

TEST REPORT

of

FCC Part 22 Subpart H and Part 24 Subpart E
FCC ID : ZNFE455G

Equipment Under Test : GSM & WCDMA Phone with Bluetooth and WLAN
Model Name : LG-E455g
Serial No. : N/A
Applicant : LG Electronics MobileComm U.S.A., Inc.
Manufacturer : LG Electronics MobileComm U.S.A., Inc.
Date of Test(s) : 2013.01.07 ~ 2013.02.15
Date of Issue : 2013.02.21

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Harim Lee

Date:

2013.02.21

Approved By:



Denny Ham

Date:

2013.02.21

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1. General information

1.1. Testing laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- Wireless Div. 3FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>.

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1.2. Details of applicant

Applicant : LG Electronics MobileComm U.S.A., Inc.

Address : 1000 Sylvan Avenue Englewood Cliffs, NJ 07632

Contact Person : Park, Joon-Soo

Phone No. : +82 2 2033 1153

1.3. Description of EUT

Kind of Product	GSM & WCDMA Phone with Bluetooth and WLAN
Model Name	LG-E455g
Serial Number	N/A
Power Supply	DC 3.8 V
Rated Power	GSM850: 33.2 dB m GSM1900: 30.2 dB m WCDMA850: 23.2 dB m WCDMA1900: 23.2 dB m
Frequency Range	GSM850 : 824.2 MHz ~ 848.8 MHz GSM1900 : 1 850.2 MHz ~ 1 909.8 MHz WCDMA850 : 826.4 MHz ~ 846.6 MHz WCDMA1900 : 1 852.4 MHz ~ 1 907.6 MHz
Class of GPRS	Class 12, Class B
Emission Designator	250K GXW (GSM850), 252K GXW (GSM1900), 4M18 F9W (WCDMA850), 4M18 F9W (WCDMA1900)

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1.4. Description of test mode

Band	Frequency (MHz)	Voice	GPRS Data			
		GSM	GPRS	GPRS	GPRS	GPRS
			1 TX Slot	2 TX Slot	3 TX Slot	4 TX Slot
		(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
GSM850	824.2	33.58	33.58	31.11	29.40	28.54
	836.6	33.61	33.60	31.19	29.46	28.59
	848.8	33.58	33.59	31.19	29.45	28.63
GSM1900	1 850.2	30.52	30.52	28.09	26.57	25.60
	1 880.0	30.52	30.52	28.04	26.50	25.52
	1 909.8	30.52	30.51	27.99	26.41	25.44

3GPP Release version	Mode	3GPP 34.121 Subtest	Cellular Band[dBm]			PCS Band[dBm]		
			4132	4183	4233	9262	9400	9538
99	WCDMA	12.2kbps RMC	23.57	23.53	23.58	23.51	23.48	23.34
5	HSDPA	Subtest1	23.54	23.48	23.52	23.43	23.44	23.32
5		Subtest2	22.55	22.44	22.55	22.48	22.42	22.29
5		Subtest3	22.06	21.98	21.98	21.98	21.91	21.84
5		Subtest4	22.08	22.07	22.91	21.96	21.92	21.94
6	HSUPA	Subtest1	21.35	21.27	21.24	21.01	21.02	21.02
6		Subtest2	20.59	20.51	20.48	20.52	20.50	20.35
6		Subtest3	20.98	20.86	20.85	20.73	20.71	20.68
6		Subtest4	21.52	21.46	21.42	21.42	21.46	21.33
6		Subtest5	21.85	21.75	21.92	21.20	21.34	21.38

- GSM (850 / 1900) & WCDMA (850/1900)

We found out the test mode with the highest power level after we analyze all the data rates. So we chose GSM850 / GSM1900 GSM Voice and WCDMA 850 /1900 12.2 kbps RMC(worst case) as a representative.

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1.5. Sample calculation for offset

Where relevant, the following sample calculation is provided:

1.5.1. Conducted test

Offset value (dB) = Directional Coupler (dB) + Attenuator (dB) + Cable loss (dB)

1.5.2. Radiation test

E.R.P. & E.I.R.P = [S.G level + Amp.](dB m) - Cable loss(dB) + Ant. gain (dB d/dB i)

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1.6. Test equipment list

Equipment	Manufacturer	Model	S/N	Call Date	Cal Interval	Call Due
Signal Generator	Agilent	E4438C	MY42082477	Mar. 29, 2012	Annual	Mar. 29, 2013
Signal Generator	R&S	SMBV100A	255834	Jul. 02, 2012	Annual	Jul. 02, 2013
Spectrum Analyzer	Agilent	E4440A	MY43362142	Mar. 29, 2012	Annual	Mar. 29, 2013
Spectrum Analyzer	Agilent	N9030A	US51350132	Oct. 30, 2012	Annual	Oct. 30, 2013
Mobile Test Unit	Agilent	E5515C	GB43345198	Mar. 29, 2012	Annual	Mar. 29, 2013
Directional Coupler	KRYTAR	152613	122661	Apr. 04, 2012	Annual	Apr. 04, 2013
Step Attenuator	Agilent	8494B	MY42141937	Mar. 31, 2012	Annual	Mar. 31, 2013
High Pass Filter	Wainwright	WHK3.0/18G-10SS	344	Jul. 12, 2012	Annual	Jul. 12, 2013
Band Rejection Filter	Wainwright	WRCG824/849-814/ 859-60/10SS	7	Mar. 31, 2012	Annual	Mar. 31, 2013
DC power Supply	Agilent	U8002A	MY49030063	Dec. 20, 2012	Annual	Dec. 20, 2013
Preamplifier	H.P.	8447F	2944A03909	Jul. 03, 2012	Annual	Jul. 03, 2013
Preamplifier	R&S	SCU 18	10117	Jan. 14, 2013	Annual	Jan. 14, 2014
Preamplifier	MITEQ Inc.	JS44-18004000-35- 8P	1546891	Jul. 12, 2012	Annual	Jul. 12, 2013
Test Receiver	R&S	ESU26	100109	Feb. 21, 2012	Biennial	Feb. 21, 2013
Bilog Antenna	SCHWARZBECK	VULB9163	396	Apr. 27, 2011	Biennial	Apr. 27, 2013
Horn Antenna	R&S	HF 906	100326	Nov. 23, 2011	Biennial	Nov. 23, 2013
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170431	May. 15, 2012	Biennial	May. 15, 2014
Dipole Antenna	SCHWARZBECK	VHA/UHA	9103/9105	May. 24, 2011	Biennial	May. 24, 2013
Antenna Master	INN-CO	MM4000	N/A	N.C.R.	N/A	N.C.R.
Turn Table	INN-CO	DS 1200 S	N/A	N.C.R.	N/A	N.C.R.
Anechoic Chamber	SY Corporation	L × W × H (9.6 m×6.4 m×6.6 m)	N/A	N.C.R.	N/A	N.C.R.

Note ;
After SCU 18(pre-amp) was calibrated, the device was tested.

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1.7. Summary of test results

The EUT has been tested according to the following specifications:

APPLIED STANDARD : FCC Part 22, 24		
Section in FCC part	Test Item	Result
§2.1046 §22.913(a) §24.232(c)	RF Radiated Output Power	Complied
§2.1053 §22.917(e) §24.238(a)	Spurious Radiated Emission	Complied
§2.1046(a)	Conducted Output Power	Complied
§2.1049(h) (i)	Occupied Bandwidth	Complied
§24.232(d)	Peak-Average Ratio	Complied
§2.1051 §22.917(e) §24.238(a)	Spurious Emission at Antenna Terminal	Complied
§2.1055 §22.355 §24.235	Frequency Stability	Complied
§22.917(e) §24.238(a)	Band Edge	Complied

1.8. Test report revision

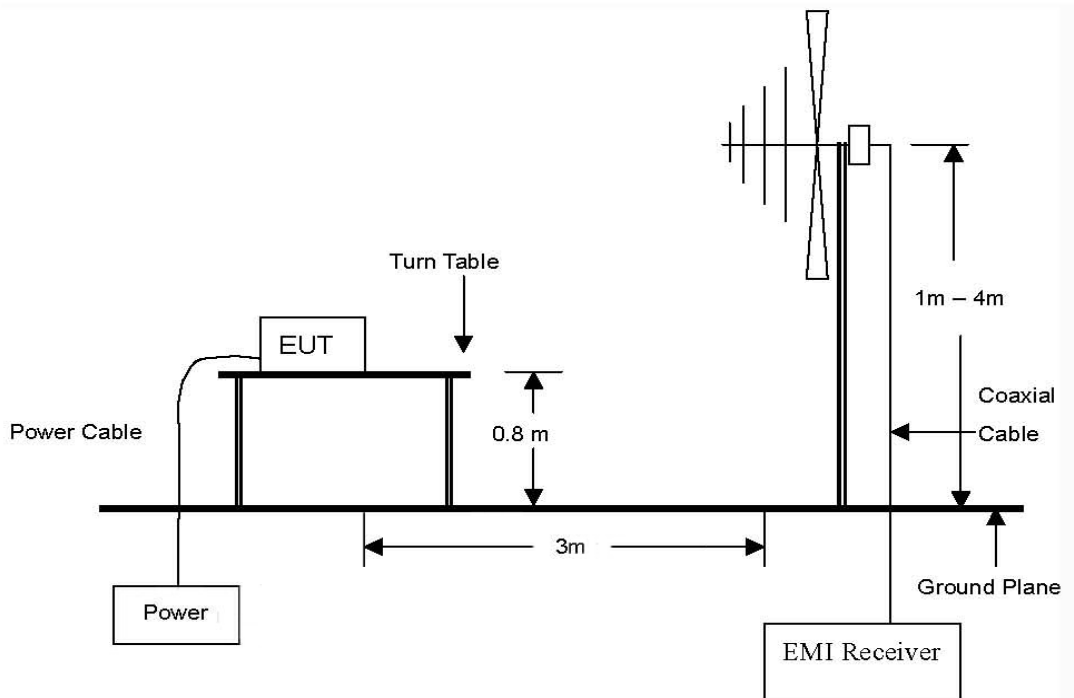
Revision	Report number	Description
0	F690501/RF-RTL006173	Initial
1	F690501/RF-RTL006173-1	Revised rated power level

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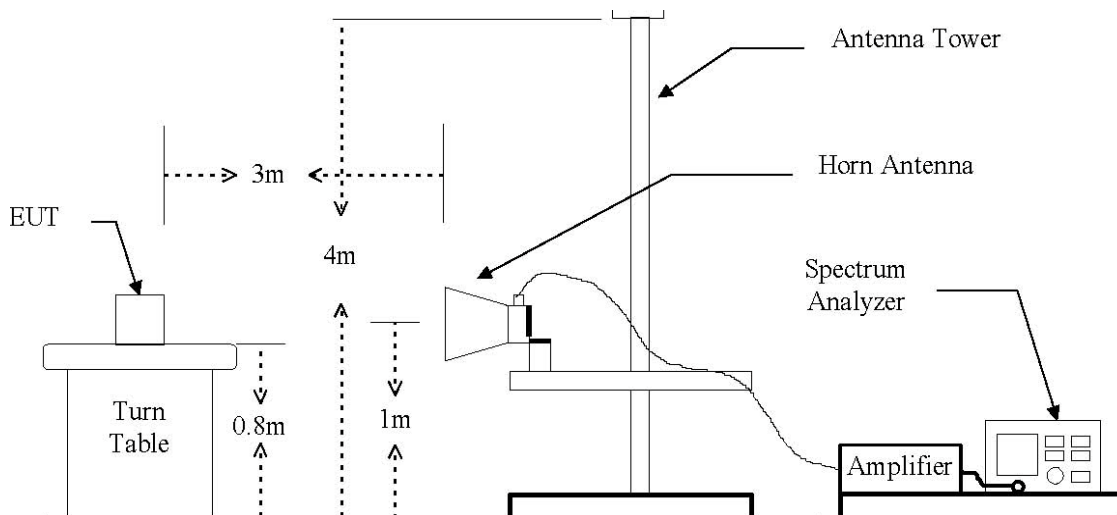
2. RF radiated output power & spurious radiated emission

2.1. Test setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.

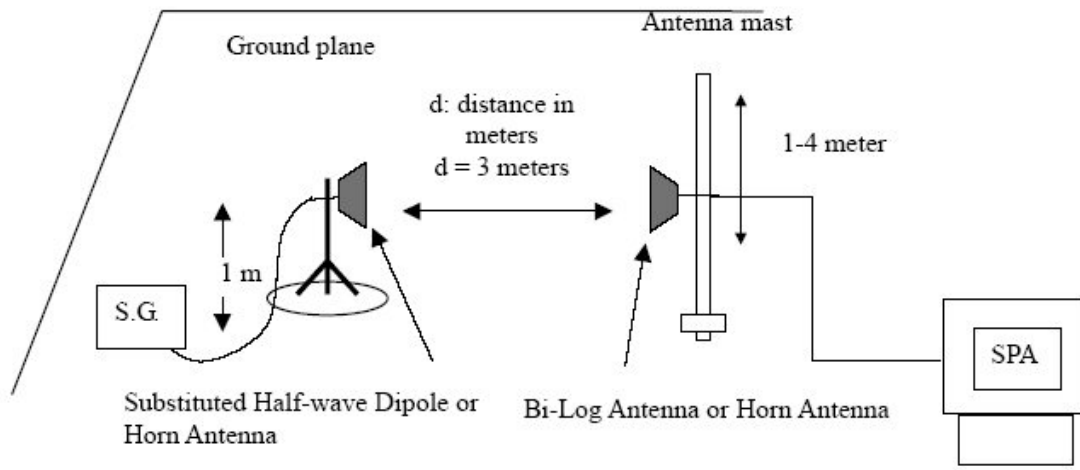


The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 20 GHz Emissions.



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The diagram below shows the test setup for substituted method



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2.2. Limit

FCC §22.913(a), the ERP of mobile transmitters must not exceed 7 watts. FCC §24.232(c) Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

2.3. Test procedure : Based on ANSI/TIA 603C: 2004

1. On a test site, the EUT shall be placed at 80cm height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. During the measurement of the EUT, the resolution bandwidth was to 1 MHz and the average bandwidth was set to 1 MHz.
5. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until the maximum signal level is detected by the measuring receiver.
7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. The EUT was replaced by half-wave dipole (824 ~ 849 MHz) or horn antenna (1 850 ~ 1 910 MHz) connected to a signal generator.
11. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
14. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

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2.4. Test result for RF radiated output power

Ambient temperature : (24 ± 2) °C

Relative humidity : 47 % R.H.

GSM850

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P.	
					(dB m)	(mW)
824.2	V	34.63	3.42	-3.44	27.77	598.41
824.2	H	35.87	3.42	-3.44	29.01	796.16
836.4	V	35.71	3.38	-3.45	28.88	772.68
836.4	H	35.69	3.38	-3.45	28.86	769.13
848.8	V	36.58	3.33	-3.41	29.84	963.83
848.8	H	37.60	3.33	-3.41	30.86	1 218.99

GSM1900

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P.	
					(dB m)	(mW)
1 850.2	V	26.25	4.87	7.55	28.93	781.63
1 850.2	H	26.25	4.87	7.55	28.93	781.63
1 880.0	V	25.15	4.91	7.63	27.87	612.35
1 880.0	H	27.88	4.91	7.63	30.60	1 148.15
1 909.8	V	26.53	4.94	7.70	29.29	849.18
1 909.8	H	27.73	4.94	7.70	30.49	1 119.44

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WCDMA850

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P.	
					(dB m)	(mW)
826.4	V	26.22	3.41	-3.44	19.37	86.50
826.4	H	27.13	3.41	-3.44	20.28	106.66
836.6	V	26.72	3.38	-3.45	19.89	97.50
836.6	H	26.64	3.38	-3.45	19.81	95.72
846.6	V	27.68	3.34	-3.42	20.92	123.59
846.6	H	27.16	3.34	-3.42	20.40	109.65

WCDMA1900

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P.	
					(dB m)	(mW)
1 852.4	V	20.79	4.87	7.56	23.48	222.84
1 852.4	H	20.36	4.87	7.56	23.05	201.84
1 880.0	V	19.41	4.91	7.63	22.13	163.31
1 880.0	H	21.19	4.91	7.63	23.91	246.04
1 907.6	V	20.85	4.94	7.69	23.60	229.09
1 907.6	H	20.08	4.94	7.69	22.83	191.87

Remark:

1. E.R.P. & E.I.R.P. = [S.G level + Amp.](dB m) - Cable loss(dB) + Ant. gain (dB d/dB i)
2. The E.R.P. & E.I.R.P. was measured in three orthogonal EUT position (x-axis, y-axis and z-axis). Worst cases are y-axis

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2.5. Spurious radiated emission

- Measured output Power: 30.86 dB m = 1.219 W
- Modulation Signal: GSM850
- Distance: 3 meters
- Limit: $-(43 + 10\log_{10}(W)) = -43.86$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P. (dB m)	dB c	Margin (dB)
Low Channel (824.2 MHz)							
1 648.24	V	-39.43	4.54	6.44	-37.53	-68.39	24.53
1 648.21	H	-42.25	4.54	6.44	-40.35	-71.21	27.35
2 472.81	V	-42.10	4.58	6.50	-40.18	-71.04	27.18
2 472.95	H	-46.13	4.58	6.50	-44.21	-75.07	31.21
Middle Channel (836.4 MHz)							
1 673.10	V	-43.06	5.67	7.97	-40.76	-71.62	27.76
1 673.08	H	-42.75	5.67	7.97	-40.45	-71.31	27.45
2 509.97	V	-45.75	5.72	8.02	-43.45	-74.31	30.45
2 509.59	H	-42.56	5.72	8.02	-40.26	-71.12	27.26
High Channel (848.8 MHz)							
1 697.65	V	-41.36	4.62	6.57	-39.41	-70.27	26.41
1 697.54	H	-47.65	4.62	6.57	-45.70	-76.56	32.70
2 546.49	V	-49.45	5.75	8.07	-47.13	-77.99	34.13
2 546.61	H	-43.06	5.75	8.07	-40.74	-71.60	27.74

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- Measured output Power : 30.60 dB m = 1.148 W
- Modulation Signal : GSM1900
- Distance : 3 meters
- Limit : $-(43 + 10\log_{10}(W)) = -43.60$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P. (dB m)	dB c	Margin (dB)
Low Channel(1 850.2 MHz)							
3 700.29	V	-47.53	7.13	11.85	-42.81	-73.41	29.81
3 700.28	H	-46.68	7.13	11.85	-41.96	-72.56	28.96
5 550.71	V	-32.31	9.24	12.12	-29.43	-60.03	16.43
5 550.70	H	-34.47	9.24	12.12	-31.59	-62.19	18.59
7 401.12	V	-41.82	10.96	10.17	-42.61	-73.21	29.61
7 400.52	H	-46.14	10.96	10.17	-46.93	-77.53	33.93
12 951.65	V	-28.85	16.40	12.67	-32.58	-63.18	19.58
12 951.40	H	-34.14	16.40	12.67	-37.87	-68.47	24.87
Middle Channel(1 880.0 MHz)							
3 759.93	V	-46.26	7.23	11.85	-41.64	-72.24	28.64
3 759.79	H	-47.04	7.23	11.85	-42.42	-73.02	29.42
5 639.82	V	-35.07	9.36	12.08	-32.35	-62.95	19.35
5 639.79	H	-34.93	9.36	12.08	-32.21	-62.81	19.21
7 520.15	V	-41.86	11.31	10.22	-42.95	-73.55	29.95
7 519.96	H	-42.95	11.31	10.22	-44.04	-74.64	31.04
13 160.56	V	-29.34	16.59	12.45	-33.48	-64.08	20.48
13 160.10	H	-31.60	16.59	12.45	-35.74	-66.34	22.74

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Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P. (dB m)	dB c	Margin (dB)
High Channel(1 909.8 MHz)							
3 819.64	V	-47.41	7.33	11.84	-42.90	-73.50	29.90
3 819.52	H	-48.86	7.33	11.84	-44.35	-74.95	31.35
5 729.54	V	-36.04	9.46	12.04	-33.46	-64.06	20.46
5 729.60	H	-34.58	9.46	12.04	-32.00	-62.60	19.00
7 639.49	V	-44.30	11.44	10.24	-45.50	-76.10	32.50
7 639.46	H	-42.42	11.44	10.24	-43.62	-74.22	30.62
13 368.53	V	-29.55	16.98	12.20	-34.33	-64.93	21.33
13 369.18	H	-29.70	16.98	12.20	-34.48	-65.08	21.48

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- Measured output Power: 20.92 dB m = 0.124 W
- Modulation Signal: WCDMA850
- Distance: 3 meters
- Limit: $-(43 + 10\log_{10}(W)) = -33.92$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB d)	E.R.P. (dB m)	dB c	Margin (dB)
Low Channel (826.4 MHz)							
1 651.35	V	-43.42	4.54	6.45	-41.51	-62.43	28.51
1 650.43	H	-50.45	4.54	6.45	-48.54	-69.46	35.54
Middle Channel (836.6 MHz)							
1 675.60	V	-40.16	4.58	6.51	-38.23	-59.15	25.23
1 675.34	H	-51.33	4.58	6.51	-49.40	-70.32	36.40
High Channel (846.6 MHz)							
1 695.57	V	-39.08	4.61	6.56	-37.13	-58.05	24.13
1 695.49	H	-51.74	4.61	6.56	-49.79	-70.71	36.79

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- Measured output Power : 23.91 dB m = 0.246 W
- Modulation Signal : WCDMA1900
- Distance : 3 meters
- Limit : $-(43 + 10\log_{10}(W)) = -36.91$ dB c

Frequency (MHz)	Ant. Pol. (H/V)	S.G level + Amp. (dB m)	Cable loss (dB)	Ant. gain (dB i)	E.I.R.P. (dB m)	dB c	Margin (dB)
Low Channel(1 852.4 MHz)							
3 707.20	V	-41.92	7.14	11.85	-37.21	-61.12	24.21
3 702.34	H	-42.57	7.13	11.85	-37.85	-61.76	24.85
5 560.91	V	-40.18	9.25	12.12	-37.31	-61.22	24.31
5 560.70	H	-40.27	9.25	12.12	-37.40	-61.31	24.40
7 413.39	V	-42.51	11.00	10.17	-43.34	-67.25	30.34
7 412.50	H	-45.64	11.00	10.17	-46.47	-70.38	33.47
Middle Channel(1 880.0 MHz)							
3 758.50	V	-39.38	7.23	11.85	-34.76	-58.67	21.76
3 757.71	H	-44.02	7.23	11.85	-39.40	-63.31	26.40
5 641.33	V	-42.61	9.36	12.08	-39.89	-63.80	26.89
5 643.53	H	-42.35	9.37	12.08	-39.64	-63.55	26.64
7 516.38	V	-41.66	11.30	10.21	-42.75	-66.66	29.75
7 515.20	H	-41.91	11.30	10.21	-43.00	-66.91	30.00
High Channel(1 907.6 MHz)							
3 812.97	V	-41.42	7.32	11.84	-36.90	-60.81	23.90
3 817.63	H	-55.53	7.33	11.84	-51.02	-74.93	38.02
5 726.36	V	-39.38	9.46	12.04	-36.80	-60.71	23.80
5725.69	H	-38.64	9.46	12.04	-36.06	-59.97	23.06
7 634.22	V	-39.87	11.44	10.24	-41.07	-64.98	28.07
7 634.70	H	-40.23	11.44	10.24	-41.43	-65.34	28.43

Remark:

1. E.R.P. & E.I.R.P. = S.G level (dB m) - Cable loss (dB) + Ant. gain (dB d/dB i)

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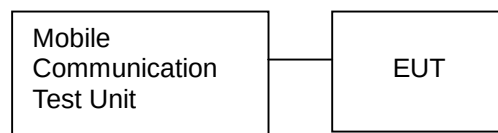
3. Conducted Output Power

3.1. Limit

Requirements: CFR 47, Section §2.1046

3.2. Test Procedure

1. The RF output of the transmitter was connected to the input of the Mobile Communication Test Unit through sufficient attenuation.
2. The mobile was set up for the max. output power with pseudo random data modulation.
3. The power was measured with Mobile Communication Test unit.



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3.3. Test Result

Ambient temperature : (24 ± 2) °C

Relative humidity : 47 % R.H.

Band	Frequency (MHz)	Voice	GPRS Data			
		GSM	GPRS	GPRS	GPRS	GPRS
			1 TX Slot	2 TX Slot	3 TX Slot	4 TX Slot
		(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
GSM850	824.2	33.58	33.58	31.11	29.40	28.54
	836.6	33.61	33.60	31.19	29.46	28.59
	848.8	33.58	33.59	31.19	29.45	28.63
GSM1900	1 850.2	30.52	30.52	28.09	26.57	25.60
	1 880.0	30.52	30.52	28.04	26.50	25.52
	1 909.8	30.52	30.51	27.99	26.41	25.44

3GPP Release version	Mode	3GPP 34.121 Subtest	Cellular Band[dBm]			PCS Band[dBm]		
			4132	4183	4233	9262	9400	9538
99	WCDMA	12.2kbps RMC	23.57	23.53	23.58	23.51	23.48	23.34
5	HSDPA	Subtest1	23.54	23.48	23.52	23.43	23.44	23.32
5		Subtest2	22.55	22.44	22.55	22.48	22.42	22.29
5		Subtest3	22.06	21.98	21.98	21.98	21.91	21.84
5		Subtest4	22.08	22.07	22.91	21.96	21.92	21.94
6	HSUPA	Subtest1	21.35	21.27	21.24	21.01	21.02	21.02
6		Subtest2	20.59	20.51	20.48	20.52	20.50	20.35
6		Subtest3	20.98	20.86	20.85	20.73	20.71	20.68
6		Subtest4	21.52	21.46	21.42	21.42	21.46	21.33
6		Subtest5	21.85	21.75	21.92	21.20	21.34	21.38

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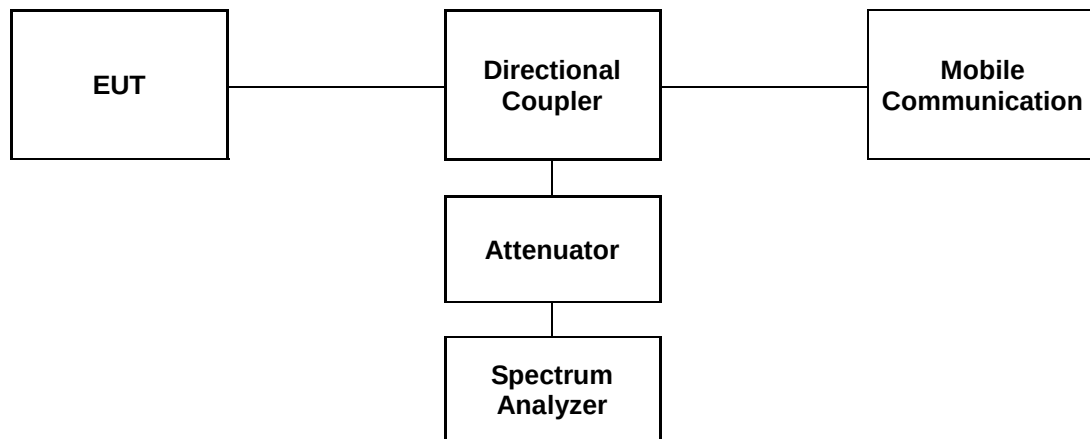
4. Occupied Bandwidth 99 %

4.1. Limit

Requirements: CFR 47, Section §2.1049.

4.2. Test Procedure

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.
2. The resolution bandwidth of the spectrum analyzer was set.
Occupied Bandwidth 99 % was tested under



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4.3 Test Results

Ambient temperature : (24 ± 2) °C
Relative humidity : 47 % R.H.

Band	Mode	Frequency (MHz)	Occupied Bandwidth (MHz)
GSM850	GSM Voice	824.2	0.249
		836.6	0.246
		848.8	0.250
GSM1900	GSM Voice	1 850.2	0.252
		1 880.0	0.252
		1 909.8	0.245
WCDMA850	12.2 kbps (RMC)	826.4	4.178
		836.6	4.175
		848.6	4.163
WCDMA1900	12.2 kbps (RMC)	1 852.4	4.171
		1 880.0	4.173
		1 907.6	4.175

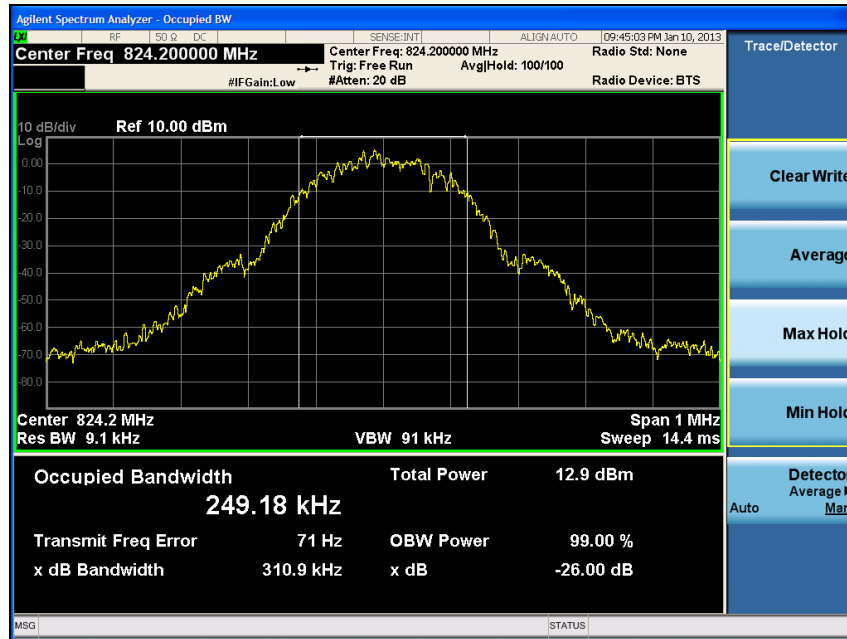
Please refer to the following plots.

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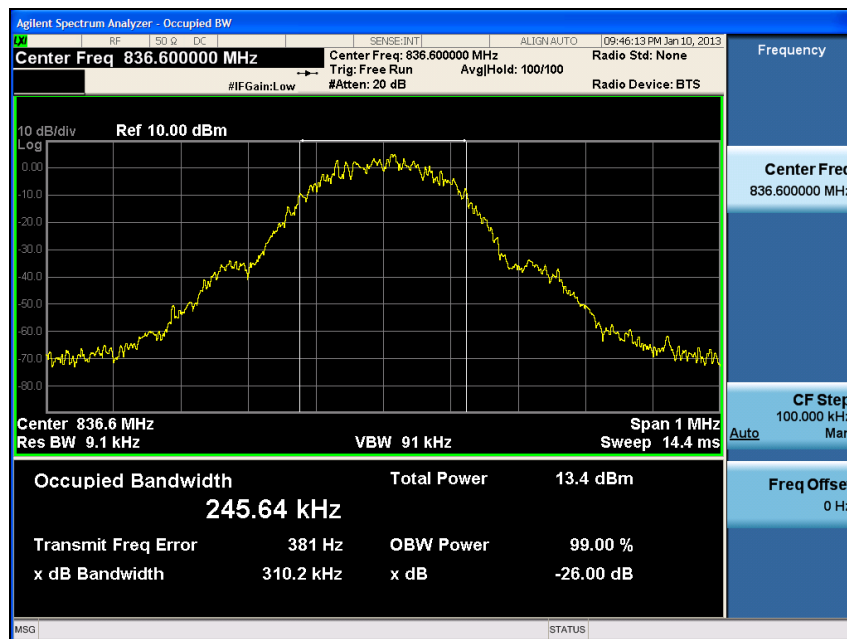
GSM850

99 %

Low Channel

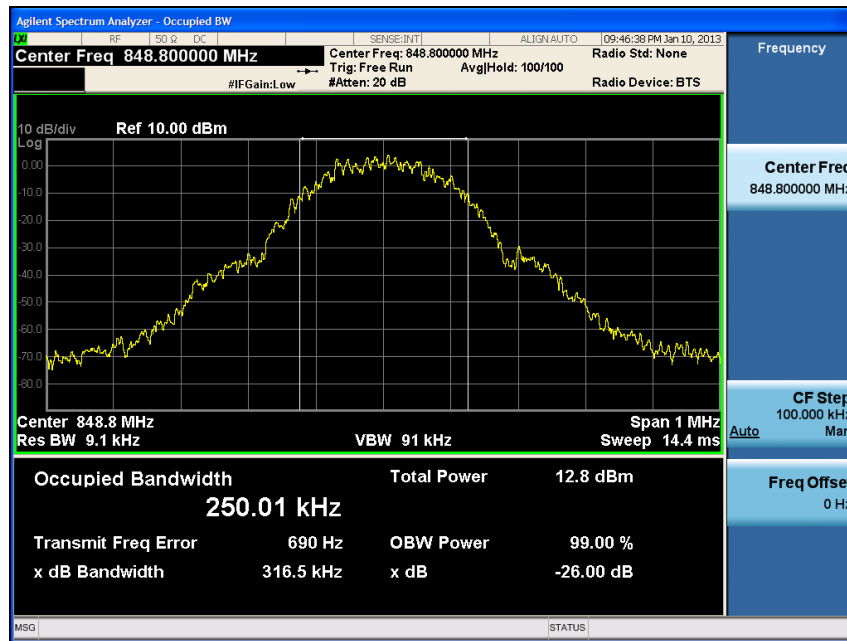


Middle Channel



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High Channel

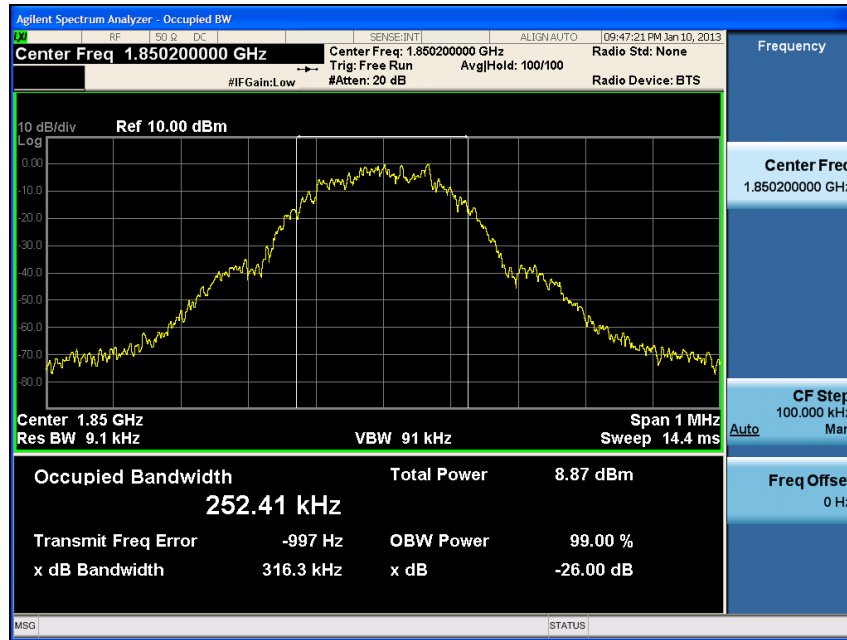


The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

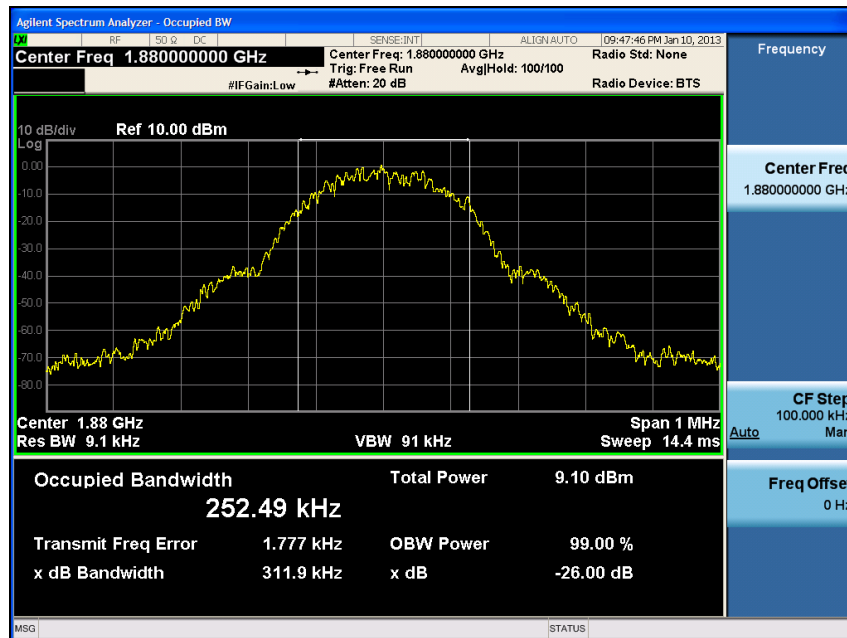
GSM1900

99 %

Low Channel

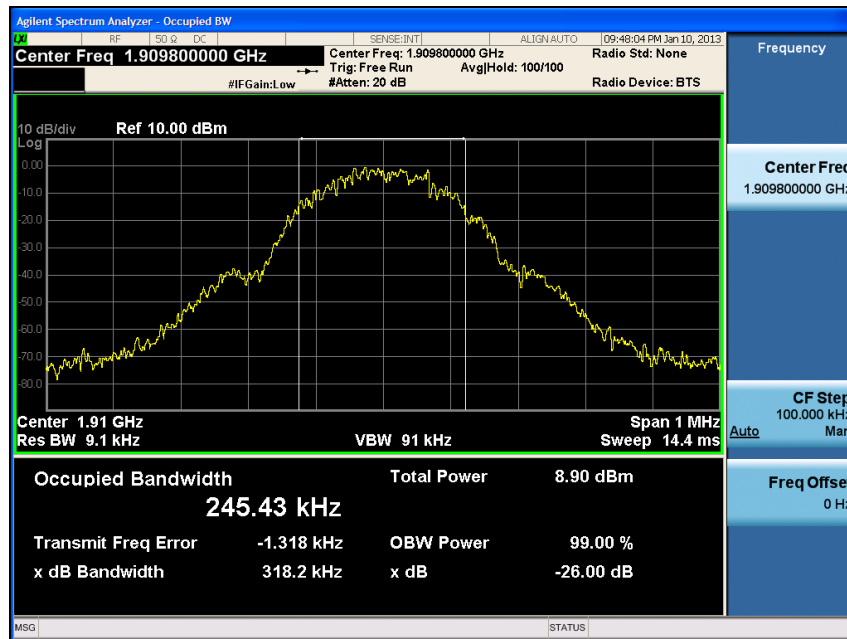


Middle Channel



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High Channel

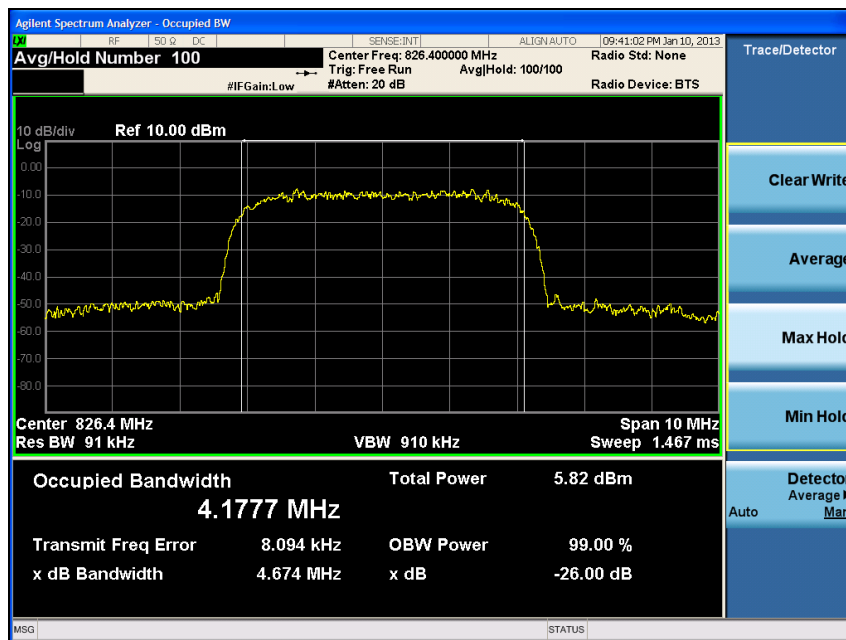


The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

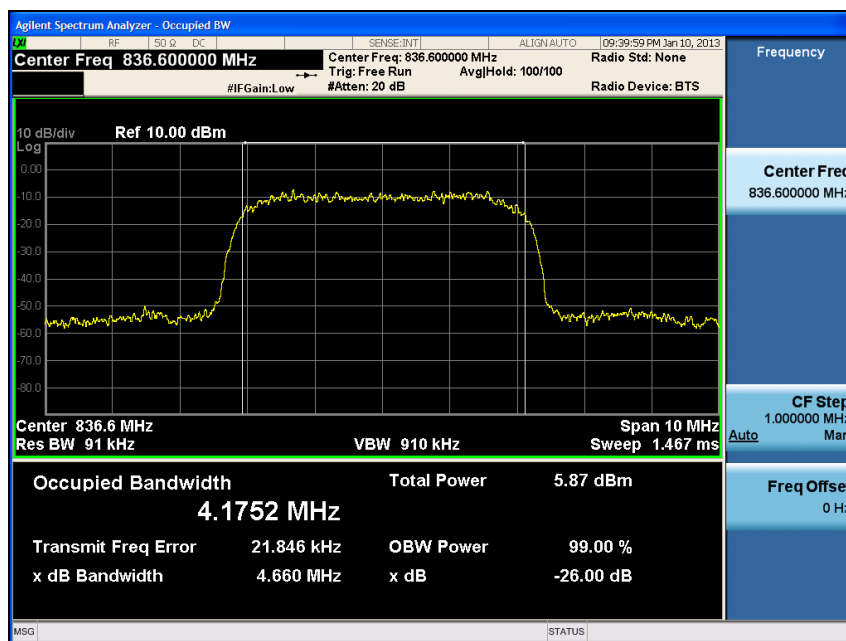
WCDMA850

99 %

Low Channel

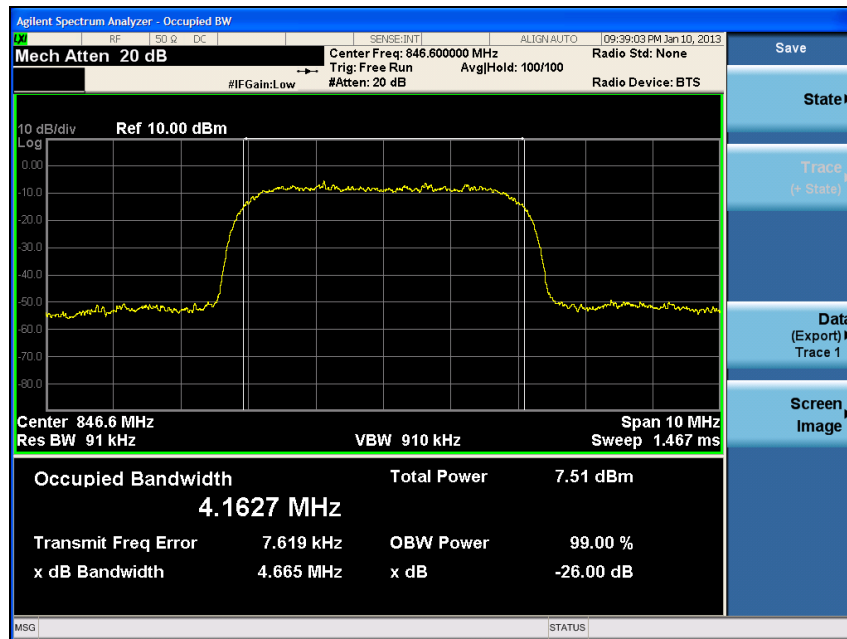


Middle Channel



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High Channel

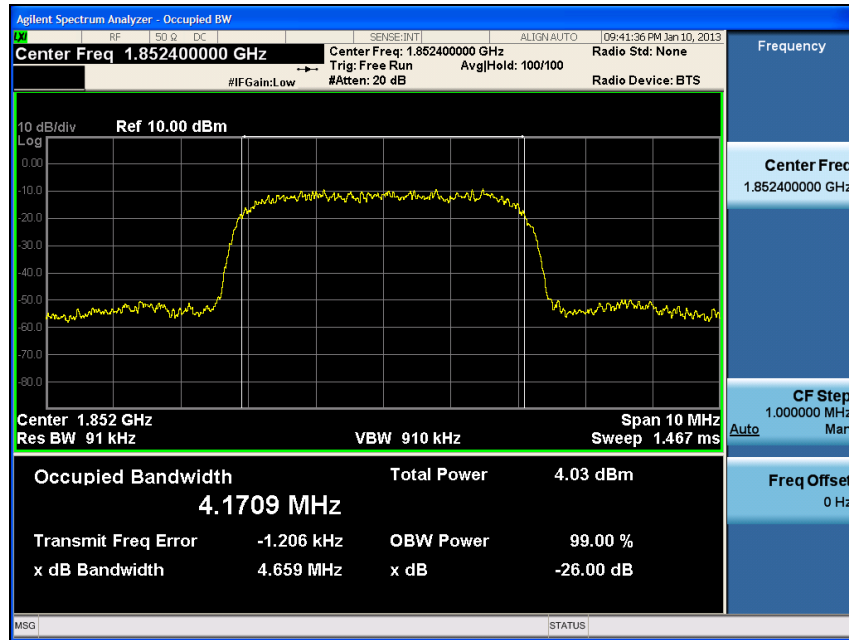


The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

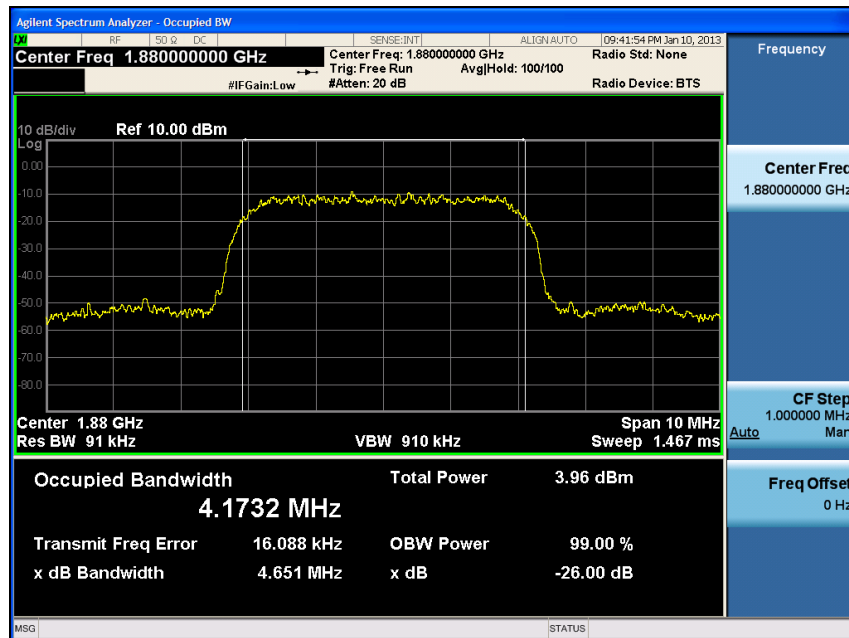
WCDMA1900

99 %

Low Channel

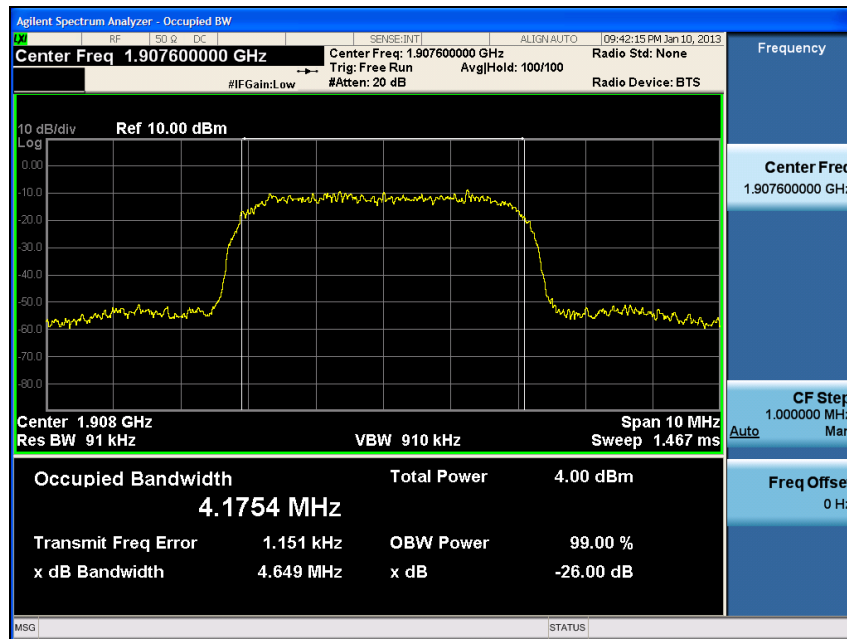


Middle Channel



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High Channel



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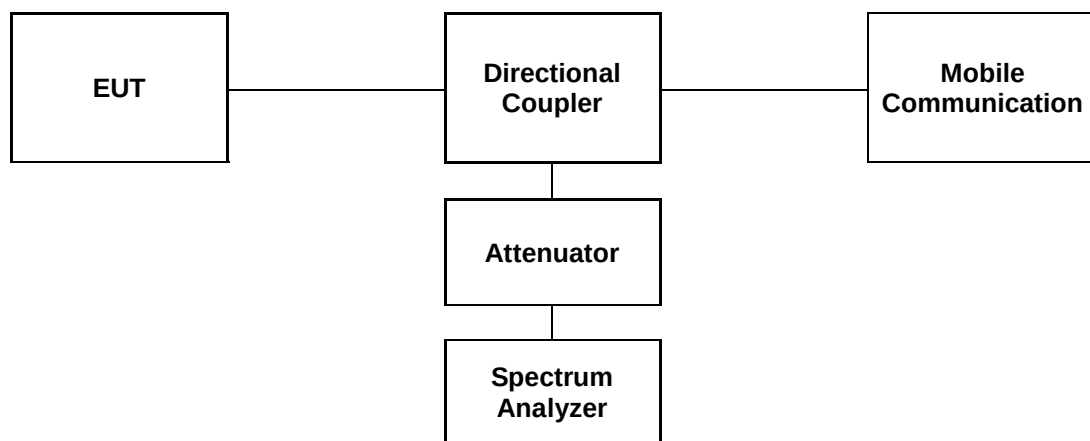
5. Peak-Average Ratio

5.1. Limit

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

5.2. Test Procedure

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.
2. The CCDF function of the spectrum analyzer was set.
3. PAR was measured with spectrum analyzer for each channel.



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5.3 Test Results

Ambient temperature : (24 ± 2) °C
Relative humidity : 47 % R.H.

Please refer to the following plots.

Band	Mode	Frequency (MHz)	PAR (dB)
GSM1900	GSM Voice	1 850.2	1.11
		1 880.0	1.51
		1 909.8	1.17
WCDMA1900	12.2 kbps (RMC)	1 852.4	2.91
		1 880.0	3.36
		1 907.6	3.35

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Peak-Average Ratio

GSM1900

Low Channel

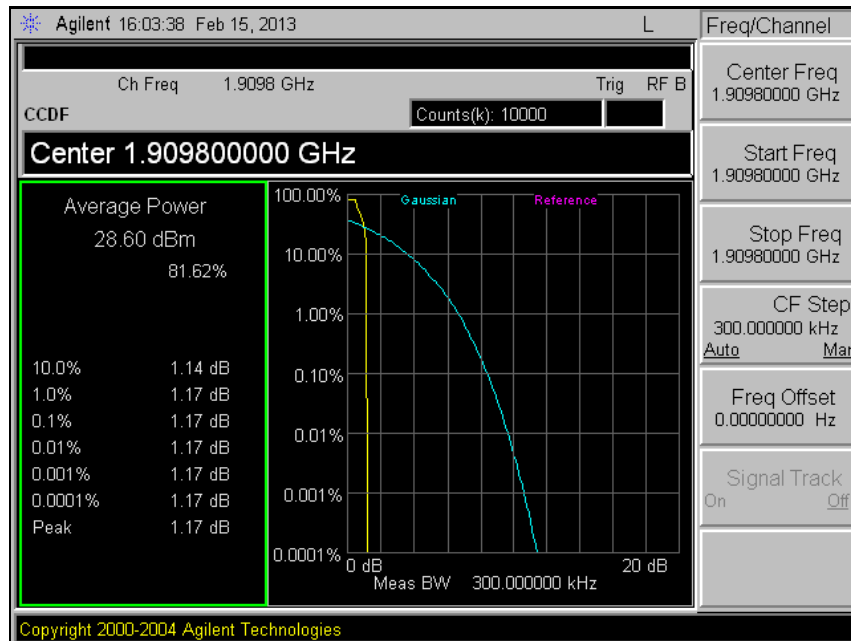


Middle Channel



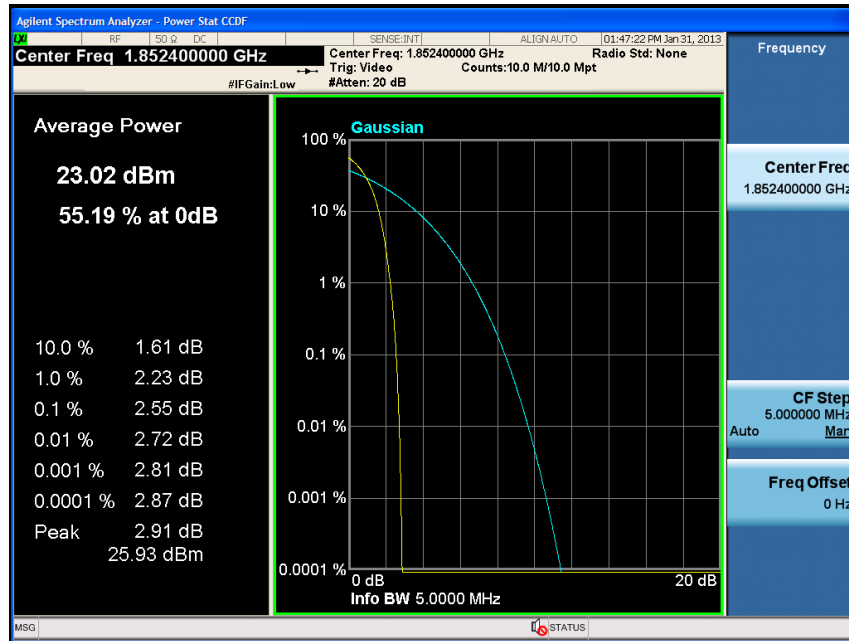
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

High Channel

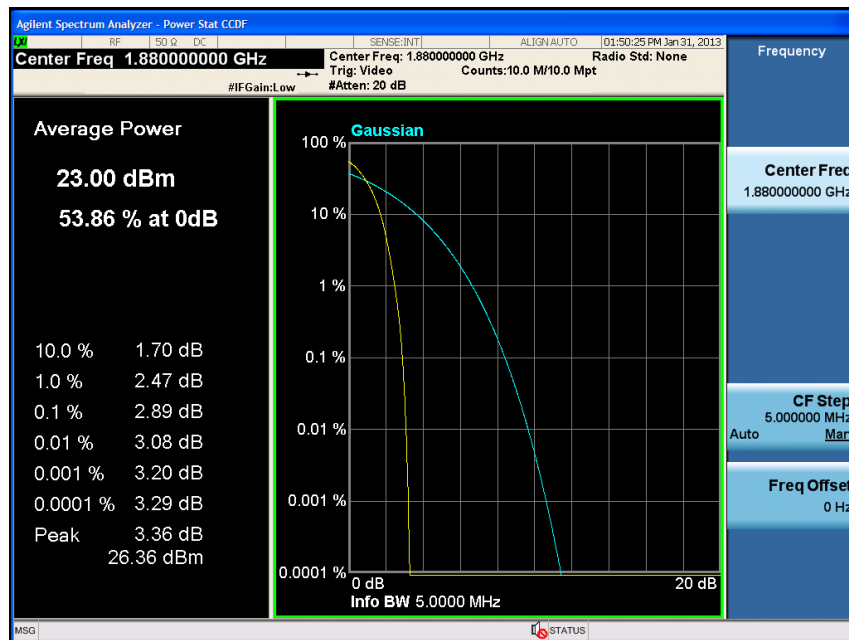


The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

WCDMA1900 Low Channel

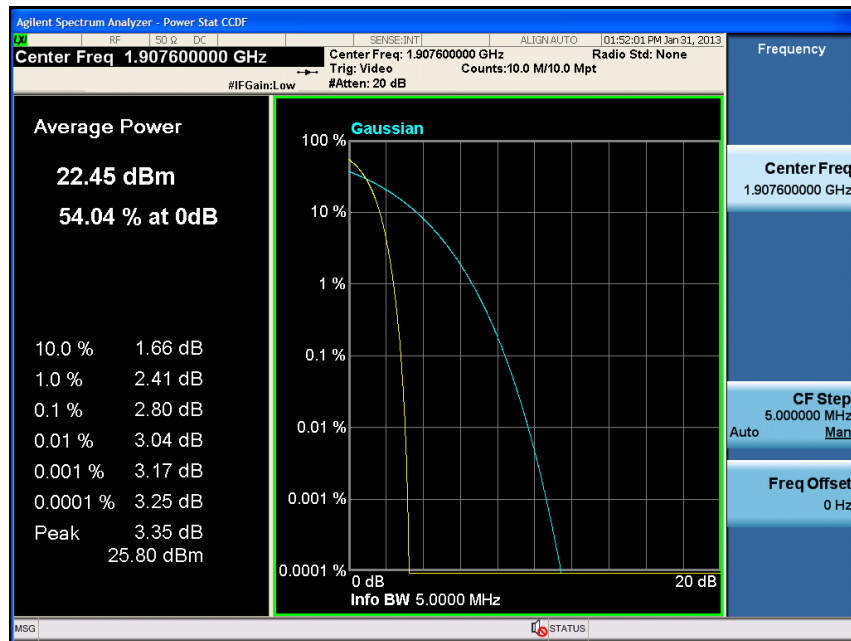


Middle Channel



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High Channel



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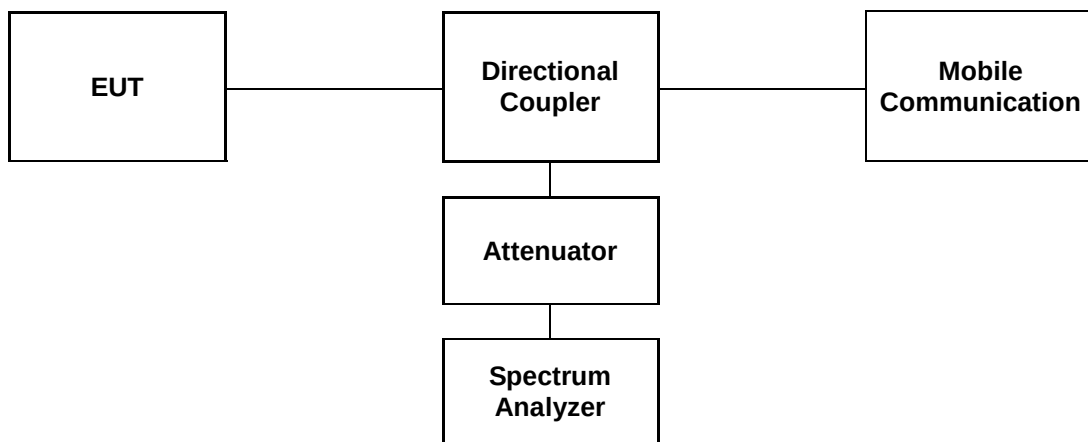
6. Spurious Emissions at Antenna Terminal

6.1. Limit

§ 22.917(e) and §24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency must be attenuated below the transmitting (P) by a factor of at least $43 + 10\log(P)$ dB.

6.2. Test Procedure

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



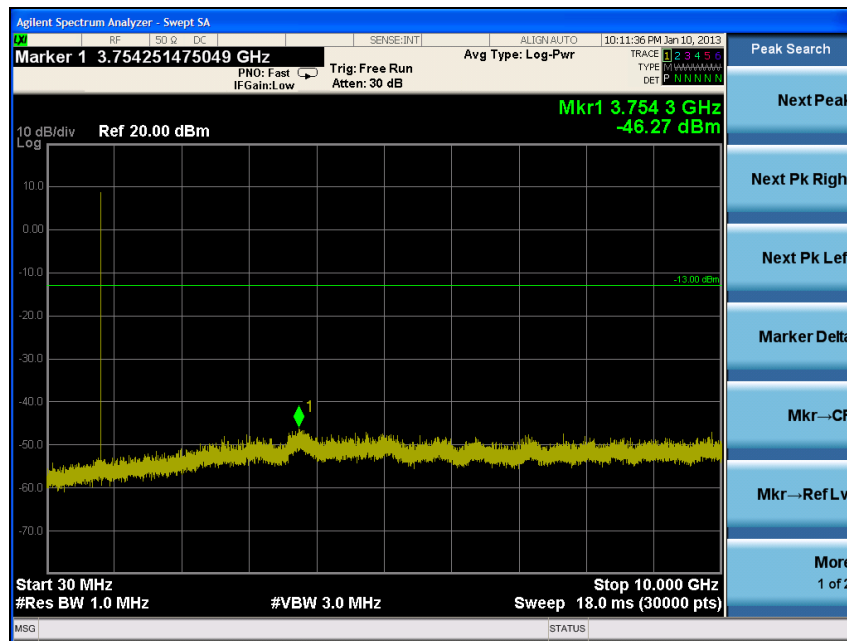
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

6.3. Test Results

Ambient temperature : (24 ± 2) °C
Relative humidity : 47 % R.H.

Please refer to the following plots.

GSM850
Low Channel



Note:

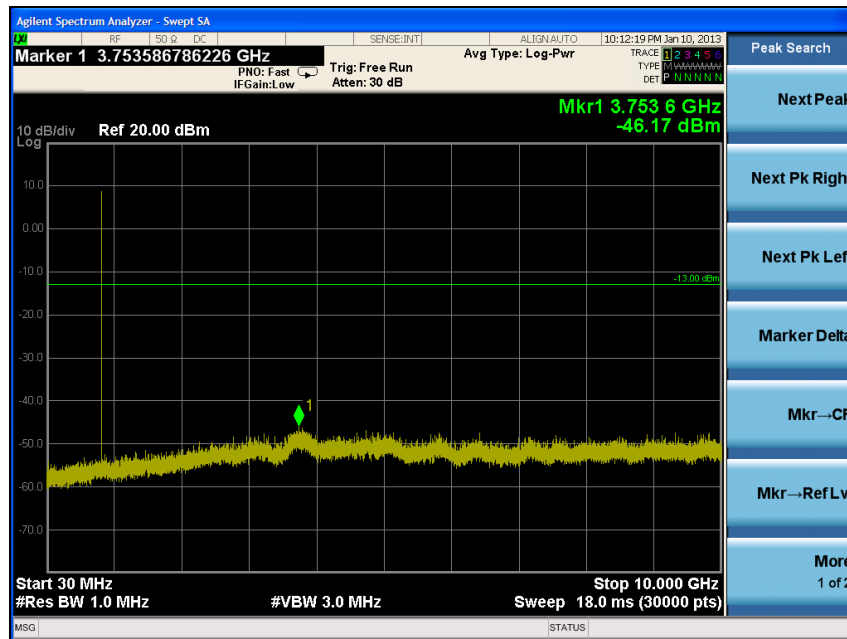
Offset (dB) = Directional Coupler (dB) + Attenuator (dB) + Cable loss (dB)

Result (dB m) = Spurious offset (dB) + Reading values (dB m)

Frequency (MHz)	Spurious offset (dB)	Reading values (dB m)	Result (dB m)
3 754.3	Noise Level	-	-

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Middle Channel



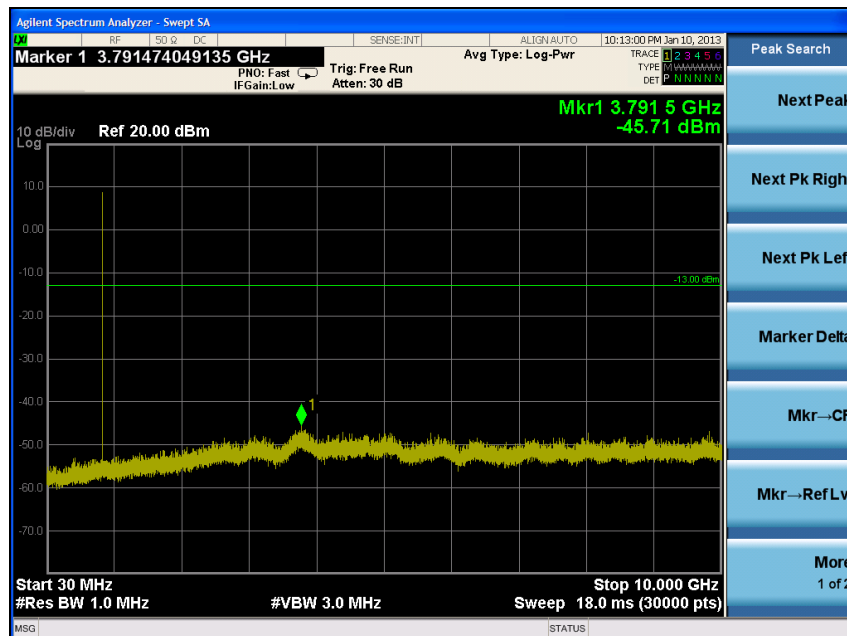
Note:

Offset (dB) = Directional Coupler (dB) + Attenuator (dB) + Cable loss (dB)

Result (dB m) = Spurious offset (dB) + Reading values (dB m)

Frequency (MHz)	Spurious offset (dB)	Reading values (dB m)	Result (dB m)
3 753.6	Noise Level	-	-

High Channel



Note:

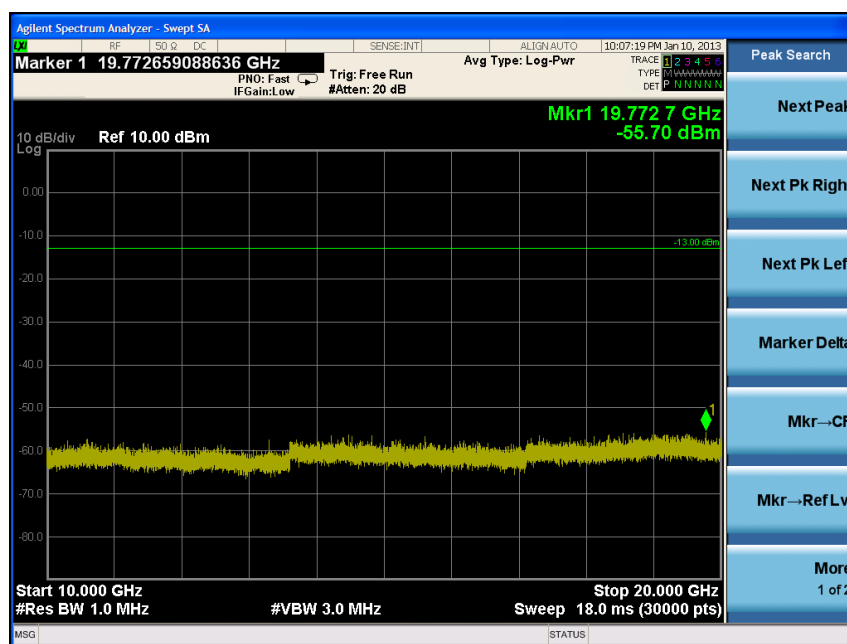
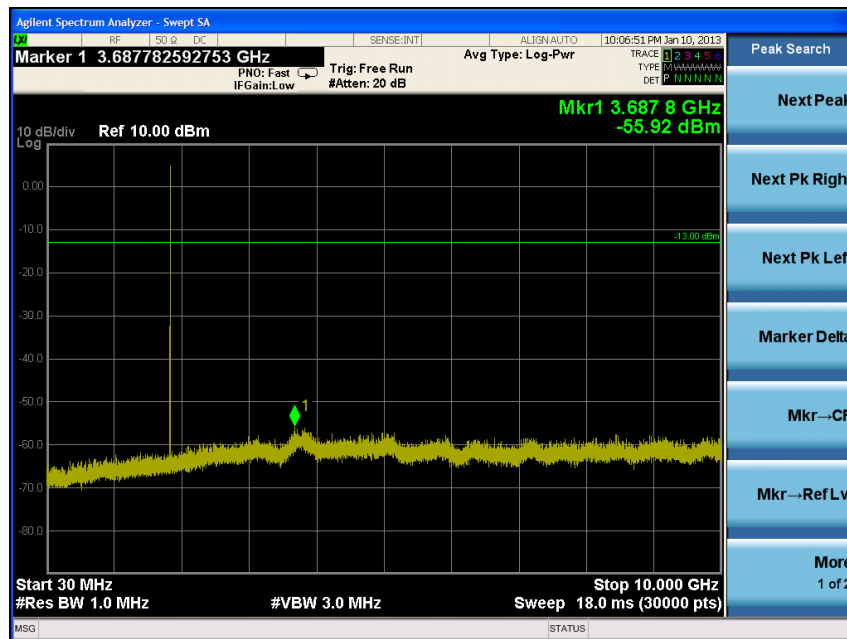
Offset (dB) = Directional Coupler (dB) + Attenuator (dB) + Cable loss (dB)

Result (dB m) = Spurious offset (dB) + Reading values (dB m)

Frequency (MHz)	Spurious offset (dB)	Reading values (dB m)	Result (dB m)
3 791.5	Noise Level	-	-

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GSM1900 Low Channel



Note:

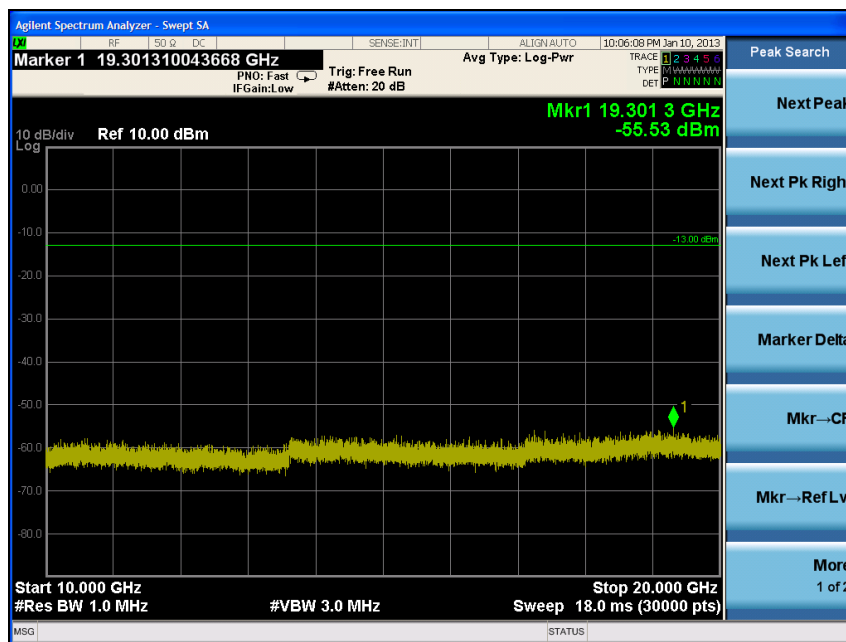
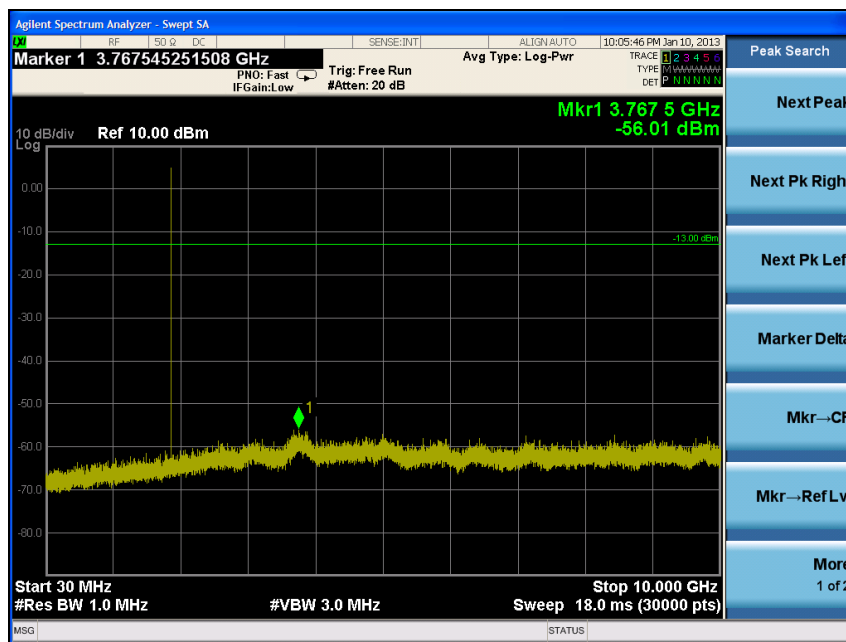
Offset (dB) = Directional Coupler (dB) + Attenuator (dB) + Cable loss (dB)

Result (dB m) = Spurious offset (dB) + Reading values (dB m)

Frequency (MHz)	Spurious offset (dB)	Reading values (dB m)	Result (dB m)
3 687.8	Noise Level	-	-
19 772.7	Noise Level	-	-

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Middle Channel



Note:

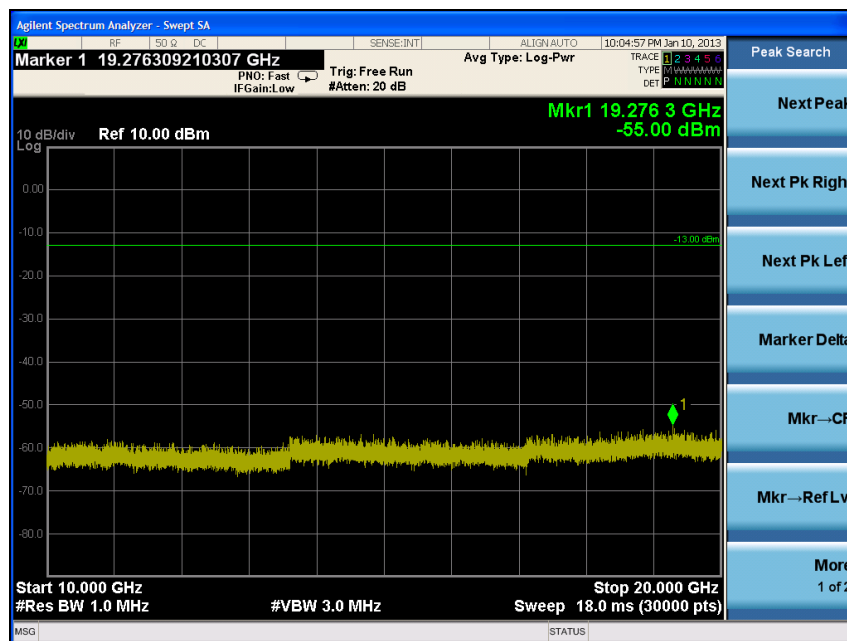
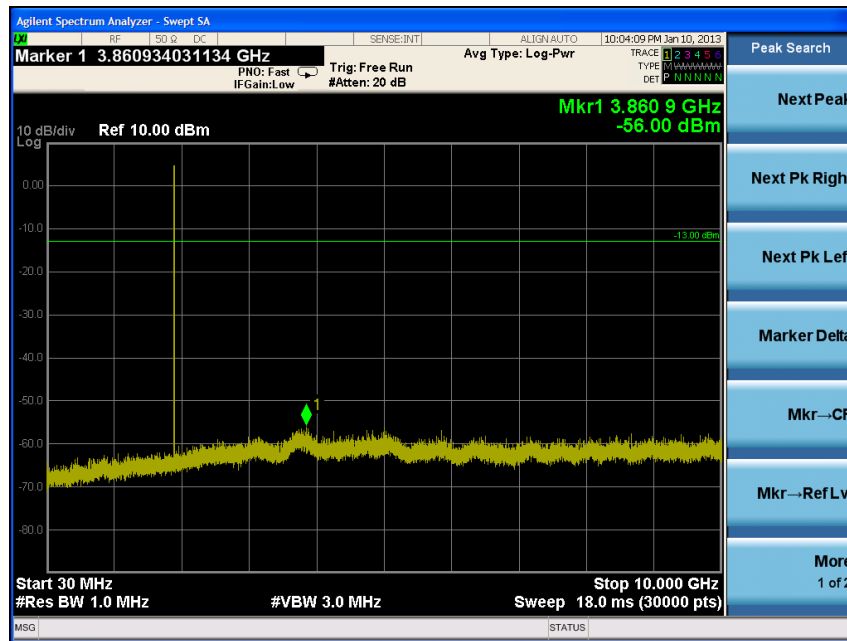
Offset (dB) = Directional Coupler (dB) + Attenuator (dB) + Cable loss (dB)

Result (dB m) = Spurious offset (dB) + Reading values (dB m)

Frequency (MHz)	Spurious offset (dB)	Reading values (dB m)	Result (dB m)
3 767.5	Noise Level	-	-
19 301.3	Noise Level	-	-

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High Channel



Note:

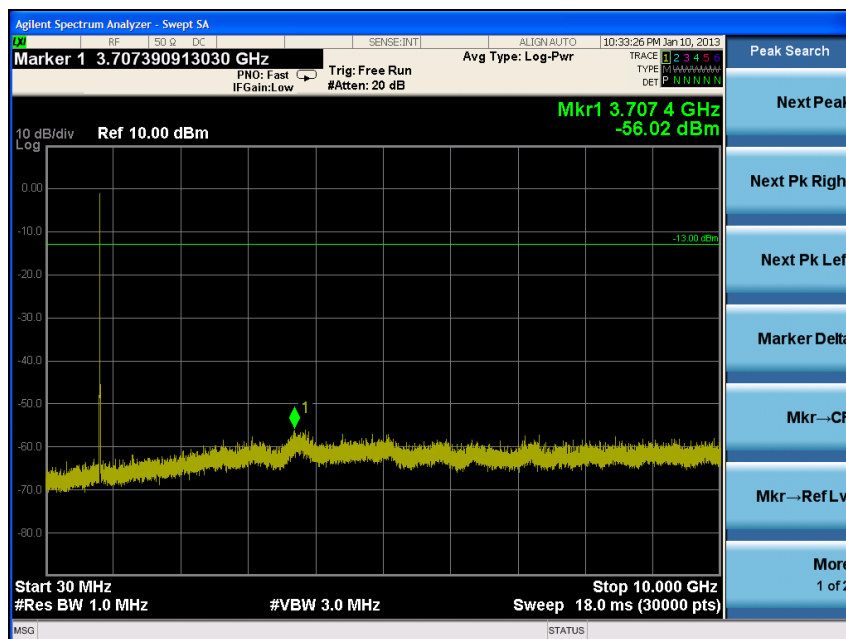
Offset (dB) = Directional Coupler (dB) + Attenuator(dB) + Cable loss (dB)

Result (dB m) = Spurious offset (dB) + Reading values (dB m)

Frequency (MHz)	Spurious offset (dB)	Reading values (dB m)	Result (dB m)
3 860.9	Noise Level	-	-
19 276.3	Noise Level	-	-

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WCDMA850 Low Channel



Note:

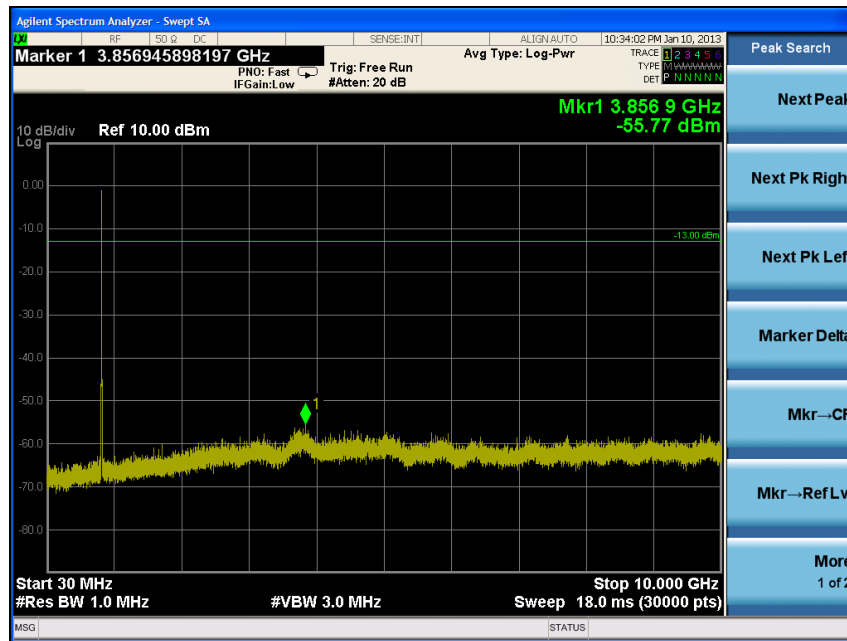
Offset (dB) = Directional Coupler (dB) + Attenuator(dB) + Cable loss (dB)

Result (dB m) = Spurious offset (dB) + Reading values (dB m)

Frequency (MHz)	Spurious offset (dB)	Reading values (dB m)	Result (dB m)
3 707.4	Noise Level	-	-

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Middle Channel



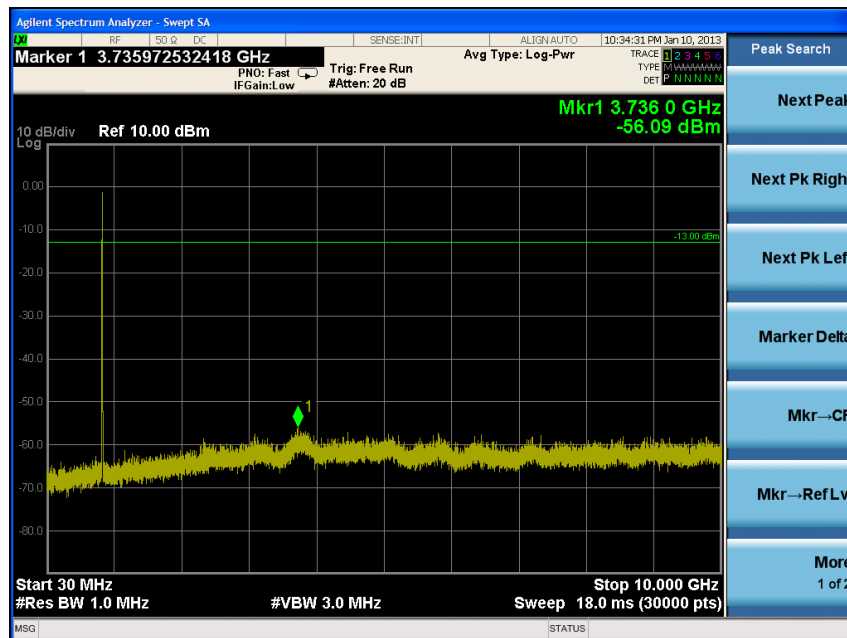
Note:

Offset (dB) = Directional Coupler (dB) + Attenuator(dB) + Cable loss (dB)

Result (dB m) = Spurious offset (dB) + Reading values (dB m)

Frequency (MHz)	Spurious offset (dB)	Reading values (dB m)	Result (dB m)
3 856.9	Noise Level	-	-

High Channel



Note:

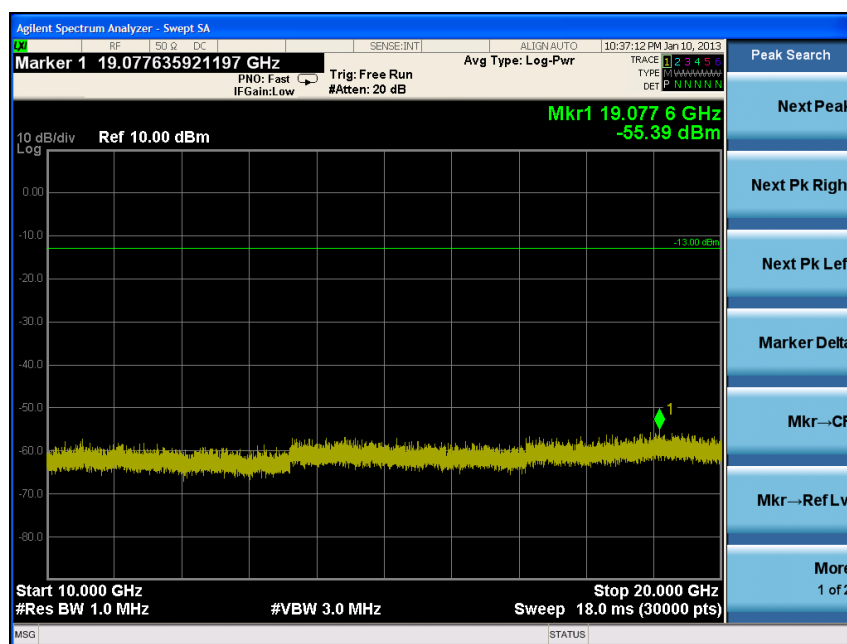
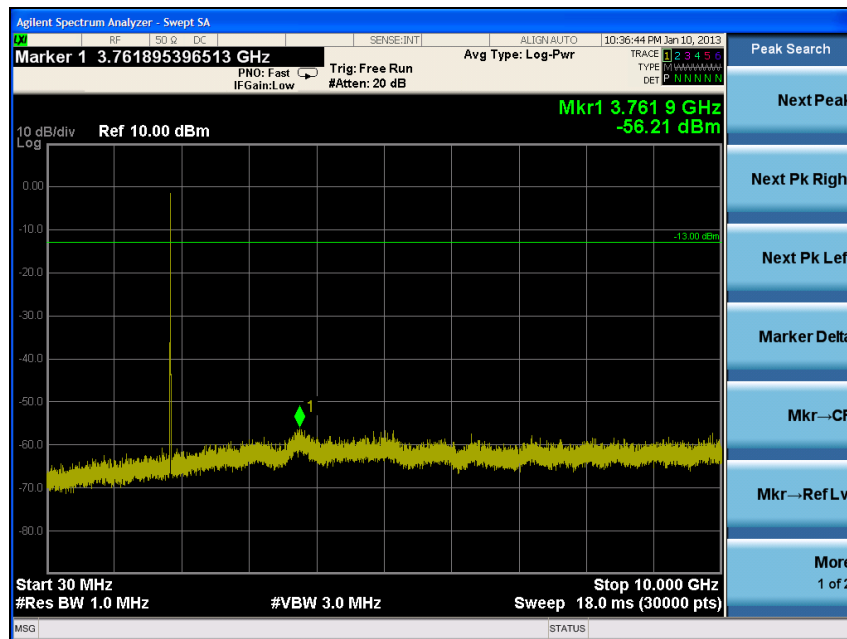
Offset (dB) = Directional Coupler (dB) + Attenuator(dB) + Cable loss (dB)

Result (dB m) = Spurious offset (dB) + Reading values (dB m)

Frequency (MHz)	Spurious offset (dB)	Reading values (dB m)	Result (dB m)
3 736.0	Noise Level	-	-

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WCDMA1900 Low Channel



Note:

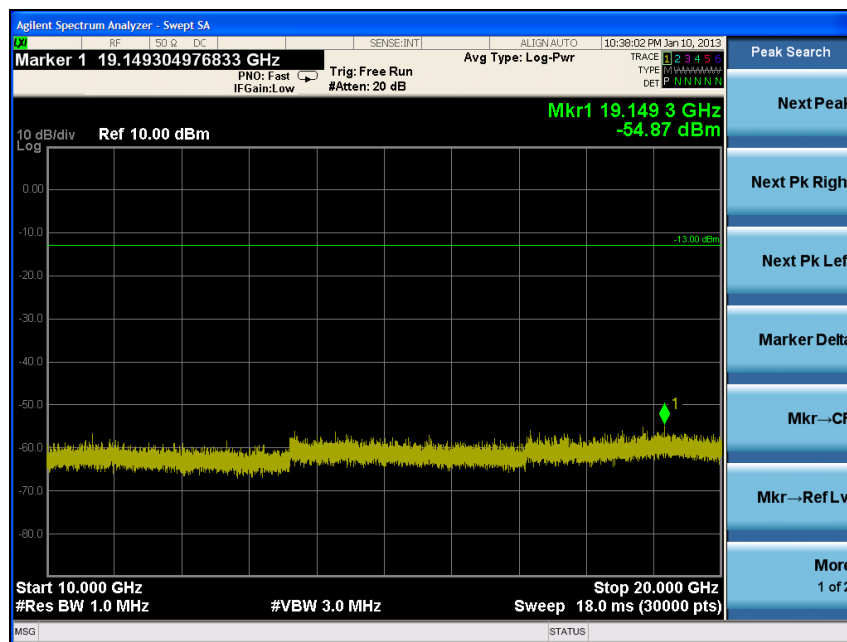
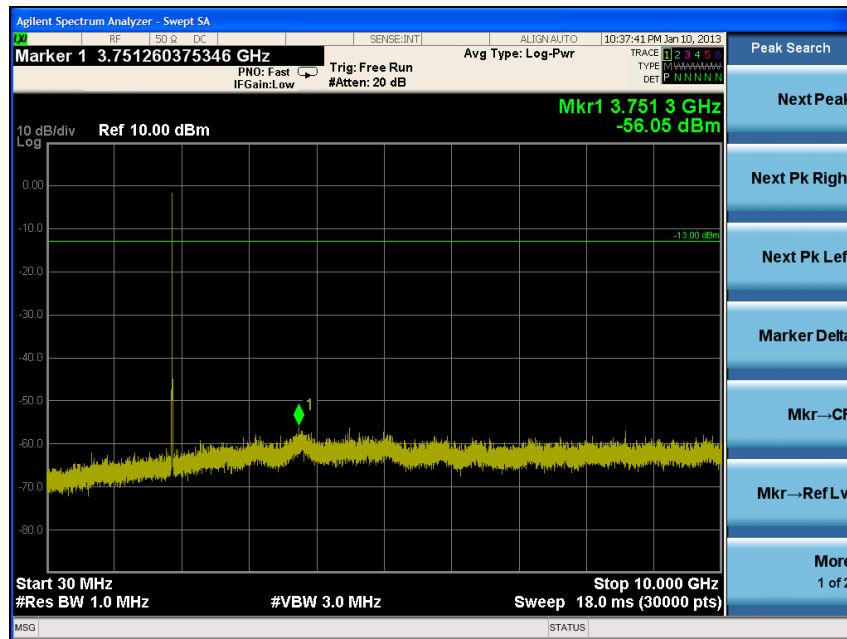
Offset (dB) = Directional Coupler (dB) + Attenuator (dB) + Cable loss (dB)

Result (dB m) = Spurious offset (dB) + Reading values (dB m)

Frequency (MHz)	Spurious offset (dB)	Reading values (dB m)	Result (dB m)
3 761.9	Noise Level	-	-
19 077.6	Noise Level	-	-

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Middle Channel



Note:

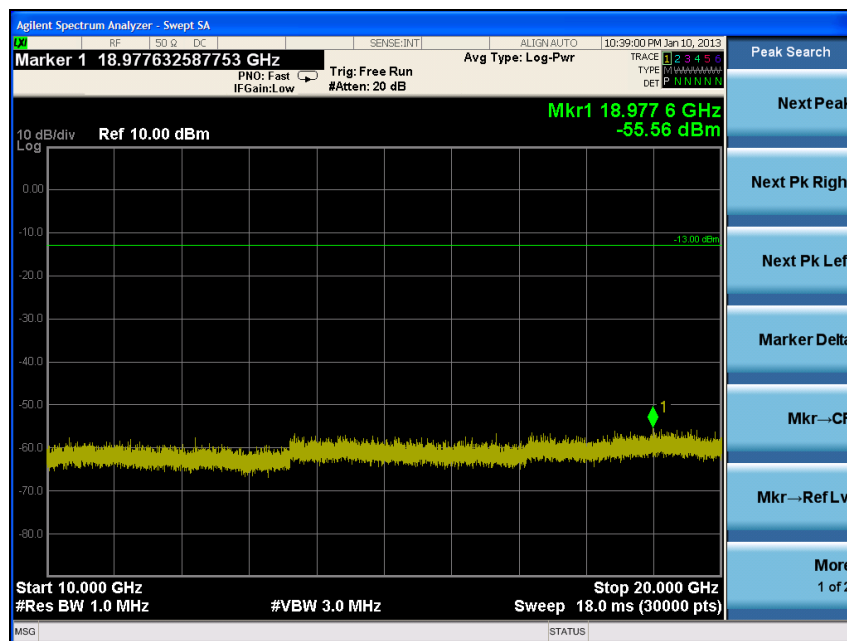
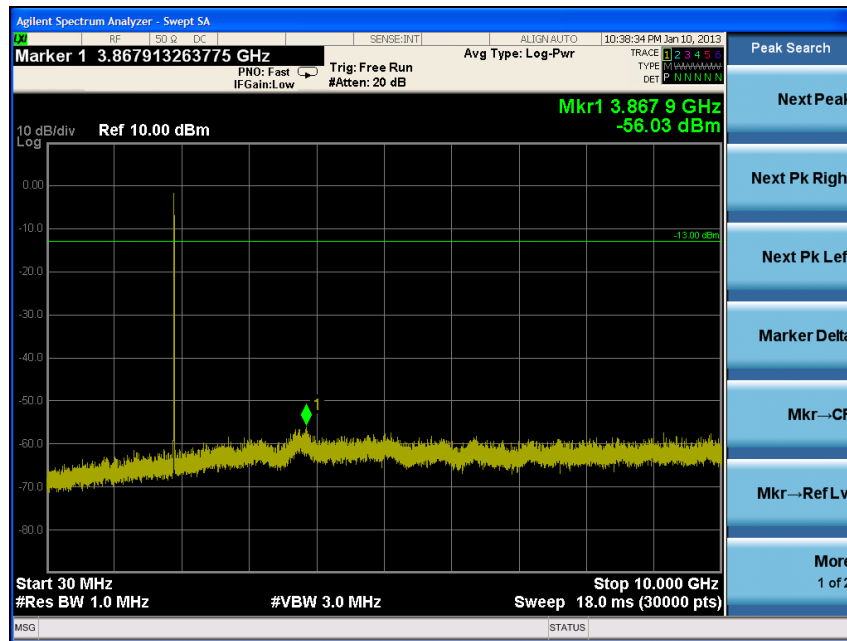
Offset (dB) = Directional Coupler (dB) + Attenuator (dB) + Cable loss (dB)

Result (dB m) = Spurious offset (dB) + Reading values (dB m)

Frequency (MHz)	Spurious offset (dB)	Reading values (dB m)	Result (dB m)
3 751.3	Noise Level	-	-
19 149.3	Noise Level	-	-

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High Channel



Note:

Offset (dB) = Directional Coupler (dB) + Attenuator(dB) + Cable loss (dB)

Result (dB m) = Spurious offset (dB) + Reading values (dB m)

Frequency (MHz)	Spurious offset (dB)	Reading values (dB m)	Result (dB m)
3 867.9	Noise Level	-	-
18 977.6	Noise Level	-	-

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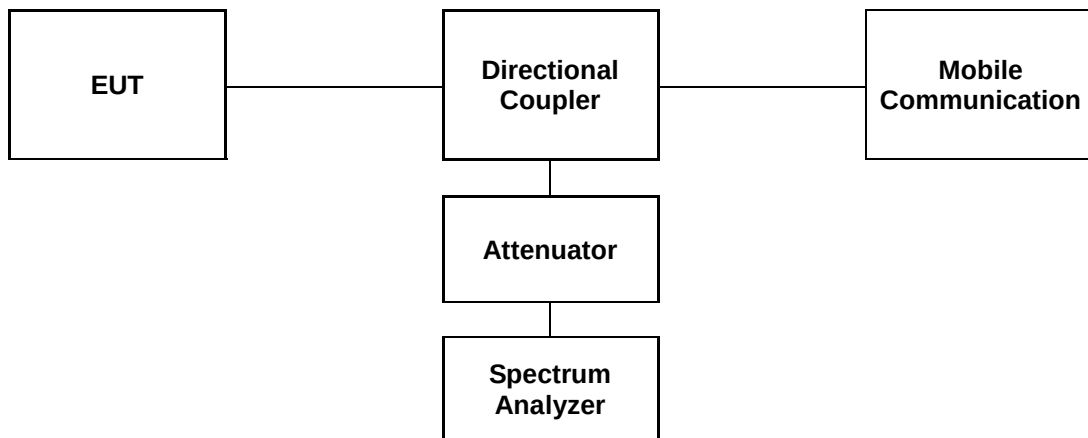
7. Band Edge

7.1. Limit

§ 22.917(e) and §24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency must be attenuated below the transmitting (P) by a factor of at least $43+10\log(P)$ dB.

7.2. Test Procedure

1. The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.
2. The center of the spectrum analyzer was set to block edge frequency.



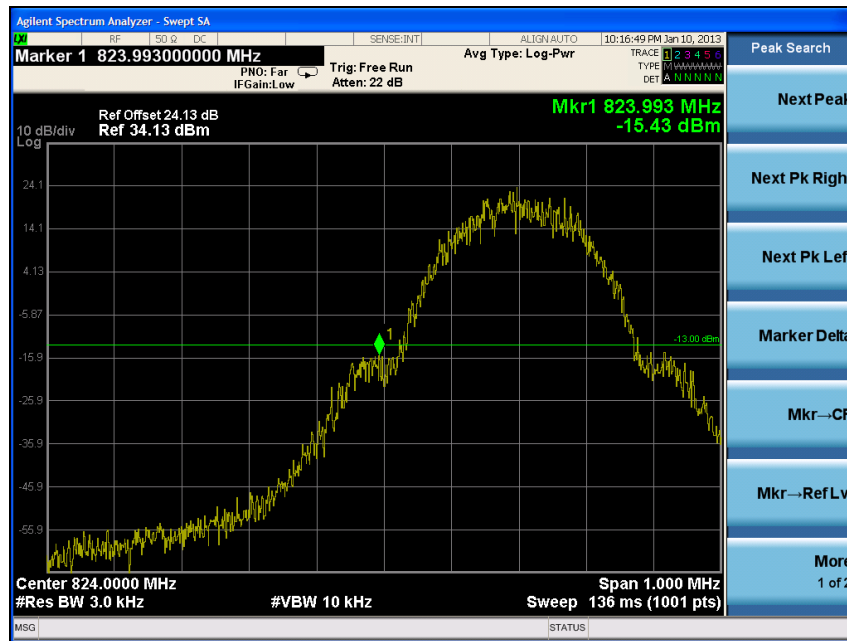
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

7.3. Test Results

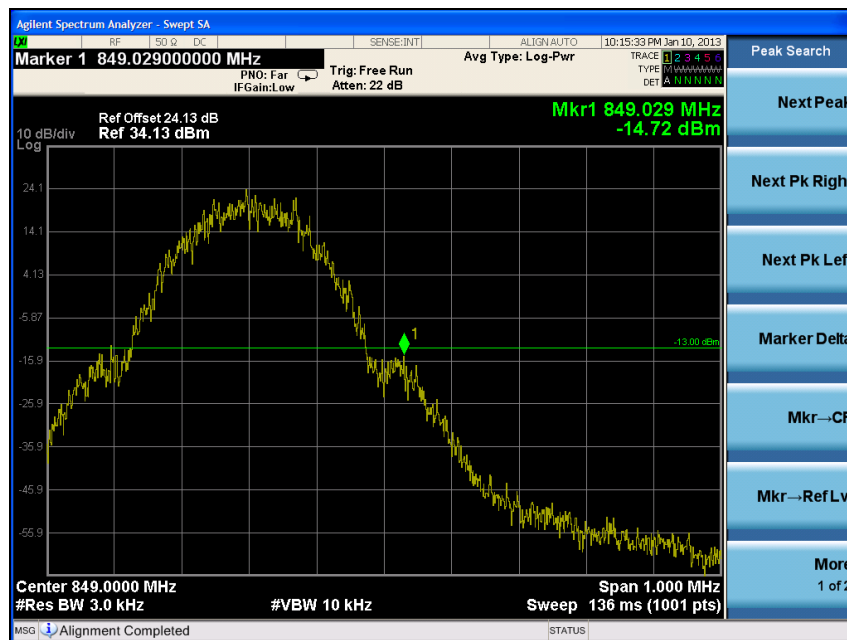
Ambient temperature : (24 ± 2) °C
Relative humidity : 47 % R.H.

Please refer to the following plots.

GSM850 Low Channel

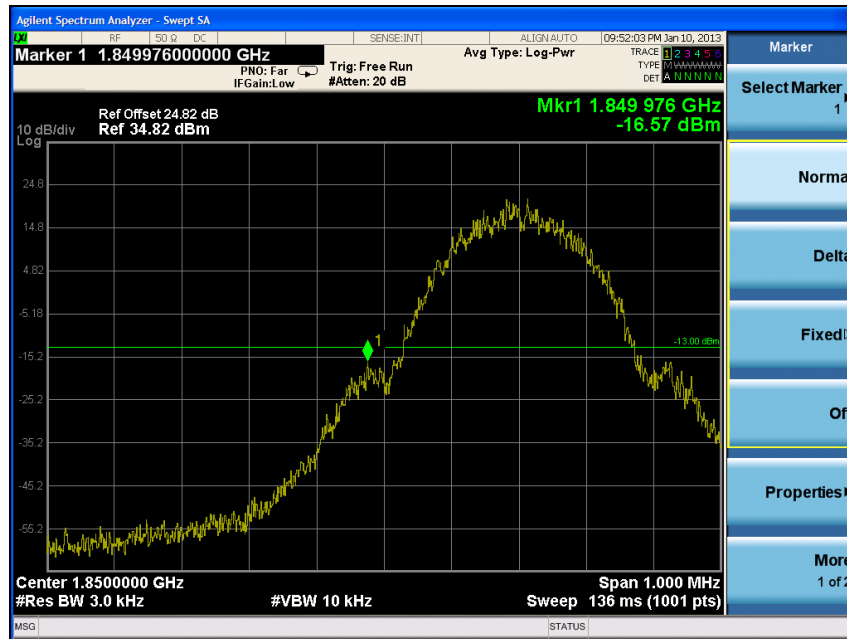


High Channel

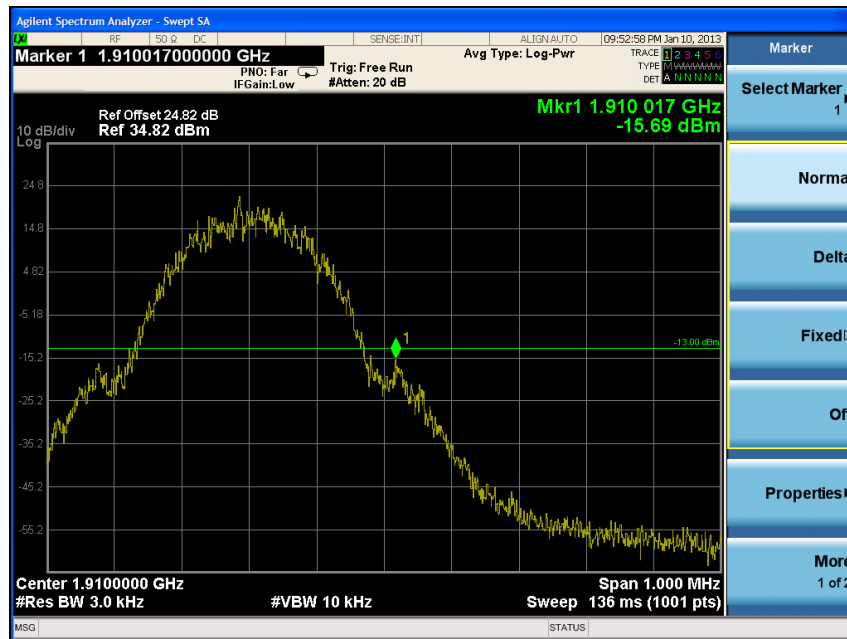


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GSM1900 Low Channel

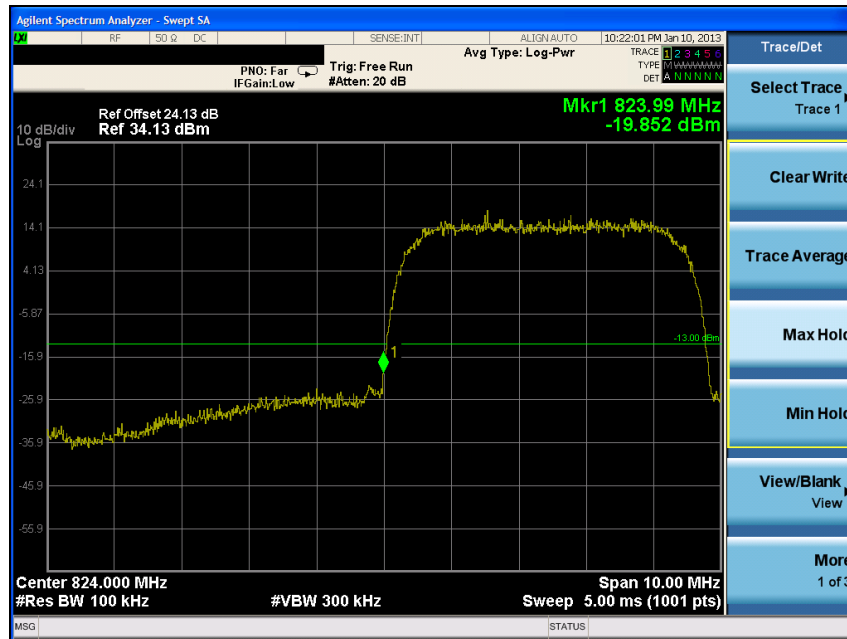


High Channel

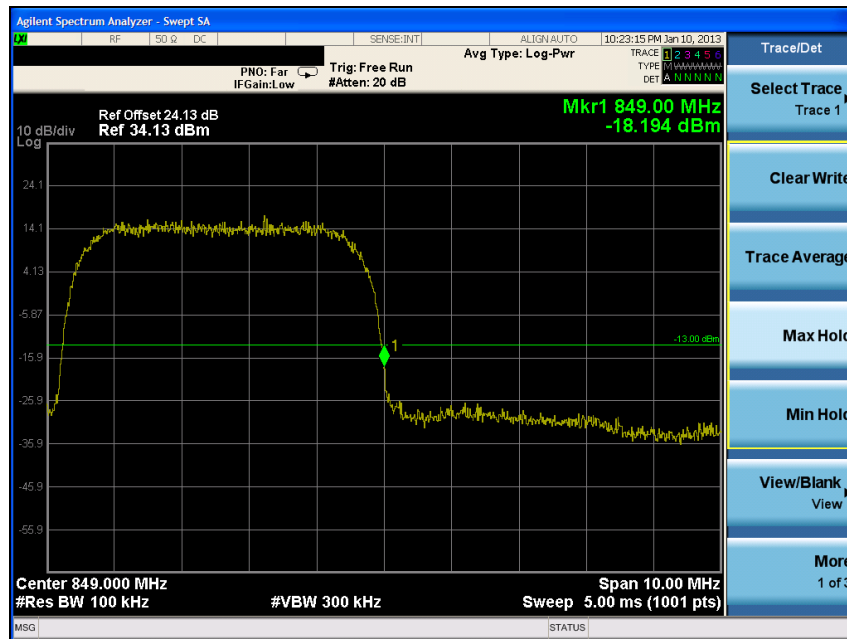


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WDCMA850 Low Channel



High Channel



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WCDMA1900 Low Channel



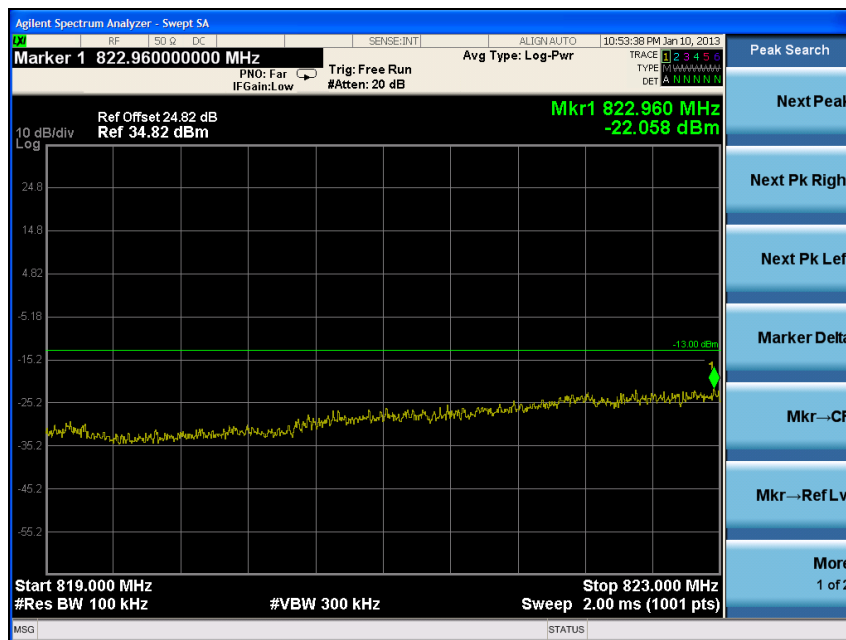
High Channel



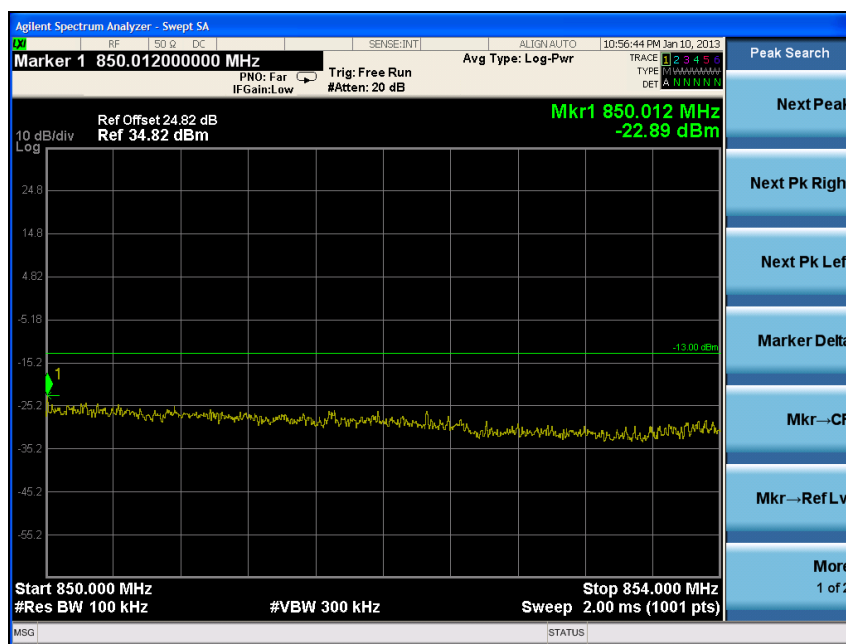
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4 MHz span plot_WCDMA850

Low Channel

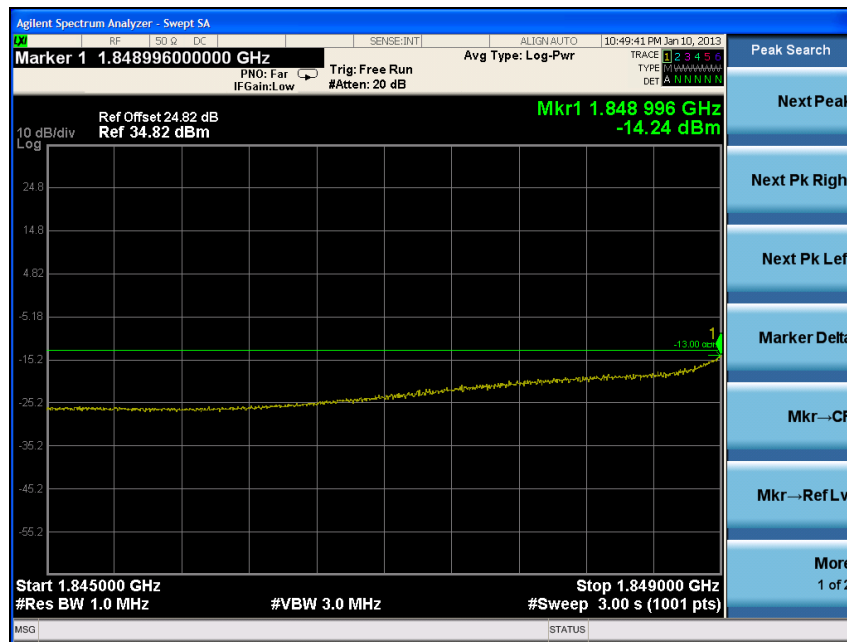


High Channel

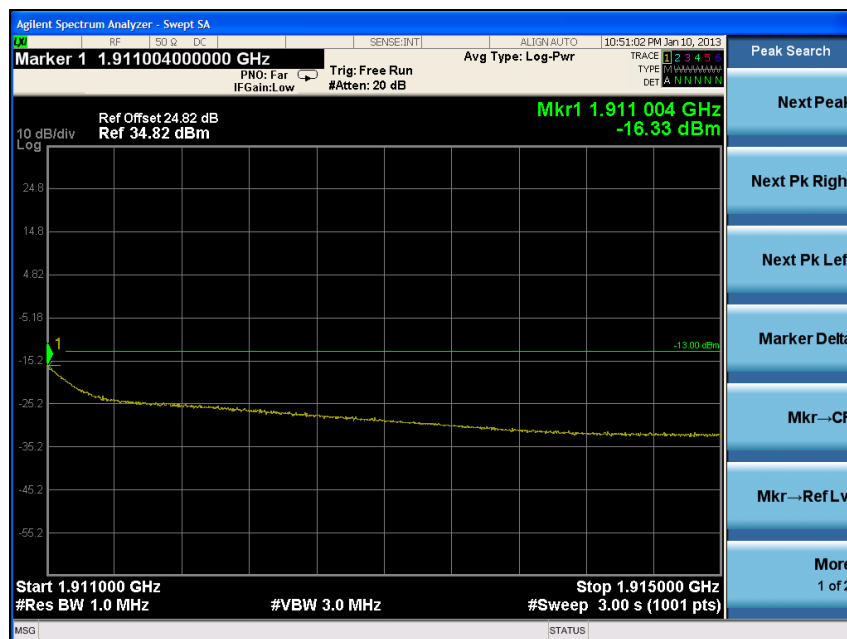


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4 MHz span plot_WCDMA1900 Low Channel



High Channel



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8. Frequency Stability

8.1. Limit

Requirements: FCC § 2.1055 (a), § 2.1055 (d) & following:

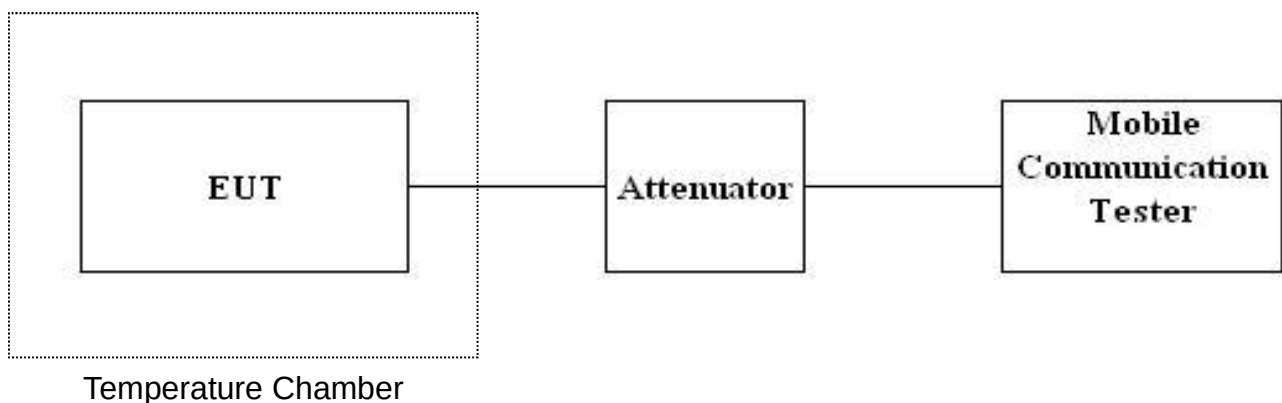
According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table of this section.

For Mobile devices operating in the 824 to 849 MHz band at a power level less than or equal to 3 Watts, the limit specified in Table C-1 is +/- 2.5 ppm.

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

8.2. Test Procedure

1. Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators.
2. The EUT was placed inside the temperature chamber.
3. After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.



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8.3. Test Results

Ambient temperature : (24 ± 2) °C
Relative humidity : 47 % R.H.

GSM850 mode at middle channel

Reference Frequency: 836.6 MHz, Limit: 2.5 ppm			
Frequency Stability versus Temperature			
Environment Temperature (℃)	Power Supplied (Vdc)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	3.8	2	0.002 39
40		5	0.005 98
30		-8	-0.009 56
24		2	0.002 39
10		-3	-0.003 59
0		-4	-0.004 78
-10		-1	-0.001 20
-20		12	0.014 34
-30		11	0.013 15
Frequency Stability versus power Supply			
Environment Temperature (℃)	Power Supplied (Vdc)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
24	4.18	4	0.004 78
	3.33(batt. End point)	-7	-0.008 37

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GSM1900 mode at middle channel

Reference Frequency: 1 880.0 MHz, Limit: 2.5 ppm			
Frequency Stability versus Temperature			
Environment Temperature (℃)	Power Supplied (Vdc)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	3.8	11	0.005 85
40		19	0.010 11
30		14	0.007 45
24		27	0.014 36
10		18	0.009 57
0		21	0.011 17
-10		28	0.014 89
-20		30	0.015 96
-30		35	0.018 62
Frequency Stability versus power Supply			
Environment Temperature (℃)	Power Supplied (Vdc)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
24	4.18	20	0.010 64
	3.33(batt. End point)	15	0.007 98

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WCDMA850 mode at middle channel

Reference Frequency: 836.4 MHz, Limit: 2.5 ppm			
Frequency Stability versus Temperature			
Environment Temperature (℃)	Power Supplied (Vdc)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	3.8	6	0.007 17
40		1	0.001 20
30		-2	-0.002 39
24		-1	-0.001 20
10		4	0.004 78
0		2	0.002 39
-10		-3	-0.003 59
-20		3	0.003 59
-30		-5	-0.005 98
Frequency Stability versus power Supply			
Environment Temperature (℃)	Power Supplied (Vdc)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
24	4.18	-5	-0.005 98
	3.33(batt. End point)	-1	-0.001 20

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WCDMA1900 mode at middle channel

Reference Frequency: 1880.0 MHz, Limit: 2.5 ppm			
Frequency Stability versus Temperature			
Environment Temperature (℃)	Power Supplied (Vdc)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	3.8	4	0.002 13
40		-2	-0.001 06
30		5	0.002 66
24		3	0.001 60
10		-1	-0.000 53
0		-3	-0.001 60
-10		7	0.003 72
-20		-6	-0.003 19
-30		5	0.002 66
Frequency Stability versus power Supply			
Environment Temperature (℃)	Power Supplied (Vdc)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
24	4.18	-3	-0.001 60
	3.33(batt. End point)	2	0.001 06

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