



Report No.: RZA2010-1332RF24-R1



Part 24


TEST REPORT

Product Name	GSM 850/1900 BT1.2 FM
FCC ID	YCNSL10
Model Name	A310
Marketing Name	SL10
Client	Lenovo Mobile Communication Technology Ltd.

TA Technology (Shanghai) Co., Ltd.



GENERAL SUMMARY

Product Name	GSM 850/1900 BT1.2 FM		
Model Name	A310	Marketing Name	SL10
FCC ID	YCNSL10	Report No.	RZA2010-1332RF24-R1
Client	Lenovo Mobile Communication Technology Ltd.		
Manufacturer	Lenovo Mobile Communication Technology Ltd		
Reference Standard(s)	<p>FCC CFR47 Part 2 (2009-12) Frequency Allocations And Radio Treaty Matters;General Rules And Regulations</p> <p>FCC CFR47 Part 24E (2009-12) Personal Communications Services</p> <p>ANSI/TIA-603-C Land mobile FM or PM Communications Equipment Measurements and Performance Standards.(2004)</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;">  (Stamp) Date of issue: September 9th, 2010 </div>		
Comment	The test result only responds to the measured sample.		

Approved by 杨伟中
Yang Weizhong

Revised by 徐凯
Xu Kai

Performed by 杜如蔚
Du Ruwei

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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.

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
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1.3. Applicant Information

Company: Lenovo Mobile Communication Technology Ltd.
Address: No.999,Qishan North 2nd Road,Information&Optoelectronics Park,Torch
Hi-tech Indu
City: Xiamen
Postal Code: /
Country: P.R.China
Contact: Qiu shouyu
Telephone: 86-0592-2166651
Fax: 86-0592-2169999-6651

1.4. Manufacturer Information

Company: Lenovo Mobile Communication Technology Ltd.
Address: No.999,Qishan North 2nd Road,Information&Optoelectronics Park,Torch
Hi-tech Indu
City: Xiamen
Postal Code: /
Country: P.R.China
Telephone: 86-0592-2166651
Fax: 86-0592-2169999-6651

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1.5. Information of EUT

General information

Name of EUT:	GSM 850/1900 BT1.2 FM		
Device Operating Configurations:			
IMEI:	862328004588317		
Operating Mode(s):	GSM1900: (tested)		
Test Modulation:	GMSK		
GPRS Multi-slot Class:	10		
E.I.R.P	25.53 dBm		
Power Supply:	Battery or Charger		
Rated Power Supply Voltage:	3.8V		
Extreme Voltage:	Minimum: 3.4V Maximum: 4.2V		
Extreme Temperature:	Lowest: -15°C Highest: +55°C		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8
Hardware Version:	HUAQIN23_08A_HW		
Software Version:	LANIX_SL10_MX_S008_100818		
Antenna Type:	Internal Antenna		

Auxiliary equipment details

AE1: Battery

Model: BL110
Manufacturer: LiShen
S/N: 201004-1102083050

AE2: Travel Charger

Model: cp-13
Manufacturer: KunXing
S/N: /

Equipment Under Test (EUT) is GSM 850/1900 BT1.2 FM with internal antenna. The EUT supports 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 September 1, 2010 to September 3, 2010.

2. Test Information

2.1. Summary of test results

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

2.2. RF Power Output

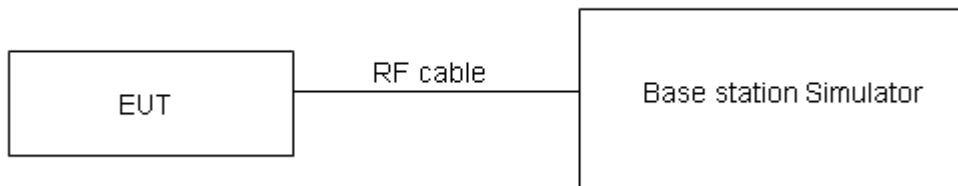
Ambient condition

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. These measurements have been tested at following channels: 512,661,810 for GSM 1900.

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

Channel	Frequency(MHz)	RF Output Power (dBm)
512	1850.2	29.23
661	1880.0	29.13
810	1909.8	29.16

GSM 1900 GPRS

Channel	Frequency (MHz)	UL-timeslot(s)	RF Output Power (dBm)
512	1850.2	1-timeslot	29.22
		2-timeslots	29.18
661	1880.0	1-timeslot	29.12
		2-timeslots	29.09
810	1909.8	1-timeslot	29.15
		2-timeslots	29.12

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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

Test procedure:

The measurement was done according to TIA/EIA 603C.

Step 1:

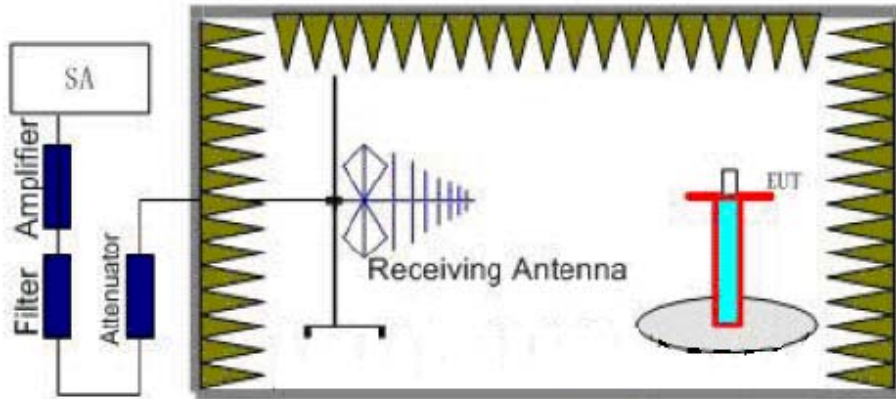
The measurement is carried out in the semi-anechoic chamber. EUT was placed on a 0.8 meters high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. A radio link shall be established between EUT and 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.

Step 2:

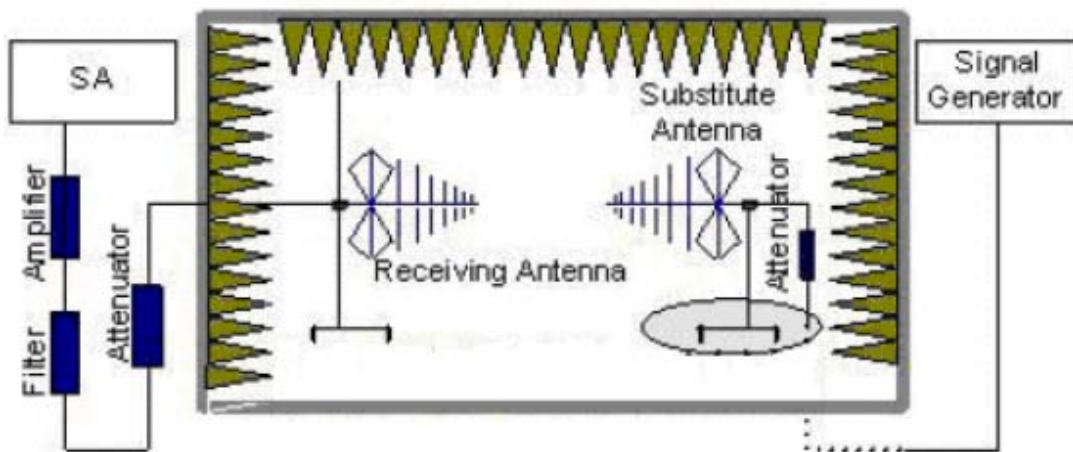
A dipole antenna shall be substituted in place of the EUT. The antenna will be driven by a signal generator with a known power S.G. applied through a Tx cable. Then the maximum Analyzer reading is recorded while the antenna was moving up and down. The E.R.P. /E.I.R.P. of the EUT can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

The correction factor (in dB)=S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading – 2.15. Then the EUT's E.R.P. was calculated with the correction factor, E.R.P. = LVL + Correction factor. The measurement will be conducted at three channels No.512, No.661 and No.810 of GSM 1900.

Test Setup



Step 1



Step 2

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

GSM 1900

Channel	Frequency (MHz)	P _{er} (EUT)	Pin	Gain (dBi)	Cable Loss	P _r (dBm)	Path Loss (dBm)	E.I.R.P (dBm)
512	1850.2	79.8756	0	1.9173	-18.1801	-34.8482	-54.9456	24.93
661	1880.0	78.3207	0	1.94	-18.2744	-35.1363	-55.3507	22.97
810	1909.8	77.2083	0	1.9	-18.3003	-35.428	-55.6283	21.58

GSM 1900 GPRS

Channel	Frequency (MHz)	P _{er} (EUT)	Pin	Gain (dBi)	Cable Loss	P _r (dBm)	Path Loss (dBm)	E.I.R.P (dBm)
512	1850.2	80.4756	0	1.9173	-18.1801	-34.8482	-54.9456	25.53
661	1880.0	78.8007	0	1.94	-18.2744	-35.1363	-55.3507	23.45
810	1909.8	77.6983	0	1.9	-18.3003	-35.428	-55.6283	22.07

2.4. Occupied Bandwidth

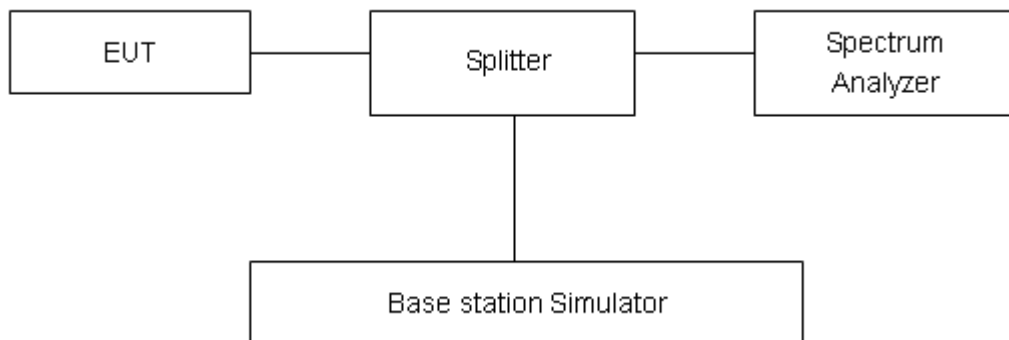
Ambient condition

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 on spectrum analyzer.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.

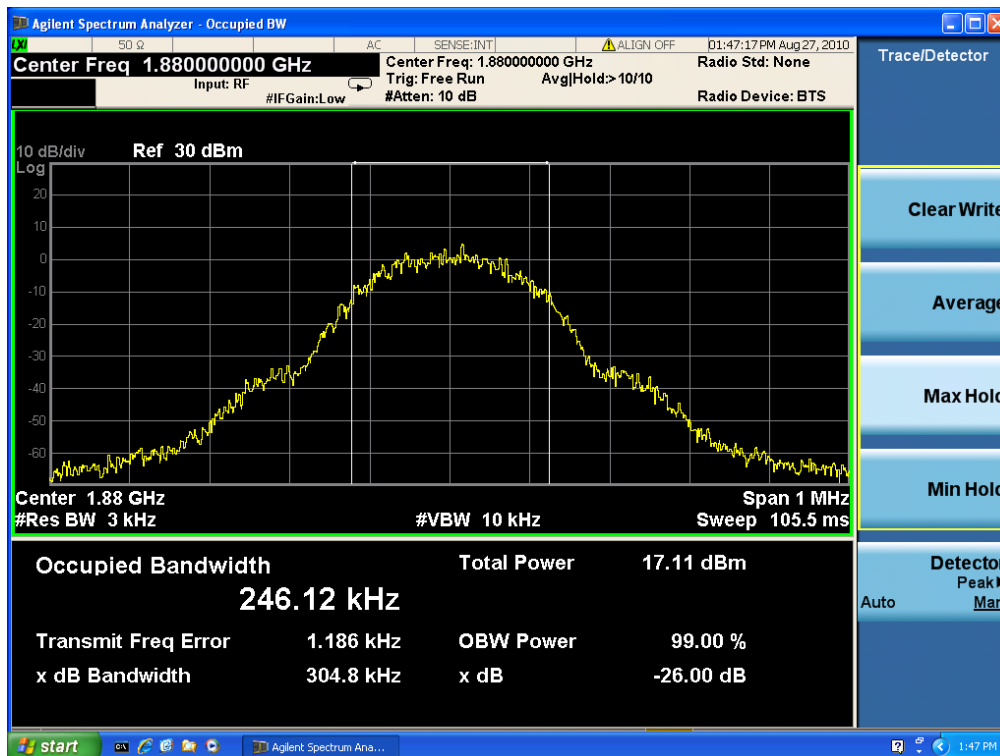
Measurement Uncertainty

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

Test Result

GSM 1900

Channel	Frequency (MHz)	99% Power Bandwidth (kHz)	-26dBc Bandwidth(kHz)
512	1850.2	246.12	304.8
661	1880.0	244.42	314.1
810	1909.8	248.46	313.3



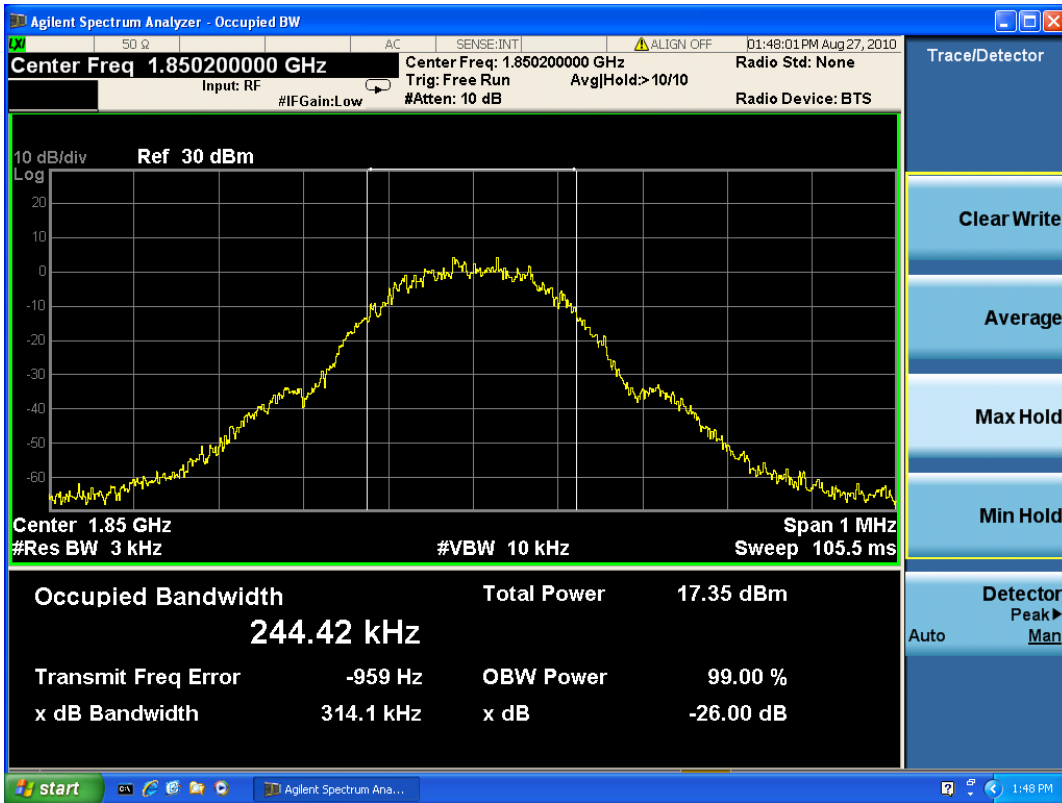
GSM1900 CH512 Occupied Bandwidth

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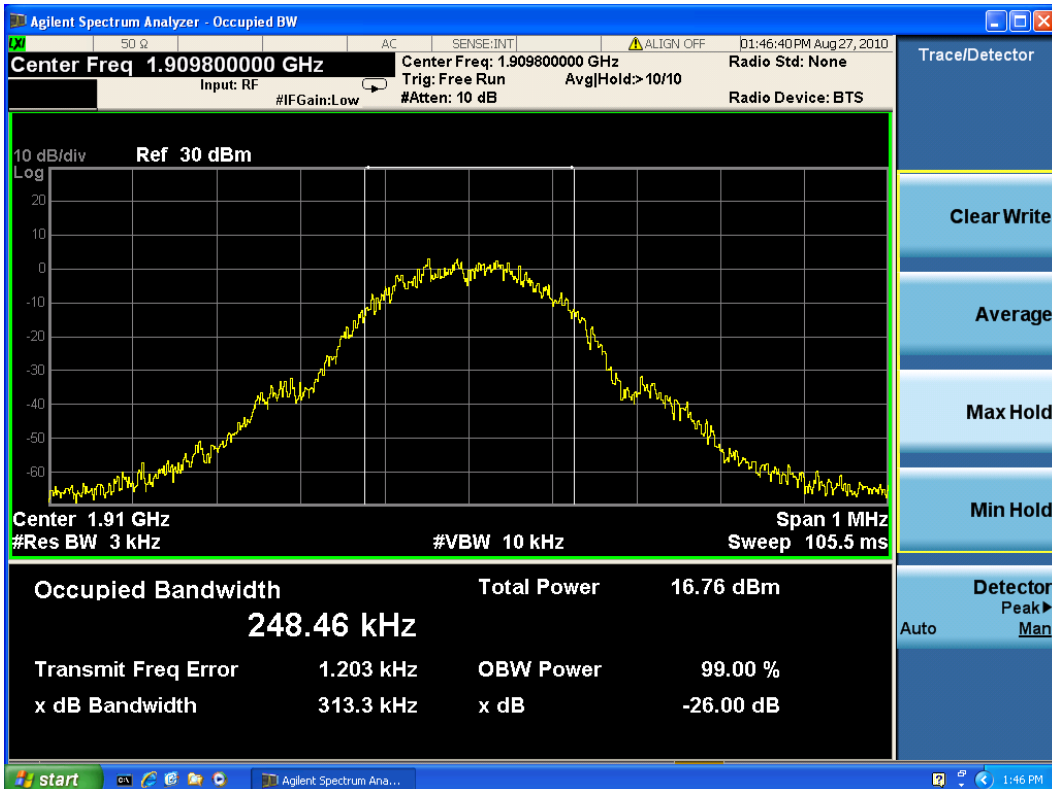
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GSM 1900 CH661 Occupied Bandwidth



GSM 1900 CH810 Occupied Bandwidth

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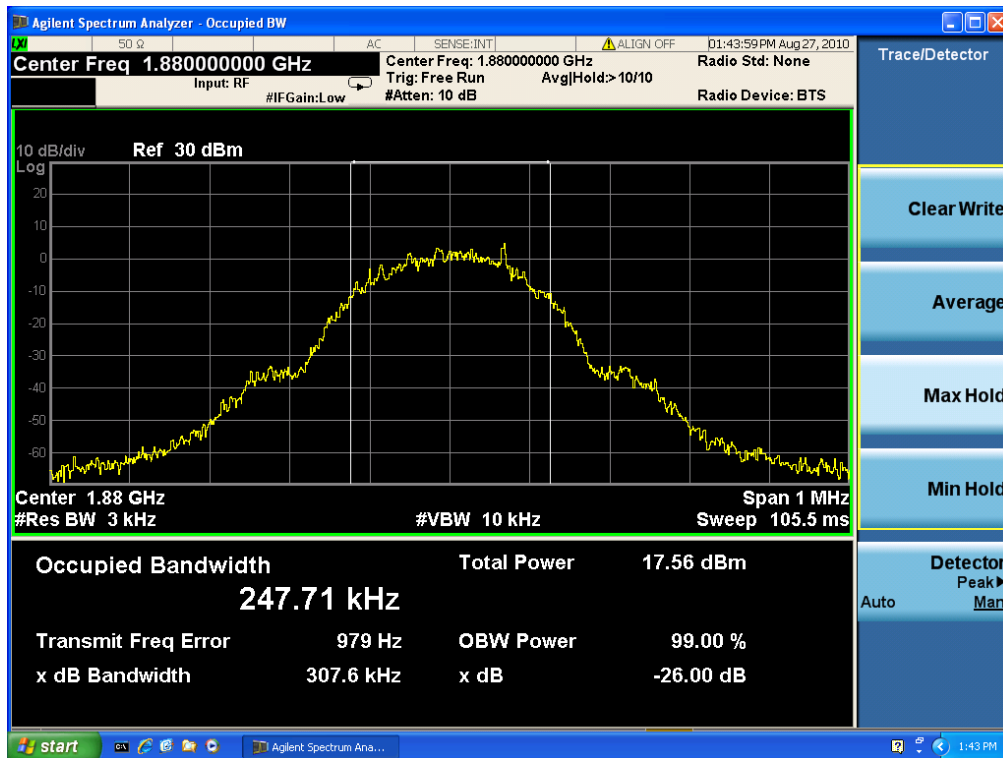
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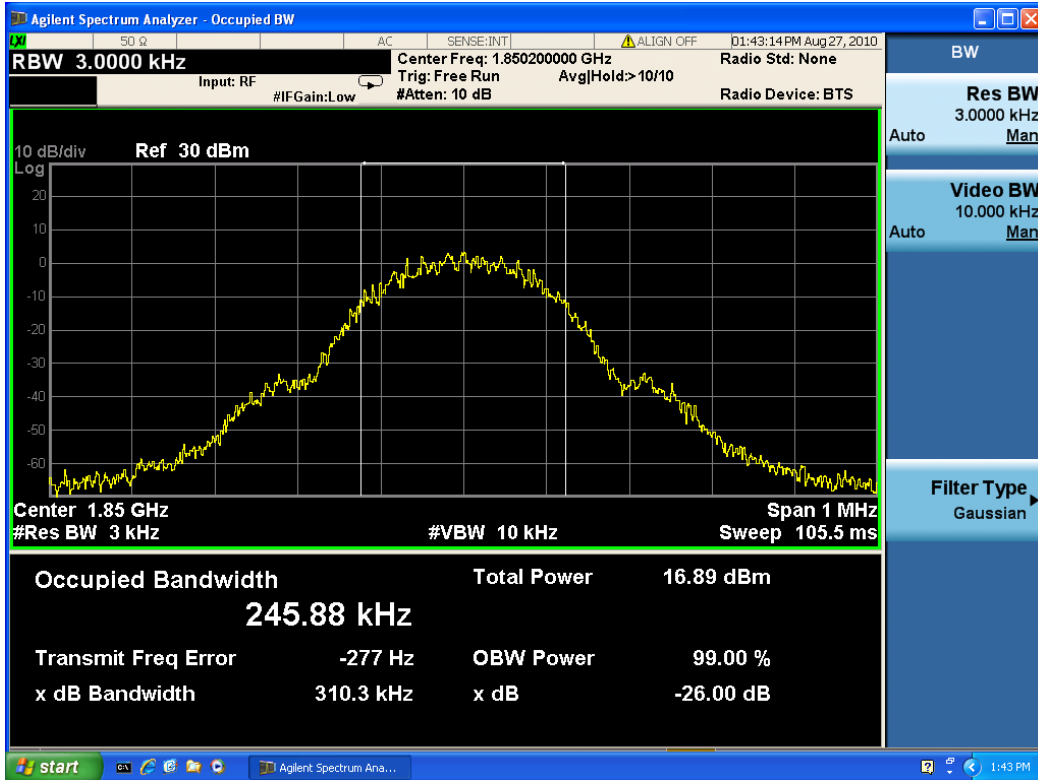
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GSM 1900 GPRS

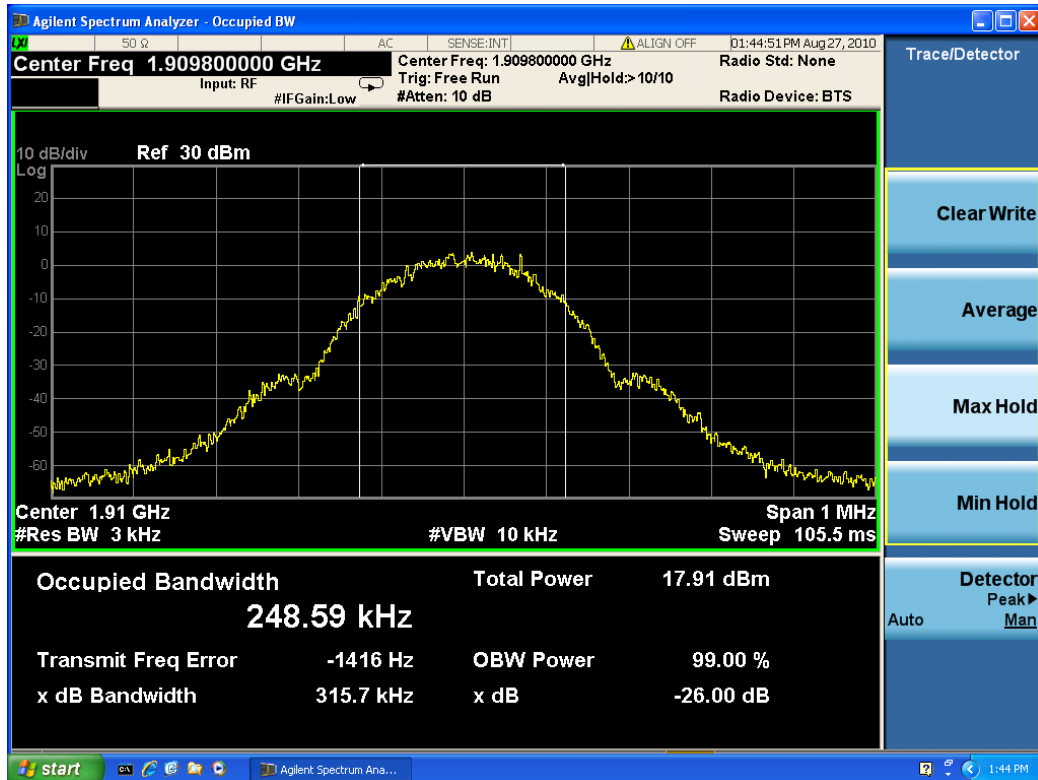
Channel	Frequency (MHz)	99% Power Bandwidth (kHz)	-26dBc Bandwidth(kHz)
512	1850.2	247.71	307.6
661	1880.0	245.88	310.3
810	1909.8	248.59	315.7



GSM1900 GPRS CH512 Occupied Bandwidth



GSM 1900 GPRS CH661 Occupied Bandwidth



GSM 1900 GPRS CH810 Occupied Bandwidth

2.5. Band Edge Compliance

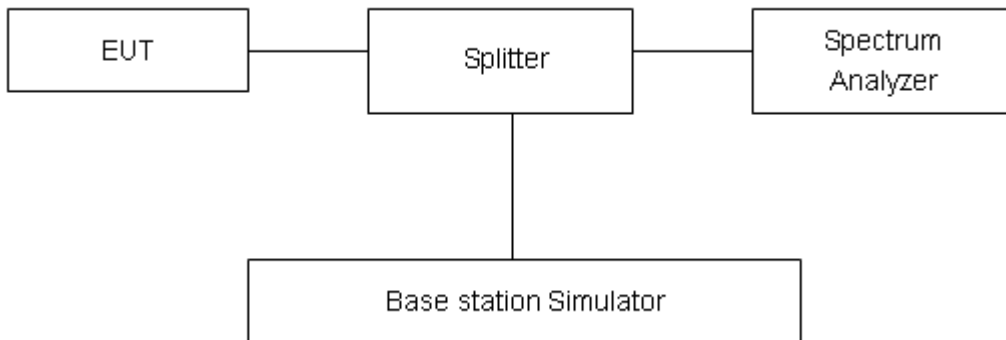
Ambient condition

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 on spectrum analyzer. 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

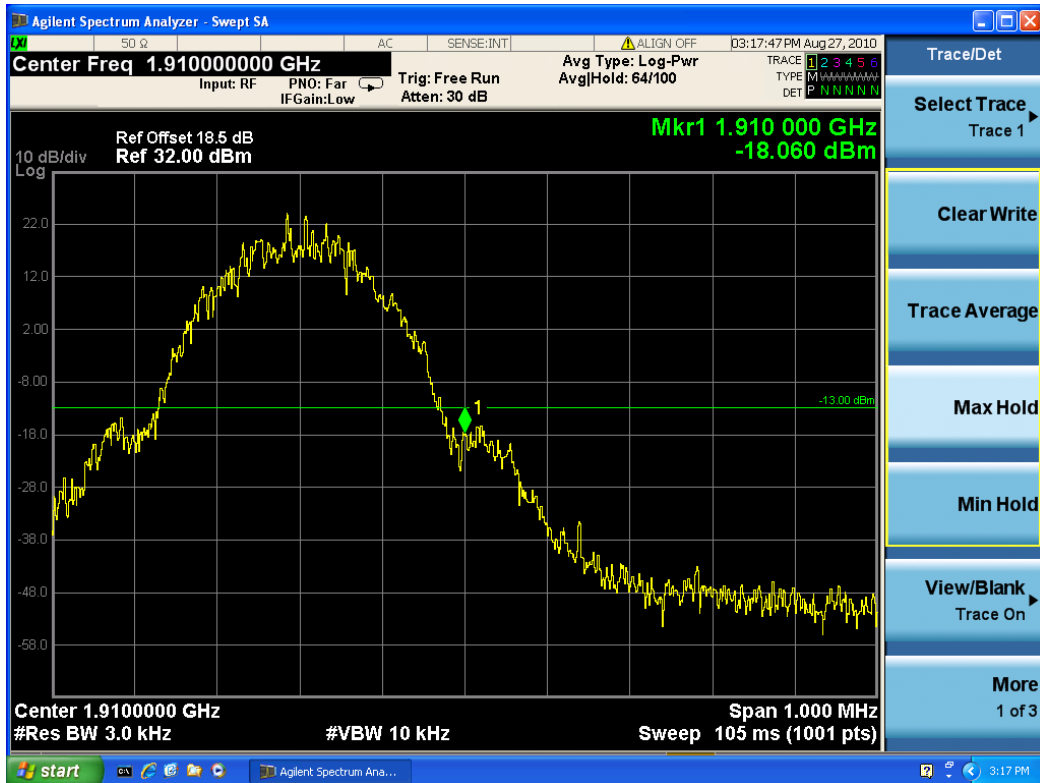
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U=0.684$ dB.

Test Result:Pass

GSM 1900



GSM 1900 512 Channel



GSM1900 810 Channel

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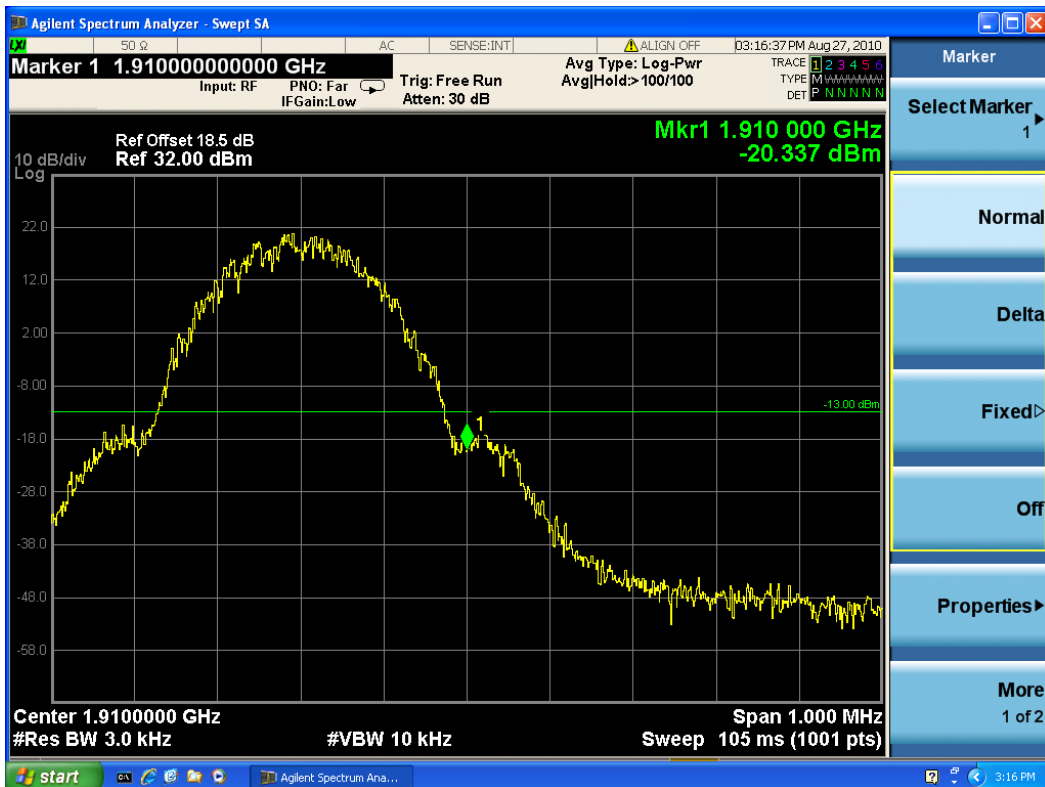
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GSM 1900 GPRS



GSM 1900 GPRS 512 Channel



GSM1900 GPRS 810 Channel

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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)

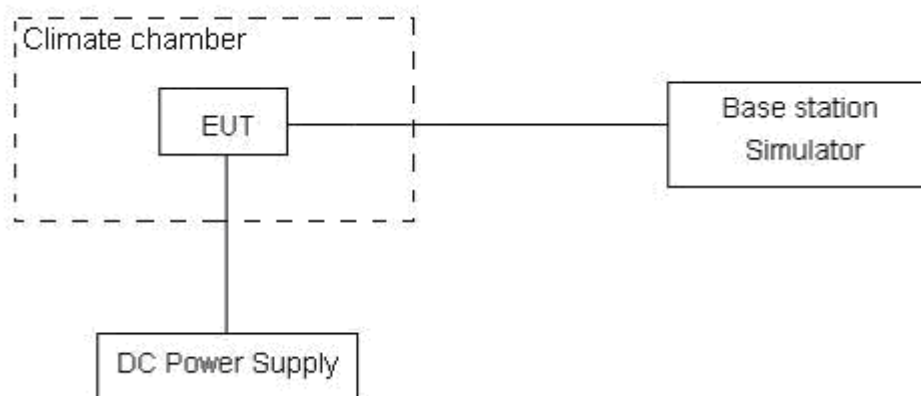
The frequency stability shall be measured with variation of primary supply voltage as follows:

(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 3.4 V and 4.2 V, with a nominal voltage of 3.7V.

Test setup



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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
	GSM 1900 Channel 661
-30	0.027
-20	0.046
-10	0.063
0	0.049
10	0.066
20	0.063
30	0.058
40	0.062
50	0.052

Voltage (V)	Test Results(ppm) / 20° C
	Channel 661
3.4	0.081
3.7	0.063
4.2	0.077

2.7. Spurious Emissions at Antenna Terminals

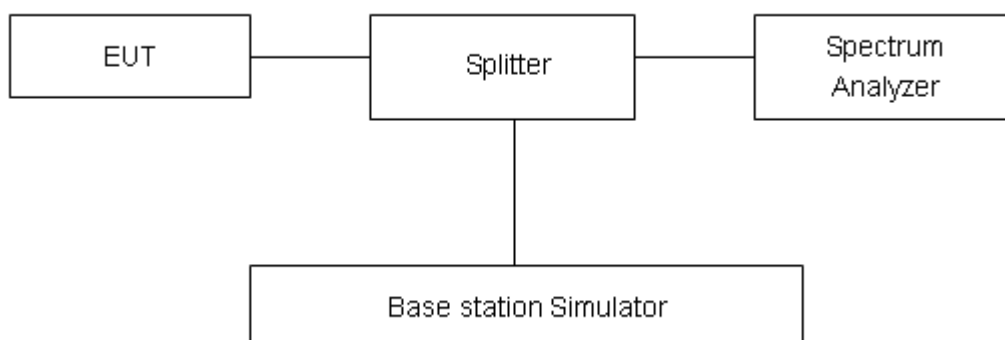
Ambient condition

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. The peak detector is used. RBW and VBW are set to 100 kHz, 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

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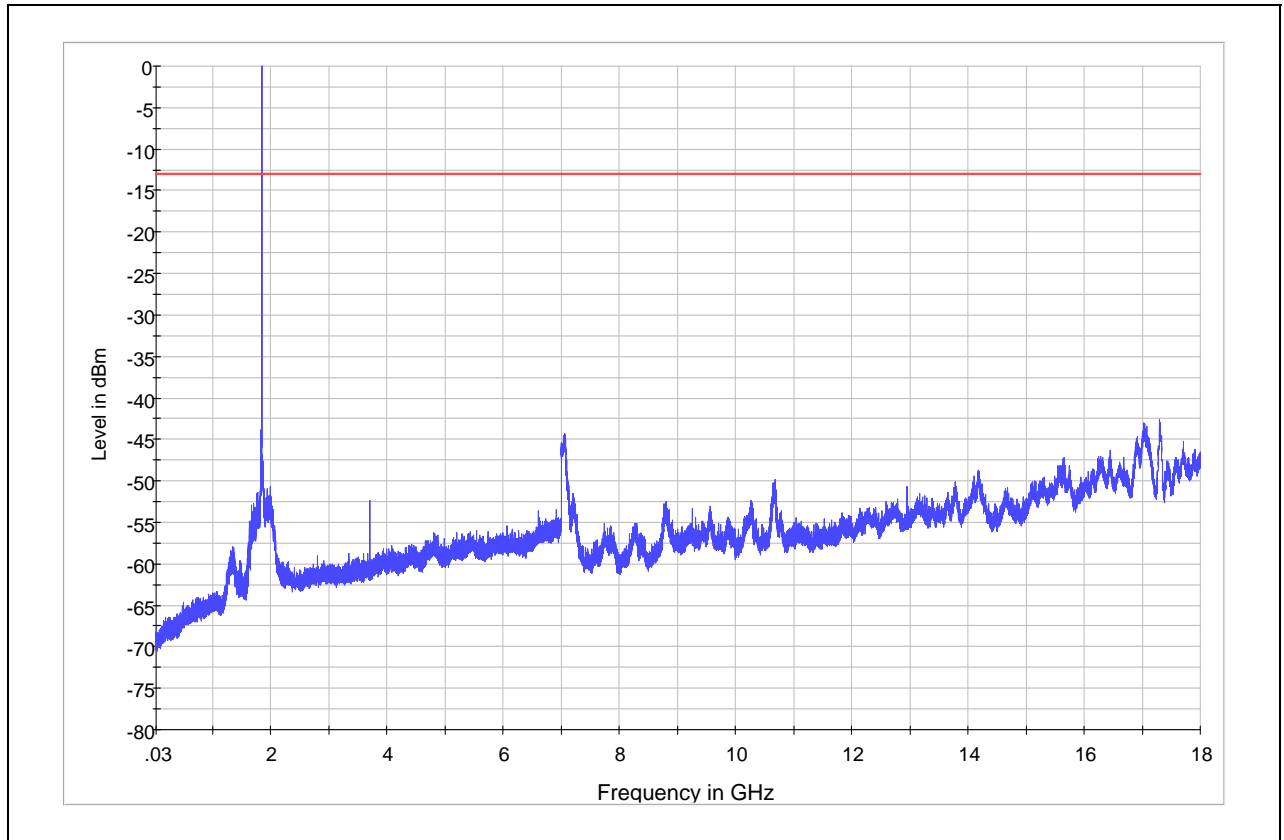
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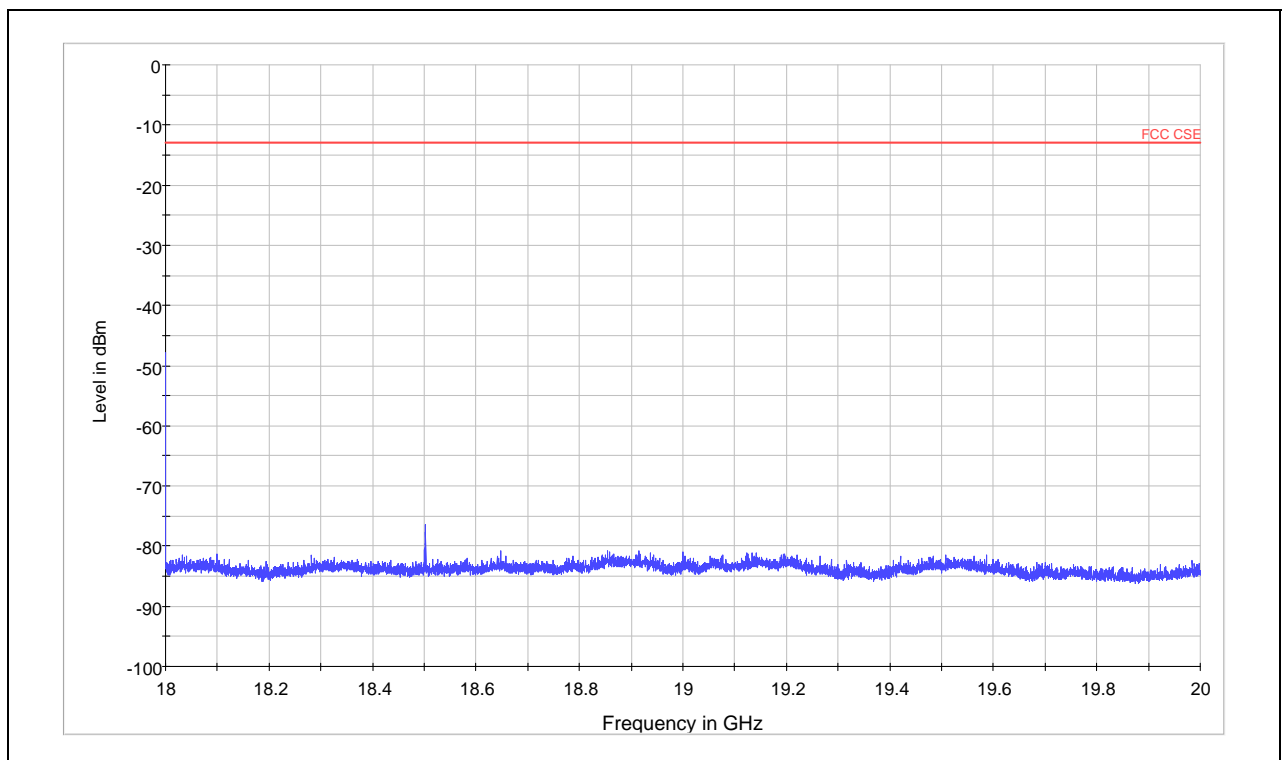
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Test Result

CH 512



Note: The signal beyond the limit is carrier:1850.2 MHz
GSM 1900 Channel 512 30MHz ~18GHz



GSM 1900 Channel 512 18GHz ~20GHz

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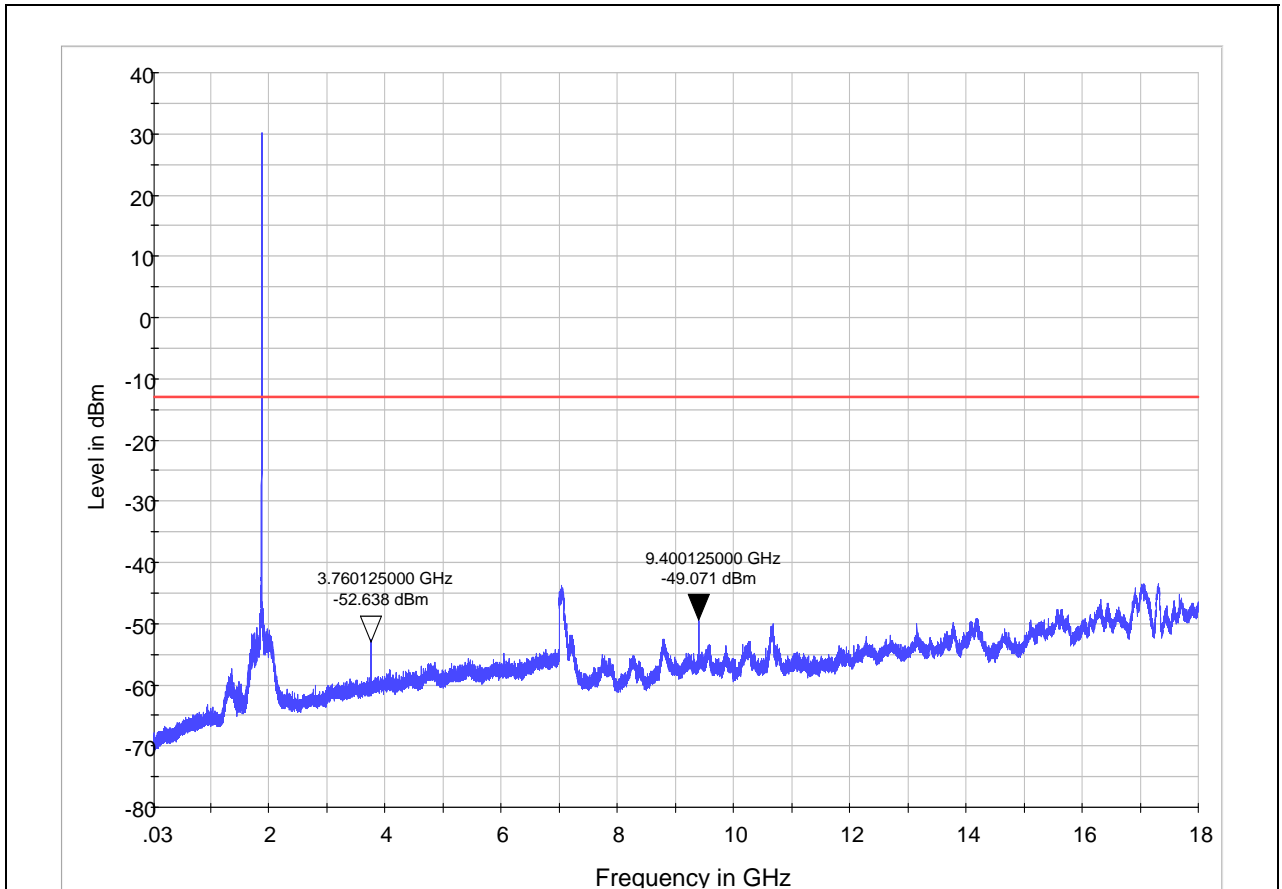
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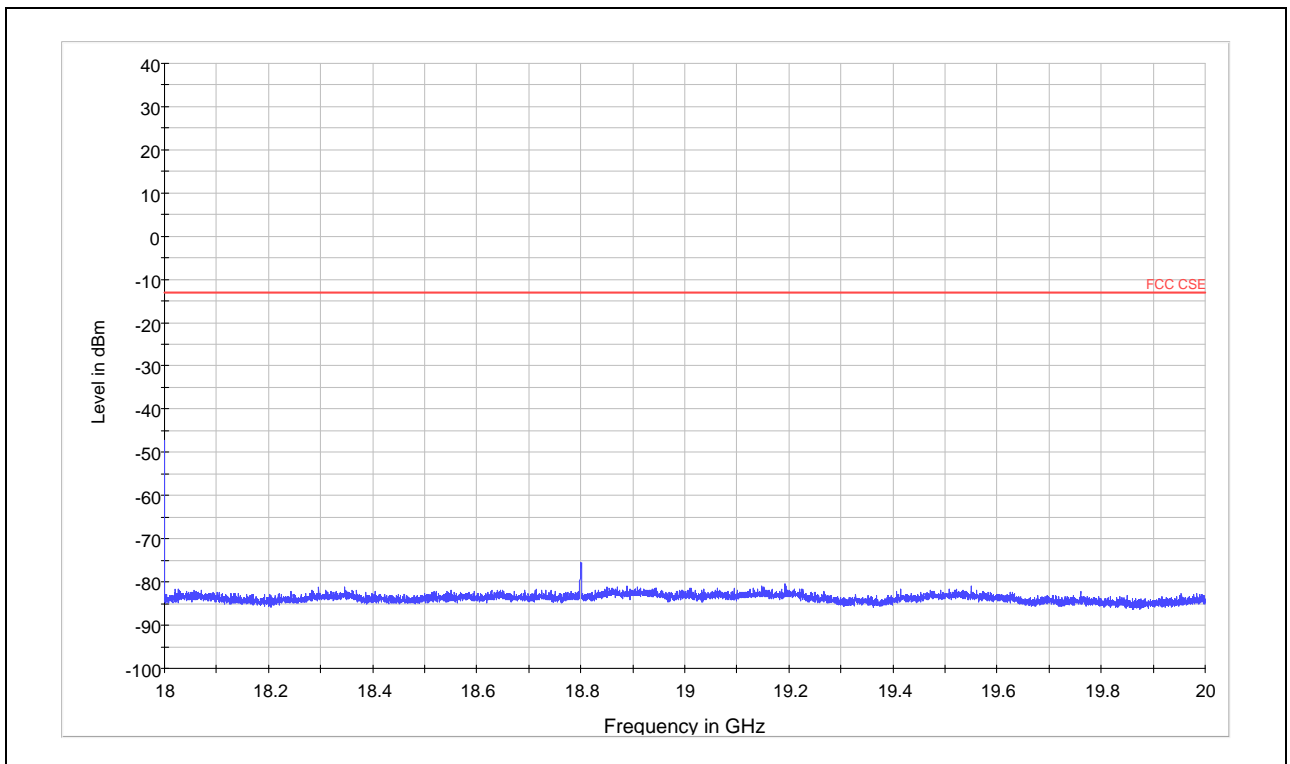
Harmonic	TX ch.512 Frequency (MHz)	Level (dBm)	Limit (dBm)
2	3700.4	Nf	-13
3	5550.6	Nf	-13
4	7400.8	Nf	-13
5	9251	Nf	-13
6	11101.2	Nf	-13
7	12951.4	Nf	-13
8	14801.6	Nf	-13
9	16651.8	Nf	-13
10	18502	Nf	-13
Nf: noise floor			

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

CH 661



Note: The signal beyond the limit is carrier:1880 MHz
GSM 1900 Channel 661 30MHz ~18GHz



GSM 1900 Channel 661 18GHz ~20GHz

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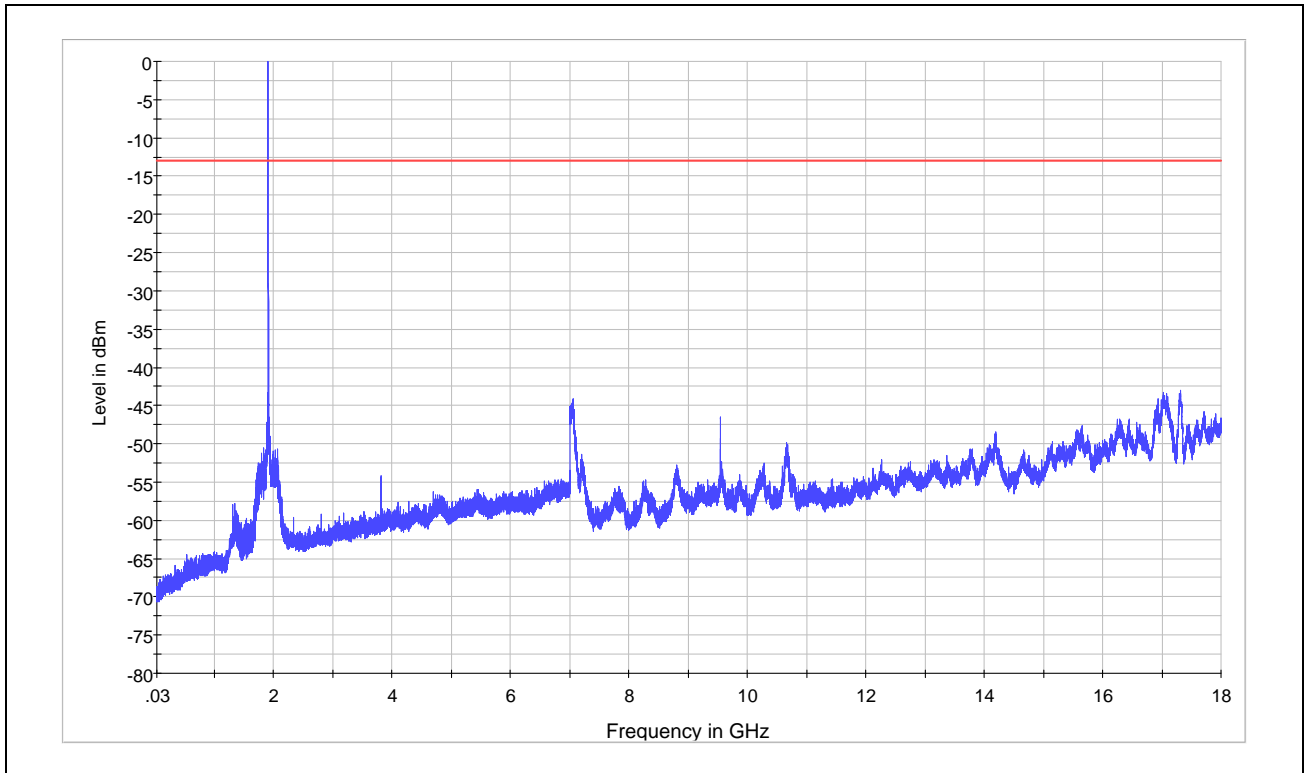
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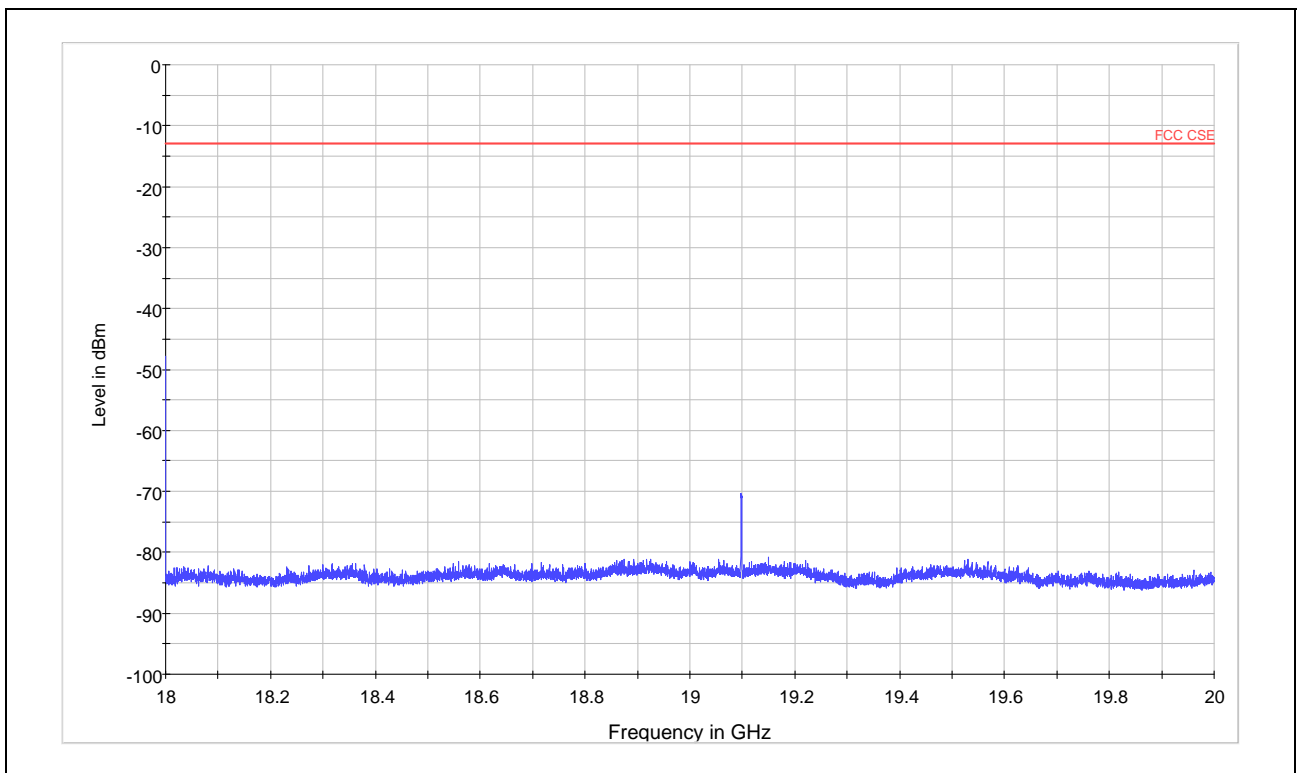
Harmonic	TX ch.661 Frequency (MHz)	Level (dBm)	Limit (dBm)
2	3760.125	-52.638	-13
3	5640	Nf	-13
4	7520	Nf	-13
5	9400.125	-49.071	-13
6	11280	Nf	-13
7	13160	Nf	-13
8	15040	Nf	-13
9	16920	Nf	-13
10	18800	Nf	-13
Nf: noise floor			

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

CH 810



Note: The signal beyond the limit is carrier:1909.8 MHz
GSM 1900 Channel 810 30MHz ~18GHz



GSM 1900 Channel 810 18GHz ~20GHz

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Harmonic	TX ch.810 Frequency (MHz)	Level (dBm)	Limit (dBm)
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.

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2.1. 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.

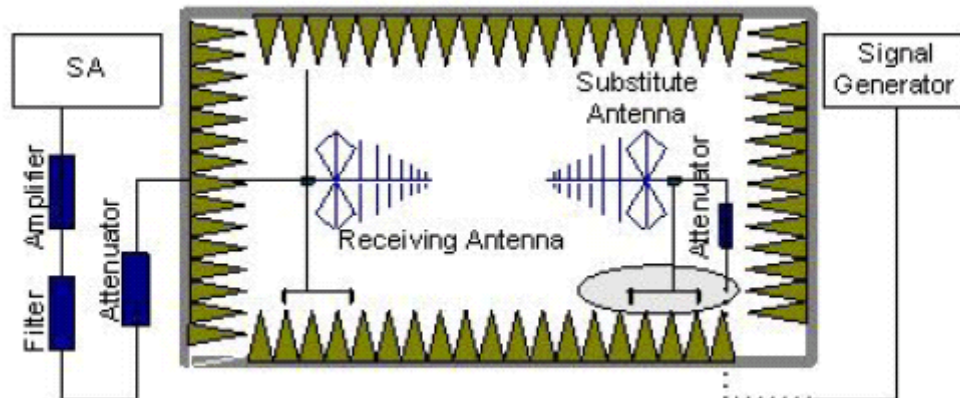
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The measurement will be conducted at channels 512,661,810 of GSM1900.

The procedure of Radiates Spurious Emission is as follows:

1. Pre-calibration

In an fully anechoic chamber, A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted at a 3 meter test distance from the receive antenna. An RF signal source is connected to the dipole with a Tx cable that has been constructed to not interfere with radiation pattern of the antenna. A known (measured) power (P_{in}) is applied to input of dipole, and the power received (P_r) is recorded from the spectrum analyzer.

“Reference Path loss” is established as $P_{in} - P_r - \text{Tx cable loss} + \text{Substitution antenna gain}$.



2. EUT Test

EUT was placed on a 1.5 meter high non – conductive table at a 3 meter test distance from the receive antenna. The height of receiving antenna is 1.5 m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the table and adjusting the receiving antenna polarization. The measurement is carried out using a spectrum analyzer .The radiated emission measurements of all non-harmonic and harmonic of the transmit frequency from 30MHz to the 10th harmonic were measured with peak detector. RBW is set to 100kHz and VBW is set to 300kHz for 30MHz to 1GHz. RBW is set to 100kHz,VBW is set to 30kHz for the carrier frequency, RBW is set to 1MHz and VBW is set to 3MHz for other frequency above 1GHz. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency. If the harmonic could not be detected above the noise floor, the ambient level was recorded.

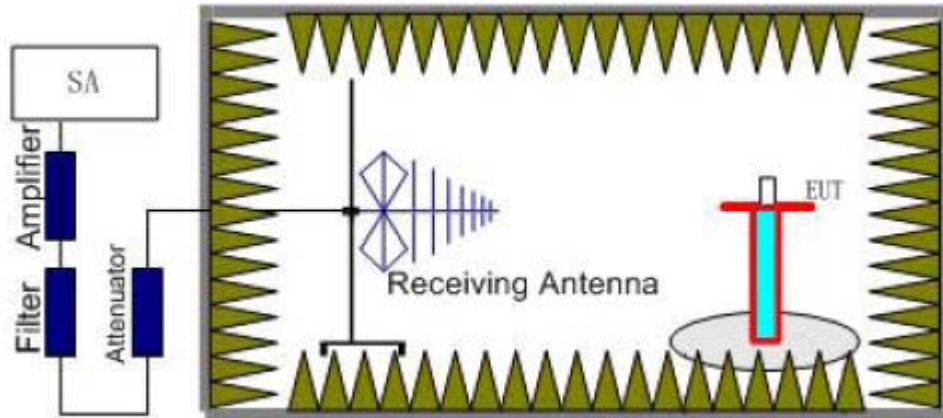
The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

Calculation procedure:

$$RSE = Rx \text{ (dBm)} + \text{Reference Path loss}$$

Rx: reading of the receiver

EUT in X-axis orientation is the worst case, the test is only for this case.



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.”

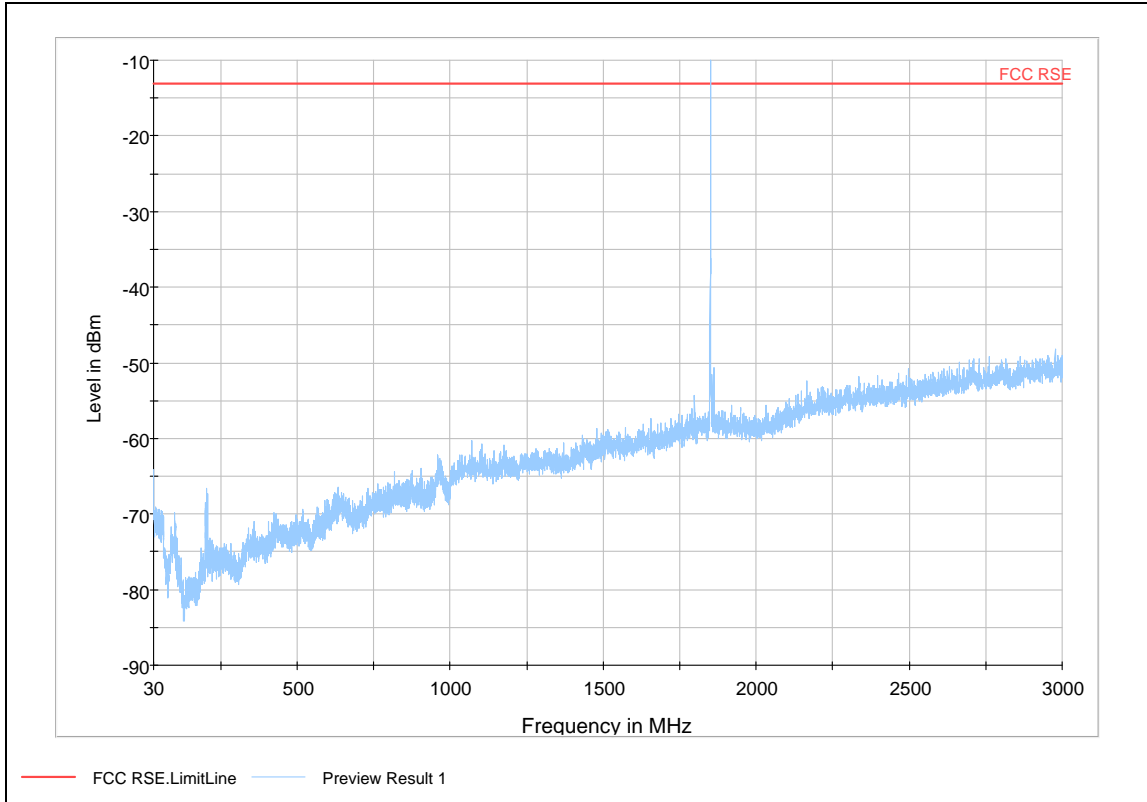
Limit	-13 dBm
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Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U = 3.16$ dB.

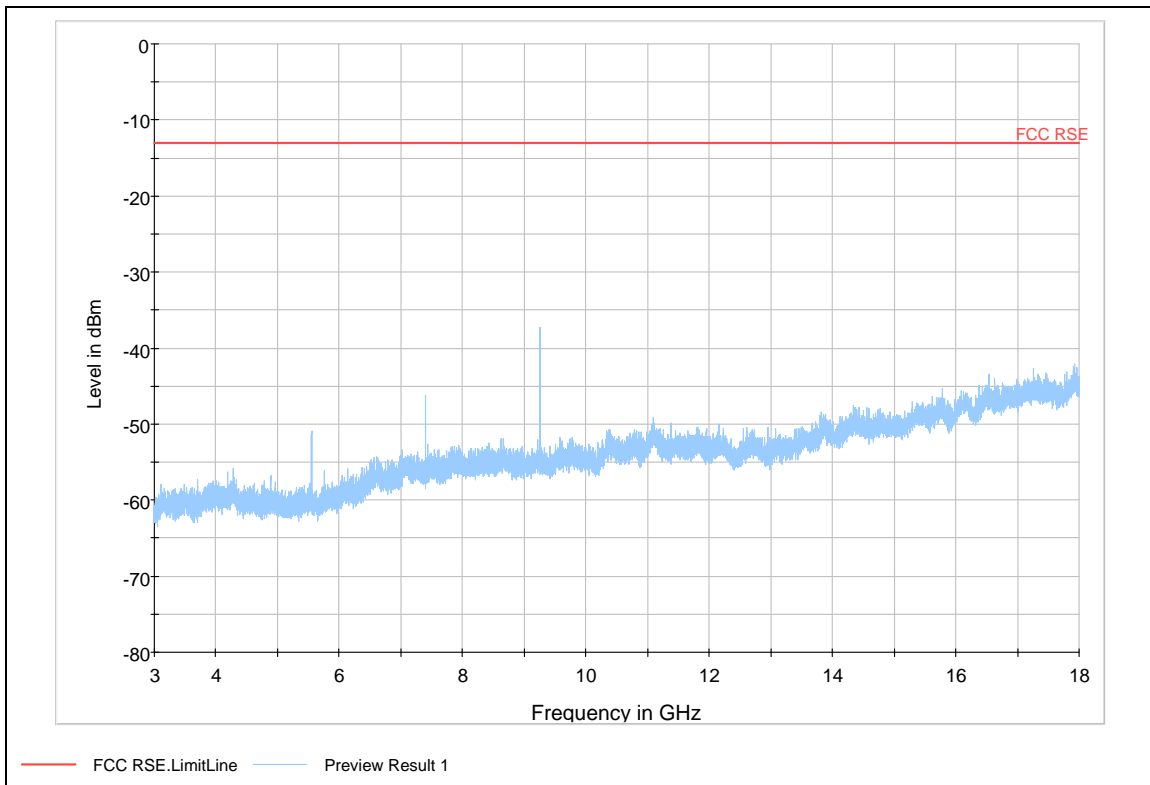
Test Result

CH 512



Note: The signal beyond the limit is carrier.

GSM 1900 Channel 512 30MHz~3GHz



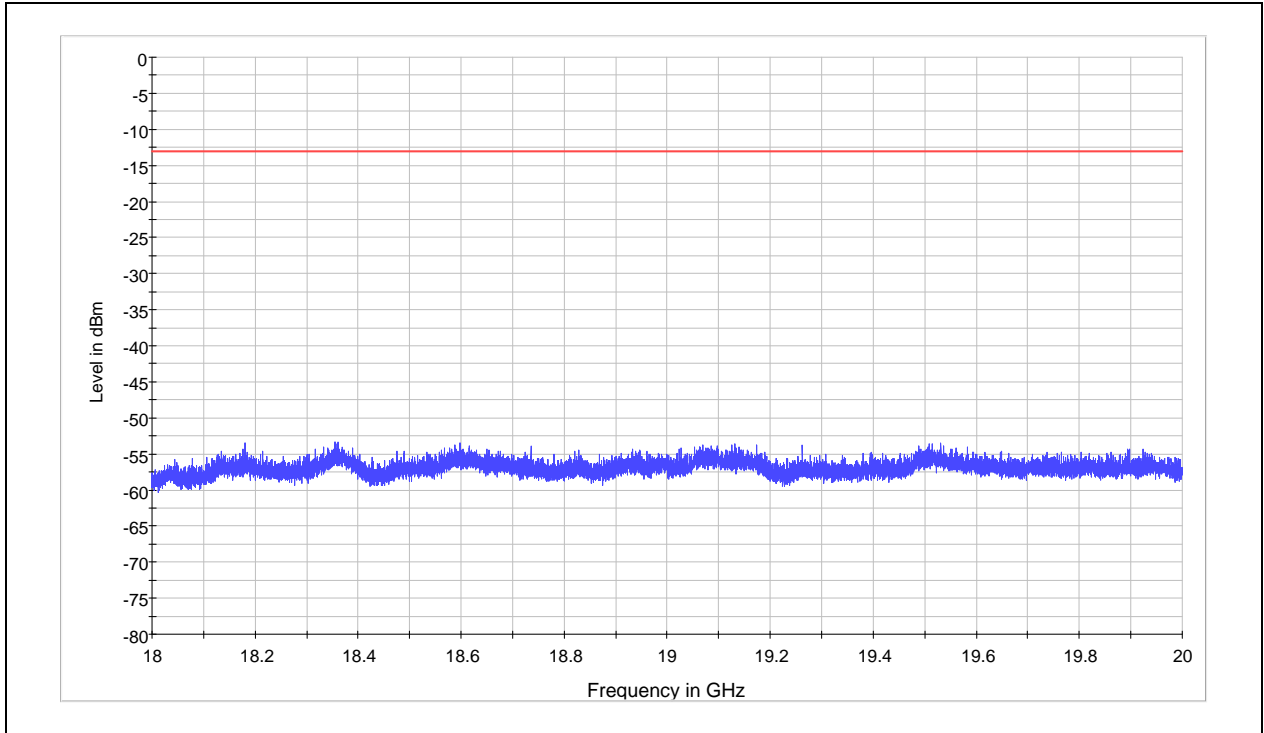
GSM 1900 Channel 512 3GHz ~18GHz

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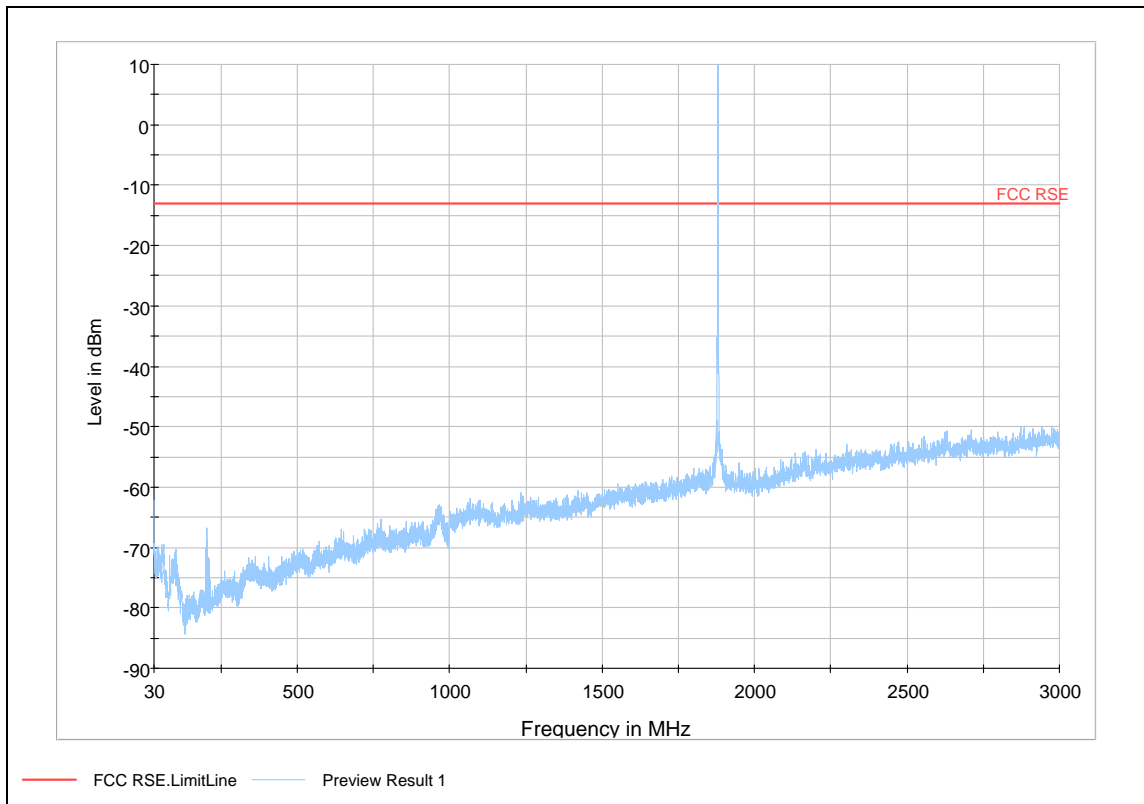
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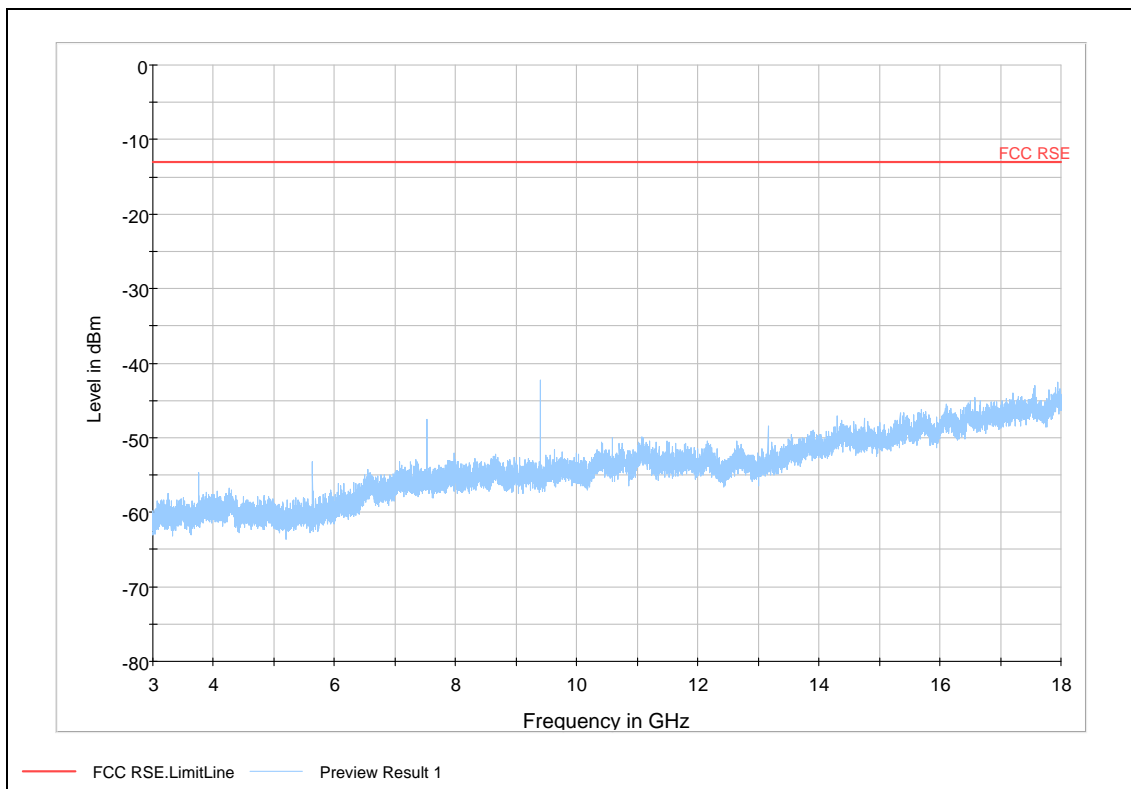


GSM 1900 Channel 512 18GHz ~20GHz

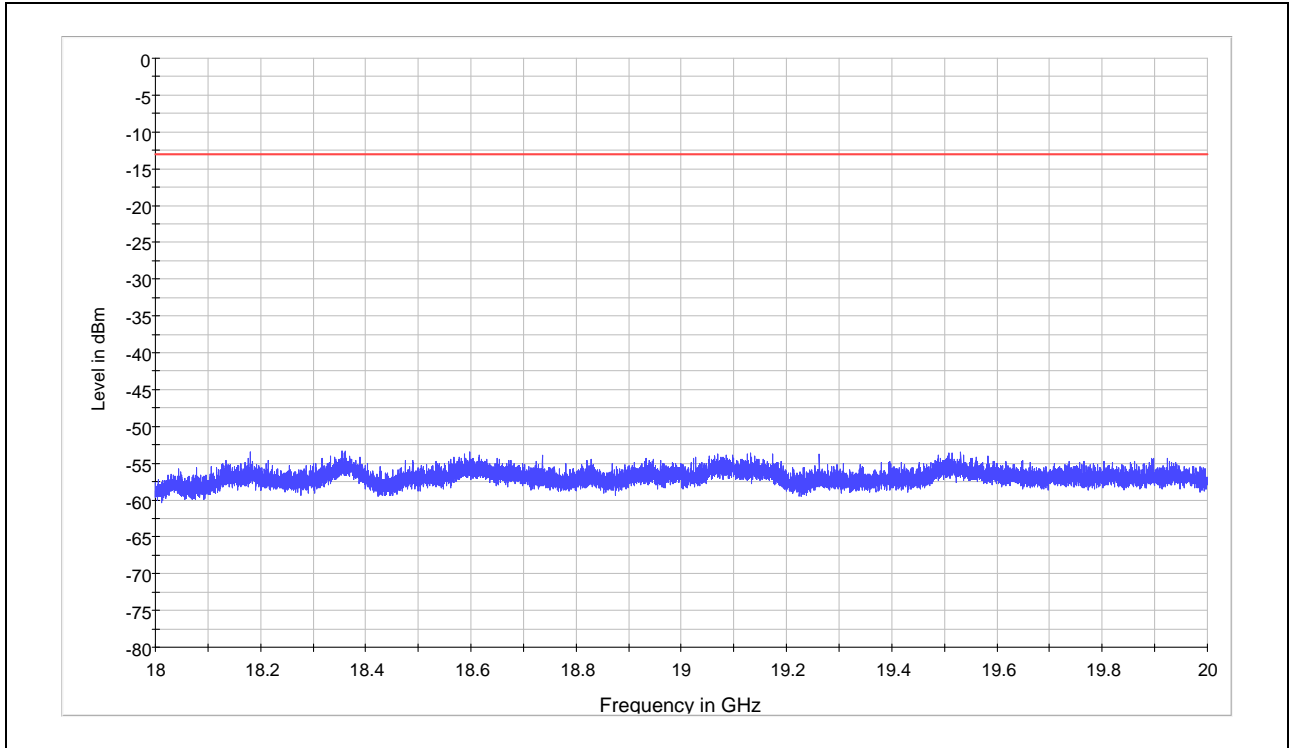
CH 661



Note: The signal beyond the limit is carrier.
GSM 1900 Channel 661 30MHz~3GHz

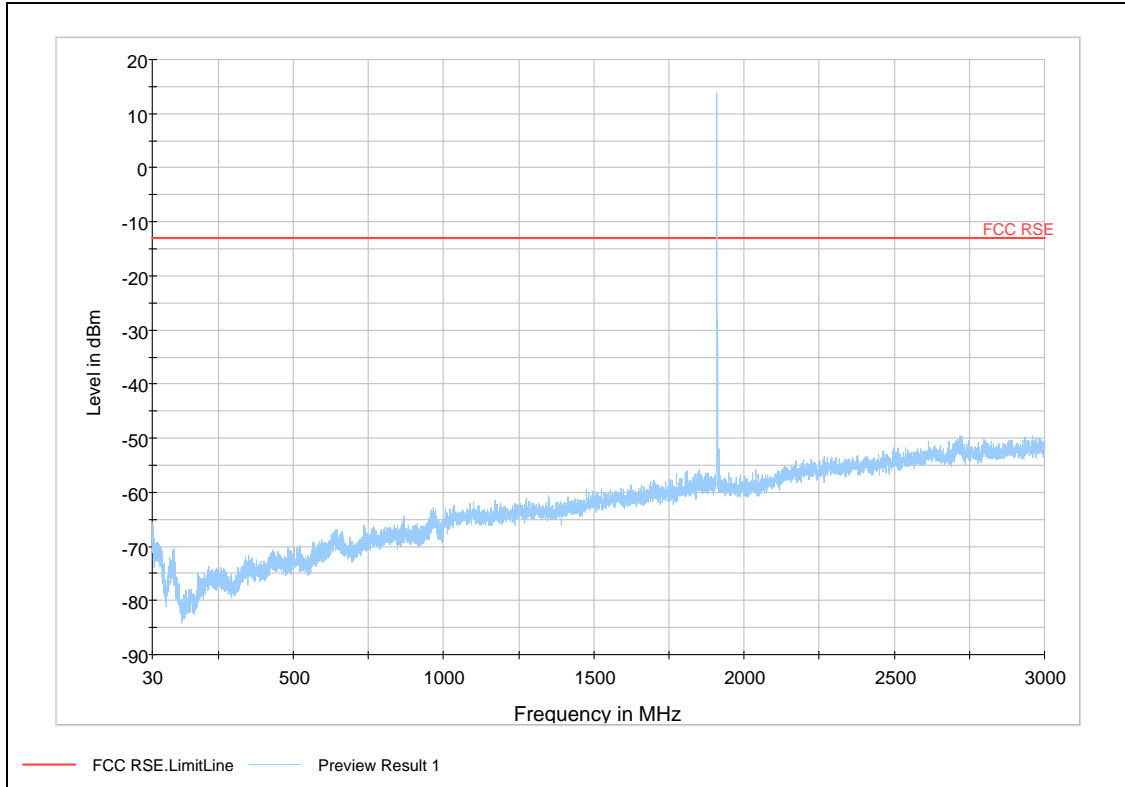


GSM 1900 Channel 661 3GHz ~18GHz

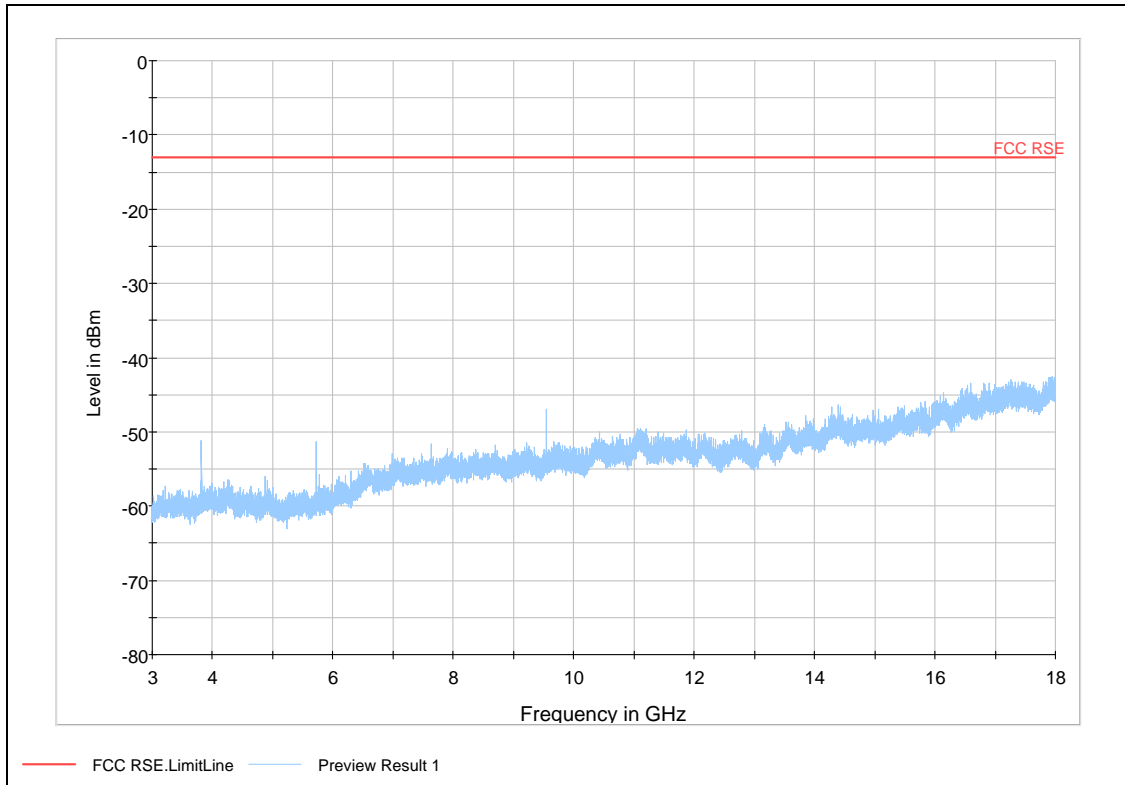


GSM 1900 Channel 661 18GHz ~20GHz

CH 810



Note: The signal beyond the limit is carrier.
GSM 1900 Channel 810 30MHz~3GHz



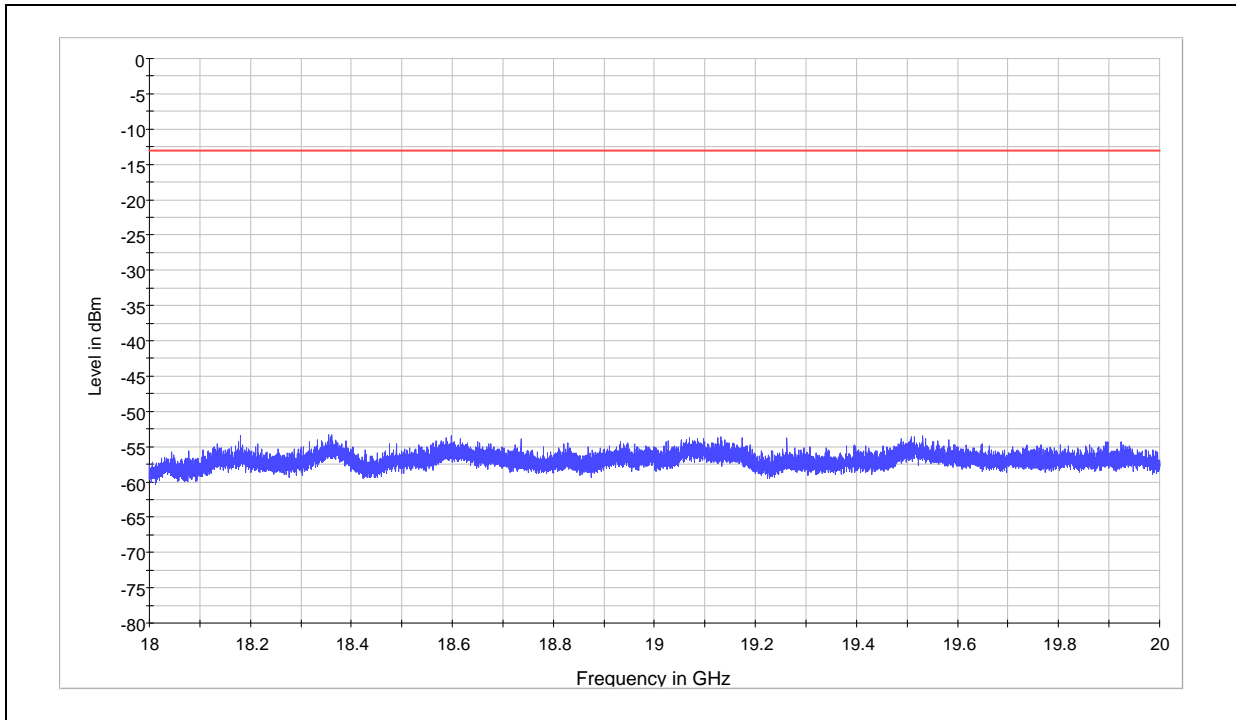
GSM 1900 Channel 810 3GHz ~18GHz

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GSM 1900 Channel 810 18GHz ~20GHz

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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	2010-05-27	One year
02	Signal Analyzer	FSV	R&S	100815	2010-06-28	One year
03	Signal generator	SMR27	R&S	1606.6000.02	2010-06-28	One year
04	EMI Test Receiver	ESCI	R&S	100948	2010-07-01	One year
05	Trilog Antenna	VUBL 9163	SCHWARZB ECK	9163-201	2010-06-29	Two years
06	Horn Antenna	HF907	R&S	100126	2009-07-02	Two years
07	Power Splitter	11667A	Agilent	52960	NA	NA
08	DC Power Supply	GPS-3030D	GM	E877677	NA	NA
09	Climatic Chamber	ESS-SDH401	YIN HE	2006001	2010-02-22	One year
10	Semi-Anechoic Chamber	9.6*6.7*6.6m	ETS-Lindgren	NA	NA	NA
11	EMI test software	ES-K1	R&S	NA	NA	NA

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

ANNEX A: EUT Appearance and Test Setup

A.1 EUT Appearance



a EUT



b Battery

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c Charger

Picture 1 EUT and Auxiliary

A.2 Test Setup



Picture 2: Radiated Spurious Emissions Test setup