



# FCC Test Report

According to

**47 CFR Part 22H, 24E**

**Equipment** : Point of Sale Terminal  
**Trade Name** : VeriFone  
**Model No.** : VX510  
**FCC ID** : B32VX510G  
**Tx Frequency Range** : GSM850 : 824.2 ~ 848.8 MHz  
GSM1900 : 1850.2 ~ 1909.8 MHz  
**Max. ERP/EIRP Power** : GSM850 : 0.36 W  
GSM1900 : 0.91 W  
**Emission Designator** : 300KGXW  
**Applicant** : VeriFone Inc.  
3755 ATHERTON RD, ROCKLIN, CA 95765, USA

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- The data shown in this test report was finished on Sep. 02, 2008 at **Sporton International Inc. LAB.**
- Report No.: FG870133-01, Report Version: Rev. 01.

Roy Wu  
Manager

**SPORTON International Inc.**

**No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.**

SPORTON International Inc.

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Report Version: Rev. 01



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**Appendix A. Photographs of EUT**

**Appendix B. Setup Photographs**



## History of This Test Report

Report Issue Date: Sep. 03, 2008

Report No.	Description



## 1. General Information

### 1.1 Applicant

VeriFone Inc.  
3755 AHERTON RD, ROCKLIN, CA 95765, USA

### 1.2 Manufacturer

Sanmina-SCI Systems (Kunshan) Co., Ltd.  
312, Qing Yang South Road, Economics and Technical Development Zone, Kunshan, Jiangsu Province,  
China 215300

### 1.3 Basic Description of Equipment under Test

<b>Equipment</b>		Point of Sale Terminal
<b>Trade Name</b>		VeriFone
<b>Model Name</b>		VX510
<b>FCC ID</b>		B32VX510G
<b>Adapter A</b>	<b>Brand Name</b>	VeriFone
	<b>Model Name</b>	Au-7992n
	<b>Power Rating</b>	I/P:100-240Vac, 50-60Hz, 2A; O/P: 9Vdc, 4A
	<b>Signal Line Type</b>	1.9 meter shielded cable with ferrite core
<b>Adapter B</b>	<b>Brand Name</b>	VeriFone
	<b>Model Name</b>	AU1360903n

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>Product Feature &amp; Specification</b>	
<b>DUT Type :</b>	Point of Sale Terminal
<b>Trade Name :</b>	VeriFone
<b>Model Name :</b>	VX510
<b>FCC ID :</b>	B32VX510G
<b>Tx Frequency :</b>	GSM850 : 824 MHz ~ 849 MHz GSM1900 : 1850 MHz ~1910 MHz
<b>Rx Frequency :</b>	GSM850 : 869 MHz ~ 894 MHz GSM1900 : 1930 MHz ~ 1990 MHz
<b>Maximum Output Power to Antenna :</b>	GSM850: 32.42 dBm GSM1900: 29.61dBm
<b>Maximum ERP/EIRP :</b>	GSM850 : 0.36 W ( 25.61 dBm) GSM1900 : 0.91 W ( 29.59 dBm)
<b>Antenna Type :</b>	Fixed Internal
<b>HW Version :</b>	DVT1
<b>SW Version :</b>	OS QJ001104
<b>Type of Modulation :</b>	GMSK
<b>Type of Emission :</b>	300KGXW
<b>DUT Stage :</b>	Identical Prototype

**1.5 Report Date**

EUT Received : Aug. 28, 2008

Report Date : Sep. 03, 2008

## 2. Test Configuration of Equipment under Test

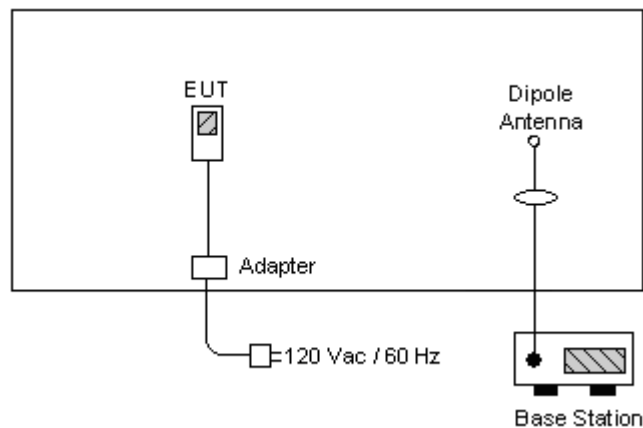
### 2.1 Test Manner

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 GSM1900.

### 2.2 Test Mode

Application	GSM850	GSM1900
Radiated Emission	<input checked="" type="checkbox"/> Mode 1: GSM Link	<input checked="" type="checkbox"/> Mode 2: GSM Link
Conducted Measurement	<input checked="" type="checkbox"/> Mode 1: GSM Link	<input checked="" type="checkbox"/> Mode 2: GSM Link

### 2.3 Connection Diagram of Test System



### 2.4 Ancillary Equipment List

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Code
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 1<sup>st</sup> 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 : 03CH07-HY, TH02-HY  
FCC Designation No : TW1022

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 GSM1900.

#### **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

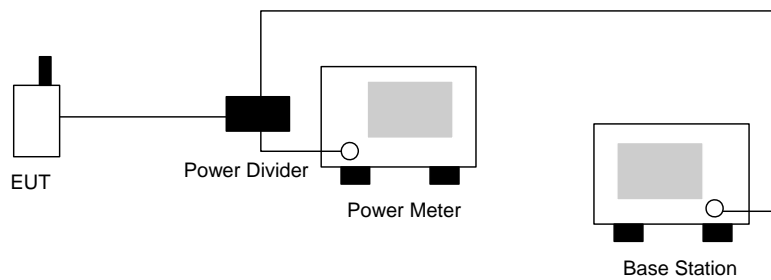
### 4.2.1 Measurement Instruments

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 GSM1900 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)	32.29	1.694
	189	836.4 (Mid)	32.42	1.746
	251	848.8 (High)	32.21	1.663
GSM1900	512	1850.2 (Low)	28.71	0.743
	661	1880.0 (Mid)	29.07	0.807
	810	1909.8 (High)	29.61	0.914



### 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.

$E_t = R_t + AF$

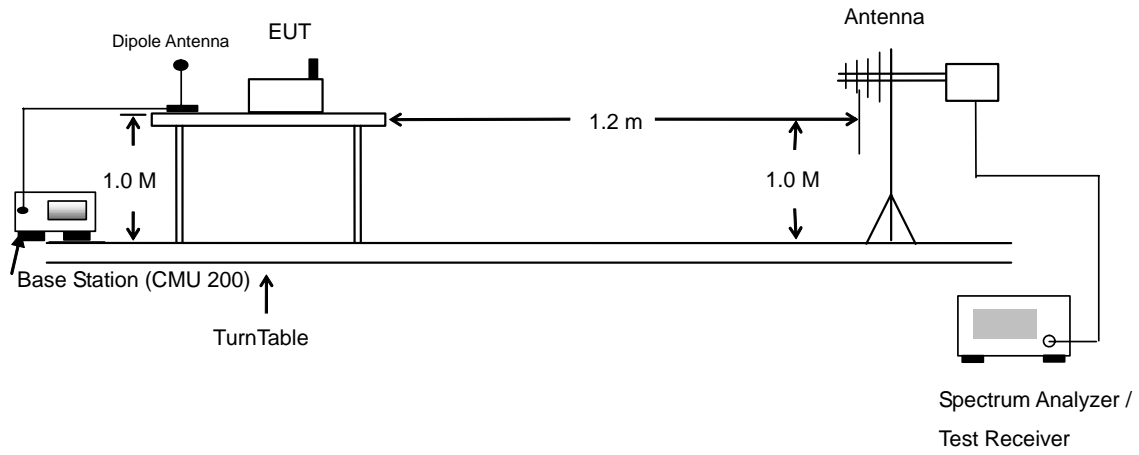
$E_s = R_s + AF$

$AF$  (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

GSM850 Radiated Power ERP						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.20	-21.98	-48.12	0.00	-1.08	25.06	0.32
836.40	-23.16	-48.28	0.00	-0.93	24.19	0.26
848.80	-21.98	-48.35	0.00	-0.76	25.61	0.36
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.20	-21.88	-47.97	0.00	-1.08	25.01	0.32
836.40	-21.81	-48.01	0.00	-0.93	25.27	0.34
848.80	-21.84	-48.05	0.00	-0.76	25.45	0.35

GSM1900 Radiated Power EIRP						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-24.31	-51.88	0.00	1.96	29.53	0.90
1880.00	-27.95	-52.99	0.00	2.00	27.04	0.51
1909.80	-28.99	-54.28	0.00	1.98	27.27	0.53
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-24.50	-52.13	0.00	1.96	29.59	0.91
1880.00	-26.51	-53.17	0.00	2.00	28.66	0.73
1909.80	-26.61	-54.13	0.00	1.98	29.50	0.89

## 4.4 Occupied Bandwidth and Band Edge Measurement

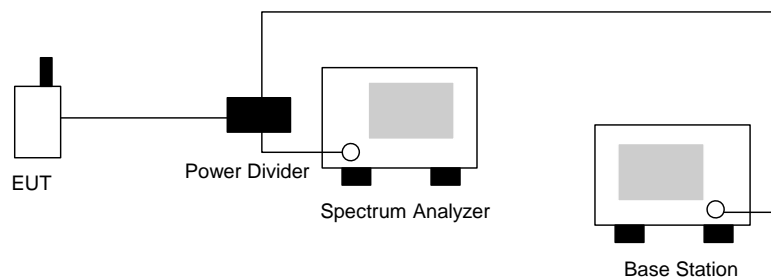
### 4.4.1 Measurement Instruments

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  $BW/100$ .

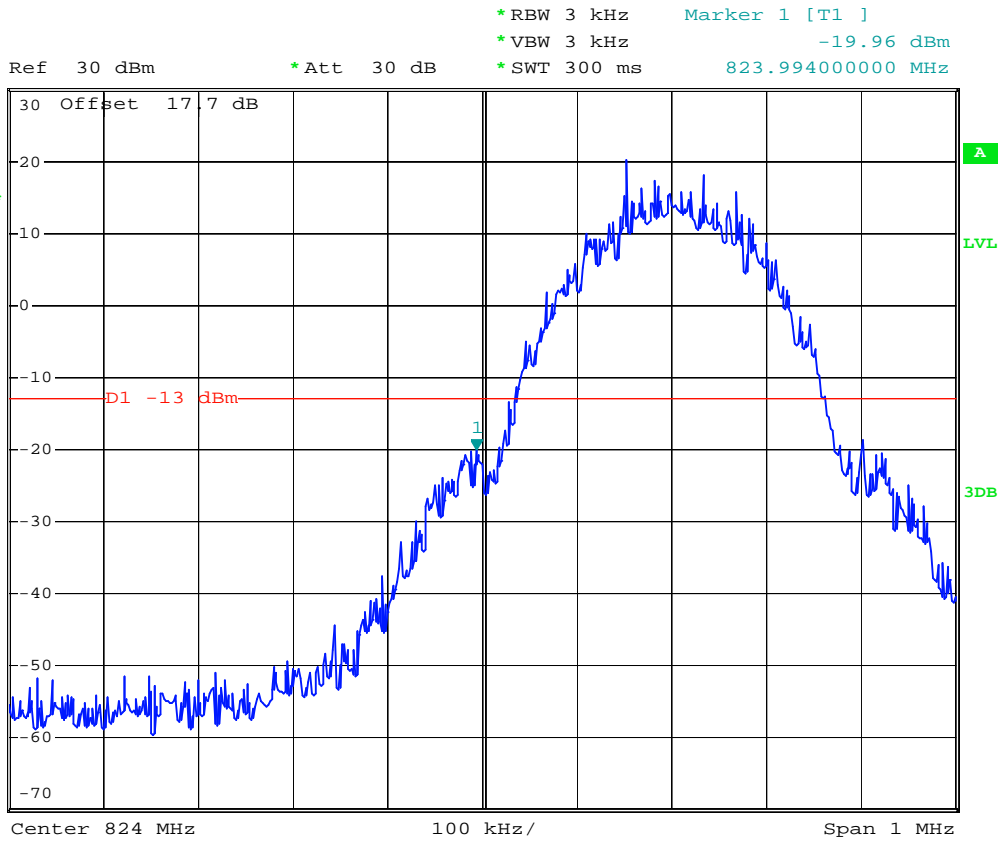
### 4.4.3 Test Setup Layout





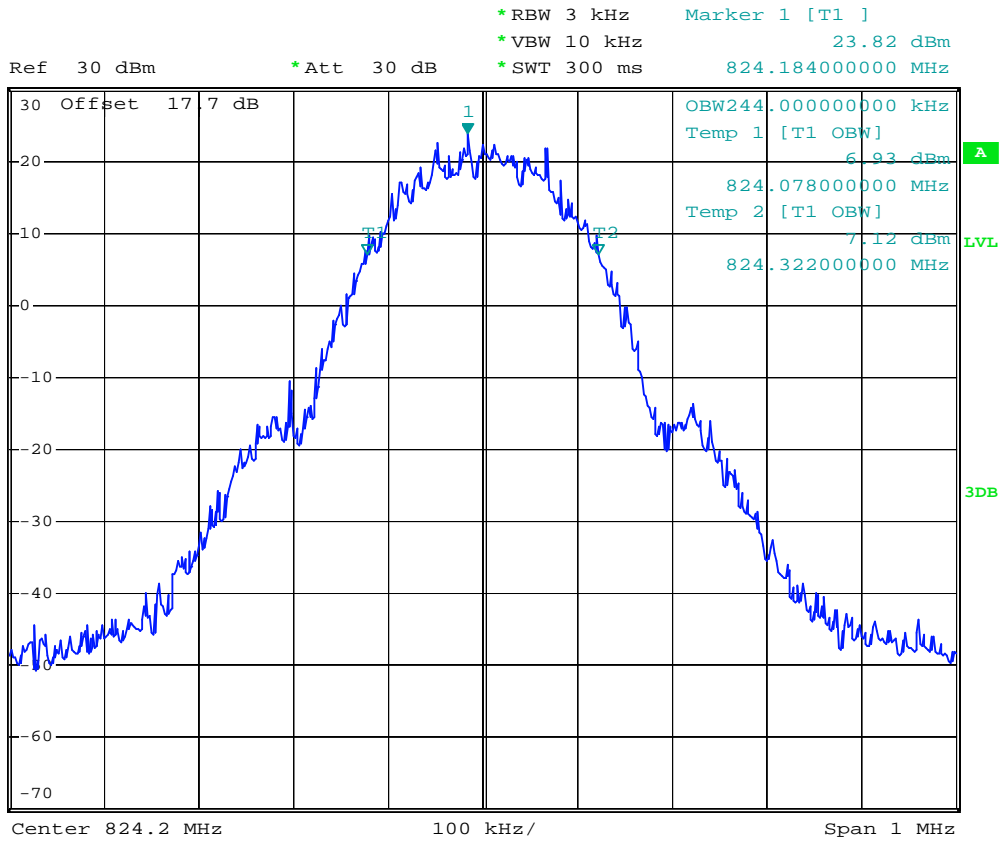
4.4.4 Test Result

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





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

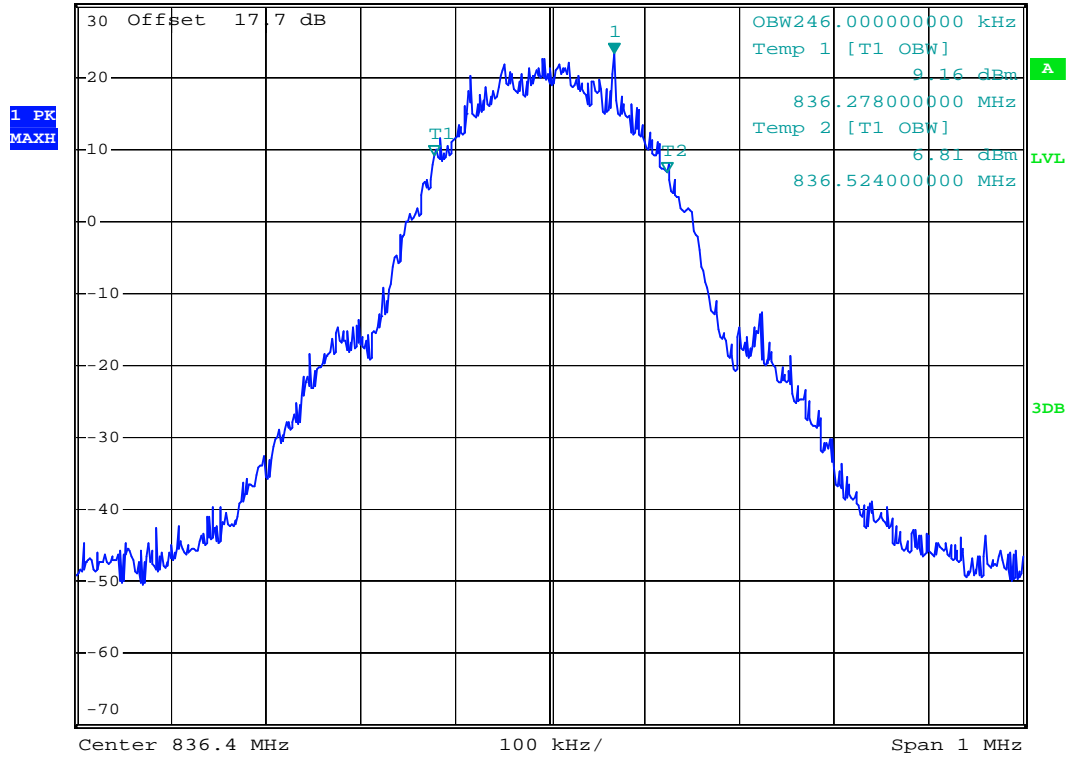




- Test Mode : GSM850 CH189 99% Occupied Bandwidth
- Power State : High



Ref 30 dBm      \*Att 30 dB      \*RBW 3 kHz      Marker 1 [T1 ]  
 \*VBW 10 kHz      23.34 dBm  
 \*SWT 300 ms      836.468000000 MHz



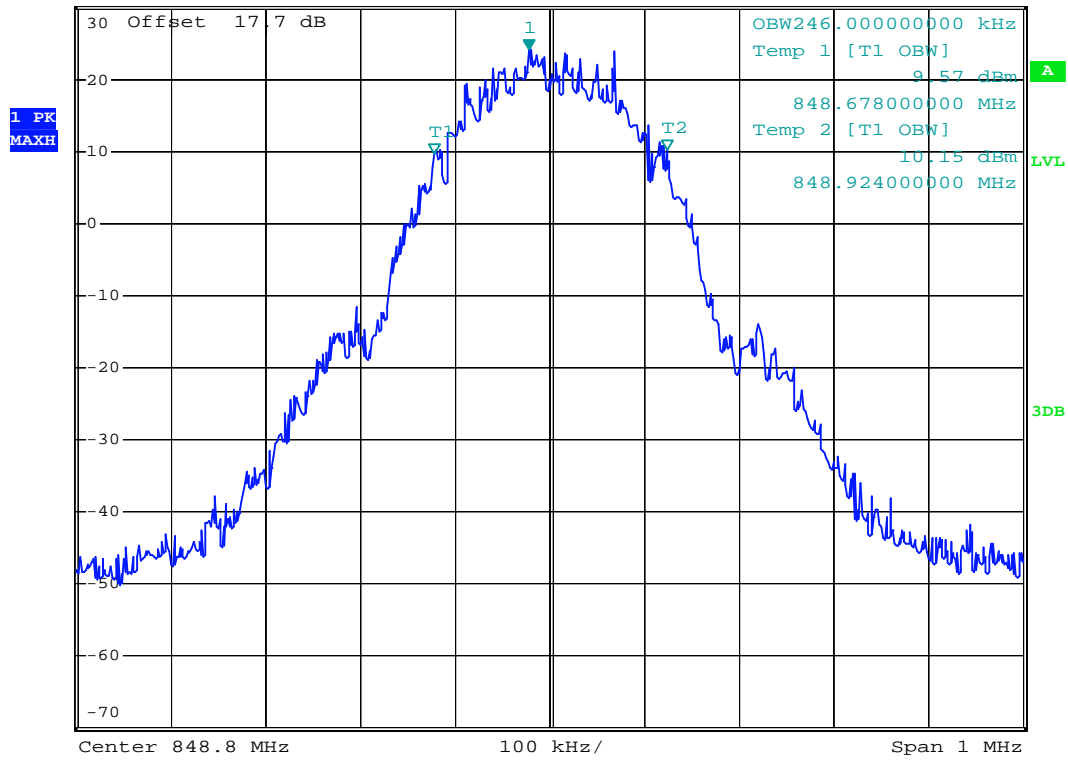




- Test Mode : GSM850 CH 251 99% Occupied Bandwidth
- Power State : High



Ref 30 dBm      \*Att 30 dB      \*RBW 3 kHz      Marker 1 [T1 ]  
 \*VBW 10 kHz      24.12 dBm  
 \*SWT 300 ms      848.778000000 MHz

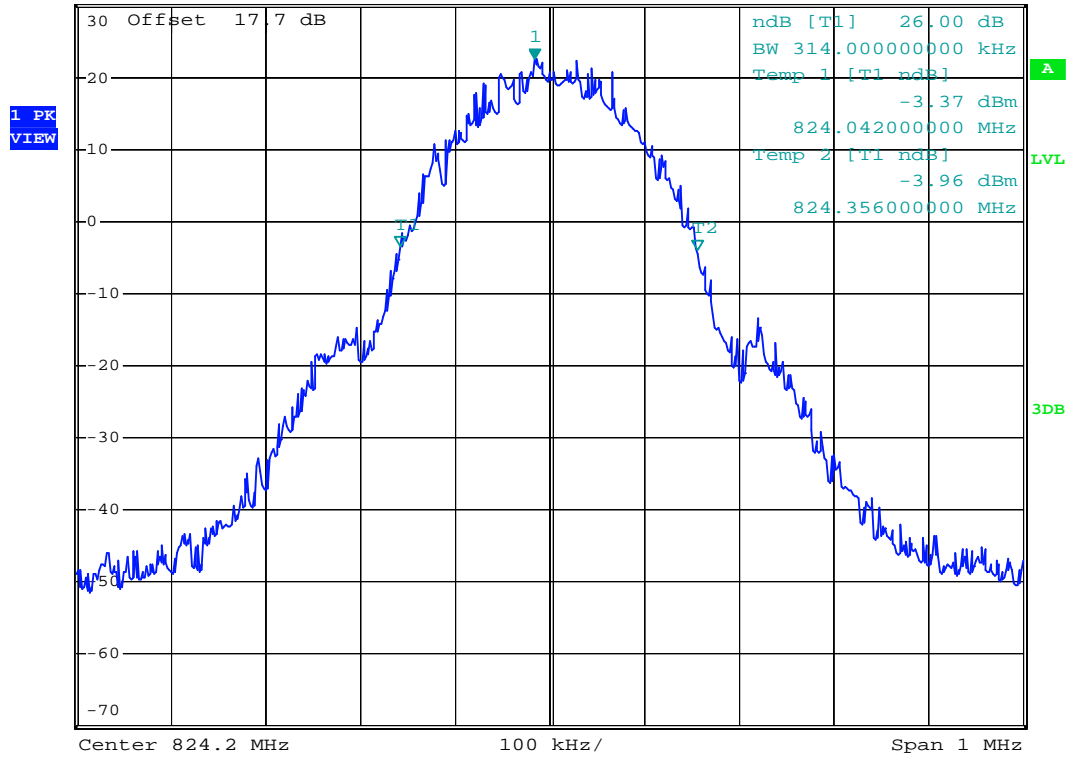




- Test Mode : GSM850 CH128 26dB Bandwidth
- Power State : High

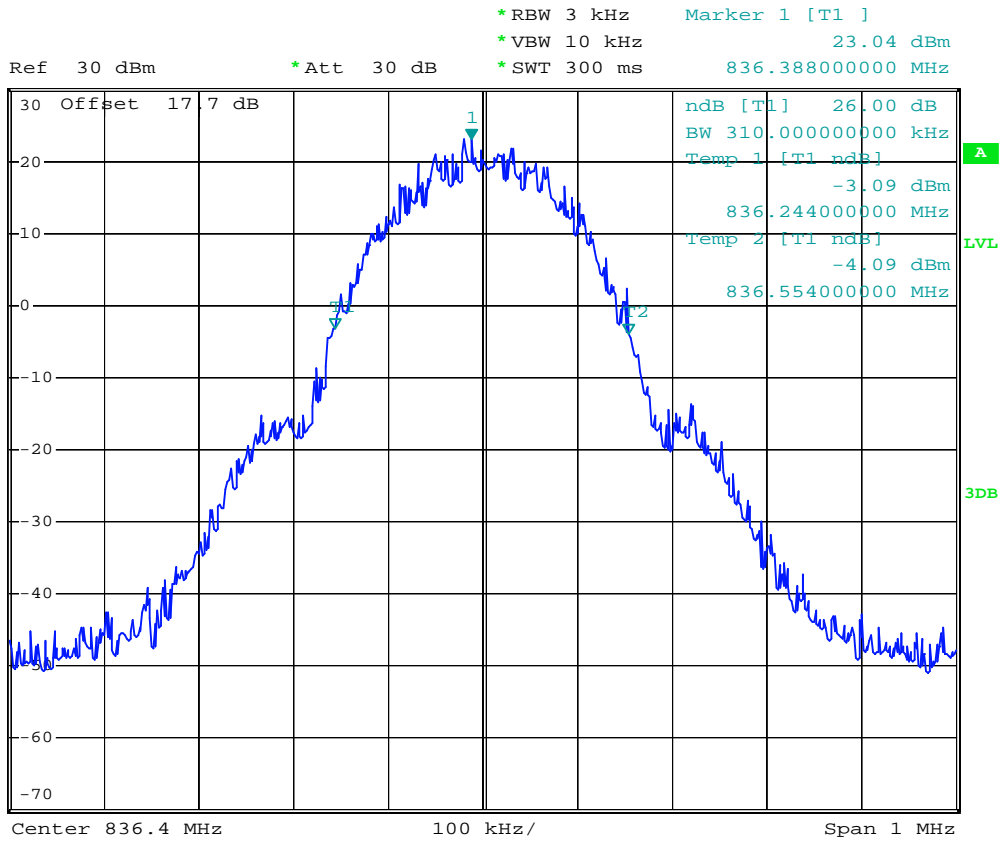


Ref 30 dBm      \*Att 30 dB      \*RBW 3 kHz      Marker 1 [T1]      \*VBW 10 kHz      22.46 dBm  
 \*SWT 300 ms      824.18400000 MHz



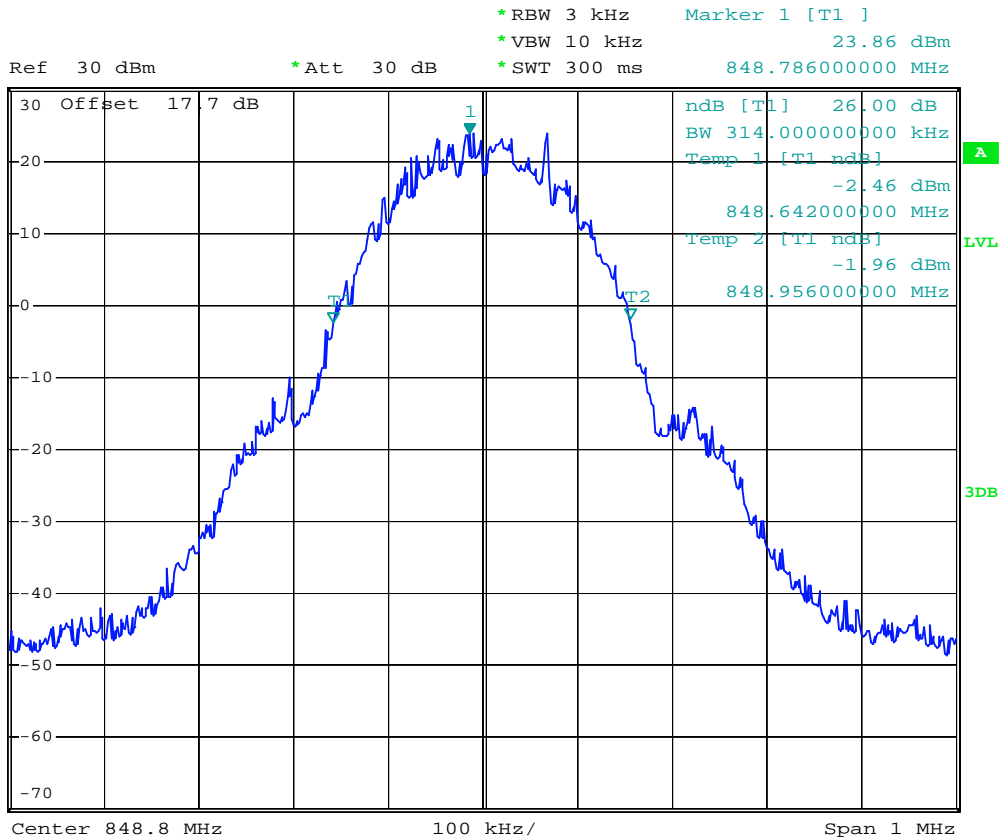


- Test Mode : GSM850 CH189 26dB Bandwidth
- Power State : High





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





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

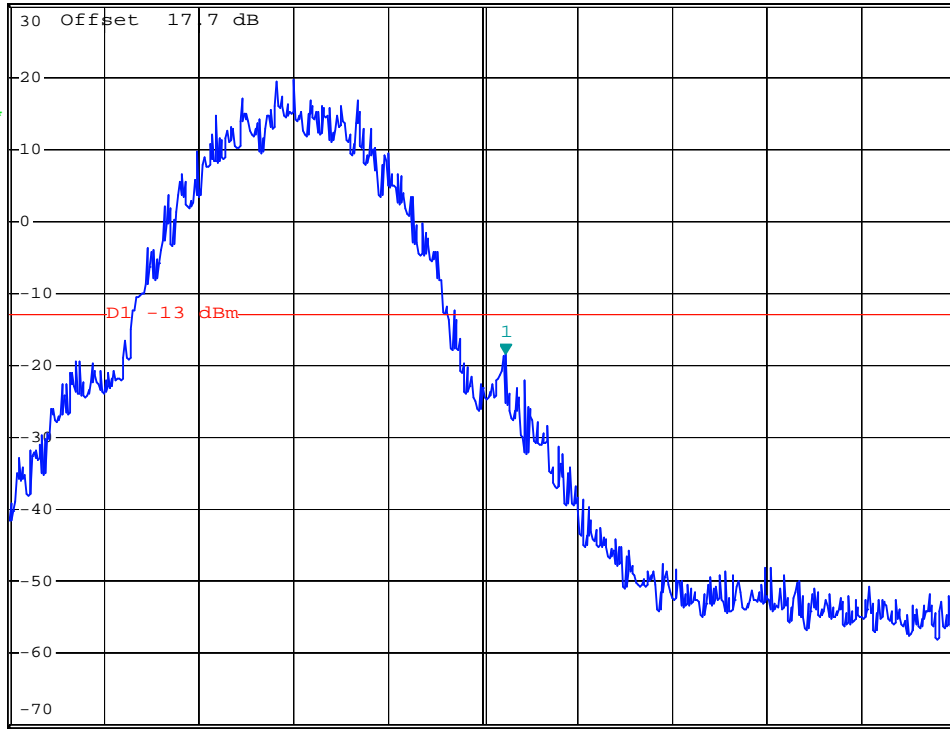


\*RBW 3 kHz      Marker 1 [T1 ]  
\*VBW 3 kHz      -18.47 dBm  
\*SWT 300 ms      849.024000000 MHz

Ref 30 dBm

\*Att 30 dB

1 AV\*  
VIEW



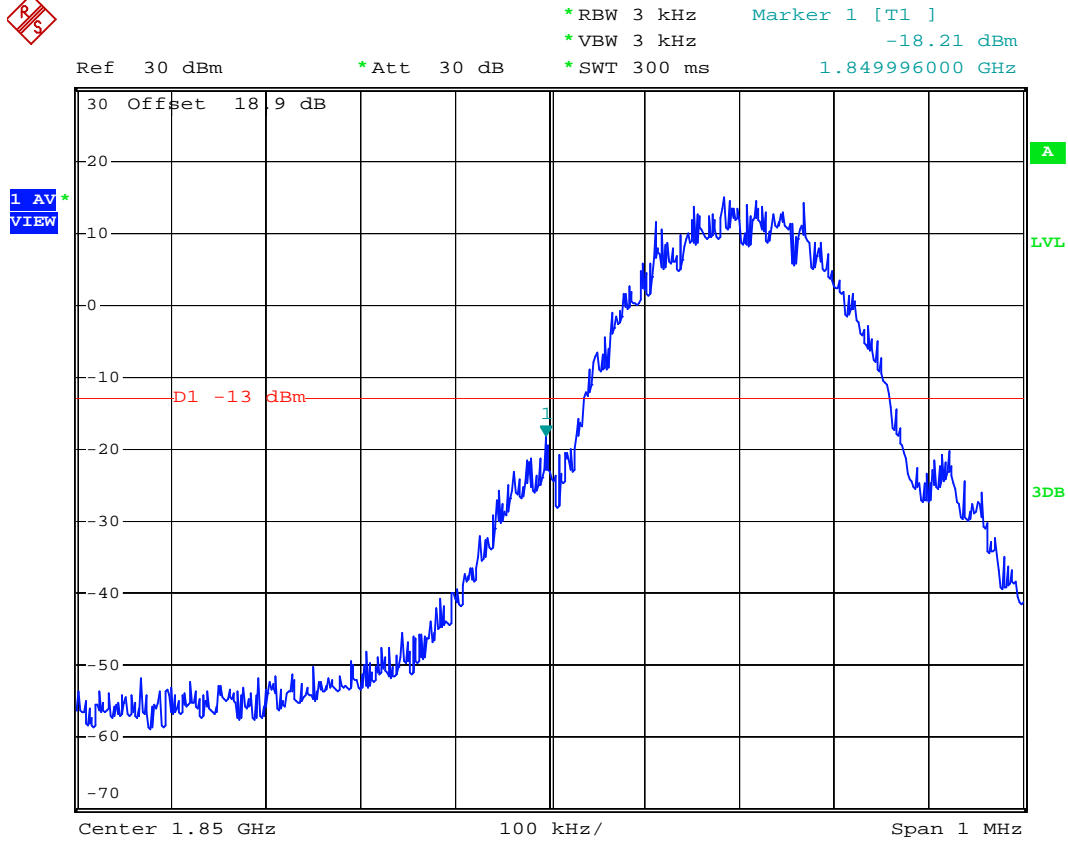
Center 849 MHz

100 kHz/

Span 1 MHz

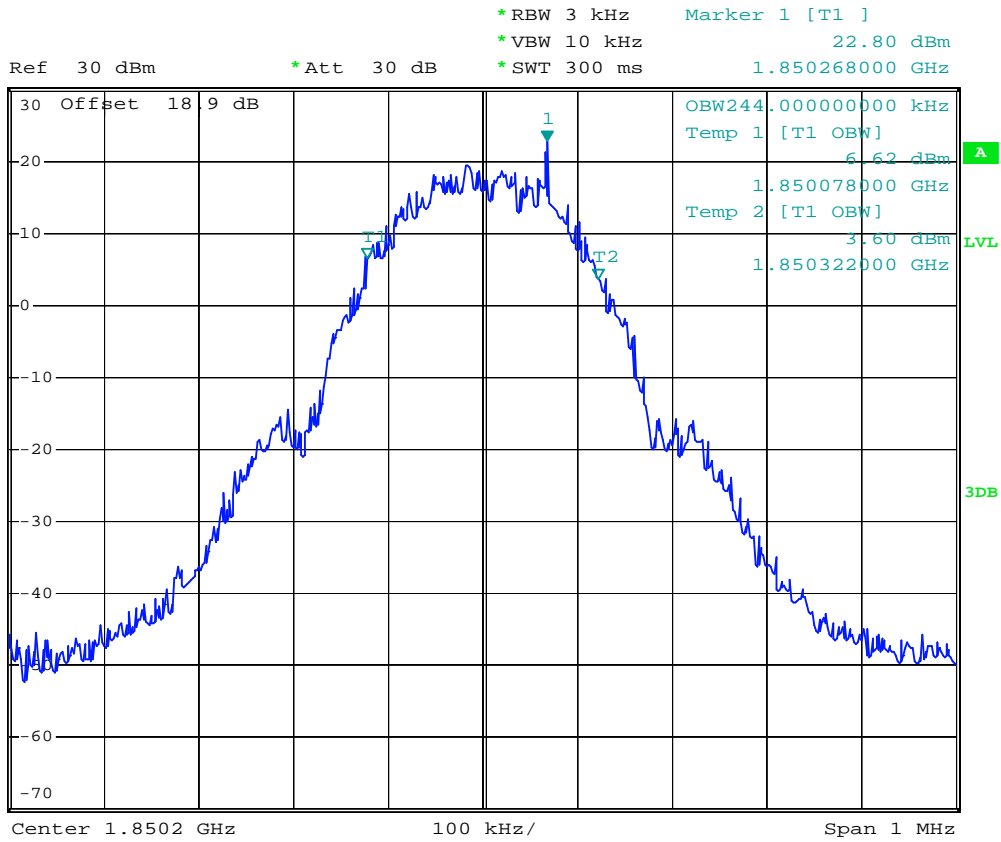


- Mode 2
- Test Mode : GSM1900 CH512 Lower Band Edge
- Power State : High



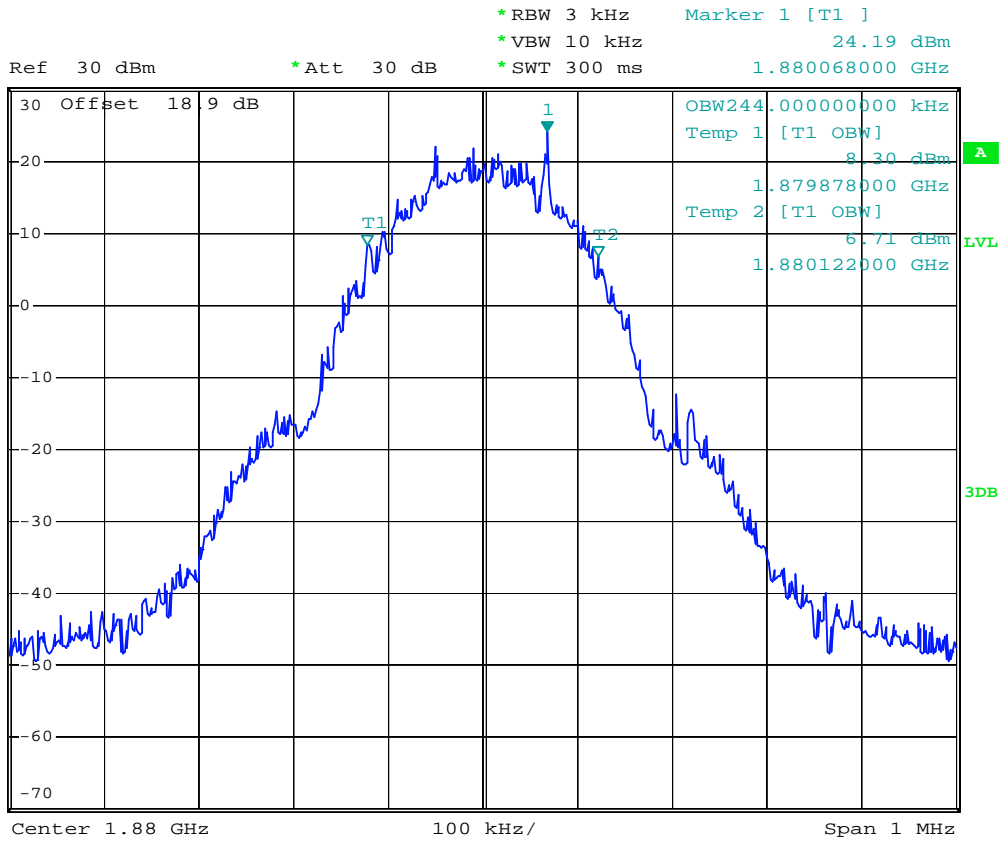


- Test Mode : GSM1900 CH512 99% Occupied Bandwidth
- Power State : High





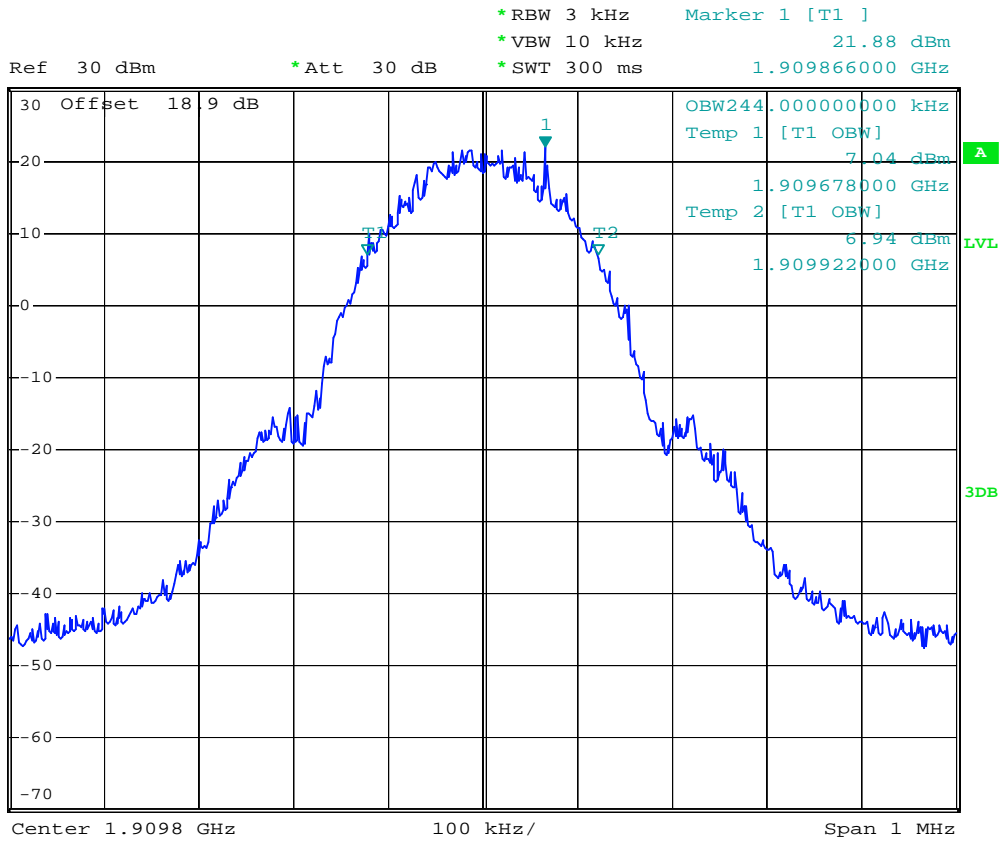
- Test Mode : GSM1900 CH661 99% Occupied Bandwidth
- Power State : High







- Test Mode : GSM1900 CH810 99% Occupied Bandwidth
- Power State : High





- Test Mode : GSM1900 CH512 26dB Bandwidth
- Power State : High

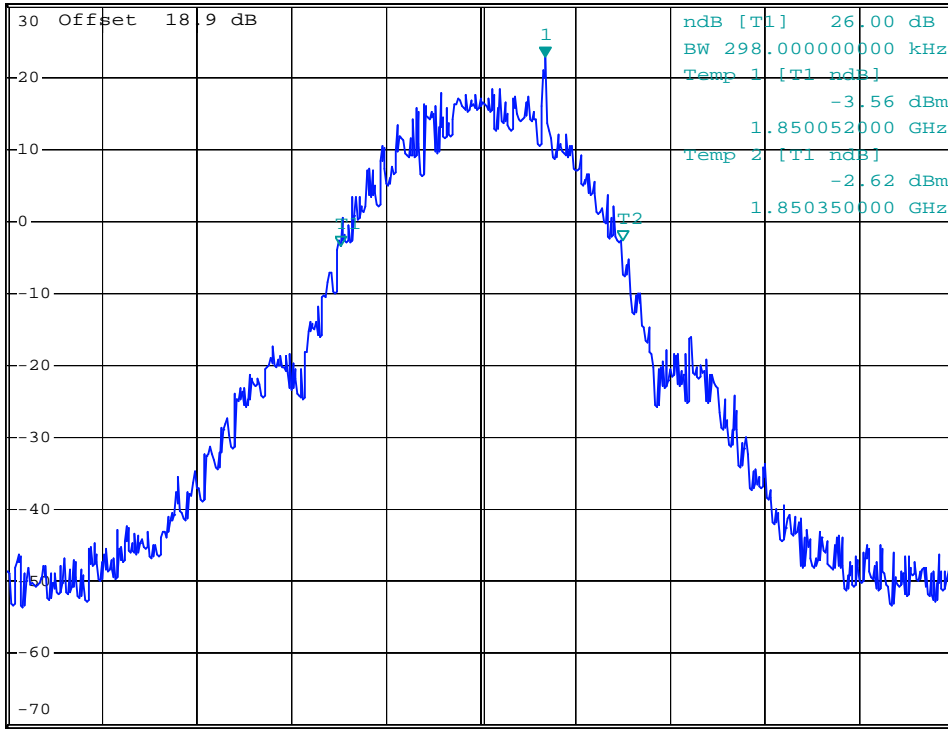


\*RBW 3 kHz      Marker 1 [T1 ]  
 \*VBW 10 kHz      22.74 dBm  
 \*SWT 300 ms      1.850268000 GHz

Ref 30 dBm

\*Att 30 dB

1 PK VIEW



Center 1.8502 GHz

100 kHz/

Span 1 MHz



- Test Mode : GSM1900 CH661 26dB Bandwidth
- Power State : High

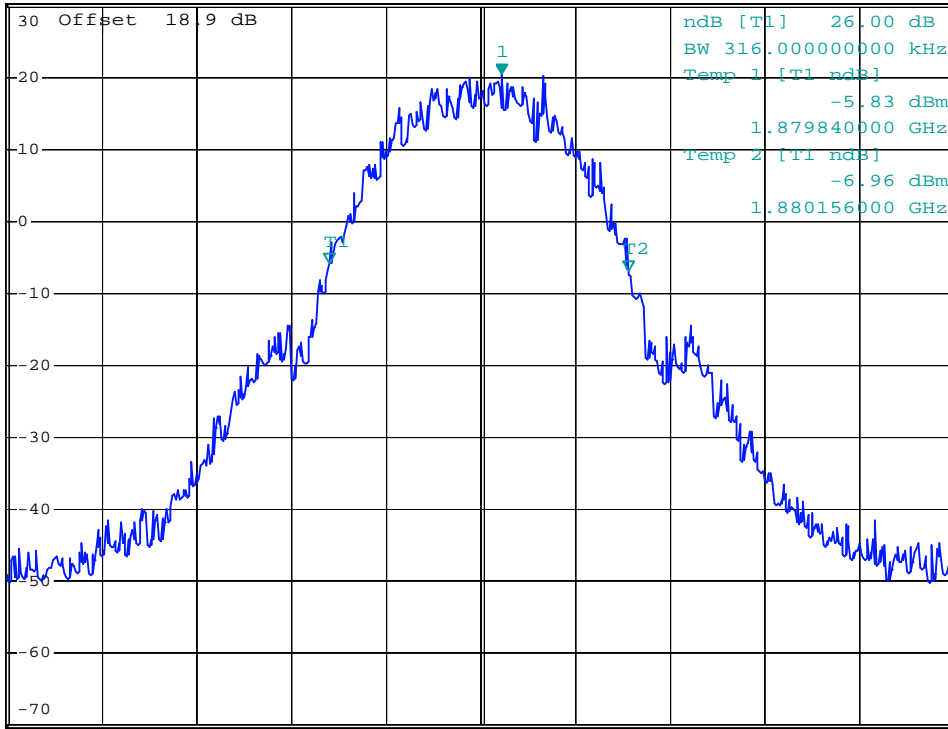


\*RBW 3 kHz      Marker 1 [T1 ]  
 \*VBW 10 kHz      20.46 dBm  
 \*SWT 300 ms      1.880022000 GHz

Ref 30 dBm

\*Att 30 dB

1 PK VIEW



Center 1.88 GHz

100 kHz/

Span 1 MHz



- Test Mode : GSM1900 CH810 26dB Bandwidth
- Power State : High

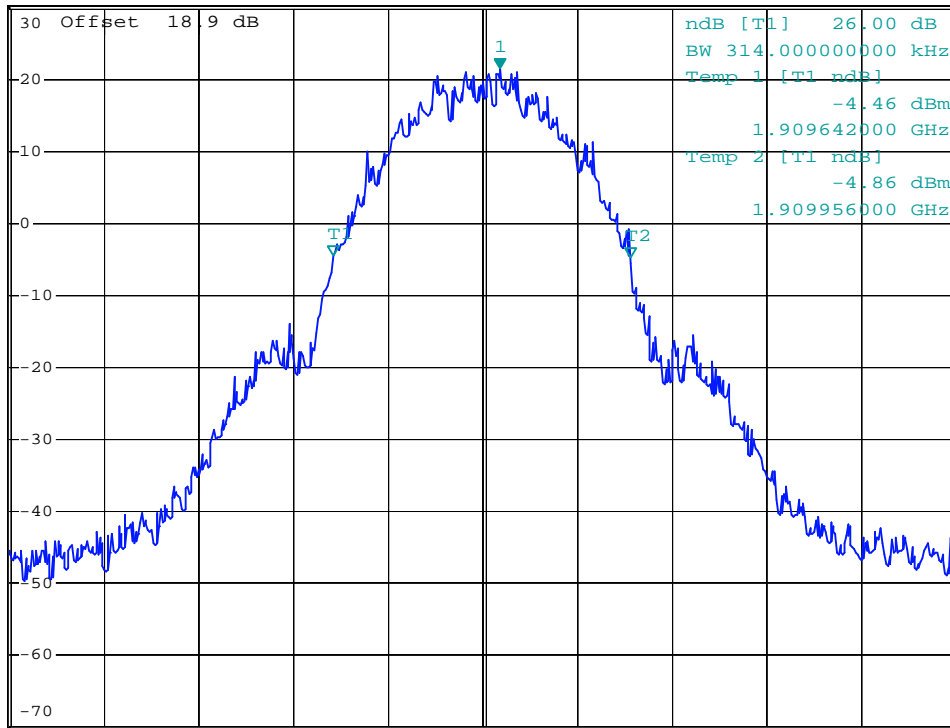


\*RBW 3 kHz      Marker 1 [T1 ]  
 \*VBW 10 kHz      21.41 dBm  
 \*SWT 300 ms      1.909818000 GHz

Ref 30 dBm

\*Att 30 dB

1 PK  
VIEW



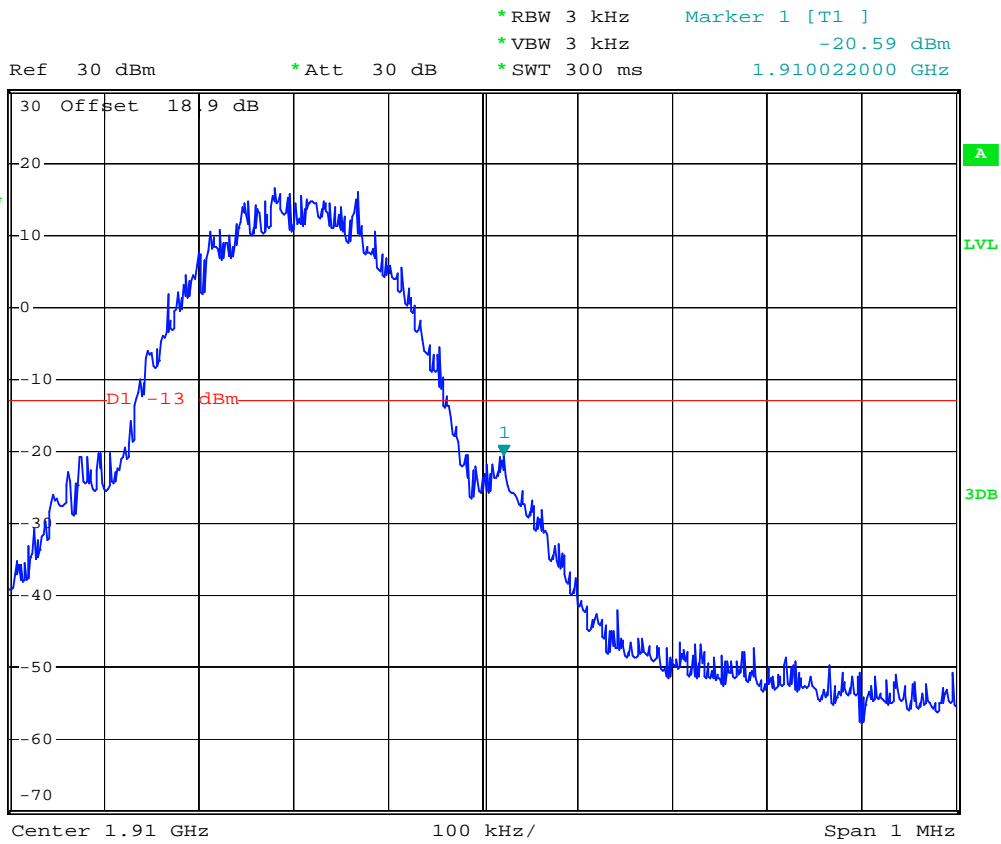
Center 1.9098 GHz

100 kHz/

Span 1 MHz



- Test Mode : GSM1900 CH810 Higher Band Edge
- Power State : High



## 4.5 Conducted Emission

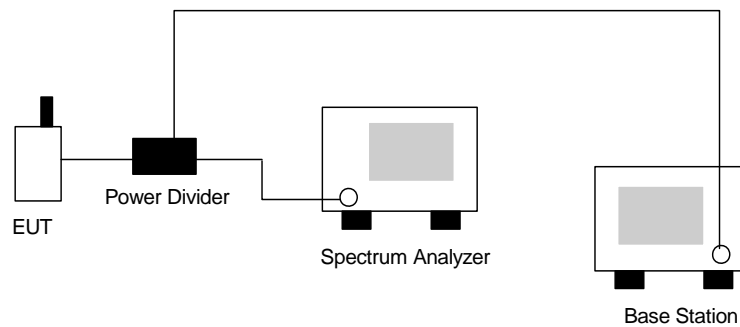
### 4.5.1 Measurement Instruments

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.

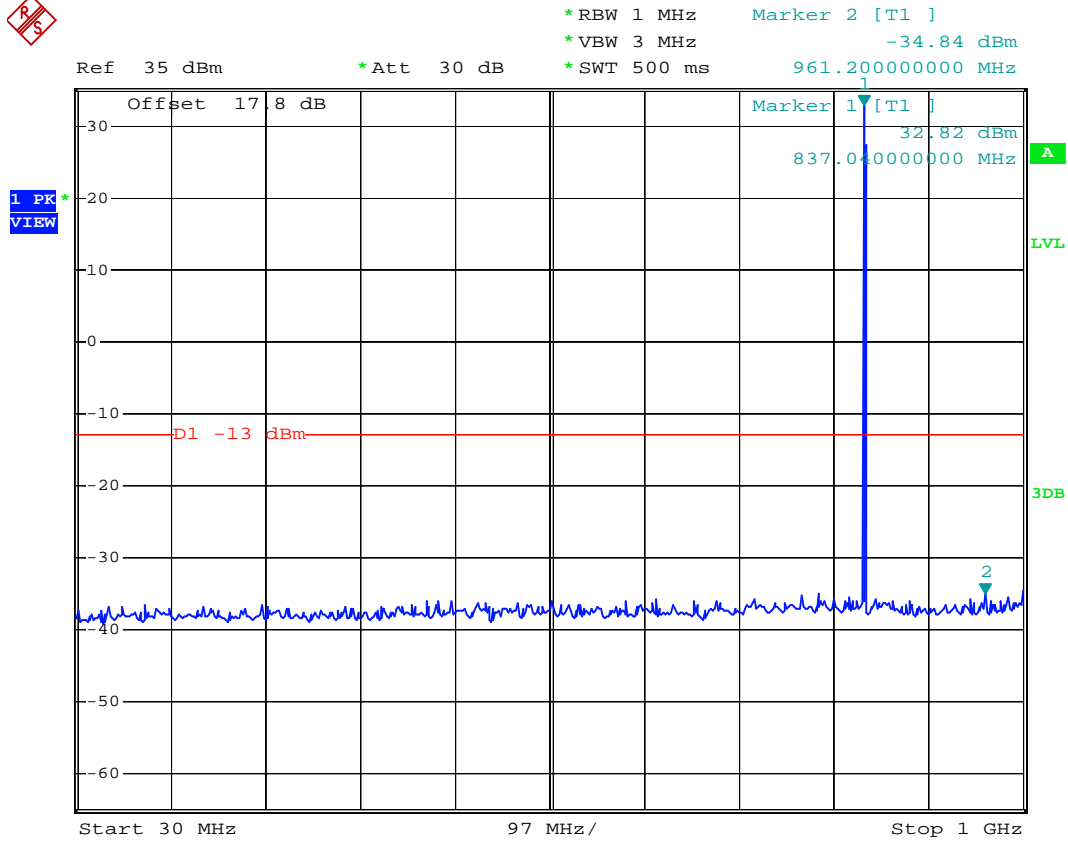
### 4.5.3 Test Setup Layout





4.5.4 Test Result

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

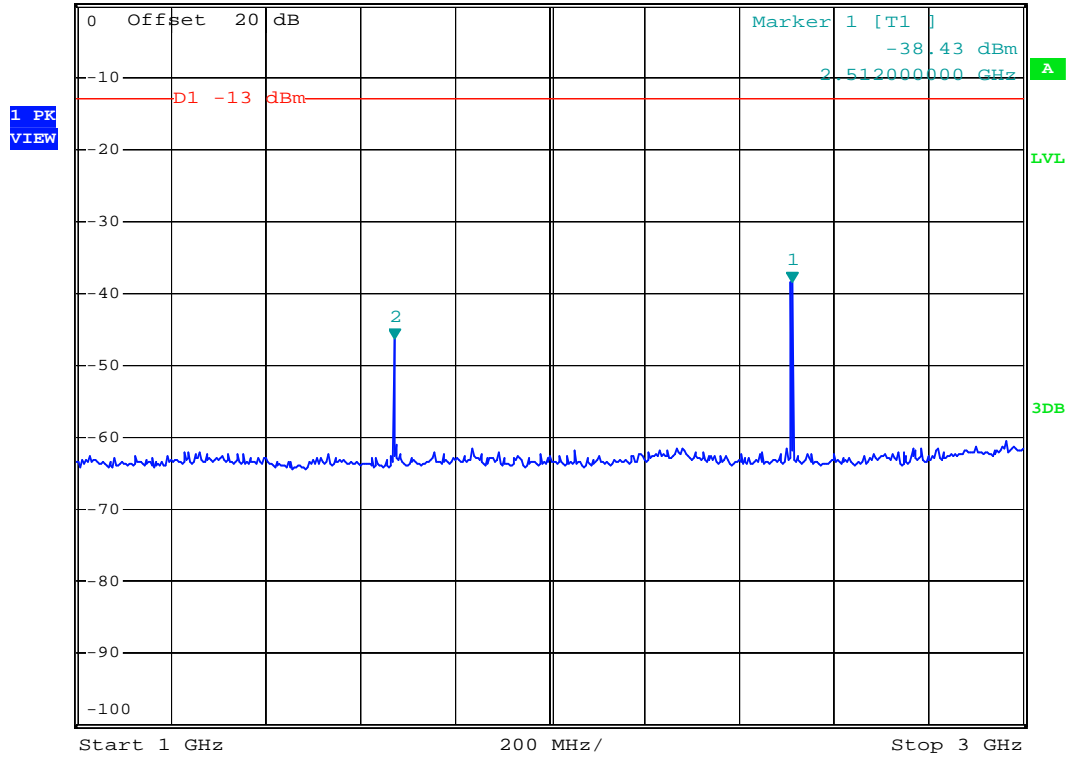




- Test Mode : GSM850 CH189
- Frequency Range : 1G-3G



Ref 0 dBm      \*Att 0 dB      \*RBW 1 MHz      Marker 2 [T1 ]  
\*VBW 3 MHz      -46.23 dBm  
\*SWT 500 ms      1.672000000 GHz







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

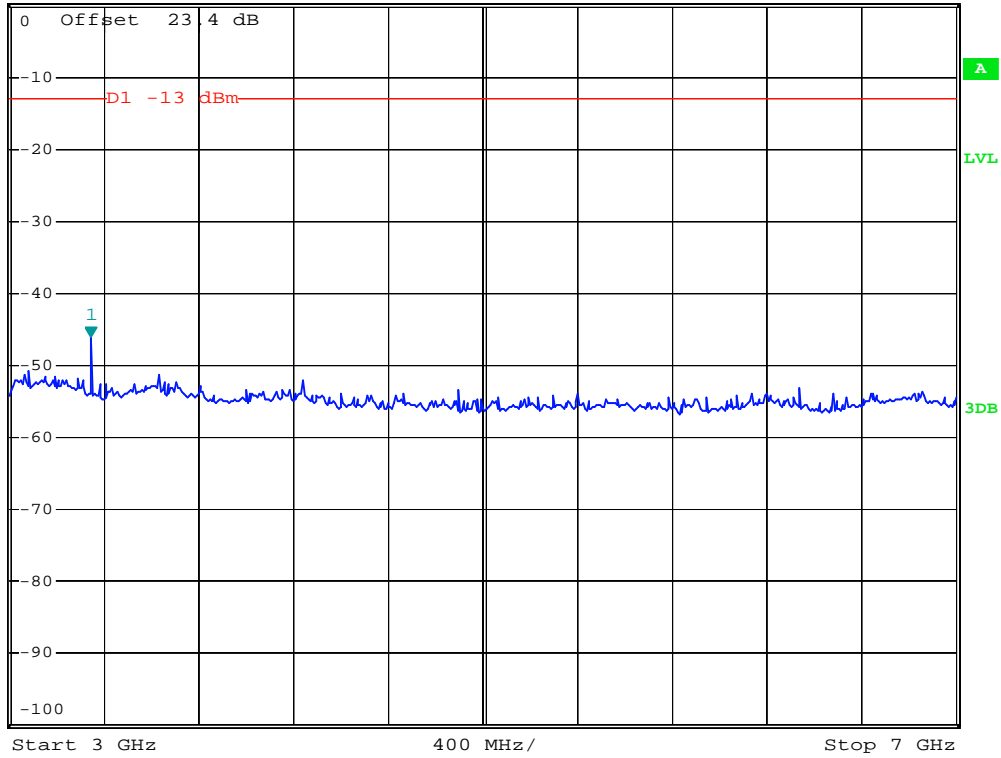


\*RBW 1 MHz      Marker 1 [T1 ]  
\*VBW 3 MHz      -46.05 dBm  
\*SWT 500 ms      3.344000000 GHz

Ref 0 dBm

\*Att 0 dB

1 PK  
VIEW





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

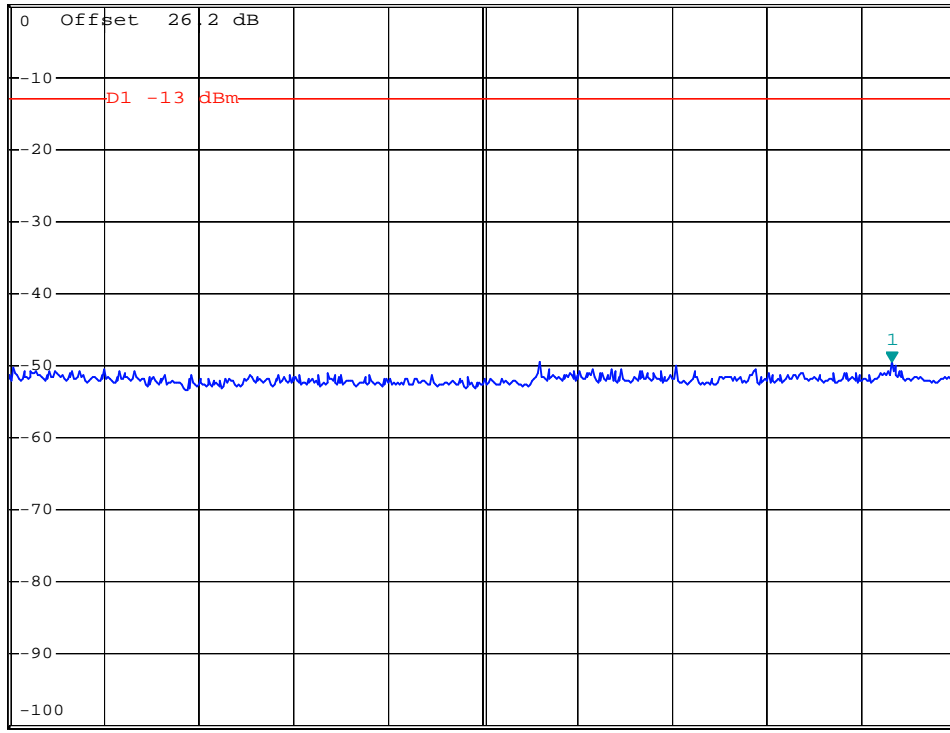


\*RBW 1 MHz      Marker 1 [T1 ]  
\*VBW 3 MHz      -49.36 dBm  
\*SWT 500 ms      8.864000000 GHz

Ref 0 dBm

\*Att 0 dB

1 PK  
VIEW



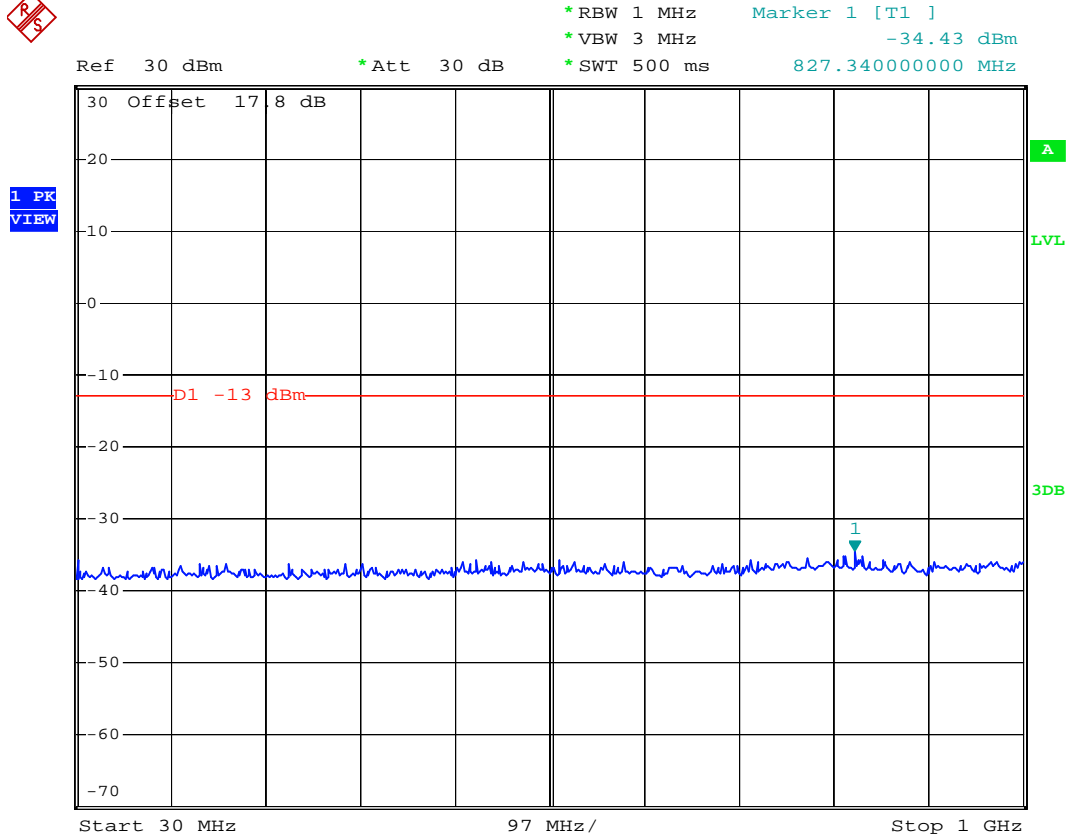
Start 7 GHz

200 MHz/

Stop 9 GHz

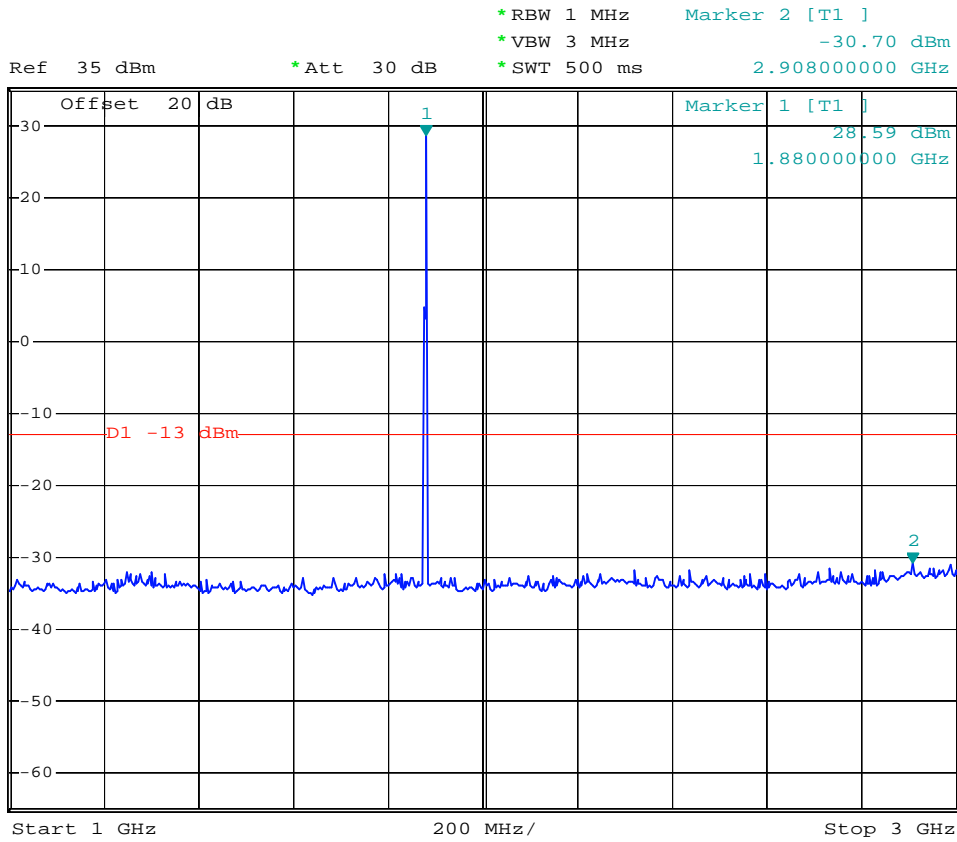


- Mode 2
- Test Mode : GSM1900 CH661
- Frequency Range : 30M-1G





- Test Mode : GSM1900 CH661
- Frequency Range : 1G-3G





- Test Mode : GSM1900 CH661
- Frequency Range : 3G-7G

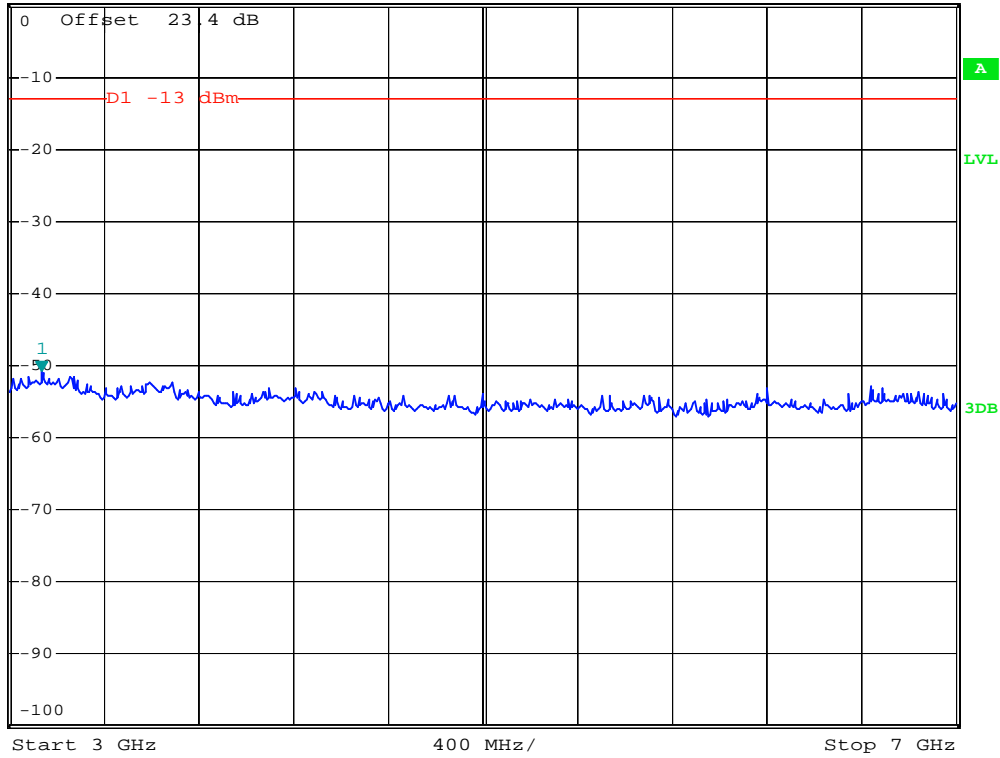


\*RBW 1 MHz      Marker 1 [T1 ]  
\*VBW 3 MHz      -50.74 dBm  
\*SWT 500 ms      3.136000000 GHz

Ref 0 dBm

\*Att 0 dB

1 PK  
VIEW





- Test Mode : GSM1900 CH661
- Frequency Range : 7G-13.6G

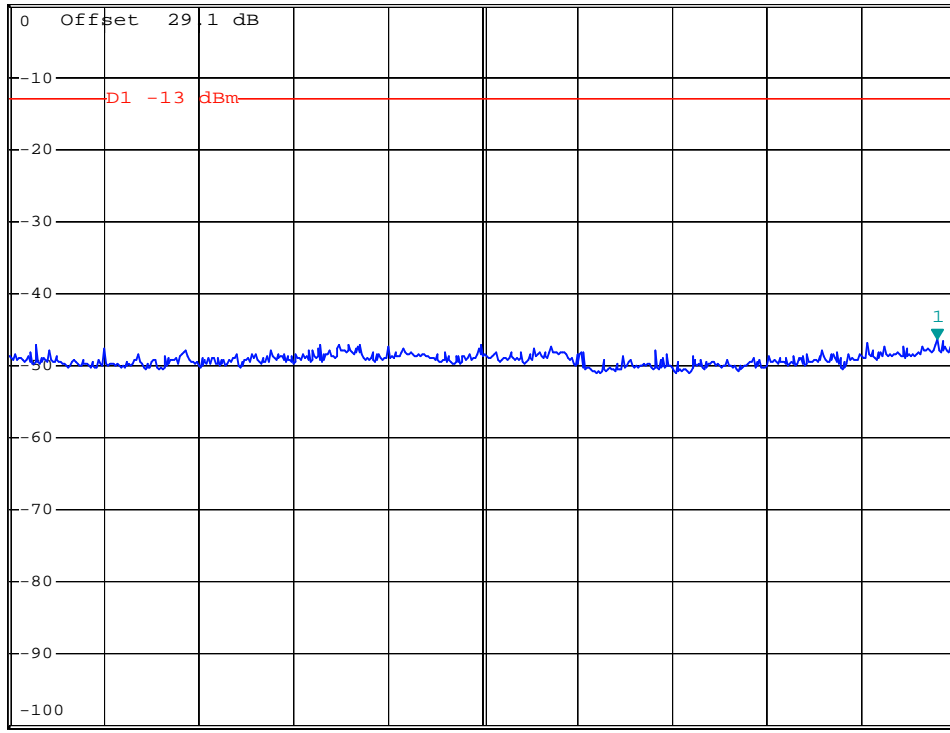


\*RBW 1 MHz      Marker 1 [T1 ]  
\*VBW 3 MHz      -46.21 dBm  
\*SWT 500 ms      13.468000000 GHz

Ref 0 dBm

\*Att 0 dB

1 PK  
VIEW



Start 7 GHz

660 MHz/

Stop 13.6 GHz



- Test Mode : GSM1900 CH661
- Frequency Range : 13.6G-19.1G

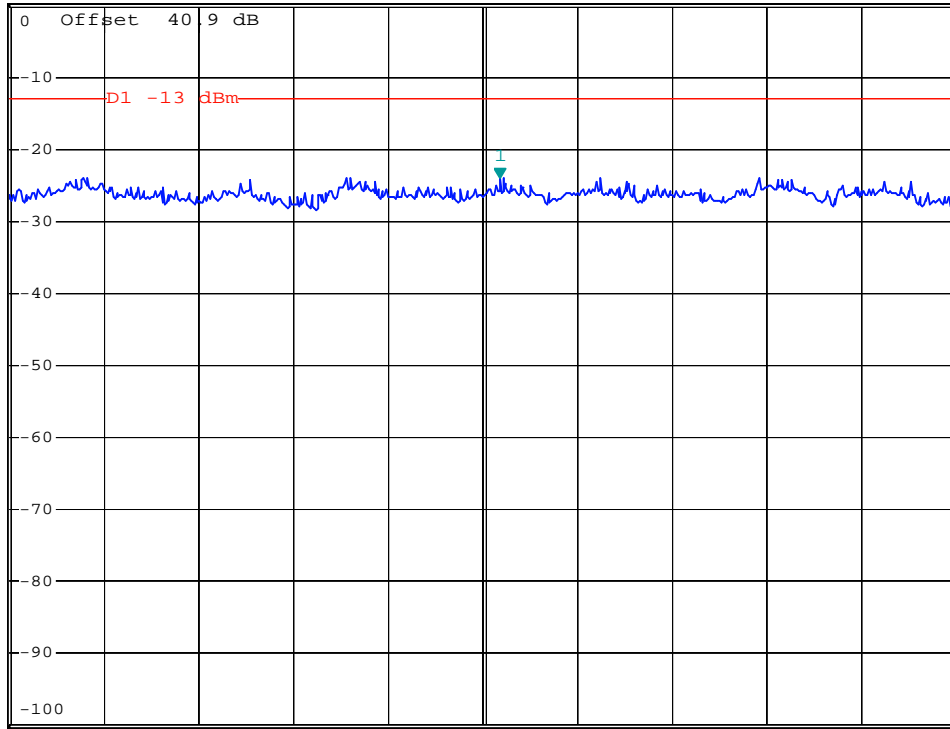


\*RBW 1 MHz      Marker 1 [T1 ]  
 \*VBW 3 MHz      -23.89 dBm  
 \*SWT 500 ms      16.449000000 GHz

Ref 0 dBm

\*Att 0 dB

1 PK VIEW



Start 13.6 GHz

550 MHz/

Stop 19.1 GHz



## **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**

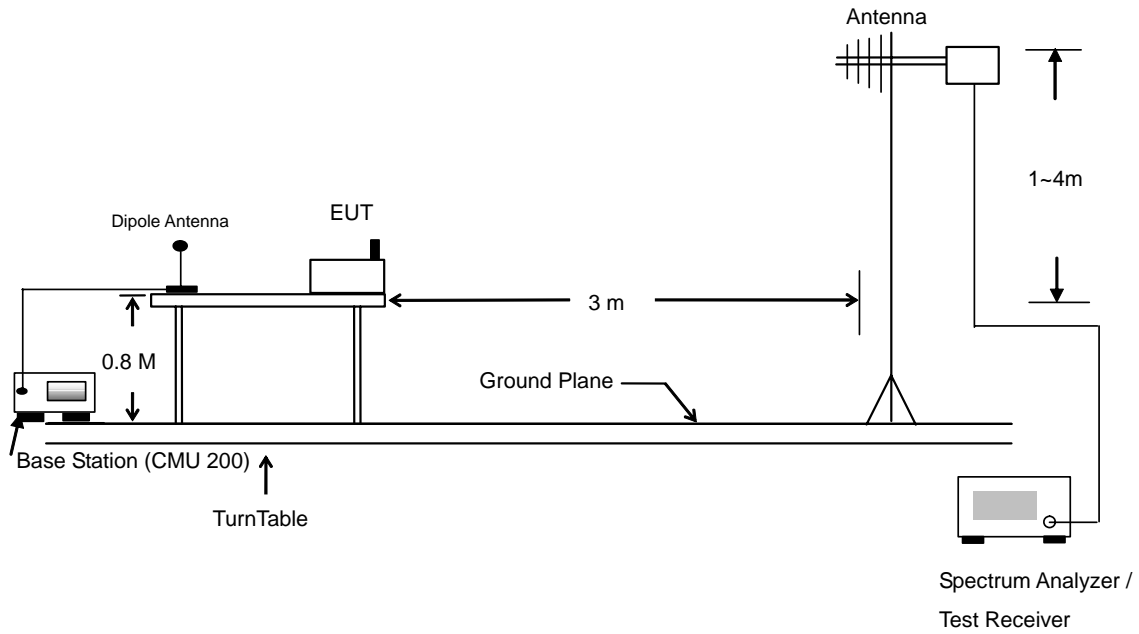
As described in chapter 5 of this test report.

### **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.



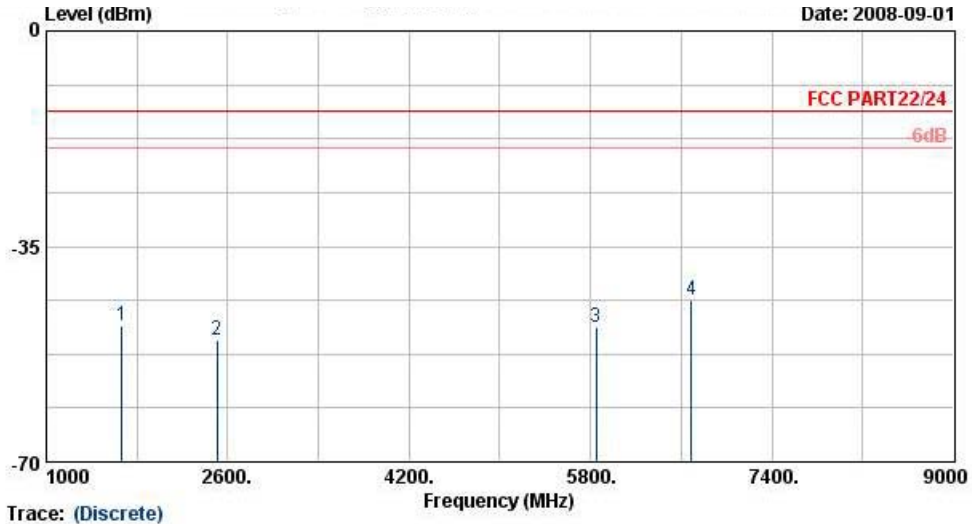
4.6.3 Test Setup Layout





4.6.4 Test Data

- Mode 1
- Horizontal Polarization



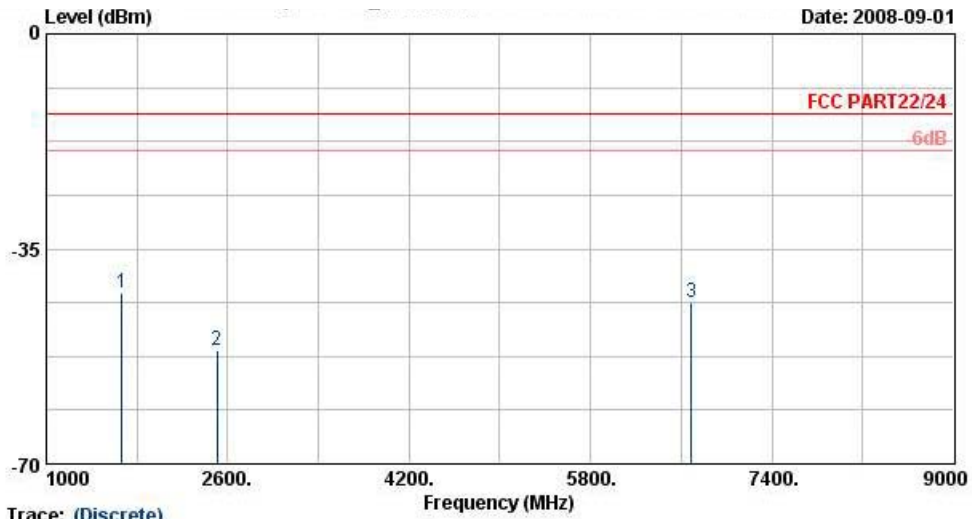
Site : 03CH07-HY  
 Condition : HF-EIRP(080306) HORIZONTAL  
 Model : FG 870133-01  
 Mode : Model  
 Plane : E1

Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
1669	-47.78	-13	-34.78	-54.29	-46.79	3.39	4.55	H	Pass
2509	-50.22	-13	-37.22	-60.36	-50.28	3.71	5.92	H	Pass
5850	-48.06	-13	-35.06	-66.46	-50.51	4.38	8.98	H	Pass
6690	-43.64	-13	-30.64	-65.45	-45.83	5.22	9.56	H	Pass

Remark : Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



Vertical Polarization



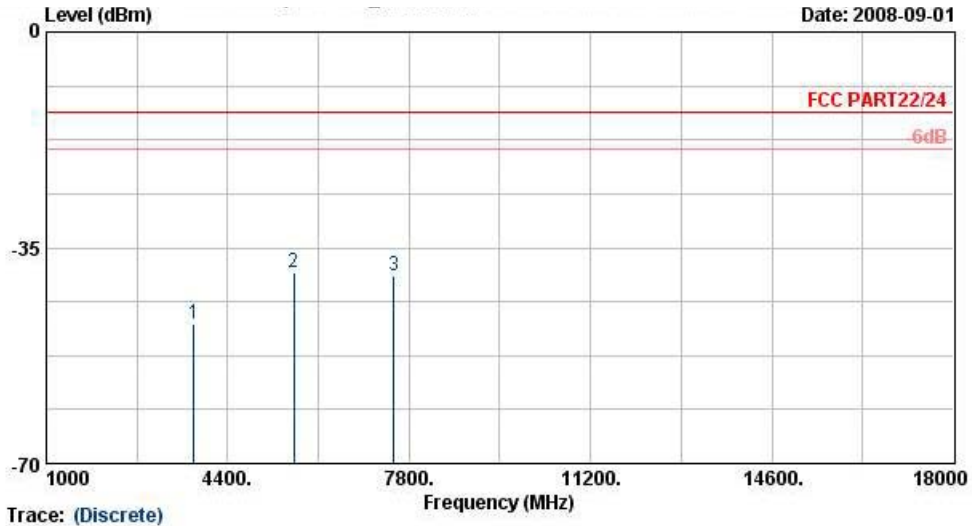
Trace: (Discrete)  
 Site : 03CH07-HY  
 Condition : HF-EIRP(080306) VERTICAL  
 Model : FG 870133-01  
 Mode : Model  
 Plane : E1

Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
1669	-42.17	-13	-29.17	-47.82	-40.79	3.39	4.16	V	Pass
2509	-51.54	-13	-38.54	-62.13	-51.4	3.71	5.72	V	Pass
6690	-43.81	-13	-30.81	-65.03	-47.06	5.22	10.62	V	Pass

Remark : Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



- Mode 2
- Horizontal Polarization



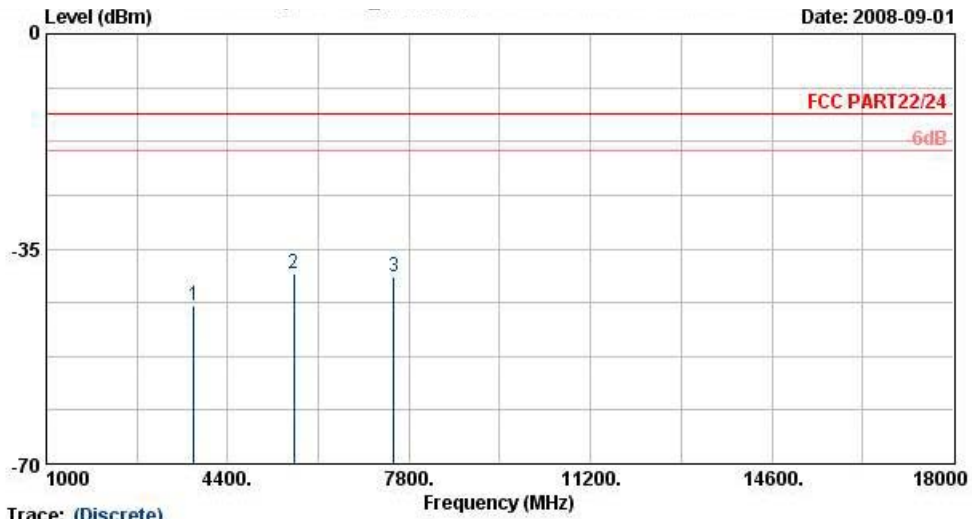
Trace: (Discrete)  
 Site : 03CH07-HY  
 Condition : HF-EIRP(080306) HORIZONTAL  
 Model : FG 870133-01  
 Mode : Model  
 Plane : E1

Frequency ( MHz )	EIRP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
3760	-47.29	-13	-34.29	-60.61	-50.66	4.03	7.40	H	Pass
5636	-39.04	-13	-26.04	-59.94	-43.98	3.87	8.81	H	Pass
7520	-39.58	-13	-26.58	-61.92	-43.46	5.83	9.71	H	Pass

Remark : Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



Vertical Polarization



Site : 03CH07-HY  
 Condition : HF-EIRP(080306) VERTICAL  
 Model : FG 870133-01  
 Mode : Model  
 Plane : E1

Frequency ( MHz )	EIRP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading ( dBm )	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain ( dBi )	Polarization ( H/V )	Result
3760	-44.35	-13	-31.35	-59.65	-48.23	4.03	7.91	V	Pass
5636	-39.03	-13	-26.03	-60.62	-44.93	3.87	9.77	V	Pass
7520	-39.55	-13	-26.55	-62.03	-44.53	5.83	10.81	V	Pass

Remark : Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

## 4.7 Frequency Stability (Temperature Variation)

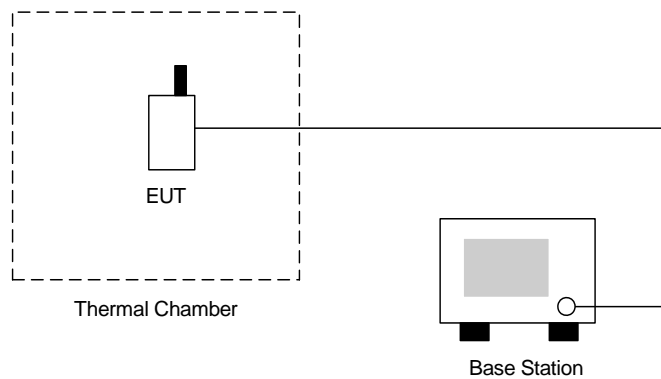
### 4.7.1 Measurement Instrument

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	27	0.01	2.5	Passed
-20	-25	-0.03		
-10	-23	-0.03		
0	-17	-0.02		
10	-11	-0.01		
20	16	0.02		
30	-21	-0.02		
40	-20	-0.02		
50	-11	-0.01		

• Test Mode : GSM1900 CH661

Temperature(°C)	Change (Hz)	Change (ppm)	Limit (ppm)	Result
-30	26	0.01	2.5	Passed
-20	13	0.01		
-10	21	0.01		
0	25	0.01		
10	28	0.01		
20	22	0.01		
30	26	0.01		
40	28	0.01		
50	37	0.02		

**4.8 Frequency Stability (Voltage Variation)**

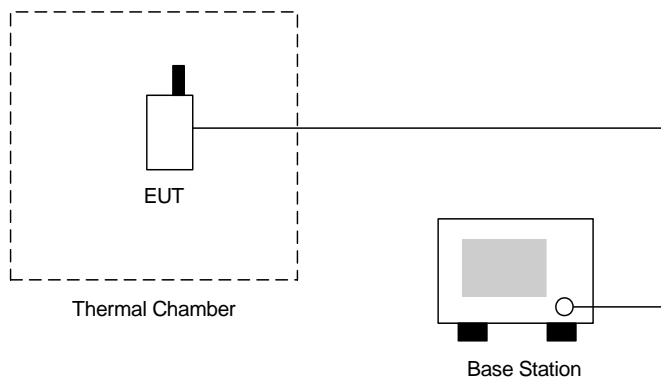
4.8.1 Measurement Instrument

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 AC power supply voltage to the EUT was varied from 85% 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
102	16	0.02	2.5	Passed
120	26	0.03		
138	44	0.05		

- Test Mode : GSM1900 CH661

Voltage(Volt)	Change (Hz)	Change (ppm)	Limit (ppm)	Result
102	22	0.01	2.5	Passed
120	-21	-0.01		
138	37	0.02		

Remark:

- 1. Normal Voltage=120.0V.
- 2. The EUT only can be powered on by using AC mains power source.



**5. List of Measurement Equipments**

<b>Instrument</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Characteristics</b>	<b>Calibration Date</b>	<b>Due Date</b>	<b>Remark</b>
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz-1GHz	Dec. 01, 2007	Nov. 30, 2008	Radiation (03CH07-HY)
Spectrum Analyzer	R & S	FSP	101067	9KHz~30GHz	Dec. 05, 2007	Dec. 04, 2008	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1G~18G	Aug. 13, 2008	Aug. 12, 2009	Radiation (03CH07-HY)
PreAmplifier	Agilent	8449B	3008A02362	1~26.5GHz	Dec. 22, 2007	Dec. 21, 2008	Radiation (03CH07-HY)
PreAmplifier	COM-POWER	PA-103A	161241	10-1000MHz.32dB .GAIN	Mar. 31, 2008	Mar.30, 2009	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	66584	1G~18G	Aug. 06, 2008	Aug. 05, 2009	Radiation (03CH07-HY)
Spectrum	R&S	FSP40	100055	9KHz~40GHz	Jun. 26, 2008	Jun. 25, 2009	Conducted (TH02-HY)
Thermal Chamber	TEN BILLION	TTH-D35P	TBN-930701	N/A	Aug. 01, 2008	Jul. 31, 2009	Conducted (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



## **Appendix A. Photographs of EUT**

Please refer to Sporton report number EP870133-01 as below.