FCC 47 CFR PART 22 SUBPART H AND PART 24 SUBPART E

TEST REPORT

for

GSM/WLAN Wireless data terminal

MODEL: BPC010

Brand: ProVista Care

Test Report Number:

C170525Z04-RP1-1

Issued Date: November 30, 2017

Issued for

Protronic (Far East) LTD.

Unit J,33F,COS Centre,56 Tsun Yip Street ,Kwun Tong,Kowloon,Hong Kong

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

TEL: 86-755-28055000

FAX: 86-755-28055221

E-Mail: service@ccssz.com

Certificate Number: 2861.01

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	November 30, 2017	Initial Issue	ALL	Amzula Chen

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1 TEST CERTIFICATION

Product	GSM/WLAN Wireless data terminal
Model	BPC010
Brand	ProVista Care
Tested	May 25~November 30, 2017
Applicant	**Protronic (Far East) LTD.** Unit J,33F,COS Centre,56 Tsun Yip Street ,Kwun Tong,Kowloon,Hong Kong
Manufacturer	**Dongguan Protronic Electronics Ltd.** XiangXi Village,Shipai Town,Dongguan City

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR PART 22 SUBPART H AND PART 24 SUBPART E	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.

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2 EUT DESCRIPTION

Product	GSM/WLAN Wireless data terminal
Model	BPC010
IMEI number	862016120100888
Brand	ProVista Care
Model Discrepancy	N/A
Identify Number	C170525Z04-RP1-1
Received Date	May 25, 2017
Power Supply	DC 5V supplied by the Notebook or DC 3.7V supplied by the battery
Battery specification	Model: MYD 502830 Rating: 3.7V, 400mAh, 1.48Wh
Frequency Range	GPRS / GSM 850MHz: 824 ~ 849 MHz GPRS / GSM 1900MHz: 1850 ~ 1910 MHz
Transmit Power (ERP & EIRP Power)	GPRS 850: 25.53dBm GPRS 1900: 26.59dBm GSM 850: 25.49dBm GSM 1900: 26.56dBm
Modulation Technique	GPRS / GSM: GMSK
Type of Emission	GPRS 850: 251KGXW GPRS 1900: 250KGXW GSM 850: 244GXW GSM 1900: 251GXW
Antenna Specification	Internal antenna with 0.8dBi gain (Max)
Temperature Range	0°C ~ +45°C
Hardware Version	E008-B_MB_V1.2
Software Version	E008B_2503A_11C_CTA_20170901.bin

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

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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.

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3.4. DESCRIPTION OF TEST MODES

The EUT (model: BPC010) 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/GSM

Test Mode	**Test Modes Description**
GSM/TM1	GSM system, GPRS, GMSK modulation
GSM/TM2	GSM system, GSM, GMSK modulation

Note:

1. 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	RF Channel		
	Low(L)	Middle (M)	High (H)
GSM850	Channel 128	Channel 190	Channel 251
	824.2 MHz	836.6 MHz	848.8 MHz
Test Mode	RF Channel		
	Low(L)	Middle (M)	High (H)
GSM1900	Channel 512	Channel 661	Channel 810
	1850.2 MHz	1880.0 MHz	1909.8 MHz

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3.5. Summary Results

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

Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	§2.1046, §22.913	FCC: ERP ≤ 7W IC: ERP ≤ 11.5W	Pass
Peak-Average Ratio	N/A	Limit≤13dB	Pass
Modulation Characteristics	§2.1047	Digital modulation	N/A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Pass
Band Edges Compliance	§2.1051, §22.917	≤-13dBm/1%*EBW, in 1MHz bands immediately outside and adjacent to The frequency block.	Pass
Spurious Emission at Antenna Terminals	§2.1051, §22.917	≤ -13dBm/1MHz, From 1MHz to 10th harmonics but outside authorized operating frequency ranges.	Pass
Field Strength of Spurious Radiation	§2.1053, §22.917	≤ -13dBm/1MHz.	Pass
Frequency Stability	§2.1055, §22.355	≤ ±2.5ppm.	Pass
Receiver Spurious Emissions	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”.			

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

Test Item	FCC Rule No.	Requirements	Verdict
Effective(Isotropic) Radiated Output Power	§2.1046, §24.232	FCC: EIRP ≤ 2W IC: EIRP ≤ 2W	Pass
Peak-Average Ratio	§2.1046, §24.232	Limit≤13dB	Pass
Modulation Characteristics	§2.1047	Digital modulation	N/A
Bandwidth	§2.1049	OBW: No limit. EBW: No limit.	Pass
Band Edges Compliance	§2.1051, §24.238	≤-13dBm/1%*EBW, in 1MHz bands immediately outside and adjacent to The frequency block.	Pass
Spurious Emission at Antenna Terminals	§2.1051, §24.238	≤ -13dBm/1MHz, From 1MHz to 10th harmonics but outside authorized operating frequency ranges.	Pass
Field Strength of Spurious Radiation	§2.1053, §22.917	≤ -13dBm/1MHz.	Pass
Frequency Stability	§2.1055, §24.235	≤ ±2.5ppm.	Pass
Receiver Spurious Emissions	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”.			

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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-4815,R-4320,T-2317, 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.*

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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	THINKPAD S2	N/A	DoC	LENOVO	N/A	Unshielded: 1.00m (AC Cable) Unshielded: 1.50m (DC Cable)
2	Wideband radio communication tester	CMW500	N/A	DoC	ROHDE&SCHWARZ	Shielded: 3.00m (Coaxial Cable)	Unshielded: 1.50m (AC Cable)

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6 FCC PART 22 & 24 REQUIREMENTS

6.1. 26DB BANDWIDTH

.6.1.1. LIMIT

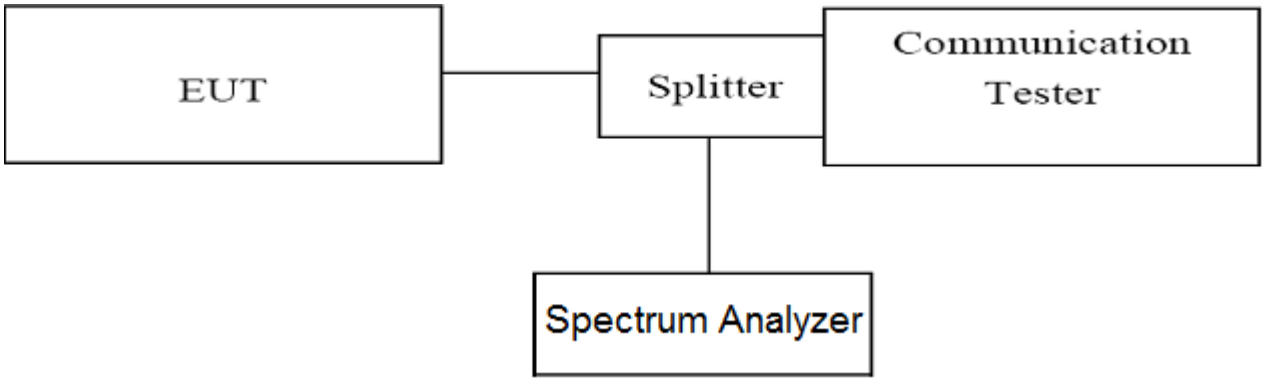
None; for reporting purposes only.

.6.1.2. MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY55370330	02/21/2017	02/20/2018
Universal Radio Communication Tester	Agilent	8960	GB44400261	02/21/2017	02/20/2018

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.

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TEST DATA

Test Mode	Channel	Frequency (MHz)	Occupied Bandwidth (99% BW) (kHz)	Emission Bandwidth (-26 dB BW) (kHz)	Verdict
GSM/TM1 /GPRS850	128	824.2	250.88	308.10	PASS
	190	836.6	245.03	300.80	PASS
	251	848.8	247.06	309.50	PASS
GSM/TM2 /GSM850	128	824.2	243.77	316.90	PASS
	190	836.6	243.49	306.20	PASS
	251	848.8	243.06	309.90	PASS
GSM/TM1 /GPRS1900	512	1850.2	245.80	306.30	PASS
	661	1880.0	246.91	314.50	PASS
	810	1908.8	250.10	314.40	PASS
GSM/TM2 /GSM1900	512	1850.2	246.10	309.30	PASS
	661	1880.0	249.18	312.00	PASS
	810	1908.8	250.73	311.40	PASS

Remark:

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

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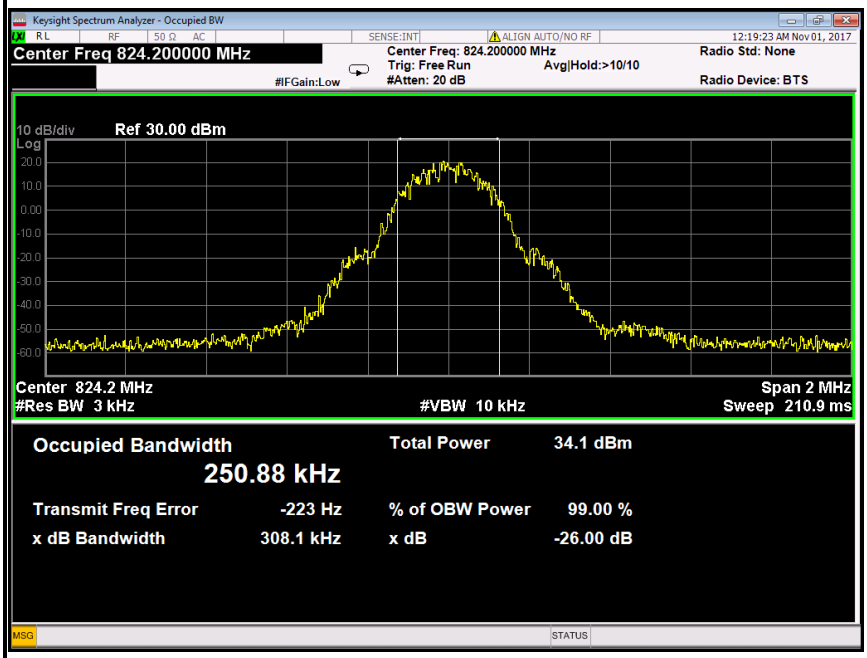
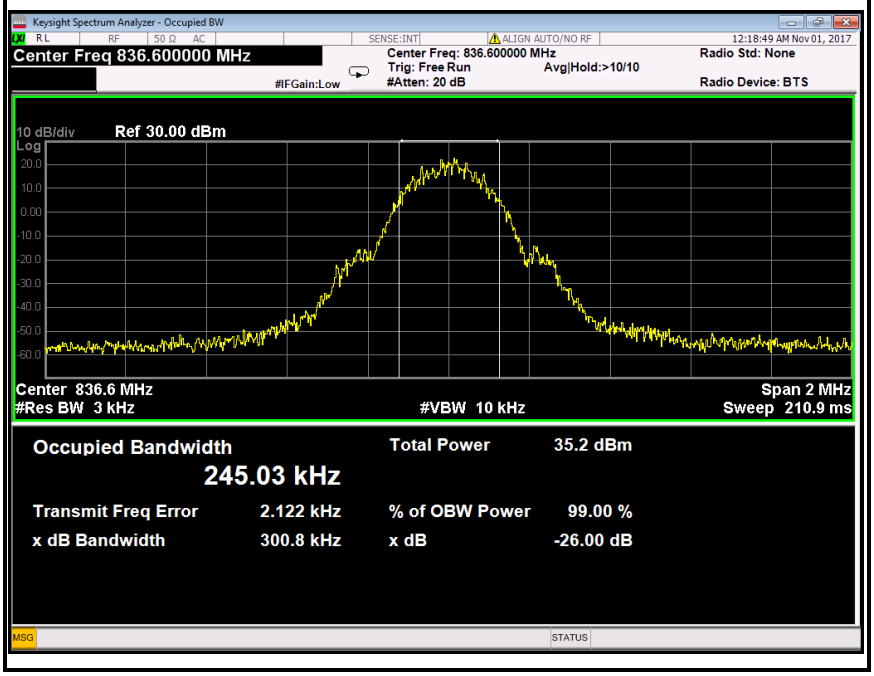
TEST PLOT

GPRS 850 (CH Low)



GPRS 850 (CH Mid)



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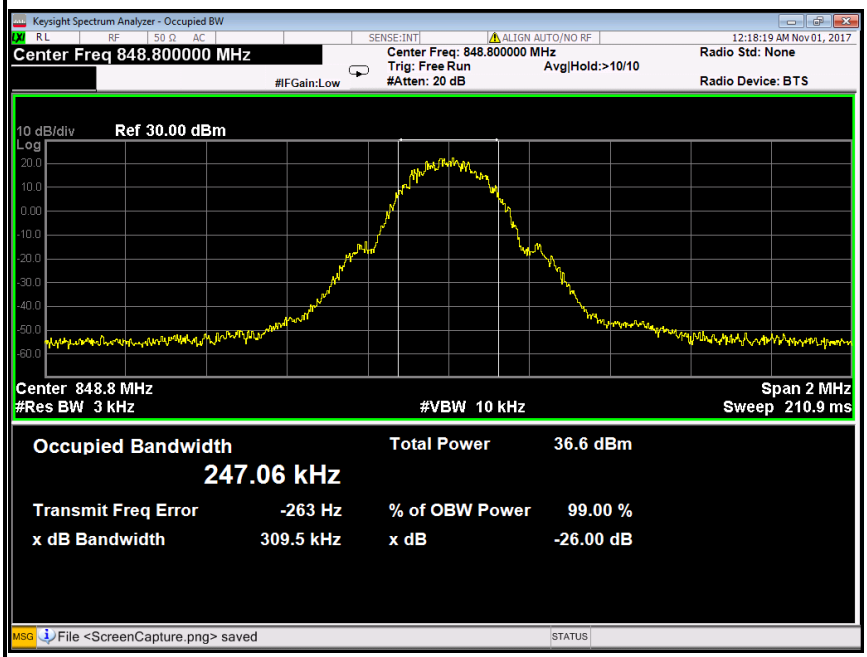
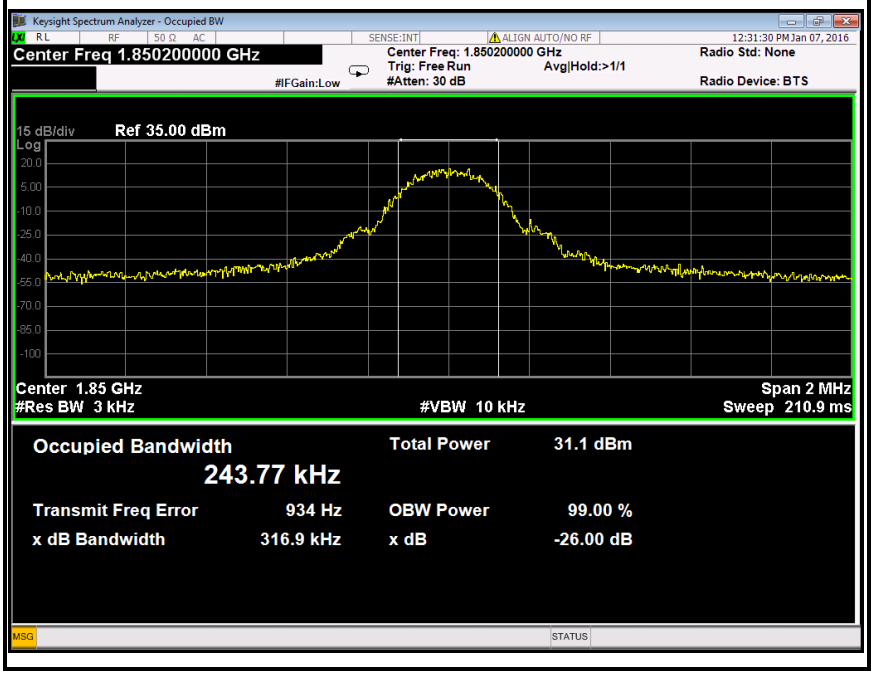
GPRS 850 (CH High)



GPRS 1900 (CH Low)



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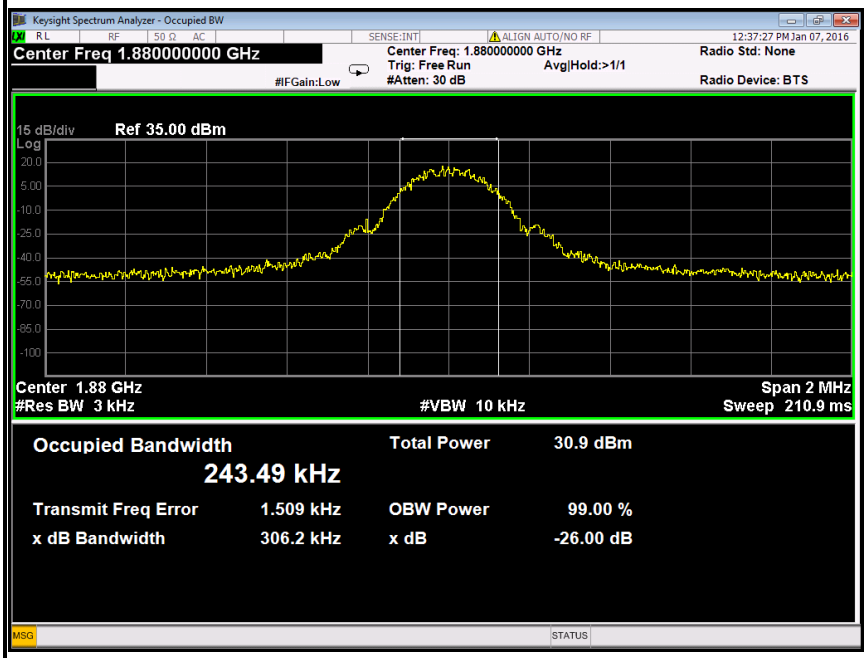
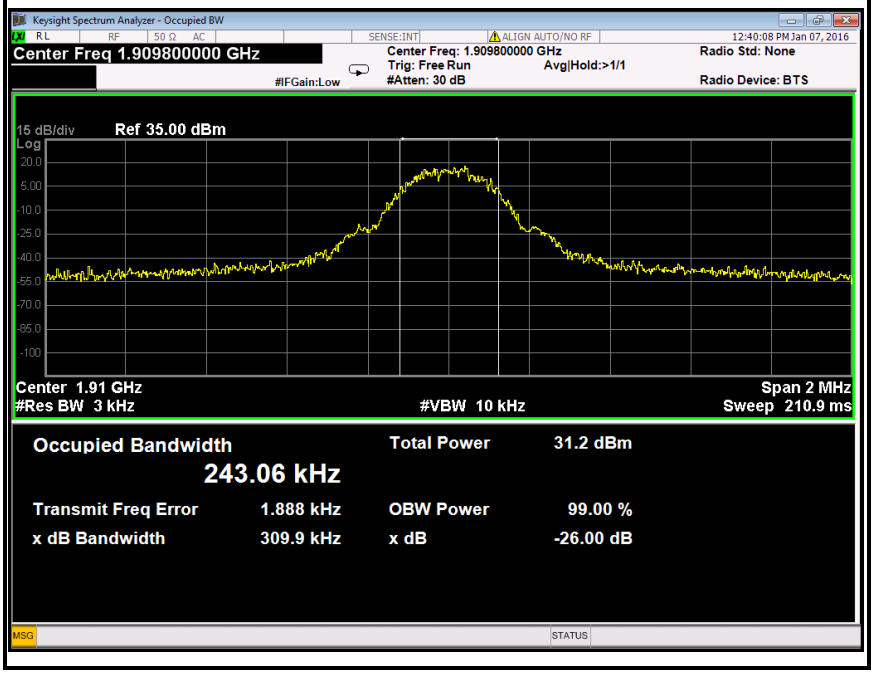
GPRS 1900 (CH Mid)



GPRS 1900 (CH High)



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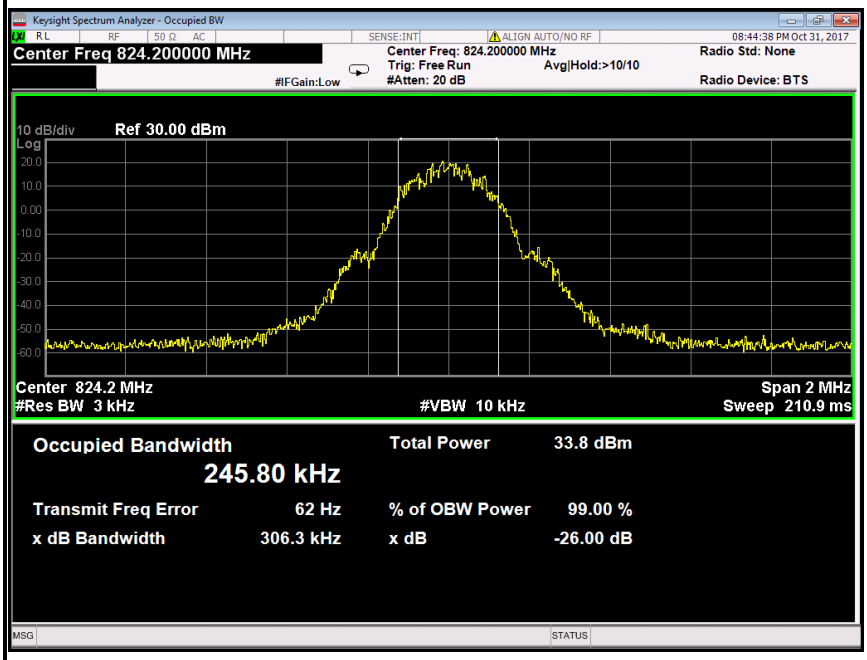
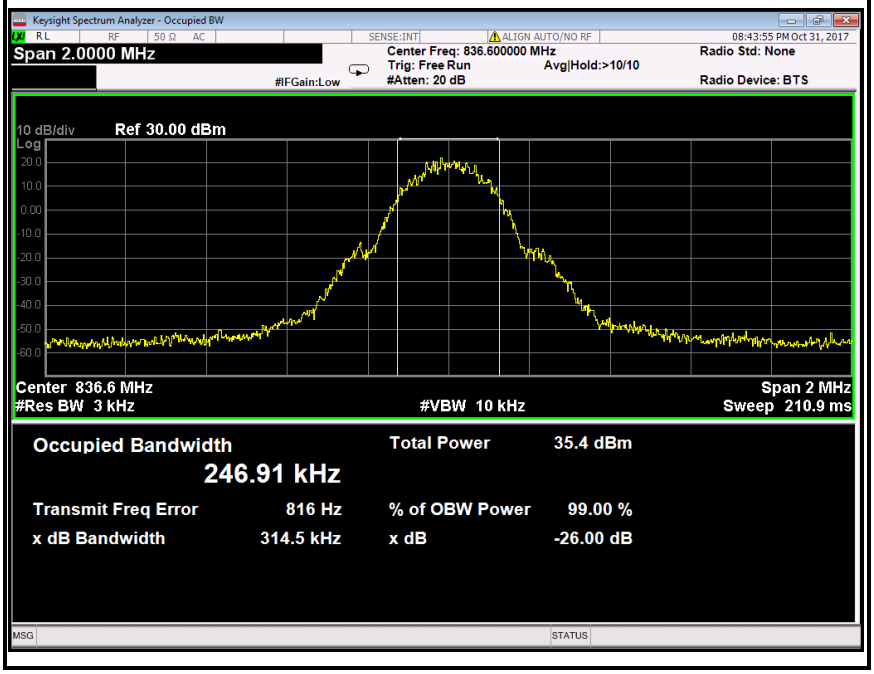
GSM 850 (CH Low)



GSM 850 (CH Mid)



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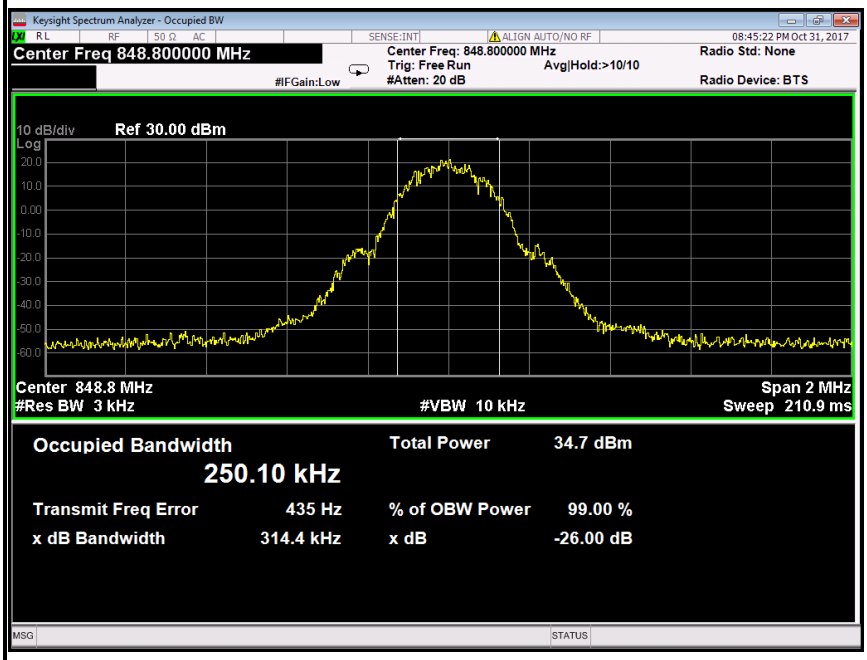
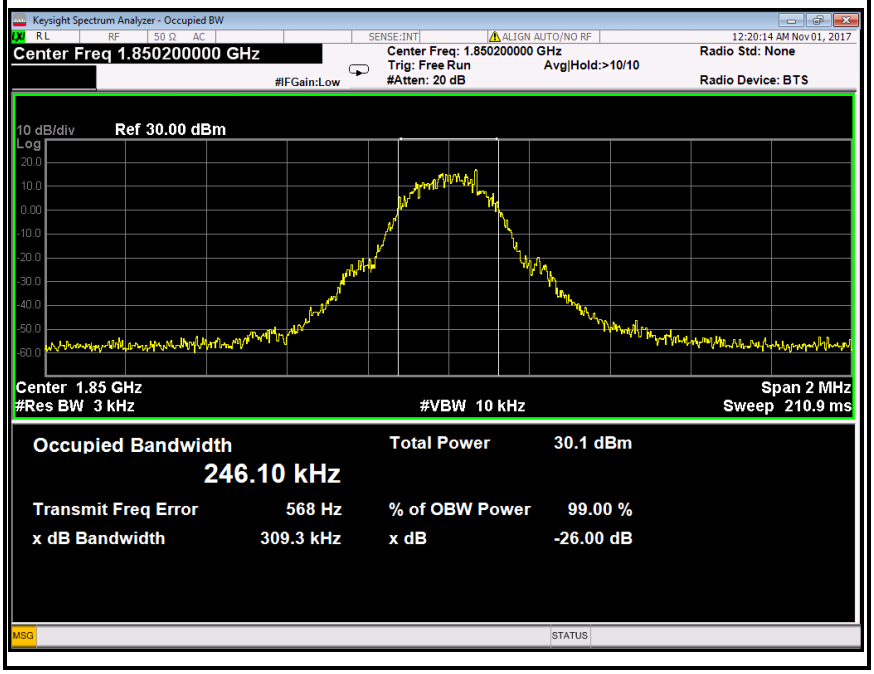
GSM 850 (CH High)



GSM 1900 (CH Low)



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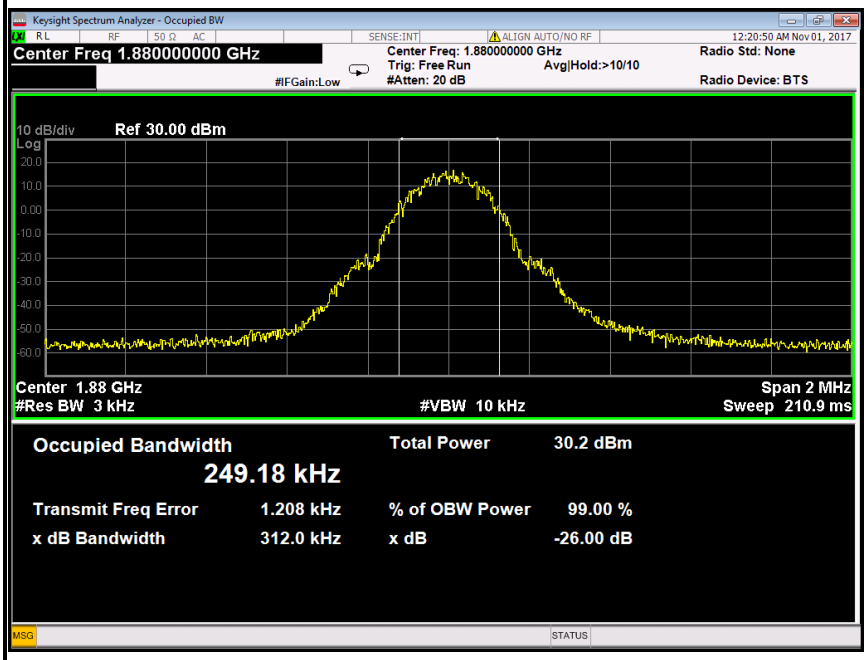
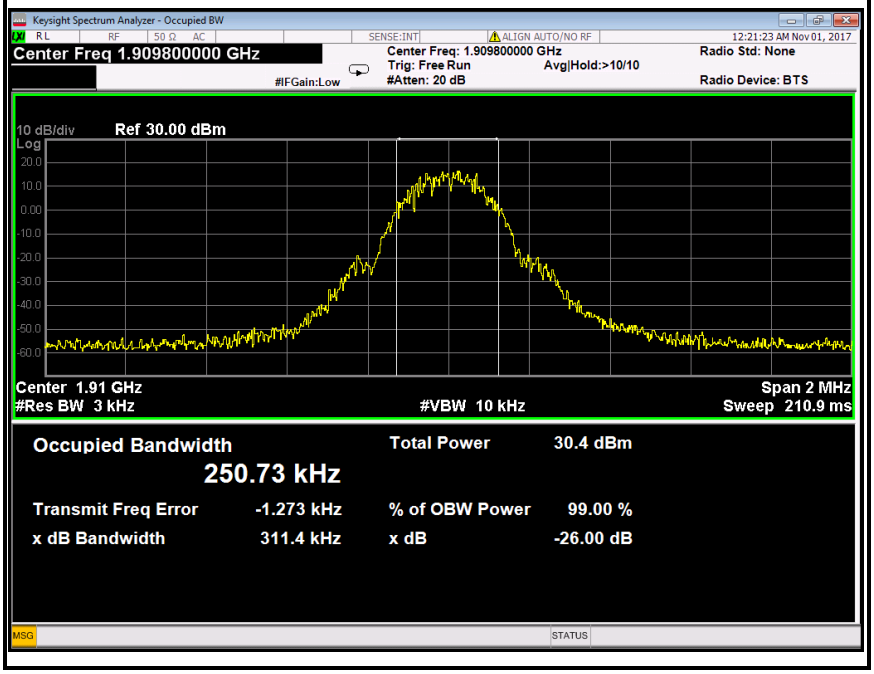
GSM 1900 (CH Mid)



GSM 1900 (CH High)



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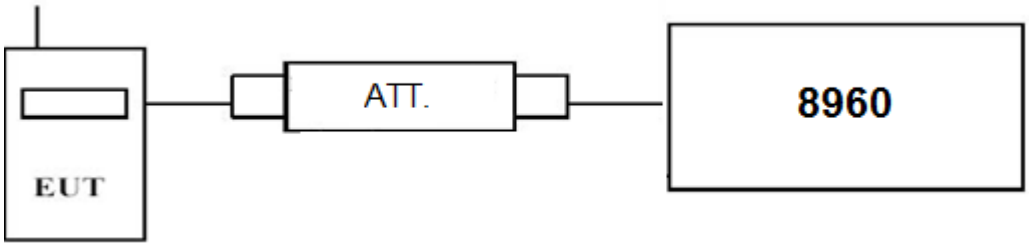
6.2. BURST AVERAGE POWER

.6.2.1. MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Universal Radio Communication Tester	Agilent	8960	GB44400261	02/21/2017	02/20/2018

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 8960 by an Att.
c) EUT Communicate with 8960 then selects a channel for testing.
d) Add a correction factor to the display 8960, and then test.

.6.2.4. TEST RESULTS

No non-compliance noted.

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TEST DATA

Test Mode	Channel	Frequency (MHz)	Burst Average Power (dBm)	Results
GPRS 850	128	824.20	24.65	PASS
	190	836.60	24.07	PASS
	251	848.80	25.53	PASS
GPRS 1900	512	1850.20	25.63	PASS
	661	1880.00	25.02	PASS
	810	1909.80	26.59	PASS

Test Mode	Channel	Frequency (MHz)	Burst Average Power (dBm)	Results
GSM 850	128	824.20	24.60	PASS
	190	836.60	24.18	PASS
	251	848.80	25.49	PASS
GSM 1900	512	1850.20	25.52	PASS
	661	1880.00	25.14	PASS
	810	1909.80	26.56	PASS

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

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6.3. PEAK TO AVERAGE RATIO

6.3.1. LIMIT

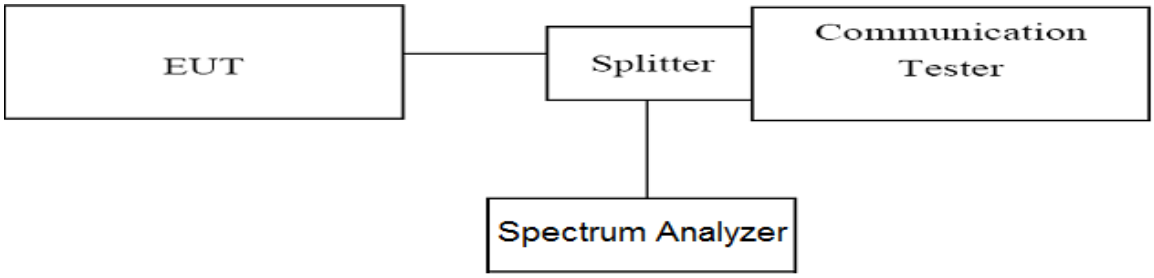
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

6.3.2. MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2017	02/20/2018
Universal Radio Communication Tester	Agilent	8960	GB44400261	02/21/2017	02/20/2018

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

6.3.3. TEST CONFIGURATION



6.3.4. TEST PROCEDURE

For GPRS/GSM

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%.

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6.3.5. TEST RESULTS

No non-compliance noted.

Test Mode	Channel	Frequency (MHz)	PAPR Value (dB)	Limits (dB)	Verdict
GPRS /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/GSM850	128	824.20	0.51	13.0	PASS
	190	836.60	0.60	13.0	
	251	848.80	0.59	13.0	
GPRS/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/GSM1900	512	1850.2	0.53	13.0	PASS
	661	1880.0	0.51	13.0	
	810	1908.8	0.57	13.0	

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6.4. ERP & EIRP MEASUREMENT

6.4.1. 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).

6.4.2. MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2017	02/20/2018
Universal Radio Communication Tester	Agilent	8960	GB44400261	02/21/2017	02/20/2018
Amplifier	EMEC	EM330	060661	02/21/2017	02/20/2018
High Noise Amplifier	Agilent	8449B	3008A01838	02/21/2017	02/20/2018
Bilog Antenna	Schwarzbeck	VULB 9160	9160-3401	02/28/2017	02/27/2018
Horn Antenna	TRC	HA0301	N/A	02/28/2017	02/27/2018
Bilog Antenna	SCHAFFNER	CBL6143	5063	02/21/2017	02/20/2018
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/28/2017	02/27/2018
Signal Generator	Anritsu	MG3694A	#050125	02/28/2017	02/27/2018
Power Meter	Anritsu	ML2495A	1204003	02/21/2017	02/20/2018
Power Sensor	Anritsu	MA2411B	1126150	02/21/2017	02/20/2018
Turn Table	N/A	N/A	N/A	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	02/21/2017	02/20/2018
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.

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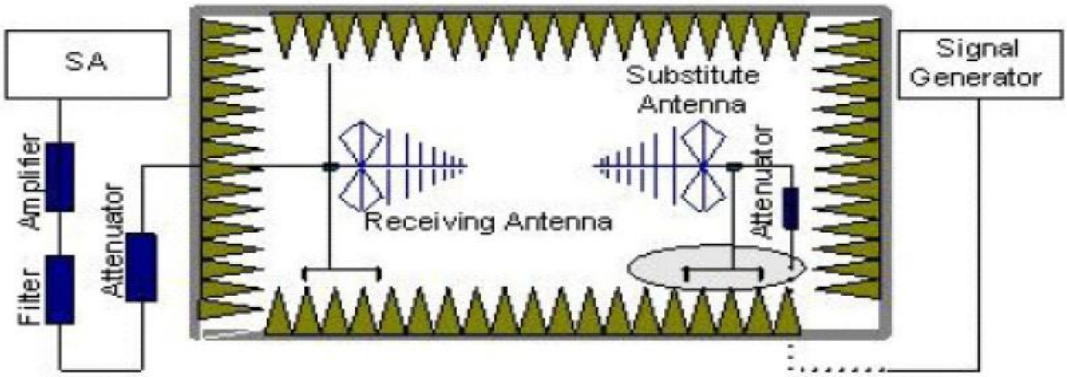
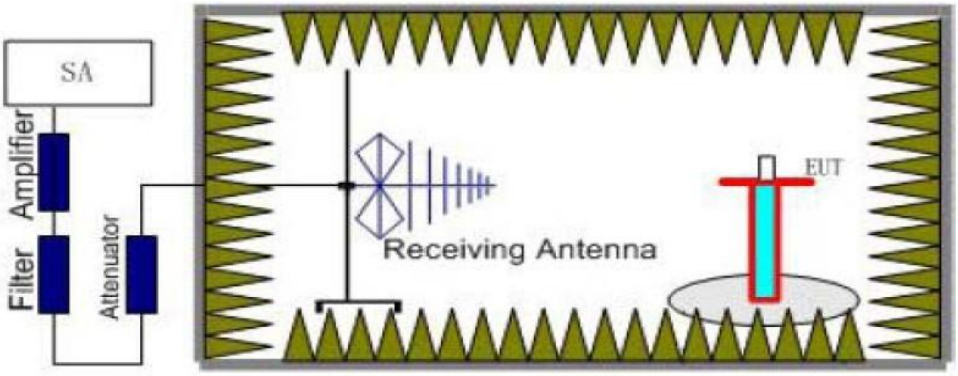
6.4.3. TEST CONFIGURATION





6.4.4. 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

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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.

6.4.5. 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	-12.54	4.10	7.26	2.15	33.11	21.58	38.45	-16.87	V
836.60	-13.57	4.14	7.26	2.15	33.11	20.51	38.45	-17.94	V
848.80	-11.84	3.90	7.26	2.15	33.12	22.49	38.45	-15.96	V
824.20	-11.01	4.10	7.26	2.15	33.11	23.11	38.45	-15.34	H
836.60	-11.84	4.14	7.26	2.15	33.11	22.24	38.45	-16.21	H
848.80	-10.37	3.90	7.26	2.15	33.12	23.96	38.45	-14.49	H

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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	-12.79	6.04	7.98	34.74	23.89	33.01	-9.12	V
1880.00	-14.48	5.20	8.05	34.78	23.15	33.01	-9.86	V
1909.80	-12.65	5.88	8.12	34.78	24.37	33.01	-8.64	V
1850.20	-10.39	6.04	7.98	34.74	26.29	33.01	-6.72	H
1880.00	-12.06	5.20	8.05	34.78	25.57	33.01	-7.44	H
1909.80	-10.04	5.88	8.12	34.78	26.98	33.01	-6.03	H

GSM 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	-13.18	4.10	7.26	2.15	33.11	20.94	38.45	-17.51	V
836.60	-13.34	4.14	7.26	2.15	33.11	20.74	38.45	-17.71	V
848.80	-12.58	3.90	7.26	2.15	33.12	21.75	38.45	-16.70	V
824.20	-11.17	4.10	7.26	2.15	33.11	22.95	38.45	-15.50	H
836.60	-11.72	4.14	7.26	2.15	33.11	22.36	38.45	-16.09	H
848.80	-10.47	3.90	7.26	2.15	33.12	23.86	38.45	-14.59	H

GSM 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	-13.07	6.04	7.98	34.74	23.61	33.01	-9.40	V
1880.00	-14.72	5.20	8.05	34.78	22.91	33.01	-10.10	V
1909.80	-12.63	5.88	8.12	34.78	24.39	33.01	-8.62	V
1850.20	-10.56	6.04	7.98	34.74	26.12	33.01	-6.89	H
1880.00	-12.20	5.20	8.05	34.78	25.43	33.01	-7.58	H
1909.80	-10.08	5.88	8.12	34.78	26.94	33.01	-6.07	H

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6.5. OUT OF BAND EMISSION AT ANTENNA TERMINALS

6.5.1. 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.

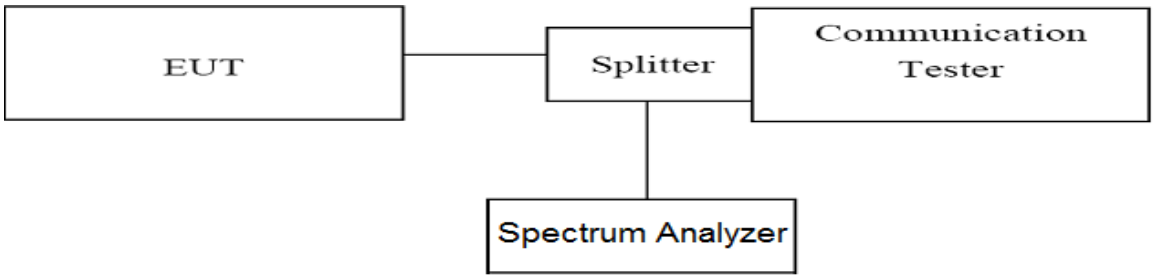
Band Edge Requirements: In the 1MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the Out of band Emission

6.5.2. MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2017	02/20/2018
Universal Radio Communication Tester	Agilent	8960	GB44400261	02/21/2017	02/20/2018

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

6.5.3. TEST CONFIGURATION



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6.5.4. 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.

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6.5.5. 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

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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
GSM 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
GSM 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

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		Figure 14-5	Conducted spurious emissions, 10GHz - 20GHz
Mode	**CH**	**Location**	**Description**
GSM 850	128	Figure 15-1	Band Edge emissions
	251	Figure 15-2	Band Edge emissions
GSM1900	512	Figure 16-1	Band Edge emissions
	810	Figure 16-2	Band Edge emissions

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Test Plot

GPRS 850

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

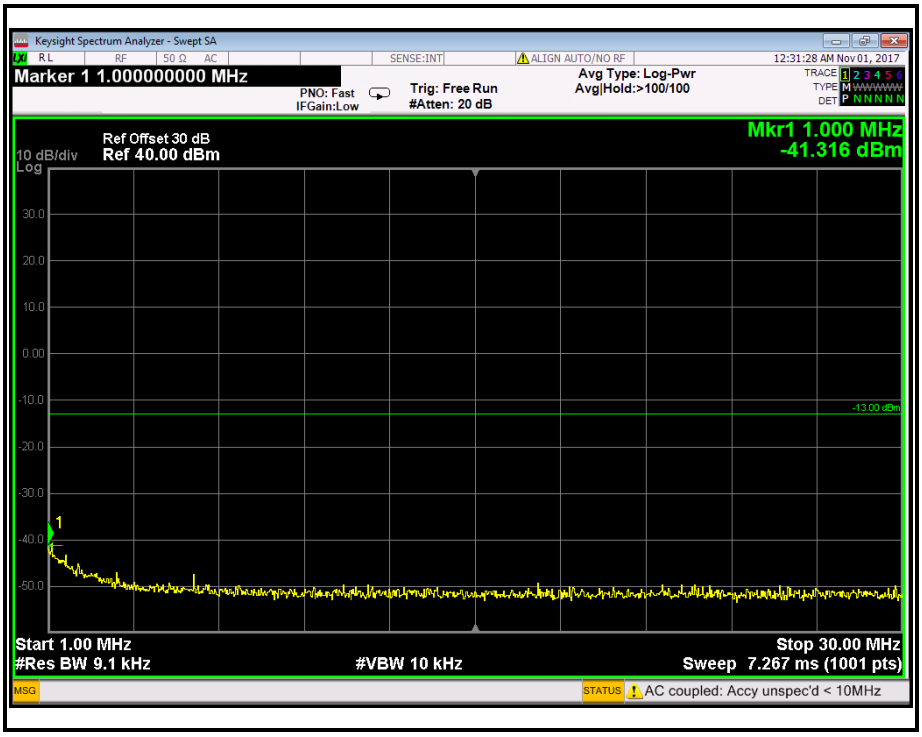

Figure 1-2: Out of Band emission at antenna terminals – GPRS CH Low

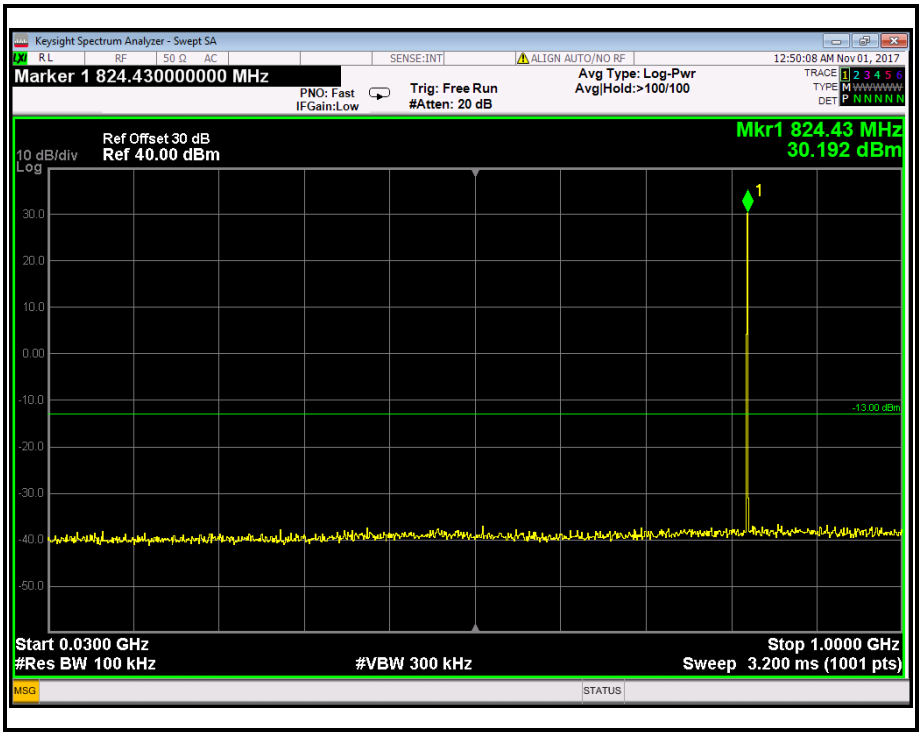

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Figure 1-3: Out of Band emission at antenna terminals – GPRS CH Low

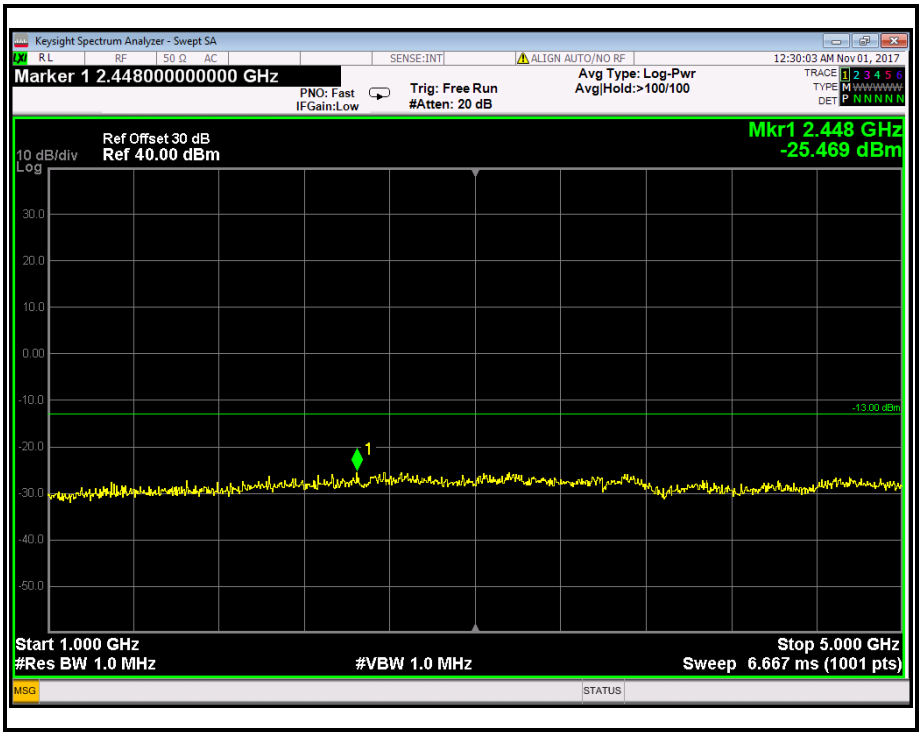

Figure 1-4: Out of Band emission at antenna terminals – GPRS CH Low

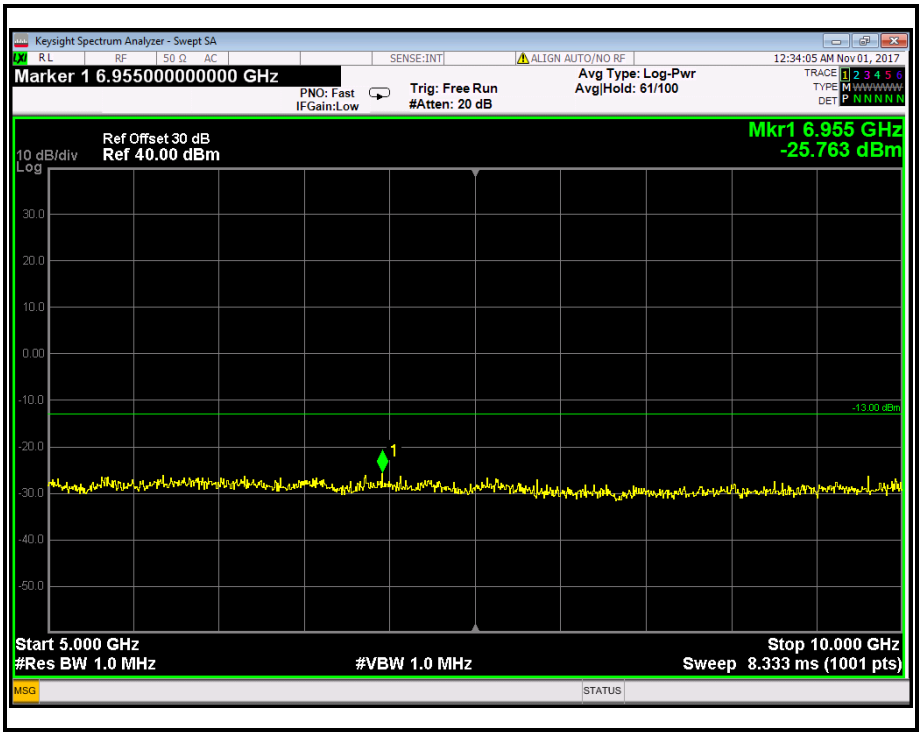

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Figure 1-5: Out of Band emission at antenna terminals – GPRS CH Low

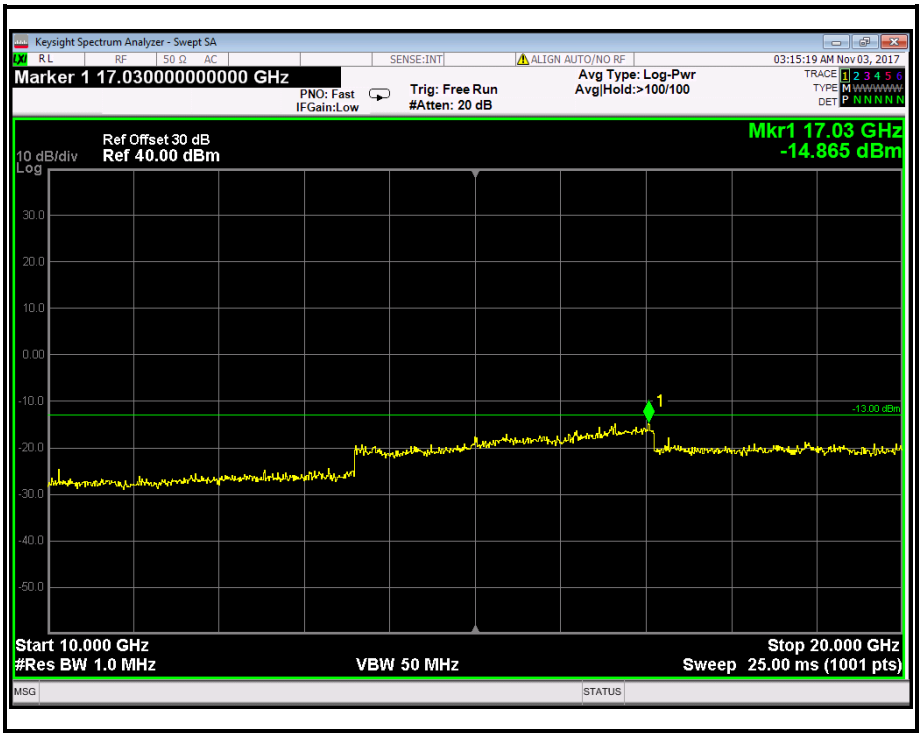

Figure 2-1: Out of Band emission at antenna terminals – GPRS CH Mid

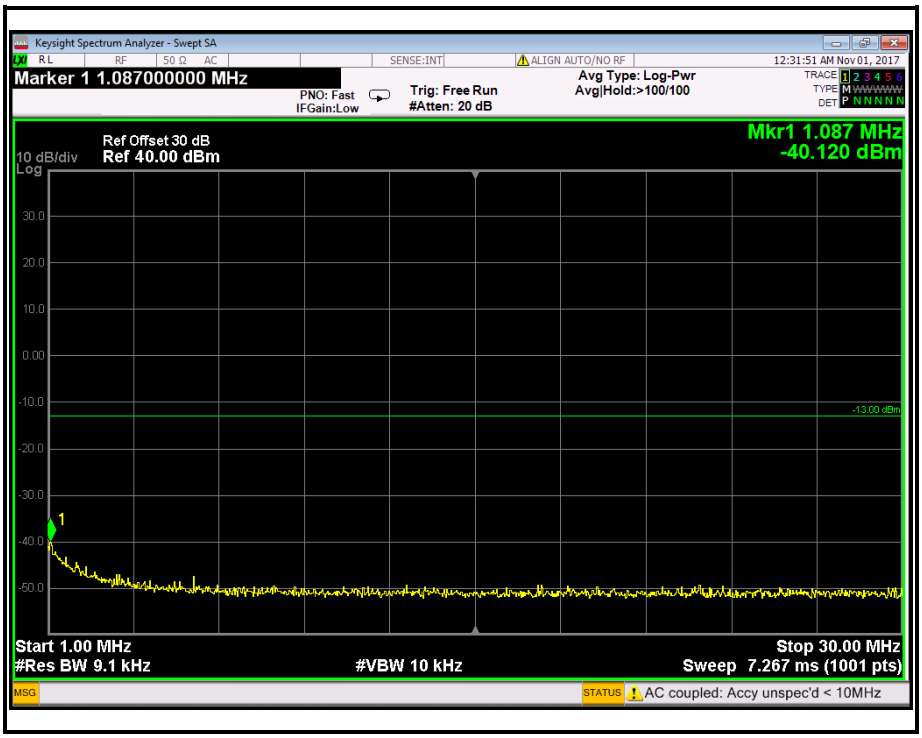

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Figure 2-2: Out of Band emission at antenna terminals – GPRS CH Mid

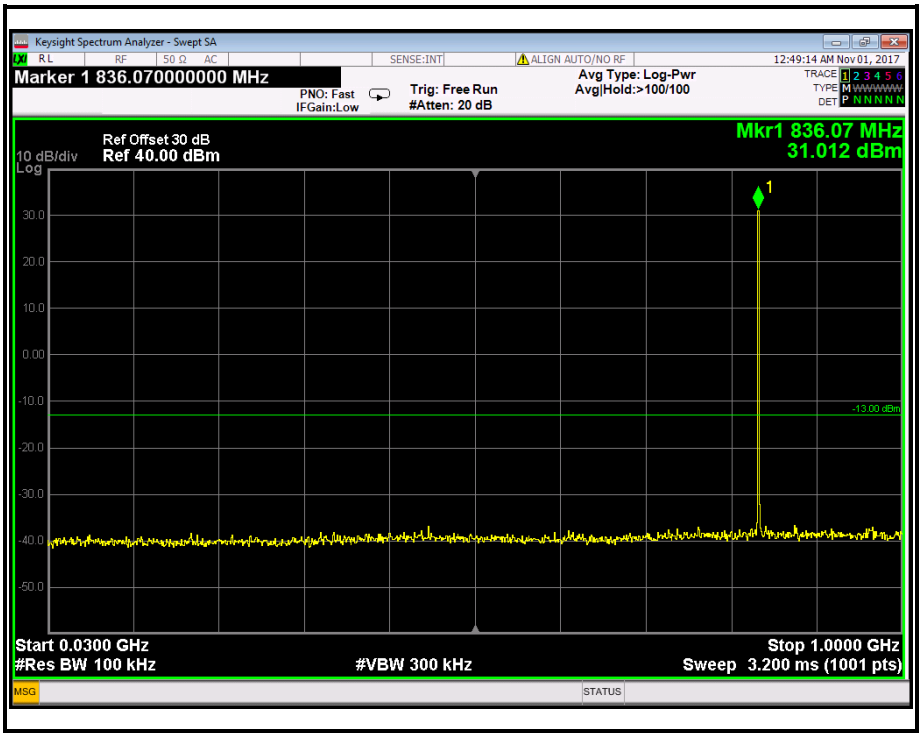

Figure 2-3: Out of Band emission at antenna terminals – GPRS CH Mid

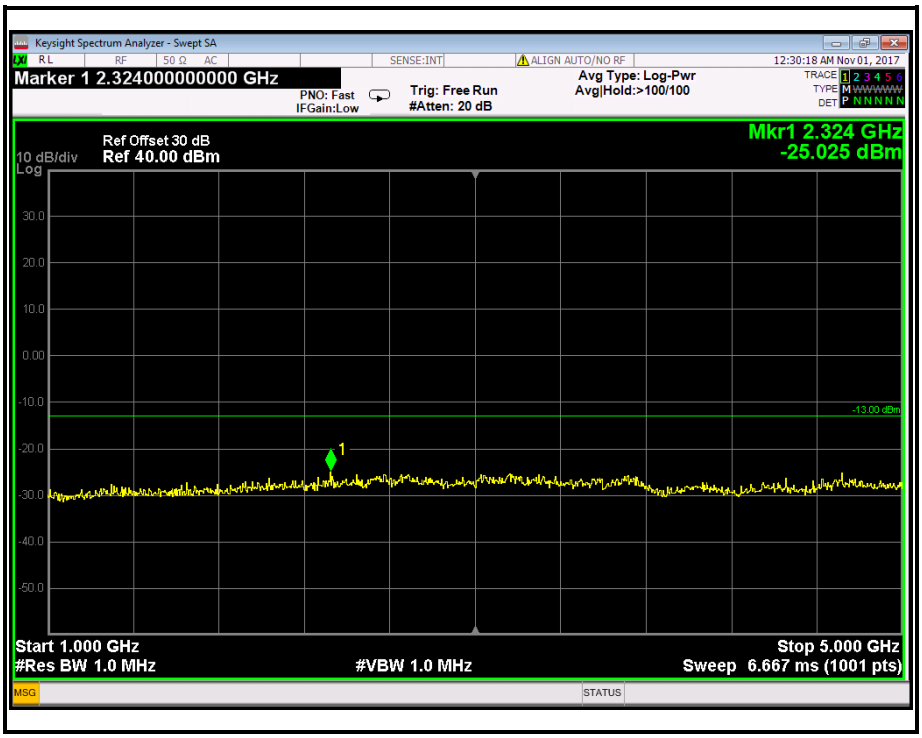

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Figure 2-4: Out of Band emission at antenna terminals – GPRS CH Mid

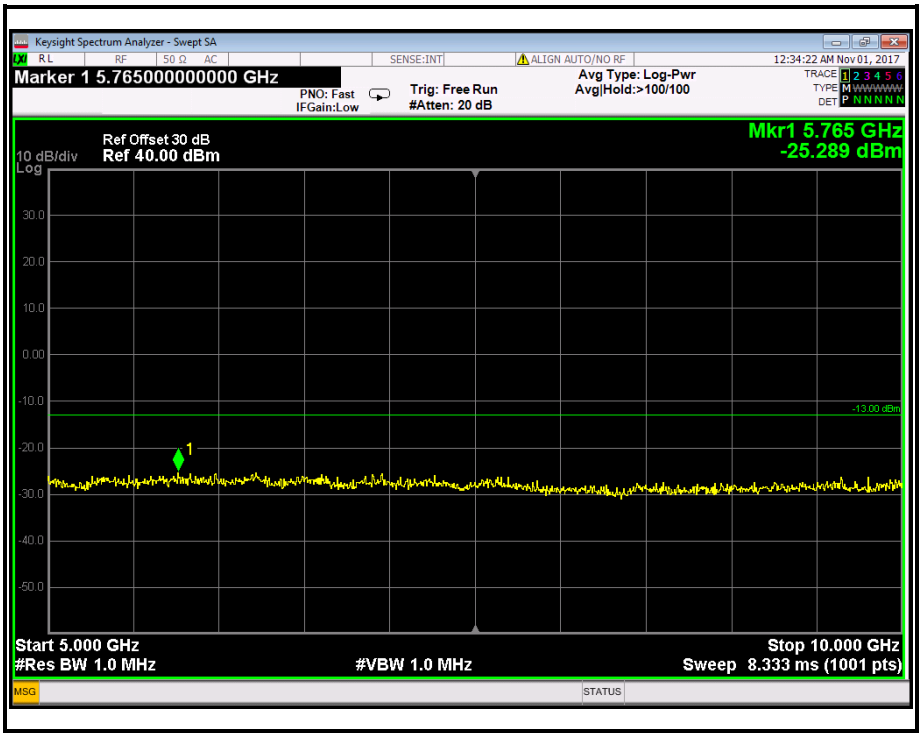

Figure 2-5: Out of Band emission at antenna terminals – GPRS CH High

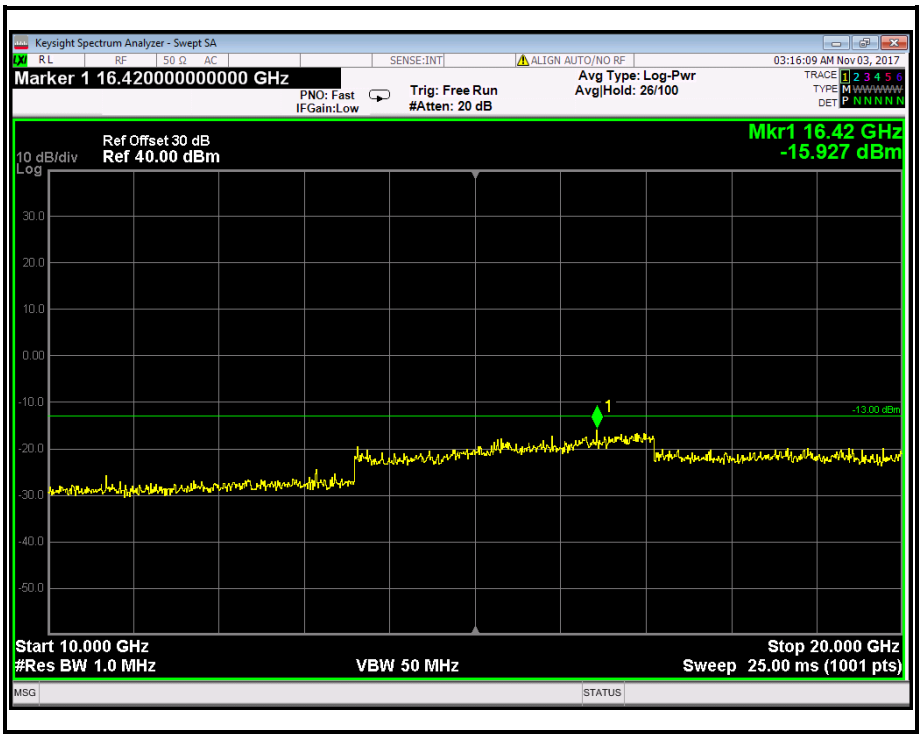

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Figure 3-1: Out of Band emission at antenna terminals – GPRS CH High

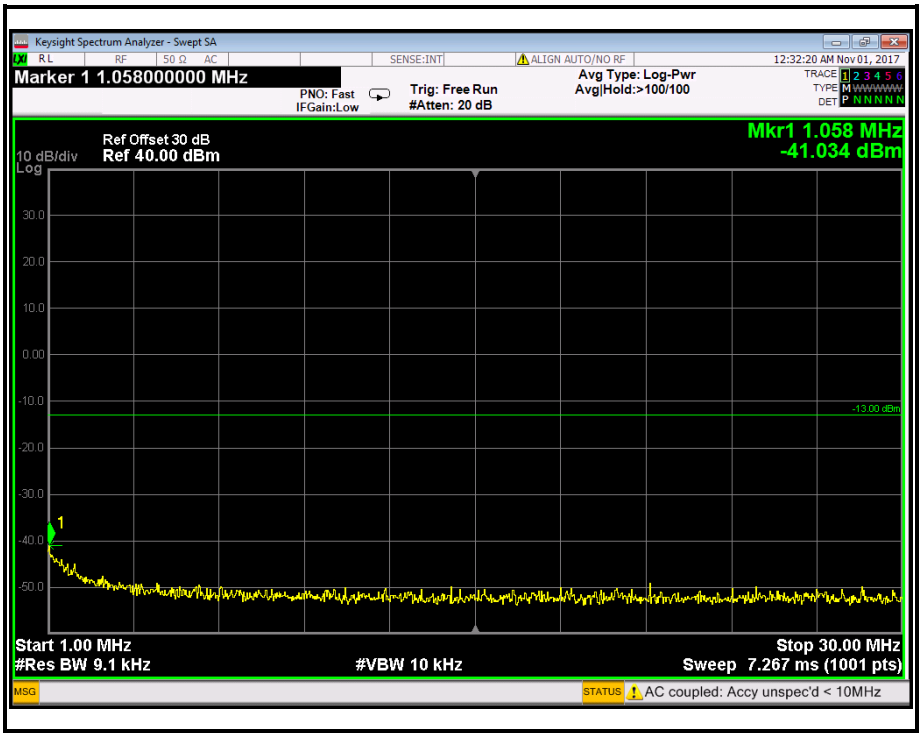

Figure 3-2: Out of Band emission at antenna terminals – GPRS CH High

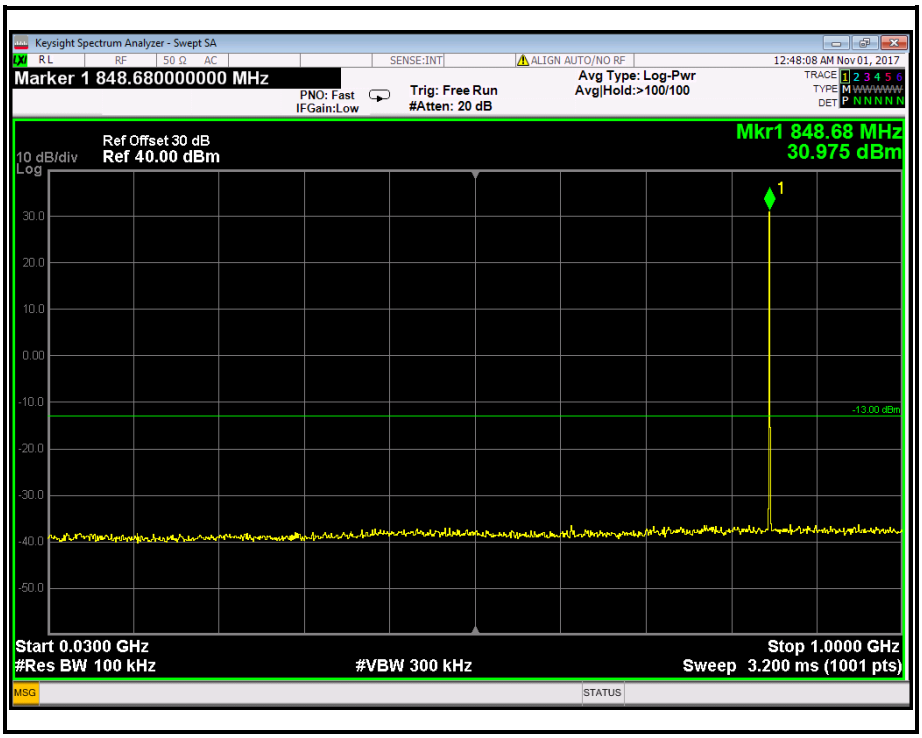

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Figure 3-3: Out of Band emission at antenna terminals – GPRS CH High

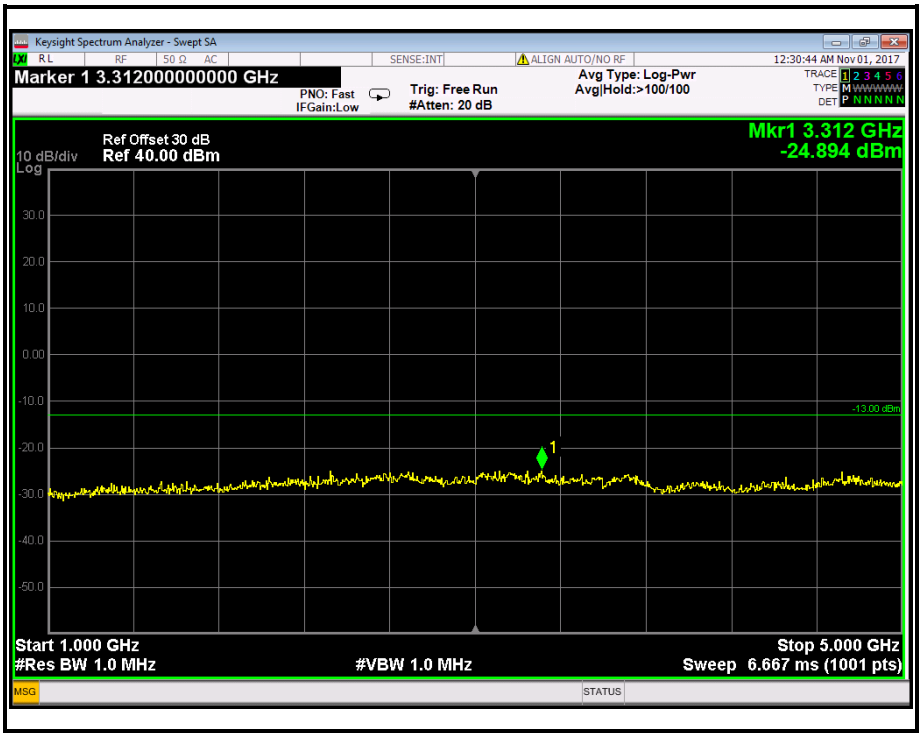

Figure 3-4: Out of Band emission at antenna terminals – GPRS CH High

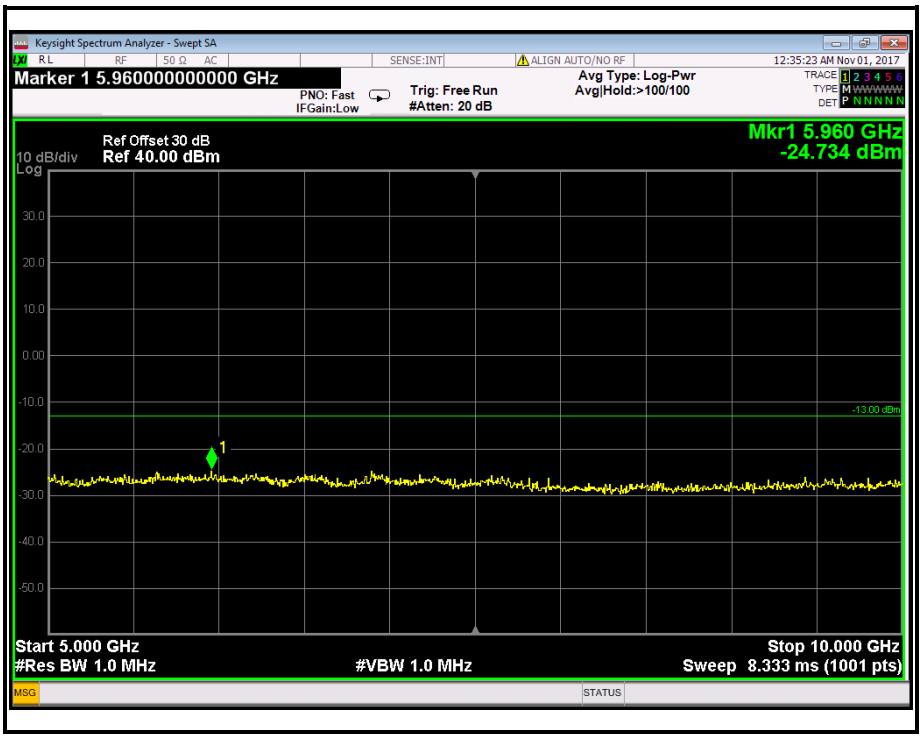

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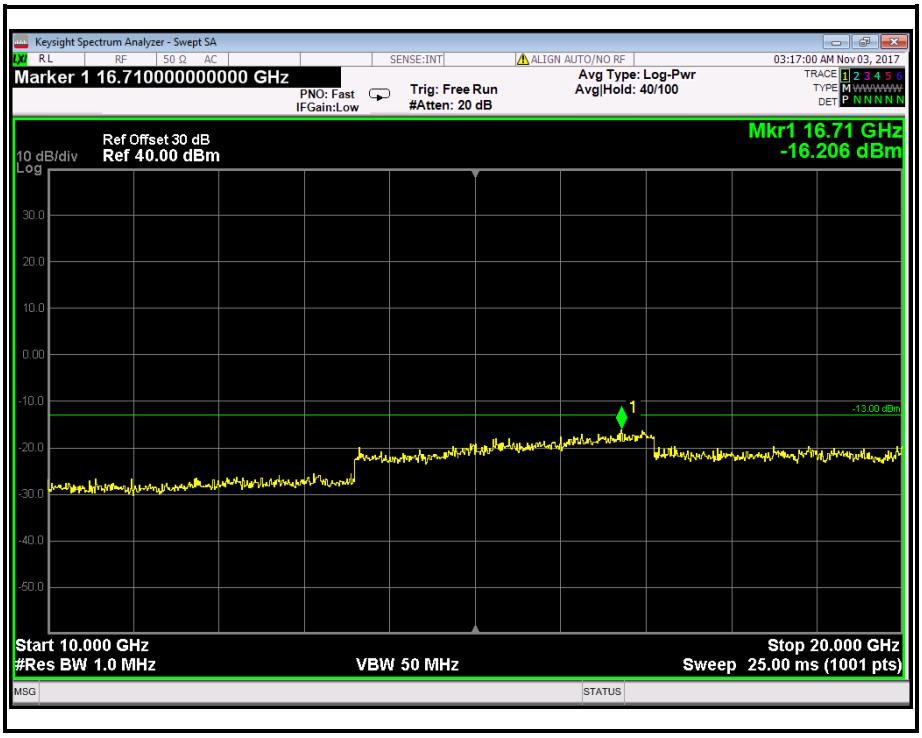
Figure 3-5: Out of Band emission at antenna terminals – GPRS CH High



GPRS 1900

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

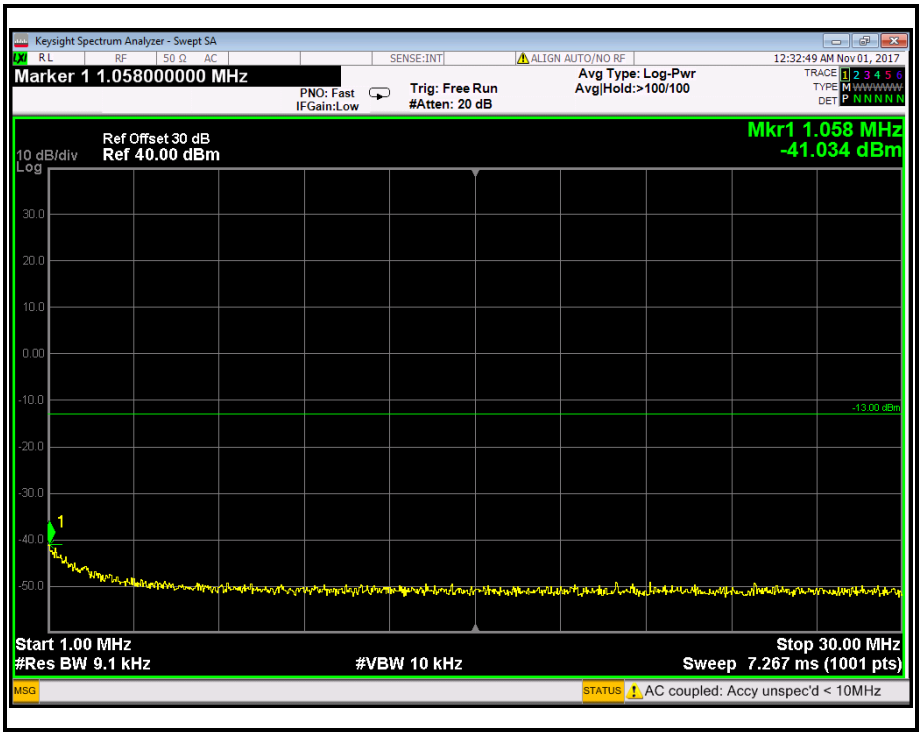


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Figure 4-2: Out of Band emission at antenna terminals – GPRS CH Low

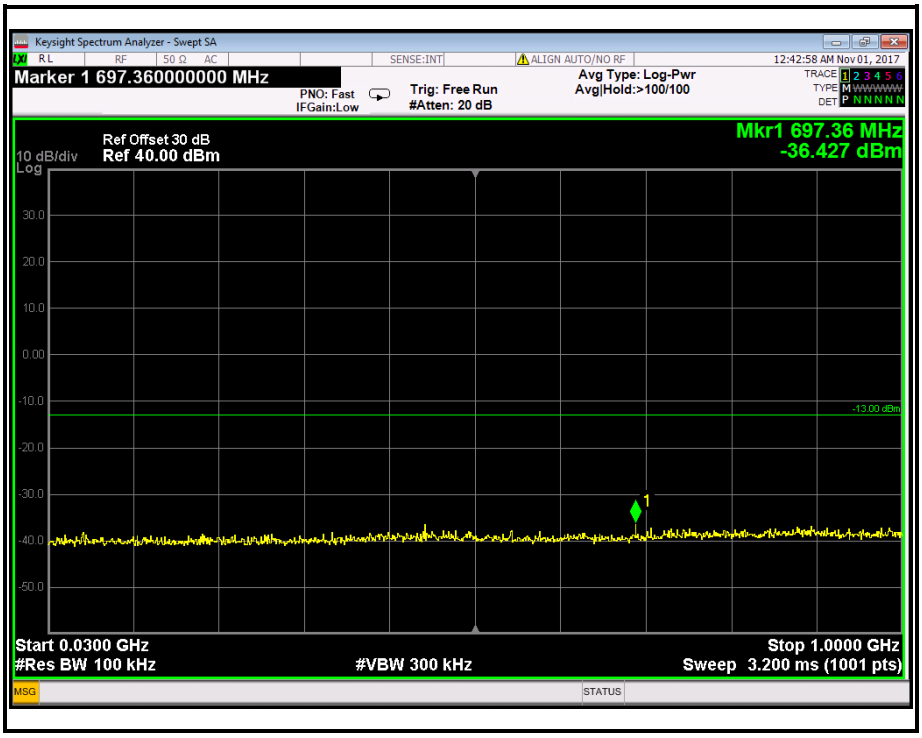

Figure 4-3: Out of Band emission at antenna terminals –GPRS CH Low

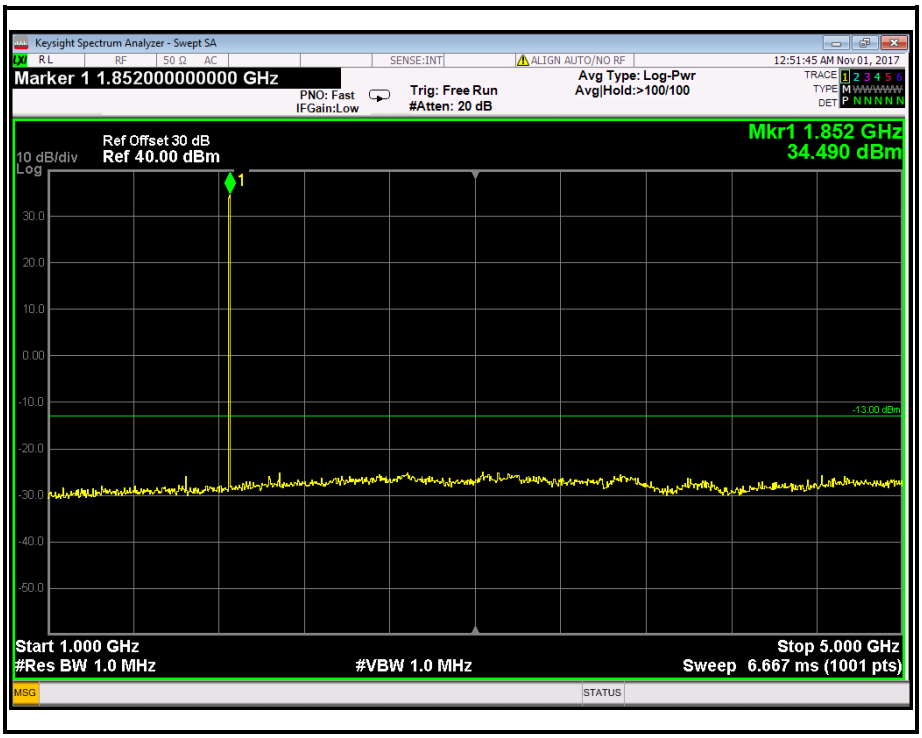

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Figure 4-4: Out of Band emission at antenna terminals –GPRS CH Low

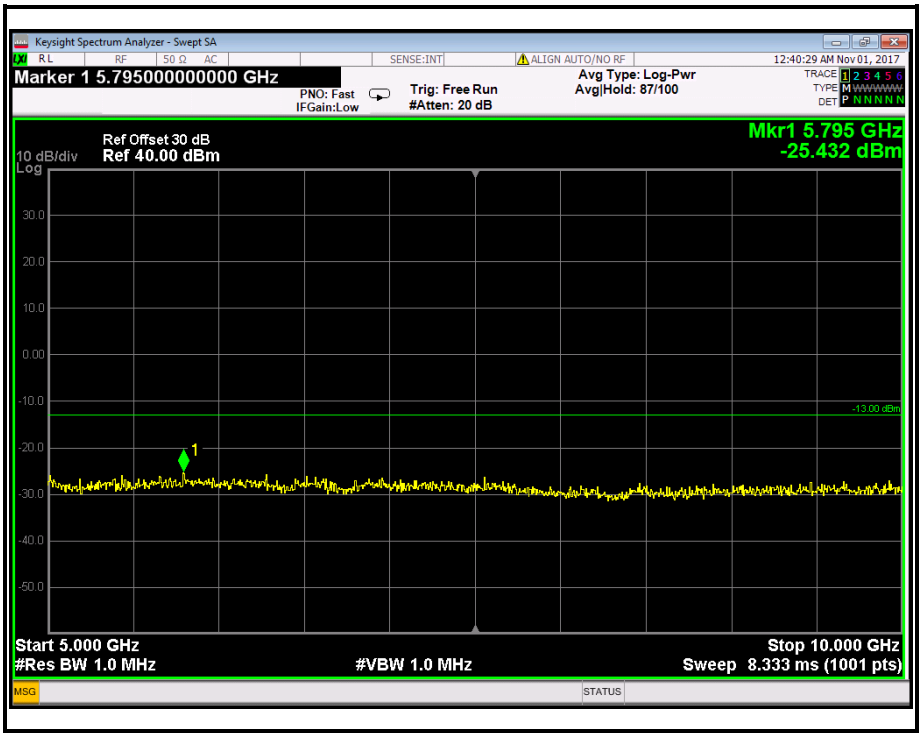

Figure 4-5: Out of Band emission at antenna terminals –GPRS CH Low

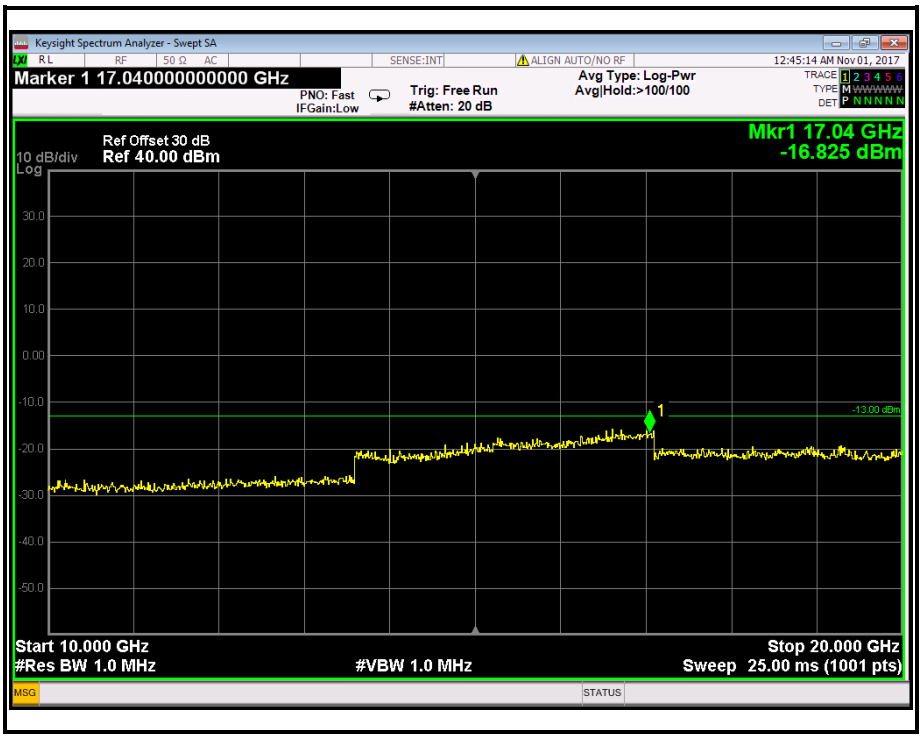

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Figure 5-1: Out of Band emission at antenna terminals –GPRS CH Mid

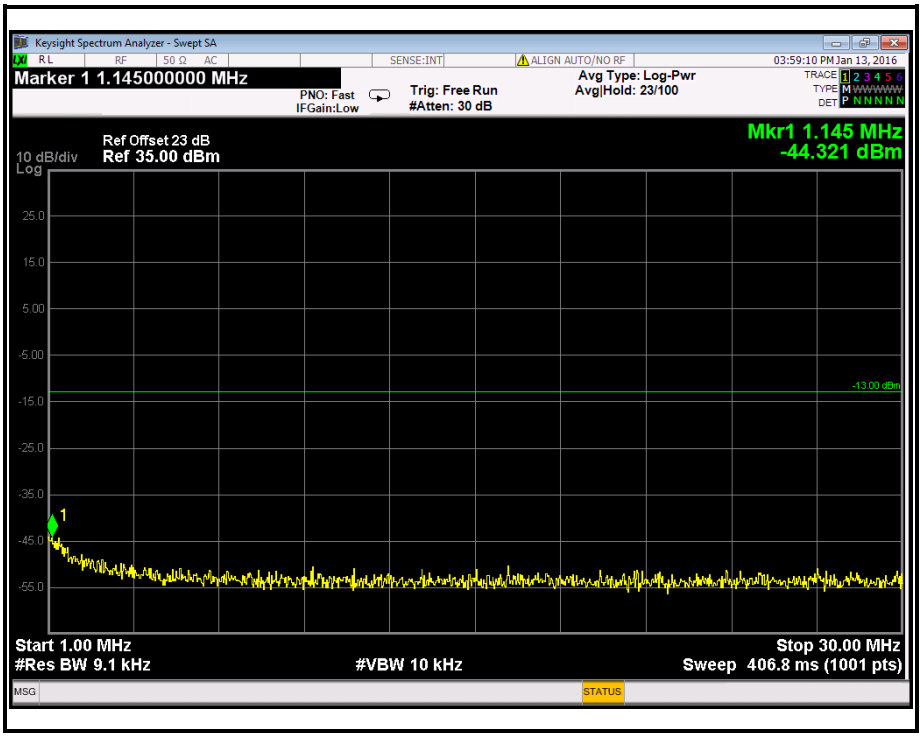

Figure 5-2: Out of Band emission at antenna terminals –GPRS CH Mid

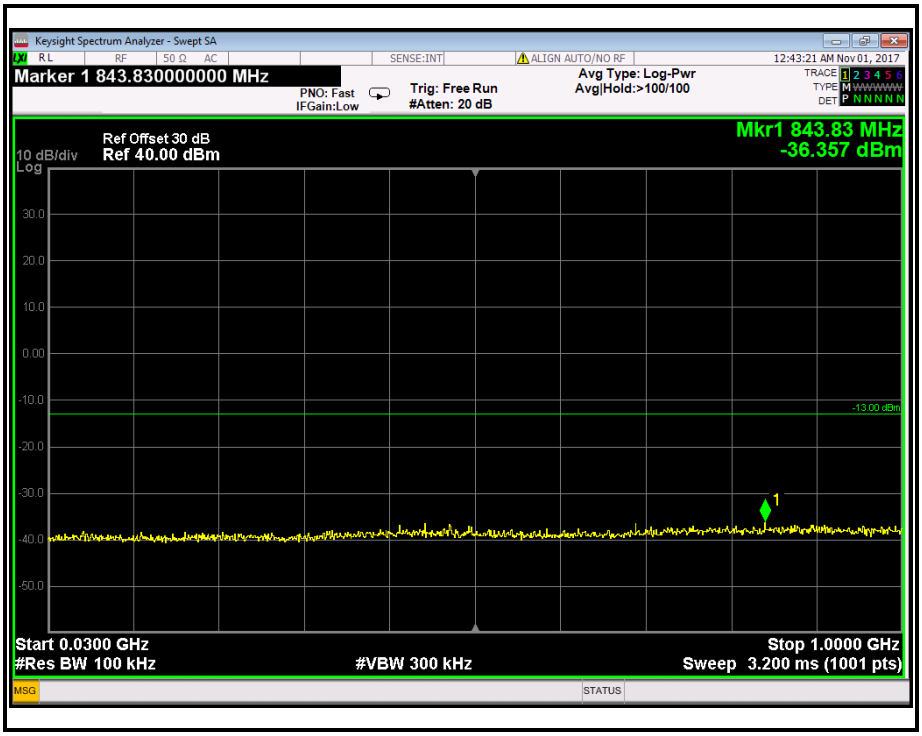

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Figure 5-3: Out of Band emission at antenna terminals –GPRS CH Mid

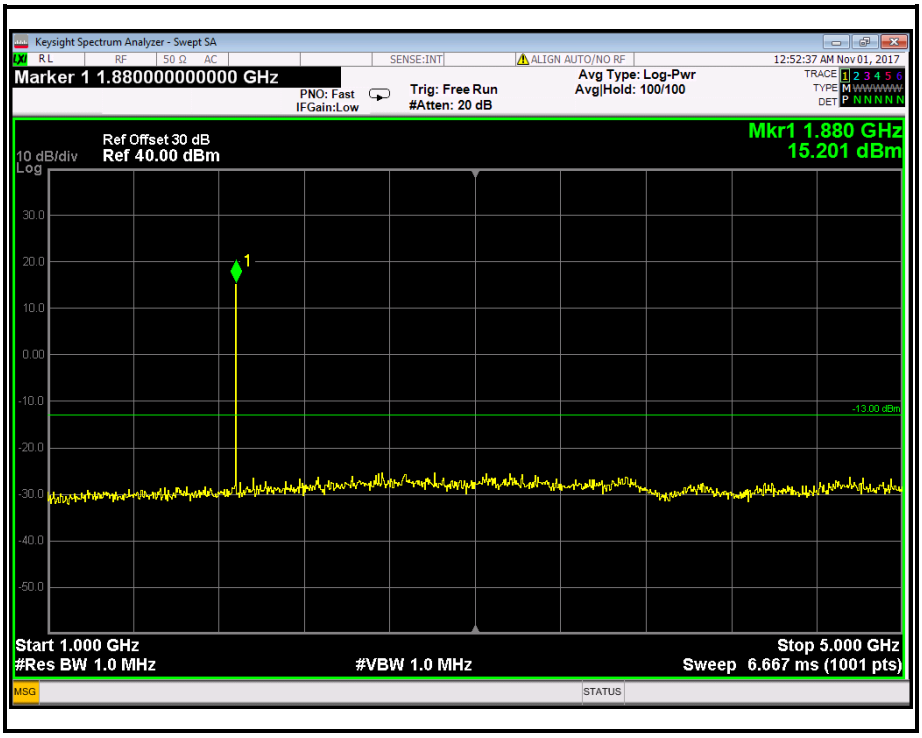

Figure 5-4: Out of Band emission at antenna terminals –GPRS CH Mid

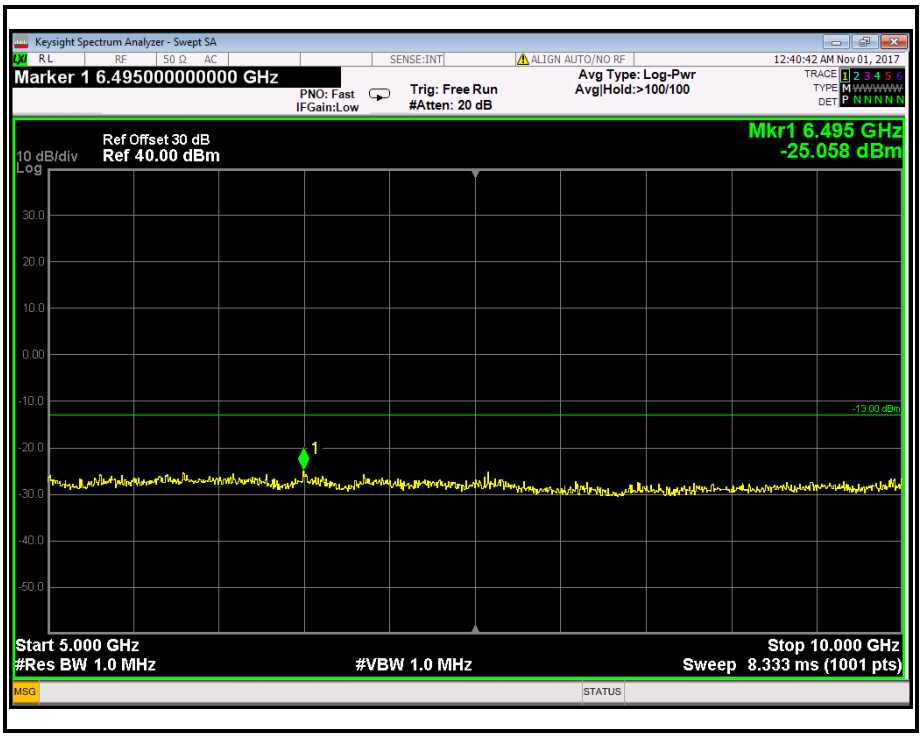

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Figure 5-5: Out of Band emission at antenna terminals –GPRS CH Mid

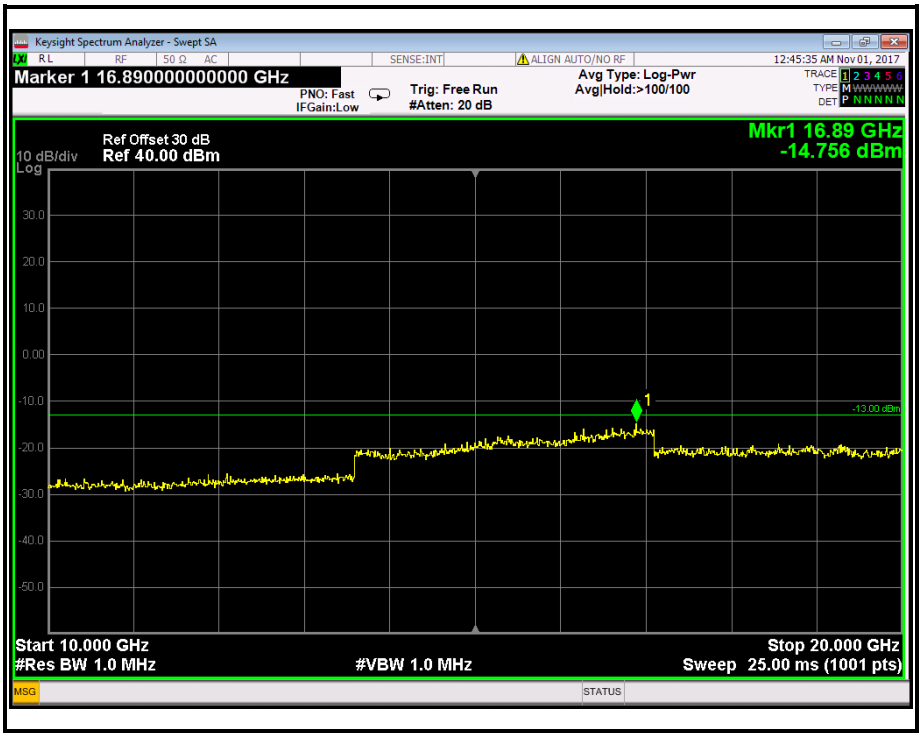

Figure 6-1: Out of Band emission at antenna terminals –GPRS CH High

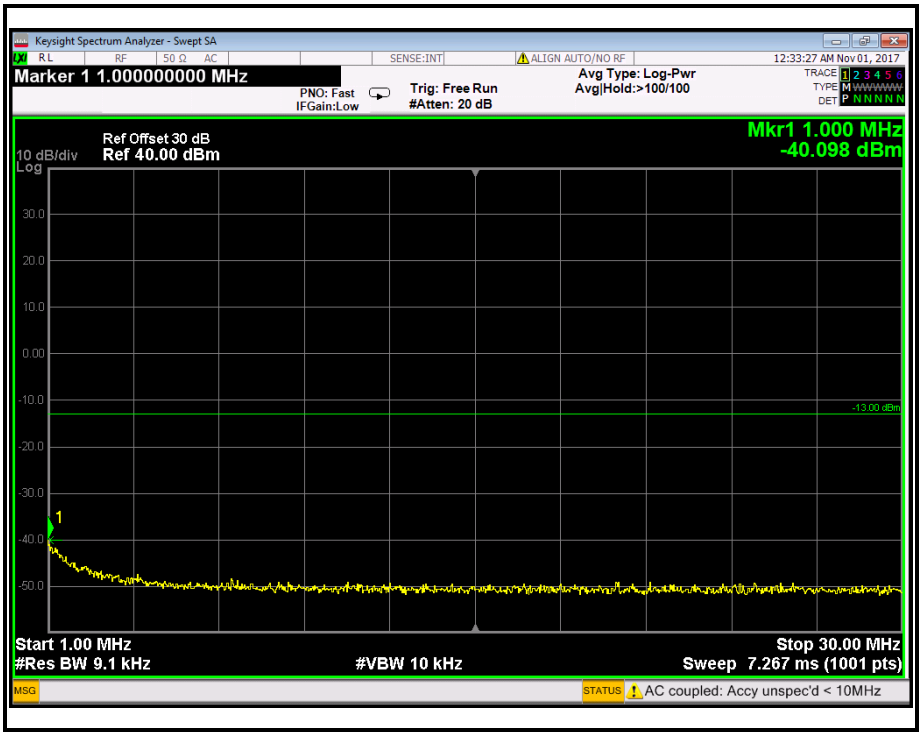

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Figure 6-2: Out of Band emission at antenna terminals –GPRS CH High

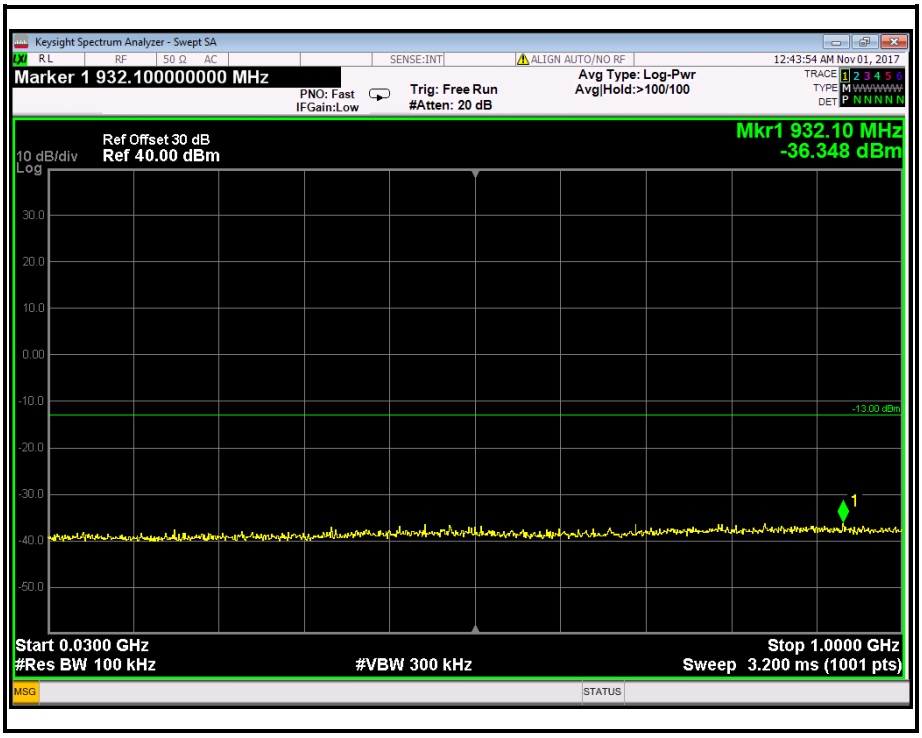

Figure 6-3: Out of Band emission at antenna terminals –GPRS CH High

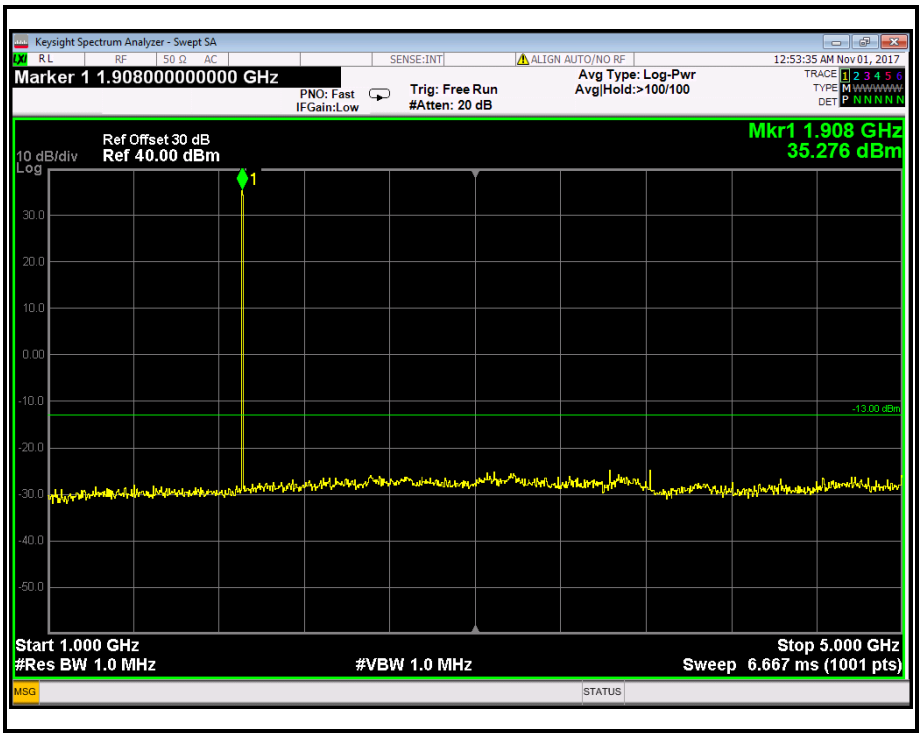

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Figure 6-4: Out of Band emission at antenna terminals –GPRS CH High

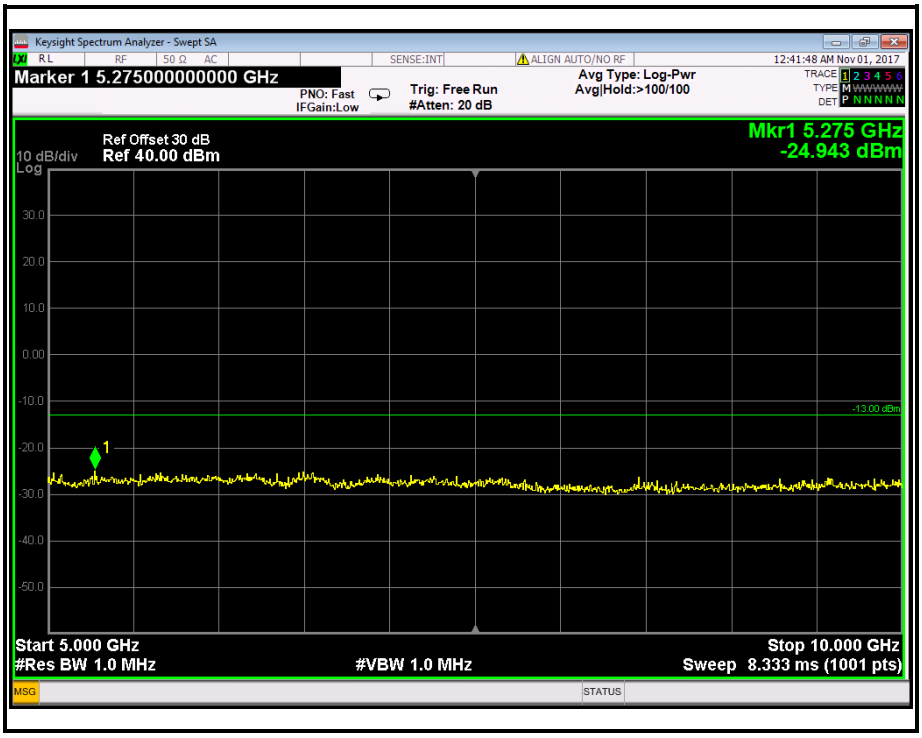
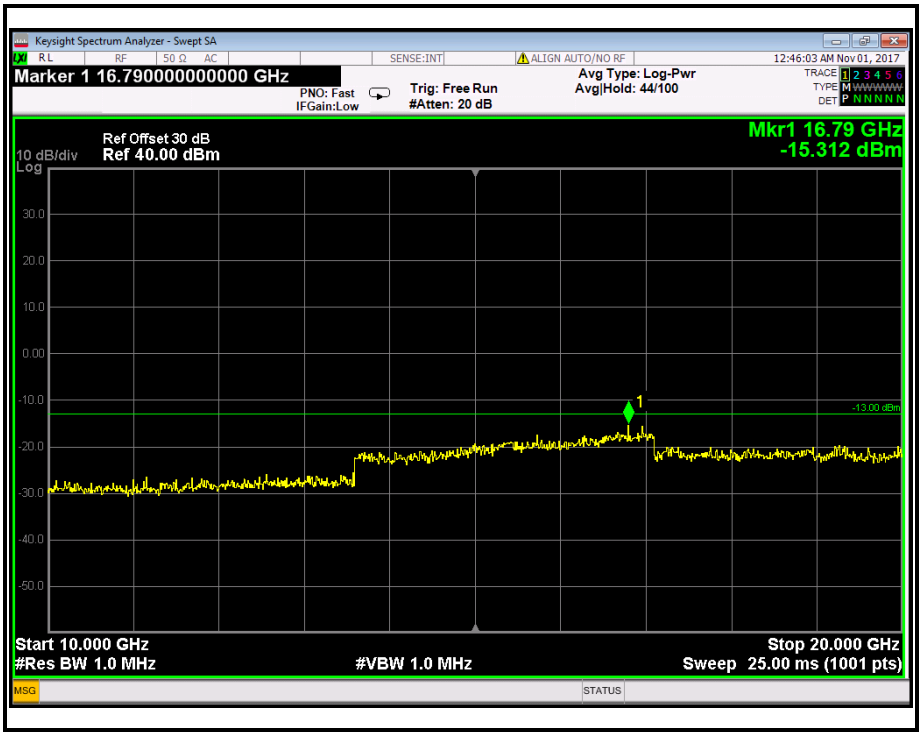


Figure 6-5: Out of Band emission at antenna terminals –GPRS CH High



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GPRS 850

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

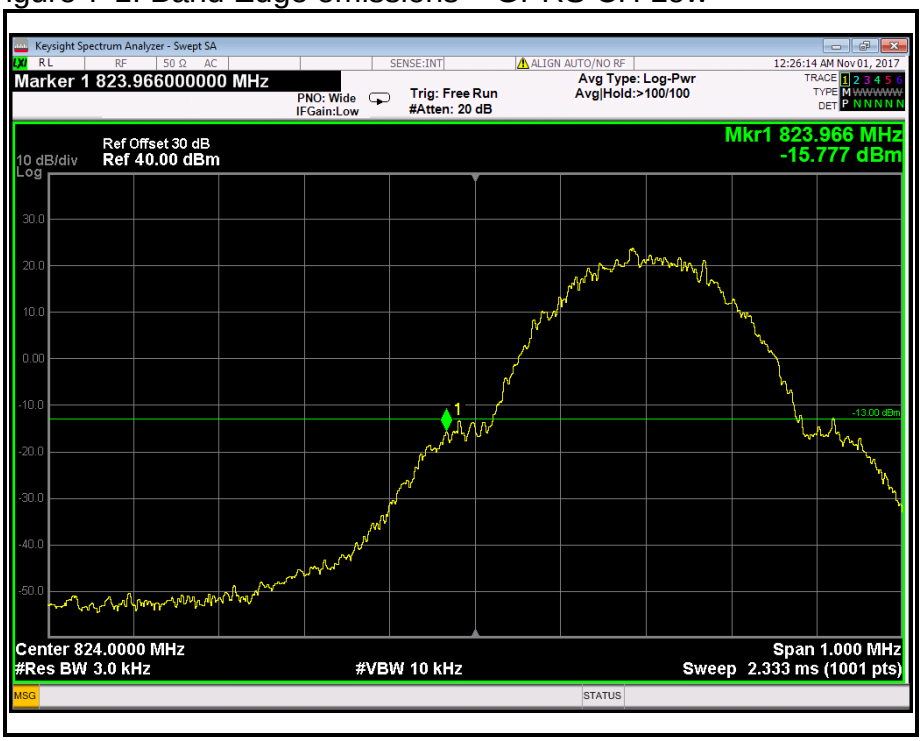
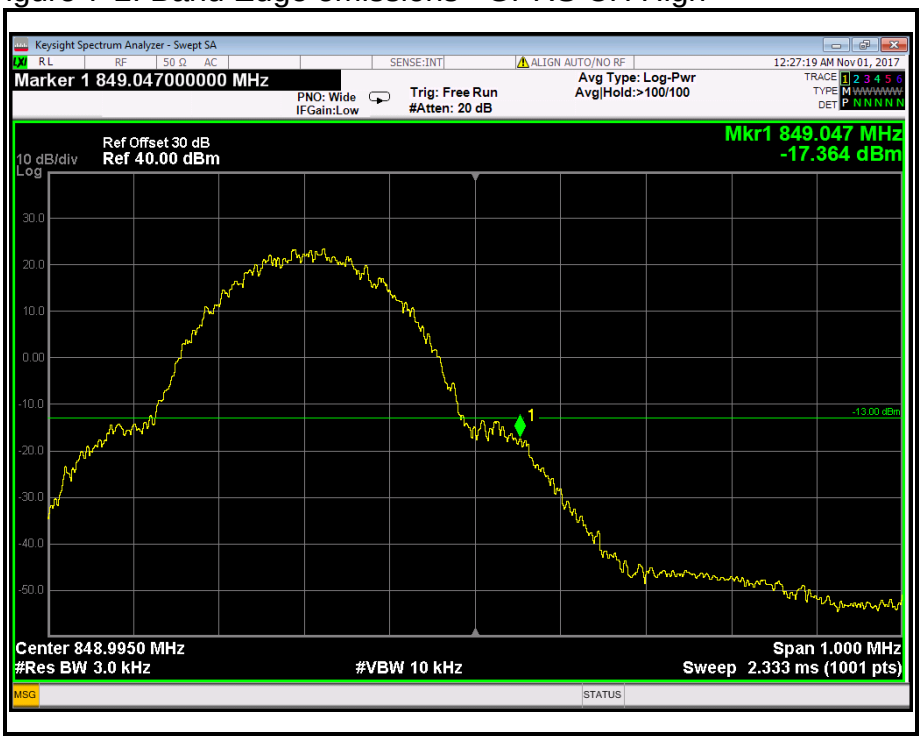


Figure 7-2: Band Edge emissions –GPRS CH High



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GPRS 1900

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

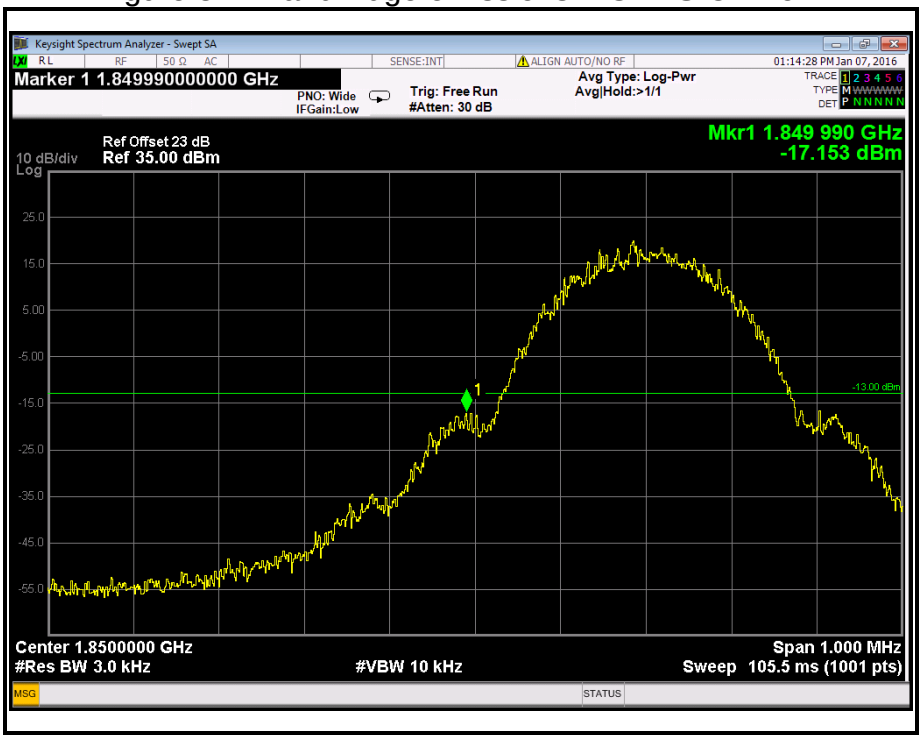
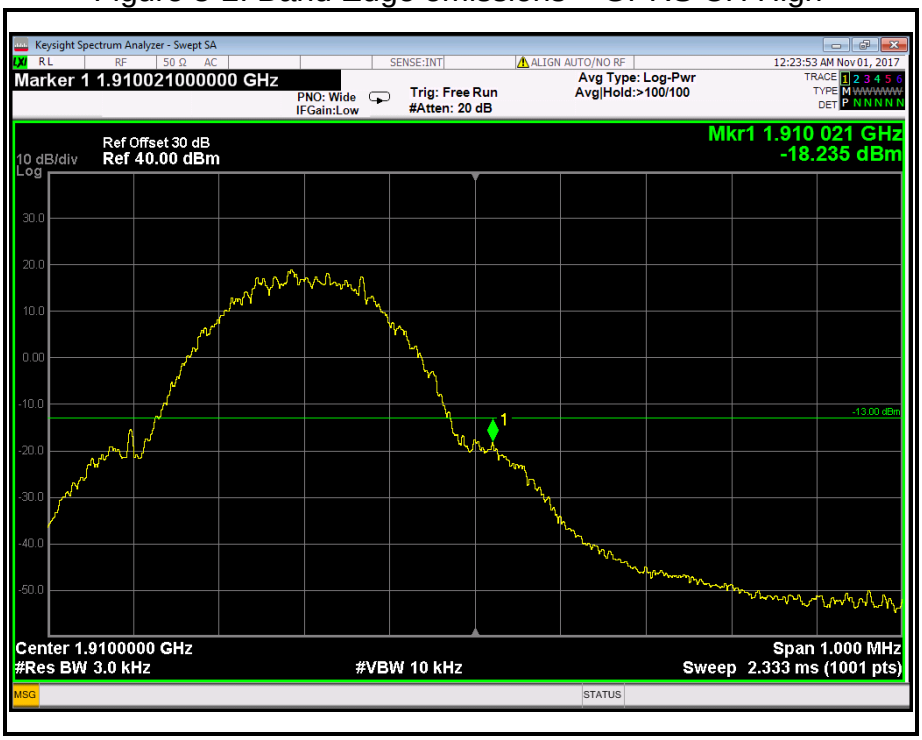


Figure 8-2: Band Edge emissions – GPRS CH High



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GSM 850

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

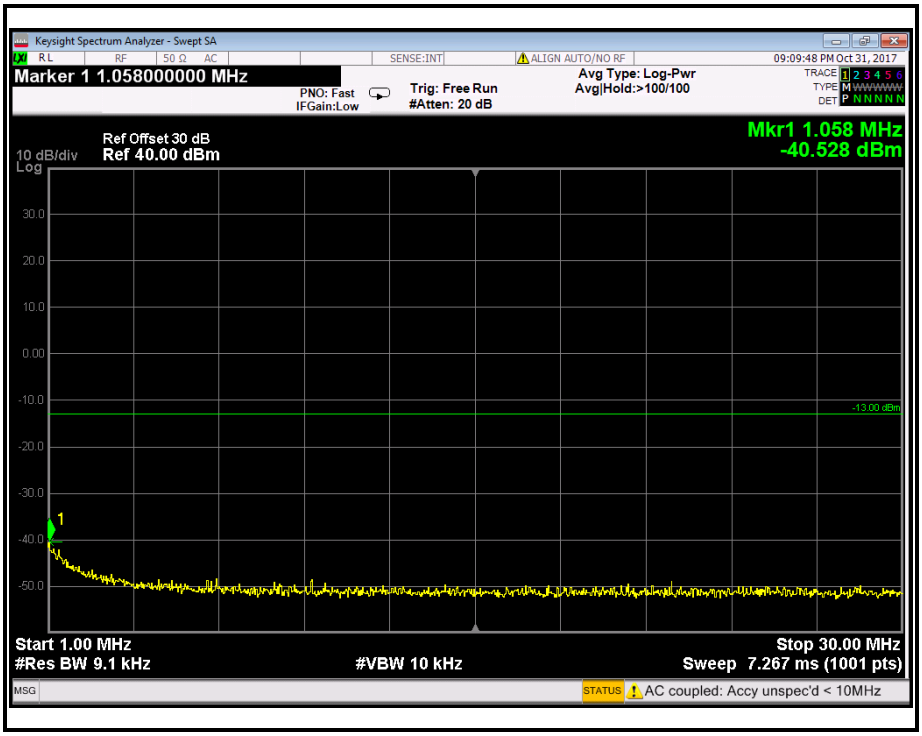

Figure 9-2: Out of Band emission at antenna terminals – GPRS CH Low

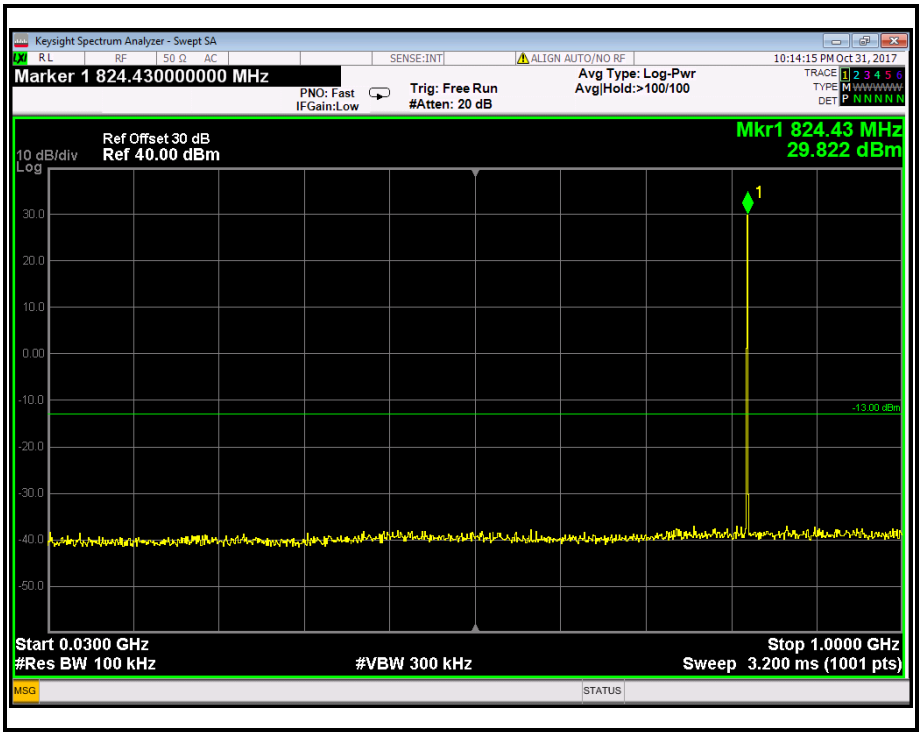

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Figure 9-3: Out of Band emission at antenna terminals – GPRS CH Low

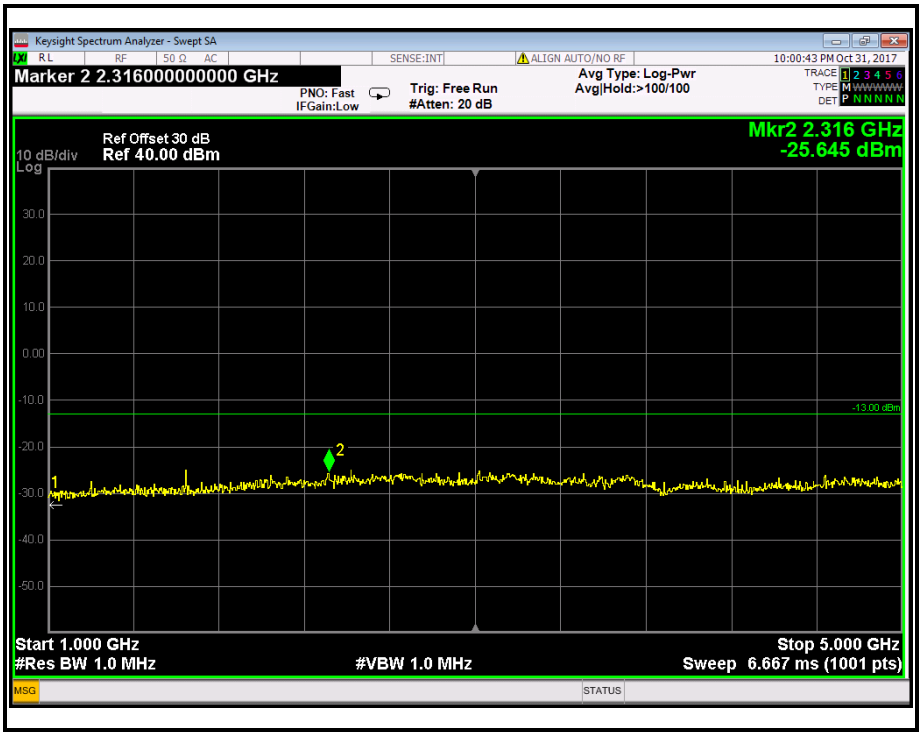

Figure 9-4: Out of Band emission at antenna terminals – GPRS CH Low

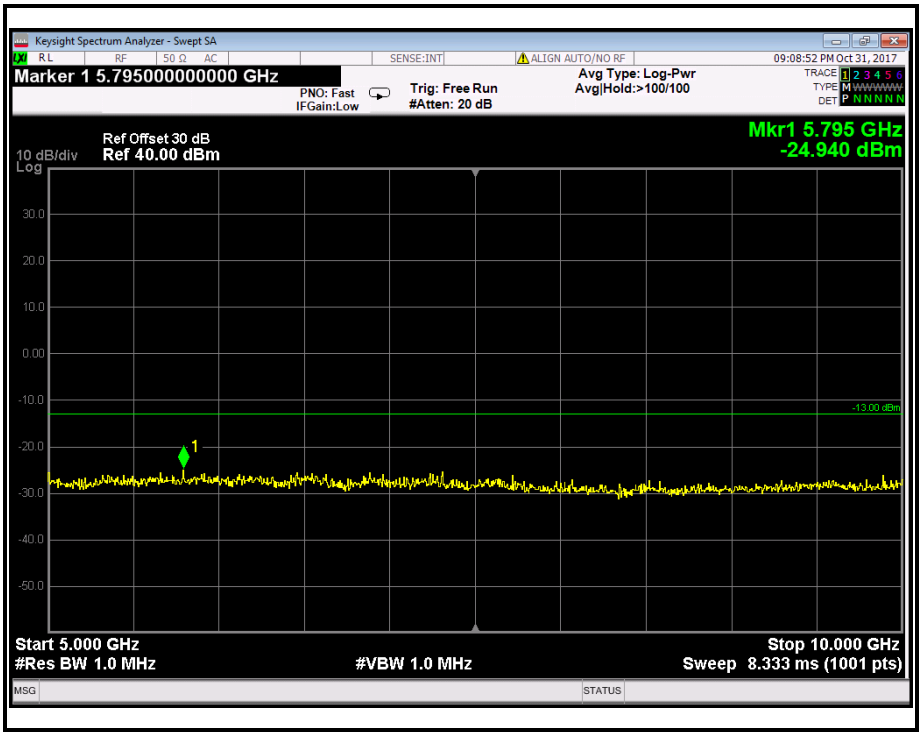

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Figure 9-5: Out of Band emission at antenna terminals – GPRS CH Low

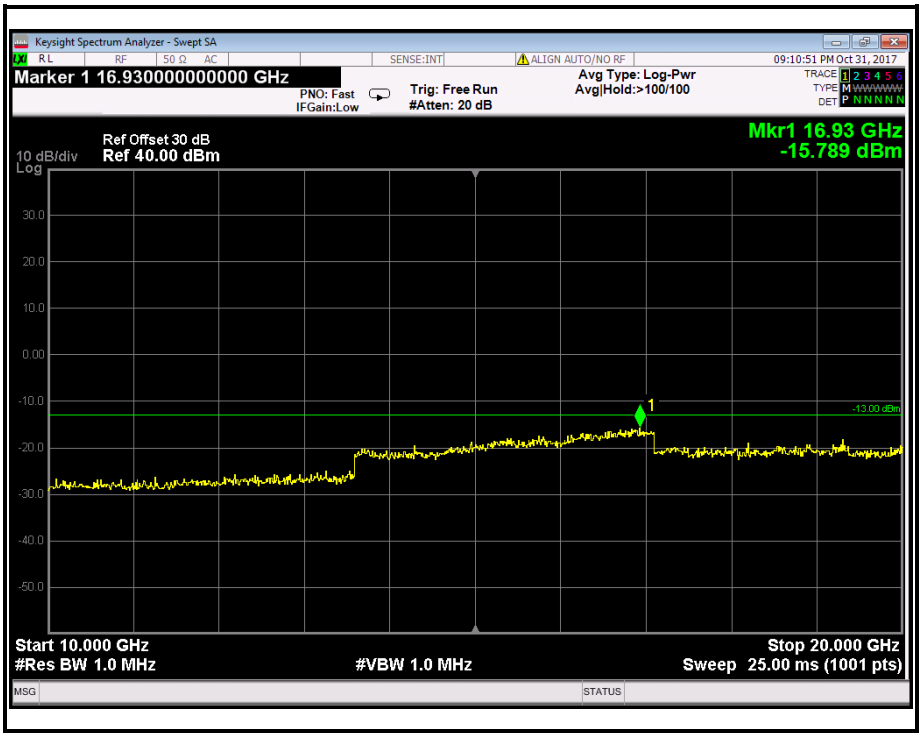

Figure 10-1: Out of Band emission at antenna terminals – GPRS CH Mid

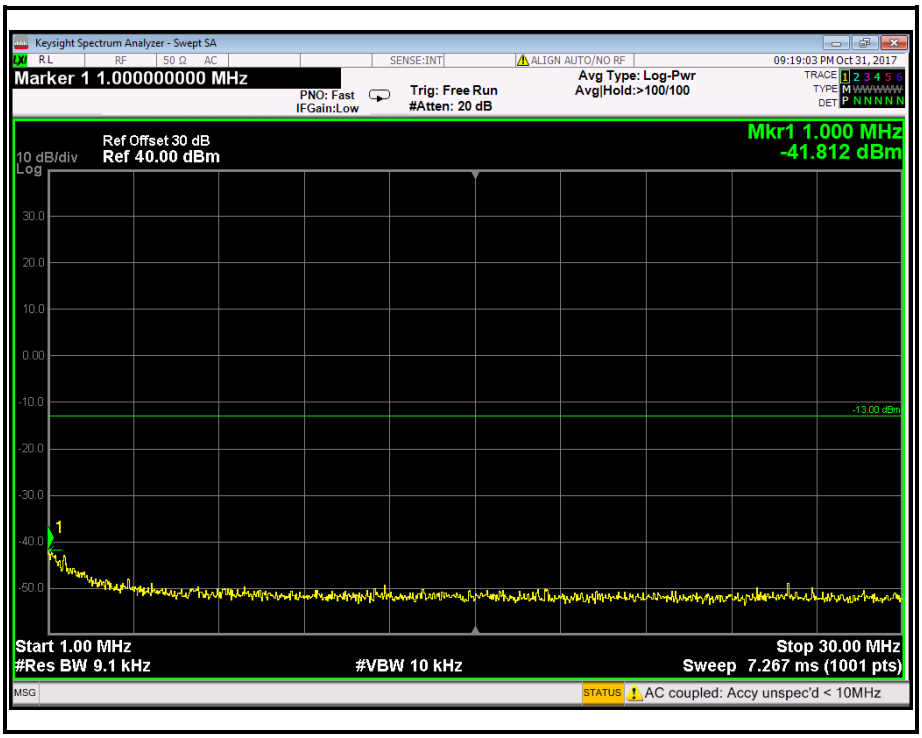

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Figure 10-2: Out of Band emission at antenna terminals – GPRS CH Mid

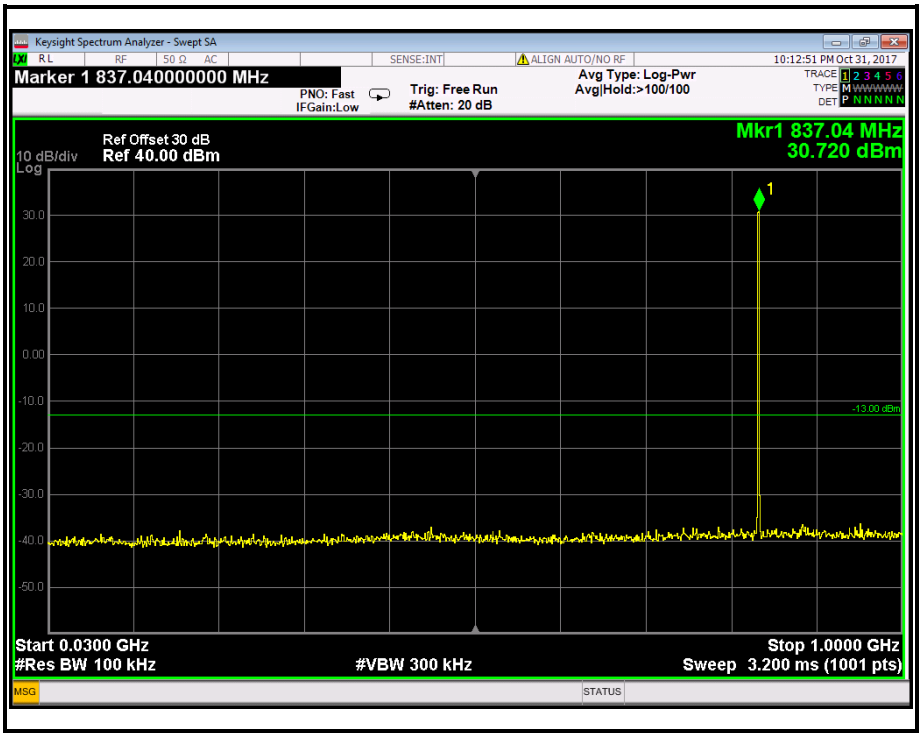

Figure 10-3: Out of Band emission at antenna terminals – GPRS CH Mid

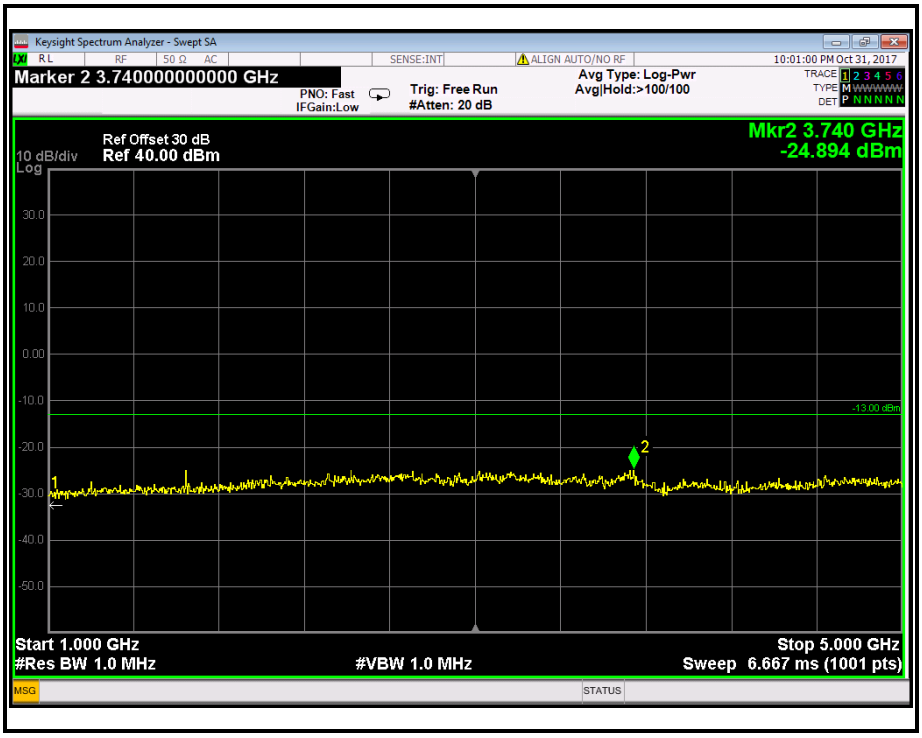

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Figure 10-4: Out of Band emission at antenna terminals – GPRS CH Mid

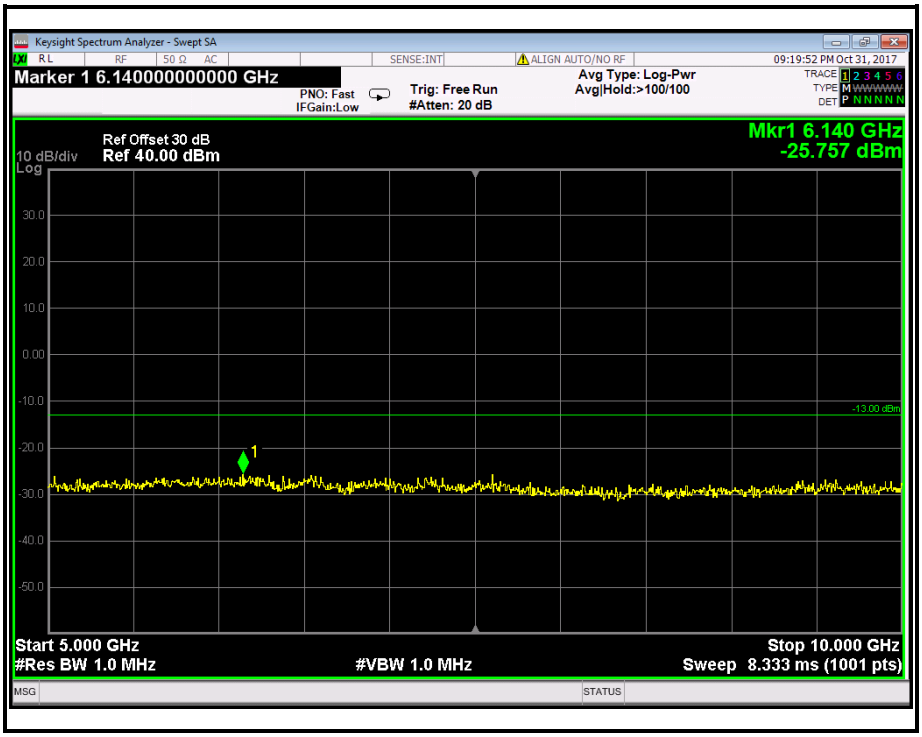

Figure 10-5: Out of Band emission at antenna terminals – GPRS CH High

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Figure 11-1: Out of Band emission at antenna terminals – GPRS CH High

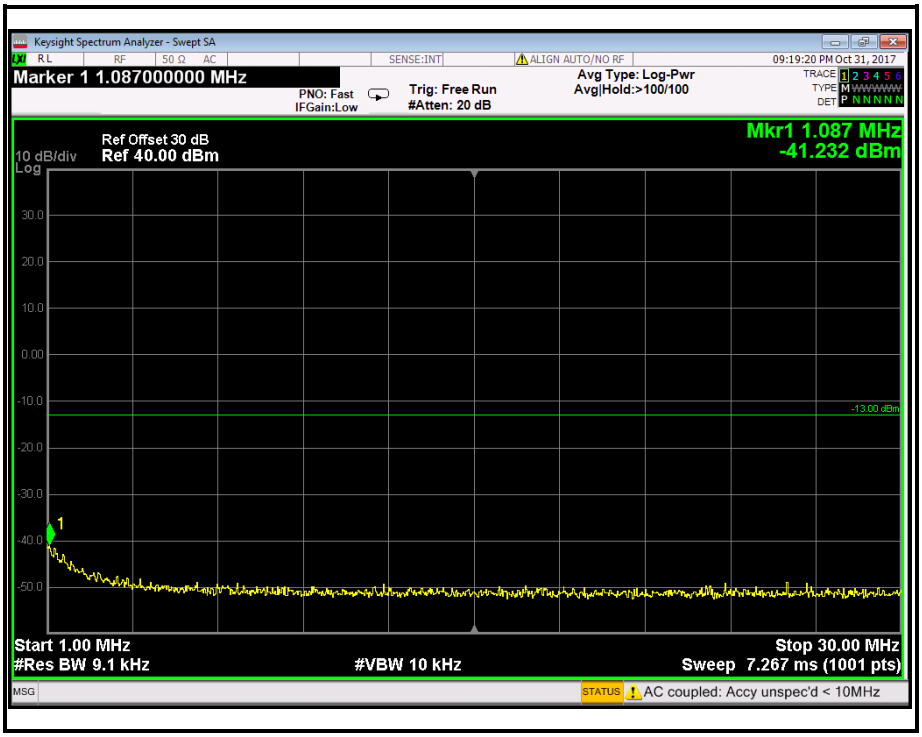

Figure 11-2: Out of Band emission at antenna terminals – GPRS CH High

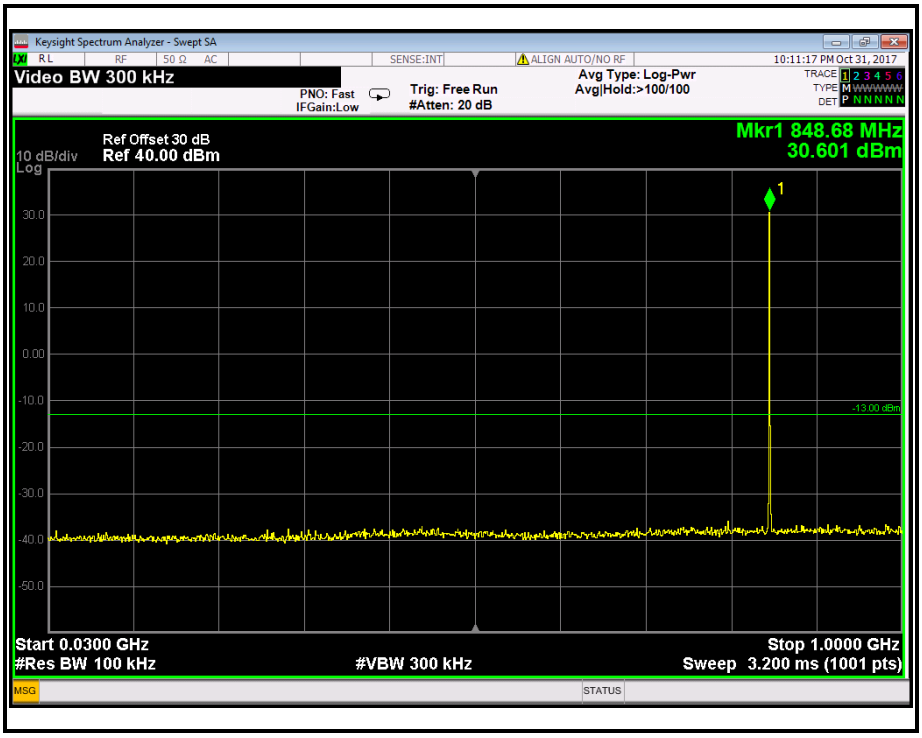

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Figure 11-3: Out of Band emission at antenna terminals – GPRS CH High

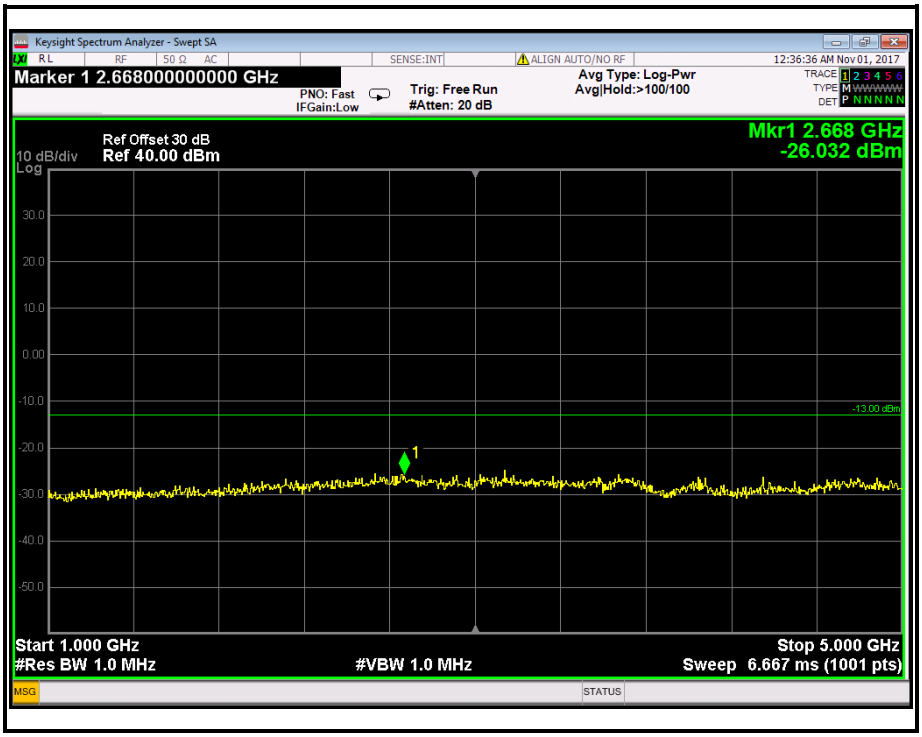

Figure 11-4: Out of Band emission at antenna terminals – GPRS CH High

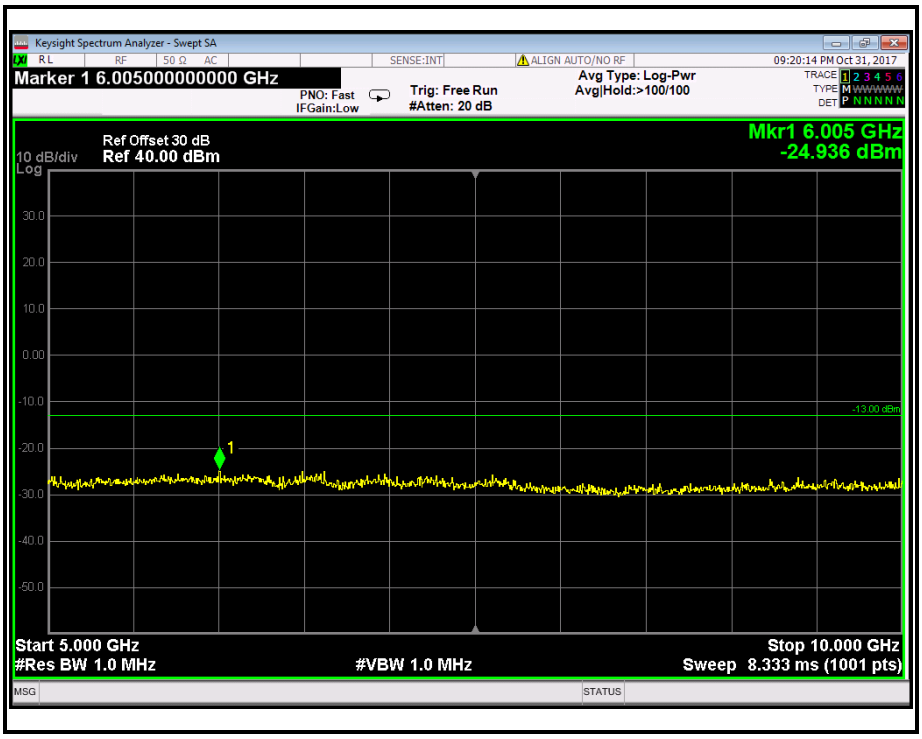

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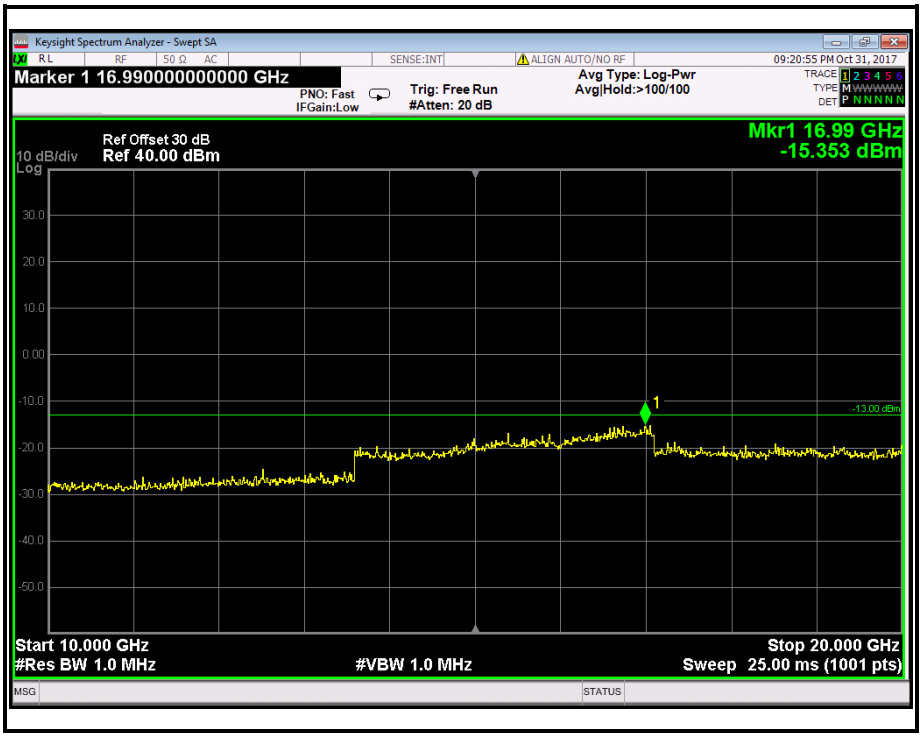
Figure 11-5: Out of Band emission at antenna terminals – GPRS CH High



GSM 1900

Figure 12-1: Out of Band emission at antenna terminals – GPRS CH Low

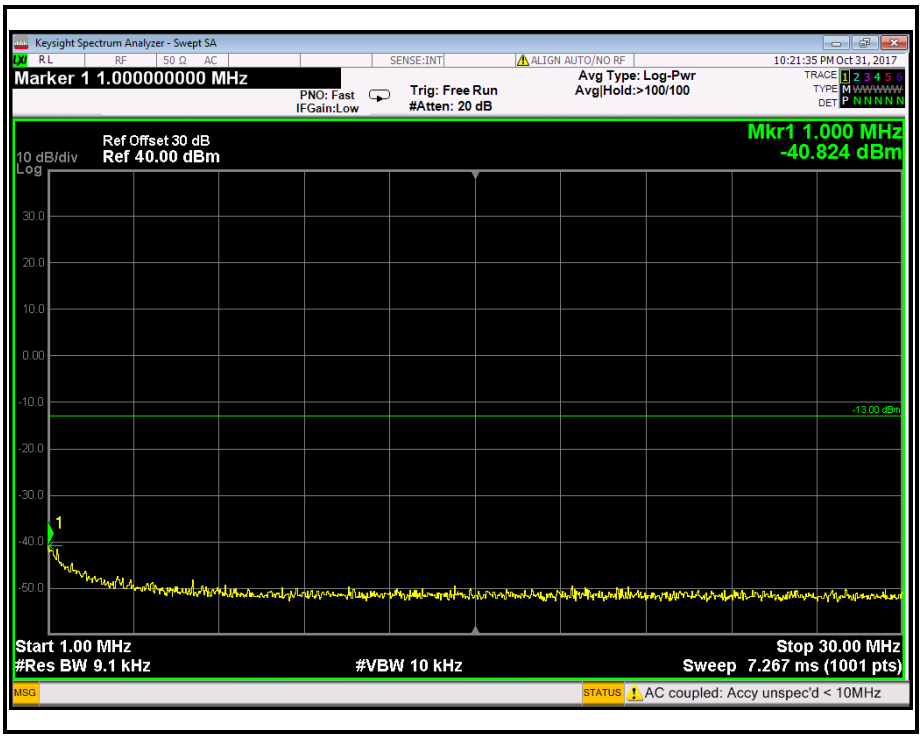


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Figure 12-2: Out of Band emission at antenna terminals – GPRS CH Low

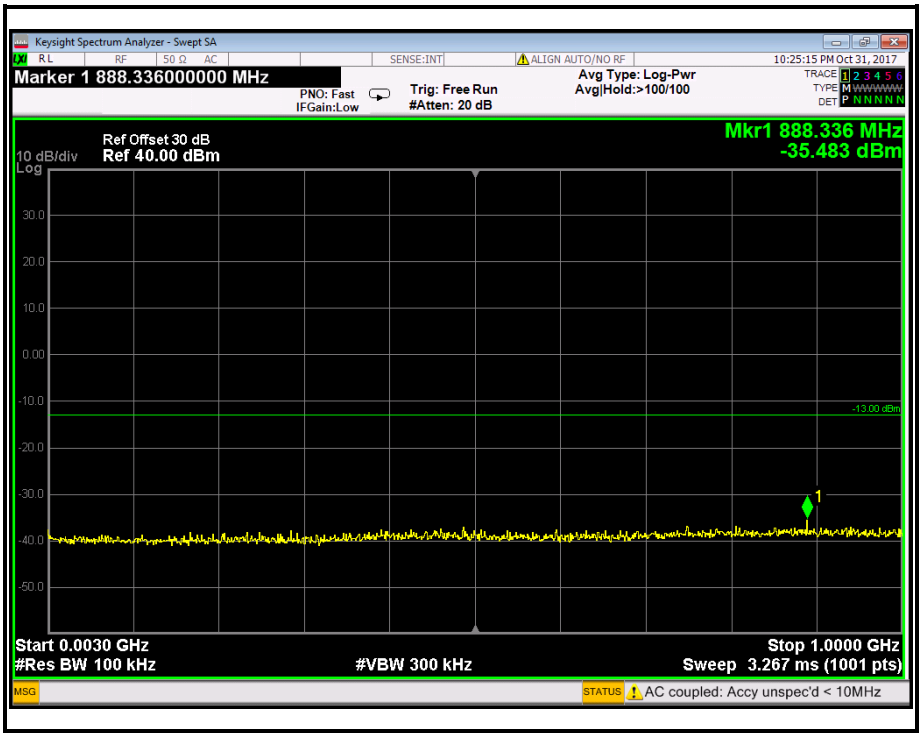

Figure 12-3: Out of Band emission at antenna terminals –GPRS CH Low

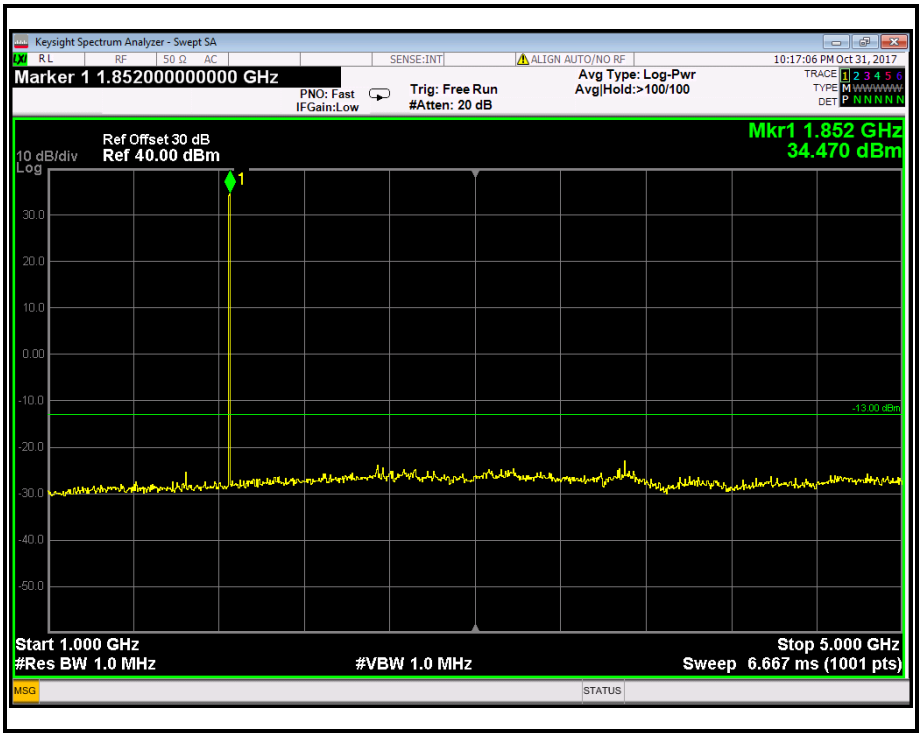

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Figure 12-4: Out of Band emission at antenna terminals –GPRS CH Low

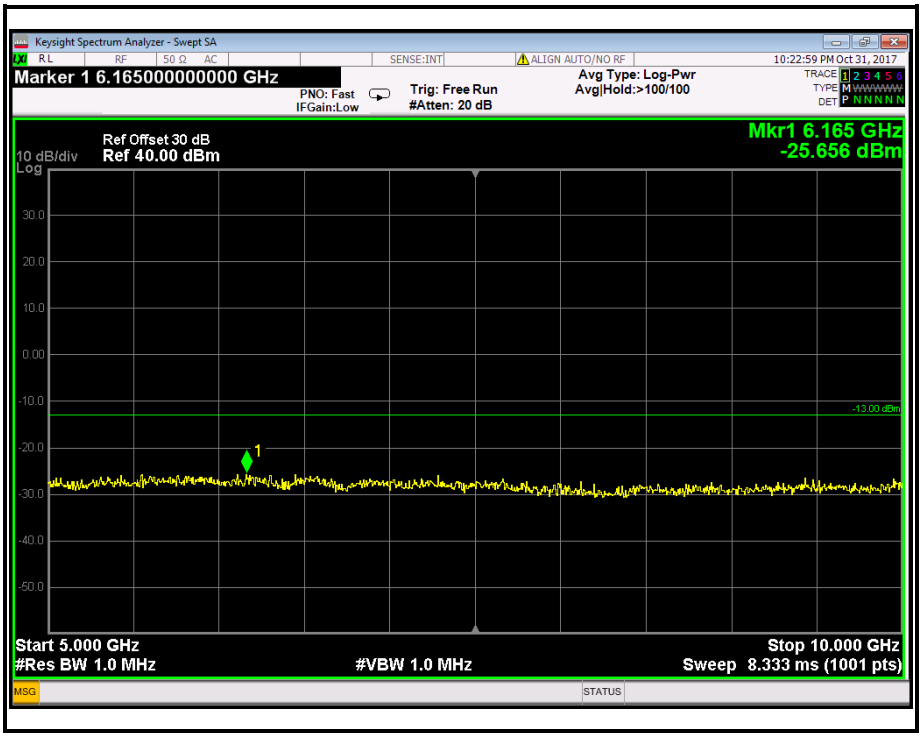

Figure 12-5: Out of Band emission at antenna terminals –GPRS CH Low

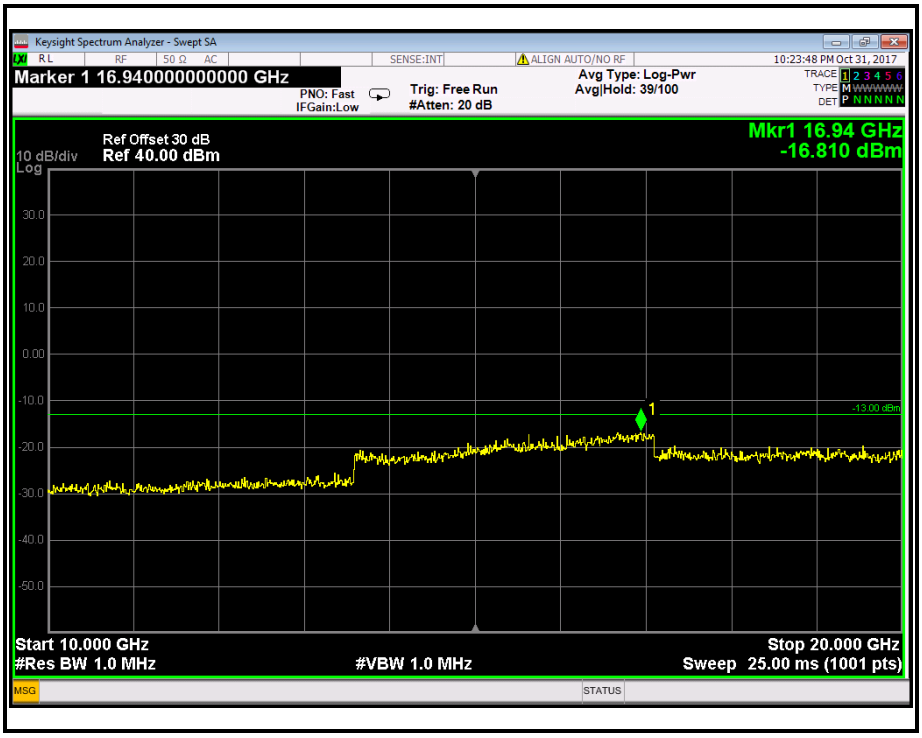

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Figure 13-1: Out of Band emission at antenna terminals –GPRS CH Mid

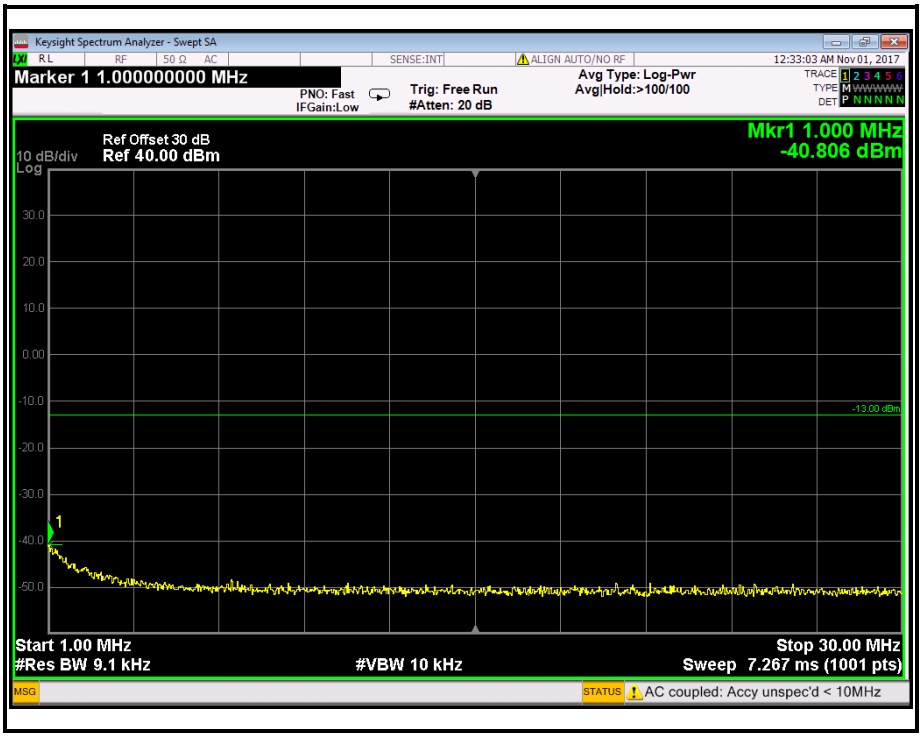

Figure 13-2: Out of Band emission at antenna terminals –GPRS CH Mid

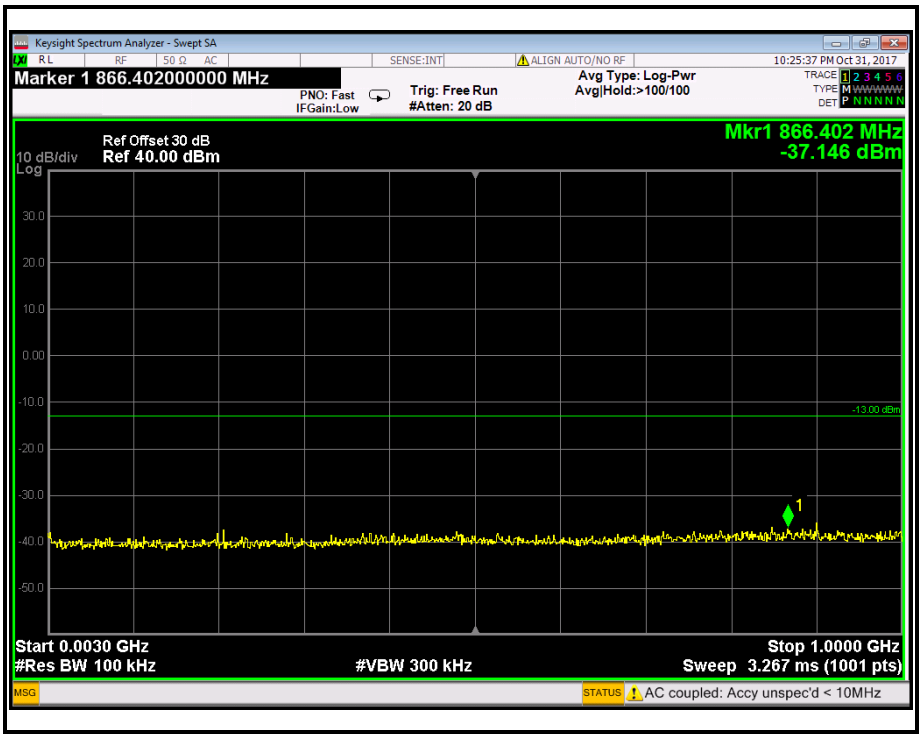

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Figure 13-3: Out of Band emission at antenna terminals –GPRS CH Mid

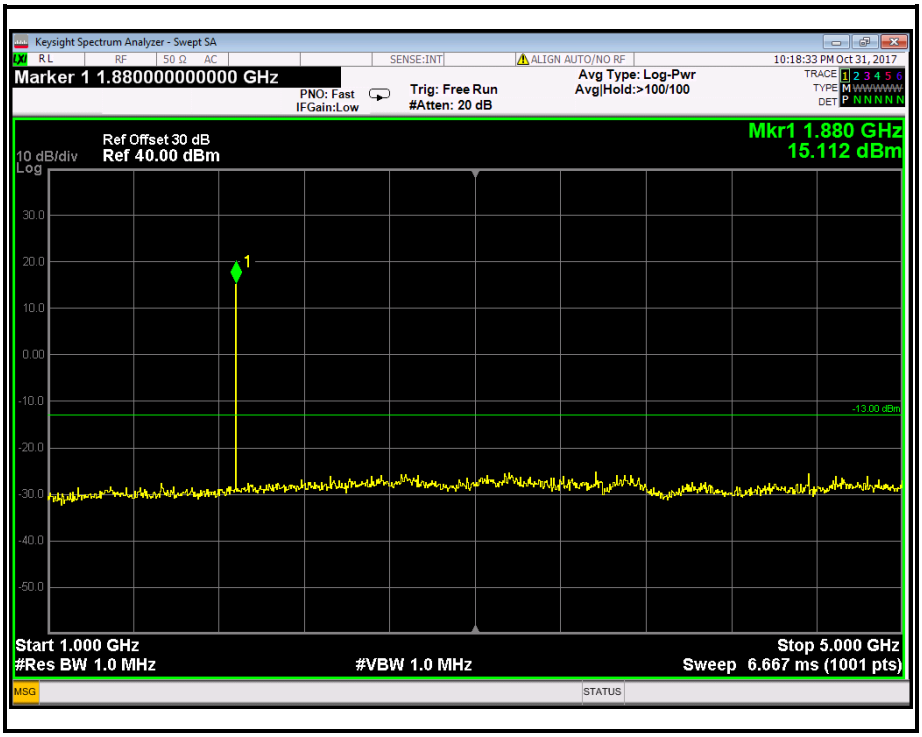

Figure 13-4: Out of Band emission at antenna terminals –GPRS CH Mid

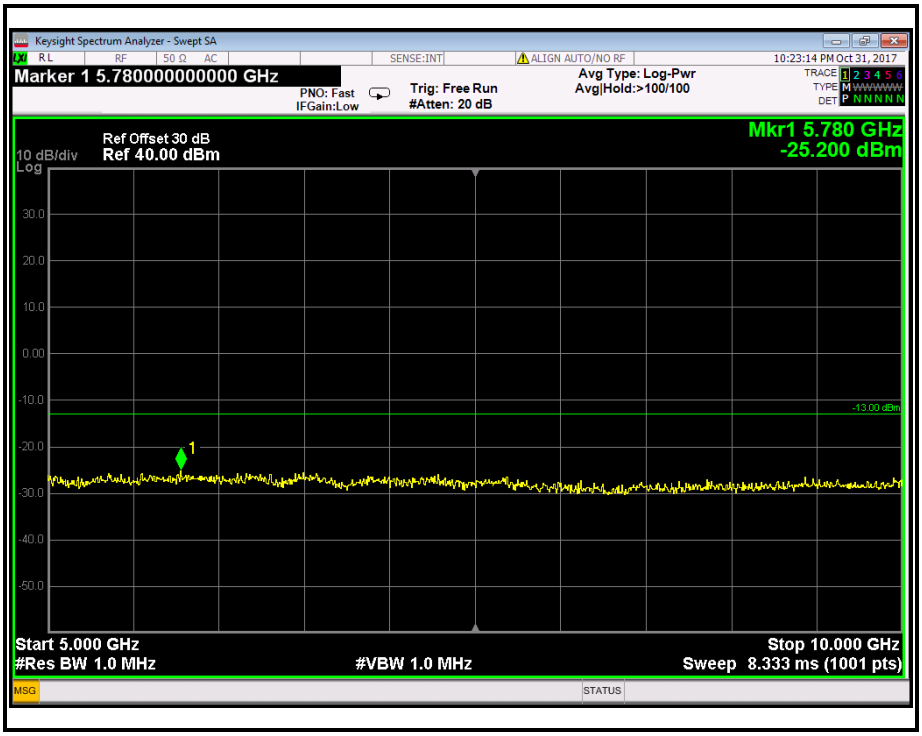

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Figure 13-5: Out of Band emission at antenna terminals –GPRS CH Mid

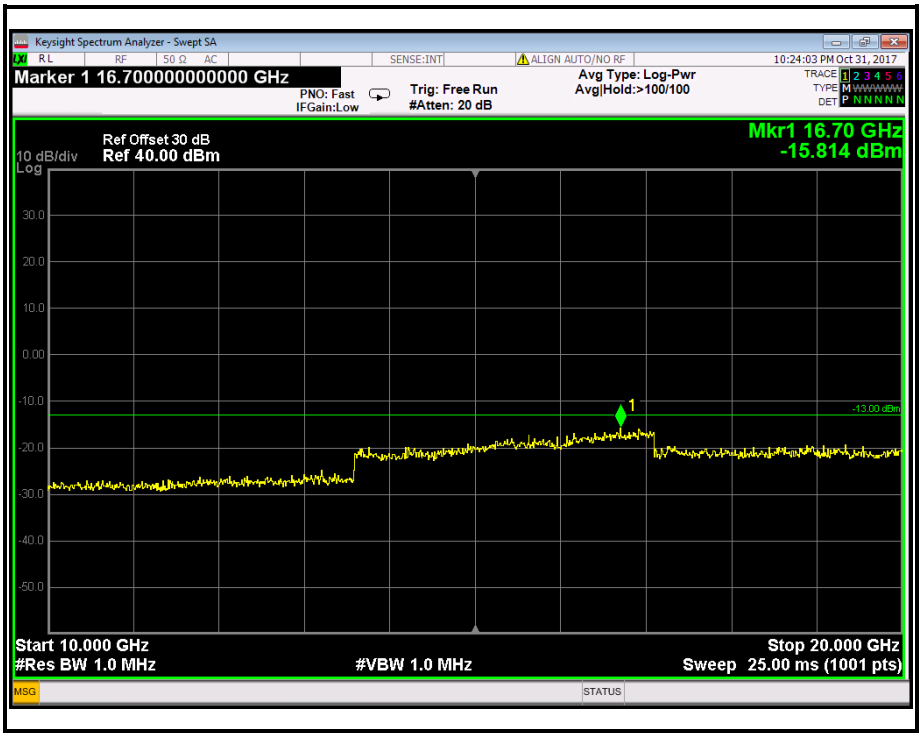

Figure 14-1: Out of Band emission at antenna terminals –GPRS CH High

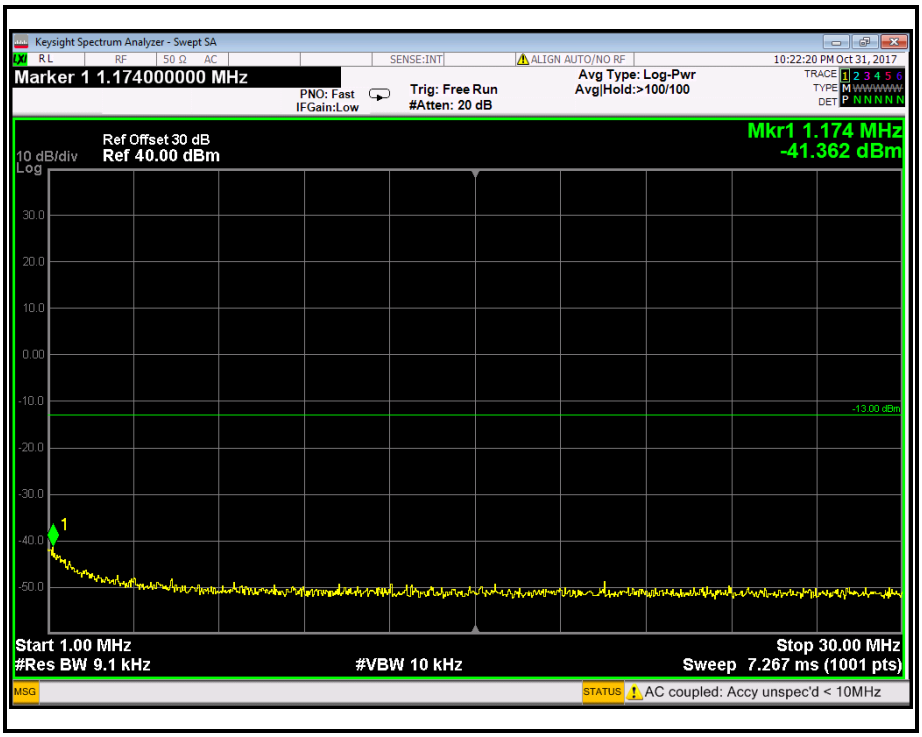

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Figure 14-2: Out of Band emission at antenna terminals –GPRS CH High

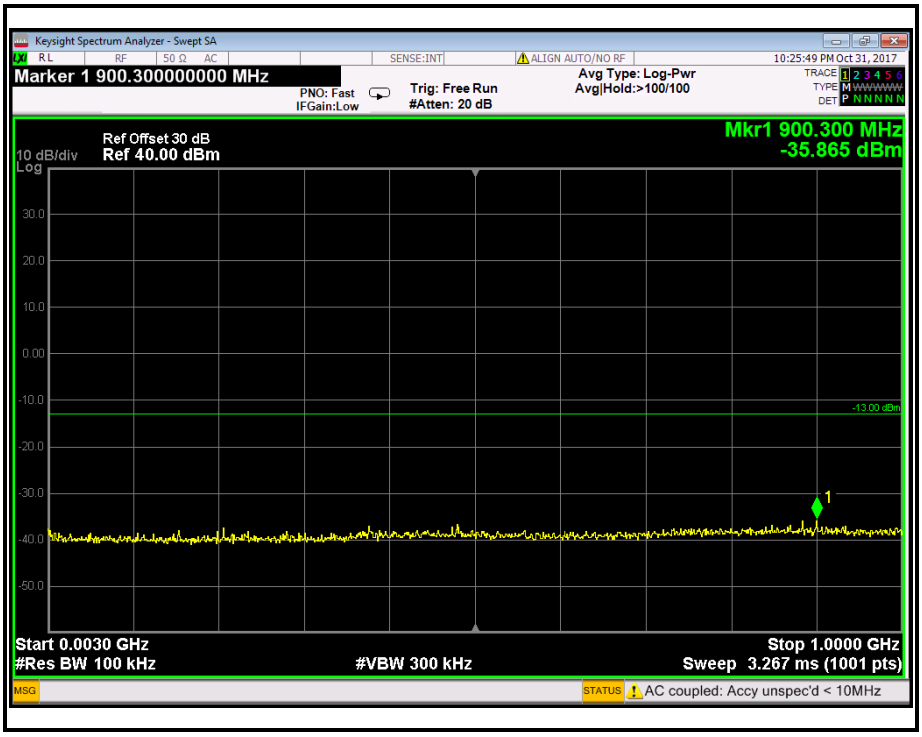

Figure 14-3: Out of Band emission at antenna terminals –GPRS CH High

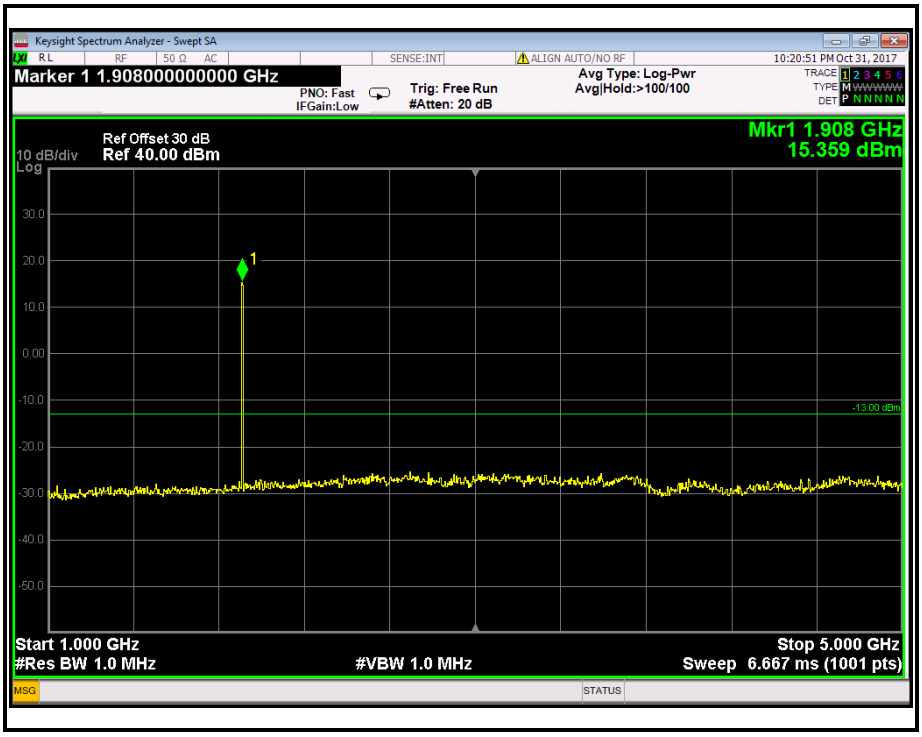

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Figure 14-4: Out of Band emission at antenna terminals –GPRS CH High

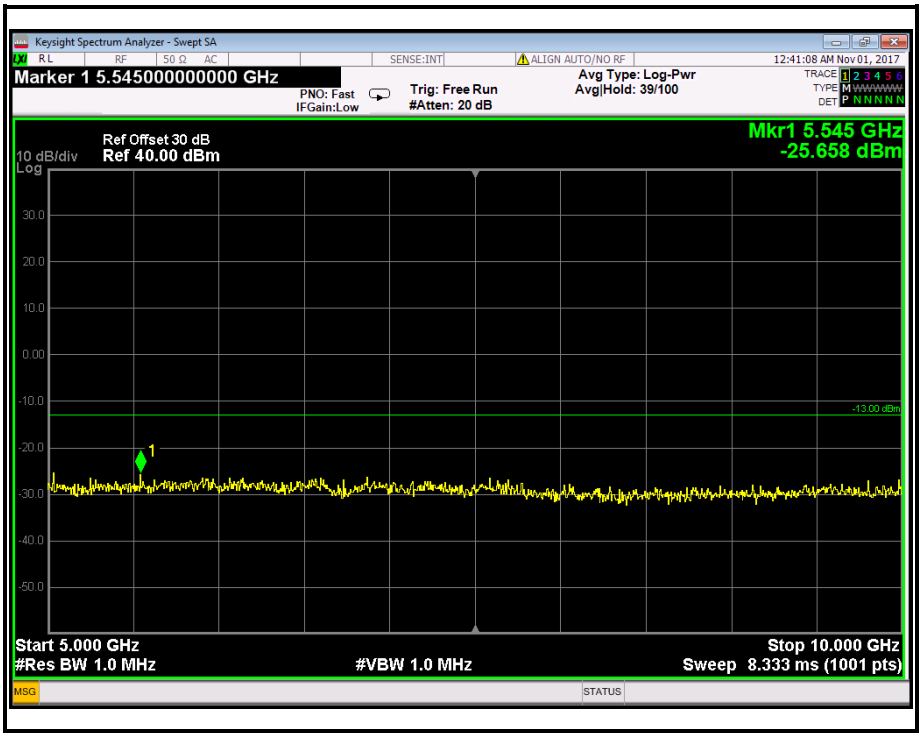
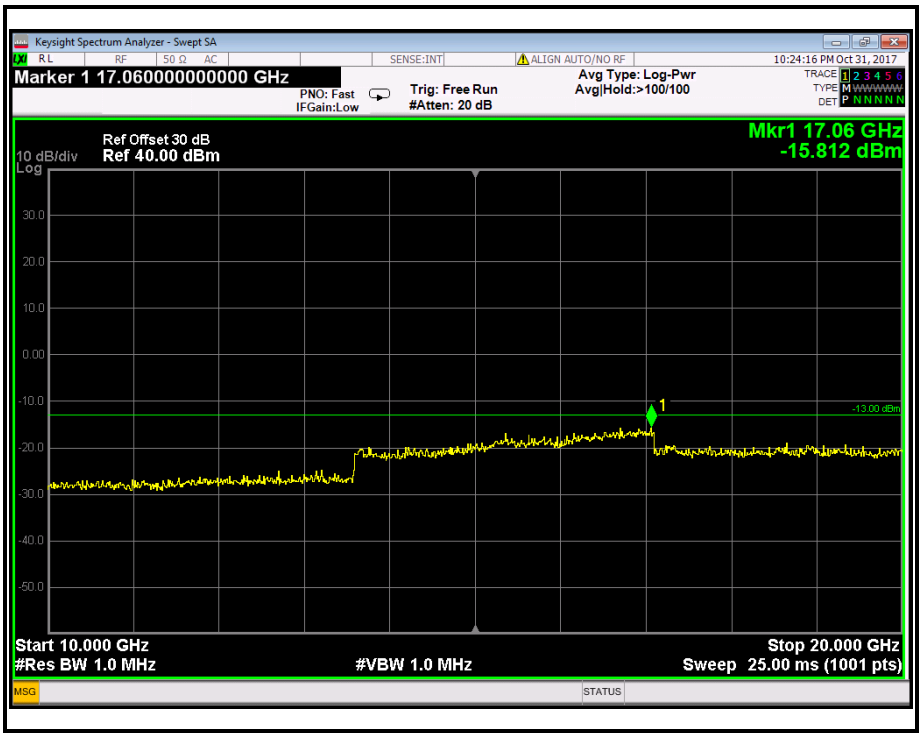


Figure 14-5: Out of Band emission at antenna terminals –GPRS CH High



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GSM 850

Figure 15-1: Band Edge emissions – GPRS CH Low

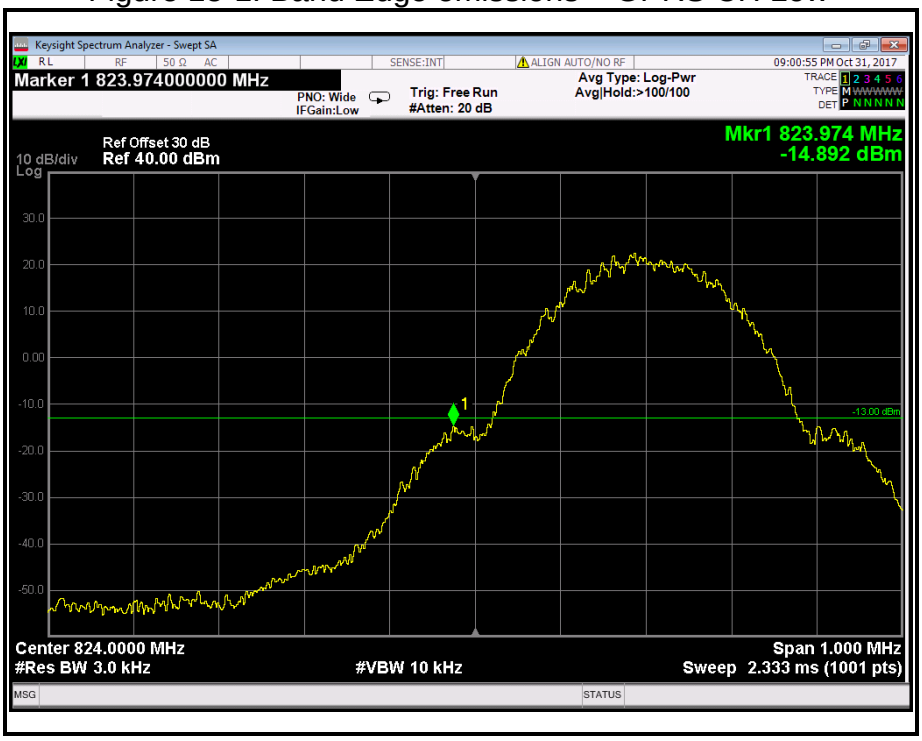
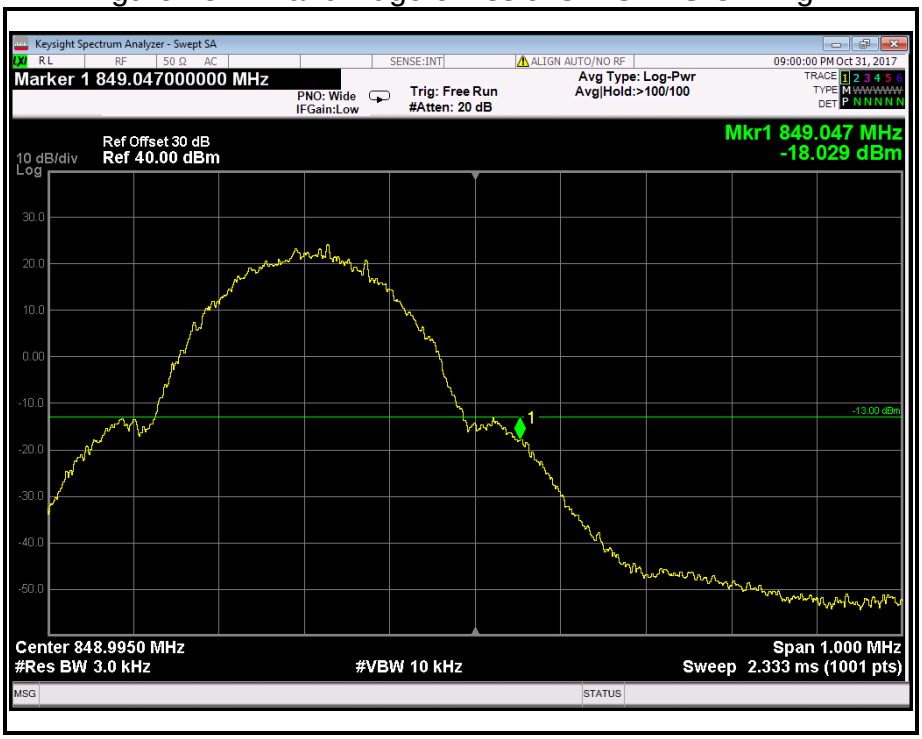


Figure 15-2: Band Edge emissions – GPRS CH High



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GSM 1900

Figure 16-1: Band Edge emissions – GPRS CH Low

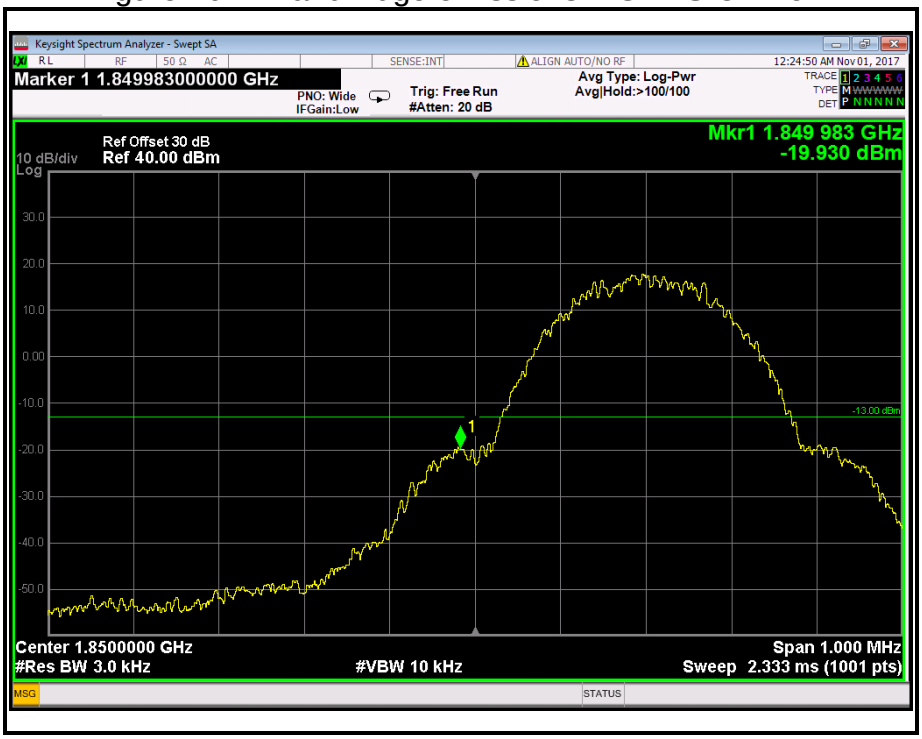
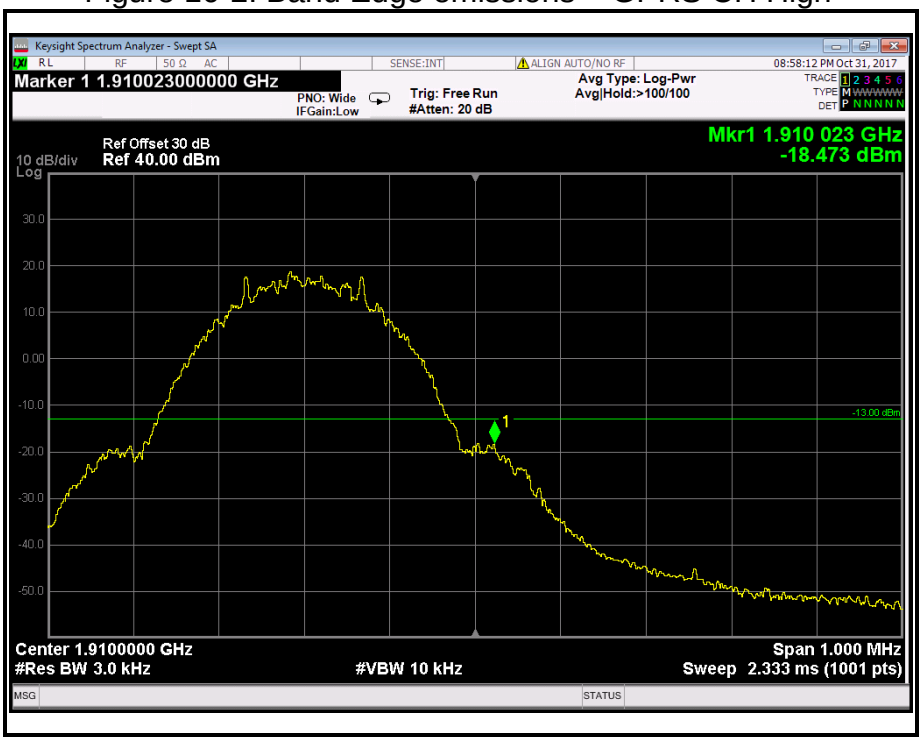


Figure 16-2: Band Edge emissions – GPRS CH High



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6.6. FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

6.6.1 LIMIT

According to FCC §2.1053, RSS-132 (4.6) & RSS-133 (6.5).

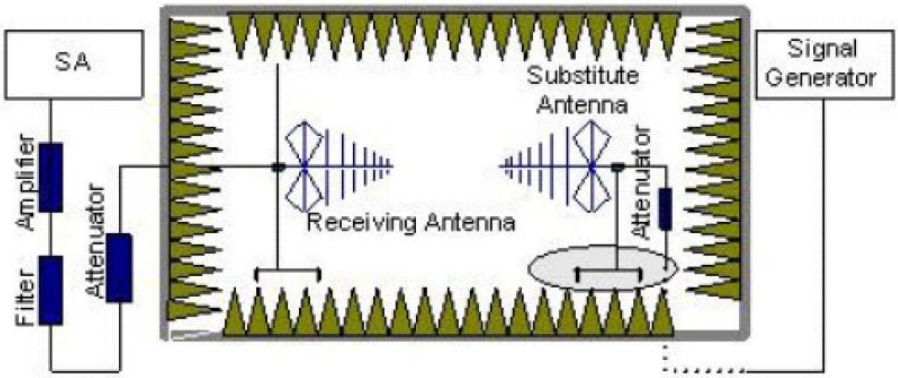
6.6.2 MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2017	02/20/2018
Universal Radio Communication Tester	Agilent	8960	GB44400261	02/21/2017	02/20/2018
Amplifier	EMEC	EM330	060661	02/21/2017	02/20/2018
High Noise Amplifier	Agilent	8449B	3008A01838	02/21/2017	02/20/2018
Bilog Antenna	Schwarzbeck	VULB 9160	9160-3401	02/28/2017	02/27/2018
Horn Antenna	TRC	HA0301	N/A	02/28/2017	02/27/2018
Bilog Antenna	SCHAFFNER	CBL6143	5063	02/21/2017	02/20/2018
Horn Antenna	SCHWARZBECK	BBHA9120	D286	02/28/2017	02/27/2018
Signal Generator	Anritsu	MG3694A	#050125	02/28/2017	02/27/2018
Power Meter	Anritsu	ML2495A	1204003	02/21/2017	02/20/2018
Power Sensor	Anritsu	MA2411B	1126150	02/21/2017	02/20/2018
Turn Table	N/A	N/A	N/A	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	02/21/2017	02/20/2018
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.*

6.6.3 TEST CONFIGURATION

Below 1GHz



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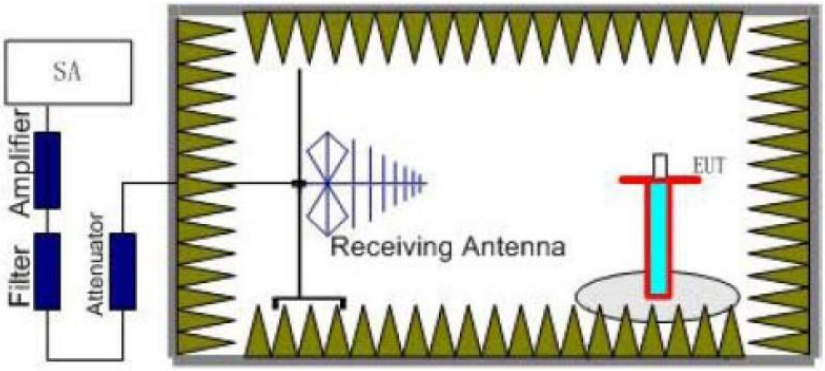

6.6.4 TEST PROCEDURE

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, an 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:

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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.
8. In order to make sure test results more clearly,we set frequency range and sweep time for difference frequency range as follows table:

Working Frequency	Subrange (GHz)	RBW	VBW	Sweep time (s)
TM1/GPRS850	0.00009~0.15	1KHz	3KHz	30
	0.00015~0.03	10KHz	30KHz	10
	0.03~1	100KHz	300KHz	10
	1~2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~10	1 MHz	3 MHz	3
TM1/GPRS1900	0.00009~0.15	1KHz	3KHz	30
	0.00015~0.03	10KHz	30KHz	10
	0.03~1	100KHz	300KHz	10
	1~2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~11	1 MHz	3 MHz	3
	11~14	1 MHz	3 MHz	3
	14~18	1 MHz	3 MHz	3
	18~20	1 MHz	3 MHz	2

6.6.5 TEST RESULTS

Refer to the attached tabular data sheets.

Remark:

1. *We were tested all refer 3GPP TS151 010 for GSM, 3GPP TS 134 121*
2. *EIRP=P_{Mea}(dBm)-P_{cl}(dB) +G_a(dBi)*
3. *We were not recorded other points as values lower than limits.*
4. *Margin = EIRP - Limit*

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Radiated Spurious Emission Measurement Result

GSM/TM1/GPRS850_ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1648.40	-40.91	5.92	3.00	7.66	-39.17	-13.00	-26.17	H
2472.60	-47.81	6.88	3.00	10.13	-44.56	-13.00	-31.56	H
1648.40	-36.56	5.92	3.00	7.66	-34.82	-13.00	-21.82	V
2472.60	-43.24	6.88	3.00	10.13	-39.99	-13.00	-26.99	V

GSM/TM1/GPRS850_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.20	-38.48	5.97	3.00	7.79	-36.66	-13.00	-23.66	H
2509.80	-43.71	6.95	3.00	10.38	-40.28	-13.00	-27.28	H
1673.20	-34.15	5.97	3.00	7.79	-32.33	-13.00	-19.33	V
2509.80	-39.00	6.95	3.00	10.38	-35.57	-13.00	-22.57	V

GSM/TM1/GPRS850_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1697.60	-44.90	6.01	3.00	7.83	-43.08	-13.00	-30.08	H
2546.40	-51.16	7.00	3.00	10.42	-47.74	-13.00	-34.74	H
1697.60	-40.61	6.01	3.00	7.83	-38.79	-13.00	-25.79	V
2546.40	-46.85	7.00	3.00	10.42	-43.43	-13.00	-30.43	V

GSM/TM2/GSM850_ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1648.40	-46.51	5.92	3.00	7.66	-44.77	-13.00	-31.77	H
2472.60	-54.42	6.88	3.00	10.13	-51.17	-13.00	-38.17	H
1648.40	-42.12	5.92	3.00	7.66	-40.38	-13.00	-27.38	V
2472.60	-52.10	6.88	3.00	10.13	-48.85	-13.00	-35.85	V

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GSM/TM2/GSM850_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1673.20	-44.40	5.97	3.00	7.79	-42.58	-13.00	-29.58	H
2509.80	-53.78	6.95	3.00	10.38	-50.35	-13.00	-37.35	H
1673.20	-39.58	5.97	3.00	7.79	-37.76	-13.00	-24.76	V
2509.80	-50.27	6.95	3.00	10.38	-46.84	-13.00	-33.84	V

GSM/TM2/GSM850_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1697.60	-51.01	6.01	3.00	7.83	-49.19	-13.00	-36.19	H
2546.40	-56.73	7.00	3.00	10.42	-53.31	-13.00	-40.31	H
1697.60	-48.49	6.01	3.00	7.83	-46.67	-13.00	-33.67	V
2546.40	-53.30	7.00	3.00	10.42	-49.88	-13.00	-36.88	V

GSM/TM1/GPRS1900_ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3700.40	-39.60	8.18	3.00	10.06	-37.72	-13.00	-24.72	H
5550.60	-32.42	10.26	3.00	11.55	-31.13	-13.00	-18.13	H
3700.40	-40.36	8.18	3.00	10.06	-38.48	-13.00	-25.48	V
5550.60	-32.15	10.26	3.00	11.55	-30.86	-13.00	-17.86	V

GSM/TM1/GPRS1900_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3760.00	-36.51	8.19	3.00	10.09	-34.61	-13.00	-21.61	H
5640.00	-26.70	10.32	3.00	11.58	-25.44	-13.00	-12.44	H
3760.00	-42.33	8.19	3.00	10.09	-40.43	-13.00	-27.43	V
5640.00	-33.54	10.32	3.00	11.58	-32.28	-13.00	-19.28	V

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GSM/TM1/GPRS1900_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3819.60	-37.13	8.25	3.00	10.13	-35.25	-13.00	-22.25	H
5729.40	-29.74	10.39	3.00	11.65	-28.48	-13.00	-15.48	H
3819.60	-38.26	8.25	3.00	10.13	-36.38	-13.00	-23.38	V
5729.40	-30.73	10.39	3.00	11.65	-29.47	-13.00	-16.47	V

GSM/TM2/GSM1900_ Low Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3700.40	-49.05	8.18	3.00	10.06	-47.17	-13.00	-34.17	H
5550.60	-67.79	10.26	3.00	11.55	-66.50	-13.00	-53.50	H
3700.40	-40.68	8.18	3.00	10.06	-38.80	-13.00	-25.80	V
5550.60	-65.49	10.26	3.00	11.55	-64.20	-13.00	-51.20	V

GSM/TM2/GSM1900_ Middle Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3760.00	-35.62	8.19	3.00	10.09	-33.72	-13.00	-20.72	H
5640.00	-68.76	10.32	3.00	11.58	-67.50	-13.00	-54.50	H
3760.00	-37.99	8.19	3.00	10.09	-36.09	-13.00	-23.09	V
5640.00	-65.49	10.32	3.00	11.58	-64.23	-13.00	-51.23	V

GSM/TM2/GSM1900_ High Channel

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3819.60	-33.07	8.25	3.00	10.13	-31.19	-13.00	-18.19	H
5729.40	-65.90	10.39	3.00	11.65	-64.64	-13.00	-51.64	H
3819.60	-32.38	8.25	3.00	10.13	-30.50	-13.00	-17.50	V
5729.40	-66.12	10.39	3.00	11.65	-64.86	-13.00	-51.86	V

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6.7. FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

6.7.1. LIMIT

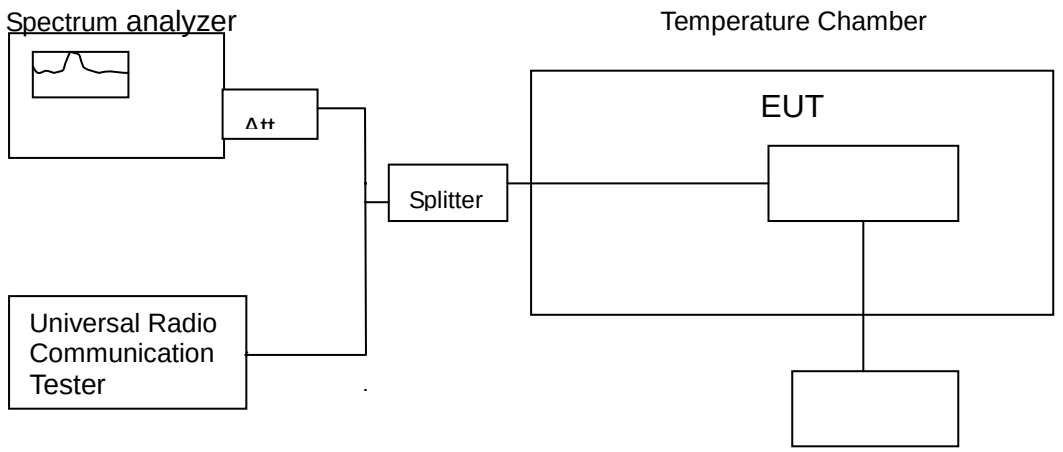
According to FCC §2.1055, FCC §24.235, RSS-132 (4.3) & RSS-133 (6.3).
Frequency Tolerance: 2.5 ppm

6.7.2. MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2017	02/20/2018
Temperature Chamber	YOUNG CHENN	QA-LP-10	200302001	09/17/2017	09/16/2018
DC POWER	QJE	QJ3003XE	018398	N/A	N/A
Universal Radio Communication Tester	Agilent	8960	GB44400261	02/21/2017	02/20/2018

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

6.7.3. TEST CONFIGURATION



Remark: *Measurement setup for testing on Antenna connector.*

6.7.4. TEST PROCEDURE

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to –25°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +55°C reached.

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6.7.5. TEST RESULTS

No non-compliance noted.

Reference Frequency: GPRS Mid Channel 836.6 MHz @ 20°C				
Limit: +/- 2.5 ppm = 2090 Hz				
Power Supply Vac	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
3.7	55	83599979	-13	2090
	50	83599973	-19	
	40	83599969	-23	
	30	83599980	-12	
	20	83599992	0	
	10	83599969	-23	
	0	83599980	-12	
	-10	83599968	-24	
	-20	83599979	-13	
	-25	83599985	-7	

Reference Frequency: GPRS Mid Channel 1880 MHz @ 20°C				
Limit: ± 2.5 ppm = 4700Hz				
Power Supply Vac	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
3.7	55	1879999979	4	4700
	50	1879999977	2	
	40	1879999974	-1	
	30	1879999980	5	
	20	1879999975	0	
	10	1879999984	9	
	0	1879999980	5	
	-10	1879999975	0	
	-20	1879999969	-6	
	-25	1879999972	-3	

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Reference Frequency: GSM Mid Channel 836.6 MHz @ 20°C				
Limit: +/- 2.5 ppm = 2090 Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
3.7	55	83599959	-45	2090
	50	83599962	-42	
	40	83599965	-39	
	30	83599964	-40	
	20	83600004	0	
	10	83599980	-24	
	0	83599972	-32	
	-10	83599969	-35	
	-20	83599974	-30	
	-25	83599985	-19	

Reference Frequency: GSM Mid Channel 1880 MHz @ 20°C				
Limit: ± 2.5 ppm = 4700Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
3.7	55	1879999985	-3	4700
	50	1879999986	-2	
	40	1879999987	-1	
	30	1879999979	-9	
	20	1879999988	0	
	10	1879999978	-10	
	0	1879999969	-19	
	-10	1879999986	-2	
	-20	1879999979	-9	
	-25	1879999986	-2	

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6.8. FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

6.8.1. LIMIT

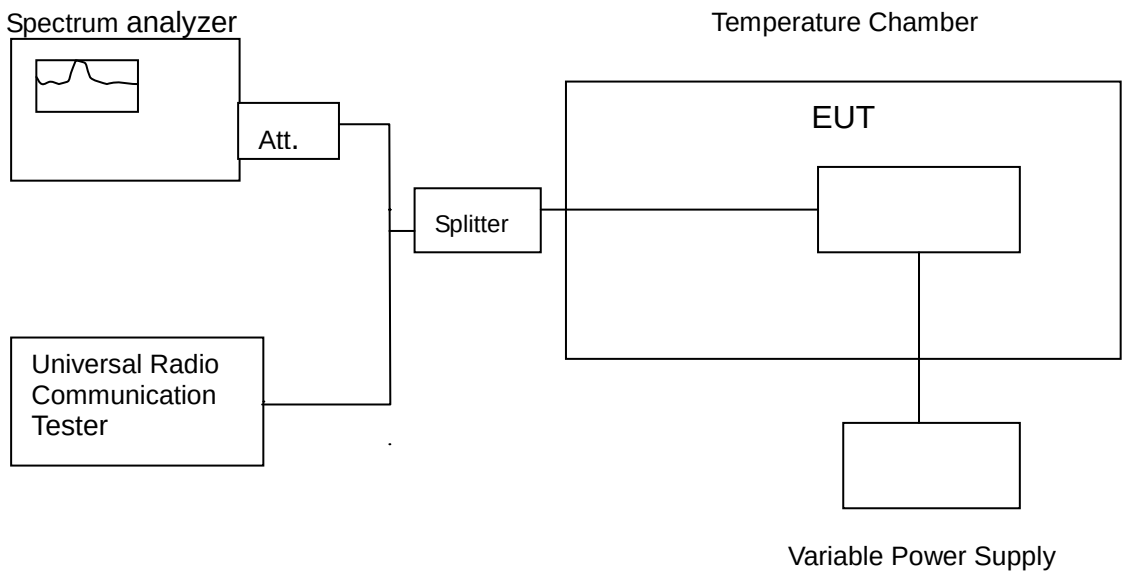
According to FCC §2.1055, FCC §24.235,
Frequency Tolerance: 2.5 ppm.

According to RSS-132 (4.3) & RSS-133 (6.3).
The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations and ±1.0 ppm for base stations.

6.8.2. MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Last Calibration	Due Calibration
Spectrum Analyzer	Agilent	N9010A	MY52221469	02/21/2017	02/20/2018
Temperature Chamber	YOUNG CHENN	QA-LP-10	200302001	09/17/2017	09/16/2018
DC POWER	QJE	QJ3003XE	018398	N/A	N/A
Universal Radio Communication Tester	Agilent	8960	GB44400261	02/21/2017	02/20/2018

6.8.3. TEST CONFIGURATION



Remark: *Measurement setup for testing on Antenna connector.*

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6.8.4. TEST PROCEDURE

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
Reduce the input voltage to specify extreme voltage variation (± 15%) and endpoint, record the maximum frequency change.

6.8.5. TEST RESULTS

No non-compliance noted.

Reference Frequency: GPRS Mid Channel 836.6 MHz @ 20°C				
Limit: ± 2.5 ppm = 2090Hz				
Power Supply Vac	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
4.07	20	83599988	-4	2090
3.70		83599992	0	
3.33		83600008	16	

Reference Frequency: GPRS Mid Channel 1880 MHz @ 20°C				
Limit: ± 2.5 ppm = 4700Hz				
Power Supply Vac	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
4.07	20	1879999960	-11	4700
3.70		1879999971	0	
3.33		1879999966	-5	

Reference Frequency: GSM Mid Channel 836.6 MHz @ 20°C				
Limit: ± 2.5 ppm = 2090Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
4.07	20	83600009	5	2090
3.70		83600004	0	
3.33		83600003	-1	

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Reference Frequency: GSM Mid Channel 1880 MHz @ 20°C				
Limit: ± 2.5 ppm = 4700Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
4.07	20	1879999990	2	4700
3.70		1879999988	0	
3.33		1879999947	-41	

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