



## Test Report

Product Name : GSM Gateway  
Model No. : V100-VolP, G100  
FCC ID : VLW-V100-G100

Applicant : Soundwin Network Inc.  
Address : 10F-4, No. 295, Sec. 2, Kuangfu Rd., Hsinchu City,  
Taiwan

Date of Receipt : 2007/07/24  
Issued Date : 2007/09/12  
Report No. : 077317R-HPUSP05V01

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.

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# Test Report Certification

Issued Date : 2007/09/12  
Report No. : 077317R-HPUSP05V01



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Applicant : Soundwin Network Inc.  
Address : 10F-4, No. 295, Sec. 2, Kuangfu Rd., Hsinchu City,  
Taiwan  
Manufacturer : Soundwin Network Inc.  
Model No. : V100-VoIP, G100  
FCC ID : VLW-V100-G100  
Rated Voltage : AC 230 V / 50 Hz  
EUT Voltage : AC 230 V / 50 Hz  
Trade Name : Soundwin  
Applicable Standard : FCC CFR Title 47 Part 2, Part 24E  
Test Result : Complied  
Performed Location : Hsinchu EMC Laboratory  
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## Laboratory Information

We , **QuietTek 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:

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<b>Germany</b>	<b>:</b>	<b>TUV Rheinland</b>
<b>Norway</b>	<b>:</b>	<b>Nemko, DNV</b>
<b>USA</b>	<b>:</b>	<b>FCC, NVLAP</b>
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The address and introduction of QuietTek 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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### Reports from Both Laboratories Are Accepted by :



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## 1. General Information

### 1.1. EUT Description

Product Name	GSM Gateway
Trade Name	Soundwin
Model No.	V100-VoIP, G100
Tx Frequency Range	1850.2MHz to 1909.8MHz
Rx Frequency Range	1930.2MHz to 1989.8MHz
Channel Number	300
Type of Modulation	GMSK
Antenna Gain	4.29dBi
CD	1 Set
LAN Cable	Non-Shielded, 1m
Antenna Cable	Non-Shielded, 1m
Power Adapter	SUNNY, SYS1298-1812-W2 I/P: 100-240V / 1A max. / 30-40VA / 50-60Hz O/P: +12V / 1.5A Cable Out: Non-Shielded, 1.68m

Working Frequency of Each Channel					
Channel	Frequency	Channel	Frequency	Channel	Frequency
512	1850.2 MHz	661	1880 MHz	810	1909.8 MHz

Note:

1. This EUT is a GSM Gateway.
2. The different of the each model is shown as below:

Model Number	Description
V100-VoIP	FXS*1, PSTN Line *1 & GSM over VoIP GSM Gateway
G100	FXS*1, PSTN Line *1 & GSM Gateway

## 1.2. Mode of Operation

QuietTek 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:

Pre-Test Mode	
EMI	Mode 1: GDM1900 Link
Final Test Mode	
RX	Mode 1: GDM1900 Link

Note:

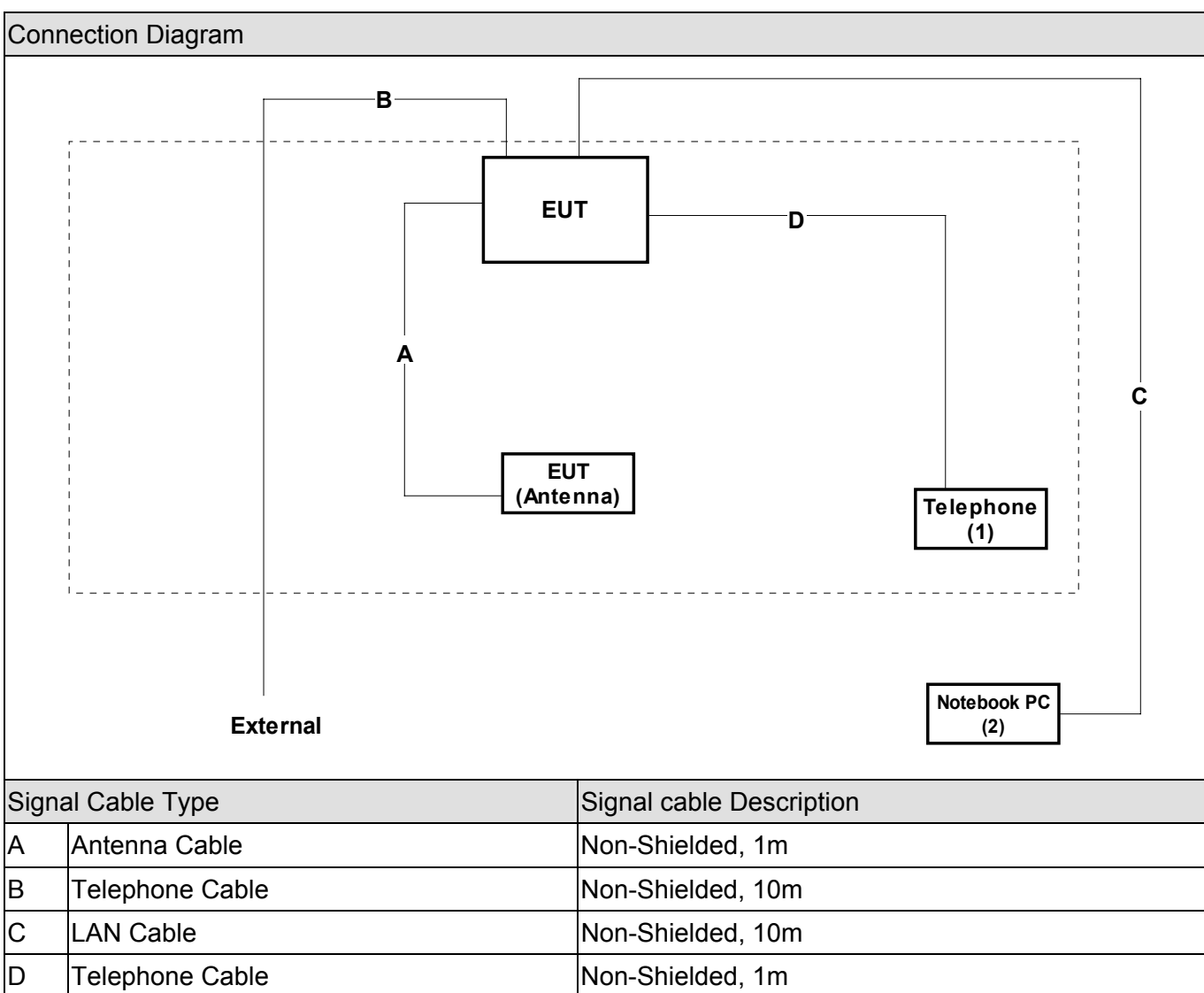
1. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.
2. This device is a composite device in accordance with Part 15 Subpart B regulations. The function for the receiver was measured and made a test report that the report number is 077317R-ITUSP02V02, certified under Declaration of Conformity.

## 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.	FCC ID	Power Cord
1 Telephone	TENDEL	K-302	50721005000552	DoC	--
2 Notebook PC	DELL	LATITUDE D400	N/A		Non-Shielded, 1.7m, one ferrite core bonded

## 1.4. Configuration of Tested System





**1.5. EUT Exercise Software**

1	Setup the EUT and simulator as shown on 1.4.
2	Turn on the power of all equipments.
3	The EUT was set to communicate with CMU200.
4	Repeat the above procedure (3).

## 2. Technical Test

### 2.1. Summary of Test Result

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

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

### 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

The following test equipments are used during the RF power output tests:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ OATS 3	Test Receiver	R & S	ESCS 30 / 100122	Feb., 2007
	Universal Radio Communication Tester	R & S	CMU200 / 104846	May, 2007
	Spectrum Analyzer	R & S	R3162 / 120300652	Feb., 2007
	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2007
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
	Horn Antenna	ETS	3115 / 0005-6160	Jul., 2007
	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	Jul., 2007
	Horn Antenna	SCHWARZBECK	BBHA9120D/ BBHA9120D639	Jul., 2007
	Signal Generator	Anritsu	MG3694A/041902	Nov. 2007

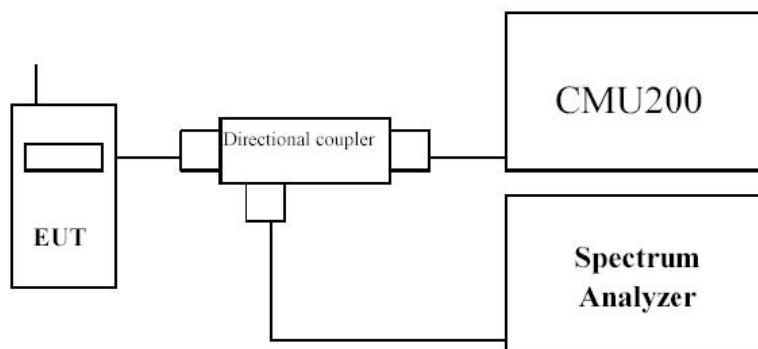
Note: 1. All equipments that need to be calibrated are with calibration period of 1 year.

2. "N/A" Ca1.Date is used to Pre-test, not final test.

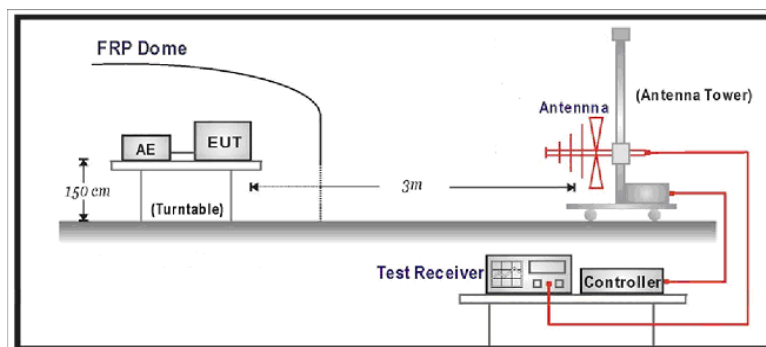
3. EIRP = Substitution Level + Substitution Antenna Gain - Cable Loss ° .

#### 3.2. Test Setup

Conducted Power Measurement:



Radiated Power Measurement:



### 3.3. Limit

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 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.

### **3.5. Uncertainty**

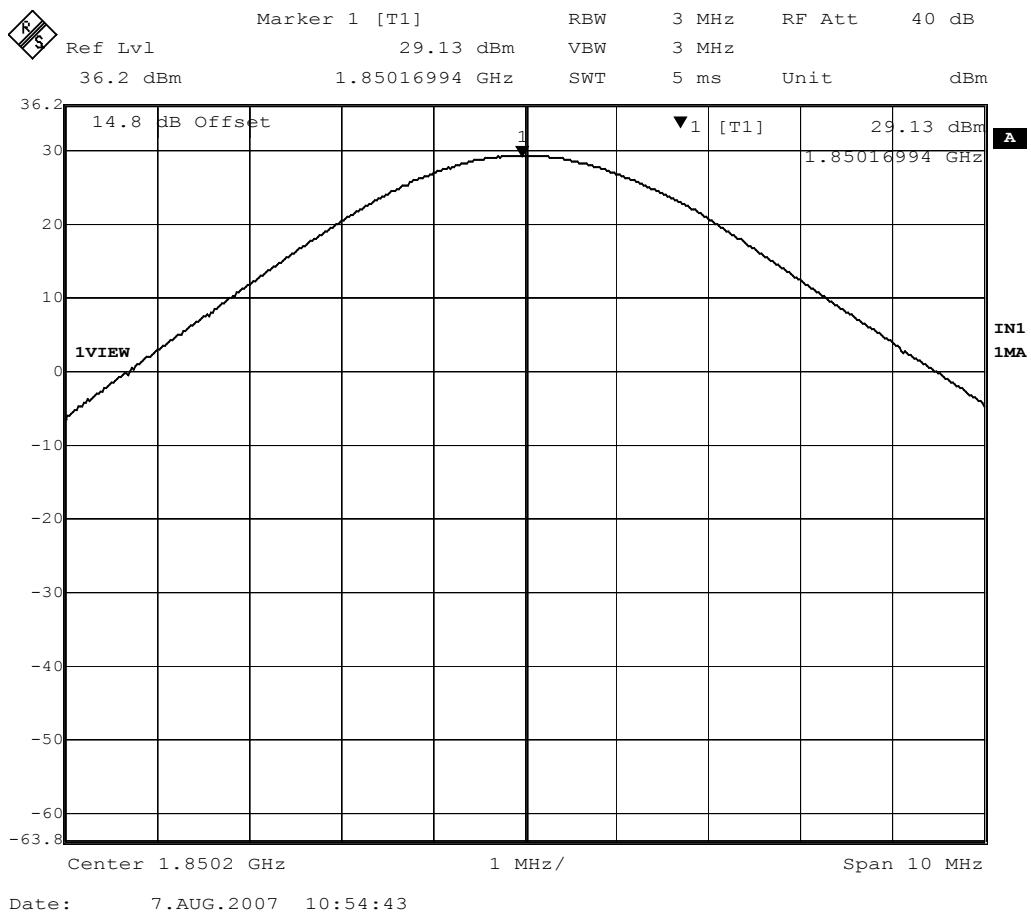
The measurement uncertainty is defined as for Conducted Power Measurement  $\pm 1.2$  dB, for Radiated Power Measurement  $\pm 3.2$  dB

## 3.6. Test Result

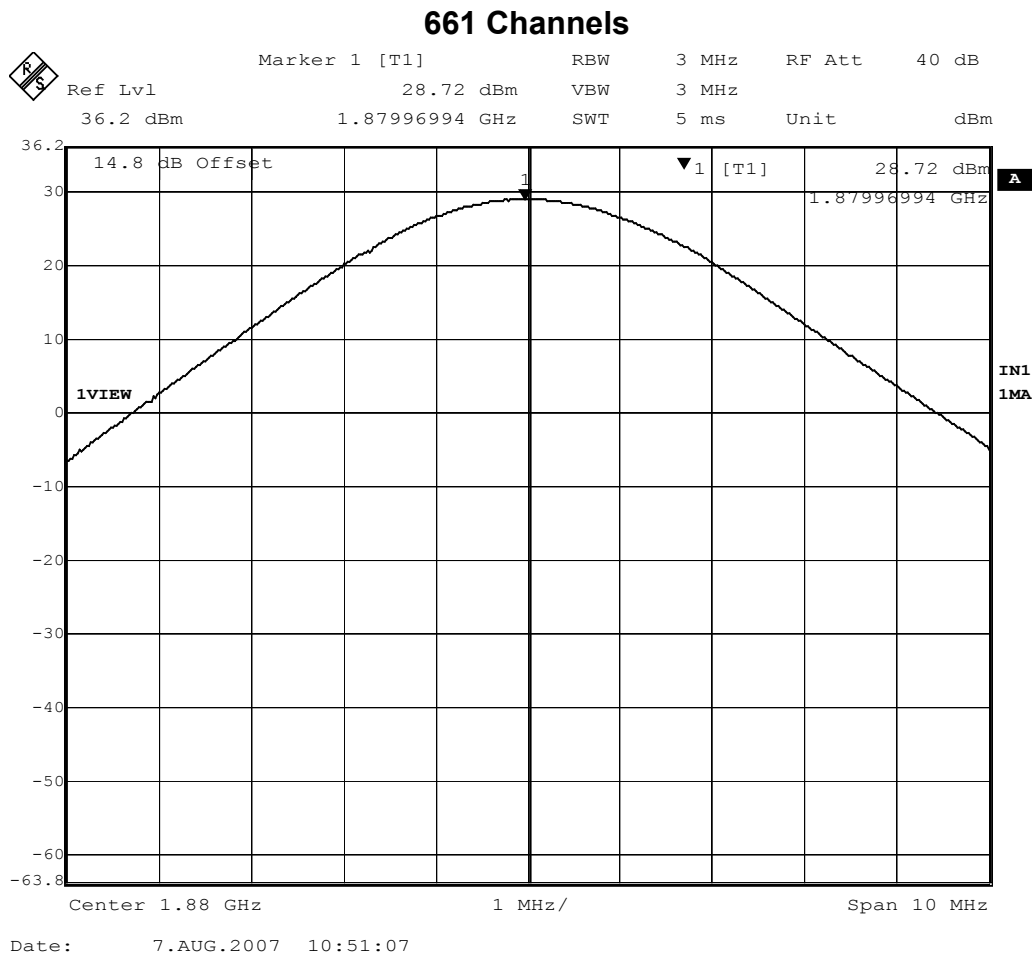
Product	GSM Gateway		
Test Item	Peak Output Power		
Test Mode	Mode 1: GDM1900 Link		
Date of Test	2007/08/07	Test Site	OATS 3

Frequency (MHz)	Conducted Output Power (dBm)
1850.20	29.13

### 512 Channels

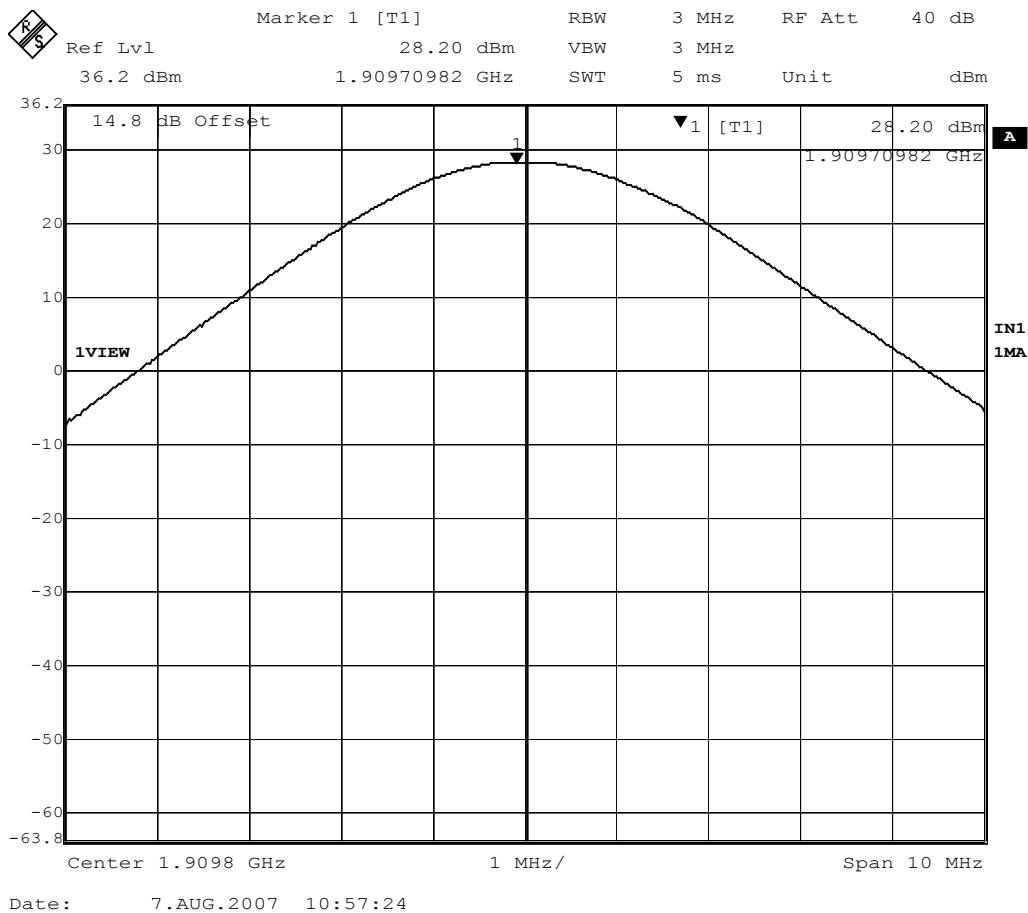


Frequency (MHz)	Conducted Output Power (dBm)
1880.00	28.72



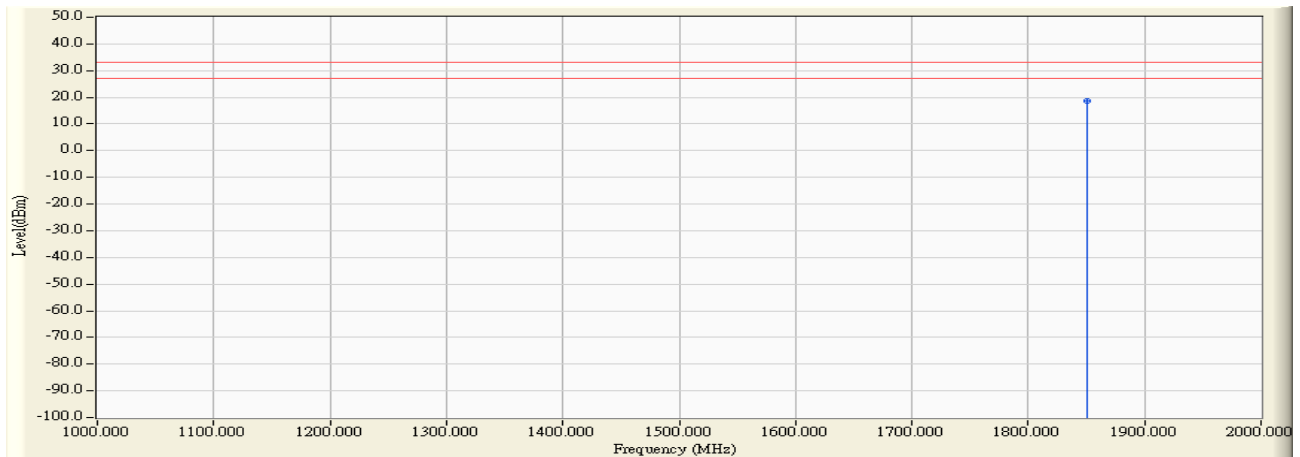
Frequency (MHz)	Conducted Output Power (dBm)
1909.80	28.20

## 810 Channels





Site : Site 3	Time : 2007/08/05 - 15:26
Limit : FCC_PART24_F_00M_PK	Margin : 6
EUT : GSM Gateway	Probe : FCC_Replace_1-18G(200701) - HORIZONTAL
Power : AC 120V/60Hz	Note : 1900MHz(512)

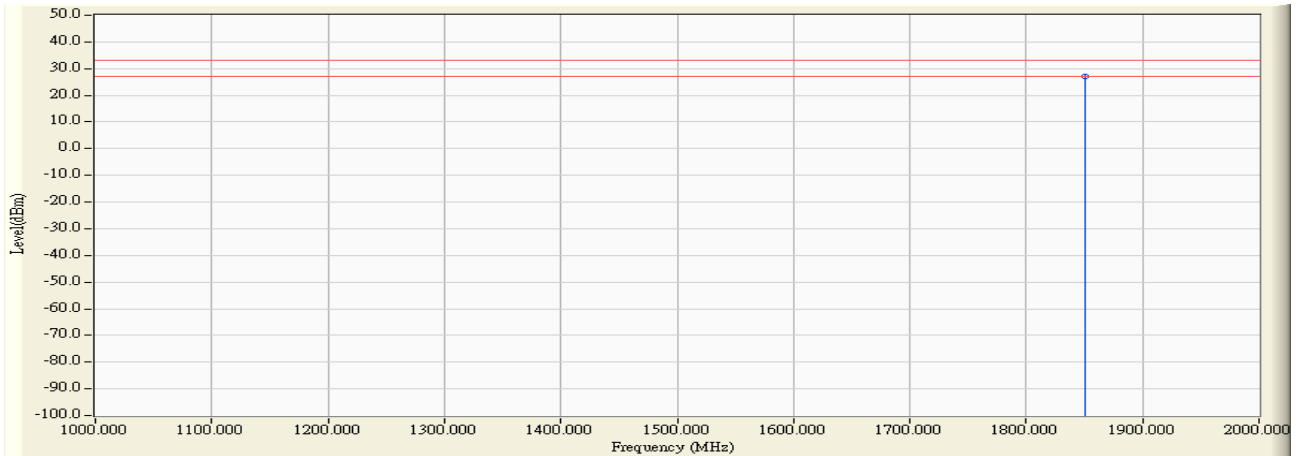


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	*	1850.010	39.200	-20.480	18.720	-14.280	33.000	PEAK

## Note:

1. All Reading Levels are Peak value.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : Site 3	Time : 2007/08/05 - 15:27
Limit : FCC_PART24_F_00M_PK	Margin : 6
EUT : GSM Gateway	Probe : FCC_Replace_1-18G(200701) - VERTICAL
Power : AC 120V/60Hz	Note : 1900MHz(512)

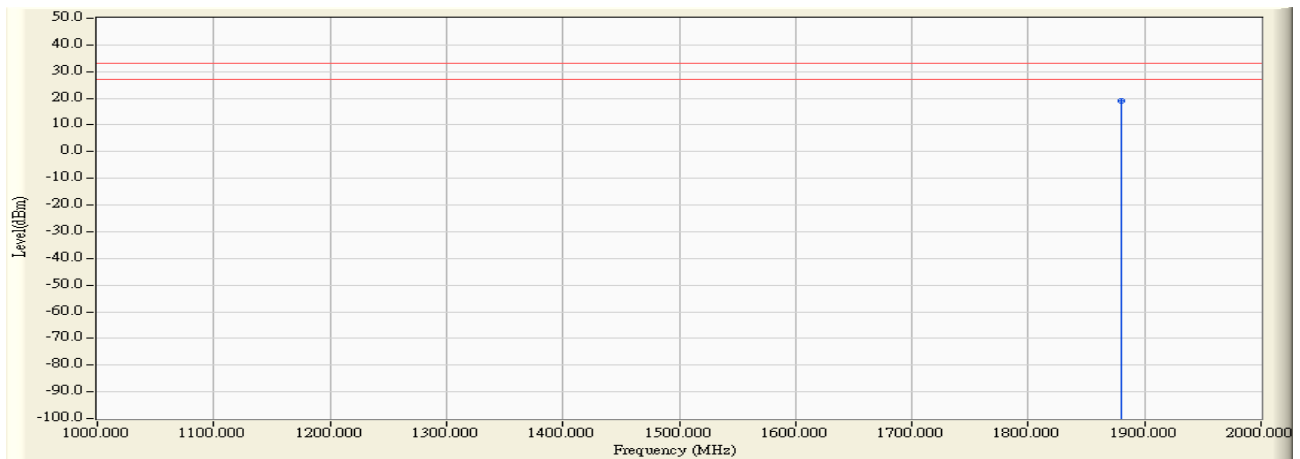


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	*	1850.010	40.110	-13.000	27.110	-5.890	33.000	PEAK

**Note:**

1. All Reading Levels are Peak value.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : Site 3	Time : 2007/08/05 - 15:46
Limit : FCC_PART24_F_00M_PK	Margin : 6
EUT : GSM Gateway	Probe : FCC_Replace_1-18G(200701) - HORIZONTAL
Power : AC 120V/60Hz	Note : 1900MHz(661)



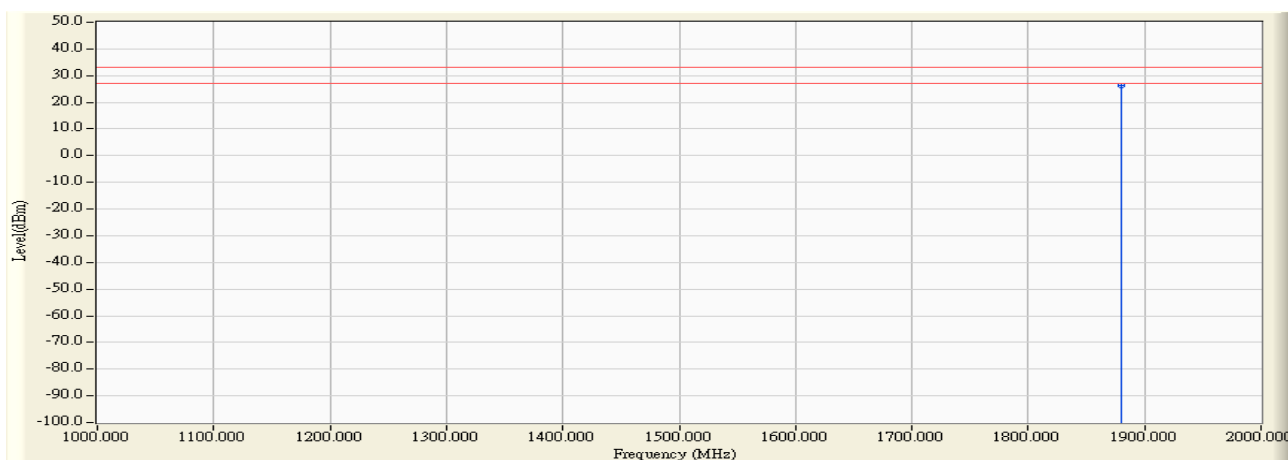
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	*	1880.219	39.324	-20.360	18.964	-14.036	33.000	PEAK

## Note:

1. All Reading Levels are Peak value.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Frequency (MHz)	EIRP (dBm)
1880.00	26.184

Site : Site 3	Time : 2007/08/05 - 15:50
Limit : FCC_PART24_F_00M_PK	Margin : 6
EUT : GSM Gateway	Probe : FCC_Replace_1-18G(200701) - VERTICAL
Power : AC 120V/60Hz	Note : 1900MHz(661)



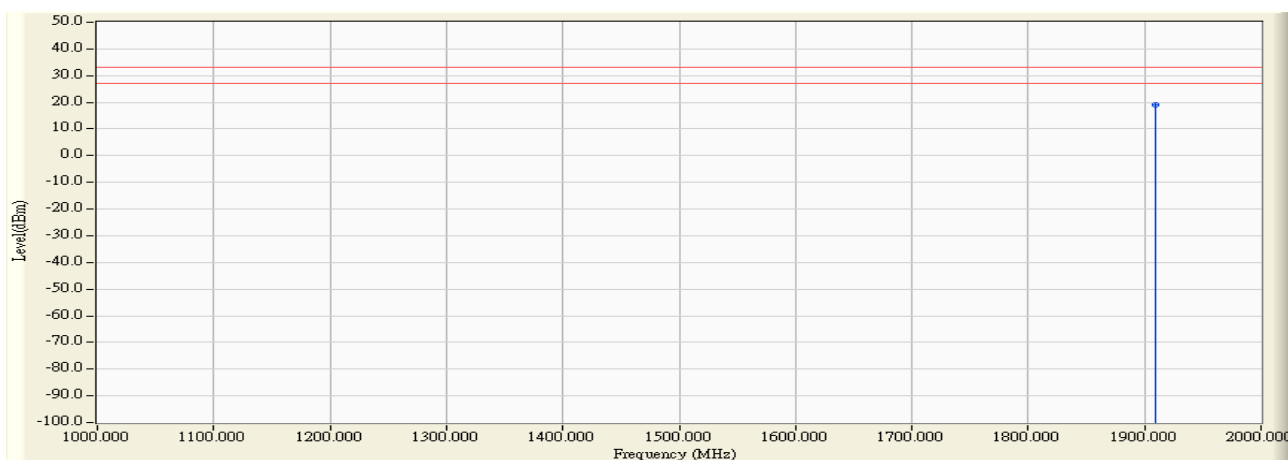
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	*	1880.150	40.235	-14.050	26.184	-6.816	33.000	PEAK

## Note:

1. All Reading Levels are Peak value.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Frequency (MHz)	EIRP (dBm)
1909.80	25.896

Site : Site 3	Time : 2007/08/05 - 15:57
Limit : FCC_PART24_F_00M_PK	Margin : 6
EUT : GSM Gateway	Probe : FCC_Replace_1-18G(200701) - HORIZONTAL
Power : AC 120V/60Hz	Note : 1900MHz(810)

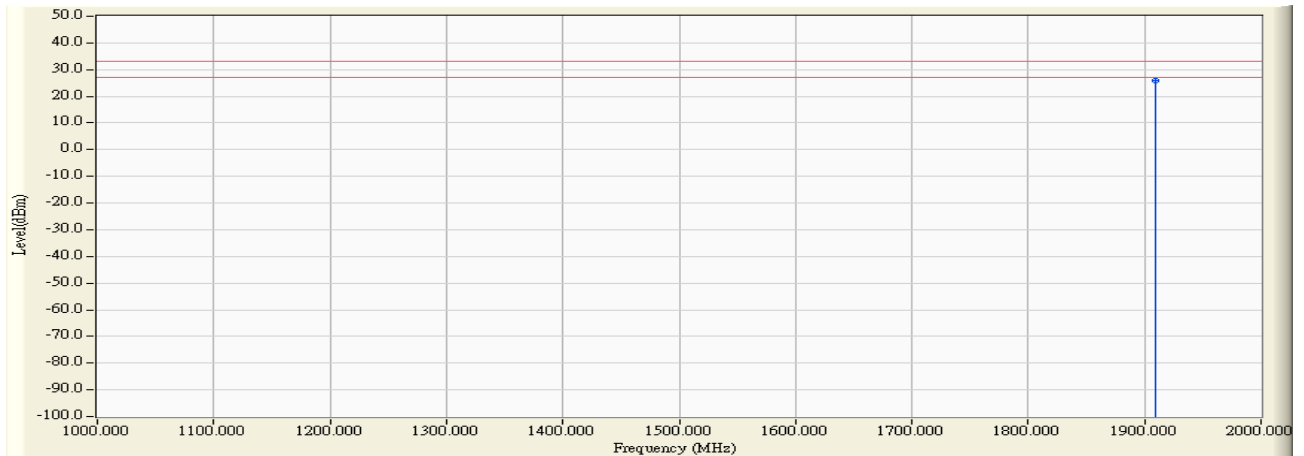


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	*	1909.700	39.446	-20.380	19.066	-13.934	33.000	PEAK

## Note:

1. All Reading Levels are Peak value.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : Site 3	Time : 2007/08/05 - 16:03
Limit : FCC_PART24_F_00M_PK	Margin : 6
EUT : GSM Gateway	Probe : FCC_Replace_1-18G(200701) - VERTICAL
Power : AC 120V/60Hz	Note : 1900MHz(810)



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	*	1909.700	40.356	-14.460	25.896	-7.104	33.000	PEAK

## Note:

1. All Reading Levels are Peak value.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

## 4. Conducted Emission

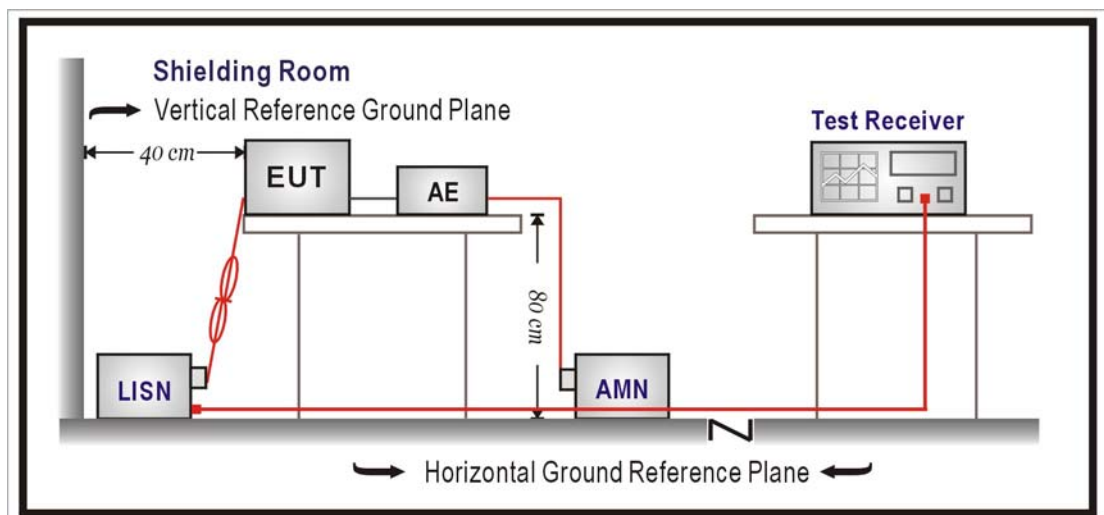
### 4.1. Test Equipment

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2007	
2	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2007	Peripherals
3	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2007	EUT
4	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2007	
5	4-wire ISN	R & S	ENY41 / 837032/001	Feb., 2007	
6	Double 2-Wire ISN	R & S	ENY22 / 835354/008	Feb., 2007	
7	No.1 Shielded Room			N/A	

Note: All equipments are calibrated every one year.

### 4.2. Test Setup



#### 4.3. Limit

Limits (dBuV)				
Frequency MHz	Class A		Class B	
	QP	AV	QP	AV
0.15 - 0.50	79	66	66-56	56-46
0.50-5.0	73	60	56	46
5.0 - 30	73	60	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

#### 4.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.) Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

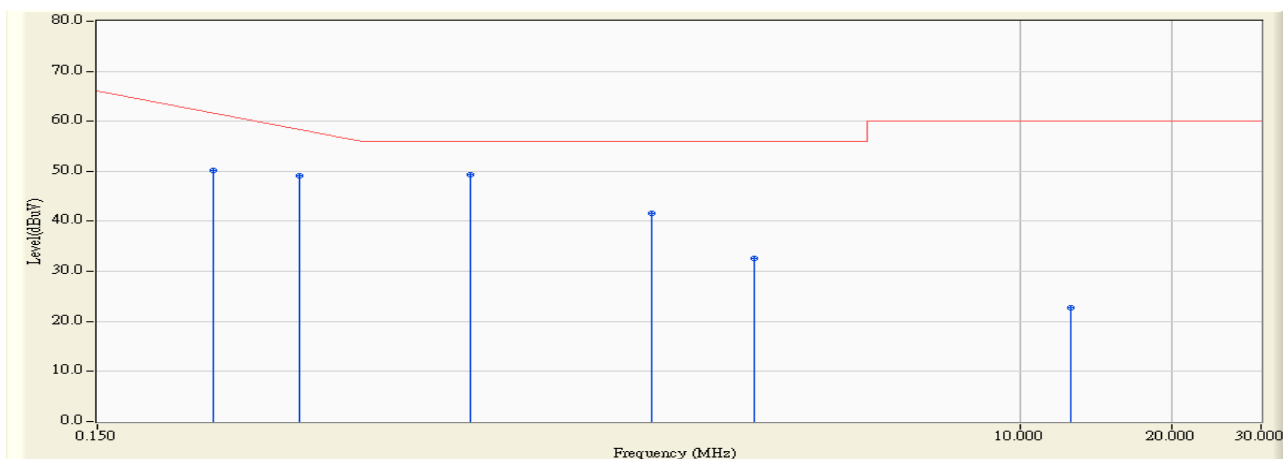
#### 4.5. Uncertainty

The measurement uncertainty is defined as  $\pm 2.26$  dB.



## 4.6. Test Result

Site : ShieldingRoom1	Time : 2007/09/09 - 15:23
Limit : CISPR_B_00M_QP	Margin : 0
EUT : GSM Gateway	Probe : SR1_LISN(16A) - Line1
Power : AC 120V/60Hz	Note : Mode 1: GDM1900 Link

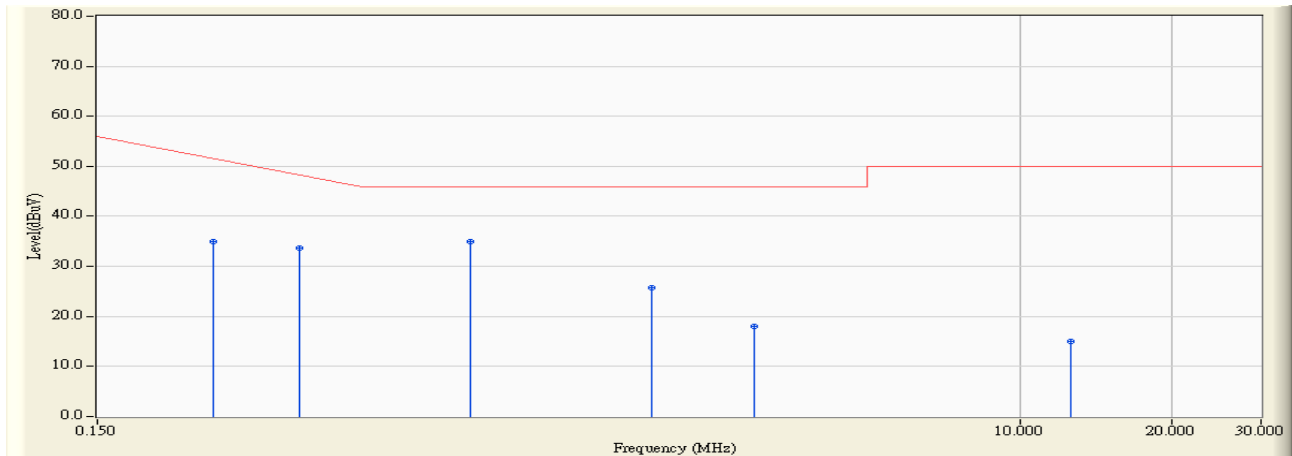


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.255	0.162	50.070	50.232	-12.768	63.000	QUASIPeAK
2		0.377	0.193	48.850	49.043	-10.471	59.514	QUASIPeAK
3	*	0.822	0.220	49.210	49.430	-6.570	56.000	QUASIPeAK
4		1.869	0.370	41.250	41.620	-14.380	56.000	QUASIPeAK
5		2.978	0.410	32.180	32.590	-23.410	56.000	QUASIPeAK
6		12.634	0.790	21.950	22.740	-37.260	60.000	QUASIPeAK

### Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : ShieldingRoom1	Time : 2007/09/09 - 15:23
Limit : CISPR_B_00M_AV	Margin : 0
EUT : GSM Gateway	Probe : SR1_LISN(16A) - Line1
Power : AC 120V/60Hz	Note : Mode 1: GDM1900 Link

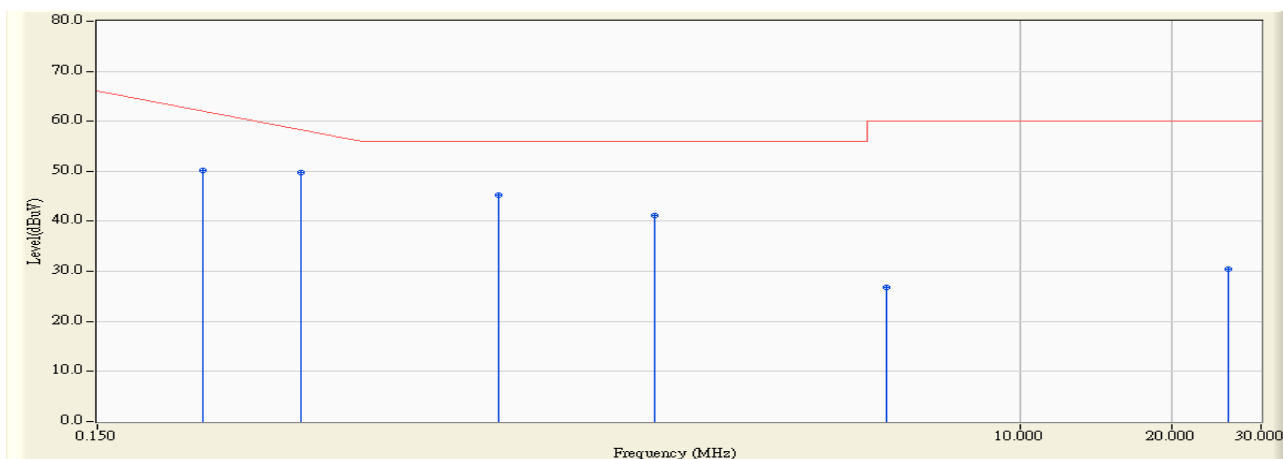


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.255	0.162	34.890	35.052	-17.948	53.000	AVERAGE
2		0.377	0.193	33.450	33.643	-15.871	49.514	AVERAGE
3	*	0.822	0.220	34.790	35.010	-10.990	46.000	AVERAGE
4		1.869	0.370	25.460	25.830	-20.170	46.000	AVERAGE
5		2.978	0.410	17.630	18.040	-27.960	46.000	AVERAGE
6		12.634	0.790	14.260	15.050	-34.950	50.000	AVERAGE

## Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : ShieldingRoom1	Time : 2007/09/09 - 15:07
Limit : CISPR_B_00M_QP	Margin : 0
EUT : GSM Gateway	Probe : SR1_LISN(16A) - Line2
Power : AC 120V/60Hz	Note : Mode 1: GDM1900 Link

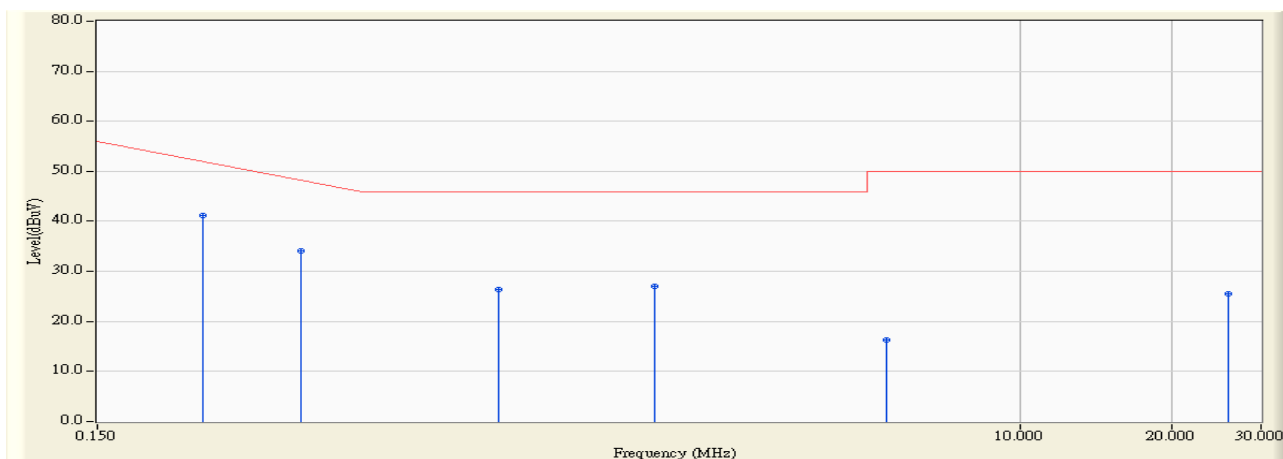


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.242	0.160	49.980	50.140	-13.231	63.371	QUASIPeAK
2	*	0.380	0.194	49.460	49.654	-9.775	59.429	QUASIPeAK
3		0.931	0.230	44.960	45.190	-10.810	56.000	QUASIPeAK
4		1.896	0.370	40.850	41.220	-14.780	56.000	QUASIPeAK
5		5.451	0.480	26.250	26.730	-33.270	60.000	QUASIPeAK
6		25.877	0.980	29.440	30.420	-29.580	60.000	QUASIPeAK

## Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : ShieldingRoom1	Time : 2007/09/09 - 15:07
Limit : CISPR_B_00M_AV	Margin : 0
EUT : GSM Gateway	Probe : SR1_LISN(16A) - Line2
Power : AC 120V/60Hz	Note : Mode 1: GDM1900 Link



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1	*	0.242	0.160	41.000	41.160	-12.211	53.371	AVERAGE
2		0.380	0.194	33.870	34.064	-15.365	49.429	AVERAGE
3		0.931	0.230	26.120	26.350	-19.650	46.000	AVERAGE
4		1.896	0.370	26.670	27.040	-18.960	46.000	AVERAGE
5		5.451	0.480	15.770	16.250	-33.750	50.000	AVERAGE
6		25.877	0.980	24.560	25.540	-24.460	50.000	AVERAGE

## Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

## 4.7. Test Photo

Test Mode : Mode 1: GDM1900 Link

Description : Front View of Conducted Emission Test Setup



Test Mode : Mode 1: GDM1900 Link

Description : Back View of Conducted Emission Test Setup



## 5. Occupied Bandwidth

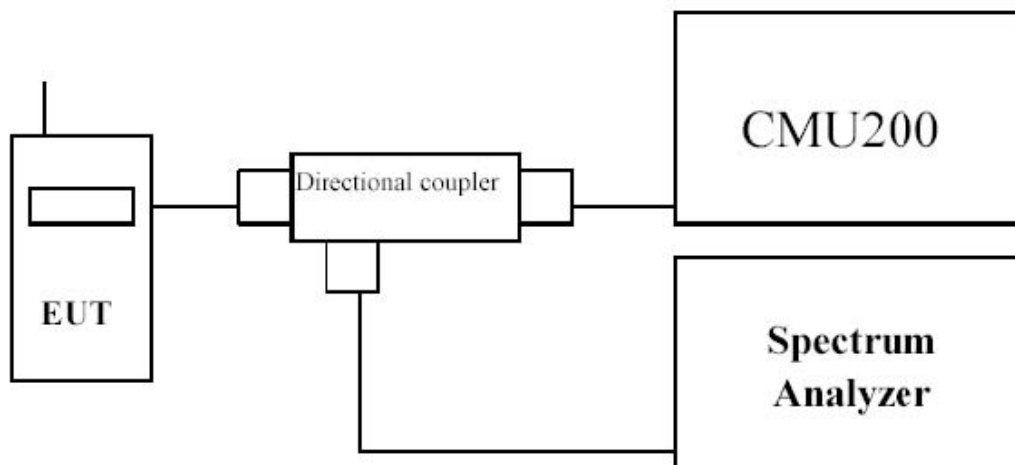
### 5.1. Test Equipment

The following test equipments are used during the RF power output tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R & S	R3182 / 100803470	May, 2007
Universal Radio Communication Tester	R & S	CMU200 / 104846	May, 2007
Directional coupler	Agilent	87300C/3239A01864	N/A
Directional coupler	Agilent	778D-012/50550	N/A

Note: All equipments upon which need to be calibrated are with calibration period of 1 year.

### 5.2. Test Setup



**5.3. Limit**

N/A

**5.4. 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.

**5.5. Uncertainty**

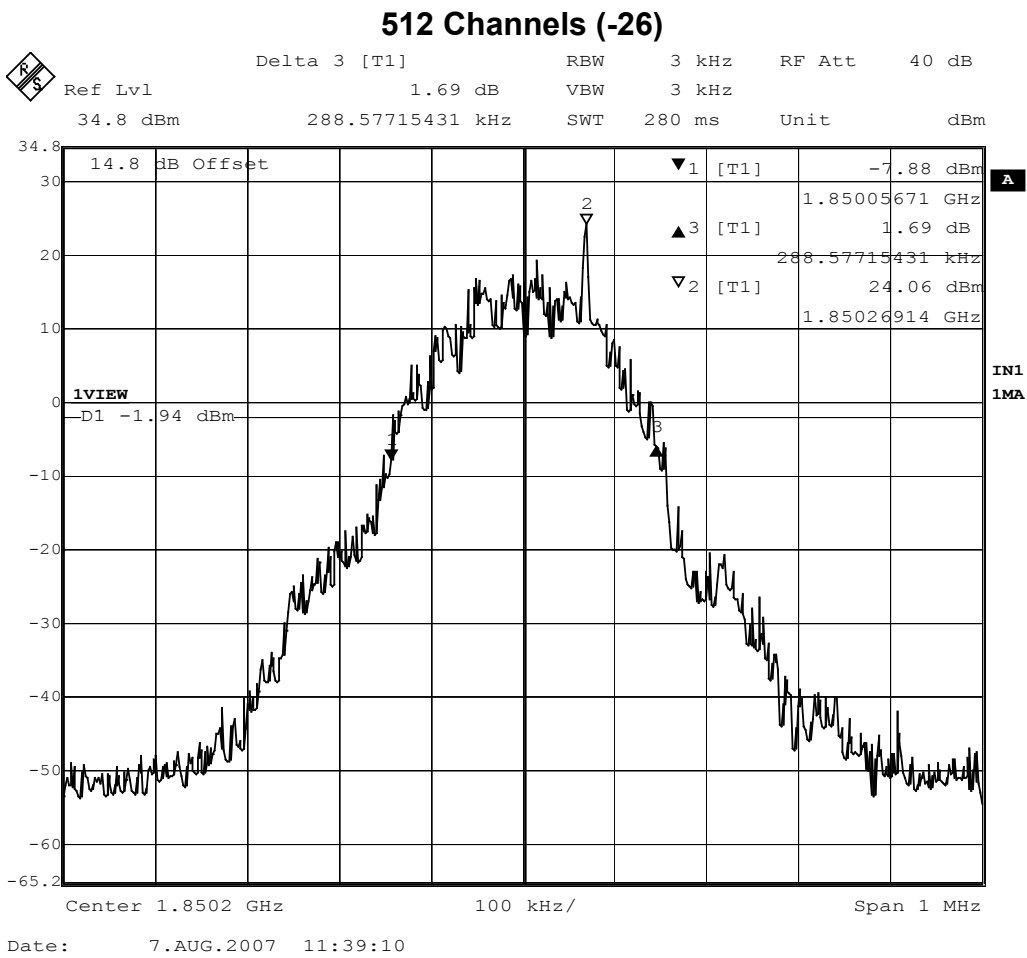
The measurement uncertainty is defined as  $\pm 10$  Hz

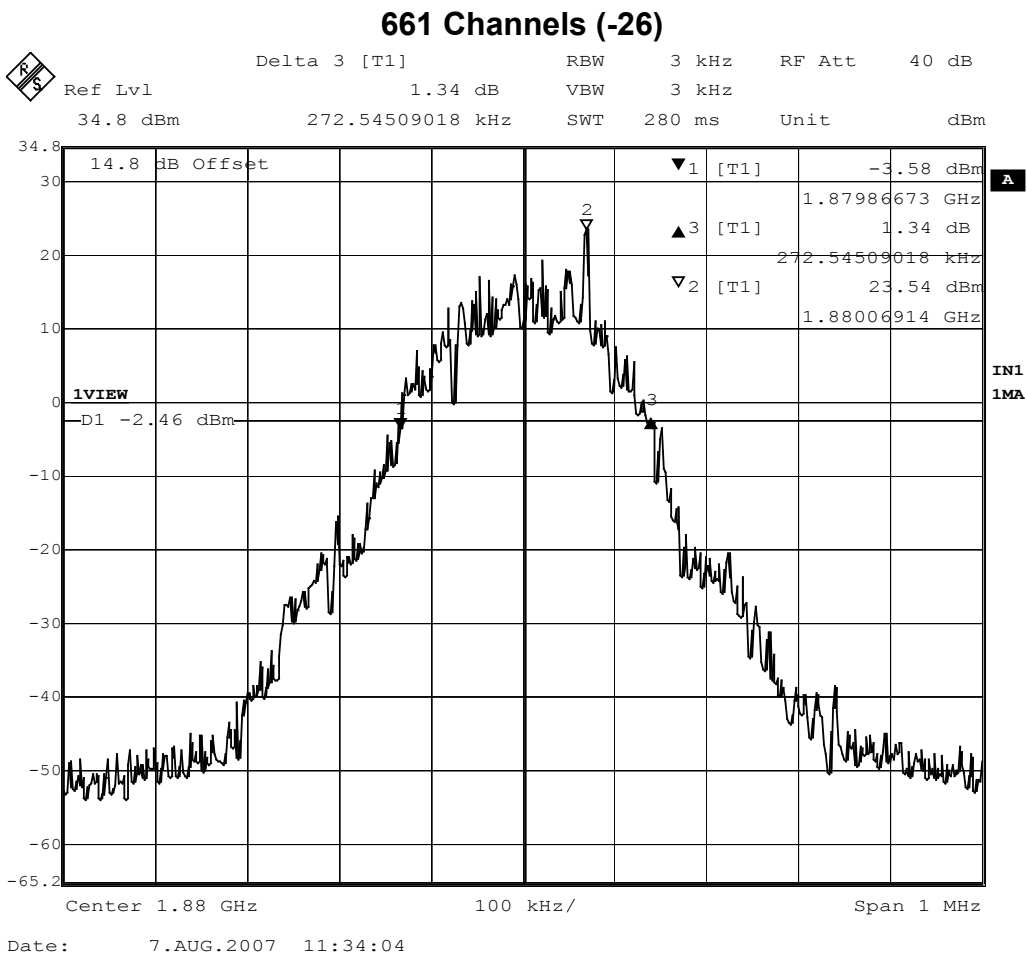
## 5.6. Test Result

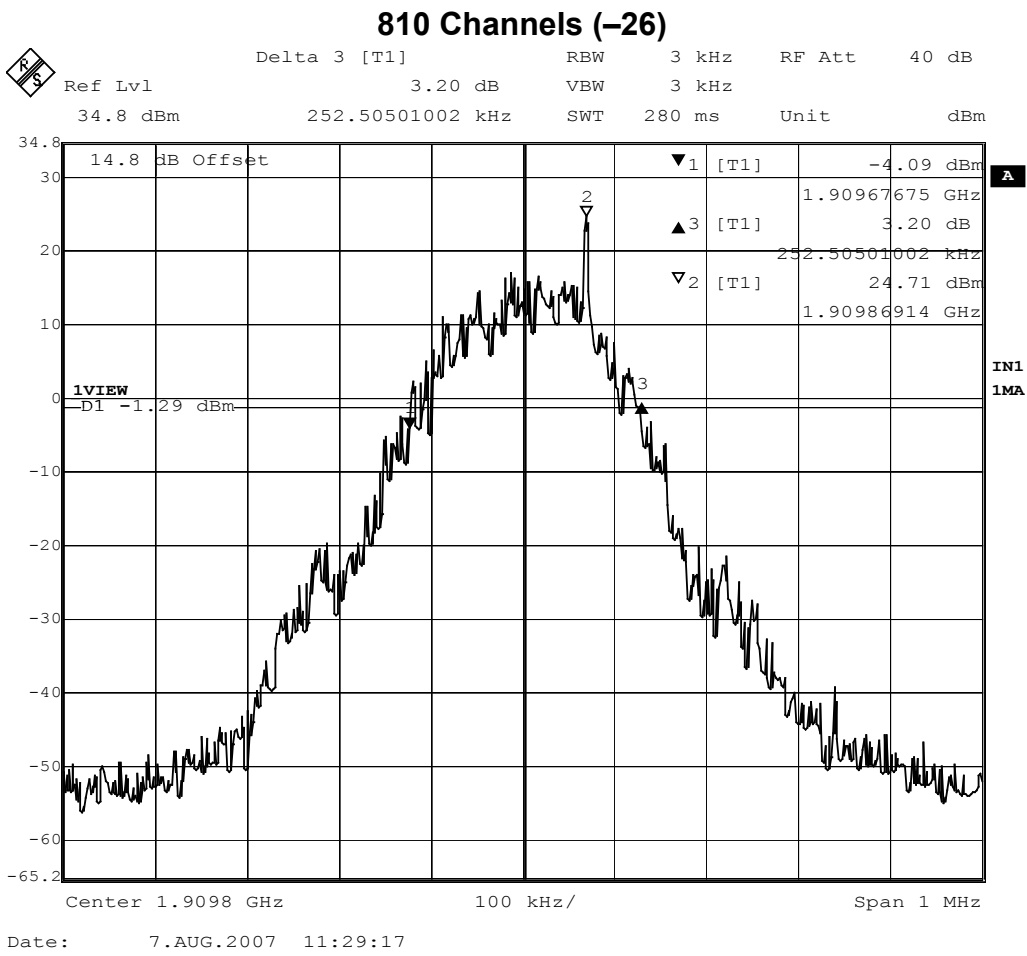
Product	GSM Gateway		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: GDM1900 Link (-26)		
Date of Test	2007/08/07	Test Site	CB4

Channel No.	Frequency (MHz)	Measurement of -26dB Bandwidth (kHz)
521	1850.2	288.577
661	1880.0	272.545
810	1909.8	252.505





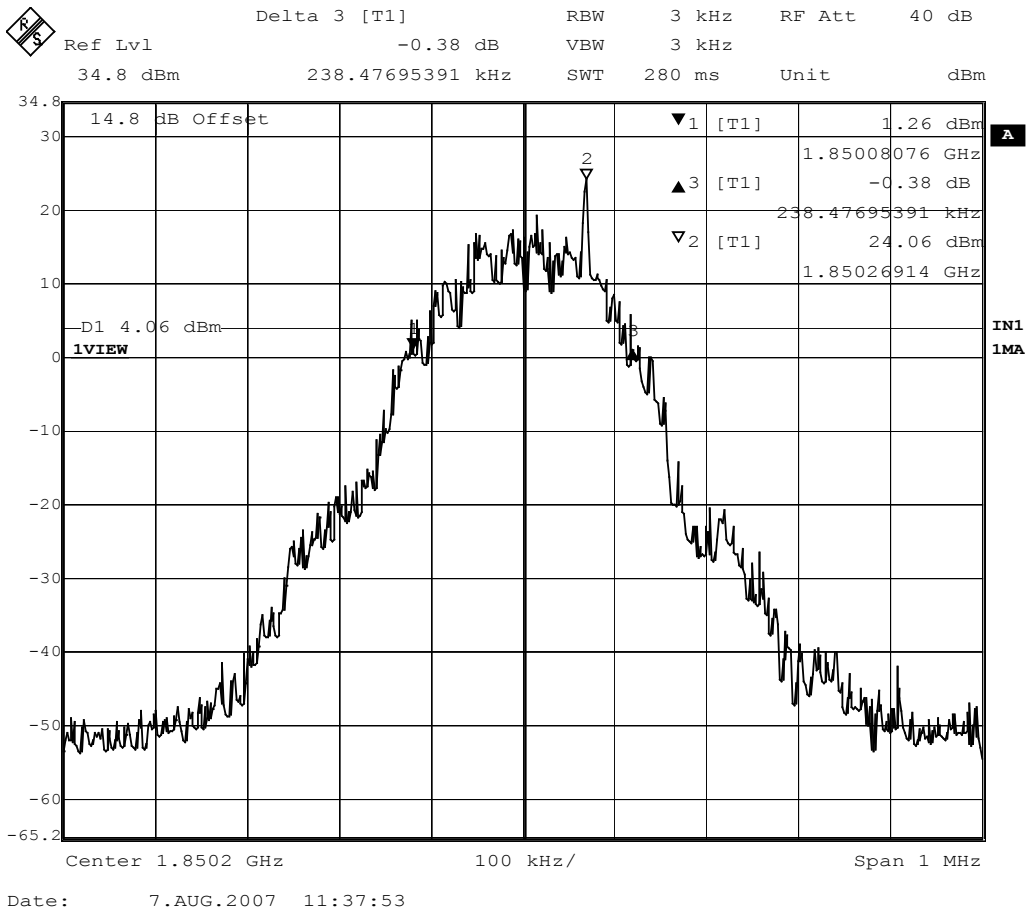




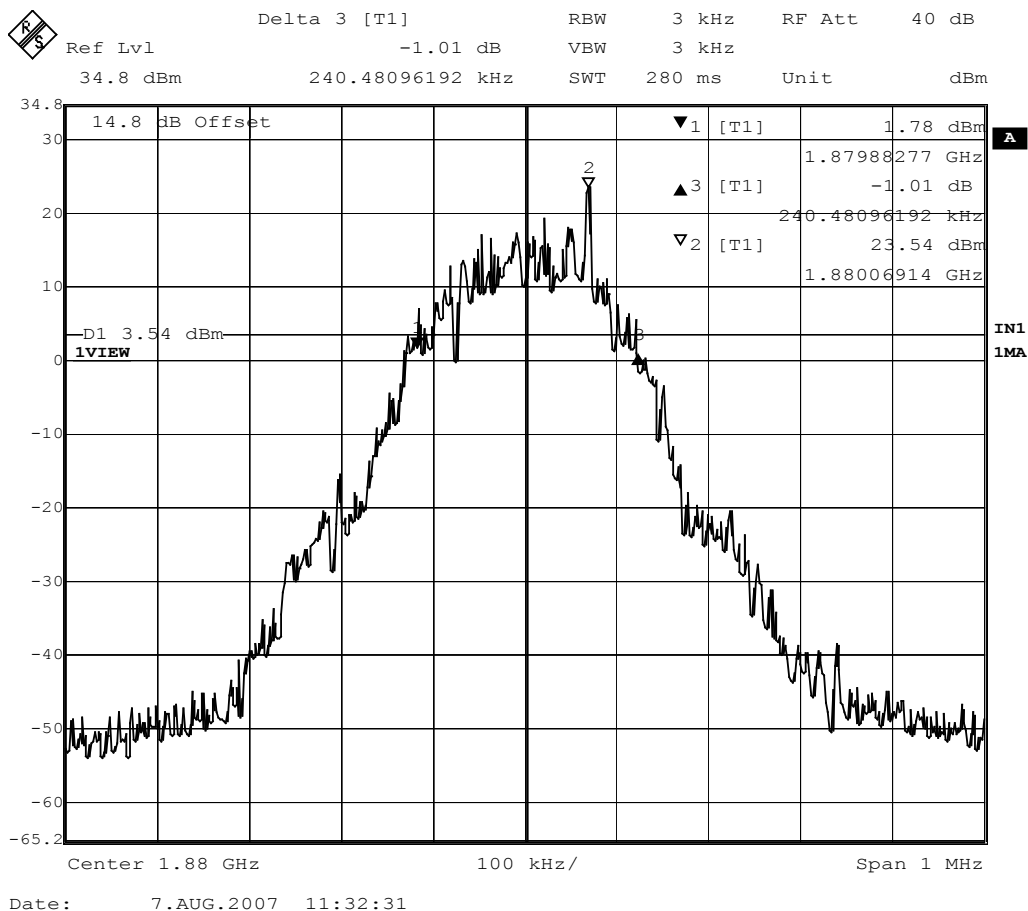
Product	GSM Gateway		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: GDM1900 Link (-20)		
Date of Test	2007/08/07	Test Site	CB4

Channel No.	Frequency (MHz)	Measurement of -20dB Bandwidth (kHz)
521	1850.2	238.476
661	1880	240.480
810	1909.8	204.408

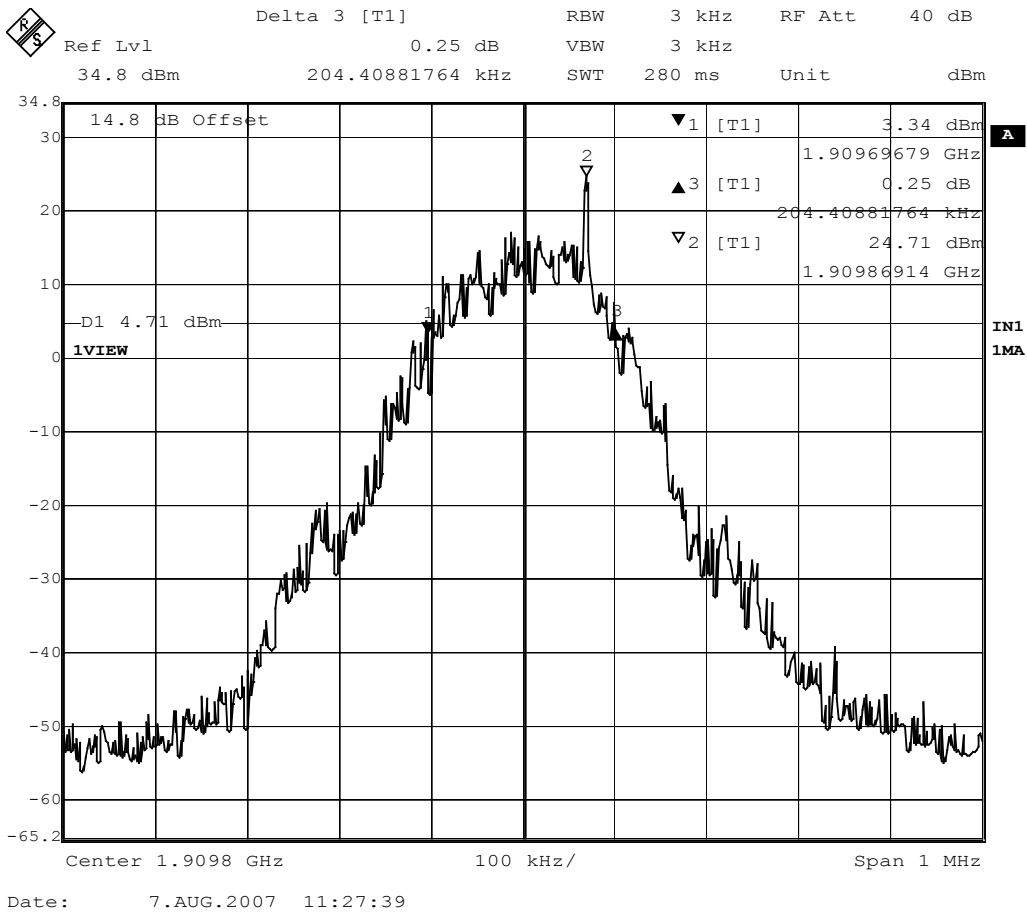
512 Channels (-20)



## 661 Channels (-20)



810 Channels (-20)



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

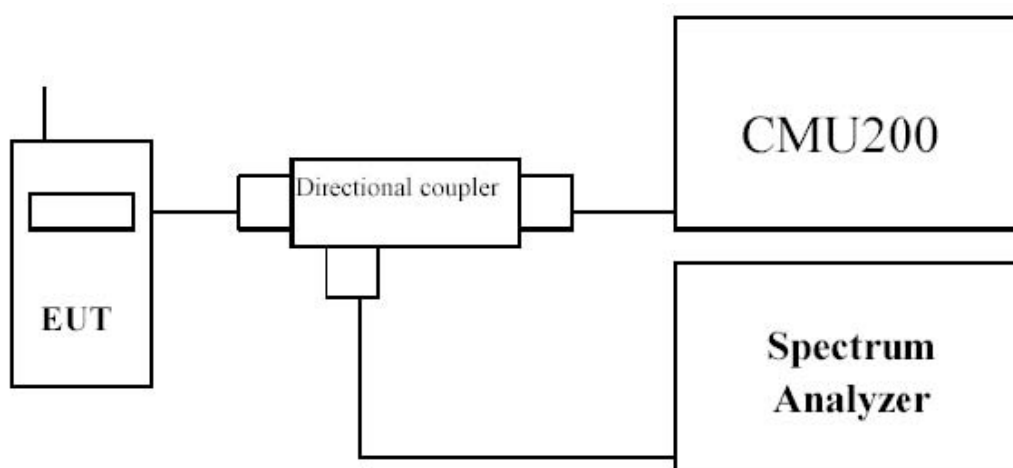
### 6.1. Test Equipment

The following test equipments are used during the RF power output tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R & S	FSP/ 100005	Oct., 2006
Universal Radio Communication Tester	R & S	CMU200 / 104846	May, 2007
Directional coupler	Agilent	87300C/3239A01864	N/A
Directional coupler	Agilent	778D-012/50550	N/A

Note: All equipments upon which need to be calibrated are with calibration period of 1 year.

### 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  $43 + 10\log(P)$  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.

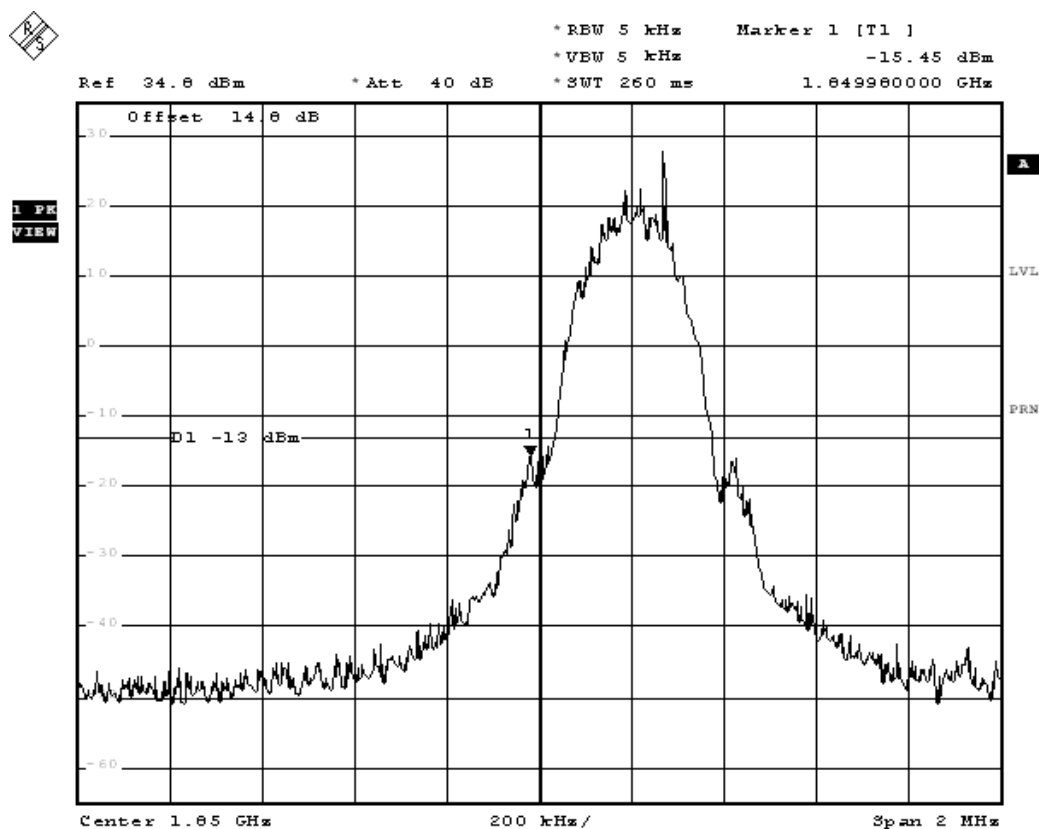
### **6.5. Uncertainty**

The measurement uncertainty is defined as  $\pm 1.2$  dB.

## 6.6. Test Result

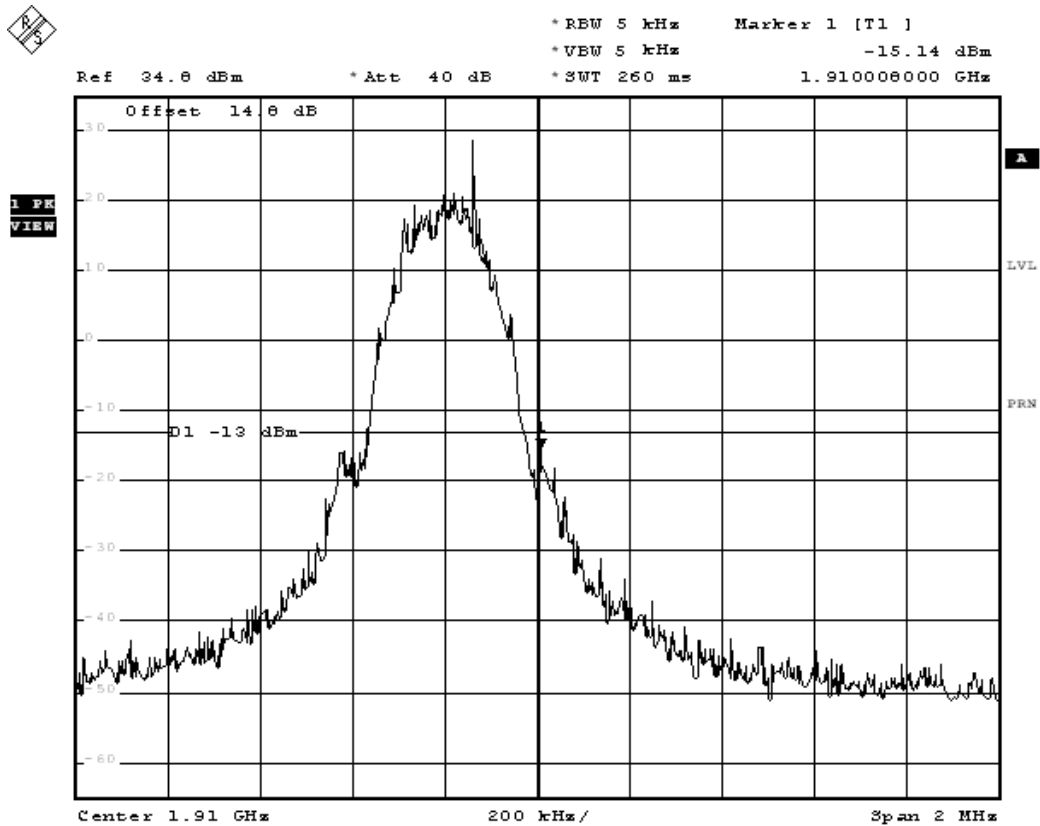
Product	GSM Gateway		
Test Item	Spurious Emission At Antenna Terminals (+/- 1MHz)		
Test Mode	Mode 1: GDM1900 Link		
Date of Test	2007/08/05	Test Site	CB4

### 512 Channels



Date: 25.APR.2008 10:35:55

## 810 Channels



Date: 25.APR.2006 10:34:03

## 7. Spurious Emission

### 7.1. Test Equipment

The following test equipments are used during the radiated emission test:

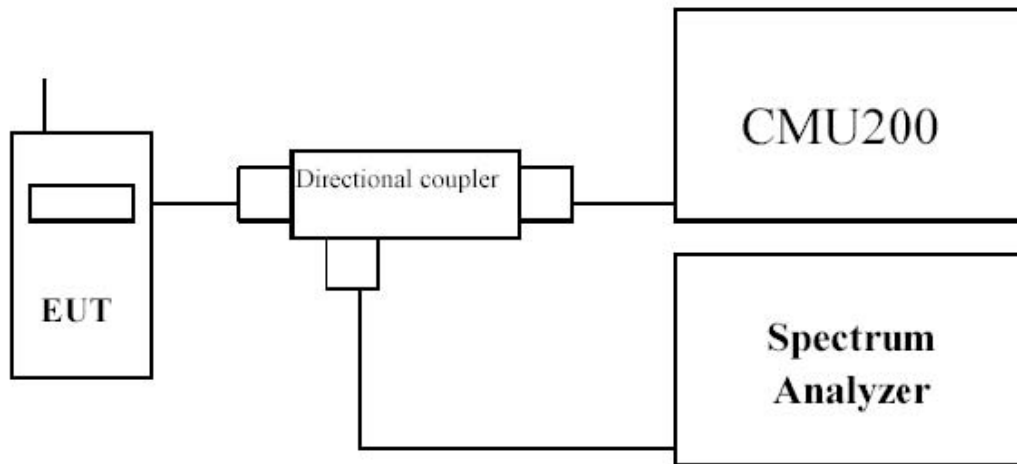
Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ OATS 3	Test Receiver	R & S	ESCS 30 / 100122	Feb., 2007
	Universal Radio Communication Tester	R & S	CMU200 / 104846	May, 2007
	Spectrum Analyzer	R & S	R3162 / 120300652	Feb., 2007
	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2007
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
	Horn Antenna	ETS	3115 / 0005-6160	Jul., 2007
	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	Jul., 2007
	Horn Antenna	SCHWARZBECK	BBHA9120D/ BBHA9120D639	Jul., 2007
	Signal Generator	Anritsu	MG3694A/041902	Nov. 2007

Note:

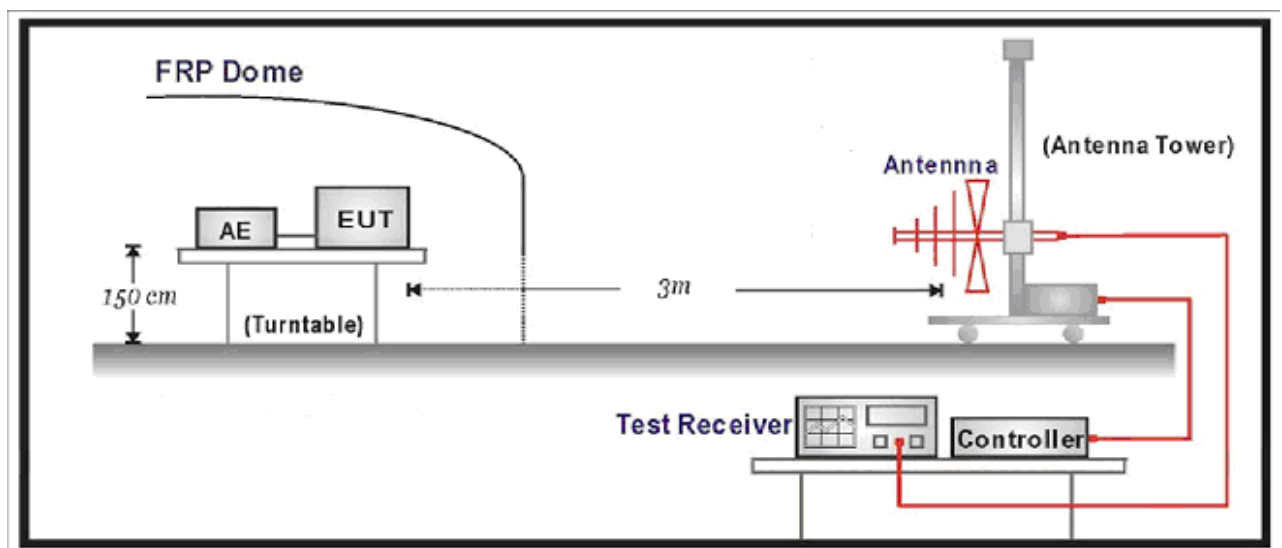
1. All equipments that need to be calibrated are with calibration period of 1 year.
2. "N/A" Ca1.Date is used to Pre-test, not final test.
3. EIRP = Substitution Level + Substitution Antenna Gain - Cable Loss °

## 7.2. Test Setup

Conducted Spurious Measurement:



Radiated Spurious Measurement:



### 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  $43 + 10\log(P)$  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<sup>th</sup> 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 10<sup>th</sup> harmonic.

### **7.5. Uncertainty**

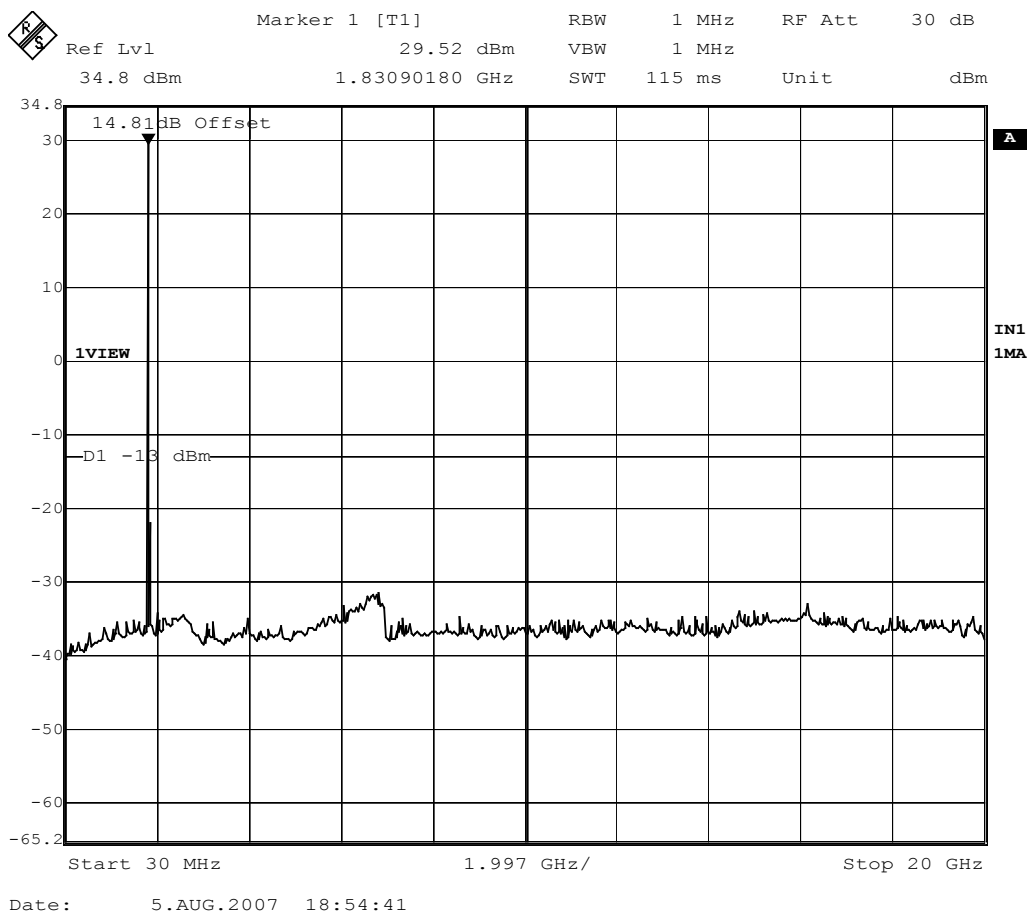
The measurement uncertainty is defined as for Conducted Power Measurement  $\pm 1.2$  dB,  
for Radiated Power Measurement  $\pm 3.2$  dB

## 7.6. Test Result

Product	GSM Gateway		
Test Item	Spurious Emission		
Test Mode	Mode 1: GDM1900 Link		
Date of Test	2007/08/05	Test Site	Site 3

## Conducted Test

### 512 Channels





Marker 1 [T1] RBW 1 MHz RF Att 30 dB  
 Ref Lvl 27.97 dBm VBW 1 MHz  
 34.8 dBm 1.87092184 GHz SWT 115 ms Unit dBm

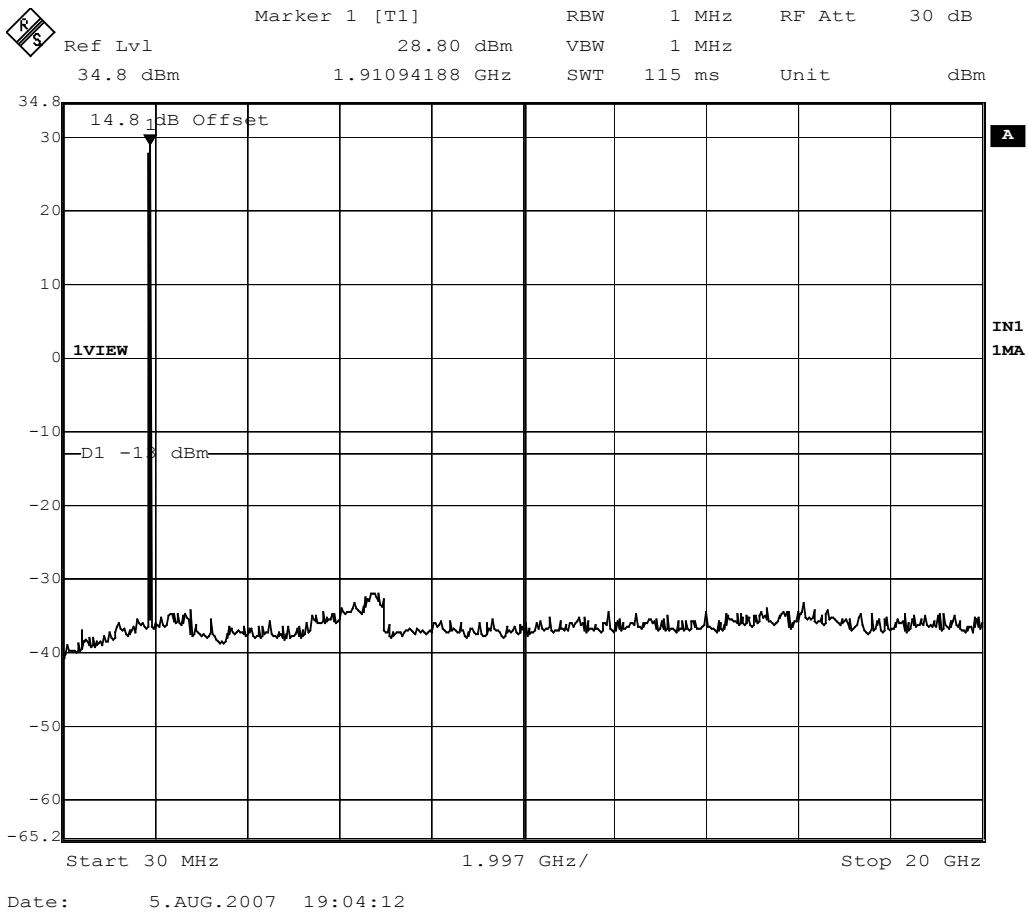
34.8  
 30  
 20  
 10  
 0  
 -10  
 -20  
 -30  
 -40  
 -50  
 -60  
 -65.2

14.8 dB Offset  
 1VIEW  
 D1 -13 dBm

Start 30 MHz 1.997 GHz/ Stop 20 GHz

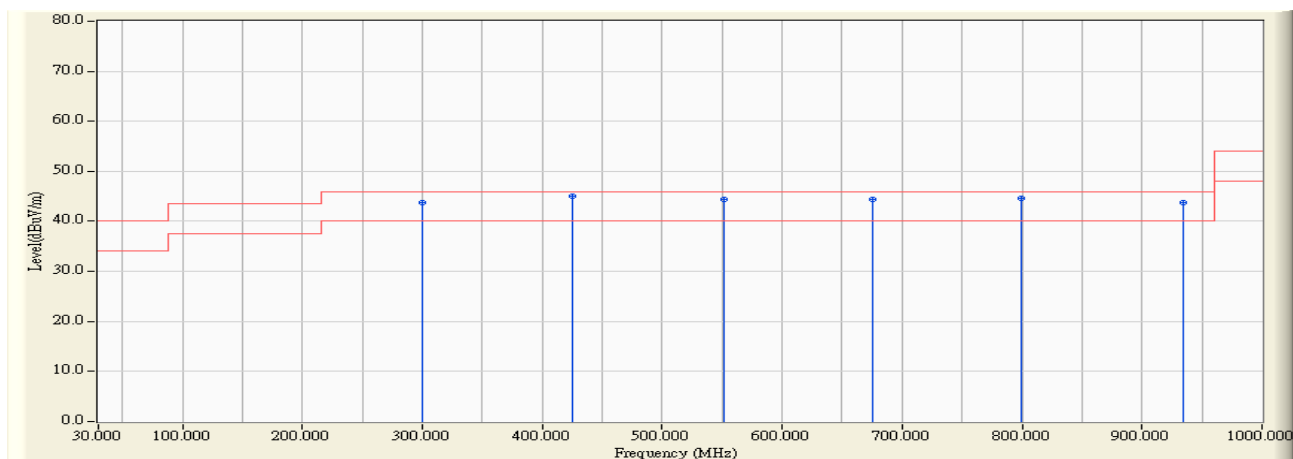
Date: 5.AUG.2007 19:02:43

810 Channels



## Radiated Test

Site : Site 3	Time : 2007/09/10 - 14:53
Limit : FCC_CLASS_B_03M_QP	Margin : 6
EUT : GSM Gateway	Probe : FCC_RF_30-1G(200605) - HORIZONTAL
Power : AC 120V/60Hz	Note : 1900MHz(512)-LINK

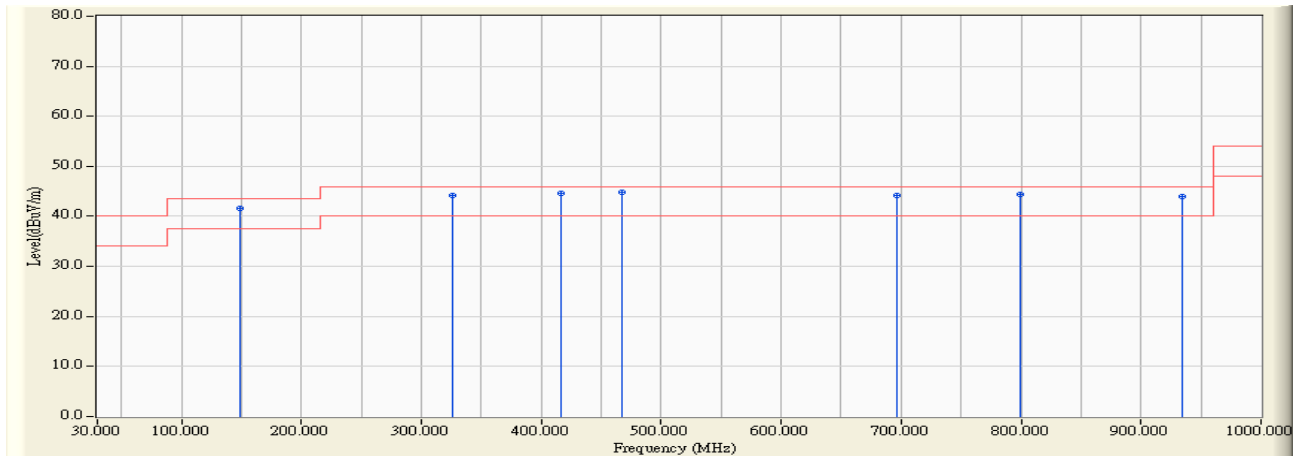


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		300.200	-3.511	47.368	43.857	-2.143	46.000	PEAK
2	*	424.609	-1.436	46.533	45.097	-0.903	46.000	PEAK
3		550.962	2.748	41.563	44.310	-1.690	46.000	PEAK
4		675.371	1.143	43.160	44.304	-1.696	46.000	PEAK
5		799.780	3.500	41.190	44.691	-1.309	46.000	PEAK
6		933.908	3.903	39.888	43.791	-2.209	46.000	PEAK

### Note:

1. All Reading Levels are Quasi-Peak value.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : Site 3	Time : 2007/09/10 - 14:51
Limit : FCC_CLASS_B_03M_QP	Margin : 6
EUT : GSM Gateway	Probe : FCC_RF_30-1G(200605) - VERTICAL
Power : AC 120V/60Hz	Note : 1900MHz(512)-LINK

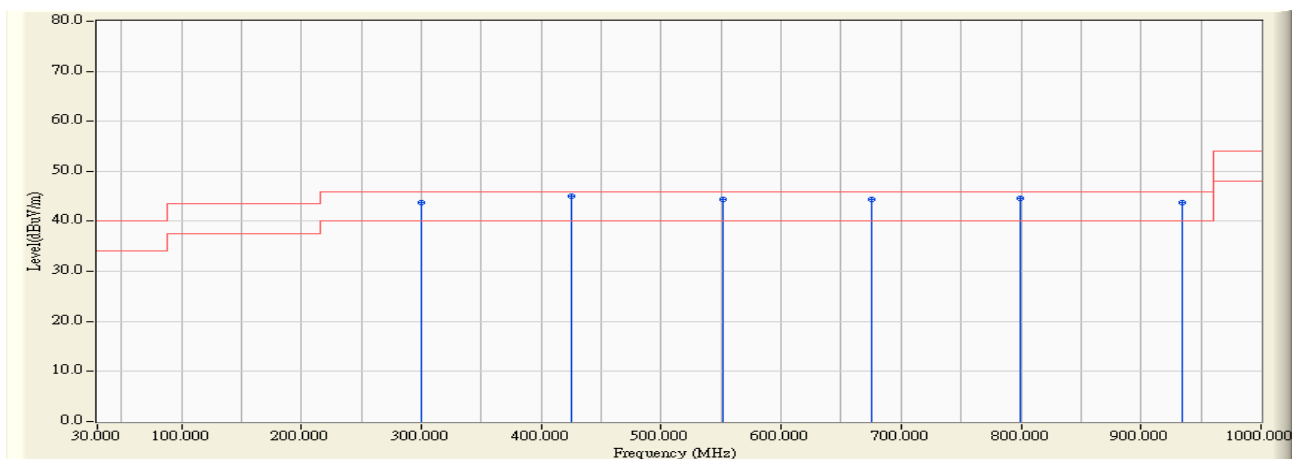


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		148.577	-4.062	45.670	41.608	-1.892	43.500	PEAK
2		325.471	-4.335	48.449	44.113	-1.887	46.000	PEAK
3		416.834	-0.979	45.548	44.569	-1.431	46.000	PEAK
4	*	467.375	-5.437	50.185	44.748	-1.252	46.000	PEAK
5		696.753	0.500	43.602	44.102	-1.898	46.000	PEAK
6		799.780	4.910	39.441	44.352	-1.648	46.000	PEAK
7		933.908	7.251	36.697	43.948	-2.052	46.000	PEAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : Site 3	Time : 2007/09/10 - 14:55
Limit : FCC_CLASS_B_03M_QP	Margin : 6
EUT : GSM Gateway	Probe : FCC_RF_30-1G(200605) - HORIZONTAL
Power : AC 120V/60Hz	Note : 1900(661)-LINK

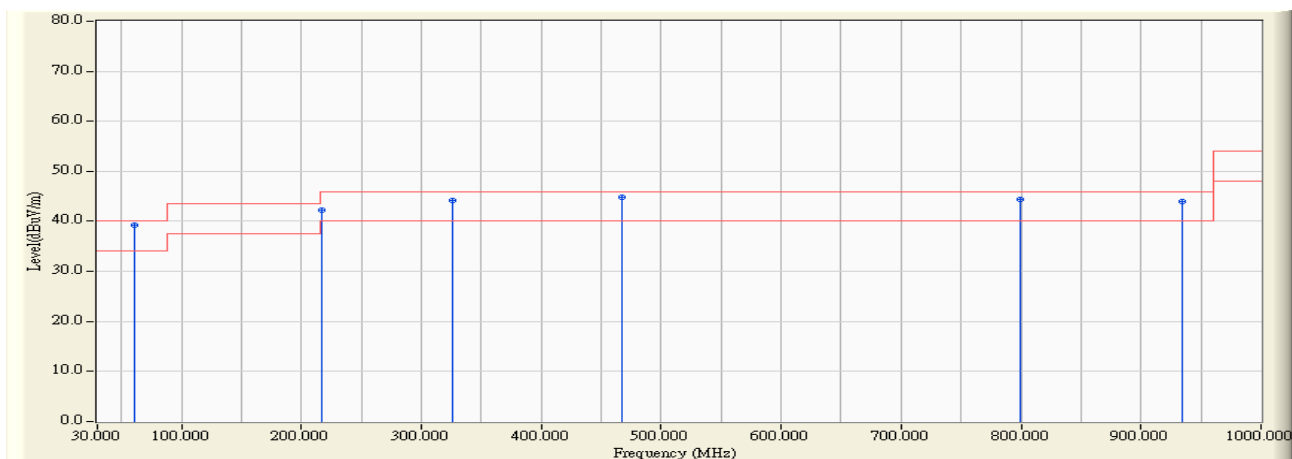


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		300.200	-3.511	47.368	43.857	-2.143	46.000	PEAK
2	*	424.609	-1.436	46.533	45.097	-0.903	46.000	PEAK
3		550.962	2.748	41.563	44.310	-1.690	46.000	PEAK
4		675.371	1.143	43.160	44.304	-1.696	46.000	PEAK
5		799.780	3.500	41.190	44.691	-1.309	46.000	PEAK
6		933.908	3.903	39.888	43.791	-2.209	46.000	PEAK

## Note:

1. All Reading Levels are Quasi-Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : Site 3	Time : 2007/09/10 - 14:54
Limit : FCC_CLASS_B_03M_QP	Margin : 6
EUT : GSM Gateway	Probe : FCC_RF_30-1G(200605) - VERTICAL
Power : AC 120V/60Hz	Note : 1900(661)-LINK

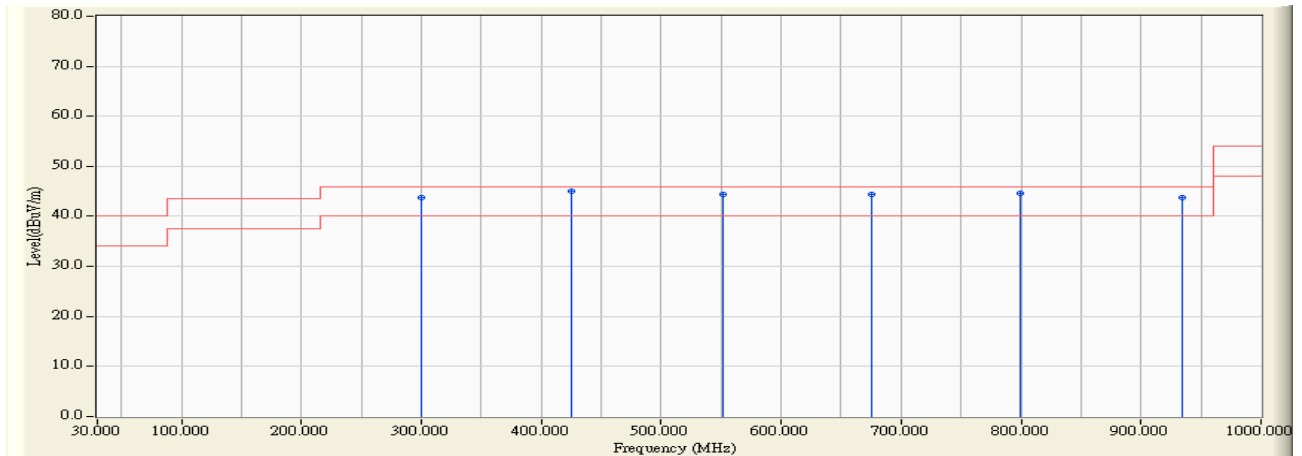


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	61.102	-7.024	46.193	39.169	-0.831	40.000	PEAK
2		216.613	-6.152	48.477	42.325	-3.675	46.000	PEAK
3		325.471	-4.335	48.449	44.113	-1.887	46.000	PEAK
4		467.375	-5.437	50.185	44.748	-1.252	46.000	PEAK
5		799.780	4.910	39.441	44.352	-1.648	46.000	PEAK
6		933.908	7.251	36.697	43.948	-2.052	46.000	PEAK

## Note:

1. All Reading Levels are Quasi-Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : Site 3	Time : 2007/09/10 - 14:58
Limit : FCC_CLASS_B_03M_QP	Margin : 6
EUT : GSM Gateway	Probe : FCC_RF_30-1G(200605) - HORIZONTAL
Power : AC 120V/60Hz	Note : 1900(810)-LINK

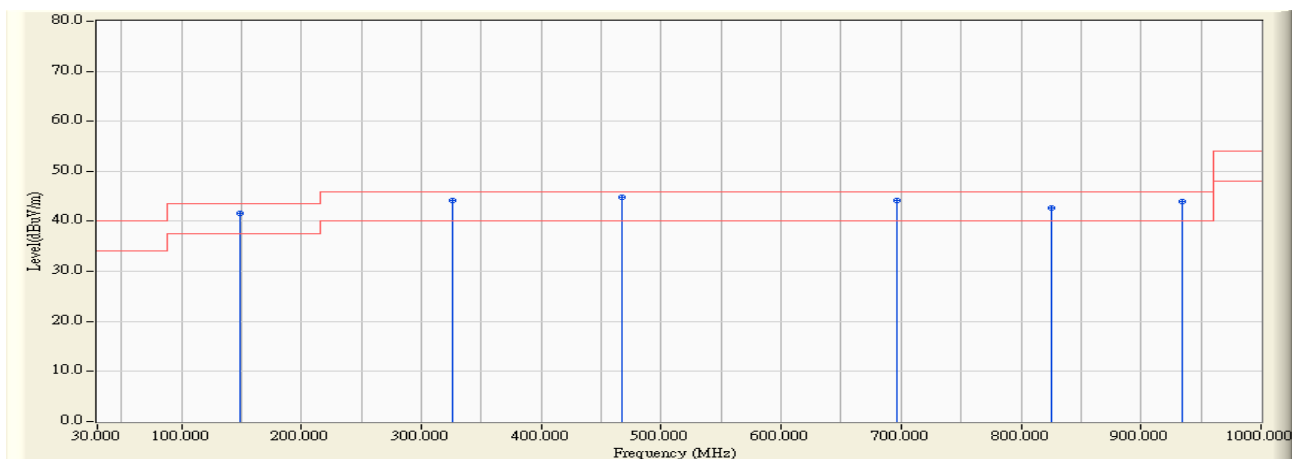


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		300.200	-3.511	47.368	43.857	-2.143	46.000	PEAK
2	*	424.609	-1.436	46.533	45.097	-0.903	46.000	PEAK
3		550.962	2.748	41.563	44.310	-1.690	46.000	PEAK
4		675.371	1.143	43.160	44.304	-1.696	46.000	PEAK
5		799.780	3.500	41.190	44.691	-1.309	46.000	PEAK
6		933.908	3.903	39.888	43.791	-2.209	46.000	PEAK

## Note:

1. All Reading Levels are Quasi-Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : Site 3	Time : 2007/09/10 - 14:57
Limit : FCC_CLASS_B_03M_QP	Margin : 6
EUT : GSM Gateway	Probe : FCC_RF_30-1G(200605) - VERTICAL
Power : AC 120V/60Hz	Note : 1900(810)-LINK



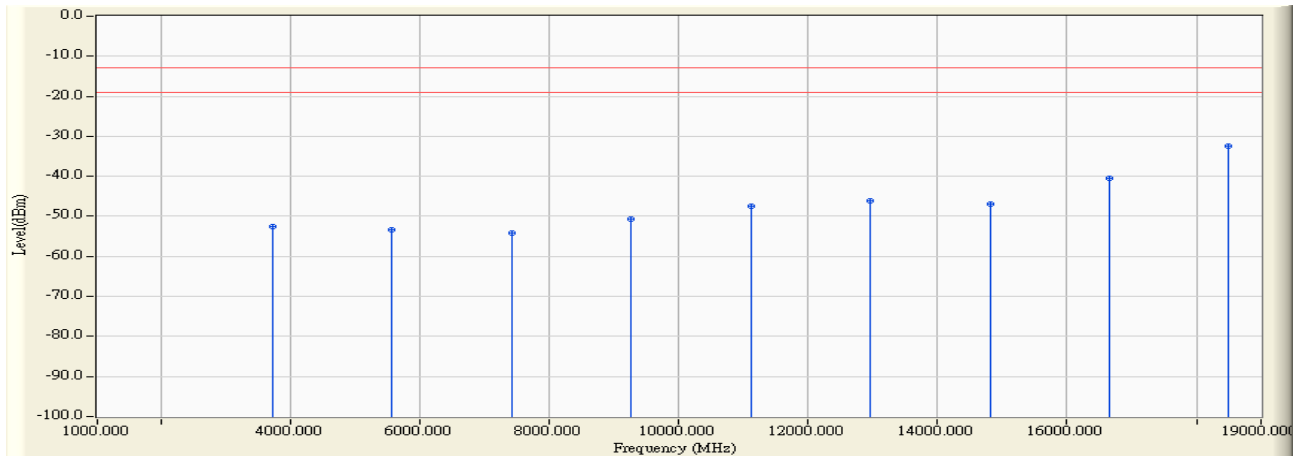
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		148.577	-4.062	45.670	41.608	-1.892	43.500	PEAK
2		325.471	-4.335	48.449	44.113	-1.887	46.000	PEAK
3	*	467.375	-5.437	50.185	44.748	-1.252	46.000	PEAK
4		696.753	0.500	43.602	44.102	-1.898	46.000	PEAK
5		825.050	5.259	37.450	42.709	-3.291	46.000	PEAK
6		933.908	7.251	36.697	43.948	-2.052	46.000	PEAK

## Note:

1. All Reading Levels are Quasi-Peak value.
2. " \* ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.



Site : Site 3	Time : 2007/07/31 - 22:04
Limit : FCC_PART24(LINK)1900_00M_PK	Margin : 6
EUT : GSM Gateway	Probe : FCC_Replace_1-18G(200701) - HORIZONTAL
Power : AC 120V/60Hz	Note : 1900MHz(512) LINK

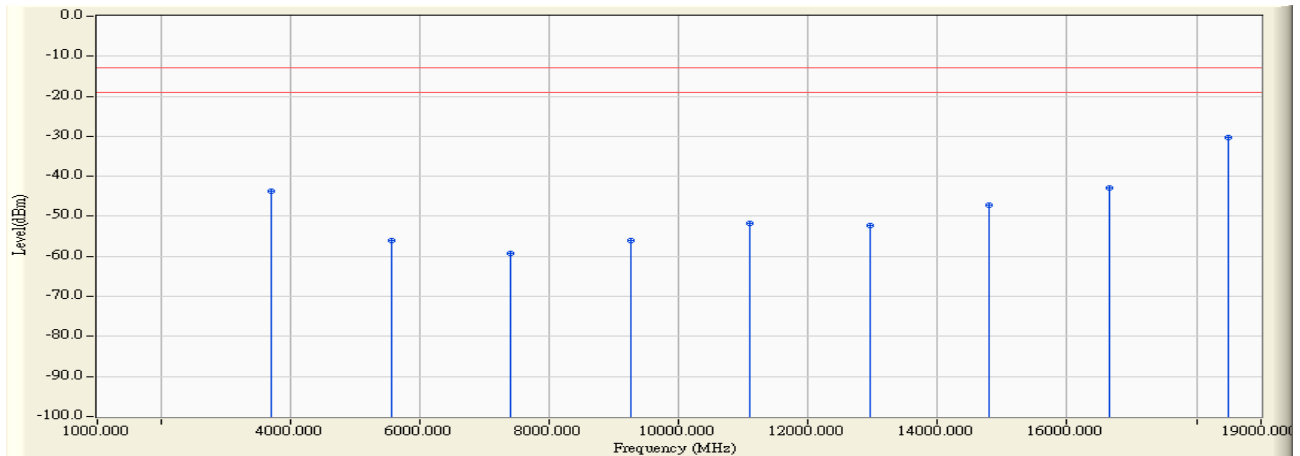


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		3710.326	13.008	-65.530	-52.521	-39.521	-13.000	PEAK
2		5550.459	19.376	-72.610	-53.234	-40.234	-13.000	PEAK
3		7409.630	20.570	-74.740	-54.170	-41.170	-13.000	PEAK
4		9259.780	24.505	-75.090	-50.585	-37.585	-13.000	PEAK
5		11103.920	27.026	-74.450	-47.424	-34.424	-13.000	PEAK
6		12960.080	29.000	-75.080	-46.080	-33.080	-13.000	PEAK
7		14810.240	29.785	-76.580	-46.795	-33.795	-13.000	PEAK
8		16666.400	35.381	-75.760	-40.380	-27.380	-13.000	PEAK
9	*	18504.530	44.510	-76.970	-32.460	-19.460	-13.000	PEAK

## Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : Site 3	Time : 2007/07/31 - 22:05
Limit : FCC_PART24(LINK)1900_00M_PK	Margin : 6
EUT : GSM Gateway	Probe : FCC_Replace_1-18G(200701) - VERTICAL
Power : AC 120V/60Hz	Note : 1900MHz(512) LINK

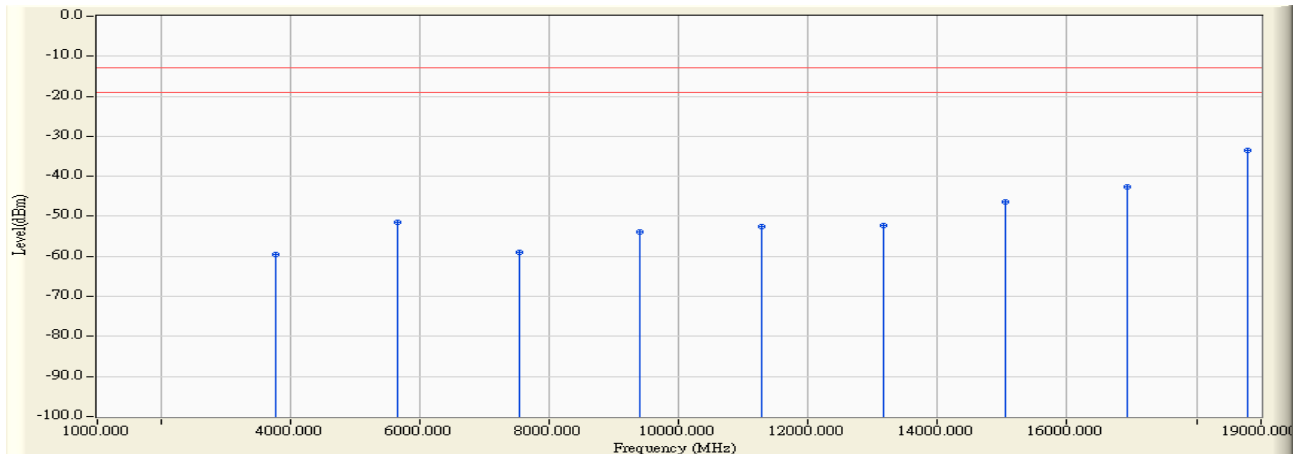


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		3700.258	13.527	-57.310	-43.783	-30.783	-13.000	PEAK
2		5550.780	16.808	-72.810	-56.002	-43.002	-13.000	PEAK
3		7400.890	21.490	-80.730	-59.240	-46.240	-13.000	PEAK
4		9251.090	23.914	-80.020	-56.106	-43.106	-13.000	PEAK
5		11100.910	27.363	-79.120	-51.757	-38.757	-13.000	PEAK
6		12951.490	27.779	-80.110	-52.332	-39.332	-13.000	PEAK
7		14802.130	31.453	-78.640	-47.187	-34.187	-13.000	PEAK
8		16651.760	35.239	-78.070	-42.831	-29.831	-13.000	PEAK
9	*	18504.340	46.740	-77.120	-30.380	-17.380	-13.000	PEAK

## Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : Site 3	Time : 2007/07/31 - 22:06
Limit : FCC_PART24(LINK)1900_00M_PK	Margin : 6
EUT : GSM Gateway	Probe : FCC_Replace_1-18G(200701) - HORIZONTAL
Power : AC 120V/60Hz	Note : 1900MHz(661) LINK

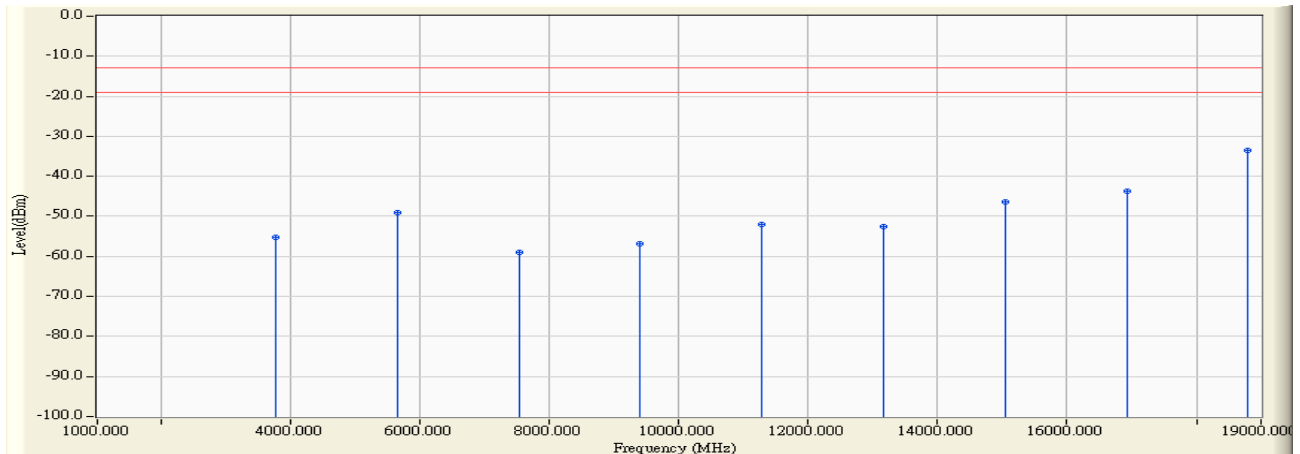


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		3760.050	13.248	-72.820	-59.572	-46.572	-13.000	PEAK
2		5640.075	19.083	-70.660	-51.577	-38.577	-13.000	PEAK
3		7520.650	20.672	-79.700	-59.027	-46.027	-13.000	PEAK
4		9399.710	24.844	-78.600	-53.756	-40.756	-13.000	PEAK
5		11280.460	26.661	-79.290	-52.629	-39.629	-13.000	PEAK
6		13160.150	28.249	-80.410	-52.161	-39.161	-13.000	PEAK
7		15040.030	31.496	-77.780	-46.283	-33.283	-13.000	PEAK
8		16920.030	35.340	-77.910	-42.570	-29.570	-13.000	PEAK
9	*	18799.960	44.510	-78.050	-33.540	-20.540	-13.000	PEAK

## Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : Site 3	Time : 2007/07/31 - 22:07
Limit : FCC_PART24(LINK)1900_00M_PK	Margin : 6
EUT : GSM Gateway	Probe : FCC_Replace_1-18G(200701) - VERTICAL
Power : AC 120V/60Hz	Note : 1900MHz(661) LINK

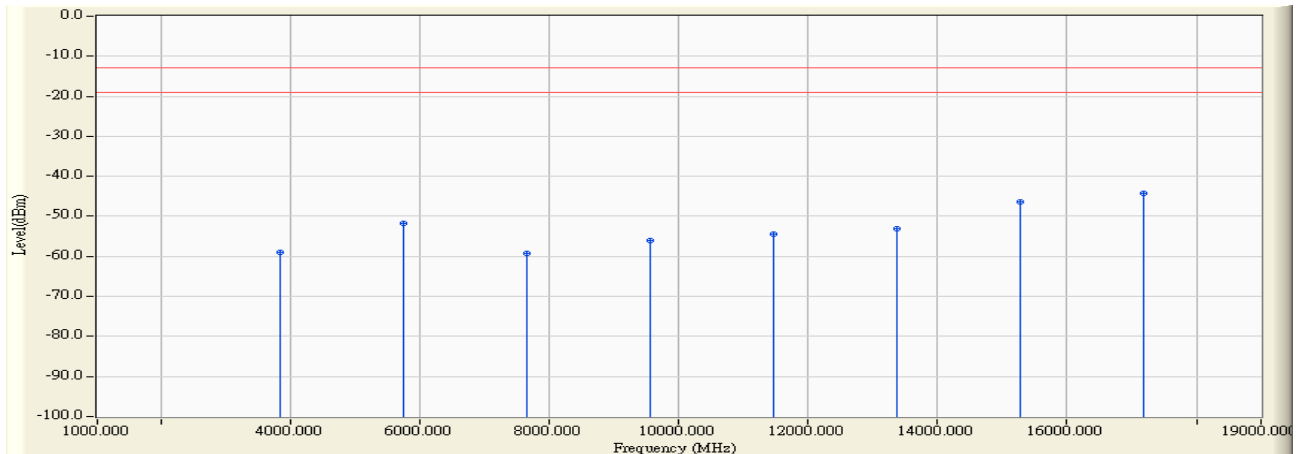


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		3760.450	13.790	-68.970	-55.180	-42.180	-13.000	PEAK
2		5640.458	17.049	-66.040	-48.991	-35.991	-13.000	PEAK
3		7520.030	21.641	-80.590	-58.949	-45.949	-13.000	PEAK
4		9400.090	24.235	-81.150	-56.915	-43.915	-13.000	PEAK
5		11281.030	27.585	-79.500	-51.915	-38.915	-13.000	PEAK
6		13159.960	27.102	-79.680	-52.578	-39.578	-13.000	PEAK
7		15040.210	33.221	-79.710	-46.489	-33.489	-13.000	PEAK
8		16920.150	34.731	-78.490	-43.759	-30.759	-13.000	PEAK
9	*	18799.840	46.740	-80.220	-33.480	-20.480	-13.000	PEAK

## Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : Site 3	Time : 2007/07/31 - 22:08
Limit : FCC_PART24(LINK)1900_00M_PK	Margin : 6
EUT : GSM Gateway	Probe : FCC_Replace_1-18G(200701) - HORIZONTAL
Power : AC 120V/60Hz	Note : 1900MHz(810) LINK

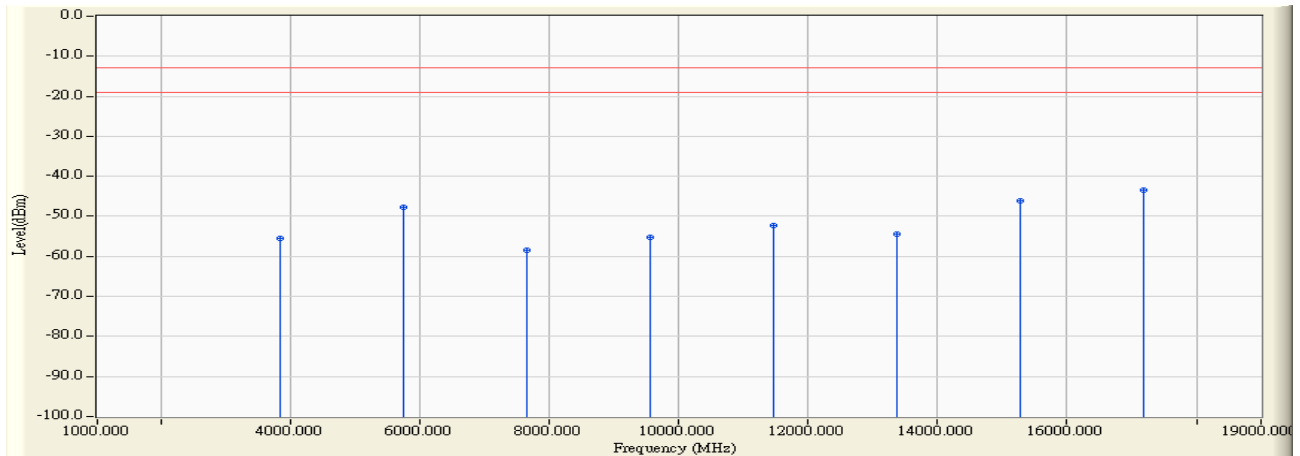


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		3819.730	13.539	-72.510	-58.972	-45.972	-13.000	PEAK
2		5729.550	18.797	-70.670	-51.873	-38.873	-13.000	PEAK
3		7638.980	20.961	-80.260	-59.299	-46.299	-13.000	PEAK
4		9549.530	25.196	-81.190	-55.993	-42.993	-13.000	PEAK
5		11458.760	26.293	-80.850	-54.557	-41.557	-13.000	PEAK
6		13368.130	27.288	-80.310	-53.023	-40.023	-13.000	PEAK
7		15278.490	31.827	-78.080	-46.253	-33.253	-13.000	PEAK
8	*	17189.040	35.001	-79.180	-44.179	-31.179	-13.000	PEAK

## Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Site : Site 3	Time : 2007/07/31 - 22:08
Limit : FCC_PART24(LINK)1900_00M_PK	Margin : 6
EUT : GSM Gateway	Probe : FCC_Replace_1-18G(200701) - VERTICAL
Power : AC 120V/60Hz	Note : 1900MHz(810) LINK



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		3829.470	14.095	-69.630	-55.535	-42.535	-13.000	PEAK
2		5729.890	17.291	-65.060	-47.769	-34.769	-13.000	PEAK
3		7639.480	21.827	-80.300	-58.473	-45.473	-13.000	PEAK
4		9548.780	24.556	-79.730	-55.174	-42.174	-13.000	PEAK
5		11458.760	27.814	-80.090	-52.276	-39.276	-13.000	PEAK
6		13368.690	26.436	-80.860	-54.424	-41.424	-13.000	PEAK
7		15278.550	33.070	-79.100	-46.029	-33.029	-13.000	PEAK
8	*	17188.160	36.687	-80.180	-43.494	-30.494	-13.000	PEAK

## Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ \* ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

## 8. Frequency Stability Under Temperature & Voltage Variations

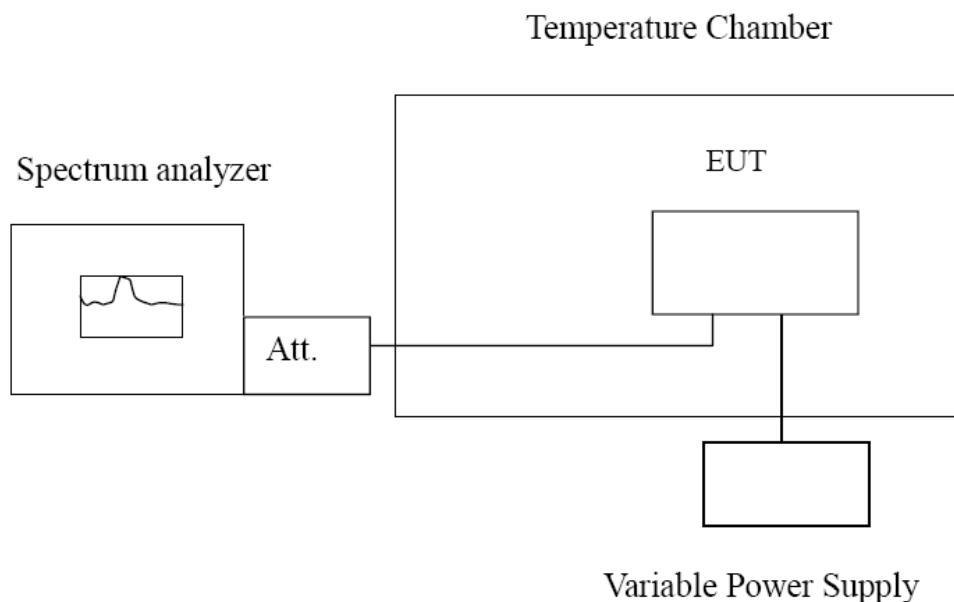
### 8.1. Test Equipment

The following test equipments are used during the RF power output tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R & S	FSP/ 100005	Oct., 2006
Universal Radio Communication Tester	R & S	CMU200 / 104846	May, 2007
Directional coupler	Agilent	87300C/3239A01864	N/A
Directional coupler	Agilent	778D-012/50550	N/A

Note: All equipments upon which need to be calibrated are with calibration period of 1 year.

### 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	$< \pm 2.5$ ppm
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## 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°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.

## 8.5. Uncertainty

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



## 8.6. Test Result

Product	GSM Gateway		
Test Item	Frequency Stability Under Temperature & Voltage Variations		
Test Mode	Mode 1: GDM1900 Link		
Date of Test	2007/08/07	Test Site	CB4

### FREQUENCY STABILITY

Voltage (VDC)	Frequency Error	Frequency Error(ppm)
10.2	-28	0.015
13.8	21	0.011

### AFC FREQ ERROR vs. TEMPERATURE

TEMPERATURE	Frequency Error(Hz)	Frequency Error (ppm)
-30	13	0.006
-20	17	0.009
-10	29	0.015
0	22	0.012
+10	39	0.021
+20	21	0.011
+30	20	0.011
+40	17	0.009
+50	31	0.016