FCC RF Test Report

APPLICANT	:	ATrack Technology Inc.
EQUIPMENT	:	GPS/GSM/GPRS Tracker
BRAND NAME	:	ATrack
MODEL NAME	:	AT1 PRO(internal GPS antenna) / AT1E PRO(external GPS antenna)
FCC ID	:	YA7-ATVT1101
STANDARD	:	FCC 47 CFR Part 2, 22(H), 24(E)
CLASSIFICATION	:	PCS Licensed Transmitter (PCB)
Tx/Rx FREQUENCY RANGE	:	GSM850 : 824.2 ~ 848.8 MHz / 869.2 ~ 893.8 MHz GSM1900 : 1850.2 ~ 1909.8 MHz / 1930.2 ~ 1989.8 MHz
MAX. ERP/EIRP POWER	:	GSM850 (GSM) : 0.29 W GSM1900 (GSM) : 0.40 W

The product was received on Nov. 03, 2010 and completely tested on Mar. 10, 2012. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI / TIA / EIA-603-C-2004 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

Jones Tsai

Jones Tsai / Manager

Testing Laboratory 1190

SPORTON INTERNATIONAL INC.

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

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG0N0338	Rev. 01	Initial issue of report	Apr. 12, 2012

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	§2.1046	N/A	Conducted Output Power	N/A	PASS	-
3.2	§22.913(a)(2)	RSS-132(4.4) SRSP-503(5.1.3)	Effective Radiated Power	< 7 Watts	PASS	-
3.2	§24.232(c)	RSS-133 (6.4) SRSP-510(5.1.2)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
3.3	§2.1049 §22.917(a) §24.238(a)	N/A	Occupied Bandwidth	N/A	PASS	-
3.4	§2.1051 §22.917(a) §24.238(a)	RSS-132 (4.5.1) RSS-133 (6.5.1)	Band Edge Measurement	< $43+10\log_{10}$(P[Watts])	PASS	-
3.5	§2.1051 §22.917(a) §24.238(a)	RSS-132 (4.5.1) RSS-133 (6.5.1)	Conducted Emission	< $43+10\log_{10}$(P[Watts])	PASS	-
3.6	§2.1053 §22.917(a) §24.238(a)	RSS-132 (4.5.1) RSS-133 (6.5.1)	Field Strength of Spurious Radiation	< $43+10\log_{10}$(P[Watts])	PASS	Under limit 14.60 dB at 9400.000 MHz
3.7	§2.1055 §22.355 §24.235	RSS-132(4.3) RSS-133(6.3)	Frequency Stability for Temperature & Voltage	< 2.5 ppm	PASS	-

1 General Description

1.1 Applicant

ATrack Technology Inc.
9F., No. 285, Sec. 2, Tiding Blvd., Neihu Dist.,Taipei City 11493, Taiwan (R.O.C)

1.2 Manufacturer

ATrack Technology Inc.
9F., No. 285, Sec. 2, Tiding Blvd., Neihu Dist.,Taipei City 11493, Taiwan (R.O.C)

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	GPS/GSM/GPRS Tracker
Brand Name	ATrack
Model Name	AT1 PRO(internal GPS antenna) / AT1E PRO(external GPS antenna)
Sample 1	EUT with External GPS Antenna
Sample 2	EUT with Internal GPS Antenna
FCC ID	YA7-ATVT1101
Tx Frequency	GSM850 : 824 MHz ~ 849 MHz GSM1900 : 1850 MHz ~ 1910 MHz
Rx Frequency	GSM850 : 869 MHz ~ 894 MHz GSM1900 : 1930 MHz ~ 1990 MHz
Maximum Output Power to Antenna	GSM850 : 32.01 dBm GSM1900 : 29.88 dBm
Antenna Type	Fixed Internal Antenna
HW Version	1.0
SW Version	1.26
Type of Modulation	GMSK
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Emission Designator and Maximum ERP/EIRP Power

FCC Rule	System	Type of Modulation	Emission Designator	Maximum ERP/EIRP
Part 22	GSM850 GSM	GMSK	240KGXW	0.29 W
Part 24	GSM1900 GSM	GMSK	244KGXW	0.40 W

1.5 Testing Site

Test Site	SPORTON INTERNATIONAL INC.		
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.	**Sporton Site No.**		**FCC/IC Registration No.**
	TH02-HY	03CH05-HY	722060/4086B-1

1.6 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR Part 2, 22(H), 24(E)
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v01
- IC RSS-132 Issue 2
- IC RSS-133 Issue 5

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.

2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

1.7 Ancillary Equipment List

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

2 Test Configuration of Equipment Under Test

2.1 Test Mode

During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range.

Frequency range investigated for radiated emission is as follows:

1. 30 MHz to 9000 MHz for GSM850.
2. 30 MHz to 19000 MHz for GSM1900.

Test Modes		
Band	**Radiated TCs**	**Conducted TCs**
GSM 850	■ GSM Link + I/O Port with DC 12V for Sample 1 ■ GSM Link + I/O Port with DC 24V for Sample 2	■ GSM Link + I/O Port with DC 12V for Sample 1
GSM 1900	■ GSM Link + I/O Port with DC 24V for Sample 1 ■ GSM Link + I/O Port with DC 24V for Sample 2	■ GSM Link+ I/O Port with DC 12V for Sample 1

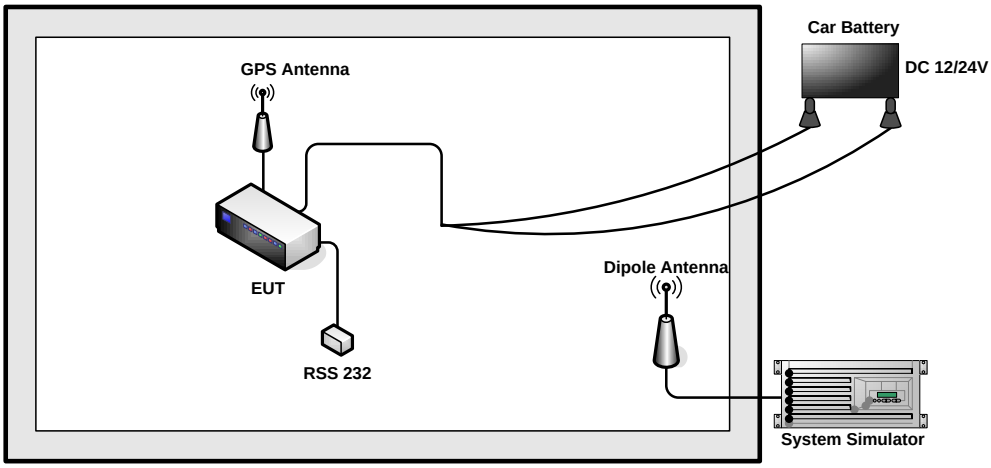
Note: The maximum power levels are GSM mode for GMSK link.

The conducted power tables are as follows:

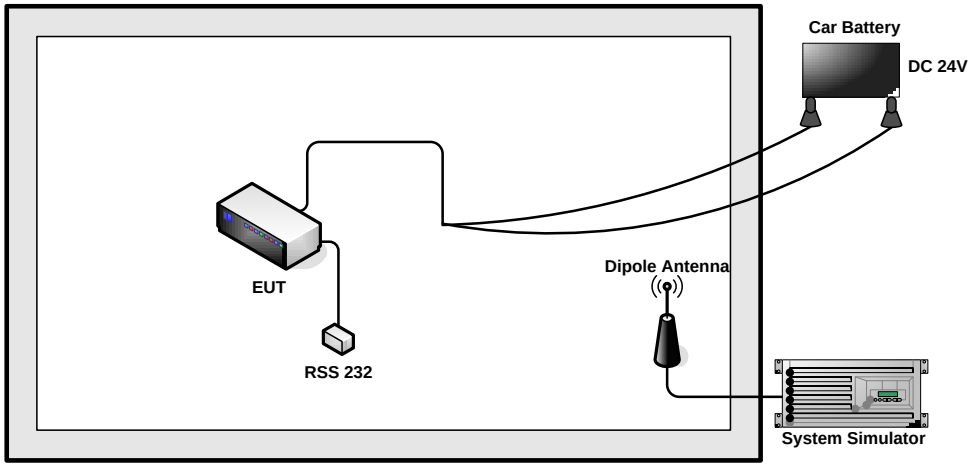
Conducted Power (*Unit: dBm)						
Band	**GSM850**			**GSM1900**		
Channel	**128**	**189**	**251**	**512**	**661**	**810**
Frequency	**824.2**	**836.4**	**848.8**	**1850.2**	**1880.0**	**1909.8**
GSM	**32.01**	31.69	31.39	**29.88**	29.52	28.65
GPRS 8	31.97	31.65	31.36	29.76	29.36	28.54
GPRS 10	31.93	31.59	31.31	29.73	29.34	28.50

2.2 Connection Diagram of Test System

<EUT with External Antenna>



<EUT with Internal Antenna>



3 Test Result

3.1 Conducted Output Power Measurement

3.1.1 Description of the Conducted Output Power Measurement

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

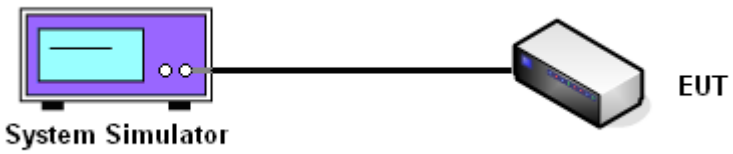
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The transmitter output port was connected to base station.
2. Set EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different modulation.

3.1.4 Test Setup



3.1.5 Test Result of Conducted Output Power

Cellular Band			
Modes	**GSM850 (GSM)**		
Channel	**128 (Low)**	**189 (Mid)**	**251 (High)**
Frequency (MHz)	**824.2**	**836.4**	**848.8**
Conducted Power (dBm)	32.01	31.69	31.39
Conducted Power (Watts)	1.59	1.48	1.38

PCS Band			
Modes	**GSM1900 (GSM)**		
Channel	**512 (Low)**	**661 (Mid)**	**810 (High)**
Frequency (MHz)	**1850.2**	**1880**	**1909.8**
Conducted Power (dBm)	29.88	29.52	28.65
Conducted Power (Watts)	0.97	0.90	0.73

3.2 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

3.2.1 Description of the ERP/EIRP Measurement

The substitution method, in ANSI / TIA / EIA-603-C-2004, was used for ERP/EIRP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v01. The ERP of mobile transmitters must not exceed 7 Watts and the EIRP of mobile transmitters are limited to 2 Watts.

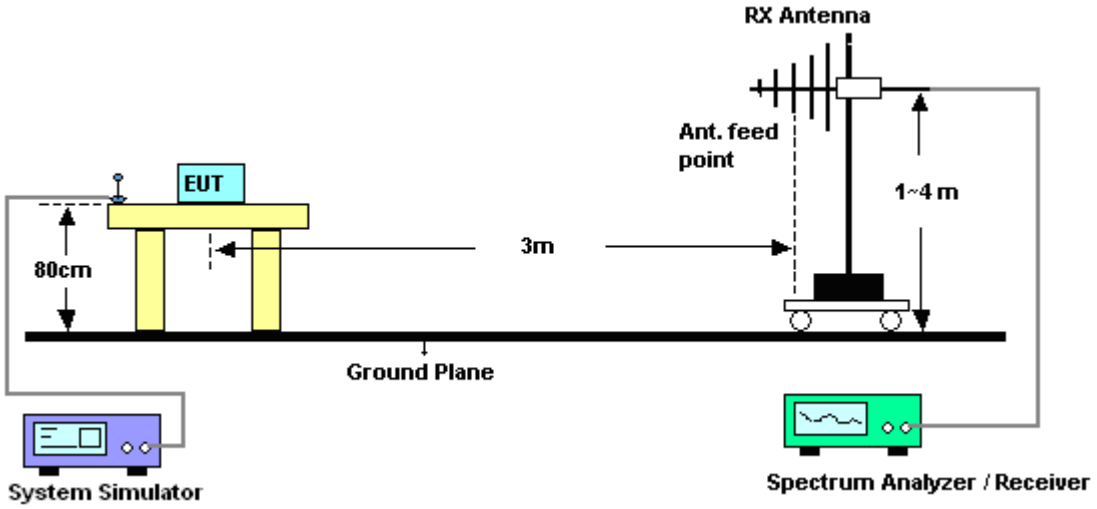
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The EUT was placed on an non-conductive rotating platform with 0.8 meter height in a semi-anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RBW= 1MHz, VBW= 3MHz, and RMS detector settings per section 4.0 of KDB 971168 D01.
2. During the measurement, the EUT was enforced in maximum power and linked with a base station. The highest emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
3. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by dipole antenna (substitution antenna) at same location, and then a known power from S.G. was applied into the dipole antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor, EIRP= LVL + Correction factor and ERP = EIRP – 2.15 .

3.2.4 Test Setup



3.2.5 Test Result of ERP

GSM850 (GSM) Radiated Power ERP				
Horizontal Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.2	-4.92	30.99	23.92	0.25
836.4	-5.09	30.89	23.65	0.23
848.8	-6.55	31.22	22.52	0.18
Vertical Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.2	-7.83	34.67	24.69	0.29
836.4	-8.50	34.88	24.23	0.26
848.8	-8.97	34.74	23.62	0.23

* ERP = LVL (dBm) + Correction Factor (dB) – 2.15

3.2.6 Test Result of EIRP

GSM1900 (GSM) Radiated Power EIRP				
Horizontal Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
1850.2	-15.52	40.91	25.39	0.35
1880.0	-15.92	41.91	25.99	0.40
1909.8	-16.53	41.73	25.20	0.33
Vertical Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**EIRP (W)**
1850.2	-17.79	42.78	24.99	0.32
1880.0	-19.55	43.75	24.20	0.26
1909.8	-19.11	43.06	23.95	0.25

* EIRP = LVL (dBm) + Correction Factor (dB)

3.3 Occupied Bandwidth Measurement

3.3.1 Description of Occupied Bandwidth Measurement

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

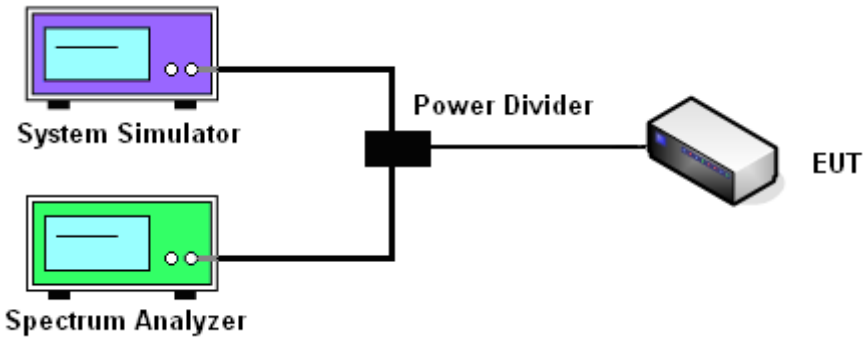
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers were measured.

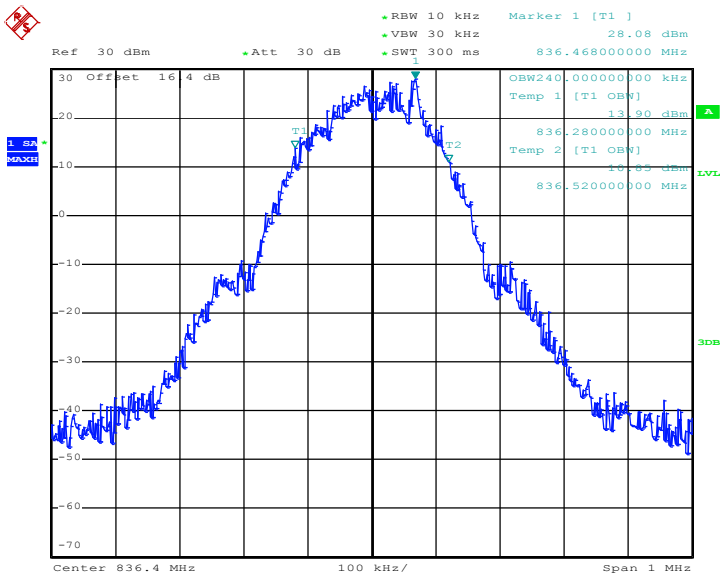
3.3.4 Test Setup



3.3.5 Test Result (Plots) of Occupied Bandwidth

Band :	GSM 850	Power Stage :	High
Test Mode :	GSM Link		

99% Occupied Bandwidth Plot on Channel 189



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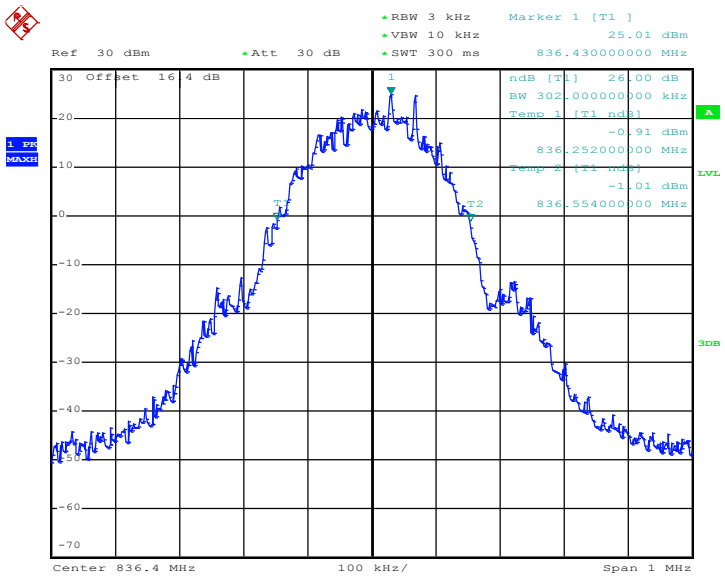
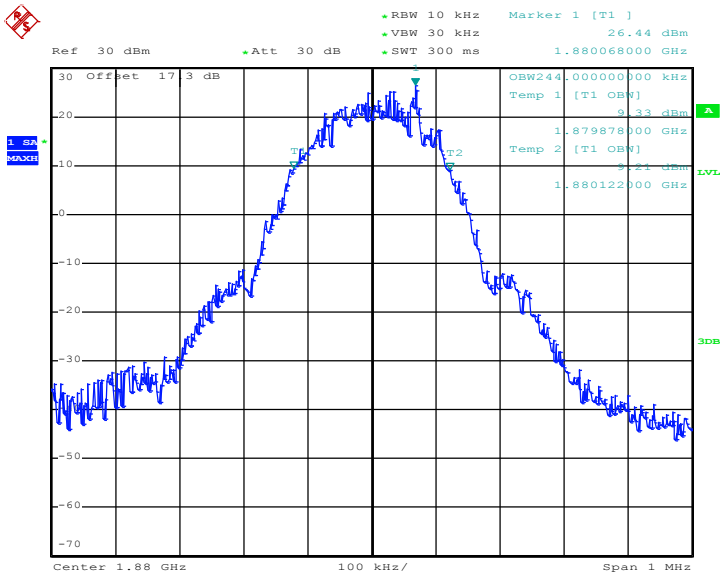
26dB Bandwidth Plot on Channel 189



Date: 5.MAR.2012 21:37:37

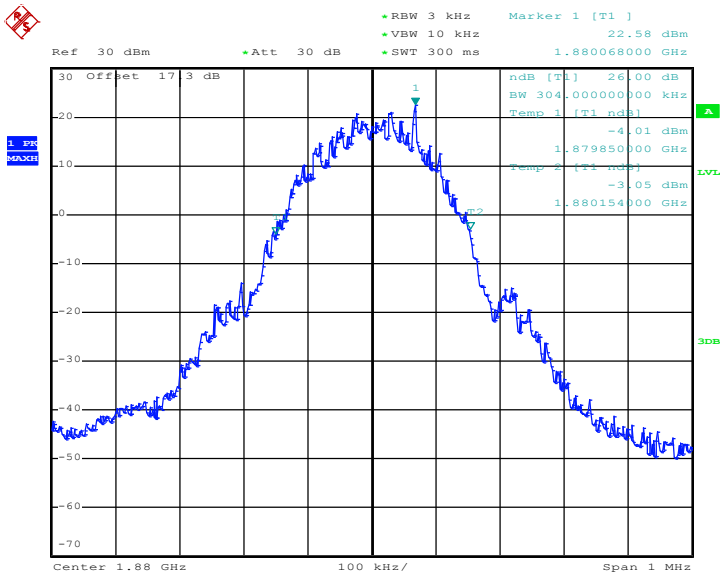
Band :	GSM 1900	Power Stage :	High
Test Mode :	GSM Link		

99% Occupied Bandwidth Plot on Channel 661



Date: 5.MAR.2012 22:23:09

26dB Bandwidth Plot on Channel 661



Date: 5.MAR.2012 21:59:28

3.4 Band Edge Measurement

3.4.1 Description of Band Edge Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

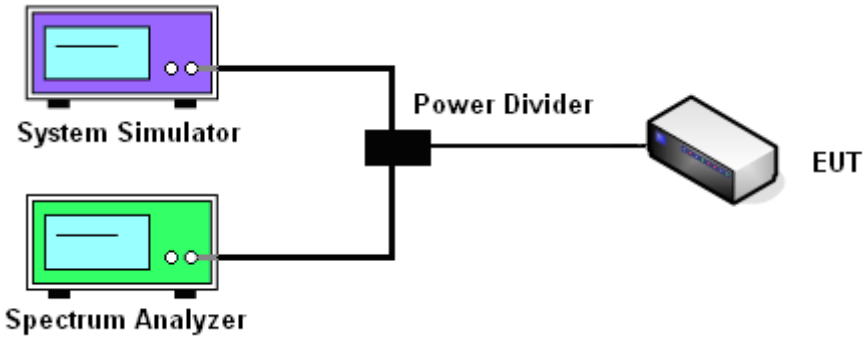
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The band edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.

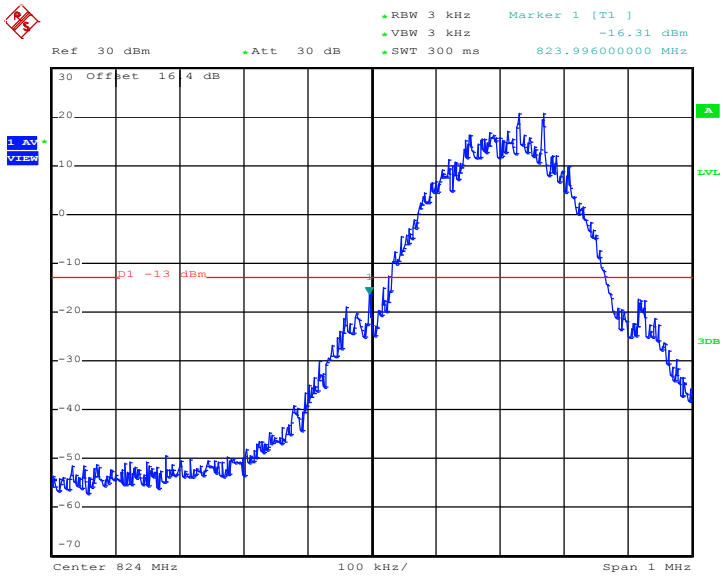
3.4.4 Test Setup



3.4.5 Test Result (Plots) of Conducted Band Edge

Band :	GSM850	Power Stage :	High
Test Mode :	GSM Link		

Lower Band Edge Plot on Channel 128



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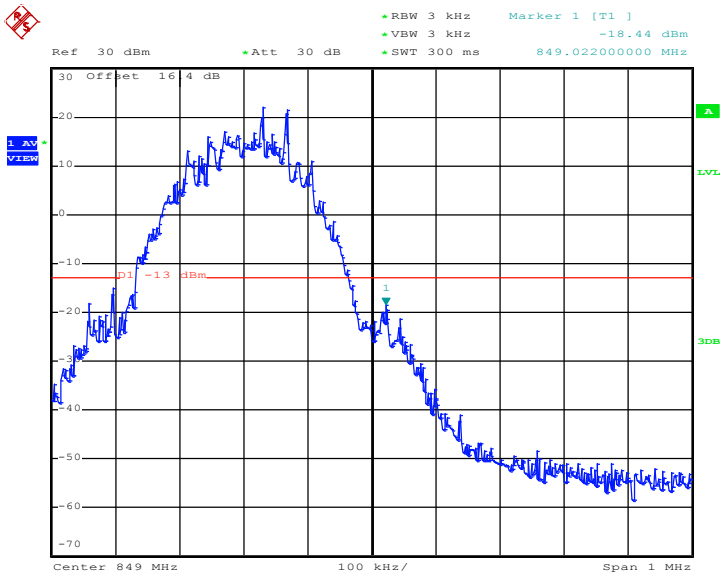
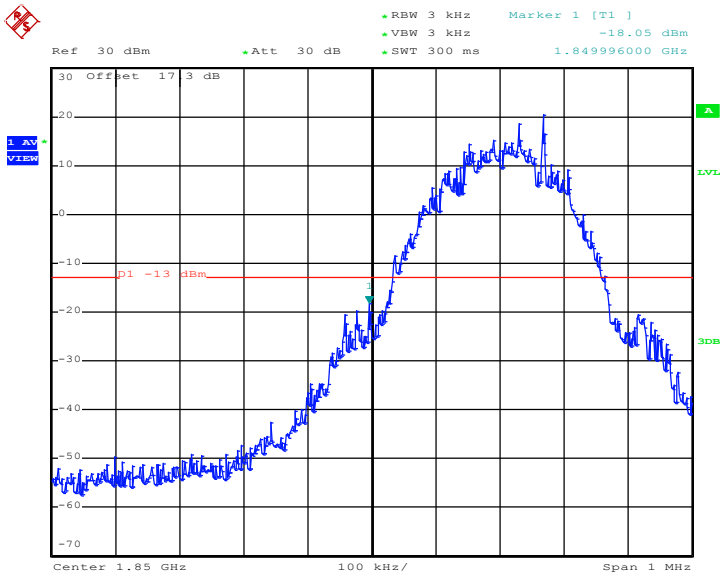
Higher Band Edge Plot on Channel 251



Date: 5.MAR.2012 21:41:15

Band :	GSM1900	Power Stage :	High
Test Mode :	GSM Link		

Lower Band Edge Plot on Channel 512



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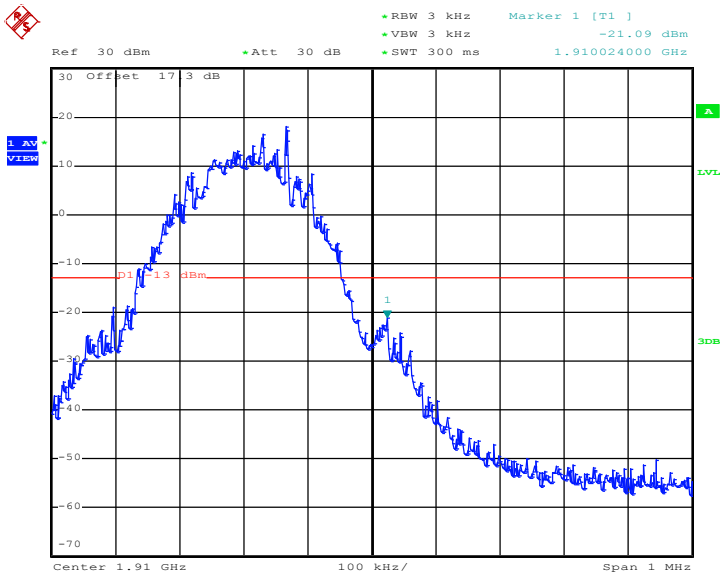
Higher Band Edge Plot on Channel 810



Date: 5.MAR.2012 22:03:04

3.5 Conducted Emission Measurement

3.5.1 Description of Conducted Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10^{th} harmonic.

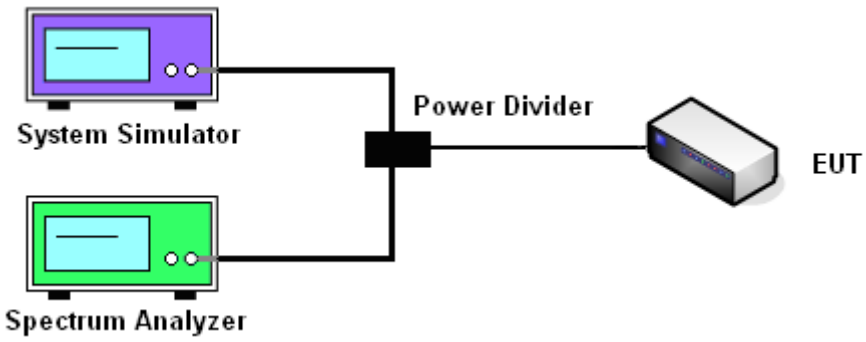
3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

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.

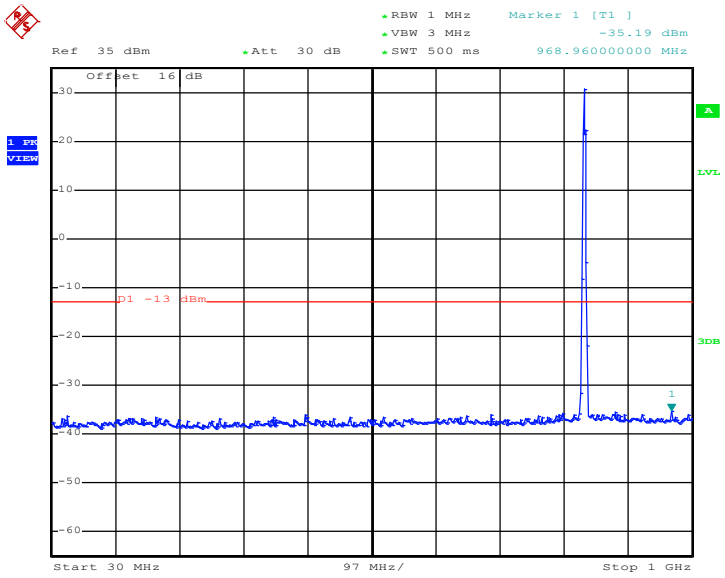
3.5.4 Test Setup



3.5.5 Test Result (Plots) of Conducted Emission

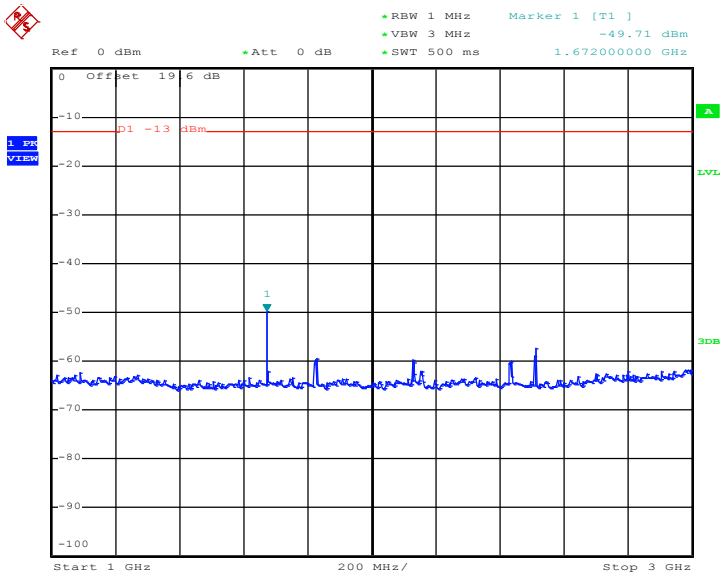
Band :	GSM850	Channel :	CH189
Test Mode :	GSM Link		

Conducted Emission Plot between 30MHz ~ 1GHz



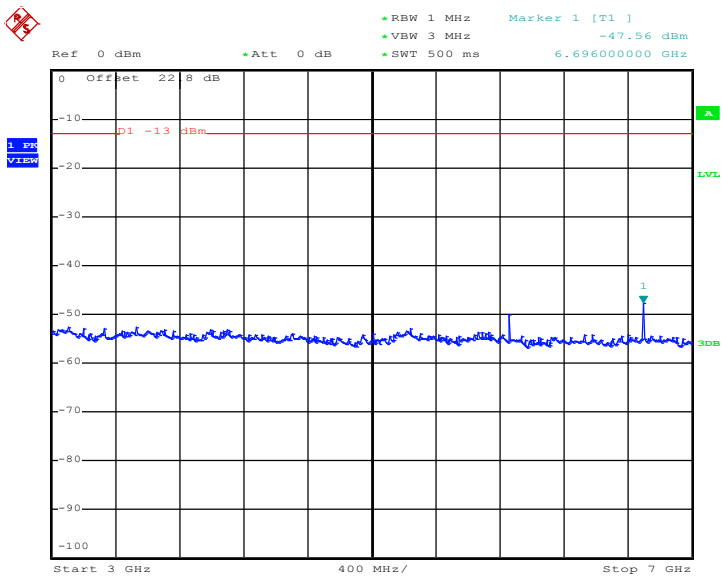
Date: 5.MAR.2012 21:17:23

Conducted Emission Plot between 1GHz ~ 3GHz



Date: 5.MAR.2012 21:17:42

Conducted Emission Plot between 3GHz ~ 7GHz



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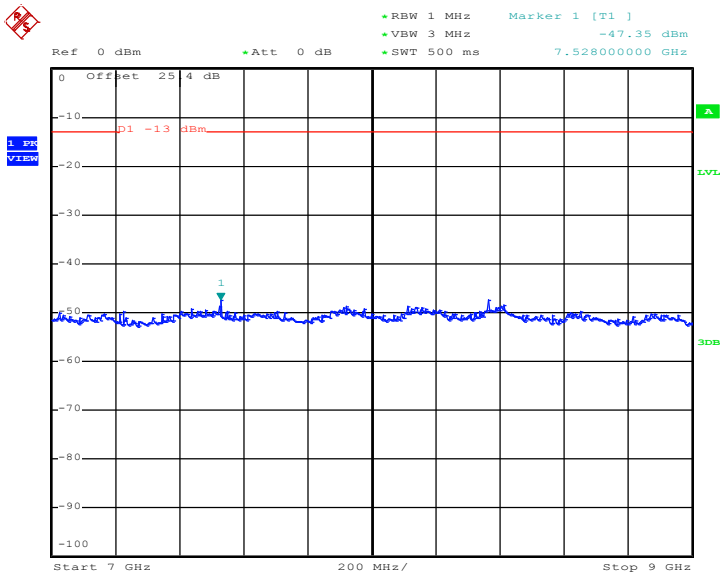
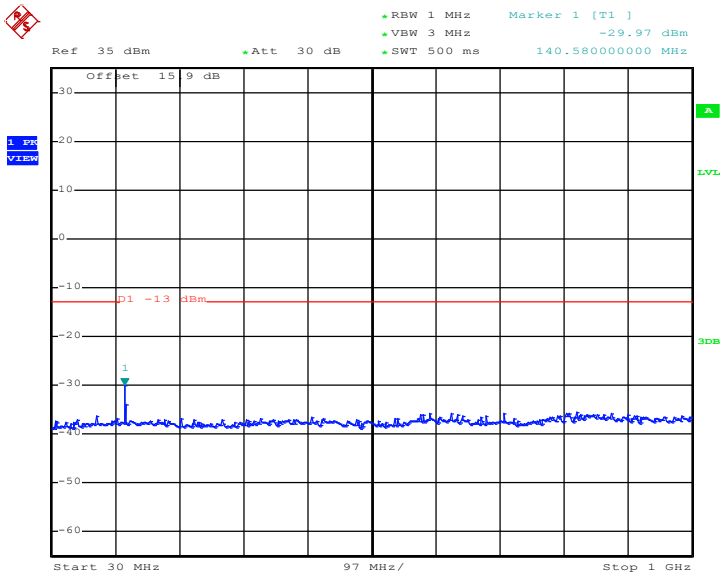
Conducted Emission Plot between 7GHz ~ 9GHz



Date: 5.MAR.2012 21:18:07

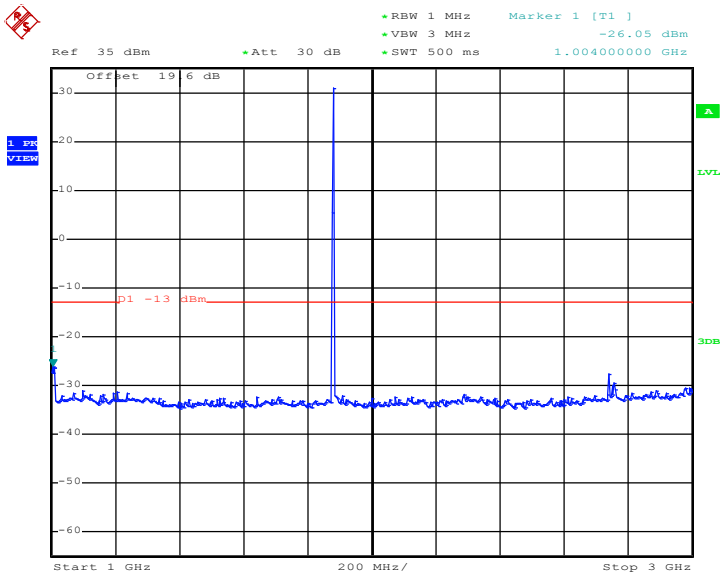
Band :	GSM1900	Channel :	CH661
Test Mode :	GSM Link		

Conducted Emission Plot between 30MHz ~ 1GHz



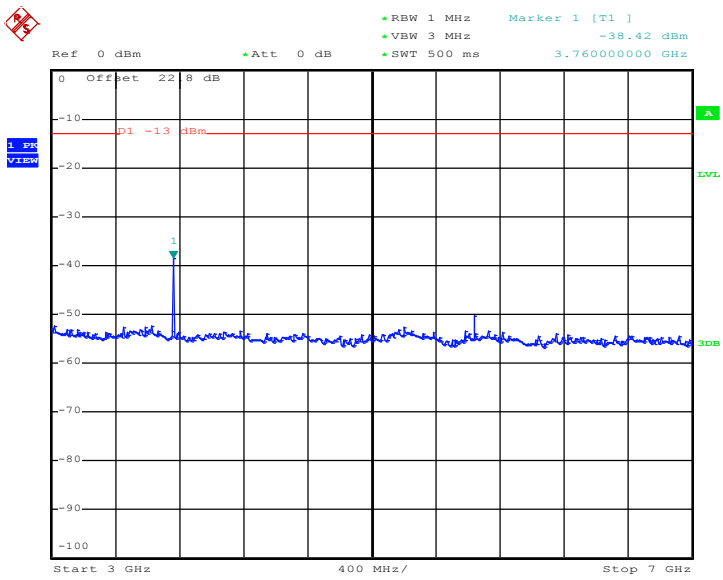
Date: 6.MAR.2012 20:56:51

Conducted Emission Plot between 1GHz ~ 3GHz



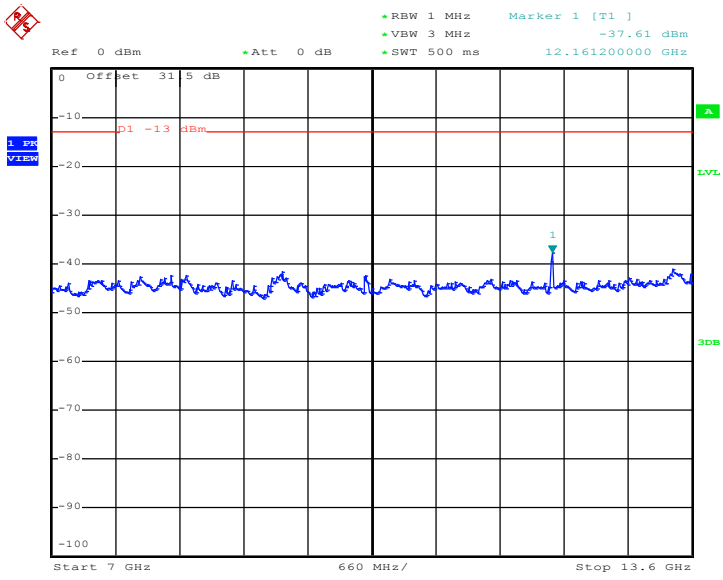
Date: 5.MAR.2012 21:49:34

Conducted Emission Plot between 3GHz ~ 7GHz



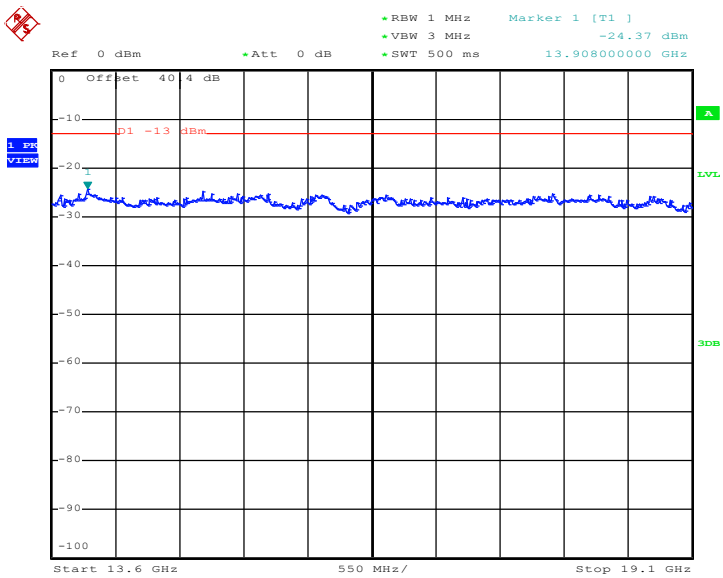
Date: 5.MAR.2012 21:49:49

Conducted Emission Plot between 7GHz ~ 13.6GHz



Date: 5.MAR.2012 21:50:02

Conducted Emission Plot between 13.6GHz ~ 19.1GHz



Date: 5.MAR.2012 21:50:15

3.6 Field Strength of Spurious Radiation Measurement

3.6.1 Description of Field Strength of Spurious Radiated Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA / EIA-603-C-2004. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

3.6.2 Measuring Instruments

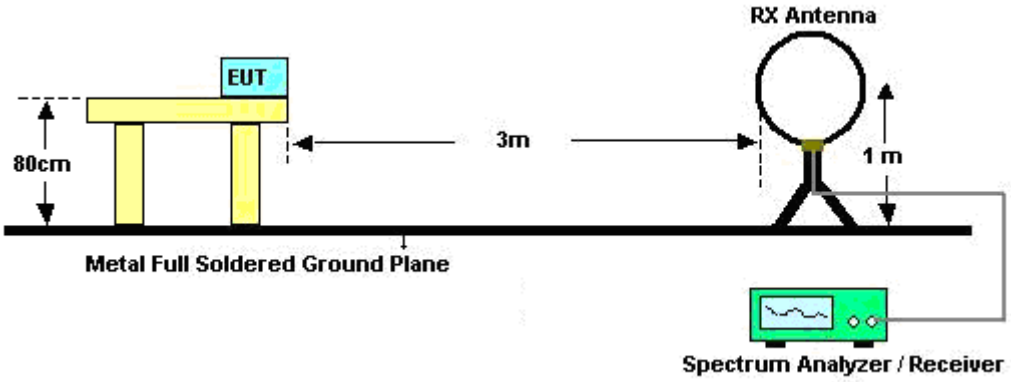
See list of measuring instruments of this test report.

3.6.3 Test Procedures

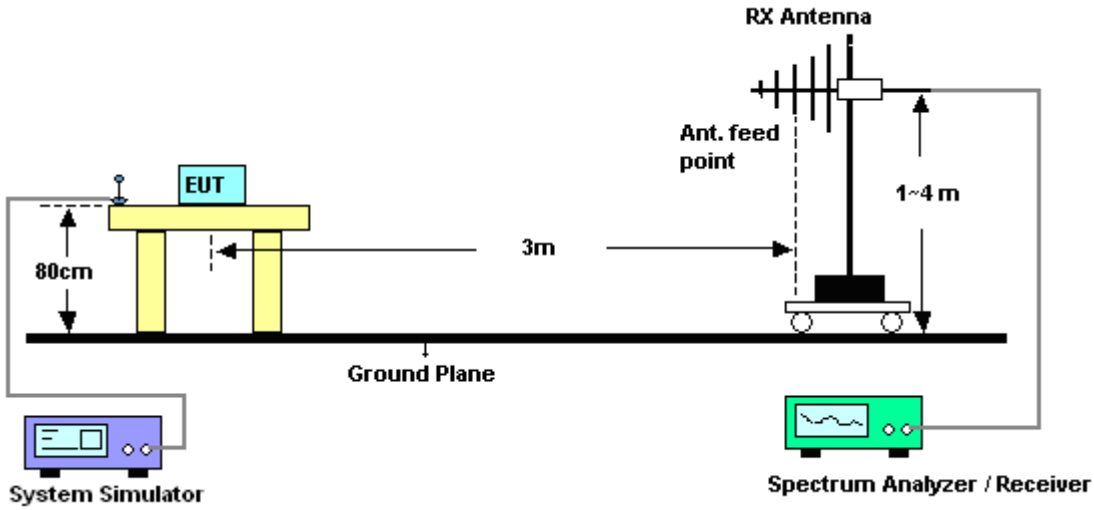
1. The EUT was placed on a rotatable wooden table with 0.8 meter about ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, 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 polarization.
10. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15

3.6.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz

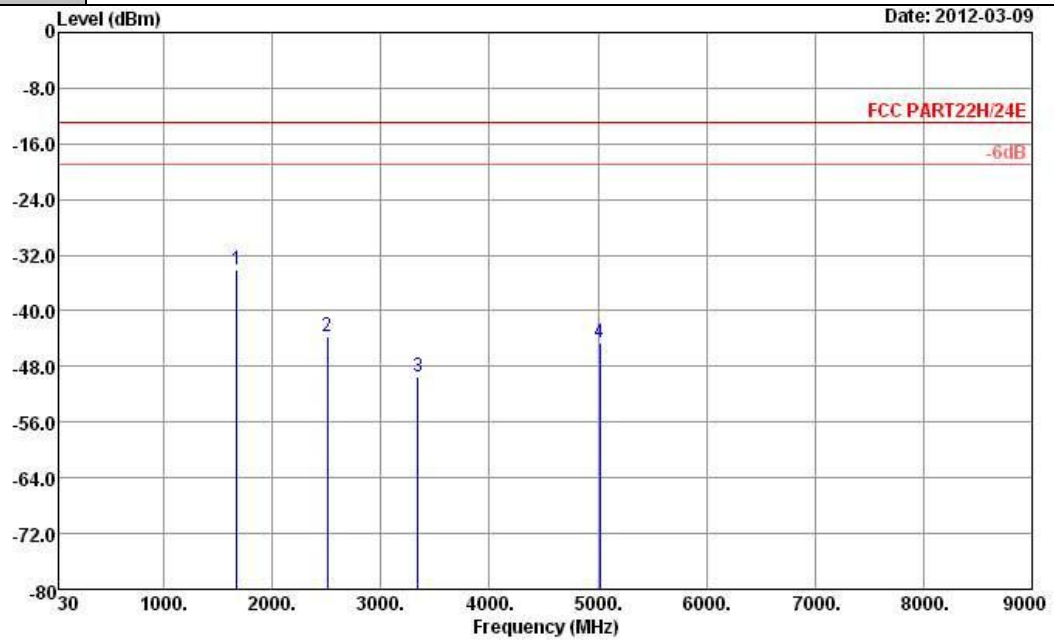


3.6.5 Test Results of Radiated Emissions (9 KHz ~ 30 MHz)

The low frequency, which started from 9 KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

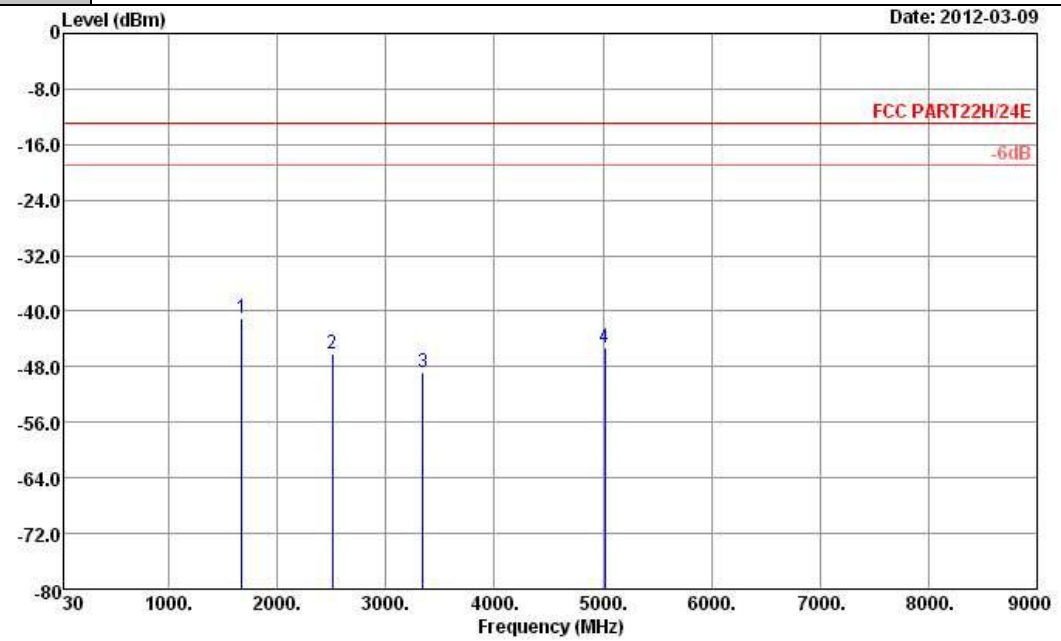
3.6.6 Test Result of Field Strength of Spurious Radiated

Band :	GSM850	**Temperature :**	20~22°C
Test Mode :	GSM Link + I/O Port with DC 12V for Sample 1	**Relative Humidity :**	40~42%
Test Engineer :	David Ke	**Polarization :**	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



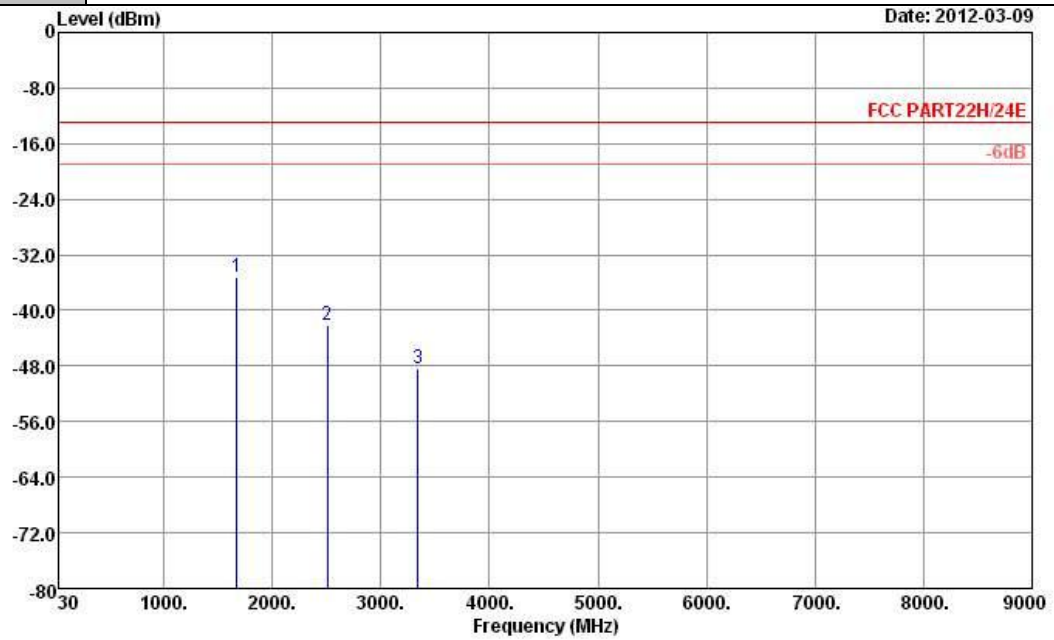
Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
1672	-34.12	-13	-21.12	-40.09	-35.31	2.15	5.49	H	Pass
2509	-43.59	-13	-30.59	-53.02	-45.48	2.38	6.41	H	Pass
3345	-49.54	-13	-36.54	-61.04	-52.87	2.86	8.34	H	Pass
5018	-44.52	-13	-31.52	-61.93	-49.26	3.62	10.51	H	Pass

Band :	GSM850	Temperature :	20~22°C
Test Mode :	GSM Link + I/O Port with DC 12V for Sample 1	Relative Humidity :	40~42%
Test Engineer :	David Ke	Polarization :	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



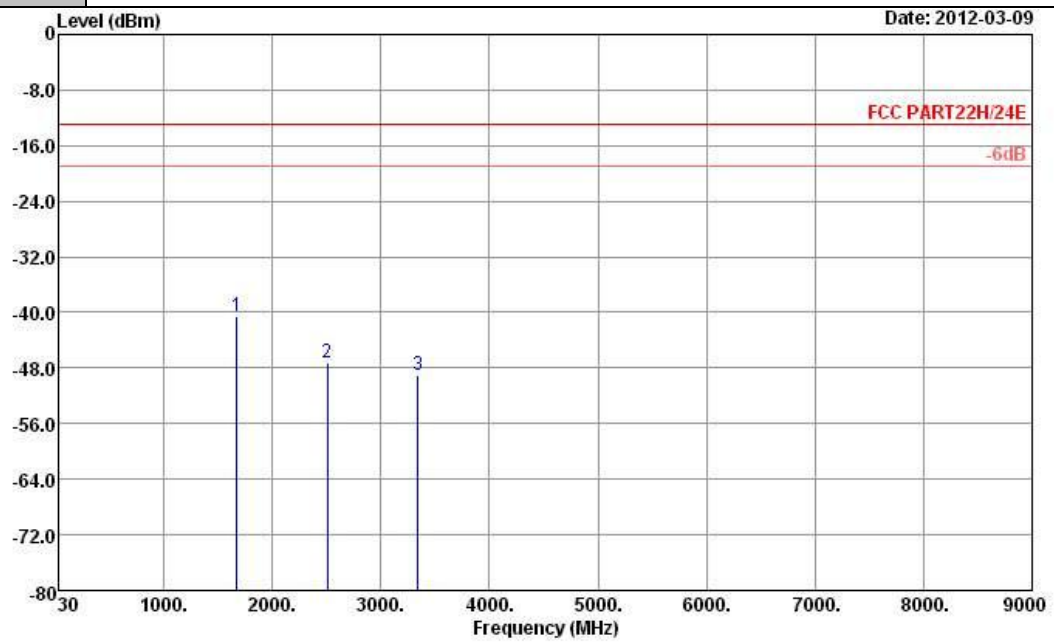
Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
1672	-41.06	-13	-28.06	-47.18	-42.25	2.15	5.49	V	Pass
2509	-46.14	-13	-33.14	-55.49	-48.03	2.38	6.41	V	Pass
3345	-48.81	-13	-35.81	-60.33	-52.14	2.86	8.34	V	Pass
5018	-45.29	-13	-32.29	-62.51	-50.03	3.62	10.51	V	Pass

Band :	GSM850	Temperature :	20~22°C
Test Mode :	GSM Link + I/O Port with DC 24V for Sample 2	Relative Humidity :	40~42%
Test Engineer :	David Ke	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



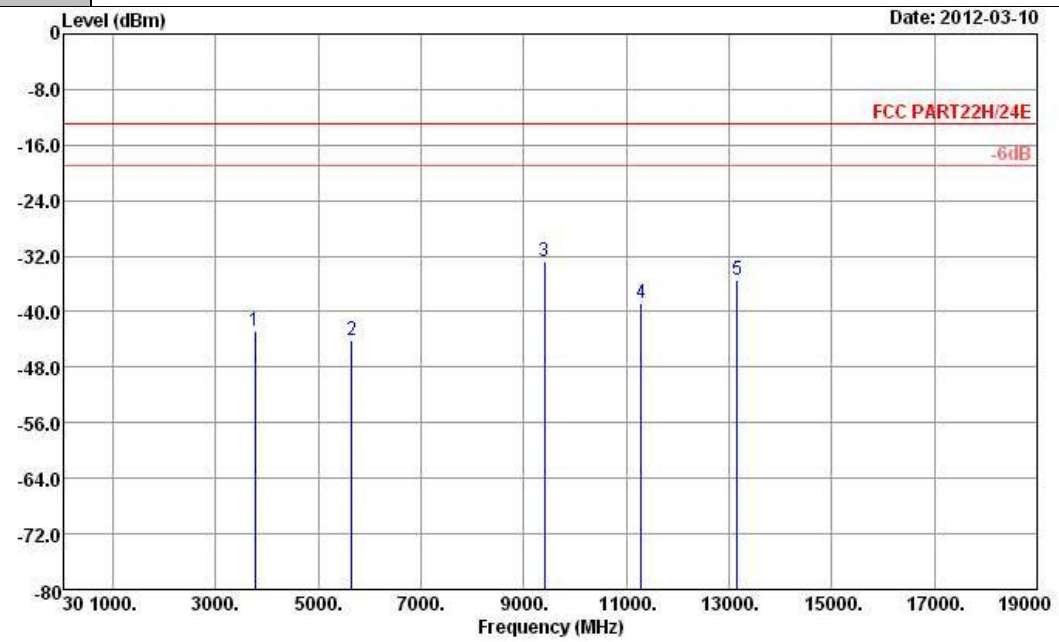
Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
1672	-35.26	-13	-22.26	-41.34	-36.45	2.15	5.49	H	Pass
2509	-42.02	-13	-29.02	-51.26	-43.91	2.38	6.41	H	Pass
3345	-48.43	-13	-35.43	-60.16	-51.76	2.86	8.34	H	Pass

Band :	GSM850	**Temperature :**	20~22°C
Test Mode :	GSM Link + I/O Port with DC 24V for Sample 2	**Relative Humidity :**	40~42%
Test Engineer :	David Ke	**Polarization :**	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



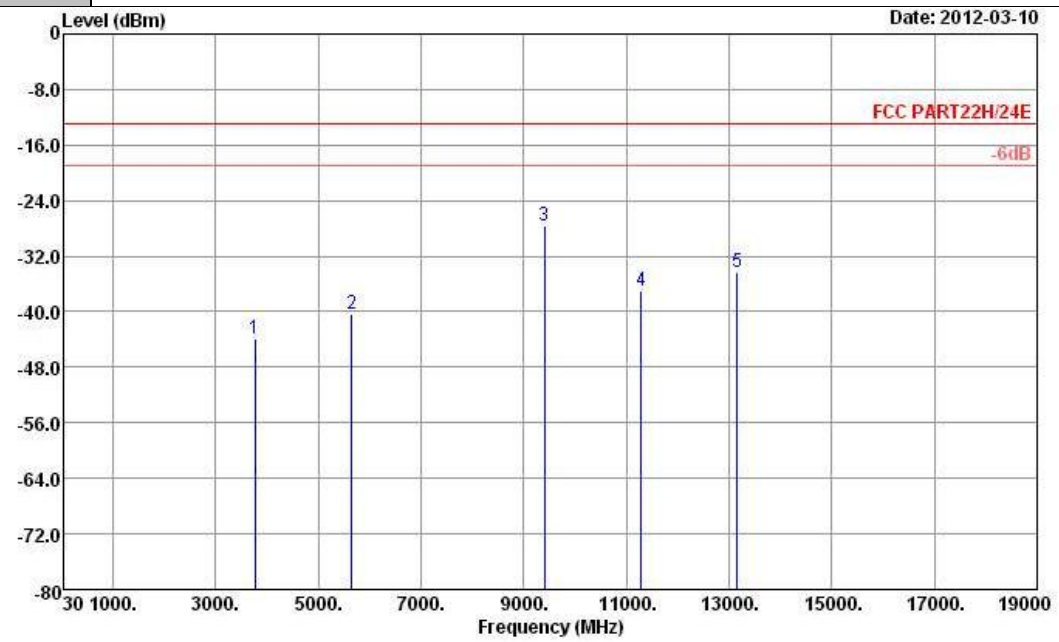
Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)	Result
1672	-40.58	-13	-27.58	-46.68	-41.77	2.15	5.49	V	Pass
2509	-47.14	-13	-34.14	-56.55	-49.03	2.38	6.41	V	Pass
3345	-49.10	-13	-36.10	-60.71	-52.43	2.86	8.34	V	Pass

Band :	GSM1900	Temperature :	20~22°C
Test Mode :	GSM Link + I/O Port with DC 12V for Sample 1	Relative Humidity :	40~42%
Test Engineer :	David Ke	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



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	-42.88	-13	-29.88	-56.35	-49.01	2.9292	9.06	H	Pass
5640	-44.20	-13	-31.20	-63.02	-51.12	3.9072	10.83	H	Pass
9400	-32.78	-13	-19.78	-56.84	-40.74	5.398	13.36	H	Pass
11280	-38.69	-13	-25.69	-65.71	-46.1	5.9324	13.34	H	Pass
13160	-35.41	-13	-22.41	-66.01	-42.47	6.428	13.49	H	Pass

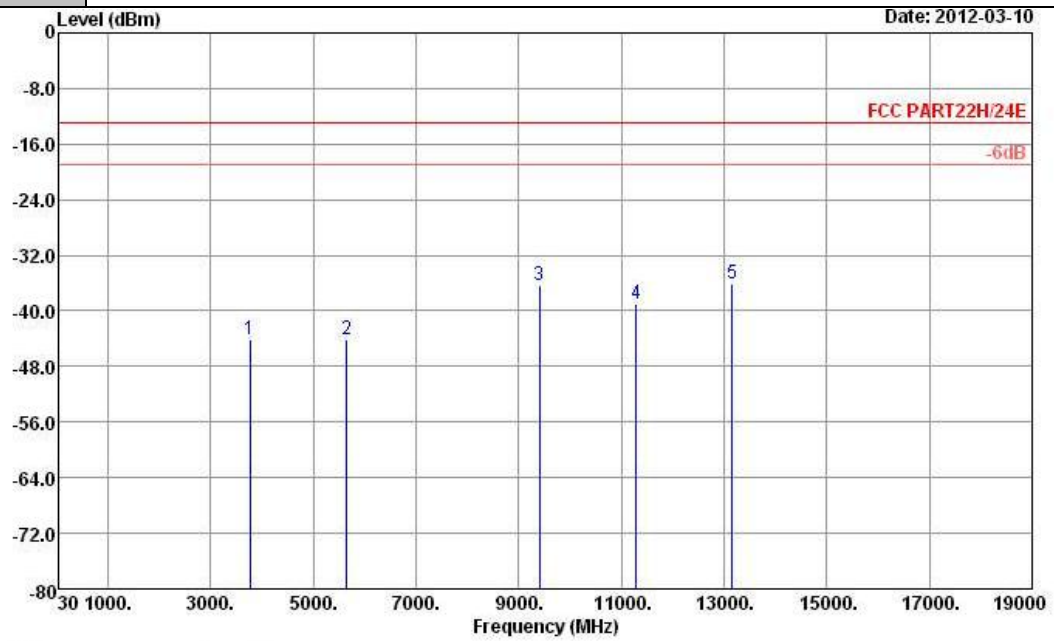
Band :	GSM1900	**Temperature :**	20~22°C
Test Mode :	GSM Link + I/O Port with DC 12V for Sample 1	**Relative Humidity :**	40~42%
Test Engineer :	David Ke	**Polarization :**	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Site : 03CH05-HY
Condition : FCC PART22H/24E HF_EIRP_101221 VERTICAL
Project : FG 0N0338

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	-43.90	-13	-30.90	-57.38	-50.03	2.9292	9.06	V	Pass
5640	-40.29	-13	-27.29	-59.24	-47.21	3.9072	10.83	V	Pass
9400	-27.60	-13	-14.60	-51.72	-35.56	5.398	13.36	V	Pass
11280	-37.01	-13	-24.01	-64.12	-44.42	5.9324	13.34	V	Pass
13160	-34.33	-13	-21.33	-64.96	-41.39	6.428	13.49	V	Pass

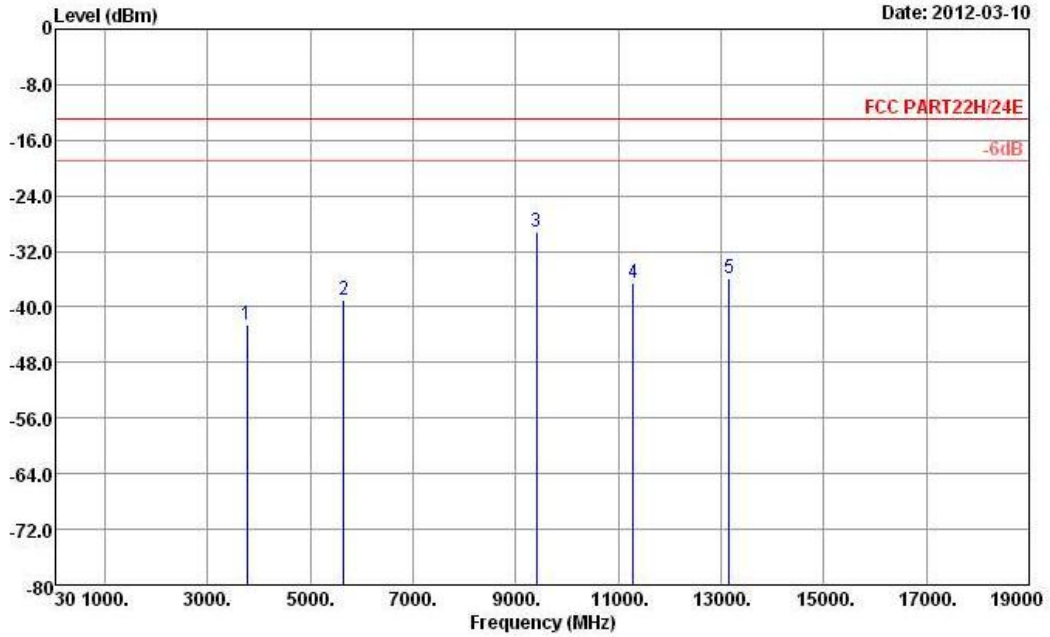
Band :	GSM1900	Temperature :	20~22°C
Test Mode :	GSM Link + I/O Port with DC 24V for Sample 2	Relative Humidity :	40~42%
Test Engineer :	David Ke	Polarization :	Horizontal
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Site : 03CH05-HY
Condition : FCC PART22H/24E HF_EIRP_101221 HORIZONTAL
Project : FG 0N0338

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	-44.08	-13	-31.08	-57.54	-50.21	2.9292	9.06	H	Pass
5640	-44.15	-13	-31.15	-62.97	-51.07	3.9072	10.83	H	Pass
9400	-36.38	-13	-23.38	-60.45	-44.34	5.398	13.36	H	Pass
11280	-38.91	-13	-25.91	-65.92	-46.32	5.9324	13.34	H	Pass
13160	-36.07	-13	-23.07	-66.63	-43.13	6.428	13.49	H	Pass

Band :	GSM1900	**Temperature :**	20~22°C
Test Mode :	GSM Link + I/O Port with DC 24V for Sample 2	**Relative Humidity :**	40~42%
Test Engineer :	David Ke	**Polarization :**	Vertical
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.		



Site : 03CH05-HY
Condition : FCC PART22H/24E HF_EIRP_101221 VERTICAL
Project : FG 0N0338

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	-42.50	-13	-29.50	-56.3	-48.63	2.9292	9.06	V	Pass
5640	-39.05	-13	-26.05	-57.9	-45.97	3.9072	10.83	V	Pass
9400	-29.23	-13	-16.23	-53.73	-37.19	5.398	13.36	V	Pass
11280	-36.62	-13	-23.62	-63.8	-44.03	5.9324	13.34	V	Pass
13160	-35.82	-13	-22.82	-66.42	-42.88	6.428	13.49	V	Pass

3.7 Frequency Stability Measurement

3.7.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

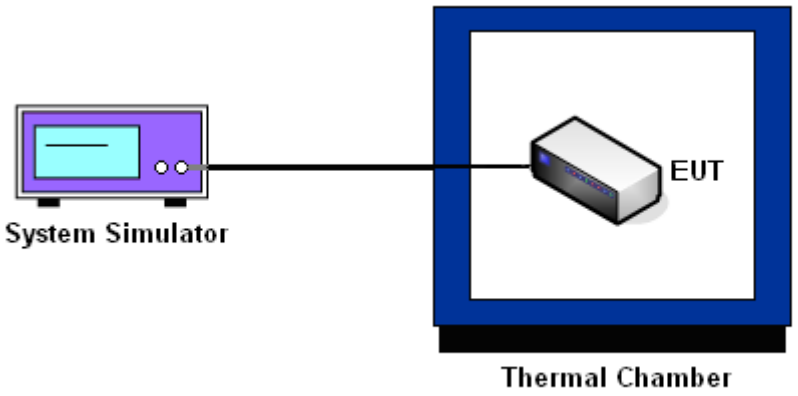
3.7.3 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. If the EUT cannot be turned on at -30°C, the testing lowest temperature will be raised in 10°C step until the EUT can be turned on.

3.7.4 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at 25±5° C and connected with the base station.
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.

3.7.5 Test Setup



3.7.6 Test Result of Temperature Variation

Band :	GSM 850	Channel :	189
Limit (ppm) :	2.5		

Temperature (°C)	GSM		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	N/A	N/A	PASS
-20	24	0.03	
-10	-17	-0.02	
0	21	0.02	
10	19	0.02	
20	17	0.02	
30	-13	-0.02	
40	26	0.03	
50	28	0.03	

Note: The manufacturer declared that the EUT could work properly between temperatures -20°C~50°C.

Band :	GSM 1900	Channel :	661
Limit (ppm) :	2.5		

Temperature (°C)	GSM		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	N/A	N/A	PASS
-20	51	0.03	
-10	61	0.03	
0	43	0.02	
10	58	0.03	
20	59	0.03	
30	48	0.03	
40	54	0.03	
50	47	0.02	

Note: The manufacturer declared that the EUT could work properly between temperatures -20°C~50°C.

3.7.7 Test Result of Voltage Variation

Band & Channel	Mode	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
GSM 850 CH189	GSM	24	11	0.01	2.5	PASS
		BEP	-13	-0.02		
		40	23	0.03		
GSM 1900 CH661	GSM	24	41	0.02		
		BEP	63	0.03		
		40	81	0.04		

Note:

1. Normal Voltage = 24V.
2. Battery End Point (BEP) = 9 V.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
System Simulator	R&S	CMU200	117995	N/A	Jul. 28, 2011	Mar. 05, 2012 ~ Mar. 06, 2012	Jul. 27, 2012	Conducted (TH02-HY)
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 13, 2011	Mar. 05, 2012 ~ Mar. 06, 2012	Jun. 12, 2012	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D35P	TBN-930701	N/A	Jul. 27, 2011	Mar. 05, 2012 ~ Mar. 06, 2012	Jul. 26, 2012	Conducted (TH02-HY)
Spectrum Analyzer	R&S	ESU26	100390	20Hz ~ 26.5GHz	Dec. 22, 2011	Mar. 09, 2012 ~ Mar. 10, 2012	Dec. 21, 2012	Radiation (03CH05-HY)
COM-POWER	Double Ridge Horn	AH-118	701030	1GHz ~ 18GHz	N/A	Mar. 09, 2012 ~ Mar. 10, 2012	N/A	Radiation (03CH05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2725	30MHz ~ 2GHz	Oct. 22, 2011	Mar. 09, 2012 ~ Mar. 10, 2012	Oct. 21, 2012	Radiation (03CH05-HY)
Turn Table	HD	Deis HD 2000	420/611	0 ~ 360 degree	N/A	Mar. 09, 2012 ~ Mar. 10, 2012	N/A	Radiation (03CH05-HY)
Antenna Mast	HD	MA 240	240/666	1 m ~ 4 m	N/A	Mar. 09, 2012 ~ Mar. 10, 2012	N/A	Radiation (03CH05-HY)
Horn Antenna	ESCO	3117	66584	1GHz ~ 18GHz	Aug. 04, 2011	Mar. 09, 2012 ~ Mar. 10, 2012	Aug. 03, 2012	Radiation (03CH05-HY)
COM-POWER	COM-POWER	PA-103	161075	10Hz ~ 1000MHz Gain:32dB	Mar. 29, 2011	Mar. 09, 2012 ~ Mar. 10, 2012	Mar. 28, 2012	Radiation (03CH05-HY)
Pre Amplifier	EMCI	EMC051845	SN980048	1GHz~18GHz	Jul. 18, 2011	Mar. 09, 2012 ~ Mar. 10, 2012	Jul. 17, 2012	Radiation (03CH05-HY)
Pre Amplifier	Agilent	8449B	3008A01917	1GHz~26.5GHz	Aug. 30, 2011	Mar. 09, 2012 ~ Mar. 10, 2012	Aug. 29, 2012	Radiation (03CH05-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Mar. 09, 2012 ~ Mar. 10, 2012	Jul. 28, 2012	Radiation (03CH05-HY)
System Simulator	R&S	CMU200	106656	N/A	May 14, 2010	Mar. 09, 2012 ~ Mar. 10, 2012	May 13, 2012	Radiation (03CH05-HY)

5 Uncertainty of Evaluation

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

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-Shape	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 (1 GHz ~ 40 GHz)

Contribution	Uncertainty of X_i		$u(X_i)$	C_i	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	±0.10	Normal (k=2)	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 Γ1 = 0.197 Antenna VSWR Γ2 = 0.194 Uncertainty = 20Log(1-Γ1*Γ2)	+0.34 / -0.35	U-Shape	0.244	1	0.244
Combined Standard Uncertainty Uc(y)	**2.36**				
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.72**				

Appendix A. Photographs of EUT

Please refer to Sporton report number EP0N0338 as below.