FCC RF Test Report

APPLICANT	:	ZTE CORPORATION
EQUIPMENT	:	WCDMA/LTE Dual-Mode Digital Mobile Phone
BRAND NAME	:	ZTE
MODEL NAME	:	Vodafone Smart ultra 6, VF-995N, Vodafone Smart ultra
FCC ID	:	SRQ-995N
STANDARD	:	FCC 47 CFR Part 2, 24(E)
CLASSIFICATION	:	PCS Licensed Transmitter Held to Ear (PCE)

The testing was completed on Apr. 29, 2015. We, SPORTON INTERNATIONAL (KUNSHAN) 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 (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory
2627

SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG531601-01A	Rev. 01	Initial issue of report	May 05, 2015

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	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
3.4	§2.1049 §24.238(b)	Occupied Bandwidth	N/A	PASS	-
3.5	§2.1051 §24.238(a)	Band Edge Measurement	< $43+10\log_{10}$(P[Watts])	PASS	-
3.6	§2.1051 §24.238(a)	Conducted Spurious Emission	< $43+10\log_{10}$(P[Watts])	PASS	-
3.7	§2.1053 §24.238(a)	Field Strength of Spurious Radiation	< $43+10\log_{10}$(P[Watts])	PASS	Under limit 29.38 dB at 7521.000 MHz
3.8	§2.1055 §24.235	Frequency Stability for Temperature & Voltage	Within Authorized Band	PASS	-

1 General Description

1.1 Applicant

ZTE CORPORATION
ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P. R. China

1.2 Manufacturer

ZTE CORPORATION
ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P. R. China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	WCDMA/LTE Dual-Mode Digital Mobile Phone
Brand Name	ZTE
Model Name	Vodafone Smart ultra 6, VF-995N, Vodafone Smart ultra
FCC ID	SRQ-995N
EUT supports Radios application	GSM/GPRS/EGPRS/NFC/LTE WLAN 2.4GHz 802.11b/g/n HT20 Bluetooth v3.0 + EDR/ Bluetooth v4.1 LE
HW Version	wreA
SW Version	P839V55V1.0.0B01
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	GSM1900: 1850.2 MHz ~ 1909.8MHz
Rx Frequency	GSM1900: 1930.2 MHz ~ 1989.8 MHz
Maximum Output Power to Antenna	GSM1900 : 29.52 dBm
Antenna Type	PIFA Antenna
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE: GMSK / 8PSK

1.5 Modification of EUT

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

1.6 Maximum EIRP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	Maximum EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
Part 24	GSM1900 GSM	GMSK	0.3936	0.0096 ppm	245KGXW
Part 24	GSM1900 EDGE class 8	8PSK	0.1738	0.0117 ppm	245KG7W

1.7 Testing Location

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.		
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958		
Test Site No.	**Sporton Site No.**		**FCC Registration No.**
	TH01-KS	03CH02-KS	418269

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 Registration No.**
	03CH10-HY	TW1022

Note: The test site complies with ANSI C63.4 2009 requirement.

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, 24(E)
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02

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 v02r02 with maximum output power.

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

Radiated emissions were investigated as following frequency range:

1. 30 MHz to 10th harmonic for GSM1900.

All modes and data rates and positions were investigated.

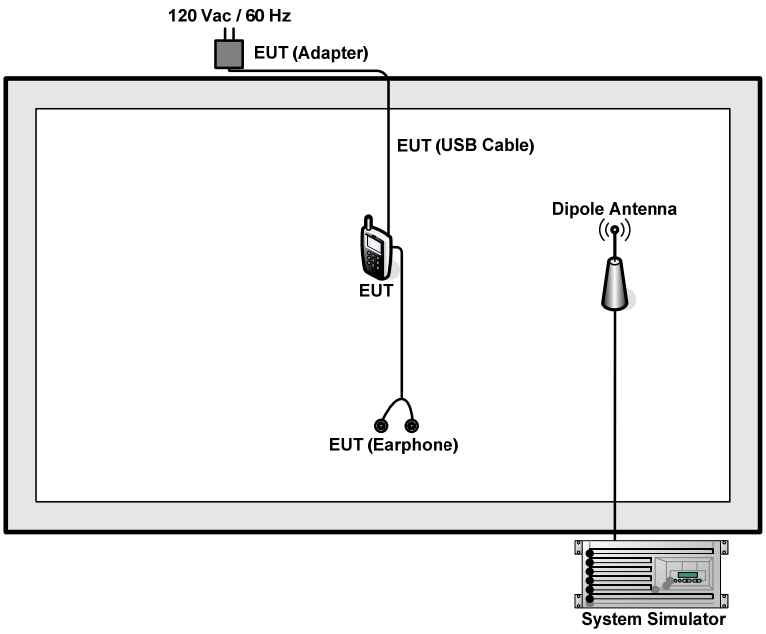
Test modes are chosen to be reported as the worst case configuration below:

Test Modes		
Band	**Radiated TCs**	**Conducted TCs**
GSM 1900	■ GSM Link ■ EDGE class 8 Link	■ GSM Link ■ EDGE class 8 Link

Conducted Power Measurement Results:

Conducted Power (*Unit: dBm)			
Band	**GSM1900**		
Channel	**512**	**661**	**810**
Frequency	**1850.2**	**1880.0**	**1909.8**
GSM	**29.52**	29.30	29.27
GPRS class 8	29.51	29.29	29.26
GPRS class 10	26.38	26.31	26.30
GPRS class 11	24.16	24.10	24.07
GPRS class 12	22.91	22.89	22.83
EGPRS class 8	25.68	25.62	25.55
EGPRS class 10	24.15	24.12	23.97
EGPRS class 11	21.56	21.48	21.40
EGPRS class 12	19.89	19.87	19.76

2.2 Connection Diagram of Test System



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.	DC Power Supply	GW INSTEK	GPS-3030D	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 6 dB and a 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 6 + 10 = 16 (dB)

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.

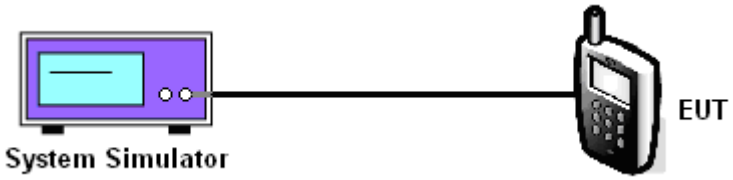
3.1.2 Measuring Instruments

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

PCS Band						
Modes	**GSM1900 (GSM)**			**GSM1900 (EDGE class 8)**		
Channel	**512 (Low)**	**661 (Mid)**	**810 (High)**	**512 (Low)**	**661 (Mid)**	**810 (High)**
Frequency (MHz)	**1850.2**	**1880**	**1909.8**	**1850.2**	**1880**	**1909.8**
Conducted Power (dBm)	29.52	29.30	29.27	25.68	25.62	25.55

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.

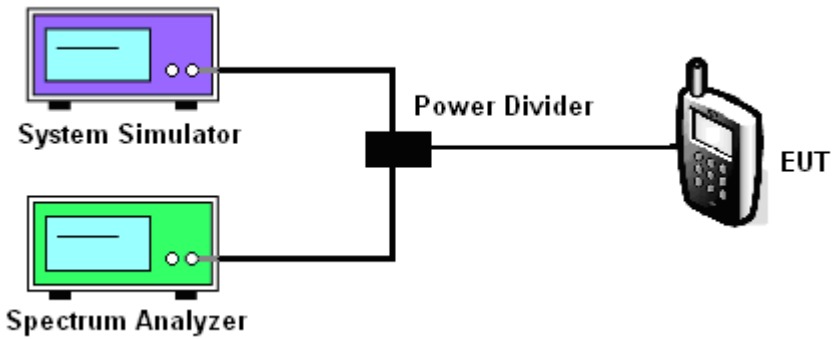
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 5.7.1.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. 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.
4. 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 %.
5. Record the deviation as Peak to Average Ratio.

3.2.4 Test Setup



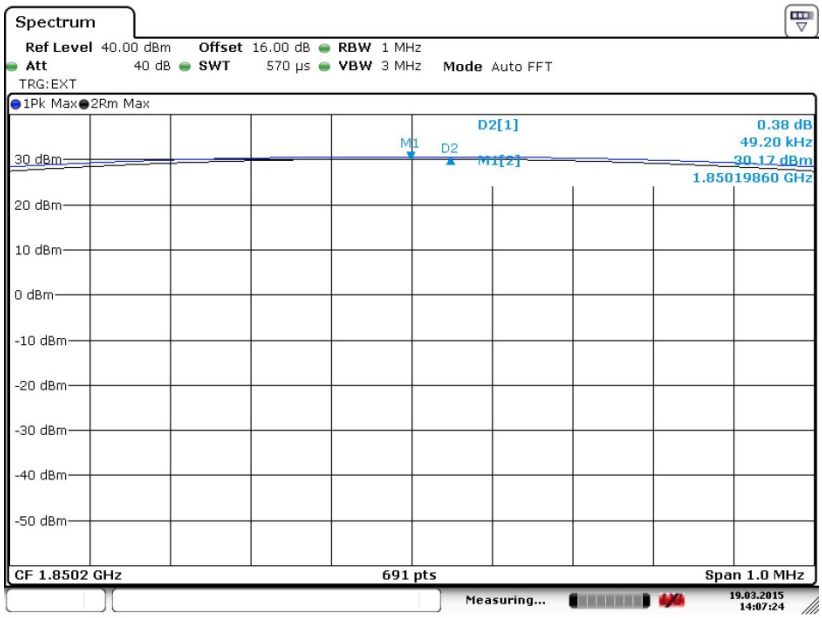
3.2.5 Test Result of Peak-to-Average Ratio

PCS Band						
Modes	GSM1900 (GSM)			GSM1900 (EDGE class 8)		
Channel	512 (Low)	661 (Mid)	810 (High)	512 (Low)	661 (Mid)	810 (High)
Frequency (MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8
Peak-to-Average Ratio (dB)	0.38	0.40	0.42	2.86	2.82	2.87

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

Band :	GSM 1900	Test Mode :	GSM Link (GMSK)

Peak-to-Average Ratio on Channel 512 (1850.2 MHz)



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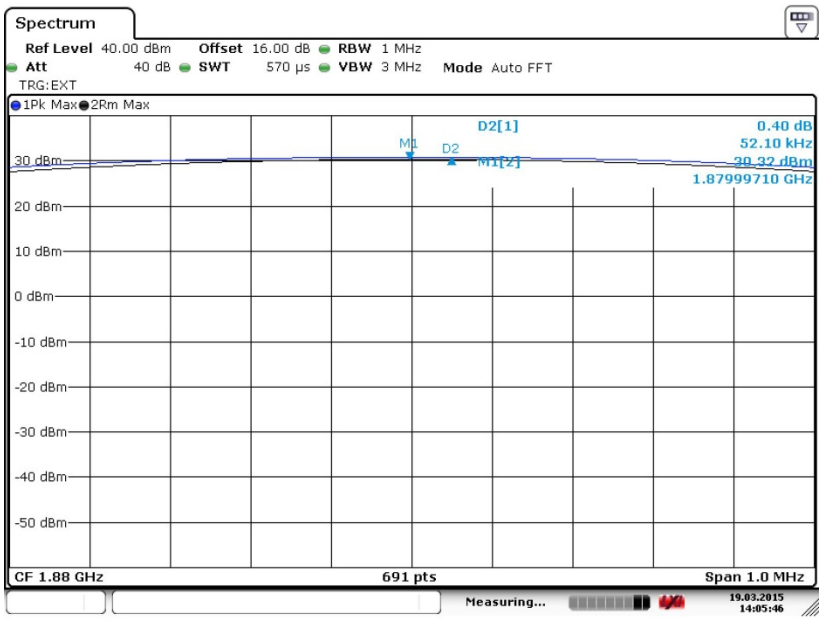
Peak-to-Average Ratio on Channel 661 (1880.0 MHz)



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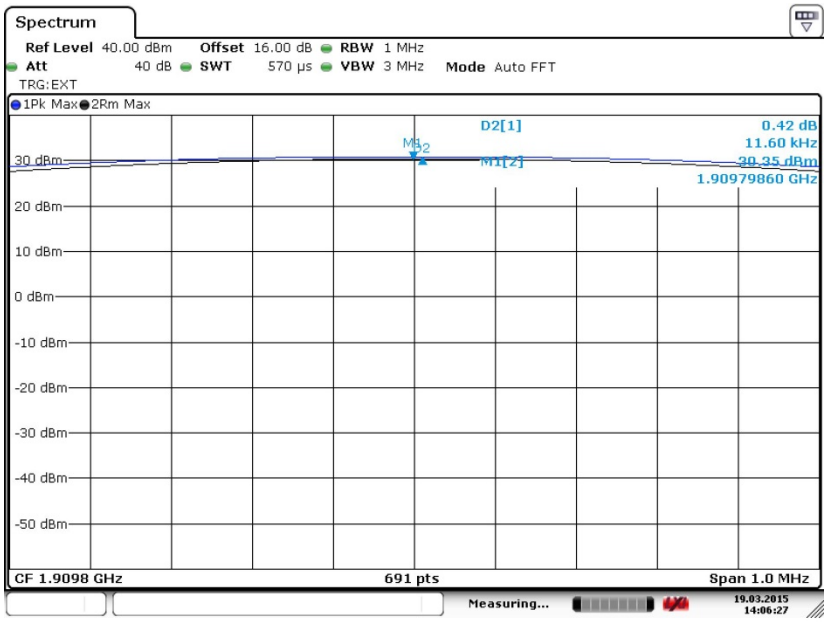
Peak-to-Average Ratio on Channel 810 (1909.8 MHz)



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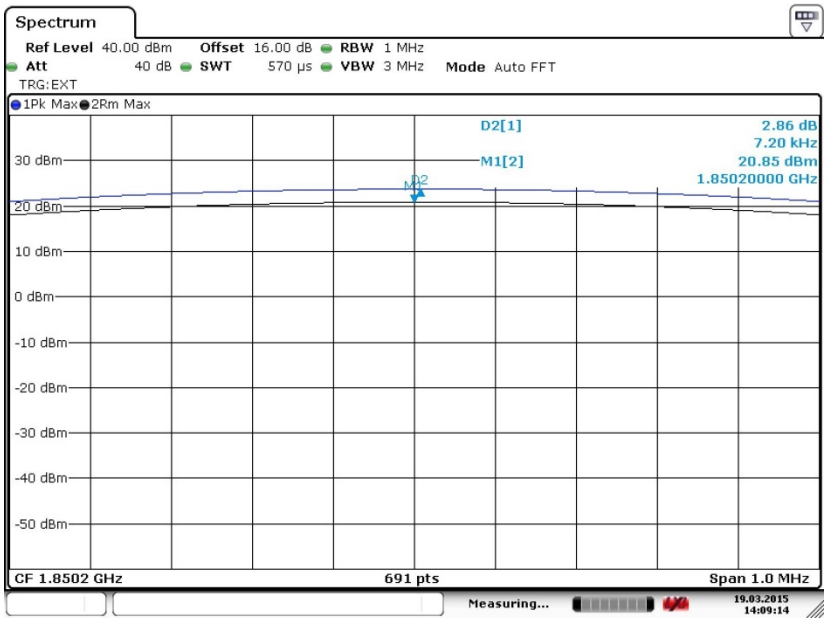
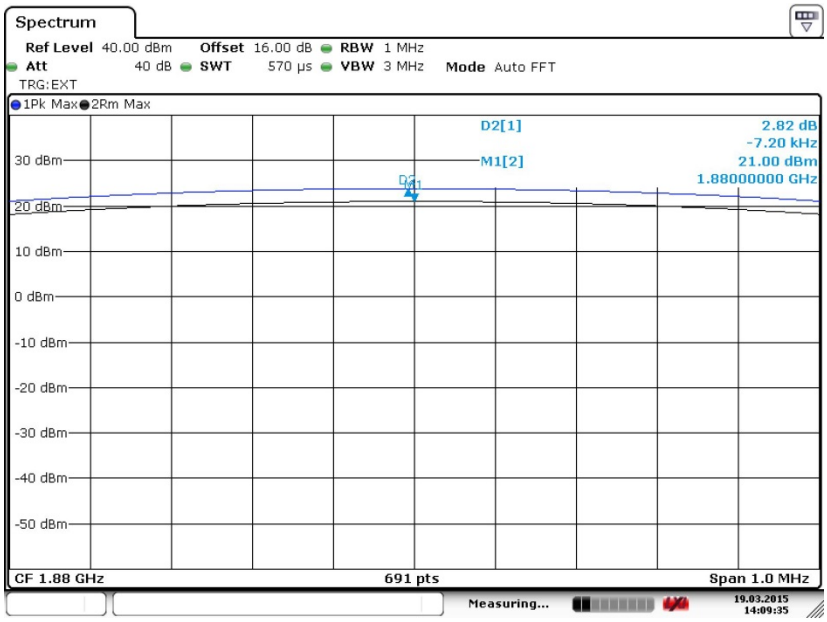
Band :	GSM 1900	Test Mode :	EDGE class 8 Link (8PSK)

Peak-to-Average Ratio on Channel 512 (1850.2 MHz)



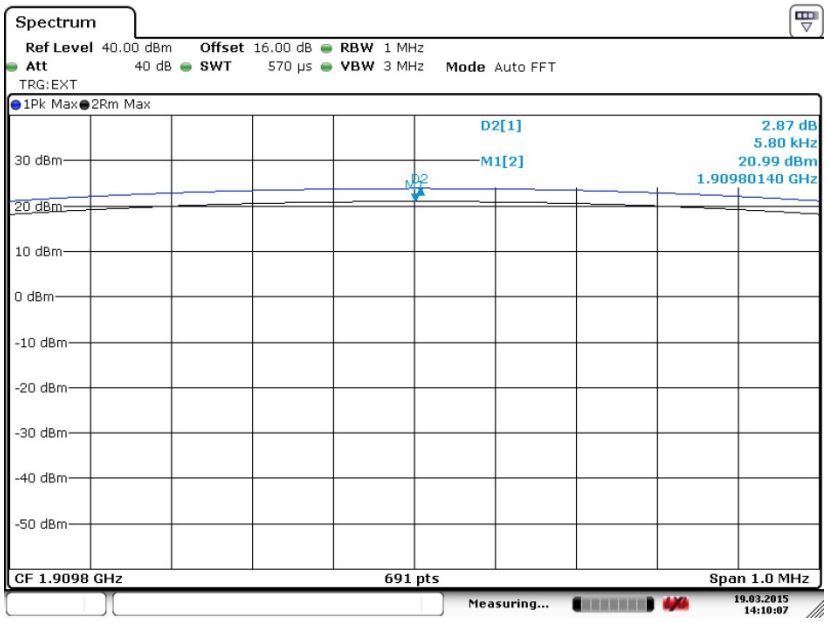
Date: 19.MAR.2015 14:09:14

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



Date: 19.MAR.2015 14:09:35

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



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3.3 Effective Isotropic Radiated Power Measurement

3.3.1 Description of the EIRP Measurement

The substitution method, in ANSI / TIA / EIA-603-C-2004, was used for EIRP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r02. 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 testing follows FCC KDB 971168 v02r02 Section 5.2.1. (for CDMA/WCDMA), Section 5.2.2.2 (for GSM/GPRS/EDGE) and ANSI / TIA-603-C-2004 Section 2.2.17.
2. The EUT was placed on a non-conductive rotating platform 0.8 meters high 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 RMS detector per section 5. of KDB 971168 D01.
3. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power. The maximum 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.
4. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by the 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. Take the record of the output power at substitution antenna.

	GSM/GPRS/EDGE	WCDMA/HSPA
SPAN	500kHz	10MHz
RBW	10kHz	100kHz
VBW	30kHz	300kHz
Detector	RMS	RMS
Trace	Average	Average
Average Type	Power	Power
Sweep Count	100	100

3.3.4 Test Result of EIRP

GSM1900 (GSM) Radiated Power EIRP					
Channel	Frequency (MHz)	Horizontal		Vertical	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	1850.2	25.95	0.3936	25.46	0.3516
Middle	1880	25.35	0.3428	25.89	0.3882
Highest	1909.8	25.32	0.3404	25.77	0.3776
Limit	EIRP < 2W	Result		PASS	

GSM1900 (EDGE class 8) Radiated Power EIRP					
Channel	Frequency (MHz)	Horizontal		Vertical	
		EIRP(dBm)	EIRP(W)	EIRP(dBm)	EIRP(W)
Lowest	1850.2	21.93	0.1560	21.64	0.1459
Middle	1880	22.15	0.1641	22.40	0.1738
Highest	1909.8	21.91	0.1552	22.38	0.1730
Limit	EIRP < 2W	Result		PASS	

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.

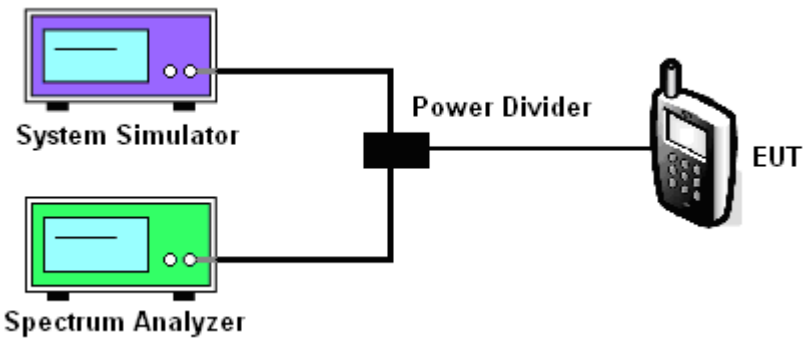
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

5. The testing follows FCC KDB 971168 v02r02 Section 4.2.
6. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
7. 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.
8. The 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3*RBW, peak detector, trace maximum hold.
9. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3*RBW, peak detector, trace maximum hold.

3.4.4 Test Setup



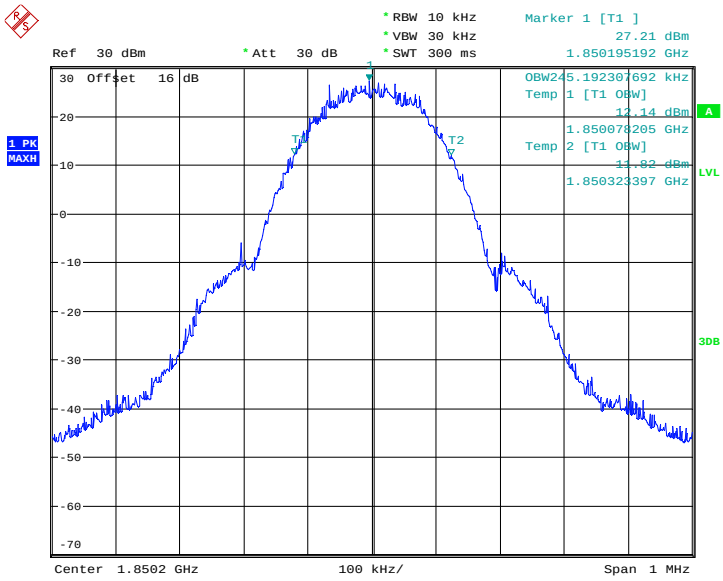
3.4.5 Test Result of Occupied Bandwidth and 26dB Bandwidth

PCS Band						
Modes	**GSM1900 (GSM)**			**GSM1900 (EDGE class 8)**		
Channel	**512 (Low)**	**661 (Mid)**	**810 (High)**	**512 (Low)**	**661 (Mid)**	**810 (High)**
Frequency (MHz)	**1850.2**	**1880**	**1909.8**	**1850.2**	**1880**	**1909.8**
99% OBW (kHz)	245.19	245.19	244.00	243.59	243.59	245.19
26dB BW (kHz)	314.10	314.10	312.50	307.69	306.00	312.50

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

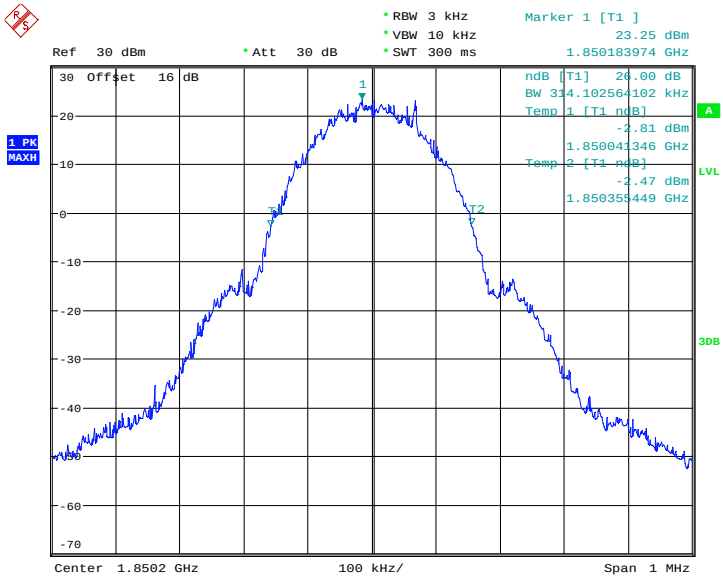
Band :	GSM 1900	Test Mode :	GSM Link (GMSK)

99% Occupied Bandwidth Plot on Channel 512 (1850.2 MHz)



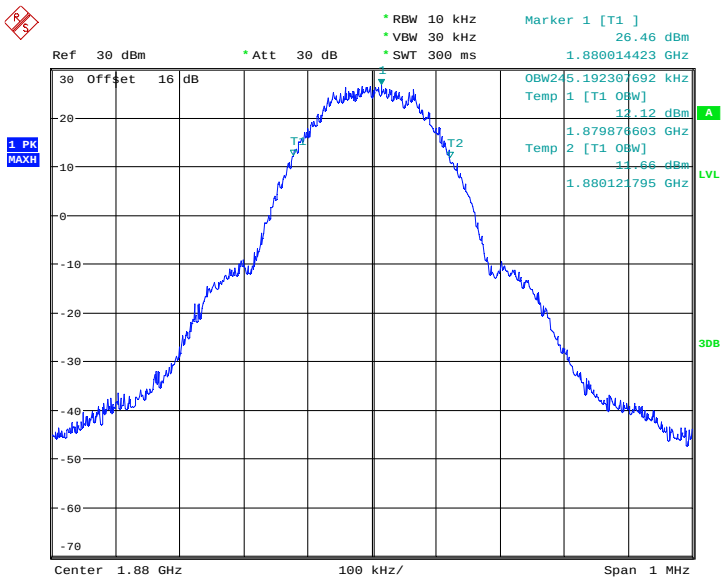
Date: 19.MAR.2015 10:55:58

26dB Bandwidth Plot on Channel 512 (1850.2 MHz)



Date: 19.MAR.2015 10:49:32

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



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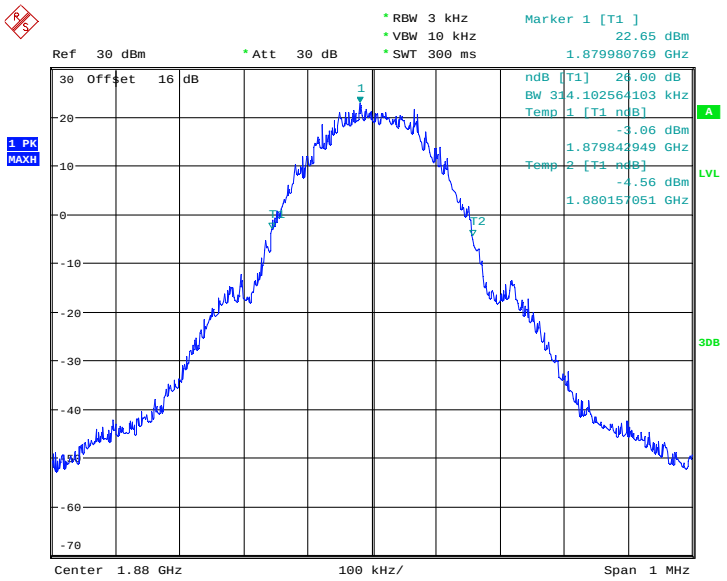
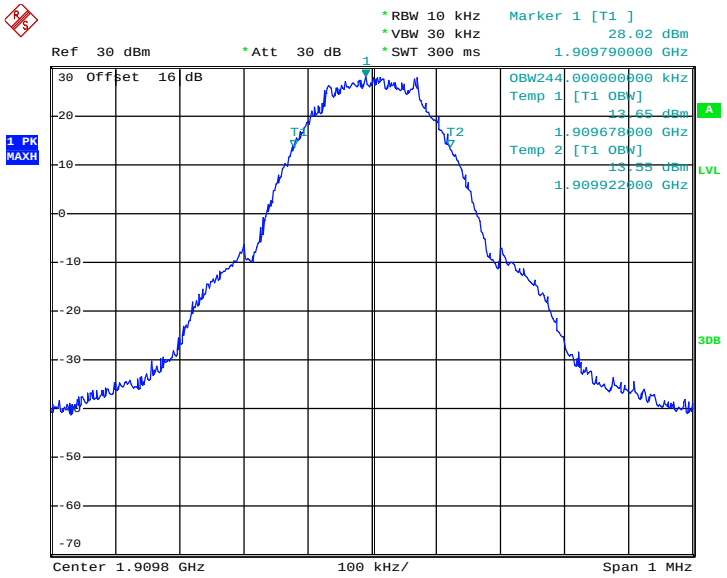
26dB Bandwidth Plot on Channel 661 (1880.0 MHz)



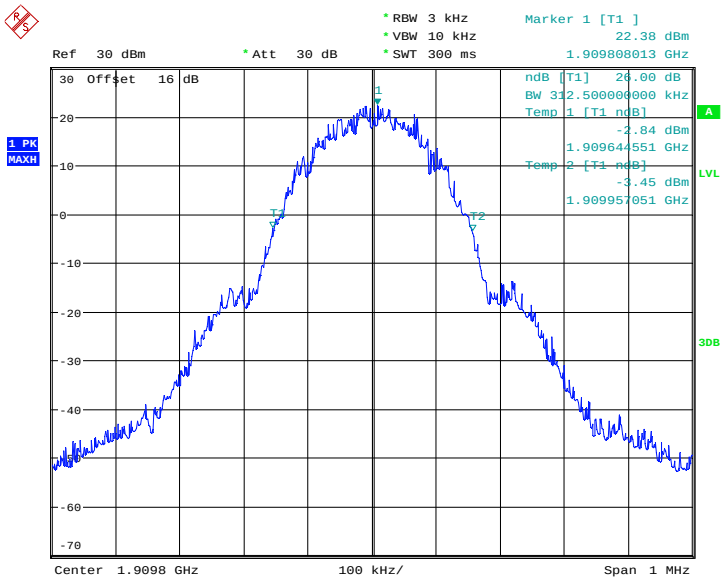
Date: 19.MAR.2015 10:50:51

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



Date: 19.MAR.2015 14:59:06

26dB Bandwidth Plot on Channel 810 (1909.8 MHz)



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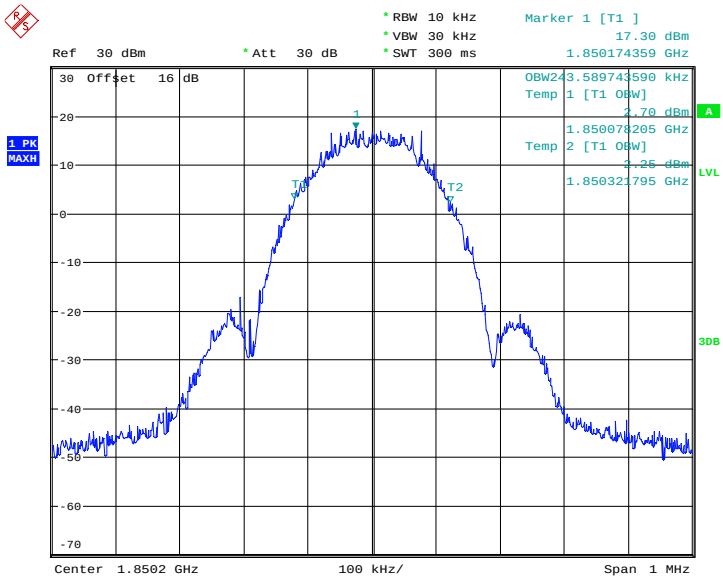
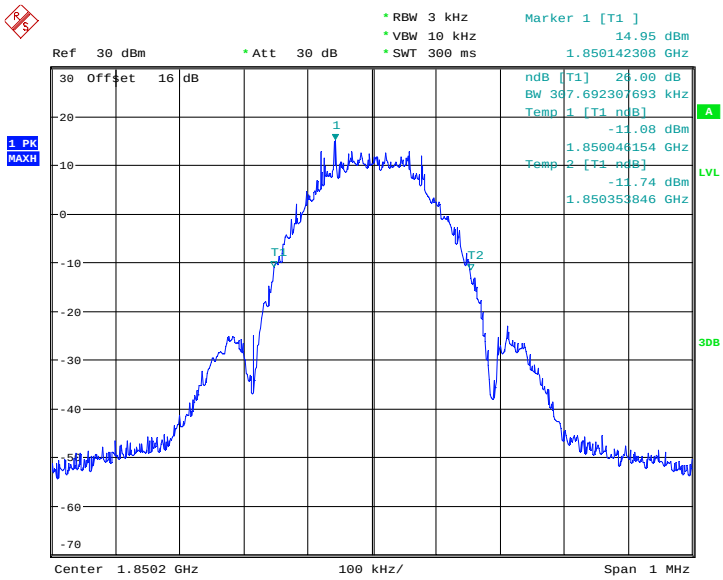
Band :	GSM 1900	Test Mode :	EDGE class 8 Link (8PSK)

99% Occupied Bandwidth Plot on Channel 512 (1850.2 MHz)



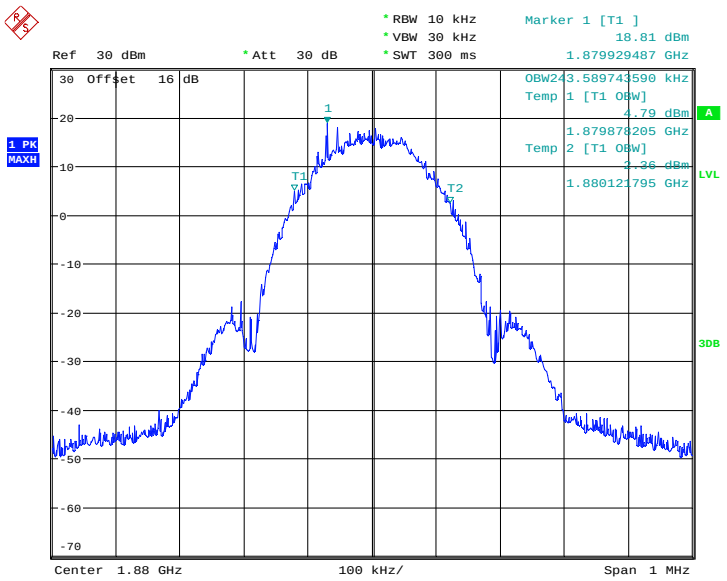
Date: 19.MAR.2015 11:32:46

26dB Bandwidth Plot on Channel 512 (1850.2 MHz)



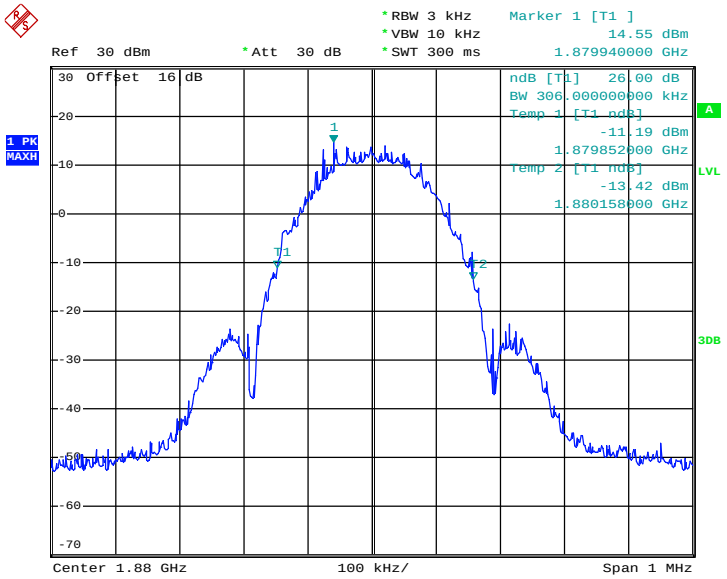
Date: 19.MAR.2015 12:58:22

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



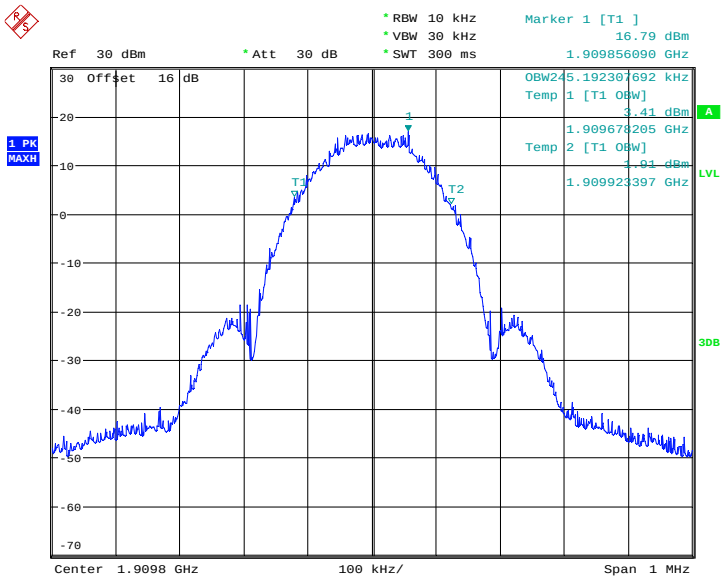
Date: 19.MAR.2015 11:32:23

26dB Bandwidth Plot on Channel 661 (1880.0 MHz)



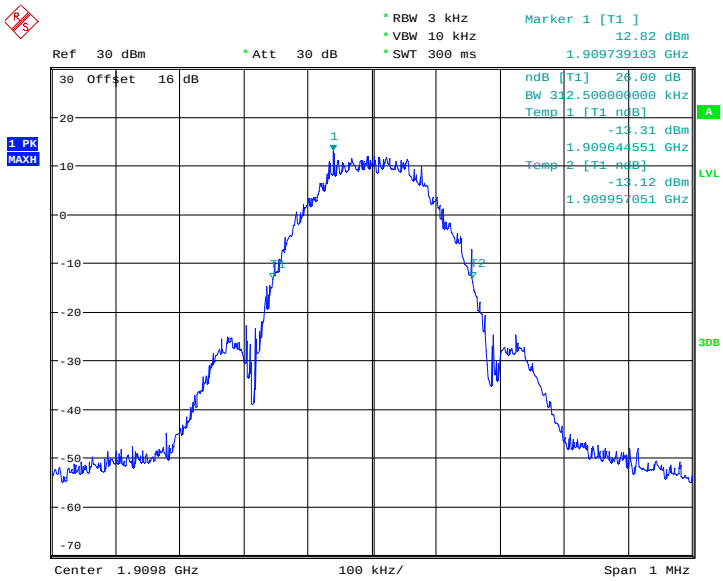
Date: 19.MAR.2015 14:55:49

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



Date: 19.MAR.2015 11:32:02

26dB Bandwidth Plot on Channel 810 (1909.8 MHz)



Date: 19.MAR.2015 11:31:01

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.

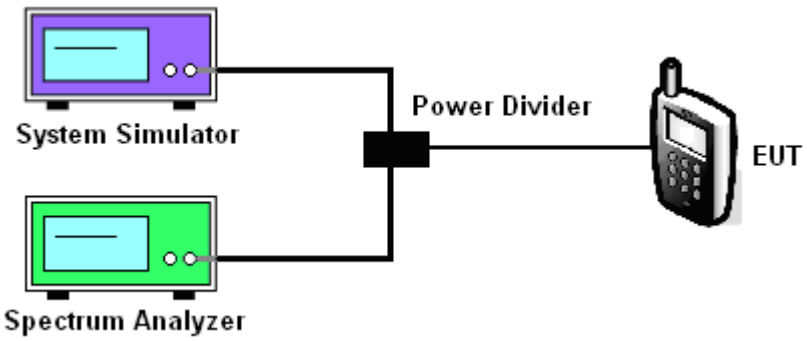
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. 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.
4. The band edges of low and high channels for the highest RF powers were measured.
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 + 10log(P) dB below the transmitter power P(Watts)
   = P(W) - [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
   = -13dBm.

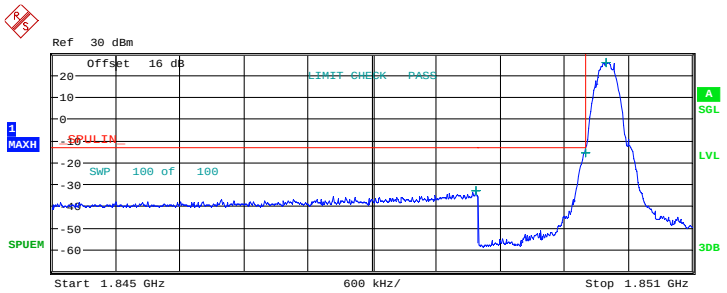
3.5.4 Test Setup



3.5.5 Test Result (Plots) of Conducted Band Edge

Band :	GSM1900	Test Mode :	GSM Link (GMSK)

Lower Band Edge Plot on Channel 512 (1850.2 MHz)

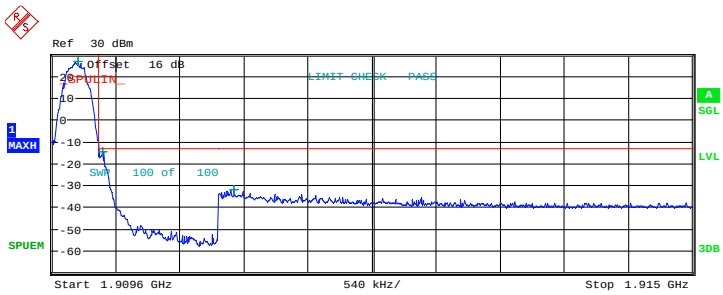


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
1.845 G	1.849 G	1.00 M	1.848970 G	-33.37	-20.37
1.849 G	1.850 G	3.00 k	1.849998 G	-15.67	-2.67
1.850 G	1.851 G	10.00 k	1.850192 G	25.76	-9.24

Date: 19.MAR.2015 11:05:33

Band :	GSM1900	Test Mode :	GSM Link (GMSK)

Higher Band Edge Plot on Channel 810 (1909.8 MHz)

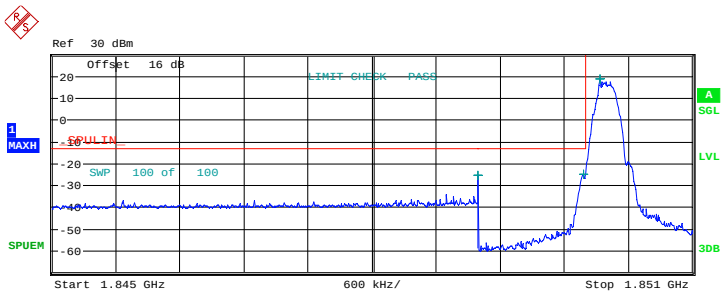


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
1.910 G	1.910 G	10.00 k	1.909815 G	26.70	-8.30
1.910 G	1.911 G	3.00 k	1.910024 G	-14.72	-1.72
1.911 G	1.915 G	1.00 M	1.911130 G	-32.21	-19.21

Date: 19.MAR.2015 11:01:48

Band :	GSM1900	Test Mode :	EDGE class 8 Link (8PSK)

Lower Band Edge Plot on Channel 512 (1850.2 MHz)

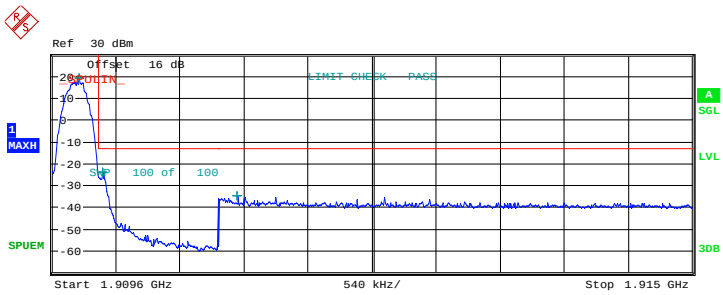


Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
1.845 G	1.849 G	1.00 M	1.848986 G	-25.52	-12.52
1.849 G	1.850 G	3.00 k	1.849978 G	-25.02	-12.02
1.850 G	1.851 G	10.00 k	1.850130 G	18.64	-16.36

Date: 19.MAR.2015 12:44:01

Band :	GSM1900	Test Mode :	EDGE class 8 Link (8PSK)

Higher Band Edge Plot on Channel 810 (1909.8 MHz)



Start [Hz]	Stop [Hz]	RBW [Hz]	Freq [Hz]	PwrAbs [dBm]	Δ Limit [dB]
1.910 G	1.910 G	10.00 k	1.909823 G	19.04	-15.96
1.910 G	1.911 G	3.00 k	1.910028 G	-24.10	-11.10
1.911 G	1.915 G	1.00 M	1.911162 G	-35.12	-22.12

Date: 19.MAR.2015 12:46:16

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.

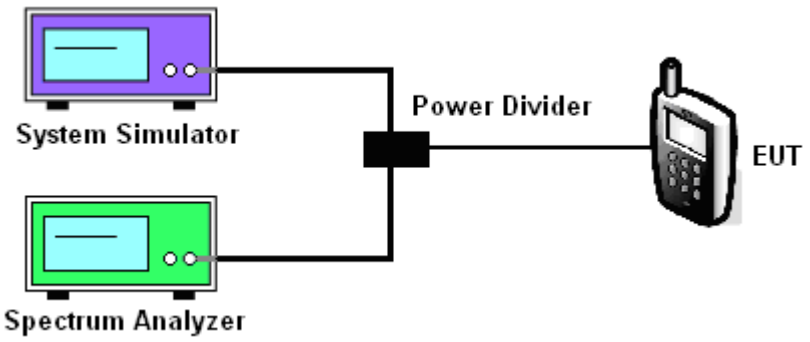
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. 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.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)
   = P(W) - [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
   = -13dBm.

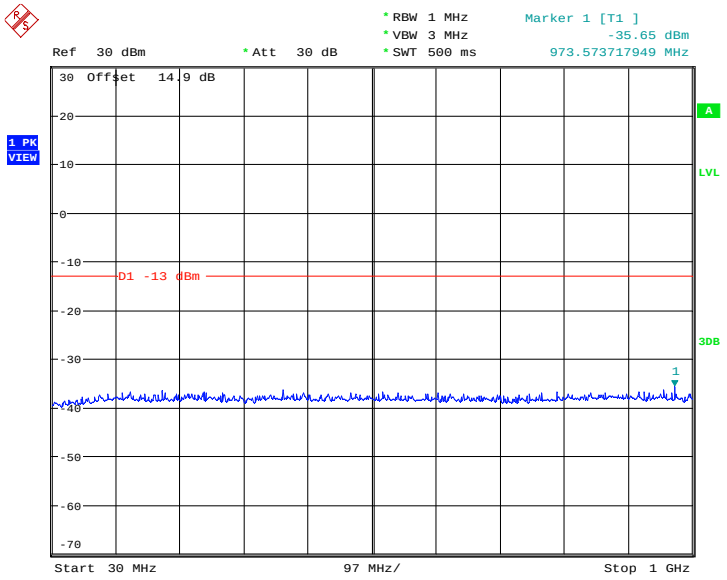
3.6.4 Test Setup



3.6.5 Test Result (Plots) of Conducted Spurious Emission

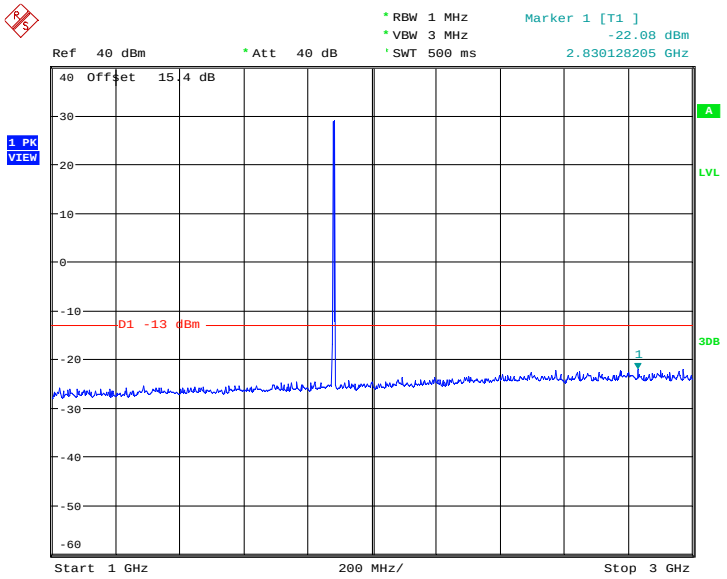
Band :	GSM1900	Channel :	CH661
Test Mode :	GSM Link (GMSK)	Frequency :	1880.0 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



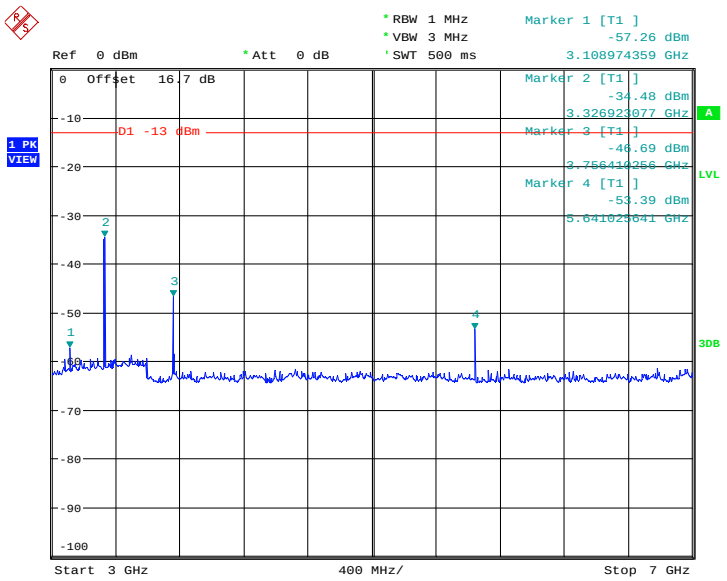
Date: 19.MAR.2015 11:08:02

Conducted Spurious Emission Plot between 1GHz ~ 3GHz



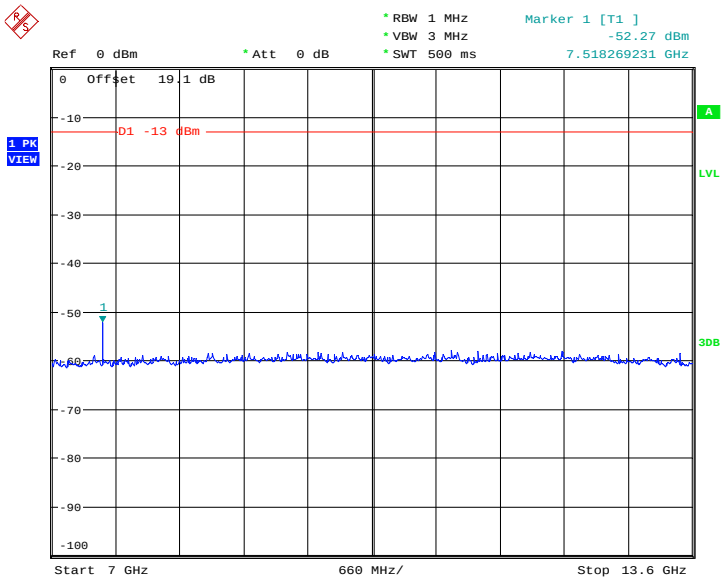
Date: 19.MAR.2015 11:09:32

Conducted Spurious Emission Plot between 3GHz ~ 7GHz



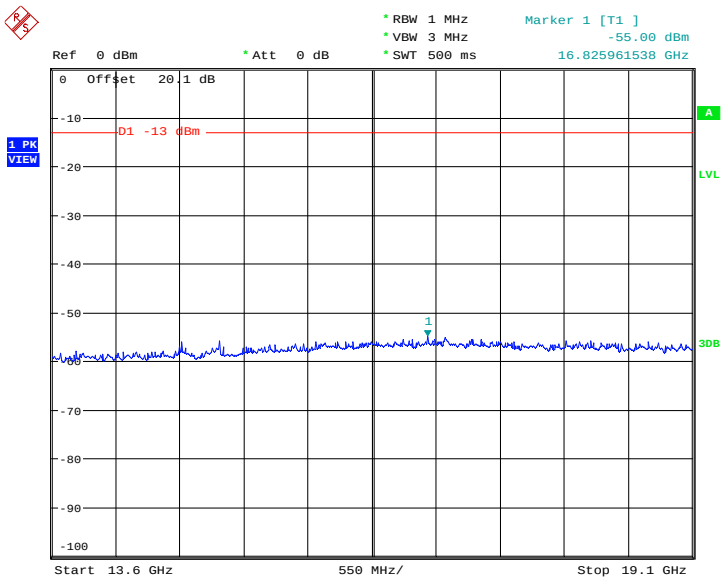
Date: 19.MAR.2015 11:11:11

Conducted Spurious Emission Plot between 7GHz ~ 13.6GHz



Date: 19.MAR.2015 11:12:06

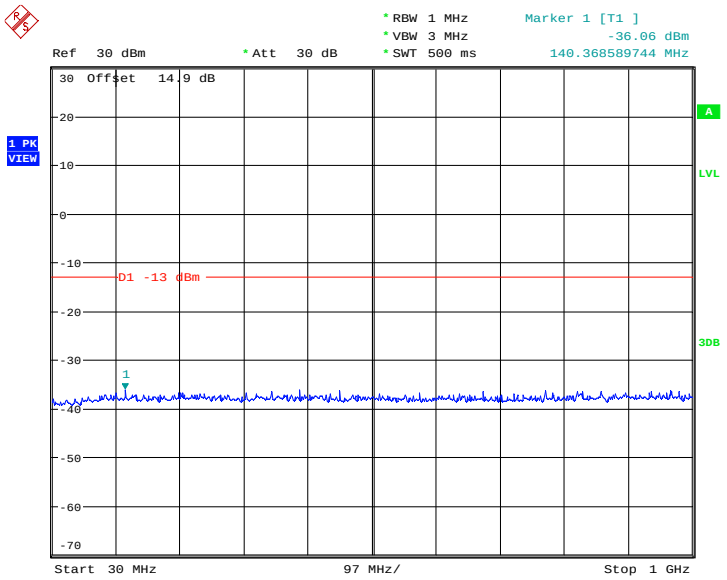
Conducted Spurious Emission Plot between 13.6GHz ~ 19.1GHz



Date: 19.MAR.2015 11:14:48

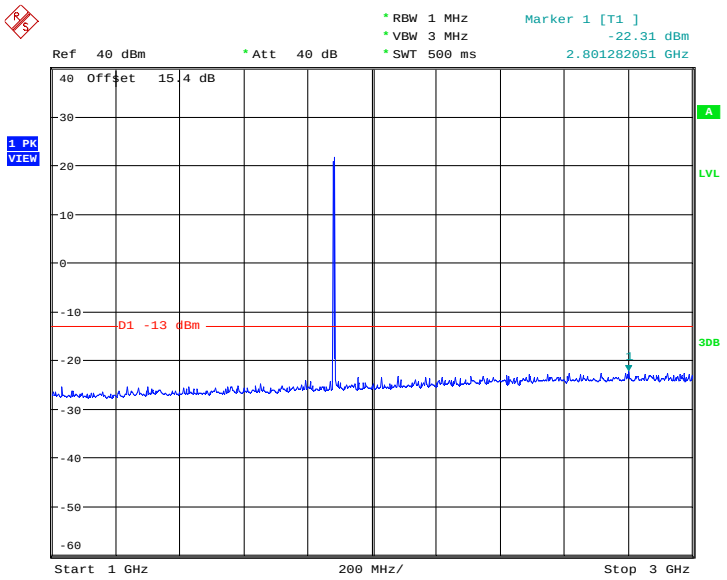
Band :	GSM1900	Channel :	CH661
Test Mode :	EDGE class 8 Link (8PSK)	Frequency :	1880.0 MHz

Conducted Spurious Emission Plot between 30MHz ~ 1GHz



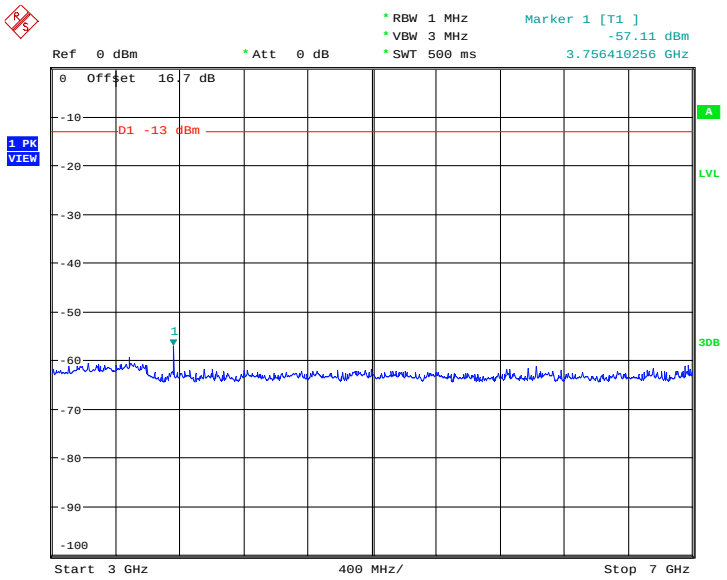
Date: 19.MAR.2015 12:47:49

Conducted Spurious Emission Plot between 1GHz ~ 3GHz



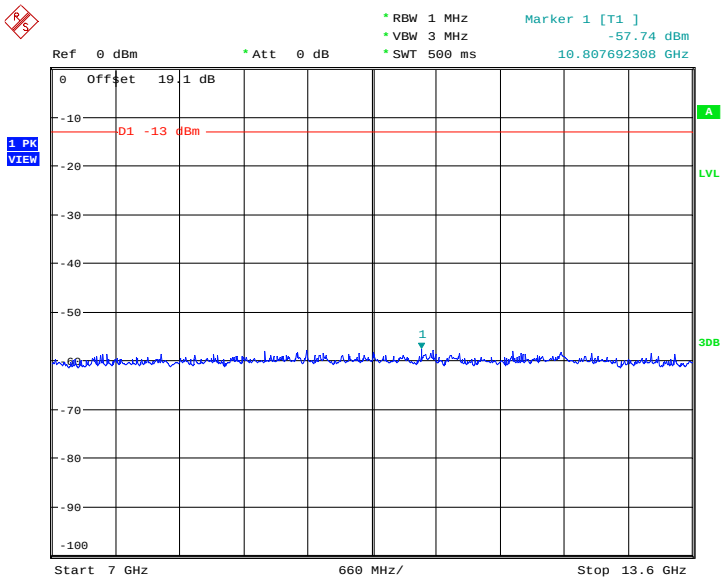
Date: 19.MAR.2015 12:49:37

Conducted Spurious Emission Plot between 3GHz ~ 7GHz



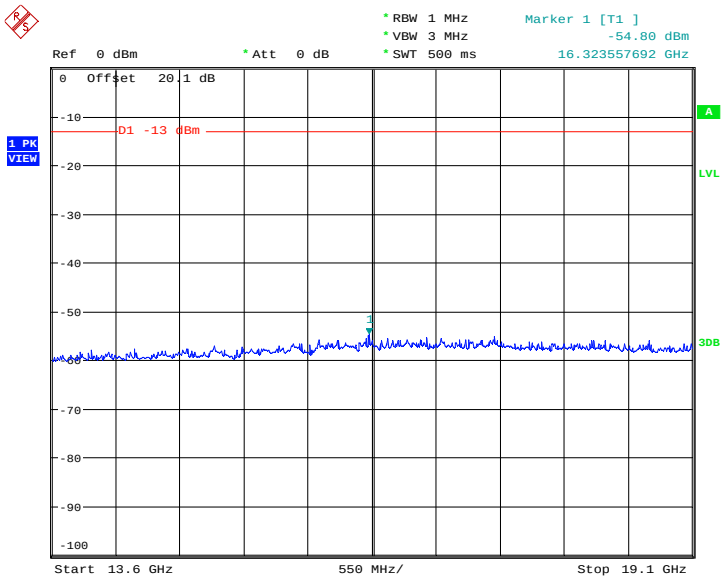
Date: 19.MAR.2015 12:50:51

Conducted Spurious Emission Plot between 7GHz ~ 13.6GHz



Date: 19.MAR.2015 12:51:40

Conducted Spurious Emission Plot between 13.6GHz ~ 19.1GHz



Date: 19.MAR.2015 12:52:53

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 testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-C-2004 Section 2.2.12.
2. The EUT was placed on a rotatable wooden table 0.8 meters above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. 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.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
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 + 10log(P) dB below the transmitter power P(Watts)

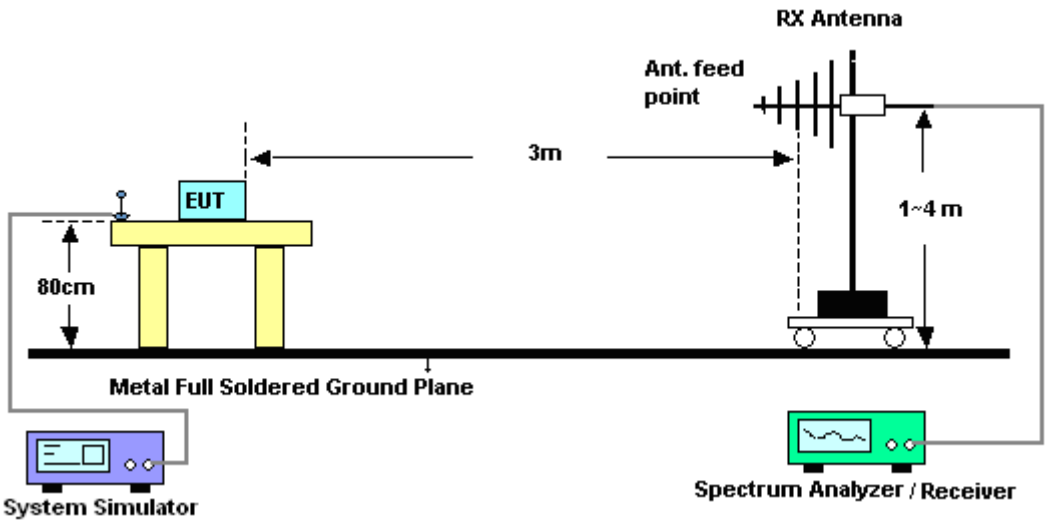
    = P(W) - [43 + 10log(P)] (dB)

    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)

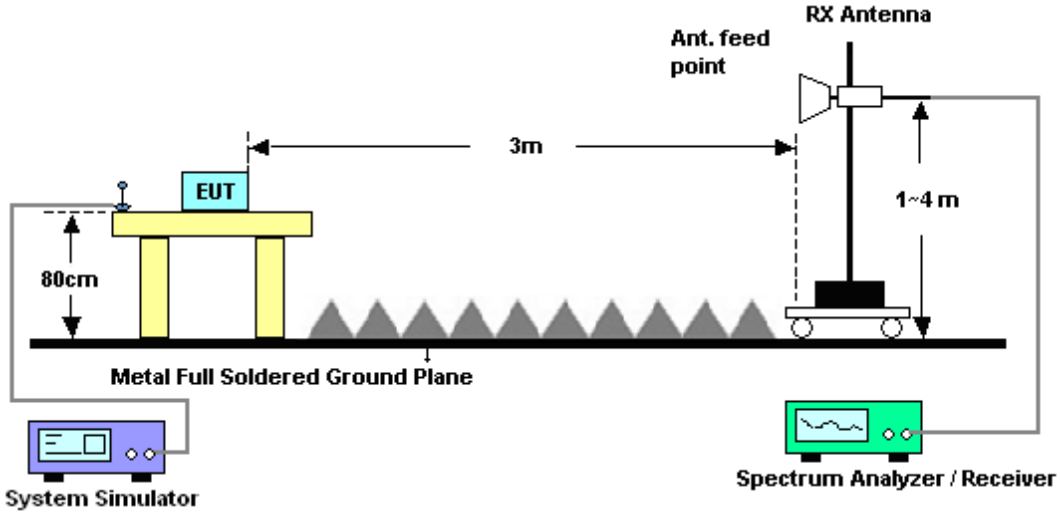
    = -13dBm.

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 :	GSM1900	**Temperature :**	22~23°C
Test Mode :	GSM Link (GMSK)	**Relative Humidity :**	42~43%
Test Engineer :	Simon Lu	**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
3759	-51.05	-13	-38.05	-65.25	-55.65	3	7.60	H	Pass
5640	-45.92	-13	-32.92	-59.71	-52.18	3.84	10.10	H	Pass
7521	-42.38	-13	-29.38	-62.16	-49.88	4.43	11.93	H	Pass

Band :	GSM1900	**Temperature :**	22~23°C
Test Mode :	GSM Link (GMSK)	**Relative Humidity :**	42~43%
Test Engineer :	Simon Lu	**Polarization :**	Vertical
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
3759	-52.55	-13	-39.55	-65.04	-57.15	3	7.60	V	Pass
5640	-47.97	-13	-34.97	-60.38	-54.23	3.84	10.10	V	Pass
7521	-45.03	-13	-32.03	-62.82	-52.53	4.43	11.93	V	Pass

Band :	GSM1900	**Temperature :**	18~19°C
Test Mode :	EDGE class 8 Link (8PSK)	**Relative Humidity :**	41~42%
Test Engineer :	Ken Huang	**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
3764	-51.21	-13	-38.21	-70.27	-57.84	1.69	8.32	H	Pass
5644	-44.92	-13	-31.92	-68.6	-51.97	2.71	9.76	H	Pass
7524	-45.39	-13	-32.39	-74.08	-54.78	2.42	11.81	H	Pass

Band :	GSM1900	**Temperature :**	18~19°C
Test Mode :	EDGE class 8 Link (8PSK)	**Relative Humidity :**	41~42%
Test Engineer :	Ken Huang	**Polarization :**	Vertical
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
3764	-48.02	-13	-35.02	-66.64	-54.65	1.69	8.32	V	Pass
5644	-42.40	-13	-29.40	-64.74	-49.45	2.71	9.76	V	Pass
7524	-43.13	-13	-30.13	-71.46	-52.52	2.42	11.81	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 ±0.00025% (±2.5ppm) of the center frequency.

3.8.2 Measuring Instruments

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

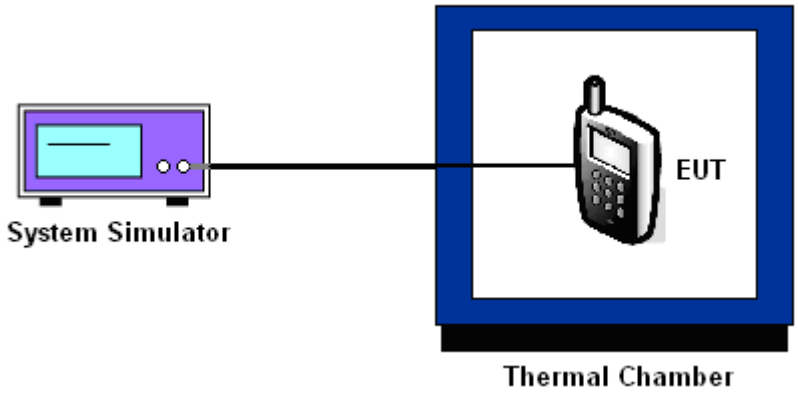
3.8.3 Test Procedures for Temperature Variation

1. The testing follows FCC KDB 971168 v02r02 Section 9.0.
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. 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.
4. 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 testing follows FCC KDB 971168 v02r02 Section 9.0.
2. The EUT was placed in a temperature chamber at 25±5° C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
4. 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 1900	Channel :	661
Limit (ppm) :	within authorized band	Frequency :	1880.0 MHz

Temperature (°C)	GSM	EDGE class 8	Result
	Deviation (ppm)	Deviation (ppm)	
50	0.0080	0.0117	PASS
40	0.0043	0.0074	
30	0.0016	0.0021	
20(Ref.)	0.0000	0.0000	
10	0.0021	0.0011	
0	0.0032	0.0027	
-10	0.0064	0.0053	
-20	0.0085	0.0090	
-30	0.0096	0.0101	

Note: The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

3.8.7 Test Result of Voltage Variation

Band & Channel	Mode	Voltage (Volt)	Deviation (ppm)	Limit (ppm)	Result
GSM 1900 CH661	GSM	4.2	0.0021	(Note 3.)	PASS
		3.8	0.0032		
		BEP	0.0027		
	EDGE class 8	4.2	0.0011		
		3.8	0.0005		
		BEP	0.0005		

Note:

1. Normal Voltage = 3.8V.
2. Battery End Point (BEP) = 3.5 V.
3. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Oct. 28, 2014	Mar. 19, 2015	Oct. 27, 2015	Conducted (TH01-KS)
Spectrum Analyzer	R&S	FSV30	101338	9kHz~30GHz	May 04, 2014	Mar. 19, 2015	May 03, 2015	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 25, 2014	Mar. 19, 2015	Oct. 24, 2015	Conducted (TH01-KS)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9 kHz~7 GHz	Aug. 30, 2014	Apr. 07, 2015	Aug. 29, 2015	Radiation (03CH10-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV30	101749	10Hz ~ 30GHz	Feb. 09, 2015	Apr. 07, 2015	Feb. 08, 2016	Radiation (03CH10-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Sep. 27, 2014	Apr. 07, 2015	Sep. 26, 2015	Radiation (03CH10-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1GHz~18GHz	Aug. 19, 2014	Apr. 07, 2015	Aug. 18, 2015	Radiation (03CH10-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz~40GHz	Oct. 02, 2014	Apr. 07, 2015	Oct. 01, 2015	Radiation (03CH10-HY)
Preamplifier	COM-POWER	PA-103A	161241	10 MHz ~ 1000MHz	Mar. 16, 2015	Apr. 07, 2015	Mar. 15, 2016	Radiation (03CH10-HY)
Preamplifier	Agilent	8449B	3008A02362	1 GHz~26.5 GHz	Oct. 21, 2014	Apr. 07, 2015	Oct. 20, 2015	Radiation (03CH10-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Apr. 07, 2015	N/A	Radiation (03CH10-HY)
Antenna Mast	ChainTek	M-400-0	114/8000604/L	N/A	N/A	Apr. 07, 2015	N/A	Radiation (03CH10-HY)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Sep. 29, 2014	Apr. 29, 2015	Sep. 28, 2015	Radiation (03CH02-KS)
Spectrum Analyzer	R&S	FSV40	101040	10kHz~40GHz;Max 30dBm	Sep. 25, 2014	Apr. 29, 2015	Sep. 24, 2015	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6112D	37879	30MHz-2GHz	Sep. 13, 2014	Apr. 29, 2015	Sep. 12, 2015	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 08, 2014	Apr. 29, 2015	Nov. 07, 2015	Radiation (03CH02-KS)
Active Horn Antenna	com-power	AHA-118	701030	1GHz~18GHz	Nov. 08, 2014	Apr. 29, 2015	Nov. 07, 2015	Radiation (03CH02-KS)
SHF-EHF Horn	com-power	AH-840	101070	18Ghz-40GHz	Sep. 04, 2014	Apr. 29, 2015	Sep. 03, 2015	Radiation (03CH02-KS)
Amplifier	com-power	PA-103A	161069	1kHz ~1000MHz / 32 dB	May 04, 2014	Apr. 29, 2015	May 03, 2015	Radiation (03CH02-KS)
Amplifier	Agilent	8449B	3008A02384	1-26.5GHz Gain 30dB	Oct. 28, 2014	Apr. 29, 2015	Oct. 27, 2015	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Apr. 29, 2015	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Apr. 29, 2015	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Apr. 29, 2015	NCR	Radiation (03CH02-KS)

5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz) for 03CH10-HY

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.5 dB**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz) for 03CH02-KS

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.1 dB**