

588 West Jindu Road, Songjiang District, Shanghai, China

+86 (0) 21 6191 5666 Report No.:SHEMO10030019402 Telephone: Fax:

+86 (0) 21 6191 5655 Page 1 of 51

Tino.Pan@sgs.com

# TEST REPORT

SHEMO10030019402 Application No. : Applicant: Sierra Wireless Inc.

FCC ID: N7NQ2687 IC ID: 2417C-Q2687

**Equipment Under Test (EUT):** 

Product Name: Airprime Q2687 **WAVECOM Brand Name:** Model Name: Airprime Q2687

AirPrime Q2687 Intelligent Embedded Moudule Marketing Name:

Standards: IC RSS 132 Issue 2,RSS 133 Issue 5/ FCC part 2, 22H & 24E

Date of Receipt: February 16,2010

Date of Test: February 20,2010 to March 8,2010

Date of Issue: March 15,2010

**Test Result:** PASS \*

Tino Pan

**E&E Section Manager** 

SGS-CSTC (Shanghai)Co., Ltd.

San Yuan Project Engineer

SGS-CSTC (Shanghai)Co., Ltd.

San Yuan

In the configuration tested, the EUT detailed in this report complied with the standards specified above. Please refer to section 2 of this report for further details.



ReportNo.: SHEMO10030019402

Page: 2 of 51

## 2 Test Summary

Description of Test	FCC Rules	IC Standards	Result
RF Power Output	2.1046(a) 22.913(a) 24.232(b)	RSS-132,4.4 RSS-133,6.4	Compliant
99% Occupied Bandwidth	2.1049(h)	RSS-Gen,4.6	Compliant
Out of Band Emissions at antenna Terminals and Band Edge	2.1051 22.917(a) 24.238(a)	RSS-132,4.5 RSS-133,6.5	Compliant
Field Strength of Spurious Emissions	2.1053 22.917(a) 24.238(a)	RSS-132,4.5 RSS-133,6.5	Compliant
Frequency Stability vs. Temperature and Voltage	2.1055	RSS-132,4.3 RSS-133,6.3	Compliant



ReportNo.: SHEMO10030019402

Page: 3 of 51

#### 3 Contents

			Page
1	CC	OVER PAGE	1
2	TE	EST SUMMARY	2
3	CC	ONTENTS	3
4		ENERAL INFORMATION	
	4.1	CLIENT INFORMATION	Δ
	4.2	GENERAL DESCRIPTION OF E.U.T.	
	4.3	TEST LOCATION	
	4.4	TEST FACILITY	5
	4.5	Test Methodogy	5
5	EQ	QUIPMENTS USED DURING TEST	6
6	TE	EST RESULTS	7
	6.1	E.U.T. TEST CONDITIONS	7
	6.2	RF Power Output	8
	6.3	99% OCCUPIED BANDWIDTH	
	6.4	OUT OF BAND EMISSIONS AT ANTENNA TERMINALS	
	-	4.1 Band edges emissions	
	6.5	FIELD STRENGTH OF RADIATED SPURIOUS EMISSIONS	
	6.6	RECEIVER SPURIOUS EMISSIONS	
	6.7	FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT	
	6.8	Frequency Stability V.S. VOLTAGE MEASUREMENT	49



ReportNo.: SHEMO10030019402

Page: 4 of 51

#### 4 General Information

#### 4.1 Client Information

Applicant: Sierra Wireless Inc.

Address of Applicant: 13811 Wireless Way Richmond, British Columbia Canada, V6V 3A4

Manufacturer: Sierra Wireless Inc.

Address of Manufacturer: 13811 Wireless Way Richmond, British Columbia Canada, V6V 3A4

#### 4.2 General Description of E.U.T.

Product Name:	Airprime Q2687
Brand Name:	WAVECOM
Model Name:	Airprime Q2687
Marketing Name:	AirPrime Q2687 Intelligent Embedded Module
Power Supply:	3.6V DC

#### GSM and WCDMA:

	Operating frequency		
Cellular phone standards Frequency	GSM/GPRS/EDGE, 850 Class 10	824.2MHz-848.8MHz	33dBm
Range and Power:	GSM/GPRS/EDGE, 1900 Class 10	1850.2MHz-1909.8MHz	30dBm
Hardware Version:	520		
Software Version:	Firmware 7.43		
IMEI:	35406001385405		

#### 4.3 Test Location

Tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shanghai EMC Laboratory

588 West Jindu Road, Songjiang District, Shanghai, China

Tel: +86 21 61915666 Fax: +86 21 61915678



ReportNo.: SHEMO10030019402

Page: 5 of 51

#### 4.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### • CNAS (No. CNAS L0599)

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. Date of expiry: 2011-07-29.

#### • FCC – Registration No.: 402683

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered and fully described in a report filed with the Federal Communications Commission (FCC). The acceptance letter from the FCC is maintained in our files. Registration No.: 402683, Expiry Date: 2012-03-17.

#### • Industry Canada (IC) – IC Assigned Code: 8617A

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A. Expiry Date: 2011-09-29.

#### • VCCI (Member No.: 3061)

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3172 and C-3514 respectively. Date of Registration: 2009-11-30. Date of Expiry: 2012-03-17.

#### 4.5 Test Methodogy

Both conducted and radiated testing were performed according to the procedures document on TIA/EIA-603-C-2004 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.



ReportNo.: SHEMO10030019402

Page: 6 of 51

#### 5 Equipments Used during Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	EMI test receiver	Rohde & Schwarz	ESU40	100109	2009-6-4	2010-6-3
2	Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-679	2009-6-4	2010-6-3
3	Horn Antenna	Rohde & Schwarz	HF906	100284	2009-4-11	2010-4-10
4	ANTENNA	SCHWARZBECK	VULB9168	9168-313	2009-6-4	2010-6-3
5	Ultra broadband antenna	Rohde & Schwarz	HL562	100227	2009-10-9	2010-10-8
6	Atmosphere pressure meter	Shanghai ZhongXuan Electronic Co;Ltd	BY-2003P		2009-10-15	2010-10-14
7	CLAMP METER	FLUKE	316	86080010	2009-04-27	2010-04-26
8	Thermo- Hygrometer	ZHICHEN	ZC1-2	01050033	2009-10-15	2010-10-14
9	High-low temperature cabinet	Shanghai YuanZhen	GW2050		2009-6-18	2010-6-17
10	DC power	KIKUSUI	PMC35-3	NF100260	2010-1-16	2011-1-15
11	Power meter	Rohde & Schwarz	NRP	101641	2009-5-5	2010-5-4
12	UNIVERSAL RADIO COMMUNICATI ON TESTER	Rohde & Schwarz	CMU 200	112012	2009-08-25	2010-08-24
13	Tunable Notch Filter	Wainwright instruments Gmbh	WRCT1800.0/ 2000.0-0.2/40- 5SSK	11	2010-1-27	2011-1-26
14	Tunable Notch Filter	Wainwright instruments Gmbh	WRCT800.0/8 80.0-0.2/40- 5SSK	9	2010-1-27	2011-1-26



ReportNo.: SHEMO10030019402

Page: 7 of 51

#### 6 Test Results

#### 6.1 E.U.T. test conditions

Power supply: DC 3.6V

Operating Environment:

Temperature: 20.0 -25.0 °C Humidity: 38-48 % RH Atmospheric Pressure: 992 -1006 mbar



ReportNo.: SHEMO10030019402

Page: 8 of 51

#### 6.2 RF Power Output

Test Requirement: RSS 132,4.4 The maximum ERP shall be 11.5 watts for mobile stations.

RSS 133,6.4 Mobile stations and hand-held portables are limited to

2 watts maximum e.i.r.p.

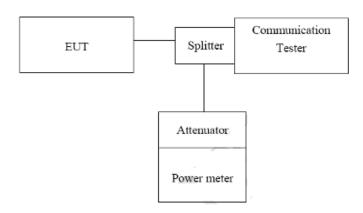
Part 2.1046

Part 22.913(a) Mobile station are limited to 7W ERP

Part 24.232(d) peak Power measurement, FCC 24.232(c) Maximum

Power reduction 3GPP Power Limitation for HSDPA and HSUPA

Test Setup



Measurement Setup for testing on Antenna connector.

Test Date: March 5,2010 to March 10,2010

Test Status: Test lowest, middle, highest channel.

Test Procedure:

The transmitter output was connected to calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power in dBm. The power output at the transmitter antenna port was determined by adding the vaule of attenuator to the power meter reading.



ReportNo.: SHEMO10030019402

Page: 9 of 51

Measurement Result:

RF Conducted output power GSM/EDGE (GMSK; 8-PSK)

Result: GSM 850

		1 Time Slot			2 Time Slot				
_		GMSK Mode		8-PSK Mode		GMSK Mode		8-PSK Mode	
Frequency (MHz)	Ch	Peak	AV	Peak	AV	Peak	AV	Peak	AV
		power	power	power	power	power	power	power	power
		(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
824.2	128	32.0	31.9	29.2	26.0	32.0	31.9	29.1	25.9
836.6	190	31.9	31.7	29.4	26.1	31.9	31.7	29.6	26.4
848.8	251	31.7	31.6	29.4	26.2	31.7	31.6	29.6	26.4

PCS 1900

		1 Time Slot			2 Time Slot				
		GMSK Mode		8-PSK Mode		GMSK Mode		8-PSK Mode	
Frequency	Ch	Ch Peak	AV	Peak	AV	Peak	AV	Peak	AV
(MHz)		power	power	power	power	power	power	power	power
		(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
1850.2	512	29.4	29.3	28.6	25.5	29.4	29.3	28.6	25.5
1880.0	661	29.3	29.2	28.3	25.1	29.3	29.2	28.4	25.2
1909.8	810	29.5	29.3	28.4	25.1	29.5	29.4	28.4	25.2



ReportNo.: SHEMO10030019402

Page: 10 of 51

#### 6.3 99% Occupied Bandwidth

Test Requirement: RSS Gen 4.6;

Part 2.1049

Test Date: March 5,2010 to March 10,2010
Test Status: Test lowest, middle, highest channel.

Test Procedure:

The EUT output RF connector was connected with a short a cable to the spectrum analyzer, RBW was set to about 1% of emission BW, VBW>=3 times RBW, 99% bandwidth bandwidth were measured, the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

#### Test result:

EUT Mode	Frequency (MHz)	СН	99% Bandwidth (MHz)	
GSM 850	824.2	128	0.2468	
	836.6	190	0.2452	
	848.8	251	0.2452	

EUT Mode	Frequency (MHz)	СН	99% Bandwidth (MHz)
EDGE 850	824.2	128	0.2404
	836.6	190	0.2404
	848.8	251	0.2388

EUT Mode	Frequency (MHz)	СН	99% Bandwidth (MHz)
	1850.2	512	0.2452
PCS 1900	1880.0	661	0.2420
	1909.8	810	0.2452

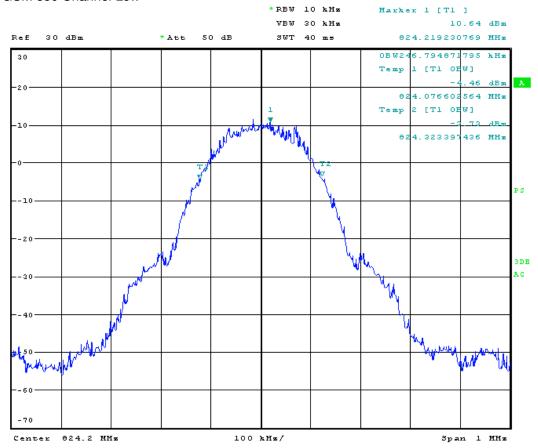
EUT Mode	Frequency (MHz)	СН	99% Bandwidth (MHz)
EDGE 1900	1850.2	512	0.2372
	1880.0	661	0.2372
	1909.8	810	0.2388



ReportNo.: SHEMO10030019402

Page: 11 of 51

99% Bandwidth
GSM 850 Channel Low

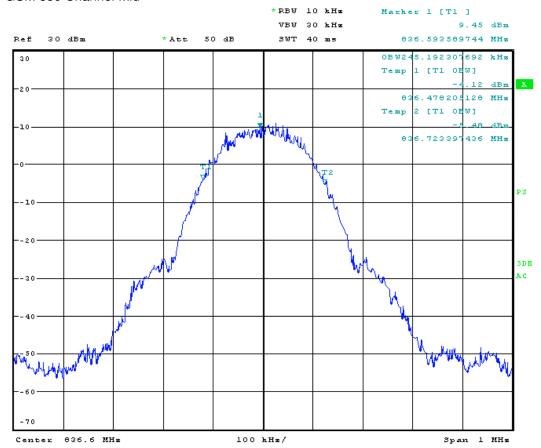




ReportNo.: SHEMO10030019402

Page: 12 of 51

99% Bandwidth
GSM 850 Channel Mid

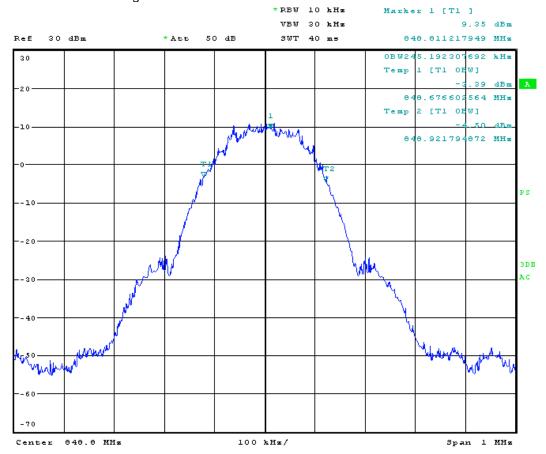




ReportNo.: SHEMO10030019402

Page: 13 of 51

99% Bandwidth
GSM 850 Channel High

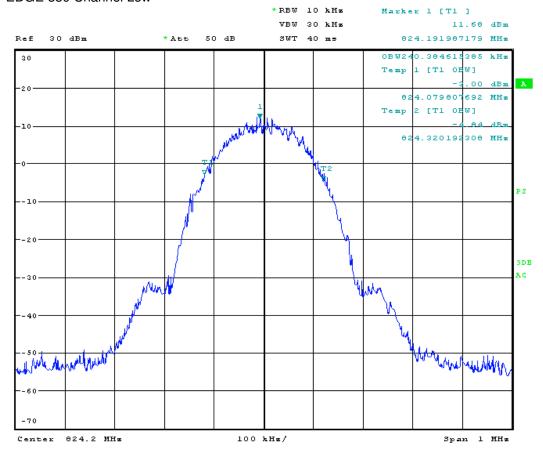




ReportNo.: SHEMO10030019402

Page: 14 of 51

99% Bandwidth
EDGE 850 Channel Low

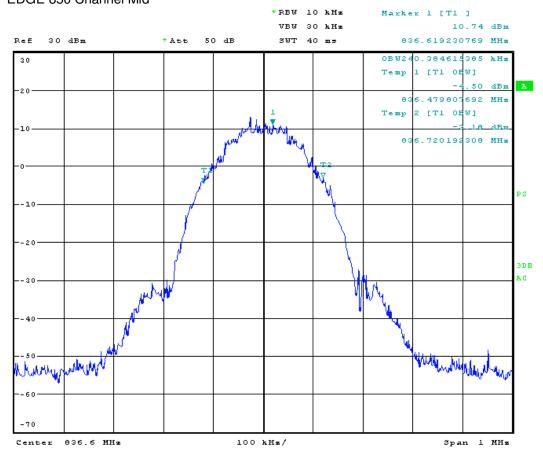




ReportNo.: SHEMO10030019402

Page: 15 of 51

99% Bandwidth
EDGE 850 Channel Mid

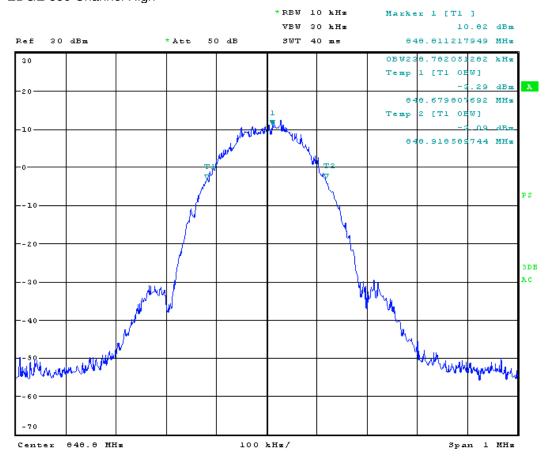




ReportNo.: SHEMO10030019402

Page: 16 of 51

99% Bandwidth
EDGE 850 Channel High

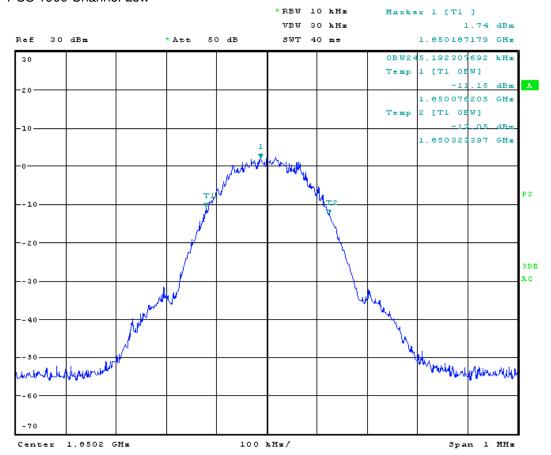




ReportNo.: SHEMO10030019402

Page: 17 of 51

99% Bandwidth
PCS 1900 Channel Low

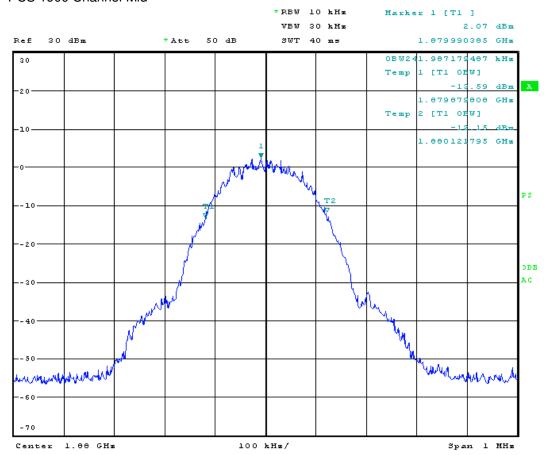




ReportNo.: SHEMO10030019402

Page: 18 of 51

99% Bandwidth
PCS 1900 Channel Mid

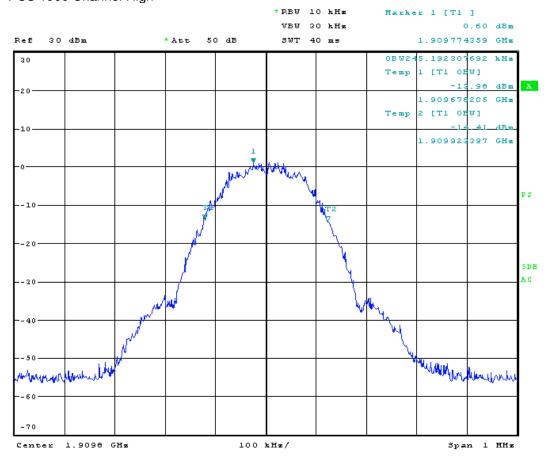




ReportNo.: SHEMO10030019402

Page: 19 of 51

99% Bandwidth
PCS 1900 Channel High

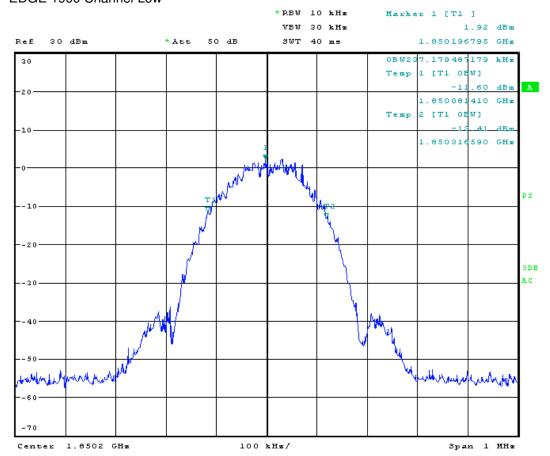




ReportNo.: SHEMO10030019402

Page: 20 of 51

99% Bandwidth
EDGE 1900 Channel Low

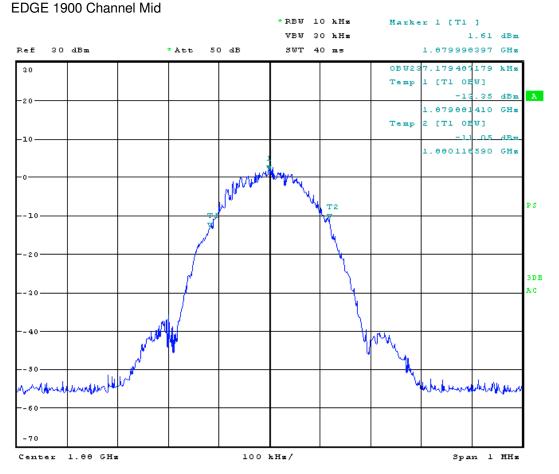




ReportNo.: SHEMO10030019402

Page: 21 of 51

99% Bandwidth

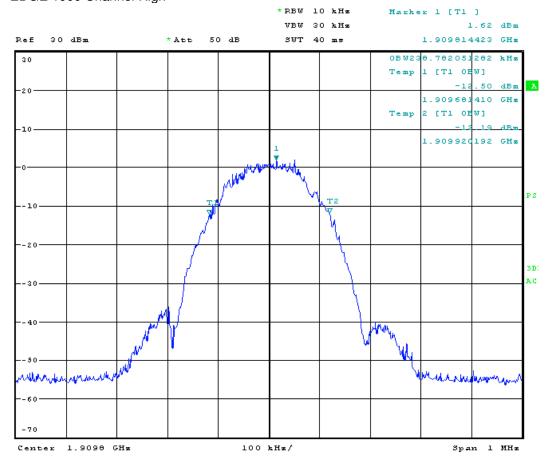




ReportNo.: SHEMO10030019402

Page: 22 of 51

99% Bandwidth
EDGE 1900 Channel High





ReportNo.: SHEMO10030019402

Page: 23 of 51

#### 6.4 Out of band emissions at antenna Terminals

#### 6.4.1 Band edges emissions

Test Requirement: RSS 132, 4.5.1;RSS 133, 6.5.1(a)(i),(b)

Part 2.1051,

FCC part 22.917(a), 24.238(a) the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specification in the instruction manual and/or alignment procedure, shall not be less than 43+10log(Mean power in watts) dBc below the mean power output outside a license's frequency

block(-13dBm).

Test Date: March 4,2010

Test Procedure:

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emission is any up to 10<sup>th</sup> harmonic.

For the out of band: set RBW, VBW=1MHz, stat=30MHz, stop= 10 th harmonic. Limit= --13dBm

Band Edge requirements: In 1Mhz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 % of bandwidth of fundamental emission of the transmitter any be employed to measure the out of band emission. Limit=-13dBm.

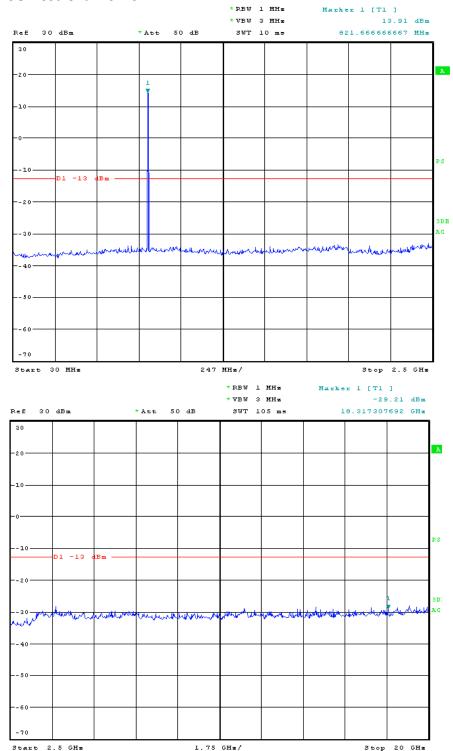


ReportNo.: SHEMO10030019402

Page: 24 of 51

#### Measurement result:

#### **GSM 850 Channel Low**

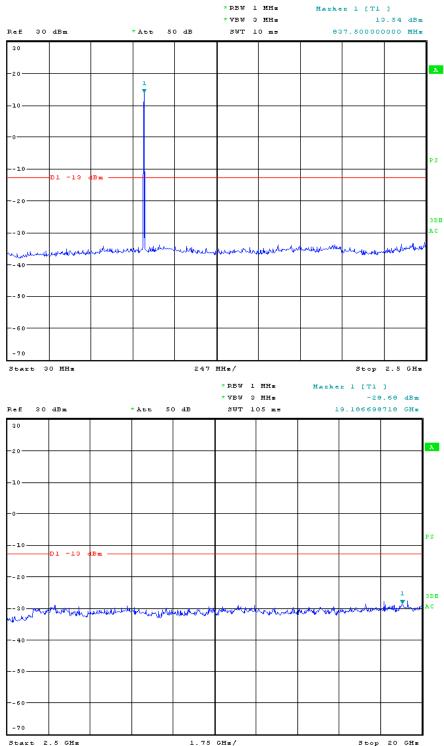




ReportNo.: SHEMO10030019402

Page: 25 of 51

#### **GSM 850 Channel Mid**

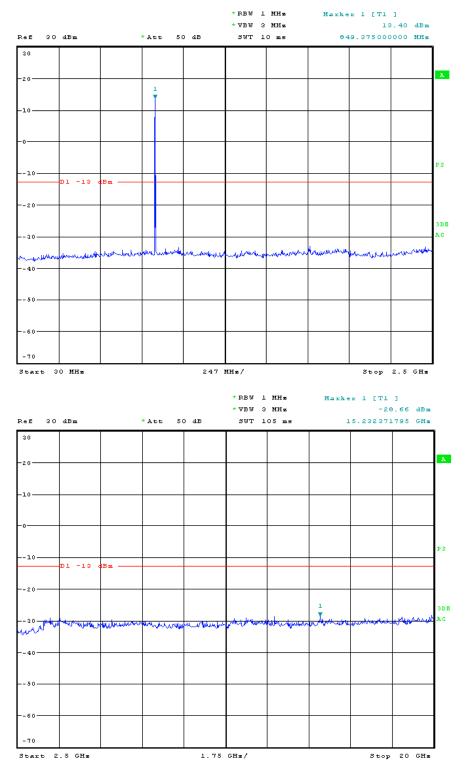




ReportNo.: SHEMO10030019402

Page: 26 of 51

#### **GSM 850 Channel High**

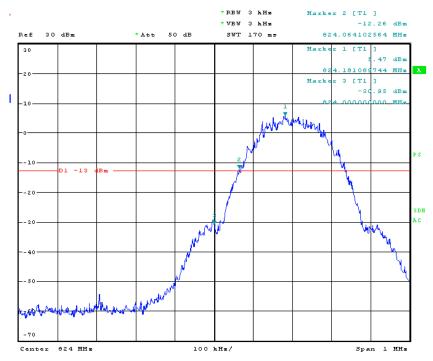




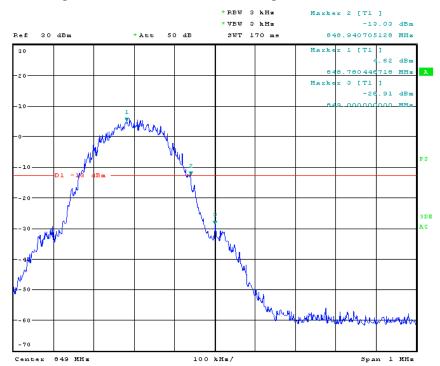
ReportNo.: SHEMO10030019402

Page: 27 of 51

#### Band Edge emission GSM 850 Channel Low



#### Band Edge emission GSM 850 Channel high

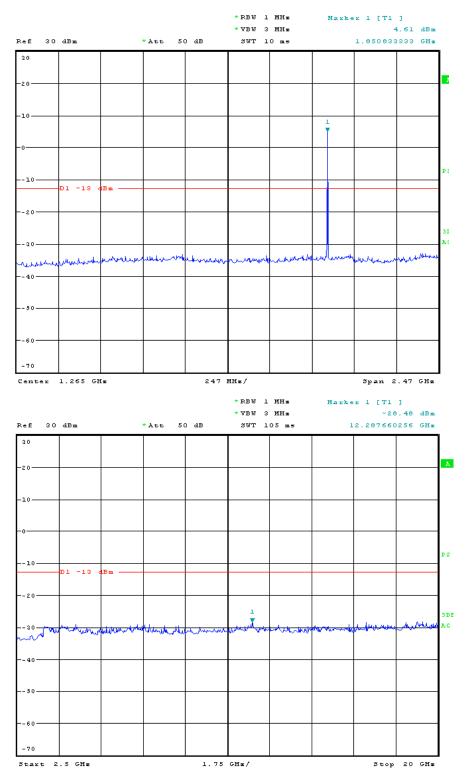




ReportNo.: SHEMO10030019402

Page: 28 of 51

#### **PCS 1900 Channel Low**

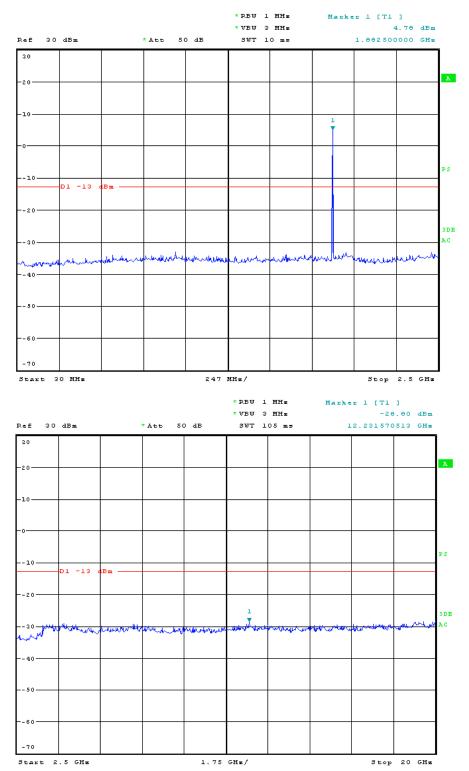




ReportNo.: SHEMO10030019402

Page: 29 of 51

#### **PCS 1900 Channel Mid**

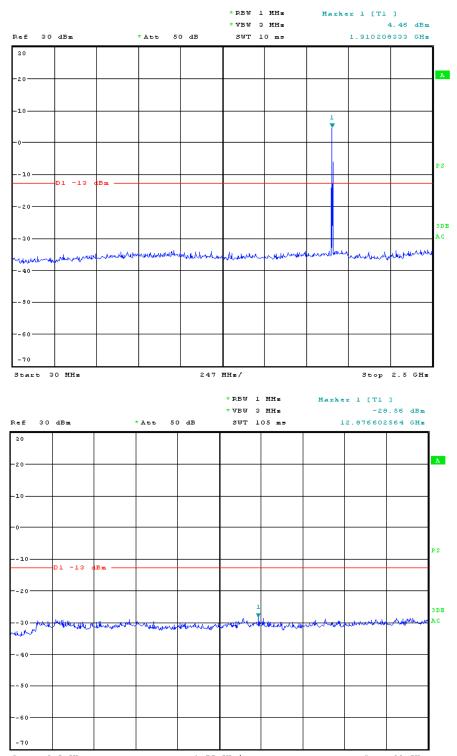




ReportNo.: SHEMO10030019402

Page: 30 of 51

#### PCS 1900 Channel High

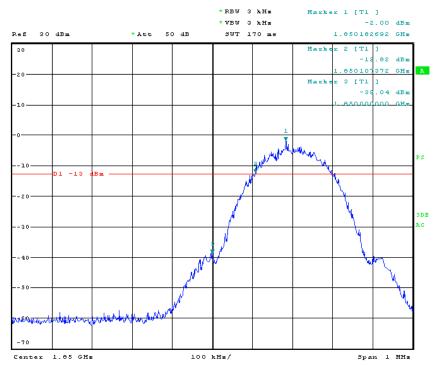




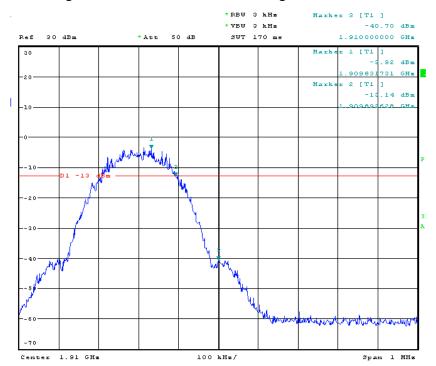
ReportNo.: SHEMO10030019402

Page: 31 of 51

#### Band Edge emission PCS 1900 Channel Low



#### Band Edge emission PCS 1900 Channel high





ReportNo.: SHEMO10030019402

Page: 32 of 51

#### 6.5 Field Strength of Radiated Spurious Emissions

Test Requirement: RSS 132, 4.5.1;RSS 133, 6.5.1(a)(i),(b)

Part 2.1053

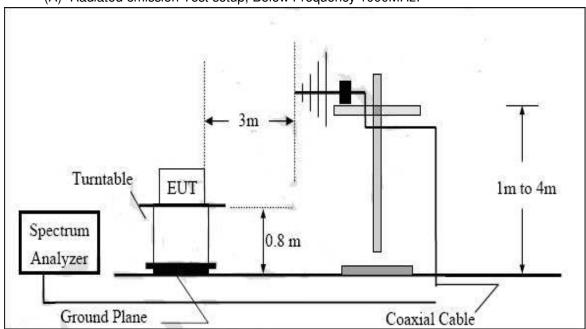
FCC part 22.917(a), 24.238(a) the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specification in the instruction manual and/or alignment procedure, shall not be less than 43+10log(Mean power in watts) dBc below the mean power output outside a license's frequency

block(-13dBm).

Test Date: March 8,2010

Test Setup:

(A) Radiated emission Test setup, Below Frequency 1000MHz:

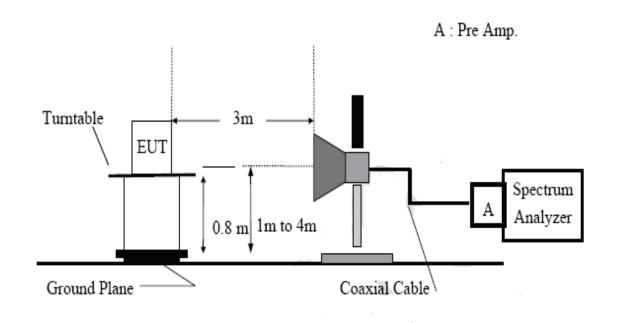




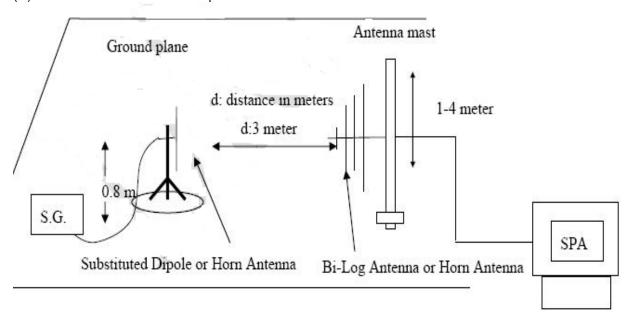
ReportNo.: SHEMO10030019402

Page: 33 of 51

#### (B) Radiated emission Test setup frequency over 1GHz:



#### (C) Substituted Method Test setup:





ReportNo.: SHEMO10030019402

Page: 34 of 51

#### **Test Procedure:**

The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated.

ERP in frequency band 824.2-848.8MHz were measured using substitution method. The EUT was replaced by dipole antenna connected, the S.G. output was recorded and ERP was calculated as follow:

EIRP in frequency band 1850.5-1909.8MHz were measured using a substitution method. The EUT was replaced by a horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows:

ERP=S.G. output (dBm) + Antenna Gain (dBd)-Cable Loss (dB) EIRP=S.G. output (dBm) + Antenna Gain (dBi)-Cable Loss (dB)



ReportNo.: SHEMO10030019402

Page: 35 of 51

Radiated spurious Emission Measurement Result: GSM 850 mode

Operation mode: TX CH Low mode Fundamental Frequency: 824.2MHz

Fundamental Frequency: 824.2MHZ									
Frequen cy (MHz)	Ant.Pol. H/V	S.G Output (dBm)	Antenna Gain (dBd)	Cable Loss (dBm)	ERP (dBm)	Limit (dBm)	Safe Margin (dB)		
100.00	Н	-52.27	2.6	1	-50.67	-13	37.67		
200.00	Н	-52	9.1	1.42	-44.32	-13	31.32		
800.00	Н	-54.67	8.7	2.86	-48.83	-13	35.83		
1648.40	Н	-51.73	6.95	4.17	-48.95	-13	35.95		
2472.60	Н	-52.39	8.35	5.24	-49.28	-13	36.28		
3296.80	Н	-51.34	8.15	6.11	-49.3	-13	36.3		
4121.00	Н	-49.84	8.45	6.94	-48.33	-13	35.33		
100.00	V	-53.87	2.6	1	-52.27	-13	39.27		
200.00	V	-54.57	9.1	1.42	-46.89	-13	33.89		
800.00	V	-55.37	8.7	2.86	-49.53	-13	36.53		
1648.40	V	-51.43	6.95	4.17	-48.65	-13	35.65		
2472.60	V	-52.99	8.35	5.24	-49.88	-13	36.88		
3296.80	V	-52.28	8.15	6.11	-50.24	-13	37.24		
4121.00	V	-50.3	8.45	6.94	-48.79	-13	35.79		

#### Remark:

- 1 emission behaviors belong to narrowband spurious emission.
- 2 The result basic equation calculation is as follow:

ERP (dBm)=S.G. Output(dBm) + Antenna Gain(dBd)-Cable Loss



ReportNo.: SHEMO10030019402

Page: 36 of 51

Radiated spurious Emission Measurement Result: GSM 850 mode

Operation mode: TX CH Mid mode Fundamental Frequency: 836.60MHz

Fundamental Frequency. 850.500MHz							
Frequen cy (MHz)	Ant.Pol. H/V	S.G Output (dBm)	Antenna Gain (dBd)	Cable Loss (dBm)	ERP (dBm)	Limit (dBm)	Safe Margin (dB)
100.00	Н	-52.66	2.6	1	-51.06	-13	38.06
200.00	Н	-52.39	9.1	1.42	-44.71	-13	31.71
800.00	Н	-55.06	8.7	2.86	-49.22	-13	36.22
1673.20	Н	-52.12	6.95	4.2	-49.37	-13	36.37
2509.80	Н	-52.78	8.35	5.36	-49.79	-13	36.79
3346.40	Н	-51.73	8.15	6.25	-49.83	-13	36.83
4183.00	Н	-50.23	8.45	6.98	-48.76	-13	35.76
100.00	V	-54.26	2.6	1	-52.66	-13	39.66
200.00	V	-54.96	9.1	1.42	-47.28	-13	34.28
800.00	V	-55.76	8.7	2.86	-49.92	-13	36.92
1673.20	V	-51.82	6.95	4.2	-49.07	-13	36.07
2509.80	V	-53.38	8.35	5.36	-50.39	-13	37.39
3346.40	V	-52.67	8.15	6.25	-50.77	-13	37.77
4183.00	V	-50.69	8.45	6.98	-49.22	-13	36.22

#### Remark:

- 1 emission behaviors belong to narrowband spurious emission.
- 2 The result basic equation calculation is as follow:

ERP (dBm)=S.G. Output(dBm) + Antenna Gain(dBd)-Cable Loss



ReportNo.: SHEMO10030019402

Page: 37 of 51

Radiated spurious Emission Measurement Result: GSM 850 mode

Operation mode: TX CH High mode Fundamental Frequency: 848.8MHz

Fundamental Frequency, 040.0Minz							
Frequen cy (MHz)	Ant.Pol. H/V	S.G Output (dBm)	Antenna Gain (dBd)	Cable Loss (dBm)	ERP (dBm)	Limit (dBm)	Safe Margin (dB)
100.00	Н	-53.09	2.6	1	-51.49	-13	38.49
200.00	Н	-51.81	9.1	1.42	-44.13	-13	31.13
800.00	Н	-54.05	8.7	2.86	-48.21	-13	35.21
1697.60	Н	-52.21	6.95	4.22	-49.48	-13	36.48
2546.40	Н	-51.99	8.35	5.39	-49.03	-13	36.03
3395.20	Н	-50.98	8.15	6.35	-49.18	-13	36.18
4244.00	Н	-50.76	8.45	7.04	-49.35	-13	36.35
100.00	V	-53.61	2.6	1	-52.01	-13	39.01
200.00	V	-53.13	9.1	1.42	-45.45	-13	32.45
800.00	V	-55.6	8.7	2.86	-49.76	-13	36.76
1697.60	V	-52.1	6.95	4.22	-49.37	-13	36.37
2546.40	V	-52.4	8.35	5.39	-49.44	-13	36.44
3395.20	V	-52.33	8.15	6.35	-50.53	-13	37.53
4244.00	V	-51.29	8.45	7.04	-49.88	-13	36.88

#### Remark:

- 1 emission behaviors belong to narrowband spurious emission.
- 2 The result basic equation calculation is as follow:

ERP (dBm)=S.G. Output(dBm) + Antenna Gain(dBd)-Cable Loss



ReportNo.: SHEMO10030019402

Page: 38 of 51

Radiated spurious Emission Measurement Result: PCS 1900 mode

Operation mode: TX CH Low mode Fundamental Frequency: 1850.2MHz

Fundamental Frequency: 1850.2MHz							
Frequen cy (MHz)	Ant.Pol. H/V	S.G Output (dBm)	Antenna Gain (dBi)	Cable Loss (dBm)	EIRP (dBm)	Limit (dBm)	Safe Margin (dB)
100.00	Н	-52.67	2.6	1	-51.07	-13	38.07
200.00	Н	-52.5	9.1	1.42	-44.82	-13	31.82
800.00	Н	-52.17	8.7	2.86	-46.33	-13	33.33
1800.00	Н	-51.24	7	4.38	-48.62	-13	35.62
3700.40	Н	-52.43	8.35	6.77	-50.85	-13	37.85
5550.60	Н	-51.29	9.55	8.1	-49.84	-13	36.84
7400.80	Н	-51.17	9.75	9.51	-50.93	-13	37.93
9251.00	Н	-53.33	10.55	11.08	-53.86	-13	40.86
100.00	V	-52.17	2.6	1	-50.57	-13	37.57
200.00	V	-53.55	9.1	1.42	-45.87	-13	32.87
800.00	V	-53.69	8.7	2.86	-47.85	-13	34.85
1800.00	V	-49.4	7	4.38	-46.78	-13	33.78
3700.40	V	-51.73	8.35	6.77	-50.15	-13	37.15
5550.60	V	-51.91	9.55	8.1	-50.46	-13	37.46
7400.80	V	-52.67	2.6	1	-51.07	-13	38.07
9251.00	V	-52.5	9.1	1.42	-44.82	-13	31.82

#### Remark:

1 emission behaviors belong to narrowband spurious emission.

2 The result basic equation calculation is as follow:

EIRP(dBm)=S.G. Output(dBm) + Antenna Gain(dBi)-Cable Loss



ReportNo.: SHEMO10030019402

Page: 39 of 51

Radiated spurious Emission Measurement Result: PCS 1900 mode

Operation mode: TX CH mid mode Fundamental Frequency: 1880.0MHz

Fundamental Frequency. 1000.0Minz							
Frequen cy (MHz)	Ant.Pol. H/V	S.G Output (dBm)	Antenna Gain (dBi)	Cable Loss (dBm)	EIRP (dBm)	Limit (dBm)	Safe Margin (dB)
100.00	Н	-52.61	2.6	1	-51.01	-13	38.01
200.00	Н	-54.44	9.1	1.42	-46.76	-13	33.76
800.00	Н	-54.11	8.7	2.86	-48.27	-13	35.27
1800.00	Н	-51.11	7	4.38	-48.49	-13	35.49
3760.00	Н	-51.11	8.42	6.84	-49.53	-13	36.53
5640.00	Н	-51.21	9.5	8.31	-50.02	-13	37.02
7520.00	Н	-51.16	9.78	9.6	-50.98	-13	37.98
9400.00	Н	-53.27	10.61	11.32	-53.98	-13	40.98
100.00	V	-54.11	2.6	1	-52.51	-13	39.51
200.00	V	-54.11	9.1	1.42	-46.43	-13	33.43
800.00	V	-53.11	8.7	2.86	-47.27	-13	34.27
1800.00	V	-52.31	7	4.38	-49.69	-13	36.69
3760.00	V	-53.67	8.42	6.84	-52.09	-13	39.09
5640.00	V	-53.81	9.5	8.31	-52.62	-13	39.62
7520.00	V	-52.61	2.6	1	-51.01	-13	38.01
9400.00	V	-54.44	9.1	1.42	-46.76	-13	33.76

#### Remark:

1 emission behaviors belong to narrowband spurious emission.

2 The result basic equation calculation is as follow:

EIRP(dBm)=S.G. Output(dBm) + Antenna Gain(dBi)-Cable Loss



ReportNo.: SHEMO10030019402

Page: 40 of 51

Radiated spurious Emission Measurement Result: PCS 1900 mode

Operation mode: TX CH High mode Fundamental Frequency: 1909.8MHz

Fundamental Frequency: 1909.8MHz							
Frequen cy (MHz)	Ant.Pol. H/V	S.G Output (dBm)	Antenna Gain (dBi)	Cable Loss (dBm)	EIRP (dBm)	Limit (dBm)	Safe Margin (dB)
100.00	Н	-50.96	2.6	1	-49.36	-13	36.36
200.00	Н	-50.85	9.1	1.42	-43.17	-13	30.17
800.00	Н	-50.64	8.7	2.86	-44.8	-13	31.8
1800.00	Н	-51.1	7	4.38	-48.48	-13	35.48
3819.60	Н	-51.07	8.42	6.88	-49.53	-13	36.53
5729.80	Н	-50.86	9.5	8.48	-49.84	-13	36.84
7639.20	Н	-51.89	9.78	9.7	-51.81	-13	38.81
9549.00	Н	-51.61	10.61	11.64	-52.64	-13	39.64
100.00	V	-52.13	2.6	1	-50.53	-13	37.53
200.00	V	-52.51	9.1	1.42	-44.83	-13	31.83
800.00	V	-51.81	8.7	2.86	-45.97	-13	32.97
1800.00	V	-50.96	7	4.38	-48.34	-13	35.34
3819.60	V	-52.76	8.42	6.88	-51.22	-13	38.22
5729.80	V	-52.49	9.5	8.48	-51.47	-13	38.47
7639.20	V	-50.96	2.6	1	-49.36	-13	36.36
9549.00	V	-50.85	9.1	1.42	-43.17	-13	30.17

#### Remark:

1 emission behaviors belong to narrowband spurious emission.

2 The result basic equation calculation is as follow:

EIRP(dBm)=S.G. Output(dBm) + Antenna Gain(dBi)-Cable Loss



ReportNo.: SHEMO10030019402

41 of 51 Page:

#### 6.6 Receiver Spurious Emissions

Test Requirement: RSS-GEN section 6;

RSS-GEN section 7.2.3.2

Limit: Table 1 - Spurious Emission Limits for Receivers

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 metres)	
30-88	100	
88-216	150	
216-960	200	
Above 960	500	

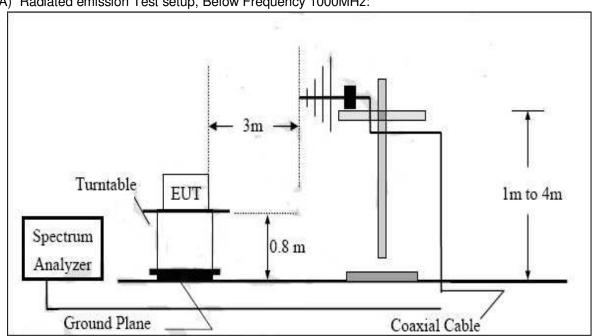
40.0 dBµV/m between 30MHz to 88MHz 43.5 dBµV/m between 88MHz to 216MHz  $46.0 \text{ dB}\mu\text{V/m}$  between 216MHz to 960MHz

54.0 dBμV/m above 960MHz

Test Date: March 5,2010

#### Test Setup:

(A) Radiated emission Test setup, Below Frequency 1000MHz:

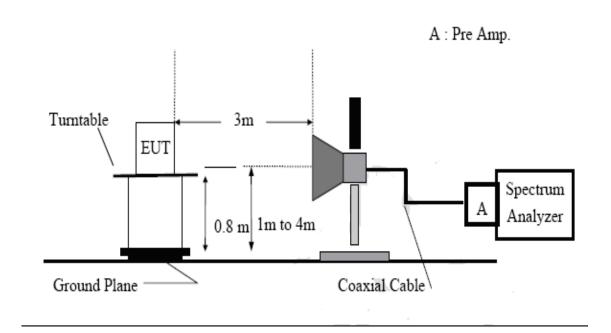


(B) Radiated emission Test setup frequency over 1GHz:



ReportNo.: SHEMO10030019402

Page: 42 of 51



#### **Test Procedure:**

The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and lowering of the test antenna from 4m to 1m. For emissions below 1 GHz, measurements shall be performed using QP detector. Above 1 GHz, measurements shall be performed using an average detector.



ReportNo.: SHEMO10030019402

Page: 43 of 51

#### **Measurement Result:**

Operation mode: GSM 850 Receiver mode

Operation	Operation mode: G5W 650 Receiver mode					
Frequen cy (MHz)	Ant.Pol. H/V	Level (dBuV/m)	Limit (dBuV/m)	Safe Margin (dB)		
30.00	Н	14.8	40.0	25.2		
175.00	Н	32.4	43.5	11.1		
233.0	Н	32.3	46.0	13.7		
300.0	Н	25.0	46.0	21.0		
405.0	Н	31.1	46.0	14.9		
1500.00	Н	18.0	54.0	36.0		
30.00	V	15.8	40.0	22.2		
156.0	V	31.0	43.5	12.5		
176.0	V	27.9	43.5	15.6		
404.0	V	26.6	46.0	19.4		
1000.00	V	31.0	54.0	23.0		
1500.00	V	18.0	54.0	36.0		



ReportNo.: SHEMO10030019402

Page: 44 of 51

#### **Measurement Result:**

Operation mode: GSM 1900 Receiver mode

Operation	Operation mode: GSM 1900 Receiver mode					
Frequen cy (MHz)	Ant.Pol. H/V	Level (dBuV/m)	Limit (dBuV/m)	Safe Margin (dB)		
30.00	Н	15.9	40.0	24.1		
177.00	Н	33.9	43.5	9.6		
234.00	Н	33.1	46.0	12.9		
402.00	Н	28.0	46.0	18.0		
556.00	Н	34.3	46.0	11.7		
3000.00	Н	21.0	54.0	33.0		
30.00	V	16.5	40.0	23.5		
156.00	V	26.8	43.5	16.7		
176.00	V	27.8	43.5	15.7		
402.00	V	25.0	46.0	21.0		
537.00	V	33.6	46.0	12.4		
3000.00	V	21.0	54.0	33.0		



ReportNo.: SHEMO10030019402

Page: 45 of 51

#### 6.7 Frequency Stability V.S. TEMPERATURE MEASUREMENT

Test Requirement: RSS-132,4.3; RSS-133,6.3;

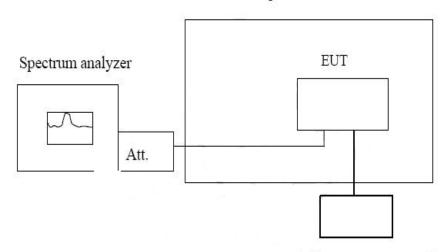
Part 2.1055(a)(1)

Test Date: March 5,2010

Test Status: Test lowest channel, middle, highest channel.

Test Setup:

Temperature Chamber



Variable DC Power Supply

Note: Measurement setup for testing On antenna connector.

#### Test procedure:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. Reference power supply voltage for these tests is DC 3.6 V.RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the Spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25 degree operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30 degree. After the temperature stabilized for approximately 30 minutes record the frequency. Repeat step measure with 10 degree per stage until the highest temperature of 50 degree reached.

Frequency Tolerance: +/-2.5ppm for 850MHz band +/-2.5ppm for 1900MHz band



ReportNo.: SHEMO10030019402

Page: 46 of 51

Reference Frequency: GSM 850 Low channel 824.2MHz@ 25 degree						
Limit: +/- 2.5ppm = 2091Hz						
Environment	Limit					
Temperature(degree)	(MHz)	(Hz)	(Hz)			
-30	824.200043	43	2091			
-20	824.200009	9	2091			
-10	824.200031	31	2091			
10	824.200016	16	2091			
20	824.200068	68	2091			
30	824.200014	14	2091			
40	824.200002	2	2091			
50	824.200007	7	2091			

Reference Frequency: GSM 850 Mid channel 836.6MHz@ 25 degree							
	Limit: +/- 2.5ppm = 2091Hz						
Environment	Environment Frequency Delta Limit						
Temperature(degree)	(MHz)	(Hz)	(Hz)				
-30	836.400006	6	2091				
-20	836.400012	12	2091				
-10	836.400004	4	2091				
10	836.399992	8	2091				
20	836.400016	16	2091				
30	836.400008	8	2091				
40	836.400020	20	2091				
50	836.400011	11	2091				



ReportNo.: SHEMO10030019402

Page: 47 of 51

Reference Frequency: GSM 850 High channel 848.8MHz@ 25 degree						
Limit: +/- 2.5ppm = 2091Hz						
Environment Frequency Delta Lim						
Temperature(degree)	(MHz)	(Hz)	(Hz)			
-30	848.800022	22	2091			
-20	848.800073	73	2091			
-10	848.800006	6	2091			
10	848.800009	9	2091			
20	848.800029	29	2091			
30	848.800040	40	2091			
40	848.800012	12	2091			
50	848.800017	17	2091			

Reference Frequency: PCS 1900 Low channel 1850.2MHz@ 25 degree							
	Limit: +/- 2.5ppm = 4700Hz						
Environment	Environment Frequency Delta Limit						
Temperature(degree)	(MHz)	(Hz)	(Hz)				
-30	1850.199997	3	4700				
-20	1850.199921	79	4700				
-10	1850.199973	27	4700				
10	1850.199920	70	4700				
20	1850.199922	78	4700				
30	1850.199991	9	4700				
40	1850.199932	68	4700				
50	1850.199988	12	4700				



ReportNo.: SHEMO10030019402

Page: 48 of 51

Reference Frequency: PCS 1900 Mid channel 1880MHz@ 25 degree						
Limit: +/- 2.5ppm = 4700Hz						
Environment Frequency Delta Lim						
Temperature(degree)	(MHz)	(Hz)	(Hz)			
-30	1879.999982	18	4700			
-20	1879.999992	9	4700			
-10	1879.999950	50	4700			
10	1879.999914	86	4700			
20	1879.999994	6	4700			
30	1879.999987	13	4700			
40	1879.999973	27	4700			
50	1879.999986	14	4700			

Reference Frequency: PCS 1900 High channel 1909.8MHz@ 25 degree			
Limit: +/- 2.5ppm = 4700Hz			
Environment	Frequency	Delta	Limit
Temperature(degree)	(MHz)	(Hz)	(Hz)
-30	1909.799990	10	4700
-20	1909.799986	14	4700
-10	1909.799972	28	4700
10	1909.799976	24	4700
20	1909.799992	8	4700
30	1909.799991	9	4700
40	1909.799986	14	4700
50	1909.799969	31	4700



ReportNo.: SHEMO10030019402

Page: 49 of 51

#### 6.8 Frequency Stability V.S. VOLTAGE MEASUREMENT

Test Requirement:

RSS-132,4.3; RSS-133,6.3;

Part 2.1055(d)(1)

Test Date:

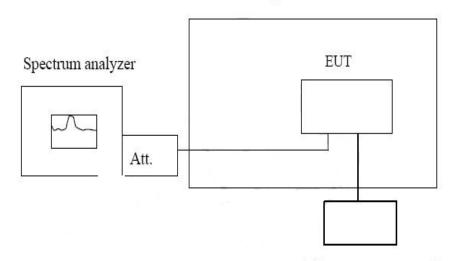
March 5,2010

Test Status:

Test lowest channel, middle, highest channel.

Test Setup:

Temperature Chamber



Variable DC Power Supply

Note: Measurement setup for testing On antenna connector.

#### Test procedure:

Set chamber temperature to 25 degree. Use a variable AC power/ DC power supply to power the EUT and set the Voltage to rated voltage. Reference power supply voltage for these tests is DC 3.6 V. Set the spectrum analyzer RBW enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specified extreme voltage variation(+/-15%) and endpoint, record the maximum frequency change.

Frequency Tolerance: +/-2.5ppm for 850MHz band

+/-2.5ppm for 1900MHz band



ReportNo.: SHEMO10030019402

Page: 50 of 51

Reference Frequency: GSM 850 Low channel 824.2MHz@ 25 degree			
Limit: +/- 2.5ppm = 2091Hz			
Power Supply	Frequency	Delta	Limit
Vdc	(MHz)	(Hz)	(Hz)
4.8	824.200011	11	2091
3.6	824.200000	0	2091
3.2	824.200013	13	2091

Reference Frequency: GSM 850 Mid channel 836.6MHz@ 25 degree			
Limit: +/- 2.5ppm = 2091Hz			
Power Supply	Frequency	Delta	Limit
Vdc	(MHz)	(Hz)	(Hz)
4.8	836.400014	14	2091
3.6	836.600000	0	2091
3.2	836.400012	12	2091

Reference Frequency: GSM 850 High channel 848.8MHz@ 25 degree			
Limit: +/- 2.5ppm = 2091Hz			
Power Supply	Frequency	Delta	Limit
Vdc	(MHz)	(Hz)	(Hz)
4.8	848.800025	25	2091
3.6	848.800000	0	2091
3.2	848.800011	11	2091



ReportNo.: SHEMO10030019402

Page: 51 of 51

Reference Frequency: PCS 1900 Low channel 1850.2MHz@ 25 degree			
Limit: +/- 2.5ppm = 4700Hz			
Power Supply	Frequency	Delta	Limit
Vdc	(MHz)	(Hz)	(Hz)
4.8	1850.199982	18	4700
3.6	1850.200000	0	4700
3.2	1850.199991	9	4700

Reference Frequency: PCS 1900 Mid channel 1880MHz@ 25 degree			
Limit: +/- 2.5ppm = 4700Hz			
Power Supply	Frequency	Delta	Limit
Vdc	(MHz)	(Hz)	(Hz)
4.8	1879.999994	6	4700
3.6	1880.000000	0	4700
3.2	1879.999988	12	4700

Reference Frequency: PCS 1900 High channel 1909.8MHz@ 25 degree			
Limit: +/- 2.5ppm = 4700Hz			
Power Supply	Frequency	Delta	Limit
Vdc	(MHz)	(Hz)	(Hz)
4.8	1909.799984	16	4700
3.6	1909.800000	0	4700
3.2	1909.799986	14	4700

#### ~End of Report~