



Part 22

TEST REPORT

Product Name	WCDMA/GSM Dual band mobile phone
Model Name	W716S
Brand Name	Haier
FCC ID	SG71408W716S
Applicant	Haier Telecom (Qingdao) Co., Ltd.
Manufacturer	Haier Telecom (Qingdao) Co., Ltd.
Date of issue	August 25, 2014

TA Technology (Shanghai) Co., Ltd.

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	15
2.5. Band Edge Compliance	26
2.6. Peak-to-Average Power Ratio (PAPR)	35
2.7. Frequency Stability	42
2.8. Spurious Emissions at Antenna Terminals	46
2.9. Radiates Spurious Emission	53
3. Main Test Instruments	58
ANNEX A: EUT Appearance and Test Setup	59
A.1 EUT Appearance	59
A.2 Test Setup	60

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. The sample under test was selected by the Client. This report only refers to the item that has undergone the test.

This report alone 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 electronic report is inconsistent with the printed one, it should be subject to the latter.

TA Technology (Shanghai) Co., Ltd.

Test Report

Report No.: RXA1407-0191RF01R1

Page 5 of 60

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: Haier Telecom (Qingdao) Co., Ltd.
No1. Haier Road , Hi-tech Zone
Address: Qingdao
P.R. China
266101

1.4. Manufacturer Information

Company: Haier Telecom (Qingdao) Co., Ltd.
No1. Haier Road , Hi-tech Zone
Address: Qingdao
P.R. China
266101

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

Report No.: RXA1407-0191RF01R1

Page 6 of 60

1.5. Information of EUT

General information

Product IMEI:	862295021475693		
Hardware Version:	H01		
Software Version:	HW-W716S-H01-S001-VE		
Antenna Type:	Internal Antenna		
Device Operating Configurations:			
Test Mode(s):	GSM 850: WCDMA Band V;		
Test Modulation:	(GSM)GMSK,8PSK; (WCDMA)QPSK		
GPRS Multislot Class:	12		
EGPRS Multislot Class:	12		
HSDPA UE Category:	14		
HSUPA UE Category:	6		
Maximum E.R.P.	GSM 850: 29.35 dBm WCDMA Band V: 20.65 dBm		
Power Supply:	Battery or Charger (AC adaptor)		
Rated Power Supply Voltage:	3.8V		
Extreme Voltage:	Minimum: 3.6V Maximum: 4.2V		
Test Temperature:	Lowest: -20°C Highest: +50°C		
Test Channel: (Low - Middle - High)	128 - 190 - 251 4132 - 4183 - 4233	(GSM 850) (WCDMA Band V)	
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM850	824.2 ~ 848.8	869.2 ~ 893.8
	WCDMA Band V	826.4 ~ 846.6	871.4 ~ 891.6

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

Report No.: RXA1407-0191RF01R1

Page 7 of 60

Auxiliary Equipment Details

Name	Model	Manufacturer	Capacity	S/N
Battery	H11277	Zhongshan TIANMAO Battery Co.,Ltd	1400mAh	EB094300000E0000315T

1.6. Test Date

The test is performed from August 5, 2014 to August 11, 2014.

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

Report No.: RXA1407-0191RF01R1

Page 8 of 60

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	Peak-to-Average Power Ratio	KDB 971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 / 22.355	PASS
7	Spurious Emissions at Antenna Terminals	2.1051 / 22.917(a)	PASS
8	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.

2.2. RF Power Output

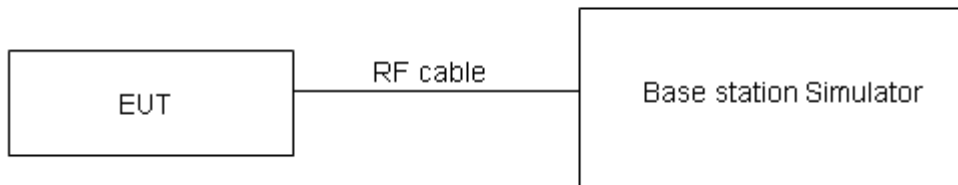
Ambient condition

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.: RXA1407-0191RF01R1

Page 10 of 60

Test Results

GSM 850		Conducted Power(dBm)		
		Channel 128	Channel 190	Channel 251
		824.2 (MHz)	836.6 (MHz)	848.8 (MHz)
GSM	Results	32.32	31.63	32.33
GPRS (GMSK)	1TXslot	32.23	31.67	32.21
	2TXslots	31.57	30.90	31.60
	3TXslots	30.18	29.37	30.14
	4TXslots	29.04	28.22	28.90
EGPRS (8PSK)	1TXslot	32.20	31.46	32.12
	2TXslots	31.63	30.78	31.62
	3TXslots	30.14	29.29	30.01
	4TXslots	29.06	28.42	29.08

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 V		Conducted Power(dBm)		
		Channel 4132	Channel 4183	Channel 4233
		826.4(MHz)	836.6(MHz)	846.6(MHz)
RMC		22.10	22.03	22.23
HSDPA	Sub - Test 1	21.33	21.28	21.39
	Sub - Test 2	21.35	21.34	21.42
	Sub - Test 3	21.34	21.34	21.39
	Sub - Test 4	21.31	21.33	21.39
HSUPA	Sub - Test 1	19.44	19.41	19.43
	Sub - Test 2	19.32	19.41	19.45
	Sub - Test 3	19.90	19.90	19.99
	Sub - Test 4	18.90	18.86	18.93
	Sub - Test 5	20.64	20.64	20.68

Note:

- 1) The maximum RF Output Power numbers are marks in bold.
- 2) The following testing in HSDPA/HSUPA is set to Sub - Test 2 /Sub – Test 5 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. $ERP/EIRP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$

P_s (dBm) : Input power to substitution antenna.

G_s (dBi or dBd) : Substitution antenna Gain.

$E_t = R_t + AF$

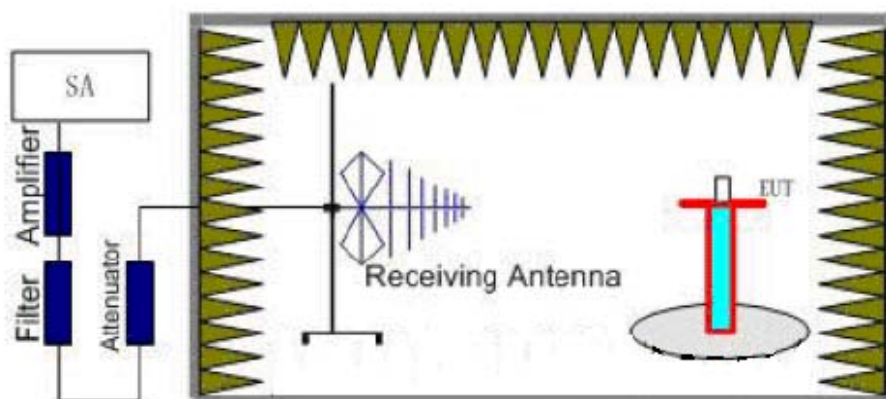
$E_s = R_s + AF$

AF (dB/m) : Receive antenna factor

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

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

Test Setup



TA Technology (Shanghai) Co., Ltd.

Test Report

Report No.: RXA1407-0191RF01R1

Page 12 of 60

Limits

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

Limit	$\leq 7 \text{ W}$ (38.45 dBm)
-------	--------------------------------

Measurement Uncertainty

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

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

Report No.: RXA1407-0191RF01R1

Page 13of 60

Test Results:Pass

GSM850					
Horizontal Polarization					
Frequency(MHz)	Rt(dBm)	Rs(dBm)	Ps(dBm)	Gs(dBd)	ERP(dBm)
824.2	-17.24	-45.53	0	-1.09	29.35
836.6	-17.90	-45.38	0	-0.91	28.72
848.8	-17.61	-45.37	0	-0.77	29.14
Vertical Polarization					
Frequency(MHz)	Rt(dBm)	Rs(dBm)	Ps(dBm)	Gs(dBd)	ERP(dBm)
824.2	-24.86	-45.65	0	-1.09	21.85
836.6	-26.22	-45.46	0	-0.91	20.48
848.8	-24.80	-45.49	0	-0.77	22.07
GPRS 850					
Horizontal Polarization					
Frequency(MHz)	Rt(dBm)	Rs(dBm)	Ps(dBm)	Gs(dBd)	ERP(dBm)
824.2	-18.29	-45.53	0	-1.09	28.30
836.6	-18.74	-45.38	0	-0.91	27.88
848.8	-18.14	-45.37	0	-0.77	28.61
Vertical Polarization					
Frequency(MHz)	Rt(dBm)	Rs(dBm)	Ps(dBm)	Gs(dBd)	ERP(dBm)
824.2	-26.82	-45.65	0	-1.09	19.89
836.6	-26.81	-45.46	0	-0.91	19.89
848.8	-25.96	-45.49	0	-0.77	20.91
EGPRS 850					
Horizontal Polarization					
Frequency(MHz)	Rt(dBm)	Rs(dBm)	Ps(dBm)	Gs(dBd)	ERP(dBm)
824.2	-22.44	-45.53	0	-1.09	24.15
836.6	-23.53	-45.38	0	-0.91	23.09
848.8	-23.01	-45.37	0	-0.77	23.74
Vertical Polarization					
Frequency(MHz)	Rt(dBm)	Rs(dBm)	Ps(dBm)	Gs(dBd)	ERP(dBm)
824.2	-30.37	-45.65	0	-1.09	16.34
836.6	-31.33	-45.46	0	-0.91	15.37
848.8	-30.84	-45.49	0	-0.77	16.03

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

Report No.: RXA1407-0191RF01R1

Page 14 of 60

WCDMA Band V					
Horizontal Polarization					
Frequency(MHz)	Rt(dBm)	Rs(dBm)	Ps(dBm)	Gs(dBd)	ERP(dBm)
826.4	-26.91	-45.44	0	-1.02	19.66
836.6	-26.41	-45.38	0	-0.91	20.21
846.6	-26.08	-45.38	0	-0.80	20.65
Vertical Polarization					
Frequency(MHz)	Rt(dBm)	Rs(dBm)	Ps(dBm)	Gs(dBd)	ERP(dBm)
826.4	-36.20	-45.54	0	-1.02	10.47
836.6	-34.59	-45.46	0	-0.91	12.11
846.6	-34.79	-45.49	0	-0.80	12.05

Note: ERP = EIRP - 2.15

2.4. Occupied Bandwidth

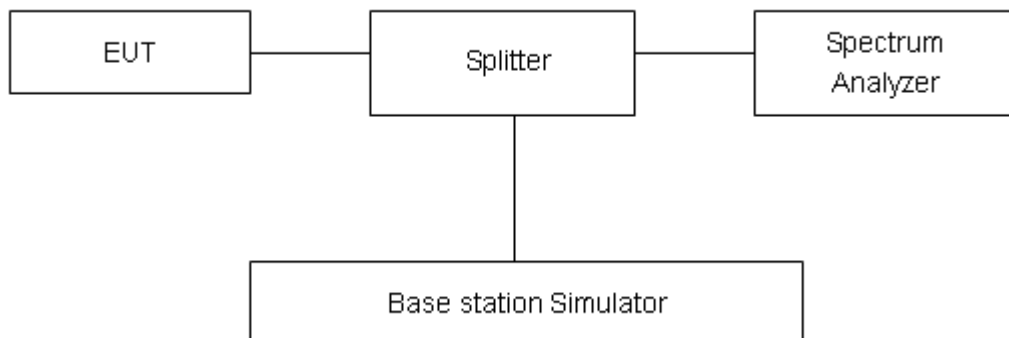
Ambient condition

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 and RBW is set to 51kHz,VBW is set to 100kHz for WCDMA Band V. 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 $k = 2$, $U = 624\text{Hz}$.

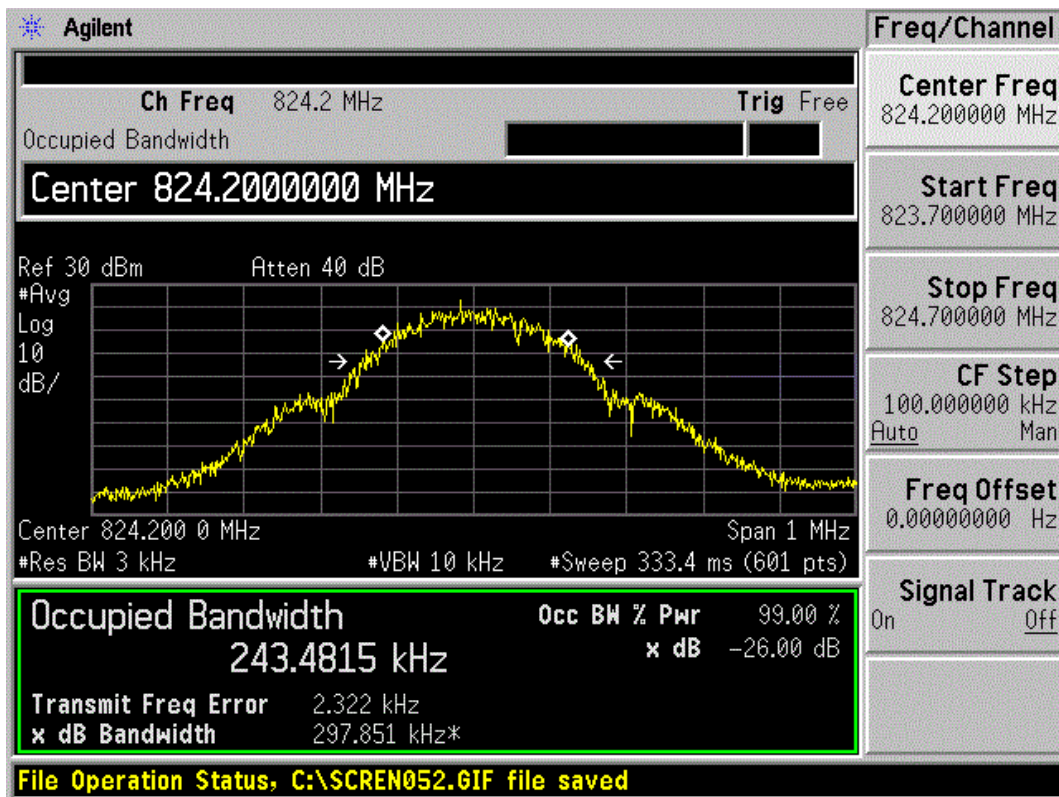
TA Technology (Shanghai) Co., Ltd. Test Report

Report No.: RXA1407-0191RF01R1

Page 16 of 60

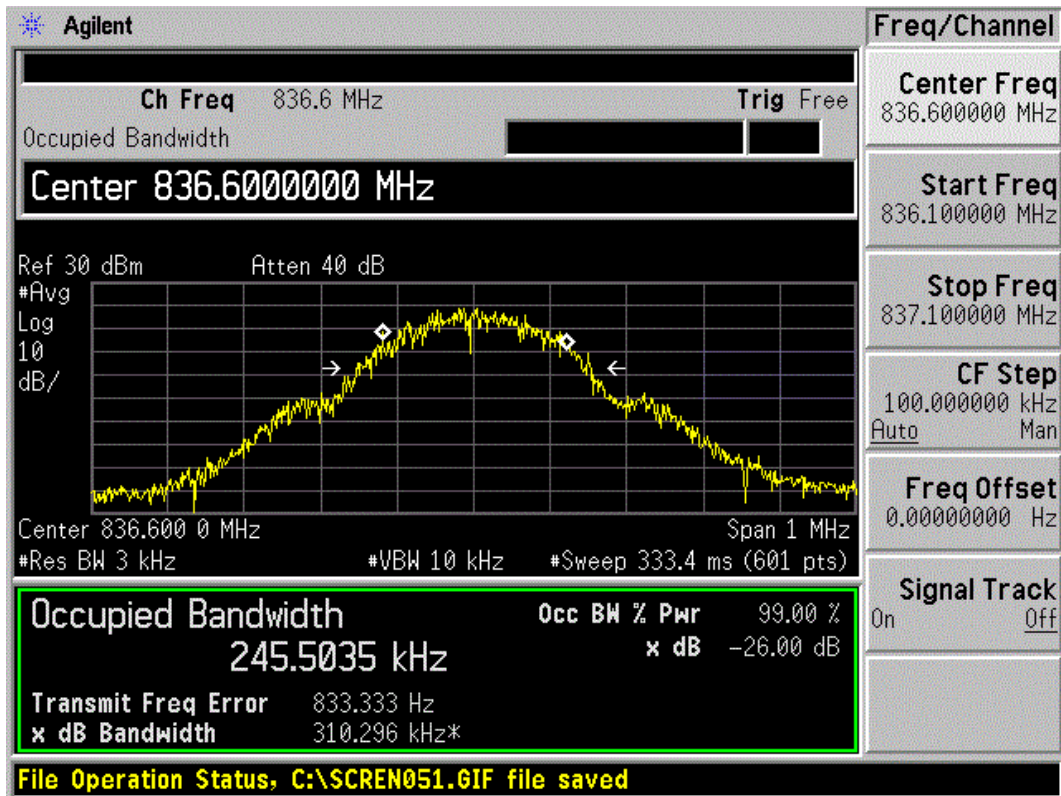
Test Result

	Channel	Frequency (MHz)	99% Power Bandwidth (kHz)	-26dBc Bandwidth(kHz)
GSM 850	128	824.2	243.4815	297.851
	190	836.6	245.5035	310.296
	251	848.8	248.3876	306.469
GPRS (GMSK)	128	824.2	241.7986	309.228
	190	836.6	247.2551	315.447
	251	848.8	241.9456	303.826
EGPRS (8-PSK)	128	824.2	243.9306	303.646
	190	836.6	242.0317	305.980
	251	848.8	244.0612	314.957

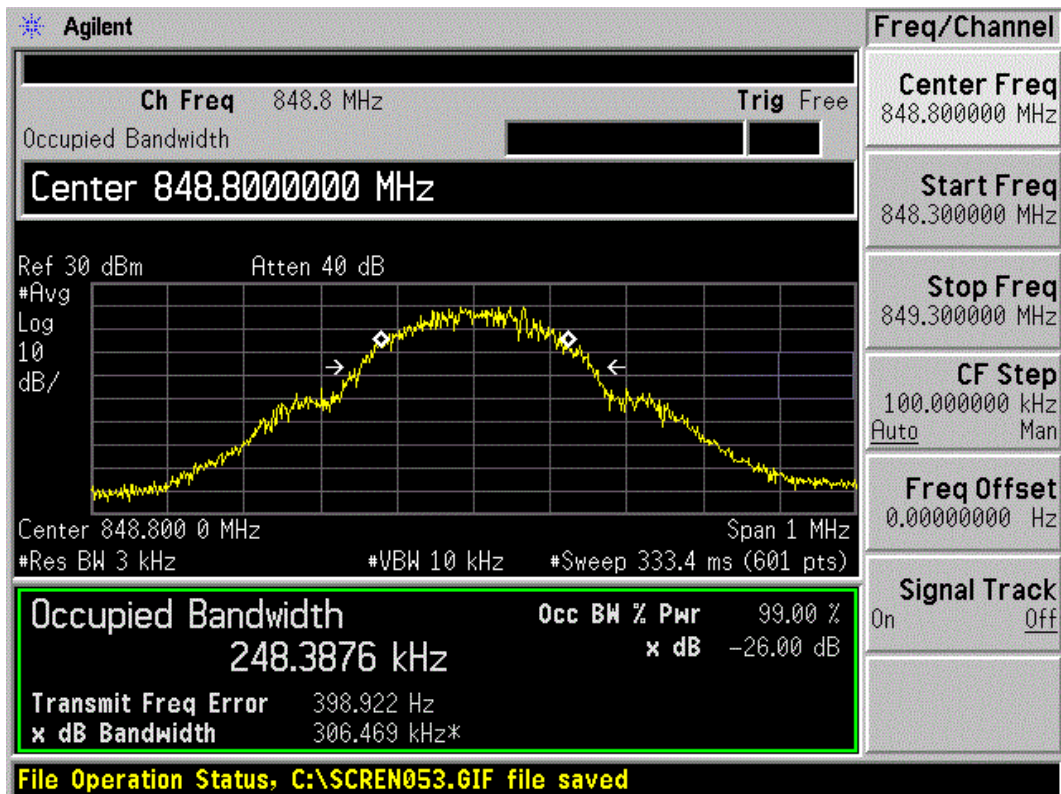


GSM 850 CH128 Occupied Bandwidth

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

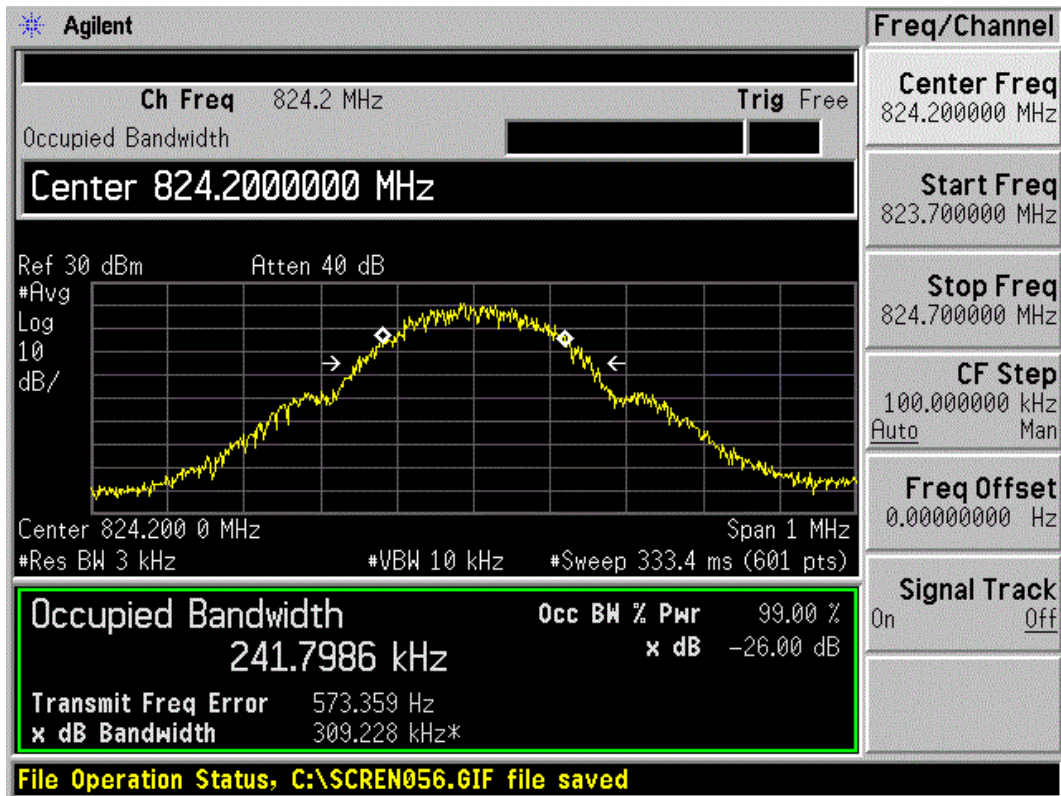


GSM 850 CH190 Occupied Bandwidth

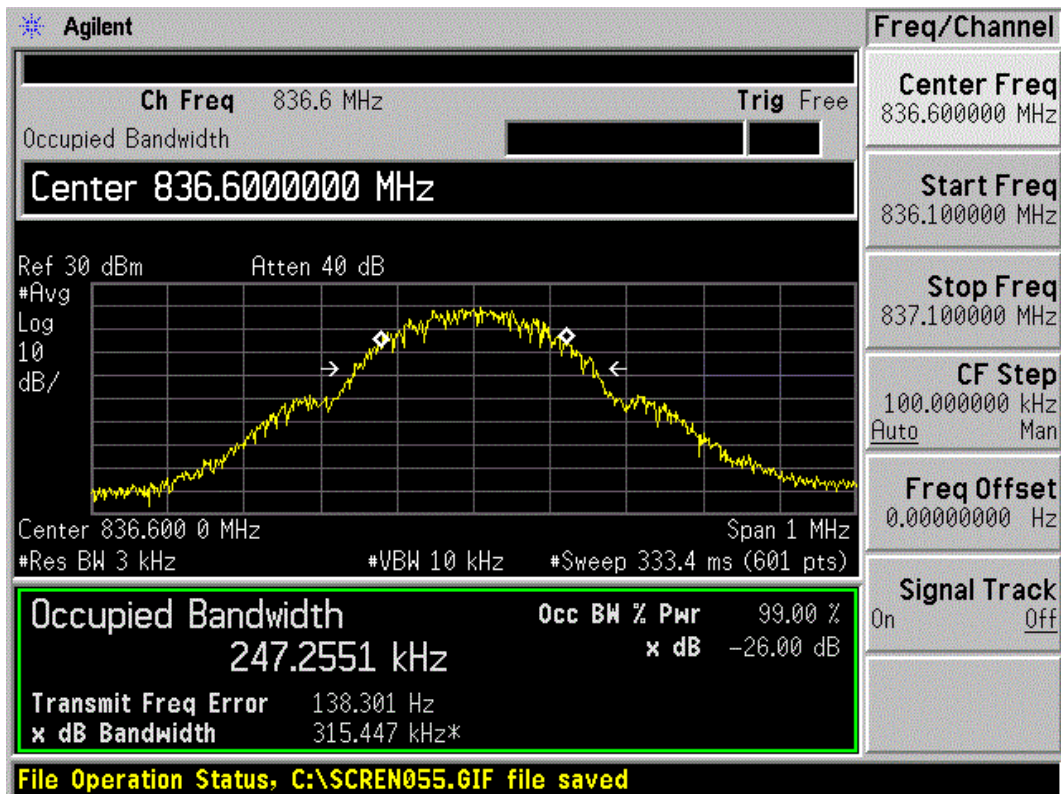


GSM 850 CH251 Occupied Bandwidth

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

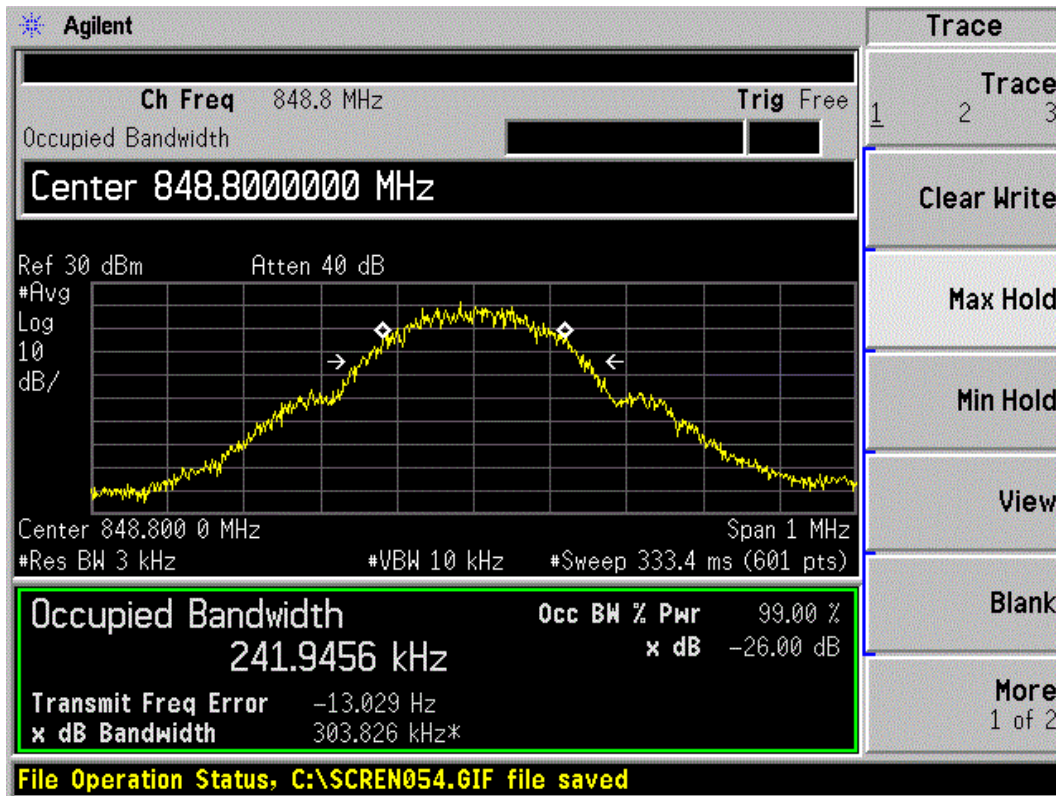


GSM 850 GPRS CH128 Occupied Bandwidth

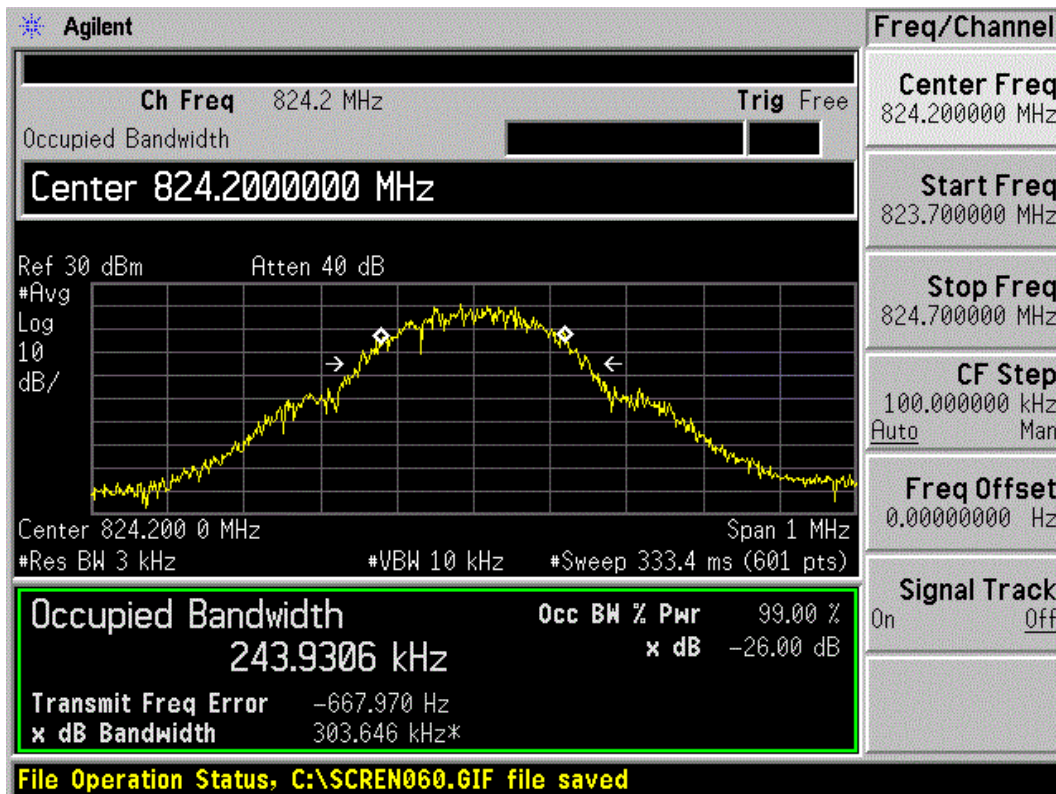


GSM 850 GPRS CH190 Occupied Bandwidth

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

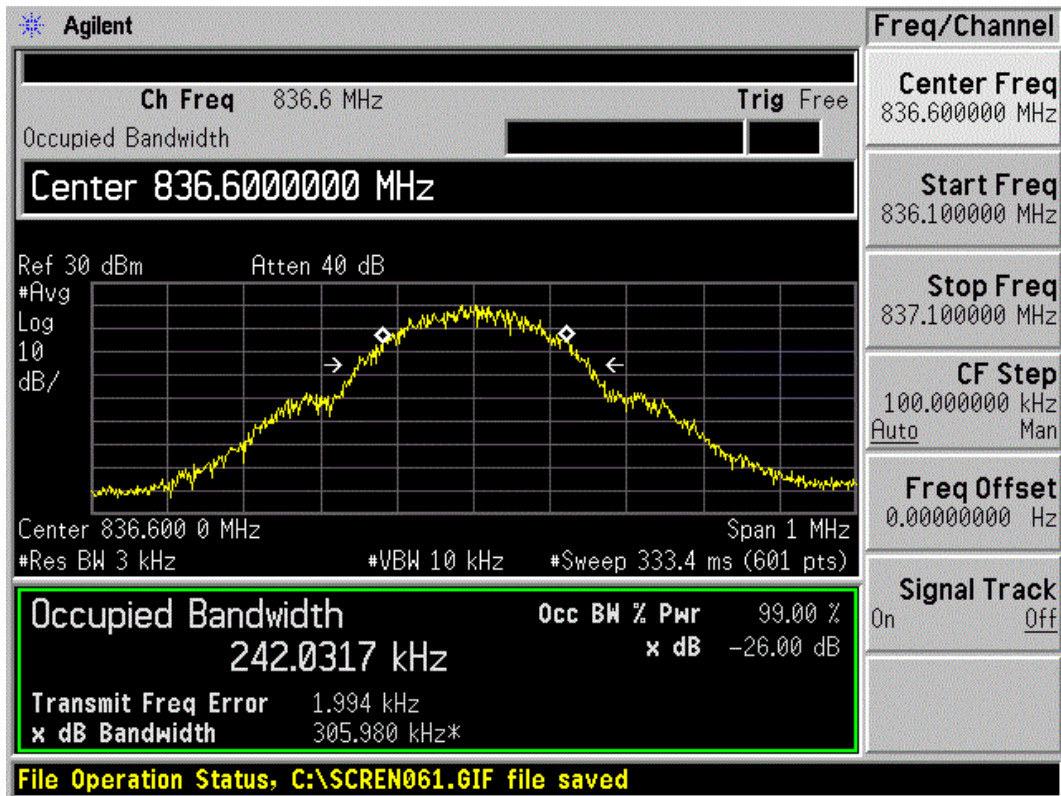


GSM 850 GPRS CH251 Occupied Bandwidth

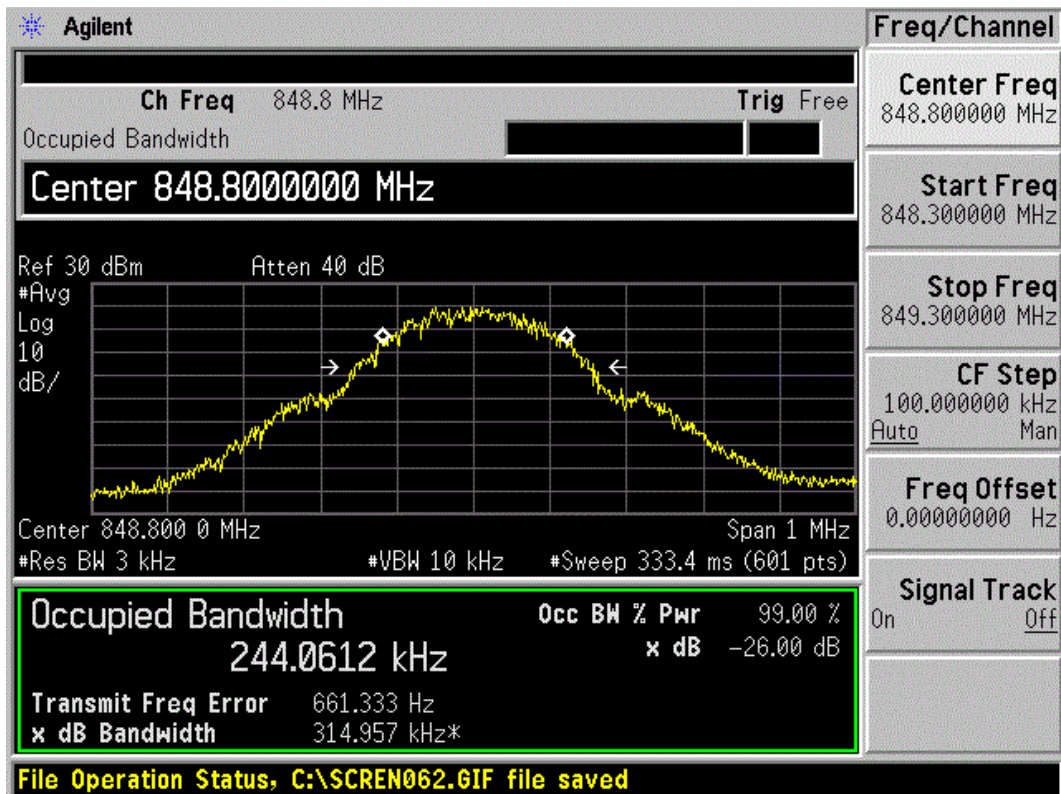


GSM 850 EGPRS CH128 Occupied Bandwidth

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



GSM 850 EGPRS CH190 Occupied Bandwidth



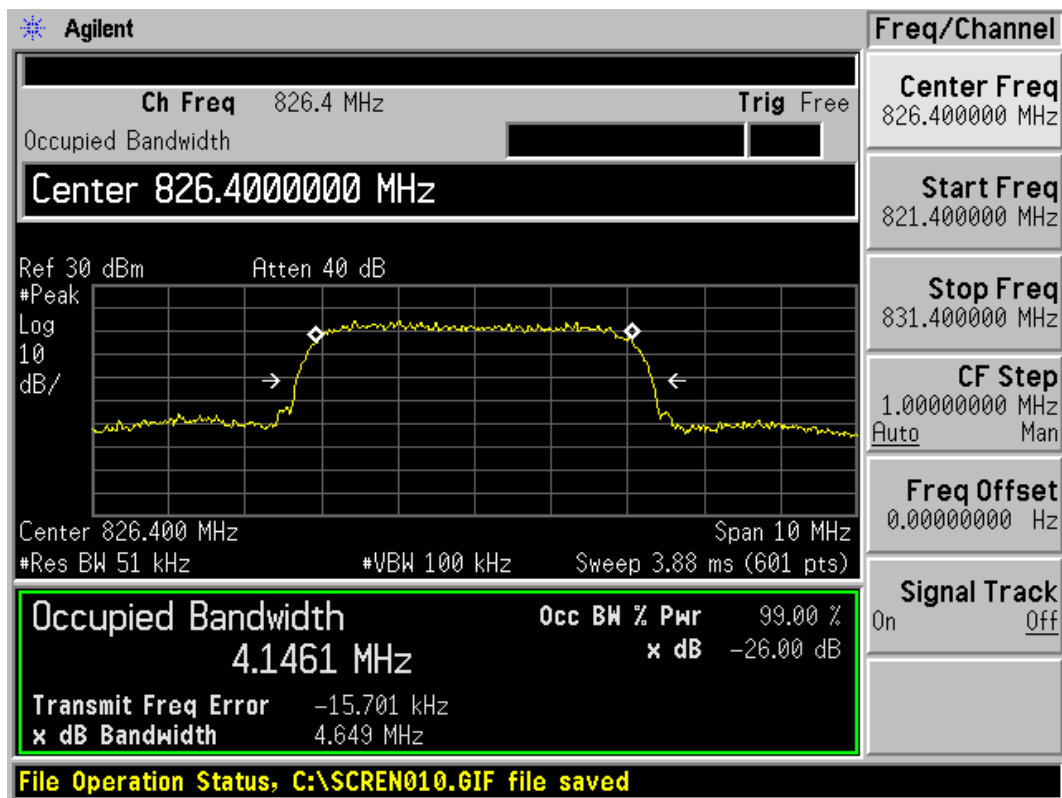
GSM 850 EGPRS CH251 Occupied Bandwidth

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

Report No.: RXA1407-0191RF01R1

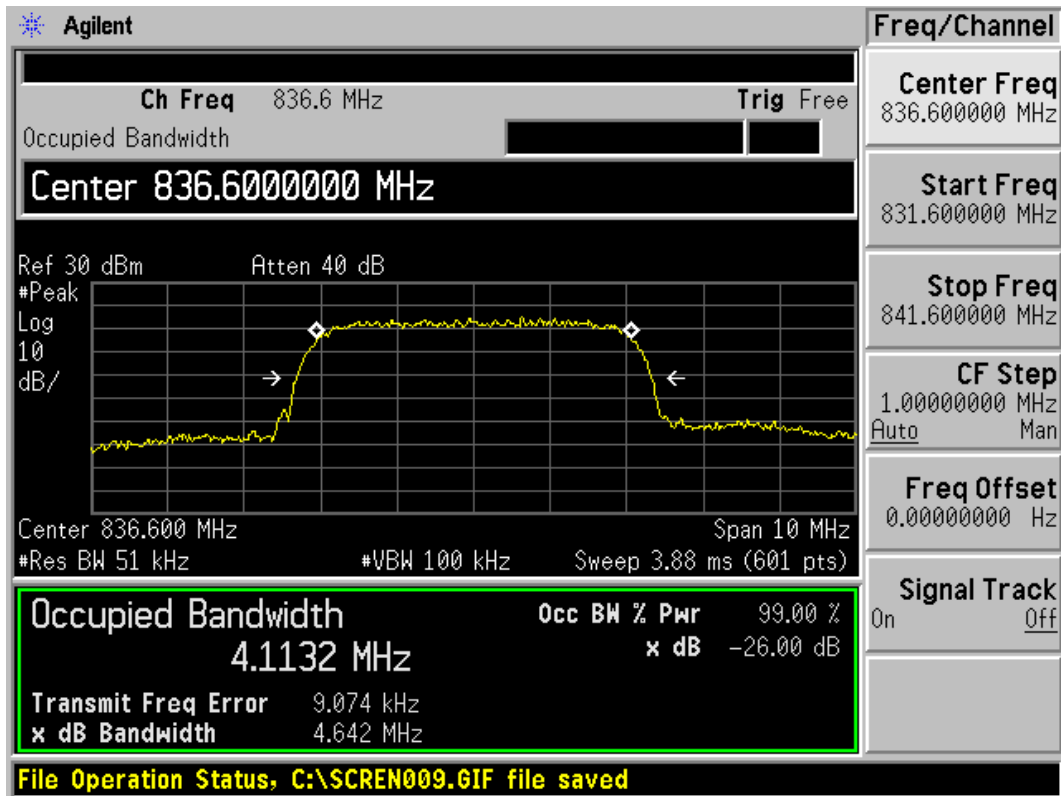
Page 21 of 60

	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
WCDMA Band V	4132	826.4	4.1461	4.649
	4183	836.6	4.1132	4.642
	4233	846.6	4.1556	4.661
HSDPA	4132	826.4	4.1711	4.680
	4183	836.6	4.1371	4.643
	4233	846.6	4.1757	4.667
HSUPA	4132	826.4	4.1750	4.702
	4183	836.6	4.1441	4.662
	4233	846.6	4.1711	4.668

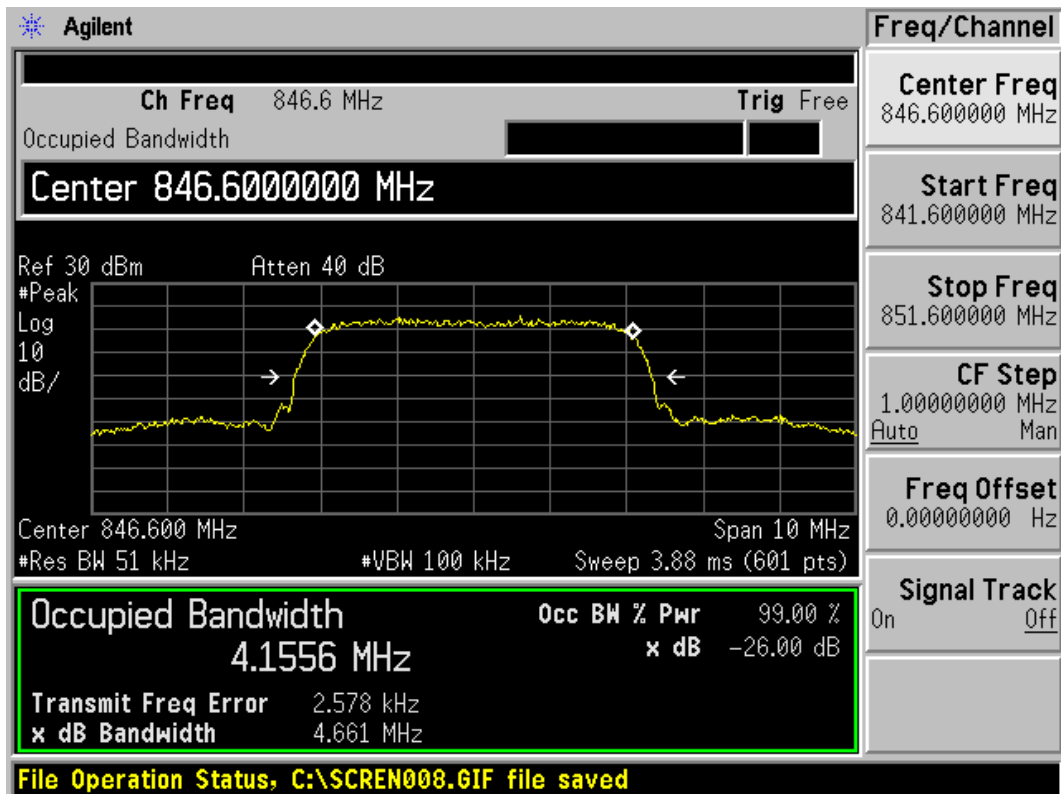


WCDMA Band V CH4132 Occupied Bandwidth

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



WCDMA Band V CH4183 Occupied Bandwidth

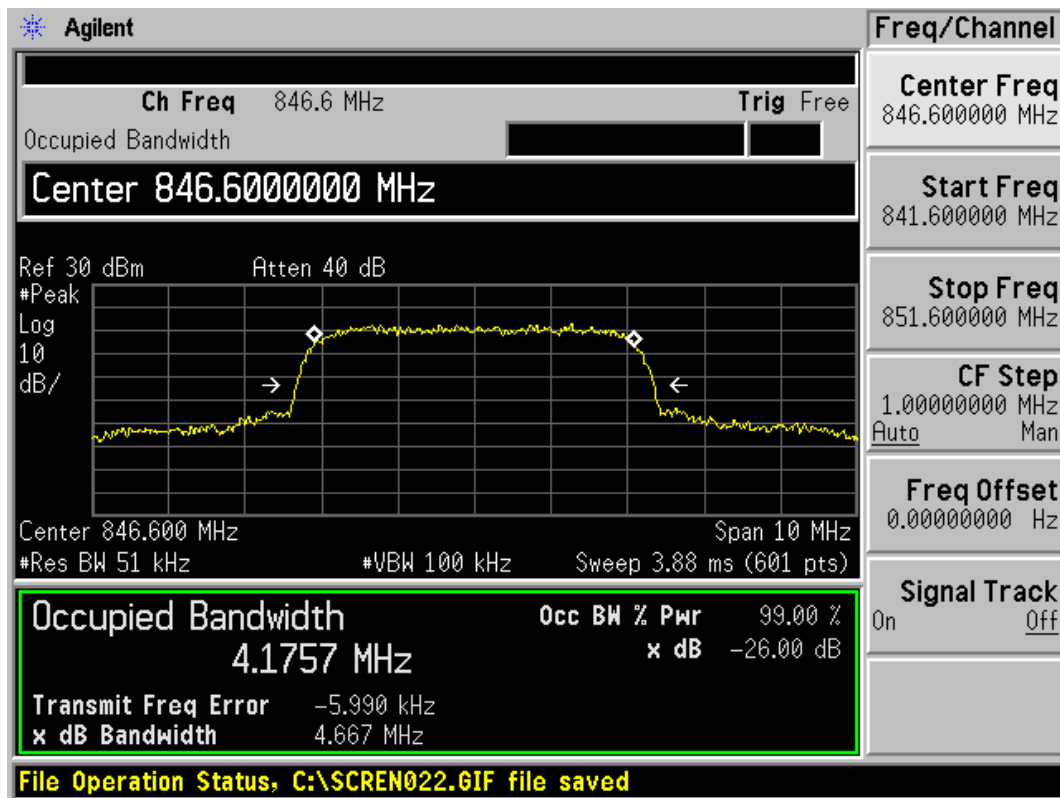


WCDMA Band V CH4233 Occupied Bandwidth

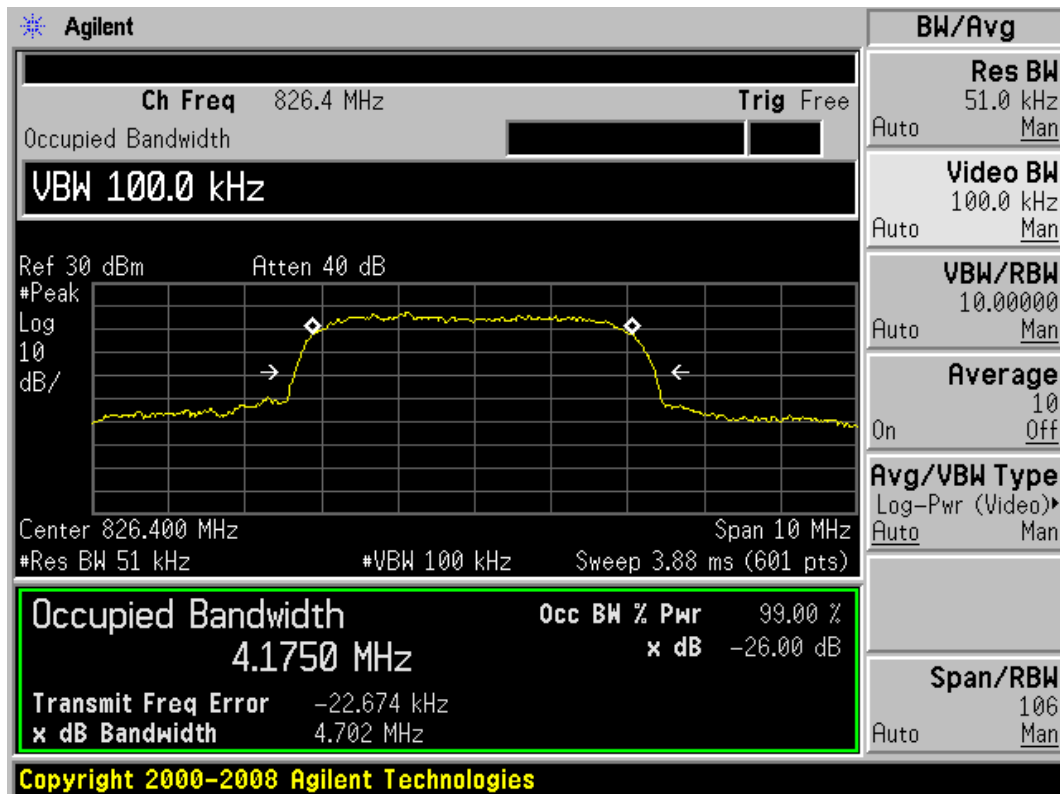
TA Technology (Shanghai) Co., Ltd. Test Report

Report No.: RXA1407-0191RF01R1

Page 24 of 60

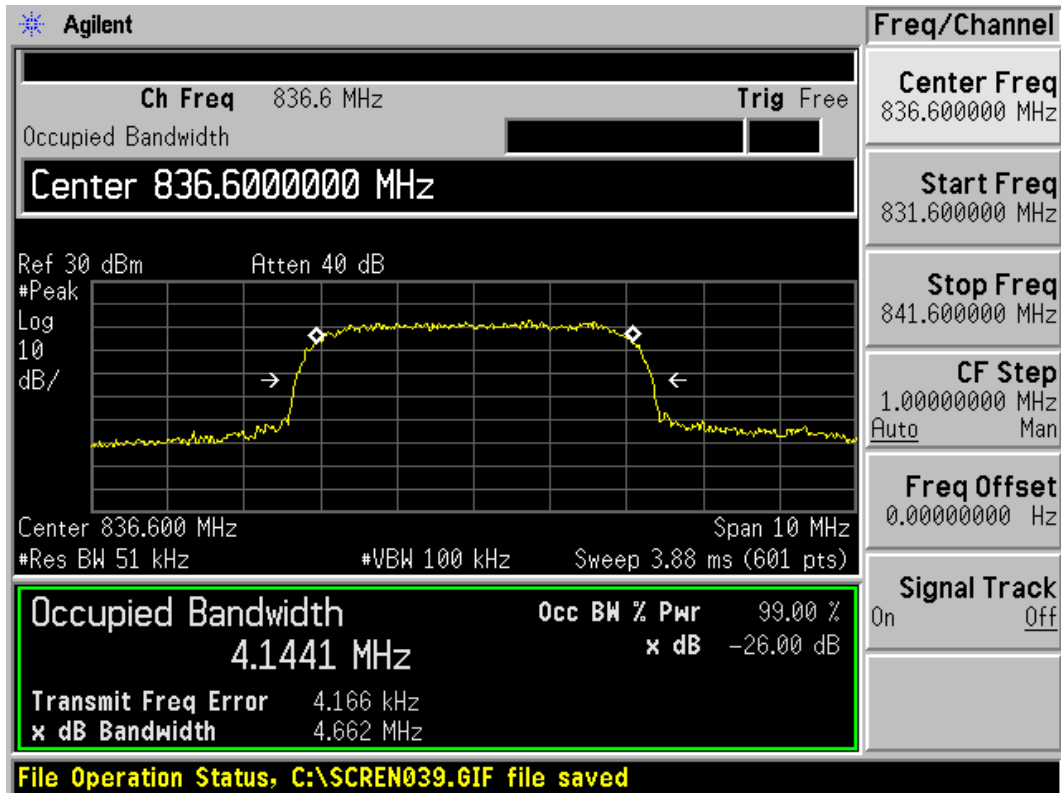


WCDMA Band V HSDPA CH4233 Occupied Bandwidth

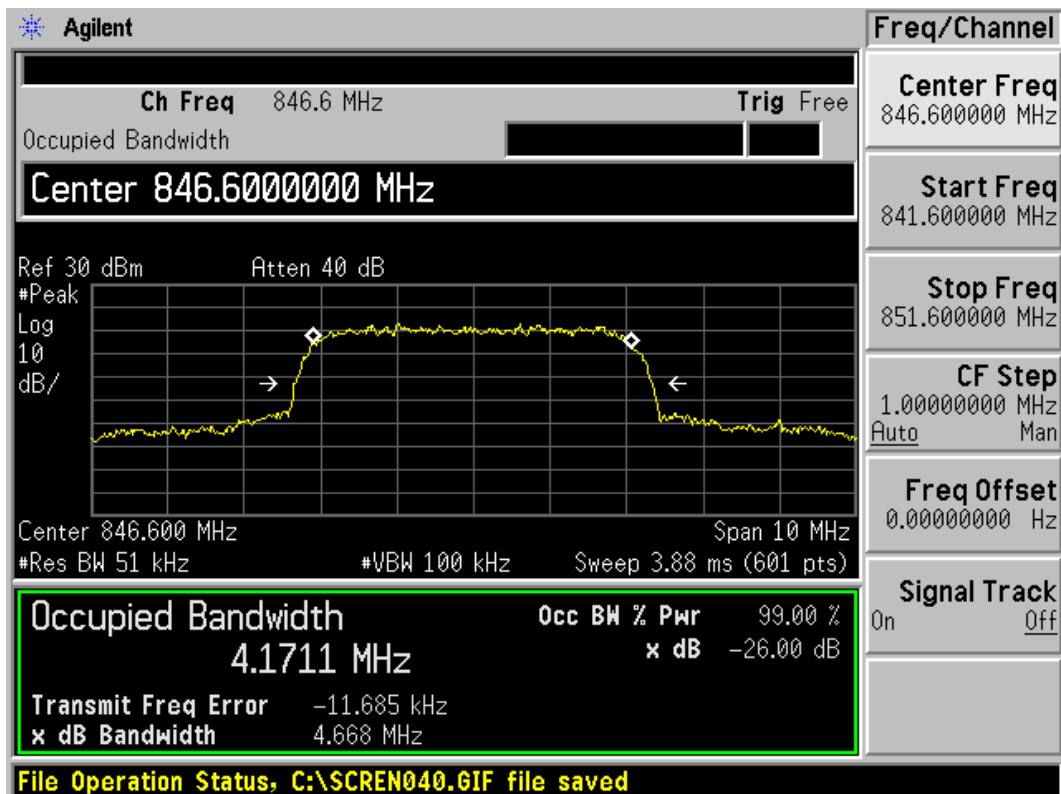


WCDMA Band V HSUPA CH4132 Occupied Bandwidth

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



WCDMA Band V HSUPA CH4183 Occupied Bandwidth



WCDMA Band V HSUPA CH4233 Occupied Bandwidth

2.5. Band Edge Compliance

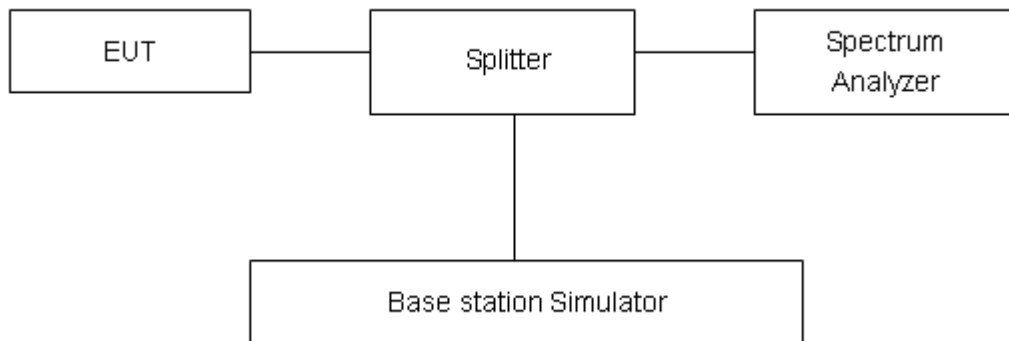
Ambient condition

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 3kHz,VBW is set to 10kHz for GSM 850 and RBW is set to 51kHz,VBW is set to 100kHz for WCDMA Band V. 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
-------	---------

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.

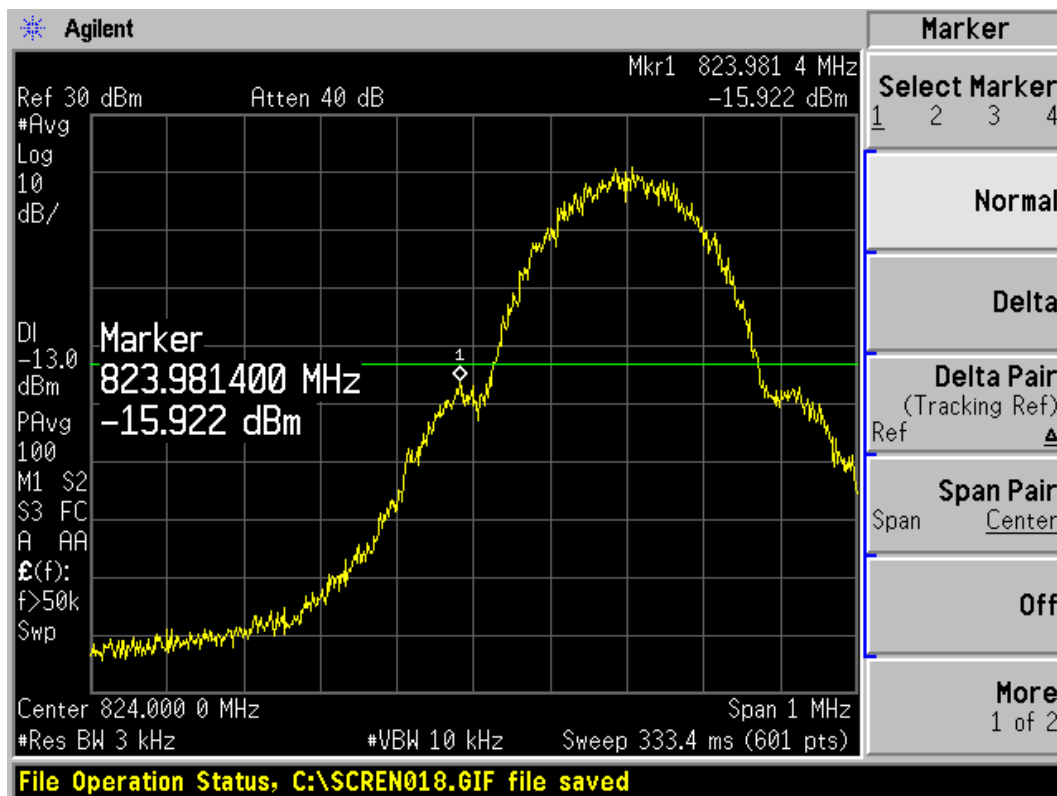
TA Technology (Shanghai) Co., Ltd. Test Report

Report No.: RXA1407-0191RF01R1

Page 27 of 60

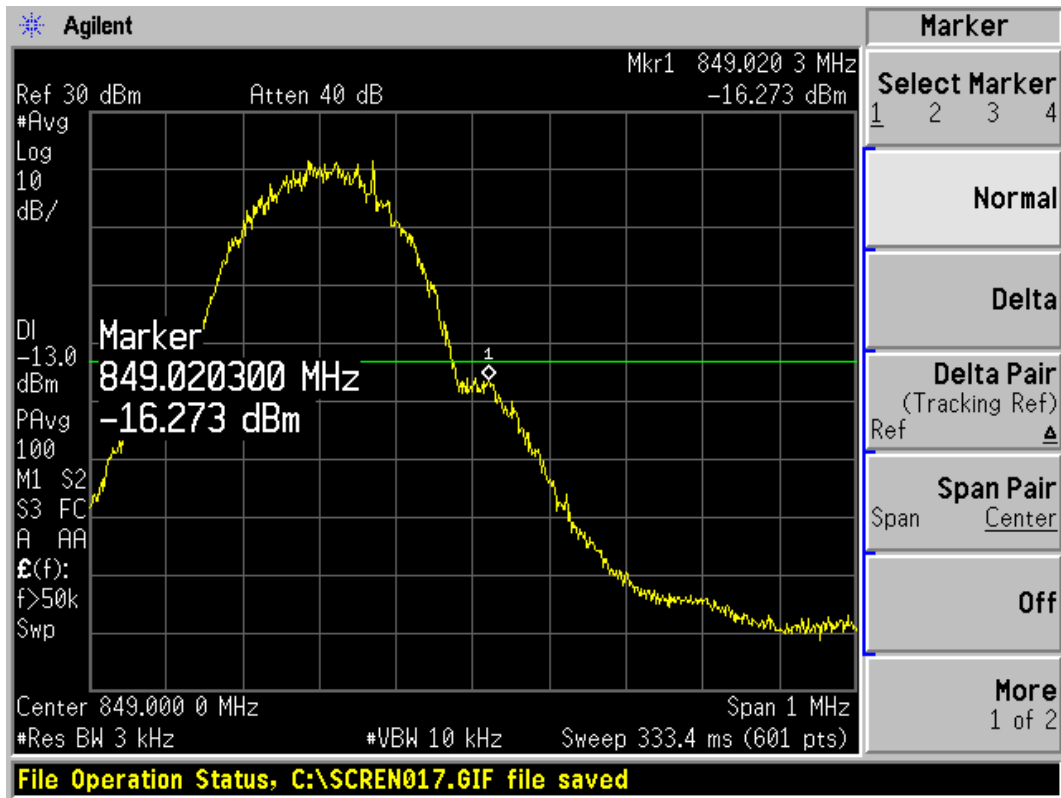
Test Result:

GSM 850	Carrier frequency (MHz)	Reference value (dBm)	Limit	Conclusion
GSM	823.9814	-15.922	-13	PASS
	849.0203	16.273	-13	PASS
GPRS (GMSK)	823.9747	-16.874	-13	PASS
	849.0017	-15.493	-13	PASS
EGPRS (8-PSK)	823.9814	-16.665	-13	PASS
	849.0169	-16.113	-13	PASS

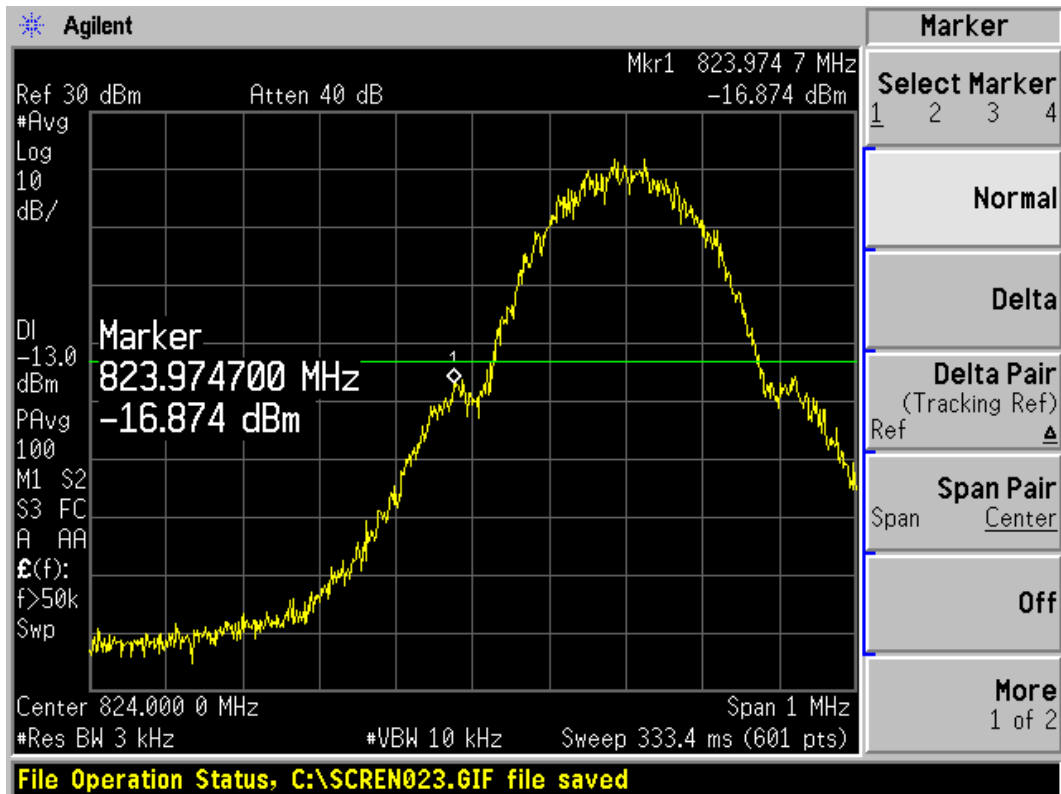


GSM 850 128 Channel

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

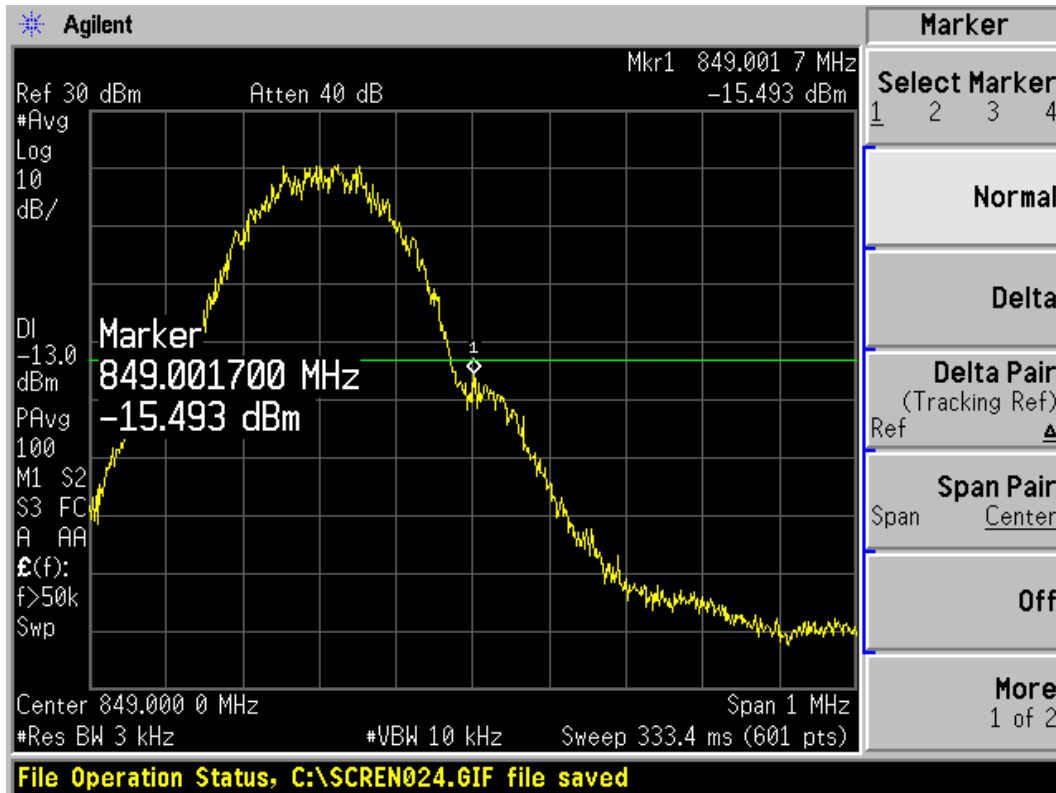


GSM 850 251 Channel

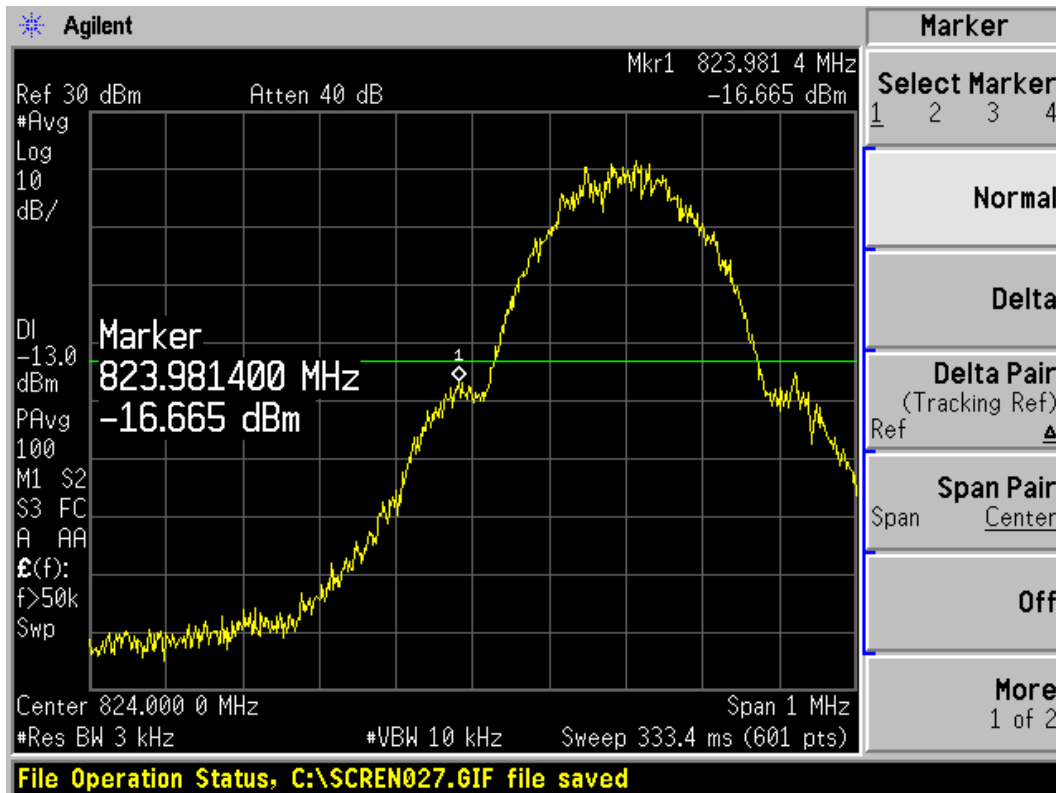


GSM 850 GPRS 128 Channel

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

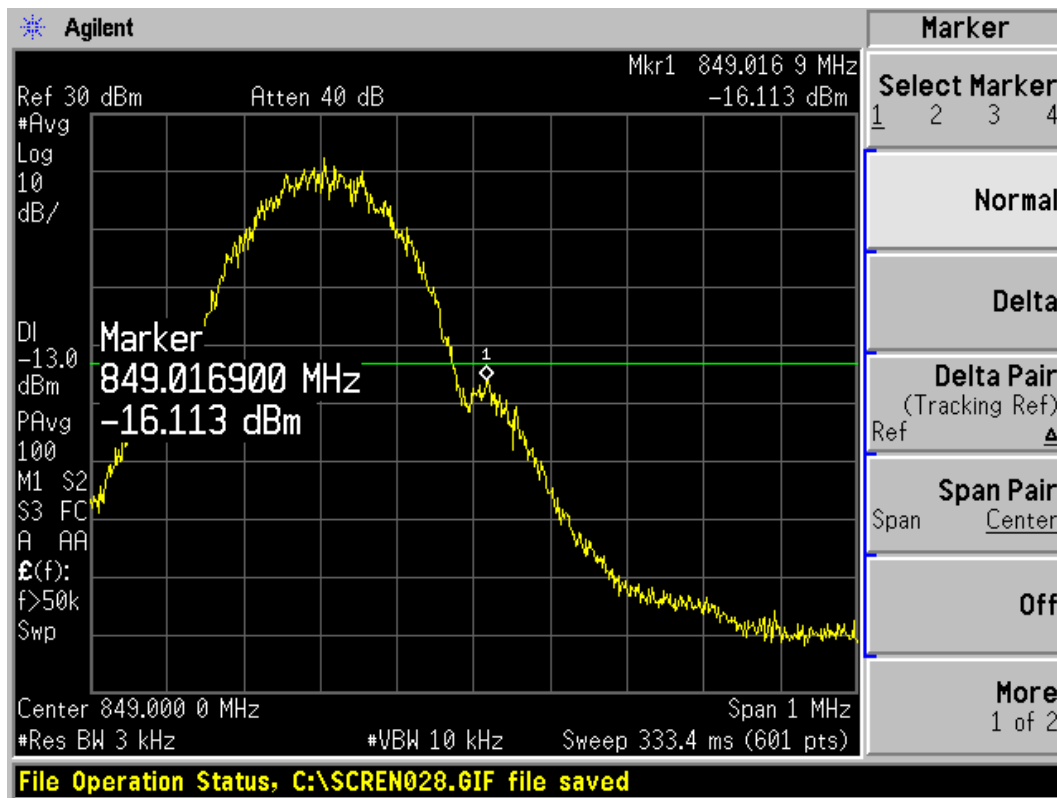


GSM 850 GPRS 251 Channel



GSM 850 EGPRS 128 Channel

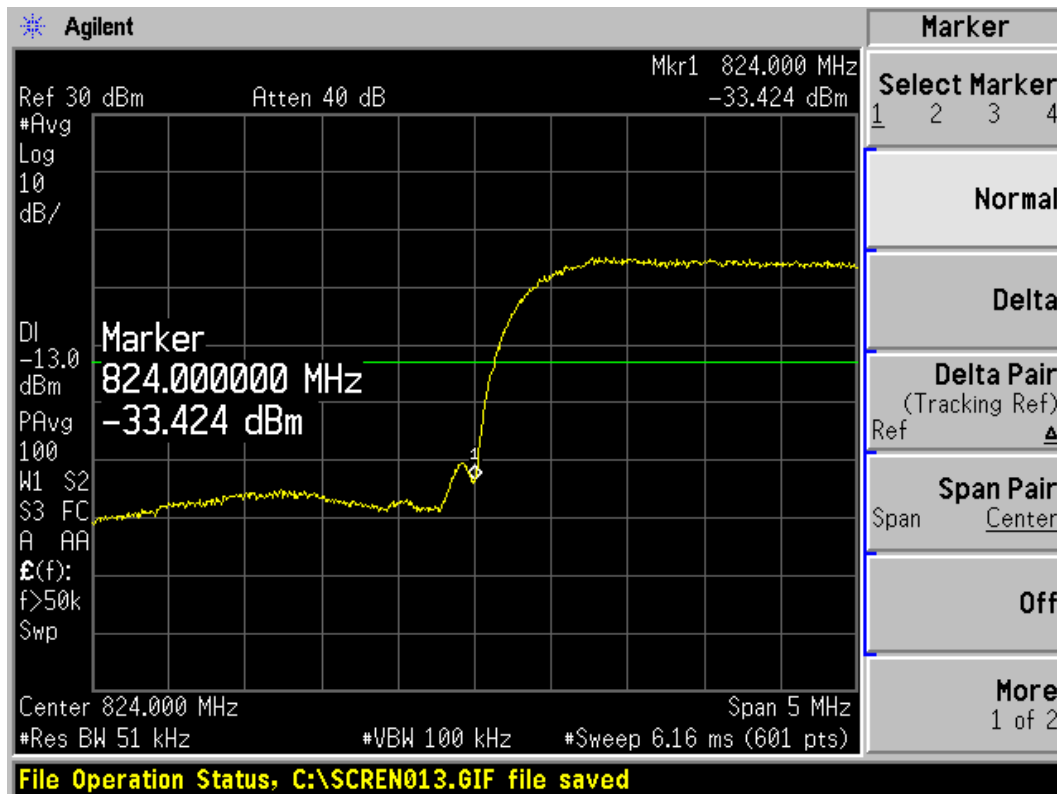
TA Technology (Shanghai) Co., Ltd.
Test Report



GSM 850 EGPRS 251 Channel

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

WCDMA Band V	Carrier frequency (MHz)	Reference value (dBm)	Limit	Conclusion
RMC	824	-33.424	-13	PASS
	849	-34.324	-13	PASS
HSDPA	824	-31.671	-13	PASS
	849	-31.013	-13	PASS
HSUPA	824	-31.303	-13	PASS
	849	-32.500	-13	PASS

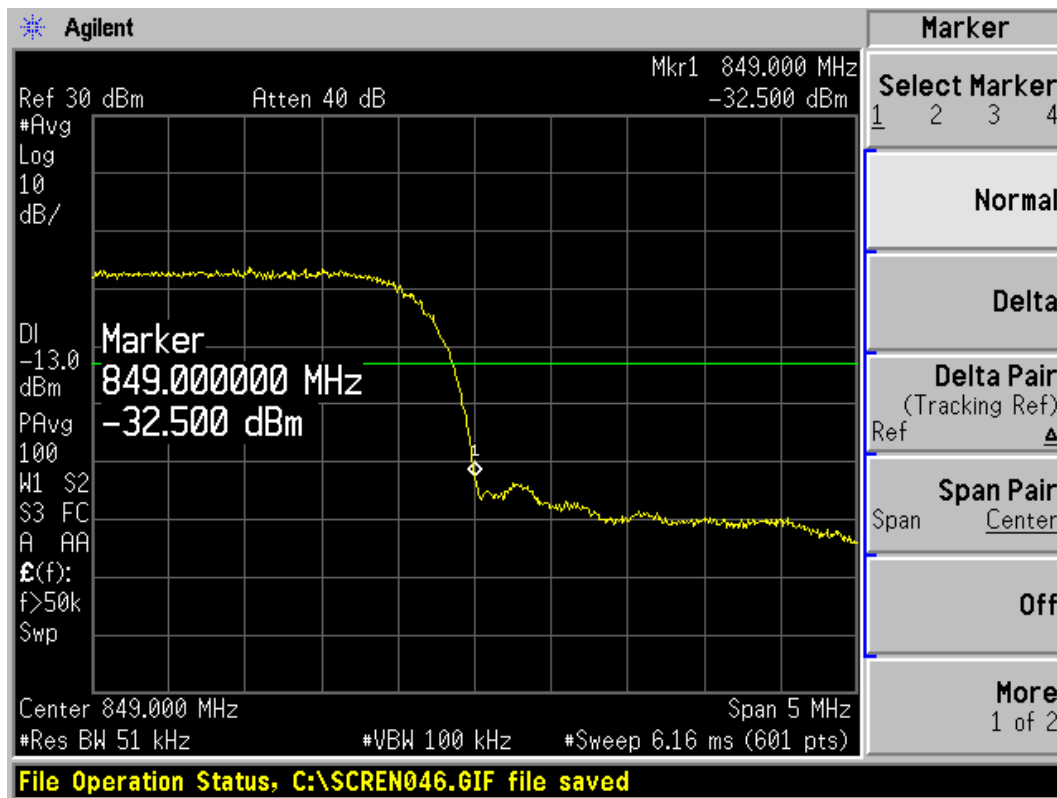


WCDMA Band V 4132 Channel

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

Report No.: RXA1407-0191RF01R1

Page 34 of 60



WCDMA Band V HSUPA 4233 Channel

2.6. Peak-to-Average Power Ratio (PAPR)

Ambient condition

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

Methods of Measurement

For WCDMA test, which OBW is more than 1MHz, the measurement procedures in KDB971168 are used.

The inherent randomness of the power peaks in a noise-like signal makes it difficult to quantify the peak power using traditional measurement techniques for determining the peak power of an analog signal. The peak power of a digitally-modulated signal is predictable only on a statistical basis. Thus, for these types of signals, a statistical measurement of the peak power is necessary.

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth.

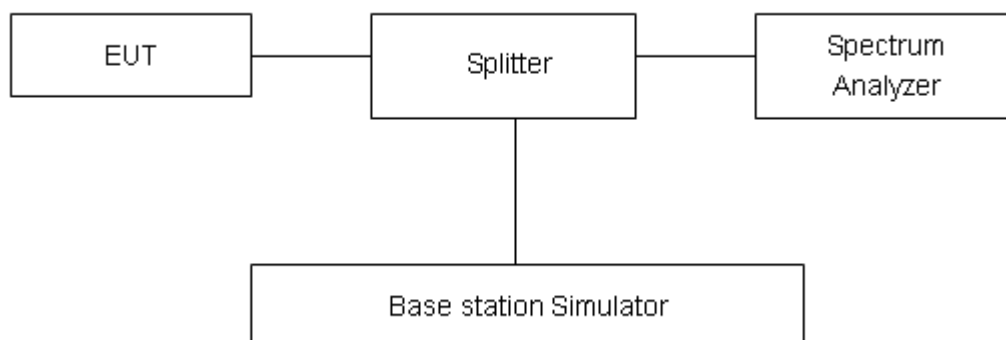
Step 1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.

Step 2. Set the CCDF option in Spectrum analyzer.

Step 3. Record the maximum PAPR level associated with a probability of 0.1%.

For GSM PAPR test, the peak power and the average power were measured separately via the spectrum analyzer.

Test Setup



Limits

No specific Peak-to-Average Ratio requirements in KDB 971168.

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.: RXA1407-0191RF01R1

Page 36 of 60

Test Results

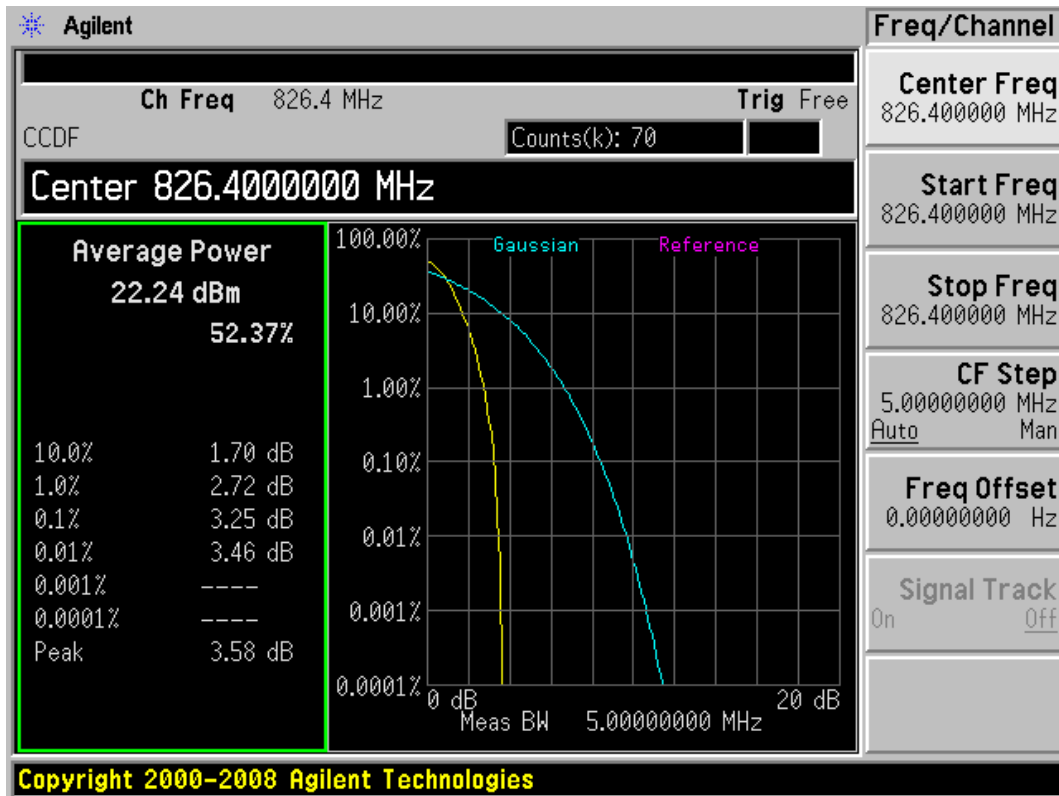
GSM 850	Channel	Frequency (MHz)	Peak(dBm)	Avg(dBm)	PAPR(dB)
GSM	128	824.2	32.33	32.32	0.01
	190	836.6	31.64	31.63	0.01
	251	848.8	32.34	32.33	0.01
GPRS	128	824.2	32.24	32.23	0.01
	190	836.6	31.68	31.67	0.01
	251	848.8	32.22	32.21	0.01
EGPRS(8PSK)	128	824.2	32.21	32.20	0.01
	190	836.6	31.47	31.46	0.01
	251	848.8	32.13	32.12	0.01

Mode	Channel	Frequency (MHz)	Test Result(dB)
WCDMA Band V	4132	826.4	3.25
	4183	836.6	3.19
	4233	846.6	3.31
HSDPA	4132	826.4	2.47
	4183	836.6	3.23
	4233	846.6	3.15
HSUPA	4132	826.4	2.73
	4183	836.6	3.37
	4233	846.6	3.39

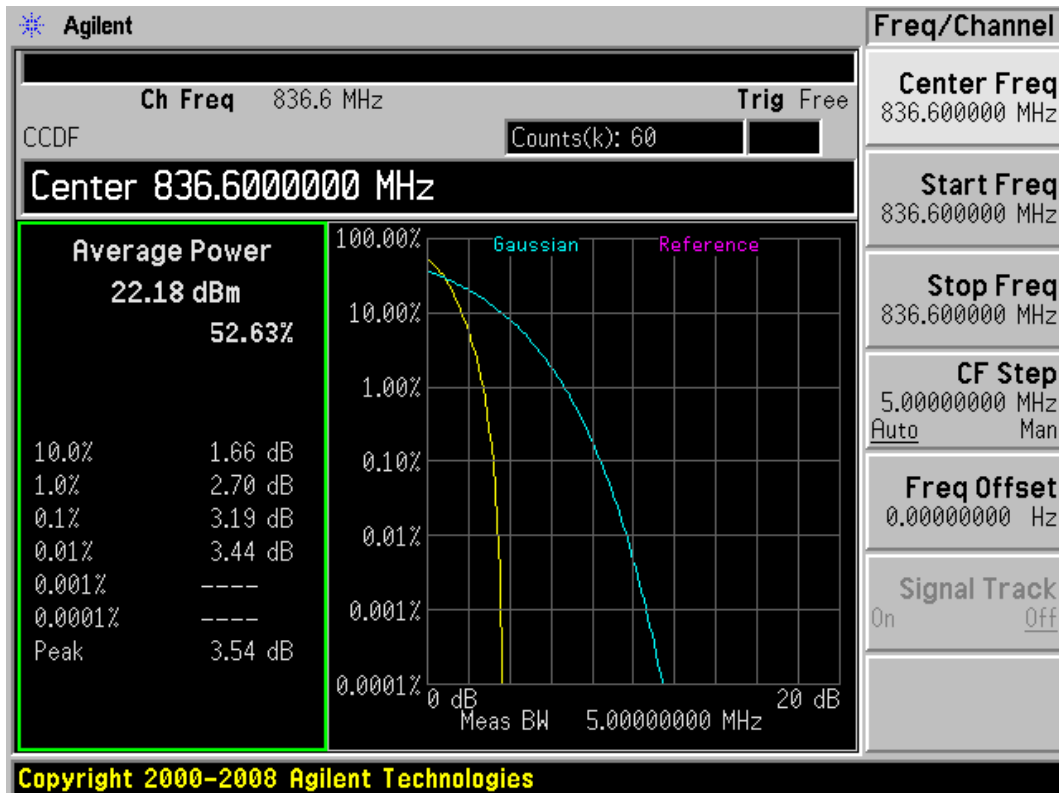
TA Technology (Shanghai) Co., Ltd. Test Report

Report No.: RXA1407-0191RF01R1

Page 37 of 60



WCDMA Band V CH4132

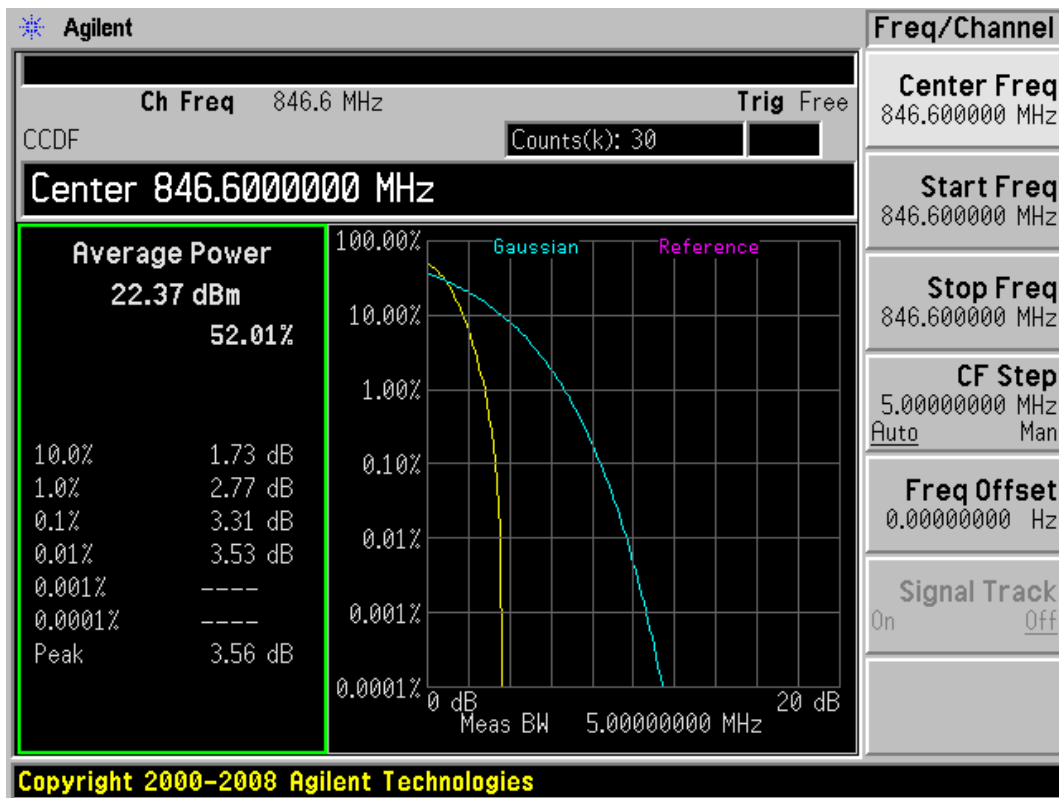


WCDMA Band V CH4183

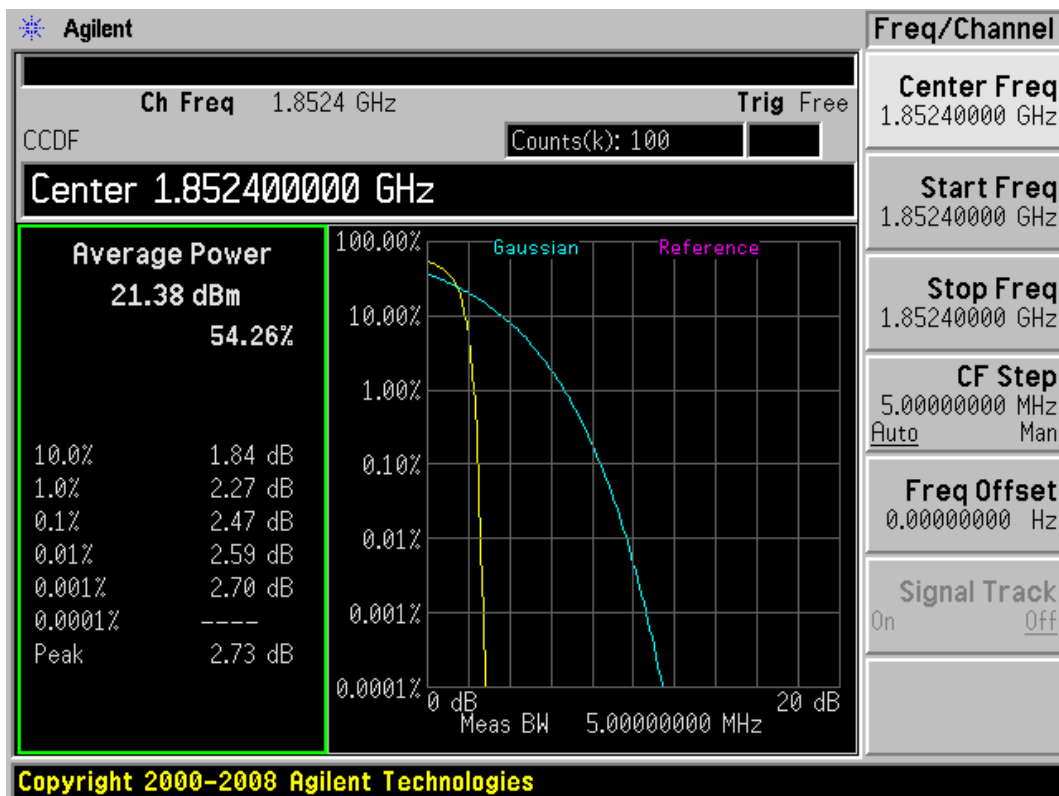
TA Technology (Shanghai) Co., Ltd. Test Report

Report No.: RXA1407-0191RF01R1

Page 38of 60



WCDMA Band V CH4233

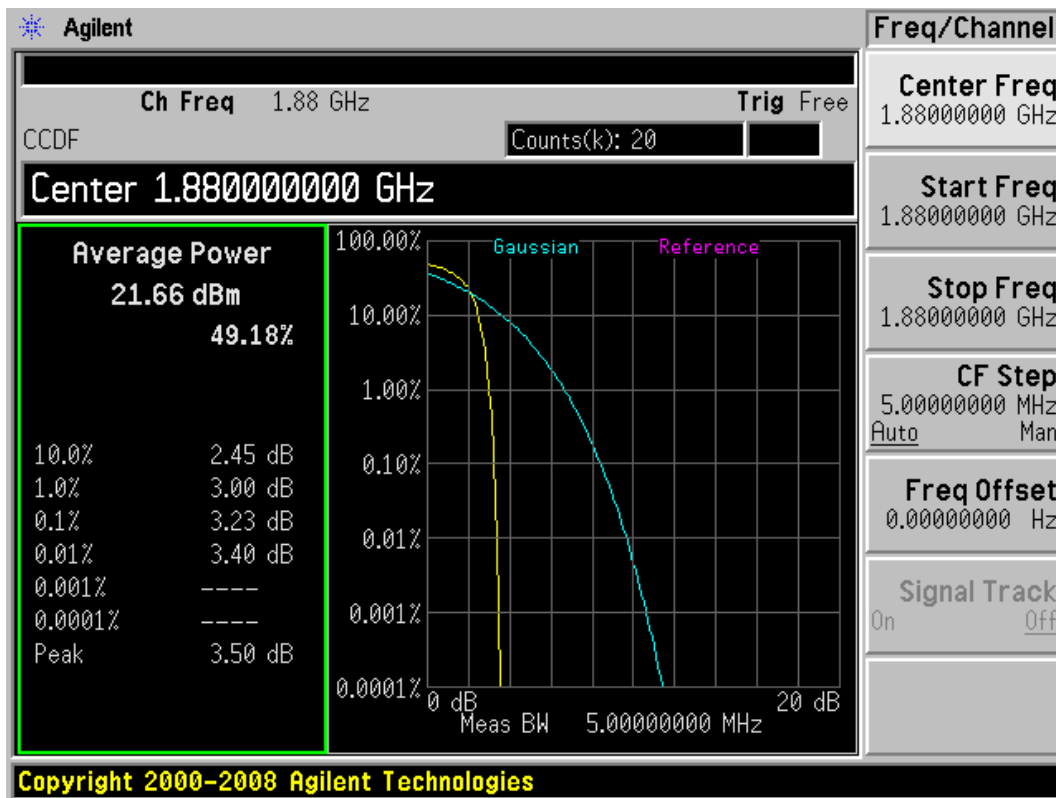


WCDMA Band V+HSDPA CH4132

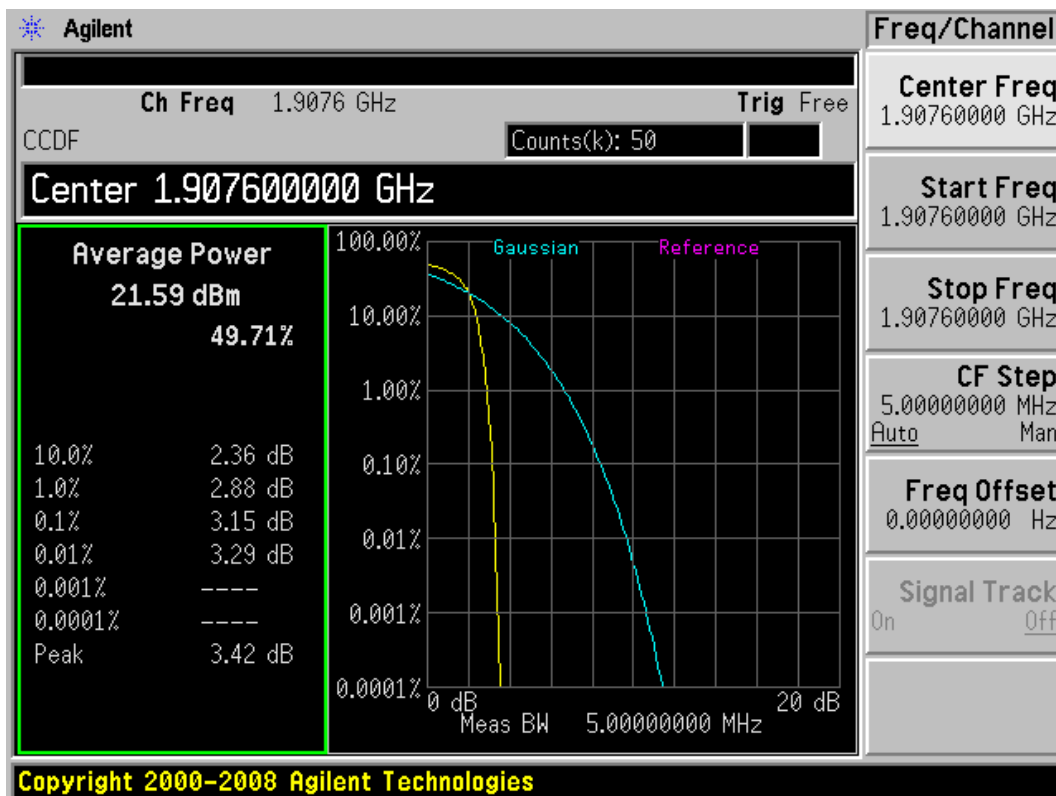
TA Technology (Shanghai) Co., Ltd. Test Report

Report No.: RXA1407-0191RF01R1

Page 39 of 60



WCDMA Band V+HSDPA CH4183

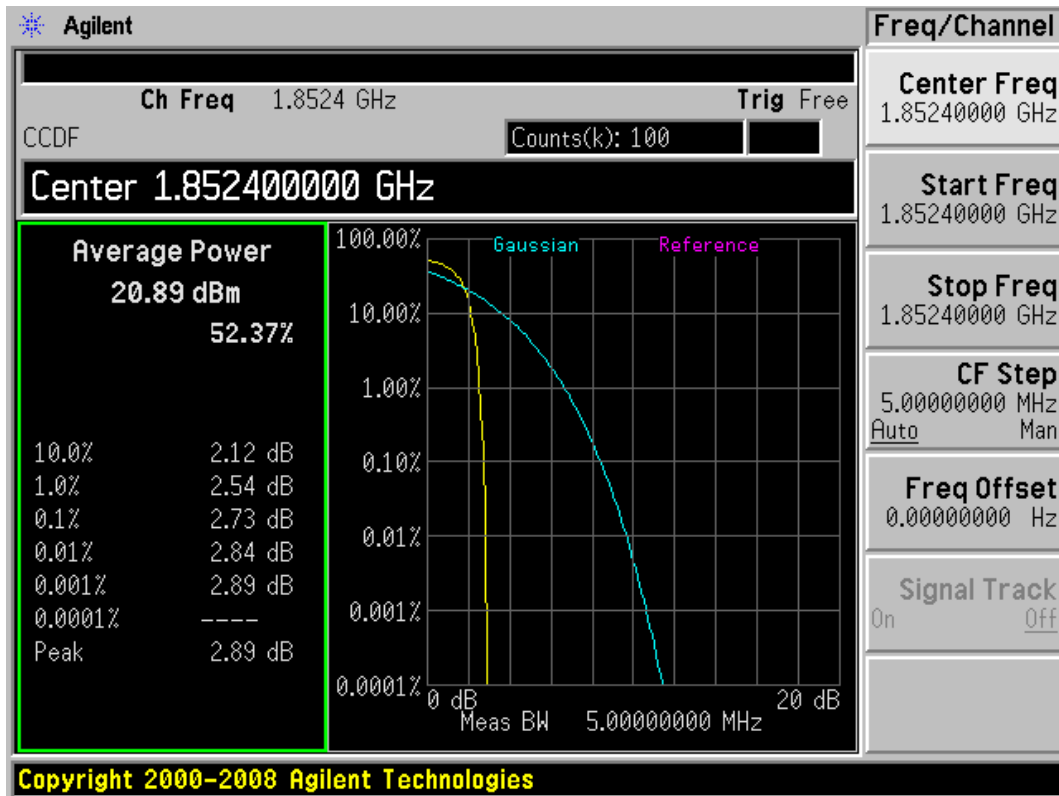


WCDMA Band V+HSDPA CH4233

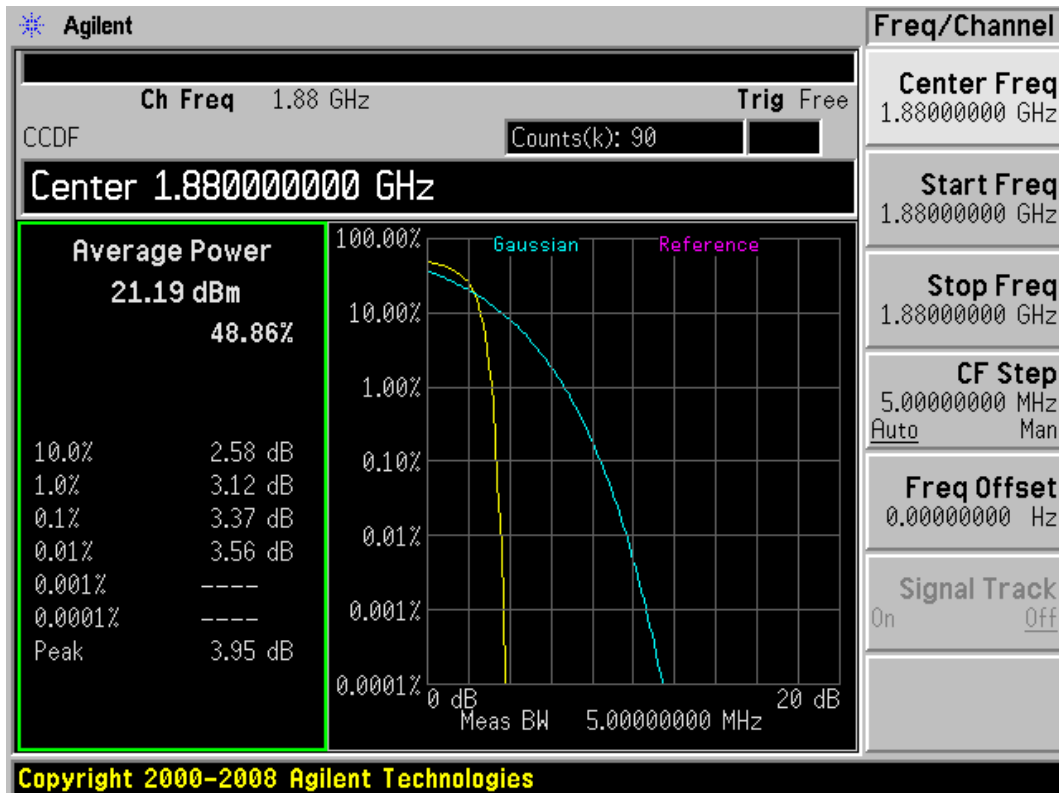
TA Technology (Shanghai) Co., Ltd. Test Report

Report No.: RXA1407-0191RF01R1

Page 40 of 60



WCDMA Band V+HSUPA CH4132

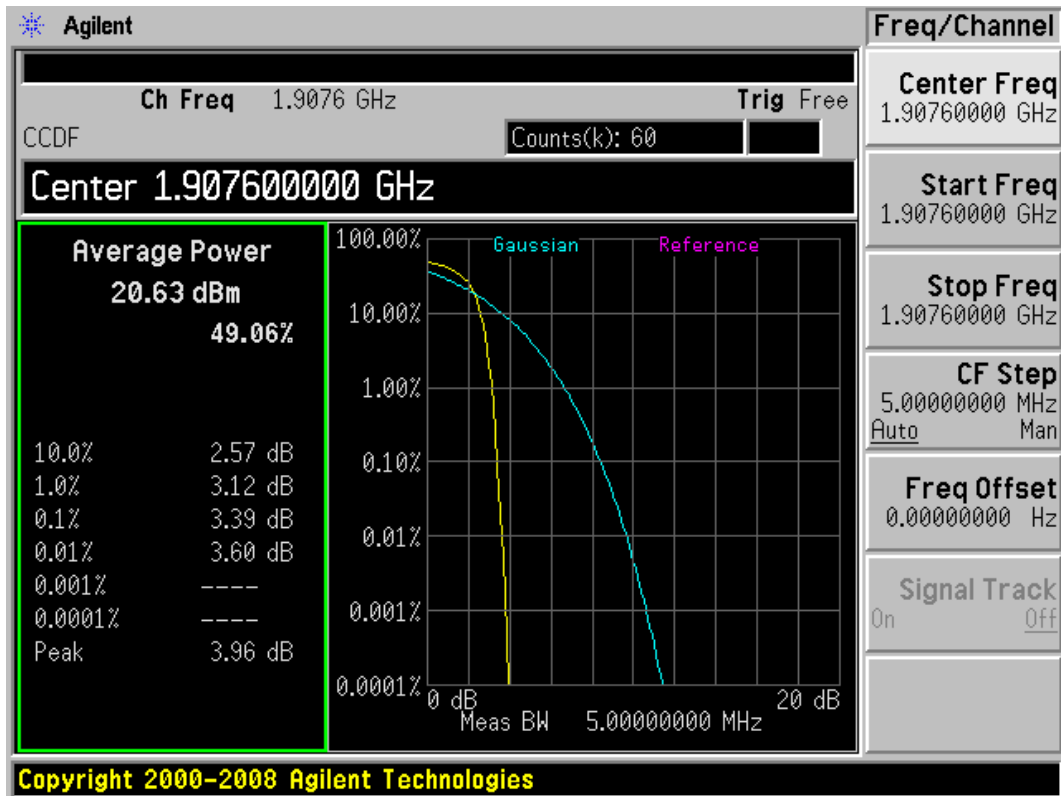


WCDMA Band V+HSUPA CH4183

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

Report No.: RXA1407-0191RF01R1

Page 41 of 60



WCDMA Band V+HSUPA CH4233

2.7. 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 -20°C to +50°C in 10°C step size,

(1) With all power removed, the temperature was decreased to -20°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 -20°C to +50°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

2. Frequency Stability (Voltage Variation)

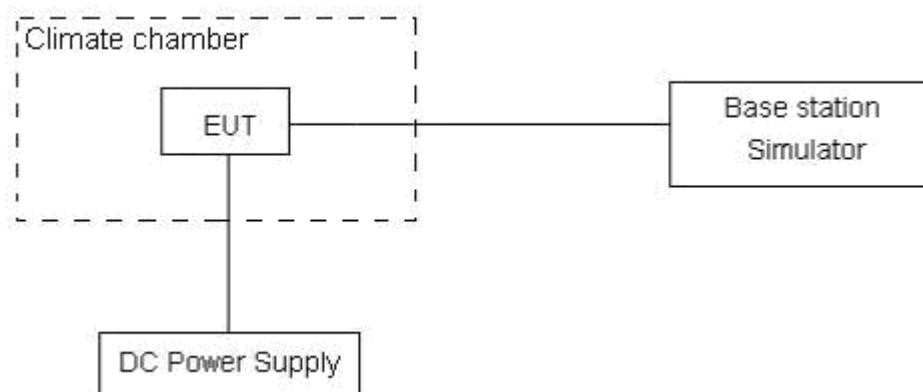
The frequency stability shall be measured with variation of primary supply voltage as follows:

(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.: RXA1407-0191RF01R1

Page 43 of 60

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
--------	----------------

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.

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

Report No.: RXA1407-0191RF01R1

Page 44 of 60

Test Result

GSM 850

Temperature (°C)	Test Results (ppm) / 3.8 V Power supply		
	Channel 190		
	GSM(GMSK)	GPRS(GMSK)	EGPRS(8PSK)
-20	0.01445	0.00690	0.01304
-10	0.01681	0.00940	0.02024
0	0.01893	0.01002	0.01771
10	0.01607	0.01091	0.01562
20	0.01879	0.00668	0.01347
30	0.01946	0.01342	0.01424
40	0.01724	0.01242	0.02015
50	0.01462	0.01361	0.01767

Voltage (V)	Test Results(ppm) / 20°C		
	Channel 190		
	GSM(GMSK)	GPRS(GMSK)	EGPRS(8PSK)
3.6	0.01396	0.01006	0.01459
3.8	0.01879	0.00668	0.01347
4.2	0.01562	0.01456	0.01847

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

Report No.: RXA1407-0191RF01R1

Page 45 of 60

WCDMA Band V

Temperature (°C)	Test Results (ppm) / 3.8 V Power supply
	Channel 4183
-20	0.004757
-10	0.002678
0	0.002092
10	0.005642
20	0.004721
30	0.003000
40	0.005283
50	0.004542

Voltage (V)	Test Results(ppm) / 20°C
	Channel 4183
3.6	0.002940
3.8	0.004721
4.2	0.003765

2.8. Spurious Emissions at Antenna Terminals

Ambient condition

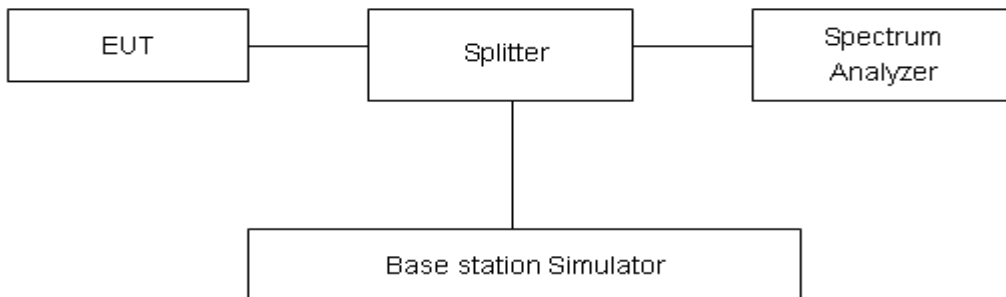
Temperature	Relative humidity
21°C ~25°C	40%~60%

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. For WCDMA Band V, 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.

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.

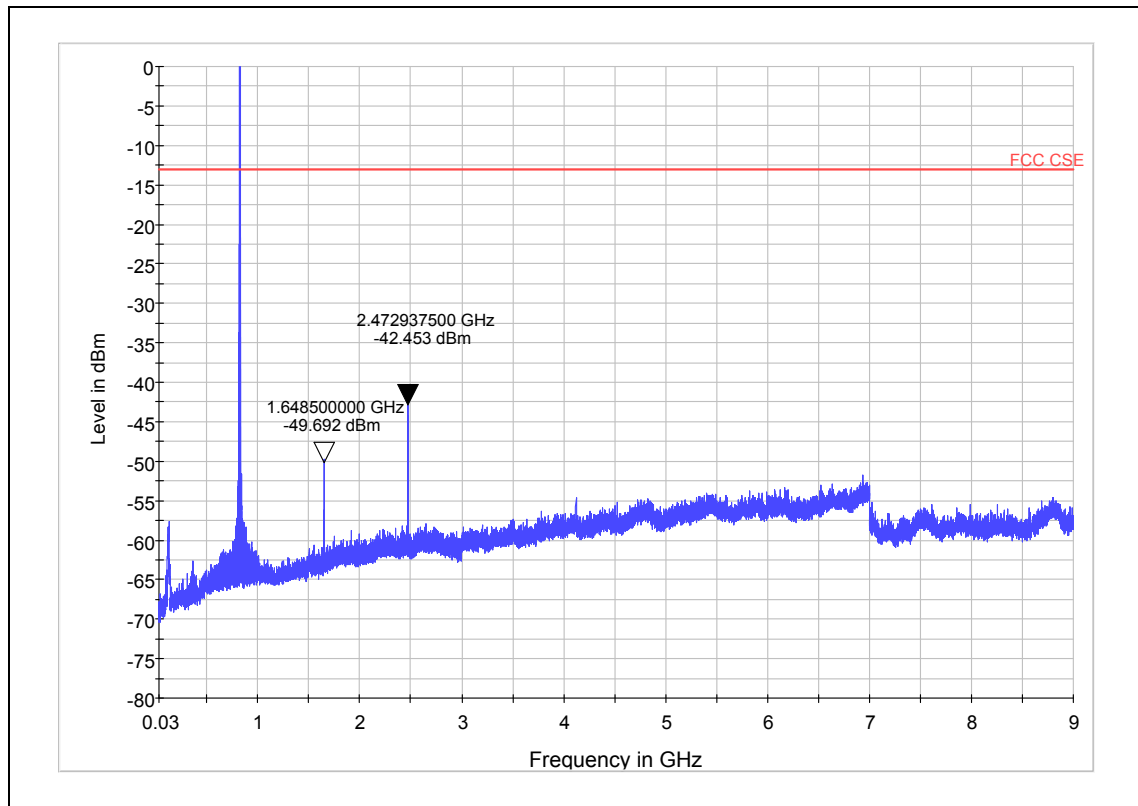
Test Report

Report No.: RXA1407-0191RF01R1

Page 47 of 60

Test Result

GSM 850 CH128

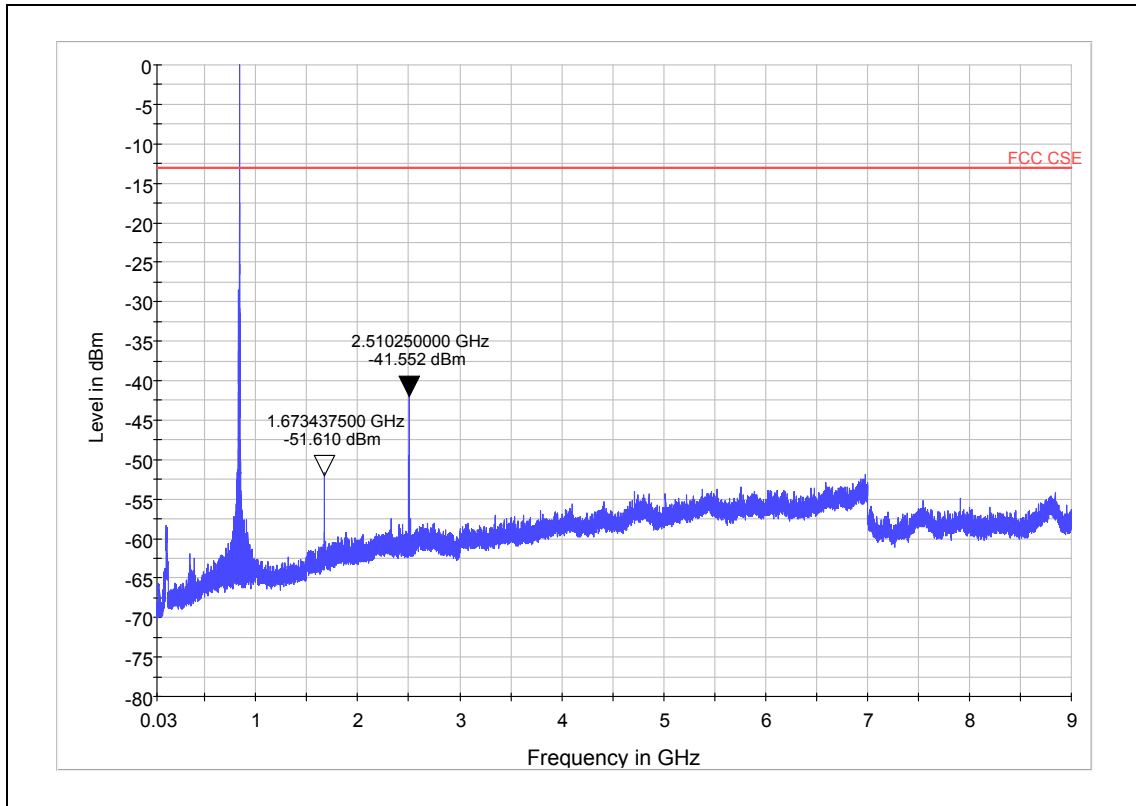


Note: The signal beyond the limit is carrier
GSM 850 128 Channel 30MHz~9GHz

Harmonic	TX ch.128 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	1648.5	-49.692	-13	36.692
3	2472.937	-42.453	-13	29.453

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

GSM 850 CH190

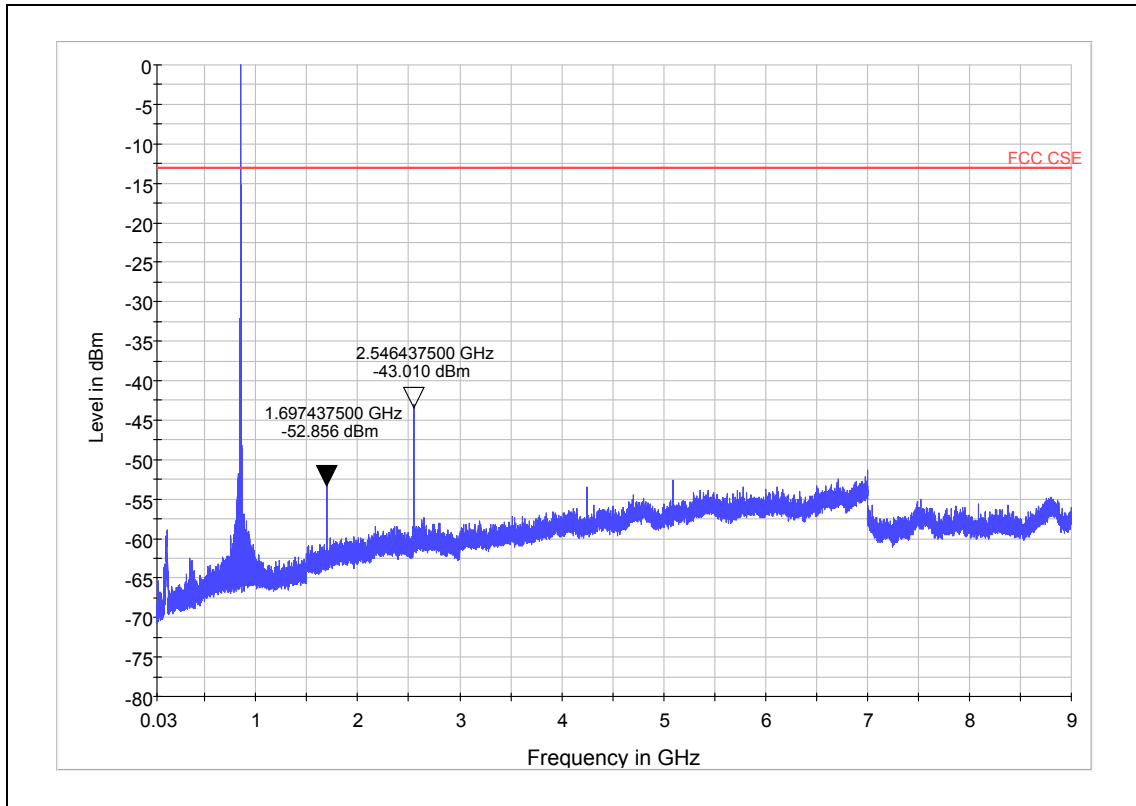


Note: The signal beyond the limit is carrier
GSM 850 190 Channel 30MHz~9GHz

Harmonic	TX ch.190 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	1673.4375	-51.610	-13	38.610
3	2510.25	-41.552	-13	28.552

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

GSM 850 CH251



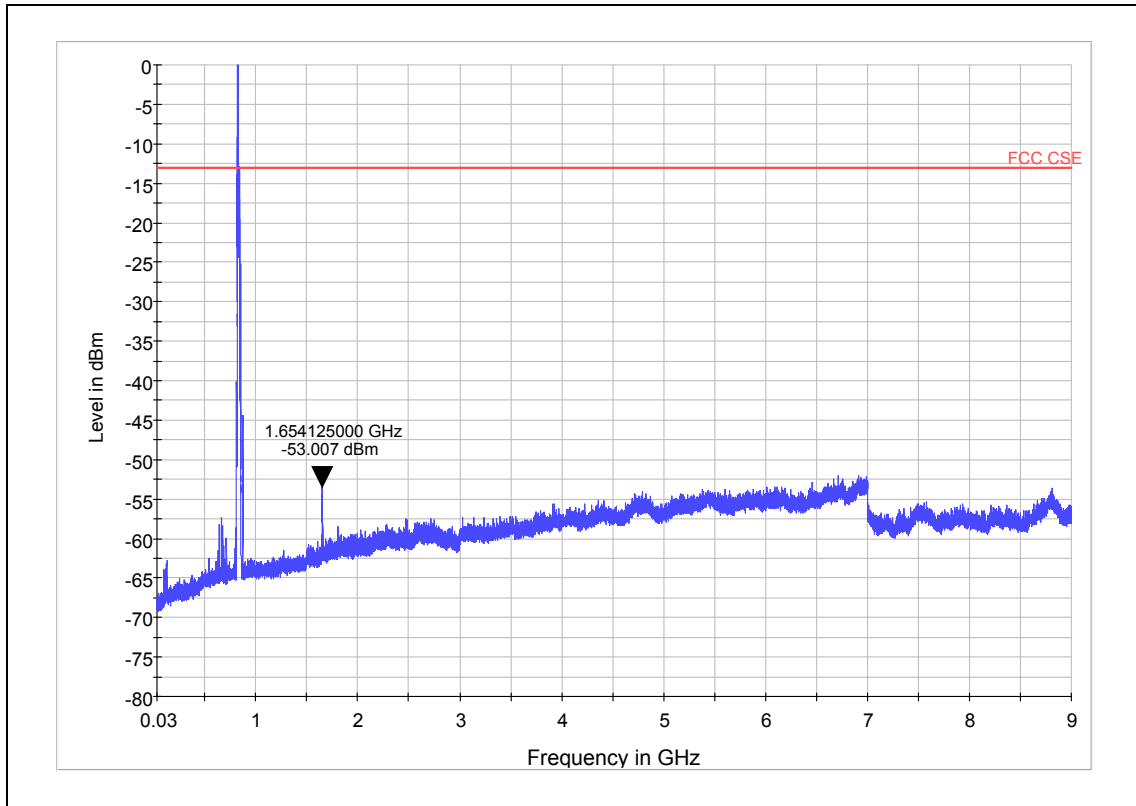
Note: The signal beyond the limit is carrier
GSM 850 251 Channel 30MHz~9GHz

Harmonic	TX ch.251 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	1697.4375	-52.856	-13	39.856
3	2546.4375	-43.010	-13	30.010

TA Technology (Shanghai) Co., Ltd.

Test Report

WCDMA Band V CH4132



Note: The signal beyond the limit is carrier
WCDMA Band V 4132 Channel 30MHz~9GHz

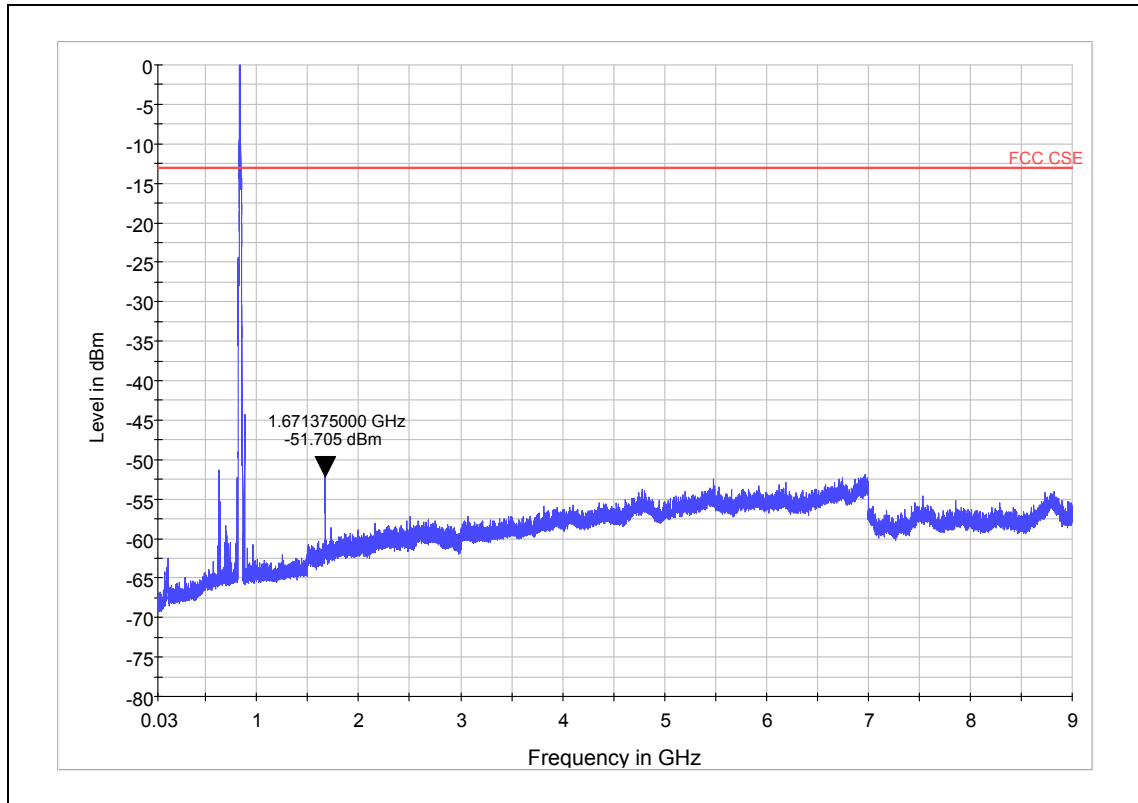
Harmonic	TX ch.4132 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	1654.125	-53.007	-13	40.007

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

Report No.: RXA1407-0191RF01R1

Page 51 of 60

WCDMA Band V CH4183

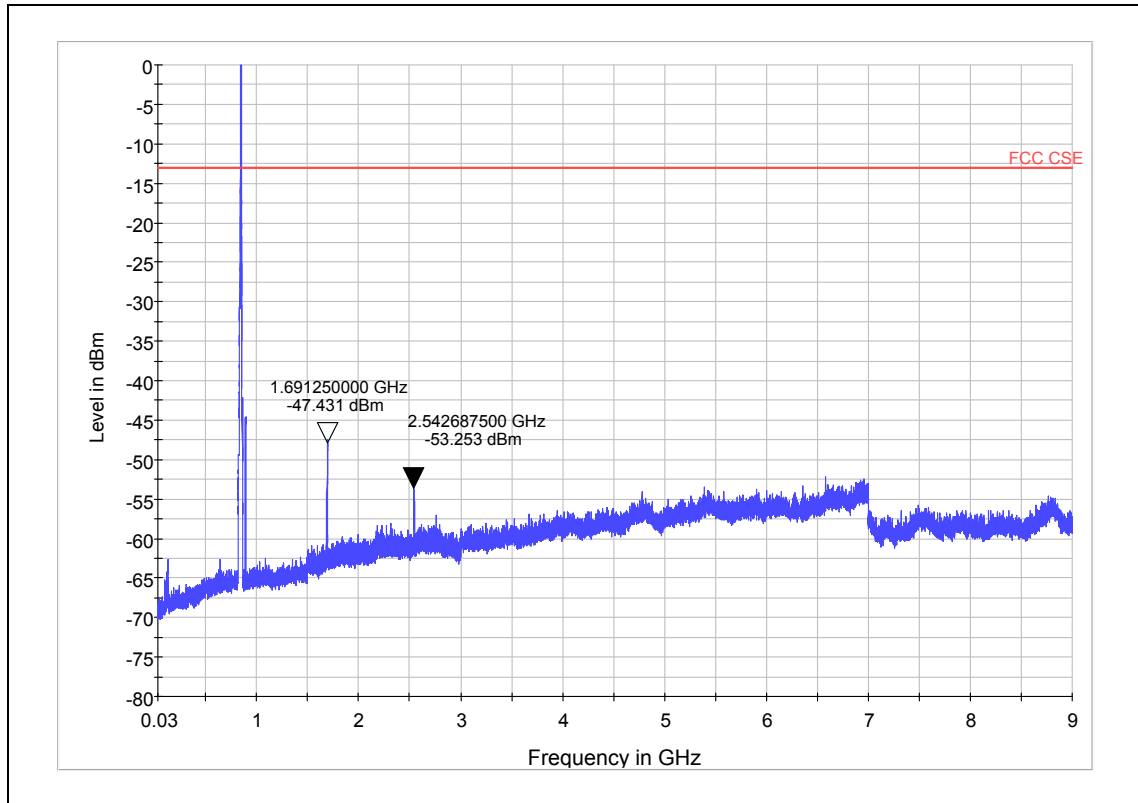


Note: The signal beyond the limit is carrier
WCDMA Band V 4183 Channel 30MHz~9GHz

Harmonic	TX ch.4183 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	1671.375	-51.705	-13	38.705

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

WCDMA Band V CH4233



Note: The signal beyond the limit is carrier
WCDMA Band V 4233 Channel 30MHz~9GHz

Harmonic	TX ch.4233 Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)
2	1691.25	-47.431	-13	34.431
3	2542.6875	-53.253	-13	40.253

2.9. 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.

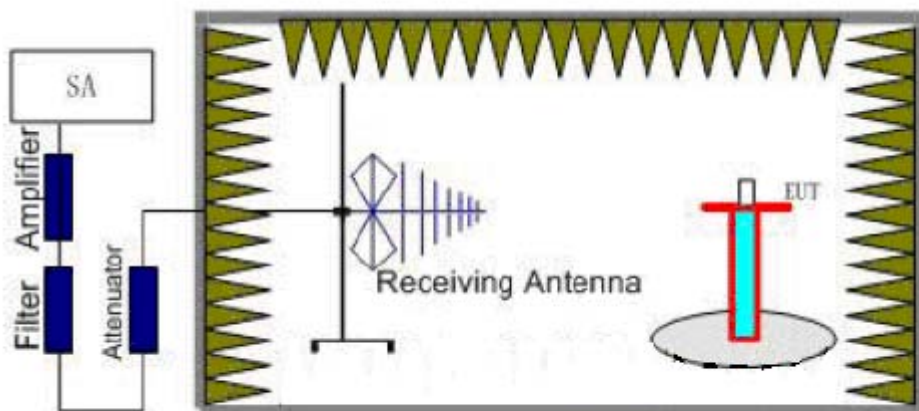
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment.

The emissions less than 20 dB below the permissible value are reported.

The procedure of Radiates Spurious Emission is as follows:

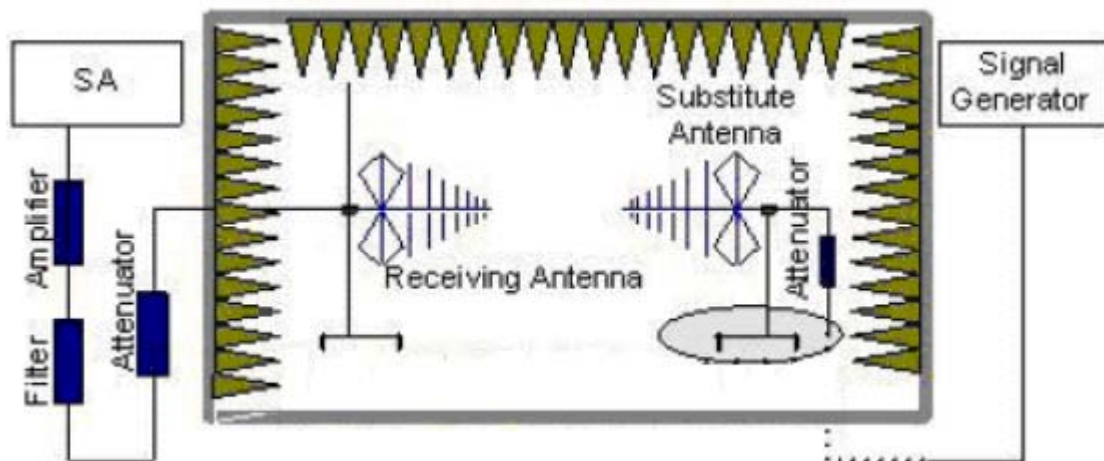
Step 1:

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 stand-up position (Z 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
-------	---------

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.: RXA1407-0191RF01R1

Page 55of 60

Test Result

GSM 850 CH128

Harmonic	TX ch.128 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1647.8	-45.6	2	10.15	Vertical	-39.60	-13	26.60	0
3	2473.5	-40.35	2.51	11.35	Vertical	-33.66	-13	20.66	0
4	3296.3	-59.2	4.2	10.85	Vertical	-54.70	-13	41.70	135
5	4121.6	-55.9	5.2	11.35	Vertical	-51.90	-13	38.90	45
6	4945.1	-57.1	5.5	11.95	Vertical	-52.80	-13	39.80	180
7	5769.4	-61.76	5.7	13.55	Vertical	-56.06	-13	43.06	270
8	6256.5	-57.56	6.3	13.75	Vertical	-52.26	-13	39.26	270
9	7417.8	-61.08	6.8	13.85	Vertical	-56.18	-13	43.18	0
10	8242	-59.52	6.9	14.25	Vertical	-54.32	-13	41.32	180

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2.The worst emission was found in the antenna is vertical position.

GSM 850 CH190

Harmonic	TX ch.190 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.4	-46.78	2	10.75	Vertical	-40.18	-13	27.18	135
3	2509.7	-39.89	2.51	11.05	Vertical	-33.50	-13	20.50	225
4	3346.4	-64.61	4.2	11.15	Vertical	-59.81	-13	46.81	180
5	4183.125	-56.17	5.2	11.15	Vertical	-52.37	-13	39.37	315
6	5019.6	-61.23	5.5	11.95	Vertical	-56.93	-13	43.93	0
7	5856.2	-62.70	5.7	13.55	Vertical	-57.00	-13	44.00	270
8	6692.8	-61.77	6.3	13.75	Vertical	-56.47	-13	43.47	180
9	7529.4	-60.26	6.8	13.85	Vertical	-55.36	-13	42.36	0
10	8366	-61.88	6.9	14.25	Vertical	-56.68	-13	43.68	90

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2.The worst emission was found in the antenna is vertical position.

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

Report No.: RXA1407-0191RF01R1

Page 56of 60

GSM 850 CH251

Harmonic	TX ch.251 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1696.9	-48.03	2	10.15	Vertical	-42.03	-13	29.03	180
3	2546.6	-41.16	2.51	11.05	Vertical	-34.77	-13	21.77	225
4	3395.2	-64.16	4.2	11.15	Vertical	-59.36	-13	46.36	0
5	4244.6	-54.35	5.2	11.15	Vertical	-50.55	-13	37.55	225
6	5092.8	-62.89	5.5	11.95	Vertical	-58.59	-13	45.59	90
7	5941.6	-63.04	5.7	13.55	Vertical	-57.34	-13	44.34	0
8	6790.4	-60.84	6.3	13.75	Vertical	-55.54	-13	42.54	270
9	7639.2	-60.52	6.8	13.85	Vertical	-55.62	-13	42.62	180
10	8488	-62.22	6.9	14.25	Vertical	-57.02	-13	44.02	0

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2.The worst emission was found in the antenna is vertical position.

WCDMA Band V CH4132

Harmonic	TX ch.4132 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1652.8	-69.24	2	10.15	Vertical	-63.24	-13	50.24	180
3	2479.2	-66.74	2.51	11.35	Vertical	-60.05	-13	47.05	135
4	3305.6	-64.45	4.2	10.85	Vertical	-59.95	-13	46.95	90
5	4132	-62.89	5.2	11.35	Vertical	-58.89	-13	45.89	180
6	4958.4	-63.43	5.5	11.95	Vertical	-59.13	-13	46.13	270
7	5784.8	-61.76	5.7	13.55	Vertical	-56.06	-13	43.06	0
8	6611.2	-61.10	6.3	13.75	Vertical	-55.80	-13	42.80	180
9	7437.6	-61.08	6.8	13.85	Vertical	-56.18	-13	43.18	90
10	8264	-61.86	6.9	14.25	Vertical	-56.66	-13	43.66	0

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2.The worst emission was found in the antenna is vertical position.

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

Report No.: RXA1407-0191RF01R1

Page 57 of 60

WCDMA Band V CH4183

Harmonic	TX ch.4183 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.2	-66.58	2	10.75	Vertical	-59.98	-13	46.98	0
3	2509.8	-62.78	2.51	11.05	Vertical	-56.39	-13	43.39	90
4	3346.4	-64.61	4.2	11.15	Vertical	-59.81	-13	46.81	180
5	4183	-62.67	5.2	11.15	Vertical	-58.87	-13	45.87	270
6	5019.6	-61.23	5.5	11.95	Vertical	-56.93	-13	43.93	0
7	5856.2	-62.70	5.7	13.55	Vertical	-57.00	-13	44.00	180
8	6692.8	-61.77	6.3	13.75	Vertical	-56.47	-13	43.47	90
9	7529.4	-60.26	6.8	13.85	Vertical	-55.36	-13	42.36	0
10	8366	-61.88	6.9	14.25	Vertical	-56.68	-13	43.68	270

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2.The worst emission was found in the antenna is vertical position.

WCDMA Band V CH4233

Harmonic	TX ch.4233 Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1693.2	-60.63	2	10.15	Vertical	-54.63	-13	41.63	180
3	2539.8	-56.6	2.51	11.05	Vertical	-50.21	-13	37.21	270
4	3386.4	-64.16	4.2	11.15	Vertical	-59.36	-13	46.36	0
5	4233	-61.50	5.2	11.15	Vertical	-57.70	-13	44.70	180
6	5079.6	-62.89	5.5	11.95	Vertical	-58.59	-13	45.59	90
7	5926.2	-63.04	5.7	13.55	Vertical	-57.34	-13	44.34	0
8	6772.8	-60.84	6.3	13.75	Vertical	-55.54	-13	42.54	90
9	7619.4	-60.52	6.8	13.85	Vertical	-55.62	-13	42.62	0
10	8466	-62.22	6.9	14.25	Vertical	-57.02	-13	44.02	0

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2.The worst emission was found in the antenna is vertical position.

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

Report No.: RXA1407-0191RF01R1

Page 58 of 60

3. Main Test Instruments

No.	Name	Type	Manufacturer	Serial Number	Calibration Date	Valid Period
01	Base Station Simulator	CMU200	R&S	118133	2014-06-28	One year
02	Power Splitter	SHX-GF2-2-13	Hua Xiang	10120101	NA	NA
03	Spectrum Analyzer	E4445A	Agilent	MY46181146	2014-06-28	One year
04	Universal Radio Communication Tester	E5515C	Agilent	MY48367192	2014-06-28	One year
05	Signal Analyzer	FSV30	R&S	100815	2014-06-28	One year
06	Signal generator	SMB 100A	R&S	102594	2014-06-28	One year
07	EMI Test Receiver	ESCI	R&S	100948	2014-06-28	One year
08	Trilog Antenna	VUBL 9163	SCHWARZB ECK	9163-201	2013-06-19	Three years
09	Horn Antenna	HF907	R&S	100126	2012-07-01	Three years
10	Climatic Chamber	PT-30B	Re Ce	20101891	2013-09-09	Three years

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

ANNEX A: EUT Appearance and Test Setup

A.1 EUT Appearance



a: EUT



b: Battery

Picture 1 EUT and Auxiliary

A.2 Test Setup



Picture 2: Radiated Spurious Emissions Test setup