



Part 24

TEST REPORT

Product Name	3G Quad Band HSDPA/HSUPA PoC enabled mobile phone
Model Name	Sonim XP5520-A-R1, Sonim XP5520-A-R2, Sonim XP5530-A-R1, Sonim XP5560-A-R1, Sonim XP5560-A-R2, Sonim XP5560-A-R3, Sonim XP5570-A-R1 (P35F008AA)
Marketing Name	Sonim XP5520 BOLT
FCC ID	WYPP35F008AA
IC	8090A-P35F008AA
Client	Sonim Technologies, Inc.

TA Technology (Shanghai) Co., Ltd.

TA Technology (Shanghai) Co., Ltd.


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GENERAL SUMMARY

Product Name	3G Quad Band HSDPA/HSUPA PoC enabled mobile phone	Marketing Name	Sonim XP5520 BOLT
Model Name	Sonim XP5520-A-R1, Sonim XP5520-A-R2, Sonim XP5530-A-R1, Sonim XP5560-A-R1, Sonim XP5560-A-R2, Sonim XP5560-A-R3, Sonim XP5570-A-R1 (P35F008AA)		
FCC ID	WYPP35F008AA		
IC	8090A-P35F008AA		
Report No.	RZA1109-1686RF03R1		
Client	Sonim Technologies, Inc.		
Manufacturer	Sonim Technologies, Inc.		
Reference Standard(s)	<p>FCC CFR47 Part 2 (2010-12) Frequency Allocations And Radio Treaty Matters;General Rules And Regulations</p> <p>FCC CFR47 Part 24E (2010-12) Personal Communications Services</p> <p>ANSI/TIA-603-C(2004) Land mobile FM or PM Communications Equipment Measurements and Performance Standards.</p> <p>RSS-133 Issue 5, (2009-2) 2 GHz Personal Communications Services</p> <p>RSS-Gen Issue 2 (2007-6) General Requirements and Information for the Certification of Radio communication Equipment</p>		
Conclusion	<p>This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in Chapter 2 of this test report are below limits specified in the relevant standards.</p> <p>General Judgment: Pass</p> <div style="text-align: right;">  <p>(Stamp) Date of issue: November 25th, 2011</p> </div>		
Comment	The test result only responds to the measured sample.		

Approved by 初伟中
Director

Revised by 徐凯
RF Manager

Performed by 李
RF Engineer

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1. General Information

1.1. Notes of the test report

TA Technology (Shanghai) Co., Ltd. guarantees the reliability of the data presented in this test report, which is the results of measurements and tests performed for the items under test on the date and under the conditions stated in this test report and is based on the knowledge and technical facilities available at TA Technology (Shanghai) Co., Ltd. at the time of execution of the test.

TA Technology (Shanghai) Co., Ltd. is liable to the client for the maintenance by its personnel of the confidentiality of all information related to the items under test and the results of the test. This report only refers to the item that has undergone the test.

This report standalone dose not constitute or imply by its own an approval of the product by the certification Bodies or competent Authorities. This report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of **TA Technology (Shanghai) Co., Ltd.** and the Accreditation Bodies, if it applies.

If the electrical report is inconsistent with the printed one, it should be subject to the latter.

1.2. Testing laboratory

Company: TA Technology (Shanghai) Co., Ltd.
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City: Shanghai
Post code: 201201
Country: P. R. China
Contact: Yang Weizhong
Telephone: +86-021-50791141/2/3
Fax: +86-021-50791141/2/3-8000
Website: <http://www.ta-shanghai.com>
E-mail: yangweizhong@ta-shanghai.com

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1.3. Applicant Information

Company: Sonim Technologies, Inc.
Address: 1875 S. Grant Street, Suite 620
City: San Mateo
Postal Code: Ca 94420
Country: U.S.A
Contact: Sabrina Payonk
Telephone: +1 650 353 9851
Fax: +1 650 378 8190

1.4. Manufacturer Information

Company: Sonim Technologies, Inc.
Address: 1875 S. Grant Street, Suite 620
City: San Mateo
Postal Code: Ca 94420
Country: U.S.A
Telephone: +1 650 353 9851
Fax: +1 650 378 8190

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1.5. Information of EUT

General information

Name of EUT:	3G Quad Band HSDPA/HSUPA PoC enabled mobile phone		
IMEI:	001080000529504		
Hardware Version:	A		
Software Version:	11.0.0-12.0.2-4100-00.0		
Antenna Type:	Internal Antenna		
Device Operating Configurations:			
Operating Mode(s):	GSM1900; (tested) WCDMA Band II; (tested)		
Test Modulation:	(GSM)GMSK; (WCDMA)QPSK		
GPRS Multislot Class:	12		
EGPRS Multislot Class:	12		
Maximum E.I.R.P.	GSM 1900: 34.3579 dBm WCDMA Band II: 28.0791 dBm		
Power Supply:	Battery or Charger		
Rated Power Supply Voltage:	3.7V		
Extreme Voltage:	Minimum: 3.5V Maximum: 4.2V		
Extreme Temperature:	Lowest: -20°C Highest: +60°C		
Test Channel: (Low - Middle - High)	512 - 661 - 810 (GSM 1900) (tested) 9262 - 9400 - 9538 (WCDMA Band II) (tested)		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8
	WCDMA Band II	1852.4 ~ 1907.6	1932.4 ~ 1987.6

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Auxiliary equipment details

AE1: Battery

Model: BAT-01950-01S
Manufacturer: Sonim Technologies, Inc.
S/N: S1105000105

Equipment Under Test (EUT) is 3G Quad Band HSDPA/HSUPA PoC enabled mobile phone with internal antenna. The EUT is tested GSM1900 in this report.

The sample under test was selected by the Client.

Components list please refer to documents of the manufacturer.

1.6. Test Date

The test is performed from October 8, 2011 to October 12, 2011.

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2. Test Information

2.1. Summary of test results

Number	Test Case	Clause in FCC rules	Clause in IC rules	Verdict
1	RF power output	2.1046	6.4	PASS
2	Effective Isotropic Radiated power	24.232	/	PASS
3	Occupied Bandwidth	2.1049	/	PASS
4	Band Edge Compliance	24.238	6.5	PASS
5	Frequency Stability	2.1055 / 24.235	6.3	PASS
6	Spurious Emissions at Antenna Terminals	2.1051 / 24.238	/	PASS
7	Radiates Spurious Emission	2.1053 / 24.238	/	PASS
8	Receiver Spurious Emissions	/	6.6	PASS

2.2. RF Power Output

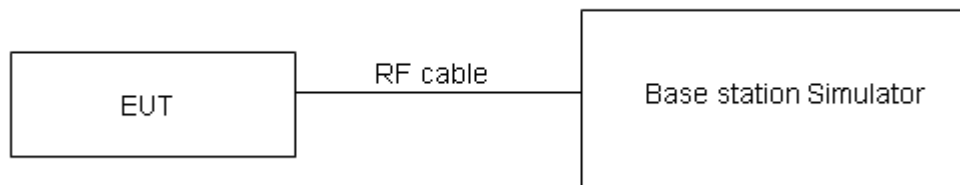
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

During the process of the testing, The EUT is controlled by the Base Station Simulator to ensure max power transmission and proper modulation.

Test Setup



The loss between RF output port of the EUT and the input port of the tester has been taken into consideration.

Limits

No specific RF power output requirements in part 2.1046.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 0.4$ dB.

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Test Results

GSM 1900		Conducted Power(dBm)		
		Channel 512	Channel 661	Channel 810
		1850.2(MHz)	1880(MHz)	1909.8(MHz)
GSM	Results	26.76	26.95	27.24
GPRS (GMSK)	1TXslot	26.75	26.95	27.22
	2TXslots	25.93	26.14	26.43
	3TXslots	25.33	25.57	25.85
	4TXslots	25.68	25.92	26.22
EGPRS (8PSK)	1TXslot	22.37	22.48	22.4
	2TXslots	21.35	21.22	21.19
	3TXslots	20.1	20.17	20.03
	4TXslots	19.78	18.97	19.23

Note:

- 1) The maximum RF Output Power numbers are marks in bold.
- 2)The following testing in GPRS/EGPRS is set to 1TXslot based on the maximum RF Output Power.

WCDMA Band II	Conducted Power(dBm)		
	Channel 9262	Channel 9400	Channel 9538
	1852.4(MHz)	1880(MHz)	1907.6(MHz)
12.2kbps RMC	21.98	23.46	23.6
64kbps RMC	21.91	23.35	23.49
144kbps RMC	21.88	23.28	23.51
384kbps RMC	21.79	23.34	23.47

Note:

- 1) The maximum RF Output Power numbers are marks in bold.
- 2)The following testing in WCDMA Band is set to 12.2kbps RMC based on the maximum RF Output Power.

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2.3. Effective Isotropic Radiated Power

Ambient condition

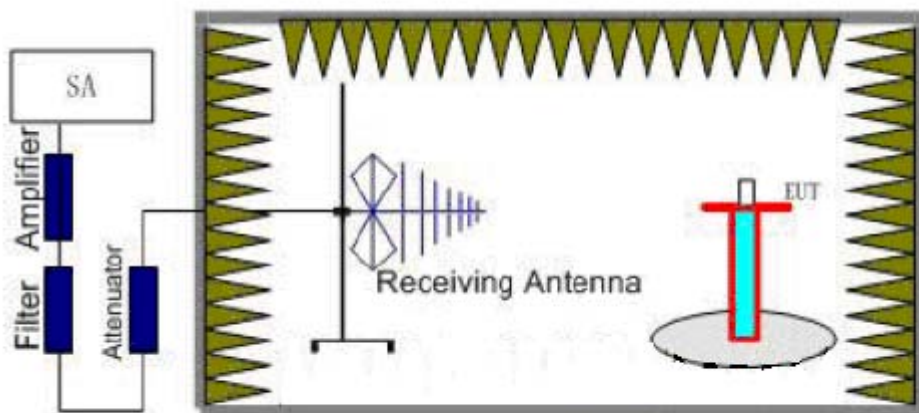
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

The measurement procedures in TIA- 603C are used.

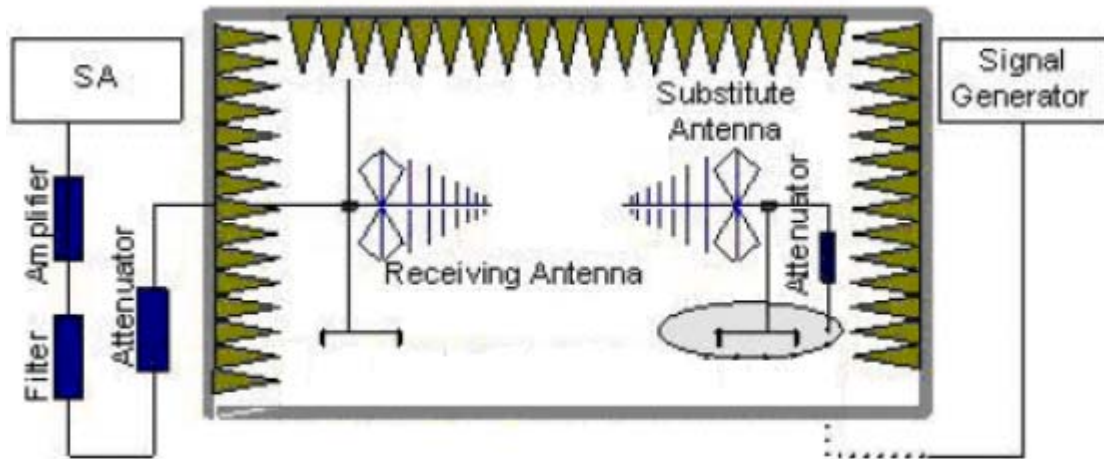
Step 1:

The measurement is carried out in the semi-anechoic chamber.. EUT was placed on a 0.8 meters high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used while RBW and VBW are both set to 3MHz. During the measurement, the highest emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna moved up and down over a range from 1 to 4 meters in both horizontally and vertically polarized orientations. The test setup refers to figure below.



Step 2:

A dipole antenna shall be substituted in place of the EUT. The antenna will be driven by a signal generator with a adjustable S.G. applied through a 30dB amplifier and a Tx cable. Then the Analyzer reading which is equal to LVL is recorded while the antenna was moving up and down. The E.R.P. /E.I.R.P. of the EUT can be calculated through the level of the signal generator, Tx cable loss and the gain of the substitution antenna. The test setup refers to figure below.



$$E.R.P = S.G + 30. - Tx Cable loss + Substitution antenna gain - 2.15.$$

$$EIRP = E.R.P + 2.15$$

Limits

Rule Part 24.232(b) specifies that "Mobile/portable stations are limited to 2 watts EIRP. Peak power" and Rule Part 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage".

Limit (EIRP)	$\leq 2\text{ W (33 dBm)}$
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Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 1.19\text{ dB}$

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Test Results:Pass

	Channel	Polarization	LVL (dBm)	SG+30 (dBm)	Gain (dBi)	Cable Loss (dBm)	E.I.R.P. (dBm)
GSM 1900	512	Vertical	-13.84	50.78	1.92	18.18	32.3685
	661	Vertical	-14.67	51.12	1.94	18.27	32.878
	810	Vertical	-14.38	51.26	1.9	18.30	32.919
GSM 1900 GPRS(GMSK)	512	Vertical	-15.94	52.77	1.92	18.18	34.3579
	661	Vertical	-16.64	52.27	1.94	18.27	33.8545
	810	Vertical	-17.51	51.78	1.9	18.30	33.3844
GSM 1900 EGPRS(8-PSK)	512	Vertical	-22.49	50.98	1.92	18.18	32.5455
	661	Vertical	-25.94	51.02	1.94	18.27	32.6268
	810	Vertical	-23.96	50.68	1.9	18.30	32.2503
WCDMA Band II	9262	Vertical	-26.66	45.98	1.92	18.18	27.5528
	9400	Vertical	-25.62	46.48	1.94	18.27	28.0791
	9538	Vertical	-23.35	46.27	1.92	18.30	27.8114

Note: 1. E.R.P =S.G+30. - Tx Cable loss + Substitution antenna gain – 2.15.

2. EIRP= E.R.P+2.15

2.4. Occupied Bandwidth

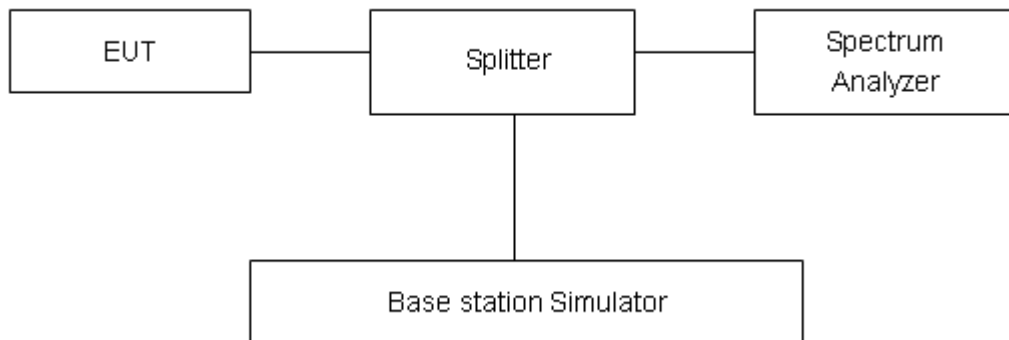
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 3kHz,VBW is set to 10kHz for GSM 1900 and RBW is set to 51kHz,VBW is set to 100kHz for WCDMA Band II.99% power and -26dBc occupied bandwidths are recorded. Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 624\text{Hz}$.

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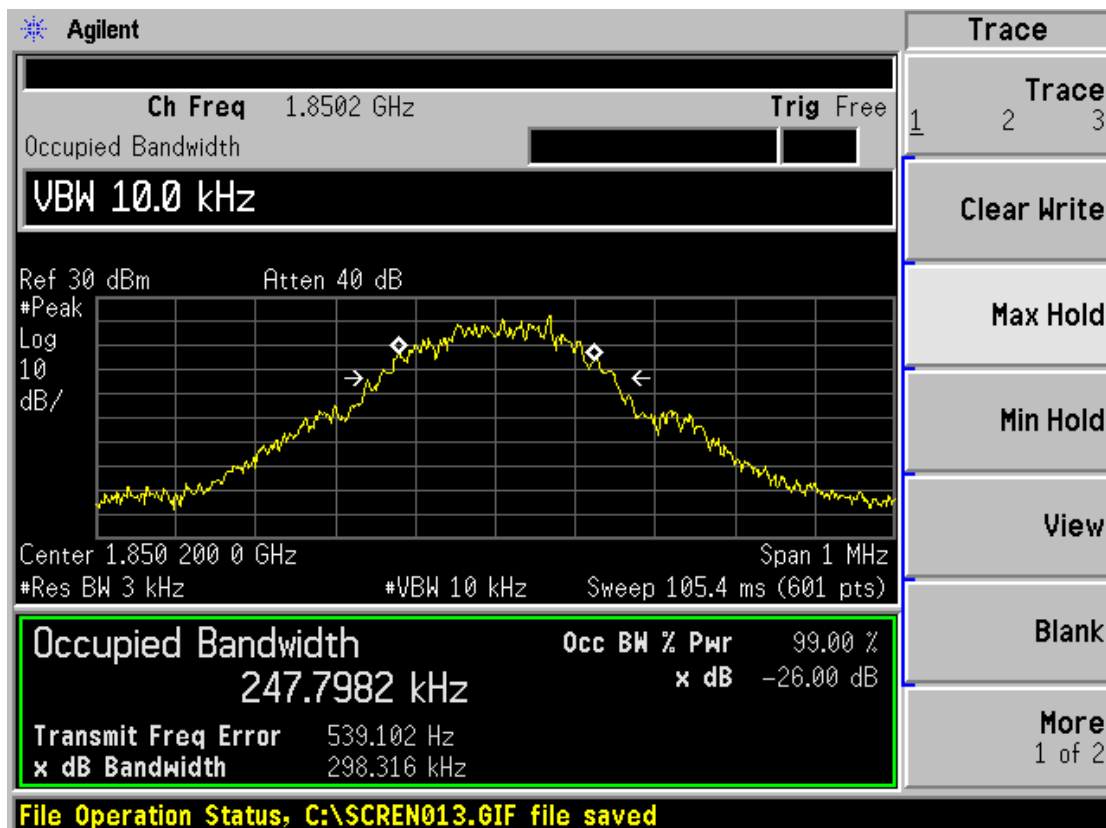
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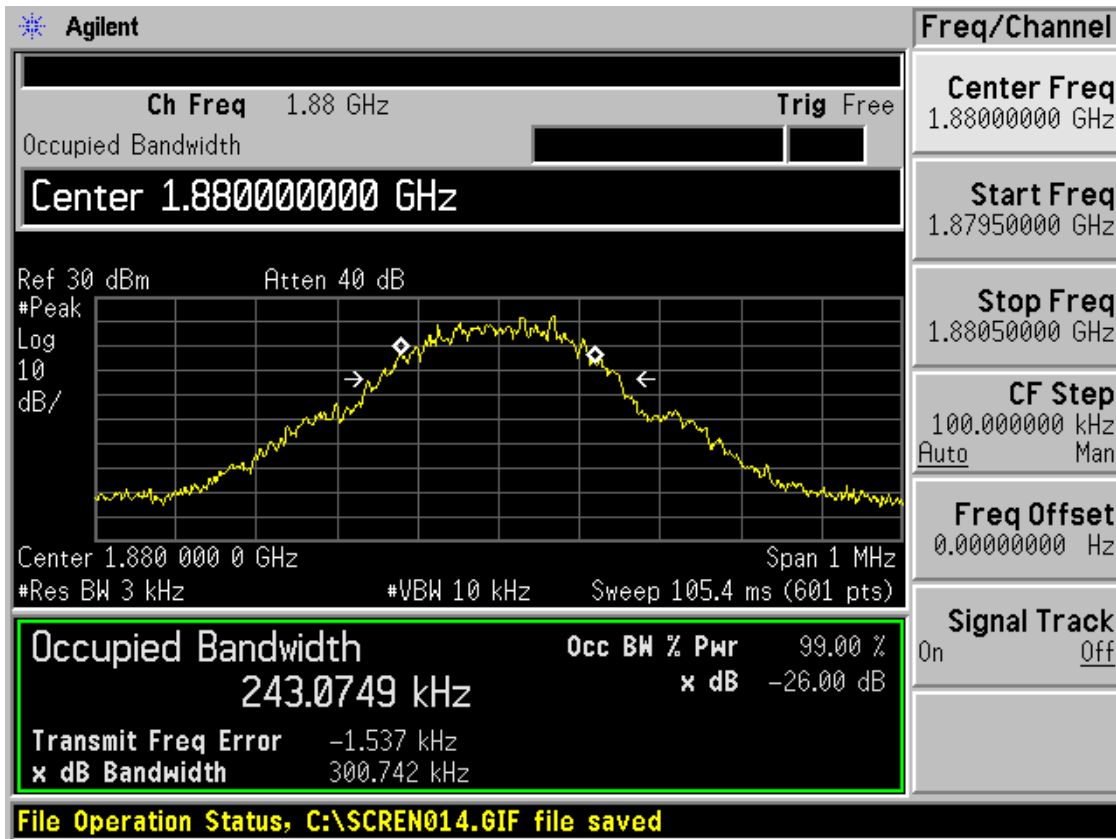
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Test Result

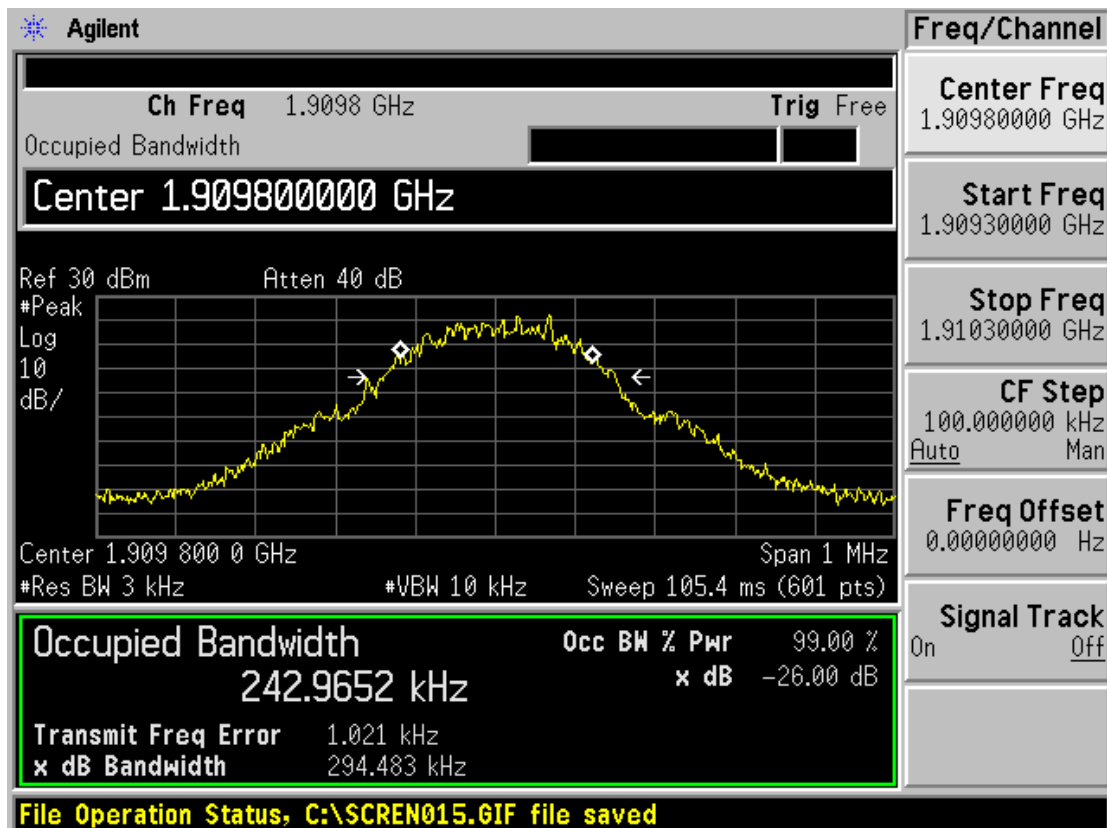
	Channel	Frequency (MHz)	99% Power Bandwidth (kHz)	-26dBc Bandwidth(kHz)
GSM 1900	512	1850.2	247.7982	298.316
	661	1880.0	243.0749	300.742
	810	1909.8	242.9652	294.483
GSM 1900+GPRS	512	1850.2	246.4427	308.297
	661	1880.0	243.5570	318.570
	810	1909.8	247.0042	315.023
GSM 1900+EGPRS	512	1850.2	250.5852	310.083
	661	1880.0	246.8384	318.179
	810	1909.8	243.2916	309.581



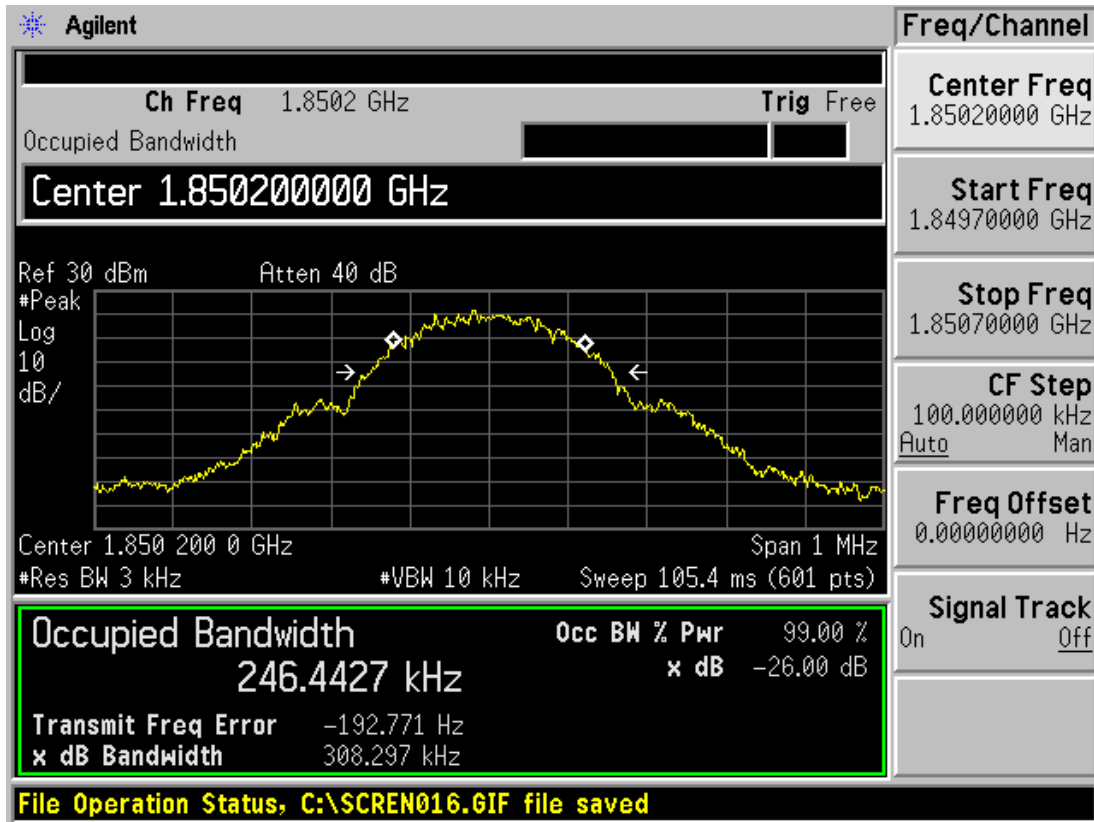
GSM1900 CH512 Occupied Bandwidth



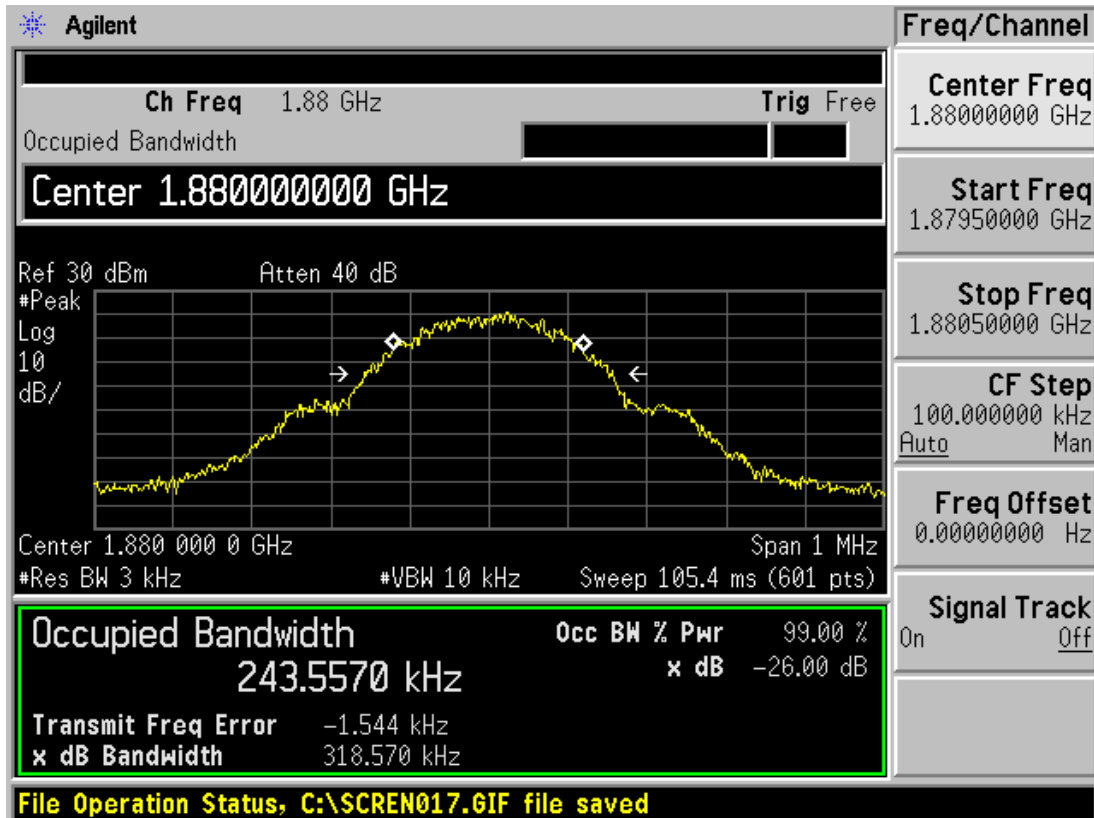
GSM 1900 CH661 Occupied Bandwidth



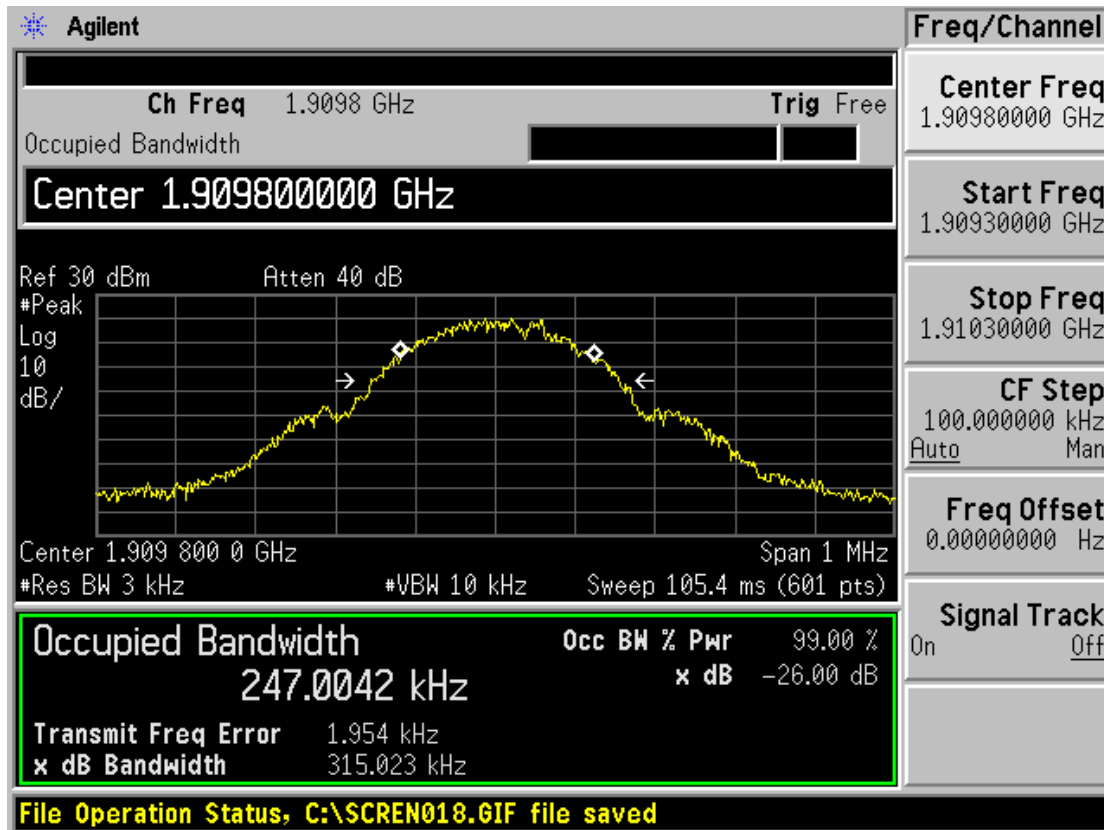
GSM 1900 CH810 Occupied Bandwidth



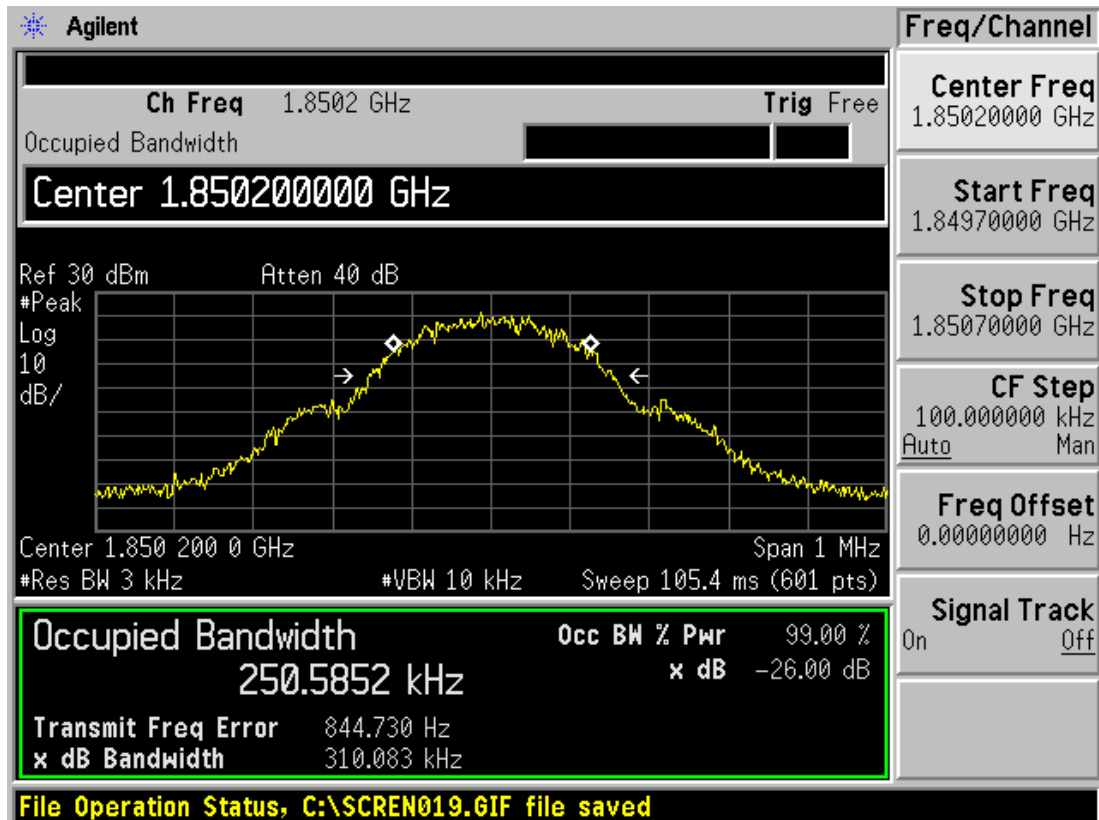
GSM1900 GPRS CH512 Occupied Bandwidth



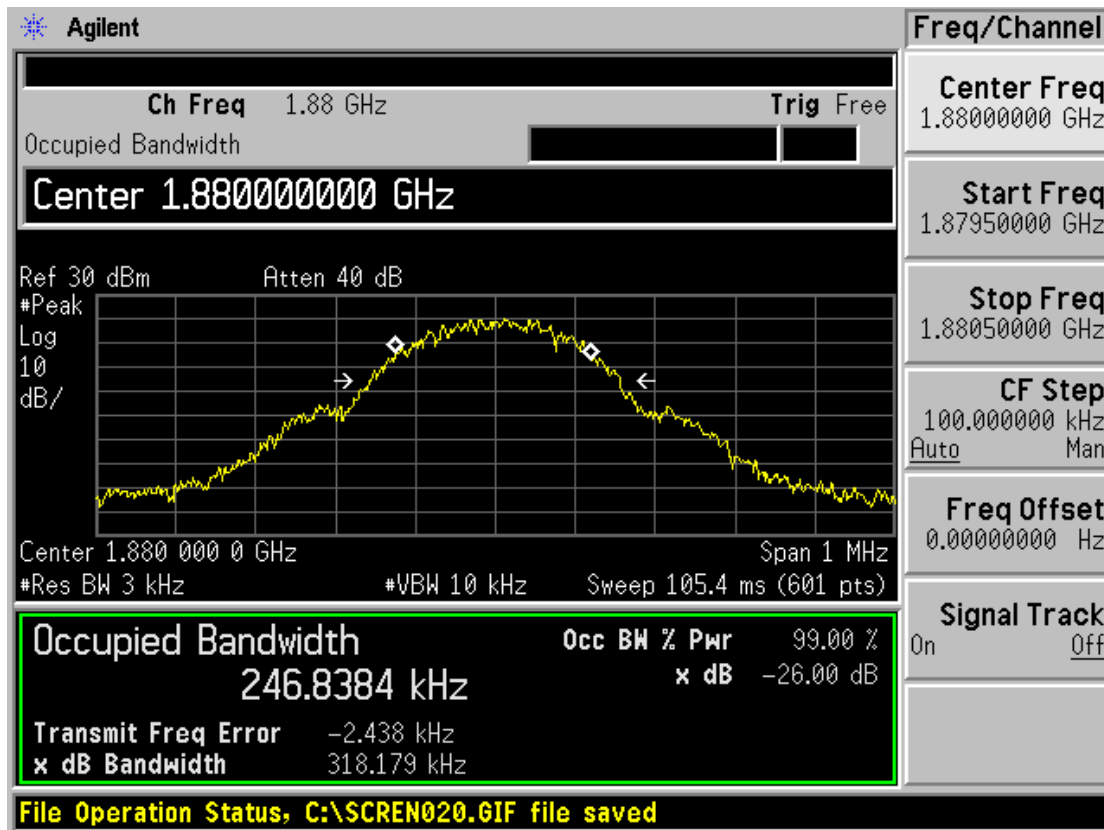
GSM 1900 GPRS CH661 Occupied Bandwidth



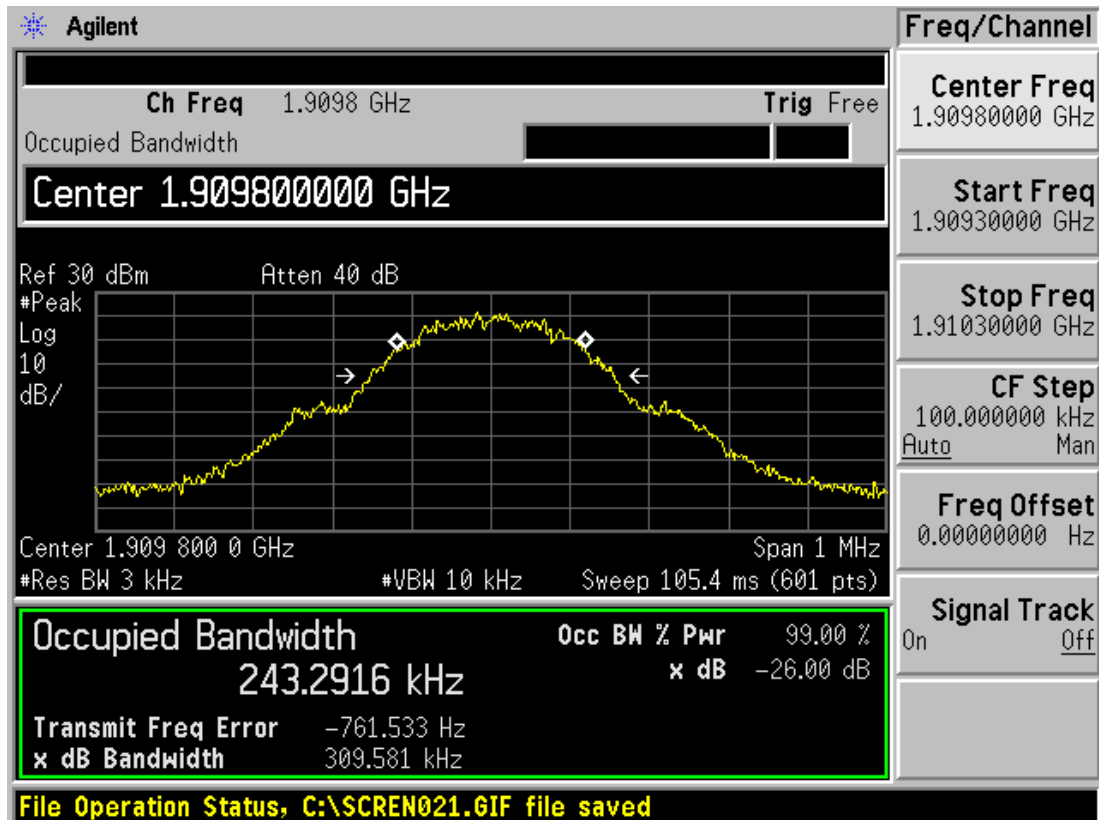
GSM 1900 GPRS CH810 Occupied Bandwidth



GSM1900 EGPRS CH512 Occupied Bandwidth



GSM 1900 EGPRS CH661 Occupied Bandwidth



GSM 1900 EGPRS CH810 Occupied Bandwidth

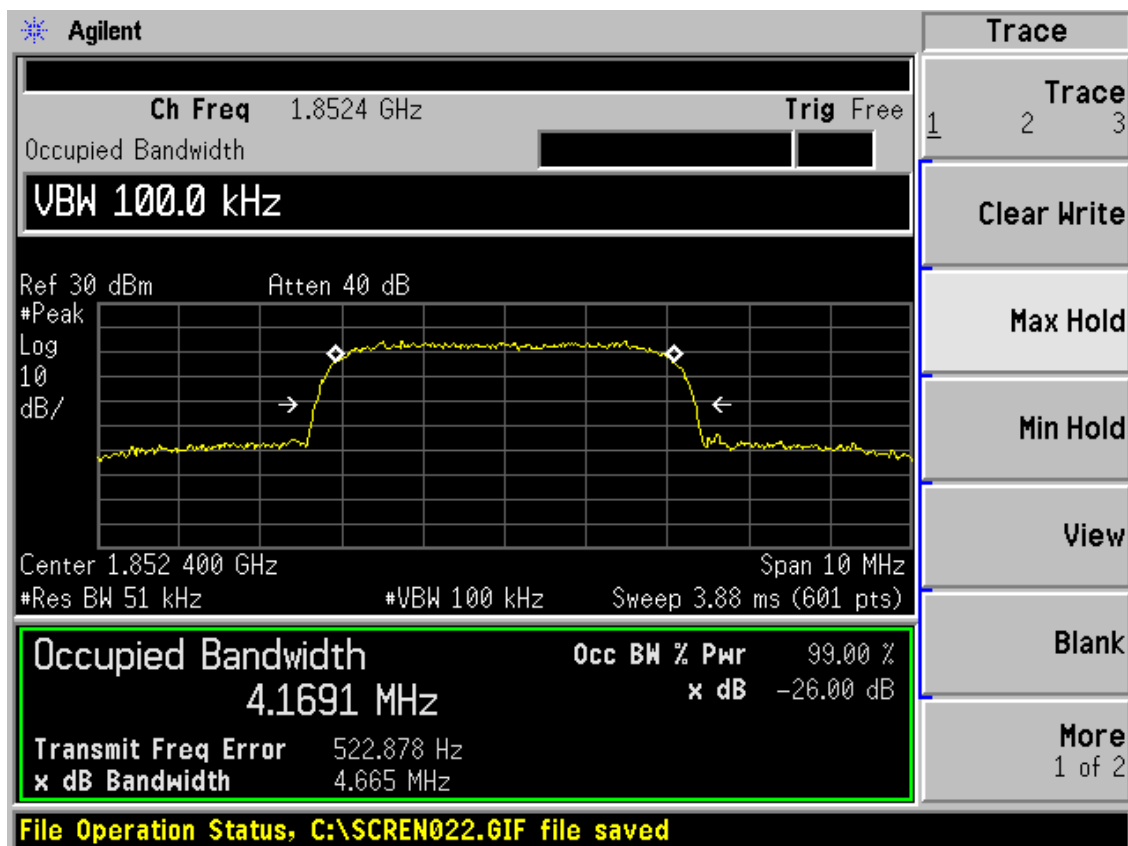
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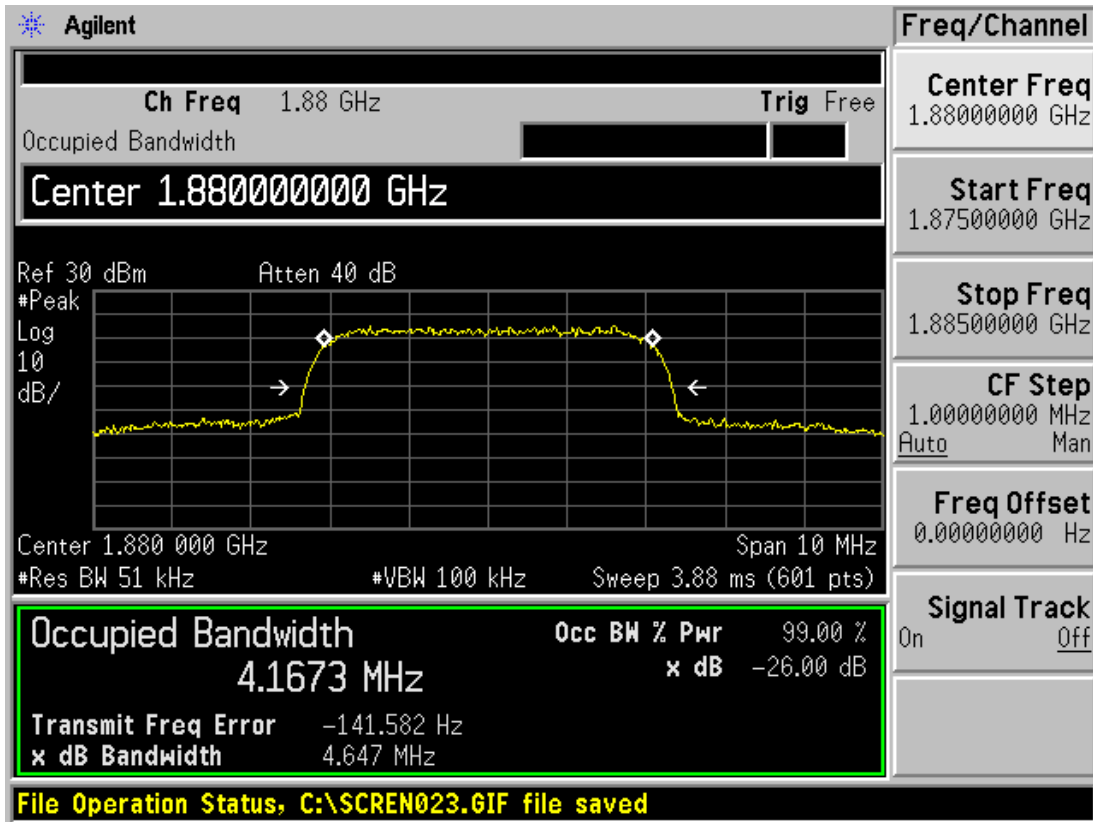
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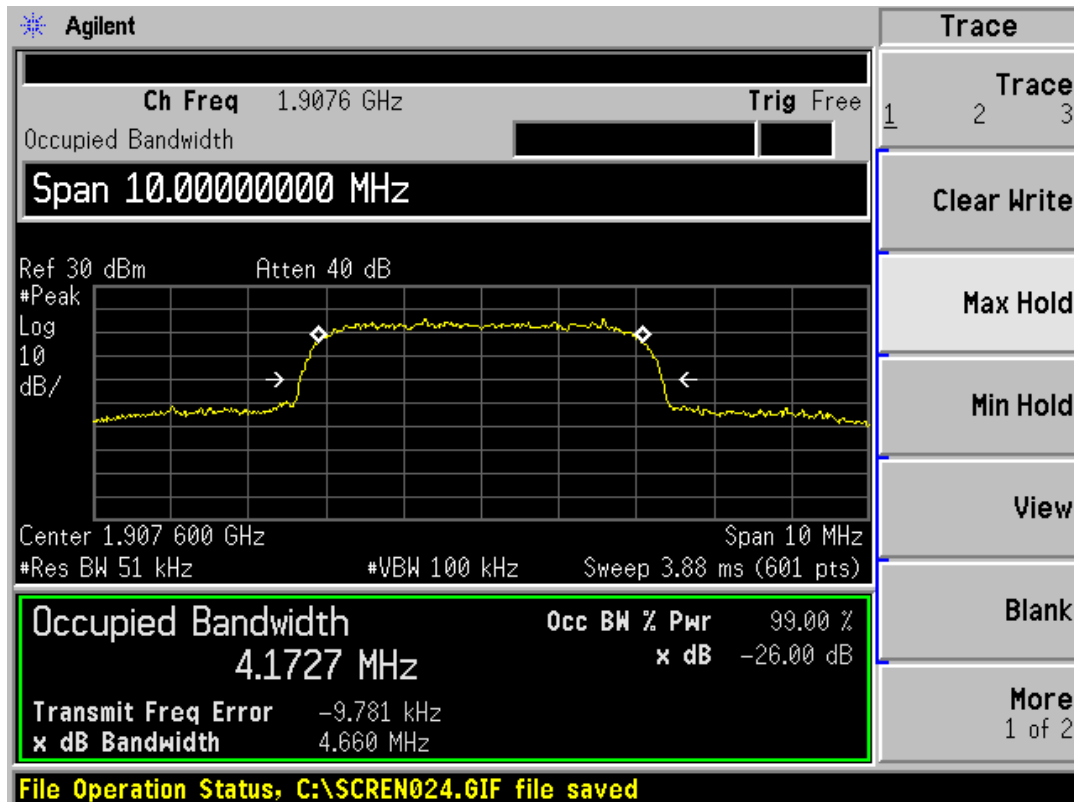
	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
WCDMA Band II	9262	1852.4	4.1691	4.665
	9400	1880	4.1673	4.647
	9538	1907.6	4.1727	4.660



WCDMA Band II CH9262 Occupied Bandwidth



WCDMA Band II CH9400 Occupied Bandwidth



WCDMA Band II CH9538 Occupied Bandwidth

2.5. Band Edge Compliance

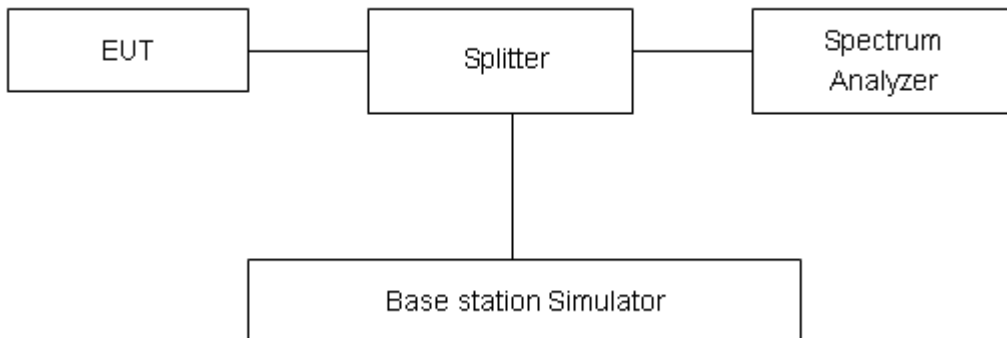
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured. The Average detector is used and RBW is set to 3kHz,VBW is set to 10kHz for GSM 1900 and RBW is set to 51kHz,VBW is set to 100kHz for WCDMA Band II. Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10} (P)$ dB.”

Limit	-13 dBm
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Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$, $U=0.684$ dB.

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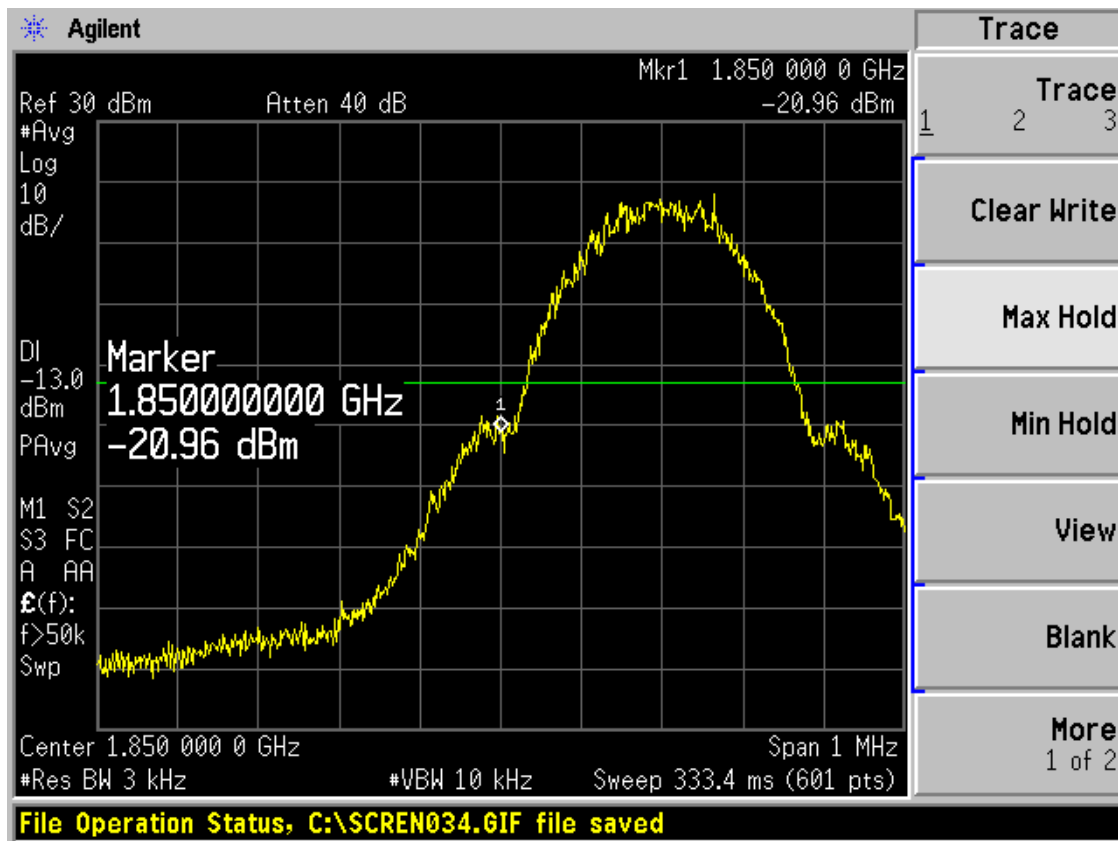
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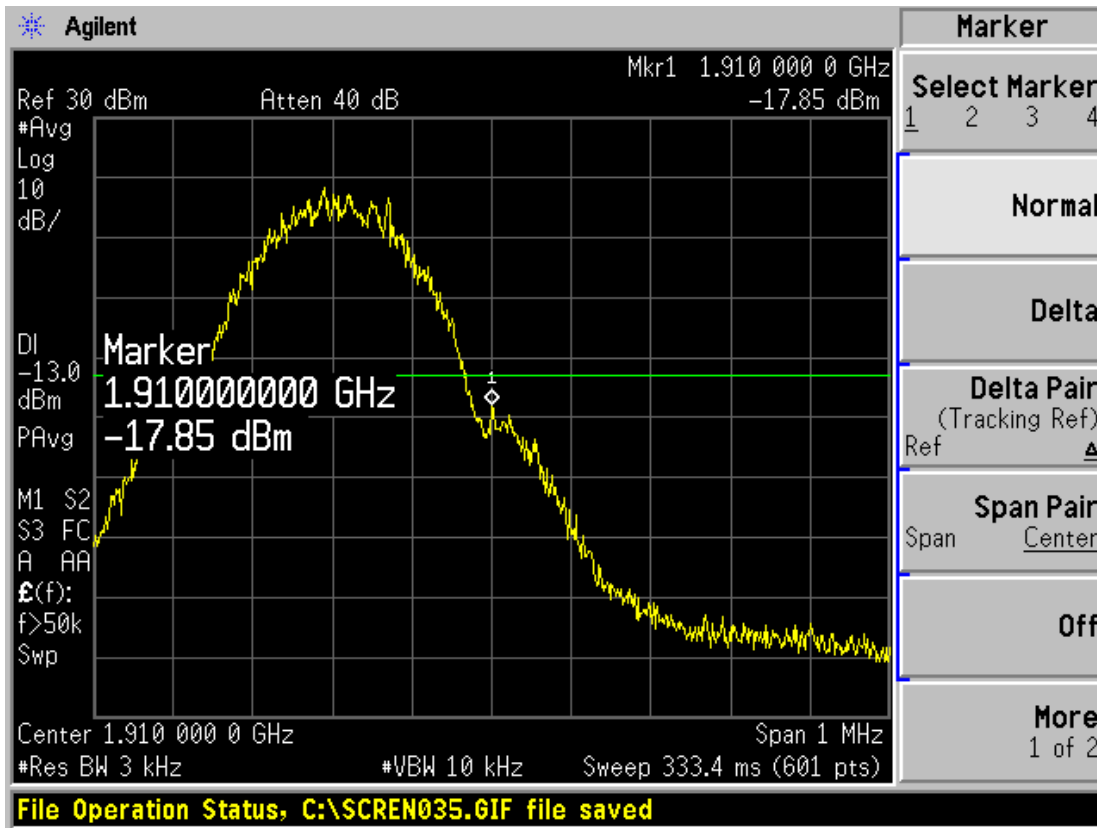
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Test Result:

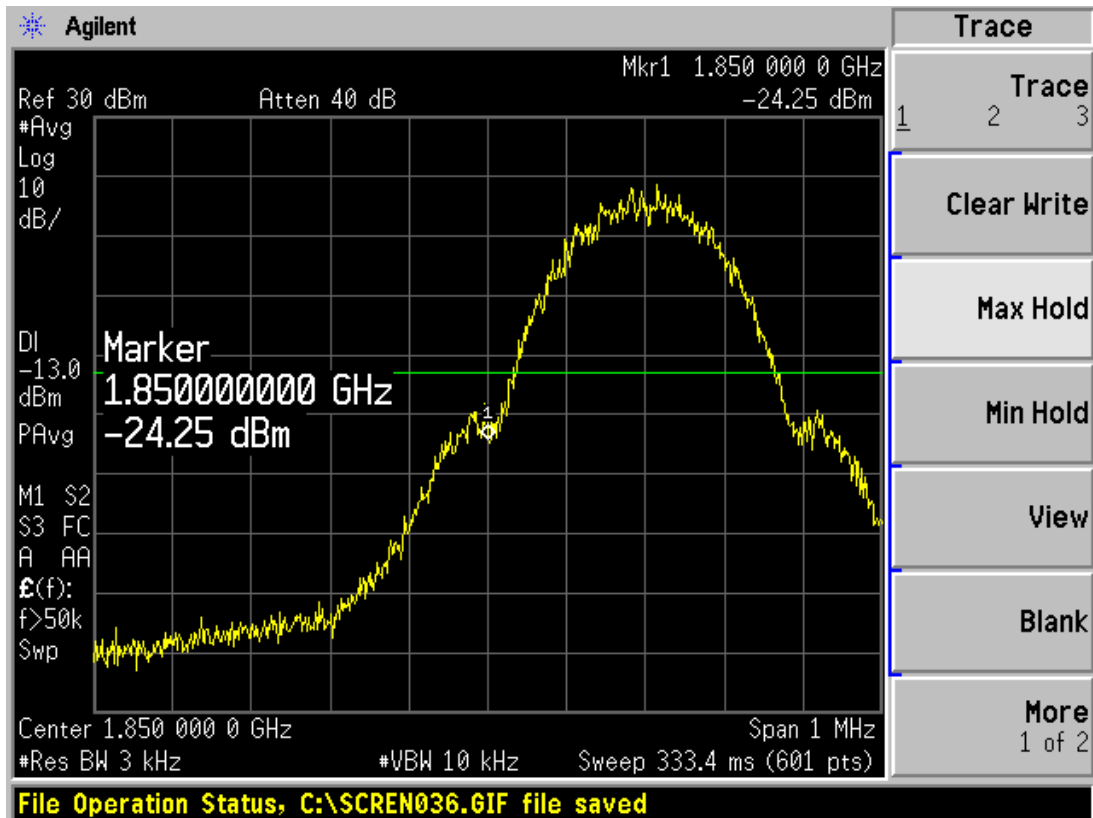
	Carrier frequency (MHz)	Reference value (dBm)	Limit	Conclusion
GSM 1900	1850.0	-20.96	-13	PASS
	1910.0	-17.85	-13	PASS
GSM 1900+GPRS	1850.0	-24.25	-13	PASS
	1910.0	-22.30	-13	PASS
GSM 1900+EGPRS	1850.0	-31.42	-13	PASS
	1910.0	-29.06	-13	PASS



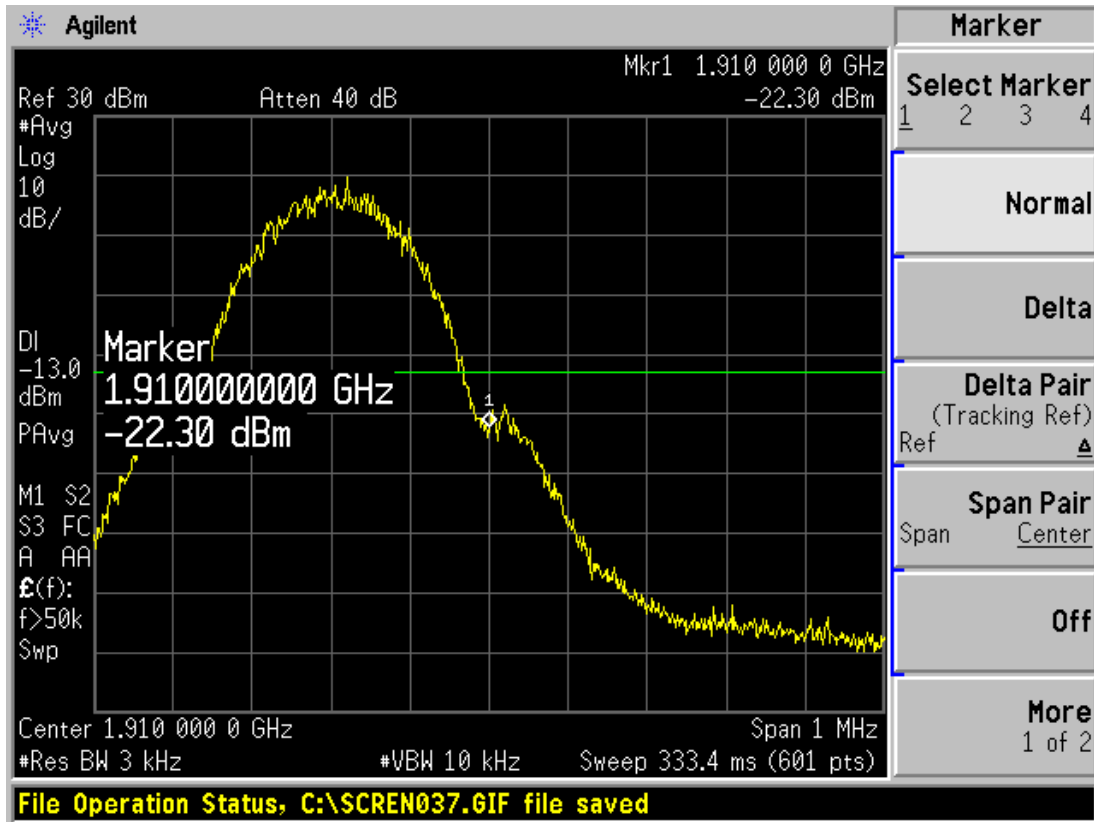
GSM 1900 512 Channel



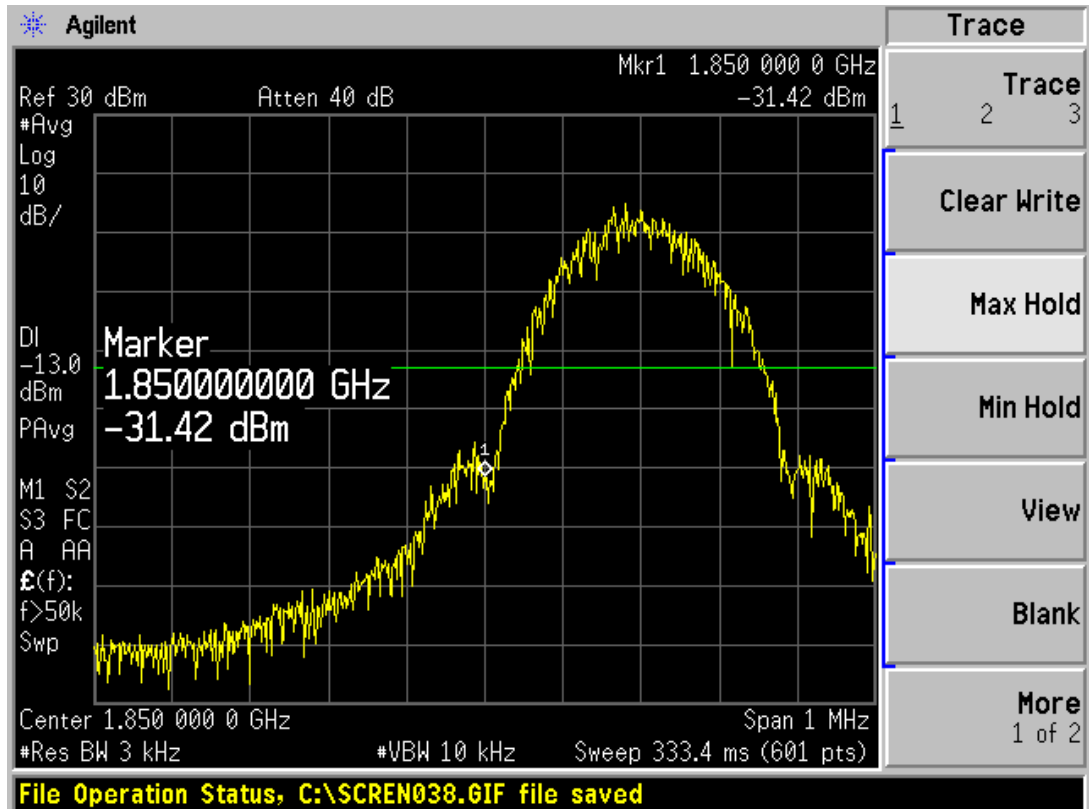
GSM1900 810 Channel



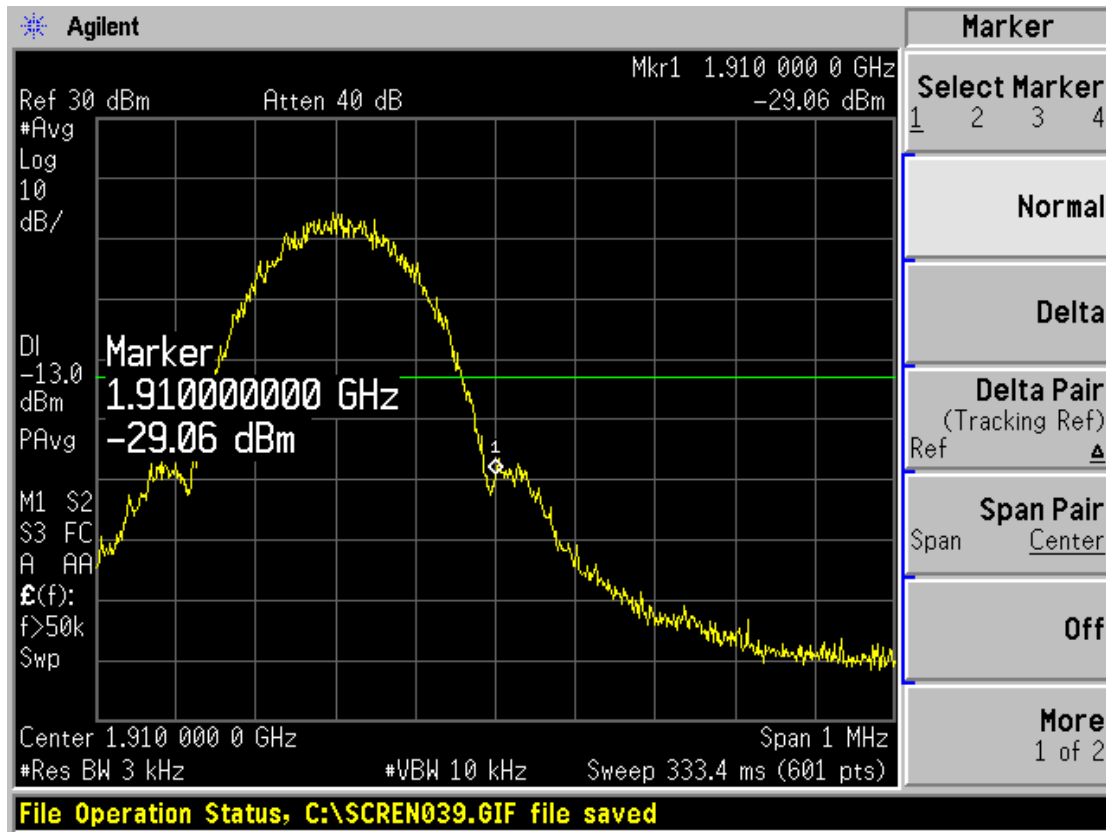
GSM 1900 GPRS 512 Channel



GSM1900 GPRS 810 Channel



GSM 1900 EGPRS 512 Channel



GSM1900 EGPRS 810 Channel

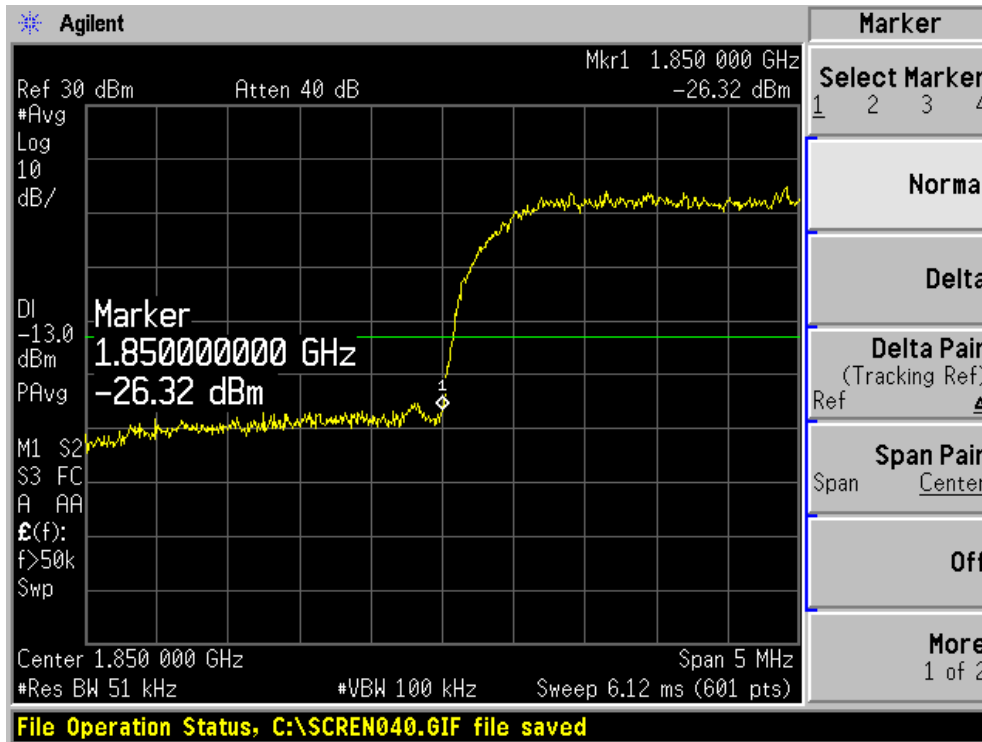
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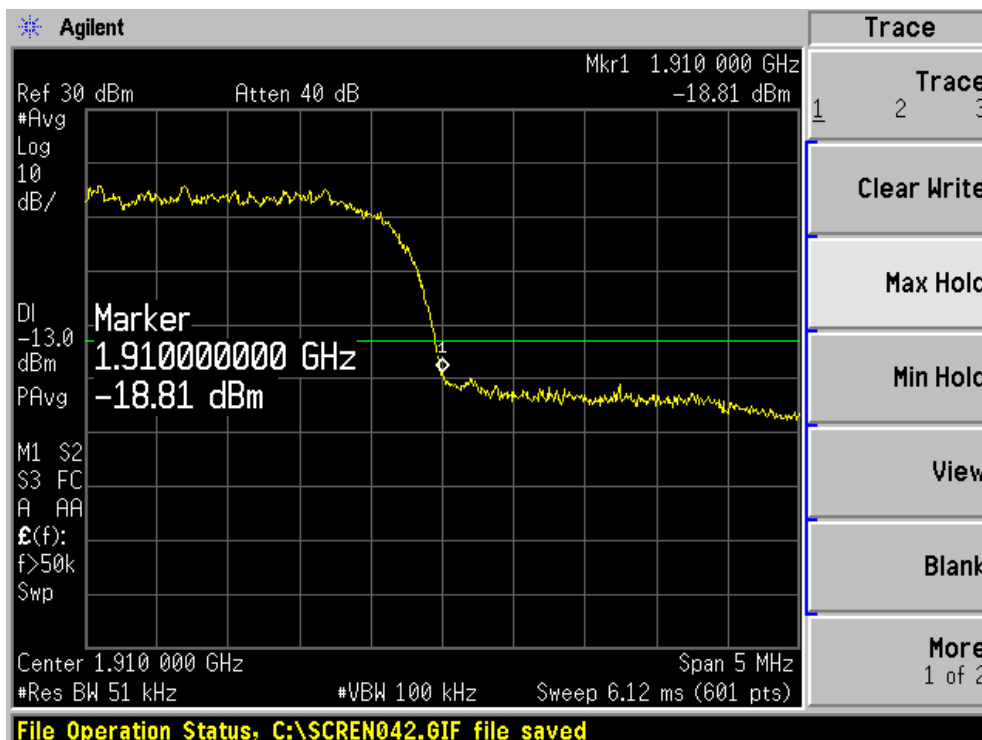
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	Carrier frequency (MHz)	Reference value (dBm)	Limit	Conclusion
WCDMA Band II	1849.8	-26.32	-13	PASS
	1910.2	-18.81	-13	PASS



WCDMA Band II 9262 Channel



WCDMA Band II 9538 Channel

2.6. Frequency Stability

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

1. Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -30°C to +50°C in 10°C step size,

(1) With all power removed, the temperature was decreased to -30°C and permitted to stabilize for three hours.

(2) Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.

(3) Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

2. Frequency Stability (Voltage Variation)

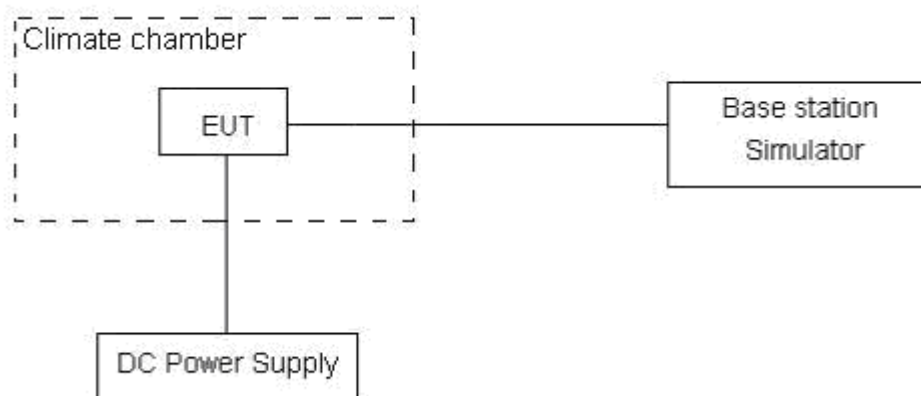
The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.

This transceiver is specified to operate with an input voltage of between 3.5 V and 4.2 V, with a nominal voltage of 3.7V.

Test setup



Limits

No specific frequency stability requirements in part 24.235

Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor $k = 3$, $U = 0.01\text{ppm}$.

Test Result

GSM 1900

Temperature (° C)	Test Results (ppm) / 3.7 V Power supply
	Channel 661
-30	0.00314
-20	0.00257
-10	0.00163
0	0.00028
10	0.00140
20	0.00229
30	0.00232
40	0.00319
50	0.00363

Voltage (V)	Test Results(ppm) / 20° C
	Channel 661
3.5	0.00234
3.7	0.00229
4.2	0.00271

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WCDMA Band II

Temperature (°C)	Test Results (ppm) / 3.7 V Power supply
	Channel 9400
-30	0.00256
-20	0.00223
-10	0.00143
0	0.00031
10	0.00170
20	0.00195
30	0.00213
40	0.00278
50	0.00325

Voltage (V)	Test Results(ppm) / 20°C
	Channel 9400
3.5	0.00181
3.7	0.00195
4.2	0.00268

2.7. Spurious Emissions at Antenna Terminals

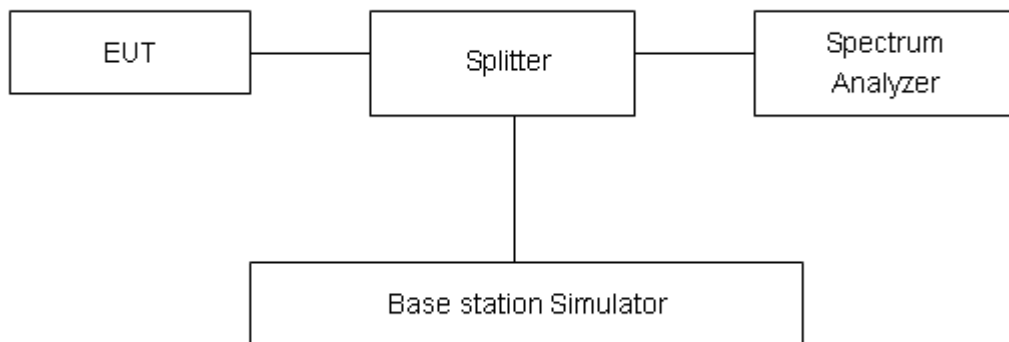
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to the 10th harmonic of the carrier. For GSM 1900, RBW and VBW are set to 100 kHz, Sweep is set to ATUO. For WCDMA Band II, RBW and VBW are set to 100 kHz for the carrier frequency, or RBW and VBW are set to 1MHz(other frequency), Sweep is set to ATUO.

Test setup



Limits

Rule Part 24.238(a) specifies that “on any frequency outside a licensee’s frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10} (P)$ dB.”

Limit	-13 dBm
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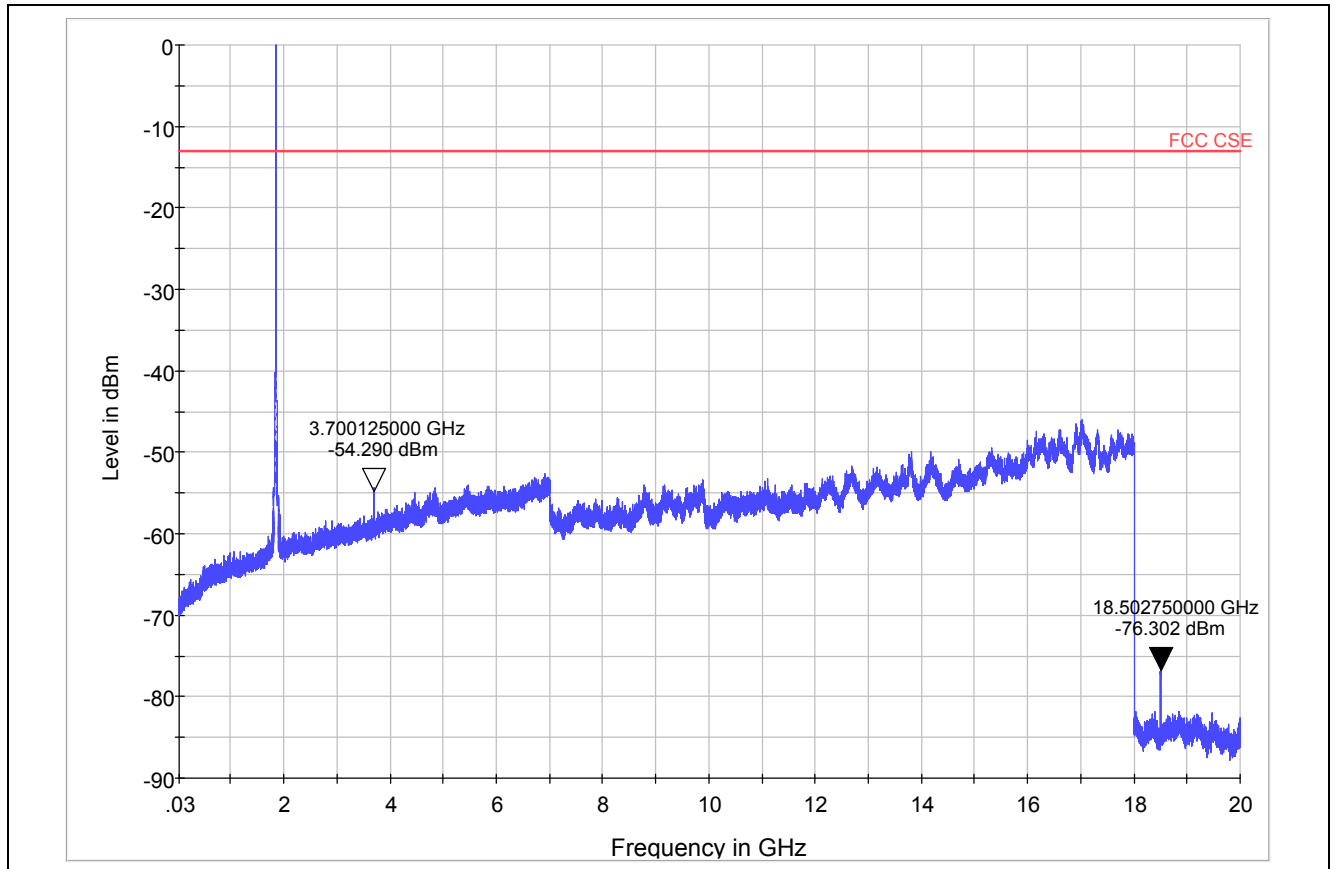
Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-12.75GHz	1.407 dB

Test Result

GSM 1900 CH 512



Note: The signal beyond the limit is carrier.

GSM 1900 512 Channel 30MHz~20GHz

Harmonic	TX ch.512 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	3700.125	-54.290	-13	41.290
3	5550.6	Nf	-13	/
4	7400.8	Nf	-13	/
5	9251	Nf	-13	/
6	11101.2	Nf	-13	/
7	12951.4	Nf	-13	/
8	14801.6	Nf	-13	/
9	16651.8	Nf	-13	/
10	18502.75	-76.302	-13	63.302

Nf: noise floor

Note: The other Spurious RF conducted emissions level is no more than noise floor.

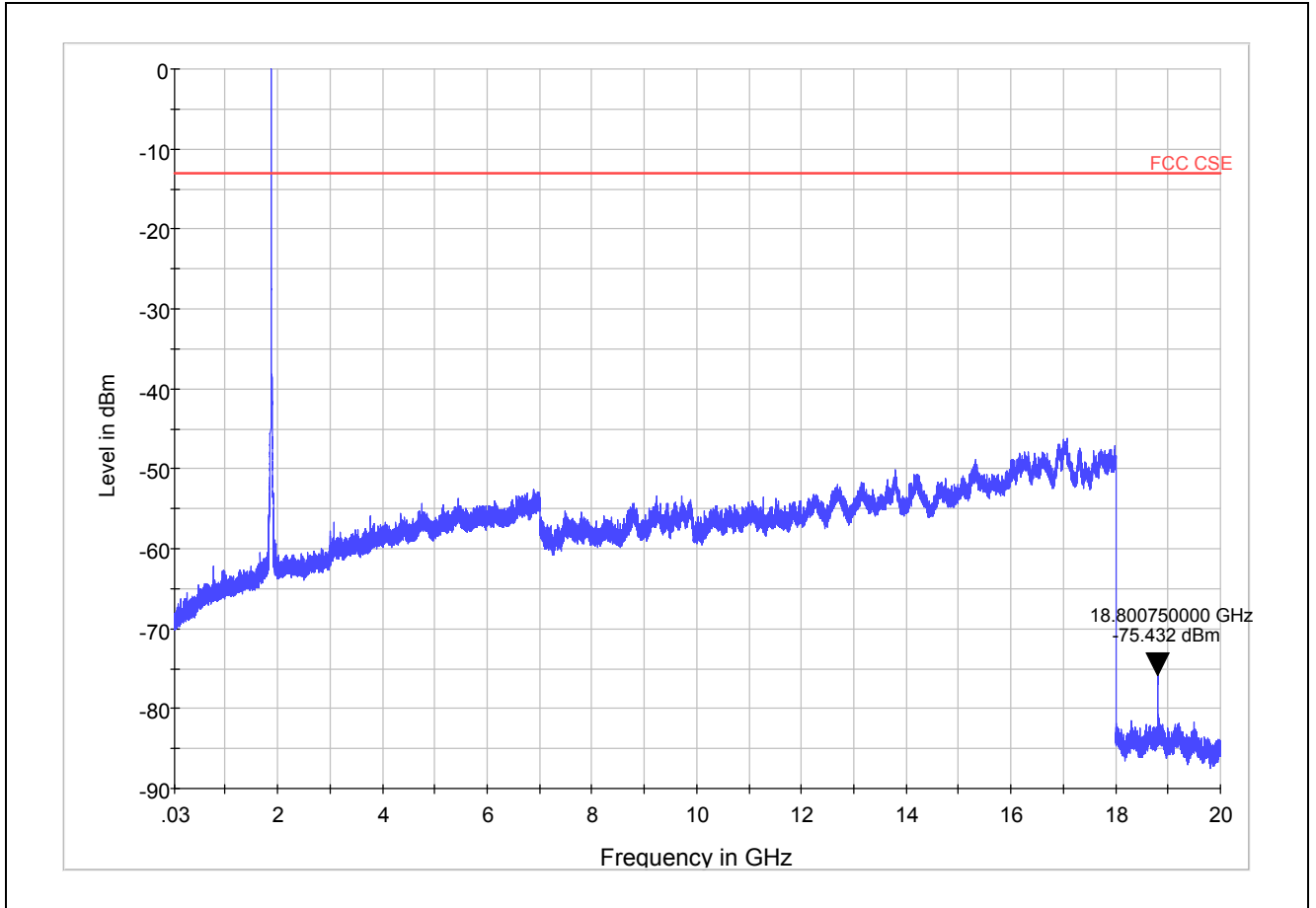
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GSM 1900 CH 661



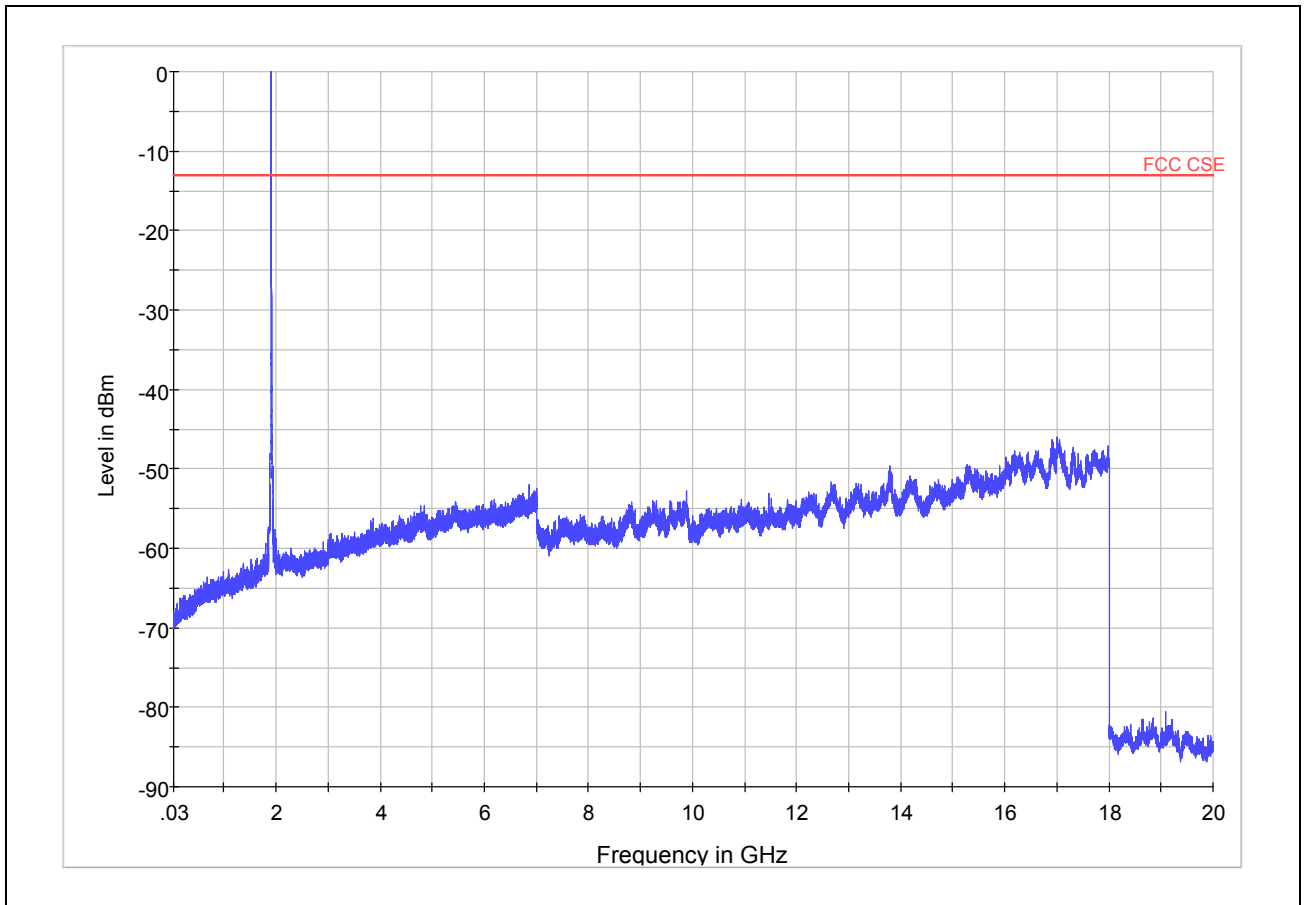
Note: The signal beyond the limit is carrier.
GSM 1900 661 Channel 30MHz~20GHz

Harmonic	TX ch.661 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	3760	Nf	-13	/
3	5640	Nf	-13	/
4	7520	Nf	-13	/
5	9400	Nf	-13	/
6	11280	Nf	-13	/
7	13160	Nf	-13	/
8	15040	Nf	-13	/
9	16920	Nf	-13	/
10	18800.75	-75.432	-13	62.432

Nf: noise floor

Note: The other Spurious RF conducted emissions level is no more than noise floor.

GSM 1900 CH 810



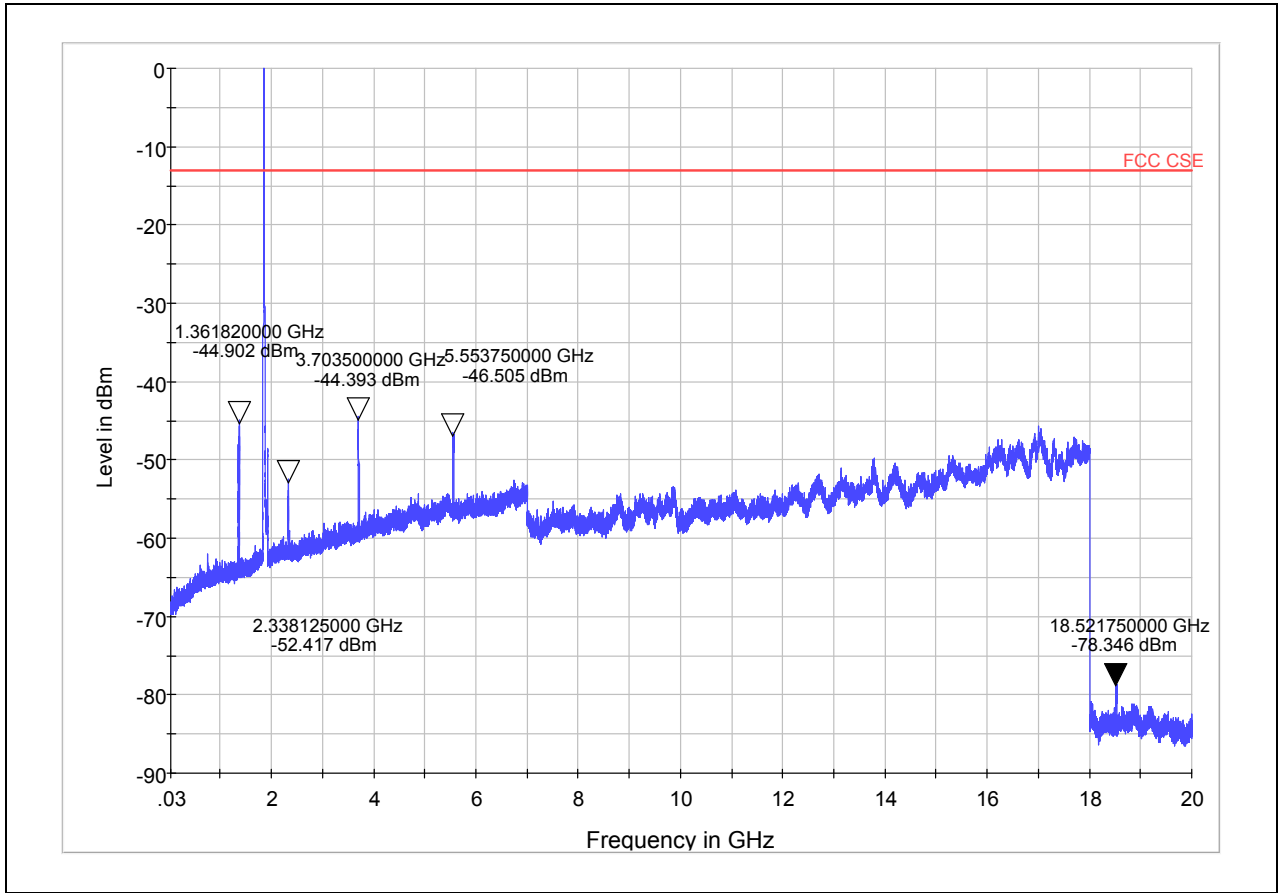
Note: The signal beyond the limit is carrier.
GSM 1900 810 Channel 30MHz~20GHz

Harmonic	TX ch.810 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	3819.6	Nf	-13	/
3	5729.4	Nf	-13	/
4	7639.2	Nf	-13	/
5	9549	Nf	-13	/
6	11458.8	Nf	-13	/
7	13368.6	Nf	-13	/
8	15278.4	Nf	-13	/
9	17188.2	Nf	-13	/
10	19098	Nf	-13	/

Nf: noise floor

Note: The other Spurious RF conducted emissions level is no more than noise floor.

WCDMA Band II CH9262



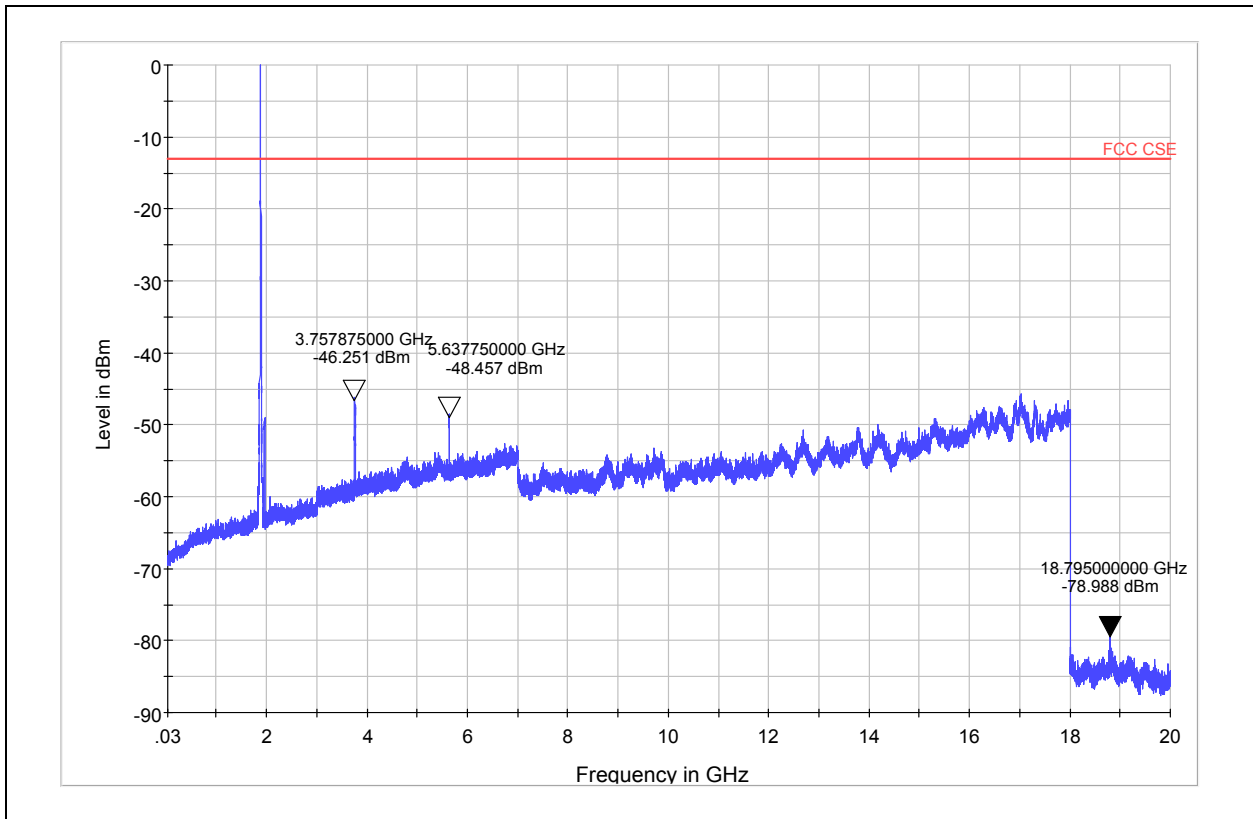
Note: The signal beyond the limit is carrier.
WCDMA Band II 9262 Channel 30MHz~20GHz

Harmonic	TX ch.9262 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	3703.5	-44.393	-13	31.393
3	5553.75	-46.505	-13	33.505
4	7409.6	Nf	-13	/
5	9262	Nf	-13	/
6	11114.4	Nf	-13	/
7	12966.8	Nf	-13	/
8	14819.2	Nf	-13	/
9	16671.6	Nf	-13	/
10	18521.75	-78.346	-13	65.346

Nf: noise floor

Note: The other Spurious RF conducted emissions level is no more than noise floor.

WCDMA Band II CH9400



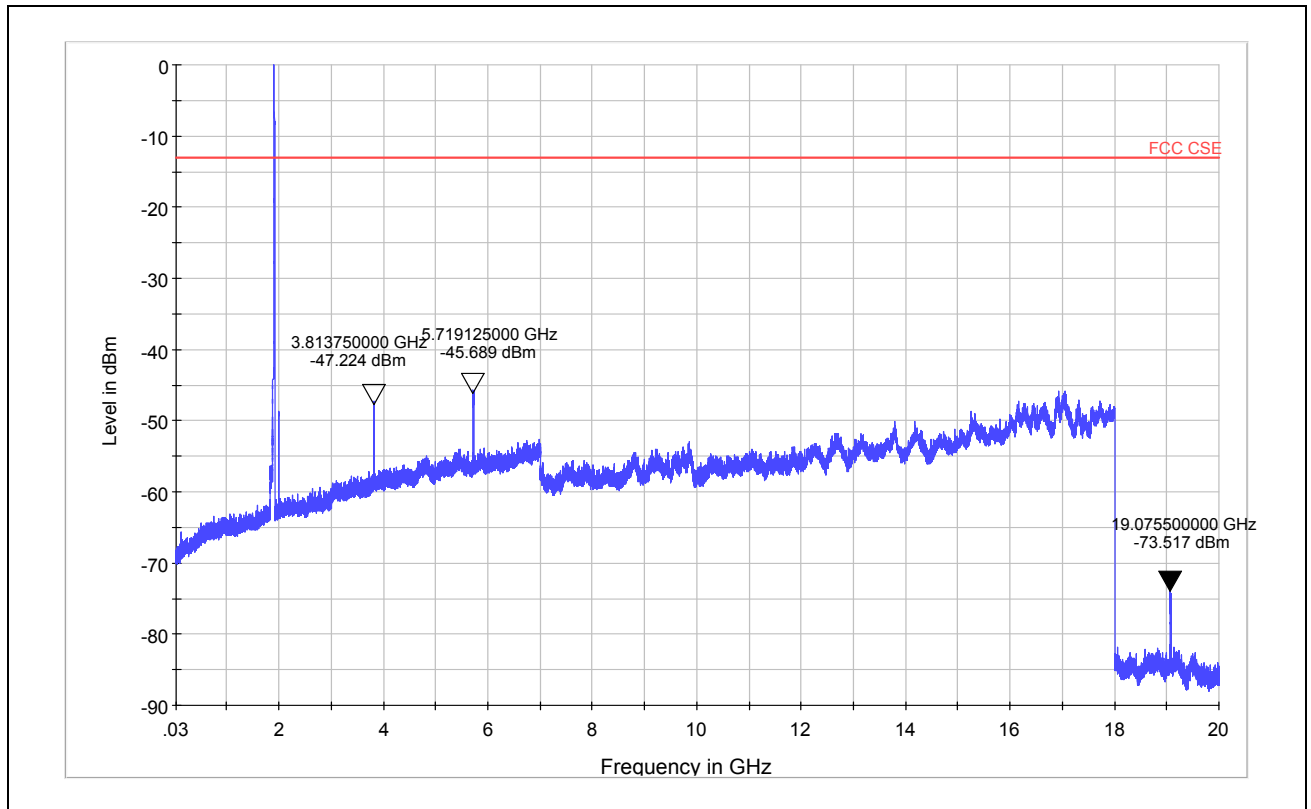
Note: The signal beyond the limit is carrier.
WCDMA Band II 9400 Channel 30MHz~20GHz

Harmonic	TX ch.9400 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	3757.875	-46.251	-13	33.251
3	5637.75	-48.457	-13	35.457
4	7520	Nf	-13	/
5	9400	Nf	-13	/
6	11280	Nf	-13	/
7	13160	Nf	-13	/
8	15040	Nf	-13	/
9	16920	Nf	-13	/
10	18795	-78.988	-13	65.988

Nf: noise floor

Note: The other Spurious RF conducted emissions level is no more than noise floor.

WCDMA Band II CH9538



Note: The signal beyond the limit is carrier.
WCDMA Band II 9538 Channel 30MHz~20GHz

Harmonic	TX ch.9538 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	3813.75	-47.224	-13	34.224
3	5719.125	-45.689	-13	32.689
4	7630.4	Nf	-13	/
5	9538	Nf	-13	/
6	11445.6	Nf	-13	/
7	13353.2	Nf	-13	/
8	15260.8	Nf	-13	/
9	17168.4	Nf	-13	/
10	19075.5	-73.517	-13	60.517

Nf: noise floor

Note: The other Spurious RF conducted emissions level is no more than noise floor.

2.8. Radiates Spurious Emission

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

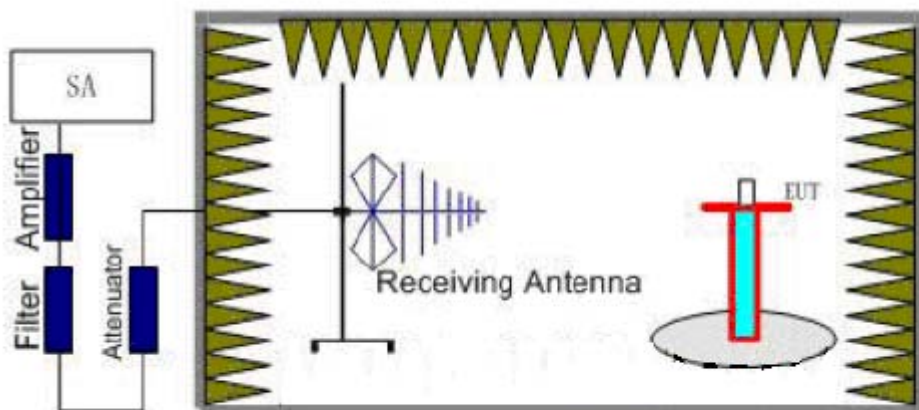
The measurements procedures in TIA -603C are used.

The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment.

The procedure of Radiates Spurious Emission is as follows:

Step 1:

The measurement is carried out in the semi-anechoic chamber. EUT was placed on a 0.8 meters high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used while RBW and VBW are both set to 3MHz. During the measurement, the highest emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna moved up and down over a range from 1 to 4 meters in both horizontally and vertically polarized orientations. The test setup refers to figure below.



Step 2:

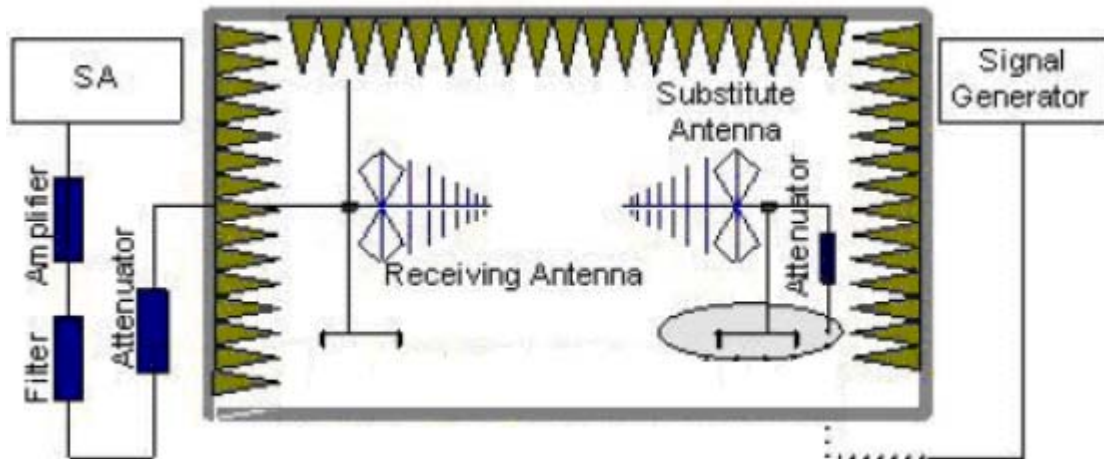
A dipole antenna shall be substituted in place of the EUT. The antenna will be driven by a signal generator with a adjustable S.G. applied through a Tx cable. Adjust the level of the signal generator output until the value of the receiver reach the previously recorded analyzer power level (LVL). Then The E.R.P. /E.I.R.P. of the EUT can be calculated through the level of the signal generator, Tx cable loss and the gain of the substitution antenna. The test setup refers to figure below.

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E.R.P (peak power) =S.G. - Tx Cable loss + Substitution antenna gain – 2.15.
 EIRP= E.R.P+2.15

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the antenna is vertical.

Limits

Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.”

Limit	-13 dBm
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Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$, $U = 3.55$ dB.

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Test Result

GSM 1900 CH 512

Harmonic	TX ch.512 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3700.4	-50.676	5.1	11.05	-44.726	-13	31.726	180
3	5550.6	-54.853	5.42	12.65	-47.623	-13	34.623	180
4	7400.8	/	/	/	Nf	-13	/	/
5	9251	/	/	/	Nf	-13	/	/
6	11101.2	/	/	/	Nf	-13	/	/
7	12951.4	/	/	/	Nf	-13	/	/
8	14801.6	/	/	/	Nf	-13	/	/
9	16651.8	/	/	/	Nf	-13	/	/
10	18502	/	/	/	Nf	-13	/	/

Nf: noise floor

Note: The other Spurious RF Radiated emissions level is no more than noise floor.

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GSM 1900 CH 661

Harmonic	TX ch.661 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3760	-50.1	5.1	11.05	-44.15	-13	31.15	180
3	5640	/	/	/	Nf	-13	/	/
4	7520	/	/	/	Nf	-13	/	/
5	9400	/	/	/	Nf	-13	/	/
6	11280	/	/	/	Nf	-13	/	/
7	13160	/	/	/	Nf	-13	/	/
8	15040	/	/	/	Nf	-13	/	/
9	16920	/	/	/	Nf	-13	/	/
10	18800	/	/	/	Nf	-13	/	/

Nf: noise floor

Note: The other Spurious RF Radiated emissions level is no more than noise floor.

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GSM 1900 CH 810

Harmonic	TX ch.810 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3819.6	-55.94	6.1	11.05	-50.99	-13	37.99	180
3	5729.4	/	/	/	Nf	-13	/	/
4	7639.2	/	/	/	Nf	-13	/	/
5	9549	/	/	/	Nf	-13	/	/
6	11458.8	/	/	/	Nf	-13	/	/
7	13368.6	/	/	/	Nf	-13	/	/
8	15278.4	/	/	/	Nf	-13	/	/
9	17188.2	/	/	/	Nf	-13	/	/
10	19098	/	/	/	Nf	-13	/	/

Nf: noise floor

Note: The other Spurious RF Radiated emissions level is no more than noise floor.

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WCDMA Band II CH9262

Harmonic	TX ch.9262 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3704.8	/	/	/	Nf	-13	/	/
3	5557.2	/	/	/	Nf	-13	/	/
4	7409.6	/	/	/	Nf	-13	/	/
5	9262	/	/	/	Nf	-13	/	/
6	11114.4	/	/	/	Nf	-13	/	/
7	12966.8	/	/	/	Nf	-13	/	/
8	14819.2	/	/	/	Nf	-13	/	/
9	16671.6	/	/	/	Nf	-13	/	/
10	18524	/	/	/	Nf	-13	/	/

Nf: noise floor

Note: The other Spurious RF Radiated emissions level is no more than noise floor.

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WCDMA Band II CH9400

Harmonic	TX ch.9400 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3760	/	/	/	Nf	-13	/	/
3	5640	/	/	/	Nf	-13	/	/
4	7520	/	/	/	Nf	-13	/	/
5	9400	/	/	/	Nf	-13	/	/
6	11280	/	/	/	Nf	-13	/	/
7	13160	/	/	/	Nf	-13	/	/
8	15040	/	/	/	Nf	-13	/	/
9	16920	/	/	/	Nf	-13	/	/
10	18800	/	/	/	Nf	-13	/	/

Nf: noise floor

Note: The other Spurious RF Radiated emissions level is no more than noise floor.

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WCDMA Band II CH9538

Harmonic	TX ch.9538 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3815.2	/	/	/	Nf	-13	/	/
3	5722.8	/	/	/	Nf	-13	/	/
4	7630.4	/	/	/	Nf	-13	/	/
5	9538	/	/	/	Nf	-13	/	/
6	11445.6	/	/	/	Nf	-13	/	/
7	13353.2	/	/	/	Nf	-13	/	/
8	15260.8	/	/	/	Nf	-13	/	/
9	17168.4	/	/	/	Nf	-13	/	/
10	19076	/	/	/	Nf	-13	/	/

Nf: noise floor

Note: The other Spurious RF Radiated emissions level is no more than noise floor.

2.9. Receiver Spurious Emissions

Ambient condition

Temperature	Relative humidity	Pressure
24°C~26°C	45%~50%	102.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The distance between EUT and receive antenna should be 3 meters. During the test, the EUT was operating in its typical mode. The test method is according to RSS-GEN (2007). Sweep the whole frequency band through the range from 30MHz to 6GHz. During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum of radiated emission signal level. The measurements shall be repeated with orthogonal polarization of the test antenna.

The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing. During the test, the EUT is worked at maximum output power.

Set the spectrum analyzer in the following:

Below 1GHz(detector: Peak and Quasi-Peak):

RBW=100kHz / VBW=300kHz / Sweep=AUTO

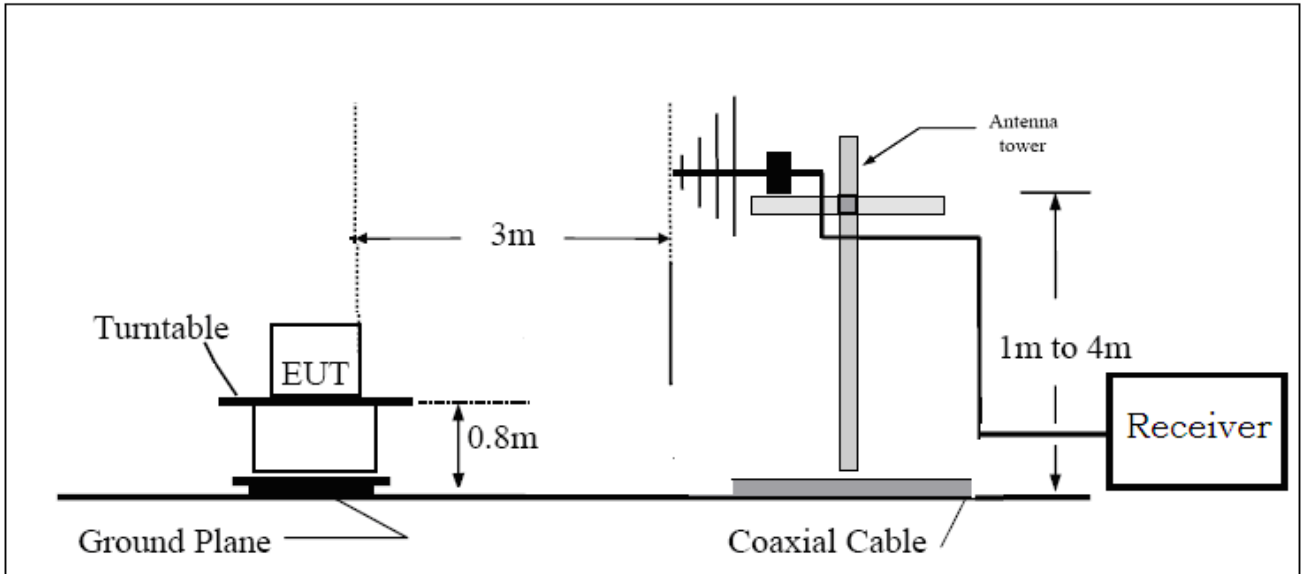
Above 1GHz(detector: Peak):

(a) PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO

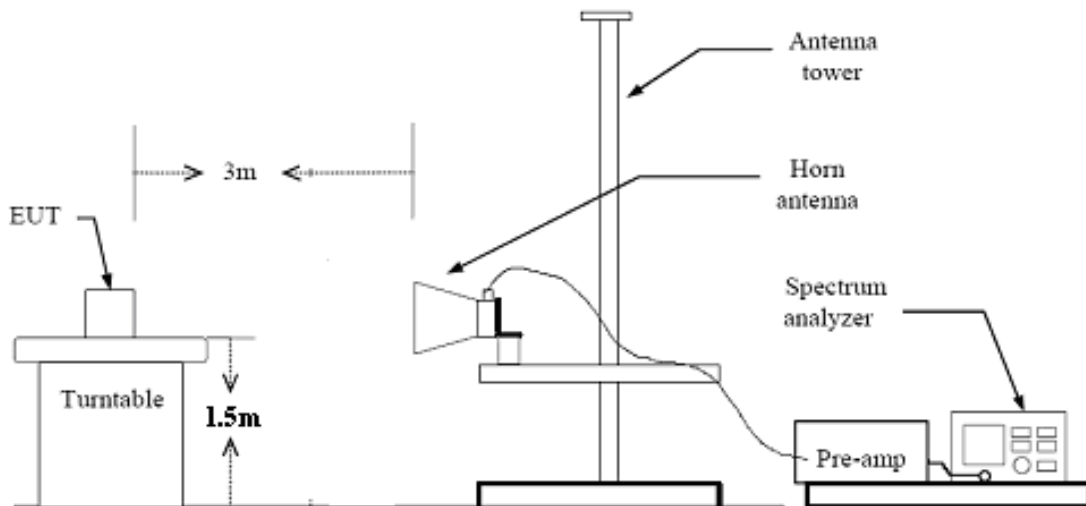
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

Test Setup

Below 1GHz



Above 1GHz



Limits

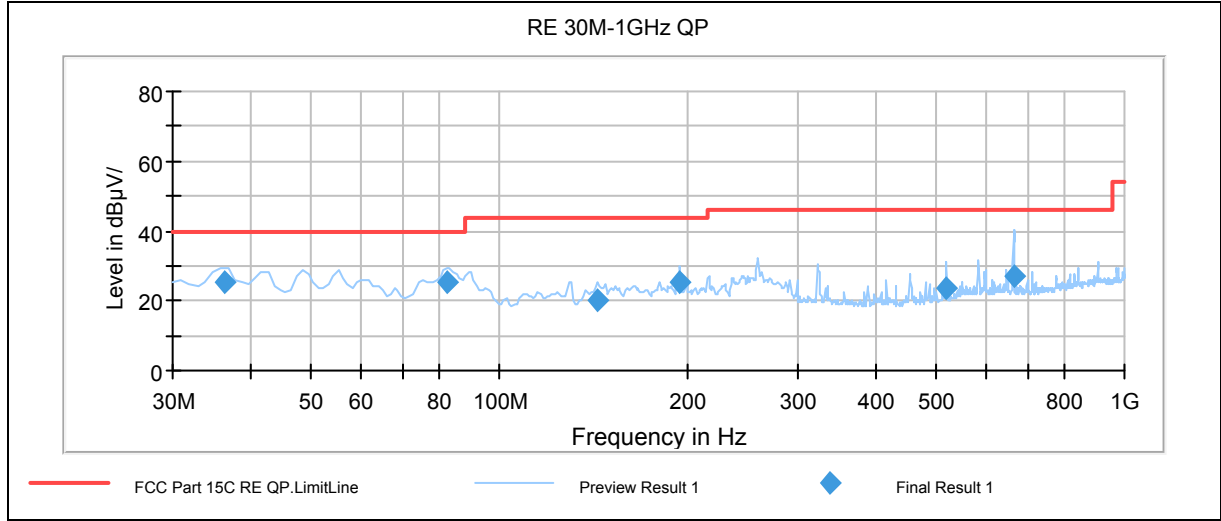
Frequency (MHz)	Field Strength (dB μ V/m)	Detector
30 -88	40.0	Quasi-peak
88-216	43.5	Quasi-peak
216 – 960	46.0	Quasi-peak
960-1000	54.0	Quasi-peak
1000-5 th harmonic of the highest frequency or 40GHz, which is lower	54 74	Average Peak

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U = 3.92$ dB.

Test Results

GSM 1900



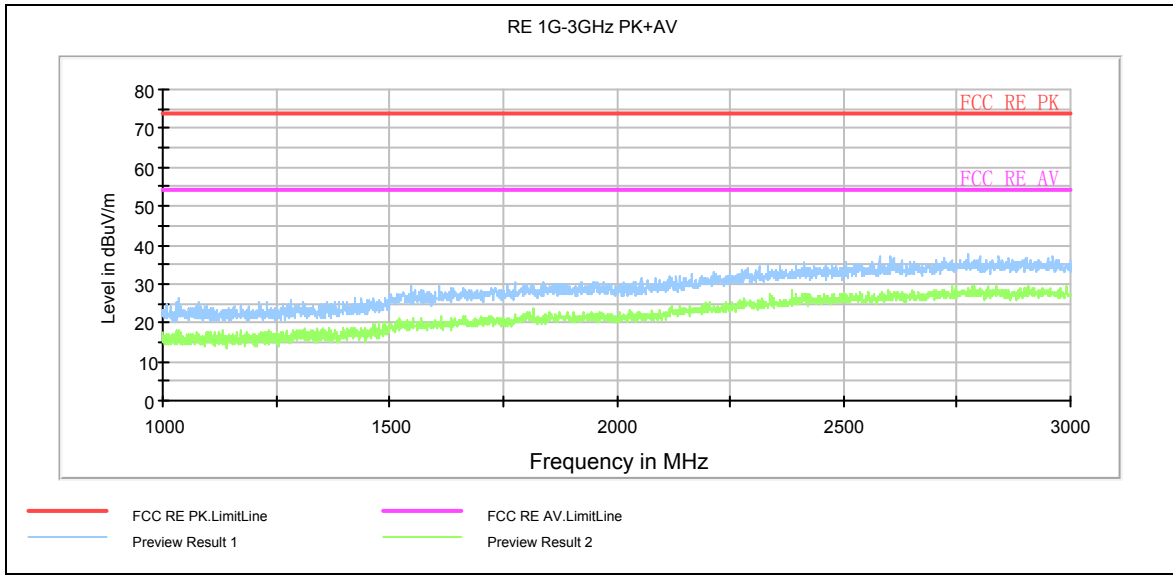
Radiated Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
36.340000	25.1	125.0	V	54.0	47.8	-22.7	14.9	40.0
82.750000	25.1	116.0	V	50.0	54.3	-29.2	14.9	40.0
144.010000	20.4	100.0	V	299.0	51.3	-30.9	23.1	43.5
194.700000	25.1	225.0	V	15.0	53.8	-28.7	18.4	43.5
519.320000	23.8	100.0	V	148.0	44.6	-20.8	22.2	46.0
666.120000	26.8	100.0	V	170.0	45.2	-18.4	19.2	46.0

Remark: 1. Quasi-Peak = Reading value + Correction factor

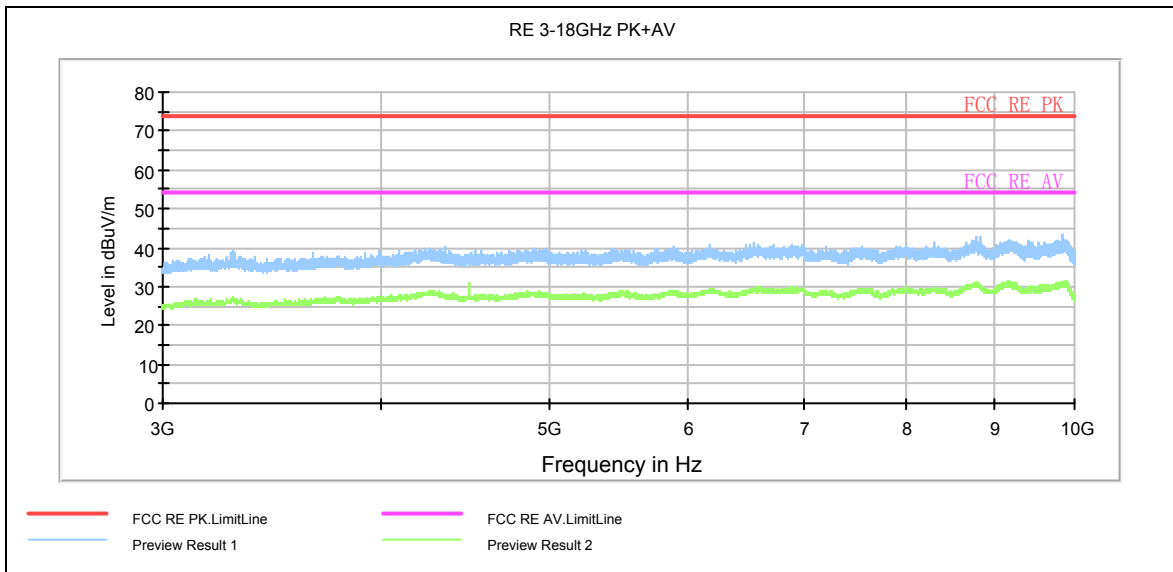
2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)

3. Margin = Limit – Quasi-Peak



Note: Blue trace uses the peak detection Green trace uses the average detection

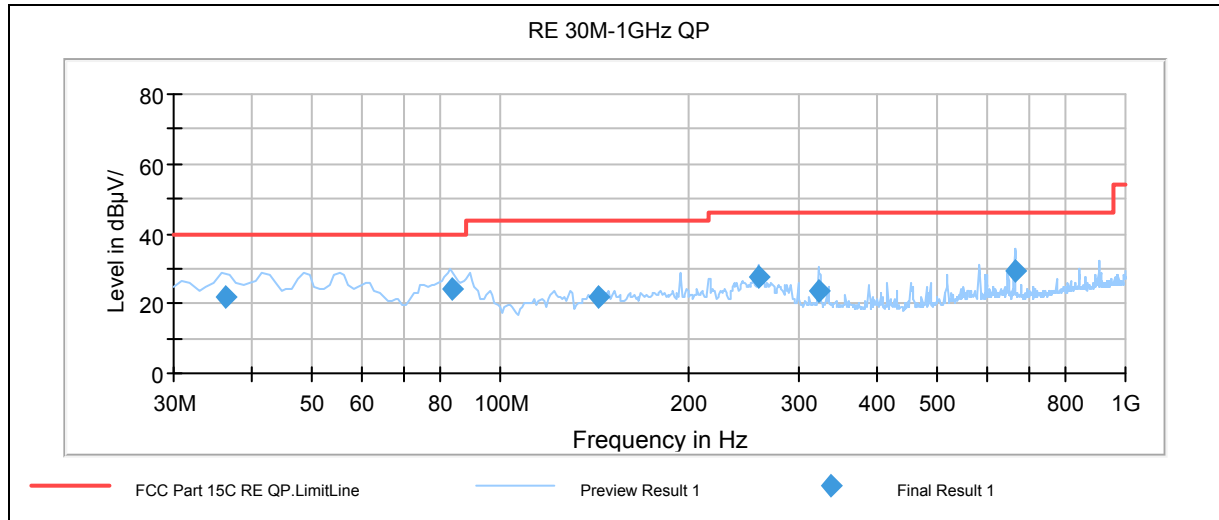
Radiated Emission from 1GHz to 3GHz



Note: Blue trace uses the peak detection Green trace uses the average detection

Radiated Emission from 3GHz to 10GHz

WCDMA Band II



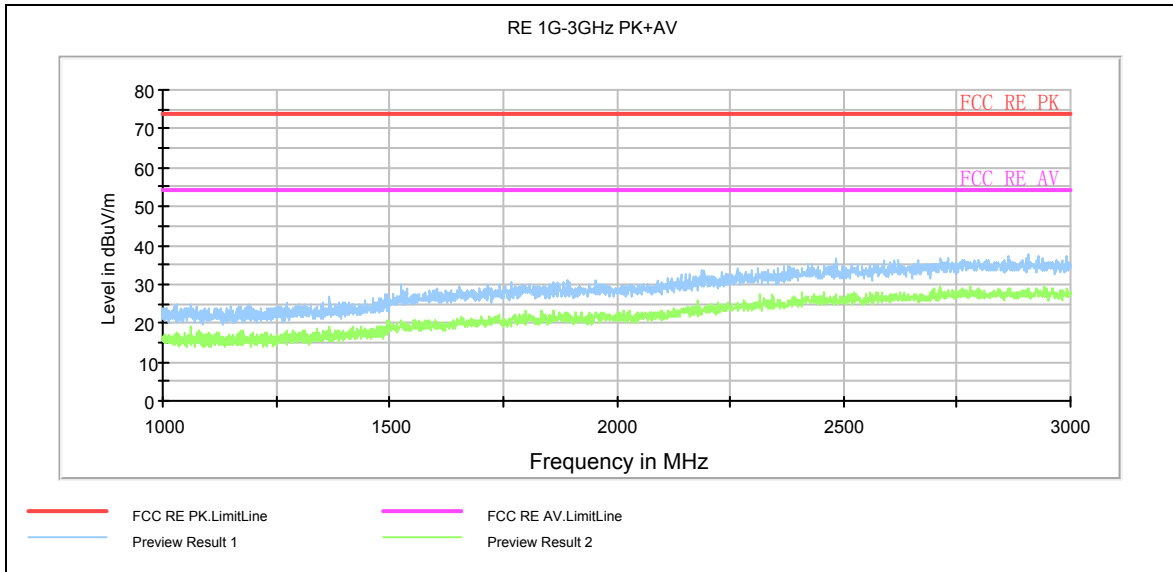
Radiated Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Reading value (dBuV/m)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
36.260000	21.9	100.0	V	28.0	-22.7	-22.7	18.1	40.0
83.630000	24.0	175.0	V	71.0	-28.9	-28.9	16.0	40.0
144.010000	21.8	100.0	V	0.0	-30.9	-30.9	21.7	43.5
259.610000	27.7	225.0	V	192.0	-26.4	-26.4	18.3	46.0
323.460000	23.5	175.0	V	167.0	-24.9	-24.9	22.5	46.0
666.080000	29.3	100.0	V	188.0	-18.4	-18.4	16.7	46.0

Remark: 1. Quasi-Peak = Reading value + Correction factor

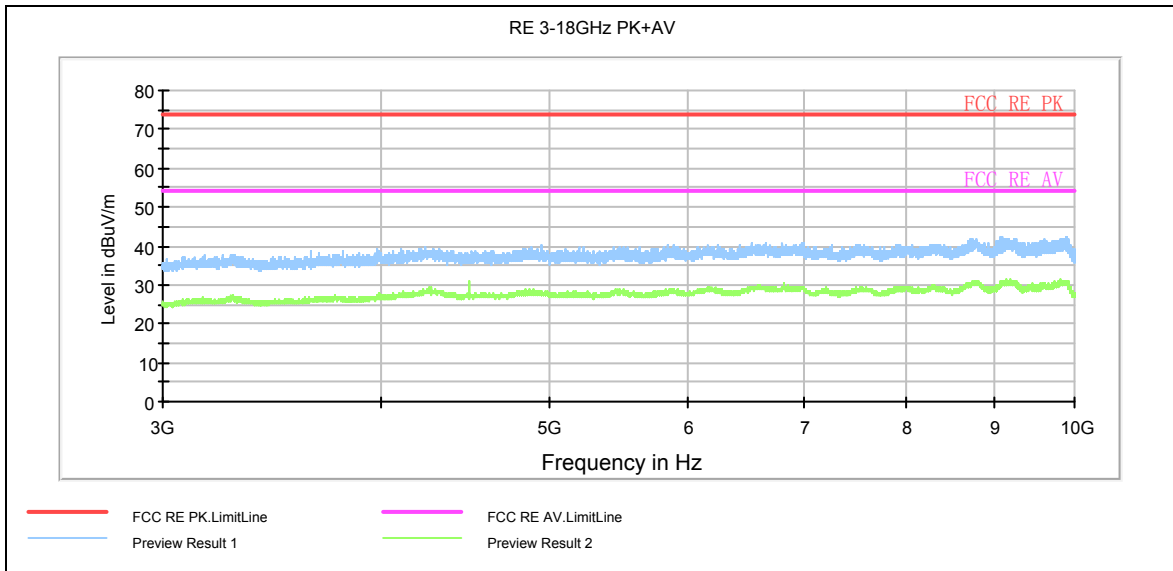
2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)

3. Margin = Limit – Quasi-Peak



Note: Blue trace uses the peak detection Green trace uses the average detection

Radiated Emission from 1GHz to 3GHz



Note: Blue trace uses the peak detection Green trace uses the average detection

Radiated Emission from 3GHz to 10GHz

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3. Main Test Instruments

No.	Name	Type	Manufacturer	Serial Number	Calibration Date	Valid Period
01	Base Station Simulator	CMU200	R&S	118133	2011-05-26	One year
02	Power Splitter	SHX-GF2-2-13	Hua Xiang	10120101	NA	NA
03	Spectrum Analyzer	E4445A	Agilent	MY46181146	2011-06-07	One year
04	Universal Radio Communication Tester	E5515C	Agilent	MY48367192	2011-06-03	One year
05	Signal Analyzer	FSV	R&S	100815	2011-06-27	One year
06	Signal generator	SMR27	R&S	1606.6000.02	2011-06-27	One year
07	EMI Test Receiver	ESCI	R&S	100948	2011-06-30	One year
08	Trilog Antenna	VUBL 9163	SCHWARZB ECK	9163-201	2010-06-29	Two years
09	Horn Antenna	HF907	R&S	100126	2011-07-01	Two years
10	Climatic Chamber	PT-30B	Re Ce	20101891	2010-09-10	Three years
11	Semi-Anechoic Chamber	9.6*6.7*6.6m	ETS-Lindgren	NA	NA	NA
12	EMI test software	ES-K1	R&S	NA	NA	NA

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