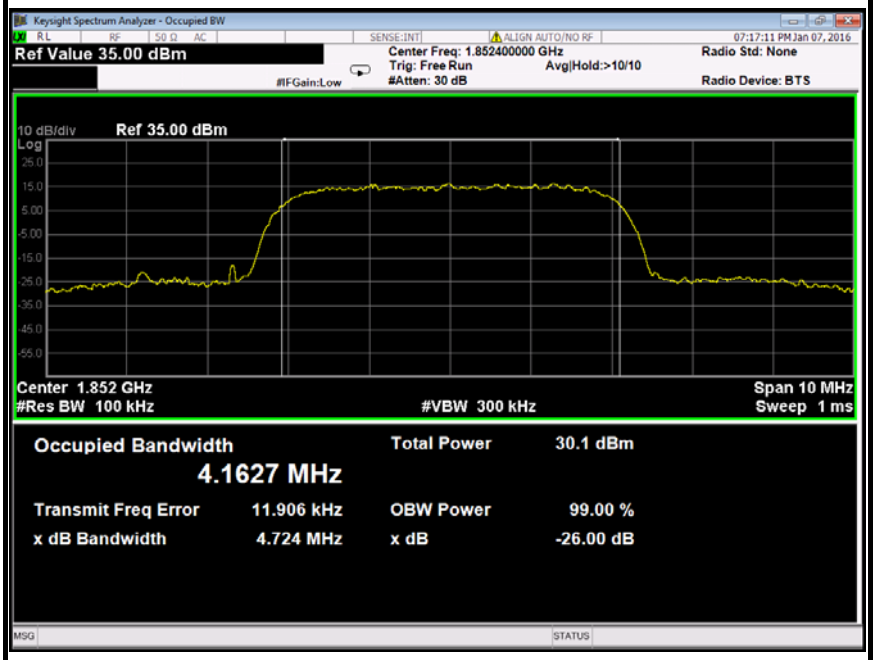
EDGE 1900 (CH Mid)



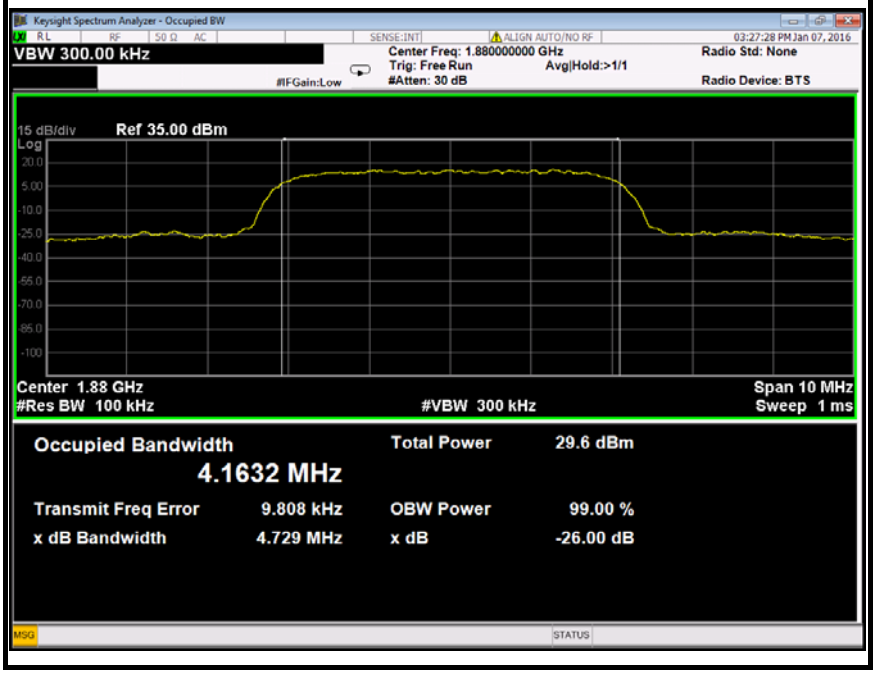
EDGE 1900 (CH High)



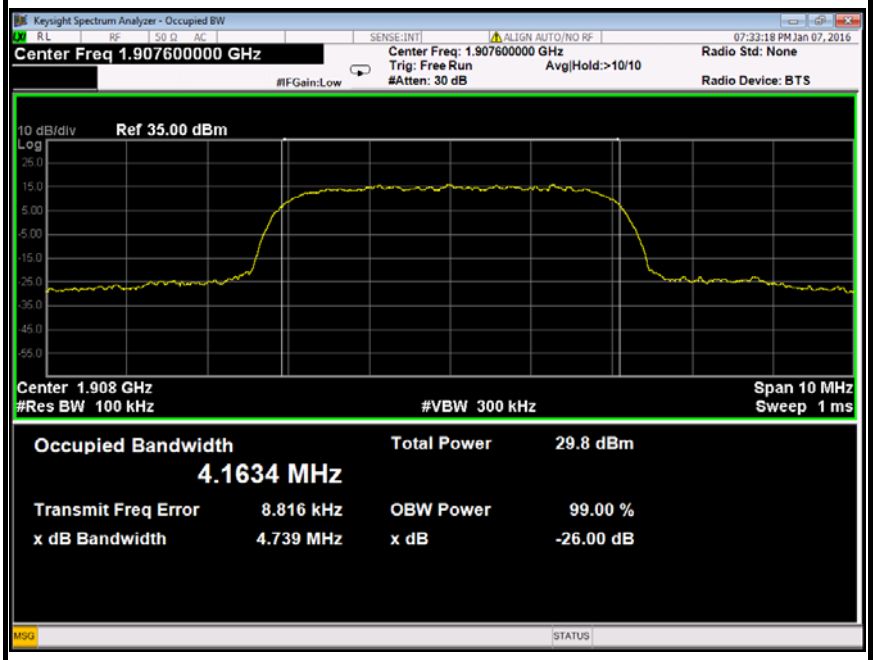
WCDMA Band II (CH Low)



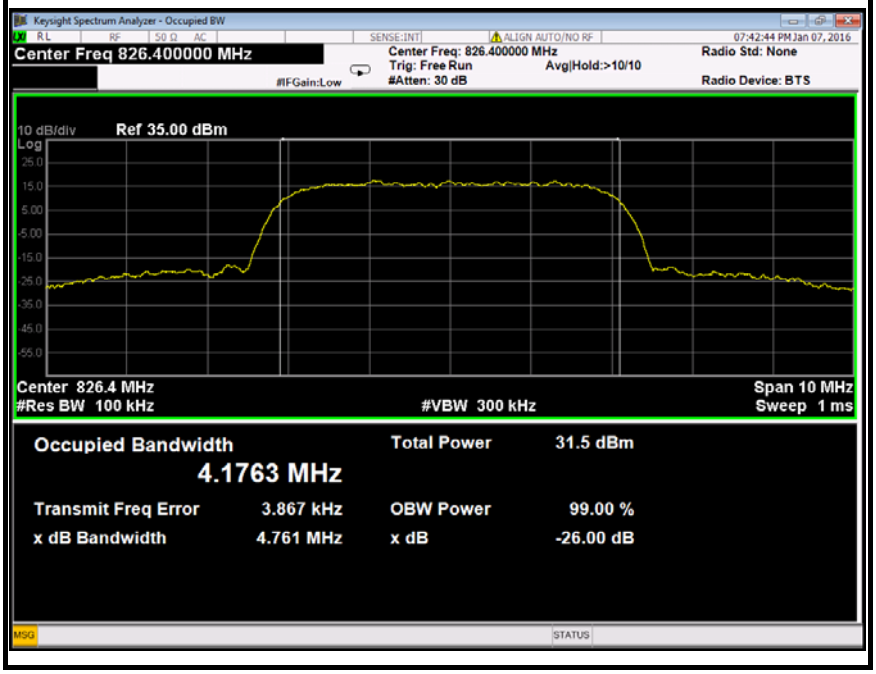
WCDMA Band II (CH Mid)



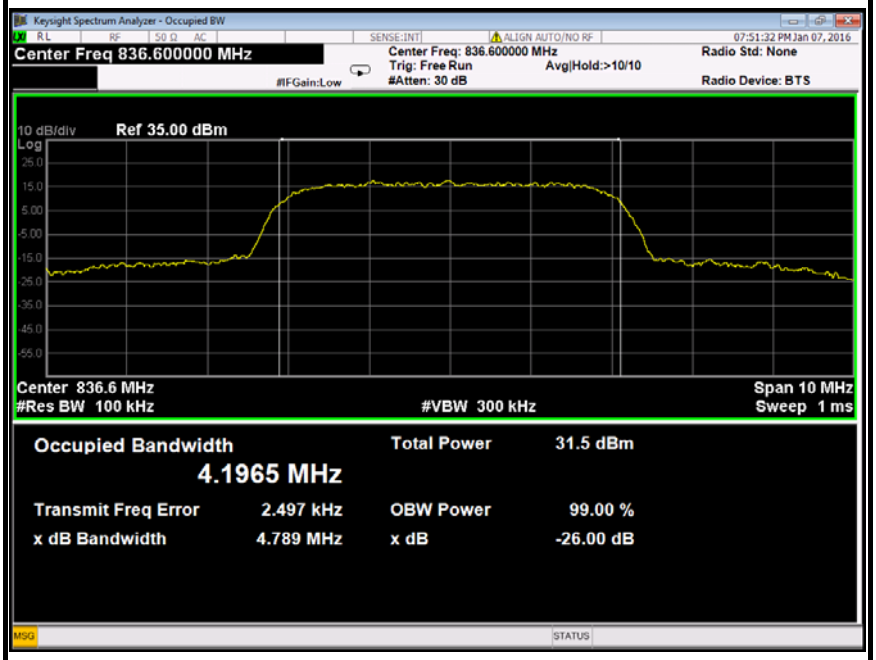
WCDMA Band II (CH High)



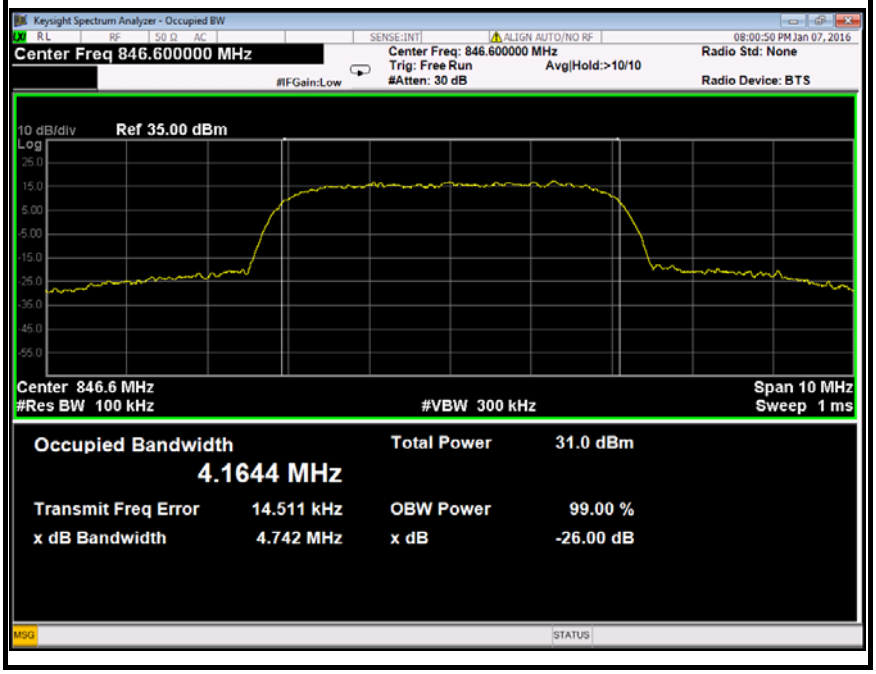
WCDMA Band V (CH Low)



WCDMA Band V (CH Mid)



WCDMA Band V (CH High)



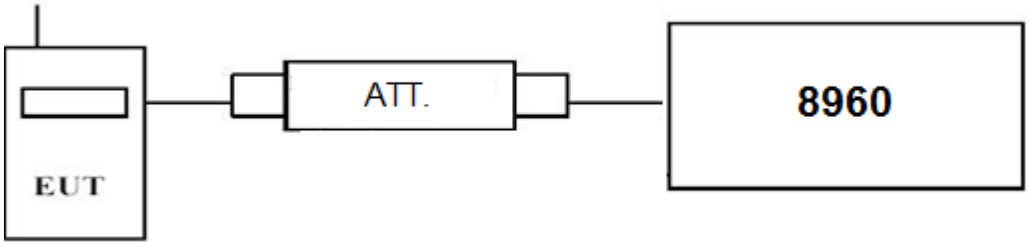
6.2. BURST AVERAGE POWER

.6.2.1. MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Universal Radio Communication Tester	Agilent	8960	MY48367671	09/04/2015	09/03/2016
Cable	HuberSuhner	SUCOFLEX104PEA	N/A	N/A	N/A

Remark: *Each piece of equipment is scheduled for calibration once a year.*

.6.2.2. TEST CONFIGURATION



.6.2.3. TEST PROCEDURE

Conducted Power Measurement:

a) Place the EUT on a bench and set it in transmitting mode.
b) Connect a low loss RF cable from the antenna port to a CMU200 by an Att.
c) EUT Communicate with CMU200 then selects a channel for testing.
d) Add a correction factor to the display CMU200, and then test.

.6.2.4. TEST RESULTS

No non-compliance noted.

TEST DATA

Test Mode	Channel	Frequency (MHz)	Burst Average Power (dBm)	Results
GPRS 850	128	824.20	30.76	PASS
	190	836.60	30.64	PASS
	251	848.80	30.21	PASS
GPRS 1900	512	1850.20	27.10	PASS
	661	188.00	27.41	PASS
	810	1909.80	27.67	PASS

Test Mode	Channel	Frequency (MHz)	Burst Average Power (dBm)	Results
EDGE 850	128	824.20	30.57	PASS
	190	836.60	30.43	PASS
	251	848.80	30.44	PASS
EDGE 1900	512	1850.20	26.75	PASS
	661	188.00	27.02	PASS
	810	1909.80	27.25	PASS

Test Mode	Channel	Frequency (MHz)	Burst Average Power (dBm)	Results
WCDMA Band II	9262	1852.40	23.62	PASS
	9400	1880.00	23.92	PASS
	9538	1907.60	24.15	PASS
WCDMA Band V	4132	826.40	24.70	PASS
	4182	836.60	23.86	PASS
	4233	846.60	23.95	PASS

Remark: The value of factor includes both the loss of cable and external attenuator

6.3. PEAK TO AVERAGE RATIO

6.3.1. LIMIT

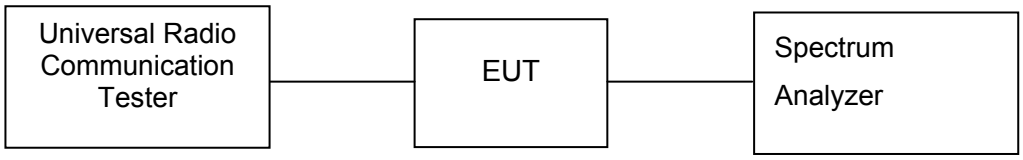
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

6.3.2. MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	10/25/2015	10/24/2016
Universal Radio Communication Tester	Agilent	8960	MY48367671	09/04/2015	09/03/2016
Cable	HuberSuhner	SUCOFLEX104PEA	N/A	N/A	N/A

Remark: *Each piece of equipment is scheduled for calibration once a year.*

6.3.3. TEST CONFIGURATION



6.3.4. TEST PROCEDURE

For GSM/EDGE

Use spectrum to measure the total peak power and record as P_{Pk}. Use spectrum to measure the total average power and record as P_{Avg}. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm).

Determine the PAPR from:

PAPR (dB) = P_{Pk} (dBm) - P_{Avg} (dBm).

For UMTS

1. Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
2. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
3. Set the number of counts to a value that stabilizes the measured CCDF curve;
4. Set the measurement interval as follows:

   1). for continuous transmissions, set to 1 ms,

   2). for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.

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

6.3.5. TEST RESULTS

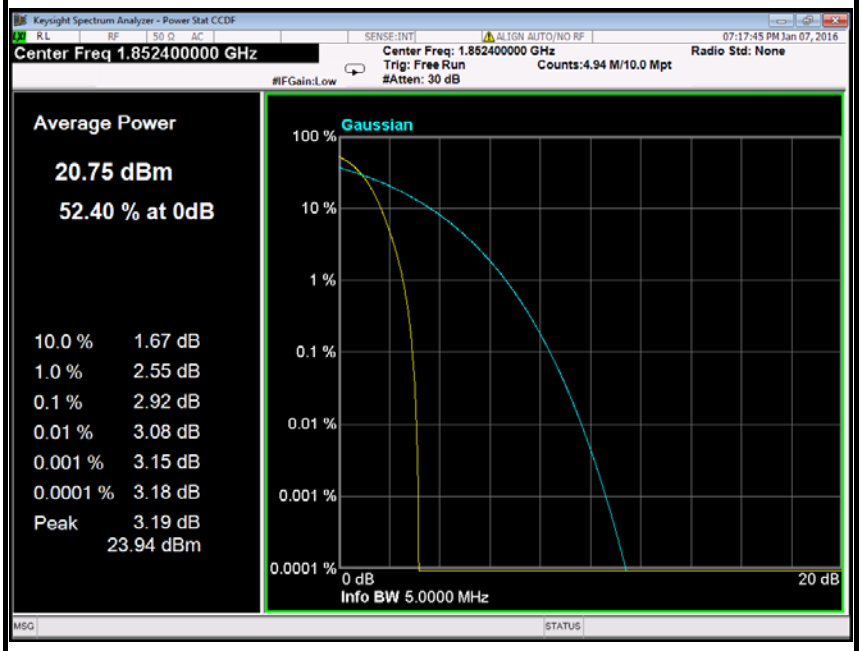
No non-compliance noted.

Test Mode	Channel	Frequency (MHz)	PAPR Value (dB)	Limits (dB)	Verdict
GSM/TM1/GRPS850	128	824.20	0.42	13.0	PASS
	190	836.60	0.51	13.0	
	251	848.80	0.44	13.0	
GSM/TM2/EDGE850	128	824.20	3.51	13.0	PASS
	190	836.60	3.60	13.0	
	251	848.80	3.59	13.0	
GSM/TM1/GPRS1900	512	1850.2	0.53	13.0	PASS
	661	1880.0	0.48	13.0	
	810	1908.8	0.45	13.0	
GSM/TM2/EDGE1900	512	1850.2	3.43	13.0	PASS
	661	1880.0	3.41	13.0	
	810	1908.8	3.47	13.0	
UMTS/TM3/ WCDMA Band V	4132	826.40	2.46	13.0	PASS
	4183	836.60	2.86	13.0	
	4233	846.60	2.77	13.0	
UMTS/TM3/ WCDMA Band II	9262	1852.40	2.92	13.0	PASS
	9400	1880.00	3.08	13.0	
	9538	1907.60	3.06	13.0	

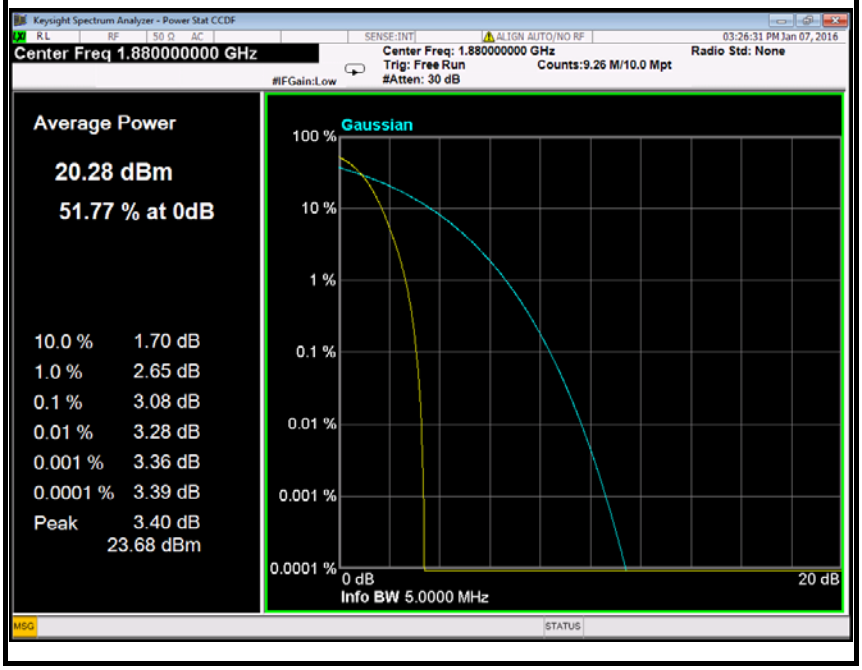
Test Plot

WCDMA (Band II)

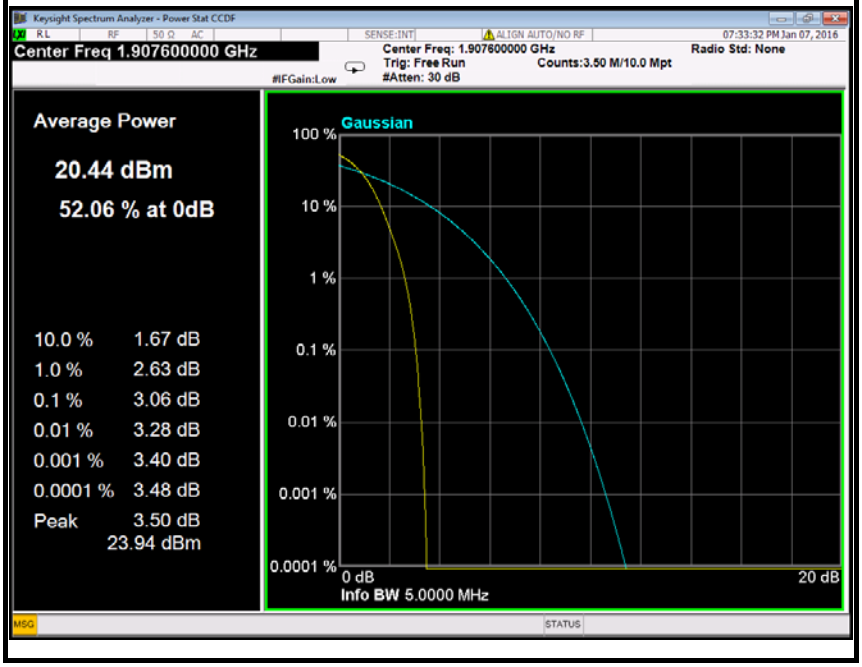
CH Low



CH Mid

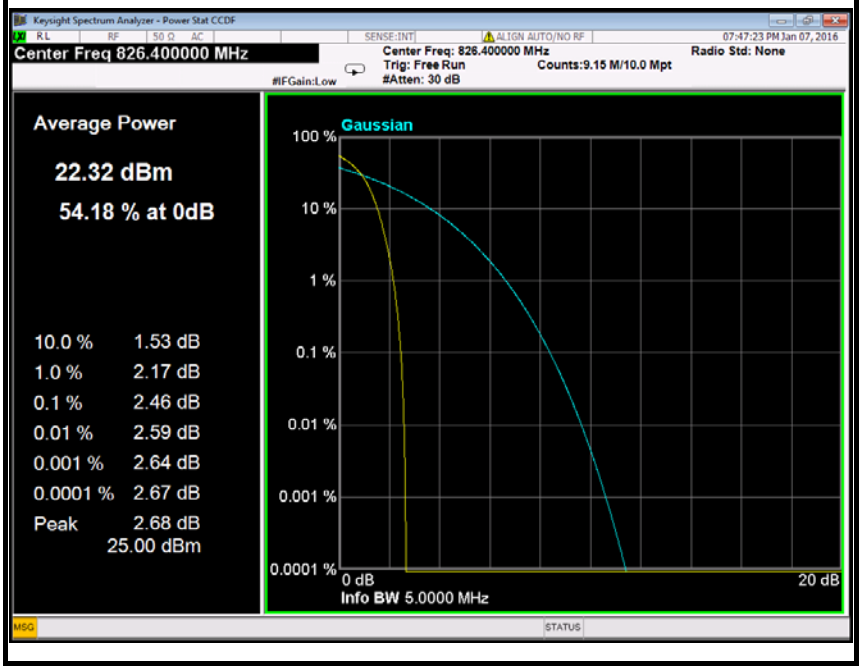


CH High

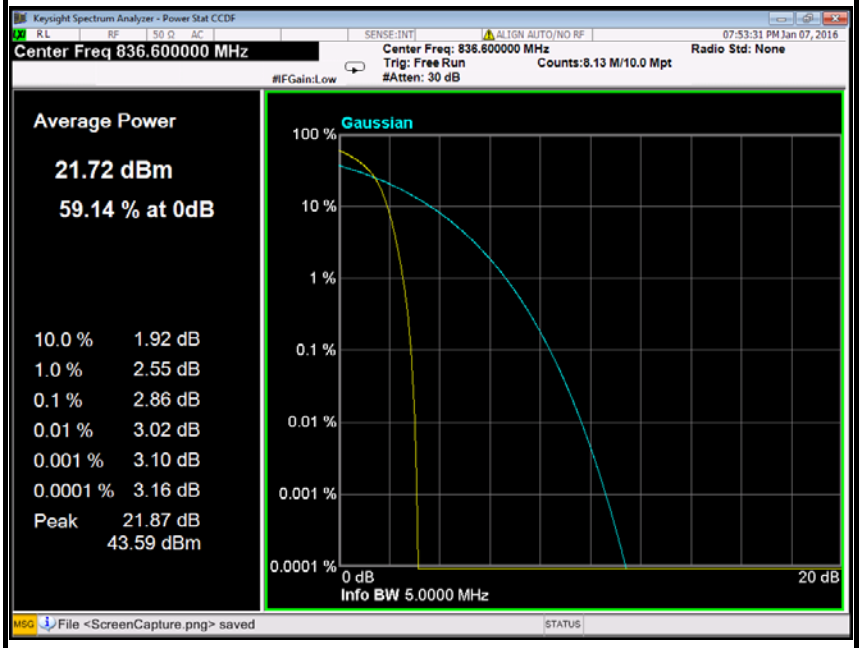


WCDMA (Band V)

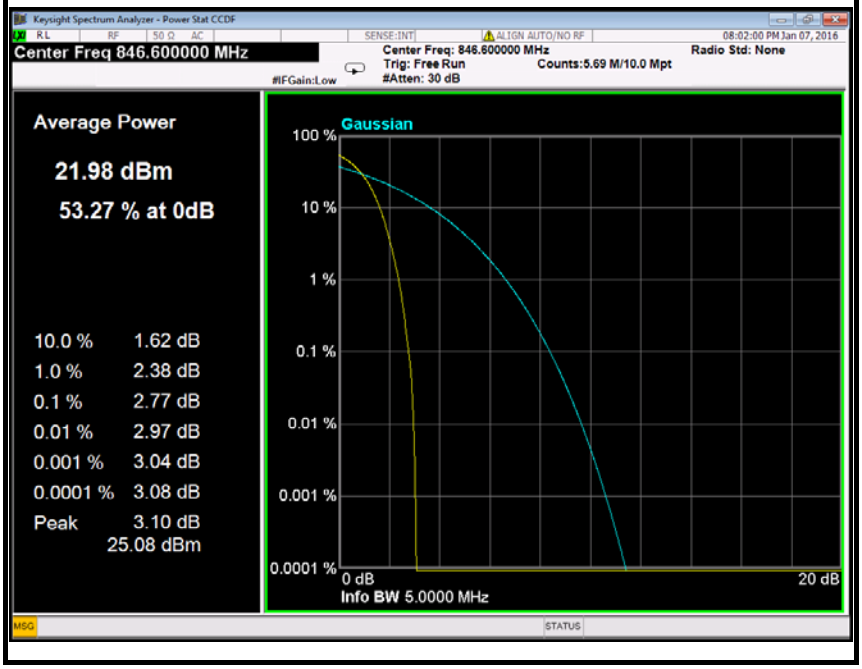
CH Low



CH Mid



CH High



6.4. ERP & EIRP MEASUREMENT

.6.5.1. LIMIT

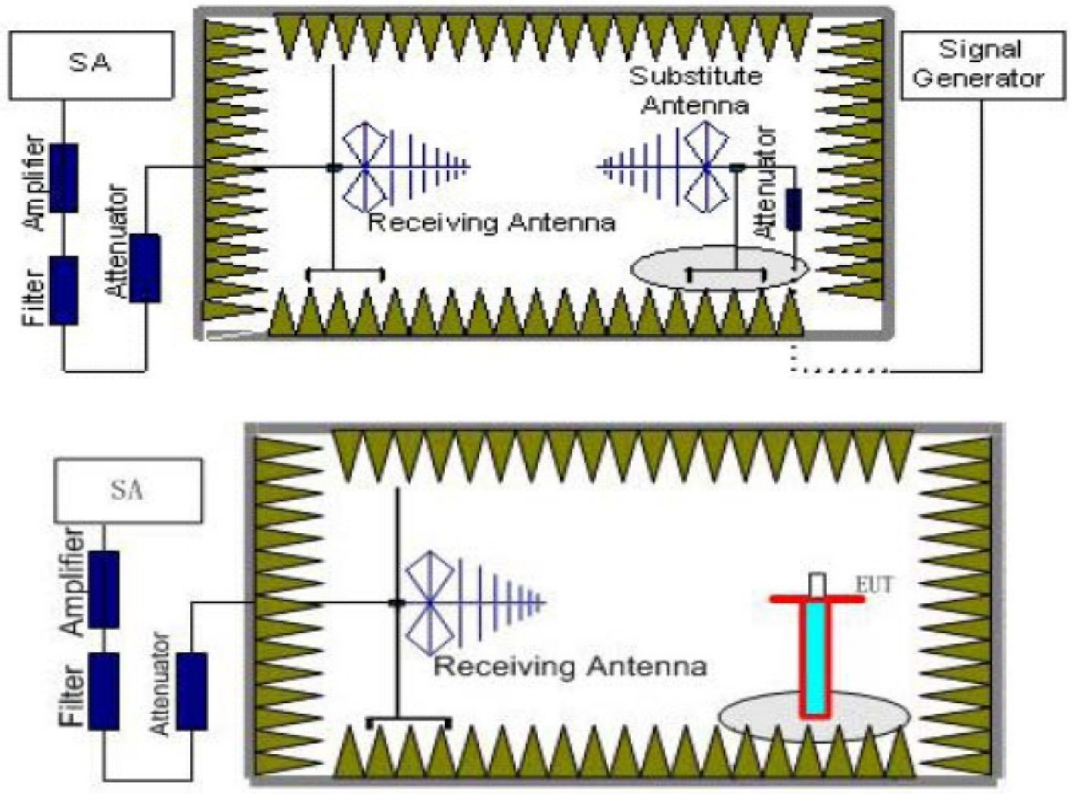
According to FCC §2.1046
FCC 22.913(b): The Effective Radiated Power (ERP) of mobile transmitters must not exceed 7 Watts.
RSS-132 § 4.4 the maximum (ERP) shall be 6.3 Watts for mobile stations.
FCC 24.232(b): The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.
RSS133 § 6.4: Mobile stations and hand-held portables are limited to 2 watts maximum (EIRP).

.6.5.2. MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	E4446A	US44300399	02/28/2015	02/27/2016
Spectrum Analyzer	Agilent	N9010A	MY52221469	09/24/2015	09/23/2016
Signal Generator	Anritsu	MG3694A	#050125	02/28/2015	02/27/2016
Bilog Antenna	SCHAFFNER	CBL6143	5063	02/28/2015	02/27/2016
Bilog Antenna	SCHAFFNER	CBL6143	5082	02/28/2015	02/27/2016
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/28/2015	02/27/2016
Horn Antenna	TRC	HA0301	N/A	02/28/2015	02/27/2016
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/28/2015	02/27/2016
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

Remark: Each piece of equipment is scheduled for calibration once a year.

.6.5.3. TEST CONFIGURATION



.6.5.4. TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50 m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as (P_r).
4. The EUT shall be replaced by a substitution antenna. In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power

(P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

5. An amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test. The measurement results are obtained as described below:
   Power (EIRP) =P_{Mea}- P_{Ag} - P_{cl} + G_a
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

.6.5.5. TEST RESULTS

No non-compliance noted.

GPRS 850 Test Data

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Correction (dB)	P_{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
824.20	-8.89	4.10	7.26	2.15	33.11	25.23	38.45	-13.22	V
836.60	-9.91	4.14	7.26	2.15	33.11	24.17	38.45	-14.28	V
848.80	-9.06	3.90	7.26	2.15	33.12	25.27	38.45	-13.18	V
824.20	-15.13	4.10	7.26	2.15	33.11	18.99	38.45	-19.46	H
836.60	-13.96	4.14	7.26	2.15	33.11	20.12	38.45	-18.33	H
848.80	-12.60	3.90	7.26	2.15	33.12	21.73	38.45	-16.72	H

GPRS 1900 Test Data

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1850.20	-12.56	6.04	7.98	34.74	24.12	33.01	-8.89	V
1880.00	-13.51	5.20	8.05	34.78	24.12	33.01	-8.89	V
1909.80	-13.34	5.88	8.12	34.78	23.68	33.01	-9.33	V
1850.20	-20.06	6.04	7.98	34.74	16.62	33.01	-16.39	H
1880.00	-20.01	5.20	8.05	34.78	17.62	33.01	-15.39	H
1909.80	-18.70	5.88	8.12	34.78	18.32	33.01	-14.69	H

EDGE 850 Test Data

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Correction (dB)	P_{Ag} (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
824.20	-9.24	4.10	7.26	2.15	33.11	24.88	38.45	-13.57	V
836.60	-8.86	4.14	7.26	2.15	33.11	25.22	38.45	-13.23	V
848.80	-8.34	3.90	7.26	2.15	33.12	25.99	38.45	-12.46	V
824.20	-19.16	4.10	7.26	2.15	33.11	14.96	38.45	-23.49	H
836.60	-19.34	4.14	7.26	2.15	33.11	14.74	38.45	-23.71	H
848.80	-18.69	3.90	7.26	2.15	33.12	15.64	38.45	-22.81	H

EDGE 1900 Test Data

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1850.20	-19.97	6.04	7.98	34.74	19.89	33.01	-13.12	V
1880.00	-18.91	5.20	8.05	34.78	20.90	33.01	-12.11	V
1909.80	-19.76	5.88	8.12	34.78	19.99	33.01	-13.02	V
1850.20	-26.69	6.04	7.98	34.74	13.17	33.01	-19.84	H
1880.00	-26.11	5.20	8.05	34.78	13.70	33.01	-19.31	H
1909.80	-24.28	5.88	8.12	34.78	15.47	33.01	-17.54	H

WCDMA Test Data (Band II)

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	P_{Ag} (dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1852.40	-14.16	6.04	7.98	34.74	22.52	33.01	-10.49	V
1880.00	-14.65	5.20	8.05	34.78	**22.98**	33.01	-10.03	V
1907.60	-14.85	5.88	8.12	34.78	22.17	33.01	-10.84	V
1852.40	-21.64	6.04	7.98	34.74	15.04	33.01	-17.97	H
1880.00	-20.75	5.20	8.05	34.78	16.88	33.01	-16.13	H
1907.60	-21.49	5.88	8.12	34.78	15.53	33.01	-17.48	H

WCDMA Test Data (Band V)

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	G_a Antenna Gain(dB)	Correction (dB)	P_{Ag} (dB)	Peak ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
826.40	-8.77	4.10	7.26	2.15	33.11	25.35	38.45	-13.10	V
836.60	-9.24	4.14	7.26	2.15	33.11	24.84	38.45	-13.61	V
844.60	-9.56	3.90	7.26	2.15	33.12	24.77	38.45	-13.68	V
826.40	-18.99	4.10	7.26	2.15	33.11	15.13	38.45	-23.32	H
836.60	-18.15	4.14	7.26	2.15	33.11	15.93	38.45	-22.52	H
844.60	-17.74	3.90	7.26	2.15	33.12	16.59	38.45	-21.86	H

6.5. OUT OF BAND EMISSION AT ANTENNA TERMINALS

.6.6.1. LIMIT

According to FCC §2.1051, FCC §22.917, FCC §24.238(a). RSS-132 (4.5.2), RSS-133 (6.6).

Out of Band Emissions: The mean power of emission must be attenuated below the mean power of the non-modulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at least 43 + 10 log P dB.

Mobile Emissions in Base Frequency Range: The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not exceed –80 dBm at the transmit antenna connector.

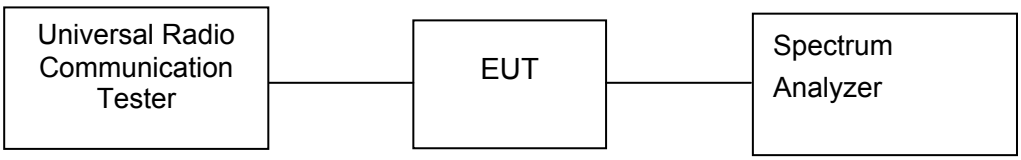
Band Edge Requirements: In the 1MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the Out of band Emission

.6.6.2. MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	10/25/2015	10/24/2016
Universal Radio Communication Tester	Agilent	8960	MY48367671	09/04/2015	09/03/2016
Cable	HuberSuhner	SUCOFLEX104PEA	N/A	N/A	N/A

Remark: *Each piece of equipment is scheduled for calibration once a year.*

.6.6.3. TEST CONFIGURATION



.6.6.4. TEST PROCEDURE

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

For the out of band: Set the RBW, VBW = 1MHz, Start=30MHz, Stop= 10 th harmonic. Limit = -13dBm

Band Edge Requirements (824 MHz and 849 MHz /1850MHz and 1910MHz): In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions. Limit, -13dBm.

.6.6.5. TEST RESULTS

No non-compliance noted.

Test Data

Mode	CH	Location	Description
GPRS 850	128	Figure 1-1	Conducted spurious emissions, 1MHz - 30MHz
		Figure 1-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 1-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 1-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 1-5	Conducted spurious emissions, 10GHz - 20GHz
	190	Figure 2-1	Conducted spurious emissions, 1MHz - 30MHz
		Figure 2-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 2-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 2-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 2-5	Conducted spurious emissions, 10GHz - 20GHz
	251	Figure 3-1	Conducted spurious emissions, 1MHz - 30MHz
		Figure 3-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 3-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 3-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 3-5	Conducted spurious emissions, 10GHz - 20GHz
GPRS 1900	512	Figure 4-1	Conducted spurious emissions, 1MHz – 30MHz
		Figure 4-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 4-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 4-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 4-5	Conducted spurious emissions, 10GHz - 20GHz
	661	Figure 5-1	Conducted spurious emissions, 1MHz – 30MHz
		Figure 5-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 5-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 5-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 5-5	Conducted spurious emissions, 10GHz - 20GHz
	810	Figure 6-1	Conducted spurious emissions, 1MHz – 30MHz
		Figure 6-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 6-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 6-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 6-5	Conducted spurious emissions, 10GHz - 20GHz

Mode	CH	Location	Description
GPRS 850	128	Figure 7-1	Band Edge emissions
	251	Figure 7-2	Band Edge emissions
GPRS 1900	512	Figure 8-1	Band Edge emissions
	810	Figure 8-2	Band Edge emissions

Mode	CH	Location	Description
EDGE 850	128	Figure 9-1	Conducted spurious emissions, 1MHz - 30MHz
		Figure 9-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 9-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 9-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 9-5	Conducted spurious emissions, 10GHz - 20GHz
	190	Figure 10-1	Conducted spurious emissions, 1MHz - 30MHz
		Figure 10-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 10-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 10-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 10-5	Conducted spurious emissions, 10GHz - 20GHz
	251	Figure 11-1	Conducted spurious emissions, 1MHz - 30MHz
		Figure 11-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 11-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 11-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 11-5	Conducted spurious emissions, 10GHz - 20GHz
EDGE 1900	512	Figure 12-1	Conducted spurious emissions, 1MHz – 30MHz
		Figure 12-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 12-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 12-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 12-5	Conducted spurious emissions, 10GHz - 20GHz
	661	Figure 13-1	Conducted spurious emissions, 1MHz – 30MHz
		Figure 13-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 13-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 13-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 13-5	Conducted spurious emissions, 10GHz - 20GHz
	810	Figure 14-1	Conducted spurious emissions, 1MHz – 30MHz
		Figure 14-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 14-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 14-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 14-5	Conducted spurious emissions, 10GHz - 20GHz

Mode	CH	Location	Description
EDGE 850	128	Figure 15-1	Band Edge emissions
	251	Figure 15-2	Band Edge emissions
EDGE1900	512	Figure 16-1	Band Edge emissions
	810	Figure 16-2	Band Edge emissions

Mode	CH	Location	Description
WCDMA (Band II)	9262	Figure 17-1	Conducted spurious emissions, 1MHz - 30MHz
		Figure 17-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 17-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 17-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 17-5	Conducted spurious emissions, 10GHz - 20GHz
	9400	Figure 18-1	Conducted spurious emissions, 1MHz - 30MHz
		Figure 18-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 18-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 18-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 18-5	Conducted spurious emissions, 10GHz - 20GHz
	9538	Figure 19-1	Conducted spurious emissions, 1MHz - 30MHz
		Figure 19-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 19-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 19-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 19-5	Conducted spurious emissions, 10GHz - 20GHz
WCDMA (Band V)	4132	Figure 20-1	Conducted spurious emissions, 1MHz - 30MHz
		Figure 20-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 20-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 20-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 20-5	Conducted spurious emissions, 10GHz - 20GHz
	4182	Figure 21-1	Conducted spurious emissions, 1MHz - 30MHz
		Figure 21-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 21-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 21-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 21-5	Conducted spurious emissions, 10GHz - 20GHz
	4233	Figure 22-1	Conducted spurious emissions, 1MHz - 30MHz
		Figure 22-2	Conducted spurious emissions, 30MHz - 1GHz
		Figure 22-3	Conducted spurious emissions, 1GHz - 5GHz
		Figure 22-4	Conducted spurious emissions, 5GHz - 10GHz
		Figure 22-5	Conducted spurious emissions, 10GHz - 20GHz

Mode	CH	Location	Description
WCDMA (Band II)	9262	Figure 23-1	Band Edge emissions
	9538	Figure 23-2	Band Edge emissions
WCDMA (Band V)	4132	Figure 24-1	Band Edge emissions
	4233	Figure 24-2	Band Edge emissions

Test Plot

GPRS 850

Figure 1-1: Out of Band emission at antenna terminals – GPRS CH Low

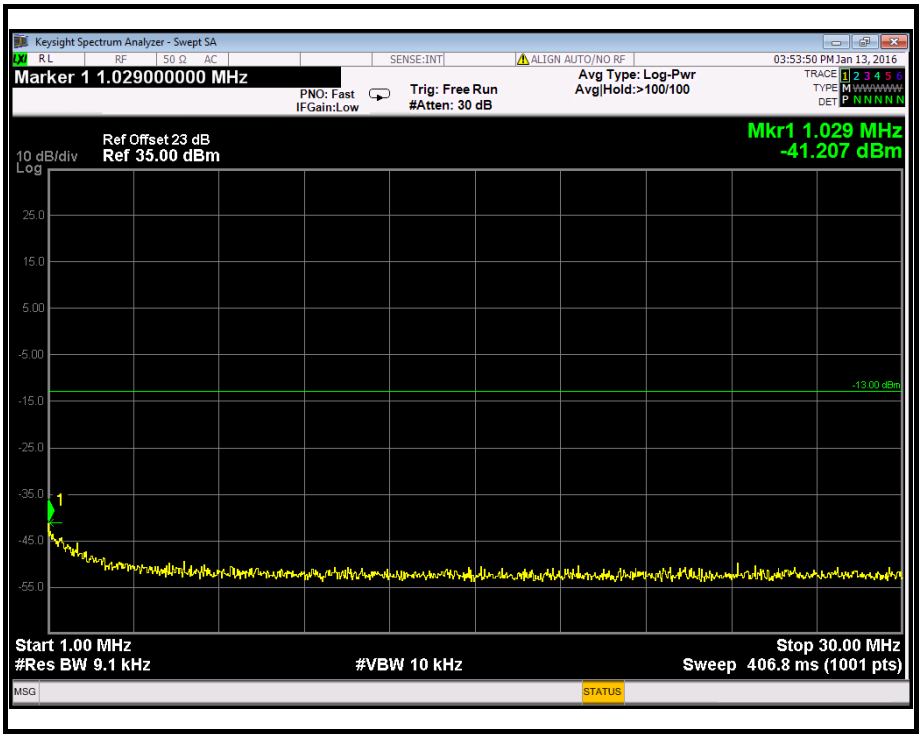


Figure 1-2: Out of Band emission at antenna terminals – GPRS CH Low

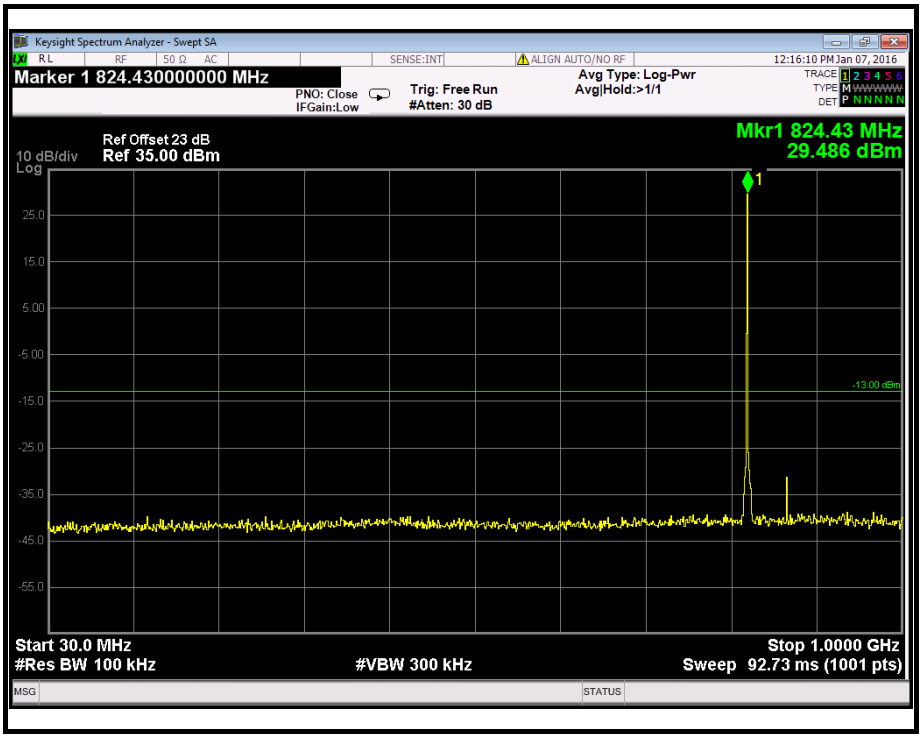


Figure 1-3: Out of Band emission at antenna terminals – GPRS CH Low

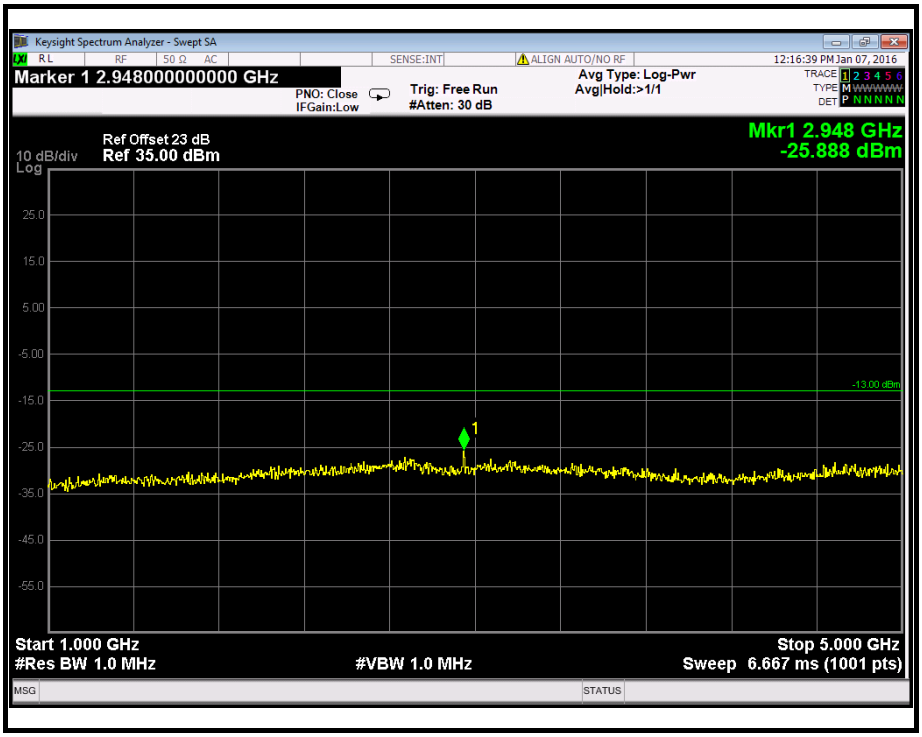


Figure 1-4: Out of Band emission at antenna terminals – GPRS CH Low

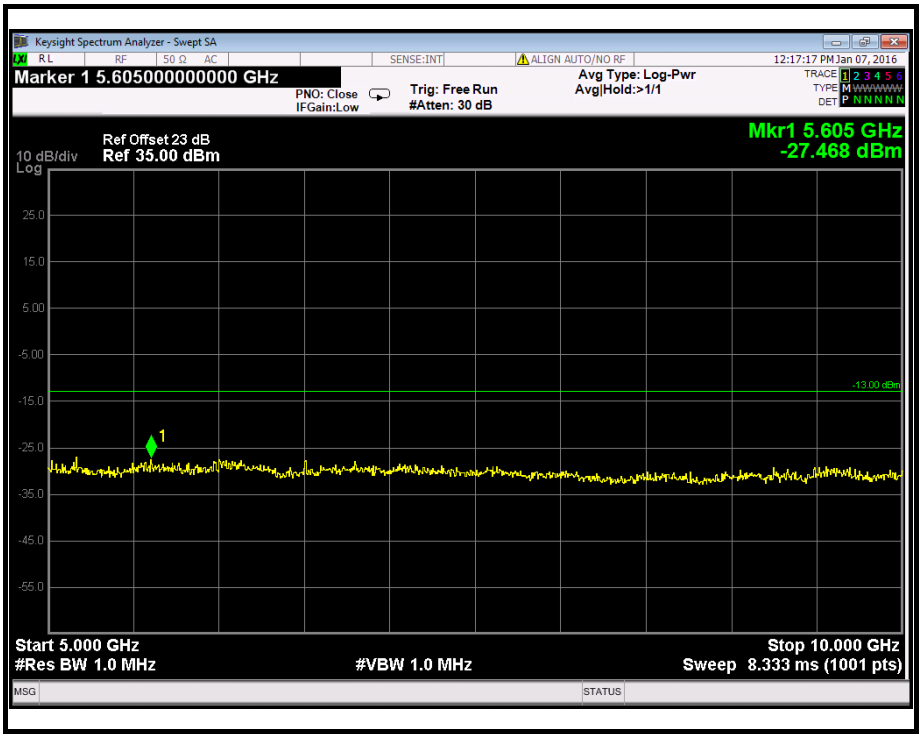


Figure 1-5: Out of Band emission at antenna terminals – GPRS CH Low

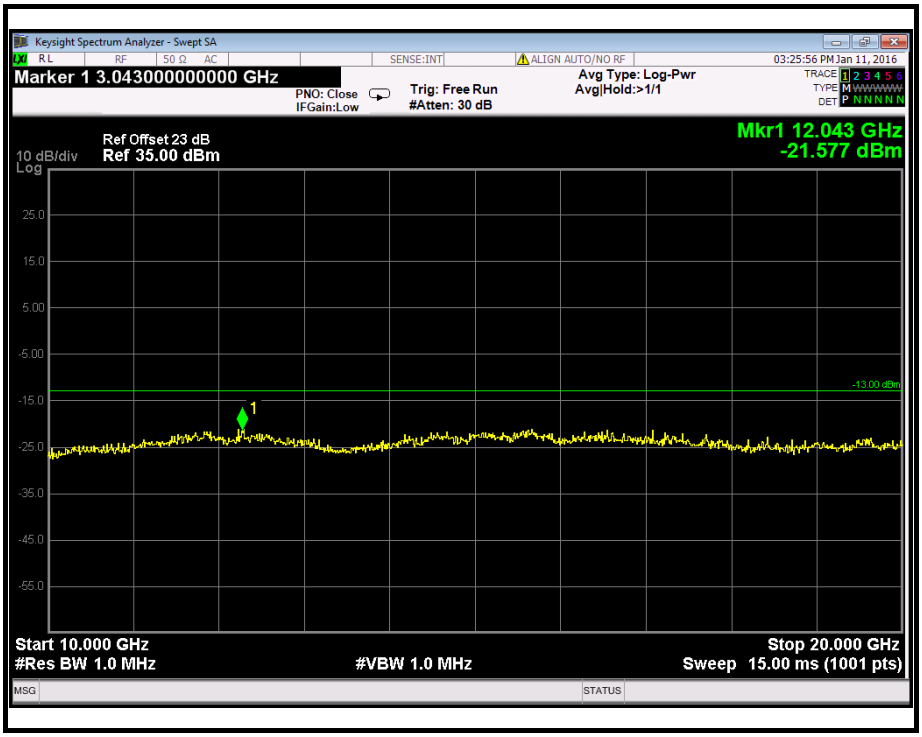


Figure 2-1: Out of Band emission at antenna terminals – GPRS CH Mid

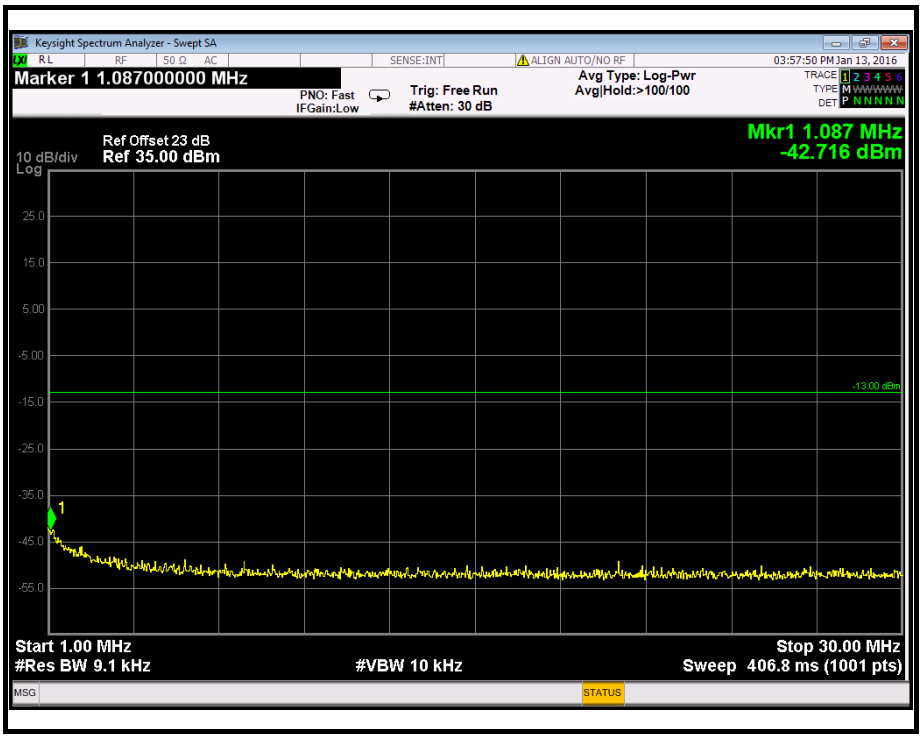


Figure 2-2: Out of Band emission at antenna terminals – GPRS CH Mid

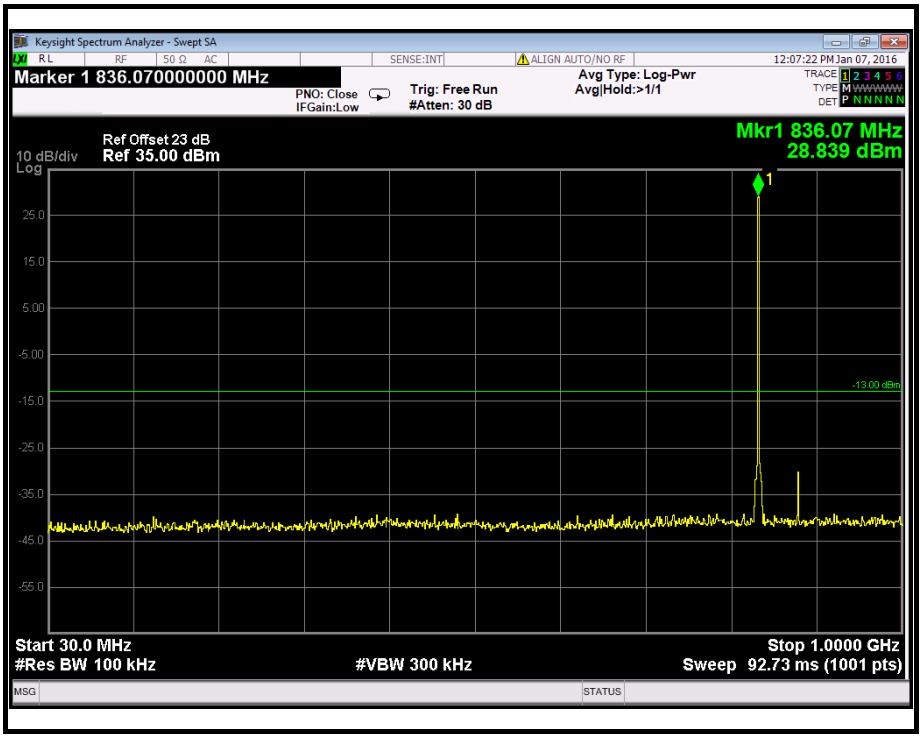


Figure 2-3: Out of Band emission at antenna terminals – GPRS CH Mid

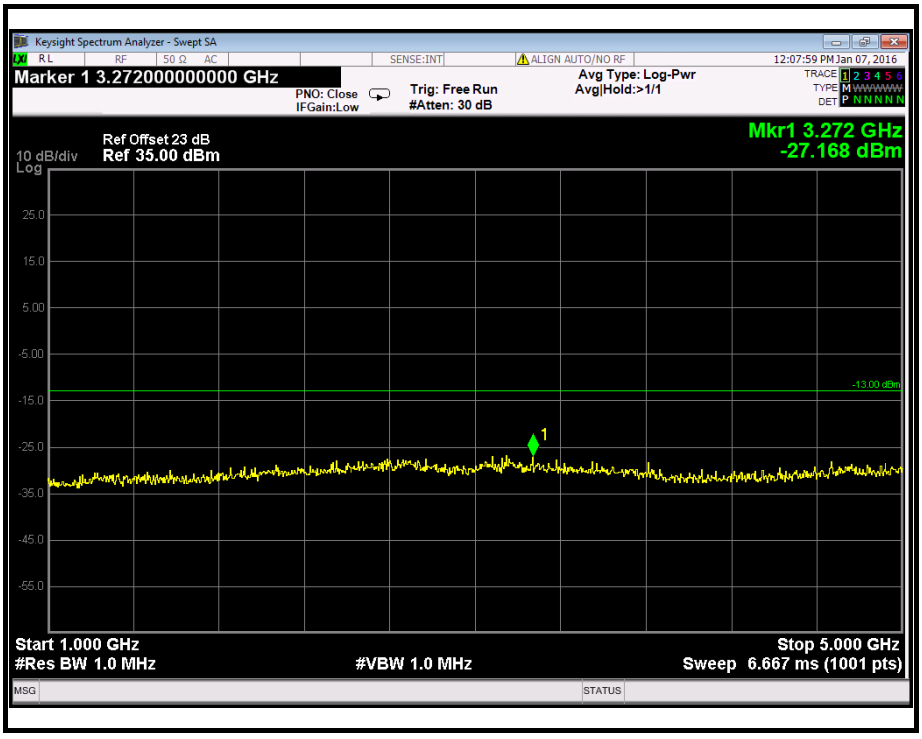


Figure 2-4: Out of Band emission at antenna terminals – GPRS CH Mid

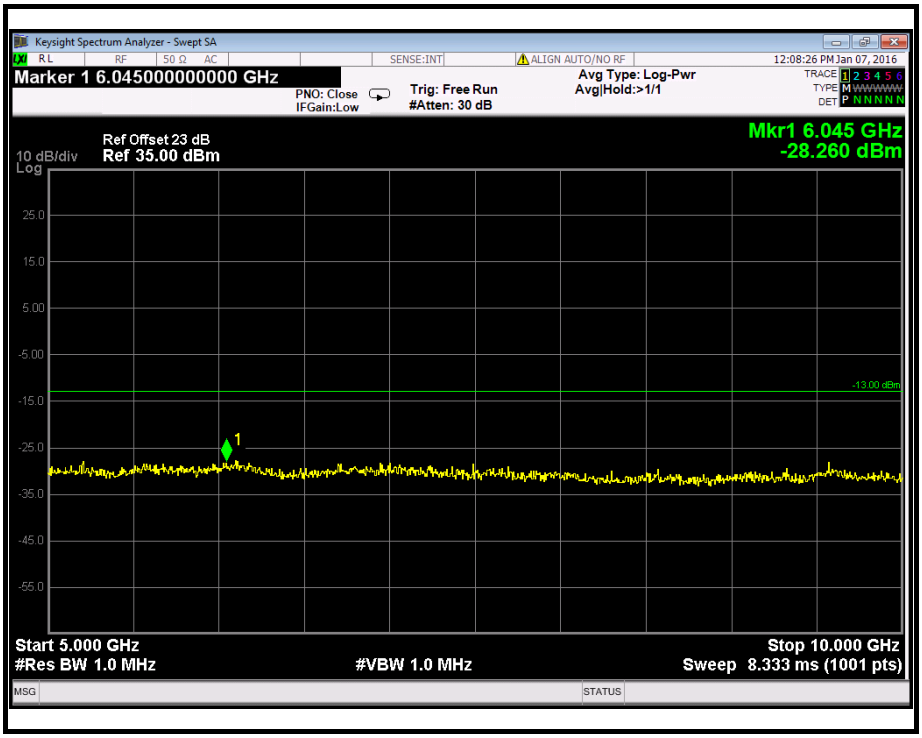


Figure 2-5: Out of Band emission at antenna terminals – GPRS CH High

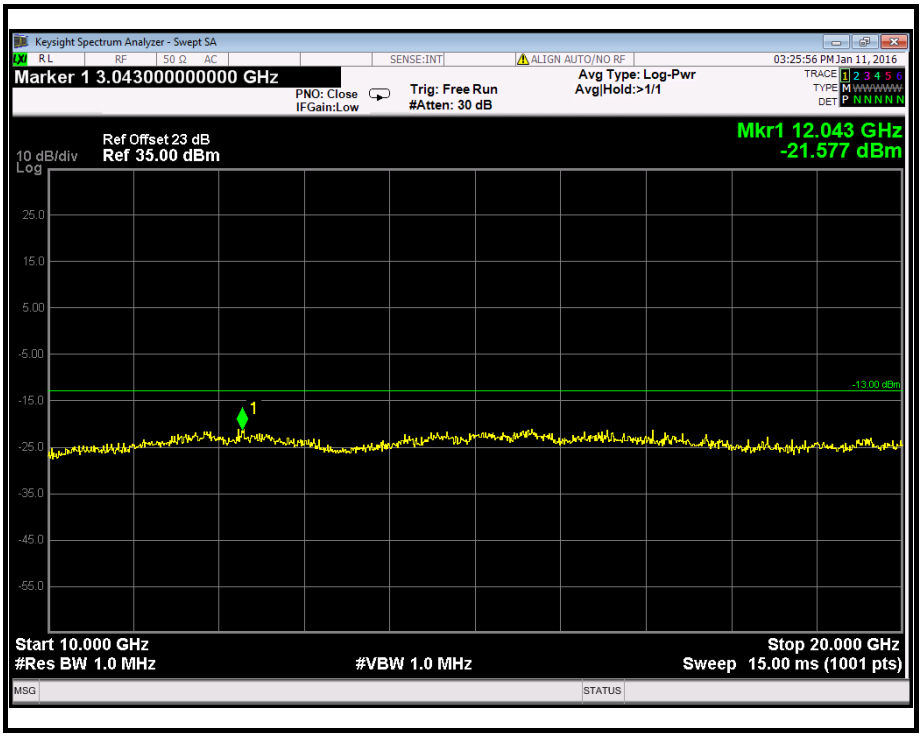


Figure 3-1: Out of Band emission at antenna terminals – GPRS CH High

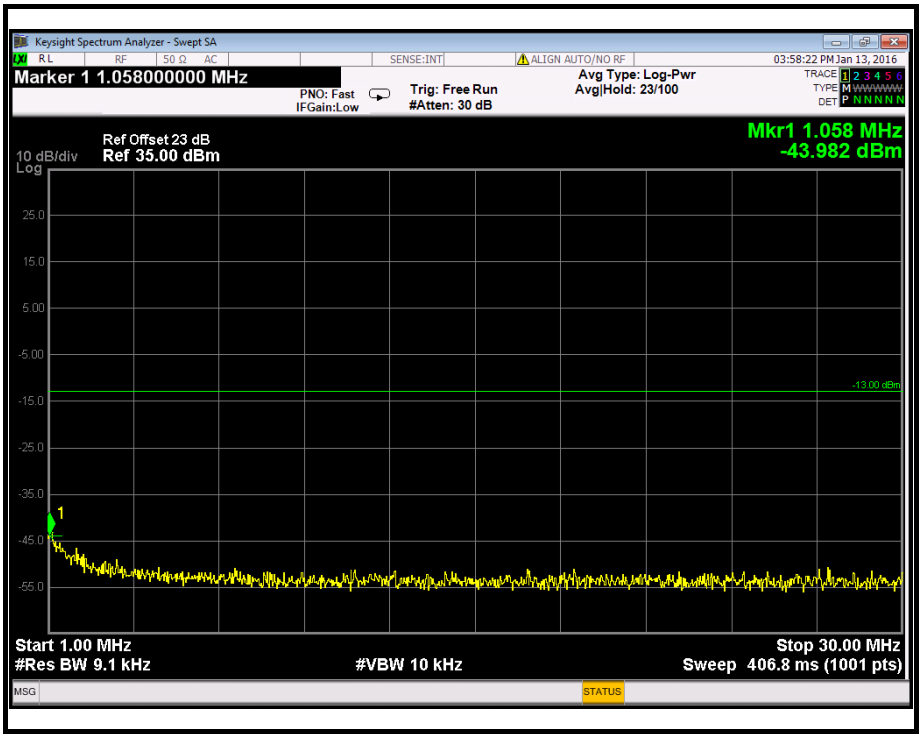


Figure 3-2: Out of Band emission at antenna terminals – GPRS CH High

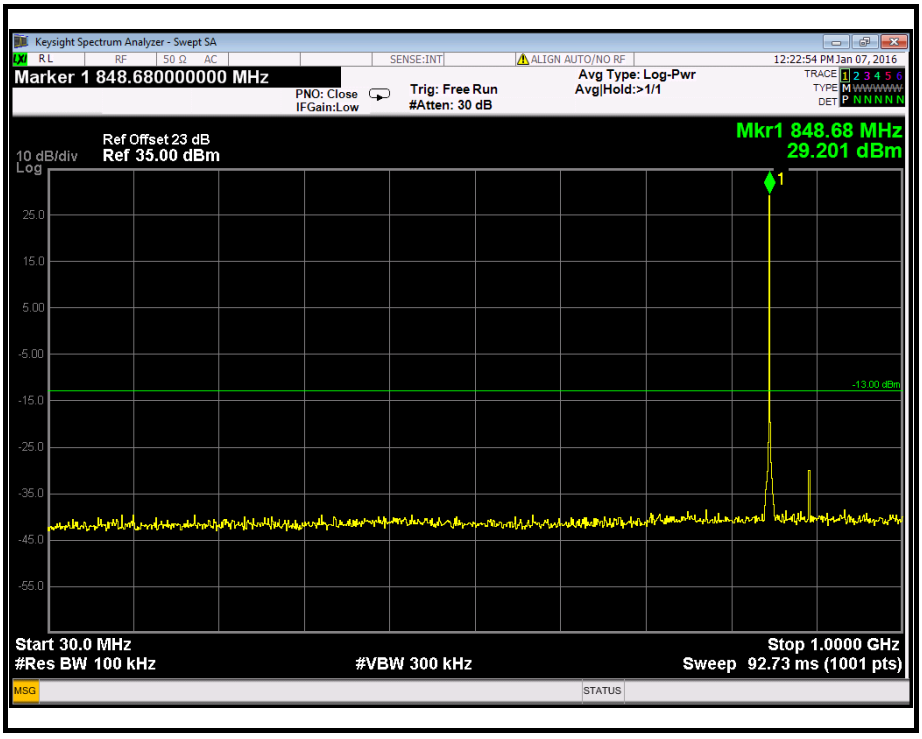


Figure 3-3: Out of Band emission at antenna terminals – GPRS CH High

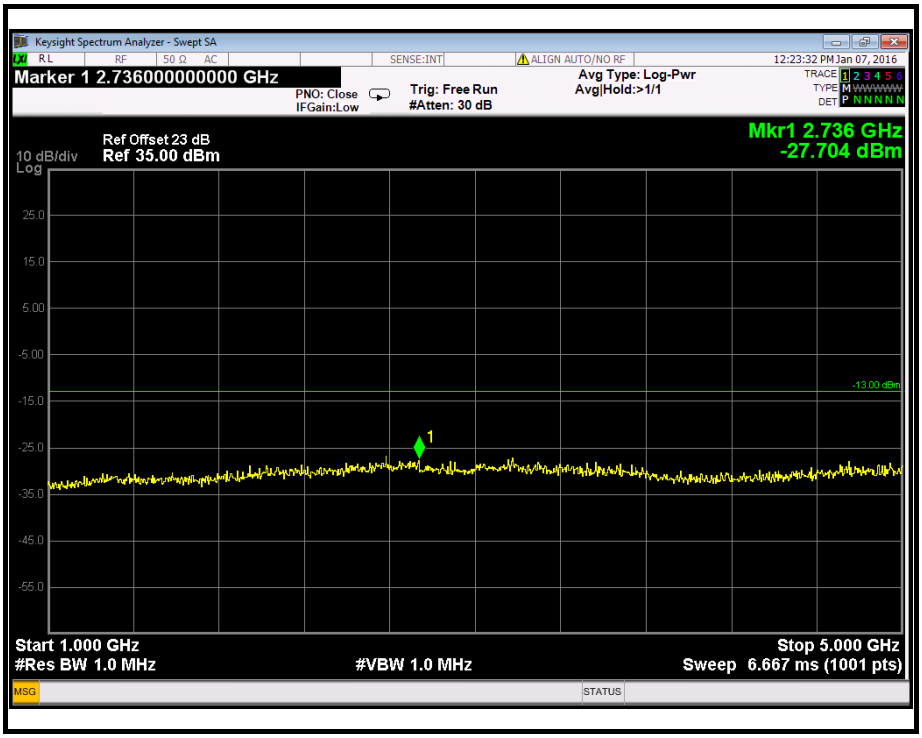


Figure 3-4: Out of Band emission at antenna terminals – GPRS CH High

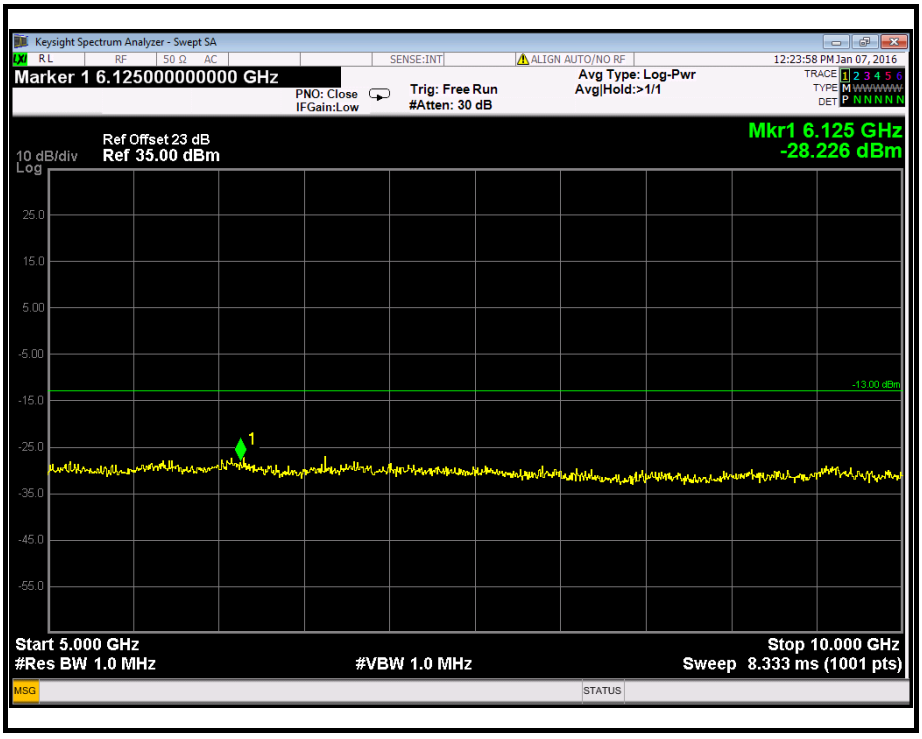
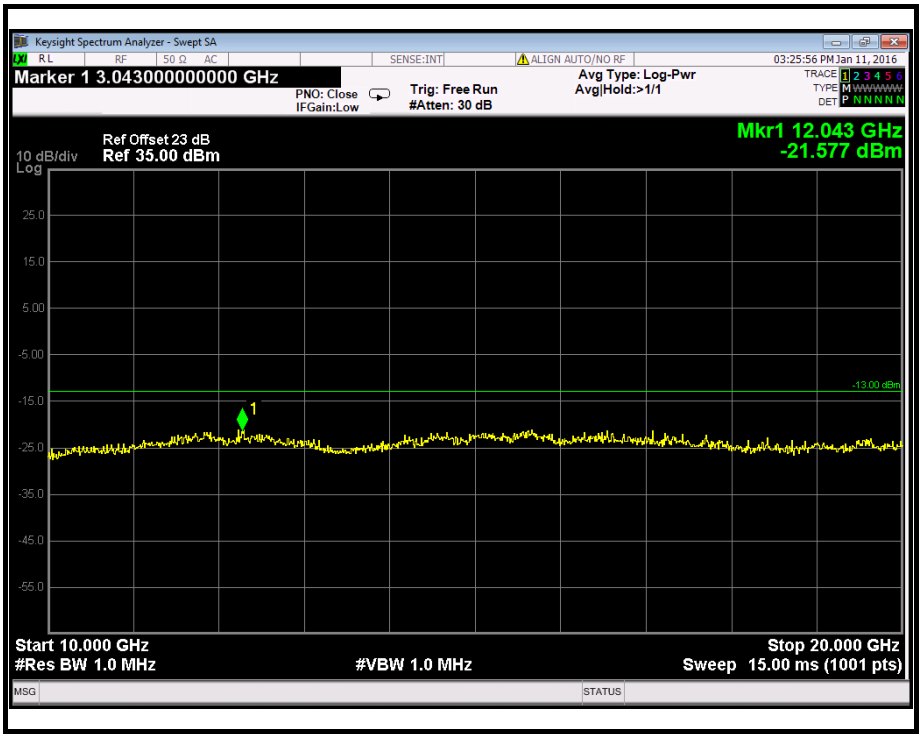


Figure 3-5: Out of Band emission at antenna terminals – GPRS CH High



GPRS 1900

Figure 4-1: Out of Band emission at antenna terminals – GPRS CH Low

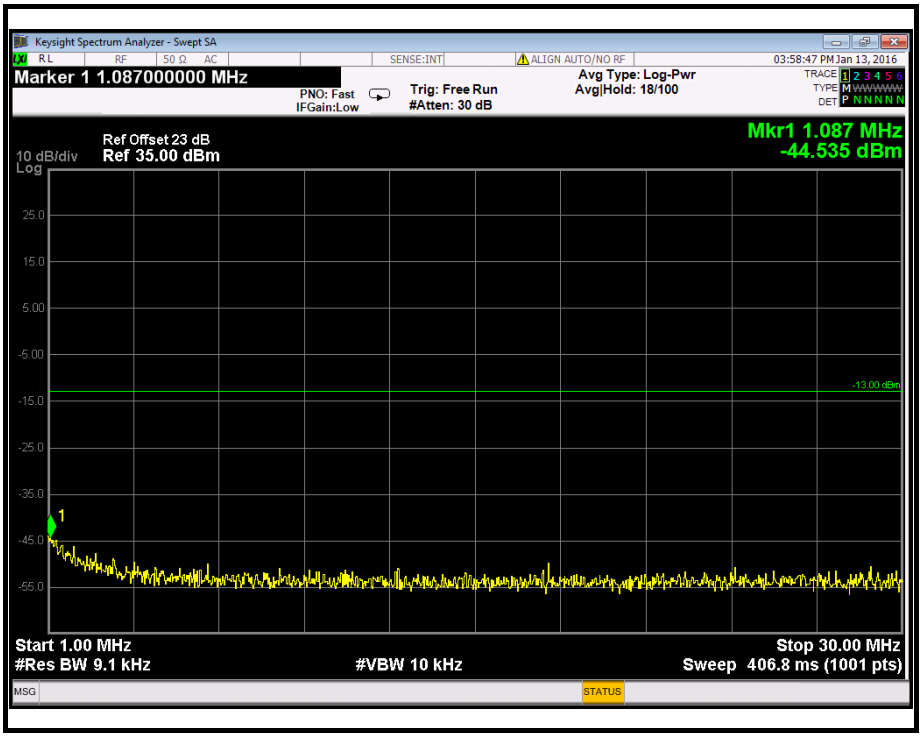


Figure 4-2: Out of Band emission at antenna terminals – GPRS CH Low

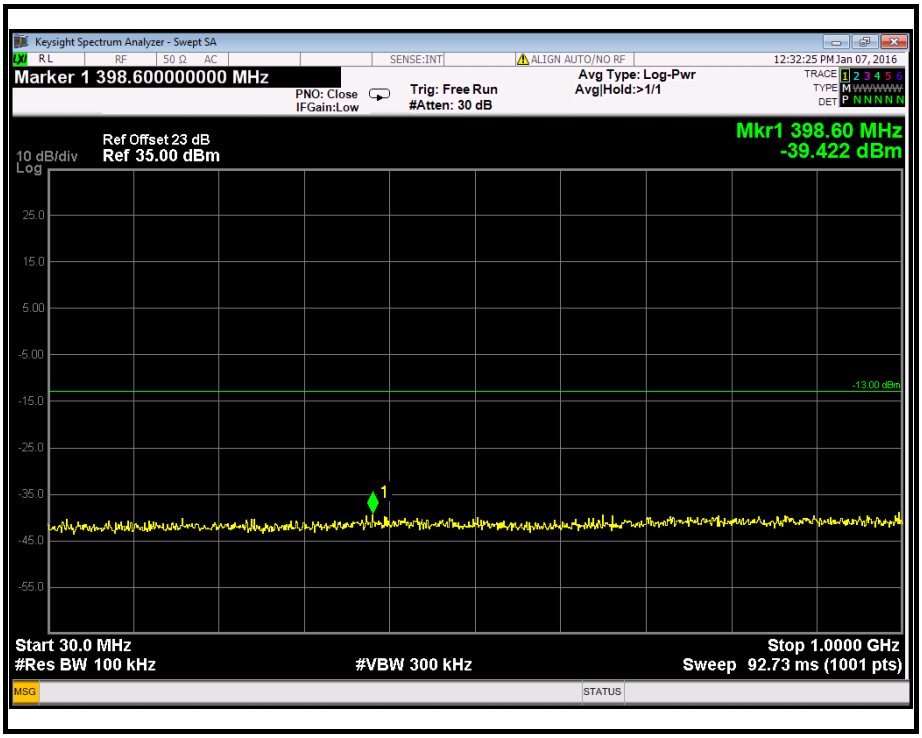


Figure 4-3: Out of Band emission at antenna terminals –GPRS CH Low

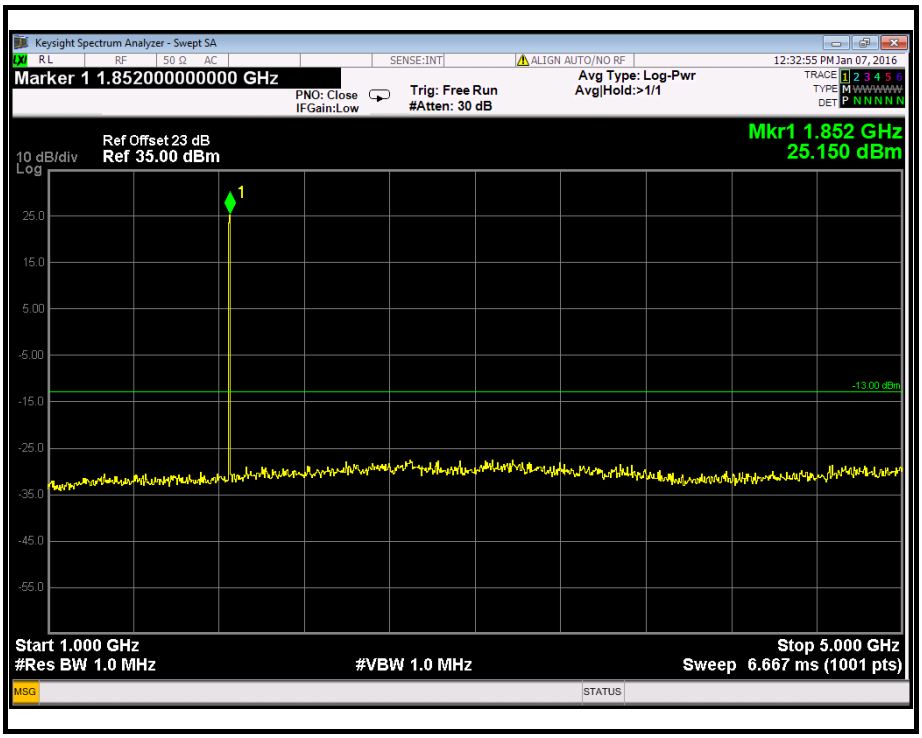


Figure 4-4: Out of Band emission at antenna terminals –GPRS CH Low

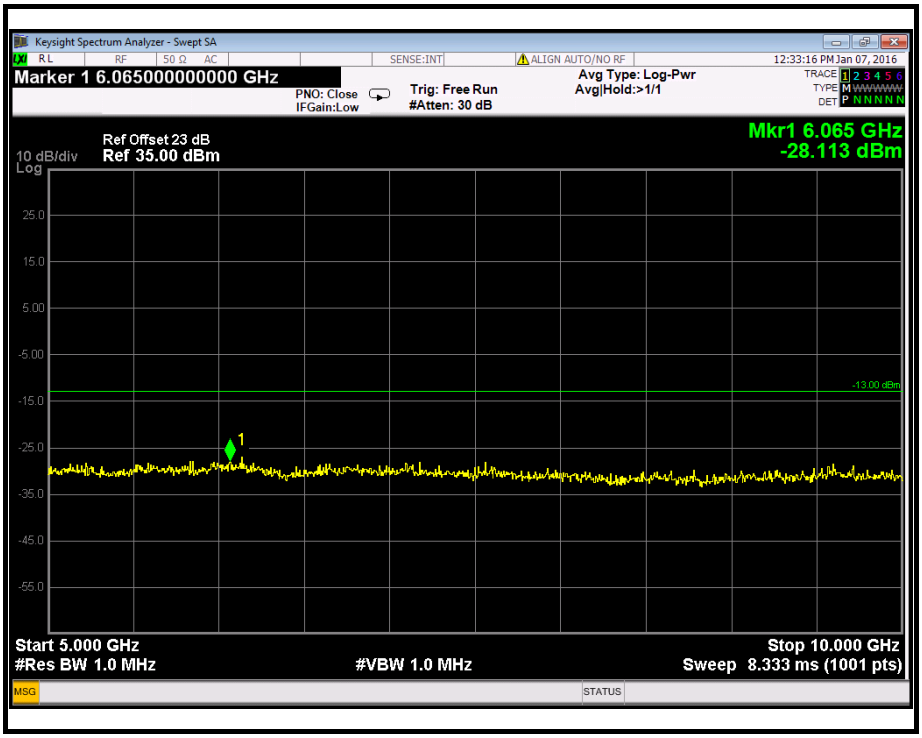


Figure 4-5: Out of Band emission at antenna terminals –GPRS CH Low

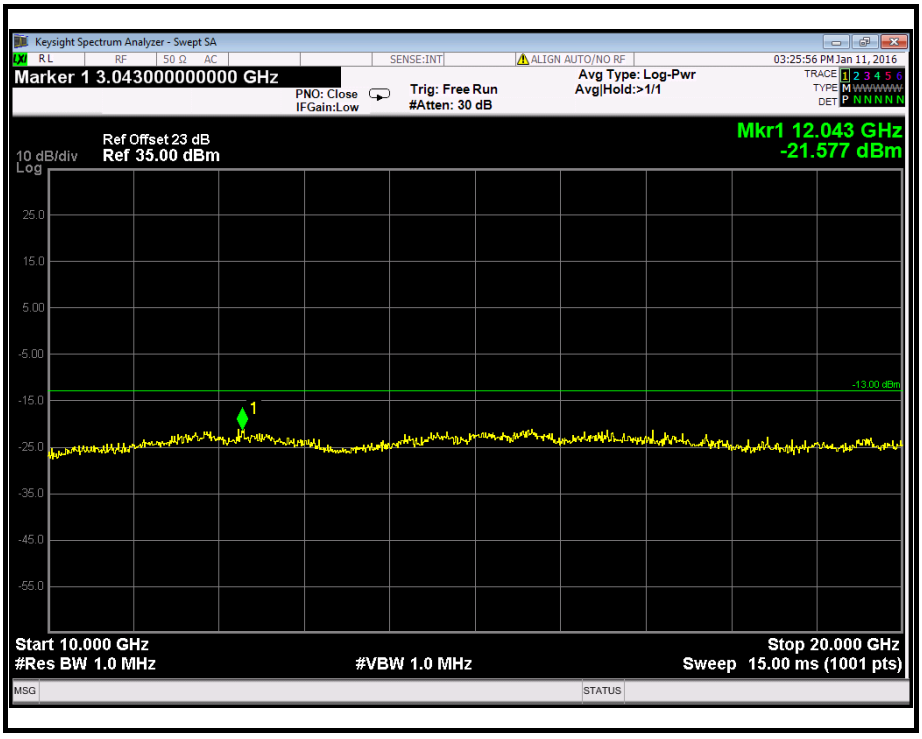


Figure 5-1: Out of Band emission at antenna terminals –GPRS CH Mid

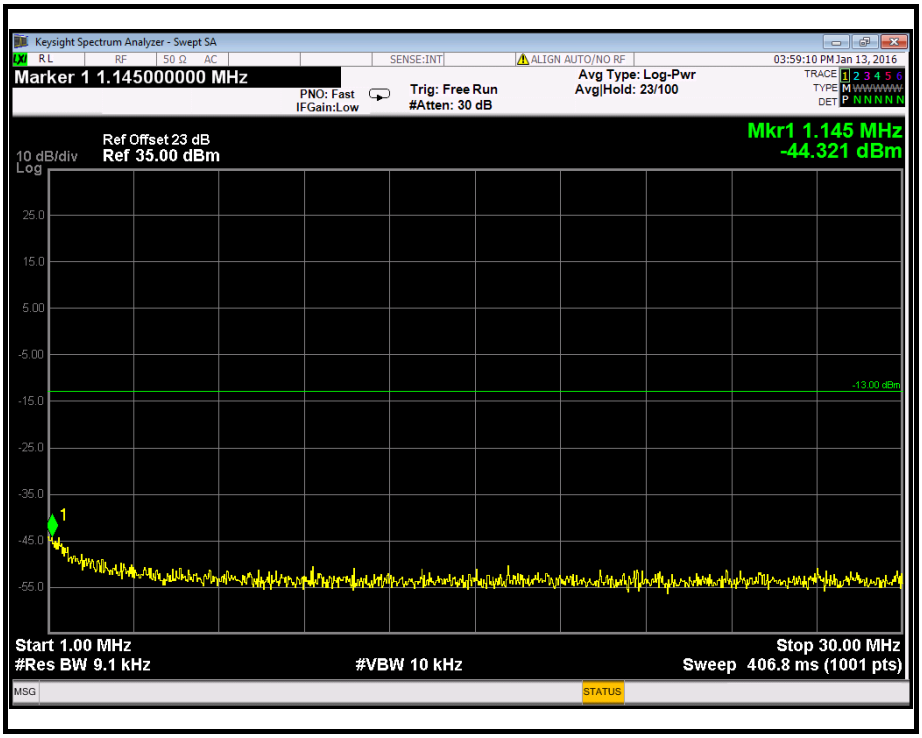


Figure 5-2: Out of Band emission at antenna terminals –GPRS CH Mid

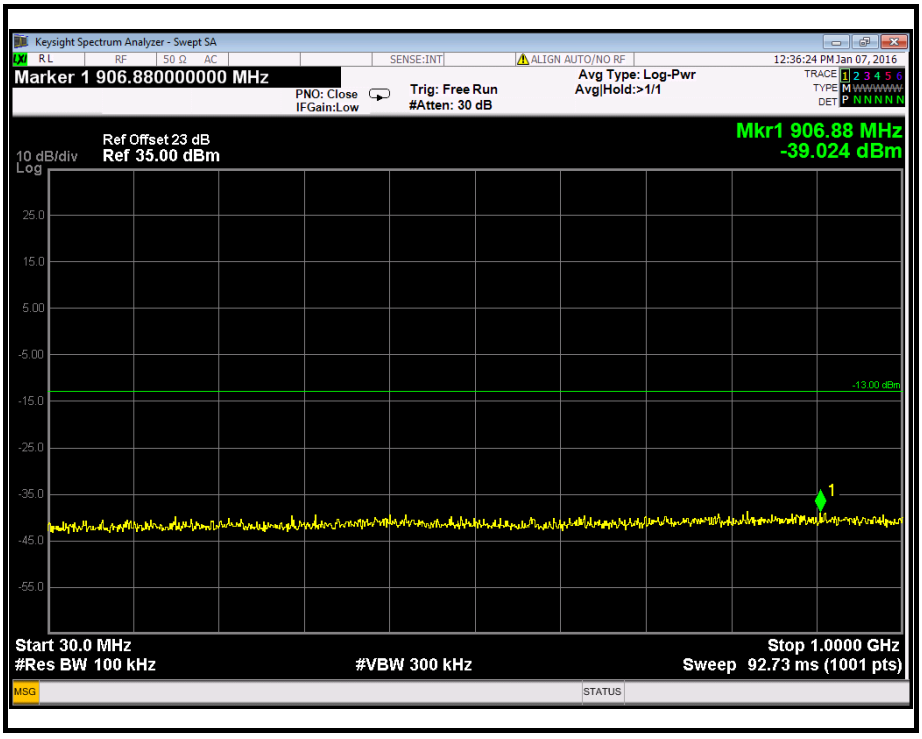


Figure 5-3: Out of Band emission at antenna terminals –GPRS CH Mid

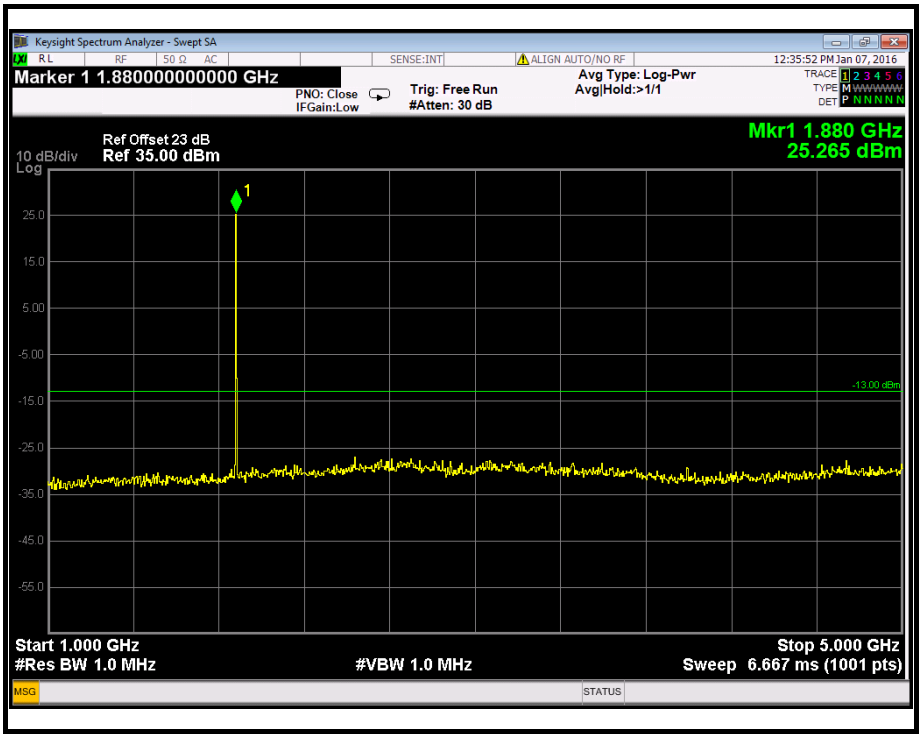


Figure 5-4: Out of Band emission at antenna terminals –GPRS CH Mid

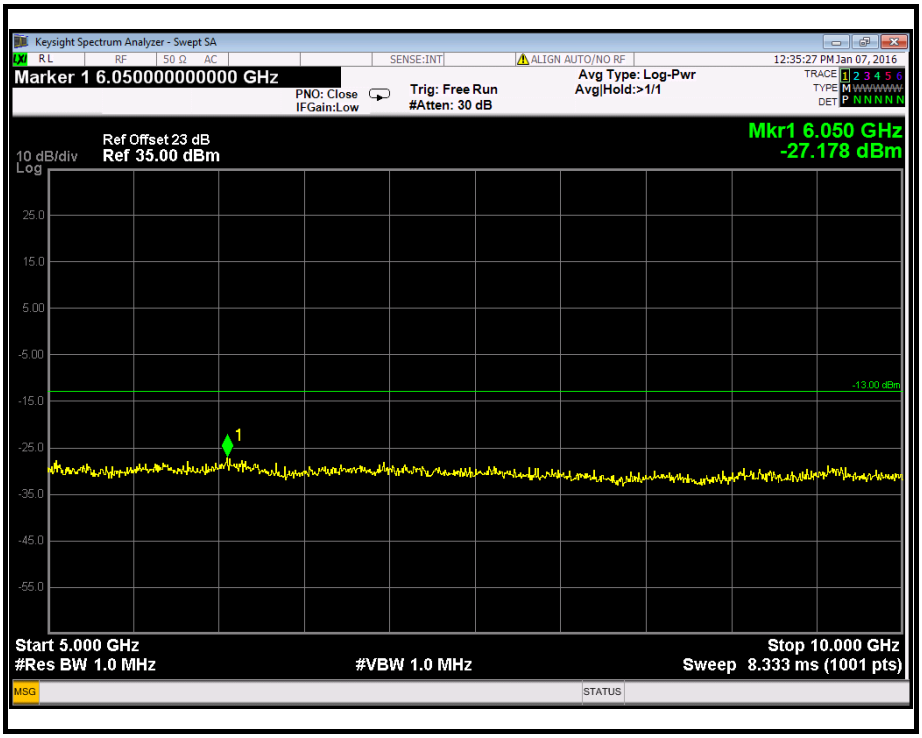


Figure 5-5: Out of Band emission at antenna terminals –GPRS CH Mid

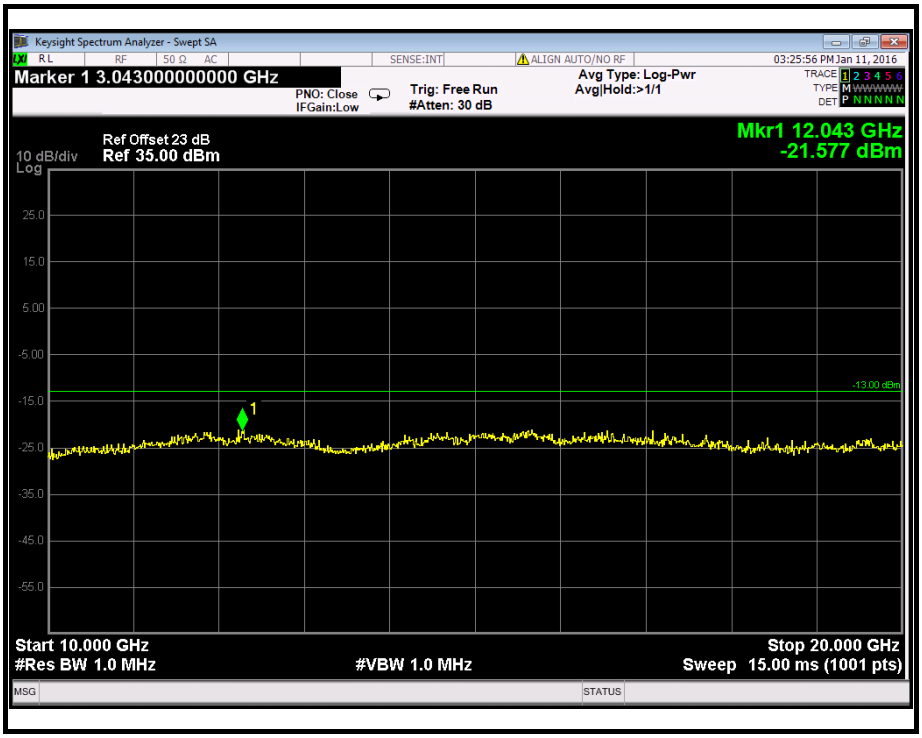


Figure 6-1: Out of Band emission at antenna terminals –GPRS CH High

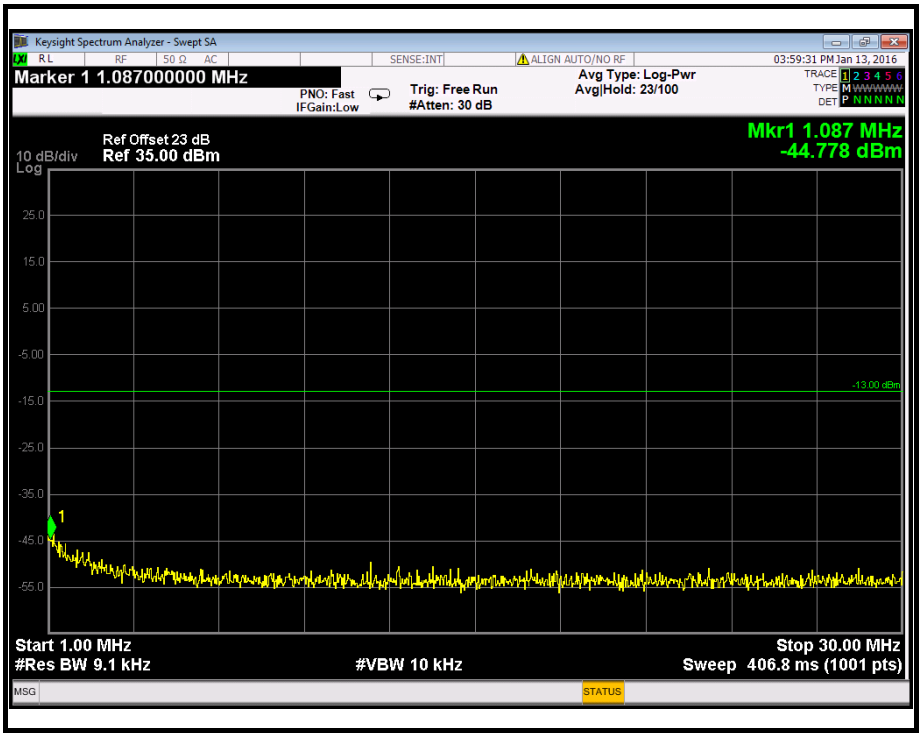


Figure 6-2: Out of Band emission at antenna terminals –GPRS CH High

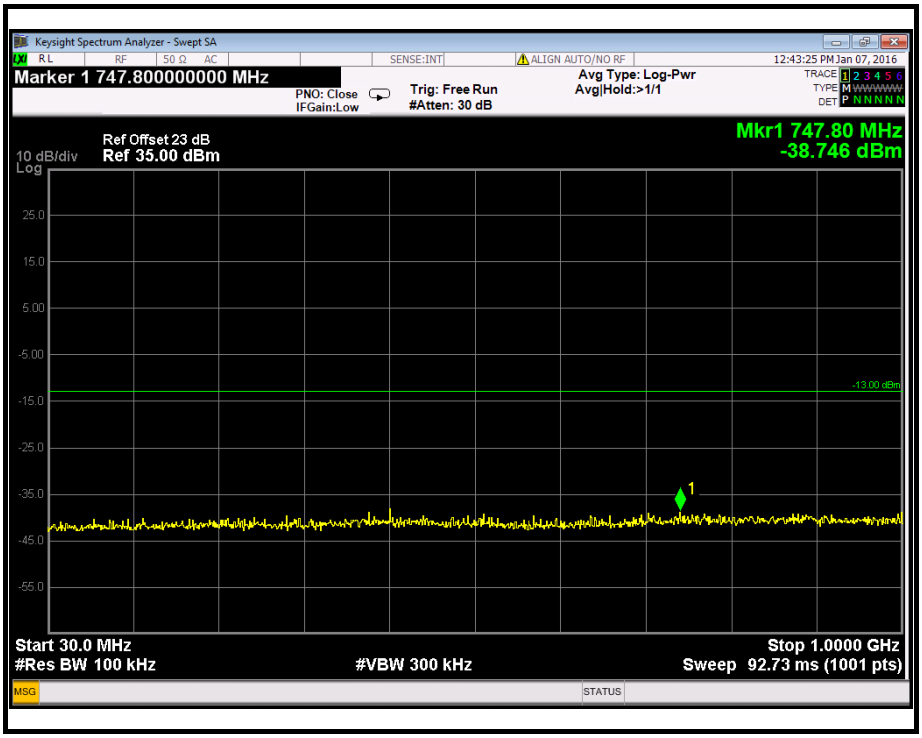


Figure 6-3: Out of Band emission at antenna terminals –GPRS CH High

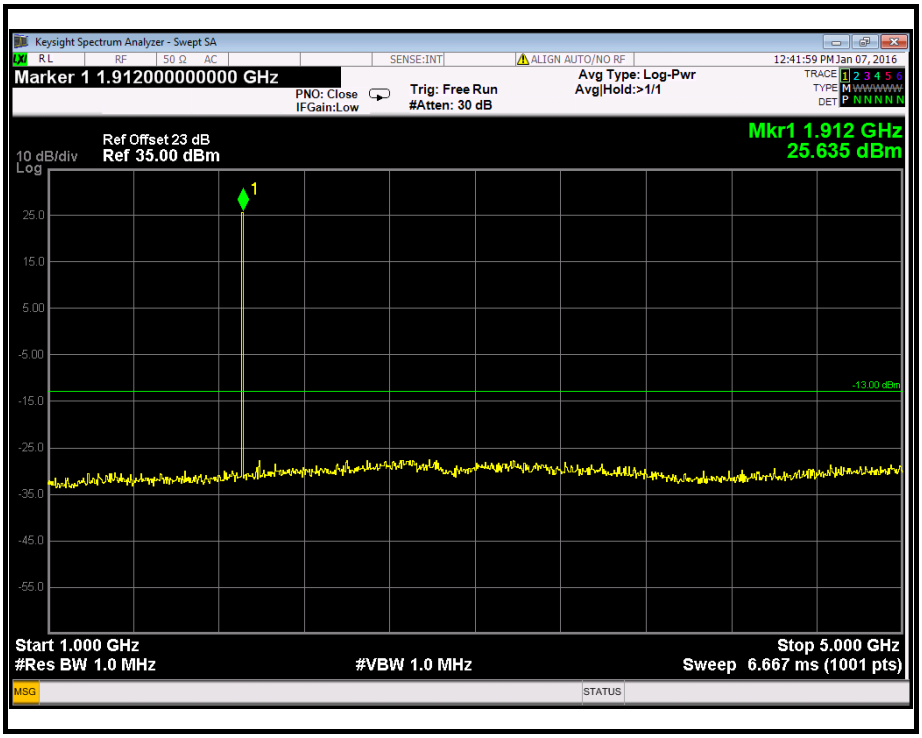


Figure 6-4: Out of Band emission at antenna terminals –GPRS CH High

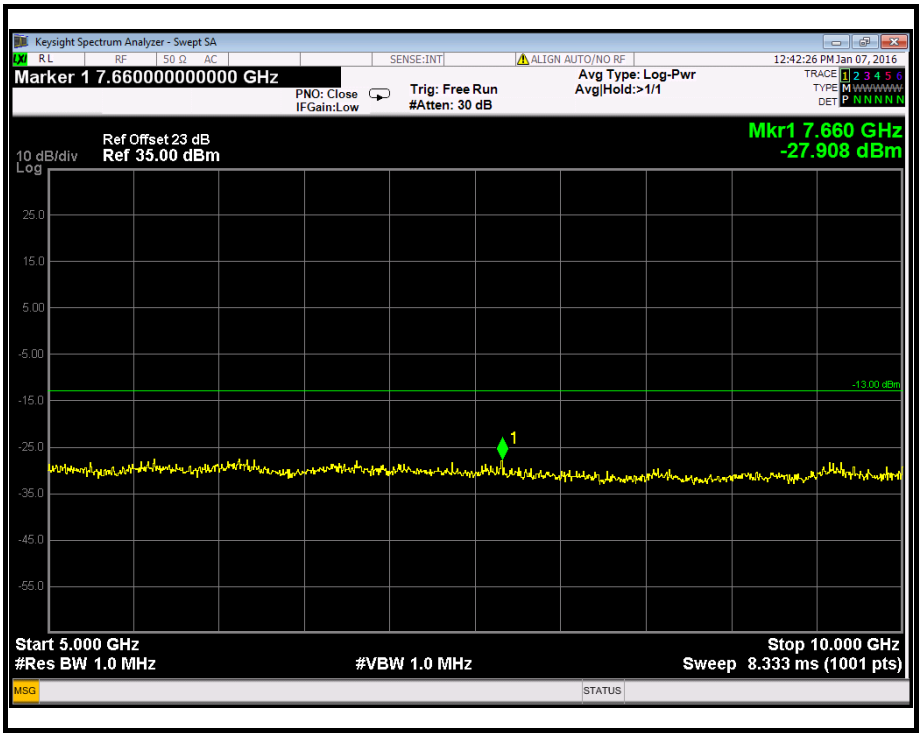
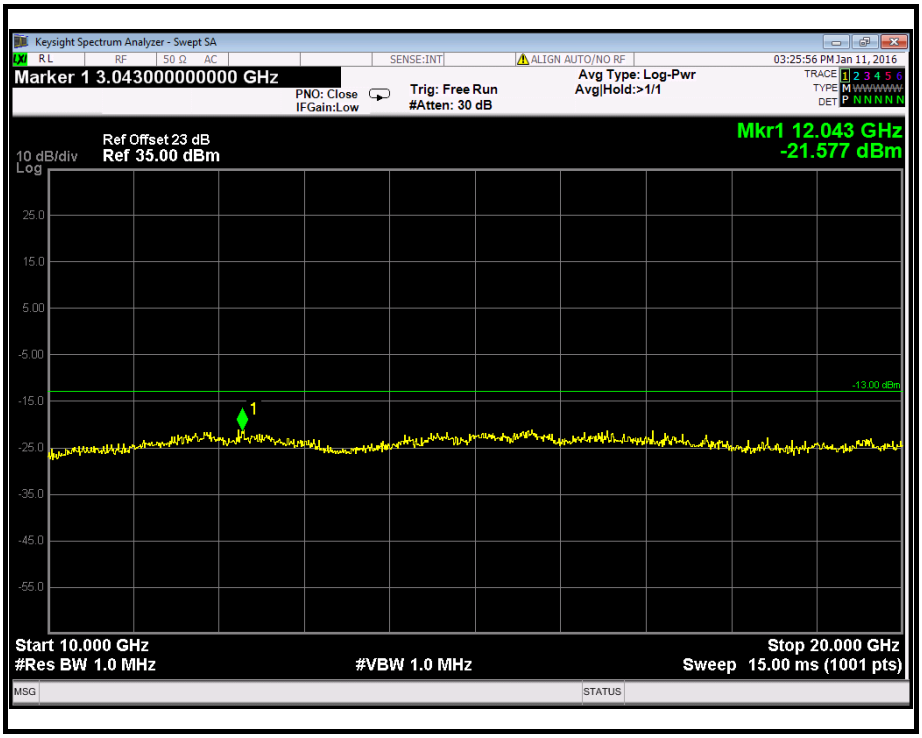


Figure 6-5: Out of Band emission at antenna terminals –GPRS CH High



GPRS 850

Figure 7-1: Band Edge emissions – GPRS CH Low

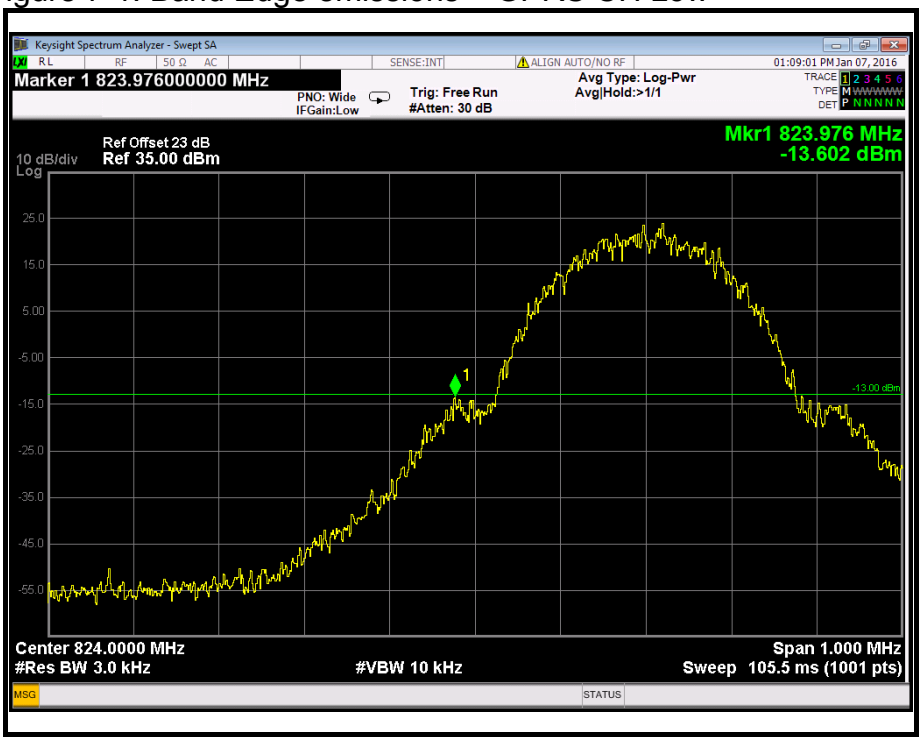
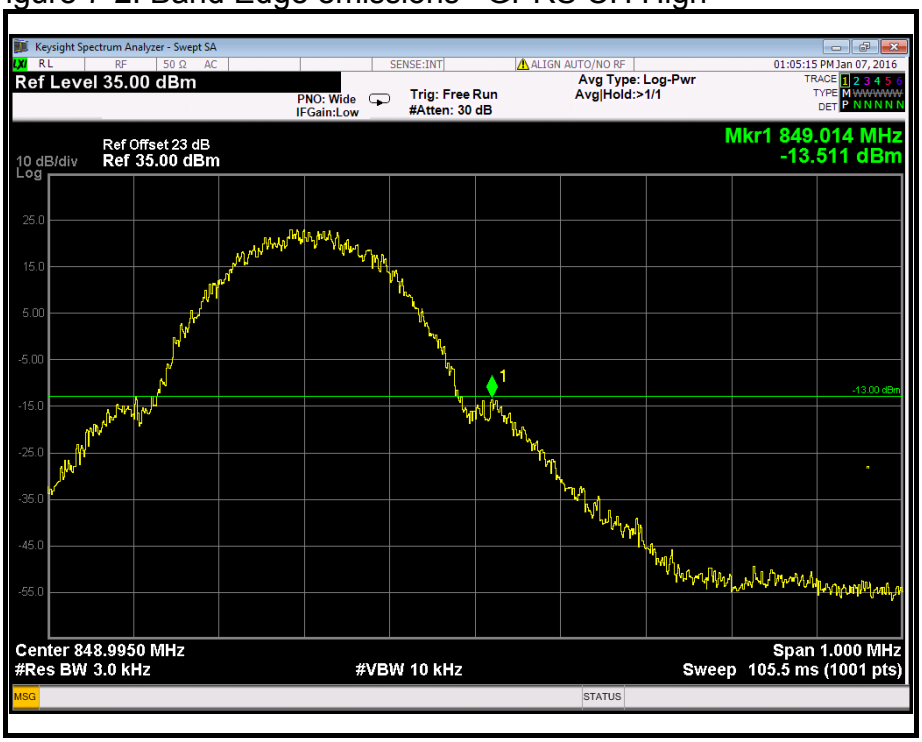


Figure 7-2: Band Edge emissions –GPRS CH High



GPRS 1900

Figure 8-1: Band Edge emissions – GPRS CH Low

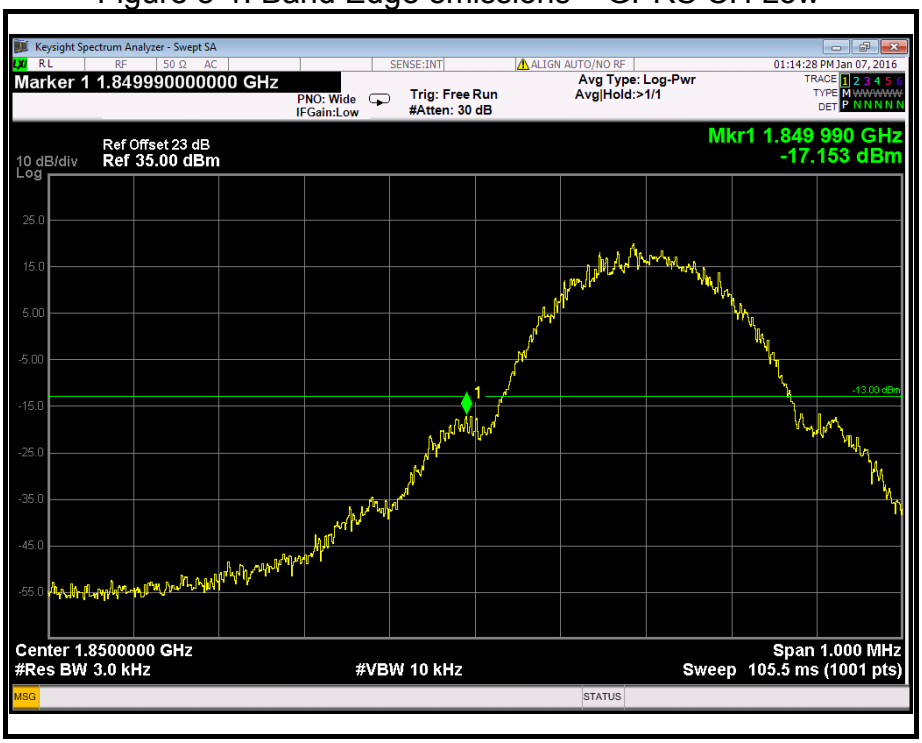
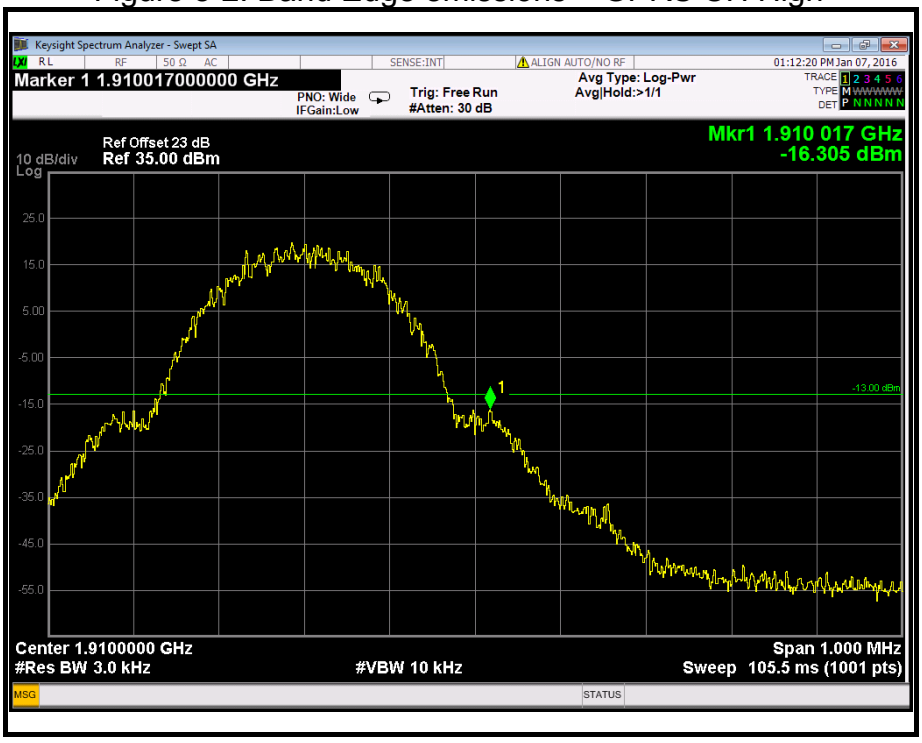


Figure 8-2: Band Edge emissions – GPRS CH High



EDGE 850

Figure 9-1: Out of Band emission at antenna terminals – GPRS CH Low

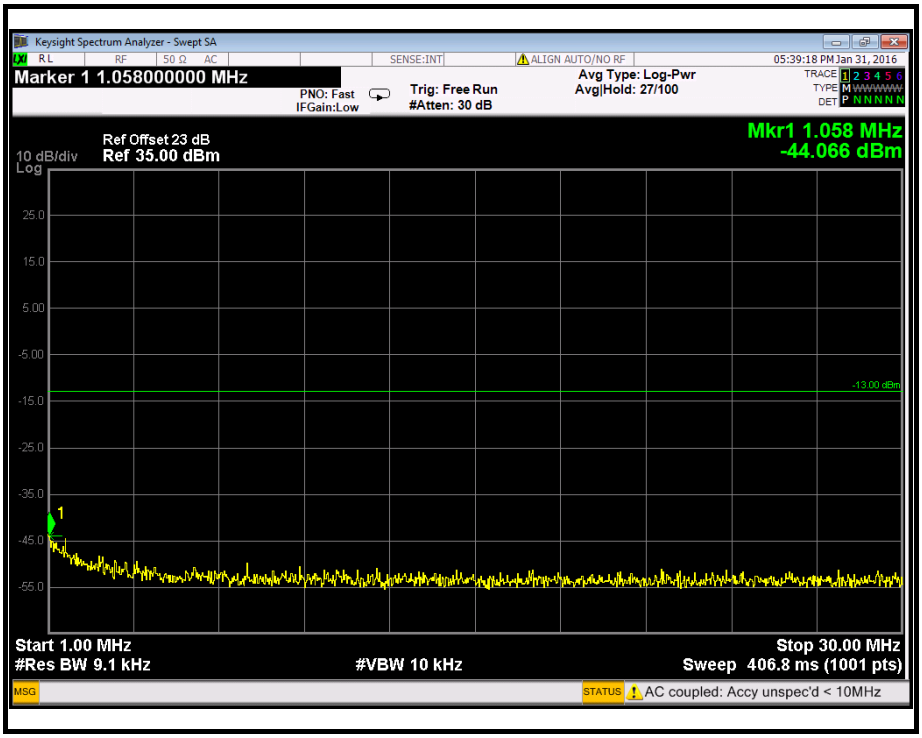


Figure 9-2: Out of Band emission at antenna terminals – GPRS CH Low

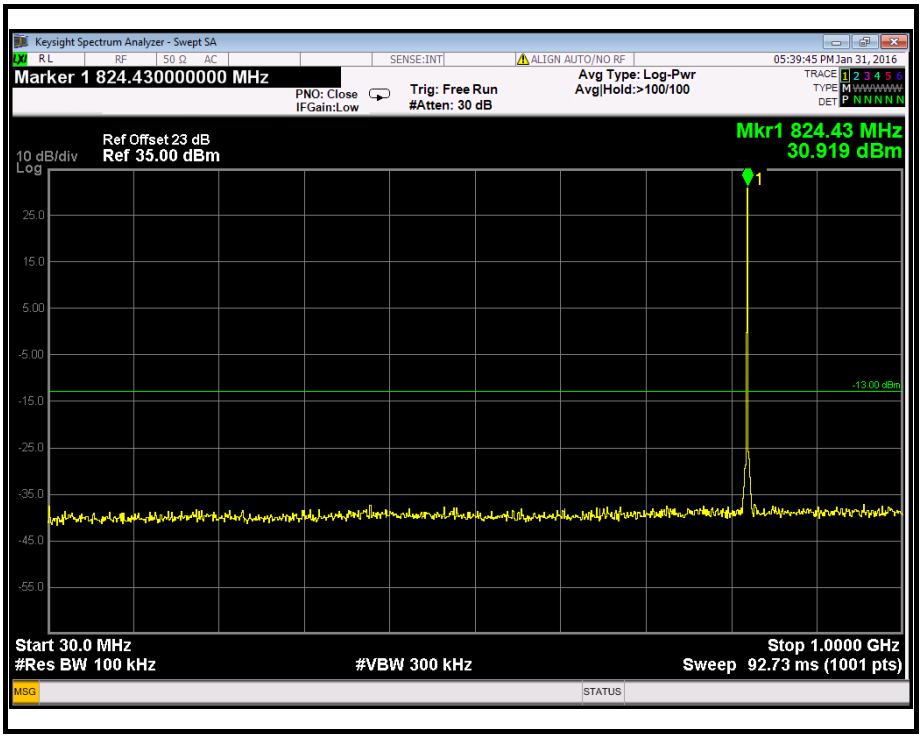


Figure 9-3: Out of Band emission at antenna terminals – GPRS CH Low

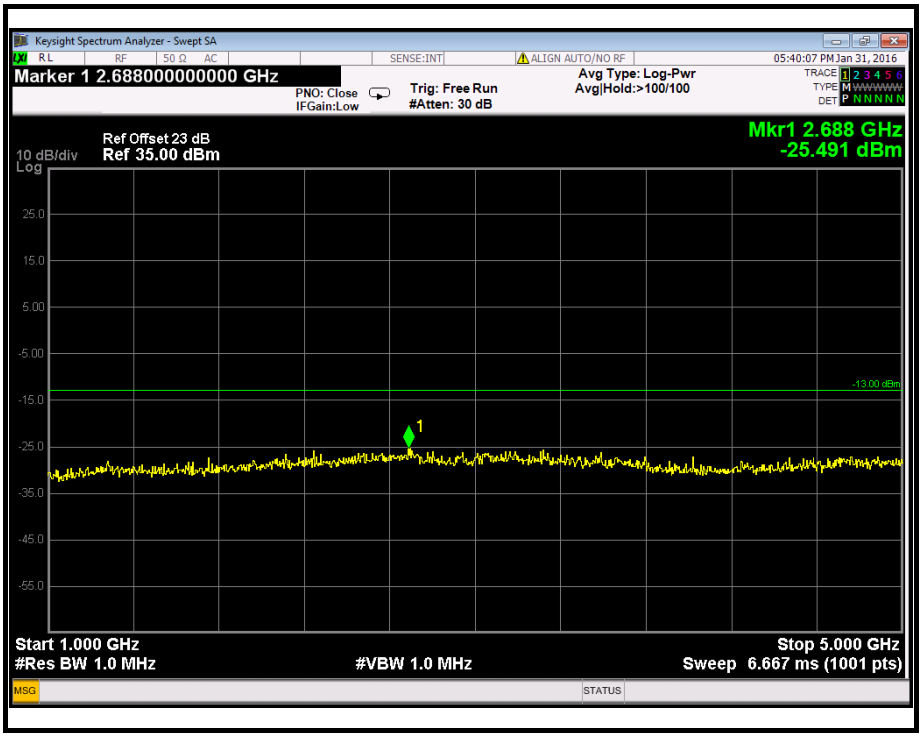


Figure 9-4: Out of Band emission at antenna terminals – GPRS CH Low

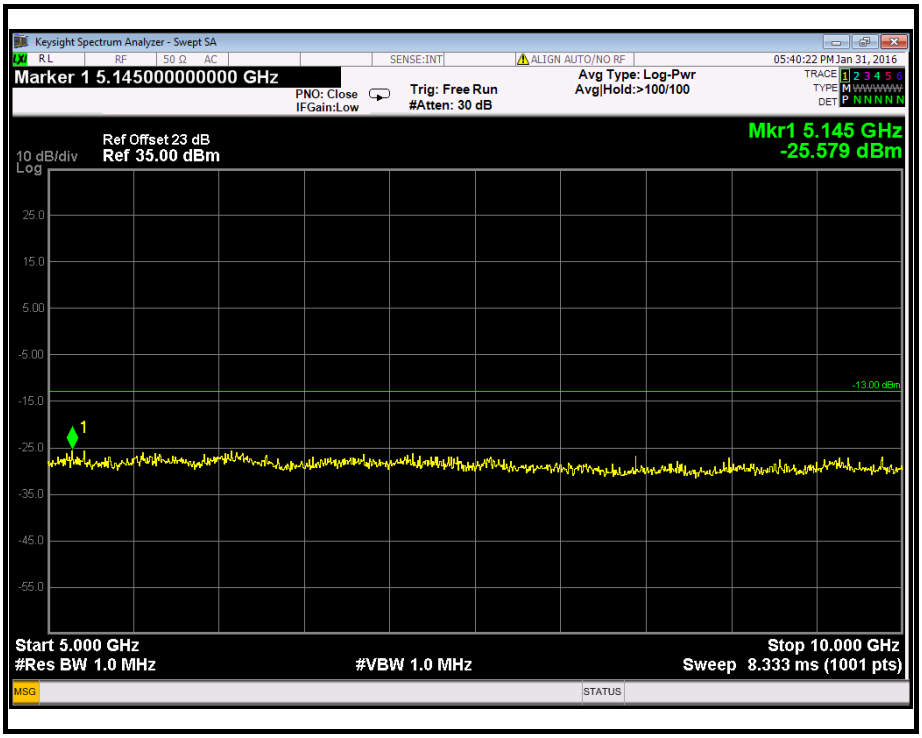


Figure 9-5: Out of Band emission at antenna terminals – GPRS CH Low

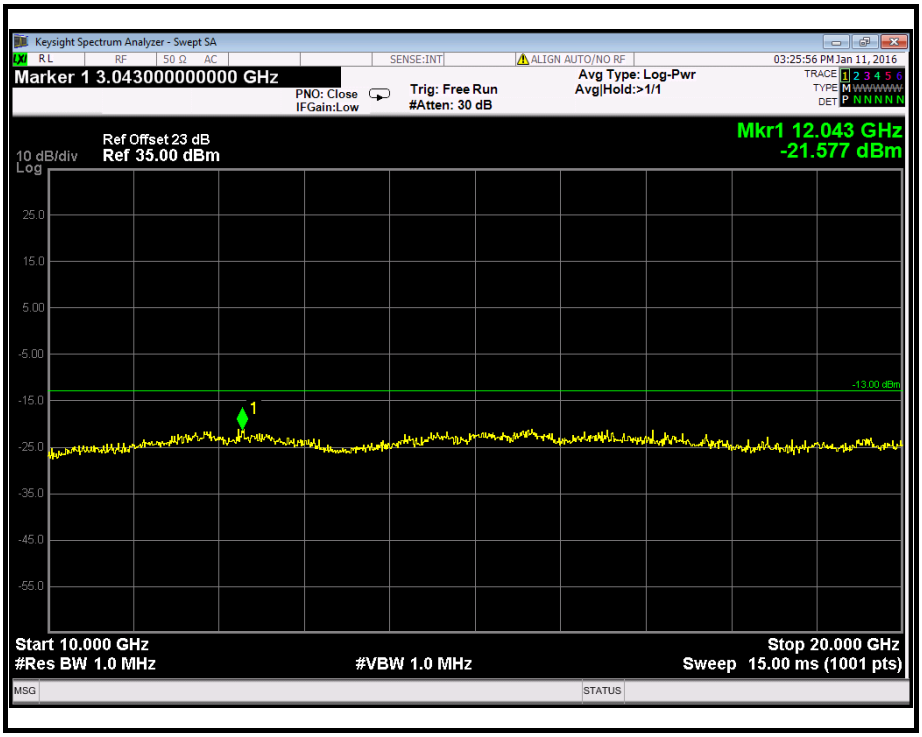


Figure 10-1: Out of Band emission at antenna terminals – GPRS CH Mid