



# FCC Test Report

for

## 47 CFR Part 22H, 24E

**Equipment** : Personal Tracking System

**Model No.** : (1)GT-2000NP personal tracking system,  
(2)GT-2000NP-1 personal tracking system,  
(3)GT-2000NP-D personal tracking system,  
(4)GT-2000NP-1D personal tracking system

**FCC ID** : TBQGT-2000NP

**Tx Frequency Range** : GSM850 : 824.2 ~ 848.8MHz  
PCS1900 : 1850.2 ~1909.8 MHz

**Max. ERP/EIRP Power** : GSM850 : 0.81W  
PCS1900 : 0.68W

**Emission Designator** : 300KGXW

**Applicant** : **PORTMAN ELECTRONICS (SHENZHEN) CO., LTD.**  
The Ninth Building, Tong-fuyu Industrial District,  
LongHua Town, Bao'an, Shenzhen, China

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- The data shown in this test report were carried out on Nov. 09, 2007 at **Sporton International Inc. LAB.**
- Report No.: FG790401, Report Version: Rev. 01.

Jones Tsai  
Manager

### **SPORTON International Inc.**

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.



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History of this test report

Report Issue Date: Nov. 30, 2007

Report No.	Description



## 1. General Information

### 1.1 Applicant

**PORTMAN ELECTRONICS (SHENZHEN) CO., LTD.**

The Ninth Building, Tong-fuyu Industrial District, LongHua Town, Bao'an, Shenzhen, China

### 1.2 Manufacturer

**PORTMAN ELECTRONICS (SHENZHEN) CO., LTD.**

The Ninth Building, Tong-fuyu Industrial District, LongHua Town, Bao'an, Shenzhen, China

### 1.3 Basic Description of Equipment under Test

<b>Equipment</b>		Personal Tracking System
<b>Model Name</b>		(1)GT-2000NP personal tracking system, (2)GT-2000NP-1 personal tracking system, (3)GT-2000NP-D personal tracking system, (4)GT-2000NP-1D personal tracking system
<b>FCC ID</b>		TBQGT-2000NP
<b>Adapter</b>	<b>Manufacutre</b>	Anfunet Technologies (Shenzhen) Co, Ltd.
	<b>Brand Name</b>	Anfunet
	<b>Model Name</b>	A01S050100C
	<b>Power Rating</b>	I/P: 100-240Vac, 50-60Hz, 100mA O/P: 5Vdc, 1.0A
	<b>AC Power Cord Type</b>	1.8 meter shielded cable without ferrite core
<b>Battery</b>	<b>Brand Name</b>	Nokia
	<b>Model Name</b>	EMPNO092BL1700
	<b>Rating</b>	3.7Vdc, 1700mAh
	<b>Type</b>	Li-ion

Remark: Above EUT's information was declared by manufacturer. Please refer to the specifications of manufacturer or User's Manual for more detailed features description.



#### 1.4 Feature of Equipment under Test

<b>DUT Type :</b>	Personal Tracking System
<b>Model Name :</b>	(1)GT-2000NP personal tracking system, (2)GT-2000NP-1 personal tracking system, (3)GT-2000NP-D personal tracking system, (4)GT-2000NP-1D personal tracking system
<b>FCC ID :</b>	TBQGT-2000NP
<b>Tx Frequency :</b>	GSM850 : 824 ~ 849 MHz PCS1900 : 1850 ~ 1910 MHz
<b>Rx Frequency :</b>	GSM850 : 869 ~ 894 MHz PCS1900 : 1930 ~ 1990 MHz
<b>Maximum ERP/EIRP :</b>	GSM850 : 0.81W (29.09dBm) PCS1900 : 0.68W (28.33dBm)
<b>Maximum Output Power to Antenna :</b>	GSM850 : 32.38 dBm PCS1900 : 29.72 dBm
<b>Antenna Type :</b>	PIFA Antenna
<b>Antenna Gain :</b>	GSM850 : -1.5 dBi PCS1900 : -1.8 dBi
<b>Type of Antenna Connector</b>	N/A
<b>Power Rating (DC/AC , Voltage and Current of RF element or PA) :</b>	DC 3.6V, 300mA
<b>HW Version :</b>	D3
<b>SW Version :</b>	2.10
<b>Digital Modulation Emission :</b>	GMSK
<b>Type of Emission :</b>	300KGXW
<b>DUT Stage :</b>	Identical Prototype

#### 1.5 Report Date

EUT Received : Sep. 04, 2007

Report Date : Nov. 30, 2007

## 2. Test Configuration of Equipment under Test

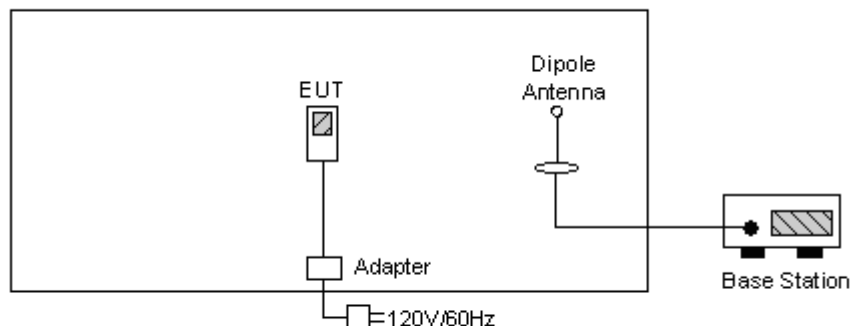
### 2.1 Test Manner

1. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range.
2. During all testings, EUT is in link mode with base station emulator at maximum power level.
3. Frequency range investigated: radiated emission 30 MHz to 9000 MHz for GSM850; 30MHz to 19000 MHz for PCS1900.

### 2.2 Test Mode

Application	GSM850	PCS1900
Radiated Emission	<input checked="" type="checkbox"/> Mode 1: GSM850 Link	<input checked="" type="checkbox"/> Mode 2: PCS1900 Link
Conducted Measurement	<input checked="" type="checkbox"/> Mode 1: GSM850 Link	<input checked="" type="checkbox"/> Mode 2: PCS1900 Link

### 2.3 Connection Diagram of Test System



### 2.4 Ancillary Equipment List

Item	Equipment	Trade Name	Model No.	FCC ID	Cable Cord	Power Cord
1.	Base Station	R&S	CMU200	N/A	N/A	Unshielded, 1.8m



### **3. General Information of Test Site**

Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park,  
Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.  
TEL : 886-3-327-3456  
FAX : 886-3-328-4978  
Test Site No : 03CH06-HY, TH02-HY

The chamber meets the characteristics of ANSI C63.4-2003. This site is on file with the FCC.

#### **3.1 Test Voltage**

AC 120V / 60Hz

#### **3.2 Test Compliance**

47 CFR Part 22H, 24E, Part 2

#### **3.3 Frequency Range**

- a. Radiation: from 30MHz to 9000MHz for GSM850.
- b. Radiation: from 30 MHz to 19000 MHz for PCS1900.

#### **3.4 Test Distance**

The test distance of radiated emission from antenna to EUT is 3 m.



## 4. Test Data and Test Result

### 4.1 List of Measurements and Examinations

FCC Rule	Description of Test	Result	Section
§2.1046	RF Output Power	Passed	4.2
§ 22.913 §24.232	ERP / EIRP	Passed	4.3
§2.1049, § 22.917, § 24.238(b)	Occupied Bandwidth & Band Edge Measurement	Passed	4.4
§2.1051	Conducted Emission	Passed	4.5
§2.1053	Field Strength of Spurious Radiation	Passed	4.6
§2.1055, § 22.355, §24.235	Frequency Stability vs. Temperature	Passed	4.7
§2.1055, §22.355, §24.235	Frequency Stability vs. Voltage	Passed	4.8



## 4.2 RF Output Power

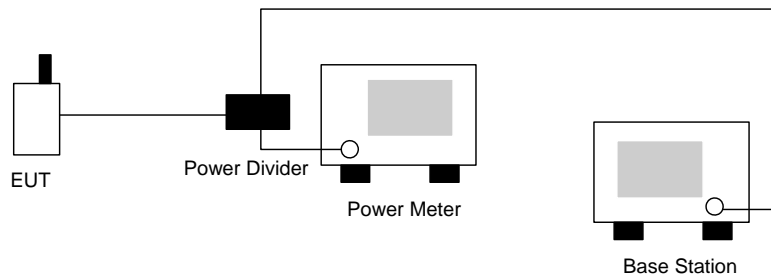
### 4.2.1 Measurement Instruments

As described in chapter 5 of this test report.

### 4.2.2 Test Procedure

- a. The transmitter output was connected to power meter and base station through power divider.
- b. Set EUT at PCL=5 for GSM850 and/or PCL=0 for PCS1900 maximum power through base station.
- c. Select lowest, middle, and highest channels for each band.

### 4.2.3 Test Setup Layout



### 4.2.4 Test Result

Bands	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watts)
GSM850	128	824.2 (Low)	31.99	1.581
	189	836.4 (Mid)	32.19	1.656
	251	848.8 (High)	32.38	1.730
PCS1900	512	1850.2 (Low)	29.60	0.912
	661	1880.0 (Mid)	29.62	0.916
	810	1909.8 (High)	29.72	0.938



### 4.3 ERP / EIRP Measurement

Equivalent isotropic radiated power measurements by substitution method according to ANSI/TIA/EIA-603-C.

#### 4.3.1 Measurement Instruments

As described in chapter 5 of this test report.

#### 4.3.2 Test Procedure

- a. The EUT was placed on a table with 1.0 meter height in an fully anechoic chamber.
- b. The EUT was set 1.2 meters from the receiving antenna which was mounted on the antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiated power.
- d. The height of the receiving antenna is also kept at 1.0M height.
- e. Taking the record of maximum ERP/EIRP.
- f. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
- g. The conducted power at the terminal of the dipole antenna is measured.
- h. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
- i.  $ERP/EIRP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$

$P_s$  (dBm) : Input power to substitution antenna.

$G_s$  (dBi or dBd) : Substitution antenna Gain.

$E_t = R_t + AF$

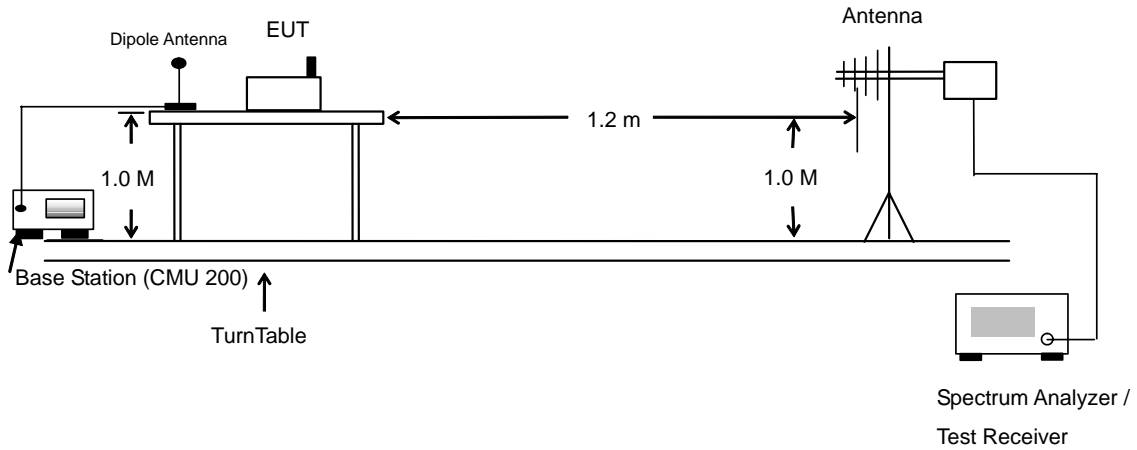
$E_s = R_s + AF$

$AF$  (dB/m) : Receive antenna factor

$R_t$  : The highest received signal in Spectrum Analyzer for EUT.

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

4.3.3 Test Setup Layout of ERP/EIRP





4.3.4 Test Result

<b>GSM850 Radiated Power ERP</b>						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.20	-29.85	-48.12	0.00	-1.08	17.19	0.05
836.40	-30.84	-48.28	0.00	-0.93	16.51	0.04
848.80	-31.39	-48.35	0.00	-0.76	16.20	0.04
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.20	-17.80	-47.97	0.00	-1.08	29.09	0.81
836.40	-18.85	-48.01	0.00	-0.93	28.23	0.67
848.80	-19.52	-48.05	0.00	-0.76	27.77	0.60

<b>PCS1900 Radiated Power EIRP</b>						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-32.29	-51.88	0.00	1.96	21.55	0.14
1880.00	-33.60	-52.99	0.00	2.00	21.39	0.14
1909.80	-34.46	-54.28	0.00	1.98	21.80	0.15
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-26.27	-52.13	0.00	1.96	27.82	0.61
1880.00	-27.48	-53.17	0.00	2.00	27.69	0.59
1909.80	-27.78	-54.13	0.00	1.98	28.33	0.68

## 4.4 Occupied Bandwidth and Band Edge Measurement

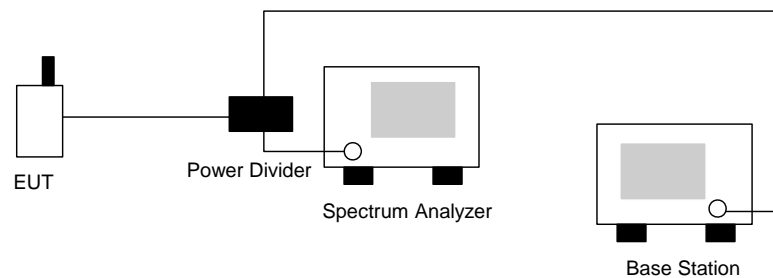
### 4.4.1 Measurement Instruments

As described in chapter 5 of this test report.

### 4.4.2 Test Procedure

- a. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
- b. The 99% occupied bandwidth of middle channel for the highest and lowest RF powers were measured.
- c. The bandedge of low and high channels for the highest RF powers within the transmitting frequency band were measured. Setting RBW as roughly  $BW/100$ .

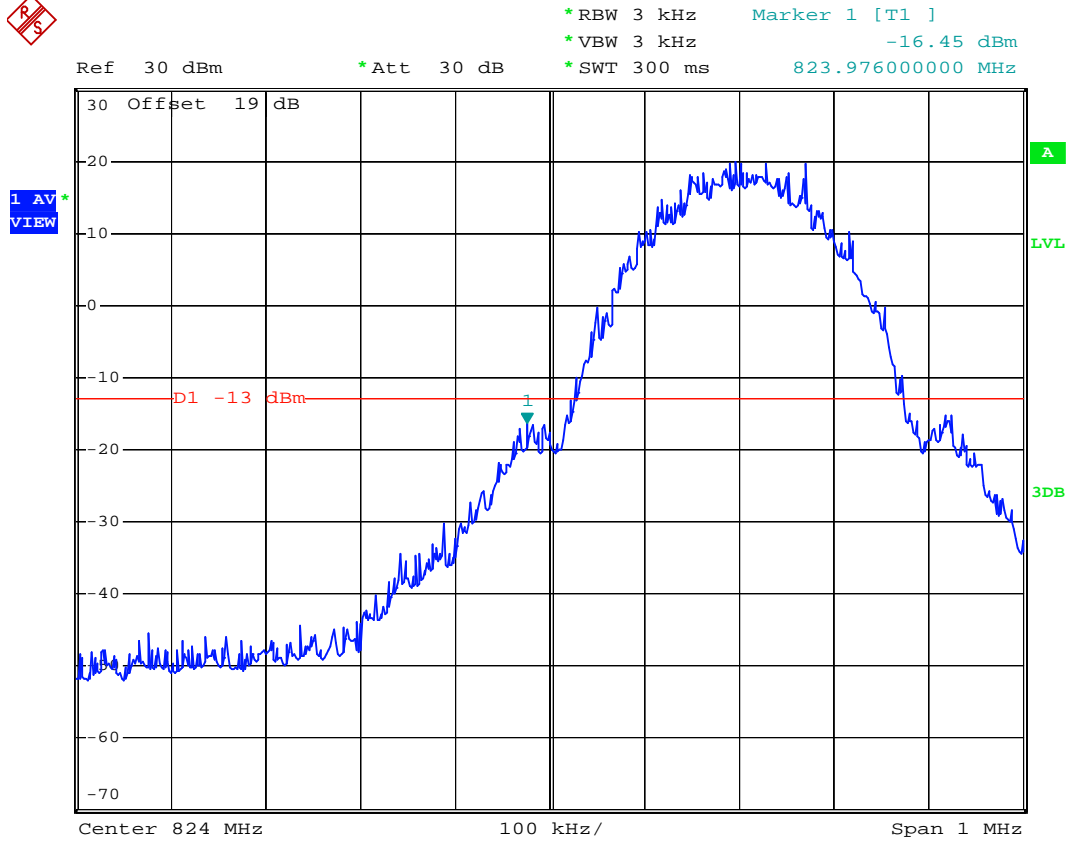
### 4.4.3 Test Setup Layout





4.4.4 Test Result

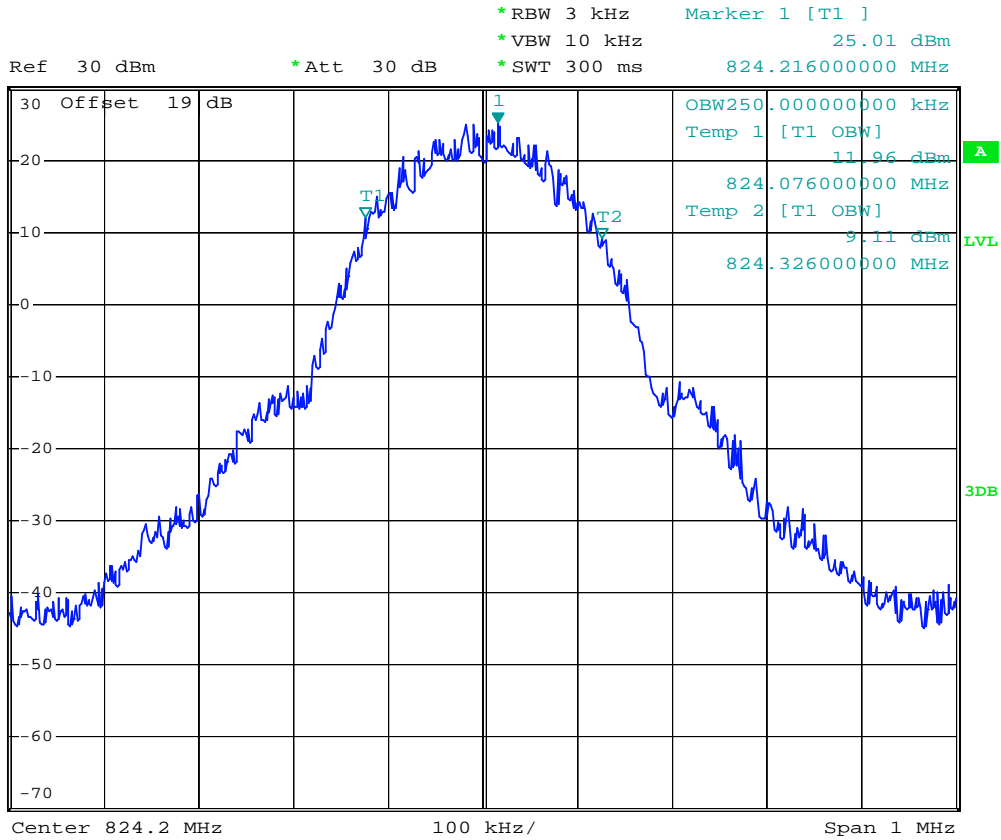
- Mode 1
- Test Mode : GSM850 CH128 Lower Band Edge
- Power State : High



Date: 9.NOV.2007 01:16:15



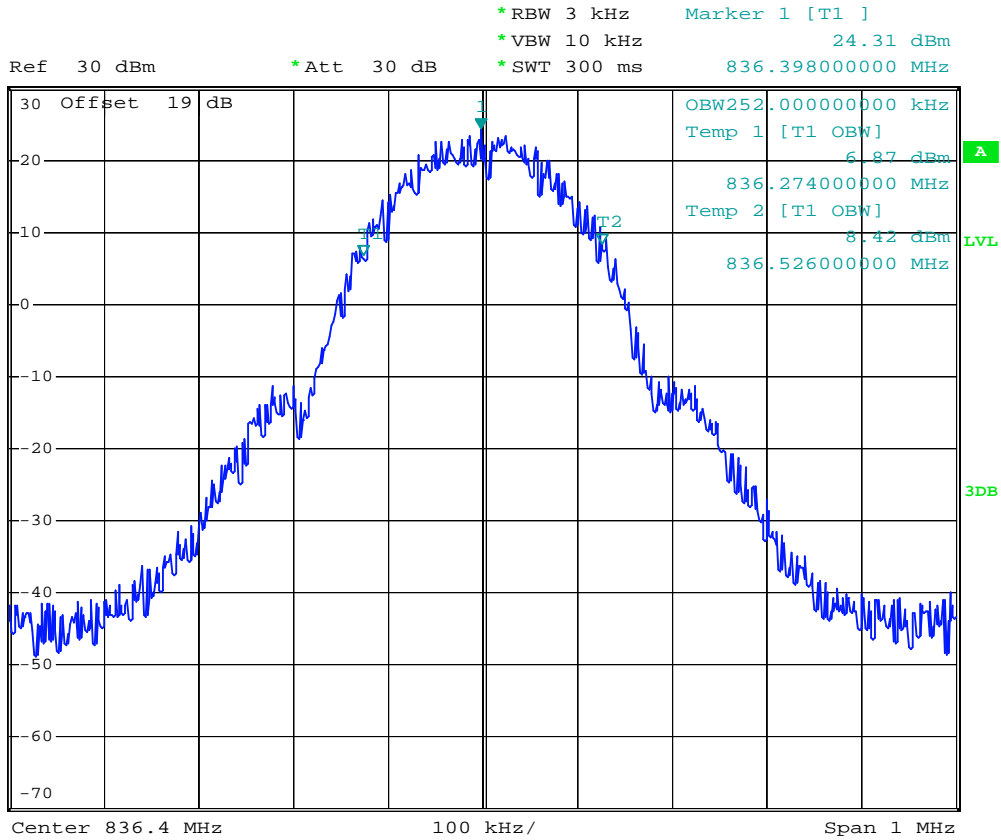
- Test Mode : GSM850 CH128 99% Occupied Bandwidth
- Power State : High



Date: 9.NOV.2007 01:13:14



- Test Mode : GSM850 CH189 99% Occupied Bandwidth
- Power State : High

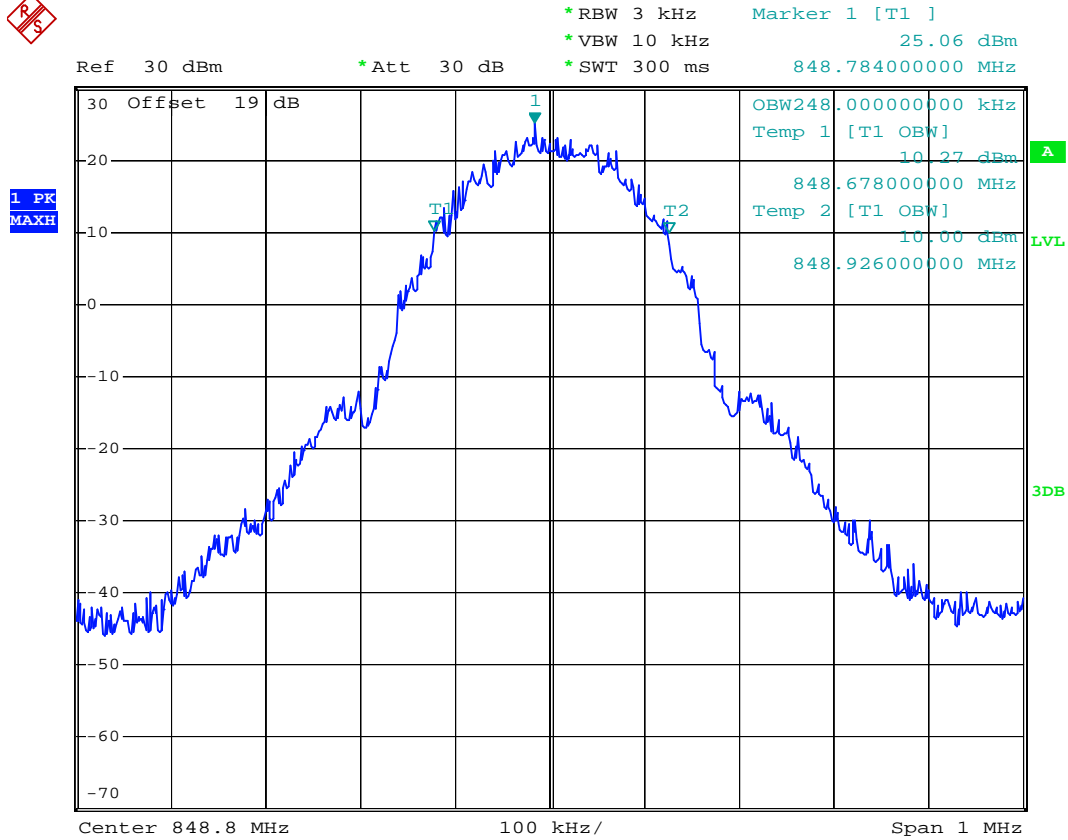


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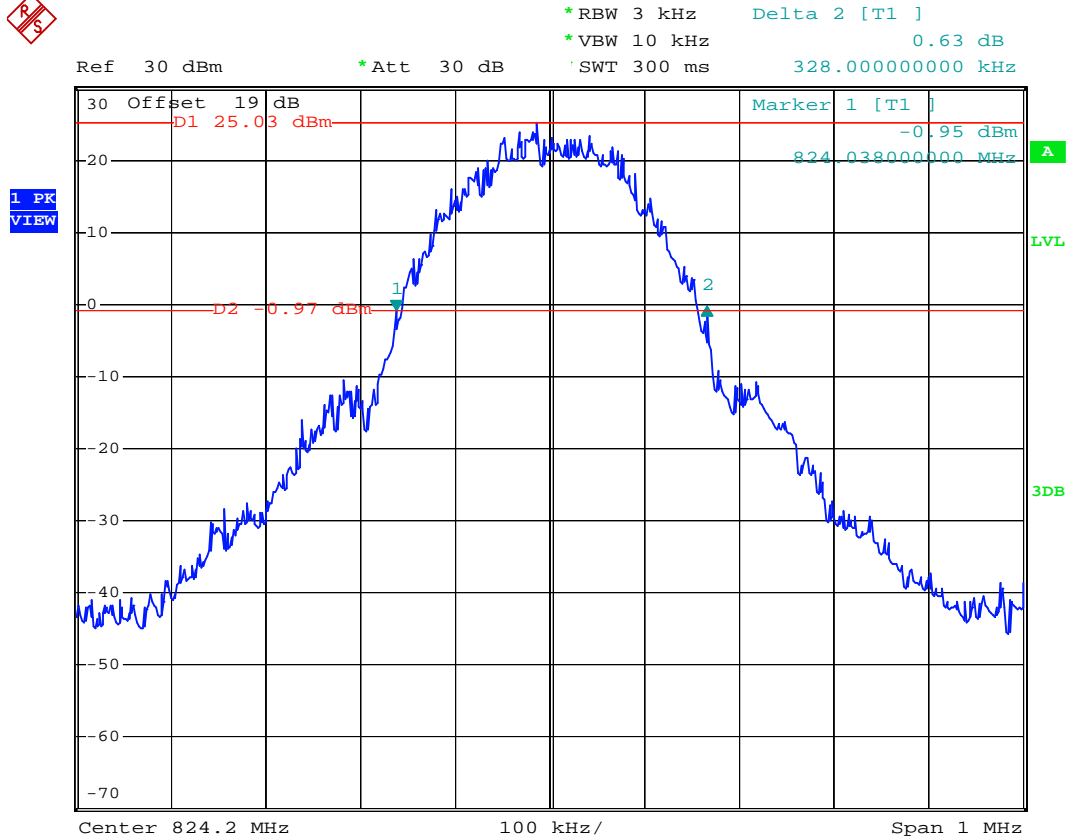
- Test Mode : GSM850 CH 251 99% Occupied Bandwidth
- Power State : High



Date: 9.NOV.2007 01:12:36



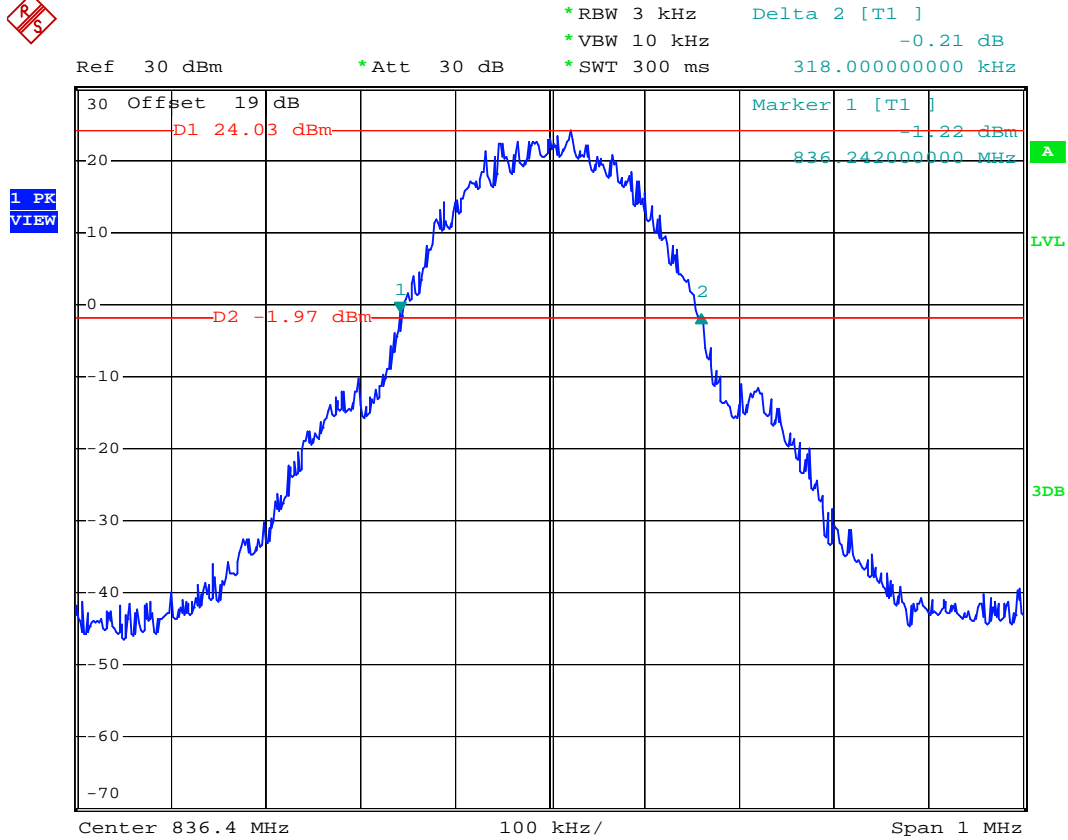
- Test Mode : GSM850 CH128 26dB Bandwidth
- Power State : High



Date: 9.NOV.2007 01:09:54



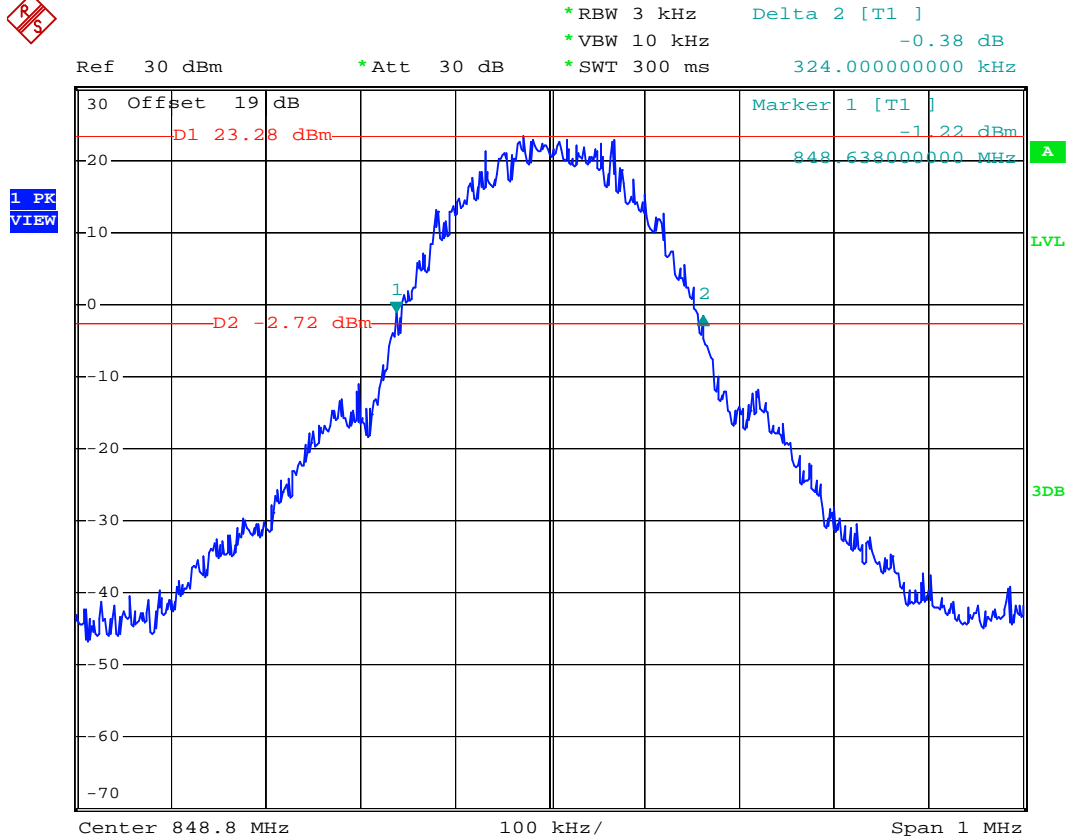
- Test Mode : GSM850 CH189 26dB Bandwidth
- Power State : High



Date: 9.NOV.2007 01:10:55



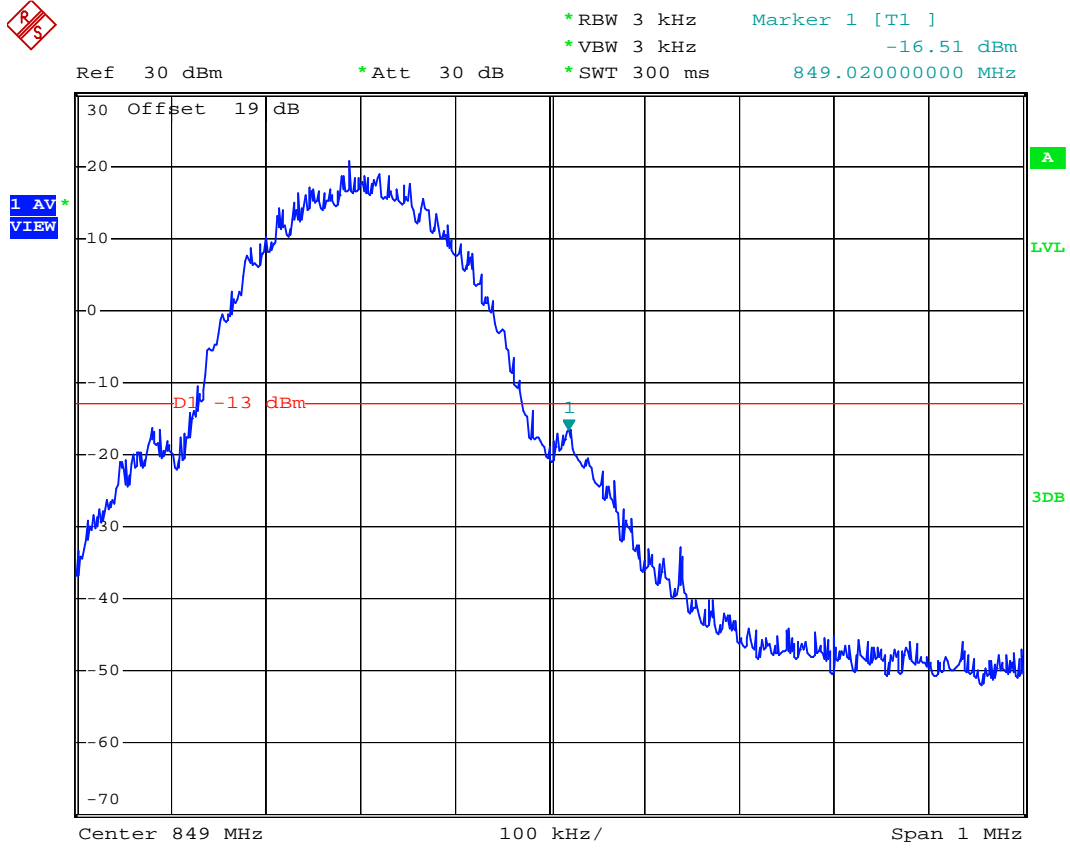
- Test Mode : GSM850 CH 251 26dB Bandwidth
- Power State : High



Date: 9.NOV.2007 01:11:53



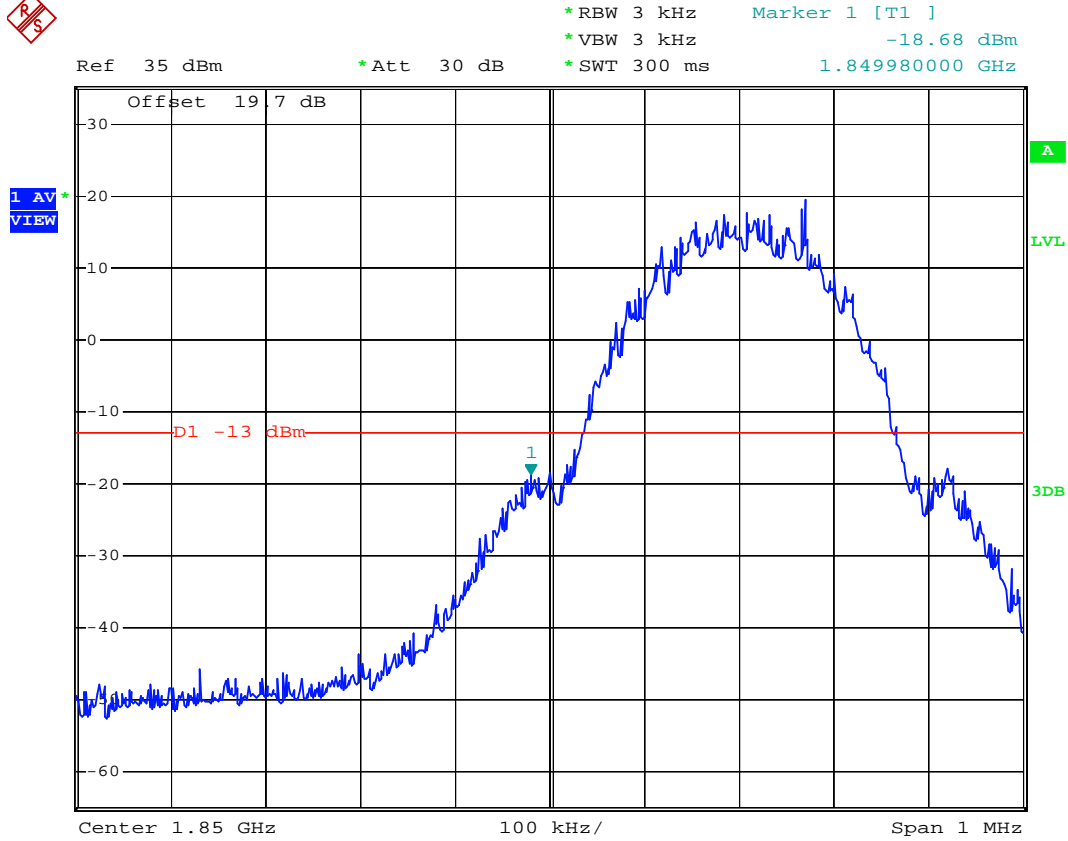
- Test Mode : GSM850 (GSM) CH251 Higher Band Edge
- Power State : High



Date: 9.NOV.2007 01:23:29



- Mode 2
- Test Mode : PCS1900 CH512 Lower Band Edge
- Power State : High



Date: 9.NOV.2007 01:50:16



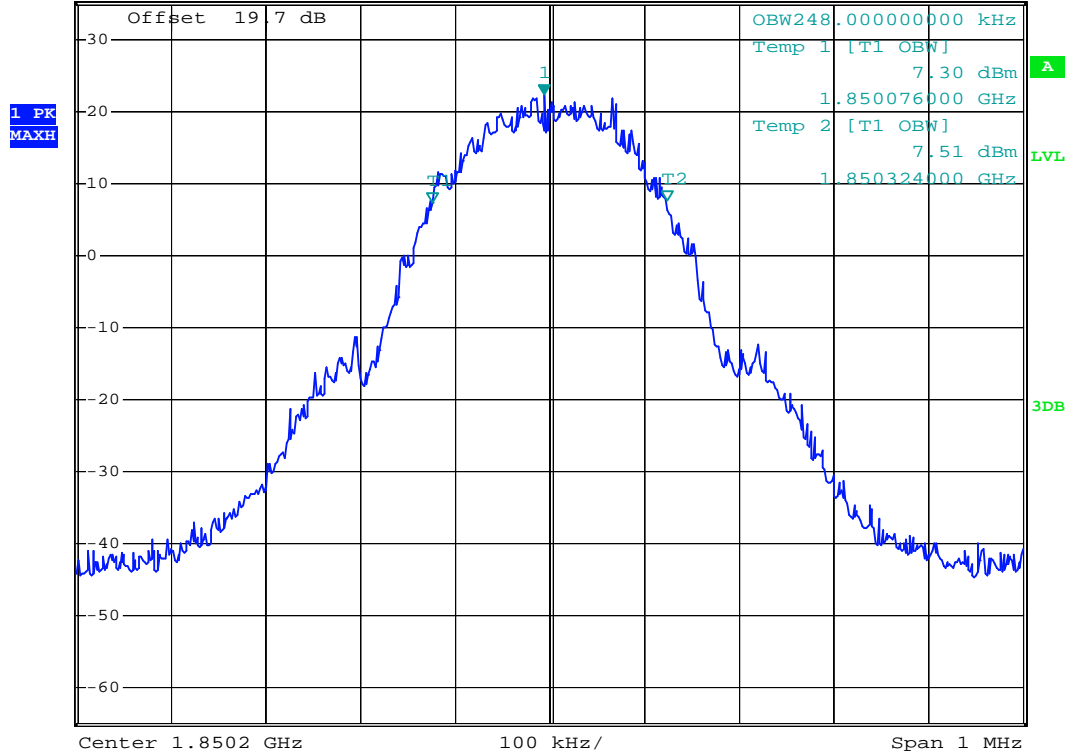
- Test Mode : PCS1900 CH512 99% Occupied Bandwidth
- Power State : High



\*RBW 3 kHz      Marker 1 [T1 ]  
 \*VBW 10 kHz      22.39 dBm  
 \*SWT 300 ms      1.850194000 GHz

Ref 35 dBm

\*Att 30 dB



Date: 9.NOV.2007 01:47:08



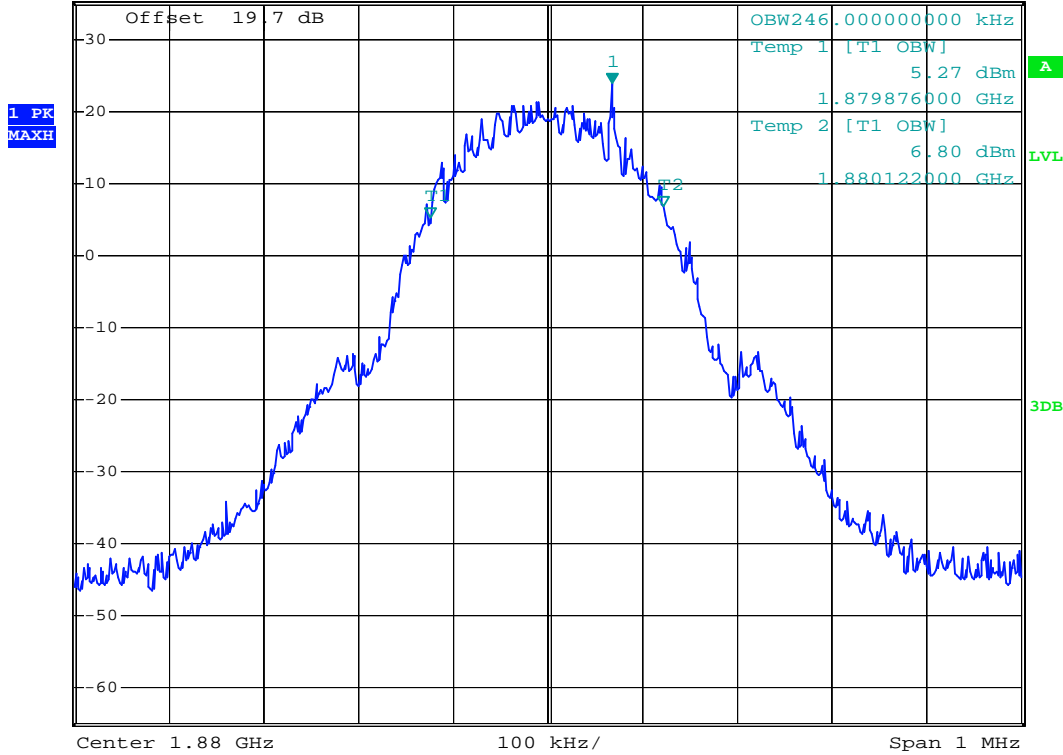
- Test Mode : PCS1900 CH661 99% Occupied Bandwidth
- Power State : High



\*RBW 3 kHz      Marker 1 [T1 ]  
 \*VBW 10 kHz      23.75 dBm  
 \*SWT 300 ms      1.880068000 GHz

Ref 35 dBm

\*Att 30 dB

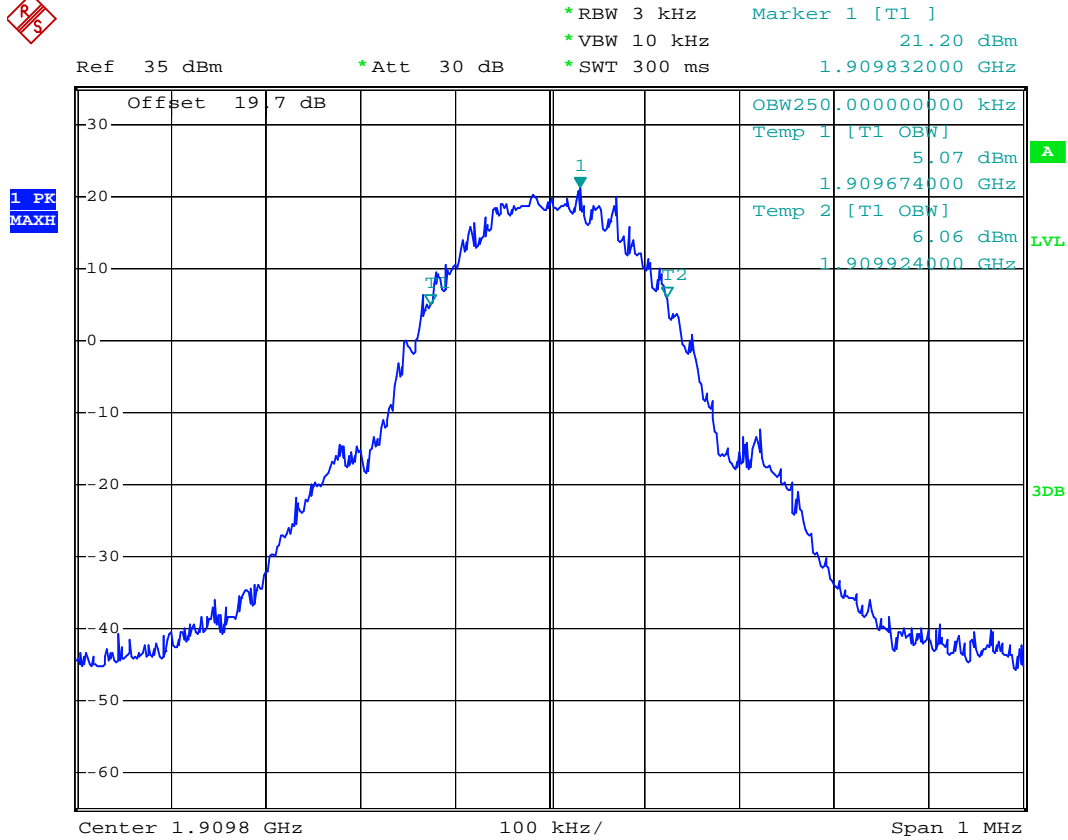


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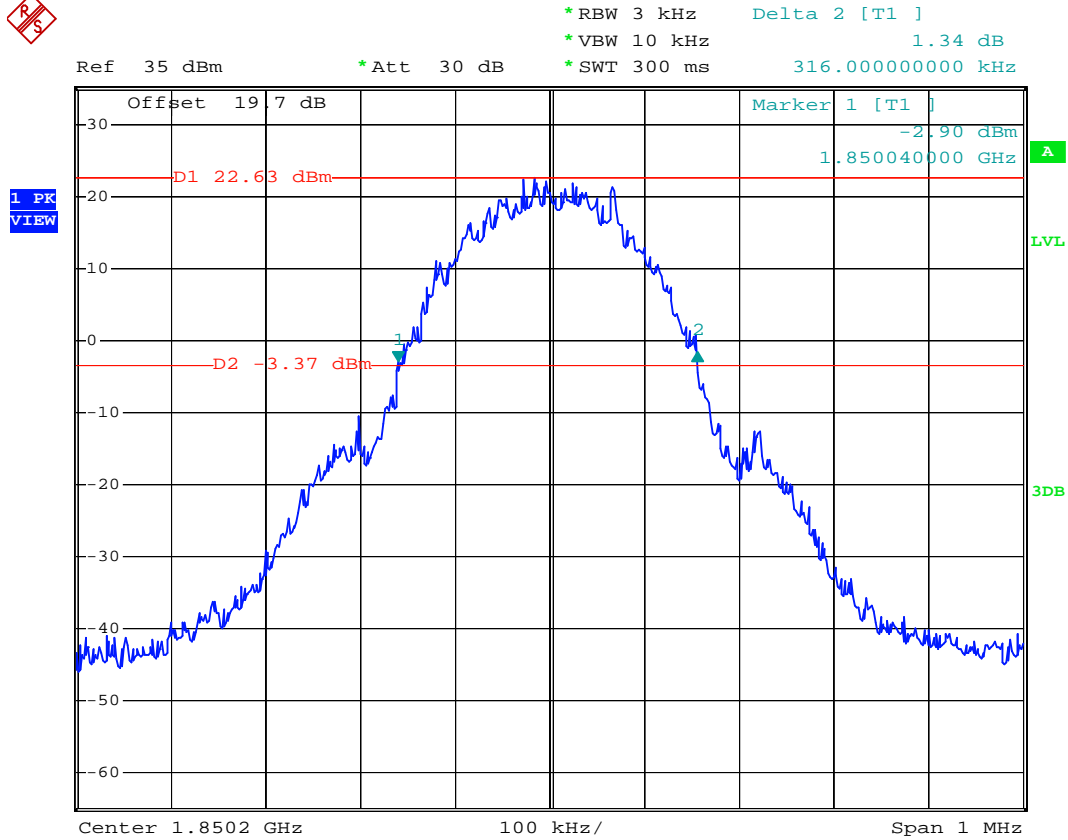
- Test Mode : PCS1900 CH810 99% Occupied Bandwidth
- Power State : High



Date: 9.NOV.2007 01:46:10



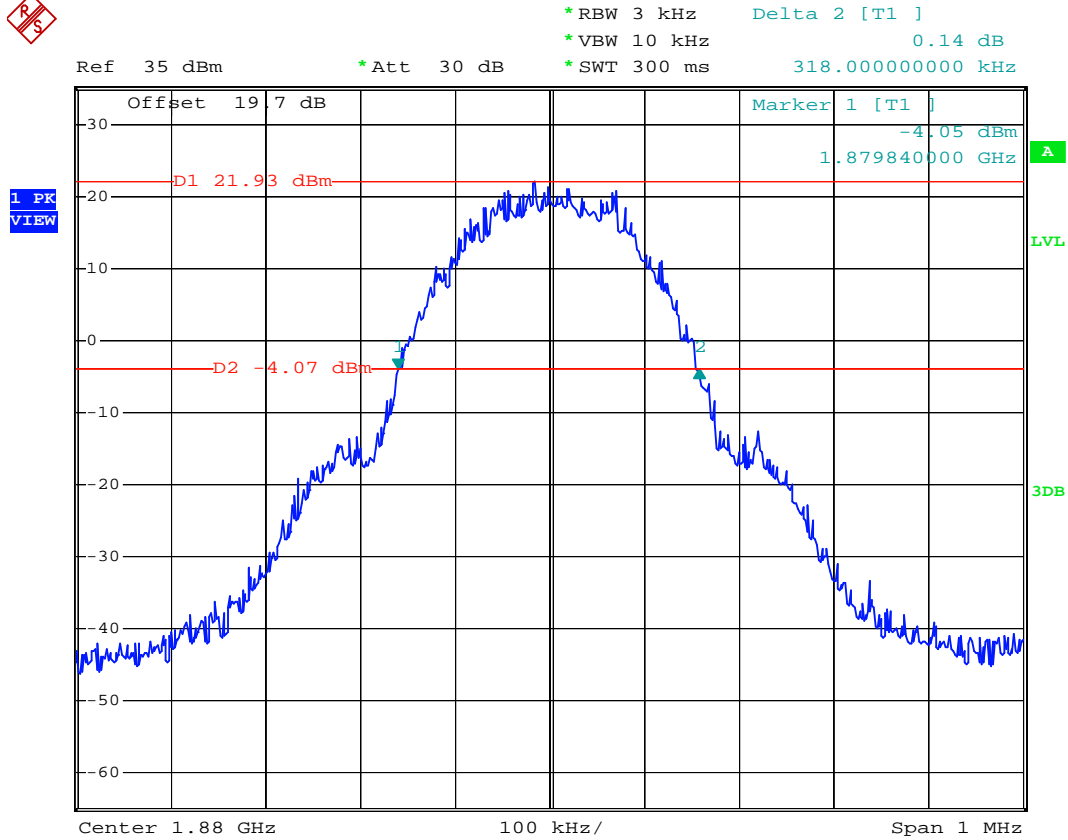
- Test Mode : PCS1900 CH512 26dB Bandwidth
- Power State : High



Date: 9.NOV.2007 01:42:29



- Test Mode : PCS1900 CH661 26dB Bandwidth
- Power State : High



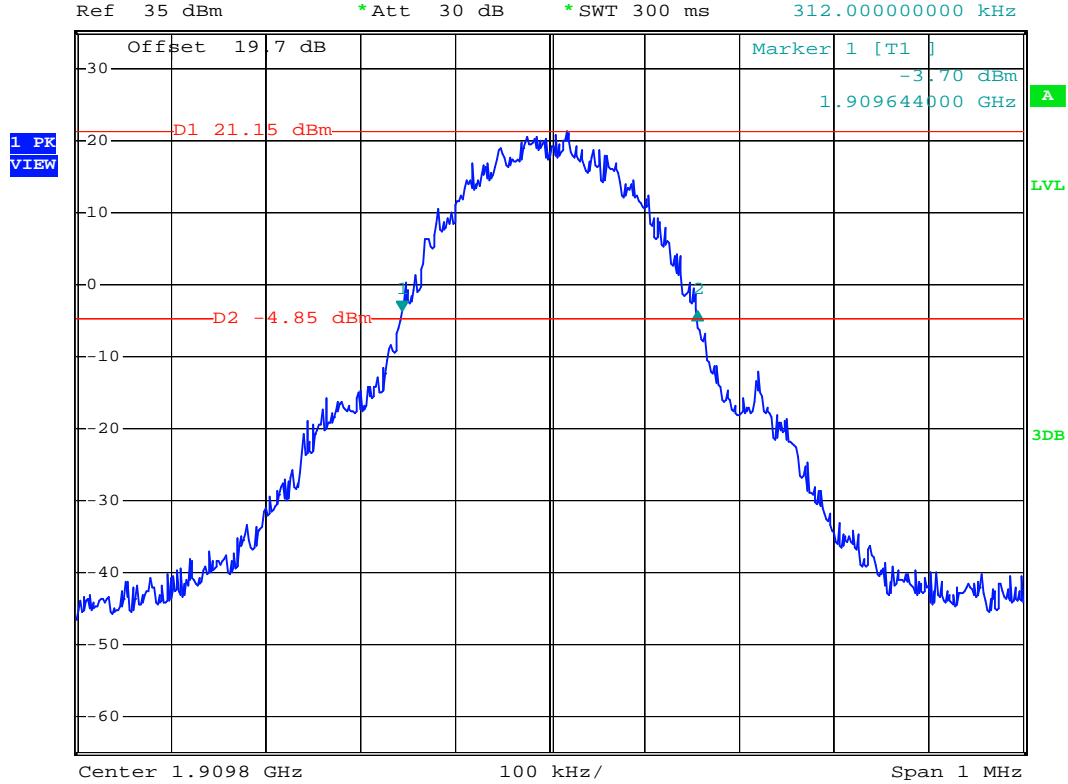
Date: 9.NOV.2007 01:43:56



- Test Mode : PCS1900 CH810 26dB Bandwidth
- Power State : High



\*RBW 3 kHz      Delta 2 [T1 ]  
 \*VBW 10 kHz      -0.10 dB  
 \*SWT 300 ms      312.000000000 kHz



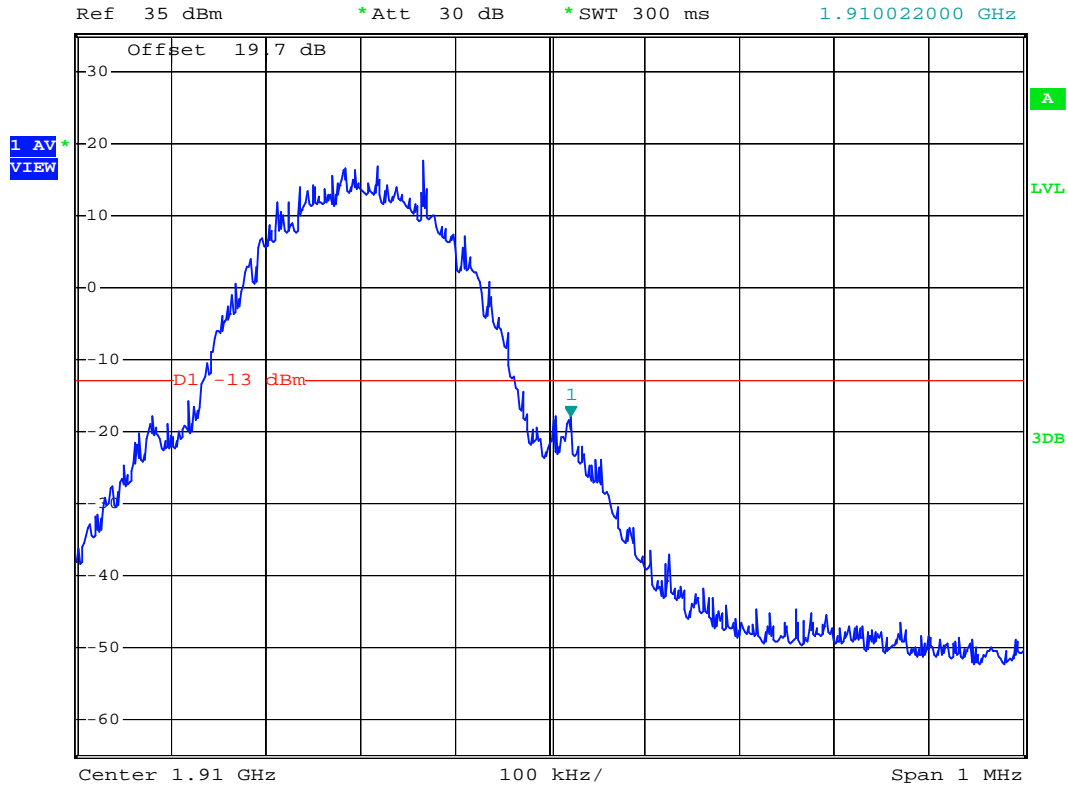
Date: 9.NOV.2007 01:45:10



- Test Mode : PCS1900 CH810 Higher Band Edge
- Power State : High



\*RBW 3 kHz      Marker 1 [T1 ]  
 \*VBW 3 kHz      -17.77 dBm  
 \*SWT 300 ms      1.910022000 GHz



Date: 9.NOV.2007 01:53:50

## 4.5 Conducted Emission

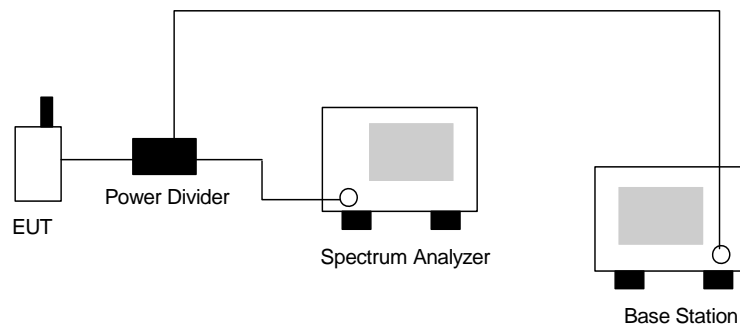
### 4.5.1 Measurement Instruments

As described in chapter 5 of this test report.

### 4.5.2 Test Procedure

- a. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
- b. The middle channel for the highest RF power within the transmitting frequency was measured.
- c. The conducted spurious emission for the whole frequency range was taken.

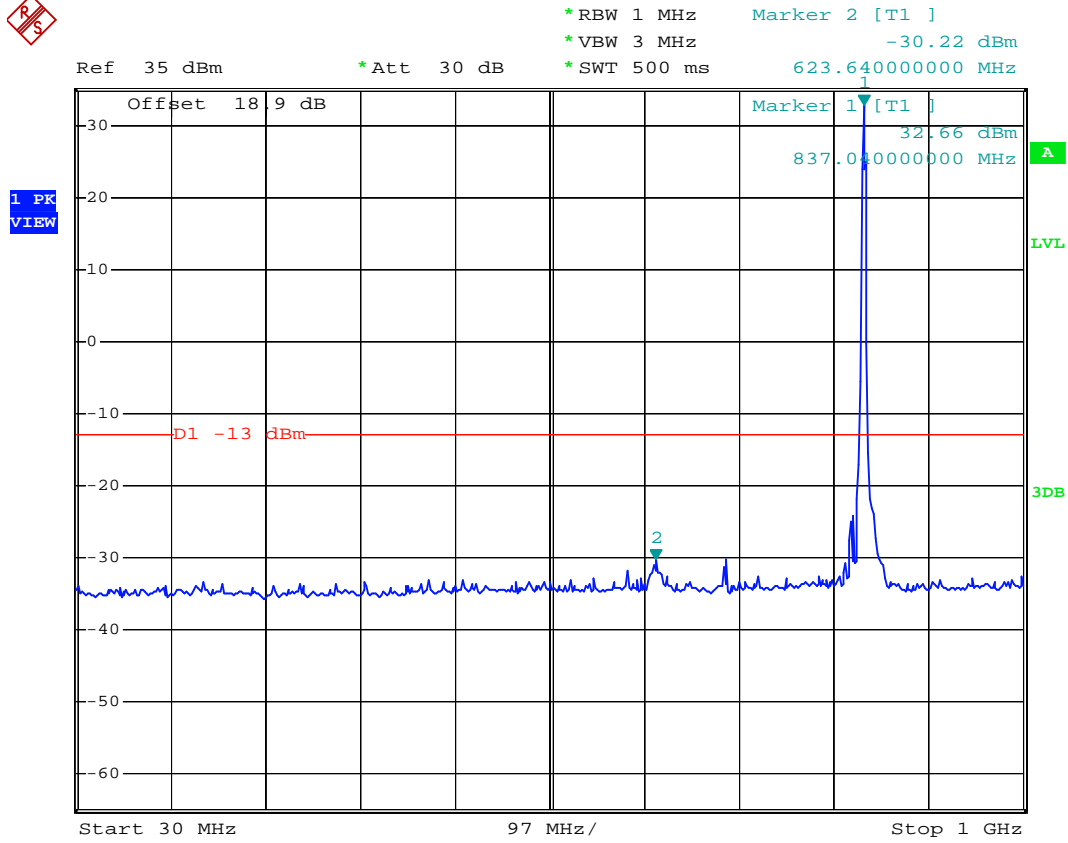
### 4.5.3 Test Setup Layout





4.5.4 Test Result

- Mode 1
- Test Mode : GSM850 CH189
- Frequency Range : 30M-1G



Date: 9.NOV.2007 02:00:21



- Test Mode : GSM850 CH189
- Frequency Range : 1G-3G

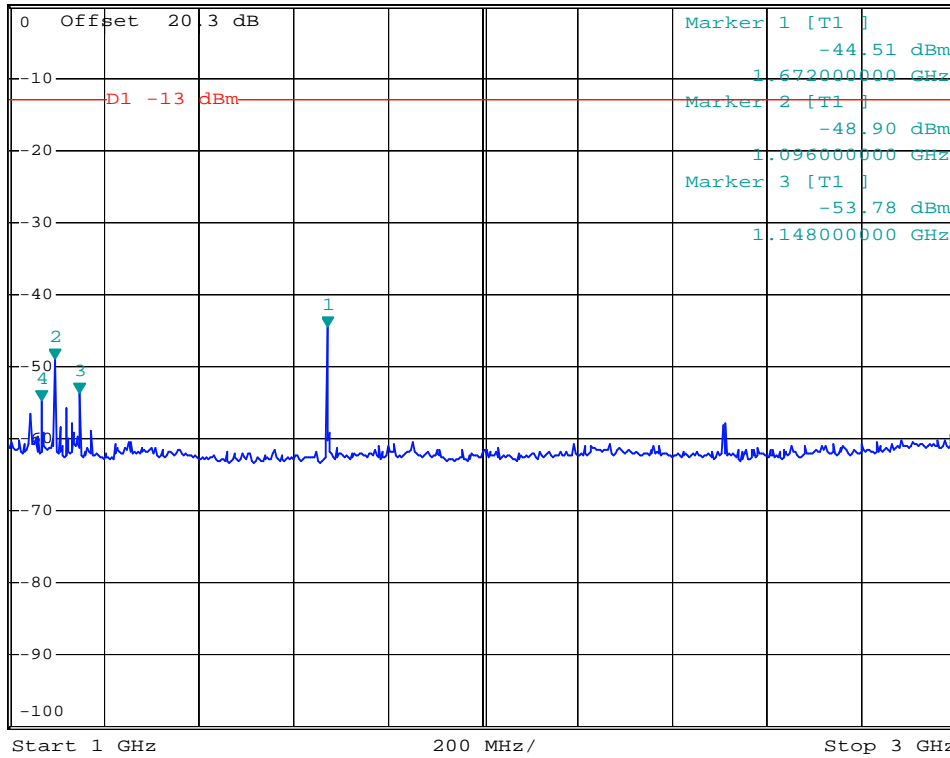


\*RBW 1 MHz      Marker 4 [T1 ]  
 \*VBW 3 MHz      -54.85 dBm  
 \*SWT 500 ms      1.068000000 GHz

Ref 0 dBm

\*Att 0 dB

1 PK  
VIEW



Date: 9.NOV.2007 02:05:55

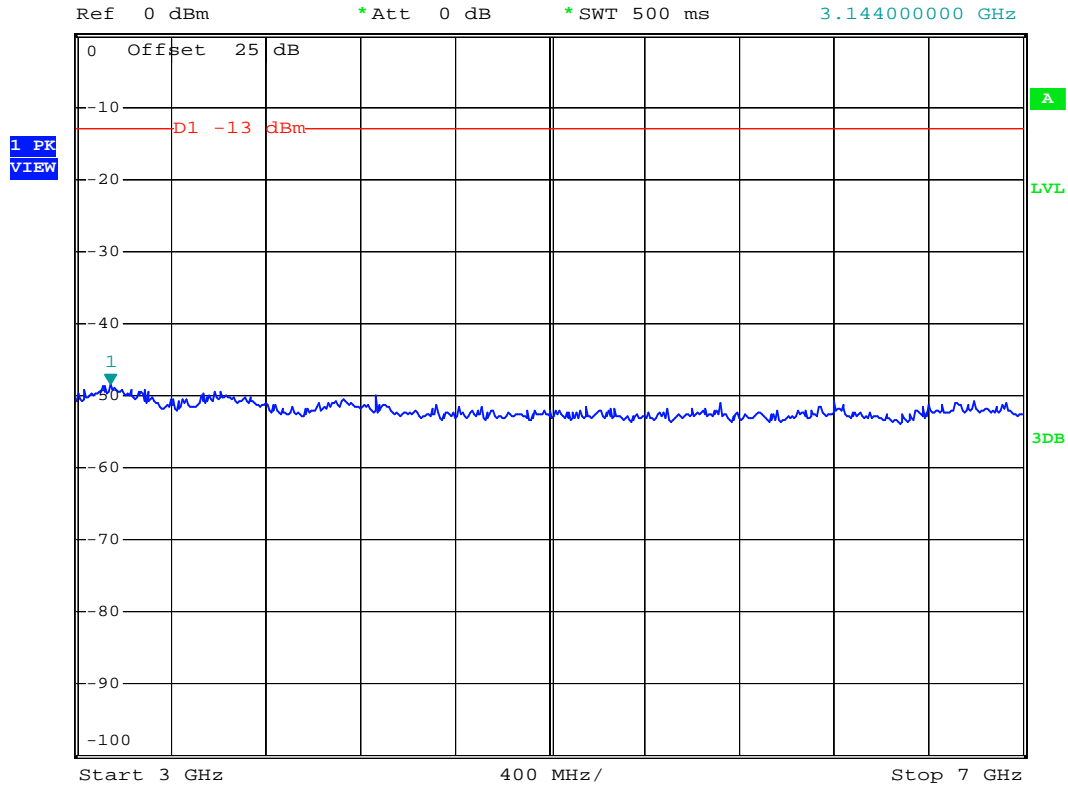




- Test Mode : GSM850 CH189
- Frequency Range : 3G-7G



\*RBW 1 MHz      Marker 1 [T1 ]  
 \*VBW 3 MHz      -48.38 dBm  
 \*SWT 500 ms      3.144000000 GHz



Date: 9.NOV.2007 02:07:15



- Test Mode : GSM850 CH189
- Frequency Range : 7G-9G

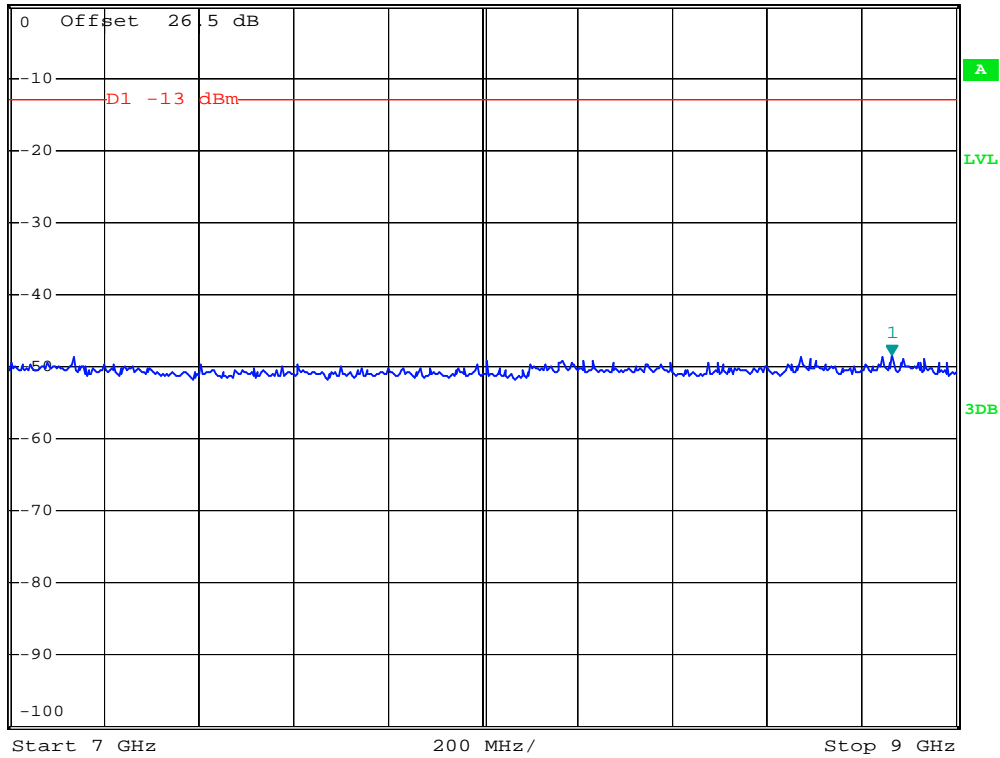


\*RBW 1 MHz      Marker 1 [T1 ]  
 \*VBW 3 MHz      -48.54 dBm  
 \*SWT 500 ms      8.864000000 GHz

Ref 0 dBm

\*Att 0 dB

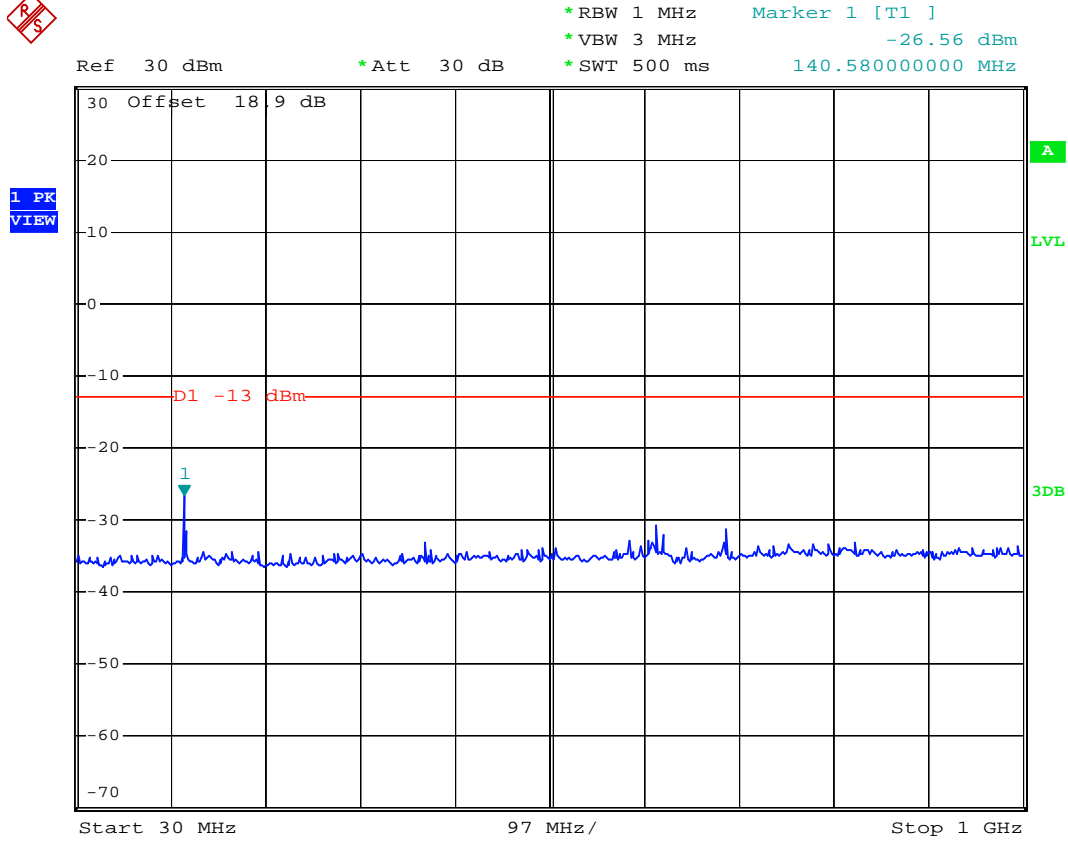
1 PK  
VIEW



Date: 9.NOV.2007 02:08:55



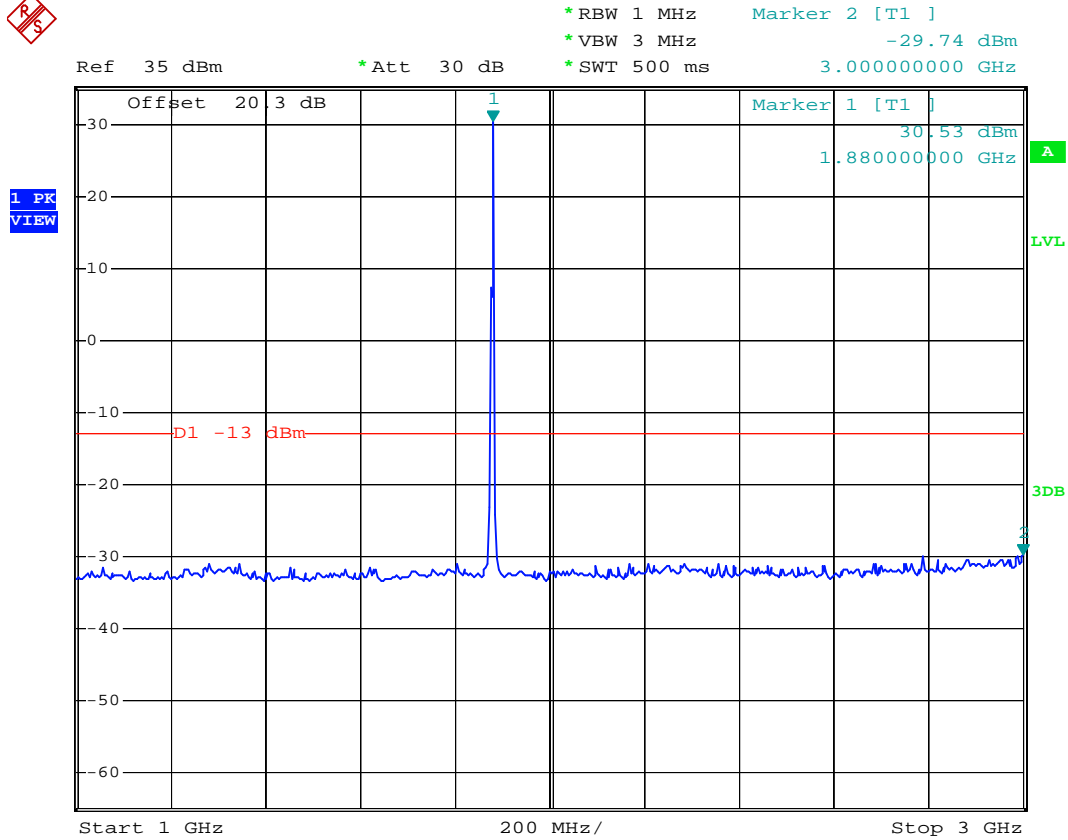
- Mode 2
- Test Mode : PCS1900 CH661
- Frequency Range : 30M-1G



Date: 9.NOV.2007 01:58:35



- Test Mode : PCS1900 CH661
- Frequency Range : 1G-3G



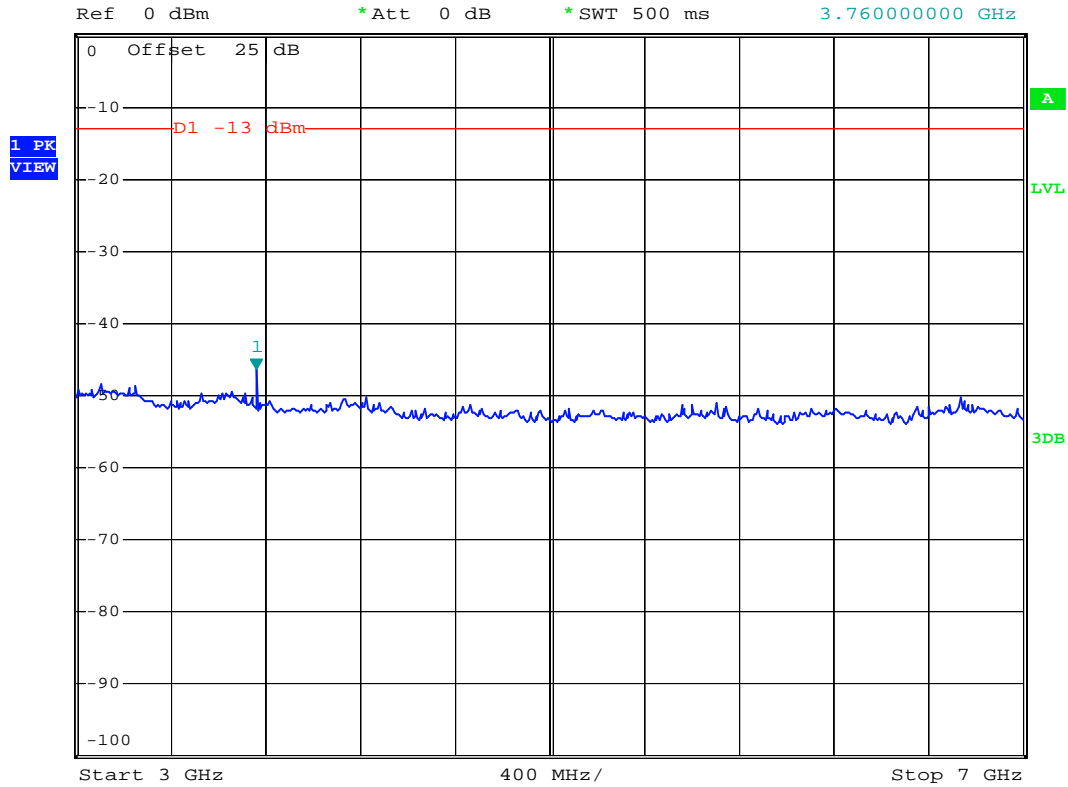
Date: 9.NOV.2007 02:02:19



- Test Mode : PCS1900 CH661
- Frequency Range : 3G-7G



\*RBW 1 MHz      Marker 1 [T1 ]  
 \*VBW 3 MHz      -46.25 dBm  
 \*SWT 500 ms      3.76000000 GHz



Date: 9.NOV.2007 02:07:54



- Test Mode : PCS1900 CH661
- Frequency Range : 7G-13.6G

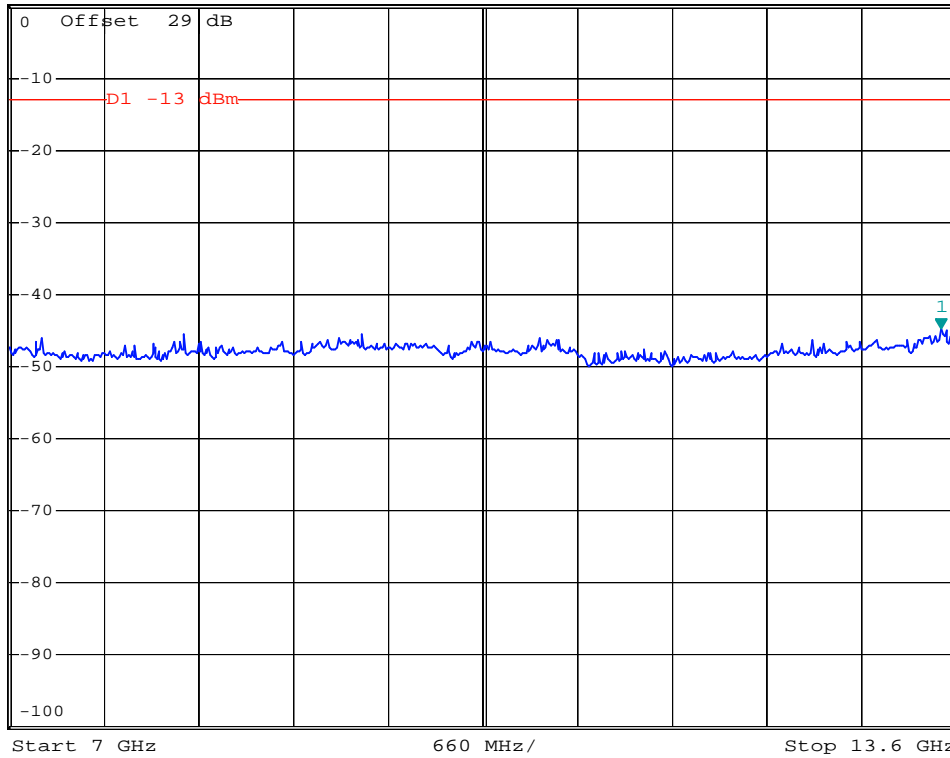


\*RBW 1 MHz      Marker 1 [T1 ]  
 \*VBW 3 MHz      -44.64 dBm  
 \*SWT 500 ms      13.494400000 GHz

Ref 0 dBm

\*Att 0 dB

1 PK  
VIEW



Date: 9.NOV.2007 02:10:03



- Test Mode : PCS1900 CH661
- Frequency Range : 13.6G-19.1G

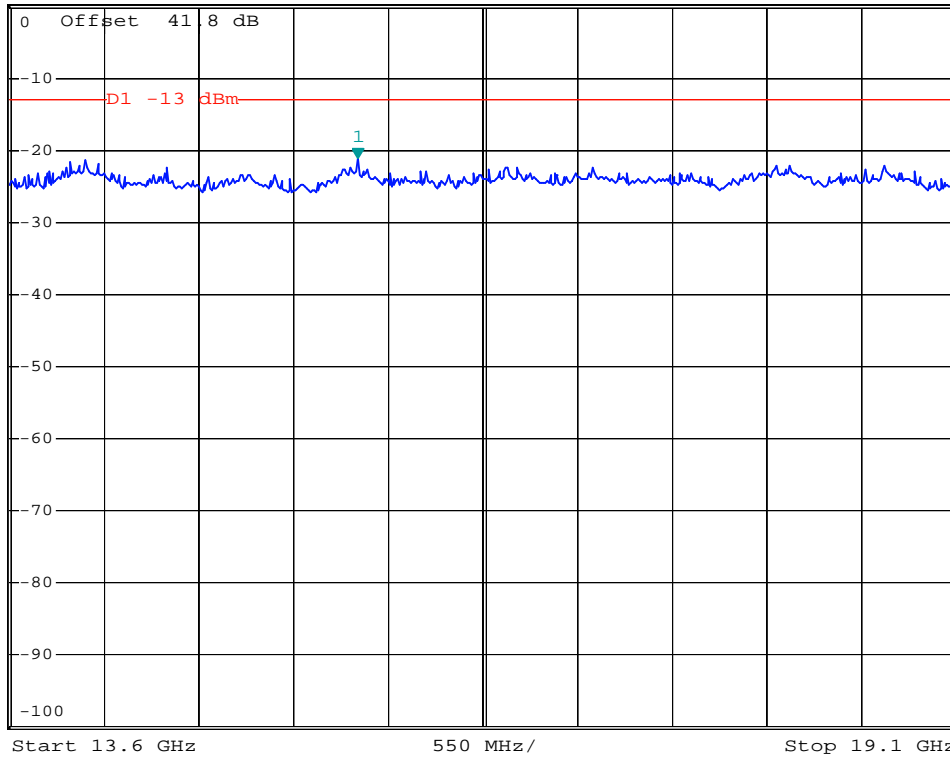


\*RBW 1 MHz      Marker 1 [T1 ]  
 \*VBW 3 MHz      -21.11 dBm  
 \*SWT 500 ms      15.624000000 GHz

Ref 0 dBm

\*Att 0 dB

1 PK  
VIEW



Date: 9.NOV.2007 02:10:47

## 4.6 Field Strength of Spurious Radiation

Equivalent isotropic radiated Power Measurements by substitution method according to ANSI/TIA/EIA-603-C.

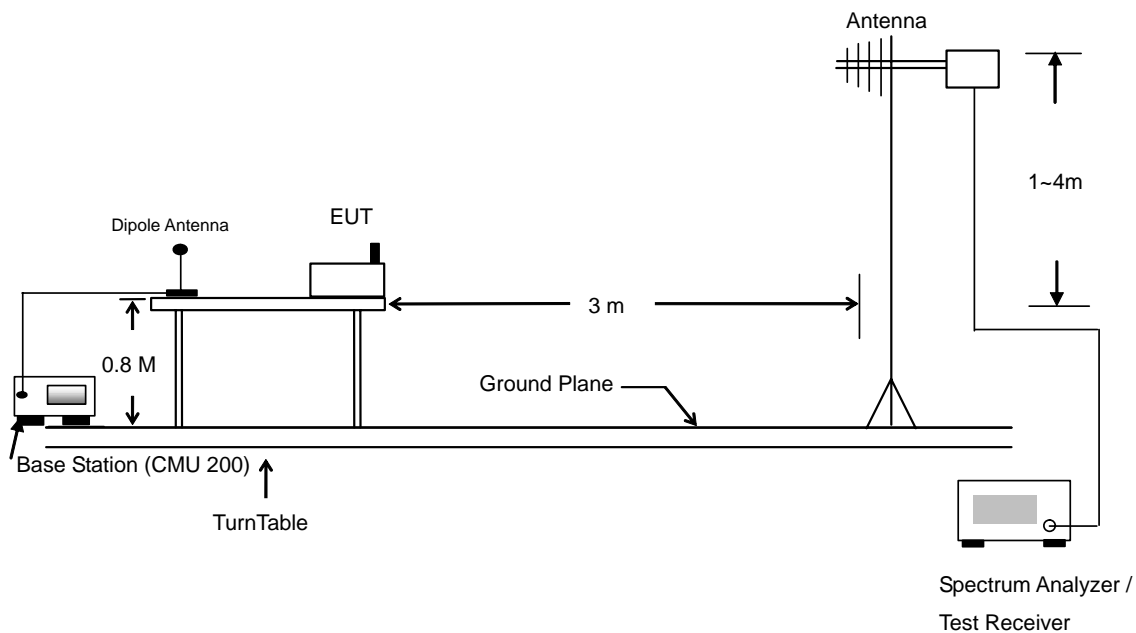
### 4.6.1 Measurement Instruments

As described in chapter 5 of this test report.

### 4.6.2 Test Procedure

- a. The EUT was placed on a rotatable wooden table with 0.8 meter about ground.
- b. The EUT was set 3 meters from the receiving antenna which was mounted on the antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest spurious emission.
- d. The height of the receiving antenna is varied between one meter and four meters to reach the maximum spurious emission for both horizontal and vertical polarizations.
- e. Taking the record of maximum spurious emission.
- f. A Horn antenna was substituted in place of the EUT and was driven by a signal generator.
- g. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
- h. Taking the record of output power at antenna port.
- i. Repeat step 7 to step 8 for another polarization.
- j. Emission level (dBm) = output power + substitution Gain.

### 4.6.3 Test Setup Layout



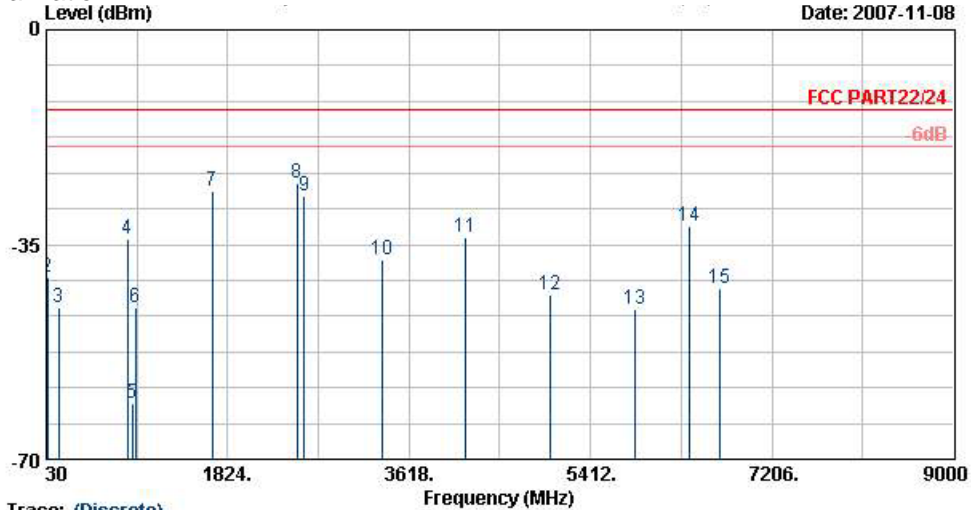




4.6.4 Test Data

4.6.4.1 Mode 1

Horizontal Polarization



Date: 2007-11-08

Trace: (Discrete)

Site : 03CH06-HY  
 Condition : FCC PART22/24 ETRP-071107 HORIZONTAL  
 EUT : Tracking system  
 Power : 120Vac/60Hz  
 Model : FC 790401  
 Mode : GSM850 Link;Ch189+Adaptor  
 Plane : E2

	Freq	Level	Over	Limit	Read		
	MHz	dBm	Limit	Line	Level	Factor	Remark
			dB	dBm	dBm	dB	
1	39.18	-42.98	-29.98	-13.00	-37.85	-5.12	Peak
2	44.04	-40.44	-27.44	-13.00	-32.28	-8.17	Peak
3	156.09	-45.17	-32.17	-13.00	-32.28	-12.89	Peak
4	836.40	-34.11			-32.77	-1.34	Peak
5	881.40	-60.84			-59.94	-0.90	Peak
6	915.30	-45.33	-32.33	-13.00	-44.76	-0.58	Peak
7	1672.80	-26.20	-13.20	-13.00	-31.63	5.43	Peak
8 @	2509.20	-25.07	-12.07	-13.00	-35.30	10.23	Peak
9	2584.00	-27.03	-14.03	-13.00	-37.44	10.41	Peak
10	3345.60	-37.56	-24.56	-13.00	-49.75	12.19	Peak
11	4182.00	-33.93	-20.93	-13.00	-48.43	14.50	Peak
12	5018.40	-43.25	-30.25	-13.00	-59.11	15.86	Peak
13	5854.80	-45.41	-32.41	-13.00	-62.88	17.47	Peak
14	6394.00	-32.08	-19.08	-13.00	-50.28	18.21	Peak
15	6691.20	-42.03	-29.03	-13.00	-59.88	17.85	Peak

Remark:

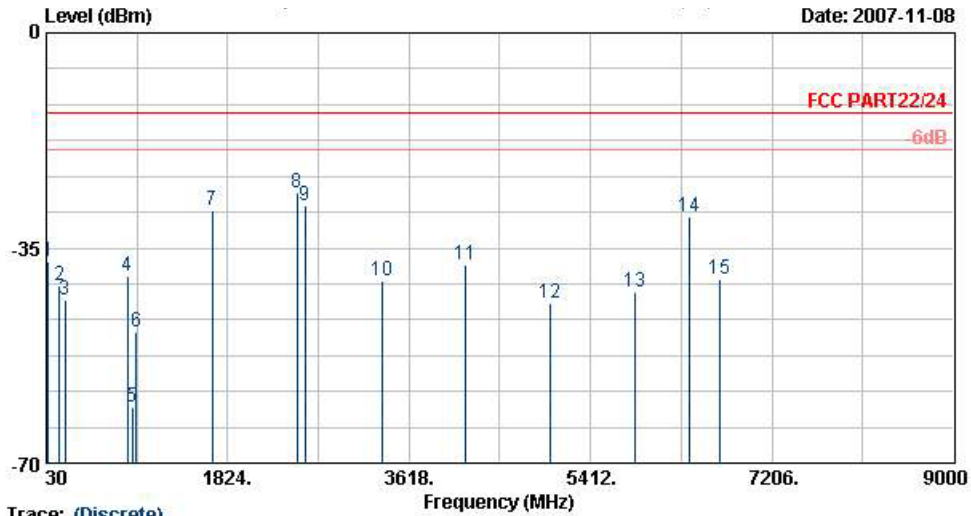
- #4: MS Signal
- #5: BS Signal



Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)	Result
1672	-29.85	-13	-31.63	-29	5.05	6.35	H	Pass
2509	-31.95	-13	-35.3	-32	5.93	8.13	H	Pass
2584	-30.56	-13	-37.44	-31	5.91	8.5	H	Pass
3345	-45.13	-13	-49.75	-46	6.88	9.9	H	Pass
4182	-39.55	-13	-48.43	-40.5	7.52	10.62	H	Pass
5018	-51.11	-13	-59.11	-50	8.49	9.53	H	Pass
5854	-55.71	-13	-62.88	-55	9.2	10.64	H	Pass
6394	-38.59	-13	-50.28	-38.5	9.16	11.22	H	Pass
6691	-52.88	-13	-59.88	-50	9.83	9.1	H	Pass



Vertical Polarization



Date: 2007-11-08

Trace: (Discrete)

Site : 03CH06-HV  
 Condition : FCC PART22/24 ETRP-071107 VERTICAL  
 EUT : Tracking system  
 Power : 120Vac/60Hz  
 Model : FC 790401  
 Mode : GSM850 Link;Ch169+Adaptor  
 Plane : E2

	Freq	Level	Over	Limit	Read		
	MHz	dBm	Limit	Line	Level	Factor	Remark
			dB	dBm	dBm	dB	
1	49.98	-37.25	-24.25	-13.00	-22.43	-14.82	Peak
2	157.44	-41.23	-28.23	-13.00	-33.02	-8.21	Peak
3	213.33	-43.51	-30.51	-13.00	-35.21	-8.30	Peak
4	836.40	-39.63			-40.99	1.36	Peak
5	881.40	-61.00			-62.72	1.72	Peak
6	917.40	-48.78	-35.78	-13.00	-50.79	2.00	Peak
7	1672.80	-28.85	-15.85	-13.00	-34.28	5.43	Peak
8	2509.20	-25.99	-12.99	-13.00	-36.22	10.23	Peak
9	2588.00	-28.01	-15.01	-13.00	-38.42	10.41	Peak
10	3345.60	-40.33	-27.33	-13.00	-52.52	12.19	Peak
11	4182.00	-37.80	-24.80	-13.00	-52.30	14.50	Peak
12	5018.40	-43.97	-30.97	-13.00	-59.83	15.86	Peak
13	5854.80	-42.24	-29.24	-13.00	-59.71	17.47	Peak
14	6388.00	-30.05	-17.05	-13.00	-48.26	18.21	Peak
15	6691.20	-40.18	-27.18	-13.00	-58.03	17.85	Peak

Remark:

- #4: MS Signal
- #5: BS Signal
- There is no more obvious emission except the listings above.

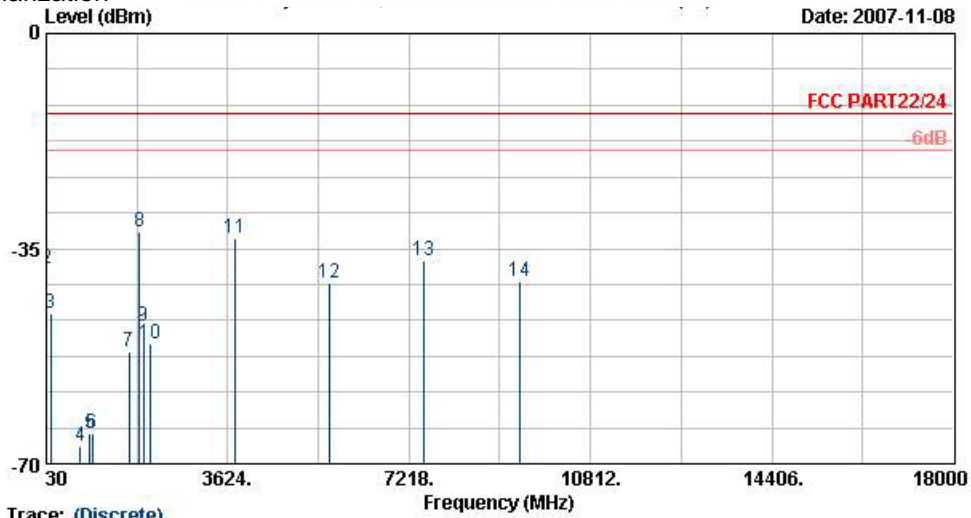


Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)	Result
1672	-30.25	-13	-34.28	-29.4	5.05	6.35	V	Pass
2509	-26.25	-13	-36.22	-26.3	5.93	8.13	V	Pass
2588	-27.35	-13	-38.42	-27.8	5.91	8.51	V	Pass
3345	-46.13	-13	-52.52	-47	6.88	9.9	V	Pass
4182	-44.05	-13	-52.3	-45	7.52	10.62	V	Pass
5018	-53.11	-13	-59.83	-52	8.49	9.53	V	Pass
5854	51.69	-13	-59.71	52.4	9.2	10.64	V	Pass
6388	-36.68	-13	-48.26	-36.6	9.16	11.23	V	Pass
6691	-50.88	-13	-58.03	-48	9.83	9.1	V	Pass



4.6.4.2 Mode 2

Horizontal Polarization



Date: 2007-11-08

Site : 03CH06-HV  
 Condition : FCC PART22/24 ETRP-071107 HORIZONTAL  
 EUT : Tracking system  
 Power : 120Vac/60Hz  
 Model : FC 790401  
 Mode : PCS1900 Link;Ch661+Adaptor  
 Plane : E2

	Freq	Level	Over	Limit	Read		
	MHz	dBm	Limit	Line	Level	Factor	Remark
			dB	dBm	dBm	dB	
1	30.00	-43.23	-30.23	-13.00	-43.59	0.36	Peak
2	44.04	-38.37	-25.37	-13.00	-30.21	-8.17	Peak
3	123.69	-45.41	-32.41	-13.00	-32.89	-12.52	Peak
4	705.30	-67.23	-54.23	-13.00	-64.57	-2.67	Peak
5	896.40	-64.93	-51.93	-13.00	-64.17	-0.76	Peak
6	941.90	-65.01	-52.01	-13.00	-64.69	-0.32	Peak
7	1678.00	-51.81	-38.81	-13.00	-57.25	5.43	Peak
8	1884.00	-32.16			-39.17	7.01	Peak
9	1958.00	-47.68			-55.22	7.54	Peak
10	2078.00	-50.45	-37.45	-13.00	-58.69	8.24	Peak
11	3760.00	-33.31	-20.31	-13.00	-46.63	13.32	Peak
12	5640.00	-40.58	-27.58	-13.00	-57.61	17.03	Peak
13	7520.00	-36.89	-23.89	-13.00	-54.31	17.42	Peak
14	9400.00	-40.38	-27.38	-13.00	-59.17	18.79	Peak

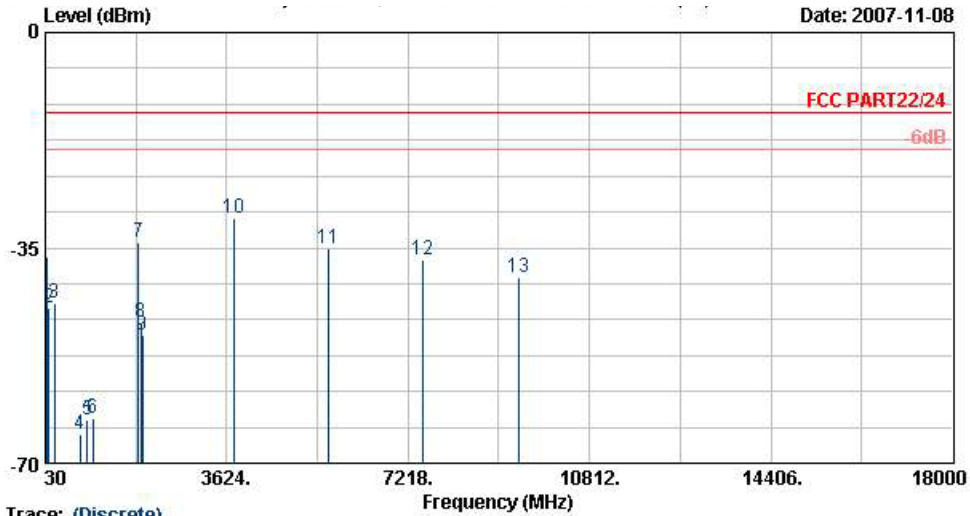
Remark:

- #8: MS Signal
- #9: BS Signal

Frequency	EIRP	Limit	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
( MHz )	( dBm )	( dBm )	Reading	Power	loss	Gain	(H/V)	
			(dBm)	(dBm)	(dB)	(dBi)		
3760	-36.07	-13	-46.63	-40	7.17	11.1	H	Pass
5640	-45.91	-13	-57.61	-47.7	8.77	10.56	H	Pass
7520	-43.11	-13	-54.31	-40.3	10.21	7.4	H	Pass
9400	-46.05	-13	-59.17	-44.2	11.61	9.76	H	Pass



Vertical Polarization



Date: 2007-11-08

Trace: (Discrete)

Site : 03CH06-HY  
 Condition : FCC PART22/24 EIRP-071107 VERTICAL  
 EUT : Tracking system  
 Power : 120Vac/60Hz  
 Model : FG 790401  
 Mode : PCS1900 Link;Ch661+Adaptor  
 Plane : E2

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Remark
	MHz	dBm	dB	dBm	dBm	dB	
1	49.44	-36.47	-23.47	-13.00	-21.92	-14.55	Peak
2	93.99	-44.88	-31.88	-13.00	-36.36	-8.53	Peak
3	211.98	-44.06	-31.06	-13.00	-35.74	-8.32	Peak
4	717.90	-65.35	-52.35	-13.00	-65.18	-0.17	Peak
5	854.40	-62.96	-49.96	-13.00	-64.47	1.50	Peak
6	978.30	-62.69	-49.69	-13.00	-65.18	2.49	Peak
7	1884.00	-34.17			-41.18	7.01	Peak
8	1928.00	-47.05	-34.05	-13.00	-54.45	7.40	Peak
9	1958.00	-49.20			-56.73	7.54	Peak
10 @	3760.00	-30.16	-17.16	-13.00	-43.47	13.32	Peak
11	5640.00	-35.14	-22.14	-13.00	-52.17	17.03	Peak
12	7520.00	-36.88	-23.88	-13.00	-54.30	17.42	Peak
13	9400.00	-39.74	-26.74	-13.00	-58.54	18.79	Peak

Remark:

- #7: MS Signal
- #9: BS Signal
- There is no more obvious emission except the listings above.

Frequency (MHz)	EIRP (dBm)	Limit (dBm)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
3760	-32.07	-13	-43.47	-36	7.17	11.1	V	Pass
5640	-40.31	-13	-52.17	-42.1	8.77	10.56	V	Pass
7520	-43.31	-13	-54.3	-40.5	10.21	7.4	V	Pass
9400	-45.65	-13	-58.57	-43.8	11.61	9.76	V	Pass

## 4.7 Frequency Stability (Temperature Variation)

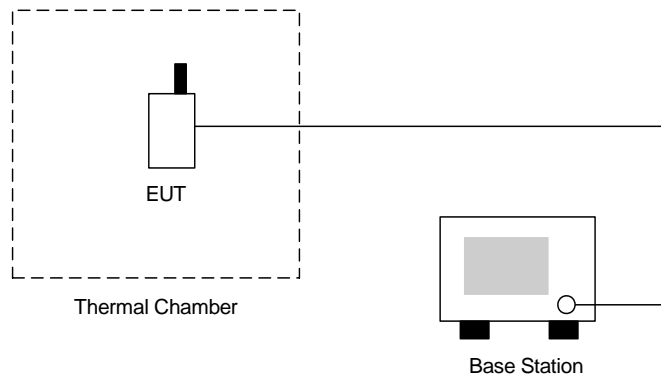
### 4.7.1 Measurement Instrument

As described in chapter 5 of this test report.

### 4.7.2 Test Procedure

- a. The EUT and test equipment were set up as shown on the following section.
- b. With all power removed, the temperature was decreased to  $-30^{\circ}\text{C}$  and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.
- c. With power OFF, the temperature was raised in  $10^{\circ}\text{C}$  steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.
- d. The temperature tests were performed for the worst case.
- e. Test data was recorded.

### 4.7.3 Test Setup Layout





4.7.4 Test Result

• Test Mode : GSM850 CH189

Temperature(°C)	Change (Hz)	Change (ppm)	Limit (ppm)	Result
-30	42	0.02	2.5	Passed
-20	34	0.04		
-10	37	0.04		
0	33	0.04		
10	30	0.04		
20	38	0.04		
30	32	0.04		
40	28	0.03		
50	33	0.04		

• Test Mode : PCS1900 CH661

Temperature(°C)	Change (Hz)	Change (ppm)	Limit (ppm)	Result
-30	-32	-0.02	2.5	Passed
-20	21	0.01		
-10	25	0.01		
0	-25	-0.01		
10	-28	-0.01		
20	-24	-0.01		
30	32	0.02		
40	-35	-0.02		
50	30	0.02		



## 4.8 Frequency Stability (Voltage Variation)

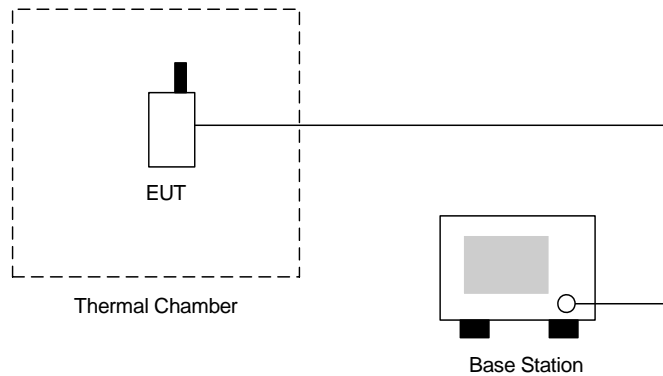
### 4.8.1 Measurement Instrument

As described in chapter 5 of this test report.

### 4.8.2 Test Procedure

- a. The EUT was placed in a temperature chamber at  $25\pm 5^{\circ}\text{C}$  and connected as the following section.
- b. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
- c. The variation in frequency was measured for the worst case.

### 4.8.3 Test Setup Layout



### 4.8.4 Test Result

- Test Mode : GSM850 CH189

Voltage(Volt)	Change (Hz)	Change (ppm)	Limit (ppm)	Result
3.7	39.0	0.05	2.5	Passed
BEP	22.0	0.03		
4.2	35.0	0.04		

- Test Mode : PCS1900 CH661

Voltage(Volt)	Change (Hz)	Change (ppm)	Limit (ppm)	Result
3.7	24.0	0.01	2.5	Passed
BEP	31.0	0.02		
4.2	-22.0	-0.01		

Remark:

1. Normal Voltage=3.7V.
2. Battery End Point (BEP)= 3.5V.



## 5. List of Measurement Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
Spectrum Analyzer	Agilent	E4408B	MY44211028	9KHz-26.5GHz	Oct. 17, 2007	Oct. 16, 2008	Radiation (03CH06-HY)
EMI Test Receiver	R&S	ESCS30	100356	9KHz-2.75GHz	Jul. 26, 2007	Jul. 25, 2008	Radiation (03CH06-HY)
Double Ridge Horn Antenna	Com-Power	AH118	071025	1G~18G	Jun. 04, 2007	Jun. 03, 2008	Radiation (03CH06-HY)
SHF-EHF Horn	SCHWARZBECK	BBHA 9170	9170-249	14G - 40G	Nov. 20, 2006	Nov. 19, 2008	Radiation (03CH06-HY)
Base Station Simulator	R & S	CMU200	103937	Third-Band	Oct. 19, 2007	Oct. 18, 2008	Radiation (03CH06-HY)
Thermal	Tenyi technology	TTH-D35P	TBN-930701	N/A	Aug. 02, 2007	Aug. 01, 2008	Conduction (TH02-HY)
Spectrum	R&S	FSP40	100055	9KHz~40GHz	Jun. 25, 2007	Jun. 24, 2008	Conduction (TH02-HY)
Bluetooth Test	ANRITSU	MT8852A	6K00003939	N/A	N/A	N/A	Conduction (TH02-HY)
Power Divider	ARRA	5200-1	3871	N/A	Oct. 01, 2007	Sep. 30, 2008	Conduction (TH02-HY)
DC Power Supply	TOPWARD	3303D	740889	N/A	May 25, 2007	May 24, 2009	Conduction (TH02-HY)
Power Meter	Agilent	E4416A	GB41292344	N/A	Feb. 08, 2007	Feb. 07, 2008	Conduction (TH02-HY)
Power Sensor	Agilent	E9327A	US40441548	N/A	Feb. 08, 2007	Feb. 07, 2008	Conduction (TH02-HY)



## 6. Uncertainty Evaluation

### Uncertainty of Radiated Emission Measurement (30MHz ~ 1000MHz)

Contribution	Uncertainty of $x_i$		$u(x_i)$
	dB	Probability Distribution	
Receiver reading	0.41	Normal(k=2)	0.21
Antenna factor calibration	0.83	Normal(k=2)	0.42
Cable loss calibration	0.25	Normal(k=2)	0.13
Pre Amplifier Gain calibration	0.27	Normal(k=2)	0.14
Rcv/SPA specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site imperfection	1.43	Rectangular	0.83
Mismatch	+0.39/-0.41	U-shaped	0.28
<b>Combined standard uncertainty Uc(y)</b>	<b>1.27</b>		
<b>Measuring uncertainty for a level of confidence of 95% U=2Uc(y)</b>	<b>2.54</b>		

### Uncertainty of Radiated Emission Measurement (1GHz ~ 40GHz)

Contribution	Uncertainty of $x_i$		$u(x_i)$	$C_i$	$C_i * u(x_i)$
	dB	Probability Distribution			
Receiver reading	±0.10	Normal(k=1)	0.10	1	0.10
Antenna factor calibration	±1.70	Normal(k=2)	0.85	1	0.85
Cable loss calibration	±0.50	Normal(k=2)	0.25	1	0.25
Receiver Correction	±2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	±1.50	Rectangular	0.87	1	0.87
Site imperfection	±2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR $\Gamma_1 = 0.197$ Antenna VSWR $\Gamma_2 = 0.194$ Uncertainty = $20 \log(1 - \Gamma_1 * \Gamma_2 * \Gamma_3)$	+0.34/-0.35	U-shaped	0.244	1	0.244
<b>Combined standard uncertainty Uc(y)</b>	<b>2.36</b>				
<b>Measuring uncertainty for a level of confidence of 95% U=2Uc(y)</b>	<b>4.72</b>				

END OF TEST REPORT