

FCC RF Test Report

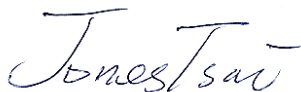
APPLICANT : CT Asia
EQUIPMENT : Mobile Phone
BRAND NAME : BLU
MODEL NAME : Zoey II
FCC ID : YHLBLUZOEYII
STANDARD : FCC 47 CFR Part 2, 22(H), 24(E)
CLASSIFICATION : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on Aug. 08, 2014 and testing was completed on Sep. 03, 2014. We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA / EIA-603-C-2004 and has been in 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 (SHENZHEN) INC., the test report shall not be reproduced except in full.



Reviewed by: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL (SHENZHEN) INC.

No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P.R.C.



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG480803	Rev. 01	Initial issue of report	Sep. 09, 2014

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046	Conducted Output Power	N/A	PASS	-
3.2	§24.232(d)	Peak-to-Average Ratio	<13 dB	PASS	-
3.3	§22.913(a)(2)	Effective Radiated Power	< 7 Watts	PASS	-
3.3	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
3.4	§2.1049 §22.917(b) §24.238(b)	Occupied Bandwidth	N/A	PASS	-
3.5	§2.1051 §22.917(a) §24.238(a)	Band Edge Measurement	$< 43 + 10 \log_{10}(P[\text{Watts}])$	PASS	-
3.6	§2.1051 §22.917(a) §24.238(a)	Conducted Spurious Emission	$< 43 + 10 \log_{10}(P[\text{Watts}])$	PASS	-
3.7	§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation	$< 43 + 10 \log_{10}(P[\text{Watts}])$	PASS	Under limit 15.41 dB at 5640.000 MHz
3.8	§2.1055 §22.355 §24.235	Frequency Stability for Temperature & Voltage	< 2.5 ppm	PASS	-

1 General Description

1.1 Applicant

CT Asia

Unit 01, 15/F, Seaview Centre, 139-141 Hoi bun road, Kwun Tong, Kowloon, Hongkong

1.2 Manufacturer

Zechin Communications Co.,Ltd.

Unit804, 8th Floor Desay Tech Building Gaoxin Road South, Nanshan District Shenzhen, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	BLU
Model Name	Zoey II
FCC ID	YHLBLUZOEYII
EUT supports Radios application	GSM/GPRS/Bluetooth v2.1 + EDR
HW Version	S513-MB-V1.2
SW Version	BLU_T276_V03_GENERIC
EUT Stage	Identical Prototype

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 Product Specification subjective to this standard

Product Specification subjective to this standard	
Tx Frequency	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8MHz
Rx Frequency	GSM850: 869.2 MHz ~ 893.8 MHz GSM1900: 1930.2 MHz ~ 1989.8 MHz
Maximum Output Power to Antenna	GSM850 : 32.28 dBm GSM1900 : 29.18 dBm
Antenna Type	Fixed Internal Antenna
Type of Modulation	GSM: GMSK GPRS: GMSK

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
Part 22	GSM850 GSM	GMSK	0.7786	0.0060 ppm	247KGXW
Part 24	GSM1900 GSM	GMSK	0.9605	0.0048 ppm	247KGXW

1.7 Testing Location

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.		
Test Site Location	No. 3 Building, the third floor of south, Shahe River west, Fengzeyuan warehouse, Nanshan District, Shenzhen, Guangdong, P.R.C. TEL: +86-755-3320-2398		
Test Site No.	Sporton Site No.		FCC Registration No.
	TH01-SZ	03CH01-SZ	831040

Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.		
Test Site Location	No. 101, Complex Building C, Guanlong Village, Xili Town, Nanshan District, Shenzhen, Guangdong, P.R.C. TEL: +86-755-8637-9589 FAX: +86-755-8637-9595		
Test Site No.	Sporton Site No.		
	OTA01-SZ		

1.8 Applicable 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 v02r01

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.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r01 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Frequency range investigated for radiated emission: 30MHz to 10th harmonic.

Test Modes		
Band	Radiated TCs	Conducted TCs
GSM 850	■ GSM Link	■ GSM Link
GSM 1900	■ GSM Link	■ GSM Link

Note: The maximum power levels are chosen to test as the worst case configuration as follows:

GSM mode for GMSK modulation, only this mode is used for all tests.

Conducted Power Measurement Results:
SIM 1:

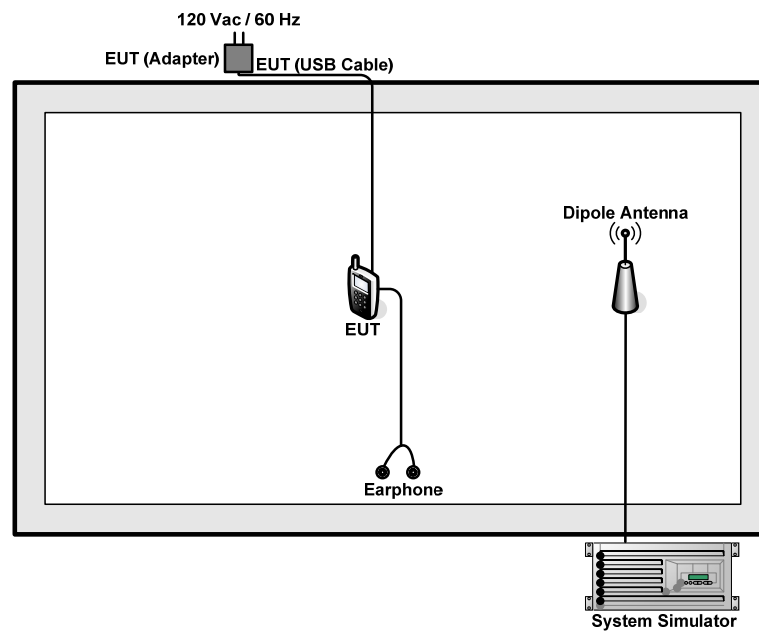
Conducted Power (*Unit: dBm)						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency	824.2	836.4	848.8	1850.2	1880.0	1909.8
GSM	32.15	32.25	32.28	28.77	28.96	29.18
GPRS class 8	31.91	31.95	31.99	28.71	28.86	29.17
GPRS class 10	30.89	30.98	30.99	28.26	28.34	28.68
GPRS class 11	28.99	29.12	29.15	26.84	26.95	27.34
GPRS class 12	28.16	28.22	28.32	25.86	25.98	26.29

SIM 2:

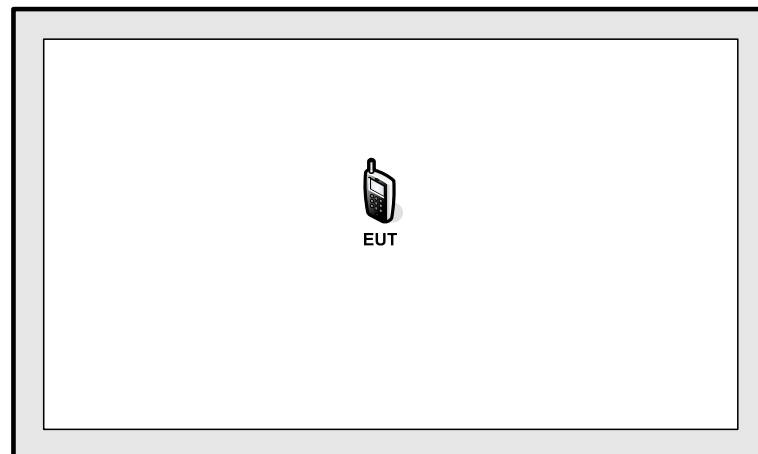
Conducted Power (*Unit: dBm)						
Band	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency	824.2	836.4	848.8	1850.2	1880.0	1909.8
GSM	32.13	32.22	32.26	28.75	28.93	29.17
GPRS class 8	31.89	31.91	31.97	28.68	28.84	29.16
GPRS class 10	30.87	30.94	30.96	28.24	28.31	28.65
GPRS class 11	28.95	29.10	29.14	26.82	26.94	27.32
GPRS class 12	28.14	28.21	28.29	25.85	25.96	26.28

2.2 Connection Diagram of Test System

<22H Tx Mode>



<24E Tx Mode>



2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	System Simulator	Agilent	E5515C	N/A	N/A	Unshielded, 1.8 m
3.	Lenovo	SH100	N/A	N/A	N/A	N/A
4.	DC Power Supply	TOPWORD	3303DR	N/A	N/A	Unshielded, 1.8 m

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 8.5 dB and a 10dB attenuator.

Example :

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 8.5 + 10 = 18.5 \text{ (dB)}\end{aligned}$$

3 Test Result

3.1 Conducted Output Power Measurement

3.1.1 Description of the Conducted Output Power Measurement

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

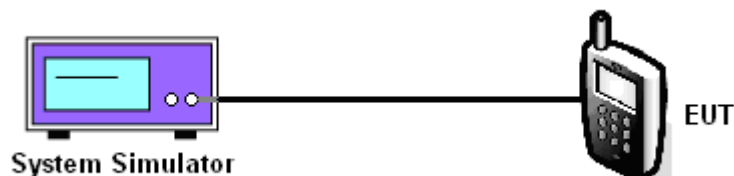
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure the maximum burst average power for GSM and maximum average power for other modulation signal.

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)	32.15	32.25	32.28
Conducted Power (Watts)	1.64	1.68	1.69

PCS Band			
Modes	GSM1900 (GSM)		
Channel	512 (Low)	661 (Mid)	810 (High)
Frequency (MHz)	1850.2	1880	1909.8
Conducted Power (dBm)	28.77	28.96	29.18
Conducted Power (Watts)	0.75	0.79	0.83

Note: maximum burst average power for GSM.

3.2 Peak-to-Average Ratio

3.2.1 Description of the PAR Measurement

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

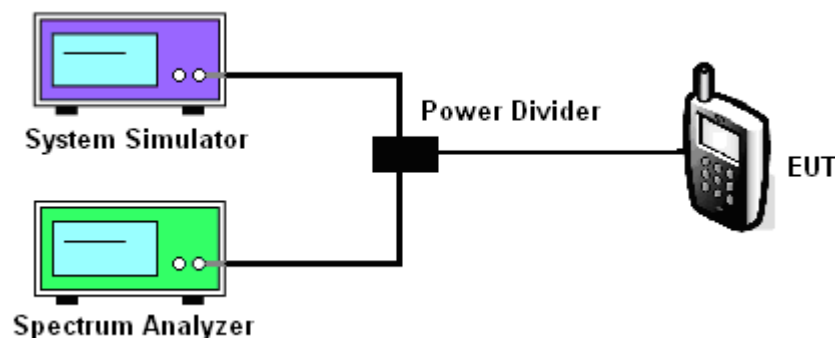
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2. For GSM/EGPRS operating modes:
 - a. Set EUT in maximum power output.
 - b. Set the RBW = 1MHz, VBW = 3MHz, Peak detector on spectrum analyzer for first trace.
 - c. Set the RBW = 1MHz, VBW = 3MHz, RMS detector on spectrum analyzer for second trace.
 - d. The wanted burst signal is triggered by spectrum analyzer, and measured respectively the peak level and Mean level without burst-off time, after system simulator has synchronized with the spectrum analyzer.
3. For UMTS operating modes:
 - a. Set the CCDF (Complementary Cumulative Distribution Function) option on the spectrum analyzer.
 - b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
4. Record the deviation as Peak to Average Ratio.

3.2.4 Test Setup



3.2.5 Test Result of Peak-to-Average Ratio

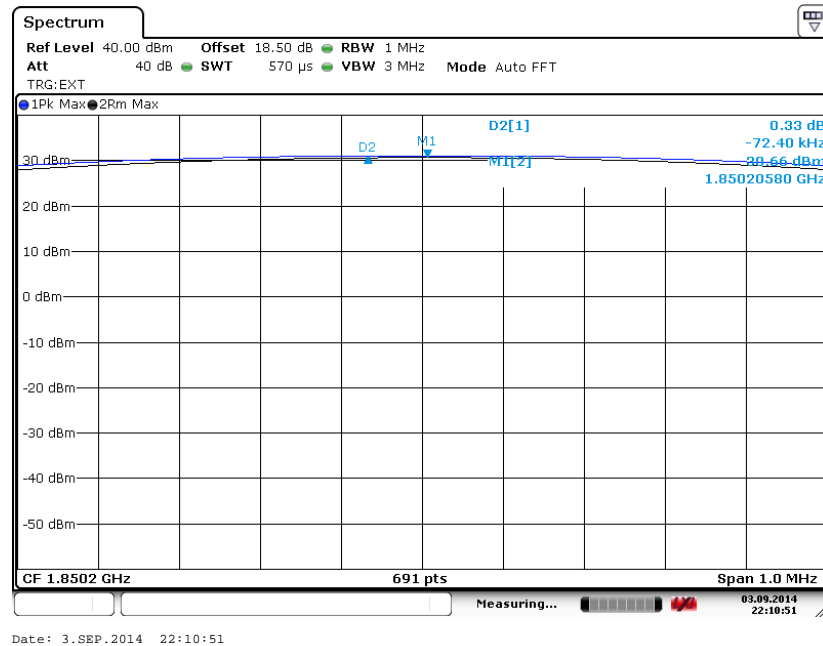
PCS Band			
Modes	GSM1900 (GSM)		
Channel	512 (Low)	661 (Mid)	810 (High)
Frequency (MHz)	1850.2	1880	1909.8
Peak-to-Average Ratio (dB)	0.33	0.34	0.33



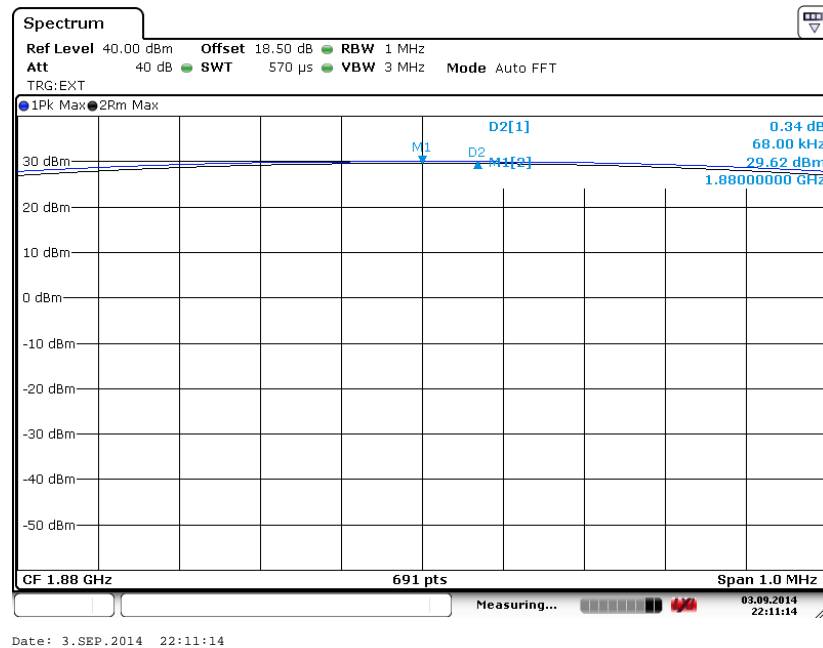
3.2.6 Test Result (Plots) of Peak-to-Average Ratio

Band :	GSM 1900	Test Mode :	GSM Link (GMSK)
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Peak-to-Average Ratio on Channel 512 (1850.2 MHz)

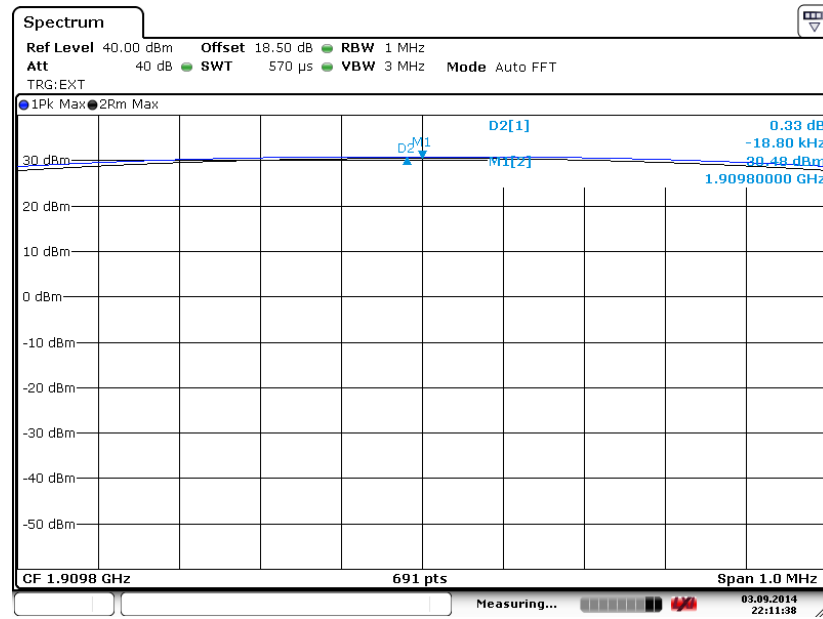


Peak-to-Average Ratio on Channel 661 (1880.0 MHz)





Peak-to-Average Ratio on Channel 810 (1909.8 MHz)



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3.3 Effective Radiated Power and Effective Isotropic Radiated Power Measurement

3.3.1 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 v02r01. The ERP of mobile transmitters must not exceed 7 Watts and the EIRP of mobile transmitters are limited to 2 Watts.

3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The EUT was placed on a turntable 1.5 meters high in a fully anechoic chamber.
2. The EUT was placed 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. GSM operating modes: Set RBW= 1MHz, VBW= 3MHz, RMS detector over burst;
UMTS operating modes: Set RBW= 100 kHz, VBW= 300 kHz, RMS detector over frame, and use channel power option with bandwidth=5MHz, per KDB 971168 D01.
4. The table was rotated 360 degrees to determine the position of the highest radiated power.
5. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
6. Taking the record of maximum ERP/EIRP.
7. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
8. The conducted power at the terminal of the dipole antenna is measured.
9. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
10. $ERP/EIRP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$

P_s (dBm) : Input power to substitution antenna.

G_s (dBi or dBd) : Substitution antenna Gain.

$E_t = R_t + AF$

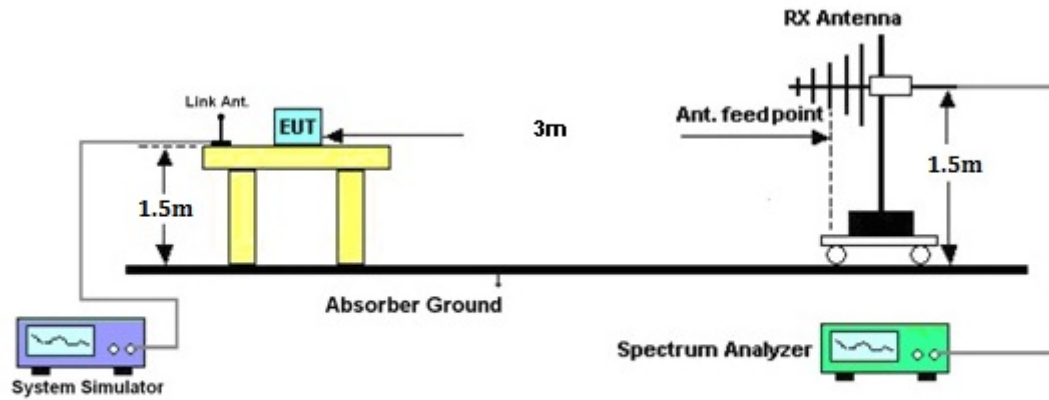
$E_s = R_s + AF$

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.

3.3.4 Test Setup



3.3.5 Test Result of ERP

GSM850 (GSM) Radiated Power ERP						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.20	-20.61	-48.12	0.00	-1.08	26.43	0.4396
836.40	-19.57	-48.28	0.00	-0.93	27.78	0.5993
848.80	-18.68	-48.35	0.00	-0.76	28.91	0.7786
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	ERP (W)
824.20	-34.02	-47.97	0.00	-1.08	12.87	0.0193
836.40	-33.22	-48.01	0.00	-0.93	13.86	0.0243
848.80	-31.37	-48.05	0.00	-0.76	15.92	0.0391

3.3.6 Test Result of EIRP

GSM1900 (GSM) Radiated Power EIRP						
Horizontal Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-24.94	-51.88	0.00	1.96	28.90	0.7758
1880.00	-25.65	-52.99	0.00	2.00	29.34	0.8597
1909.80	-26.44	-54.28	0.00	1.98	29.82	0.9605
Vertical Polarization						
Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBi)	EIRP (dBm)	EIRP (W)
1850.20	-28.15	-52.13	0.00	1.96	25.94	0.3925
1880.00	-29.39	-53.17	0.00	2.00	25.78	0.3782
1909.80	-30.00	-54.13	0.00	1.98	26.11	0.4087

3.4 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.4.1 Description of 99% Occupied Bandwidth and 26dB Bandwidth Measurement

The 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

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.

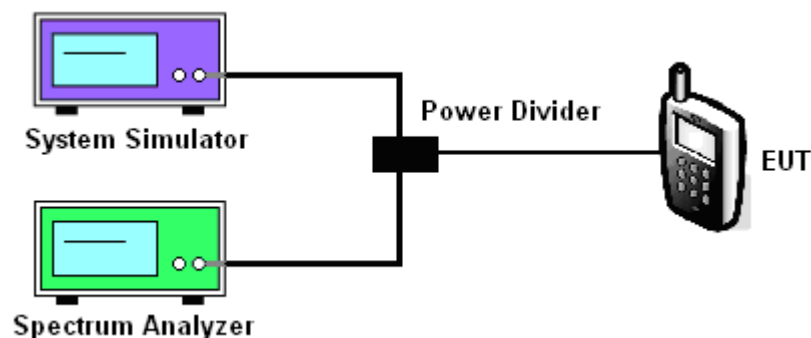
3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3*RBW, sample detector, trace maximum hold.
4. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3*RBW, peak detector, trace maximum hold.

3.4.4 Test Setup



3.4.5 Test Result of Occupied Bandwidth and 26dB Bandwidth

Cellular Band			
Modes	GSM850 (GSM)		
Channel	128(Low)	189(Mid)	251(High)
Frequency (MHz)	824.2	836.4	848.8
99% OBW (MHz)	247.47	247.47	246.02
26dB BW (MHz)	309.70	309.70	314.00

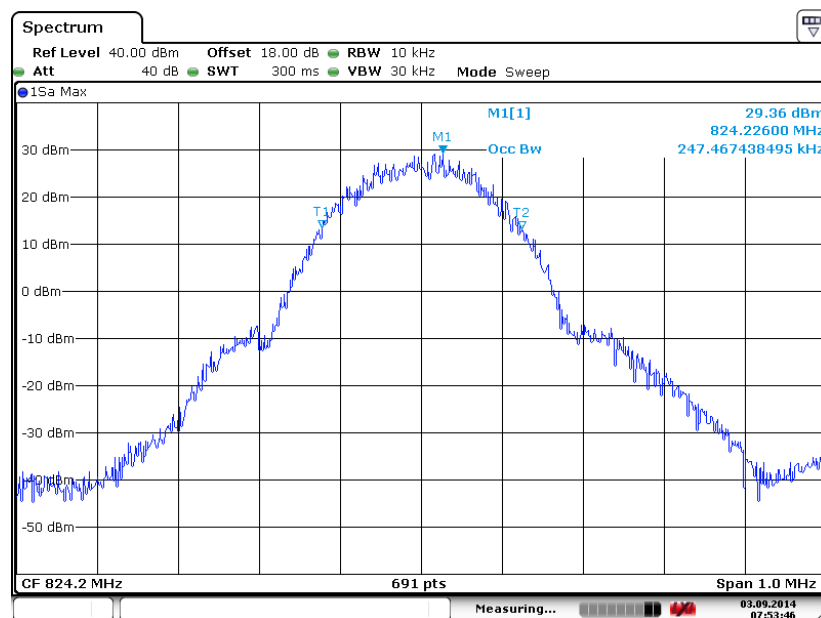
PCS Band			
Modes	GSM1900 (GSM)		
Channel	512(Low)	661(Mid)	810(High)
Frequency (MHz)	1850.2	1880	1909.8
99% OBW (MHz)	246.02	247.47	246.02
26dB BW (MHz)	308.20	308.20	309.70



3.4.6 Test Result (Plots) of Occupied Bandwidth and 26dB Bandwidth

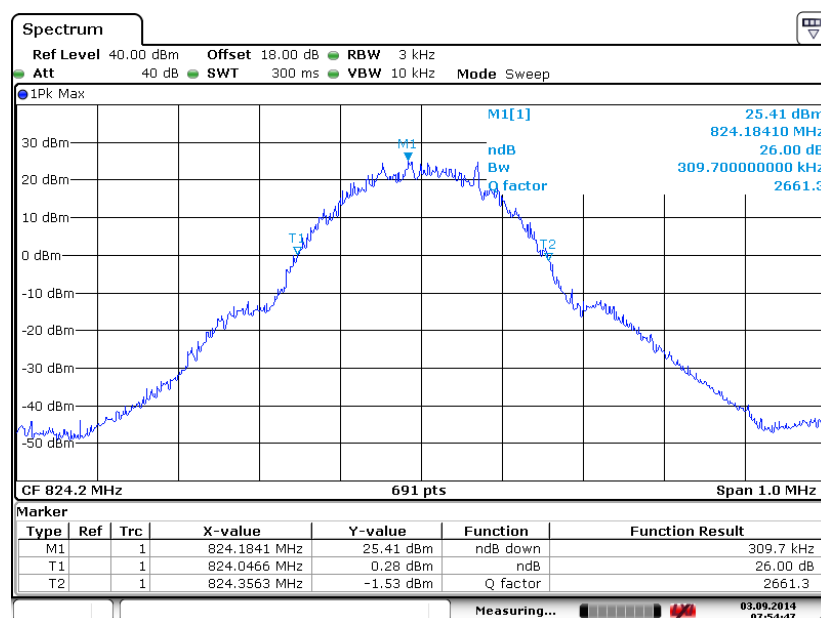
Band :	GSM 850	Test Mode :	GSM Link (GMSK)
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99% Occupied Bandwidth Plot on Channel 128 (824.2 MHz)



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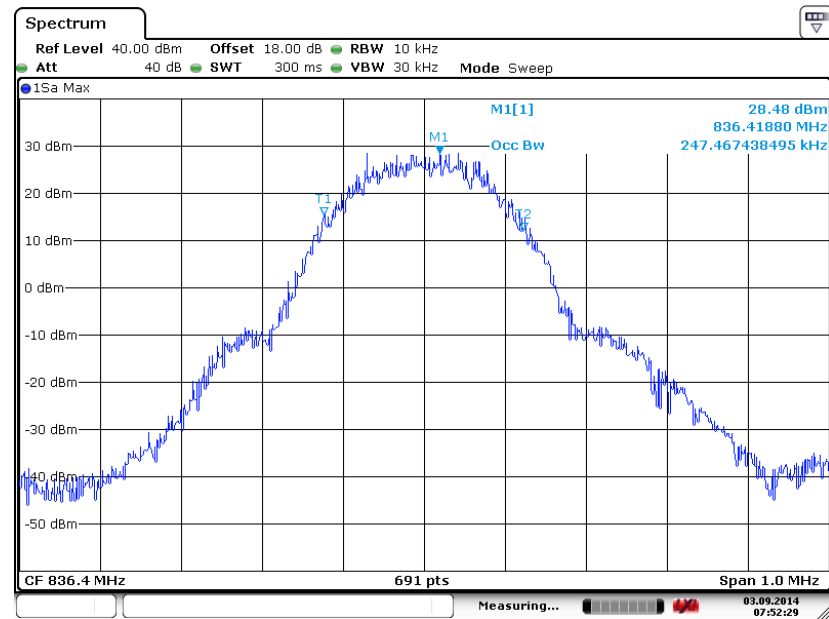
26dB Bandwidth Plot on Channel 128 (824.2 MHz)



Date: 3.SEP.2014 07:54:47

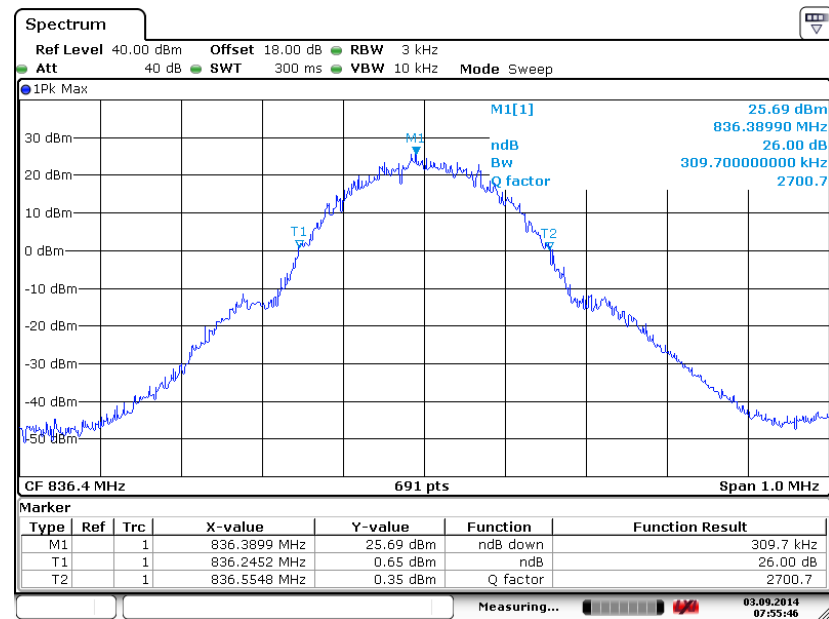


99% Occupied Bandwidth Plot on Channel 189 (836.4 MHz)



Date: 3.SEP.2014 07:52:29

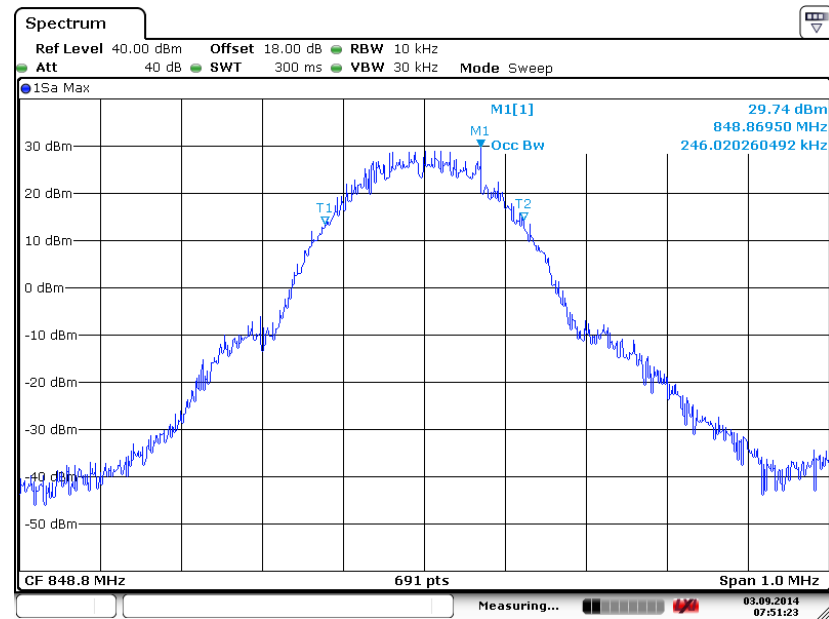
26dB Bandwidth Plot on Channel 189 (836.4 MHz)



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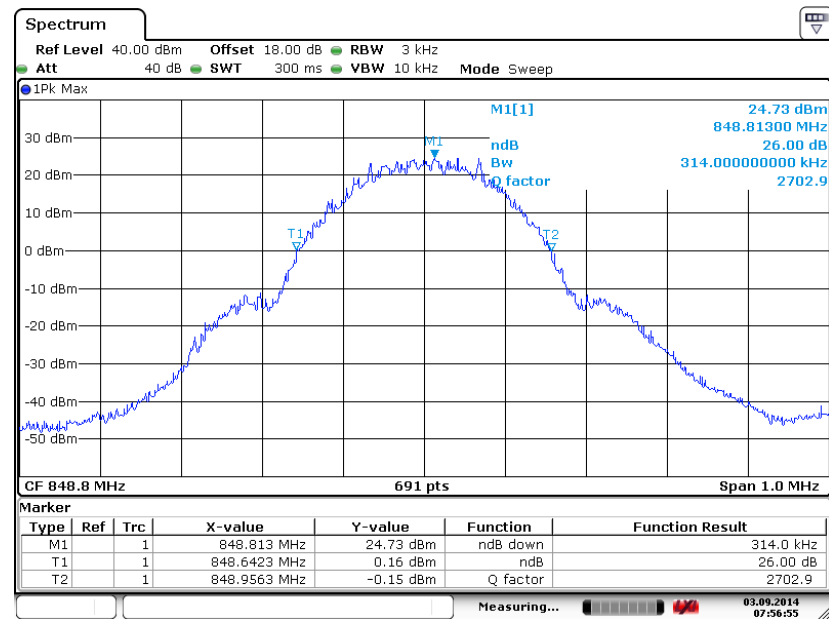


99% Occupied Bandwidth Plot on Channel 251 (848.8 MHz)



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26dB Bandwidth Plot on Channel 251 (848.8 MHz)

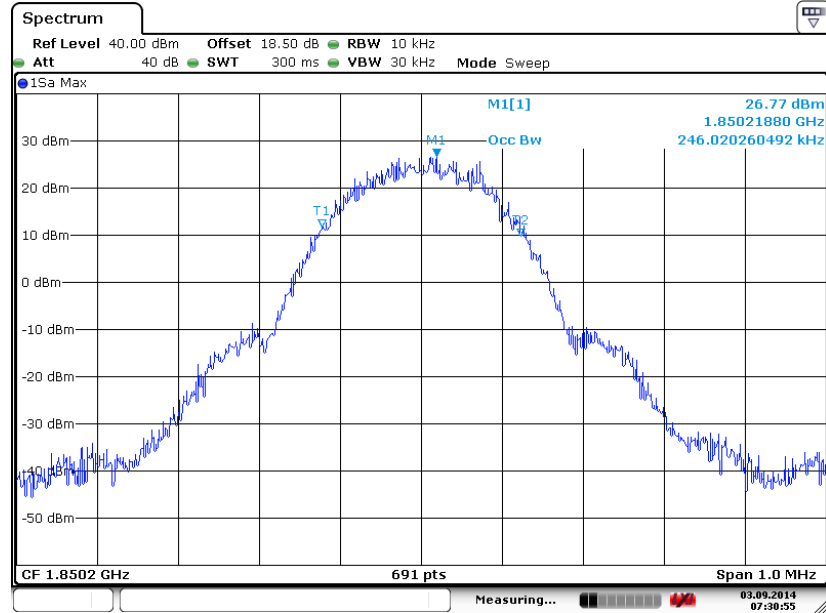


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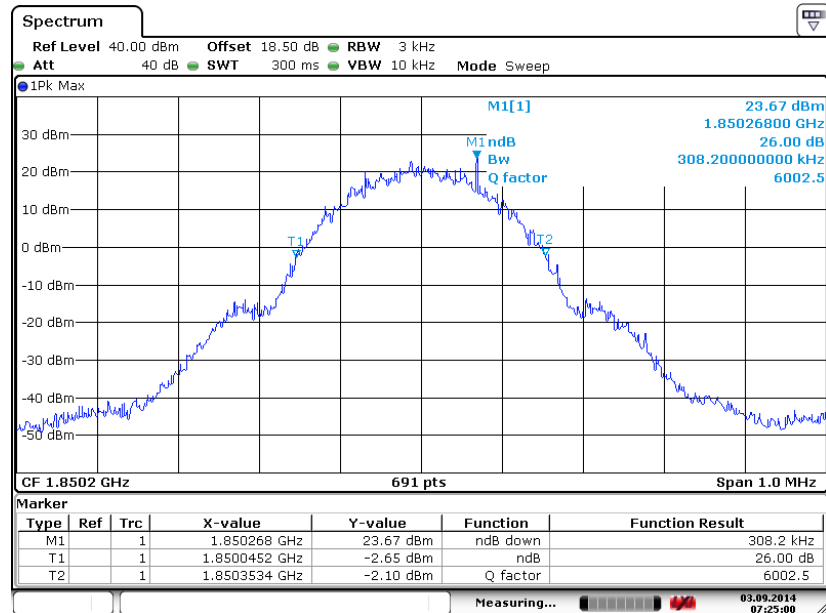
Band :	GSM 1900	Test Mode :	GSM Link (GMSK)
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99% Occupied Bandwidth Plot on Channel 512 (1850.2 MHz)



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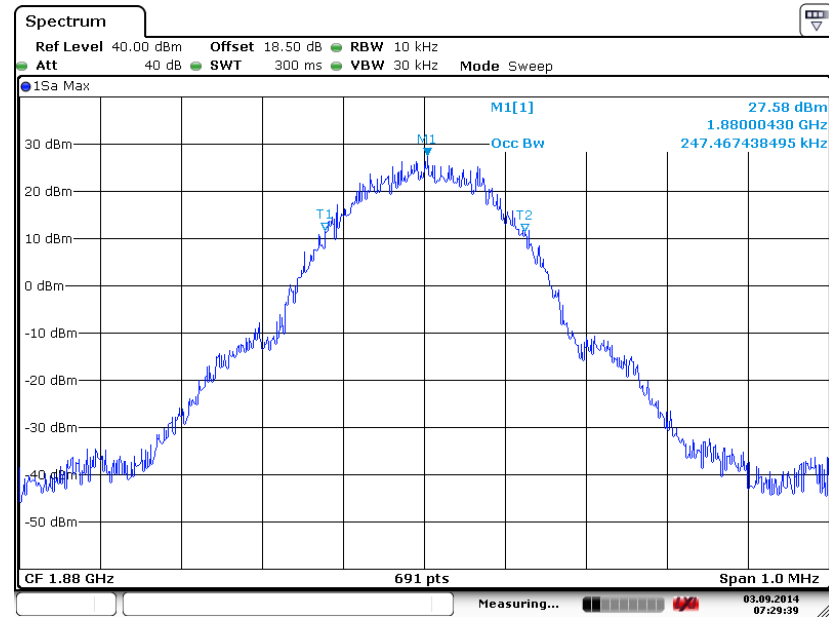
26dB Bandwidth Plot on Channel 512 (1850.2 MHz)



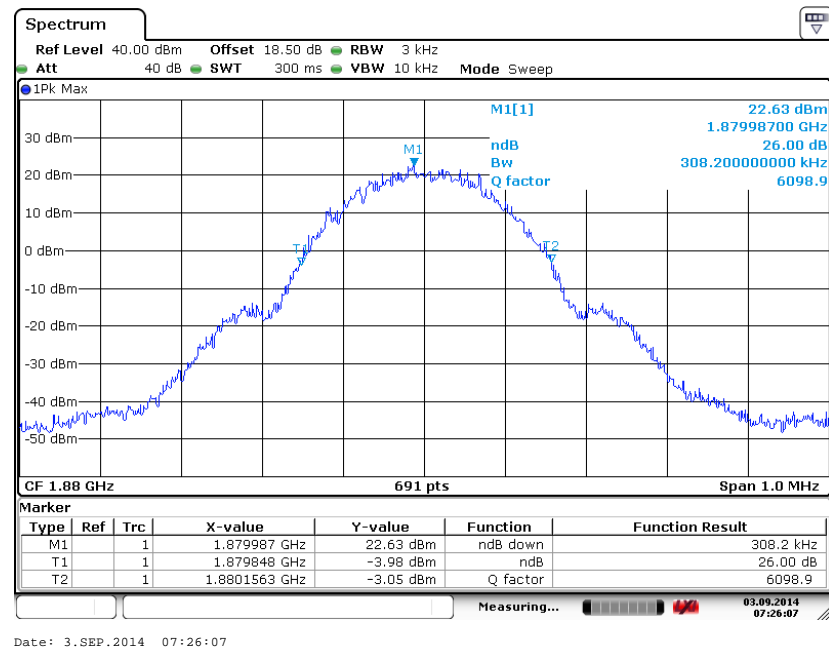
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99% Occupied Bandwidth Plot on Channel 661 (1880.0 MHz)

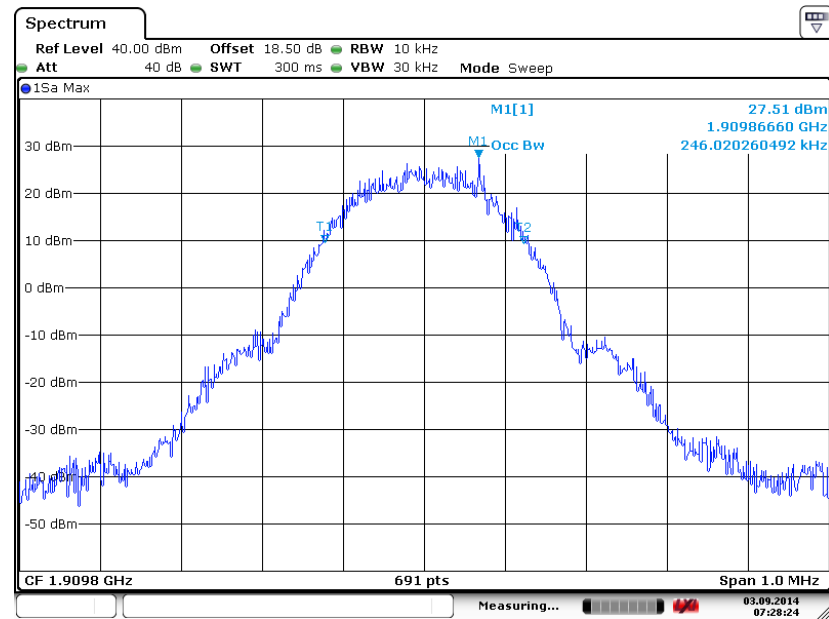


26dB Bandwidth Plot on Channel 661 (1880.0 MHz)

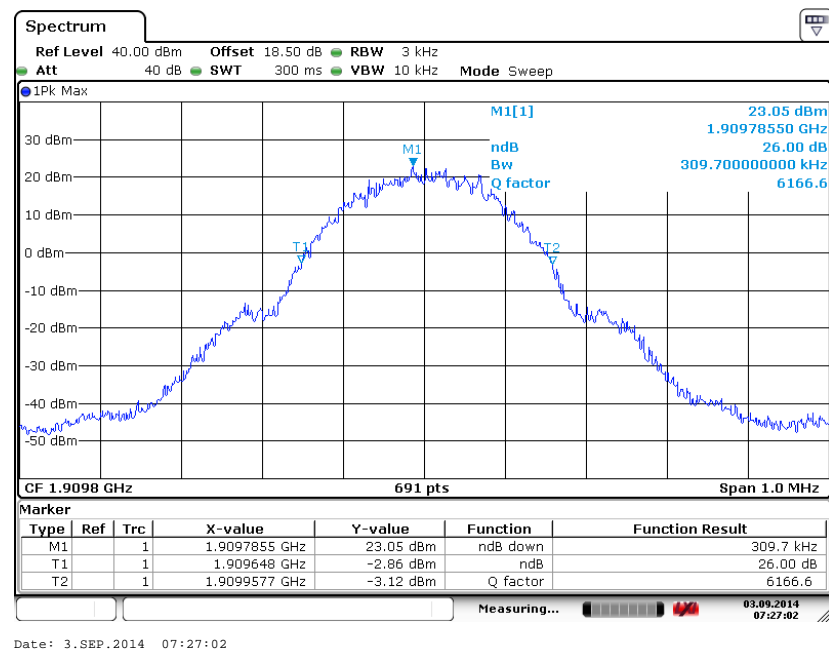




99% Occupied Bandwidth Plot on Channel 810 (1909.8 MHz)



26dB Bandwidth Plot on Channel 810 (1909.8 MHz)



3.5 Band Edge Measurement

3.5.1 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.

3.5.2 Measuring Instruments

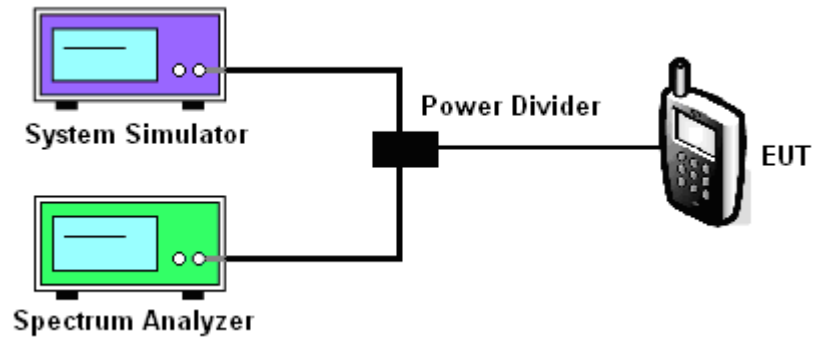
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator.
The path loss was compensated to the results for each measurement.
3. The band edges of low and high channels for the highest RF powers were measured.
4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
5. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
 $= -13\text{dBm}.$

3.5.4 Test Setup

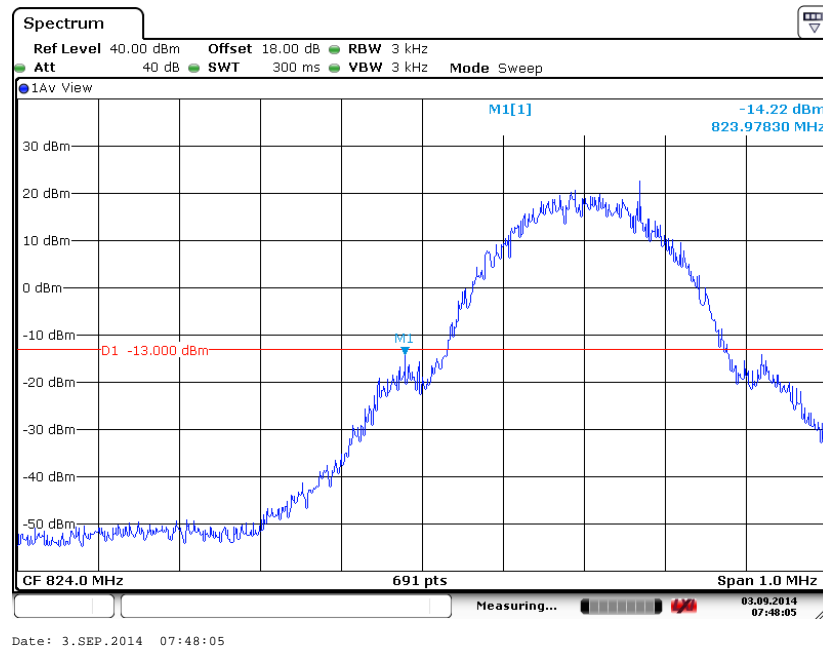
<Conducted Band Edge >



3.5.5 Test Result (Plots) of Conducted Band Edge

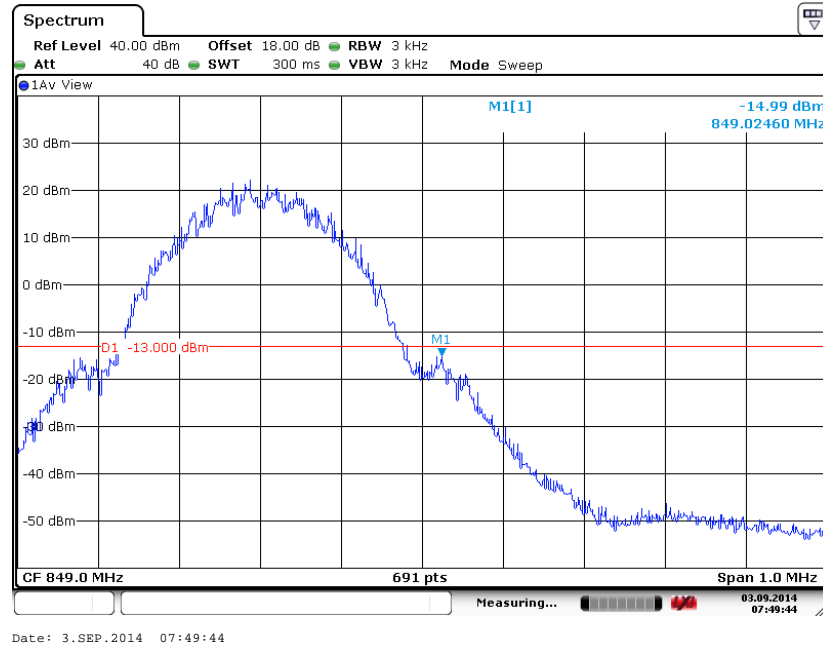
Band :	GSM850	Test Mode :	GSM Link (GMSK)
Correction Factor :	0.20 dB	Maximum 26dB Bandwidth :	0.314MHz
Band Edge :	-14.02dBm	Measurement Value :	-14.22dBm

Lower Band Edge Plot on Channel 128 (824.2 MHz)



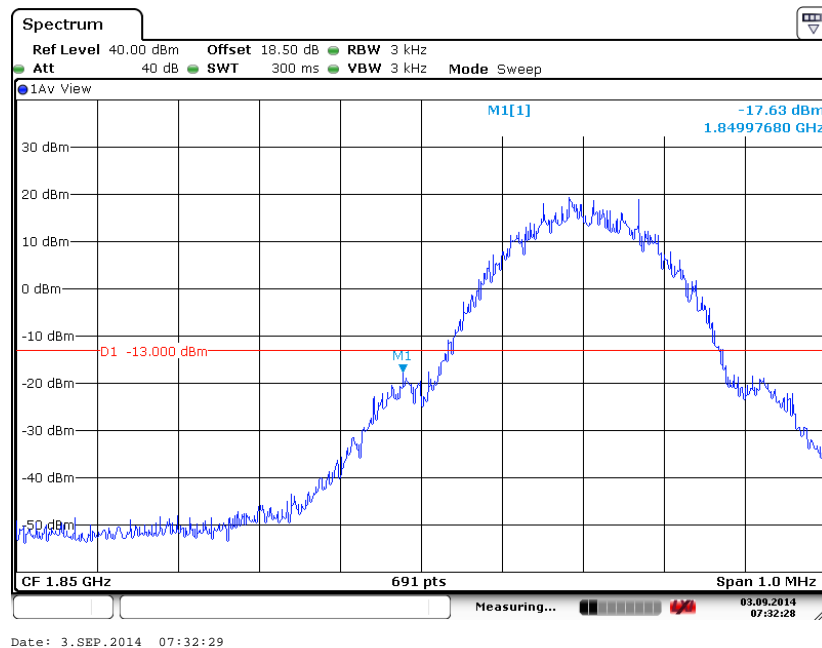
1. Correction Factor(dB)= $10\log(1\% \text{ Emission BW/RBW})$
2. Band Edge= Measurement Value + Correction Factor(dB)

Band :	GSM850	Test Mode :	GSM Link (GMSK)
Correction Factor :	0.20 dB	Maximum 26dB Bandwidth :	0.314MHz
Band Edge :	-14.79dBm	Measurement Value :	-14.99dBm

Higher Band Edge Plot on Channel 251 (848.8 MHz)




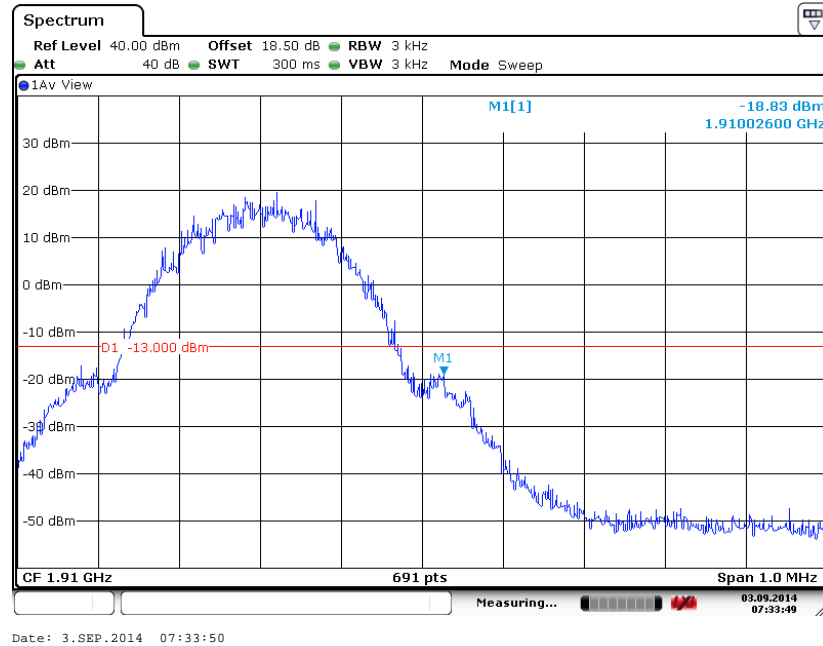
Band :	GSM1900	Test Mode :	GSM Link (GMSK)
Correction Factor :	0.14 dB	Maximum 26dB Bandwidth :	0.310MHz
Band Edge :	-17.49dBm	Measurement Value :	-17.63dBm

Lower Band Edge Plot on Channel 512 (1850.2 MHz)

1. Correction Factor(dB)= $10\log(1\% \text{ Emission BW/RBW})$
2. Band Edge= Measurement Value + Correction Factor(dB)

Band :	GSM1900	Test Mode :	GSM Link (GMSK)
Correction Factor :	0.14 dB	Maximum 26dB Bandwidth :	0.310MHz
Band Edge :	-18.69dBm	Measurement Value :	-18.83dBm

Higher Band Edge Plot on Channel 810 (1909.8 MHz)



1. Correction Factor(dB)= $10\log(1\% \text{ Emission BW/RBW})$
2. Band Edge= Measurement Value + Correction Factor(dB)

3.6 Conducted Spurious Emission Measurement

3.6.1 Description of Conducted Spurious 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 10th harmonic.

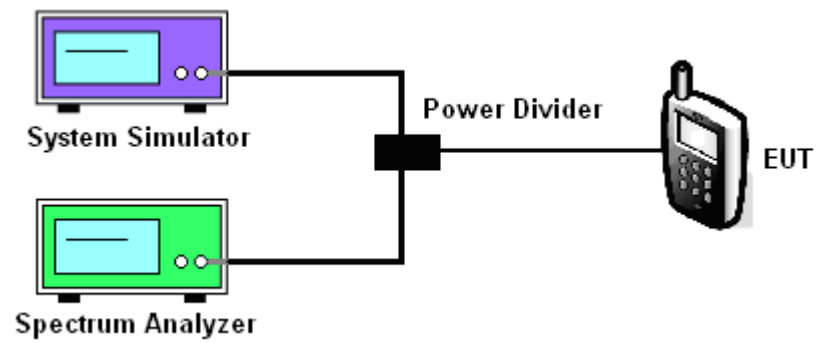
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

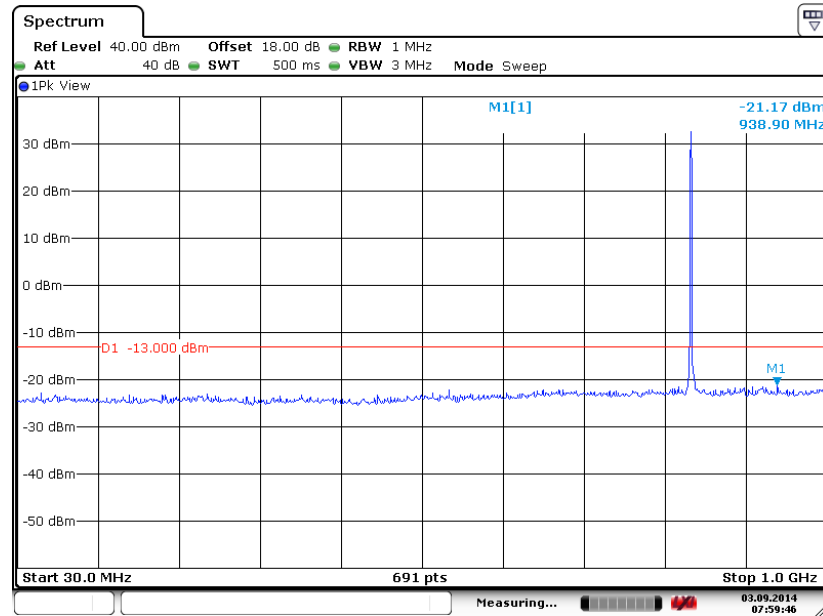
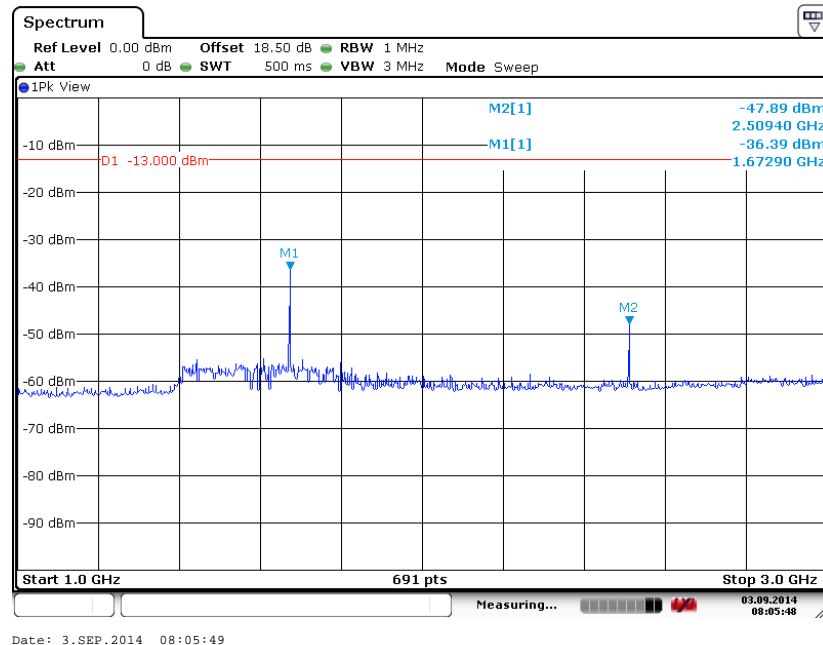
1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator.
The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)]$ (dB)
 $= [30 + 10\log(P)]$ (dBm) - $[43 + 10\log(P)]$ (dB)
 $= -13\text{dBm}$.

3.6.4 Test Setup



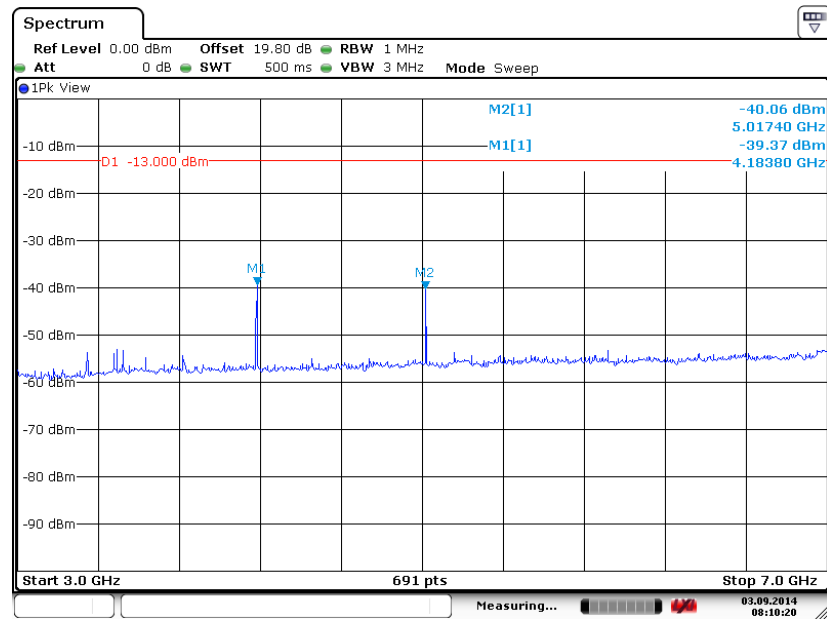
3.6.5 Test Result (Plots) of Conducted Spurious Emission

Band :	GSM850	Channel :	CH189
Test Mode :	GSM Link (GMSK)	Frequency :	836.4 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz

Conducted Spurious Emission Plot between 1GHz ~ 3GHz


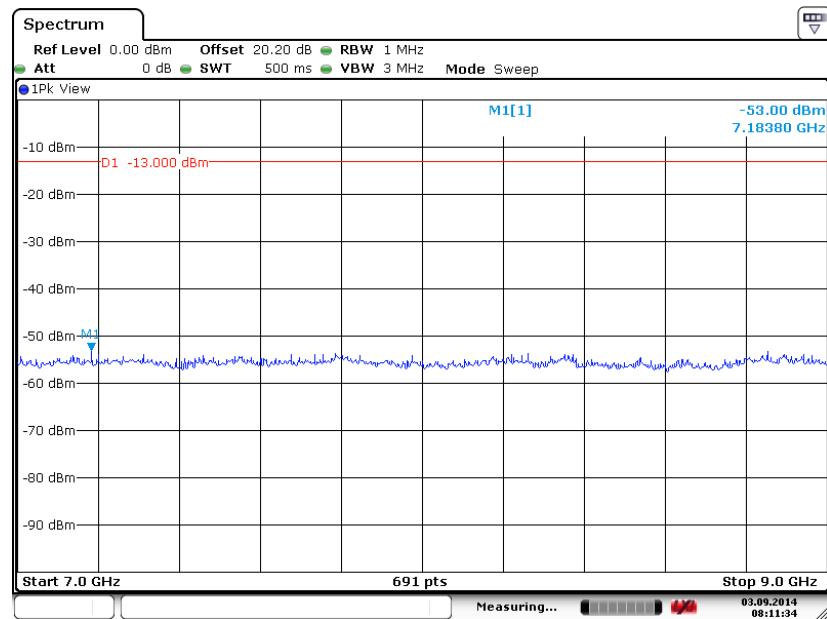


Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 3.SEP.2014 08:10:21

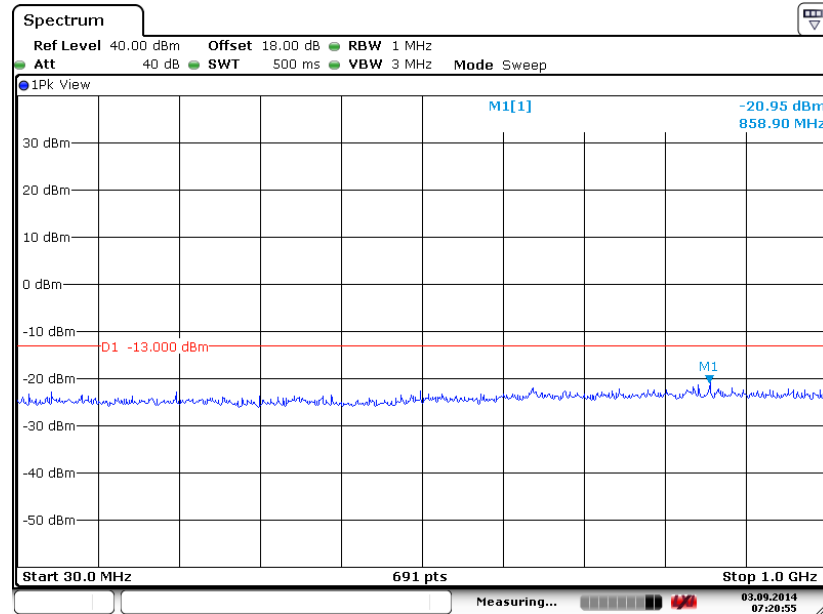
Conducted Spurious Emission Plot between 7GHz ~ 9GHz



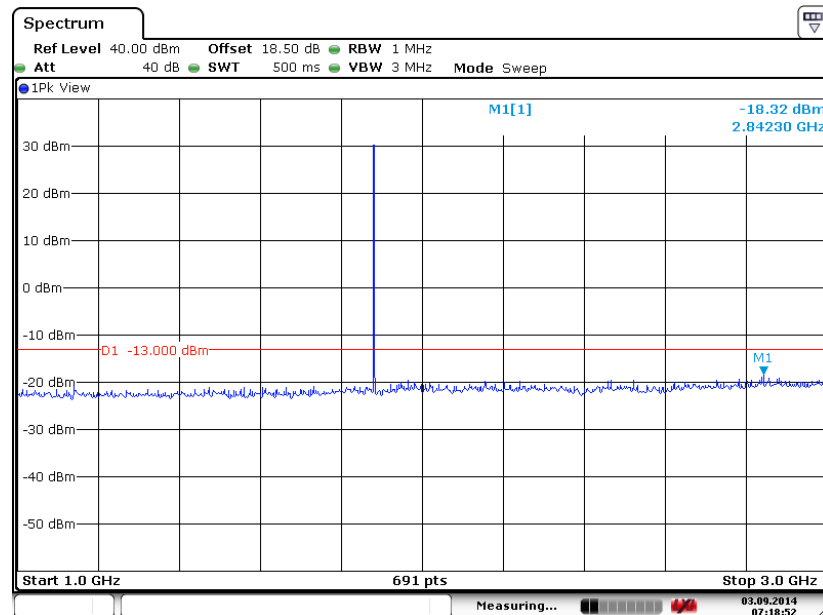
Date: 3.SEP.2014 08:11:35



Band :	GSM1900	Channel :	CH661
Test Mode :	GSM Link (GMSK)	Frequency :	1880.0 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz

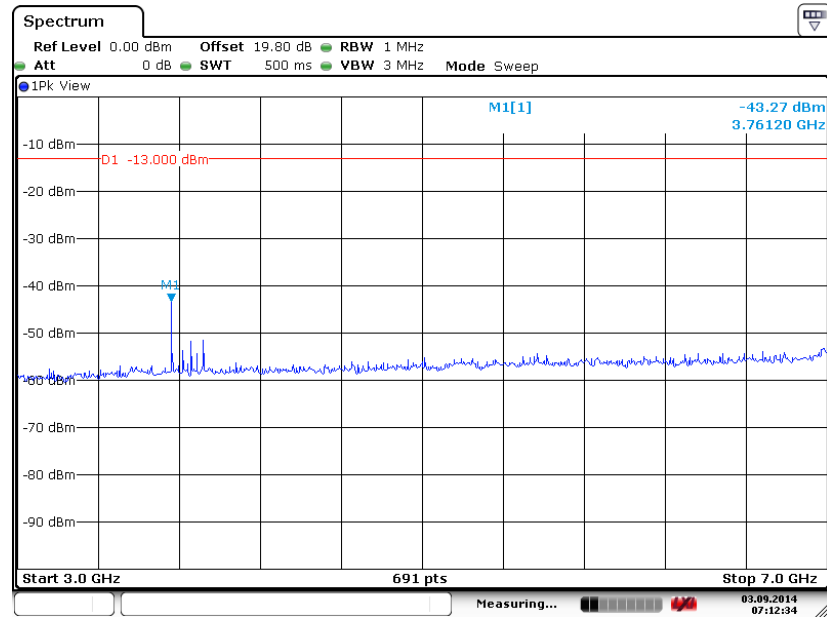
Date: 3.SEP.2014 07:20:56

Conducted Spurious Emission Plot between 1GHz ~ 3GHz

Date: 3.SEP.2014 07:18:53

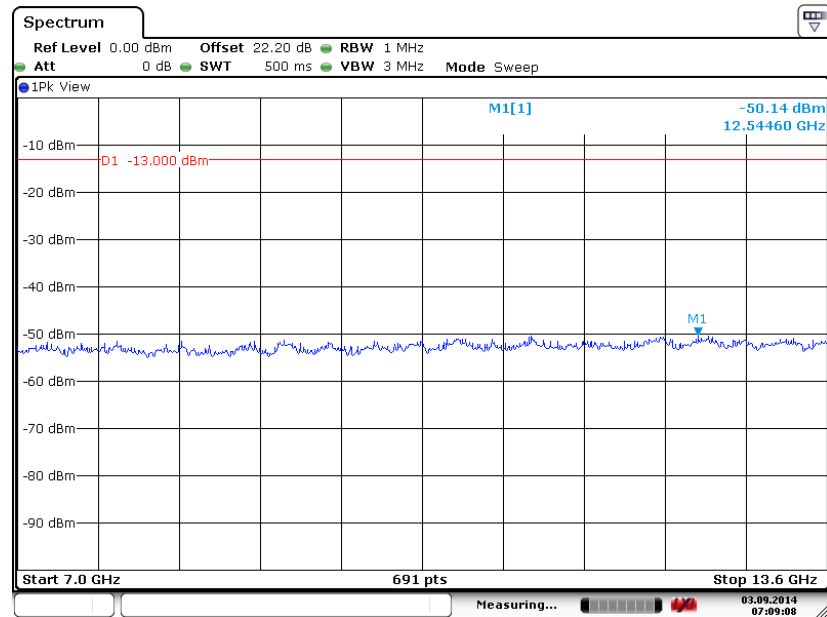


Conducted Spurious Emission Plot between 3GHz ~ 7GHz



Date: 3.SEP.2014 07:12:34

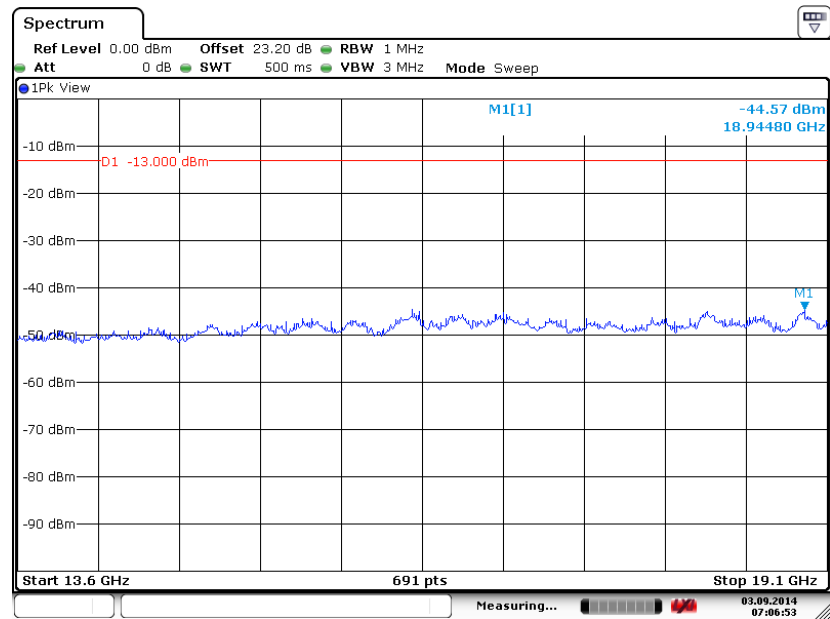
Conducted Spurious Emission Plot between 7GHz ~ 13.6GHz



Date: 3.SEP.2014 07:09:08



Conducted Spurious Emission Plot between 13.6GHz ~ 19.1GHz



Date: 3.SEP.2014 07:06:54

3.7 Field Strength of Spurious Radiation Measurement

3.7.1 Description of Field Strength of Spurious Radiated Measurement

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.

3.7.2 Measuring Instruments

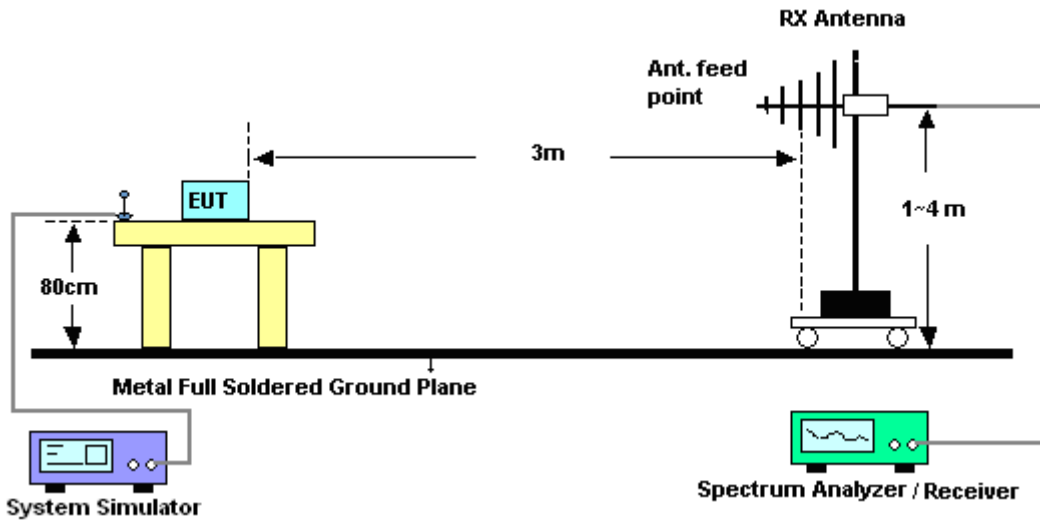
The measuring equipment is listed in the section 4 of this test report.

3.7.3 Test Procedures

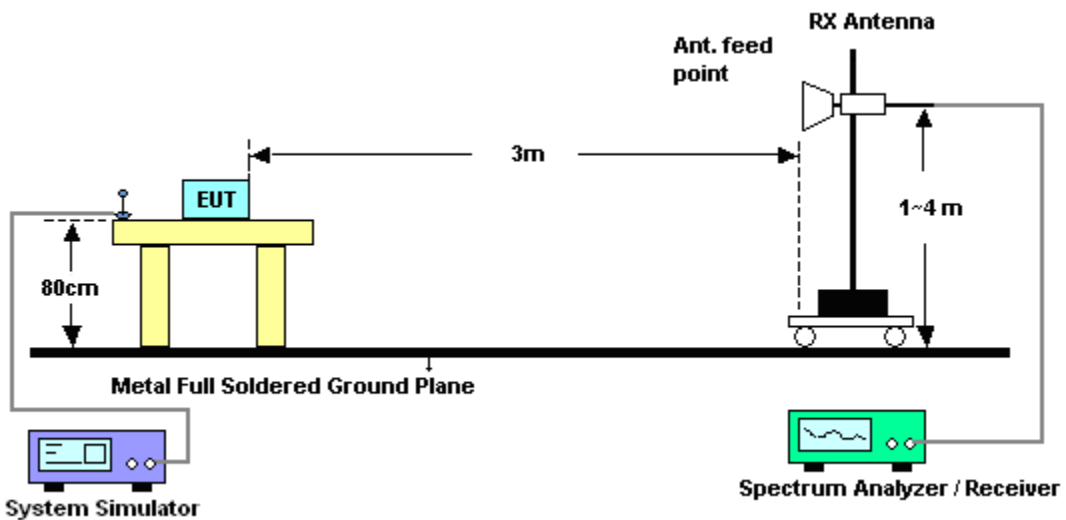
1. The EUT was placed on a rotatable wooden table 0.8 meters above the ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking 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. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11. $ERP \text{ (dBm)} = EIRP - 2.15$
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
13. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
 $= -13\text{dBm}.$

3.7.4 Test Setup

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.7.5 Test Result of Field Strength of Spurious Radiated

Band :	GSM850 for CH128					Temperature :	23~25°C		
Test Mode :	GSM Link (GMSK)					Relative Humidity :	48~52%		
Test Engineer :	Rock Tang					Polarization :	Horizontal		
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1648.4	-34.29	-13	-21.29	-51.68	-37.11	0.73	5.70	H	Pass
2472.6	-37.87	-13	-24.87	-62.81	-40.23	0.91	5.42	H	Pass
3296.8	-57.60	-13	-44.60	-68.47	-62.24	1.07	7.86	H	Pass
4121	-46.81	-13	-33.81	-62.03	-52.13	1.45	8.92	H	Pass
4945.2	-49.98	-13	-36.98	-68.87	-56.09	1.4	9.66	H	Pass
5769.4	-44.34	-13	-31.34	-63.28	-51.03	1.71	10.55	H	Pass

Band :	GSM850 for CH128					Temperature :	23~25°C		
Test Mode :	GSM Link (GMSK)					Relative Humidity :	48~52%		
Test Engineer :	Rock Tang					Polarization :	Vertical		
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1648.4	-36.16	-13	-23.16	-50.70	-38.98	0.73	5.70	V	Pass
2472.6	-41.14	-13	-28.14	-63.49	-43.50	0.91	5.42	V	Pass
3296.8	-55.55	-13	-42.55	-67.73	-60.19	1.07	7.86	V	Pass
4121	-49.27	-13	-36.27	-64.95	-54.59	1.45	8.92	V	Pass
4945.2	-37.85	-13	-24.85	-57.56	-43.96	1.40	9.66	V	Pass
5769.4	-41.97	-13	-28.97	-60.75	-48.66	1.71	10.55	V	Pass



Band :	GSM850 for CH189					Temperature :	23~25°C		
Test Mode :	GSM Link (GMSK)					Relative Humidity :	48~52%		
Test Engineer :	Rock Tang					Polarization :	Horizontal		
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1672	-31.59	-13	-18.59	-47.95	-34.56	0.88	6.00	H	Pass
2510	-39.02	-13	-26.02	-63.28	-41.63	1.08	5.84	H	Pass
3346	-60.08	-13	-47.08	-70.68	-64.45	1.14	7.66	H	Pass
4182	-49.86	-13	-36.86	-64.62	-55.13	1.37	8.79	H	Pass
5018	-48.38	-13	-35.38	-66.67	-54.52	1.51	9.80	H	Pass
5854	-42.96	-13	-29.96	-61.18	-49.49	1.62	10.30	H	Pass

Band :	GSM850 for CH189					Temperature :	23~25°C		
Test Mode :	GSM Link (GMSK)					Relative Humidity :	48~52%		
Test Engineer :	Rock Tang					Polarization :	Vertical		
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1672	-31.61	-13	-18.61	-45.80	-34.58	0.88	6.00	V	Pass
2510	-38.72	-13	-25.72	-61.11	-41.33	1.08	5.84	V	Pass
3346	-53.11	-13	-40.11	-64.94	-57.48	1.14	7.66	V	Pass
4182	-50.69	-13	-37.69	-65.91	-55.96	1.37	8.79	V	Pass
5018	-45.26	-13	-32.26	-62.71	-51.40	1.51	9.80	V	Pass
5854	-44.91	-13	-31.91	-62.81	-51.44	1.62	10.30	V	Pass



Band :	GSM850 for CH251					Temperature :	23~25°C		
Test Mode :	GSM Link (GMSK)					Relative Humidity :	48~52%		
Test Engineer :	Rock Tang					Polarization :	Horizontal		
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1697.6	-30.59	-13	-17.59	-47.33	-33.58	0.75	5.89	H	Pass
2546.4	-41.71	-13	-28.71	-66.06	-44.42	1.12	5.98	H	Pass
3395.2	-55.55	-13	-42.55	-66.75	-59.95	1.25	7.80	H	Pass
4244	-48.39	-13	-35.39	-62.55	-53.64	1.29	8.69	H	Pass
5092.8	-47.91	-13	-34.91	-65.70	-53.96	1.48	9.68	H	Pass
5941.6	-47.58	-13	-34.58	-65.35	-54.05	1.52	10.14	H	Pass

Band :	GSM850 for CH251					Temperature :	23~25°C		
Test Mode :	GSM Link (GMSK)					Relative Humidity :	48~52%		
Test Engineer :	Rock Tang					Polarization :	Vertical		
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1697.6	-31.52	-13	-18.52	-46.06	-34.51	0.75	5.89	V	Pass
2546.4	-38.60	-13	-25.60	-61.40	-41.31	1.12	5.98	V	Pass
3395.2	-51.17	-13	-38.17	-63.60	-55.57	1.25	7.80	V	Pass
4244	-47.90	-13	-34.90	-62.52	-53.15	1.29	8.69	V	Pass
5092.8	-48.20	-13	-35.20	-65.15	-54.25	1.48	9.68	V	Pass
5941.6	-47.59	-13	-34.59	-65.04	-54.06	1.52	10.14	V	Pass

Band :	GSM1900 for CH512					Temperature :	23~25°C		
Test Mode :	GSM Link (GMSK)					Relative Humidity :	48~52%		
Test Engineer :	Rock Tang					Polarization :	Horizontal		
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	EIRP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
3700.4	-55.15	-13	-42.15	-66.70	-61.90	1.2	7.95	H	Pass
5550.6	-35.28	-13	-22.28	-55.70	-43.38	1.5	9.60	H	Pass
7400.8	-46.89	-13	-33.89	-68.47	-57.08	1.7	11.89	H	Pass
9251	-54.73	-13	-41.73	-76.15	-65.16	2.32	12.75	H	Pass
11101.2	-45.85	-13	-32.85	-73.78	-56.66	2.05	12.86	H	Pass
12951.4	-45.48	-13	-32.48	-75.46	-55.96	2.52	13.00	H	Pass

Band :	GSM1900 for CH512					Temperature :	23~25°C		
Test Mode :	GSM Link (GMSK)					Relative Humidity :	48~52%		
Test Engineer :	Rock Tang					Polarization :	Vertical		
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	EIRP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
3700.4	-54.45	-13	-41.45	-68.88	-61.20	1.2	7.95	V	Pass
5550.6	-32.50	-13	-19.50	-52.46	-40.60	1.5	9.6	V	Pass
7400.8	-38.87	-13	-25.87	-61.75	-49.06	1.7	11.89	V	Pass
9251	-50.96	-13	-37.96	-73.88	-61.39	2.32	12.75	V	Pass
11101.2	-40.50	-13	-27.50	-68.53	-51.31	2.05	12.86	V	Pass
12951.4	-37.75	-13	-24.75	-67.8	-48.23	2.52	13	V	Pass

Band :	GSM1900 for CH661					Temperature :	23~25°C		
Test Mode :	GSM Link (GMSK)					Relative Humidity :	48~52%		
Test Engineer :	Rock Tang					Polarization :	Horizontal		
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	EIRP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
3760	-49.64	-13	-36.64	-63.07	-56.38	1.28	8.02	H	Pass
5640	-35.78	-13	-22.78	-56.71	-44.20	1.58	10.00	H	Pass
7520	-48.73	-13	-35.73	-70.67	-59.05	1.78	12.10	H	Pass
9400	-50.29	-13	-37.29	-72.41	-61.07	2.22	13.00	H	Pass
11280	-42.09	-13	-29.09	-70.58	-52.94	2.16	13.01	H	Pass
13160	-41.53	-13	-28.53	-72.11	-52.59	2.64	13.70	H	Pass

Band :	GSM1900 for CH661	Temperature :	23~25°C						
Test Mode :	GSM Link (GMSK)	Relative Humidity :	48~52%						
Test Engineer :	Rock Tang	Polarization :	Vertical						
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	EIRP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
3760	-49.81	-13	-36.81	-64.84	-56.55	1.28	8.02	V	Pass
5640	-28.41	-13	-15.41	-49.35	-36.83	1.58	10	V	Pass
7520	-46.04	-13	-33.04	-68.29	-56.36	1.78	12.1	V	Pass
9400	-47.17	-13	-34.17	-70.79	-57.95	2.22	13	V	Pass
11280	-40.39	-13	-27.39	-68.98	-51.24	2.16	13.01	V	Pass
13160	-36.85	-13	-23.85	-67.5	-47.91	2.64	13.7	V	Pass



Band :	GSM1900 for CH810					Temperature :	23~25°C		
Test Mode :	GSM Link (GMSK)					Relative Humidity :	48~52%		
Test Engineer :	Rock Tang					Polarization :	Horizontal		
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	EIRP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
3819.6	-53.34	-13	-40.34	-64.91	-60.11	1.23	8.00	H	Pass
5729.4	-34.96	-13	-21.96	-55.85	-43.09	1.52	9.65	H	Pass
7639.2	-52.40	-13	-39.40	-74.64	-62.58	1.82	12.00	H	Pass
9549	-52.77	-13	-39.77	-75.19	-63.28	2.18	12.69	H	Pass
11458.8	-45.97	-13	-32.97	-74.96	-56.72	2.1	12.85	H	Pass
13368.6	-43.67	-13	-30.67	-74.70	-55.09	2.58	14.00	H	Pass

Band :	GSM1900 for CH810					Temperature :	23~25°C		
Test Mode :	GSM Link (GMSK)					Relative Humidity :	48~52%		
Test Engineer :	Rock Tang					Polarization :	Vertical		
Remark :	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.								
Frequency	EIRP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
3819.6	-48.97	-13	-35.97	-63.42	-55.74	1.23	8	V	Pass
5729.4	-31.65	-13	-18.65	-52.07	-39.78	1.52	9.65	V	Pass
7639.2	-49.22	-13	-36.22	-71.77	-59.40	1.82	12	V	Pass
9549	-49.32	-13	-36.32	-73.24	-59.83	2.18	12.69	V	Pass
11458.8	-34.90	-13	-21.90	-64.25	-45.65	2.1	12.85	V	Pass
13368.6	-38.38	-13	-25.38	-69.48	-49.80	2.58	14	V	Pass

3.8 Frequency Stability Measurement

3.8.1 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 $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency.

3.8.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

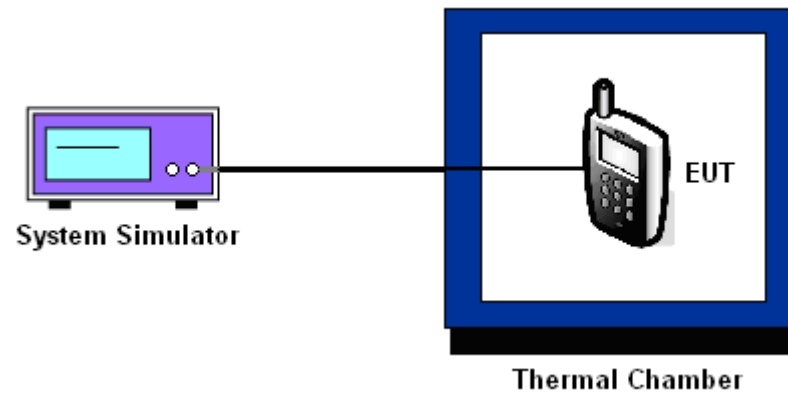
3.8.3 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. 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 steps 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.

3.8.4 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at $25\pm 5^{\circ}\text{C}$ and connected with the system simulator.
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.

3.8.5 Test Setup



3.8.6 Test Result of Temperature Variation

Band :	GSM 850	Channel :	189
Limit (ppm) :	2.5	Frequency :	836.4 MHz

Temperature (°C)	GSM		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	-31	0.0060	PASS
-20	-30	0.0048	
-10	-28	0.0024	
0	-27	0.0012	
10	-25	0.0012	
20(Ref.)	-26	0.0000	
30	-26	0.0000	
40	-27	0.0012	
50	-29	0.0036	

Band :	GSM 1900	Channel :	661
Limit (ppm) :	2.5	Frequency :	1880.0 MHz

Temperature (°C)	GSM		Result
	Freq. Dev. (Hz)	Deviation (ppm)	
-30	-39	0.0048	PASS
-20	-37	0.0037	
-10	-36	0.0032	
0	-33	0.0016	
10	-31	0.0005	
20(Ref.)	-30	0.0000	
30	-32	0.0011	
40	-35	0.0027	
50	-37	0.0037	

3.8.7 Test Result of Voltage Variation

Band & Channel	Mode	Voltage (Volt)	Freq. Dev. (Hz)	Deviation (ppm)	Limit (ppm)	Result
GSM 850 CH189	GSM	3.7	-25	0.0012	2.5	PASS
		BEP	-29	0.0036		
		4.2	-26	0.0000		
GSM 1900 CH661	GSM	3.7	-32	0.0011		
		BEP	-36	0.0032		
		4.2	-38	0.0043		

Note:

1. Normal Voltage = 3.7V.
2. Battery End Point (BEP) = 3.4 V.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Signal Analyzer	R&S	FSV40	101078	10Hz~40GHz	May. 08, 2014	Sep. 03, 2014	May. 07, 2015	Conducted (TH01-SZ)
Thermal Chamber	Hongzhan	LP-150U	HD20120425	-40℃~150℃	Feb. 21, 2014	Sep. 03, 2014	Feb. 20, 2015	Conducted (TH01-SZ)
ESCIO TEST Receiver	R&S	ESCI	100724	9kHz~3GHz	Feb. 21, 2014	Aug. 30, 2014	May 25, 2015	Radiation (03CH01-SZ)
Spectrum Analyzer	Agilent	N9038A	MY52260185	20Hz~26.5GHz	May 26, 2014	Aug. 30, 2014	May 08, 2015	Radiation (03CH01-SZ)
Bilog Antenna	TESEQ	CBL 6112D	23188	30MHz~2GHz	Oct. 26, 2013	Aug. 30, 2014	Oct. 25, 2014	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	00119436	1GHz~18GHz	Oct. 26, 2013	Aug. 30, 2014	Oct. 25, 2014	Radiation (03CH06-HY)
Double Ridged Horn Antenna	COM-POWER	AH-840	101073	18GHz~40GHz	Jan. 27, 2014	Aug. 30, 2014	Feb. 20, 2015	Radiation (03CH01-SZ)
Amplifier	ADVANTEST	BB525C	E9007003	9kHz~3000MHz	Feb. 21, 2014	Aug. 30, 2014	May 07, 2015	Radiation (03CH01-SZ)
Amplifier	Yiai	AV3860B	04030	2GHz~26.5GHz	May 08, 2014	Aug. 30, 2014	Mar. 24, 2015	Radiation (03CH01-SZ)
AC Source(AVR)	Chroma	61601	616010001985	100Vac~250Vac	NCR	Aug. 30, 2014	NCR	Radiation (03CH01-SZ)
Turn Table	EM Electronics	EM 1000	N/A	0~360 degree	NCR	Aug. 30, 2014	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM Electronics	EM 1000	N/A	1 m~4 m	NCR	Aug. 30, 2014	NCR	Radiation (03CH01-SZ)
Spectrum Analyzer	R&S	FSP 7	100818	9kHz~7GHz	Sep. 02, 2014	Sep. 03, 2014	Sep. 01, 2015	ERP/EIRP (OTA01-SZ)
Quad-Ridged Horn	ETS-Lindgren	3164-08	00102954	700MHz~10000MHz	N/A	Sep. 03, 2014	N/A	ERP/EIRP (OTA01-SZ)
Multi-Devices Controller	ETS-Lindgren	2090-OPT1	00108147	N/A	N/A	Sep. 03, 2014	N/A	ERP/EIRP (OTA01-SZ)
Switch Control Mainframe	Agilent	3499A	MY42005451	N/A	N/A	Sep. 03, 2014	N/A	ERP/EIRP (OTA01-SZ)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.9
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