



FCC TEST REPORT

for

47 CFR Part 22H, 24E

Equipment : GPS Vehicle Tracking Device
Trade Name : IntelliTrac
Model No. : X1
FCC ID : RLS-STAVL0637
Tx Frequency Range : GSM850 : 824.2~848.8MHz
PCS1900 : 1850.2~1909.8MHz
Max. ERP/EIRP Power : GSM850 : 0.19W
PCS1900 : 0.16W
Emission Designator : 300 KGXW
Applicant : **Systems & Technology Corp.**
18-5F, No.79, Hsin Tai Wu Road, Sec. 1, Hsichih, Taipei
Hsien, Taiwan, R.O.C.

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- The data shown in this test report were carried out on Sep. 16, 2006 at **Sporton International Inc. LAB.**
- Report No.: FG690824, Report Version: Rev. 04.

Roy Wu
Deputy 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: Oct. 16, 2006

Report No.	Description



1. General Information

1.1. Applicant

Systems & Technology Corp.

18-5F, No.79, Hsin Tai Wu Road, Sec. 1, Hsichih, Taipei Hsien, Taiwan, R.O.C.

1.2 Manufacturer

Shuttle Inc.

No.30, Lane 76, Rei Kuang Rd., Hei-Hu Dist, Taipei, Taiwan, R.O.C.

1.3 Basic Description of Equipment under Test

Equipment : GPS Vehicle Tracking Device
Trade Name : IntelliTrac
Model No. : X1
FCC ID : RLS-STAVL0637
Power Supply Type : DC Power Source
DC Power Cable : DC12V
Battery : VARTA, PLF523450 C

**1.4 Feature of Equipment under Test**

DUT Type :	GPS Vehicle Tracking Device
Trade Name :	IntelliTrac
Model Name :	X1
FCC ID :	RLS-STAVL0637
Tx Frequency :	GSM850 : 824 ~ 849 MHz PCS1900 : 1850 ~1910 MHz
Rx Frequency :	GSM850 : 869 ~ 894 MHz PCS1900 : 1930 ~ 1990 MHz
Antenna Type :	Fixed External
Maximum Output Power to Antenna :	GSM850 : 31.96 dBm PCS1900 : 29.03 dBm
Maximum ERP/EIRP :	GSM850 : 0.19 W (22.69 dBm) PCS1900 : 0.16 W (22.09 dBm)
HW Version :	Rev.E
SW Version :	V1.05X
Power Rating (DC/AC , Voltage and Current of RF element or PA) :	4V / 450 mAh
Digital Modulation Emission :	GMSK
Type of Emission :	300 KGXW
DUT Stage :	Production Unit

1.5 Report Date

EUT Received : Sep. 08, 2006

Report Date : Oct. 16, 2006

2 Test Configuration of Equipment under Test

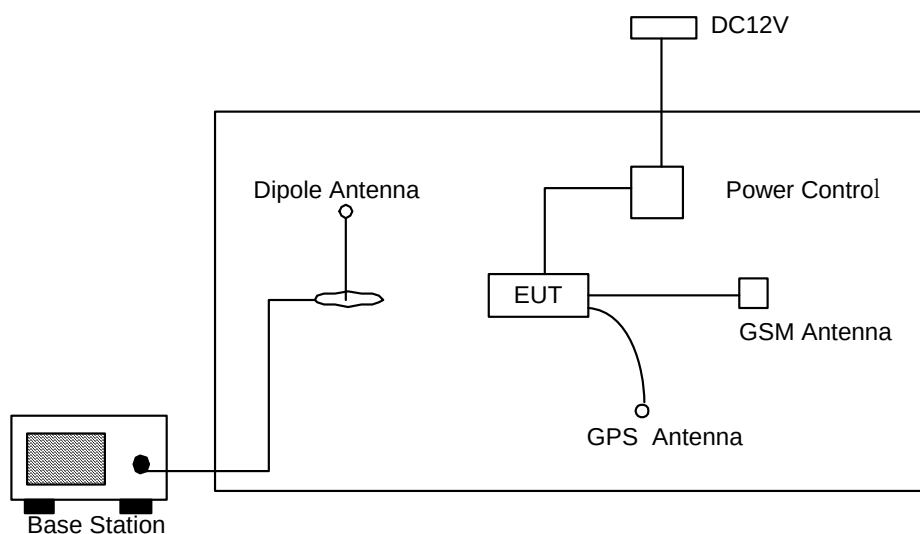
2.1 Test Manner

- The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range.
- During all testings, EUT is in link mode with base station emulator at maximum power level. (PCL=5 for GSM 850 or PCL=0 for PCS 1900)
- Frequency range investigated: radiated emission 30 MHz to 9000 MHz for GSM850; 30MHz to 19000 MHz for PCS 1900.

2.2 Test Mode

Application	GSM 850	PCS 1900
Radiated Emission	☒ Mode 1: CH 189	☒ Mode 2: CH 661
Conducted Measurement	☒ Mode 1: CH 189	☒ Mode 2: CH 661

2.3 Connection Diagram of Test System



2.4 Ancillary Equipment List

Item	Equipment	Model No.	Serial No.
1.	Base Station (R&S)	CMU200	106656
2.	DC Power Supply (GW)	GPC-60300	N/A



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 : TH02-HY, 03CH06-HY

The chamber meets the characteristics of ANSI C63.4-2003. This site is on file with the FCC. The Industry Canada file number for this site is IC 4088.

3.1 Test Voltage

DC 12V

3.2 Test in Compliance with

47 CFR Part 22H, 24E and Part 2.

3.3 Frequency Range Investigated

- a. Radiation: from 30MHz to 9000MHz for GSM 850.
- b. Radiation: from 30 MHz to 19000 MHz for PCS 1900.

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

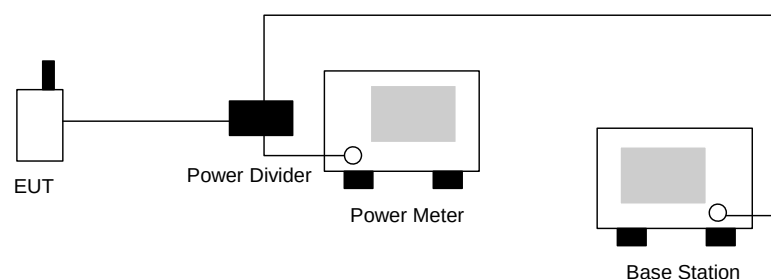
4.2.1 Measurement Instruments :

As described in chapter 5 of this test report.

4.2.2 Test Procedure :

1. The transmitter output was connected to power meter and base station through power divider.
2. Set EUT at PCL=5 for GSM 850 and/or PCL=0 for PCS 1900 through base station.
3. 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)
GSM 850	128	824.2 (Low)	31.85	1.531
	189	836.4 (Mid)	31.94	1.563
	251	848.8 (High)	31.96	1.570

Bands	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watts)
PCS 1900	512	1850.2 (Low)	29.03	0.800
	661	1880.0 (Mid)	28.83	0.764
	810	1909.8 (High)	28.71	0.743



4.3 ERP / EIRP Measurement

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

4.3.1 Measurement Instruments

As described in chapter 5 of this test report.

4.3.2 Test Procedure

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

P_s (dBm) : Input power to substitution antenna.

G_s (dBi or dBd) : Substitution antenna Gain.

$E_t = R_t + AF$

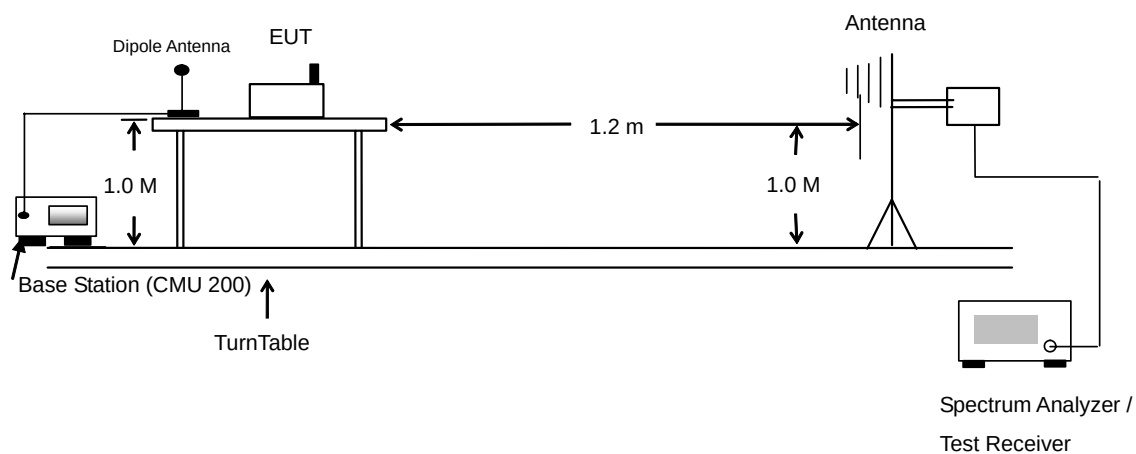
$E_s + R_s + AF$

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	-26.14	-48.12	0.00	-1.08	20.90	0.12
836.40	-24.66	-48.28	0.00	-0.93	22.69	0.19
848.80	-27.56	-48.35	0.00	-0.76	20.03	0.10
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.20	-31.95	-47.97	0.00	-1.08	14.94	0.03
836.40	-31.25	-48.01	0.00	-0.93	15.83	0.04
848.80	-32.34	-48.05	0.00	-0.76	14.95	0.03

PCS1900 Radiated Power EIRP						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-32.26	-51.88	0.00	1.96	21.58	0.14
1880.00	-33.68	-52.99	0.00	2.00	21.31	0.14
1909.80	-34.17	-54.28	0.00	1.98	22.09	0.16
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-40.56	-52.13	0.00	1.96	13.53	0.02
1880.00	-43.09	-53.17	0.00	2.00	12.08	0.02
1909.80	-43.01	-54.13	0.00	1.98	13.10	0.02

4.4 Occupied Bandwidth and Band Edge Measurement

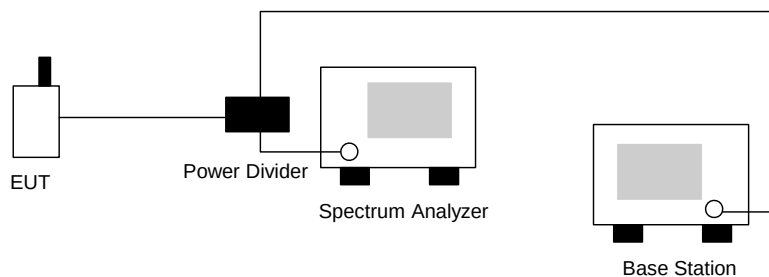
4.4.1 Measurement Instruments

As described in chapter 5 of this test report.

4.4.2 Test Procedure

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The occupied bandwidth of middle channel for the highest and lowest RF powers were measured.
3. 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.

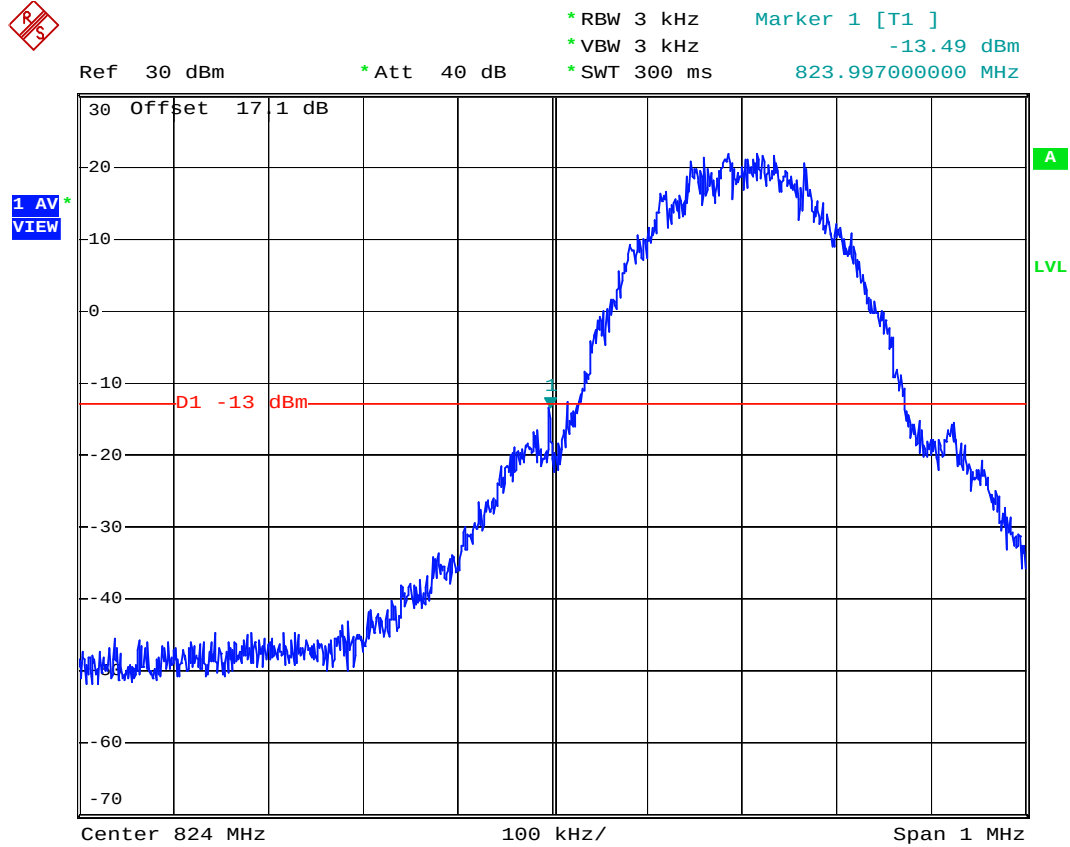
4.4.3 Test Setup Layout





4.4.4 Test Result

- Test Mode : GSM 850 CH128 Lower Band Edge
- Power State : High



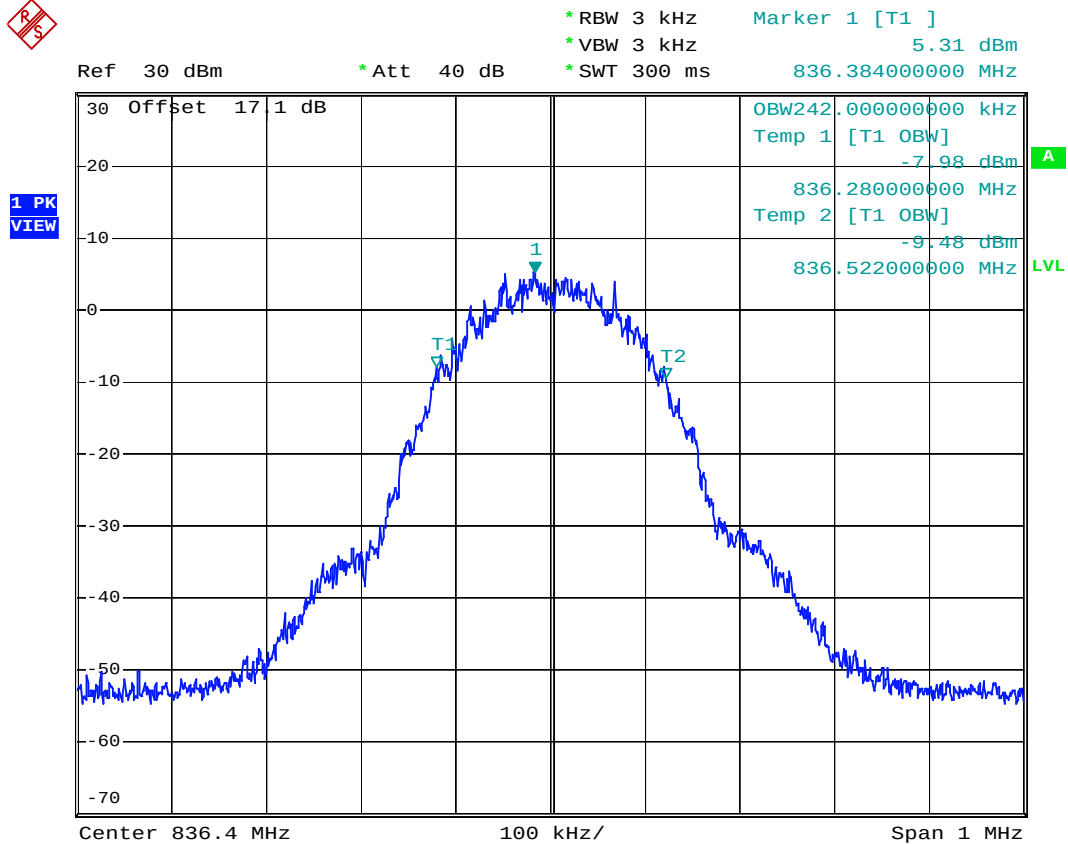
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FCC TEST REPORT

Report No. : FG690824

- Test Mode : GSM 850 CH189 99% Occupied Bandwidth
- Power State : Low



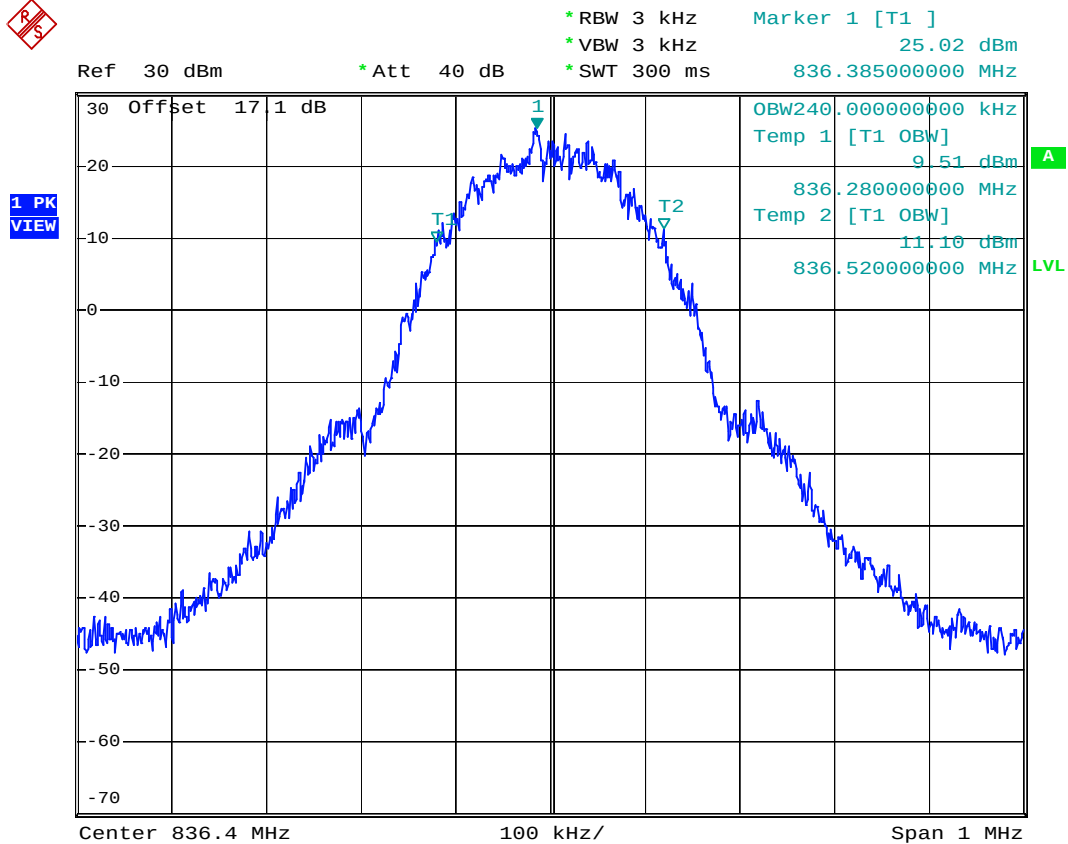
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FCC TEST REPORT

Report No. : FG690824

- Test Mode : GSM 850 CH189 99% Occupied Bandwidth
- Power State : High



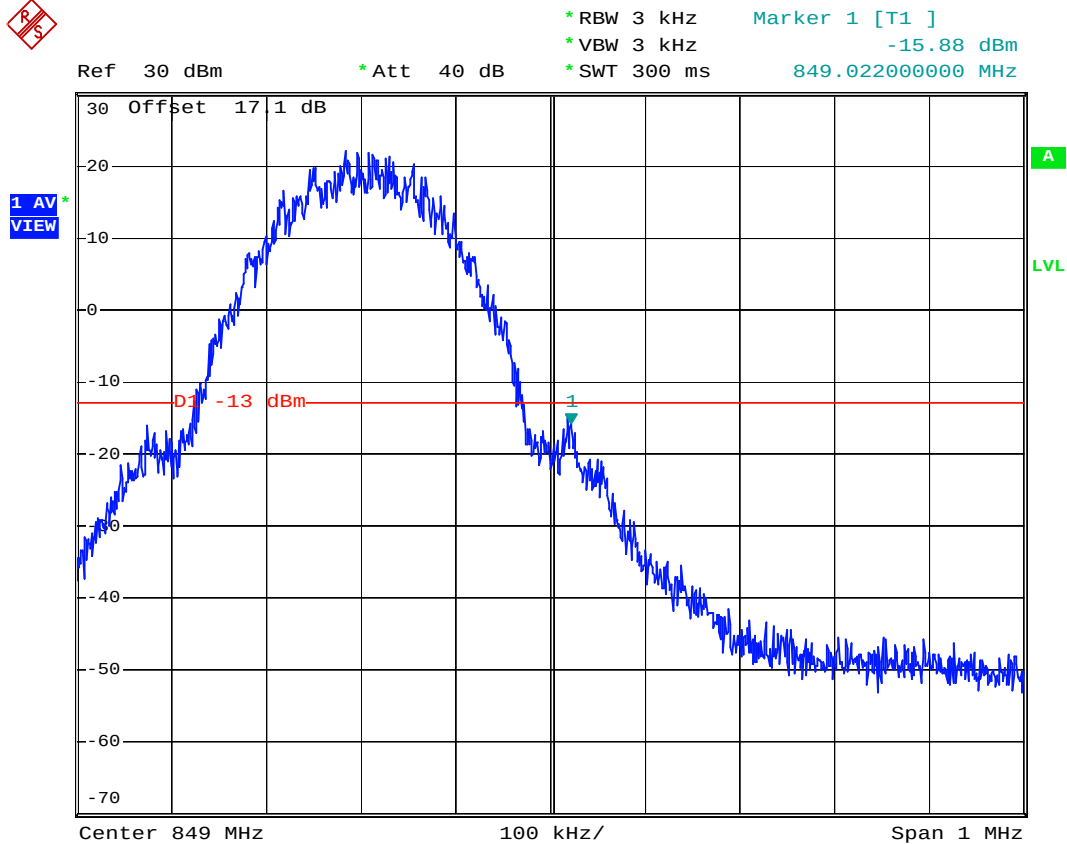
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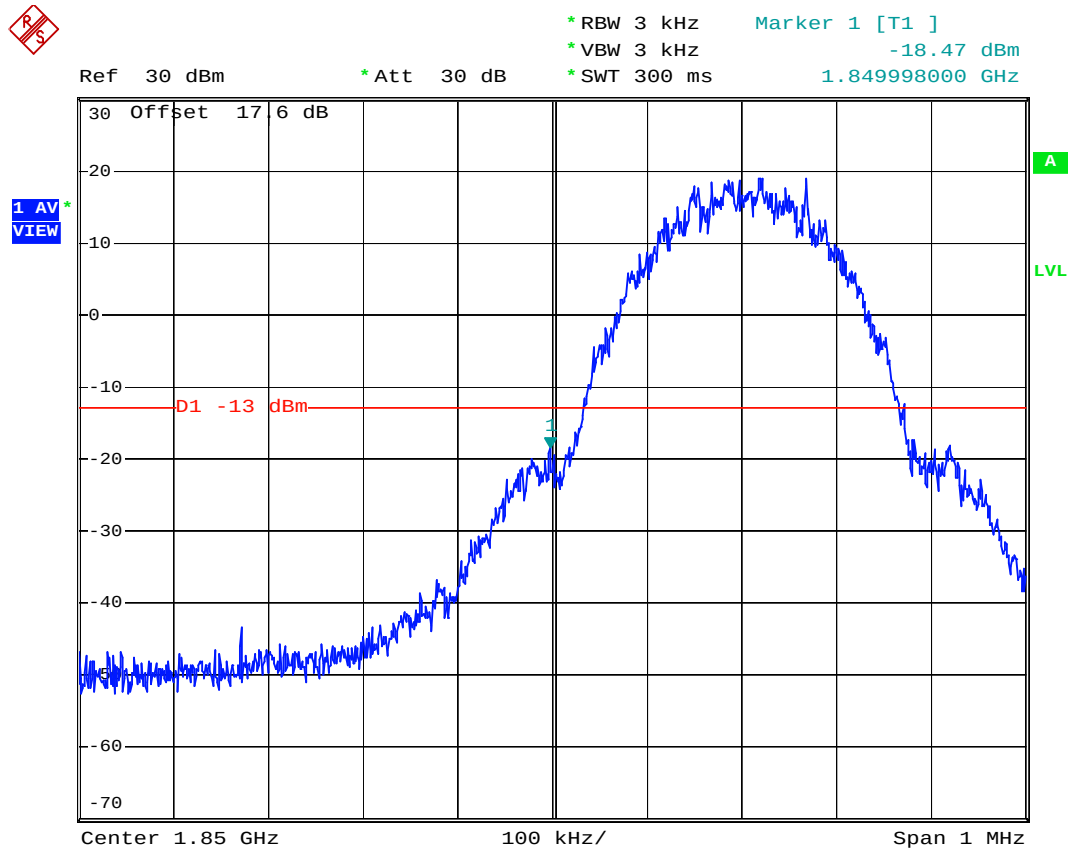
- Test Mode : GSM 850 CH251 Higher Band Edge
- Power State : High



Date: 16.SEP.2006 03:11:27



- Test Mode : PCS 1900 CH512 Lower Band Edge
- Power State : High



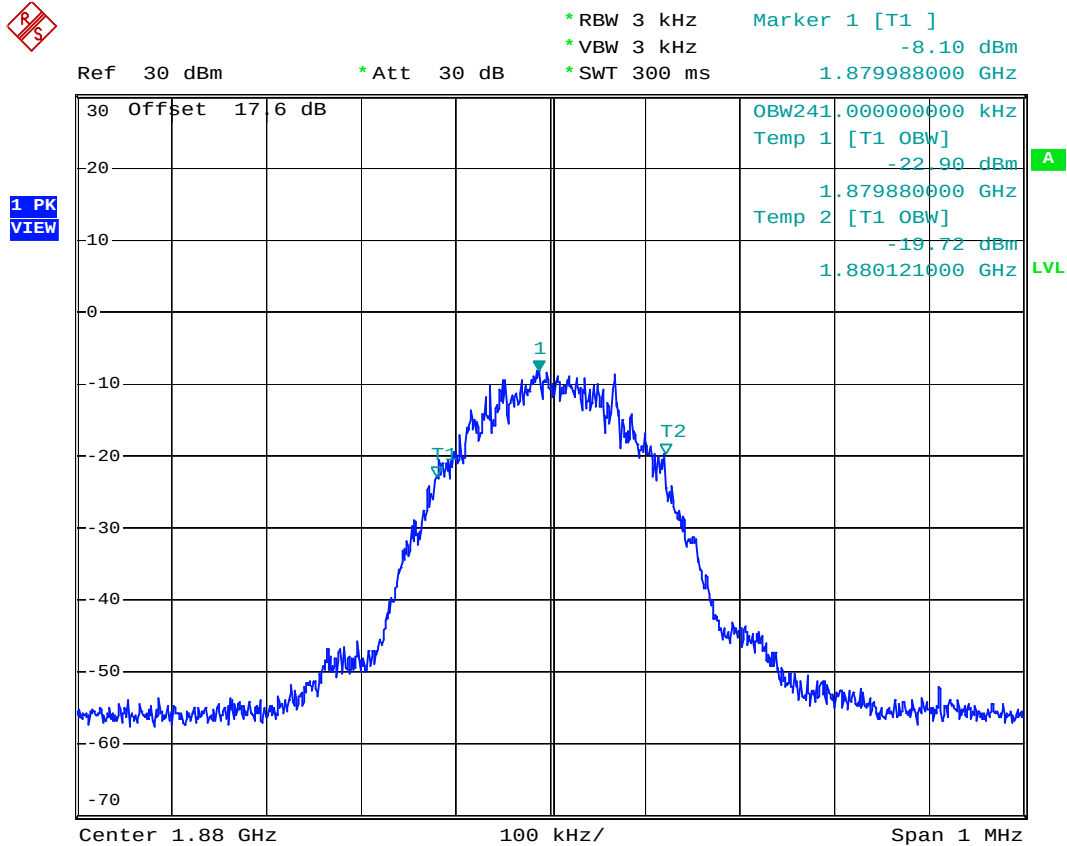
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FCC TEST REPORT

Report No. : FG690824

- Test Mode : PCS 1900 CH661 99% Occupied Bandwidth
- Power State : Low



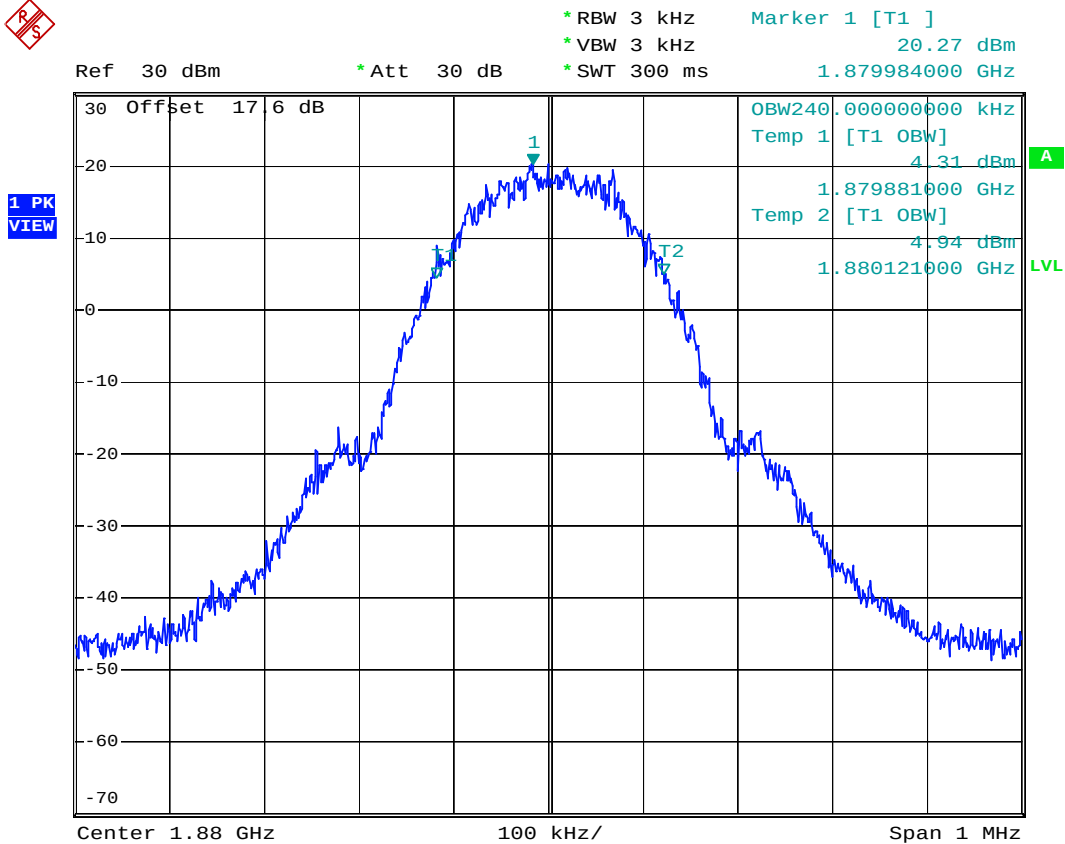
Date: 16.SEP.2006 04:30:08



FCC TEST REPORT

Report No. : FG690824

- Test Mode : PCS 1900 CH661 99% Occupied Bandwidth
- Power State : High



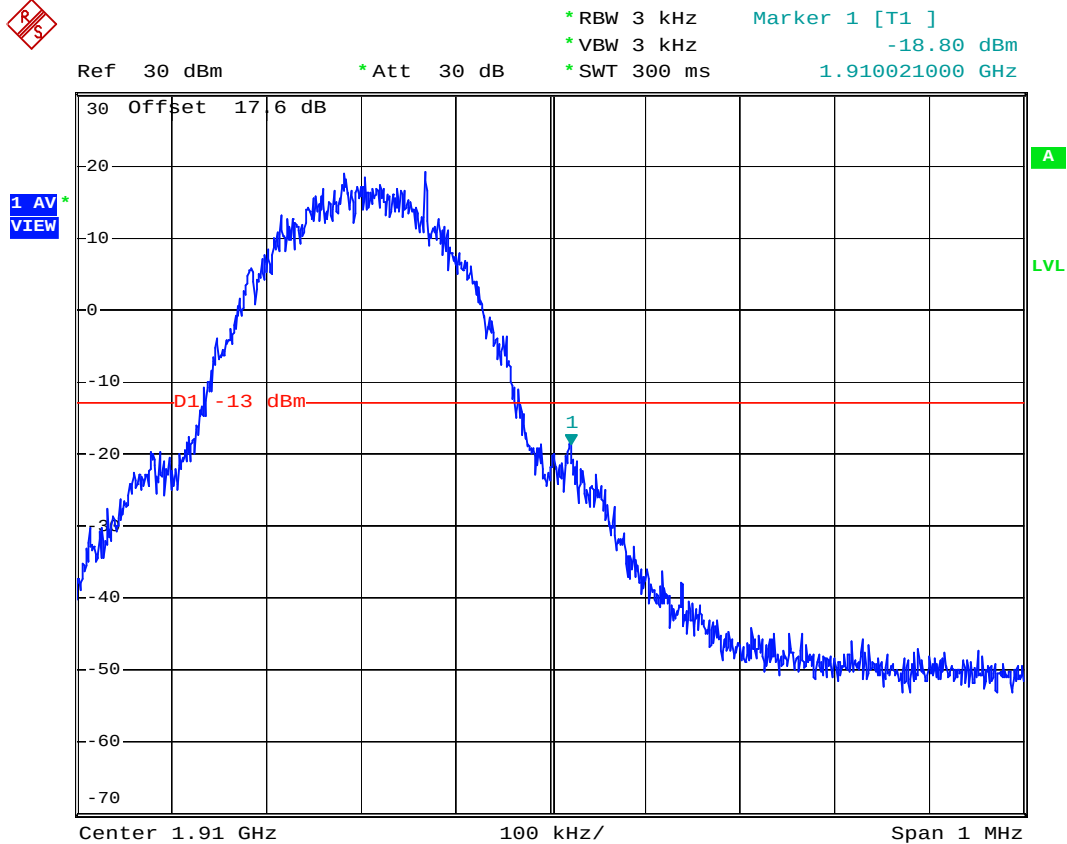
Date: 16.SEP.2006 04:22:36



FCC TEST REPORT

Report No. : FG690824

- Test Mode : PCS 1900 CH810 Higher Band Edge
- Power State : High



Date: 16.SEP.2006 04:19:05

4.5 Conducted Emission

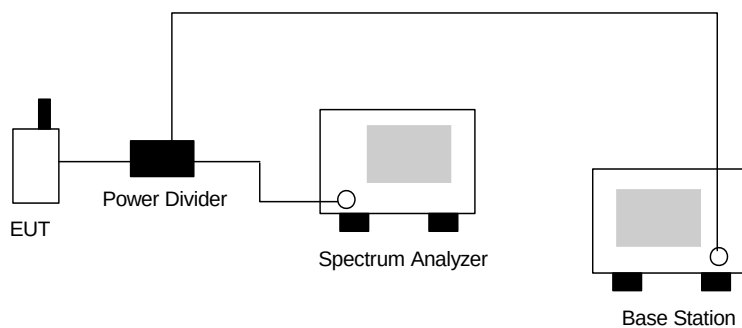
4.5.1 Measurement Instruments

As described in chapter 5 of this test report.

4.5.2 Test Procedure

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

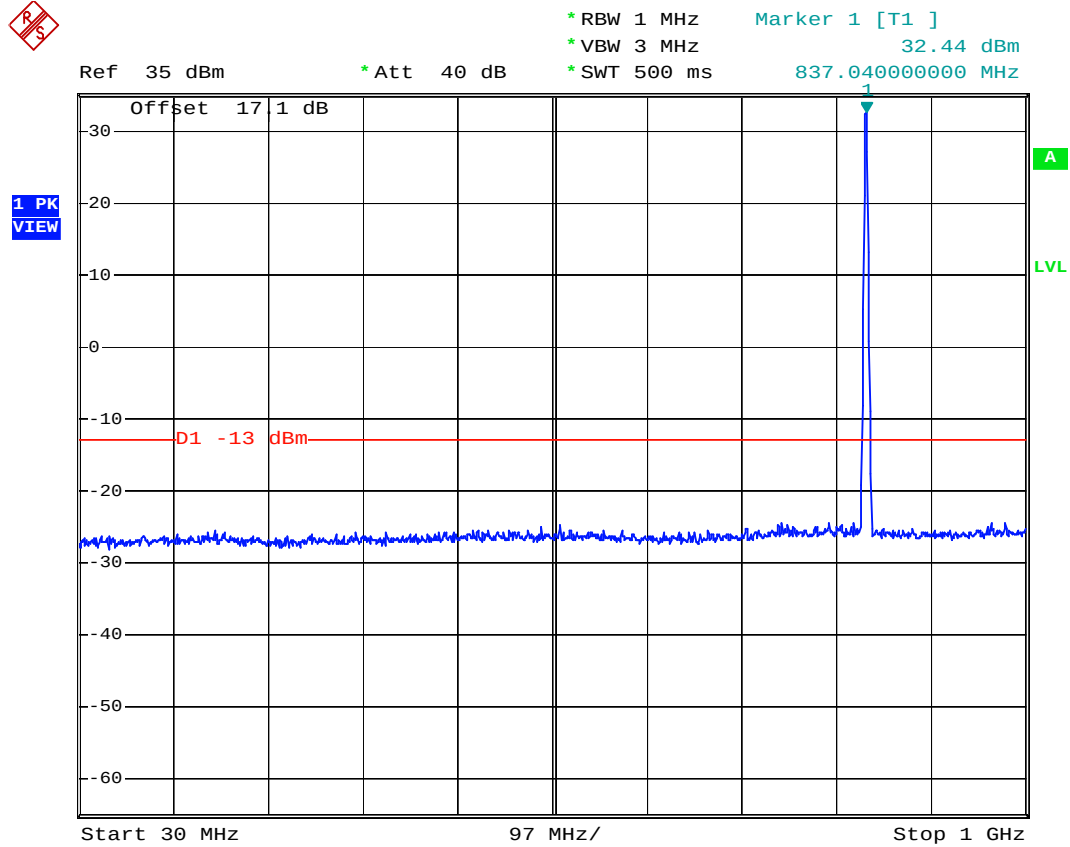
4.5.3 Test Setup Layout





4.5.4 Test Result

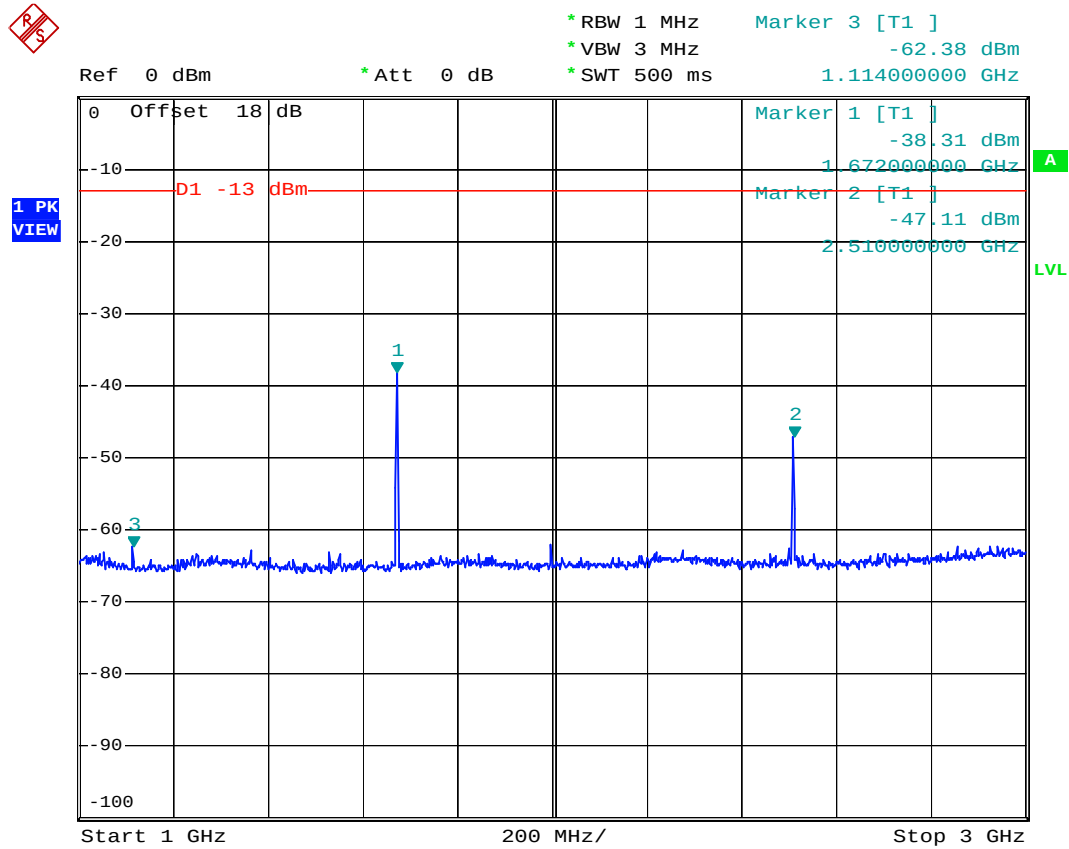
- Test Mode : GSM 850 CH189
- Frequency Range : 30M-1G



Date: 16.SEP.2006 03:42:44



- Test Mode : GSM 850 CH189
- Frequency Range : 1G-3G



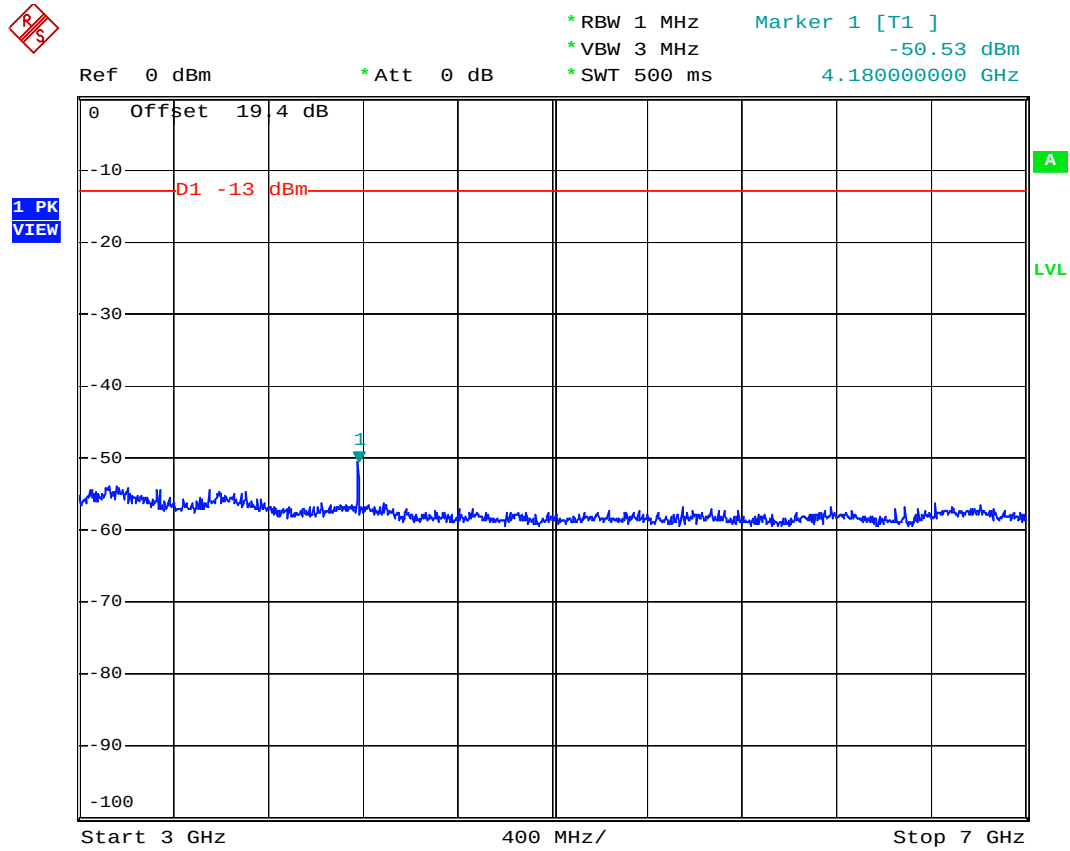
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FCC TEST REPORT

Report No. : FG690824

- Test Mode : GSM 850 CH189
- Frequency Range : 3G-7G



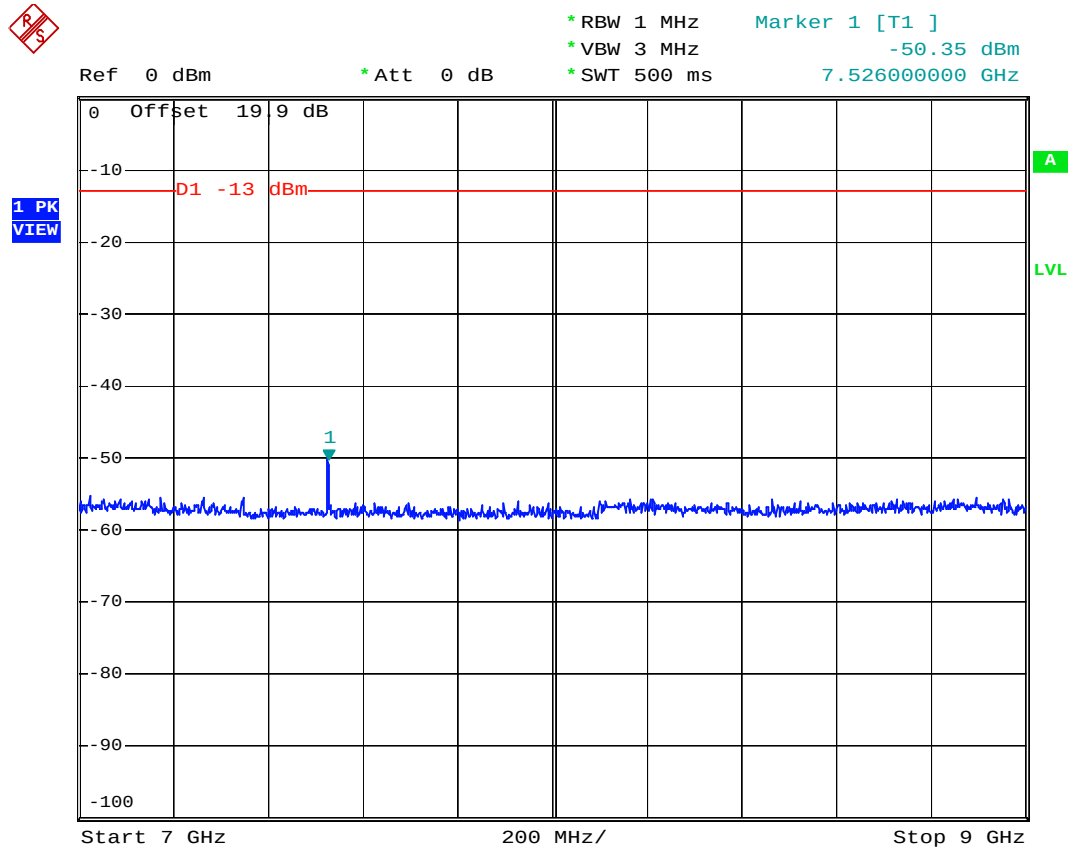
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FCC TEST REPORT

Report No. : FG690824

- Test Mode : GSM 850 CH189
- Frequency Range : 7G-9G



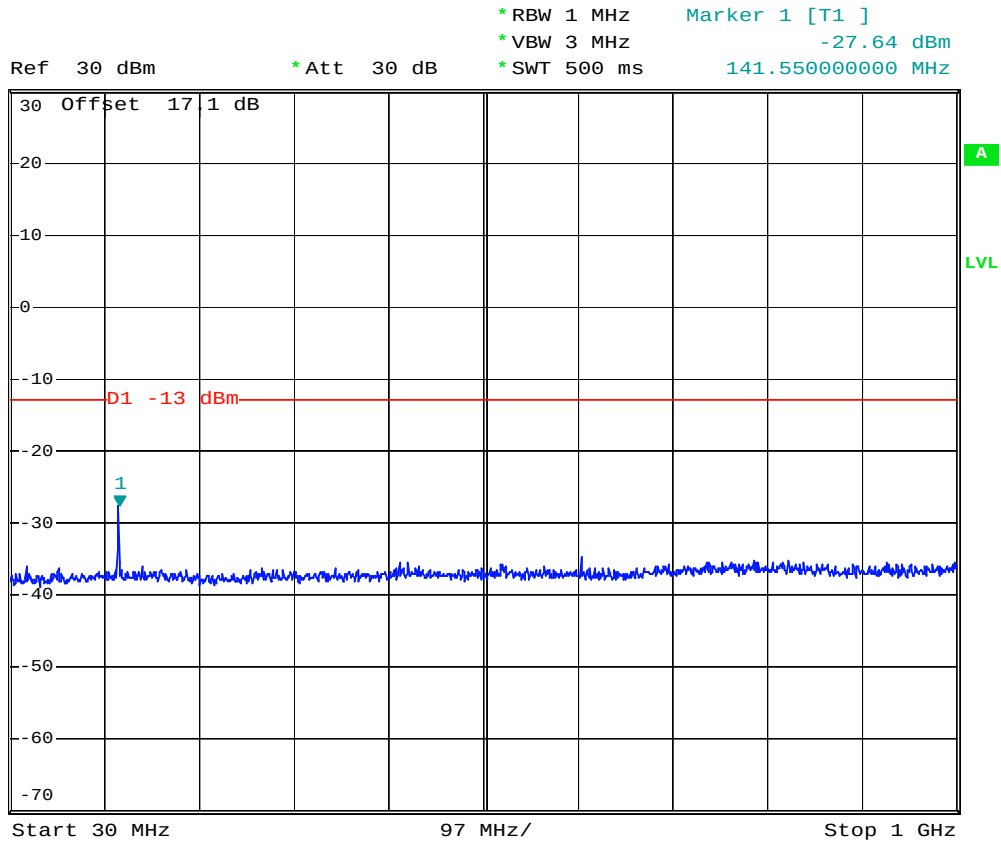
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- Test Mode : PCS 1900 CH661
- Frequency Range : 30M-1G



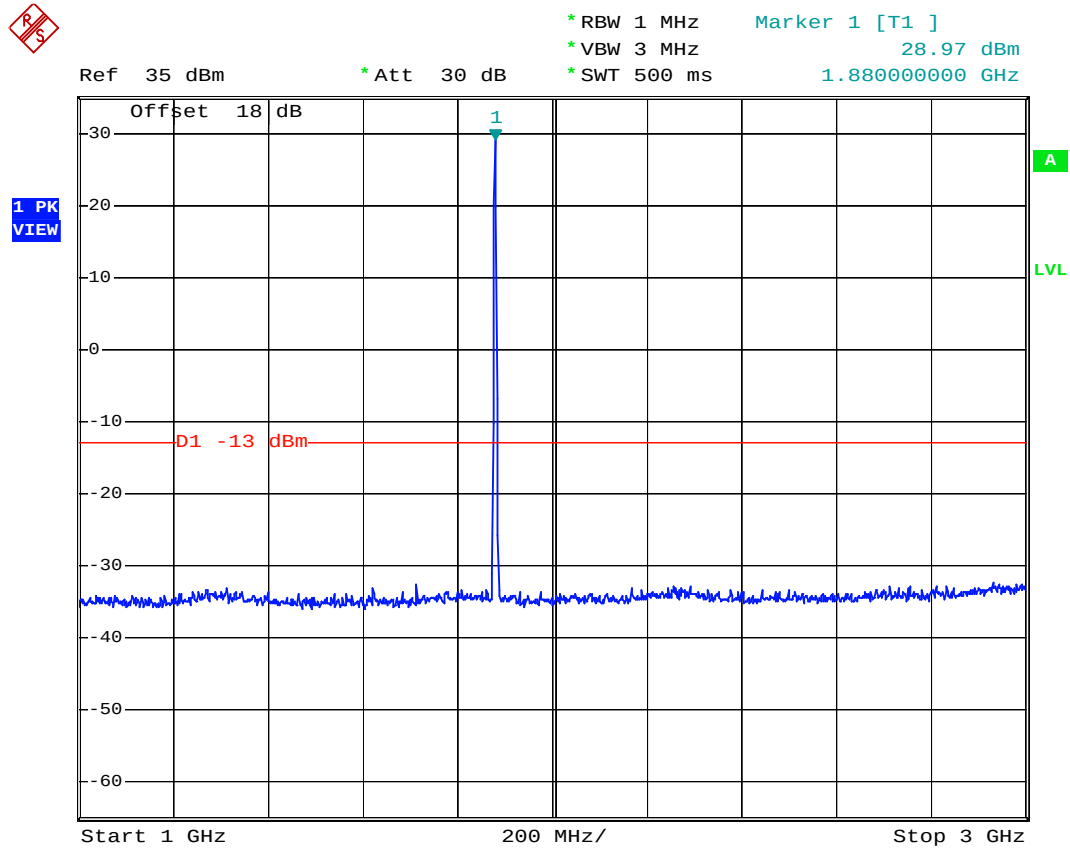
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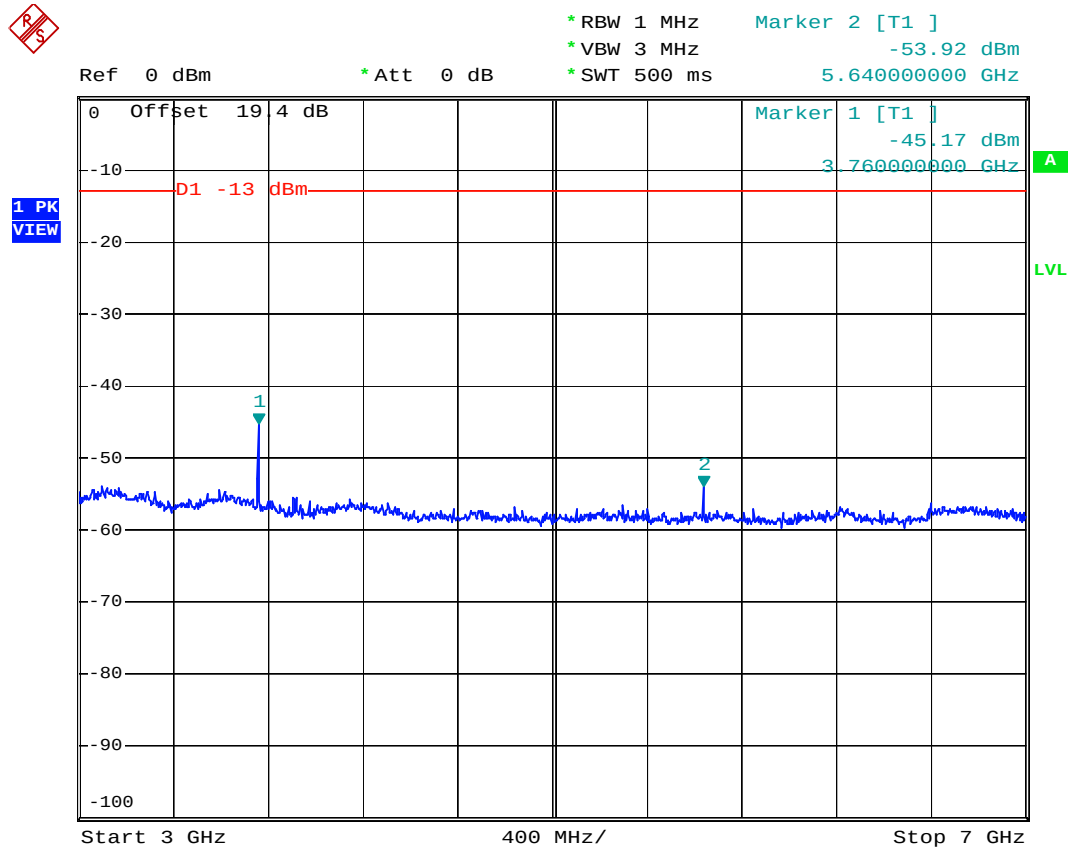
- Test Mode : PCS 1900 CH661
- Frequency Range : 1G-3G



Date: 16.SEP.2006 04:37:41



- Test Mode : PCS 1900 CH661
- Frequency Range : 3G-7G



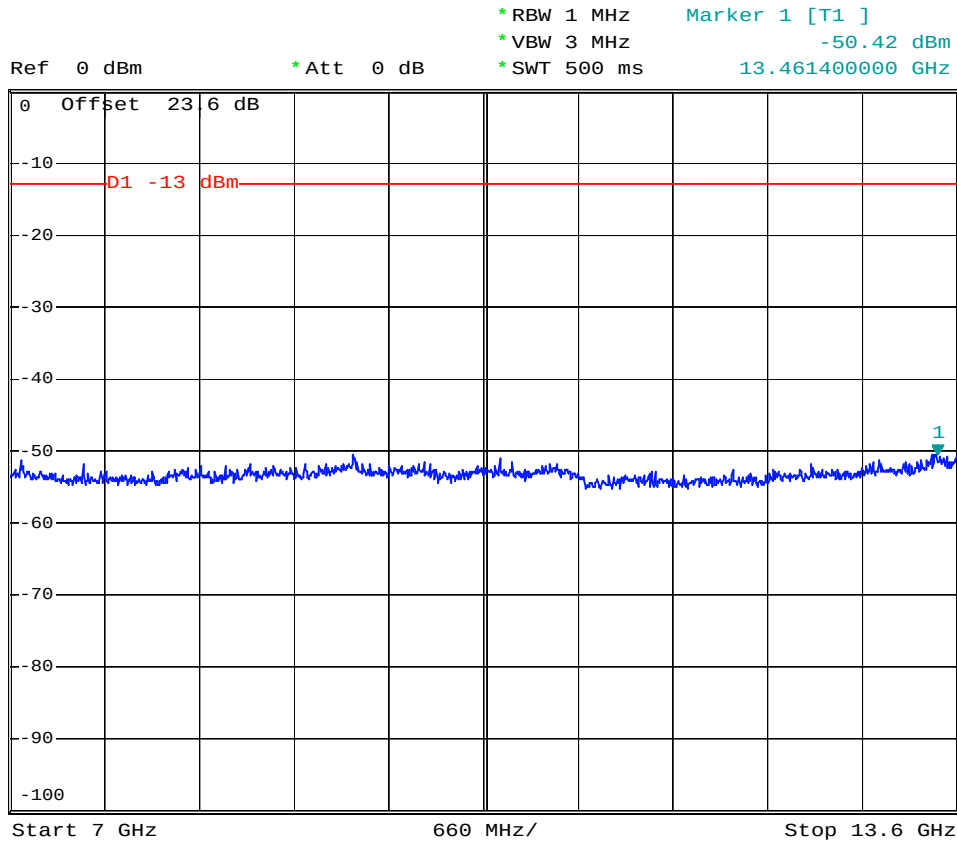
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FCC TEST REPORT

Report No. : FG690824

- Test Mode : PCS 1900 CH661
- Frequency Range : 7G-13.6G



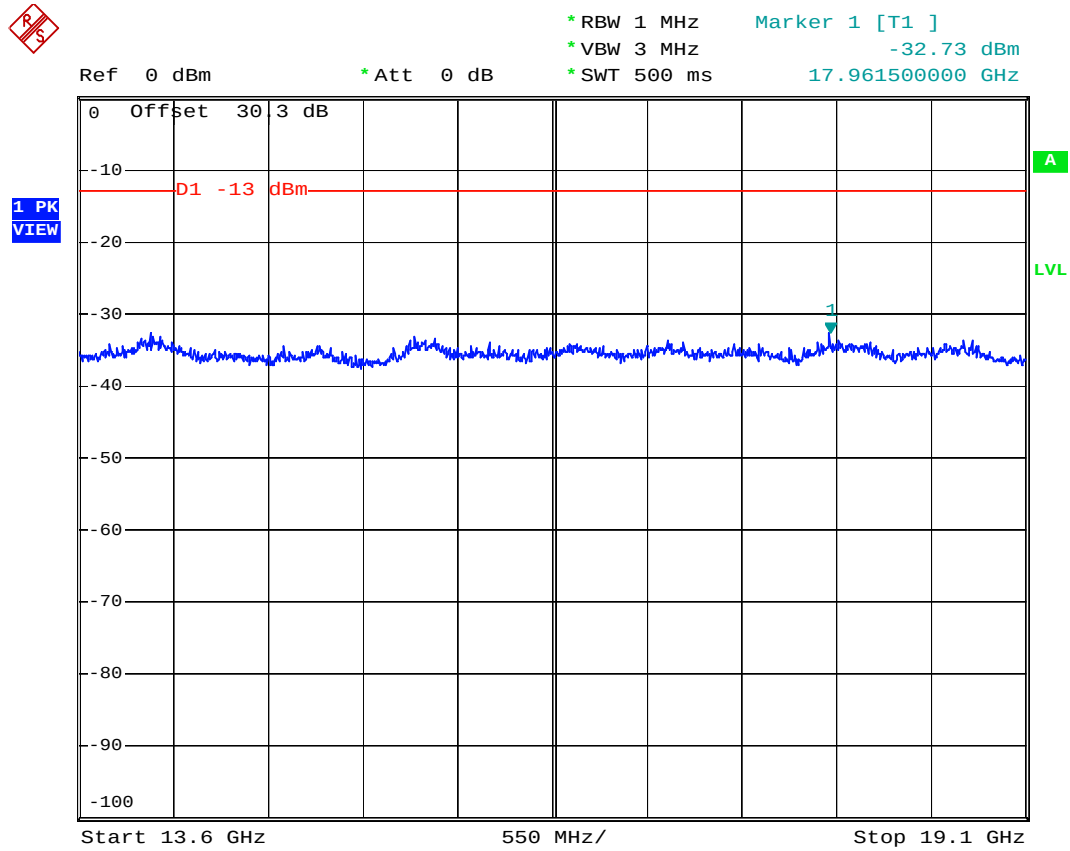
Date: 16.SEP.2006 04:44:35



FCC TEST REPORT

Report No. : FG690824

- Test Mode : PCS 1900 CH661
- Frequency Range : 13.6G-19.1G



Date: 16.SEP.2006 04:46:07

4.6 Field Strength of Spurious Radiation

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

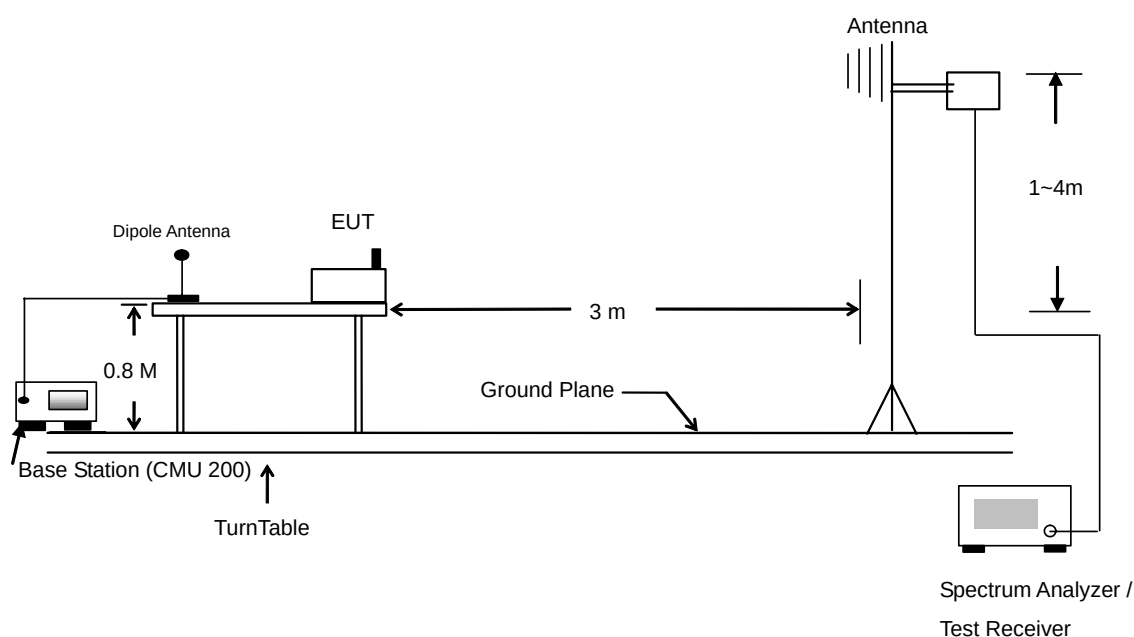
4.6.1 Measurement Instruments

As described in chapter 5 of this test report.

4.6.2 Test Procedure

1. The EUT was placed on a rotatable wooden table with 0.8 meter about ground.
2. The EUT was set 3 meters from the receiving antenna which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. 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.
5. Taking the record of maximum spurious emission.
6. A Horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another substitution.
10. Emission level (dBm) = output power + substitution Gain.

4.6.3 Test Setup Layout



4.6.4 Test Result

- Test Mode : Mode 1

GSM 850 Radiated Spurious ERP							
H Polarization				V Polarization			
Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (Db)	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Margin (Db)
71.040	-53.240	-13	-40.24	69.690	-45.410	-13	-32.41
121.530	-51.510	-13	-38.51	81.030	-47.840	-13	-34.84
191.190	-47.350	-13	-34.35	187.680	-47.310	-13	-34.31
638.800	-57.610	-13	-44.61	637.400	-57.230	-13	-44.23
1674.000	-45.390	-13	-32.39	1674.000	-52.610	-13	-39.61
2508.000	-53.400	-13	-40.40	2508.000	-56.770	-13	-43.77

- Test Mode : Mode 2

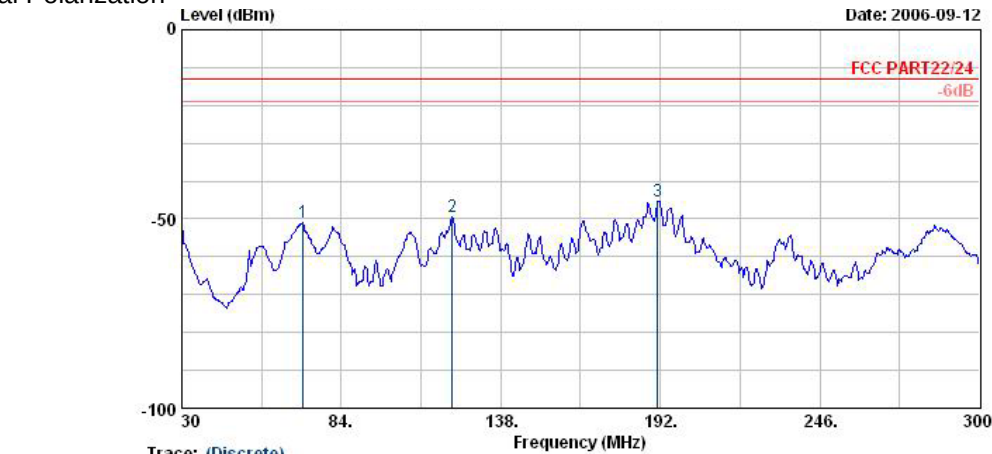
PCS 1900 Radiated Spurious EIRP							
H Polarization				V Polarization			
Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (Db)	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (Db)
30.000	-51.730	-13	-38.73	30.000	-48.300	-13	-35.30
132.330	-50.030	-13	-37.03	71.040	-43.880	-13	-30.88
191.730	-43.810	-13	-30.81	191.730	-44.070	-13	-31.07
309.800	-60.490	-13	-47.49	572.300	-62.170	-13	-49.17
498.800	-62.830	-13	-49.83	605.900	-59.140	-13	-46.14
637.400	-56.770	-13	-43.77	638.800	-54.480	-13	-41.48
1728.000	-54.450	-13	-41.45	1728.000	-58.290	-13	-45.29



4.6.5 Test Data

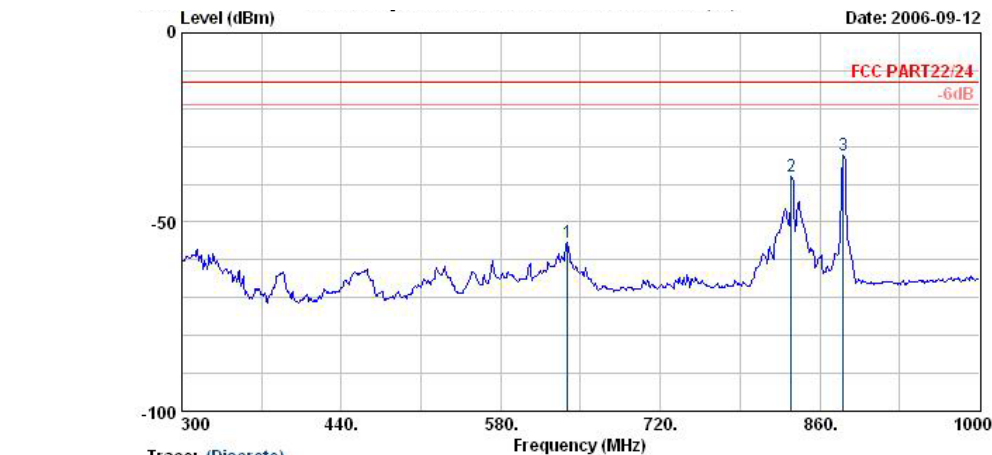
4.6.5.1 Mode 1

Horizontal Polarization



Site : 09CH06-HY
Condition : LF-SFURIOUS HORIZONTAL
EUT : GPS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG 690824
Mode : GSM850 Link;Ch189

	Freq	Level	Over	Limit	Read		
	MHz	dBm	Limit	Line	Level	Factor	Remark
	MHz	dBm	dB	dBm	dBm	dB	
1	71.0	-51.09	-38.09	-13.00	-38.74	-12.35	Peak
2	121.5	-49.36	-36.36	-13.00	-36.87	-12.49	Peak
3	191.2	-45.20	-32.20	-13.00	-31.91	-13.29	Peak

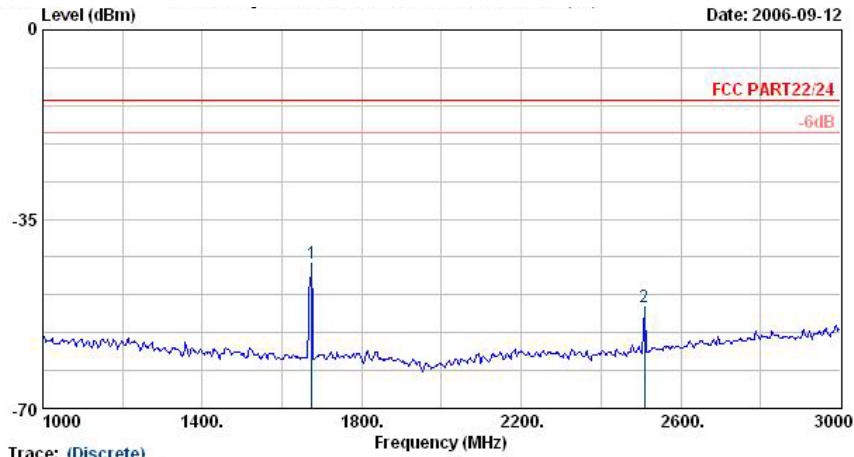


Site : 09CH06-HY
Condition : LF-SFURIOUS HORIZONTAL
EUT : GPS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG 690824
Mode : GSM850 Link;Ch189

	Freq	Level	Over	Limit	Read		
	MHz	dBm	Limit	Line	Level	Factor	Remark
	MHz	dBm	dB	dBm	dBm	dB	
1	638.8	-55.46	-42.46	-13.00	-52.12	-3.34	Peak
2	834.8	-37.92			-36.56	-1.35	Peak
3 @	880.3	-32.27			-31.36	-0.91	Peak

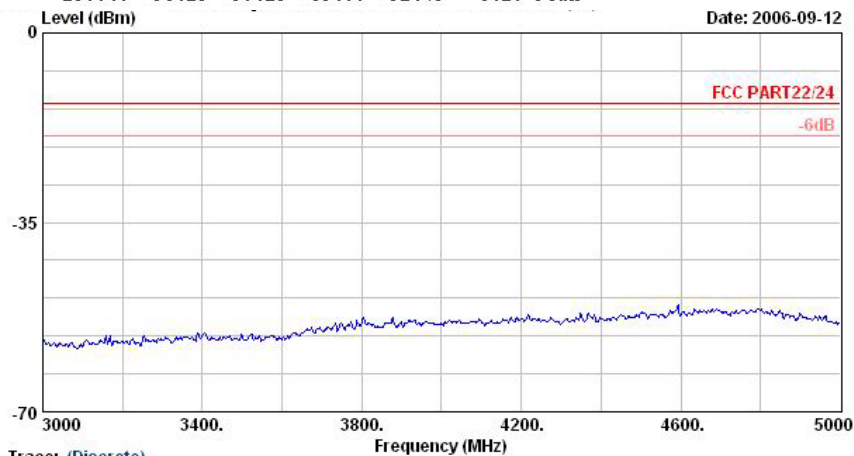
Remark:

- #2: MS TCH Signal
- #3: BS TCH Signal



Trace: (Discrete)
Site : 03CH06-HY
Condition : HF-SPURIOUS HORIZONTAL
EUT : GPS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG 690824
Mode : GSM850 Link;Ch189

	Freq	Level	Over	Limit	Read	
	MHz	dBm	Limit	Line	Level	Factor Remark
		dBm	dB	dBm	dBm	dB
1	1674.0	-43.24	-30.24	-13.00	-43.46	0.22 Peak
2	2508.0	-51.25	-38.25	-13.00	-52.45	1.20 Peak

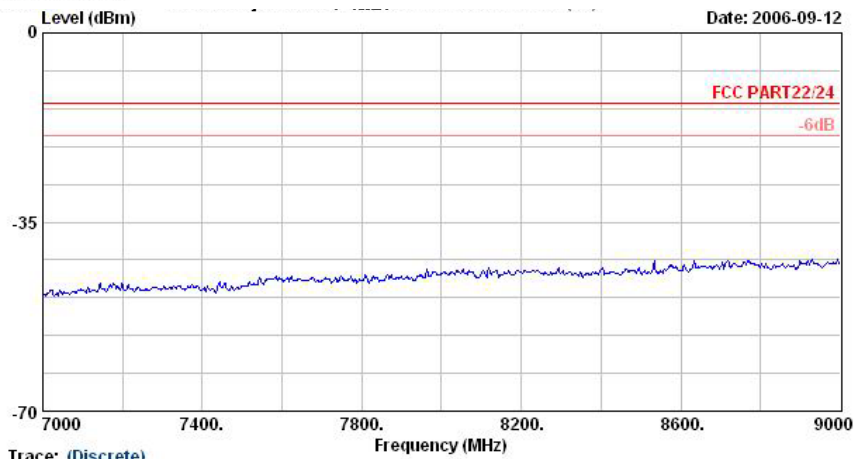
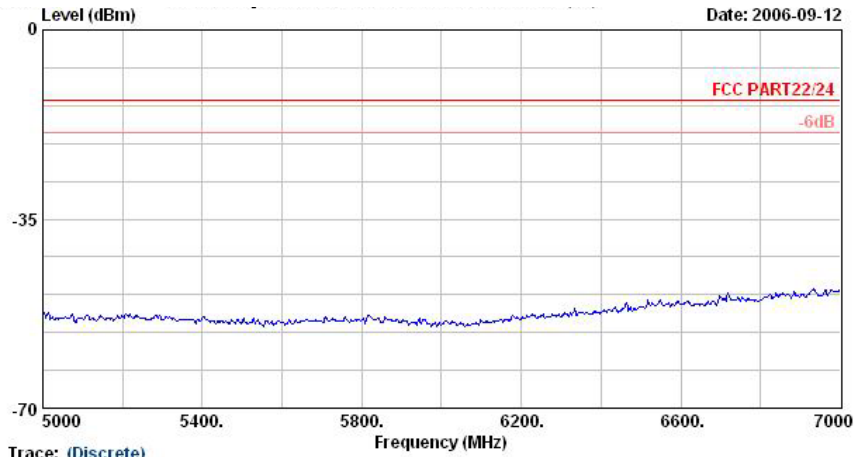


Trace: (Discrete)
Site : 03CH06-HY
Condition : HF-SPURIOUS HORIZONTAL
EUT : GPS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG 690824
Mode : GSM850 Link;Ch189



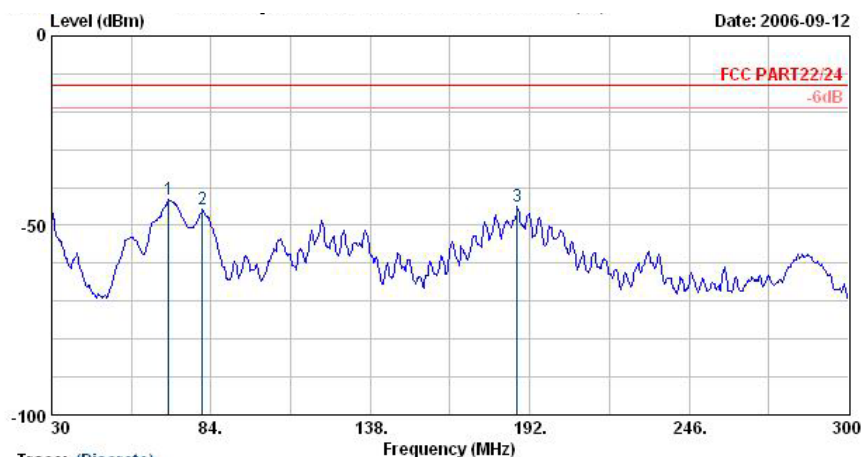
FCC TEST REPORT

Report No. : FG690824





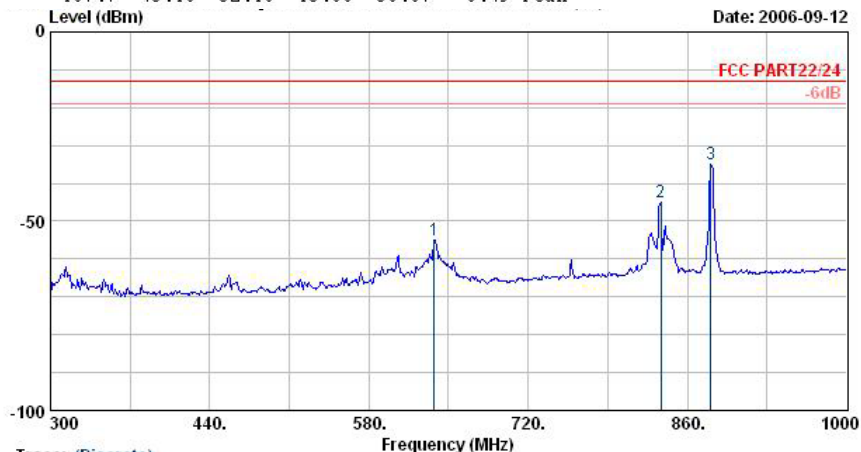
Vertical Polarization



Trace: (Discrete)

Site : 03CH06-HY
Condition : LF-SPURIOUS VERTICAL
EUT : GPS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG 690824
Mode : GSM850 Link;Ch189

	Freq	Level	Over	Limit	Read		
	MHz	dBm	Limit	Line	Level	Factor	Remark
		dBm	dB	dBm	dBm	dB	
1	69.7	-43.26	-30.26	-13.00	-31.23	-12.02	Peak
2	81.0	-45.69	-32.69	-13.00	-35.34	-10.35	Peak
3	187.7	-45.16	-32.16	-13.00	-36.67	-8.49	Peak



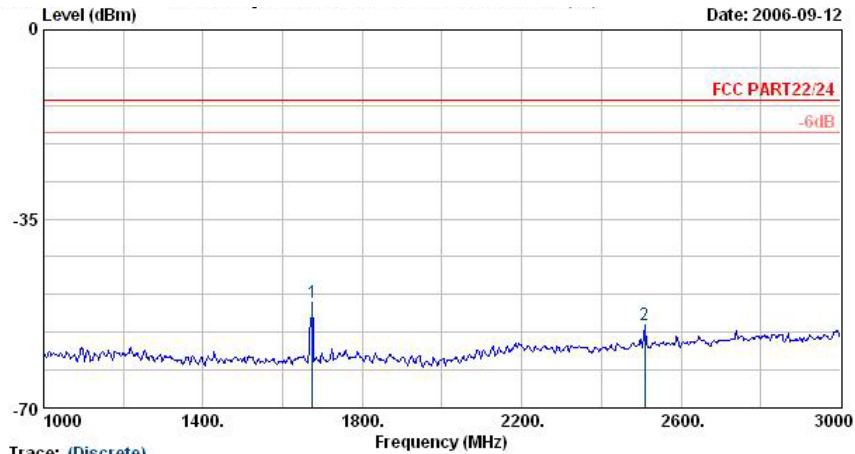
Trace: (Discrete)

Site : 03CH06-HY
Condition : LF-SPURIOUS VERTICAL
EUT : GPS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG 690824
Mode : GSM850 Link;Ch189

	Freq	Level	Over	Limit	Read		
	MHz	dBm	Limit	Line	Level	Factor	Remark
		dBm	dB	dBm	dBm	dB	
1	637.4	-55.08	-42.08	-13.00	-53.70	-1.38	Peak
2	836.9	-45.07			-46.43	1.36	Peak
3 @	880.3	-34.86			-36.57	1.71	Peak

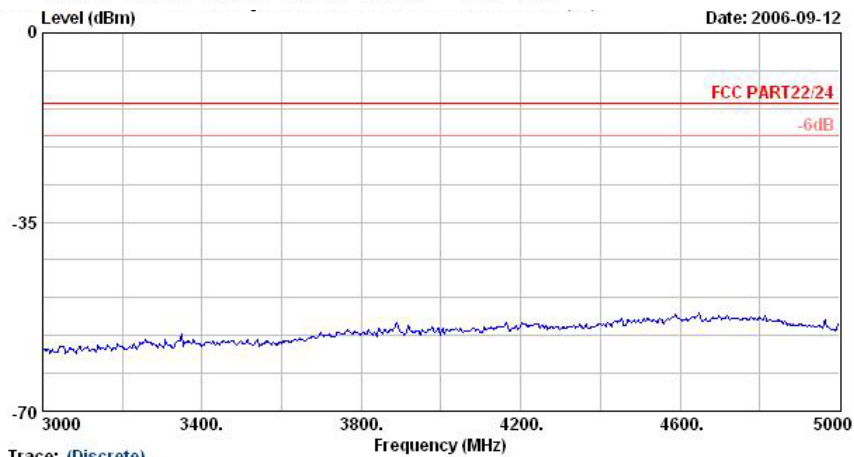
Remark:

1. #2: MS TCH Signal
2. #3: BS TCH Signal

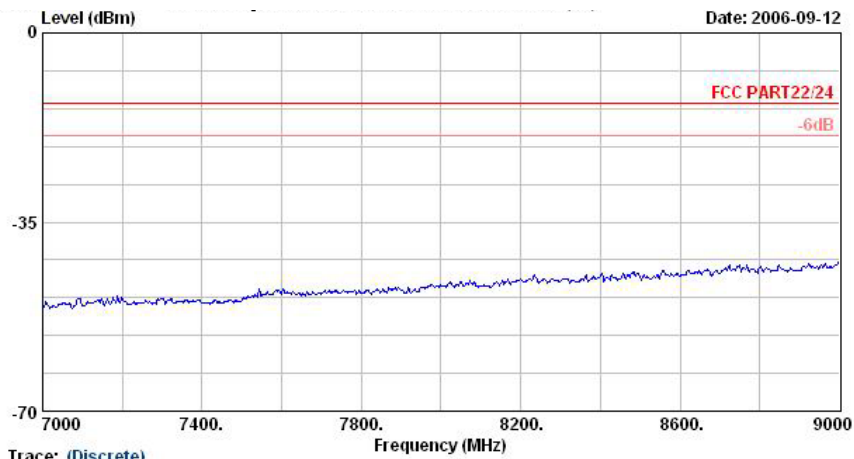
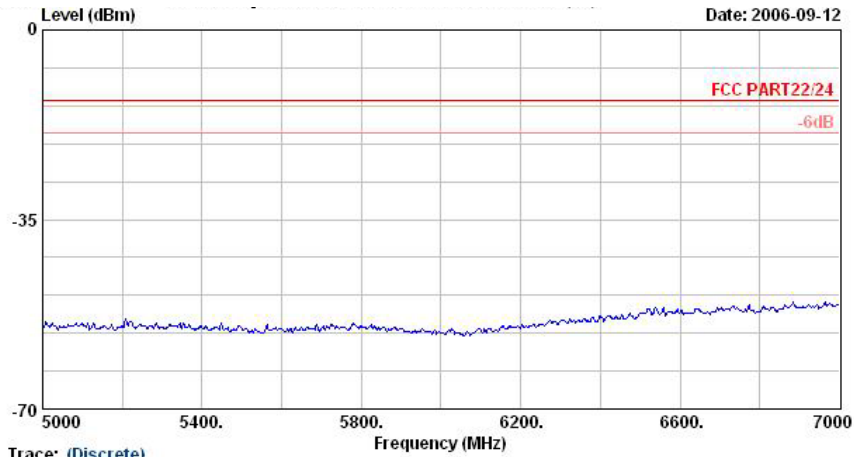


Trace: (Discrete)
Site : 03CH06-HY
Condition : HF-SFURIOUS VERTICAL
EUT : GPS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG 690824
Mode : GSM850 Link;Ch189

	Freq	Level	Over	Limit	Read	
	MHz	dBm	Limit	Line	Level	Factor Remark
		dBm	dB	dBm	dBm	dB
1	1674.0	-50.46	-37.46	-13.00	-49.98	-0.48 Peak
2	2508.0	-54.62	-41.62	-13.00	-56.89	2.27 Peak



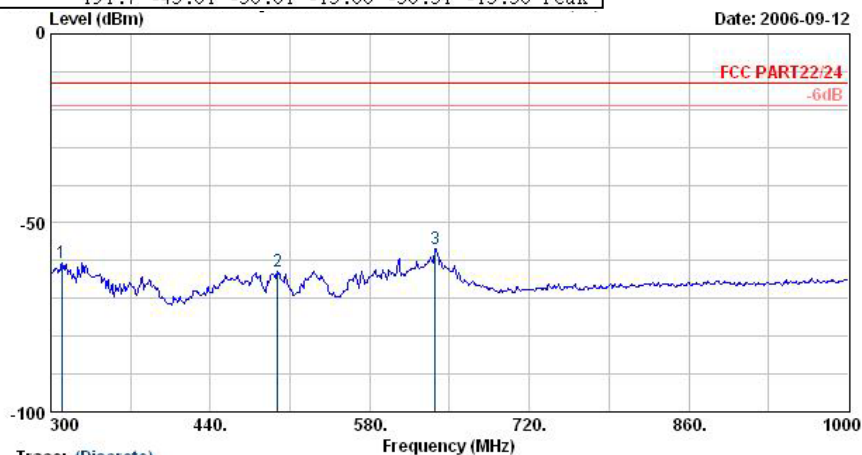
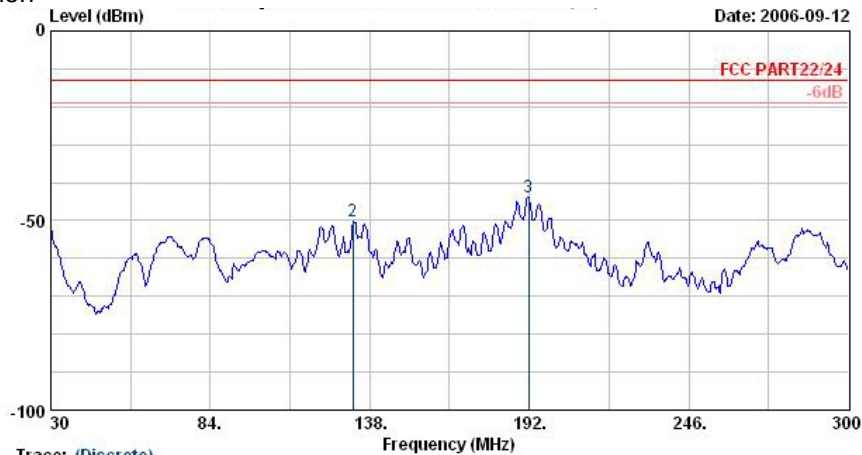
Trace: (Discrete)
Site : 03CH06-HY
Condition : HF-SFURIOUS VERTICAL
EUT : GPS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG 690824
Mode : GSM850 Link;Ch189





4.6.5.2 Mode 2

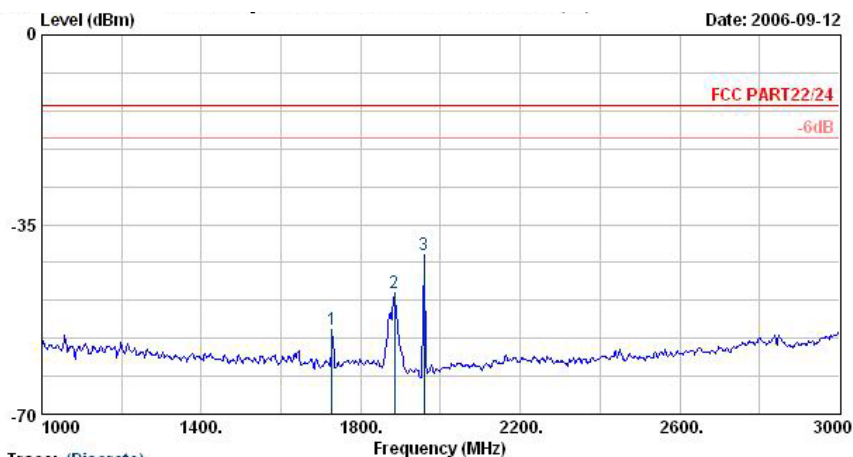
Horizontal Polarization





FCC TEST REPORT

Report No. : FG690824

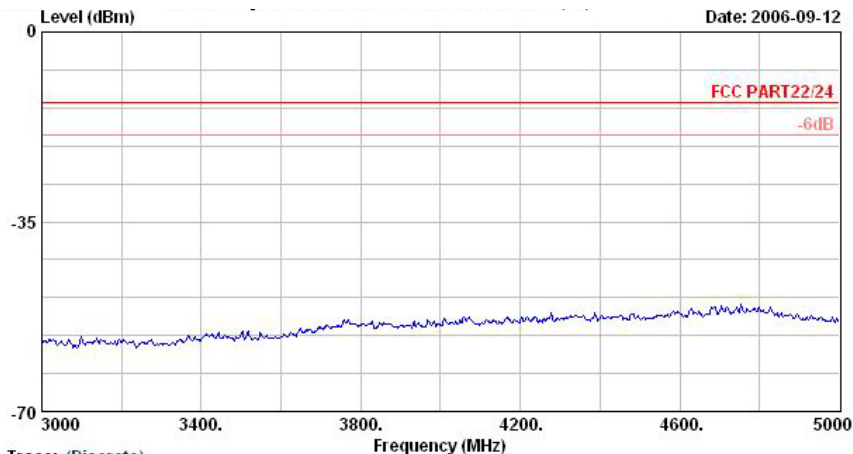


Trace: (Discrete)
Site : 03CH06-HY
Condition : HF-SPURIOUS HORIZONTAL
EUT : GPS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG690824
Mode : PCS1900 Link CM661

	Freq	Level	Over	Limit	Read		
	MHz	dBm	Limit	Line	Level	Factor	Remark
			dB	dBm	dBm	dB	
1	1728.0	-54.45	-41.45	-13.00	-54.48	0.02	Peak
2	1884.0	-47.52			-46.85	-0.68	Peak
3 @	1958.0	-40.53			-39.42	-1.11	Peak

Remark:

1. #1: MS TCH Signal
2. #2: BS TCH Signal

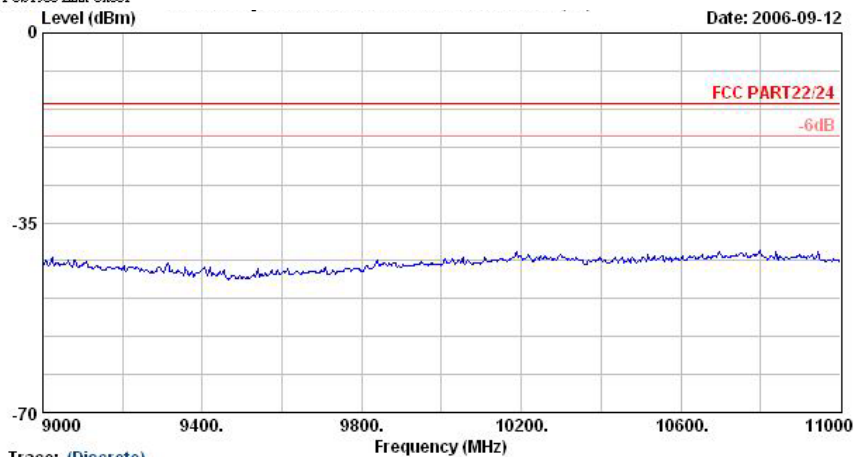
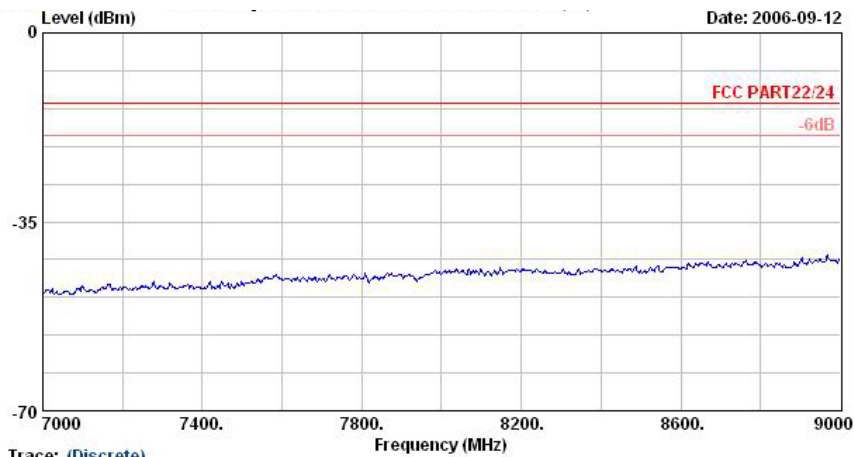
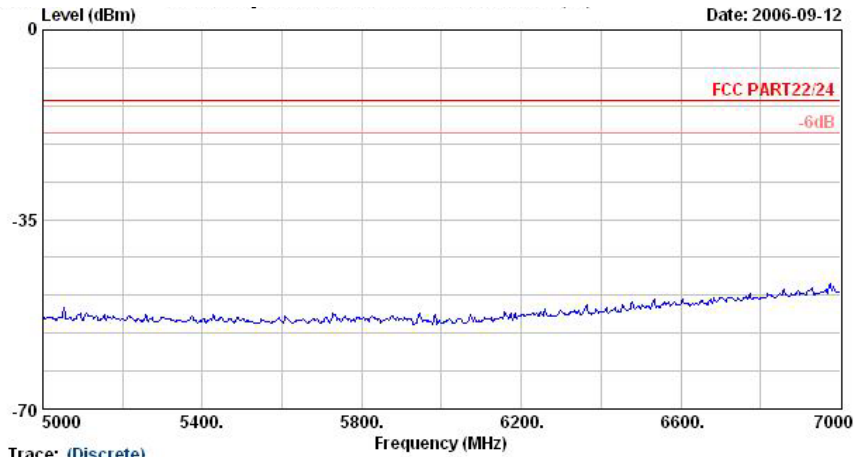


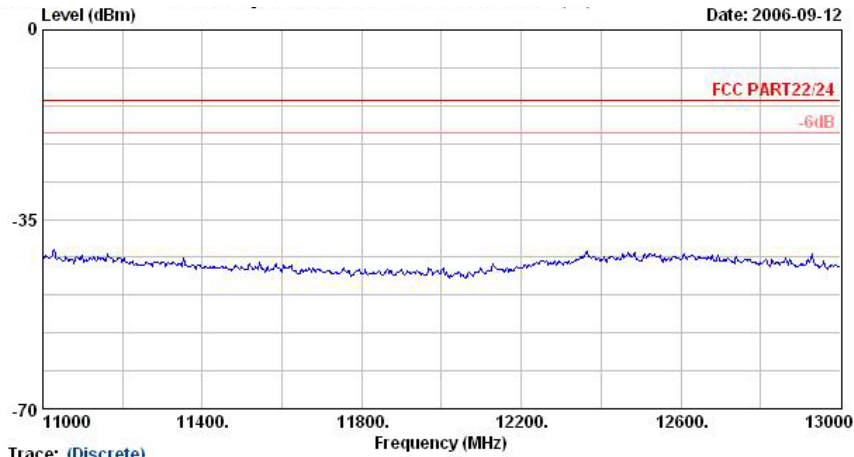
Trace: (Discrete)
Site : 03CH06-HY
Condition : HF-SPURIOUS HORIZONTAL
EUT : GPS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG690824
Mode : PCS1900 Link CM661



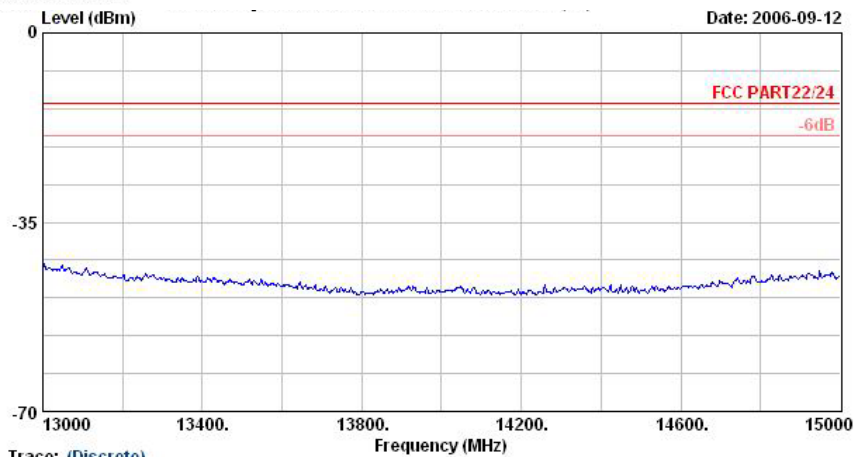
FCC TEST REPORT

Report No. : FG690824

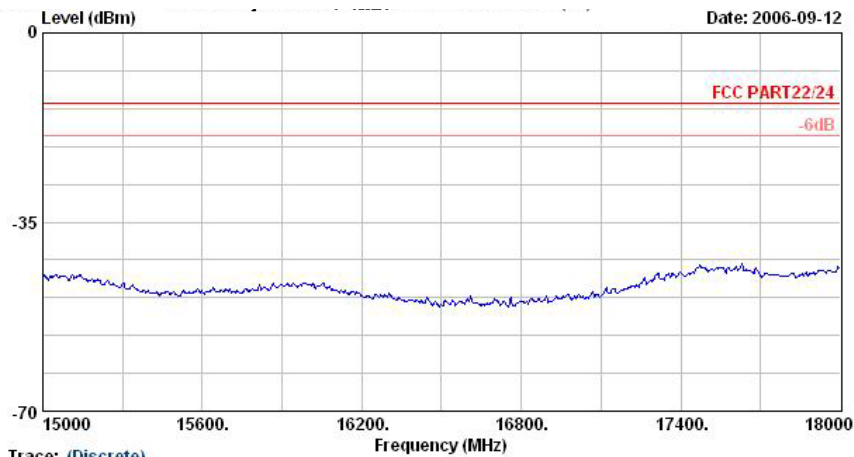




Trace: (Discrete)
Site : 03CH06-HY
Condition : HF-SPURIOUS HORIZONTAL
EUT : GFS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG690824
Mode : PCS1900 Link CM661



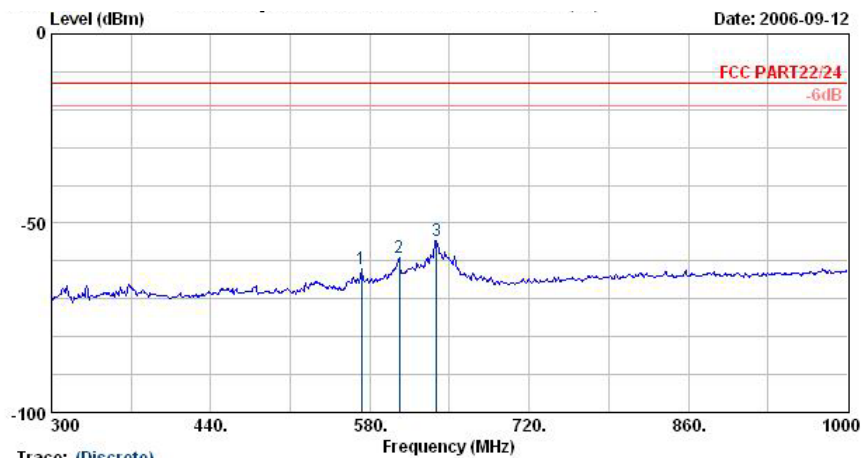
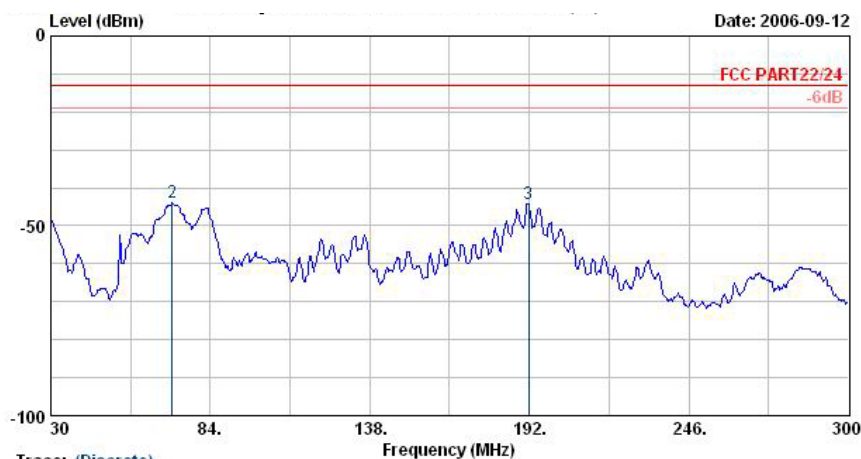
Trace: (Discrete)
Site : 03CH06-HY
Condition : HF-SPURIOUS HORIZONTAL
EUT : GFS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG690824
Mode : PCS1900 Link CM661

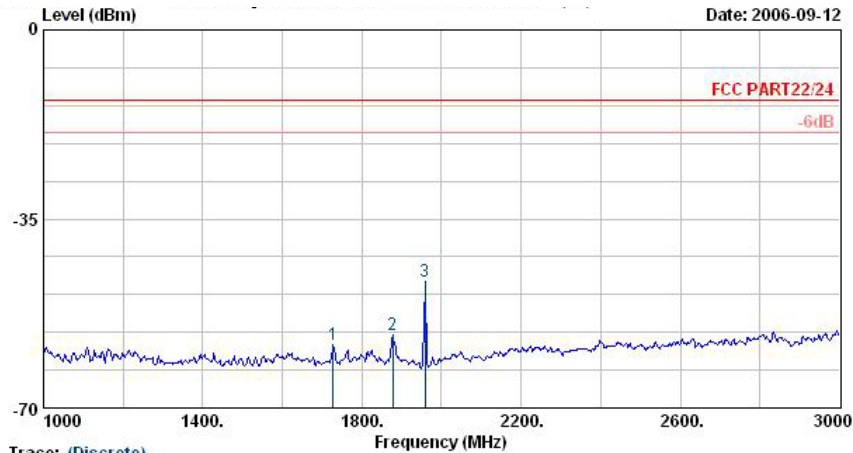


Trace: (Discrete)
Site : 03CH06-HY
Condition : HF-SPURIOUS HORIZONTAL
EUT : GFS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG690824
Mode : PCS1900 Link CM661



Vertical Polarization



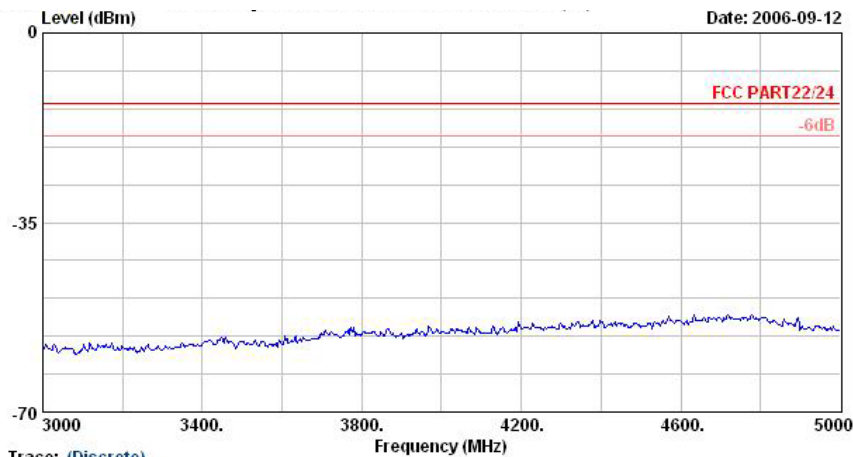


Trace: (Discrete)
Site : 03CH06-HY
Condition : HF-SPURIOUS VERTICAL
EUT : GFS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG690824
Mode : PCS1900 Link Ch661

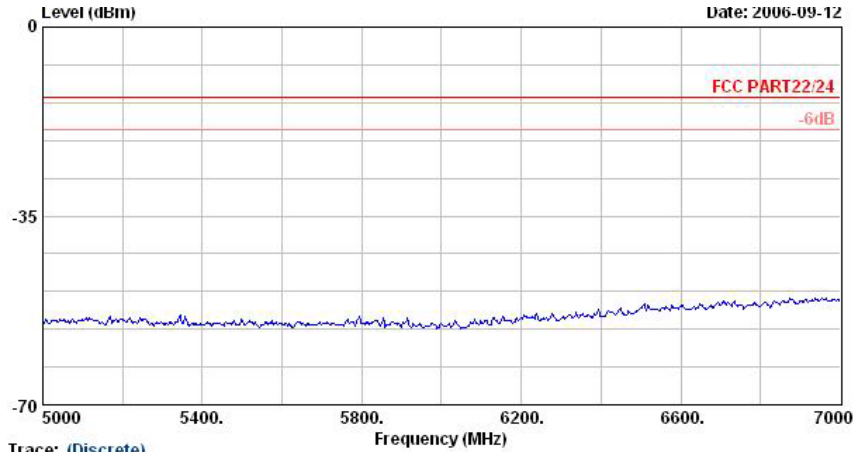
	Freq	Level	Over	Limit	Read		
	MHz	dBm	Limit	Line	Level	Factor	Remark
		dBm	dB	dBm	dBm	dB	
1	1728.0	-58.29	-45.29	-13.00	-57.95	-0.34	Peak
2	1878.0	-56.49			-56.09	-0.40	Peak
3 @	1958.0	-46.65			-46.06	-0.60	Peak

Remark:

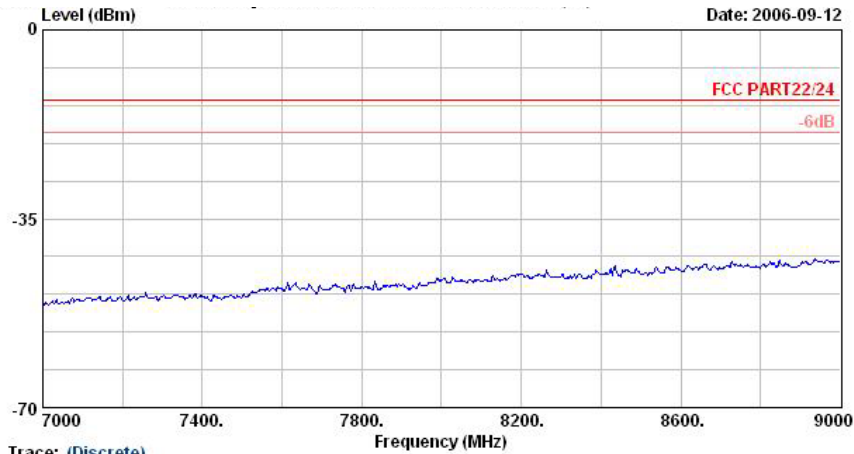
1. #2: MS TCH Signal
2. #3: BS TCH Signal



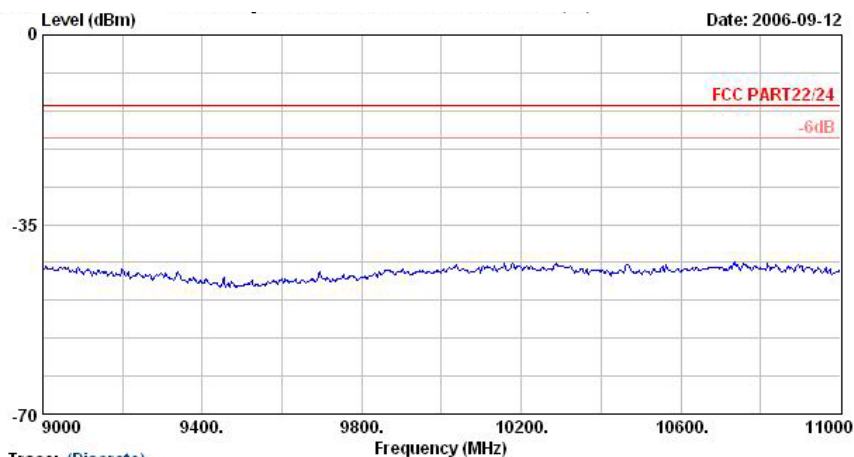
Trace: (Discrete)
Site : 03CH06-HY
Condition : HF-SPURIOUS VERTICAL
EUT : GFS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG690824
Mode : PCS1900 Link Ch661



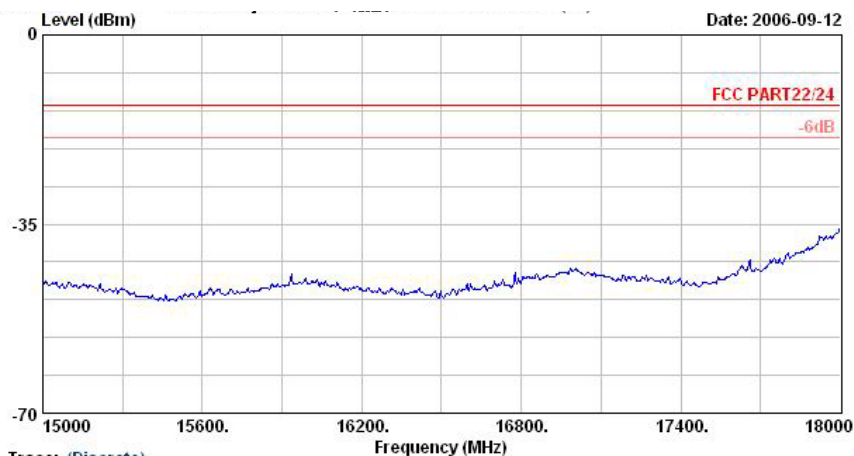
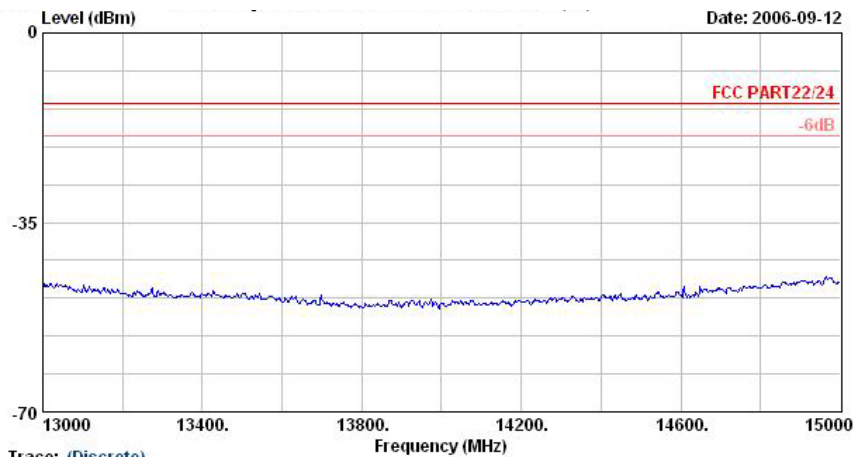
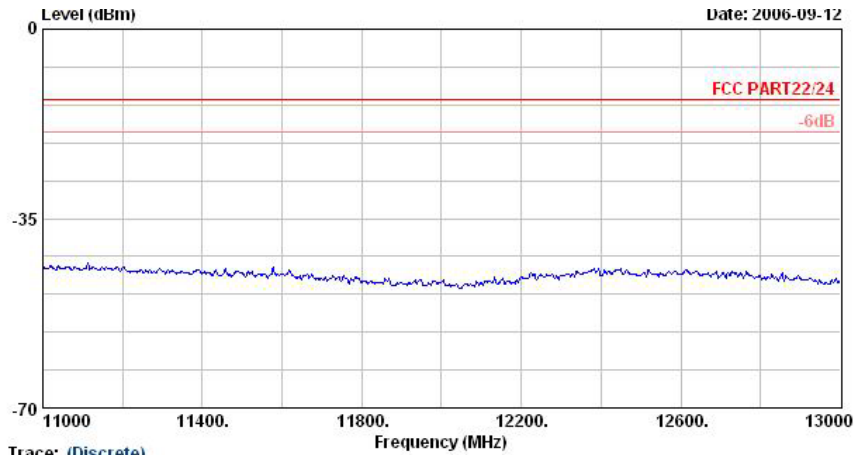
Trace: (Discrete)
Site : 03CH06-HY
Condition : HF-SPURIOUS VERTICAL
EUT : GFS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG690824
Mode : PCS1900 Link CM661



Trace: (Discrete)
Site : 03CH06-HY
Condition : HF-SPURIOUS VERTICAL
EUT : GFS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG690824
Mode : PCS1900 Link CM661



Trace: (Discrete)
Site : 03CH06-HY
Condition : HF-SPURIOUS VERTICAL
EUT : GFS+GSM(900/1800/1900/850)
Power : 12Vdc
Model : FG690824
Mode : PCS1900 Link CM661



Remark: There is no more obvious spurious emission except the listings above.

4.7 Frequency Stability (Temperature Variation)

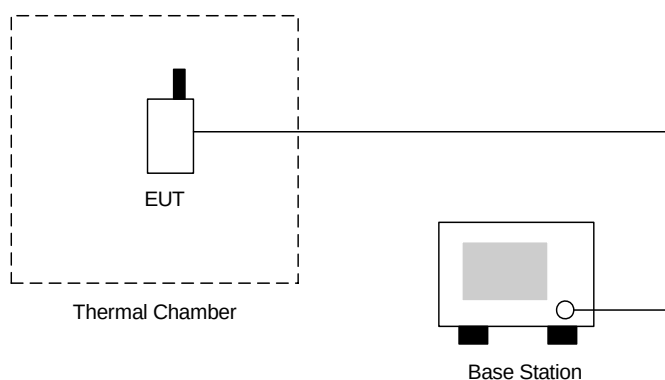
4.7.1 Measurement Instrument

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 -20°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°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 : GSM 850 CH189

Temperature(°C)	Change (Hz)	Change (ppm)	Limit (ppm)	Result
-30	36	0.02	2.5	Passed
-20	-28	-0.01		
-10	-39	-0.02		
0	-20	-0.01		
10	27	0.01		
20	16	0.01		
30	-34	-0.02		
40	15	0.01		
50	22	0.01		

▪ Test Mode : PCS 1900 CH661

Temperature(°C)	Change (Hz)	Change (ppm)	Limit (ppm)	Result
-30	45	0.02	2.5	Passed
-20	-44	-0.02		
-10	-65	-0.03		
0	-25	-0.01		
10	14	0.01		
20	22	0.01		
30	-18	-0.01		
40	15	0.01		
50	19	0.01		

4.8 Frequency Stability (Voltage Variation)

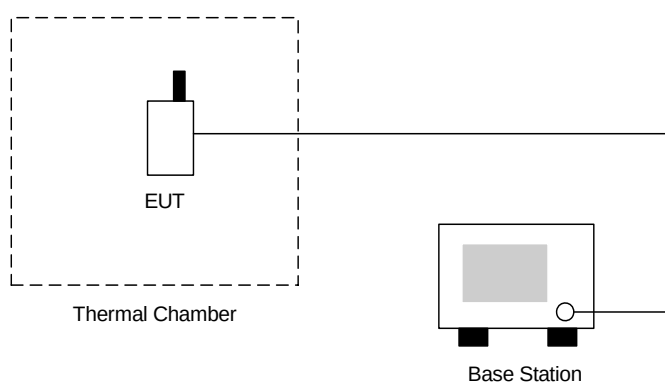
4.8.1 Measurement Instrument

As described in chapter 5 of this test report.

4.8.2 Test Procedure

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

4.8.3 Test Setup Layout



4.8.4 Test Result

▪ Test Mode : GSM 850 CH189

Voltage(Volt)	Change (Hz)	Change (ppm)	Limit (ppm)	Result
12	-17.0	-0.01	2.5	Passed
BEP	-18.0	-0.01		
13.8	-21.0	-0.01		

▪ Test Mode : PCS 1900 CH661

Voltage(Volt)	Change (Hz)	Change (ppm)	Limit (ppm)	Result
12	-19.0	-0.01	2.5	Passed
BEP	-24.0	-0.01		
13.8	-31.0	-0.02		

Remark:

1. Normal Voltage=12V.
2. Battery End Point (BEP)=10.2V.



5 List of Measurement Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
Spectrum analyzer	Agilent	E4408B	MY44211030	9KHz-26.5GHz	Jul. 25, 2006	Jul. 24, 2007	Radiation (03CH06-HY)
Receiver	R&S	ESCS30	100356	9KHz-2.75GHz	Jun. 26, 2006	Jun. 25, 2007	Radiation (03CH06-HY)
Controller	CT	SC100	N/A	N/A	N/A	N/A	Radiation (03CH06-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2885	30MHz -2GHz	Nov. 21, 2004	Nov. 20, 2006	Radiation (03CH06-HY)
Horn Antenna	Com-Power	AH118	071025	1G-18G	Feb. 1, 2005	Jan. 31, 2007	Radiation (03CH06-HY)
SHF-EHF Horn	SCHWARZBECK	BBHA 9170	9170-249	14G - 40G	Jul. 21, 2006	Jul. 20, 2007	Radiation (03CH06-HY)
HF Amplifier	MITEQ	AFS44	973248	0.1G - 26.5G	Dec. 17, 2005	Dec. 17, 2006	Radiation (03CH06-HY)
Amplifier	MITEQ	AMF-6F	997165	26G - 40G	Jul. 21, 2006	Jul. 20, 2007	Radiation (03CH06-HY)
Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	N/A	Radiation (03CH06-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	N/A	Radiation (03CH06-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
combined standard uncertainty Uc(y)	1.27		
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)	2.54		

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 = $20 \log(1 - \Gamma_1^2 * \Gamma_2^2)$	+0.34/-0.35	U-shaped	0.244	1	0.244
Combined standard uncertainty Uc(y)	2.36				
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	4.72				

END OF TEST REPORT