



Report No.: RZA2010-1332RF22-R1



# Part 22

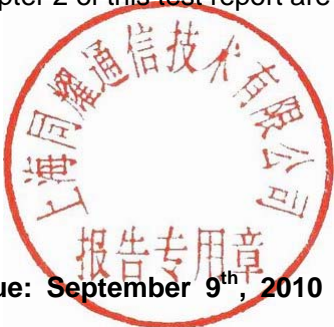
# TEST REPORT

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

<b>Product Name</b>	GSM 850/1900 BT1.2 FM		
<b>Model Name</b>	A310	<b>Marketing Name</b>	SL10
<b>FCC ID</b>	YCNSL10	<b>Report No.</b>	RZA2010-1332RF22-R1
<b>Client</b>	Lenovo Mobile Communication Technology Ltd.		
<b>Manufacturer</b>	Lenovo Mobile Communication Technology Ltd		
<b>Reference Standard(s)</b>	<p><b>FCC Part 2</b>      Frequency allocations and radio treaty matters; general rules and regulation. (V10.1.06)</p> <p><b>FCC Part 22</b>    Public Mobile Services. (V10.1.06)</p> <p><b>ANSI/TIA-603-C</b> Land mobile FM or PM Communications Equipment Measurements and Performance Standards.(2004)</p>		
<b>Conclusion</b>	<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: <b>Pass</b></p> <div style="text-align: right;">  <p>(Stamp) Date of issue: September 9<sup>th</sup>, 2010</p> </div>		
<b>Comment</b>	The test result only responds to the measured sample.		

Approved by 杨伟中  
Yang Weizhong

Revised by 徐凯  
Xu kai

Performed by 刘伟  
Liu Wei

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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  
Fax: +86-021-50791141/2/3-8000  
Website: <http://www.ta-shanghai.com>  
E-mail: [yangweizhong@ta-shanghai.com](mailto:yangweizhong@ta-shanghai.com)

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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):	GSM 850: (tested)		
Test Modulation:	GMSK		
GPRS Multi-slot Class:	10		
E.R.P	29.88 dBm		
Power Supply:	Battery or Charger (AC adaptor)		
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)
	GSM850	824.2 ~ 848.8	869.2 ~ 893.8
Hardware Version:	HUAQIN23_08A_HW		
Software Version:	LANIX_SL10_MX_S008_100818		
Antenna Type:	Internal Antenna		

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### Auxiliary Equipment Details

#### AE1: Battery

Model: BL110  
Manufacture: LiShen  
IMEI or SN: 201004-1102083050

#### AE2: Travel Adapter

Model: cp-13  
Manufacture: KunXing  
IMEI or SN: /

Equipment Under Test (EUT) is GSM 850/1900 BT1.2 FM with integrated antenna. It consists of mobile phone, battery and adaptor (see ANNEX A) and the detail about these is in chapter 1.5 in this report. The EUT supports GSM 850 band 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.

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## 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 Radiated Power	22.913(a)(2)	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	22.917	PASS
5	Frequency Stability	2.1055 / 22.355	PASS
6	Spurious Emissions at Antenna Terminals	2.1051 / 22.917(a)	PASS
7	Radiates Spurious Emission	2.1053 / 22.917 (a)	PASS



## 2.2. RF Power Output

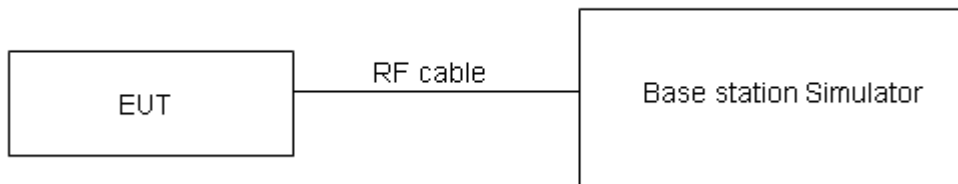
### Ambient condition

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: 128, 190, and 251 for GSM 850 band.

### 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 850

Channel	Frequency (MHz)	RF Output Power (dBm)
128	824.2	32.73
190	836.6	32.69
251	848.8	32.66

GSM 850 GPRS

Channel	Frequency (MHz)	UL-timeslot(s)	RF Output Power (dBm)
128	824.2	1-timeslot	32.72
		2-timeslots	32.72
190	836.6	1-timeslot	32.68
		2-timeslots	32.69
251	848.8	1-timeslot	32.65
		2-timeslots	32.66

### 2.3. Effective 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.

The radiated power was measured using ETS-LINDGREN OTA Chamber in “Peak” mode.

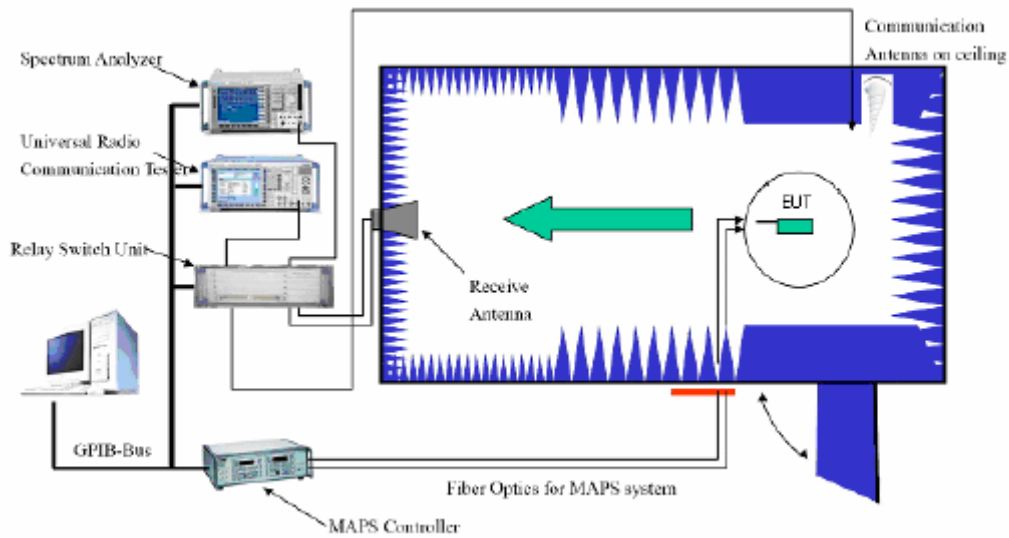
1. In an fully anechoic chamber, a sleeve dipole antenna for the frequency band of interest is placed on the reference centre of the turntable at a 5 meters test distance from the test receive antenna. An RF signal source is connected to the dipole with a Tx cable that has been constructed to not interfere 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.
2. The EUT substituted for the dipole at the reference centre of the chamber. A radio link shall be established between EUT and the Base Station Simulator. The EUT is controlled to ensure at its maximum power level and proper modulation.
3. A scan is performed to obtain the radiation pattern. A peak detector is used while RBW and VBW are both set to 3MHz. From these measurements, the maximum radiated power ( $P_{er}$ ) was recorded from the spectrum analyzer from the 360 degrees rotation of the turntable and in both horizontally and vertically polarized orientations of the test antenna.

The Reference Path loss =  $P_{in} - P_r - \text{Tx cable loss} + \text{Substitution antenna gain}$

$EIRP = P_{er} + \text{Path loss}$

4. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15 \text{ dBi}$ .
5. The measurement will be conducted at three channels No.128, No.190 and No.251 (Bottom, middle and top channels of GSM 850).

### Test Setup



### Limits

Rule Part 22.913(a) specifies that "Mobile/portable stations are limited to 7 watts ERP".

GSM 850(ERP)	$\leq 7 \text{ W}$ (38.45 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 850**

Channel	Frequency (MHz)	P <sub>er</sub> (EUT)	Pin	Gain (dBi)	Cable Loss	P <sub>r</sub> (dBm)	Path Loss (dBm)	E.R.P (dBm)
128	824.2	75.7136	0	1.06475	-15.1681	-30.5608	-46.7936	26.77
190	836.6	78.2761	0	1.2373	-15.1951	-30.4537	-46.8861	29.24
251	848.8	78.6858	0	1.384	-15.2426	-30.4192	-47.0458	29.49

**GSM 850 GPRS**

Channel	Frequency (MHz)	P <sub>er</sub> (EUT)	Pin	Gain (dBi)	Cable Loss	P <sub>r</sub> (dBm)	Path Loss (dBm)	E.R.P (dBm)
128	824.2	76.0436	0	1.06475	-15.1681	-30.5608	-46.7936	27.10
190	836.6	78.6161	0	1.2373	-15.1951	-30.4537	-46.8861	29.58
251	848.8	79.0758	0	1.384	-15.2426	-30.4192	-47.0458	29.88

## 2.4. Occupied Bandwidth

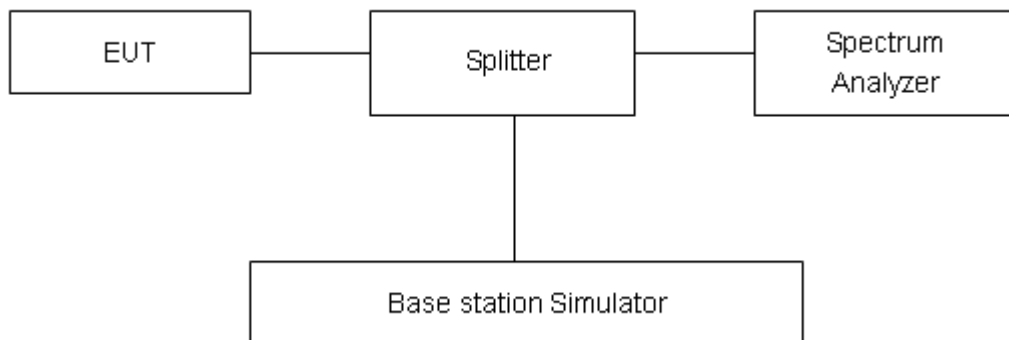
### Ambient condition

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  $k = 2$ .  $U = 624\text{Hz}$ .

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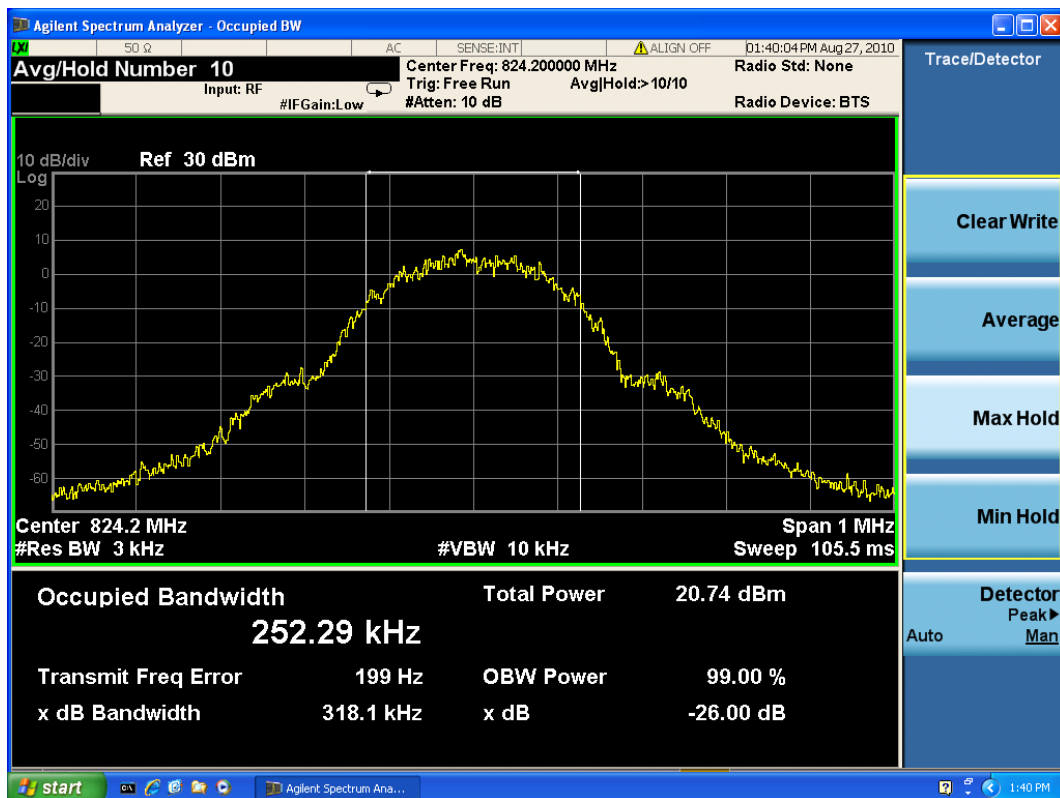
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## Test Result

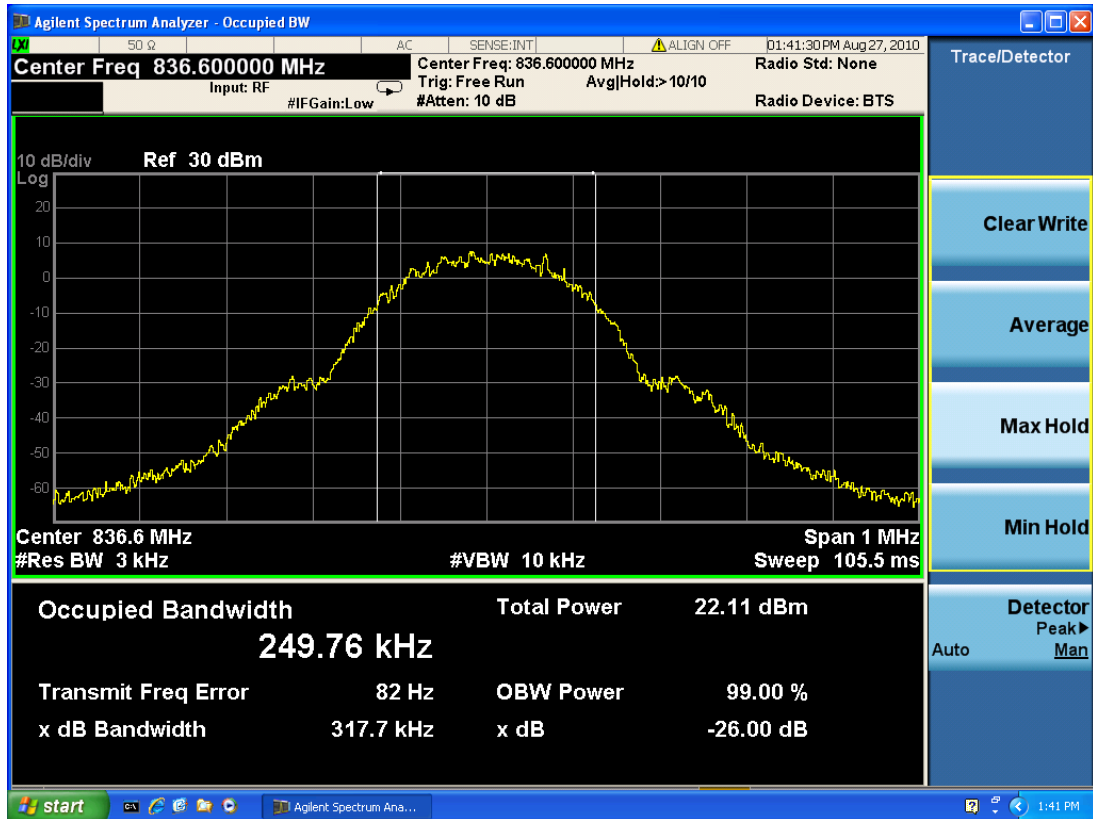
GSM 850

Channel	Frequency (MHz)	99% Power Bandwidth (kHz)	-26dBc Bandwidth(kHz)
128	824.2	252.29	318.1
190	836.6	249.76	317.7
251	848.8	248.94	316.4

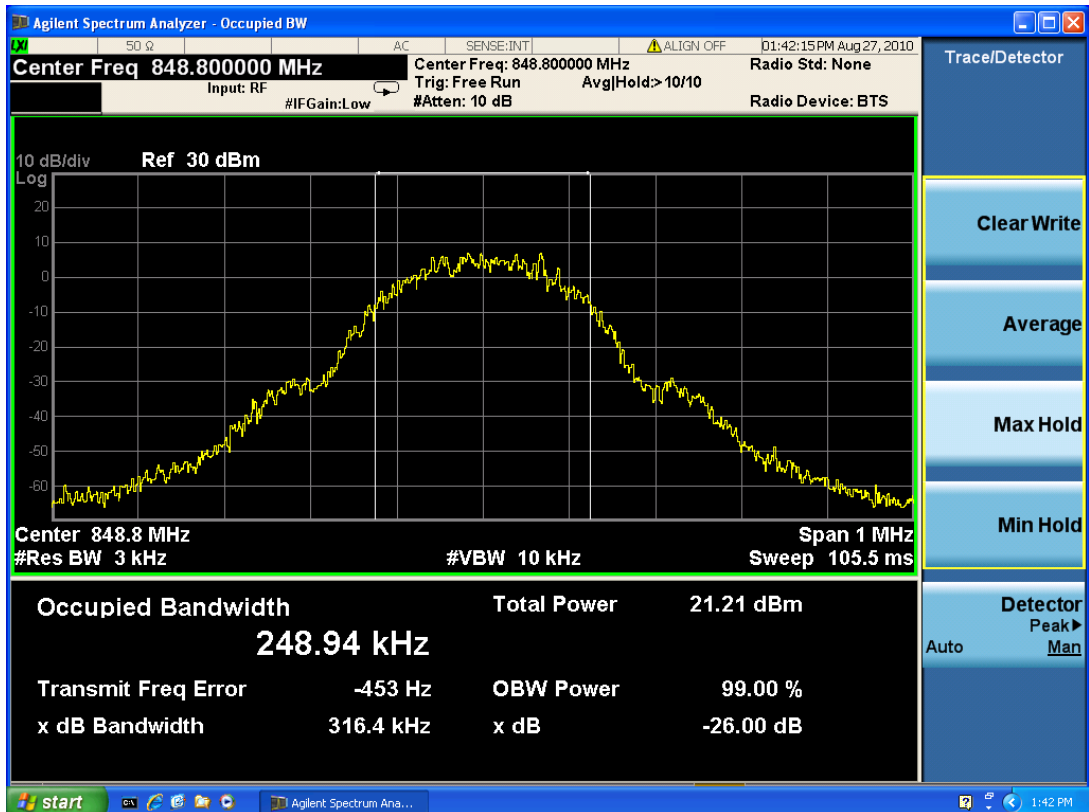


GSM 850 CH128 Occupied Bandwidth

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GSM 850 CH190 Occupied Bandwidth



GSM 850 CH251 Occupied Bandwidth



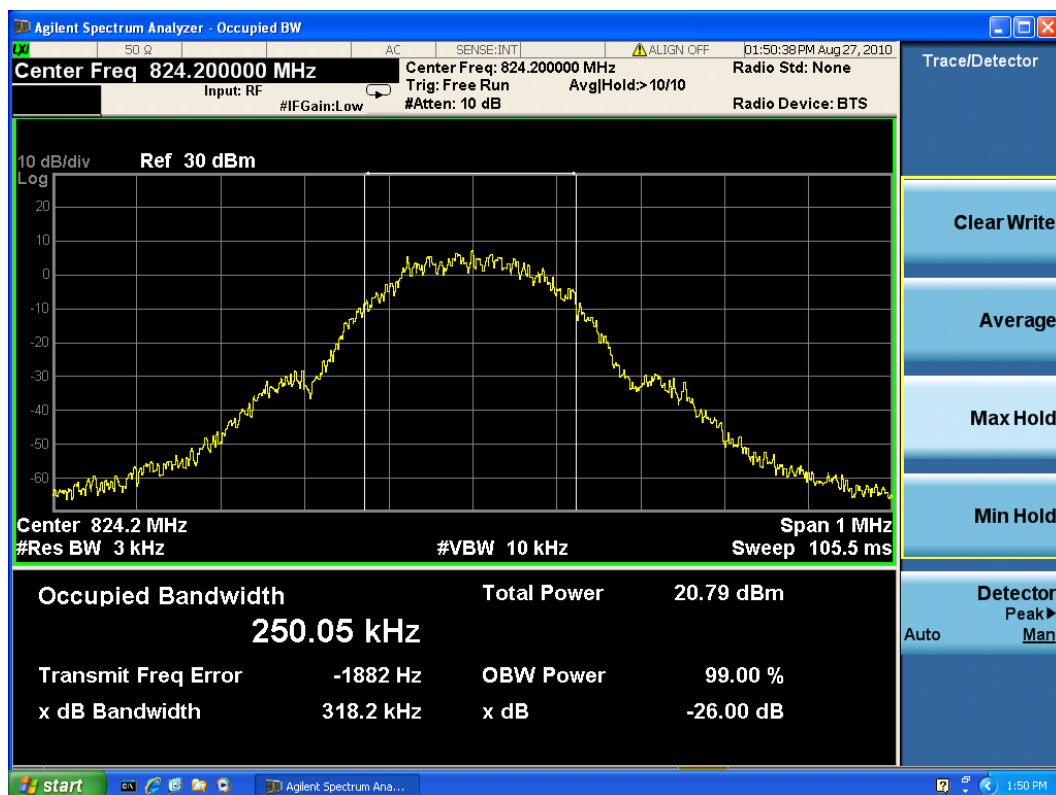
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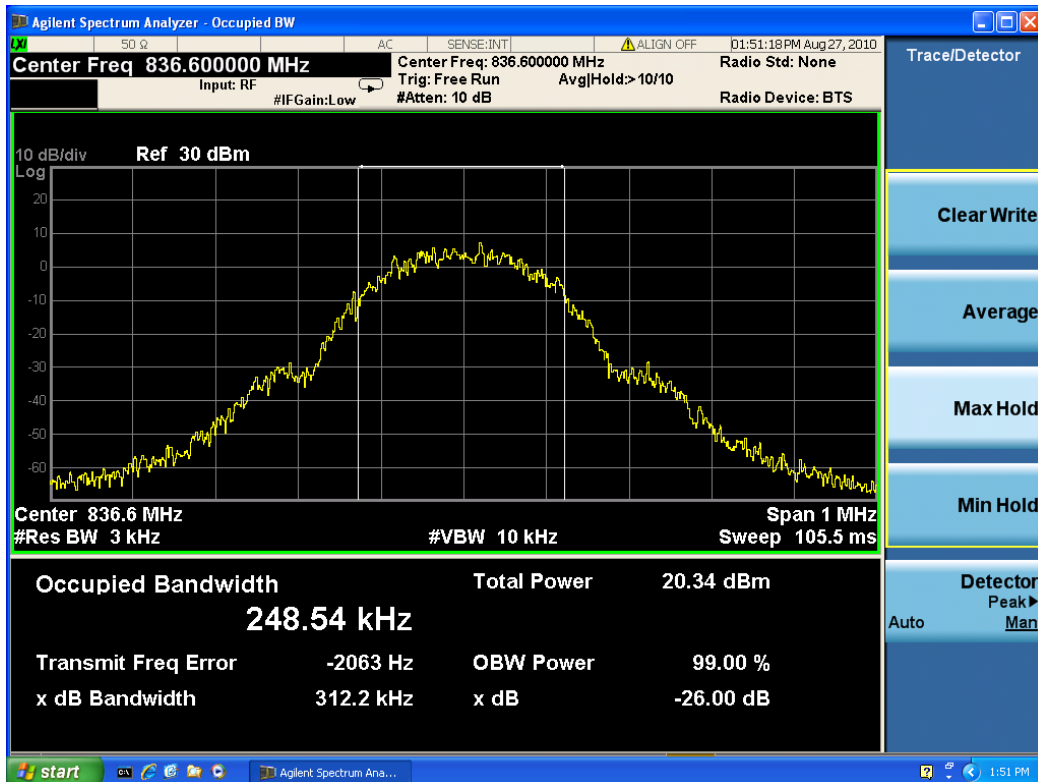
## GSM 850 GPRS

Channel	Frequency (MHz)	99% Power Bandwidth (kHz)	-26dBc Bandwidth(kHz)
128	824.2	250.05	318.2
190	836.6	248.54	312.2
251	848.8	247.42	317.9

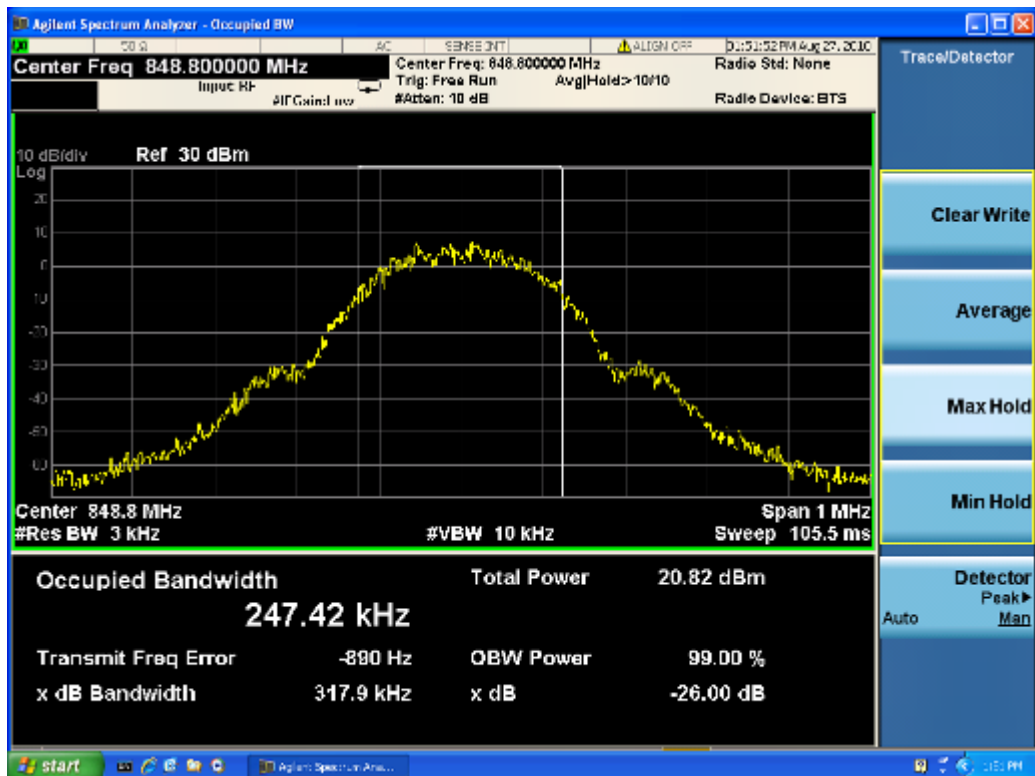


GSM 850 CH128 Occupied Bandwidth

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GSM 850 CH190 Occupied Bandwidth



GSM 850 CH251 Occupied Bandwidth

## 2.5. Band Edge Compliance

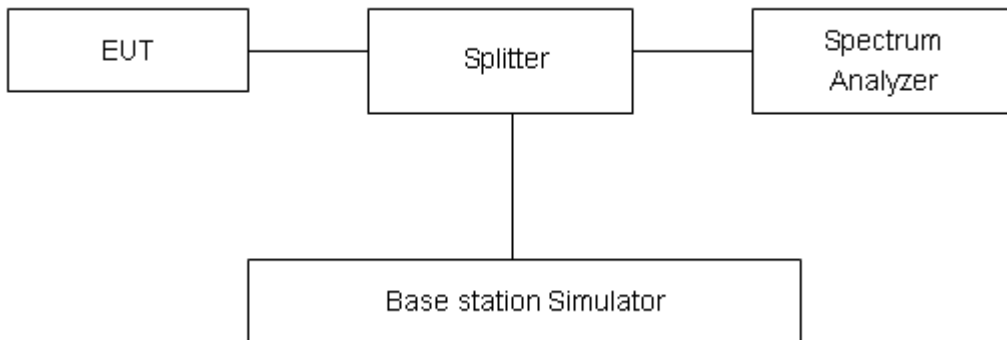
### Ambient condition

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. 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 22.917(a) specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  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.

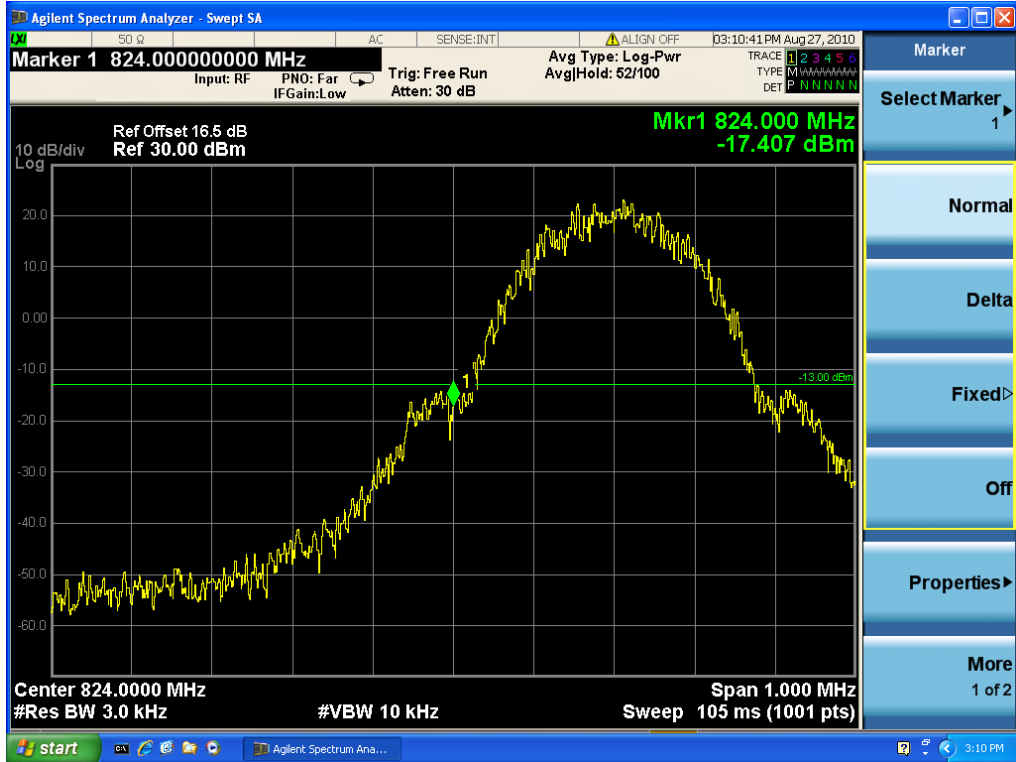
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Test Result: Pass

GSM 850



GSM 850 128 Channel



GSM 850 251 Channel

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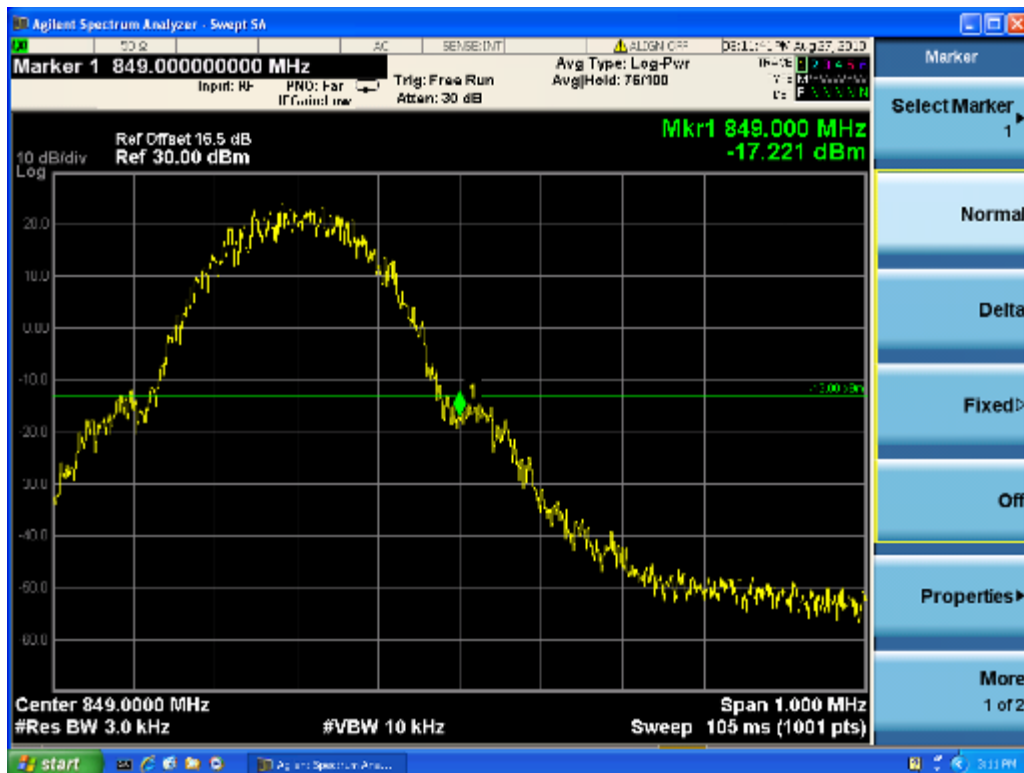
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GSM 850 GPRS



GSM 850 GPRS 128 Channel



GSM 850 GPRS 251 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)

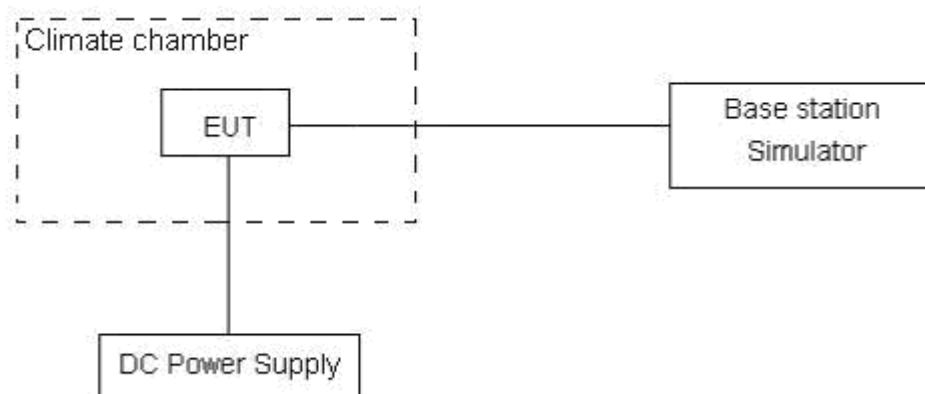
The frequency stability shall be measured with variation of primary supply voltage as follows:

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

### Test setup



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## Test Report

### Limits

According to the JTC standard, the frequency stability of the carrier shall be accurate to within 2.5 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 22.355 Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Limits	$\leq 2.5$ ppm
--------	----------------

### Measurement Uncertainty

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

### Test Result

Temperature (° C)	Test Results (ppm) / 3.7 V Power supply
	Channel 190
-30	0.049
-20	0.047
-10	0.048
0	0.036
10	0.039
20	-0.031
30	0.036
40	0.037
50	0.029

Voltage (V)	Test Results(ppm) / 20° C
	Channel 190
3.4	0.017
3.7	-0.031
4.2	0.029

## 2.7. Spurious Emissions at Antenna Terminals

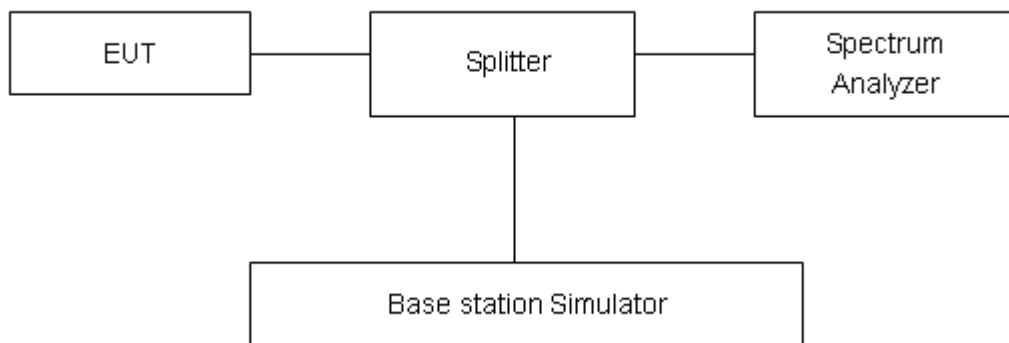
### Ambient condition

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 22.917(a) specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  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



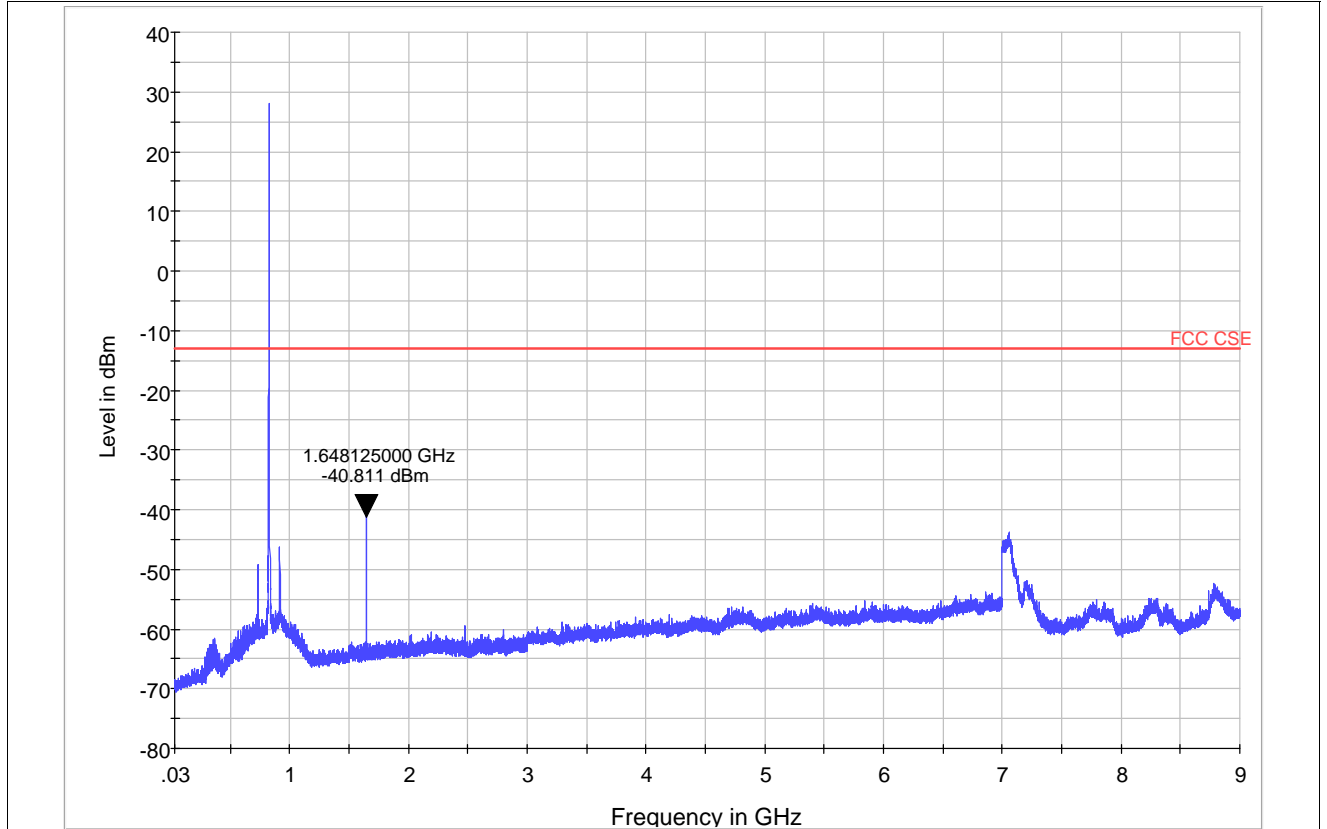
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## Test Result

GSM 850 CH128



Note: The signal beyond the limit is carrier:824.2 MHz  
GSM 850 128 Channel 30MHz~9GHz

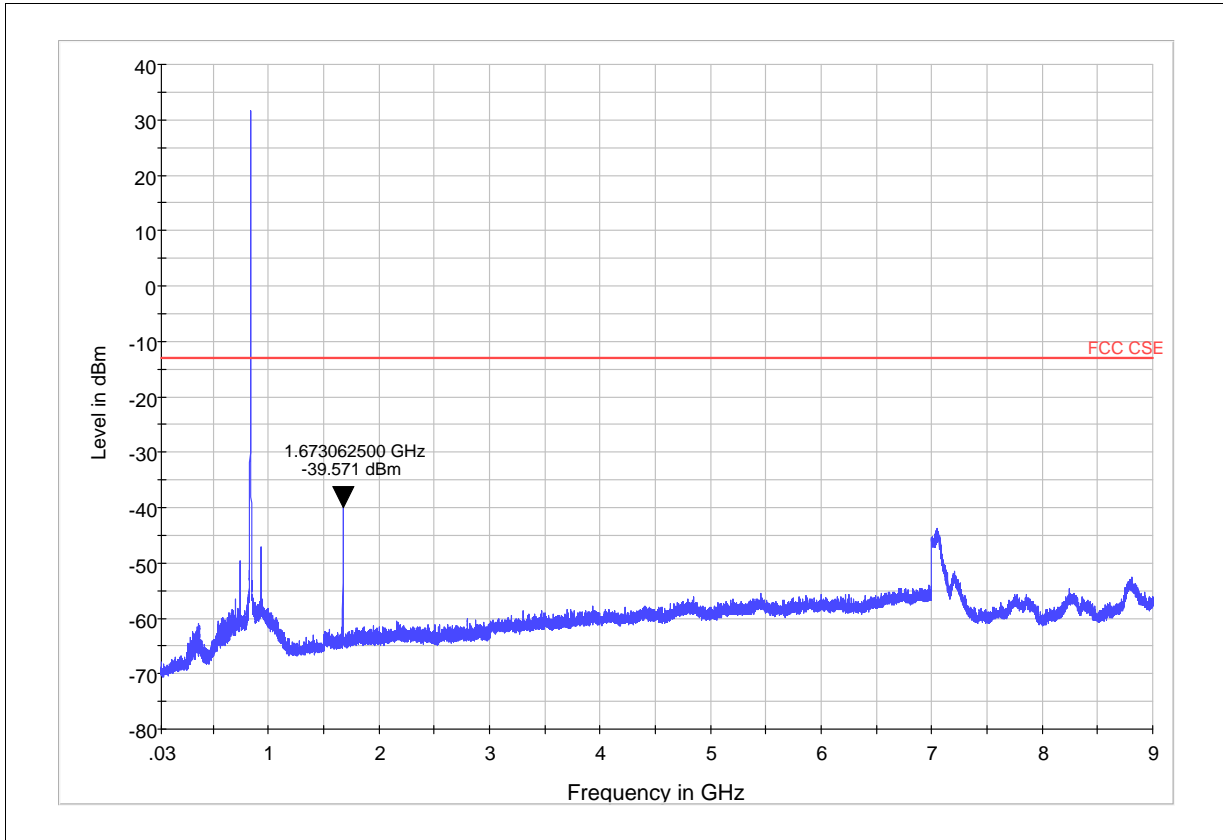
Harmonic	TX ch.39 Frequency (MHz)	Level (dBm)	Limit (dBm)
2	1648.125	-40.811	-13
3	2472.6	Nf	-13
4	3296.8	Nf	-13
5	4121	Nf	-13
6	4945.2	Nf	-13
7	5769.4	Nf	-13
8	6593.6	Nf	-13
9	7417.8	Nf	-13
10	8242	Nf	-13

Nf: noise floor

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

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GSM 850 CH190



Note: The signal beyond the limit is carrier:836.6 MHz  
GSM 850 190 Channel 30MHz~9GHz

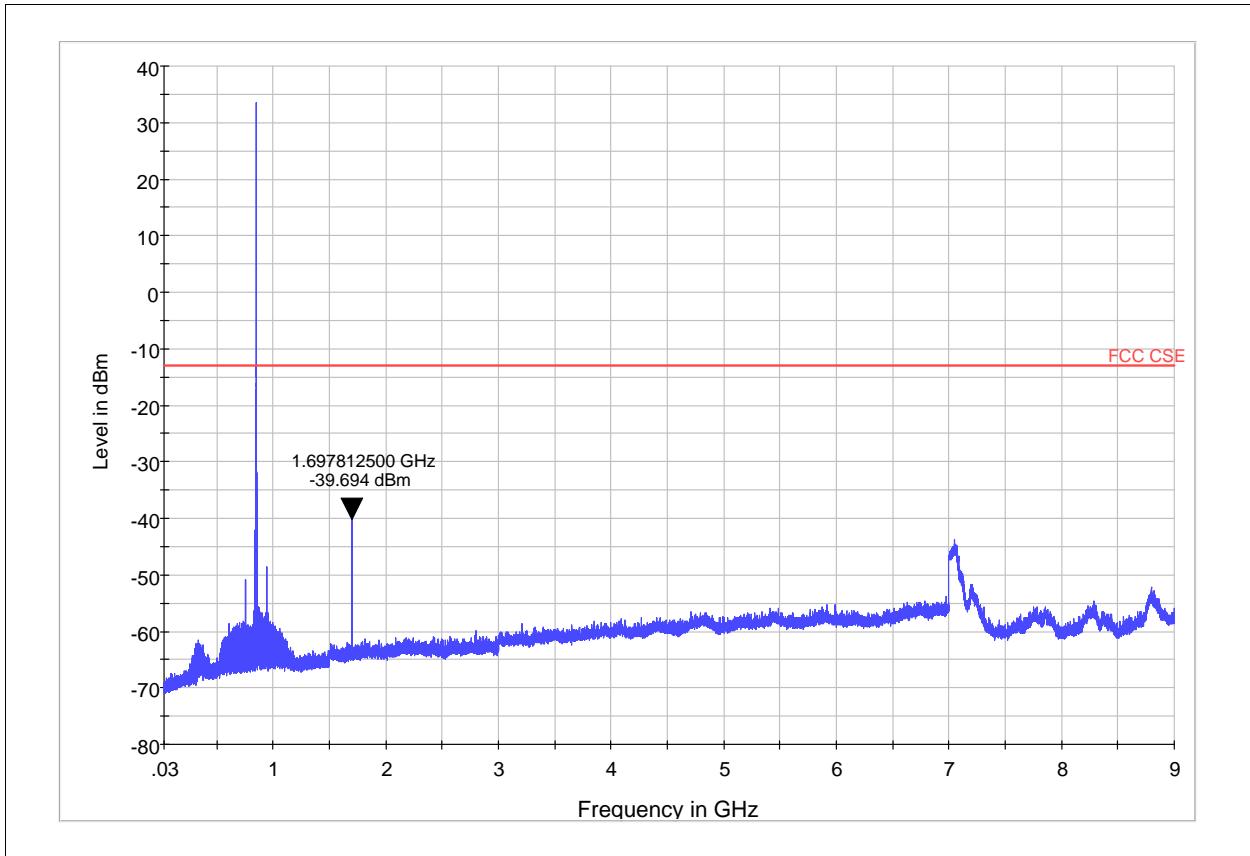
Harmonic	TX ch.39 Frequency (MHz)	Level (dBm)	Limit (dBm)
2	1673.0625	-39.571	-13
3	2509.8	Nf	-13
4	3346.4	Nf	-13
5	4183	Nf	-13
6	5019.6	Nf	-13
7	5856.2	Nf	-13
8	6692.8	Nf	-13
9	7529.4	Nf	-13
10	8366	Nf	-13

Nf: noise floor

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

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GSM 850 CH251



Note: The signal beyond the limit is carrier:848.8 MHz  
GSM 850 251 Channel 30MHz~9GHz

Harmonic	TX ch.39 Frequency (MHz)	Level (dBm)	Limit (dBm)
2	1697.8125	-39.694	-13
3	2546.4	Nf	-13
4	3395.2	Nf	-13
5	4244	Nf	-13
6	5092.8	Nf	-13
7	5941.6	Nf	-13
8	6790.4	Nf	-13
9	7639.2	Nf	-13
10	8488	Nf	-13

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.

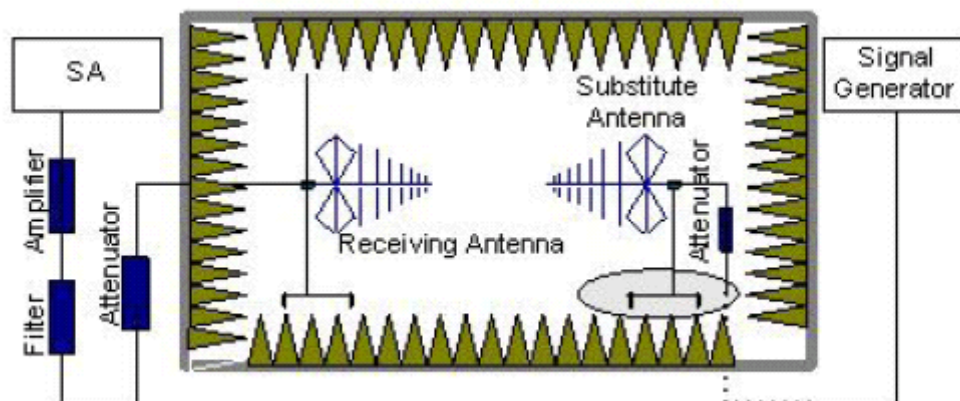
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The measurement will be conducted at three channels 128, 190, 251 of GSM850.

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

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harmonic could not be detected above the noise floor, the ambient level was recorded.

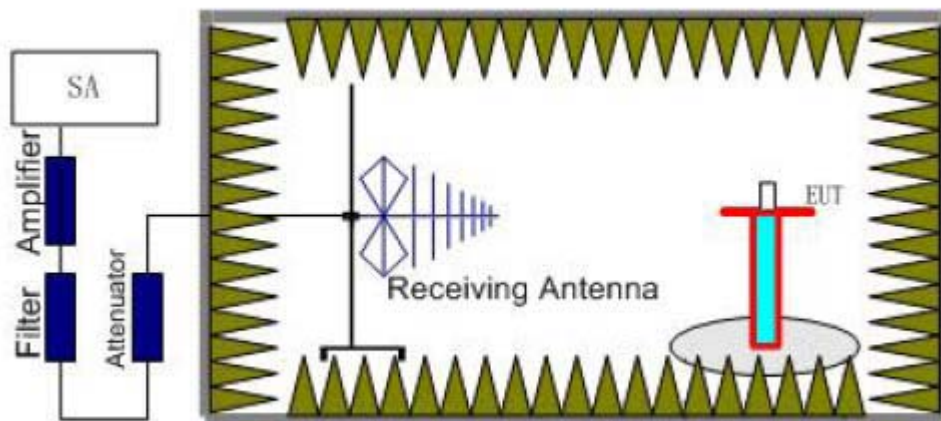
The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

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 22.917(a) specifies that "The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB."

Limit	-13 dBm
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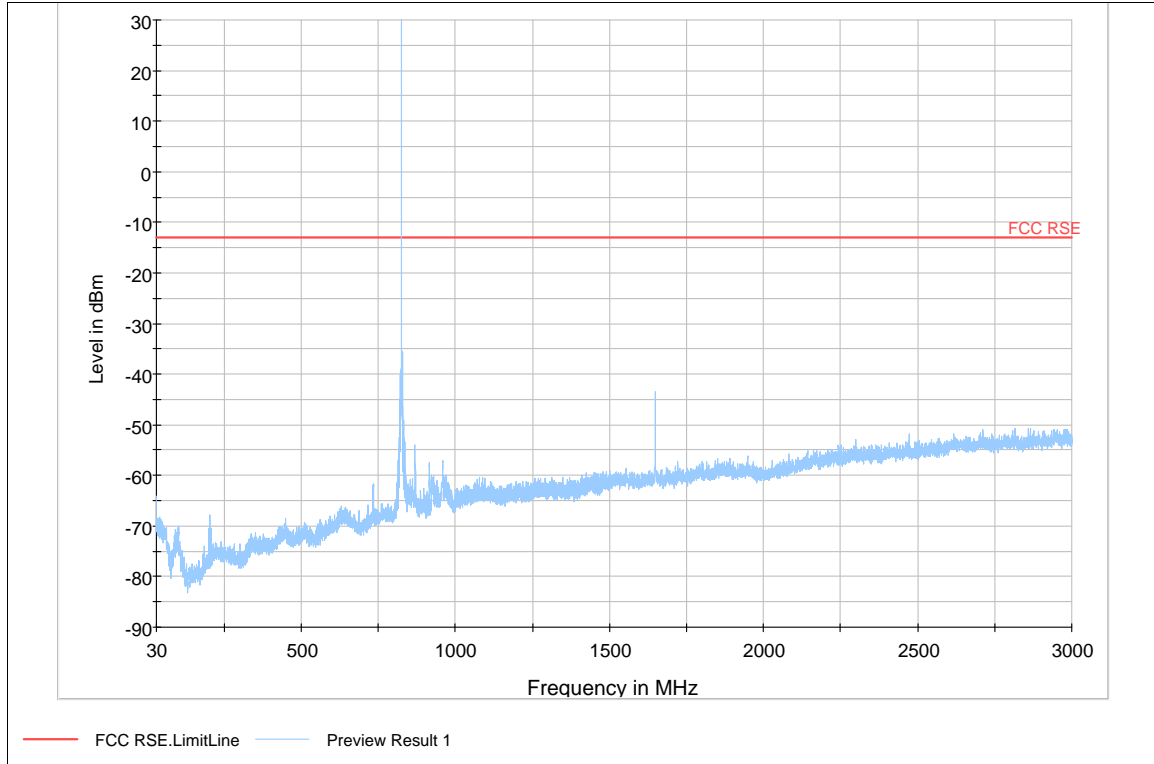
## Measurement Uncertainty

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.

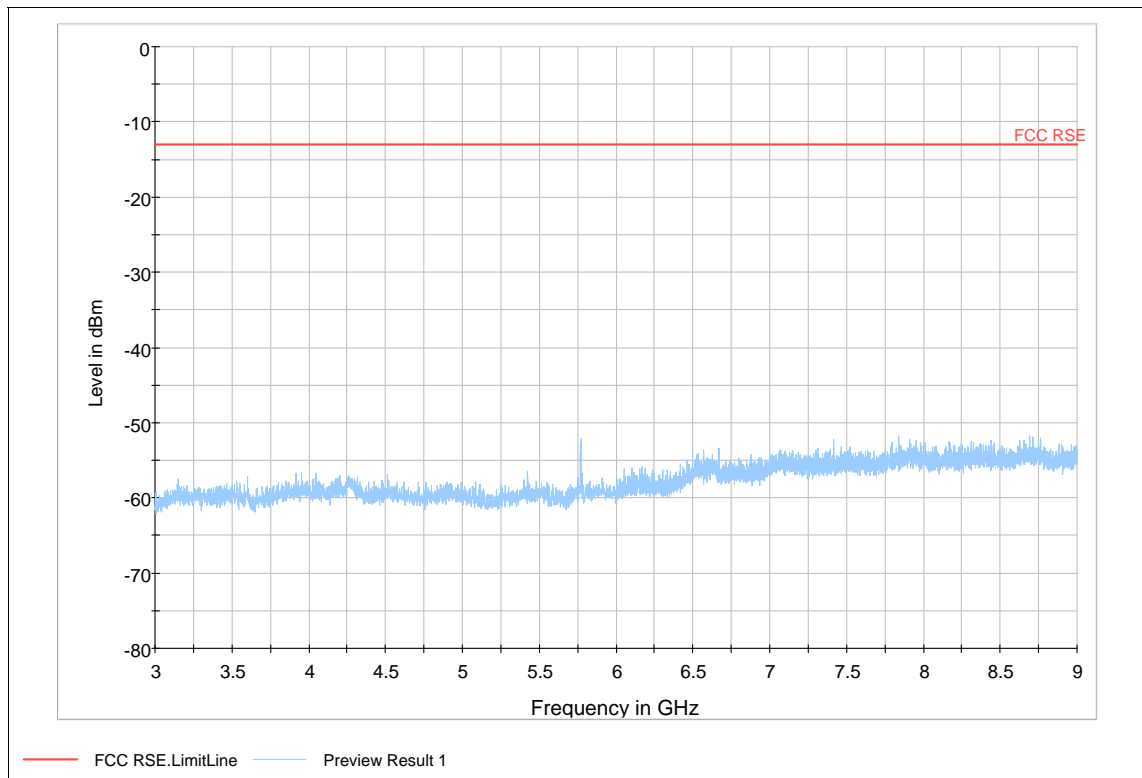
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## Test Result

### GSM 850 CH128



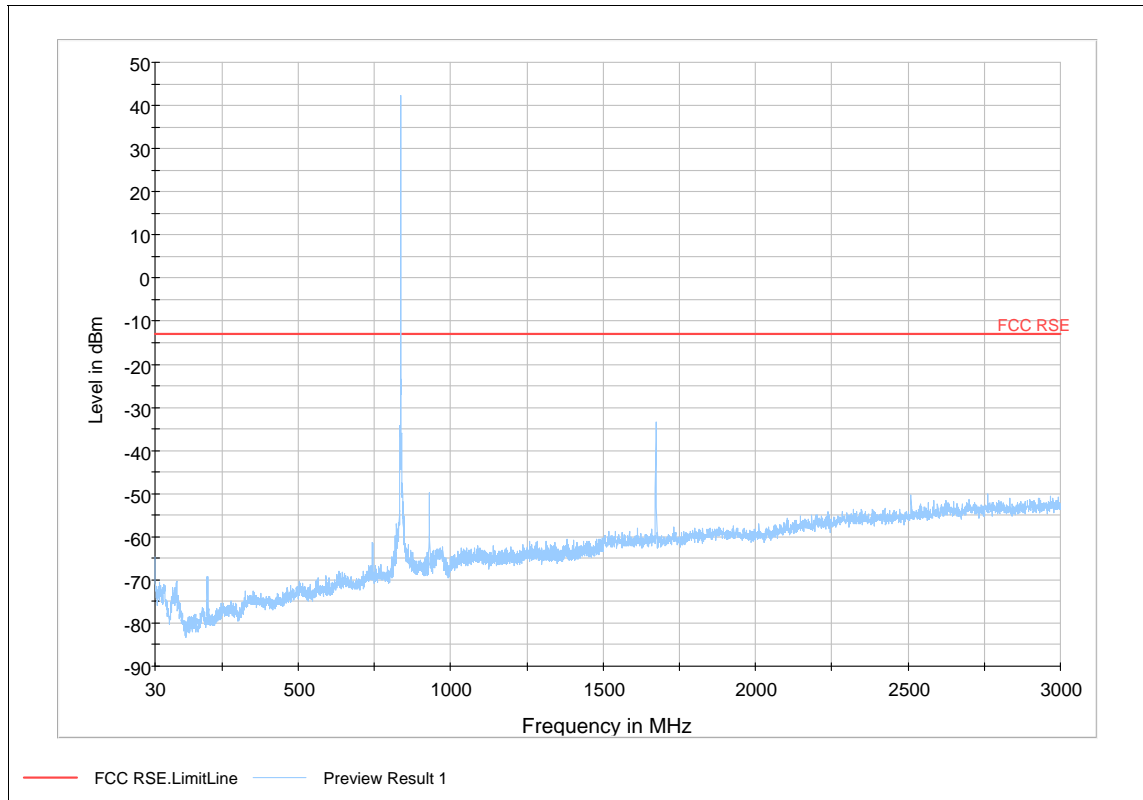
Note: The signal beyond the limit is carrier.  
GSM 850 128 Channel 30MHz~3GHz



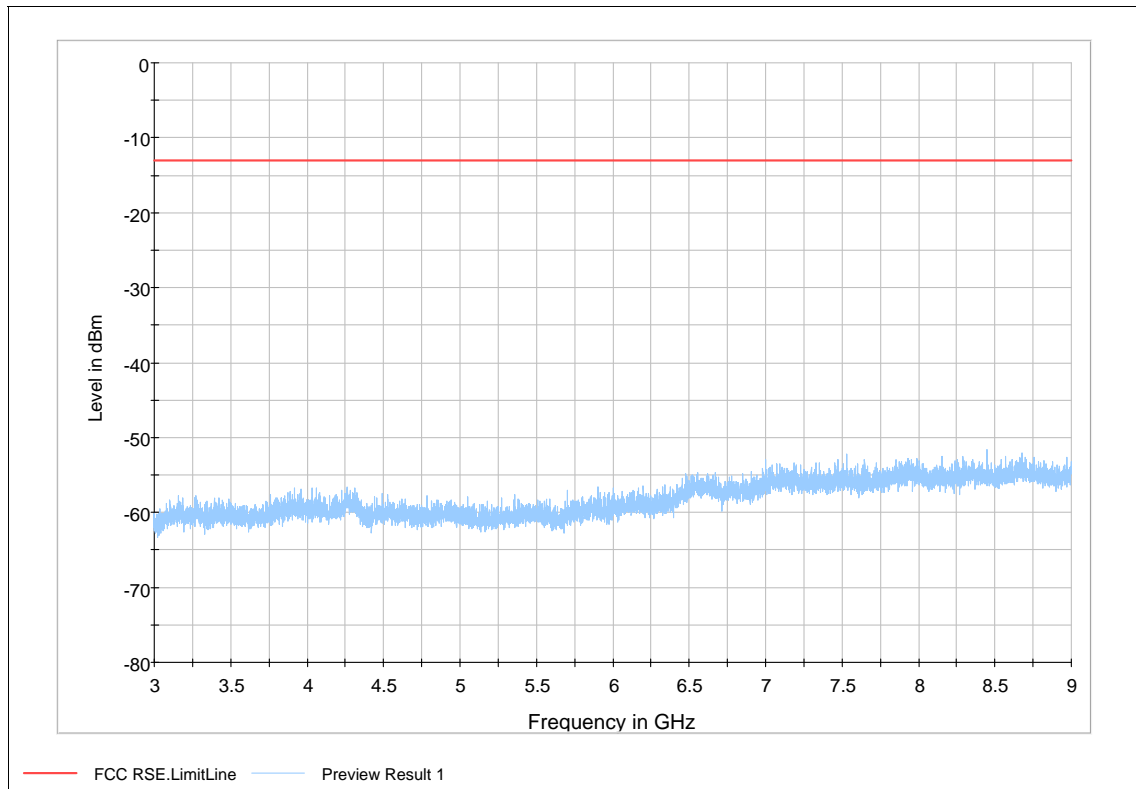
GSM 850 128 Channel 3GHz ~9GHz

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## GSM 850 CH190



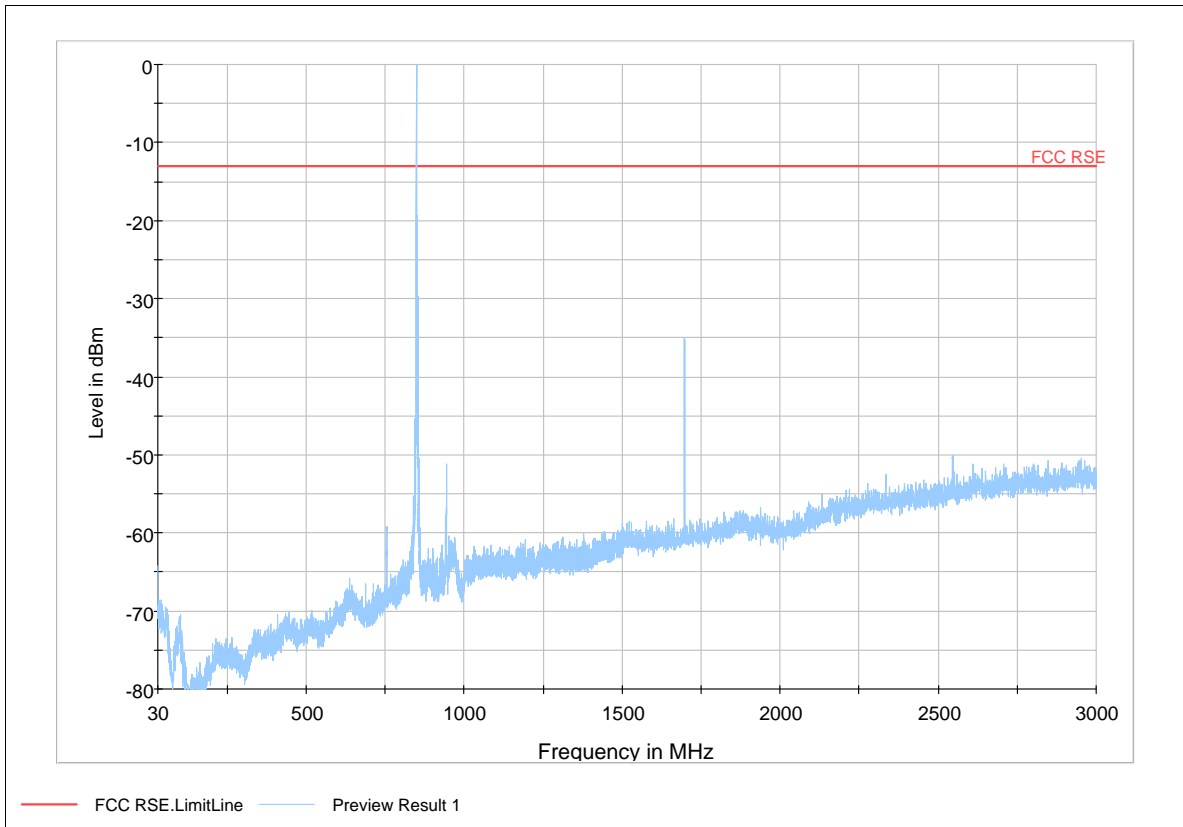
Note: The signal beyond the limit is carrier.  
GSM 850 190 Channel 30MHz~3GHz



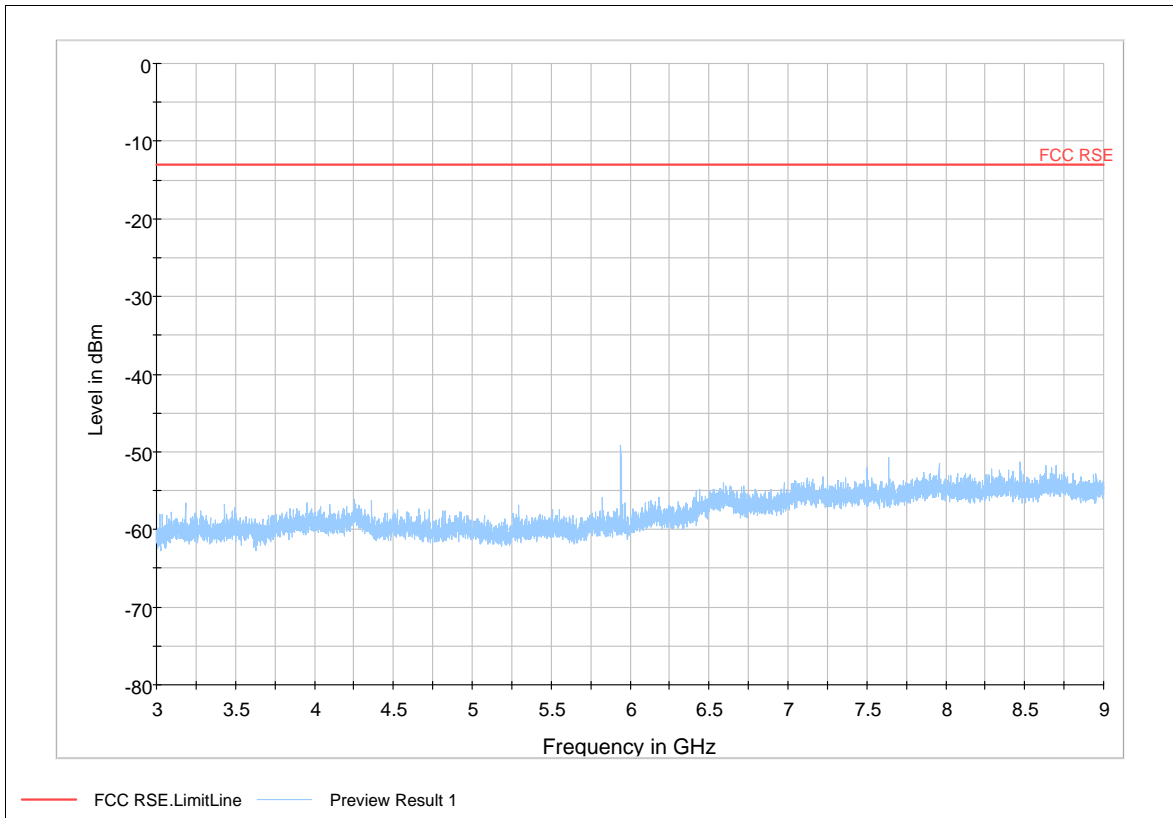
GSM 850 190 Channel 3GHz ~9GHz

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## GSM 850 CH251



Note: The signal beyond the limit is carrier.  
GSM 850 251 Channel 30MHz~3GHz



GSM 850 251 Channel 3GHz ~9GHz



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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



c Charger

Picture 1 EUT and Auxiliary

## A.2 Test Setup



Picture 2: Radiated Spurious Emissions Test setup