FCC Part22H&24E Test Report
Industry Canada RSS-132/RSS-133

Product Name	:	HiALLNC
Model No.	:	HiALLNC
FCC ID	:	VW3HIALLNC
IC	:	9140A-HIALLNC

Applicant	:	Sagemcom
Address	:	250 route de l'empereur 92848, France

Date of Receipt	:	13/04/2012
Test Date	:	13/04/2012~18/04/2012
Issued Date	:	03/05/2012
Report No.	:	124S024R-HP-US-P07V01
Report Version	:	V 1.3

Test Report Certification

Issued Date : 03/05/2012
Report No. : 124S024R-HP-US-P07V01

QuieTek

Product Name	:	HiALLNC
Applicant	:	Sagemcom
Address	:	250 route de l'empereur 92848, France
Manufacturer	:	Sagemcom
Address	:	250 route de l'empereur 92848, France
Model No.	:	HiALLNC
FCC ID	:	VW3HIALLNC
IC	:	9140A-HIALLNC
EUT Voltage	:	Minimum: 3.3v, Normal: 3.7v, Maximum: 4.5v
Brand Name	:	SAGEMCOM
Applicable Standard	:	FCC CFR Title 47 Part 2,TIA/EIA 603-C
		FCC Part22 Subpart H, FCC Part24 Subpart E
		Industry Canada RSS-132, Issue 2: 2005
		Industry Canada RSS-133, Issue 5: 2009
Test Result	:	Complied
Performed Location	:	Suzhou EMC Laboratory
		No.99 Hongye Rd., Suzhou Industrial Park Loufeng Hi-Tech
		Development Zone., Suzhou, China
		TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098
		FCC Registration Number: 800392; IC Lab Code: 4075B

Documented By : Alice Ni
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(Engineering Supervisor: Robin Wu)

Approved By : Marlin Chen
(Engineering Manager: Marlin Chen)

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/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

Taiwan R.O.C.	**:**	**BSMI, NCC, TAF**
Germany	**:**	**TUV Rheinland**
Norway	**:**	**Nemko, DNV**
USA	**:**	**FCC, NVLAP**
Japan	**:**	**VCCI**
China	**:**	**CNAS**

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site :http://www.quietek.com/tw/ctg/cts/accreditations.htm
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : http://www.quietek.com/
If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

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No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C.
TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789 E-Mail : service@quietek.com

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TEL : +86-512-6251-5088 / FAX : 86-512-6251-5098 E-Mail : service@quietek.com

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1. General Information

1.1. EUT Description

Product Name	HiALLNC
Model No.	HiALLNC
RF Exposure Environment	Uncontrolled
GPS	
Operate Frequency	1575.42MHz
Type of modulation	BPSK
2G	
Support Band	GSM850/PCS1900/GSM900/DCS1800
GPRS Type	Class B
GPRS Class	Class 10
Uplink	GSM 850: 824~849MHz PCS 1900: 1850~1910MHz
Downlink	GSM 850: 869~894MHz PCS 1900: 1930~1990MHz
Release Version	R99
Type of modulation	GMSK

Antenna used for testing:

Antenna type	Monopole
Antenna Gain	-3.0dBi for GSM 850 -1.0dBi for PCS 1900 -2.0dBi for GPS

1.2. 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 Link
Mode 2: GPRS 1900 Link

Note:

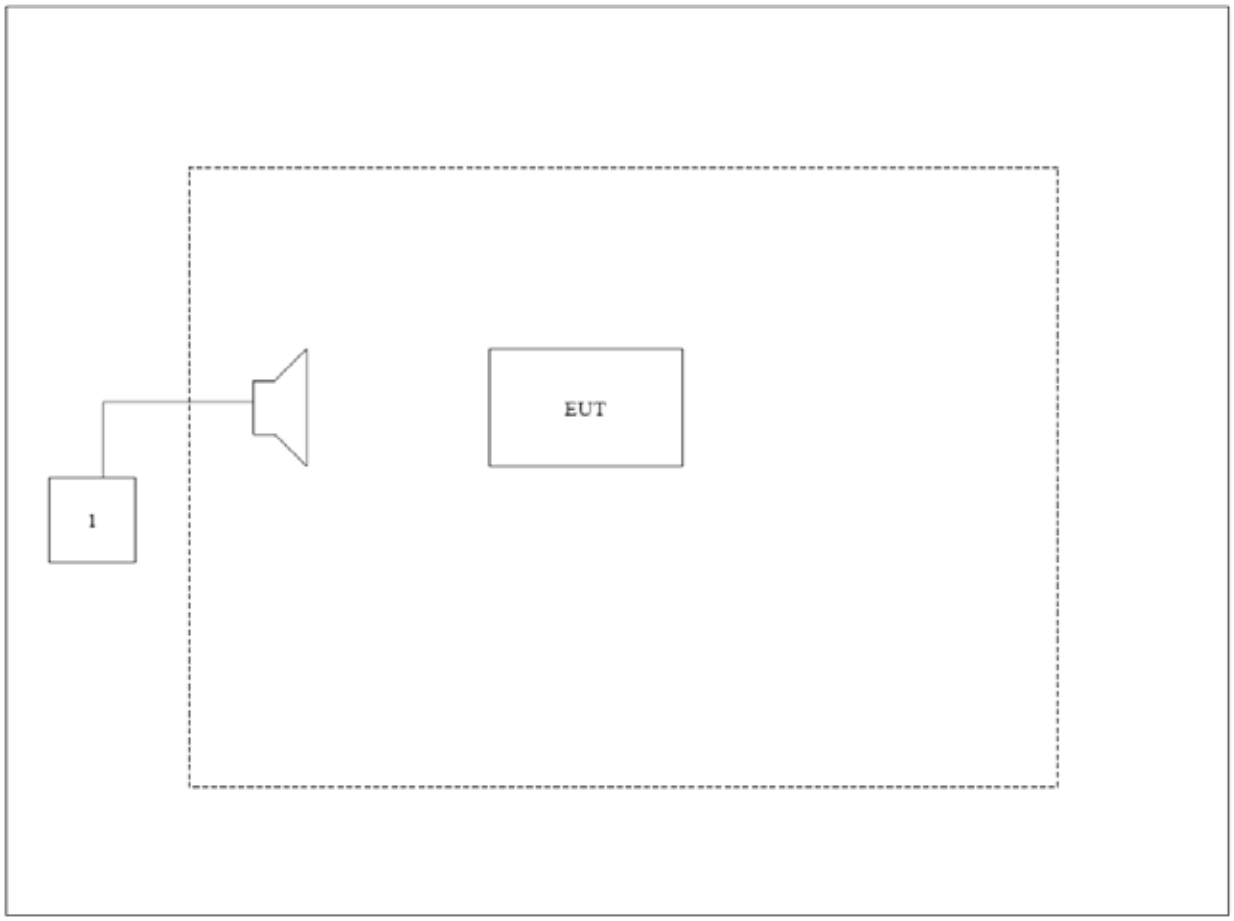
1. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.
2. For the ERP/EIRP and radiated emission test, every axis (X, Y, Z) was verified, and show the worst result on this report.

1.3. 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	CMU200	R&S	CMU200	N/A	N/A

1.4. Configuration of Tested System

Connection Diagram	
	
Signal Cable Type	Signal cable Description

1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of all equipment.
3	EUT Communicate with CMU200, then select channel to test.

2. Technical Test

2.1. 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)

Performed Item	Section in CFR 47	Section in RSS GEN or RSS-132	Test Performed	Deviation
Peak Output Power	FCC Part 22.913(a)(2) and Part 2.1046	4.4	Yes	No
Modulation Characteristic	FCC Part 2.1047(d)	4.2	Yes	No
Occupied Bandwidth	FCC Part 2.1049	RSS GEN 4.6	Yes	No
Spurious Emission At Antenna Terminals (+/- 1MHz)	FCC Part 22.917(a) and Part 2.1049	4.5	Yes	No
Spurious Emission	FCC Part 22.917(b) and Part 2.1051, 2.1053	4.5, 4.6	Yes	No
Frequency Stability Under Temperature & Voltage Variations	FCC Part 22.355 and 2.1055	4.3	Yes	No

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

Performed Item	Section in CFR 47	Section in RSS GEN or RSS-133	Test Performed	Deviation
Peak Output Power	FCC Part 24.232(b) and Part 2.1046	6.4	Yes	No
Modulation Characteristic	FCC Part 2.1047(d)	6.2	Yes	No
Occupied Bandwidth	FCC Part 24.238(b) and Part 2.1049	RSS GEN 4.6	Yes	No
Spurious Emission At Antenna Terminals (+/- 1MHz)	FCC Part 24.238(a) and Part 2.1049	6.5	Yes	No
Spurious Emission	FCC Part 24.238(b) and Part 2.1051, 2.1053	6.5, 6.6	Yes	No
Frequency Stability Under Temperature & Voltage Variations	FCC Part 24.235 and 2.1055	6.3	Yes	No

2.2. 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

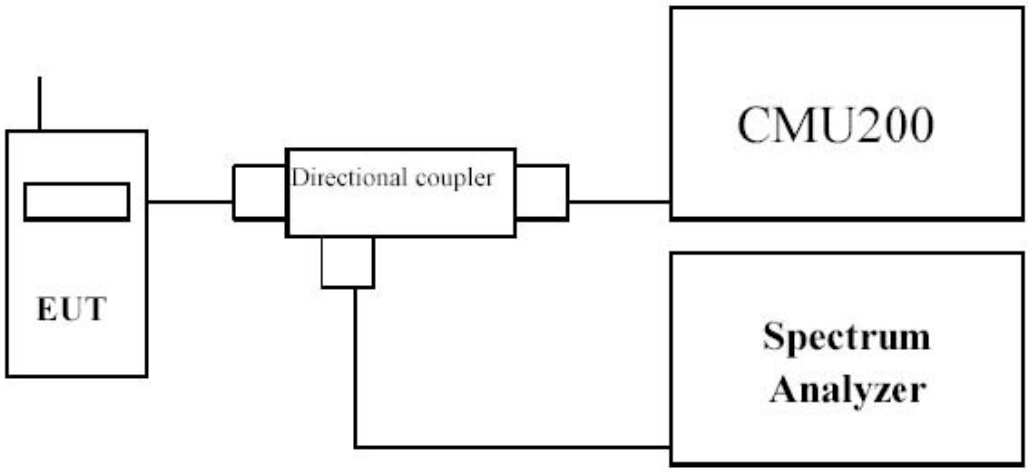
3.1. Test Equipment

Peak Output Power / AC-5

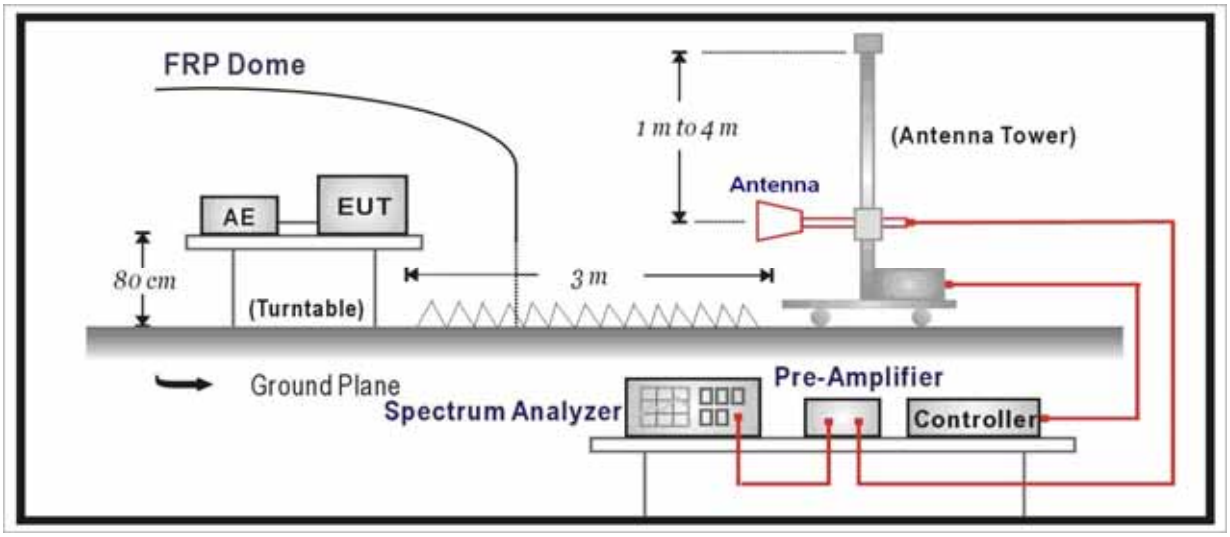
Instrument	Manufacturer	Type No.	Serial No	Cali. Due Date
PSA Series Spectrum Analyzer	Agilent	E4440A	MY49420184	2013.04.10
Radio Communication Tester	R&S	CMU 200	117088	2012.04.29
Dual Directional Coupler	Agilent	778D	20160	2012.04.20
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2012.04.20
PSG Analog Signal Generator	Agilent	E8257D	MY44321116	2012.04.23
Preamplifier	QuieTek	AP-025C	CHM-0503006	2012.05.05
Preamplifier	Miteq	NSP1800-25	1364185	2012.05.05
Bilog Antenna	Teseq GmbH	CBL6112D	27612	2012.10.18
Half Wave Tuned Dipole Antenna	COM-POWER	AD-100	40137	2013.11.24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	737	2013.11.24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	499	2012.06.11
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC5-TH	2013.01.10

3.2. Test Setup

Conducted Power Measurement:



Radiated Power Measurement:



3.3. 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.

3.4. 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 selects a channel for testing.
d) Add a correction factor to the display of spectrum, and then test.

Radiated Power Measurement:

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

u) Test site anechoic chamber refer to ANSI C63.4: 2009.

3.5. Uncertainty

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

3.6. Test Result

GPRS 850

Channel No.	Frequency (MHz)	Modulation	Conducted Power (dBm)	ERP (dBm)	Limit (dBm)
128	824.2	GMSK	33.05	30.26	38.50
189	836.4	GMSK	32.84	28.98	38.50
251	848.8	GMSK	32.87	29.30	38.50

GPRS1900

Channel No.	Frequency (MHz)	Modulation	Conducted Power (dBm)	EIRP (dBm)	Limit (dBm)
512	1850.2	GMSK	29.87	29.61	33.00
661	1880.0	GMSK	30.15	29.32	33.00
810	1909.8	GMSK	29.65	28.42	33.00

Note: The maximum PAR for GPRS1900 is 10.5dB less than 13 dB.

Radiated Measurement

GPRS 850

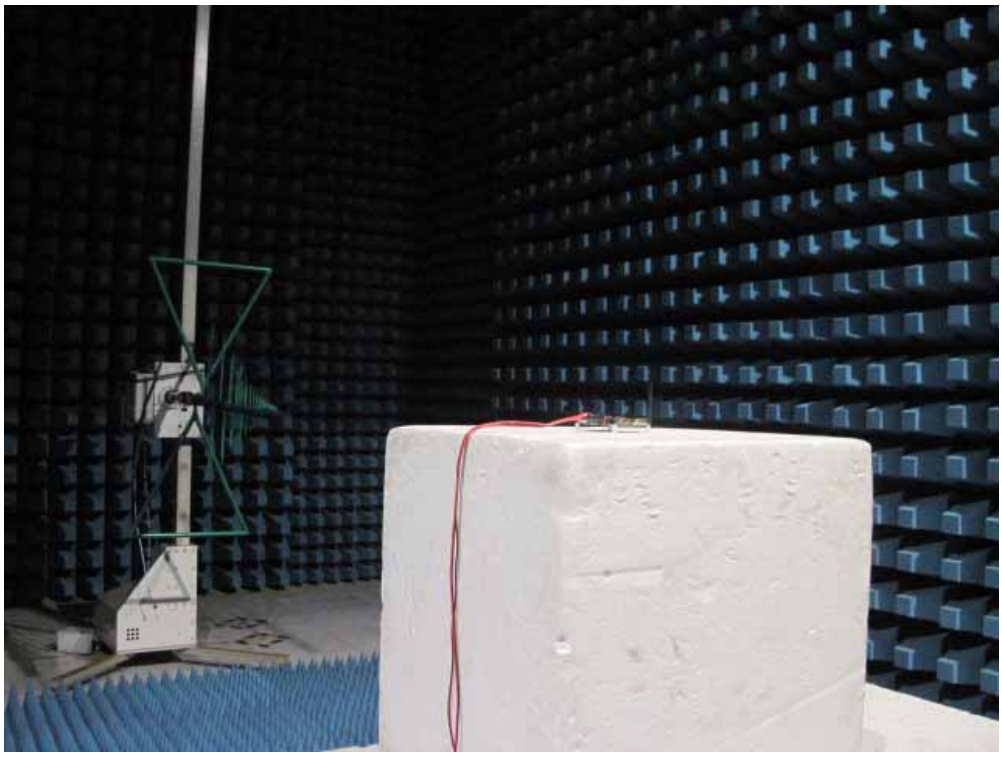
Frequency (MHz)	SA Reading (dBm)	Ant. Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 128 (824.20MHz)								
824.2	-1.70	H	32.04	1.76	-0.02	30.26	38.50	-8.24
824.2	-9.53	V	24.96	1.76	-0.02	23.18	38.50	-15.32
Middle Channel 189 (836.40MHz)								
836.4	-3.25	H	30.63	1.75	0.10	28.98	38.50	-9.52
836.4	-10.39	V	24.36	1.75	0.10	22.71	38.50	-15.79
High Channel 251 (848.80MHz)								
848.8	-3.06	H	30.95	1.78	0.13	29.30	38.50	-9.20
848.8	-9.65	V	24.95	1.78	0.13	23.30	38.50	-15.2

GPRS1900

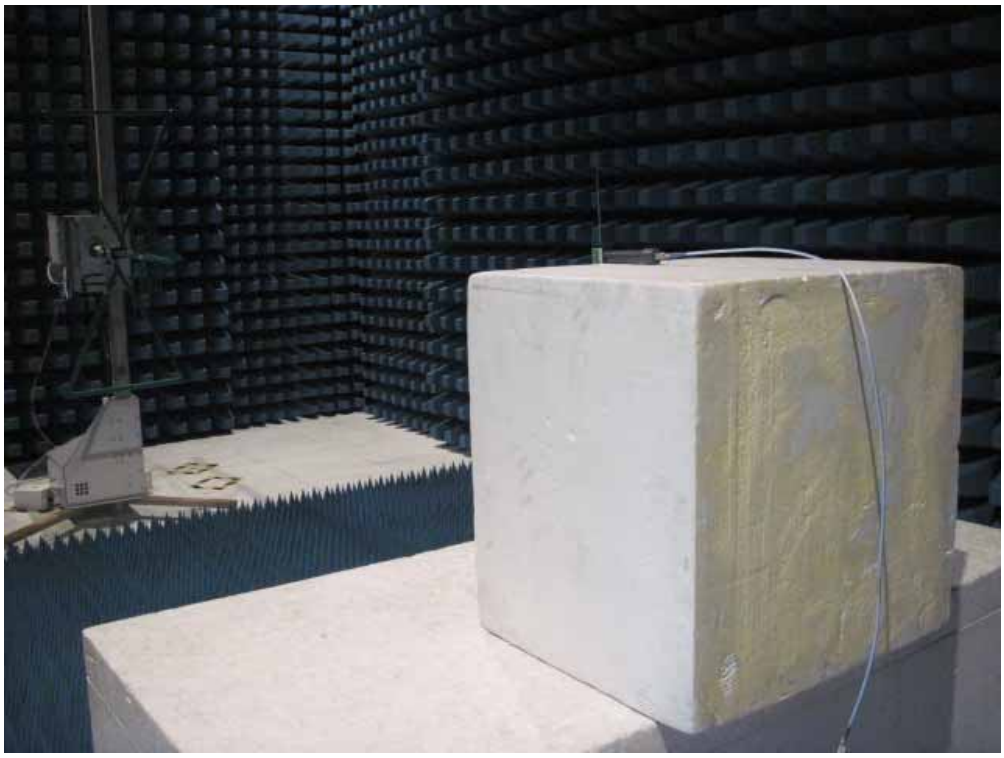
Frequency (MHz)	SA Reading (dBm)	Ant .Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 512 (1850.20MHz)								
1850.2	23.29	H	21.89	2.68	10.40	29.61	33.00	-3.39
1850.2	23.24	V	21.65	2.68	10.40	29.37	33.00	-3.63
Middle Channel 661 (1880.00MHz)								
1880.0	23.06	H	21.57	2.68	10.43	29.32	33.00	-3.69
1880.0	23.41	V	21.56	2.68	10.43	29.31	33.00	-3.69
High Channel 810 (1909.80MHz)								
1909.8	21.40	H	19.91	2.70	10.44	27.65	33.00	-5.35
1909.8	22.51	V	20.68	2.70	10.44	28.42	33.00	-4.58

3.7. Test Photograph

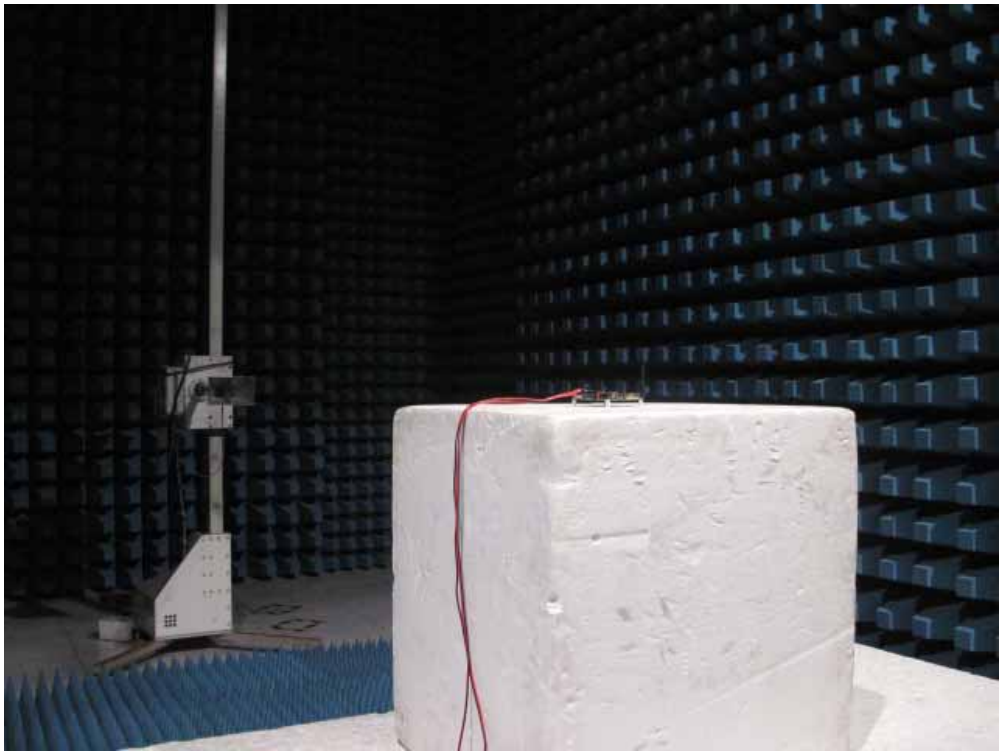
Description: ERP Test Setup



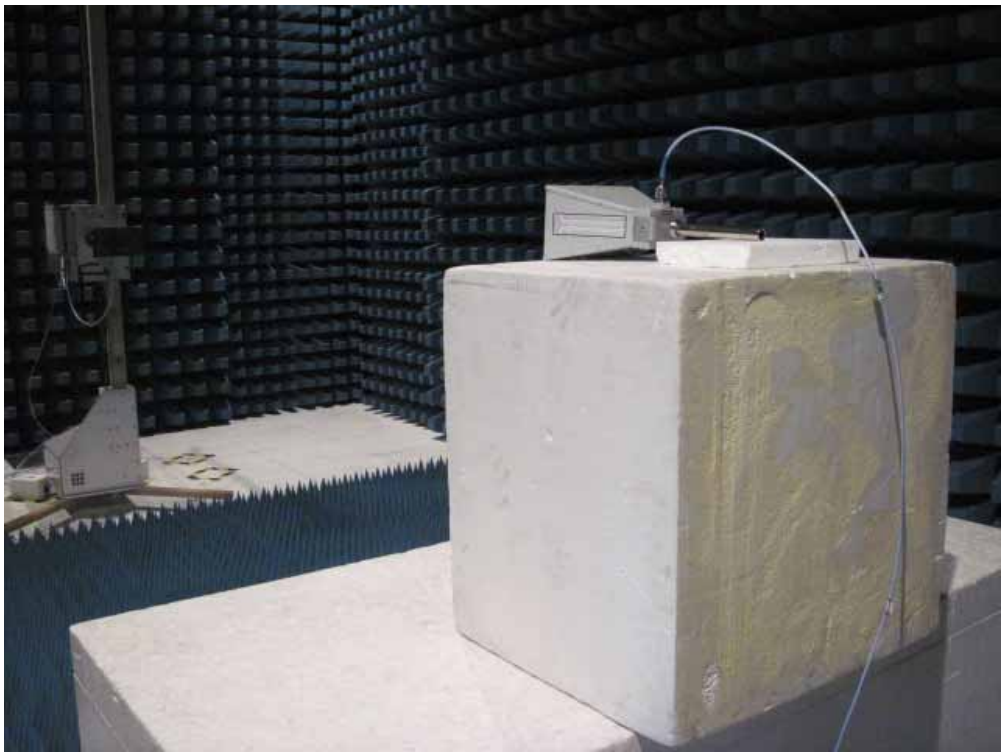
Description: Substitution Antenna for ERP Test



Description: EIRP Test Setup



Description: Substitution Antenna for EIRP Test



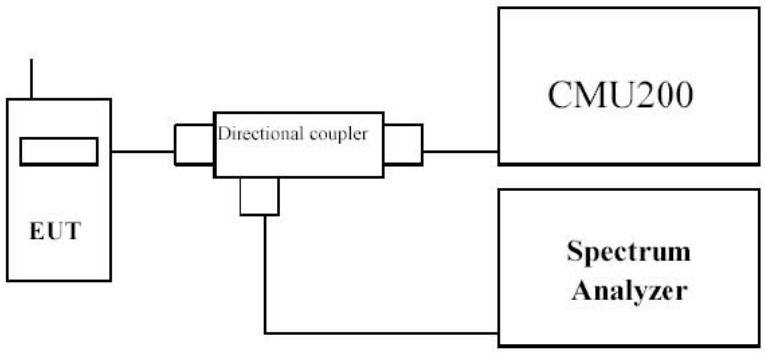
4. Modulation Characteristic

4.1. Test Equipment

Modulation Characteristic / AC-6

Instrument	Manufacturer	Type No.	Serial No	Cal. Date
PSA Series Spectrum Analyzer	Agilent	E4440A	MY49420184	2013.04.10
Radio Communication Tester	R&S	CMU 200	117088	2012.04.29
Dual Directional Coupler	Agilent	778D	20160	2012.04.20
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2012.04.20
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC6-TH	2013.01.10

4.2. Test Setup



4.3. Limit

N/A

4.4. 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*F*Tb
where F = Peak frequency deviation in Hz and Tb = 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.

4.5. Uncertainty

The measurement uncertainty is defined as 0.1%

4.6. Test Result

The modulation of GSM/GPRS were verified and confirmed compliance with requirement.

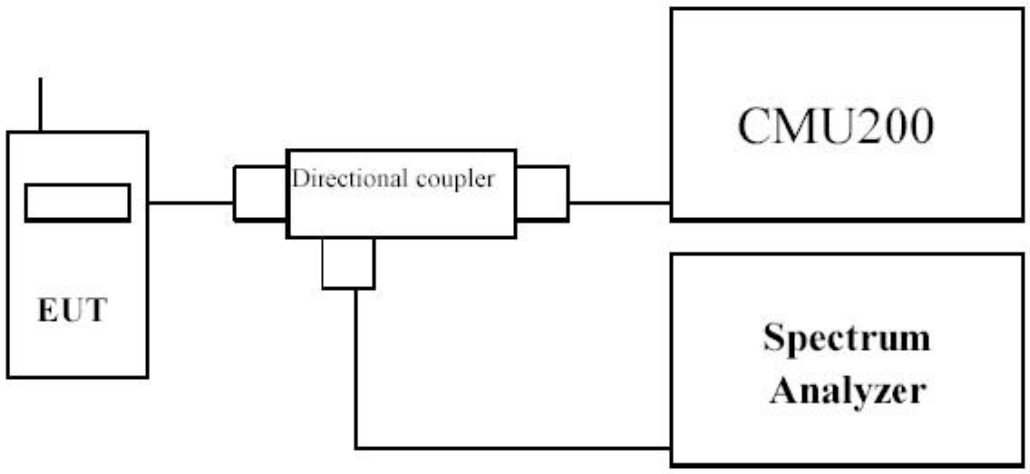
5. Occupied Bandwidth

5.1. Test Equipment

Occupied Bandwidth / AC-6

Instrument	Manufacturer	Type No.	Serial No	Cali. Due Date
PSA Series Spectrum Analyzer	Agilent	E4440A	MY49420184	2013.04.10
Radio Communication Tester	R&S	CMU 200	117088	2012.04.29
Dual Directional Coupler	Agilent	778D	20160	2012.04.20
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2012.04.20
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC6-TH	2013.01.10

5.2. Test Setup



5.3. Limit

N/A

5.4. Test Procedure

Using Occupied Bandwidth measurement function of spectrum analyzer, and setting as follows:
For GSM 850/1900 test --- RBW = 3 kHz and VBW = 10 kHz

5.5. Uncertainty

The measurement uncertainty is defined as ± 10 Hz

5.6. Test Result

Product	HiALLNC		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: GPRS 850 Link		
Date of Test	2012/04/17	Test Site	AC-6

Channel No.	Frequency (MHz)	-26dB Occupied Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
128	824.20	314.15	246.12
189	836.40	316.93	251.31
251	848.80	314.43	247.95

Figure Channel 128 (824.20MHz)

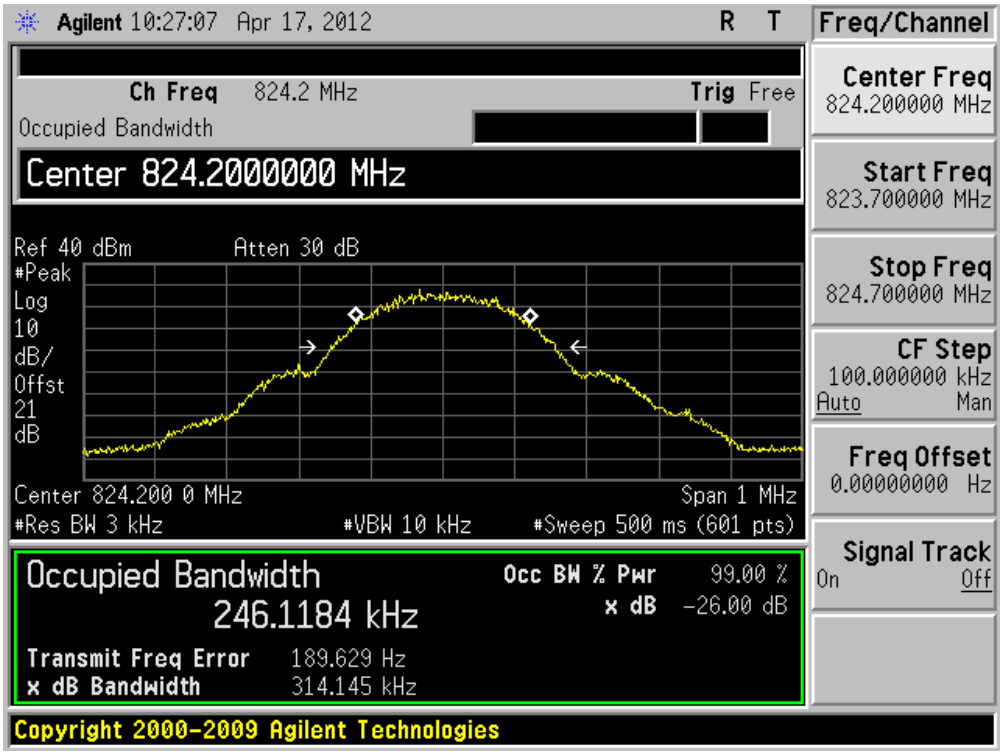


Figure Channel 189 (836.40MHz)

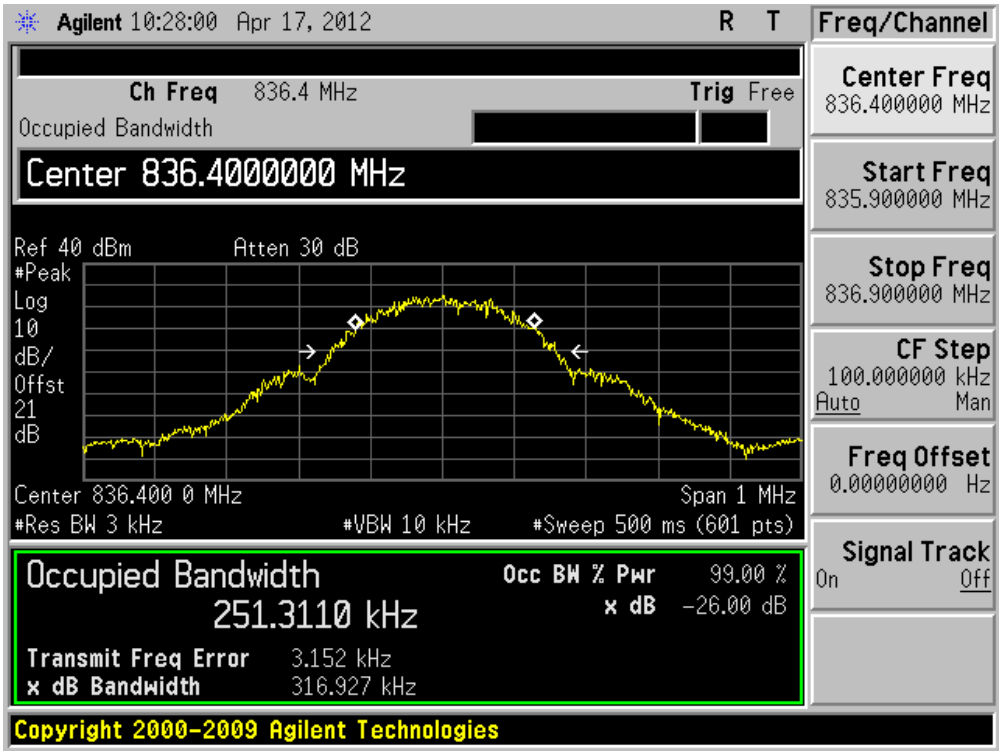
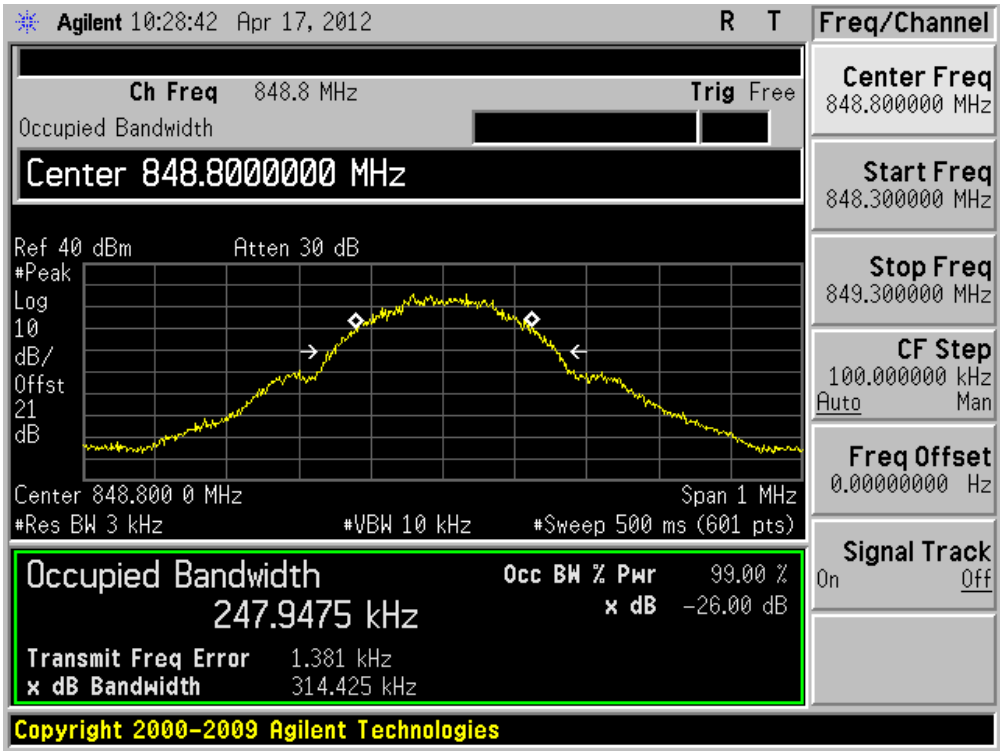


Figure Channel 251 (848.80MHz)



Product	HiALLNC		
Test Item	Occupied Bandwidth		
Test Mode	Mode 2: GPRS 1900 Link		
Date of Test	2012/04/17	Test Site	AC-6

Channel No.	Frequency (MHz)	-26dB Occupied Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
512	1850.20	318.97	248.42
661	1880.00	311.18	247.84
810	1909.80	318.93	245.57

Figure Channel 512 (1850.20MHz)

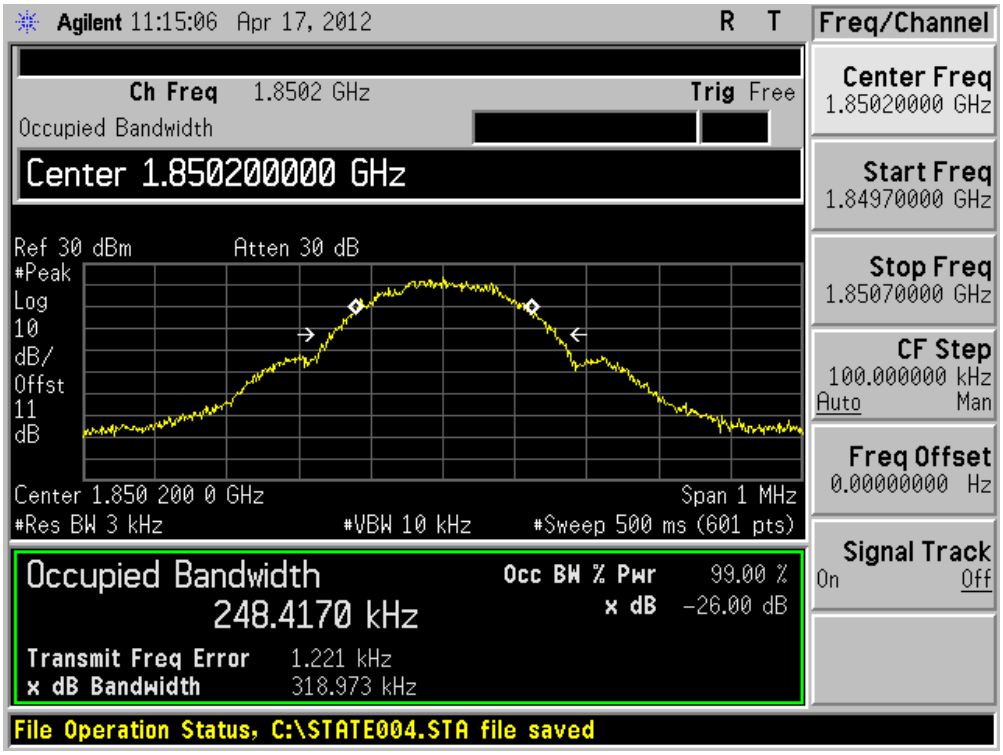


Figure Channel 661 (1880.00MHz)

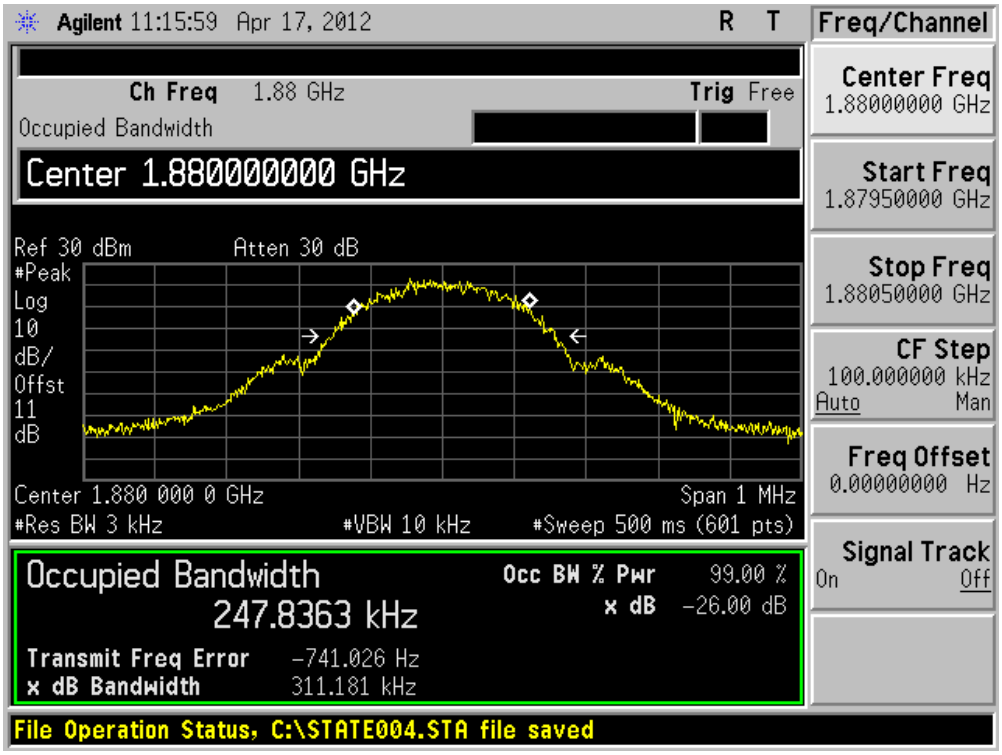
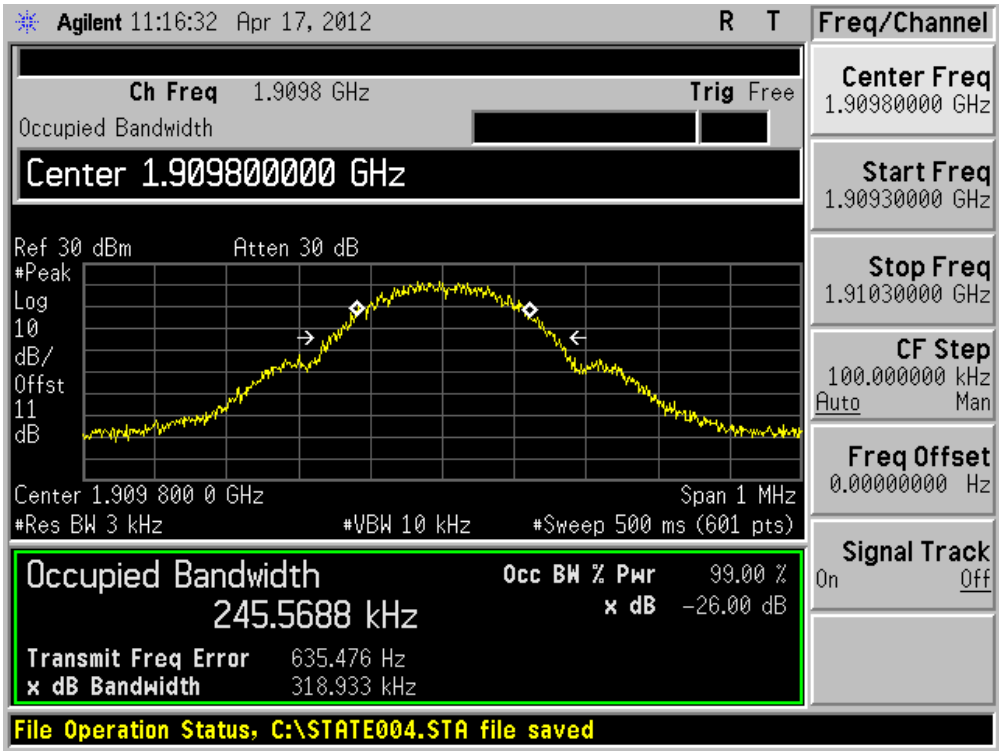


Figure Channel 810 (1909.80MHz)



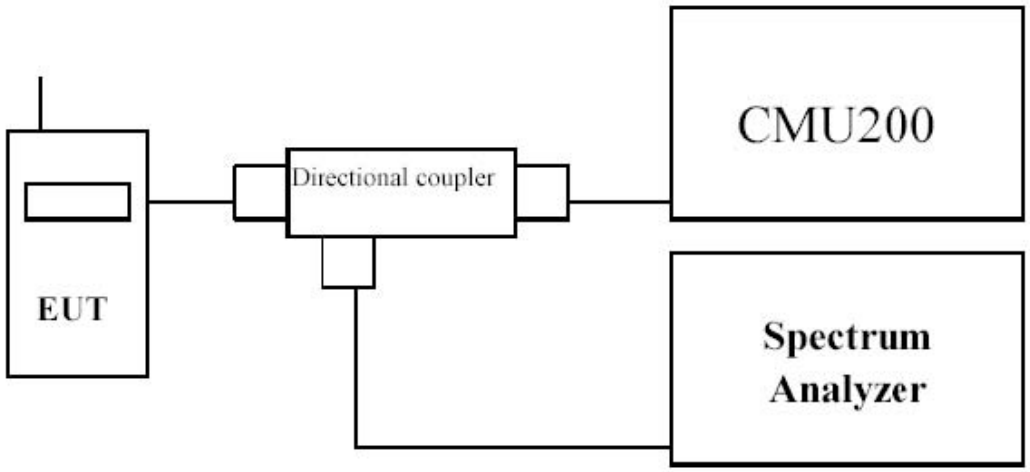
6. Spurious Emission At Antenna Terminals (+/- 1MHz)

6.1. Test Equipment

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

Instrument	Manufacturer	Type No.	Serial No	Cali. Due Date
PSA Series Spectrum Analyzer	Agilent	E4440A	MY49420184	2013.04.10
Radio Communication Tester	R&S	CMU 200	117088	2012.04.29
Dual Directional Coupler	Agilent	778D	20160	2012.04.20
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2012.04.20
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC6-TH	2013.01.10

6.2. Test Setup



6.3. 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 + 10log(P) dB.

6.4. 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.

6.5. Uncertainty

The measurement uncertainty is defined as ± 1.2 dB.

6.6. Test Result

Product	HiALLNC		
Test Item	Spurious Emission At Antenna Terminals (+/- 1MHz)		
Test Mode	Mode 1: GPRS 850 Link		
Date of Test	2012/04/17	Test Site	AC-6

Figure Channel 128 (824.20MHz)

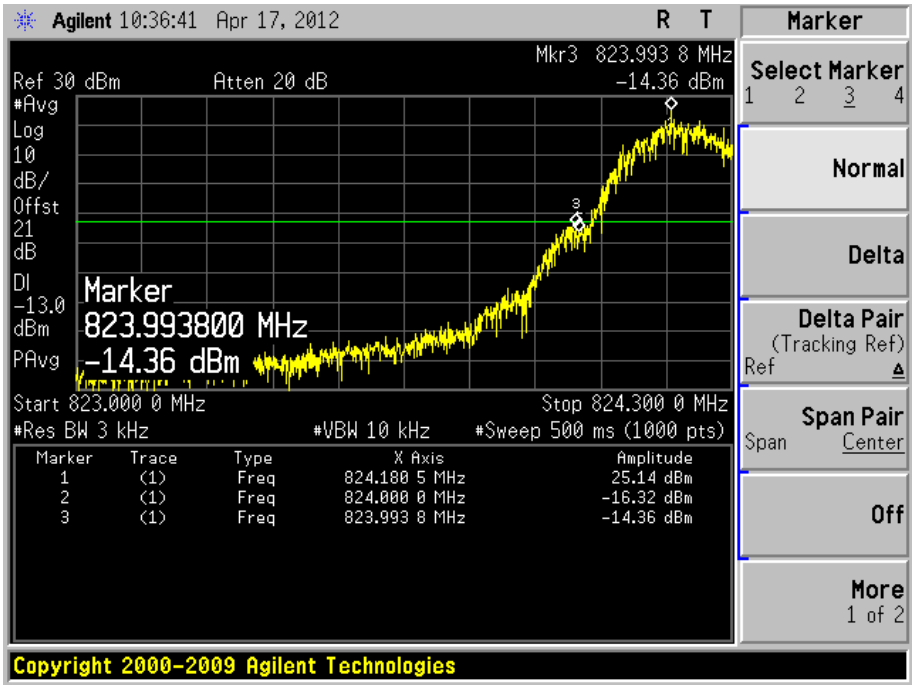
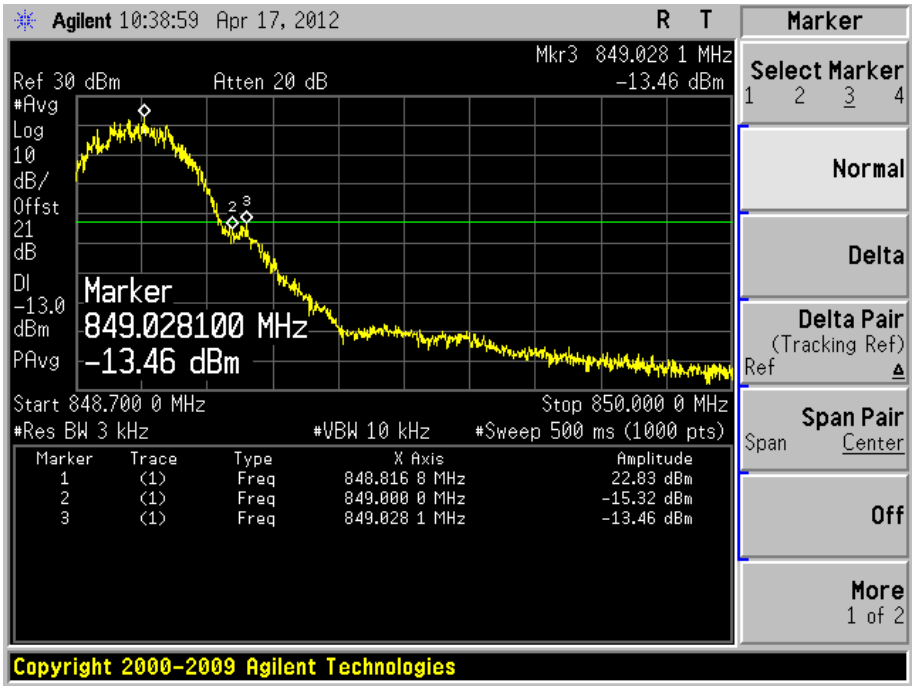


Figure Channel 251 (848.80MHz)



Product	HiALLNC		
Test Item	Spurious Emission At Antenna Terminals (+/- 1MHz)		
Test Mode	Mode 2: GPRS 1900 Link		
Date of Test	2012/04/17	Test Site	AC-6

Figure Channel 512 (1850.20MHz)

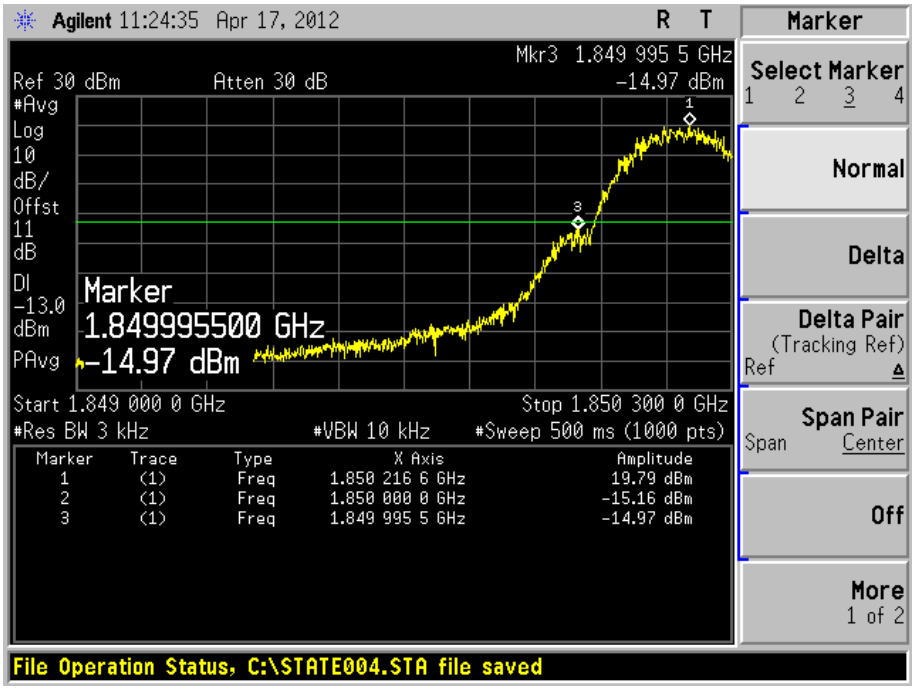
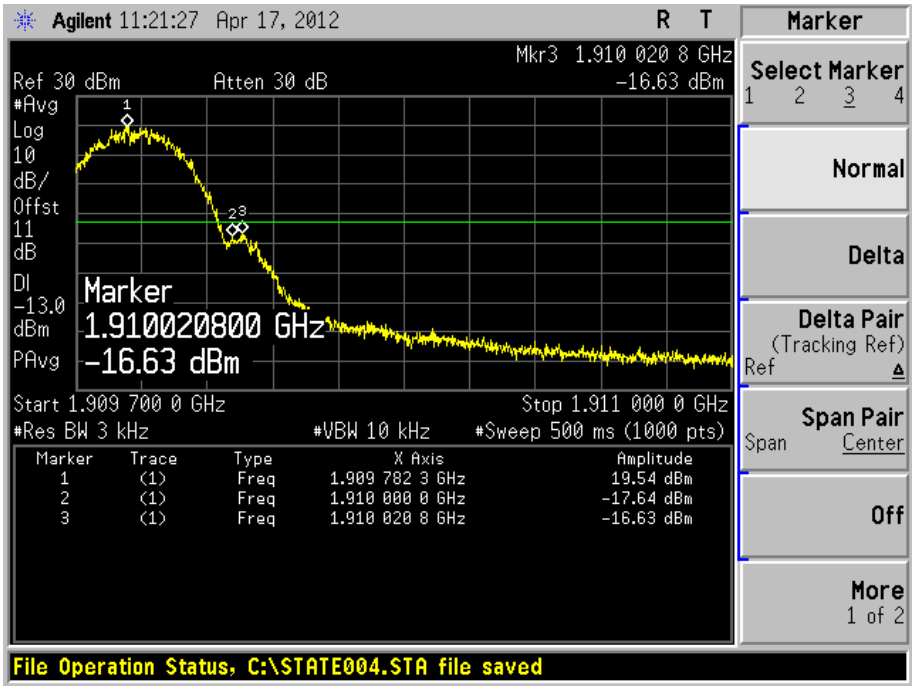


Figure Channel 810 (1909.80MHz)



7. Spurious Emission

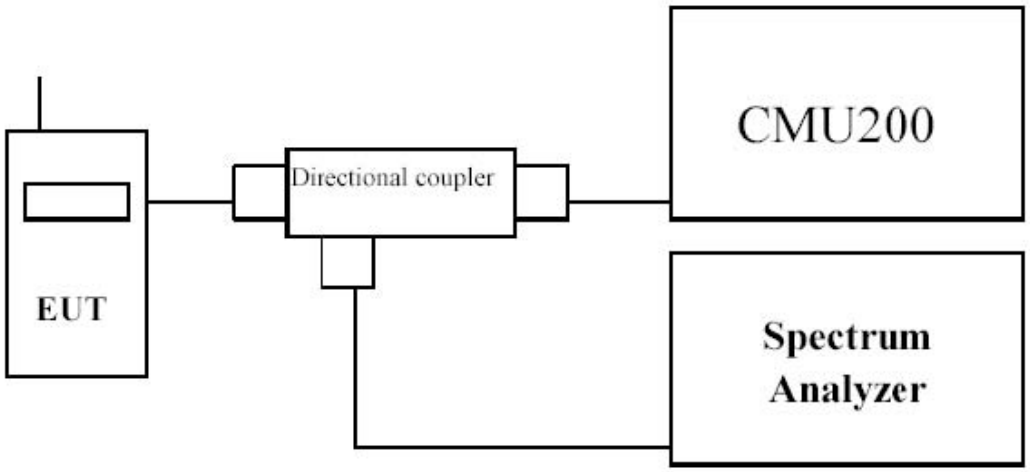
7.1. Test Equipment

Spurious Emission / AC-5

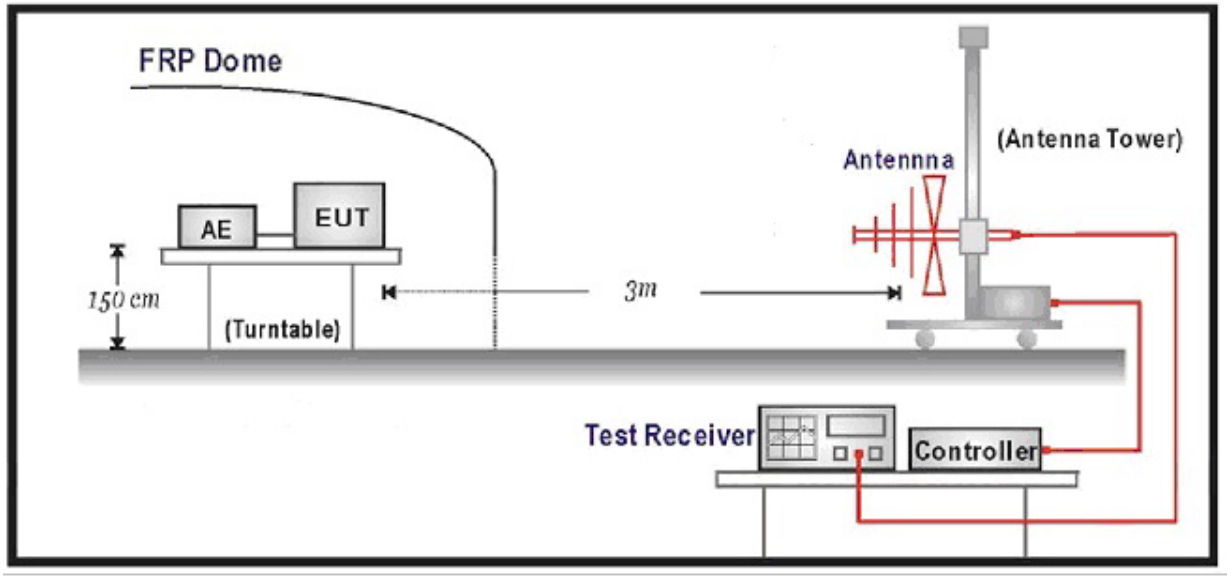
Instrument	Manufacturer	Type No.	Serial No	Cali. Due Date
PSA Series Spectrum Analyzer	Agilent	E4440A	MY49420184	2013.04.10
Radio Communication Tester	R&S	CMU 200	117088	2012.04.29
Dual Directional Coupler	Agilent	778D	20160	2012.04.20
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2012.04.20
PSG Analog Signal Generator	Agilent	E8257D	MY44321116	2012.04.23
Preamplifier	QuieTek	AP-025C	CHM-0503006	2012.05.05
Preamplifier	Miteq	NSP1800-25	1364185	2012.05.05
Bilog Antenna	Teseq GmbH	CBL6112D	27612	2012.10.18
Half Wave Tuned Dipole Antenna	COM-POWER	AD-100	40137	2013.11.24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	737	2013.11.24
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	499	2012.06.11
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC5-TH	2013.01.10

7.2. Test Setup

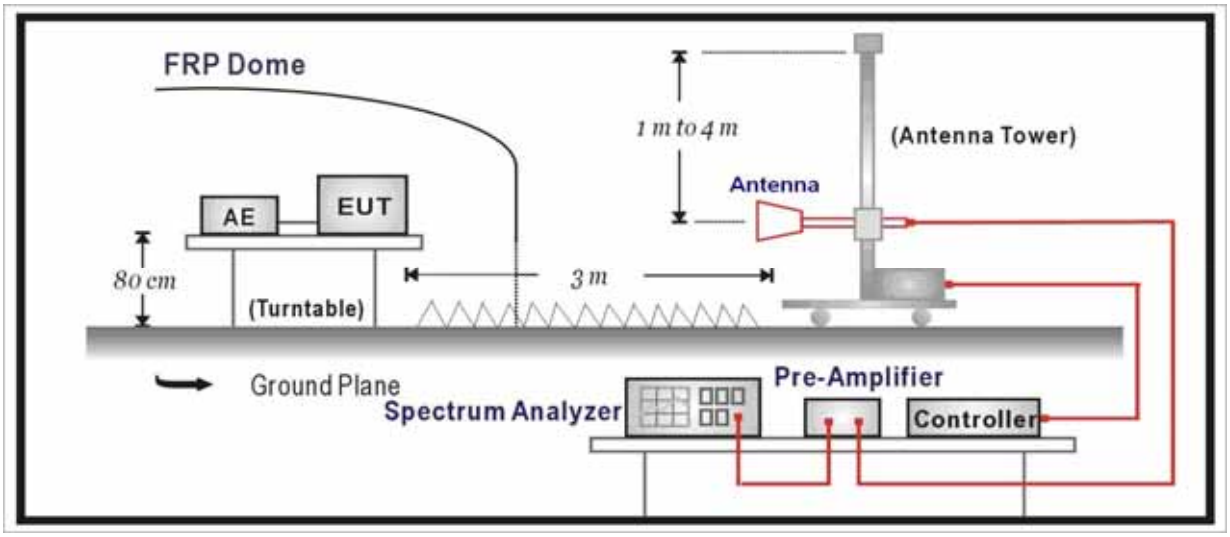
Conducted Spurious Emission Measurement:



Radiated Spurious Measurement: below 1GHz



Radiated Spurious Measurement: above 1GHz



7.3. 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 + 10log(P) dB.

7.4. 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 10^{th} 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.
v) 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 10^{th} harmonic.
q) Test site anechoic chamber refer to ANSI C63.4: 2009

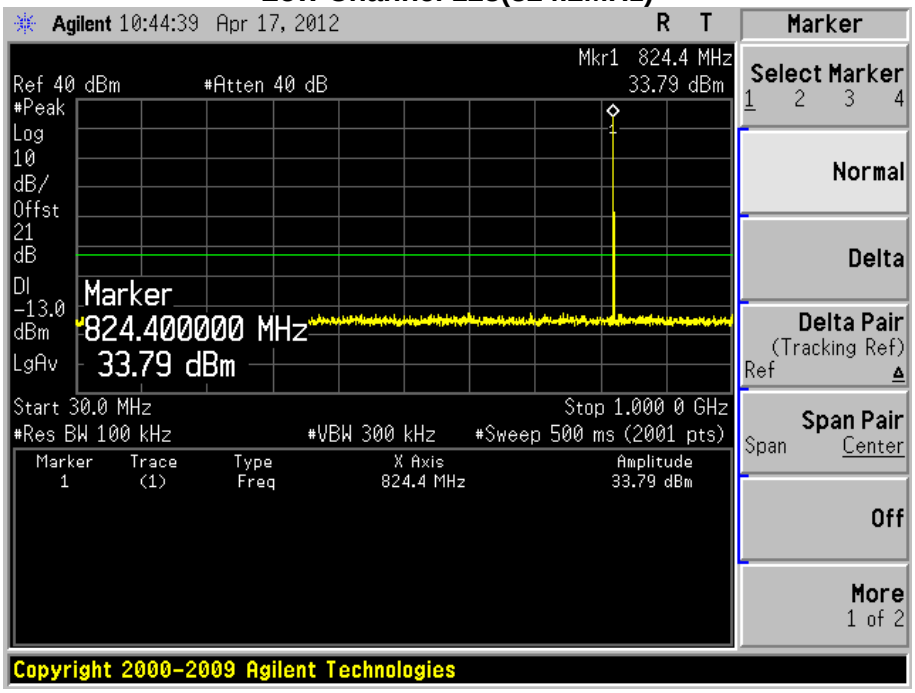
7.5. Uncertainty

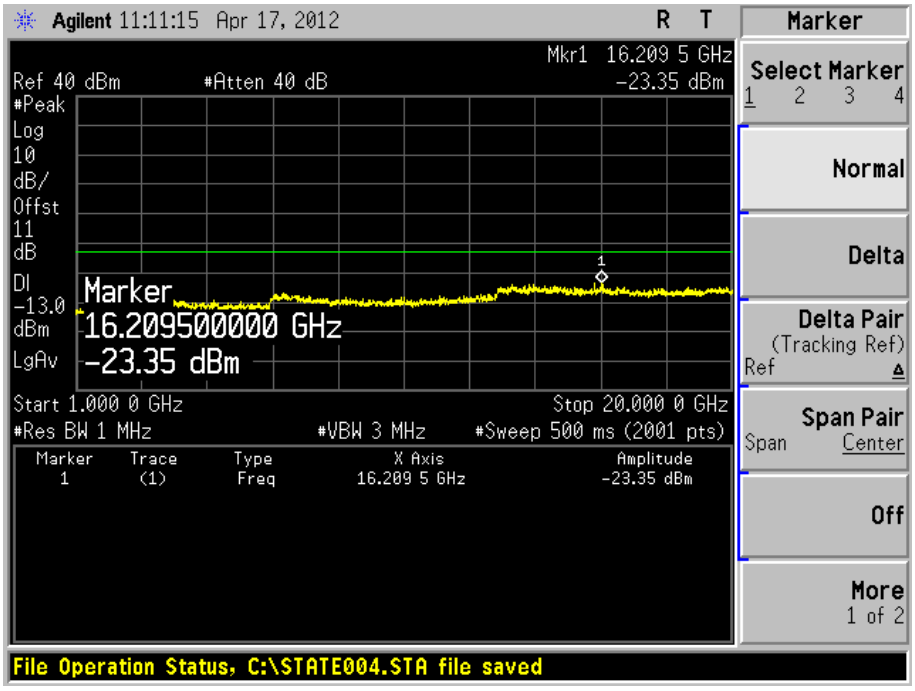
The measurement uncertainty is defined as 3.2 dB for Radiated Power Measurement.

7.6. Test Result

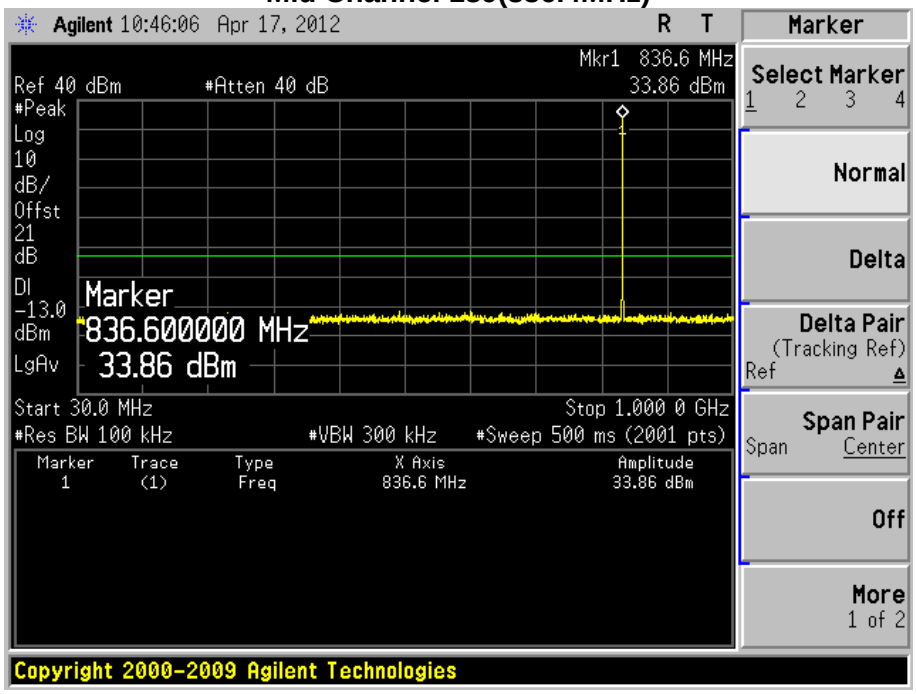
Product	HiALLNC		
Test Item	Conducted Spurious Emission		
Test Mode	Mode 1: GPRS 850 Link		
Date of Test	2012/04/17	Test Site	TR-8

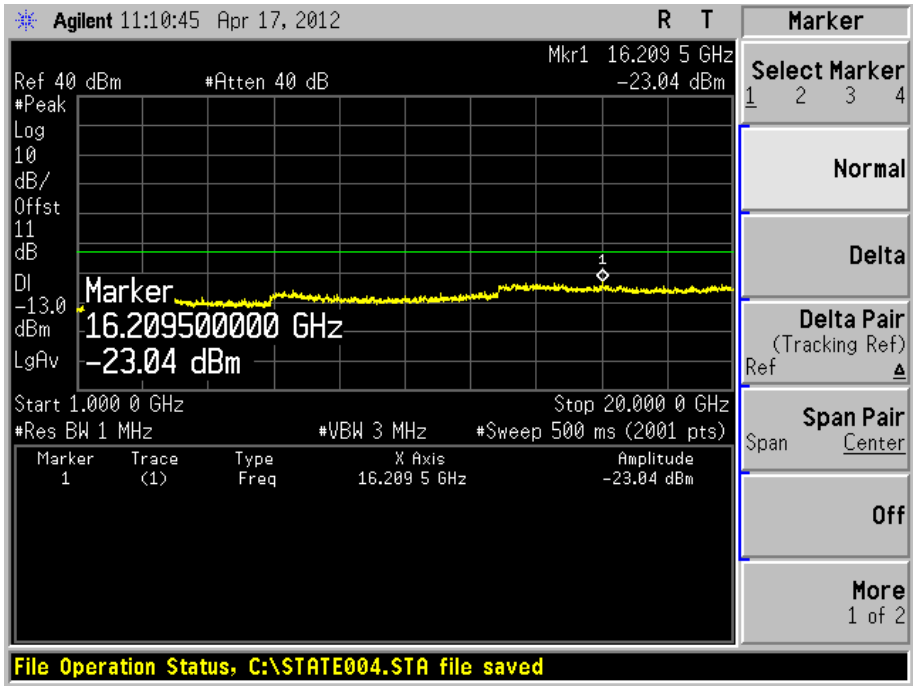
Low Channel 128(824.2MHz)



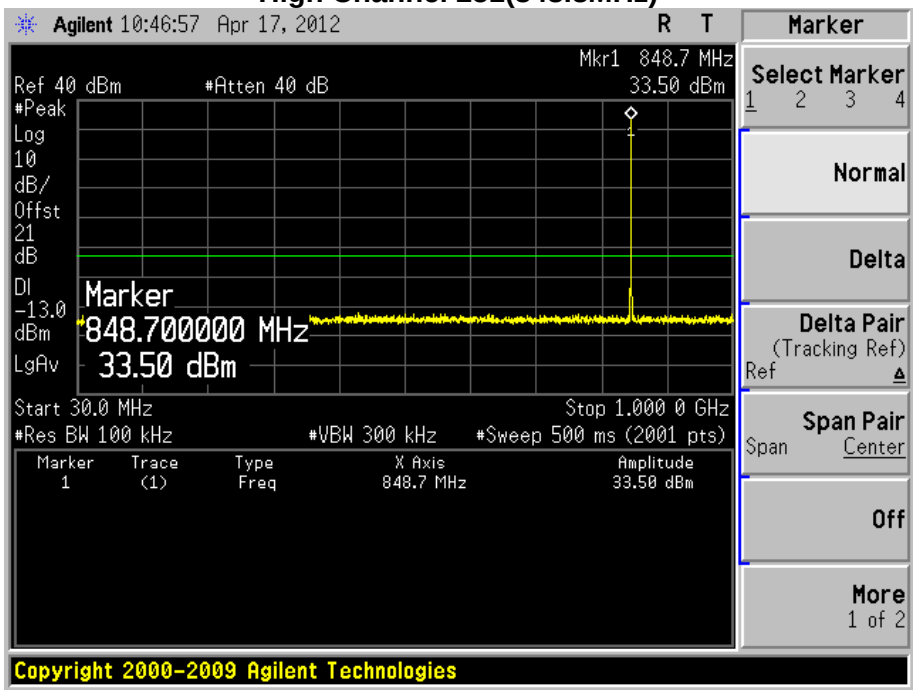


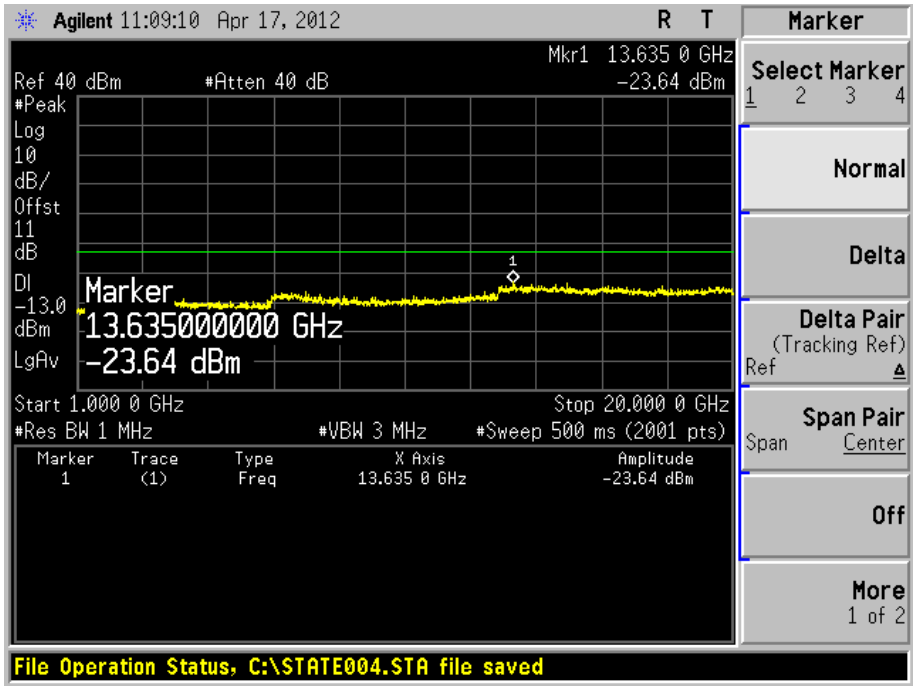
Mid Channel 189(836.4MHz)





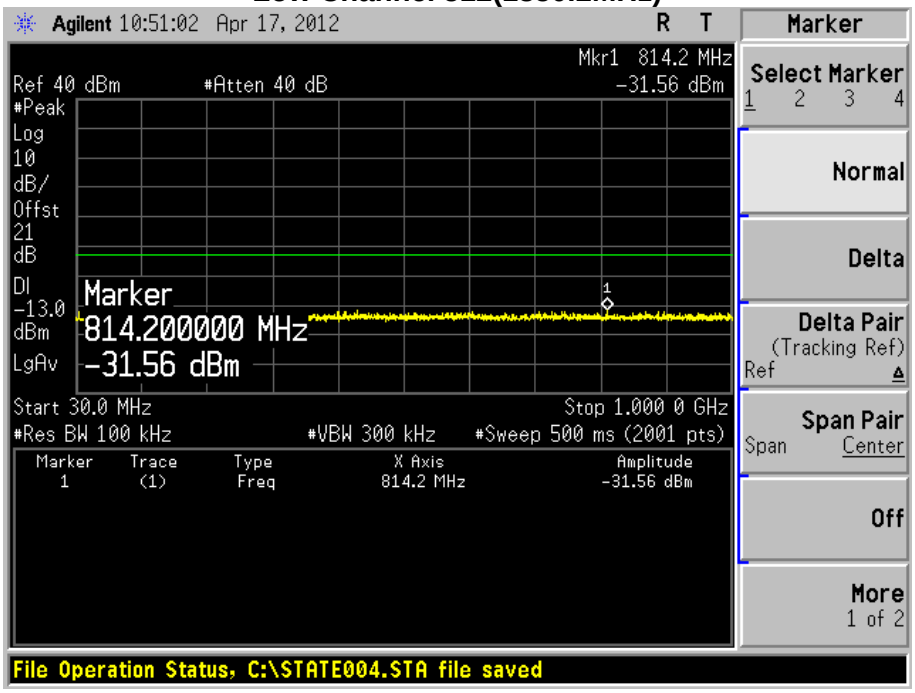
High Channel 251(848.8MHz)

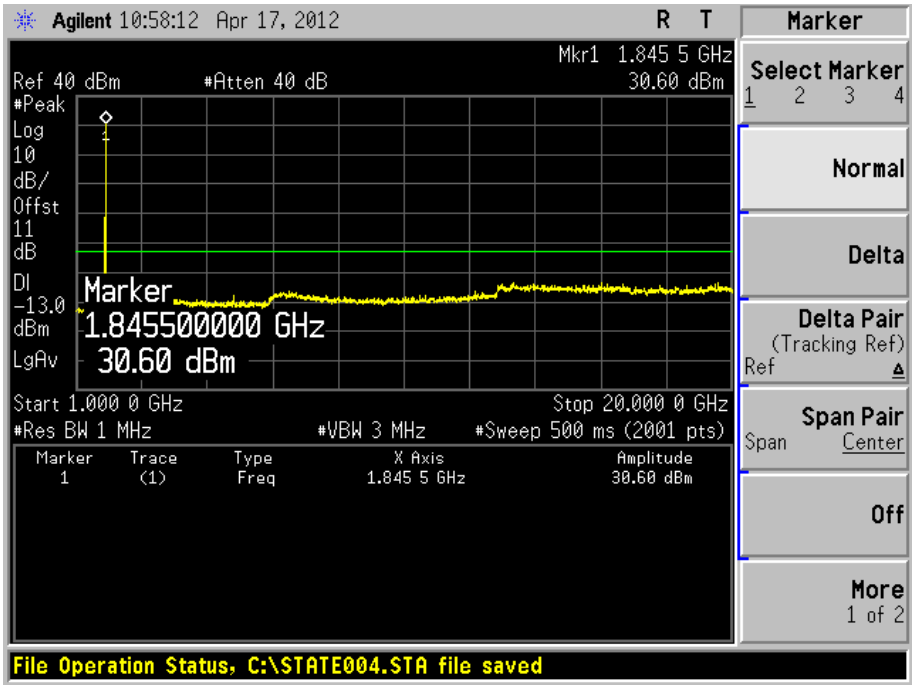




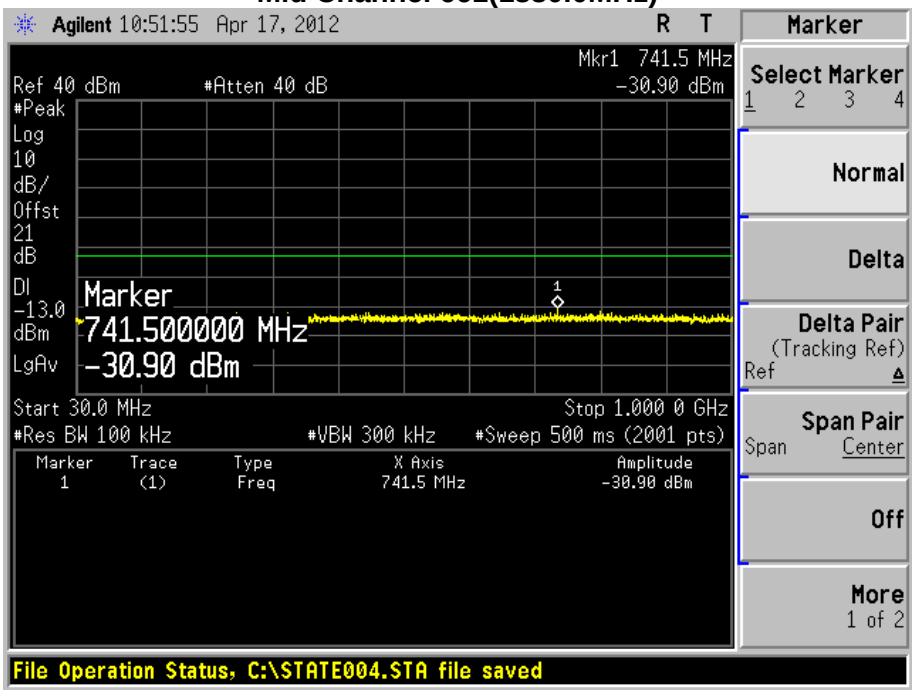
Product	HiALLNC		
Test Item	Conducted Spurious Emission		
Test Mode	Mode 2: GPRS 1900 Link		
Date of Test	2012/04/17	Test Site	TR-8

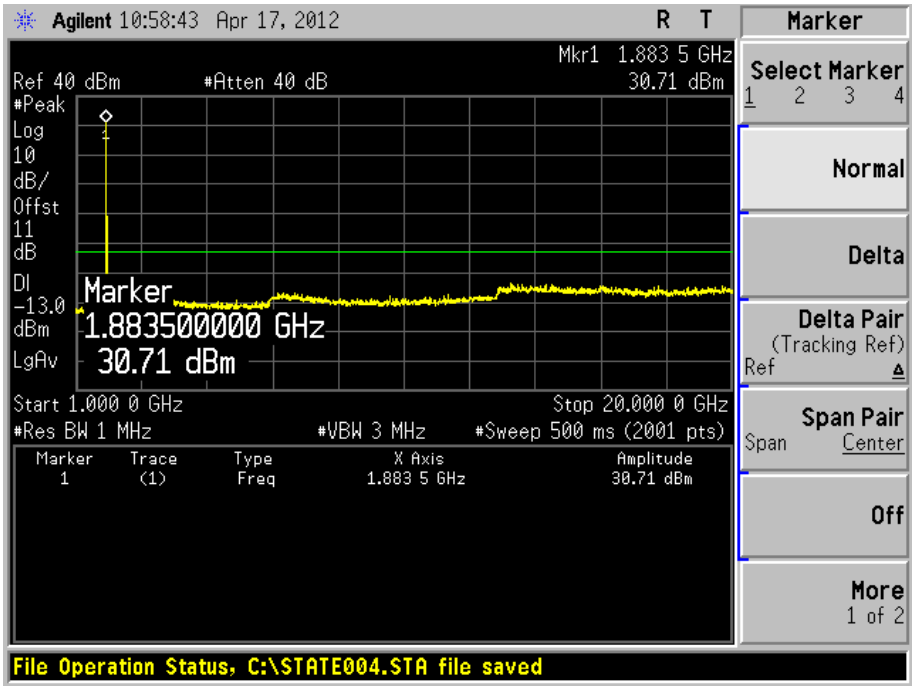
Low Channel 512(1850.2MHz)



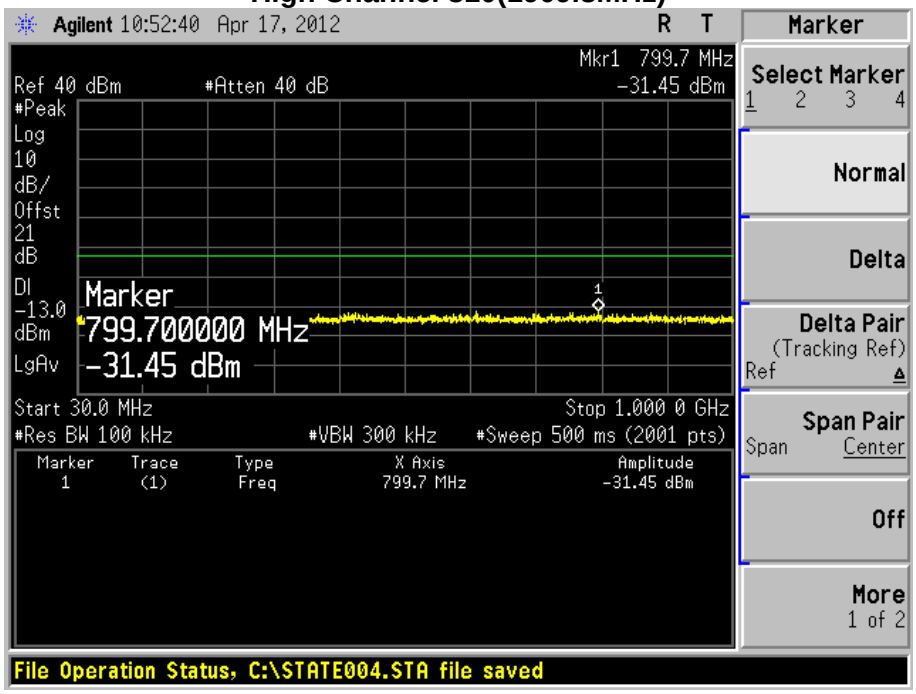


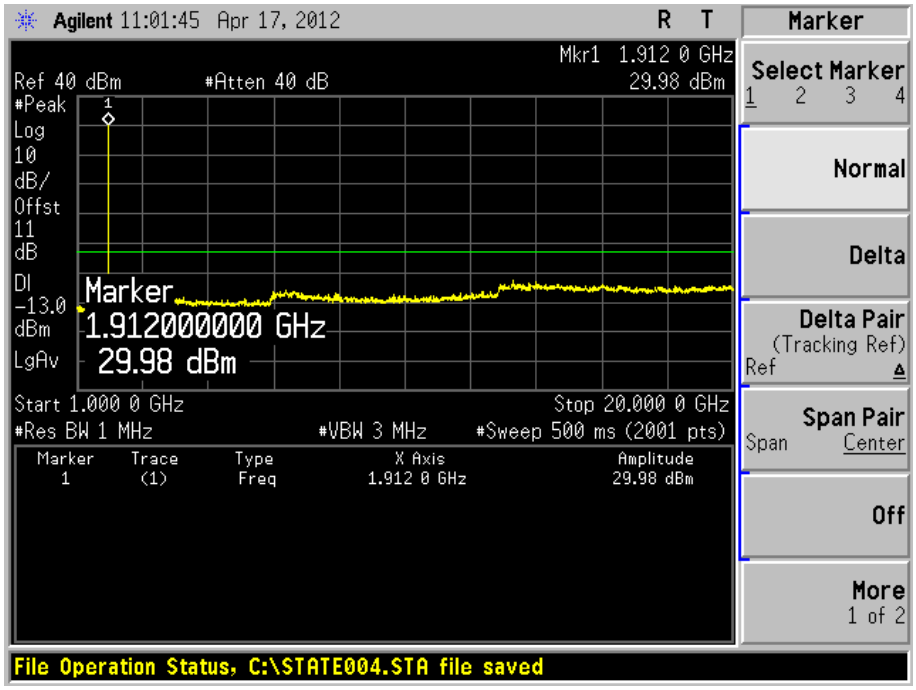
Mid Channel 661(1880.0MHz)





High Channel 810(1909.8MHz)





Product	HiALLNC		
Test Item	Radiated Spurious Emission		
Test Mode	Mode 1: GPRS 850 Link		
Date of Test	2012/04/17	Test Site	AC-5

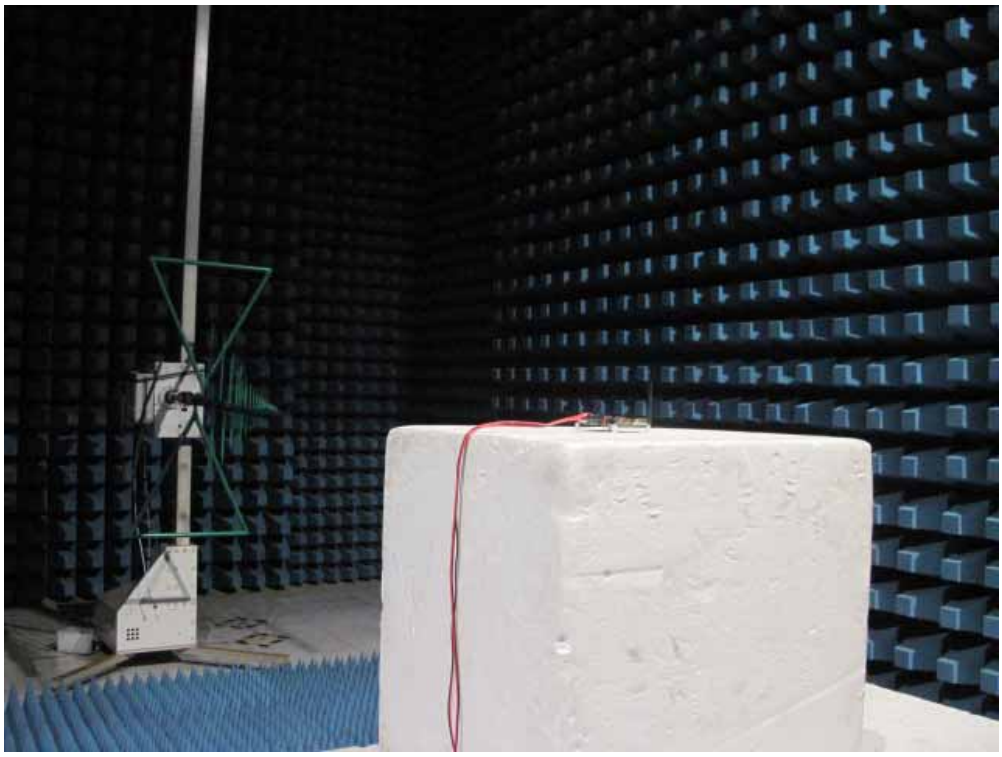
Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 128 (824.20MHz)								
1646.00	-46.68	V	-49.25	2.50	9.75	-42.00	-13.00	-29.00
2470.50	-44.65	V	-43.68	3.12	10.48	-36.32	-13.00	-23.32
1646.00	-43.82	H	-46.48	2.50	9.75	-39.23	-13.00	-26.23
2470.50	-53.45	H	-52.34	3.12	10.48	-44.98	-13.00	-31.98
Middle Channel 189 (836.40MHz)								
1671.50	-48.76	V	-51.43	2.52	9.95	-44.00	-13.00	-31.00
2513.00	-44.67	V	-43.99	3.18	10.62	-36.55	-13.00	-23.55
1671.50	-50.35	H	-52.77	2.52	9.95	-45.34	-13.00	-32.34
2513.00	-56.23	H	-55.16	3.18	10.62	-47.72	-13.00	-34.72
High Channel 251 (848.80MHz)								
1697.00	-53.45	V	-56.18	2.54	10.06	-48.66	-13.00	-35.66
2547.00	-45.38	V	-43.81	3.14	10.68	-36.27	-13.00	-23.27
1697.00	-52.94	H	-54.94	2.54	10.06	-47.42	-13.00	-34.42
2547.00	-54.76	H	-52.94	3.14	10.68	-45.40	-13.00	-32.40

Product	HiALLNC		
Test Item	Radiated Spurious Emission		
Test Mode	Mode 2: GPRS 1900 Link		
Date of Test	2012/04/17	Test Site	AC-5

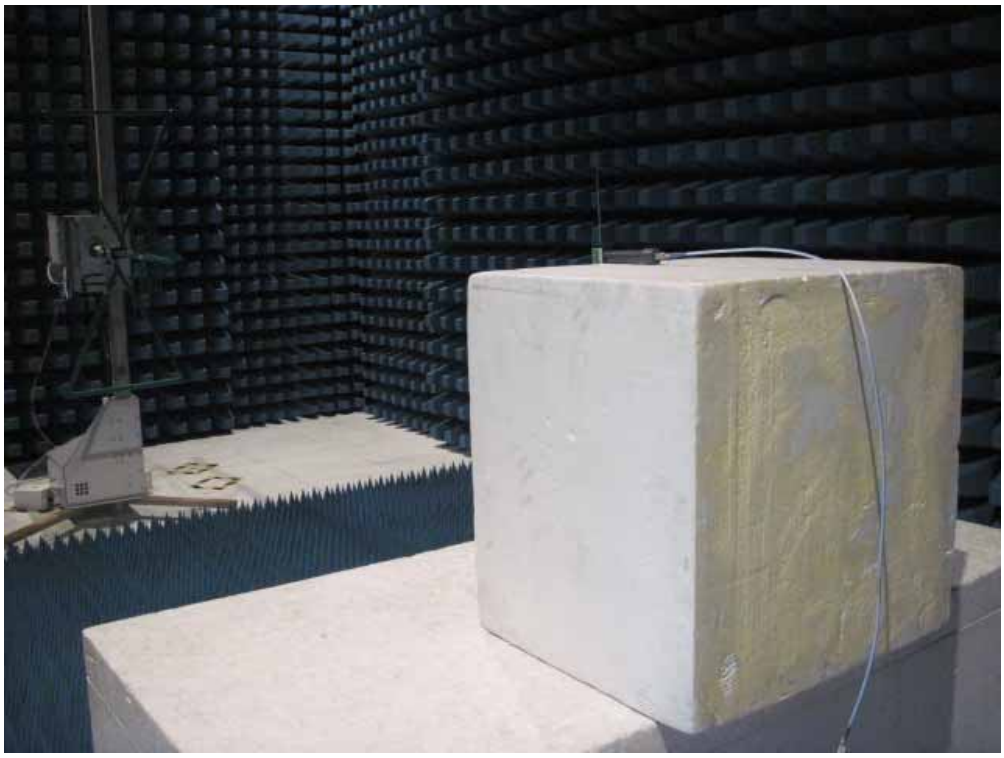
Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
Low Channel 512 (1850.20MHz)								
3703.00	-43.03	V	-39.86	3.84	12.69	-31.01	-13.00	-18.01
5547.50	-48.35	V	-40.08	4.82	13.15	-31.75	-13.00	-18.75
3703.00	-45.39	H	-42.30	3.84	12.69	-33.45	-13.00	-20.45
5547.50	-54.30	H	-46.64	4.82	13.15	-38.31	-13.00	-25.31
Middle Channel 661 (1880.00MHz)								
3762.50	-41.82	V	-38.92	3.73	12.72	-29.93	-13.00	-16.93
5641.00	-51.50	V	-43.73	4.93	13.14	-35.52	-13.00	-22.52
3762.50	-46.46	H	-43.48	3.73	12.72	-34.49	-13.00	-21.49
5641.00	-54.81	H	-47.37	4.93	13.14	-39.16	-13.00	-26.16
High Channel 810 (1909.80MHz)								
3822.00	-47.17	V	-43.89	4.02	12.73	-35.18	-13.00	-22.18
5726.00	-52.17	V	-43.71	4.87	13.11	-35.47	-13.00	-22.47
3822.00	-47.45	H	-44.02	4.02	12.73	-35.31	-13.00	-22.31
5726.00	-53.81	H	-45.73	4.87	13.11	-37.49	-13.00	-24.49

7.7. Test Photograph

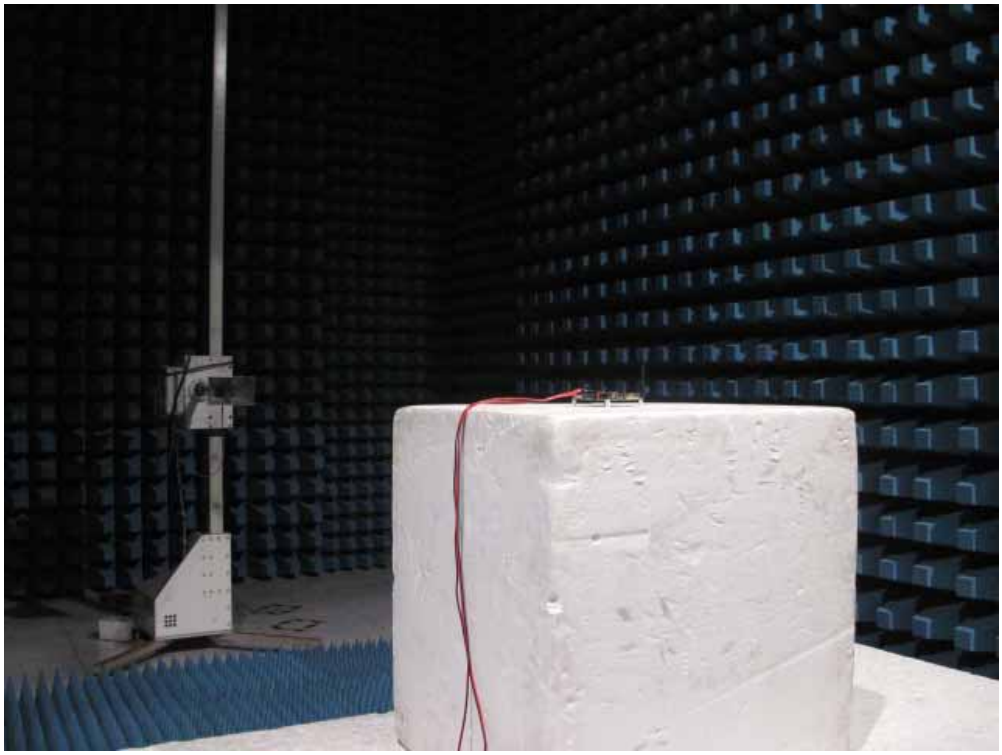
Description: ERP Test Setup



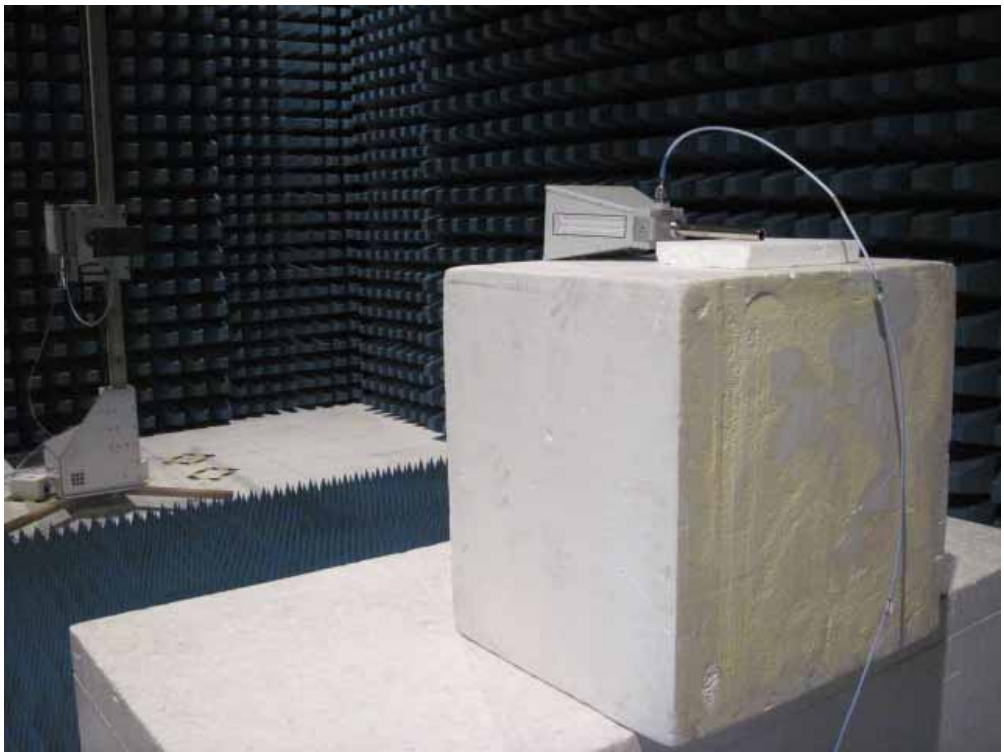
Description: Substitution Antenna for ERP Test



Description: EIRP Test Setup



Description: Substitution Antenna for EIRP Test



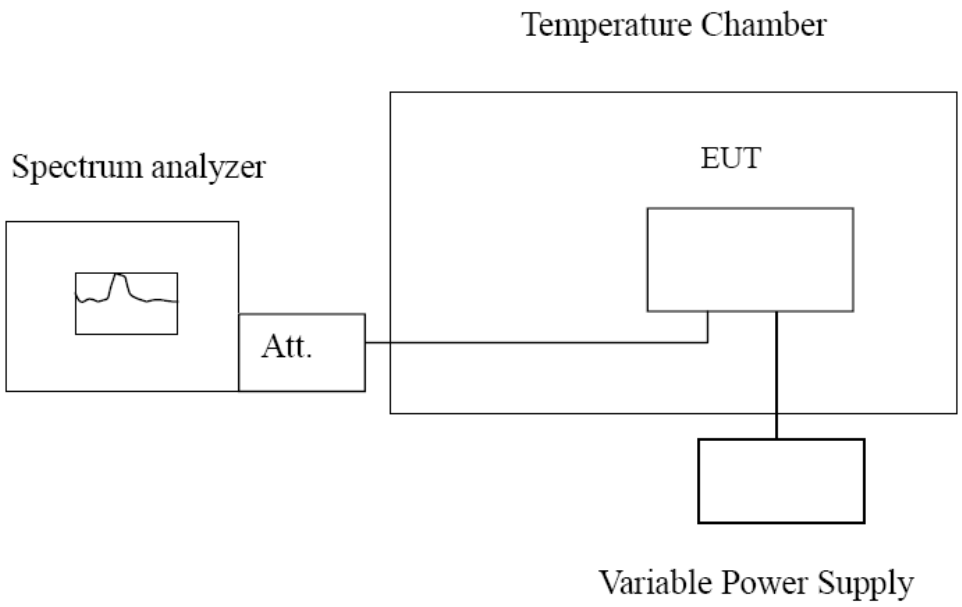
8. Frequency Stability Under Temperature & Voltage Variations

8.1. Test Equipment

Frequency Stability Under Temperature & Voltage Variations / AC-6

Instrument	Manufacturer	Type No.	Serial No	Cali. Due Date
PSA Series Spectrum Analyzer	Agilent	E4440A	MY49420184	2013.04.10
Radio Communication Tester	R&S	CMU 200	117088	2012.04.29
Dual Directional Coupler	Agilent	778D	20160	2012.04.20
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2012.04.20
DC Power Supply	IDRC	CD-035-020PR	977272	2012.09.22
Temperature & Humidity Chamber	Gaoyu	TH-1P-B	WIT-05121302	2013.01.13
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC6-TH	2013.01.10

8.2. Test Setup



8.3. Limit

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

Limit	< ± 2.5 ppm

8.4. 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℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20℃. 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 (±15%) and endpoint, record the maximum frequency change.

8.5. Uncertainty

The measurement uncertainty is defined as ± 10 Hz.

8.6. Test Result

Product	HiALLNC		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 1: GPRS 850 Link		
Date of Test	2012/04/17	Test Site	TR7

Frequency Stability under Temperature

Temperature Interval (℃)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
-30	836.40	42	± 2091
-20	836.40	38	± 2091
-10	836.40	25	± 2091
0	836.40	30	± 2091
10	836.40	28	± 2091
20	836.40	32	± 2091
30	836.40	35	± 2091
40	836.40	40	± 2091
50	836.40	46	± 2091

Frequency Stability under Voltage

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
4.500	836.40	-41	± 2091
3.700	836.40	30	± 2091
3.300	836.40	-46	± 2091

Product	HiALLNC		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 2: GPRS 1900 Link		
Date of Test	2012/04/17	Test Site	TR7

Frequency Stability under Temperature

Temperature Interval (℃)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
-30	1880.00	47	± 4700
-20	1880.00	51	± 4700
-10	1880.00	45	± 4700
0	1880.00	48	± 4700
10	1880.00	41	± 4700
20	1880.00	47	± 4700
30	1880.00	50	± 4700
40	1880.00	55	± 4700
50	1880.00	58	± 4700

Frequency Stability under Voltage

DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Limit (Hz)
4.500	1880.00	47	± 4700
3.700	1880.00	48	± 4700
3.300	1880.00	50	± 4700

9. Receiver Spurious Emission for RSS 132/133

9.1. Test Equipment

Spurious Emission / AC-2

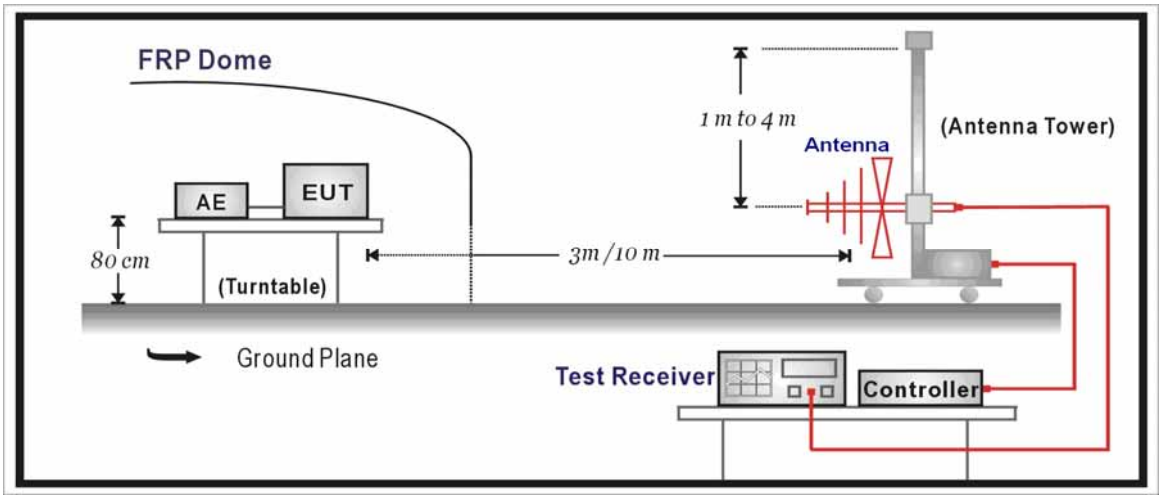
Instrument	Manufacturer	Model No.	Serial No.	Cali. Due Date
Radio Communication Tester	R&S	CMU 200	117088	2012.04.29
EMI Test Receiver	R&S	ESCI	100573	2012.04.23
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2012.10.18
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2013.03.02
Temperature/Humidity Meter	zhicheng	ZC1-2	AC2-TH	2013.01.10

Spurious Emission / AC-5

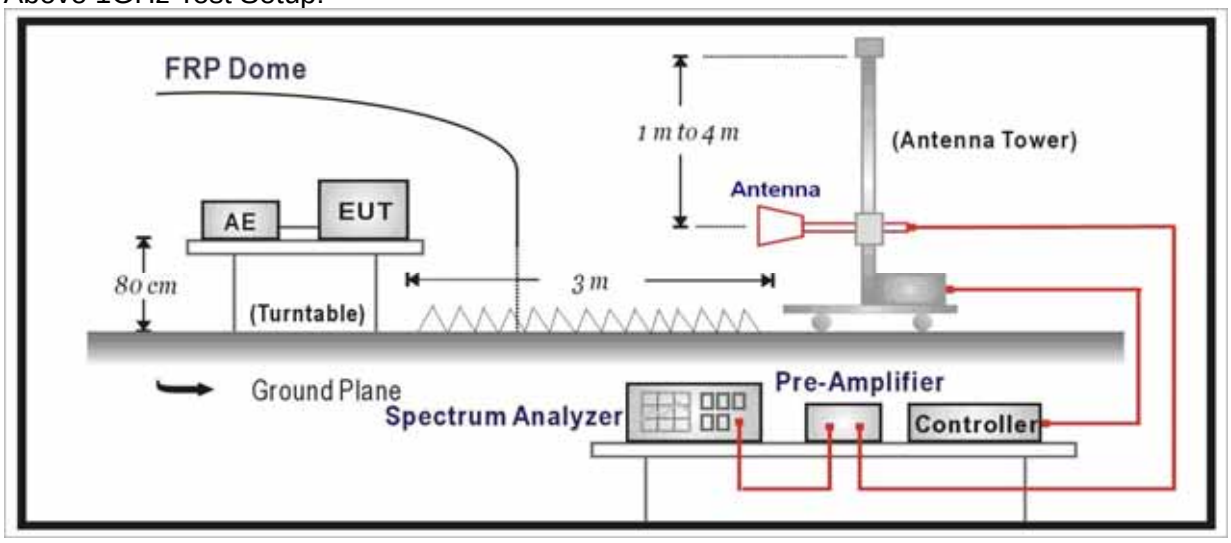
Instrument	Manufacturer	Type No.	Serial No	Cali. Due Date
Radio Communication Tester	R&S	CMU 200	117088	2012.04.29
Spectrum Analyzer	Agilent	N9010A	MY48030494	2012.04.23
Preamplifier	Miteq	NSP1800-25	1364185	2012.05.05
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	499	2012.06.11
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2012.05.05
Temperature/Humidity Meter	zhicheng	ZC1-2	AC5-TH	2013.01.10

9.2. Test Setup

Under 1GHz Test Setup:



Above 1GHz Test Setup:



9.3. Limit

According to Standard RSS132/133 refer to RSS-Gen Issue 2.

Field Strength micro-volts/m at 3 meters		
Frequency (MHz)	Distance (m)	Level (dBuV/m)
30 - 88	3	40
88 - 216	3	43.5
216 - 960	3	46
Above 960	3	54

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)

9.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 10 meters. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated on radiated measurement.

On any frequency or frequencies below or equal to 1000 MHz, the radiated limits shown are based on measuring equipment employing a quasi-peak detector function and above 1000 MHz, the radiated limits shown are based measuring equipment employing an average detector function.

When average radiated emission measurement are included emission measurement Above 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

For class A, the measurement distance between the EUT and antenna is 10 meters for under

1GHz and above 1GHz.

For class B, the measurement distance between the EUT and antenna is 10 meters for under 1GHz and 3 meters for above 1GHz.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCI) is 120 kHz and above 1GHz is 1MHz.

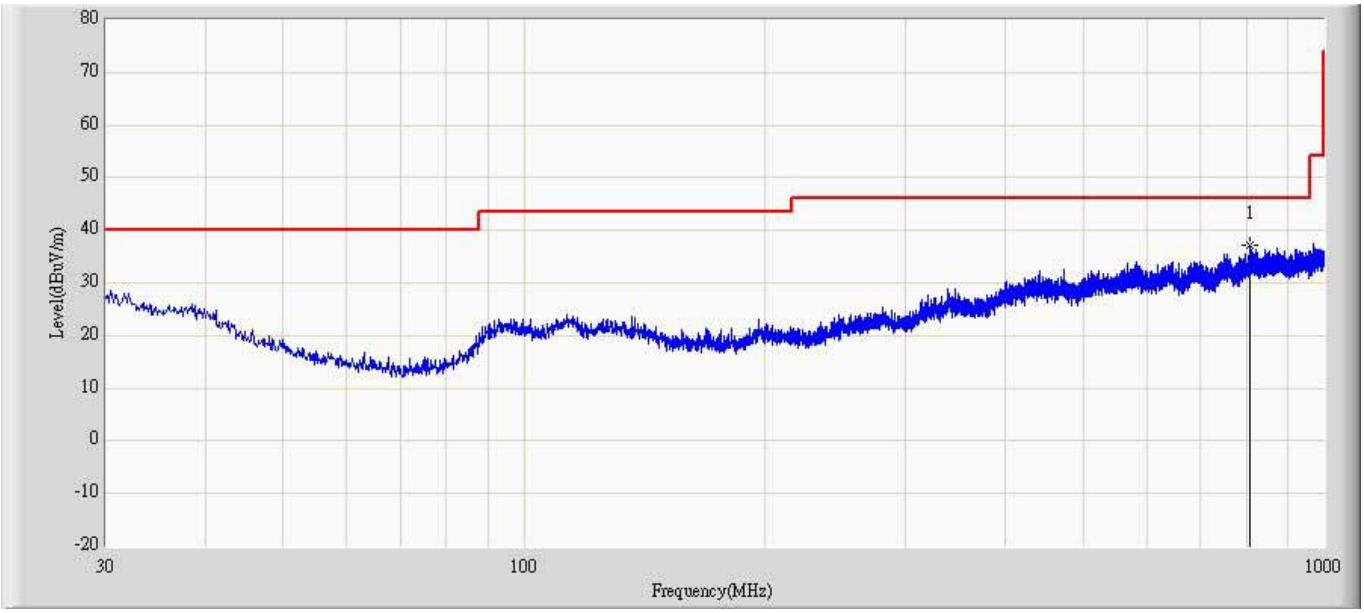
Note: When measurement above 1GHz, the horn antenna will bend down a little (as horn antenna have the narrow beamwidth) in order to find the maximum emission of EUT

9.5. Uncertainty

The measurement uncertainty is defined as 3.2 dB for Radiated Power Measurement.

9.6. Test Result

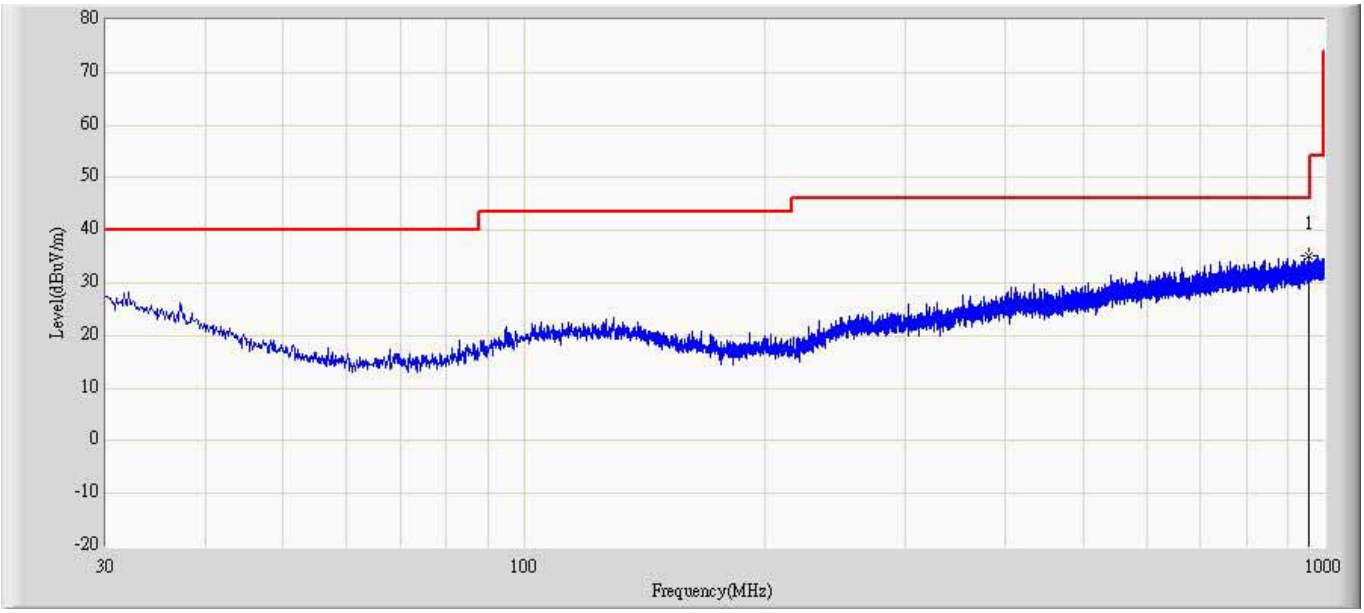
Engineer: Sunny	
Site: AC2	Time: 2012/04/18 - 09:00
Limit: RSS_GEN_Radiation_03M_QP	Margin: 0
Probe: CBL6112D_27613(30-1000MHz)	Polarity: Horizontal
EUT: HiALLNC	Power: DC 3.7V
Note: GPRS850 Idle (Using Peak detector)	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	809.153	37.102	5.947	-8.898	46.000	31.155	PK

This plot is valid for low, mid & high channels (worst-case plot).

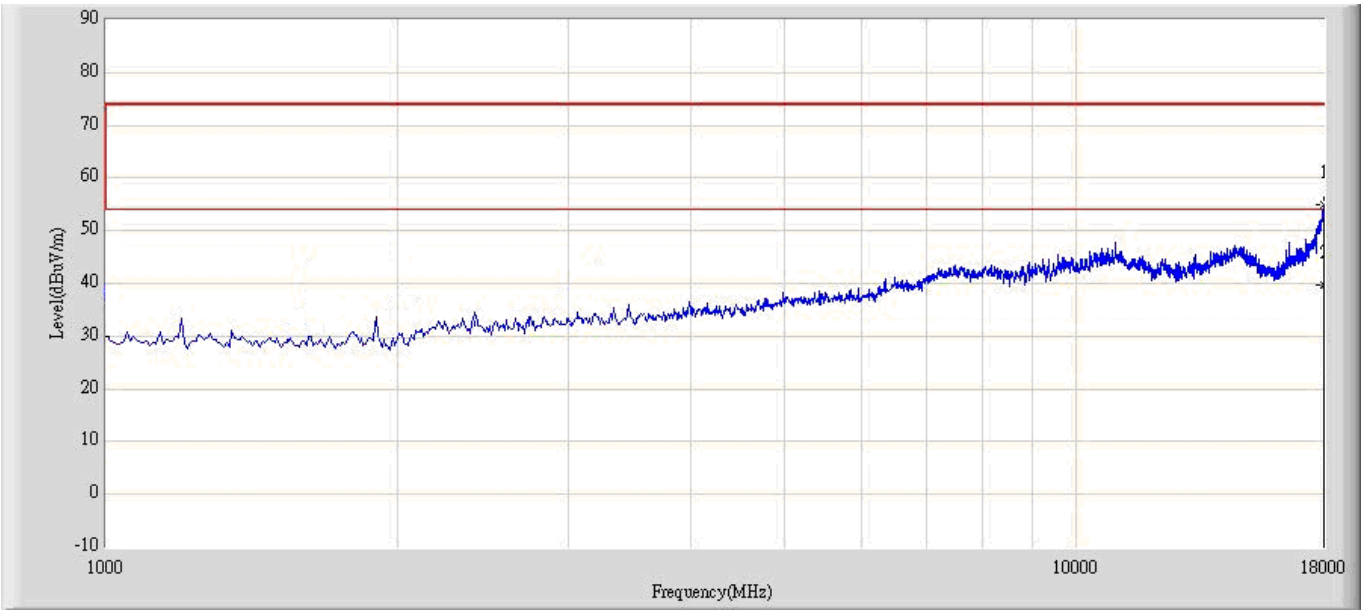
Engineer: Sunny	
Site: AC2	Time: 2012/04/18 - 09:04
Limit: RSS_GEN_Radiation_03M_QP	Margin: 0
Probe: CBL6112D_27613(30-1000MHz)	Polarity: Vertical
EUT: HiALLNC	Power: DC 3.7V
Note: GPRS850 Idle (Using Peak detector)	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	958.047	35.149	5.013	-10.851	46.000	30.137	PK

This plot is valid for low, mid & high channels (worst-case plot).

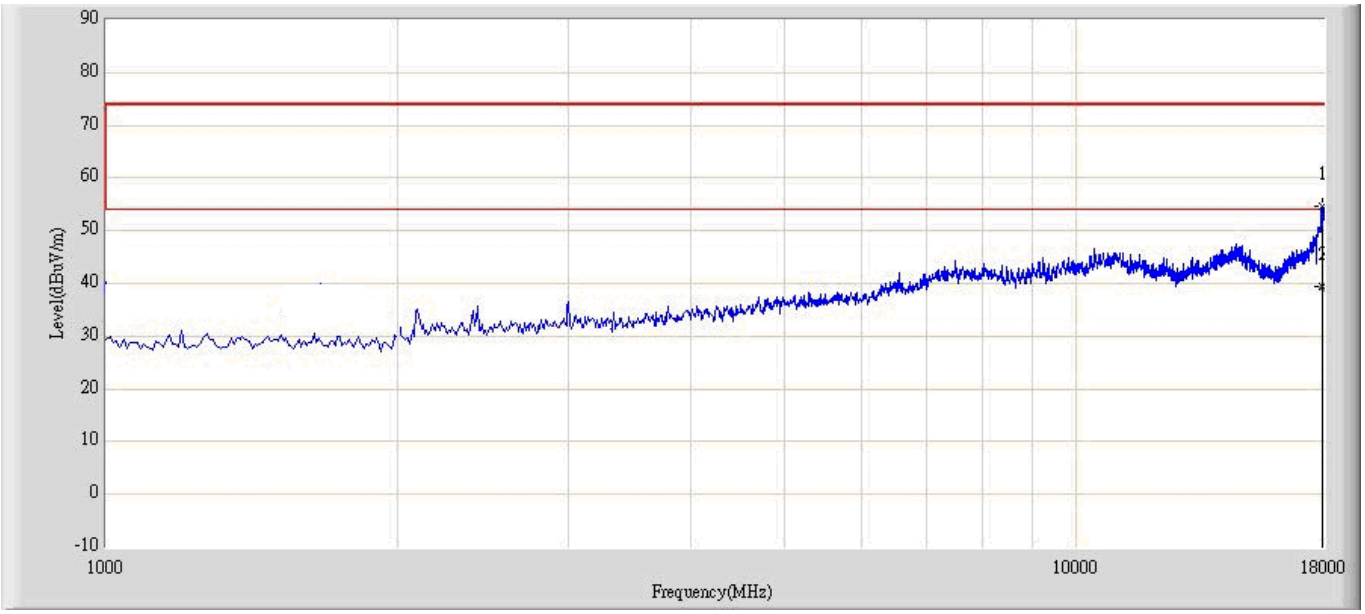
Engineer: Sunny	
Site: AC5	Time: 2012/04/18 - 10:56
Limit: RSS_GEN_Radiation_03M	Margin: 0
Probe: BBHA9120D_499(1-18GHz)	Polarity: Horizontal
EUT: HiALLNC	Power: DC 3.7V
Note: GPRS 850 Idle	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		18000.000	54.805	39.189	-19.195	74.000	15.616	PK
2	*	18000.000	39.842	24.226	-14.158	54.000	15.616	AV

This plot is valid for low, mid & high channels (worst-case plot).

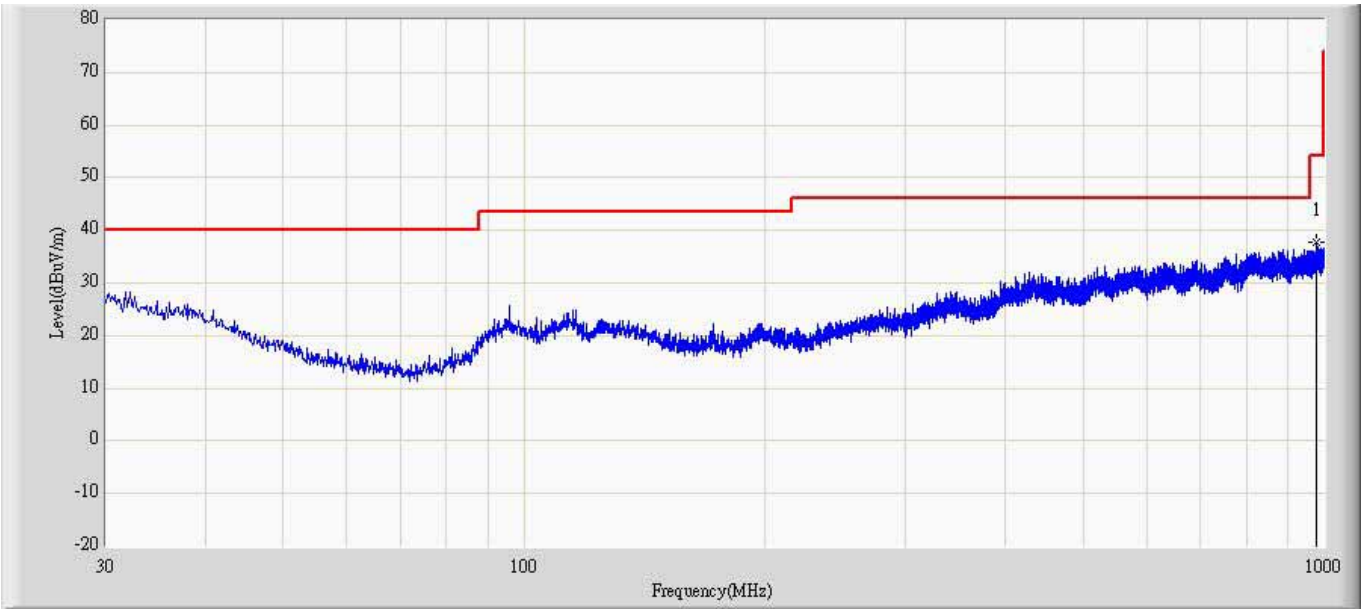
Engineer: Sunny	
Site: AC5	Time: 2012/04/18 - 10:56
Limit: RSS_GEN_Radiation_03M	Margin: 0
Probe: BBHA9120D_499(1-18GHz)	Polarity: Vertical
EUT: HiALLNC	Power: DC 3.7V
Note: GPRS 850 Idle	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		17940.500	54.518	40.084	-19.482	74.000	14.434	PK
2	*	17940.500	39.548	25.114	-14.452	54.000	14.434	AV

This plot is valid for low, mid & high channels (worst-case plot).

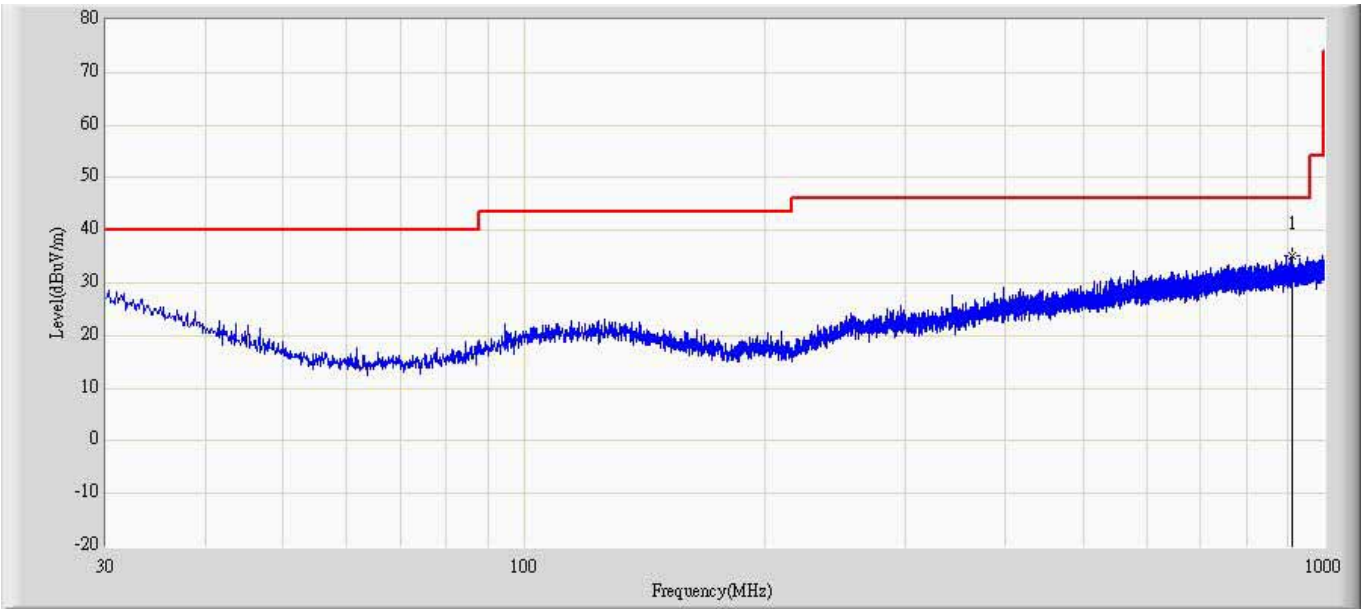
Engineer: Sunny	
Site: AC2	Time: 2012/04/18 - 09:05
Limit: RSS_GEN_Radiation_03M_QP	Margin: 0
Probe: CBL6112D_27613(30-1000MHz)	Polarity: Horizontal
EUT: HiALLNC	Power: DC 3.7V
Note: GPRS1900 Idle (Using Peak detector)	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	979.024	37.682	5.140	-16.318	54.000	32.542	PK

This plot is valid for low, mid & high channels (worst-case plot).

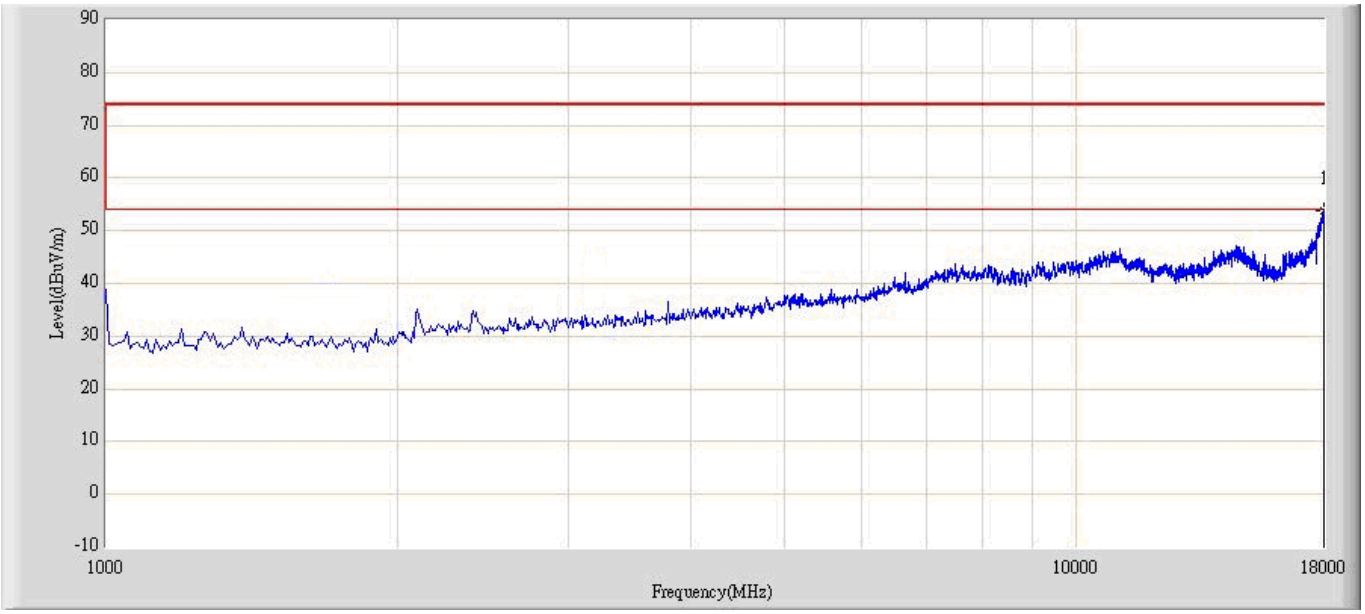
Engineer: Sunny	
Site: AC2	Time: 2012/04/18 - 09:06
Limit: RSS_GEN_Radiation_03M_QP	Margin: 0
Probe: CBL6112D_27613(30-1000MHz)	Polarity: Vertical
EUT: HiALLNC	Power: DC 3.7V
Note: GPRS1900 Idle (Using Peak detector)	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	912.579	35.298	5.609	-10.702	46.000	29.689	PK

This plot is valid for low, mid & high channels (worst-case plot).

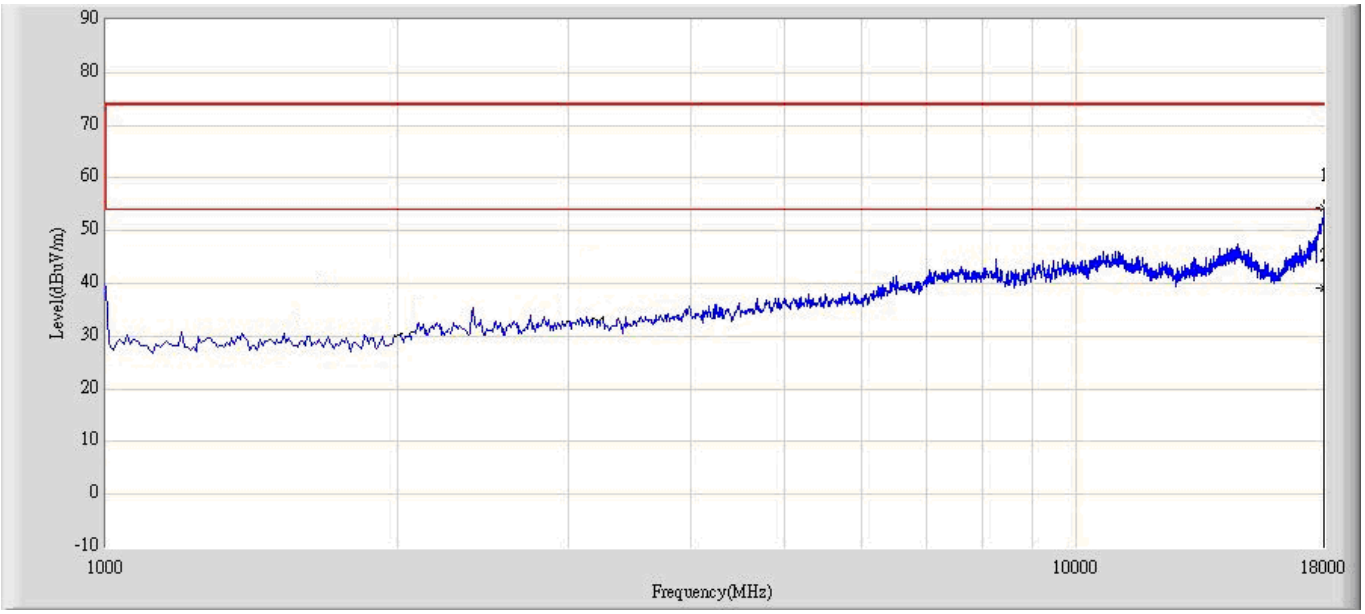
Engineer: Sunny	
Site: AC5	Time: 2012/04/18 - 10:56
Limit: RSS_GEN_Radiation_03M	Margin: 0
Probe: BBHA9120D_499(1-18GHz)	Polarity: Horizontal
EUT: HiALLNC	Power: DC 3.7V
Note: GPRS1900 Idle	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	18000.000	53.827	38.211	-20.173	74.000	15.616	PK

This plot is valid for low, mid & high channels (worst-case plot).

Engineer: Sunny	
Site: AC5	Time: 2012/04/18 - 10:56
Limit: RSS_GEN_Radiation_03M	Margin: 0
Probe: BBHA9120D_499(1-18GHz)	Polarity: Vertical
EUT: HiALLNC	Power: DC 3.7V
Note: GPRS1900 Idle	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		17983.000	54.285	38.959	-19.715	74.000	15.326	PK
2	*	17983.000	39.205	23.879	-14.795	54.000	15.326	AV

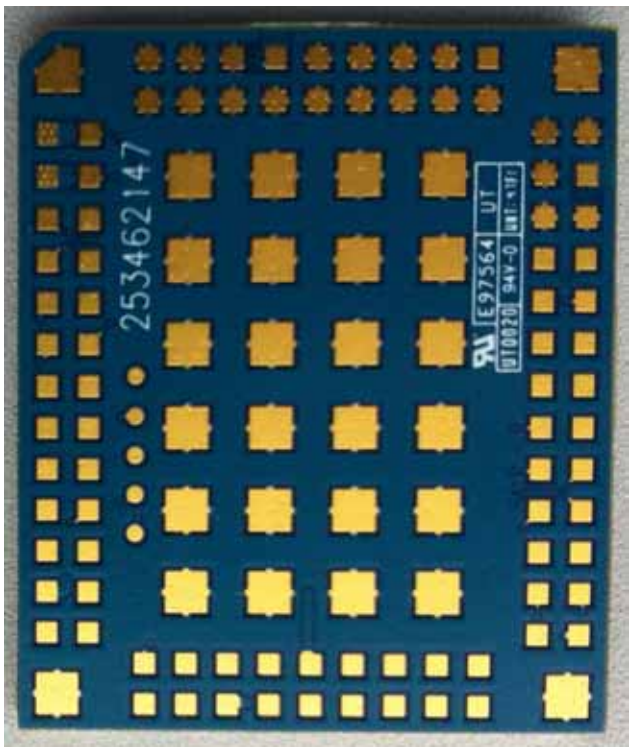
This plot is valid for low, mid & high channels (worst-case plot).

10. Attachment

➢ EUT Photograph

(1) EUT Photo

(2) EUT Photo



(3) EUT Photo

(4) EUT Test Platform