

FCC Part22E&24H Test Report

Product Name : GPRS Module / POS Terminal
Model No. : GPRS Module H50-CM06/POS
Terminal H50-10
FCC ID : UWJH50CM06

Applicant : BLUE BAMBOO (HK) LIMITED
Address : Unit 1001, Lucky Building, No.39 Wellington Street,
Central, Hong Kong

Date of Receipt : 2009/04/20
Issued Date : 2009/04/30
Report No. : 095S008R-HP-US-P07V01
Report Version : V1.0

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by CNLA, NVLAP, NIST or any agency of the Government.

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Test Report Certification

Issued Date : 2009/04/30

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 Applicant : BLUE BAMBOO (HK) LIMITED
 Address : Unit 1001, Lucky Building, No.39 Wellington Street,
 Central, Hong Kong
 Manufacturer : BLUE BAMBOO (HK) LIMITED
 Model No. : GPRS Module H50-CM06/POS Terminal H50-10
 FCC ID : UWJH50CM06
 Rated Voltage : AC 120 V / 60 Hz
 EUT Voltage : DC 9 V
 Trade Name : BLUE BAMBOO
 Applicable Standard : FCC CFR Title 47 Part 2, Part 22H and Part 24E
 Test Result : Complied
 Performed Location : SuZhou EMC laboratory
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 FCC Registration Number: 800392

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Laboratory Information

We , **Quietek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited by the following accreditation Bodies in compliance with ISO 17025, EN 45001 and Guide 25:

Taiwan R.O.C.	: BSMI, DGT, CNLA
Germany	: TÜV Rheinland
Norway	: Nemko, DNV
USA	: FCC, NVLAP
Japan	: VCCI

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site : <http://tw.quietek.com/modules/myalbum/>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site : <http://www.quietek.com/>

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1. General Information

◆ EUT Description

Product Name	GPRS Module / POS Terminal
Trade Name	BLUE BAMBOO
Model No.	GPRS Module H50-CM06/POS Terminal H50-10
FCC ID	UWJH50CM06
Working Voltage	DC 9 V
Tx Frequency Range	GSM 850: 824MHz to 849MHz PCS 1900: 1850MHz to 1910MHz
Rx Frequency Range	GSM 850: 869MHz to 894MHz PCS 1900: 1930MHz to 1990MHz
Channel Number	GSM 850: 124 PCS 1900: 299
Type of Modulation	GMSK
Channel Control	Auto
Antenna type	External SSMB
Antenna Gain	GSM 850: -4.5dBi PCS 1900: 1dBi

Component	
AC Adapter	Manufacturer: BLUE BAMBOO M/N: SL-0106-9U1A-U Input: AC 100-240V, 0.3A, 50-60Hz Output: DC 9.0V, 1.0A

Note: H50-CM06 is a GPRS module, and H50-10 is the final POS base terminal including H50-CM06 GPRS module.

◆ **Mode of Operation**

Quietek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: GPRS 850
Mode 2: GPRS 1900

Note:

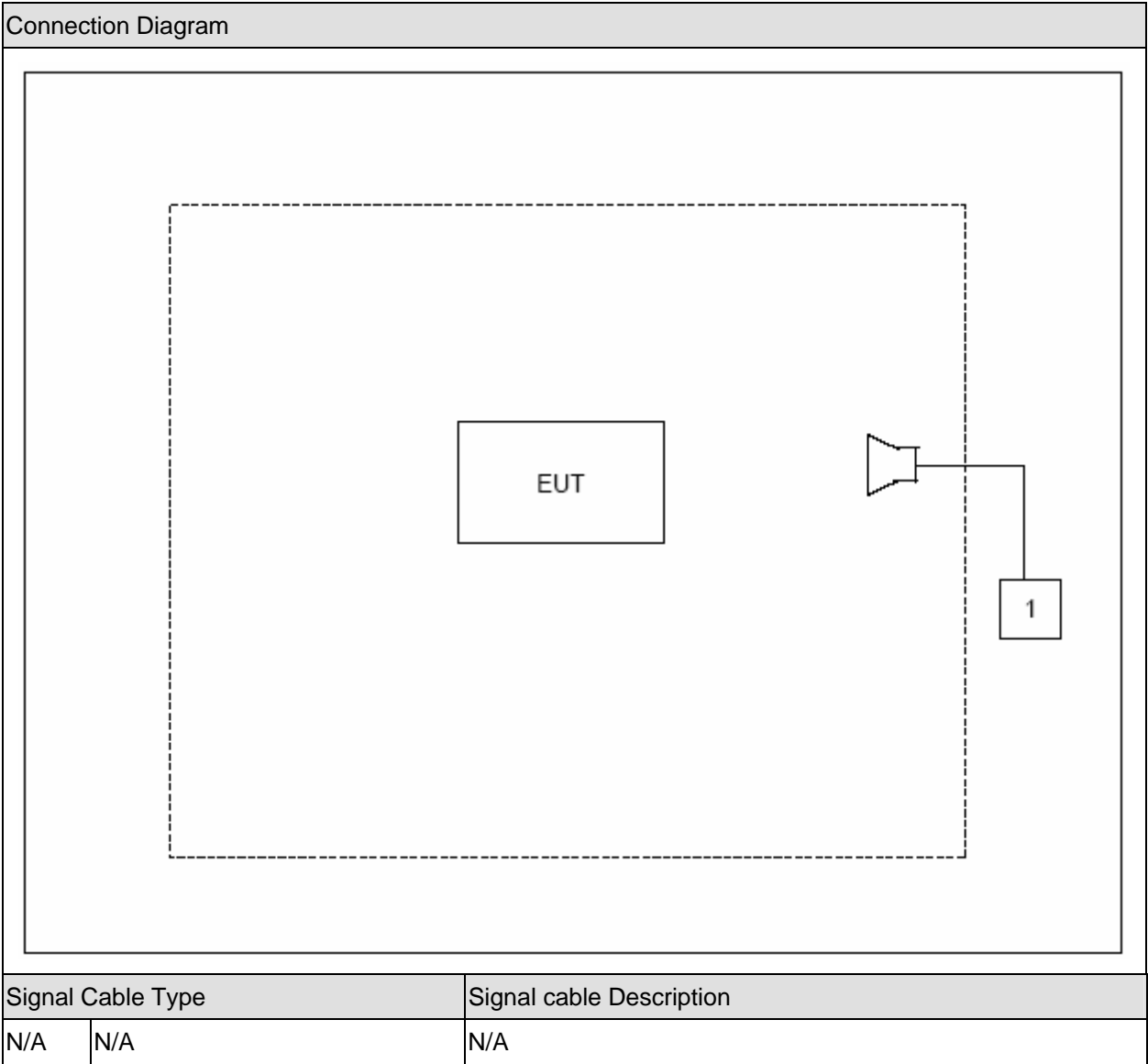
1. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.
2. This device is a composite device in accordance with Part 15 Subpart B regulations. The function for the receiver was measured and made a test report that the report number is 095S008R-HP-US-P01V02.

◆ Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	N/A	N/A	N/A	N/A	N/A

◆ Configuration of Tested System



◆ EUT Exercise Software

1	Setup the EUT and simulators as shown on 1.4.
2	Turn on the power of EUT.
3	Set EUT communicate with CMU200, and then select channel and PLC to test. PLC set "5" for GSM850 and "0" for GSM1900 to get the maximum output power.

2. Technical Test

◆ Summary of Test Result

- ☒ No deviations from the test standards
☐ Deviations from the test standards as below description:

For GSM 850 (FCC Part 22H & Part 2)

Emission			
Performed Item	Normative References	Test Performed	Deviation
Peak Output Power	FCC Part 22.913(a)(2) and Part 2.1046	Yes	No
Modulation Characteristic	FCC Part 2.1047(d)	Yes	No
Occupied Bandwidth	FCC Part 2.1049	Yes	No
Spurious Emission At Antenna Terminals (+/- 1MHz)	FCC Part 22.917(a) and Part 2.1049	Yes	No
Spurious Emission	FCC Part 22.917(b) and Part 2.1051, 2.1053	Yes	No
Frequency Stability Under Temperature & Voltage Variations	FCC Part 22.355 and 2.1055	Yes	No

For PCS 1900 (FCC Part 24E & Part 2)

Emission			
Performed Item	Normative References	Test Performed	Deviation
Peak Output Power	FCC Part 24.232(b) and Part 2.1046	Yes	No
Modulation Characteristic	FCC Part 2.1047(d)	Yes	No
Occupied Bandwidth	FCC Part 24.238(b) and Part 2.1049	Yes	No
Spurious Emission At Antenna Terminals (+/- 1MHz)	FCC Part 24.238(a) and Part 2.1049	Yes	No
Spurious Emission	FCC Part 24.238(b) and Part 2.1051, 2.1053	Yes	No
Frequency Stability Under Temperature & Voltage Variations	FCC Part 24.235 and 2.1055	Yes	No

◆ Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	23
Humidity (%RH)	25-75	52
Barometric pressure (mbar)	860-1060	950-1000

3. Peak Output Power

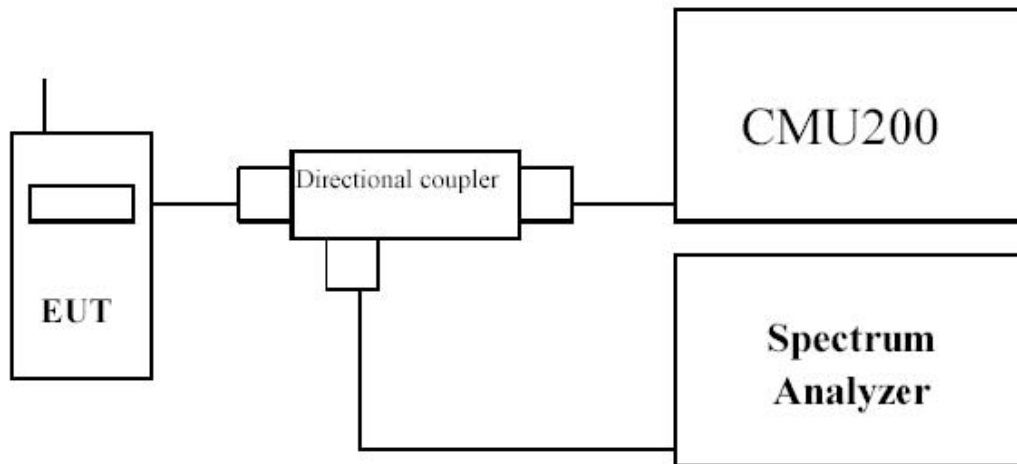
◆ Test Equipment

Peak Output Power / AC-4

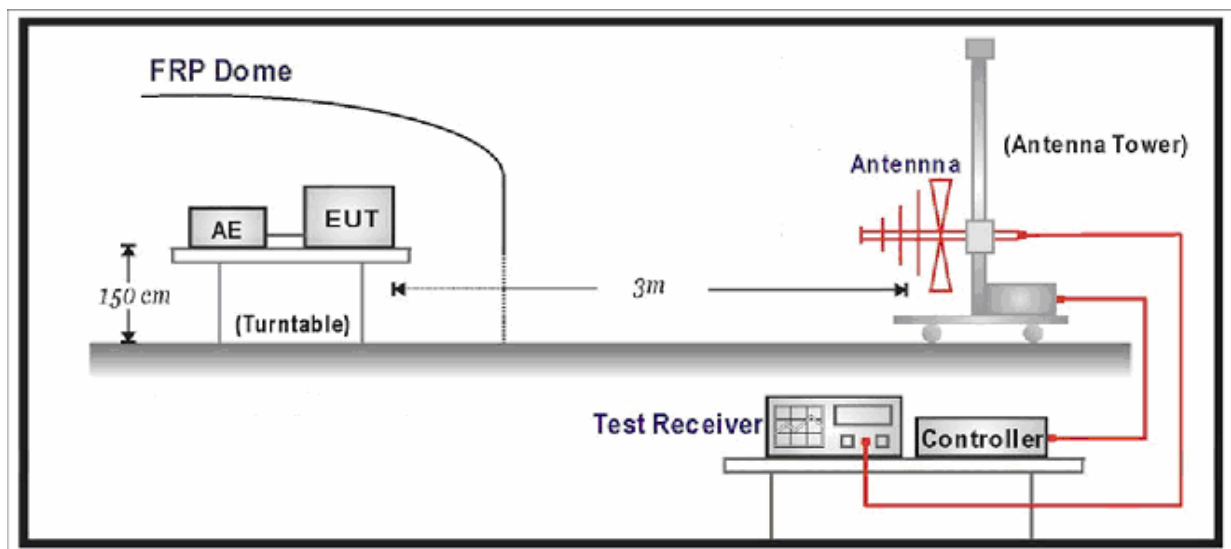
Instrument	Manufacturer	Type No.	Serial No	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2008/06/11
Radio Communication Tester	R&S	CMU 200	106388	2008/10/21
Dual Directional Coupler	Agilent	778D	20160	2009/04/20
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2009/04/20
PSG Analog S.G.	Agilent	E8257D	MY44321116	2008/06/11
Preamplifier	QuieTek	AP-025C	QT-AP005	2008/11/24
Preamplifier	QuieTek	AP-180C	CHM-0602013	2008/11/24
Bilog Type Antenna	Schaffner	CBL6141A	4278	2008/11/24
Half Wave Tuned Dipole Antenna	COM-POWER	AD-100	40137	2008/11/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	496	2008/11/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	499	2008/11/24
Coaxial Cable	Huber+Suhner	AC4-RL	06	2008/11/24
Coaxial Cable	Huber+Suhner	AC4-RH	07	2008/11/24
Coaxial Cable	Huber+Suhner	AC4-T	09	2008/11/24
Coaxial Cable	Huber+Suhner	AC4-RF-H	10	2008/11/24
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH007	2009/03/31

◆ Test Setup

Conducted Power Measurement:



Radiated Power Measurement:



◆ Limit

For FCC Part 22.913(a)(2):

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

For FCC Part 24.232(b):

The EIRP of mobile transmitters and auxiliary test transmitters must not exceed 2 Watts.

◆ Test Procedure

Conducted Power Measurement:

- a) Place the EUT on a bench and set it in transmitting mode.
- b) Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMU200 by a Directional Couple.
- c) EUT Communicate with CMU200, then select a channel for testing.
- d) Add a correction factor to the display of spectrum, and then test.

Radiated Power Measurement:

- a) The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- b) The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter
- c) The output of the test antenna shall be connected to the measuring receiver.
- d) The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- e) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- f) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- g) The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- h) The maximum signal level detected by the measuring receiver shall be noted.
- i) The transmitter shall be replaced by a substitution antenna.
- j) The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- k) The substitution antenna shall be connected to a calibrated signal generator.
- l) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- m) The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- n) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
- o) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

- p) The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.

◆ **Uncertainty**

The measurement uncertainty is defined as for Conducted Power Measurement ± 1.2 dB,
for Radiated Power Measurement ± 3.2 dB

◆ Test Result

Product	GPRS Module / POS Terminal		
Test Item	Peak Output Power		
Test Mode	Mode 1: GPRS 850		
Date of Test	2009/05/25	Test Site	AC-5

Channel No.	Frequency (MHz)	Modulation	Conducted Peak Output Power Measurement (dBm)	Radiated Peak Output Power Measurement (dBm)	Limit (dBm)	Result
128	824.2	GPRS	32.88	27.76	38.50	Pass
189	836.4	GPRS	32.72	28.84	38.50	Pass
251	848.8	GPRS	32.84	29.97	38.50	Pass

Radiated Measurement

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 128 (824.20MHz)								
824.20	12.26	H	27.86	2.44	-0.02	25.40	38.5	-13.10
824.20	14.49	V	30.22	2.44	-0.02	27.76	38.5	-10.74
Middle Channel 189 (836.40MHz)								
836.40	12.06	H	27.69	2.52	0.10	25.27	38.5	-13.23
836.40	15.26	V	31.26	2.52	0.10	28.84	38.5	-10.66
High Channel 251 (848.80MHz)								
848.80	13.73	H	29.18	2.62	0.13	26.69	38.5	-11.81
848.80	17.15	V	32.46	2.62	0.13	29.97	38.5	-8.53

Product	GPRS Module / POS Terminal		
Test Item	Peak Output Power		
Test Mode	Mode 2: GPRS 1900		
Date of Test	2009/05/25	Test Site	AC-5

Channel No.	Frequency (MHz)	Modulation	Conducted Peak Output Power Measurement (dBm)	Radiated Peak Output Power Measurement (dBm)	Limit (dBm)	Result
512	1850.2	GPRS	29.88	30.73	33.00	Pass
661	1880.0	GPRS	29.92	30.79	33.00	Pass
810	1909.8	GPRS	29.76	30.47	33.00	Pass

Radiated Measurement

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 512 (1850.20MHz)								
1850.20	22.07	H	22.48	3.56	10.4	29.32	33.00	-3.68
1850.20	23.54	V	23.89	3.56	10.4	30.73	33.00	-2.27
Middle Channel 661 (1880.00MHz)								
1880.00	21.22	H	21.66	3.58	10.43	28.51	33.00	-4.49
1880.00	23.25	V	23.94	3.58	10.43	30.79	33.00	-2.21
High Channel 810 (1909.80MHz)								
1909.80	21.56	H	22.49	4.01	10.44	28.92	33.00	-4.08
1909.80	23.24	V	24.04	4.01	10.44	30.47	33.00	-2.53

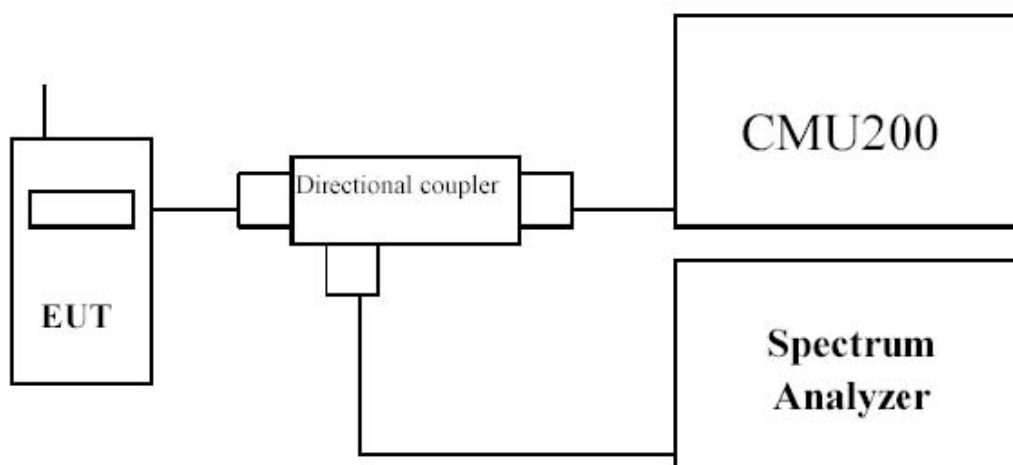
4. Modulation Characteristic

◆ Test Equipment

Modulation Characteristic / AC-4

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2008/06/11
Radio Communication Tester	R&S	CMU 200	106388	2008/10/21
Dual Directional Coupler	Agilent	778D	20160	2009/04/20
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2009/04/20
Coaxial Cable	Huber+Suhner	AC4-RF-H	10	2008/11/24
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH007	2009/03/31

◆ Test Setup



◆ **Limit**

N/A

◆ **Test Procedure**

GMSK is a form of binary signaling schemes which represent digital states as a shift between discrete sinusoidal frequencies called Frequency Shift Keying (FSK). Minimum Shift Keying (MSK) is continuous phase FSK with the smallest possible modulation index h . Modulation index is defined as: $h = 2 \cdot F \cdot T_b$

where F = Peak frequency deviation in Hz and T_b = Bit period in seconds

Two discrete frequencies, representing two distinct digital states, with equal phases at switch time $t = 0$ requires a minimum value of $h = 0.5$. The Gaussian part of GMSK describes the fact that the digital pulses are filtered in the time domain. This results in bits which are sinusoidal rather than square. The effective spectrum is then compressed with the average carrier frequency in the center of the passband. This is a great advantage because of the significantly reduced bandwidth. GMSK is utilized because of these bandwidth conservation properties.

The bandwidth for GSM is a 60 MHz up-link at 1850-1910 MHz and down-link at 1930-1990 MHz. The 65 MHz is divided into 299 channels, each of which is 200 kHz wide. Slight spectral spillage is allowed into neighboring channels (which is minimized by GMSK). This separated transmit/receive frequencies scheme under GSM enables easier duplex filtering.

Within the bandwidth, individual channels are subdivided into multiframes (made of 26 frames), frames (made of 8 time slots), and time slots (made of 8 fields). The time slots are 0.57 ms long allowing 156.25 bits of information including overhead.

The modulation used in GPRS is the same used in GSM. A GSM channel contains eight timeslots, each timeslot is dedicated to one circuit switched call. For GPRS the timeslots are assigned on an as needed basis, and more than one timeslot can be assigned for a particular transmission depending on the network and the device.

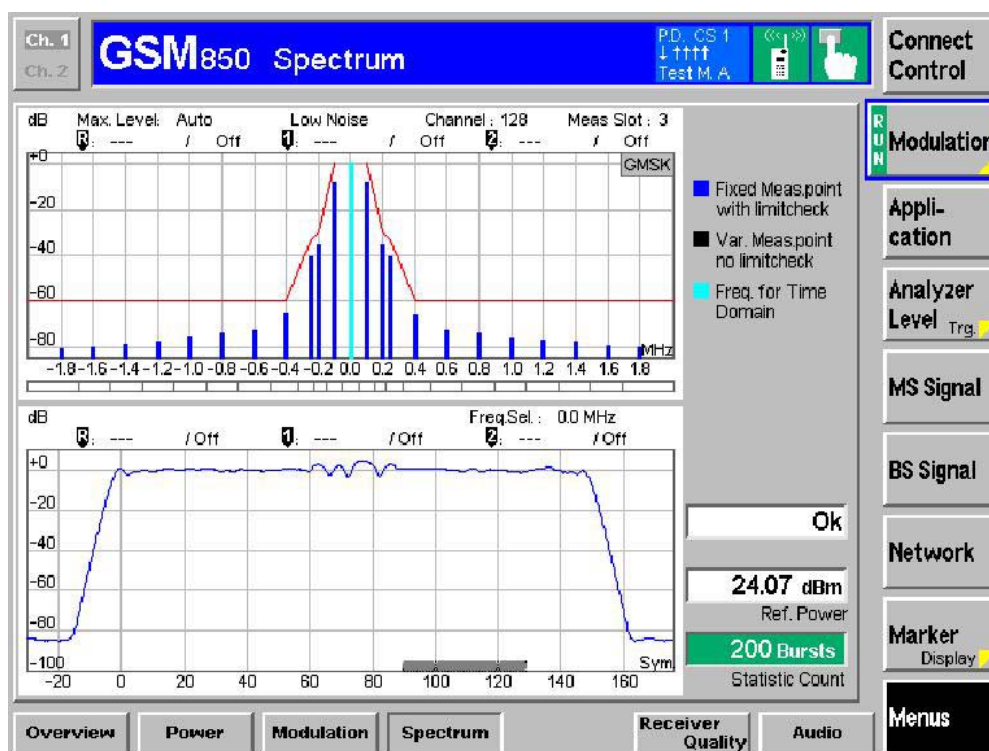
◆ **Uncertainty**

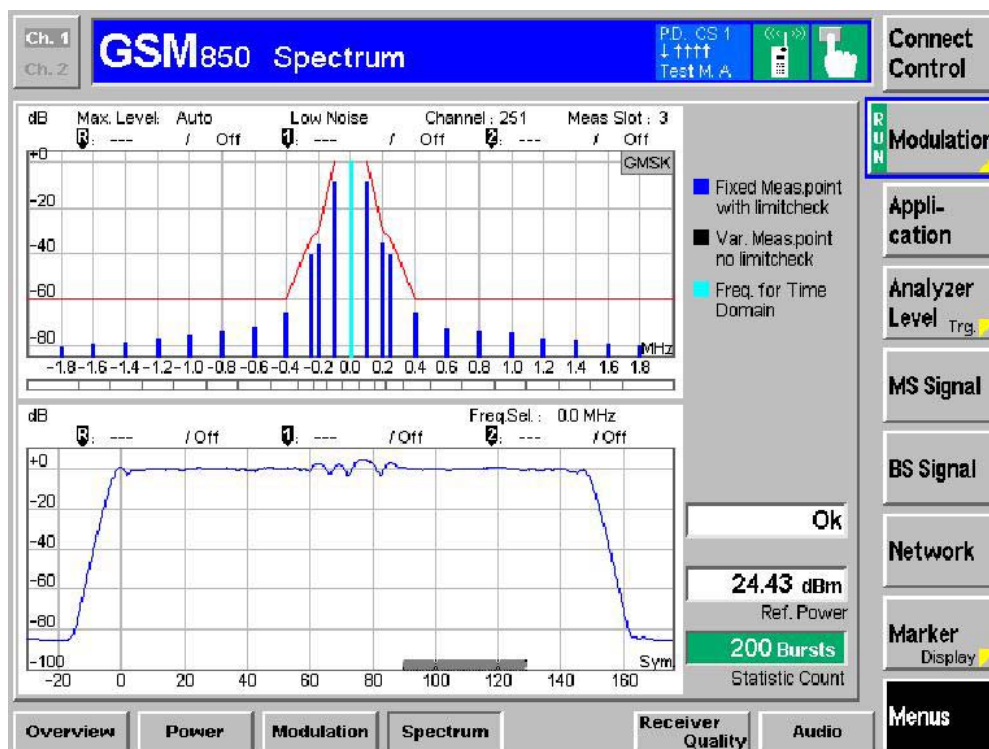
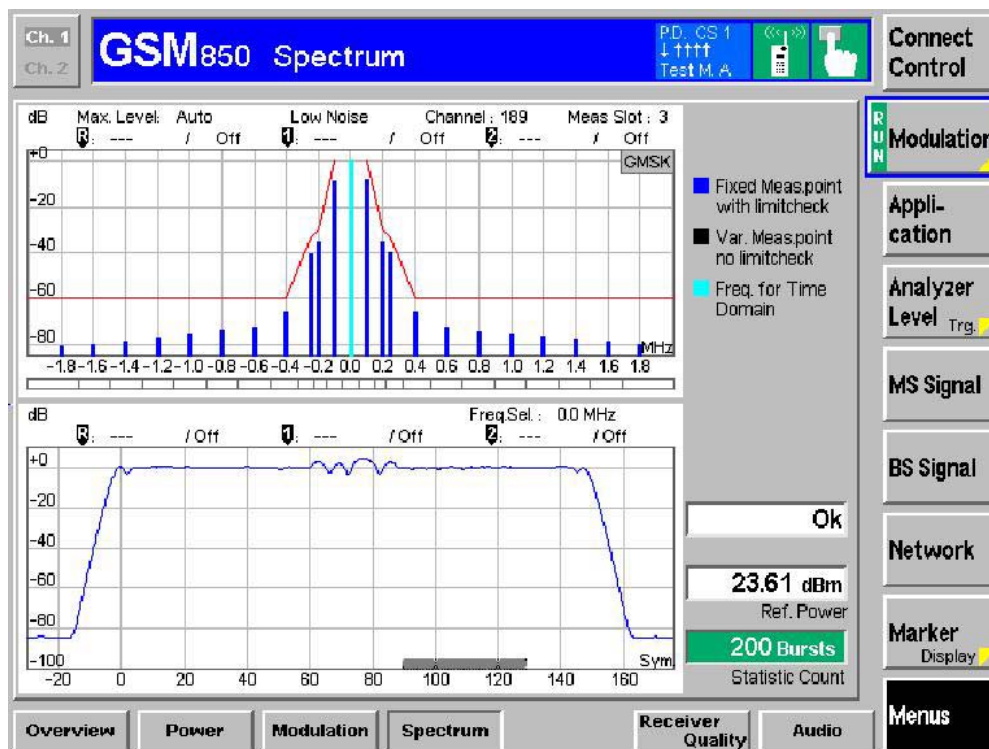
The measurement uncertainty is defined as 0.1%

◆ Test Result

Product	GPRS Module / POS Terminal		
Test Item	Modulation Characteristic		
Test Mode	Mode 1: GPRS 850		
Date of Test	2009/04/26	Test Site	AC-3

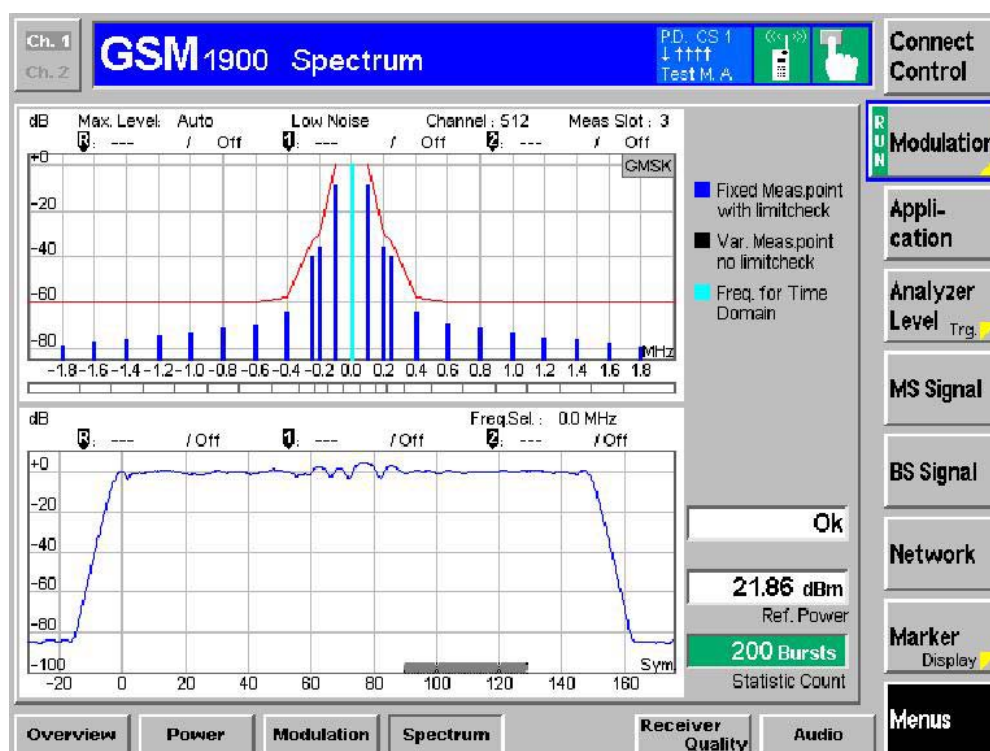
Figure (GPRS 850)

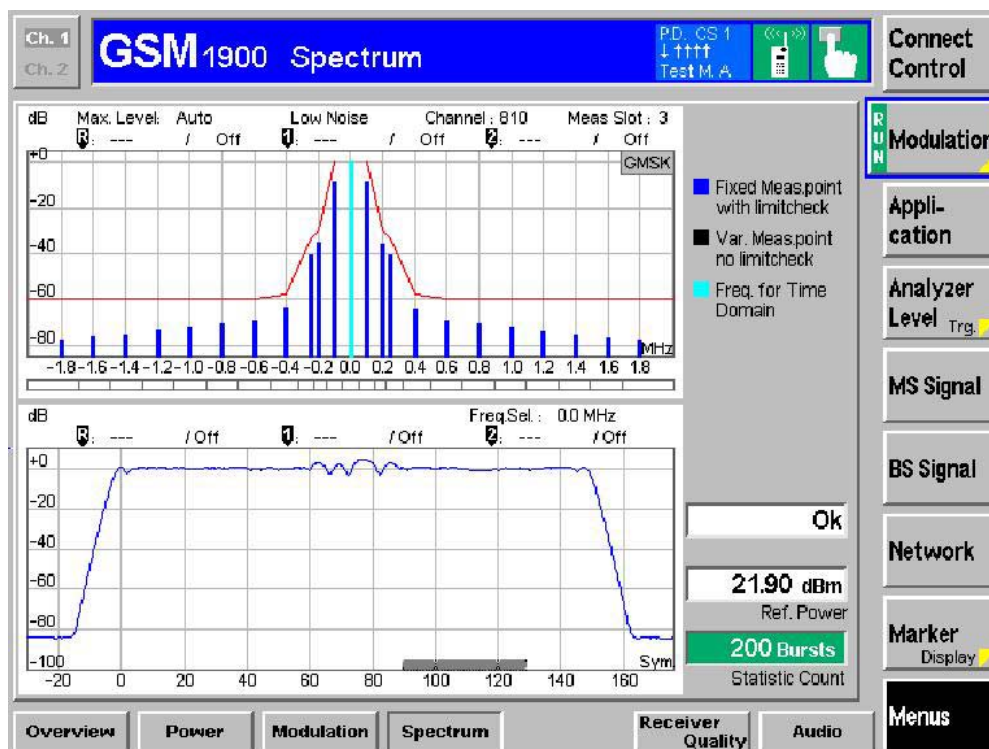
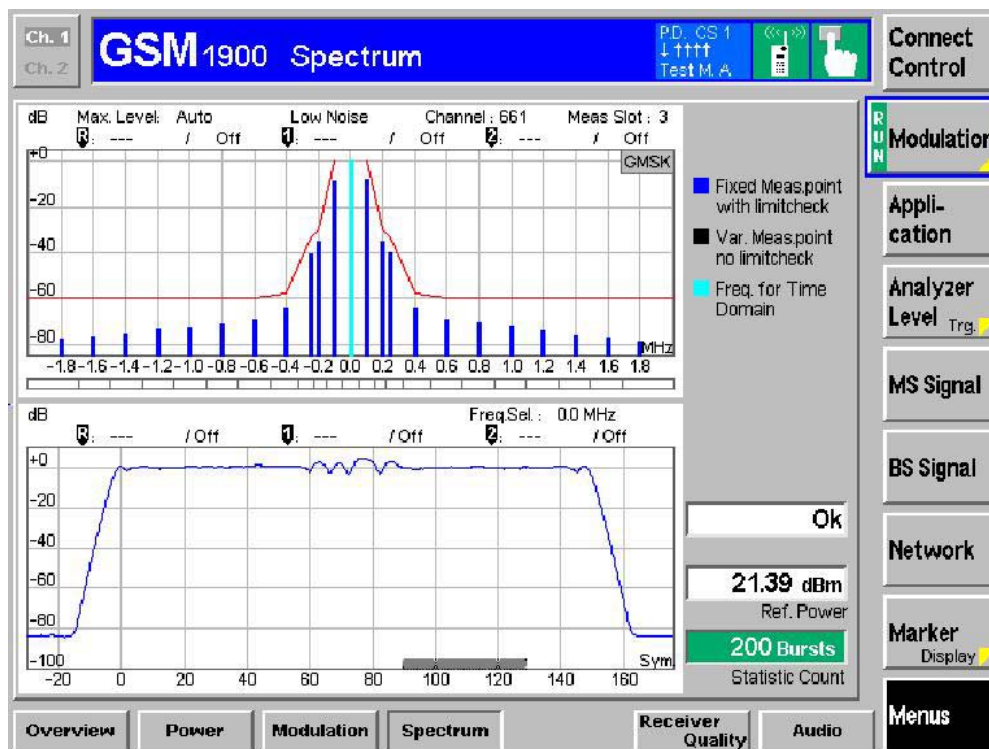




Product	GPRS Module / POS Terminal		
Test Item	Modulation Characteristic		
Test Mode	Mode 2: GPRS 1900		
Date of Test	2009/04/26	Test Site	AC-3

Figure (GPRS 1900)





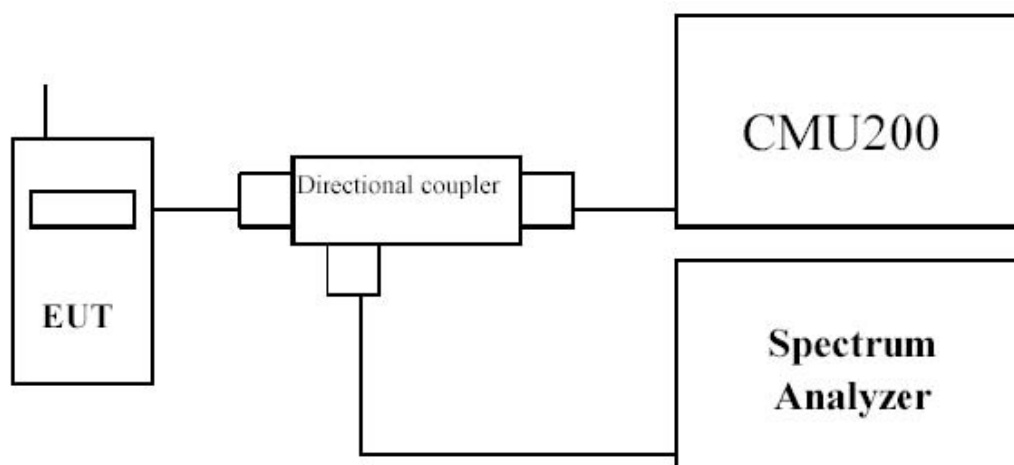
5. Occupied Bandwidth

◆ Test Equipment

Occupied Bandwidth / AC-4

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2008/06/11
Radio Communication Tester	R&S	CMU 200	106388	2008/10/21
Dual Directional Coupler	Agilent	778D	20160	2009/04/20
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2009/04/20
Coaxial Cable	Huber+Suhner	AC4-RF-H	10	2008/11/24
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH007	2009/03/31

◆ Test Setup



◆ **Limit**

N/A

◆ **Test Procedure**

Using a resolution bandwidth of 3kHz and a video bandwidth of 10kHz, the -26dBc points were established and the emission bandwidth determined. The plots below show the resultant display from the Spectrum Analyzer.

◆ **Uncertainty**

The measurement uncertainty is defined as ± 10 Hz

◆ Test Result

Product	GPRS Module / POS Terminal		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: GPRS 850		
Date of Test	2009/04/25	Test Site	AC-3

Channel No.	Frequency (MHz)	Measurement of -26dB Bandwidth (kHz)
128	824.20	306.000
189	836.40	310.000
251	848.80	306.000

Figure Channel 128 (824.20MHz)

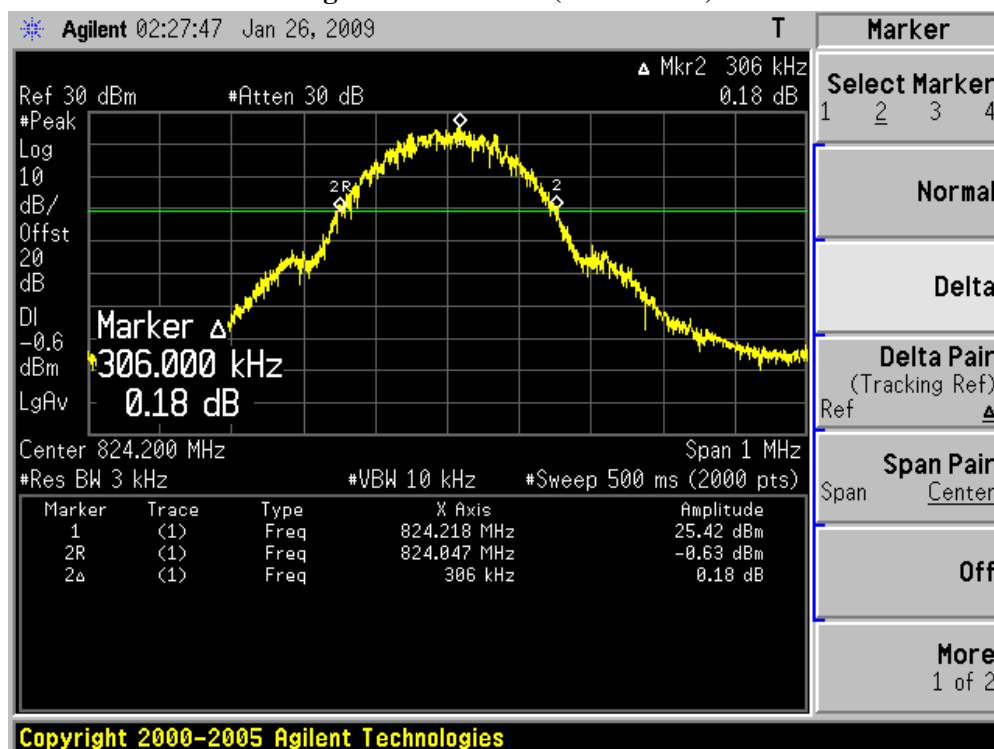


Figure Channel 189 (836.40MHz)

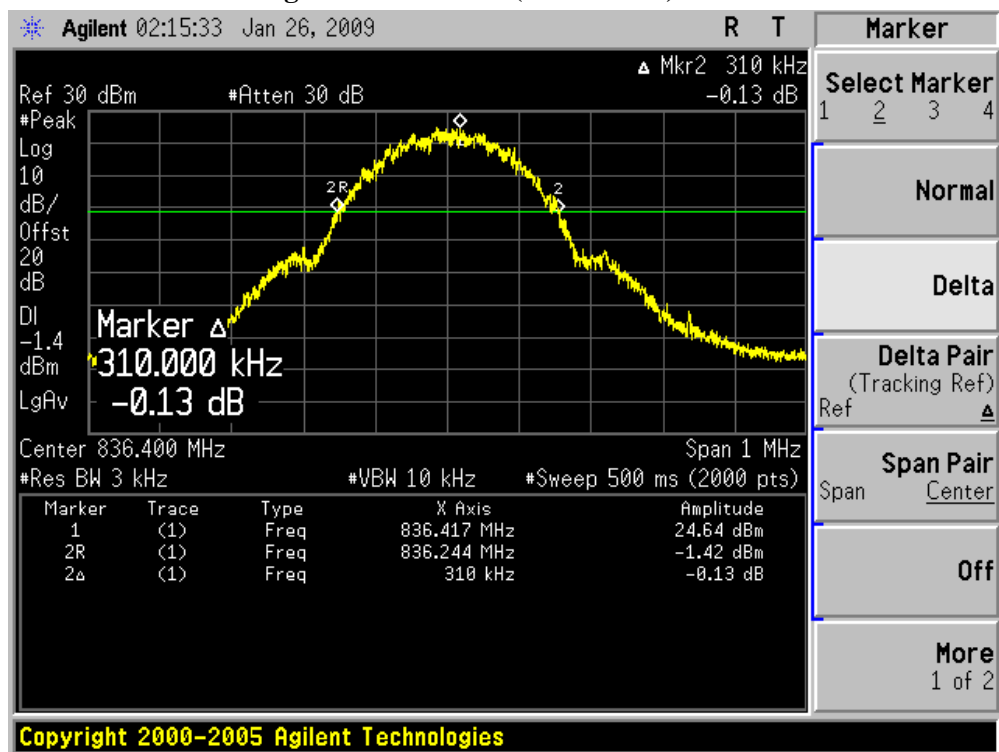
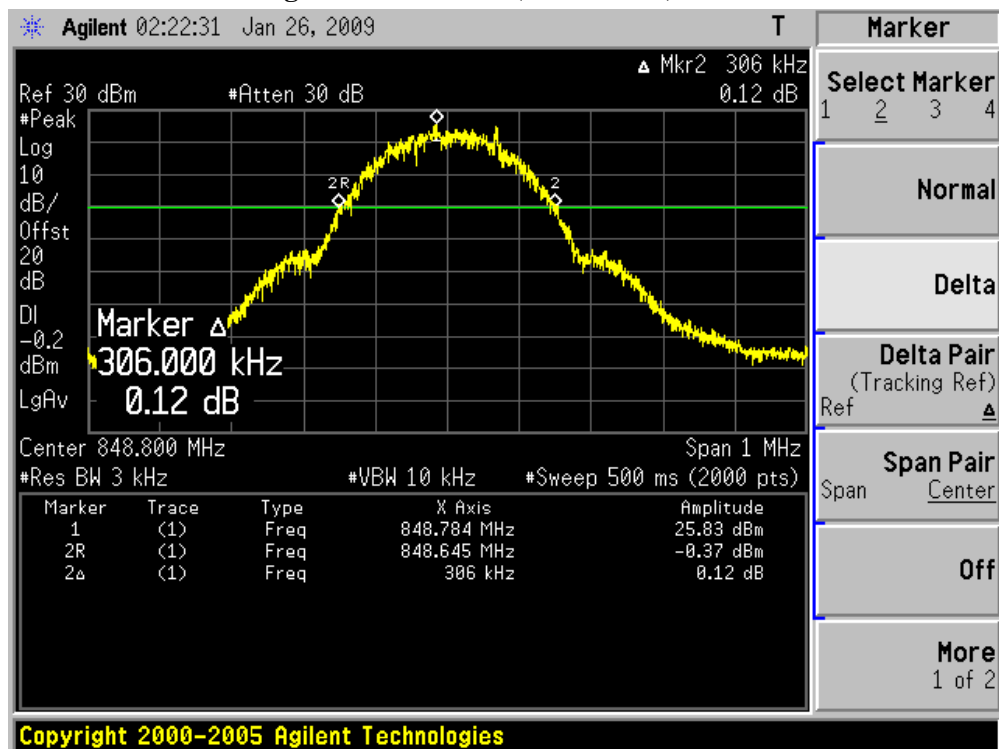


Figure Channel 251 (848.80MHz)



Product	GPRS Module / POS Terminal		
Test Item	Occupied Bandwidth		
Test Mode	Mode 2: GPRS 1900		
Date of Test	2009/04/25	Test Site	AC-3

Channel No.	Frequency (MHz)	Measurement of -26dB Bandwidth (kHz)
512	1850.20	301.000
661	1880.00	306.000
810	1909.80	302.000

Figure Channel 512 (1850.20MHz)

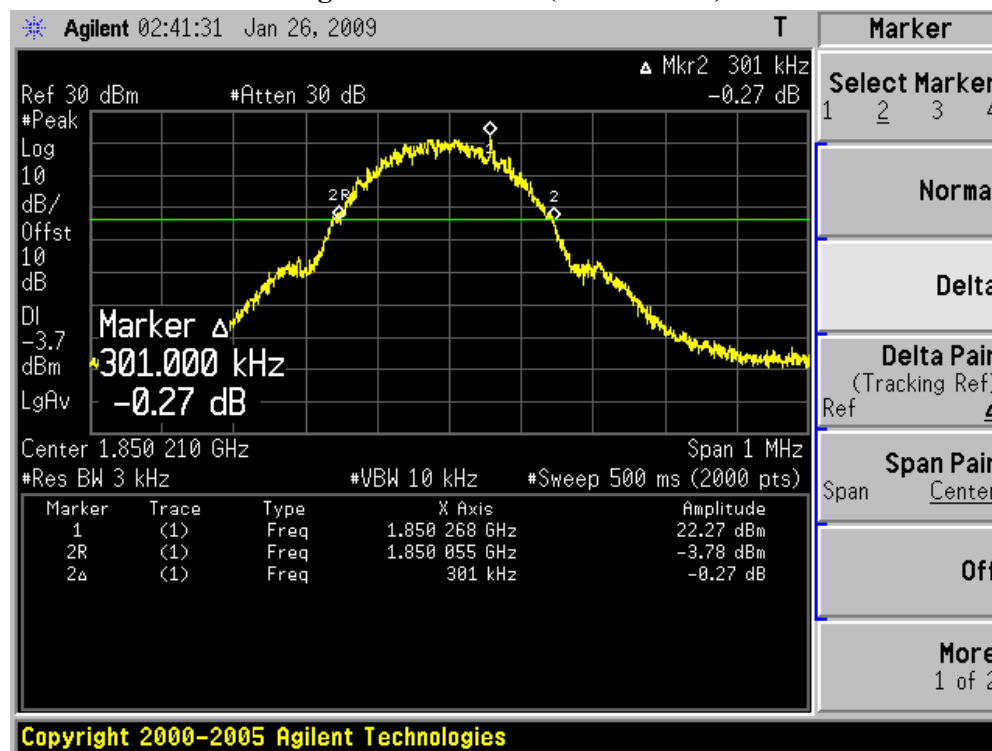


Figure Channel 661 (1880.00MHz)

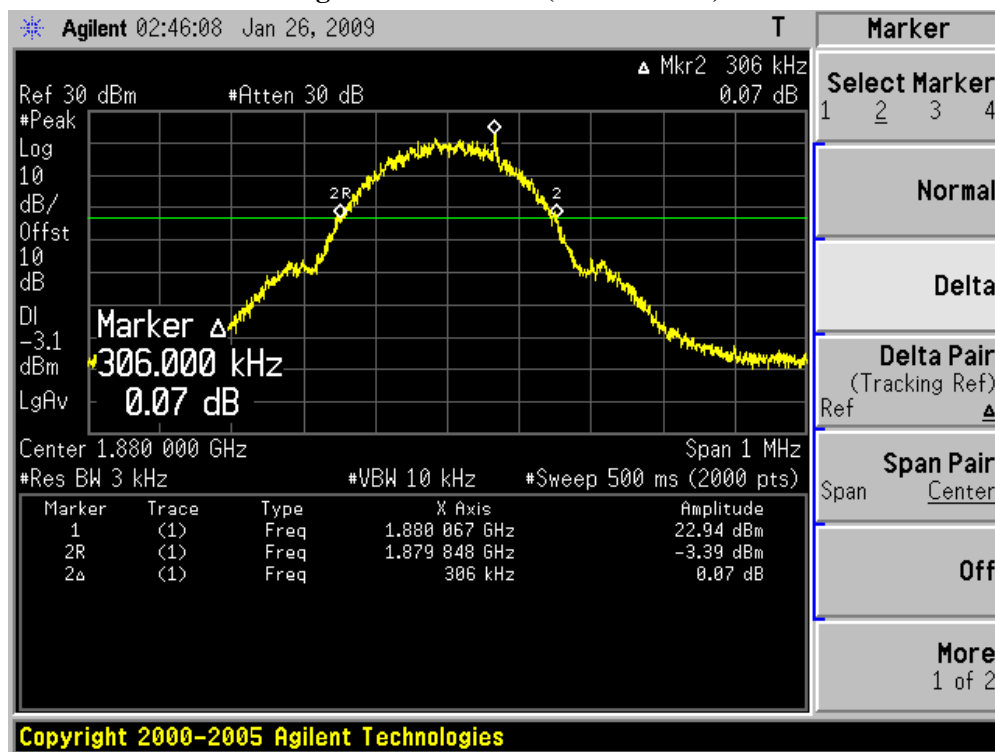
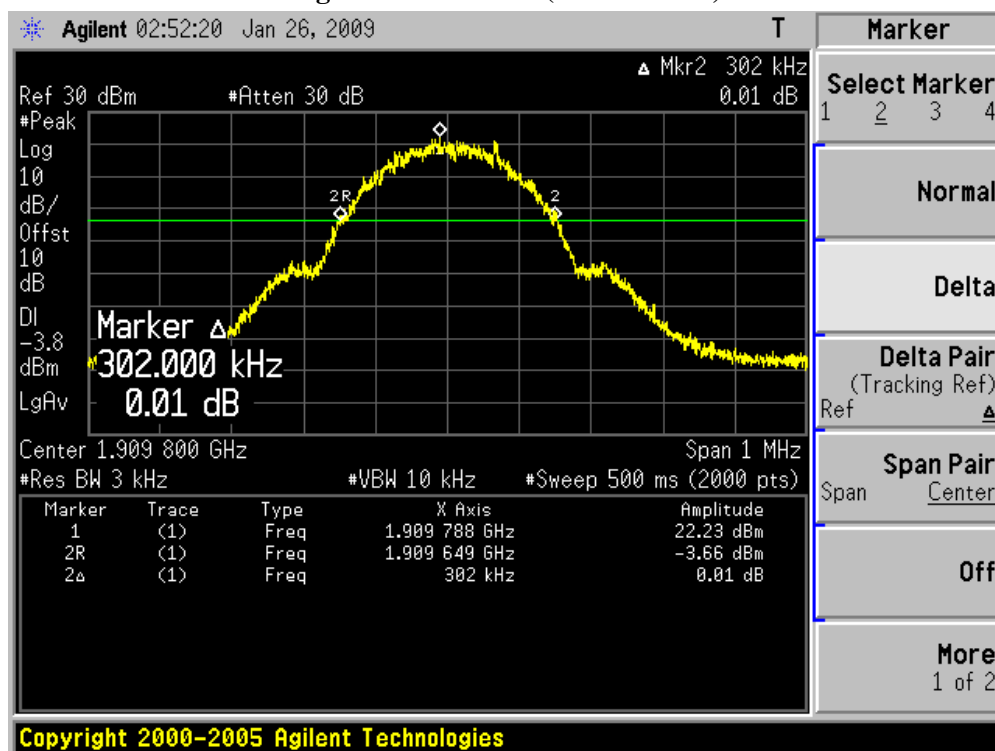


Figure Channel 810 (1909.80MHz)



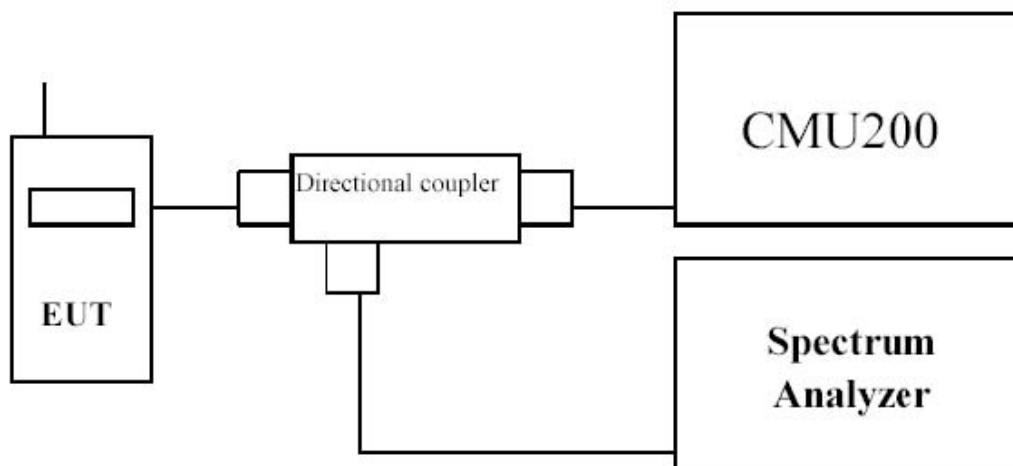
6. Spurious Emission At Antenna Terminals (+/- 1MHz)

◆ Test Equipment

Spurious Emission At Antenna Terminals (+/- 1MHz) / AC-4

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2008/06/11
Radio Communication Tester	R&S	CMU 200	106388	2008/10/21
Dual Directional Coupler	Agilent	778D	20160	2009/04/20
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2009/04/20
Coaxial Cable	Huber+Suhner	AC4-RF-H	10	2008/11/24
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH007	2009/03/31

◆ Test Setup



◆ **Limit**

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.

◆ **Test Procedure**

In the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.

◆ **Uncertainty**

The measurement uncertainty is defined as ± 1.2 dB.

◆ Test Result

Product	GPRS Module / POS Terminal		
Test Item	Spurious Emission At Antenna Terminals (+/- 1MHz)		
Test Mode	Mode 1: GPRS 850		
Date of Test	2009/04/25	Test Site	AC-3

Figure Channel 128 (824.20MHz)-Peak

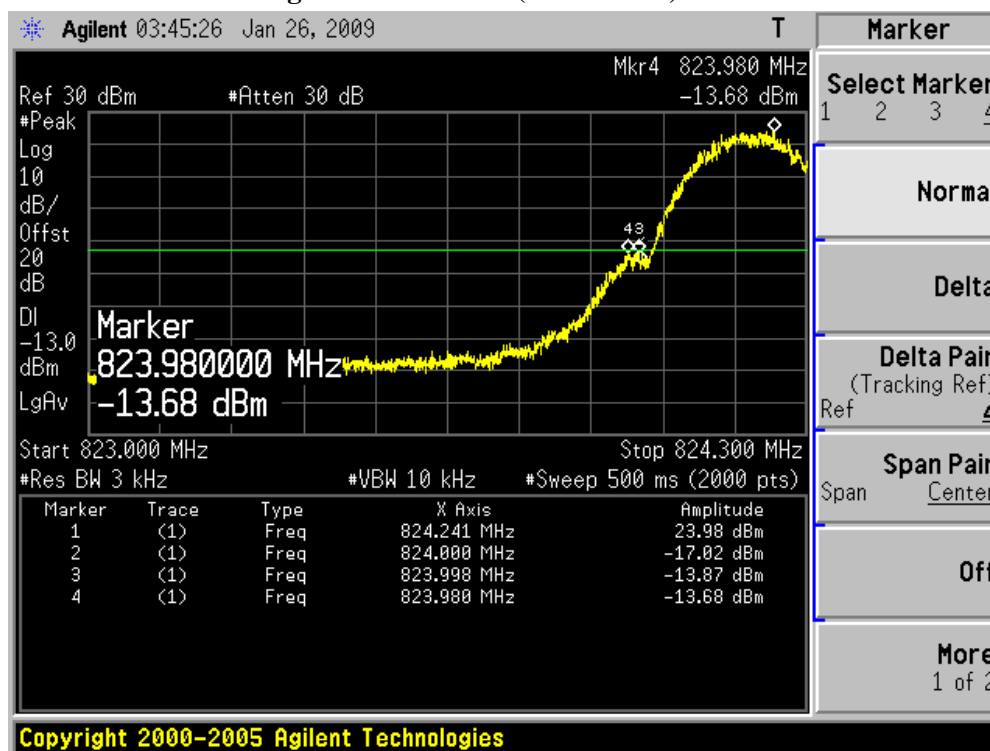


Figure Channel 128 (824.20MHz)-Average

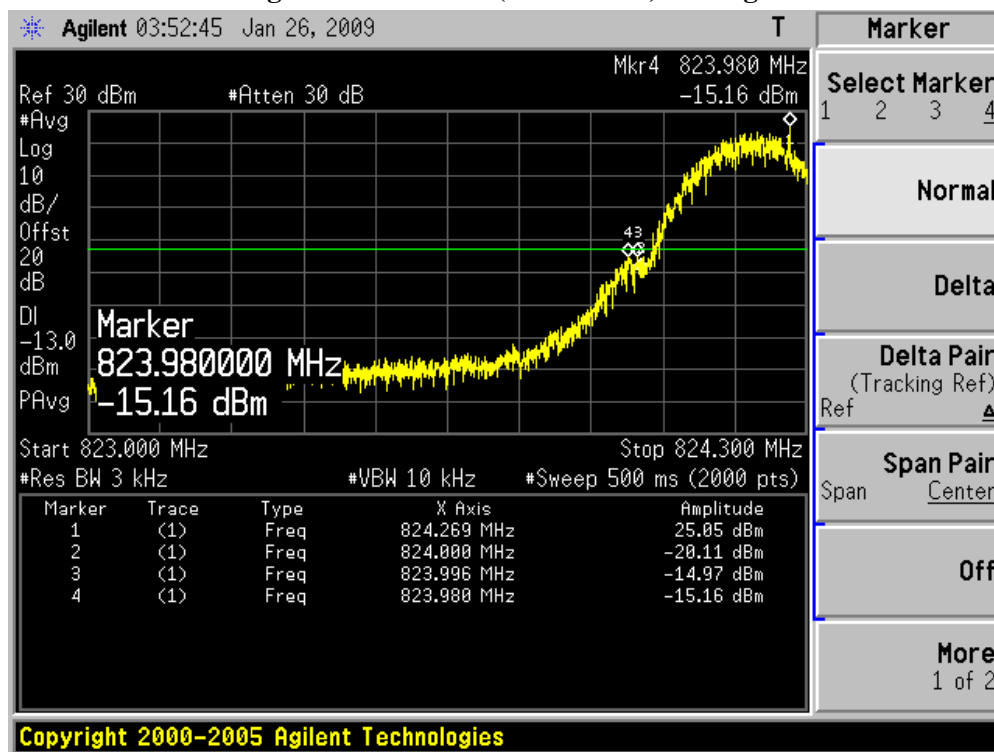


Figure Channel 251 (848.80MHz)-Peak

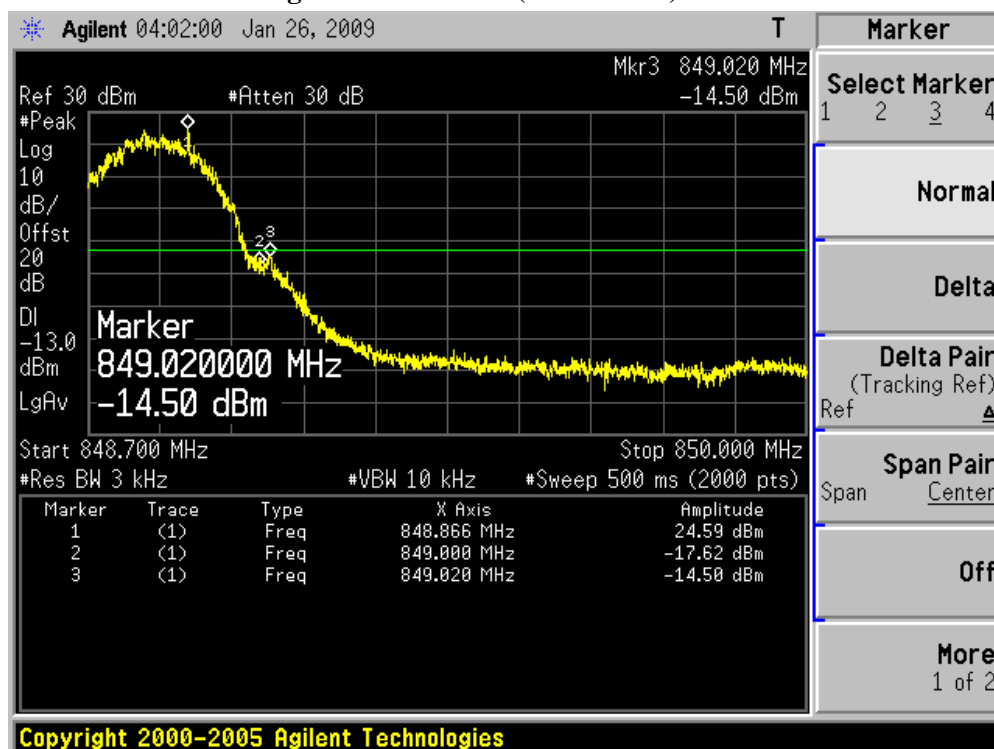
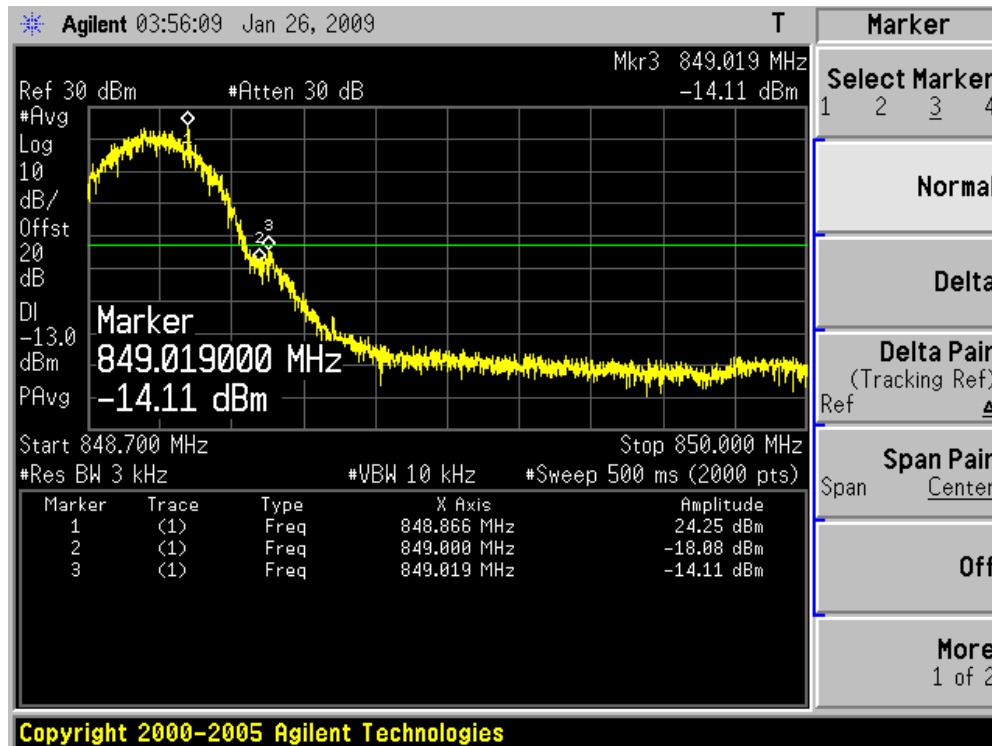


Figure Channel 251 (848.80MHz)-Average



Product	GPRS Module / POS Terminal		
Test Item	Spurious Emission At Antenna Terminals (+/- 1MHz)		
Test Mode	Mode 2: GPRS 1900		
Date of Test	2009/04/25	Test Site	AC-3

Figure Channel 512 (1850.20MHz) -Peak

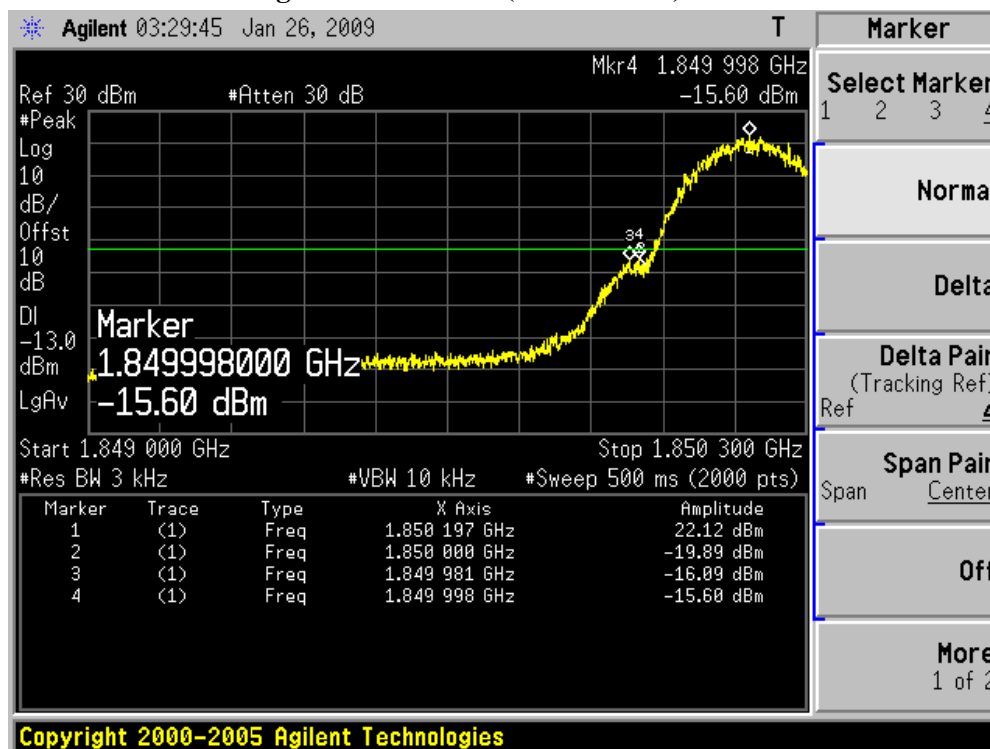


Figure Channel 512 (1850.20MHz) -Average

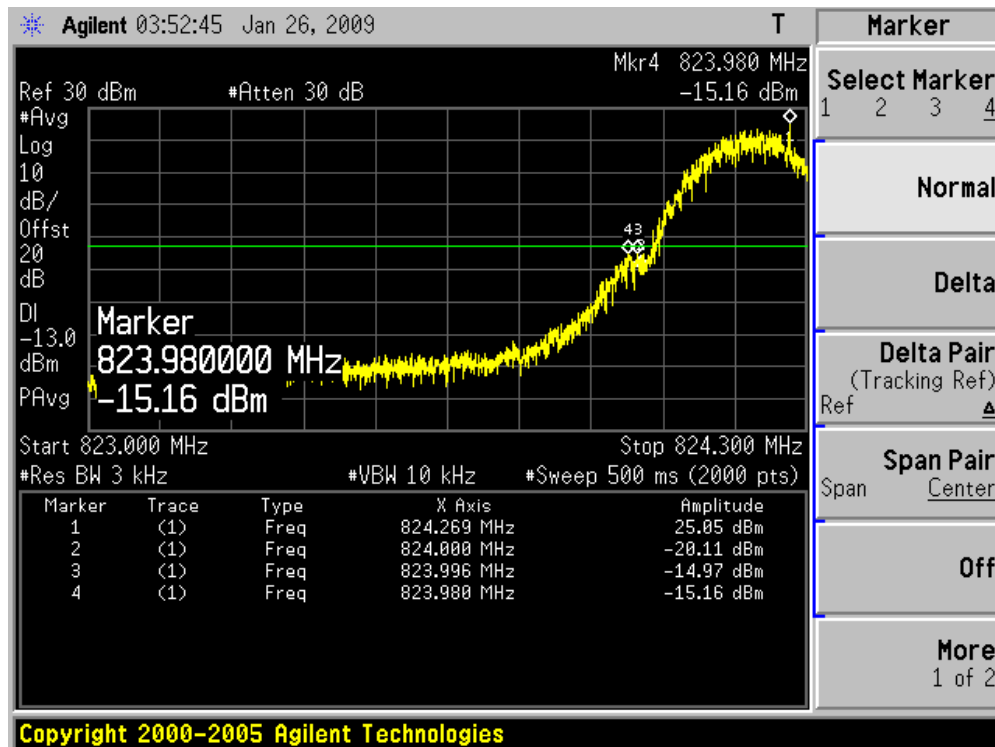


Figure Channel 810 (1909.80MHz) -Peak

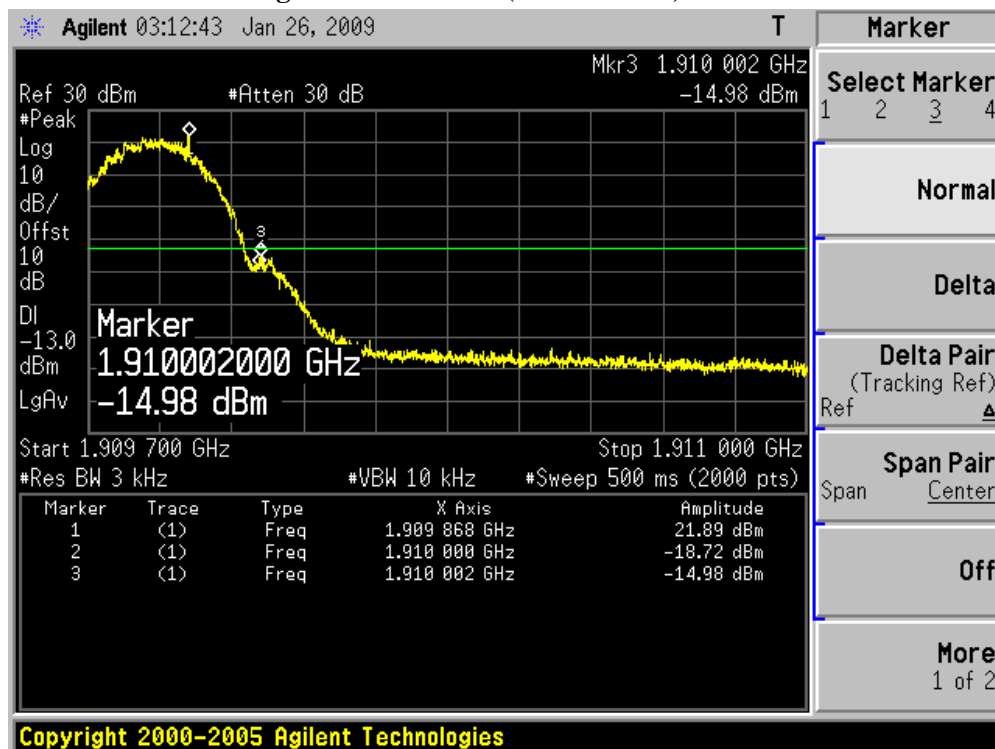
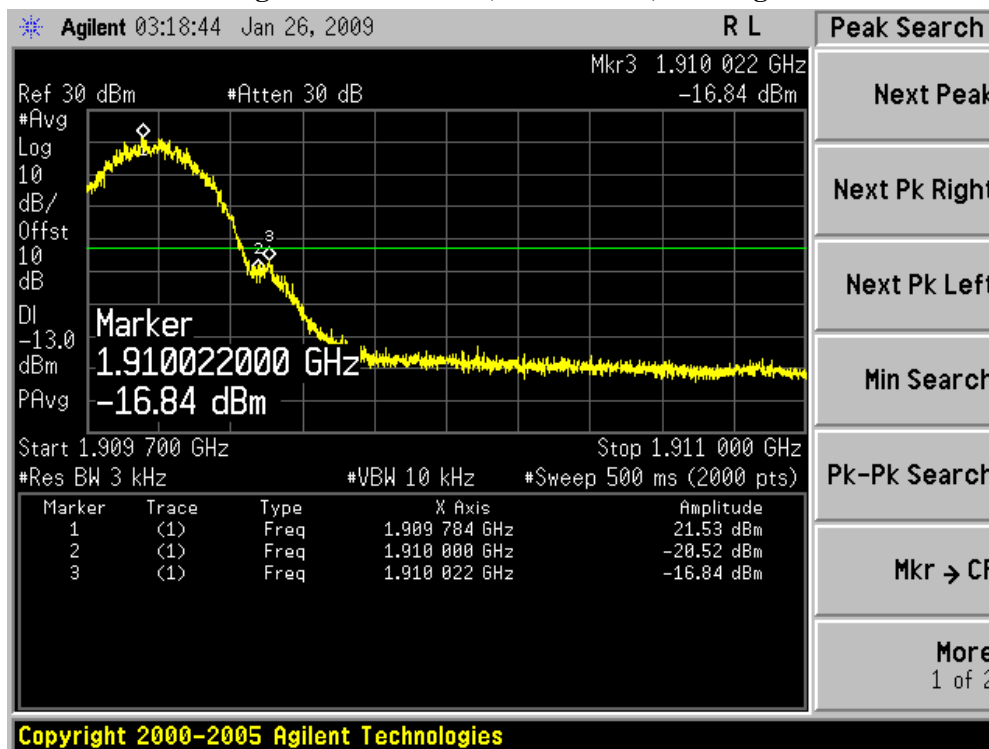


Figure Channel 810 (1909.80MHz) -Average



7. Spurious Emission

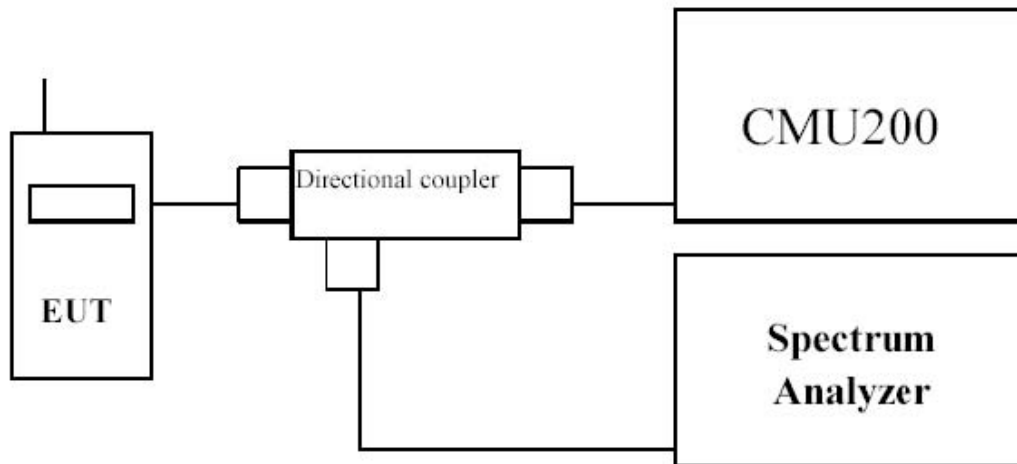
◆ Test Equipment

Spurious Emission / AC-4

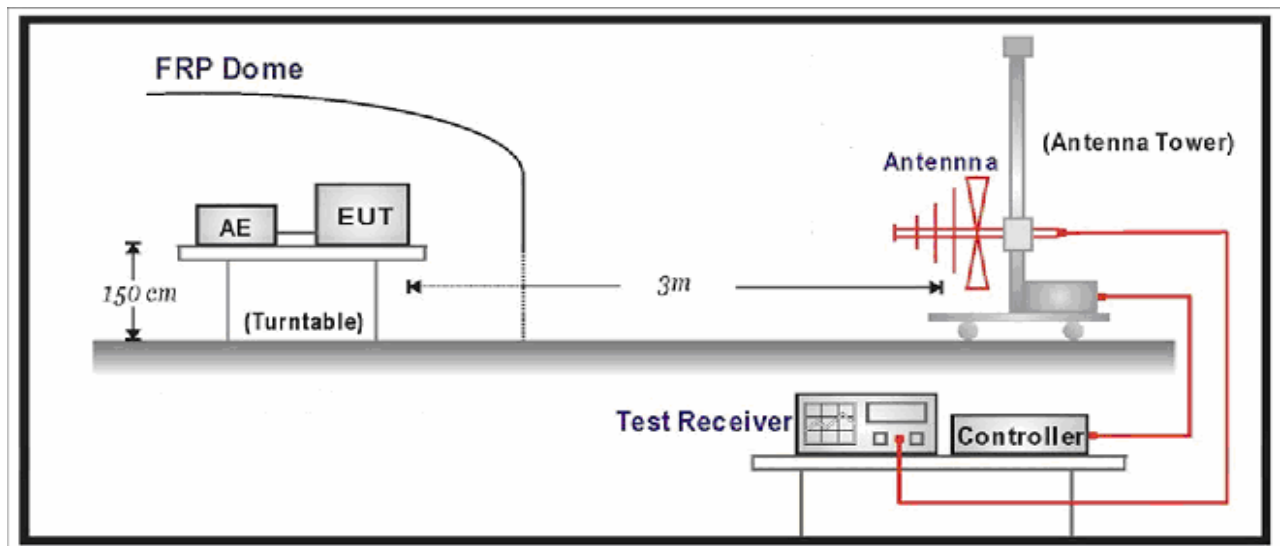
Instrument	Manufacturer	Type No.	Serial No	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2008/06/11
Radio Communication Tester	R&S	CMU 200	106388	2008/10/21
Dual Directional Coupler	Agilent	778D	20160	2009/04/20
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2009/04/20
PSG Analog S.G.	Agilent	E8257D	MY44321116	2008/06/11
Preamplifier	Quietek	AP-025C	QT-AP005	2008/11/24
Preamplifier	Quietek	AP-180C	CHM-0602013	2008/11/24
Bilog Type Antenna	Schaffner	CBL6141A	4278	2008/11/24
Half Wave Tuned Dipole Antenna	COM-POWER	AD-100	40137	2008/11/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	496	2008/11/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	499	2008/11/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2008/11/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	295	2008/11/24
Coaxial Cable	Huber+Suhner	AC4-RL	06	2008/11/24
Coaxial Cable	Huber+Suhner	AC4-RH	07	2008/11/24
Coaxial Cable	Huber+Suhner	AC4-T	08	2008/11/24
Coaxial Cable	Huber+Suhner	AC4-RF-H	10	2008/11/24
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH007	2009/03/31

◆ Test Setup

Conducted Spurious Measurement:



Radiated Spurious Measurement:



◆ Limit

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.

◆ Test Procedure

Conducted Spurious Measurement:

- a) Place the EUT on a bench and set it in transmitting mode.
- b) Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMU200 by a Directional Couple.
- c) EUT Communicate with CMU200, then select a channel for testing.
- d) Add a correction factor to the display of spectrum, and then test.
- e) The resolution bandwidth of the spectrum analyzer was set at 1 MHz, sufficient scans were taken to show the out of band Emission if any up to 10th harmonic.

Radiated Spurious Measurement:

- a) The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
- b) The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter
- c) The output of the test antenna shall be connected to the measuring receiver.
- d) The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
- e) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- f) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- g) The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- q) The maximum signal level detected by the measuring receiver shall be noted.
- h) The transmitter shall be replaced by a substitution antenna.
- i) The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- j) The substitution antenna shall be connected to a calibrated signal generator.
- k) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- l) The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
- m) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.

- n) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
- o) The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
- p) The frequency range was checked up to 10th harmonic.

◆ **Uncertainty**

The measurement uncertainty is defined as for Conducted Power Measurement ± 1.2 dB,
for Radiated Power Measurement ± 3.2 dB

◆ Test Result

Product	GPRS Module / POS Terminal		
Test Item	Spurious Emission		
Test Mode	Mode 1: GPRS 850		
Date of Test	2009/05/25	Test Site	AC-5

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 128 (824.20MHz)								
1645.00	-50.71	V	-50.83	3.28	9.75	-44.36	-13.00	-31.36
2470.00	-57.66	V	-53.80	4.10	10.48	-47.42	-13.00	-34.42
1645.00	-45.82	H	-45.49	3.28	9.75	-39.02	-13.00	-26.02
2470.00	-63.08	H	-59.20	4.10	10.48	-52.82	-13.00	-39.82
Middle Channel 189 (836.40MHz)								
1675.00	-49.37	V	-49.19	3.32	9.95	-42.56	-13.00	-29.56
2515.00	-60.13	V	-56.44	3.81	10.62	-49.63	-13.00	-36.63
1675.00	-44.90	H	-44.53	3.32	9.95	-37.90	-13.00	-24.90
2515.00	-60.87	H	-57.23	3.81	10.62	-50.42	-13.00	-37.42
High Channel 251 (848.80MHz)								
1705.00	-49.36	V	-49.34	3.35	10.13	-42.56	-13.00	-29.56
2545.00	-49.63	V	-56.12	4.19	10.68	-49.63	-13.00	-36.63
1705.00	-47.27	H	-46.79	3.35	10.13	-40.01	-13.00	-27.01
2545.00	-56.49	H	-52.53	4.19	10.68	-46.04	-13.00	-33.04

Product	GPRS Module / POS Terminal		
Test Item	Spurious Emission		
Test Mode	Mode 2: GPRS 1900		
Date of Test	2009/05/25	Test Site	AC-5

Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 512 (1850.20MHz)								
3706.66	-42.99	V	-37.59	4.78	12.69	-29.68	-13.00	-16.68
5550.00	-52.83	V	-41.50	6.03	13.15	-34.38	-13.00	-21.38
3706.66	-45.70	H	-40.26	4.78	12.69	-32.35	-13.00	-19.35
5550.00	-54.01	H	-42.67	6.03	13.15	-35.55	-13.00	-22.55
Middle Channel 661 (1880.00MHz)								
3753.33	-46.38	V	-40.39	5.03	12.72	-32.70	-13.00	-19.70
5643.33	-53.68	V	-42.43	5.93	13.14	-35.22	-13.00	-22.22
3753.33	-47.68	H	-41.75	5.03	12.72	-34.06	-13.00	-21.06
5643.33	-57.36	H	-46.27	5.93	13.14	-39.06	-13.00	-26.06
High Channel 810 (1909.80MHz)								
3823.33	-55.56	V	-42.06	5.03	12.73	-41.53	-13.00	-18.53
5736.66	-52.75	V	-40.89	6.20	13.11	-33.98	-13.00	-20.98
3823.33	-46.70	H	-40.32	5.03	12.73	-32.62	-13.00	-19.62
5736.66	-57.72	H	-45.92	6.20	13.11	-39.01	-13.00	-26.01

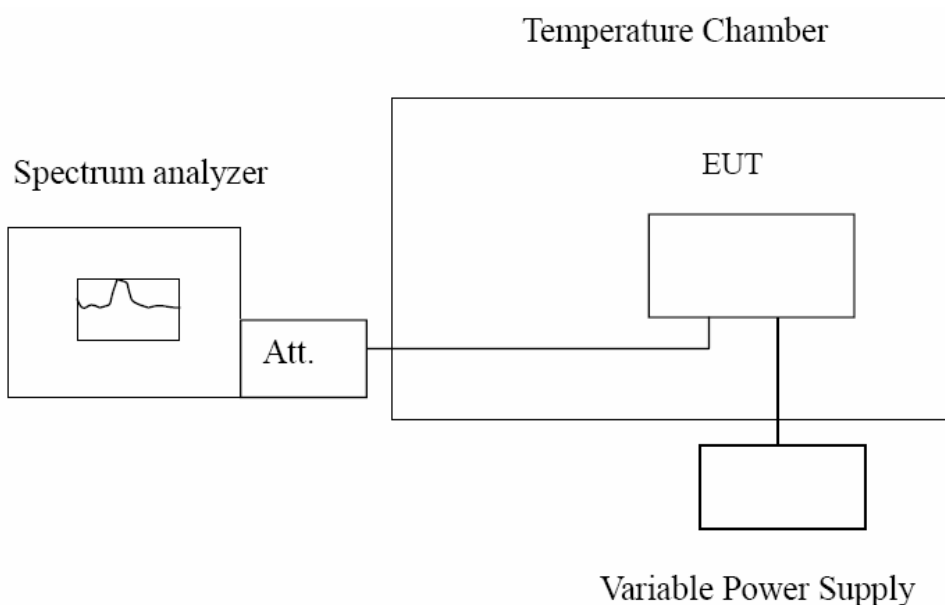
8. Frequency Stability Under Temperature & Voltage Variations

◆ Test Equipment

Frequency Stability Under Temperature & Voltage Variations / AC-4

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2008/06/11
Radio Communication Tester	R&S	CMU 200	106388	2008/10/21
Dual Directional Coupler	Agilent	778D	20160	2009/04/20
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2009/04/20
Coaxial Cable	Huber+Suhner	AC3-RF	08	2008/11/24
AC Power Supply	IDRC	CF-500TP	979422	2008/10/21
DC Power Supply	IDRC	CD-035-020PR	977272	2008/10/21
Programmable Temperature & Humidity Chamber	Gaoyu	TH-1P-B	WIT-05121302	2009/01/19
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH003	2009/03/31

◆ Test Setup



◆ **Limit**

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Limit	$< \pm 2.5 \text{ ppm}$
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◆ **Test Procedure**

Frequency Stability Under Temperature Variations:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. Reduce the input voltage to specify extreme voltage variation ($\pm 15\%$) and endpoint, record the maximum frequency change.

◆ **Uncertainty**

The measurement uncertainty is defined as $\pm 10 \text{ Hz}$.

◆ Test Result

Product	GPRS Module / POS Terminal		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 1: GPRS 850		
Date of Test	2009/03/05	Test Site	AC-3

Frequency Stability under Temperature

Temperature Interval (°C)	Test Frequency (MHz)	Deviation (Hz)	Limit (kHz)
-30	836.40	-48	± 2091
-20	836.40	-38	± 2091
-10	836.40	-23	± 2091
0	836.40	-18	± 2091
10	836.40	-20	± 2091
20	836.40	-16	± 2091
30	836.40	-18	± 2091
40	836.40	-26	± 2091
50	836.40	-30	± 2091

Frequency Stability under Voltage

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (KHz)
3.14	836.40	-41	± 2091
3.70	836.40	-16	± 2091
4.25	836.40	-30	± 2091

Product	GPRS Module / POS Terminal		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 2: GPRS 1900		
Date of Test	2009/03/05	Test Site	AC-3

Frequency Stability under Temperature

Temperature Interval (°C)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
-30	1880.00	-64	± 4700
-20	1880.00	-55	± 4700
-10	1880.00	-49	± 4700
0	1880.00	-47	± 4700
10	1880.00	-33	± 4700
20	1880.00	-23	± 4700
30	1880.00	-32	± 4700
40	1880.00	-37	± 4700
50	1880.00	-49	± 4700

Frequency Stability under Voltage

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (KHz)
3.14	1880.00	-62	± 4700
3.70	1880.00	-39	± 4700
4.25	1880.00	-67	± 4700