



Part 22

TEST REPORT

Product Name	GSM/GPRS module
Model Name	SIM900E
Marketing Name	SIM900E
FCC ID	UDV-SIM900E
Client	Shanghai Simcom Ltd
Manufacturer	Shanghai Simcom Ltd
Date of issue	July 1, 2013

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TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 2 of 36

GENERAL SUMMARY

Reference Standard(s)	<p>FCC CFR47 Part 2 (2012) Frequency Allocations And Radio Treaty Matters; General Rules And Regulations</p> <p>FCC CFR 47 Part 22H (2012) Public Mobile Services(850MHz)</p> <p>ANSI/TIA-603-C(2004) Land mobile FM or PM Communications Equipment Measurements and Performance Standards.</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>
Comment	The test result only responds to the measured sample.

Approved by 杨伟中

Director

Revised by 唐锐

RF Manager

Performed by 李舟舟

RF Engineer

TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 3 of 36

TABLE OF CONTENT

1. General Information	4
1.1. Notes of the test report	4
1.2. Testing laboratory	5
1.3. Applicant Information	5
1.4. Manufacturer Information.....	5
1.5. Information of EUT.....	6
1.6. Test Date	7
2. Test Information	8
2.1. Summary of test results	8
2.2. RF Power Output	9
2.3. Effective Radiated Power.....	11
2.4. Occupied Bandwidth.....	13
2.5. Band Edge Compliance	18
2.6. Frequency Stability	22
2.7. Spurious Emissions at Antenna Terminals	25
2.8. Radiates Spurious Emission	29
3. Main Test Instruments	34
ANNEX A: EUT Appearance and Test Setup.....	35
A.1 EUT Appearance	35
A.2 Test Setup.....	36

TA Technology (Shanghai) Co., Ltd.

Test Report

Report No.: RXA1305-0050RF01R2

Page 4 of 36

1. General Information

1.1. Notes of the test report

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L2264.

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 428261.

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 8510A.

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 does 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.

TA Technology (Shanghai) Co., Ltd. Test Report

Report No.: RXA1305-0050RF01R2

Page 5 of 36

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

1.3. Applicant Information

Company: Shanghai Simcom Ltd
Address: Building A, SIM Technology Building, No.633 Jinzhong Road, Changning District, Shanghai
City: Shanghai
Postal Code: /
Country: P. R. China

1.4. Manufacturer Information

Company: Shanghai Simcom Ltd
Address: Building A, SIM Technology Building, No.633 Jinzhong Road, Changning District, Shanghai
City: Shanghai
Postal Code: /
Country: P. R. China

TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 6 of 36

1.5. Information of EUT

General information

Name of EUT:	GSM/GPRS module		
IMEI :	/		
Hardware Version:	V1.02		
Software Version:	SIM900 R11.0		
Device Operating Configurations:			
Operating Mode(s):	GSM 850:(tested)		
Test Modulation:	(GSM)GMSK;		
GPRS Multislot Class:	10		
Maximum E.R.P.	GPRS 850: 32.87 dBm		
Rated Power Supply Voltage:	3.8V		
Extreme Voltage:	Minimum: 3.6V Maximum: 4.2V		
Extreme Temperature:	Lowest: -40°C Highest: +85°C		
Test Channel: (Low - Middle - High)	128 - 190 - 251 (GSM 850) (tested)		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM850	824.2 ~ 848.8	869.2 ~ 893.8

TA Technology (Shanghai) Co., Ltd.

Test Report

Report No.: RXA1305-0050RF01R2

Page 7 of 36

Auxiliary Equipment Details

Equipment Under Test (EUT) is GSM/GPRS module. The EUT is tested 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 May 17, 2013 to June 4, 2013.

TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 8 of 36

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

PASS: The EUT complies with the essential requirements in the standard.

FAIL: The EUT does not comply with the essential requirements in the standard.

TA Technology (Shanghai) Co., Ltd.

Test Report

Report No.: RXA1305-0050RF01R2

Page 9 of 36

2.2. RF Power Output

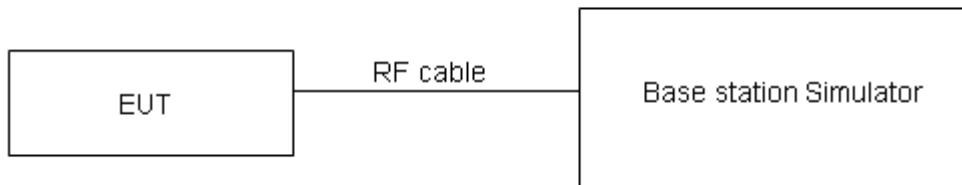
Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

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.

TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 10 of 36

Test Results

GSM 850		Average Conducted Power(dBm)		
		Channel 128	Channel 190	Channel 251
		824.2 (MHz)	836.6 (MHz)	848.8 (MHz)
GSM	Results	32.61	32.60	32.65
GPRS (GMSK)	1TXslot	32.60	32.62	32.64
	2TXslots	32.54	32.57	32.6

Note:

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

2.3. Effective Radiated Power

Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

Methods of Measurement

The measurement procedures in TIA- 603C are used.

1. The EUT was placed on a turntable with 1.5 meter height in a fully anechoic chamber.
2. The EUT was set at 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. GSM operating modes: Set RBW= 1MHz, VBW= 3MHz, RMS detector over burst;
 UMTS operating modes: Set RBW= 100 KHz, VBW= 300 KHz, RMS detector over frame, and use channel power option with bandwidth=5MHz, per section 4.0 of KDB 971168 D01.
4. The table was rotated 360 degrees to determine the position of the highest radiated power.
5. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
6. Taking the record of maximum ERP/EIRP.
7. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
8. The conducted power at the terminal of the dipole antenna is measured.
9. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
10. $ERP/EIRP = Ps + Et - Es + Gs = Ps + Rt - Rs + Gs$

Ps (dBm) : Input power to substitution antenna.

Gs (dBi or dBd) : Substitution antenna Gain.

Et = Rt + AF

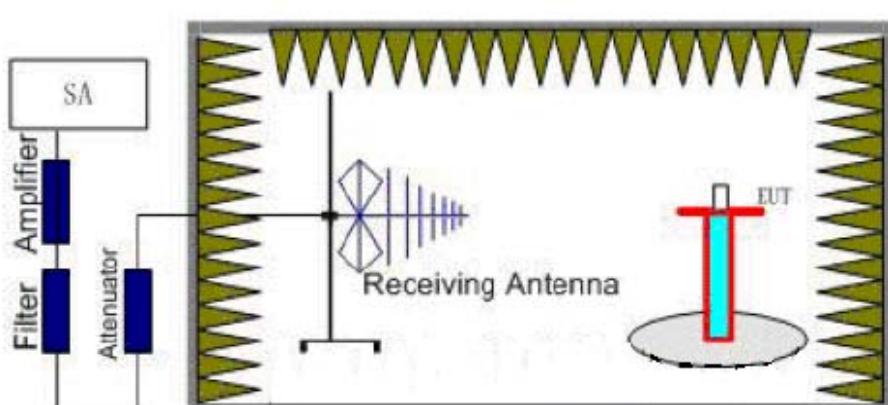
Es = Rs + AF

AF (dB/m) : Receive antenna factor

Rt : The highest received signal in spectrum analyzer for EUT.

Rs : The highest received signal in spectrum analyzer for substitution antenna.

Test Setup



TA Technology (Shanghai) Co., Ltd.

Test Report

Report No.: RXA1305-0050RF01R2

Page 12 of 36

Limits

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

Limit	≤ 7 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 $k = 2$, $U = 1.19$ dB

Test Results: Pass

Mode	Channel	Polarization	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	E.R.P. (dBm)
GSM 850	128	Vertical	-16.69	-49.34	0	-1.28	31.37
	190	Vertical	-17.43	-49.85	0	-1.05	31.37
	251	Horizontal	-16.36	-50.14	0	-0.98	32.80
GSM 850 GPRS(GMSK)	128	Vertical	-16.89	-49.34	0	-1.28	31.17
	190	Vertical	-17.68	-49.85	0	-1.05	31.12
	251	Vertical	-16.29	-50.14	0	-0.98	32.87

Note: 1. EIRP = E.R.P+2.15

TA Technology (Shanghai) Co., Ltd.

Test Report

Report No.: RXA1305-0050RF01R2

Page 13 of 36

2.4. Occupied Bandwidth

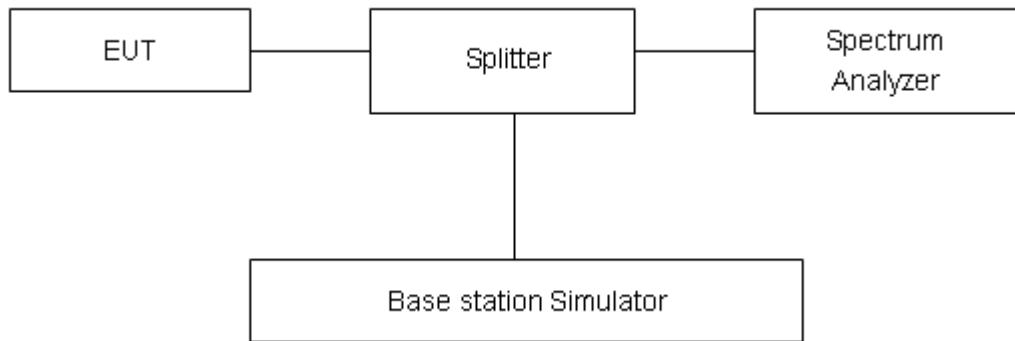
Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

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

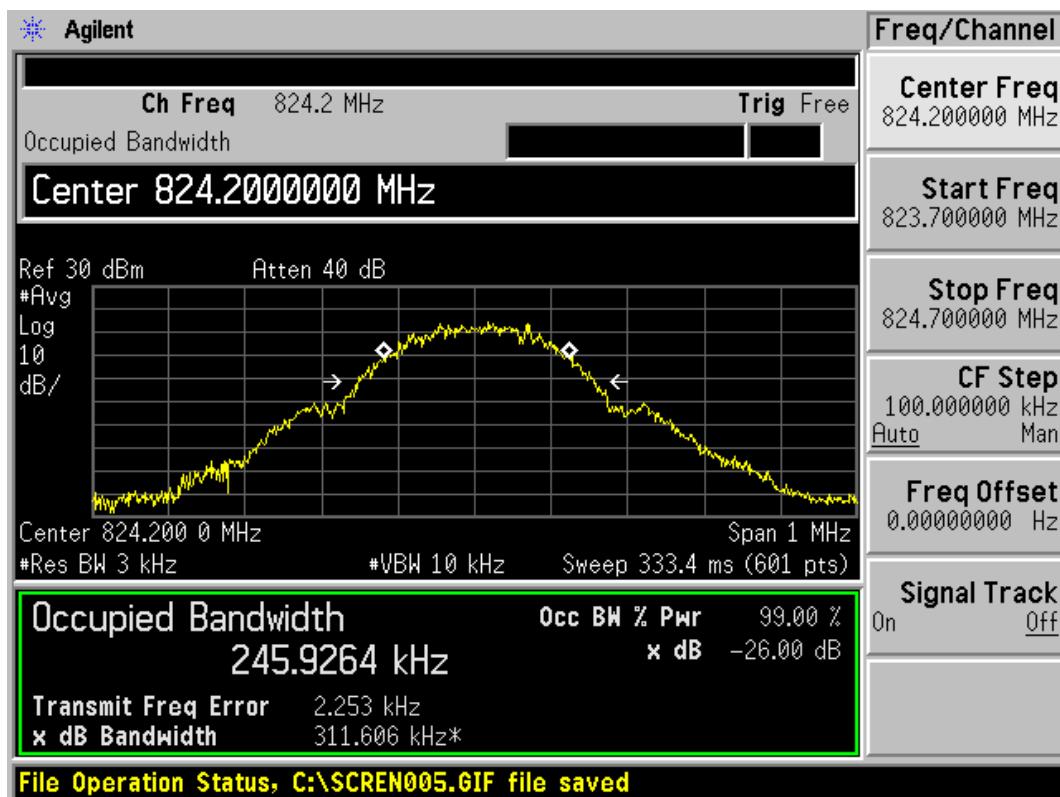
TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 14 of 36

Test Result

	Channel	Frequency (MHz)	99% Power Bandwidth (kHz)	-26dBc Bandwidth(kHz)
GSM 850	128	824.2	245.926	311.606
	190	836.6	250.321	313.460
	251	848.8	249.958	309.922
GSM 850+GPRS	128	824.2	245.552	313.275
	190	836.6	249.606	313.460
	251	848.8	249.440	310.537

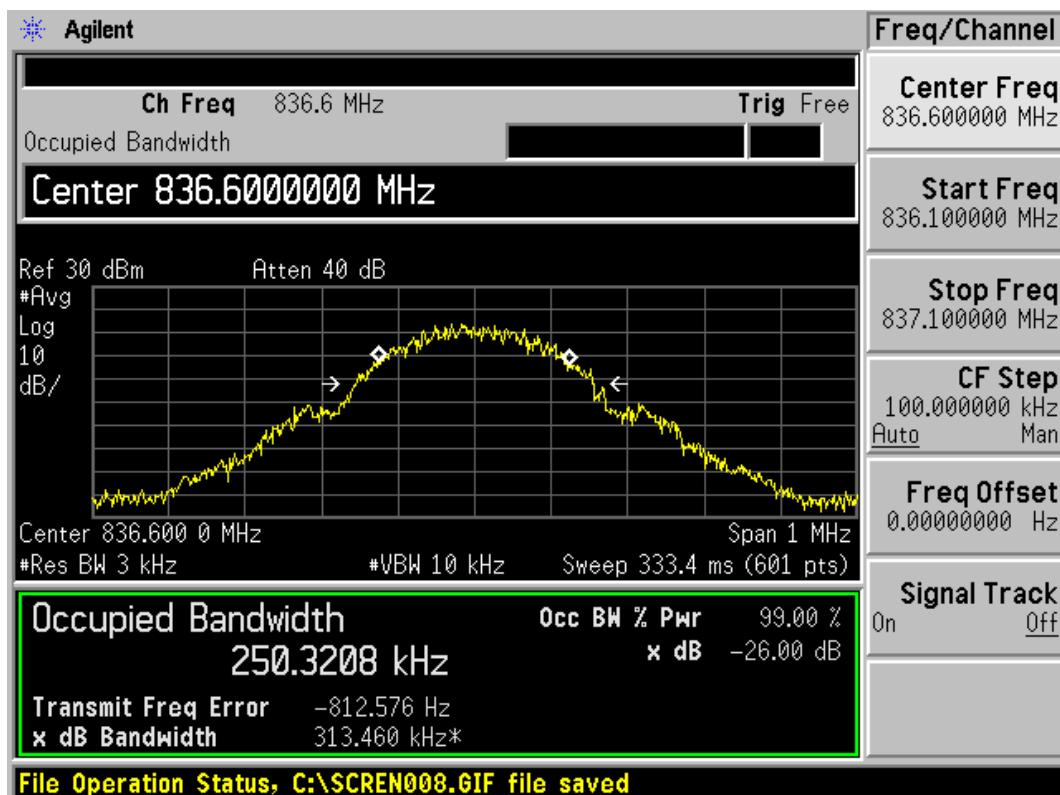


GSM 850 CH128 Occupied Bandwidth

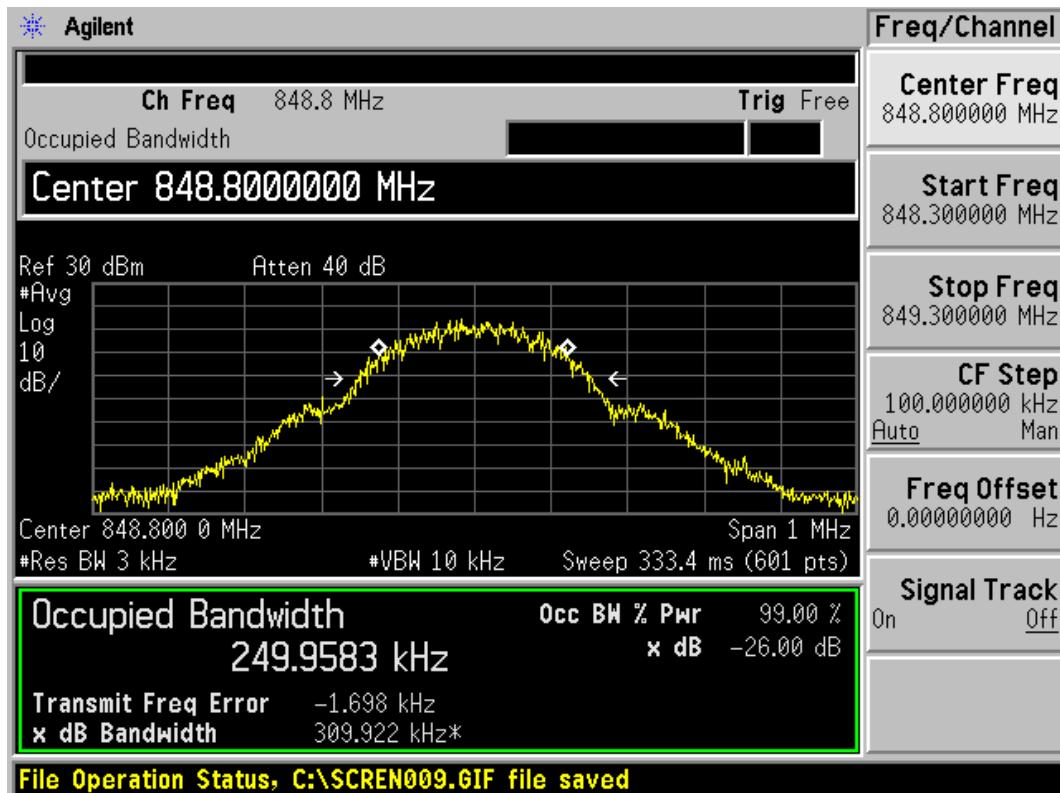
TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 15 of 36



GSM 850 CH190 Occupied Bandwidth

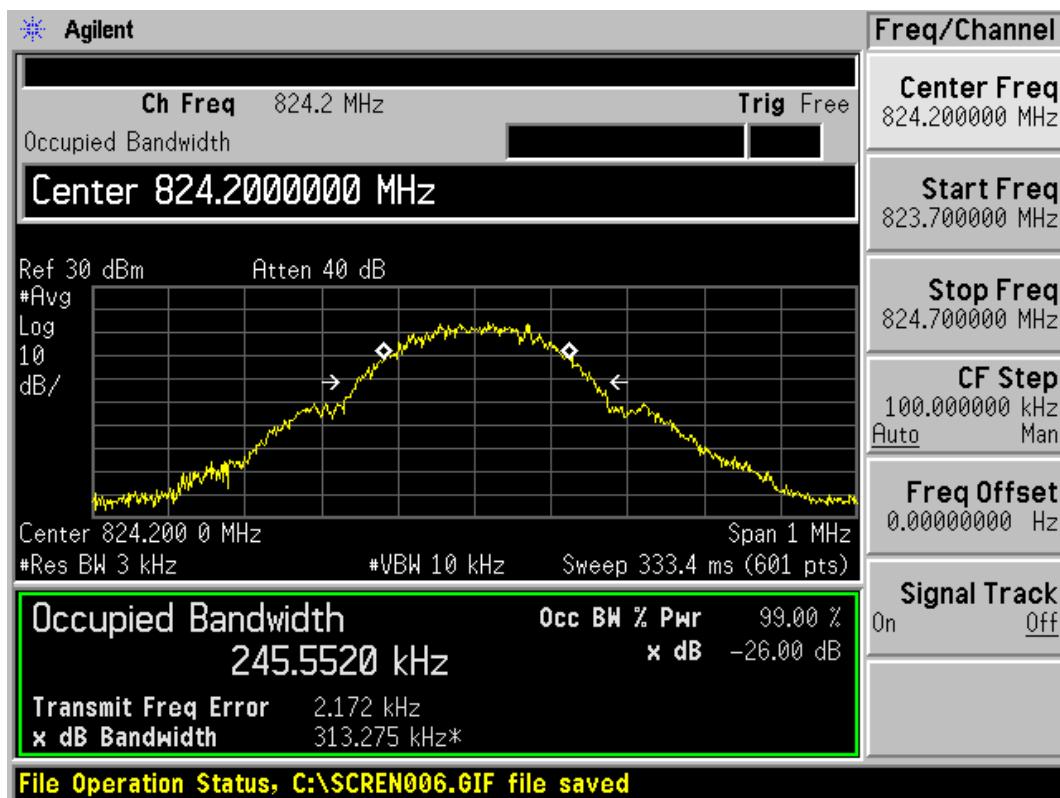


GSM 850 CH251 Occupied Bandwidth

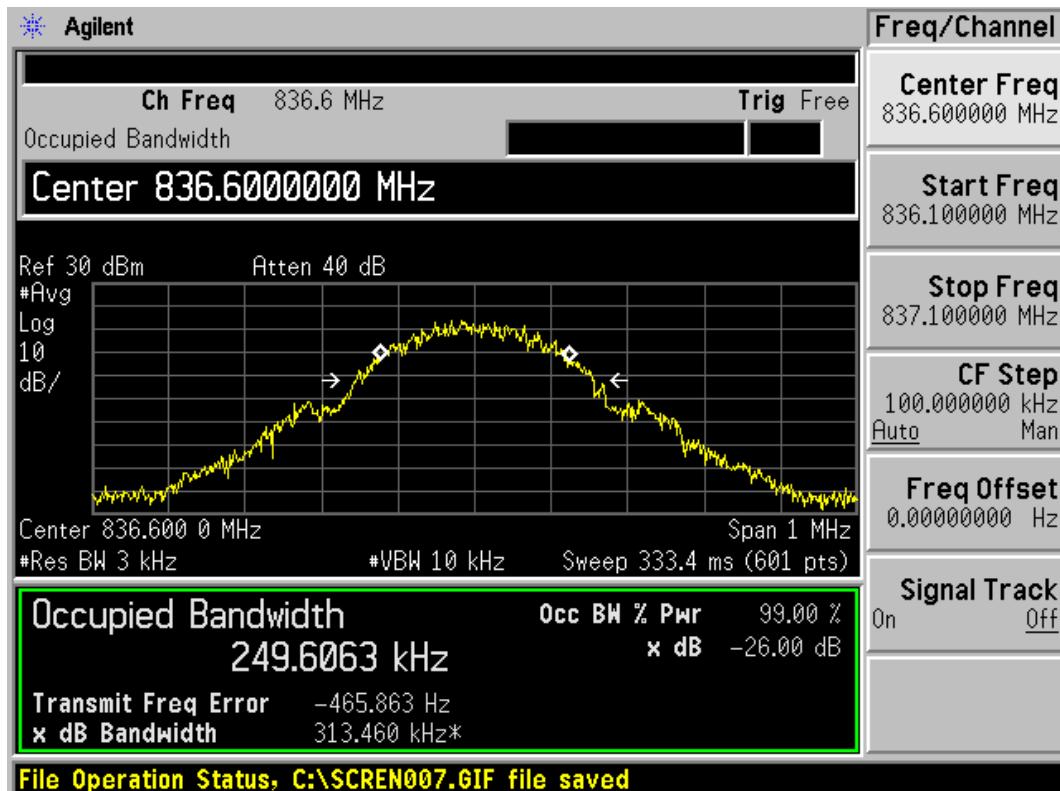
TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 16 of 36



GSM 850 GPRS CH128 Occupied Bandwidth

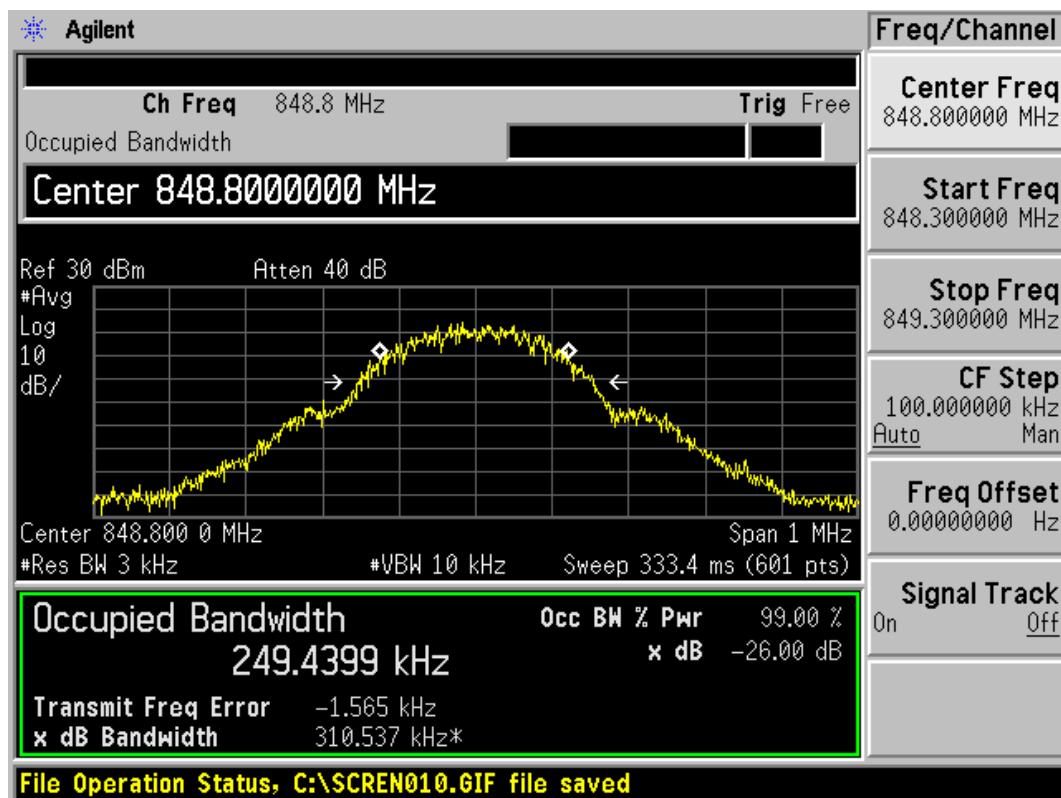


GSM 850 GPRS CH190 Occupied Bandwidth

TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 17 of 36



GSM 850 GPRS CH251 Occupied Bandwidth

TA Technology (Shanghai) Co., Ltd. Test Report

Report No.: RXA1305-0050RF01R2

Page 18 of 36

2.5. Band Edge Compliance

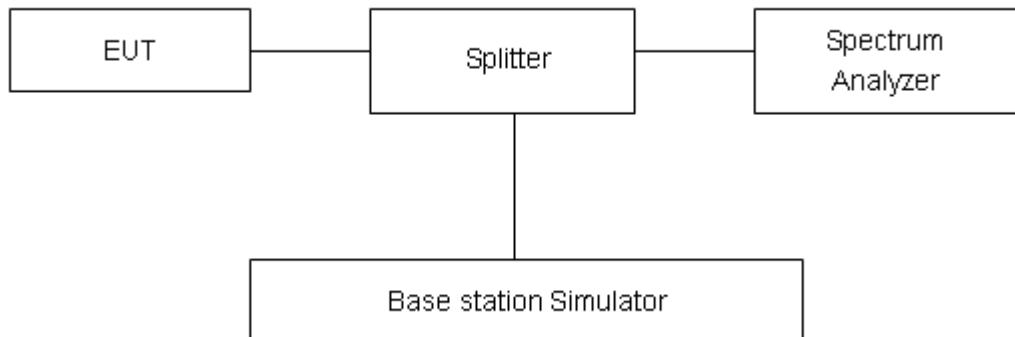
Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

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 5.1kHz, VBW is set to 15kHz for GSM 850. 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.

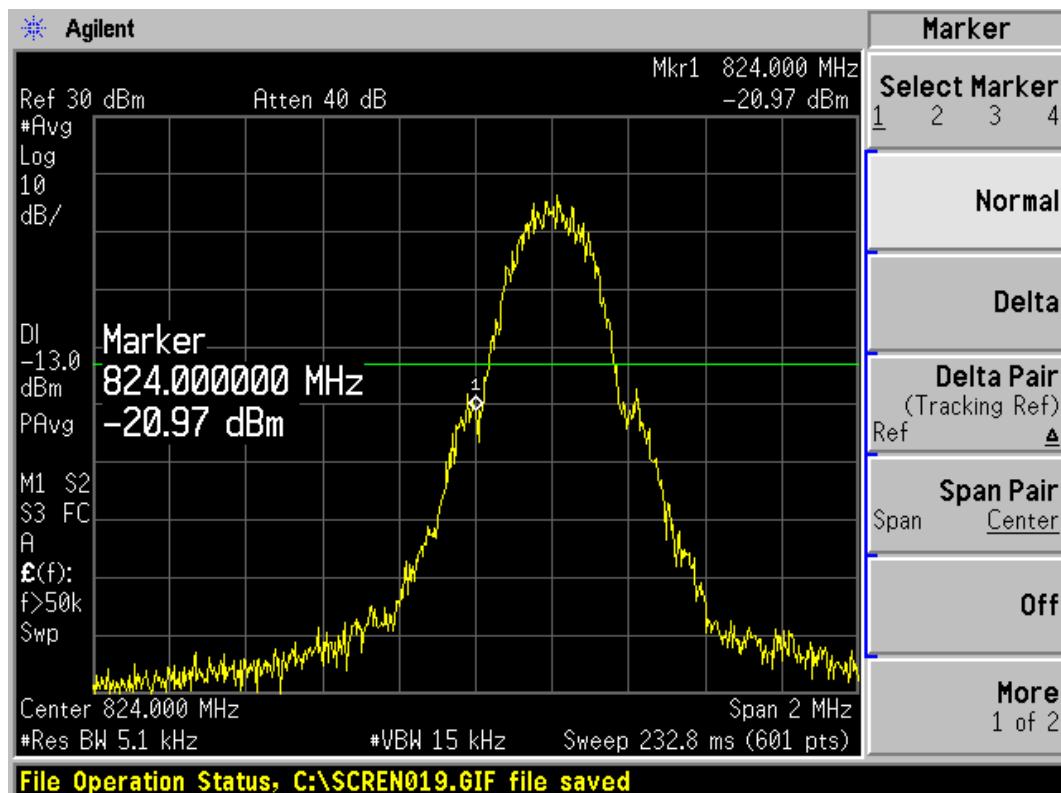
TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 19 of 36

Test Result:

	Carrier frequency (MHz)	Reference value (dBm)	Limit	Conclusion
GSM 850	824.0	-20.97	-13	PASS
	849.0	-24.25	-13	PASS
GSM 850+GPRS	824.0	-20.72	-13	PASS
	849.0	-20.64	-13	PASS

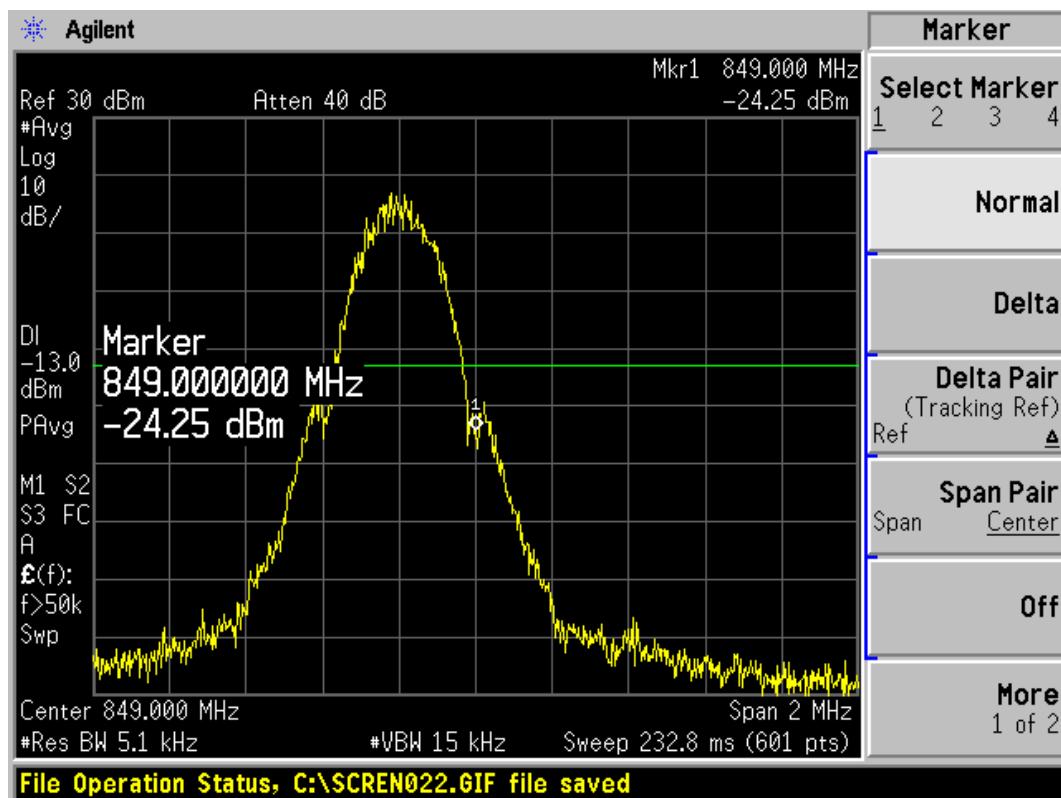


GSM 850 128 Channel

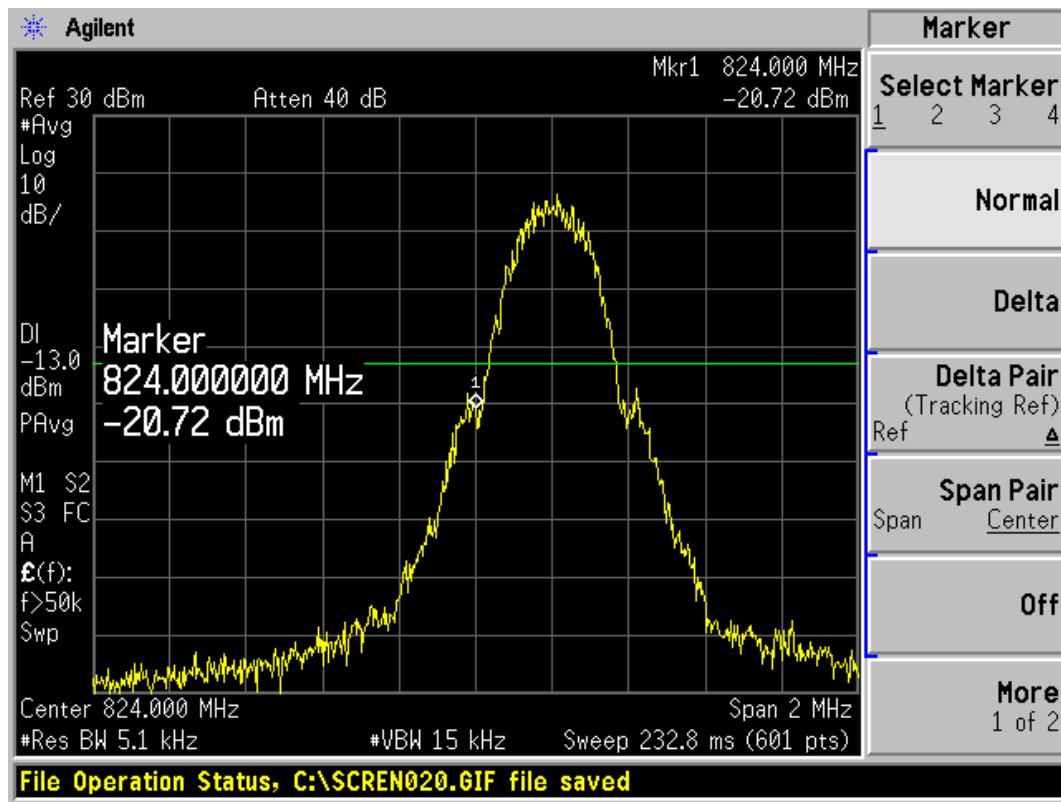
TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 20 of 36



GSM 850 251 Channel

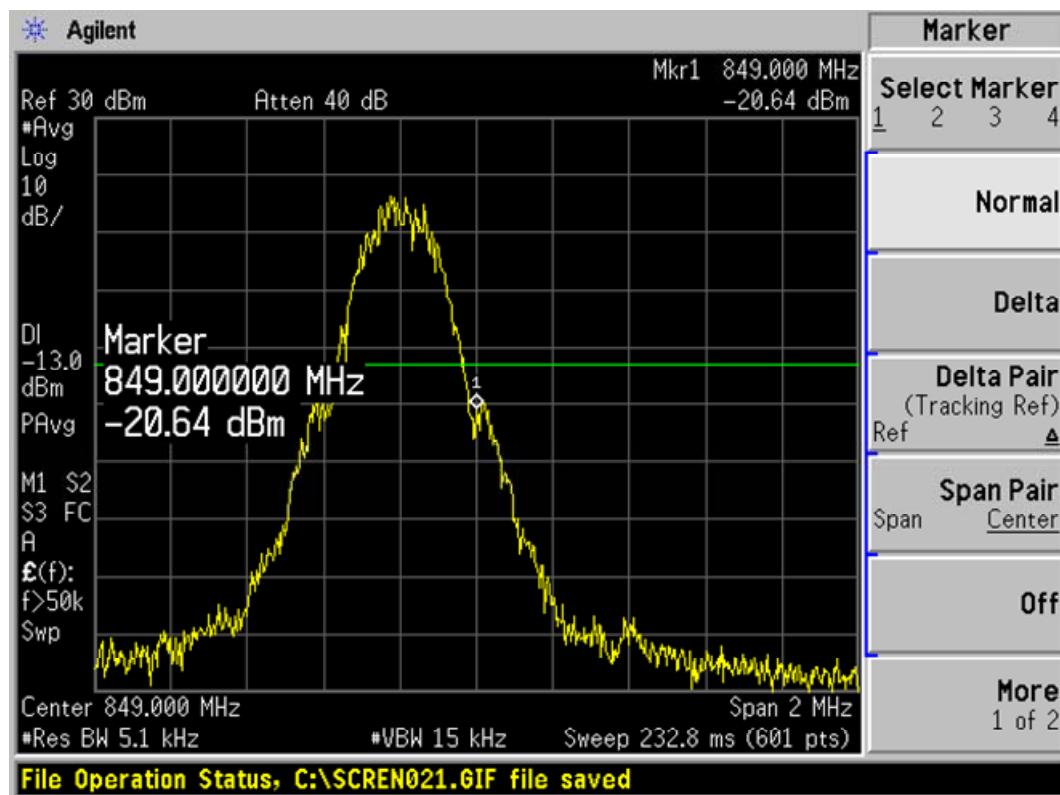


GSM 850 GPRS 128 Channel

TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 21 of 36



GSM 850 GPRS 251 Channel

2.6. Frequency Stability

Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

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)

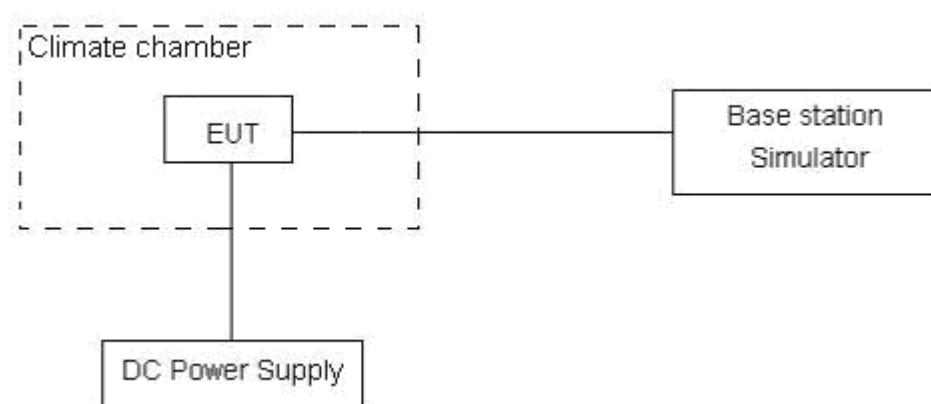
The frequency stability shall be measured with variation of primary supply voltage as follows:

(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 3.6 V and 4.2 V, with a nominal voltage of 3.8V.

Test setup



TA Technology (Shanghai) Co., Ltd.

Test Report

Report No.: RXA1305-0050RF01R2

Page 23 of 36

Limits

According to the Sec. 22.355, the frequency stability of the carrier shall be accurate to within 2.5 ppm of the received frequency for mobile stations.

Limits	≤ 2.5 ppm
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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 $k = 3, U = 0.01\text{ppm}$.

Test Result

GSM 850

Temperature (°C)	Test Results (ppm) / 3.8 V Power supply
	Channel 190
-30	-15.76
-20	-13.3
-10	-16.78
0	-11.77
10	-13.75
20	-13.01
30	-12.48
40	-12.56
50	-12.07

Voltage (V)	Test Results(ppm) / 20°C
	Channel 190
3.6	-15.04
3.8	-13.01
4.2	-10.00

TA Technology (Shanghai) Co., Ltd.
Test Report

GPRS 850

Temperature (°C)	Test Results (ppm) / 3.8 V Power supply
	Channel 190
-30	8.16
-20	9.37
-10	10.15
0	0.3
10	4.03
20	-4.41
30	0.93
40	0.84
50	2.18

Voltage (V)	Test Results(ppm) / 20°C
	Channel 190
3.6	-3.15
3.8	-4.41
4.2	-5.17

TA Technology (Shanghai) Co., Ltd.

Test Report

Report No.: RXA1305-0050RF01R2

Page 25 of 36

2.7. Spurious Emissions at Antenna Terminals

Ambient condition

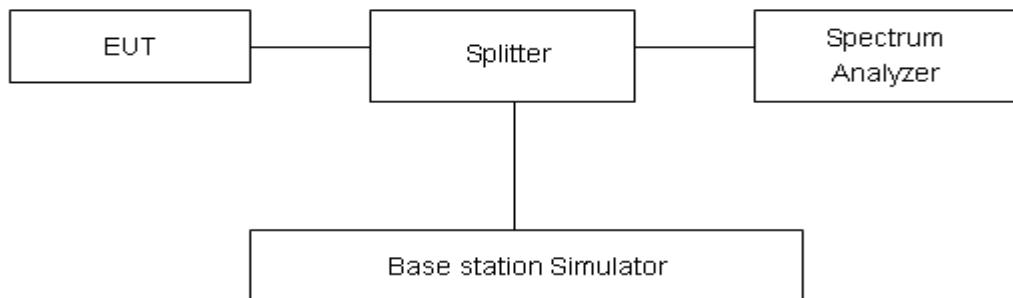
Temperature	Relative humidity
21°C ~25°C	40%~60%

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. For GSM 850, RBW and VBW are set to 100 kHz, Sweep is set to ATUO.

Of those disturbances below (limit – 20 dB), the mark is not required for the EUT.

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

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

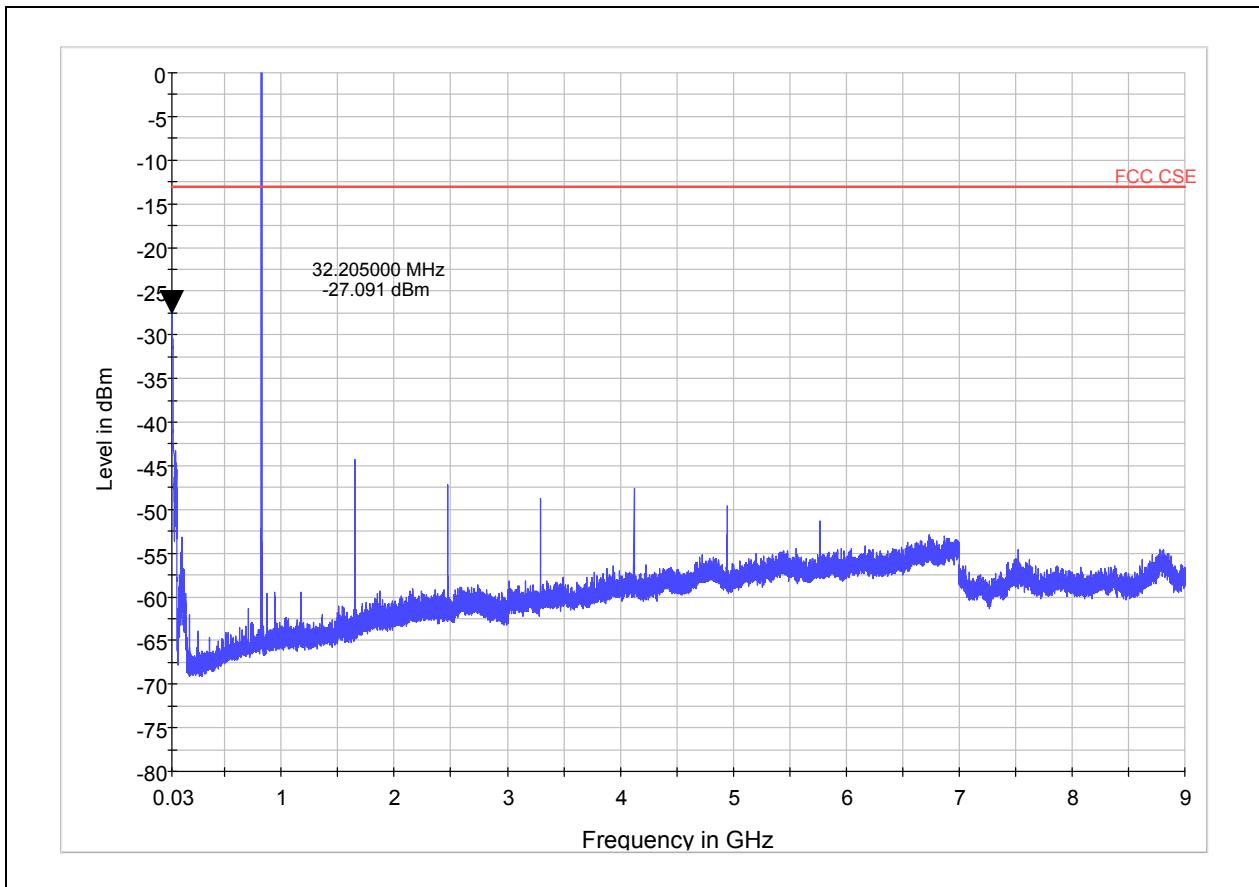
TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 26 of 36

Test Result

GSM 850 CH128



Note: The signal beyond the limit is carrier

GSM 850 128 Channel 30MHz~9GHz

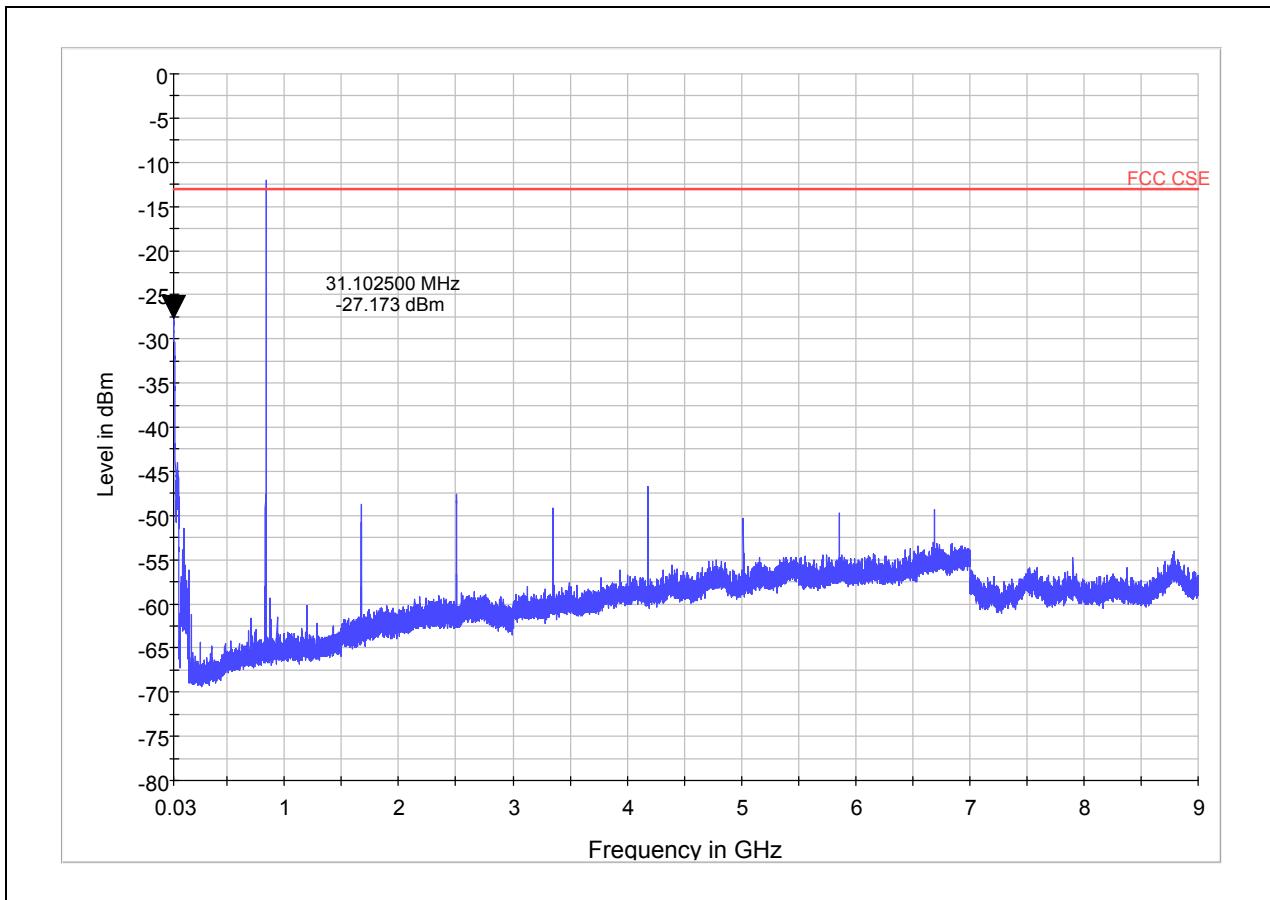
Harmonic	TX ch.128 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	1648.8	N/A	-13	/
3	2472.6	N/A	-13	/
4	3296.8	N/A	-13	/
5	4121	N/A	-13	/
6	4945.2	N/A	-13	/
7	5769.4	N/A	-13	/
8	6593.6	N/A	-13	/
9	7417.8	N/A	-13	/
10	8242	N/A	-13	/
N/A: not applicable				

TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 27 of 36

GSM 850 CH190



Note: The signal beyond the limit is carrier

GSM 850 190 Channel 30MHz~9GHz

Harmonic	TX ch.190 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	1673.2	N/A	-13	/
3	2509.8	N/A	-13	/
4	3346.4	N/A	-13	/
5	4183	N/A	-13	/
6	5019.6	N/A	-13	/
7	5856.2	N/A	-13	/
8	6692.8	N/A	-13	/
9	7529.4	N/A	-13	/
10	8366	N/A	-13	/

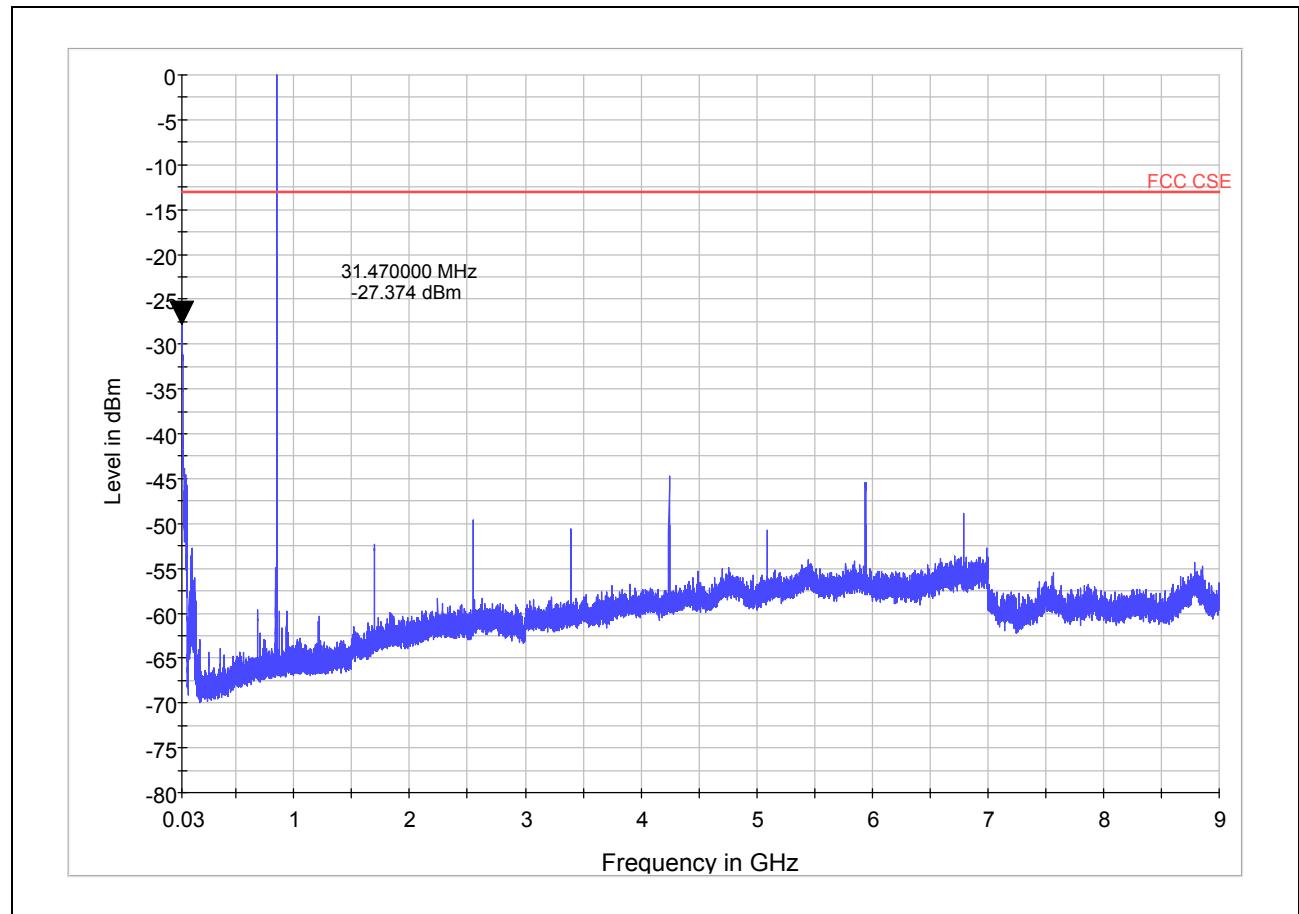
N/A: not applicable

TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 28 of 36

GSM 850 CH251



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

Harmonic	TX ch.251 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	1697.6	N/A	-13	/
3	2546.4	N/A	-13	/
4	3395.2	N/A	-13	/
5	4244	N/A	-13	/
6	5092.8	N/A	-13	/
7	5941.6	N/A	-13	/
8	6790.4	N/A	-13	/
9	7639.2	N/A	-13	/
10	8488	N/A	-13	/

N/A: not applicable

2.8. Radiates Spurious Emission

Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

Method of Measurement

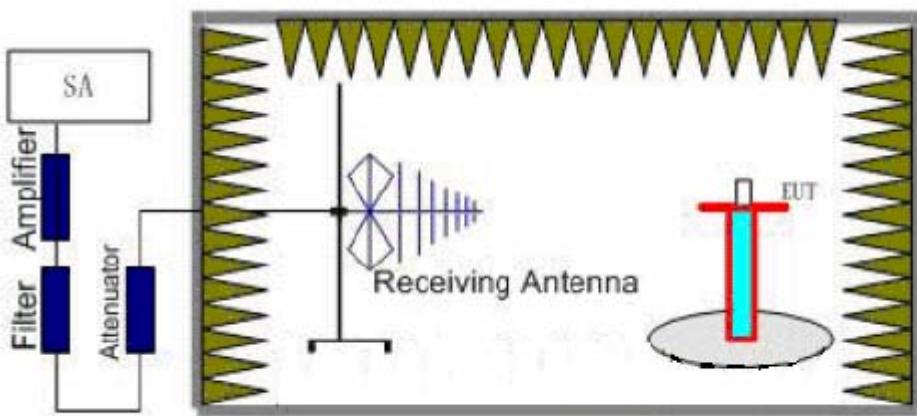
The measurements procedures in TIA -603C are used.

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:

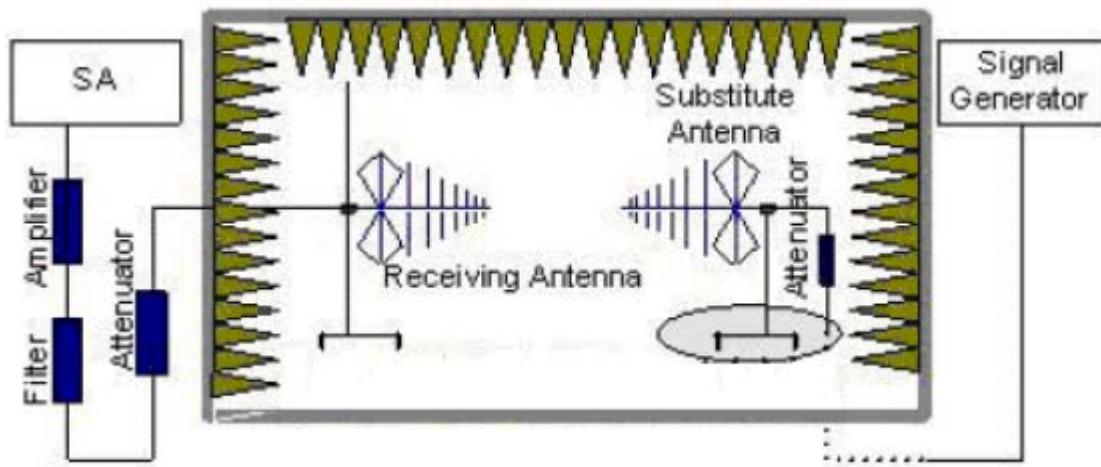
Step 1:

The measurement is carried out in the semi-anechoic chamber. EUT was placed on a 1.5 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.



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 lie-down position (X axis) and the antenna is vertical.

Of those disturbances below (limit - 20 dB), the mark is not required for the EUT.

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 $k = 1.96$, $U = 3.55$ dB.

TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 31 of 36

Test Result

GSM 850 CH128

Harmonic	TX ch.128 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1648.5	-52.45	2	10.15	-46.45	-13	33.45	180
3	2472.9	-50.54	2.51	11.35	-43.85	-13	30.85	90
4	3296.6	-57.12	4.2	10.85	-52.62	-13	39.62	0

TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 32 of 36

GSM 850 CH190

Harmonic	TX ch.190 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.1	-49.11	2	10.75	-42.51	-13	29.51	0
3	2510.1	-47.89	2.51	11.05	-41.50	-13	28.50	180
7	5856.8	-58.32	5.7	13.55	-52.62	-13	39.62	0

TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 33 of 36

GSM 850 CH251

Harmonic	TX ch.251 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1697.3	-43.99	2	10.15	-37.98	-13	24.98	270
3	2546.6	-51.06	2.51	11.05	-44.67	-13	31.67	45

TA Technology (Shanghai) Co., Ltd.
Test Report

Report No.: RXA1305-0050RF01R2

Page 34 of 36

3. Main Test Instruments

No.	Name	Type	Manufacturer	Serial Number	Calibration Date	Valid Period
01	Base Station Simulator	CMU200	R&S	118133	2012-06-30	One year
02	Power Splitter	SHX-GF2-2-13	Hua Xiang	10120101	NA	NA
03	Spectrum Analyzer	E4445A	Agilent	MY46181146	2012-06-30	One year
04	Universal Radio Communication Tester	E5515C	Agilent	MY48367192	2012-06-30	One year
05	Signal Analyzer	FSV30	R&S	100815	2012-06-30	One year
06	Signal generator	SMB 100A	R&S	102594	2012-06-30	One year
07	EMI Test Receiver	ESCI	R&S	100948	2012-06-30	One year
08	Trilog Antenna	VUBL 9163	SCHWARZB ECK	9163-201	2010-06-20	Three years
09	Horn Antenna	HF907	R&S	100126	2012-07-01	Three years
10	Climatic Chamber	PT-30B	Re Ce	20101891	2010-09-10	Three years

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

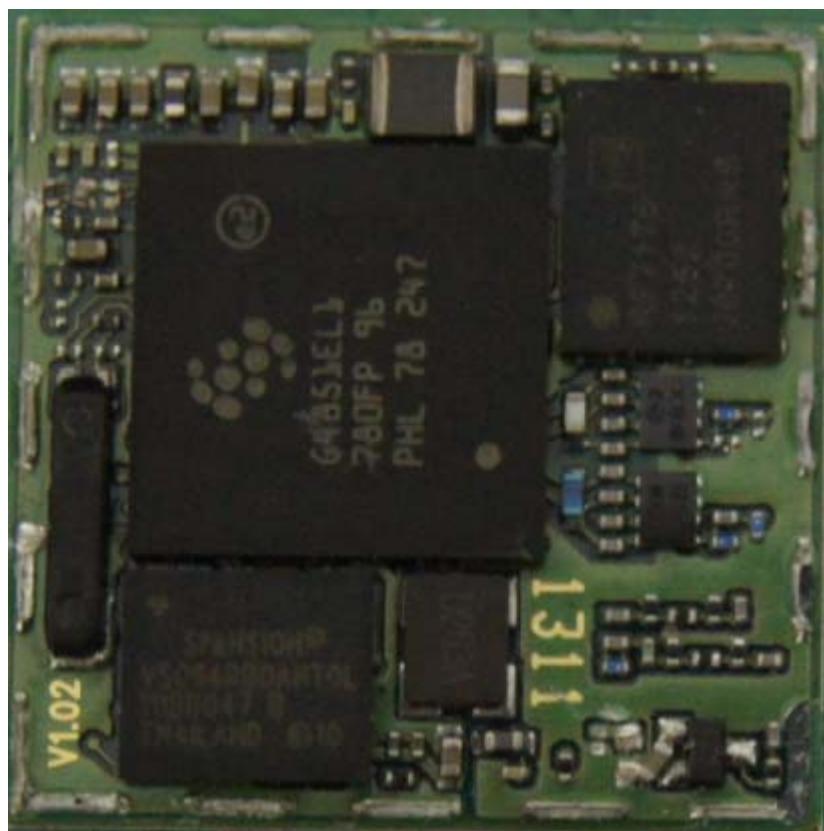
**TA Technology (Shanghai) Co., Ltd.
Test Report**

Report No.: RXA1305-0050RF01R2

Page 35 of 36

ANNEX A: EUT Appearance and Test Setup

A.1 EUT Appearance



a: EUT

Picture 1 EUT and Auxiliary

**TA Technology (Shanghai) Co., Ltd.
Test Report**

Report No.: RXA1305-0050RF01R2

Page 36 of 36

A.2 Test Setup



Picture 2: Radiated Spurious Emissions Test setup